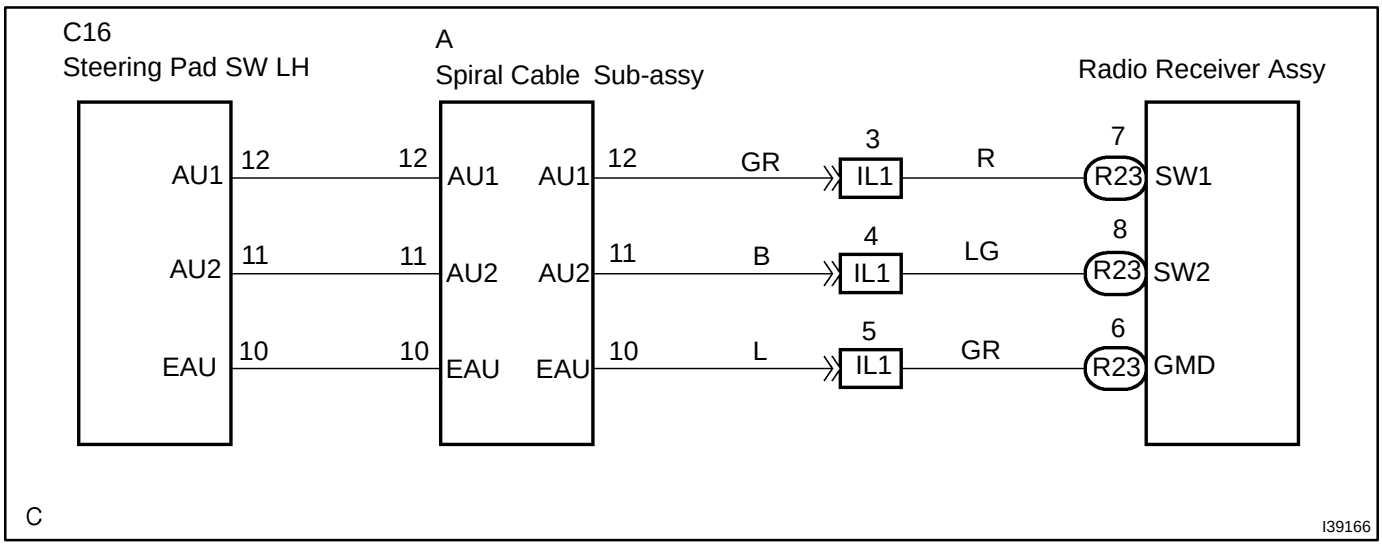
STEERING PAD SWITCH CIRCUIT

CIRCUIT DESCRIPTION

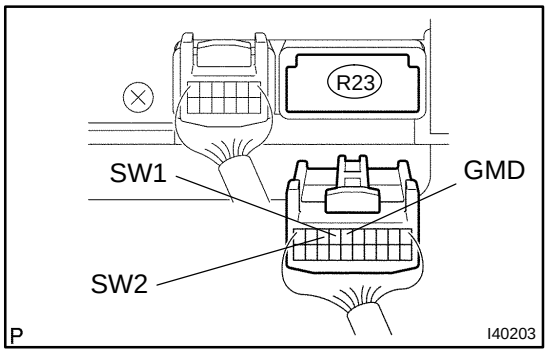
This circuit sends an operation signal from the steering pad switch to the radio receiver assy.
If there is an open in the circuit, the audio system cannot be operated by the steering pad switch.
If there is a short in the circuit, the same condition as that when the switch is continuously depressed occurs. Therefore, the radio receiver assy cannot be operated by the steering pad switch, and also the radio receiver assy itself does not function.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT RADIO RECEIVER ASSY



(a) Disconnect the connectors from the radio receiver assy.
(b) Measure the resistance according to the values in the table below.

Standard:

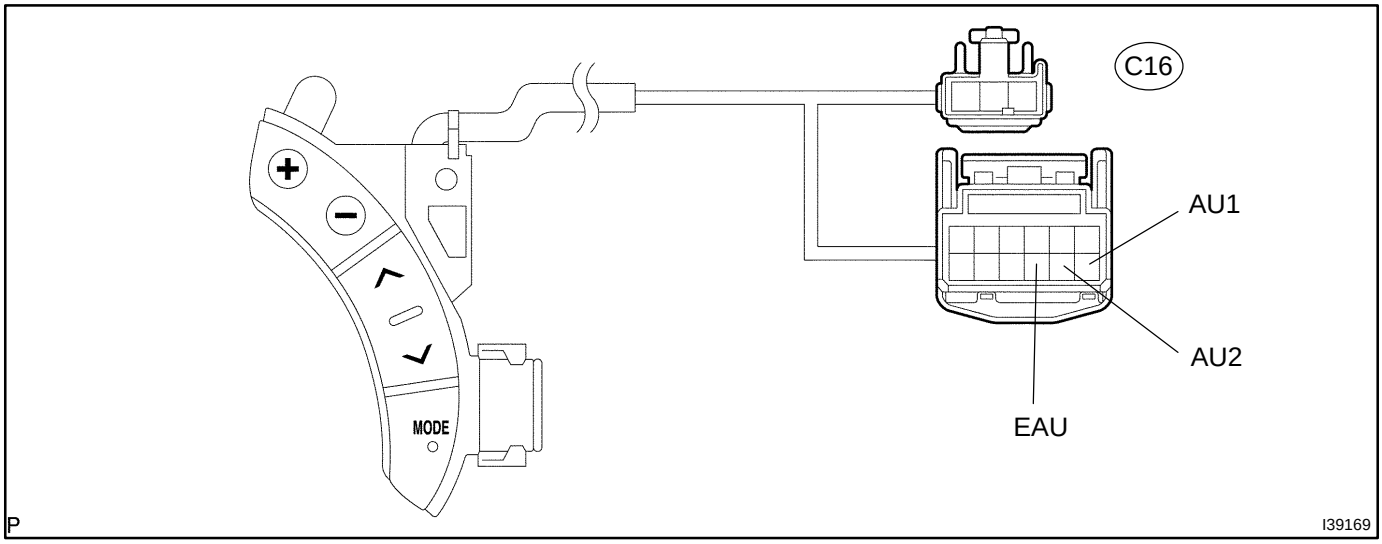
Tester connection	Condition	Specified condition
SW1 - GMD	Do not switch position	Approx. 100 kΩ
SW1 - GMD	SEEK+ switch: push	Approx. 0 Ω
SW1 - GMD	SEEK- switch: push	Approx. 0.3 kΩ
SW1 - GMD	VOL+ switch: push	Approx. 1 kΩ
SW1 - GMD	VOL- switch: push	Approx. 3.2 kΩ
SW2 - GMD	Do not switch position	Approx. 100 kΩ
SW2 - GMD	MODE switch: push	Approx. 0 Ω

NG → **Go to step 2**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-1632)

2	INSPECT STEERING PAD SWITCH LH(AU1,AU2,EAU)



(a) Disconnect the steering pad switch LH connector.
(b) Measure the resistance according to the values in the table below.
Standard:

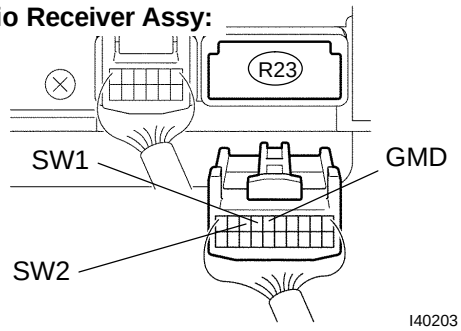
Tester connection	Condition	Specified condition
AU1 - EAU	Do not switch position	Approx. 100 kΩ
AU1 - EAU	SEEK+ switch: push	Approx. 0 Ω
AU1 - EAU	SEEK- switch: push	Approx. 0.3 kΩ
AU1 - EAU	VOL+ switch: push	Approx. 1 kΩ
AU1 - EAU	VOL- switch: push	Approx. 3.2 kΩ
AU2 - EAU	Do not switch position	Approx. 100 kΩ
AU2 - EAU	MODE switch: push	Approx. 0 Ω

NG → **REPLACE STEERING PAD SWITCH LH (SEE PAGE 67-28)**

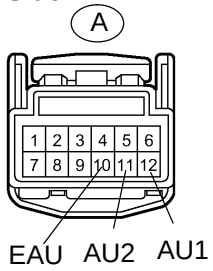
OK

3	CHECK HARNESS AND CONNECTOR(SPIRAL CABLE SUB-ASSY - RADIO RECEIVER ASSY)

Radio Receiver Assy:



Spiral Cable Side:



(a) Disconnect the connectors from the spiral cable sub-assy and radio receiver assy R23.

(b) Measure the resistance according to the values in the table below.

Standard:

Tester connection	Specified condition
SW1 - AU1	Below 1 Ω
SW2 - AU2	Below 1 Ω
GMD - EAU	Below 1 Ω
SW1 - Body ground	10 kΩ or higher
SW2 - Body ground	10 kΩ or higher
GMD - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

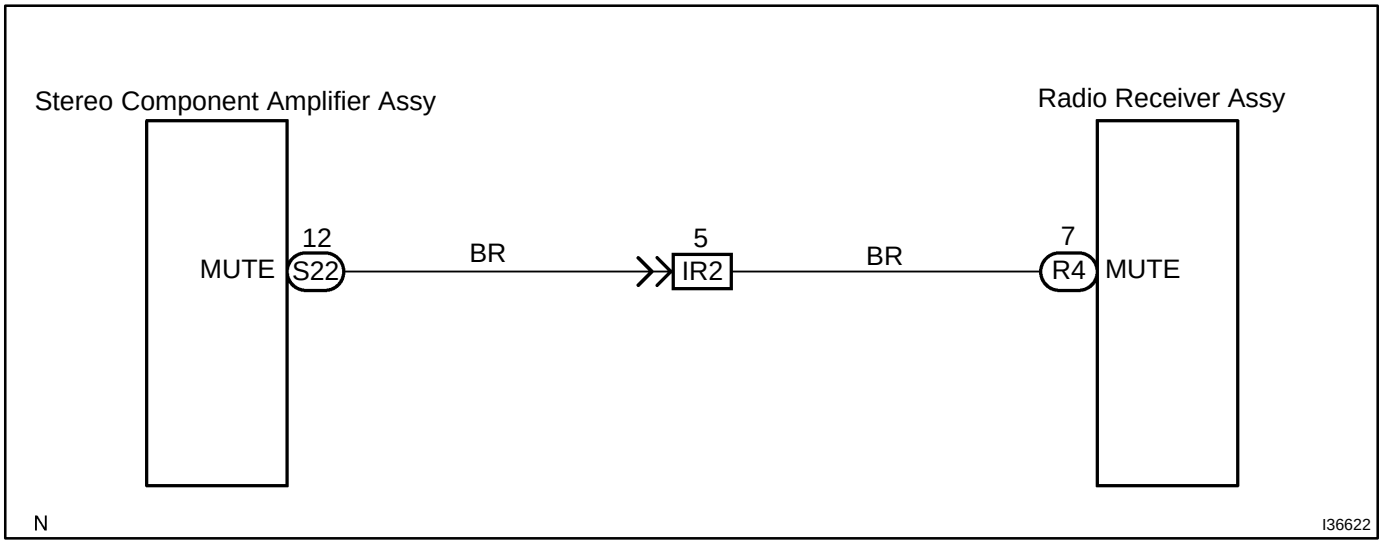
REPLACE SPIRAL CABLE SUB-ASSY (SEE PAGE 60-26)

AMP MUTE SIGNAL CIRCUIT (FROM RADIO RECEIVER ASSY)

CIRCUIT DESCRIPTION

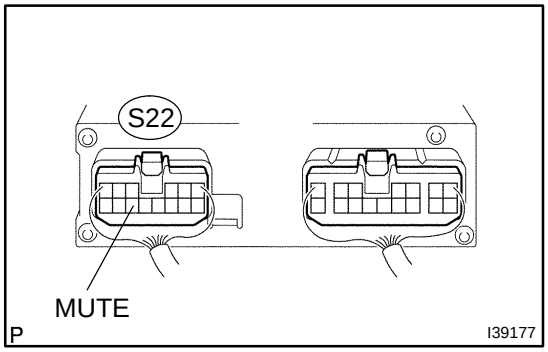
This circuit sends the signal to the stereo component amplifier to mute the noise. Because of that, the noise produced by changing the sound source ceases.
In addition, this circuit is used to mute the sound when the navigation system performs voice guide.
If the vehicle is equipped with a navigation system, normal audio sound will cease, and only voice guidance will be heard from the driver's side speaker when voice guides are given.
If there is an open in the circuit, noise can be heard from the speaker when changing the sound source.
If there is a short in the circuit, even though the stereo component amplifier assy is normal, no sound or only extremely small sound can be produced.

WIRING DIAGRAM



INSPECTION PROCEDURE

1 INSPECT STEREO COMPONENT AMPLIFIER ASSY



(a) Measure the voltage according to the value in the table below.

Standard:

Tester connection	Condition	Specification
MUTE - Body ground	Turn ignition switch to ACC, Audio system is playing → Changing	Above 3.5 V → Below 1 V

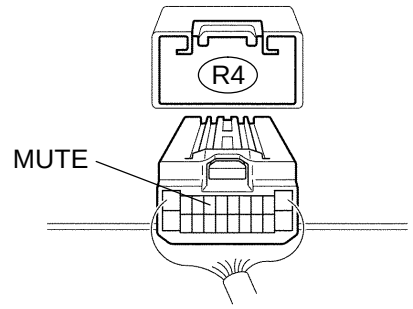
NG → **Go to step 2**

OK

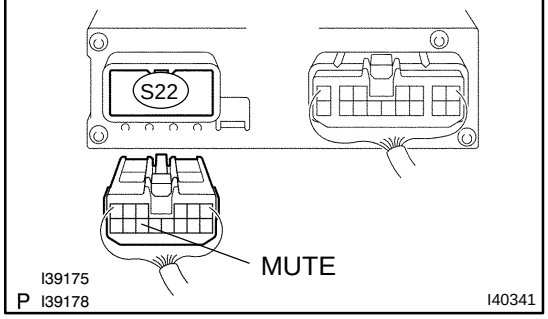
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-1632)

2 CHECK HARNESS AND CONNECTOR(RADIO RECEIVER ASSY - STEREO COMPONENT AMPLIFIER ASSY)

Radio Receiver Assy:



Stereo Component Amplifier Assy:



(a) Disconnect the connectors from the radio receiver assy and stereo component amplifier assy.

(b) Measure the resistance according to the values in the table below.

Standard:

Tester connection	Condition	Specified condition
MUTE - MUTE	Always	Below 1 Ω
MUTE - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3	REPLACE RADIO RECEIVER ASSY (SEE PAGE 67-6)

(a) Replace the radio receiver assy and check if it operates normally.
OK: The radio receiver assy operates normally

OK	NORMAL OPERATION

NG

REPLACE STEREO COMPONENT AMPLIFIER ASSY (SEE PAGE 67-20)

SPEAKER CIRCUIT

CIRCUIT DESCRIPTION

- When the vehicle has a built-in type amplifier, a sound signal is sent from the radio receiver assy to the speakers via the ”standard type” circuit.
- When the vehicle has a separate type amplifier, a sound signal from the radio receiver assy is amplified by the stereo component amplifier and then transmitted to the speaker via the ”JBL type”.

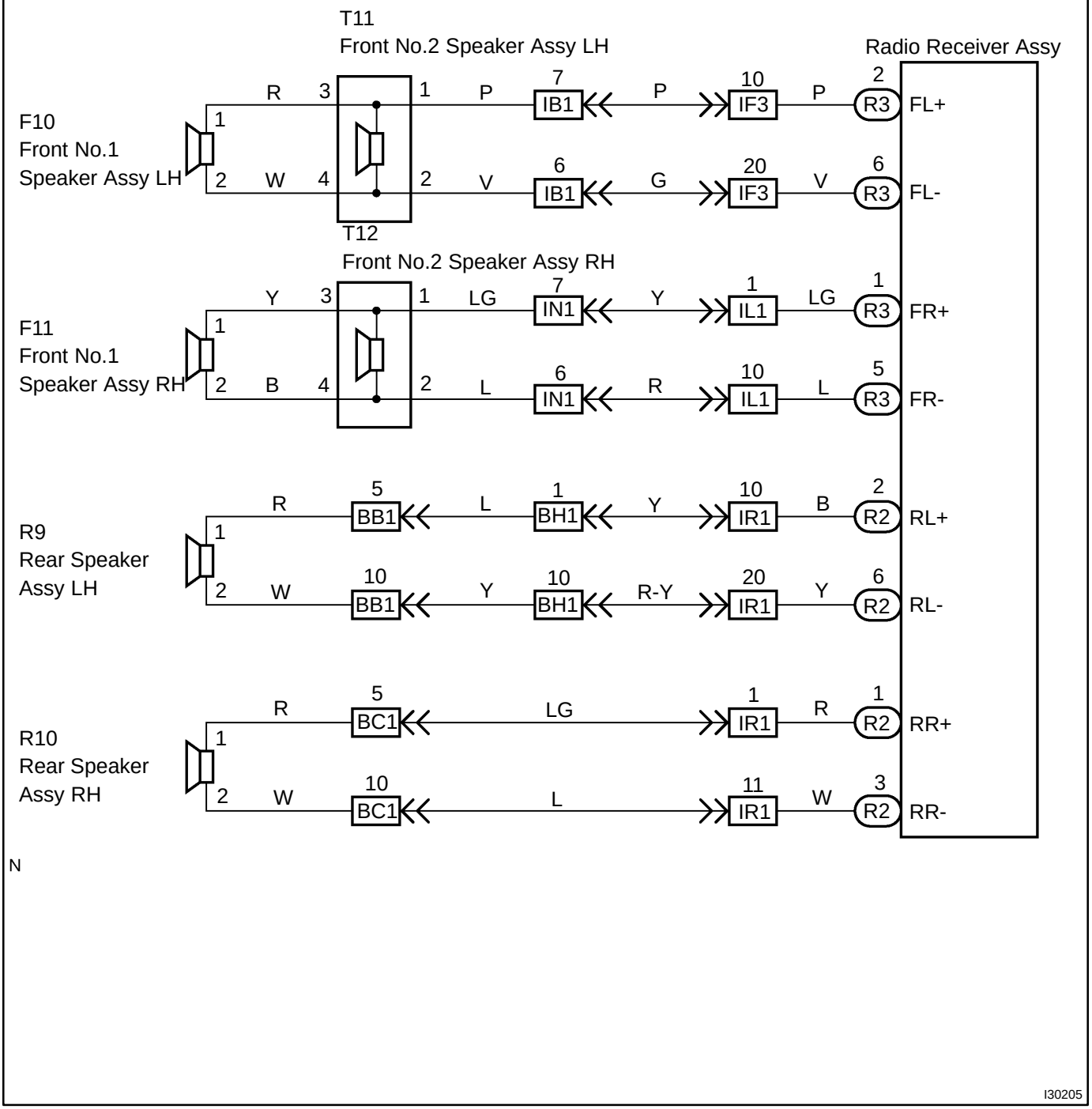
If there is a short in this circuit, the stereo component amplifier assy detects it and stops output to the speaker. Thus sound can not be heard from the speaker even if there is no malfunction in the stereo component amplifier assy or speaker.

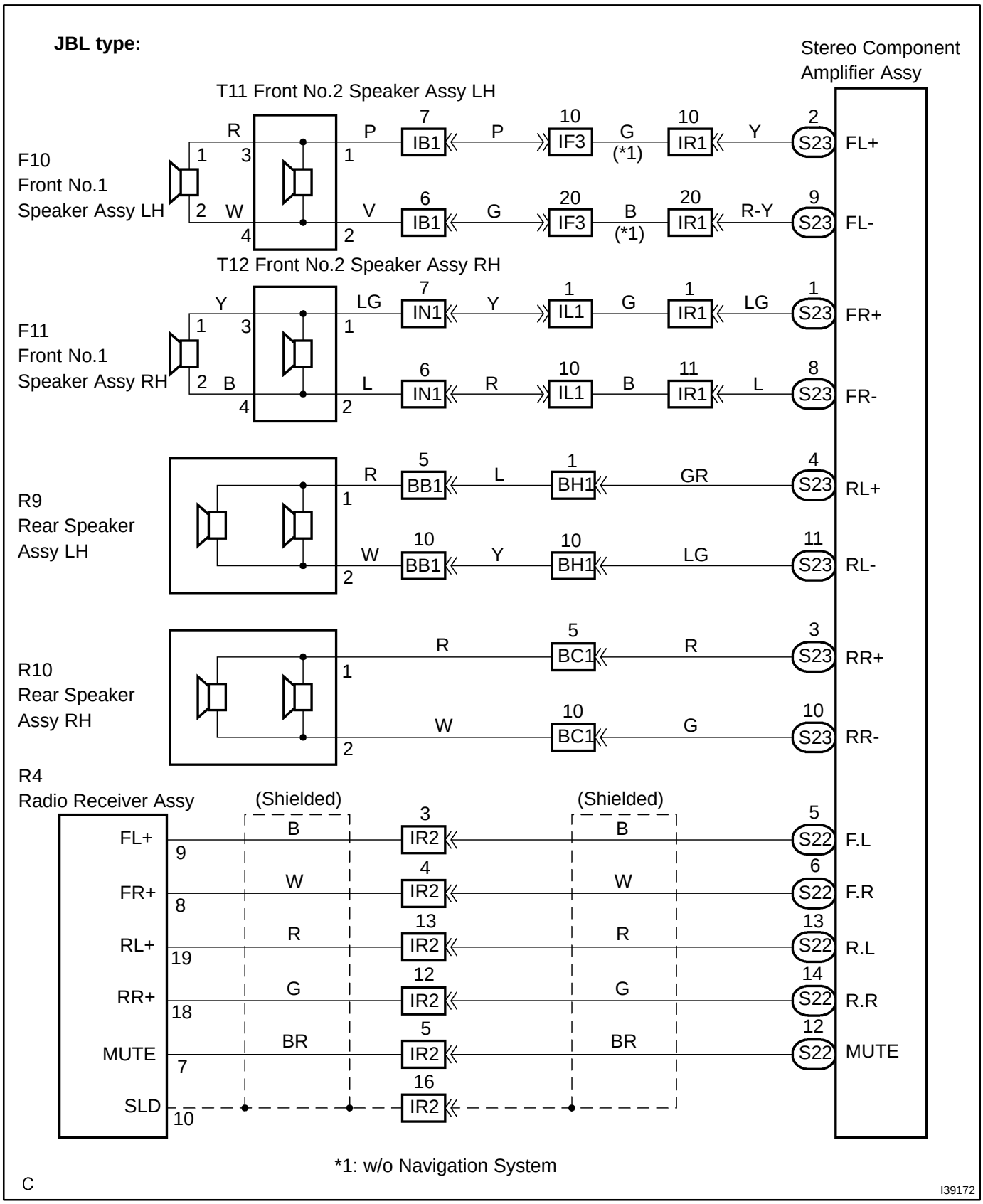
JBL Type:

When a short in the speaker circuit is detected, all sound output is stopped.

WIRING DIAGRAM

Standard type:




JBL type:
Stereo Component Amplifier Assy
T11 Front No.2 Speaker Assy LH
F10 Front No.1 Speaker Assy LH
R
W
P
V
IB1
IF3
IR1
S23
FL+
FL-
(*1)
T12 Front No.2 Speaker Assy RH
F11 Front No.1 Speaker Assy RH
Y
B
LG
L
IN1
IL1
FR+
FR-
R9 Rear Speaker Assy LH
GR
BB1
BH1
RL+
RL-
R10 Rear Speaker Assy RH
BC1
RR+
RR-
R4 Radio Receiver Assy
(Shielded)
IR2
S22
FL+
FR+
RL+
RR+
MUTE
SLD
F.L
F.R
R.L
R.R
MUTE
*1: w/o Navigation System
C
I39172

INSPECTION PROCEDURE

1	CHECK TYPE

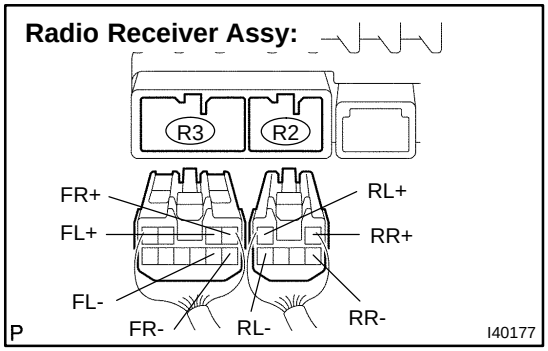
HINT:
If the radio receiver assy is JBL type, ”JBL” is indicated on its surface.
(a) Choose type to be inspected.

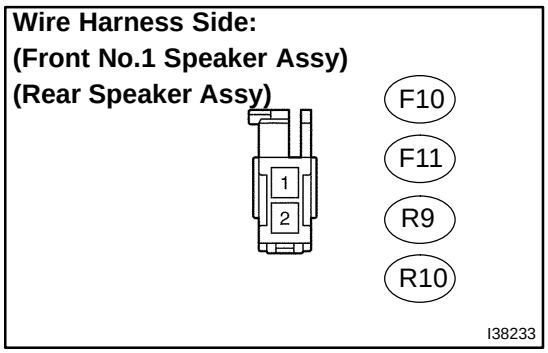
Type	Go to step
Standard type	A
JBL type	B

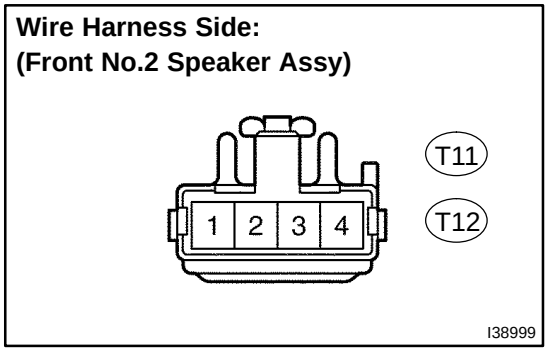
B → **Go to step 6**

A

2	CHECK HARNESS AND CONNECTOR(RADIO RECEIVER ASSY - SPEAKER ASSY)







(a) Disconnect the connectors from the radio receiver assy and speakers.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Specified condition
FL+ - 1 (Front No.1 speaker assy LH)	Below 1 Ω
FL- - 2 (Front No.1 speaker assy LH)	Below 1 Ω
FR+ - 1 (Front No.1 speaker assy RH)	Below 1 Ω
FR- - 2 (Front No.1 speaker assy RH)	Below 1 Ω
FL+ - 1 (Front No.2 speaker assy LH)	Below 1 Ω
FL- - 2 (Front No.2 speaker assy LH)	Below 1 Ω
FR+ - 1 (Front No.2 speaker assy RH)	Below 1 Ω
FR- - 2 (Front No.2 speaker assy RH)	Below 1 Ω
RL+ - 1 (Rear speaker assy LH)	Below 1 Ω
RL- - 2 (Rear speaker assy LH)	Below 1 Ω
RR+ - 1 (Rear speaker assy RH)	Below 1 Ω
RR- - 2 (Rear speaker assy RH)	Below 1 Ω
FL+ - Body ground	10 kΩ or higher
FL- - Body ground	10 kΩ or higher
FR+ - Body ground	10 kΩ or higher
FR- - Body ground	10 kΩ or higher
RL+ - Body ground	10 kΩ or higher
RL- - Body ground	10 kΩ or higher
RR+ - Body ground	10 kΩ or higher
RR- - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3	INSPECT FRONT NO. 1 SPEAKER ASSY

(a) Resistance check
(1) Measure the resistance between the terminals of the speaker.

NOTICE:

The speaker should not be removed for checking.

Standard: 4 Ω

NG → **REPLACE FRONT NO. 1 SPEAKER ASSY (SEE PAGE 67-10)**

OK

4	INSPECT FRONT NO. 2 SPEAKER ASSY

(a) Check that malfunction disappears when another speaker in a good condition is installed.
OK: Malfunction disappears.

HINT:

- Connect all the connectors to the speakers.
- When there is a possibility that either right or left front speaker is defective, inspect by interchanging the right one and the left one.

OK → **REPLACE FRONT NO. 2 SPEAKER ASSY (SEE PAGE 67-1 1)**

NG

5	INSPECT REAR SPEAKER ASSY

(a) Resistance check
(1) Measure the resistance between the terminals of the speaker.

NOTICE:

The speaker should not be removed for checking.

Standard: 8 Ω

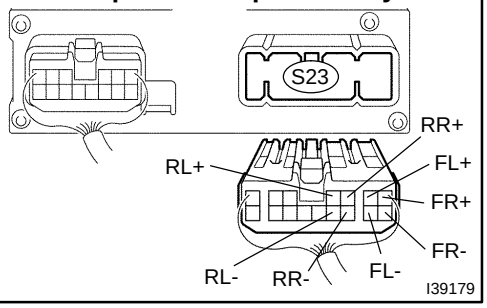
NG → **REPLACE REAR SPEAKER ASSY (SEE PAGE 67-12)**

OK

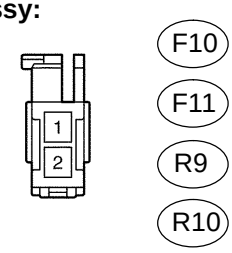
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-1632)

6 CHECK HARNESS AND CONNECTOR(STEREO COMPONENT AMPLIFIER ASSY - SPEAKER ASSY)

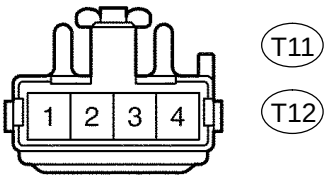
Stereo Component Amplifier Assy:



Front No.1 Speaker Assy:
Rear Speaker Assy:



Front No.2 Speaker Assy:



(a) Disconnect the connectors from the stereo component amplifier assy and speakers.

(b) Measure the resistance according to the values in the table below.

Standard:

Tester connection	Specified condition
FL+ - 1 (Front No.1 speaker assy LH)	Below 1 Ω
FL- - 2 (Front No.1 speaker assy LH)	Below 1 Ω
FR+ - 1 (Front No.1 speaker assy RH)	Below 1 Ω
FR- - 2 (Front No.1 speaker assy RH)	Below 1 Ω
FL+ - 1 (Front No.2 speaker assy LH)	Below 1 Ω
FL- - 2 (Front No.2 speaker assy LH)	Below 1 Ω
FR+ - 1 (Front No.2 speaker assy RH)	Below 1 Ω
FR- - 2 (Front No.2 speaker assy RH)	Below 1 Ω
RL+ - 1 (Rear speaker assy LH)	Below 1 Ω
RL- - 2 (Rear speaker assy LH)	Below 1 Ω
RR+ - 1 (Rear speaker assy RH)	Below 1 Ω
RR- - 2 (Rear speaker assy RH)	Below 1 Ω
FL+ - Body ground	10 kΩ or higher
FL- - Body ground	10 kΩ or higher
FR+ - Body ground	10 kΩ or higher
FR- - Body ground	10 kΩ or higher
RL+ - Body ground	10 kΩ or higher
RL- - Body ground	10 kΩ or higher
RR+ - Body ground	10 kΩ or higher
RR- - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

7 INSPECT FRONT NO. 1 SPEAKER ASSY

(a) Resistance check

(1) Measure the resistance between the terminals of the speaker.

NOTICE:

The speaker should not be removed for checking.

Standard: 2 Ω

NG → **REPLACE FRONT NO. 1 SPEAKER ASSY (SEE PAGE 67-10)**

OK

8	INSPECT FRONT NO. 2 SPEAKER ASSY

(a) Check that malfunction disappears when another speaker in a good condition is installed.
OK: Malfunction disappears.

HINT:

- Connect the connector to the speaker.
- When there is a possibility that either right or left front speaker is defective, inspect by interchanging the right one and the left one.

OK → **REPLACE FRONT NO. 2 SPEAKER ASSY (SEE PAGE 67-11)**

NG

9	INSPECT REAR SPEAKER ASSY

(a) Resistance check
(1) Measure the resistance between the terminals of the speaker.

NOTICE:
The speaker should not be removed for checking.

Standard: 2 Ω

NG → **REPLACE REAR SPEAKER ASSY (SEE PAGE 67-12)**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-1632)

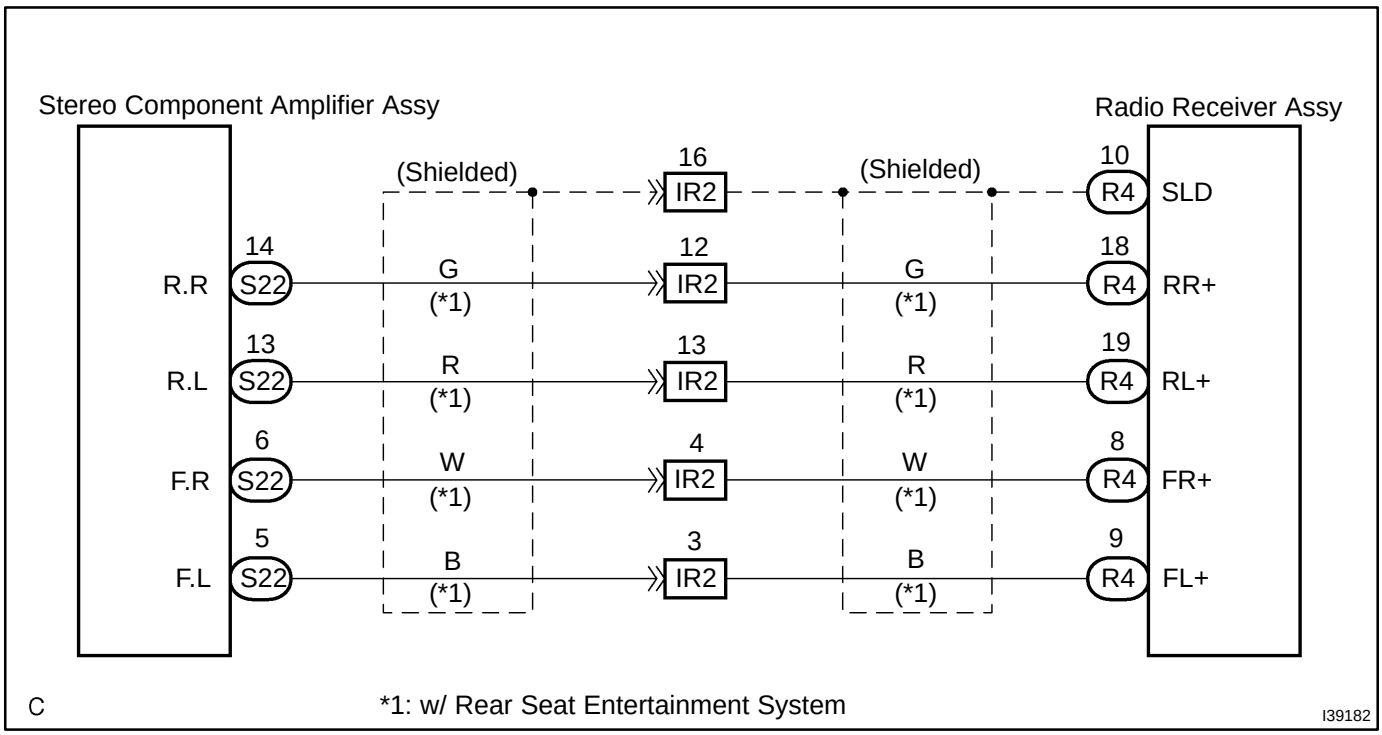
AMP SOUND SIGNAL CIRCUIT (RADIO RECEIVER ASSY - AMP)

CIRCUIT DESCRIPTION

The radio receiver assy sends a sound signal to the stereo component amplifier assy through this circuit. The sound signal that has been sent is amplified by the stereo component amplifier assy, and then is sent to the speaker.

If there is an open or short in the circuit, sound can not be heard from the speaker even if there is no malfunction in the stereo component amplifier assy or speaker.

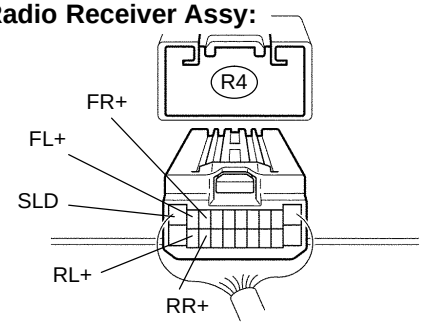
WIRING DIAGRAM



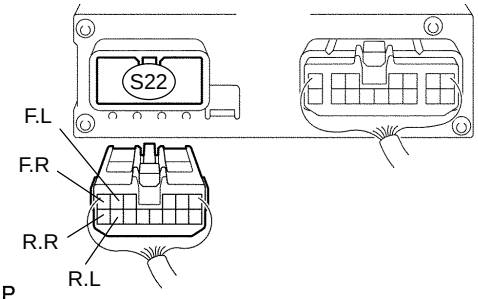
INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR(RADIO RECEIVER ASSY - STEREO COMPONENT AMPLIFIER ASSY)

Radio Receiver Assy:



Stereo Component Amplifier Assy:



(a) Disconnect the connectors from the radio receiver assy and stereo component amplifier assy.

(b) Measure the resistance according to the values in the table below.

Standard:

Tester connection	Specified condition
FL+ - F.L	Below 1 Ω
FR+ - F.R	Below 1 Ω
RL+ - R.L	Below 1 Ω
RR+ - R.R	Below 1 Ω
FL+ - Body ground	10 kΩ or higher
FR+ - Body ground	10 kΩ or higher
RL+ - Body ground	10 kΩ or higher
RR+ - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-1632)

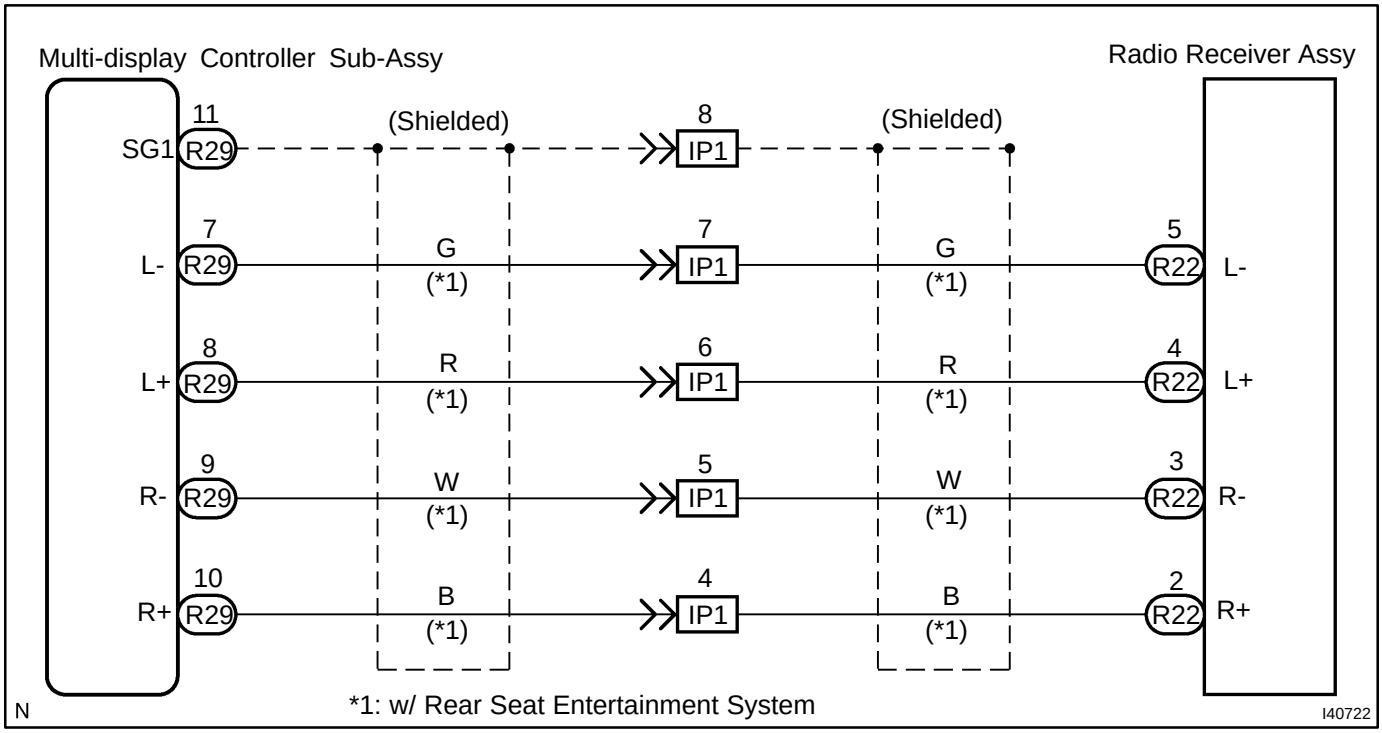
RSE SOUND SIGNAL CIRCUIT (MULTI-DISPLA Y CONTROLLER SUB-ASSY - RADIO RECEIVER ASSY)

CIRCUIT DESCRIPTION

The multi-display controller sub-assy sends a sound signal to the radio receiver assy through this circuit. The sound signal that has been sent is amplified by the stereo component amplifier assy, and then is sent to the speaker.

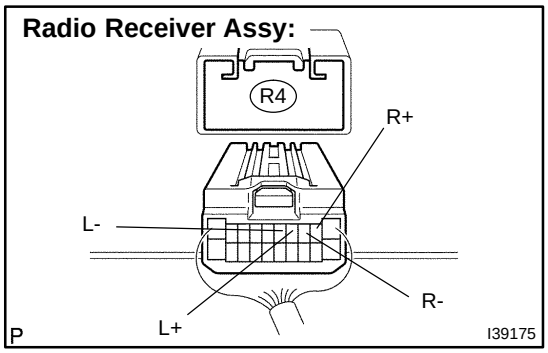
If there is an open or short in the circuit, sound can not be heard from the speaker even if there is no malfunction in the stereo component amplifier assy or speaker.

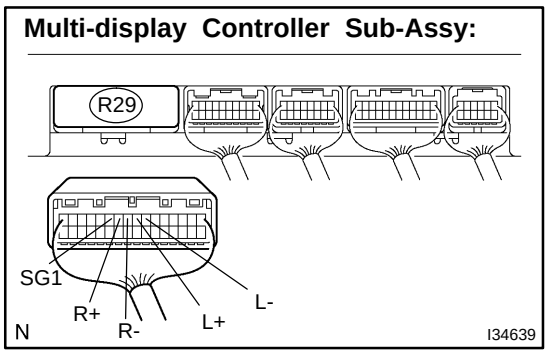
WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR(MULTI-DISPLA Y CONTROLLER SUB-ASSY - RADIO RECEIVER ASSY)





(a) Disconnect the connectors from the radio receiver assy and multi-display controller sub-assy.

(b) Measure the resistance according to the values in the table below.

Standard:

Tester connection	Specified condition
R+ - R+	Below 1 Ω
R- - R-	Below 1 Ω
L+ - L+	Below 1 Ω
L- - L-	Below 1 Ω
R+ - Body ground	10 kΩ or higher
R- - Body ground	10 kΩ or higher
L+ - Body ground	10 kΩ or higher
L- - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

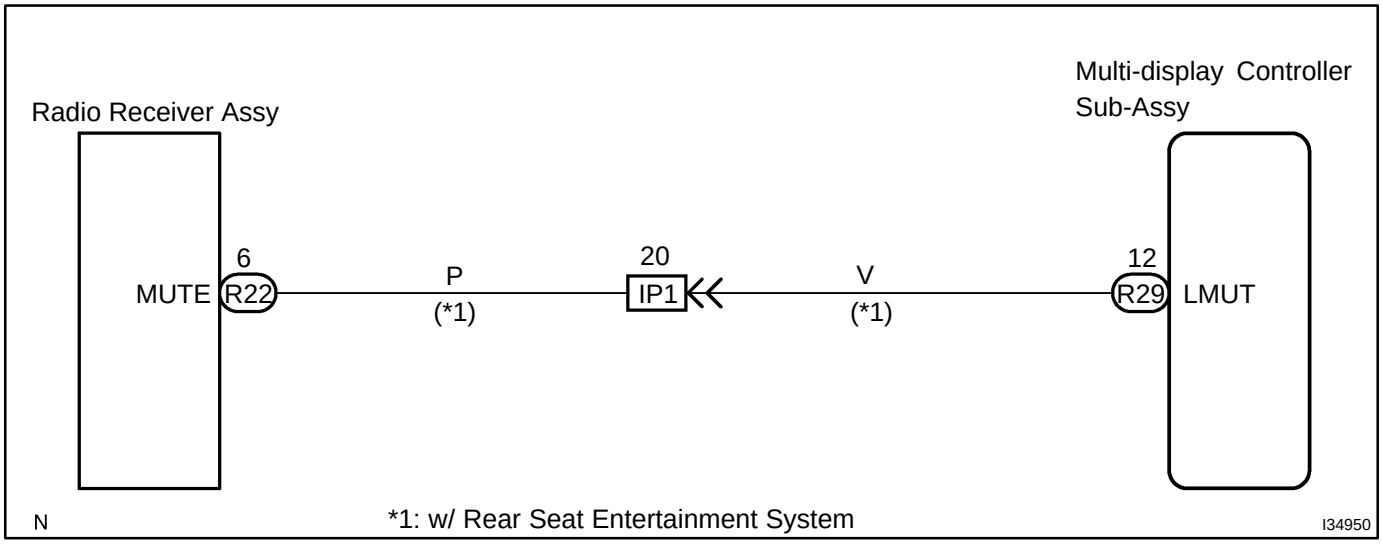
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-1632)

MUTE SIGNAL CIRCUIT (FROM MULTI-DISPLA Y CONTROLLER SUB-ASSY)

CIRCUIT DESCRIPTION

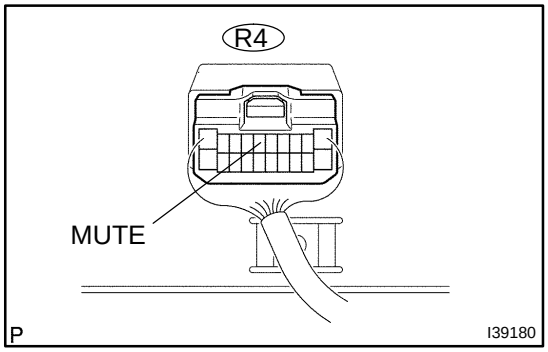
The radio receiver assy controls the volume according to the LMUT signal from the multi-display controller sub-assy .
The LMUT signal is send to reduce noise and pop sound when switching mode, etc.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT RADIO RECEIVER ASSY



(a) Measure the voltage according to the value in the table below.

Standard:

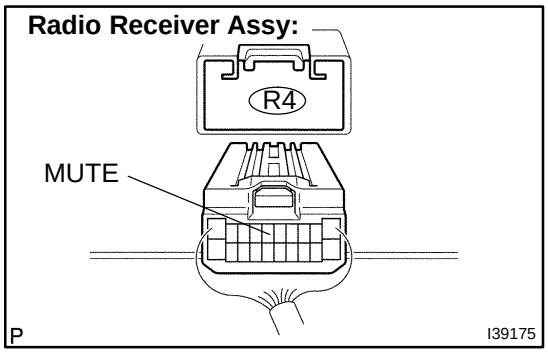
Tester connection	Condition	Specification
MUTE - Body ground	Turn ignition switch to ACC, RSE system is playing → Changing	Above 3.5 V → Below 1 V

NG → **Go to step 2**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-1632)

2	CHECK HARNESS AND CONNECTOR(RADIO RECEIVER ASSY - MULTI-DISPLAY CONTROLLER SUB-ASSY)

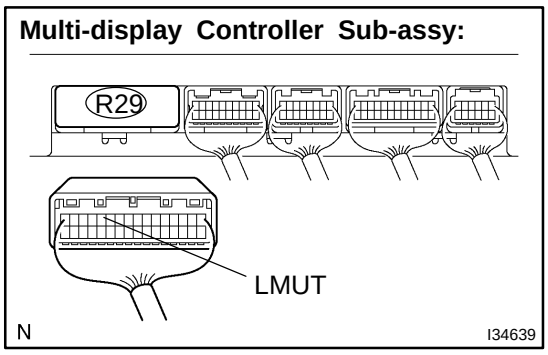


(a) Disconnect the connectors from the radio receiver assy and multi-display controller sub-assy.

(b) Measure the resistance according to the values in the table below.

Standard:

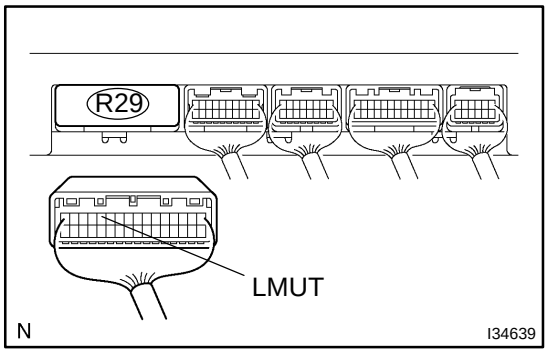
Tester connection	Condition	Specified condition
MUTE - LMUT	Always	Below 1 Ω
MUTE - Body ground	Always	10 kΩ or higher



NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3	INSPECT MULTI-DISPLAY CONTROLLER SUB-ASSY



(a) Disconnect the connectors from the multi-display controller sub-assy.

(b) Measure the resistance according to the values in the table below.

Standard:

Tester connection	Condition	Specified condition
LMUT - Body ground	Turn ignition switch to ACC	Above 3.5 V

NG → **REPLACE RADIO RECEIVER ASSY (SEE PAGE 67-6)**

OK

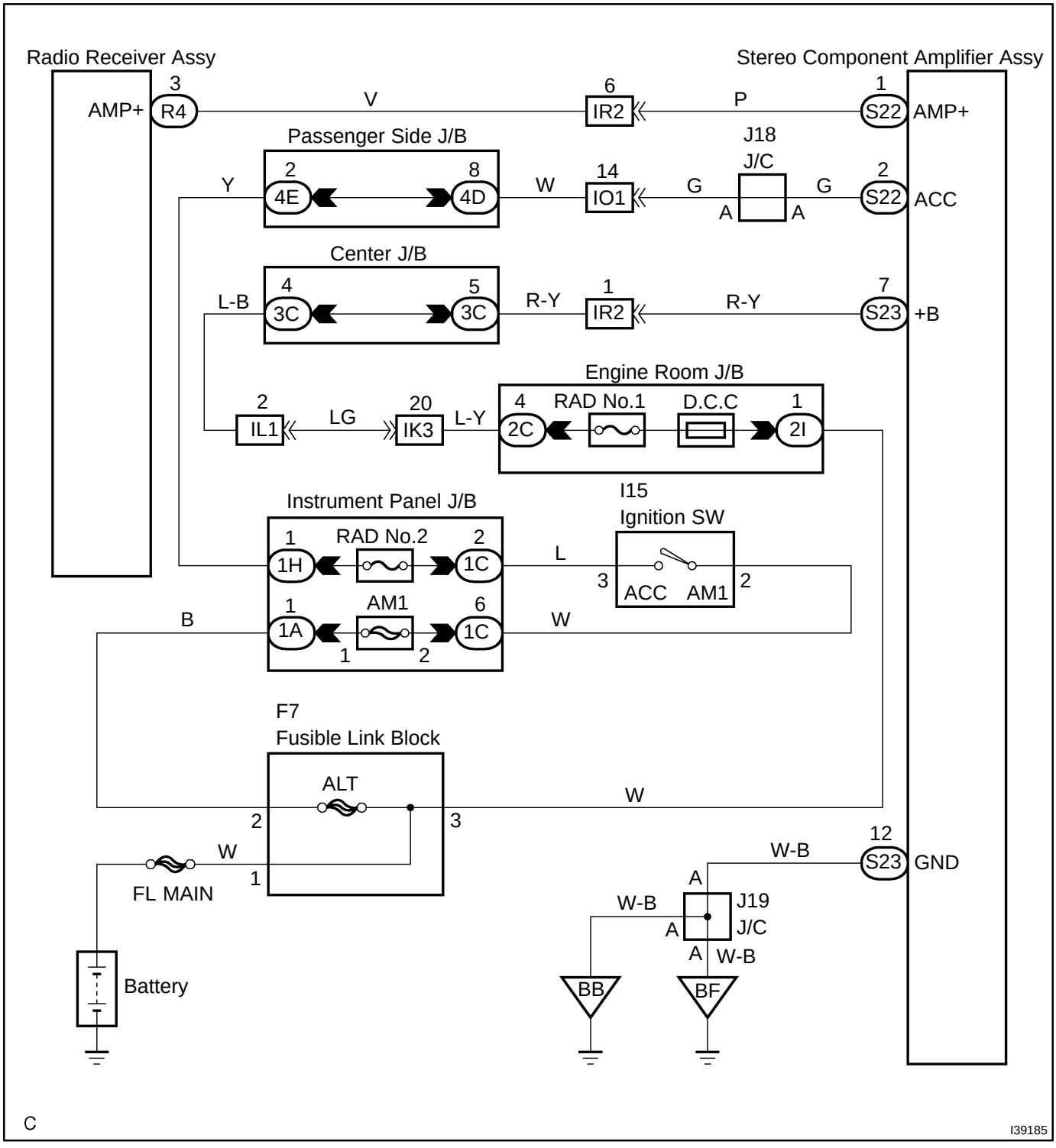
REPLACE MULTI-DISPLAY CONTROLLER SUB-ASSY (SEE PAGE 67-23)

POWER SOURCE CIRCUIT (STEREO COMPONENT AMPLIFIER ASSY)

CIRCUIT DESCRIPTION

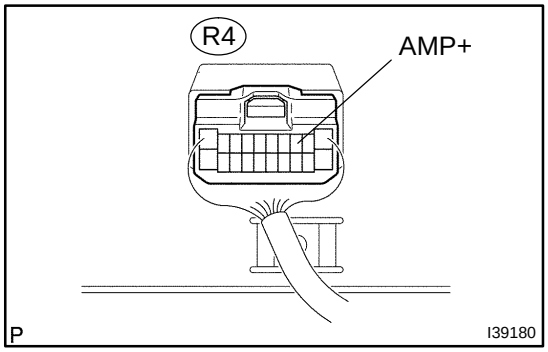
This circuit provides the power to the stereo component amplifier assy.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT RADIO RECEIVER ASSY



(a) Measure the voltage according to the value in the table below.

Standard:

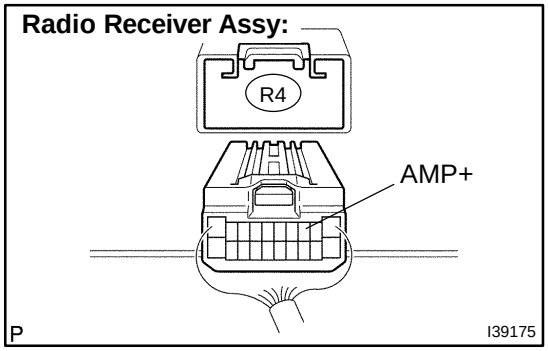
Tester connection	Condition	Specified condition
AMP+ - Body ground	Radio receiver assy ON	10 to 14 V

NG → **REPLACE RADIO RECEIVER ASSY (SEE PAGE 67-6)**

OK

2	CHECK HARNESS AND CONNECTOR(RADIO RECEIVER ASSY - STEREO COMPONENT AMPLIFIER ASSY)

Radio Receiver Assy:



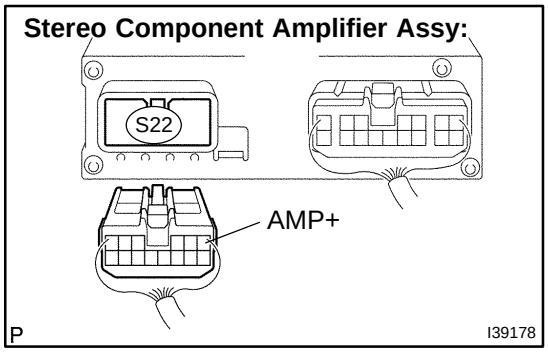
(a) Disconnect the connectors from the radio receiver assy and stereo component amplifier assy.

(b) Measure the resistance according to the values in the table below.

Standard:

Tester connection	Condition	Specified condition
AMP+ - AMP+	Always	Below 1 Ω
AMP+ - Body ground	Always	10 kΩ or higher

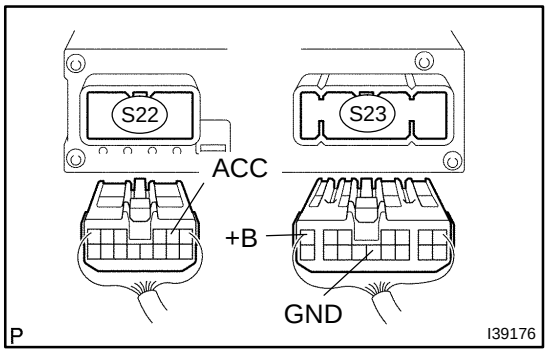
Stereo Component Amplifier Assy:



NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3	INSPECT STEREO COMPONENT AMPLIFIER ASSY(+B, ACC, GND)



(a) Disconnect the connectors from the stereo component amplifier assy.

(b) Measure the resistance according to the values in the table below.

Standard:

Tester connection	Condition	Specified condition
GND - Body ground	Always	Below 1 Ω

(c) Measure the voltage according to the values in the table below.

Standard:

Tester connection	Condition	Specified condition
+B - GND	Always	10 to 14 V
ACC - GND	Ignition SW ACC	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-1632)

CD CANNOT BE EJECTED

INSPECTION PROCEDURE

1	PRESS ”EJECT” AND CHECK OPERATION

(a) Press ”EJECT”and check the operation.
  (1) Press the CD EJECT switch of the radio receiver assembly for 2 seconds or more to see if the CD is ejected.
  OK: CD is ejected.

Reference:
If the CD is not ejected, bring the vehicle in for repair.
Do not attempt to remove it by force.

NG → **REPLACE RADIO RECEIVER ASSY (SEE PAGE 67-6)**

OK

2	CHECK IF A PROPER CD IS INSERTED

(a) Check that a normal audio CD is inserted.
  (1) Check in what conditions the sound skipping occurs.
  OK: Driving on a bad road.

NG → **REPLACE RADIO RECEIVER ASSY (SEE PAGE 67-6)**

OK

3	REPLACE CD WITH ANOTHER AND RECHECK

(a) Replace the CD with another and recheck.
  (1) Check the installation condition of the radio receiver assembly.
  OK: Installed properly.

NG → **REPLACE RADIO RECEIVER ASSY (SEE PAGE 67-6)**

OK

CD FAULTY

CD CANNOT BE INSERTED OR IS EJECTED RIGHT AFTER INSERTION

INSPECTION PROCEDURE

1	CHECK IF A NORMAL CD IS INSERTED

(a) Check if a normal CD is inserted.
  (1) Make sure that the CD is a normal audio CD, and that there is no deformation, flaw, stain, burr or other defects on the CD.
  OK: Normal audio CD.

Reference:
- Translucent or oddly-shaped CD cannot be played.
- Computer CD-ROMs (even those with music) and CD-R discs cannot be played.
- Playing an 8 cm CD does not require an adapter.

NG → **CD FAULTY**

OK

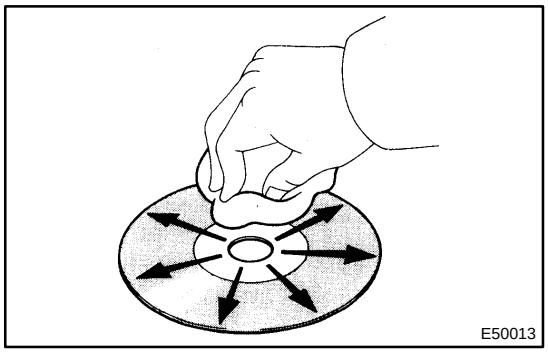
2	CHECK IF A CD IS INSERTED PROPERLY

(a) Check if a CD is inserted properly.
  (1) Check whether or not the CD is inserted upside down.
  OK: Not upside down.

NG → **SET DISC CORRECTLY**

OK

3	DISC CLEANING


E50013

(a) Disc cleaning
  (1) If the disc gets dirty, clean the disc by wiping the surface from the center to outside in the radial directions with a soft cloth.

NOTICE:
Do not use a conventional record cleaner or anti-static preservative.

OK: Malfunction disappears.

OK → **DISC DIRTY**

NG

4	REPLACE CD WITH ANOTHER AND RECHECK

(a) Replace the CD with another and recheck.
(1) Replace the CD with another normal one to see if the same trouble occurs again.
OK: Malfunction disappears.

NG → **REPLACE RADIO RECEIVER ASSY (SEE PAGE 67-6)**

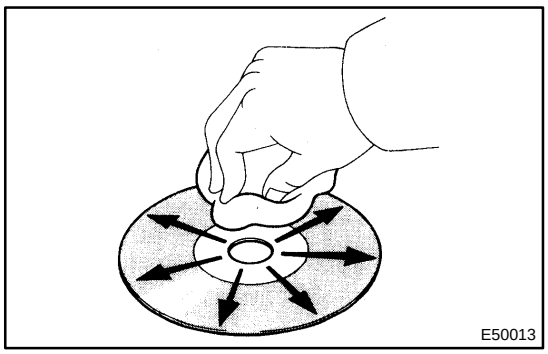
OK

CD FAULTY

CD SOUND SKIPS

INSPECTION PROCEDURE

1	DISC CLEANING



(a) Disc cleaning
  (1) If the disc gets dirty, clean the disc by wiping the surface from the center to outside in a radial direction with a soft cloth.

NOTICE:
Do not use a conventional record cleaner or anti-static preservative.

OK: Malfunction disappears.

OK	DISC DIRTY

NG

2	REPLACE CD WITH ANOTHER AND RECHECK

(a) Replace the CD with another and recheck.
  (1) Replace the CD with another normal one to see if the same trouble occurs again.

OK: Malfunction disappears.

OK	CD FAULTY

NG

3	CHECK WHEN THIS HAPPENS

(a) Check when this happens.
  (1) Check under what conditions (places) noise occurs.

OK: Driving on a bumpy road.

OK	Go to step 5

NG

4	COMPARE IT WITH ANOTHER CAR OF SAME MODEL

(a) Compare it with another vehicle of the same model.
  (1) Compare it with the vehicle of the same type which does not have a trouble to see if there is any difference in the CD sound.

OK: No difference found.

OK	SETTING

NG

5	CHECK OF RADIO RECEIVER ASSEMBLY INSTALLATION

(a) Check the radio receiver assembly installation condition.
(1) Check that the radio receiver assembly is installed properly.
OK: Installed properly.

NG → **INSTALL THE RADIO RECEIVER ASSEMBLY PROPERLY**

OK

6	DID TEMPERATURE IN CABIN CHANGE RAPIDLY?

(a) Did the temperature in the cabin change rapidly?
(1) Check whether or not the rapid temperature change occurred in the cabin.
OK: The rapid temperature change occurred.

Reference:
The rapid temperature change creates condensation inside the CD player, which may prevent the CD from being played.

NG → **REPLACE RADIO RECEIVER ASSY (SEE PAGE 67-6)**

OK

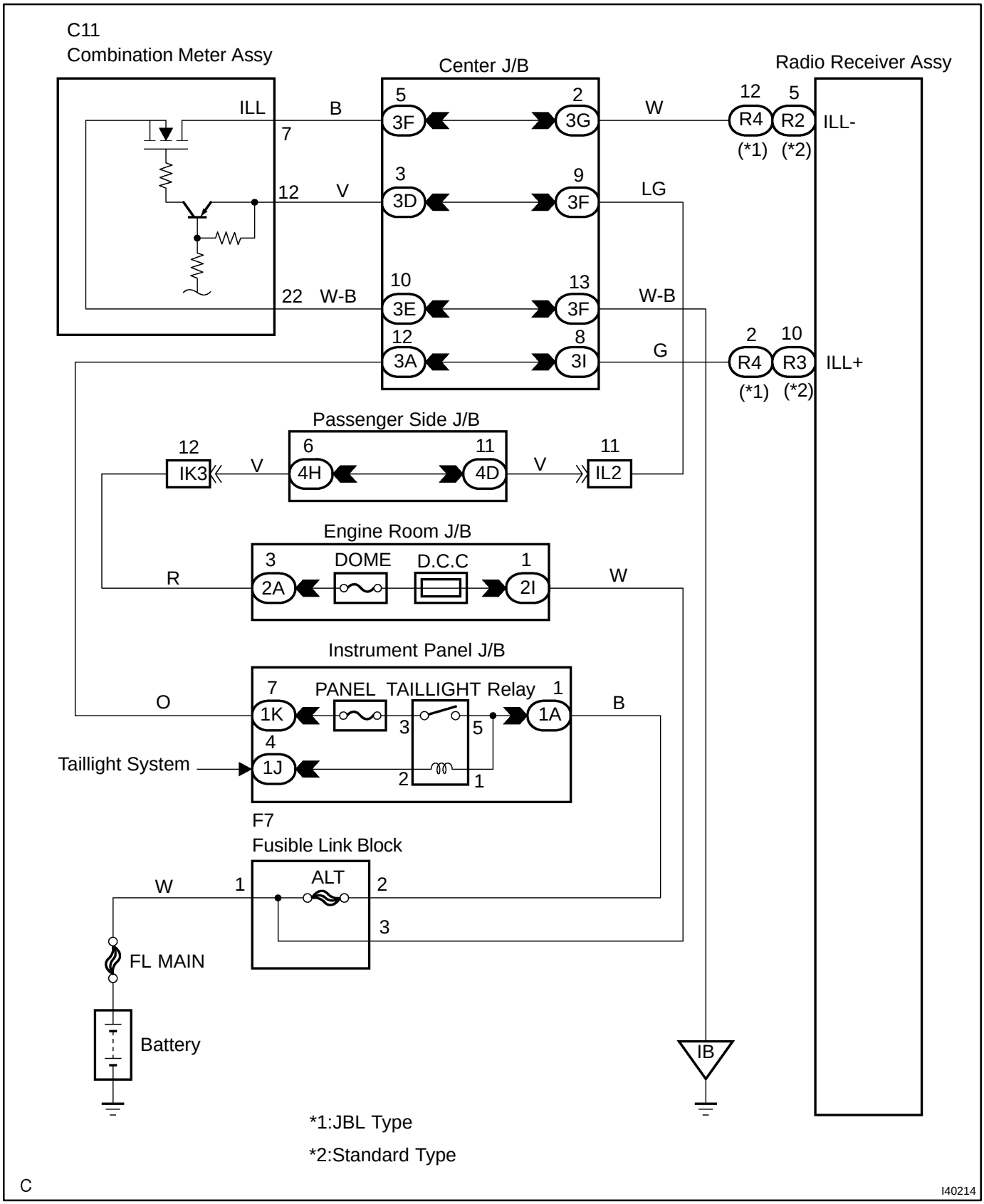
CONDENSATION DUE TO TEMPERATURE CHANGE (LEAVE IT AS IT IS FOR A WHILE BEFORE USING)

ILLUMINATION CIRCUIT

CIRCUIT DESCRIPTION

When the light control switch is in the TAIL or HEAD position, the TAILLIGHT relay activates and supplies power to illuminate the radio receiver assy panel.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK SYSTEM

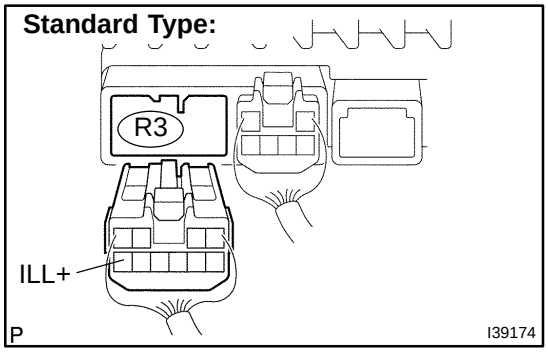
(a) Turn the light control switch to the TAIL or HEAD position.
Check if other displays or indicators such as the A/C indicator come on.
OK: Other displays or indicators come on.

NG → **GO TO COMBINATION METER SYSTEM (SEE PAGE 05-1868)**

OK

2	INSPECT RADIO RECEIVER ASSY(ILL+)

Standard Type:

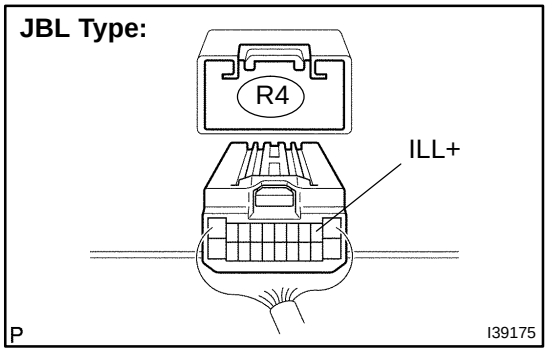


(a) Disconnect the connector from the radio receiver assy.
(b) Measure the voltage according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
ILL+ - Body ground	Light SW TAIL or HEAD	10 to 14 V

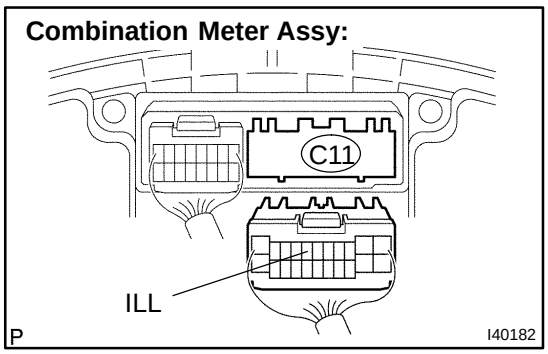
JBL Type:



NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3	CHECK HARNESS AND CONNECTOR(COMBINATION METER ASSY - RADIO RECEIVER ASSY)

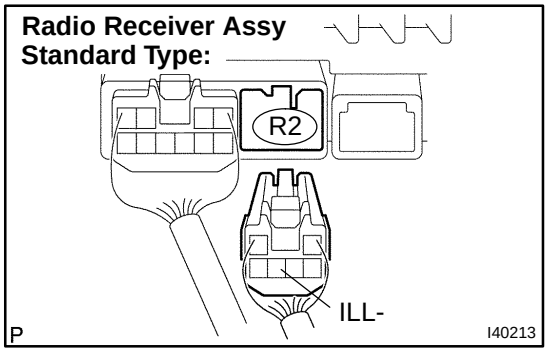


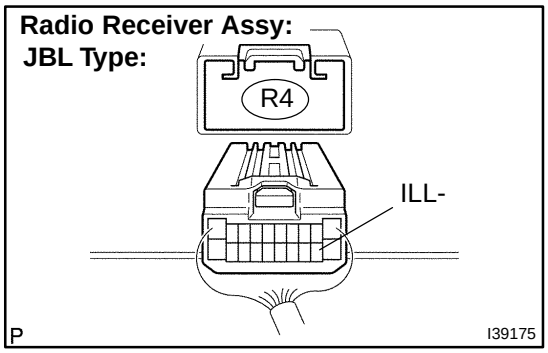
(a) Disconnect the connectors from the combination meter assy and radio receiver assy.

(b) Measure the resistance according to the values in the table below.

Standard:

Tester connection	Specified condition
ILL - ILL-	Below 1 Ω
ILL - Body ground	10 kΩ or higher





NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

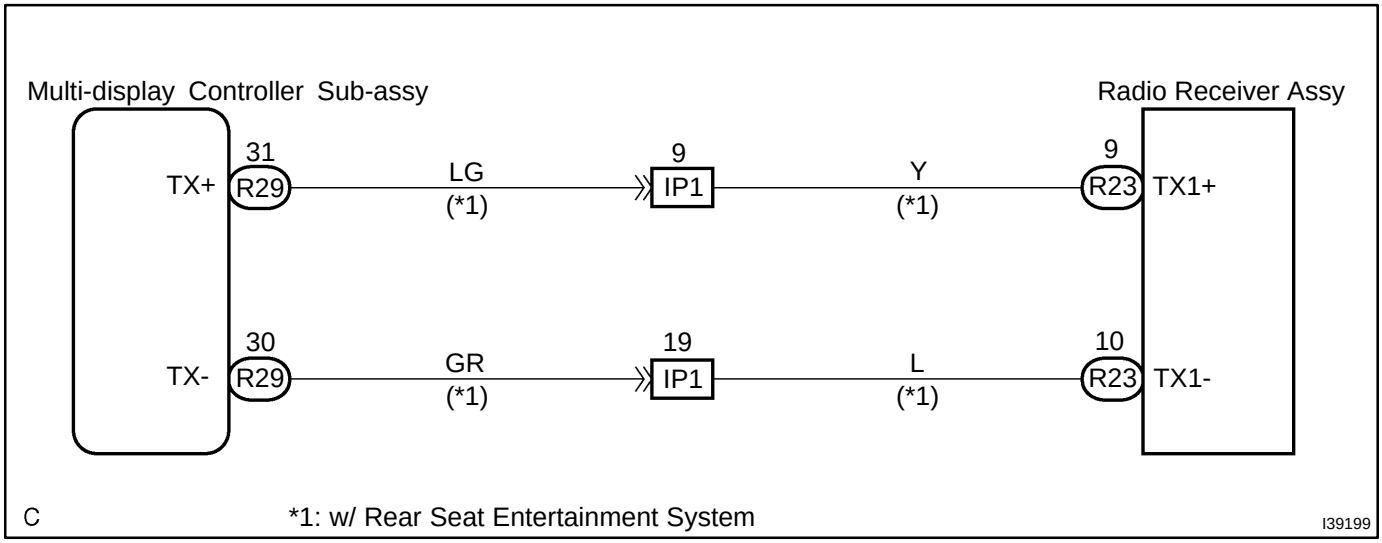
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-1632)

AVC-LAN CIRCUIT (MULTI-DISPLAY CONTROLLER SUB-ASSY - RADIO RECEIVER ASSY

CIRCUIT DESCRIPTION

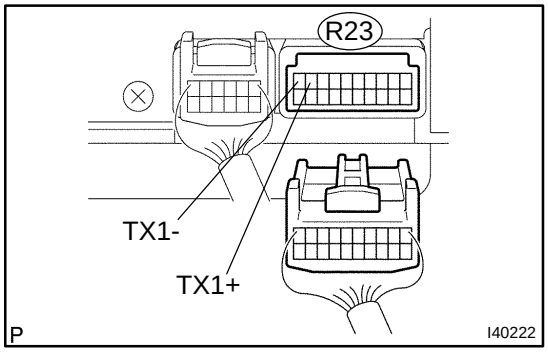
Each unit of the radio receiver system connected to AVC-LAN (communication bus) communicates by transferring the signals from each switch.
When +B short and GND short occur in this AVC-LAN, radio receiver system will not function normally as communication is discontinued.
In AVC-LAN, radio receiver assy becomes the communication master, and the radio receiver assy has enough resistance necessary for transmitting the communication.

WIRING DIAGRAM



INSPECTION PROCEDURE

1 INSPECT RADIO RECEIVER ASSY



(a) Measure the resistance according to the value(s) in the table below.

Standard:

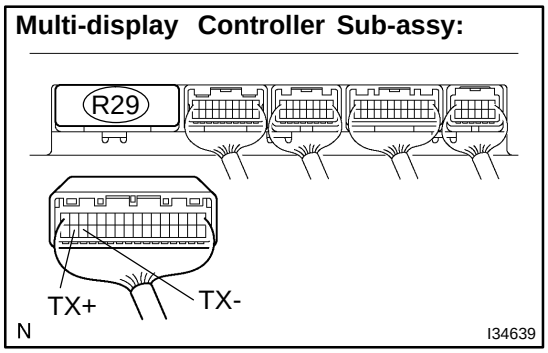
Tester connection	Condition	Specified condition
TX1+ - TX1-	Always	60 to 80 Ω

NG → **REPLACE RADIO RECEIVER ASSY (SEE PAGE 67-6)**

OK

2 CHECK HARNESS AND CONNECTOR(MULTI-DISPLA Y CONTROLLER SUB-ASSY - RADIO RECEIVER ASSY)

Multi-display Controller Sub-assy:



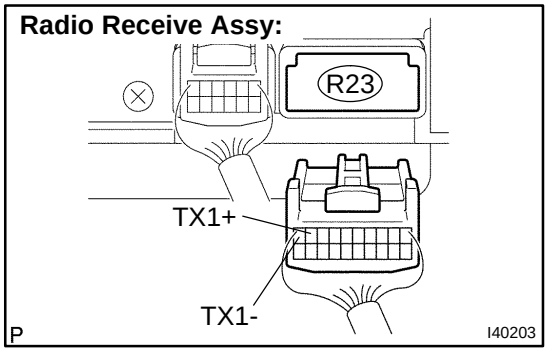
(a) Disconnect the connectors from the multi-display controller sub-assy R29 and radio receiver assy R23.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
TX+ - TX1+	Always	Below 1 Ω
TX- - TX1-	Always	Below 1 Ω
TX+ - Body ground	Always	10 kΩ or higher
TX- - Body ground	Always	10 kΩ or higher

Radio Receive Assy:



NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

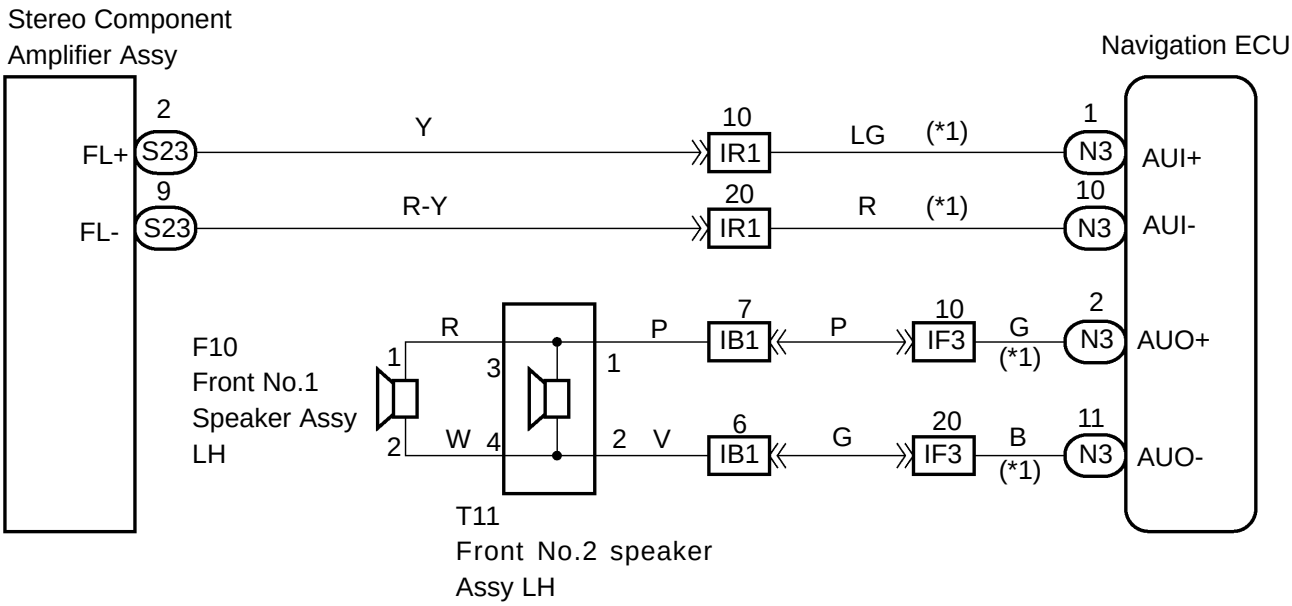
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-1632)

SPEAKER CIRCUIT (DRIVER SIDE SPEAKER)

CIRCUIT DESCRIPTION

When the vehicle is equipped with the navigation system, a sound signal for the driver's side is sent from the stereo component amplifier to the driver's side speaker via the navigation ECU.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK NAVIGATION VOICE GUIDANCE

(a) Check if navigation voice guidance is heard from the speaker on the driver side.
OK: Voice guidance is heard.

OK → **Go to step 8**

NG

2	CHECK SETTING(THE VOLUME OF THE NAVIGATION VOICE SOUND)

(a) Check that ”OFF” is not selected.
OK: OFF is not selected.

NG → **USING VOICE ADJUSTMENT SWITCH, TURN THE VOICE GUIDANCE VOLUME UP**

OK

3	INSPECT SYSTEM

(a) Check the system.
(1) Check if sound is heard from speakers.

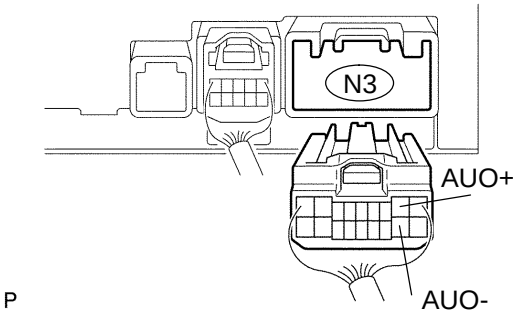
Symptom	Proceed to
No sound is heard from both speakers	A
No sound is heard from front No.1 speaker assy	B
No sound is heard from front No.2 speaker assy	Replace front No.2 speaker assy (see page 67-11)

B → **Go to step 6**

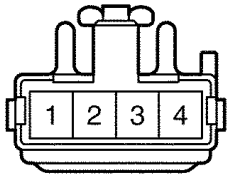
A

4	CHECK HARNESS AND CONNECTOR(NAVIGATION ECU - FRONT NO. 2 SPEAKER ASSY)

Navigation ECU:



Wire Harness Side:
Front No.2 Speaker Assy



I40178
I38999
I40553

(a) Disconnect the connectors from the navigation ECU and speaker.
(b) Measure the resistance according to the values in the table below.

Standard:

Tester connection	Condition	Specified condition
AUO+ - 1	Always	Below 1 Ω
AUO- - 2	Always	Below 1 Ω
AUO+ - Body ground	Always	10 kΩ or higher
AUO- - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

5	INSPECT FRONT NO. 2 SPEAKER ASSY

(a) Check that malfunction disappears when another speaker in a good condition is installed.
OK: Malfunction disappears.

HINT:

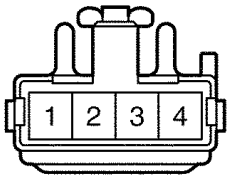
- Connect all the connectors to the speakers.
- When there is a possibility that either right or left front speaker is defective, inspect by interchanging the right one and the left one.

OK → **REPLACE FRONT NO. 2 SPEAKER ASSY (SEE PAGE 67-1 1)**

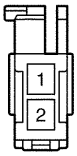
NG

6	CHECK HARNESS AND CONNECTOR(FRONT NO. 2 SPEAKER ASSY - FRONT NO. 1 SPEAKER ASSY)

Wire Harness Side:
Front No.2 Speaker Assy



Wire Harness Side:
Front No.1 Speaker Assy



I38999
I38233
I40554

(a) Disconnect the connectors from the front No.2 speaker assy and front No.1 speaker assy.
(b) Measure the resistance according to the values in the table below.

Tester connection	Condition	Specified condition
3 (Front No.2 speaker Assy) - 1 (Front No.1 speaker Assy)	Always	Below 1 Ω
4 (Front No.2 speaker Assy) - 2 (Front No.1 speaker Assy)	Always	Below 1 Ω
3 (Front No.2 speaker Assy) - Body ground	Always	10 kΩ or higher
4 (Front No.2 speaker Assy) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

7	INSPECT FRONT NO. 1 SPEAKER ASSY

(a) Resistance check
(1) Measure the resistance between the terminals of the speaker.

NOTICE:
The speaker should not be removed for checking.

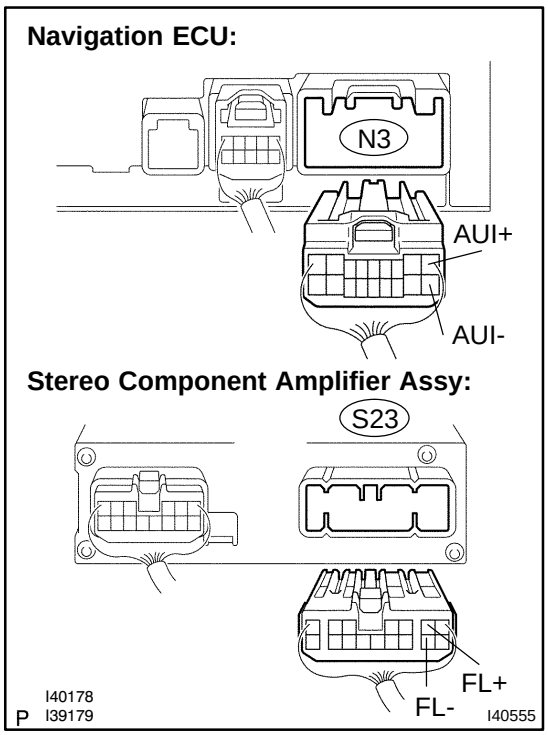
Standard: 4 Ω

NG → **REPLACE FRONT NO. 1 SPEAKER ASSY (SEE PAGE 67-10)**

OK

REPLACE NAVIGATION ECU (SEE PAGE 67-9)

8	CHECK HARNESS AND CONNECTOR(NAVIGATION ECU - STEREO COMPONENT AMPLIFIER ASSY)



(a) Disconnect the connectors from the navigation ECU and stereo component amplifier assy.

(b) Measure the resistance according to the values in the table below.

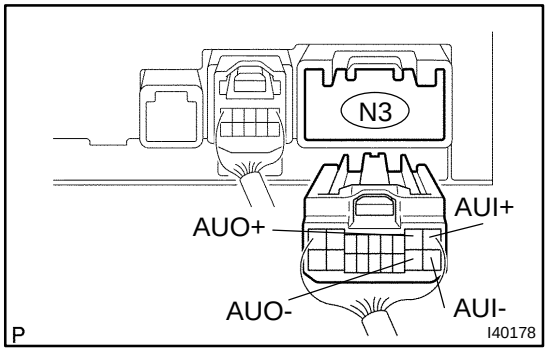
Standard:

Tester connection	Condition	Specified condition
AUI+ - FL+	Always	Below 1 Ω
AUI- - FL-	Always	Below 1 Ω
AUI+ - Body ground	Always	10 kΩ or higher
AUI- - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

9	INSPECT NAVIGATION ECU



(a) Disconnect the connector from the navigation ECU.

(b) Measure the resistance according to the values in the table below.

Standard:

Tester connection	Condition	Specified condition
AUI+ - AUO+	Always	Below 1 Ω
AUI- - AUO-	Always	Below 1 Ω

NG → **REPLACE NAVIGATION ECU (SEE PAGE 67-9)**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-1632)

NOISE OCCURS

INSPECTION PROCEDURE

1 CHECK OF SPEAKER INSTALLATION

(a) Check the speaker installation condition.
  (1) Check that each speaker is securely installed.
  OK: Malfunction disappears.

HINT:
The radio is equipped with a noise prevention system that blocks only excessively loud noise. If loud noise occurs, check whether or not the ground on the antenna installation part and the proper noise-prevention equipment are all installed, and whether or not there is improper wiring.

Condition in which noise occurs	Noise type
Depressing the acceleration pedal increases the noise, and stopping the engine stops the noise immediately.	Alternator noise
Noise occurs during A/C or the heater operation.	Blower motor noise
Rapid acceleration during the drive on an unpaved road or after the ignition switch is turned on makes noise.	Fuel pump noise
Pressing and then releasing the horn switch, and keeping pressing the horn switch makes noise.	Horn noise
Quiet noise is heard while the engine is running, but stops with the engine.	Ignition noise
Noise occurs in turn with the blink of the turn signal flash.	Flasher noise
Noise occurs during window washer operation.	Washer noise
Noise occurs while the engine is running, and it continues even after the engine is stopped.	Water temperature sensor noise
Noise occurs during wiper operation.	Wiper noise
Noise occurs when the brake pedal is depressed.	Stop light switch noise
Others	Static electricity on the vehicle

HINT:
- Identify the condition in which the noise occurs, and check the noise filter on the related part.
- Make sure first that there is no noise from outside. Failing to do so makes the noise occurrence source detection difficult and leads to misdiagnosis.
- The noise should be removed in descending order of loudness.

NG → INSTALL IT PROPERLY

OK

IDENTIFICATION OF NOISE SOURCE

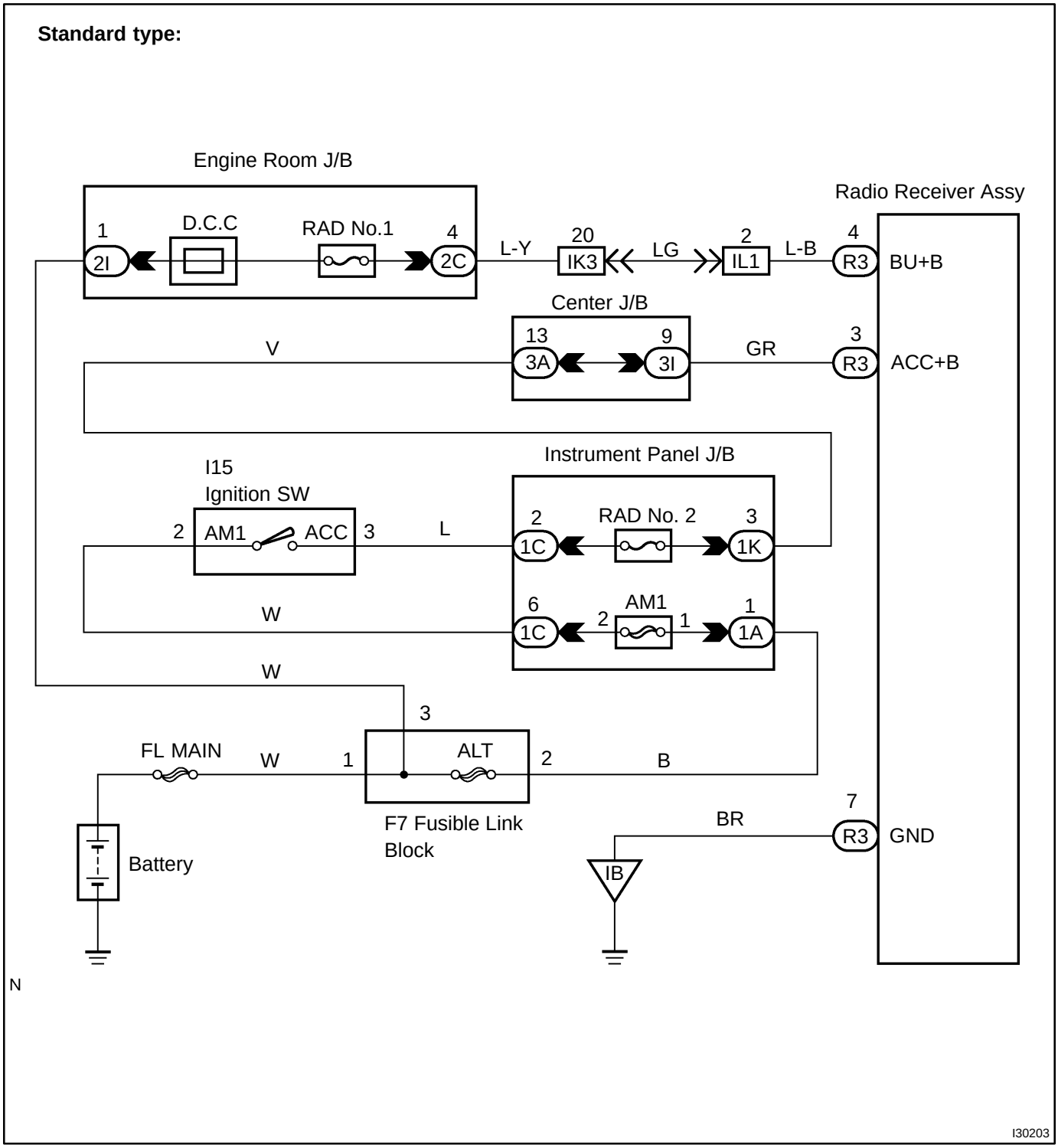
POWER SOURCE CIRCUIT (RADIO RECEIVER ASSY)

CIRCUIT DESCRIPTION

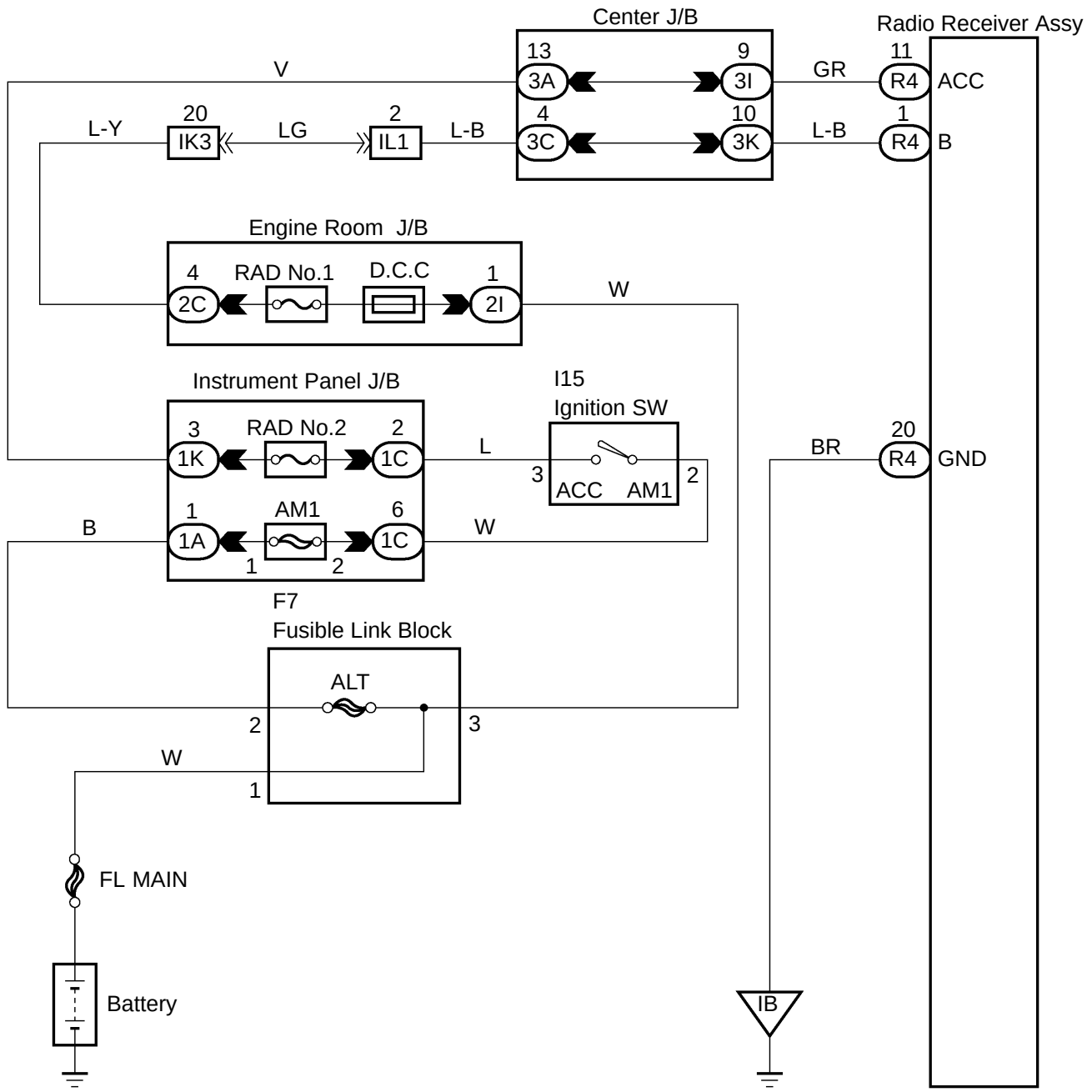
This circuit provides the power to the radio receiver assy.

WIRING DIAGRAM

Standard type:



JBL type:


Center J/B
Radio Receiver Assy
13
9
11
3A
3I
R4
ACC
V
GR
20
2
4
10
1
L-Y
IK3
LG
IL1
L-B
3C
3K
L-B
R4
B
Engine Room J/B
4
RAD No.1
D.C.C
1
2C
2I
W
Instrument Panel J/B
I15
Ignition SW
3
RAD No.2
2
1K
1C
L
3
ACC
AM1
2
20
BR
R4
GND
1
AM1
6
B
1A
1C
W
1
2
F7
Fusible Link Block
ALT
2
3
W
1
FL MAIN
Battery
IB
C
I39184

INSPECTION PROCEDURE

1	CHECK TYPE

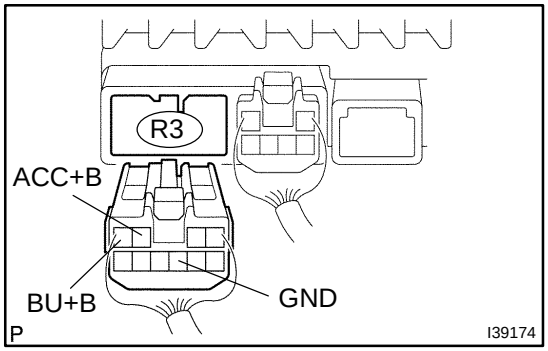
HINT:
If the radio receiver assy is JBL type, ”JBL” is indicated on its surface.
(a) Choose type to be inspected.

Type	Go to step
Standard type	A
JBL type	B

B → **Go to step 3**

A

2	INSPECT RADIO RECEIVER ASSY(BU+B, ACC+B, GND)



(a) Disconnect the connectors from the radio receiver assy.
(b) Measure the resistance according to the value in the table below.

Standard:

Tester connection	Condition	Specified condition
GND - Body ground	Always	Below 1 Ω

(c) Measure the voltage according to the values in the table below.

Standard:

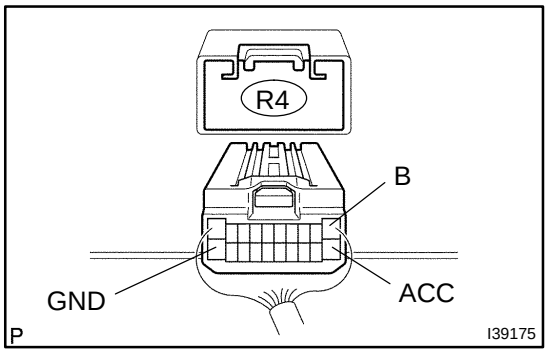
Tester connection	Condition	Specified condition
BU+B - GND	Always	10 to 14 V
ACC+B - GND	Ignition SW ACC	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-1632)

3 INSPECT RADIO RECEIVER ASSY(B, ACC, GND)



(a) Disconnect the connectors from the radio receiver assy.

(b) Measure the resistance according to the value in the table below.

Standard:

Tester connection	Condition	Specified condition
GND - Body ground	Always	Below 1 Ω

(c) Measure the voltage according to the values in the table below.

Standard:

Tester connection	Condition	Specified condition
B - GND	Always	10 to 14 V
ACC - GND	Ignition SW ACC	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-1632)

RADIO BROADCAST CANNOT BE RECEIVED(BAD RECEPTION)

INSPECTION PROCEDURE

1	CHECK IF RADIO AUTO-SEARCH FUNCTIONS PROPERLY

(a) Check if the radio auto-search functions properly.
(1) Perform the auto-search of the radio and check that it functions normally.
OK: The radio auto-search functions properly.

OK → **REPLACE RADIO RECEIVER ASSY (SEE PAGE 67-6)**

NG

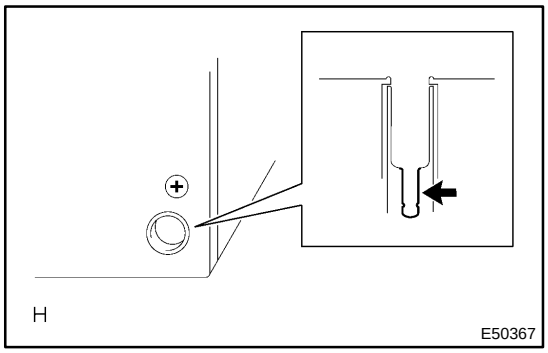
2	CHECK OPTIONAL COMPONENT

(a) Check optional component (sun shade film, telephone antenna etc.).
(1) Check whether or not any optional component such as the sun shade film and the telephone antenna is installed.
OK: Optional component is installed.

OK → **EFFECT FROM OPTIONAL COMPONENT**

NG

3	INSPECT RADIO RECEIVER ASSY(ANTENNA)



(a) Preparation for Check
  (1) Remove the antenna plug of the radio receiver assembly.

(b) Noise Check
  (1) With the radio receiver assy connector connected, turn the ignition switch to the ACC position.
  (2) Turn on the radio and choose the AM mode.
  (3) Place a flat-head screwdriver or a piece of metal such as thin wire on an antenna jack of the radio receiver assy and check that the noise is heard from the speaker.

OK: Noise occurs.

NG → **REPLACE RADIO RECEIVER ASSY (SEE PAGE 67-6)**

OK

4	CHECK ANTENNA TYPE

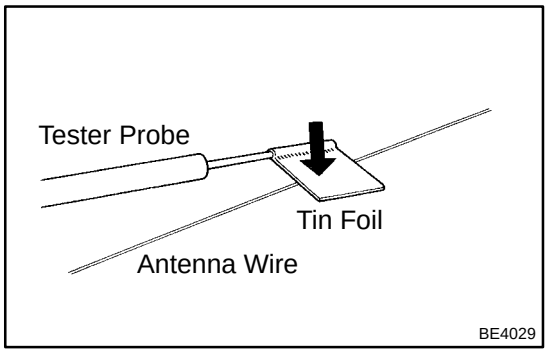
(a) Choose type to be inspected.

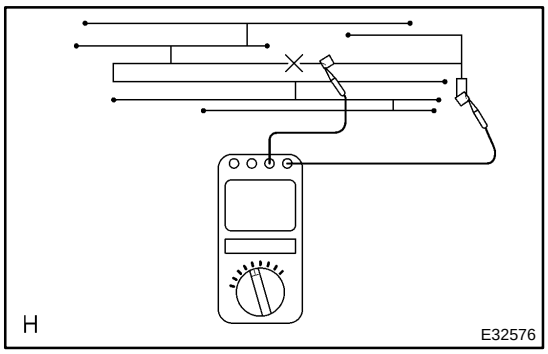
Type	Go to step
Glass printed type antenna	A
Fender type antenna	B

B → **Go to step 7**

A

5	CHECK ANTENNA ASSY





(a) Check for continuity of the antenna.

HINT:

Inspect the continuity, at the center of each antenna wire, as shown in the illustration.

NOTICE:

When cleaning the glass, use a soft dry cloth, and wipe the glass in the direction of the wire. Take care not to damage the wires. Do not use detergents or glass cleaners with abrasive ingredients. When measuring voltage, wind a piece of tin foil around the top of the negative probe and press the foil against the wire with your finger, as shown in the illustration.

OK: There is continuity in the antenna.

NG	REPAIR ANTENNA ASSY (SEE PAGE 67-33)

OK

6	REPLACE AMPLIFIER ANTENNA ASSY (SEE PAGE 67-15 OR 67-16)

(a) Replace the amplifier antenna assy and check if it operates normally.

OK: The amplifier antenna assy operates normally.

OK	NORMAL OPERATION

NG

REPLACE RADIO RECEIVER ASSY (SEE PAGE 67-6)

7	CHECK ANTENNA ASSY

(a) Check that the antenna is securely installed.

OK: The antenna is installed properly.

OK	Go to step 6

NG

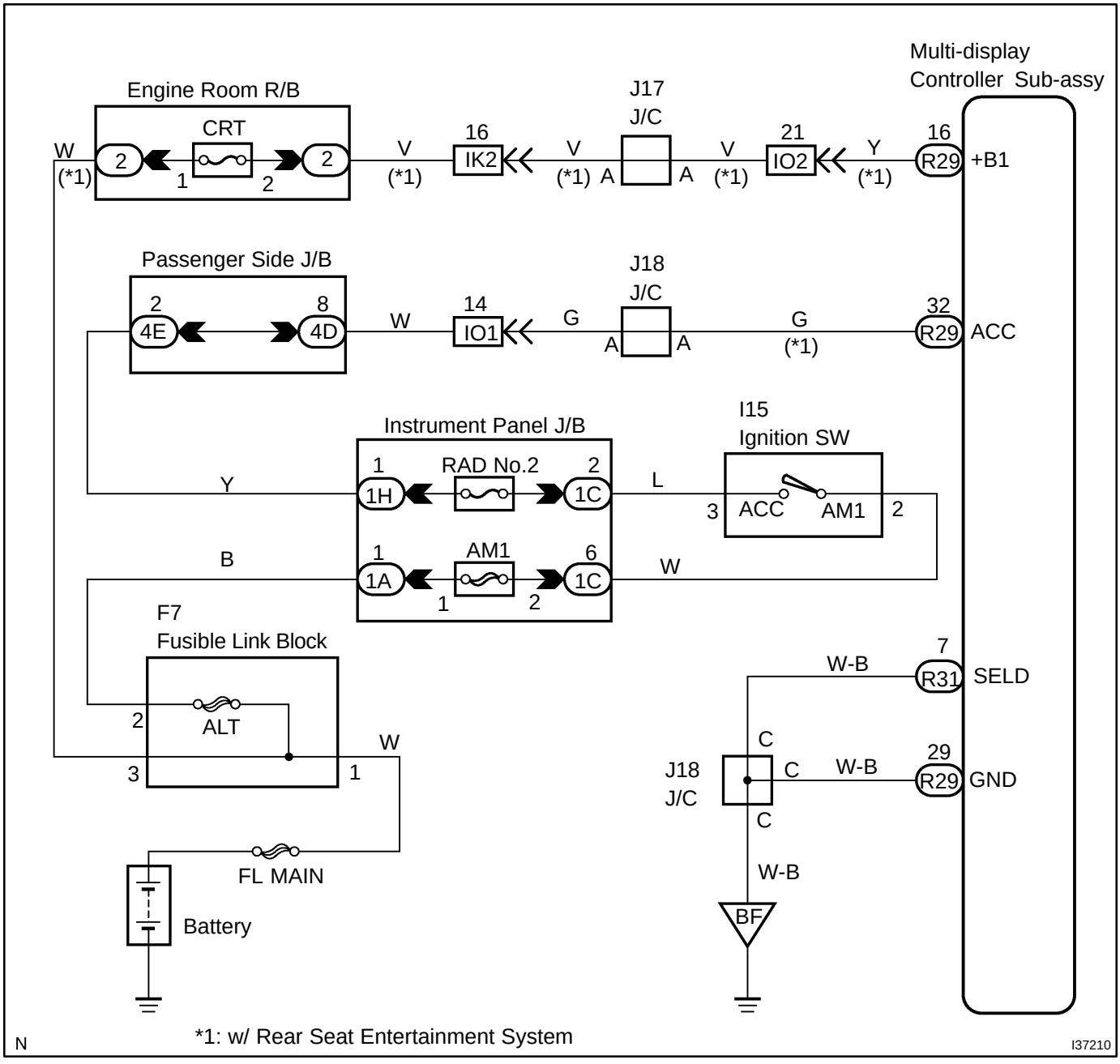
INSTALL THE ANTENNA ASSY PROPERLY

POWER SOURCE CIRCUIT(MULTI-DISPLA Y CONTROLLER SUB-ASSY)

CIRCUIT DESCRIPTION

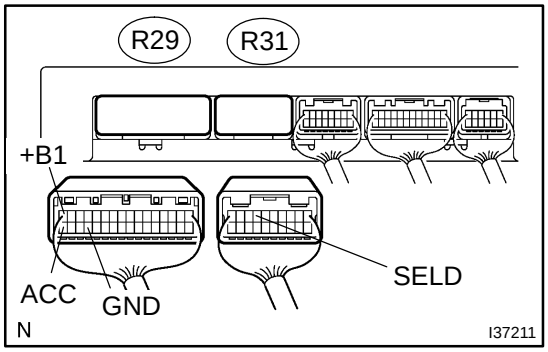
This circuit provides the power to the multi-display controller sub-assy.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT MULTI-DISPLA Y CONTROLLER SUB-ASSY(+B1, ACC, GND, SELD)



(a) Disconnect the connectors from the multi-display controller sub-assy.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
GND - Body ground	Always	Below 1 Ω
SELD - Body ground	Always	Below 1 Ω

(c) Measure the voltage according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
+B1 - GND	Always	10 - 14 V
ACC - GND	Ignition SW ACC	10 - 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-1632)

SOUND QUALITY IS BAD ONLY WHEN CD IS PLAYED (VOLUME IS TOO LOW)

INSPECTION PROCEDURE

1	REPLACE CD WITH ANOTHER AND RECHECK

(a) Replace the CD with another one and recheck.
(1) Check the installation condition of the radio receiver assembly.
OK: Malfunction disappears.

NG → **REPLACE RADIO RECEIVER ASSY (SEE PAGE 67-6)**

OK

CD FAULTY

SOUND QUALITY IS BAD ONLY WHEN PLAYING TAPE

INSPECTION PROCEDURE

1	REPLACE CASSETTE TAPE WITH ANOTHER AND RECHECK

(a) Replace the cassette tape with another one and recheck.
(1) Replace the cassette tape with another normal one to see if the same trouble occurs again.
OK: Malfunction disappears.

OK → **CASSETTE TAPE FAULTY**

NG

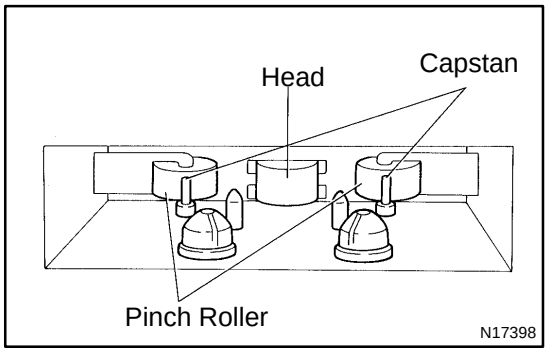
2	CHECK FOR ANY FOREIGN OBJECT

(a) Check for foreign objects.
(1) Check that no foreign objects or defects are detected in the cassette tape player.
OK: No foreign objects or defects are detected.

NG → **REMOVE FOREIGN OBJECT**

OK

3	CLEAN HEAD AND CHECK OPERATION



(a) Head cleaning
(1) Raise the cassette door with your finger. Using a pencil or similar object, push in the guide.
(2) Using a cleaning pen or cotton applicator soaked in cleaner, clean the head surface, pinch rollers and capstans.
(3) Check if the same trouble occurs again.
OK: Malfunction disappears.

NG → **REPLACE RADIO RECEIVER ASSY (SEE PAGE 67-6)**

OK

HEAD DIRTY

SOUND QUALITY IS BAD IN ALL MODES (VOLUME IS TOO LOW)

INSPECTION PROCEDURE

1	ADJUST SOUND QUALITY

(a) Adjust the sound quality.
(1) Operate the radio receiver assy to adjust the sound quality.
OK: Malfunction disappears.

OK	BAD SOUND QUALITY

NG

2	COMPARE IT WITH ANOTHER VEHICLE OF SAME MODEL

(a) Compare it with another vehicle of the same model.
(1) Compare it with the vehicle of the same type which does not have a trouble to see if there is any difference in the sound quality.
OK: No difference is found.

OK	SETTING

NG

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-1632)

CASSETTE TAPE CANNOT BE EJECTED

INSPECTION PROCEDURE

1	PRESS ”EJECT” AND CHECK OPERATION

(a) Press ”EJECT” and check the operation.
(1) Press the cassette tape EJECT switch of the radio receiver assembly for 2 seconds or more and check that the cassette tape is ejected.
OK: The cassette tape is ejected.

NG → **REPLACE RADIO RECEIVER ASSY (SEE PAGE 67-6)**

OK

2	CHECK CASSETTE TAPE

(a) Check the cassette tape.
(1) Check that the ejected cassette tape does not have a peeled label, a cassette body deformation or any other defects.
OK: No fault on the cassette tape.

NG → **CASSETTE TAPE FAULTY**

OK

3	REPLACE CASSETTE TAPE WITH ANOTHER AND RECHECK

(a) Replace the cassette tape with another and recheck.
(1) Replace the cassette tape with another normal one to see if the same trouble occurs again.
OK: Malfunction disappears.

NG → **REPLACE RADIO RECEIVER ASSY (SEE PAGE 67-6)**

OK

CASSETTE TAPE FAULTY

CASSETTE TAPE CANNOT BE INSERTED OR PLAYED

INSPECTION PROCEDURE

1	CHECK FOR ANY FOREIGN OBJECT

(a) Check for any foreign objects.
(1) Check that no foreign objects or defects are detected in the cassette tape player of the radio receiver assembly.
OK: No foreign objects or defects are detected.

NG → **REMOVE FOREIGN OBJECT**

OK

2	CHECK CASSETTE TAPE

(a) Check the cassette tape.
(1) Check that the cassette tape is a normal tape with music or voice recorded.
OK: Proper cassette tape with music or voice recorded.

NG → **CASSETTE TAPE FAULTY**

OK

3	REPLACE CASSETTE TAPE WITH ANOTHER AND RECHECK

(a) Replace the cassette tape with another one and recheck.
(1) Replace the cassette tape with another normal one to see if the same trouble occurs again.
OK: The function returns to be normal.

NG → **REPLACE RADIO RECEIVER ASSY (SEE PAGE 67-6)**

OK

CASSETTE TAPE FAULTY

TAPE IS TANGLED DUE TO INCORRECT TAPE SPEED OR AUTO-REVERSE MALFUNCTION

INSPECTION PROCEDURE

1	CHECK FOR ANY FOREIGN OBJECT

(a) Check for any foreign objects.
  (1) Check that no foreign objects or defects are detected in the cassette tape player of the radio receiver assy.

OK: No foreign objects or defects are detected.

NG → **REMOVE FOREIGN OBJECT**

OK

2	REPLACE CASSETTE TAPE WITH ANOTHER AND RECHECK(BELOW 90 MIN.)

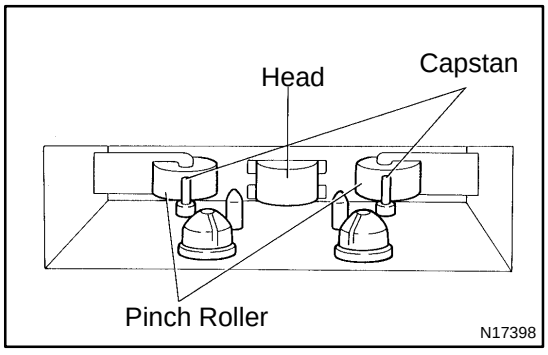
(a) Replace the cassette tape with another one and recheck.
  (1) Replace the cassette tape with another normal one (90 minutes. or less) to see if the same trouble occurs again.

OK: Malfunction disappears.

OK → **CASSETTE TAPE FAULTY**

NG

3	CLEAN HEAD AND CHECK OPERATION



(a) Head cleaning
  (1) Raise the cassette door with your finger. Using a pencil or similar object, push in the guide.
  (2) Using a cleaning pen or cotton applicator soaked in cleaner, clean the head surface, pinch rollers and capstans.
  (3) Check if the same trouble occurs again.

OK: Malfunction disappears.

NG → **REPLACE RADIO RECEIVER ASSY (SEE PAGE 67-6)**

OK

HEAD DIRTY

0569B-11

CUSTOMER PROBLEM ANALYSIS CHECK

AUDIO SYSTEM Check Sheet

Inspector's name: _____

Customer's Name		**VIN**	
		Production Date	
		Licence Plate No.	
Date of Vehicle Brought in	/ /	**Odometer Reading**	**km mile**

Date of First Occurrence	/ /
Frequency of Problem Occurrence	⁎ Constant ⁎ Intermittent (Times a day)

Problem Symptom	⁎ **Switch**
	⁎ **Radio**
	⁎ **CD**
	⁎ **Noise**

	Parts name	**DTC (1st time)**	**DTC (2nd time)**
DTC Check	Radio receiver assy		
	Stereo component amplifier assy		
	Others		

I32867

I35110

AUDIO SYSTEM

05IRH-01

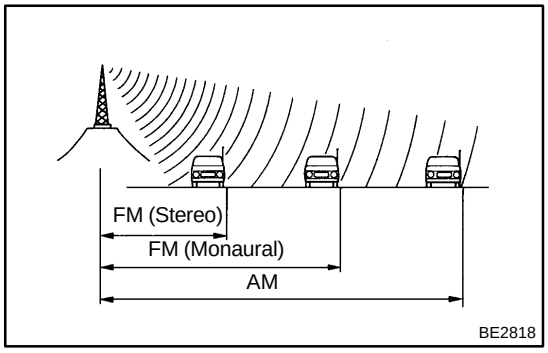
DESCRIPTION

1. RADIO WAVE BAND

The radio wave bands used in radio broadcasting are as follows:

Frequency	30 kHz	300 kHz	3 MHz	30 MHz	300 MHz
Designation	LF	MF	HF	VHF	
Radio wave		AM ← →		FM ← →	
Modulation	Amplitude modulation			Frequency modulation	

LF: Low Frequency
MF: Medium Frequency
HF: High Frequency
VHF: Very High Frequency

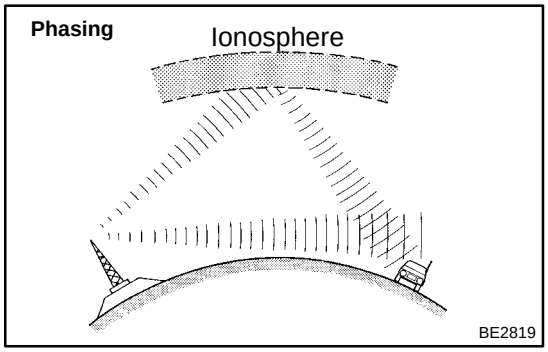


2. SERVICE AREA

(a) There is a great difference in the size of the service areas for AM and FM broadcasting. Sometimes an FM stereo broadcast cannot be received even though AM can be received very clearly.
FM stereo has the smaller service area, it also picks up static and other types of interference (”noise”) easily.

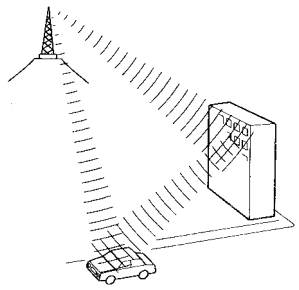
3. RECEPTION PROBLEMS

HINT:
Besides the problem of static, there are other problems, such as ”phasing”, ”multipath” and ”fade out”. These problems are caused not by electrical noise but by the nature of the radio waves themselves.



(a) Phasing
Besides electrical interference, AM broadcasts are also susceptible to other types of interference, especially at night. This is because AM radio waves bounce off the ionosphere at night. These radio waves then interfere with the signals that reach the vehicle’s antenna directly from the same transmitter. This type of interference is called ”phasing”.

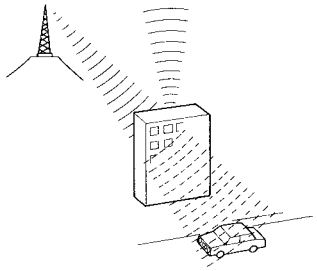
Multipath



BE2820

(b) Multipath
Interference caused by reflection of radio waves against obstructions is called ”Multipath”. Multipath occurs when radio signals emitted from the broadcast transmitter antenna are reflected against tall buildings or mountains and interferes with other signals which are to be received directly.

Fade Out



BE2821

(c) Fade Out
FM radio wave tends to be reflected against obstructions such as tall buildings or mountains because FM frequency is higher than that of AM. For this reason, FM signals often seem to gradually disappear or fade away as the vehicle goes behind those obstructions. This phenomenon is called ”fade out”.

4. NOISE PROBLEMS

(a) It is very important for technicians to understand a customer’s claim about noise clearly. Use the following table to diagnose the phenomena.

Radio wave	Condition in which noise occurs	Probable cause
AM	Noise occurs at a specific place.	Strong possibility of foreign noise.
	Noise occurs when listening to faint broadcasting.	The same program may be broadcasted from some local stations. If the program is the same, one of those may be tuned in.
FM	Noise occurs only at night.	Strong possibility of beat from a distant broadcasting.
	Noise occurs at a specific place during driving.	Strong possibility of multipath noise and phasing noise caused by changes of FM frequency.

HINT:
If the condition when the noise occurs does not meet any of the above, find out the cause based on ”Reception Problems”. Refer to the description about Multipath and Phasing mentioned previously.

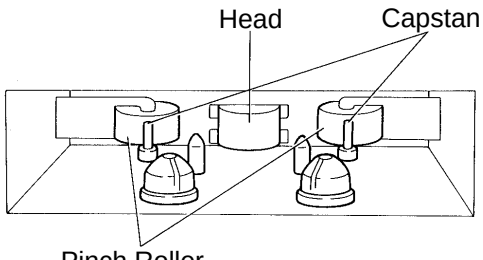
5. COMPACT DISC PLAYER

(a) Compact Disc (hereafter called ”CD”) Players use a laser beam pick-up to read the digital signals recorded on the CD and reproduce analog signals of the music, etc. 4.7 in. (12 cm) and 3.2 in. (8 cm) discs are available for the CD player.

HINT:
Never disassemble or apply oil to any part of the player unit. Do not insert any object other than a disc, into the CD player.

NOTICE:
CD players use an invisible laser beam which could cause hazardous radiation exposure. Be sure to operate the player correctly as instructed.

Example:

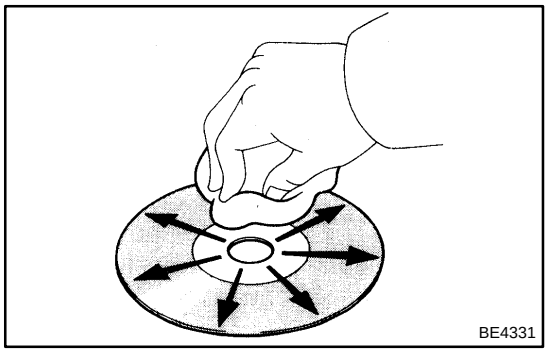


6. MAINTENANCE

Tape Player/Head Cleaning:

(a) Raise the cassette door with your finger.
Using a pencil or similar object, push in the guide.

(b) Using a cleaning pen or cotton applicator soaked in cleaner, clean the head surface, pinch rollers and capstans.



7. MAINTENANCE

CD Player/Disc Cleaning:

If the disc gets dirty, clean the disc by wiping the surface from the center to outside in the radial directions with a soft cloth.

NOTICE:

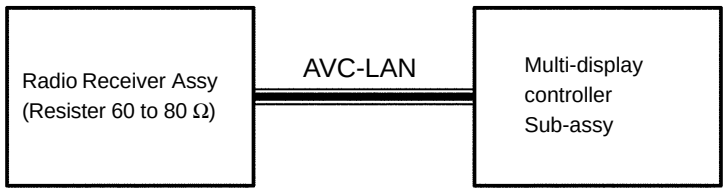
Do not use a conventional record cleaner or anti-static preservative.

8. AVC-LAN Description

(a) What is AVC-LAN?

AVC-LAN, an abbreviation for "Audio Visual Communication Local Area Network", is a united standard developed by the manufacturers in affiliation with Toyota Motor Corporation. This standard pertains to audio and visual signals as well as switch and communication signals.

Example:



P I39082

(b) Purpose:

Recently, car audio systems have rapidly developed and the functions vastly changed. The conventional car audio system is being integrated with multi-media interfaces similar to those in navigation systems. At the same time, customers are demanding higher quality from their audio systems. This is merely an overview of the standardization background. The specific purposes are as follows.

(1) To solve sound problems, etc. caused by using components of different manufacturers through signal standardization.

(2) To allow each manufacturer to concentrate on developing products they do best. From this, reasonably priced products can be produced.

HINT:

* If a +B or GND short is detected in the AVC-LAN circuit, communication is interrupted and the audio system will stop functioning.

- If an audio system is equipped with a navigation system, the multi-display unit acts as the master unit. If the navigation system is not equipped, the audio head unit acts as the master unit instead. If the radio and navigation assy is equipped, it is the master unit.
- The radio receiver assy provides resistance to make communication possible.
- The car audio system with an AVC-LAN circuit has a diagnostic function.
- Each component has a specified number (3-digit) called a physical address. Each function has a number (2-digit) called a logical address.

9. Communication system outline

(a) Components of the audio system communicate with each other via the AVC-LAN.

(b) Radio receiver assy has enough resistance (60 to 80 Ω) necessary for transmitting the communication. This is essential for communication.

(c) If a short circuit or open circuit occurs in the AVC-LAN circuit, communication is interrupted and the audio system will stop functioning.

10. Diagnostic function outline

(a) The audio system has a diagnostic function (the result is indicated on the master unit).

(b) A 3-digit hexadecimal component code (physical address) is allocated to each component on the AVC-LAN. Using this code, the component in the diagnostic function can be displayed.

055LJ-12

DIAGNOSTIC TROUBLE CODE CHART

Terms	Meaning
Physical address	Three-digit code (shown in hexadecimal) which is given to each component comprising the AVC-LAN. Corresponding to the function, individual symbols are specified.
Logical address	Two-digit code (shown in hexadecimal) which is given to each function comprising the inner system of the AVC-LAN.

HINT:

Titles for each unit are stated in the following order: physical address(parts name).

1. 190 (RADIO RECEIVER ASSY)

HINT:

- *1: Even if no failure is detected, trouble codes may be stored depending on the battery condition or voltage for starting the engine.
- *2: The code is stored 180 seconds after the power supply connector is disconnected after engine start.
- *3: The code may be stored when the engine key is turned 1 minute after engine start.
- *4: The code may be stored when the engine key is turned again after engine start.

(a) Logical address: 01 (Communication control)

DTC	Diagnosis item	Diagnosis content	Countermeasure and inspected parts
21	ROM Error	Abnormal condition of ROM is detected.	Replace radio receiver assy.
22	RAM Error	Abnormal condition of RAM is detected.	Replace radio receiver assy.
D6 *1	Absence of Master	Component in which this code is recorded was disconnected from system or master component with ignition switch in ACC or ON.	・Check harness for power supply system of radio receiver assy. ・Check harness for communication system of radio receiver assy.
D8 *2	No Response to Connection Check	Component shown by sub code is or was disconnected from system after engine start.	・Check harness for power supply system of component shown by sub code. ・Check harness for communication system of component shown by sub code.
D9 *1	Last Mode Error	Audio or visual component operated before engine stop is or was disconnected with ignition switch in ACC or ON.	・Check harness for power supply system of component shown by sub code. ・Check harness for communication system of component shown by sub code.
DA	No Response to ON/OFF Instruction	No response is identified when changing mode (audio and visual mode change). Sound and picture does not change by button operation.	・Check harness for power supply system of component shown by sub code. ・Check harness for communication system of component shown by sub code. ・If error occurs again, replace component shown by sub code.
DB *1	Mode Status Error	Dual alarm is detected.	・Check harness for power supply system of component shown by sub code. ・Check harness for communication system of component shown by sub code.
DC *3	Transmission Error	Transmission to component shown by auxiliary code has been failed. (Detecting this DTC does not necessarily mean actual failure.)	If same sub code is recorded in other component, check harness for power supply and communication system of all components shown by code. (If not, delete DTC and recheck.)
DD *4	Master Reset (Momentary Interruption)	After the engine was started, master component was disconnected from system.	・Check harness for power supply system of radio receiver assy. ・Check harness for communication system of radio receiver assy. ・If this error occurs frequently, replace radio receiver assy.

DTC	Diagnosis item	Diagnosis content	Countermeasure and inspected parts
DE *4	Slave Reset (Momentary Interruption)	After the engine was started, component shown by sub code was disconnected from system.	⋊Check harness for power supply of component shown by sub code. ⋊Check harness for communication system of component shown by sub code.
DF *4	Master Error	Due to defective cognition of component with a display, master function is switched to audio equipment. Error occurs in communication between sub-master (audio) and master component.	⋊Check harness for power supply of radio receiver assy. ⋊Check harness for communication system of radio receiver assy. ⋊Check harness for communication system between radio receiver assy and sub-master component.
E0 *1	Registration Completion Instruction Error	”Registration Completion Instruction” command from master cannot be received.	Since this DTC is provided for engineering purposes, it may be detected when no actual failure exists.
E1 *1	Voice Processing Device ON Error	When the AMP device records that the AMP output does not function even while the source device operates.	⋊Check harness for power supply of radio receiver assy. ⋊Check harness for communication system of radio receiver assy.
E2	ON/OFF Instruction Parameter Error	Error occurs in ON/OFF controlling command from master component.	Replace radio receiver assy.
E3 *1	Registration Request Transmission	Registration Request command is output from component shown by sub code. Receiving Connection Check Instruction, Registration Request command is output from sub-master component.	Since this DTC is provided for engineering purposes, it may be detected when no actual failure exists.
E4 *1	Multiple Frame Abort	Multiple frame transmission is aborted.	Since this DTC is provided for engineering purposes, it may be detected when no actual failure exists.

(b) Logical address: 60 (Radio unit)

DTC	Diagnosis item	Diagnosis content	Countermeasure and inspected parts
43	AM Tuner Error	Abnormal condition of AM tuner is detected.	Replace radio receiver assy.
44	FM Tuner Error	Abnormal condition of FM tuner is detected.	Replace radio receiver assy.

(c) Logical address: 61 (Cassette unit)

DTC	Diagnosis item	Diagnosis content	Countermeasure and inspected parts
40	Mechanical Error of Media	Malfunction due to mechanical failure is identified. Either that, or cassette tape is cut or entangled.	⋊Inspect cassette tape. ⋊Replace radio receiver assy.
41	EJECT Error	Malfunction due to mechanical failure.	Replace radio receiver assy.
42	Tape caught in the radio receiver assy	Hub lock etc.	Inspect cassette tape.

(d) Logical address: 62 (CD player)

DTC	Diagnosis item	Diagnosis content	Countermeasure and inspected parts
47	Detection of high temperature	High temperature is detected in CD player.	With ignition switch off, leave vehicle in cool shaded place for a while and recheck. After deleting the DTC memory, if same code detected, replace radio receiver assy.
48	Detection of excess current	Excess current flows into CD player.	Replace radio receiver assy.

(e) Logical address: 63 (In-dash CD changer)

DTC	Diagnosis item	Diagnosis content	Countermeasure and inspected parts
51	CD changer elevator error	Mechanical error occurred during elevator operation	Replace radio receiver assy.
52	CD changer clump error	Failure in disc clamping or clamp error	Replace radio receiver assy.

2. 1F6,16C,16D (MULTI-DISPLA Y CONTROLLER SUB-ASSY)

HINT:

- *1: Even if no failure is detected, this code may be stored depending on the battery condition or voltage for starting the engine.
- *2: The code is stored 180 seconds after the power supply connector is disconnected after engine start.
- *3: The code may be stored when the engine key is turned 1 minute after engine start.
- *4: The code may be stored when the engine key is turned again after engine start.
- *5: If the device is reported as not existing during verification, check the power source circuit and AVC-LAN circuit for the device.

(a) Logical address: 01 (Communication control)

DTC	Diagnosis item	Condition	Countermeasure and inspected parts
D6 *1	Absence of Master	Component in which this code is recorded was disconnected from system with ignition switch in ACC or ON. Either that, or multi-display controller sub-assy was disconnected when this code was recorded.	・Check harness for power supply system of radio receiver assy. ・Check harness for communication system of radio receiver assy. ・Check harness for communication system between radio receiver assy and multi-display controller sub-assy.
D7 *2	Connection Check Error	Component in which this code is recorded was disconnected from system after engine start. Either that, or multi-display controller sub-assy was disconnected when this code was recorded.	・Check harness for power supply system of radio receiver assy. ・Check harness for communication system of radio receiver assy. ・Check harness for power supply of multi-display controller sub-assy. ・Check harness for communication system of multi-display controller sub-assy.
DC *2 *5	Transmission Error	Transmission to component shown by sub-code failed. (This code does not necessarily mean actual failure.)	If same sub-code is recorded in other component(s), check harness for power supply and communication system of all components shown by code.
DD *3	Master Reset (Momentary Interruption)	Master component was disconnected after engine start.	・Check harness for power supply system of radio receiver assy. ・Check harness for communication system of radio receiver assy. ・Check harness for power supply of multi-display controller sub-assy. ・Check harness for communication system of multi-display controller sub-assy. ・If error occurs frequently, replace radio receiver assy.
DF *4	Master Error	Due to defective condition of component with a display, master function is switched to audio equipment. Error occurs in communication between sub-master (audio) and master component.	・Check harness for power supply of radio receiver assy. ・Check harness for communication system of radio receiver assy. ・Check harness for communication system between multi-display controller sub-assy and radio receiver assy.
E0 *1	Registration Completion Instruction Error	”Registration Completion Instruction” command from master cannot be received.	Since this DTC is provided for engineering, it may be detected when no actual failure exists.
E2	ON/OFF Instruction Parameter Error	Error occurs in ON/OFF controlling command from radio receiver assy.	Replace radio receiver assy.

DTC	Diagnosis item	Condition	Countermeasure and inspected parts
E3 *1	Registration Request Transmission	・Registration Request command is output from slave component. ・Registration Request command is output from sub-master component.	Since this DTC is provided for engineering, it may be detected when no actual failure exists.
E4	Multiple Frame Abort	Multiple frame transmission is aborted.	Since this DTC is provided for engineering purpose, it may be detected when no actual failure exists.

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HOW TO PROCEED WITH TROUBLESHOOTING

1	VEHICLE BROUGHT TO WORKSHOP

2	CUSTOMER PROBLEM ANALYSIS (SEE PAGE 05-1617)

3	BASIC INSPECTION

(a) Basic inspection.
  (1) Check the battery voltage.
  Standard: 11 to 14 V
(b) Check the power supply to the radio receiver assy.
  (1) Turn the ignition switch to the ACC position.
  (2) Check whether or not the display appears on the radio receiver assy.

DISPLAY DOES NOT APPEAR (PROCEED TO PROBLEM SYMPTOM TABLE) (SEE PAGE 05-1632)	
DISPLAY APPEARS (GO TO STEP 4)	

4	DTC CHECK (SEE PAGE 05-1618)

HINT:
If the audio system is equipped with a multi-display, check DTCs in the NAVIGATION SYSTEM section(see page 05-1757).

DTC IS OUTPUT (GO TO STEP 9)	
DTC IS NOT OUTPUT (GO TO STEP 10)	

5	DTC CHART (SEE PAGE 05-1624)

GO TO STEP 12	

6	PROBLEM SYMPTOMS TABLE (SEE PAGE 05-1632)

7	CIRCUIT INSPECTION AND PART INSPECTION (SEE PAGE 05-1634 - 05-1688)

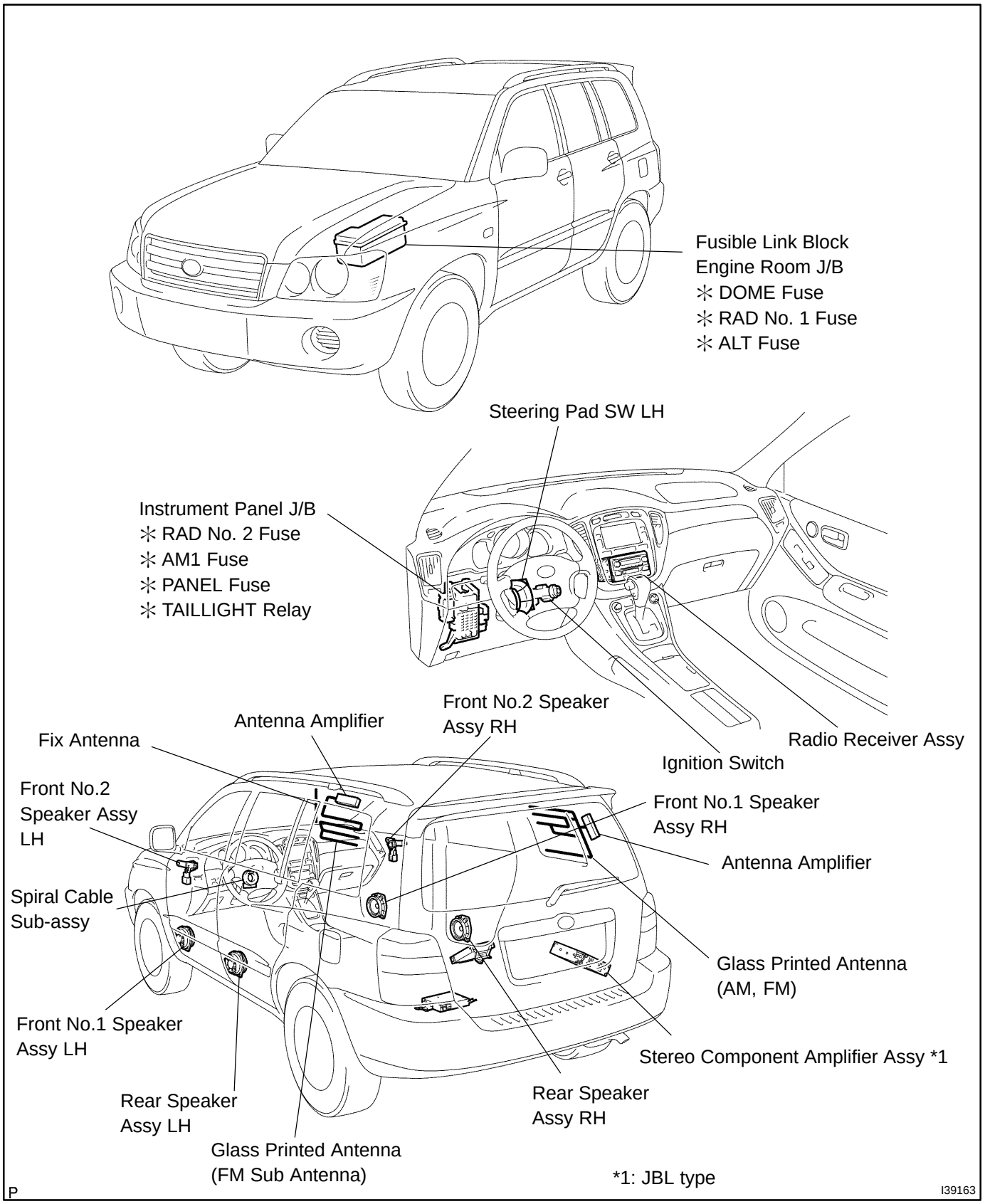
8	IDENTIFICATION OF PROBLEM

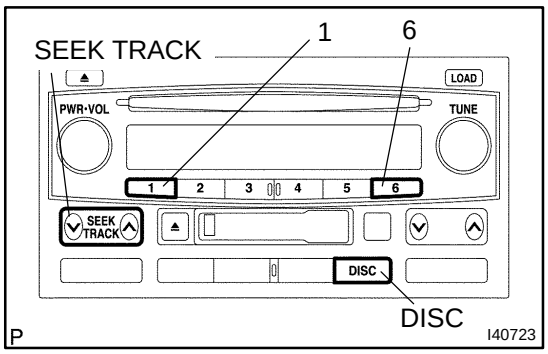
9	CONFIRMATION TEST

END

055LK-11

LOCATION





055LI-10

PRE-CHECK

1. DIAGNOSTIC CHECK

(a) Starting Diagnostic Mode (All elements come on during the SW check mode.)

(1) Turn off the audio system and turn the ignition switch to the ACC position. While pressing the preset switches ”1” and ”6” at the same time, press the ”DISC” 3 times.

(2) Reference:

- When the system enters the Diagnosis Mode, beep sound is emitted 3 times and all the elements come on during the SW check mode.
- It takes about 40 seconds to complete the check.
- Turn all the elements in the LCD on.
- When pressing the switch, confirm beep sound is emitted.
- Press the ”SEEK TRACK UP” switch to enter the ”Service Check Screen”.

(b) Service Check Screen

(1) Reference:

In the service check mode, the system check and the diagnostic memory check are performed, and the check results are displayed in ascending order of the component codes (physical address).

Terms	Meaning
Component code (Physical address)	Three-digit code (in hexadecimal) given to each device comprising AVC-LAN. Corresponding to its function, individual symbol is provided.
Logical address	Two-digit code (in hexadecimal) given to each function and device unit in each device comprising AVC-LAN.

Code No. (physical address) List

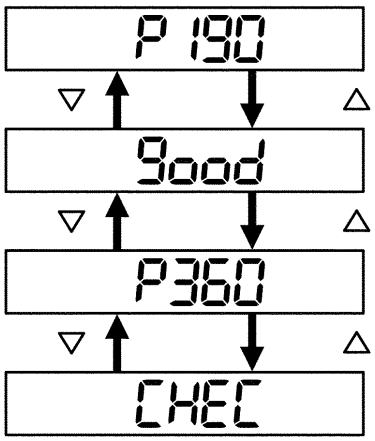
Code No. (physical address)	Equipment name
190	Radio receiver assy (Audio head unit)
1F6, 16C	Multi-display Controller Sub-assy

(c) Finishing Diagnostic Mode

(1) Press the ”DISC” switch for 2 seconds or more, or turn the ignition switch off.

(d) Service Check Mode Result Display (for checking the current and the past system conditions).

(1) Press the ”SEEK TRACK” switch to see the check result of each component.



P---indicates physical address.
190---physical address

good---”The component is normal”.

P---indicates physical address.
360---physical address

CHEC---”Check needed”.

△ : SEEK TRACK UP

▽ : SEEK TRACK DOWN

The illustration shows the case that the system has 2 components with codes 190 and 360, and one component (code 360) requires a check.
The check result is displayed in ascending order of component code. The component device code is displayed first, and then the check result follows.

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(2) Check Result Display.

Display	Original Language	Meaning	Action to be taken
good	Good (normal)	No DTCs are detected in both ”System Check Mode” and ”Diagnostic Memory Mode”.	-
NCON	No connection	The system recognized the component when it was registered, but the component gives no response to the ”Diagnostic Mode ON Request”.	Check the power source circuit and the communication circuit of the component indicated by the component code (physical address).
ECHN	Exchange	One or more DTCs for ”Exchange” are detected in either ”System Check Mode” or ”Diagnostic Memory Mode”.	Go to the detailed information mode to check the trouble area referring to the DTC list.
CHEC	Check	When no DTCs are detected for ”Exchange”, one or more DTCs for ”Check” are detected in either ”System Check Mode” or ”Diagnostic Memory Mode”.	Go to the detailed information mode to check the trouble area referring to the DTC list.

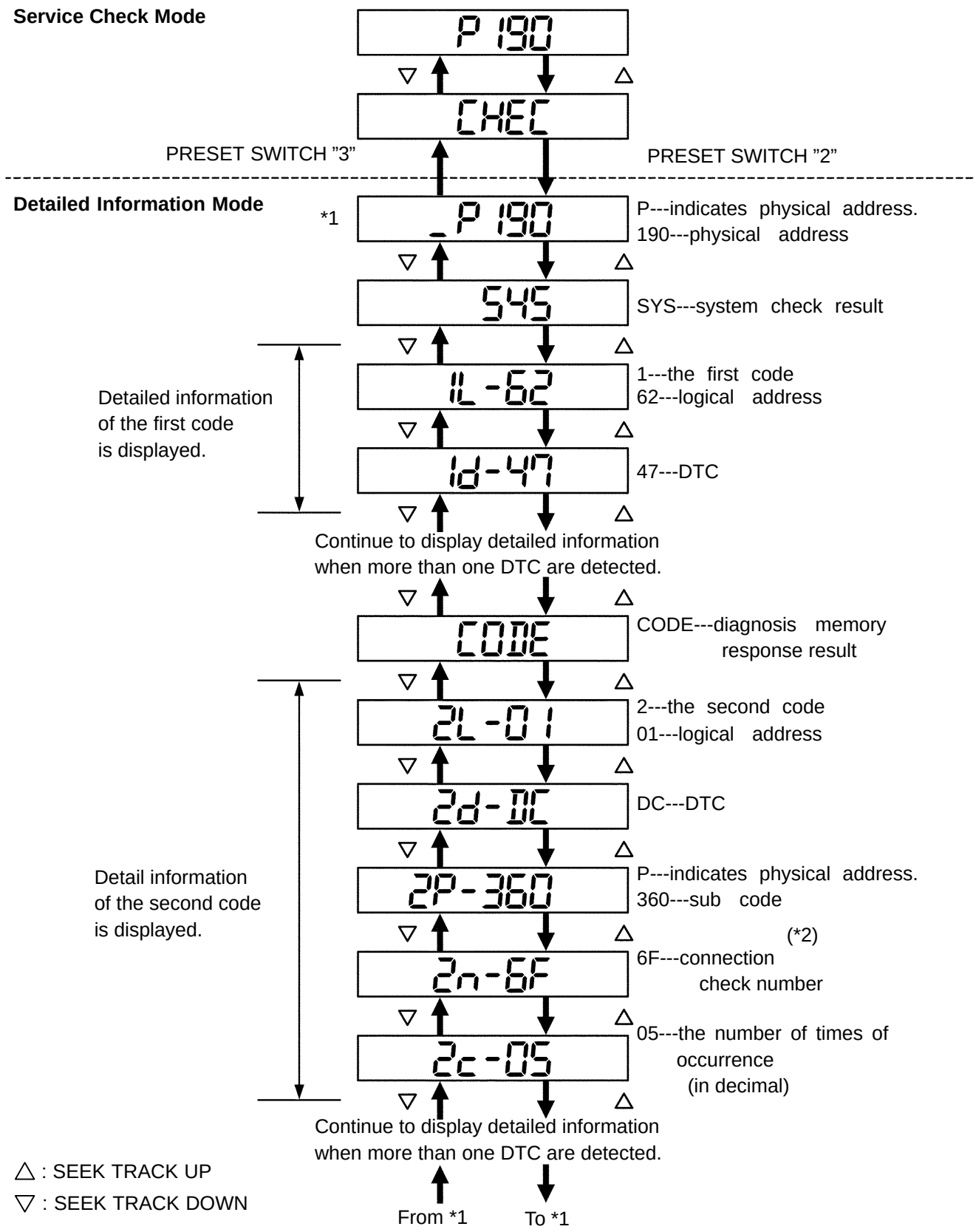
Display	Original Language	Meaning	Action to be taken
OLD	Old version	Old DTC application is identified and DTC is detected in either ”System Check Mode” or ”Diagnostic Memory Mode”.	-
NRES	No response	The device gives no response to any one of ”System Check Mode ON Request”, ”System Check Result Request” and ”Diagnostic Memory Request”.	Check the power source circuit and the communication circuit of the component indicated by the component code (physical address).

(3) To perform the Service Check again, press the preset switch ”1”.

(e) Detailed Information Mode (when displaying the DTC for a trouble component)

(1) With ”CHEC” or ”ECHN” being displayed, press the preset switch ”2” to go to the detailed information mode.

(2) Press the ”SEEK TRACK” switch to display the ”System Check Result (SYS)” and ”Diagnostic Memory Response (CODE)”.



The illustration shows the case that the component with code 190 has DTC "47" and "dC" as a result of the system check and the diagnostic memory response.
The detailed information mode shows the system check result first, then the diagnostic memory response result follows. (*2): As for the DTCs that do not have any sub code, sub code is not displayed.

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(3) Displayed Items in Detailed Information Mode

Division Code for DTC display	Meaning	The order of detailed information displayed when the "TUNE UP" switch is pressed (The order is reversed when the "TUNE DOWN" switch is pressed.)
SYS	System check result is displayed.	Logical address → DTC
CODE	Diagnostic memory check result is displayed.	Logical address→ DTC→ Sub code→ Connection confirmation number→ The number of times of occurrence

(4) Check the trouble area referring to the DTC list.

(5) To return to the service check mode, press the preset switch "3".

(f) Clearing Individual DTC Memory (when clearing the memory of the DTC detected in the past individually)

(1) Press the preset switch "5" for 2 seconds or more while the "ECHN" is displayed in the service check mode or during the detailed information mode.

HINT:

* A beep sound is emitted once when the DTC memory is completely cleared.
* When the DTC memory is cleared, only the component code (physical address) is displayed for the target component.
* To check DTCs, press the preset switch "1" and perform the service check again.

(g) Clearance of all the DTC memory (when clearing all the memory of the DTCs detected in the past)

(1) Start the diagnostic mode after repairing the trouble area.

(2) Press the preset switch "5" for 2 seconds or more. ("CLR" is displayed at this time.)

HINT:

* A beep sound is emitted once when the DTC memory is completely cleared.
* When the DTC memory for all the component is cleared, only the component codes (physical address) are displayed.

(3) Press the preset switch "1" to perform the service check again, and check that no DTCs are displayed for all the component codes (physical address).

2. IDENTIFICATION OF NOISE SOURCE

(a) Identify the condition in which the noise occurs, and check the noise filter on the related part.

Condition in which noise occurs	Noise Source
Depressing the acceleration pedal increases the noise, and stopping the engine stops the noise immediately.	Generator
Noise occurs during A/C or the heater operation.	Blower motor
Rapid acceleration while driving on an unpaved road or after the ignition switch is turned on makes noise.	Fuel pump
Pressing and then releasing the horn switch, and keeping pressing the horn switch makes unusual noise.	Horn
Quiet noise is heard while the engine is running, but stops with the engine.	Ignition
Noise occurs synchronously with the turn signal flash.	Flasher
Noise occurs during the window washer operation.	Washer
Noise occurs during the engine running, and it continues even after the engine stops.	Engine coolant temperature sensor
Noise occurs during the wiper operation.	Wiper
Noise occurs when the brake pedal is depressed.	Stop light switch
Others	Static electricity stored on the vehicle

(b) Reference:

- ⁎ Make sure first that there is no noise from outside. Failing to do so makes the noise source detection difficult and leads to misunderstanding.
- ⁎ The noise should be removed in descending order of loudness.
- ⁎ Turning the radio so that no station is received makes the noise more noticeable, making the recognition of the phenomenon easier.

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PROBLEM SYMPTOMS TABLE

RADIO RECEIVER ASSY

Symptom	Suspect Area	See page
Pressing power switch does not start system.	5. Power source circuit (radio receiver assy) 6. Radio receiver assy	05-1634 67-6
All switches do not respond.	1. Steering pad switch circuit 2. Radio receiver assy	05-1643 67-6
Turning on light switch does not light up night time illumination of radio receiver.	1. Illumination circuit 2. Radio receiver assy	05-1647 67-6
All sound can not be heard.	1. Power source circuit (radio receiver assy) 2. Power source circuit (stereo component amplifier assy) *1 3. AMP sound signal circuit (radio receiver assy - AMP) *1 4. Speaker circuit 5. AMP mute signal circuit (from radio receiver assy) *1 6. Stereo component amplifier assy *1 7. Radio receiver assy	05-1634 05-1638 05-1669 05-1657 05-1651 67-20 67-6
Front speaker (driver side) only is not heard. (volume is too low)	1. Power source circuit (radio receiver assy) 2. Power source circuit (stereo component amplifier assy) *1 3. Speaker circuit (driver side speaker) *2 4. AMP sound signal circuit (radio receiver assy - AMP) *1 5. Stereo component amplifier assy *1 6. Radio receiver assy	05-1634 05-1638 05-1664 05-1669 67-20 67-6
Sound quality is bad in all modes. (volume is too low)	1. Power source circuit (radio receiver assy) 2. Power source circuit (stereo component amplifier assy) *1 3. Speaker circuit 4. AMP sound signal circuit (radio receiver assy - AMP) *1 5. Sound quality is bad in all modes (volume is too low) 6. Stereo component amplifier assy *1 7. Radio receiver assy	05-1634 05-1638 05-1657 05-1669 05-1673 67-20 67-6
Sound quality is bad or sound is not heard. (RSE sound)	1. Power source circuit (radio receiver assy) 2. Power source circuit (multi-display controller sub-assy) 3. AVC-LAN circuit (multi-display controller sub-assy - radio receiver assy) 4. RSE sound signal circuit (multi-display controller sub-assy - radio receiver assy) 5. Mute signal circuit (from multi-display controller sub-assy) 6. Radio receiver assy 7. Multi-display controller sub-assy	05-1634 05-1641 05-1688 05-1671 05-1654 67-6 67-23
Noise occurs.	-	05-1674
Radio broadcast cannot be received. (bad reception)	-	05-1675
CD cannot be inserted or is ejected right after insertion.	1. Power source circuit (radio receiver assy) 2. CD cannot be inserted or is ejected right after insertion	05-1634 05-1678
CD cannot be ejected.	1. Power source circuit (radio receiver assy) 2. CD cannot be ejected	05-1634 05-1680
Sound quality is bad only when playing CD. (volume is too low)	-	05-1681
CD sound skips.	-	05-1682
Cassette tape cannot be inserted or played.	1. Power source circuit (radio receiver assy) 2. Cassette tape cannot be inserted or played	05-1634 05-1684

Cassette tape cannot be ejected.	1. Power source circuit (radio receiver assy) 2. Cassette tape cannot be ejected	05-1634 05-1685
Sound quality is bad only when playing tape.	-	05-1686
Tape is tangled due to incorrect tape speed or auto-reverse malfunction.	-	05-1687

*1: JBL type
*2: w/ Navigation System

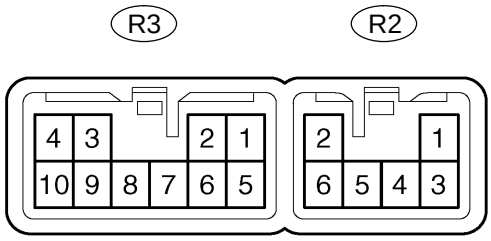
STEERING PAD SWITCH

Symptom	Suspect Area	See page
A audio system cannot be operated with steering pad switch	1. Steering pad switch circuit 2. Radio receiver assy	05-1643 67-6

05IRI-01

TERMINALS OF ECU

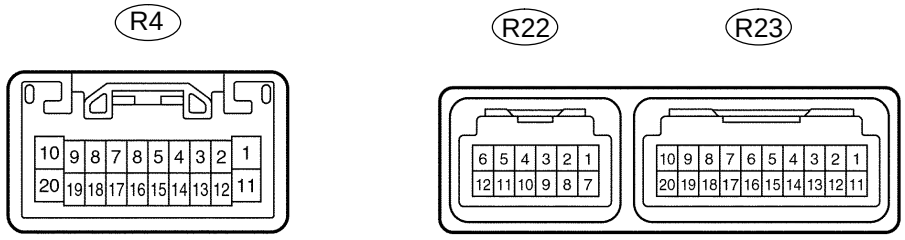
1. RADIO RECEIVER ASSY (STANDARD TYPE)



I40196

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specification
RR+ (R2-1) - GND (R3-7)	R - BR	Sound signal (Rear Right)	Audio system is sounding	-
RL+ (R2-2) - GND (R3-7)	B - BR	Sound signal (Rear Left)	Audio system is sounding	-
RR- (R2-3) - GND (R3-7)	W - BR	Sound signal (Rear Right)	Audio system is sounding	-
ILL- (R2-5) - Body ground	W - Body ground	Illumination (rheostat) signal	Light control switch TAIL or HEAD	10 to 14 V
RL- (R2-6) - GND (R3-7)	Y - BR	Sound signal (Real Left)	Audio system is sounding	-
FR+ (R3-1) - GND (R3-7)	LG - BR	Sound signal (Front Right)	Audio system is sounding	-
FL+ (R3-2) - GND (R3-7)	P - BR	Sound signal (Front Left)	Audio system is sounding	-
ACC+B (R3-3) - GND (R3-7)	GR - BR	Accessory (ON)	Turn Ignition switch OFF → ACC or ON	Below 1V → 10 to 14 V
BU+B (R3-4) - GND (R3-7)	L-B - BR	Battery	Always	10 to 14 V
FR- (R3-5) - GND (R3-7)	L - BR	Sound signal (Front Right)	Audio system is sounding	-
FL- (R3-6) - GND (R3-7)	V - BR	Sound signal (Front Left)	Audio system is sounding	-
GND (R3-7) - Body ground	BR - Body ground	Ground	Always	Below 1 Ω
ILL+ (R3-10) - GND (R3-7)	G - BR	Illumination (rheostat) signal	Light control switch TAIL or HEAD	10 to 14 V

2. RADIO RECEIVER ASSY (JBL TYPE)



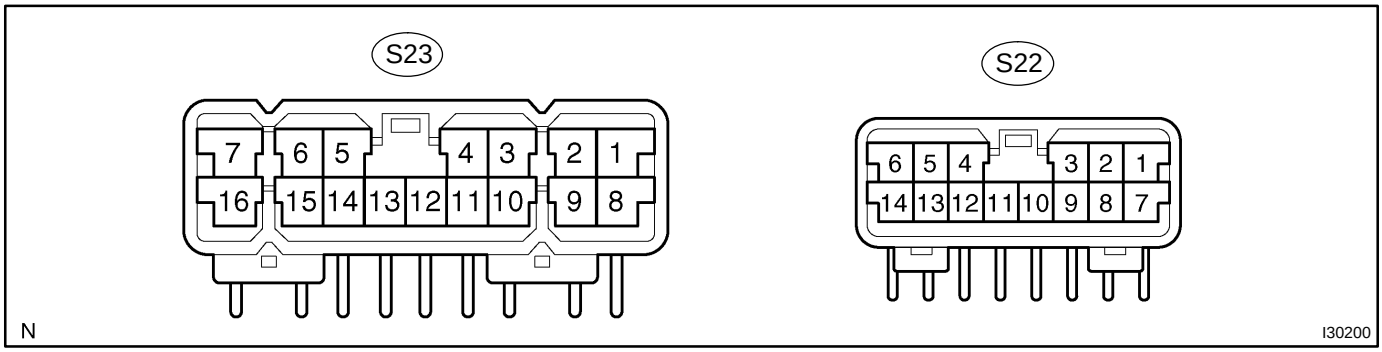
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I40207

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specification
B (R4-1) - GND (R4-20)	L-B - BR	Battery	Always	10 to 14 V
ILL+ (R4-2) - GND (R4-20)	G - BR	Illumination (rheostat) signal	Light control switch TAIL or HEAD	10 to 14 V
AMP+ (R4-3) - GND (R4-20)	V - BR	Stereo component amplifier assy control signal	Turn Ignition switch OFF → ACC or ON	Below 1V → 10 to 14 V
MUTE (R4-7) - GND (R4-20)	BR - BR	MUTE signal	Audio system is sounding → changing	Above 3.5 V → Below 1 V
FR+ (R4-8) - GND (R4-20)	W - BR	Sound signal (Front Right)	Audio system is sounding	-
FL+ (R4-9) - GND (R4-20)	B - BR	Sound signal (Front Left)	Audio system is sounding	-

SLD (R4-10) - Body ground	Shielded - Body ground	Shield ground	Always	Below 1 Ω
ACC (R4-11) - GND (R4-20)	GR - BR	Accessory	Turn Ignition switch OFF → ACC or ON	Below 1V → 10 to 14 V
ILL- (R4-12) - GND (R4-20)	W - BR	Illumination (rheostat) signal	Light control switch TAIL or HEAD	10 to 14 V
ANT+ (R4-13) - GND (R4-20)	O - BR	Power source of antenna	See "Service Check Mode"	-
S.GND (R4-16) - Body ground	Y - Body ground	Shield ground	Always	Below 1 Ω
BEEP (R4-17) - GND (R4-20)	L - BR	Beep sound signal	Audio system is sounding	-
RR+ (R4-18) - GND (R4-20)	G - BR	Sound signal (Rear Right)	Audio system is sounding	-
RL+ (R4-19) - GND (R4-20)	R - BR	Sound signal (Rear Left)	Audio system is sounding	-
GND (R4-20) - Body ground	BR - Body ground	Ground	Always	Below 1 Ω
R+ (R22-2) - GND (R4-20)	B - BR	Sound signal (Right)	RSE system is sounding	-
R- (R22-3) - GND (R4-20)	W - BR	Sound signal (Right)	RSE system is sounding	-
L+ (R22-4) - GND (R4-20)	R - BR	Sound signal (Left)	RSE system is sounding	-
L- (R22-5) - GND (R4-20)	G - BR	Sound signal (Left)	RSE system is sounding	-
MUTE (R22-6) - GND (R4-20)	P - BR	MUTE signal	RSE system is sounding → changing	Above 3.5 V → Below 1 V
TX1+ (R23-9) - GND (R4-20)	Y - BR	AVC - LAN communication signal	Turn Ignition switch to ACC	2 to 3 V
TX1- (R23-10) - GND (R4-20)	L - BR	AVC - LAN communication signal	Turn Ignition switch to ACC	2 to 3 V

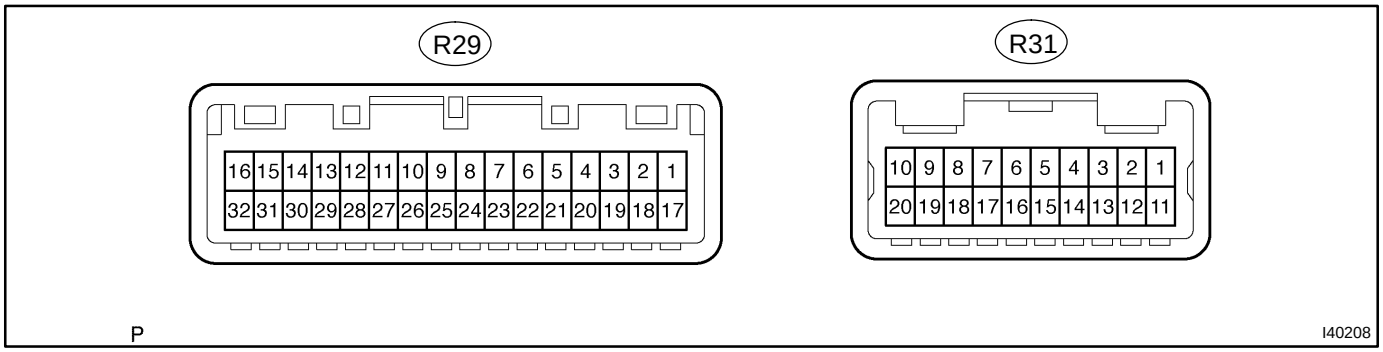
3. STEREO COMPONENT AMPLIFIER ASSY (JBL TYPE)



Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specification
AMP+ (S22-1) - GND (S23-12)	P - W-B	Stereo component amplifier assy control signal	Radio switch is ON	10 to 14 V
ACC (S22-2) - GND (S23-12)	G - W-B	Accessory (ON)	Turn Ignition switch OFF → ACC or ON	Below 1V → 10 to 14 V
BEEP (S22-4) - GND (S23-12)	L - W-B	Beep sound signal	Audio system is sounding	-
F.L (S22-5) - GND (S23-12)	B - W-B	Sound signal (Front Left)	Audio system is sounding	-
F.R (S22-6) - GND (S23-12)	W - W-B	Sound signal (Front Right)	Audio system is sounding	-
SGND (S22-11) - Body ground	Y - Body ground	Shield ground	Always	Below 1 Ω
MUTE (S22-12) - GND (S23-12)	BR - W-B	MUTE signal	Audio system is sounding → changing	Above 3.5 V → Below 1 V
R.L (S22-13) - GND (S23-12)	R - W-B	Sound signal (Rear Left)	Audio system is sounding	-
R.R (S22-14) - GND (S23-12)	G - W-B	Sound signal (Rear Right)	Audio system is sounding	-
FR+ (S23-1) - GND (S23-12)	LG - W-B	Sound signal (Front Right)	Audio system is sounding	-
FL+ (S23-2) - GND (S23-12)	Y - W-B	Sound signal (Front Left)	Audio system is sounding	-
RR+ (S23-3) - GND (S23-12)	R - W-B	Sound signal (Rear Right)	Audio system is sounding	-
RL+ (S23-4) - GND (S23-12)	GR - W-B	Sound signal (Rear Left)	Audio system is sounding	-
+B (S23-7) - GND (S23-12)	R-Y - W-B	Battery	Always	10 to 14 V

FR- (S23-8) - GND (S23-12)	L - W-B	Sound signal (Front Right)	Audio system is sounding	-
FL- (S23-9) - GND (S23-12)	R-Y - W-B	Sound signal (Front Left)	Audio system is sounding	-
RR- (S23-10) - GND (S23-12)	G - W-B	Sound signal (Rear Right)	Audio system is sounding	-
RL- (S23-11) - GND (S23-12)	LG - W-B	Sound signal (Rear Left)	Audio system is sounding	-
GND (S23-12) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω

4. MULTI-DISPLA Y CONTROLLER SUB-ASSY



Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specification
L- (R29-7) - GND (R29-29)	G - W-B	Sound signal (Left)	RSE system is sounding	-
L+ (R29-8) - GND (R29-29)	R - W-B	Sound signal (Left)	RSE system is sounding	-
R- (R29-9) - GND (R29-29)	W - W-B	Sound signal (Right)	RSE system is sounding	-
R+ (R29-10) - GND (R29-29)	B - W-B	Sound signal (Right)	RSE system is sounding	-
SG1 (R29-11) - Body ground	Shielded - Body ground	Shield ground	Always	Below 1 Ω
LMUT (R29-12) - GND (R29-29)	V - W-B	MUTE signal	RSE system is sounding → changing	Above 3.5 V → Below 1 V
+B1 (R29-16) - GND (R29-29)	Y - W-B	Battery	Always	10 to 14 V
GND (R29-29) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
TX- (R29-30) - GND (R29-29)	GR - W-B	AVC - LAN communication signal	Turn Ignition switch to ACC	2 to 3 V
TX+ (R29-31) - GND (R29-29)	LG - W-B	AVC - LAN communication signal	Turn Ignition switch to ACC	2 to 3 V
ACC (R29-32) - GND (R29-29)	G - W-B	Accessory (ON)	Turn Ignition switch OFF → ACC or ON	Below 1V → 10 to 14 V
SELD (R31-7) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω

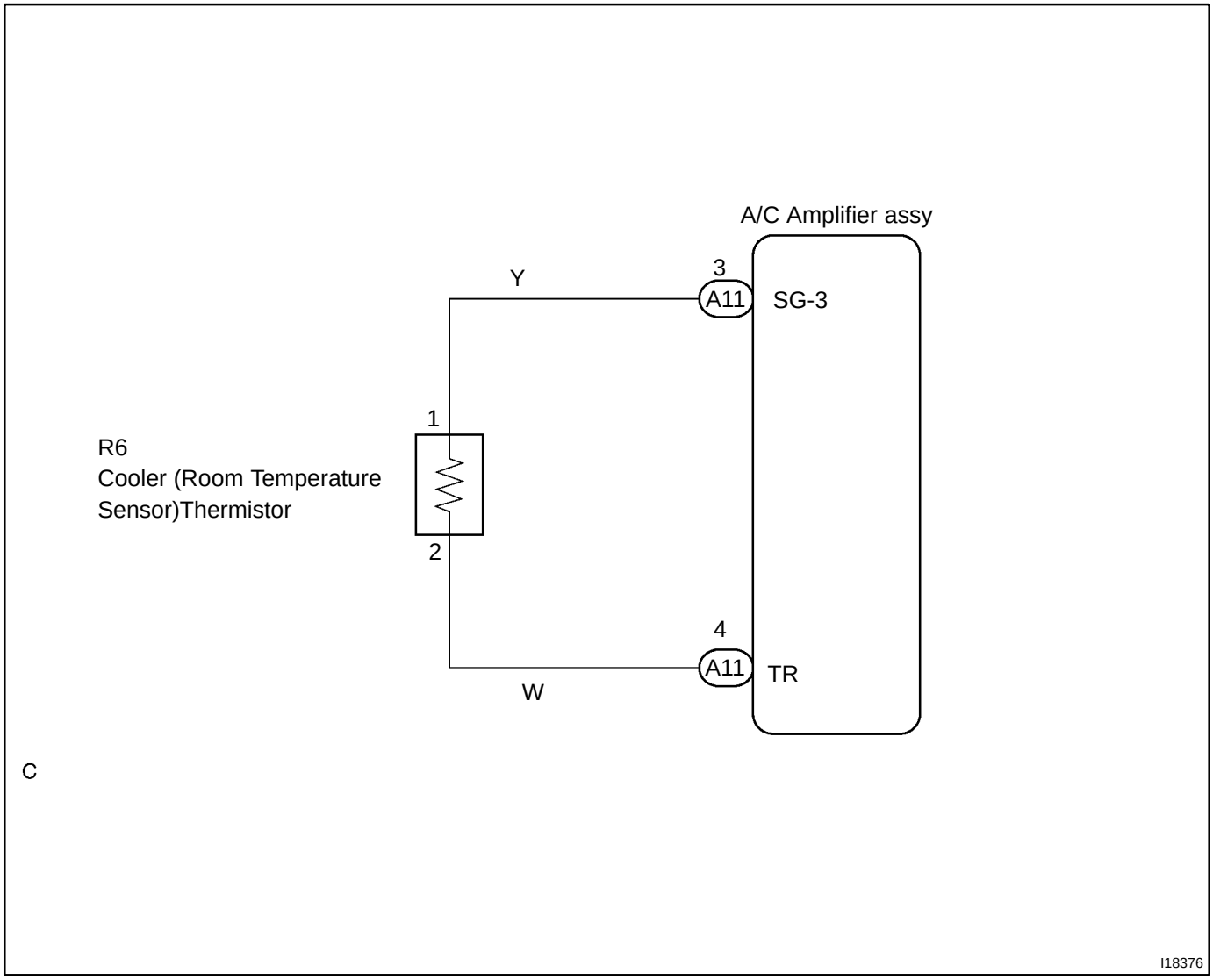
DTC B1411/11 ROOM TEMPERATURE SENSOR CIRCUIT

CIRCUIT DESCRIPTION

This sensor detects the temperature inside the cabin and sends the appropriate signals to the A/C amplifier assy.

DTC No.	Detection item	Trouble Area
B1411/11	Open or short in room temperature sensor circuit	・Cooler (room temperature sensor) thermistor ・Harness or connector between cooler (room temperature sensor) thermistor and A/C amplifier assy ・A/C amplifier assy

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

In case of using the hand-held tester, start the inspection step 1 and in case of not using the hand-held tester, start from step 2.

1 READ VALUE OF HAND-HELD TESTER

(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester main switch ON.
(c) Select the items below in the DATA LIST,and read the displays on the hand-held tester.

A C:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
ROOM TEMP	Room temperature sensor /min.: -6.5°C (20.3°F) max.: 57.25°C (135.05°F)	Actual room temperature	-

Result:

NG	A
OK (Checking from the DTC)	B
OK (Checking from the PROBLEM SYMPTOM TABLE)	C

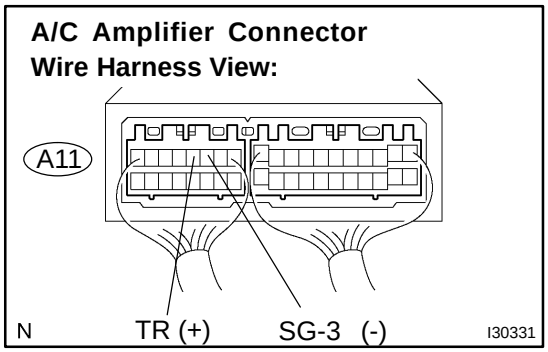
B → **REPLACE AIRCONDITIONER AMPLIFIER ASSY**

C → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-1 129)**

A

2 INSPECT AIRCONDITIONER AMPLIFIER ASSY(TR, SG-3)

A/C Amplifier Connector Wire Harness View:



(a) Remove A/C amplifier assy with connectors still connected.
(b) Turn the ignition switch to the ON position.
(c) Measure the voltage according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
A11-3 (SG-3) - A11-4 (TR)	at 25°C (77°F)	1.8 to 2.2 V
A11-3 (SG-3) - A11-4 (TR)	at 40°C (104°F)	1.2 to 1.6 V

HINT:

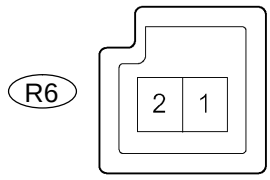
As the temperature increases, the voltage decreases.

OK → **REPLACE AIRCONDITIONER AMPLIFIER ASSY**

NG

3 INSPECT COOLER (ROOM TEMP. SENSOR) THERMISTOR

Cooler Thermistor Connector Front View:



H I30111

(a) Remove cooler (room temperature sensor) thermistor.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

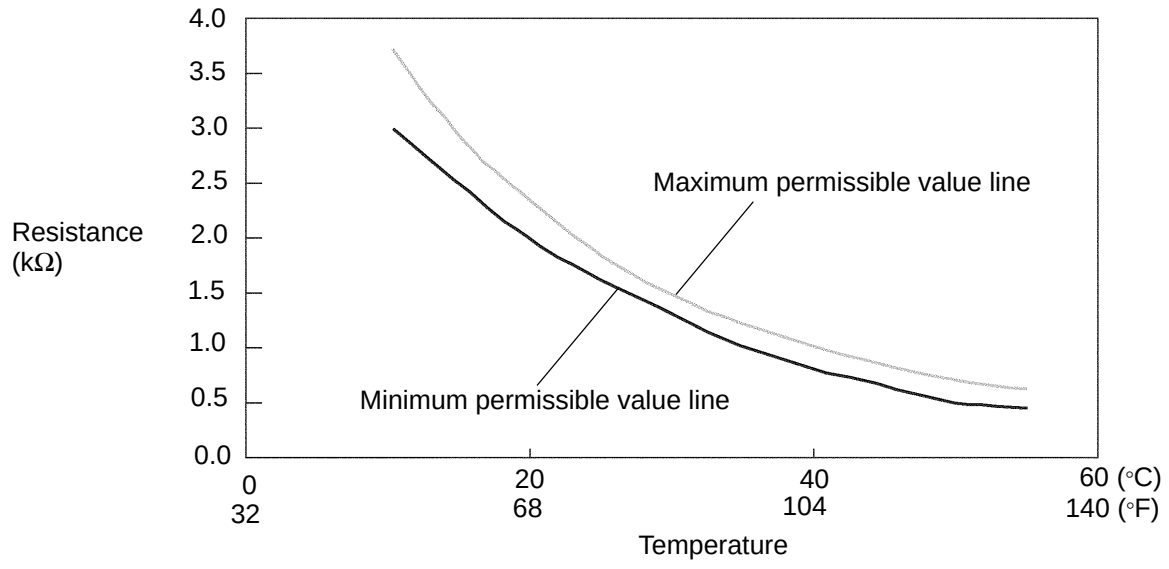
Tester connection	Condition	Specified condition
R6-1 - R6-2	10°C (50°F)	3.00 to 3.73 kΩ
R6-1 - R6-2	15°C (59°F)	2.45 to 2.88 kΩ
R6-1 - R6-2	20°F (68°F)	1.95 to 2.30 kΩ
R6-1 - R6-2	25°C (77°F)	1.60 to 1.80 kΩ
R6-1 - R6-2	30°C (86°F)	1.28 to 1.47 kΩ
R6-1 - R6-2	35°C (95°F)	1.00 to 1.22 kΩ
R6-1 - R6-2	40°C (104°F)	0.80 to 1.00 kΩ
R6-1 - R6-2	45°C (113°F)	0.65 to 0.85 kΩ
R6-1 - R6-2	50°C (122°F)	0.50 to 0.70 kΩ
R6-1 - R6-2	55°C (131°F)	0.44 to 0.60 kΩ
R6-1 - R6-2	60°C (140°F)	0.36 to 0.50 kΩ

NOTICE:

- **Even slightly touching the sensor may change the resistance value. Be sure to hold the connector of the sensor.**
- **When measuring the sensor temperature must be the same as the ambient temperature.**

HINT:

As the temperature increases, the resistance decreases (see the chart below).



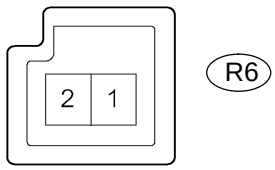
I38777
H I40673

NG	**REPLACE COOLER (ROOM TEMP. SENSOR) THERMISTOR**

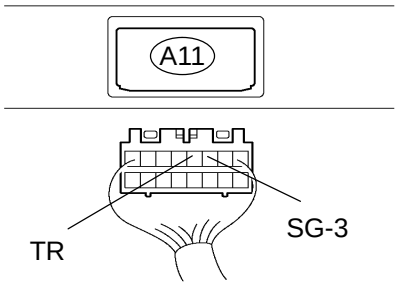
OK

4	**CHECK HARNESS AND CONNECTOR(COOLER (ROOM TEMPERATURE SENSOR) THERMISTOR - A/C AMPLIFIER ASSY)**

Cooler (Room Temperature Sensor) Thermistor Connector Front View:



A/C Amplifier Connector Wire Harness View:



(a) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
A11-4 (TR) - R6-2	Always	Below 1 Ω
A11-3 (SG-3) - R6-1	Always	Below 1 Ω
A11-4 (TR) - Body ground	Always	10 kΩ or higher
A11-3 (SG-3) - Body ground	Always	10 kΩ or higher

NG	**REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE AIRCONDITIONER AMPLIFIER ASSY

DTC B1412/12 AMBIENT TEMPERATURE SENSOR CIRCUIT

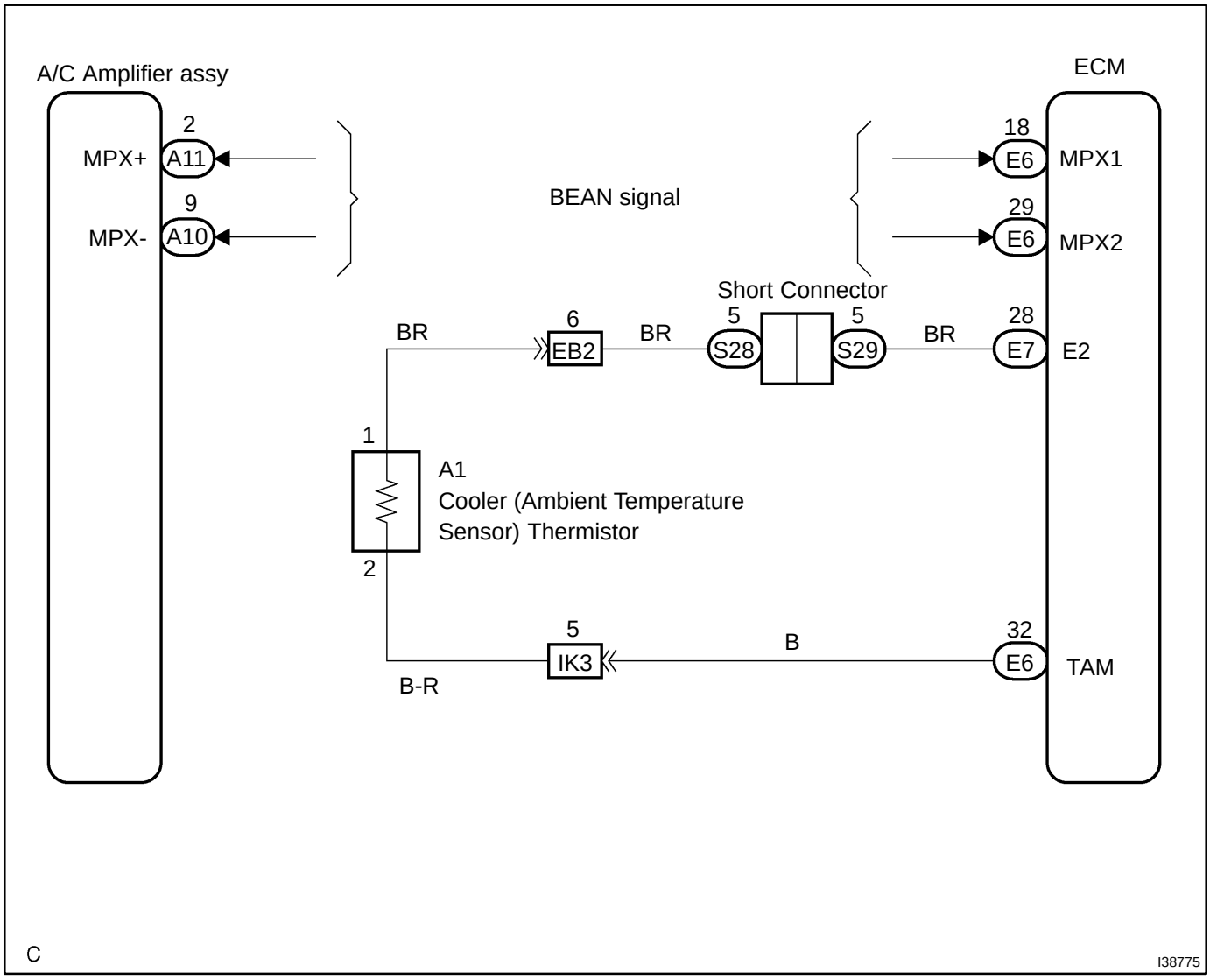
CIRCUIT DESCRIPTION

The ECM and A/C amplifier communicate via BEAN.

This sensor detects the temperature outside the cabin and sends the appropriate signals to the A/C amplifier assy.

DTC No.	Detection item	Trouble Area
B1412/12	Open or short in ambient temperature sensor circuit	・Cooler (ambient temperature sensor) thermistor ・Harness or connector between cooler (ambient temperature sensor) thermistor and ECM ・ECM ・A/C amplifier assy

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

In case of using the hand-held tester, start the inspection step 1 and in case of not using the hand-held tester, start from step 2.

1 READ VALUE OF HAND-HELD TESTER

(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester main switch ON.
(c) Select the items below in the DATA LIST, and read the displays on the hand-held tester.

A C:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
AMBI TEMP SENS	Ambient temperature sensor /min.: -23.3°C (-9.94°F) max.: 65.95°C (150.71°F)	Actual ambient temperature	-
AMBI TEMP	adjusted ambient temperature /min.: -30.8°C (-23.44°F) max.: 50.8°C (123.44°F)	Actual ambient temperature	-

Result:

NG	A
OK (Checking from the DTC)	B
OK (Checking from the PROBLEM SYMPTOM TABLE)	C

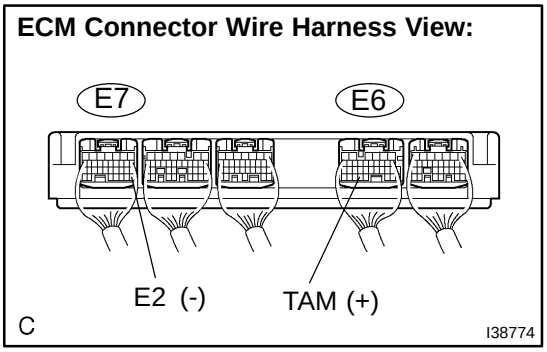
B → **REPLACE ECM**

C → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE(SEE PAGE 05-1 129)**

A

2 INSPECT ECM(TAM, E2)

ECM Connector Wire Harness View:



(a) Remove ECM with connectors still connected.
(b) Turn ignition switch ON.
(c) Measure the voltage according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
E6-32 (TAM) - E7-28 (E2)	at 25°C (77°F)	1.4 to 1.8 V
E6-32 (TAM) - E7-28 (E2)	at 40°C (104°F)	0.8 to 1.2 V

HINT:

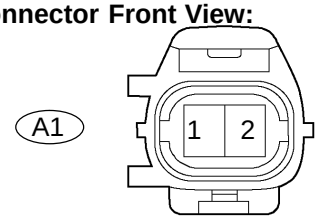
As the temperature increases, the voltage decreases.

OK → **REPLACE ECM**

NG

3 INSPECT COOLER (AMBIENT TEMP. SENSOR) THERMISTOR

Ambient Temperature Sensor Connector Front View:



H I30487

(a) Remove cooler (ambient temperature sensor) thermistor.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

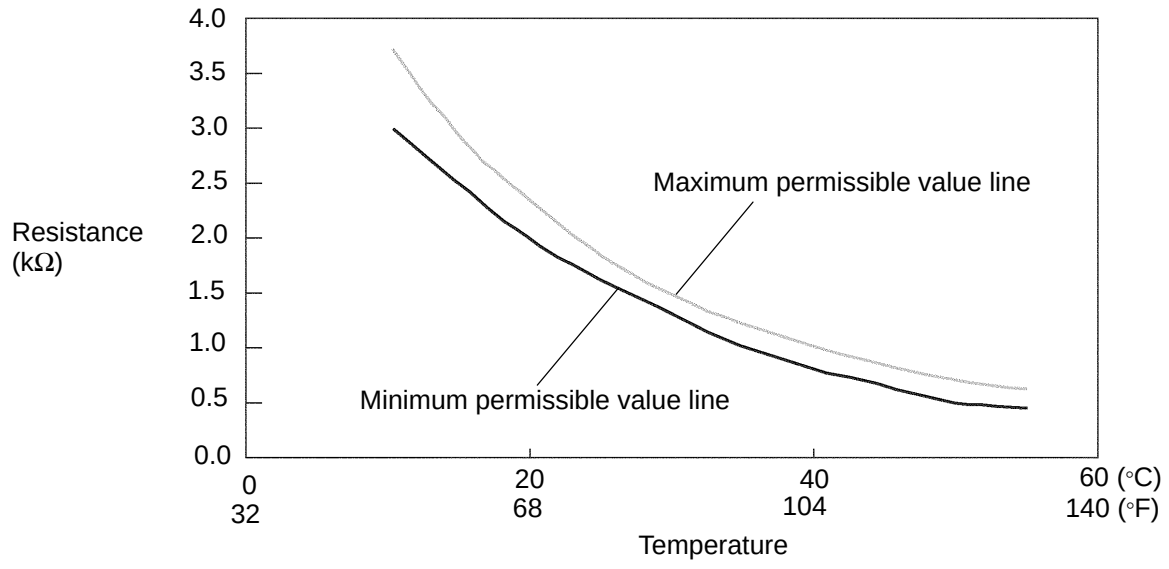
Tester connection	Condition	Specified condition
A1-1 - A1-2	10°C (50°F)	3.00 to 3.73 kΩ
A1-1 - A1-2	15°C (59°F)	2.45 to 2.88 kΩ
A1-1 - A1-2	20°F (68°F)	1.95 to 2.30 kΩ
A1-1 - A1-2	25°C (77°F)	1.60 to 1.80 kΩ
A1-1 - A1-2	30°C (86°F)	1.28 to 1.47 kΩ
A1-1 - A1-2	35°C (95°F)	1.00 to 1.22 kΩ
A1-1 - A1-2	40°C (104°F)	0.80 to 1.00 kΩ
A1-1 - A1-2	45°C (113°F)	0.65 to 0.85 kΩ
A1-1 - A1-2	50°C (122°F)	0.50 to 0.70 kΩ
A1-1 - A1-2	55°C (131°F)	0.44 to 0.60 kΩ
A1-1 - A1-2	60°C (140°F)	0.36 to 0.50 kΩ

NOTICE:

- **Even slightly touching the sensor may change the resistance value. Be sure to hold the connector of the sensor.**
- **When measuring the sensor temperature must be the same as the ambient temperature.**

HINT:

As the temperature increases, the resistance decreases (see the chart below).



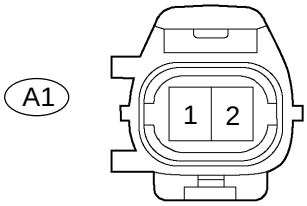
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NG	**REPLACE COOLER (AMBIENT TEMP. SENSOR) THERMISTOR**

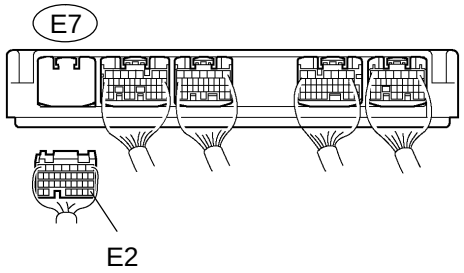
OK

4	**CHECK HARNESS AND CONNECTOR(COOLER (AMBIENT TEMPERATURE SENSOR) THERMISTOR - ECM)**

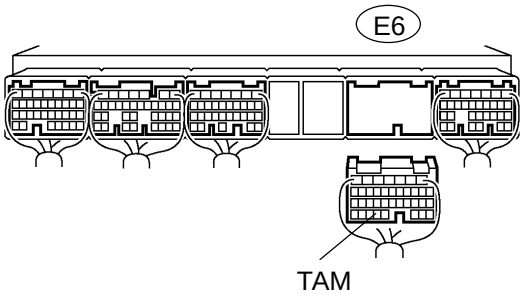
Ambient Temperature Sensor Connector Front View:



ECM Connector Wire Harness View:



ECM Connector Wire Harness View:



(a) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
E7-28 (E2) - A1-1	Always	Below 1 Ω
E6-32 (TAM) - A1-2	Always	Below 1 Ω
E7-28 (E2) - Body ground	Always	10 kΩ or higher
E6-32 (TAM) - Body ground	Always	10 kΩ or higher

NG	**REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE ECM

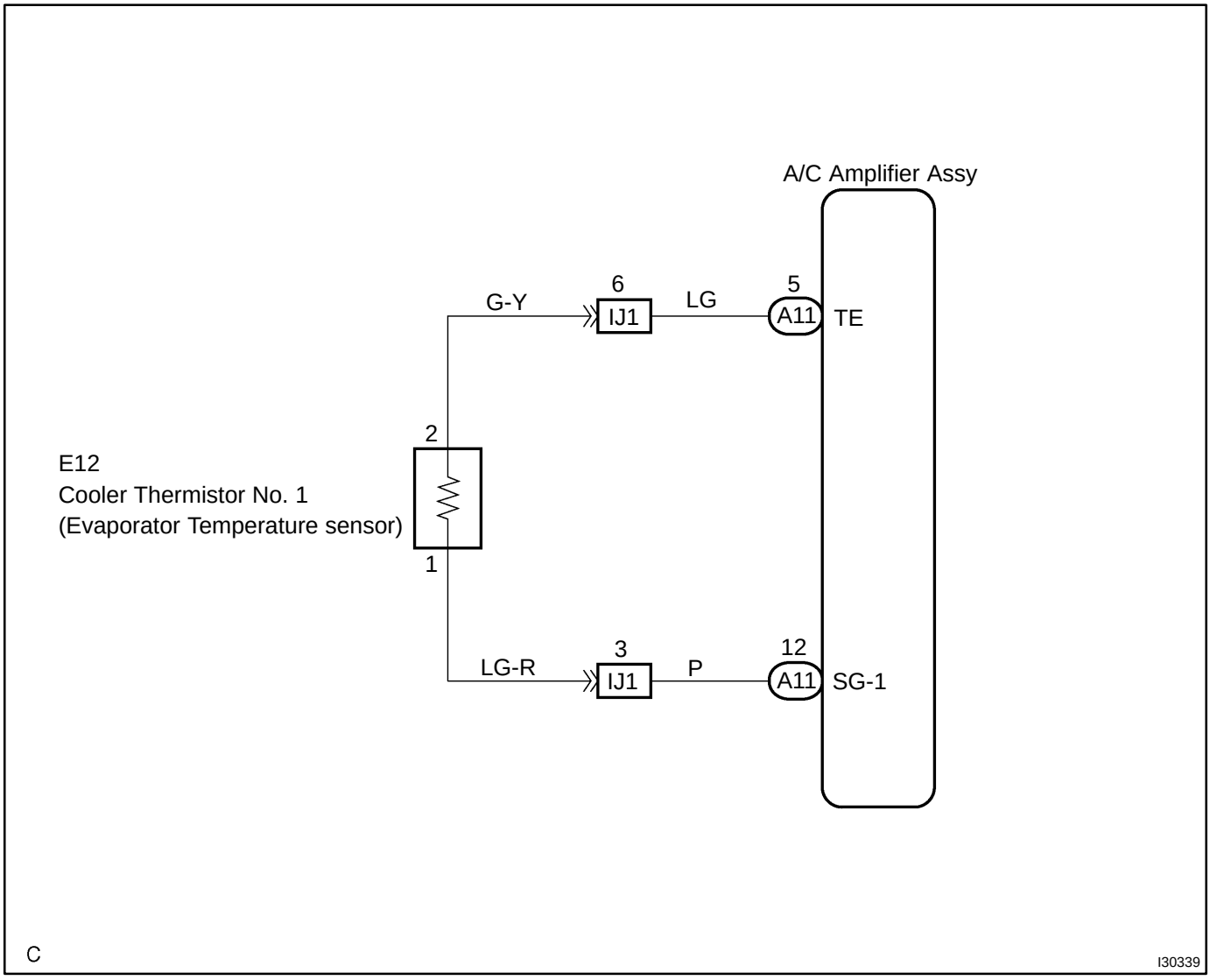
DTC B1413/13 EVAPORATOR TEMPERATURE SENSOR CIRCUIT

CIRCUIT DESCRIPTION

This sensor detects the temperature inside the cooling unit and sends the appropriate signals to the A/C amplifier assy.

DTC No.	Detection Item	Trouble Area
B1413/13	Open or short in evaporator temperature sensor circuit.	・Cooler thermistor No. 1 (Evaporator temperature sensor) ・Harness or connector between cooler thermistor No. 1 and A/C amplifier assy. ・A/C amplifier assy.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

In case of using the hand-held tester, start the inspection step 1 and in case of not using the hand-held tester, start from step 2.

1 READ VALUE OF HAND-HELD TESTER

(a) Connect the hand-held tester to DLC3.
(b) Turn the ignition switch ON and push the hand-held tester main switch ON.
(c) Select the items below in the DATA LIST, and read the displays on the hand-held tester.

A C:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
EVAP TEMP	Evaporator temperature sensor /min.: -29.7°C (-21.46°F) max.: 59.55°C (139.19°F)	Actual evaporator temperature	-

Result:

NG	A
OK (Checking from the DTC)	B
OK (Checking from the PROBLEM SYMPTOM TABLE)	C

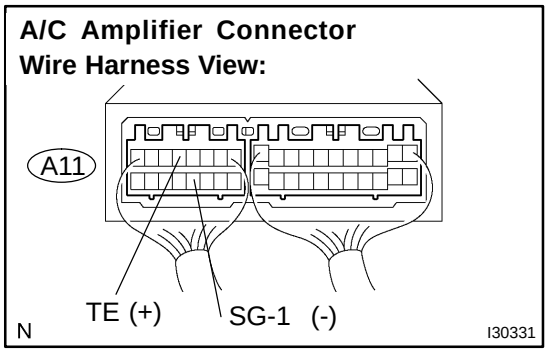
B → **REPLACE AIRCONDITIONER AMPLIFIER ASSY**

C → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE(SEE PAGE 05-1 129)**

A

2 INSPECT AIRCONDITIONER AMPLIFIER ASSY(TE, SG-1)

A/C Amplifier Connector Wire Harness View:



(a) Remove A/C amplifier assy with connectors still connected.
(b) Turn the ignition switch to the ON position.
(c) Measure the voltage according to the value(s) in the table below.

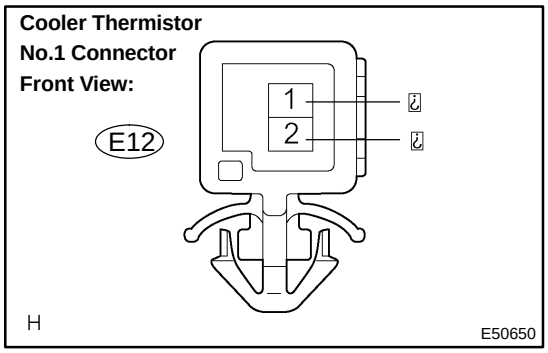
Standard:

Tester connection	Condition	Specified condition
A11-5 (TE) - A11-12 (SG-1)	at 0°C (32°F)	2.0 to 2.4 V
A11-5 (TE) - A11-12 (SG-1)	at 15°C (59°F)	1.4 to 1.8 V

OK → **REPLACE AIRCONDITIONER AMPLIFIER ASSY**

NG

3 INSPECT COOLER THERMISTOR NO.1(EVAPORATOR TEMPERATURE SENSOR)



(a) Remove cooler thermistor No. 1.

(b) Check resistance between terminals 1 and 2 of cooler thermistor No. 1 at each temperature, as shown in the chart.

Standard:

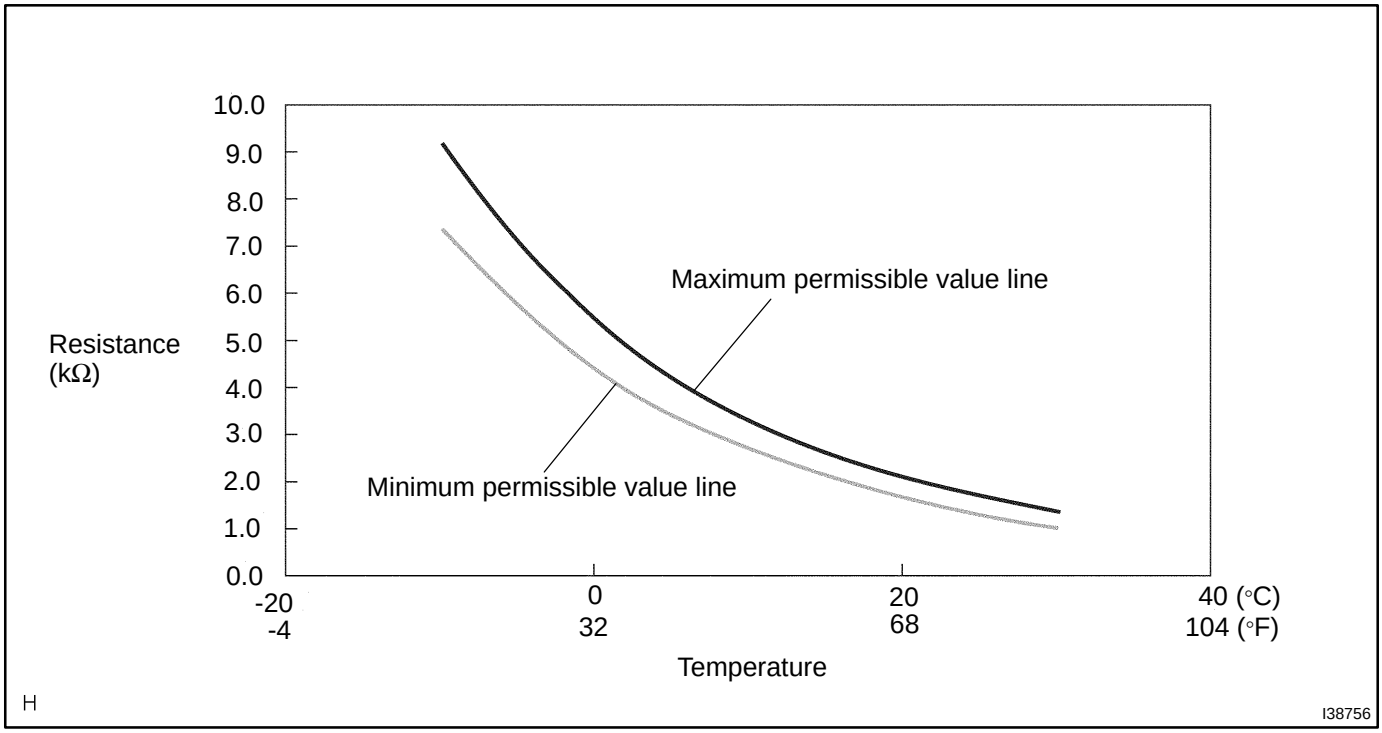
Tester connection	Condition	Specified condition
E12-1 - E12-2	-10 °C (14°F)	7.40 to 9.20 kΩ
E12-1 - E12-2	-5 °C (23°F)	5.65 to 7.00 kΩ
E12-1 - E12-2	0°C (32°F)	4.35 to 5.40 kΩ
E12-1 - E12-2	5°C (41°F)	3.40 to 4.20 kΩ
E12-1 - E12-2	10°C (50°F)	2.68 to 3.30 kΩ
E12-1 - E12-2	15°C (59°F)	2.10 to 2.60 kΩ
E12-1 - E12-2	20°F (68°F)	1.66 to 2.10 kΩ
E12-1 - E12-2	25°C (77°F)	1.32 to 1.66 kΩ
E12-1 - E12-2	30°C (86°F)	1.05 to 1.35 kΩ

NOTICE:

- **Even slightly touching the sensor may change the resistance value. Be sure to hold the connector of the sensor.**
- **When measuring the sensor temperature must be the same as the ambient temperature.**

HINT:

As the temperature increases, the resistance decrease (see the graph below).

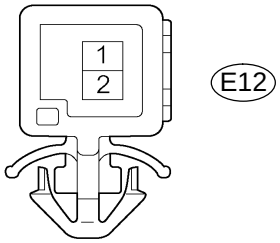


NG	REPLACE COOLER THERMISTOR NO.1(EVAPORATOR TEMPERATURE SENSOR)

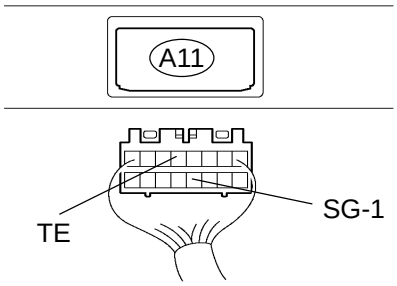
OK

4	CHECK HARNESS AND CONNECTOR(COOLER THERMISTER NO.1 (EVAPORATOR TEMPERATURE SENSOR) - A/C AMPLIFIER ASSY)

Cooler Thermistor No.1 Connector Wire Harness View:



A/C Amplifier Connector Wire Harness View:



I41012

(a) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
A11-5 (TE) - E12-2	Always	Below 1 Ω
A11-12 (SG-1) - E12-1	Always	Below 1 Ω
A11-5 (TE) - Body ground	Always	10 kΩ or higher
A11-12 (SG-1) - Body ground	Always	10 kΩ or higher

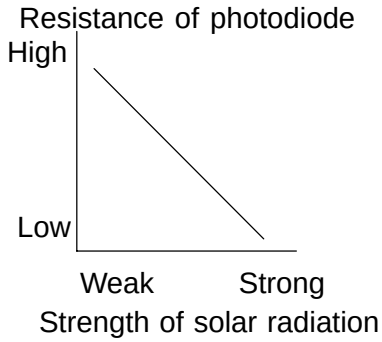
NG	REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE AIRCONDITIONER AMPLIFIER ASSY

DTC	B1421/21	SOLAR SENSOR CIRCUIT (PASSENGER SIDE)

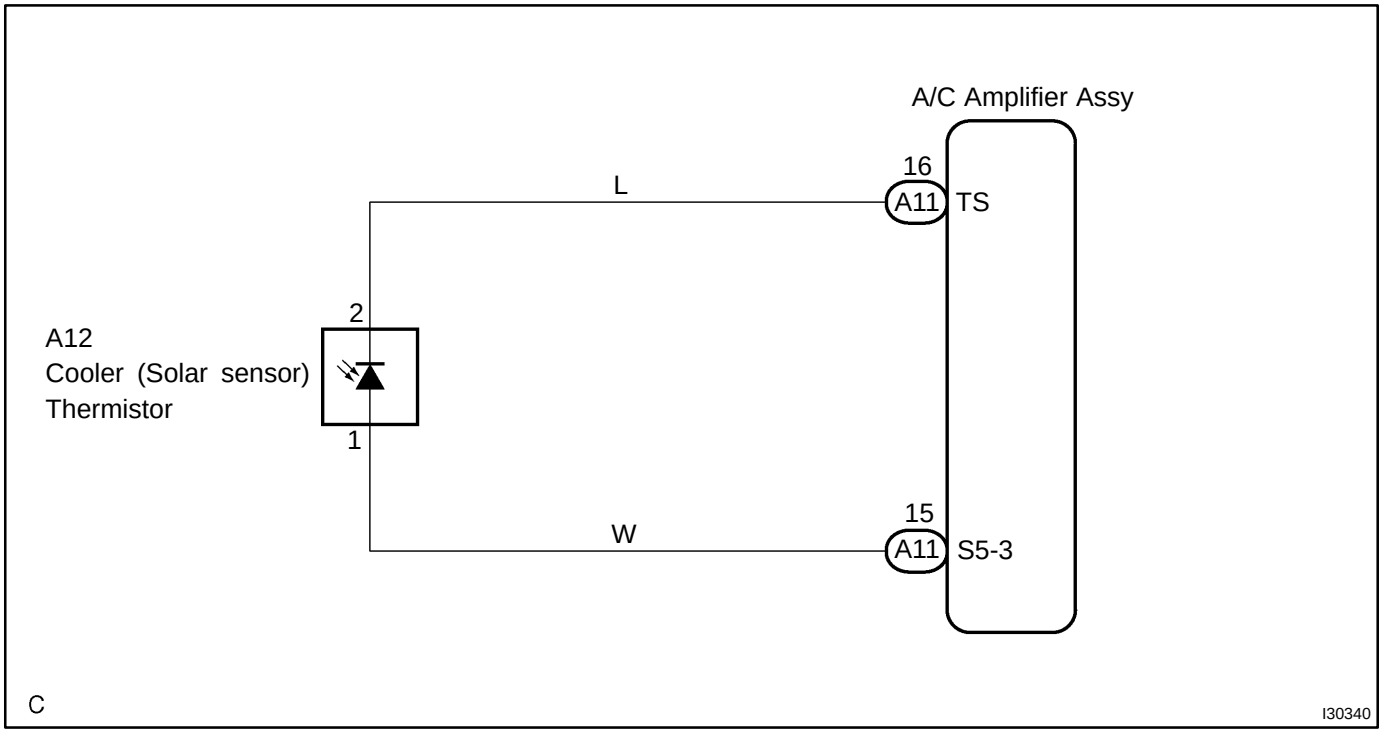
CIRCUIT DESCRIPTION



A photo diode in the solar sensor detects solar radiation and sends signals to the A/C amplifier assy.

DTC No.	Detection Item	Trouble Area
B1421/21	Open or short in solar sensor circuit. (Please note that display of DTC B1421/21 is not abnormal when the sensor is not receiving solar radiation.)	⋇Cooler (solar sensor) thermistor ⋇Harness or connector between Cooler (solar sensor) Thermistor and A/C amplifier assy ⋇A/C amplifier assy

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

In case of using the hand-held tester, start the inspection step 1 and in case of not using the hand-held tester, start from step 2.

1 READ VALUE OF HAND-HELD TESTER

(a) Connect the hand-held tester to DLC3.
(b) Turn the ignition switch ON and push the hand-held tester main switch ON.
(c) Select the items below in the DATA LIST, and read the displays on the hand-held tester.

A C:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
SOLAR SENS-P	Solar sensor (Passenger side) /min.: 0 max.: 255	Changes depending on brightness (Passenger side)	-

Result:

NG	A
OK (Checking from the DTC)	B
OK (Checking from the PROBLEM SYMPTOM TABLE)	C

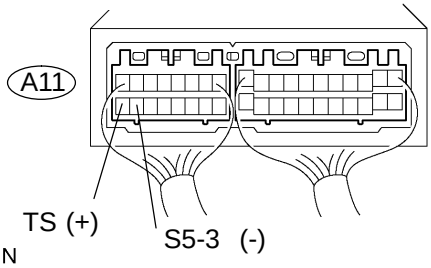
B → **REPLACE AIRCONDITIONER AMPLIFIER ASSY**

C → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE(SEE PAGE 05-1 129)**

A

2 INSPECT AIRCONDITIONER AMPLIFIER ASSY(TS, S5-3)

A/C Amplifier Connector Wire Harness View:



(a) Remove A/C amplifier assy with connectors still connected.
(b) Turn the ignition switch to the ON position.
(c) Measure the voltage according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
A11-16 (TS) - A11-15 (S5-3)	Sensor subject to electric light	Below 4.0 V
A11-16 (TS) - A11-15 (S5-3)	Sensor is covered by a cloth	4.0 to 4.5 V

HINT:

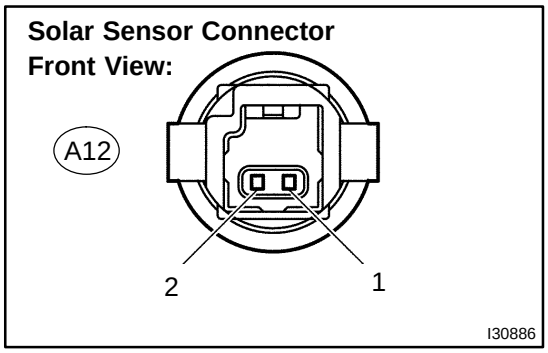
As the inspection light is moved away from the sensor, the voltage increases.

Use an incandescent lamp for inspection. Bring it within 30 cm (11.8 in.) of the solar sensor.

OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE(SEE PAGE 05-1 129)**

NG

3	INSPECT COOLER (SOLAR SENSOR) THERMISTOR



(a) Remove the cooler (solar sensor) thermistor.
(b) Measure the resistance according to the value(s) in the table below.
(c) Connect the negative (-) lead from the ohmmeter to terminal 1 and positive (+) lead to terminal 2 of the A/C solar sensor.

Standard:

Tester connection	Condition	Specified condition
A12-1 - A12-2	Sensor is subject to electric light	Except ∞ Ω
A12-1 - A12-2	Sensor is covered with a cloth	∞ Ω (No continuity)

NOTICE:

The connection procedure for using a digital tester such as an electrical tester is shown above. When using an analog tester, connect the negative (-) lead to terminal 2 and positive (+) lead to terminal 1 of the A/C solar sensor.

HINT:

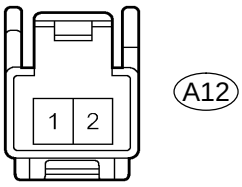
- As the inspection light is moved away from the sensor, the resistance increases.
- Use an incandescent lamp for inspection. Bring it within 30 cm (11.8 in.) of the cooler (solar sensor) thermistor.

NG → **REPLACE COOLER (SOLAR SENSOR) THERMISTOR**

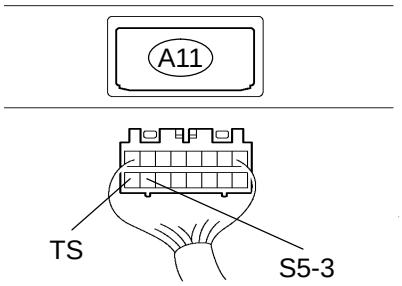
OK

4	CHECK HARNESS AND CONNECTOR(COOLER (SOLAR SENSOR) THERMISTOR - A/C AMPLIFIER ASSY)

Cooler (Solar Sensor) Thermistor Connector Wire Harness View:



A/C Amplifier Connector Wire Harness View:



(a) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
A11-15 (S5-3) - A12-1	Always	Below 1 Ω
A11-16 (TS) - A12-2	Always	Below 1 Ω
A11-15 (S5-3) - Body ground	Always	10 kΩ or higher
A11-16 (TS) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE AIRCONDITIONER AMPLIFIER ASSY

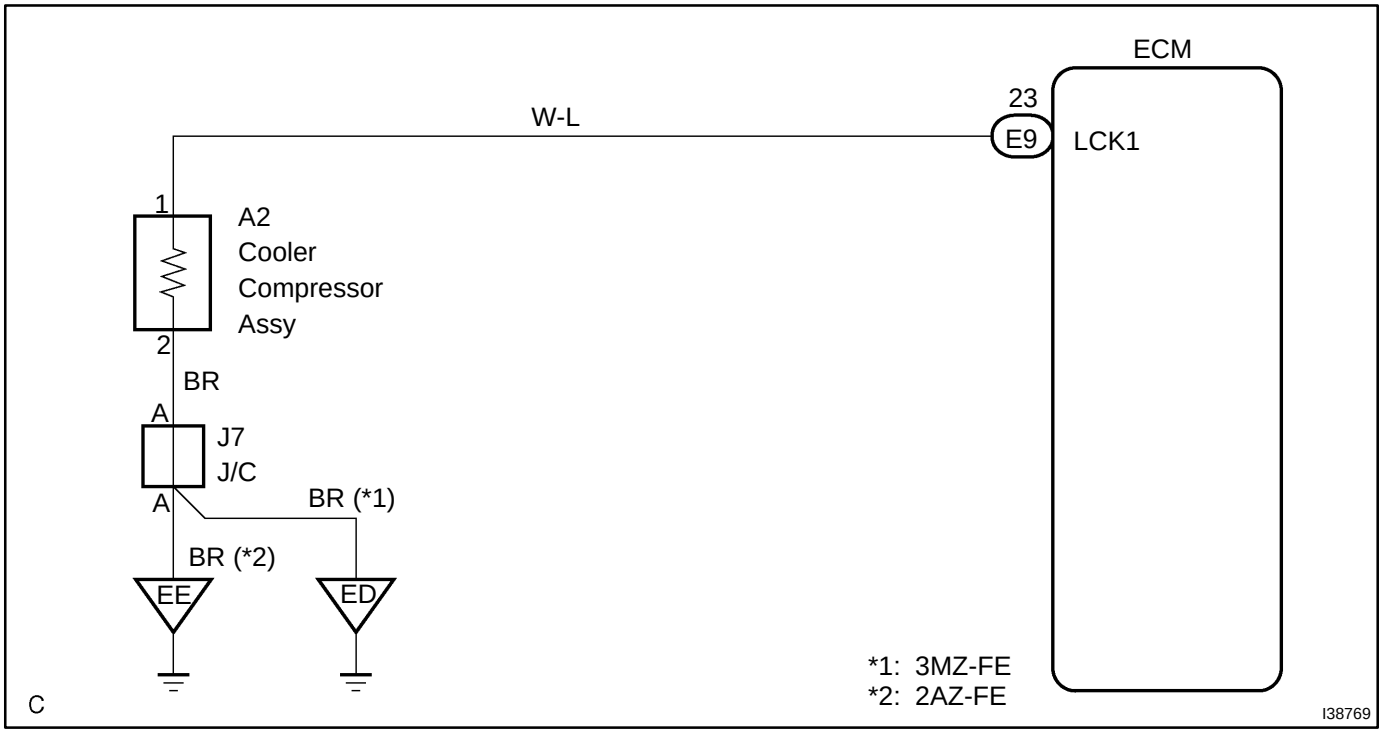
DTC B1422/22 COMPRESSOR LOCK SENSOR CIRCUIT

CIRCUIT DESCRIPTION

The ECM and A/C amplifier communicate via BEAN.
This sensor sends 4 pulses per engine revolution to the ECM.
If the number ratio of the compressor speed divided by the engine speed is smaller than a predetermined value, the ECM turns the compressor OFF. And the indicator flashes at about 1 second intervals.

DTC No.	Detection Item	Trouble Area
B1422/22	All conditions below are detected for 3 secs. or more (c) Engine speed: 450 rpm or more (d) Ratio between engine and compressor speed deviates 20 % or more in comparison to normal operation.	・Cooler compressor assy (A/C magnetic clutch and lock sensor) ・Cooler compressor assy drive belt ・Cooler compressor assy lock sensor ・Harness and connector between cooler compressor assy and ECM ・Multiplex communication circuit ・ECM ・A/C amplifier assy

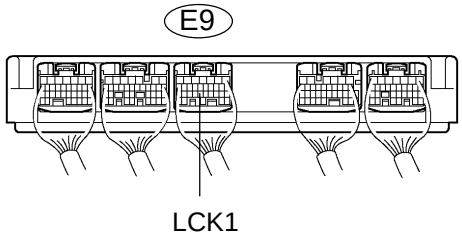
WIRING DIAGRAM



INSPECTION PROCEDURE

1 INSPECT ECM(LCK1)

ECM Connector Wire Harness View:



(a) Remove the ECM with connectors still connected.
(b) Measure the voltage according to the value(s) in the table below.

Standard:

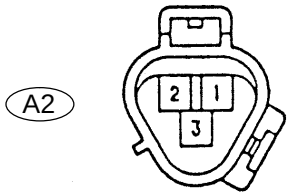
Tester connection	Condition	Specified condition
E9-23 (LCK1) - Body ground	Start engine A/C, switch AUTO	Pulse generation

OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE(SEE PAGE 05-1 129)**

NG

2 INSPECT COOLER COMPRESSOR ASSY

Cooler Compressor Assy Connector Front View:



(a) Disconnect the cooler compressor assy connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

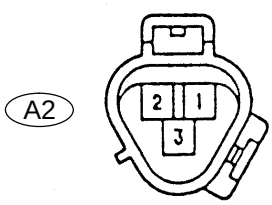
Tester connection	Condition	Specified condition
A2-1 - A2-2	at 20°C (68°F)	165 to 205 Ω

NG → **REPLACE COOLER COMPRESSOR ASSY**

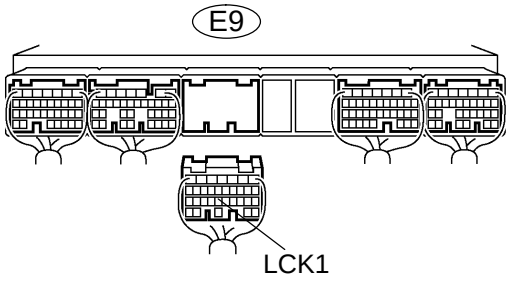
OK

3	CHECK HARNESS AND CONNECTOR(ECM - COOLER COMPRESSOR ASSY)

Cooler Compressor Assy Connector Front view:



ECM Connector Wire Harness View:



I41017

(a) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
E9-23(LCK1) - A2-1	Always	Below 1 Ω
E9-23 (LCK1) - Body ground	Always	10 kΩ or higher
A2-2 - Body ground	Always	Below 1 Ω

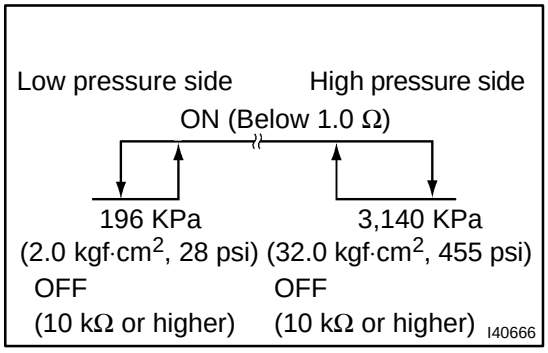
NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE ECM

DTC B1423/23 PRESSURE SWITCH CIRCUIT

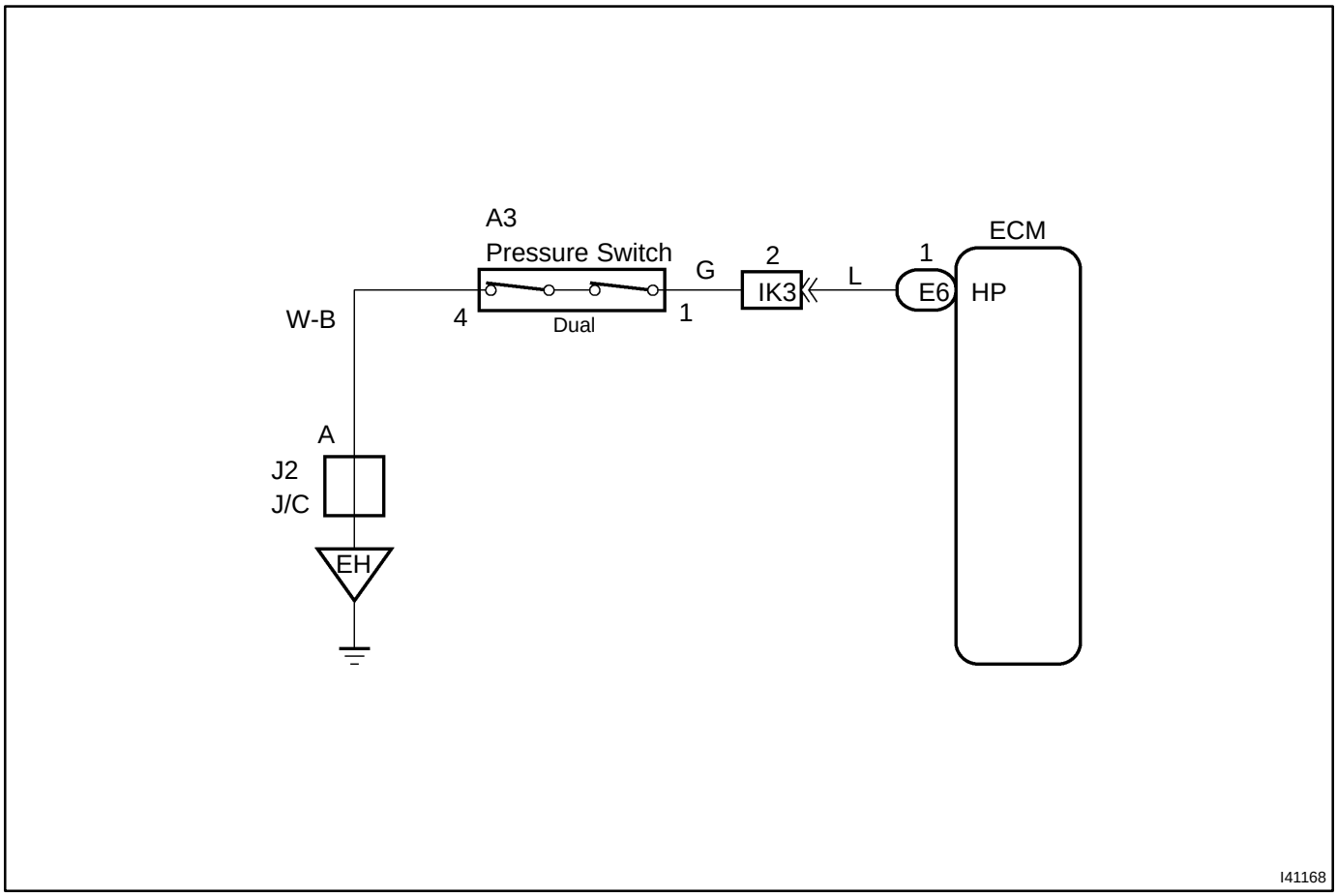
CIRCUIT DESCRIPTION



The ECM and A/C amplifier communicate via BEAN.
The pressure switch sends the appropriate signals to the A/C amplifier when the A/C refrigerant pressure drops too low or rises too high. When the A/C amplifier receives these signals, it outputs signals through the A/C amplifier to turn the magnet clutch relay off and turns the magnetic clutch off.

DTC No.	Detection Item	Trouble Area
B1423/23	・Open in pressure sensor circuit. ・Abnormal refrigerant pressure. below 196 kPa (2.0 kg/cm2, 28 psi) over 3,140 kPa (32.0 kgf/cm2, 455 psi)	・Pressure switch ・Harness or connector between cooler refrigerant liquid pipe A (pressure switch) and ECM ・Multiplex communication circuit ・Refrigerant pipe line ・ECM ・A/C amplifier assy

WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT REFRIGERANT PRESSURE

(a) Set the manifold gauge.
(b) Read the manifold gauge pressure when these conditions are established.
Test conditions:
- Temperature at the air inlet with the switch set at RECIRC is 30 to 35˚C (86 to 95˚F)
- Engine running at 1,500 rpm
- Blower speed control switch at ”HI” position
- Temperature control dial at ”COOL” position
- Air conditioning switch ON
- Fully open doors

Standard:
Pressure on high pressure side:
1.37 to 1.57 MPa (13.9 to 16.0 kgf·cm^2, 198 to 228 psi)

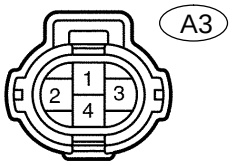
HINT:
If the refrigerant pressure is below 196 KPa (2.0 kgf·cm^2, 28 psi), the refrigerant amount in the air conditioning cycle may have decreased significantly for reasons such as a gas leakage.

NG → **INSPECT AND REPAIR AIR CONDITIONING CYCLE**

OK

2	CHECK AIR CONDITIONING OPERATION

Pressure Switch Connector Wire Harness View:



I40669

(a) Disconnect the pressure switch connector.
(b) Connect terminals 1 and 4 of the connector of the pressure switch on the vehicle wire harness side using a service wire.
(c) Start the engine.
(d) Turn the air conditioning switch on and check that the magnet clutch is turned on.
(e) Check that the magnet clutch is turned off when disconnecting terminals 1 and 4 (that are connected in the prior step).
OK:
Terminals 1 and 4 connected: magnet clutch is on
Terminals 1 and 4 disconnected: magnet clutch is off

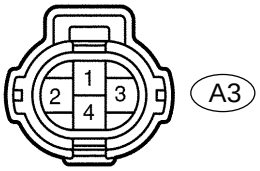
NG → **Go to step 3**

OK

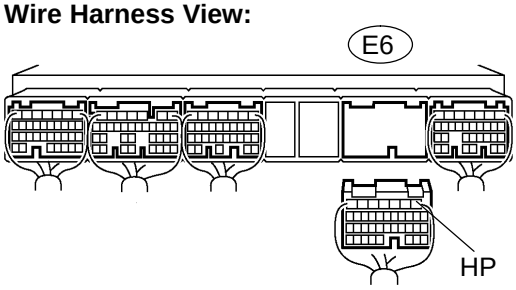
REPLACE PRESSURE SWITCH

3 CHECK HARNESS AND CONNECTOR(PRESSURE SWITCH - ECM)

Pressure Switch Connector
Front View:



ECM Connector
Wire Harness View:



I41169

(a) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
E6-1 (HP) - A3-1	Always	Below 1 Ω
A3-4 - Body ground	Always	Below 1 Ω
E6-1 (HP) - Body ground	Always	10 kΩ or higher
A3-1 - Body ground	Always	10 kΩ or higher

Result:

NG	A
OK (Checking from the PROBLEM SYMPTOMS TABLE)	B
OK (Checking from the DTC)	C

B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

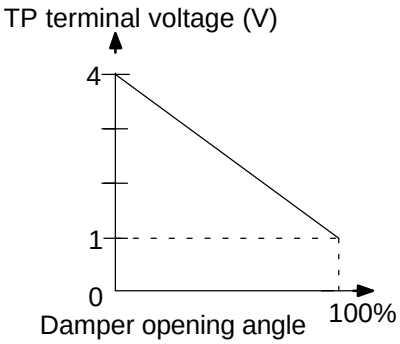
C → **REPLACE AIRCONDITIONER AMPLIFIER ASSY**

A

REPAIR OR REPLACE HARNESS OR CONNECTOR

DTC	B1431/31	AIR MIX DAMPER POSITION SENSOR CIRCUIT (PASSENGER SIDE)

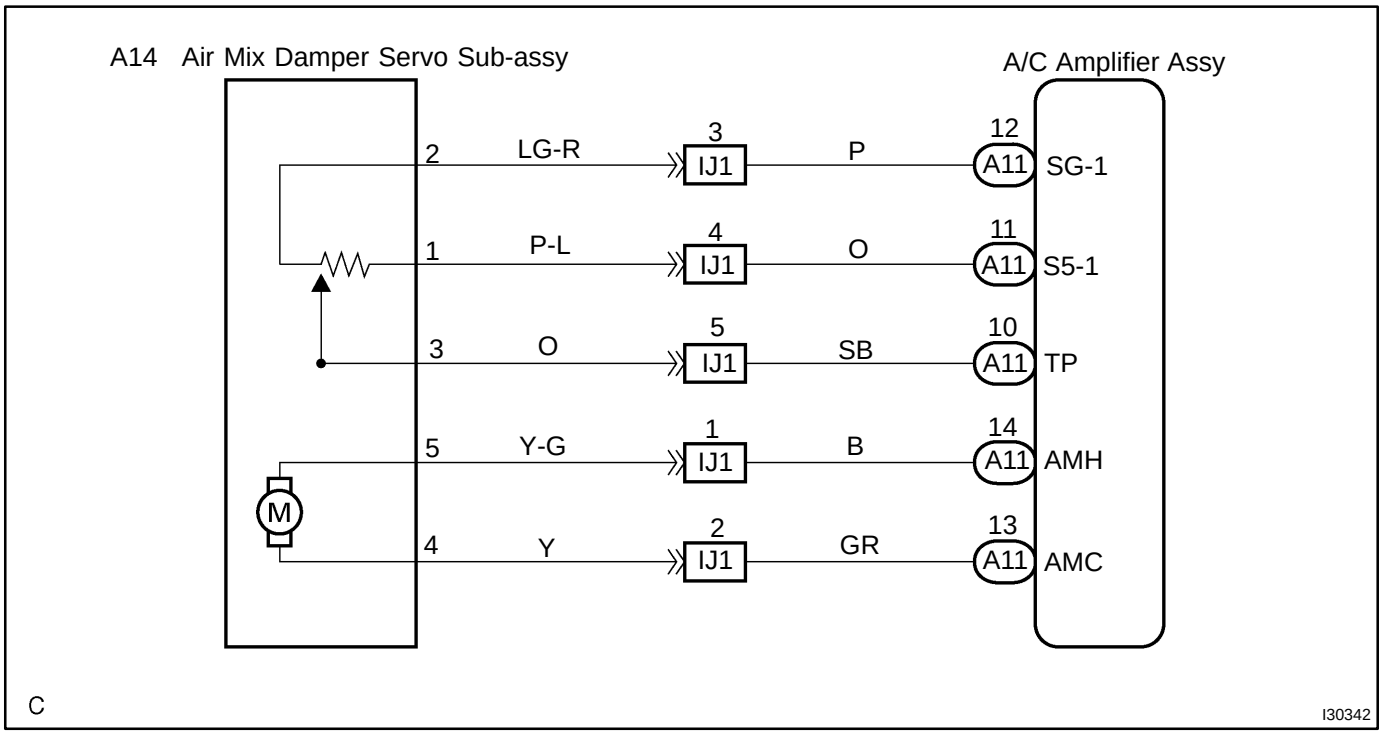
CIRCUIT DESCRIPTION



This sensor detects the position of the air mix damper servo sub-assy and sends the appropriate signals to the A/C amplifier assy. The position sensor is built into the air mix servo sub-assy.

DTC No.	Detection Item	Trouble Area
B1431/31	Short to ground or power source circuit in air mix damper position sensor circuit.	・Air mix damper position sensor. ・Harness or connector between air mix damper servo sub-assy and A/C amplifier assy. ・A/C amplifier assy

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

In case of using the hand-held tester, start the inspection step 1 and in case of not using the hand-held tester, start from step 2.

1 READ VALUE OF HAND-HELD TESTER

(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester main switch ON.
(c) Select the items below in the DATA LIST, and read the displays on the hand-held tester.

A C:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
A/M DAMP POS-P	Air mix damper position (Passenger side) /min.:-5% max.:105%	Changes depending on the set temperature (Passenger side)	-
A/M DAMP TARG-P	Air mix damper target position (Passenger side) /min.:-5% max.:105%	Changes depending on the set temperature (Passenger side)	-

Result:

NG	A
OK (Checking from the DTC)	B
OK (Checking from the PROBLEM SYMPTOM TABLE)	C

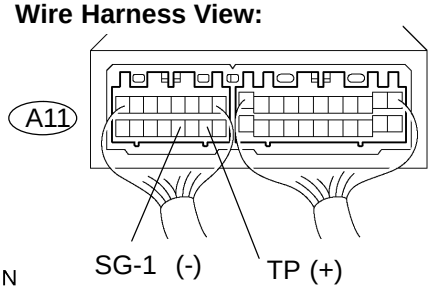
B → **REPLACE AIRCONDITIONER AMPLIFIER ASSY**

C → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-1 129)**

A

2 INSPECT AIRCONDITIONER AMPLIFIER ASSY(TP, SG-1)

A/C Amplifier Connector Wire Harness View:



(a) Remove the A/C amplifier assy with connectors still connected.
(b) Turn the ignition switch to the ON position.
(c) Measure the voltage according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
A11-10 (TP) - A11-12 (SG-1)	MAX. COOL	3.5 to 4.5 V
A11-10 (TP) - A11-12 (SG-1)	MAX. WARM	0.5 to 1.8 V

HINT:

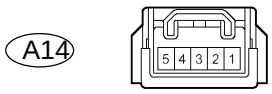
As the set temperature increases, the voltage decreases gradually without interruption.

OK → **REPLACE AIRCONDITIONER AMPLIFIER ASSY**

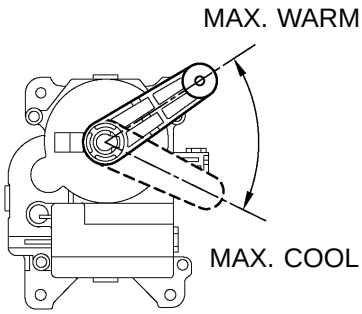
NG

3 INSPECT AIRMIX DAMPER SERVO SUB-ASSY

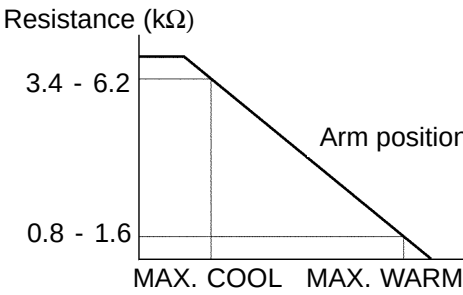
Air Mix Damper Servo Sub-assy Connector Wire Harness View:



I30157



I30332



I30161

(a) Remove the air mix damper servo sub-assy.

(b) Measure resistance between terminals 1 and 2 of air mix damper servo sub-assy connector.

Standard:

Tester connection	Condition	Specified condition
A14-1 - A14-2	Always	4.2 to 7.8 kΩ

(c) While operating air mix damper servo sub-assy as shown in the procedure on page 05-1 160, measure resistance between terminals 1 and 3 of air mix damper servo sub-assy.

Standard:

Tester connection	Condition	Specified condition
A14-1 - A14-3	MAX. COOL	3.4 to 6.2 kΩ
A14-1 - A14-3	MAX. WARM	0.8 to 1.6 kΩ

HINT:

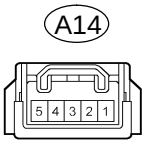
As the air mix damper servo sub-assy moves from cool side to warm side, the resistance decreases gradually without interruption.

NG → **REPLACE AIRMIX DAMPER SERVO SUB-ASSY**

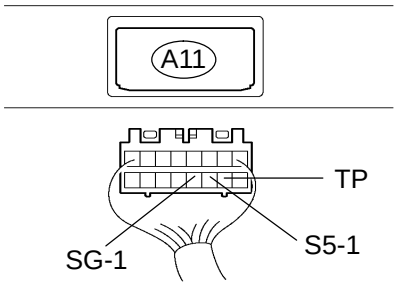
OK

4	CHECK HARNESS AND CONNECTOR(AIR MIX DAMPER SERVO SUB-ASSY - A/C AMPLIFIER ASSY)

Air Mix Damper Servo Sub-assy Wire Harness View:



A/C Amplifier Connector Wire Harness View:



(a) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
A11-11 (S5-1) - A14-1	Always	Below 1 Ω
A11-12 (SG-1) - A14-2	Always	Below 1 Ω
A11-10 (TP) - A14-3	Always	Below 1 Ω
A11-11 (S5-1) - Body ground	Always	10 kΩ or higher
A11-12 (SG-1) - Body ground	Always	10 kΩ or higher
A11-10 (TP) - Body ground	Always	10 kΩ or higher

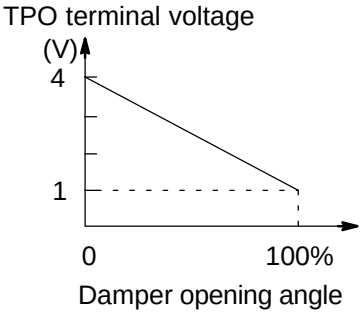
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE AIRCONDITIONER AMPLIFIER ASSY

DTC B1433/33 AIR OUTLET DAMPER POSITION SENSOR CIRCUIT

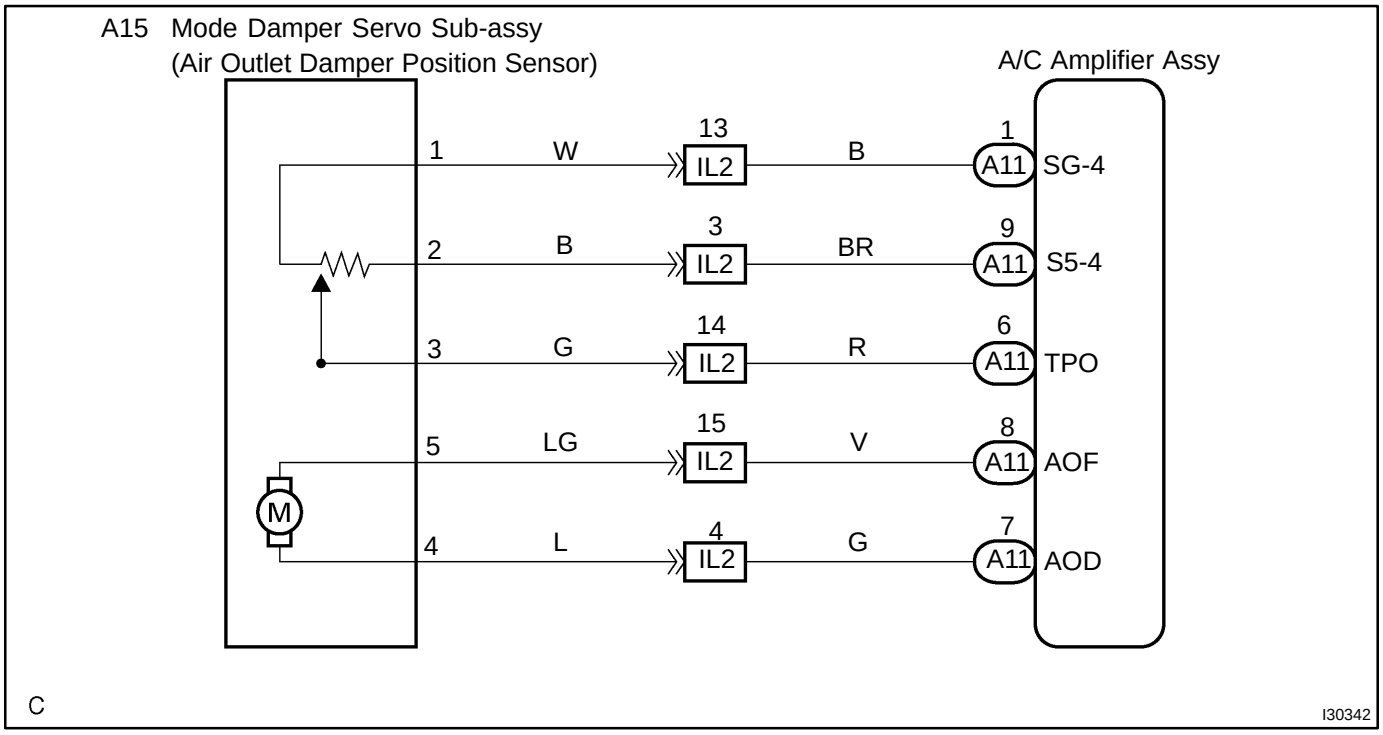
CIRCUIT DESCRIPTION



This sensor detects the position of the mode damper servo sub-assy and sends the appropriate signals to the A/C amplifier assy. The position sensor is built into the mode damper servo sub-assy .

DTC No.	Detection Item	Trouble Area
B1433/33	Short to ground or power source circuit in air outlet damper position sensor circuit.	・Mode damper position sensor (Air outlet damper position sensor) ・Harness or connector between mode damper servo sub-assy and A/C amplifier assy ・A/C amplifier assy

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

In case of using the hand-held tester, start the inspection step 1 and in case of not using the hand-held tester, start from step 2.

1 READ VALUE OF HAND-HELD TESTER

(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester main switch ON.
(c) Select the items below in the DATA LIST, and read the displays on the hand-held tester.

A C:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
A/O DAMP POS	Air outlet damper position /min.:-14% max.:113.5%	Changes depending on air outlet power position	-
A/O DAMP TARG	Air outlet damper target position /min.:-14% max.:113.5%	Changes depending on air outlet power position	-

Result:

NG	A
OK (Checking from the DTC)	B
OK (Checking from the PROBLEM SYMPTOM TABLE)	C

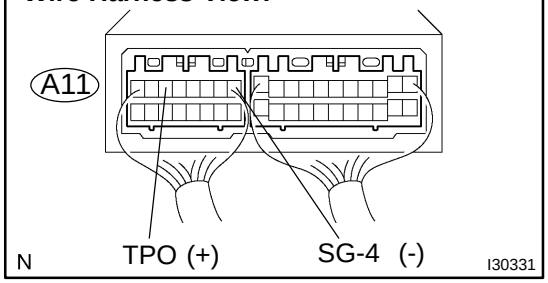
B → **REPLACE AIRCONDITIONER AMPLIFIER ASSY**

C → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-1 129)**

A

2 INSPECT AIRCONDITIONER AMPLIFIER ASSY(TPO, SG-4)

A/C Amplifier Connector Wire Harness View:



(a) Remove the A/C amplifier assy with connectors still connected.
(b) Turn the ignition switch to the ON position.
(c) Measure the voltage according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
A11-6 (TPO) - A11-1 (SG-4)	FACE	3.5 to 4.5 V
A11-6 (TPO) - A11-1 (SG-4)	DEF	0.5 to 1.5 V

HINT:

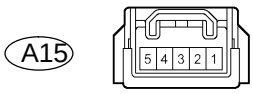
As the air outlet servomotor is moved from FACE side to DEF side, the voltage decreases gradually without interruption.

OK → **REPLACE AIRCONDITIONER AMPLIFIER ASSY**

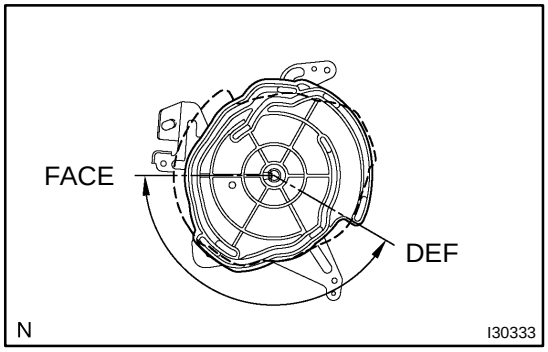
NG

3 INSPECT MODE DAMPER SERVO SUB-ASSY

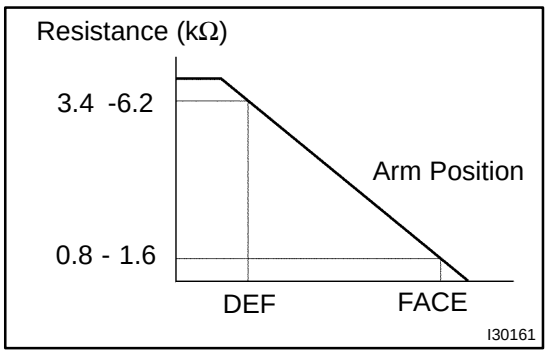
Mode Damper Servo Sub-assy Connector Wire Harness View:



I30157



I30333



I30161

OK

(a) Remove the mode damper servo sub-assy.

(b) Measure resistance between terminals 1 and 2 of mode damper servo sub-assy connector.

Standard:

Tester connection	Condition	Specified condition
A15-1 - A15-2	Always	4.2 to 7.8 kΩ

(c) While operating mode damper servo sub-assy as in the procedure on page 05-1 164, measure resistance between terminals 1 and 3 of mode damper servo sub-assy.

Standard:

Tester connection	Condition	Specified condition
A15-1 - A15-3	DEF	3.4 to 6.2 kΩ
A15-1 - A15-3	FACE	0.8 to 1.6 kΩ

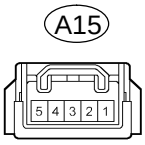
HINT:

As the mode damper servo sub-assy moves from DEF side to FACE side, the resistance decreases gradually without interruption.

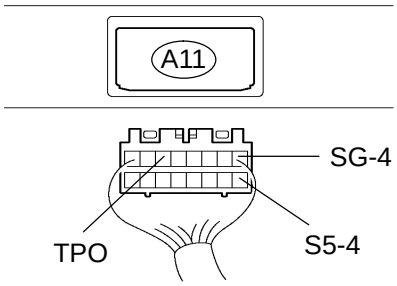
NG → **REPLACE MODE DAMPER SERVO SUB-ASSY**

4	CHECK HARNESS AND CONNECTOR(MODE DAMPER SERVO SUB-ASSY - A/C AMPIFIER ASSY)

Mode Damper Servo Sub- assy Wire Harness View:



A/C Amplifier Connector Wire Harness View:



(a) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
A11-1 (SG-4) - A15-1	Always	Below 1 Ω
A11-9 (S5-4) - A15-2	Always	Below 1 Ω
A11-6 (TPO) - A15-3	Always	Below 1 Ω
A11-1 (SG-4) - Body ground	Always	10 kΩ or higher
A11-9 (S5-4) - Body ground	Always	10 kΩ or higher
A11-6 (TPO) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE AIRCONDITIONER AMPLIFIER ASSY

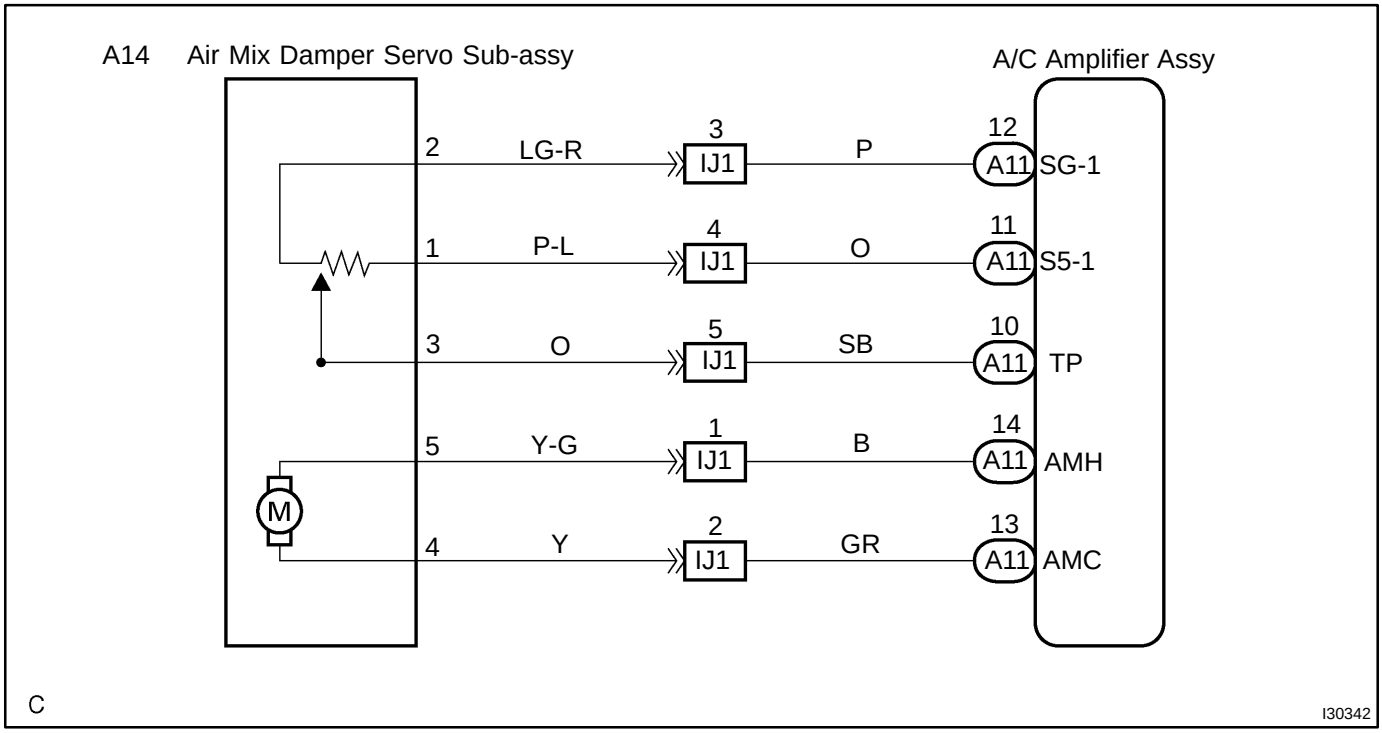
DTC	B1441/41	AIR MIX DAMPER CONTROL SERVOMOTOR CIRCUIT (PASSENGER SIDE)

CIRCUIT DESCRIPTION

This air mix damper servo sub-assy is controlled by the A/C amplifier assy and moves the air mix damper servo sub-assy to the desired position.

DTC No.	Detection Item	Trouble Area
B1441/41	Air mix damper position sensor value does not change even if A/C amplifier assy operates air mix damper servo sub-assy.	・Air mix damper servo sub-assy ・Harness or connector between air mix damper servo sub-assy and A/C amplifier assy ・A/C amplifier assy

WIRING DIAGRAM



INSPECTION PROCEDURE

1	PERFORM ACTUATOR CHECK

(a) Set to actuator check mode (see page 05-1 117).
(b) Press the DEF switch and change to step operation.
(c) Check the air flow temperature by hand.

Display Code	Air Mix Damper Operation
0	COOL side (-5 % open)
1	COOL side (-5 % open)
2	COOL side (-5 % open)
3	COOL side (-5 % open)
4	COOL/WARM (50 % open)
5	COOL/WARM (50 % open)
6	WARM side (105 % open)
7	WARM side (105 % open)
8	WARM side (105 % open)
9	WARM side (105 % open)

OK:
Air flow temperature changes in accordance with each display code.

Result:

NG	A
OK (Checking from the PROBLEM SYMPTOMS TABLE)	B
OK (Checking from the DTC)	C

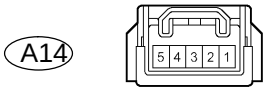
B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-1 129)**

C → **REPLACE AIRCONDITIONER AMPLIFIER ASSY**

A

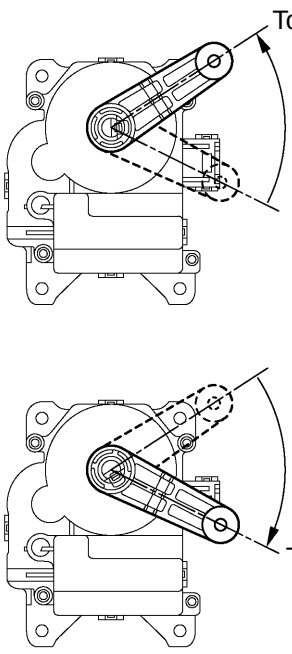
2	INSPECT AIRMIX DAMPER SERVO SUB-ASSY

Air Mix Damper Servo Sub-assy Connector Wire Harness View:



I30157

(a) Remove the air mix damper servo sub-assy.
(b) Connect the positive (+) lead from the battery to terminal 4 and negative (-) lead to terminal 5, then check that the lever turns to ”COOL” side smoothly.
(c) Connect the positive (+) lead from the battery to terminal 5 and negative (-) lead to terminal 4, then check that the lever turns to ”WARM” side smoothly.



N

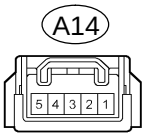
I30334

NG → **REPLACE AIRMIX DAMPER SERVO SUB-ASSY**

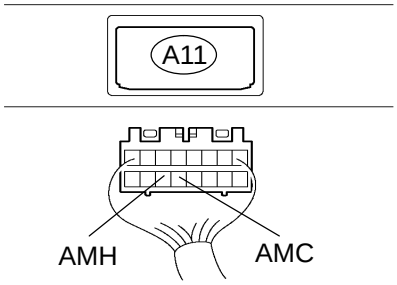
OK

3	**CHECK HARNESS AND CONNECTOR(AIR MIX DAMPER SERVO SUB-ASSY - A/C AMPLIFIER ASSY)**

Air Mix Damper Servo Sub- assy Connector Wire Harness View:



A/C Amplifier Connector Wire Harness View:



(a) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
A11-13 (AMC) - A14-4	Always	Below 1 Ω
A11-14 (AMH) - A14-5	Always	Below 1 Ω
A11-13 (AMC) - Body ground	Always	10 kΩ or higher
A11-14 (AMH) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE AIRCONDITIONER AMPLIFIER ASSY

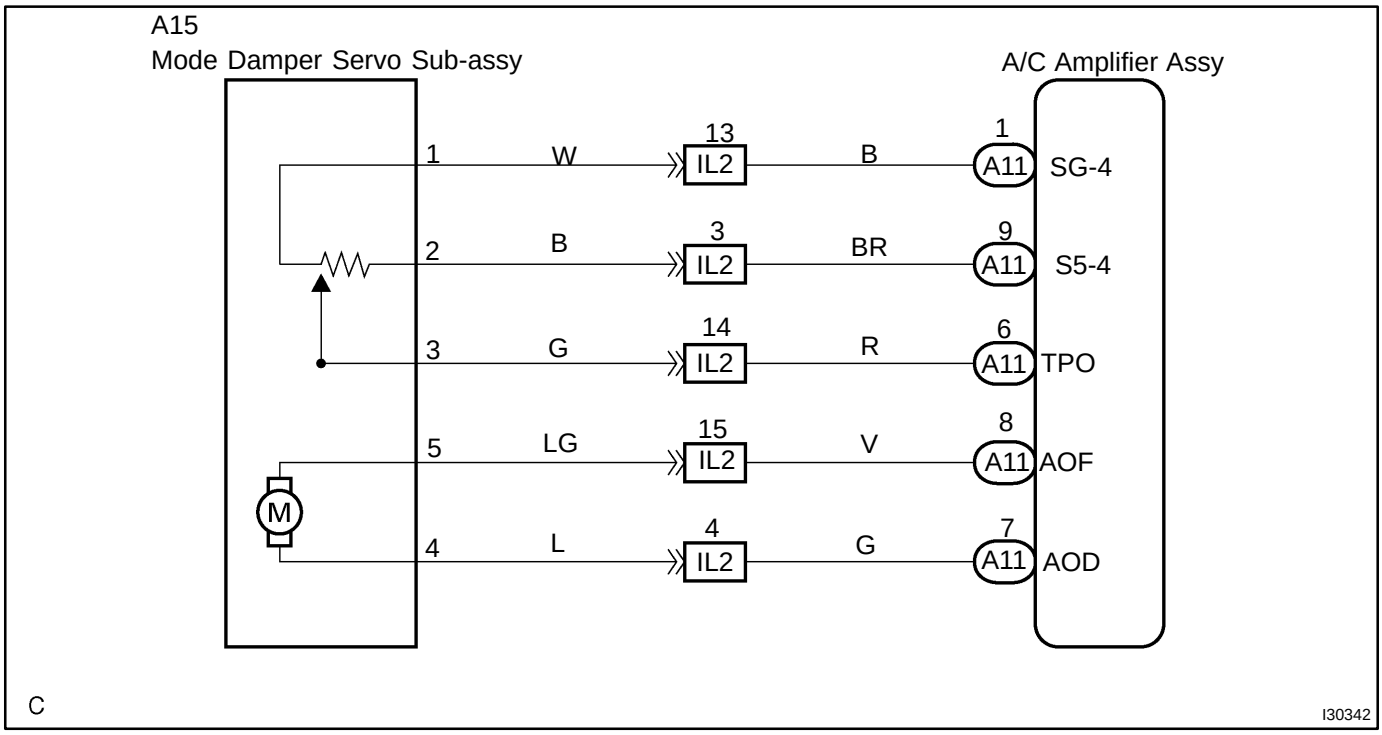
DTC	B1443/43	AIR OUTLET DAMPER CONTROL SERVOMOTOR CIRCUIT

CIRCUIT DESCRIPTION

This circuit turns the servomotor and changes each mode damper position by the signals from the A/C amplifier assy. When the AUTO switch is on, the A/C amplifier assy changes the mode automatically between (FACE), (BI-LEVEL) and (FOOT) according to the temperature setting.

DTC No.	Detection Item	Trouble Area
B1443/43	Air outlet damper position sensor value does not change even if A/C amplifier assy operates air mode damper servo sub-assy.	⋇Mode damper servo sub-assy. ⋇Harness or connector between mode damper servo sub-assy and A/C amplifier assy. ⋇A/C amplifier assy.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	PERFORM ACTUATOR CHECK

(a) Warm up engine.
(b) Set to actuator check mode (see page 05-1 117).
(c) Press the DEF switch and change it to step operation
(d) Press the DEF switch and check that the air flow by hand.

Display code	Air flow condition
0	FACE
1	FACE
2	FACE
3	FACE
4	FACE
5	B/L
6	FOOT
7	FOOT
8	FOOT/DEF
9	DEF

OK:

Air flow position changes in accordance with each display code.

Result:

NG	A
OK (Checking from the PROBLEM SYMPTOMS TABLE)	B
OK (Checking from the DTC)	C

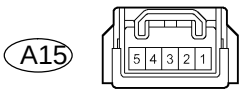
B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-1 129)**

C → **REPLACE AIRCONDITIONER AMPLIFIER ASSY**

A

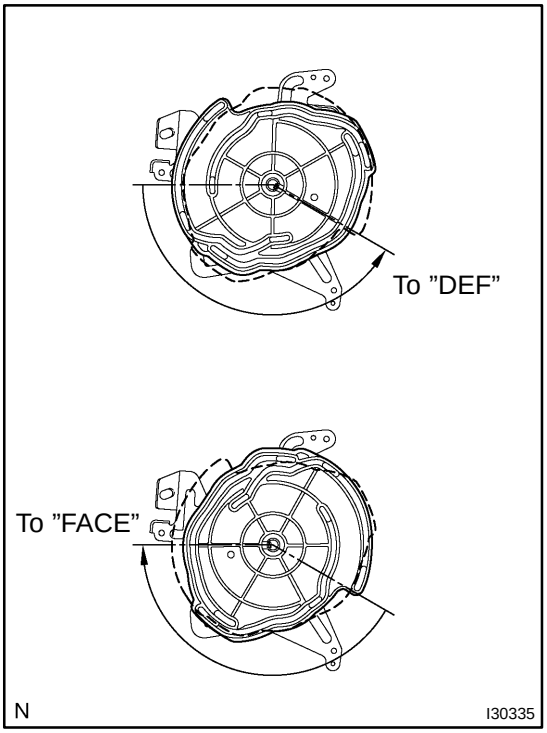
2	INSPECT MODE DAMPER SERVO SUB-ASSY

Mode Damper Servo Sub-assy Connector Wire Harness View:



I30157

(a) Remove the air mode damper servo sub-assy.
(b) Connect the positive (+) lead from the battery to terminal 4 and negative (-) lead to terminal 5 then check that the lever turns to ”DEF” position.
(c) Connect the positive (+) lead from the battery to terminal 5 and negative (-) lead to terminal 4 then check that the lever turns to ”FACE” position.



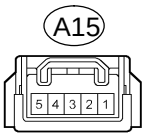
I30335

NG → REPLACE MODE DAMPER SERVO SUB-ASSY

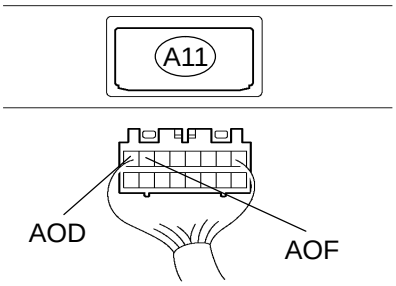
OK

3	CHECK HARNESS AND CONNECTOR(MODE DAMPER SERVO SUB-ASSY - A/C AMPLIFIER ASSY)

Mode Damper Servo Sub- assy Wire Harness View:



A/C Amplifier Connector Wire Harness View:



I41014

(a) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
A11-8 (AOF) - A15-5	Always	Below 1 Ω
A11-7 (AOD) - A15-4	Always	Below 1 Ω
A11-8 (AOF) - Body ground	Always	10 kΩ or higher
A11-7 (AOD) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE AIRCONDITIONER AMPLIFIER ASSY

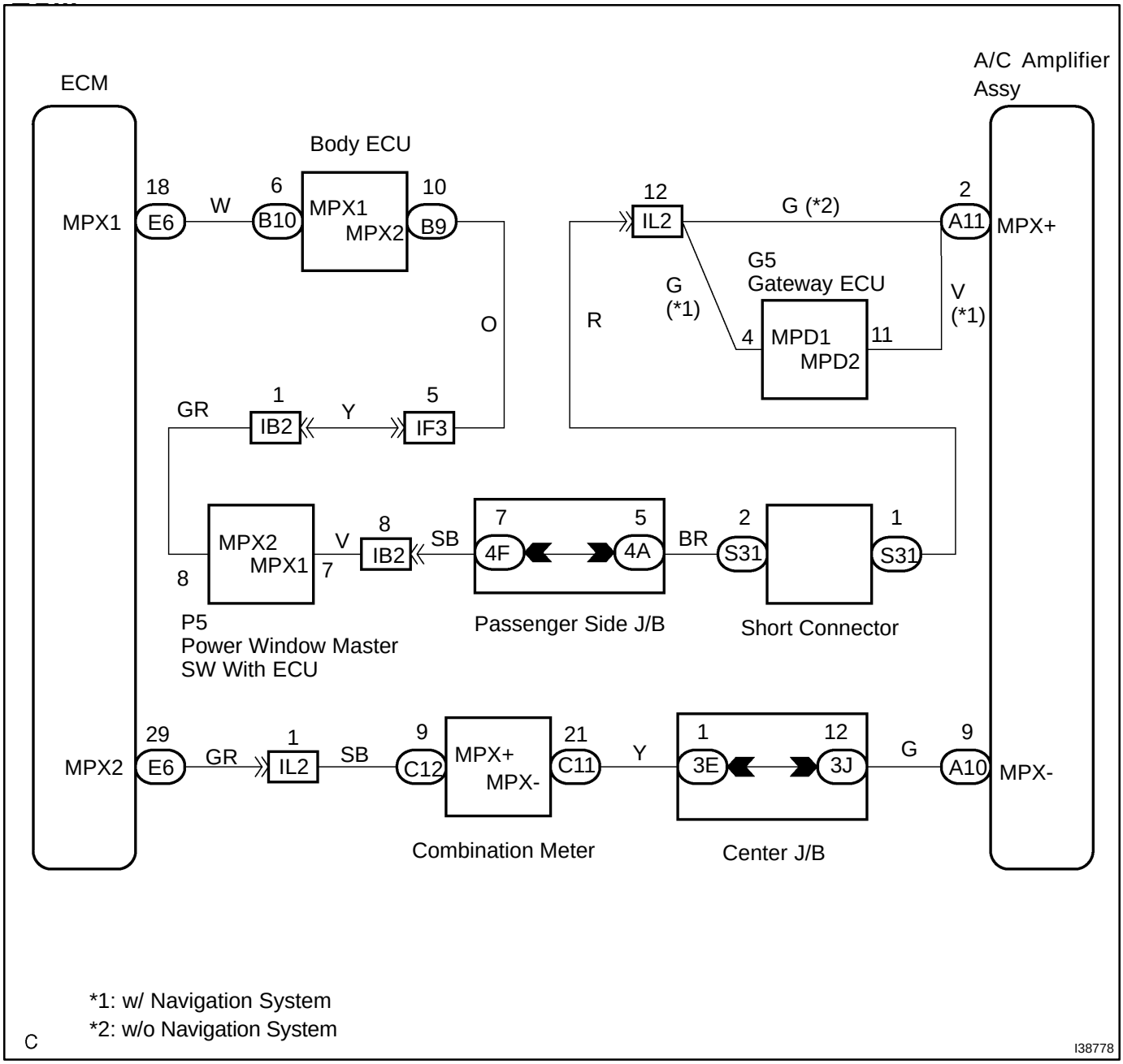
DTC B1499/99 MULTIPLEX COMMUNICATION CIRCUIT

CIRCUIT DESCRIPTION

The ECM and A/C amplifier communicate via BEAN.
This DTC is output when communication stops.

DTC No.	Detection Item	Trouble Area
B1499/99	Multiplex communication circuit	Open in multiplex communication circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK MULTIPLEX COMMUNICATION SYSTEM

NG → GO TO MULTIPLEX COMMUNICATION SYSTEM

OK

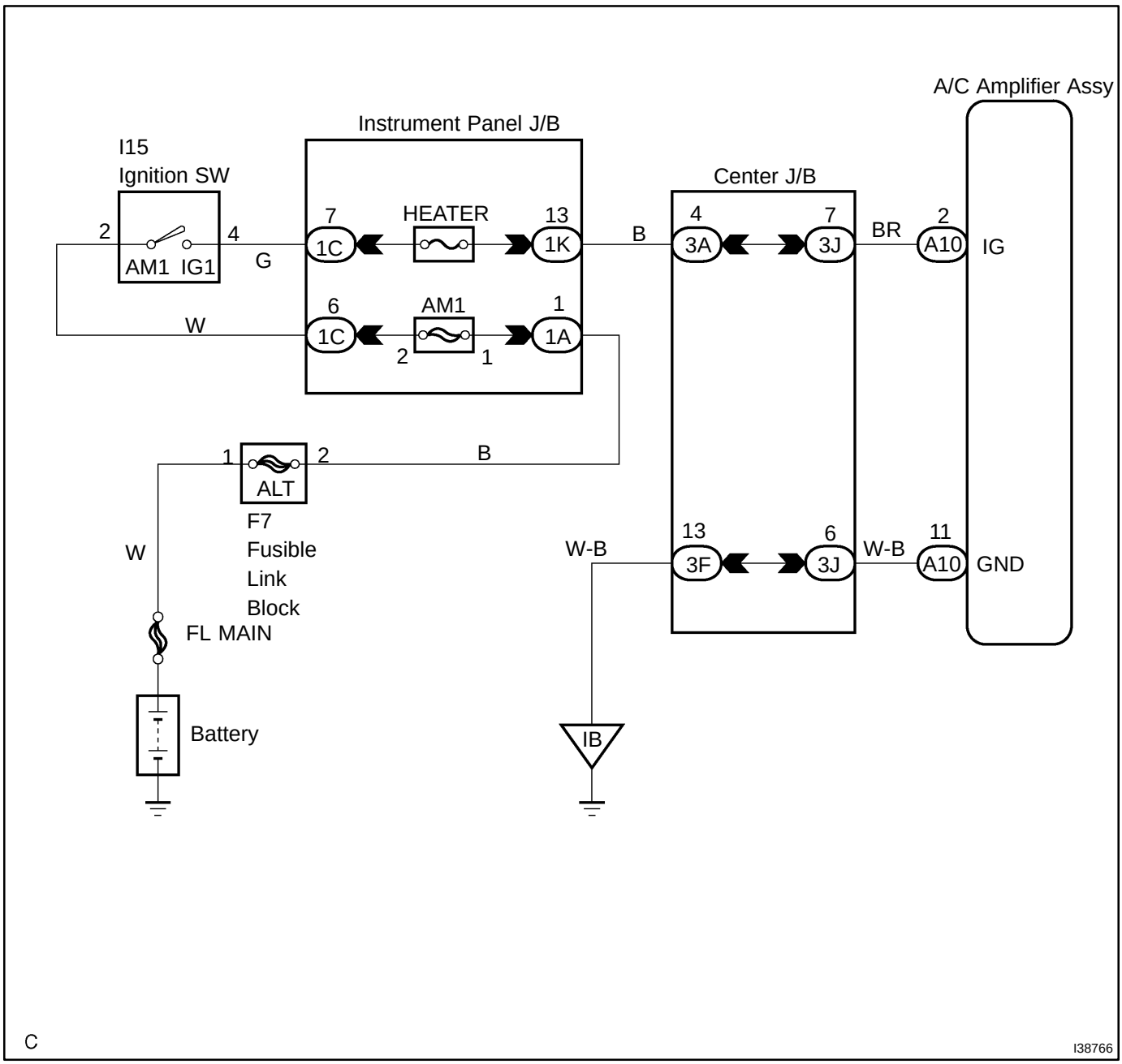
REPLACE AIRCONDITIONER AMPLIFIER ASSY

IG POWER SOURCE CIRCUIT

CIRCUIT DESCRIPTION

This is the power source for the A/C amplifier assy and servomotor, etc.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK FUSE(HEATER, AM1 FUSES)

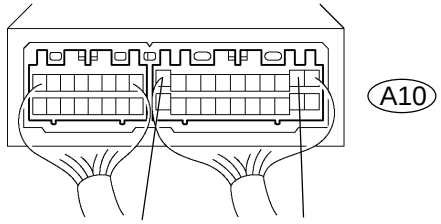
(a) Remove the HEATER and AM1 fuses from the instrument panel J/B.
(b) Check that the continuity exists in HEATER and AM1 fuses.

NG → REPLACE FUSE

OK

2	INSPECT AIRCONDITIONER AMPLIFIER ASSY(IG, GND)

A/C Amplifier Connector Wire Harness View:



(a) Remove the A/C amplifier assy with connectors still connected.
(b) Measure the voltage according to the value(s) in the table below.

Standard:

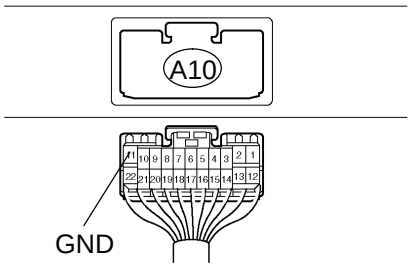
Tester connection	Condition	Specified condition
A10-2 (IG) - A10-11 (GND)	Ignition switch ON	10 to 14 V

OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-1 129)**

NG

3	CHECK HARNESS AND CONNECTOR(A/C AMPLIFIER ASSY - BODY GROUND)

A/C Amplifier Connector Wire Harness View:



(a) Measure the resistance according to the value(s) in the table below.

Standard:

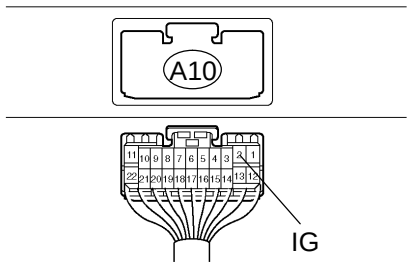
Tester connection	Condition	Specified condition
A10-11 (GND) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4 CHECK HARNESS AND CONNECTOR(A/C AMPLIFIER ASSY - BATTERY)

A/C Amplifier Connector Wire Harness View:



(a) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
A10-2 (IG) - Body ground	Ignition switch OFF → ON	Below 1.0 V → 10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

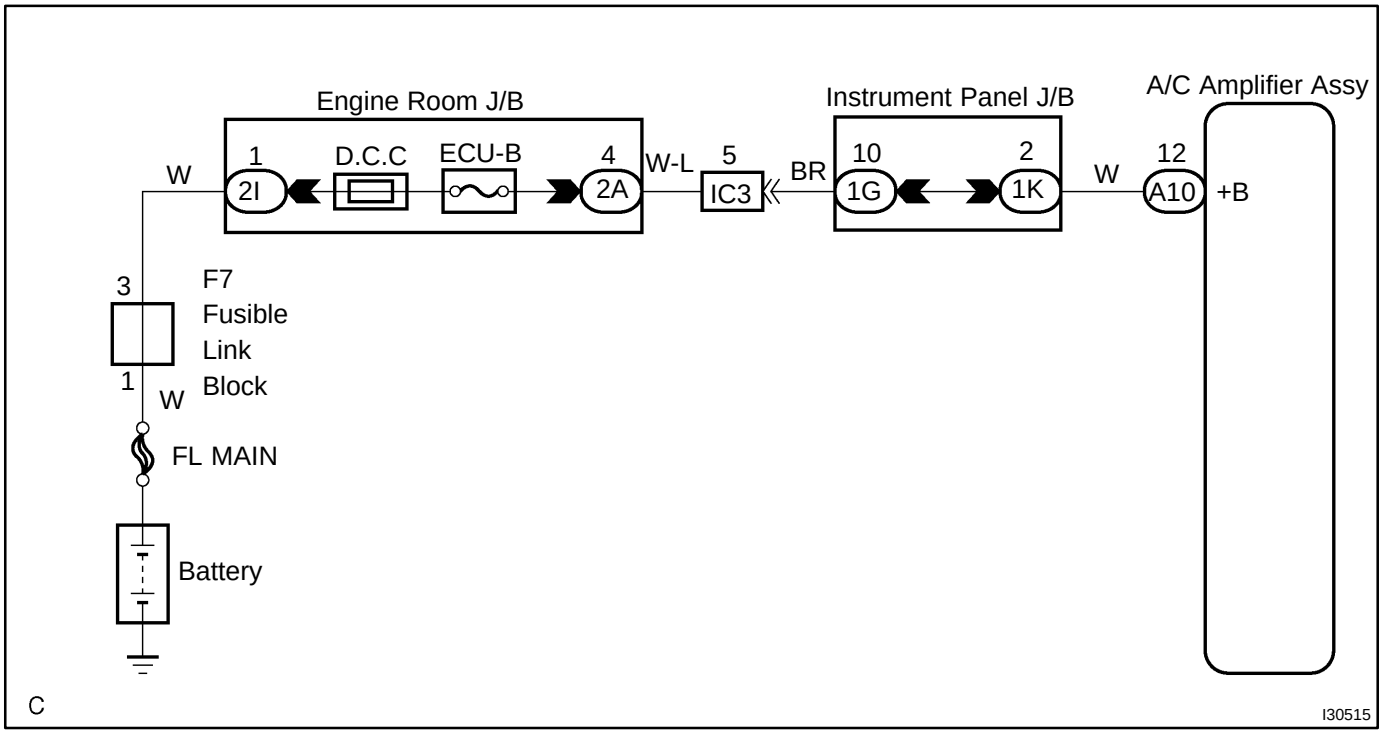
REPLACE AIRCONDITIONER AMPLIFIER ASSY

BACK-UP POWER SOURCE CIRCUIT

CIRCUIT DESCRIPTION

This is the back-up power source for the A/C amplifier assy. Power is supplied even when the ignition switch is off and is used for diagnostic trouble code memory, etc.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK FUSE(ECU-B FUSE)

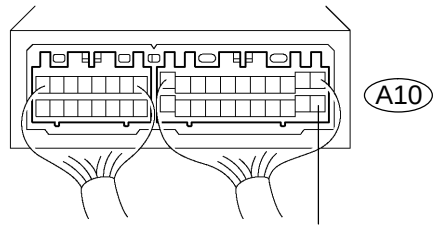
(a) Remove the ECU-B fuse from the engine room J/B.
(b) Check that the continuity exits of ECU-B fuse.

NG → **REPLACE FUSE**

OK

2	INSPECT AIRCONDITIONER AMPLIFIER ASSY(+B)

A/C Amplifier Connector Wire Harness View:



(a) Remove the A/C amplifier assy with connectors still connected.
(b) Measure the voltage according to the value(s) in the table below.

Standard:

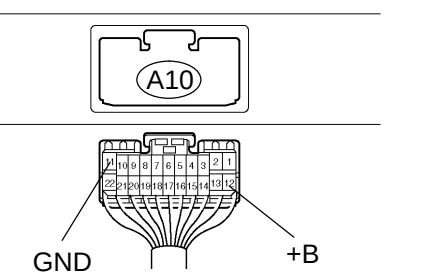
Tester connection	Condition	Specified condition
A10-12 (+B) - Body ground	Always	10 to 14 V

OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-1 129)**

NG

3	CHECK HARNESS AND CONNECTOR(A/C AMPLIFIER ASSY - BATTERY)

A/C Amplifier Connector Wire Harness View:



(a) Remove the A/C amplifier assy and disconnect the connector.
(b) Measure the voltage according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
A10-12 (+B) - A10-11 (GND)	Always	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

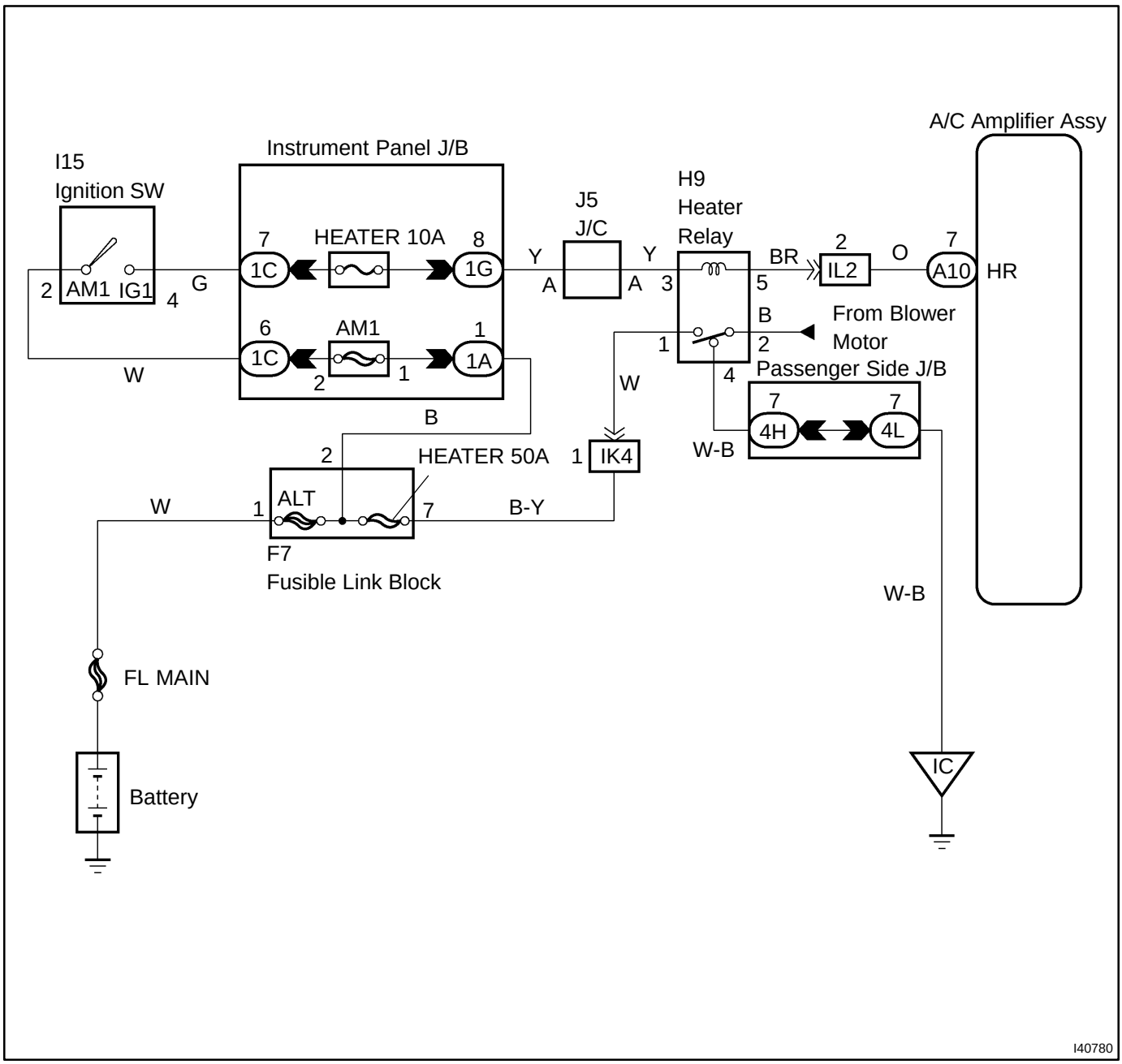
REPLACE AIRCONDITIONER AMPLIFIER ASSY

HEATER RELAY CIRCUIT

CIRCUIT DESCRIPTION

The heater relay is switched on by signals from the A/C amplifier assy. It supplies power to the blower motor.

WIRING DIAGRAM



INSPECTION PROCEDURE

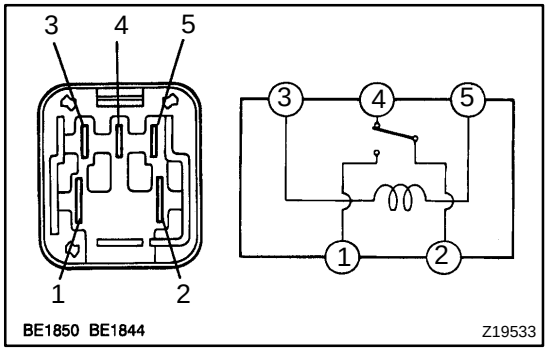
1 CHECK FUSE(15 A HEATER, 50 A HEATER, AM1 FUSES)

(a) Remove the 15 A HEATER and AM1 fuses from the instrument panel J/B.
(b) Remove the 50 A HEATER fuse from fusible link block.
(c) Check that the continuity exists in 15 A HEATER and 50 A HEATER, AM1 fuses.

NG → **REPLACE FUSE**

OK

2 INSPECT HEATER BLOWER MOTOR RELAY ASSY



(a) Check that the continuity exists between each pair of terminals of heater blower motor relay assy, as shown in the chart.

Tester connection	Condition	Specified condition
2 - 1	Always	10 kΩ or higher
2 - 4	Always	Below 1.0 Ω

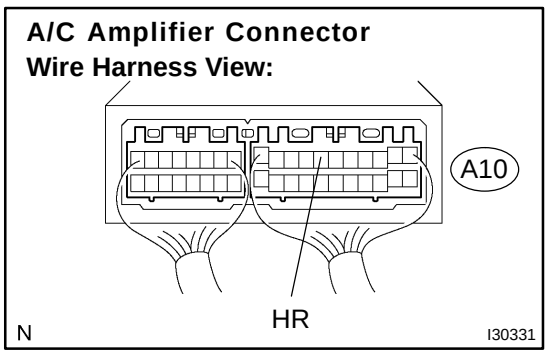
(b) Check continuity between each pair of terminals, as shown the chart.

Tester connection	Condition	Specified condition
2 - 1	When battery voltage applied to terminals 3 and 5	Below 1.0 Ω
2 - 4	When battery voltage applied to terminals 3 and 5	10 kΩ or higher

NG → **REPLACE HEATER BLOWER MOTOR RELAY ASSY**

OK

3 INSPECT AIRCONDITIONER AMPLIFIER ASSY(HR)



(a) Remove the A/C amplifier assy with connectors still connected.
(b) Measure the voltage according to the value(s) in the table below.

Standard:

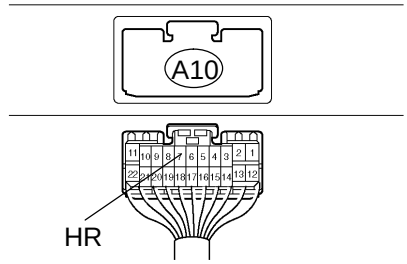
Tester connection	Condition	Specified condition
A10-7 (HR) - Body ground	Ignition switch OFF	0 V
A10-7 (HR) - Body ground	Ignition switch ON Blower switch ON	Below 1.0 V
A10-7 (HR) - Body ground	Ignition switch ON Blower switch OFF	10 to 14 V

OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

NG

4	CHECK HARNESS AND CONNECTOR

A/C Amplifier Connector Wire Harness View:



I38763

(a) Measure the voltage according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
A10-7 (HR) - Body ground	Ignition switch OFF → ON	Below 1 V → 10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

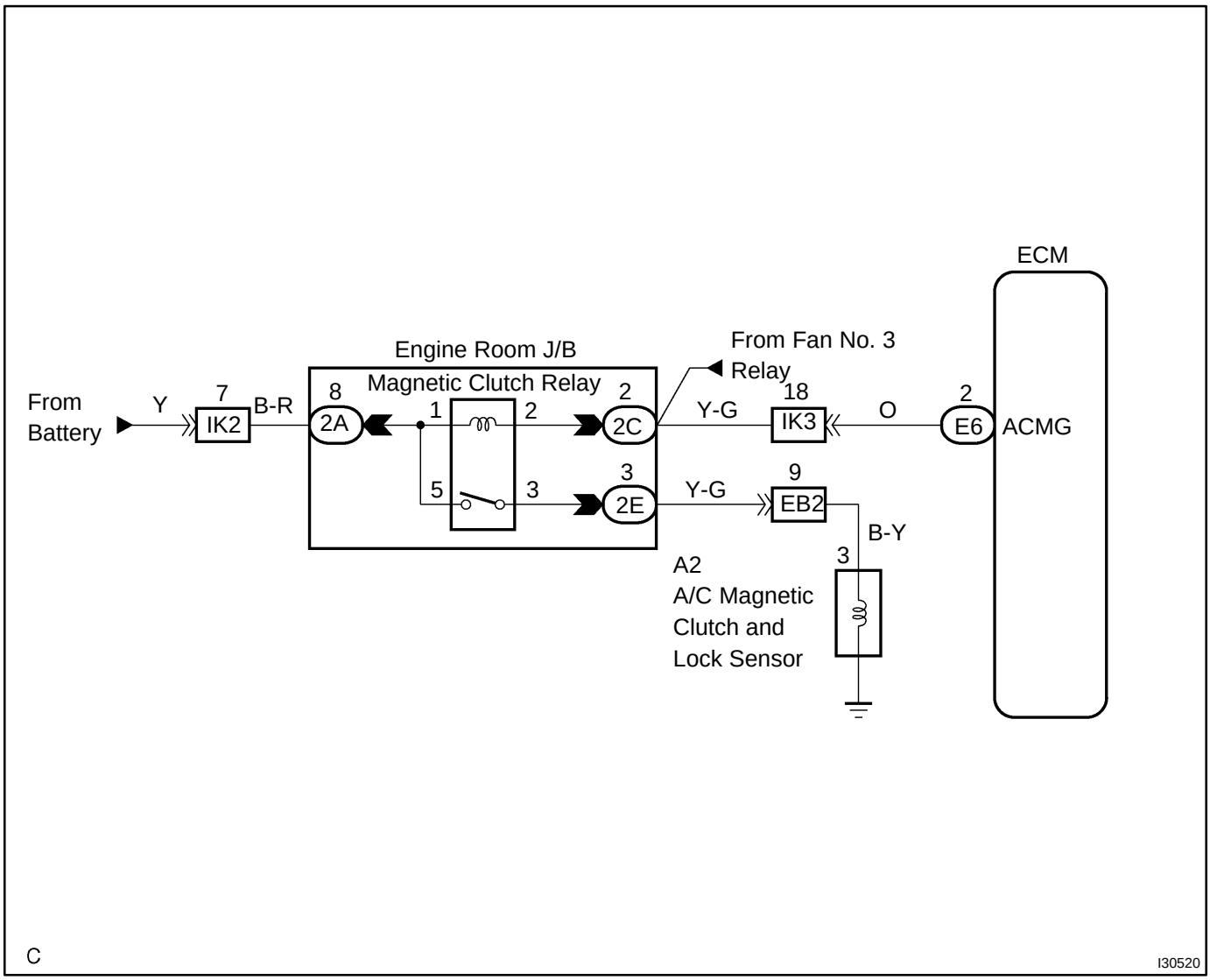
REPAIR OR REPLACE AIRCONDITIONER AMPLIFIER ASSY

COMPRESSOR CIRCUIT

CIRCUIT DESCRIPTION

The ECM and A/C amplifier communicate via BEAN.
The A/C amplifier assy outputs the magnetic clutch ON signal to the ECM.
Receiving this signal, the ECM sends a signal through terminal ACMG and switches the magnetic clutch relay ON, thus turning on the magnetic clutch.

WIRING DIAGRAM



INSPECTION PROCEDURE

1 READ VALUE OF HAND-HELD TESTER

(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester main switch ON.
(c) Select the items below in the DATA LIST, and read the displays on the hand-held tester.

ENGINE AND ECT / ALL:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
A/C SIG	A/C signal/ ON or OFF	A/C ON: ON	-
A/C MAG CLUTCH	A/C magnet clutch/ ON or OFF	A/C magnet clutch ON: ON	-

NG → **INSPECT MULTIPLEX COMMUNICATION CIRCUIT**

OK

2 PERFORM ACTIVE TEST USING HAND-HELD TESTER

(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester main switch ON.
(c) Select the item below in the ACTIVE TEST, and then check that the relay operates.

ENGINE AND ECT / ALL:

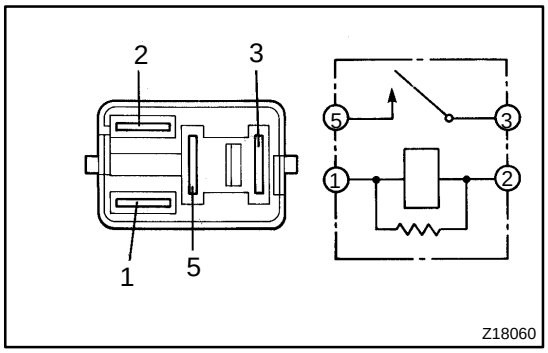
Item	Test Details/Display (Range)	Diagnostic Note
A/C MAG CLUTCH	Magnetic clutch relay / OFF, ON	Operating sound can be heard

NG → **Go to step 3**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-1 129)

3 INSPECT MAGNET-CLUTCH RELAY



(a) Remove the relay (magnet clutch relay) from the engine room R/B.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

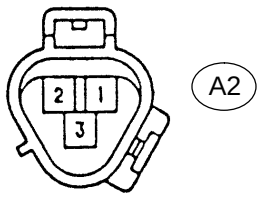
Tester connection	Condition	Specified condition
3 - 5	Always	10 kΩ or higher
3 - 5	When battery voltage applied to terminals 1 and 2	Below 1 Ω

NG → **REPLACE MAGNET-CLUTCH RELAY**

OK

4 INSPECT MAGNET CLUTCH ASSY

Magnet Clutch Assy Connector From View:



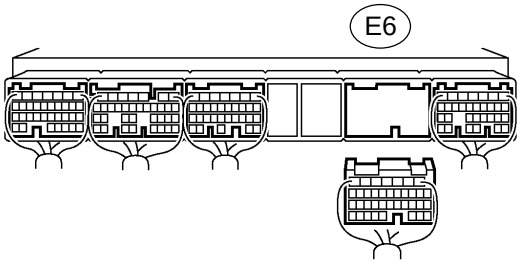
(a) Disconnect the connector from the magnet clutch assy.
(b) Connect the positive (+) lead from the battery to terminal 3 and negative (-) lead to body ground, then check that the magnet clutch assy is engaged.

NG → **REPLACE MAGNET CLUTCH ASSY**

OK

5 INSPECT ECM

ECM Connector Wire Harness View:



(a) Remove the ECM and disconnect the connector.
(b) Measure the voltage according to the value(s) in the table below.

Standard:

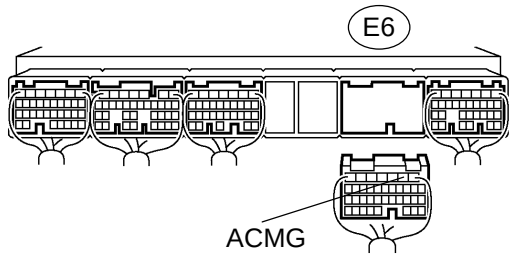
Tester connection	Condition	Specified condition
E6-2 (ACMG) - Body ground	Ignition switch ON	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

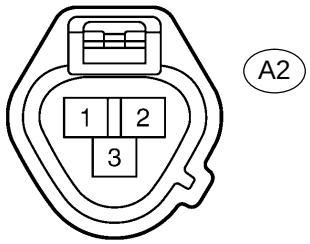
OK

6 CHECK HARNESS AND CONNECTOR

ECM Connector
Wire Harness View:



Magnet Clutch Assy Connector
Wire Harness View:



I36159
E51630
I38853

(a) Disconnect the connector.
(b) Measure the voltage according to the value(s) in the table below.

Standard:

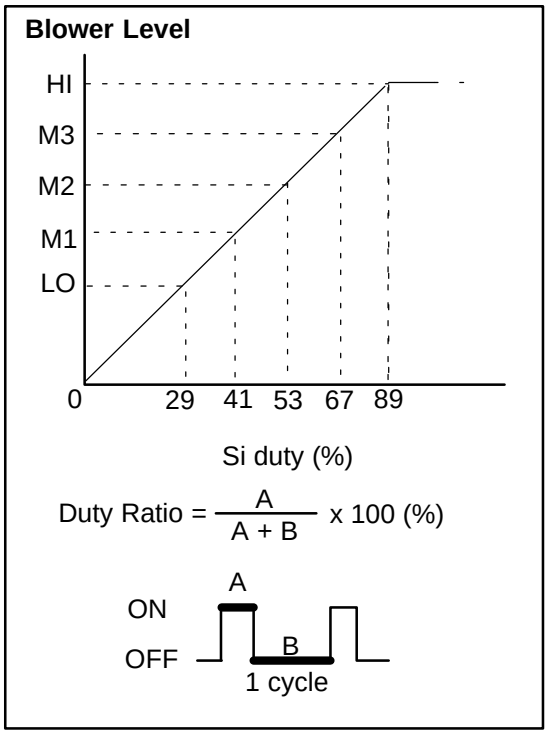
Tester connection	Condition	Specified condition
A2-3 - Body ground	Ignition switch ON When using service wire, terminal E6-2 (ACMG) and Body ground are not connect	Below 1 V
A2-3 - Body ground	Ignition switch ON When using service wire, terminal E6-2 (ACMG) and Body ground are connect	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE ECM

BLOWER MOTOR CIRCUIT



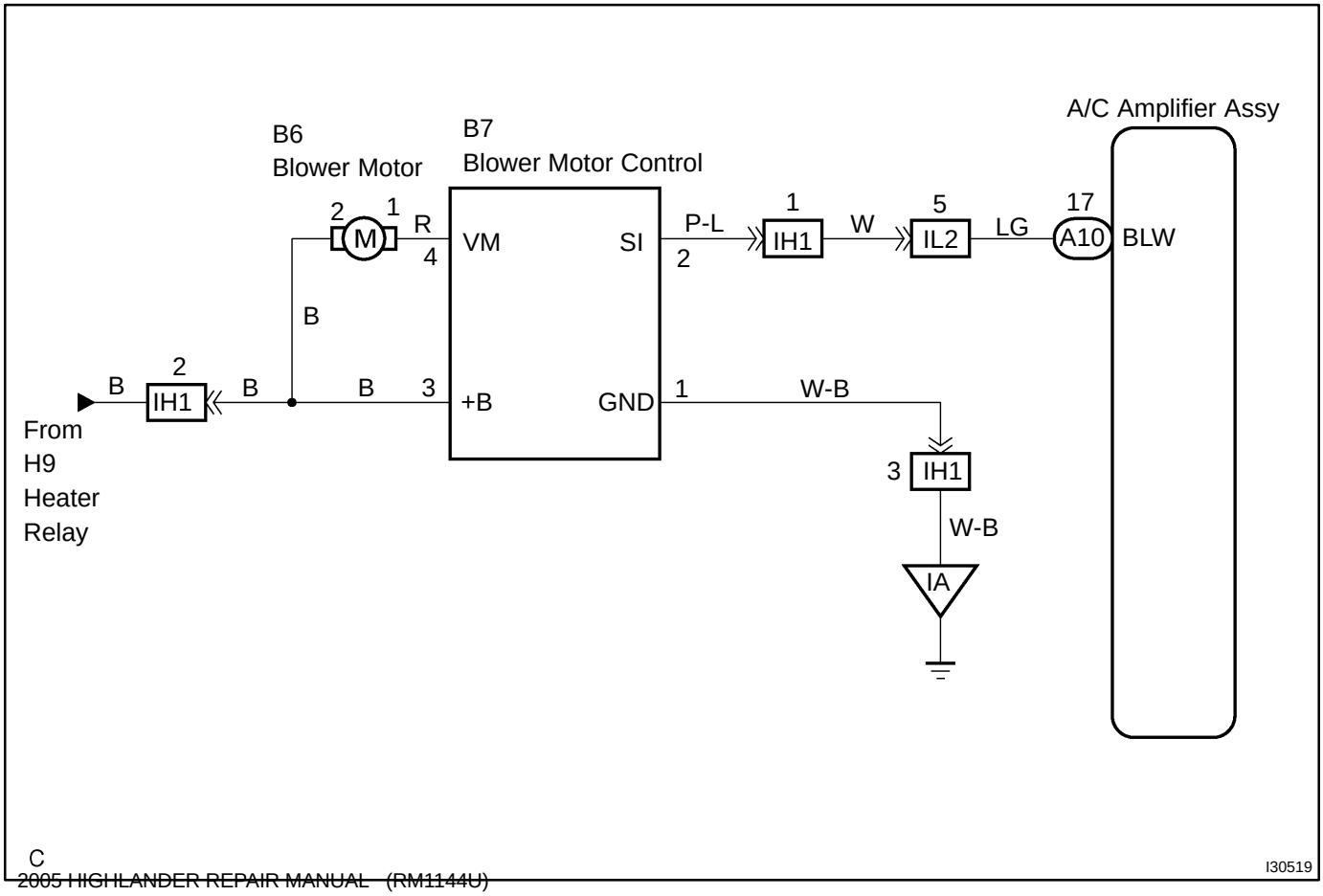
CIRCUIT DESCRIPTION

The blower motor is operated by signals from the A/C amplifier assy. Blower motor speed signals are transmitted by changes in the Duty Ratio.

Duty Ratio

The duty ratio is the ratio of the period of continuity in one cycle. For example, if A is the period of continuity in one cycle, B is the period of non-continuity.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	PERFORM ACTUATOR CHECK

(a) Set the actuator check mode (see page 05-1 117).
(b) Press the blower switch to change to the step operation.
(c) Check the air flow level by hand.

Display Code	Blower level
0	0
1	1
2	14
3	14
4	14
5	14
6	14
7	14
8	14
9	31

OK:
Blower level changes in accordance with each display code.

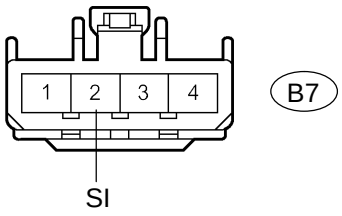
NG → **Go to step 2**

OK

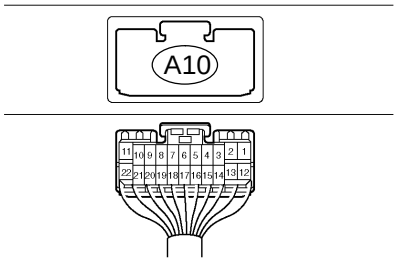
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-1 129)

2	CHECK HARNESS AND CONNECTOR(BLOWER MOTOR CONTROLLER - A/C AMPLIFIER)

Blower Motor Controller Connector Front View:



A/C Amplifier Connector Wire Harness View:



I41004

(a) Measure the resistance according to the value(s) in the table below.
Standard:

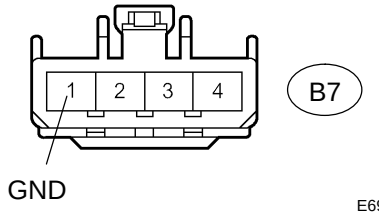
Tester connection	Condition	Specified condition
A10-17 (BLW) - B7-2 (SI)	Always	Below 1 Ω
A10-17 (BLW) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3	CHECK HARNESS AND CONNECTOR(BLOWER MOTOR CONTROLLER - BODY GROUND)

Blower Motor Controller Connector
Front View:



(a) Measure the resistance according to the value(s) in the table below.
Standard:

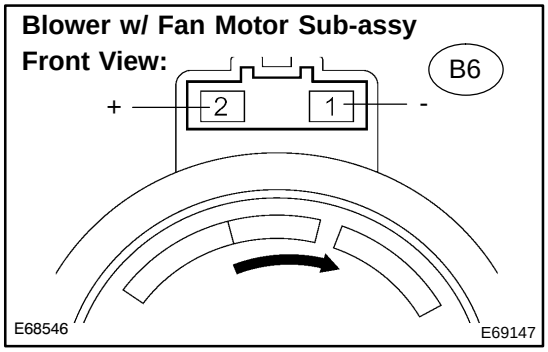
Tester connection	Condition	Specified condition
B7-1 (GND) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4	INSPECT COOLING UNIT MOTOR SUB-ASSY W/FAN

Blower w/ Fan Motor Sub-assy
Front View:



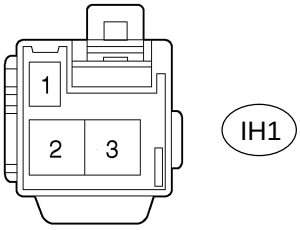
(a) Remove the blower w/ fan motor sub-assy.
(b) Connect positive (+) lead to terminal 2 of the blower motor connector and negative (-) lead to terminal 1.
Standard: Blower motor operates smoothly.

NG → **REPLACE COOLING UNIT MOTOR SUB-ASSY W/FAN**

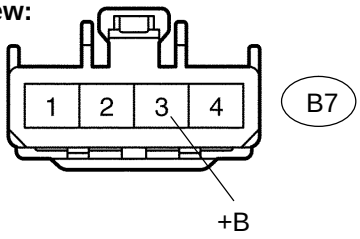
OK

5	CHECK A/C SUB NO.2 WIRE

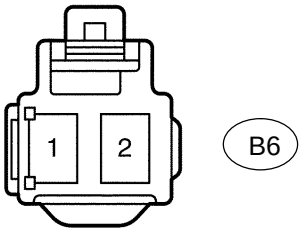
A/C Sub No.2 Wire Connector
Front View:
Wire to wire



A/C Sub No.2 Wire Connector
Front View:



A/C Sub No.2 Wire Connector
Front View:



I41008

(a) Measure the resistance according to the value(s) in the table below.
Standard:

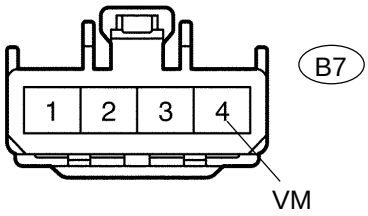
Tester connection	Condition	Specified condition
IH1-2 - B6-2	Always	Below 1 Ω
IH1-2 - B7-3 (+B)	Always	Below 1 Ω
B6-2 - B7-3 (+B)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE A/C SUB NO.2 WIRE**

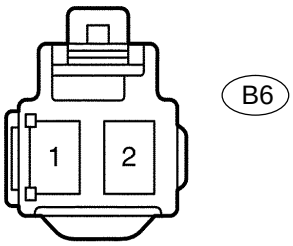
OK

6	**CHECK HARNESS AND CONNECTOR(BLOWER MOTOR CONTROLLER - BLOWER MOTOR)**

Blower Motor Controller Connector Front View:



Blower Motor Connector Front View:



P I36240

(a) Measure the resistance according to the value(s) in the table below.

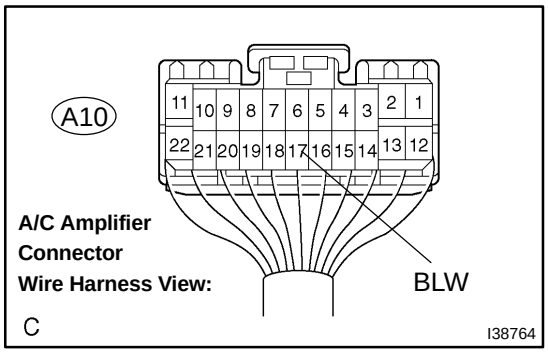
Standard:

Tester connection	Condition	Specified condition
B7-4 (VM) - B6-1	Always	Below 1 Ω
B7-4 (VM) - Body ground	Always	10 kΩ or higher

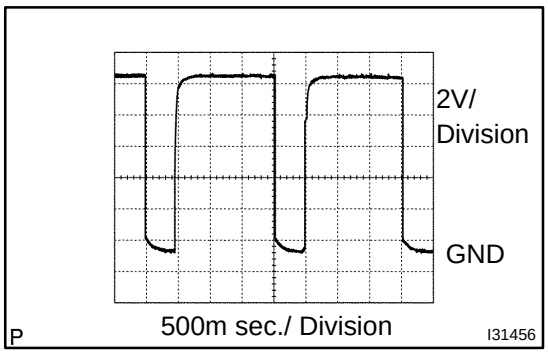
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

7	**INSPECT AIR CONDITIONING AMPLIFIER(BLW - BODY GROUND)**



(a) Remove the A/C amplifier with the connectors still connected.
(b) Turn the ignition switch to the ON position.
(c) Turn the blower switch on (Lo).



(d) Measure the waveform between terminal BLW (A10-17) of the A/C amplifier and body ground.
OK:
Waveform operates as shown in the illustration.

HINT:
Waveform varies with the blower level.

NG → **REPLACE AIR CONDITIONING AMPLIFIER**

OK

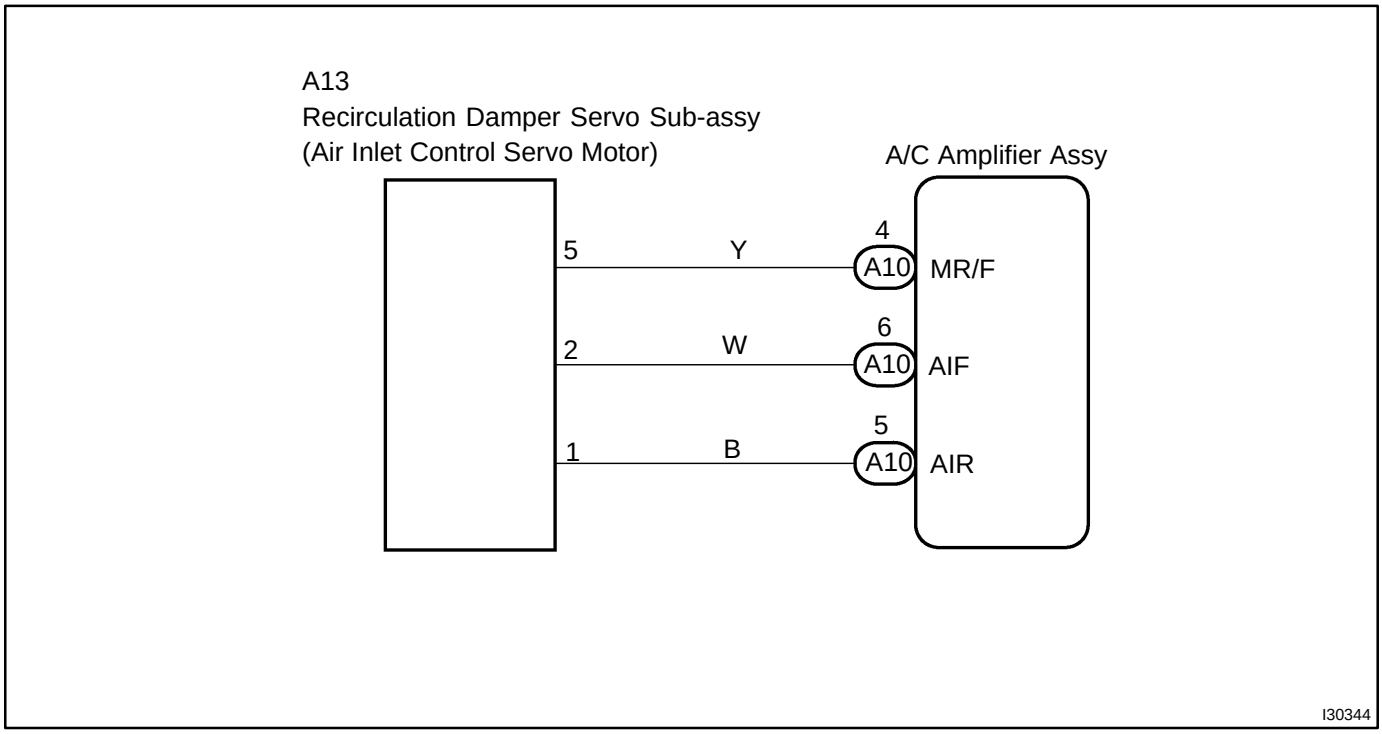
REPLACE BLOWER MOTOR CONTROL

RECIRCULATION DAMPER SERVOMOTOR CIRCUIT

CIRCUIT DESCRIPTION

The A/C amplifier assy controls the recirculation damper servo sub-assy and moves it to the desired position.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	PERFORM ACTUATOR CHECK

(a) Remove the glove box to see and check the recirculation damper servo sub-assy operation.
(b) Set to the actuator check mode (see page 05-1 117).
(c) Press the DEF switch and change it to step operation.
(d) Press the DEF switch in order and check the operation of recirculation damper servo sub-assy.

Display code	Recirculation damper position
0	FRESH
1	FRESH
2	FRESH
3	FRESH
4	RECIRCULATION
5	RECIRCULATION
6	RECIRCULATION
7	RECIRCULATION
8	RECIRCULATION
9	RECIRCULATION

OK:

Recirculation damper position changes in accordance with each display code.

Result:

NG	A
OK (Checking from the PROBLEM SYMPTOMS TABLE)	B
OK (Checking from the DTC)	C

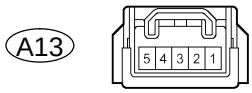
B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-1 129)**

C → **REPLACE AIRCONDITIONER AMPLIFIER ASSY**

A

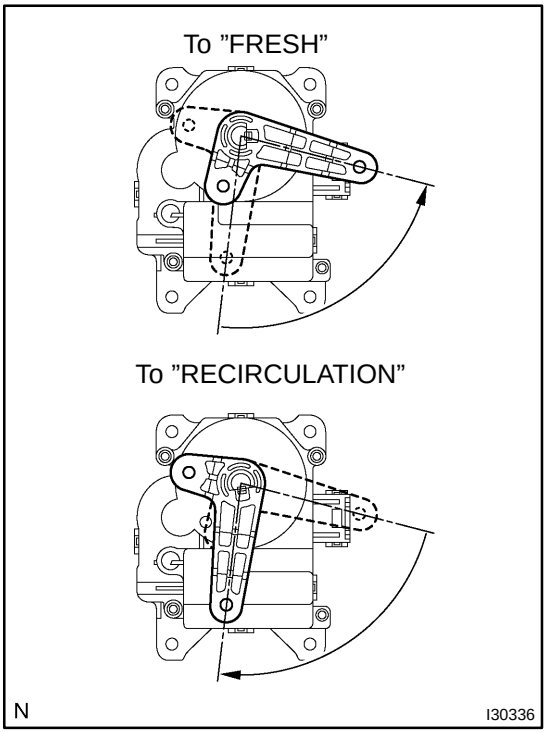
2	**INSPECT RECIRCULATION DAMPER SERVO SUB-ASSY(AIR INLET CONTROL SERVO MOTOR)**

Recirculation Damper Servo Sub-assy Connector Wire Harness View:



I30157

(a) Remove the recirculation damper servo sub-assy.
(b) Connect the positive (+) lead to from the battery to terminal 5 and negative (-) lead to terminal 2, then check that the lever turns to ”FRESH” side smoothly.
(c) Connect the positive (+) lead to from the battery to terminal 1 and negative (-) lead to terminal 5, then check that the lever turns to ”RECIRCULATION” side smoothly.

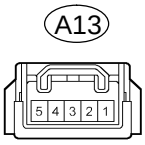


NG → **REPLACE RECIRCULATION DAMPER SERVO SUB-ASSY(AIR INLET CONTROL SERVO MOTOR)**

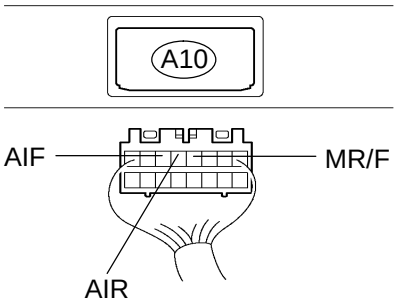
OK

3	CHECK HARNESS AND CONNECTOR(RECIRCULATON DAMPER SERVO SUB-ASSY (AIR INLET CONTROL SERVO MOTOR) - A/C AMPLIFIER ASSY)

Recirculation Damper Servo Sub-assy Wire Harness View:



A/C Amplifier Connector Wire Harness View:



(a) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
A10-4 (MR/F) - A13-5	Always	Below 1 Ω
A10-6 (AIF) - A13-2	Always	Below 1 Ω
A10-5 (AIR) - A13-1	Always	Below 1 Ω
A10-4 (MR/F) - Body ground	Always	10 kΩ or higher
A10-6 (AIF) - Body ground	Always	10 kΩ or higher
A10-5 (AIR) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

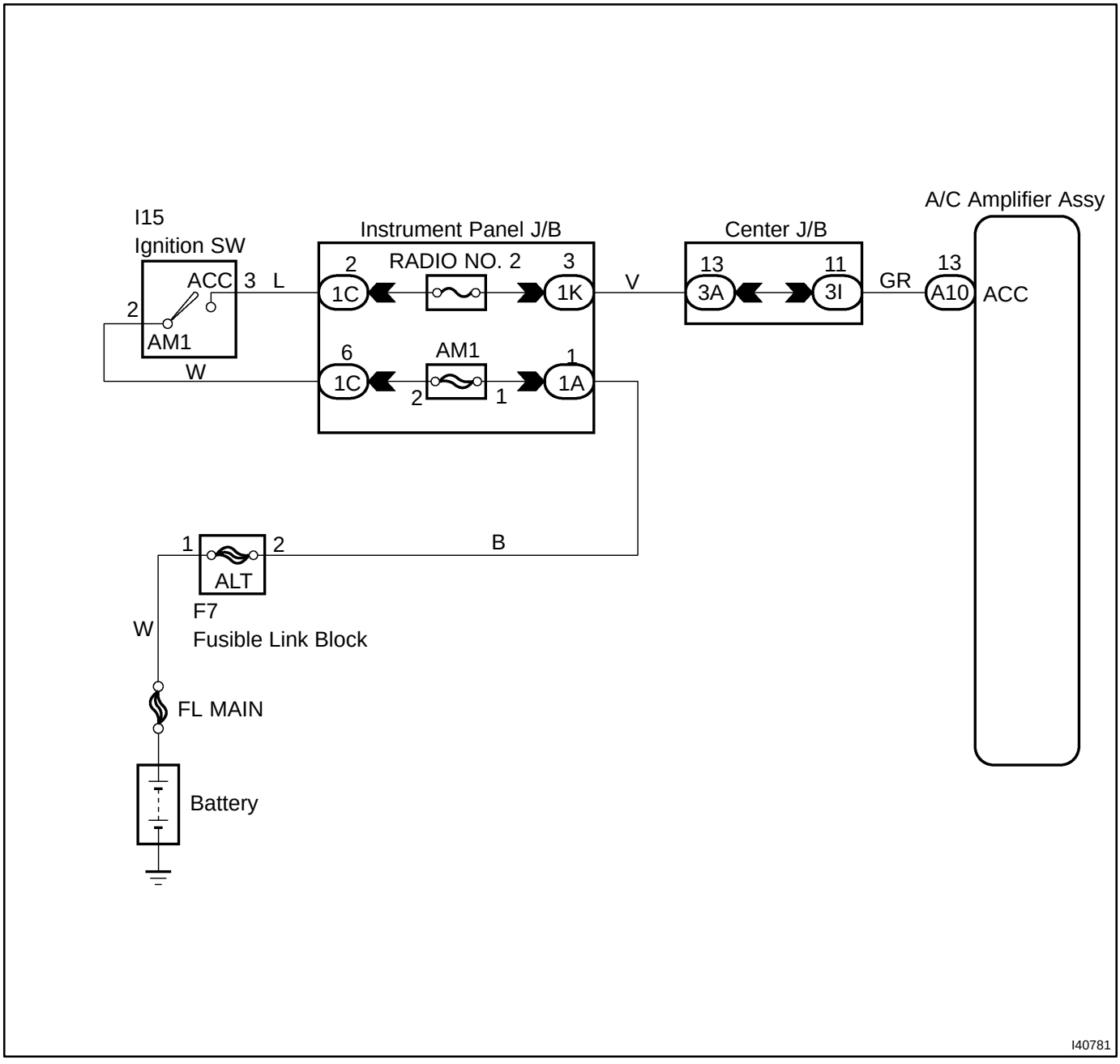
REPLACE AIRCONDITIONER AMPLIFIER ASSY

ACC POWER SOURCE CIRCUIT

CIRCUIT DESCRIPTION

This circuit supplies power to the A/C amplifier assy. It supplies power to the illumination for the clock.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK FUSE(RADIO NO. 2, AM1 FUSES)

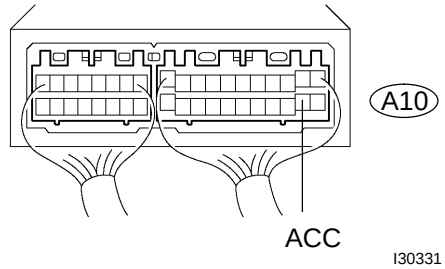
(a) Remove the RADIO No. 2 and AM1 fuses from the instrument panel J/B.
(b) Check that the continuity exits in RADIO No. 2 and AM1 fuses.

NG → **REPLACE FUSE**

OK

2	INSPECT AIRCONDITIONER AMPLIFIER ASSY(ACC)

A/C Amplifier Connector Wire Harness View:



(a) Remove the A/C amplifier assy with connectors still connected.
(b) Measure the voltage according to the value(s) in the table below.

Standard:

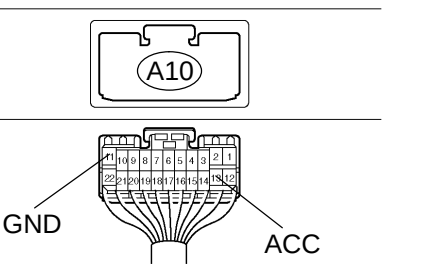
Tester connection	Condition	Specified condition
A10-13 (ACC) - Body ground	Ignition switch ACC	10 to 14 V

OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-1 129)**

NG

3	CHECK HARNESS AND CONNECTOR(A/C AMPLIFIER ASSY - BATTERY)

A/C Amplifier Connector Wire Harness View:



(a) Remove the A/C amplifier assy and disconnect the connector.
(b) Measure the voltage according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
A10-13 (ACC) - A10-11 (GND)	Always	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE AIRCONDITIONER AMPLIFIER ASSY

0521Y-03

CUSTOMER PROBLEM ANALYSIS CHECK

AIR CONDITIONING SYSTEM Check Sheet

Inspector's name:

Customer's Name		**VIN**	
		Production Data	
		Licence Plate No.	
Date Vehicle Brought In	/ /	**Odometer Reading**	**km miles**

Date of Problem Occurrence	/ /
How Often does Problem Occur?	⁎ Continuous ⁎ Intermittent (times a day)
Weather	⁎ Fine ⁎ Cloudy ⁎ Snowy ⁎ Various / Other
Outdoor Temperature	⁎ Hot ⁎ Warm ⁎ Cool ⁎ Cold (Approx. °F °C)

Symptoms	**Air Flow Control is Faulty**	⁎ Blower motor does not operate ⁎ Blower motor speed does not change (Always Hi, Always Med, Always Lo)
	Temperature Control is Faulty	⁎ Cabin temperature does not go down ⁎ Cabin temperature does not rise ⁎ Response is slow
	Air Inlet Control is Faulty	⁎ Cannot change between FRS and REC (Always Fresh or always Recirculating)
	Vent Control is Faulty	⁎ Mode does not change ⁎ Unable to enter the desired mode

DTC Check	**1st Time**	⁎ Normal System Code⁎ Malfunction Code (Code)
	2nd Time	⁎ Normal System Code⁎ Malfunction Code (Code)

I30150

05220-03

DIAGNOSTIC TROUBLE CODE CHART

If malfunction code is displayed during the DTC check (sensor check), check the circuit listed for that code in the table below (Proceed to the page given for that circuit).

DTC No. (See Page)	Detection Item	Trouble Area	Memory*4
00	Normal	-	-
B1411/11*1 (05-1130)	Room temperature sensor circuit	›Cooler (room temperature sensor) thermistor ›Harness or connector between cooler (room temperature sensor) thermistor and A/C amplifier assy ›A/C amplifier assy	○ (8.5 min. or more)
B1412/12*2 (05-1134)	Ambient temperature sensor circuit	›Cooler (ambient temperature sensor) thermistor ›Harness or connector between cooler (ambient temperature sensor) thermistor and ECM ›ECM ›A/C amplifier assy	○ (8.5 min. or more)
B1413/13 (05-1138)	Evaporator temperature sensor circuit	›Cooler thermistor No. 1 (Evaporator temperature sensor) ›Harness or connector between cooler thermistor No. 1 sensor and A/C amplifier assy ›A/C amplifier assy	○ (8.5 min. or more)
B1421/21*3 (05-1142)	Solar sensor circuit (short)	›Cooler (solar sensor) thermistor ›Harness or connector between cooler (solar sensor) thermistor and A/C amplifier assy ›A/C amplifier assy	○ (8.5 min. or more)
B1421/21*3 (05-1142)	Solar sensor circuit (open)	›Cooler (solar sensor) thermistor ›Harness or connector between A/C solar sensor and A/C amplifier assy ›A/C amplifier assy	-
B1422/22*5 (05-1146)	All conditions below are detected for 3 sec. or more (a) Engine speed: 450 rpm or more (b) Ratio between engine and compressor rpm deviates 20% or more in comparison to normal operation.	›Cooler compressor assy ›Cooler compressor assy drive belt ›Cooler compressor assy lock sensor ›Harness and connector between ECM and cooler compressor assy, cooler compressor assy and body ground ›Multiplex communication circuit ›ECM ›A/C amplifier assy	-
B1423/23 (05-1149)	Pressure switch circuit	›Pressure switch ›Harness or connector between pressure switch and ECM ›Multiplex communication circuit ›ECM ›A/C amplifier assy	-
B1431/31 (05-1152)	Air mix damper position sensor circuit	›Air mix damper position sensor ›Harness or connector between air mix damper servo sub-assy and A/C amplifier assy ›A/C amplifier assy	○ (1 min. or more)
B1433/33 (05-1156)	Air outlet damper position sensor circuit	›Mode damper position sensor ›Harness or connector between mode damper servo sub-assy and A/C amplifier assy ›A/C amplifier assy	○ (1 min. or more)
B1441/41 (05-1160)	Air mix control servo motor circuit	›Air mix damper servo sub-assy ›Air mix damper position sensor ›Harness or connector between air mix damper servo sub-assy and A/C amplifier assy ›A/C amplifier assy	○ (15 sec.)

B1443/43 (05-1164)	Air outlet control servo motor circuit	・Mode damper servo sub-assy ・Mode damper position sensor ・Harness or connector between mode damper servo sub-assy and A/C amplifier assy ・A/C amplifier assy	○ (15 sec.)
B1499/99 (05-1168)	Multiplex communication circuit	・Open in multiplex communication circuit	-

HINT:

- *1: If the room temperature is approx. -18.6˚C (-1.48˚F) or lower, DTC B1411/11 may be output even though the system is normal.
- *2: If the ambient temperature is approx. -52.9˚C (-63.22˚F) or lower, DTC B1412/12 may be output even though the system is normal.
- *3: If the check is being performed in a dark place, DTC B1421/21 (solar sensor circuit abnormal) could be displayed.
- *4: The A/C amplifier assy memorizes the DTC of the respective malfunction it has occurred for the period of the time indicated in the brackets.
- *5: Compressor lock (DTC B1422/22) is indicated only for a current malfunction. (see page 05-1 146)
  To confirm DTC B1422/22, perform the following steps.
  (1) With the engine ON, enter the DTC check mode.
  (2) Press the R/F switch to enter actuator check mode, and set the operation to Step No. 3.
  (3) Press the AUTO switch to return to DTC check mode.
  (4) The DTC is displayed after approximately 3 seconds.

AIR CONDITIONING SYSTEM

0521X-03

HOW TO PROCEED WITH TROUBLESHOOTING

1	VEHICLE BROUGHT TO WORK SHOP

2	CUSTOMER PROBLEM ANALYSIS (SEE PAGE 05-1 116)

3	CHECK AND CLEAR DTC (SEE PAGE 05-1 117)

4	PROBLEM SYMPTOM CONFIRMATION

- SYMPTOM DOES NOT OCCUR (GO TO STEP 5)
- SYMPTOM OCCURS (GO TO STEP 8)

5	SYMPTOM SIMULATION (SEE PAGE 01-26)

6	CHECK MULTIPLEX COMMUNICATION SYSTEM

- MULTIPLEX COMMUNICATION SYSTEM DTC OUTPUTS (PROCEED TO ”MULTIPLEX COMMUNICATION SYSTEM)
- NO MULTIPLEX COMMUNICATION SYSTEM DTC (GO TO STEP 7)

7	CHECK BEAN COMMUNICATION SYSTEM

- BEAN DTC OUTPUTS (PROCEED TO ”COMMUNICATION SYSTEM”)
- NO BEAN DTC (GO TO STEP 8)

8	DTC CHECK (OTHER THAN MULTIPLEX COMMUNICATION SYSTEM DTC)

- MALFUNCTION CODE (GO TO STEP 9)
- NORMAL CODE (GO TO STEP 10)

9	DTC CHART (SEE PAGE 05-1 125)

GO TO STEP 10

10	PROBLEM SYMPTOMS TABLE (SEE PAGE 05-1 129)

11	ACTUATOR CHECK (SEE PAGE 05-1 117)

12	CIRCUIT INSPECTION (SEE PAGE 05-1 130 - 05-1 190)

13	IDENTIFICATION OF PROBLEM

14	PARTS INSPECTION

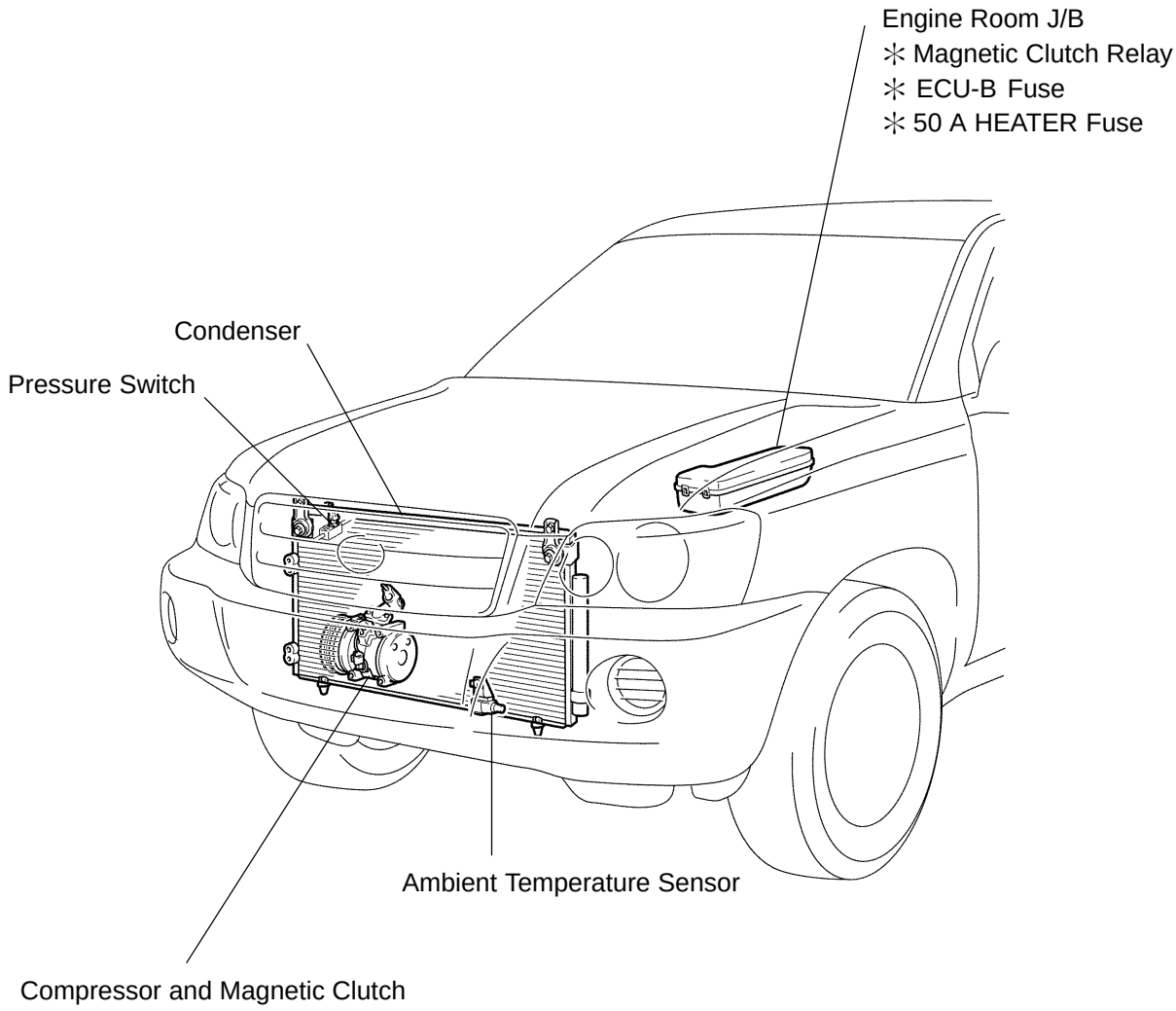
15	REPAIR

16	CONFIRMATION TEST

END

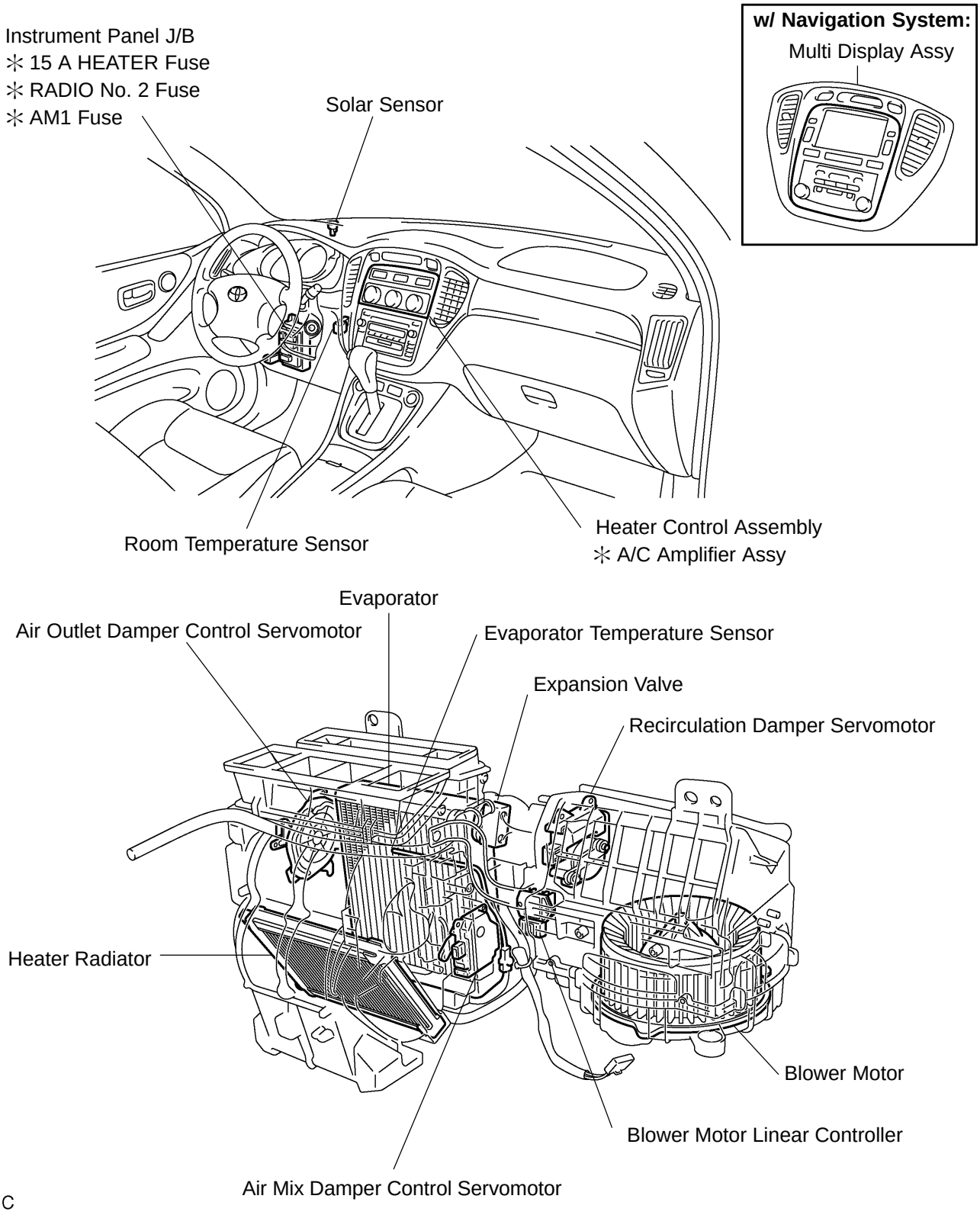
05221-03

LOCATION



I30305

w/o Navigation System:

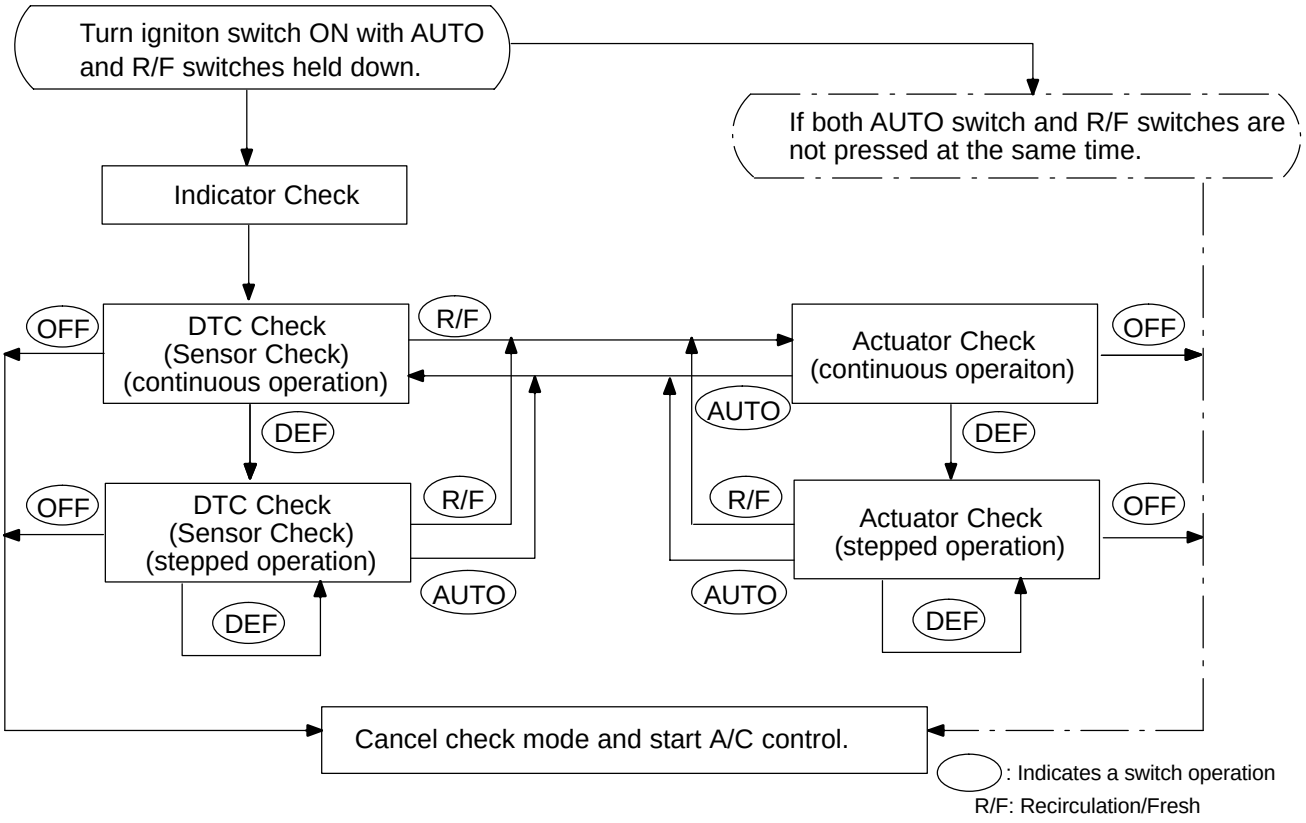


05IU9-01

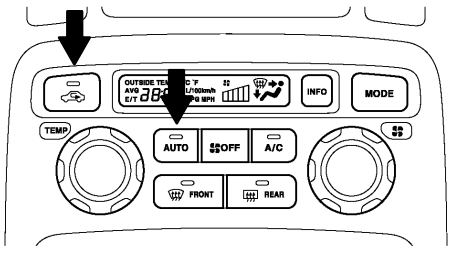
PRE-CHECK

1. LIST OF OPERATION METHODS

By operating each of the A/C control switches as shown in the diagram below, it is possible to enter the diagnosis check mode.

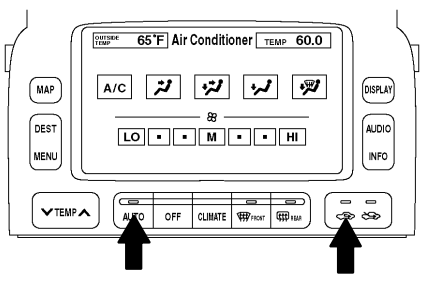


w/o Navigation System



N I30328

w/ Navigation System

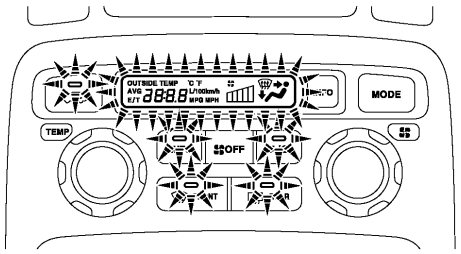


C I38758

2. INDICATOR CHECK

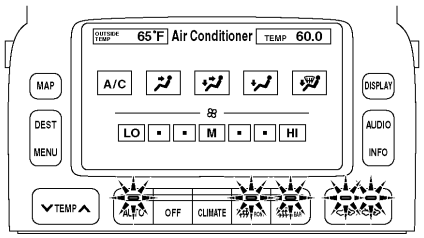
(a) Turn the ignition switch ON while pressing the A/C control AUTO switch and R/F switch simultaneously.

w/o Navigation System

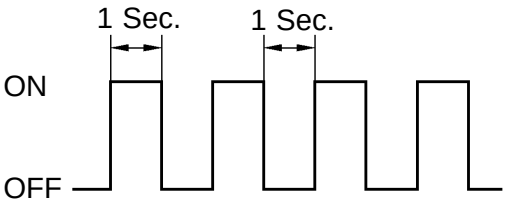


I41003

w/ Navigation System



C I38757



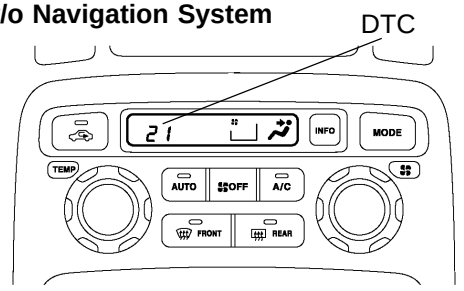
N I36113

(b) Check that the indicators light up and go off at 1 second intervals 4 times in succession.

HINT:

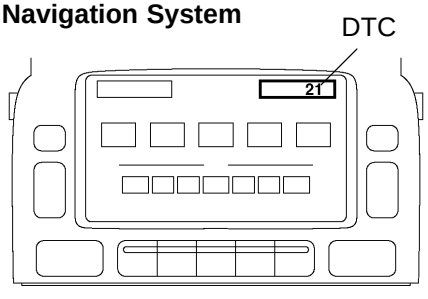
- After the indicator check is completed, the system enters the DTC automatically.
- Press the OFF switch when desiring to cancel the check mode.

w/o Navigation System



N I30327

w/ Navigation System



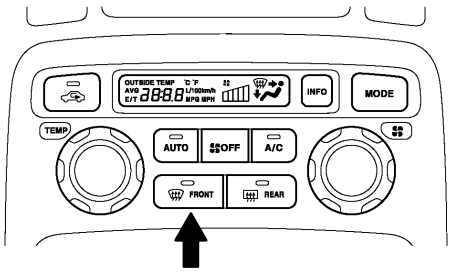
C I38759

3. DTC CHECK (SENSOR CHECK)

(a) Perform an indicator check. After the indicator check is completed, the system enters the DTC check mode automatically.

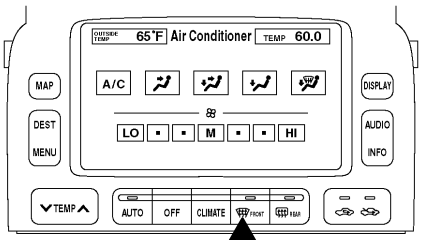
(b) Read the code displayed on the panel. Refer to the list of codes on page 05- 1125 when reading the codes. (Trouble codes are output at the temperature display.)

w/o Navigation System



N I30328

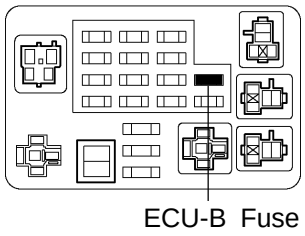
w/ Navigation System



C I38758

(c) If the slower display is desired, press the FRONT DEF switch and change it to stepped operation. Each time the FRONT DEF switch is pressed, the display changes by 1 step.

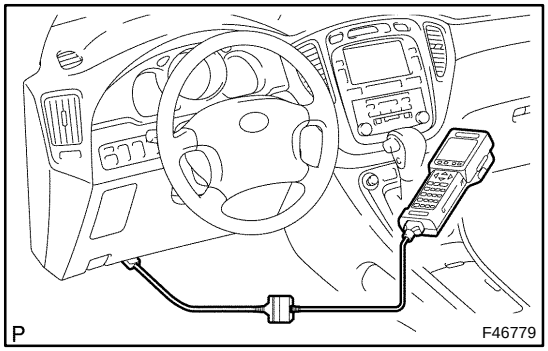
Engine Room J/B



N I30337

4. CLEARING DTC

(a) To clear diagnostic trouble code, there are 2 ways.
  (1) During sensor check, press the FRONT DEF switch and REAR DEF switch at the same time.
  (2) Pull the ECU-B fuse in engine room J/B for 20 sec. or longer to clear the DTC memory.



P F46779

5. DTC CHECK USING HAND-HELD TESTER

(a) Connect the hand-held tester to the DLC3.
(b) Power switch ON (ready).
(c) Read the DTC following the prompts on the tester screen. Please refer to the hand-held tester operator's manual for further details.
(d) Clear the DTCs.

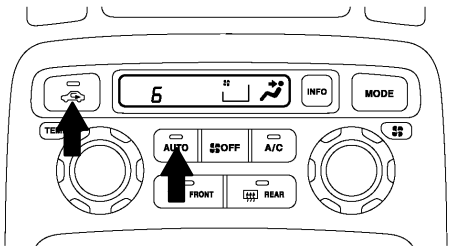
HINT:

After repairing the malfunctions, clear the DTC.
  (1) Connect the hand-held tester to DLC3.
  (2) Turn the ignition switch to the ON position.
  (3) Erase the DTCs following the prompts on the tester screen.

HINT:

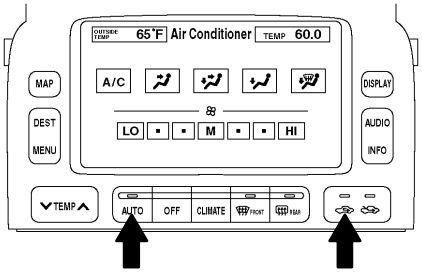
Refer to the hand-held tester operator's manual for further details.

w/o Navigation System



N I30329

w/ Navigation System



C I38758

6. ACTUATOR CHECK

(a) Turn the ignition switch to the ON position while pressing the A/C control AUTO switch and R/F (Recirculation / Fresh) switch simultaneously.

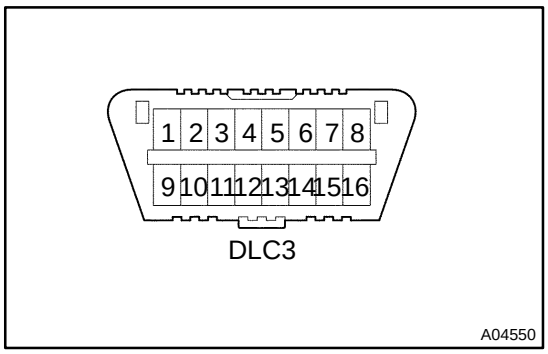
(b) As each damper, motor and relay automatically operate the actuator check at 1 second intervals from step No.1 to No.10 continuously, check the temperature and air flow visually and by hand.

If a slower display is desired, press the temperature up switch and change the display in the step operation. Each time the temperature up switch is pressed, the display changes by 1 step.

HINT:

- Codes are displayed from the smaller to the larger numbers in order.
- To cancel the check mode, press the ”OFF” switch.

Step No.	Display code	Conditions				
		Blower level	Air flow vent	Air inlet damper	Magnetic clutch	Air mix damper
1	0	0	FACE	FRESH	OFF	”COOL” side (Fully closed)
2	1	1	FACE	FRESH	OFF	”COOL” side (Fully closed)
3	2	17	FACE	FRESH	ON	”COOL” side (Fully closed)
4	3	17	FACE	FRESH	ON	”COOL” side (Fully closed)
5	4	17	FACE	RECIRCULATION	ON	”COOL”/ ”WARM ” (50% open)
6	5	17	B/L	RECIRCULATION	ON	”COOL”/ ”WARM ” (50% open)
7	6	17	FOOT	RECIRCULATION	ON	”WARM” side (Fully opened)
8	7	17	FOOT	RECIRCULATION	ON	”WARM” side (Fully opened)
9	8	17	FOOT/ DEF	RECIRCULATION	ON	”WARM” side (Fully opened)
10	9	31	DEF	RECIRCULATION	ON	”WARM” side (Fully opened)



7. CHECK DLC3

(a) The vehicle's ECM uses ISO 9141-2 for communication. The terminal arrangement of the DLC3 complies with SAEJ1962 and matches the ISO 9141-2 format.

Terminal No.	Connection/Voltage or Resistance	Condition
7	Bus + Line/Pulse generation	During transmission
4	Chassis Ground - Body Ground/1 Ω or less	Always
5	Signal Ground - Body Ground/1 Ω or less	Always
16	Battery Positive - Body Ground/9 to 14 V	Always

8. DATA LIST

HINT:

From the DATA LIST displayed on the hand-held tester, you can read the values of the displays, sensors, actuators and so on without parts removal. Reading the DATA LIST as the first step of troubleshooting is one way to shorten labor time.

(a) Connect the hand-held tester to the DLC3.

(b) Turn the ignition switch to the ON position.

(c) From the display on the tester, select the "DATA LIST".

ALL:

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
A/C SIG	A/C signal / ON or OFF	A/C ON: ON	-

A C:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
ROOM TEMP	Room temperature sensor /min.: -6.5℃ (20.3℉) max.: 57.25℃ (135.05℉)	Actual room temperature	-
AMBI TEMP SENS	Ambient temperature sensor /min.: -23.3℃ (-9.94℉) max.: 65.95℃ (150.71℉)	Actual ambient temperature	-
AMBI TEMP	Adjusted ambient temperature /min.: -30.8℃ (-23.44℉) max.: 50.8℃ (123.44℉)	Actual ambient temperature	-
EVAP TEMP	Evaporator temperature sensor /min.: -29.7℃ (-21.46℉) max.: 59.55℃ (139.19℉)	Actual evaporator temperature	-
SOLAR SENS-D	Solar sensor (Driver side) /min.: 0 max.: 255	Changes depending on brightness (Driver side)	-
COOLANT TEMP	Engine coolant temperature /min.: 1.3℃ (34.34℉) max.: 90.55℃ (194.99℉)	Actual engine coolant temperature	-
SET TEMP-D	Set temperature (Driver side) /min.: 0 max.: 255	Actual set temperature (Driver side)	-
A/M DAMP POS-D	Air mix damper position (Driver side) /min.: -14% max.: 113.5%	Changes depending on the set temperature (Driver side)	-

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
A/O DAMP POS	Air outlet damper position /min.: -14% max.: 113.5%	Changes depending on air outlet power position	-
A/M DAMP TARG-D	Air mix damper target position (Driver side) /min.: -14% max.: 113.5%	Changes depending on the set temperature (Driver side)	-
A/O DAMP TARG	Air outlet damper target position /min.: -14% max.: 113.5%	Changes depending on air outlet power position	-
BLOWER LEVEL	Blower motor speed level /min.: Level 0 max.: Level 31	Changes depending on blower level	-
#CODES	Number of Trouble Codes /min.: 0 max.: 255	-	-
HAND FREE TEL	Hands free telephone / OFF, ON	-	-
SET TEMP SHIFT	Shift set temperature/2C decr, 1C decr, NORMAL, 1C incr, 2C incr	Changes depending on shift set temperature *1	-
COMPRESSOR MODE	Compressor mode /AUTO, MANUAL	Changes depending on compressor mode *1	-
COMPRS/DEF OPER	Compressor/DEF operation mode /LINK, NORMAL	Changes depending on compressor/DEF operation mode *1	-

HINT:

*1: It differs depending on the user setting.

05223-03

PROBLEM SYMPTOMS TABLE

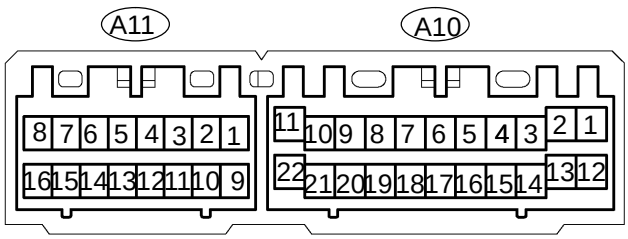
Symptom	Suspect Area	See page
Whole functions of the A/C system does not operate.	1. IG power source circuit 2. A/C amplifier assy	05-1170 01-36
Air Flow Control: No blower operation	1. Heater relay circuit 2. Blower motor circuit 3. A/C amplifier assy	05-1187 05-1181 01-36
Air Flow Control: No blower control	1. Blower motor circuit	05-1181
Air Flow Control: Insufficient air output	1. Blower motor circuit 2. A/C amplifier assy	05-1181 01-36
Temperature Control: No cool air comes out	1. Volume of refrigerant 2. Drive belt tension 2AZ-FE 3MZ-FE 3. Refrigerant pressure 4. Compressor circuit 5. Compressor lock sensor circuit 6. Pressure switch circuit 7. Air mix control servomotor circuit 8. Air mix damper position sensor circuit 9. Room temperature sensor circuit 10. Ambient temperature sensor circuit 11. A/C amplifier assy	55-11 19-12 19-36 55-11 05-1190 05-1146 05-1149 05-1160 05-1152 05-1130 05-1134 01-36
Temperature Control: No warm air comes out	1. Air mix control servomotor circuit 2. Air mix damper position sensor circuit 3. Ambient temperature sensor circuit 4. Room temperature sensor circuit 5. Evaporator temperature sensor circuit 6. A/C amplifier assy 7. Heater radiator	05-1160 05-1152 05-1134 05-1130 05-1138 01-36 -
Temperature Control: Output air is warmer or cooler than the set temperature or response is slow.	1. Room temperature sensor circuit 2. Ambient temperature sensor circuit 3. Solar sensor circuit 4. Air mix damper position sensor circuit 5. Air mix control servomotor circuit 6. A/C amplifier assy	05-1130 05-1134 05-1142 05-1152 05-1160 01-36
Temperature Control: No temperature control (only Max. cool or Max. warm)	1. Air mix control servomotor circuit 2. Air mix damper position sensor circuit 3. A/C amplifier assy	05-1160 05-1152 01-36
No air inlet control	1. Recirculation damper control servomotor circuit 2. A/C amplifier assy	05-1177 01-36
No air outlet control	1. Air outlet damper position sensor circuit 2. Air outlet control servomotor circuit 3. A/C amplifier assy	05-1156 05-1164 01-36
Engine idle up does not occur, or is continuous.	1. Compressor circuit 2. Compressor lock sensor circuit 3. A/C amplifier assy	05-1190 05-1146 01-36
Set temperature value displayed does not match up with operation of temperature control switch.	1. A/C amplifier assy	01-36
Brightness does not change when rheostat volume or light control switch is turned.	1. Illumination light system 2. A/C amplifier assy	- 01-36
Unable to access the diagnosis mode	1. A/C amplifier assy	01-36
DTC not recorded. Set mode is cleared when IG switch is turned off.	1. Back-up power source circuit 2. A/C amplifier assy	05-1173 01-36

05IUA-02

TERMINALS OF ECU

A/C AMPLIFIER

A/C Amplifier Wire Harness View:



N

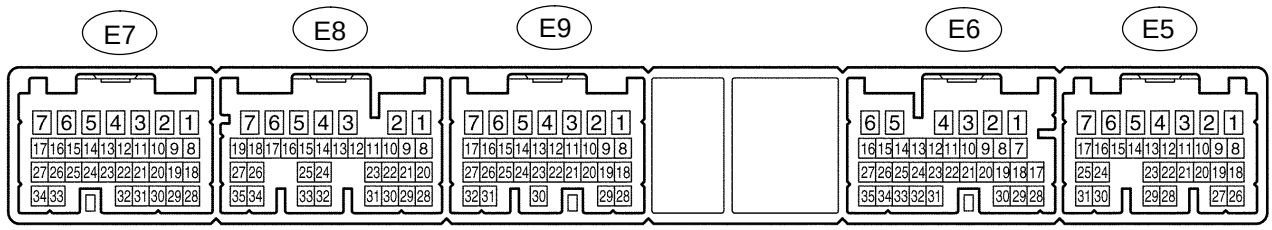
I30330

Terminal No. (Symbols)	Wiring Color	Terminal Description	Condition	Specification
A10-2 (IG) - A10-11 (GND)	BR - W-B	Main power supply	Ignition switch: LOCK or ACC → ON	0 → 10 to 14 V
A10-4 (MR/F) - A10-6 (AIF)	Y - W	Recirculation damper servomotor operation signal	Ignition switch: ON R/F switch: RECIRCULATION → FRESH	Below 1.0 → 10 to 14 V
A10-5 (AIR) - A10-4 (MR/F)	B - Y	Recirculation damper servomotor operation signal	Ignition switch: ON R/F switch: FRESH → RECIRCULATION	Below 1.0 → 10 to 14 V
A10-7 (HR) - A10-11 (GND)	O - W-B	Blower speed operation signal	Ignition switch: ON Blower switch: ON → OFF	Below 1.0 → 10 to 14 V
A10-9 (MPX-) - A10-11 (GND)	G - W-B	Multiplex communication signal	Ignition switch: ON	Pulse generate
A10-11 (GND) - Body ground	W-B - Body ground	Ground for main power supply	Always	Below 1.0 Ω
A10-12 (+B) - A10-11 (GND)	W - W-B	Back up power supply	Always	10 to 14 V
A10-13 (ACC) - A10-11 (GND)	GR -W-B	Power supply for accessories	Ignition switch: LOCK → ON	0 → 10 to 14 V
A10-17 (BLW) - A10-11 (GND)	LG - W-B	Blower speed operation signal	Ignition switch: ON Blower switch: OFF → LO, M1, M2, M3, HI	Pulse generate
A11-4 (TR) - A11-3 (SG-3)	W- Y	Room temperature sensor signal	Ignition switch: ON Cabin temperature: 40°C (104°F) → 25°C (77°F)	1.2 to 1.6 → 1.8 to 2.2 V
A11-5 (TE) - A11-12 (SG-1)	LG -P	Evaporator temperature sensor signal	Ignition switch: ON Evaporator temperature: 15°C (59°F) → 0°C (32°F)	1.4 to 1.8 → 2.0 to 2.4 V
A11-6 (TPO) - A11-12 (SG-1)	R - P	Mode damper servomotor operation signal	Ignition switch: ON R/F switch: DEF → FACE	0.5 to 1.5 → 3.5 to 4.5 V
A11-7 (AOD) - A10-11 (GND)	G -W-B	Mode damper servomotor operation signal	Ignition switch: ON Mode switch: FACE → DEF	Below 1.0 → 10 to 14 V
A11-8 (AOF) - A10-11 (GND)	V - W-B	Mode damper servomotor operation signal	Ignition switch: ON Mode switch: DEF → FACE	Below 1.0 → 10 to 14 V
A11-9 (S5-4) - A10-11 (GND)	BR - W-B	Ignition switch signal	Ignition switch: ON	4.5 to 5.5 V
A11-10 (TP) - A10-11 (GND)	SB - W-B	Air mix damper servomotor operation signal	Ignition switch: ON Set temperature: MAX. WARM → MAX. COOL	0.5 to 1.5 → 3.5 to 4.5 V
A11-11 (S5-1) - A11-12 (SG-1)	O - P	Power supply for air mix control servomotor	Ignition switch: ON	4.5 to 5.5 V
A11-13 (AMC) - A10-11 (GND)	GR - W-B	Air mix damper servomotor operation signal	Ignition switch: ON Set temperature: MAX. WARM → MAX. COOL	Below 1.0 → 10 to 14 V

Terminal No. (Symbols)	Wiring Color	Terminal Description	Condition	Specification
A11-14 (AMH) - A10-11 (GND)	B - W-B	Air mix damper servomotor operation signal	Ignition switch: ON Set temperature: MAX. COOL → MAX. WARM	Below 1.0 → 10 to 14 V
A11-16 (TS) - A11-15 (S5-3)	L - W	Solar sensor signal	Ignition switch: ON Solar sensor subject to electric light → Solar sensor is covered by a cloth	4.5 to 5.5 → Below 4.0 V

ECM

ECM Connector Wire Harness View:



I30693

Terminal No. (Symbols)	Wiring Color	Terminal Description	Condition	Specification
E6-32 (TAM) - E7-28 (E2)	B - BR	Ambient temperature signal	Ignition switch: ON Ambient temperature: 40°C (104°F) → 25°C (77°F)	0.8 to 1.2 → 1.4 to 1.8 V

05IPW-01

DATA LIST/ACTIVE TEST

DATA LIST

According to the DATA LIST displayed by the hand-held tester, you can read the value of the switch, sensor, actuator and so on without parts removal. Reading the DATA LIST as the first step of troubleshooting is one method to shorten work time.

(a) Warm up the engine.
(b) Turn the ignition switch to OFF.
(c) Connect the hand-held tester to DLC3.
(d) Turn the ignition switch to ON.
(e) Operate the hand-held tester according to the steps on the display and select ”DATA LIST”.

METER:

Item	Measurement Item/ Range (Display)	Normal Condition	Diagnostic Note
SPEED METER	Vehicle speed / Min.: 0 km/h (0 mph), Max.: 255 km/h (158 mph)	Almost same as actual vehicle speed (When driving)	-
TACHO METER	Engine speed / Min.: 50 rpm, Max.: 12,750 rpm	Almost same as actual engine speed (When engine is running)	-
FUEL GAUGE	Fuel input signal Min.: 0, Max.: 255	Fuel gauge indicates (F): 48 Fuel gauge indicates (3/4): 93 Fuel gauge indicates (1/2): 148 Fuel gauge indicates (1/4): 188 Fuel gauge indicates (E): 206	-
LIGHT RHEOSTAT	Light control rheostat / Min.: 0, Max.: 255	Light control rheostat switch is Dark (0) → Bright (255)	-
ODO/TRIP SW	ODO/TRIP switch is ON / OFF	ON: Switch is pushed OFF: Switch is released	-
TAIL CANCEL SW	TAIL CANCEL switch is ON / OFF	ON: Tail cancel position OFF: Except tail cancel position	-

ECM:

Item	Measurement Item/ Range (Display)	Normal Condition	Diagnostic Note
VEHICLE SPEED	Vehicle speed / Min.: 0 km/h (0 mph), Max.: 255 km/h (158 mph)	Almost same as actual vehicle speed (When driving)	-
ENGINE SPD	Engine speed / Min.: 0 rpm, Max.: 16,383 rpm	Almost same as actual engine speed (When engine is running)	-
COOLANT TEMP	Coolant Temperature / Min.: -40°C (-40 °F), Max.: 140°C (284°F)	After warming up: 80 to 95°C (176 to 203°F)	If the value is ”-40°C (-40°F)” or ”140°C (284°F)”, sensor circuit is open or shorted.

ABS:

Item	Measurement Item/ Range (Display)	Normal Condition	Diagnostic Note
(FR/FL/RR/RL) SPD	Vehicle speed / Min.: 0 km/h (0 mph), Max.: 326 km/h (202 mph)	Almost same as actual speed (When driving)	-

ACTIVE TEST

Performing the ACTIVE TEST using the hand-held tester allows the meters, indicators and so on to operate without parts removal. Performing the ACTIVE TEST as the first step of troubleshooting is one way to shorten labor time.

It is possible to display the DATA LIST on hand-held tester during the ACTIVE TEST.

(a) Connect the hand-held tester to DLC3.

(b) Turn the ignition switch to the ON position.

(c) From the display on tester, perform the ”ACTIVE TEST”.

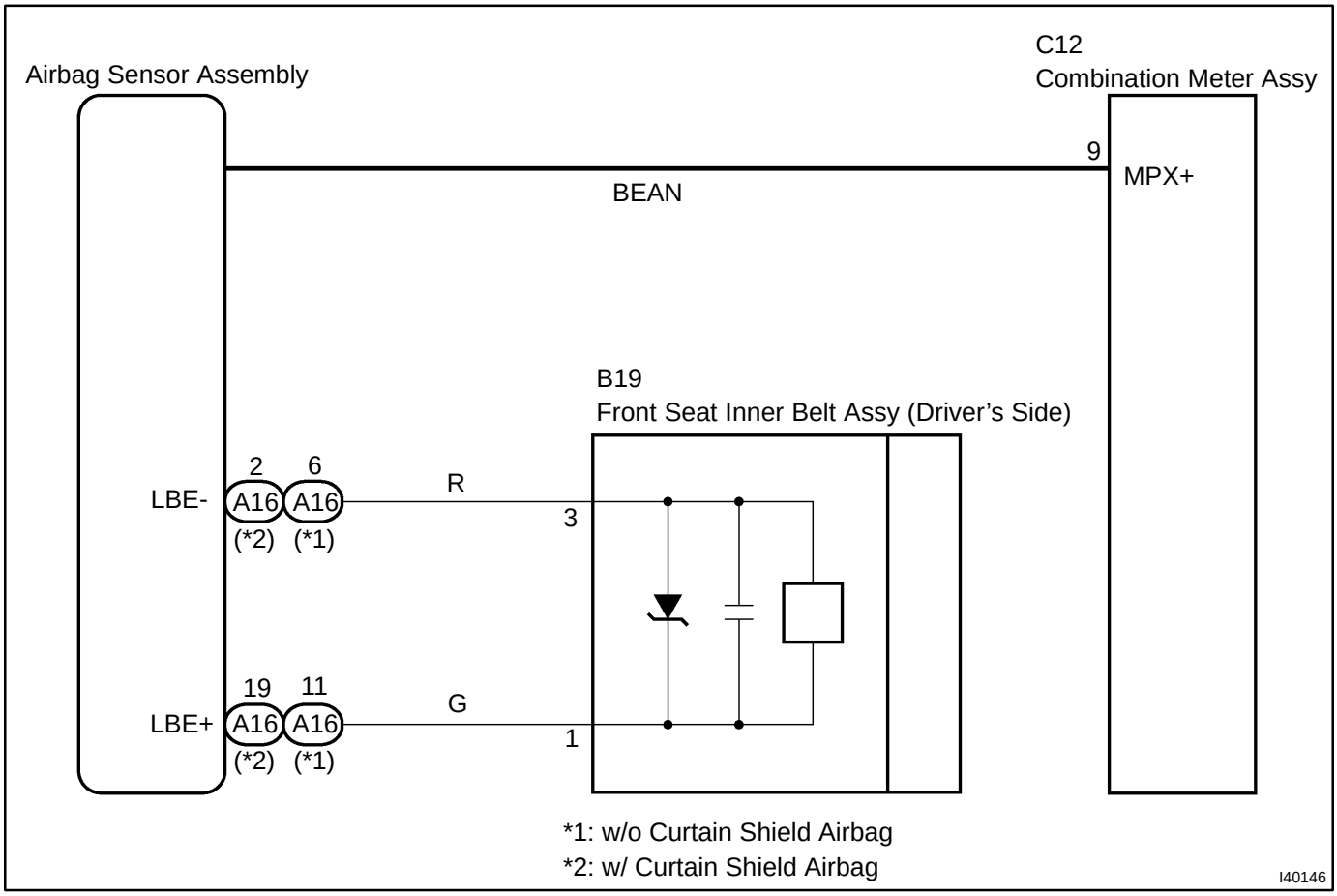
METER:

Item	Test Details	Diagnostic Note
SPEED METER	0 / 40(25) / 80(50) / 120(75) / 160(99) / 200(124) km/h(mph)	-
TACHOMETER	0rpm / 1000rpm / 2000rpm / 3000rpm / 4000rpm / 5000rpm / 6000rpm / 7000rpm	-
FUEL GAUGE	OFF, METER F, 3/4, 1/2, 1/4, METER E, EMPTY	-
COOLANT TEMP	LOW, 60›‡C, 70›‡C, 80›‡C, NORMAL, 110›‡C, 120›‡C, HIGH	-
SHIFT INDIC	A/T indicator operation (P, R, N, D, S, 3, 2, L)	Comfirm that the vehicle is stopped and engine idling
LOW FUEL WARN	Indicat. Lamp FUEL (OFF/ON)	Comfirm that the vehicle is stopped and engine idling
D-BEL T REMIND	Indicat. Lamp D-SEAT BELT (OFF/ON)	Comfirm that the vehicle is stopped and engine idling
OIL PRESS WARN	Indicat. Lamp OIL (OFF/ON)	Comfirm that the vehicle is stopped and engine idling
DISCHARGE WARN	Indicat. Lamp CHARGE (OFF/ON)	Comfirm that the vehicle is stopped and engine idling
TAILLIGHT INDIC	Indicat. Lamp TAIL (OFF/ON)	Comfirm that the vehicle is stopped and engine idling
CRUISE INDIC	Indicat. Lamp CRUISE (OFF/ON)	Comfirm that the vehicle is stopped and engine idling
Rr FOG INDIC	Indicat. Lamp Rr FOG (OFF/ON)	Comfirm that the vehicle is stopped and engine idling
SRS WARN	Indicat. Lamp AIRBAG (OFF/ON)	Comfirm that the vehicle is stopped and engine idling
TRC OFF INDIC	Indicat. Lamp TRAC (TRC) OFF (OFF/ON)	Comfirm that the vehicle is stopped and engine idling
SLIP INDIC	Indicat. Lamp SLIP (OFF/ON)	Comfirm that the vehicle is stopped and engine idling
O/D OFF INDIC	Indicat. Lamp O/D OFF (OFF/ON)	Comfirm that the vehicle is stopped and engine idling
ODO/TRIP DISP	Indicat. ODO/TRIP DISPLAY (OFF/ON)	Comfirm that the vehicle is stopped and engine idling
A/T OIL TEMP	A/T OIL temperatue operation (OFF/ON)	Comfirm that the vehicle is stopped and engine idling
Fr FOG INDIC	Indicat. Lamp Fr FOG (OFF/ON)	Comfirm that the vehicle is stopped and engine idling
TIRE PRESS WARN	Indicat. Lamp TIRE PRESS (OFF/ON)	Comfirm that the vehicle is stopped and engine idling
DOOR WARN	Indicat. Lamp DOOR (OFF/ON)	Comfirm that the vehicle is stopped and engine idling
ECT SNOW WARN	Indicat. Lamp ECT SNOW (OFF/ON)	Comfirm that the vehicle is stopped and engine idling
KEY REMND BUZZR	Key remained buzzer (OFF/ON)	Comfirm that the vehicle is stopped and engine idling

Item	Test Details	Diagnostic Note
SEAT BELT BUZZR	Seat Belt buzzer (OFF/ON)	Comfirm that the vehicle is stopped and engine idling
REVERSE BUZZER	Reverse buzzer (OFF/ON)	Comfirm that the vehicle is stopped and engine idling
S SHFT RJCT BUZ	Sports Shift reject buzzer (OFF/ON)	Comfirm that the vehicle is stopped and engine idling
SPEED BUZZER	Speed buzzer (OFF/ON)	Comfirm that the vehicle is stopped and engine idling
WARNING BUZZER	Warning buzzer (OFF/ON)	Comfirm that the vehicle is stopped and engine idling

SEAT BELT WARNING LAMP FOR DRIVER'S SEAT DOES NOT OPERATE

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

If there is an open in the ground circuit (Airbag sensor assy center), the airbag sensor assy center outputs DTCs. Perform troubleshooting with the "Supplemental Restraint System 05-1200 ".

1	PERFORM ACTIVE TEST BY HAND-HELD TESTER

(a) Operate the hand-held tester according to the steps on the display and select the "ACTIVE TEST".

METER:

Item	Test Details	Diagnostic Note
D-BELT REMIND	Indicat. Lamp D-SEAT BELT (OFF/ON)	Confirm that the vehicle is stopped and engine idling

NG → **REPLACE COMBINATION METER ASSY (SEE PAGE 71-18)**

OK

2 READ VALUE OF HAND-HELD TESTER(DRIVER SEAT BELT)

(a) Operate the hand-held tester according to the steps on the display and select the ”DATA LIST”.

SRS AIRBAG:

Item	Measurement Item/ Range (Display)	Normal Condition	Diagnostic Note
D SEAT BUCKL	Driver seat belt buckle switch is ON / OFF	ON: Seat belt is fastened OFF: Seat belt is unfastened	-

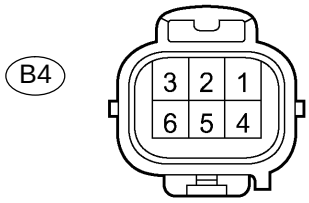
NG → **Go to step 3**

OK

REPLACE COMBINATION METER ASSY(SEE PAGE 71-18)

3 INSPECT FRONT SEAT INNER BELT ASSY (DRIVER SIDE)

Front Seat Inner Belt Assy (Driver Side)
Connector Front View:



(a) Disconnect the connector from the front seat inner belt assy (Driver Side).

(b) Measure the resistance according to the value(s) in the table below.

Standard:

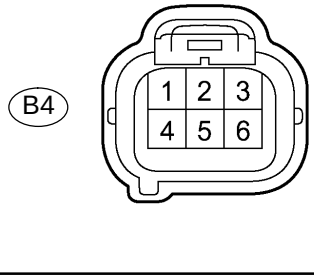
Terminal No	Condition	Specified condition
B4-2 - B4-5	Seat belt is fastened	Approx. 330 Ω
B4-2 - B4-5	Seat belt is unfastened	Approx. 1,330 Ω

NG → **REPLACE FRONT SEAT INNER BELT ASSY (DRIVER SIDE)**

OK

4 CHECK HARNESS AND CONNECTOR(FRONT SEAT INNER BELT ASSY - BODY GROUND)(SEE PAGE 01-26)

Front Seat Inner Belt Assy (Driver Side)
Wire Harness View:



(a) Disconnect the connector from the front seat inner belt assy (Driver Side).

(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Condition	Specified Condition
B4-5 - Body ground	Always	Below 1 Ω

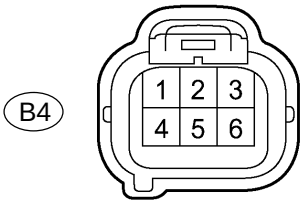
NG → **Go to step 5**

OK

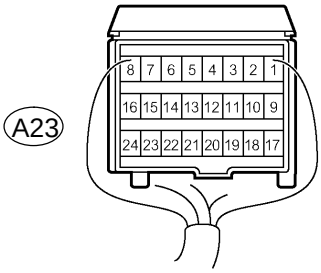
END

5	CHECK HARNESS AND CONNECTOR(FRONT SEAT INNER BELT ASSY - AIRBAG SENSOR ASSY CENTER)(SEE PAGE 01-26)

Front Seat Inner Belt Assy (Driver Side) Wire Harness View:



Airbag Sensor Assy Center Wire Harness View:



I39225

(a) Disconnect the B4, A23 connectors.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Condition	Specified Condition
B4-2 - A23-10	Always	Below 1 Ω
A23-10 - Body ground	Always	10 kΩ or higher

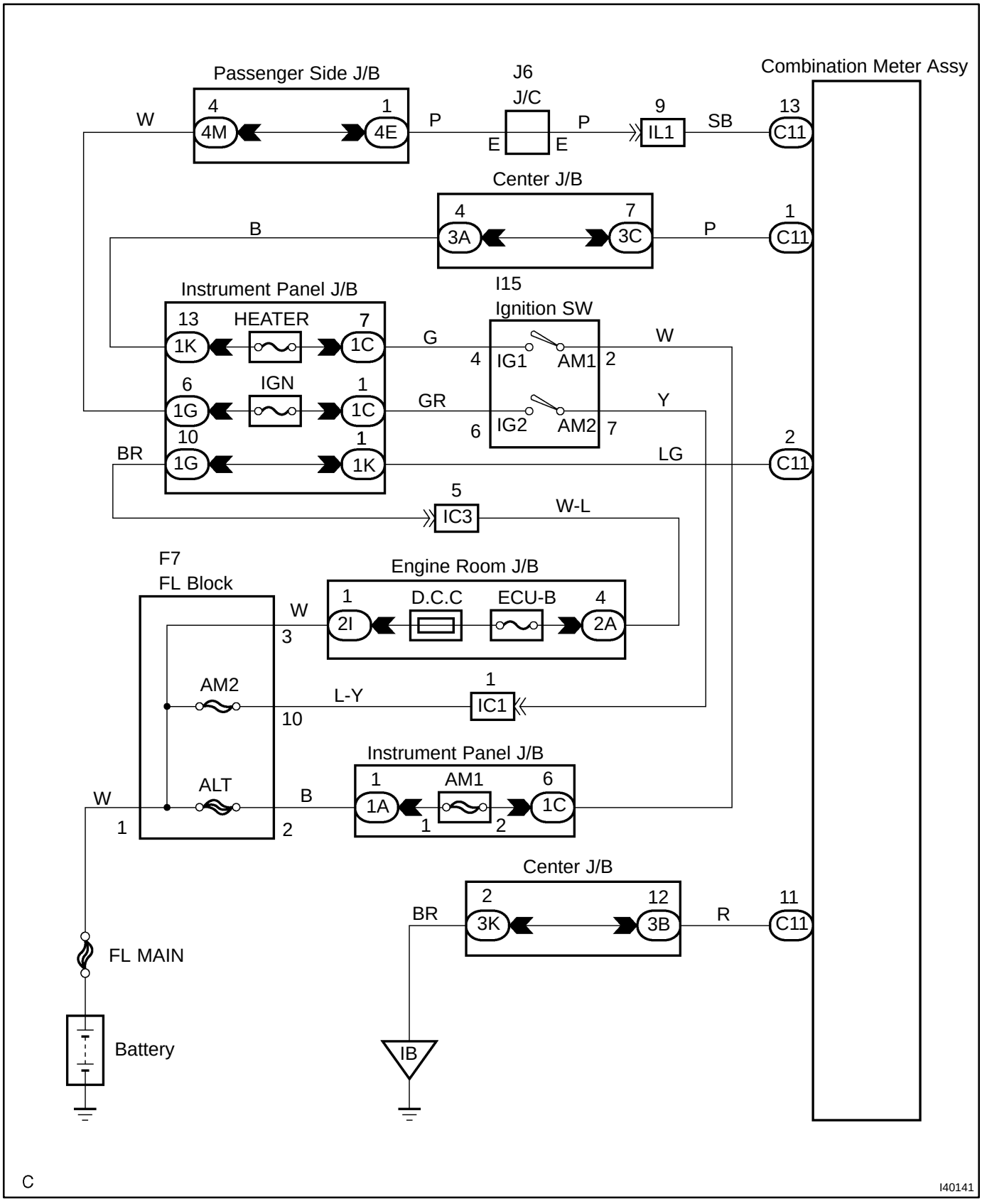
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

END

ENTIRE COMBINATION METER DOES NOT OPERATE

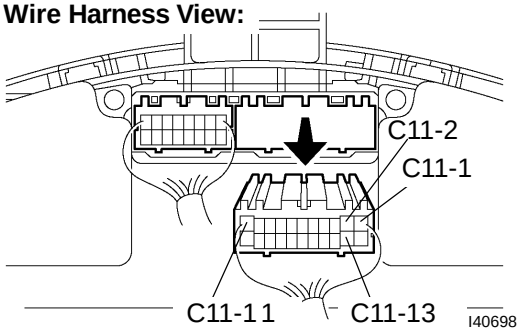
WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT COMBINATION METER ASSY

Wire Harness View:



(a) Measure the resistance according to the value(s) in the table below.

Standard:

Terminal No	Condition	Specified condition
C11-11 - Body ground	Always	Below 1 Ω

(b) Measure the voltage according to the value(s) in the table below.

Standard:

Terminal No	Condition	Specified condition
C11-2 - Body ground	Always	10 to 14 V
C11-1 - Body ground	Ignition switch ON	10 to 14 V
C11-13 - Body ground	Ignition switch ON	10 to 14 V

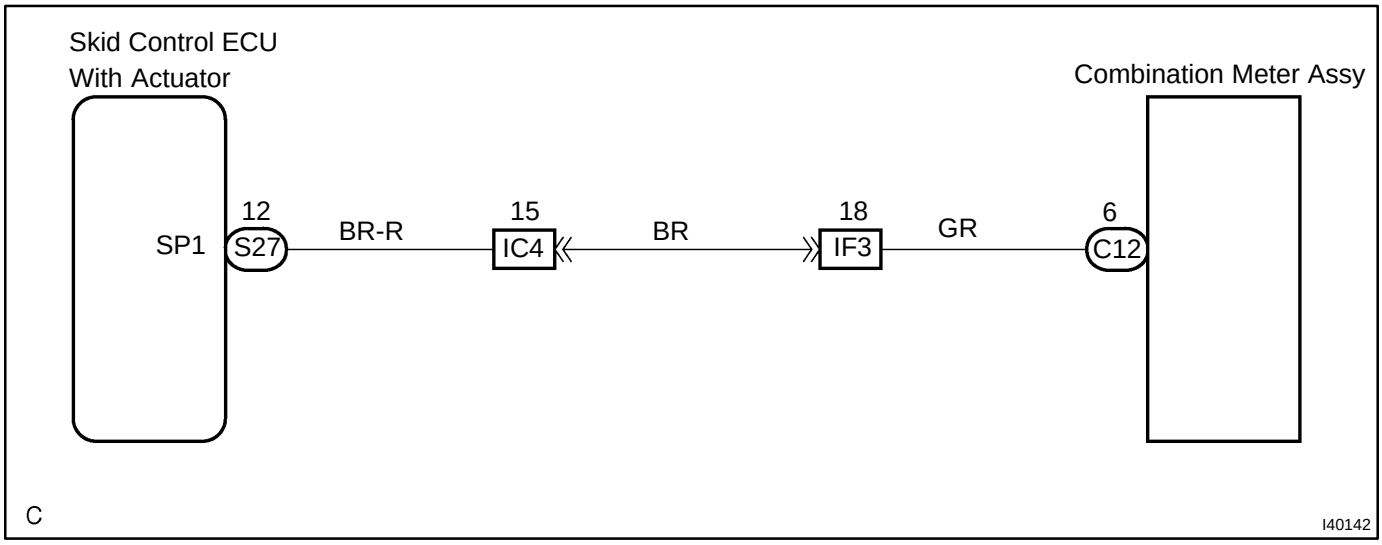
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE COMBINATION METER ASSY(SEE PAGE 71-18)

MALFUNCTION IN SPEEDOMETER

WIRING DIAGRAM



INSPECTION PROCEDURE

1	PERFORM ACTIVE TEST BY HAND-HELD TESTER

(a) Operate the hand-held tester according to the steps on the display and select the ”ACTIVE TEST”.

METER:

Item	Test Details	Diagnostic Note
SPEED METER	0 / 40(24) / 80(48) / 120(72) / 160(96) / 200(120) km/h(mph)	-

OK:

Needle indication is normal.

NG → **REPLACE COMBINATION METER ASSY (SEE PAGE 71-18)**

OK

2	READ VALUE OF HAND-HELD TESTER(VEHICLE SPEED SIGNAL)

(a) Operate the hand-held tester according to the steps on the display and select the ”DATA LIST”.

METER:

Item	Measurement Item/ Range (Display)	Normal Condition	Diagnostic Note
SPEED METER	Vehicle speed / Min.: 1 km/h (1 mph), Max.: 255 km/h (158 mph)	Almost same as actual vehicle speed (When driving)	-

OK:

Vehicle speed displayed on the tester is almost the same as the actual vehicle speed.

NG → **Go to step 3**

OK

REPLACE COMBINATION METER ASSY(SEE PAGE 71-18)

3	READ VALUE OF HAND-HELD TESTER(VEHICLE SPEED SIGNAL)

(a) Operate the hand-held tester according to the steps on the display and select the ”DATA LIST”.

ABS:

Item	Measurement Item/ Range (Display)	Normal Condition	Diagnostic Note
(FR/FL/RR/RL) SPD	Vehicle speed / Min.: 0 km/h (0 mph), Max.: 326 km/h (202 mph)	Almost same as actual speed (When driving)	-

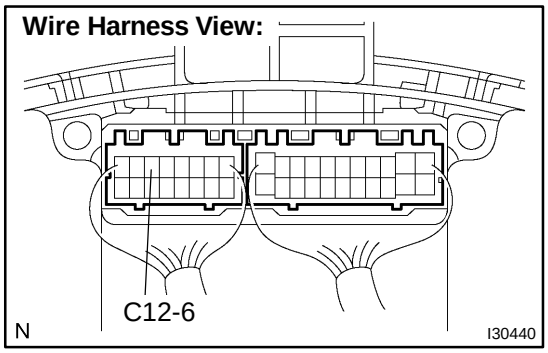
OK:

Vehicle speed displayed on the tester is almost the same as the actual vehicle speed.

NG → **GO TO BRAKE CONTROL SYSTEM (SEE PAGE 05-761)**

OK

4	INSPECT COMBINATION METER ASSY



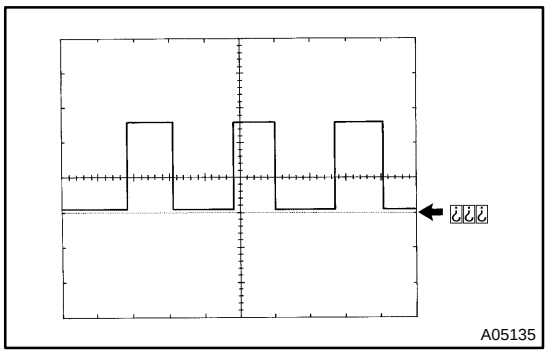
INSPECTION USING OSCILLOSCOPE

(a) Check the input signal waveform.

(1) Remove the combination meter assy.

(2) Connect the oscilloscope to the terminals C12-6 and body ground.

(3) Start the engine.



(4) Check the signal waveform according to the condition (s) in the table below.

Item	Condition
Tool setting	5 V/DIV, 20 ms/DIV
Vehicle condition	Driving at approx. 20 Km/h (12 mph)

OK:

As shown in the illustration

HINT:

As vehicle speed increases, the cycle of the signal waveform narrows.

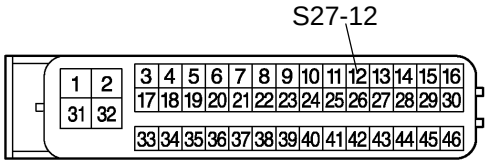
NG	Go to step 5

OK

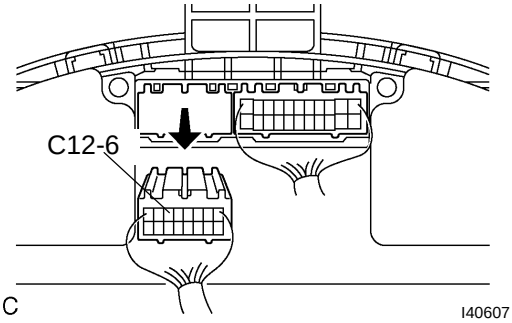
REPLACE COMBINATION METER ASSY(SEE PAGE 71-18)

5	CHECK HARNESS AND CONNECTOR(ABS&TRACTION ACTUATOR ASSY(VSC) - COMBINATION METER ASSY)(SEE PAGE 01-26)

ABS&Traction Actuator Assy (VSC)
Wire Harness View:



Combination Meter Assy
Wire Harness View:



(a) Disconnect the C12 and S27 connectors.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

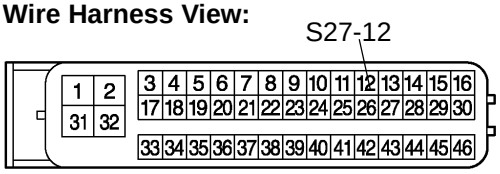
Tester Connection	Condition	Specified Condition
C12-6 - S27-12	Always	Below 1 Ω
C12-6 - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

6	INSPECT COMBINATION METER ASSY

ABS&Traction Actuator Assy (VSC)
Wire Harness View:



(a) Disconnect the S27 connector.
(b) Measure the voltage according to the value(s) in the table below.

Standard:

Tester Connection	Condition	Specified Condition
S27-12 - Body ground	Ignition switch ON	10 to 14 V

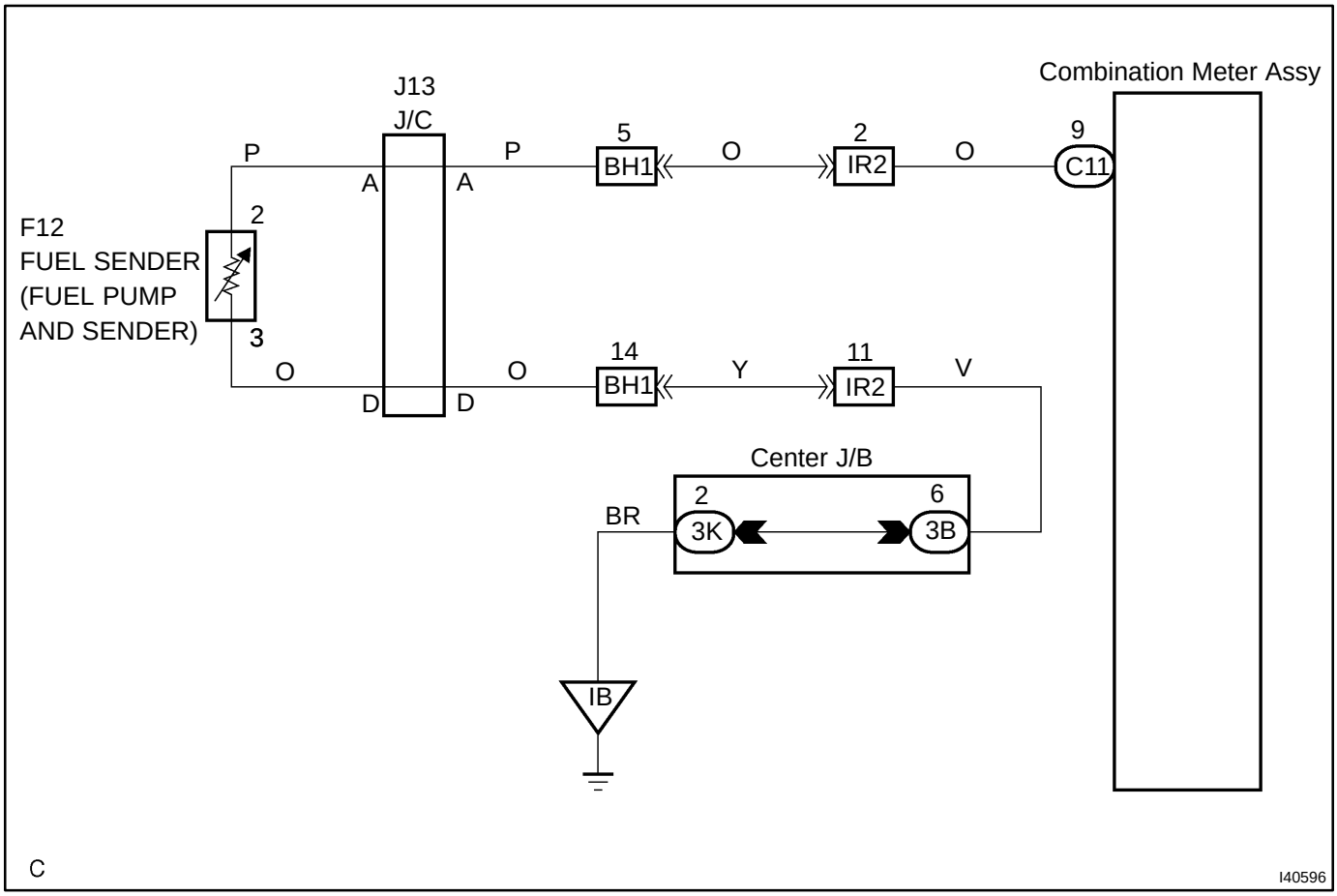
NG → **REPLACE COMBINATION METER ASSY (SEE PAGE 71-18)**

OK

GO TO BRAKE CONTROL SYSTEM(SEE PAGE 05-761)

MALFUNCTION IN FUEL RECEIVER GAUGE

WIRING DIAGRAM



INSPECTION PROCEDURE

1	PERFORM ACTIVE TEST BY HAND-HELD TESTER

(a) Operate the hand-held tester according to the steps on the display and select the "ACTIVE TEST".

METER:

Item	Test Details	Diagnostic Note
FUEL GAUGE	OFF, EMPTY, 1/2, FULL	-

OK: Needle indication is normal.

NG → **REPLACE COMBINATION METER ASSY (SEE PAGE 71-18)**

OK

2 READ VALUE OF HAND-HELD TESTER(FUEL GAUGE)

(a) Operate the hand-held tester according to the steps on the display and select the ”DATA LIST”.

METER:

Item	Measurement Item/ Range (Display)	Normal Condition	Diagnostic Note
FUEL GAUGE	Fuel input signal Min.: 0, Max.: 255	Fuel gauge indicates (F): 48 Fuel gauge indicates (3/4): 93 Fuel gauge indicates (1/2): 148 Fuel gauge indicates (1/4): 188 Fuel gauge indicates (E): 206	-

OK:

Fuel input signal displayed on the tester is almost the same as Needle indication.

NG → **Go to step 3**

OK

REPLACE COMBINATION METER ASSY(SEE PAGE 71-18)

3 INSPECT FUEL SENDER GAUGE ASSY

Fuel Sender Gauge
Connector Front View:



Ie−5−1−A I30899

(a) Measure the voltage according to the value(s) in the table below.

Standard:

Tester Connection	Condition	Specified Condition
F20-1 - F20-3	Ignition switch ACC or ON	Below 1 to 5 V

(b) Remove the fuel sender gauge assy.

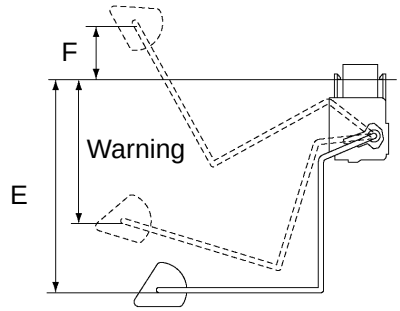
(c) Connect the fuel sender gauge connector.

(d) Check that the float position is between E and F.

(e) Measure the voltage between the terminals 2 and 1 of connector according to the value(s) in the table below.

Standard:

Float level	Float position mm (in.)	Voltage (V)
F	-34.8 (-1.37) ≦ 3 (0.12)	4.5 to 4.75
1/2	92.8 (3.65) ≦ 3 (0.12)	1.41 ≦ 1.61
Warning	137.0 (5.39) ≦ 3 (0.12)	0.20 to 0.45



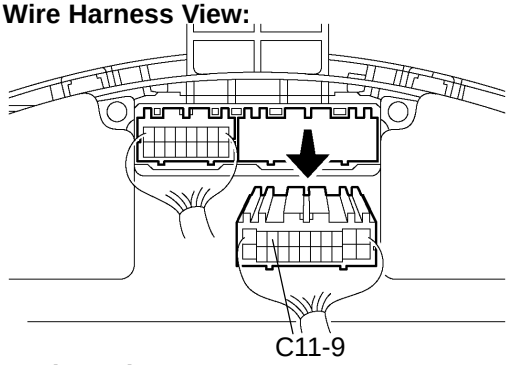
I39224

NG → **REPLACE FUEL SENDER GAUGE ASSY**

OK

4	CHECK HARNESS AND CONNECTOR(FUEL SENDER GAUGE ASSY - COMBINATION METER ASSY)(SEE PAGE 01-26)

Combination Meter Assy
Wire Harness View:



Fuel Sender Gauge Connector
Front View: F12



I40609

(a) Disconnect the F12 and C11 connectors.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Condition	Specified Condition
C11-9 - F12-2	Always	Below 1 Ω
F12-3 - Body ground	Always	Below 1 Ω
F11-9 - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

END

05246-04

CUSTOMER PROBLEM ANALYSIS CHECK

COMBINATION METER SYSTEM Check Sheet

Inspector's name:

Customer's Name		**VIN**	
		Production Date	
		Licence Plate No.	
Date of Vehicle Brought In	/ /	**Odometer Reading**	**km** **mile**

Date Problem First Occurred		/ /
Frequency Problem Occurs		○ Constantly ○ Sometimes (Times per day, month) ○ Once only
Weather Conditions When Problem Occurred	**Weather**	○ Fine ○ Cloudy ○ Rainy ○ Snowy ○ Various/Others
	Outside Temperature	○ Hot ○ Warm ○ Cool ○ Cold (Approx. °F (°C))

Problem Symptom	**Gauge**	✳Malfunction in speedometer
		✳Malfunction in tachometer
		✳Malfunction in water temperature receiver gauge
		✳Malfunction in fuel receiver gauge
	Others	✳Entire combination meter does not operate
		✳Seat belt warning lamp for driver's seat does not operate
		✳
		✳
		✳
		✳
		✳
		✳
		✳
		✳
		✳
		✳

COMBINATION METER

05245-04

HOW TO PROCEED WITH TROUBLESHOOTING

1	VEHICLE BROUGHT TO WORKSHOP

2	CUSTOMER PROBLEM ANALYSIS (SEE PAGE 05-1869)

3	PROBLEM SYMPTOM CONFIRMATION (SEE PAGE 05-1882)

4	CHECK MULTIPLEX COMMUNICATION SYSTEM (SEE PAGE 05-2095)

(a) Check for DTC outputs.

MULTIPLEX DTC OUTPUTS (PROCEED TO "BODY MULTIPLEX COMMUNICATION SYSTEM")	
NO MULTIPLEX DTC (GO TO STEP 5)	

5	CHECK CAN COMMUNICATION SYSTEM (SEE PAGE 05-2095)

(a) Check for DTC outputs.

CAN DTC OUTPUTS (PROCEED TO "CAN COMMUNICATION SYSTEM")	
NO CAN DTC (GO TO STEP 6)	

6	CIRCUIT INSPECTION (SEE PAGE 05-1883 - 05-1898)

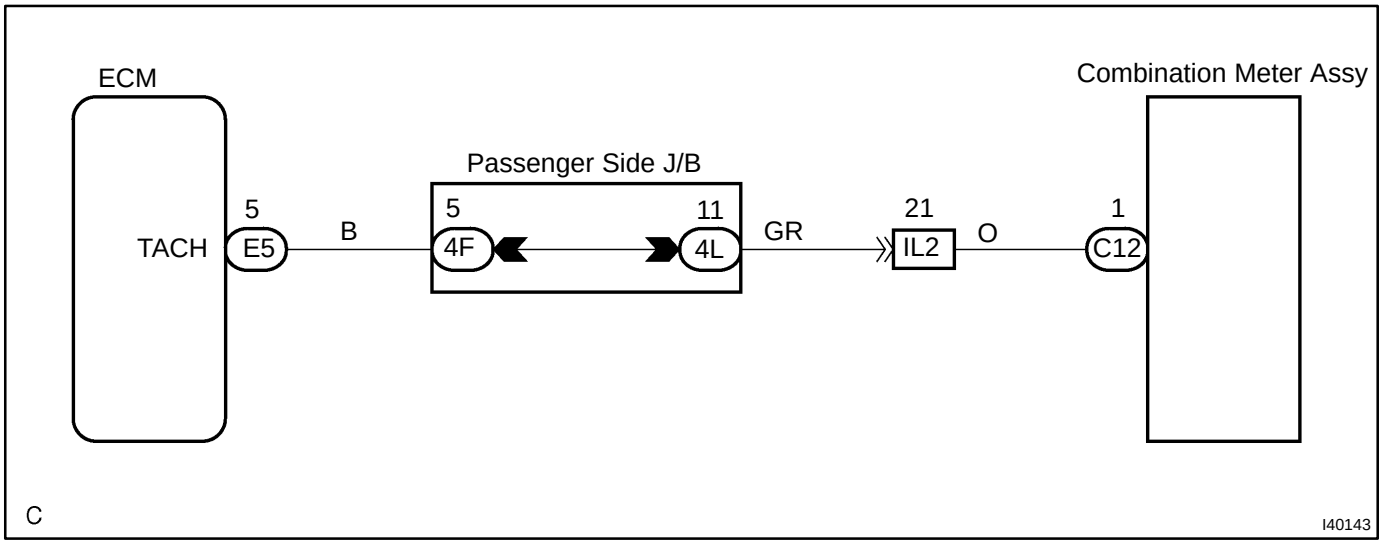
7	REPAIR OR REPLACE

8	CONFIRMATION TEST

END

MALFUNCTION IN TACHOMETER

WIRING DIAGRAM



INSPECTION PROCEDURE

1	PERFORM ACTIVE TEST BY HAND-HELD TESTER

(a) Operate the hand-held tester according to the steps on the display and select the ”ACTIVE TEST”.

METER:

Item	Test Details	Diagnostic Note
TACHOMETER	0rpm / 1000rpm / 2000rpm / 3000rpm / 4000rpm / 5000rpm / 6000rpm / 7000rpm	-

OK:

Needle indication is normal.

NG → **REPLACE COMBINATION METER ASSY (SEE PAGE 71-18)**

OK

2	READ VALUE OF HAND-HELD TESTER(ENGINE SPEED SIGNAL)

(a) Operate the hand-held tester according to the steps on the display and select the ”DATA LIST”.

METER:

Item	Measurement Item/ Range (Display)	Normal Condition	Diagnostic Note
TACHO METER	Engine speed / Min.: 50 rpm, Max.: 12,750 rpm	Almost same as actual engine speed (When engine is running)	-

OK:

Engine speed displayed on the tester is almost the same as the actual engine speed.

NG → **Go to step 3**

OK

REPLACE COMBINATION METER ASSY(SEE PAGE 71-18)

3	READ VALUE OF HAND-HELD TESTER(ENGINE SPEED SIGNAL)

(a) Operate the hand-held tester according to the steps on the display and select the ”DATA LIST”.

ALL (ECM):

Item	Measurement Item/ Range (Display)	Normal Condition	Diagnostic Note
ENGINE SPD	Engine speed / Min.: 50 rpm, Max.: 12,750 rpm	Almost same as actual engine speed (When engine is running)	-

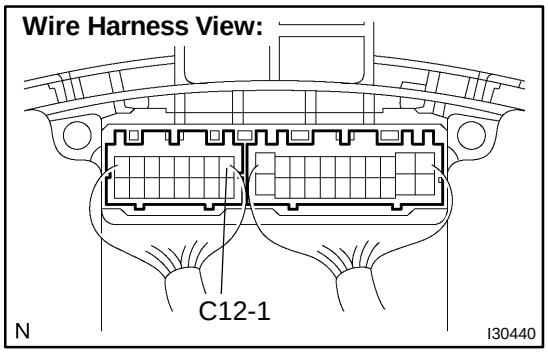
OK:

Engine speed displayed on the tester is almost the same as the actual engine speed.

NG → **GO TO ENGINE CONTROL SYSTEM (SEE PAGE 05-5 , 05-362)**

OK

4	INSPECT COMBINATION METER ASSY



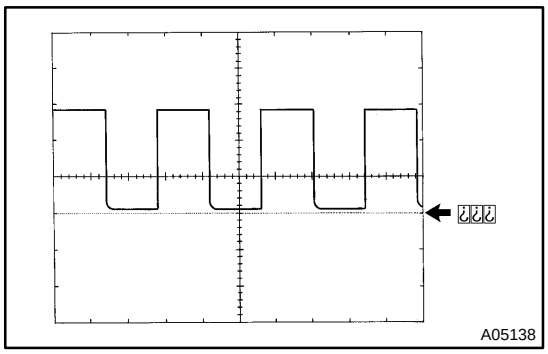
INSPECTION USING OSCILLOSCOPE

(a) Check the input signal waveform.

(1) Remove the combination meter assy.

(2) Connect the oscilloscope to the terminals C12-1 and body ground.

(3) Start the engine.



(4) Check the signal waveform according to the condition (s) in the table below.

Item	Condition
Tool setting	5 V/DIV, 10 ms/DIV
Vehicle condition	Engine idle speed

OK:

As shown in the illustration

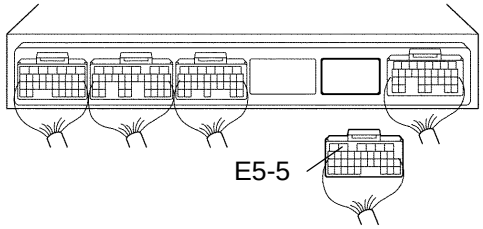
NG → **Go to step 5**

OK

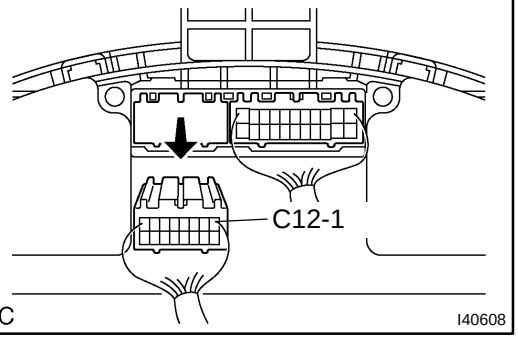
REPLACE COMBINATION METER ASSY(SEE PAGE 71-18)

5	CHECK HARNESS AND CONNECTOR(ECM - COMBINATION METER ASSY) (SEE PAGE 01-26)

ECM Wire Harness View:



Combination Meter Assy Wire Harness View:



(a) Disconnect the C12 and E5 connectors.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

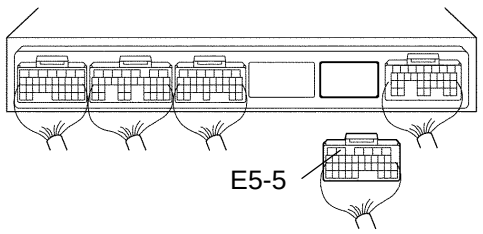
Tester Connection	Condition	Specified Condition
C12-1 - E5-5	Always	Below 1 Ω
C12-1 - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

6	INSPECT COMBINATION METER ASSY

ECM Wire Harness View:



(a) Disconnect the E5 connector.
(b) Measure the voltage according to the value(s) in the table below.

Standard:

Tester Connection	Condition	Specified Condition
E5-5 - Body ground	Ignition switch ON	10 to 14 V

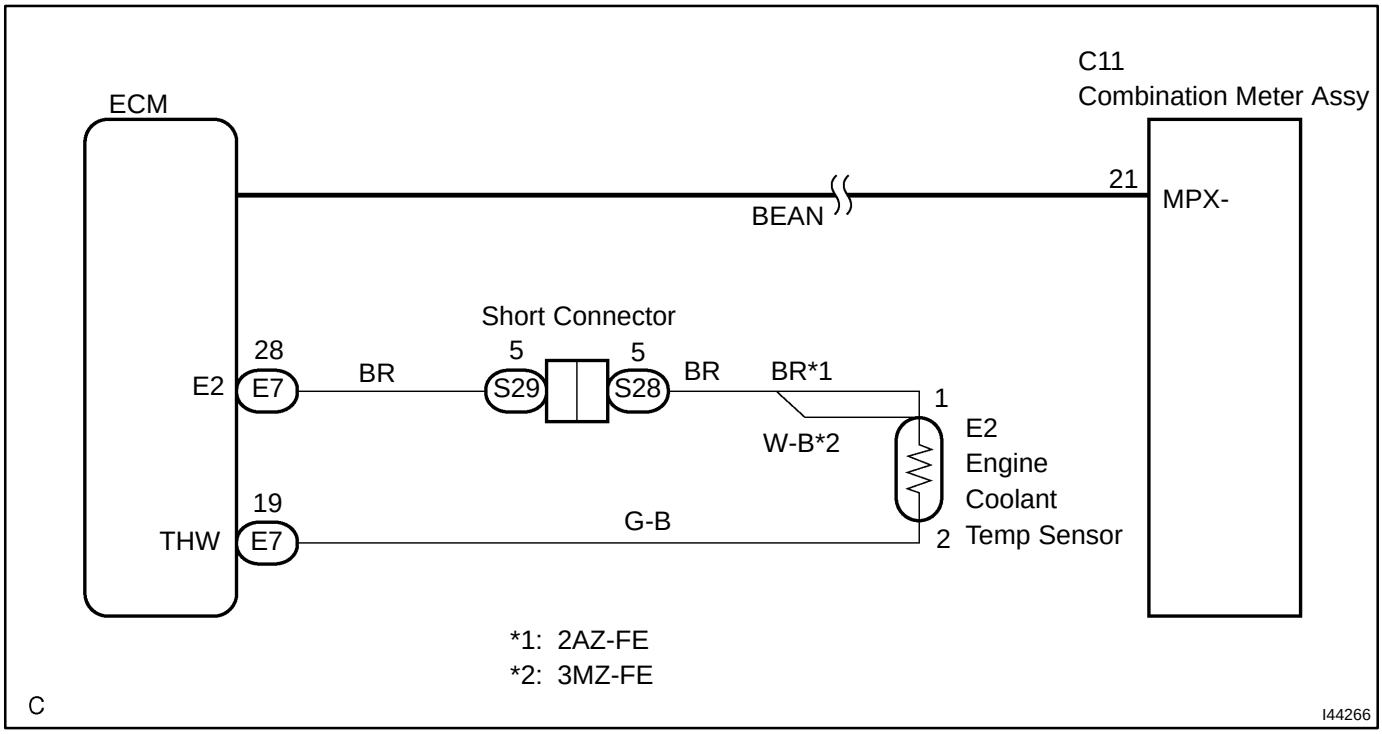
NG → **REPLACE COMBINATION METER ASSY (SEE PAGE 71-18)**

OK

GO TO ENGINE CONTROL SYSTEM(SEE PAGE 05-5 , 05-366)

MALFUNCTION IN WATER TEMPERATURE RECEIVER GAUGE

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
If there is an open or short in the engine coolant temperature sensor circuit, the ECM outputs DTCs. Perform troubleshooting with the "SFI System 05-5 ,.05-366 ".

1	PERFORM ACTIVE TEST BY HAND-HELD TESTER

(a) Operate the hand-held tester according to the steps on the display and select the "ACTIVE TEST".
METER:

Item	Test Details	Diagnostic Note
COOLANT TEMP	LOW / NORMAL / HI	-

OK:
Needle indication is normal.

NG → **REPLACE COMBINATION METER ASSY (SEE PAGE 71-18)**

OK

2	READ VALUE OF HAND-HELD TESTER(ENGINE COOLANT)

(a) Operate the hand-held tester according to the steps on the display and select the ”DATA LIST”.

ECM:

Item	Measurement Item/ Range (Display)	Normal Condition	Diagnostic Note
COOLANT TEMP	Coolant Temperature / Min.: -40°C (-40 °F), Max.: 140°C (284°F)	After warming up: 80 to 95°C (176 to 203°F)	If the value is ”-40°C (-40°F)” or ”140°C (284°F)”, sensor circuit is open or shorted.

OK:

Coolant temperature displayed on the tester is between 80°C (176°F) and 95°C (203°F) after warning up.

NG → **GO TO ENGINE CONTROL SYSTEM (SEE PAGE 05-5 , 05-366)**

OK

3	REPLACE COMBINATION METER ASSY

OK:

Normal operation

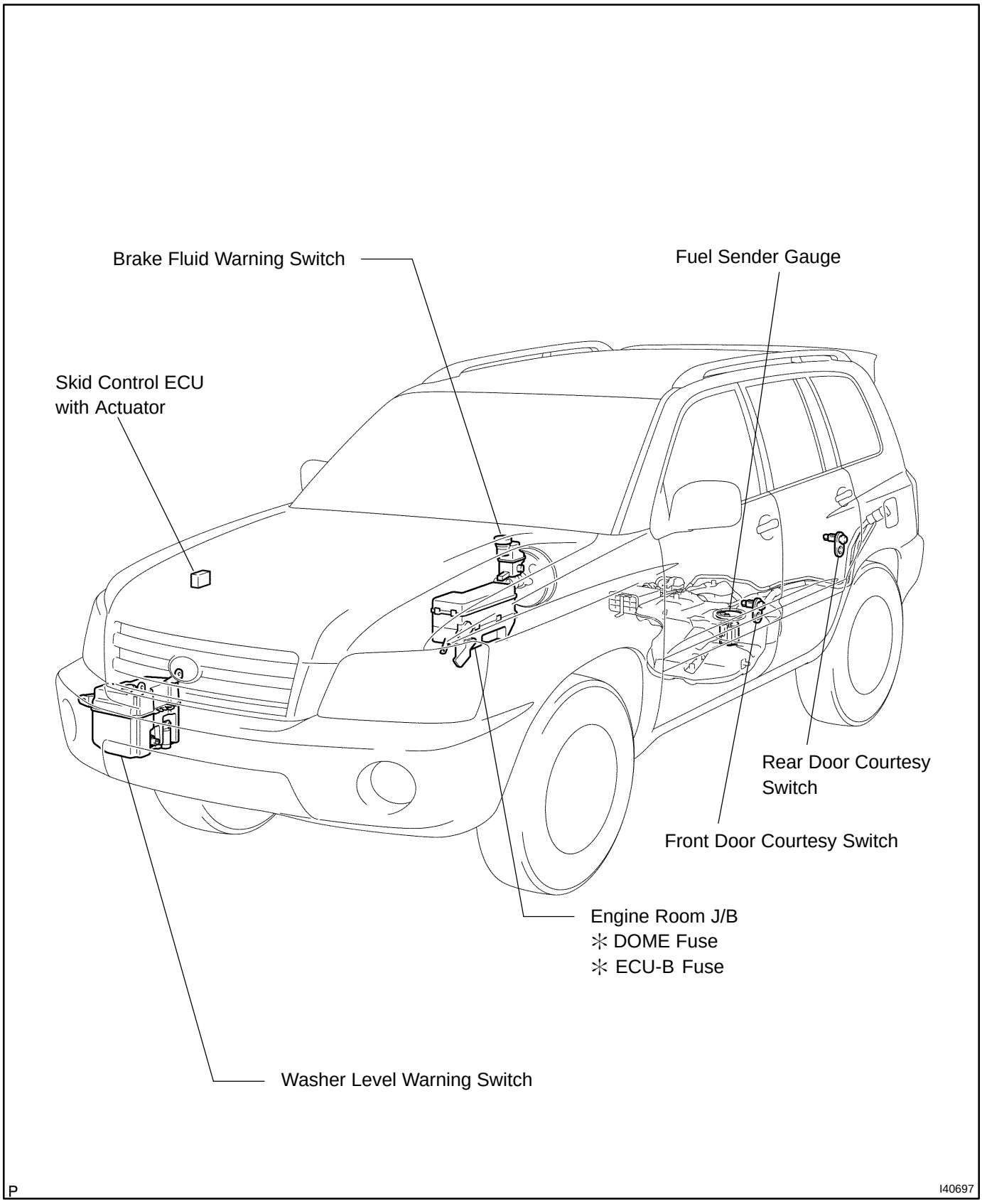
NG → **GO TO ENGINE CONTROL SYSTEM (SEE PAGE 05-5 , 05-366)**

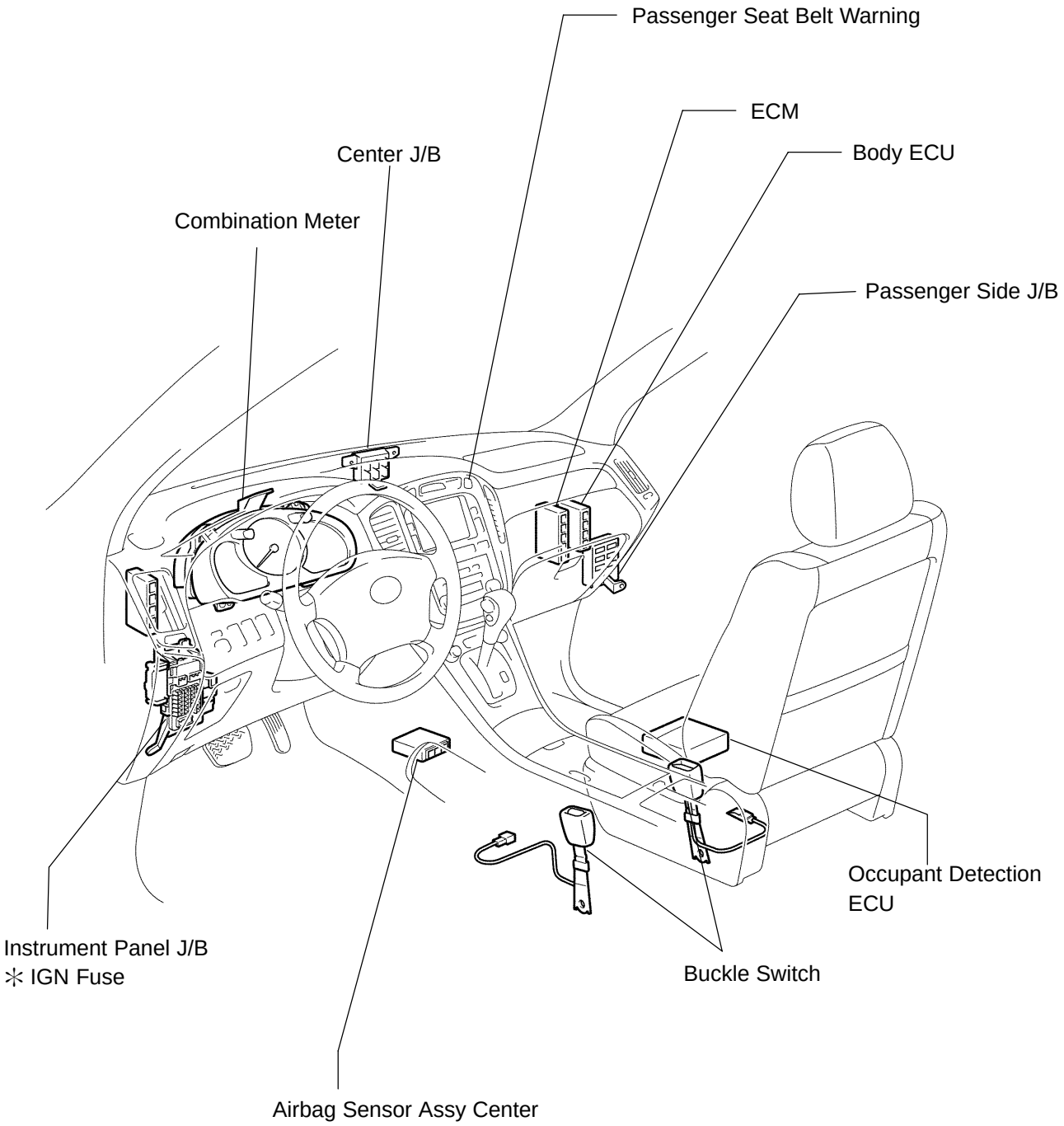
OK

END

05IPU-01

LOCATION

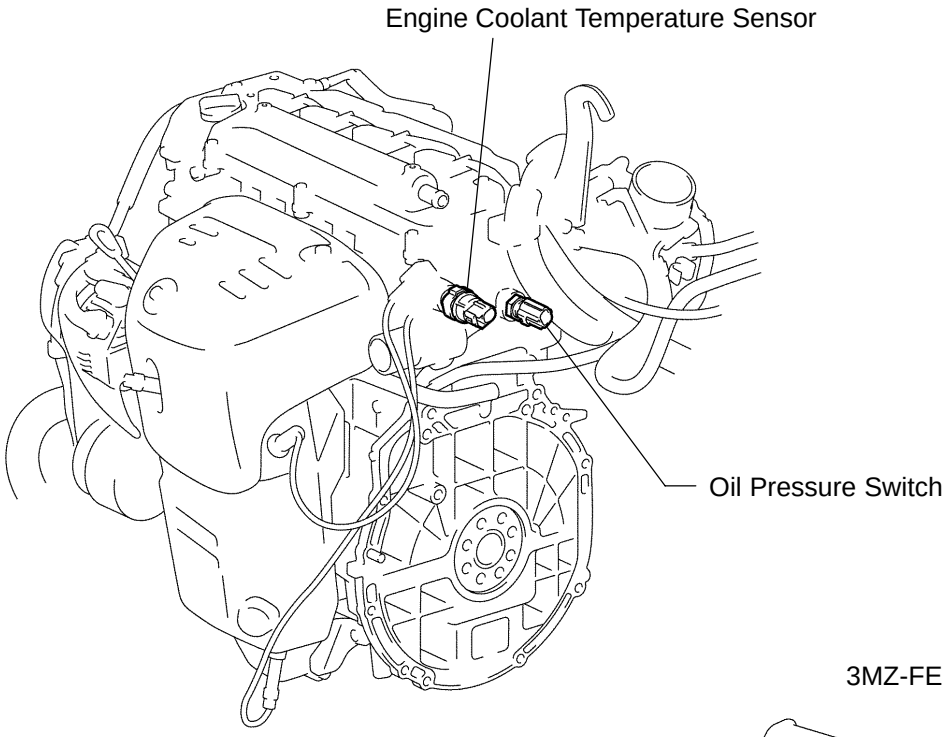



Passenger Seat Belt Warning
ECM
Body ECU
Center J/B
Combination Meter
Passenger Side J/B
Occupant Detection ECU
Instrument Panel J/B
* IGN Fuse
Buckle Switch
Airbag Sensor Assy Center

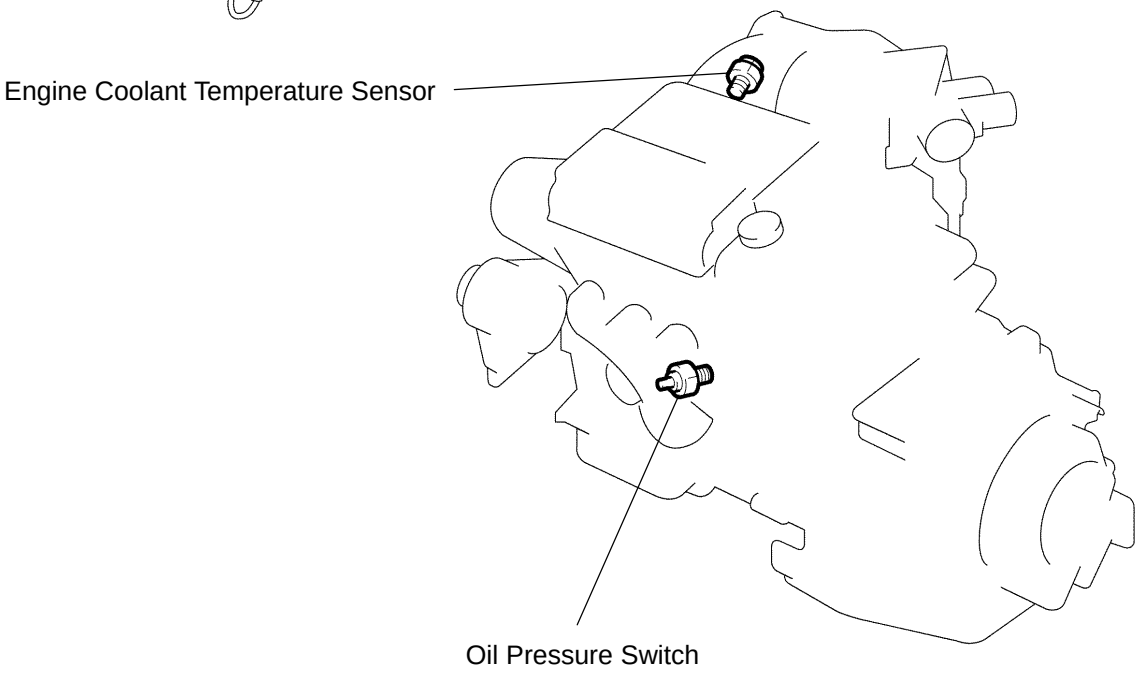
P

I40158

2AZ-FE Engine:

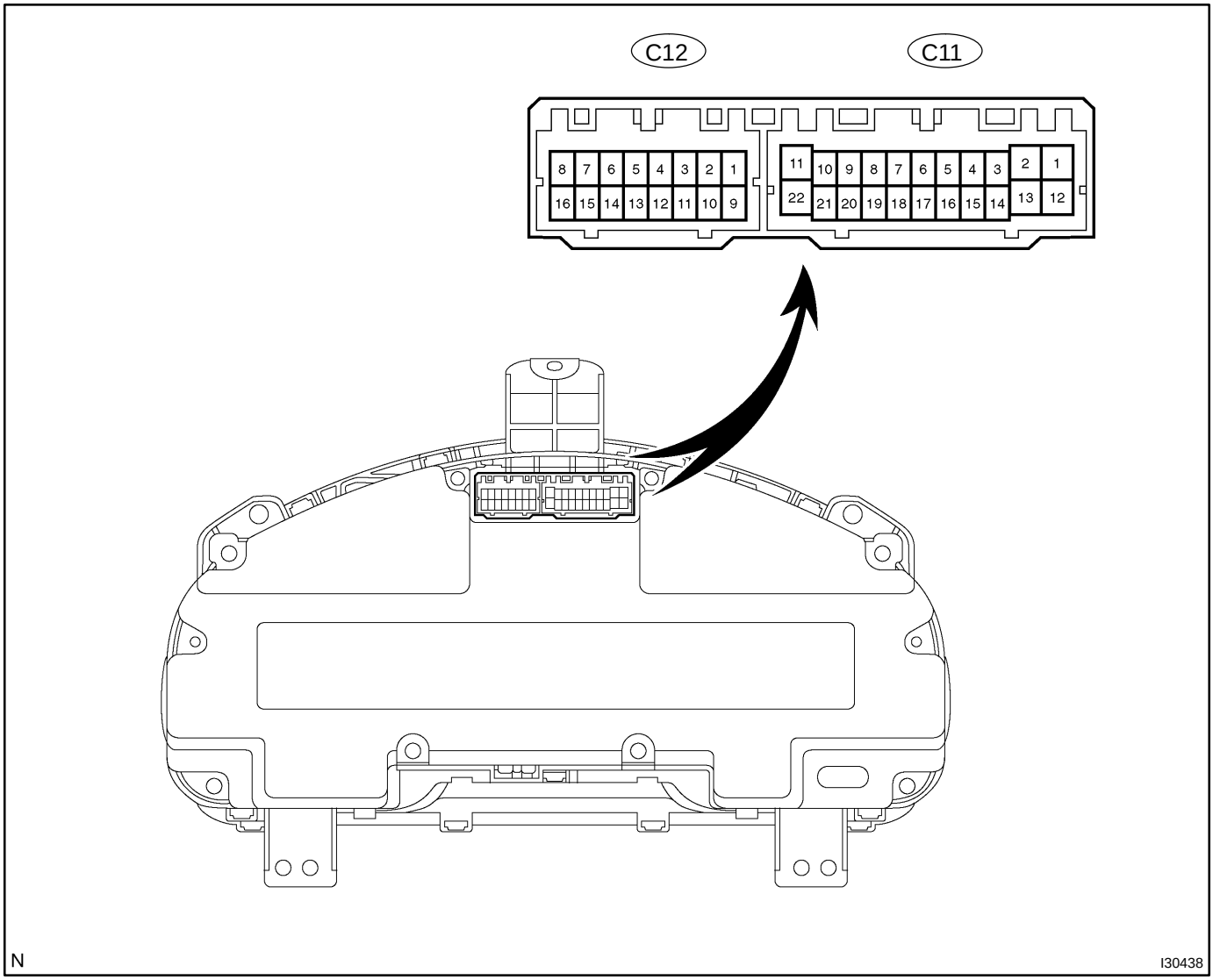


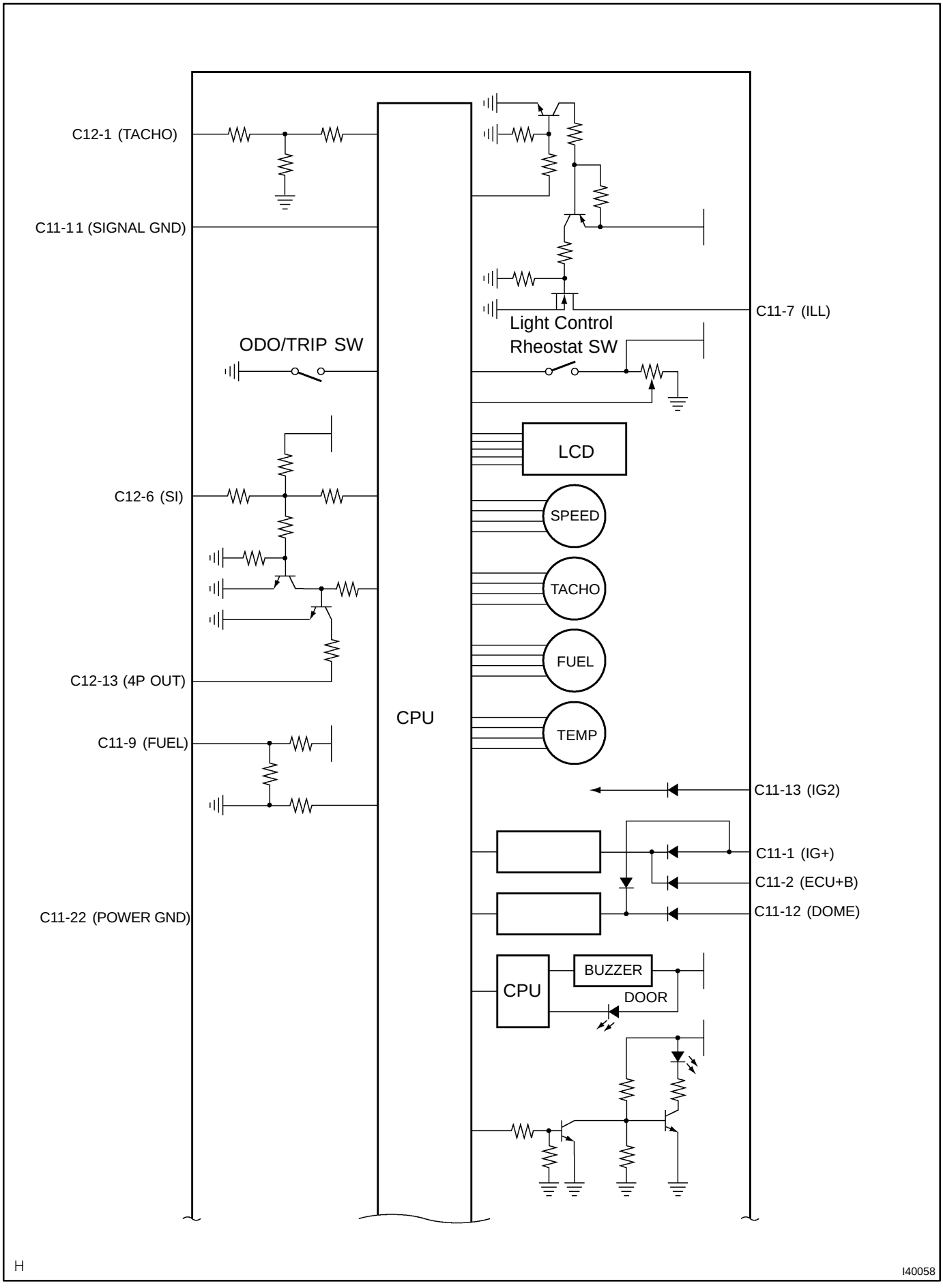
3MZ-FE Engine:

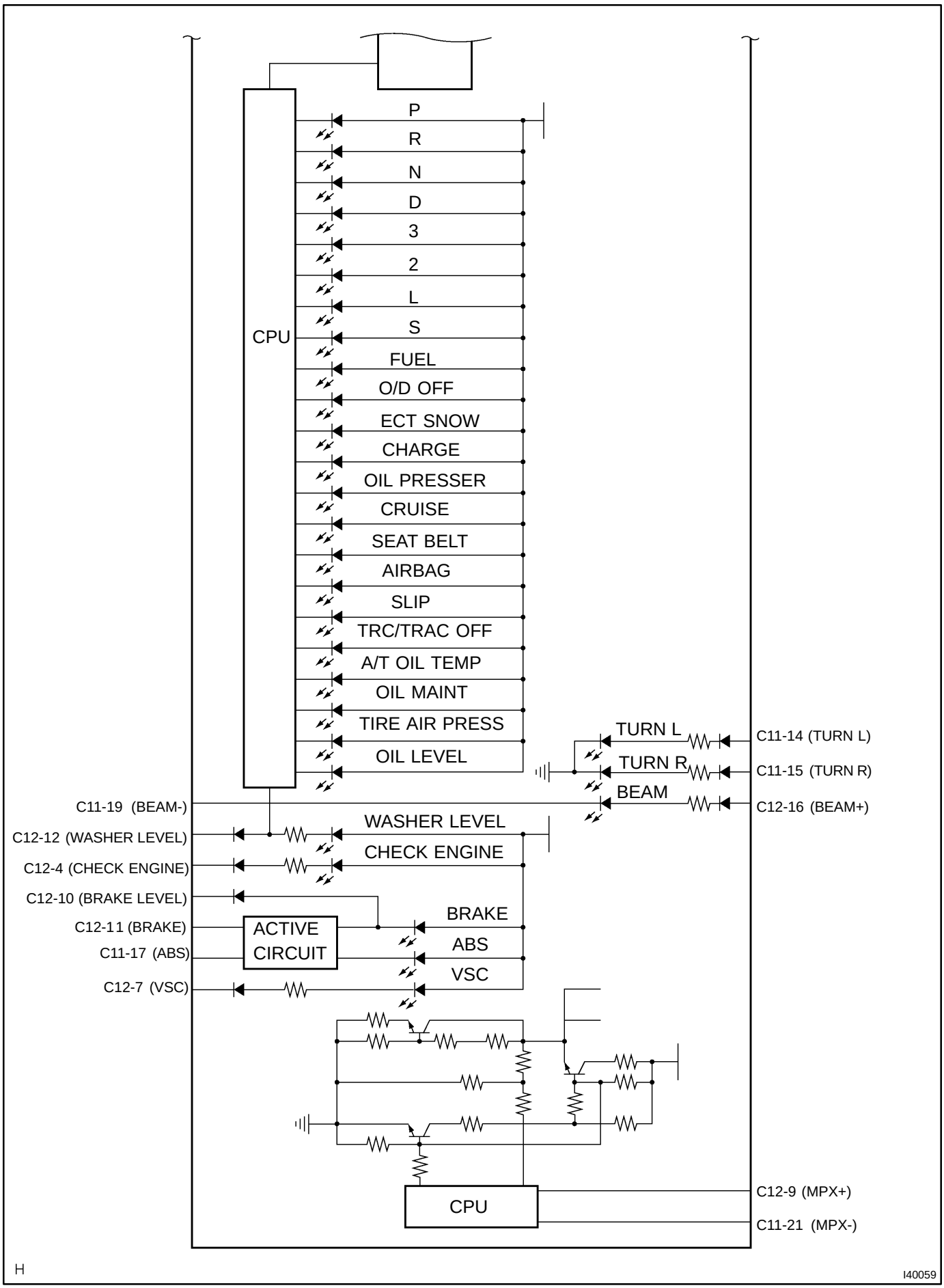


P

I30455


C12
C11
8 7 6 5 4 3 2 1
16 15 14 13 12 11 10 9
11 10 9 8 7 6 5 4 3 2 1
22 21 20 19 18 17 16 15 14 13 12
N
I30438


C12-1 (TACHO)
C11-11 (SIGNAL GND)
C11-7 (ILL)
Light Control
Rheostat SW
ODO/TRIP SW
LCD
C12-6 (SI)
SPEED
TACHO
FUEL
C12-13 (4P OUT)
CPU
TEMP
C11-9 (FUEL)
C11-13 (IG2)
C11-1 (IG+)
C11-2 (ECU+B)
C11-22 (POWER GND)
C11-12 (DOME)
CPU
BUZZER
DOOR
H
I40058


CPU
P
R
N
D
3
2
L
S
FUEL
O/D OFF
ECT SNOW
CHARGE
OIL PRESSER
CRUISE
SEAT BELT
AIRBAG
SLIP
TRC/TRAC OFF
A/T OIL TEMP
OIL MAINT
TIRE AIR PRESS
OIL LEVEL
TURN L
TURN R
BEAM
C11-14 (TURN L)
C11-15 (TURN R)
C12-16 (BEAM+)
C11-19 (BEAM-)
WASHER LEVEL
CHECK ENGINE
C12-12 (WASHER LEVEL)
C12-4 (CHECK ENGINE)
C12-10 (BRAKE LEVEL)
BRAKE
ABS
VSC
C12-11 (BRAKE)
C11-17 (ABS)
C12-7 (VSC)
ACTIVE CIRCUIT
CPU
C12-9 (MPX+)
C11-21 (MPX-)
H
I40059

Terminal No.		Wire Harness Side
C11	1	HEATER Fuse
	2	ECU-B Fuse
	7	PANEL Fuse
	9	Fuel sender gauge
	11	Ground (Signal Ground)
	12	DOME Fuse
	13	IGN Fuse
	14	Turn Signal Flasher
	15	Turn Signal Flasher
	17	Skid Control ECU
	19	Headlight Dimmer Switch
	21	Multiplex Communication Line (MPX-)
	22	Ground (Power Ground)
C12	1	ECM
	4	ECM
	6	Skid Control ECU (SI)
	7	Skid Control ECU (VSC)
	9	Multiplex Communication Line (MPX+)
	10	Brake Warning Switch
	11	Skid Control ECU
	12	Washer Level Warning Switch
	13	Speed Control Unit (4P-OUT)
	16	Headlight Relay

05248-04

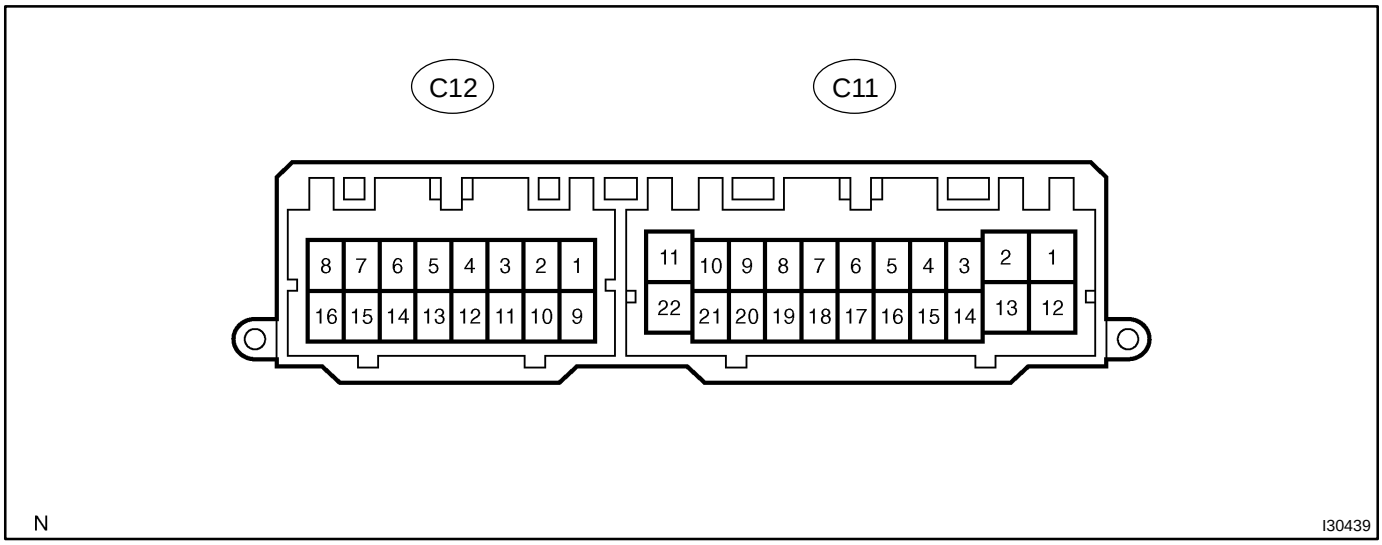
PROBLEM SYMPTOMS TABLE

Chart No.	Symptom	See page
1	Entire combination meter does not operate	05-1883
2	Malfunction in speedometer	05-1885
3	Malfunction in tachometer	05-1889
4	Malfunction in fuel receiver gauge	05-1893
5	Malfunction in water temperature receiver gauge	05-1896
7	Seat belt warning lamp for driver's seat does not operate	05-1898

05IPV-03

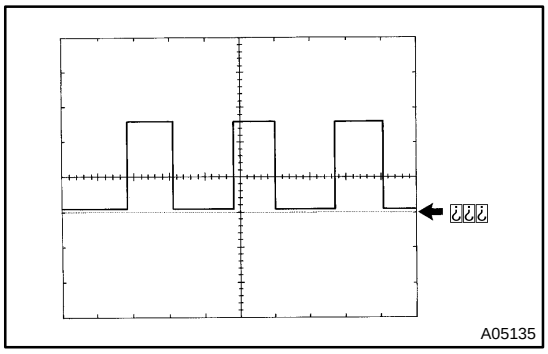
TERMINALS OF ECU

COMBINATION METER ASSY



Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	Specified Condition
IG+ (C11-1) - Body ground	P - Body ground	Ignition switch signal	Ignition switch OFF → ON	Below 1 V → 10 to 14 V
ECU+B (C11-2) - Body ground	LG - Body ground	Battery	Always	10 to 14 V
ILL (C11-7) - Body ground	B - Body ground	Illumination signal	Tail light OFF → ON	Pulse generation
FUEL (C11-9) - Body ground	O - Body ground	Fuel signal	Ignition switch ON, fuel level is FULL → EMPTY	Below 1 V → 4 to 7 V
SIGNAL GND (C11-11) - Body ground	R - Body ground	Ground	Always	Below 1 Ω
DOME (C11-12) - Body ground	V - Body ground	Battery	Always	10 to 14 V
IG2 (C11-13) - Body ground	SB - Body ground	Ignition switch signal	Ignition switch OFF → ON	Below 1 V → 10 to 14 V
TURN L (C11-14) - Body ground	L - Body ground	Turn signal L	Ignition switch ON, turn signal LH indicator OFF → ON	Below 1 V → 10 to 14 V
TURN R (C11-15) - Body ground	GR - Body ground	Turn signal R	Ignition switch ON, turn signal RH indicator OFF → ON	Below 1 V → 10 to 14 V
ABS (C11-17) - Body ground	W - Body ground	ABS signal	Ignition switch ON, ABS warning light ON → OFF	6.7 to 12 V → Below 1 V
BEAM- (C11-19) - Body ground	BR - Body ground	Hi-Beam signal	Headlight dimmer switch Lo → Hi	10 to 14 V → Below 1 V
MPX- (C11-21)	-	Communication signal	Communication circuit	-
POWER GND (C11-22) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
TACH (C12-1) - Body ground	O - Body ground	Tacho meter signal (Input)	Engine running	Pulse generation (See waveform 2)
CHECK ENGINE (C12-4) - Body ground	L - Body ground	CHECK ENGINE signal	Ignition switch ON, CHECK ENGINE warning light ON → OFF	Below 1 V → 10 to 14 V
SP1 (C12-6) - Body ground	GR - Body ground	Speed signal (Input)	Ignition switch ON and turn the wheel slowly	Pulse generation (See waveform 1)
VSC (C12-7) - Body ground	P - Body ground	VSC signal	Ignition switch ON, VSC warning light ON → OFF	Below 1 V → 10 to 14 V

MPX+ (C12-9)	-	Communication signal	Communication circuit	-
BRAKE (C12-10) - Body ground	V - Body ground	Brake fluid level signal	Ignition switch ON, brake fluid level (LO) → NORMAL	Below 1 V → 10 to 14 V
BRAKE (C12-11) - Body ground	B - Body ground	Brake signal	Ignition switch ON, BRAKE warning light ON → OFF	6.7 to 12 V → Below 1 V
WASHER LEVEL (C12-12) - Body ground	BR - Body ground	Washer level signal	Washer indicator OFF → ON	10 to 14 V → Below 1 V
4P OUT (C12-13) - Body ground	W - Body ground	Speed signal (Output)	Ignition switch ON and turn the wheel slowly	Pulse generation (See waveform 1)
BEAM+ (C12-16) - Body ground	G - Body ground	Hi-Beam signal	Hi-Beam OFF → ON	Below 1 V → 10 to 14 V

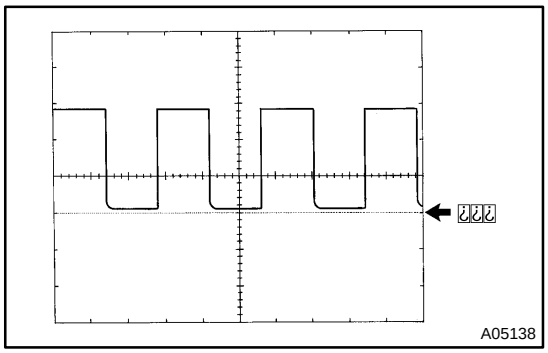


Waveform 1 (Reference):

Item	Contents
Tool setting	5 V/DIV, 20 ms/DIV
Vehicle condition	Driving at approx. 20 Km/h

HINT:

As the vehicle speed increases, the cycle of the signal waveform narrows.



Waveform 2 (Reference):

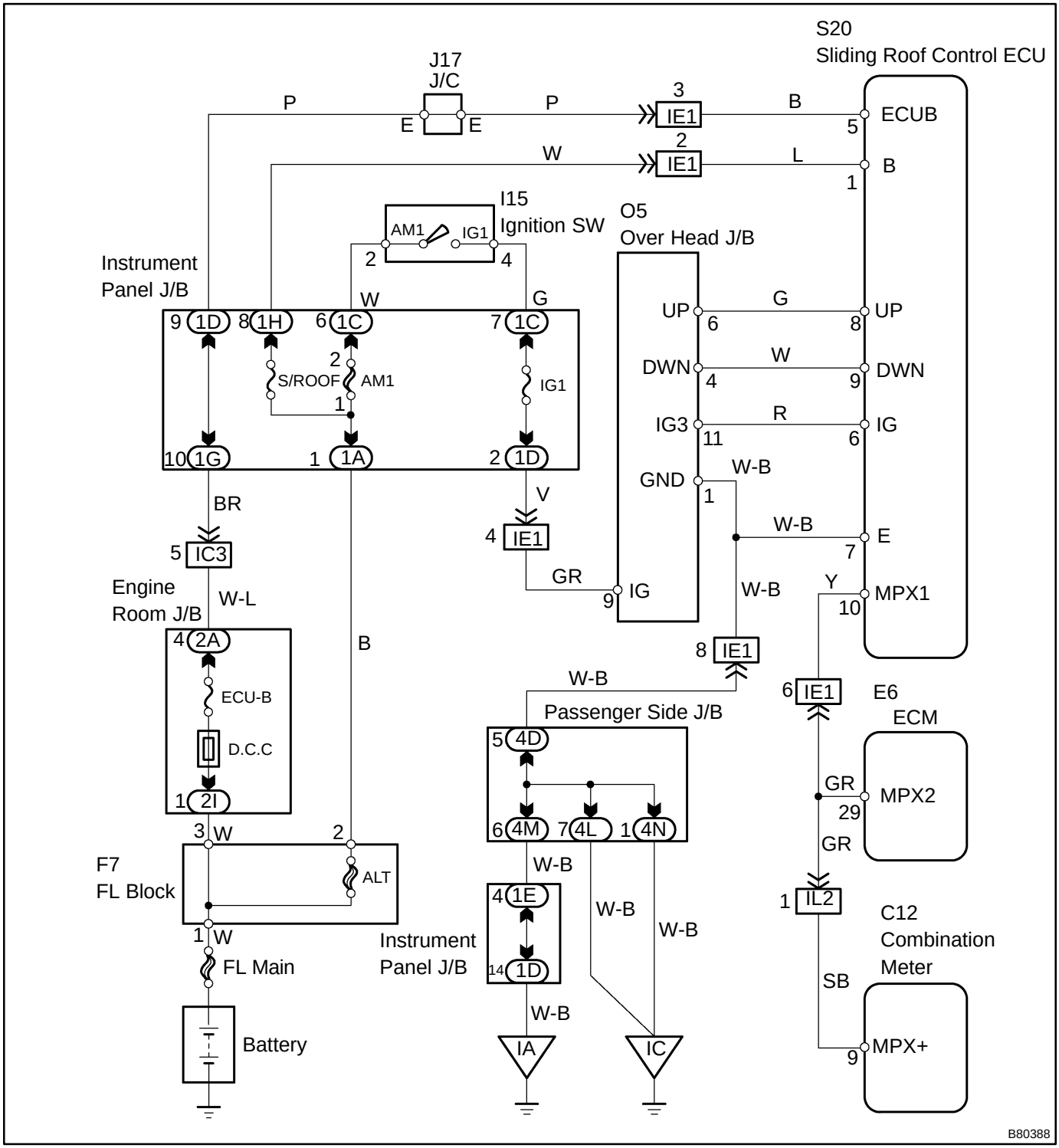
Item	Contents
Tool setting	5 V/DIV, 10 ms/DIV
Vehicle condition	Engine idle speed

SLIDING ROOF DOES NOT MOVE BY SLIDING ROOF CONTROL SWITCH

CIRCUIT DESCRIPTION

The sliding roof drive gear sub-assy (sliding roof ECU) monitors a sliding roof motor switch signal in line, and the motor built in the sliding roof drive gear sub-assy (sliding roof ECU) is driven.

WIRING DIAGRAM



1	READ VALUE OF HAND-HELD TESTER

(a) Connect the hand-held tester to the DLC3.
(b) Enter into the DATA LIST of the hand-held tester.

Sliding Roof ECU

Item	Switch condition	Standard value
OPEN SW	Pressed → Unpressed	ON/OFF
CLOSE SW	Pressed → Unpressed	ON/OFF

NG → **Go to step 4**

OK

2	PERFORM ACTIVE TEST BY HAND-HELD TESTER

(a) Connect the hand-held tester to the DLC3.
(b) Enter into the ACTIVE TEST of the hand-held tester.

Sliding Roof ECU

Item	Condition
Sliding Roof	CLOSE/UP
Sliding Roof	OPEN/DOWN

NG → **Go to step 6**

OK

3	READ VALUE OF HAND-HELD TESTER

(a) Connect the hand-held tester to the DLC3.
(b) Enter into the DATA LIST of the hand-held tester.

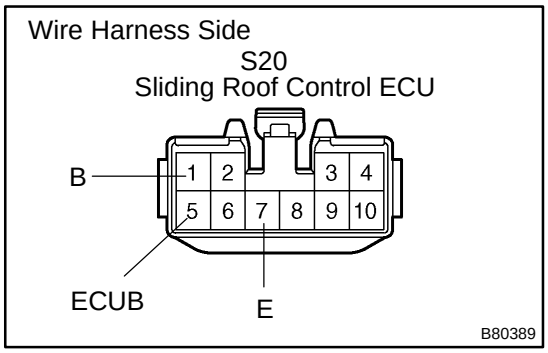
Sliding Roof ECU

Item	Switch condition	Standard value
Hall IC condition	Do sliding and tiling operation	ON/OFF

OK → **REPLACE SLIDING ROOF DRIVE GEAR SUB-ASSY**

NG

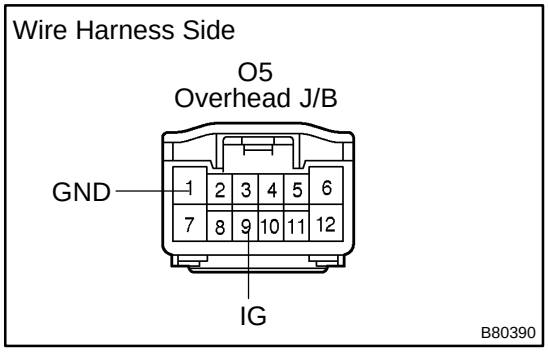
4 CHECK WIRE HARNESS



(a) Disconnect the S20 roof drive gear connector.
(b) Check the voltage or continuity between the terminals of the S20 roof drive gear wire harness side connector.

Standard:

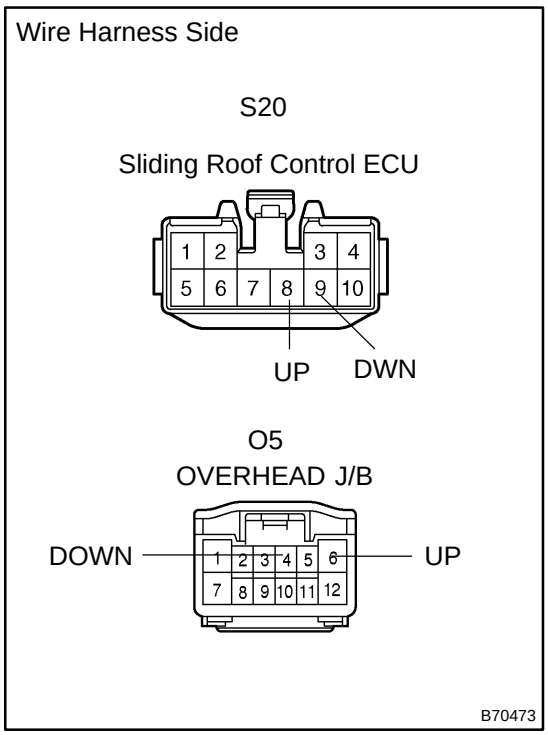
Symbol (Terminal No.)	Condition	Specified condition
E (S20-7) ⇔ Body ground	Constant	Continuity
B (S20-1) ⇔ E (S20-7)	Constant	10 to 14 V
ECUB (S20-5) ⇔ E (S20-7)	Constant	10 to 14 V



(c) Disconnect the O5 overhead J/B connector.
(d) Check the voltage or continuity between the terminals of the O5 overhead J/B wire harness side connector.

Standard:

Symbol (Terminal No.)	condition	Specified condition
IG (O5-9) ⇔ GND (O5-1)	Ignition switch position OFF → ON	0V → 10V - 14V
GND (O5-1) ⇔ Body ground	Constant	Continuity



(e) Disconnect the O5 overhead J/B connector.
(f) Check the continuity between the S20 drive gear and O5 overhead J/B wire harness side connectors.

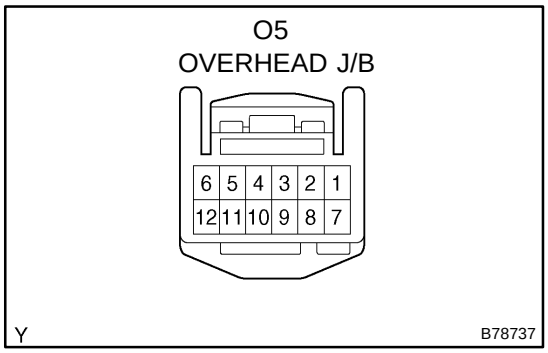
Standard:

Symbol (Terminal No.) (Drive gear ⇔ Motor switch)	Specified condition
UP (S20-8) ⇔ UP (O5-6)	Continuity
DWN (S20-9) ⇔ DOWN (O5-4)	Continuity
IG (S20-6) ⇔ IG3 (O5-11)	Continuity

NG → **REPAIR OR REPLACE WIRE HARNESS**

OK

5 INSPECT SLIDE ROOF MOTOR SWITCH



(a) Inspect the overhead J/B continuity.

Standard:

Terminal No.	Condition	Specified condition
1 ⇔ 8	Slide open	Continuity
1 ⇔ 9	Tilt up	Continuity

NG → **REPLACE SLIDE ROOF MOTOR SWITCH**

OK → **REPLACE SLIDING ROOF DRIVE GEAR SUB-ASSY**

6 CHECK MOVEMENT OF SLIDING ROOF

(a) Remove the sliding roof drive gear, then check that the sliding roof can be moved by hand.

NG → **REPAIR OR REPLACE SLIDING ROOF**

OK

REPLACE SLIDING ROOF DRIVE GEAR SUB-ASSY

051RB-03

CUSTOMER PROBLEM ANALYSIS CHECK

SLIDING ROOF CONTROL SYSTEM Check Sheet

Inspector's name: _____

Customer's Name		**Registration No.**	
		Registration Year	
		Frame No.	
Date Vehicle Brought in	/ /	**Odometer Reading**	**km miles**

Date Problem First Occurred		/ /
Frequency Problem Occurs		⁎ Constant ⁎ Sometimes (Times per day, month) ⁎ Once only
Weather Conditions When Problem Occurred	**Weather**	⁎ Fine ⁎ Cloudy ⁎ Rainy ⁎ Snowy ⁎ Various/Others
	Outdoor temperature	⁎ Hot ⁎ Warm ⁎ Cool ⁎ Cold (Approx. °C (°F))

Problem Symptom

⁎ Sliding roof control system does not operate.
⁎ Sliding roof operates abnormally or stops halfway.

SLIDING ROOF SYSTEM

HOW TO PROCEED WITH TROUBLESHOOTING

051RA-04

HINT:

Troubleshoot in accordance with the procedure on the following pages.

1	VEHICLE BROUGHT TO WORKSHOP

2	CUSTOMER PROBLEM ANALYSIS (See page 05-1975)

3	PROBLEM SYMPTOM CONFIRMATION

(a) If the symptom does not occur, proceed to A.

(b) If the symptom occurs, proceed to B.

A	SYMPTOM SIMULATION

B

4	PROBLEM SYMPTOMS TABLE (See page 05-1980)

5	CIRCUIT INSPECTION (See page 05-1981)

6	IDENTIFICATION OF PROBLEM

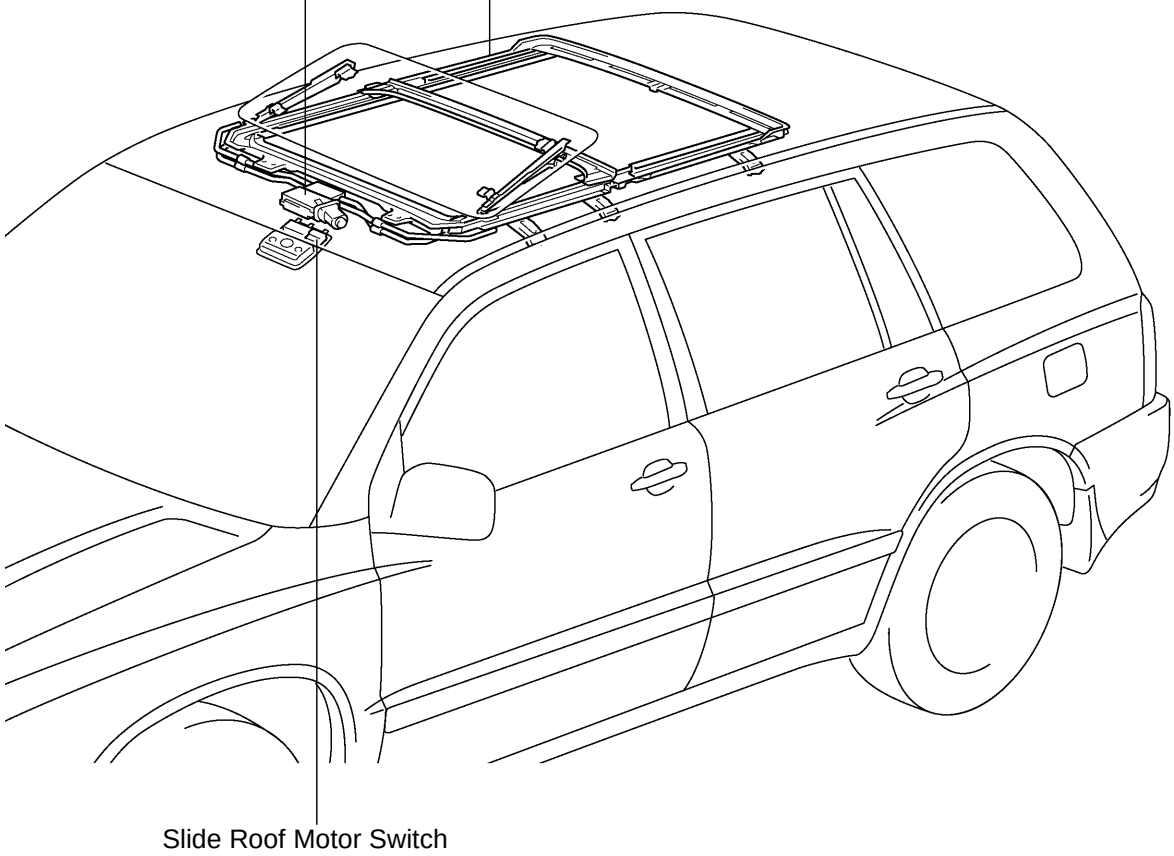
7	REPAIR OR REPLACE

8	CONFIRMATION TEST

END

051RC-04

LOCATION



O

B51423

0523P-03

PRE-CHECK

1. CHECK USING HAND-HELD TESTER

(a) Connect the hand-held tester to the DLC3.

(b) Select the DATA LIST mode on the hand-held tester.

Sliding Roof ECU

Item	Switch condition	Standard value
OPEN SW	Pressed→Unpressed	ON/OFF
CLOSE SW	Pressed→Unpressed	ON/OFF
Position detection SW 1	Do sliding and tilting operation	ON/OFF
Position detection SW 2	Do sliding and tilting operation	ON/OFF
Hall IC condition	Do sliding and tiling operation	Normal/Abnormal
Hall IC out put	Do sliding and tiling operation	Lo/Hi
IG	Ignition Switch ON→OFF	ON/OFF
IG line signal	Ignition Switch ON→OFF	ON/OFF
Operation possible after key-OFF	Ignition Switch ON→OFF	ON/OFF

(c) The active test will indicate if the part is normal or malfunctioning.

Sliding Roof ECU

Item	Condition
Sliding Roof	CLOSE/UP
Sliding Roof	OPEN/DOWN

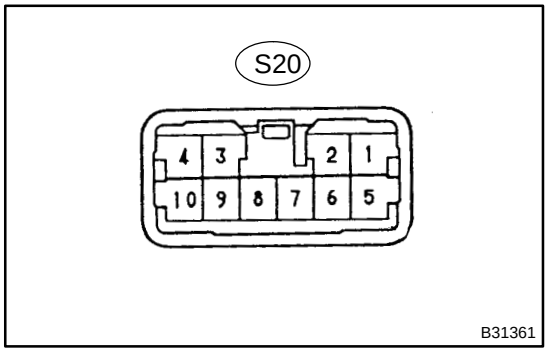
051RE-04

PROBLEM SYMPTOMS TABLE

Symptom	Suspected Area	See page
Sliding roof system operates abnormally.	1. Slide roof control switch 2. Sliding roof control motor and relay 3. Wire harness	05-1981 05-1981 -
Sliding roof system stops operation halfway. (No foreign materials are trapped in motor assembly)	1. Slide roof control switch 2. Sliding roof control motor and relay 3. Wire harness	05-1981 05-1981 -

05JFS-03

TERMINALS OF ECU



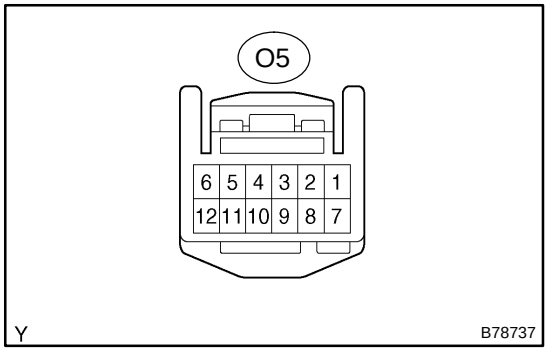
1. INSPECT SLIDING ROOF DRIVE GEAR SUB-ASSY (SLIDING ROOF ECU)

(a) Disconnect the sliding roof ECU connector, and check the voltage or continuity of each terminal of the wire harness side connector.

Standard:

Symbols (Terminals No.)	Wiring color	Condition	Specified condition
ECUB (S20-5) ⇔ Body ground	B⇔ -	Constant	10 to 14 V
B (S20-1) ⇔ Body ground	L⇔ -	Constant	10 to 14 V
E (S20-7) ⇔ Body ground	W-B ⇔ -	Constant	Continuity

If the result is not as specified, there may be a malfunction on the wire harness.



2. CHECK OVERHEAD J/B

(a) Disconnect the overhead J/B connector, and check the voltage or continuity of each terminal of the connector.

Standard:

Symbols (Terminals No.)	Wiring color	Condition	Specified condition
UP (O5-6) ⇔ Body ground	G ⇔ -	Each switch OFF	Continuity
DOWN (O5-4) ⇔ Body ground	W ⇔ -	Each switch OFF	Continuity

Symbols (Terminals No.)	Wiring color	Condition	Specified condition
UP (O5-6) ⇔ Body ground	G ⇔ -	・Ignition switch ON ・Sliding roof fully closed ・Slide open switch OFF → ON (Slide open side)	0 V → 10 to 14 V
DOWN (O5-4) ⇔ Body ground	W ⇔ -	・Ignition switch ON ・Sliding roof fully opened ・Tilt up switch OFF → ON (Slide close side)	0 V → 10 to 14 V
IG (O5-9) ⇔ Body ground	GR ⇔ -	Ignition switch ON	0 V → 10 to 14 V
GND (O5-1) ⇔ Body ground	W-B ⇔ -	Constant	Continuity

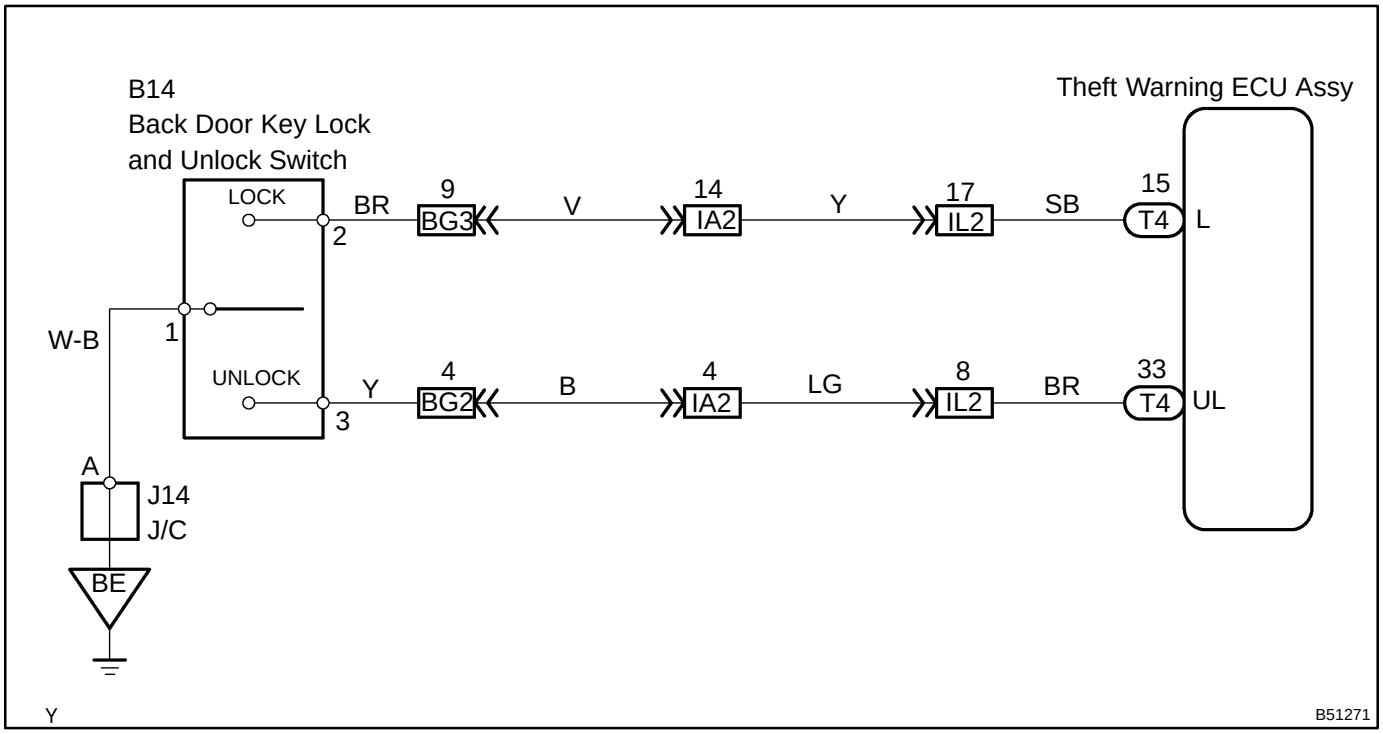
If the result is not as specified, there may be a malfunction on the wire harness.

BACK DOOR KEY LOCK AND UNLOCK SWITCH CIRCUIT

CIRCUIT DESCRIPTION

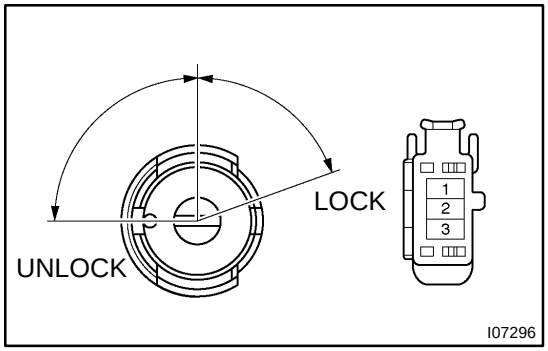
The back door key lock and unlock switch comes on when the back door key cylinder is turned to the unlock side with the key.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK BACK DOOR KEY LOCK AND UNLOCK SWITCH



(a) Remove the switch.
(b) Measure the resistance.

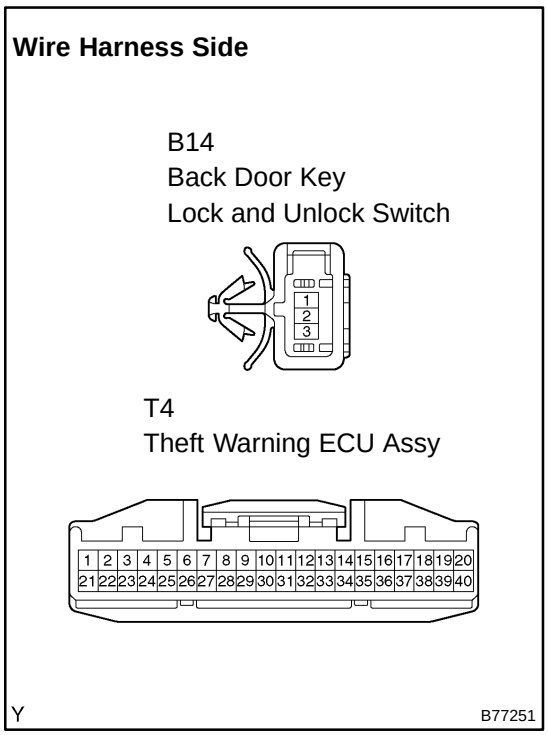
Standard:

Tester Connection	Condition	Specified Condition
1-2	Turned to lock side	Below 1 Ω
1-2, 1-3	Not turned	10 kΩ or higher
1-3	Turned to unlock side	Below 1 Ω

NG → **REPLACE BACK DOOR KEY LOCK AND UNLOCK SWITCH**

OK

2	CHECK WIRE HARNESS (THEFT WARNING ECU ASSY - BACK DOOR KEY LOCK AND UNLOCK SWITCH)



(a) Disconnect the T4 ECU connector.
(b) Disconnect the B14 switch connector.
(c) Measure the resistance between the wire harness side connectors.

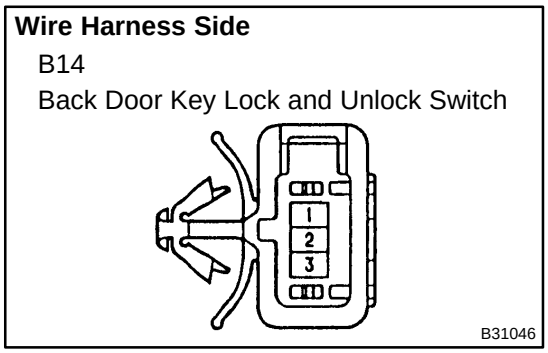
Standard:

Tester Connection	Specified Condition
B14-2 (LOCK) - T4-15 (L)	Below 1 Ω
B14-8 (UNLOCK) - T4-33 (UL)	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

3	CHECK BACK DOOR KEY LOCK AND UNLOCK SWITCH (BODY GROUND)



(a) Disconnect the B14 switch connector.
(b) Measure the resistance between the wire harness side connector and body ground.

Standard:

Tester Connection	Specified Condition
B14-1 - Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

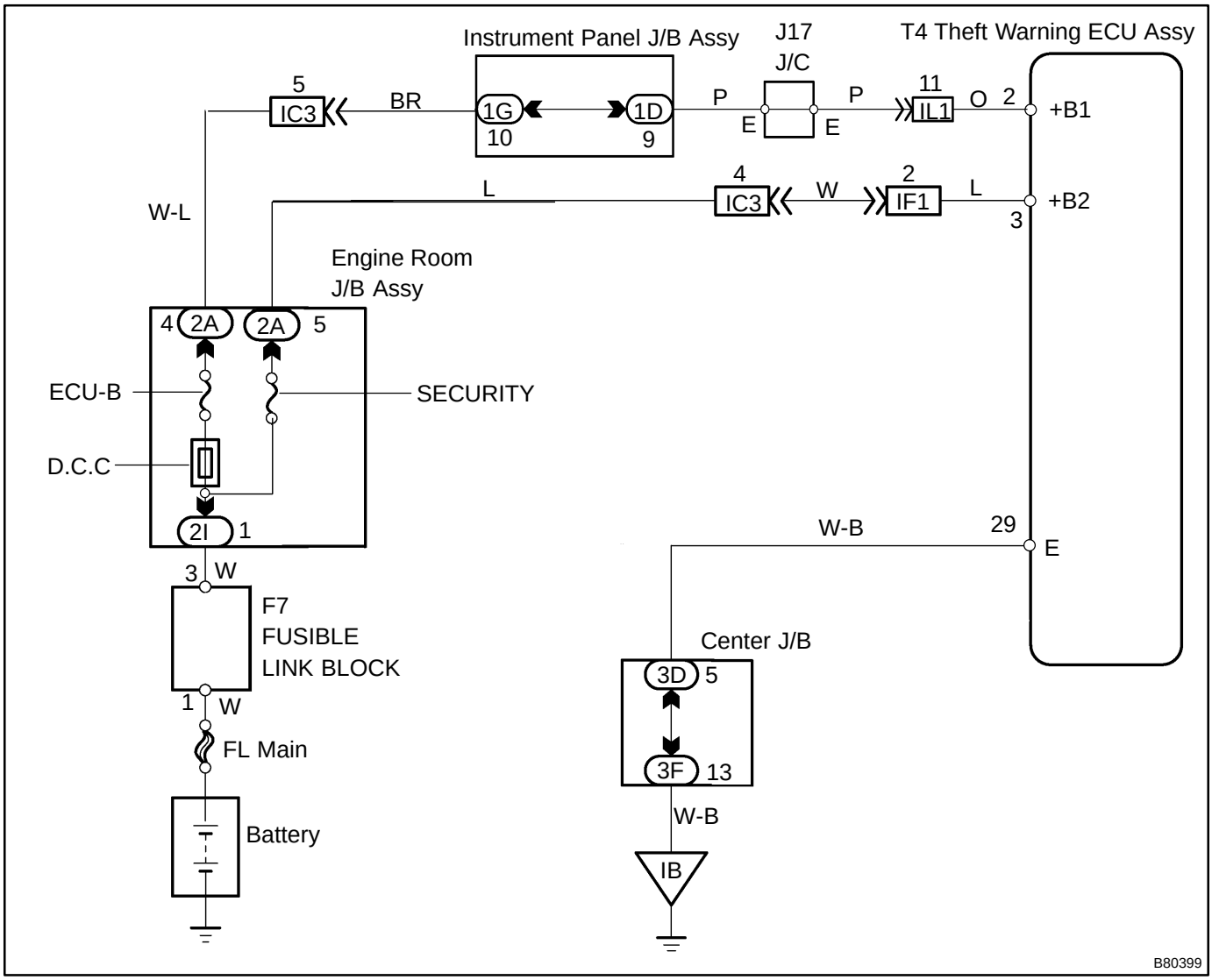
REPLACE THEFT WARNING ECU ASSY

ECU POWER SOURCE CIRCUIT

CIRCUIT DESCRIPTION

This circuit provides power to operate the theft deterrent (warning) ECU.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK THEFT WARNING ECU ASSY (ECU-B)

(a) Remove the ECU-B fuse from the engine room J/B.
(b) Measure the resistance.
Standard: Below 1 Ω

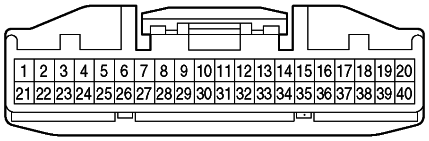
OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

NG

2	CHECK WIRE HARNESS (POWER SOURCE)

Wire Harness Side

T4
Theft Warning ECU Assy



B63408

(a) Disconnect the T4 ECU connector.
(b) Measure the voltage of the wire harness side connector.
Standard:

Tester Connection	Specified Condition
T4-2 (+B1) - T4-29 (E)	10 to 14 V

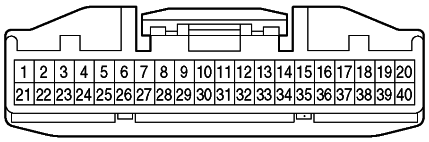
NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

3	CHECK THEFT WARNING ECU ASSY (GROUND)

Wire Harness Side

T4
Theft Warning ECU Assy



B63408

(a) Disconnect the T5 ECU connector.
(b) Measure the resistance between the wire harness side connector and body ground.
Standard:

Tester Connection	Specified Condition
T4-2 (+B1) - Body ground	Below 1 Ω
T4-29 (E) - Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

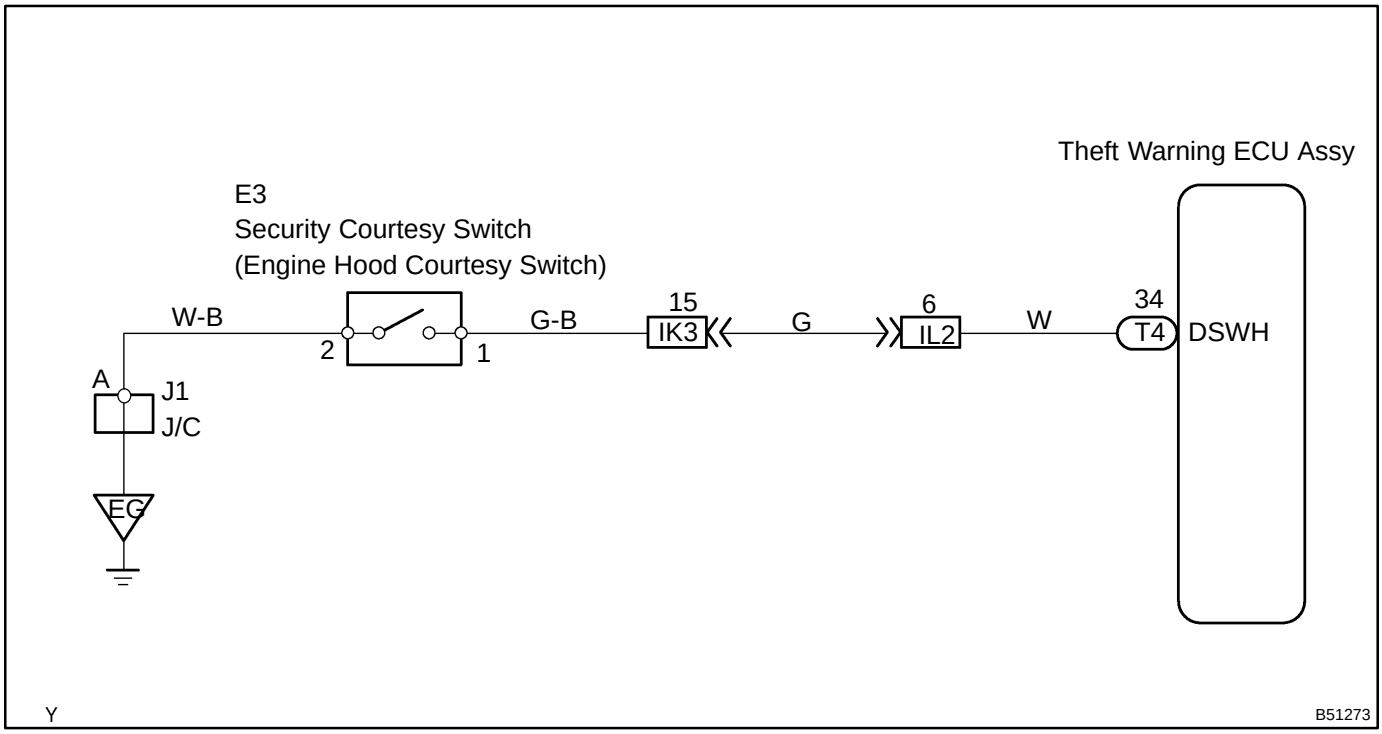
PROCEED TO NEXT CIRCUIT INSPECTION

ENGINE HOOD COURTESY SWITCH CIRCUIT

CIRCUIT DESCRIPTION

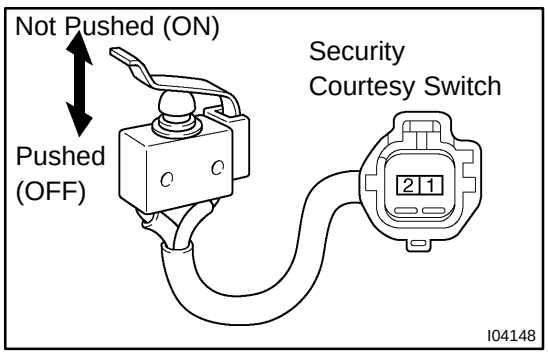
The hood door courtesy switch is built in the engine hood lock assembly. The switch comes on when the engine hood is opened and goes off when the engine hood is closed.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT SECURITY COURTESY SWITCH



(a) Remove the courtesy switch.
(b) Measure the resistance of the switch.

Tester Connection	Condition	Specified Condition
1-2	Pushed (OFF (Lock))	10 kΩ or higher
1-2	Not pushed (ON (Unlock))	Below 1 Ω

NG → **REPLACE SECURITY COURTESY SWITCH**

OK

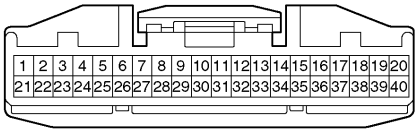
2	**CHECK WIRE HARNESS (THEFT WARNING ECU ASSY - SECURITY COURTESY SWITCH**

Wire Harness Side

E3
Security Courtesy Switch



T4
Theft Warning ECU Assy



Y B77252

(a) Disconnect the T4 ECU connector.
(b) Disconnect the E3 switch connector.
(c) Measure the resistance between the wire harness side connectors.

Standard:

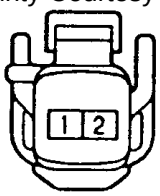
Tester Connection	Specified Condition
T4-34 (DSWH) - E3-1	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

3	**CHECK WIRE HARNESS (SECURITY COURTESY SWITCH - BODY GROUND)**

Wire Harness Side
E3
Security Courtesy Switch



B31016

(a) Disconnect the E3 switch connector.
(b) Measure the resistance between the wire harness side connector and body ground.

Standard:

Tester Connection	Specified Condition
E3-2 - Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

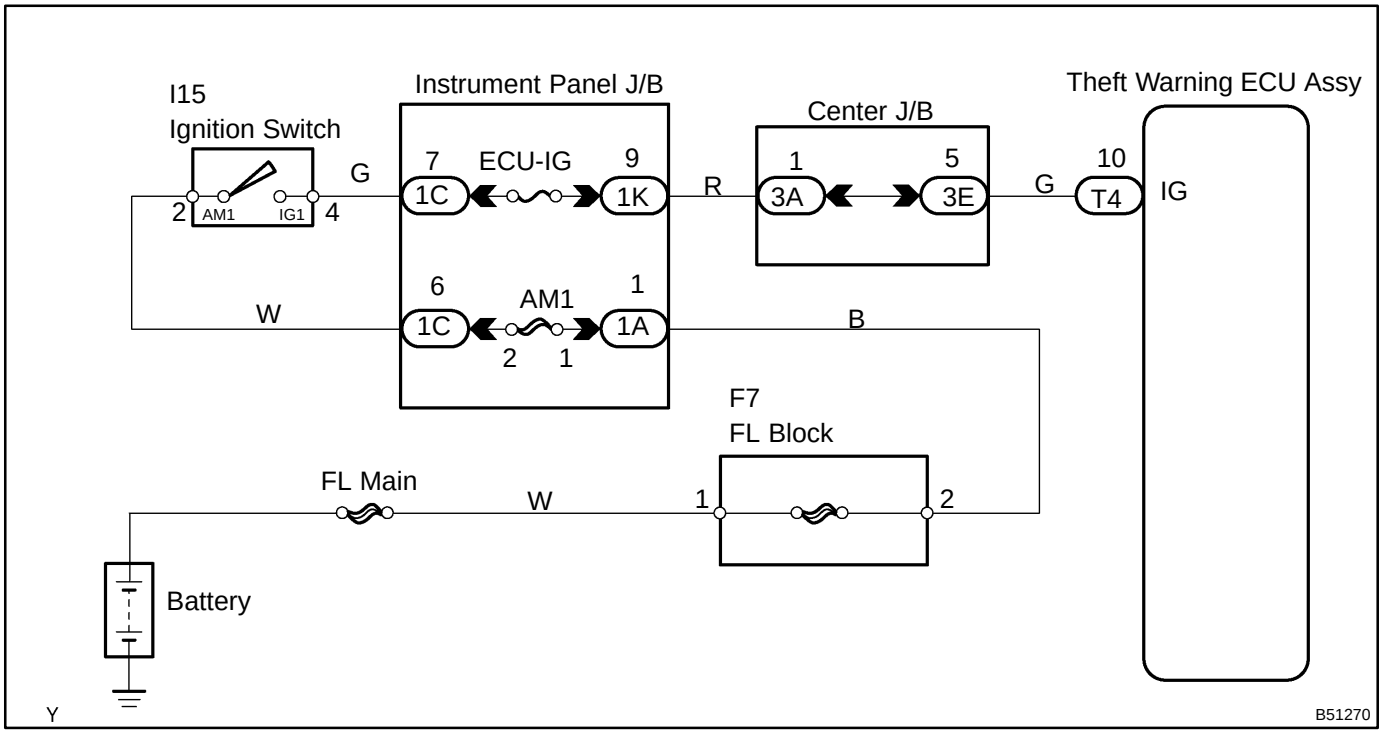
REPLACE THEFT WARNING ECU ASSY

IGNITION SWITCH CIRCUIT

CIRCUIT DESCRIPTION

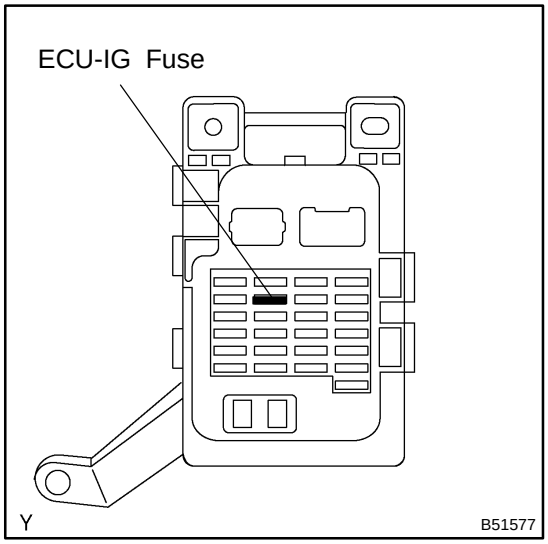
When the ignition switch is turned to the ON position, battery positive voltage is applied to terminal IG of the ECU. When battery positive voltage is applied to terminal IG of the ECU while the theft deterrent system is operating, the warning stops. Furthermore, the power supplied from terminal IG of the ECU is used as the power for the door courtesy switch and position switch, etc.

WIRING DIAGRAM



INSPECTION PROCEDURE

1 CHECK ECU-IG FUSE (ECU-IG)

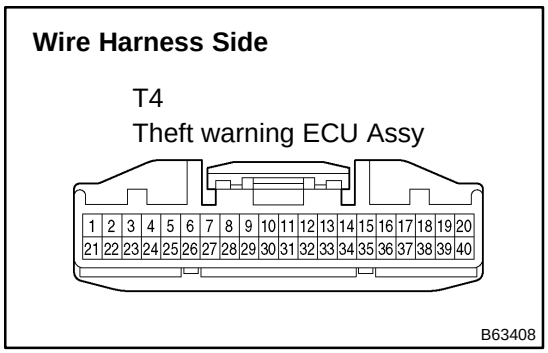


(a) Remove the ECU-IG fuse from the engine room J/B.
(b) Measure the resistance.
Standard: Below 1 Ω

NG → **REPLACE FUSE**

OK

2 CHECK THEFT WARNING ECU ASSY (IG VOLTAGE)



(a) Disconnect the T4 ECU connector.
(b) Turn the ignition switch ON.
(c) Measure the voltage between the wire harness side connector and body ground.
Standard:

Tester Connection	Specified Condition
T4-10 (IG) - Body ground	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

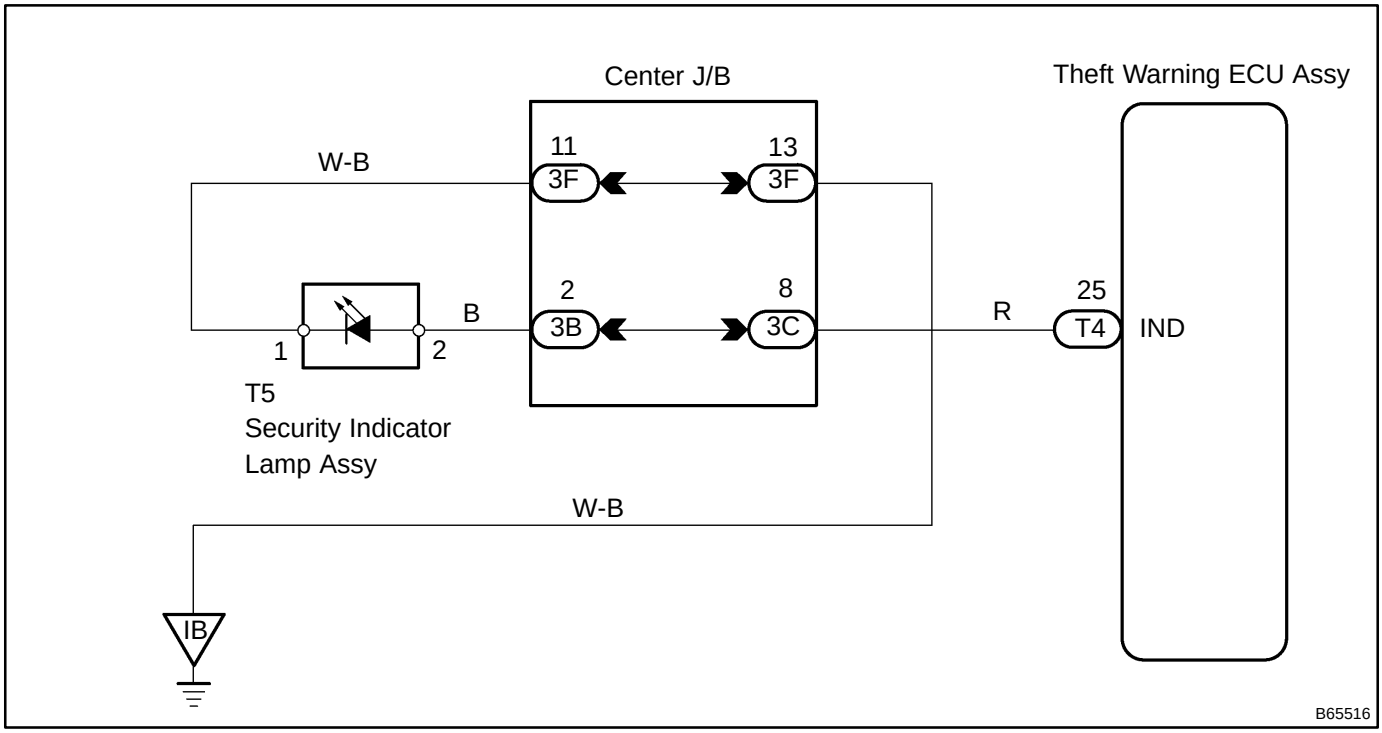
CHECK AND REPLACE THEFT WARNING ECU ASSY

INDICATOR LIGHT CIRCUIT

CIRCUIT DESCRIPTION

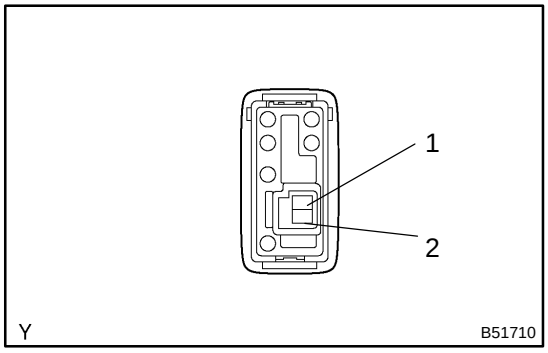
While the theft deterrent system is preparing to be set, this circuit lights up the indicator lamp. When the system is set, it continuously turns the indicator lamp on for 0.75 seconds and then turns it off for 1.25 seconds, thus the indicator lamp blinks.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK SECURITY INDICATOR LAMP ASSY (OPERATION)



(a) Disconnect the T5 indicator lamp connector.
(b) Check if the security indicator lamp comes on when battery voltage is applied to each terminal of the connector.

Standard:

Measuring Condition	Specified Operation
Battery positive (+) - Terminal 2 Battery negative (-) - Terminal 1	Indicator lamp comes on.

NG → **REPLACE SECURITY INDICATOR LAMP ASSY**

OK

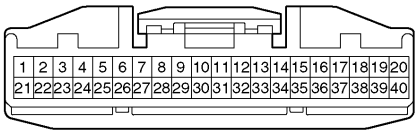
2	**CHECK WIRE HARNESS (THEFT WARNING ECU ASSY - SECURITY INDICATOR LAMP ASSY)**

Wire Harness Side

T5
Security Indicator
Lamp Assy



T4
Theft Warning ECU Assy



Y B77249

(a) Disconnect the T5 indicator lamp and T4 ECU connectors
(b) Measure the resistance between the wire harness side connecters.

Standard:

Tester Connection	Specified Condition
T4-25 (IND) - T5-2	Below 1 Ω

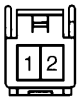
NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

3	**CHECK WIRE HARNESS (SECURITY INDICATOR LAMP ASSY - BODY GROUND)**

Wire Harness Side

T5
Theft Deterrent
Indicator Lamp Assy



B78292

(a) Disconnect the T5 indicator lamp connector
(b) Measure the resistance between the wire harness side connector and body ground.

Standard:

Tester Connection	Specified Condition
T5-1 - Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

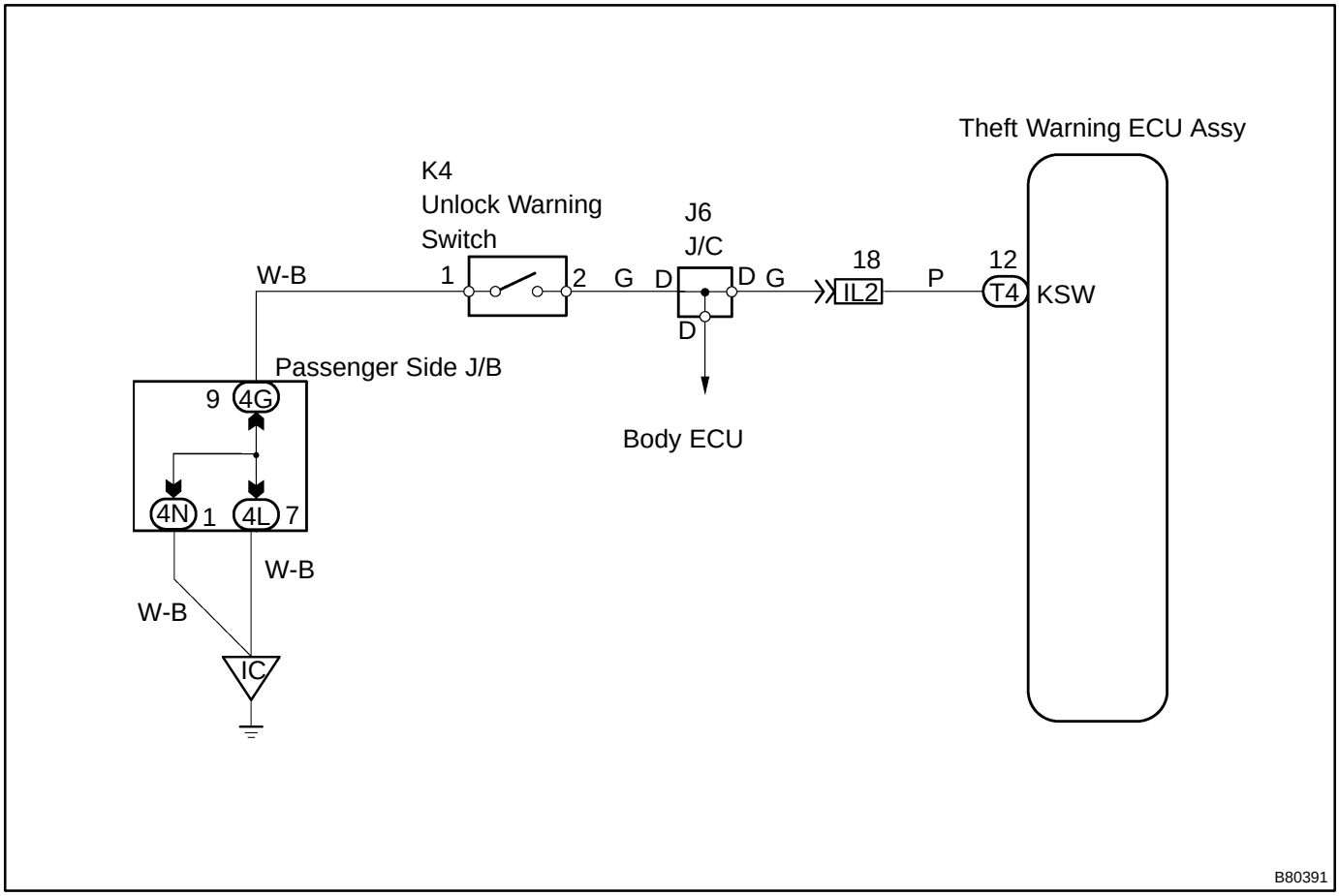
CHECK AND REPLACE THEFT WARNING ECU ASSY

UNLOCK WARNING SWITCH CIRCUIT

CIRCUIT DESCRIPTION

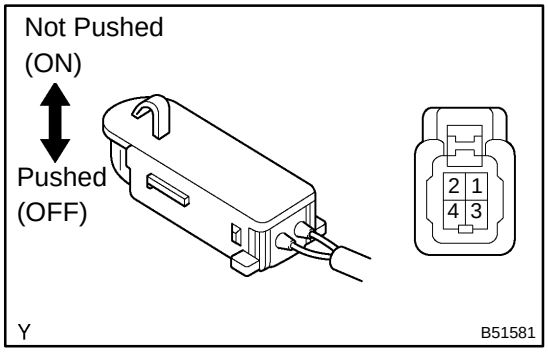
The key unlock warning switch comes on when the ignition key is inserted in the ignition key cylinder and goes off when the ignition key is removed.
The ECU operates the key confinement prevention function while the key unlock warning switch is on.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT UN-LOCK WARNING SWITCH ASSY



(a) Remove the warning switch.
(b) Measure the resistance of the switch.

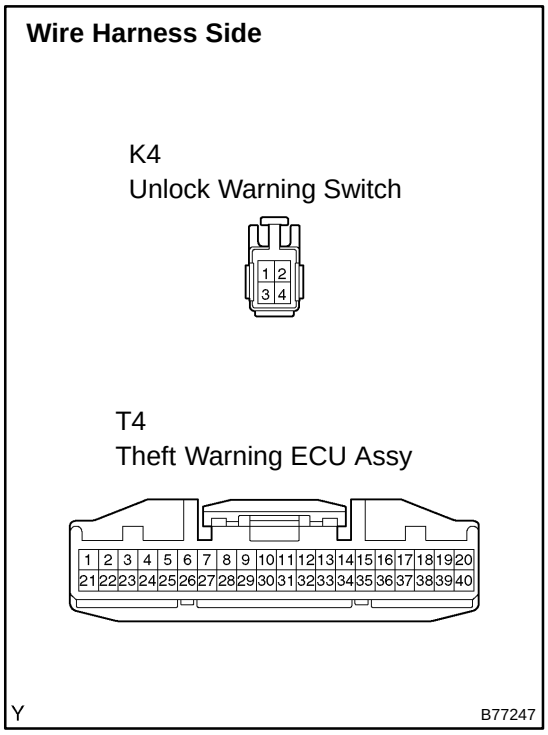
Standard:

Tester Connection	Condition	Specified Condition
1 - 2	Not pushed (ON (Key inserted))	Below 1 Ω
1 - 2	Pushed (OFF (Key removed))	10 kΩ or higher

NG → **REPLACE UN-LOCK WARNING SWITCH ASSY**

OK

2	CHECK WIRE HARNESS (THEFT WARNING ECU ASSY - UNLOCK WARNING SWITCH ASSY)



(a) Disconnect the T4 ECU connector.
(b) Disconnect the K4 switch connector.
(c) Measure the resistance between the wire harness side connectors.

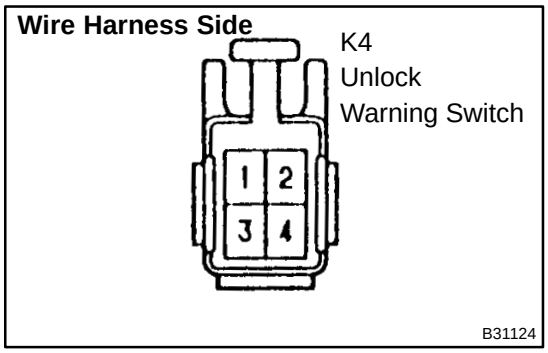
Standard:

Tester Connection	Specified Condition
T4-12 (KSW) - K4-2	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

3	CHECK WIRE HARNESS (UNLOCK WARNING SWITCH ASSY - BODY GROUND)



(a) Disconnect the K4 switch connector.
(b) Measure the resistance between the wire harness side connector and body ground.

Standard:

Tester Connection	Specified Condition
(K4-1) - Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

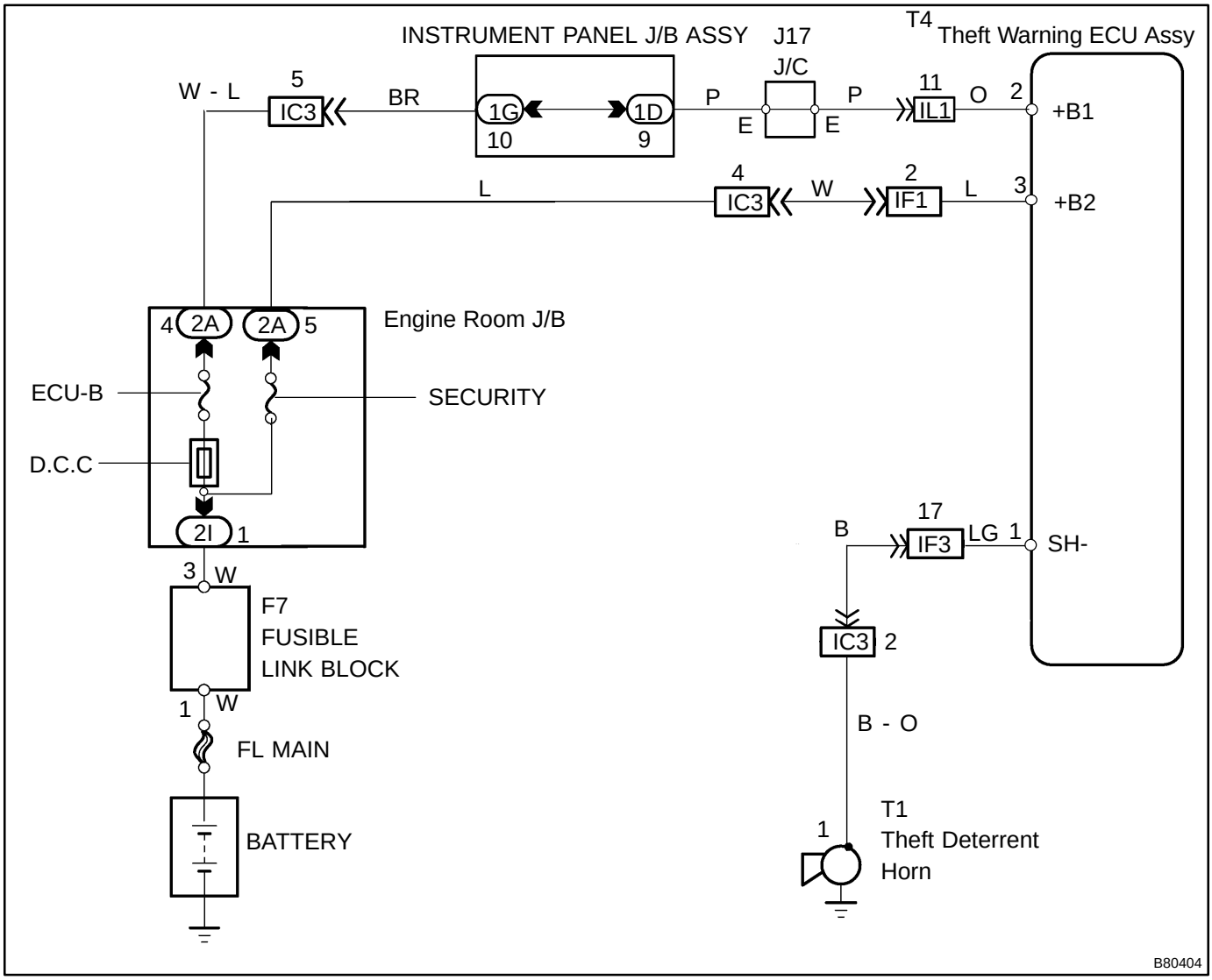
CHECK THEFT WARNING ECU ASSY

THEFT DETERRENT HORN CIRCUIT

CIRCUIT DESCRIPTION

When the theft deterrent system is operating, the relay in the ECU turns on and off in a cycle of approximately 0.2 seconds, causing the theft warning horn to blow (see the wiring diagram below).

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK THEFT WARNING ECU ASSY (SECURITY)

(a) Remove the SECURITY fuse from the engine room J/B.
(b) Measure the resistance.
Standard: Below 1 Ω

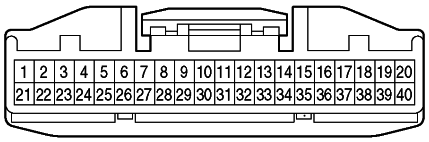
NG	REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

2 CHECK THEFT WARNING ECU ASSY (THEFT WARNING ECU - BODY GROUND)

Wire Harness Side

T4
Theft Warning ECU Assy



B63408

(a) Disconnect the T4 ECU connector.
(b) Measure the voltage between the T4 ECU connector and body ground.

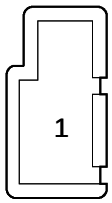
Standard:

Tester Connection	Specified Condition
T4-3 (+B2) - Body ground	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

3 CHECK SECURITY HORN ASSY



Y B51580 B64984

(a) Disconnect the T1 security horn connector.
(b) Check operation of the security horn.

Standard:

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 1 Battery negative (-) → Body ground	Security horn blows

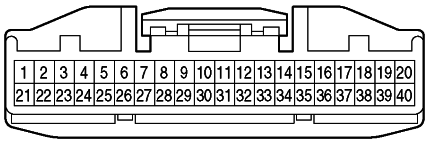
NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

4	**CHECK SECURITY HORN ASSY (THEFT WARNING ECU ASSY - SECURITY HORN ASSY)**

Wire Harness Side

T4
Theft Warning ECU Assy



T1
Security Horn Assy



B63408
B58961
B64978

(a) Disconnect the T4 ECU connector.
(b) Disconnect the T1 security horn connector.
(c) Measure the resistance between the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
T4-1 (SH-) - T1-1	Below 1 Ω

OK

NG → **REPLACE SECURITY HORN ASSY**

0522N-03

CUSTOMER PROBLEM ANALYSIS CHECK

THEFT DETERRENT SYSTEM Check Sheet

Inspector's name: _____

Customer's Name		**VIN**	
		Production Date	
		Licence Plate No.	
Date Vehicle Brought in	/ /	**Odometer Reading**	**km miles**

Date Problem First Occurred		/ /
Frequency Problem Occurs		⁎ Constant ⁎ Sometimes (Times per day, month) ⁎ Once only
Weather Conditions When Problem Occurred	**Weather**	⁎ Fine ⁎ Cloudy ⁎ Rainy ⁎ Snowy ⁎ Various/Others
	Outdoor temperature	⁎ Hot ⁎ Warm ⁎ Cool ⁎ Cold (Approx. °C (°F))

Problem Symptom

⁎ Theft deterrent system cannot be set.		
⁎ Indicator lamp does not flash when theft deterrent system is set. (It stays on or does not illuminate at all.)		
⁎ Theft deterrent system does not operate.	⁎ When unlocked using door lock knob. ⁎ When engine hood is opened.	Malfunction ⁎ Horns only ⁎ Warning only ⁎ Headlights only ⁎ Taillights only ⁎ Starter cut only ⁎ Door lock operation only
⁎ Theft deterrent system cannot be canceled once set.	⁎ When door is unlocked using key or wireless door lock control system. ⁎ When key is inserted into ignition key cylinder and turned to ACC or ON (however, only when the system has never operated). ⁎ When back door is opened with key.	
⁎ Theft deterrent system cannot be canceled during warning operation.	⁎ When door is unlocked using key or wireless door lock control system. ⁎ When key is inserted into ignition key cylinder and turned to ACC or ON.	
⁎ Warning operation does not start when system is set and door or back door is opened with key.		
⁎ Other		

THEFT DETERRENT SYSTEM

0522M-03

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

Use this procedure to troubleshoot the theft deterrent system.

1	VEHICLE BROUGHT TO WORKSHOP

2	CUSTOMER PROBLEM ANALYSIS AND SYMPTOM CHECK (See page 05-2013)

3	PROBLEM SYMPTOMS TABLE (See page 05-2023)

(a) If the fault is not listed on the problem symptoms table, proceed to A.

(b) If the fault is listed on the problem symptoms table, proceed to B.

B → Go to step 5

A

4	OVERALL ANALYSIS AND TROUBLESHOOTING

(a) Pre-check (see page 05-2014).

(b) Terminals of ECU (see page 05-2022).

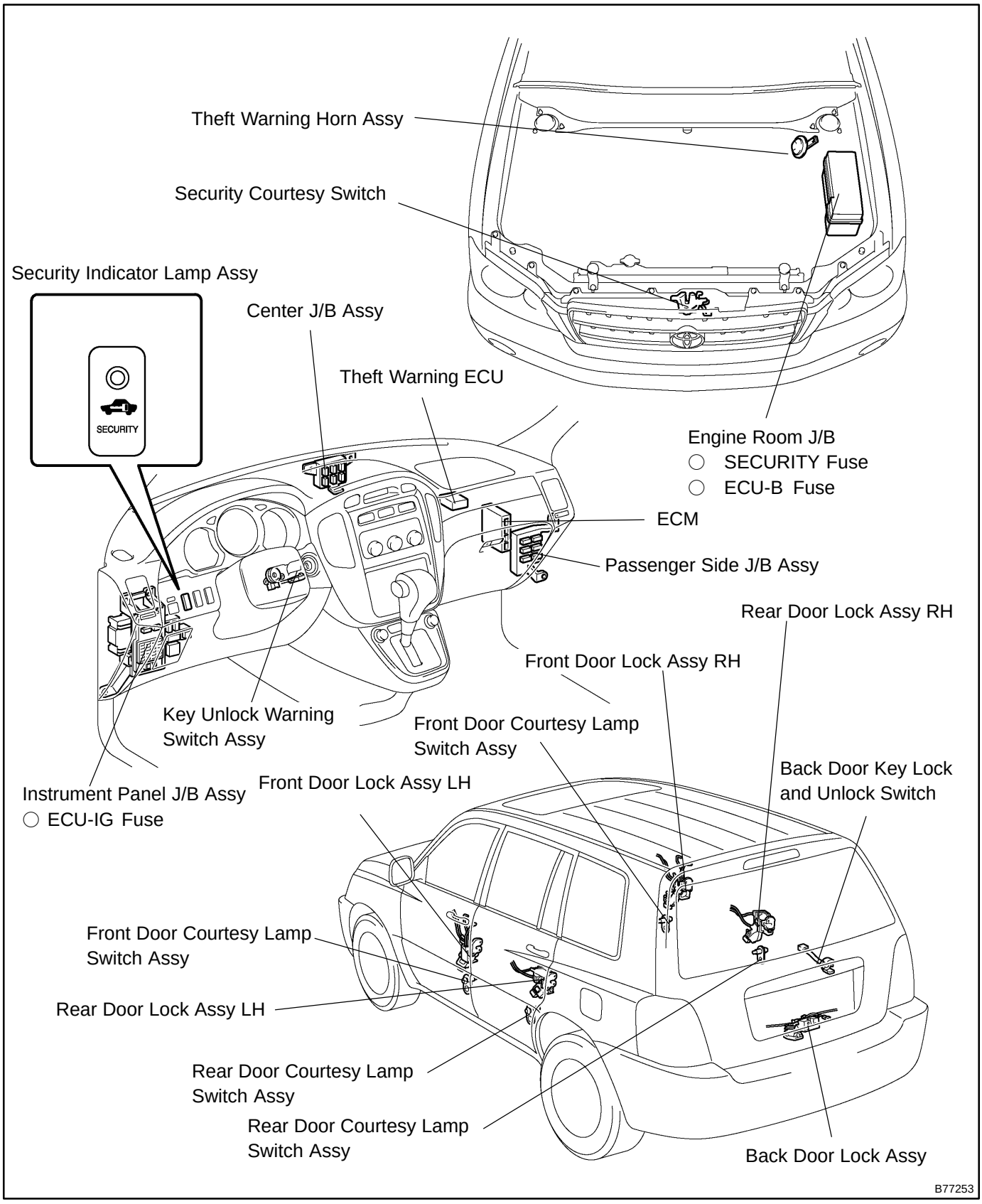
5	ADJUST, REPAIR OR REPLACE

6	CONFIRMATION TEST

END

0522O-03

LOCATION



0522Y-04

PRE-CHECK

1. OUTLINE OF THEFT DETERRENT SYSTEM

When the theft deterrent system is set and any of the following conditions is met, the system sounds the horns and flashes the headlights and the taillights for approximately 1 minute. At the same time, the system locks all the doors (If all the doors are not locked at once, the system repeats the door locking operation every 6.38 seconds during the 1-minute-alarming time).

There are 2 modes in this system; one is the active arming mode and another is the passive arming mode. The system is set initially in the active arming mode. It can be switched to the passive arming mode by a specified operation (See step 4).

- ○ Any of the doors (including the engine hood and back door) is unlocked or opened without the key. *1
- ○ The battery terminal is disconnected and reconnected.
- ○ The system receives a panic signal from the transmitter. *2

*1: Only in the active arming mode.

*2: When the ignition key is not inserted into the key cylinder.

HINT:

There are 4 states in each mode: disarmed state, arming preparation state, armed state and alarm sounding state.

(1) Disarmed state:
- ○ When the theft deterrent function does not operate.

(2) Arming preparation state:
- ○ Time from a user locks a door to leave the vehicle.
- ○ Time until transferring to the armed state.
- ○ When the theft deterrent function does not operate.

(3) Armed state:
- ○ When a user leaves the vehicle completely.
- ○ When the theft deterrent function operates.

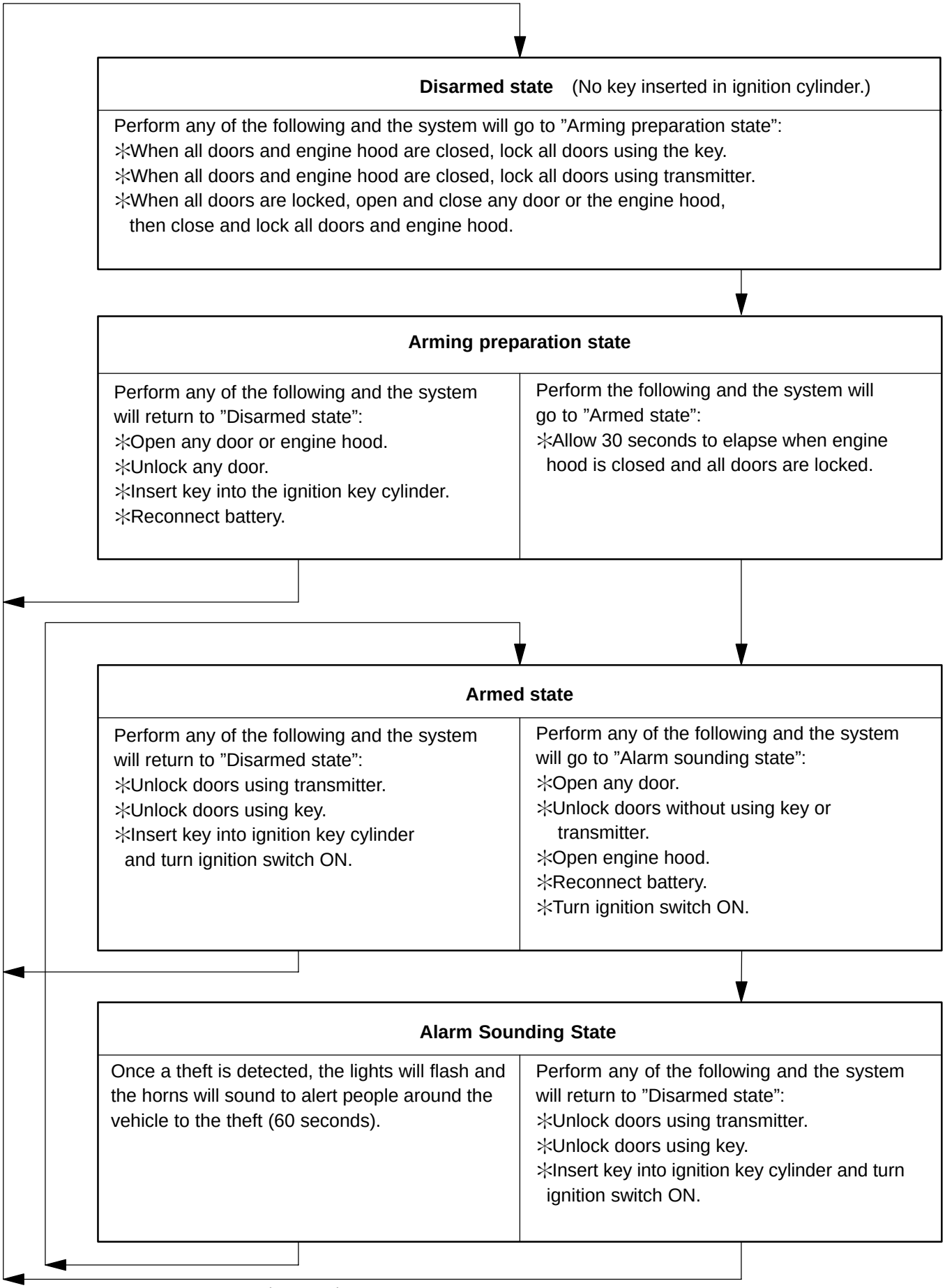
(4) Alarm sounding state:
- ○ In this condition, once a theft is detected, the lights will flash and the horns will sound to alert people around the vehicle to the theft.
  Refer to the table for alarming method and time.

Alarming method	Horn
	Theft deterrent horn
	Headlight
	Taillight
Alarming time	60 seconds
Alarming output	Continuous 0.40 sec. (ON) 0.40 sec. (OFF)

HINT:

In the alarm sounding state, when either of the doors is unlocked and no key is in the key cylinder, a force lock signal is output.

2. ACTIVE ARMING MODE



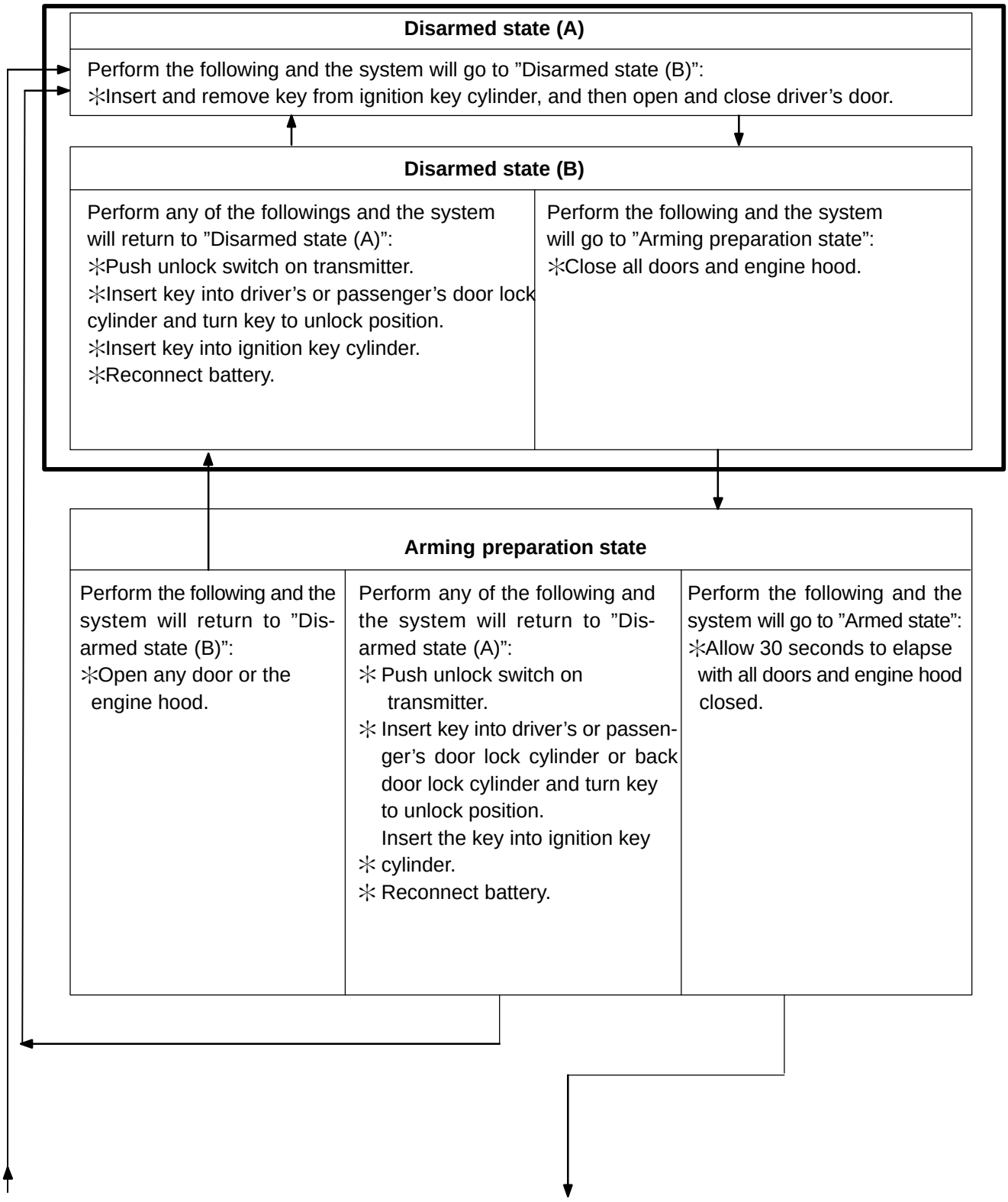
Indicator light output:

Condition	Indicator lamp
Disarmed state	OFF
Arming preparation state	ON
Armed state	BLINK
Alarm sounding state	ON

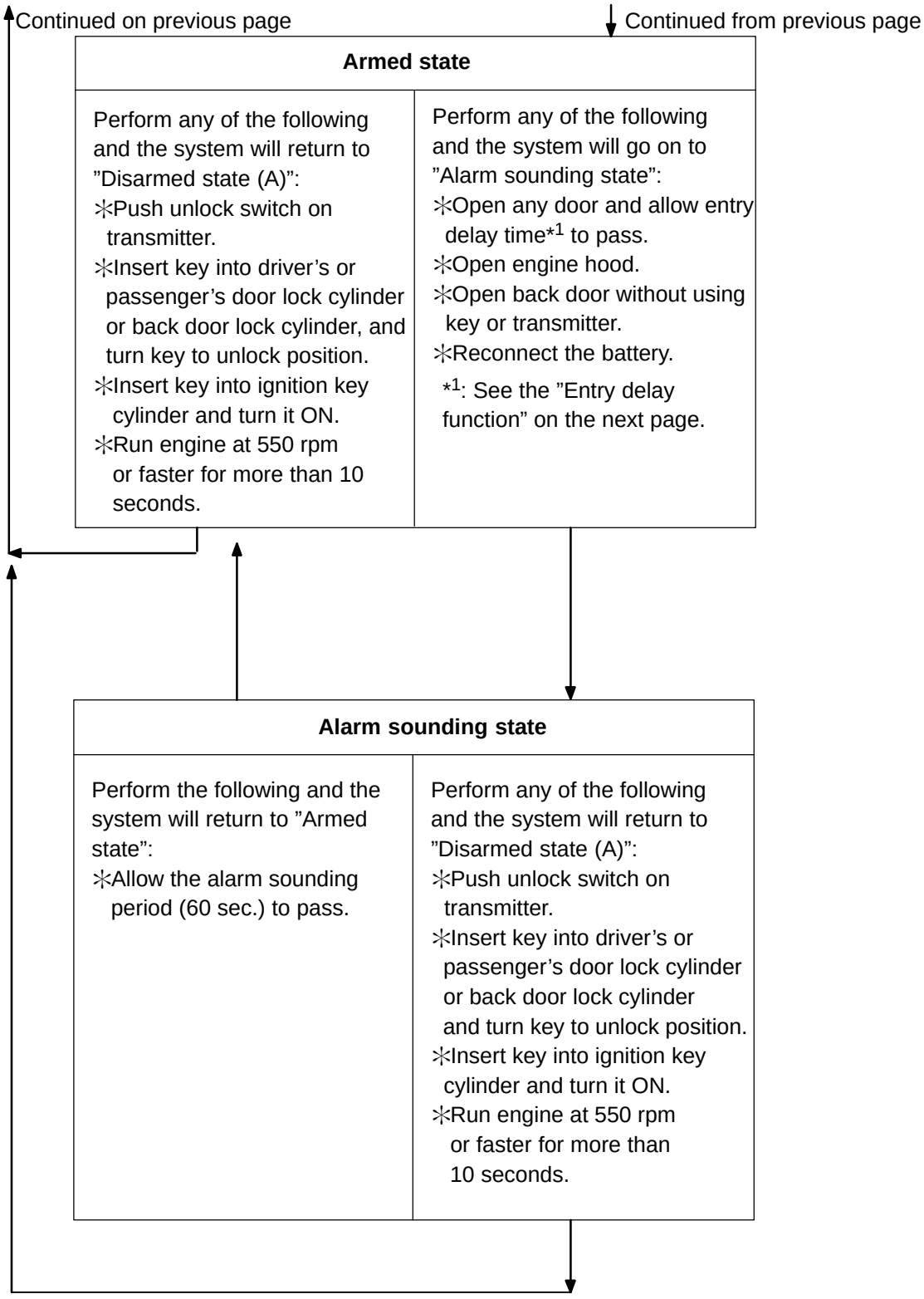
HINT:
Even in the disarmed state, the indicator lamp flashes, due to a signal output from the immobiliser system. Also, the indicator light flashes whenever receiving a signal from the immobiliser system at any time in the armed state.
Flashing frequency:
0.2 seconds (ON)
1.8 seconds (OFF)

3. PASSIVE ARMING MODE

○ This mode can be turned on according to the specified method (see step 4).
○ The initially set mode (when shipped from factory) is the active arming mode (No passive arming mode).



Continued from next page
Continued on next page


Continued on previous page
Continued from previous page
Armed state
Perform any of the following and the system will return to "Disarmed state (A)":
⁎Push unlock switch on transmitter.
⁎Insert key into driver's or passenger's door lock cylinder or back door lock cylinder, and turn key to unlock position.
⁎Insert key into ignition key cylinder and turn it ON.
⁎Run engine at 550 rpm or faster for more than 10 seconds.
Perform any of the following and the system will go on to "Alarm sounding state":
⁎Open any door and allow entry delay time*1 to pass.
⁎Open engine hood.
⁎Open back door without using key or transmitter.
⁎Reconnect the battery.
*1: See the "Entry delay function" on the next page.
Alarm sounding state
Perform the following and the system will return to "Armed state":
⁎Allow the alarm sounding period (60 sec.) to pass.
Perform any of the following and the system will return to "Disarmed state (A)":
⁎Push unlock switch on transmitter.
⁎Insert key into driver's or passenger's door lock cylinder or back door lock cylinder and turn key to unlock position.
⁎Insert key into ignition key cylinder and turn it ON.
⁎Run engine at 550 rpm or faster for more than 10 seconds.

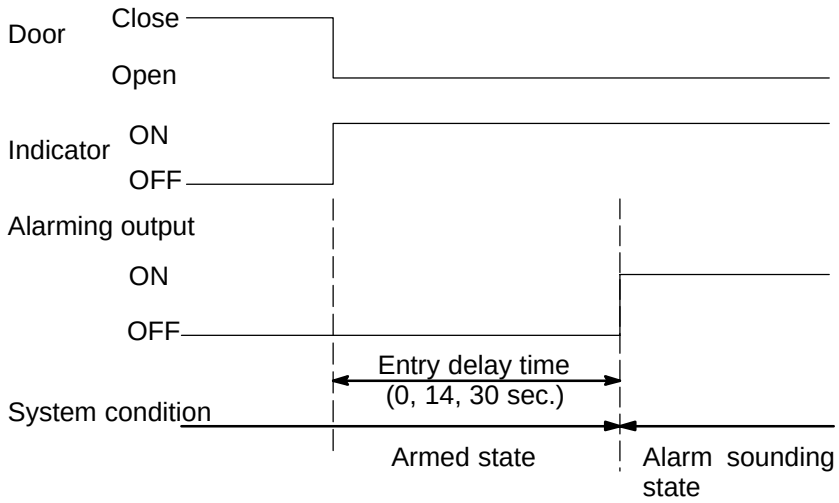
Entry delay function:

HINT:

In the armed state, if any closed door is opened, entry delay time will start.

If the transferring condition (Armed state → Disarmed state) is satisfied during the entry delay time, the system will switch to the disarmed state. However if the condition is not satisfied, the system will judge it to be a theft, and then the system will switch to the alarm sounding state.

.



HINT:

The entry delay time can be selected among 0, 14, 30 seconds by the customizing function.

Indicator lamp output:

Condition	Indicator
Disarmed state	OFF
Arming preparation state	ON
Armed state (Entry delay time)	BLINK (ON)
Alarm sounding state	ON

HINT:

Even in the disarmed state, the indicator lamp flashes, due to a signal output from the immobilizer system. Also, the indicator flashes whenever receiving a signal from the immobilizer system at any time in the armed state.

Flashing frequency:

0.2 seconds (ON)

1.8 seconds (OFF)

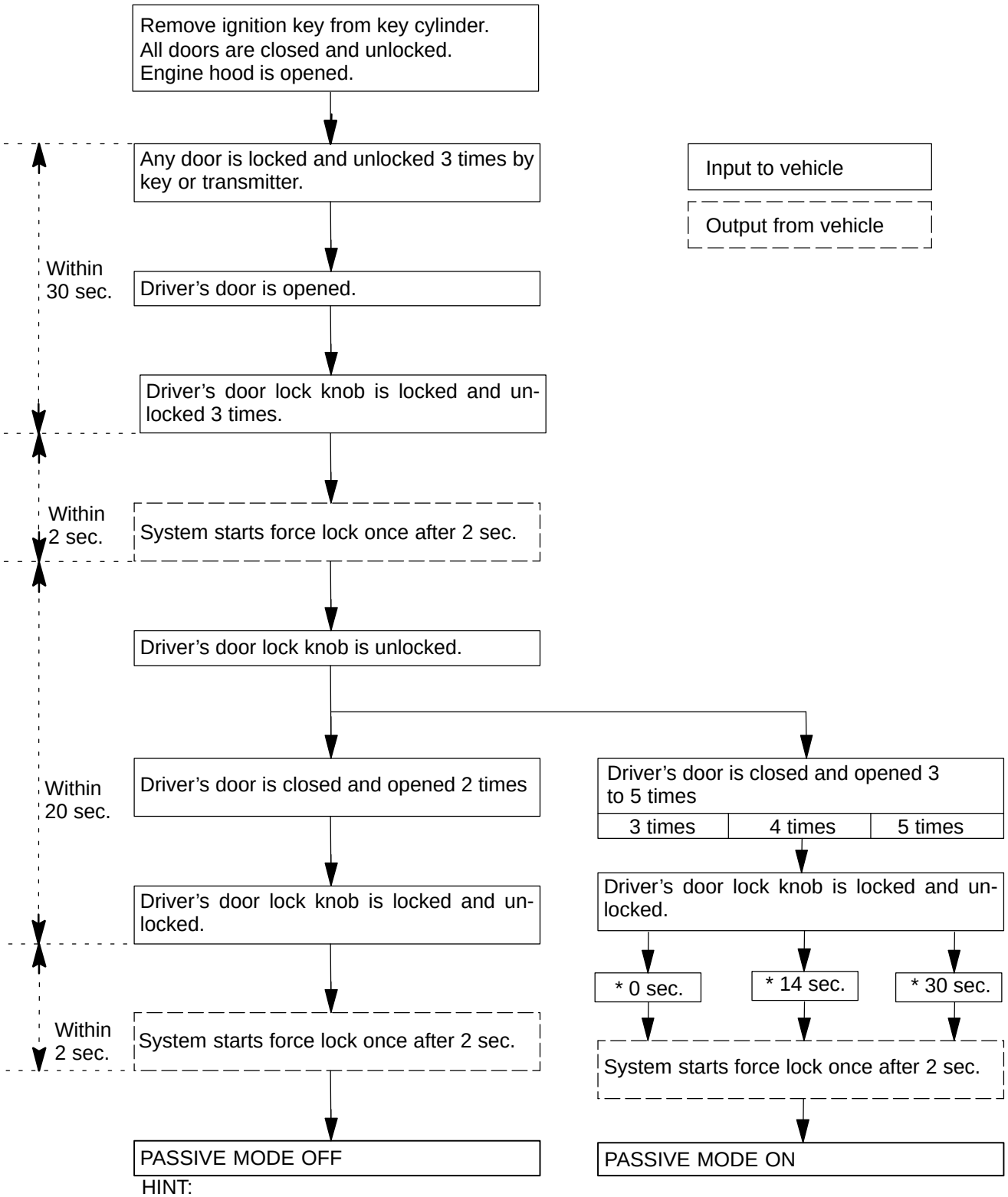
Switching to the active arming mode:

HINT:

In each state of the passive arming mode, when the switching condition to the active arming mode (disarmed state of active arming mode → arming preparation state of active arming mode) is satisfied, the system will switch to each state of the active arming mode. In this case, the active arming mode will continue until the system switches to the disarmed state.

State of passive arming mode before switch	State of active arming mode after switch
Disarmed state	Arming preparation state
Arming preparation state	Arming preparation state (continuing for 30 sec.)
Armed state (During entry delay time)	Armed state (After alarming time has elapsed, armed state)
Alarm sounding state	After alarming time has elapsed, armed state

4. CHANGING METHOD OF PASSIVE ARMING MODE (ON or OFF)



HINT:
⁎Initial mode is PASSIVE MODE OFF.
⁎If there is a different signal in the middle of changing. It is invalid.
*: Entry delay time

0522Q-03

PROBLEM SYMPTOMS TABLE

Proceed to the reference page shown in the matrix chart below for each malfunction symptom and perform a troubleshooting for each circuit.

HINT:

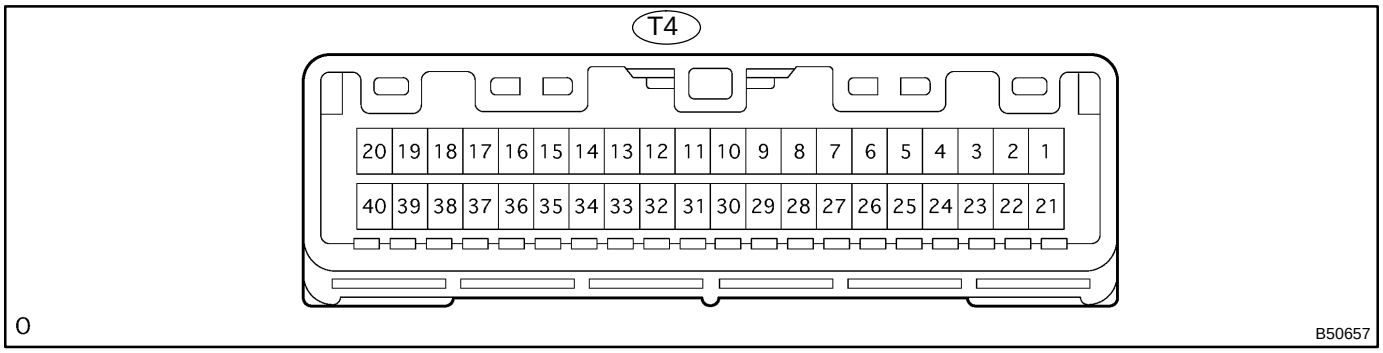
Troubleshooting of the theft deterrent system is based on the premise that the door lock control system is operating normally. Accordingly, before troubleshooting the theft deterrent system, first make certain that the door lock control system is operating normally.

Symptom	Suspected Area	See Page
Theft deterrent system cannot be set.	1. Indicator lamp circuit 2. ECU power source circuit 3. Key un-lock warning switch circuit 4. Back door key lock and unlock switch circuit 5. Engine hood courtesy switch circuit 6. Theft warning ECU	05-2024 05-2026 05-2033 05-2036 05-2038 -
Indicator lamp does not blink when theft deterrent system is set.	1. Indicator lamp circuit	05-2024
When theft deterrent system is set (System does not operate when the engine hood is opened).	1. Engine hood courtesy switch circuit 2. Theft warning ECU	05-2038 -
When theft deterrent system is set (It is not canceled when the ignition key is turned to ACC or ON position).	1. Ignition switch circuit	05-2031
When theft deterrent system is set (It is still operating when back door is opened with key).	1. Back door key lock and un-lock switch circuit	05-2036
While theft deterrent system is in warning operation (Horns do not sound).	1. Horn circuit	05-2028
Even when theft deterrent system is not set (Horns sound).	1. Horn circuit	05-2028

0522P-04

TERMINALS OF ECU

1. CHECK THEFT WARNING ECU ASSY (THEFT DETERRENT ECU)



(a) Disconnect the T4 ECU connector, and check the voltage or continuity of each terminal of the wire harness side connector.

Standard:

Symbols (Terminal No.)	Wiring color	Condition	Specified Condition
E (T4-29) - Body ground	W-B - Body ground	Constant	Below 1 Ω
+B1 (T4-2) - Body ground	O- Body ground	Constant	10 to 14 V
+B2 (T4-3) - Body ground	L- Body ground	Constant	10 to 14 V
L (T4-15) - Body ground	SB - Body ground	Using key, back door lock cylinder LOCK → UNLOCK	Below 1 Ω → 10 kΩ or higher
UL (T4-33) - Body ground	BR - Body ground	Using key, back door lock cylinder UNLOCK → Other position	
IG (T4-10) - E (T4-29)	G - W-B	Ignition switch OFF → ON	0V → 10 to 14 V

If the result is not as specified, there may be a malfunction on the wire harness side.

(b) Reconnect the T4 ECU connector, and check the voltage of each terminal of the connector.

Standard:

Symbols (Terminal No.)	Wiring Color	Condition	Specified Condition
DSWH (T4-34) - E (T4-29)	W - W-B	Engine hood courtesy switch OFF (Closed) → ON (Opened)	10 to 14 V → 0 V
KSW (T4-12) - E (T4-29)	P - W-B	Key unlock warning switch ON (Key inserted) → OFF (Key removed)	10 to 14 V → 0 V
IND (T4-25) - E (T4-29)	R - W-B	During set preparation	3 to 5 V (Waveform)
SH- (T4-1) - Body ground	LG - Body ground	Alarm sounding state	10 to 14 V → 0 V (Waveform)

If the result is not as specified, the theft warning ECU assy may malfunction.

ALL DOORS ARE NOT OPERATED BY THE DRIVER'S DOOR KEY CYLINDER FOR INTERLOCKED WITH KEY

CIRCUIT DESCRIPTION

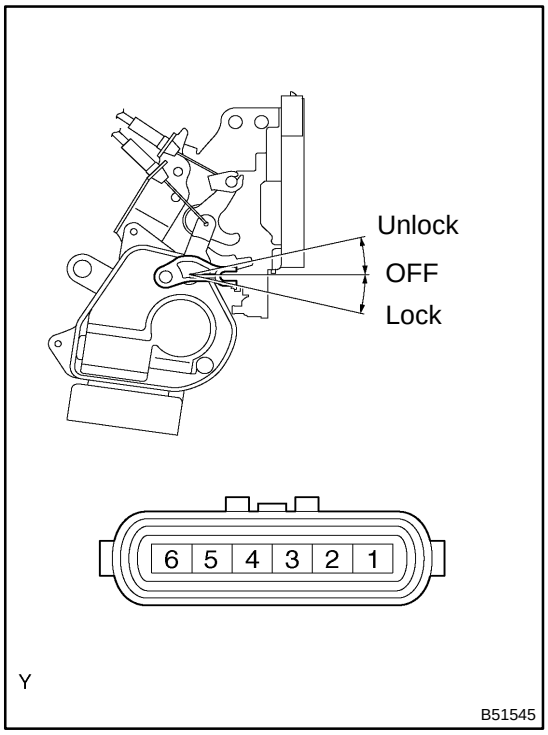
A lock or unlock signal via the manual switch (built in the master switch) and driver door key is transmitted to the multiplex network body ECU multiply from the master switch (door ECU), and the multiplex network body ECU drives the door lock motor of each door.

WIRING DIAGRAM

HINT:
Refer to See page 05-1944 .

INSPECTION PROCEDURE

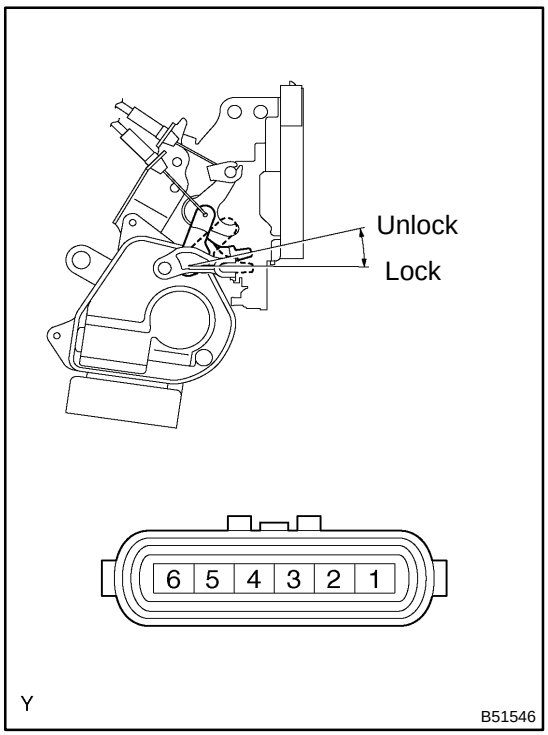
1 INSPECT FRONT DOOR LOCK ASSY LH



(a) Inspect the door lock assy continuity.

Standard:

Switch position	Tester connection	Specified condition
Lock	2 ⇔ 4	Continuity
OFF	-	No continuity
Unlock	2 ⇔ 3	Continuity



(b) Inspect the door lock motor operation.

Standard:

Measuring condition	Operation
Battery positive - Terminal 5 Battery negative - Terminal 6	Lock
Battery positive - Terminal 6 Battery negative - Terminal 5	Unlock

(c) Inspect the position switch continuity.

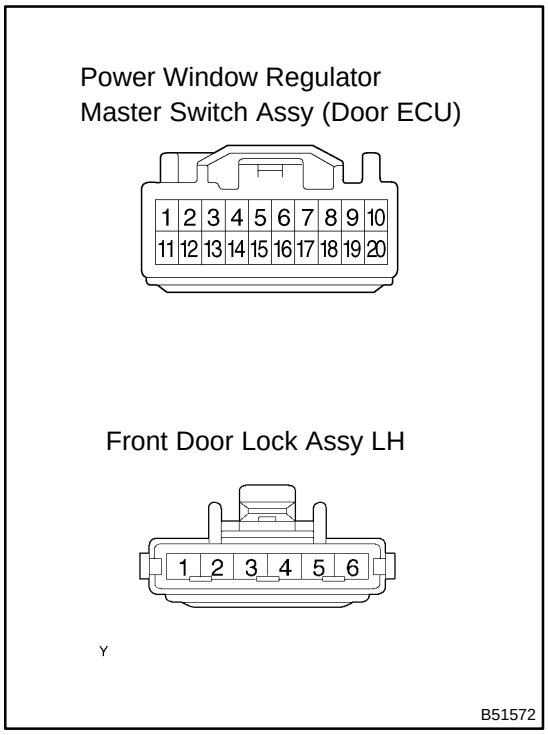
Standard:

Measuring condition	Tester connection	Specified condition
Battery positive - Terminal 6 Battery negative - Terminal 5	1 ⇔ 2	Continuity

NG → **REPLACE FRONT DOOR LOCK ASSY LH**

OK

2	CHECK WIRE HARNESS



(a) Disconnect the master switch and door lock connector.

(b) Check the continuity between the master switch and door lock.

Standard:

Terminals (Switch ⇔ Door Lock)	Specified condition
16 ⇔ 1	Continuity
4 ⇔ 4	Continuity
14 ⇔ 3	Continuity

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE POWER WINDOW REGULATOR MASTER SWITCH ASSY

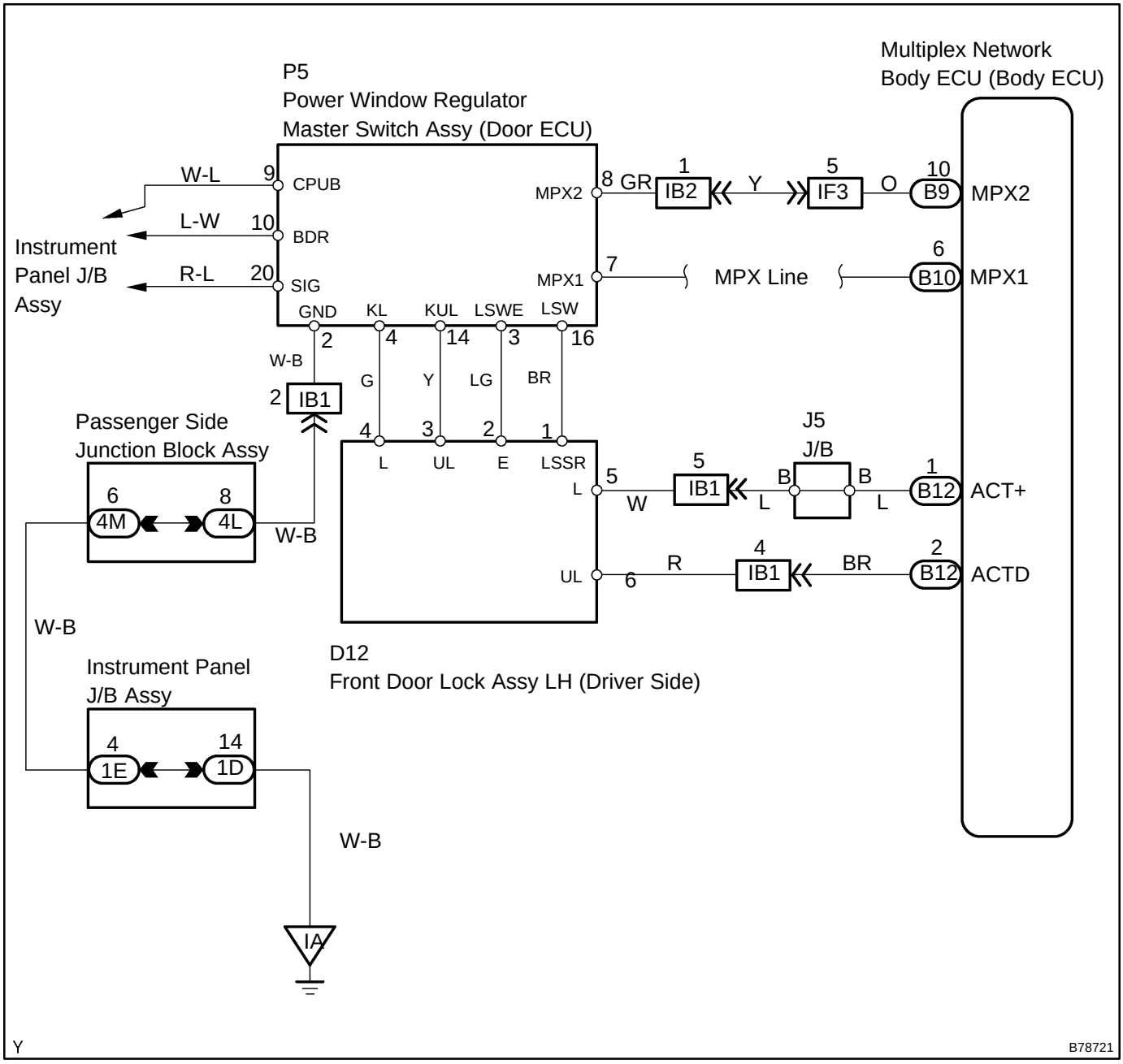
DTC	B1222/22	DOOR LOCK SWITCH CIRCUIT ON DRIVER DOOR

CIRCUIT DESCRIPTION

This DTC will be output when the driver door unlock switch (for key operation) of the power window regulator master switch assy is on.

DTC No	DTC Detecting Condition	Trouble Area
B1222/22	Stick of key lock and unlock switch	・Power window regulator master switch assy (door ECU) ・Front door lock assy LH (driver side) ・Multiplex network body ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

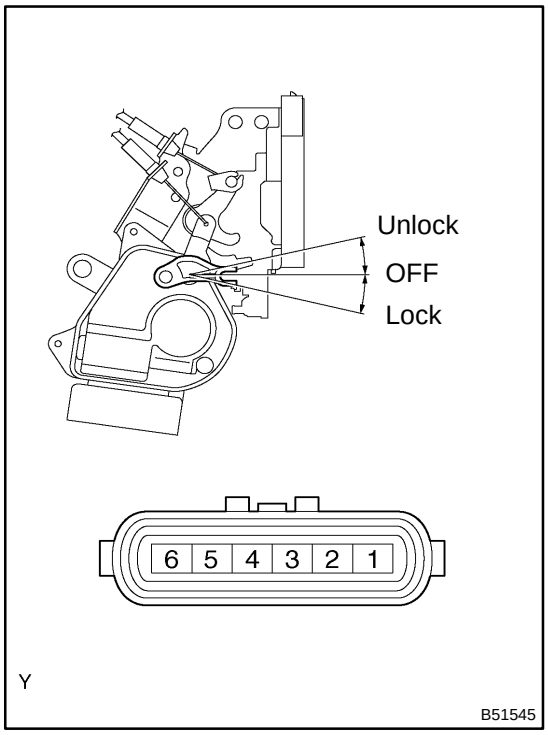
1	CHECK DIAGNOSTIC CODE OUTPUT

(a) Check if code B1222/22 will disappear but only B1211/11 (communication stop) will be output when the master switch connector is disconnected.
   (1) B1222/22 code output, proceed to A.
   (2) B1211/11 code output, proceed to B.

B → **REPLACE MULTIPLEX NETWORK BODY ECU**

A

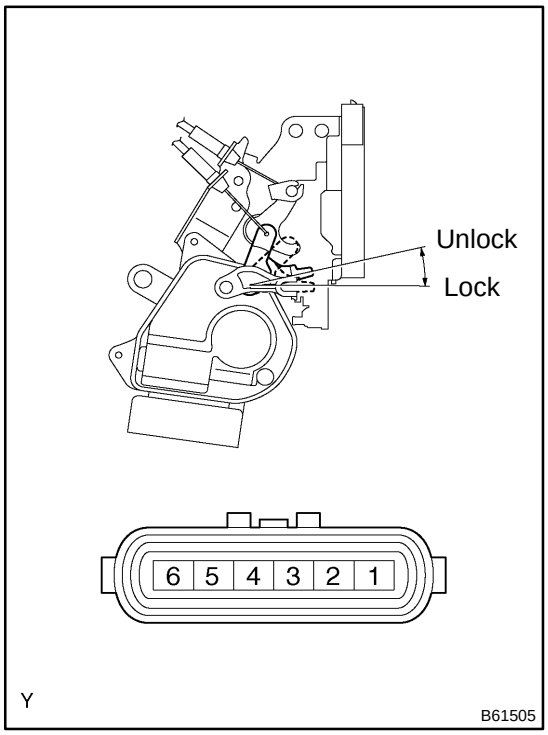
2 INSPECT FRONT DOOR LOCK ASSY LH



(a) Inspect the door lock assy continuity.

Standard:

Switch Position	Tester Connection	Specified Condition
Lock	3 ⇔ 5	Continuity
OFF	-	No continuity
Unlock	4 ⇔ 5	Continuity



(b) Inspect the door lock motor operation.

Standard:

Measuring Condition	Operation
Battery positive - Terminal 1 Battery negative - Terminal 2	Lock
Battery positive - Terminal 2 Battery negative - Terminal 1	Unlock

(c) Inspect the position switch continuity.

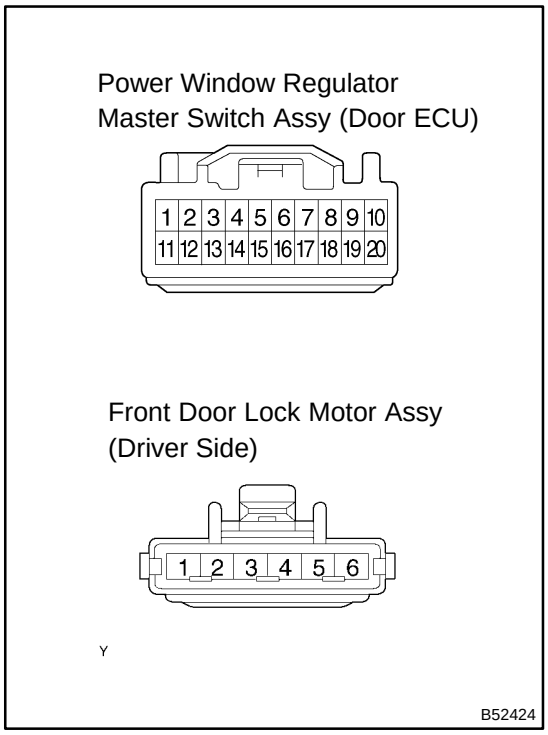
Standard:

Measuring Condition	Tester Connection	Specified Condition
Battery positive - Terminal 2 Battery negative - Terminal 1	1 ⇔ 2	Continuity

NG → **REPLACE FRONT DOOR LOCK ASSY RH**

OK

3 CHECK WIRE HARNESS



(a) Disconnect the connector from the master switch and front door lock motor LH.

(b) Check the connector on the harness side.

Continuity:

Tester Connection (Switch ⇔ Motor)	Specified Condition
4 ⇔ 4	Continuity
14 ⇔ 3	Continuity

(c) Check the master switch connector on the wire harness side.

Continuity:

Tester Connection	Specified Condition
4 ⇔ Body ground	No continuity
14 ⇔ Body ground	No continuity

Voltage:

Tester Connection	Specified Condition
4 ⇔ Body ground	0 V
14 ⇔ Body ground	0 V

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE POWER WINDOW REGULATOR MASTER SWITCH ASSY

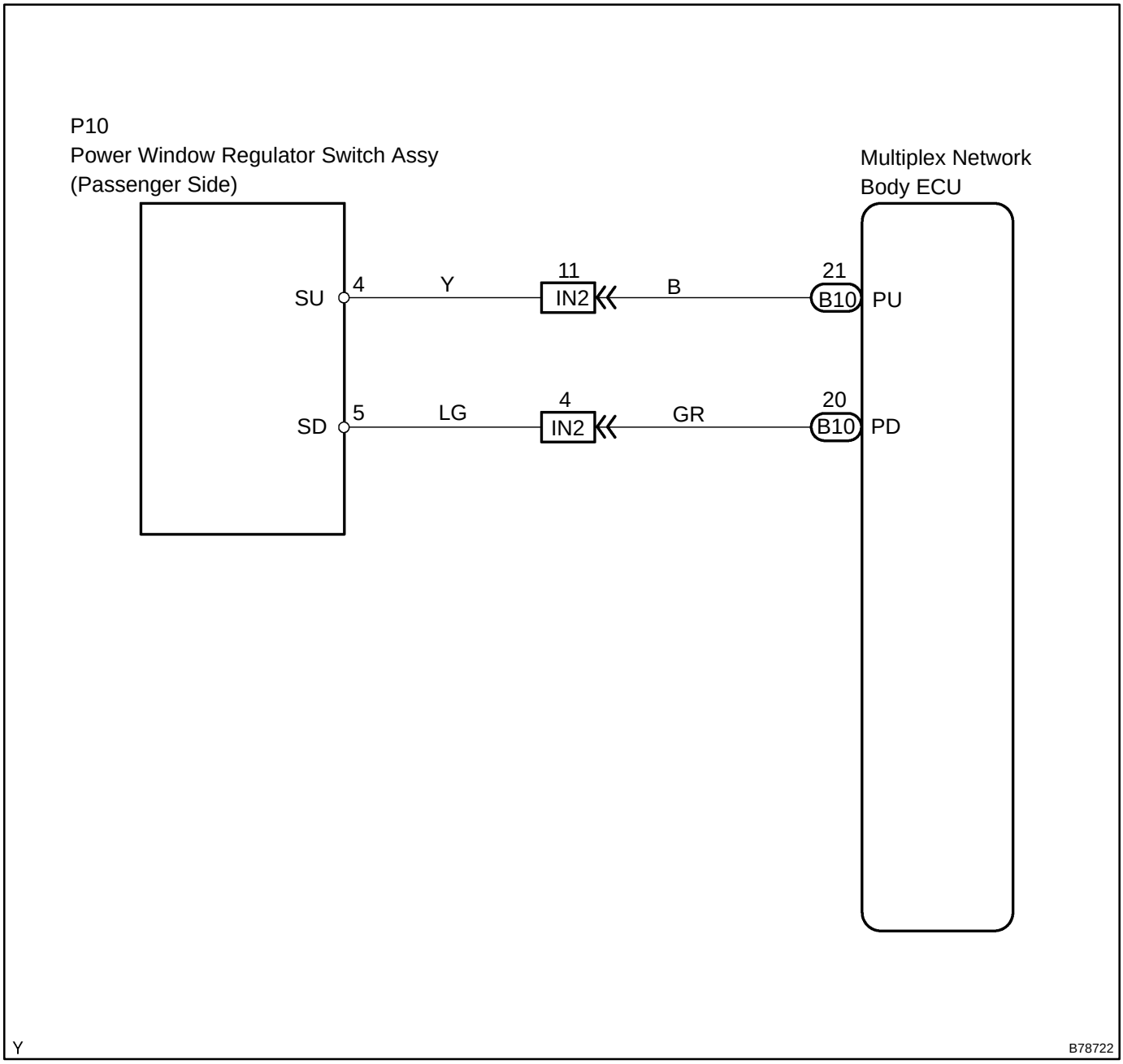
DTC	B1223/23	POWER WINDOW SWITCH CIRCUIT ON PASSENGER DOOR

CIRCUIT DESCRIPTION

This DTC is output when any switch of the door control switch is on.

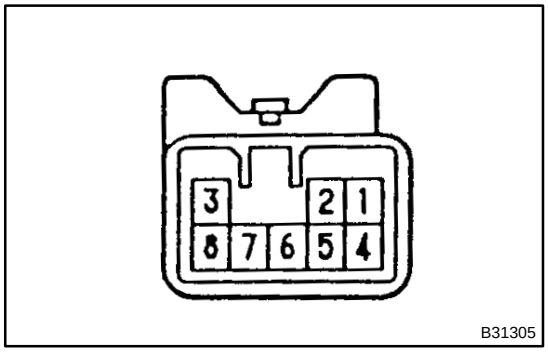
DTC No	DTC Detecting Condition	Trouble Area
B1223/23	Stick of power window switch	⋇Power window regulator switch assy (passenger side) ⋇Multiplex network body ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1 INSPECT POWER WINDOW REGULATOR SWITCH ASSY (PASSENGER'S SIDE)



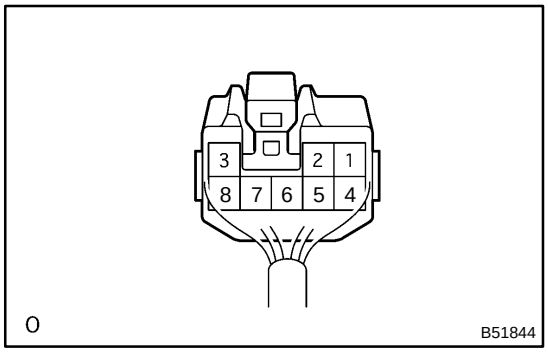
(a) Inspect the power window switch continuity.

Switch Position	Tester Connection	Specified Condition
Up	3 - 5	Continuity
OFF	-	No continuity
Down	4 - 5	Continuity

NG → **REPLACE POWER WINDOW REGULATOR SWITCH ASSY**

OK

2 CHECK WIRE HARNESS



(a) Disconnect the connector from the door control switch.
(b) Check the connector on the wire harness side.

Continuity:

Tester Connection	Specified Condition
1 ⇔ Body ground	Continuity
4 ⇔ Body ground	No continuity
5 ⇔ Body ground	No continuity

Voltage:

Tester Connection	Specified Condition
1 ⇔ Body ground	0 V
4 ⇔ Body ground	0 V
5 ⇔ Body ground	0 V

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE MULTIPLEX NETWORK BODY ECU

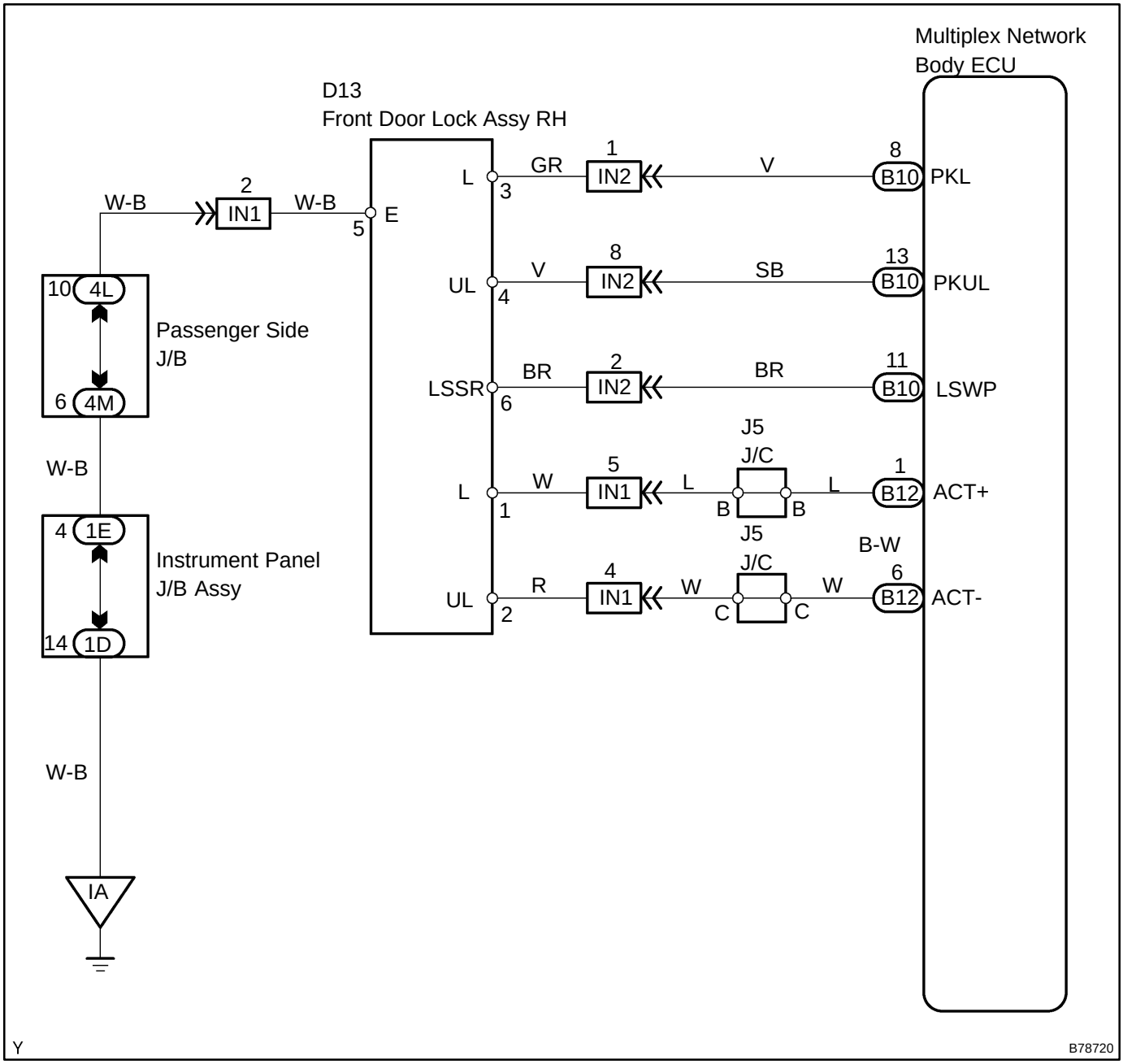
DTC B1224/24 Door lock switch circuit on passenger door

CIRCUIT DESCRIPTION

This DTC is output when the passenger door unlock switch (for key operation) of the door control switch is on.

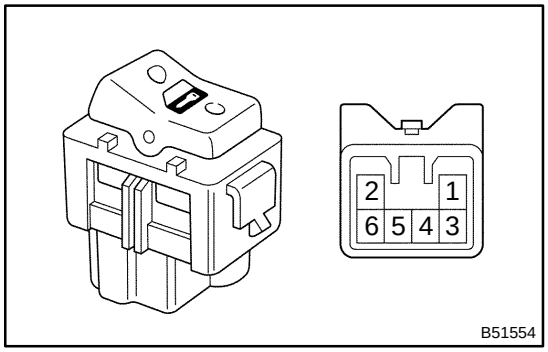
DTC No.	DTC Detecting Condition	Trouble Area
B1224/24	Stick of key lock and unlock switch	・Door control switch assy (passenger side) ・Front door lock assy RH ・Multiplex network body ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT DOOR CONTROL SWITCH ASSY



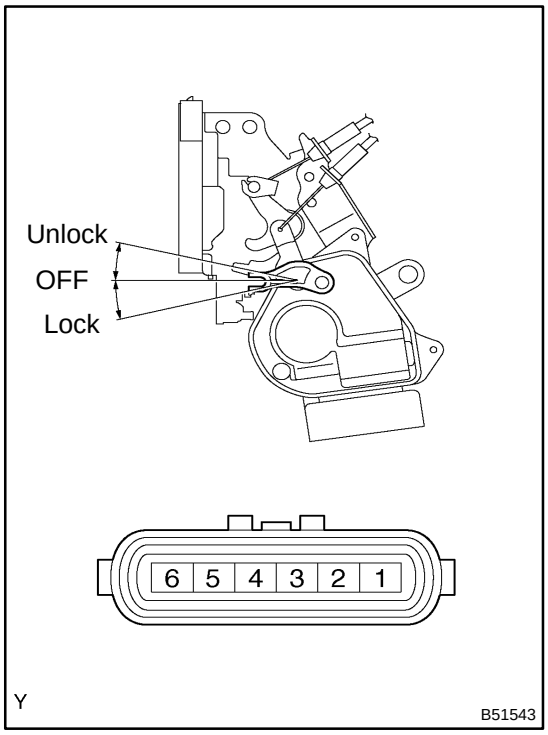
(a) Inspect the door control switch continuity.

Switch Position	Tester Connection	Specified Condition
Lock	3 - 6	Continuity
OFF	-	No continuity
Unlock	3 - 5	Continuity

NG → **REPLACE DOOR CONTROL SWITCH ASSY**

OK

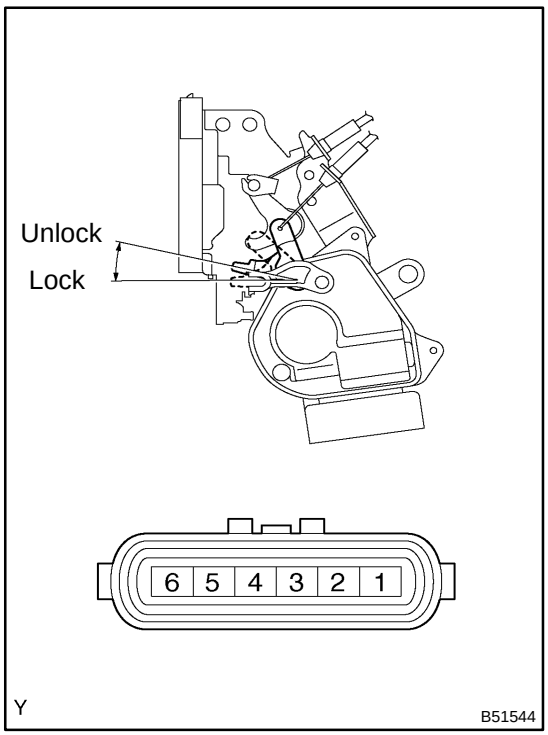
2 INSPECT FRONT DOOR LOCK ASSY RH



(a) Inspect the door lock assy continuity.

Standard:

Switch Position	Tester Connection	Specified Condition
Lock	3 ⇔ 5	Continuity
OFF	-	No continuity
Unlock	4 ⇔ 5	Continuity



(b) Inspect the door lock motor operation.

Standard:

Measuring Condition	Operation
Battery positive - Terminal 1 Battery negative - Terminal 2	Lock
Battery positive - Terminal 2 Battery negative - Terminal 1	Unlock

(c) Inspect the position switch continuity.

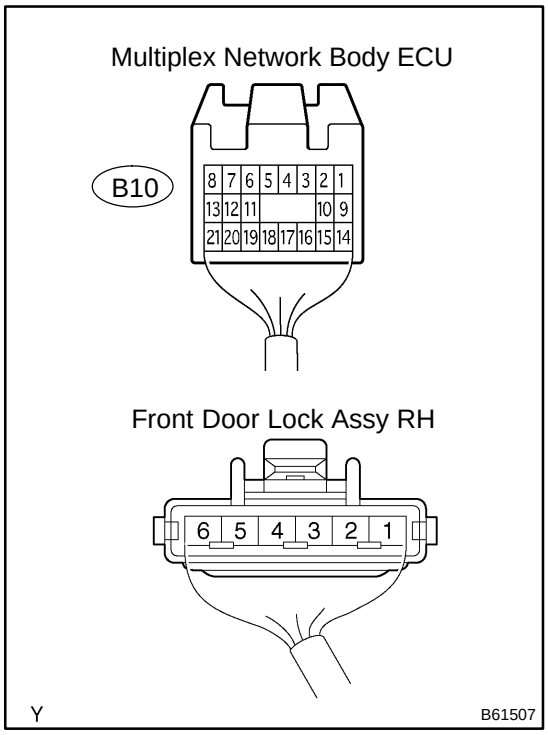
Standard:

Measuring Condition	Tester Connection	Specified Condition
Battery positive - Terminal 2 Battery negative - Terminal 1	5 ⇔ 6	Continuity

NG → **REPLACE FRONT DOOR LOCK ASSY RH**

OK

3 CHECK WIRE HARNESS



(a) Disconnect the connector from the body ECU B10 connector and front door lock assy RH connector.

(b) Check the connector on the wire harness side.

Continuity:

Tester Connection (Body ECU ⇔ Door Lock)	Specified Condition
B10-8 ⇔ 3	Continuity
B10-13 ⇔ 4	Continuity

(c) Check the master switch connector on the wire harness side.

Continuity:

Tester Connection (Body ECU or Door Lock ⇔ Body ground)	Specified Condition
B10-8 or 3 ⇔ Body ground	No continuity
B10-13 or 4 ⇔ Body ground	No continuity

Voltage:

Tester Connection (Body ECU or Door Lock ⇔ Body ground)	Specified Condition
B10-8 or 3 ⇔ Body ground	0 V
B10-13 or 4 ⇔ Body ground	0 V

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

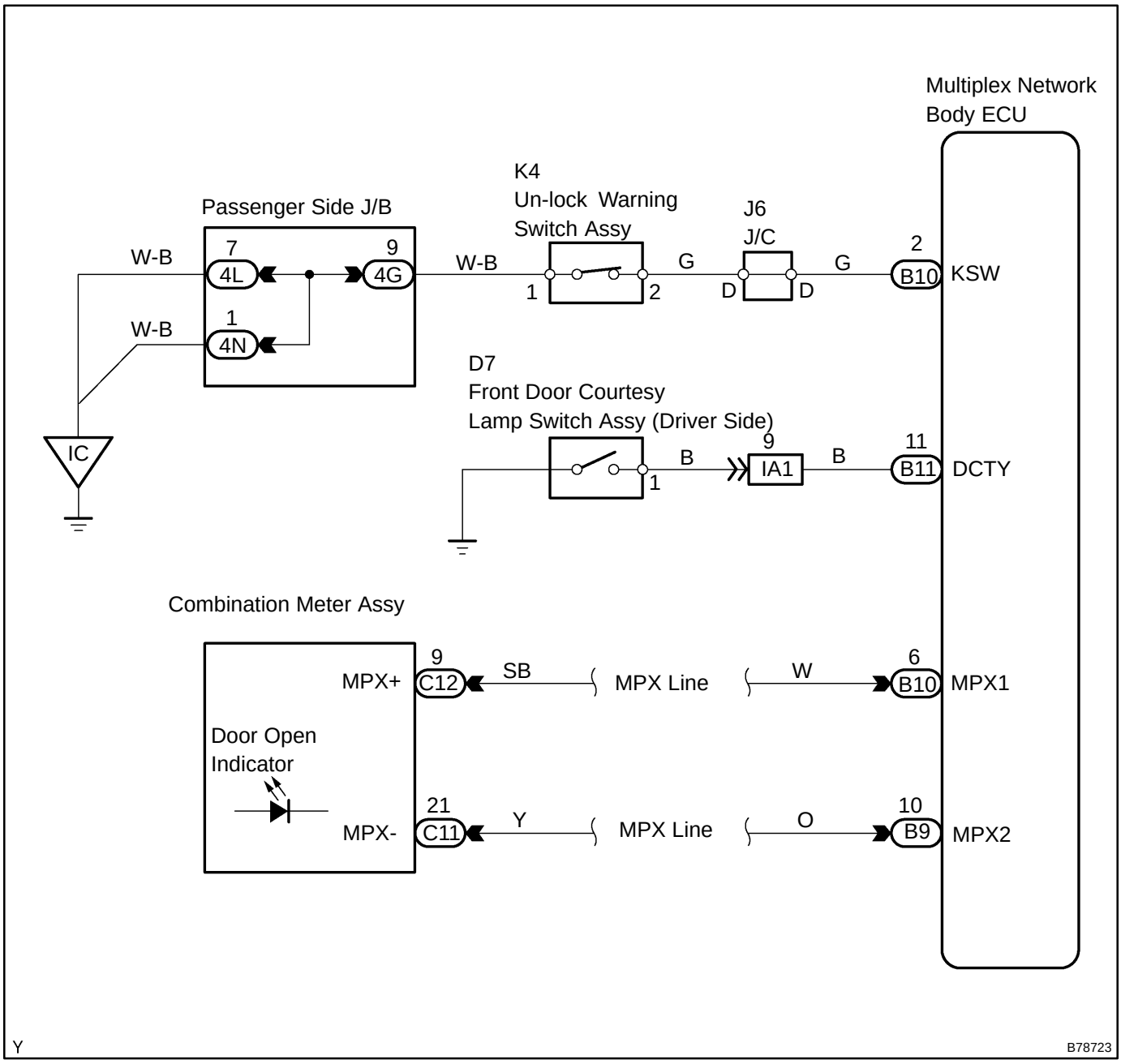
REPLACE MULTIPLEX NETWORK BODY ECU

KEY CONFINEMENT PREVENTION FUNCTION DOES NOT WORK PROPERLY (MANUAL OPERATION AND INTERLOCKED WITH KEY ARE ACTIVE)

CIRCUIT DESCRIPTION

The multiplex network body ECU senses, by the un-lock warning switch, that the ignition key is in the key cylinder. Because of this, the multiplex network body ECU will unlock all the doors immediately after locking them if a door has been locked while the key is in the ignition key cylinder.

WIRING DIAGRAM



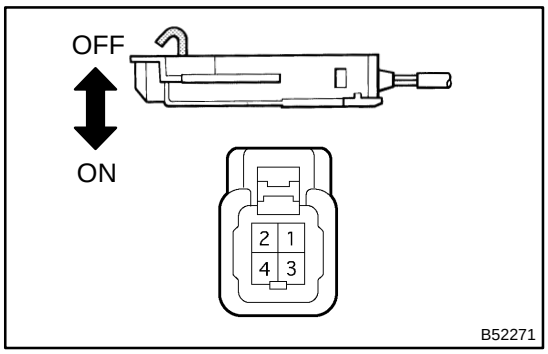
INSPECTION PROCEDURE

1 CHECK MANUAL DOOR LOCK OPERATION

NG → GO TO POWER WINDOW CONTROL SYSTEM (See page 05-1912)

OK

2 INSPECT UN-LOCK WARNING SWITCH ASSY



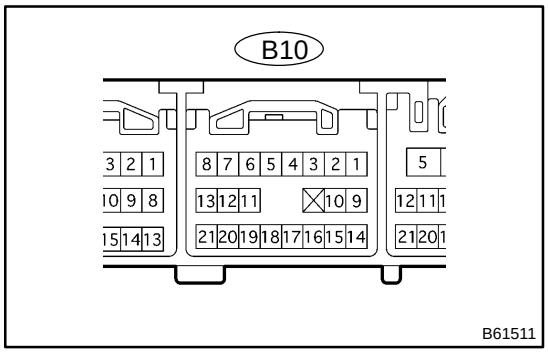
(a) Inspect the un-lock warning switch continuity.
Standard:

Condition	Tester Connection	Specified Condition
Switch OFF (Key removed)	-	No continuity
Switch ON (Key set)	1 ⇔ 2	Continuity

NG → REPLACE UN-LOCK WARNING SWITCH ASSY

OK

3 CHECK MULTIPLEX NETWORK BODY ECU



(a) Disconnect the multiplex network body ECU B10 connector and inspect the body ECU B10-2 terminal.
Standard:

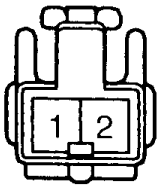
Tester Connection	Condition	Specified Condition
B10-2 ⇔ Body ground	Constant	12 - 14 V

NG → REPLACE MULTIPLEX NETWORK BODY ECU

OK

4	CHECK WIRE HARNESS

Wire Harness Side



B51904

(a) Disconnect the un-lock warning switch connector and inspect the connector on the wire harness side.
Standard:

Tester Connection	Condition	Specified Condition
2 ⇔ Body ground	Constant	10 - 14 V
1 ⇔ Body ground	Constant	Continuity

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

5	CHECK DOOR OPEN WARNING LIGHT

(a) Check that the door open warning light will be on when the driver door is opened.

OK → **REPLACE MULTIPLEX NETWORK BODY ECU**

NG

6	INSPECT FRONT DOOR COURTESY LAMP SWITCH ASSY

(a) Inspect the door courtesy lamp switch continuity.
Standard:

Switch Position	Specified Condition
ON (switch pin released: opened door)	Continuity
OFF (switch pin pushed in: closed door)	No continuity

NG → **REPLACE FRONT DOOR COURTESY LAMP SWITCH ASSY**

OK

REPAIR OR REPLACE WIRE HARNESS (COURTESY LIGHT SWITCH - BODY ECU)

0526D-02

CUSTOMER PROBLEM ANALYSIS CHECK

POWER DOOR LOCK CONTROL SYSTEM Check Sheet Inspector's name: _____

Customer's Name		**Registration No.**	
		Registration Year	
		Frame No.	
Date Vehicle Brought in	/ /	**Odometer Reading**	**km miles**

Date Problem First Occurred		/ /
Frequency Problem Occurs		○ Constant ○ Sometimes (Times per day, month) ○ Once only
Weather Conditions When Problem Occurred	**Weather**	○ Fine ○ Cloudy ○ Rainy ○ Snowy ○ Various/Others
	Outdoor temperature	○ Hot ○ Warm ○ Cool ○ Cold (Approx. °C (°F))

Problem Symptom	○ Malfunction in Door Lock/Unlock Operation Using Door Lock Control Switch.	○ Driver side door lock control switch.	○ Driver side door ○ Passenger side door
		○ Passenger side door key lock and unlock control switch.	○ Driver side door ○ Passenger side door
	○ Malfunction in Door Lock/Unlock Operation Using Key.	○ Driver side door key lock and unlock control switch.	○ Driver side door ○ Passenger side door
		○ Passenger side door key lock and unlock control switch.	○ Driver side door ○ Passenger side door
		○ 2-operation unlock function of driver side door key lock and unlock switch.	
	○ Malfunction in Key Lock-In Prevention Function.		
	○ Malfunction in Luggage Compartment Door Opener Function.		
	○ Others.		

0526F-02

DIAGNOSTIC TROUBLE CODE CHART

If a malfunction code is displayed during the DTC check, check the circuit listed for that code in the table below (Proceed to the page given for that circuit.).

DTC No. (See Page)	Detection Item	Trouble Area	Open Door Warning Light
B1222/22 (05-1944)	Door lock switch circuit on driver door	・Power window regulator master switch assy (door ECU) ・Front door lock assy RH (driver side) ・Multiplex Network Body ECU	Blinks
B1223/23 (05-1948)	Power window switch circuit on passenger door	・Door control switch assy (passenger side) ・Multiplex Network Body Body ECU	Blinks
B1224/24 (05-1950)	Door lock switch circuit on passenger door	・Door control switch assy (passenger side) ・Front door lock assy RH (passenger side) ・Multiplex Network Body Body ECU	Blinks

0526C-02

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

Troubleshoot in accordance with the procedure on the following pages.

1	VEHICLE BROUGHT TO WORKSHOP

2	SYMPTOM CHECK

3	INSPECT COMMUNICATION FUNCTION OF LARGE-SCALE MULTIPLEX COMMUNICATION SYSTEM (BEAN)

(a) Check that there is no abnormality in the communication system by inspecting the communication function of the multiplex communication system with the hand-held tester.
   (1) (ECU unconnected, communication line abnormal) Without code output, proceed to A.
   (2) (ECU unconnected, communication line abnormal) With code output, proceed to B.

B → GO TO MULTIPLEX COMMUNICATION SECTION

A

4	DIAGNOSIS CODE CHECK (See page 05-1939)

(a) Check diagnosis code.
   (1) Without code output, proceed to A.
   (2) With code output, proceed to B.

B → GO TO DTC CHART (See page 05-1939)

A

5	PROBLEM SYMPTOMS TABLE (See page 05-1943)

(a) Without applicable symptoms, proceed to A.
(b) With applicable symptoms, proceed to B.

B → GO TO SYMPTOMS TABLE

A

6	PERFORM TROUBLESHOOTING IN THE FOLLOWING METHOD, DEPENDING ON MALFUNCTION SYMPTOM

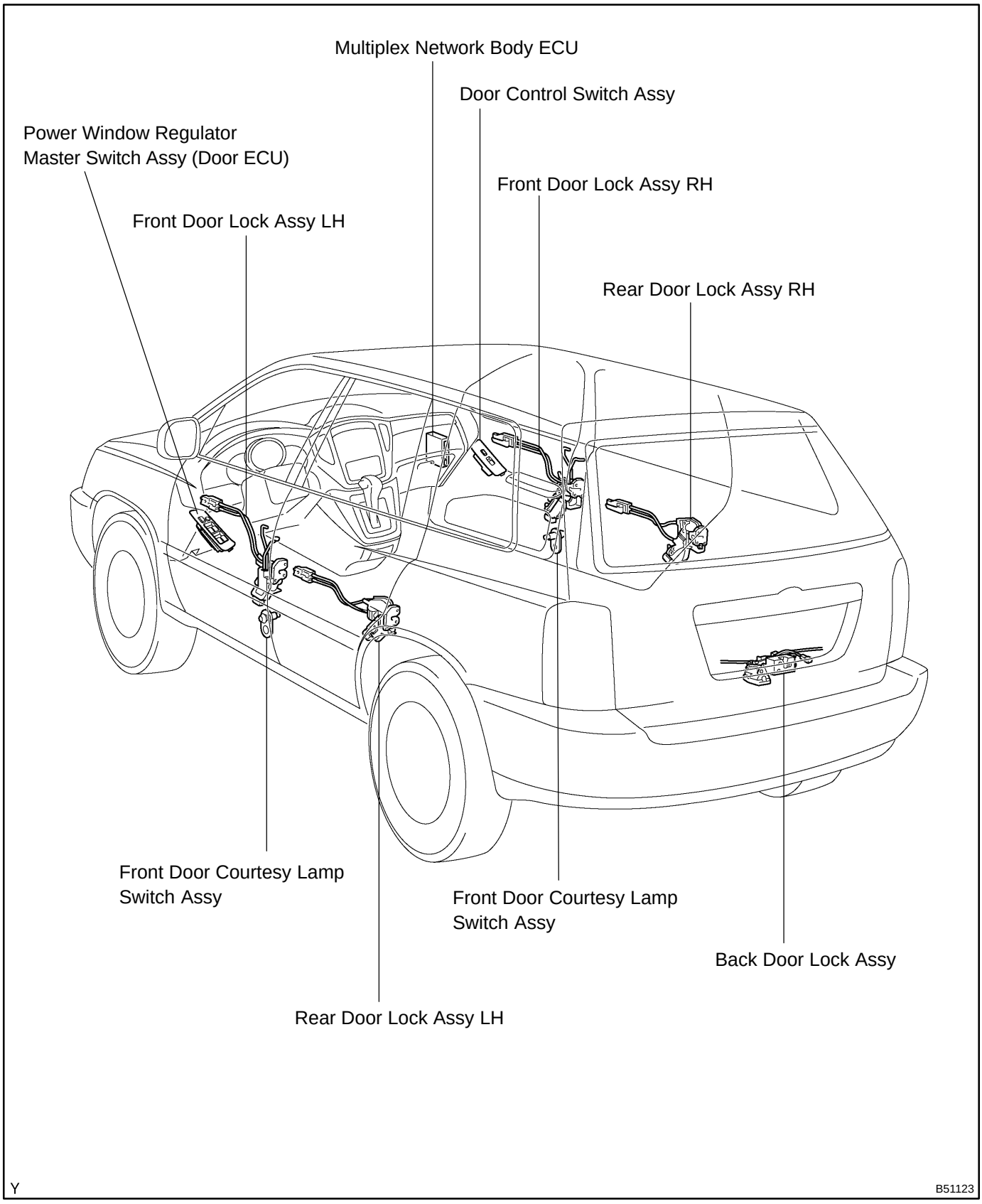
(a) Pre-inspection (See page 05-1938)
   (1) Inspection with the hand-held tester (ECU DATA MONITOR)
(b) ECU terminal position

7	ADJUSTMENT, REPAIR OR REPLACEMENT

END

0526G-01

LOCATION



POWER DOOR LOCK CONTROL SYSTEM

0526B-01

PRECAUTION

1. NOTICES OF REMOVAL AND INSTALLATION OPERATIONS

(a) Before performing operations related to the door lock and door lock cylinder, be sure to disconnect the battery terminal or the connector of the window regulator motor.

CAUTION:

If the operation is performed with the connectors being connected, the door control switch inside the door lock might be unexpectedly actuated, which results in injury.

0526E-01

PRE-CHECK

1. USING HAND-HELD TESTER

(a) Hook up the hand-held tester to the DLC3.

(b) Monitor the ECU data by following the prompts on the tester screen.

HINT:

Hand-held tester has a ”Snapshot” function which records the monitored data.

Refer to the hand-held tester operator’s manual for further details.

2. DTC CLEAR

(a) The DTCs and freeze frame data will be erased by the hand-held tester to erase the codes.

3. DATA LIST

HINT:

According to the DATA LIST displayed by the OBD II scan tool or hand-held tester, you can read the value of the switch, sensor, actuator and so on without parts removal. Reading the DATA LIST as a first step of troubleshooting is one of the method to shorten the labor time.

(a) Connect the OBD II scan tool or hand-held tester to the DLC3.

(b) Turn the ignition switch ON.

(c) According to the display on tester, read the ”DATA LIST”.

Standard (Body ECU):

Item	Measurement Item/ Display (Range)	Normal Condition	Diagnostic Note
KEY SW	Key unlock warning SW signal/ON or OFF	ON: Key is IG key cylinder OFF: Key is not in IG key cylinder	-

0526I-03

PROBLEM SYMPTOMS TABLE

Symptom	Suspected Area	See Page
All doors are not operated by driver's door key cylinder for inter-locked with key	1. Body ECU monitor code 2. Front door lock assy RH (driver side) 3. Wire harness 4. Power window regulator master switch assy (Door ECU)	05-1954
Key confinement prevention function does not work properly (Manual operation and operation interlocked with key are active)	1. Un-lock warning switch assy 2. Wire harness 3. Door open warning Light (built in combination meter) 4. Front door courtesy lamp switch assy (driver side)	05-1957
Door lock system does not operate at all	1. Door 20 A fuse 2. Multiplex Network Body ECU 3. Wire harness	05-2046
Door lock system does not operate by manual switch	1. Power window regulator master switch assy (door ECU) (Door control switch for manual operation) 2. Multiplex Network Body ECU 3. Wire harness	05-2046
Fault in key confinement prevention operate	1. Multiplex Network Body ECU 2. Un-lock warning switch assy 3. Front door courtesy lamp switch assy (driver side) 4. Wire harness	05-1957
Only one door lock does not operate	1. Door lock assy 2. Wire harness	73-3
Fault in 2-operation unlock function of driver side door key lock and unlock switch	1. Door key lock and unlock switch circuit 2. Power window regulator master switch assy (Door ECU) 3. Multiplex Network Body ECU 4. Wire harness	73-3

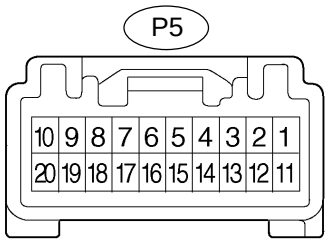
0526H-04

TERMINALS OF ECU

1. POWER WINDOW REGULATOR MASTER SWITCH ASSY (DOOR ECU)

(a) Disconnect the master switch connector.

(b) Check the voltage or continuity of each terminal of the wire harness side connector.



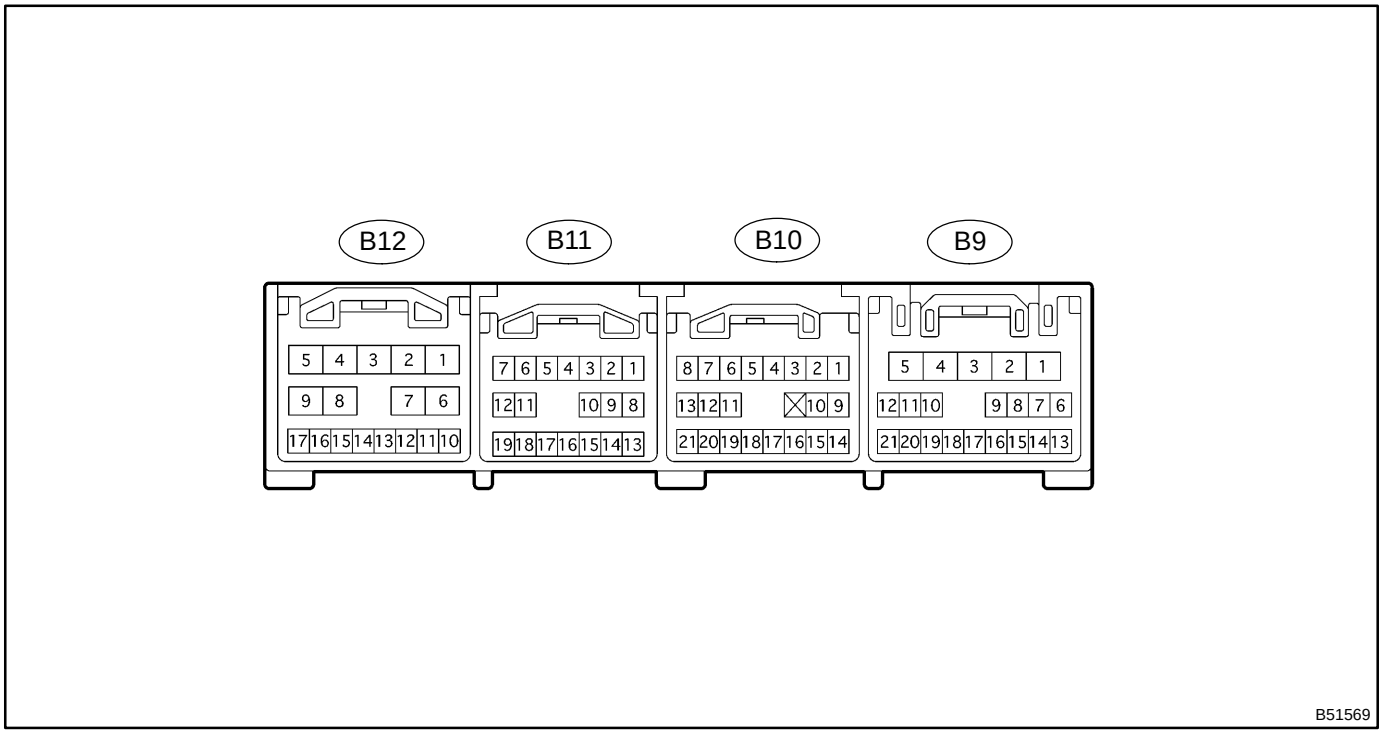
B51555

Standard:

Symbols (Terminal No.)	Wiring Color	Condition	Specified Condition
SIG (P5-20) ⇔ GND (P5-2)	R-L ⇔ W-B	Ignition switch OFF → ON	0 V → 10 - 14 V
BDR (P5-10) ⇔ GND (P5-2)	L-W ⇔ W-B	Constant	10 - 14 V
CPUB (P5-9) ⇔ GND (P5-2)	W-L ⇔ W-B	Constant	10 - 14 V
KL (P5-4) ⇔ GND (P5-2)	G ⇔ W-B	Driver side door lock key cylinder OFF → LOCK	10 - 14 V → Below 0 V
KUL (P5-14) ⇔ GND (P5-2)	Y ⇔ W-B	Driver side door lock key cylinder OFF → UNLOCK	10 - 14 V → Below 0 V
LSW (P5-16) ⇔ GND (P5-2)	BR ⇔ W-B	Driver side door LOCK → UNLOCK	10 - 14 V → Below 0 V
LSWE (P5-3) ⇔ GND (P5-2)	LG ⇔ W-B	Constant	Continuity
GND (P5-2) ⇔ Body ground	W-B ⇔ -	Constant	Continuity

If the result is not as specified, there may be a malfunction on the wire harness side.

2. BODY ECU



(a) Disconnect the body ECU connectors B12, B10 and B9.

(b) Check the voltage or continuity of each terminal of the wire harness side connector.

Symbols (Terminal No.)	Wiring Color	Condition	Specified Condition
BDR1 (B12-4) ⇔ Body ground	B ⇔ -	Constant	10 - 14 V
IG (B9-5) ⇔ Body ground	BR ⇔ -	Ignition switch OFF → ON	0 V → 10 - 14 V
GND1 (B12-7) ⇔ Body ground	W-B ⇔ -	Constant	Continuity
KSW (B10-2) ⇔ Body ground	G ⇔ -	No key in the ignition key cylinder → With key	No continuity → Continuity
ACC (B9-17) ⇔ Body ground	B ⇔ -	Ignition switch OFF → ON	0 V → 10 - 14 V
BECU (B12-9) ⇔ Body ground	G ⇔ -	Constant	10 - 14 V

(c) Reconnect the body ECU connectors, and check the voltage of each terminal of the connectors.

Symbols (Terminal No.)	Wiring Color	Condition	Specified Condition
DCTY (B11-11) ⇔ Body ground	B ⇔ -	Driver door CLOSED → OPEN	10 - 14 V → Below 0 V
KSW (B10-2) ⇔ Body ground	G ⇔ -	No key in the ignition key cylinder → With key	10 - 14 V → Below 0 V
ACT+ (B12-1) ⇔ Body ground	L ⇔ -	Master switch and driver's door key cylinder OFF → LOCK	0 V → 10 - 14 V → 0 V
PCTY (B12-16) ⇔ Body ground	SB ⇔ -	Passenger door CLOSED → OPEN	10 - 14 V → Below 0 V
RCTY (B12-15) ⇔ Body ground	LG ⇔ -	Rear door (RH, LH) CLOSED → OPEN	10 - 14 V → Below 0 V
ACT- (B12-6) ⇔ Body ground	W ⇔ -	Master switch and driver's door key cylinder OFF → UNLOCK	0 V → 10 - 14 V → 0 V

If the result is not as specified, there may be a malfunction on the wire harness side.

ONLY WIRELESS CONTROL FUNCTION IS INOPERATIVE

CIRCUIT DESCRIPTION

The door control receiver receives a signal from transmitter and sends it to body ECU by line.
And the body ECU transmits the signal to the door lock assembly to control the door lock/unlock operation.

NOTICE:

The wireless door lock control system has a function with a large-scale multiplex communication system. First of all, inspect the communication function depending on the "HOW TO PROCEED WITH TROUBLESHOOTING", and check that the communication system has no malfunction. Then finally proceed with the troubleshooting. Also, in case that the wire harness between the body ECU and door control receiver has been short-circuited, diagnostic code 42 will be output and the wireless control will not function.

INSPECTION PROCEDURE

HINT:

The initial condition that the customizing function by the hand-held tester is not chosen is shown.

1. VEHICLE'S INITIAL CONDITION (CONDITION OF WIRELESS CONTROL POSSIBLE)

(a) No key in the ignition key cylinder.
(b) All doors closed (door open indicator off).
(c) All doors locked.

HINT:

The switch described in this text is a LOCK/ UNLOCK switch for transmitting, and it is built in the door control transmitter.

1	CHECK TRANSMITTER BATTERY SIMPLY

(a) Check that the LED of the transmitter lights up 3 times when the switch has been pressed 3 times.

HINT:

If the LED does not light up when the switch has been pressed 3 times or more, it may be caused by the dead battery. Replace the battery with a new or normal one, and then check that doors will be locked or unlocked by the standard operation.

NOTICE:

Standard operation means to press and hold the transmitter switch for 1 second, facing the transmitter to the vehicle, in 1 m (3.28 ft) away from the driver's door outside handle in the right direction.

NG → **REPLACE TRANSMITTER (LITHIUM) BATTERY**

OK

2	CONFIRM ROOM LAMP ON

(a) Check that the room lamp comes on.

HINT:

When the lamp does not come on, proceed with the self-diagnostic mode after repairing the room lamp.

3	ENTER INTO SELF-DIAGNOSTIC MODE

(a) Enter into the self-diagnostic mode by operating the ignition switch lock cylinder.
   (1) Insert the key into the ignition switch lock cylinder under the vehicle's initial condition, and then operate the ignition switch assembly OFF → ON → OFF once within 5 seconds after the key is pulled out.
   (2) Within 30 seconds after the ignition switch assembly is turned OFF, operate the ignition switch assembly OFF → ON → OFF 9 times.

NOTICE:

The mode returns to the normal mode if even one of the above conditions has not been met.

HINT:

- The operation of the ignition switch assembly OFF → ON will finish the self-diagnostic mode.
- Do not carry out the lock/unlock operations during the self-diagnostic mode.

(b) Check that the system has entered into the self-diagnostic mode by blinks of the room lamp.

NG → **Go to step 8**

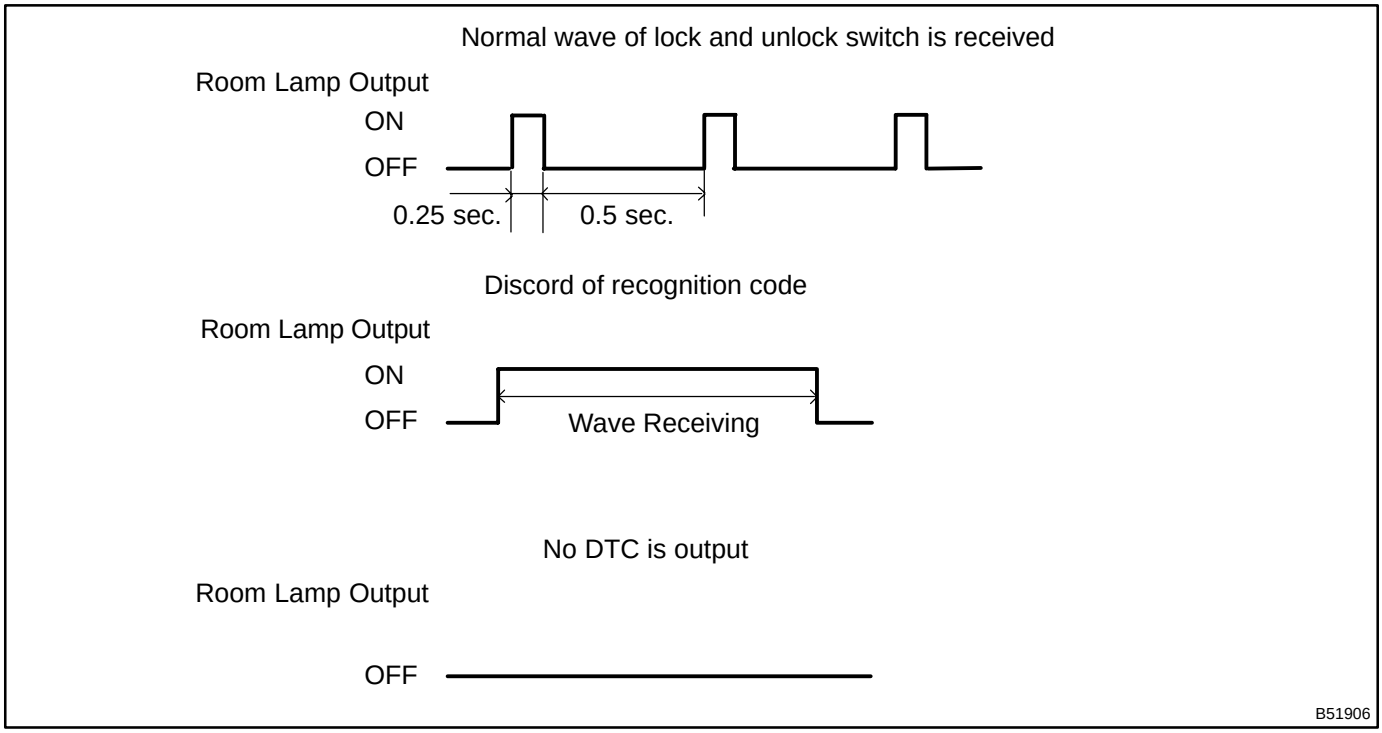
OK

4	CHECK BY SELF-DIAGNOSTIC MODE

(a) Check the output of the DTC when the door control transmitter switch has been kept pressed (The DTC output can be checked by the output of the room lamp).

HINT:

- In case of a reception of the normal wave of the LOCK/UNLOCK switch (room lamp blinking) and no DTC outputs (room lamp off), go to step A.
- In case of discord of recognition code (room lamp on), go to step B.



B	Go to step 7

A

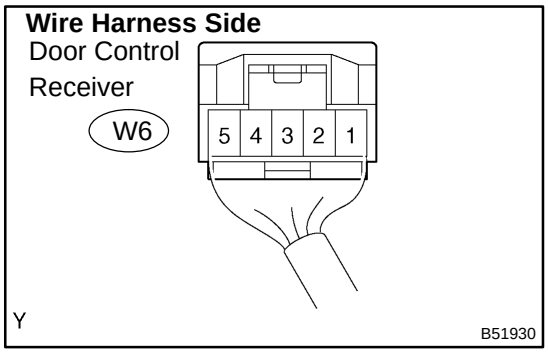
5	CHECK THE WAVE REACHING RANGE

(a) Check that the diagnosis will be output when a new or normal door control transmitter switch for a same type vehicle, has been pressed.

OK	REPLACE TRANSMITTER SUB-ASSY MODULE SET DOOR CONTROL

NG

6 CHECK DOOR CONTROL RECEIVER



(a) Check the DOME fuse.
(b) Disconnect the W6 receiver connector.
(c) Check the voltage or continuity between the W6 receiver wire harness side connector and body ground.

Standard:

Terminal No.	Specified condition
5 - Body ground	10 - 14 V
1 - Body ground	Continuity

NG → **REPAIR OR REPLACE FUSE OR WIRE HARNESS AND CONNECTOR**

OK

REPLACE DOOR CONTROL RECEIVER

7 RE-REGISTER RECOGNITION CODE OF TRANSMITTER

(a) Check if it is possible to enter into the rewrite mode or the add mode for the recognition code registration, and if a recognition code can be registered, as well.

NG → **REPLACE MULTIPLEX NETWORK BODY ECU**

OK

NORMAL (FUNCTION)

8 CONFIRM INPUT METHOD OF SELF-DIAGNOSTIC MODE

NG → **Go to step 3**

OK

9 INSPECT UN-LOCK WARNING SWITCH ASSY (See page 05-1957)

NG → **REPLACE UN-LOCK WARNING SWITCH ASSY**

OK

REPLACE MULTIPLEX NETWORK BODY ECU

DTC	42	WIRELESS DOOR LOCK RECEIVER CIRCUIT MALFUNCTIONS

CIRCUIT DESCRIPTION

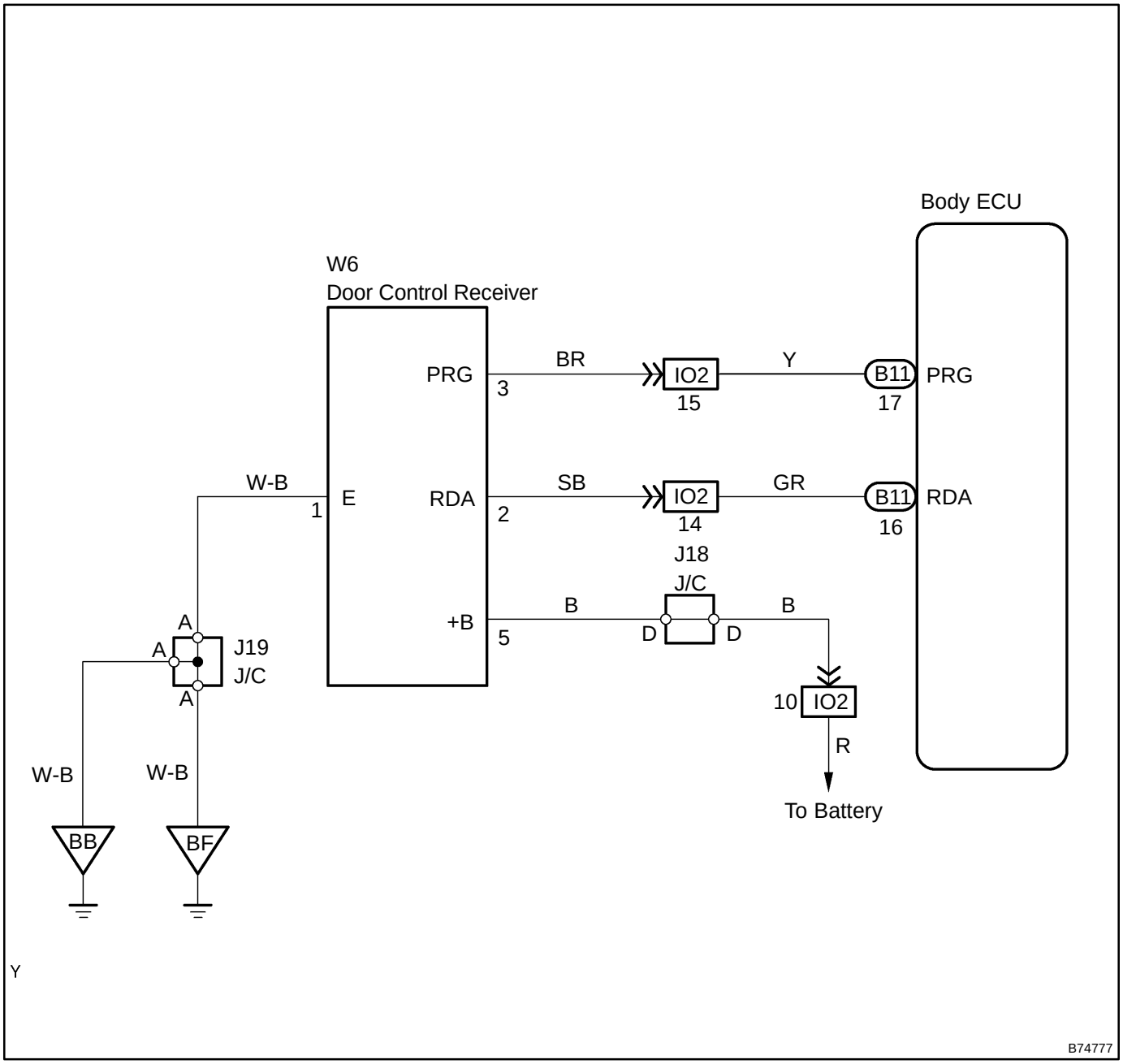
The door control receiver locks the doors via the wireless control by receiving and sending input/output signals from the body ECU.

DTC No.	DTC Detection Condition	Trouble Area
42	In diagnostic mode, reception of applicable RDA signal is impossible within 1 second after PRG signal has been output from body ECU.	・Wireless door control receiver ・Wire harness ・Body ECU

HINT:

In this circuit, the diagnostic mode means that the door open indicator inside the meter will blink by turning the ignition switch ON after short-circuited between terminals 13 (TC) and 4 (CG) of the DLC3 by SST.

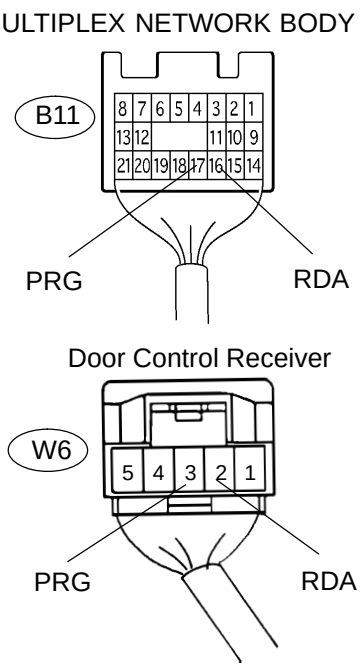
WIRING DIAGRAM



INSPECTION PROCEDURE

1	**CHECK WIRE HARNESS (MULTIPLEX NETWORK BODY ECU ⇔ DOOR CONTROL RECEIVER)**

Wire Harness Side



(a) Disconnect the B11 ECU connector.
(b) Disconnect the W6 receiver connector.
(c) Check the continuity between the B11 ECU and W6 receiver wire harness side connectors.
Standard (OPEN):

Symbol (Terminal No.)	Specified condition
RDA (B11-16) ⇔ RDA (W6-2)	Continuity
PRG (B11-17) ⇔ PRG (W6-3)	Continuity

(d) Check the continuity between the B11 ECU or W6 receiver wire harness side connectors and body ground.
Standard (SHORT):

Symbol (Terminal No.)	Specified condition
RDA (B11-16) or RDA (W6-2) ⇔ Body ground	No continuity
PRG (B11-17) or PRG (W6-3) ⇔ Body ground	No continuity

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

2	**CHECK DOOR CONTROL RECEIVER**

(a) Check that the wireless system operates when connected to a new or normal door control receiver.
(b) Check if no diagnosis has been output.
Standard: No diagnosis has been output

OK → **REPLACE DOOR CONTROL RECEIVER**

NG

REPLACE MULTIPLEX NETWORK BODY ECU

0526P-03

CUSTOMER PROBLEM ANALYSIS CHECK

WIRELESS DOOR LOCK CONTROL System Check Sheet

Inspector's Name _____

Customer's Name		**Registration No.**	
		Registration Year	/ /
		Frame No.	
Date Vehicle Brought In	/ /	**Odometer Reading**	**km miles**

Date Problem First Occurred		/ /
Frequency Problem Occurs		☐ Constant ☐ Sometimes (times/per day, month) ☐ Once only
Weather Conditions When Problem Occurred	**Weather**	☐ Fine ☐ Cloudy ☐ Rainy ☐ Snowy ☐ Various/Others
	Outdoor Temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold (Approx. ˚C (˚F))
	Place	☐ Everywhere ☐ Specific Locality( )
Date Transmitter Battery Last Replaced		/ /

Problem Symptom	☐ Whole wireless door lock control system does not operate.	
	☐ Only door unlock operation is impossible.	
	☐ Only door lock operation is impossible.	
	☐ Only key confinement prevention function is impossible.	
	☐ Wireless door lock function operates even when each door is opened.	
	☐ Wireless door lock functions incorrectly. (Although one door is unlocked, when the transmitter switch is pressed, all doors become unlocked.)	☐ When RH door is unlocked. ☐ When LH door is unlocked.
	☐ Others	

0526R-02

DIAGNOSTIC TROUBLE CODE CHART

If a malfunction code is displayed during the DTC check, check the circuit listed for that code in the table below (Proceed to the page given for that circuit).

DTC No. (See Page)	Detection Item	Trouble Area	Open Door Warning Light
42 (05-1968)	Wireless door lock receiver circuit malfunctions	›Wire harness ›Wireless door lock receiver ›Body ECU	Blinks

WIRELESS DOOR LOCK CONTROL SYSTEM

HOW TO PROCEED WITH TROUBLESHOOTING

0526O-02

HINT:

Troubleshoot in accordance with the procedure on the following pages.

1	VEHICLE BROUGHT TO WORKSHOP

2	CUSTOMER PROBLEM ANALYSIS AND SYMPTOM CHECK (See page 05-1962)

3	INSPECT COMMUNICATION FUNCTION OF LARGE-SCALE MULTIPLEX COMMUNICATION SYSTEM (BEAN)

(a) Check that there is no abnormality in the communication system by inspecting the communication function of the body multiplex communication system with the hand-held tester.
  (1) (ECU unconnected, communication line abnormal) Without code output, proceed to A.
  (2) (ECU unconnected, communication line abnormal) With code output, proceed to B.

B	GO TO BODY MULTIPLEX COMMUNICATION SECTION (See page 05-2040)

A

4	CHECK DIAGNOSTIC TROUBLE CODE (See page 05-1964)

(a) Check a DTC and note it down if a code is output.
(b) Delete the DTC.
(c) Check if the DTC will be output once again, when the problem symptom is simulated based on the noted code.
  (1) Without an output of the code, proceed to A.
  (2) With an output of the code, proceed to B.

B	Go to step 7

A

5	PROBLEM SYMPTOMS TABLE (See page 05-1967)

(a) Without applicable symptoms, proceed to A.
(b) With applicable symptoms, proceed to B.

B	Go to step 7

A

6	**PERFORM TROUBLESHOOTING IN THE FOLLOWING METHOD, DEPENDING ON MALFUNCTION SYMPTOM**

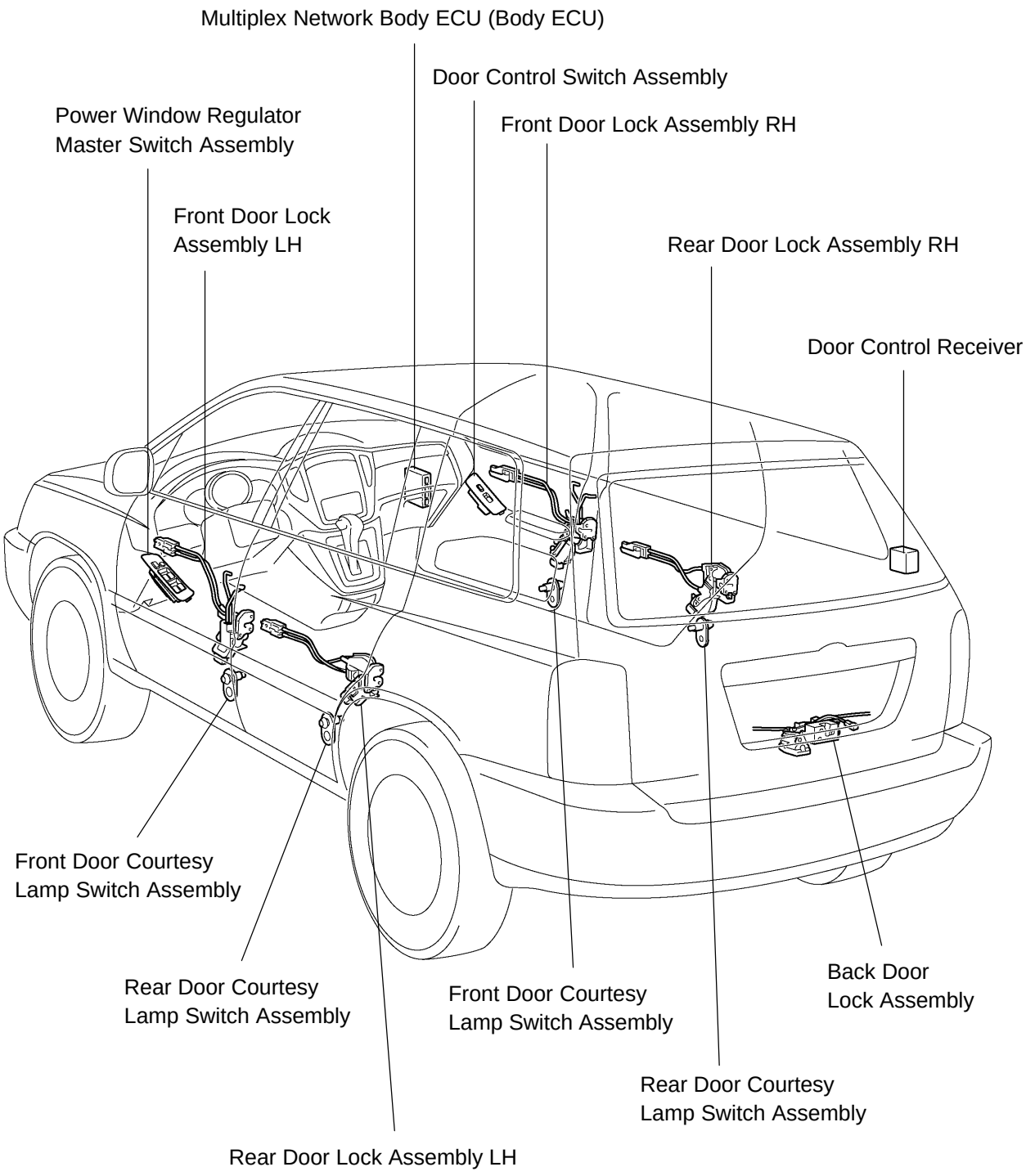
(a) Pre-check (See page 05-1963).
  (1) Inspection with the hand-held tester (ECU DATA MONITOR).
  (2) Inspection with the hand-held tester (ACTIVE TEST).
(b) Terminals of ECU (See page 05-1966).

7	**ADJUSTMENT, REPAIR OR REPLACEMENT**

END

0526S-02

LOCATION



Y

B51134

0526Q-03

PRE-CHECK

1. INSPECT WITH HAND-HELD TESTER

(a) ECU Data Monitor (MPX Body ECU)

(1) The ECU data monitor will indicate if the part is normal or malfunction.

Item	Inspecting condition	Standard value
KEY SW	Ignition ON → No key	ON → OFF

(b) Customizing Function (reference)

(1) The use of the hand-held tester makes it possible to select the following controls on the door lock.

Item	Setting
Wireless door lock operation	With/ Without function
Automatic locking time	30 sec. / 60 sec.
Room lamp on when door unlocked via wireless control	With/ Without function
Open door warning	ON / OFF
Alarm function	ON / OFF
2 times operation wireless unlock	ON / OFF
Unlock with 2 times driver's door key operation	ON / OFF

0526U-02

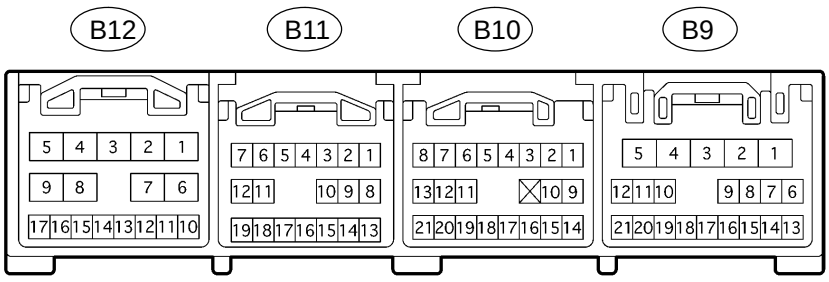
PROBLEM SYMPTOMS TABLE

Symptom	Suspected Area	See page
All functions of wireless door lock control system are inoperative (only wireless control function is inoperative).	1. Transmitter battery 2. Door control transmitter 3. Door control receiver 4. DOME fuse 5. Body ECU 6. Un-lock warning SW 7. Wire harness	05-1970

0526T-04

TERMINALS OF ECU

1. CHECK MULTIPLEX NETWORK BODY ECU (BODY ECU)



B61267

(a) Disconnect the B9, B10 and B12 ECU connectors, and check the voltage or continuity of each terminal of the wire harness side connector.

Standard:

Symbols (Terminals No.)	Wiring color	Condition	Specified condition
BDR1 (B12-4) ⇔ Body ground	B⇔ -	Constant	10 - 14 V
IG (B9-5) ⇔ Body ground	BR⇔ -	Ignition switch OFF → ON	0 V → 10 - 14 V
GND1 (B12-7) ⇔ Body ground	W-B ⇔ -	Constant	Continuity
KSW (B10-2) ⇔ Body ground	G⇔ -	No key in ignition key cylinder → With key	No continuity → Continuity
ACC (B9-17) ⇔ Body ground	B⇔ -	Ignition switch OFF → ON	0 V → 10 - 14 V
BECU (B12-9) ⇔ Body ground	G⇔ -	Constant	10 - 14 V

If the result is not as specified, there may be a malfunction the wire harness side.

(b) Reconnect the B9, B10 and B12 ECU connectors, and check the voltage of each terminal of the connector.

Standard:

Symbols (Terminals No.)	Wiring color	Condition	Specified condition
DCTY (B11-11) ⇔ Body ground	B⇔ -	Driver's door CLOSED → OPEN	10 - 14 V → Below 1 V
KSW (B10-2) ⇔ Body ground	G⇔ -	No key in ignition key cylinder → With key	10 - 14 V → Below 1 V
ACT+ (B12-1) ⇔ Body ground	L⇔ -	Master switch and driver's door key cylinder OFF → LOCK	0 V → 10 - 14 V → 0 V
PCTY (B12-16) ⇔ Body ground	SB⇔ -	Passenger's door CLOSED → OPEN	10 - 14 V → Below 1 V
RCTY (B12-15) ⇔ Body ground	LG⇔ -	Rear door (RH, LH) CLOSED → OPEN	10 - 14 V → Below 1 V
ACT- (B12-6) ⇔ Body ground	W⇔ -	Master switch and driver's door key cylinder OFF → UNLOCK	0 V → 10 - 14 V → 0 V

If the result is not as specified, the theft warning ECU assy may malfunction.

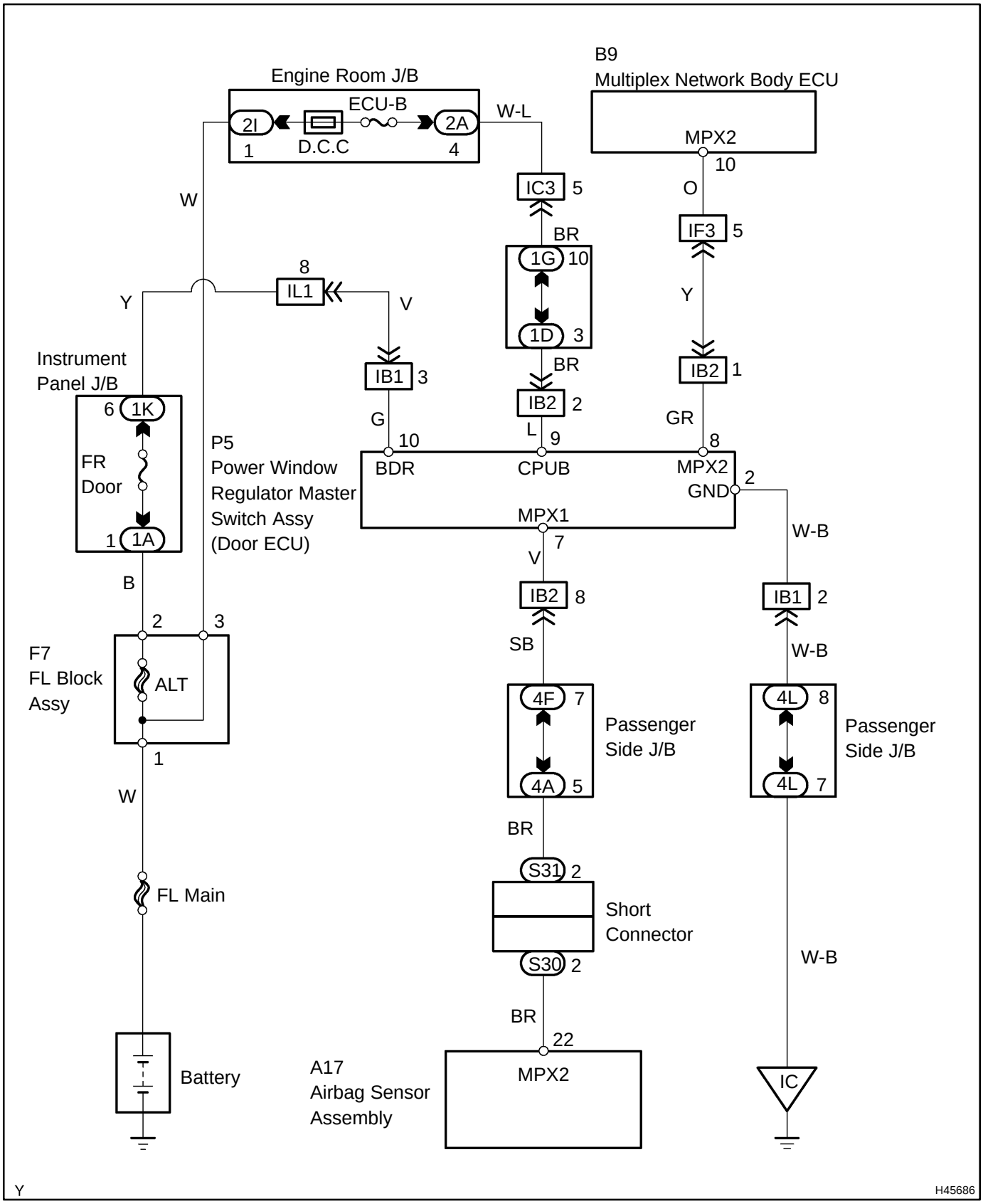
DTC	B1211/11	DRIVER DOOR ECU COMMUNICATION STOP

CIRCUIT DESCRIPTION

B1211/11 will be output when the communication between the power window regulator master switch assy (door ECU) and multiplex network body ECU stops for more than 10 seconds.

DTC No.	DTC Detection Condition	Trouble Area
B1211/11	Door ECU communication stop	・Power window regulator master switch assy (door ECU) ・Wire harness

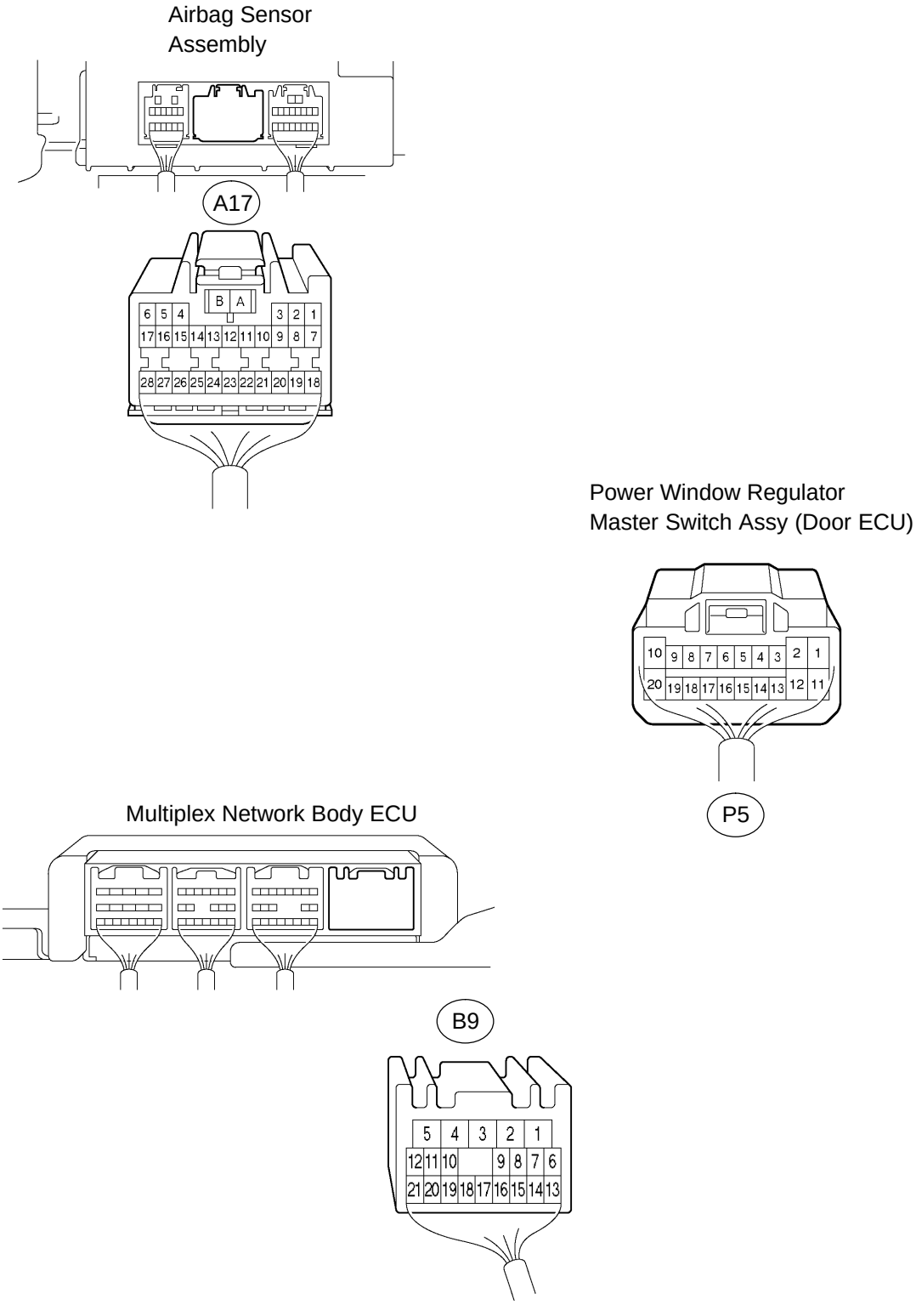
WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK CONTINUITY OF COMMUNICATION LINE

(a) Check the wire harness between the multiplex network body ECU, power window regulator master switch assy (door ECU) and airbag sensor assembly.



C

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(1) Disconnect the connectors of the master switch, body ECU and air conditioner amplifier.
(2) Check the continuity between terminal P5-8 (MPX2) of the master switch vehicle's side connector and terminal B9-10 (MPX2) of the body ECU vehicle's side connector.

Standard: Continuity

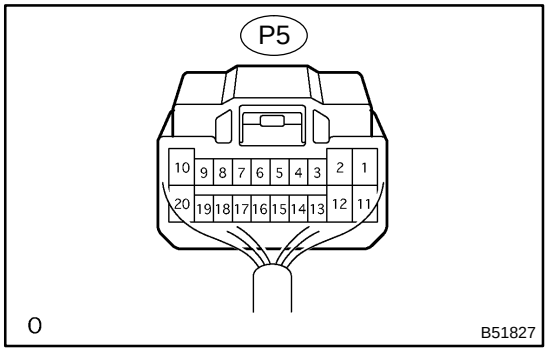
(3) Check the continuity between terminal P5-7 (MPX1) of the master switch vehicle's side connector and terminal A17-22 (MPX2) of the airbag sensor assembly vehicle's side connector.

Standard: Continuity

NG	**REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

2	**CHECK POWER WINDOW REGULATOR MASTER SWITCH ASSY**



(a) Inspect the power window regulator master switch assy (door ECU) (power source input).
(1) Disconnect the master switch connector.
(2) Check the voltage of each terminal of the master switch vehicle's side connector.

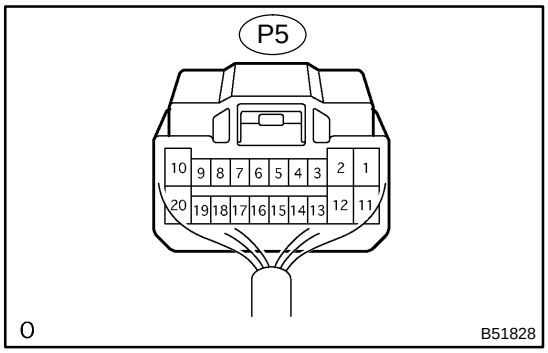
Standard:

Symbols (Terminal No.)	Condition	Specified Condition
CPUB (P5-9) ⇔ Body ground	Constant	10 - 14 V
BDR (P5-10) ⇔ Body ground	Constant	10 - 14 V

NG	**REPAIR OR REPLACE FUSE OR WIRE HARNESS AND CONNECTOR**

OK

3	CHECK POWER WINDOW REGULATOR MASTER SWITCH ASSY



(a) Inspect the power window regulator master switch assy (door ECU) P5-2 (GND).
   (1) Disconnect the master switch connector.
   (2) Check the continuity between terminal P5-2 (GND) of the master switch and the body ground.

Standard: Continuity

NG	**REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE POWER WINDOW REGULATOR MASTER SWITCH ASSY

DTC	B1214	DOOR SYSTEM COMMUNICATION BUS MALFUNCTION (+B SHORT)

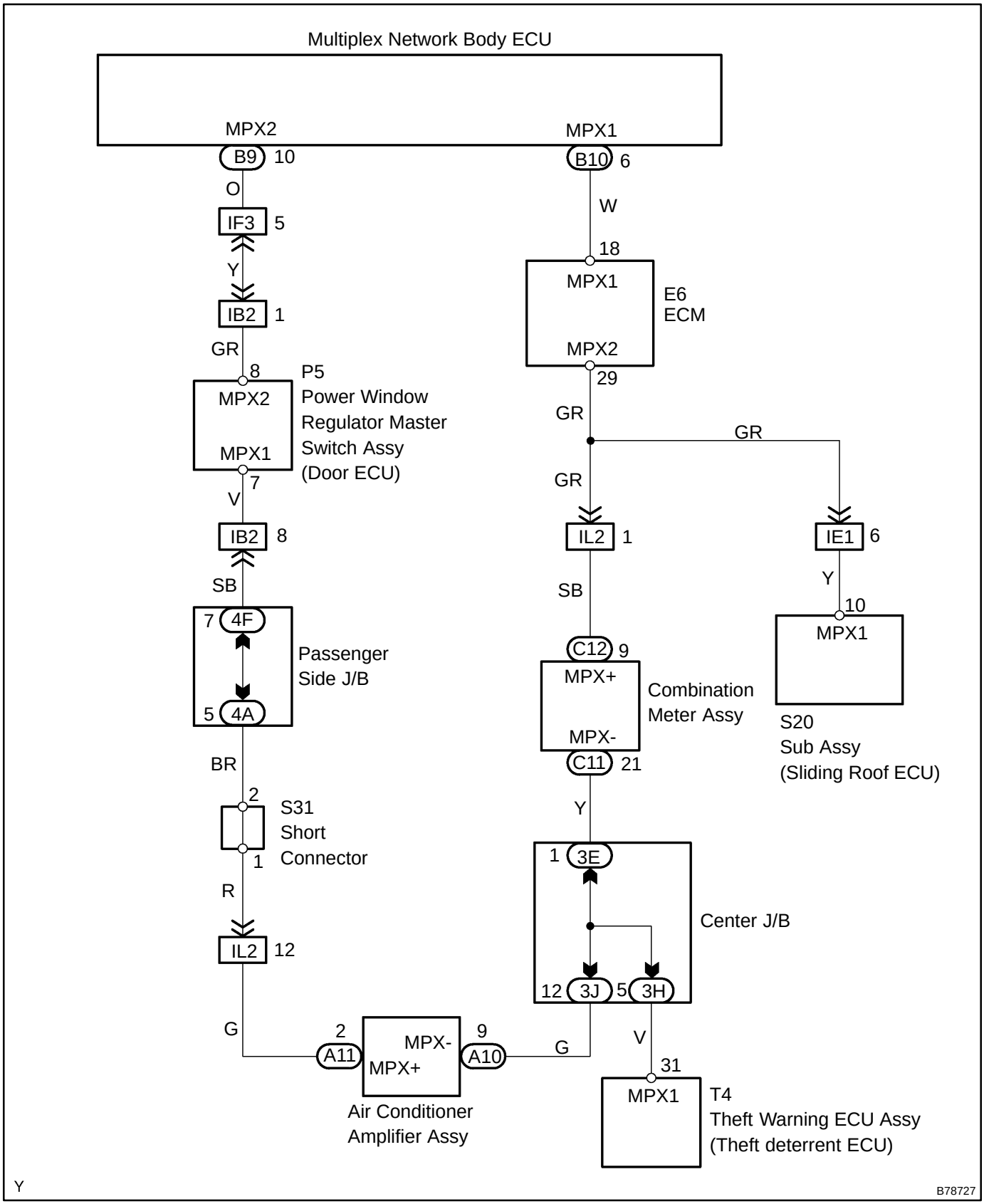
DTC	B1215	DOOR SYSTEM COMMUNICATION BUS MALFUNCTION (GND SHORT)

CIRCUIT DESCRIPTION

B1214 and B1215 will be output when +B and body ground is short-circuited on the communication bus. Detecting this condition will make all the BEAN communication unable and output some DTCs.

DTC No.	DTC Detecting Condition	Trouble Area
B1214	Communication circuit and +B battery system short	·Power window regulator master switch assy (door ECU) ·ECM ·Air conditioner amplifier assy (A/C ECU) ·Combination meter assy (meter ECU) ·Theft warning ECU assy (theft deterrent ECU) ·Sliding roof drive gear sub-assy (sliding roof ECU) ·Wire harness ·Multiplex network body ECU
B1215	Communication circuit and body ground short	·Power window regulator master switch assy (door ECU) ·ECM ·Air conditioner amplifier assy (A/C ECU) ·Combination meter assy (meter ECU) ·Theft warning ECU assy (theft deterrent) ·Sliding roof drive gear sub-assy (sliding roof ECU) ·Wire harness ·Multiplex network body ECU

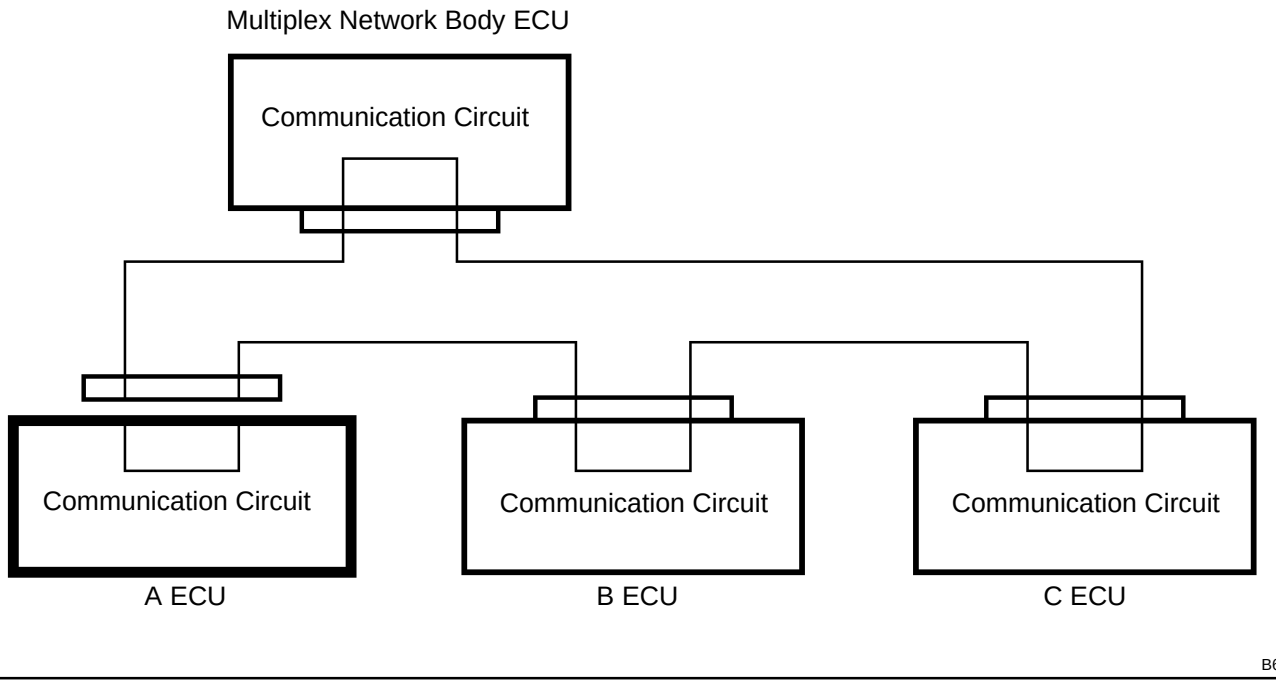
WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK DIAGNOSTIC TROUBLE CODE (A ECU)

(a) Check whether the output of the DTC will stop when the A ECU connector is disconnected.



NOTICE:
Disconnect the connectors in the operational sequence, and start the next operation after the connector is connected.
HINT:
In this case, the A ECU represents the power window regulator master switch assy (door ECU).

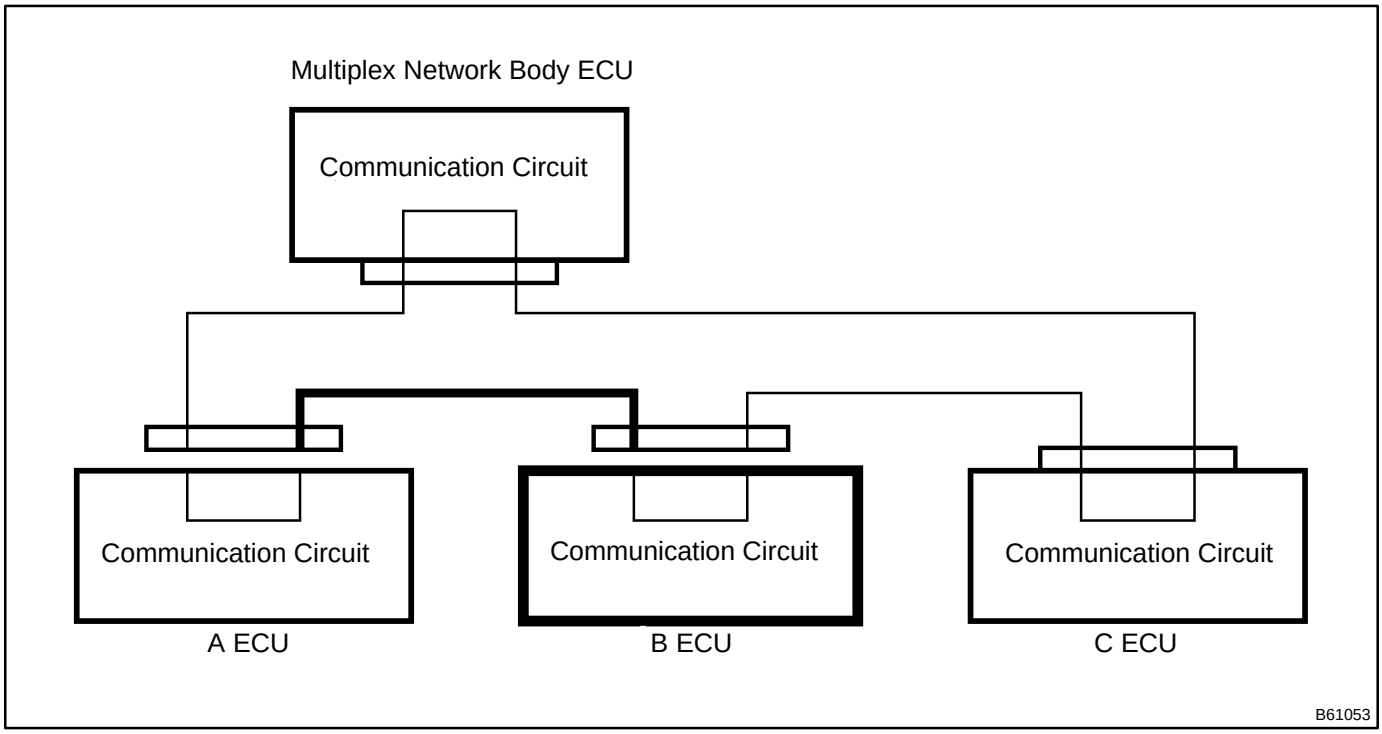
Standard: The disconnected A ECU is abnormal when the output of the DTC stops.

OK	REPLACE A ECU

NG

2	CHECK DIAGNOSTIC TROUBLE CODE (B ECU)

(a) Check whether the output of the DTC will stop when the B ECU connector is disconnected.



NOTICE:

Disconnect the connectors in the operational sequence, and start the next operation after the connector is connected.

HINT:

In this case, the B ECU represents the sliding roof drive gear sub-assy (sliding roof ECU), combination meter assy (meter ECU), air conditioner amplifier assy (A/C ECU) or theft warning ECU assy (theft deterrent).

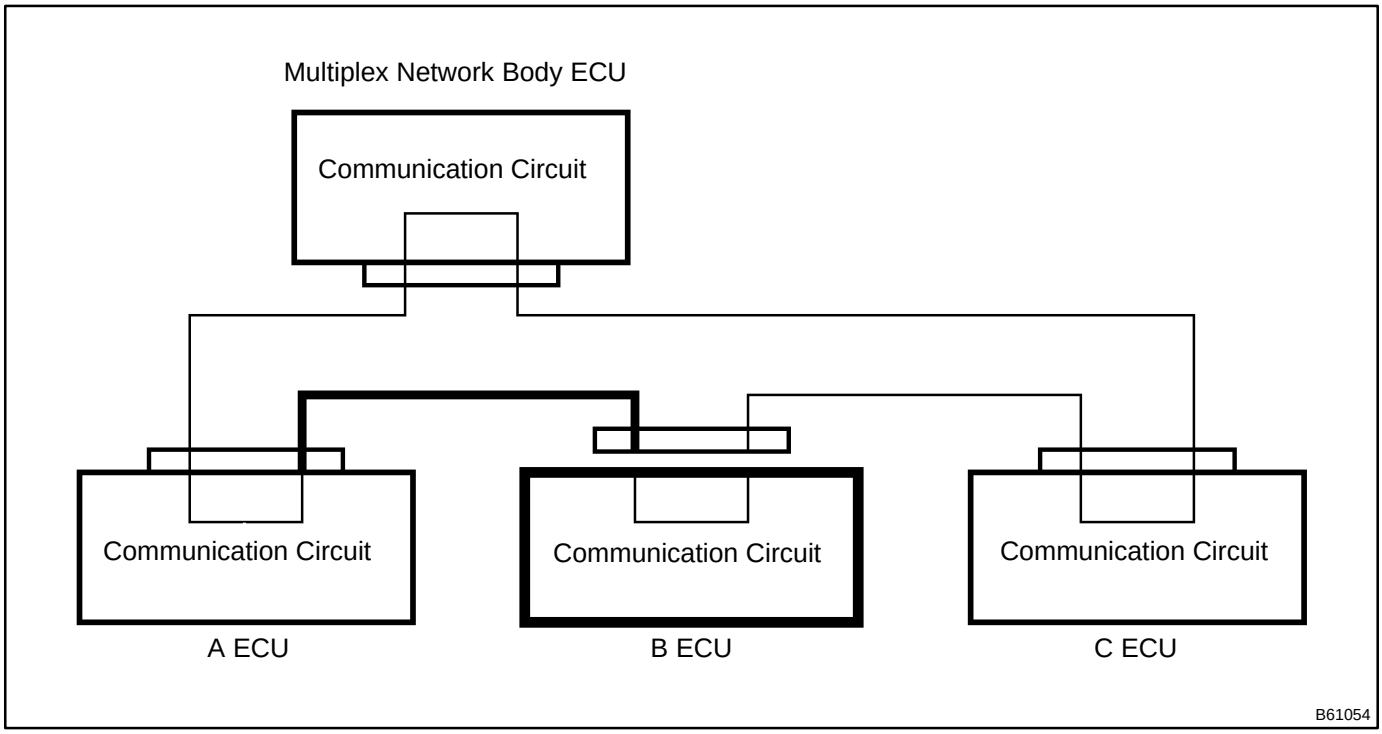
Standard: The disconnected B ECU or the wire harness between the A ECU and B ECU is abnormal when the output of the DTC stops.

NG → **Go to step 4**

OK

3	CHECK WIRE HARNESS BETWEEN A ECU AND B ECU

(a) Inspect short-circuit in +B or body ground.



(1) Check whether the DTC will be output when the A ECU connector is connected.

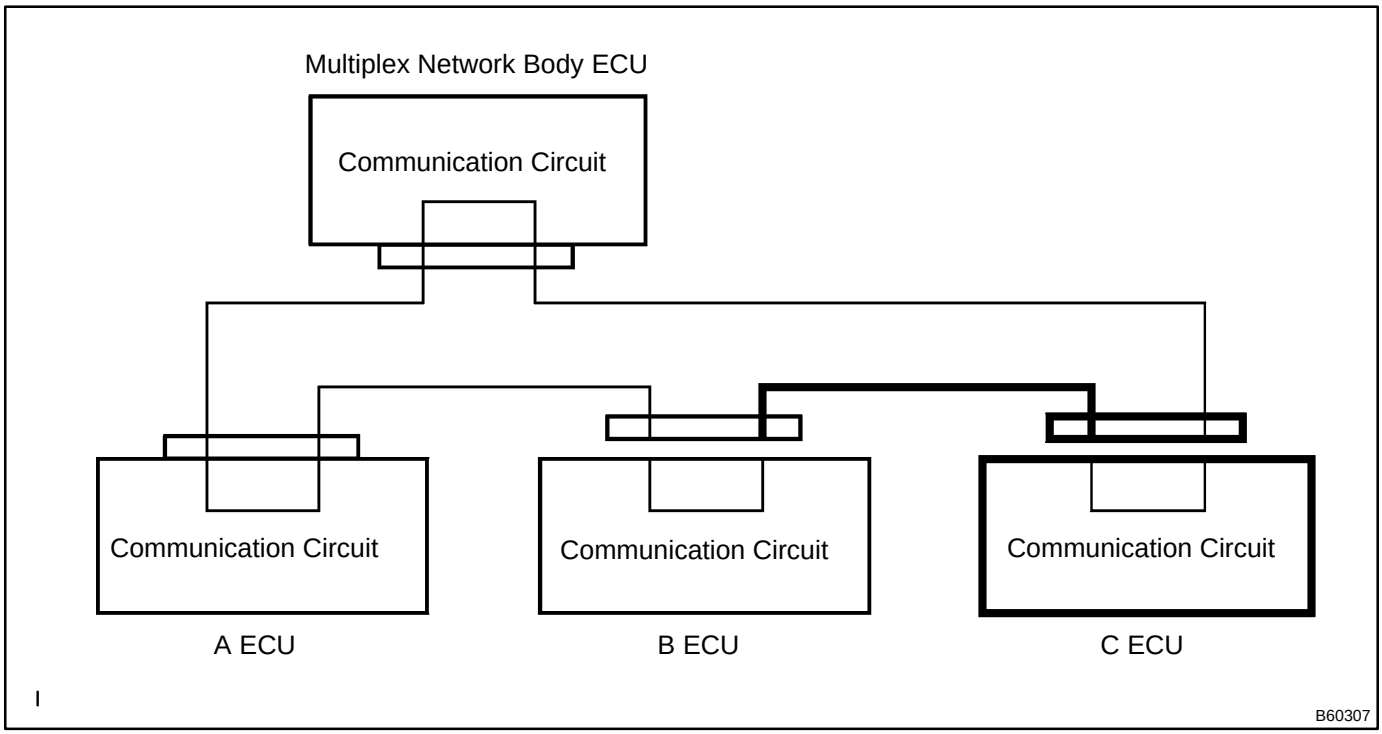
NOTICE:

Disconnect the connectors in the operational sequence, and start the next operation after the connector is connected.

OK	**REPLACE B ECU**
NG	**REPAIR OR REPLACE WIRE HARNESS BETWEEN A ECU AND B ECU**

4	CHECK DIAGNOSTIC TROUBLE CODE (C ECU)

(a) Check whether the output of the DTC will stop when the A ECU connector is connected and the C ECU connector is disconnected.



NOTICE:
Disconnect the connectors in the operational sequence, and start the next operation when the connector is connected.
HINT:
In this case, the C ECU represents the ECM.

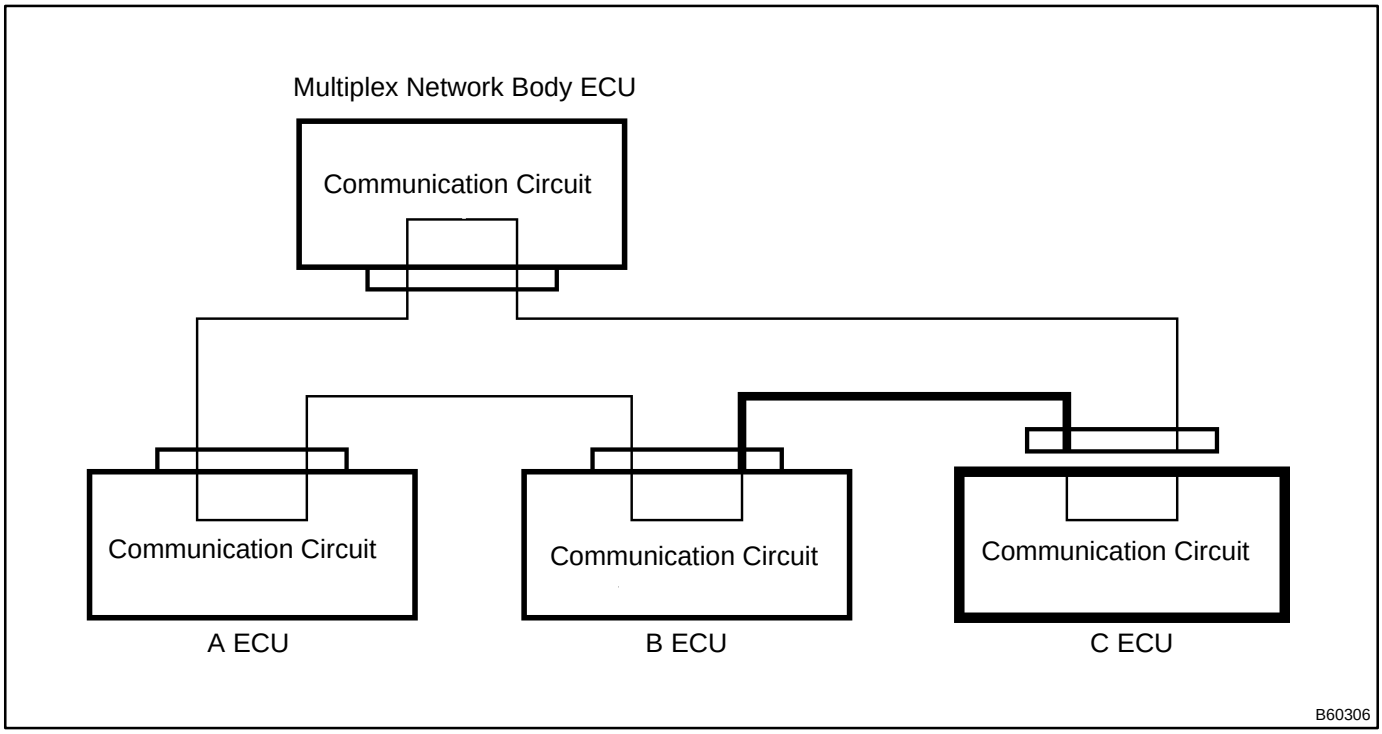
Standard: The disconnected C ECU or the wire harness between the B ECU and C ECU is abnormal when the output of the DTC stops.

NG → **Go to step 6**

OK

5	CHECK WIRE HARNESS BETWEEN B ECU AND C ECU

(a) Inspect short-circuit in +B or body ground.



(1) Check whether the DTC will be output when the B ECU connector is connected.

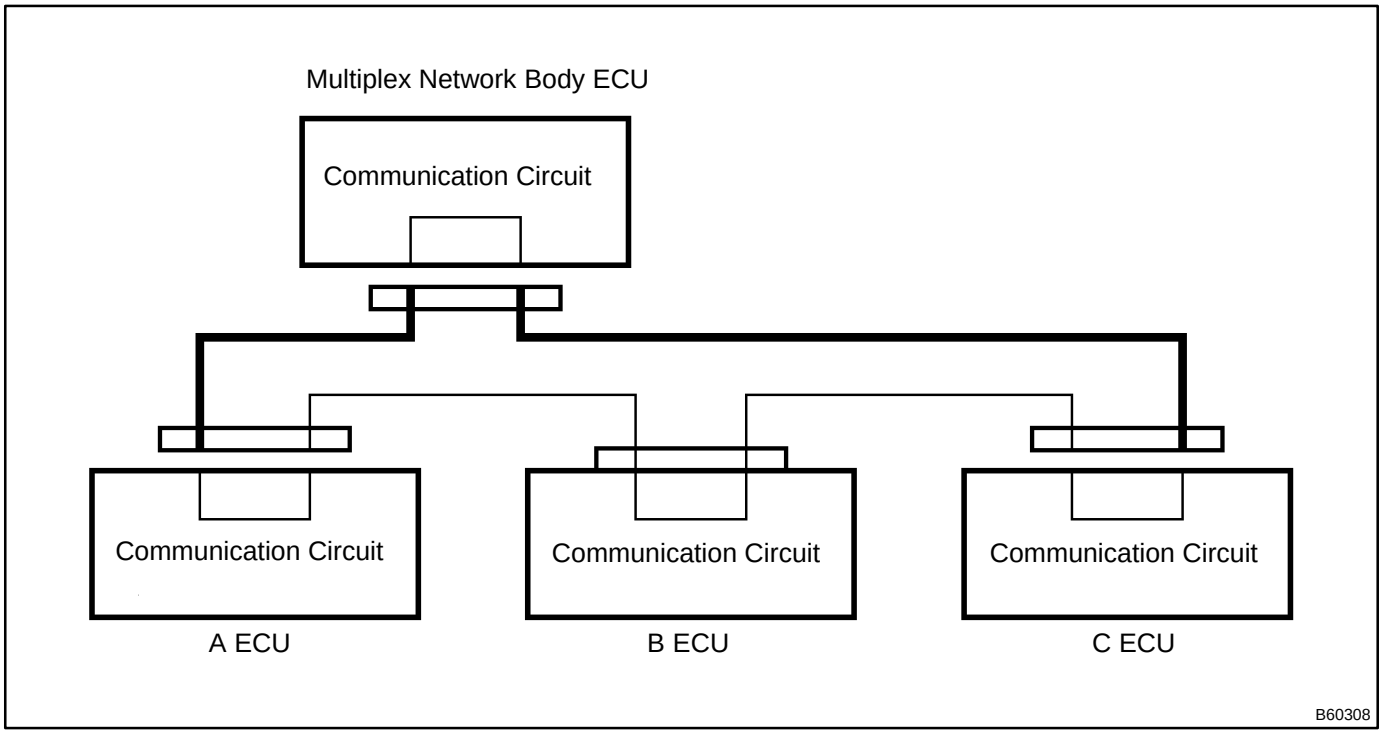
NOTICE:

Disconnect the connectors in the operational sequence, and start the next operation after the connector is connected.

OK	**REPLACE C ECU**
NG	**REPAIR OR REPLACE WIRE HARNESS BETWEEN B ECU AND C ECU**

6	CHECK WIRE HARNESS MPX BODY ECU AND A ECU OR C ECU

(a) Inspect short-circuit in +B or body ground.



(1) Disconnect the connectors of the A ECU and multiplex network body ECU.

(2) Inspect short-circuit in +B of the wire harness between the A ECU and multiplex network body ECU, and also in the body ground.

Standard:

0 V when short-circuited in +B.

No continuity between each ECU terminal and the body ground when short-circuited in the body ground.

HINT:

In this case, the A ECU represents the power window regulator master switch assy (door ECU).

(3) Inspect short-circuit in +B of the wire harness between the C ECU and multiplex network body ECU, and also in the body ground.

Standard:

0 V when short-circuited in +B.

No continuity between each ECU terminal and the body ground when short-circuited in the body ground.

HINT:

In this case, the C ECU represents the ECM.

NG → **REPAIR OR REPLACE WIRE HARNESS BETWEEN MPX BODY ECU AND A ECU OR C ECU**

OK

REPLACE MULTIPLEX NETWORK BODY ECU

DTC B1241 BODY ECU SWITCH CIRCUIT DIAGNOSIS

CIRCUIT DESCRIPTION

These DTC notify how the switch works as follows:
If the DTC is not output when operating the switch, switch contact has failed. If the DTC is output when not operating the switch, it means the switch is ON or stuck. When something wrong is found by this diagnosis, inspect each switch. Replace the switch if there is a problem or check the body ECU and wire harness.

DTC No.	DTC Detecting Condition	Trouble Area
B1241/41	・Driver seat belt buckle switch is OFF (fastened) or stuck ・Light control switch is ON (TAIL) or stuck ・Light control switch is ON (HEAD) or stuck	・Driver seat belt buckle switch ・Light control switch ・Multiplex network body ECU ・Wire harness

HINT:
Please refer to the pages listed below for switch inspection.

- For the driver seat belt buckle switch, see page 05-1898 .
- For the light control switch, see page 05-1586 .

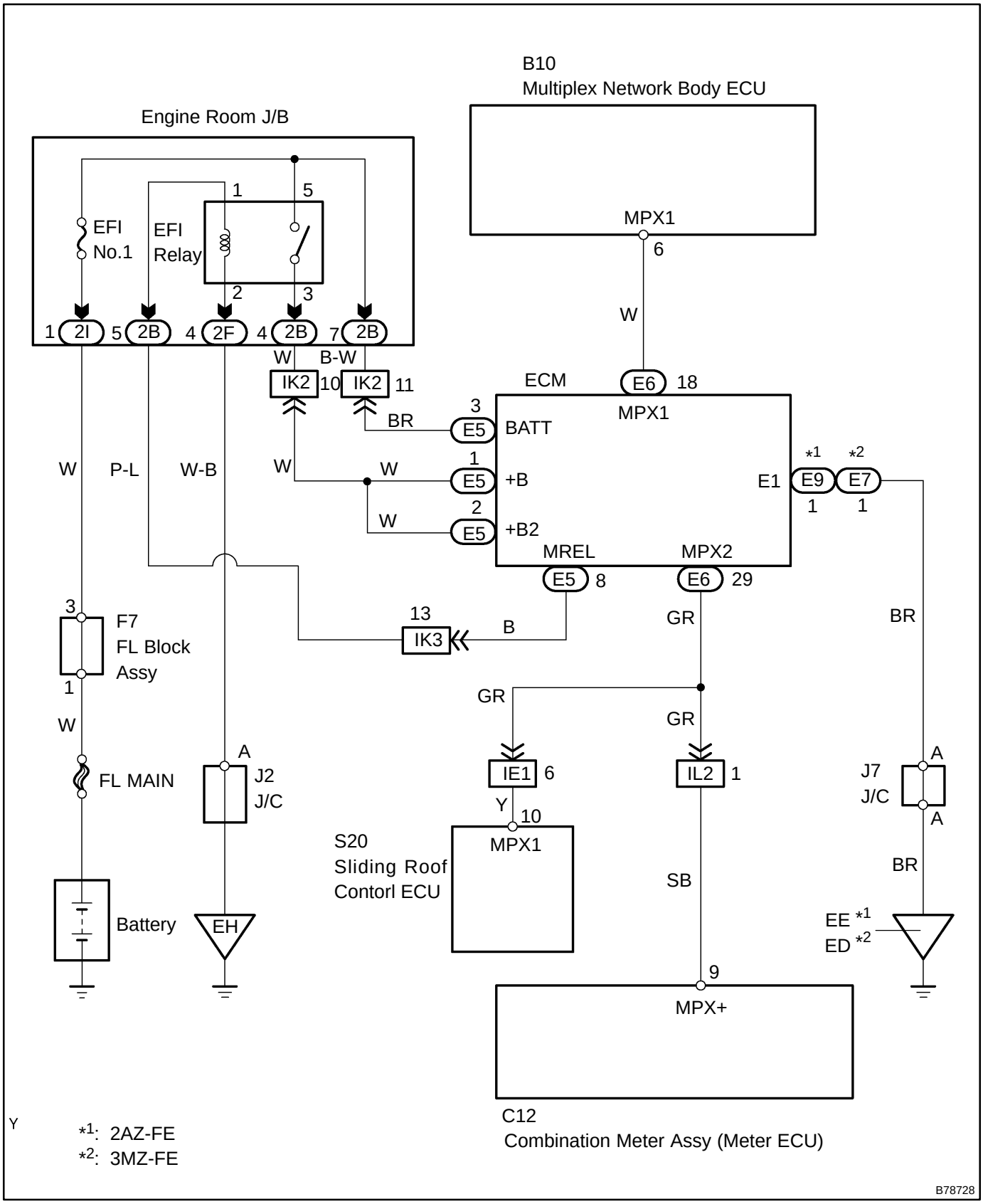
DTC	B1261	ECM (ENGINE ECU) COMMUNICATION STOP

CIRCUIT DESCRIPTION

B1261 will be output when the communication between the ECM and multiplex network body ECU stops for more than 10 seconds.

DTC No.	DTC Detecting Condition	Trouble Area
B1261	No communication from ECM for more than 10 seconds	ECM Wire harness

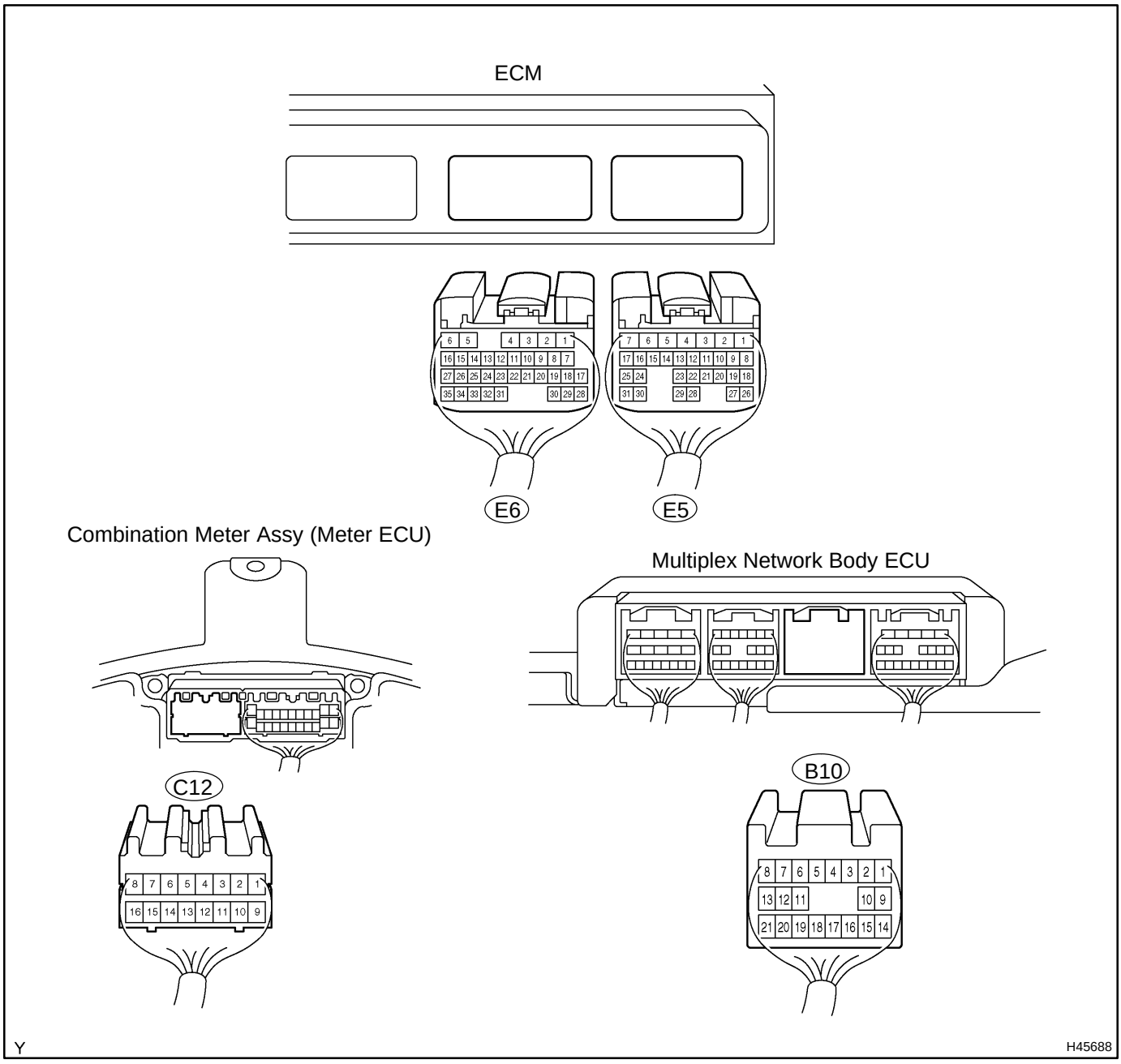
WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK CONTINUITY OF COMMUNICATION LINE

(a) Check the wire harness between the combination meter assy (meter ECU), ECM and multiplex network body ECU



(1) Disconnect the connectors of the meter assy, ECM and body ECU.
(2) Inspect the continuity between terminals E6-18 (MPX1) of the ECM vehicle's side connector and B10-6 (MPX1) of the body ECU vehicle's side connector.

Standard:

Symbols (Terminal No.)	Specified Condition
MPX1 (E6-18) ⇔ MPX1 (B10-6) (equipped with 1MZ-FE)	Continuity
MPX1 (E6-18) ⇔ MPX1 (B10-6) (equipped with 2AZ-FE)	Continuity

(3) Inspect the continuity between terminals E6-29 (MPX2) of the ECM vehicle's side connector and C12-9 (MPX+) of the meter assy vehicle's side connector.

Standard:

Symbols (Terminal No.)	Specified Condition
MPX2 (E6-29) ⇔ MPX+ (C12-9) (equipped with 1MZ-FE)	Continuity
MPX2 (E6-29) ⇔ MPX+ (C12-9) (equipped with 2AZ-FE)	Continuity

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

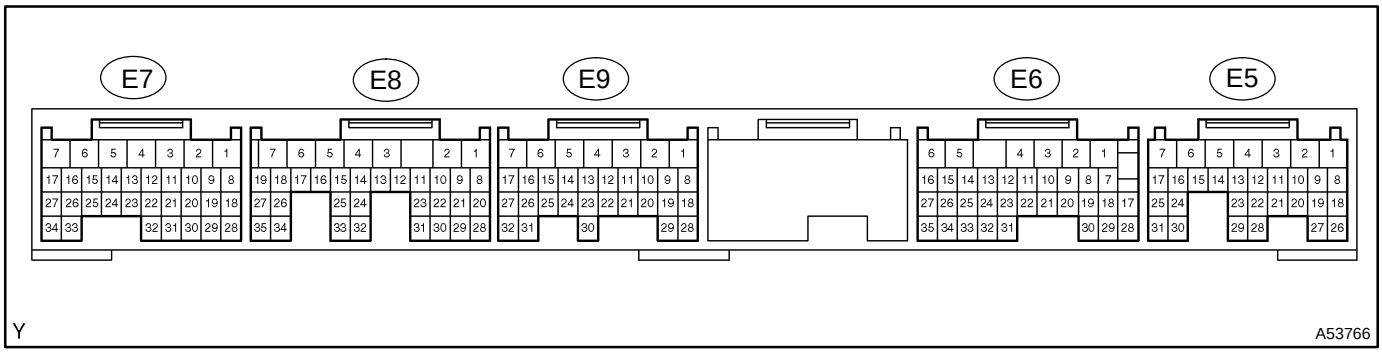
OK

2	CHECK ECM

(a) Inspect the ECM (power source input).

NOTICE:

Do not disconnect the ECM connector. The inspection should be started from the backside of the connector.



Standard:

Symbols (Terminal No.)	In/Output	Condition	Specified Condition
BATT (E5-3) ⇔ Body ground	Input	Constant	9 - 14 V
+B (E5-1) ⇔ Body ground	Input	Engine stopped, ignition switch ON	9 - 14 V
+B2 (E5-2) ⇔ Body ground	Input	Engine stopped, ignition switch ON	9 - 14 V

NG → **REPAIR OR REPLACE FUSE OR WIRE HARNESS AND CONNECTOR**

OK

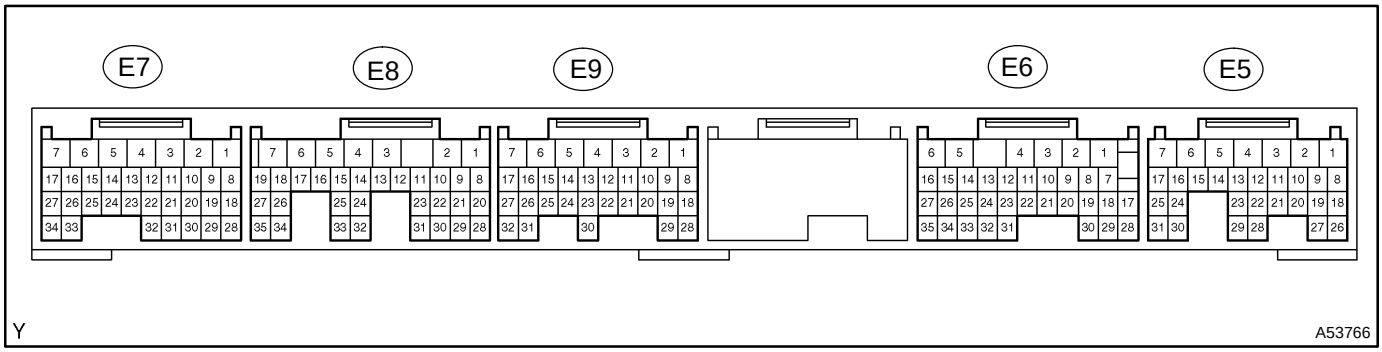
3	CHECK ECM

(a) Inspect the ECM (body ground).

NOTICE:

Do not disconnect the ECM connector. The inspection should be started from the backside of the connector.

(1) Inspect the continuity between each terminal of the ECM connector and the body ground.



Standard:

Symbols (Terminal No.)	In/Output	Condition	Specified Condition
E1 (E9-1 (*1), E7-1 (*2)) ⇔ Body ground	Input	Constant	Continuity

(*1) : 2AZ-FE

(*2) : 3MZ-FE

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE ECM

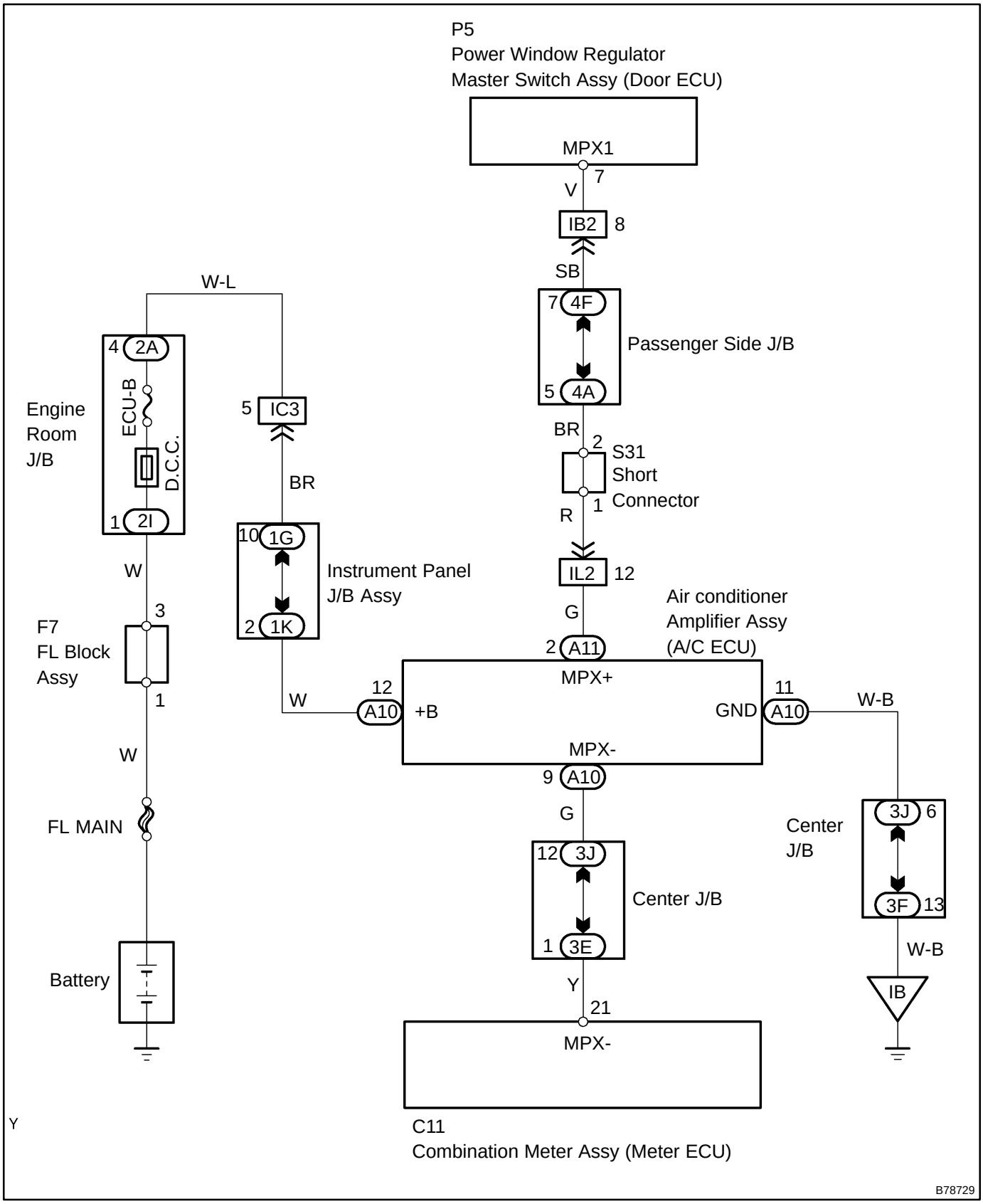
DTC B1262/62 A/C ECU COMMUNICATION STOP

CIRCUIT DESCRIPTION

B1262/62 will be output when the communication between the air conditioner amplifier assy (A/C ECU) and multiplex network body ECU stops for more than 10 seconds.

DTC No.	DTC Detecting Condition	Trouble Area
B1262/62	No communication from A/C ECU for more than 10 seconds	・Air conditioner amplifier assy (A/C ECU) ・Wire harness

WIRING DIAGRAM

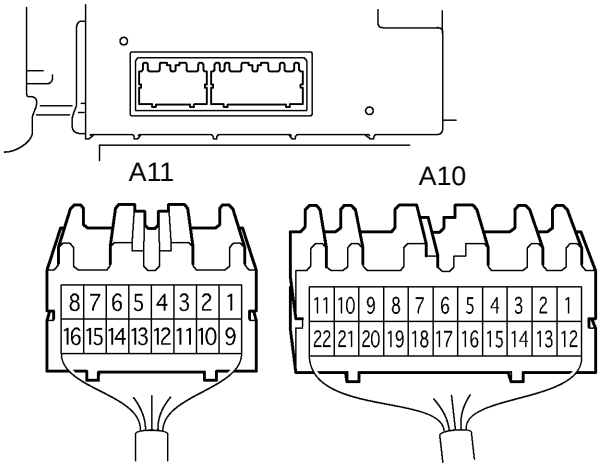


INSPECTION PROCEDURE

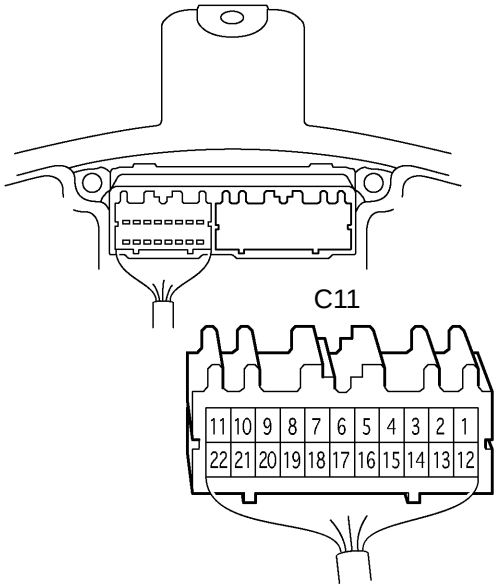
1	CHECK CONTINUITY OF COMMUNICATION LINE

(a) Inspect the wire harness between the combination meter assy (meter ECU), air conditioner amplifier assy (A/C ECU) and power window regulator master switch assy (door ECU).

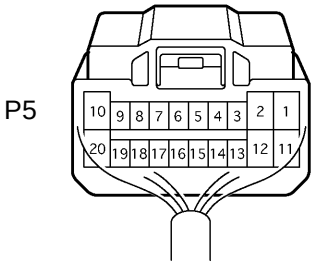
Air Conditioner Amplifier Assy (A/C ECU)



Combination Meter Assy (Meter ECU)



Power Window Regulator
Master Switch Assy (Door ECU)



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B51594

(1) Disconnect the connectors of the air conditioner amplifier, master switch and meter assy.
(2) Inspect the continuity between terminal A10-9 (MPX-) of the air conditioner amplifier vehicle's side connector and terminal C11-21 (MPX-) of the meter assy vehicle's side connector.

Standard: Continuity

(3) Inspect the continuity between terminal A11-2 (MPX+) of the air conditioner amplifier vehicle's side connector and terminal P5-7 (MPX1) of the master switch.

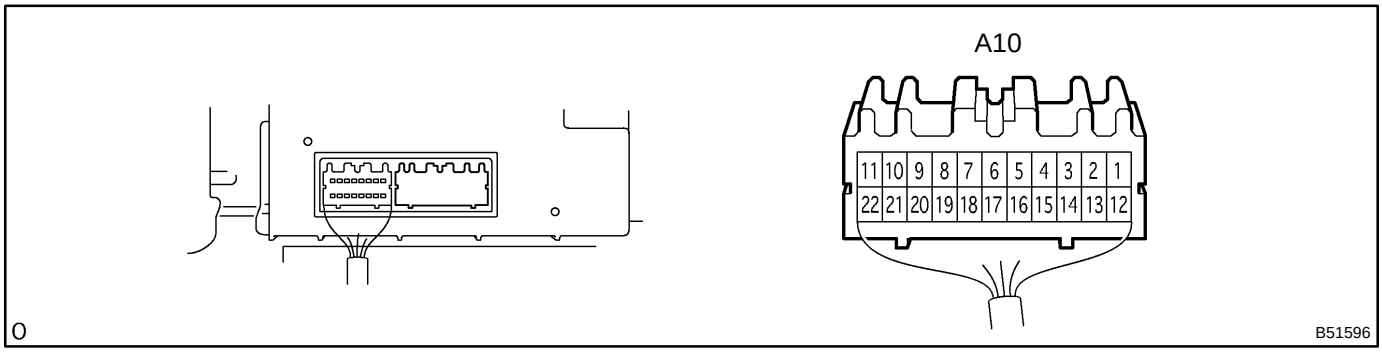
Standard: Continuity

NG	**REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

2	**CHECK AIRCONDITIONER AMPLIFIER ASSY**

(a) Inspect the air conditioner amplifier assy (A/C ECU) (power source input).



(1) Disconnect the air conditioner amplifier connector A10.
(2) Inspect the voltage between terminal A10-12 (+B) of the vehicle's side connector and the body ground.

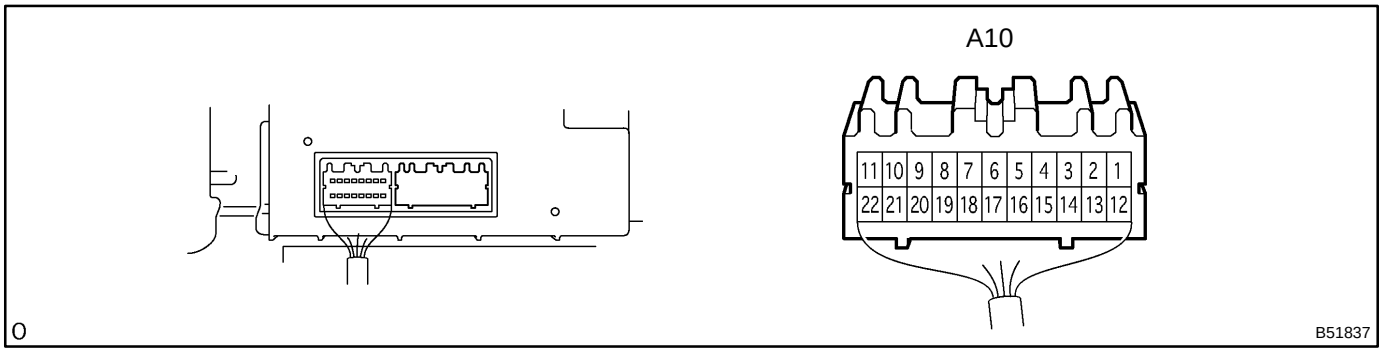
Standard: 10 - 14 V

NG	**REPAIR OR REPLACE FUSE OR WIRE HARNESS AND CONNECTOR**

OK

3	CHECK AIRCONDITIONER AMPLIFIER ASSY

(a) Inspect the air conditioner amplifier assy (A/C ECU) (body ground).



(1) Disconnect the air conditioner amplifier connector A10.
(2) Inspect the continuity between terminal A10-11 (GND) of the vehicle's side connector and the body ground.

Standard: Continuity

NG	REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

REPLACE AIRCONDITIONER AMPLIFIER ASSY

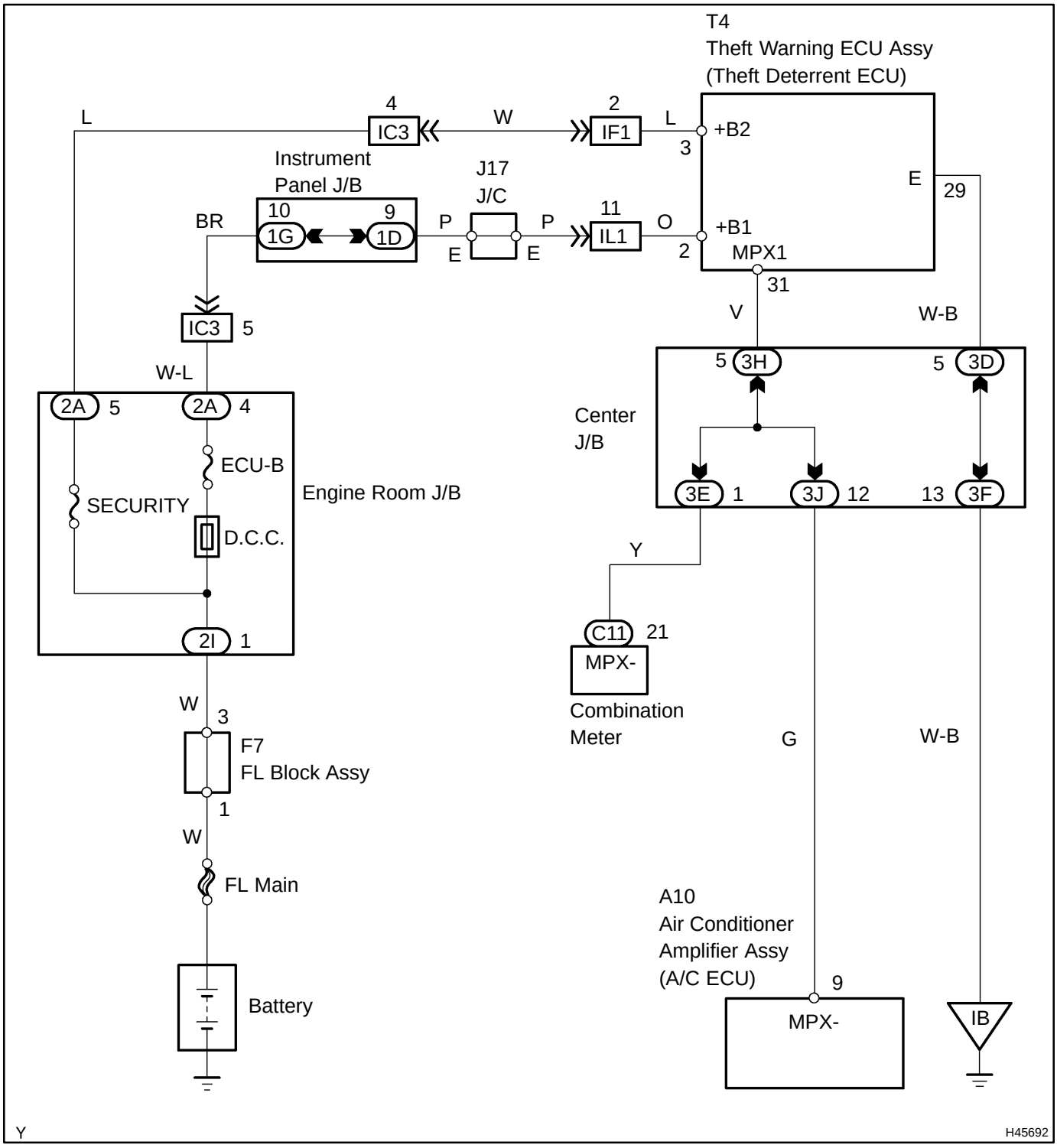
DTC	B1269/69	THEFT DETERRENT ECU COMMUNICATION STOP

CIRCUIT DESCRIPTION

B1269/69 will be output when the communication between the theft warning ECU assy (theft deterrent ECU) and multiplex network body ECU stops for more than 10 seconds.

DTC No.	DTC Detecting Condition	Trouble Area
B1269/69	No communication from theft deterrent ECU for more than 10 seconds	・Theft warning ECU assy (theft deterrent ECU) ・Wire harness

WIRING DIAGRAM

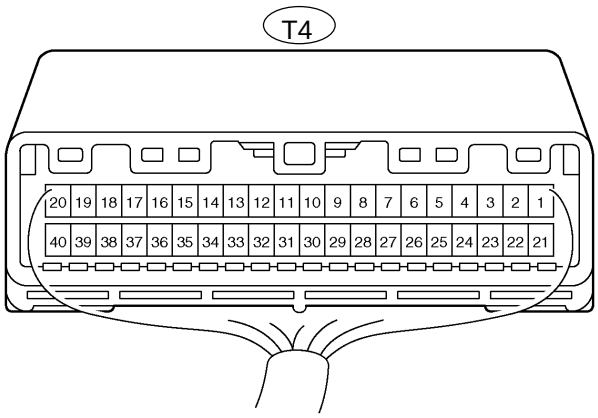


INSPECTION PROCEDURE

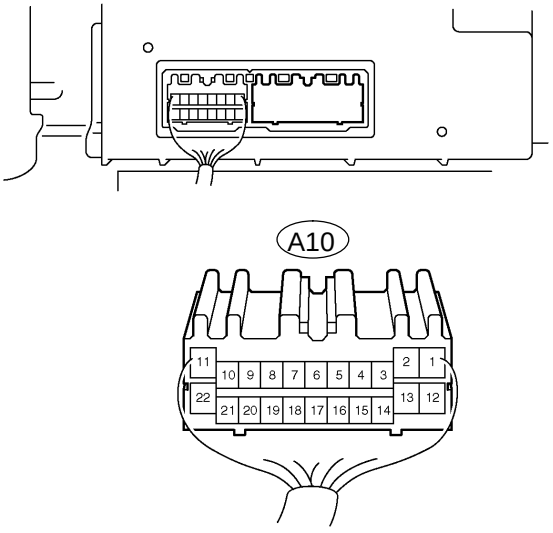
1	CHECK CONTINUITY OF COMMUNICATION LINE

(a) Check the wire harness between the combination meter, theft warning ECU assy (theft deterrent ECU) and airconditioner amplifier assy (A/C ECU).

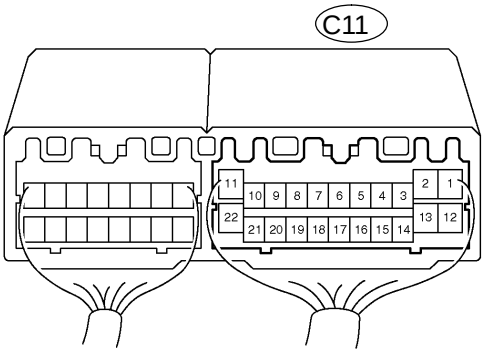
Theft Warning ECU Assy
(Theft Deterrent ECU)



Air Conditioner
Amplifier Assy
(A/C ECU)



Combination Meter



Y H45691

(1) Disconnect the connectors of the theft warning ECU, master switch and air conditioner amplifier.
(2) Check the continuity between terminal T4-31 (MPX1) of the theft warning ECU vehicle's side connector and terminal C11-21 (MPX-) of the master switch vehicle's side connector.
(3) Check the continuity between terminal T4-31 (MPX1) of the theft warning ECU vehicle's side connector and terminal A10-9 (MPX-) of the air conditioner amplifier vehicle's side connector.

Standard: Continuity

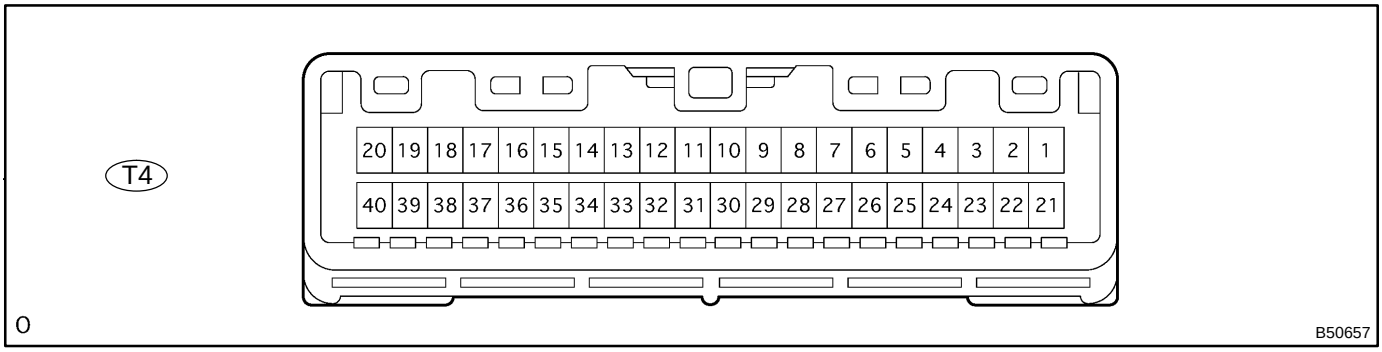
NG	**REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

2	**CHECK THEFT WARNING ECU ASSY**

(a) Inspect the theft warning ECU assy (theft deterrent ECU) (power source input).
(1) Disconnect the theft warning ECU connector.
(2) Check the voltage between terminal T4-2 (+B1) and T4-8 (+B2) of the theft warning ECU and the body ground.

Standard: 10 - 14 V



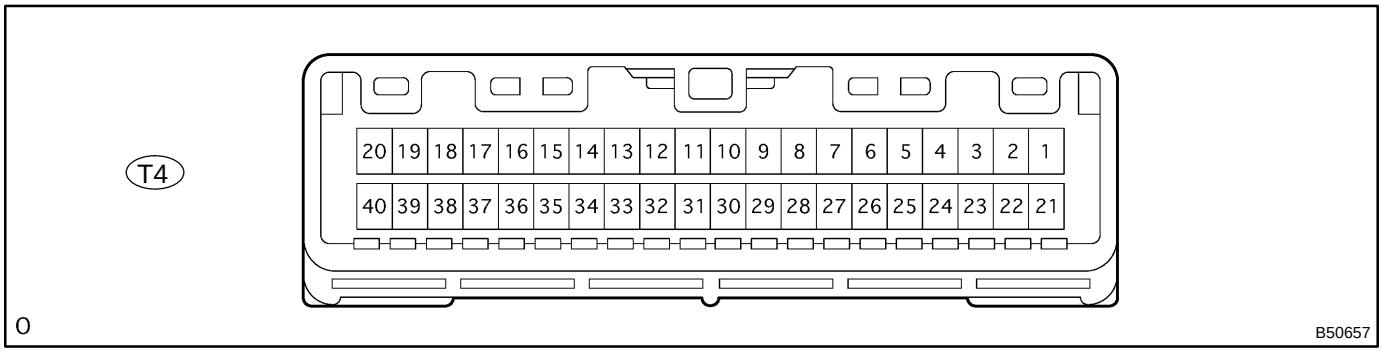
NG	**REPAIR OR REPLACE FUSE OR WIRE HARNESS AND CONNECTOR**

OK

3	CHECK THEFT WARNING ECU ASSY

(a) Inspect the theft warning ECU assy (theft deterrent ECU) (body ground).
  (1) Disconnect the theft warning ECU connector.
  (2) Check the continuity between terminal T4-29 (E) of the theft warning ECU vehicle's side connector and the body ground.

Standard: Continuity



NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE THEFT WARNING ECU ASSY

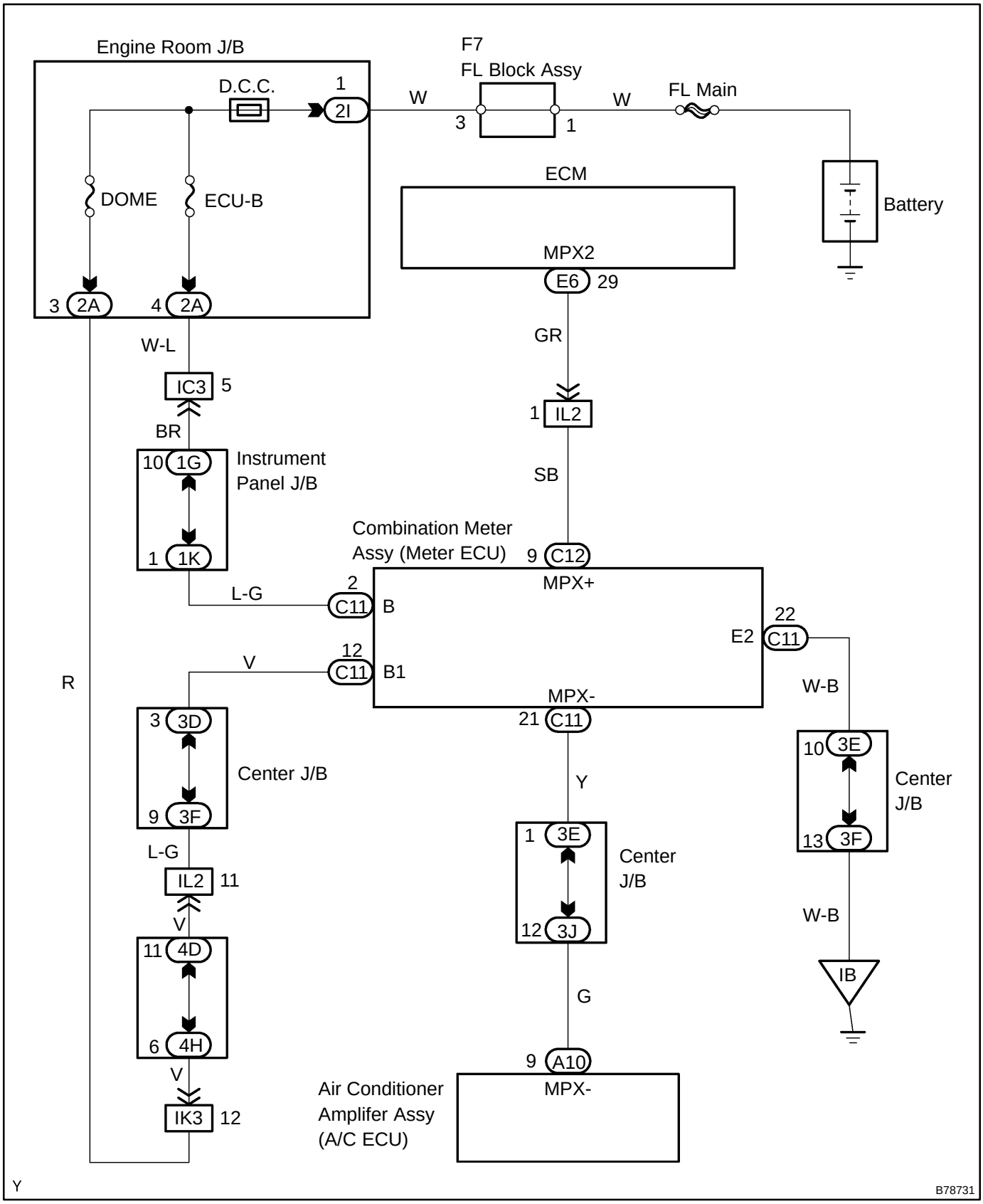
DTC	B1271	COMBINATION METER ECU COMMUNICATION STOP

CIRCUIT DESCRIPTION

B1271 will be output when the communication between the combination meter assy (meter ECU) and multiplex network body ECU stops for more than 10 seconds.

DTC No.	DTC Detecting Condition	Trouble Area
B1271	No communication from meter ECU for more than 10 seconds	›Combination meter assy (meter ECU) ›Wire harness

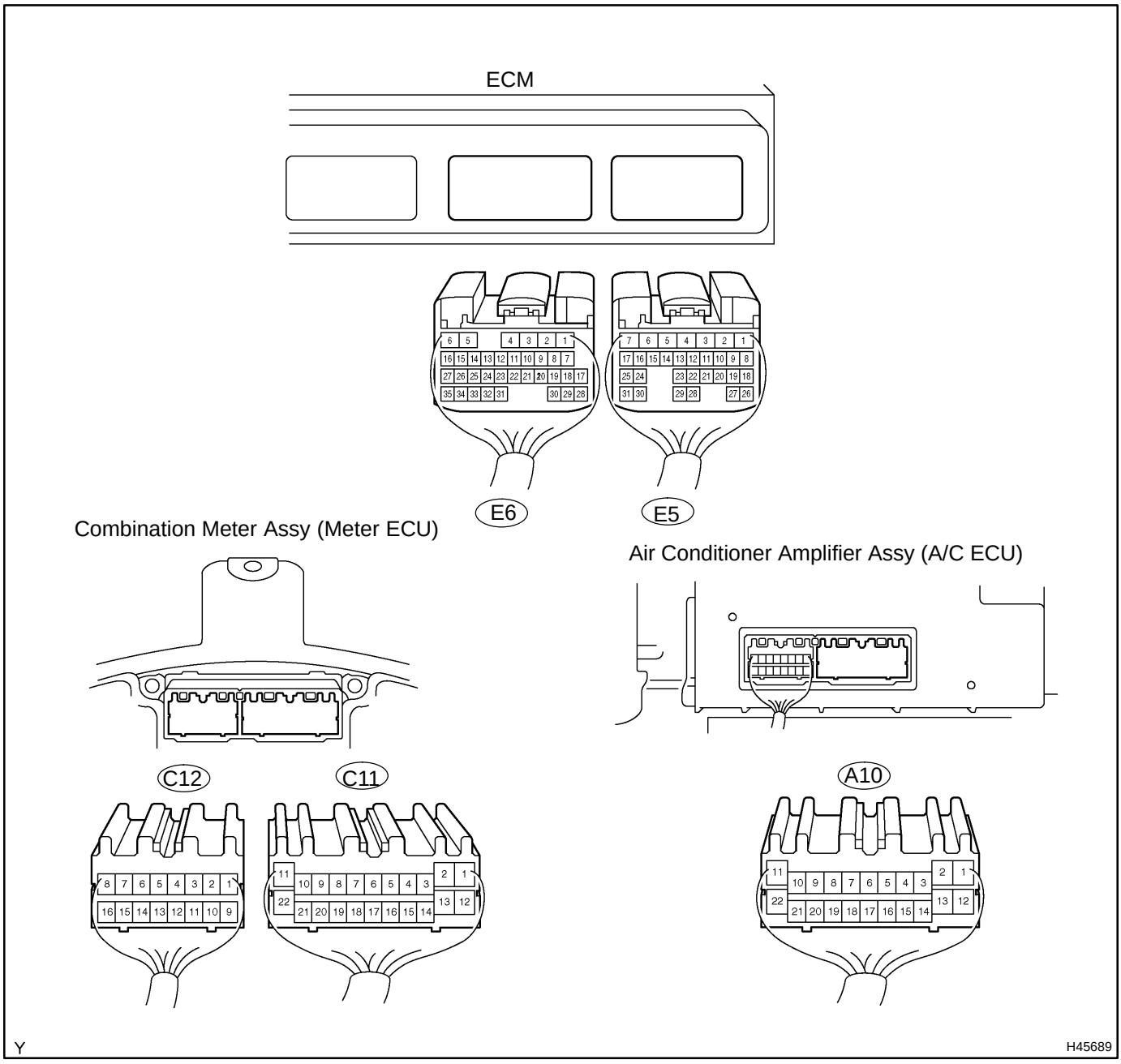
WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK CONTINUITY OF COMMUNICATION LINE

(a) Inspect the wire harness between the ECM, combination meter assy (meter ECU) and air conditioner amplifier assy (A/C ECU).



(1) Disconnect the connectors of the meter assy, ECM and air conditioner amplifier.
(2) Inspect the continuity between terminal C12-9 (MPX+) of the meter assy vehicle's side connector and terminal E6-29 (MPX2) of the ECM vehicle's side connector.

Standard:

Symbols (Terminal No.)	Specified Condition
MPX+ (C12-9) ⇔ MPX2 (E6-29) (equipped with 1MZ-FE)	Continuity
MPX+ (C12-9) ⇔ MPX2 (E6-29) (equipped with 2AZ-FE)	Continuity

(3) Inspect the continuity between terminal C11-21 (MPX-) of the meter assy vehicle's side connector and terminal A10-9 (MPX-) of the air conditioner amplifier vehicle's side connector.

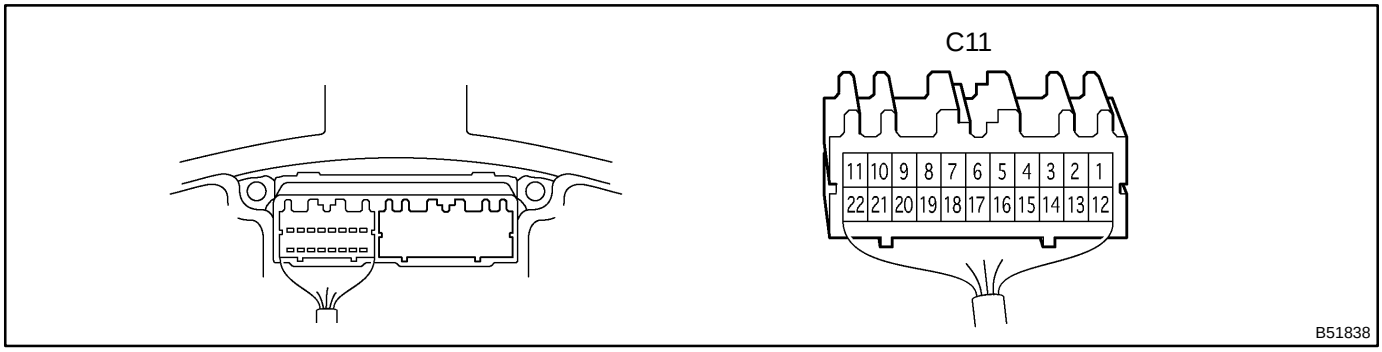
Standard: Continuity

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

2 CHECK COMBINATION METER ASSY

(a) Inspect the combination meter assy (meter ECU) (power source input).



(1) Disconnect the meter assy connector C11.
(2) Inspect the voltage of each terminal of the vehicle's side connector.

Standard:

Symbols (Terminal No.)	Condition	Specified Condition
B (C11-2) ⇔ Body ground	Constant	10 - 14 V
B1 (C11-12) ⇔ Body ground	Constant	10 - 14 V

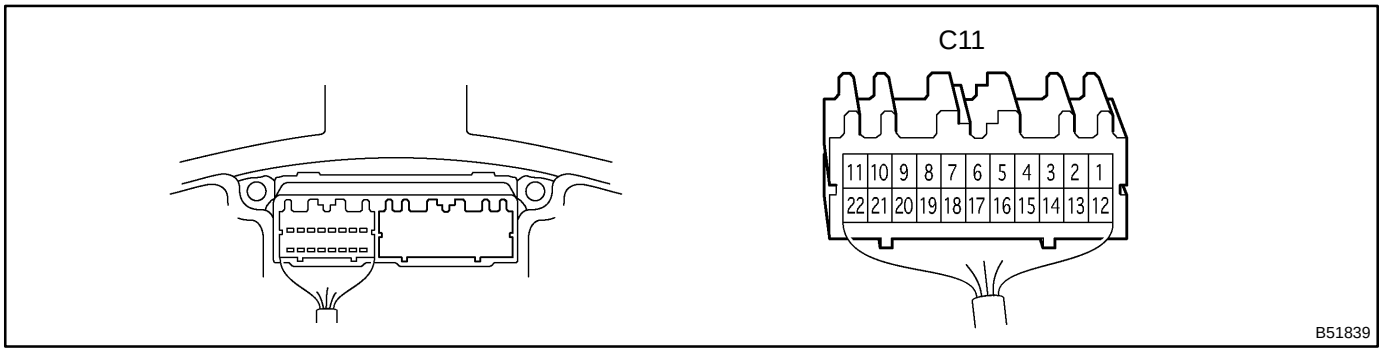
HINT:
If the value is not as specified, there may be a malfunction in the vehicle's side connector.

NG → **REPAIR OR REPLACE FUSE OR WIRE HARNESS AND CONNECTOR**

OK

3	CHECK COMBINATION METER ASSY

(a) Inspect the combination meter assy (meter ECU) (body ground).



(1) Disconnect the meter assy connector C11.
(2) Inspect the continuity between terminal C11-22 (E2) of the vehicle's side connector and the body ground.

Standard: Continuity

NG	REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

REPLACE COMBINATION METER ASSY

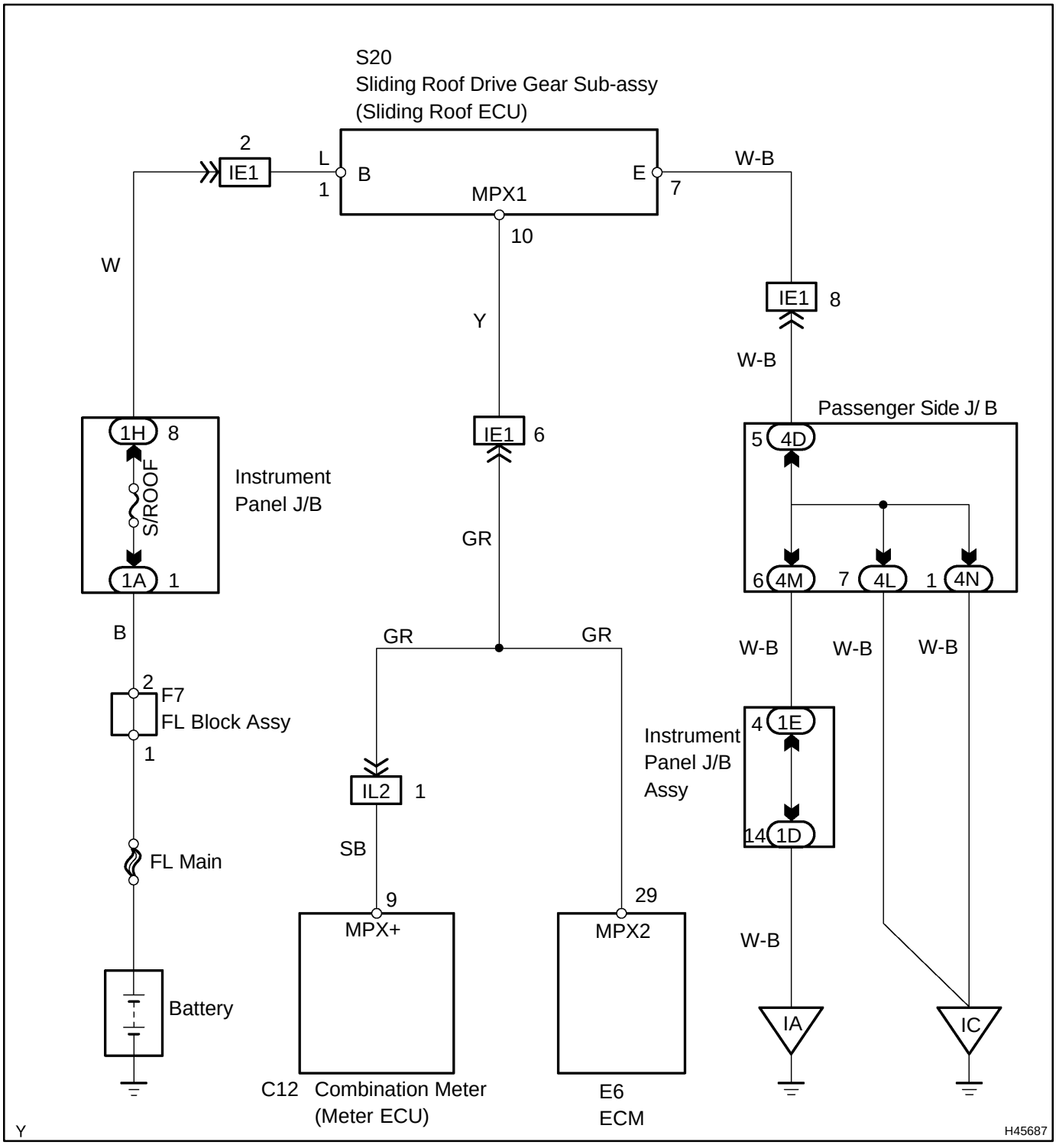
DTC	B1273/73	SLIDING ROOF ECU COMMUNICATION STOP

CIRCUIT DESCRIPTION

B1273/73 will be output when the communication between the sliding roof drive gear sub-assy (sliding roof ECU) and the MPX body ECU stops for more than 10 seconds.

DTC No.	DTC Detecting Condition	Trouble Area
B1273/73	No communication from sliding roof ECU for more than 10 seconds	・Sliding roof drive gear sub-assy (sliding roof ECU) ・Wire harness

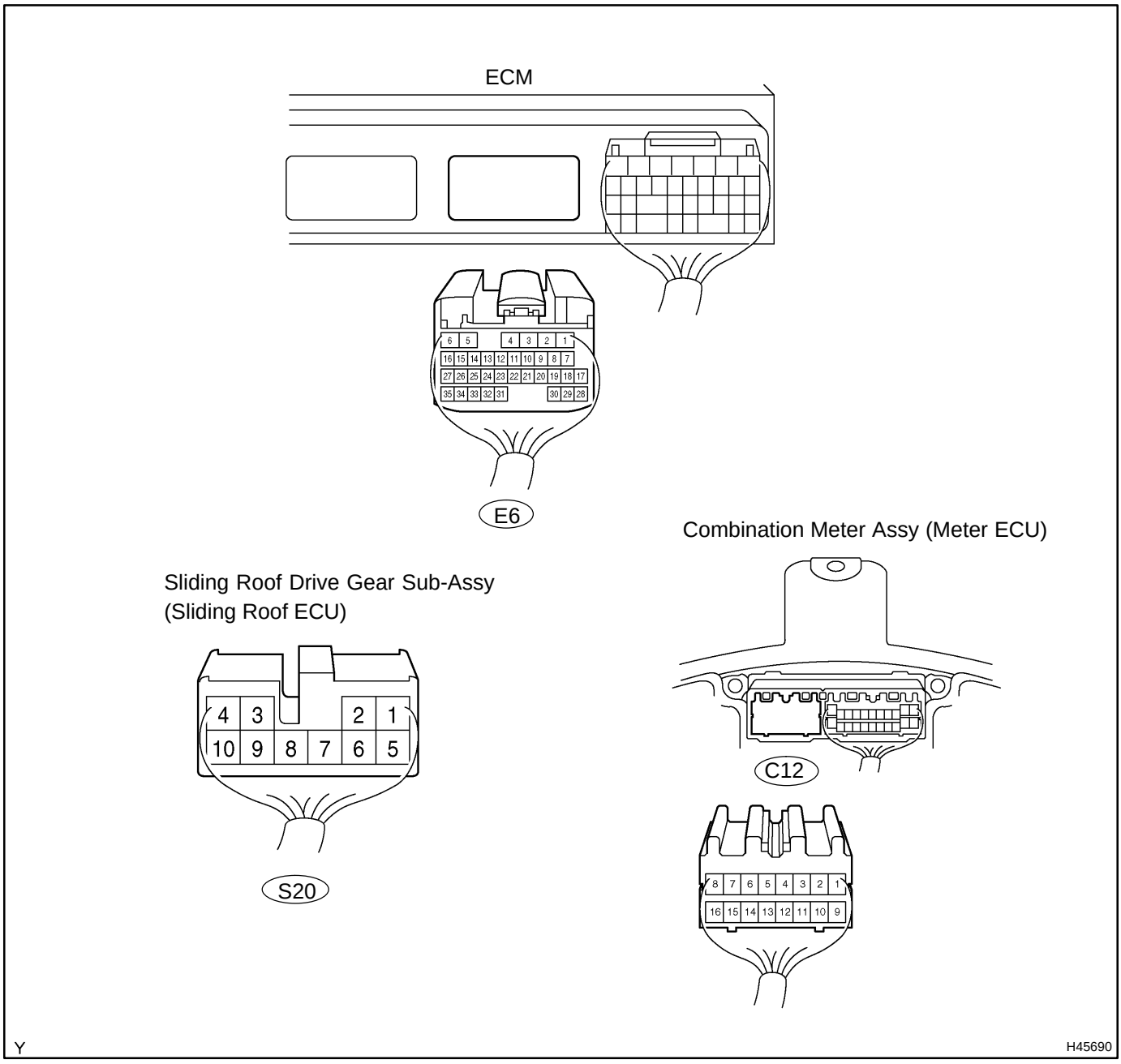
WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK CONTINUITY OF COMMUNICATION LINE

(a) Inspect the wire harness between the ECM, sliding roof drive gear sub-assy (sliding roof ECU) and combination meter assy (meter ECU).



(1) Disconnect the connectors of the sliding roof ECU, ECM and meter assy.
(2) Inspect the continuity between terminal S20-10 (MPX1) of the sliding roof ECU vehicle's side connector and terminal E6-29 (MPX2) of the ECM vehicle's side connector.

Standard:

Symbols (Terminal No.)	Specified Condition
MPX1 (S20-10) ⇔ MPX2 (E6-29) (equipped with 1MZ-FE)	Continuity
MPX1 (S20-10) ⇔ MPX2 (E6-29) (equipped with 2AZ-FE)	Continuity

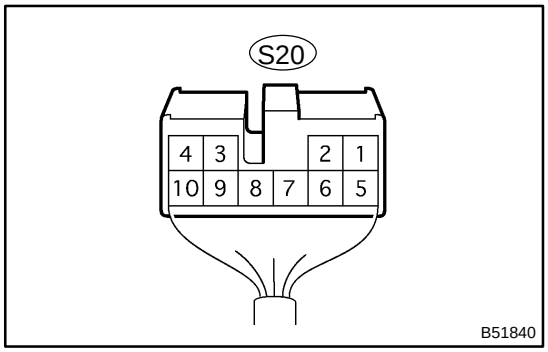
(3) Inspect the continuity between terminal S20-10 (MPX1) of the sliding roof ECU vehicle's side connector and terminal C12-9 (MPX+) of the meter assy vehicle's side connector.

Standard: Continuity

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

2 CHECK SLIDING ROOF DRIVE GEAR SUB-ASSY



(a) Inspect the sliding roof drive gear sub-assy (sliding roof ECU).
(1) Disconnect the sliding roof ECU connector.
(2) Inspect the voltage of each terminal of the vehicle's side connector.

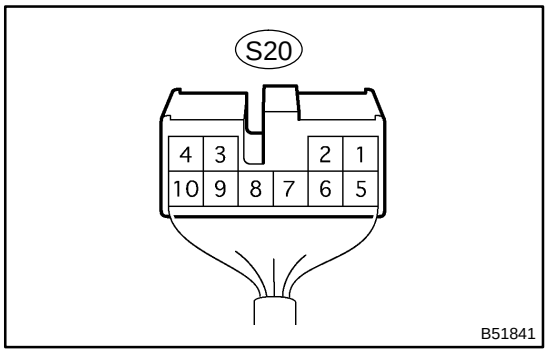
Standard:

Symbols (Terminal No.)	Condition	Specified Condition
B (S20-1) ⇔ Body ground	Constant	10 - 14 V

NG → **REPAIR OR REPLACE FUSE OR WIRE HARNESS AND CONNECTOR**

OK

3	CHECK SLIDING ROOF DRIVE GEAR SUB-ASSY



(a) Inspect the sliding roof drive gear sub-assy (sliding roof ECU).
  (1) Disconnect the sliding roof ECU connector.
  (2) Inspect the voltage of each terminal of the vehicle's side connector.

Standard:

Symbols (Terminal No.)	Condition	Specified Condition
E (S20-7) ⇔ Body ground	Constant	Continuity

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE SLIDING ROOF DRIVE GEAR SUB-ASSY

0523T-05

DIAGNOSTIC TROUBLE CODE CHART

1. BODY ECU DIAGNOSTIC TROUBLE CODE

DTC Code	Lamp Code	Diagnostic Item	Diagnostic Result
B1200	Normal code	Normal	Normal
B1211	11	Power window regulator master switch assy (door ECU) communication stop	No communication from door ECU for more than 10 seconds
B1214	-	Communication bus +B battery system short	Communication circuit and +B battery system short
B1215	-	Communication bus (body ground) short	Communication bus and body ground short
B1241	41	Body ECU switch circuit diagnosis	Switch is ON or stuck
B1261	-	ECM communication stop	No communication from ECM for more than 10 seconds
B1262	62	Airconditioner amplifier assy (A/C ECU) communication stop	No communication from A/C ECU for more than 10 seconds
B1269	69	Theft warning ECU assy (theft deterrent ECU) communication stop	No communication from theft warning ECU for more than 10 seconds
B1271	-	Combination meter assy (meter ECU) communication stop	No communication from meter ECU for more than 10 seconds
B1273	73	Sliding roof drive gear sub-assy (sliding roof ECU) communication stop	No communication from sliding roof ECU for more then 10 seconds

MULTIPLEX COMMUNICATION SYSTEM

0523R-05

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

Troubleshoot in accordance with the procedure on the following pages.

1	VEHICLE BROUGHT TO WORKSHOP

2	SYMPTOM CHECK

3	INSPECT COMMUNICATION FUNCTION OF LARGE-SCALE MULTIPLEX COMMUNICATION SYSTEM (BEAN)

(a) Check that there is no abnormality in the communication system by inspecting the communication function of the multiplex communication system with the hand-hel tester.
  (1) (ECU communication stop, communication line abnormal) With code output, proceed to A.
  (2) (ECU communication stop, communication line abnormal) Without code output, proceed to B.

B → GO TO SECTION OF EACH SYSTEM

A

4	DIAGNOSTIC TROUBLE CODE CHECK (See page 05-2044)

(a) Check a DTC and note it if a code is output.
(b) Delete the DTC.
(c) Check if the DTC will be output once again, when the problem symptom is simulated based on the noted code.
  (1) When no code is output (symptom check and simulation is possible), proceed to A.
  (2) When no code is output (symptom check and simulation is impossible), proceed to B.
  (3) When the code is output, proceed to C.

B → GO TO PROBLEM SIMULATION (See page 01-26)

C → Go to step 7

A

5	PROBLEM SYMPTOMS TABLE (See page 05-2050)

(a) Without applicable symptoms, proceed to A.
(b) With applicable symptoms, proceed to B.

B → Go to step 7

A

6	**PERFORM TROUBLESHOOTING IN THE FOLLOWING METHOD, DEPENDING ON MALFUNCTION SYMPTOM**

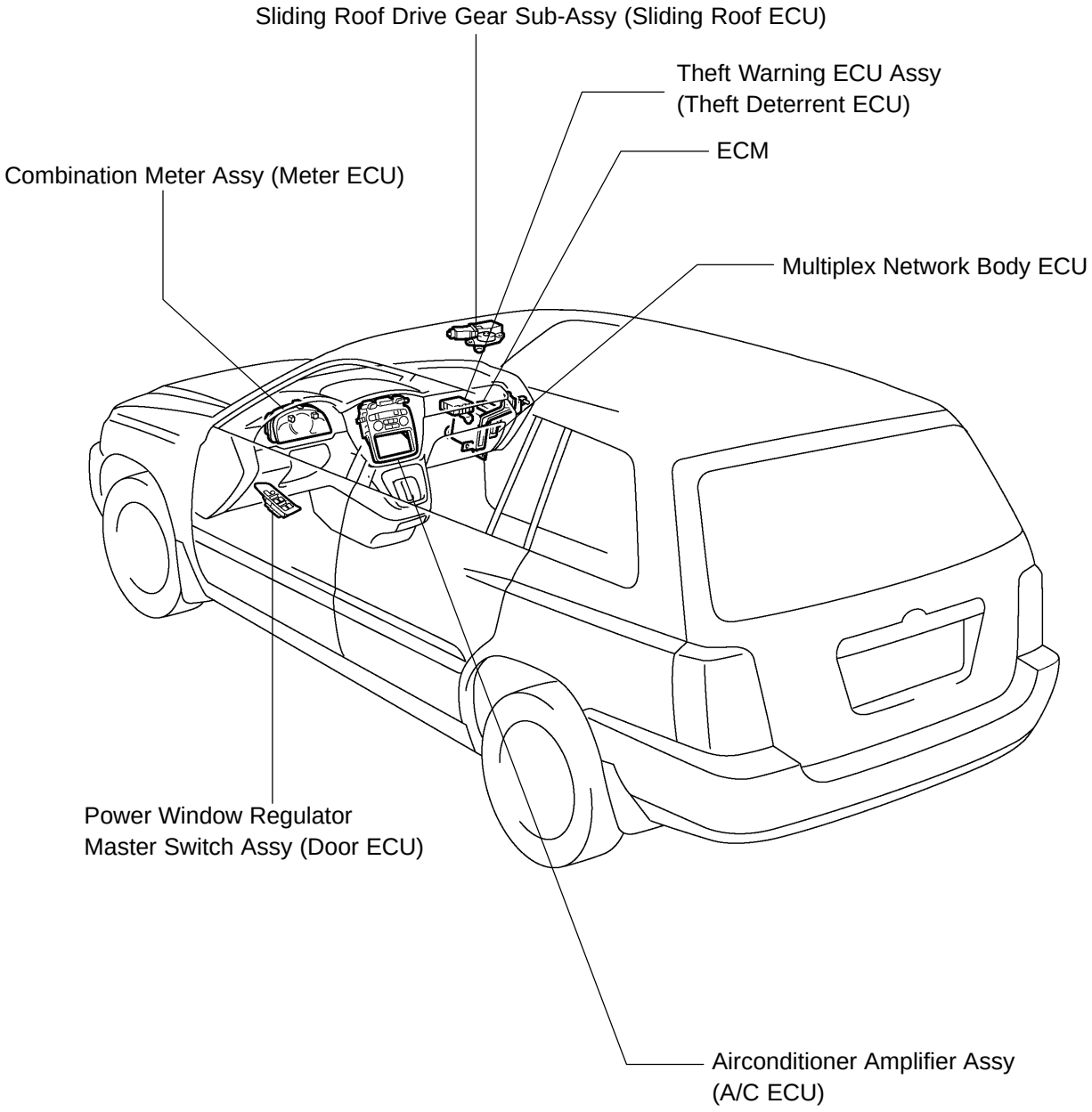
(a) Pre-check (See page 05-2042)
(b) Terminals of ECU (See page 05-2046)

7	**ADJUSTMENT, REPAIR OR REPLACEMENT**

END

0523U-04

LOCATION



O

B51250

0523S-03

PRE-CHECK

1. MULTIPLEX COMMUNICATION SYSTEM (BEAN)

(a) The BEAN communication line is used for the body, meters and air conditioning controls. Since the line is loop-shaped, the communication can be kept by the line that is not open even if a part of the line becomes open for some reasons. In case that the line becomes short (bus-down) for some reasons, however, all the BEAN communication will be impossible and some DTC will be output.

HINT:

When a bus-down occurs, the communication from the related ECU will stop. Therefore, an outputs of a DTC will be impossible. So, perform a DTC (SAE code) inspection with the hand-held tester.

2. COMMUNICATION FUNCTION INSPECTION

(a) Inspect the battery positive voltage.
Standard: 10 - 14 V

(b) Perform a DTC check of the body ECU by connecting the hand-held tester to the DLC3 and turning the ignition switch ON.
(1) Check that the DTCs of the ECU unconnected and also a short-circuit in the communication bus are not output.

3. INSPECT OUTPUT OF DTC BY DOOR OPEN INDICATOR

(a) Inspect the battery positive voltage.
Standard: 10 - 14 V (when engine stopped)

(b) Check the DTC output.

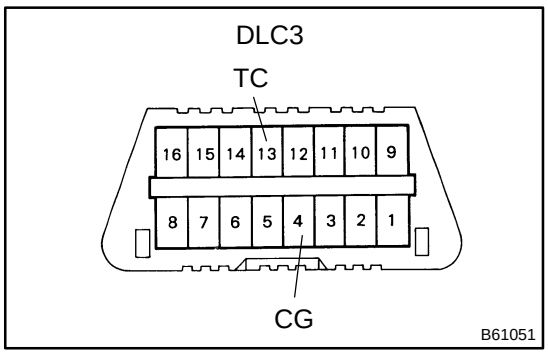
NOTICE:

No abnormality exists in all the following items; door open indicator LED, wire harness, courtesy lamp switch's contact condition, multiplex network body ECU, etc.

(1) Check that the door open indicator will be on when any of the doors is opened.

HINT:

In case that the indicator will not be on, the following problems are possible reasons; door open indicator LED defective, wire harness short, courtesy light switch's contact condition defective, multiplex network body ECU defective, etc.



(2) Using SST (diagnosis check wire), make a short-circuit between terminals TC (13) and CG (4) of the DLC3 connector.
SST 09843-18040

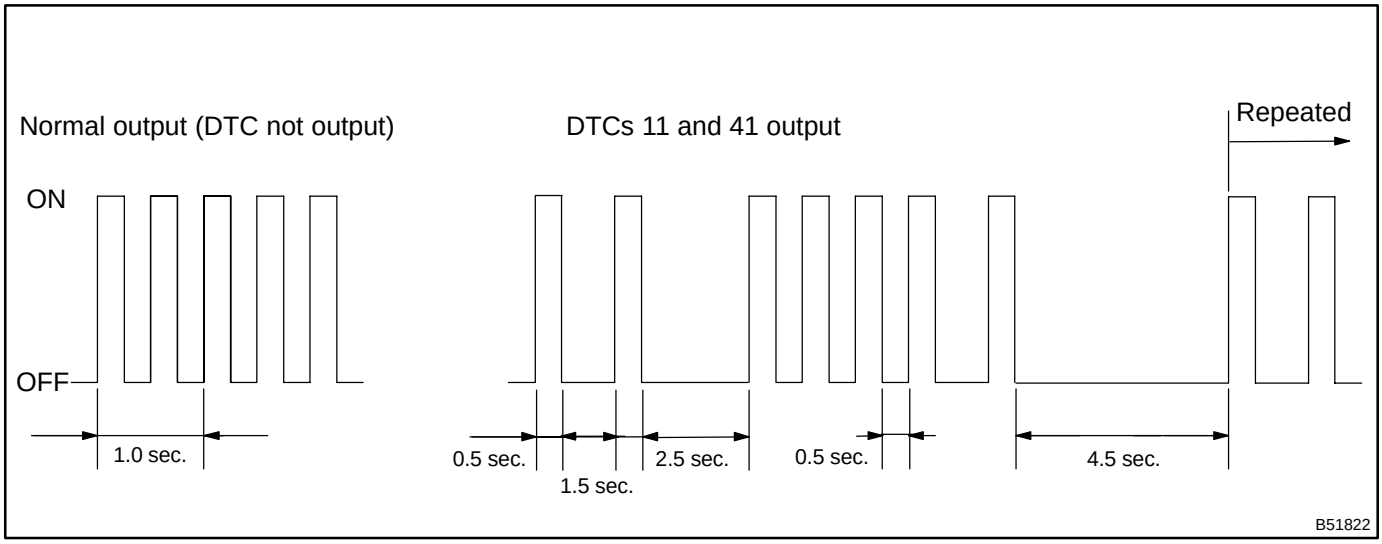
NOTICE:

Do not make a short-circuit in any other positions.

(3) Turn the ignition (starter) switch ON and read the number of blinks of the door open indicator.

HINT:

When 2 or more codes are output simultaneously, the display will be started from the smallest numbered code.



(4) When the DTC of the ECU unconnected is displayed, perform an inspection depending on the troubleshooting.

HINT:

- When the communication bus is defective, the door open indicator in the meter will not be on. Therefore no DTC will be output.
- When other DTCs are output, refer to the DTC chart and applicable section.
- When no normal output is output even in the normal condition, problems, such as a short-circuit between terminals TC and CG, meter fuses defective, etc., may exist.
- When the door open indicator is always on, the wire harness might be short-circuited.

4. INSPECT OUTPUT OF DTC WITH HAND-HELD TESTER

(a) Inspect the battery positive voltage.

Standard: 10 - 14 V

(b) Inspect the DTC monitor code output.

(1) Connect the hand-held tester to the DLC3 and turn the ignition (starter) switch ON, then check the DTC.

HINT:

When the DTC check is impossible, check the following items.

- ECU data monitor is possible (multiplex network body ECU is defective).
- The display shows a communication error (refer to the new diagnostic system and operations when an error occurred). (See page 01-26)

(2) When the display shows DTCs that the ECU is unconnected and the communication bus is defective, perform an inspection depending on the troubleshooting.

HINT:

When other DTCs are output, refer to the DTC chart and applicable section.

0523W-04

PROBLEM SYMPTOMS TABLE

1. TROUBLESHOOTING FOR EACH PROBLEM SYMPTOM

NOTICE:

Confirm the problem symptom and make an inspection depending on the applicable flow chart.

Problem Symptom	Suspected Area	See Page
B1211/11 (no communication from driver door ECU for more than 10 seconds)	1. Power window regulator master switch assembly 2. Wire harness	05-2051 05-2051
B1214 (short in communication circuit and +B power source system)	1. Power window regulator master switch assembly 2. ECM 3. Air conditioning amplifier assembly 4. Combination meter assembly 5. Theft warning ECU 6. Sliding roof drive gear 7. Wire harness 8. MPX body ECU	05-2056 05-2056 05-2056 05-2056 05-2056 05-2056 05-2056 05-2056
B1215 (short in communication circuit and body ground)	1. Power window regulator master switch assembly 2. ECM 3. Air conditioning amplifier assembly 4. Combination meter assembly 5. Theft warning ECU 6. Sliding roof drive gear 7. Wire harness 8. MPX body ECU	05-2056 05-2056 05-2056 05-2056 05-2056 05-2056 05-2056 05-2056
B1261 (no communication from ECM for more than 10 seconds)	1. ECM 2. Wire harness	05-2065 05-2065
B1262/62 (no communication from A/C ECU for more than 10 seconds)	1. Air conditioning amplifier assembly 2. Wire harness	05-2070 05-2070
B1269/69 (no communication from theft deterrent ECU for more than 10 seconds)	1. Theft warning ECU 2. Wire harness	05-2075 05-2075
B1271 (no communication from combination meter ECU for more than 10 seconds)	1. Combination meter assembly 2. Wire harness	05-2080 05-2080
B1273/73 (no communication from sliding roof control ECU for more than 10 seconds)	1. Sliding roof drive gear 2. Wire harness	05-2085 05-2085

0523V-05

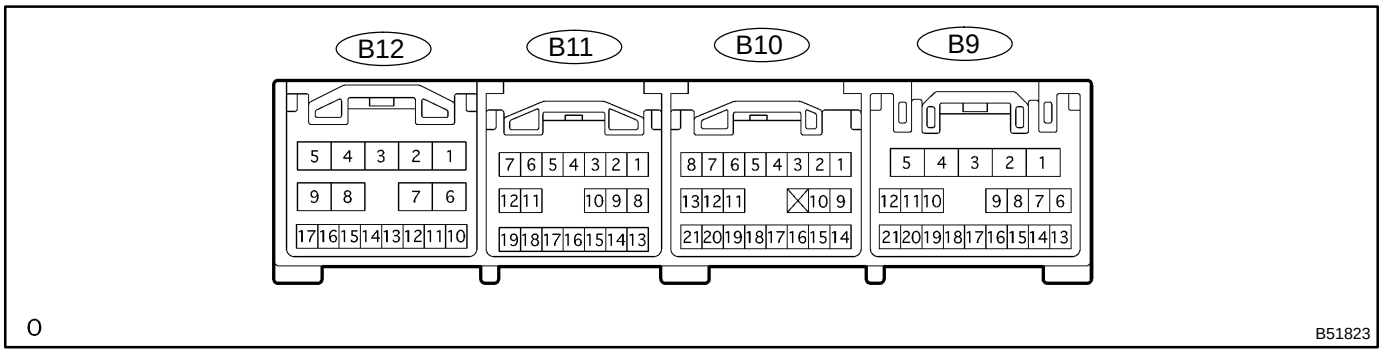
TERMINALS OF ECU

1. MULTIPLEX NETWORK BODY ECU

(a) Check the body ECU.

(1) Disconnect the body ECU connectors B9 and B12.

(2) Check the voltage or continuity of each terminal of the vehicle's side connectors.

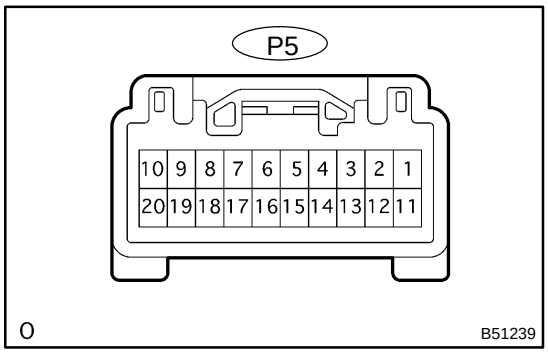


Standard:

Symbols (Terminal No.)	Wiring Color	Condition	Specified Condition
GND1 (B12-7) ⇔ Body ground	W-B ⇔ -	Constant	Continuity
GND2 (B9-2) ⇔ Body ground	W-B ⇔ -	Constant	Continuity
BECU (B12-9) ⇔ GND1 (B12-7)	G ⇔ W-B	Constant	10 - 14 V
BDR1 (B12-4) ⇔ GND1 (B12-7)	B ⇔ W-B	Constant	10 - 14 V

HINT:

If the value is not as specified, the vehicle's side may be defective.



2. POWER WINDOW REGULATOR MASTER SWITCH ASSY (DOOR ECU)

(a) Check the master switch.

(1) Disconnect the master switch connector.

(2) Check the voltage or continuity of each terminal of the vehicle's side connector.

Standard:

Symbols (Terminal No.)	Wiring Color	Condition	Specified Condition
GND (P5-2) ⇔ Body ground	W-B ⇔ -	Constant	Continuity
CPUB (P5-9) ⇔ GND (P5-2)	L ⇔ W-B	Constant	10 - 14 V
BDR (P5-10) ⇔ GND (P5-2)	G ⇔ W-B	Constant	10 - 14 V

HINT:

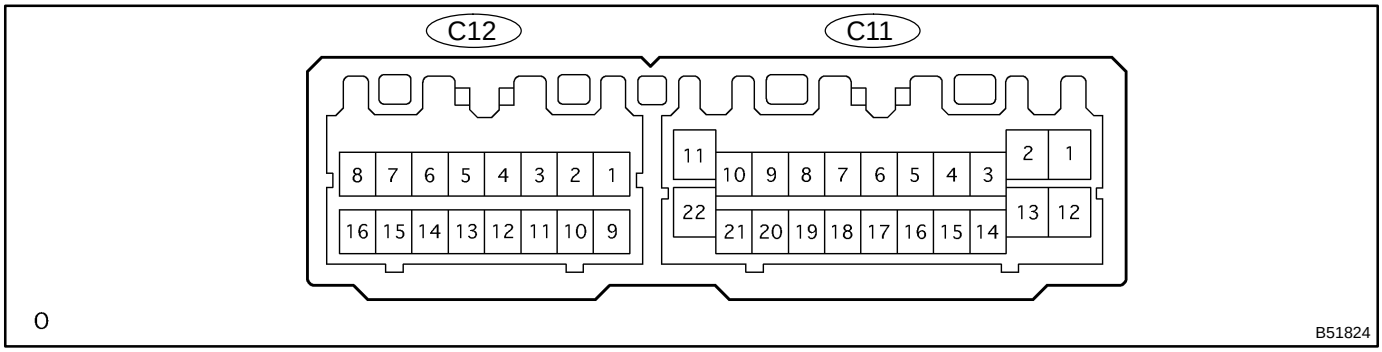
If the value is not as specified, the vehicle's side may be defective.

3. COMBINATION METER ASSY (METER ECU)

(a) Check the meter.

(1) Disconnect the meter connector C11.

(2) Check the voltage or continuity of each terminal of the vehicle's side connector.



Standard:

Symbols (Terminal No.)	Wiring Color	Condition	Specified Condition
E2 (C11-22) ⇔ Body ground	W-B ⇔ -	Constant	Continuity
B (C11-2) ⇔ E2 (C11-22)	LG ⇔ W-B	Constant	10 - 14 V
B2 (C11-12) ⇔ E2 (C11-22)	V ⇔ W-B	Constant	10 - 14 V

HINT:

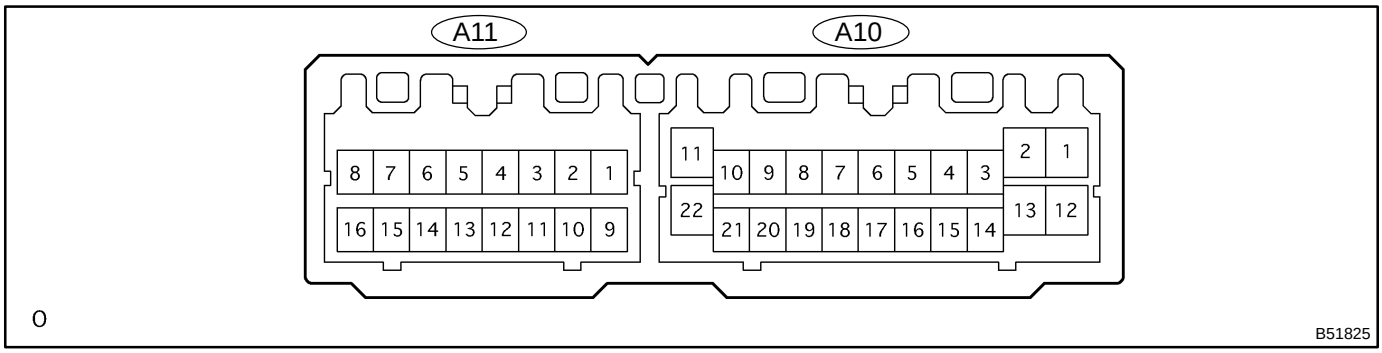
If the value is not as specified, the vehicle's side may be defective.

4. AIR CONDITIONER AMPLIFIER ASSY (A/C ECU)

(a) Check the air conditioner amplifier.

(1) Disconnect the air conditioner amplifier connector A10.

(2) Check the voltage or continuity of each terminal of the vehicle's side connector.



Standard:

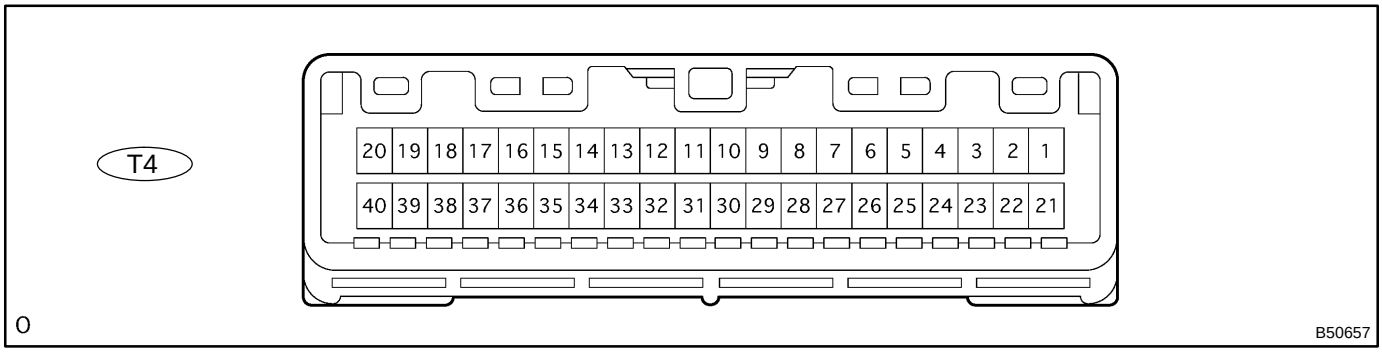
Symbols (Terminal No.)	Wiring Color	Condition	Specified Condition
GND (A10-11) ⇔ Body ground	W-B ⇔ -	Constant	Continuity
+B (A10-12) ⇔ GND (A10-11)	W ⇔ W-B	Constant	10 - 14 V

HINT:

If the value is not as specified, the vehicle's side may be defective.

5. THEFT WARNING ECU ASSY (THEFT DETERRENT ECU)

(a) Check the theft warning ECU.
  (1) Disconnect the connector.
  (2) Check the voltage or continuity of each terminal of the vehicle's side connector.



Standard:

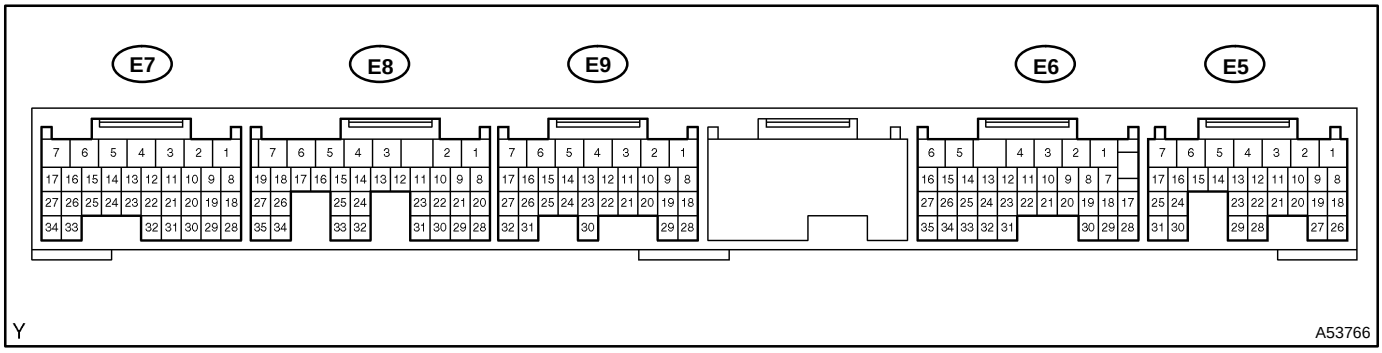
Symbols (Terminal No.)	Wiring Color	Condition	Specified Condition
E (T4-29) ⇔ Body ground	W-B ⇔ -	Constant	Continuity
+B1 (T4-2) ⇔ E (T4-29)	O ⇔ W-B	Constant	10 - 14 V
+B2 (T4-3) ⇔ E (T4-29)	L ⇔ W-B	Constant	10 - 14 V

6. ECM

(a) Inspect the ECM operation.
  (1) Check the voltage or continuity of each terminal of the vehicle's side connectors.

NOTICE:

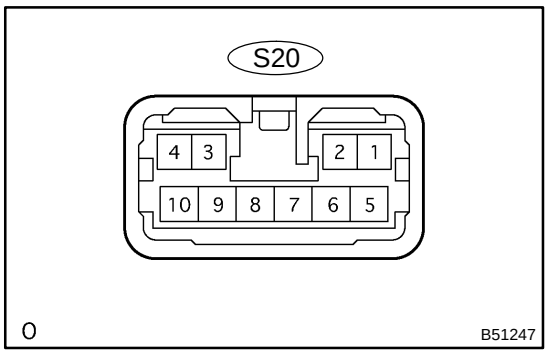
- **The inspection should be started from the back side of the connector with the ECM connector being connected.**
- **Before the measurement, check the power source voltage (10 - 14 V when IG ON) and body ground (5 Ω or less between each ground terminal and the engine body, when IG OFF).**



Standard:

Symbols (Terminal No.)	Wiring Color	Condition	Specified Condition
BATT (E5-3) ⇔ E1 (E9-1(*1))	BR ⇔ BR	Constant	9 - 14 V
+B (E5-1) ⇔ E1 (E7-1(*2))	W ⇔ BR	Engine stopped, ignition switch ON	9 - 14 V
+B2 (E5-2) ⇔ E1 (E9-1(*1), E7-1(*2))	W ⇔ BR	Engine stopped, ignition switch ON	9 - 14 V
E1 (E9-1)*1 ⇔ Body ground E7 (E7-1)*2 ⇔ Body ground	BR ⇔ -	Continuity	Constant

*1:2AZ-FE
*2:3MZ-FE



7. SLIDING ROOF DRIVE GEAR SUB-ASSY (SLIDING ROOF ECU)

(a) Check the sliding roof ECU.

(1) Disconnect the sliding roof ECU connector.

(2) Check the voltage or continuity between each terminal of the vehicle's side connectors.

Standard:

Symbols (Terminal No.)	Wiring Color	Condition	Specified Condition
E (S20-7) ⇔ Body ground	W-B ⇔ -	Constant	Continuity
B (S20-1) ⇔ E (S20-7)	L ⇔ W-B	Constant	10 - 14 V

DTC	B1221/21	POWER WINDOW SWITCH CIRCUIT ON DRIVER DOOR

CIRCUIT DESCRIPTION

This DTC is output when any switch of the power window regulator master switch assy (door ECU) is ON.

DTC No.	DTC Detecting Condition	Trouble Area
B1221/21	Any switch of the power window regulator master switch is ON	Power window regulator master switch assy (door ECU)

INSPECTION PROCEDURE

1	CHECK POWER WINDOW REGULATOR MASTER SWITCH ASSY

(a) Check if code B1221/21 will disappear but only B1211/11 (communication stop) will be output when the master switch connector is disconnected.
   (1) B1221/21 code output, proceed to A.
   (2) B1211/11 code output, proceed to B.

B → REPLACE POWER WINDOW REGULATOR MASTER SWITCH ASSY

A

REPLACE MULTIPLEX NETWORK BODY ECU

DTC	B1231/31	JAM PROTECTION LIMIT SWITCH CIRCUIT ON DRIVER DOOR

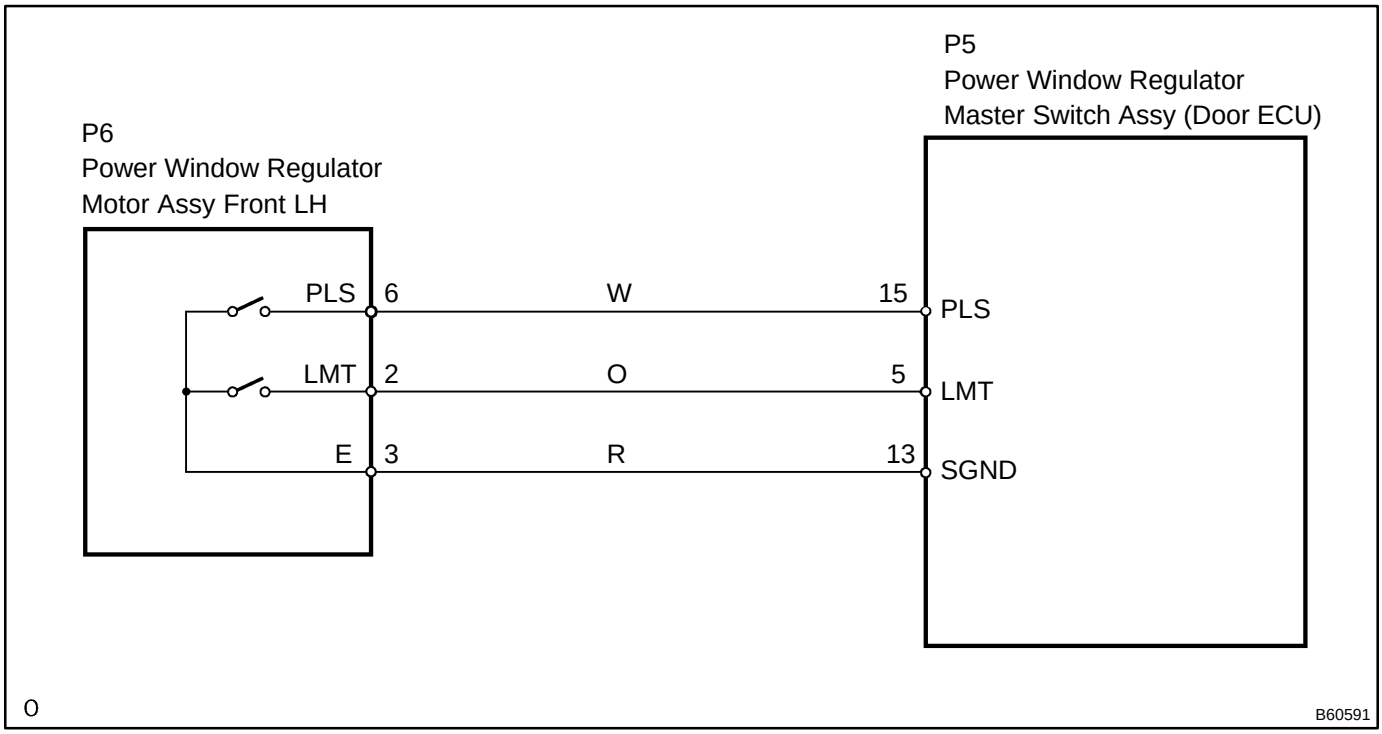
DTC	B1232/32	JAM PROTECTION PULSE SWITCH CIRCUIT ON DRIVER DOOR

CIRCUIT DESCRIPTION

This DTC is output when the power window regulator motor assy malfunctions.

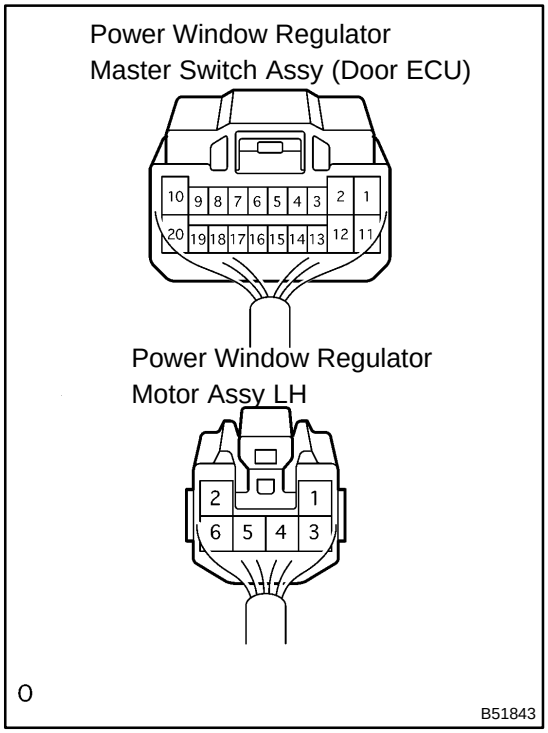
DTC No.	DTC Detecting Condition	Trouble Area
B1231/31	Open in power window regulator motor assy LH limit switch system	・Power window regulator motor assy LH ・Wire harness
B1232/32	Open or short in power window regulator motor assy LH pulse sensor system	・Power window regulator motor assy LH ・Wire harness

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK WIRE HARNESS



(a) Disconnect the connectors of the power window regulator master switch assy and power window regulator motor assy LH.

(b) Check the continuity between the master switch and regulator motor.

Standard:

Item	Symbols (Terminal No.) Master switch ⇔ Regulator motor	Specified Condition
Limit switch	LMT (5) ⇔ LMT (2) SGND (13) ⇔ E (3)	Continuity
Pulse sensor	PLS (15) ⇔ PLS (6) SGND (13) ⇔ E (3)	Continuity

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE POWER WINDOW REGULATOR MOTOR ASSY LH (DRIVER SIDE)

REMOTE OPERATION VIA MASTER SWITCH IS IMPOSSIBLE IN THE OTHER DOOR (OPERATION VIA EACH DOOR SWITCH IS POSSIBLE)

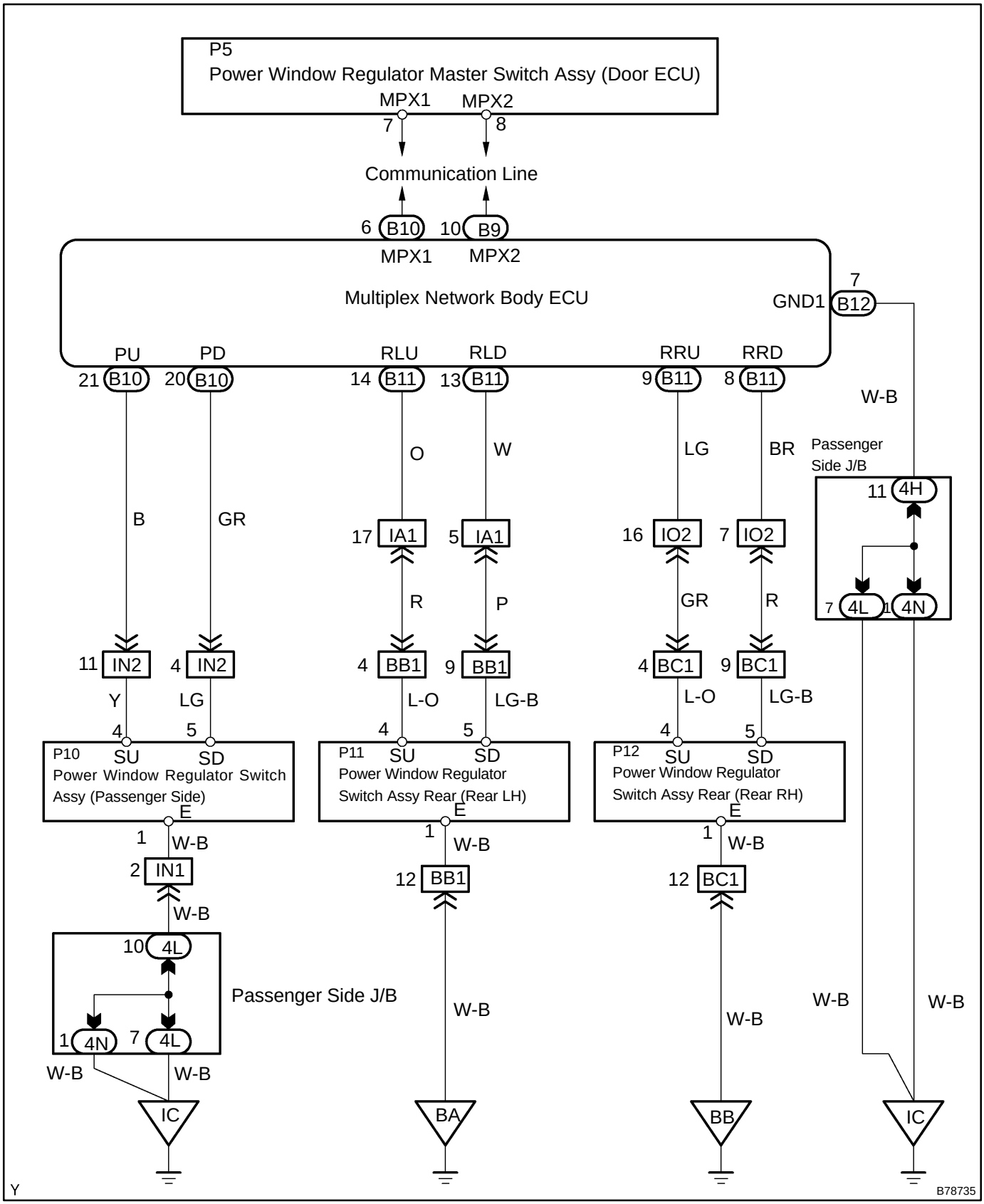
CIRCUIT DESCRIPTION

When the ignition switch is ON, the master switch (door ECU) sends a remote switch signal for the other seats multiply to the body ECU, then the body ECU drives the power window motor for the other seats.

NOTICE:

The power window system has a function with a large-scale multiplex communications. First of all, inspect the communication function depending on the ”how to proceed with troubleshooting”, and check that there is no abnormality in the communication system. Then finally proceed with the troubleshooting.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK HAND-HELD TESTER

(a) Monitor code

(1) Using the hand-held tester, inspect the monitor code of the door ECU.

HINT:

* The monitor code shows the switch condition when a DTC is output.
* When a monitor code is indicated while the switch is not operated, the switch is detected in being stuck. When a monitor code is not indicated while the switch is operated, it is detected that the switch contact condition is bad.

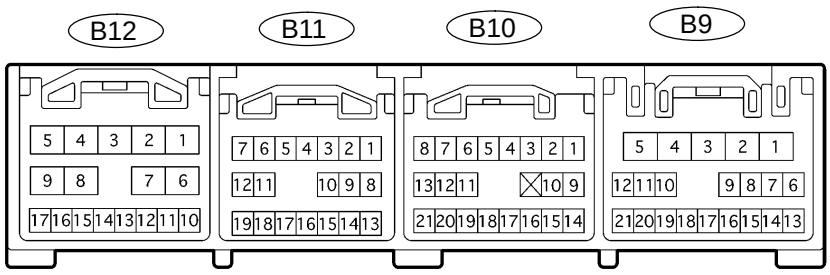
DTC Code	Item	Monitor Item
B1221/21	Driver's side switch 1 (operating)	Any switch of the power window regulator master switch is ON

NG → **Go to step 3**

OK

2 CHECK MULTIPLEX NETWORK BODY ECU

(a) Inspect the output of the body ECU.
(1) Inspect the voltage between terminal 7 (GND1) and each terminal of the door which body ECU is inoperative.



Standard:

Symbols (Terminal No.)	Condition	Specified Condition
PU (B10-21) ⇔ GND1 (B12-7)	Ignition switch ON, master switch passenger side switch OFF → UP (manual operation)	0 V → 10 - 14 V
PD (B10-20) ⇔ GND1 (B12-7)	Ignition switch ON, master switch passenger side switch OFF → DOWN (manual operation)	0 V → 10 - 14 V
RRU (B11-9) ⇔ GND1 (B12-7)	Ignition switch ON, master switch rear RH side switch OFF → UP (manual operation)	0 V → 10 - 14 V
RRD (B11-8) ⇔ GND1 (B12-7)	Ignition switch ON, master switch rear RH side switch OFF → DOWN (manual operation)	0 V → 10 - 14 V
RLU (B11-14) ⇔ GND1 (B12-7)	Ignition switch ON, master switch rear LH side switch OFF → UP (manual operation)	0 V → 10 - 14 V
RLD (B11-13) ⇔ GND1 (B12-7)	Ignition switch ON, master switch rear LH side switch OFF → DOWN (manual operation)	0 V → 10 - 14 V

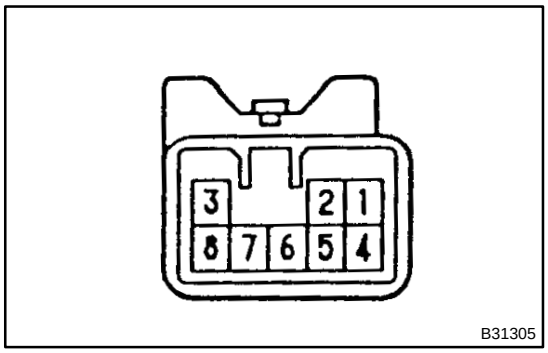
HINT:
- When an output to the passenger door is normal, proceed to OK-A.
- When outputs to both rear doors are normal, proceed to OK-B.
- When an output to either of the passenger door and both rear doors are abnormal, proceed to NG.

OK-B → **Go to step 4**

NG → **REPLACE MULTIPLEX NETWORK BODY ECU**

OK-A

3	CHECK POWER WINDOW REGULATOR SWITCH ASSY (PASSENGER SIDE)



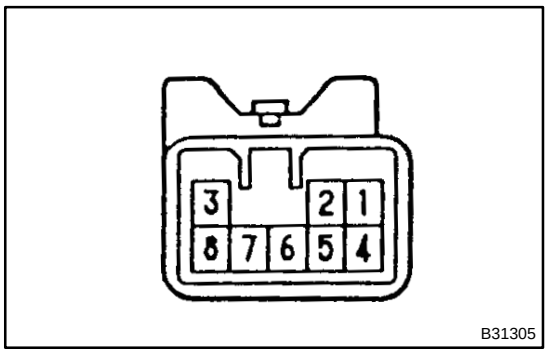
(a) Check the continuity.
(1) Check the continuity between each terminal of the connectors.

Standard:

Switch Operation	Measuring Condition	Specified Condition
Not operated	Terminal 4 ⇔ Terminal 1	Continuity
Not operated	Terminal 5 ⇔ Terminal 1	Continuity

OK	**REPAIR OR REPLACE HARNESS AND CONNECTOR**
NG	**REPLACE POWER WINDOW REGULATOR SWITCH ASSY**

4	CHECK POWER WINDOW REGULATOR SWITCH ASSY REAR (REAR RH AND LH)



(a) Check the continuity.
(1) Check the continuity between each terminal of the connectors.

Standard:

Switch Operation	Measuring Condition	Specified Condition
Not operated	Terminal 4 ⇔ Terminal 1	Continuity
Not operated	Terminal 5 ⇔ Terminal 1	Continuity

OK	**REPAIR OR REPLACE HARNESS AND CONNECTOR**
NG	**REPLACE POWER WINDOW REGULATOR SWITCH ASSY REAR**

WINDOWS CANNOT BE OPERATED VIA REGULATOR SWITCH AT EACH SEAT

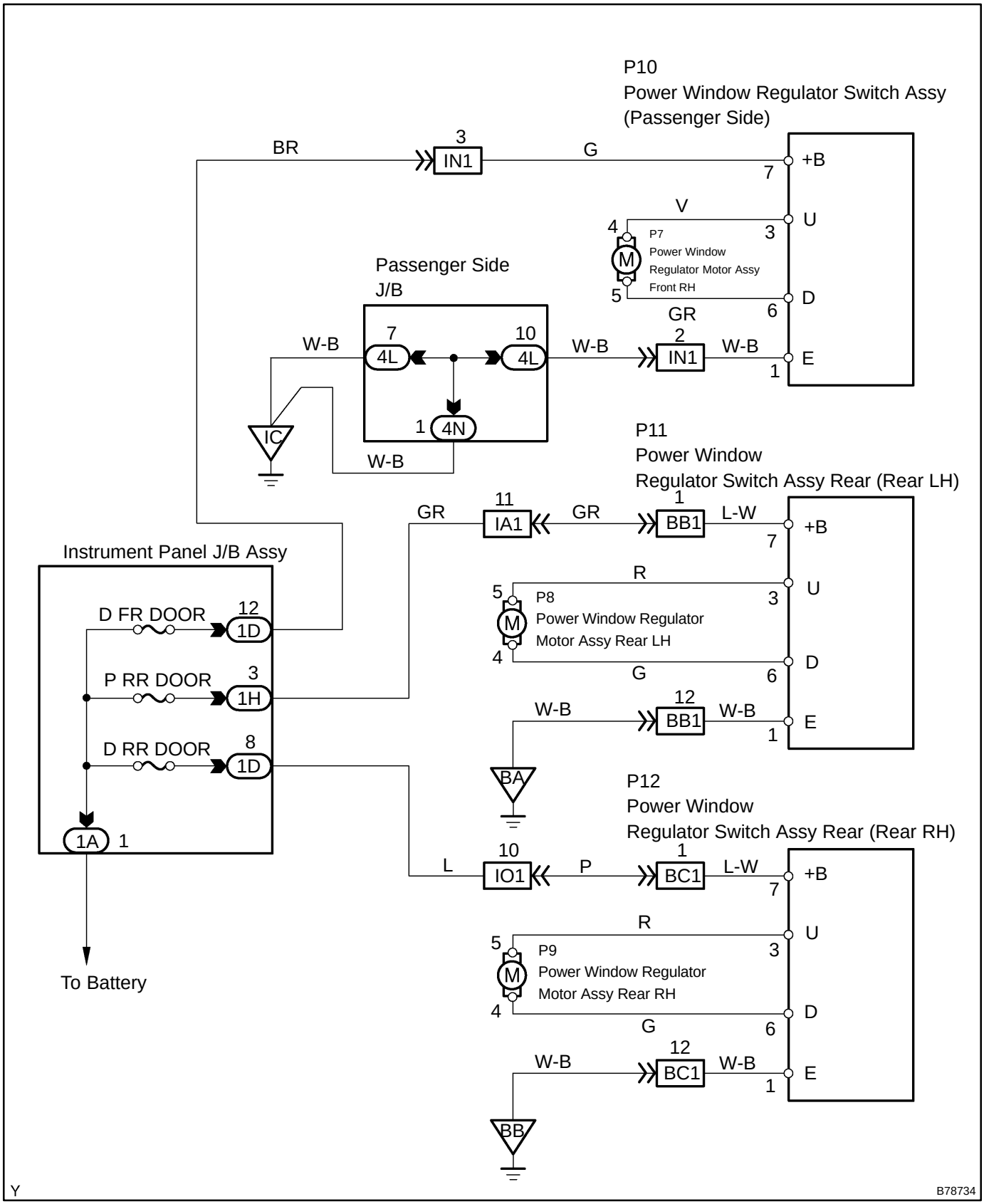
CIRCUIT DESCRIPTION

With the ignition switch ON and the window lock switch at NORMAL (except driver side), each regulator switch drives each power window motor.

NOTICE:

The power window system has a function with a large-scale body multiplex communications. First of all, inspect the communication function depending on the ”how to proceed with troubleshooting”, and check that there is no abnormality in the communication system. Then finally proceed with the troubleshooting.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK FUSE

(a) Check whether the regulator switch fuses D FR DOOR 25 A, P RR DOOR 20 A and D RR DOOR 20 A of inoperative seats are normal.

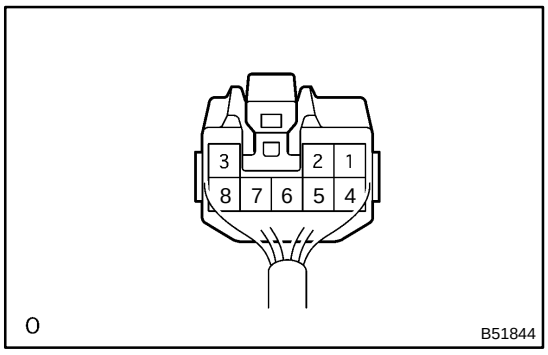
HINT:

- If the fuse for the passenger side door is normal, proceed to OK-A.
- If the fuse for the rear RH and LH doors is normal, proceed to OK-B.
- If the fuse for the passenger side door is defective, proceed to NG-A.
- If the fuse for the rear RH door is defective, proceed to NG-B.
- If the fuse for the rear LH door is defective, proceed to NG-C.

OK-B	**Go to step 6**
NG-A	**REPLACE FUSE (D FR DOOR 25 A)**
NG-B	**REPLACE FUSE (P RR DOOR 20 A)**
NG-B	**REPLACE FUSE (D RR DOOR 20 A)**

OK-A

2	CHECK POWER WINDOW REGULATOR SWITCH ASSY (PASSENGER SIDE)



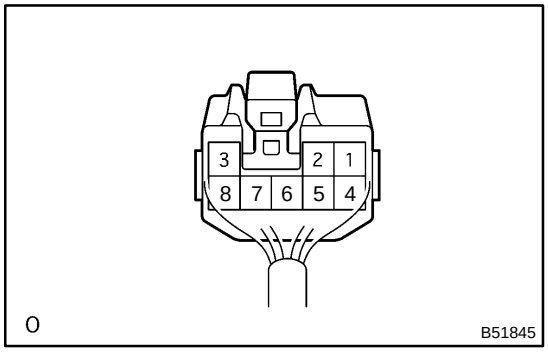
(a) Inspect the power source voltage.
  (1) Disconnect the regulator switch connector.
  (2) Check the voltage between terminal 7 (B) of the regulator switch vehicle's side connector and the body ground.

Standard: 10 - 14 V with ignition switch ON

NG	**REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

3	CHECK POWER WINDOW REGULATOR SWITCH ASSY (PASSENGER SIDE)



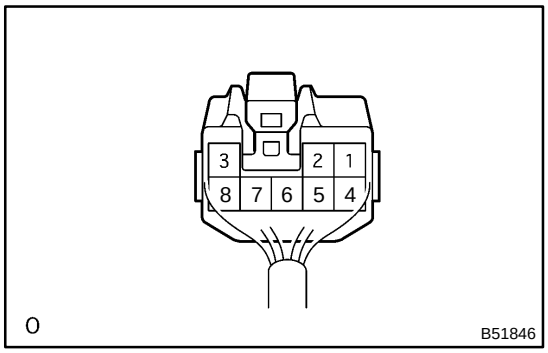
(a) Inspect the GND.
  (1) Disconnect the regulator switch connector.
  (2) Check the continuity between terminal 1 (E) of the regulator switch vehicle's side connector and the body ground.

Standard: Continuity (constant)

NG	**REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

4	CHECK POWER WINDOW REGULATOR MOTOR ASSY RH (PASSENGER SIDE)



(a) Inspect the motor operation.
  (1) Disconnect the regulator switch connector.
  (2) Inspect the door glass operation when the battery voltage is applied between terminals 3 (U) and 6 (D) of the regulator switch vehicle's side connector.

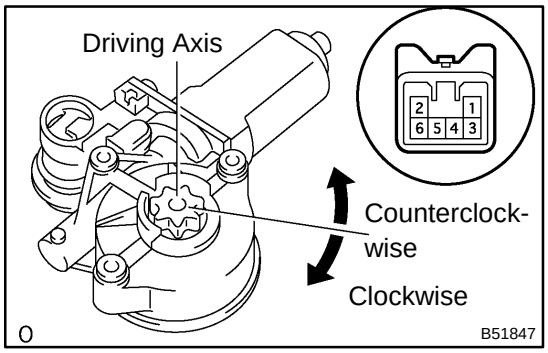
Standard:

Measuring Condition	Operational Direction
Battery positive - Terminal 3 (U) Battery negative - Terminal 6 (D)	Upward
Battery positive - Terminal 6 (D) Battery negative - Terminal 3 (U)	Downward

OK → **REPLACE POWER WINDOW REGULATOR SWITCH ASSY**

NG

5 INSPECT POWER WINDOW REGULATOR MOTOR ASSY RH (PASSENGER SIDE)



(a) Inspect the operation of the front LH power window regulator motor assembly.

(1) Check that the motor operates smoothly when the battery voltage is applied to each terminal of the connector.

Standard:

Measuring Condition	Operational Direction
Battery positive - Terminal 4 Battery negative - Terminal 5	Clockwise rotation toward driving axis
Battery positive - Terminal 5 Battery negative - Terminal 4	Counterclockwise rotation toward driving axis

(b) Inspect the PTC operation inside the power window regulator motor.

NOTICE:

The inspection should be performed with the power window regulator and door glass installed to the vehicle.

(1) Set a DC 400 A probe of the electrical tester in the wire harness of terminal 1 or 2.

NOTICE:

Match the arrow mark of the probe with the current direction.

(2) Set the door glass in the fully closed position.

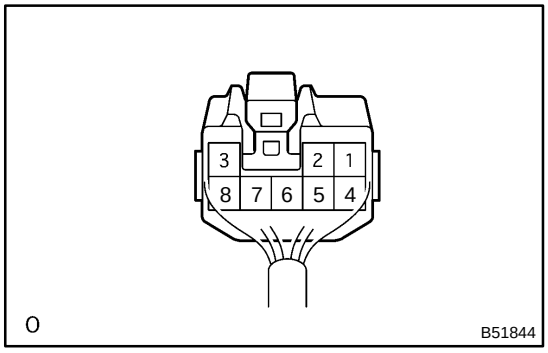
(3) When 60 seconds have elapsed after the door glass is fully closed, check now long the current takes to charge, from approximately 16 - 34 A into 1 A or less, when the power window switch is turned UP once again.

Standard: Approximately 4 - 90 seconds

(4) When approximately 60 seconds have elapsed after the inspection of the current cut-off, check that the door glass goes down when the power window regulator switch is turned DOWN.

OK	**REPAIR OR REPLACE HARNESS AND CONNECTOR**
NG	**REPLACE POWER WINDOW REGULATOR MOTOR ASSY RH**

6 CHECK POWER WINDOW REGULATOR SWITCH ASSY REAR (REAR RH AND LH)



(a) Inspect the power source voltage.

(1) Disconnect the regulator switch connector.

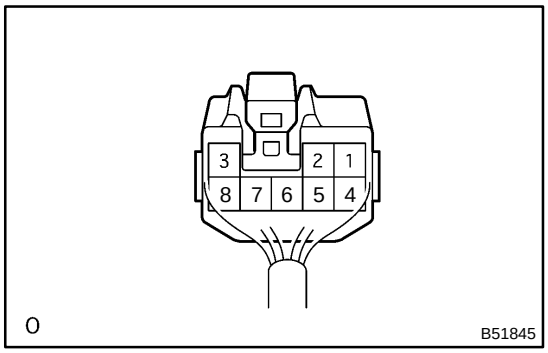
(2) Check the voltage between terminal 7 (+B) of the regulator switch vehicle's side connector and the body ground.

Standard: 10 - 14 V with ignition switch ON

NG	**REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

7	CHECK POWER WINDOW REGULATOR SWITCH ASSY REAR (REAR RH AND LH)

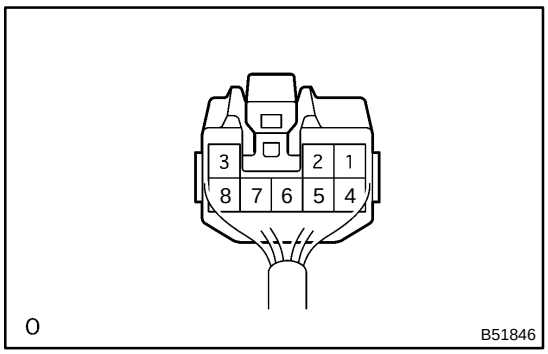


(a) Inspect the GND.
  (1) Disconnect the regulator switch connector.
  (2) Check the continuity between terminal 1 (E) of the regulator switch vehicle's side connector and the body ground.

Standard: Continuity (constant)

NG	**REPAIR OR REPLACE HARNESS AND CONNECTOR**
OK-A	**Go to step 8 (In case Rear RH side)**
OK-B	**Go to step 10 (In case Rear LH side)**

8	CHECK POWER WINDOW REGULATOR MOTOR ASSY RH (REAR RH)



(a) Inspect the motor operation.
  (1) Disconnect the regulator switch connector.
  (2) Inspect the door glass operation when the battery voltage is applied between terminals 3 (U) and 6 (D) of the regulator switch vehicle's side connector.

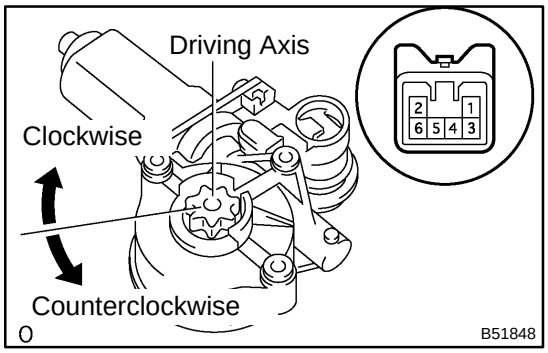
Standard:

Measuring condition	Operational direction
Battery positive - Terminal 3 (U) Battery negative - Terminal 6 (D)	Upward
Battery positive - Terminal 6 (D) Battery negative - Terminal 3 (U)	Downward

OK	**REPLACE POWER WINDOW REGULATOR SWITCH ASSY REAR**

NG

9	INSPECT POWER WINDOW REGULATOR MOTOR ASSY RH (REAR RH)



(a) Inspect the operation of the power window regulator motor assy RH (Rear RH side).

(1) Check that the motor operates smoothly when the battery voltage is applied to each terminal of the connector.

Standard:

Measuring Condition	Operational Direction
Battery positive - Terminal 5 Battery negative - Terminal 4	Clockwise rotation toward driving axis
Battery positive - Terminal 4 Battery negative - Terminal 5	Counterclockwise rotation toward driving axis

(b) Inspect the PTC operation inside the power window regulator motor.

NOTICE:

The inspection should be performed with the power window regulator and door glass installed to the vehicle.

(1) Set a DC 400 A probe of the electrical tester in the wire harness of terminal 1 or 2.

NOTICE:

Match the arrow mark of the probe with the current direction.

(2) Set the door glass in the fully closed position.

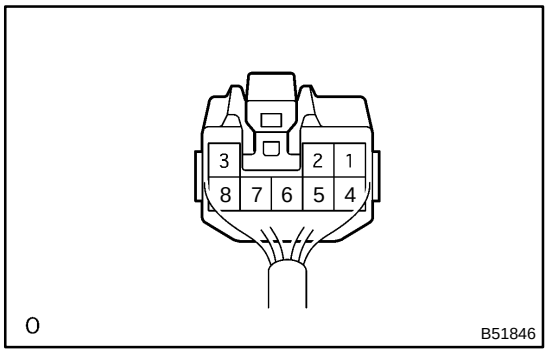
(3) When 60 seconds have elapsed after the door glass is fully closed, check now long the current takes to charge, from approximately 16 - 34 A into 1 A or less, when the power window switch is turned UP once again.

Standard: Approximately 4 - 90 seconds

(4) When approximately 60 seconds have elapsed after the inspection of the current cut-off, check that the door glass goes down when the power window regulator switch is turned DOWN.

OK	**REPAIR OR REPLACE HARNESS AND CONNECTOR**
NG	**REPLACE POWER WINDOW REGULATOR MOTOR ASSY RH**

10	CHECK POWER WINDOW REGULATOR MOTOR ASSY LH (REAR LH)



(a) Inspect the motor operation.
  (1) Disconnect the regulator switch connector.
  (2) Inspect the door glass operation when the battery voltage is applied between terminals 3 (U) and 6 (D) of the regulator switch vehicle's side connector.

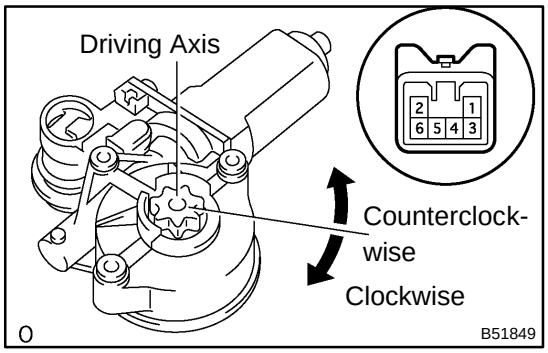
Standard:

Measuring condition	Operational direction
Battery positive - Terminal 3 (U) Battery negative - Terminal 6 (D)	Upward
Battery positive - Terminal 6 (D) Battery negative - Terminal 3 (U)	Downward

OK → **REPLACE POWER WINDOW REGULATOR SWITCH ASSY REAR**

NG

11	INSPECT POWER WINDOW REGULATOR MOTOR ASSY LH (REAR LH)



(a) Inspect the operation of the power window regulator motor assy LH (Rear LH side).

(1) Check that the motor operates smoothly when the battery voltage is applied to each terminal of the connector.

Standard:

Measuring condition	Operational direction
Battery positive - Terminal 4 Battery negative - Terminal 5	Clockwise rotation toward driving axis
Battery positive - Terminal 5 Battery negative - Terminal 4	Counterclockwise rotation toward driving axis

(b) Inspect the PTC operation inside the power window regulator motor.

NOTICE:

The inspection should be performed with the power window regulator and door glass installed to the vehicle.

(1) Set a DC 400 A probe of the electrical tester in the wire harness of terminal 1 or 2.

NOTICE:

Match the arrow mark of the probe with the current direction.

(2) Set the door glass in the fully closed position.

(3) When 60 seconds have elapsed after the door glass is fully closed, check now long the current takes to charge, from approximately 16 - 34 A into 1 A or less, when the power window switch is turned UP once again.

Standard: Approximately 4 - 90 seconds

(4) When approximately 60 seconds have elapsed after the inspection of the current cut-off, check that the door glass goes down when the power window regulator switch is turned DOWN.

NG → **REPLACE POWER WINDOW REGULATOR MOTOR ASSY LH**

OK

REPAIR OR REPLACE HARNESS AND CONNECTOR

DRIVER POWER WINDOW DOES NOT OPERATE

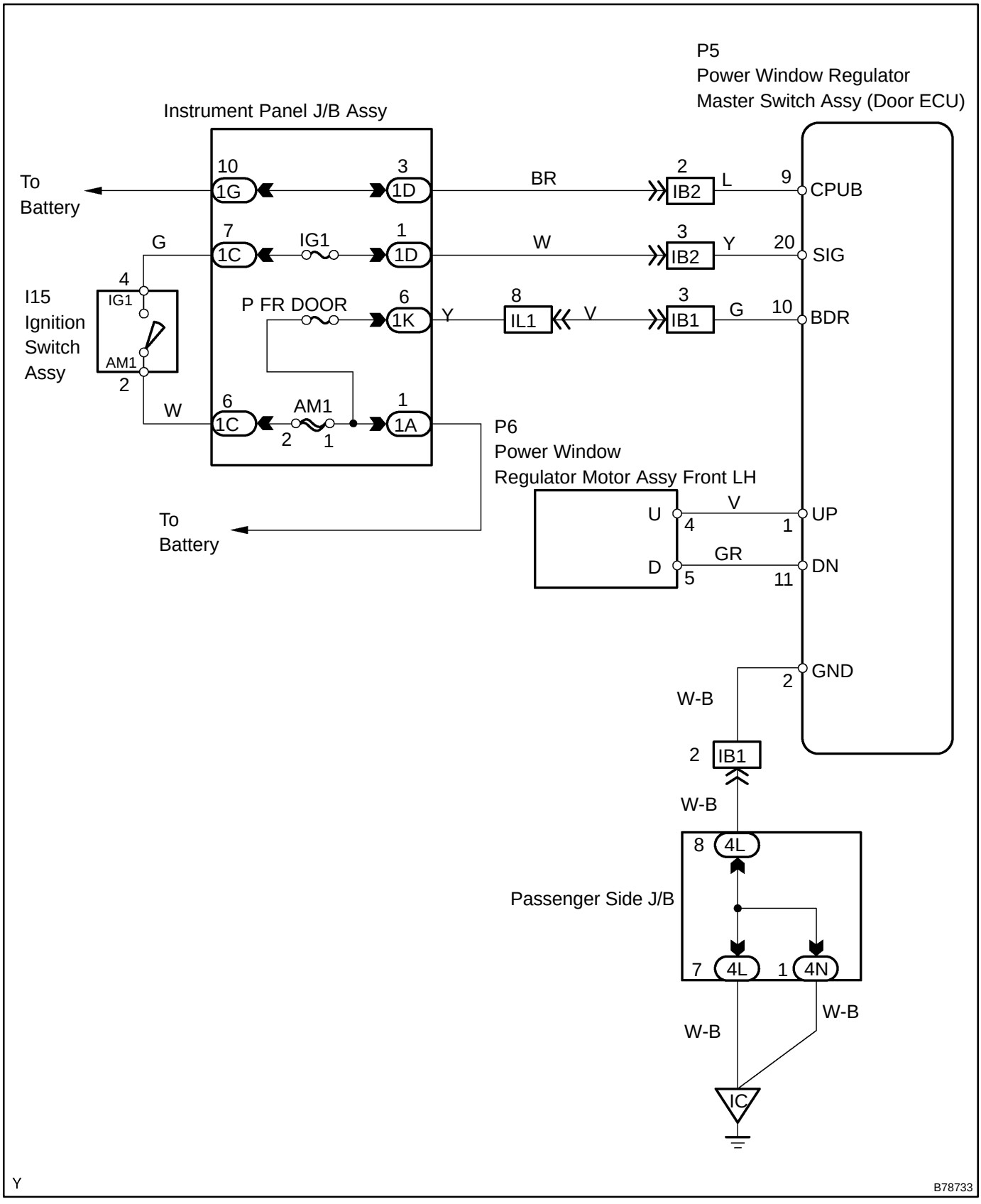
CIRCUIT DESCRIPTION

The power window regulator master switch assy (door ECU) controls the driver side power window by itself and drives the driver side power window motor.

NOTICE:

The power window system has a function with a large-scale multiplex communication. First of all, inspect the communication function depending on ”how to proceed with troubleshooting” and confirm that the communication system has no abnormality. Then finally perform the troubleshooting.

WIRING DIAGRAM



INSPECTION PROCEDURE

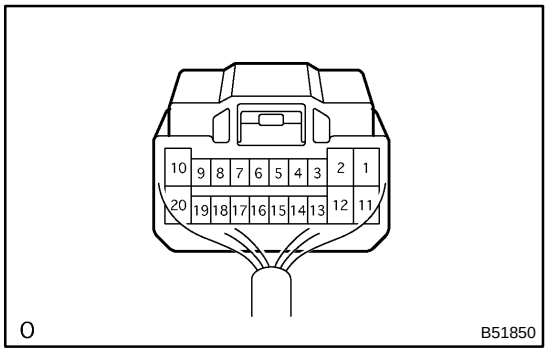
1	CHECK FUSE

(a) Check if the P FR DOOR 20 A, ECU B 7.5 A and IG1 7.5 A fuses are normal.

NG → **REPLACE FUSE**

OK

2	CHECK POWER WINDOW REGULATOR MASTER SWITCH ASSY



(a) Check the power source voltage.
  (1) Disconnect the master switch connector.
  (2) Check the voltage of each terminal of the vehicle's side connector of the master switch.

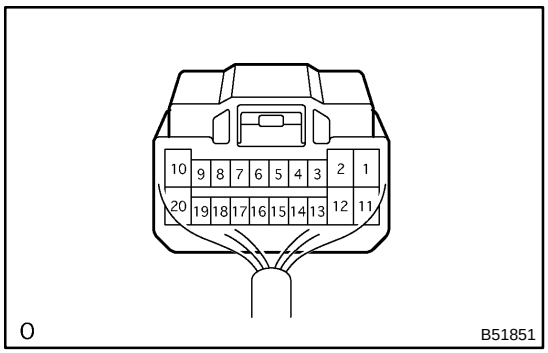
Standard:

Symbols (Terminal No.)	Condition	Specified Condition
CPUB (9) ⇔ Body ground	Constant	10 - 14 V
BDR (10) ⇔ Body ground	Constant	10 - 14 V
SIG (20) ⇔ Body ground	Ignition switch OFF → ON	0 V → 10 - 14 V

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

3	CHECK POWER WINDOW REGULATOR MASTER SWITCH ASSY



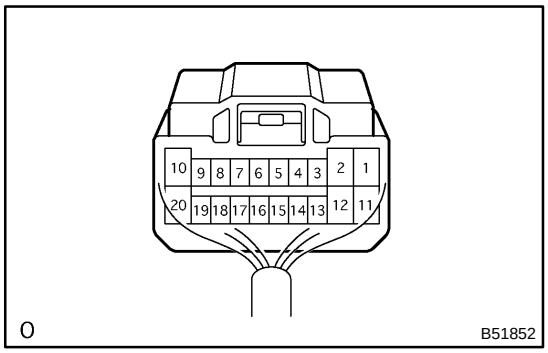
(a) Check the GND.
  (1) Disconnect the master switch connector.
  (2) Check the continuity between terminal 2 (GND) of the vehicle's side connector of the master switch and the body ground.

Standard: Continuity (constant)

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

4	CHECK POWER WINDOW REGULATOR MOTOR ASSY LH (DRIVER'S SIDE)



(a) Disconnect the master switch connector.
(b) Inspect the door glass operation when the battery voltage is applied between terminals 1 (UP) and 11 (DN) of the vehicle's side connector of the master switch.

Standard:

Measuring Condition	Operational Direction
Battery positive - Terminal 1 (UP) Battery negative - Terminal 11 (DN)	Upward
Battery positive - Terminal 11 (DN) Battery negative - Terminal 1 (UP)	Downward

OK → **REPLACE POWER WINDOW REGULATOR MASTER SWITCH ASSY**

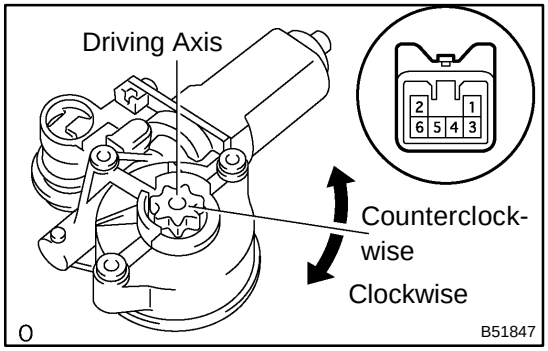
NG

5	INSPECT POWER WINDOW REGULATOR MOTOR ASSY LH (DRIVER SIDE)

(a) Inspect the power window regulator motor assy LH (Driver side) operation.

NOTICE:

- **Do not apply the battery voltage, because the pulse sensor and limit switch could be damaged if the battery voltage is applied to terminals 2, 3 and 6 of the power window regulator motor connector.**
- **Be sure to reset the power window regulator motor (initial position setting of limit switch) when the driver's side power window regulator motor is installed to the regulator.**



(1) Check that the motor operates smoothly when the battery positive voltage is applied to each terminal of the connector.

Standard:

Measuring Condition	Operational Direction
Battery positive - Terminal 5 Battery negative - Terminal 4	Clockwise
Battery positive - Terminal 4 Battery negative - Terminal 5	Counterclockwise

(b) Inspect the PTC operation inside the power window regulator motor.

NOTICE:

The inspection should be performed with the power window regulator and door glass installed to the vehicle.

(1) Set a DC 400 A probe of the electrical tester in the wire harness of terminal 4 or 5.

NOTICE:

Match the arrow mark of the probe with the current direction.

(2) Set the door glass in the fully closed position.

(3) When 60 seconds have elapsed after the door glass is fully closed, check now long the current takes to charge, from approximately 16 - 34 A into 1 A or less, when the power window switch is turned UP once again.

Standard: Approximately 4 - 90 seconds

(4) When approximately 60 seconds have elapsed after the inspection of the current cut-off, check that the door glass goes down when the power window regulator switch is turned DOWN.

NG → **REPLACE POWER WINDOW REGULATOR MOTOR ASSY LH**

OK

REPAIR OR REPLACE HARNESS AND CONNECTOR

0523F-02

CUSTOMER PROBLEM ANALYSIS CHECK

POWER WINDOW CONTROL SYSTEM Check Sheet

Inspector's name: _____

Customer's Name		**Registration No.**	
		Registration Year	
		Frame No.	
Date Vehicle Brought in	/ /	**Odometer Reading**	**km miles**

Date Problem First Occurred		/ /
Frequency Problem Occurs		○ Constant ○ Sometimes (times per day, month) ○ Once only
Weather Conditions When Problem Occurred	**Weather**	○ Fine ○ Cloudy ○ Rainy ○ Snowy ○ Various/Others
	Outdoor Temperature	○ Hot ○ Warm ○ Cool ○ Cold (Approx. C (F))

Malfunction Symptoms	○ Diagnosis code is output	○ B1221/21 ○ B1231/31 ○ B1232/32
	○ AUTO UP/AUTO DOWN is impossible	
	○ Operation interlocked with key is impossible	
	○ Operation after key-OFF is impossible	
	○ Remote operation by the master switch is impossible in a switch	
	○ Passenger Side ○ Rear RH Side ○ Rear LH Side	
	○ Operation by a switch of each seat is impossible in a switch	
	○ Passenger Side ○ Rear RH Side ○ Rear LH Side	
Condition when recovered normal		○ IG ON ○ Engine Started ○ ( ) Switch operated
Condition when problem occurred	Yes／No	○ IG OFF／ON ○ ( ) Switch operated ○ Others ( )

0523J-02

DIAGNOSTIC TROUBLE CODE CHART

1. DIAGNOSTIC TROUBLE CODE

Door ECU (driver side)

DTC Code	Item	Diagnosis
B1231/31	Driver side jam protection limit switch malfunctions	Power window regulator motor assy RH open in limit switch system
B1232/32	Driver side jam protection sensor malfunctions	Power window regulator motor assy RH open or short in pulse sensor system

2. MONITOR CODE

HINT:

- The monitor code shows the switch condition when a DTC is output.
- When a monitor code is indicated while the switch is not operated, the switch is detected in being stuck. When a monitor code is not indicated while the switch is operated, it is detected that the switch contact condition is bad.

DTC Code	Item	Monitor Item
B1221/21	Driver side switch 1 (operating)	Any switch of the power window regulator master switch is ON

0523E-02

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

Troubleshoot in accordance with the procedure on the following pages.

1	VEHICLE BROUGHT TO WORKSHOP

2	CUSTOMER PROBLEM ANALYSIS CHECK AND SYMPTOM CHECK (See page 05-1904)

3	INSPECT COMMUNICATION FUNCTION OF LARGE-SCALE MULTIPLEX COMMUNICATION SYSTEM (BEAN)

(a) Check that there is no abnormality in the communication system by inspecting the communication function of the multiplex communication system with the hand-held tester.
   (1) (ECU unconnected, communication line abnormal) Without code output, proceed to A.
   (2) (ECU unconnected, communication line abnormal) With code output, proceed to B.

B	GO TO MULTIPLEX COMMUNICATION SECTION (See page 05-2044)

A

4	DIAGNOSTIC TROUBLE CODE CHECK (See page 05-1908)

(a) Check the diagnostic trouble code.
   (1) Without code output, proceed to A.
   (2) With code output, proceed to B.

B	Go to step 7

A

5	PROBLEM SYMPTOMS TABLE (See page 05-191 1)

(a) Without applicable symptoms, proceed to A.
(b) With applicable symptoms, proceed to B.

B	Go to step 7

A

6	PERFORM TROUBLESHOOTING IN THE FOLLOWING METHOD, DEPENDING ON MALFUNCTION SYMPTOM

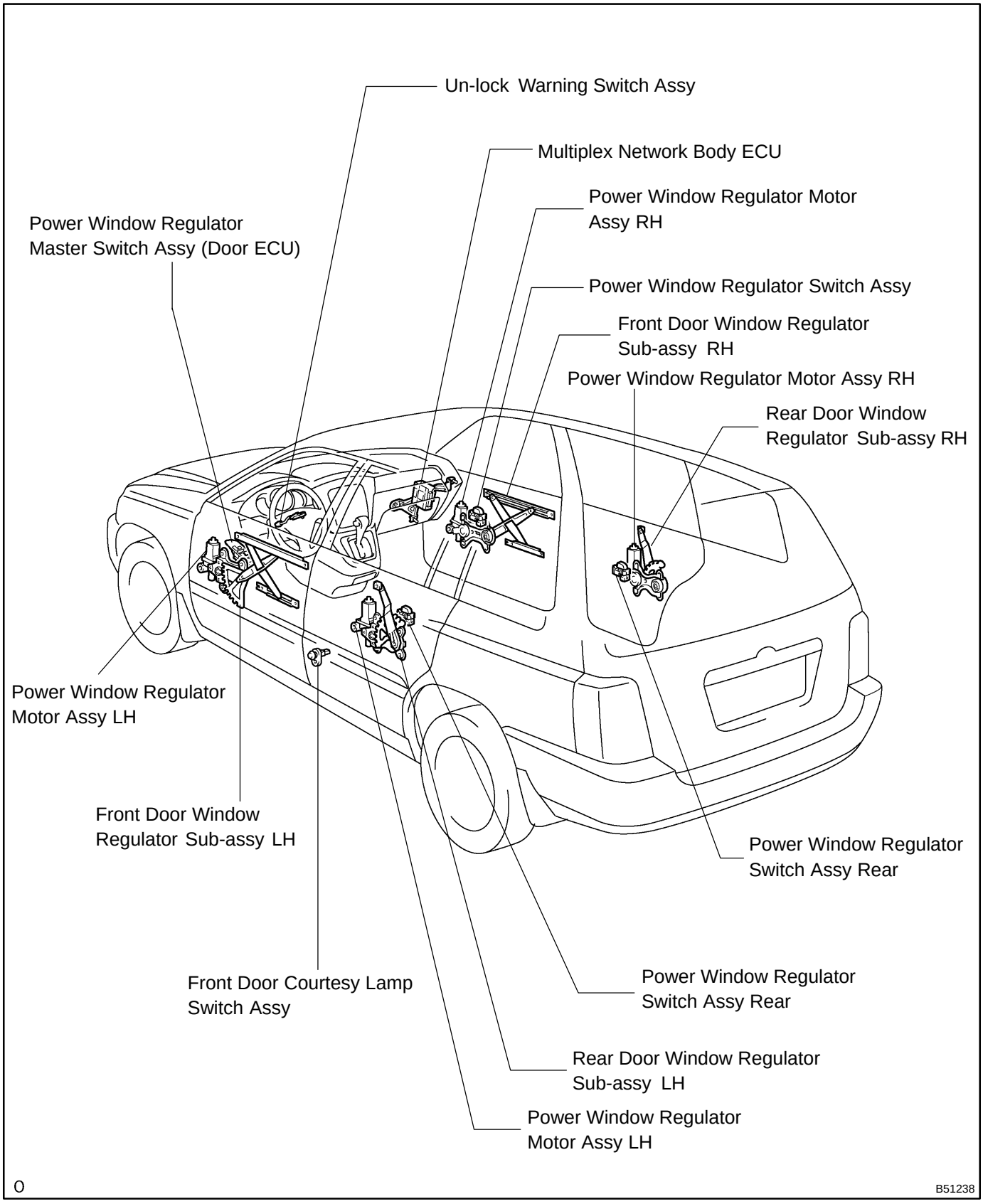
(a) Pre-check (See page 05-1905)
  (1) Check with hand-held tester (ECU data monitor).
  (2) Check with hand-held tester (Active test).
(b) Terminals of ECU (See page 05-1909)

7	ADJUSTMENT, REPAIR OR REPLACEMENT

END

0523K-02

LOCATION



POWER WINDOW CONTROL SYSTEM

0523D-02

PRECAUTION

1. NOTICES OF INSPECTION WITH REMOVAL AND INSTALLATION PROCEDURES

(a) Before performing operations related to the front door lock assy RH and door lock cylinder, disconnect the battery terminal or the connectors of the power window regulator master switch assy.

CAUTION:

If the operation is performed with the connectors being connected, the door control switch (interlocked with key) inside the door lock might be unexpectedly actuated, which results in injury.

0523G-02

PRE-CHECK

1. POWER WINDOW OPERATION MODE

HINT:

The initial condition that the customizing function by the hand-held tester is not chosen is shown.

Standard:

Power window operation	Ignition switch ON	Ignition switch OFF Operative after key-OFF	Ignition switch OFF Inoperative after key-OFF
Manual UP	Operative	Jam protection function operative	Inoperative
Manual DOWN	Operative	Operative	Inoperative
AUTO UP	Jam protection function operative	Jam protection function operative	Inoperative
AUTO DOWN	Operative	Operative	Inoperative
UP operation interlocked with key	Inoperative	Jam protection function operative	Jam protection function operative
DOWN operation interlocked with key	Inoperative	Operative	Operative

2. POWER WINDOW FAIL-SAFE FUNCTION

(a) When an abnormality is detected in the limit switch and pulse sensor for operating the jam protection function (DTC: B1231/31, B1232/32), the following power window operations will be prohibited by the fail-safe function.

Standard:

Power window operation	Ignition switch ON	Ignition switch OFF Operative after key-OFF	Ignition switch OFF Inoperative after key-OFF
Manual UP	Operative	Operation prohibited	-
Manual DOWN	Operative	Operation prohibited	-
AUTO UP	Operation prohibited	Operation prohibited	-
AUTO DOWN	Operation prohibited	Operation prohibited	-
UP operation interlocked with key	-	Operation prohibited	Operation prohibited
DOWN operation interlocked with key	-	Operation prohibited	Operation prohibited

HINT:

In case of normal limit switch, the prohibition (fail-safe function) will be cancelled by fully opening the door glass that is fully closed by the manual operation, then AUTO operations will be possible.

3. CHECK HAND-HELD TESTER

(a) ECU Data Monitor:

(1) The ECU data monitor will indicate if the part is normal or malfunctioning.

Standard:

Door ECU (driver side) (switch condition)

Item	Inspecting condition	Standard value
Driver side power window AUTO switch	Pressed → Not pressed	ON/OFF
Jam protection limit switch	Power window fully open → fully closed	ON/OFF

Door ECU (driver side) (jam protection threshold)

Item	Inspecting condition	Standard value
Window full-close position → 1/4 open position	Power window is going UP by manual operation	OK/CAUTION*
Window 1/4 open position → 2/4 open position	Power window is going UP by manual operation	OK/CAUTION*
Window 2/4 open position → 3/4 open position	Power window is going UP by manual operation	OK/CAUTION*
Window 3/4 open position → full-open position	Power window is going UP by manual operation	OK/CAUTION*

HINT:

* : ”CAUTION” is indicated when something is detected in being caught in the window.

(b) Active Test:

(1) The active test will indicate if the part is normal or malfunctioning.

Standard:

Door ECU (driver side)

Item	Operation
Power window	UP/DOWN

(c) Customizing Function (reference):

(1) Using the hand-held tester, select a setting from the following items on the power window.

Standard:

Door ECU (driver side)

Item	Setting
Power window UP operation interlocked with door	With/Without function
Power window DOWN operation interlocked with door	With/Without function

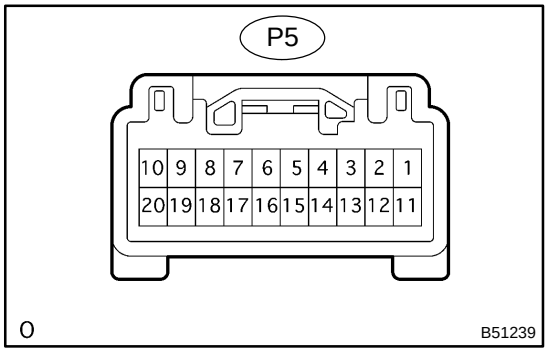
0523M-03

PROBLEM SYMPTOMS TABLE

Problem Symptom	Suspected Area	See Page
B1221/21 (Door ECU SW ON)	1. Power window regulator master switch assy (door ECU)	05-1912
B1231/31 (Driver side jam protection limit switch malfunctions)	1. Power window regulator motor assy LH	05-1913
B1232/32 (Driver side jam protection sensor malfunctions)	1. Power window regulator motor assy LH	05-1913
AUTO UP/AUTO DOWN does not operate (only driver side)	1. Power window regulator master switch assy (door ECU) 2. Power window regulator motor assy LH	05-1913 05-1913
Power window operation is impossible by operation interlocked with key (only driver side)	1. Front door lock assy RH 2. Power window regulator master switch assy (door ECU)	05-1957 05-1909
Operation is impossible after key-OFF (only driver side)	1. Front door courtesy lamp switch assy 2. Multiplex network body ECU	05-1957 05-1909
Driver's side power window does not operate	1. P FR DOOR 20 A fuse 2. ECU-B 7.5 A fuse 3. IG1 7.5 A fuse 4. Power window regulator master switch assy (door ECU) 5. Power window regulator motor assy RH 6. Wire harness	05-1915 05-1915 05-1915 05-1915 05-1915 05-1915
Window operation via regulator switch for each seat is impossible	1. P FR DOOR 20 A fuse 2. D FR DOOR 25 A fuse 3. D RR DOOR 20 A fuse 4. P RR DOOR 20 A fuse 5. Power window regulator master switch assy (door ECU) 6. Power window regulator switch assy 7. Power window regulator motor assy RH 8. Power window regulator motor assy LH 9. Wire harness	05-1920 05-1920 05-1920 05-1920 05-1920 05-1920 05-1920 05-1920 05-1920
Remote operation of other seat via master switch is impossible	1. Power window regulator master switch assy (door ECU) 2. Multiplex network body ECU 3. Wire harness	05-1929 05-1929 05-1929

0523L-04

TERMINALS OF ECU



1. CHECK POWER WINDOW REGULATOR MASTER SWITCH ASSY (DOOR ECU)

(a) Disconnect the P5 master switch connector.

(b) Check the voltage or continuity of each terminal of the wire harness side connector.

Standard:

Symbols (Terminal No.)	Wiring Color	Condition	Specified Condition
GND (P5-2) ⇔ Body ground	W-B ⇔ -	Constant	Continuity
CPUB (P5-9) ⇔ GND (P5-2)	L ⇔ W-B	Constant	10 - 14 V
SIG (P5-20) ⇔ GND (P5-2)	Y ⇔ W-B	Ignition switch OFF → ON	0 V → 10 - 14 V
BDR (P5-10) ⇔ GND (P5-2)	G ⇔ W-B	Constant	10 - 14 V
DN (P5-11) ⇔ UP (P5-1)	GR ⇔ V	Constant	Continuity
LMT (P5-5) ⇔ SGND (P5-13)	O ⇔ R	Driver side door glass fully closed	No continuity
LMT (P5-5) ⇔ SGND (P5-13)	O ⇔ R	Driver side door glass opened by 4 mm (0.16 in.) or more	Continuity
KUL (P5-14) ⇔ LSWE (P5-3)	Y ⇔ LG	Driver side door lock cylinder be in neutral by key → UNLOCK	No continuity → Continuity
KL (P5-4) ⇔ LSWE (P5-3)	G ⇔ LG	Driver side door lock cylinder be in neutral by key → LOCK	No continuity → Continuity

If the result is not as specified, the wire harness side may malfunction.

(1) Reconnect the P5 switch connector, and check the voltage of each terminal of the connector.

Standard:

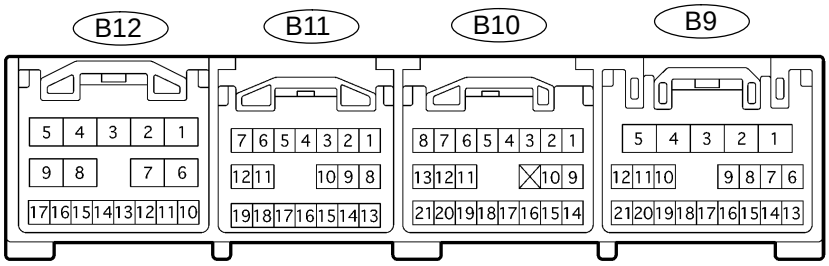
Symbols (Terminal No.)	Wiring Color	Condition	Specified Condition
UP (P5-1) ⇔ GND (P5-2)	V ⇔ W-B	Ignition switch ON, master switch driver's side switch OFF → UP (manual operation)	0 V → 10 - 14 V
UP (P5-1) ⇔ GND (P5-2)	V ⇔ W-B	Ignition switch ON, driver side door glass fully opened → master switch driver side switch UP (auto operation) → door glass fully closed	0 V → 10 - 14 V → 0 V
DN (P5-11) ⇔ GND (P5-2)	GR ⇔ W-B	Ignition switch ON, master switch driver's side switch OFF → DOWN (manual operation)	0 V → 10 - 14 V
DN (P5-11) ⇔ GND (P5-2)	GR ⇔ W-B	Ignition switch ON, driver side door glass fully closed → master switch driver side switch OFF → DOWN (auto operation) → door glass fully opened	0 V → 10 - 14 V → 0 V
PWS (P5-6) ⇔ GND (P5-2)	B ⇔ W-B	Ignition switch ON, window lock switch LOCK → NORMAL	0 V → 10 - 14 V

If the result is not as specified, the master switch may malfunction.

2. CHECK MULTIPLEX NETWORK BODY ECU

(a) Disconnect the body ECU connectors B9, B10, B11 and B12.

(b) Check the voltage or continuity of each terminal of the wire harness side connector.



Standard:

Symbols (Terminal No.)	Wiring Color	Condition	Specified Condition
GND1 (B12-7) ⇔ Body ground	W-B ⇔ -	Constant	Continuity
GND2 (B9-2) ⇔ Body ground	W-B ⇔ -	Constant	Continuity
BECU (B12-9) ⇔ GND1 (B12-7)	G ⇔ W-B	Constant	10 - 14 V
BDR1 (B12-4) ⇔ GND1 (B12-7)	B ⇔ W-B	Constant	10 - 14 V
IG (B9-5) ⇔ GND1 (B12-7)	BR ⇔ W-B	Ignition switch OFF → ON	0 V → 10 - 14 V
DCTY (B11-11) ⇔ GND1 (B12-7)	B ⇔ W-B	Driver door fully closed → Opened	No continuity → Continuity
KSW (B10-2) ⇔ GND1 (B12-7)	G ⇔ W-B	No key in ignition key cylinder → Key inserted	No continuity → Continuity

If the result is not as specified, the wire harness side may malfunction.

(c) Reconnect the ECU connectors, and check the voltage of each terminal of the connectors.

Standard:

Symbols (Terminal No.)	Wiring Color	Condition	Specified Condition
PU (B10-21) ⇔ GND1 (B12-7)	B ⇔ W-B	Ignition switch ON, master switch passenger side switch OFF → UP (manual operation)	0 V → 10 - 14 V
PD (B10-20) ⇔ GND1 (B12-7)	GR ⇔ W-B	Ignition switch ON, master switch passenger side switch OFF → DOWN (manual operation)	0 V → 10 - 14 V
RRU (B11-9) ⇔ GND1 (B12-7)	LG ⇔ W-B	Ignition switch ON, master switch rear RH side switch OFF → UP (manual operation)	0 V → 10 - 14 V
RRD (B11-8) ⇔ GND1 (B12-7)	BR ⇔ W-B	Ignition switch ON, master switch rear RH side switch OFF → DOWN (manual operation)	0 V → 10 - 14 V
RLU (B11-14) ⇔ GND1 (B12-7)	O ⇔ W-B	Ignition switch ON, master switch rear LH side switch OFF → UP (manual operation)	0 V → 10 - 14 V
RLD (B11-13) ⇔ GND1 (B12-7)	W ⇔ W-B	Ignition switch ON, master switch rear LH side switch OFF → DOWN (manual operation)	0 V → 10 - 14 V

If the result is not as specified, the door ECU or communication line may malfunction.

05IQQ-01

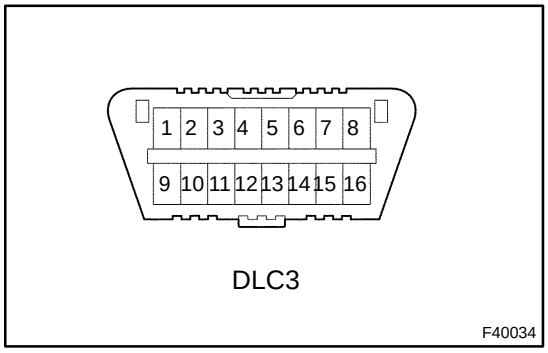
DIAGNOSIS SYSTEM

1. DESCRIPTION

The ECU controls the cruise control system of the vehicle. The data and DTCs relating to the cruise control system can be read from the DLC3 of the vehicle. If no DTCs are output when checking for DTCs, there may be a problem with the combination meter or the multiplex communication system.

Use the hand-held tester or SST to check and solve the problem.

SST 09843-18040



2. CHECK THE DLC3

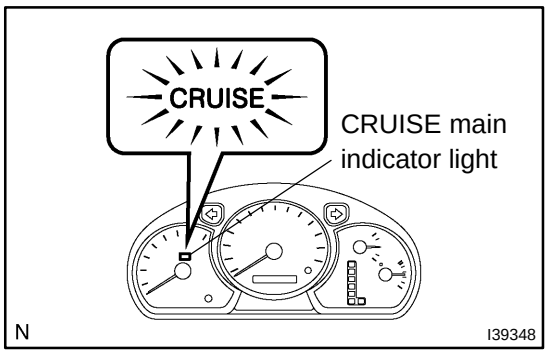
(a) The vehicle's ECM uses ISO 9141-2 for communication. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 9141-2 format.

Symbols (Terminals No.)	Terminal Description	Condition	Specified Condition
SIL(7) - SG(5)	Bus "+" line	During transmission	Pulse generation
CG(4) - Body ground	Chassis ground	Always	Below 1 Ω
SG(5) - Body ground	Signal ground	Always	Below 1 Ω
BAT(16) - Body ground	Battery positive	Always	11 to 16 V

HINT:

If the display shows "UNABLE TO CONNECT TO VEHICLE" when you have connected the hand-held tester to the DLC3, turned the ignition switch to the ON position and operated the tester, there is a problem on either the vehicle side or the tool side.

- If communication is normal when the tool is connected to another vehicle, inspect the DLC3 on the original vehicle.
- If communication is still impossible when the tool is connected to another vehicle, the problem is probably in the tool itself, so consult the Service Department listed in the tool's instruction manual.



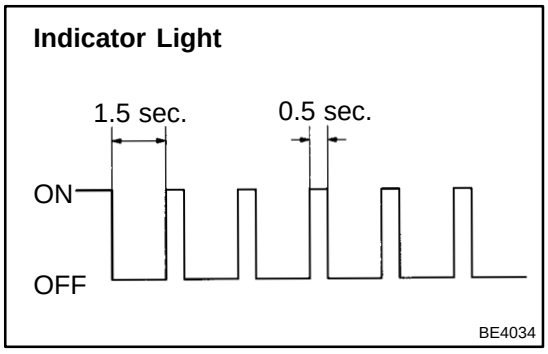
3. CHECK THE INDICATOR

(a) Turn the ignition switch to the ON position.

(b) Check that the CRUISE main indicator light comes on when the cruise control main switch ON-OFF button is pushed on, and that the indicator light goes off when the ON-OFF button is pushed off.

HINT:

If there is a problem with the indicator, inspect the cruise main indicator light circuit (see page 05-2165).



HINT:

If a malfunction occurs in the vehicle speed sensors, stop lamp switch assy or other related parts during cruise control driving, and the ECM actuates AUTO CANCEL of the cruise control and then the CRUISE main indicator light starts to blink, informing the driver of the malfunction. At the same time, data of the malfunction is stored as a diagnostic trouble code, or DTC.

05IQT-02

DATA LIST/ACTIVE TEST

1. DATA LIST

(a) While the hand-held tester is connected to the DLC3 and with the ignition switch turned to the ON position, the CRUISE CONTROL data list can be displayed. Follow the prompts on the tester screen to access the data list.

CC (ECM):

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
VEHICLE SPD	Vehicle speed / min.: 0 km/h (0 mph), max.: 255 km/h (158 mph)	Actual vehicle speed	-
MEMORY SPD	Cruise control memorized speed / min.: 36 km/h (22.5 mph), max.: 200 km/h (125 mph)	Actual stored vehicle speed	-
THROTTLE	Required throttle opening angle / min.: 0°, max.: 84°	Actual required throttle opening	-
CRUISE CONTROL	Cruise control system active condition / ON or OFF	ON : Cruise control activated OFF : Cruise control inactivated	-
MAIN SW (MAIN)	Main SW signal (Main CPU) / ON or OFF	ON : Main SW ON (Pushed on) OFF: Main SW OFF (Pushed off)	*1
MAIN SW (SUB)	Main SW signal (Sub CPU) / ON or OFF	ON : Main SW ON (Pushed on) OFF: Main SW OFF (Pushed off)	*1
CCS INDICATOR M	Cruise indicator signal (Main CPU) / ON or OFF	ON: CRUISE main indicator light is on OFF: CRUISE main indicator light is off	-
CCS INDICATOR S	Cruise indicator signal (Sub CPU) / ON or OFF	ON: CRUISE main indicator light is on OFF: CRUISE main indicator light is off	-
CANCEL SW	CANCEL SW signal / ON or OFF	ON : CANCEL SW ON OFF : CANCEL SW OFF	-
SET/COAST SW	-/SET SW signal / ON or OFF	ON : -/SET SW ON OFF : -/SET SW OFF	-
RES/ACC SW	+/RES SW signal / ON or OFF	ON : +/RES SW ON OFF : +/RES SW OFF	-
STP LIGHT SW2-M	Stop lamp SW signal (Main CPU) / ON or OFF	ON : Brake pedal depressed OFF : Brake pedal released	-
STP LIGHT SW2-S	Stop lamp SW signal (Sub CPU) / ON or OFF	ON : Brake pedal depressed OFF : Brake pedal released	-
STP LIGHT SW1-S	Stop light SW signal (Sub CPU) / ON or OFF	ON : Brake pedal depressed OFF : Brake pedal released	-
SHIFT D POS	PNP SW signal (D position) / ON or OFF	ON : Shift D position OFF : Except shift D position	-

HINT:

*1 is OK but cruise indicator not turn on → CRUISE MAIN indicator or wire harness or ECM failure

2. ACTIVE TEST

HINT:

Performing the ACTIVE TEST using the hand-held tester allows components such as the relay, VSV, and actuator to operate without parts removal. Performing the ACTIVE TEST as the first step of troubleshooting is one way to shorten labor time.

It is possible to display the DATA LIST during the ACTIVE TEST.

(a) Connect the hand-held tester to the DLC3.

(b) Turn the ignition switch to the ON position.

(c) According to the display on the tester, perform the ”ACTIVE TEST”.

HINT:

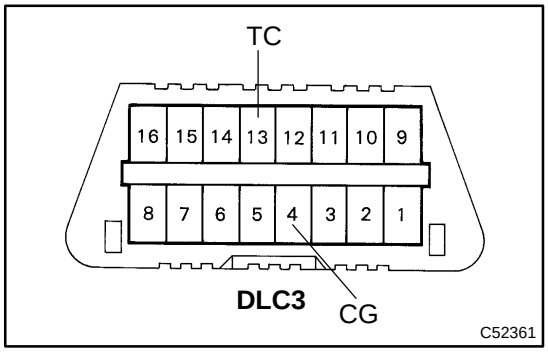
The ignition switch must be turned to the ON position to proceed ACTIVE TEST using the hand-held tester.

COMBINATION METER ASSY:

Item	Vehicle Condition / Test Details	Diagnostic Note
CRUISE INDIC	”CRUISE” indicator is ON / OFF	-

05IQR-01

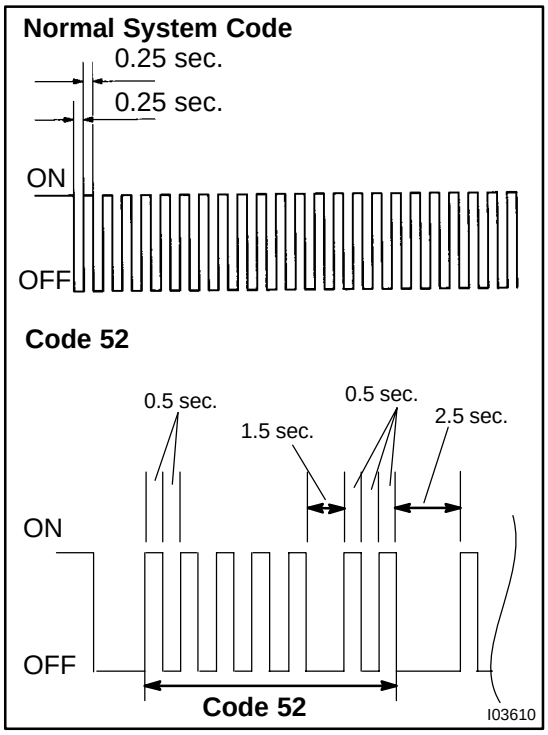
DTC CHECK/CLEAR



1. DTC CHECK (USING SST CHECK WIRE)

(a) Using SST check wire, connect terminals TC and CG of the DLC3.
SST 09843-18040

(b) Turn the ignition switch to the ON position.



(c) Read and record any DTCs from the CRUISE main indicator light on the combination meter. As examples, refer to the chart on the left for the indications of the normal system code and code 52.

(d) Refer to the Diagnostic Trouble Code Chart (see page 05-2153) for DTC information.

2. DTC CLEAR (USING SST CHECK WIRE)

(a) Remove the battery cable or ECU-IG fuse.

3. DTC CHECK (USING HAND-HELD TESTER)

(a) Connect the hand-held tester to the DLC3.

(b) Turn the ignition switch to the ON position.

(c) Read the DTCs on the tester screen.

4. DTC CLEAR (USING HAND-HELD TESTER)

(a) Connect the hand-held tester to the DLC3.

(b) Turn the ignition switch to the ON position.

(c) Clear the DTCs following the prompts on the tester screen.

05IQS-01

FAIL-SAFE CHART

1. If the following conditions are detected while the cruise control is in operation, the system clears the stored vehicle speed in the ECM and cancels the cruise control operation.

Vehicle Condition	Auto Cancel Condition	Re-operation Condition
The CRUISE main indicator light blinks.	・There is an open or short in the stop lamp switch circuit. ・There is a problem with the vehicle speed signal. ・There is a problem with the throttle position sensor and motor.	Push the ON-OFF button of the cruise control main switch on again.
The CRUISE main indicator light blinks.	・There is a problem with the input circuit of the stop lamp switch circuit. ・There is a problem with the cancel circuit.	・Turn the ON-OFF button of the cruise control main switch on again. ・Turn the ignition switch off.
The CRUISE main indicator light goes off.	・Vehicle speed is lower than the low speed limit (approx. 40 km/h (approx. 25 mph)) while running with the cruise control on. ・Vehicle speed is lower than the stored speed by 16 km/h (approx. 9.9 mph) or more.	Push the cruise control main switch to -/SET.

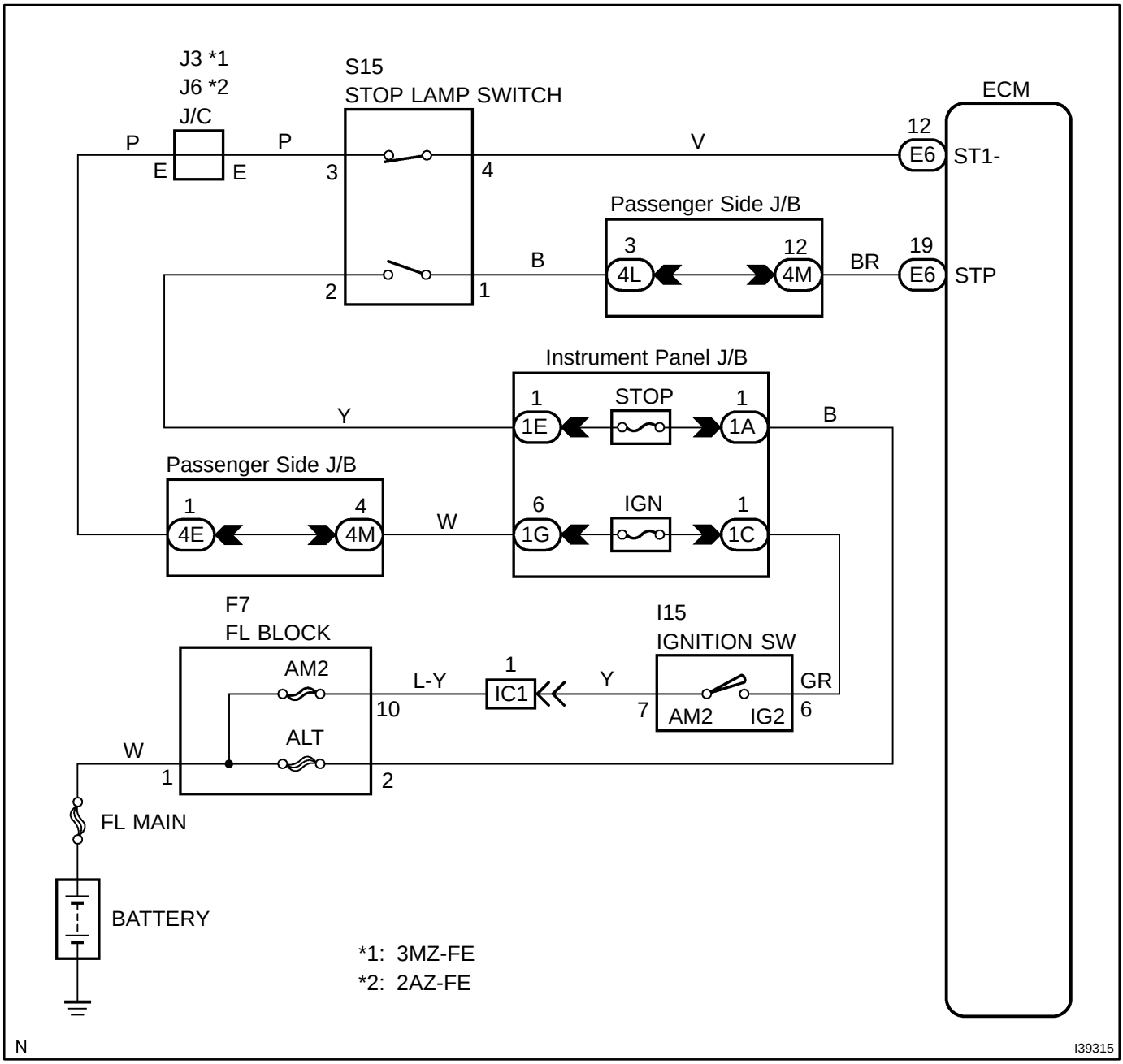
DTC	P0571/52	STOP LIGHT SWITCH CIRCUIT MALFUNCTION

CIRCUIT DESCRIPTION

When the brake pedal is depressed, the stop lamp switch assy sends a signal to the ECM. When the ECM receives this signal, it cancels the cruise control.
Fail-safe function operates to enable normal driving even if there is a malfunction in the stop lamp signal circuit.
The cancel condition occurs when positive battery voltage is applied to terminal STP.
When the brake is applied, battery positive voltage is normally applied to terminal STP of the ECM through the STOP fuse and the stop lamp switch assy, and the ECM turns the cruise control off.

DTC No.	DTC Detection Condition	Trouble Area
P0571/52	The malfunction code is output when the voltage of the STP terminal and that of the ST1- terminal on the ECM are less than 1 V for 0.5 sec. or more.	・Stop lamp switch assy ・Stop lamp switch assy circuit ・ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

1 READ VALUE OF HAND-HELD TESTER

(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch to the ON position, and turn the hand-held tester main switch on.
(c) Select the item ”STP LIGHT SW2-M”, ”STP LIGHT SW2-S” or ”STP LIGHT SW1-S” in the DATA LIST, and read its value displayed on the hand-held tester.
(d) Check that the stop lamp comes on when the brake pedal is depressed, and goes off when the brake pedal is released.

ECM:

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
STP LIGHT SW2-M	Stop lamp SW signal (Main CPU) / ON or OFF	ON : Brake pedal depressed OFF : Brake pedal released	-
STP LIGHT SW2-S	Stop lamp SW signal (Sub CPU) / ON or OFF	ON : Brake pedal depressed OFF : Brake pedal released	-
STP LIGHT SW1-S	Stop lamp SW signal (Sub CPU) / ON or OFF	ON : Brake pedal depressed OFF : Brake pedal released	-

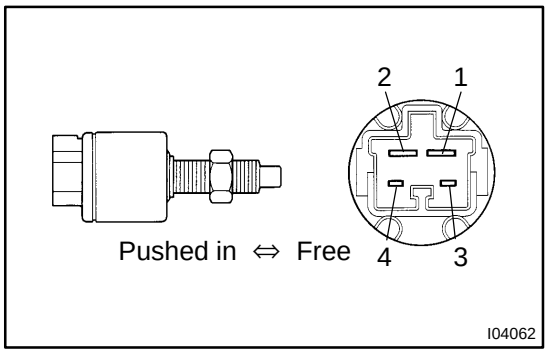
OK:
When brake pedal operation is performed, the standard values will be above.

NG → **Go to step 2**

OK

REPLACE ECM (SEE PAGE 10-24)

2 INSPECT STOP LAMP SWITCH ASSY



(a) Disconnect the stop lamp switch assy connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

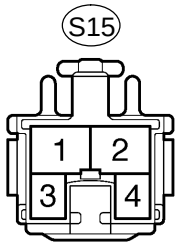
Switch condition	Tester connection	Specified value
Switch pin free	1 - 2	Below 1 Ω
Switch pin free	3 - 4	10 kΩ or higher
Switch pin pushed in	1 - 2	10 kΩ or higher
Switch pin pushed in	3 - 4	Below 1 Ω

NG → **REPLACE STOP LAMP SWITCH ASSY**

OK

3 CHECK HARNESS AND CONNECTOR

Stop Lamp Switch Wire Harness Side Connector Front View:



(a) Measure the voltage according to the value(s) in the table below.

Standard:

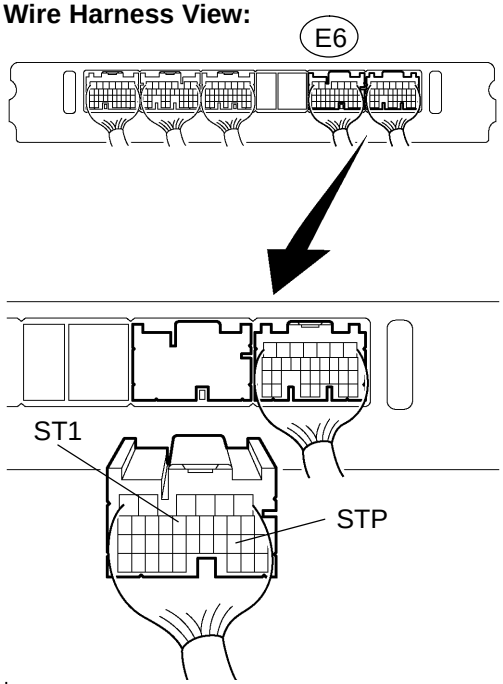
Tester connection	Condition	Specified condition
S15-2 - Body ground	Always	10 to 16 V
S15-3 - Body ground	Ignition SW ON	10 to 16 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (STOP LAMP SWITCH - BATTERY)**

OK

4 INSPECT ECM

Wire Harness View:



(a) Reconnect the stop lamp switch connector.
(b) Disconnect the E6 connector from the ECM.
(c) Turn the ignition switch to the ON position.
(d) Measure the voltage according to the value(s) in the table below.

Standard:

Pedal condition	Tester connection	Specification
Depressed	E6-19 (STP) - Body ground	10 to 16 V
Released	E6-19 (STP) - Body ground	Below 1 V
Depressed	E6-12 (ST1-) - Body ground	Below 1 V
Released	E6-12 (ST1-) - Body ground	10 to 16 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (STOP LAMP SWITCH - ECM)**

OK

REPLACE ECM (SEE PAGE 10-24)

DTC P0607/54 INPUT SIGNAL CIRCUIT MALFUNCTION

CIRCUIT DESCRIPTION

This DTC indicates the internal abnormalities of the ECM.

DTC No.	Detection Item	Trouble Area
P0607/54	The ECM has a supervisory CPU and a control ECU inside. When each input STP signal is different for 0.15 sec. or more, this trouble code is output. This trouble code is output after 0.4 sec. has passed from the time the cruise cancel input signal (STP input) is input into the ECM.	ECM

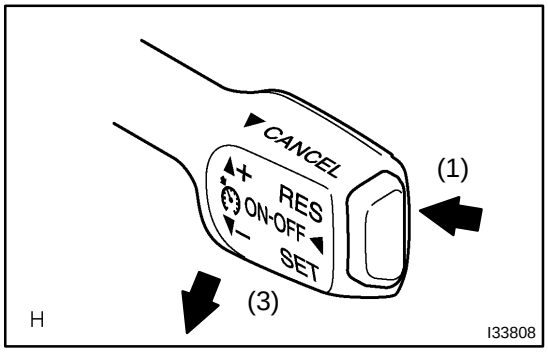
HINT:
The ECM receives signals from each sensor to control all the functions of the cruise control with the micro-computer.
When a trouble code is detected, fail-safe remains on until the ignition switch is turned off.

INSPECTION PROCEDURE

1	REPLACE ECM (SEE PAGE 10-24)

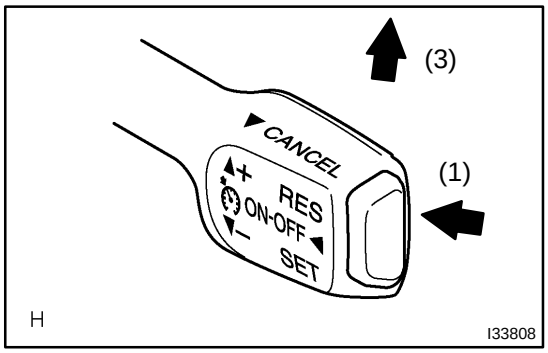
05IQP-02

ROAD TEST

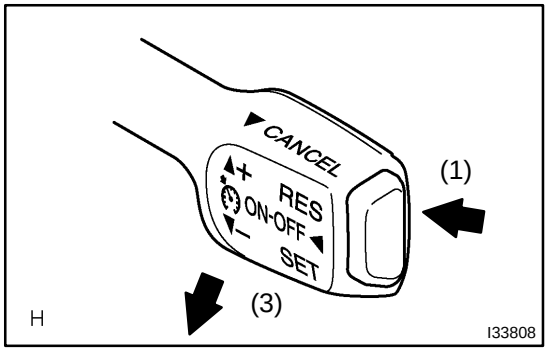


1. PROBLEM SYMPTOM CONFIRMATION

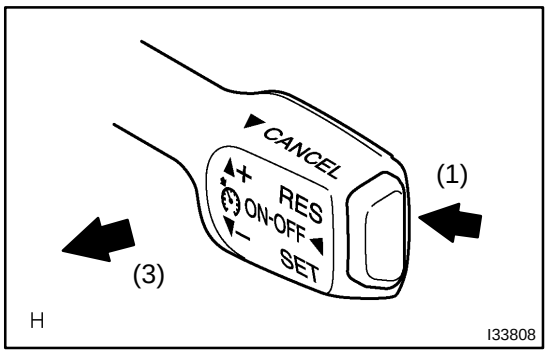
(a) Inspect the SET function.
- (1) Push the ON-OFF button on.
- (2) Drive at the required speed (40 km/h (25 mph) or higher).
- (3) Push the cruise control main switch to -/SET.
- (4) After releasing the switch, check that the vehicle cruises at the set speed.



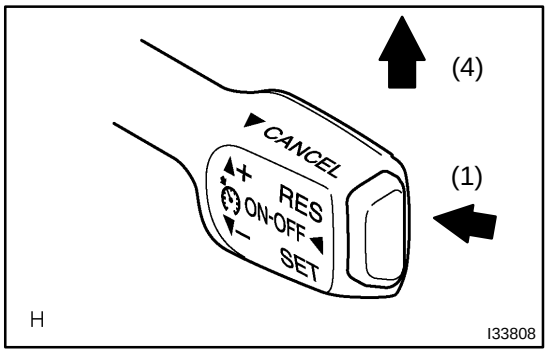
(b) Inspect the ACC (+) switch.
- (1) Push the ON-OFF button on.
- (2) Drive at the required speed (40 km/h (25 mph) or higher).
- (3) Push the cruise control main switch to -/SET.
- (4) Check that vehicle speed increases while the cruise control main switch is pushed to +/RES, and that the vehicle cruises at the newly set speed when the switch is released.
- (5) Momentarily push the cruise control main switch to +/RES and then immediately release it. Check that vehicle speed increases by approximately 1.6 km/h (1.0 mph) (Tap-up function).



(c) Inspect the COAST (-) function.
- (1) Push the ON-OFF button on.
- (2) Drive at the required speed (40 km/h (25 mph) or higher).
- (3) Push the cruise control main switch to -/SET.
- (4) Check that vehicle speed decreases while the cruise control main switch is pushed to -/SET, and the vehicle cruises at the newly set speed when the switch is released.
- (5) Momentarily push the cruise control main switch to -/SET , and then immediately release it. Check that vehicle speed decreases by approximately 1.6 km/h (1.0 mph) (Tap-down function).



(d) Inspect the CANCEL function.
(1) Push the ON-OFF button on.
(2) Drive at the required speed (40 km/h (25 mph) or higher).
(3) Push the cruise control main switch to -/SET.
(4) When doing one of the followings, check that the cruise control system is cancelled and that the normal driving mode is reset.
- Depressing the brake pedal
- Moving the shift lever to any position except D
- Pushing the ON-OFF button off
- Pulling the cruise control main switch to CANCEL



(e) Inspect the RES (RESUME) function.
(1) Push the ON-OFF button on.
(2) Drive at the required speed (40 km/h (25 mph) or higher).
(3) Push the cruise control main switch to -/SET.
(4) When doing one of the followings, check that the cruise control system is cancelled and that the normal driving mode is reset.
- Depressing the brake pedal
- Moving the shift lever to any position except D
- Pulling the cruise control main switch to CANCEL

(5) After pushing the cruise control main switch to +/RES at a driving speed of more than 40 km/h (25 mph), check that the vehicle restores the speed prior to the cancellation.

05IQL-01

SYSTEM DESCRIPTION

1. CRUISE CONTROL SYSTEM

The computer which controls the cruise control system is combined with the ECM, and the actuator uses the throttle position sensor and motor. A microcomputer is built into the ECM to control functions including: ON-OFF , SET/COAST, RESUME/ACCEL, CANCEL, vehicle speed operation, motor output control, and overdrive control.

- The ECM compares the driving vehicle speed from the speed sensor with the stored vehicle speed set through the cruise control main switch assy. The ECM instructs the throttle valve motor of the throttle position sensor and motor to close the valve when the driving vehicle speed is greater than the stored vehicle speed, and instructs it to open the valve when the driving speed is less than the stored speed.
- The ECM receives signals such as ON-OFF, SET/COAST, RESUME/ACCEL, and CANCEL from the cruise control main switch assy and executes them.
- The ECM turns on the indicator in the combination meter based upon the ON signal from the cruise control main switch assy.
- The ECM cancels the cruise control system when it detects that the brake pedal is depressed, based on the stop lamp switch signal.
- The ECM cancels the cruise control system when it detects that the shift position is changed from D to N, based on the park/neutral position switch assy signal.

2. LIMIT CONTROL

(a) Low speed limit

The lowest possible limit of the speed setting range is set at approximately 40 km/h (25 mph). The cruise control system cannot be set when the driving vehicle speed is below the low speed limit. Cruise control operation will be automatically canceled and the stored vehicle speed will be erased when the vehicle speed goes below the low speed limit while the cruise control is in operation.

(b) High speed limit

The highest possible limit of the speed setting range is set at approximately 200 km/h (125 mph). The cruise control system cannot be set when the driving vehicle speed is over the high speed limit. Speed up using RESUME/ACCEL with the cruise control main switch assy also cannot be set beyond the high speed limit.

3. OPERATION OF CRUISE CONTROL

The cruise control main switch operates seven functions: SET, COAST(-), TAP-DOWN, RESUME, ACCEL(+), TAP-UP and CANCEL. The SET, TAP-DOWN and COAST functions, and the RESUME, TAP-UP and ACCEL functions are operated with the same switch. The cruise control main switch assy is an automatic return type switch which turns on only while operating it in each arrow direction and turns off after releasing it.

(a) SET CONTROL

Vehicle speed is stored and constant speed control is maintained when pushing the switch to -/SET while driving with the cruise control main switch ON-OFF button on (the CRUISE main indicator light is on), and the vehicle speed is within the set speed range (between the low and high speed limits).

(b) COAST CONTROL

The ECM makes the cruise control demanding throttle opening angle zero degrees and decelerates the vehicle (the throttle valve is not fully closed due to idle speed control, etc.) when -/SET on the cruise control main switch is pressed and held while the cruise control system is in operation. Vehicle speed, when the cruise control main switch is released from -/SET, is stored and constant speed control is maintained.

(c) TAP-DOWN CONTROL

When tapping down on the cruise control main switch to -/SET (for approx. 0.5 second) while the cruise control system is in operation, the stored vehicle speed decreases each time by approximately 1.6 km/h (1.0 mph). However, when the difference between the driving and the stored vehicle speed is more than 5 km/h (approx. 3.1 mph), the vehicle speed, when the cruise control main switch is released from -/SET, will be stored and constant speed control is maintained.

(d) ACCELERATION CONTROL

The throttle valve motor of the throttle position sensor and motor is instructed by the ECM to open the valve when +/RES on the cruise control main switch is pressed and held while the cruise control system is in operation. Vehicle speed, when the cruise control main switch is released from +/RES, is stored and the vehicle is controlled at a constant speed.

(e) TAP-UP CONTROL

When tapping up on the cruise control main switch to +/RES (for approx. 0.5 second) while the cruise control system is in operation, the stored vehicle speed increases each time by approximately 1.6 km/h (1.0 mph). However, when the difference between the driving and the stored vehicle speed is more than 5 km/h (approx. 3.1 mph), the stored vehicle speed will not be changed.

(f) RESUME CONTROL

If cruise control operation was cancelled with the stop lamp switch or the CANCEL switch, and if driving speed is within the limit range, pushing the cruise control main switch to +/RES restores vehicle speed memorized at the time of cancellation, and maintains constant speed control.

(g) MANUAL CANCEL CONTROL

Doing any of the following cancels the cruise control system while in operation. (The stored vehicle speed in the ECM is maintained.)

- Depressing the brake pedal
- Moving the shift lever to any position except D
- Pushing the cruise control main switch to CANCEL
- Pushing the cruise control main switch ON-OFF button off (The stored vehicle speed in the ECM is not maintained.)

4. AUTO CANCEL (FAIL-SAFE)

This system has an automatic cancellation function (fail-safe) (for details, see page 05-2148).

05IQO-01

CUSTOMER PROBLEM ANALYSIS CHECK

CRUISE CONTROL SYSTEM Check Sheet

Inspector's name: _____

Customer's Name		**VIN**	
		Production Date	
		Licence Plate No.	
Date Vehicle Brought in	/ /	**Odometer Reading**	**km mile**

Condition of Problem Occurrence	**Date Problem Occurred**	/ /
	Frequency Problem Occurs	○ Continuous ○ Intermittent (times a day)
	Vehicle Speed when Problem Occurred	**km mile**

Symptoms	○ Auto cancel occurs	⁎Driving condition ○ City driving ○ Freeway ○ Uphill ○ Downhill ⁎After cancel occurred, did the driver activate cruise control again? ○ Yes ○ No
	○ Cancel does not occur	○ With brake ON ○ Except shifting into D position ○ When control SW turns to CANCEL position
	○ Cruise control malfunction	○ Slip to acceleration side ○ Slip to deceleration side ○ Hunting occurs
	○ Switch malfunction	○ SET ○ ACCEL(+) ○ COAST(-) ○ RESUME ○ CANCEL
	○ CRUISE MAIN indicator light	○ Remains ON ○ Does not light up ○ Blinks

DTC Check	**1st Time**	○ Normal System Code ○ Trouble Code (Code)
	2nd Time	○ Normal System Code ○ Trouble Code (Code)

05IQV-01

DIAGNOSTIC TROUBLE CODE CHART

HINT:

- Using SST 09843-18040, connect terminals TC and CG of the DLC3.
- If a trouble code is displayed during the DTC check, check the circuit listed for that code. For details of each code, refer to the "See page" under respective "DTC No." in the DTC chart.

DTC No. (See Page)	Circuit Inspection	Trouble Area
P0500/21 (05-2154)	Vehicle Speed Sensor Circuit Malfunction	・Vehicle speed sensor ・Vehicle speed sensor signal circuit ・ECM
P0503/23 (05-2154)	Vehicle Speed Sensor Circuit Malfunction	・Vehicle speed sensor ・Vehicle speed sensor signal circuit ・ECM
P0571/52 (05-2155)	Stop Light Switch Circuit Malfunction	・Stop lamp switch assy ・Stop lamp switch assy circuit ・ECM
P0607/54 (05-2159)	Input Signal Circuit Malfunction	・ECM

05IQN-02

HOW TO PROCEED WITH TROUBLESHOOTING

The hand-held tester can be used at steps 4, 5, 6, and 11.

1	VEHICLE BROUGHT TO WORK SHOP

2	CUSTOMER PROBLEM ANALYSIS (SEE PAGE 05-2142)

3	PROBLEM SYMPTOM CONFIRMATION

4	CHECK BODY MULTIPLEX COMMUNICATION SYSTEM (SEE PAGE 05-2040)

(a) Check for output DTCs.

HINT:

The ECM of this system is connected to the multiplex communication system. Therefore, before starting troubleshooting, make sure to check that there is no trouble in the multiplex communication system.

	MULTIPLEX SYSTEM DTC IS OUTPUT (PROCEED TO "BODY MULTIPLEX COMMUNICATION SYSTEM")
	NO MULTIPLEX SYSTEM DTC (GO TO STEP 5)

5	DTC CHECK AND CLEAR (SEE PAGE 05-2147)

6	DTC CHECK (OTHER THAN MULTIPLEX DTC) (SEE PAGE 05-2147)

	TROUBLE CODE (GO TO STEP 7)
	NORMAL SYSTEM CODE (GO TO STEP 8)

7	DTC CHART (SEE PAGE 05-2153)

GO TO STEP 11

8	PROBLEM SYMPTOM SIMULATION

→ SYMPTOM DOES NOT OCCUR (GO TO STEP 9)

→ SYMPTOM OCCURS (GO TO STEP 10)

9	SYMPTOM SIMULATION (SEE PAGE 01-26)

10	PROBLEM SYMPTOMS TABLE (SEE PAGE 05-2152)

11	CIRCUIT INSPECTION (SEE PAGE 05-2154 - 05-2166)

12	TERMINALS OF ECM (SEE PAGE 05-2151)

13	IDENTIFICATION OF PROBLEM

14	REPAIR OR REPLACE

15	CONFIRMATION TEST

END

DTC	P0500/21	VEHICLE SPEED SENSOR CIRCUIT MALFUNCTION

DTC	P0503/23	VEHICLE SPEED SENSOR CIRCUIT MALFUNCTION

CIRCUIT DESCRIPTION

3MZ-FE: See page 05-578 .
2AZ-FE: See page 05-216 .

DTC No.	DTC Detection Condition	Trouble Area
P0500/21	This trouble code is output when the vehicle speed signal from the vehicle speed sensor is cut for 0.14 sec. or more while the cruise control is in operation.	・Vehicle speed sensor ・Vehicle speed sensor signal circuit ・ECM
P0503/23	Momentary interruption and noise are detected when a rapid change of vehicle speed occurs while the cruise control is in operation.	・Vehicle speed sensor ・Vehicle speed sensor signal circuit ・ECM

WIRING DIAGRAM

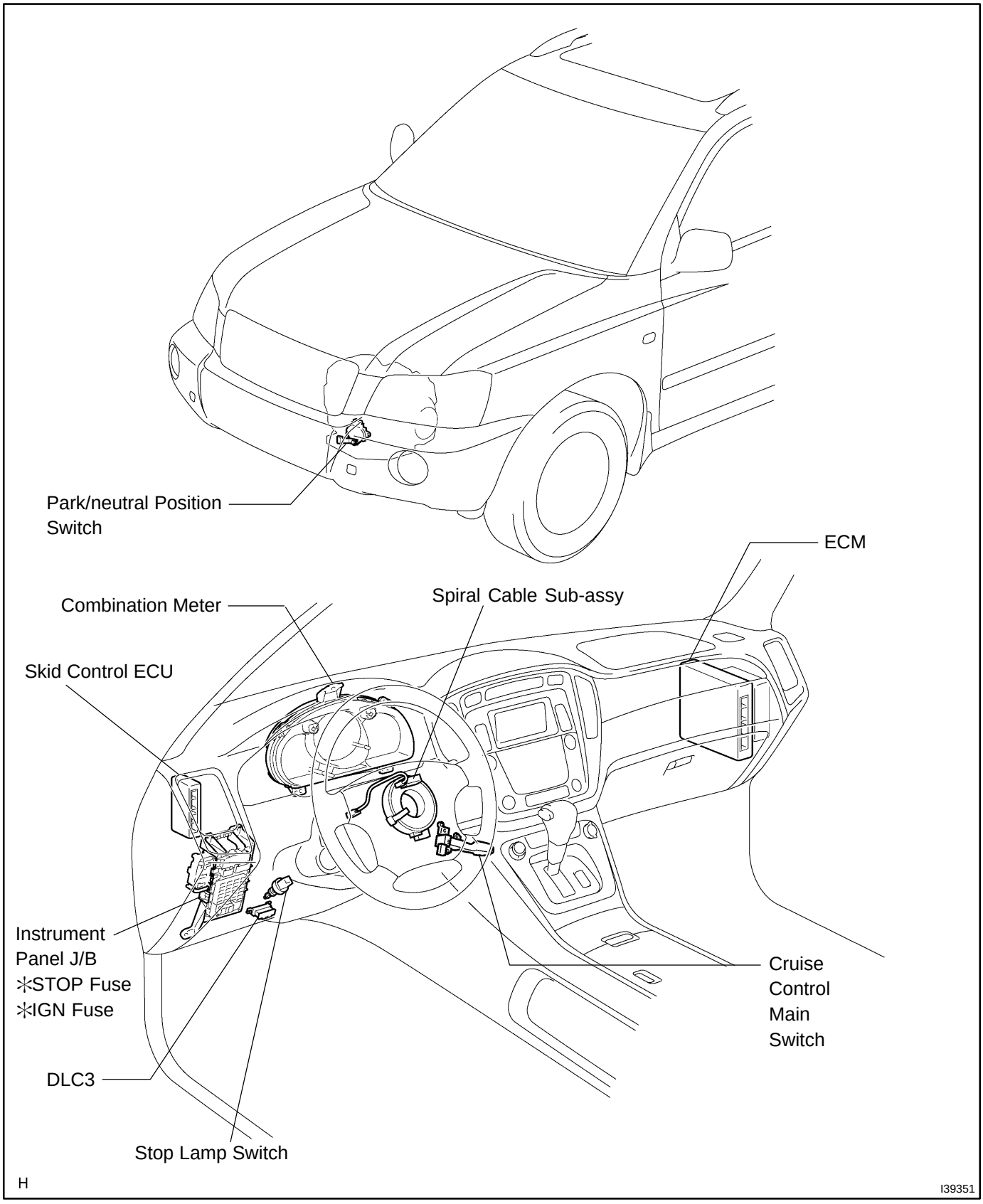
3MZ-FE: See page 05-578 .
2AZ-FE: See page 05-216 .

INSPECTION PROCEDURE

3MZ-FE: See page 05-578 .
2AZ-FE: See page 05-216 .

05IQK-01

LOCATION



CRUISE CONTROL SYSTEM

05IQZ-01

PRECAUTION

1. Pay attention to the following points when inspecting the cruise control system.

(a) Push the cruise control main switch ON-OFF button off when not using the cruise control.

(b) Be careful of vehicle speed increase when driving downhill with the cruise control on.

(c) RESUME/ACCEL operation, after canceling the cruise control, works as RESUME, and works as ACCEL while the cruise control system is in operation.

(d) Push the cruise control main switch ON-OFF button off and reset the cruise control if the CRUISE main indicator light blinks while the cruise control system is in operation. When the cruise control cannot be set by this procedure or cancelled immediately after setting, there may be a malfunction in the system.

(e) Do not use the cruise control system where the road conditions are as follows:

- Heavy traffic
- Steep downhill
- Sharp turns
- Icy or snowy roads
- Slippery roads

05IQU-02

PROBLEM SYMPTOMS TABLE

If a normal system code is displayed during the DTC check but the problem still occurs, check the circuits for each problem symptom in the order given in the table below and proceed to the relevant troubleshooting page.

HINT:

Inspect the ”Fuse” and ”Relay” before confirming the suspected areas as shown in the chart below.

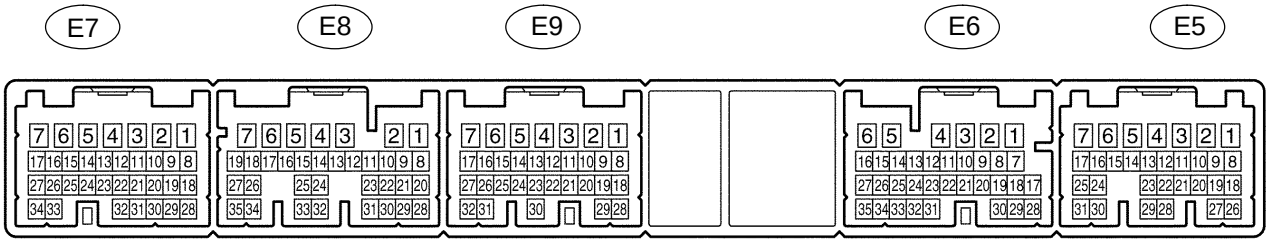
Inspect each malfunction circuit in numerical order for the corresponding symptom.

If the malfunction still exists even after checking and confirming that all the circuits are normal, replace the ECM.

Symptom	Suspected Area		See page
Main switch cannot be turned ON. (Cruise indicator light in combination meter does not come on.)	3. Cruise control switch circuit 4. CRUISE main indicator light circuit 5. ECM		05-2160 05-2165 10-24
Vehicle speed setting cannot be done. (Although indicator light in combination meter comes on when the main switch is turned ON, it goes off when vehicle speed is set.)	1. Cruise control switch circuit 2. ECM		05-2160 10-24
Setting cannot be done. (Indicator light in combination meter comes on when the main switch is turned ON and they remain ON while setting.)	1. Cruise control switch circuit 2. Stop lamp switch circuit 3. Park/neutral position switch circuit 4. Transmission control switch circuit 5. Combination meter system 6. ECM	 U151E/U151F U241E/U141F U151E/U151F U241E/U141F	05-2160 05-2155 05-1036 05-922 05-1109 05-981 05-1868 10-24
While the vehicle is driven with cruise control, the set control is cancelled. (Indicator light and CRUISE remain ON.)	1. Cruise control switch circuit 2. Vehicle speed sensor circuit 3. Stop lamp switch circuit 4. CRUISE main indicator light circuit 5. Park/neutral position switch circuit 6. ECM	 3MZ-FE 2AZ-FE U151E/U151F U241E/U141F	05-2160 05-578 05-216 05-2155 05-2165 05-1036 05-922 10-24
Hunting (Speed is not constant.)	1. Vehicle speed sensor circuit 2. ECM	3MZ-FE 2AZ-FE	05-578 05-216 10-24
Setting cannot be cancelled. (When Coast, Acceleration, Resume, Set speed change and Control switch are operated.)	1. Cruise control switch circuit 2. ECM		05-2160 10-24
DTC is not output, or is output when should not be.	1. Diagnosis circuit 2. ECM		05-2166 10-24
CRUISE MAIN indicator light does not come on.	1. Cruise control switch circuit 2. CRUISE main indicator light circuit 3. ECM 4. Combination meter assy		05-2160 05-2165 10-24 71-18

05B31-08

TERMINALS OF ECM



I30693

Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	Specified Condition
TC - E1 (E5-20 - E9-1) *1 (E5-20 - E7-1) *2	O - BR	Ground	Ignition switch ON → Connect terminals TC and CG of DLC3	10 to 16 V → Below 1 V
STP - E1 (E6-19 - E9-1) *1 (E6-19 - E7-1) *2	BR - BR	Stop lamp signal	Ignition switch ON Depress brake pedal → Release brake pedal	10 to 16 V → Below 1 V
CCS - E1 (E6-24 - E9-1) *1 (E6-24 - E7-1) *2	LG - BR	Cruise control main switch circuit	Ignition switch ON CANCEL switch hold ON -/SET switch hold ON +/RES switch hold ON MAIN switch hold ON	10 to 16 V 6.6 to 11.4 V 4.5 to 8.1 V 2.3 to 4.5 V Below 1 V
ST1- - E1 (E6-12 - E9-1) *1 (E6-12 - E7-1) *2	V - BR	Stop lamp signal	Ignition switch ON Depress brake pedal → Release brake pedal	Below 1 V → 10 to 16 V

*1: 2AZ-FE

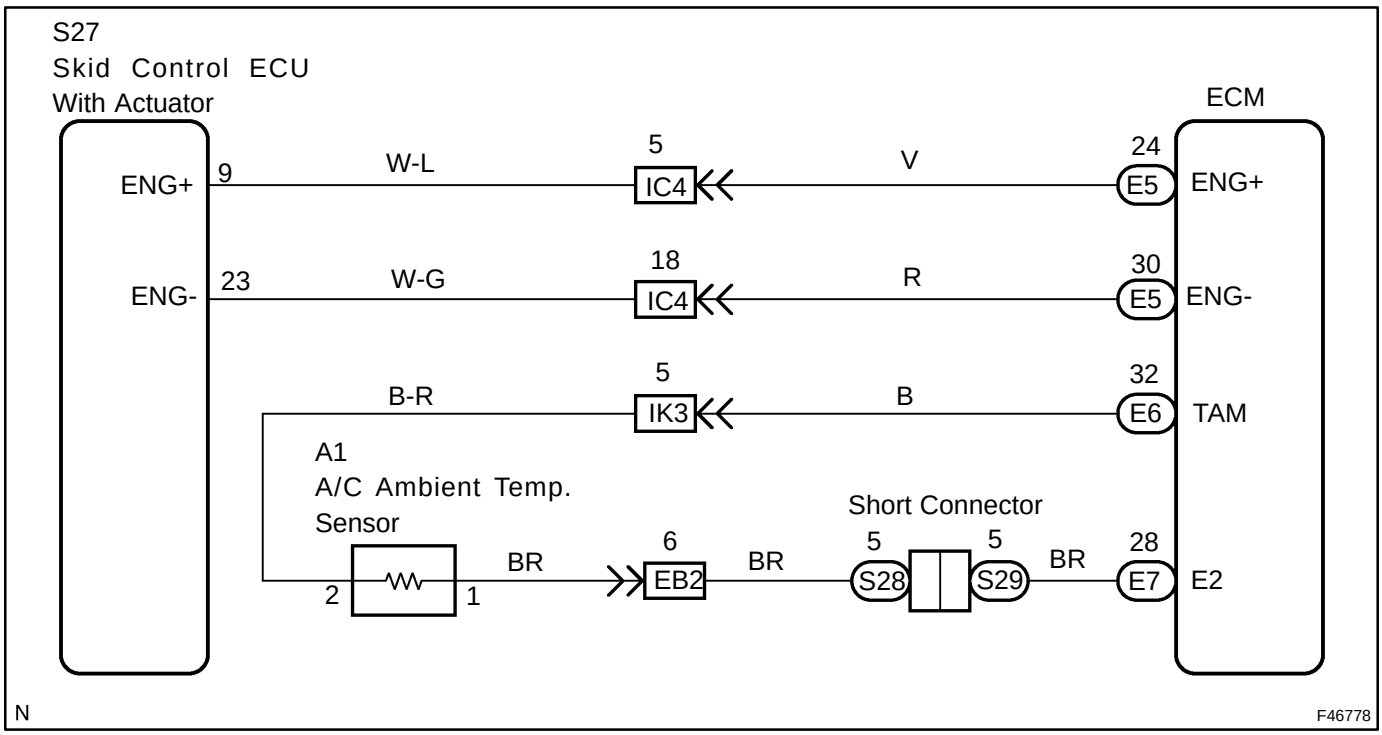
*2: 3MZ-FE

AMBIENT TEMPERATURE SENSOR CIRCUIT

CIRCUIT DESCRIPTION

The ambient temperature sensor sends the outside temperature signal to the ECM. The ECM transmits the signal to the skid control ECU as a communication signal. The skid control ECU controls the tire pressure warning system, depending on the changes of the outside temperature.
HINT:
The signal sent from the ambient temperature sensor is also used in the A/C.

WIRING DIAGRAM



INSPECTION PROCEDURE

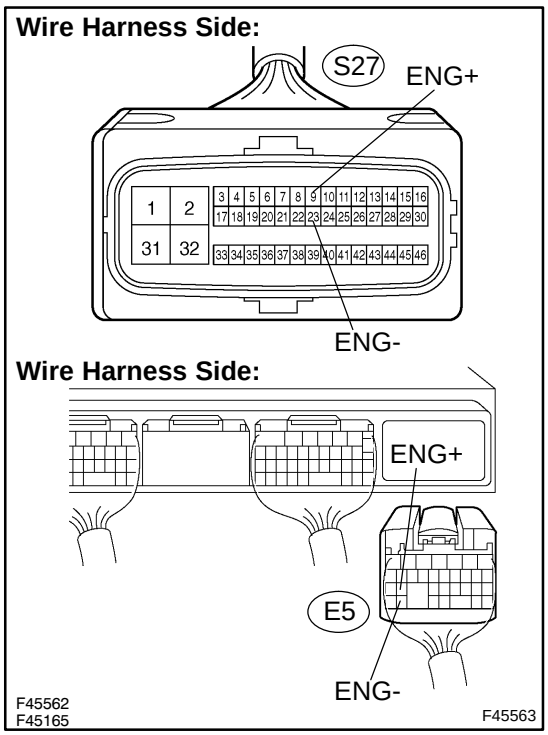
1	CHECK DIAGNOSTIC CODE OUTPUT

(a) Check if the normal code is output by air conditioning system (see page 05-1 117).
OK:
DTC is not output.

NG → **REPAIR CIRCUIT INDICATED BY OUTPUT CODE**

OK

2	CHECK HARNESS AND CONNECTOR(BRAKE ACTUATOR ASSY - ECM) (SEE PAGE 01-36)



(a) Disconnect the brake actuator assy S27 connector and ECM E5 connector.

(b) Measure the resistance between each terminal of brake actuator assy and ECM wire harness side connectors.

Standard:

Tester connection	Specified condition
S27-9 (ENG+) - E5-24 (ENG+)	Below 1 Ω
S27-23 (ENG-) - E5-30 (ENG-)	Below 1 Ω

(c) Measure the resistance between each terminal of the brake actuator assy wire harness side connector and body ground.

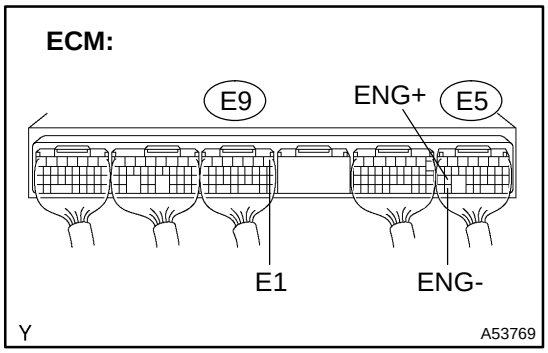
Standard:

Tester connection	Specified condition
S27-9 (ENG+) - Body ground	10 kΩ or higher
S27-23 (ENG-) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

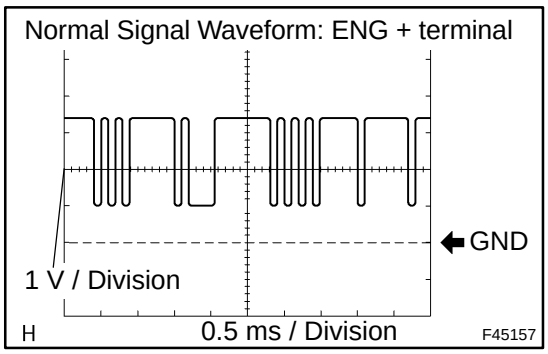
3	**INSPECT ECM(ENG+, ENG- OUTPUT)**



(a) Connect the brake actuator assy S27 connector and ECM E5 connector.

(b) Remove the ECM with the connectors connected.

(c) Turn the ignition switch to the ON position.



(d) Using an oscilloscope, connect the terminals, as shown in the chart below.

Tester Connection
E5-24 (ENG+) - E9-1 (E1)

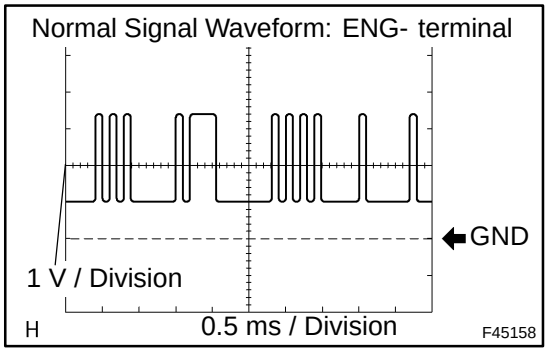
(e) With the engine idling, check the output waveform.

OK:

Signal waveform appears as shown in the illustration.

HINT:

As the vehicle speed increases, the waveform cycle narrows.



(f) Using an oscilloscope, connect the terminals, as shown in the chart below.

Tester Connection
E5-30 (ENG-) - E9-1 (E1)

(g) With the engine idling, check the output waveform.

OK:

Signal waveform appears as shown in the illustration.

HINT:

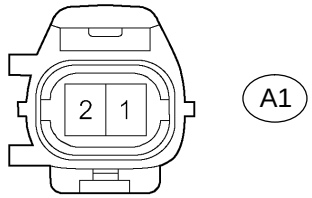
As the engine speed increases, the waveform cycle narrows.

NG → **REPLACE ECM**

OK

4 INSPECT AMBIENT TEMPERATURE SENSOR

Ambient Temperature Sensor:



H I30155

(a) Remove the ambient temperature sensor and disconnect the A1 connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

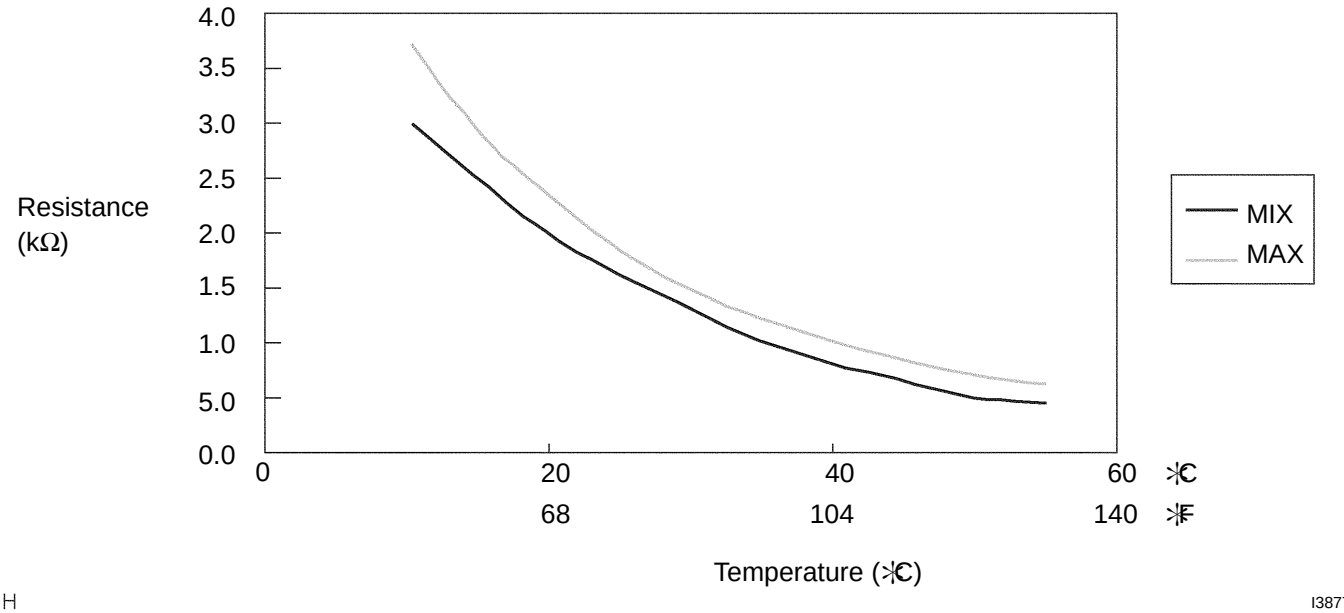
Tester connection	Condition	Specified condition
A1-1 - A1-2	50°F (10°C)	3.00 to 3.73 kΩ
A1-1 - A1-2	59°F (15°C)	2.45 to 2.88 kΩ
A1-1 - A1-2	68°F (20°C)	1.95 to 2.30 kΩ
A1-1 - A1-2	77°F (25°C)	1.60 to 1.80 kΩ
A1-1 - A1-2	86°F (30°C)	1.28 to 1.47 kΩ
A1-1 - A1-2	95°F (35°C)	1.00 to 1.22 kΩ
A1-1 - A1-2	104°F (40°C)	0.80 to 1.00 kΩ
A1-1 - A1-2	113°F (45°C)	0.65 to 0.85 kΩ
A1-1 - A1-2	122°F (50°C)	0.50 to 0.70 kΩ
A1-1 - A1-2	131°F (55°C)	0.44 to 0.60 kΩ
A1-1 - A1-2	140°F (60°C)	0.36 to 0.50 kΩ

HINT:

As the temperature increases, the resistance decreases (see the chart below).

NOTICE:

Even slightly touching the sensor may change the resistance value. Be sure to hold the connector of the sensor.



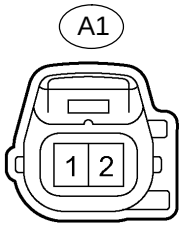
H I38777

NG → REPLACE AMBIENT TEMPERATURE SENSOR

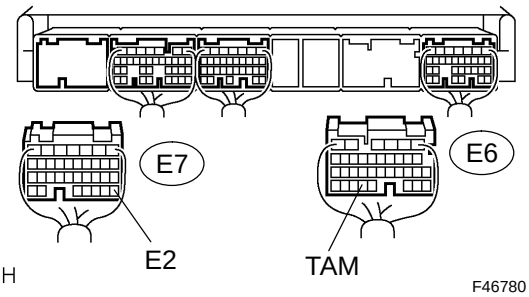
OK

5	CHECK HARNESS AND CONNECTOR(ECM - AMBIENT TEMPERATURE SENSOR) (SEE PAGE 01-36)

Wire harness side:



Wire harness side:



(a) Disconnect the ECM E6 and E7 connectors.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
E6-32 (TAM) - A1-2	Always	Below 1 Ω
E7-28 (E2) - A1-1	Always	Below 1 Ω
E6-32 (TAM) - Body ground	Always	10 kΩ or higher
E7-28 (E2) - Body ground	Always	10 kΩ or higher

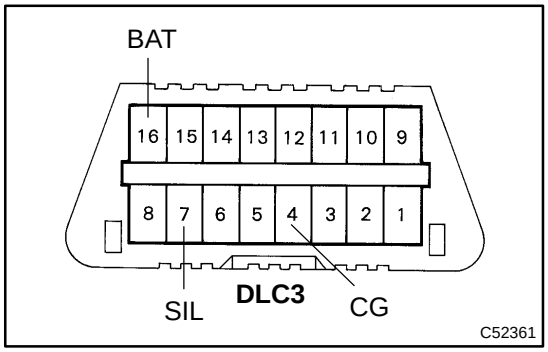
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE ECM (SEE PAGE 10-9 OR 10-24)

05EZ0-02

DIAGNOSIS SYSTEM



1. DIAGNOSTIC SYSTEM

(a) Inspect the battery voltage.

Battery voltage: 11 to 14 V

If voltage is below 11 V, recharge the battery before proceeding.

(b) Check the DLC3.

The vehicle's skid control ECU uses ISO 9141-2 for communication. The terminal arrangement of the DLC3 complies with SAE J1962 and matches with the ISO 9141-2 format.

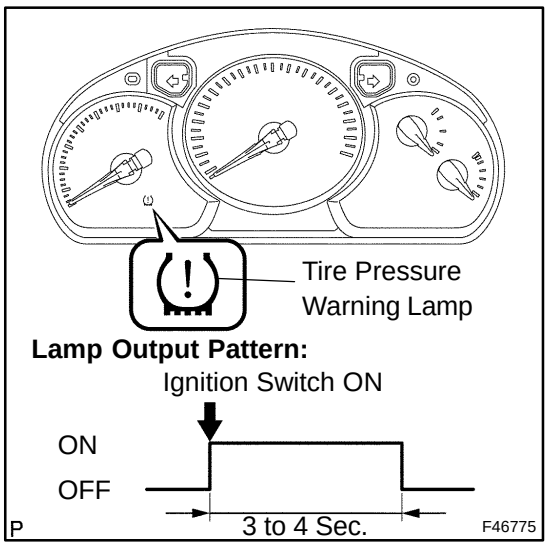
Verify conditions listed in the table below:

Terminal No.	Terminal name	Connection / Voltage or Resistance	Condition
7	SIL	Bus + Line / Pulse generation	During transmission
4	CG	Chassis Ground to Body Ground / 1 Ω or less	Always
16	BAT	Battery Positive to Body Ground / 10 to 14 V	Always

HINT:

If the hand-held tester displays "UNABLE TO CONNECT TO VEHICLE" when the cable of the hand-held tester is properly connected to the DLC3, the ignition switch is turned to the ON position and the tester is operated, there is either a problem on the vehicle side or tester side.

- If communication is normal when the tester is connected to another vehicle, inspect the DLC3 on the original vehicle.
- If communication is still not possible when the tool is connected to another vehicle, the problem is probably in the tester itself. In this case, consult the Service Department listed in the tester's instruction manual.



2. CHECK WARNING LAMP

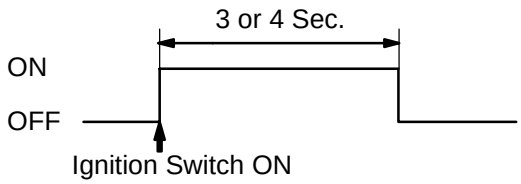
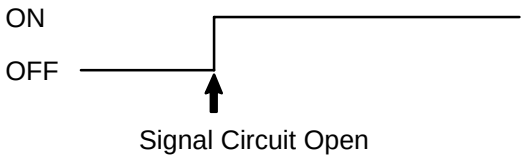
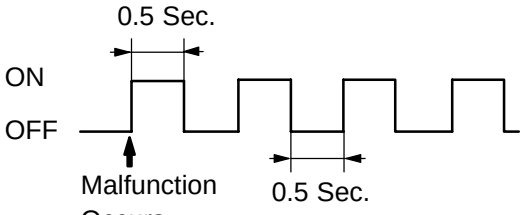
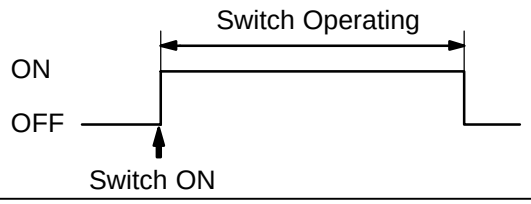
(a) Turn the ignition switch to the LOCK position.

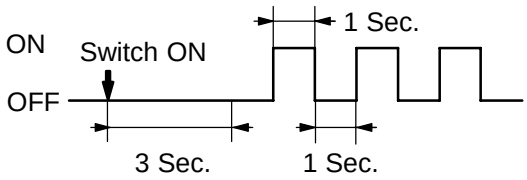
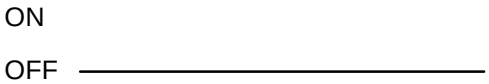
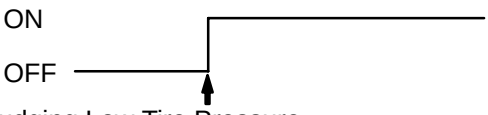
(b) When the ignition switch is turned to the ON position, the lamp should come on for 3 to 4 seconds and then go off.

HINT:

If the tire pressure warning lamp has a defect, check the tire pressure warning lamp output patterns and the problem symptoms table (see page 05-740).

3. TIRE PRESSURE WARNING LAMP CHART:

Priority	Condition	Tire Pressure Warning Lamp Output Pattern
1	Ignition switch is in the ON position.	Tire pressure warning lamp comes on for 3 seconds when the ignition switch is turned to the ON position. (However, during initialization, the lamp comes on for 4 seconds.) 
2	**System abnormal 1** Tire pressure warning lamp signal is open. HINT: When the tire pressure warning lamp drive signal circuit opens due to a skid control ECU malfunction, communication error, open circuit in the wire harness, etc., the tire pressure warning lamp comes on. (Active Lamp Circuit)	Tire pressure warning lamp comes on 
3	**System abnormal 2** ABS system malfunction Speed sensor malfunction Stop lamp switch assy malfunction HINT: The skid control ECU monitors the speed sensor signal and the stop lamp switch signal, and the tire pressure warning lamp blinks.	Tire pressure warning lamp blinks (Comes on and goes off repeatedly at 0.5 second intervals.)  HINT: (When the skid control ECU detects a system abnormal 2 malfunction, check the ABS DTCs and proceed to the pages on which the ABS DTCs are described.)
4 (When in test mode)	Tire pressure warning reset switch is turned on during test mode. (Press and hold the tire pressure warning reset switch.)	Tire pressure warning lamp comes on when the tire pressure warning reset switch is turned on. 

Priority	Condition	Tire Pressure Warning Lamp Output Pattern
5	Initialization mode is received. HINT: See step 3 for initialization procedure.	Tire pressure warning lamp blinks 3 times (Comes on and goes off repeatedly at 1 second intervals.) 
6	Failure to initialize when driving the vehicle. HINT: 3 conditions will indicate this pattern: 1. New vehicle from factory 2. ECM replacement 3. Failure to initialize	Tire pressure warning lamp blinks (Comes on and goes off repeatedly at 0.25 second intervals.) 
7	Outputs tire air pressure check result. HINT: The result is output only when driving at 19 mph (35 km/h) or more.	Tire pressure is judged to be normal: Warning light is OFF:  Tire pressure is judged to be low: Warning light comes on: 

HINT:
When the skid control ECU does not operate properly, the ABS warning lamp comes on as an ABS system malfunction.

05EZ1-02

DATA LIST/ACTIVE TEST

1. DATA LIST

HINT:

By accessing the DATA LIST displayed by the hand-held tester, you can read the value of the switches and sensors without removing any parts. Reading the DATA LIST as the first step of troubleshooting is one method to shorten labor time.

(a) Connect the hand-held tester to the DLC3.

(b) Turn the ignition switch to the ON position.

(c) Following the display on the tester, select the ”DATA LIST”.

ABS:

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
STOP LIGHT SW	Stop light switch / ON or OFF	ON: Brake pedal depressed OFF: Brake pedal released	-
WHEEL SPD FR	Front right wheel speed reading / min.: 0 km/h (0 mph) max.: 326.4 km/h (202 mph)	Actual wheel speed	Speed indicated on speedometer
WHEEL SPD FL	Front left wheel speed reading / min.: 0 km/h (0 mph) max.: 326.4 km/h (202 mph)	Actual wheel speed	Speed indicated on speedometer
WHEEL SPD RR	Rear right wheel speed reading / min.: 0 km/h (0 mph) max.: 326.4 km/h (202 mph)	Actual wheel speed	Speed indicated on speedometer
WHEEL SPD RL	Rear left wheel speed reading / min.: 0 km/h (0 mph) max.: 326.4 km/h (202 mph)	Actual wheel speed	Speed indicated on speedometer
VEHICLE SPD	Vehicle speed reading / min.: 0 km/h (0 mph) max.: 326.4 km/h (202 mph)	Actual vehicle speed	Speed indicated on speedometer
EFI COM	EFI communication open detection / Normal or Open	Normal	-
TEST MODE	Test mode / NORMAL or TEST	NORMAL: Normal mode TEST: During test mode	-
#CODES	Number of DTC recorded / min.: 0, max.: 255	Min.: 0, Max.: -	-

2. ACTIVE TEST

HINT:

Perform the ACTIVE TEST using the hand-held tester to operate the ABS warning lights. Performing the ACTIVE TEST is one of the methods to shorten labor time. It is possible to display the DATA LIST during the ACTIVE TEST.

(a) Connect the hand-held tester to the DLC3.

(b) Turn the ignition switch to the ON position.

(c) Following the display on the tester, perform the ”ACTIVE TEST”.

ABS:

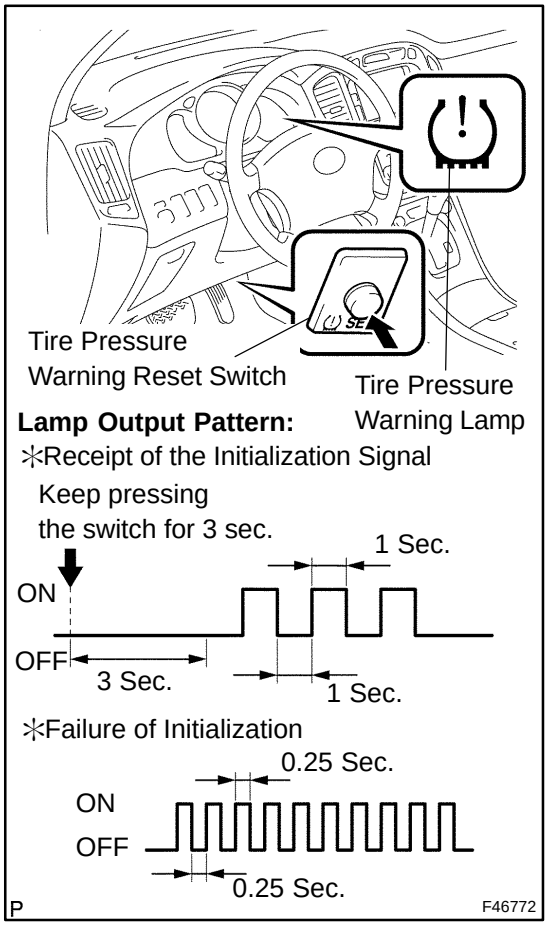
Item	Vehicle Condition / Test Details	Diagnostic Note
ABS WARN LIGHT	ABS warning light / ON or OFF	-

05EYX-02

INITIALIZATION

NOTICE:

- **This system requires initializing after changing tires or wheels, or after rotating the tires.**
- **Be sure to adjust the tire air pressure to the specified value before initialization.**



1. INITIALIZING THE TIRE PRESSURE WARNING SYSTEM

(a) Check and adjust the tire pressure to the specified value.

	Specified Value
Front	210 kpa (2.1 kgf/cm^2, 30 psi)
Rear	210 kpa (2.1 kgf/cm^2, 30 psi)

(b) With the vehicle stopped, turn the ignition switch to the ON position.

(c) Press and hold the tire pressure warning reset switch until the tire pressure warning lamp blinks 3 times at 1 second intervals.

HINT:

If the tire pressure warning lamp does not blink, perform the initialization again. (with the ignition switch off, perform the procedure above starting at step 1-(b).)

(d) Drive the vehicle at 19 mph (30 km/h) or more, to complete the initialization of the skid control ECU. (It takes more than one hour.)

HINT:

If the tire pressure warning lamp blinks at 0.25 second intervals while the vehicle is being driven, the initialization may have failed. If so, perform the initialization again. (Turn the ignition switch off and retry from step 1-(a).)

(e) After initialization is completed, the skid control ECU monitors the tire pressure by using the wheel speed sensors.

(f) To verify the system has been initialized check the length of time the tire pressure warning lamp is on after turning the ignition switch to the ON position.

- Not initialized: 4 sec.
- Initialized: 3 sec.

05CLA-03

SYSTEM DESCRIPTION

1. TIRE PRESSURE WARNING SYSTEM DESCRIPTION

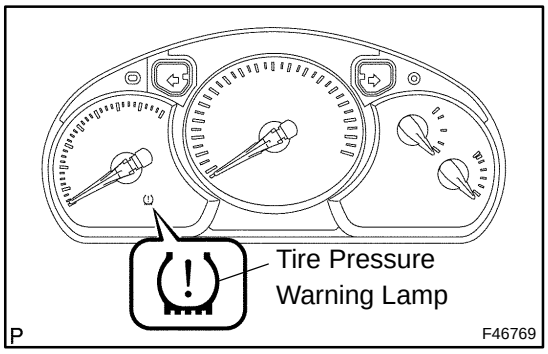
(a) The tire pressure warning system informs the driver if it detects a low tire pressure. When the tire pressure warning system detects low tire pressure in any of the 4 wheels, which affects safe driving the tire pressure warning lamp comes on.

	Specified Value
Front	210 kpa (2.1 kgf/cm^2, 30 psi)
Rear	210 kpa (2.1 kgf/cm^2, 30 psi)

(b) Tire pressure warning system is controlled by the skid control ECU.

HINT:

When the tire pressure reset switch is push, the tire pressure warning lamp goes off.

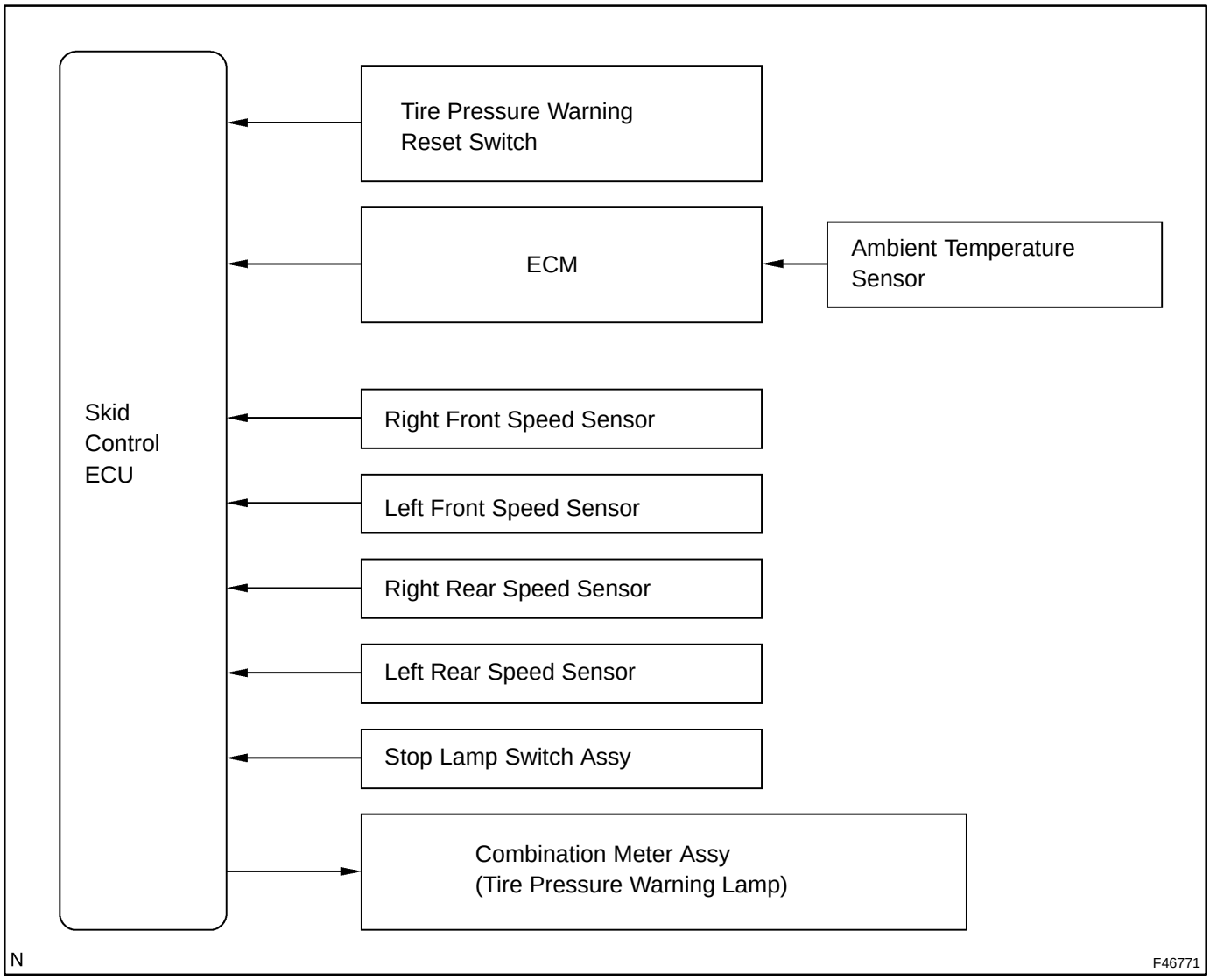


2. TIRE PRESSURE WARNING DISPLAY FUNCTION

(a) The tire pressure warning lamp comes on, according to the condition of the tire pressure warning system, as shown in the DIAGNOSIS SYSTEM (see page 05-744).

05EYW-02

SYSTEM DIAGRAM

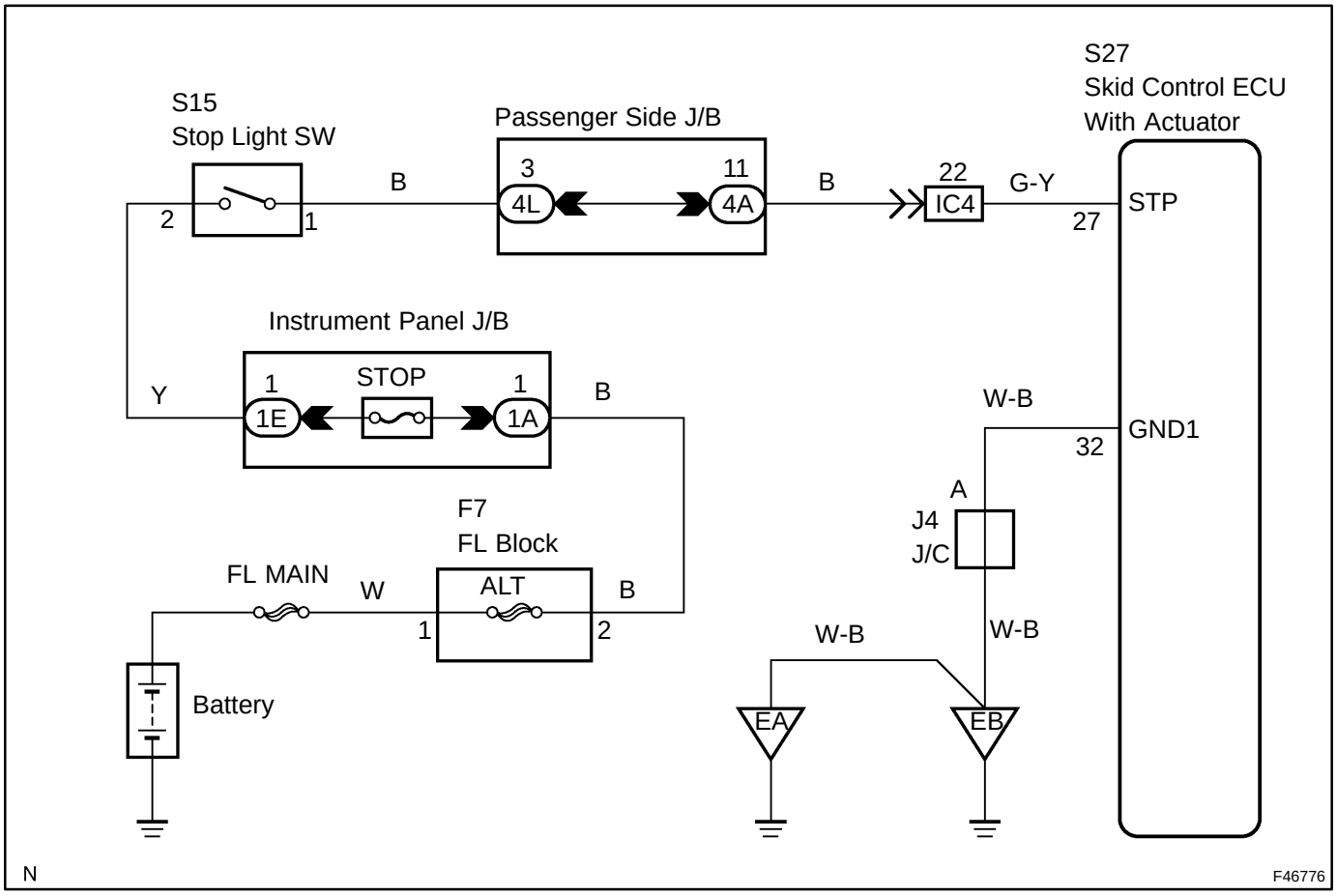


STOP LAMP SWITCH CIRCUIT

CIRCUIT DESCRIPTION

When the stop lamp switch is ON (brake pedal depressed), the skid control ECU suspends the tire pressure warning system.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK STOP LAMP SWITCH OPERATION

(a) Check that the stop lamp comes on when the brake pedal is depressed, and goes off when the brake pedal is released.

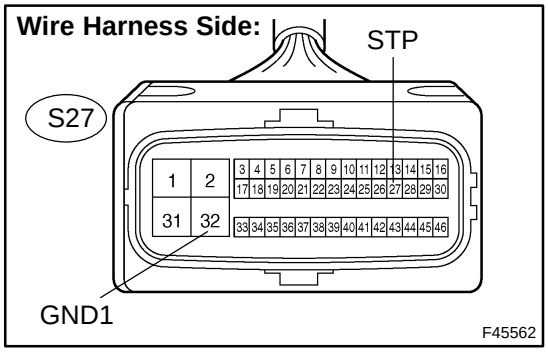
OK:

Stop lamp functions normally.

NG → **Go to step 3**

OK

2	CHECK HARNESS AND CONNECTOR(BRAKE ACTUATOR ASSY - STOP LAMP SWITCH ASSY) (SEE PAGE 01-36)



(a) Disconnect the brake actuator assy connector.

(b) Measure the voltage according to the value(s) in the table below.

Standard:

Switch condition	Tester connection	Specified condition
Brake pedal depressed	S27-27 (STP) - S27-32 (GND1)	10 to 14 V
Brake pedal released	S27-27 (STP) - S27-32 (GND1)	Below 1.5 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

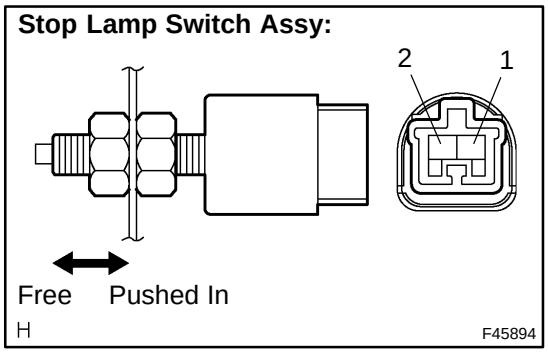
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-740)

3	CHECK REAR COMBINATION LAMP ASSY LH

NG → **REPLACE REAR COMBINATION LAMP ASSY LH**

OK

4	INSPECT STOP LAMP SWITCH ASSY



(a) Disconnect the stop lamp switch assy S15 connector.
(b) Measure the resistance according to the value(s) in the table below.

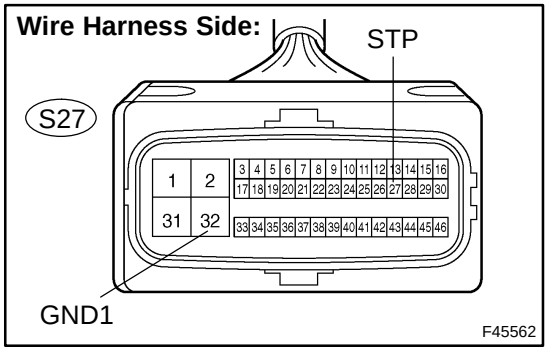
Standard:

Switch condition	Tester connection	Specified condition
Switch pin free	1 - 2	Below 1 Ω
Switch pin pushed in	1 - 2	10 kΩ or higher

NG → **REPLACE STOP LAMP SWITCH ASSY**

OK

5	CHECK HARNESS AND CONNECTOR(BRAKE ACTUATOR ASSY - STOP LAMP SWITCH ASSY) (SEE PAGE 01-36)



(a) Connect the stop lamp switch assy S15 connector.
(b) Disconnect the brake actuator assy connector.
(c) Measure the voltage according to the value(s) in the table below.

Standard:

Switch condition	Tester connection	Specified condition
Brake pedal depressed	S27-27 (STP) - S27-32 (GND1)	10 to 14 V
Brake pedal released	S27-27 (STP) - S27-32 (GND1)	Below 1.5 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

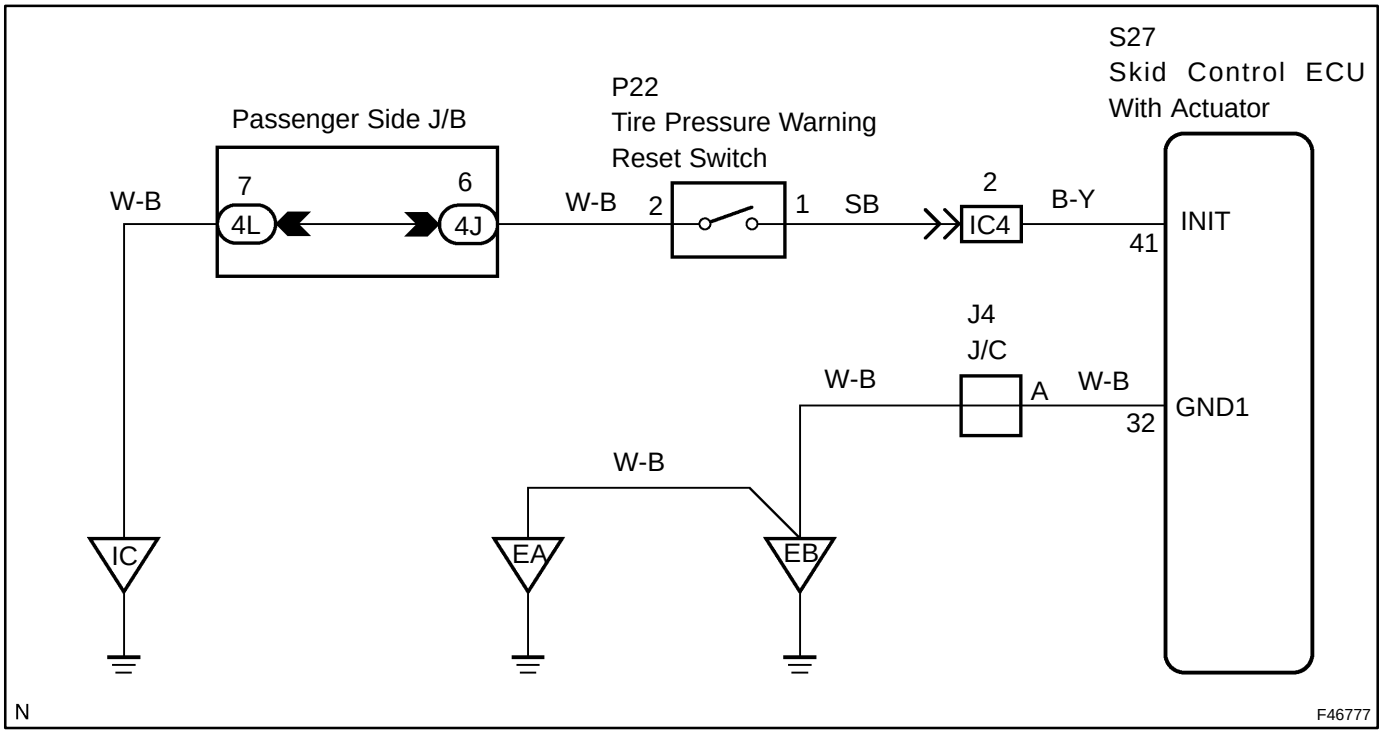
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-740)

TIRE PRESSURE WARNING RESET SWITCH CIRCUIT

CIRCUIT DESCRIPTION

Receiving the signal from the tire pressure warning reset switch, the skid control ECU indicates initialization of the tire pressure warning system.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK TIRE PRESSURE WARNING RESET SWITCH (SEE PAGE 05-737)

OK:

Tire pressure warning reset switch functions normally.

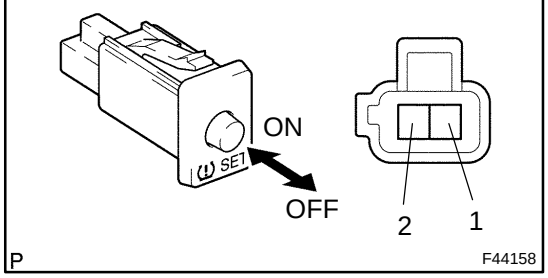
NG → **Go to step 2**

OK

CORRECT TIRE PRESSURE TO THE SPECIFIED PRESSURE, THEN INITIALIZE THE SYSTEM

2 INSPECT TIRE PRESSURE WARNING RESET SWITCH

Tire Pressure Warning Reset Switch:



(a) Disconnect the tire pressure warning reset switch P22 connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

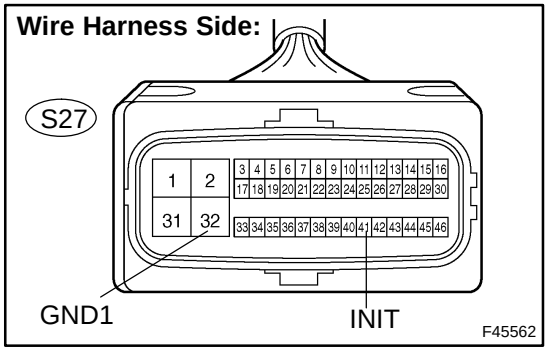
Switch condition	Specified condition
ON	Below 1 Ω
OFF	10 kΩ or higher

NG → **REPLACE TIRE PRESSURE WARNING RESET SWITCH**

OK

3 CHECK HARNESS AND CONNECTOR(TIRE PRESSURE WARNING RESET SWITCH - BRAKE ACTUATOR ASSY) (SEE PAGE 01-36)

Wire Harness Side:



(a) Reconnect the tire pressure warning reset switch P22 connector.

(b) Disconnect the brake actuator assy connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard:

Switch condition	Tester connection	Specified condition
ON	S27-41 (INIT) - S27-32 (GND1)	Below 1 Ω
OFF	S27-41 (INIT) - S27-32 (GND1)	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-740)

ABS SYSTEM MALFUNCTION

CIRCUIT DESCRIPTION

The skid control ECU outputs DTCs when a speed sensor malfunction occurs or there is an open in the stop lamp switch assy circuit of the ABS system. If ABS system has a malfunction, tire pressure warning system will not function.

INSPECTION PROCEDURE

1	CHECK DIAGNOSTIC TROUBLE CODE OUTPUT

(a) Check that the normal code is output by ABS system (see page 05-765).
OK:
DTC is not output.

NG → **REPAIR CIRCUIT INDICATED BY OUTPUT CODE**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-740)

TIRE PRESSURE WARNING LAMP CIRCUIT

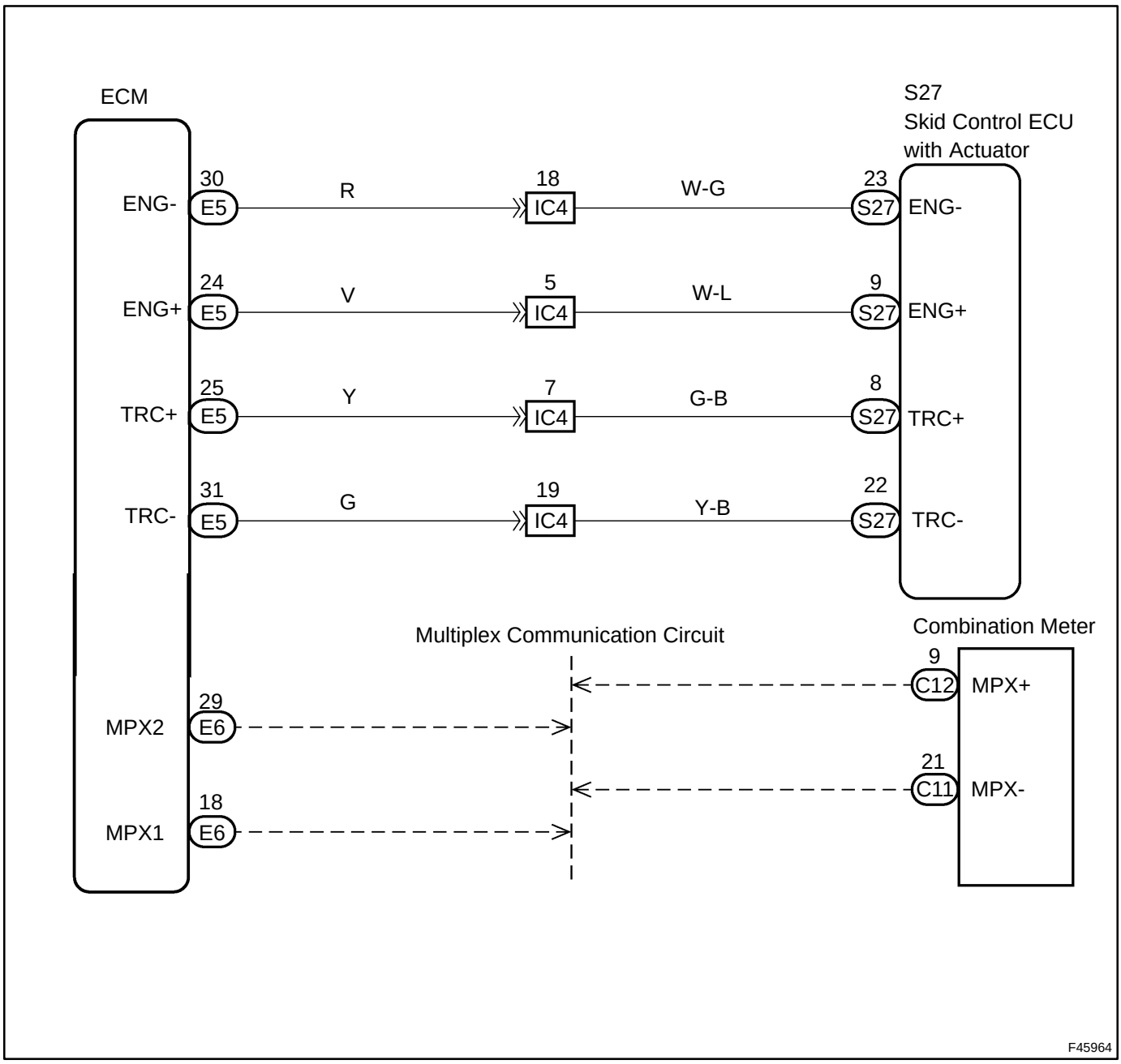
CIRCUIT DESCRIPTION

When the tire pressure decreases, the skid control ECU illuminates the tire pressure warning lamp on the combination meter assy.

HINT:

Refer to the ”TIRE PRESSURE WARNING LAMP CHART” section in the ”DIAGNOSIS SYSTEM” for the tire pressure warning lamp (see page 05-744).

WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT COMBINATION METER ASSY(TIRE PRESSURE WARNING LAMP)

(a) Turn the ignition switch to the ON position.
(b) Check the tire pressure warning lamp.
OK:
Tire pressure warning lamp comes on for 3 or 4 seconds.

NG → **REPLACE COMBINATION METER ASSY (SEE PAGE 71-18)**

OK

2	CHECK DIAGNOSTIC CODE OUTPUT

(a) Check if the normal code is output by SFI system (see page 05-38 or 05-400).
OK:
No DTC output from SFI system.

NG → **REPAIR CIRCUIT INDICATED BY OUTPUT CODE**

OK

3	CHECK DIAGNOSTIC CODE OUTPUT

(a) Check if the normal code is output by VSC system (see page 05-765).
OK:
No DTC output from VSC system.

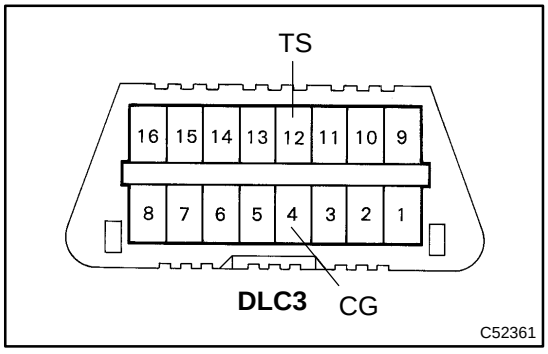
NG → **REPAIR CIRCUIT INDICATED BY OUTPUT CODE**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-740)

05EYY-02

TEST MODE PROCEDURE

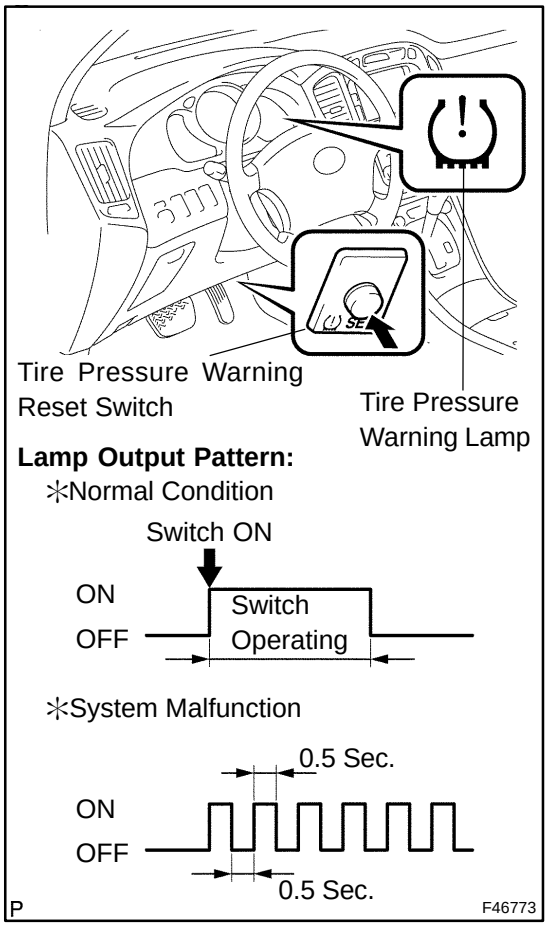


1. TEST MODE (USING SST CHECK WIRE)

(a) Make sure the ignition switch off.

(b) Using SST, connect terminals TS and CG of the DLC3.
SST 09843-18040

(c) Turn the ignition switch to the ON position.



(d) Press the tire pressure warning reset switch.

(e) Check that the tire pressure warning lamp comes on.

HINT:

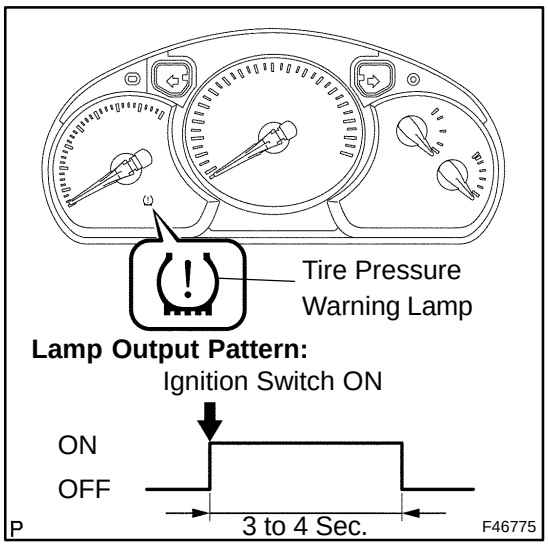
- Unless (d) above is done, the tire pressure warning lamp remains off while in test mode.
- When there is a problem with the tire pressure warning system, the tire pressure warning lamp blinks at 0.5 second intervals.

If the lamp output result is not normal, proceed to the problem symptoms table or TS terminal circuit.

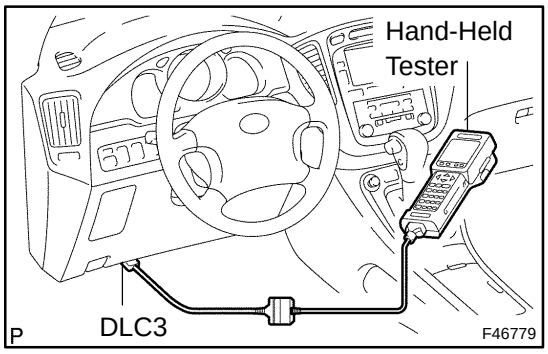
Item	See page
Problem symptoms table	05-740
TS and CG terminal circuit	05-873

(f) Turn the ignition switch off.

(g) Remove the SST from the DLC3.
SST 09843-18040

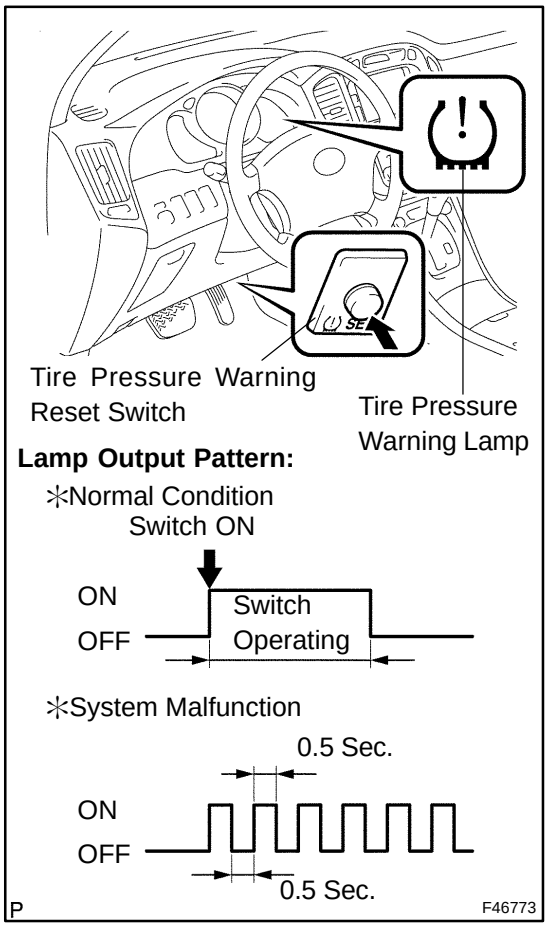


(h) Turn the ignition switch to the ON position.
(i) Check that the tire pressure warning lamp goes off.
(j) Initialize the tire pressure warning system (see page 05-736).



2. TEST MODE (USING THE HAND-HELD TESTER)

(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch to the ON position.
(c) Select ”SIGNAL CHECK”, and proceed checking with the hand-held tester.



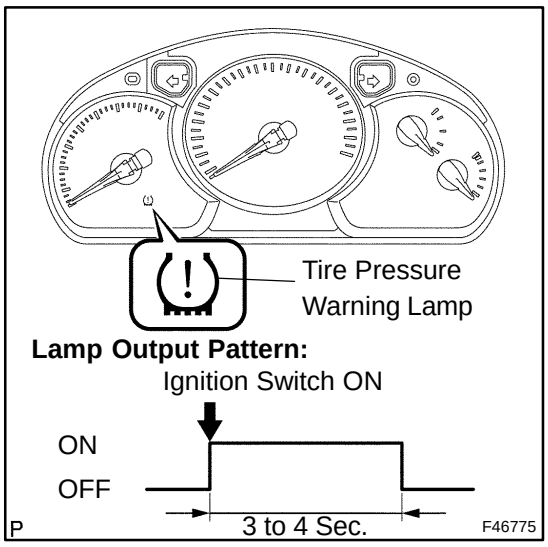
(d) Press the tire pressure warning reset switch.
(e) Check that the tire pressure warning lamp comes on.

HINT:

- Unless (d) above is done, the tire pressure warning lamp remains off while in test mode.
- When there is a problem with the tire pressure warning system, the tire pressure warning lamp blinks at 0.5 second intervals.

If the lamp output result is not normal, proceed to the problem symptoms table (see page 05-740).

(f) Turn the ignition switch off.



(g) Turn the ignition switch to the ON position.
(h) Check that the tire pressure warning lamp goes off.
(i) Initialize the tire pressure warning system (see page 05-736).

05BW7-05

CUSTOMER PROBLEM ANALYSIS CHECK

Tire Pressure Warning System Check Sheet

Inspector's Name :

Customer's Name		**VIN**	
		Production Date	/ /
		Licence Plate No.	
Date Vehicle Brought In	/ /	**Odometer Reading**	km miles

Date Problem First Occurred	/ /
Frequency Problem Occurs	☐ Continuous ☐ Intermittent (times a day)

Symptoms	☐ **In spite of abnormal low pressure of the tire pressure,the warning lamp does not come on.**	
	☐ **The warning lamp was on and the tire was filled up with air, but the warning lamp does not go off.**	
	Tire Pressure Warning Lamp Abnormal	☐ Remains ON ☐ Does not Come on

Check Item	**ABS Warning Lamp**	☐ Normal ☐ Malfunction Code (Code)
	Tire	☐ Tire Pressure FR ( ) FL ( ) RR ( ) RL ( ) ☐ Tire Size FR ( ) FL ( ) RR ( ) RL ( ) ☐ Tire Type FR ( ) FL ( ) RR ( ) RL ( ) ☐ Tire Wear Condition FR ( ) FL ( ) RR ( ) RL ( ) ☐ History of Changing Tires or Wheels When ( ) ☐ History of Rotating Tires When ( )

05BW6-05

HOW TO PROCEED WITH TROUBLESHOOTING

The hand-held tester can be used at steps 3, 6 and 9.

1	VEHICLE BROUGHT TO WORKSHOP

2	CUSTOMER PROBLEM ANALYSIS (SEE PAGE 05-735)

3	CHECK MULTIPLEX COMMUNICATION SYSTEM (SEE PAGE 05-2040)

(a) Check that DTC is output.

- **DTC IS OUTPUT (PROCEED TO "MULTIPLEX COMMUNICATION SYSTEM")**
- **DTC IS NOT OUTPUT (Go to step 4)**

4	CHECK TIRE PRESSURE WARNING LAMP CONDITION

(a) Turn the ignition switch to the ON position.
(b) Record the condition of the tire pressure warning lamp on the combination meter assy.
(c) Refer to the "TIRE PRESSURE WARNING LAMP CHART" section of the DIAGNOSIS SYSTEM for checking the condition of the tire pressure warning lamp (see page 05-744).

5	PROBLEM SYMPTOMS TABLE (SEE PAGE 05-740)

6	CIRCUIT INSPECTION (SEE PAGE 05-748 to 05-756)

7	IDENTIFICATION OF PROBLEM

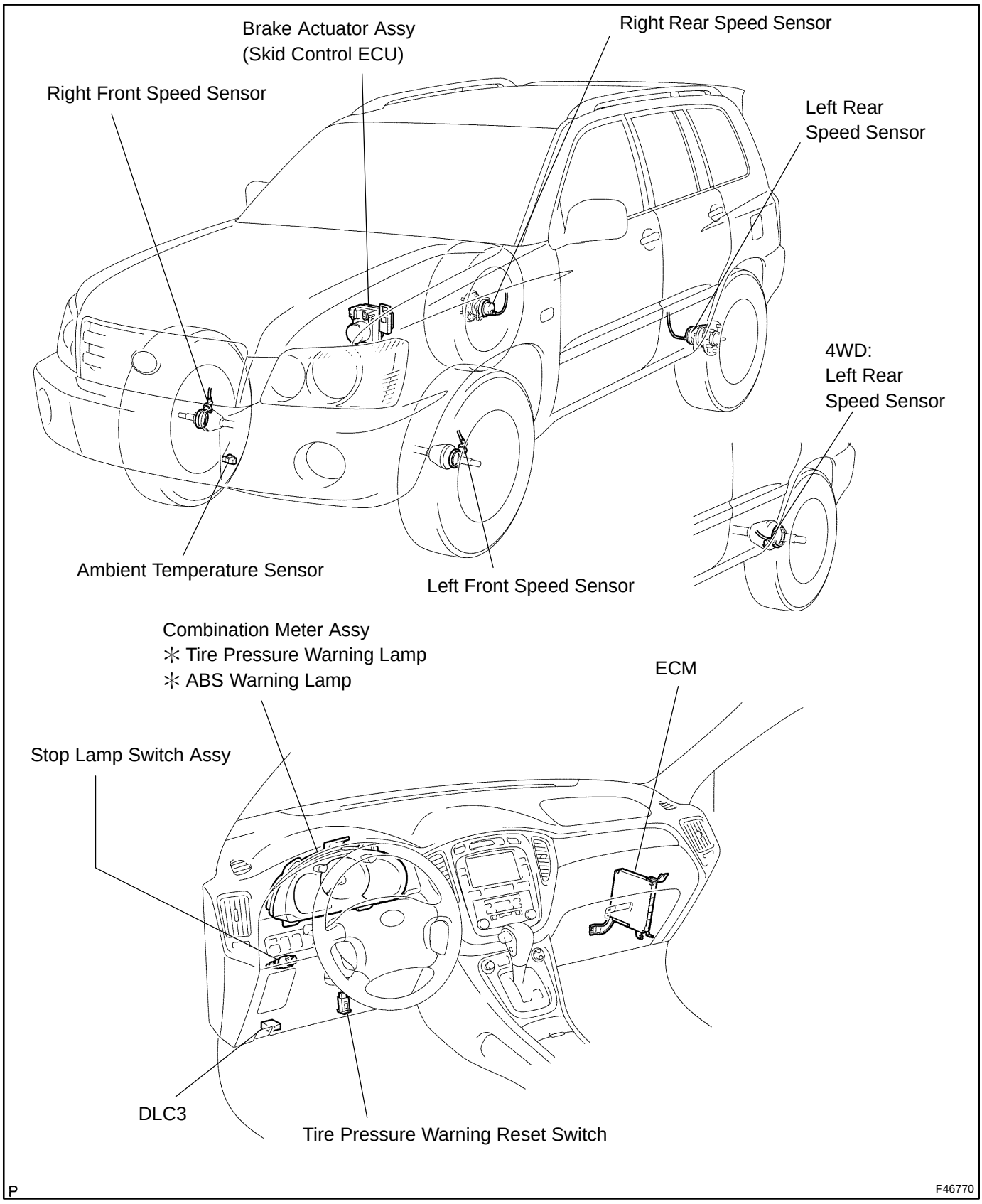
8	REPAIR

9	CONFIRMATION TEST

END

05CLC-04

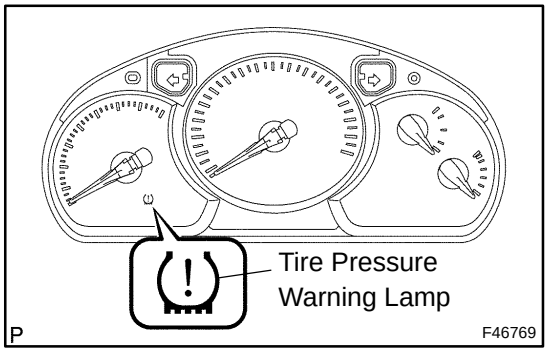
LOCATION



TIRE PRESSURE WARNING SYSTEM

PRECAUTION

05CL9-03



1. TIRE PRESSURE WARNING SYSTEM PRECAUTION

(a) When the tire pressure warning lamp comes on, immediately check the air pressure of all tires and adjust to the specified pressure.

	Specified Value
Front	210 kpa (2.1 kgf/cm^2, 30 psi)
Rear	210 kpa (2.1 kgf/cm^2, 30 psi)

(b) This system requires initializing after changing tires or wheels, or after rotating the tires (see page 28-1).
Set tire pressure within the specified range before initializing. If the tire air pressure is not within the specified range, the tire pressure warning system will not function.

(c) In the following cases, the system may not operate normally.

- A compact spare tire, snow tires, or tire chains are used.
- The tire pressure is excessively higher than specified, or tire pressure suddenly drops due to bursting or other causes.
- The vehicle is driven on a slippery road surface such as rough or frozen roads.
- The vehicle speed is 19 mph (30 km/h) or less or more than 62 mph (100 km/h) , and the driving duration is less than 5 minutes.
- The tires differ in tread pattern or manufacture.
- The tires are not the specified size.
- The tread wear is very different among the installed tires.
- Rapid acceleration/deceleration or sharp turns is continued.
- Towing a trailer.
- The loading is over the limit or imbalanced.
- Initialization was not performed correctly after replacing or rotating tires or wheels.
- The outside temperature is below 32°F (0°C) or above 104°F (40°C).

2. FAIL-SAFE FUNCTION

(a) When a system malfunction occurs in the tire pressure warning system, the tire pressure warning lamp blinks.

(b) The result of this diagnosis is stored in the skid control ECU.

05BWC-05

PROBLEM SYMPTOMS TABLE

Check the circuits for each problem symptom in the order given in the table below, and proceed to the relevant troubleshooting page.

HINT:

- Inspect each circuit in numerical order for the corresponding symptom.
  If the malfunction still exists even after checking and confirming that all the circuits are normal, replace the brake actuator assy.
- When a malfunction is found in the skid control ECU, replace the brake actuator assy.
- When the tire pressure warning lamp blinks and the ABS warning lamp comes on, check the ABS system first.

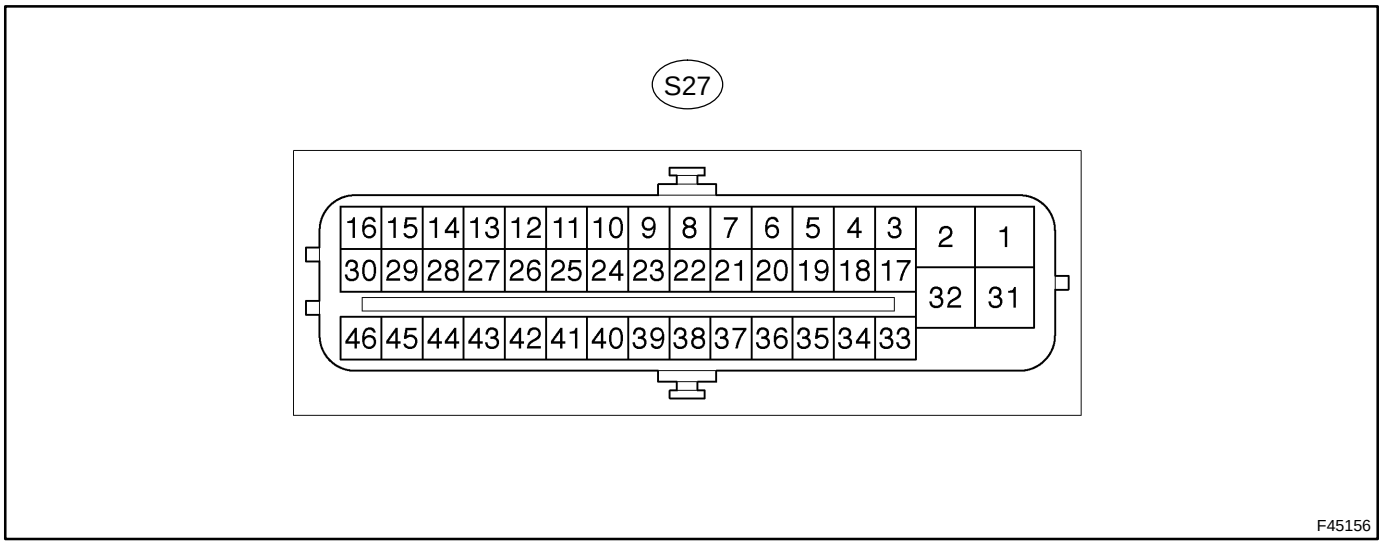
Symptom	Suspect Area	See page
Tire pressure warning lamp does not come on after ignition switch is turned ON.	3. Tire pressure warning lamp circuit 4. Combination meter assy 5. Brake actuator assy	05-754 05-1868 -
Tire pressure warning lamp remains on after ignition switch is turned ON. HINT: ・System abnormal 1 is detected. ・Low pressure is detected.	1. Check tire pressure and press the tire pressure reset switch a few seconds. 2. Tire pressure warning lamp circuit 3. Combination meter assy 4. Brake actuator assy	- 05-754 05-1868 -
Tire pressure warning lamp blinks at 0.5 second intervals. HINT: System abnormal 2 is detected.	1. Stop lamp switch circuit 2. Vehicle speed sensor 3. ABS system malfunction	05-748 05-788 05-751
Tire pressure warning lamp blinks at 0.25 second intervals. HINT: ECU requires initialization.	1. Initialize the tire pressure warning system 2. Brake actuator assy	05-736 -
ECU is initialized (tire pressure warning reset switch is ON), but tire pressure warning lamp does lit.	1. Check initialization 2. Tire pressure warning reset switch circuit 3. Brake actuator assy	05-736 05-752 -
Tire pressure warning lamp comes on while driving, but lamp goes off without supplying tire air pressure.	1. Check tire pressure warning lamp 2. Tire pressure warning lamp circuit 3. Combination meter assy 4. Brake actuator assy HINT: Tire pressure may be affected by the driving environment. When any of the detected pressures reach standard tire pressure value, the warning lamp may go off.	05-744 05-744 05-754 -
Tire pressure warning lamp comes on, but tire air pressure is within the standard value.	1. Check if vehicle has the appropriate size tire. 2. Ambient temperature sensor circuit 3. Tire pressure warning lamp circuit 4. Combination meter assy 5. Brake actuator assy HINT: ・Using inappropriate size tires, or not using the indicated tires. ・Tire pressure is not adjusted at initialization.	- 05-756 05-754 05-1868 -

Tire pressure warning lamp remains off, even when tire air pressure decreased.	1. Check if vehicle has the appropriate size tires. 2. Ambient temperature sensor circuit 3. Tire pressure warning lamp circuit 4. Combination meter assy 5. Brake actuator assy HINT: ・Using inappropriate size tires. ・Tire pressure may be affected by the driving environment. Since tire pressure decreases in cold weather, the pressure warning lamp may come on. ・Tire pressure is not adjusted at initialization.	- 05-756 05-754 05-1868 -
Tire pressure warning lamp comes on while driving, and lamp remains lit after correcting tire pressure.	1. Press the tire pressure reset switch a few seconds. 2. Check tire pressure warning lamp 3. Tire pressure warning lamp circuit 4. Combination meter assy 5. Ambient temperature sensor circuit 6. Brake actuator assy	- 05-744 05-754 05-1868 05-756 -
Test mode cannot be completed.	1. ABS system malfunction 2. TS terminal circuit 3. Brake actuator assy	05-751 05-873 -

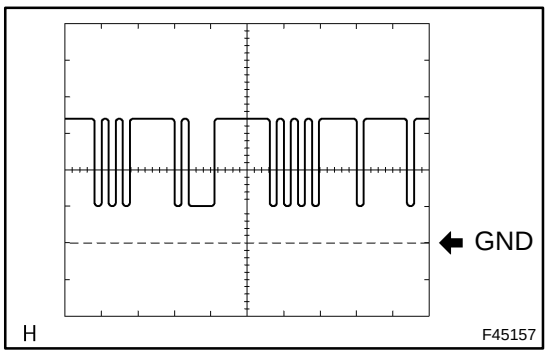
05IOX-02

TERMINALS OF ECU

SKID CONTROL ECU:

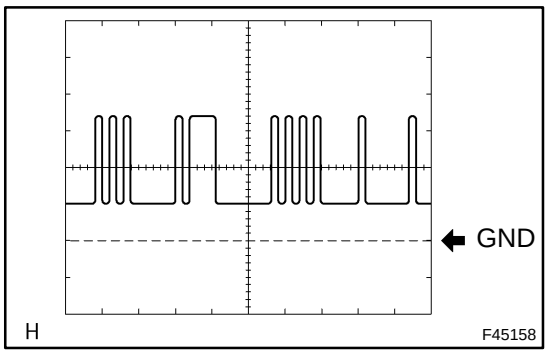


Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	Specified Condition
TRC+ (8) - TRC- (22)	G-B - Y-B	ECM communication output	Ignition switch ON	Pulse generation
ENG+ (9) - GND1 (32)	W-L - W-B	ECM serial communication line (+) input signal	Ignition switch ON and vehicle speed 30 km/h (19 mph) or more	Pulse generation (See wave form 1)
D/G (13) - GND1 (32)	GR-B - W-B	Diagnosis tester communication line	Ignition switch ON	10 to 14 V
ENG- (23) - GND1 (32)	W-G - W-B	ECM serial communication line (-) input signal	Ignition switch ON and engine idle speed	Pulse generation (See wave form 2)
STP (27) - GND1 (32)	G-Y - W-B	Stop lamp switch assy input signal	Brake pedal depressed	10 to 14 V
STP (27) - GND1 (32)	G-Y - W-B	Stop lamp switch assy input signal	Brake pedal released	Below 1.5 V
GND1 (32) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
INIT (41) - GND1 (32)	B-Y - W-B	Tire pressure warning reset switch signal	Ignition switch ON and tire pressure warning reset switch ON	Below 3 V
INIT (41) - GND1 (32)	B-Y - W-B	Tire pressure warning reset switch signal	Ignition switch ON and tire pressure warning reset switch OFF	10 to 14 V



Wave form 1: Reference

Item	Condition
Terminal	ENG+ - GND1
Tool setting	1 V / DIV, 0.5 ms / DIV
Vehicle condition	Engine idle speed



Wave form 2: Reference

Item	Condition
Terminal	ENG- - GND1
Tool setting	1 V / DIV, 0.5 ms / DIV
Vehicle condition	Engine idle speed

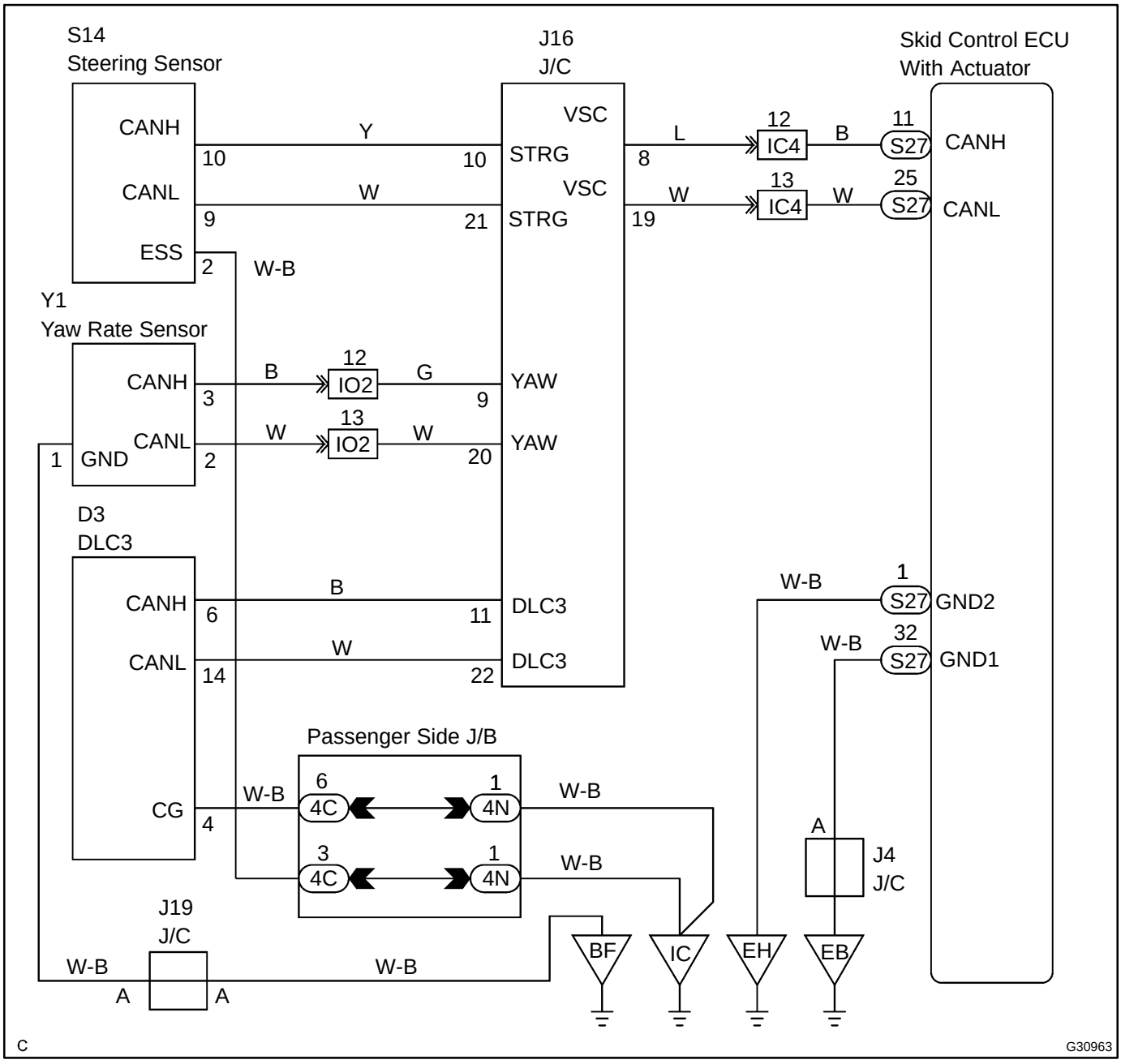
CHECK CAN BUS LINE (CAN-L) FOR SHORT TO GND

CIRCUIT DESCRIPTION

A short to GND is suspected in the CAN bus line when there is continuity between terminals 4 (CG) and 14 (CANL) of the DLC3.

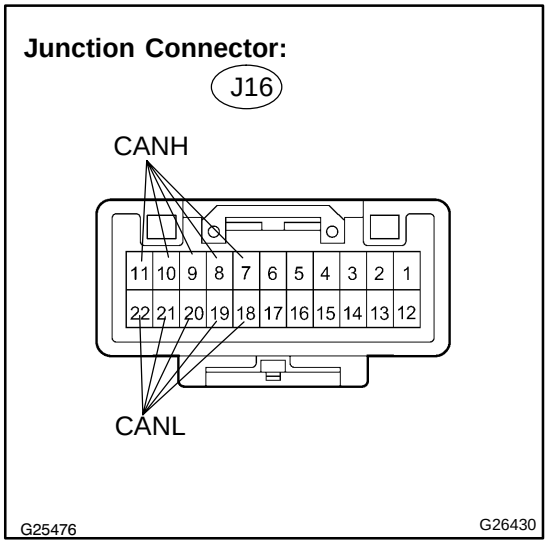
Symptom	Trouble Area
There is continuity between terminals 4 (CG) and 14 (CANL) of DLC3.	⁜Short to GND in CAN bus line (CANL) ⁜Skid control ECU ⁜Steering sensor ⁜Yaw rate sensor

WIRING DIAGRAM

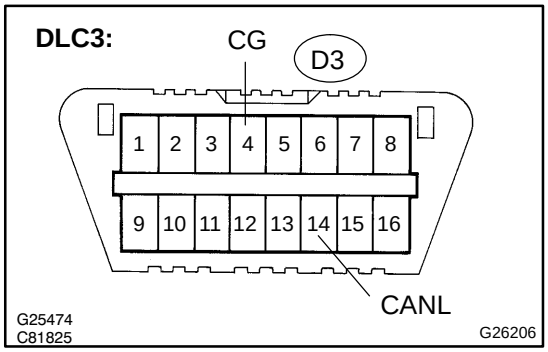


INSPECTION PROCEDURE

1	CHECK CAN BUS LINE FOR SHORT TO GND(DLC3 SUB BUS LINE, CAN-L)



(a) Disconnect the wire harness connector (J16) from the junction connector.



(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
D3-4 (CG) - D3-14 (CANL)	Ignition SW OFF	1 MΩ or more

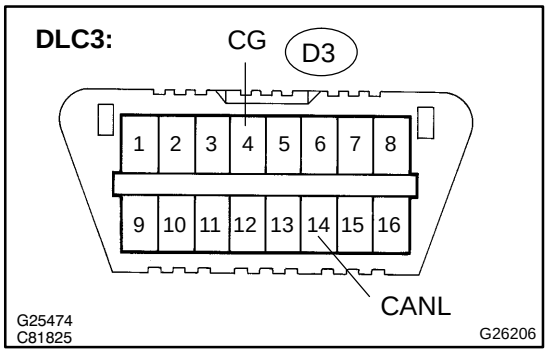
NG → **REPAIR OR REPLACE DLC3 SUB BUS LINE OR CONNECTOR (CAN-L)**

OK

2	CONNECTION OF CONNECTORS

(a) Reconnect the wire harness connector (J16) to the junction connector.

3 CHECK CAN BUS LINE FOR SHORT TO GND(SKID CONTROL ECU, CAN-L)



(a) Disconnect the connector (S27) from the skid control ECU.
(b) Measure the resistance according to the value(s) in the table below.

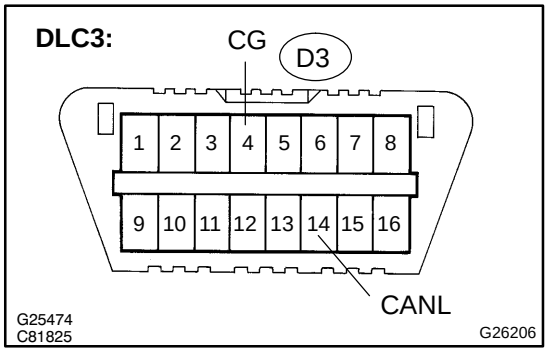
Standard:

Tester connection	Condition	Specified value
D3-4 (CG) - D3-14 (CANL)	Ignition SW OFF	3 kΩ or more

OK → **REPLACE SKID CONTROL ECU WITH ACTUATOR (SEE PAGE 32-37)**

NG

4 CHECK CAN BUS LINE FOR SHORT TO GND(STEERING SENSOR, CAN-L)



(a) Reconnect the connector (S27) to the skid control ECU.
(b) Disconnect the connector (S14) from the steering sensor.
(c) Measure the resistance according to the value(s) in the table below.

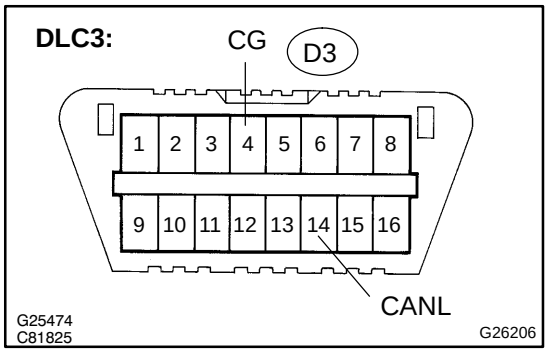
Standard:

Tester connection	Condition	Specified value
D3-4 (CG) - D3-14 (CANL)	Ignition SW OFF	3 kΩ or more

OK → **REPLACE STEERING SENSOR (SEE PAGE 32-48)**

NG

5 CHECK CAN BUS LINE FOR SHORT TO GND(YAW RATE SWENSOR, CAN-L)



(a) Reconnect the connector (S14) to the steering sensor.
(b) Disconnect the connector (Y1) from the yaw rate sensor.
(c) Measure the resistance according to the value(s) in the table below.

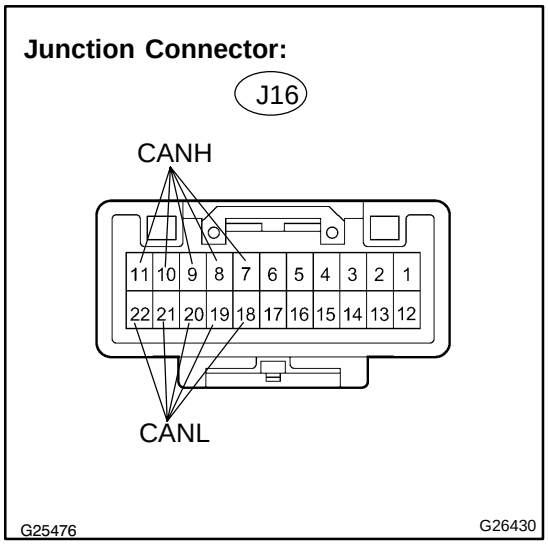
Standard:

Tester connection	Condition	Specified value
D3-4 (CG) - D3-14 (CANL)	Ignition SW OFF	3 kΩ or more

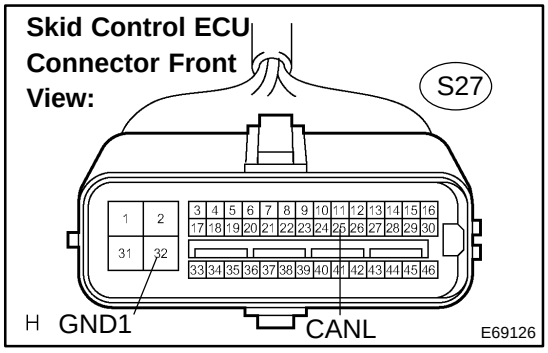
OK → **REPLACE YAW RATE SENSOR (SEE PAGE 32-46)**

NG

6	**CHECK CAN BUS LINE FOR SHORT TO GND(SKID CONTROL ECU - JUNCTION CONNECTOR, CAN-L)**



(a) Reconnect the connector (Y1) to the yaw rate sensor.
(b) Disconnect the wire harness connector (J16) from the junction connector.
(c) Disconnect the connector (S27) from the skid control ECU.



(d) Measure the resistance according to the value(s) in the table below.

Standard:

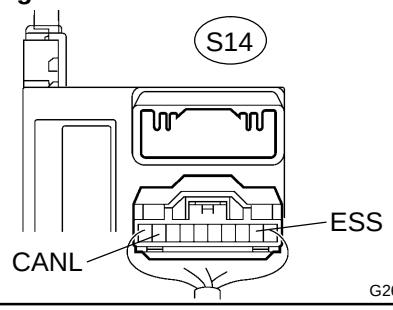
Tester connection	Condition	Specified value
S27-25 (CANL) - S27-32 (GND1)	Ignition SW OFF	1 MΩ more

NG → **REPAIR OR REPLACE CAN MAIN BUS LINE OR CONNECTOR (SKID CONTROL ECU - JUNCTION CONNECTOR, CAN-L)**

OK

7	**CHECK CAN BUS LINE FOR SHORT TO GND(STEERING SENSOR - JUNCTION CONNECTOR, CAN-L)**

Steering Sensor Wire Harness View:



(a) Disconnect the connector (S14) from the steering sensor.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
S14-2 (ESS) - S14-9 (CANL)	Ignition SW OFF	1 MΩ more

HINT:
Check the wire harness connector connected to the junction connector while disconnecting them.

NG → **REPAIR OR REPLACE CAN MAIN BUS LINE OR CONNECTOR (STEERING SENSOR - JUNCTION CONNECTOR, CAN-L)**

OK

REPAIR OR REPLACE YAW RATE SENSOR SUB BUS LINE OR CONNECTOR (CAN-L)

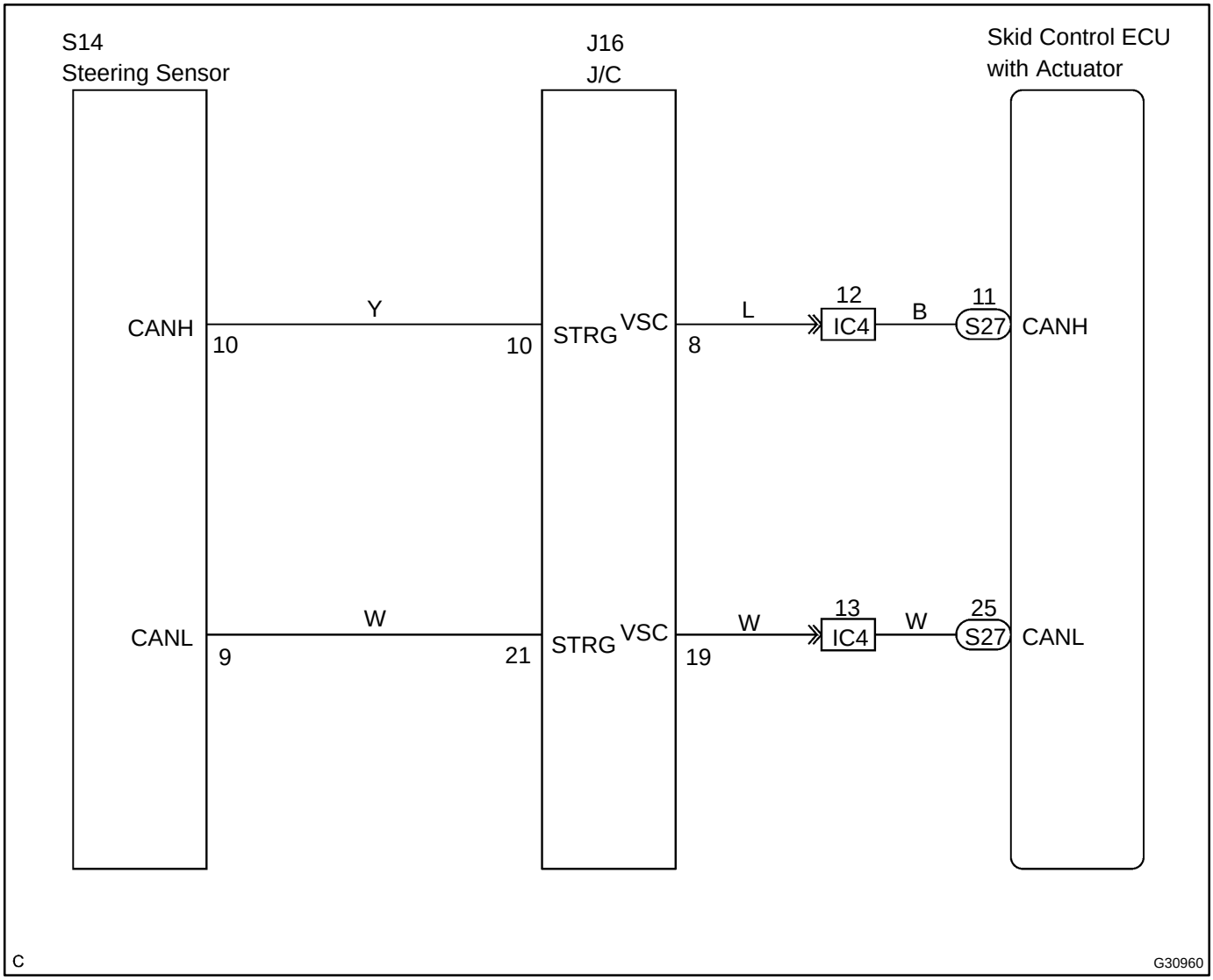
CHECK CAN MAIN BUS LINE FOR DISCONNECTION

CIRCUIT DESCRIPTION

The CAN main bus line and DLC3 sub bus line may have a disconnection when the resistance between terminals 6 (CANH) and 14 (CANL) of the DLC3 is more than 69 Ω.

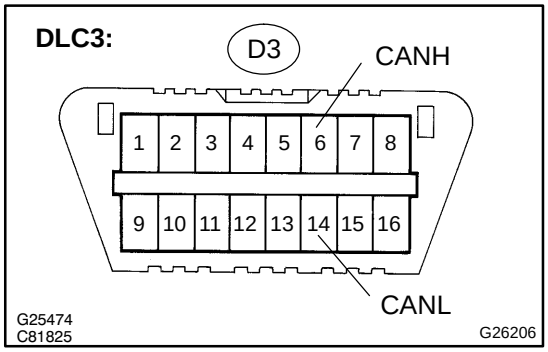
Symptom	Trouble Area
Resistance between terminals 6 (CANH) and 14 (CANL) of DLC3 is more than 69 Ω .	⋇CAN main bus line ⋇Skid control ECU ⋇Steering sensor

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK DLC3



(a) Turn the ignition switch to the LOCK position.
(b) Measure the resistance according to the value(s) in the table below.

Result:

Tester connection	Condition	Specified value	Result
D3-6 (CANH) - D3-14 (CANL)	Ignition SW OFF	108 to 132 Ω	A
D3-6 (CANH) - D3-14 (CANL)	Ignition SW OFF	132 Ω or more	B

NOTICE:

When the measured value is 132 Ω or more and the CAN communication system diagnostic code is output, there may be a fault besides disconnection of the DLC3 sub bus line. For that reason, troubleshooting should be performed again from "How to proceed with troubleshooting" after repairing the trouble area.

B → **REPAIR OR REPLACE DLC3 SUB BUS LINE OR CONNECTOR (CAN-H, CAN-L)**

A

2	READ OUTPUT DTC

(a) Read the output diagnostic codes.

Standard:

U0073/94, U0123/62, U0124/95 and U0126/63 are output simultaneously.	A
Only U0126/63 is output.	B

NOTICE:

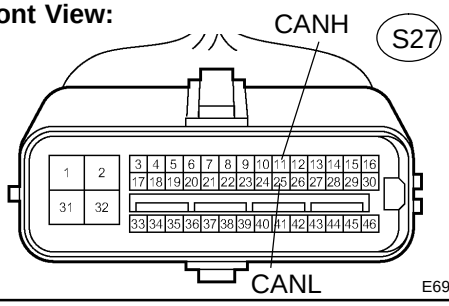
Diagnostic codes other than the CAN communication system diagnostic codes (U0073/94, U0123/62, U0124/95, U0126/63) may be output simultaneously with the CAN codes.

B → **Go to step 4**

A

3	CHECK CAN MAIN BUS LINE FOR DISCONNECTION(SKID CONTROL ECU - JUNCTION CONNECTOR)

Skid Control ECU Connector
Front View:



(a) Disconnect the connector (S27) from the skid control ECU.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
S27-11 (CANH) - S27-25 (CANL)	Ignition SW OFF	108 to 132 Ω

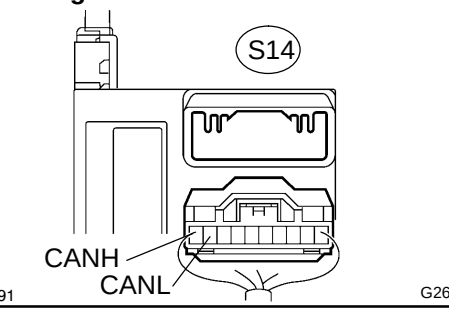
NG → **REPAIR OR REPLACE CAN MAIN BUS LINE OR CONNECTOR (SKID CONTROL ECU - JUNCTION CONNECTOR)**

OK

REPLACE SKID CONTROL ECU WITH ACTUATOR (SEE PAGE 32-37)

4	CHECK CAN MAIN BUS LINE FOR DISCONNECTION(STEERING SENSOR - JUNCTION CONNECTOR)

Steering Sensor Wire Harness View:



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the connector (S14) from the steering sensor.
(c) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
S14-10 (CANH) - S14-9 (CANL)	Ignition SW OFF	108 to 132 Ω

NG → **REPAIR OR REPLACE CAN MAIN BUS LINE OR CONNECTOR (STEERING SENSOR - JUNCTION CONNECTOR)**

OK

REPLACE STEERING SENSOR (SEE PAGE 32-48)

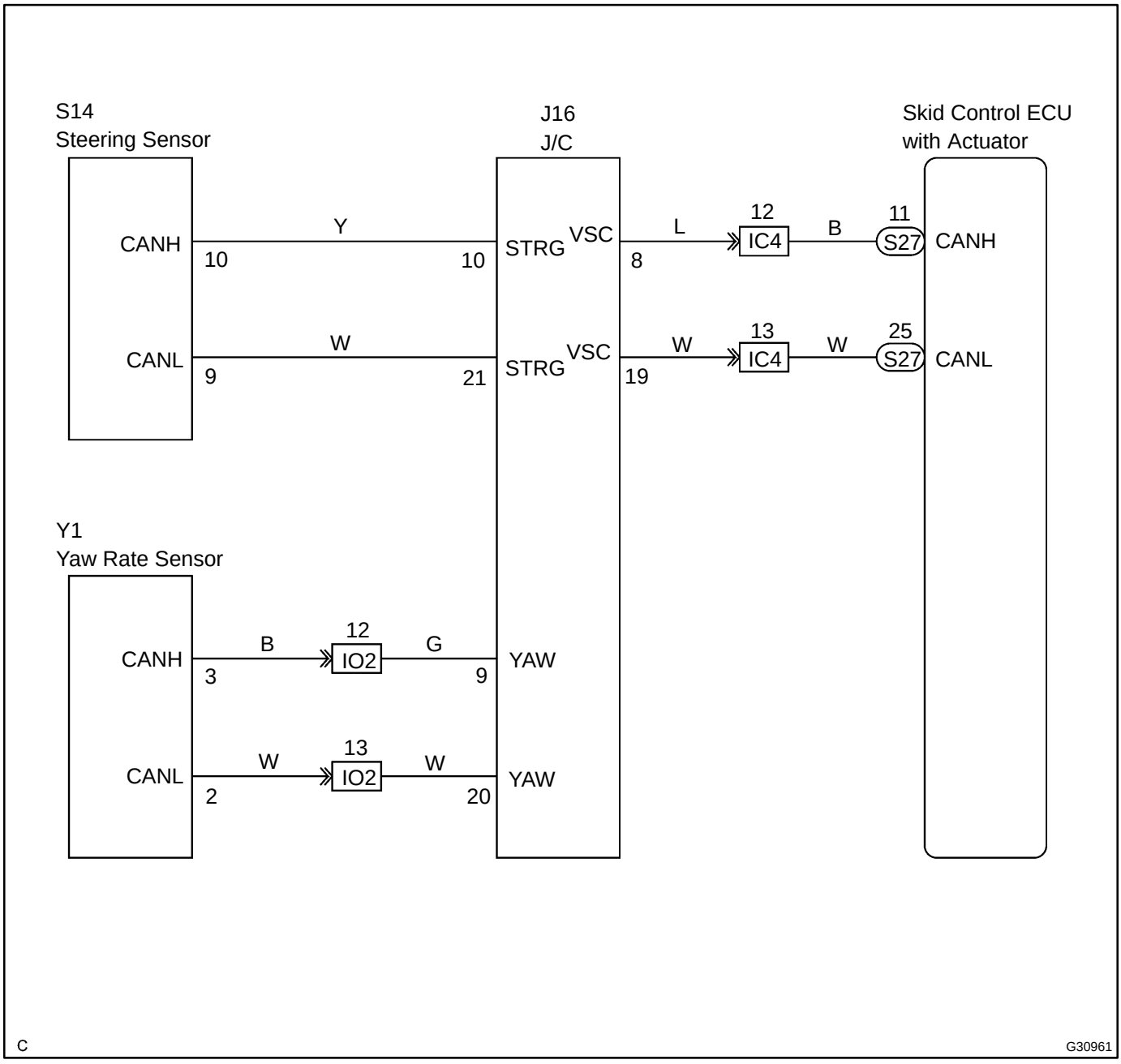
CHECK CAN BUS LINES FOR SHORT CIRCUIT

CIRCUIT DESCRIPTION

The CAN bus lines are considered to be shorted when the resistance between terminals 6 (CANH) and 14 (CANL) of the DLC3 is below 54 Ω.

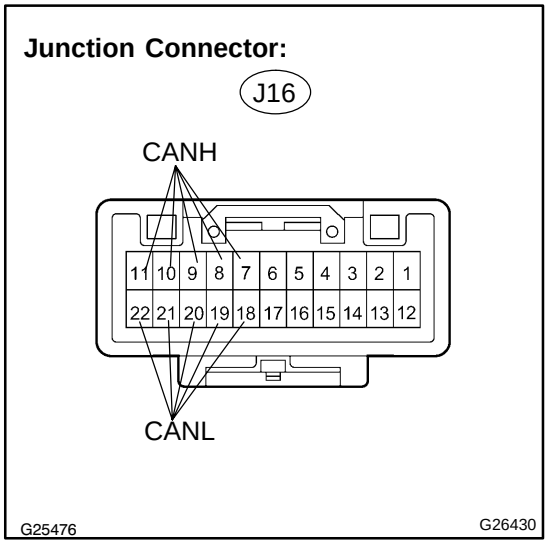
Symptom	Trouble Area
Resistance between terminals 6 (CANH) and 14 (CANL) of DLC3 is below 54 Ω.	⋇Short in CAN bus lines ⋇Skid control ECU ⋇Steering sensor ⋇Yaw rate sensor

WIRING DIAGRAM

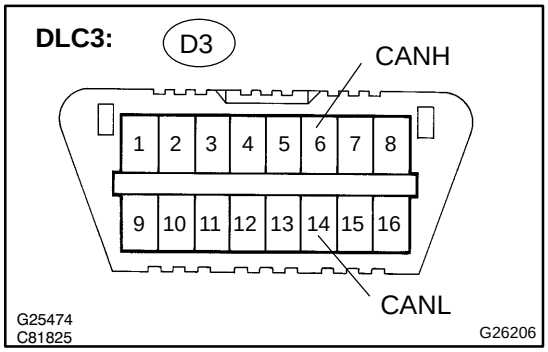


INSPECTION PROCEDURE

1	CHECK CAN BUS LINES FOR SHORT(DLC3 SUB BUS LINE)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the wire harness connector (J16) from the junction connector.



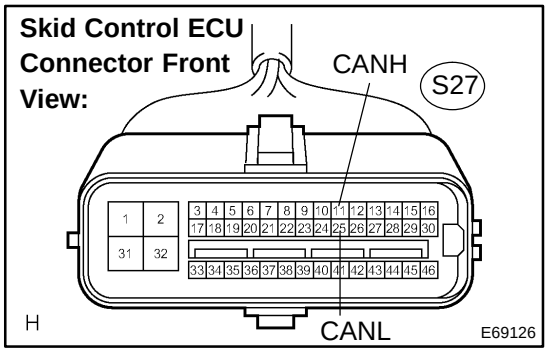
(c) Measure the resistance according to the value(s) in the table below.
Standard:

Tester connection	Condition	Specified value
D3-6 (CANH) - D3-14 (CANL)	Ignition SW OFF	1 MΩ or more

NG → **REPAIR OR REPLACE DLC3 SUB BUS LINE OR CONNECTOR (CAN-H, CAN-L)**

OK

2	CHECK CAN BUS LINES FOR SHORT(SKID CONTROL ECU - JUNCTION CONNECTOR)



(a) Disconnect the connector (S27) from the skid control ECU.
(b) Measure the resistance according to the value(s) in the table below.
Standard:

Tester connection	Condition	Specified value
S27-11 (CANH) - S27-25 (CANL)	Ignition SW OFF	1 MΩ or more

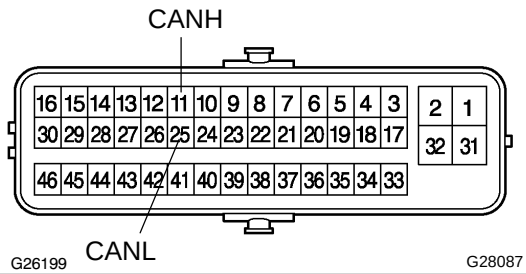
HINT:
Check the wire harness connector connected to the junction connector while disconnecting it.

NG → **REPAIR OR REPLACE CAN MAIN BUS LINE OR CONNECTOR (CAN-H, CAN-L)**

OK

3 INSPECT SKID CONTROL ECU WITH ACTUATOR(CANH - CANL)

Skid Control ECU:



(a) Measure the resistance according to the value(s) in the table below.

Standard:

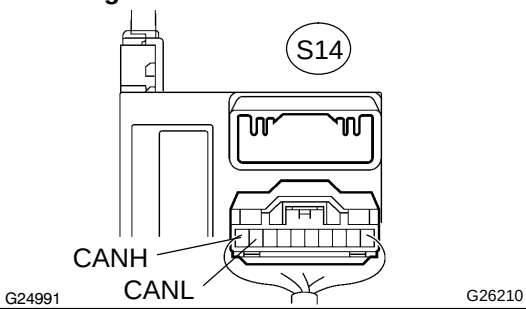
Tester connection	Condition	Specified value
11 (CANH) - 25 (CANL)	Ignition SW OFF	108 to 132 Ω

NG → **REPLACE SKID CONTROL ECU WITH ACTUATOR (SEE PAGE 32-37)**

OK

4 CHECK CAN BUS LINES FOR SHORT(STEERING SENSOR - JUNCTION CONNECTOR)

Steering Sensor Wire Harness View:



(a) Disconnect the connector (S14) from the steering sensor.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
S14-10 (CANH) - S14-9 (CANL)	Ignition SW OFF	1 MΩ or more

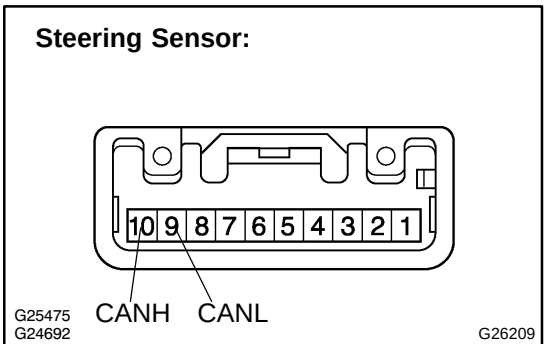
HINT:
Check the wire harness connector connected to the junction connector while disconnecting it.

NG → **REPAIR OR REPLACE STEERING SENSOR SUB BUS LINE OR CONNECTOR (CAN-H, CAN-L)**

OK

5 INSPECT STEERING SENSOR(CANH - CANL)

Steering Sensor:



(a) Measure the resistance according to the value(s) in the table below.

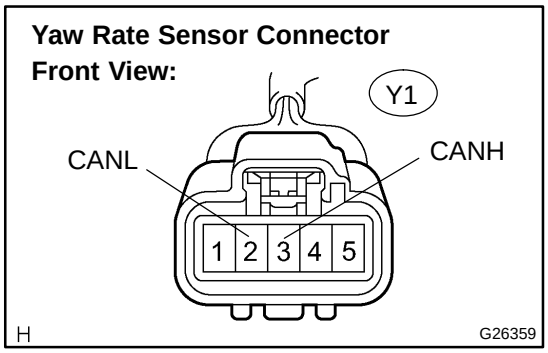
Standard:

Tester connection	Condition	Specified value
10 (CANH) - 9 (CANL)	Ignition SW OFF	108 to 132 Ω

NG → **REPLACE STEERING SENSOR (SEE PAGE 32-48)**

OK

6	CHECK CAN BUS LINES FOR SHORT(YAW RATE SENSOR SUB BUS LINE)



(a) Disconnect the connector (Y1) from the yaw rate sensor.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
Y1-3 (CANH) - Y1-2 (CANL)	Ignition SW OFF	1 MΩ or more

HINT:
Check the wire harness connector connected to the junction connector while disconnecting it.

NG → **REPAIR OR REPLACE YAW RATE SENSOR SUB BUS LINE OR CONNECTOR (CAN-H, CAN-L)**

OK

REPLACE YAW RATE SENSOR (SEE PAGE 32-46)

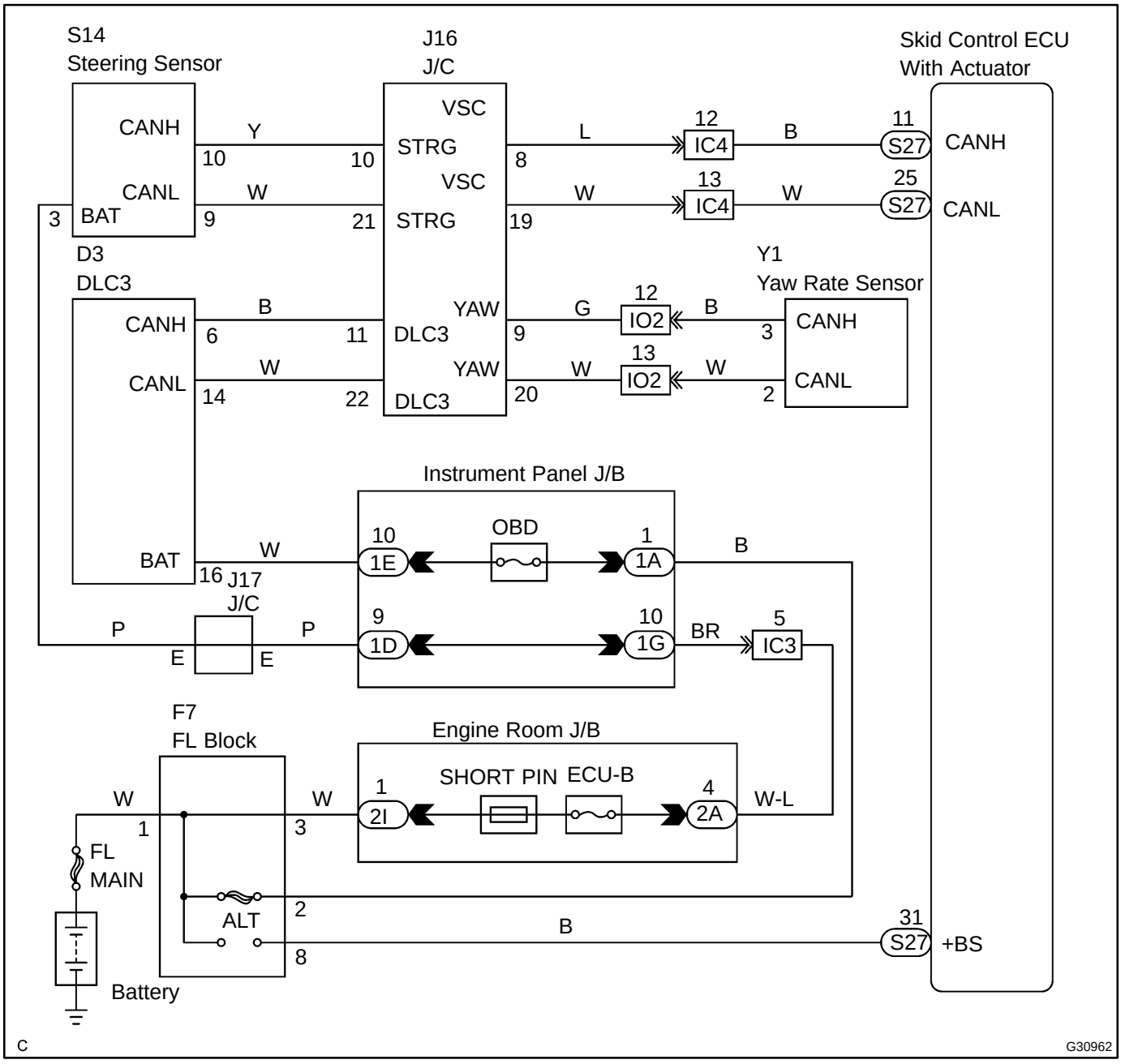
CHECK CAN BUS LINE (CAN-H) FOR SHORT TO +B

CIRCUIT DESCRIPTION

A short to +B is suspected in the CAN bus line when there is continuity between terminals 16 (BAT) and 6 (CANH) of the DLC3.

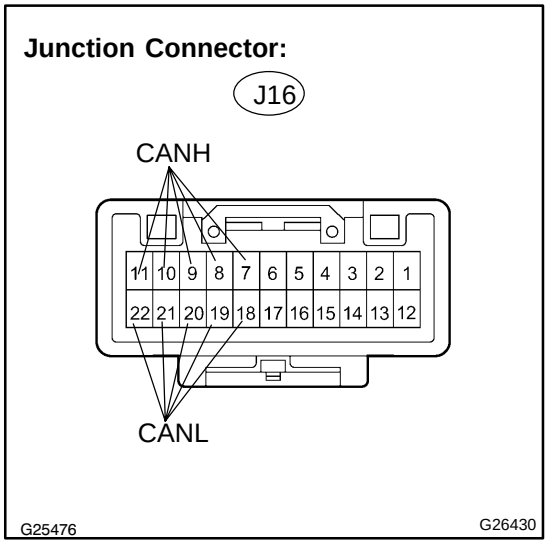
Symptom	Trouble Area
There is continuity between terminals 16 (BAT) and 6 (CANH) of DLC3.	・Short to +B in CAN bus line (CANH) ・Skid control ECU ・Steering sensor ・Yaw rate sensor

WIRING DIAGRAM

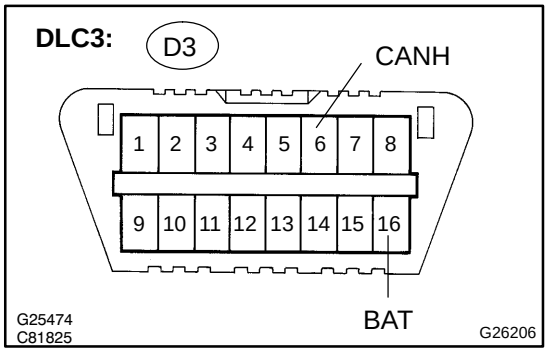


INSPECTION PROCEDURE

1	CHECK CAN BUS LINE FOR SHORT TO +B(DLC3 SUB BUS LINE, CAN-H)



(a) Disconnect the wire harness connector (J16) from the junction connector.



(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
D3-6 (CANH) - D3-16 (BAT)	Ignition SW OFF	1 MΩ or more

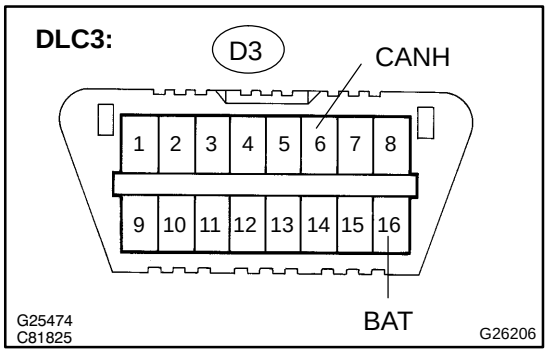
NG → **REPAIR OR REPLACE DLC3 SUB BUS LINE OR CONNECTOR (CAN-H)**

OK

2	CONNECTION OF CONNECTORS

(a) Reconnect the wire harness connectors (J16) to the junction connector.

3 CHECK CAN BUS LINE FOR SHORT TO +B(SKID CONTROL ECU, CAN-H)



(a) Disconnect the connector (S27) from the skid control ECU.
(b) Measure the resistance according to the value(s) in the table below.

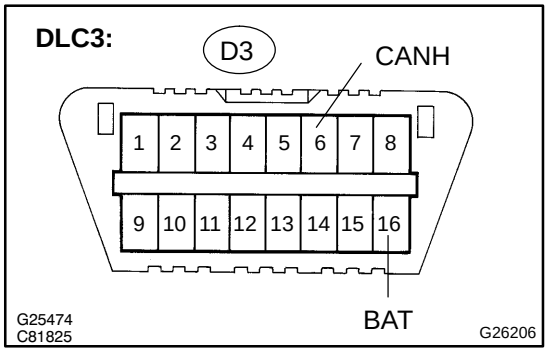
Standard:

Tester connection	Condition	Specified value
D3-6 (CANH) - D3-16 (BAT)	Ignition SW OFF	1 MΩ or more

OK → **REPLACE SKID CONTROL ECU WITH ACTUATOR (SEE PAGE 32-37)**

NG

4 CHECK CAN BUS LINE FOR SHORT TO +B(STEERING SENSOR, CAN-H)



(a) Reconnect the connector (S27) to the skid control ECU.
(b) Disconnect the connector (S14) from the steering sensor.
(c) Measure the resistance according to the value(s) in the table below.

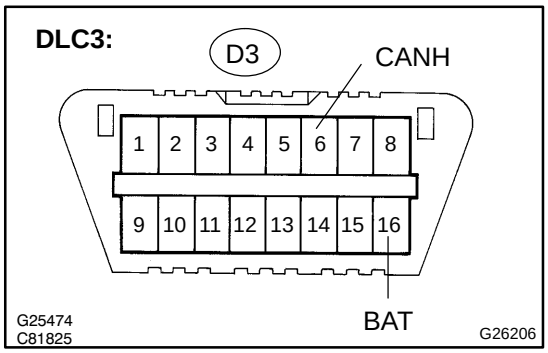
Standard:

Tester connection	Condition	Specified value
D3-6 (CANH) - D3-16 (BAT)	Ignition SW OFF	1 MΩ or more

OK → **REPLACE STEERING SENSOR (SEE PAGE 32-48)**

NG

5 CHECK CAN BUS LINE FOR SHORT TO +B(YAW RATE SENSOR, CAN-H)



(a) Reconnect the connector (S14) to the steering sensor.
(b) Disconnect the connector (Y1) from the yaw rate sensor.
(c) Measure the resistance according to the value(s) in the table below.

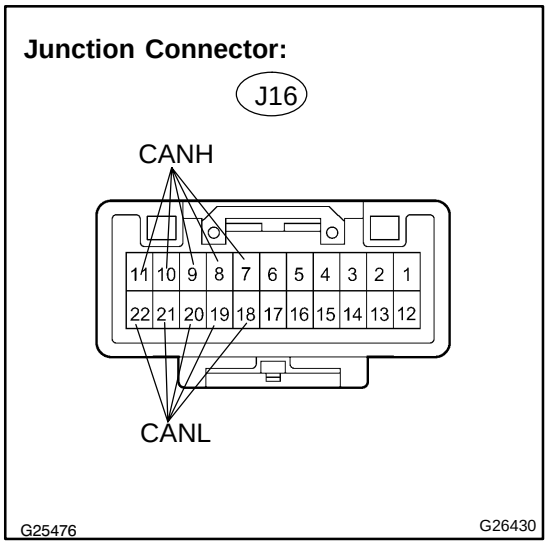
Standard:

Tester connection	Condition	Specified value
D3-6 (CANH) - D3-16 (BAT)	Ignition SW OFF	1 MΩ or more

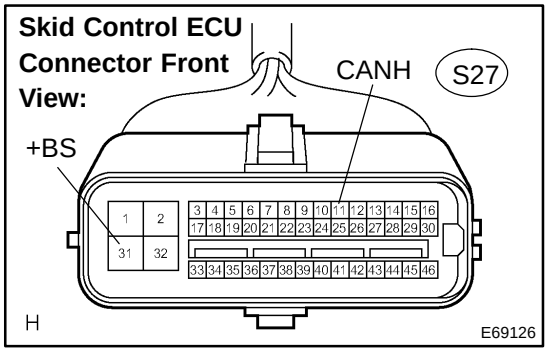
OK → **REPLACE YAW RATE SENSOR (SEE PAGE 32-46)**

NG

6	**CHECK CAN BUS LINE FOR SHORT TO +B(SKID CONTROL ECU - JUNCTION CONNECTOR, CAN-H)**



(a) Reconnect the connector (Y1) to the yaw rate sensor.
(b) Disconnect the wire harness connector (J16) from the junction connector.
(c) Disconnect the connector (S27) from the skid control ECU.



(d) Measure the resistance according to the value(s) in the table below.

Standard:

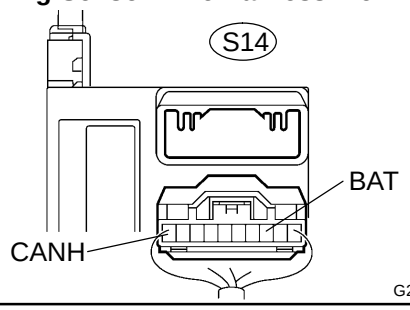
Tester connection	Condition	Specified value
S27-11 (CANH) - S27-31 (+BS)	Ignition SW OFF	1 MΩ or more

NG → **REPAIR OR REPLACE CAN MAIN BUS LINE OR CONNECTOR (SKID CONTROL ECU - JUNCTION CONNECTOR, CAN-H)**

OK

7	CHECK CAN BUS LINE FOR SHORT TO +B(STEERING SENSOR - JUNCTION CONNECTOR, CAN-H)

Steering Sensor Wire Harness View:



(a) Disconnect the connector (S14) from the steering sensor.
(b) Measure the resistance according to the values in the table below.

Standard:

Tester connection	Condition	Specified value
S14-10 (CANH) - S14-3 (BAT)	Ignition SW OFF	1 MΩ or more

HINT:
Check the wire harness connector connected to the junction connector while disconnecting it.

NG → **REPAIR OR REPLACE CAN MAIN BUS LINE OR CONNECTOR (STEERING SENSOR - JUNCTION CONNECTOR, CAN-H)**

OK

REPAIR OR REPLACE YAW RATE SENSOR SUB BUS LINE OR CONNECTOR (CAN-H)

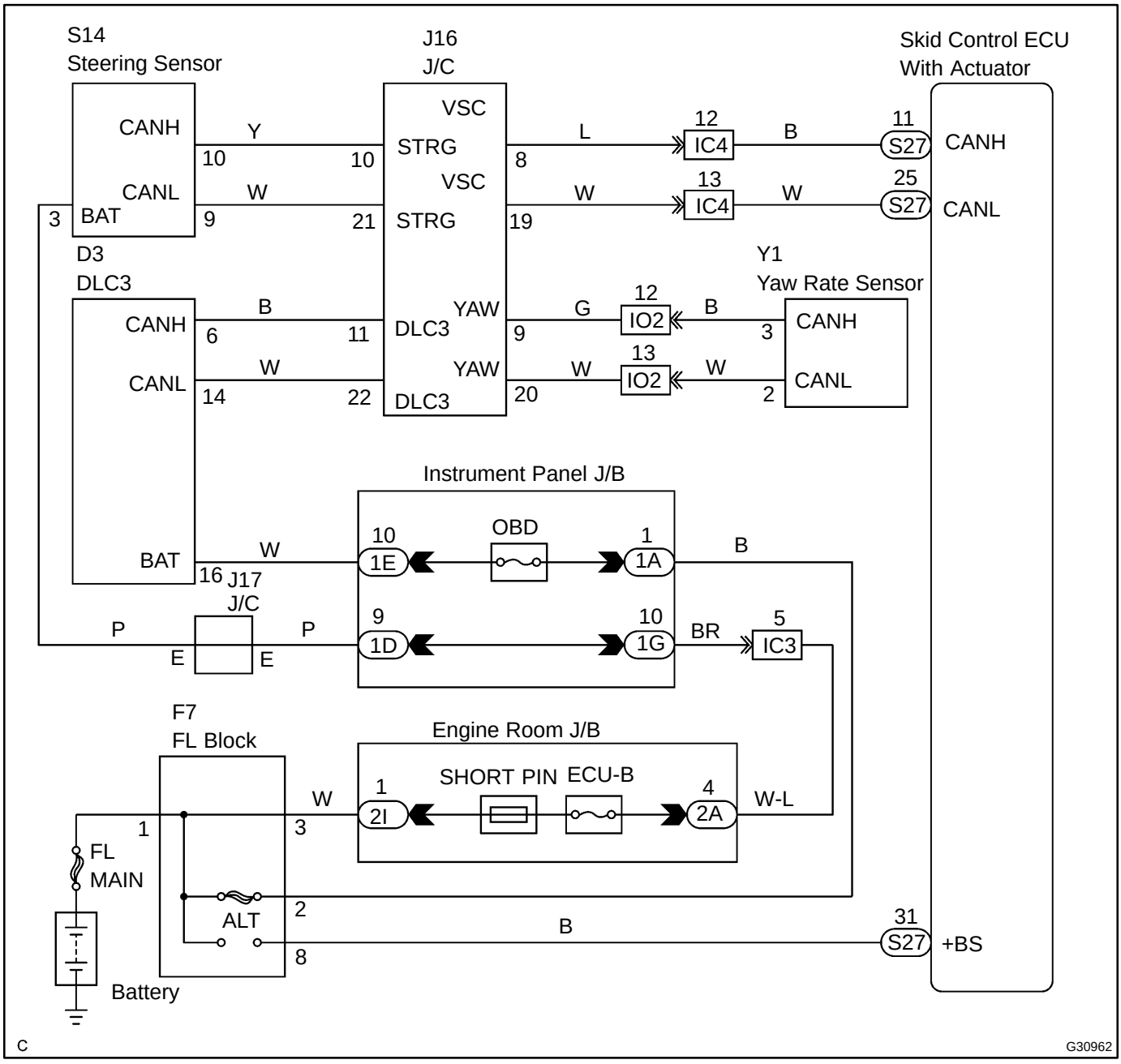
CHECK CAN BUS LINE (CAN-L) FOR SHORT TO +B

CIRCUIT DESCRIPTION

A short to the +B is suspected in the CAN bus line when there is continuity between terminals 16 (BAT) and 14 (CANL) of the DLC3.

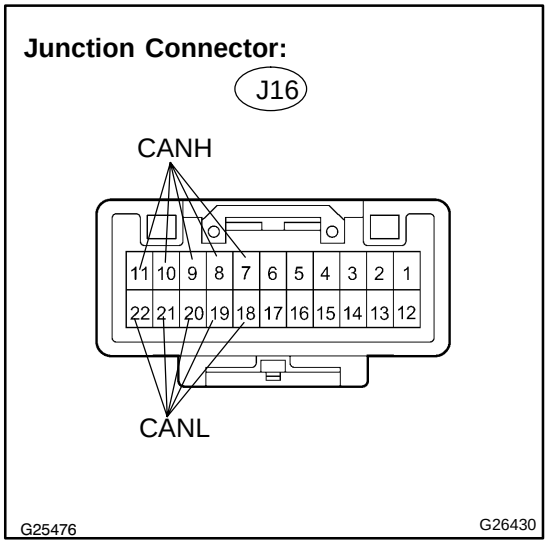
Symptom	Trouble Area
There is continuity between terminals 16 (BAT) and 14 (CANL) of DLC3.	・Short to +B in CAN bus line (CANL) ・Skid control ECU ・Steering sensor ・Yaw rate sensor

WIRING DIAGRAM

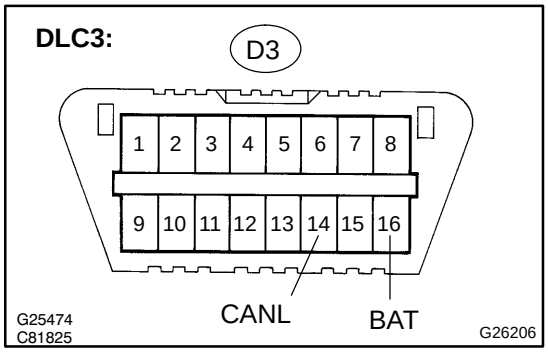


INSPECTION PROCEDURE

1	CHECK CAN BUS LINE FOR SHORT TO +B(DLC3 SUB BUS LINE, CAN-L)



(a) Disconnect the wire harness connector (J16) from the junction connector.



(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
D3-14 (CANL) - D3-16 (BAT)	Ignition SW OFF	1 MΩ or more

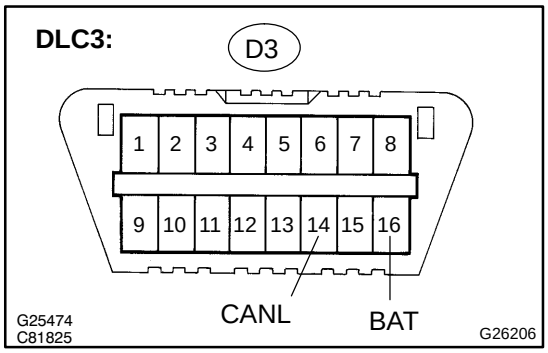
NG → **REPAIR OR REPLACE DLC3 SUB BUS LINE OR CONNECTOR (CAN-L)**

OK

2	CONNECTION OF CONNECTORS

(a) Reconnect the wire harness connector (J16) to the junction connector.

3 CHECK CAN BUS LINE FOR SHORT TO +B(SKID CONTROL ECU, CAN-L)



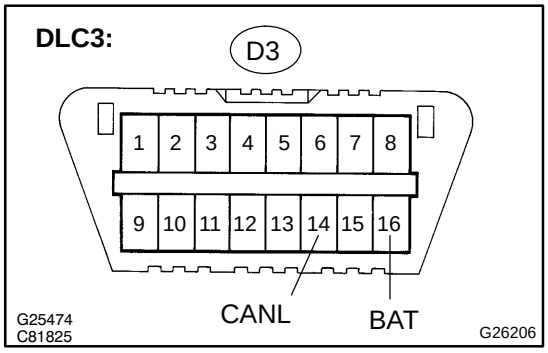
(a) Disconnect the connector (S27) from the skid control ECU.
(b) Measure the resistance according to the value(s) in the table below.
Standard:

Tester connection	Condition	Specified value
D3-14 (CANL) - D3-16 (BAT)	Ignition SW OFF	1 MΩ or more

OK → **REPLACE SKID CONTROL ECU WITH ACTUATOR (SEE PAGE 32-37)**

NG

4 CHECK CAN BUS LINE FOR SHORT TO +B(STEERING SENSOR, CAN-L)



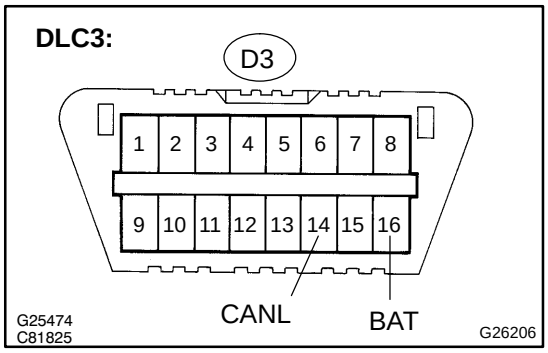
(a) Reconnect the connector (S27) to the skid control ECU.
(b) Disconnect the connector (S14) from the steering sensor.
(c) Measure the resistance according to the value(s) in the table below.
Standard:

Tester connection	Condition	Specified value
D3-14 (CANL) - D3-16 (BAT)	Ignition SW OFF	1 MΩ or more

OK → **REPLACE STEERING SENSOR (SEE PAGE 32-48)**

NG

5 CHECK CAN BUS LINE FOR SHORT TO +B(YAW RATE SENSOR, CAN-L)



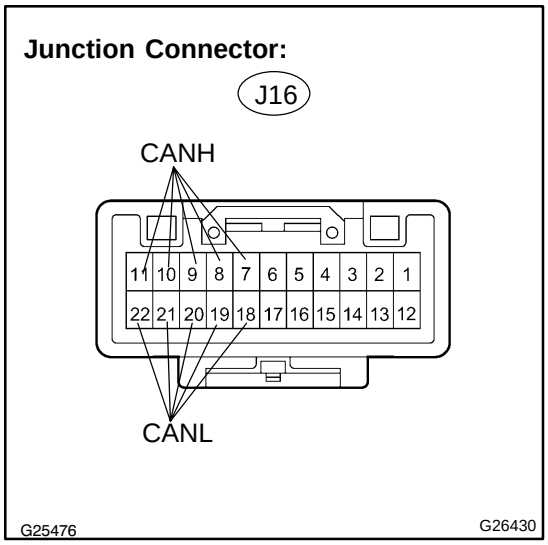
(a) Reconnect the connector (S14) to the steering sensor.
(b) Disconnect the connector (Y1) from the yaw rate sensor.
(c) Measure the resistance according to the value(s) in the table below.

Tester connection	Condition	Specified value
D3-14 (CANL) - D3-16 (BAT)	Ignition SW OFF	1 MΩ or more

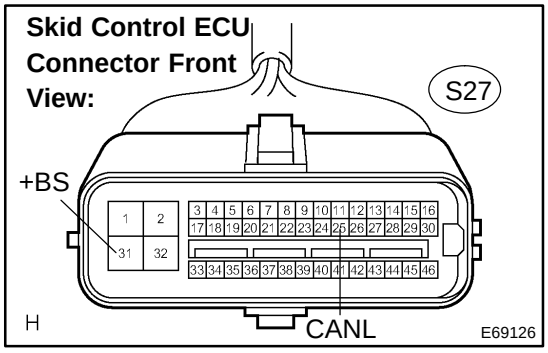
OK → **REPLACE YAW RATE SENSOR (SEE PAGE 32-46)**

NG

6	**CHECK CAN BUS LINE FOR SHORT TO +B(SKID CONTROL ECU - JUNCTION CONECTOR, CAN-L)**



(a) Reconnect the connector (Y1) to the yaw rate sensor.
(b) Disconnect the wire harness connector (J16) from the junction connector.
(c) Disconnect the connector (S27) from the skid control ECU.



(d) Measure the resistance according to the value(s) in the table below.

Standard:

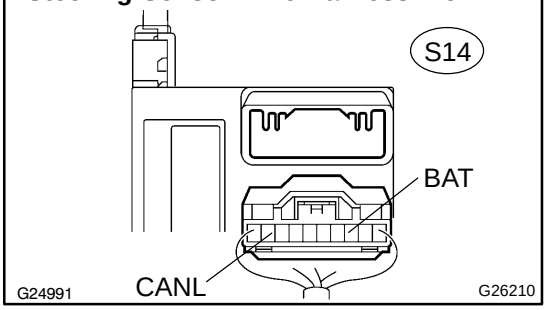
Tester connection	Condition	Specified value
S27-25 (CANL) - S27-31 (+BS)	Ignition SW OFF	1 MΩ or more

NG → **REPAIR OR REPLACE CAN MAIN BUS LINE OR CONNECTOR (SKID CONTROL ECU - JUNCTION CONNECTOR, CAN-L)**

OK

7	**CHECK CAN BUS LINE FOR SHORT TO +B(STEERING SENSOR - JUNCTION CONNESTOR, CAN-L)**

Steering Sensor Wire Harness View:



(a) Disconnect the connector (S14) from the steering sensor.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
S14-9 (CANL) - S14-3 (BAT)	Ignition SW OFF	1 MΩ or more

HINT:

Check the wire harness connector connected to the junction connector while disconnecting it.

NG → **REPAIR OR REPLACE CAN MAIN BUS LINE OR CONNECTOR (STEERING SENSOR - JUNCTION CONNECTOR, CAN-L)**

OK

REPAIR OR REPLACE YAW RATE SENSOR SUB BUS LINE OR CONNECTOR (CAN-L)

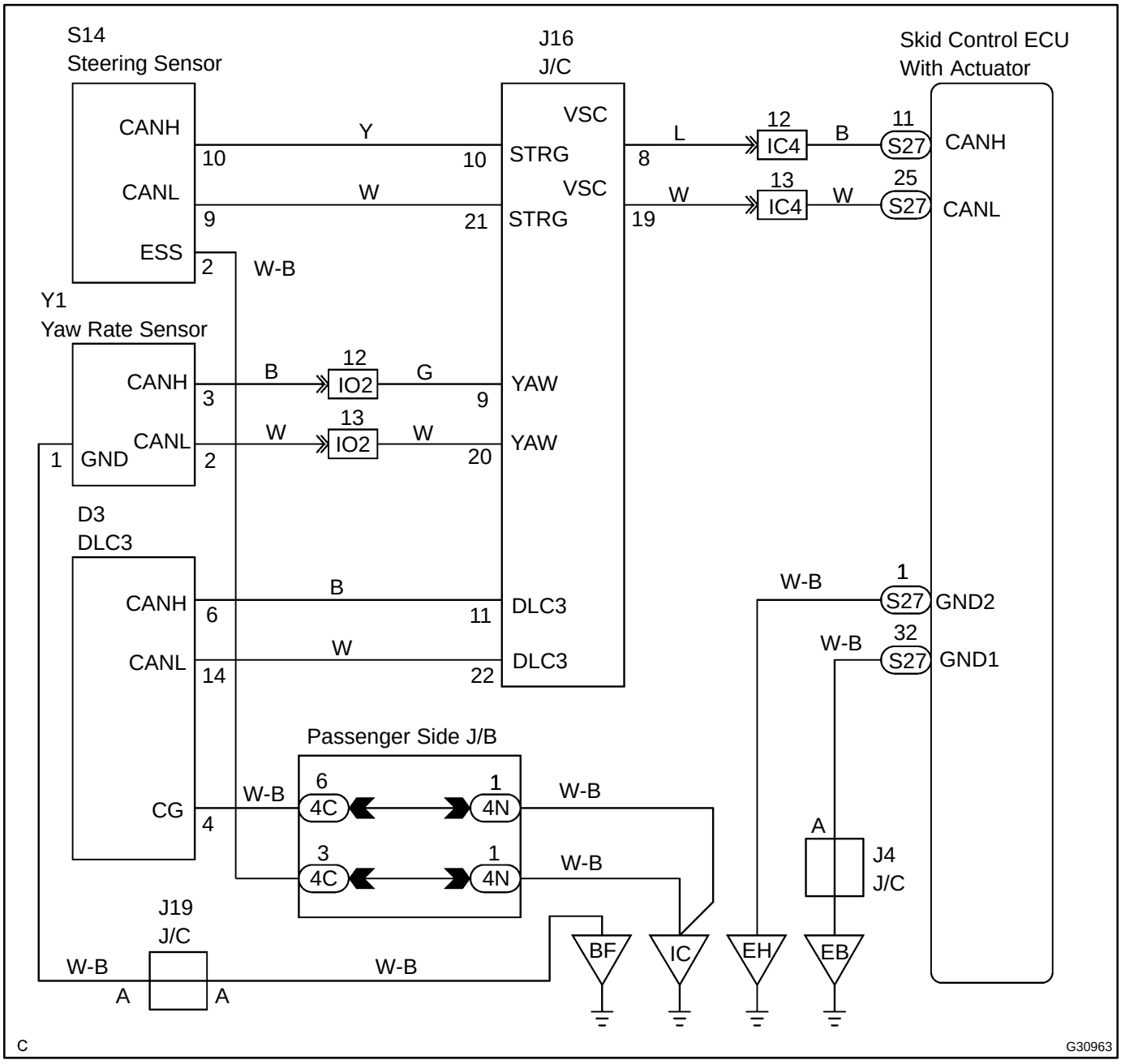
CHECK CAN BUS LINE (CAN-H) FOR SHORT TO GND

CIRCUIT DESCRIPTION

A short to GND is suspected in the CAN bus line when there is continuity between terminals 4 (CG) and 6 (CANH) of the DLC3.

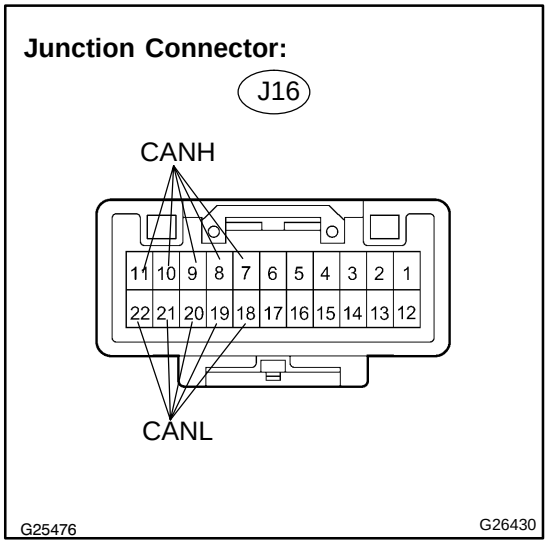
Symptom	Trouble Area
There is continuity between terminals 4 (CG) and 6 (CANH) of DLC3.	⋇Short to GND in CAN bus line (CANH) ⋇Skid control ECU ⋇Steering sensor ⋇Yaw rate sensor

WIRING DIAGRAM

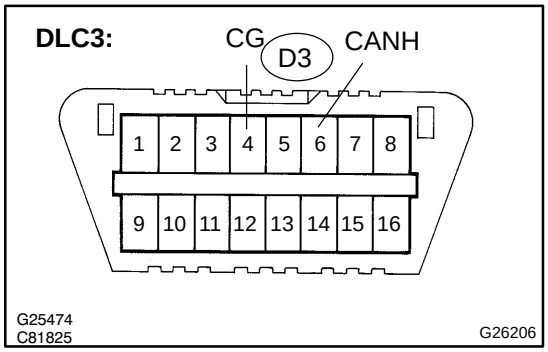


INSPECTION PROCEDURE

1	CHECK CAN BUS LINE FOR SHORT TO GND(DLC3 SUB BUS LINE, CAN-H)



(a) Disconnect the wire harness connector (J16) from the junction connector.



(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
D3-4 (CG) - D3-6 (CANH)	Ignition SW OFF	1 MΩ or more

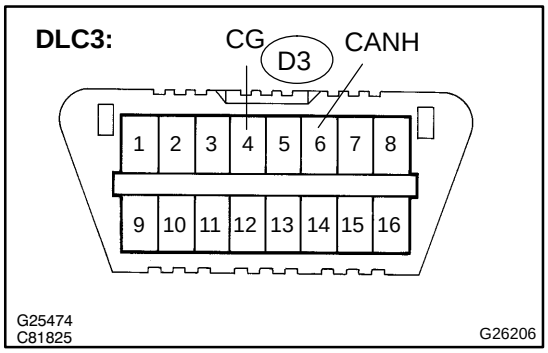
NG → **REPAIR OR REPLACE DLC3 SUB BUS LINE OR CONNECTOR (CAN-H)**

OK

2	CONNECTION OF CONNECTORS

(a) Reconnect the wire harness connector (J16) to the junction connector.

3 CHECK CAN BUS LINE FOR SHORT TO GND(SKID CONTROL ECU, CAN-H)



(a) Disconnect the connector (S27) from the skid control ECU.
(b) Measure the resistance according to the value(s) in the table below.

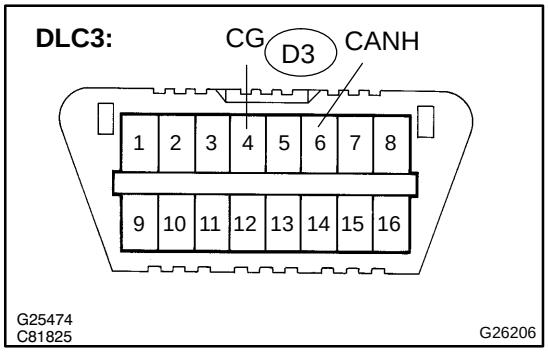
Standard:

Tester connection	Condition	Specified value
D3-4 (CG) - D3-6 (CANH)	Ignition SW OFF	3 kΩ or more

OK → **REPLACE SKID CONTROL ECU WITH ACTUATOR (SEE PAGE 32-37)**

NG

4 CHECK CAN BUS LINE FOR SHORT TO GND(STEERING SENSOR, CAN-H)



(a) Reconnect the connector (S27) to the skid control ECU.
(b) Disconnect the connector (S14) from the steering sensor.
(c) Measure the resistance according to the value(s) in the table below.

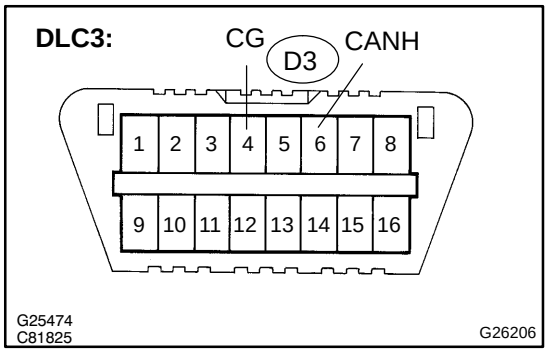
Standard:

Tester connection	Condition	Specified value
D3-4 (CG) - D3-6 (CANH)	Ignition SW OFF	3 kΩ or more

OK → **REPLACE STEERING SENSOR (SEE PAGE 32-48)**

NG

5 CHECK CAN BUS LINE FOR SHORT TO GND(YAW RATE SENSOR, CAN-H)



(a) Reconnect the connector (S14) to the steering sensor.
(b) Disconnect the connector (Y1) from the yaw rate sensor.
(c) Measure the resistance according to the value(s) in the table below.

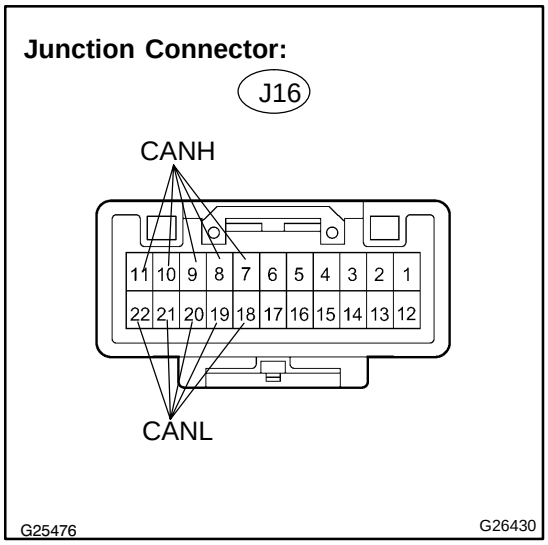
Standard:

Tester connection	Condition	Specified value
D3-4 (CG) - D3-6 (CANH)	Ignition SW OFF	3 kΩ or more

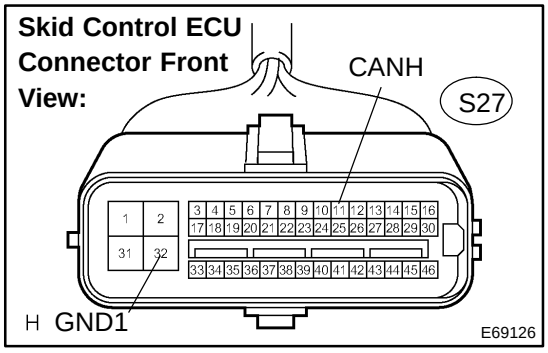
OK → **REPLACE YAW RATE SENSOR (SEE PAGE 32-46)**

NG

6	**CHECK CAN BUS LINE FOR SHORT TO GND(SKID CONTROL ECU - JUNCTION CONNECTOR, CAN-H)**



(a) Reconnect the connector (Y1) to the yaw rate sensor.
(b) Disconnect the wire harness connector (J16) from the junction connector.
(c) Disconnect the connector (S27) from the skid control ECU.



(d) Measure the resistance according to the value(s) in the table below.

Standard:

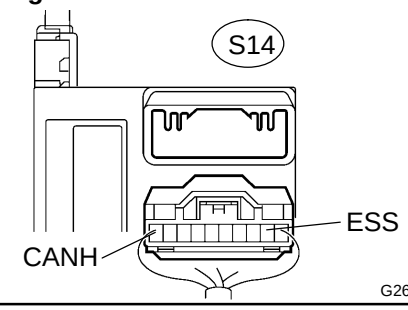
Tester connection	Condition	Specified value
S27-11 (CANH) - S27-32 (GND1)	Ignition SW OFF	1 MΩ or more

NG → **REPAIR OR REPLACE CAN MAIN BUS LINE OR CONNECTOR (SKID CONTROL ECU - JUNCTION CONNECTOR, CAN-H)**

OK

7	CHECK CAN BUS LINE FOR SHORT TO GND(STEERING SENSOR - JUNCTION CONNECTOR, CAN-H)

Steering Sensor Wire Harness View:



(a) Disconnect the connector (S14) from the steering sensor.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
S14-2 (ESS) - S14-10 (CANH)	Ignition SW OFF	1 MΩ or more

HINT:
Check the wire harness connector connected to the junction connector while disconnecting it.

NG → **REPAIR OR REPLACE CAN MAIN BUS LINE OR CONNECTOR (STEERING SENSOR - JUNCTION CONNECTOR, CAN-H)**

OK

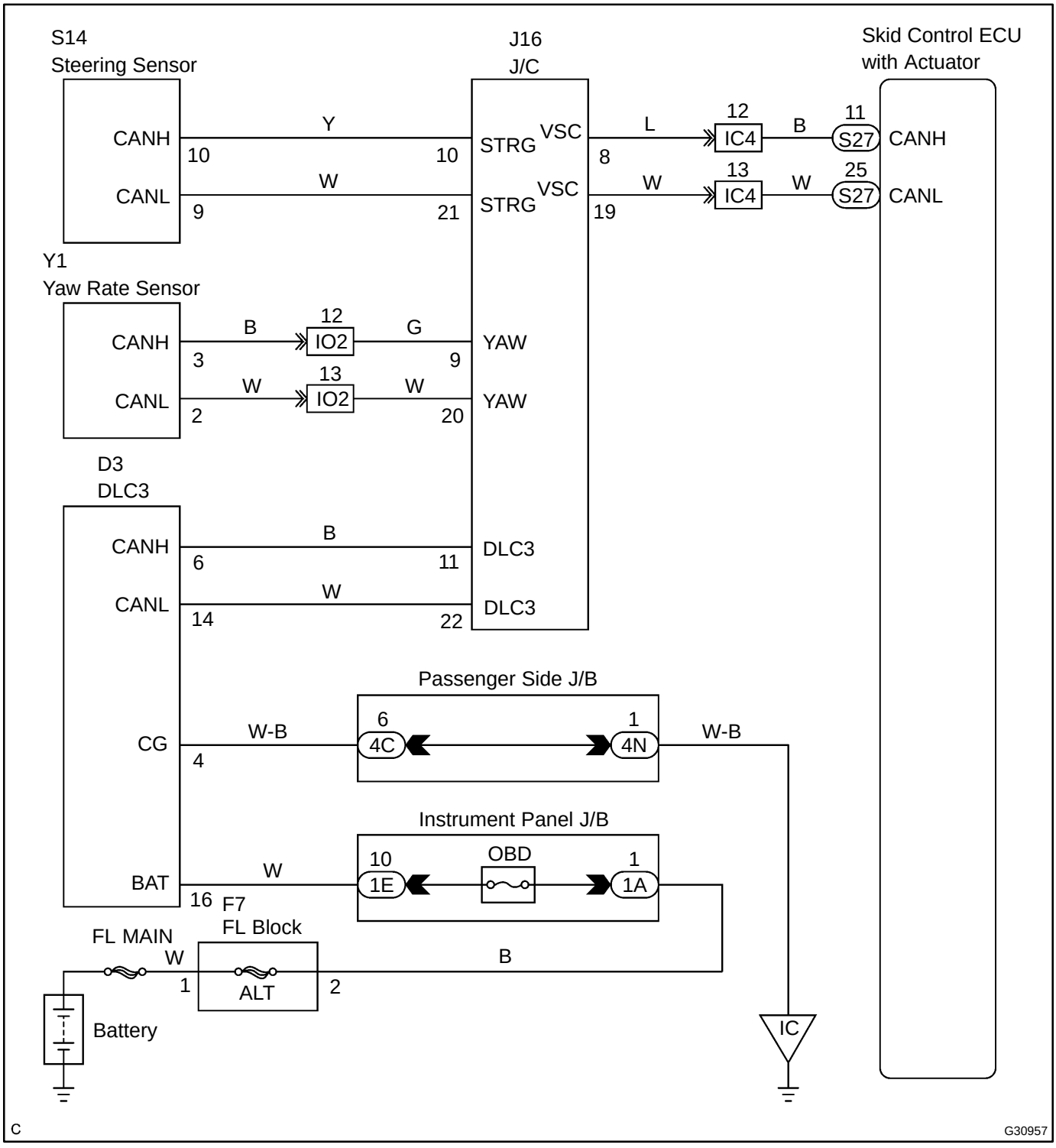
REPAIR OR REPLACE YAW RATE SENSOR SUB BUS LINE OR CONNECTOR (CAN-H)

CHECK CAN BUS LINE

CIRCUIT DESCRIPTION

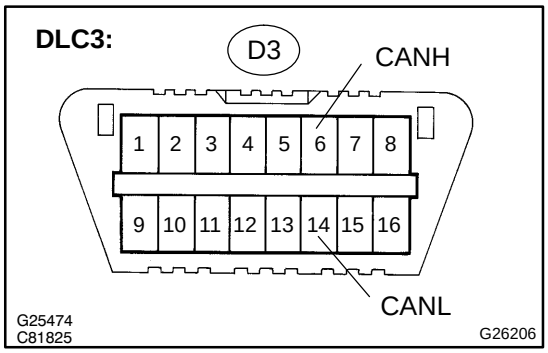
When any DTC for the CAN communication is output, first measure the resistance between the terminals of DLC3 to specify the trouble area.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK CAN BUS LINE(MAIN BUS LINE FOR DISCONNECTION, BUS LINES FOR SHORT CIRCUIT)



(a) Turn the ignition switch to the LOCK position.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

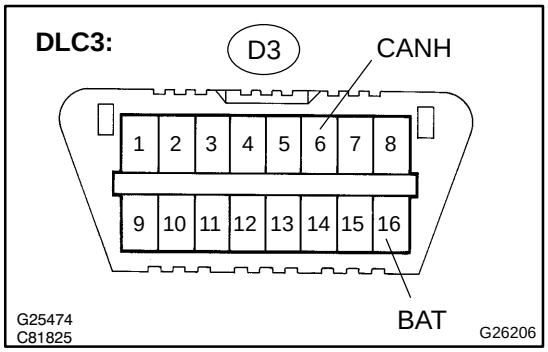
Tester connection	Condition	Specified value	Result
D3-6 (CANH) - D3-14 (CANL)	Ignition SW OFF	54 to 69 Ω	OK
D3-6 (CANH) - D3-14 (CANL)	Ignition SW OFF	69 Ω or more	NG-A
D3-6 (CANH) - D3-14 (CANL)	Ignition SW OFF	54 Ω or less	NG-B

NG-A → **CHECK CAN MAIN BUS LINE FOR DISCONNECTION (SEE PAGE 05-2109)**

NG-B → **CHECK CAN BUS LINES FOR SHORT CIRCUIT (SEE PAGE 05-21 12)**

OK

2	CHECK CAN BUS LINE (CAN-H) FOR SHORT TO +B



(a) Measure the resistance according to the value(s) in the table below.

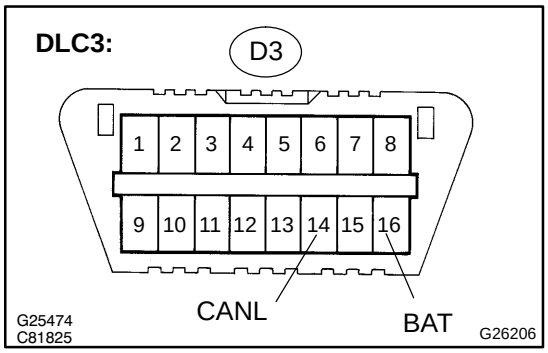
Standard:

Tester connection	Condition	Specified value
D3-6 (CANH) - D3-16 (BAT)	Ignition SW OFF	1 MΩ or more

NG → **CHECK CAN BUS LINE (CAN-H) FOR SHORT TO +B (SEE PAGE 05-21 16)**

OK

3 CHECK CAN BUS LINE (CAN-L) FOR SHORT TO +B



(a) Measure the resistance according to the value(s) in the table below.

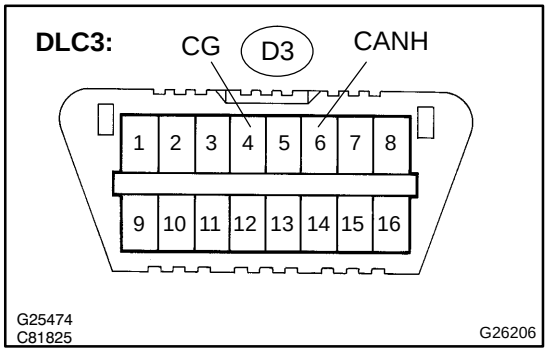
Standard:

Tester connection	Condition	Specified value
D3-14 (CANL) - D3-16 (BAT)	Ignition SW OFF	1 MΩ or more

NG → **CHECK CAN BUS LINE (CAN-L) FOR SHORT TO +B (SEE PAGE 05-2121)**

OK

4 CHECK CAN BUS LINE (CAN-H) FOR SHORT TO GND



(a) Measure the resistance according to the value(s) in the table below.

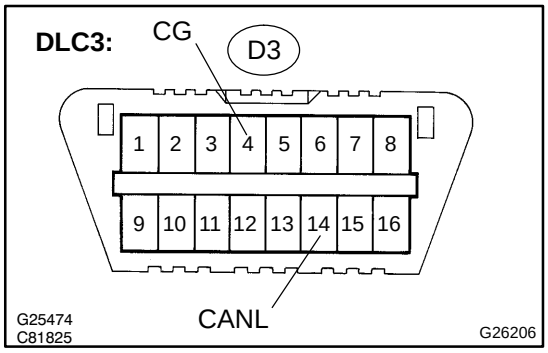
Standard:

Tester connection	Condition	Specified value
D3-4 (CG) - D3-6 (CANH)	Ignition SW OFF	3 kΩ or more

NG → **CHECK CAN BUS LINE (CAN-H) FOR SHORT TO GND (SEE PAGE 05-2126)**

OK

5 CHECK CAN BUS LINE (CAN-L) FOR SHORT TO GND



(a) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
D3-4 (CG) - D3-14 (CANL)	Ignition SW OFF	3 kΩ or more

NG → **CHECK CAN BUS LINE (CAN-L) FOR SHORT TO GND (SEE PAGE 05-2131)**

OK

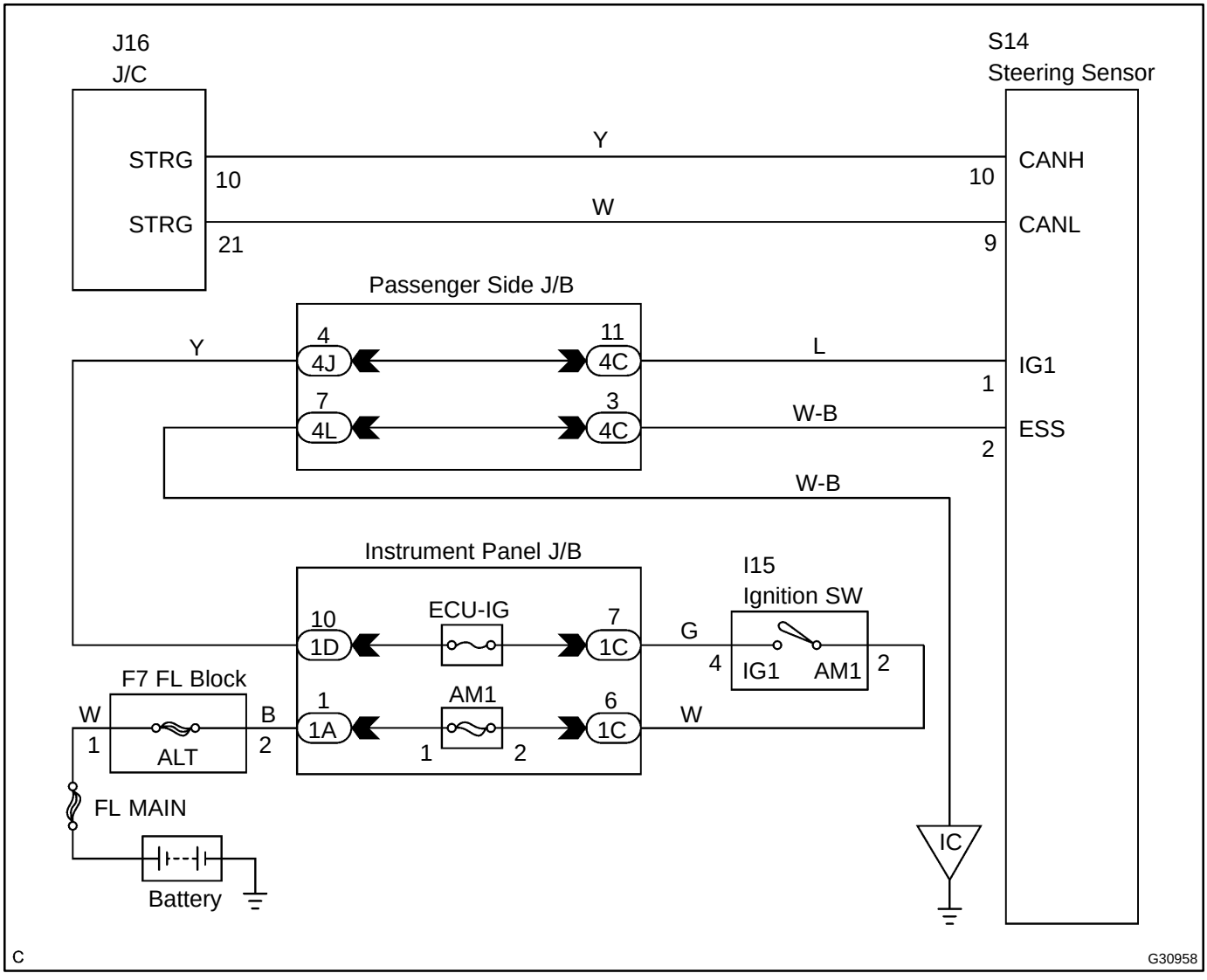
HOW TO PROCEED WITH TROUBLESHOOTING (SEE PAGE 05-2095)

STEERING SENSOR COMMUNICATION STOP MODE

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
U0126/63	・When ECU terminal IG1 voltage is 9.5 V or more, data is not received from the steering sensor for more than 1 sec. ・When ECU terminal IG1 voltage is 9.5 V or more, data can not be received from the steering sensor more than once within 5 sec. This situation repeatedly occurs more than 10 times.	・Steering sensor ・Power source of steering sensor

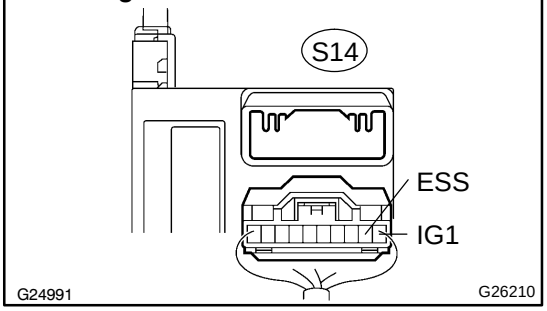
WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK WIRE HARNESS(IG1, ESS)

Steering Sensor Wire Harness View:



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the connector (S14) from the steering sensor.
(c) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
S14-2 (ESS) - Body ground	Always	Below 1 Ω

(d) Connect the connector (S14) to the steering sensor.
(e) Measure the voltage according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
S14-1 (IG1) - Body ground	Ignition SW ON	10 to 14 V

NOTICE:
Perform the measurement from the back of the connector with the connector connected.

NG → **REPAIR OR REPLACE WIRE HARNESS OR CONNECTOR**

OK

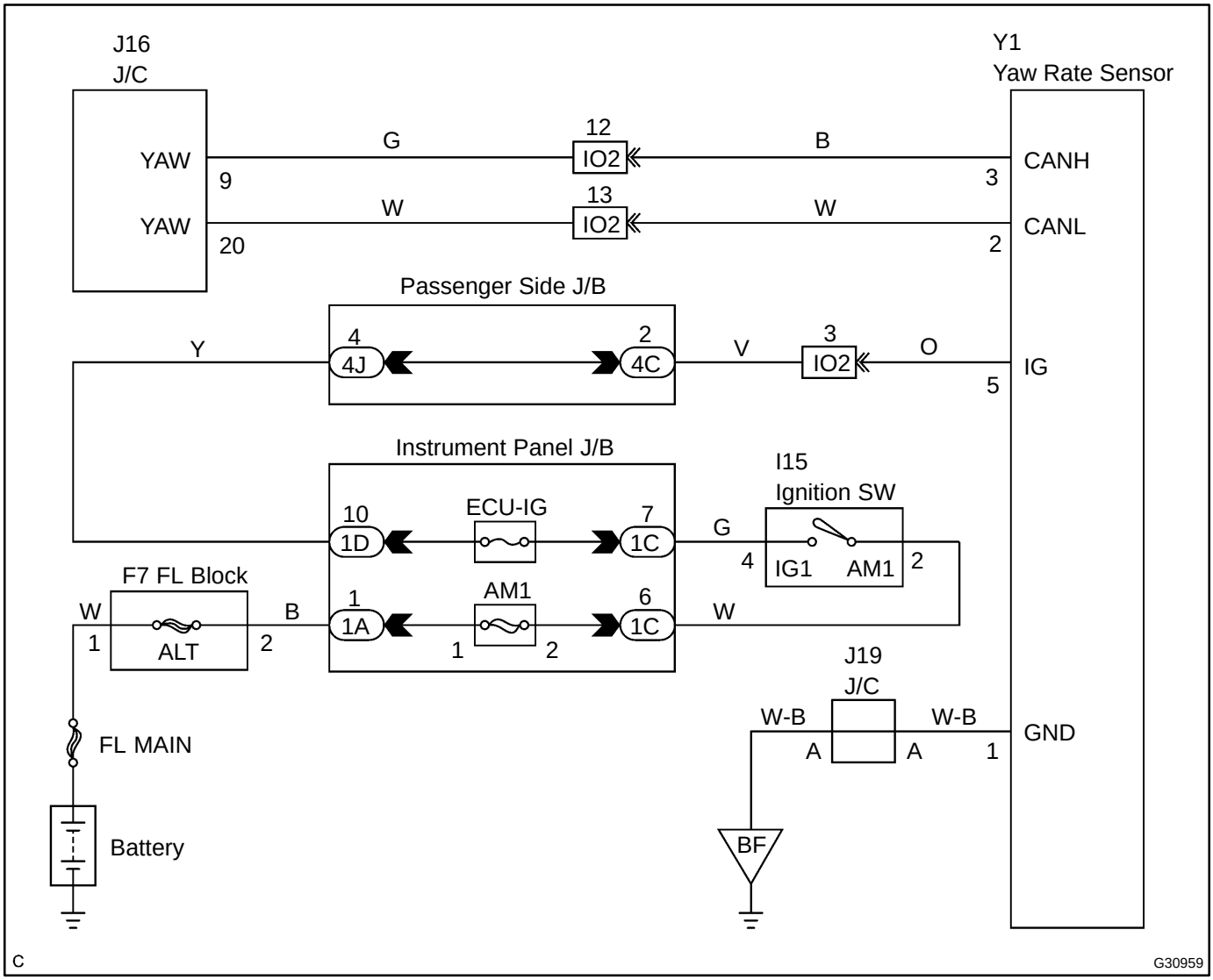
REPLACE STEERING SENSOR (SEE PAGE 32-48)

YAW RATE SENSOR COMMUNICATION STOP MODE

CIRCUIT DESCRIPTION

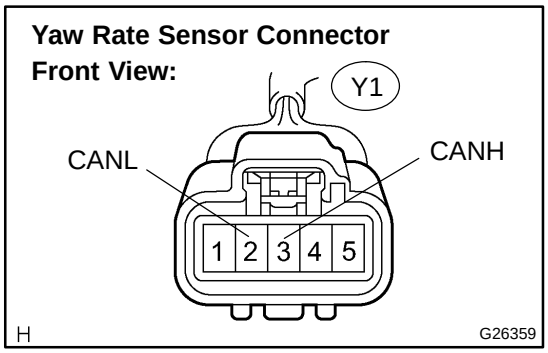
DTC No.	DTC Detecting Condition	Trouble Area
U0123/62	・When ECU terminal IG1 voltage is 9.5 V or more, data is not received from the yaw rate sensor for more than 1 sec. ・When ECU terminal IG1 voltage is 9.5 V or more, data can not be received from the yaw rate sensor more than once within 5 sec .This situation repeatedly occurs more than 10 times.	・Yaw rate sensor ・Yaw rate sensor sub bus line ・Power source of yaw rate sensor
U0124/95	・When ECU terminal IG1 voltage is 9.5 V or more, data is not received from the deceleration the sensor for more than 1 sec. ・When ECU terminal IG1 voltage is 9.5 V or more, data can not be received from the deceleration sensor more than once within 5 sec. This situation repeatedly occurs more than 10 times.	・Yaw rate sensor ・Yaw rate sensor sub bus line ・Power source of yaw rate sensor

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK CAN BUS LINE FOR DISCONNECTION(YAW RATE SENSOR SUB BUS LINE)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the connector (Y1) from the yaw rate sensor.
(c) Measure the resistance according to the value(s) in the table below.

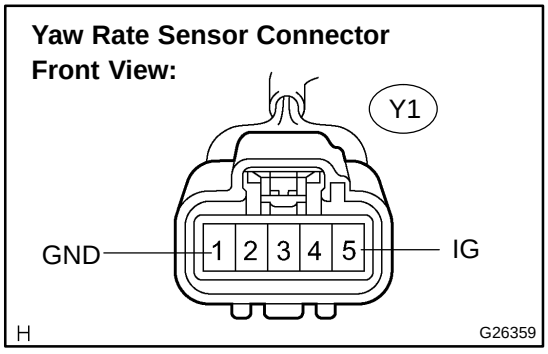
Standard:

Tester connection	Condition	Specified value
Y1-2 (CANL) - Y1-3 (CANH)	Ignition SW OFF	54 to 69 Ω

NG → **REPAIR OR REPLACE YAW RATE SENSOR SUB BUS LINE OR CONNECTOR (CAN-H, CAN-L)**

OK

2	CHECK WIRE HARNESS(IG,GND)



(a) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
Y1-1 (GND) - Body ground	Always	Below 1 Ω

(b) Measure the voltage according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified value
Y1-5 (IG) - Body ground	Ignition SW ON	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE YAW RATE SENSOR (SEE PAGE 32-46)

CAN COMMUNICATION SYSTEM

05BYH-15

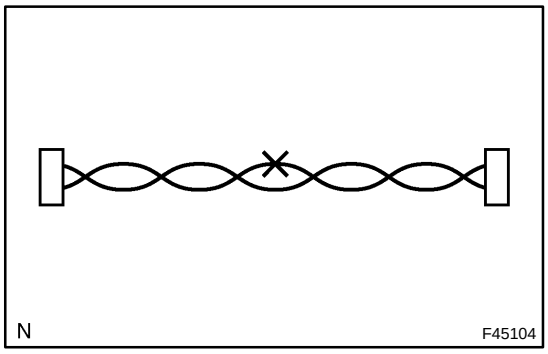
PRECAUTION

1. HANDLING PRECAUTIONS ON STEERING SYSTEM

(a) Care must be taken when replacing parts. Incorrect replacement could affect the performance of the steering system and result in a driving hazard.

2. HANDLING PRECAUTIONS ON SRS AIRBAG SYSTEM

(a) The HIGHLANDER is equipped with a SRS (Supplemental Restraint System), such as the driver airbag and front passenger airbag. Failure to carry out service operation in the correct sequence could cause the SRS to unexpectedly deploy during servicing, possibly leading to a serious accident. Before servicing (including removal or installation of parts, inspection or replacement), be sure to read the precautionary notice for the Supplemental Restraint System (see page 60-1).

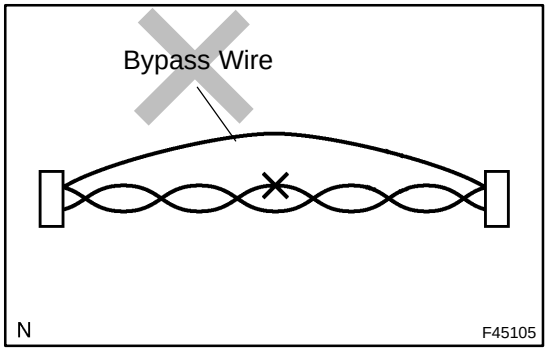


3. WIRE HARNESS REPAIR

(a) After repairing the wire bus line with solder, wrap the repaired part with vinyl tape.

NOTICE:

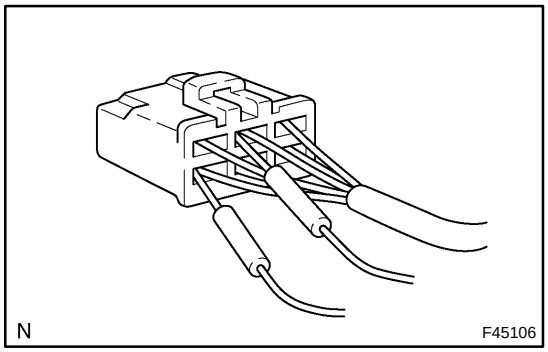
- **The CANL bus line and CANH bus line must be installed together all the time.**
  When installing, make sure to twist them.
- **The difference in length of the CANL bus line and CANH bus line should be within 100 mm (3.937 in.).**
- **Untwisted parts around the connectors should be within 80 mm (3.150 in.).**



(b) Do not perform bypass wiring between the connectors.

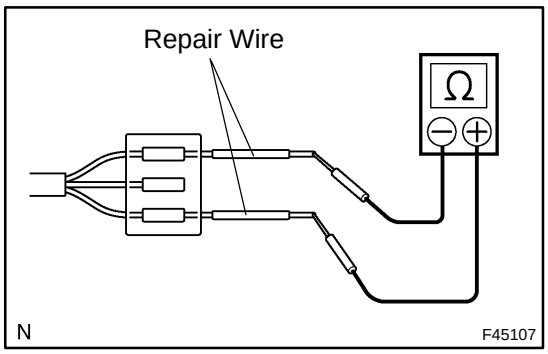
NOTICE:

If you perform bypass wiring, the characteristic of the twisted wire harness will be lost.



4. CONNECTOR HANDLING

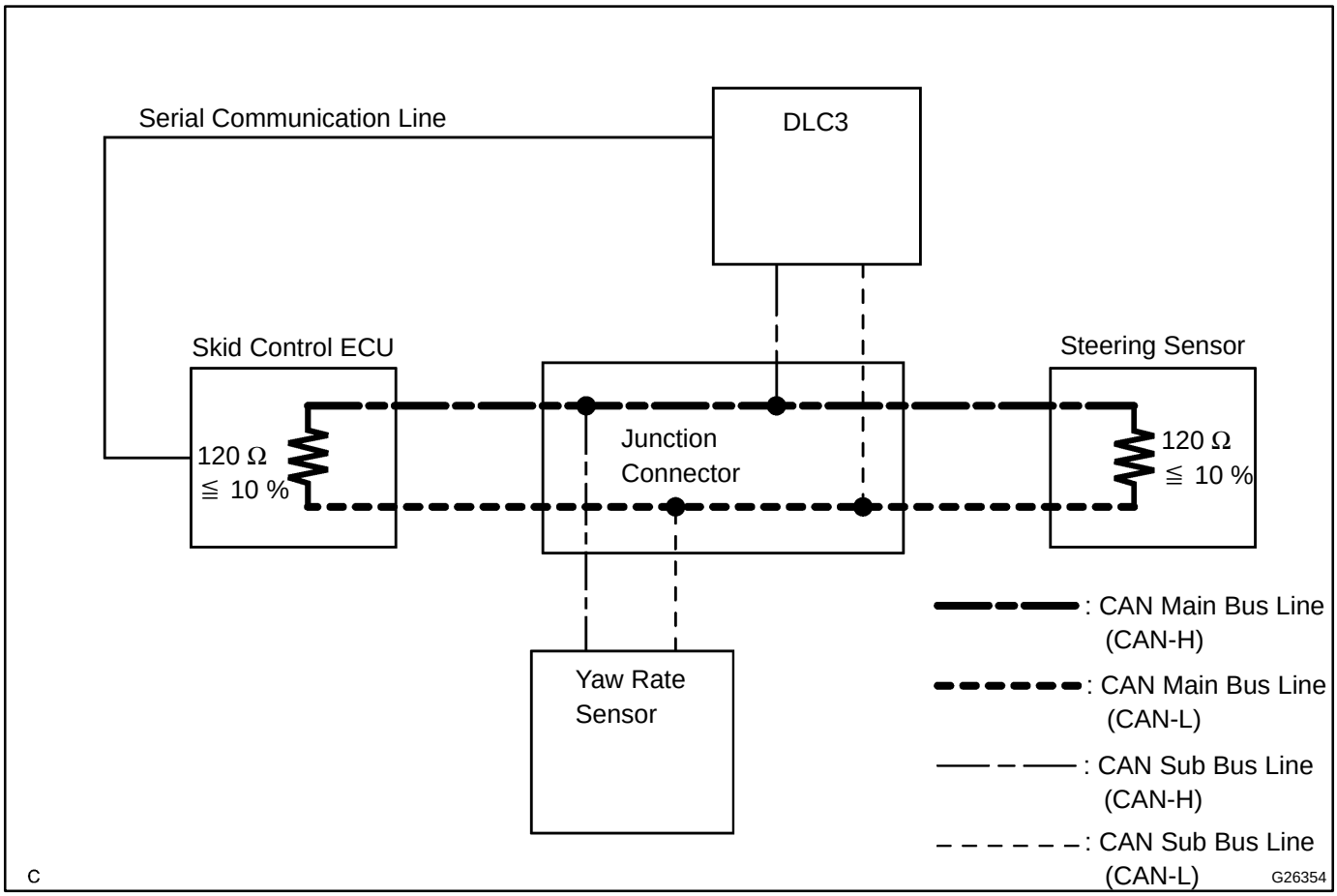
(a) When inserting tester probes into a connector, insert them from the back of the connector.



(b) If it is impossible to check resistance from the back of the connector, use a repair wire to check it.

05DY2-04

SYSTEM DIAGRAM



HINT:

The Skid Control ECU stores DTCs and performs DTC communication by receiving information from the Steering Sensor and Yaw Rate Sensor. These sensors cannot store DTCs or perform DTC communication.

05BYQ-06

CUSTOMER PROBLEM ANALYSIS CHECK

CAN Communication System Check Sheet

Inspector's Name :

Customer's Name		**VIN**	
		Production Date	/ /
		Licence Plate No.	
Date Vehicle Brought In	/ /	**Odometer Reading**	km miles

Date Problem First Occurred	/ /
Frequency Problem Occurs	☐ Continuously ☐ Intermittently (times a day)

DTC Check	**1st Time**	☐ Normal System Code ☐ Trouble Code (Code)
	2nd Time	☐ Normal System Code ☐ Trouble Code (Code)

05DY3-12

DESCRIPTION

1. BRIEF DESCRIPTION

(a) CAN (Controller Area Network) is a serial data communication system for real time application. It is a vehicle multiplex communication system which has a high communication speed (500 kbps) and the ability to detect malfunctions.

(b) The CAN performs the communication based on the differential voltage by pairing the CANH bus line and CANL bus line.

(c) The HIGHLANDER uses the CAN communication system for communication between the following ECU and sensors in the ABS with EBD & BA & TRC & VSC system.

(d) The CAN has two resistors of 120 Ω that are necessary for communication to the main bus line.

2. DEFINITION OF TERMS

(a) Main bus line

(1) Main bus line is a wire harness between the two terminus circuits on the bus (communication line). This is the main bus in the CAN communication system.

(b) Sub bus line

(1) Sub bus line is a wire harness which diverges from the main bus line, which is the main bus of the CAN bus, to an ECU or sensor.

3. ECU OR SENSORS WHICH COMMUNICATE THROUGH THE CAN COMMUNICATION SYSTEM

(a) Skid Control ECU

(b) Steering Sensor

(c) Yaw Rate Sensor

4. DIAGNOSTIC CODES FOR THE CAN COMMUNICATION SYSTEM

(a) DTCs for CAN system are as follows:
U0073/94, U0123/62, U0124/95, U0126/63

5. REMARKS FOR TROUBLESHOOTING

(a) Trouble in the CAN bus (communication line) can be checked from the DLC3 (except a wire break other than in the DLC3 sub bus line).

(b) By using the hand-held tester, DTCs for the CAN communication system can be checked through the DTC ISO 9141K-Line.

(c) The CAN communication system cannot detect the trouble in the DLC3 sub bus line even though the DLC3 is also connected to the CAN communication system.

05BYL-13

DIAGNOSTIC TROUBLE CODE CHART

1. DTCs COMBINATION TABLE

NOTICE:

Complete ”CHECK CAN BUS LINE” (see page 05-2102), to confirm that there is no disconnection in the CAN main bus lines and there is no short circuit, short to +B or short to ground in the CAN bus lines. Then perform troubleshooting according to the DTC combination table.

(a) Confirm the trouble mode according to the combination of output DTCs.

Trouble Mode	U0073/94	U0123/62	U0124/95	U0126/63
Skid control ECU communication stop mode	◯	◯	◯	◯
Yaw rate sensor communication stop mode	-	◯	◯	-
Steering sensor communication stop mode	-	-	-	◯

HINT:

- ◯ ..... DTCs that are being output.
- - ..... DTCs that are not being output.

(b) Confirm the trouble mode by referring to the above. Then check the parts to be replaced and pages to proceed to, by referring to the below.

Output Code	Suspected Area	See page and parts to be replaced
Skid control ECU communication stop mode (U0073/94, U0123/62, U0124/95 and U0126/63 are output simultaneously)	Skid control ECU	Replace skid control ECU
Yaw rate sensor communication stop mode (U0123/62 and U0124/95 are output simultaneously)	・Open circuit between yaw rate sensor and junction connector ・Yaw rate sensor power source/internal malfunction	05-2107
Steering sensor communication stop mode (U0126/63 only)	・Steering sensor power source/internal malfunction	05-2105

05BYJ-06

HOW TO PROCEED WITH TROUBLESHOOTING

NOTICE:

When DTCs other than U0073/94, U0123/62, U0124/95, U0126/63 are output, inspect and repair the trouble areas indicated by the DTCs.

1	CHECK CAN BUS LINE (SEE PAGE 05-2102)

2	CHECK AND CLEAR DTCs

HINT:

When checking the DTCs for the skid control ECU, proceed to page 05-765

3	CHECK DTC COMBINATION TABLE (SEE PAGE 05-2101)

4	CIRCUIT INSPECTION

5	IDENTIFICATION OF PROBLEM

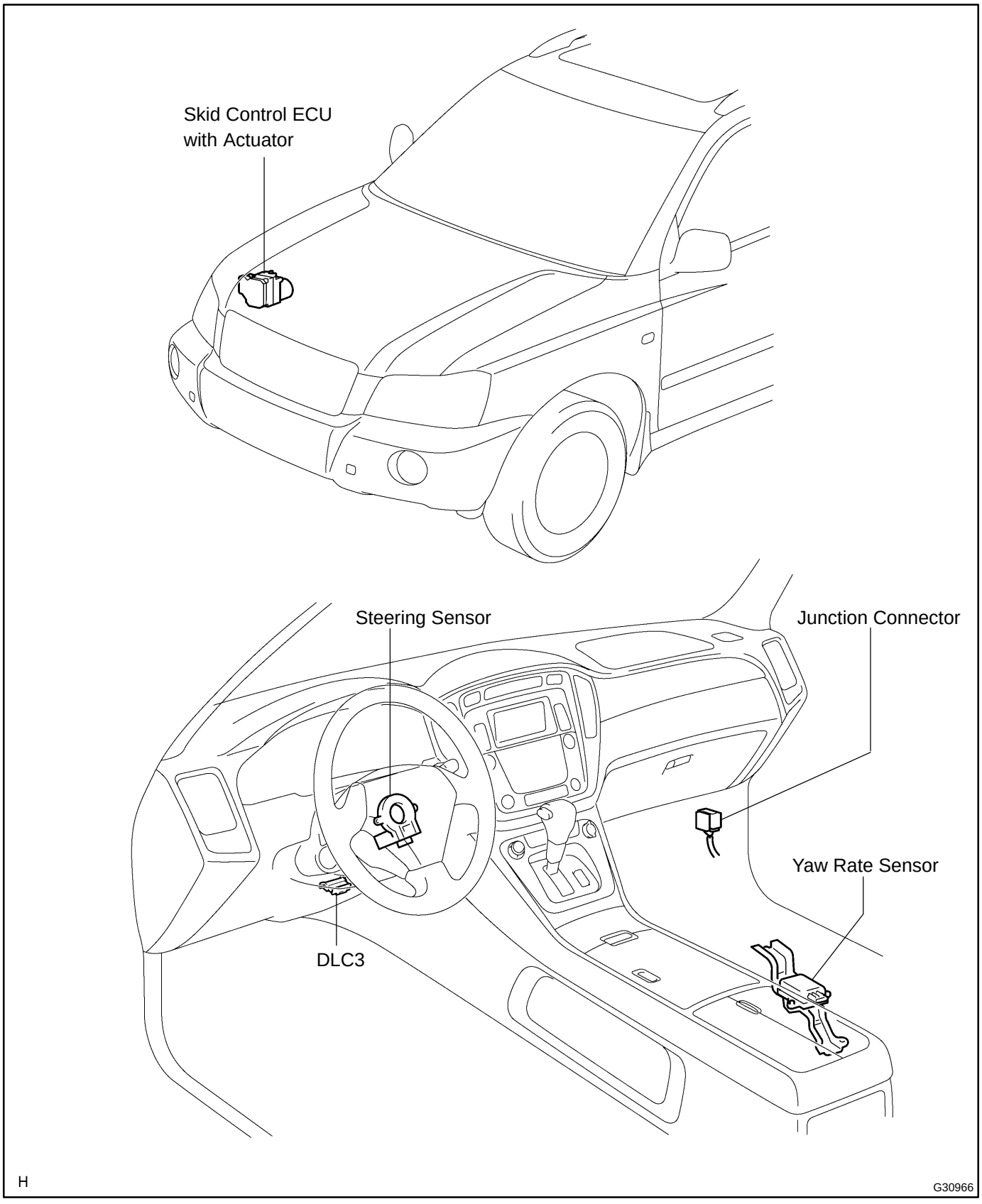
6	REPAIR OR REPLACE

7	CONFIRMATION TEST

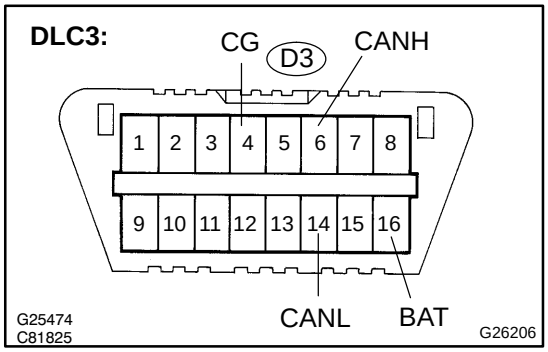
END

05BYM-06

LOCATION



TERMINALS OF ECU



1. DLC3

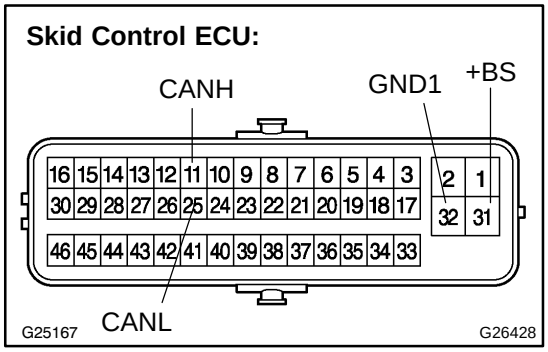
(a) Check DLC3.

(1) Turn the ignition switch off.

(2) Measure the resistance according to the value(s) in the table below.

Standard:

Terminals	Check item	Condition	Specified value
D3-6 (CANH) - D3-14 (CANL)	Resistance	Ignition SW OFF	54 to 69 Ω
D3-6 (CANH) - D3-16 (BAT)	Resistance	Ignition SW OFF	More than 1 MΩ
D3-14 (CANL) - D3-16 (BAT)	Resistance	Ignition SW OFF	More than 1 MΩ
D3-6 (CANH) - D3-4 (CG)	Resistance	Ignition SW OFF	More than 3 kΩ
D3-14 (CANL) - D3-4 (CG)	Resistance	Ignition SW OFF	More than 3 kΩ



2. SKID CONTROL ECU

(a) Check skid control ECU.

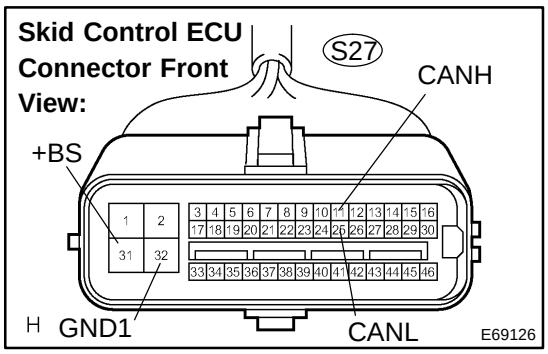
(1) Turn the ignition switch off.

(2) Disconnect the connector (S27) from the skid control ECU.

(3) Measure the resistance according to the value(s) in the table below.

Standard:

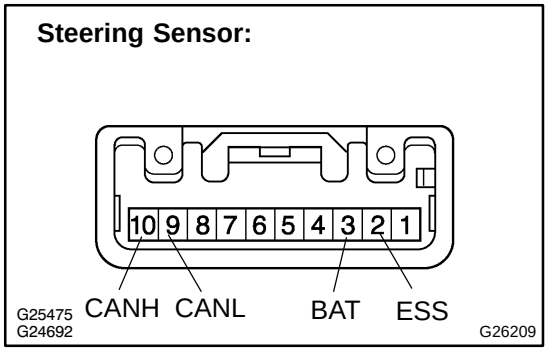
Terminals	Check item	Condition	Specified value
11 (CANH) - 25 (CANL)	Resistance	Ignition SW OFF	108 to 132 Ω
11 (CANH) - 32 (GND1)	Resistance	Ignition SW OFF	More than 3 kΩ
25 (CANL) - 32 (GND1)	Resistance	Ignition SW OFF	More than 3 kΩ
11 (CANH) - 31 (+BS)	Resistance	Ignition SW OFF	More than 1 MΩ
25 (CANL) - 31 (+BS)	Resistance	Ignition SW OFF	More than 1 MΩ



(b) Check the skid control ECU harness side connector (S27).
(1) Turn the ignition switch off.
(2) Disconnect the connector (S27) from the skid control ECU.
(3) Measure the resistance according to the value(s) in the table below.

Standard:

Terminals	Wiring Color	Check item	Condition	Specified value
S27-11 (CANH) - S27-25 (CANL)	B - W	Resistance	Ignition SW OFF	108 to 132 Ω
S27-11 (CANH) - S27-32 (GND1)	B - W-B	Resistance	Ignition SW OFF	More than 3 kΩ
S27-25 (CANL) - S27-32 (GND1)	W - W-B	Resistance	Ignition SW OFF	More than 3 kΩ
S27-11 (CANH) - S27-31 (+BS)	B - B	Resistance	Ignition SW OFF	More than 1 MΩ
S27-25 (CANL) - S27-31 (+BS)	W - B	Resistance	Ignition SW OFF	More than 1 MΩ

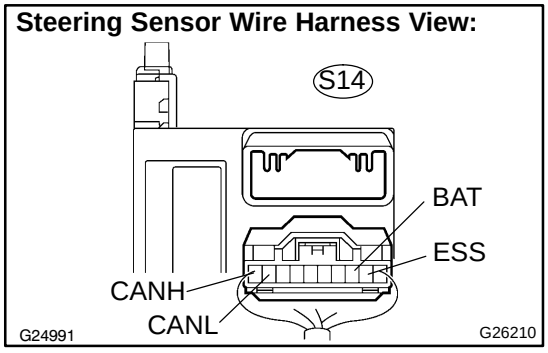


3. STEERING SENSOR

(a) Check steering sensor.
(1) Turn the ignition switch off.
(2) Disconnect the connector (S14) from the steering sensor.
(3) Measure the resistance according to the value(s) in the table below.

Standard:

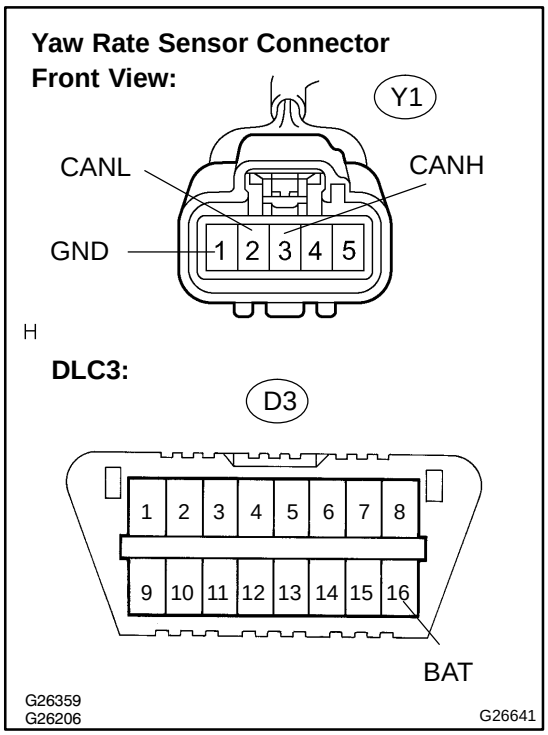
Terminals	Check item	Condition	Specified value
10 (CANH) - 9 (CANL)	Resistance	Ignition SW OFF	108 to 132 Ω
10 (CANH) - 2 (ESS)	Resistance	Ignition SW OFF	More than 3 kΩ
9 (CANL) - 2 (ESS)	Resistance	Ignition SW OFF	More than 3 kΩ
10 (CANH) - 3 (BAT)	Resistance	Ignition SW OFF	More than 1 MΩ
9 (CANL) - 3 (BAT)	Resistance	Ignition SW OFF	More than 1 MΩ



(b) Check the harness side connector (S14) of the steering sensor.
(1) Turn the ignition switch off.
(2) Disconnect the connector (S14) from the steering sensor.
(3) Measure the resistance according to the value(s) in the table below.

Standard:

Terminals	Wiring Color	Check item	Condition	Specified value
S14-10 (CANH) - S14-9 (CANL)	Y - W	Resistance	Ignition SW OFF	108 to 132 Ω
S14-10 (CANH) - S14-2 (ESS)	Y - W-B	Resistance	Ignition SW OFF	More than 3 kΩ
S14-9 (CANL) - S14-2 (ESS)	W - W-B	Resistance	Ignition SW OFF	More than 3 kΩ
S14-10 (CANH) - S14-3 (BAT)	Y - P	Resistance	Ignition SW OFF	More than 1 MΩ
S14-9 (CANL) - S14-3 (BAT)	W - W-R	Resistance	Ignition SW OFF	More than 1 MΩ



4. YAW RATE SENSOR

(a) Check the yaw rate sensor harness side connector (Y1).

(1) Turn the ignition switch off.

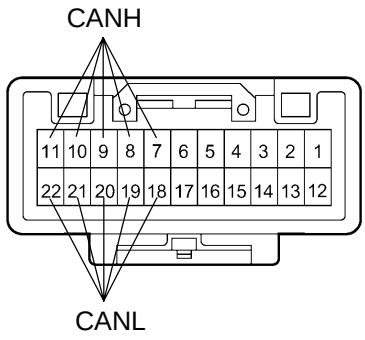
(2) Disconnect the connector (Y1) from the yaw rate sensor.

(3) Measure the resistance according to the value(s) in the table below.

Standard:

Terminals	Wiring Color	Check item	Condition	Specified value
Y1-3 (CANH) - Y1-2 (CANL)	B - W	Resistance	Ignition SW OFF	54 to 69 Ω
Y1-3 (CANH) - Y1-1 (GND)	B - W-B	Resistance	Ignition SW OFF	More than 3 kΩ
Y1-2 (CANL) - Y1-1 (GND)	W - W-B	Resistance	Ignition SW OFF	More than 3 kΩ
Y1-3 (CANH) - D3-16 (BAT)	B - W	Resistance	Ignition SW OFF	More than 1 MΩ
Y1-2 (CANL) - D3-16 (BAT)	W - W	Resistance	Ignition SW OFF	More than 1 MΩ

Junction Connector (J16):



G25476 G26430

5. JUNCTION CONNECTOR (J16)

(a) Check the junction connector.

(1) Turn the ignition switch off.

(2) Disconnect the connector from the junction connector.

(3) Check the junction connector between the terminals below on the junction connector.

Standard:

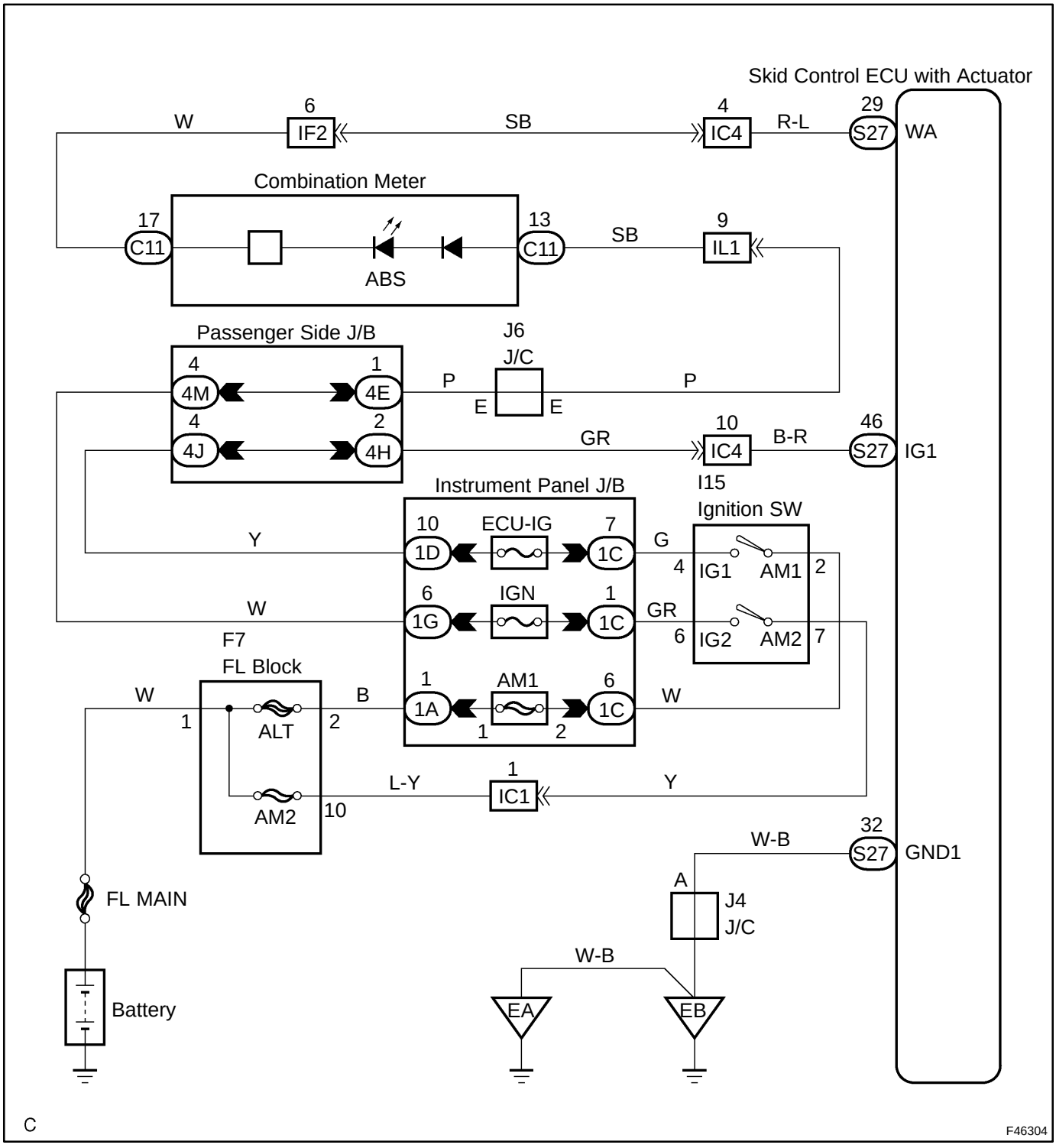
Terminals	Check item	Condition	Specified value
7, 8, 9, 10, 11 (CANH) ⇔ 18, 19, 20, 21, 22 (CANL)	Resistance	Ignition SW OFF	More than 3 kΩ
7, 8, 9, 10, 11 (CANH) ⇔ Body ground	Resistance	Ignition SW OFF	More than 3 kΩ
18, 19, 20, 21, 22 (CANL) ⇔ Body ground	Resistance	Ignition SW OFF	More than 3 kΩ
7, 8, 9, 10, 11 (CANH) ⇔ +B	Resistance	Ignition SW OFF	More than 3 kΩ
18, 19, 20, 21, 22 (CANL) ⇔ +B	Resistance	Ignition SW OFF	More than 3 kΩ
7 (CANH) ⇔ 11 (CANH)	Resistance	Ignition SW OFF	Less than 1 Ω
7 (CANH) ⇔ 10 (CANH)	Resistance	Ignition SW OFF	Less than 1 Ω
7 (CANH) ⇔ 9 (CANH)	Resistance	Ignition SW OFF	Less than 1 Ω
7 (CANH) ⇔ 8 (CANH)	Resistance	Ignition SW OFF	Less than 1 Ω
18 (CANL) ⇔ 22 (CANL)	Resistance	Ignition SW OFF	Less than 1 Ω
18 (CANL) ⇔ 21 (CANL)	Resistance	Ignition SW OFF	Less than 1 Ω
18 (CANL) ⇔ 20 (CANL)	Resistance	Ignition SW OFF	Less than 1 Ω
18 (CANL) ⇔ 19 (CANL)	Resistance	Ignition SW OFF	Less than 1 Ω

ABS WARNING LIGHT CIRCUIT (REMAINS ON)

CIRCUIT DESCRIPTION

During DTC read by SST (CHECK WIRE), if the ABS warning light remains on, troubleshoot by following this inspection flow.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK DTC

(a) Is DTC output for ABS?
Standard:

DTC is not output	A
DTC is output	B

B → **REPAIR CIRCUIT INDICATED BY OUTPUT CODE**

A

2	INSPECT CHECK IF SKID CONTROL ECU CONNECTOR IS SECURELY CONNECTED

NG → **CONNECT CONNECTOR TO ECU**

OK

3	INSPECT BATTERY

(a) Check the battery voltage.
Standard:

Tester Connection	Specified Condition
Battery terminal ((+) - (-))	11 to 14 V

NG → **INSPECT CHARGING SYSTEM**

OK

4	INSPECT SKID CONTROL ECU TERMINAL VOLTAGE(IG1 TERMINAL)

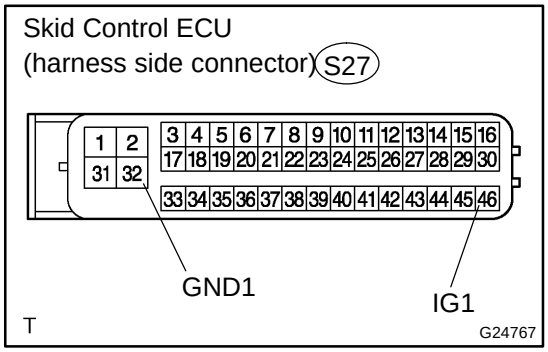
WHEN USING HAND-HELD TESTER:

(a) Connect the hand-held tester to the DLC3.
(b) Start the engine.
(c) Select the DATA LIST mode on the hand-held tester.
(d) Read the voltage condition output from the ECU displayed on the hand-held tester.

Item	Measurement Item / Range (Display)	Normal Condition
IG VOLTAGE	ECU power supply voltage / TOO LOW / NORMAL	NORMAL: 9.5 V or over TOO LOW: Below 9.5 V

OK:

"Normal" is displayed.



WHEN NOT USING HAND-HELD TESTER:

(a) Disconnect the skid control ECU connector.
(b) Turn the ignition switch ON position.
(c) Measure the voltage according to the value(s) in the table below.

Standard:

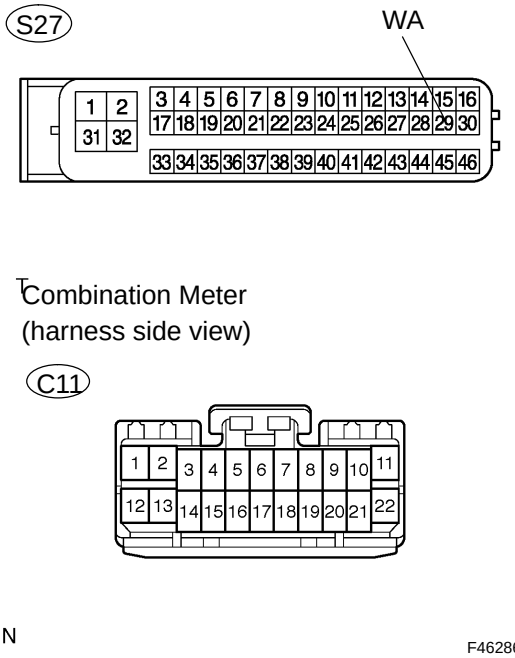
Tester Connection	Specified Condition
S27-46 (IG1) - S27-32 (GND1)	11 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

5 CHECK HARNESS AND CONNECTOR(SKID CONTROL ECU - COMBINATION METER)

Skid Control ECU Front View



(a) Disconnect the skid control ECU connector and combination meter connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition
C11-17 - S27-29 (WA)	Below 1 Ω

(c) Measure the resistance according to the value(s) in the table below.

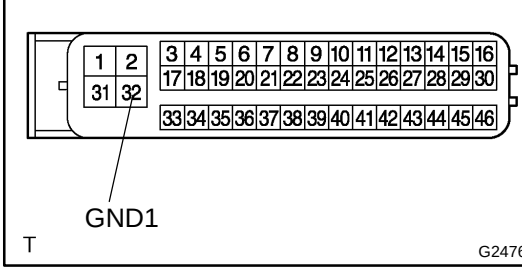
Standard:

Tester Connection	Specified Condition
S27-29 (WA) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

6 CHECK HARNESS AND CONNECTOR(SKID CONTROL ECU - BODY GROUND)



(a) Disconnect the skid control ECU connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition
S27-32 (GND1) - Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

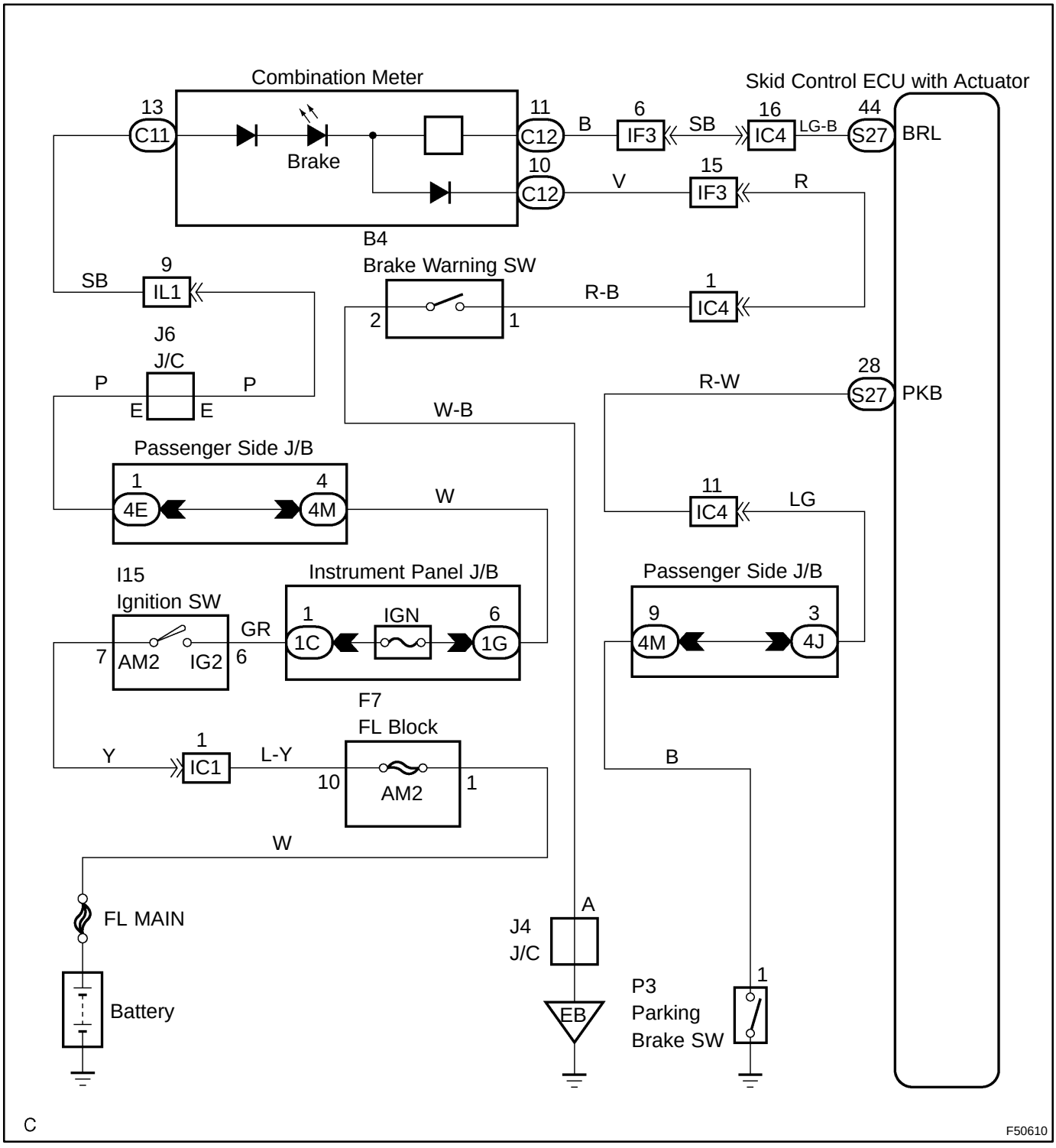
REPLACE ABS & TRACTION ACTUATOR ASSY (SEE PAGE 32-37)

BRAKE WARNING LIGHT CIRCUIT

CIRCUIT DESCRIPTION

The BRAKE warning light comes on when the brake fluid is insufficient, the parking brake is applied or the EBD is defective.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

When releasing the parking brake, set the chocks to hold the vehicle for safety.

1	CHECK BRAKE FLUID

(a) Release the parking brake pedal.

(b) Check that the brake fluid level is proper.

NG → ADD BRAKE FLUID

OK

2	CHECK DTC FOR ABS

(a) Are the DTC recorded? (see page 05-765)

NO → Go to step 3

YES

REPAIR CIRCUIT INDICATED BY OUTPUT CODE

3	INSPECT BRAKE WARNING LIGHT

WHEN USING HAND-HELD TESTER:

(a) Connect the hand-held tester to the DLC3.

(b) Start the engine.

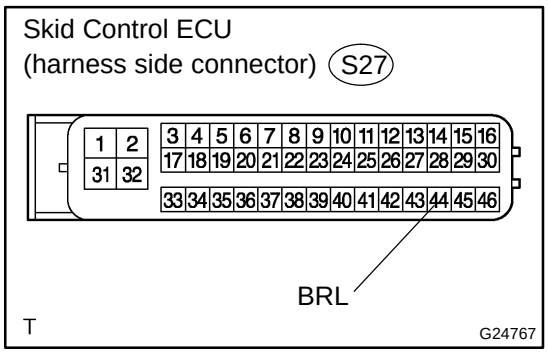
(c) Select the item "BRAKE WARN LIGHT" in the ACTIVE TEST and operate the BRAKE warning light on the hand-held tester.

Item	Vehicle Condition / Test Details	Diagnostic Note
BRAKE WRN LIGHT	Turns BRAKE warning light ON / OFF	Observe combination meter

(d) Check that "ON" and "OFF" of the BRAKE warning light are indicated on the combination meter when using the hand-held tester.

OK:

Turn the BRAKE warning light on or off in accordance with the hand-held tester.



WHEN NOT USING HAND-HELD TESTER:

(a) Turn the ignition switch off and disconnect the connector from the skid control ECU.

(b) Ground terminal BRL of the skid control ECU.

(c) Turn the ignition switch to the ON position.

(d) Check that the brake warning light.

OK:

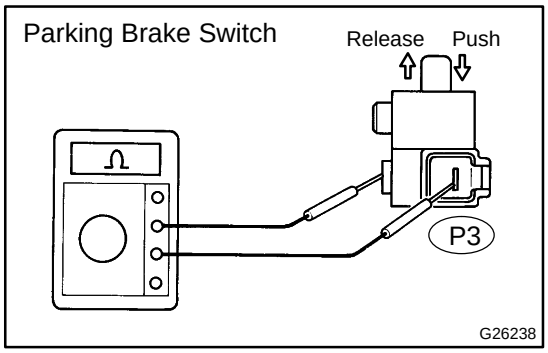
Turn the light on or off in accordance with the connection of terminal BRL and body ground.

NG → Go to step 4

OK

REPLACE ABS & TRACTION ACTUATOR ASSY (SEE PAGE 32-37)

4 INSPECT PARKING BRAKE SWITCH ASSY



(a) Remove the parking brake switch connector.
(b) Measure the resistance according to the value(s) in the table below.

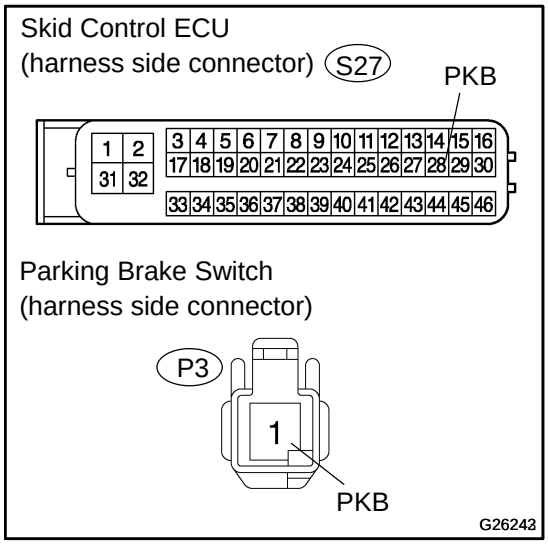
Standard:

Tester Connection	Switch Condition	Specified Condition
P3-1 - Ground part	Released	Below 1 Ω
P3-1 - Ground part	Pushed in	10 kΩ or higher

NG → **REPLACE PARKING BRAKE SWITCH ASSY**

OK

5 CHECK HARNESS OR CONNECTOR(SKID CONTROL ECU - PARKING BRAKE SWITCH)



(a) Disconnect the skid control ECU connector and the parking brake switch connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition
S27-28 (PKB) - P3-1 (PKB)	Below 1 Ω

(c) Measure the resistance according to the value(s) in the table below.

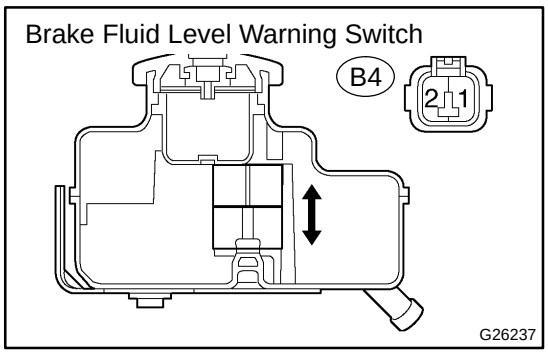
Standard:

Tester Connection	Specified Condition
S27-28 (PKB) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

6 INSPECT BRAKE FLUID LEVEL WARNING SWITCH



(a) Remove the reservoir tank cap and strainer.
(b) Disconnect the brake fluid level warning switch connector.
(c) Measure the resistance according to the value(s) in the table below.

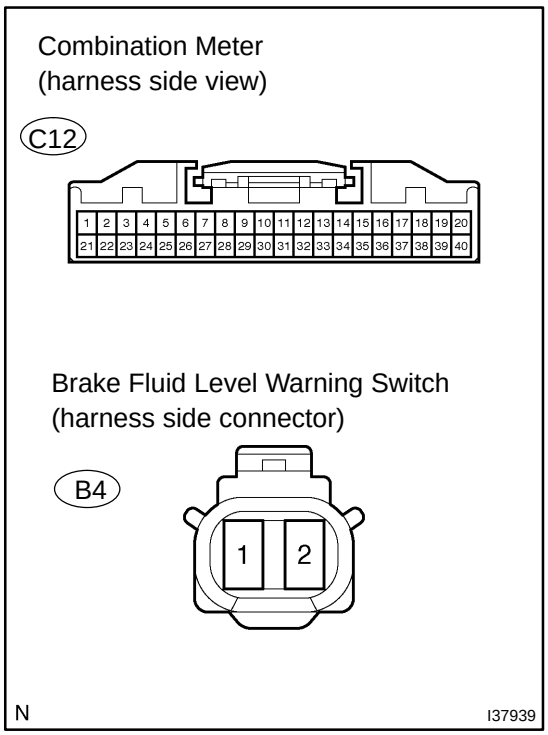
Standard:

Tester Connection	Switch Condition	Specified Condition
(B4-1) - (B4-2)	Float UP	10 kΩ or higher
(B4-1) - (B4-2)	Float DOWN	Below 1 Ω

NG → **REPLACE BRAKE FLUID LEVEL WARNING SWITCH**

OK

7	**CHECK HARNESS OR CONNECTOR(BRAKE FLUID LEVEL WARNING SWITCH - COMBINATION METER)**



(a) Disconnect the combination meter connector and the brake fluid level warning switch connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition
(C12-10) - (B4-1)	Below 1 Ω

(c) Measure the resistance according to the value(s) in the table below.

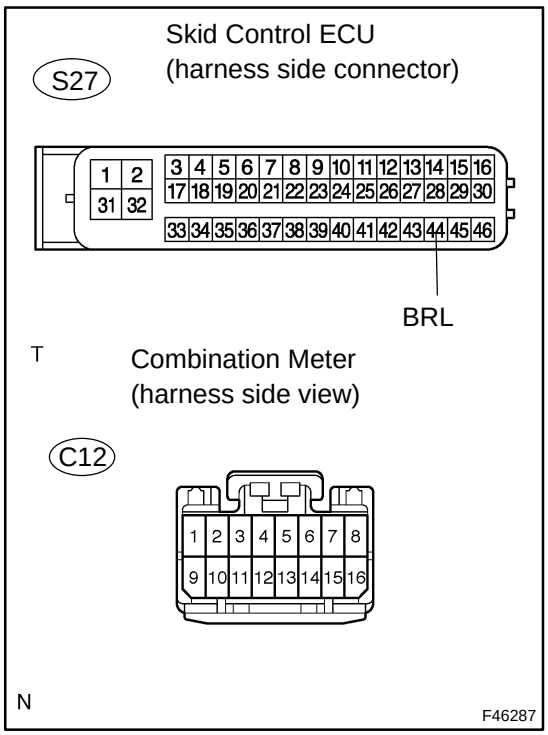
Standard:

Tester Connection	Specified Condition
(C12-10) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

8	CHECK HARNESS OR CONNECTOR(SKID CONTROL ECU - COMBINATION METER)



(a) Disconnect the skid control ECU connector and combination meter connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition
S27-44 (BRL) - (C12-3)	Below 1 Ω

(c) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition
S27-44 (BRL) - Body ground	10 kΩ or higher

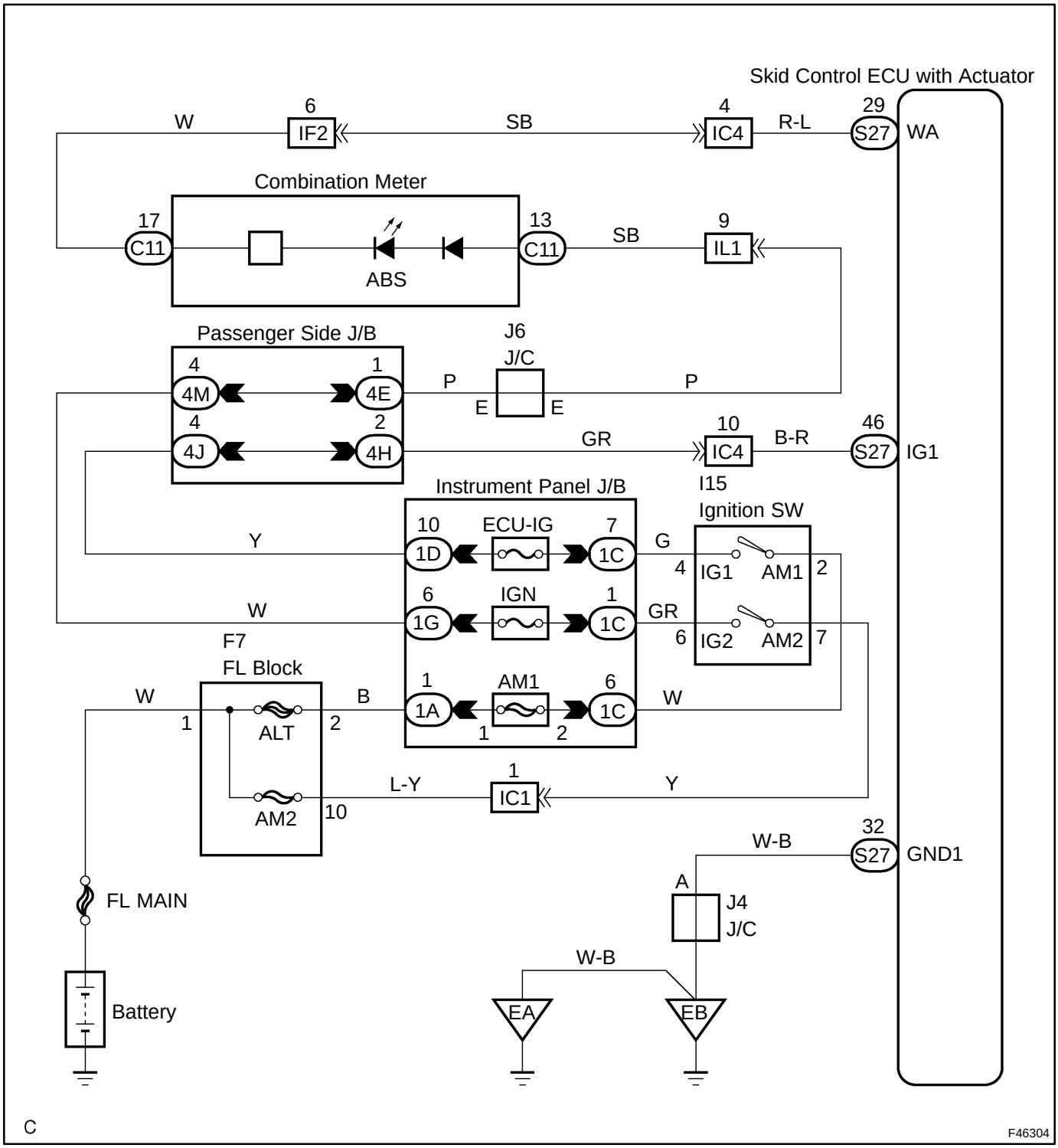
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPAIR OR REPLACE COMBINATION METER ASSY (SEE PAGE 32-37)

ABS WARNING LIGHT CIRCUIT (DOES NOT LIGHT UP)

WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT ABS WARNING LIGHT

WHEN USING HAND-HELD TESTER:

(a) Connect the hand-held tester to the DLC3 and start the engine.

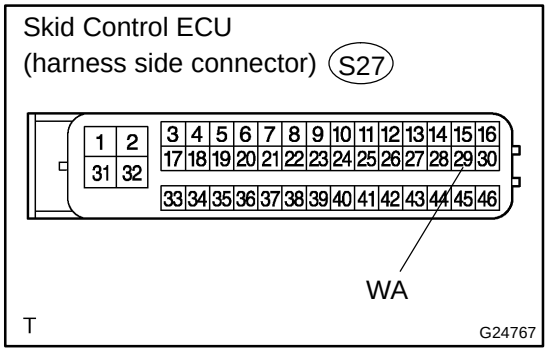
(b) Select the item "ABS WARN LIGHT" in the ACTIVE TEST and operate the ABS warning light on the hand-held tester.

Item	Vehicle Condition / Test Details	Diagnostic Note
ABS WARN LIGHT	Turns ABS warning light ON / OFF	Observe combination meter

(c) Check that "ON" and "OFF" of the ABS warning light can be shown on the combination meter by the hand-held tester.

OK:

Turn the ABS warning light ON or OFF in accordance with the hand-held tester.



WHEN NOT USING HAND-HELD TESTER:

(a) Turn the ignition switch off and disconnect the connector from the skid control ECU.

(b) Ground terminal WA of the skid control ECU.

(c) Turn the ignition switch to the ON position.

(d) Check that the ABS warning light.

OK:

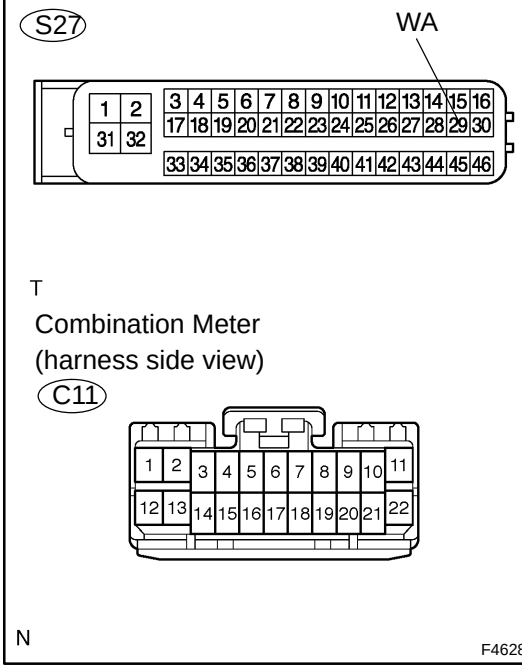
Turn the light ON or OFF in accordance with the connecting condition of terminal WA and body ground.

NG → **CHECK AND REPAIR ABS WARNING LIGHT CIRCUIT**

OK

2	CHECK HARNESS AND CONNECTOR(SKID CONTROL ECU - COMBINATION METER)

Skid Control ECU Front View



(a) Disconnect the skid control ECU connector and combination meter connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition
C11-17 - S27-29 (WA)	Below 1 Ω

(c) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition
S27-29 (WA) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE ABS & TRACTION ACTUATOR ASSY (SEE PAGE 32-37)

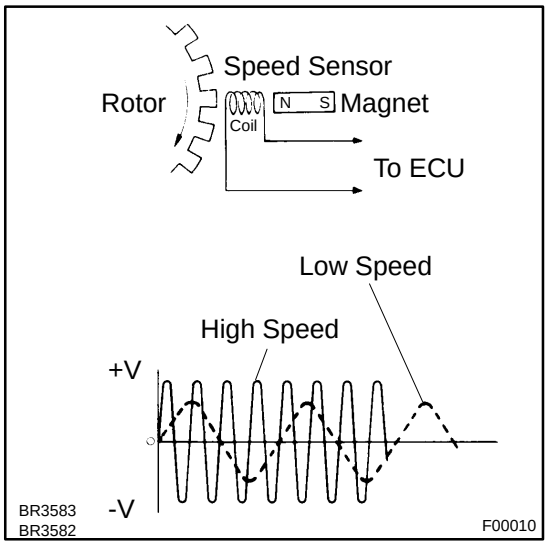
DTC	C0200/31	RIGHT FRONT SPEED SENSOR

DTC	C0205/32	LEFT FRONT SPEED SENSOR

DTC	C1235/35	FOREIGN MATTER IS ATTACHED ON TIP OF RIGHT FRONT SENSOR

DTC	C1236/36	FOREIGN MATTER IS ATTACHED ON TIP OF LEFT FRONT SENSOR

CIRCUIT DESCRIPTION



The speed sensor detects wheel speed and sends the appropriate signals to the ECU. These signals are used to control the ABS control system. The front and rear rotors have 48 serrations each.

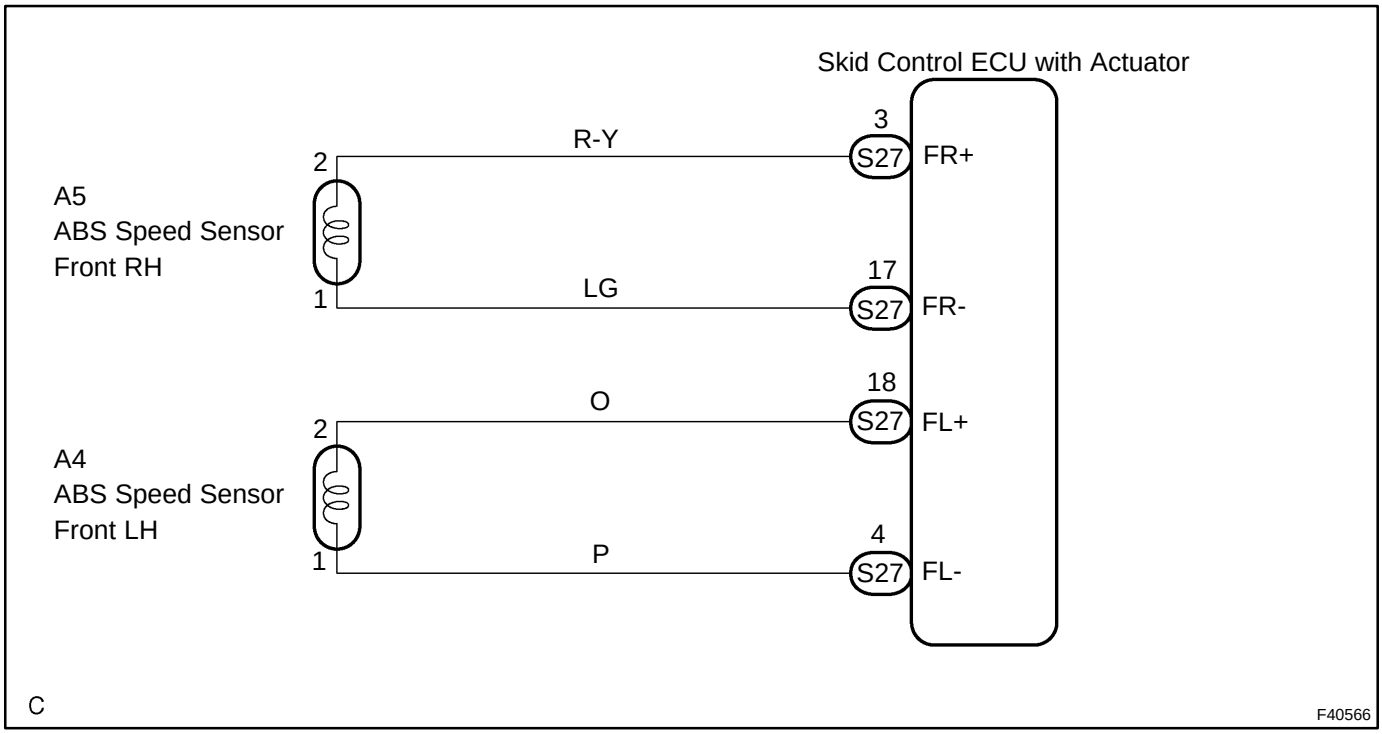
When the rotors rotate, the magnetic field emitted by the permanent magnet in the speed sensor generates AC voltage. Since the frequency of this AC voltage changes in direct proportion to the speed of the rotor, the frequency is used by the ECU to detect the speed of each wheel.

DTC No.	DTC Detecting Condition	Trouble Area
C0200/31 C0205/32	(1) All the following conditions continues for at least 1 second. ・Vehicle speed is more than 6 mph (10 km/h). ・Open or short in vehicle speed sensor signal circuit of faulty wheel continues for 1 second or more. (2) Momentary interruption of the sensor signal of faulty wheel has occurred 7 times or more. (3) Sensor signal circuit is open for 0.5 seconds.	・Right front and left front speed sensor ・Each speed sensor circuit ・Sensor rotor ・Sensor installation
C1235/35 C1236/36	All the following conditions for at least 5 seconds. ・Vehicle speed is more than 12 mph (20 km/h). ・Vehicle speed sensor signal receives.	・Right front and left front speed sensor ・Each speed sensor ・Sensor installation

HINT:

- DTC C0200/31 and C1235/35 are for the right front speed sensor.
- DTC C0205/32 and C1236/36 are for the left front speed sensor.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Start the inspection from step 1 when using the hand-held tester and start from step 3 when not using the hand-held tester.

1	READ VALUE OF HAND-HELD TESTER(FRONT SPEED SENSOR)

(a) Connect the hand-held tester to the DLC3.
(b) Start the engine.
(c) Select the DATA LIST mode on the hand-held tester.
(d) Check that there is no difference between the speed value output from the speed sensor displayed on the hand-held tester and the speed value displayed on the speedometer when driving the vehicle.

Item	Measurement Item / Range (Display)	Normal Condition
WHEEL SPD FR	Wheel speed sensor (FR) reading / min.: 0 km/h (0 MPH, max.: 326 km/h (202 MPH)	Actual wheel speed
WHEEL SPD FL	Wheel speed sensor (FL) reading / min.: 0 km/h (0 MPH, max.: 326 km/h (202 MPH)	Actual wheel speed

OK:

There is almost no difference from the displayed speed value.

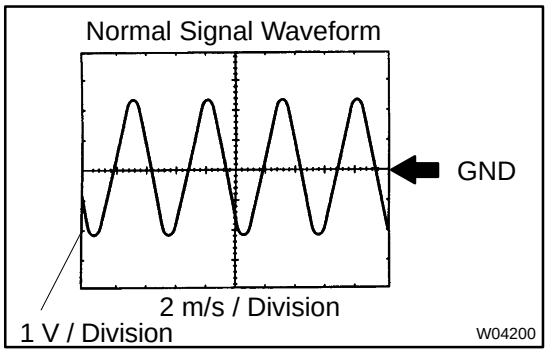
HINT:

There is tolerance of ± 10 % in the speedometer indication.

NG → **Go to step 3**

OK

2	INSPECT SPEED SENSOR AND SENSOR ROTOR SERRATIONS



INSPECTION USING OSCILLOSCOPE

(a) Connect the oscilloscope to terminal FR+ - FR- or FL+ - FL- of the skid control ECU.

(b) Drive the vehicle at about 19 mph (30 km/h), and check the signal waveform.

OK:

A waveform as shown in a figure should be output.

HINT:

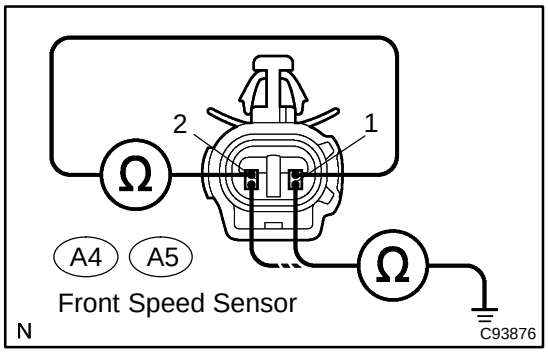
* As the vehicle speed (wheel revolution speed) increases, a cycle of the waveform narrows and the fluctuation in the output voltage becomes greater.
* When noise is identified in the waveform on the oscilloscope, error signals are generated due to the speed sensor rotor's scratches, looseness or foreign matter attached to it.

NG	Go to step 6

OK

REPLACE ABS & TRACTION ACTUATOR ASSY (SEE PAGE 32-37)

3 INSPECT FRONT SPEED SENSOR



(a) Make sure that there is no looseness at the connectors' locking part and connecting part of connector.

(b) Disconnect the speed sensor connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard:

LH:

Tester Connection	Specified Condition
A4-1 (FL-) - A4-2 (FL+)	0.6 to 2.5 kΩ

RH:

Tester Connection	Specified Condition
A5-1 (FR-) - A5-2 (FR+)	0.6 to 2.5 kΩ

(d) Measure the resistance according to the value(s) in the table below.

Standard:

LH:

Tester Connection	Specified Condition
A4-1 (FL-) - Body ground	10 kΩ or higher
A4-2 (FL+) - Body ground	10 kΩ or higher

RH:

Tester Connection	Specified Condition
A5-1 (FR-) - Body ground	10 kΩ or higher
A5-2 (FR+) - Body ground	10 kΩ or higher

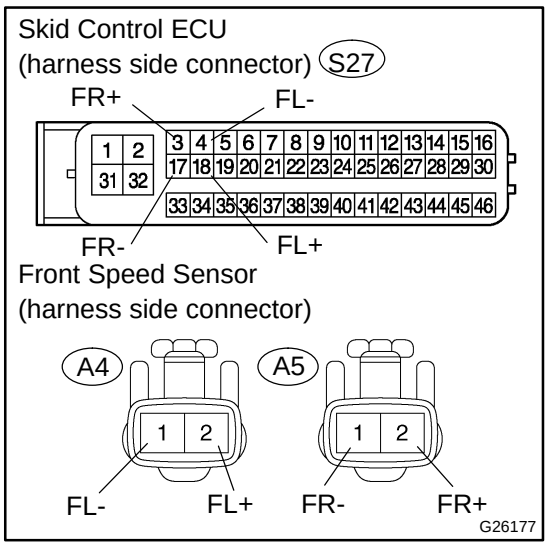
NOTICE:

Check the speed sensor signal after replacement (see page 05-765).

NG → **REPLACE FRONT SPEED SENSOR (SEE PAGE 32-40)**

OK

4	**CHECK HARNESS AND CONNECTOR(FRONT SPEED SENSOR - SKID CONTROL ECU)**



(a) Disconnect the skid control ECU connector and the front speed sensor connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

LH:

Tester Connection	Specified Condition
S27-18 (FL+) - A4-2 (FL+)	Below 1 Ω
S27-4 (FL-) - A4-1 (FL-)	Below 1 Ω

RH:

Tester Connection	Specified Condition
S27-3 (FR+) - A5-2 (FR+)	Below 1 Ω
S27-17 (FR-) - A5-1 (FR-)	Below 1 Ω

(c) Measure the resistance according to the value(s) in the table below.

Standard:

LH:

Tester Connection	Specified Condition
S27-18 (FL+) - Body ground	10 kΩ or higher
S27-4 (FL-) - Body ground	10 kΩ or higher

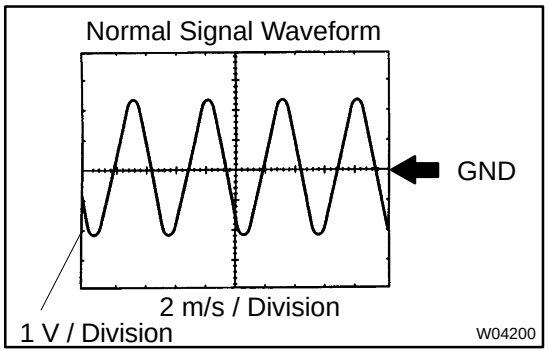
RH:

Tester Connection	Specified Condition
S27-3 (FR+) - Body ground	10 kΩ or higher
S27-17 (FR-) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

5 INSPECT SPEED SENSOR AND SENSOR ROTOR SERRATIONS



INSPECTION USING OSCILLOSCOPE

(a) Connect the oscilloscope to terminal FR+ - FR- or FL+ - FL- of the skid control ECU.

(b) Drive the vehicle at about 19 mph (30 km/h), and check the signal waveform.

OK:

A waveform as shown in a figure should be output.

HINT:

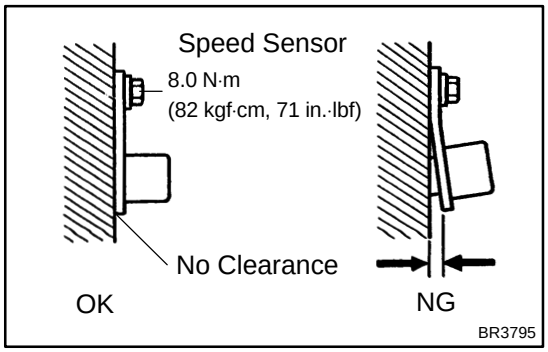
- As the vehicle speed (wheel revolution speed) increases, a cycle of the waveform narrows and the fluctuation in the output voltage becomes greater.
- When noise is identified in the waveform on the oscilloscope, error signals are generated due to the speed sensor rotor's scratches, looseness or foreign matter attached to it.

NG	Go to step 6

OK

REPLACE ABS & TRACTION ACTUATOR ASSY (SEE PAGE 32-37)

6 INSPECT FRONT SPEED SENSOR INSTALLATION



(a) Check the speed sensor installation.

OK:

•The installation bolt is tightened properly.

Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)

•There is no clearance between the sensor and the front steering knuckle.

NOTICE:

Check the speed sensor signal after the replacement (see page 05-765).

NG	REPLACE FRONT SPEED SENSOR (SEE PAGE 32-40)

OK

7	INSPECT SPEED SENSOR TIP

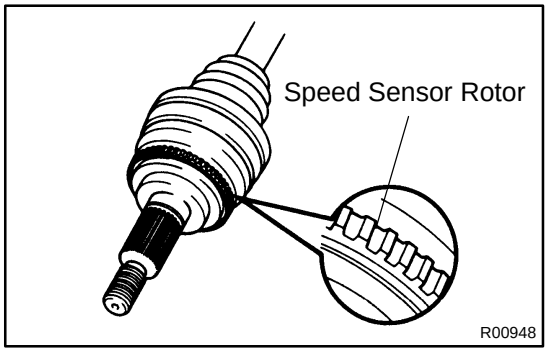
(a) Remove the front speed sensor (see page 32-40).
(b) Check the sensor tip.
OK:
No scratches or foreign matter on the sensor tip.

NOTICE:
Check the speed sensor signal after the replacement (see page 05-765).

NG → **CLEAN OR REPAIR SPEED SENSOR**

OK

8	INSPECT SPEED SENSOR ROTOR



(a) Remove the front speed sensor rotor.
(b) Check the sensor rotor serrations.
OK:
No scratches, missing teeth or foreign matter on the rotors.

HINT:
If there is foreign matter in the rotor, remove it and check the output waveform after reassembly.

NOTICE:
Check the speed sensor signal after the replacement (see page 05-765).

NG → **CLEAN OR REPAIR SPEED SENSOR ROTOR**

OK

REPLACE ABS & TRACTION ACTUATOR ASSY (SEE PAGE 32-37)

DTC	C0210/33	RIGHT REAR SPEED SENSOR

DTC	C0215/34	LEFT REAR SPEED SENSOR

DTC	C1238/38	FOREIGN MATTER IS ATTACHED ON TIP OF RIGHT REAR SENSOR

DTC	C1239/39	FOREIGN MATTER IS ATTACHED ON TIP OF LEFT REAR SENSOR

CIRCUIT DESCRIPTION

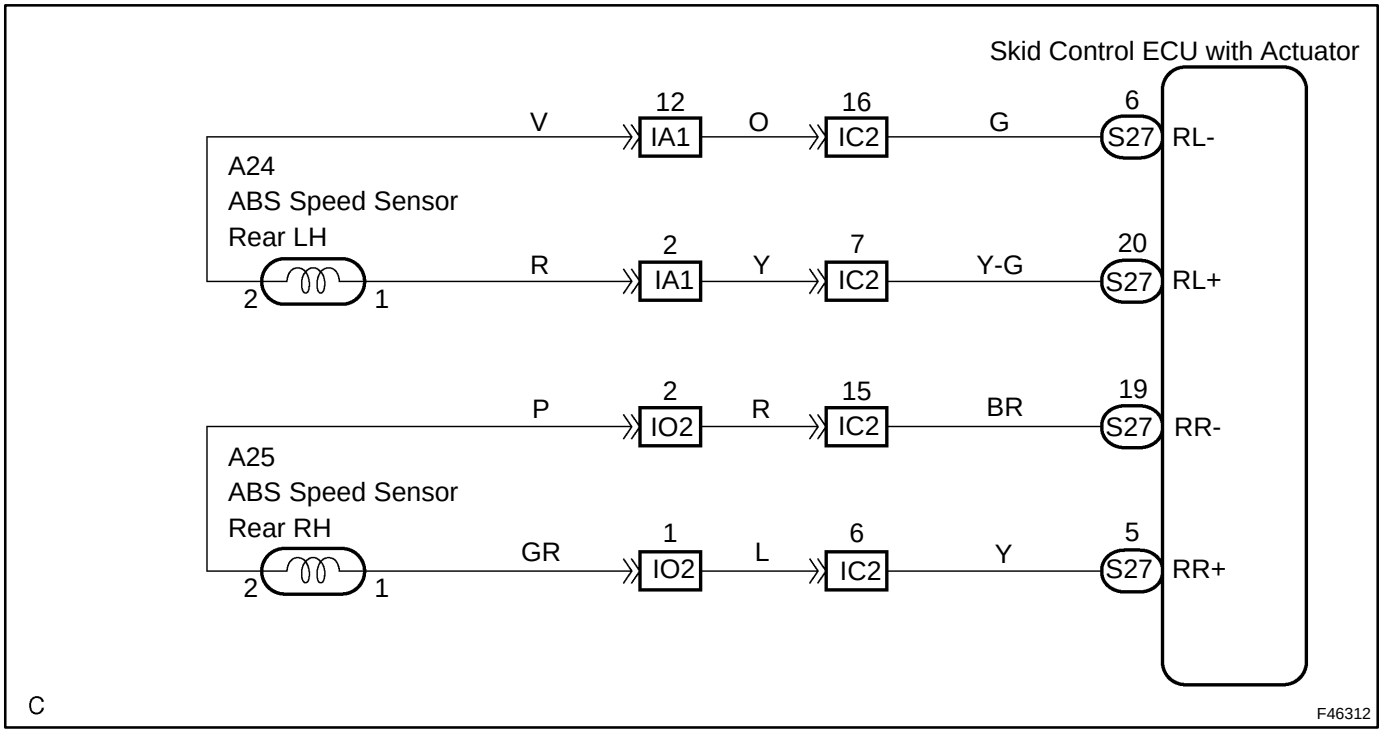
Refer to DTC C0200/31, C0205/32, C1235/35, C1236/36 on page 05-788 .

DTC No.	DTC Detecting Condition	Trouble Area
C0210/33 C0215/34	(1) All the following conditions continues for at least 1 second. ・Vehicle speed is more than 6 mph (10 km/h). ・Open or short in vehicle speed sensor signal circuit of faulty wheel continues for 1 second or more. (2) Momentary interruption of the sensor signal of faulty wheel has occurred 7 times or more. (3) Sensor signal circuit is open for 0.5 seconds.	・Right rear and left rear speed sensor ・Each speed sensor circuit ・Sensor rotor ・Sensor installation
C1238/38 C1239/39	All the following conditions for at least 5 seconds. ・Vehicle speed is more than 12 mph (20 km/h). ・Vehicle speed sensor signal receives.	・Right rear and left rear speed sensor ・Each speed sensor ・Sensor installation

HINT:

- DTC C0210/33 and C1238/38 are for the right rear speed sensor.
- DTC C0215/34 and C1239/39 are for the left rear speed sensor.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Start the inspection from step 1 when using the hand-held tester and start from step 3 when not using the hand-held tester.

1 READ VALUE OF HAND-HELD TESTER(REAR SPEED SENSOR)

(a) Connect the hand-held tester to the DLC3.
(b) Start the engine.
(c) Select the DATA LIST mode on the hand-held tester.
(d) Check that there is no difference between the speed value output from the speed sensor displayed by the hand-held tester and the speed value displayed on the speedometer when driving the vehicle.

Item	Measurement Item / Range (Display)	Normal Condition
WHEEL SPD RL	Wheel speed sensor (RL) reading / min.: 0 km/h (0 MPH, max.: 326 km/h (202 MPH)	Actual wheel speed
WHEEL SPD RR	Wheel speed sensor (RR) reading / min.: 0 km/h (0 MPH, max.: 326 km/h (202 MPH)	Actual wheel speed

OK:

There is almost no difference in the displayed speed value.

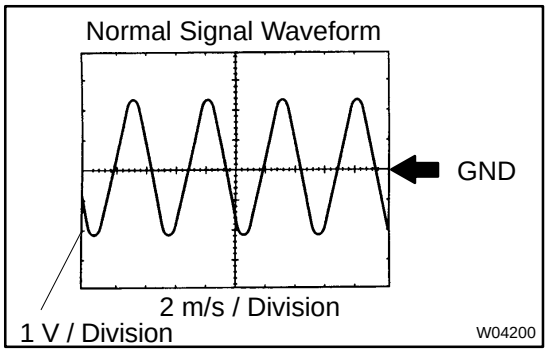
HINT:

There is tolerance of ± 10 % in the speedometer indication.

NG → **Go to step 3**

OK

2 INSPECT SPEED SENSOR AND SENSOR ROTOR SERRATIONS



INSPECTION USING OSCILLOSCOPE

(a) Connect the oscilloscope to terminals RR+ - RR- or RL+ - RL- of the skid control ECU.
(b) Drive the vehicle at approximately 19 mph (30 km/h), and check the signal waveform.

OK:

A waveform as shown in a figure should be output.

HINT:

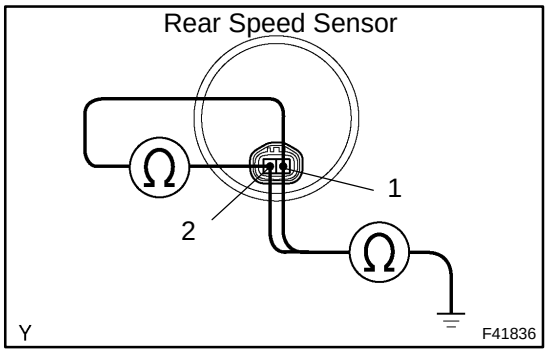
- As the vehicle speed (wheel revolution speed) increases, a cycle of the waveform narrows and the fluctuation in the output voltage becomes greater.
- When noise is identified in the waveform on the oscilloscope, error signals are generated due to the speed sensor rotor's scratches, looseness or foreign matter attached to it.

NG → **Go to step 6**

OK

REPLACE REAR SPEED SENSOR (SEE PAGE 32-37)

3 INSPECT REAR SPEED SENSOR



2WD:

(a) Disconnect the skid control sensor connector.

(b) Measure the resistance according to the value(s) in the table below.

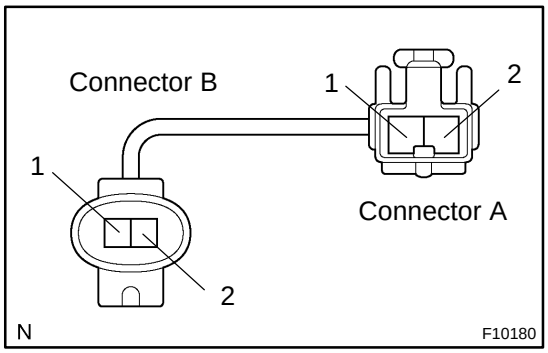
Standard:

Tester Connection	Specified Condition
1 - 2	0.9 to 2.1 kΩ

(c) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition
1 - Body ground	10 kΩ or higher
2 - Body ground	10 kΩ or higher



2WD:

Skid control sensor sub-wire harness:

(a) Remove the seat cushion and seatback.

(b) Make sure that there is no looseness at the connector's locking part and connecting part of the connector.

(c) Measure the resistance between terminal 1 of connector A and terminal 2 of connector B.

(d) Measure the resistance between terminal 2 of connector A and terminal 1 of connector B.

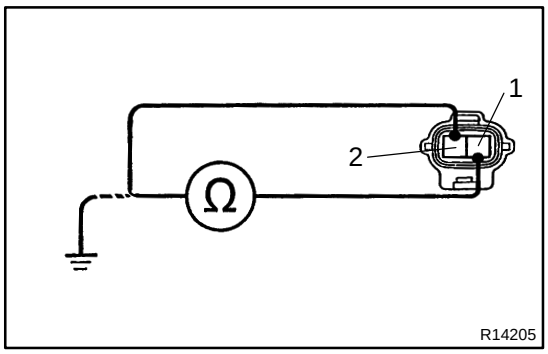
Standard:

Tester Connection	Specified Condition
A-1 - B-1	1 Ω or less
A-2 - B-2	1 Ω or less

(e) Measure resistance between terminals 1 and 2 of speed sensor connector A and body ground.

Standard:

Tester Connection	Specified Condition
1 - Body ground	10 kΩ or higher
2 - Body ground	10 kΩ or higher



4WD:

(a) Disconnect the rear speed sensor connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition
1 - 2	0.9 to 1.3 kΩ at 25 ℃

(c) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition
1 - Body ground	10 kΩ or higher
2 - Body ground	10 kΩ or higher

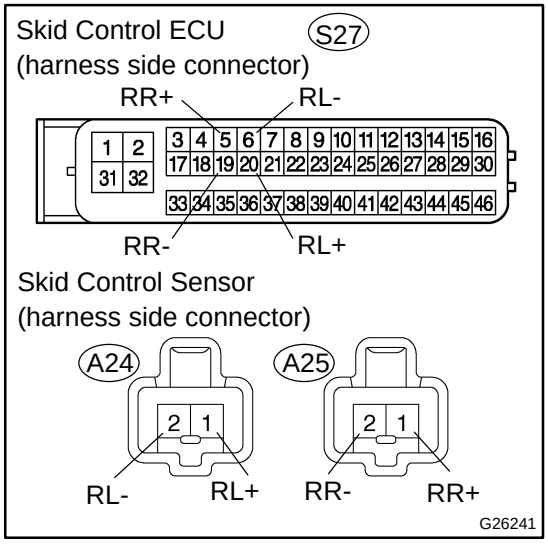
NOTICE:

Check the speed sensor signal after replacement (see page 05-765).

NG → **REPLACE REAR SPEED SENSOR (SEE PAGE 32-37)**

OK

4 CHECK HARNESS AND CONNECTOR(REAR SPEED SENSOR - SKID CONTROL ECU)



(a) Disconnect the skid control ECU connector and the skid control sensor connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

LH:

Tester Connection	Specified Condition
S27-20 (RL+) - A24-1 (RL+)	Below 1 Ω
S27-6 (RL-) - A24-2 (RL-)	Below 1 Ω

RH:

Tester Connection	Specified Condition
S27-5 (RR+) - A25-1 (RR+)	Below 1 Ω
S27-19 (RR-) - A25-2 (RR-)	Below 1 Ω

(c) Measure the resistance according to the value(s) in the table below.

Standard:

LH:

Tester Connection	Specified Condition
S27-20 (RL+) - Body ground	10 kΩ or higher
S27-6 (RL-) - Body ground	10 kΩ or higher

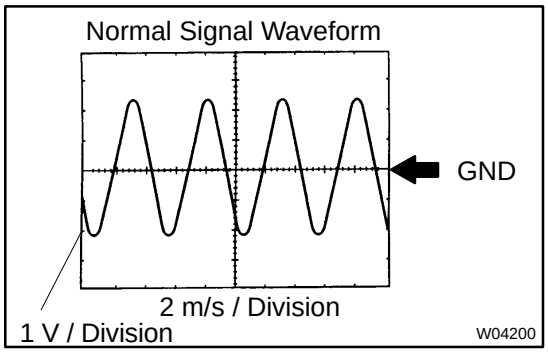
RH:

Tester Connection	Specified Condition
S27-5 (RR+) - Body ground	10 kΩ or higher
S27-19 (RR-) - Body ground	10 kΩ or higher

NG	REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

5	INSPECT SPEED SENSOR AND SENSOR ROTOR SERRATIONS



INSPECTION USING OSCILLOSCOPE

(a) Connect the oscilloscope to terminals RR+ - RR- or RL+ - RL- of the skid control ECU.

(b) Drive the vehicle at approximately 19 mph (30 km/h), and check the signal waveform.

OK:

A waveform as shown in a figure should be output.

HINT:

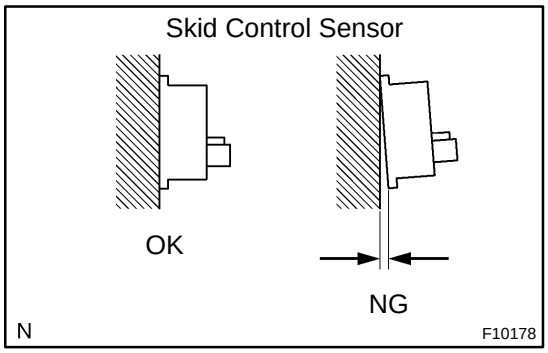
- As the vehicle speed (wheel revolution speed) increases, a cycle of the waveform narrows and the fluctuation in the output voltage becomes greater.
- When noise is identified in the waveform on the oscilloscope, error signals are generated due to the speed sensor rotor's scratches, looseness or foreign matter attached to it.

NG	Go to step 6

OK

REPLACE REAR SPEED SENSOR (SEE PAGE 32-42 (FF) OR 32-44 (4WD))

6	INSPECT REAR SPEED SENSOR INSTALLATION

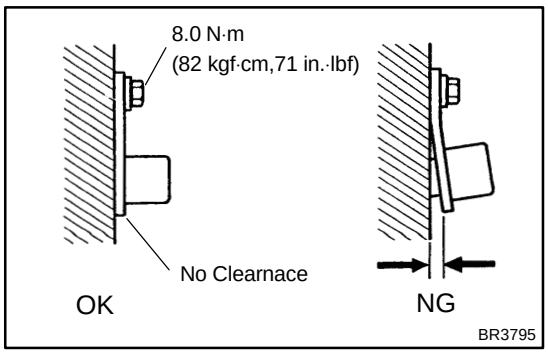


2WD:

(a) Check the sensor installation.

OK:

There is no clearance between the sensor and rear axle carrier.



4WD:

(a) Check the speed sensor installation.

OK:

There is no clearance between the sensor and rear axle carrier.

The installation bolt is tightened properly.

Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)

NOTICE:

Check the speed sensor signal after replacement (see page 05-765).

NG → **REPLACE REAR SPEED SENSOR (SEE PAGE 32-42 (FF) OR 32-44 (4WD))**

OK

7	INSPECT SPEED SENSOR ROTOR AND SENSOR TIP

2WD:

(a) Remove the skid control sensor (see page 32-42).

(b) Check the sensor tip.

OK:

No scratches or foreign matter on the sensor tip.

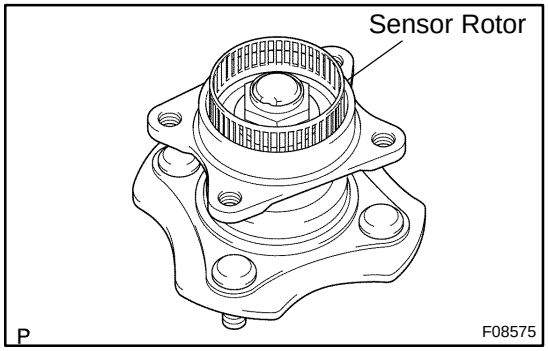
4WD:

(a) Remove the rear speed sensor (See page 32-44).

(b) Check the sensor tip.

OK:

No scratches or foreign matter on the sensor tip.

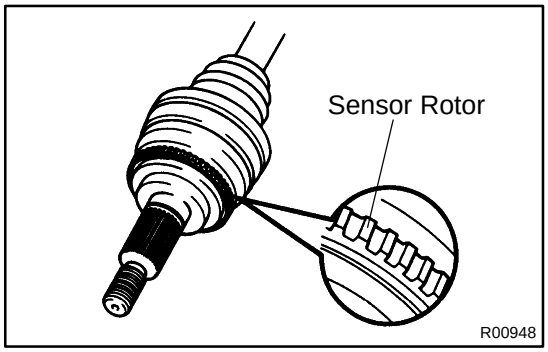


2WD:

(a) Check the sensor rotor serrations.

OK:

No scratches, missing teeth or foreign matter on the rotor.



4WD:

(a) Remove the rear drive shaft (See page 30-45).

(b) Check the sensor rotor serrations.

OK:

No scratches, missing teeth or foreign matter.

HINT:

If foreign matter is attached, remove it and after reassembling, check the output waveform.

NOTICE:

Check the speed sensor signal after the replacement (see page 05-765).

NG → **CLEAN OR REPLACE SPEED SENSOR AND SENSOR ROTOR SERRATIONS**

OK

REPLACE ABS & TRACTION ACTUATOR ASSY (SEE PAGE 32-37)

DTC	C0226/21	SFR SOLENOID CIRCUIT

DTC	C0236/22	SFL SOLENOID CIRCUIT

DTC	C0246/23	SRR SOLENOID CIRCUIT

DTC	C0256/24	SRL SOLENOID CIRCUIT

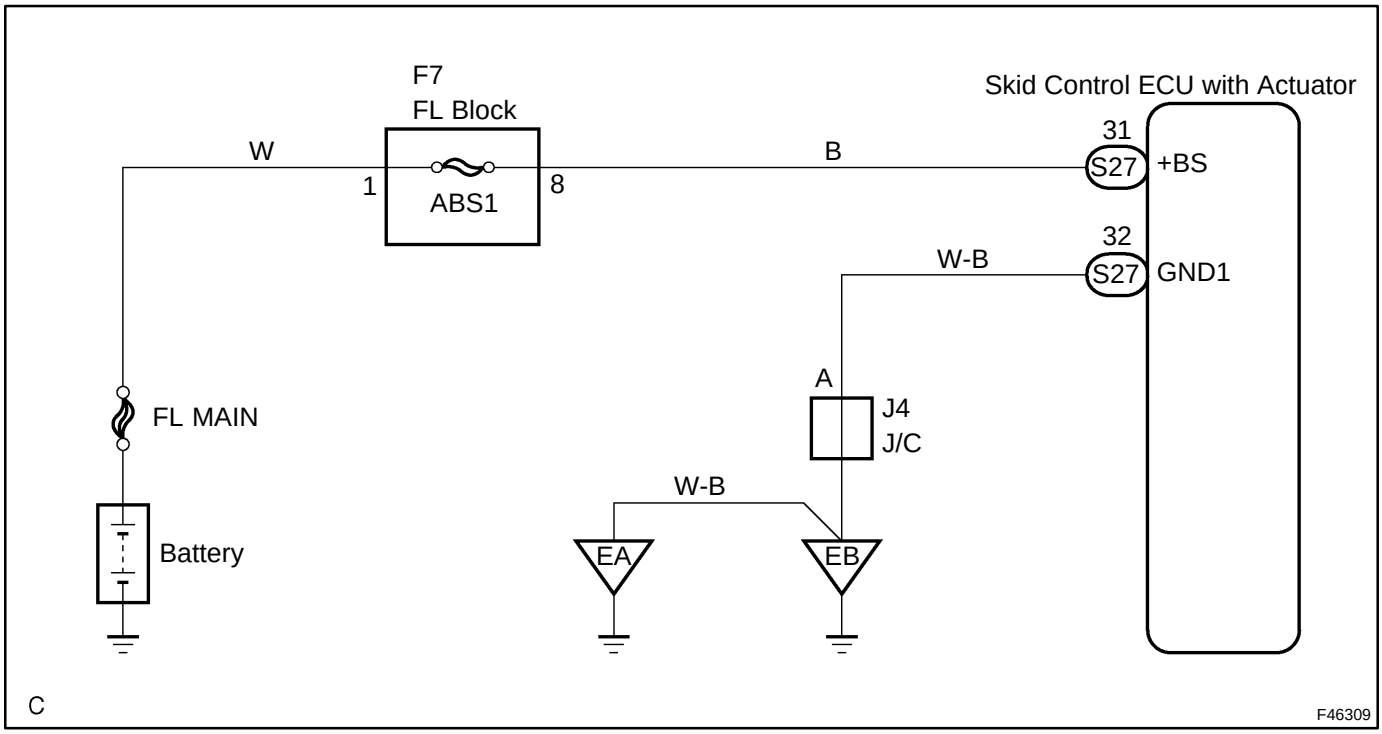
DTC	C1225/25	SMC SOLENOID CIRCUIT

CIRCUIT DESCRIPTION

This solenoid goes on when signals are received from the ECU and controls the pressure acting on the wheel cylinders to control the braking force.

DTC No.	DTC Detecting Condition	Trouble Area
C0226/21	Open or short circuit in front right solenoid circuit (SFRR or SFRH) continues for 0.05 sec. or more.	·ABS & TRAC actuator ·Each solenoid circuit
C0236/22	Open or short circuit in front left solenoid circuit (SFLR or SFLH) continues for 0.05 sec. or more.	·ABS & TRAC actuator ·Each solenoid circuit
C0246/23	Open or short circuit in rear right solenoid circuit (SRRR or SRRH) continues for 0.05 sec. or more.	·ABS & TRAC actuator ·Each solenoid circuit
C0256/24	Open or short circuit in rear left solenoid circuit (SRLR or SRLH) continues for 0.05 sec. or more.	·ABS & TRAC actuator ·Each solenoid circuit
C1225/25	When any of the following (1 to 5) is detected: (1) All the following conditions continues for at least 0.05 seconds. ·When switching solenoid (SM1 or SM2) outputs ON signal. ·Over current. (2) All the following conditions continues for at least 0.05 seconds. ·When switching solenoid (SM1 or SM2) outputs OFF signal. ·Open circuit. (3) All the following conditions continues for at least 0.05 seconds. ·When switching solenoid (SM1 or SM2) outputs OFF signal. ·Output current monitor is more than 0.15 A. (4) All the following conditions continues for at least 0.05 seconds. ·When switching solenoid (SM1 or SM2) outputs ON signal. ·Output current is more than 0.348 A. ·Difference between current monitor and target value exceeds 2, continues for between 0.1 sec. and 0.15 sec. (5) All the following conditions continues for at least 0.2 seconds. ·When switching solenoid (SM1 or SM2) outputs ON signal. ·Output current is more than 0.348 A. 1. More than 2.08 2. Less than 0.48	·ABS & TRAC actuator ·Each solenoid circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

1	RECONFIRM DTC

HINT:
This code is detected when a problem is determined in the brake actuator assy.
The solenoid circuit is in the brake actuator assy.
Therefore, solenoid circuit inspection and solenoid unit inspection cannot be performed. Be sure to check if the DTC code is output before replacing the brake actuator assy.

(a) Clear the DTCs(see page 05-765).
(b) Turn the ignition switch to the ON position.
(c) Are the same DTCs recorded?

NO → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-786).**

YES

REPLACE ABS & TRACTION ACTUATOR ASSY (SEE PAGE 32-37)

DTC	C0273/13	OPEN CIRCUIT IN ABS MOTOR RELAY CIRCUIT

DTC	C0274/14	SHORT CIRCUIT IN ABS MOTOR RELAY CIRCUIT

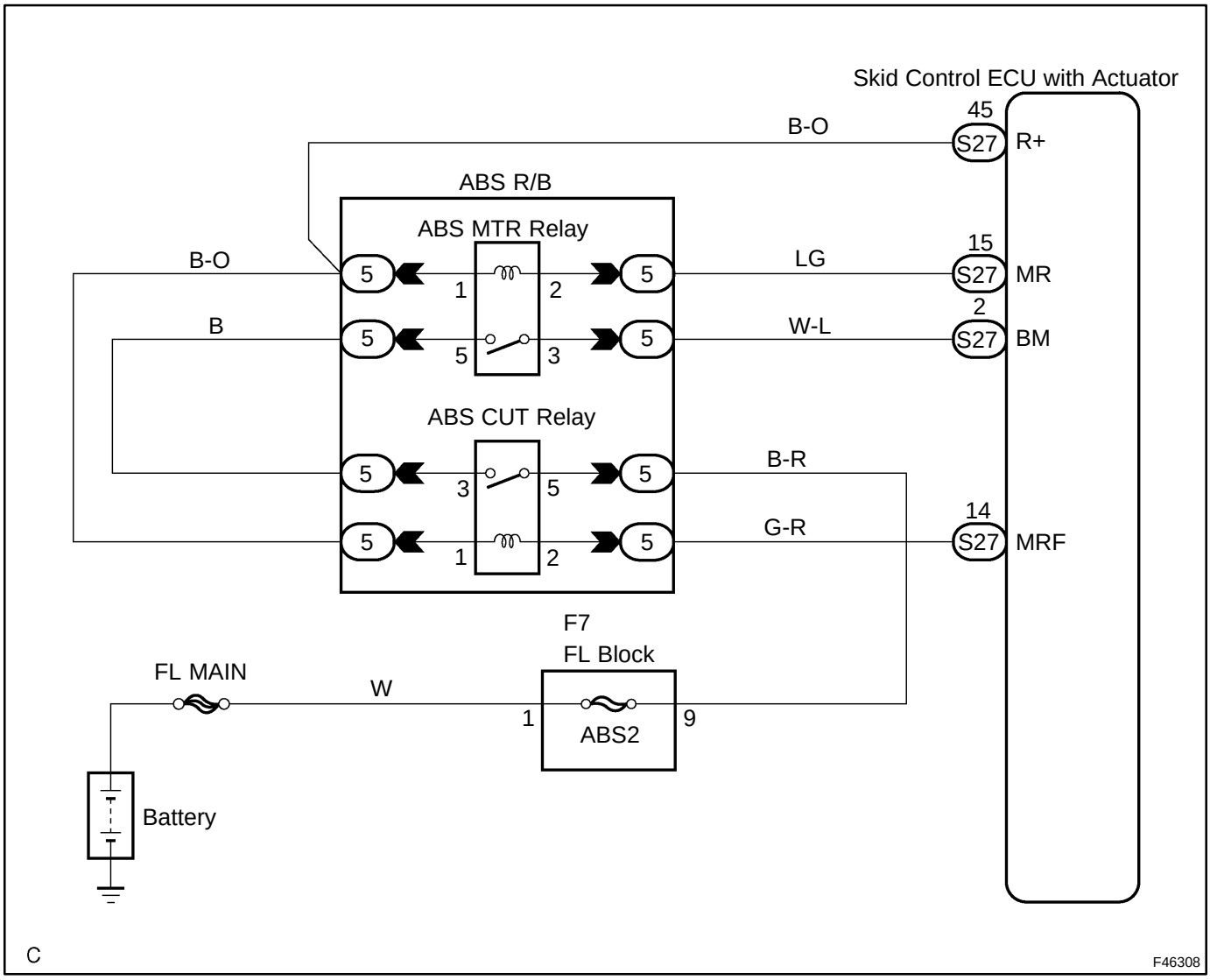
DTC	C1361/91	SHORT CIRCUIT IN ABS MOTOR FAIL SAFE RELAY CIRCUIT

CIRCUIT DESCRIPTION

- The VSC motor relays consist of 2 relays are included in the ABS R/B.
- The VSC cut relay is turned on after turning the ignition switch to the ON position. If the DTCs in the ABS pump motor circuit are memorized, the VSC cut relay cuts off the power supply to the VSC motor relay and performs the fail safe.
- While any of the ABS, BA, TRAC and VSC is operating, the skid control ECU (included in the actuator) turns the VSC motor relay on to operate the actuator pump motor.
- If the voltage applied to the VSC motor relays (+BM) drops below the condition that detects the DTCs due to the shortage of the battery or alternator output, the DTCs may be memorized.

DTC No.	DTC Detecting Condition	Trouble Area
C0273/13	When any of the following (1 to 2) is detected: (1) All the following conditions continues for at least 0.2 seconds. ・IG1 voltage is between 9.5 and 17.2 V. ・During initial check. ・ABS, BA, TRAC, and VSC are in operation. ・Relay contact is open when the relay is ON. (2) All the following conditions continues for at least 0.2 seconds. ・IG1 voltage is less than 9.5 V. ・Relay contact remains open when the relay is ON.	・ABS No.2 fuse ・ABS MTR relay ・ABS MTR relay circuit ・ABS R/B ・ABS cut relay ・ABS cut relay circuit
C0274/14	The following condition continue for at least 4 seconds. ・Relay contact is closed when the relay is OFF.	・ABS No.2 fuse ・ABS MTR relay ・ABS MTR relay circuit ・ABS R/B ・ABS cut relay ・ABS cut relay circuit
C1361/91	All the following conditions continues for at least 4 seconds. ・Immediately after turning IG switch to the ON position. ・Relay contact is closed when fail-safe relay is OFF.	・ABS No.2 fuse ・ABS MTR relay ・ABS MTR relay circuit ・ABS R/B ・ABS cut relay ・ABS cut relay circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Start the inspection from step 1 when using the hand-held tester and start from step 2 when not using the hand-held tester.

1	PERFORM ACTIVE TEST BY HAND-HELD TESTER(ABS MOTOR RELAY OPERATION)

(a) Connect the hand-held tester to the DLC3.
(b) Start the engine.
(c) Select the ACTIVE TEST mode on the hand-held tester.
(d) Check the operation sound of the ABS motor individually when operating it with the hand-held tester.

Item	Vehicle Condition / Test Details	Vehicle Condition / Test Details
ABS MOT RELAY	ABS motor relay / ON or OFF	ON : Motor relay ON

OK:

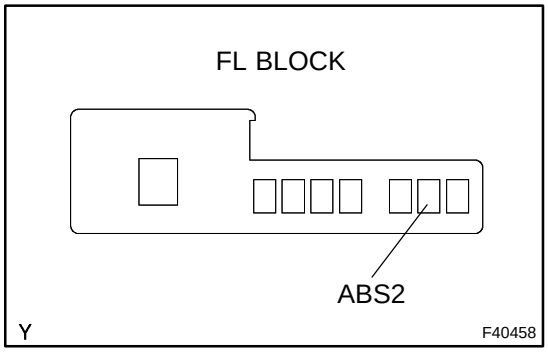
The operation sound of the ABS motor should be heard.

NG → **Go to step 2**

OK

REPLACE ABS & TRACTION ACTUATOR ASSY (SEE PAGE 32-37)

2	INSPECT FUSE(ABS2 FUSE)



(a) Remove ABS2 fuse from the FL BLOCK.
(b) Check continuity of ABS2 fuse.

Standard:

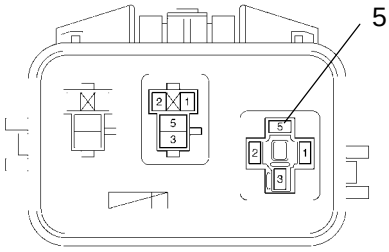
ABS No.1 fuse	Below 1Ω (Continuity)

NG → **CHECK FOR SHORT IN ALL HARNESS AND CONNECTOR CONNECTED TO FUSE AND REPLACE FUSE**

OK

3 CHECK TERMINAL VOLTAGE(VSC MOTOR RELAY 5 TERMINAL OF ABS R/B)

ABS R/B:



(a) Remove the VSC MTR relay from the ABS R/B.
(b) Turn the ignition switch to the ON position.
(c) Measure the voltage according to the value(s) in the table below.

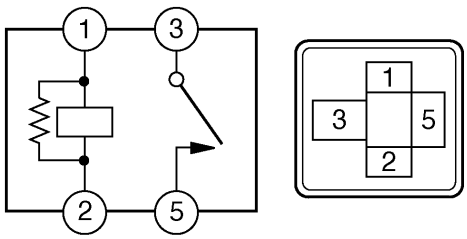
Standard:

Tester Connection	Specified Condition
Terminals 5 - Body ground	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4 INSPECT VSC MOTOR RELAY



(a) Measure the resistance according to the value(s) in the table below.

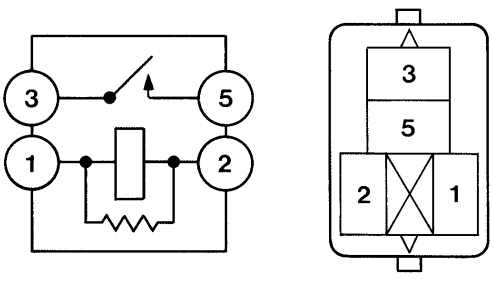
Standard:

Tester Connection	Connection	Specified resistance
3 - 5	Always	10 kΩ or higher (No continuity)
3 - 5	Apply B+ between terminal 1 and 2	Below 1 Ω

NG → **REPLACE VSC MOTOR RELAY**

OK

5 INSPECT VSC CUT RELAY



(a) Measure the resistance according to the value(s) in the table below.

Standard:

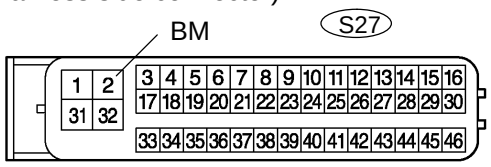
Tester Connection	Connection	Specified resistance
3 - 5	Always	10 kΩ or higher (No continuity)
3 - 5	Apply B+ between terminal 1 and 2	Below 1 Ω

NO → **REPLACE VSC CUT RELAY**

OK

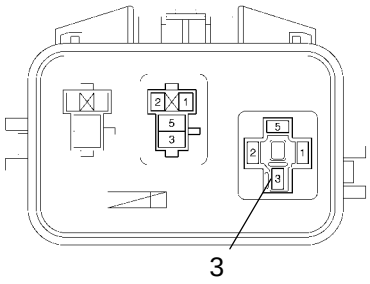
6 CHECK HARNESS AND CONNECTOR(VSC MOTOR RELAY - SKID CONTROL ECU)

Skid Control ECU
(harness side connector)



T

ABS R/B:



(a) Disconnect the skid control ECU connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition
S27-2 (BM) - 3 (ABS R/B)	Below 1 Ω

(c) Measure the resistance according to the value(s) in the table below.

Standard:

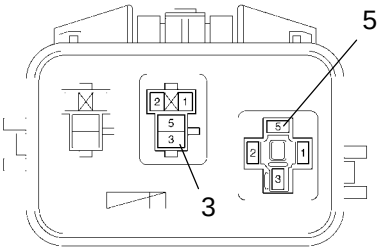
Tester Connection	Specified Condition
S27-2 BM - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

7 CHECK HARNESS AND CONNECTOR(VSC MOTOR RELAY - SKID CONTROL RELAY)

ABS R/B:



(a) Remove the ABS motor relay and skid control relay from ABS R/B.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition
5 (ABS MOTOR Relay) - 3 (Skid Control Relay)	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE ABS & TRACTION ACTUATOR ASSY (SEE PAGE 32-37)

DTC	C0278/11	OPEN CIRCUIT IN ABS SOLENOID RELAY CIRCUIT

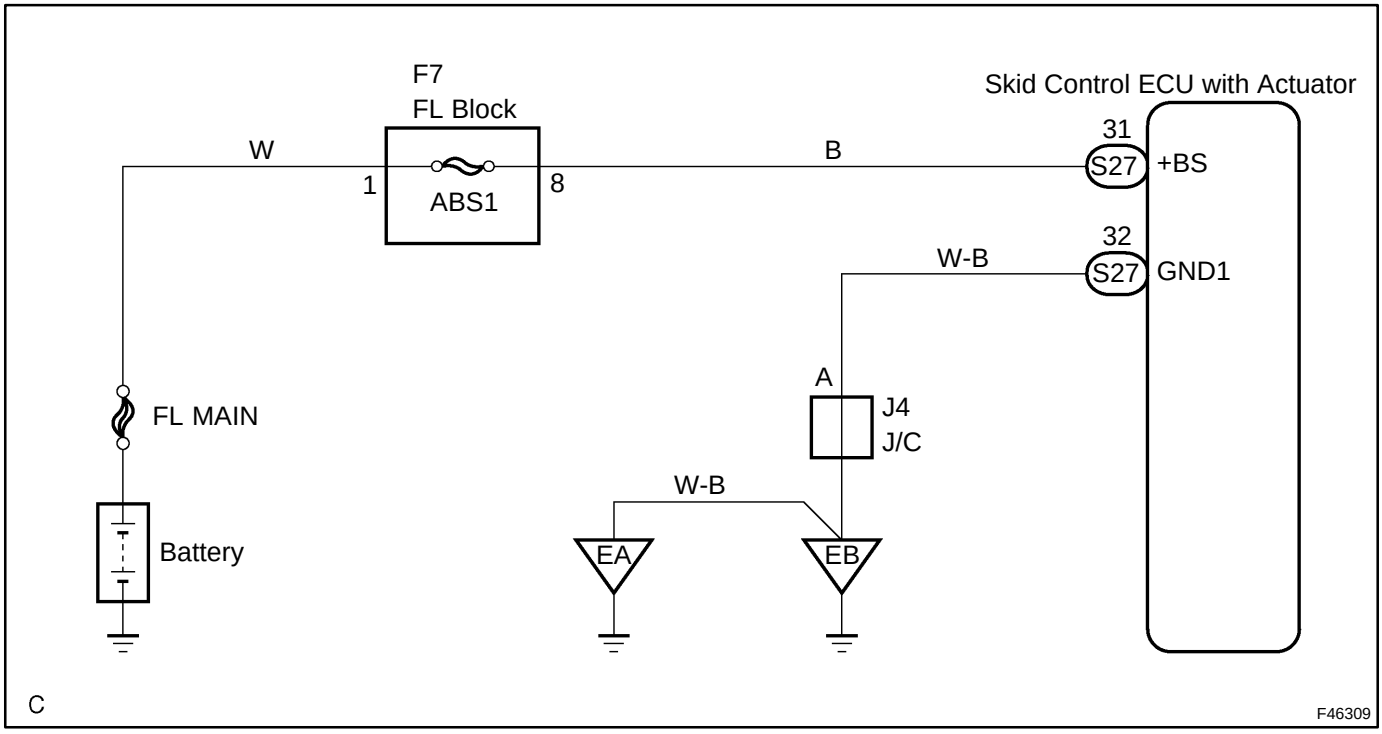
DTC	C0279/12	SHORT CIRCUIT IN ABS SOLENOID RELAY CIRCUIT

CIRCUIT DESCRIPTION

The ABS solenoid relay is built in the ABS & TRACTION Actuator assy. This relay supplies power to each ABS solenoid. If the initial check is OK, after the ignition switch is turned to the ON position, the relay goes on.

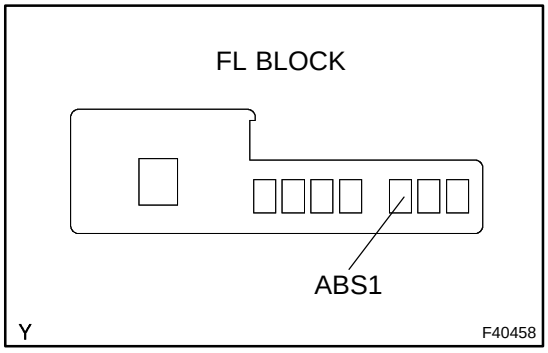
DTC No.	DTC Detecting Condition	Trouble Area
C0278/11	When any of the following (1 to 2) is detected: (1) All the following conditions continues for at least 0.2 seconds. ・IG voltage is between 9.5 and 17.2 V. ・Relay contact is open when the relay is ON. (2) All the following conditions continues for at least 0.2 seconds. ・IG voltage is 9.5 V or less when the relay is ON. ・Relay contact remains open.	・ABS No.1 fuse ・ABS SOL relay ・ABS SOL relay circuit ・ABS & TRAC actuator
C0279/12	The following condition continue for at least 0.2 seconds. ・Relay contact is closed immediately after turning IG switch to the ON position when the relay is OFF.	・ABS No.1 fuse ・ABS SOL relay ・ABS SOL relay circuit ・ABS & TRAC actuator

WIRING DIAGRAM



INSPECTION PROCEDURE

1 INSPECT FUSE(ABS1 FUSE)



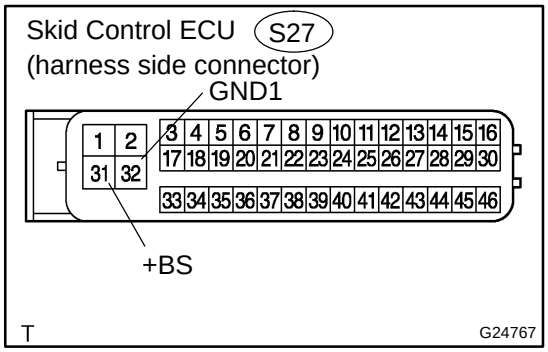
(a) Remove ABS1 fuse from the FL BLOCK.
(b) Check continuity of ABS1 fuse.
Standard:

ABS No.2 fuse	Below 1 Ω (Continuity)

NG → **CHECK FOR SHORT IN ALL HARNESS AND CONNECTOR CONNECTED TO FUSE AND REPLACE FUSE**

OK

2 INSPECT SKID CONTROL ECU CONNECTOR(+BS TERMINAL VOLTAGE)



(a) Disconnect the skid control ECU connector.
(b) Turn the ignition switch to the ON position.
(c) Measure the voltage according to the value(s) in the table below.
Standard:

Tester Connection	Specified Condition
S27-31 (+BS) - S27-32 (GND1)	10 to 14 V

NG → **Go to step 4**

OK

3 RECONFIRM DTC

(a) Clear the DTCs (see page 05-765).
(b) Turn the ignition switch to the ON position.
(c) Are the same DTCs recorded?

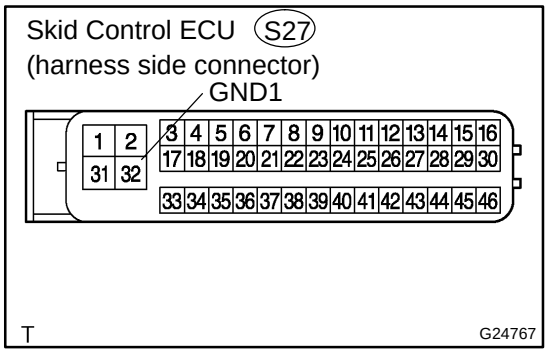
NOTICE:
When replacing ABS & TRACTION ACTUATOR ASSY, perform zero point calibration (see page 05-765).

NO → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-786)**

YES

REPLACE ABS & TRACTION ACTUATOR ASSY (SEE PAGE 32-37)

4 INSPECT SKID CONTROL ECU CONNECTOR(GND TERMINAL CONTINUITY)



(a) Disconnect the skid control ECU connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition
S27-32 (GND1) - Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

5 RECONFIRM DTC

(a) Clear the DTCs (see page 05-765).
(b) Turn the ignition switch to the ON position.
(c) Are the same DTCs recorded? (see page 05-765).

HINT:
It is suspect that the DTCs output was caused by the poor connection of the connector terminal.

NO → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-786)**

YES

REPLACE ABS & TRACTION ACTUATOR ASSY (SEE PAGE 32-37)

DTC C1201/51 ENGINE CONTROL SYSTEM MALFUNCTION

CIRCUIT DESCRIPTION

If trouble occurs in the engine control system, the skid control ECU prohibits TRAC and VSC control.

DTC No.	DTC Detecting Condition	Trouble Area
C1201/51	At the engine speed of 500 rpm, a trouble signal in the engine control system continues for 5 secs. or more.	Engine control system

INSPECTION PROCEDURE

1 CHECK DTC FOR ENGINE

(a) Check if the normal code is recorded for SFI system.

A	Normal System Code
B	Trouble Code

B → **REPAIR ENGINE CONTROL SYSTEM ACCORDING TO DTC OUTPUT**

A

REPLACE ECM

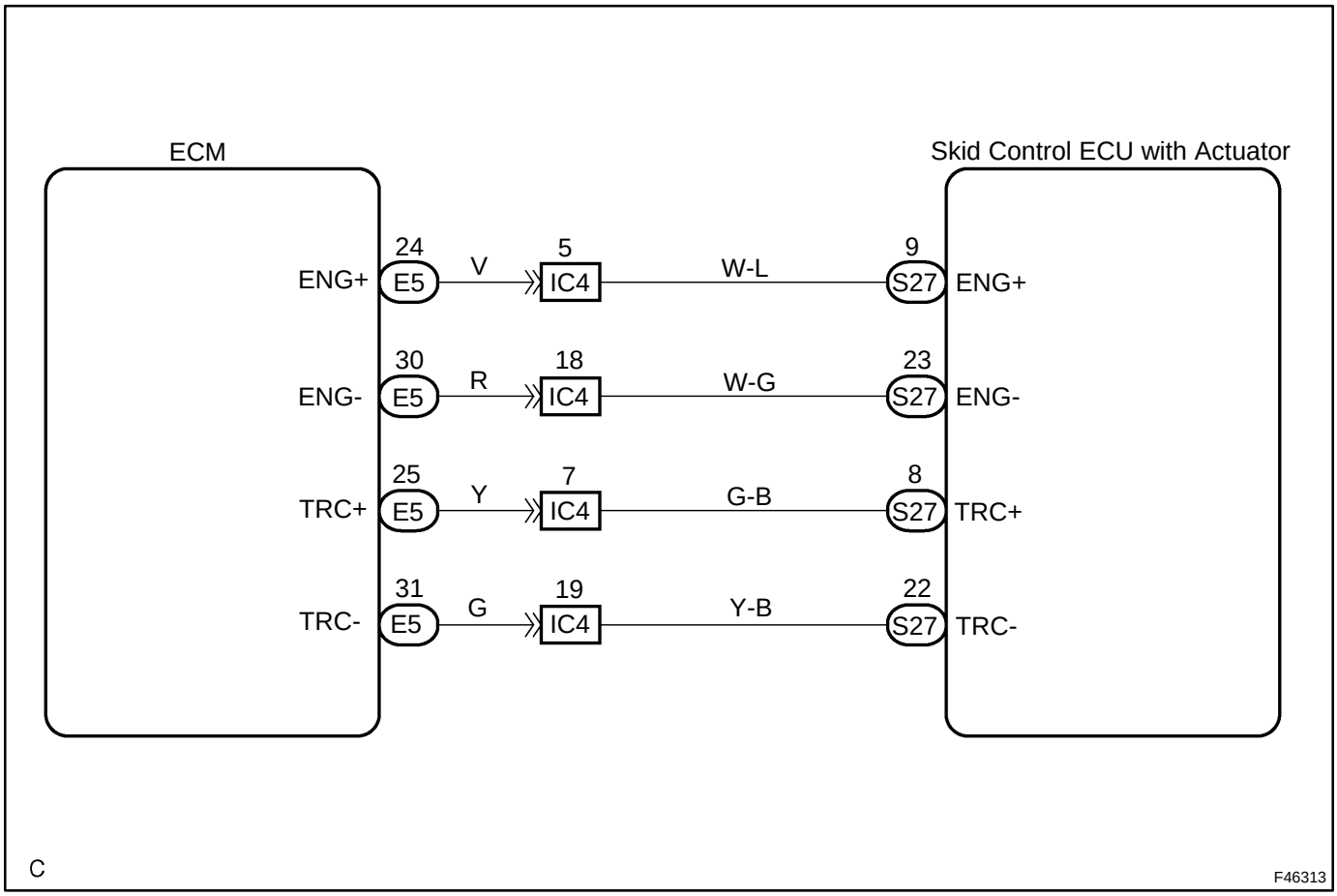
DTC	C1203/53	ECM COMMUNICATION CIRCUIT MALFUNCTION

CIRCUIT DESCRIPTION

The circuit is used to send TRAC & VSC control information from the skid control ECU to the ECM (TRC+, TRC-), and engine control information from the ECM to the skid control ECU (ENG+, ENG-).

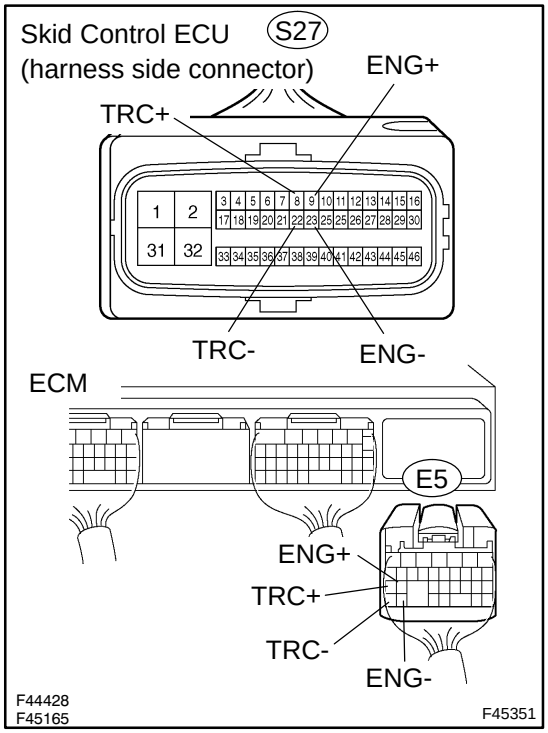
DTC No.	DTC Detecting Condition	Trouble Area
C1203/53	When any of the following (1 to 3) is detected: (1) All the following conditions continues for at least 5 seconds. ・IG1 terminal voltage is 9.5 V or more. ・Cannot send data to ECM. (2) All the following conditions continues for at least 5 seconds. ・IG1 terminal voltage is more than 9.5 V. ・Engine speed is 500 rpm or more. ・Cannot receive data from ECM. (2) All the following conditions repeats 10 times in a series. ・Cannot send data to ECM. ・Cannot receive data from ECM. ・Both of the above occur at least once within 5 sec.	・TRC+ or TRC- circuit ・ENG+ or ENG- circuit ・ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

1 CHECK HARNESS AND CONNECTOR(ECM - SKID CONTROL ECU)



(a) Disconnect the skid control ECU connector and ECM connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition
S27-8 (TRC+) - E5-25 (TRC+)	Below 1 Ω
S27-22 (TRC-) - E5-31 (TRC-)	Below 1 Ω
S27-9 (ENG+) - E5-24 (ENG+)	Below 1 Ω
S27-23 (ENG-) - E5-30 (ENG-)	Below 1 Ω

(c) Measure the resistance according to the value(s) in the table below.

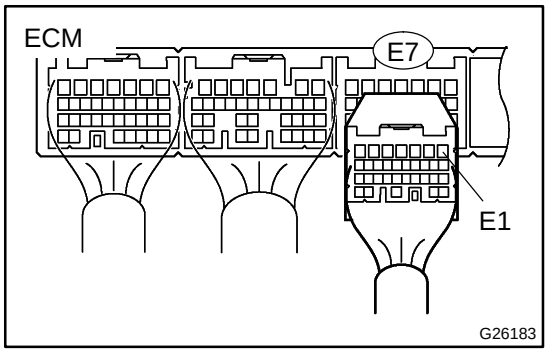
Standard:

Tester Connection	Specified Condition
S27-8 (TRC+) - Body ground	10 kΩ or higher
S27-22 (TRC-) - Body ground	10 kΩ or higher
S27-9 (ENG+) - Body ground	10 kΩ or higher
S27-23 (ENG-) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

2 CHECK HARNESS AND CONNECTOR(E1 OF ECM - BODY GROUND)



(a) Disconnect the ECM connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition
E7-1 (E1) - Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE ABS & TRACTION ACTUATOR ASSY (SEE PAGE 32-37)

DTC	C1210/36	ZERO POINT CALIBRATION OF YAW RATE SENSOR UNDONE

DTC	C1336/39	ZERO POINT CALIBRATION OF DECELERATION SENSOR UNDONE

CIRCUIT DESCRIPTION

Brake actuator receives signals from the yaw rate sensor (deceleration sensor) via CAN communication system.

Yaw rate sensor has the built-in G sensor.

If there is trouble in the bus lines between the yaw rate sensor (deceleration sensor) and CAN communication system, the DTC U0123/62 (yaw rate sensor communication trouble) and U0124/95 (G sensor communication trouble) are output.

DTC No.	DTC Detecting Condition	Trouble Area
C1210/36	Zero point calibration of yaw rate sensor undone	・Yaw rate sensor (Deceleration sensor) ・Zero point calibration undone (Perform zero point calibration and DTC. If DTC is not output again, the sensor is normal)
C1336/39	When all the following (1 to 2) is detected: (1) Drives in normal mode before completing zero point calibration. (2) Zero point voltage is not within 2.38 V and 2.62 V at zero point calibration.	・Yaw rate sensor (Deceleration sensor) ・Zero point calibration undone (If DTC is not output again, the sensor is normal)

INSPECTION PROCEDURE

HINT:

When U0121/94, U0123/62, U0124/95 or U0126/63 are output accompanied with C1210/36 or C1336/39, inspect and repair the trouble areas indicated by U0121/94, U0123/62, U0124/95 or U0126/63 first.

1	**PERFORM ZERO POINT CALIBRATION OF YAW RATE SENSOR AND DECELERATION SENSOR**

(a) Perform the zero point calibration of the yaw rate sensor and deceleration sensor (see page 05-765).

NEXT

2	**RECONFIRM DTC**

(a) Clear the DTCs (see page 05-765).
(b) Turn the ignition switch to the ON position.
(c) Are the same DTCs recorded? (see page 05-765).

NO → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-786)**

YES

3	**CHECK SENSOR INSTALLATION**

(a) Check that the yaw rate sensor has been installed properly (see page 32-46).

NG → **INSTALL YAW RATE SENSOR CORRECTLY**

OK

REPLACE YAWRATE SENSOR(SEE PAGE 32-46)

DTC C1223/43 ABS CONTROL SYSTEM MALFUNCTION

CIRCUIT DESCRIPTION

HINT:

- This DTC is output when the VSC system detects a malfunction in the ABS system.
- When DTC C1223/43 is memorized, there is no malfunction in the skid control ECU.

DTC No.	DTC Detecting Condition	Trouble Area
C1223/43	Malfunction in ABS control system	ABS control system

INSPECTION PROCEDURE

1	CHECK DTC(FOR ABS SYSTEM)

(a) Clear the DTCs (see page 05-765).
(b) Turn the ignition switch to the ON position.
(c) Are the same DTCs recorded? (see page 05-765)

NO → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-786)**

YES

REPAIR CIRCUIT INDICATED BY OUTPUT DTC

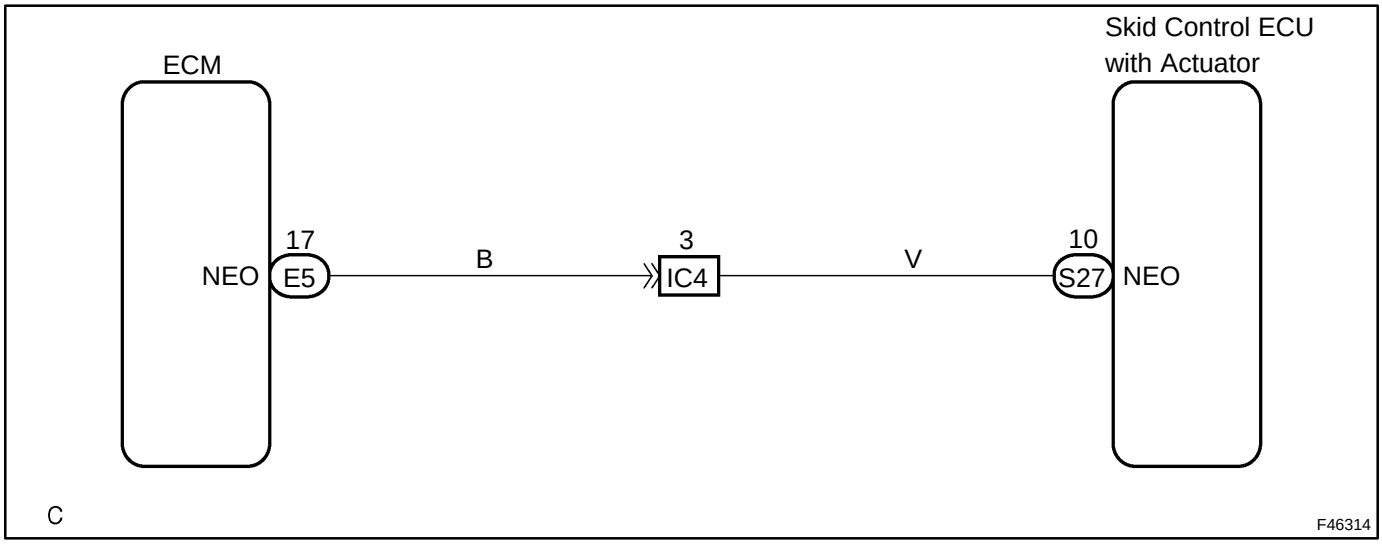
DTC C1224/44 NE SIGNAL CIRCUIT

CIRCUIT DESCRIPTION

The skid control ECU receives engine revolution speed signals (NE signals) from the ECM.

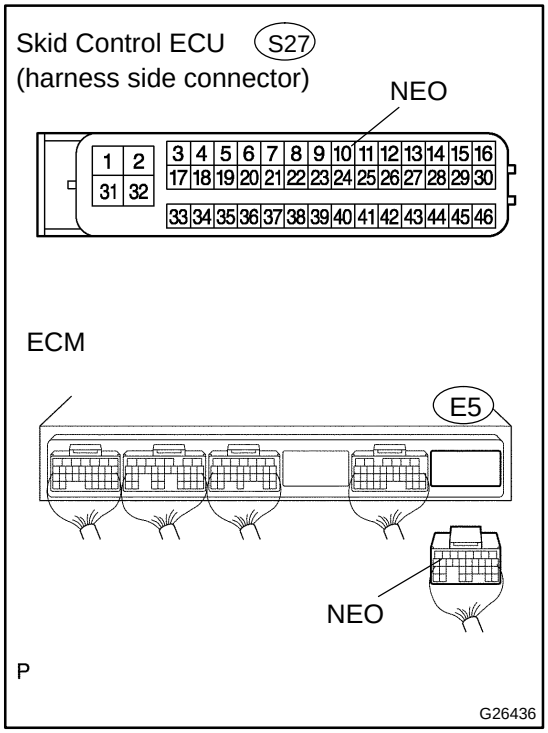
DTC No.	DTC Detecting Condition	Trouble Area
C1224/44	When any of the following (1 to 2) is detected: (1) Any of the following conditions continues for at least 10 seconds. ・Data can be received properly from ECM at a speed of more than 19 mph (30 km/h). ・Open or short in engine rpm signal circuit. (2) Any of the following conditions continues for at least 0.24 seconds. ・TRAC is in operation. ・Open or short in engine rpm signal circuit.	・NEO circuit ・ECM ・Skid control ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR(SKID CONTROL ECU - ECM)



(a) Disconnect the skid control ECU connector and the ECM connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition
S27-10 (NEO) - E5-17 (NEO)	Below 1 Ω

(c) Measure the resistance according to the value(s) in the table below.

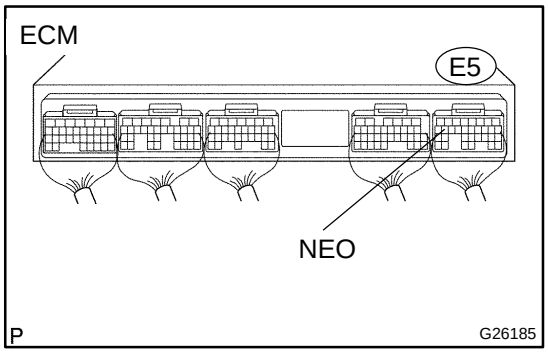
Standard:

Tester Connection	Specified Condition
S27-10 (NEO) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

2 INSPECT ECM TERMINAL VOLTAGE(NEO TERMINAL)

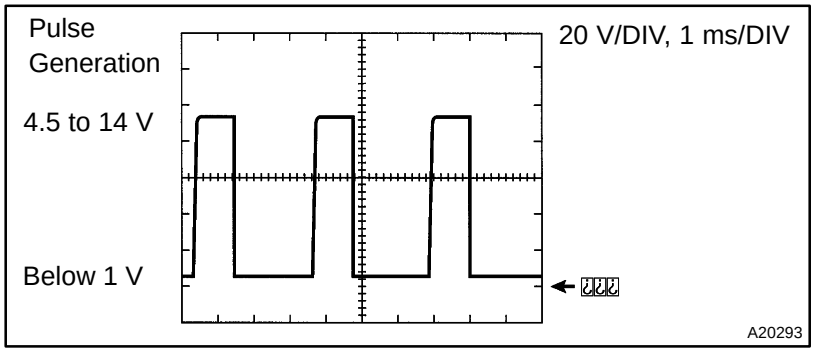


(a) Reconnect the ECM connector and the skid control ECU connector.

(b) Check the signal waveform between terminal NEO (E5-17) of the ECM and body ground for the engine conditions below.

OK:

Tester Connection	Engine Condition	Specified condition
E5-17 (NEO) - Body ground	OFF (Ignition switch ON)	4.5 to 14 V or below 1 V
E5-17 (NEO) - Body ground	ON (Idling)	Pulse generation (4.5 to 14 V ↔ below 1 V)



NG → **REPLACE ECM**

OK

3 CHECK IF SKID CONTROL ECU CONNECTOR IS SECURELY CONNECTED

NG → **CONNECT CONNECTOR TO ECU**

OK

4 RECONFIRM DTC

(a) Clear the DTCs (see page 05-765).

(b) Turn the ignition switch to the ON position.

(c) Are the same DTCs recorded?

NO → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-786)**

YES

REPLACE ABS & TRACTION ACTUATOR ASSY(SEE PAGE 32-37)

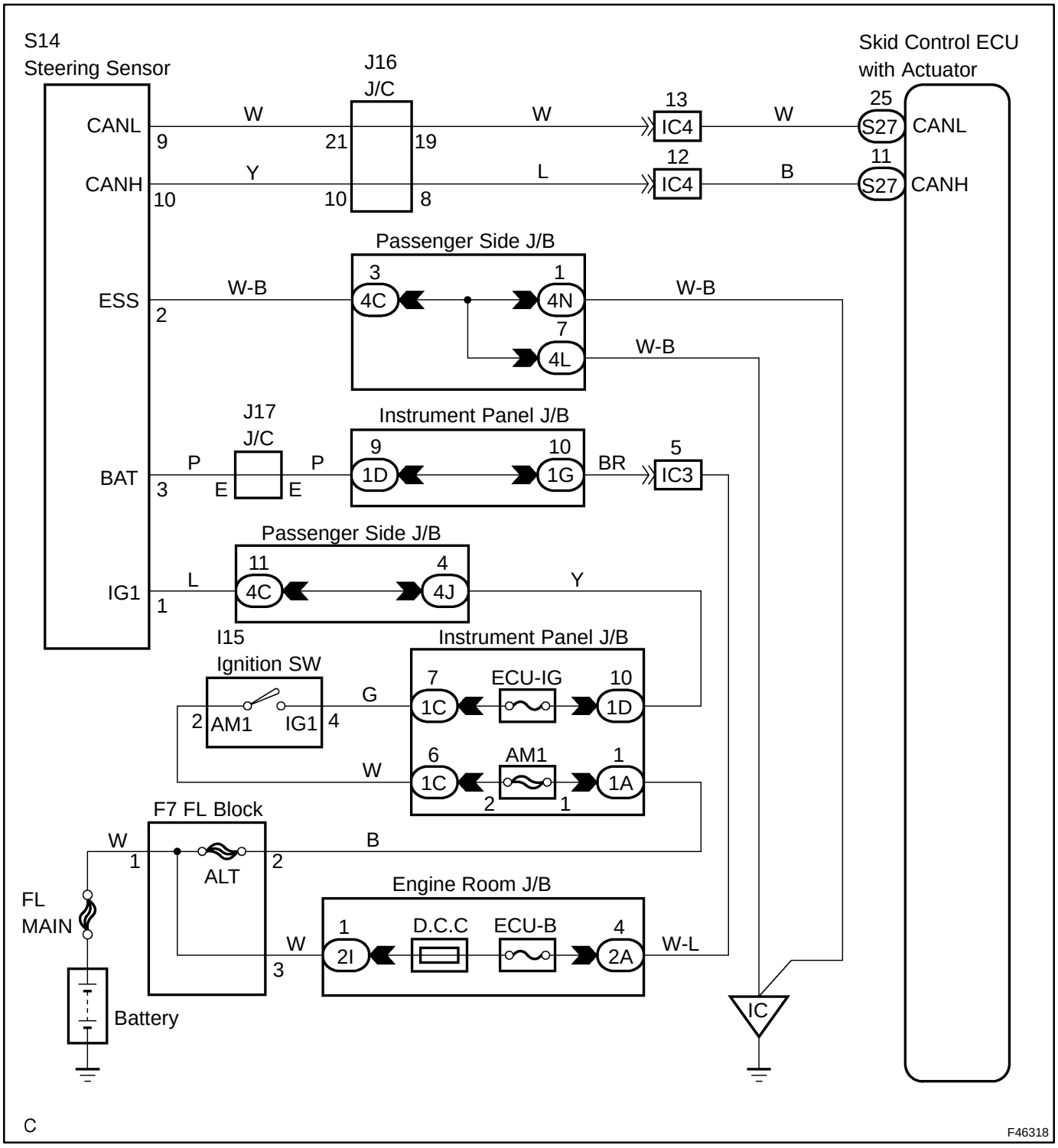
DTC	C1231/31	MALFUNCTION IN STEERING ANGLE SENSOR CIRCUIT

CIRCUIT DESCRIPTION

The steering angle sensor signal is sent to the skid control ECU through the CAN communication system. When there is a malfunction in the communication, it will be detected by the diagnosis function.

DTC No.	DTC Detecting Condition	Trouble Area
C1231/31	When ECU IG1 terminal voltage is 9.5 V or more, the steering angle sensor malfunction signal is received.	・Steering angle sensor ・Steering angle sensor circuit ・+B circuit ・CAN communication system

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- When U0121/94, U0123/62, U0124/95 or U0126/63 are output together with C1231/31, inspect and repair the trouble areas indicated by U0121/94, U0123/62, U0124/95 or U0126/63 first.
- When the speed sensor or the yaw rate sensor has trouble, DTCs for the steering angle sensor may be output even when the steering angle sensor is normal. When DTCs for the speed sensor or yaw rate sensor are output together with other DTCs for the steering angle sensor, inspect and repair the speed sensor and yaw rate sensor first, and then inspect and repair the steering angle sensor.
- Start the inspection from step 1 when using the hand-held tester and start from step 2 when not using the hand-held tester.

1 READ VALUE OF HAND-HELD TESTER(STEERING ANGLE SENSOR)

(a) Connect the hand-held tester to the DLC3.
(b) Start the engine.
(c) Select the DATA LIST mode on the hand-held tester.
(d) Check that the steering angle value of the steering angle sensor indicated on the hand-held tester, changes when the steering wheel is turned.

Item	Measurement Item / Range (Display)	Normal Condition
STEERING ANG	Steering sensor/ Min.: -1152 deg, Max.: 1150.875 deg	Min.: -128 deg/s Max.: 128 deg/s

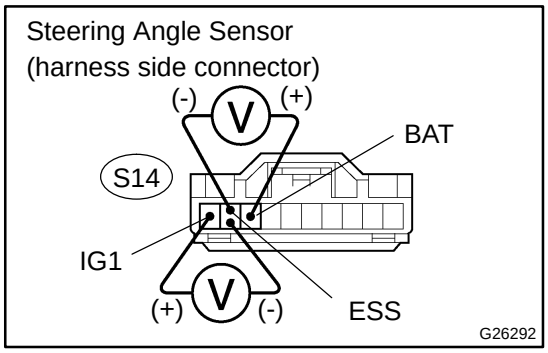
OK:

Steering angle value should change.

OK → **REPLACE ABS & TRACTION ACTUATOR ASSY (SEE PAGE 32-37)**

NG

2 CHECK TERMINAL VOLTAGE(STEERING ANGLE SENSOR CONNECTOR)



(a) Remove the steering wheel and the column lower cover.
(b) Disconnect the steering angle sensor connector S14.
(c) Turn the ignition switch to the ON position.
(d) Measure the voltage according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition
S14-1 (IG1) - S14-2 (ESS)	10 to 14 V
S14-3 (BAT) - S14-2 (ESS)	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE STEERING ANGLE SENSOR

DTC	C1232/32	MALFUNCTION IN DECELERATION SENSOR

DTC	C1234/34	MALFUNCTION IN YAW RATE SENSOR

DTC	C1243/43	MALFUNCTION IN DECELERATION SENSOR

DTC	C1244/44	OPEN OR SHORT IN DECELERATION SENSOR CIRCUIT

DTC	C1245/45	MALFUNCTION IN DECELERATION SENSOR

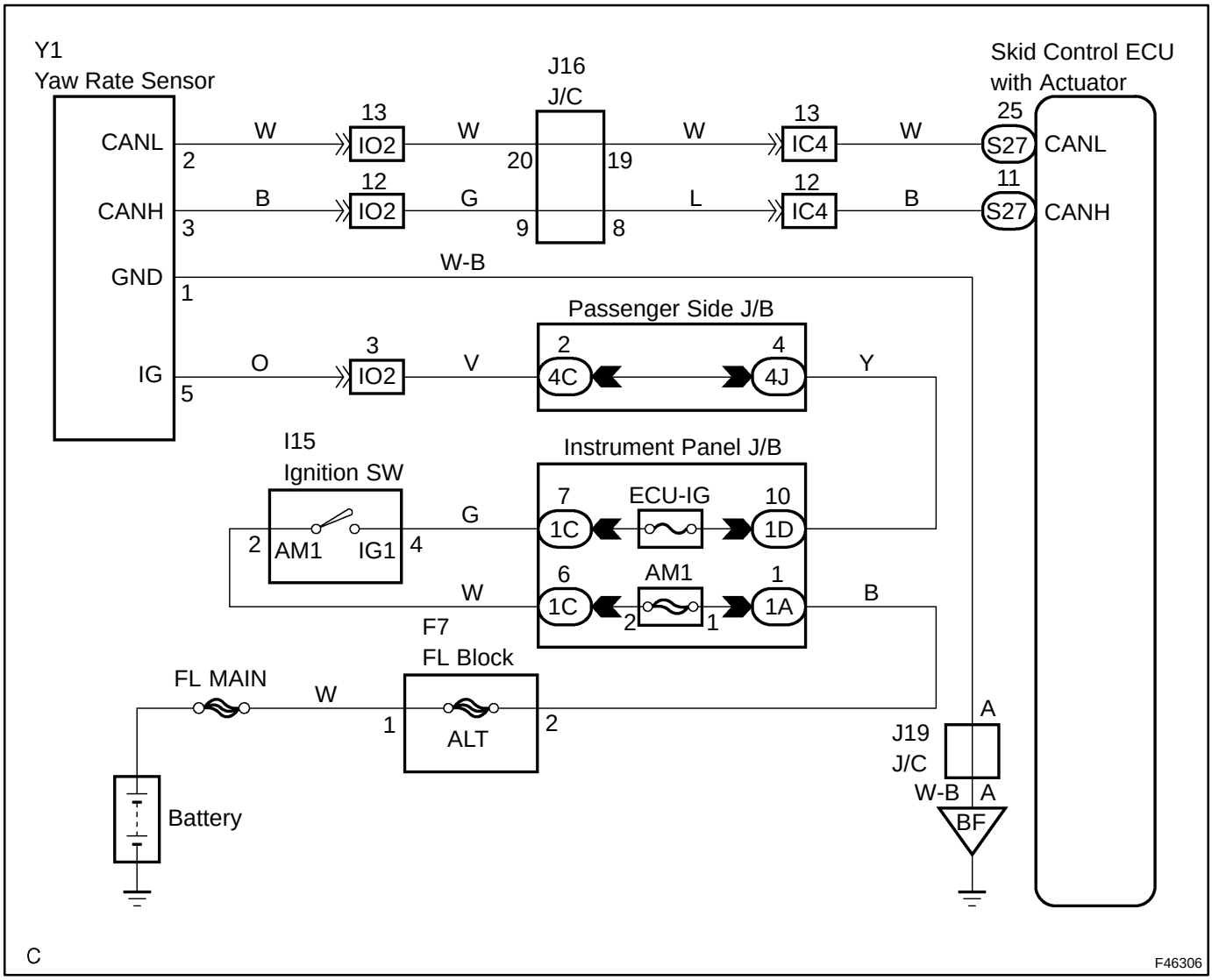
DTC	C1381/97	MALFUNCTION IN POWER SUPPLY VOLTAGE YAW/DECELERATION SENSOR

CIRCUIT DESCRIPTION

The yaw rate sensor and deceleration sensor signals are sent to the skid control ECU through the CAN communication system. When there is a malfunction in the communication, it will be detected by the diagnosis function.

DTC No.	DTC Detecting Condition	Trouble Area
C1232/32	While the vehicle is at a speed of 6mph (10 km/h) or more, the condition that the fluctuation range of the signal from either GL1 or GL2 is under 80 mV and the other is above 1.9 V continues for 30 seconds or more.	・Yaw rate/deceleration sensor ・Yaw rate/deceleration sensor circuit
C1234/34	Sensor malfunction signal is reccives from yaw rate sensor.	・Yaw rate/deceleration sensor ・Yaw rate/deceleration sensor circuit
C1243/43	The following condition repeats 16 times. ・GL1 and GL2 do not change by more than 2LSB when the vehicle decelerates from 19 mph (30 km/h) to 0 mph (0 km/h).	・Yaw rate/deceleration sensor ・Yaw rate/deceleration sensor circuit
C1244/44	When any of the following (1 to 2) is detected: (1) All the following conditions continues for at least 60 seconds. ・Vehicle is stopped. ・Difference between IGL1I and IGL2I does not drop below 0.4 G once it reaches 0.6 G or more. (2) Data malfunction signal is received from G sensor.	・Yaw rate/deceleration sensor ・Yaw rate/deceleration sensor circuit
C1245/45	The following condition continue for at least 60 seconds. ・Difference between the values calculated from G sensor value and vehicle speed exceeds 0.35 G.	・Yaw rate/deceleration sensor ・Yaw rate/deceleration sensor circuit
C1381/97	・G sensor power source malfunction signal is received for at least 10 sec. at a speed of more than 2 mph (3 km/h).	・Yaw rate/deceleration sensor ・Yaw rate/deceleration sensor circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

When U0121/94, U0123/62, U0124/95 or U0126/63 are output together with C1232/32 or C1334/34, inspect and repair the trouble areas indicated by U0121/94, U0123/62, U0124/95 or U0126/63 first.

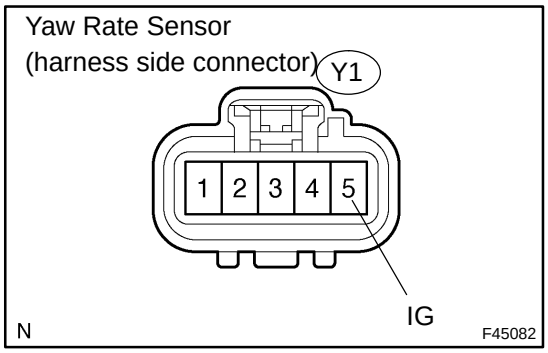
1	CHECK SENSOR INSTALLATION(YAW RATE SENSOR)

(a) Check that the yaw rate and deceleration sensor has been installed properly (see page 32-46).

NG → **INSTALL YAW RATE SENSOR CORRECTLY (SEE PAGE 32-46)**

OK

2 CHECK HARNESS AND CONNECTOR(IG TERMINAL)



(a) Disconnect the yaw rate sensor connector.
(b) Turn the ignition switch to the ON position.
(c) Measure the voltage according to the value(s) in the table below.

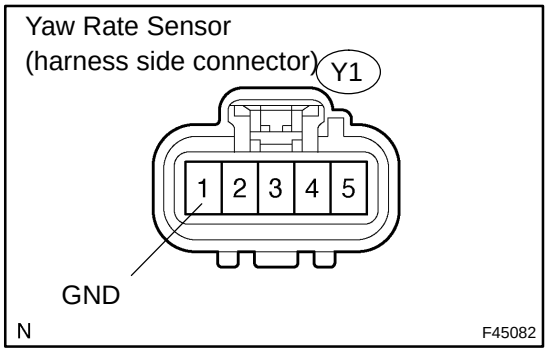
Standard:

Tester Connection	Specified Condition
Y1-5 (IG) - Body ground	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3 CHECK HARNESS AND CONNECTOR(GND TERMINAL)



(a) Disconnect the yaw rate sensor connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition
Y1-1 (GND) - Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

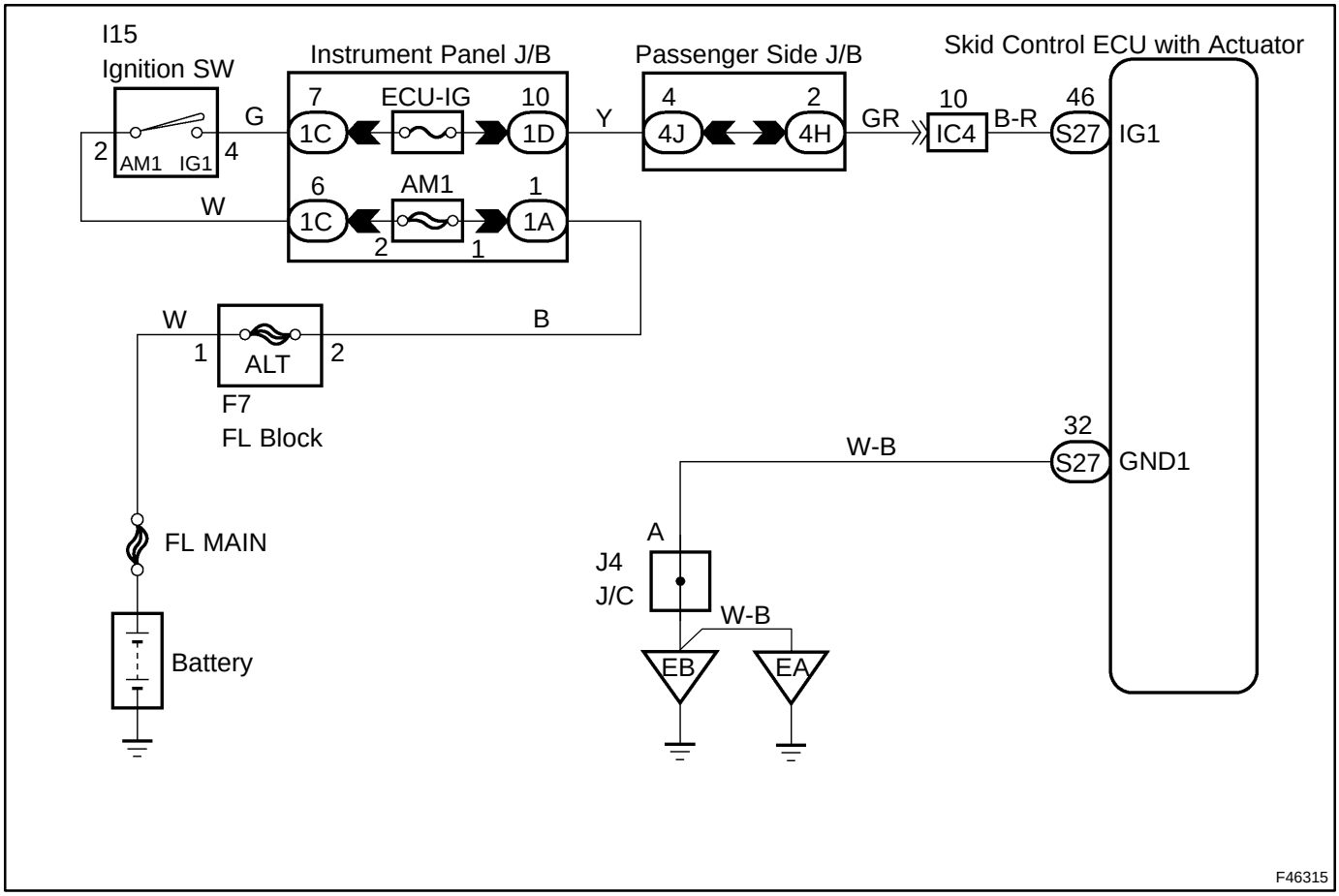
REPLACE ABS & TRACTION ACTUATOR ASSY (SEE PAGE 32-37)

DTC C1241/41 LOW BATTERY POSITIVE VOLTAGE

CIRCUIT DESCRIPTION

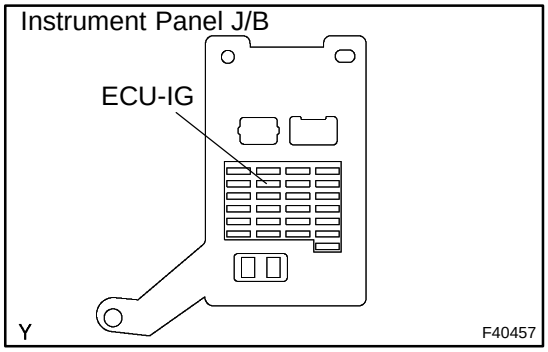
DTC No.	DTC Detecting Condition	Trouble Area
C1241/41	When any of the following (1 to 2) is detected: (1) Any of the following conditions continues for at least 10 seconds. ・Vehicle speed is more than 2 mph (3 km/h). ・IG1 terminal voltage is less than 9.5 V. (2) Any of the following conditions continues for at least 0.2 seconds. ・Solenoid relay remains ON. ・IG1 terminal voltage is less than 9.5 V. ・Relay contact is open.	・Battery ・Charging system ・Power source circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

1 INSPECT FUSE(ECU-IG FUSE)



(a) Remove ECU-IG fuse from the instrument panel J/B.
(b) Check continuity of ECU-IG fuse.
Standard:

ECU-IG Fuse	Below 1 Ω (Continuity)

NG → **INSPECT FOR SHORT CIRCUIT IN ALL HARNESS AND COMPONENTS CONNECTED TO ECU-IG FUSE**

OK

2 INSPECT BATTERY

(a) Check the battery voltage.
Standard:

Tester Connection	Specified Condition
Battery terminal ((+) - (-))	11 to 14 V

NG → **INSPECT CHARGING SYSTEM (SEE PAGE 19-12 (2AZ-FE) OR 19-36 (3MZ-FE))**

OK

3 INSPECT SKID CONTROL ECU TERMINAL VOLTAGE(IG1 TERMINAL)

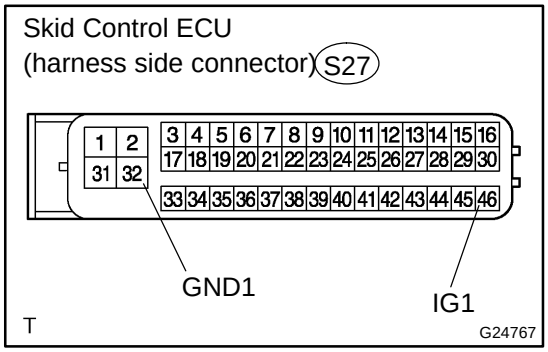
WHEN USING HAND-HELD TESTER:

(a) Connect the hand-held tester to the DLC3.
(b) Start the engine.
(c) Select the DATA LIST mode on the hand-held tester.
(d) Read the voltage condition output from the ECU displayed on the hand-held tester.

Item	Measurement Item / Range (Display)	Normal Condition
IG VOLTAGE	ECU power supply voltage / TOO LOW / NORMAL	NORMAL: 9.5 V or over TOO LOW: Below 9.5 V

OK:

"Normal" is displayed.



WHEN NOT USING HAND-HELD TESTER:

(a) Disconnect the skid control ECU connector S27.
(b) Turn the ignition switch to the ON position.
(c) Measure the voltage according to the value(s) in the table below.

Standard:

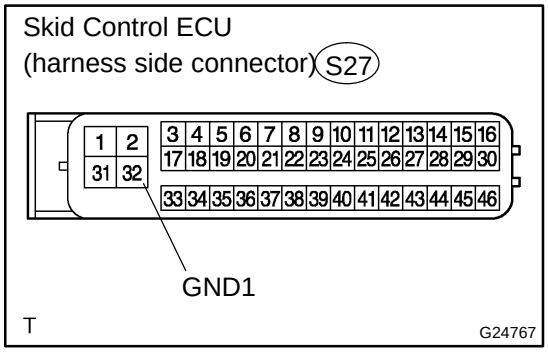
Tester Connection	Specified Condition
S27-46 (IG1) - S27-32 (GND1)	10 to 14 V

NG → **Go to step 4**

OK

REPLACE ABS & TRACTION ACTUATOR ASSY (SEE PAGE 32-37)

4 INSPECT SKID CONTROL ECU CONNECTOR(GND TERMINAL CONTINUITY)



(a) Disconnect the skid control ECU connector S27.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition
S27-32 (GND1) - Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (GND TERMINAL - BODY GROUND)**

OK

CHECK AND REPAIR HARNESS AND CONNECTOR (IG1 TERMINAL - BATTERY)

DTC	C1246/46	MALFUNCTION IN MASTER CYLINDER PRESSURE SENSOR

CIRCUIT DESCRIPTION

Master cylinder pressure sensor is connected to the skid control ECU in the actuator.

DTC No.	DTC Detecting Condition	Trouble Area
C1246/46	When any of the following (1 to 5) is detected: (1) All the following conditions continues for at least 30 seconds. ・Vehicle speed is more than 4 mph (7 km/h). ・PMC terminal voltage does not change by more than 0.005 V once it exceeds 0.86 V. (2) PMC terminal receives interference at least 7 times within 5 sec. (3) All the following conditions continues for at least 1.2 seconds. ・Stop switch is OFF. ・PMC terminal voltage is more than 0.86 V or less than 0.3 V. (4) All the following conditions continues for at least 1.2 seconds. ・IG1 terminal voltage is between 9.5 and 17.2 V. ・VCM terminal voltage is not within 4.4 and 5.6 V. (5) All the following conditions continues for at least 1.2 seconds. ・VCM terminal voltage is between 4.4 and 5.6 V. ・PMC terminal voltage is not within 0.14 and 4.85 V.	・Master cylinder pressure sensor ・Master cylinder pressure sensor circuit

INSPECTION PROCEDURE

HINT:

Start the inspection from step 1 when using the hand-held tester and start from step 2 when not using the hand-held tester.

1	READ VALUE OF HAND-HELD TESTER(MASTER CYLINDER PRESSURE SENSOR)

(a) Connect the hand-held tester to the DLC3.

(b) Start the engine.

(c) Select the DATA LIST mode on the hand-held tester.

Item	Measurement Item / Range (Display)	Normal Condition
MAS CYL PRS 1	Master cylinder pressure sensor 1 reading / min.: 0 V, max.: 5 V	When brake pedal is released : 0.3 to 0.9 V

(d) Check that the brake fluid pressure value of the master cylinder pressure sensor indicated on the hand-held tester, changes when the brake pedal is depressed.

Standard:

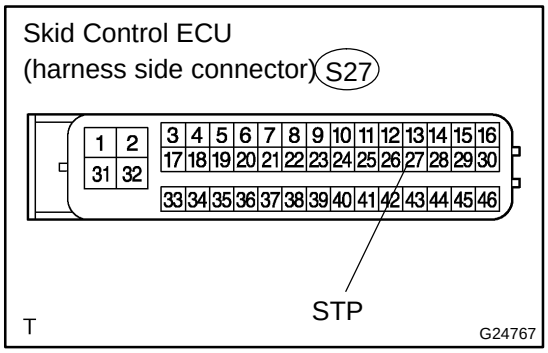
Brake fluid pressure value should change.

NG → **Go to step 2**

OK

REPLACE ABS & TRACTION ACTUATOR ASSY (SEE PAGE 32-37)

2 INSPECT SKID CONTROL ECU TERMINAL VOLTAGE(STP TERMINAL)



(a) Disconnect the skid control ECU connector.

(b) Measure the voltage according to the value(s) in the table below.

Standard:

Tester Connection	Switch condition	Specified Condition
S27-27 (STP) - Body ground	Brake pedal depressed	8 to 14 V
S27-27 (STP) - Body ground	Brake pedal released	Below 1 V

NG → **CHECK AND REPLACE STOP LIGHT SWITCH CIRCUIT**

OK

REPLACE ABS & TRACTION ACTUATOR ASSY (SEE PAGE 32-37)

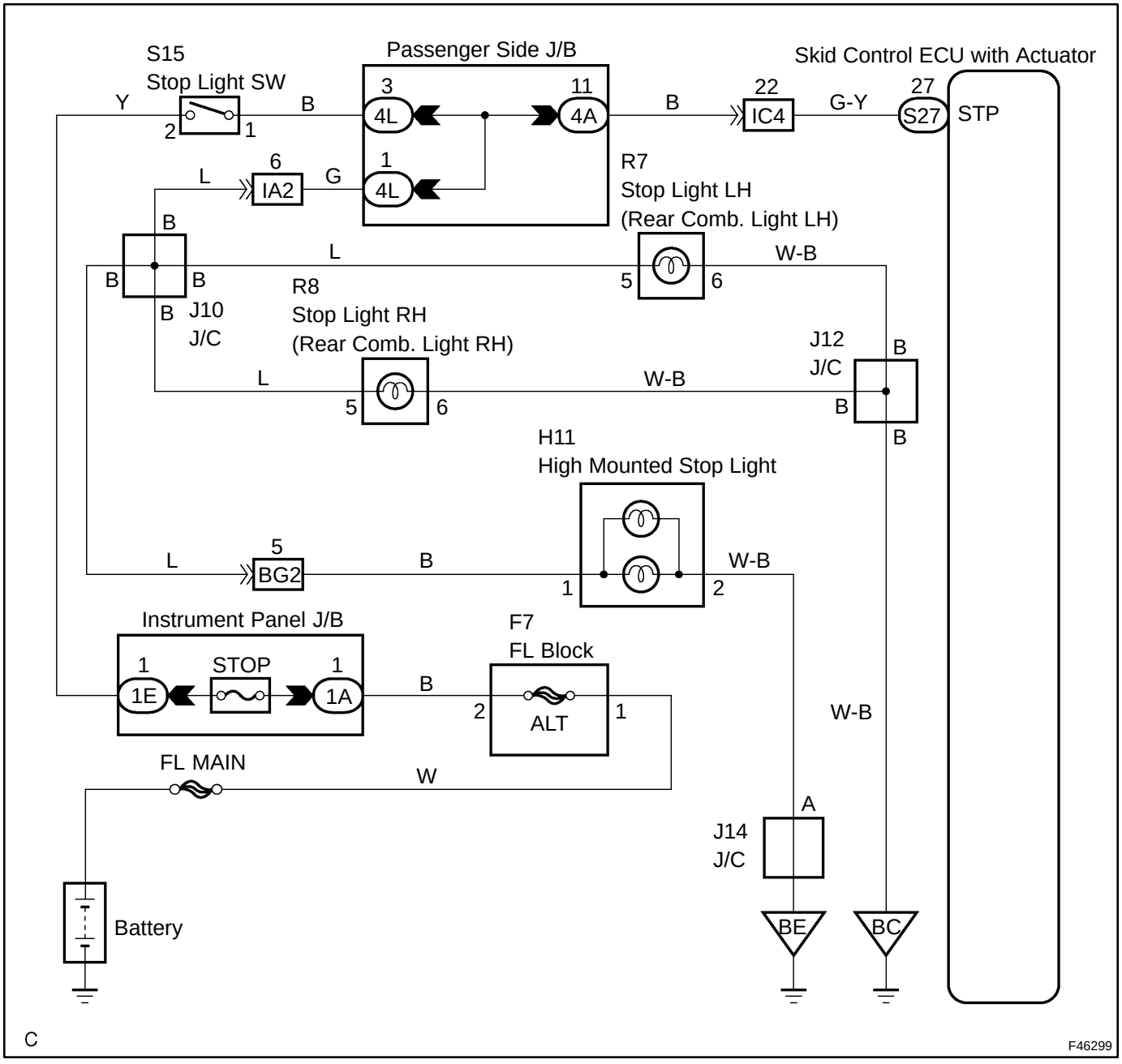
DTC	C1249/49	OPEN CIRCUIT IN STOP LIGHT SWITCH CIRCUIT

CIRCUIT DESCRIPTION

This circuit recognizes brake operation by sending a stop lamp signal to the skid control ECU.

DTC No.	DTC Detecting Condition	Trouble Area
C1249/49	All the following conditions continues for at least 0.3 seconds. ・IG1 terminal voltage is between 9.5 and 17.2 V. ・Open in stop switch circuit. ・When the brake pedal load sensing switch is on, the master cylinder pressure is 2MPa or more and the deceleration calculated from the vehicle speed is 0.2 G or more, the stop lamp switch is off for 2 seconds or more.	・Stop lamp bulb ・Stop lamp switch ・Stop lamp switch circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK STOP LAMP SWITCH OPERATION

(a) Check that the stop light comes on when the brake pedal is depressed and goes off when the brake pedal is released.

HINT:

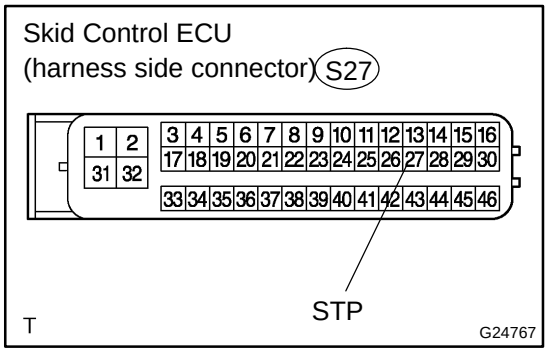
Check the stop lamp bulb as it may have burnt out.

Standard: Stop lamp switch function is normal.

NG → **Go to step 4**

OK

2	INSPECT SKID CONTROL ECU TERMINAL VOLTAGE(STP TERMINAL)



(a) Disconnect the skid control ECU connector.

(b) Measure the voltage according to the value(s) in the table below.

Standard:

Tester Connection	Switch condition	Specified Condition
S27-27 (STP) - Body ground	Brake pedal depressed	8 to 14 V
S27-27 (STP) - Body ground	Brake pedal released	Below 1 V

NG → **Go to step 5**

OK

3	RECONFIRM DTC

(a) Clear the DTCs(see page 05-765).

(b) Turn the ignition switch to the ON position.

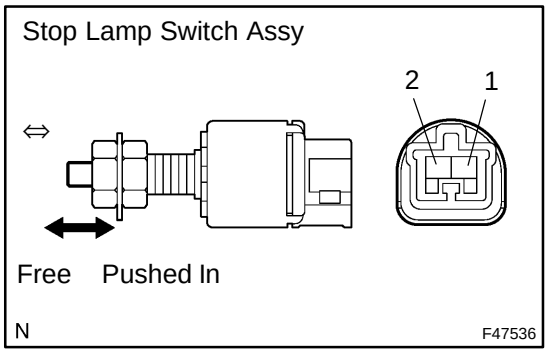
(c) Are the same DTCs detected? (see page 05-765).

NO → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-786)**

YES

REPLACE ABS & TRACTION ACTUATOR ASSY (SEE PAGE 32-37)

4 INSPECT STOP LAMP SWITCH ASSY



(a) Disconnect the stop lamp switch assy connector.
(b) Measure the resistance according to the value(s) in the table below.

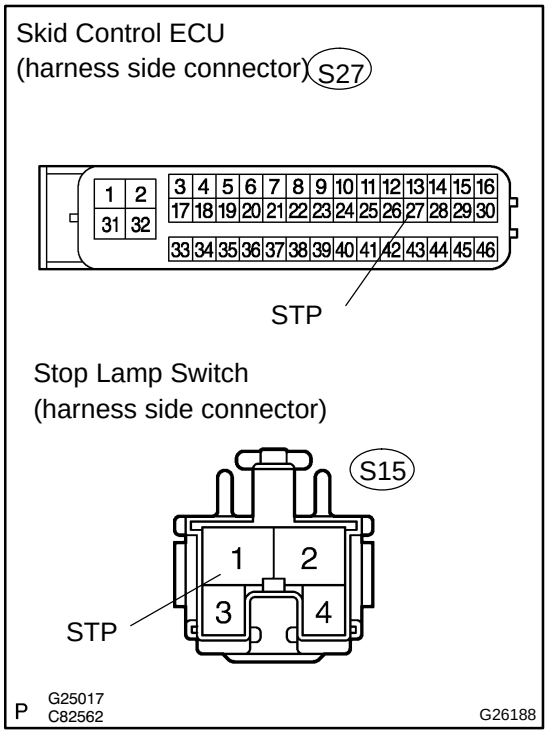
Standard:

Switch condition	Tester connection	Specified condition
Switch pin free	1 - 2	Below 1 Ω
Switch pin pushed in	1 - 2	10 kΩ or higher

NG → **REPLACE STOP LAMP SWITCH ASSY**

OK

5 CHECK HARNESS AND CONNECTOR(STOP LAMP SWITCH - SKID CONTROL ECU)



(a) Disconnect the stop lamp switch connector and skid control ECU connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition
S27-27 (STP) - S15-1 (STP)	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE ABS & TRACTION ACTUATOR ASSY(SEE PAGE 32-37)

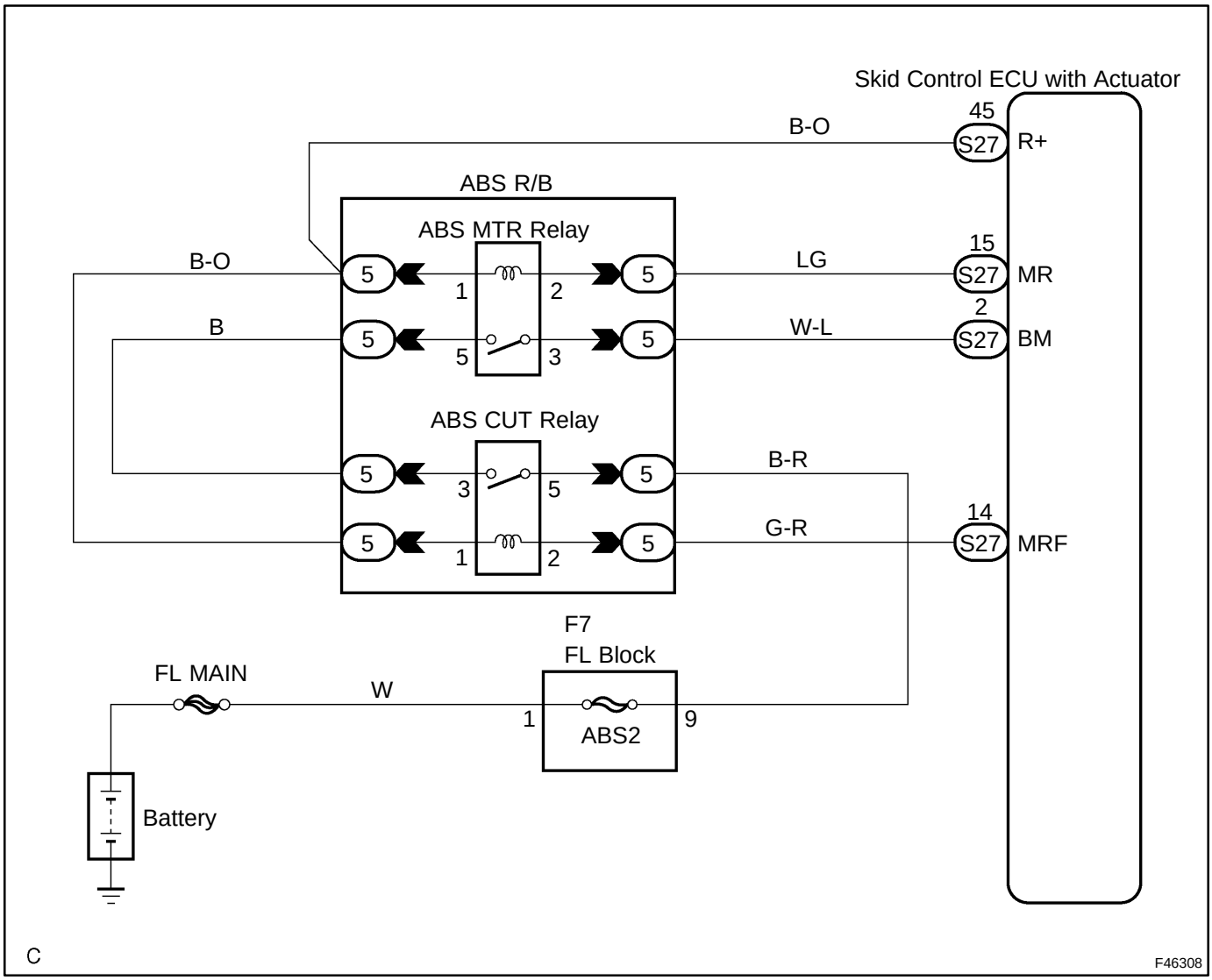
DTC	C1251/51	PUMP MOTOR IS LOCKED/OPEN CIRCUIT IN PUMP MOTOR GROUND

CIRCUIT DESCRIPTION

The ABS pump motor is located inside the brake actuator. The motor is used for BA, TRAC and VSC operation.

DTC No.	DTC Detecting Condition	Trouble Area
C1251/51	›¦Actuator pump motor does not operate properly. ›¦Open in actuator pump motor circuit continues for at least 2 sec.	›¦ABS & TRAC actuator ›¦ABS & TRAC actuator circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Start the inspection from step 1 in case of using the hand-held tester and start from step 2 in case of not using the hand-held tester.

1	PERFORM ACTIVE TEST BY HAND-HELD TESTER(ABS MOTOR RELAY OPERATION)

(a) Connect the hand-held tester to the DLC3.
(b) Start the engine.
(c) Select the ACTIVE TEST mode on the hand-held tester.
(d) Check the operation sound of the ABS motor individually when operating it with the hand-held tester.

Item	Vehicle Condition / Test Details	Vehicle Condition / Test Details
ABS MOT RELAY	ABS motor relay / ON or OFF	ON: Motor relay ON

OK:

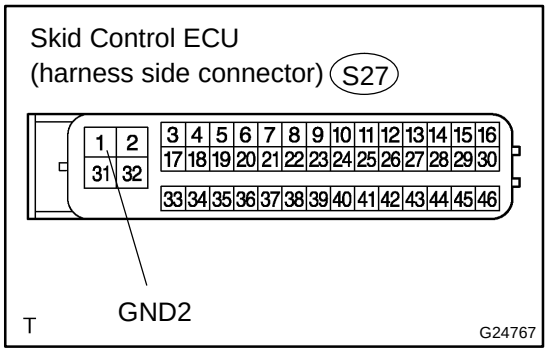
The operation sound of the ABS motor should be heard.

NG → **Go to step 2**

OK

REPLACE ABS & TRACTION ACTUATOR ASSY (SEE PAGE 32-37)

2	INSPECT HARNESS AND CONNECTOR(GND2 OF SKID CONTROL ECU AND BODY GROUND)



(a) Disconnect the skid control ECU connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition
S27-1 (GND2) - Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

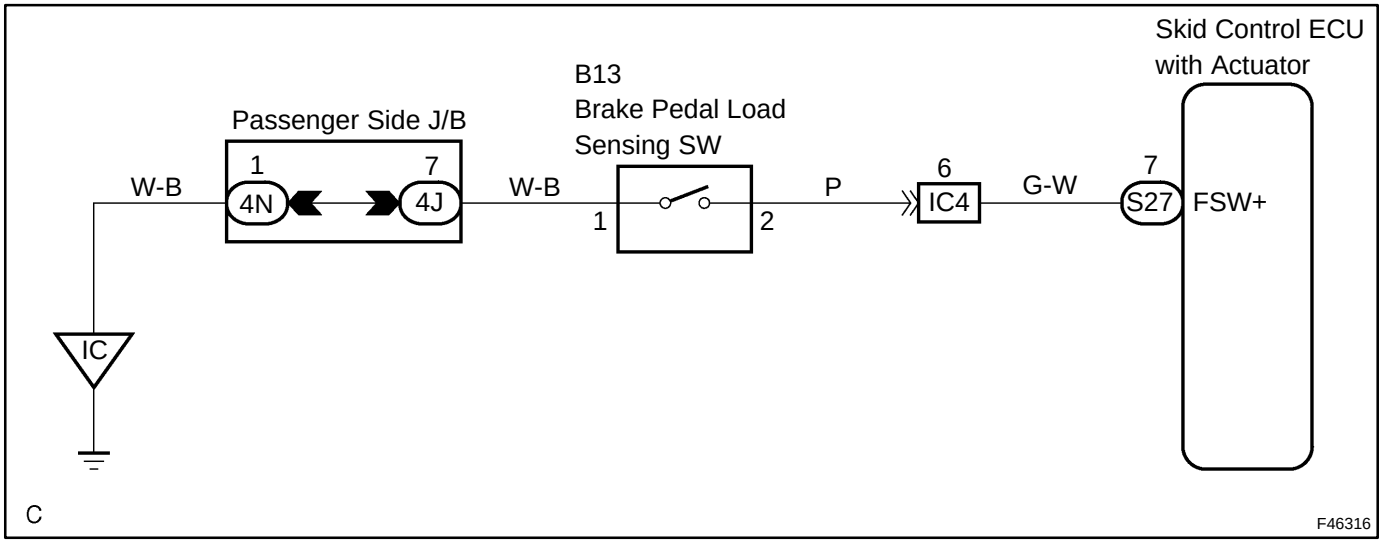
REPLACE ABS & TRACTION ACTUATOR ASSY (SEE PAGE 32-37)

DTC C1267/67 Brake Pedal Load Sensing Switch

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1267/67	・Open or short circuit in brake pedal load sensing switch continues for 0.3 secs. or more. ・Immediately after IG1 is turned to the ON position, the condition that brake pedal load sensing switch is ON and stop lamp switch is off continues for 10 secs. or more. ・While vehicle speed changes from 0 mph (0 km/h0 mph) to 19 mph (30 km/h19 mph), the condition that the brake pedal load sensing switch is on repeatedly occurs 5 times.	・Brake pedal load sensing switch ・Brake pedal load sensing switch circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

1	READ VALUE OF HAND-HELD TESTER

(a) Connect the hand-held tester to the DLC3.
(b) Start the engine.
(c) Select the DATA LIST mode on the hand-held tester.
(d) Read the value of the brake pedal load sensing switch displayed on the hand-held tester when depressing and releasing the brake pedal.

Item	Vehicle Condition / Test Details	Diagnostic Note
BRAKE WRN LIGHT	Brake load sensing switch / ON or OFF	ON : Depressed brake pedal OFF : Released brake pedal

OK:

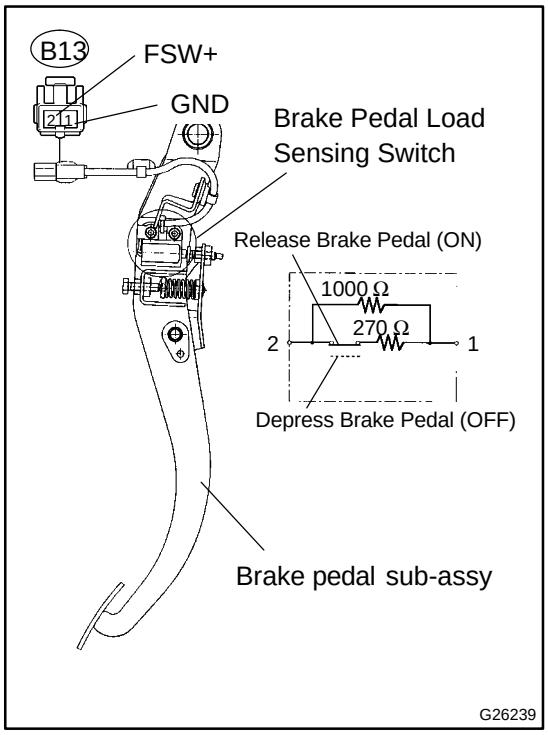
Condition	Display
Depress the brake pedal	ON
Release the brake pedal	OFF

OK → **Go to step 4**

NG

2 INSPECT BRAKE PEDAL LOAD SENSING SWITCH

NOTICE:
Do not disassemble the brake pedal sub-assy.
HINT:
Replace the brake pedal sub-assy when there is a malfunction in the brake pedal load sensing switch.



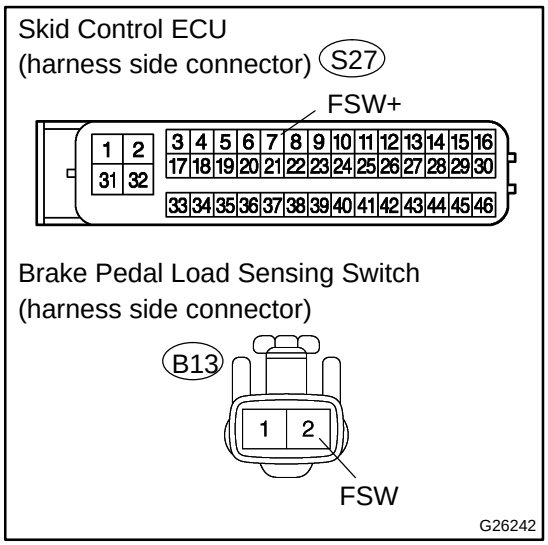
(a) Disconnect the brake pedal load sensing switch connector B13.
(b) Measure the resistance according to the value(s) in the table below.
Standard:

Tester Connection	Condition	Specified Condition
B13-2 (FSW+) - B13-1 (GND)	Depress brake pedal	Approx. 1000 Ω
	Release brake pedal	Approx. 213 Ω

NG → **REPLACE BRAKE PEDAL SUB-ASSY (SEE PAGE 32-1 1)**

OK

3 CHECK HARNESS AND CONNECTOR(BRAKE PEDAL LOAD SENSING SWITCH - SKID CONTROL ECU)



(a) Disconnect the skid control ECU connector S27 and the brake pedal load sensing switch connector B13.
(b) Measure the resistance according to the value(s) in the table below.
Standard:

Tester Connection	Specified Condition
S27-7 (FSW+) - B13-2 (FSW)	Below 1 Ω

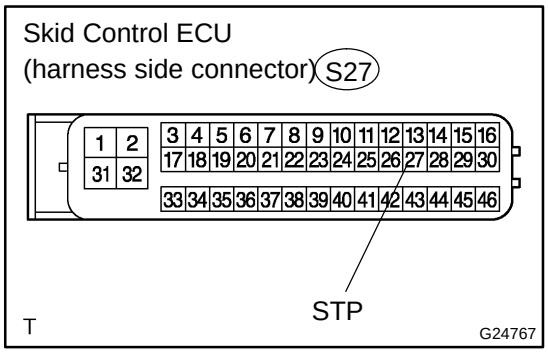
(c) Measure the resistance according to the value(s) in the table below.
Standard:

Tester Connection	Specified Condition
S27-7 (FSW+) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4	CHECK SKID CONTROL ECU TERMINAL VOLTAGE(STP TERMINAL)



(a) Disconnect the skid control ECU connector.
(b) Measure the voltage according to the value(s) in the table below.

Standard:

Tester Connection	Switch condition	Specified Condition
S27-27 (STP) - Body ground	Brake pedal depressed	8 to 14 V
S27-27 (STP) - Body ground	Brake pedal released	Below 1 V

NG → **INSPECT STOP LAMP SWITCH CIRCUIT**

OK

REPLACE ABS & TRACTION ACTUATOR ASSY (SEE PAGE 32-37)

05CCX-06

CUSTOMER PROBLEM ANALYSIS CHECK

ABS & EBD & BA Check Sheet

Inspector's Name :

Customer's Name		**VIN**	
		Production Date	/ /
		Licence Plate No.	
Date Vehicle Brought In	/ /	**Odometer Reading**	km miles

Date Problem First Occurred	/ /
Frequency Problem Occurs	☐ Continuously ☐ Intermittently (times a day)

Symptoms	☐ ABS does not operate.	
	☐ ABS does not operate efficiently.	
	☐ BA does not operate.	
	☐ EBD does not operate.	
	ABS Warning Light Abnormal	☐ Remains ON ☐ Does not Come On
	Brake Warning Light Abnormal (PKB released)	☐ Remains ON ☐ Does not Come On

DTC Check	**1st Time**	☐ Normal System Code ☐ Trouble Code (Code)
	2nd Time	☐ Normal System Code ☐ Trouble Code (Code)

Freeze Frame Data	STOP LIGHT SW	☐ ON ☐ OFF
	SYSTEM	☐ NO SYS ☐ ABS ☐ BA ☐ FAIL SF
	#IG ON	
	VEHICLE SPD	km/h MPH

TRAC & VSC Check Sheet

Inspector's Name :

Customer's Name		**VIN**	
		Production Date	/ /
		Licence No.	
Date Vehicle Brought In	/ /	**Odometer Reading**	km miles

Date Problem First Occurred	/ /
Frequency Problem Occurs	☐ Continuous ☐ Intermittent (times a day)

Symptoms	☐ TRAC does not operate. (Wheels spin when starting rapidly.)	
	☐ VSC does not operate. (Wheels sideslip at the time of sharp turning.)	
	TRAC OFF Indicator Light Abnormal	☐ Remains ON ☐ Does not Come On
	VSC Warning Indicator Abnormal	☐ Displays ☐ Does not Display
	SLIP Indicator Light Abnormal	☐ Remains ON ☐ Does not Come On
	Skid Control Buzzer Abnormal	☐ Sounds ☐ Does not Sound

Check Item	**ABS Warning Light**	☐ Normal ☐ Trouble Code (Code)
	Malfunction Indicator Light	☐ Normal ☐ Trouble Code (Code)

DTC Check	**1st Time**	☐ Normal System Code ☐ Trouble Code (Code)
	2nd Time	☐ Normal System Code ☐ Trouble Code (Code)

Freeze Frame Data	VSC/TRC OFF SW	☐ ON ☐ OFF
	SYSTEM	☐ VSC/TRAC
	SHIFT POSITION	☐ P,N ☐ 2 ☐ R ☐ 3 ☐ D ☐ 4 ☐ L ☐ FAIL
	STEERING ANG	deg
	YAW RAT	deg/s
	MAS CYL PRESS	V
	THROTTLE	deg
	MAS PRESS GRADE	MPa/s
	G (RIGHT&LEFT)	G
	G (BACK&FORTH)	G

05CCZ-12

DIAGNOSTIC TROUBLE CODE CHART

HINT:

- If a malfunction code is displayed during the DTC check, check the circuit indicated by the DTC. For details of each code, turn to the page for the respective "DTC No." in the DTC chart.
- When U0121/94, U0123/62, U0124/95 or U0126/63 are output, inspect and repair the trouble areas indicated by U0121/94, U0123/62, U0124/95 or U0126/63 first.

DTC chart of ABS:

DTC No. (See Page)	Detection Item	Trouble Area
C0200/31*1 (05-788)	Right front wheel speed sensor signal malfunction	・Right front and left front speed sensor ・Each speed sensor circuit ・Sensor rotor ・Sensor installation
C0205/32*1 (05-788)	Left front wheel speed sensor signal malfunction	・Right front and left front speed sensor ・Each speed sensor circuit ・Sensor rotor ・Sensor installation
C0210/33*1 (05-795)	Right rear wheel speed sensor signal malfunction	・Right rear and left rear speed sensor ・Each speed sensor circuit ・Sensor rotor ・Sensor installation
C0215/34*1 (05-795)	Left rear wheel speed sensor signal malfunction	・Right rear and left rear speed sensor ・Each speed sensor circuit ・Sensor rotor ・Sensor installation
C0226/21 (05-802)	Open or short circuit in brake actuator solenoid circuit (SFR circuit)	・ABS & TRAC actuator ・SFRH or SFRR circuit
C0236/22 (05-802)	Open or short circuit in brake actuator solenoid circuit (SFL circuit)	・ABS & TRAC actuator ・SFLH or SFLR circuit
C0246/23 (05-802)	Open or short circuit in brake actuator solenoid circuit (SRR circuit)	・ABS & TRAC actuator ・SRRH or SRRR circuit
C0256/24 (05-802)	Open or short circuit in brake actuator solenoid circuit (SRL circuit)	・ABS & TRAC actuator ・SRLH or SRLR circuit
C0273/13*1 (05-804)	Open circuit in ABS MTR relay circuit	・ABS No.2 fuse ・ABS MTR relay ・ABS MTR relay circuit ・J/B No.2
C0274/14 (05-804)	Short circuit in ABS MTR relay circuit	・ABS No.2 fuse ・ABS MTR relay ・ABS MTR relay circuit ・J/B No.2
C0278/11 (05-809)	Open circuit in ABS SOL relay circuit	・ABS No.1 fuse ・ABS SOL relay ・ABS SOL relay circuit ・ABS & TRAC actuator
C0279/12 (05-809)	Short circuit in ABS SOL relay circuit	・ABS No.1 fuse ・ABS SOL relay ・ABS SOL relay circuit ・ABS & TRAC actuator
C1225/25 (05-802)	Open or short circuit in brake actuator solenoid circuit (SMC circuit)	・SMF or SMR circuit ・ABS & TRAC actuator
C1235/35 (05-788)	Foreign matter is attached on the tip of the right front sensor	・Right front and left front speed sensor ・Each speed sensor ・Sensor installation

C1236/36 (05-788)	Foreign matter is attached on the tip of the left front sensor	・Right front and left front speed sensor ・Each speed sensor ・Sensor installation
C1238/38 (05-795)	Foreign matter is attached on the tip of the right rear sensor	・Right rear and left rear speed sensor ・Each speed sensor ・Sensor installation
C1239/39 (05-795)	Foreign matter is attached on the tip of the left rear sensor	・Right rear and left rear speed sensor ・Each speed sensor ・Sensor installation
C1241/41 (05-827)	Low battery positive voltage	・Battery ・Charging system ・Power source circuit
C1243/43*1 (05-824)	Malfunction in deceleration sensor (constant output)	・Yaw rate sensor (Deceleration sensor) ・Yaw rate sensor circuit (Deceleration sensor circuit)
C1244/44 (05-824)	Malfunction in deceleration sensor	・Yaw rate sensor (Deceleration sensor) ・Yaw rate sensor circuit (Deceleration sensor circuit)
C1245/45*1 (05-824)	Malfunction in deceleration sensor	・Yaw rate sensor (Deceleration sensor) ・Yaw rate sensor circuit (Deceleration sensor circuit)
C1246/46*2 (05-830)	Malfunction in master cylinder pressure sensor	・Master cylinder pressure sensor ・Master cylinder pressure sensor circuit
C1249/49 (05-832)	Open circuit in stop light switch circuit	・Stop lamp bulb ・Stop lamp switch ・Stop lamp switch circuit
C1251/51*1 (05-835)	ABS pump motor is locked Open circuit in pump motor circuit	・ABS & TRAC actuator ・ABS & TRAC actuator circuit
C1267/67 (05-837)	Open or short circuit of brake pedal load sensing switch circuit	・Brake pedal load sensing switch ・Brake pedal load sensing switch circuit
C1361/91 (05-804)	Short circuit in ABS motor fail safe relay circuit	・ABS No.2 fuse ・ABS MTR relay ・ABS MTR relay circuit ・J/B No.2
C1381/97 (05-824)	Malfunction in power supply voltage yaw/deceleration sensor	・Yaw rate sensor ・Yaw rate sensor power source circuit
U0121/94 (05-2090)	Malfunction in CAN communication	・Wire harness ・Skid control ECU
U0124/95 (05-2090)	Malfunction in CAN communication with deceleration sensor	・Wire harness ・Yaw rate sensor (Deceleration sensor)

*1, *2:

Even after the trouble areas are repaired, the ABS warning light will not go off unless the following operations are performed.

＊ *1:

(1) Drive the vehicle at 12 mph (20 km/h) for 30 seconds or more and check that the ABS warning light goes off.

(2) Clear the DTC (see page 05-765).

＊ *2:

(1) Keep the vehicle in a stationary condition for 5 seconds or more and depress the brake pedal lightly 2 or 3 times.

(2) Drive the vehicle at a vehicle speed of 31 mph (50 km/h). Then depress the brake pedal strongly for about 3 seconds.

(3) Repeat the above operation 3 times or more and check that the ABS warning light goes off.

(4) Clear the DTC (see page 05-765).

HINT:

* In some cases, the hand-held tester cannot be used when ABS warning light remains on.

DTC chart of VSC:

DTC No. (See Page)	Detection Item	Trouble Area
C1201/51 (05-812)	Malfunction in ECM	Engine control system
C1203/53 (05-813)	Malfunction in ECM communication circuit	• TRC+ or TRC- circuit • ENG+ or ENG- circuit • ECM
C1210/36 (05-815)	Zero point calibration of yaw rate sensor undone	• Yaw rate sensor (Deceleration sensor) • Zero point calibration undone
C1223/43 (05-817)	Malfunction in ABS control system	ABS control system
C1224/44 (05-818)	Open or short circuit in NEO signal circuit	• NEO circuit • ECM • Skid control ECU
C1231/31 (05-821)	Malfunction in steering angle sensor	• Steering angle sensor • Steering angle sensor circuit • +B circuit • Can communication system
C1232/32 (05-824)	Malfunction in deceleration sensor	• Yaw rate / deceleration • Yaw rate / deceleration sensor circuit
C1234/34 (05-824)	Malfunction in yaw rate sensor	• Yaw rate / deceleration • Yaw rate / deceleration sensor circuit
C1336/39 (05-815)	Zero point calibration of deceleration sensor undone	• Yaw rate sensor (Deceleration sensor) • Zero point calibration not done
U0123/62 (05-2090)	Malfunction in CAN communication with yaw rate sensor	• Wire harness • Yaw rate sensor (Deceleration sensor)
U0126/63 (05-2090)	Malfunction in CAN communication with angle position sensor	• Wire harness • Steering angle sensor

HINT:

In some cases, the hand-held tester cannot be used when the VSC warning light remains on.

DTC of sensor check function:

Code No.	Diagnosis	Trouble Area
C1271/71	Low output voltage of right front speed sensor	• Right front speed sensor • Sensor installation • Sensor rotor
C1272/72	Low output voltage of left front speed sensor	• Left front speed sensor • Sensor installation • Sensor rotor
C1273/73	Low output voltage of right rear speed sensor	• Right rear speed sensor • Sensor installation • Sensor rotor
C1274/74	Low output voltage of left rear speed sensor	• Left rear speed sensor • Sensor installation • Sensor rotor
C1275/75	Abnormal change in output voltage of right front speed sensor	Right front sensor rotor
C1276/76	Abnormal change in output voltage of left front speed sensor	Left front speed sensor rotor
C1277/77	Abnormal change in output voltage of right rear speed sensor	Right rear sensor rotor
C1278/78	Abnormal change in output voltage of left rear speed sensor	Left rear speed sensor rotor

Code No.	Diagnosis	Trouble Area
C1279/79	Deceleration sensor is faulty	・Yaw rate sensor (Deceleration sensor) ・Sensor installation
C1281/81	Master cylinder pressure sensor output signal is faulty	Master cylinder pressure sensor
C0371/71	Yaw rate sensor output signal is faulty	Yaw rate sensor (Deceleration sensor)

ABS WITH EBD & BA & TRAC & VSC SYSTEM

05CCW-06

HOW TO PROCEED WITH TROUBLESHOOTING

The hand-held tester can be used at step 3, 6, 9, 12.

1	Vehicle Brought to Workshop

2	Customer Problem Analysis (SEE PAGE 05-763)

3	Check and Clear DTCs and Freeze Frame Data (SEE PAGE 05-765)

4	Problem Symptom Confirmation

- Symptom does not occurs: Go to step 5
- Symptom occurs: Go to step 6

5	Symptom Simulation (SEE PAGE 01-36)

6	DTC Check (SEE PAGE 05-765)

- There is no output: Go to step 7
- There is output: Go to step 8

7	Problem Symptoms Table (SEE PAGE 05-786)

- Check for fluid leakage and Go to step 10

8	DTC Chart (SEE PAGE 05-779)

9	Circuit Inspection (SEE PAGE 05-788 to 05-873)

10	Identification of Problem

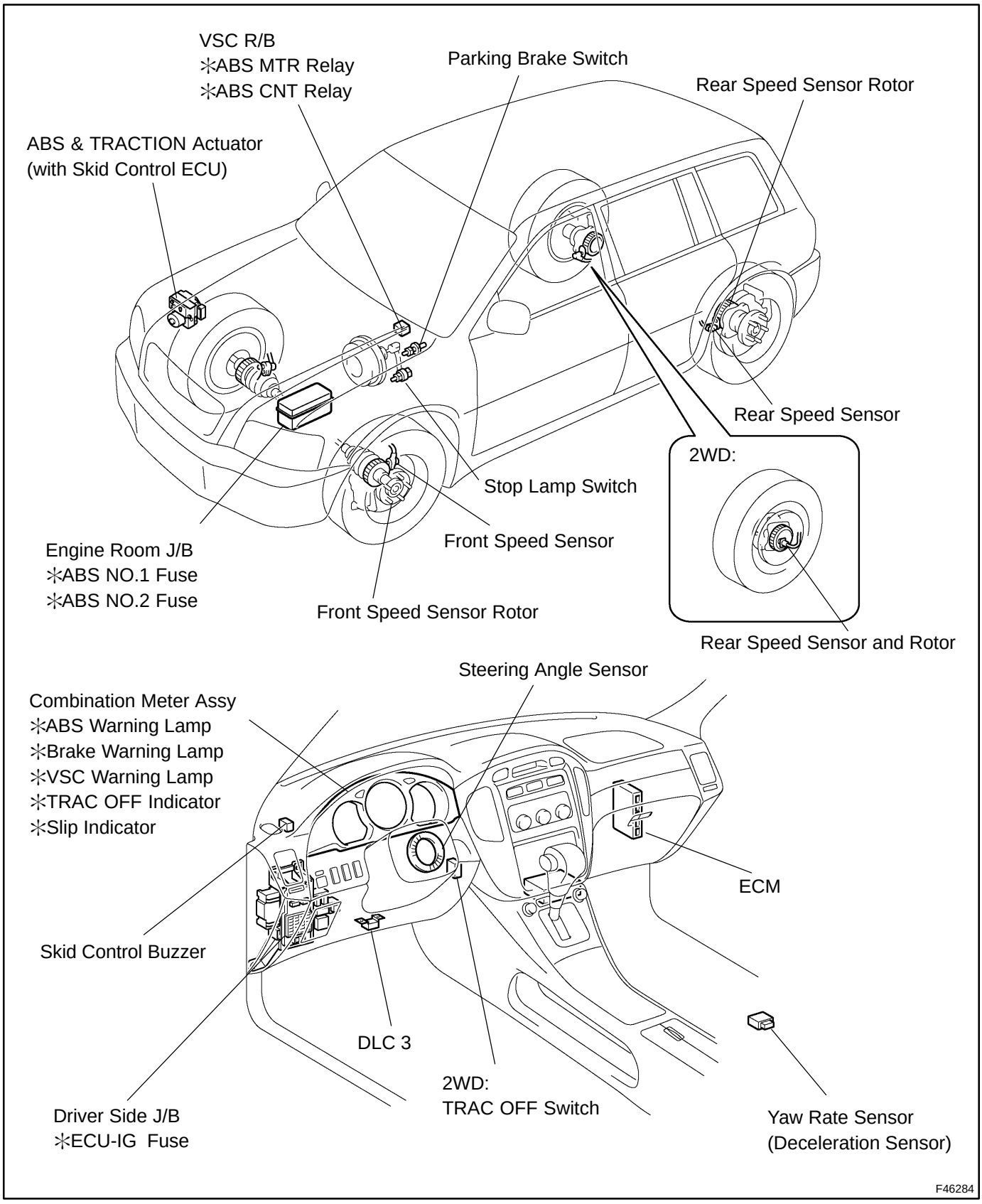
11	Repair

12	Confirmation Test

End

05CD0-06

LOCATION



05H3Y-02

PRE-CHECK

1. DIAGNOSIS SYSTEM

(a) Check the warning lights.

(1) Release parking brake lever.

NOTICE:

When releasing the parking brake, set the chocks to hold the vehicle for safety.

HINT:

When the parking brake is applied or the level of the brake fluid is low, the BRAKE warning light comes on.

(2) When the ignition switch is turned to the ON position, check that the ABS warning light, BRAKE warning light, VSC warning light, TRAC OFF indicator light and SLIP indicator light remain on for approx. 3 seconds.

HINT:

- If the ECU has any stored DTCs, the ABS warning light, VSC warning light and TRAC OFF indicator light come on.
- If the indicator does not come on, inspect if the bulb is blown out, and also the wire harness between the skid control ECU and the combination meter.
- If the indicator remains on, proceed to troubleshooting for the light circuit below.

Trouble Area	See page
ABS warning light circuit	05-840 or 05-844
VSC warning light circuit	05-847 or 05-851
BRAKE warning light circuit	05-854
TRAC OFF indicator light circuit	05-859
SLIP indicator light circuit	05-863

ABS Warning Light **BRAKE Warning Light**

USA: USA:





Canada: Canada:





VSC Warning Light **SLIP Indicator Light**

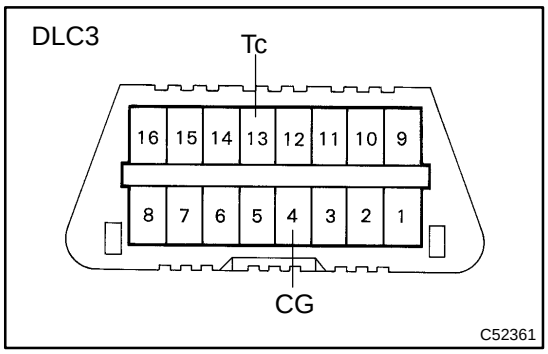




TRAC OFF Indicator Light



F45096



2. DTC CHECK/CLEAR (USING SST CHECK WIRE)

(a) Check DTCs.

(1) Using SST, connect terminals Tc and CG of the DLC3.

SST 09843-18040

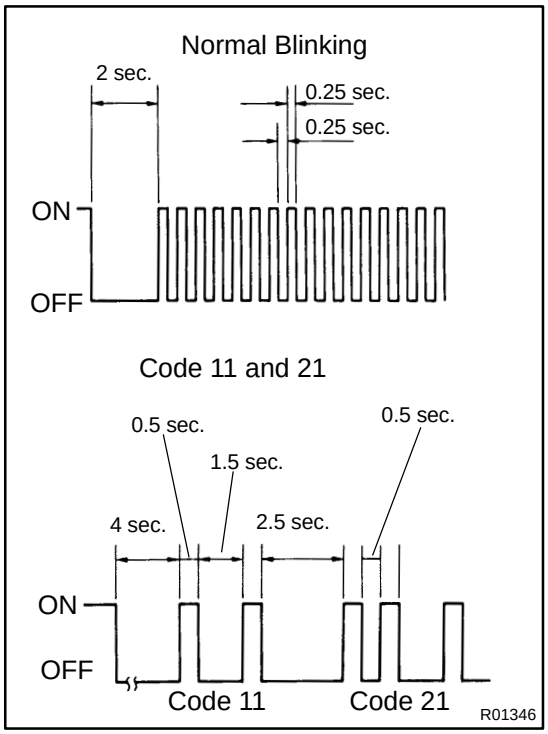
(2) Turn the ignition switch to the ON position.

(3) Read the DTC from the ABS warning light or VSC warning light on the combination meter.

HINT:

* If 2 or more malfunctions are detected at the same time, the lowest numbered code will be displayed first.
* If no code appears, inspect the diagnostic circuit, ABS warning light circuit or VSC warning light circuit.

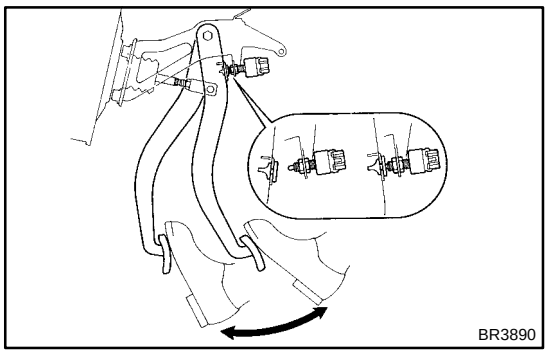
Trouble Area	See page
Tc and CG terminal circuit	05-868
ABS warning light circuit	05-840 or 05-844
VSC warning light circuit	05-847 or 05-851



* As an example, the blinking patterns for a normal system code and codes 11 and 21 are shown on the left.

(4) Codes are explained in the code table on page 05-779 .

(5) After completing the check, disconnect terminals Tc and CG of the DLC3, and turn off the display.



(b) Clear DTCs.
(1) Using SST, connect terminals Tc and CG of the DLC3.
SST 09843-18040
(2) Turn the ignition switch to the ON position.
(3) Clear the DTCs stored in the ECU by depressing the brake pedal 8 or more times within 5 sec.
(4) Check that the ABS warning light and VSC warning light shows normal blinking patterns.
(5) Remove the SST from the DLC3.
SST 09843-18040

HINT:
Cancellation cannot be preformed by removing the battery cable or the ECU-IG fuse.

3. DTC CHECK/CLEAR (USING HAND-HELD TESTER)

(a) Check DTCs.
(1) Connect the hand-held tester to the DLC3.
(2) Turn the ignition switch to the ON position.
(3) Read the DTCs following the prompts on the tester screen.

HINT:
Refer to the hand-held tester operator's manual for further details.

(b) Clear the DTCs.
(1) Connect the hand-held tester to the DLC3.
(2) Turn the ignition switch to the ON position.
(3) Operate the hand-held tester to erase the codes.

HINT:
Refer to the hand-held tester operator's manual for further details.

4. DATA LIST

HINT:
According to the DATA LIST displayed on the Hand-held tester, you can read the value and status of the switch, sensor, actuator and so on without parts removal. Reading the DATA LIST as a first step of troubleshooting is one of the methods to shorten the labor time.

(a) Connect the Hand-held tester to the DLC3.
(b) Turn the ignition switch ON.
(c) From the display on the tester, read the "DATA LIST".

*: 2WD only

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
ABS MOT RELAY	ABS motor relay / ON or OFF	ON : Motor relay ON	-
SOL RELAY	Solenoid relay / ON or OFF	ON : Solenoid relay ON	-
VSC / TRC OFF SW*	TRAC control switch / ON or OFF	ON : TRAC control switch ON	-
IDLE SW	Main idle switch / ON or OFF	ON : Accelerator pedal released OFF : Accelerator pedal depressed	-

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
STOP LIGHT SW	Stop lamp switch / ON or OFF	ON : Brake pedal depressed OFF : Brake pedal released	-
PKB SW	Parking brake switch / ON or OFF	ON : Parking brake applied OFF : Parking brake released	-
STEP FORCE SW	Brake load sensing switch / ON or OFF	ON : Depressed brake pedal OFF : Released brake pedal	-
ABS OPERT FR	ABS operation (FR) / BEFORE or OPERATE	BEFORE : No ABS operation (FR) OPERATE : During ABS operation (FR)	-
ABS OPERT FL	ABS operation (FL) / BEFORE or OPERATE	BEFORE : No ABS operation (FL) OPERATE : During ABS operation (FL)	-
ABS OPERT RR	ABS operation (RR) / BEFORE or OPERATE	BEFORE : No ABS operation (RR) OPERATE : During ABS operation (RR)	-
ABS OPERT RL	ABS operation (RL) / BEFORE or OPERATE	BEFORE : No ABS operation (RL) OPERATE : During ABS operation (RL)	-
WHEEL SPD FR	Wheel speed sensor (FR) reading / min.: 0 km/h (0 MPH, max.: 326 km/h (202 MPH)	Actual wheel speed	Similar speed as indicated on speedometer
WHEEL SPD FL	Wheel speed sensor (FL) reading / min.: 0 km/h (0 MPH, max.: 326 km/h (202 MPH)	Actual wheel speed	Similar speed as indicated on speedometer
WHEEL SPD RR	Wheel speed sensor (RR) reading / min.: 0 km/h (0 MPH, max.: 326 km/h (202 MPH)	Actual wheel speed	Similar speed as indicated on speedometer
WHEEL SPD RL	Wheel speed sensor (RL) reading / min.: 0 km/h (0 MPH, max.: 326 km/h (202 MPH)	Actual wheel speed	Similar speed as indicated on speedometer
DECELERAT SENS	Deceleration sensor 1 reading / min.: -1.869 G, max.: 1.869 G	Approximately 0 ± 0.13G at still condition	Reading changes when vehicle is bounced
DECELERAT SENS2	Deceleration sensor 2 reading / min.: -1.869 G, max.: 1.869 G	Approximately 0 ± 0.13G at still condition	Reading changes when vehicle is bounced
IG VOLTAGE	ECU power supply voltage / TOO LOW / NORMAL	NORMAL: 9.5 V or over TOO LOW: Below 9.5 V	-
SFRR	ABS solenoid (SFRR) / ON or OFF	ON : Operate	-
SFRH	ABS solenoid (SFRH) / ON or OFF	ON : Operate	-
SFLR	ABS solenoid (SFLR) / ON or OFF	ON : Operate	-

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
SFLH	ABS solenoid (SFLH) / ON or OFF	ON : Operate	-
SRRR (SRR)	ABS solenoid (SRRR (SRR)) / ON or OFF	ON : Operate	-
SRRH (SRH)	ABS solenoid (SRRH (SRH)) / ON or OFF	ON : Operate	-
SRLR	ABS solenoid (SRLR) / ON or OFF	ON : Operate	-
SRLH	ABS solenoid (SRLH) / ON or OFF	ON : Operate	-
SMF (BA-SOL)	TRAC solenoid (SMF) / ON or OFF	ON : Operate	-
SMR	TRAC solenoid (SMR) / ON or OFF	ON : Operate	-
THROTTLE	Throttle position sensor/ Min.: 0 deg, Max.: 125 deg	Release accelerator pedal: Approx. 0 deg. Depress accelerator pedal: Approx. 90 deg.	-
ENGINE SPD	Engine Speed/ Min.: 0 rpm, Max.: 6,000 rpm	Actual engine speed	-
VEHICLE SPD	Maximum wheel speed sensor reading / min.: 0 km/h (0 MPH), max.: 326 km/h (202 MPH)	Actual vehicle speed	Similar speed as indicated on speedometer
YAW RATE	Yaw rate sensor/ Min.: -128 deg/s, Max.: 128 deg/s	Min.: -128 deg/s Max.: 128 deg/s	-
YAW ZERO VALUE	Memorized zero value/ Min.: -128 deg/s, Max.: 128 deg/s	Min.: -128 deg/s Max.: 128 deg/s	-
STEERING ANG	Steering sensor/ Min.: -1152 deg, Max.: 1150.875 deg	Left turn: Increase Right turn: Decrease	-
MAS CYL PRS 1	Master cylinder pressure sensor 1 reading / min.: 0 V, max.: 5 V	When brake pedal is released : 0.3 to 0.9 V	Reading increases when brake pedal is depressed
TEST MODE	Test mode / NORMAL or TEST	NORMAL : Normal mode TEST : During test mode	-
#CODES	Number of DTC recorded / min.: 0, max.: 255	Min.: 0, max.: 39	-

5. ACTIVE TEST

HINT:

Performing the ACTIVE TEST using the hand-held tester allows the relay and actuator, etc. to operate without removing any parts. Performing the ACTIVE TEST as the first step of troubleshooting is one of the methods to shorten labor time.

It is possible to display the DATA LIST during the ACTIVE TEST.

(a) Connect the hand-held tester to the DLC3.

(b) Turn the ignition switch to the ON position.

(c) According to the display on the tester, perform the ”ACTIVE TEST”.

HINT:

Ignition switch must be turned to the ON position to proceed to the ACTIVE TEST using the hand-held tester.

Item	Vehicle Condition / Test Details	Diagnostic Note
SFRR	Turns ABS solenoid (SFRR) ON / OFF	Operation of solenoid (clicking sound) can be heard
SFRH	Turns ABS solenoid (SFRH) ON / OFF	Operation of solenoid (clicking sound) can be heard
SFLR	Turns ABS solenoid (SFLR) ON / OFF	Operation of solenoid (clicking sound) can be heard
SFLH	Turns ABS solenoid (SFLH) ON / OFF	Operation of solenoid (clicking sound) can be heard
SRRR	Turns ABS solenoid (SRRR) ON / OFF	Operation of solenoid (clicking sound) can be heard
SRRH	Turns ABS solenoid (SRRH) ON / OFF	Operation of solenoid (clicking sound) can be heard
SRLR	Turns ABS solenoid (SRLR) ON / OFF	Operation of solenoid (clicking sound) can be heard
SRLH	Turns ABS solenoid (SRLH) ON / OFF	Operation of solenoid (clicking sound) can be heard
SMF (BA-SOL)	Turns TRAC solenoid SMF (BA-SOL) ON / OFF	Operation of solenoid (clicking sound) can be heard
SMR	Turns TRAC solenoid SMR ON / OFF	Operation of solenoid (clicking sound) can be heard
SOL RELAY	Turns ABS solenoid relay ON / OFF	Operation of solenoid (clicking sound) can be heard
ABS MOT RELAY	Turns ABS motor relay ON / OFF	Operation sound of motor can be heard
ABS WARN LIGHT	Turns ABS warning light ON / OFF	Observe combination meter
VSC WARN LIGHT	Turns VSC warning light ON / OFF	Observe combination meter
VSC / TRAC OFF IND*	Turns VSC / TRAC OFF indicator ON / OFF	Observe combination meter
SLIP INDI LIGHT	Turns SLIP indicator light ON / OFF	Observe combination meter

Item	Vehicle Condition / Test Details	Diagnostic Note
BRAKE WRN LIGHT	Turns BRAKE warning light ON / OFF	Observe combination meter
VSC / BR WARN BUZ	Turns VSC / BRAKE warning buzzer ON / OFF	Buzzer can be heard

*: 2WD only

6. FREEZE FRAME DATA

HINT:

- ⁎ Whenever a DTC is detected or the ABS operates, the skid control ECU stores the current vehicle (sensor) state as freeze frame data.
- ⁎ The skid control ECU stores the number of times (maximum: 31) the ignition switch has been turned from off to the On position since the last time ABS was activated. However, if the vehicle was stopped or at low speed (4.3 mph (7 km/h) or less), or if a DTC is detected, the skid control ECU will not count the number since then.
- ⁎ Freeze frame data at the time the ABS operates:
  The skid control ECU stores and updates data whenever the ABS system operates.
  When the ECU stores data at the time a DTC is detected, the data stored when the ABS operated is erased.
- ⁎ Freeze frame data at the time a DTC is detected:
  When the skid control ECU stores data at the time a DTC is detected, no updates will be performed until the data is cleared.

(a) Connect the Hand-held tester to the DLC3.
(b) Turn the ignition switch to the ON position.
(c) From the display on the tester, select the ”FREEZE FRAME DATA”.

Hand-held tester display	Measurement Item	Reference Value
VEHICLE SPD	Wheel speed sensor reading	Speed indicated on speedometer
STOP LIGHT SW	Stop lamp switch signal	Stop lamp switch ON: ON, OFF: OFF
# IG ON	Number of operations of ignition switch ON after memorizing freeze frame data	0 to 31
MAS CYL PRESS	Master cylinder pressure sensor reading	Brake pedal release : 0.3 to 0.9 V Brake pedal depress: 0.8 to 4.5 V
MASS PRESS GRADE	Master cylinder pressure sensor change	-30 to 200 MPa/s
SYSTEM	System status	ABS activated: ABS VSC/TRC activated: VSC/TRC BA activated: BA Fail safe mode activated: FAIL SF No system activated: NO SYS
YAW RATE	Yaw rate angle sensor reading	-100 to 100
STEERING ANG	Steering sensor reading	Left turn: Increase Right turn: Decrease
G (RIGHT & LEFT)	Right and left G	-1.869 to 1.869
G (BACK & FORTH)	Back and forth G	-1.869 to 1.869
VSC (TRC) OFF SW*	TRAC control switch signal	TRC control switch ON: ON OFF: OFF
SHIFT POSITION	Shift lever position	FAIL P,N R D 4 3 2 L
THROTTLE	Throttle sensor reading	0 to 125 deg.

*: 2WD only

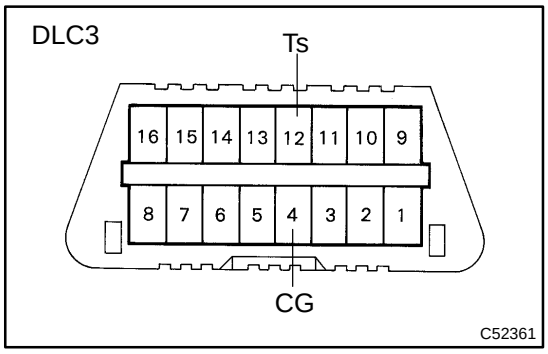
7. SENSOR SIGNAL CHECK (TEST MODE) (USING SST CHECK WIRE)

NOTICE:

After replacing the yaw rate sensor (deceleration sensor) and/or brake actuator assembly (skid control ECU), perform zero point calibration of the yaw rate sensor and deceleration sensor. (See step 9.)

HINT:

- If the ignition switch is turned from ON to the ACC or LOCK position during test mode, DTC of sensor check function will be erased.
- During test mode, ECU records all DTCs of sensor check functions. By preforming sensor signal check, the codes are erased if normality is confirmed. The codes left over are the codes where an abnormality was found.



(a) Procedures for test mode:

(1) Turn the ignition switch off.

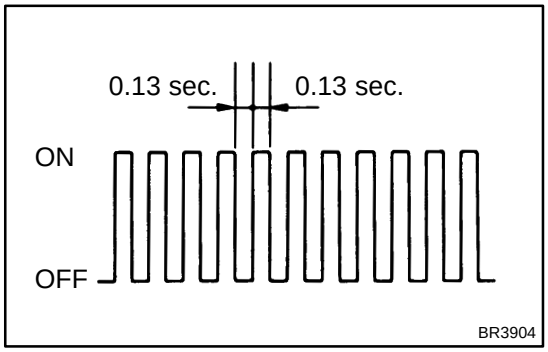
(2) Check that the steering wheel is in the straight-ahead position and shift the shift lever to the P position.

(3) Using SST, connect terminals Ts and CG of the DLC3.

SST 09843-18040

(4) Turn the ignition switch to the ON position.

(5) Check that the ABS warning light and VSC warning light blink.



HINT:

If the ABS warning light and VSC warning light do not blink, inspect the ABS warning light circuit, VSC warning light and Ts terminal circuit.

Trouble area	See Page
Ts and CG terminal circuit	05-873
ABS warning light circuit	05-840 or 05-844
VSC warning light circuit	05-847 or 05-851

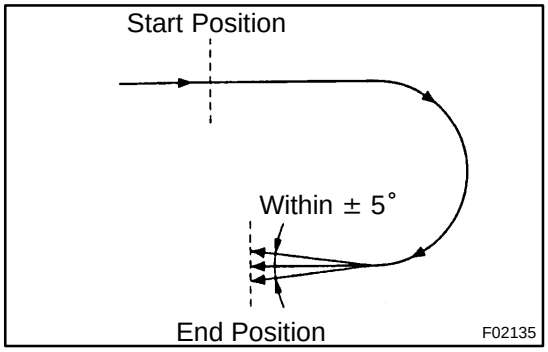
(b) Check the master cylinder pressure sensor:

(1) Leave the vehicle in a stationary condition and the brake pedal in a free condition for 1 second or more, and quickly depress the brake pedal with a force of 98 N (10 kgf, 22 lbf) or more for 1 second or more.

HINT:

- At this time, the ABS warning light remains on for 3 seconds.
- While the ABS warning light remains on, continue to depress the brake pedal with a force of 98 N (10 kgf) or more.
- The ABS warning light comes on for 3 seconds every time the brake pedal operation above is performed.

* If master cylinder pressure sensor check can not be completed, do not depress the brake pedal frequently. It may further reduce negative pressure and make the sensor check difficult to complete.
* If the negative pressure is insufficient, master cylinder pressure sensor check may not be completed. In this case, idle the engine to get enough negative pressure.
* If the brake pedal is depressed while engine is stopped, negative pressure may become insufficient and the BRL may come on. (It runs the motor and performs incorrect control.)



(c) Check the yaw rate sensor:

(1) Shift the shift lever to the D position and drive the vehicle at a speed of approx. 3 mph (5 km/h), turn the steering wheel either to the left or right 90˚ or more, and maintain a 180˚ circular drive for the vehicle.

(2) Stop the vehicle and shift the shift lever to the P position, and check that the skid control buzzer sounds for 3 sec.

NOTICE:

Deceleration sensor check should be completed before performing speed sensor check.

HINT:

* If the skid control buzzer sounds, the sensor check is completed normally.
* If the skid control buzzer does not sound, check the skid control buzzer circuit (See page 05-866), then perform the sensor check again. If the skid control buzzer still does not sound, there is a malfunction in the VSC sensor, so check for DTCs.
* Drive the vehicle in a 180˚ circle. At the end of the turn, ensure that the vehicle is exactly 180˚ within a tolerance of ± 5˚, and facing the other direction from its original start position.
* Do not spin the wheels.

(d) Check the speed sensor signal:

(1) Drive the vehicle straight forward at speed of 28 mph (45 km/h) or higher for several seconds and check that the ABS warning light goes off.

HINT:

The sensor check may not be completed if the vehicle has its wheels spun or its steering wheel turned during this check.

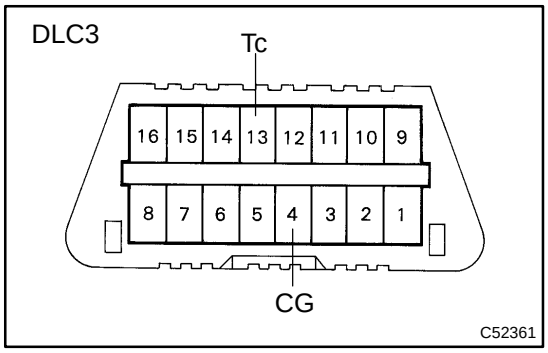
(2) Stop the vehicle.

NOTICE:

* **Before performing speed sensor check, complete master cylinder pressure sensor and deceleration sensor checks.**

* **Speed sensor check may not be completed if speed sensor check is started while turning the steering wheel or spinning the wheels.**
* **After the ABS warning light goes off, if the vehicle speed exceeds 50 mph (80 km/h), sensor check code is stored again. Decelerate or stop the vehicle before the speed reaches 50 mph (80 km/h).**
* **If sensor check has not been completed, the ABS warning light blinks while driving and ABS system does not operate.**

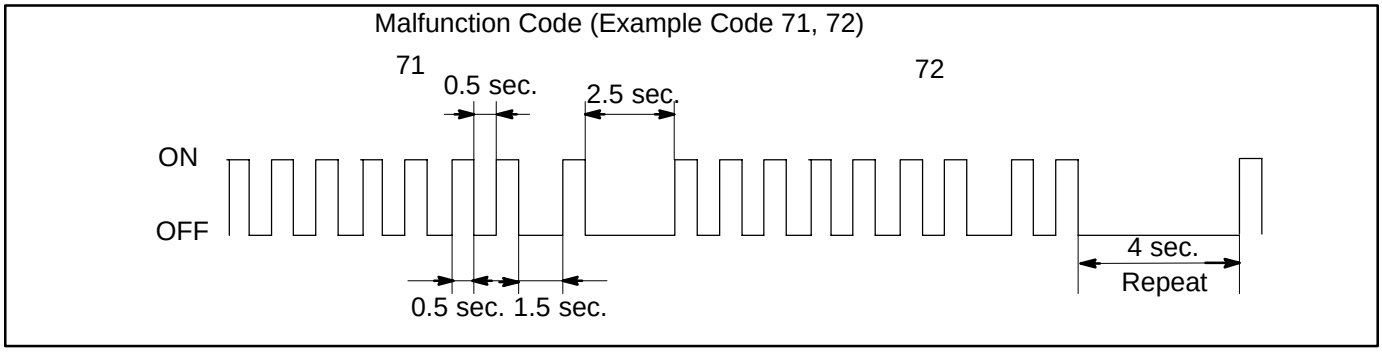
HINT:
When sensor check has been completed, the ABS warning light goes off while driving and blinks in the test mode pattern while standing.



(3) Using SST, connect terminals Tc and CG of the DLC3.
SST 09843-18040

(4) Read the number of blinks of the ABS warning light and VSC warning light.

HINT:
* See the list of DTC. (See page 05-779)
* If the check result is OK, the ABS warning light link goes off when the brake pedal is once depressed.
* If every sensor is normal, the normal blinking patterns are output. (A cycle of 0.25 seconds ON and 0.25 seconds OFF is repeated.)
* If 2 or more malfunctions are detected at the same time, the lowest numbered code will be displayed first.



(5) After performing the check, disconnect the SST from terminals Ts and CG, Tc and CG of the DLC3 and turn the ignition switch to the off position.

8. SENSOR SIGNAL CHECK (TEST MODE) (USING HAND-HELD TESTER)

NOTICE:

After replacing the yaw rate sensor (deceleration sensor) and/or brake actuator assembly (skid control ECU), perform zero point calibration of the yaw rate sensor and deceleration sensor. (See step 10.)

HINT:

- If the ignition switch is turned from ON to the ACC or LOCK position during test mode, DTC of sensor check function will be erased.
- During test mode, ECU records all DTC of sensor check function. By preforming sensor signal check, the codes are erased if normality is confirmed. The codes left over are the codes where an abnormality was found.

(a) Procedures for signal check:

(1) Turn the ignition switch off.

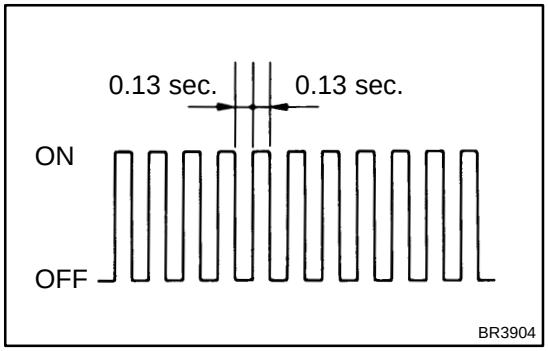
(2) Check that the shift lever position is in the P position.

(3) Connect the hand-held tester to the DLC3.

(4) Perform the signal check (test mode) by following the prompts on the tester screen.

[System Selection Screen]

"DIAGNOSIS" - "OBD/MOBD" - Select the vehicle - "ABS/VSC" - "SIGNAL CHECK"



(5) Check that the ABS warning light and VSC warning light blink.

HINT:

If the ABS warning light and VSC warning light do not blink, inspect the ABS warning light circuit and VSC warning light circuit.

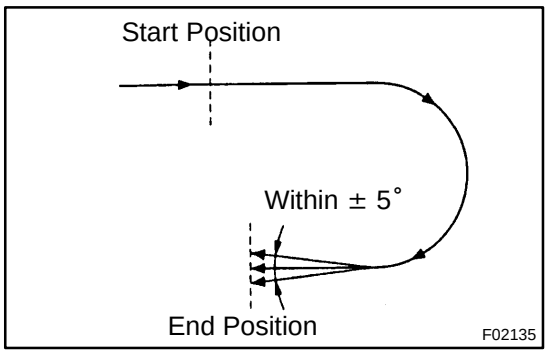
Trouble area	See Page
ABS warning light circuit	05-840 or 05-844
VSC warning light circuit	05-847 or 05-851

(b) Check the master cylinder pressure sensor:

(1) Leave the vehicle in a stationary condition and the brake pedal in a free condition for 1 second or more and quickly depress the brake pedal with a force of 98 N (10 kgf, 22 lbf) or more for 1 second or more.

HINT:

At this time, the ABS warning light remains on for 3 seconds.



(c) Check the yaw rate:

(1) Shift the shift lever to the D position and drive the vehicle at a speed of approx. 3 mph (5 km/h), and maintain a 180° circular drive for the vehicle.

(2) Stop the vehicle and shift the shift lever to the P position, and check that the skid control buzzer sounds for 3 seconds.

HINT:

- If the skid control buzzer sounds, the sensor check is completed normally.
- If the skid control buzzer does not sound, check the skid control buzzer circuit (See page 05-866), then perform the sensor check again. If the skid control buzzer still does not sound, there is a malfunction in the VSC sensor, so check for DTC.
- Drive the vehicle in a 180° circle. At the end of the turn, ensure that the vehicle is exactly 180° within a tolerance of ± 5°, and facing the other direction from its original start position.
- Do not spin the wheels.

(d) Check the speed sensor:

(1) Drive the vehicle straight forward at the speed of 28 mph (45 km/h) or higher for several seconds and check that the ABS warning light goes off.

HINT:

The sensor check may not be completed if the vehicle has its wheels spun or its steering wheel turned during this check.

(2) Stop the vehicle.

(e) Read the DTC following the tester screen.

HINT:

- Refer to the hand-held tester operator's manual for further details.
- If the check result is OK, the ABS warning light link goes off when the brake pedal is once depressed.

9. IF NECESSARY, PERFORM ZERO POINT CALIBRATION OF YAW RATE SENSOR AND/OR BRAKE ACTUATOR ASSY (USING SST CHECK WIRE)

NOTICE:

- **While obtaining the zero point, do not tilt, move or shake the vehicle but keep it in a stationary condition. (Do not start the engine.)**
- **Be sure to perform the operation on a level surface (within an inclination of 1 %).**

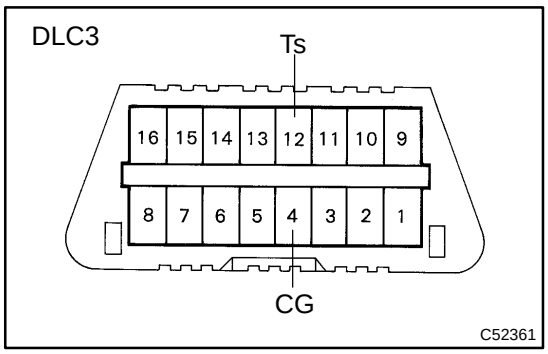
(a) Check that the steering wheel is in the straight-ahead position and shift the shift lever to the P position.

(b) Clear the zero point calibration:

HINT:

When replacing the yaw rate sensor only (not replace the brake actuator assy).

(1) Turn the ignition switch to the ON position.



(2) Using SST, connect and disconnect terminals Ts and CG of the DLC3 4 times or more within 8 seconds.
SST 09843-18040
(3) Remove the SST from the terminals of the DLC3.

(c) Obtain the zero point calibration:
(1) Turn the ignition switch off.
(2) Using SST, connect terminals Ts and CG of the DLC3.
SST 09843-18040
(3) Turn the ignition switch to the ON position.
(4) Keep the vehicle in a stationary condition on a level surface for 2 seconds or more.
(5) Check that the VSC warning light blinks.

HINT:
If the VSC warning light does not blink, perform the zero point calibration again.

(d) Remove the SST from the terminals of the DLC3.
SST 09843-18040
(e) Turn the ignition switch off.

10. IF NECESSARY, PERFORM ZERO POINT CALIBRATION OF YAW RATE SENSOR AND/OR BRAKE ACTUATOR ASSY (USING HAND-HELD TESTER)

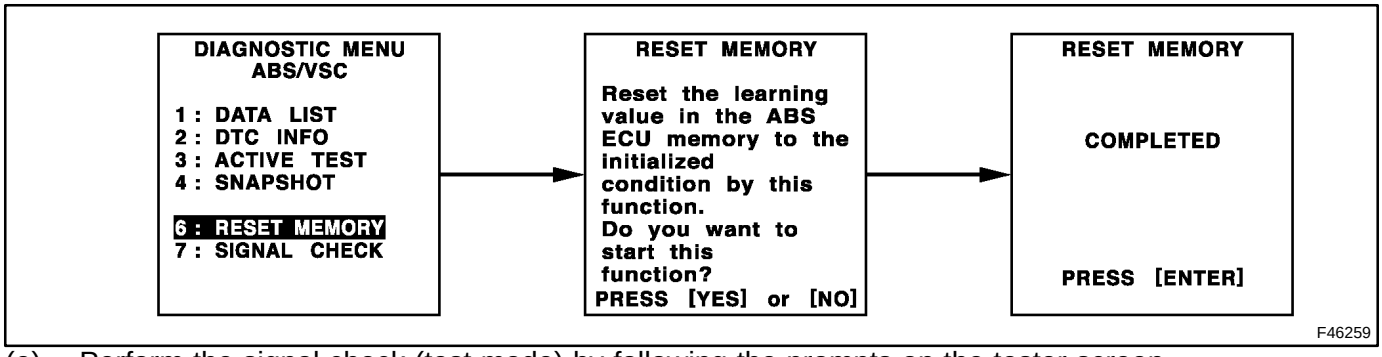
NOTICE:

- **While obtaining the zero point, do not tilt, move or shake the vehicle but keep it in a stationary condition. (Do not start the engine.)**
- **Be sure to perform the operation on a level surface (within an inclination of 1 %).**

(a) Check that the steering wheel is in the straight-ahead position and shift the shift lever to the P position.
(b) Connect the hand-held tester to the DLC3.
(c) Turn the ignition switch to the ON position.
(d) Perform the reset memory by following the prompts on the tester screen.

HINT:
When replace the yaw rate sensor only (not replace the brake actuator assy).

[System Selection Screen]
"DIAGNOSIS" - "OBD/MOBD" - Select the vehicle - "ABS/VSC" - "RESET MEMORY"



(e) Perform the signal check (test mode) by following the prompts on the tester screen.

[System Selection Screen]
"DIAGNOSIS" - "OBD/MOBD" - Select the vehicle - "ABS/VSC" - "SIGNAL CHECK"

(f) Obtain zero point of the yaw rate sensor and deceleration sensor:
(1) Keep the vehicle in a stationary condition on a level surface for 2 seconds or more.
(2) Check that the VSC warning light blinks.

HINT:
If the VSC warning light does not blink, perform the zero point calibration again.
(g) Turn the ignition switch off.

05CD2-13

PROBLEM SYMPTOMS TABLE

If there are no DTCs output but the problem still occurs, check the circuits for each problem symptom in the order given in the table below and proceed to the relevant troubleshooting page.

NOTICE:

When replacing the skid control ECU, sensor, etc., turn the ignition switch off.

Symptoms	Suspected Areas	See page
ABS does not operate BA does not operate EBD does not operate	1. Check the DTC again and make sure that the normal code is output. 2. IG power source circuit and ground circuit. 3. Speed sensor circuit 4. Check the ABS & TRAC actuator with a hand-held tester. If abnormal, check the hydraulic circuit for leakage. 5. If the symptoms still occur even after the above circuits in suspected areas are inspected and proved to be normal, replace the skid control ECU.	05-765 05-827 05-788 05-795 32-36
ABS does not operate efficiently BA does not operate efficiently EBD does not operate efficiently	1. Check the DTC again and make sure that the normal code is output. 2. Speed sensor circuit 3. Stop lamp switch circuit 4. Check the ABS & TRAC actuator with a hand-held tester. If abnormal, check the hydraulic circuit for leakage. 5. If the symptoms still occur even after the above circuits in suspected areas are inspected and proved to be normal, replace the skid control ECU.	05-765 05-788 05-795 32-36
ABS warning light abnormal Remain ON	1. ABS warning light circuit 2. Skid control ECU	05-840 -
ABS warning light abnormal Does not light up	1. ABS warning light circuit 2. Skid control ECU	05-844 -
DTC of ABS check cannot be done	1. Check the DTC again and make sure that the normal code is output. 2. TC terminal circuit 3. If the symptoms still occur even after the above circuits in suspected areas are inspected and proved to be normal, replace the skid control ECU.	05-765 05-868
Sensor signal check cannot be done	1. TS terminal circuit 2. Skid control ECU	05-873 -
VSC and/or TRAC does not operate	1. Check the DTC again and make sure that the normal code is output. 2. IG power source circuit and ground circuit. 3. Check the hydraulic circuit for leakage. 4. Speed sensor circuit 5. Deceleration sensor circuit 6. Yaw rate sensor circuit 7. Steering sensor circuit 8. If the symptoms still occur even after the above circuits in suspected areas are inspected and proved to be normal, replace the skid control ECU.	05-765 05-827 - 05-788 05-795 05-815 05-824 05-824 05-821
SLIP indicator light abnormal	1. SLIP indicator light circuit 2. Skid control ECU	05-863 -

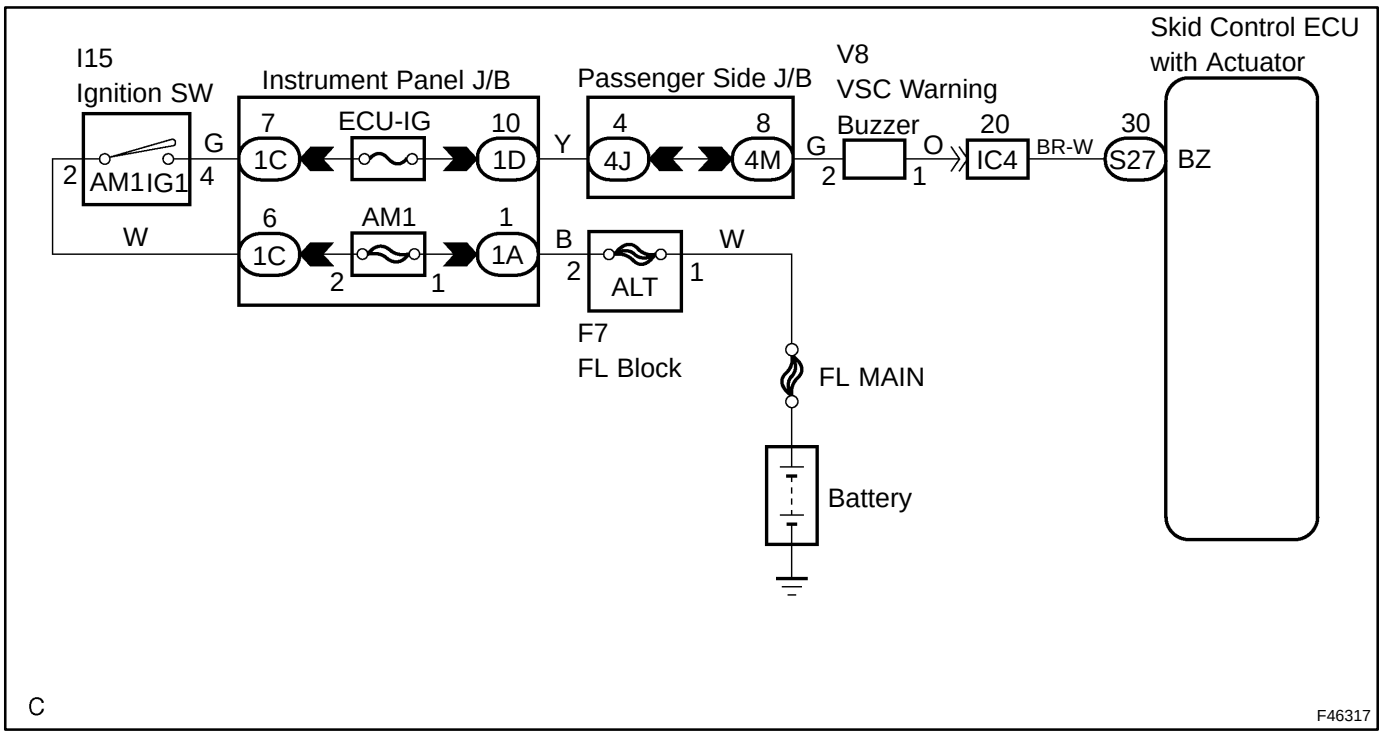
Symptoms	Suspected Areas	See page
TRAC OFF indicator abnormal	1. Check the DTC again and make sure that the normal code is output. 2. TRAC control switch circuit 3. If the symptoms still occur even after the above circuits in suspected areas are inspected and proved to be normal, replace the skid control ECU.	05-765 05-859
DTC of VSC check cannot be done	1. Check the DTC again and make sure that the normal code is output. 2. TC terminal circuit 3. If the symptoms still occur even after the above circuits in suspected areas are inspected and proved to be normal, replace the skid control ECU.	05-765 05-868
VSC warning light abnormal Remain ON	1. Check the DTC again and make sure that the normal code is output. 2. VSC warning circuit 3. If the symptoms still occur even after the above circuits in suspected areas are inspected and proved to be normal, replace the skid control ECU.	05-765 05-847
VSC warning light abnormal Does not light up	1. Check the DTC again and make sure that the normal code is output. 2. VSC warning circuit 3. If the symptoms still occur even after the above circuits in suspected areas are inspected and proved to be normal, replace the skid control ECU.	05-765 05-851

SKID CONTROL BUZZER CIRCUIT

CIRCUIT DESCRIPTION

The skid control buzzer sounds and Slip Indicator blinking during VSC operation.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Start the inspection from step 1 when using the hand-held tester and start from step 2 when not using the hand-held tester.

1	PERFORM ACTIVE TEST BY HAND-HELD TESTER(SKID CONTROL BUZZER)

(a) Connect the hand-held tester to the DLC3.

(b) Start the engine.

(c) Select the item "VSC/BR WARN BUZ" in the ACTIVE TEST and operate the skid control buzzer on the hand-held tester.

Item	Vehicle Condition / Test Details	Diagnostic Note
VSC / BR WARN BUZ	Turns VSC / BRAKE warning buzzer ON / OFF	Buzzer can be heard

(d) Check that skid control buzzer sounds by operating with the hand-held tester.

OK:

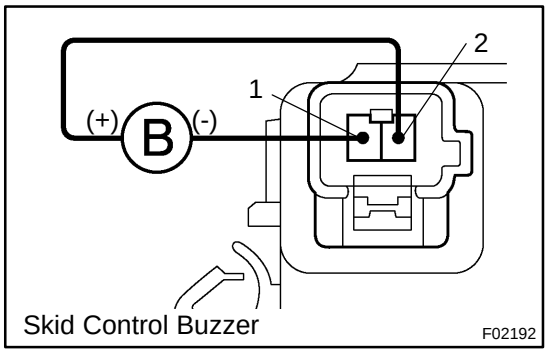
The skid control buzzer sounds in accordance with operation of the hand-held tester.

NG → **Go to step 2**

OK

REPLACE ABS & TRACTION ACTUATOR ASSY (SEE PAGE 32-37)

2	INSPECT SKID CONTROL BUZZER ASSY

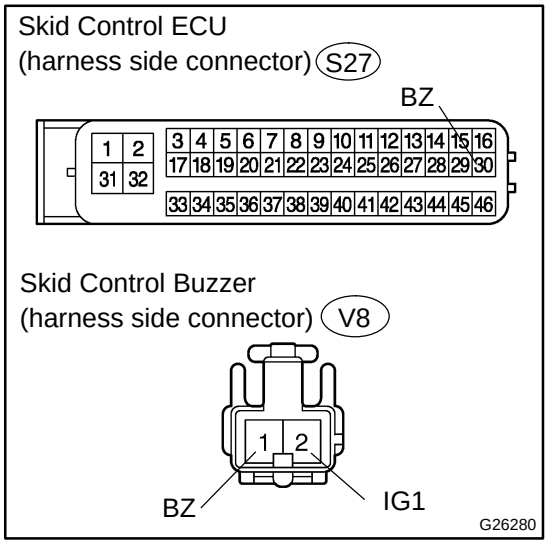


(a) Disconnect the skid control buzzer connector.
(b) Apply a battery positive voltage to terminals 1 and 2 of the skid control buzzer connector, and check that the buzzer sounds.
OK:
The skid control buzzer sound should be heard.

NG → **REPLACE SKID CONTROL BUZZER ASSY**

OK

3	CHECK HARNESS AND CONNECTOR(SKID CONTROL BUZZER - SKID CONTROL ECU)



(a) Disconnect the skid control buzzer connector and the skid control ECU connector.
(b) Measure the resistance according to the value(s) in the table below.
Standard:

Tester Connection	Specified Condition
S27-30 (BZ) - V8-1 (BZ)	Below 1 Ω

(c) Measure the resistance according to the value(s) in the table below.
Standard:

Tester Connection	Specified Condition
S27-30 (BZ) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

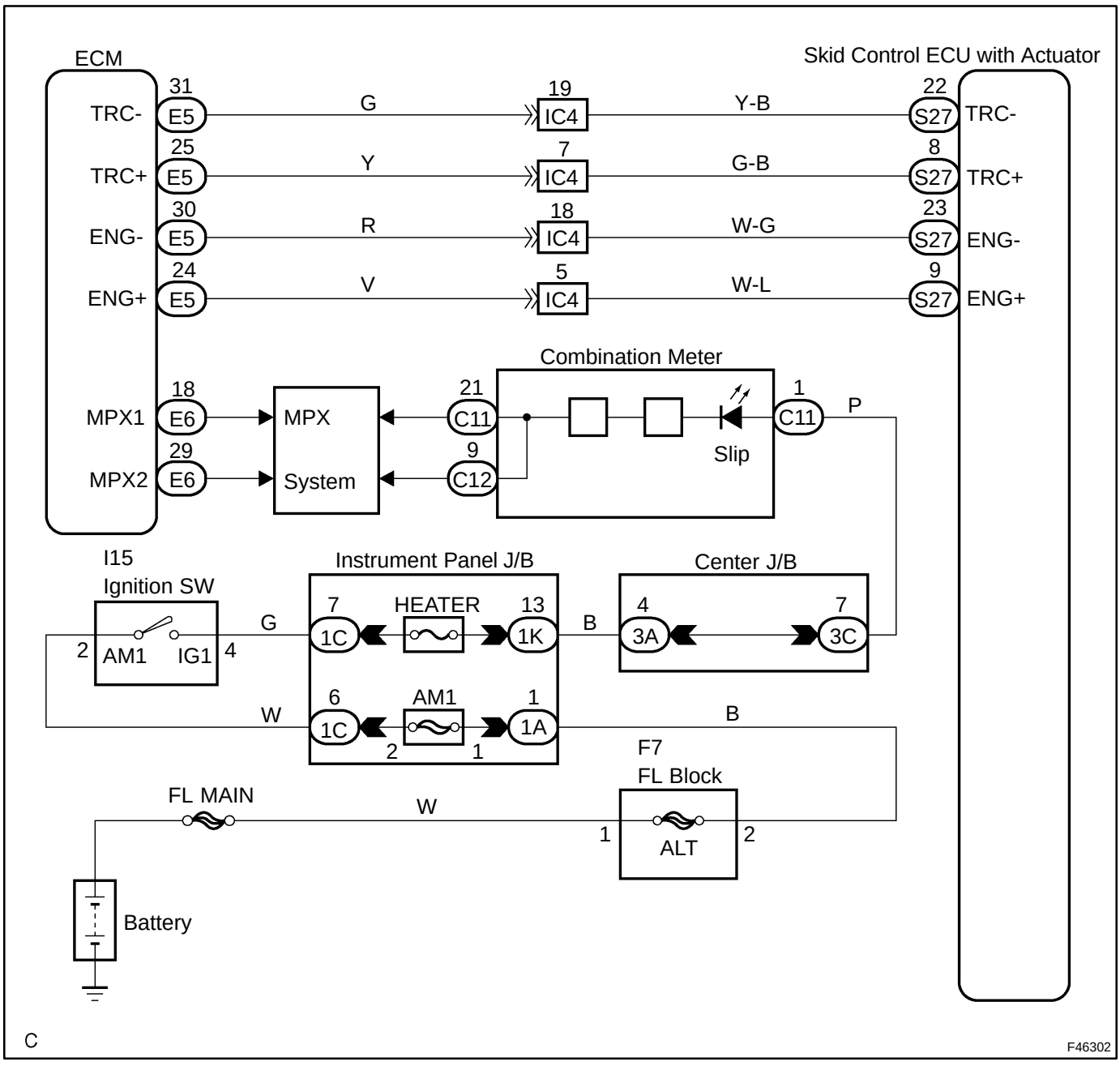
REPLACE ABS & TRACTION ACTUATOR ASSY (SEE PAGE 32-37)

SLIP INDICATOR LIGHT CIRCUIT

CIRCUIT DESCRIPTION

The SLIP indicator blinks during TRAC & VSC operation.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Start the inspection from step 1 when using the hand-held tester and start from step 2 when not using the hand-held tester.

1	PERFORM ACTIVE TEST BY HAND-HELD TESTER(SLIP INDICATOR LIGHT)

(a) Connect the hand-held tester to the DLC3.

(b) Start the engine.

(c) Select the item ”SLIP INDI LIGHT” in the ACTIVE TEST and operate the SLIP indicator light on the hand-held tester.

Item	Vehicle Condition / Test Details	Diagnostic Note
SLIP INDI LIGHT	Turns SLIP indicator light ON / OFF	Observe combination meter

(d) Check that ”ON” and ”OFF” of the SLIP indicator light are indicated on the combination meter when using the hand-held tester.

OK:

Turn the SLIP indicator light on or off in accordance with the hand-held tester.

NG → **Go to step 2**

OK

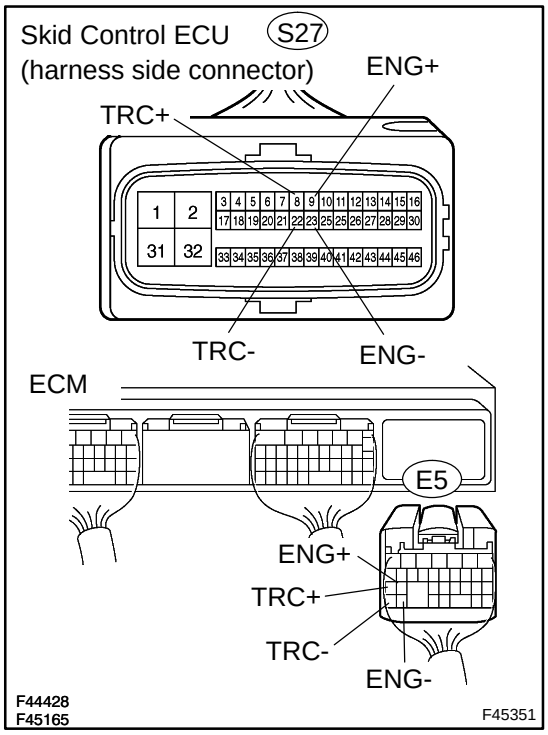
REPLACE ABS & TRACTION ACTUATOR ASSY (SEE PAGE 32-37)

2	INSPECT MULTIPLEX COMMUNCATION SYSTEM (SEE PAGE 05-2040)

NG → **REPAIR MULTIPLEX COMMUNCATION SYSTEM**

OK

3	CHECK HARNESS AND CONNECTOR(ECM - SKID CONTROL ECU)



(a) Disconnect the skid control ECU connector S27 and ECM connector E5.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition
S27-8 (TRC+) - E5-25 (TRC+)	Below 1 Ω
S27-22 (TRC-) - E5-31 (TRC-)	
S27-9 (ENG+) - E5-24 (ENG+)	
S27-23 (ENG-) - E5-30 (ENG-)	

(c) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition
S27-8 (TRC+) - Body ground	10 kΩ or higher
S27-22 (TRC-) - Body ground	
S27-9 (ENG+) - Body ground	
S27-23 (ENG-) - Body ground	

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4	INSPECT COMBINATION METER ASSEMBLY(SLIP INDICATOR LIGHT) (SEE PAGE 05-1868)

NG → **REPAIR OR REPLACE COMBINATION METER ASSEMBLY**

OK

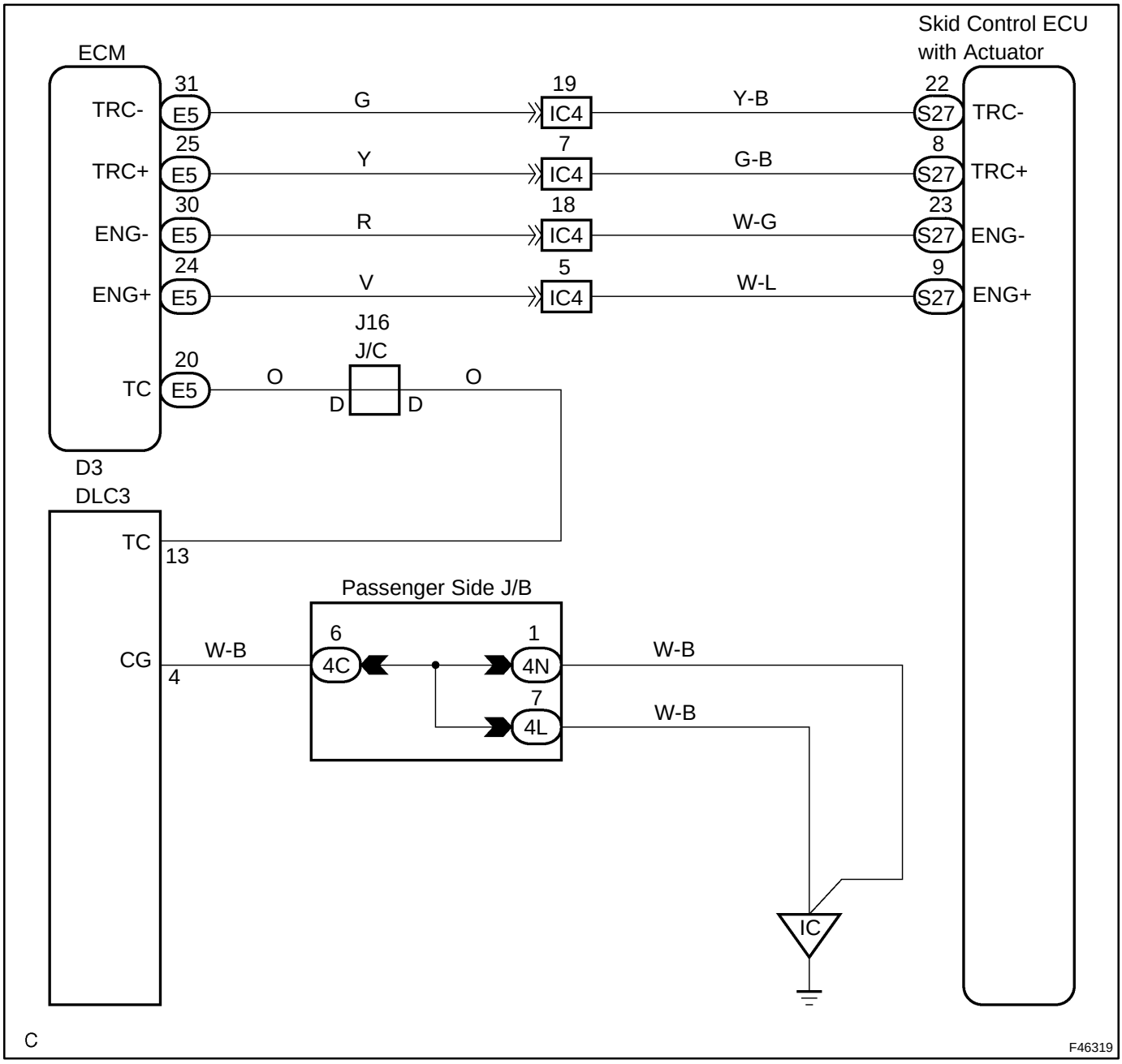
REPLACE ABS & TRACTION ACTUATOR ASSY (SEE PAGE 32-37)

TC AND CG TERMINAL CIRCUIT

CIRCUIT DESCRIPTION

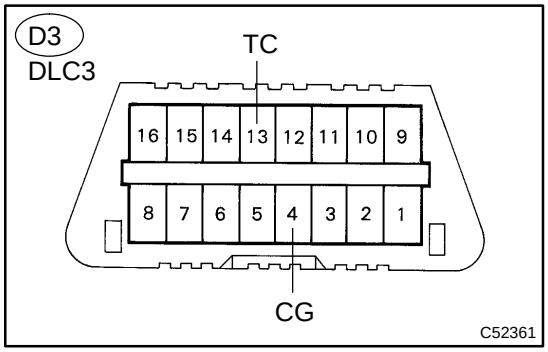
Connecting terminals TC and CG of the DLC3 causes the ECU to display the DTC by flashing the ABS warning light.

WIRING DIAGRAM



INSPECTION PROCEDURE

1 INSPECT DLC3 TERMINAL VOLTAGE(DLC3 TERMINAL VOLTAGE)



(a) Turn the ignition switch to the ON position.
(b) Measure the voltage according to the value(s) in the table below.

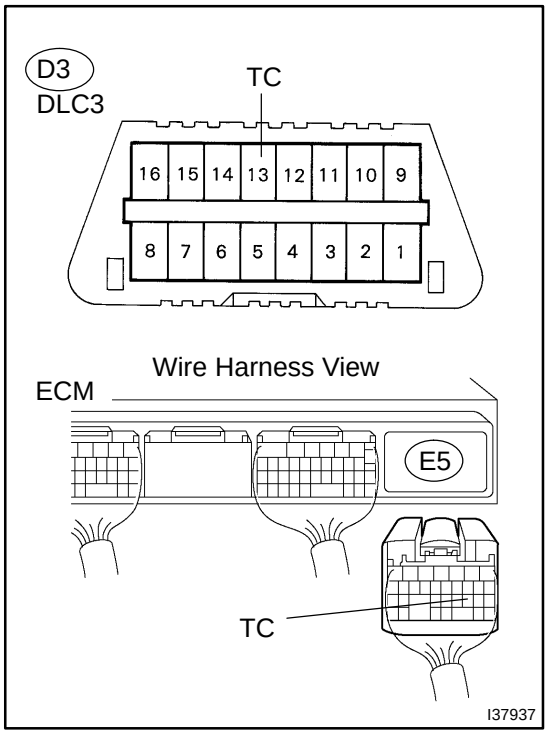
Standard:

Tester Connection	Specified Condition
D3-13 (TC) - D3-4 (CG)	10 to 14 V

NG → **Go to step 4**

OK

2 CHECK HARNESS AND CONNECTOR(ECM - DLC3)



(a) Disconnect the ECM connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition
E5-20 (TC) - D3-13 (TC)	Below 1 Ω

(c) Measure the resistance according to the value(s) in the table below.

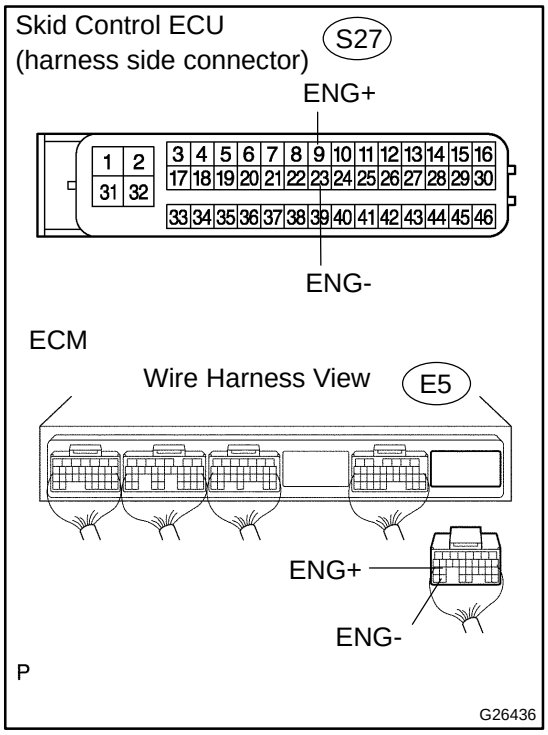
Standard:

Tester Connection	Specified Condition
D3-13 (TC) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3 CHECK HARNESS AND CONNECTOR(ECM - SKID CONTROL ECU)



(a) Disconnect the skid control ECU connector and the ECM connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition
E5-24 (ENG+) - S27-9 (ENG+)	Below 1 Ω
E5-30 (ENG-) - S27-23 (ENG-)	Below 1 Ω

(c) Measure the resistance according to the value(s) in the table below.

Standard:

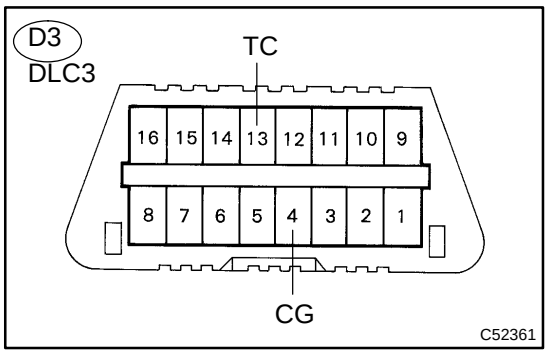
Tester Connection	Specified Condition
S27-9 (ENG+) - Body ground	10 kΩ or higher
S27-23 (ENG-) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE ABS & TRACTION ACTUATOR ASSY (SEE PAGE 32-37)

4 CHECK HARNESS AND CONNECTOR(DLC 3 - BODY GROUND)



(a) Disconnect the skid control ECU connector.

(b) Measure the resistance according to the value(s) in the table below.

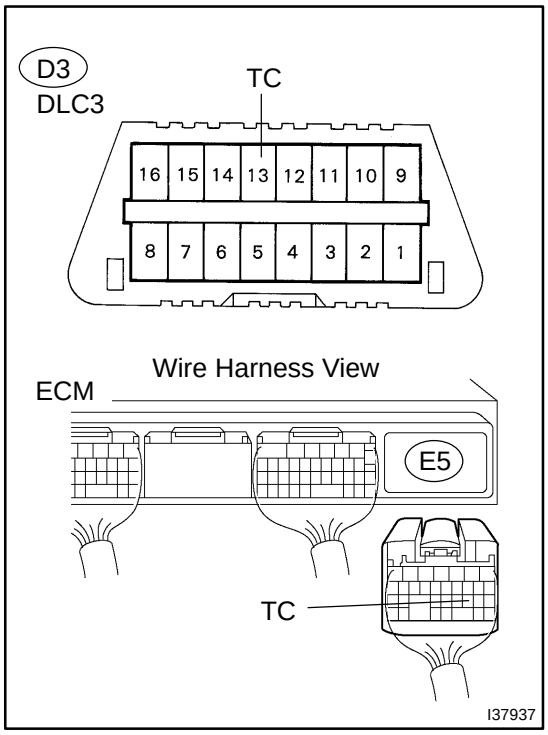
Standard:

Tester Connection	Specified Condition
D3-4 (CG) - Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

5 CHECK HARNESS AND CONNECTOR(ECM - DLC3)



(a) Disconnect the ECM connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition
E5-20 (TC) - D3-13 (TC)	Below 1 Ω

(c) Measure the resistance according to the value(s) in the table below.

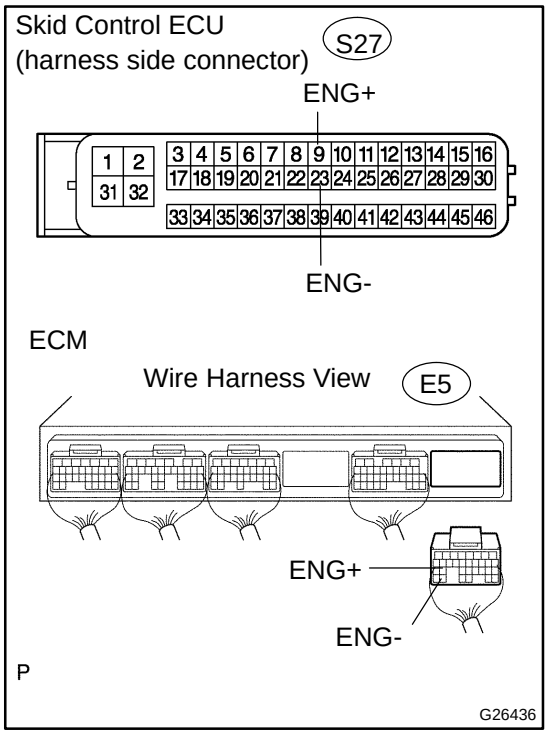
Standard:

Tester Connection	Specified Condition
D3-13 (TC) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

6 CHECK HARNESS AND CONNECTOR(ECM - SKID CONTROL ECU)



(a) Disconnect the skid control ECU connector and the ECM connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition
E5-24 (ENG+) - S27-9 (ENG+)	Below 1 Ω
E5-30 (ENG-) - S27-23 (ENG-)	Below 1 Ω

(c) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition
S27-9 (ENG+) - Body ground	10 kΩ or higher
S27-23 (ENG-) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

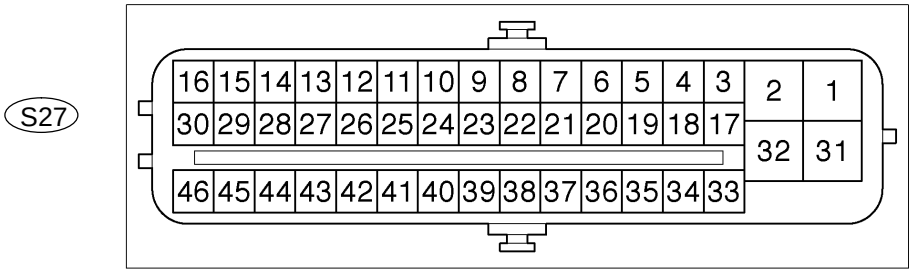
OK

REPLACE ABS & TRACTION ACTUATOR ASSY (SEE PAGE 32-37)

05CD1-12

TERMINALS OF ECU

SKID CONTROL ECU



Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	Specified Condition
BM (S27-2) - GND (Y1-1)	W-L - W-B	Motor relay test input	IG switch ON, pump motor running	10 to 14 V
FR+ (S27-3) - FR- (S27-17)	R-Y - LG	Front RH wheel speed signal input	IG switch ON, slowly turn right front wheel	AC generation
FSW+ (S27-7) - GND1 (S27-32)	G-W - W-B	FSW switch input	IG switch ON, brake pedal released	2 to 4 V
FL+ (S27-18) - FL- (S27-4)	O - P	Front LH wheel speed signal input	IG switch ON, slowly turn left front wheel	AC generation
RR+ (S27-5) - RR- (S27-19)	Y - BR	Rear RH wheel speed signal input	IG switch ON, slowly turn right rear wheel	AC generation
RL+ (S27-20) - RL- (S27-6)	Y-G - G	Rear LH wheel speed signal input	IG switch ON, slowly turn left rear wheel	AC generation
TRC+ (S27-8) - TRC- (S27-22)	G-B - Y-B	ECM communication output	IG switch ON	Pulse generation
ENG+ (S27-9) - ENG- (S27-23)	W-L - W-G	ECM communication input	IG switch ON	Pulse generation
NEO (S27-10) - GND1 (S27-32)	V - W-B	Engine rpm signal input	Engine idling	Pulse generation
CANH (S27-11) - CANL (S27-25)	B - W	CAN communication line	IG switch OFF	54 to 67 Ω
D/G (S27-13) - GND1 (S27-32)	GR-B - W-B	Diagnosis tester communication line	IG switch ON	10 to 14 V
SP1 (S27-12) - GND1 (S27-32)	BR-R - W-B	Speed signal output	Vehicle drives at about 20 km/h (12 mph)	Pulse generation
MRF (S27-14) - R+ (S27-45)	G-R - B-O	Fail safe motor relay output	IG switch ON	10 to 14 V
MR (S27-15) - R+ (S27-45)	LG - B-O	Motor relay output	IG switch ON, pump motor running	10 to 14 V
+BS (S27-31) - GND1 (S27-32)	B - W-B	Solenoid relay power supply	Always	10 to 14 V
TS (S27-24) - GND1 (S27-32)	P-B - W-B	Sensor check input	IG switch ON	10 to 14 V
STP (S27-27) - GND1 (S27-32)	G-Y - W-B	Stop light switch input	Stop light switch ON (Brake pedal pushed)	8 to 14 V
			Stop light switch OFF (Brake pedal released)	Below 1.5 V

PKB (S27-28) - GND1 (S27-32)	R-W - W-B	Parking brake switch input	IG switch ON, parking brake switch ON	Below 1.5 V
			IG switch ON, parking brake switch OFF	10 to 14 V
WA (S27-29) - GND1 (S27-32)	R-L - W-B	ABS warning light output	IG switch ON, ABS warning light ON	6 to 11 V
			IG switch ON, ABS warning light OFF	Below 2.0 V
BZ (S27-30) - GND1 (S27-32)	BR-W - W-B	Buzzer output	IG switch ON, VSC buzzer sounds	Below 1.0 ↔ 10 to 14 V
			IG switch ON, VSC buzzer does not sound	10 to 14 V
VSCW (S27-36) - GND1 (S27-32)	L-Y - W-B	VSC warning light output	IG switch ON, VSC warning light ON	Below 2.0 V
CSW* (S27-43) - GND1 (S27-32)	L-R - W-B	TRAC OFF switch input	TRAC OFF switch OFF	10 to 14 V
BRL (S27-44) - GND1 (S27-32)	LG-B - W-B	Brake warning light output	IG switch ON, BRAKE warning light ON	6 to 11 V
			IG switch ON, BRAKE warning light OFF	Below 2.0 V
R+ (S27-45) - GND1 (S27-32)	B-O - W-B	Power supply for motor relay	IG switch ON	10 to 14 V
IG1 (S27-46) - GND1 (S27-32)	B-R - W-B	IG1 power supply	IG switch ON	10 to 14 V

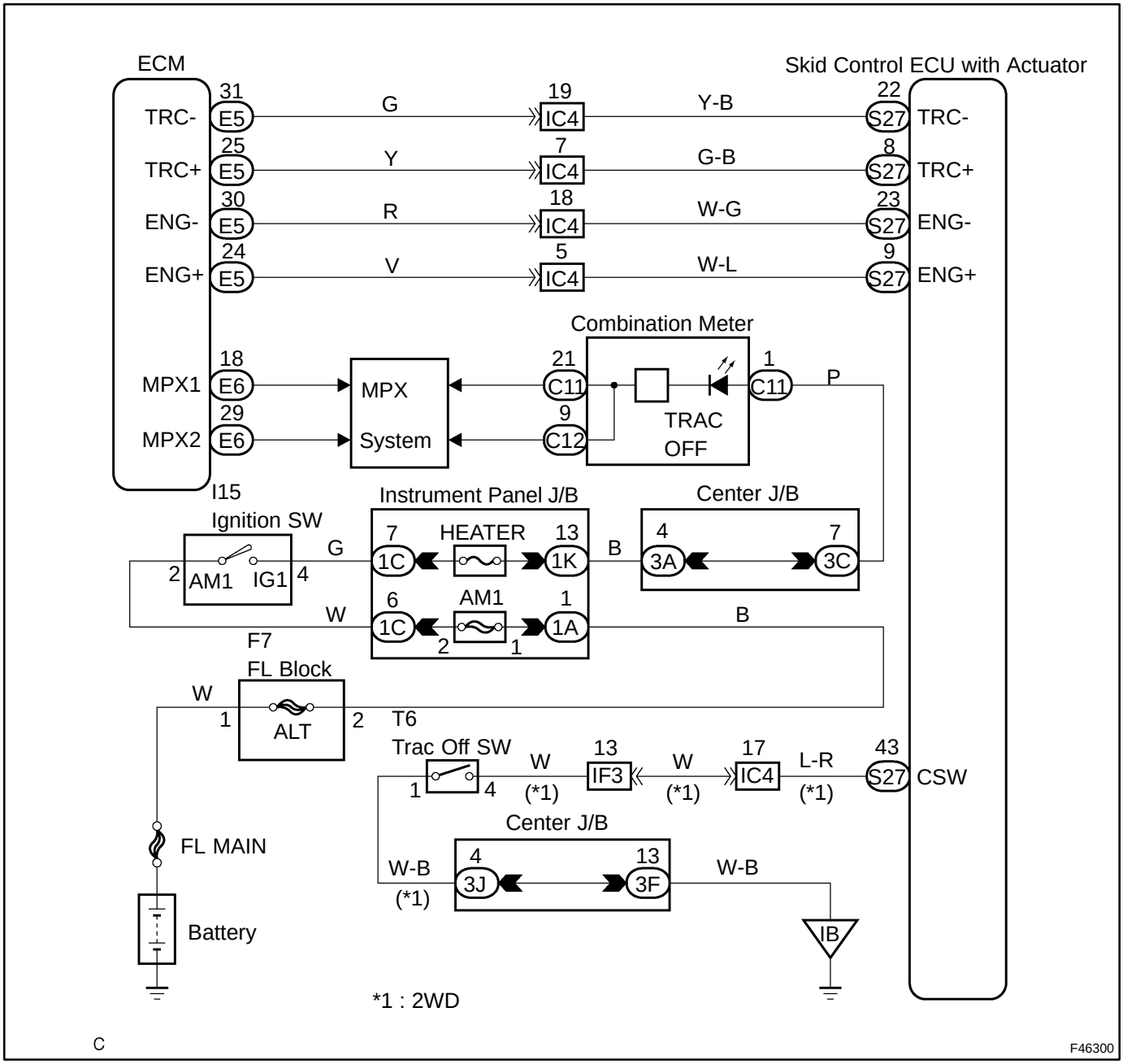
*: 2WD only

TRAC OFF INDICATOR LIGHT, TRAC OFF SWITCH CIRCUIT

CIRCUIT DESCRIPTION

The skid control ECU detects the track control main switch ON/OFF signal and turns the track off light on/off. This is the TRAC control main switch. When the TRAC control switch is pressed, the TRAC control does not operate and the TRAC OFF light comes on.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Start the inspection from step 1 when using the hand-held tester and start from step 2 when not using the hand-held tester.

1	**PERFORM ACTIVE TEST BY HAND-HELD TESTER(TRAC OFF INDICATOR LIGHT)**

(a) Connect the hand-held tester to the DLC3.
(b) Start the engine.
(c) Select the item ”TRAC OFF LIGHT” in the ACTIVE TEST and operate the TRAC OFF indicator light on the hand-held tester.

Item	Vehicle Condition / Test Details	Diagnostic Note
VSC / TRAC OFF IND	Turns VSC / TRAC OFF indicator ON / OFF	Observe combination meter

(d) Check that ”ON” and ”OFF” of the TRAC OFF indicator light are indicated on the combination meter when using the hand-held tester.

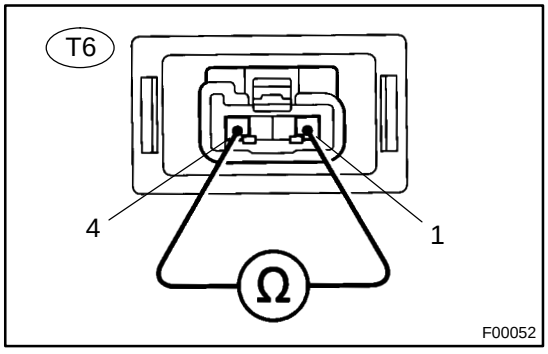
OK:

Turn the TRAC OFF indicator light on or off in accordance with the hand-held tester.

NG → **Go to step 6**

OK

2	**INSPECT TRACTION CONTROL SWITCH**



(a) Remove the TRAC control switch.
(b) Disconnect the TRAC control switch connector T6.
(c) Measure the resistance according to the value(s) in the table below.

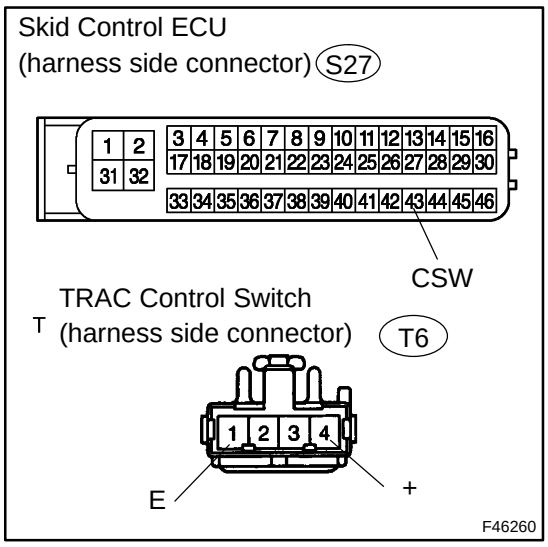
Standard:

Tester Connection	Switch Condition	Specified Condition
T6-4 - T6-1	Pushed in (ON)	Below 1 Ω
	Released (OFF)	10 kΩ or higher

NG → **REPLACE TRACTION CONTROL SWITCH**

OK

3	CHECK HARNESS AND CONNECTOR(SKID CONTROL ECU - TRAC OFF SWITCH)



(a) Disconnect the skid control ECU connector S27 and the TRAC control switch connector T6.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition
S27-43 (CSW) - T6-4 (+)	Below 1 Ω
S27-43 (CSW) - Body ground	10 kΩ or higher
T6-1 (E) - Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

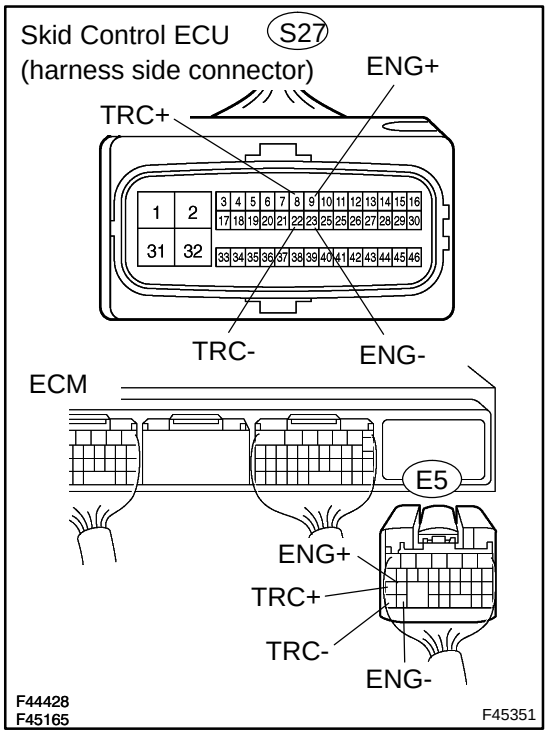
OK

4	INSPECT MULTIPLEX COMMUNCATION SYSTEM (SEE PAGE 05-2040)

NG → **REPAIR MULTIPLEX COMMUNCATION SYSTEM**

OK

5 CHECK HARNESS AND CONNECTOR(SKID CONTROL ECU - ECM)



(a) Disconnect the skid control ECU connector S27 and ECM connector E5.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition
S27-8 (TRC+) - E5-25 (TRC+)	Below 1 Ω
S27-22 (TRC-) - E5-31 (TRC-)	
S27-9 (ENG+) - E5-24 (ENG+)	
S27-23 (ENG-) - E5-30 (ENG-)	

(c) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition
S27-8 (TRC+) - Body ground	10 kΩ or higher
S27-22 (TRC-) - Body ground	
S27-9 (ENG+) - Body ground	
S27-23 (ENG-) - Body ground	

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

6 INSPECT COMBINATION METER ASSEMBLY (SEE PAGE 05-1868)

NG → **REPAIR OR REPLACE COMBINATION METER ASSEMBLY**

OK

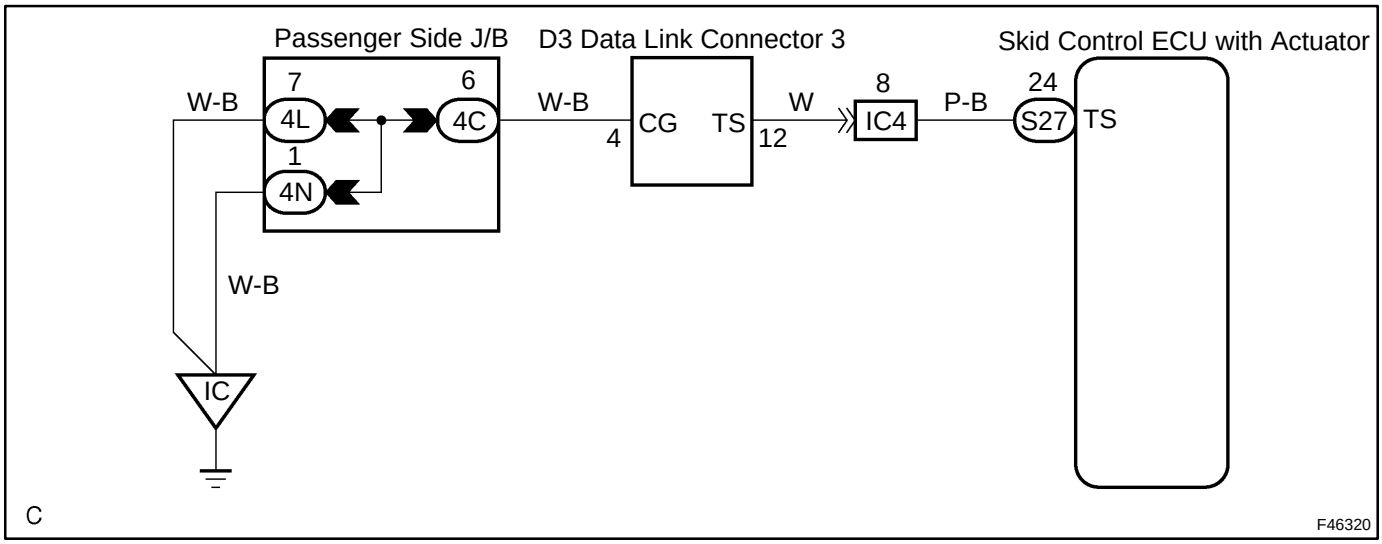
REPLACE ABS & TRACTION ACTUATOR ASSY (SEE PAGE 32-37)

TS AND CG TERMINAL CIRCUIT

CIRCUIT DESCRIPTION

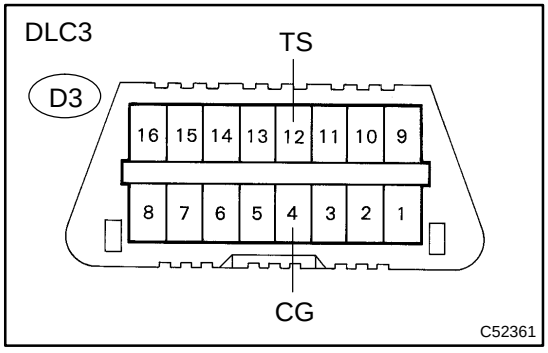
In the sensor check mode, a malfunction of the speed sensor that cannot be detected when the vehicle is stopped is detected while driving.
Transition to the sensor check mode can be performed by connecting terminals TS and CG of the DLC3 and turning the ignition switch from off to the ON position.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT DLC3 TERMINAL VOLTAGE(TS TERMINAL)



(a) Turn the ignition switch to the ON position.
(b) Measure the voltage according to the value(s) in the table below.

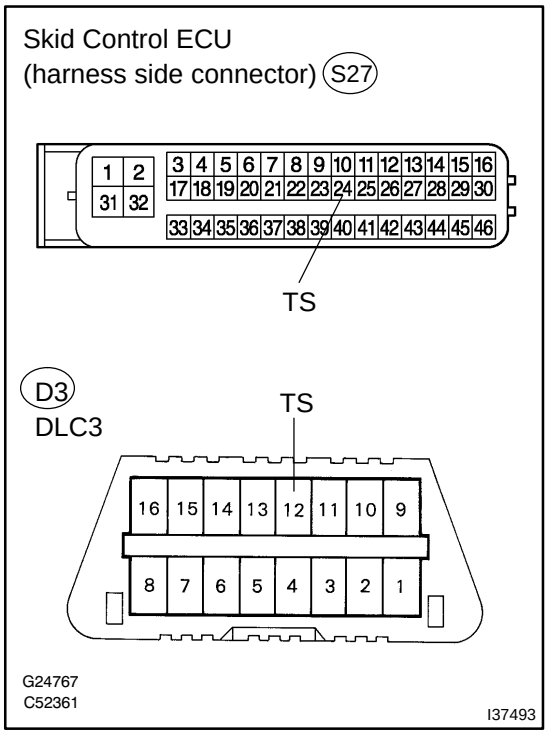
Standard:

Tester Connection	Specified Condition
D3-12 (TS) - D3-4 (CG)	10 to 14 V

NG → **Go to step 3**

OK

2 CHECK HARNESS AND CONNECTOR(DLC3 - BODY GROUND)



(a) Disconnect the skid control ECU connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition
S27-24 (TS) - D3-12 (TS)	Below 1 Ω

(c) Measure the resistance according to the value(s) in the table below.

Standard:

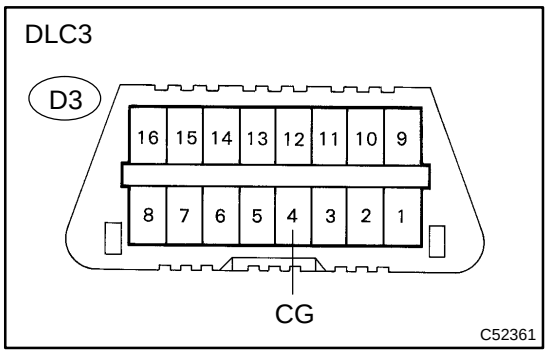
Tester Connection	Specified Condition
S27-24 (TS) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE ABS & TRACTION ACTUATOR ASSY (SEE PAGE 32-37)

3 CHECK HARNESS AND CONNECTOR(BODY GROUND - DLC3)



(a) Measure the resistance according to the value(s) in the table below.

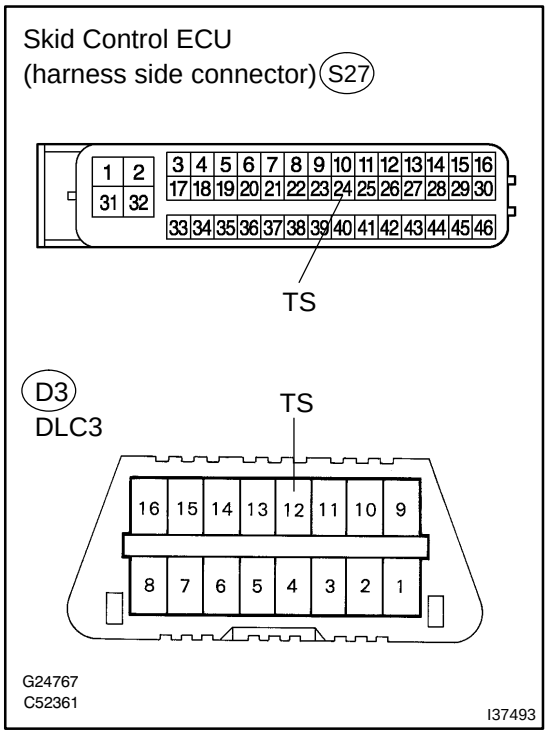
Standard:

Tester Connection	Specified Condition
D3-4 (CG) - Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4 CHECK HARNESS AND CONNECTOR(SKID CONTROL ECU - DLC3)



(a) Disconnect the skid control ECU connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition
S27-24 (TS) - D3-12 (TS)	Below 1 Ω

(c) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition
S27-24 (TS) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

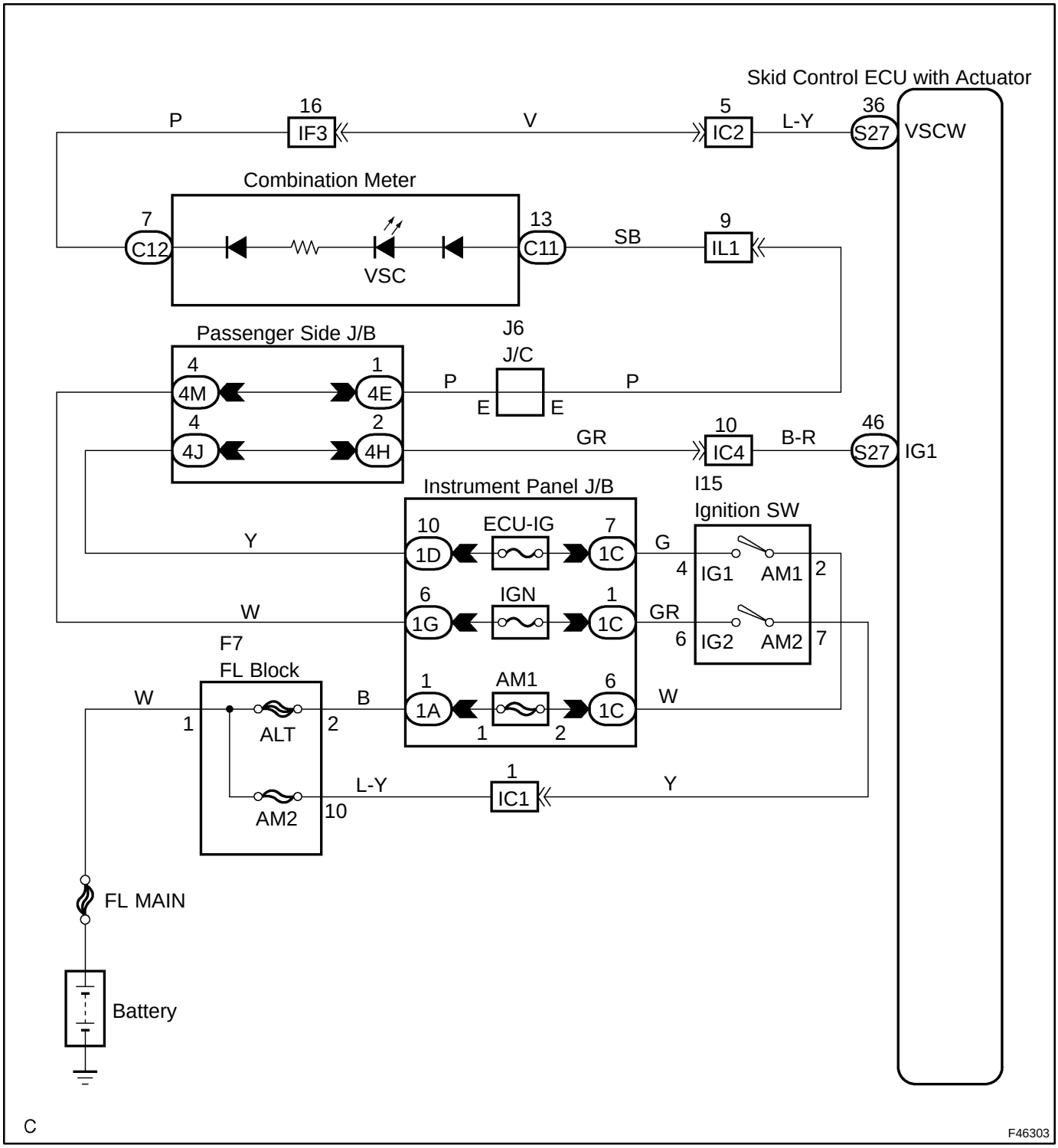
REPLACE ABS & TRACTION ACTUATOR ASSY (SEE PAGE 32-37)

VSC WARNING LIGHT CIRCUIT (REMAINS ON)

CIRCUIT DESCRIPTION

If the ECU stores DTC, the VSC warning light comes on in the combination meter.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK DTC

(a) Is DTC output for ABS and VSC?

DTC is not output	A
DTC is output	B

B → REPAIR CIRCUIT INDICATED BY OUTPUT CODE

A

2	INSPECT CHECK IF SKID CONTROL ECU CONNECTOR IS SECURELY CONNECTED

NG → CONNECT CONNECTOR TO ECU

OK

3	INSPECT BATTERY

(a) Check the battery voltage.
Standard:

Tester Connection	Specified Condition
Battery terminal ((+) - (-))	11 to 14 V

NG → INSPECT CHARGING SYSTEM (SEE PAGE 19-12 (2AZ-FE) OR 19-36 (3MZ-FE))

OK

4 INSPECT SKID CONTROL ECU TERMINAL VOLTAGE(IG1 TERMINAL)

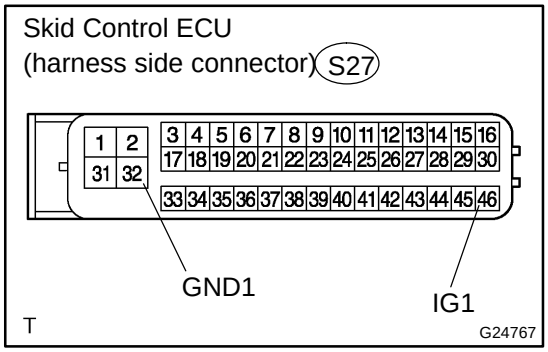
WHEN USING HAND-HELD TESTER:

(a) Connect the hand-held tester to the DLC3.
(b) Start the engine.
(c) Select the DATA LIST mode on the hand-held tester.
(d) Check the voltage condition output from the ECU displayed on the hand-held tester.

Item	Measurement Item / Range (Display)	Normal Condition
IG VOLTAGE	ECU power supply voltage / TOO LOW / NORMAL	NORMAL: 9.5 V or over UNDER: Below 9.5 V

OK:

"Normal" is displayed.



WHEN NOT USING HAND-HELD TESTER:

(a) Disconnect the skid control ECU connector.
(b) Turn the ignition switch to the ON position.
(c) Measure the voltage according to the value(s) in the table below.

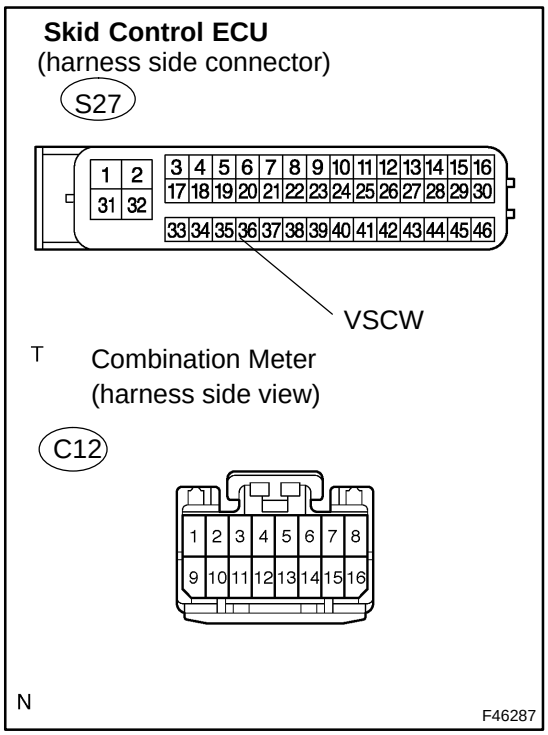
Standard:

Tester Connection	Specified Condition
S27-46 (IG1) - S27-32 (GND1)	11 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

5 CHECK HARNESS AND CONNECTOR(SKID CONTROL ECU - COMBINATION METER)



(a) Disconnect the skid control ECU connector and combination meter connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition
C12 - 7 - S27-36 (VSCW)	Below 1 Ω

(c) Measure the resistance according to the value(s) in the table below.

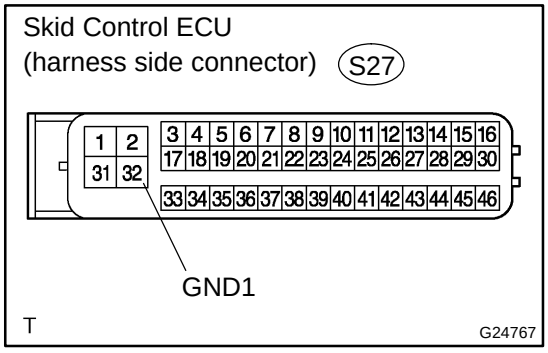
Standard:

Tester Connection	Specified Condition
S27-36 (VSCW) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

6 CHECK HARNESS AND CONNECTOR(SKID CONTROL ECU - BODY GROUND)



(a) Disconnect the skid control ECU connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition
S27-32 (GND1) - Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

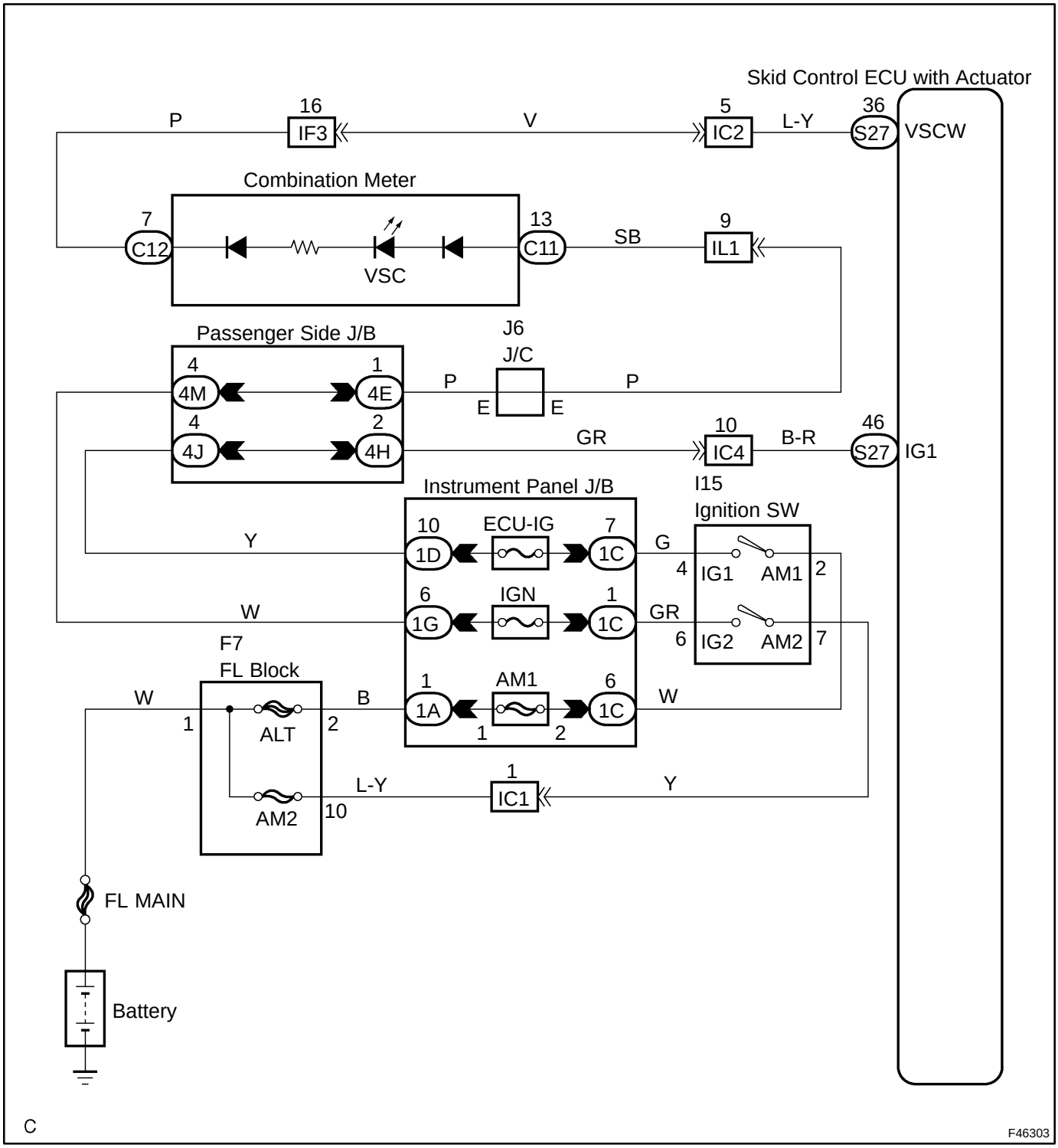
REPLACE ABS & TRACTION ACTUATOR ASSY (SEE PAGE 32-37)

VSC WARNING LIGHT CIRCUIT (DOES NOT LIGHT UP)

CIRCUIT DESCRIPTION

If the ECU stores DTC, the VSC warning light comes on in the combination meter.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK VSC WARNING LIGHT

WHEN USING HAND-HELD TESTER:

(a) Connect the hand-held tester to the DLC3 and start the engine.

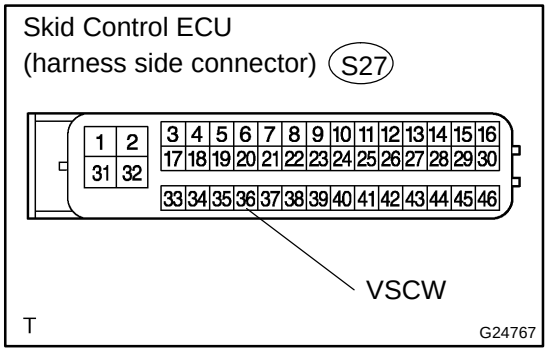
(b) Select the item "VSC WARN LIGHT" in the ACTIVE TEST and operate the VSC warning light on the hand-held tester.

(c) Check that "ON" and "OFF" of the VSC warning light are indicated on the combination meter when using the hand-held tester.

Item	Vehicle Condition / Test Details	Diagnostic Note
VSC WARN LIGHT	Turns VSC warning light ON / OFF	Observe combination meter

OK:

Turn the VSC warning light ON or OFF in accordance with the hand-held tester.



WHEN NOT USING HAND-HELD TESTER:

(a) Turn the ignition switch off and disconnect the connector from the skid control ECU.

(b) Ground the terminal VSCW of skid control ECU.

(c) Turn the ignition switch to the ON position.

(d) Check that the VSC warning light.

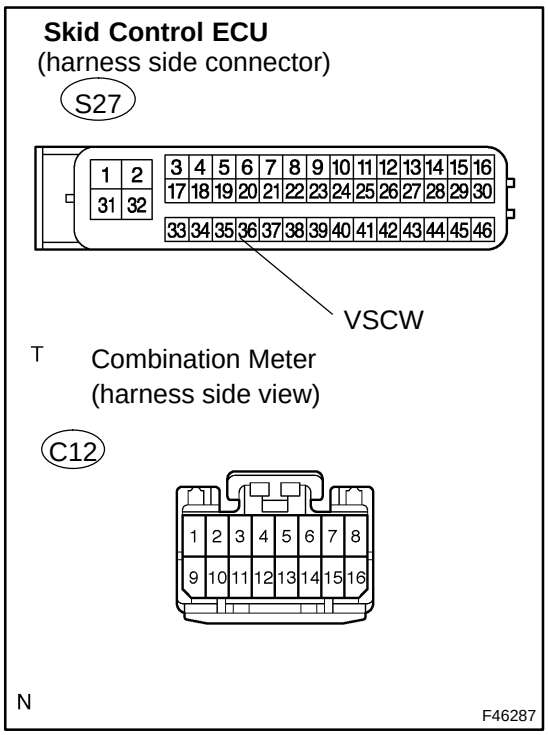
OK:

Turn the light ON or OFF in accordance with the connecting condition of terminal VSCW and body ground.

NG → **CHECK AND REPAIR VSC WARNING LIGHT CIRCUIT (SEE PAGE 05-1868)**

OK

2	CHECK HARNESS AND CONNECTOR(SKID CONTROL ECU - COMBINATION METER)



(a) Disconnect the skid control ECU connector and combination meter connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition
C12 - 7 - S27-36 (VSCW)	Below 1 Ω

(c) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition
S27-36 (VSCW) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE ABS & TRACTION ACTUATOR ASSY (SEE PAGE 32-37)

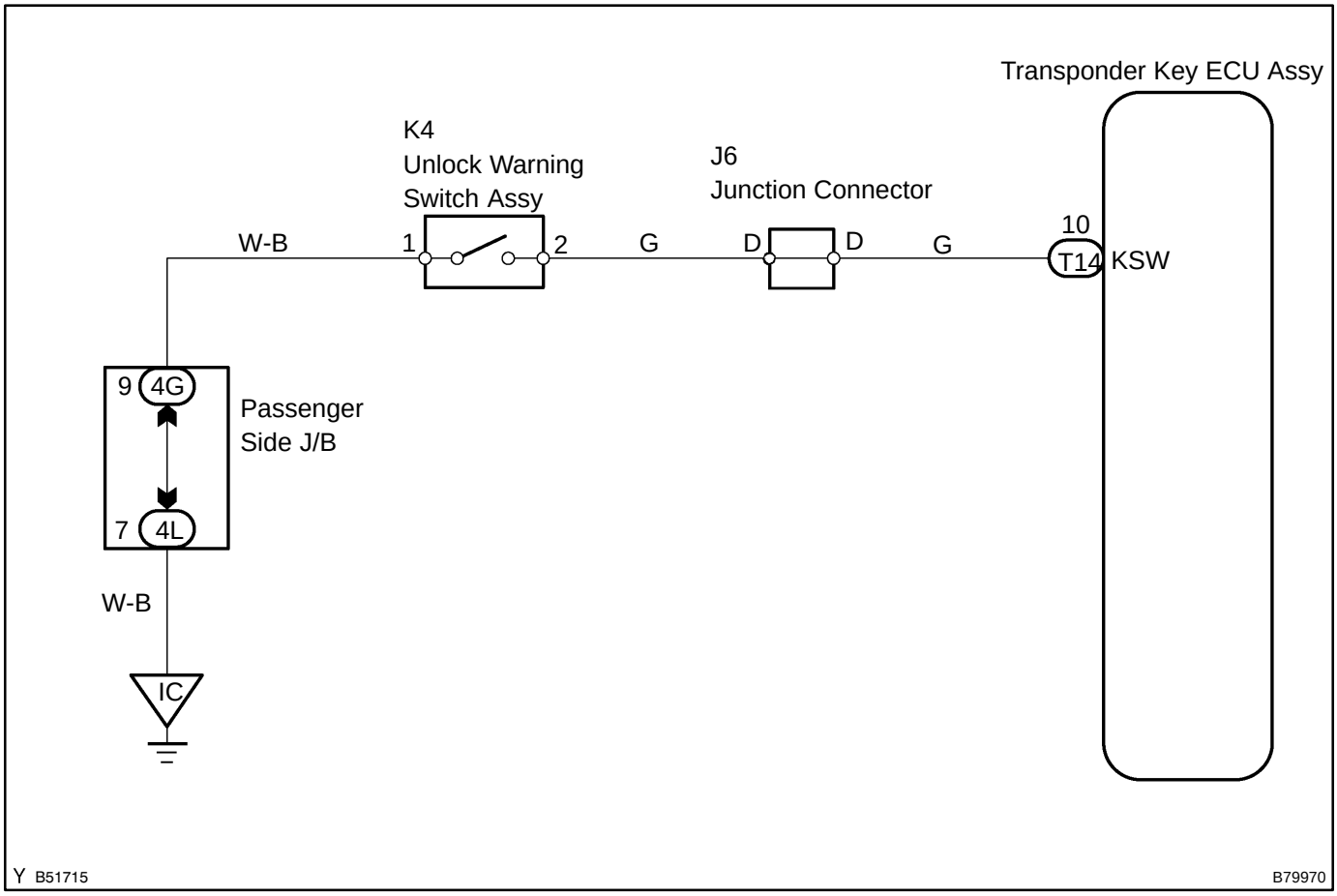
DTC	B2780	PUSH SWITCH/KEY UNLOCK WARNING SWITCH MALFUNCTION

CIRCUIT DESCRIPTION

This DTC will be output if the transponder key ECU does not detect that the unlock warning switch is ON even when the ignition switch is ON (under normal condition, the unlock warning switch is ON when the ignition switch is ON).

DTC No.	DTC Detection Condition	Trouble Area
B2780	Unlock warning switch ON is not detected when ignition switch is ON	・Unlock warning switch assy ・Wire harness ・Transponder key ECU assy

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Start the inspection from step 1 when using the hand-held tester and start from step 2 when not using the hand-held tester.

1	**READ VALUE OF HAND-HELD TESTER (TRANSPONDER KEY ECU (SWITCH CONDITION))**

(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON with the key that cannot start the engine.
(c) On the hand-held tester, select the following menu item: DIAGNOSIS/ENHANCED OBD II/DATA LIST/IMMOBILISER/KEY SW. Read the values.
OK: "ON" (Key is in ignition key cylinder) appears on the screen.

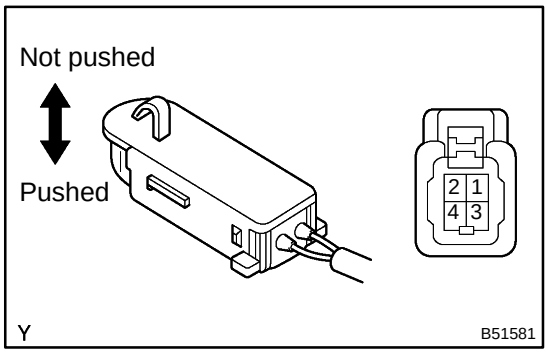
Item	Measurement Item/ Display (Range)	Normal Condition	Diagnostic Note
KEY SW	Unlock warning switch signal /ON or OFF	ON: Key is in ignition key cylinder OFF: No key is in ignition key cylinder	-

NG → **Go to step 2**

OK

REPLACE TRANSPONDER KEY ECU ASSY

2	**INSPECT UNLOCK WARNING SWITCH ASSY**



(a) Remove the unlock warning switch.
(b) Measure the resistance of the unlock warning switch.
Standard:

Tester Connection	Switch Position	Specified Condition
1 - 2	Pushed	Below 1 Ω
1 - 2	Not pushed	10 kΩ or higher

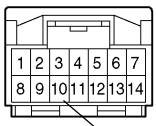
NG → **REPLACE UNLOCK WARNING SWITCH ASSY**

OK

3	CHECK WIRE HARNESS (TRANSPONDER KEY ECU ASSY - UNLOCK WARNING SWITCH ASSY)

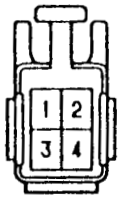
Wire Harness Side

T14
Transponder Key ECU Assy



KSW

K4
Unlock Warning Switch Assy



B63404
B65748

B78556

(a) Disconnect the T14 ECU and K4 switch connectors.
(b) Measure the resistance between the wire harness side connectors.

Standard:

Symbols (Terminal No.)	Specified Condition
T14-10 (KSW) - K4-2	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE TRANSPONDER KEY ECU ASSY

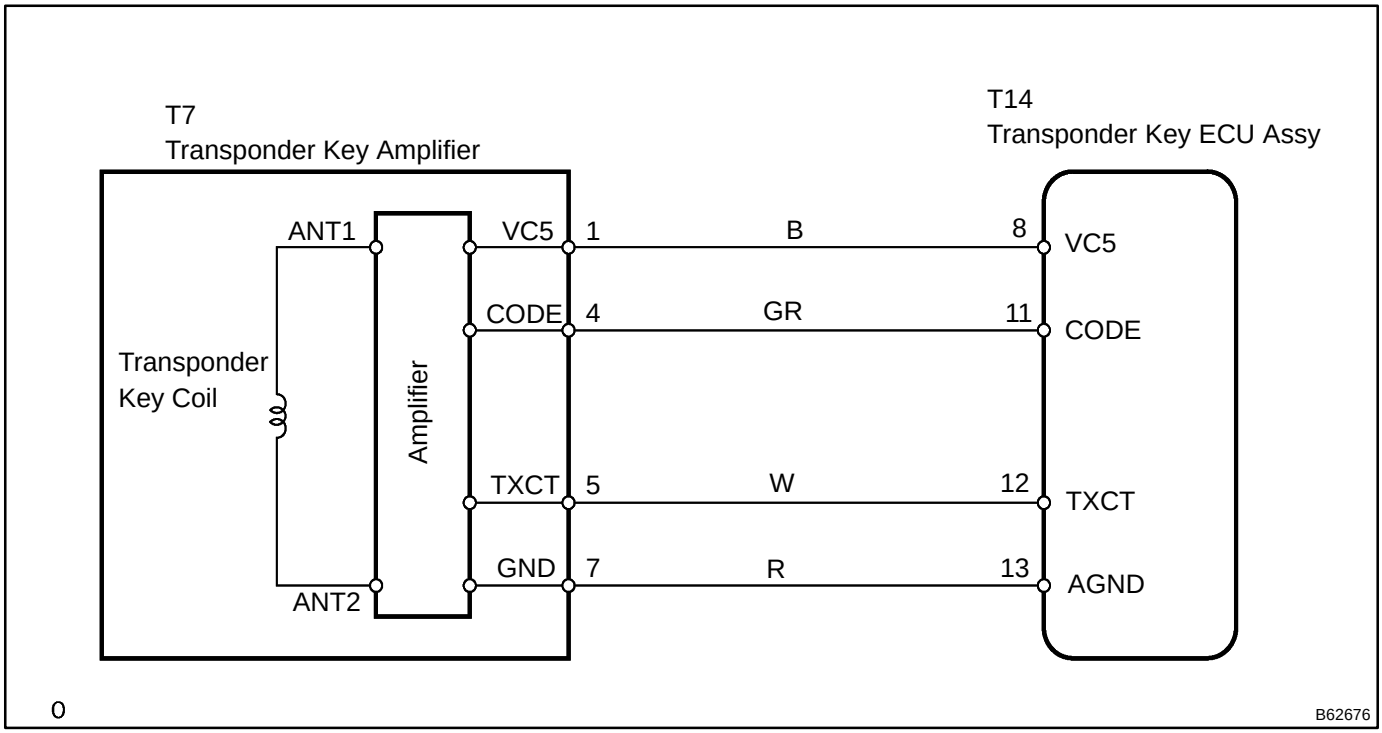
DTC	B2784	ANTENNA COIL OPEN/SHORT

CIRCUIT DESCRIPTION

The transponder key coil is built into the transponder key amplifier and receives a key code signal from the transponder chip in the key. This signal is amplified by the amplifier, then it is output to the transponder key ECU assy.

DTC No.	DTC Detection Condition	Trouble Area
B2784	Antenna coil is open/short	・Wire harness ・Transponder key amplifier ・Transponder key ECU assy

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Start the inspection from step 1 when using the hand-held tester and start from step 2 when not using the hand-held tester.

1	READ VALUE OF HAND-HELD TESTER (IMMOBILIZER ECU (TRANSPONDER KEY ECU ASSY) (SWITCH CONDITION))

(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON with the key that does not start the engine.
(c) Select the item "ANTENNA COIL" on the hand-held tester.
OK: "NORMAL" (Antenna coil is normal) appears on the screen.

Item	Measurement Item/ Display (Range)	Normal Condition	Diagnostic Note
ANTENNA COIL	Antenna coil condition /NORMAL or FAIL	NORMAL: Antenna coil is normal FAIL: Antenna coil is abnormal	-

NG → **Go to step 2**

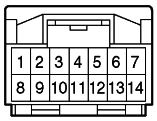
OK

REPLACE TRANSPONDER KEY ECU ASSY

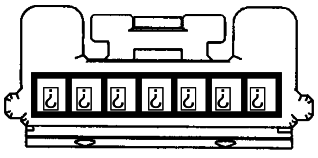
2	CHECK WIRE HARNESS (TRANSPONDER KEY ECU ASSY - TRANSPONDER KEY AMPLIFIER) (TRANSPONDER KEY ECU ASSY OR TRANSPONDER KEY AMPLIFIER - BODY GROUND)

Wire Harness Side

T14
Transponder Key ECU Assy



T7
Transponder Key Amplifier



B63404
B55013
B64974

(a) Disconnect the T14 ECU and T7 amplifier connectors.
(b) Measure the resistance of the wire harness side connectors.
Standard:

Tester Connection	Specified Condition
T14-8 (VC5) - T7-1 (VC5)	Below 1 Ω
T14-11 (CODE) - T7-4 (CODE)	Below 1 Ω
T14-12 (TXCT) - T7-5 (TXCT)	Below 1 Ω
T14-13 (AGND) - T7-7 (GND)	Below 1 Ω
T14-8 (VC5) or T7-1 (VC5) - Body ground	10 kΩ or higher
T14-11 (CODE) or T7-4 (CODE) - Body ground	10 kΩ or higher
T14-12 (TXCT) or T7-5 (TXCT) - Body ground	10 kΩ or higher
T14-13 (AGND) or T7-7 (GND) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE TRANSPONDER KEY AMPLIFIER

DTC B2793 TRANSPONDER CHIP MALFUNCTION

CIRCUIT DESCRIPTION

This DTC is output when trouble is found in a key during the key code registration or the key code is not registered normally. Replace the key when the key code registration is not performed normally and this DTC is detected.

DTC No.	DTC Detection Condition	Trouble Area
B2793	Transponder chip malfunction	Key

INSPECTION PROCEDURE

1 CHECK DTC

(a) Delete the DTC.
(b) Insert the key into the ignition key cylinder.
(c) Check that no code is output.

OK → **NO PROBLEM**

NG

2 RE-REGISTER KEY

(a) Delete the DTC.
(b) Re-register the key, and check that the engine starts with the key.

OK → **NORMAL**

NG

REPLACE KEY

DTC	B2794	UNMATCHED ENCRYPTION CODE

CIRCUIT DESCRIPTION

This DTC is output when a key with an incomplete key code is inserted into the ignition key cylinder.

DTC No.	DTC Detection Condition	Trouble Area
B2794	Key with incomplete key code is inserted	Key

INSPECTION PROCEDURE

1	REPLACE KEY

DTC B2795 UNMATCHED KEY CODE

CIRCUIT DESCRIPTION

This DTC is output when a key with a key code that has not been registered in the ECU is inserted into the ignition key cylinder.

DTC No.	DTC Detection Condition	Trouble Area
B2795	Key with unregistered key code is inserted	Key

INSPECTION PROCEDURE

1	**DELETE DTC AND INSERT ALL PRESENTLY AVAILABLE KEYS TO CHECK WHETHER ENGINE STARTS OR NOT**

OK → **NO PROBLEM (BECAUSE OF KEY RE-REGISTRATION)**

NG

REPLACE KEY THAT DOES NOT START ENGINE

DTC	B2796	NO COMMUNICATION IN IMMOBILIZER SYSTEM

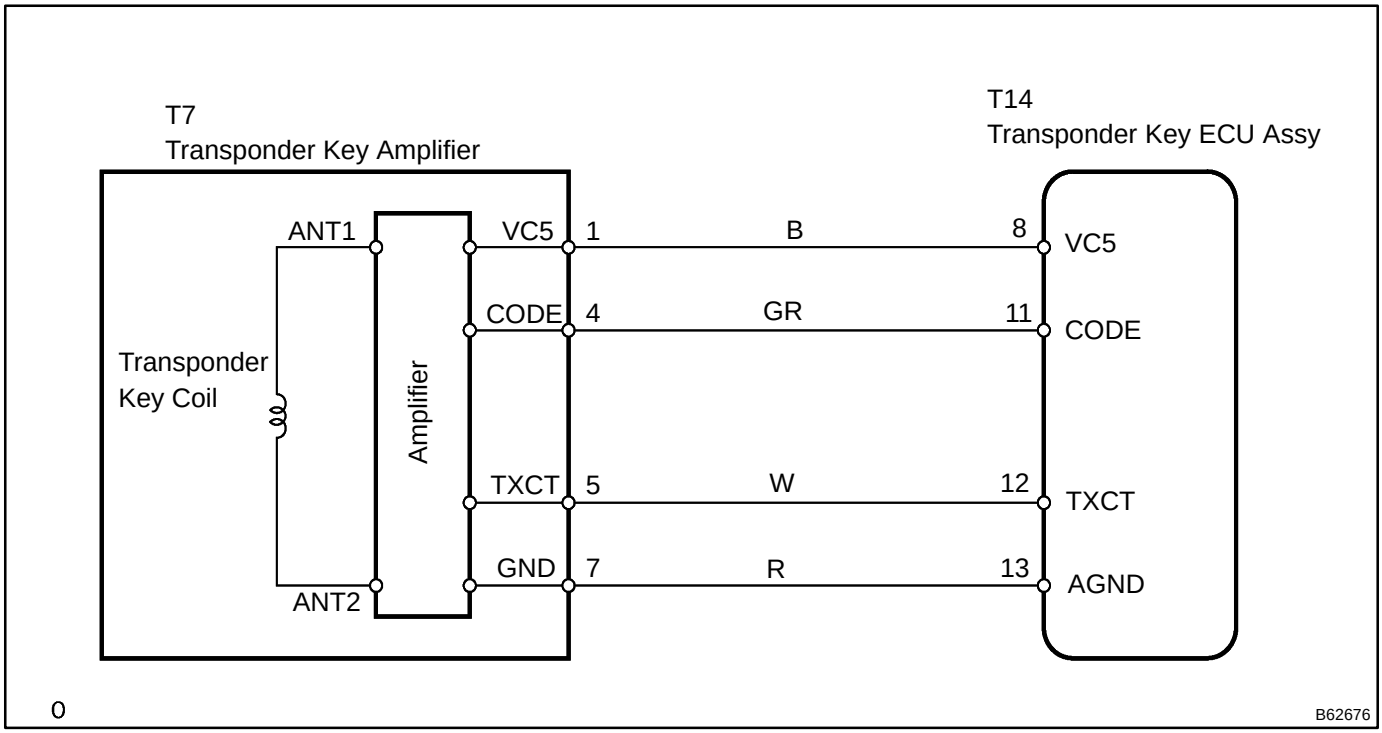
DTC	B2798	COMMUNICATION MALFUNCTION NO. 2

CIRCUIT DESCRIPTION

This code is stored in the memory when a key that does not have a transponder chip is inserted or if communication between the key and transponder key ECU assy is impossible.

DTC No.	DTC Detection Condition	Trouble Area
B2796	No communication	・Key ・Wire harness ・Transponder key amplifier ・Transponder key ECU assy
B2798	Communication error	・Key

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Start the inspection from step 1 when using the hand-held tester and start from step 2 when not using the hand-held tester.

1	**READ VALUE OF HAND-HELD TESTER (IMMOBILISER ECU (TRANSPONDER KEY ECU ASSY) (SWITCH CONDITION))**

(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON with the key that does not start the engine.
(c) Select the item "IMMOBILIZER" on the hand-held tester.
OK: "SET" (Ignition switch ON) appears on the screen.

Item	Measurement Item/ Display (Range)	Normal Condition	Diagnostic Note
IMMOBILIZER	Immobilizer system status /SET or UNSET	UNSET: Without key SET: Ignition switch ON	-

OK → **NORMAL**

NG

2	**CHECK WHETHER ENGINE STARTS WITH OTHER KEYS**

(a) Check whether the engine starts with the other keys for the vehicle.

OK → **RE-REGISTER OR REPLACE KEY THAT WILL NOT START ENGINE**

NG

HINT:

Start the inspection from step 3 when using the hand-held tester and start from step 4 when not using the hand-held tester.

3	**READ VALUE OF HAND-HELD TESTER (IMMOBILIZER ECU (TRANSPONDER KEY ECU ASSY) (SWITCH CONDITION))**

(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON with the key that does not start the engine.
(c) On the hand-held tester, select the following menu item: DIAGNOSIS/ENHANCED OBD II/DATA LIST/IMMOBILIZER/ANTENNA COIL. Read the values.
OK: "NORMAL" (Antenna coil is normal) appears on the screen.

Item	Measurement Item/ Display (Range)	Normal Condition	Diagnostic Note
ANTENNA COIL	Antenna coil condition /NORMAL or FAIL	NORMAL: Antenna coil is normal FAIL: Antenna coil is abnormal	-

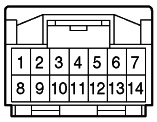
NG → **CHECK AND REPLACE TRANSPONDER KEY ECU ASSY**

OK

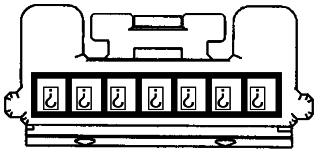
4	CHECK WIRE HARNESS (TRANSPONDER KEY ECU ASSY - TRANSPONDER KEY AMPLIFIER) (TRANSPONDER KEY ECU ASSY OR TRANSPONDER KEY AMPLIFIER - BODY GROUND)

Wire Harness Side

T14
Transponder Key ECU Assy



T7
Transponder Key Amplifier



B63404
B55013
B64974

(a) Disconnect the T14 ECU and T7 amplifier connectors.
(b) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
T14-8 (VC5) - T7-1 (VC5)	Below 1 Ω
T14-11 (CODE) - T7-4 (CODE)	Below 1 Ω
T14-12 (TXCT) - T7-5 (TXCT)	Below 1 Ω
T14-13 (AGND) - T7-7 (GND)	Below 1 Ω
T14-8 (VC5) or T7-1 (VC5) - Body ground	10 kΩ or higher
T14-11 (CODE) or T7-4 (CODE) - Body ground	10 kΩ or higher
T14-12 (TXCT) or T7-5 (TXCT) - Body ground	10 kΩ or higher
T14-13 (AGND) or T7-7 (GND) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

5	CHECK OPERATION OF TRANSPONDER KEY AMPLIFIER

(a) After replacing the transponder key amplifier with a normally functioning amplifier, check that the engine starts.

NG → **REPLACE TRANSPONDER KEY ECU ASSY**

OK

REPLACE TRANSPONDER KEY AMPLIFIER

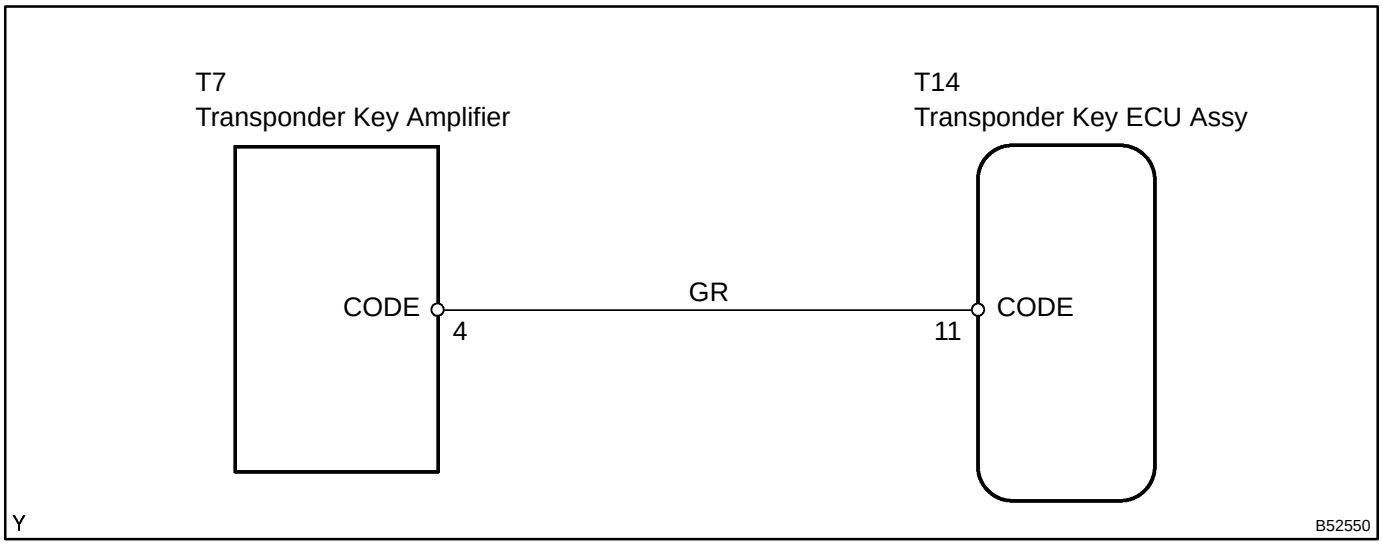
DTC	B2797	COMMUNICATION MALFUNCTION NO.1

CIRCUIT DESCRIPTION

This DTC is output when an error occurs in normal communication.
HINT:
Some noise exists in the communication line.

DTC No.	DTC Detection Condition	Trouble Area
B2797	Keys are positioned too close to each other, or noise occurred in communication line	Key Wire harness Transponder key amplifier Transponder key ECU assy

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK OPERATION OF TRANSPONDER KEY AMPLIFIER

(a) After replacing the transponder key amplifier with a normally functioning amplifier, check that the engine starts.

OK	NORMAL (TRANSPONDER KEY AMPLIFIER DEFECTIVE)

NG

REPLACE TRANSPONDER KEY ECU ASSY

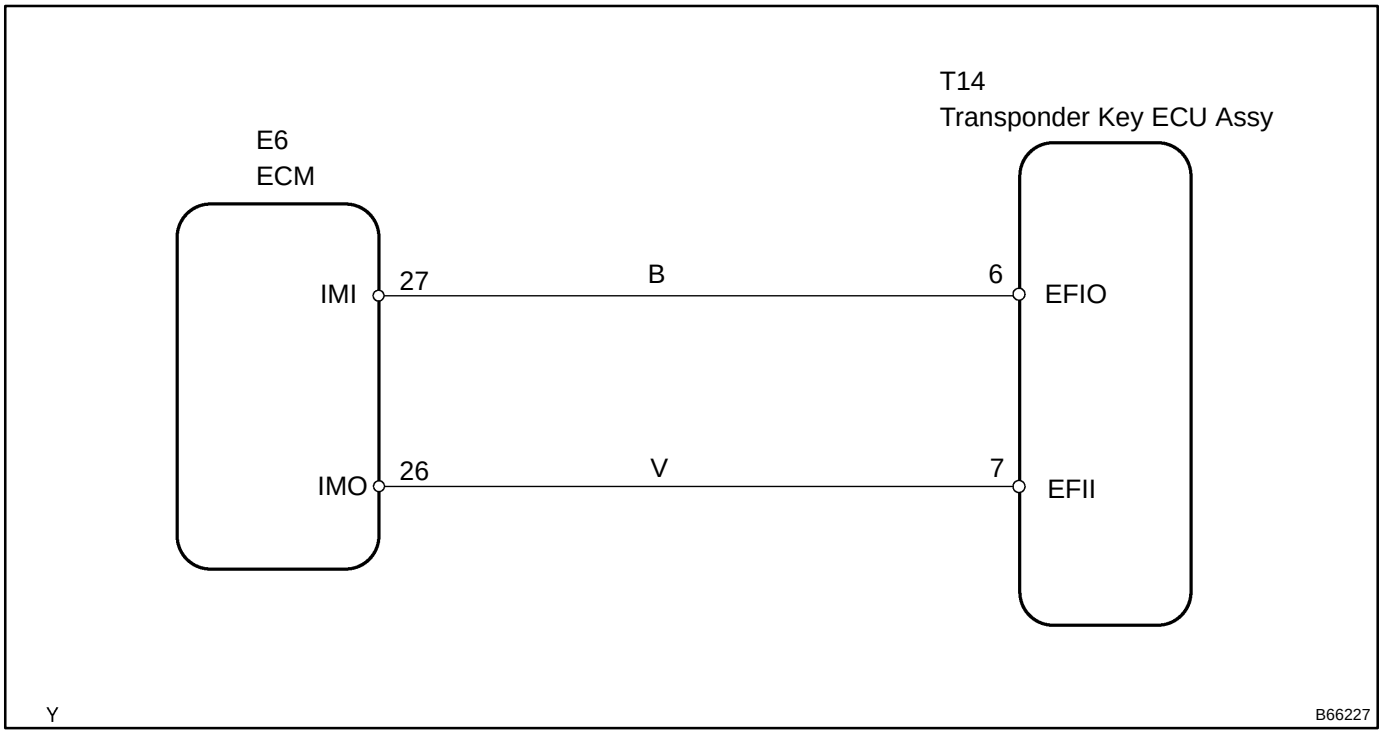
DTC	B2799	ENGINE IMMOBILIZER SYSTEM MALFUNCTION

CIRCUIT DESCRIPTION

This DTC is output when the ECM detects errors in communication between the transponder key ECU assy and the ECM, or in the communication lines.
This DTC is also output when an engine start is attempted while the ECU communication ID between the transponder key ECU assy and the ECM is different.
Before troubleshooting for this DTC, make sure that there is no DTC detected in the transponder key ECU. If there is a key code-related DTC detected in the transponder key ECU assy, repair it first.

DTC No.	DTC Detection Condition	Trouble Area
B2799	・Error in communication between ECM and transponder key ECU assy, and in communication line ・Communication ID is different during communication with transponder key ECU	・Wire harness ・Transponder key ECU assy ・Transponder key amplifier ・ECM

WIRING DIAGRAM

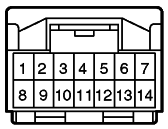


INSPECTION PROCEDURE

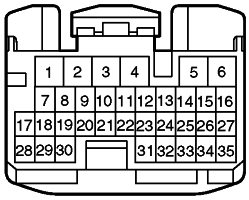
1	CHECK WIRE HARNESS (TRANSPONDER KEY ECU ASSY - ECM) (TRANSPONDER KEY ECU ASSY OR ECM - BODY GROUND)

Wire Harness Side

T14
Transponder Key ECU Assy



E6
ECM



Y B66220 B66229

(a) Disconnect the T14 ECU and E6 ECM connectors.
(b) Measure the resistance between the wire harness side connectors.
Standard:

Symbols (Terminal No.)	Specified Condition
EFIO (T14-6) - IMI (E6-27)	Below 1 Ω
EFII (T14-7) - IMO (E6-26)	Below 1 Ω

(c) Measure the resistance between the T14 or E6 wire harness side connector and the body ground.
Standard:

Symbols (Terminal No.)	Specified Condition
EFIO (T14-6) or IMI (E6-27) - Body ground	10 kΩ or higher
EFII (T14-7) or IMO (E6-26) - Body ground	10 kΩ or higher

OK → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

NG

2	CHECK OPERATION OF TRANSPONDER KEY AMPLIFIER

(a) After replacing the transponder key amplifier with a normally functioning amplifier, check that the engine starts.

NG → **REPLACE TRANSPONDER KEY ECU ASSY**

OK

NORMAL (TRANSPONDER KEY AMPLIFIER DEFECTIVE)

ENGINE IMMOBILIZER SYSTEM

052IA-27

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

Use this procedure to troubleshoot the engine immobilizer system.

1	**VEHICLE BROUGHT TO WORKSHOP**

2	**CUSTOMER PROBLEM ANALYSIS CHECK AND SYMPTOM CHECK (see page 05-1987)**

3	**CRANK ENGINE FOR MORE THAN 10 SECONDS**

4	**CHECK DTC**

(a) Check for DTCs and note any codes that are output.
(b) Delete the DTC.
(c) Recheck for DTCs. Try to prompt the DTC (SFI system and engine immobilizer system) by simulating the original activity that the DTC suggested.
  (1) If the DTC does not reoccur, proceed to A.
  (2) If the DTC (SFI system) reoccurs, proceed to B.
  (3) If the DTC (engine immobilizer system) reoccur, proceed to C.

B	**Go to SFI SYSTEM (2AZ-FE engine: See page 05-1) (3MZ-FE engine: See page 05-362)**
C	**Go to step 8**

A

5	**READ VALUE OF HAND-HELD TESTER (IMMOBILIZER ECU (TRANSPONDER KEY ECU ASSY) (SWITCH CONDITION))**

(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester main switch ON.
(c) Select the item "KEY SW" in the "DATA LIST" and read its value displayed on the hand-held tester.

Transponder key ECU assy:

Item	Measurement Item/ Display (Range)	Normal Condition	Diagnostic Note
KEY Switch	Unlock warning switch signal /ON or OFF	ON: Key is in ignition key cylinder OFF: No key is in ignition key cylinder	-

NG	**Go to DTC B2780 (see page 05-1998)**

OK

6	PROBLEM SYMPTOMS TABLE (see page 05-1997)

(a) When the problem is not listed on the problem symptoms table, proceed to A.
(b) When the problem is listed on the problem symptoms table, proceed to B.

B → Go to step 8

A

7	PERFORM TROUBLESHOOTING ACCORDING TO MALFUNCTION SYMPTOM

(a) Pre-check (see page 05-1988)
  (1) Inspect with the hand-held tester (ECU data monitor).
  (2) Inspect with the hand-held tester (ACTIVE TEST).
(b) Terminals of ECU (see page 05-1993)

8	ADJUST, REPAIR OR REPLACE

END

052IB-13

CUSTOMER PROBLEM ANALYSIS CHECK

ENGINE IMMOBILIZER SYSTEM Check Sheet

Inspector's Name :

Customer's Name		**VIN**	
		Production Date	/ /
		Licence Plate No.	
Date Vehicle Brought In	/ /	**Odometer Reading**	km miles

Date Problem First Occurred		/ /
Frequency Problem Occurs		☐ Constant ☐ Intermittent (times a day/month) ☐ Only once
Weather Conditions When Problem Occurred	**Weather**	☐ Fine ☐ Cloudy ☐ Rainy ☐ Snowy ☐ Various/Others
	Outdoor Temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold (Approx. °C (°F)

Symptoms	☐ Immobilizer is not set. (Engine starts with key codes other than the registered key code.)
	☐ Engine does not start.

DTC Check	**1st Time**	☐ Normal code ☐ Malfunction code (Code)
	2nd Time	☐ Normal code ☐ Malfunction code (Code)

052ID-13

DIAGNOSTIC TROUBLE CODE CHART

1. TRANSPONDER KEY ECU DIAGNOSTIC TROUBLE CODE CHART

DTC No. (See Page)	Detection Item	Trouble Area
B2780 (05-1998)	Push Switch/Key Unlock Warning Switch Malfunction	・Unlock warning switch ・Wire harness ・Transponder key ECU assy
B2784 (05-2001)	Antenna Coil Open/Short	・Wire harness ・Transponder key amplifier ・Transponder key ECU assy
B2793 (05-2003)	Transponder Chip Malfunction	・Key
B2794 (05-2004)	Unmatched Encryption Code	・Key
B2795 (05-2005)	Unmatched Key Code	・Key
B2796 (05-2006)	No Communication in Immobilizer System	・Key ・Transponder key amplifier ・Wire harness ・Transponder key ECU assy
B2797 (05-2009)	Communication Malfunction No. 1	・Key ・Wire harness ・Transponder key amplifier ・Transponder key ECU assy
B2798 (05-2006)	Communication Malfunction No. 2	・Key

2. ECM DIAGNOSTIC TROUBLE CODE CHART

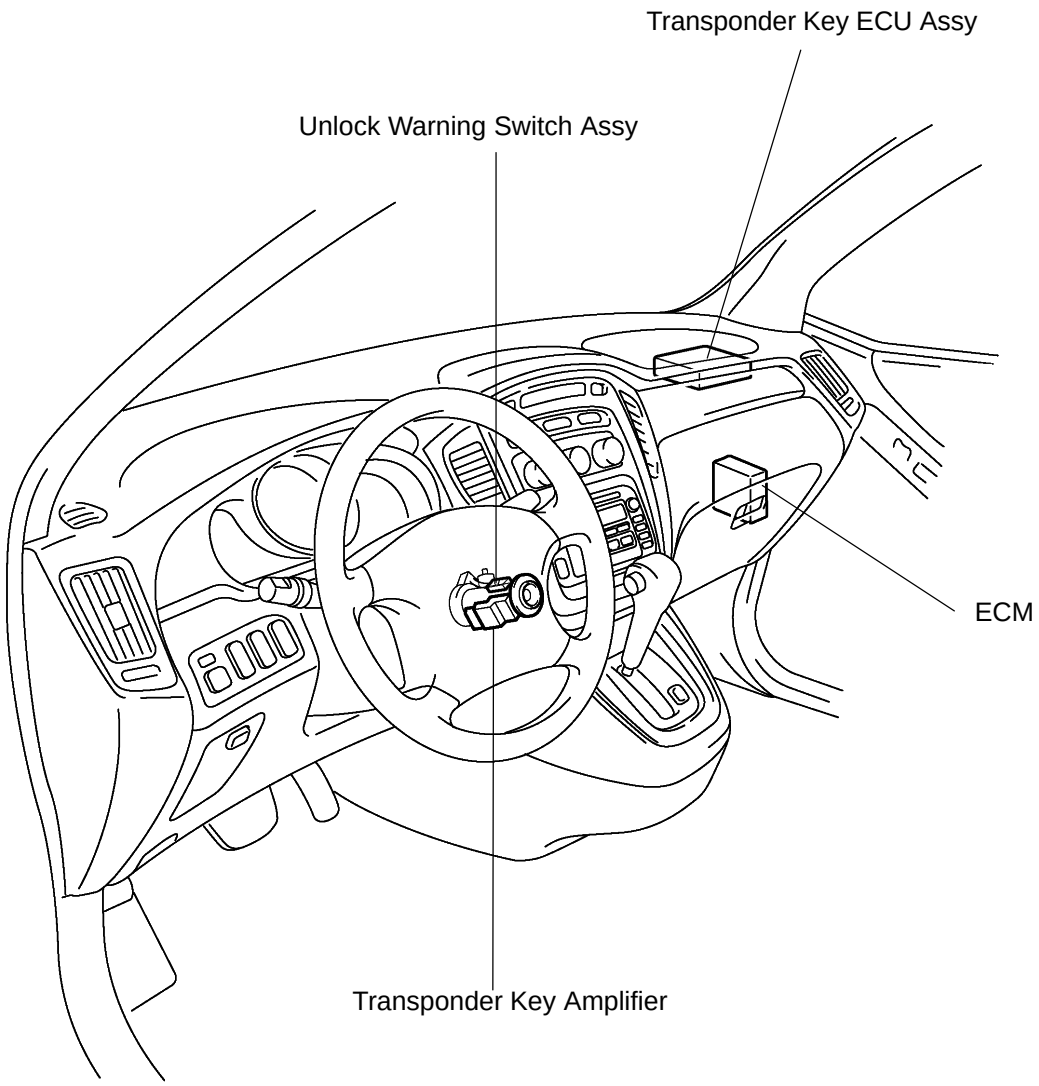
NOTICE:

The DTC for the immobilizer system is specified. If the other codes are output, check the DTC chart of the engine control system.

DTC No. (See Page)	Detection Item	Trouble Area
B2799 (05-2010)	Engine Immobilizer System Malfunction	・Wire harness ・Key ・Transponder key ECU assy ・Transponder key amplifier (Transponder key coil) ・ECM

052IE-12

LOCATION



Y

B78736

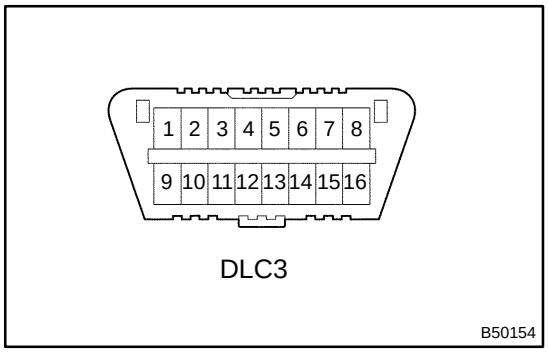
05A23-07

PRE-CHECK

1. DIAGNOSIS SYSTEM

(a) Description

(1) The ECM controls the function of the immobilizer system on this vehicle.
Data of the immobilizer system and the Diagnostic Trouble Code (DTC) can be read in the Data Link Connector 3 (DLC3) of the vehicle. When trouble occurs in the immobilizer system, even though the security indicator lamp does not turn on, DTCs can be checked.
Therefore, when there seems to be trouble with the immobilizer system, use the hand-held tester to check for trouble and troubleshoot it.



(b) Inspect the DLC3.
The vehicle's ECM uses the ISO 9141-2 communication protocol. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 9141-2 format.

Standard:

Terminal No.	Condition	Specified Condition
7 (Bus + Line) - 5 (Signal ground)	During communication	Pulse generation
4 (Chassis Ground) - Body ground	Constant	Below 1 Ω
5 (Signal Ground) - Body ground	Constant	Below 1 Ω
16 (B+) - Body ground	Constant	10 to 14 V

HINT:
Connect the cable of the hand-held tester to the DLC3, turn the ignition switch ON and attempt to use the hand-held tester. If the screen displays UNABLE TO CONNEC TO TO VEHICLE, a problem exists in the vehicle side or the tester side.

- If communication is normal when the tester is connected to other vehicle, inspect the DLC3 of the original vehicle.
- If communication is still impossible when the tester is connected to another vehicle, the problem may be in the tester itself. Consult the Service Department listed in the tester's instruction manual.

2. CHECK DIAGNOSIS

(a) Using the hand-held tester, check for DTC.

NOTICE:

Hand-held tester only:

When the diagnosis system is changed from normal mode to check mode, all DTCs and freeze frame data recorded in normal mode will be erased. Before changing modes, always check the DTCs and freeze frame data, and make a note of them.

(1) Prepare the hand-held tester.
(2) Connect the hand-held tester to the DLC3 under the instrument panel lower pad.
(3) Turn the ignition switch ON and push the hand-held tester switch ON.
(4) Use the hand-held tester to check for DTCs and freeze frame data, and make a note of them (for operating instructions, see the hand-held tester instruction book).
(5) Confirm the details of the DTCs.

(b) Either of the following procedures will erase the DTCs and freeze frame data.
  (1) Operating the hand-held tester to erase the codes (see the instruction manual for the hand-held tester).
  (2) Disconnecting the battery terminals or ECU-B fuse.

3. DATA LIST

HINT:

Using the hand-held tester DATA LIST allows switch, sensor, actuator and other item values to be read without removing any parts. Reading the DATA LIST early in troubleshooting is one way to shorten labor time.

(a) Connect the hand-held tester to the DLC3.

(b) Turn the ignition switch ON.

(c) Read the DATA LIST according to the display on the tester.

Transponder key ECU assy:

Item	Measurement Item/ Display (Range)	Normal Condition
KEY SW	Unlock warning switch signal/ ON or OFF	OFF: Key is in ignition key cylinder ON: No key is in ignition key cylinder
IG SW	Ignition switch signal/ ON or OFF	OFF: Ignition switch is in OFF or ACC position ON: Ignition switch is in ON position
IMMOBILISER	Immobilizer system status/ SET or UNSET	UNSET: Without key SET: Ignition switch ON
RESPONSE	Transponder chip data/ NG or OK	NG: Data error OK: Data OK
FRAME	Transponder chip data/ NG or OK	NG: Data error OK: Data OK
SERIAL NUMBER	Transponder chip data/ NG or OK	NG: Data error OK: Data OK
ENCRYPT CODE	Transponder chip data/ NG or OK	NG: Data error OK: Data OK
STATUS	Transponder chip data/ NG or OK	NG: Data error OK: Data OK
BCC	Transponder chip signal/ NG or OK	NG: Incorrect data sending OK: Correct data sending
SUB KEY	Sub-key code signal/ NOMATCH or MATCH	NOMATCH: Unmatched sub-key code is sent MATCH: Sub-key code is sent
MASTER KEY	Master key code signal/ NOMATCH or MATCH	NOMATCH: Unmatched master key code is sent MATCH: Master key code is sent
REGIST SUB CODE	Number of registered sub-key/ min. 0, max. 15	Number of registered sub-key
REGIST MAS CODE	Number of registered master key/ min. 0, max. 15	Number of registered master key
REG CODE SPACE	Memory space for key codes registration/ NOT FUL or FULL	NOT FUL: Possible to resister more key codes FULL: Cannot register any more key codes
ANTENNA COIL	Antenna coil condition/ NORMAL or FAIL	NORMAL: Antenna coil is normal FAIL: Antenna coil is malfunctioning

4. ACTIVE TEST

HINT:

Performing the hand-held tester ACTIVE TEST allows relay, VSV, actuator and other items to be operated without removing any parts. Performing the ACTIVE TEST early in troubleshooting is one way to shorten labor time. The DATA LIST can be displayed during the ACTIVE TEST.

(a) Connect the hand-held tester to the DLC3.

(b) Turn the ignition switch ON.

(c) Perform the ACTIVE TEST according to the display on the tester.

Transponder key ECU assy:

Item	Test Details
SECURITY INDIC	Turn security indicator ON/OFF

052IG-12

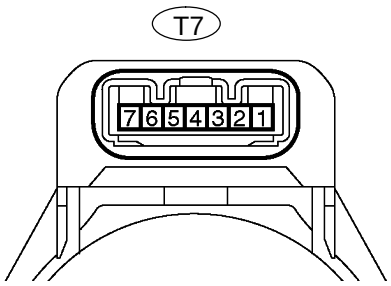
PROBLEM SYMPTOMS TABLE

Problem Symptom	Suspected Area	See Page
Engine does not start	1. Key	05-2003 05-2004 05-2005 05-2006 05-2009
	2. Transponder key amplifier	05-2001 05-2006 05-2010
	3. Transponder key ECU assy	05-1998 05-2001 05-2006 05-2009 05-2010

05A27-21

TERMINALS OF ECU

1. CHECK TRANSPONDER KEY AMPLIFIER



(a) Disconnect the T7 amplifier connector, and measure the resistance between the terminal of the wire harness side connector and body ground.

Standard:

Symbols (Terminal No.)	Wiring Color	Condition	Standard
GND (T7-7) - Body ground	R - Body ground	Constant	Below 1 Ω

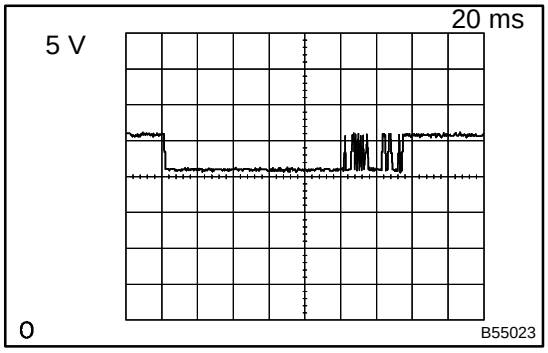
If the result is not as specified, there may be a malfunction on the wire harness side.

(b) Reconnect the T7 amplifier connector, and measure the resistance and voltage of each terminal of the connector.

Standard:

Symbols (Terminal No.)	Wiring Color	Condition	Standard
VC5 (T7-1) - GND (T7-7)	B - R	No key in ignition key cylinder → With key	0 V → 10 to 14 V
CODE(T7-4) - GND (T7-7)	GR - R	No key in ignition key cylinder → With key	Pulse generation (see waveform 1)
TXCT (T7-5) - GND (T7-7)	W - R	No key in ignition key cylinder → With key	Pulse generation (see waveform 2)
GND (T7-7) - Body ground	R - Body ground	Constant	Below 1 Ω

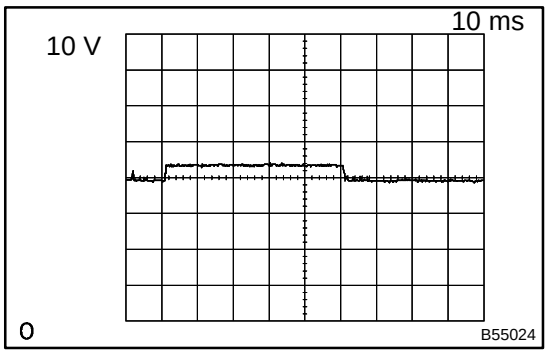
If the result is not as specified, the amplifier may have a malfunction.



(c) Inspect using an oscilloscope.

Waveform 1 (Reference):

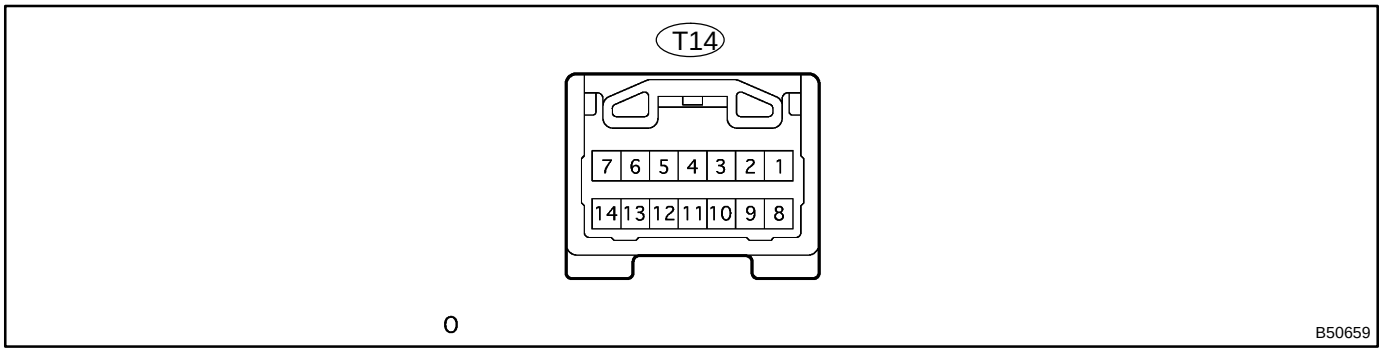
Terminal	CODE - GND
Tool Setting	5 V/DIV., 20 ms/DIV.
Condition	Ignition switch ON



Waveform 2 (Reference):

Terminal	TXCT - GND
Tool Setting	10 V/DIV., 10 ms/DIV.
Condition	Ignition switch ON

2. CHECK TRANSPONDER KEY ECU ASSY



(a) Disconnect the T14 ECU connector, and measure the voltage and resistance between each terminal of the wire harness side connector.

Standard:

Symbols (Terminal No.)	Wiring Color	Condition	Specified Condition
AGND (T14-13) - Body ground	R - Body ground	Constant	Below 1 Ω
+B (T14-1) - GND (T14-14)	P - W-B	Constant	10 to 14 V
IG (T14-2) - AGND (T14-13)	P - R	Ignition switch OFF → ON	0 V → 10 to 14 V
KSW (T14-10) - AGND (T14-13)	G - R	No key in ignition key cylinder → With key	10 kΩ or higher → Below 1 Ω

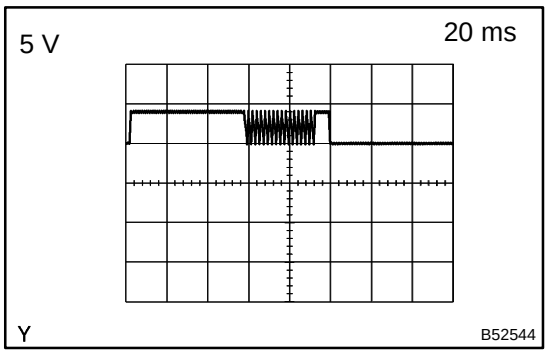
If the result is not as specified, there may be a malfunction on the wire harness side.

(b) Reconnect the T14 ECU connector, and measure the voltage between each terminal of the connector.

Standard:

Symbols (Terminal No.)	Wiring Color	Condition	Specified Condition
KSW (T14-10) - AGND (T14-13)	G - R	No key in ignition key cylinder → With key	10 to 14 V → 0 V
VC5 (T14-8) - AGND (T14-13)	B - R	Ignition switch OFF → ON	0 V → 4.5 to 5.5 V
TXCT (T14-12) - AGND (T14-13)	W - R	Ignition switch OFF → ON	Pulse generation (see waveform 1)
CODE (T14-11) - AGND (T14-13)	GR - R	Ignition switch OFF → ON	Pulse generation (see waveform 2)
EFIO (T14-6) - AGND (T14-13)	B - R	Ignition switch OFF → ON	Pulse generation (see waveform 3)
EFII (T14-7) - AGND (T14-13)	V - R	Ignition switch OFF → ON	Pulse generation (see waveform 4)

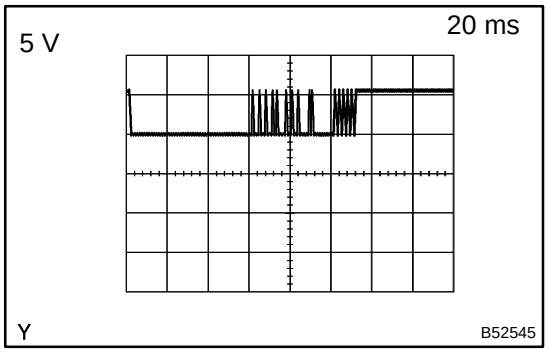
If the result is not as specified, the ECU may have a malfunction.



(c) Inspect using an oscilloscope.

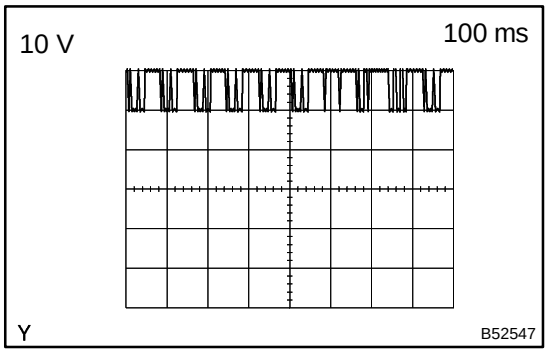
Waveform 1 (Reference):

Terminal	TXCT - GND
Tool Setting	5 V/DIV., 20 ms/DIV.
Condition	Ignition switch ON



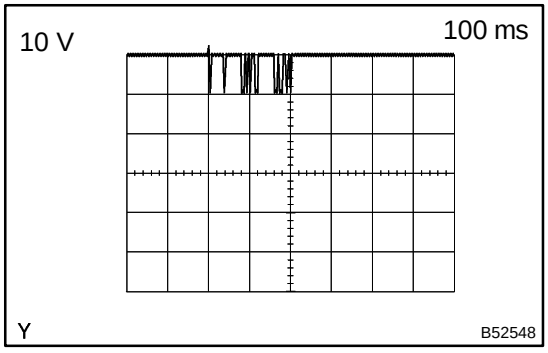
Waveform 2 (Reference):

Terminal	CODE - GND
Tool Setting	5 V/DIV., 20 ms/DIV.
Condition	Ignition switch ON



Waveform 3 (Reference):

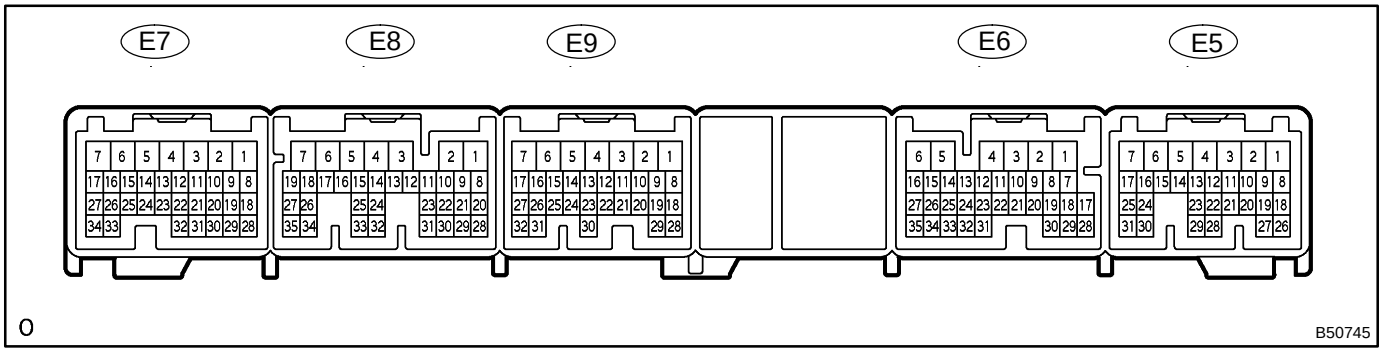
Terminal	EFIO - GND
Tool Setting	10 V/DIV., 100 ms/DIV.
Condition	Ignition switch ON



Waveform 4 (Reference):

Terminal	EFII - GND
Tool Setting	10 V/DIV., 100 ms/DIV.
Condition	Constant

3. CHECK ECM



(a) Disconnect the E6 and E7 ECM connectors, and measure the voltage and resistance between each terminal of the wire harness side connectors.

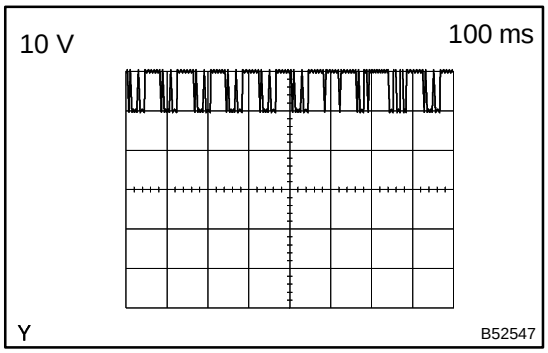
Standard:

Symbols (Terminal No.)	Wiring Color	Condition	Specified Condition
IMI (E6-27) - E1 (E9-1)*1 (E7-1)*2	B - BR	No key in ignition key cylinder → With key	Pulse generation (see waveform 1)
IMO (E6-26) - E1 (E9-1)*1 (E7-1)*2	V - BR	No key in ignition key cylinder → With key	Pulse generation (see waveform 2)
E1 (E9-1)*1 (E7-1)*2 Body ground	BR - Body ground	Constant	Below 1 Ω

If the result is not as specified, there may be a malfunction on the wire harness side.

*1: 2AZ-FE

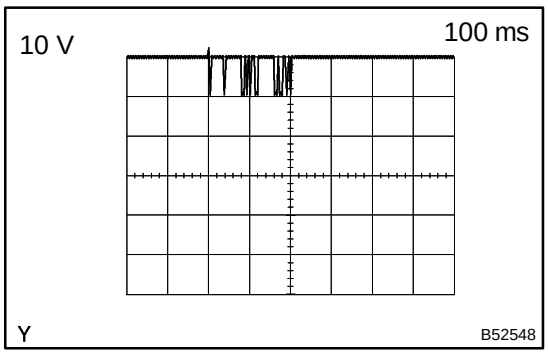
*2: 3MZ-FE



(b) Inspect using an oscilloscope.

Waveform 1 (Reference):

Terminal	IMI - GND
Tool Setting	10 V/DIV., 100 ms/DIV.
Condition	Ignition switch ON



Waveform 2 (Reference):

Terminal	IMO - GND
Tool Setting	10 V/DIV., 100 ms/DIV.
Condition	Constant

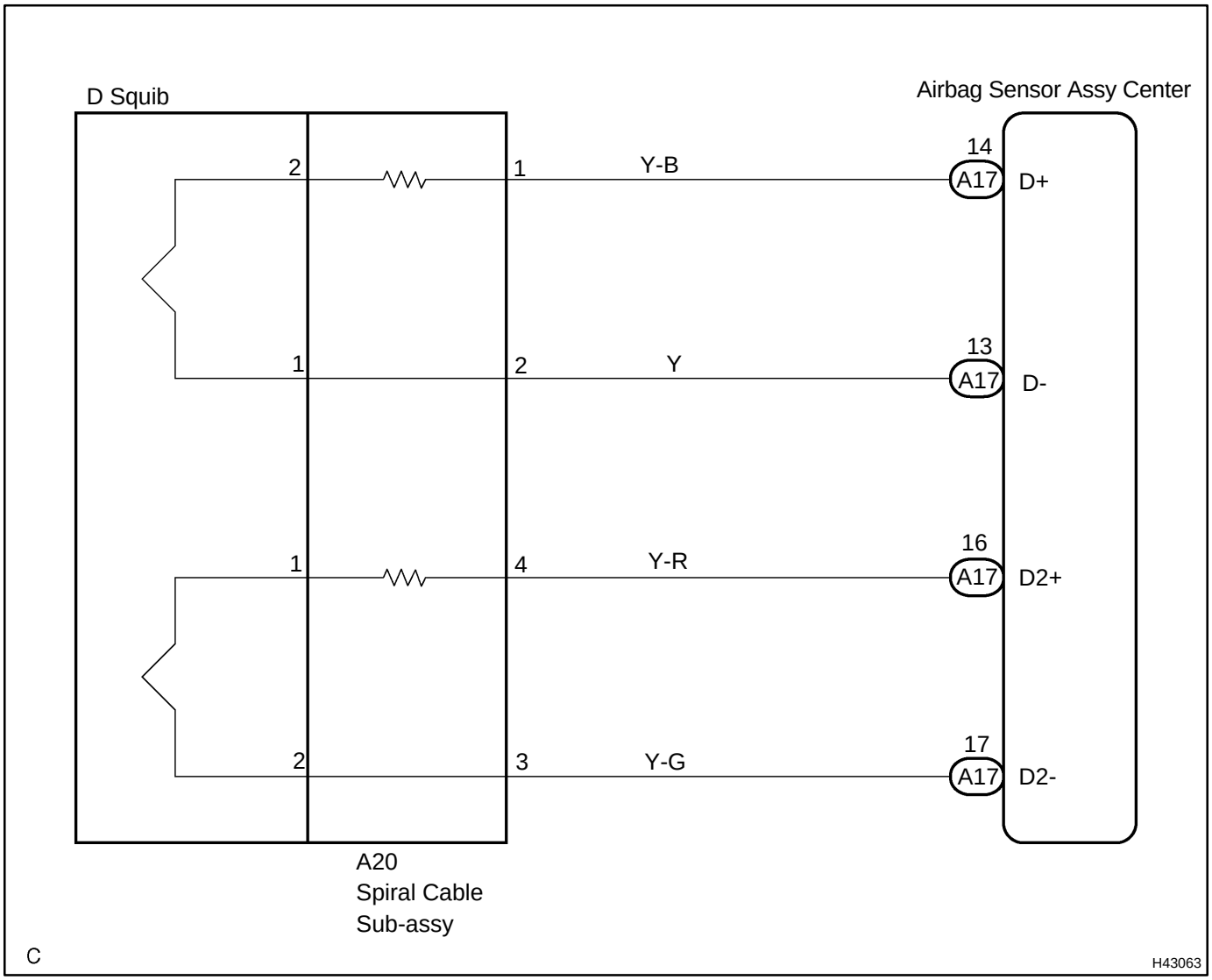
DTC B0100/13 SHORT IN D SQUIB CIRCUIT

CIRCUIT DESCRIPTION

The D squib circuit consists of the airbag sensor assy center, the spiral cable sub-assy and the horn button assy.
The circuit instructs the SRS to deploy when deployment conditions are met.
DTC B0100/13 is recorded when a short circuit is detected in the D squib circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B0100/13	・Short circuit between D+ wire harness and D- wire harness of D squib ・D squib malfunction ・Spiral cable sub-assy malfunction ・Airbag sensor assy center malfunction	・Horn button assy (D squib) ・Spiral cable sub-assy ・Airbag sensor assy center ・Cowl wire

WIRING DIAGRAM



INSPECTION PROCEDURE

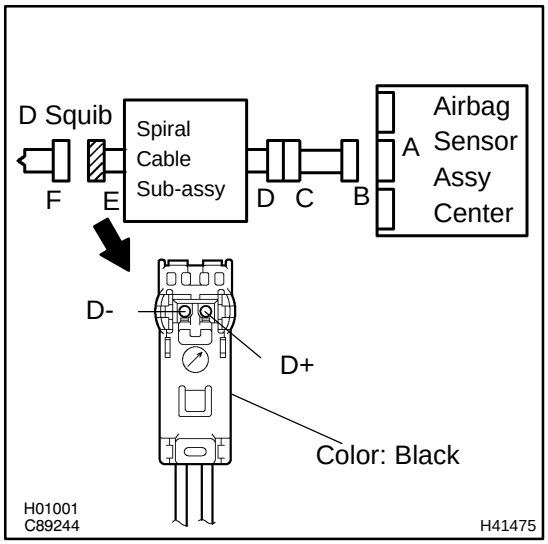
1	CHECK CONNECTOR

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the horn button assy.
(d) Check that the spiral cable sub-assy connectors (on the horn button assy side) are not damaged.
OK:
The lock button is not disengaged, or the claw of the lock is not deformed or damaged.

NG → **REPLACE SPIRAL CABLE SUB-ASSY (SEE PAGE 60-26)**

OK

2	CHECK D SQUIB CIRCUIT(AIRBAG SENSOR ASSY CENTER - HORN BUTTON ASSY)



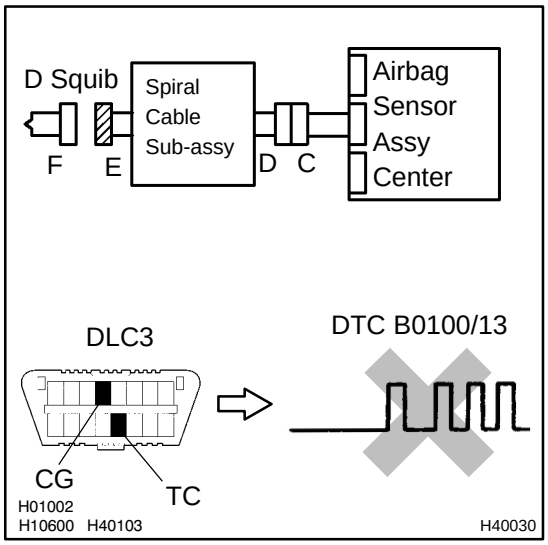
(a) Disconnect the connector from the airbag sensor assy center.
(b) Release the activation prevention mechanism built into connector ”B” (see page 05-1207).
(c) Measure the resistance according to the value(s) in the table below.
Standard:

Tester connection	Condition	Specified condition
D+ - D-	Always	1 MΩ or Higher

NG → **Go to step 5**

OK

3	CHECK AIR BAG SENSOR ASSY CENTER



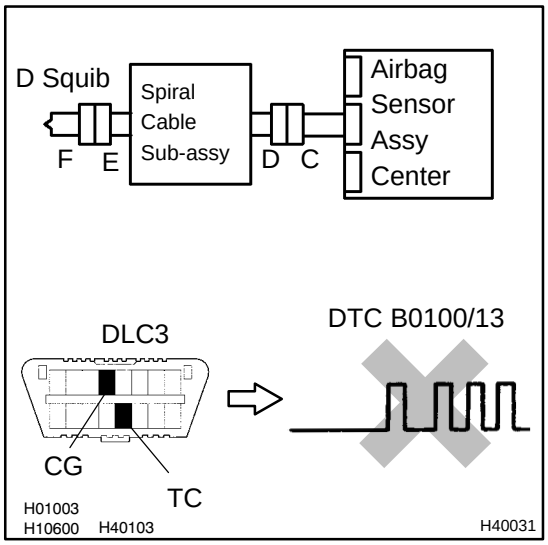
(a) Connect the connectors to the airbag sensor assy center.
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(d) Clear the DTCs stored in memory (see page 05-1215).
(e) Turn the ignition switch to the LOCK position.
(f) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(g) Check the DTCs (see page 05-1215).
OK:
DTC B0100/13 is not output.

HINT:
Codes other than code B0100/13 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG SENSOR ASSY CENTER (SEE PAGE 60-53)**

OK

4	CHECK HORN BUTTON ASSY(D SQUIB)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Connect the connectors to the horn button assy.
(d) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(e) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(f) Clear the DTCs stored in memory (see page 05-1215).
(g) Turn the ignition switch to the LOCK position.
(h) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(i) Check the DTCs (see page 05-1215).

OK:

DTC B0100/13 is not output.

HINT:

Codes other than code B0100/13 may be output at this time, but they are not related to this check.

NG → **REPLACE HORN BUTTON ASSY (SEE PAGE 60-17)**

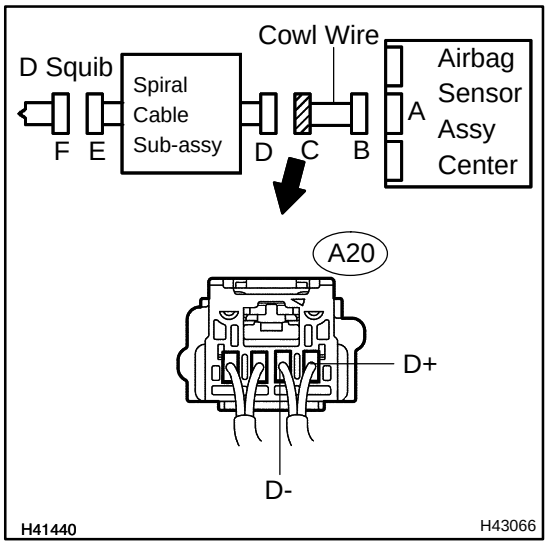
OK

USE SIMULATION METHOD TO CHECK

HINT:

- Before performing the simulation method, check that the airbag sensor assy center is in check mode (see page 05-1218).
- Perform the simulation method by selecting the check mode with the hand-held tester (see page 05-1218).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05-1218).

5 CHECK COWL WIRE



(a) Disconnect the cowl wire connector from the spiral cable sub-assy .

HINT:

The activation prevention mechanism of connector "B" has already been released.

(b) Measure the resistance according to the value(s) in the table below.

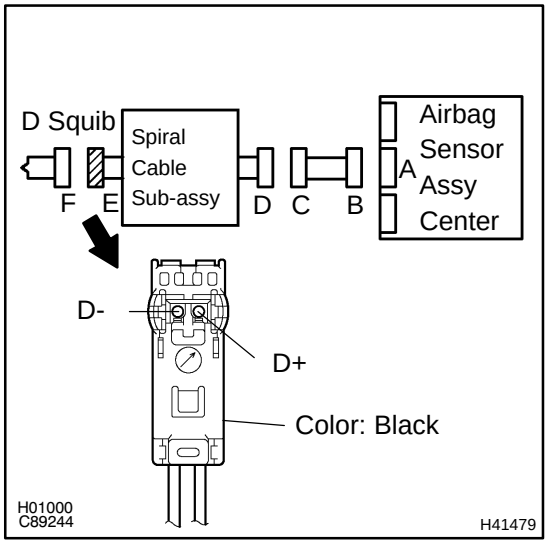
Standard:

Tester connection	Condition	Specified condition
A20-1 (D+) - A20-2 (D-)	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE COWL WIRE**

OK

6 CHECK SPIRAL CABLE SUB-ASSY



(a) Release the activation prevention mechanism built into connector "D" (see page 05-1207).

(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
D+ - D-	Always	1 MΩ or Higher

NG → **REPLACE SPIRAL CABLE SUB-ASSY (SEE PAGE 60-26)**

0K

USE SIMULATION METHOD TO CHECK

HINT:

- Before performing the simulation method, check that the airbag sensor assy center is in check mode (see page 05-1218).
- Perform the simulation method by selecting the check mode with the hand-held tester (see page 05-1218).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05-1218).

DTC B0101/14 OPEN IN D SQUIB CIRCUIT

CIRCUIT DESCRIPTION

The D squib circuit consists of the airbag sensor assy center, the spiral cable sub-assy and the horn button assy.
The circuit instructs the SRS to deploy when deployment conditions are met.
DTC B0101/14 is recorded when an open circuit is detected in the D squib circuit.

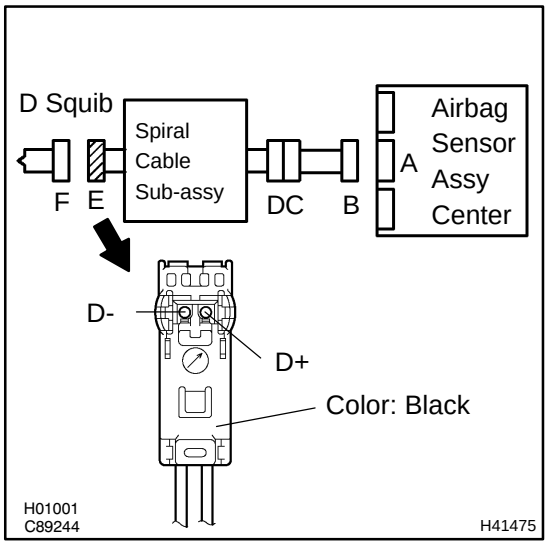
DTC No.	DTC Detecting Condition	Trouble Area
B0101/14	⋇Open circuit in D+ wire harness or D- wire harness of D squib ⋇D squib malfunction ⋇Spiral cable sub-assy malfunction ⋇Airbag sensor assy center malfunction	⋇Horn button assy (D squib) ⋇Spiral cable sub-assy ⋇Airbag sensor assy center ⋇Cowl wire

WIRING DIAGRAM

see page 05-1233 .

INSPECTION PROCEDURE

1 CHECK D SQUIB CIRCUIT(AIRBAG SENSOR ASSY CENTER - HORN BUTTON ASSY)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag sensor assy center and the horn button assy.
(d) Measure the resistance according to the value(s) in the table below.

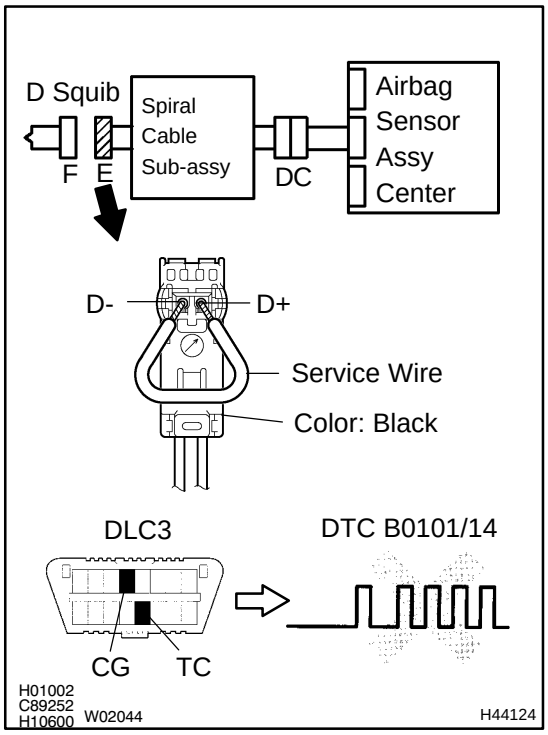
Standard:

Tester connection	Condition	Specified condition
D+ - D-	Always	Below 1 Ω

NG → **Go to step 4**

OK

2	CHECK AIR BAG SENSOR ASSY CENTER



(a) Connect the connector to the airbag sensor assy center.
(b) Using a service wire, connect D+ and D- of connector "E".

NOTICE:

- **Twist the end of the service wire in order to insert it into the connector.**
- **Do not forcibly insert the twisted service wire into the terminals of the connector when connecting.**

(c) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Clear the DTCs stored in memory (see page 05-1215).
(f) Turn the ignition switch to the LOCK position.
(g) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(h) Check the DTCs (see page 05-1215).

OK:

DTC B0101/14 is not output.

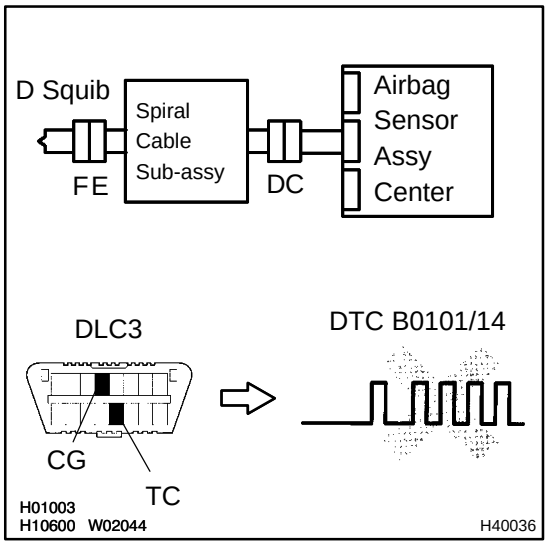
HINT:

Codes other than code B0101/14 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG SENSOR ASSY CENTER (SEE PAGE 60-53)**

OK

3 CHECK HORN BUTTON ASSY(D SQUIB)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the service wire from connector "E".
(d) Connect the connectors to the horn button assy.
(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(g) Clear the DTCs stored in memory (see page 05-1215).
(h) Turn the ignition switch to the LOCK position.
(i) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(j) Check the DTCs (see page 05-1215).

OK:

DTC B0101/14 is not output.

HINT:

Codes other than code B0101/14 may be output at this time, but they are not related to this check.

NG	REPLACE HORN BUTTON ASSY (SEE PAGE 60-17)

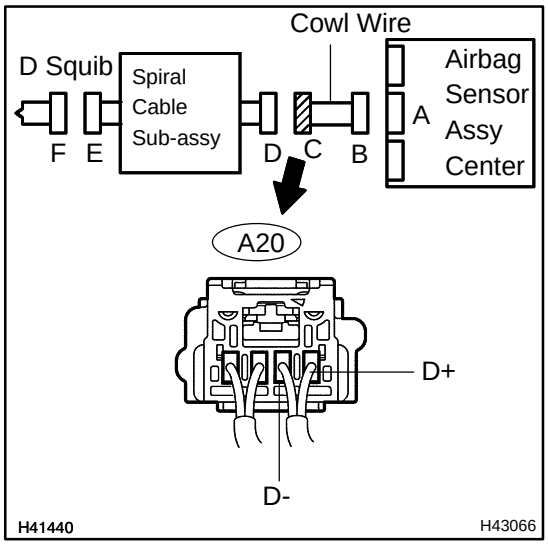
OK

USE SIMULATION METHOD TO CHECK

HINT:

- Before performing the simulation method, check that the airbag sensor assy center is in check mode (see page 05-1218).
- Perform the simulation method by selecting the check mode with the hand-held tester (see page 05-1218).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05-1218).

4 CHECK COWL WIRE



(a) Disconnect the cowl wire connector from the spiral cable sub-assy .

(b) Measure the resistance according to the value(s) in the table below.

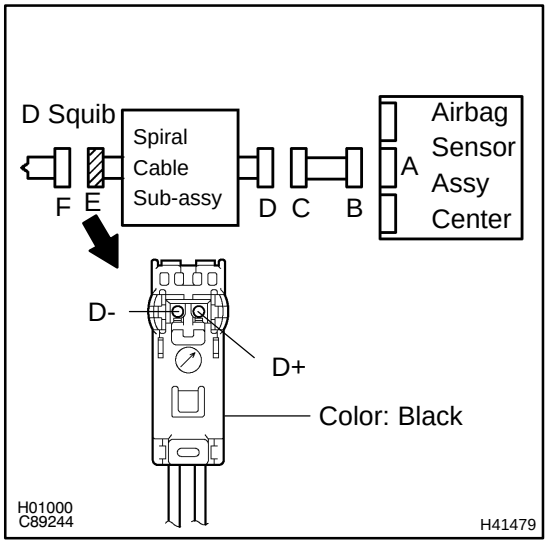
Standard:

Tester connection	Condition	Specified condition
A20-1 (D+) - A20-2 (D-)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE COWL WIRE**

OK

5 CHECK SPIRAL CABLE SUB-ASSY



(a) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
D+ - D-	Always	Below 1 Ω

NG → **REPLACE SPIRAL CABLE SUB-ASSY (SEE PAGE 60-26)**

OK

USE SIMULATION METHOD TO CHECK

HINT:

- Before performing the simulation method, check that the airbag sensor assy center is in check mode (see page 05-1218).
- Perform the simulation method by selecting the check mode with the hand-held tester (see page 05-1218).
- After selecting the check mode, perform the simulation method by wiggling each connector of the air-bag system or driving the vehicle on a city or rough road (see page 05-1218).

DTC B0102/11 SHORT IN D SQUIB CIRCUIT (TO GROUND)

CIRCUIT DESCRIPTION

The D squib circuit consists of the airbag sensor assy center, the spiral cable sub-assy and the horn button assy.
The circuit instructs the SRS to deploy when deployment conditions are met.
DTC B0102/11 is recorded when a short to ground is detected in the D squib circuit.

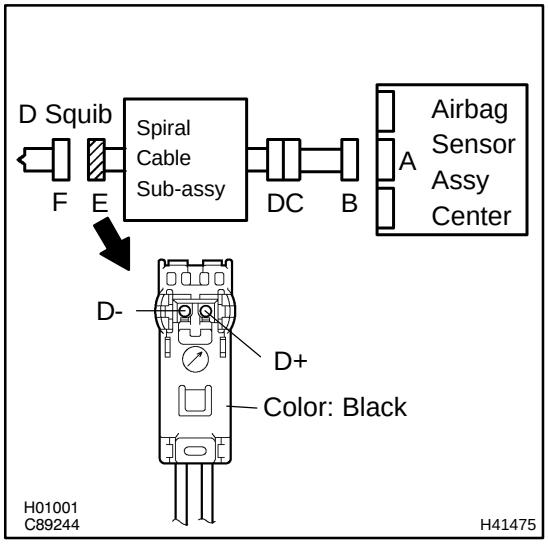
DTC No.	DTC Detecting Condition	Trouble Area
B0102/11	・Short circuit in D squib wire harness (to ground) ・D squib malfunction ・Spiral cable sub-assy malfunction ・Airbag sensor assy center malfunction	・Horn button assy (D squib) ・Spiral cable sub-assy ・Airbag sensor assy center ・Cowl wire

WIRING DIAGRAM

see page 05-1233 .

INSPECTION PROCEDURE

1 CHECK D SQUIB CIRCUIT(AIRBAG SENSOR ASSY CENTER - HORN BUTTON ASSY)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag sensor assy center and the horn button assy.
(d) Measure the resistance according to the value(s) in the table below.

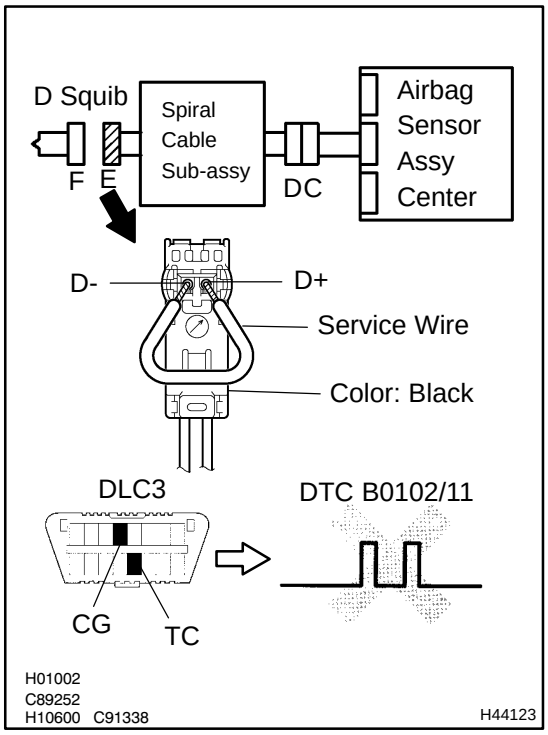
Standard:

Tester connection	Condition	Specified condition
D+ - Body ground	Always	1 MΩ or Higher
D- - Body ground	Always	1 MΩ or Higher

NG → **Go to step 4**

OK

2 CHECK AIR BAG SENSOR ASSY CENTER



(a) Connect the connector to the airbag sensor assy center.
(b) Using a service wire, connect D+ and D- of connector "E".

NOTICE:

- **Twist the end of the service wire in order to insert it into the connector.**
- **Do not forcibly insert the twisted service wire into the terminals of the connector when connecting.**

(c) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Clear the DTCs stored in memory (see page 05-1215).
(f) Turn the ignition switch to the LOCK position.
(g) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(h) Check the DTCs (see page 05-1215).

OK:

DTC B0102/11 is not output.

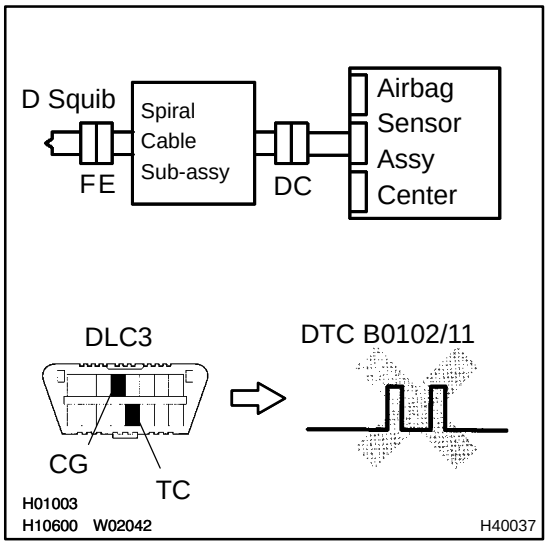
HINT:

Codes other than code B0102/11 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG SENSOR ASSY CENTER (SEE PAGE 60-53)**

OK

3 CHECK HORN BUTTON ASSY(D SQUIB)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the service wire from connector "E".
(d) Connect the connectors to the horn button assy.
(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(g) Clear the DTCs stored in memory (see page 05-1215).
(h) Turn the ignition switch to the LOCK position.
(i) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(j) Check the DTCs (see page 05-1215).

OK:

DTC B0102/11 is not output.

HINT:

Codes other than code B0102/11 may be output at this time, but they are not related to this check.

NG	REPLACE HORN BUTTON ASSY (SEE PAGE 60-17)

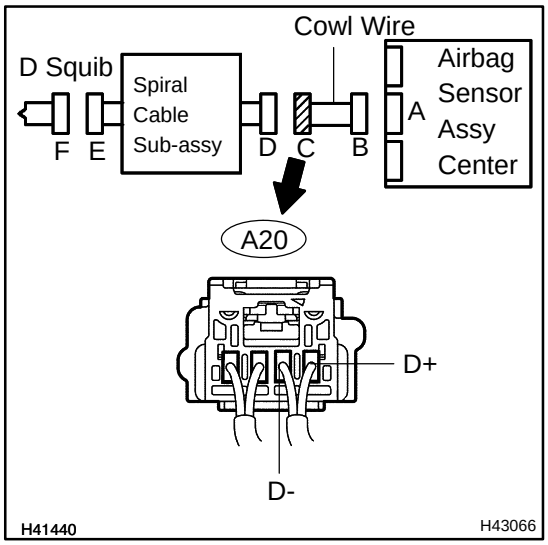
OK

USE SIMULATION METHOD TO CHECK

HINT:

- Before performing the simulation method, check that the airbag sensor assy center is in check mode (see page 05-1218).
- Perform the simulation method by selecting the check mode with the hand-held tester (see page 05-1218).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05-1218).

4 CHECK COWL WIRE



(a) Disconnect the cowl wire connector from the spiral cable sub-assy .

(b) Measure the resistance according to the value(s) in the table below.

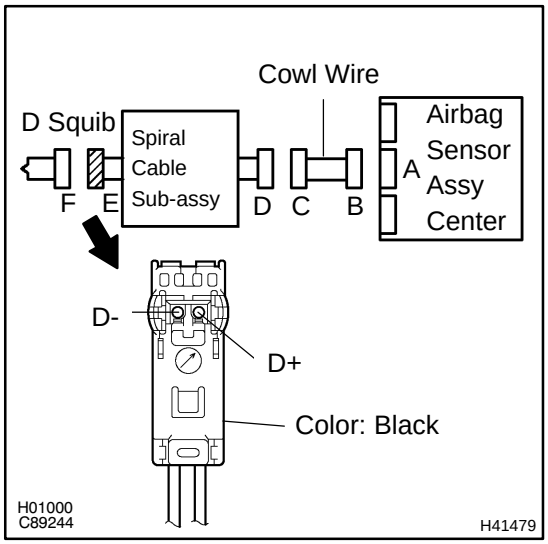
Standard:

Tester connection	Condition	Specified condition
A20-1 (D+) - Body ground	Always	1 MΩ or Higher
A20-2 (D-) - Body ground	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE COWL WIRE**

OK

5 CHECK SPIRAL CABLE SUB-ASSY



(a) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
D+ - Body ground	Always	1 MΩ or Higher
D- - Body ground	Always	1 MΩ or Higher

NG → **REPLACE SPIRAL CABLE SUB-ASSY (SEE PAGE 60-26)**

OK

USE SIMULATION METHOD TO CHECK

HINT:

- Before performing the simulation method, check that the airbag sensor assy center is in check mode (see page 05-1218).
- Perform the simulation method by selecting the check mode with the hand-held tester (see page 05-1218).
- After selecting the check mode, perform the simulation method by wiggling each connector of the air-bag system or driving the vehicle on a city or rough road (see page 05-1218).

DTC B0103/12 SHORT IN D SQUIB CIRCUIT (TO B+)

CIRCUIT DESCRIPTION

The D squib circuit consists of the airbag sensor assy center, the spiral cable sub-assy and the horn button assy.
The circuit instructs the SRS to deploy when deployment conditions are met.
DTC B0103/12 is recorded when a short to B+ is detected in the D squib circuit.

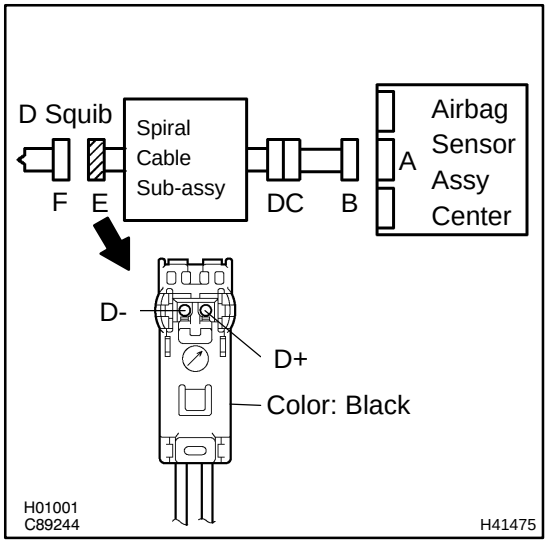
DTC No.	DTC Detecting Condition	Trouble Area
B0103/12	・Short circuit in D squib wire harness (to B+) ・D squib malfunction ・Spiral cable sub-assy malfunction ・Airbag sensor assy center malfunction	・Horn button assy (D squib) ・Spiral cable sub-assy ・Airbag sensor assy center ・Cowl wire

WIRING DIAGRAM

see page 05-1233 .

INSPECTION PROCEDURE

1	CHECK D SQUIB CIRCUIT(AIRBAG SENSOR ASSY CENTER - HORN BUTTON ASSY)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag sensor assy center and the horn button assy.
(d) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(e) Turn the ignition switch to the ON position.
(f) Measure the voltage according to the value(s) in the table below.

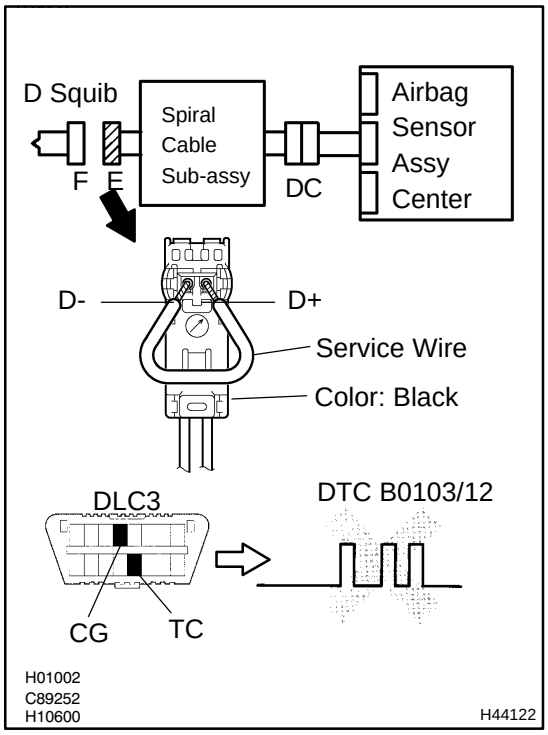
Standard:

Tester connection	Condition	Specified condition
D+ - Body ground	Ignition switch ON	Below 1 V
D- - Body ground	Ignition switch ON	Below 1 V

NG → **Go to step 4**

OK

2 CHECK AIR BAG SENSOR ASSY CENTER



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Connect the connector to the airbag sensor assy center.
(d) Using a service wire, connect D+ and D- of connector "E".

NOTICE:

- **Twist the end of the service wire in order to insert it into the connector.**
- **Do not forcibly insert the twisted service wire into the terminals of the connector when connecting.**

(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(g) Clear the DTCs stored in memory (see page 05-1215).
(h) Turn the ignition switch to the LOCK position.
(i) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(j) Check the DTCs (see page 05-1215).

OK:

DTC B0103/12 is not output.

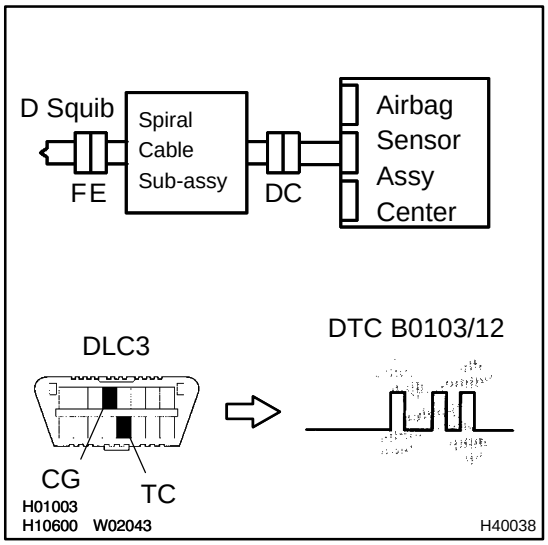
HINT:

Codes other than code B0103/12 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG SENSOR ASSY CENTER (SEE PAGE 60-53)**

OK

3 CHECK HORN BUTTON ASSY(D SQUIB)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the service wire from connector "E".
(d) Connect the connectors to the horn button assy.
(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(g) Clear the DTCs stored in memory (see page 05-1215).
(h) Turn the ignition switch to the LOCK position.
(i) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(j) Check the DTCs (see page 05-1215).

OK:

DTC B0103/12 is not output.

HINT:

Codes other than code B0103/12 may be output at this time, but they are not related to this check.

NG	REPLACE HORN BUTTON ASSY (SEE PAGE 60-17)

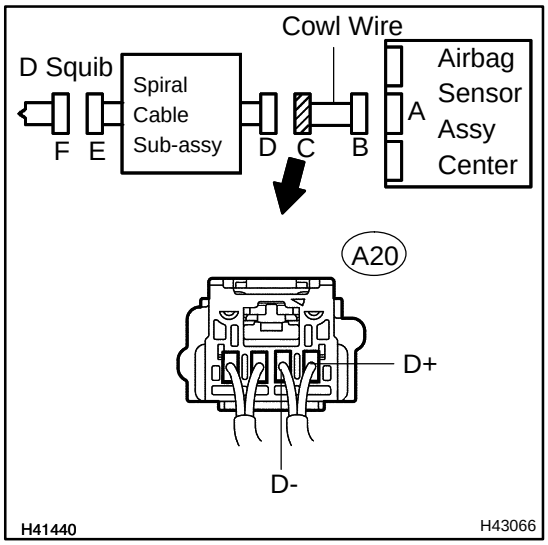
OK

USE SIMULATION METHOD TO CHECK

HINT:

- Before performing the simulation method, check that the airbag sensor assy center is in check mode (see page 05-1218).
- Perform the simulation method by selecting the check mode with the hand-held tester (see page 05-1218).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05-1218).

4	**CHECK COWL WIRE**



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the cowl wire connector from the spiral cable sub-assy .
(d) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(e) Turn the ignition switch to the ON position.
(f) Measure the voltage according to the value(s) in the table below.

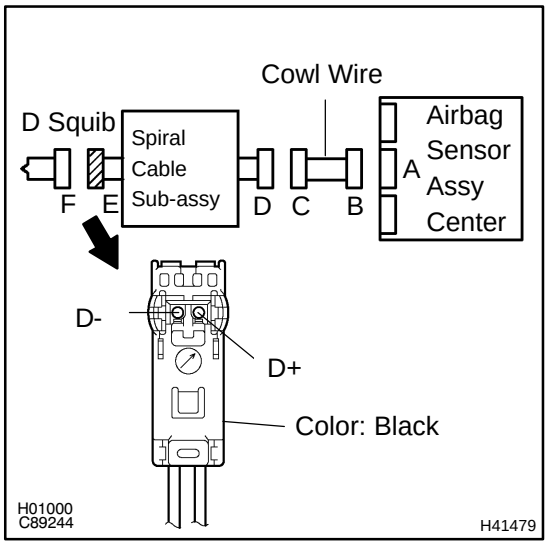
Standard:

Tester connection	Condition	Specified condition
A20-1 (D+) - Body ground	Ignition switch ON	Below 1 V
A20-2 (D-) - Body ground	Ignition switch ON	Below 1 V

NG → **REPAIR OR REPLACE COWL WIRE**

OK

5 CHECK SPIRAL CABLE SUB-ASSY



(a) Measure the voltage according to the value(s) in the table below when the ignition switch is in the ON position.

Standard:

Tester connection	Condition	Specified condition
D+ - Body ground	Ignition switch ON	Below 1 V
D- - Body ground	Ignition switch ON	Below 1 V

NG → **REPLACE SPIRAL CABLE SUB-ASSY (SEE PAGE 60-26)**

OK

USE SIMULATION METHOD TO CHECK

HINT:

- Before performing the simulation method, check that the airbag sensor assy center is in check mode (see page 05-1218).
- Perform the simulation method by selecting the check mode with the hand-held tester (see page 05-1218).
- After selecting the check mode, perform the simulation method by wiggling each connector of the air-bag system or driving the vehicle on a city or rough road (see page 05-1218).

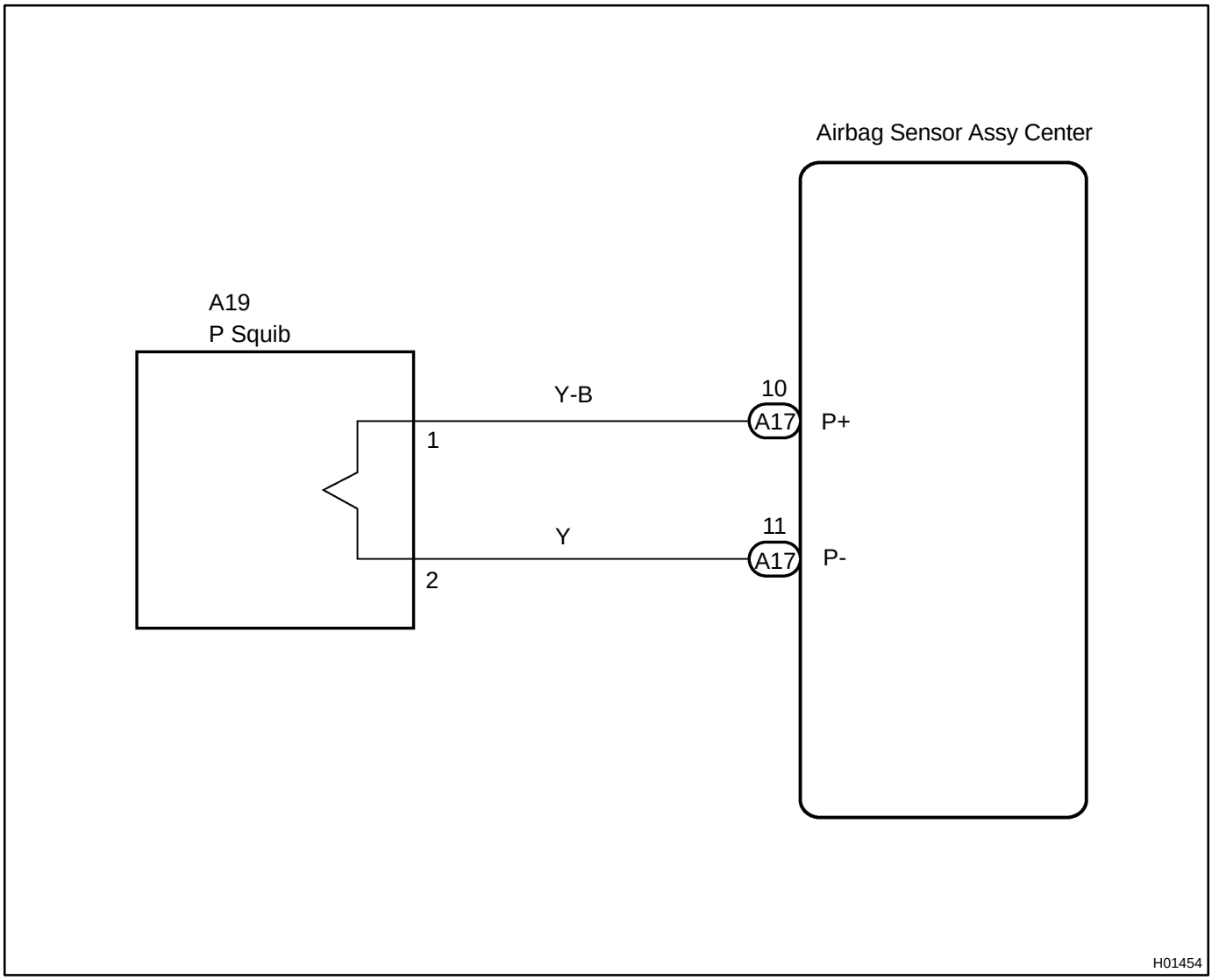
DTC B0105/53 SHORT IN P SQUIB CIRCUIT

CIRCUIT DESCRIPTION

The P squib circuit consists of the airbag sensor assy center and the front passenger airbag assy.
The circuit instructs the SRS to deploy when deployment conditions are met.
DTC B0105/53 is recorded when a short circuit is detected in the P squib circuit.

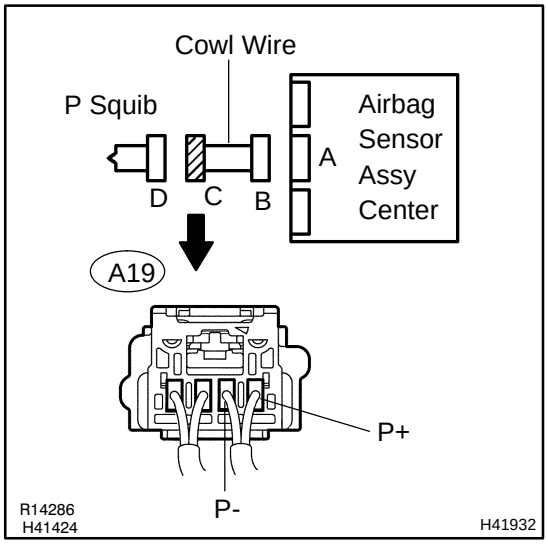
DTC No.	DTC Detecting Condition	Trouble Area
B0105/53	・Short circuit between P+ wire harness and P- wire harness of P squib ・P squib malfunction ・Airbag sensor assy center malfunction	・Front passenger airbag assy (P squib) ・Airbag sensor assy center ・Cowl wire

WIRING DIAGRAM



INSPECTION PROCEDURE

1 CHECK COWL WIRE(P SQUIB CIRCUIT)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag sensor assy center and the front passenger airbag assy.
(d) Release the activation prevention mechanism built into connector "B" (see page 05-1207).
(e) Measure the resistance according to the value(s) in the table below.

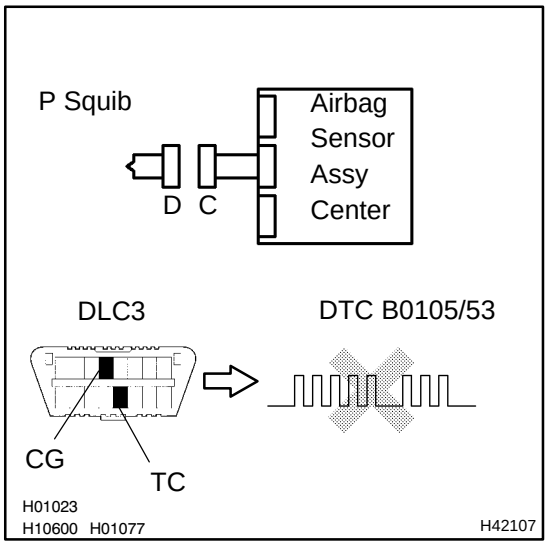
Standard:

Tester connection	Condition	Specified condition
A19-1 (P+) - A19-2 (P-)	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE COWL WIRE**

OK

2 CHECK AIR BAG SENSOR ASSY CENTER



(a) Connect the connector to the airbag sensor assy center.
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(d) Clear the DTCs stored in memory (see page 05-1215).
(e) Turn the ignition switch to the LOCK position.
(f) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(g) Check the DTCs (see page 05-1215).

OK:

DTC B0105/53 is not output.

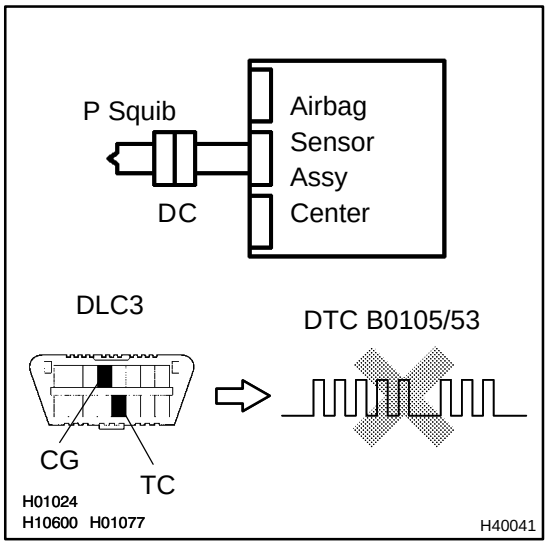
HINT:

Codes other than code B0105/53 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG SENSOR ASSY CENTER (SEE PAGE 60-53)**

OK

3	CHECK FRONT PASSENGER AIRBAG ASSY(P SQUIB)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Connect the connector to the front passenger airbag assy.
(d) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(e) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(f) Clear the DTCs stored in memory (see page 05-1215).
(g) Turn the ignition switch to the LOCK position.
(h) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(i) Check the DTCs (see page 05-1215).

OK:

DTC B0105/53 is not output.

HINT:

Codes other than code B0105/53 may be output at this time, but they are not related to this check.

NG → **REPLACE FRONT PASSENGER AIRBAG ASSY (SEE PAGE 60-29)**

OK

USE SIMULATION METHOD TO CHECK

HINT:

- Before performing the simulation method, check that the airbag sensor assy center is in check mode (see page 05-1218).
- Perform the simulation method by selecting the check mode with the hand-held tester (see page 05-1218).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05-1218).

DTC B0106/54 OPEN IN P SQUIB CIRCUIT

CIRCUIT DESCRIPTION

The P squib circuit consists of the airbag sensor assy center and the front passenger airbag assy.
The circuit instructs the SRS to deploy when deployment conditions are met.
DTC B0106/54 is recorded when an open circuit is detected in the P squib circuit.

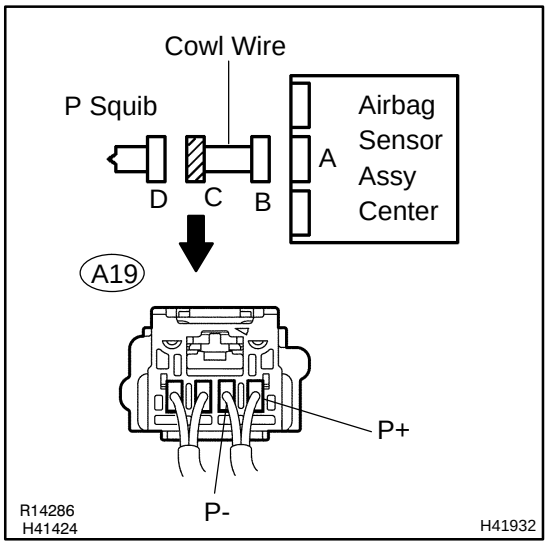
DTC No.	DTC Detecting Condition	Trouble Area
B0106/54	・Open circuit in P+ wire harness or P- wire harness of P squib ・P squib malfunction ・Airbag sensor assy center malfunction	・Front passenger airbag assy (P squib) ・Airbag sensor assy center ・Cowl wire

WIRING DIAGRAM

see page 05-1251 .

INSPECTION PROCEDURE

1 CHECK COWL WIRE(P SQUIB CIRCUIT)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag sensor assy center and the front passenger airbag assy.
(d) Measure the resistance according to the value(s) in the table below.

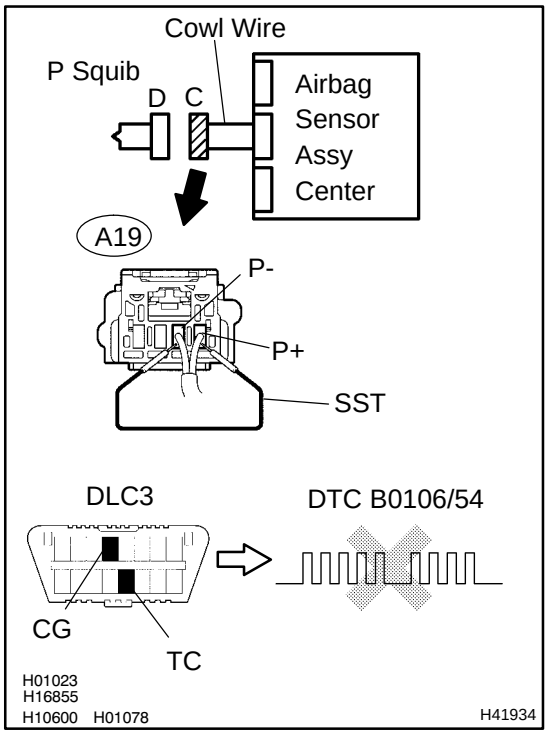
Standard:

Tester connection	Condition	Specified condition
A19-1 (P+) - A19-2 (P-)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE COWL WIRE**

OK

2	CHECK AIR BAG SENSOR ASSY CENTER



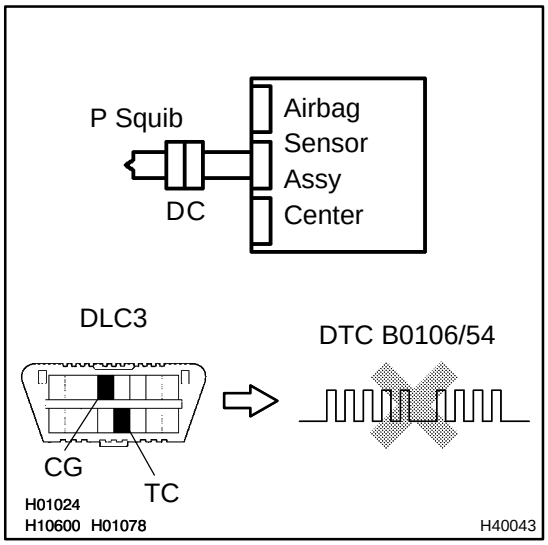
(a) Connect the connector to the airbag sensor assy center.
(b) Using SST, connect A19-1 (P+) and A19-2 (P-) of connector "C".
SST 09843-18040
(c) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Clear the DTCs stored in memory (see page 05-1215).
(f) Turn the ignition switch to the LOCK position.
(g) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(h) Check the DTCs (see page 05-1215).
OK:
DTC B0106/54 is not output.

HINT:
Codes other than code B0106/54 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG SENSOR ASSY CENTER (SEE PAGE 60-53)**

OK

3 CHECK FRONT PASSENGER AIRBAG ASSY(P SQUIB)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the SST from connector "C".
(d) Connect the connector to the front passenger airbag assy.
(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(g) Clear the DTCs stored in memory (see page 05-1215).
(h) Turn the ignition switch to the LOCK position.
(i) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(j) Check the DTCs (see page 05-1215).

OK:

DTC B0106/54 is not output.

HINT:

Codes other than code B0106/54 may be output at this time, but they are not related to this check.

NG → **REPLACE FRONT PASSENGER AIRBAG ASSY (SEE PAGE 60-29)**

OK

USE SIMULATION METHOD TO CHECK

HINT:

- Before performing the simulation method, check that the airbag sensor assy center is in check mode (see page 05-1218).
- Perform the simulation method by selecting the check mode with the hand-held tester (see page 05-1218).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05-1218).

DTC B0107/51 SHORT IN P SQUIB CIRCUIT (TO GROUND)

CIRCUIT DESCRIPTION

The P squib circuit consists of the airbag sensor assy center and the front passenger airbag assy.
The circuit instructs the SRS to deploy when deployment conditions are met.
DTC B0107/51 is recorded when a short to ground is detected in the P squib circuit.

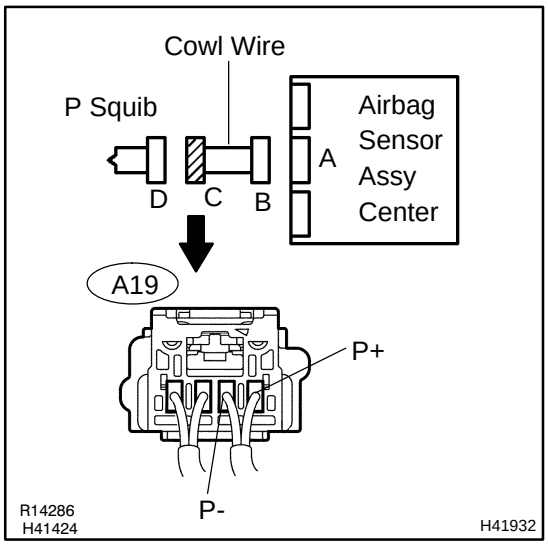
DTC No.	DTC Detecting Condition	Trouble Area
B0107/51	・Short circuit in P squib wire harness (to ground) ・P squib malfunction ・Airbag sensor assy center malfunction	・Front passenger airbag assy (P squib) ・Airbag sensor assy center ・Cowl wire

WIRING DIAGRAM

see page 05-1251 .

INSPECTION PROCEDURE

1 CHECK COWL WIRE(P SQUIB CIRCUIT)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag sensor assy center and the front passenger airbag assy.
(d) Measure the resistance according to the value(s) in the table below.

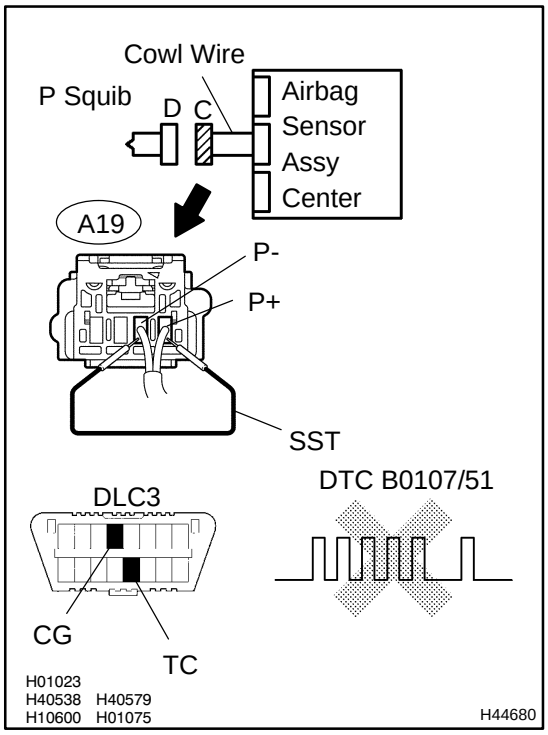
Standard:

Tester connection	Condition	Specified condition
A19-1 (P+) - Body ground	Always	1 MΩ or Higher
A19-2 (P-) - Body ground	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE COWL WIRE**

OK

2	CHECK AIR BAG SENSOR ASSY CENTER



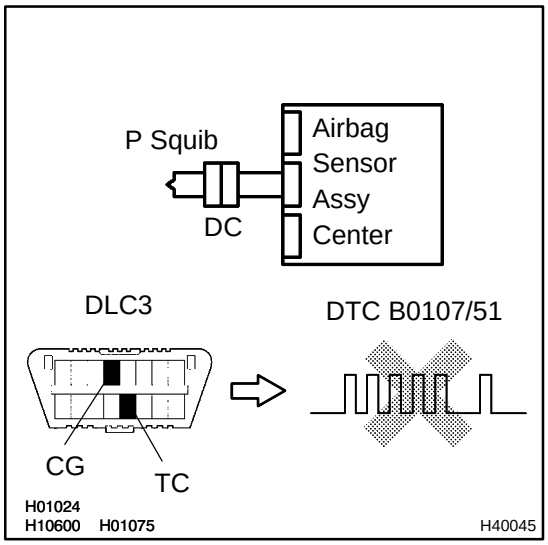
(a) Connect the connector to the airbag sensor assy center.
(b) Using SST, connect A19-1 (P+) and A19-2(P-) of connector ”C”.
SST 09843-18040
(c) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Clear the DTCs stored in memory (see page 05-1215).
(f) Turn the ignition switch to the LOCK position.
(g) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(h) Check the DTCs (see page 05-1215).
OK:
DTC B0107/51 is not output.

HINT:
Codes other than code B0107/51 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG SENSOR ASSY CENTER (SEE PAGE 60-53)**

OK

3 CHECK FRONT PASSENGER AIRBAG ASSY(P SQUIB)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the SST from connector "C".
(d) Connect the connector to the front passenger airbag assy.
(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(g) Clear the DTCs stored in memory (see page 05-1215).
(h) Turn the ignition switch to the LOCK position.
(i) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(j) Check the DTCs (see page 05-1215).

OK:

DTC B0107/51 is not output.

HINT:

Codes other than code B0107/51 may be output at this time, but they are not related to this check.

NG → **REPLACE FRONT PASSENGER AIRBAG ASSY (SEE PAGE 60-29)**

OK

USE SIMULATION METHOD TO CHECK

HINT:

- Before performing the simulation method, check that the airbag sensor assy center is in check mode (see page 05-1218).
- Perform the simulation method by selecting the check mode with the hand-held tester (see page 05-1218).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05-1218).

DTC B0108/52 SHORT IN P SQUIB CIRCUIT (TO B+)

CIRCUIT DESCRIPTION

The P squib circuit consists of the airbag sensor assy center and the front passenger airbag assy.
The circuit instructs the SRS to deploy when deployment conditions are met.
DTC B0108/52 is recorded when a short to B+ is detected in the P squib circuit.

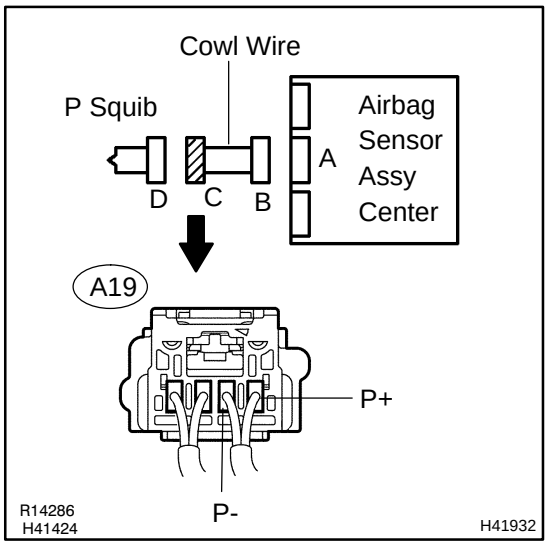
DTC No.	DTC Detecting Condition	Trouble Area
B0108/52	・Short circuit in P squib wire harness (to B+) ・P squib malfunction ・Airbag sensor assy center malfunction	・Front passenger airbag assy (P squib) ・Airbag sensor assy center ・Cowl wire

WIRING DIAGRAM

see page 05-1251 .

INSPECTION PROCEDURE

1 CHECK COWL WIRE(P SQUIB CIRCUIT)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag sensor assy center and the front passenger airbag assy.
(d) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(e) Turn the ignition switch to the ON position.
(f) Measure the voltage according to the value(s) in the table below.

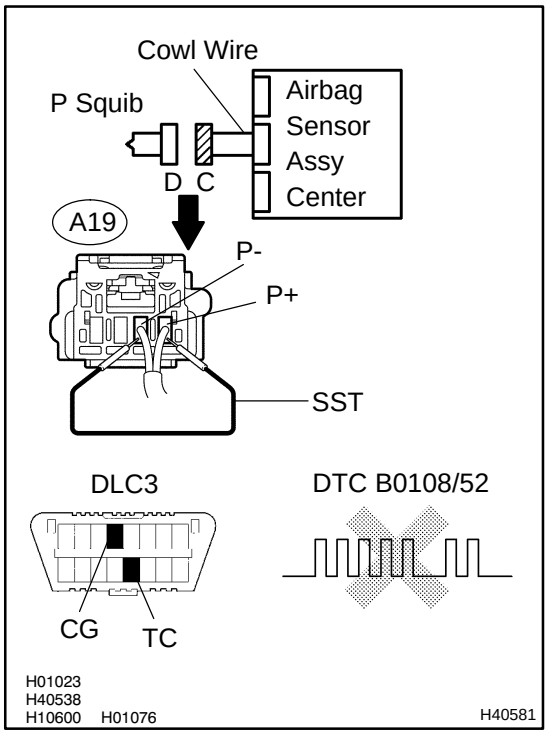
Standard:

Tester connection	Condition	Specified condition
A19-1 (P+) - Body ground	Ignition switch ON	Below 1 V
A19-2 (P-) - Body ground	Ignition switch ON	Below 1 V

NG → **REPAIR OR REPLACE COWL WIRE**

OK

2 CHECK AIR BAG SENSOR ASSY CENTER



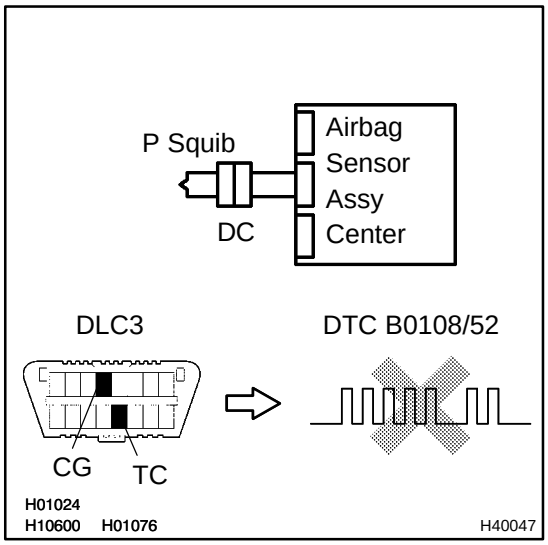
(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Connect the connector to the airbag sensor assy center.
(d) Using SST, connect A19-1 (P+) and A19-2 (P-) of connector "C".
SST 09843-18040
(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(g) Clear the DTCs stored in memory (see page 05-1215).
(h) Turn the ignition switch to the LOCK position.
(i) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(j) Check the DTCs (see page 05-1215).
OK:
DTC B0108/52 is not output.

HINT:
Codes other than code B0108/52 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG SENSOR ASSY CENTER (SEE PAGE 60-53)**

OK

3 CHECK FRONT PASSENGER AIRBAG ASSY(P SQUIB)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the SST from connector "C".
(d) Connect the connector to the front passenger airbag assy.
(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(g) Clear the DTCs stored in memory (see page 05-1215).
(h) Turn the ignition switch to the LOCK position.
(i) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(j) Check the DTCs (see page 05-1215).

OK:

DTC B0108/52 is not output.

HINT:

Codes other than code B0108/52 may be output at this time, but they are not related to this check.

NG → **REPLACE FRONT PASSENGER AIRBAG ASSY (SEE PAGE 60-29)**

OK

USE SIMULATION METHOD TO CHECK

HINT:

- Before performing the simulation method, check that the airbag sensor assy center is in check mode (see page 05-1218).
- Perform the simulation method by selecting the check mode with the hand-held tester (see page 05-1218).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05-1218).

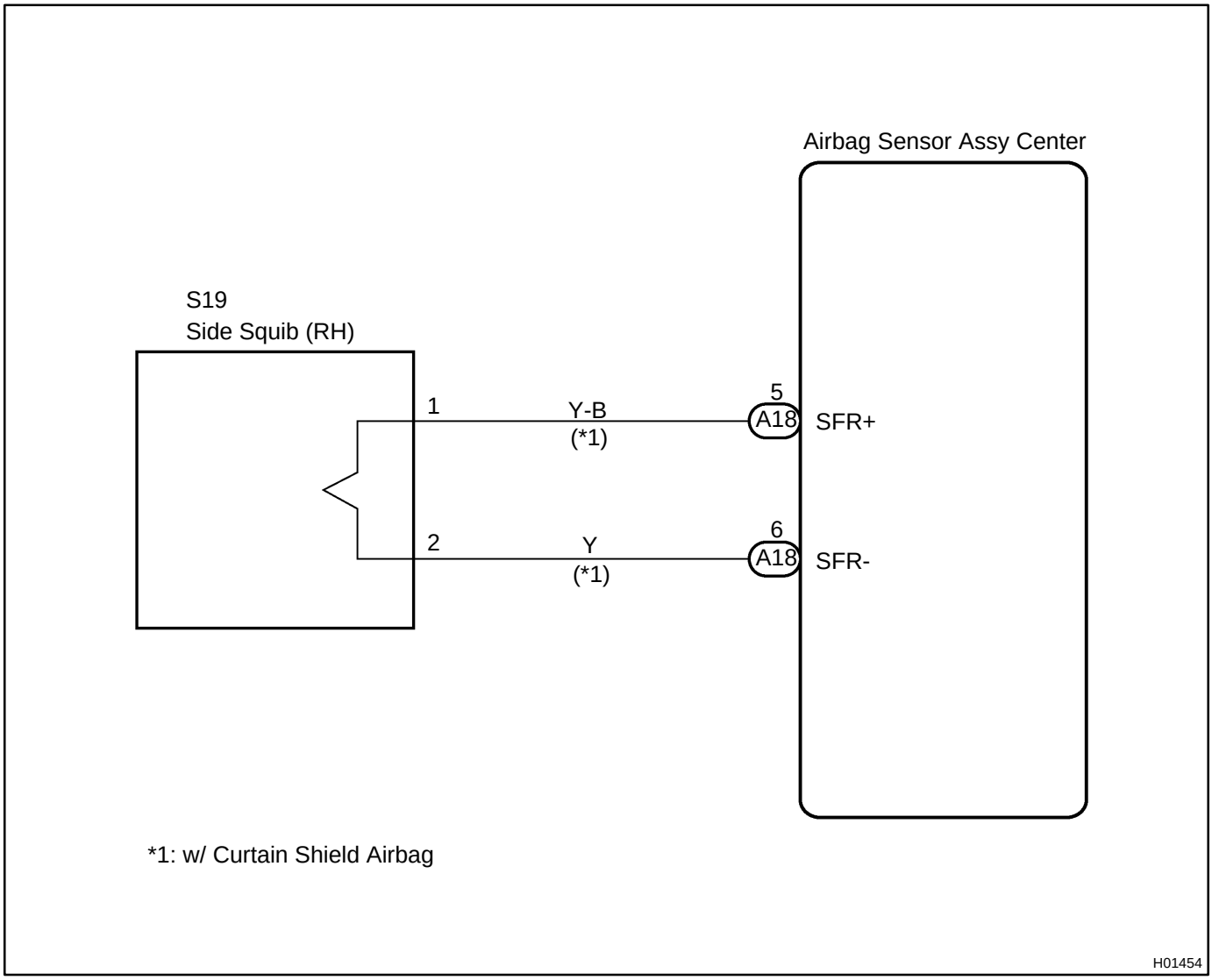
DTC B0110/43 SHORT IN SIDE SQUIB (RH) CIRCUIT

CIRCUIT DESCRIPTION

The side squib RH circuit consists of the airbag sensor assy center and the separate type front seat back assy (side squib RH).
The circuit instructs the SRS to deploy when deployment conditions are met.
DTC B0110/43 is recorded when a short circuit is detected in the side squib RH circuit.

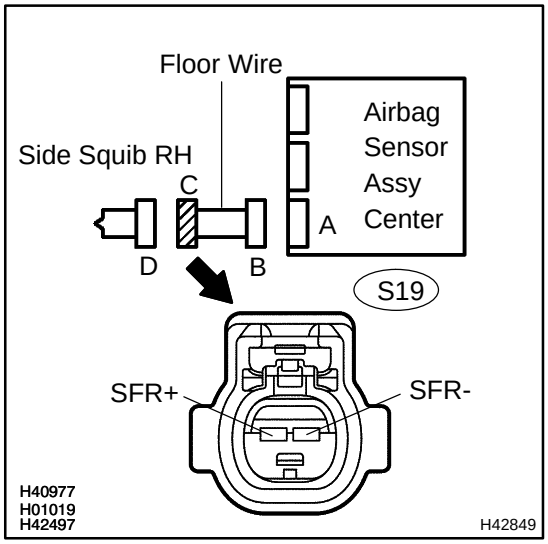
DTC No.	DTC Detecting Condition	Trouble Area
B0110/43	・Short circuit between SFR+ wire harness and SFR- wire harness of side squib RH ・Side squib (RH) malfunction ・Airbag sensor assy center malfunction	・Separate type front seat back assy (Side squib RH) ・Airbag sensor assy center ・Floor wire

WIRING DIAGRAM



INSPECTION PROCEDURE

1 CHECK FLOOR WIRE(SIDE SQUIB RH CIRCUIT)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag sensor assy center and the separate type front seat back assy (side squib RH).
(d) Release the activation prevention mechanism built into connector "B" (see page 05-1207).
(e) Measure the resistance according to the value(s) in the table below.

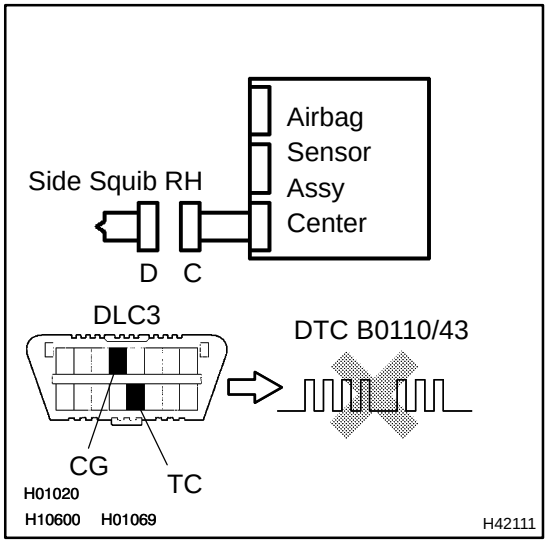
Standard:

Tester connection	Condition	Specified condition
S19-1 (SFR+) - S19-2 (SFR-)	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

2 CHECK AIR BAG SENSOR ASSY CENTER



(a) Connect the connector to the airbag sensor assy center.
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(d) Clear the DTCs stored in memory (see page 05-1215).
(e) Turn the ignition switch to the LOCK position.
(f) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(g) Check the DTCs (see page 05-1215).

OK:

DTC B0110/43 is not output.

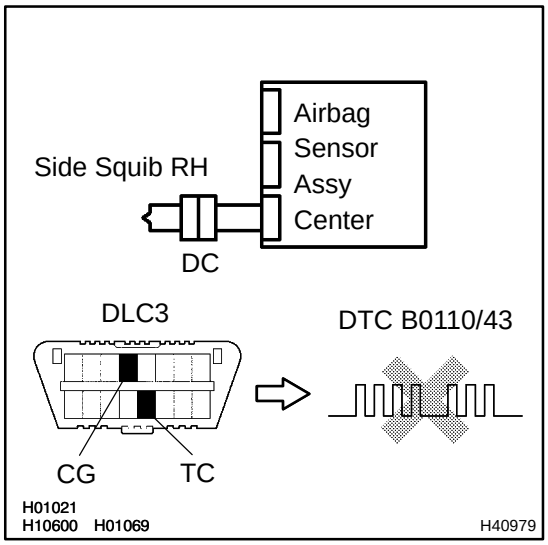
HINT:

Codes other than code B0110/43 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG SENSOR ASSY CENTER (SEE PAGE 60-53)**

OK

3	CHECK SEPARATE TYPE FRONT SEAT BACK ASSY(SIDE SQUIB RH)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Connect the connector to the separate type front seat back assy (side squib RH).
(d) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(e) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(f) Clear the DTCs stored in memory (see page 05-1215).
(g) Turn the ignition switch to the LOCK position.
(h) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(i) Check the DTCs (see page 05-1215).

OK:

DTC B0110/43 is not output.

HINT:

Codes other than code B0110/43 may be output at this time, but they are not related to this check.

NG	REPLACE SEPARATE TYPE FRONT SEAT BACK ASSY(SEE PAGE 72-1 1, 72-19)

OK

USE SIMULATION METHOD TO CHECK

HINT:

- Before performing the simulation method, check that the airbag sensor assy center is in check mode (see page 05-1218).
- Perform the simulation method by selecting the check mode with the hand-held tester (see page 05-1218).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05-1218).

DTC B0111/44 OPEN IN SIDE SQUIB (RH) CIRCUIT

CIRCUIT DESCRIPTION

The side squib RH circuit consists of the airbag sensor assy center and the separate type front seat back assy (side squib RH).
The circuit instructs the SRS to deploy when deployment conditions are met.
DTC B0111/44 is recorded when an open circuit is detected in the side squib RH circuit.

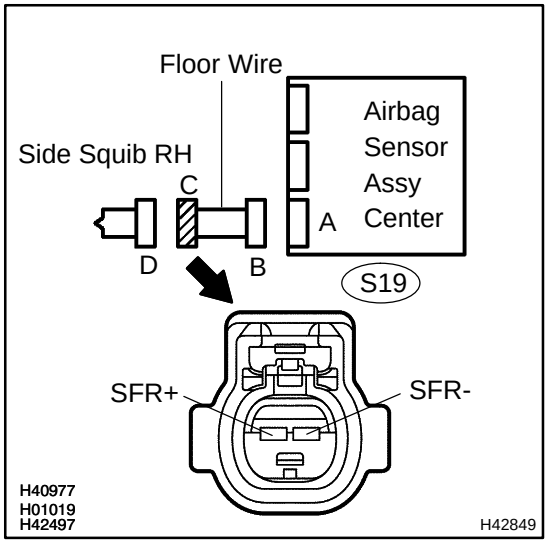
DTC No.	DTC Detecting Condition	Trouble Area
B0111/44	⋊Open circuit in SFR+ wire harness or SFR- wire harness of side squib RH ⋊Side squib (RH) malfunction ⋊Airbag sensor assy center malfunction	⋊Separate type front seat back assy (Side squib RH) ⋊Airbag sensor assy center ⋊Floor wire

WIRING DIAGRAM

see page 05-1263 .

INSPECTION PROCEDURE

1 CHECK FLOOR WIRE(SIDE SQUIB RH CIRCUIT)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Disconnect the connectors from the airbag sensor assy center and the separate type front seat back assy (side squib RH).
(d) Measure the resistance according to the value(s) in the table below.

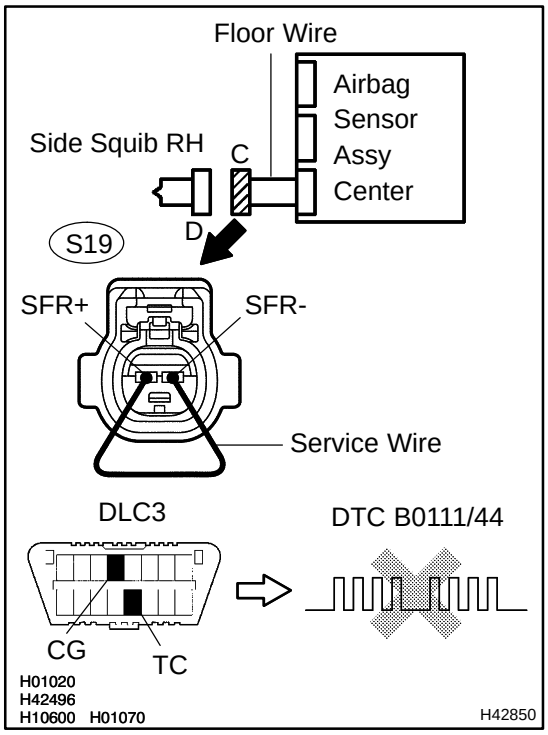
Standard:

Tester connection	Condition	Specified condition
S19-1 (SFR+) - S19-2 (SFR-)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

2 CHECK AIR BAG SENSOR ASSY CENTER



(a) Connect the connector to the airbag sensor assy center.
(b) Using a service wire, connect S19-1 (SFR+) and S19-2 (SFR-) of connector "C".

NOTICE:

Do not forcibly insert a service wire into the terminals of the connector when connecting.

(c) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Clear the DTCs stored in memory (see page 05-1215).
(f) Turn the ignition switch to the LOCK position.
(g) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(h) Check the DTCs (see page 05-1215).

OK:

DTC B0111/44 is not output.

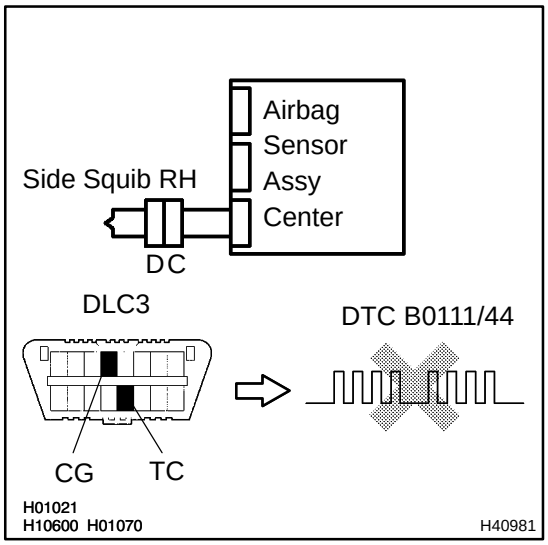
HINT:

Codes other than code B0111/44 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG SENSOR ASSY CENTER (SEE PAGE 60-53)**

OK

3	CHECK SEPARATE TYPE FRONT SEAT BACK ASSY(SIDE SQUIB RH)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the service wire from connector "C".
(d) Connect the connector to the separate type front seat back assy (side squib RH).
(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(g) Clear the DTCs stored in memory (see page 05-1215).
(h) Turn the ignition switch to the LOCK position.
(i) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(j) Check the DTCs (see page 05-1215).
OK:
DTC B0111/44 is not output.

HINT:
Codes other than code B0111/44 may be output at this time, but they are not related to this check.

NG → **REPLACE SEPARATE TYPE FRONT SEAT BACK ASSY (SEE PAGE 72-11, 72-19)**

OK

USE SIMULATION METHOD TO CHECK

HINT:
- Before performing the simulation method, check that the airbag sensor assy center is in check mode (see page 05-1218).
- Perform the simulation method by selecting the check mode with the hand-held tester (see page 05-1218).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05-1218).

DTC	B0112/41	SHORT IN SIDE SQUIB (RH) CIRCUIT (TO GROUND)

CIRCUIT DESCRIPTION

The side squib RH circuit consists of the airbag sensor assy center and the separate type front seat back assy (side squib RH).
The circuit instructs the SRS to deploy when deployment conditions are met.
DTC B0112/41 is recorded when a short to ground is detected in the side squib RH circuit.

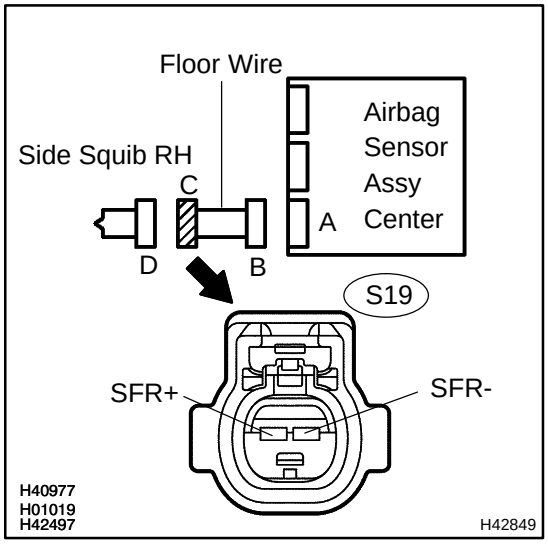
DTC No.	DTC Detecting Condition	Trouble Area
B0112/41	・Short circuit in side squib (RH) wire harness (to ground) ・Side squib (RH) malfunction ・Airbag sensor assy center malfunction	・Separate type front seat back assy (Side squib RH) ・Airbag sensor assy center ・Floor wire

WIRING DIAGRAM

see page 05-1263 .

INSPECTION PROCEDURE

1	CHECK FLOOR WIRE(SIDE SQUIB RH CIRCUIT)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag sensor assy center and the separate type front seat back assy (side squib RH).
(d) Measure the resistance according to the value(s) in the table below.

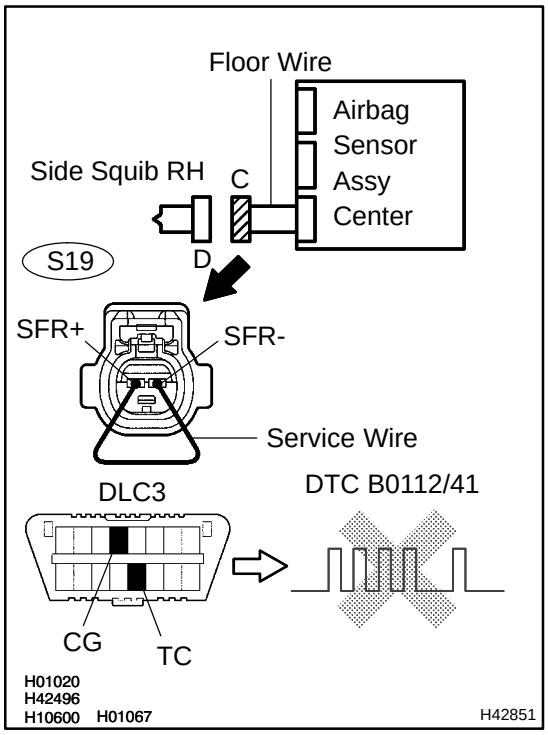
Standard:

Tester connection	Condition	Specified condition
S19-1 (SFR+) - Body ground	Always	1 MΩ or Higher
S19-2 (SFR-) - Body ground	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

2	CHECK AIR BAG SENSOR ASSY CENTER



(a) Connect the connector to the airbag sensor assy center.
(b) Using a service wire, connect S19-1 (SFR+) and S19-2 (SFR-) of connector "C".

NOTICE:

Do not forcibly insert a service wire into the terminals of the connector when connecting.

(c) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Clear the DTCs stored in memory (see page 05-1215).
(f) Turn the ignition switch to the LOCK position.
(g) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(h) Check the DTCs (see page 05-1215).

OK:

DTC B0112/41 is not output.

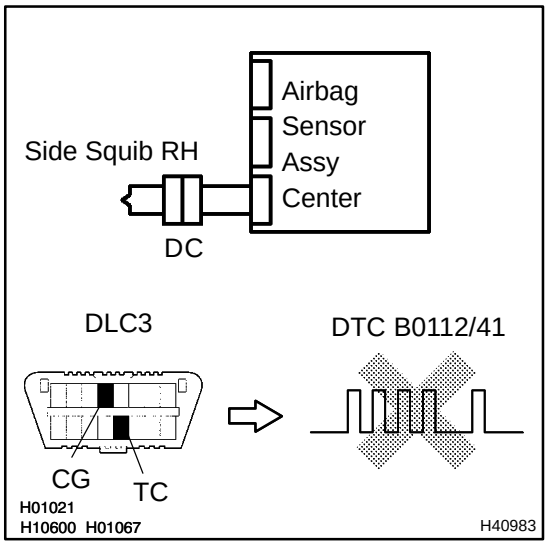
HINT:

Codes other than code B0112/41 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG SENSOR ASSY CENTER (SEE PAGE 60-53)**

OK

3 CHECK SEPARATE TYPE FRONT SEAT BACK ASSY(SIDE SQUIB RH)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the service wire from connector "C".
(d) Connect the connector to the separate type front seat back assy (side squib RH).
(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(g) Clear the DTCs stored in memory (see page 05-1215).
(h) Turn the ignition switch to the LOCK position.
(i) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(j) Check the DTCs (see page 05-1215).

OK:

DTC B0112/41 is not output.

HINT:

Codes other than code B0112/41 may be output at this time, but they are not related to this check.

NG → **REPLACE SEPARATE TYPE FRONT SEAT BACK ASSY (SEE PAGE 72-11, 72-19)**

OK

USE SIMULATION METHOD TO CHECK

HINT:

- Before performing the simulation method, check that the airbag sensor assy center is in check mode (see page 05-1218).
- Perform the simulation method by selecting the check mode with the hand-held tester (see page 05-1218).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05-1218).

DTC	B0113/42	SHORT IN SIDE SQUIB (RH) CIRCUIT (TO B+)

CIRCUIT DESCRIPTION

The side squib RH circuit consists of the airbag sensor assy center and the separate type front seat back assy (side squib RH).
This circuit instructs the SRS to deploy when deployment conditions are met.
DTC B0113/42 is recorded when a short to B+ is detected in the side squib RH circuit.

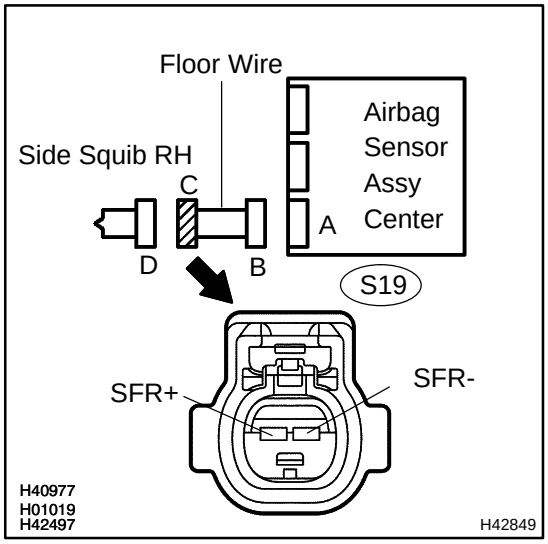
DTC No.	DTC Detecting Condition	Trouble Area
B0113/42	・Short circuit in side squib (RH) wire harness (to B+) ・Side squib (RH) malfunction ・Airbag sensor assy center malfunction	・Separate type front seat back assy (Side squib RH) ・Airbag sensor assy center ・Floor wire

WIRING DIAGRAM

see page 05-1263 .

INSPECTION PROCEDURE

1	CHECK FLOOR WIRE(SIDE SQUIB RH CIRCUIT)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag sensor assy center and the separate type front seat back assy (side squib RH).
(d) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(e) Turn the ignition switch to the ON position.
(f) Measure the voltage according to the value(s) in the table below.

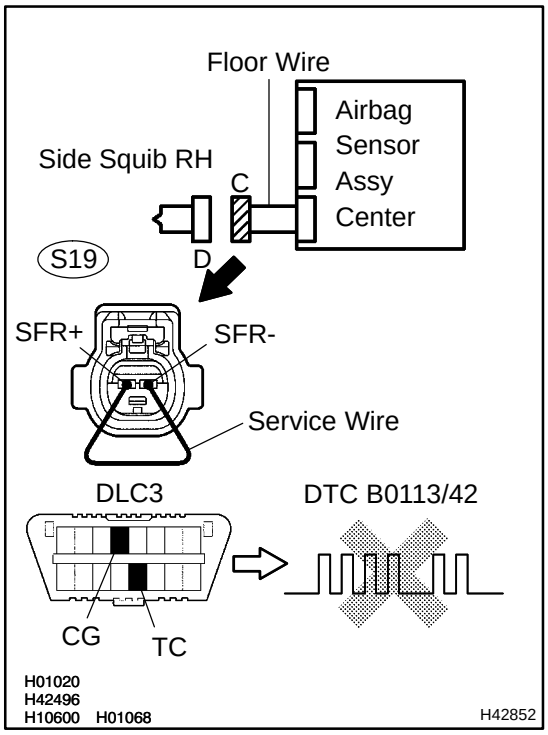
Standard:

Tester connection	Condition	Specified condition
S19-1 (SFR+) - Body ground	Ignition switch ON	Below 1 V
S19-2 (SFR-) - Body ground	Ignition switch ON	Below 1 V

NG	REPAIR OR REPLACE FLOOR WIRE

OK

2	CHECK AIR BAG SENSOR ASSY CENTER



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least for 90 seconds.
(c) Connect the connector to the airbag sensor assy center.
(d) Using a service wire, connect S19-1 (SFR+) and S19-2 (SFR-) of connector "C".

NOTICE:

Do not forcibly insert a service wire into the terminals of the connector when connecting.

(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(g) Clear the DTCs stored in memory (see page 05-1215).
(h) Turn the ignition switch to the LOCK position.
(i) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(j) Check the DTCs (see page 05-1215).

OK:

DTC B0113/42 is not output.

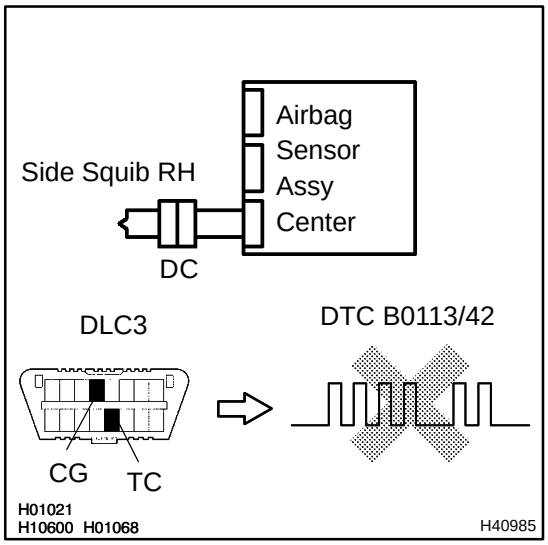
HINT:

Codes other than code B0113/42 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG SENSOR ASSY CENTER (SEE PAGE 60-53)**

OK

3 CHECK SEPARATE TYPE FRONT SEAT BACK ASSY(SIDE SQUIB RH)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the service wire from connector "C".
(d) Connect the connector to the separate type front seat back assy (side squib RH).
(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(g) Clear the DTCs stored in memory (see page 05-1215).
(h) Turn the ignition switch to the LOCK position.
(i) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(j) Check the DTCs (see page 05-1215).

OK:

DTC B0113/42 is not output.

HINT:

Codes other than code B0113/42 may be output at this time, but they are not related to this check.

NG → **REPLACE SEPARATE TYPE FRONT SEAT BACK ASSY (SEE PAGE 72-11, 72-19)**

OK

USE SIMULATION METHOD TO CHECK

HINT:

- Before performing the simulation method, check that the airbag sensor assy center is in check mode (see page 05-1218).
- Perform the simulation method by selecting the check mode with the hand-held tester (see page 05-1218).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05-1218).

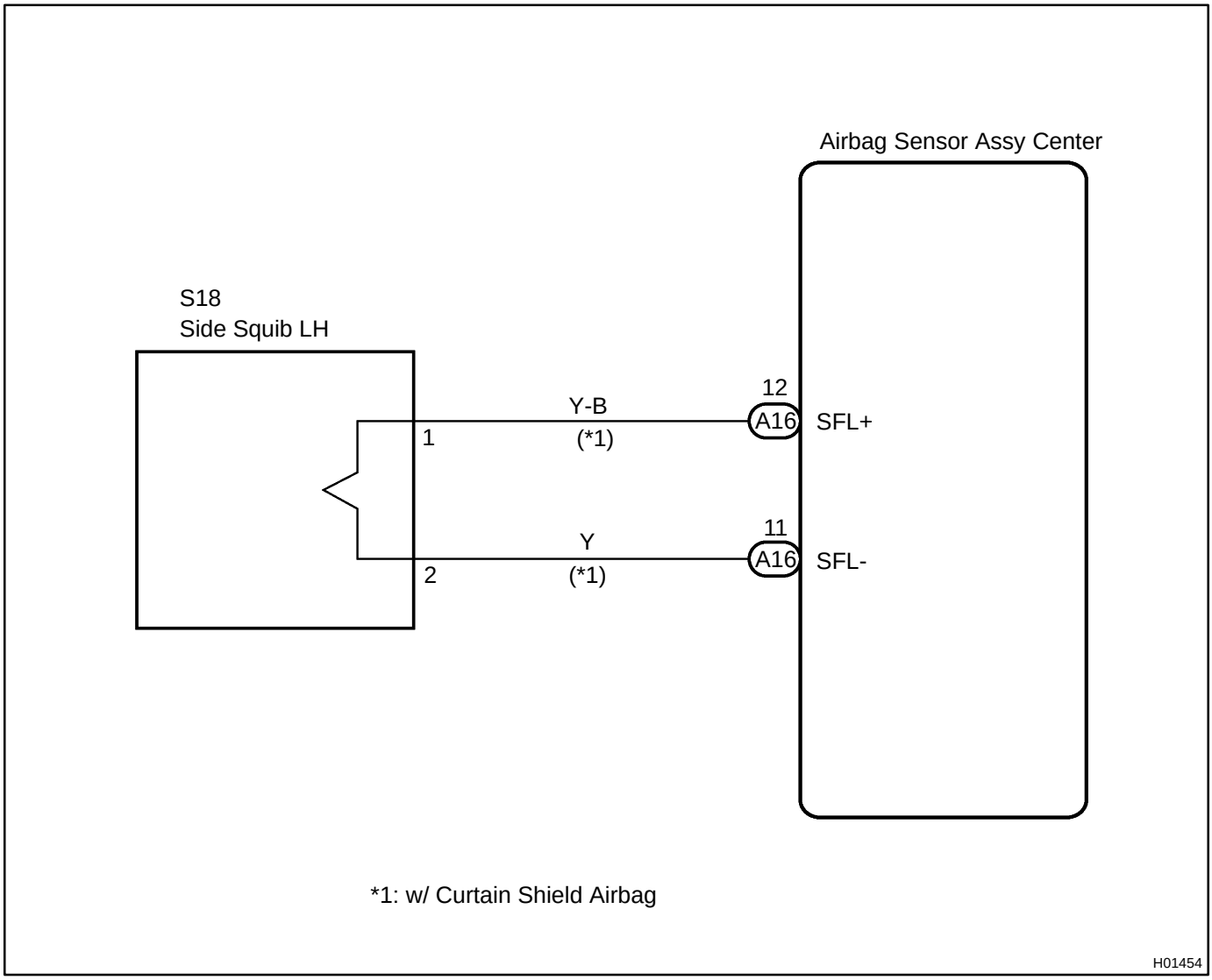
DTC B0115/47 SHORT IN SIDE SQUIB (LH) CIRCUIT

CIRCUIT DESCRIPTION

The side squib LH circuit consists of the airbag sensor assy center and the separate type front seat back assy (side squib LH).
This circuit instructs the SRS to deploy when deployment conditions are met.
DTC B0115/47 is recorded when a short circuit is detected in the side squib LH circuit.

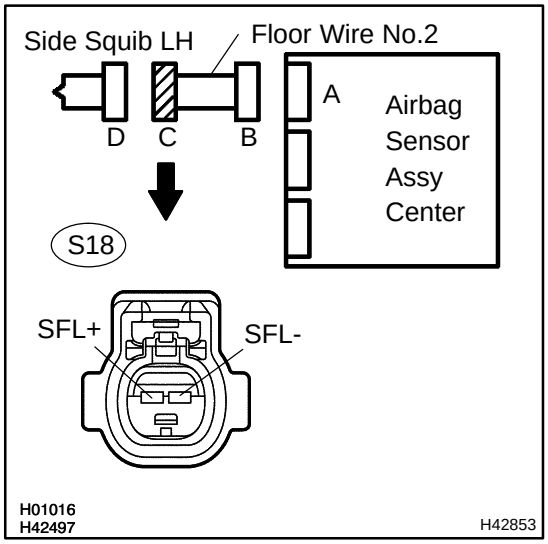
DTC No.	DTC Detecting Condition	Trouble Area
B0115/47	・Short circuit between SFL+ wire harness and SFL- wire harness of side squib LH ・Side squib (LH) malfunction ・Airbag sensor assy center malfunction	・Separate type front seat back assy (Side squib LH) ・Airbag sensor assy center ・Floor wire No.2

WIRING DIAGRAM



INSPECTION PROCEDURE

1 CHECK FLOOR WIRE NO.2(SIDE SQUIB LH CIRCUIT)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag sensor assy center and the separate type front seat back assy (side squib LH).
(d) Release the activation prevention mechanism built into connector "B" (see page 05-1207).
(e) Measure the resistance according to the value(s) in the table below.

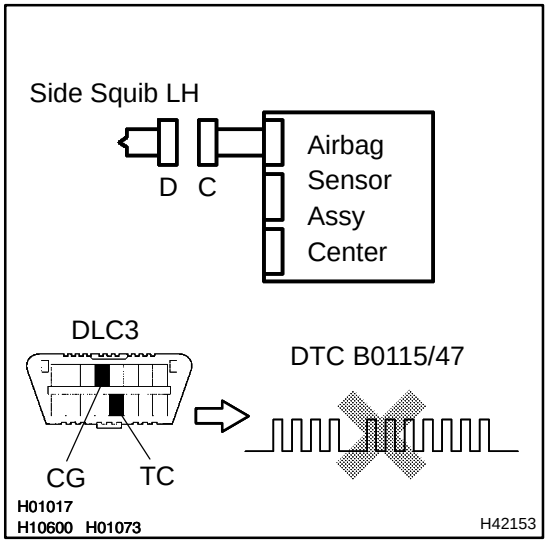
Standard:

Tester connection	Condition	Specified condition
S18-1 (SFL+) - S18-2 (SFL-)	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FLOOR WIRE NO.2**

OK

2 CHECK AIR BAG SENSOR ASSY CENTER



(a) Connect the connector to the airbag sensor assy center.
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(d) Clear the DTCs stored in memory (see page 05-1215).
(e) Turn the ignition switch to the LOCK position.
(f) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(g) Check the DTCs (see page 05-1215).

OK:

DTC B0115/47 is not output.

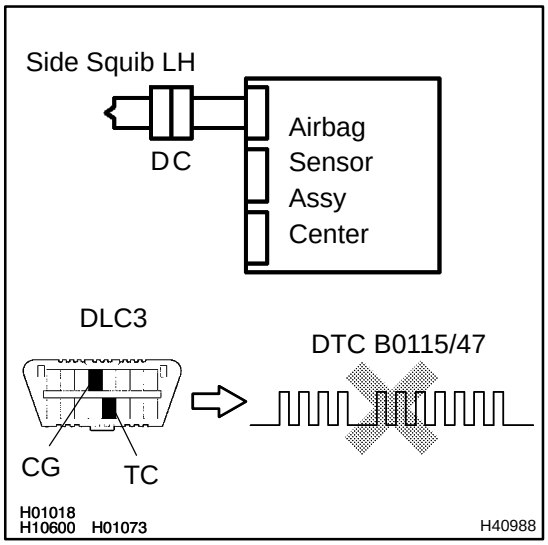
HINT:

Codes other than code B0115/47 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG SENSOR ASSY CENTER (SEE PAGE 60-53)**

OK

3	CHECK SEPARATE TYPE FRONT SEAT BACK ASSY(SIDE SQUIB LH)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Connect the connector to the separate type front seat back assy (side squib LH).
(d) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(e) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(f) Clear the DTCs stored in memory (see page 05-1215).
(g) Turn the ignition switch to the LOCK position.
(h) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(i) Check the DTCs (see page 05-1215).

OK:

DTC B0115/47 is not output.

HINT:

Codes other than code B0115/47 may be output at this time, but they are not related to this check.

NG	REPLACE SEPARATE TYPE FRONT SEAT BACK ASSY (SEE PAGE 72-11, 72-19)

OK

USE SIMULATION METHOD TO CHECK

HINT:

- Before performing the simulation method, check that the airbag sensor assy center is in check mode (see page 05-1218).
- Perform the simulation method by selecting the check mode with the hand-held tester (see page 05-1218).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05-1218).

DTC B0116/48 OPEN IN SIDE SQUIB (LH) CIRCUIT

CIRCUIT DESCRIPTION

The side squib LH circuit consists of the airbag sensor assy center and the separate type front seat back assy (side squib LH).
This circuit instructs the SRS to deploy when deployment conditions are met.
DTC B0116/48 is recorded when an open circuit is detected in the side squib LH circuit.

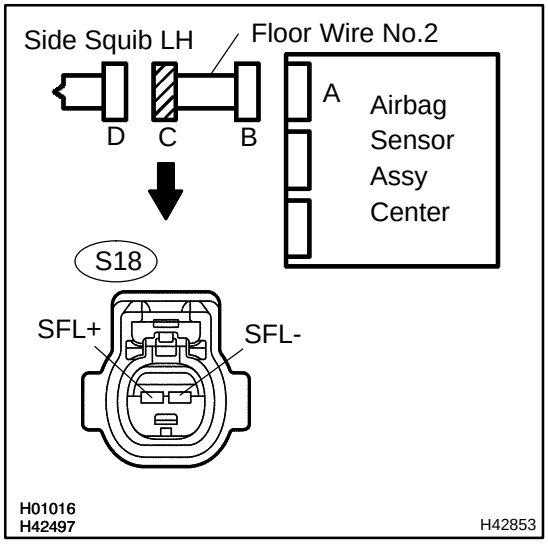
DTC No.	DTC Detecting Condition	Trouble Area
B0116/48	・Open circuit in SFL+ wire harness or SFL- wire harness of side squib LH ・Side squib (LH) malfunction ・Airbag sensor assy center malfunction	・Separate type front seat back assy (Side squib LH) ・Airbag sensor assy center ・Floor wire No.2

WIRING DIAGRAM

see page 05-1275 .

INSPECTION PROCEDURE

1	CHECK FLOOR WIRE NO.2(SIDE SQUIB LH CIRCUIT)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag sensor assy center and the separate type front seat back assy (side squib LH).
(d) Measure the resistance according to the value(s) in the table below.

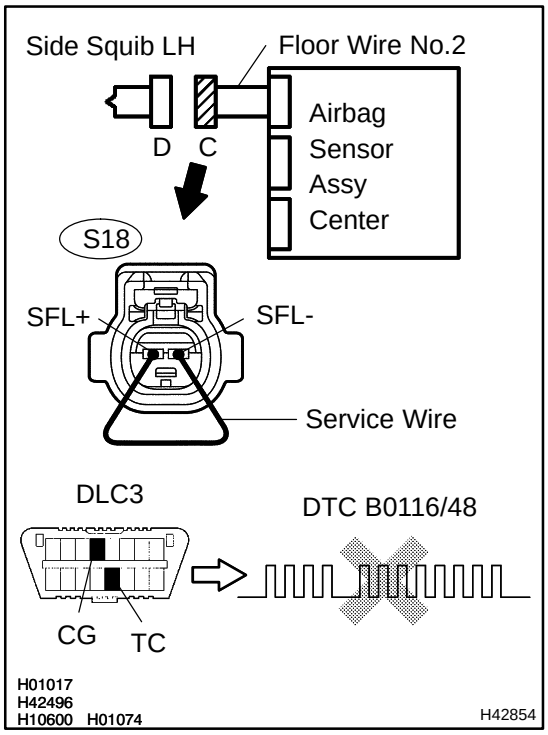
Standard:

Tester connection	Condition	Specified condition
S18-1 (SFL+) - S18-2 (SFL-)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE FLOOR WIRE NO.2**

OK →

2 CHECK AIR BAG SENSOR ASSY CENTER



(a) Connect the connector to the airbag sensor assy center.
(b) Using a service wire, connect S18-1 (SFL+) and S18-2 (SFL-) of connector "C".

NOTICE:

Do not forcibly insert a service wire into the terminals of the connector when connecting.

(c) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Clear the DTCs stored in memory (see page 05-1215).
(f) Turn the ignition switch to the LOCK position.
(g) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(h) Check the DTCs (see page 05-1215).

OK:

DTC B0116/48 is not output.

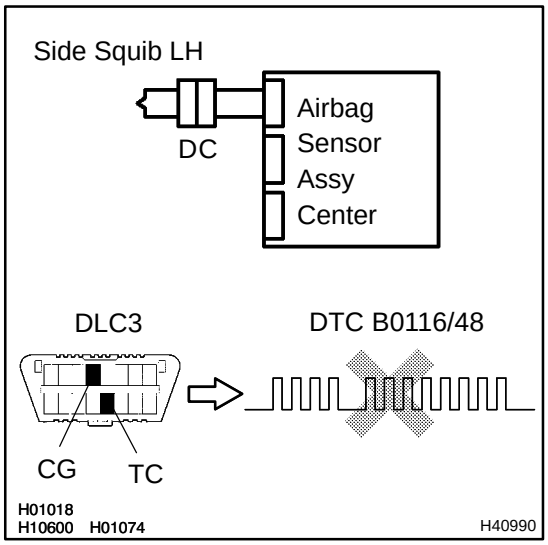
HINT:

Codes other than code B0116/48 may be output at this time, but they are not related to this check.

NG	**REPLACE AIR BAG SENSOR ASSY CENTER (SEE PAGE 60-53)**

OK

3	CHECK SEPARATE TYPE FRONT SEAT BACK ASSY(SIDE SQUIB LH)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the service wire from connector "C".
(d) Connect the connector to the separate type front seat back assy (side squib LH).
(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(g) Clear the DTCs stored in memory (see page 05-1215).
(h) Turn the ignition switch to the LOCK position.
(i) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(j) Check the DTCs (see page 05-1215).

OK:

DTC B0116/48 is not output.

HINT:

Codes other than code B0116/48 may be output at this time, but they are not related to this check.

NG	REPLACE SEPARATE TYPE FRONT SEAT BACK ASSY (SEE PAGE 72-11, 72-19)

OK

USE SIMULATION METHOD TO CHECK

HINT:

- Before performing the simulation method, check that the airbag sensor assy center is in check mode (see page 05-1218).
- Perform the simulation method by selecting the check mode with the hand-held tester (see page 05-1218).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05-1218).

DTC	B0117/45	SHORT IN SIDE SQUIB (LH) CIRCUIT (TO GROUND)

CIRCUIT DESCRIPTION

The side squib LH circuit consists of the airbag sensor assy center and the separate type front seat back assy (side squib LH).
This circuit instructs the SRS to deploy when deployment conditions are met.
DTC B0117/45 is recorded when a short to ground is detected in the side squib LH circuit.

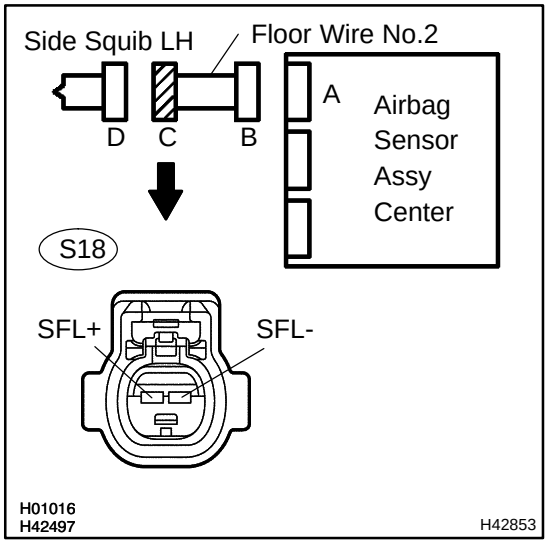
DTC No.	DTC Detecting Condition	Trouble Area
B0117/45	・Short circuit in side squib (LH) wire harness (to ground) ・Side squib (LH) malfunction ・Airbag sensor assy center malfunction	・Separate type front seat back assy (Side squib LH) ・Airbag sensor assy center ・Floor wire No.2

WIRING DIAGRAM

see page 05-1275 .

INSPECTION PROCEDURE

1	CHECK FLOOR WIRE NO.2(SIDE SQUIB LH CIRCUIT)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag sensor assy center and the separate type front seat back assy (side squib LH).
(d) Measure the resistance according to the value(s) in the table below.

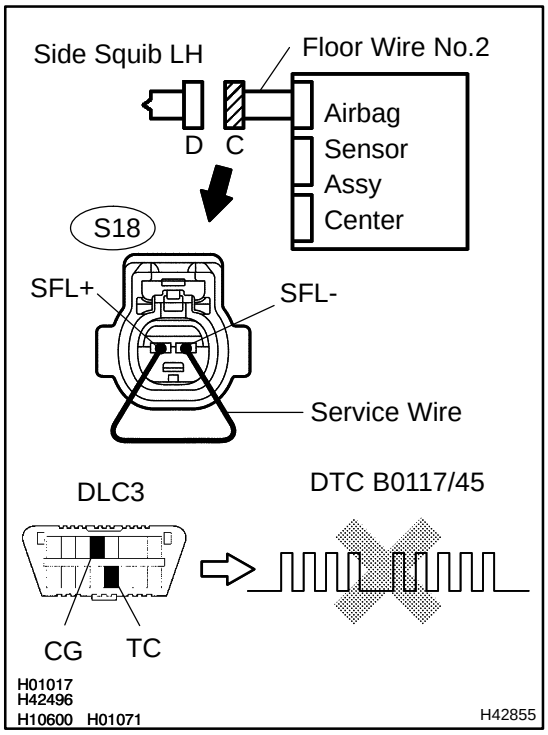
Standard:

Tester connection	Condition	Specified condition
S18-1 (SFL+) - Body ground	Always	1 MΩ or Higher
S18-2 (SFL-) - Body ground	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FLOOR WIRE NO.2**

OK

2 CHECK AIR BAG SENSOR ASSY CENTER



(a) Connect the connector to the airbag sensor assy center.
(b) Using a service wire, connect S18-1 (SFL+) and S18-2 (SFL-) of connector "C".

NOTICE:

Do not forcibly insert a service wire into the terminals of the connector when connecting.

(c) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Clear the DTCs stored in memory (see page 05-1215).
(f) Turn the ignition switch to the LOCK position.
(g) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(h) Check the DTCs (see page 05-1215).

OK:

DTC B0117/45 is not output.

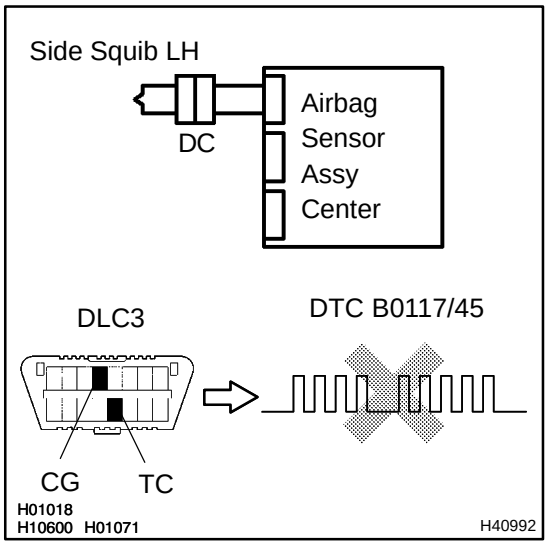
HINT:

Codes other than code B0117/45 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG SENSOR ASSY CENTER (SEE PAGE 60-53)**

OK

3 CHECK SEPARATE TYPE FRONT SEAT BACK ASSY(SIDE SQUIB LH)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the service wire from connector "C".
(d) Connect the connector to the separate type front seat back assy (side squib LH).
(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(g) Clear the DTCs stored in memory (see page 05-1215).
(h) Turn the ignition switch to the LOCK position.
(i) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(j) Check the DTCs (see page 05-1215).

OK:

DTC B0117/45 is not output.

HINT:

Codes other than code B0117/45 may be output at this time, but they are not related to this check.

NG → **REPLACE SEPARATE TYPE FRONT SEAT BACK ASSY(SEE PAGE 72-1 1, 72-19)**

OK

USE SIMULATION METHOD TO CHECK

HINT:

- Before performing the simulation method, check that the airbag sensor assy center is in check mode (see page 05-1218).
- Perform the simulation method by selecting the check mode with the hand-held tester (see page 05-1218).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05-1218).

DTC	B0118/46	SHORT IN SIDE SQUIB (LH) CIRCUIT (TO B+)

CIRCUIT DESCRIPTION

The side squib LH circuit consists of the airbag sensor assy center and the separate type front seat back assy (side squib LH).
This circuit instructs the SRS to deploy when deployment conditions are met.
DTC B0118/46 is recorded when a short to B+ is detected in the side squib LH circuit.

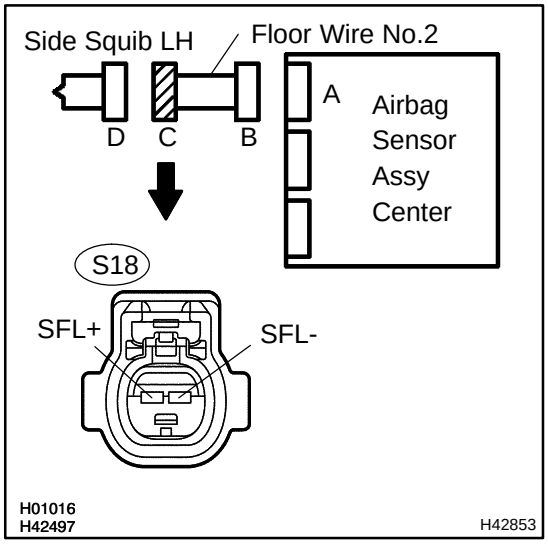
DTC No.	DTC Detecting Condition	Trouble Area
B0118/46	・Short circuit in side squib (LH) wire harness (to B+) ・Side squib (LH) malfunction ・Airbag sensor assy center malfunction	・Separate type front seat back assy (Side squib LH) ・Airbag sensor assy center ・Floor wire No.2

WIRING DIAGRAM

see page 05-1275 .

INSPECTION PROCEDURE

1	CHECK FLOOR WIRE NO.2(SIDE SQUIB LH CIRCUIT)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag sensor assy center and the separate type front seat back assy (side squib LH).
(d) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(e) Turn the ignition switch to the ON position.
(f) Measure the voltage according to the value(s) in the table below.

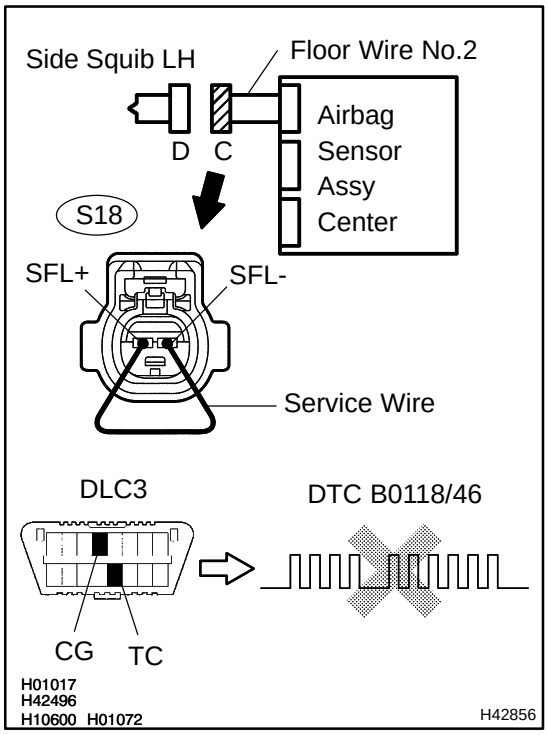
Standard:

Tester connection	Condition	Specified condition
S18-1 (SFL+) - Body ground	Ignition switch ON	Below 1 V
S18-2 (SFL-) - Body ground	Ignition switch ON	Below 1 V

NG → **REPAIR OR REPLACE FLOOR WIRE NO.2**

OK

2 CHECK AIR BAG SENSOR ASSY CENTER



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Connect the connector to the airbag sensor assy center.
(d) Using a service wire, connect S18-1 (SFL+) and S18-2 (SFL-) of connector "C".

NOTICE:

Do not forcibly insert a service wire into the terminals of the connector when connecting.

(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(g) Clear the DTCs stored in memory (see page 05-1215).
(h) Turn the ignition switch to the LOCK position.
(i) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(j) Check the DTCs (see page 05-1215).

OK:

DTC B0118/46 is not output.

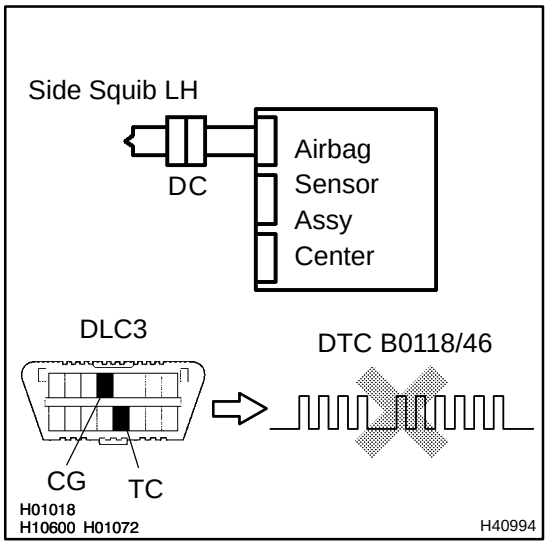
HINT:

Codes other than code B0118/46 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG SENSOR ASSY CENTER (SEE PAGE 60-53)**

OK

3	CHECK SEPARATE TYPE FRONT SEAT BACK ASSY(SIDE SQUIB LH)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the service wire from connector "C".
(d) Connect the connector to the separate type front seat back assy (side squib LH).
(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(g) Clear the DTCs stored in memory (see page 05-1215).
(h) Turn the ignition switch to the LOCK position.
(i) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(j) Check the DTCs (see page 05-1215).

OK:

DTC B0118/46 is not output.

HINT:

Codes other than code B0118/46 may be output at this time, but they are not related to this check.

NG → **REPLACE SEPARATE TYPE FRONT SEAT BACK ASSY (SEE PAGE 72-11, 72-19)**

OK

USE SIMULATION METHOD TO CHECK

HINT:

- Before performing the simulation method, check that the airbag sensor assy center is in check mode (see page 05-1218).
- Perform the simulation method by selecting the check mode with the hand-held tester (see page 05-1218).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05-1218).

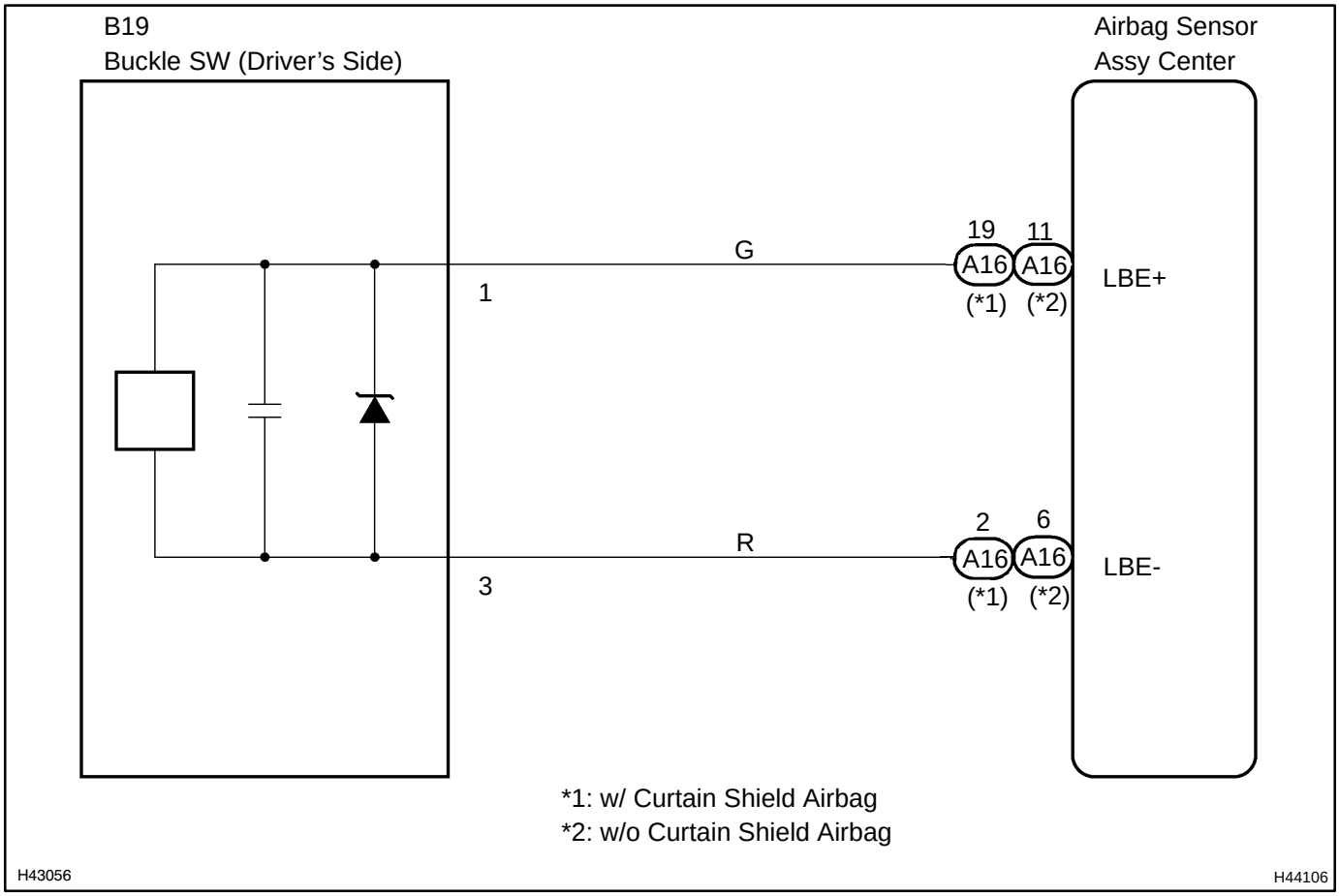
DTC	B0126/27	SEAT BELT BUCKLE SWITCH (LH) MALFUNCTION

CIRCUIT DESCRIPTION

The seat belt buckle switch LH circuit consists of the airbag sensor assy center and the front seat inner belt assy LH (seat belt buckle switch LH).
DTC B0126/27 is recorded when a malfunction is detected in the seat belt buckle switch LH circuit.

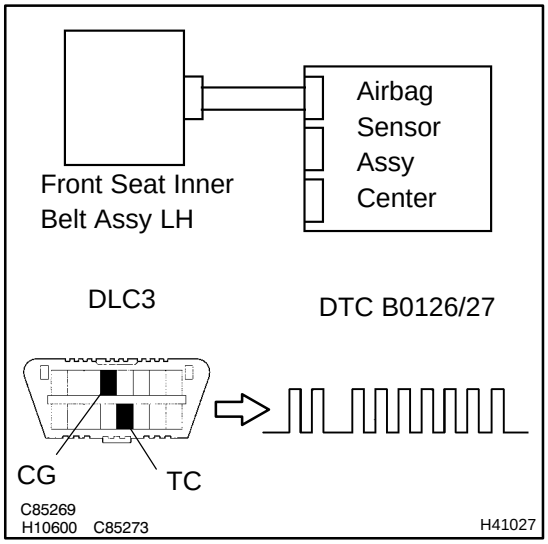
DTC No.	DTC Detecting Condition	Trouble Area
B0126/27	・Short circuit in front seat inner belt assy LH wire harness (to B+) ・Short circuit in front seat inner belt assy LH wire harness (to ground) ・Open circuit in LBE+ wire harness or LBE- wire harness of front seat inner belt assy LH ・Front seat inner belt assy LH malfunction ・Airbag sensor assy center malfunction	・Front seat inner belt assy LH (Seat belt buckle switch LH) ・Airbag sensor assy center ・Floor wire No.2

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK DTC



(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(b) Clear the DTCs stored in memory (see page 05-1215).
(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position and wait for at least 60 seconds.
(e) Check the DTCs (see page 05-1215).
OK:
DTC B0126/27 is not output.

HINT:
Codes other than code B0126/27 may be output at this time, but they are not related to this check.

NG → **Go to step 2**

OK

USE SIMULATION METHOD TO CHECK

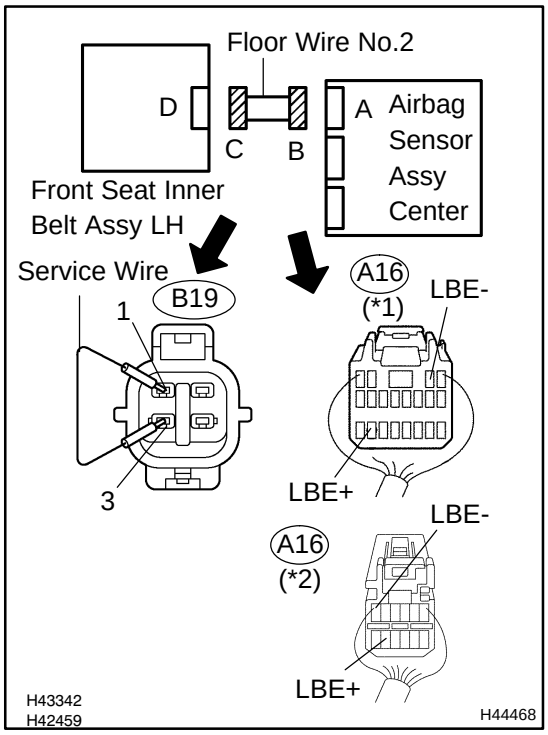
2	CHECK CONNECTION OF CONNECTORS

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Check that the connectors are properly connected to the airbag sensor assy center and the front seat inner belt assy LH.
OK:
The connectors are connected.

NG → **CONNECT CONNECTORS, THEN GO TO STEP 1**

OK

3 CHECK FLOOR WIRE NO.2(OPEN)



(a) Disconnect the connectors from the airbag sensor assy center and the front seat inner belt assy LH.

(b) Using a service wire, connect B19-1 and B19-3 of connector "C".

NOTICE:

Do not forcibly insert a service wire into the terminal of the connector when connecting.

(c) Measure the resistance according to the value(s) in the table below.

Standard:

w/ Curtain shield airbag (*1):

Tester connection	Condition	Specified condition
A16-19 (LBE+) - A16-2 (LBE-)	Always	Below 1 Ω

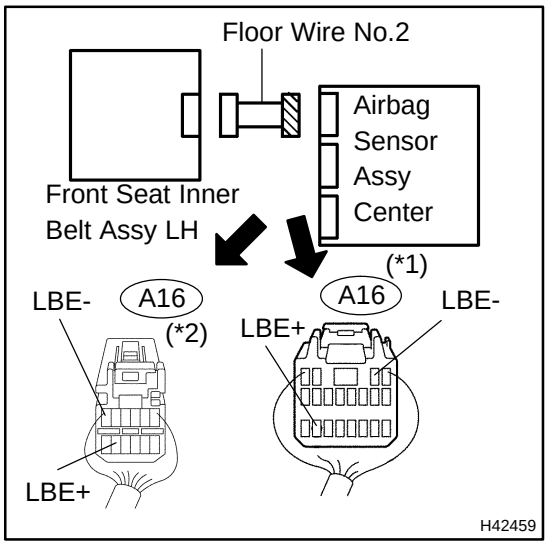
w/o Curtain shield airbag (*2):

Tester connection	Condition	Specified condition
A16-11 (LBE+) - A16-6 (LBE-)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE FLOOR WIRE NO.2**

OK

4 CHECK FLOOR WIRE NO.2(TO B+)



(a) Disconnect the service wire from connector "C".

(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.

(c) Turn the ignition switch to the ON position.

(d) Measure the voltage according to the value(s) in the table below.

Standard:

w/ Curtain shield airbag (*1):

Tester connection	Condition	Specified condition
A16-19 (LBE+) - Body ground	Ignition switch ON	Below 1 V
A16-2 (LBE-) - Body ground	Ignition switch ON	Below 1 V

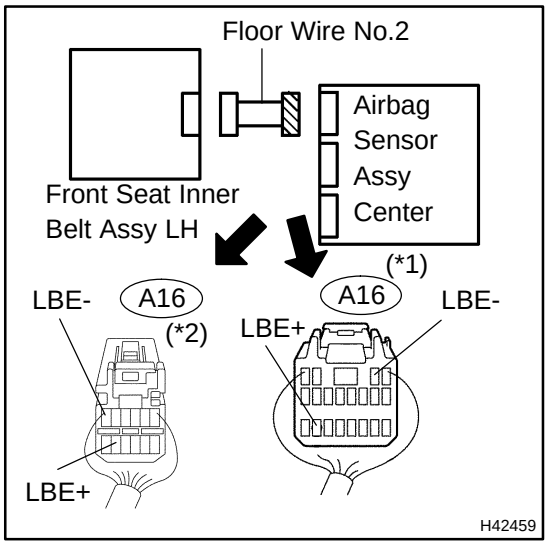
w/o Curtain shield airbag (*2):

Tester connection	Condition	Specified condition
A16-11 (LBE+) - Body ground	Ignition switch ON	Below 1 V
A16-6 (LBE-) - Body ground	Ignition switch ON	Below 1 V

NG → **REPAIR OR REPLACE FLOOR WIRE NO.2**

OK

5 CHECK FLOOR WIRE NO.2(TO GROUND)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Measure the resistance according to the value(s) in the table below.

Standard:

w/ Curtain shield airbag (*1):

Tester connection	Condition	Specified condition
A16-19 (LBE+) - Body ground	Always	1 MΩ or Higher
A16-2 (LBE-) - Body ground	Always	1 MΩ or Higher

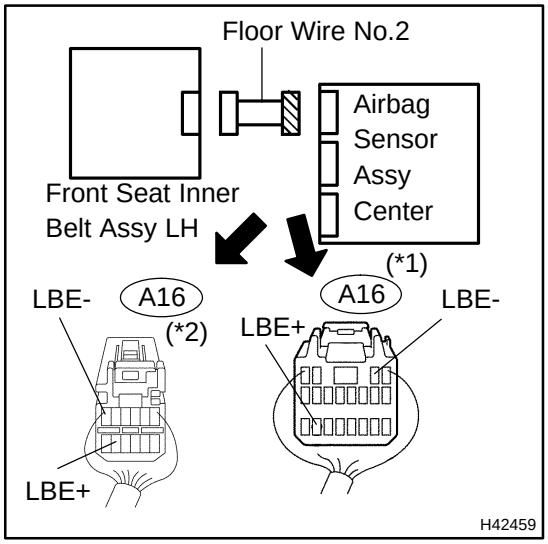
w/o Curtain shield airbag (*2):

Tester connection	Condition	Specified condition
A16-11 (LBE+) - Body ground	Always	1 MΩ or Higher
A16-6 (LBE-) - Body ground	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FLOOR WIRE NO.2**

OK

6 CHECK FLOOR WIRE NO.2(SHORT)



(a) Measure the resistance according to the value(s) in the table below.

Standard:

w/ Curtain shield airbag (*1):

Tester connection	Condition	Specified condition
A16-19 (LBE+) - A16-2 (LBE-)	Always	1 MΩ or Higher

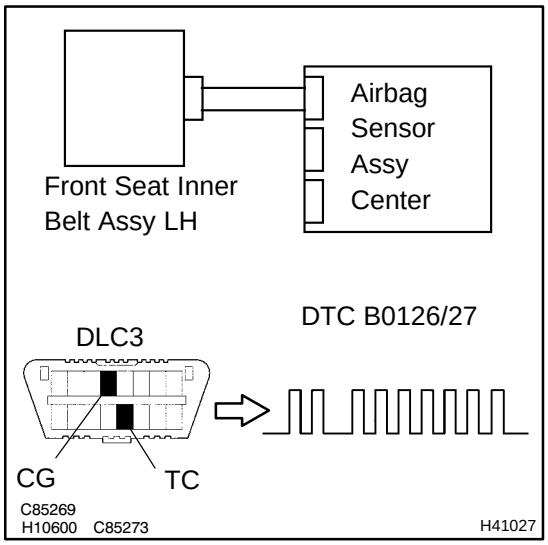
w/o Curtain shield airbag (*2):

Tester connection	Condition	Specified condition
A16-11 (LBE+) - A16-6 (LBE-)	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FLOOR WIRE NO.2**

OK

7	CHECK FRONT SEAT INNER BELT ASSY LH



(a) Connect the connectors to the front seat inner belt assy LH and the airbag sensor assy center.
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(d) Clear the DTCs stored in memory (see page 05-1215).
(e) Turn the ignition switch to the LOCK position.
(f) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(g) Check the DTCs (see page 05-1215).

OK:

DTC B0126/27 is not output.

HINT:

Codes other than code B0126/27 may be output at this time, but they are not related to this check.

NG	Go to step 8

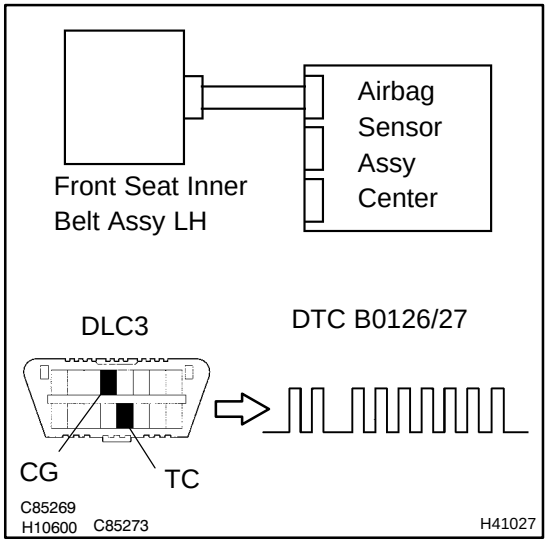
OK

USE SIMULATION METHOD TO CHECK

8	REPLACE FRONT SEAT INNER BELT ASSY LH

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Replace the front seat inner belt assy LH (see page 72-1 1, 72-19).

9	CHECK AIR BAG SENSOR ASSY CENTER



(a) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(b) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(c) Clear the DTCs stored in memory (see page 05-1215).
(d) Turn the ignition switch to the LOCK position.
(e) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(f) Check the DTCs (see page 05-1215).

OK:

DTC B0126/27 is not output.

HINT:

Codes other than code B0126/27 may be output at this time, but they are not related to this check.

NG	REPLACE AIR BAG SENSOR ASSY CENTER (SEE PAGE 60-53)

OK

END

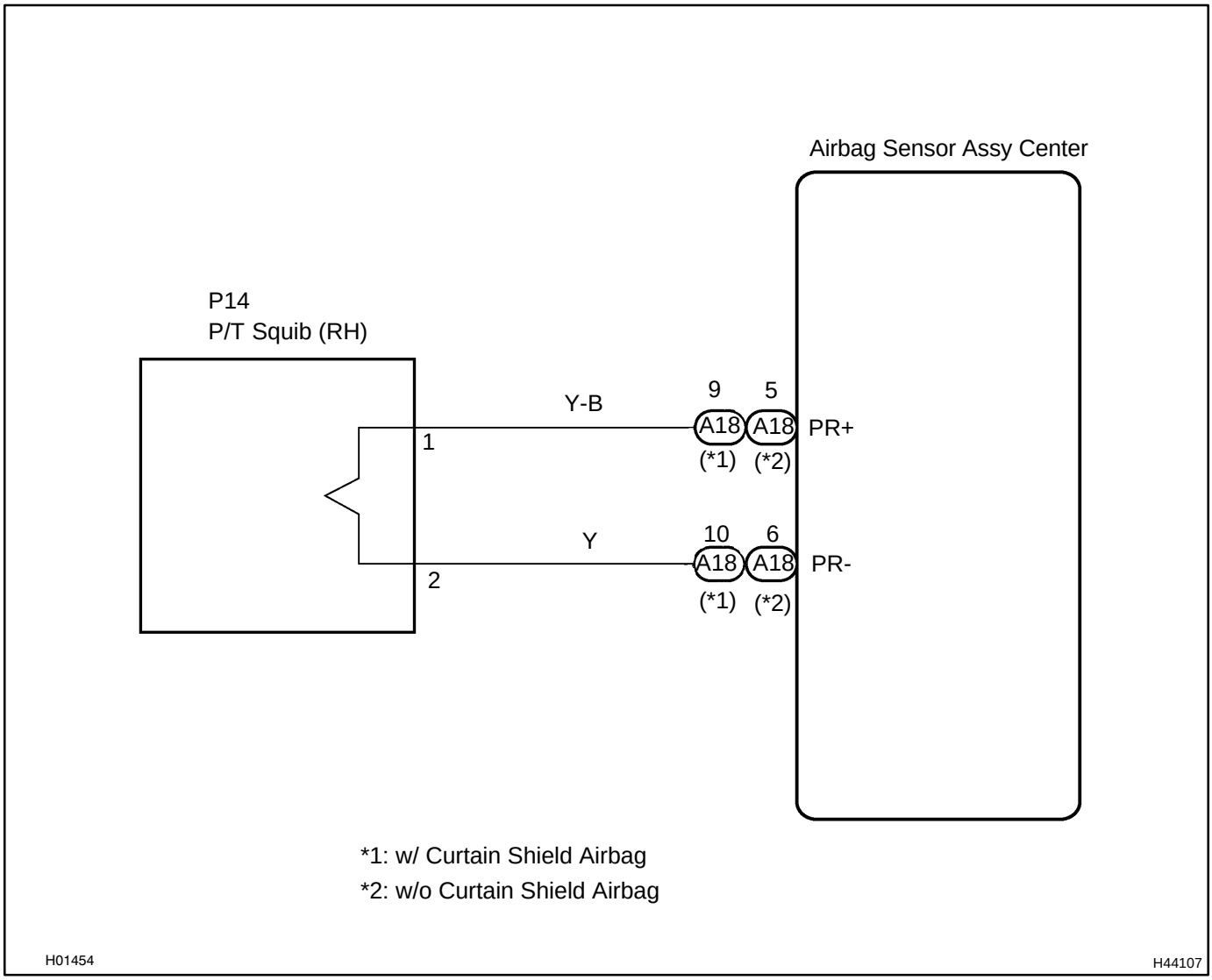
DTC B0130/63 SHORT IN P/T SQUIB (RH) CIRCUIT

CIRCUIT DESCRIPTION

The P/T squib RH circuit consists of the airbag sensor assy center and the front seat outer belt assy RH (seat belt pretensioner RH).
This circuit instructs the SRS to deploy when deployment conditions are met.
DTC B0130/63 is recorded when a short circuit is detected in the P/T squib RH circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B0130/63	・Short circuit between PR+ wire harness and PR- wire harness of squib ・P/T squib (RH) malfunction ・Airbag sensor assy center malfunction	・Front seat outer belt assy RH (P/T squib RH) ・Airbag sensor assy center ・Floor wire

WIRING DIAGRAM



INSPECTION PROCEDURE

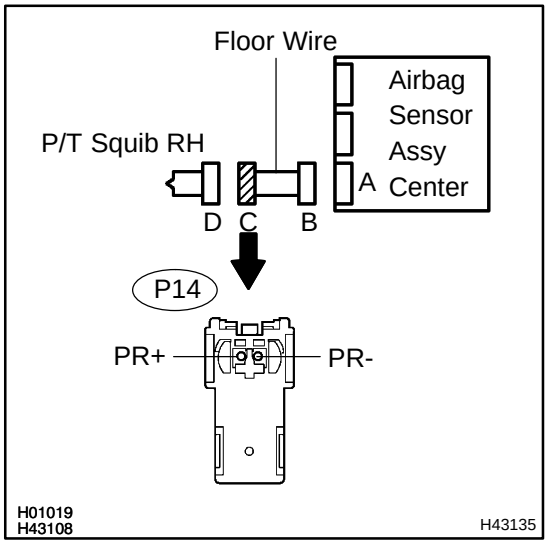
1	CHECK CONNECTOR

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the front seat outer belt assy RH.
(d) Check that the floor wire connector (on the front seat outer belt assy RH side) is not damaged.
OK:
The lock button is not disengaged, or the claw of the lock is not deformed or damaged.

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

2	CHECK FLOOR WIRE(P/T SQUIB RH CIRCUIT)



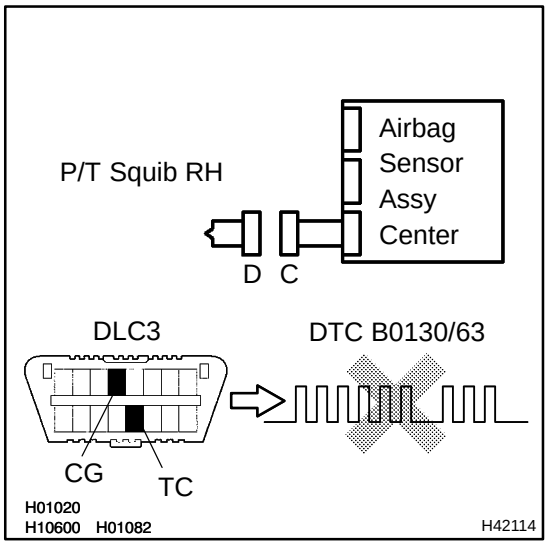
(a) Disconnect the connector from the airbag sensor assy center.
(b) Release the activation prevention mechanism built into connector "B" (see page 05-1207).
(c) Measure the resistance according to the value(s) in the table below.
Standard:

Tester connection	Condition	Specified condition
P14-1 (PR+) - P14-2 (PR-)	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

3	CHECK AIR BAG SENSOR ASSY CENTER



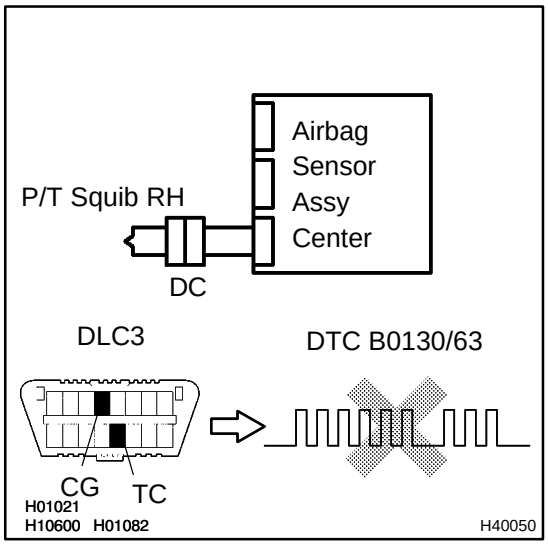
(a) Connect the connector to the airbag sensor assy center.
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(d) Clear the DTCs stored in memory (see page 05-1215).
(e) Turn the ignition switch to the LOCK position.
(f) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(g) Check the DTCs (see page 05-1215).
OK:
DTC B0130/63 is not output.

HINT:
Codes other than code B0130/63 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG SENSOR ASSY CENTER (SEE PAGE 60-53)**

OK

4	CHECK FRONT SEAT OUTER BELT ASSY RH(P/T SQUIB RH)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Connect the connector to the front seat outer belt assy RH.
(d) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(e) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(f) Clear the DTCs stored in memory (see page 05-1215).
(g) Turn the ignition switch to the LOCK position.
(h) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(i) Check the DTCs (see page 05-1215).

OK:

DTC B0130/63 is not output.

HINT:

Codes other than code B0130/63 may be output at this time, but they are not related to this check.

NG → **REPLACE FRONT SEAT OUTER BELT ASSY RH (SEE PAGE 61-4)**

OK

USE SIMULATION METHOD TO CHECK

HINT:

- Before performing the simulation method, check that the airbag sensor assy center is in check mode (see page 05-1218).
- Perform the simulation method by selecting the check mode with the hand-held tester (see page 05-1218).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05-1218).

DTC B0131/64 OPEN IN P/T SQUIB (RH) CIRCUIT

CIRCUIT DESCRIPTION

The P/T squib RH circuit consists of the airbag sensor assy center and the front seat outer belt assy RH (seat belt pretensioner RH).
This circuit instructs the SRS to deploy when deployment conditions are met.
DTC B0131/64 is recorded when an open circuit detected in the P/T squib RH circuit.

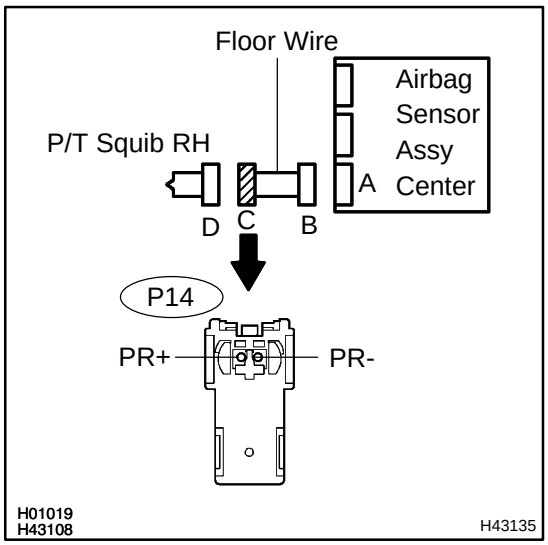
DTC No.	DTC Detecting Condition	Trouble Area
B0131/64	・Open circuit in PR+ wire harness or PR- wire harness of squib ・P/T squib (RH) malfunction ・Airbag sensor assy center malfunction	・Front seat outer belt assy RH (P/T squib RH) ・Airbag sensor assy center ・Floor wire

WIRING DIAGRAM

see page 05-1293 .

INSPECTION PROCEDURE

1	CHECK FLOOR WIRE(P/T SQUIB RH CIRCUIT)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Disconnect the connectors from the airbag sensor assy center and the front seat outer belt assy RH.
(d) Measure the resistance according to the value(s) in the table below.

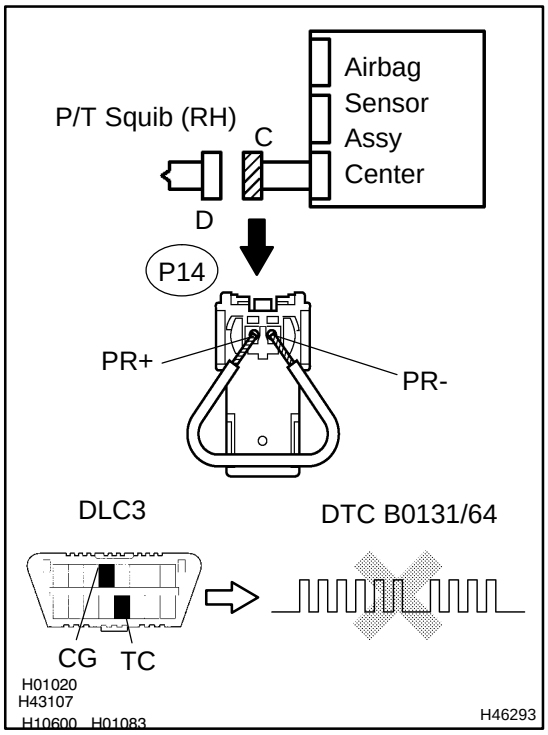
Standard:

Tester connection	Condition	Specified condition
P14-1 (PR+) - P14-2 (PR-)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

2 CHECK AIR BAG SENSOR ASSY CENTER



(a) Connect the connector to the airbag sensor assy center.
(b) Using a service wire, connect P14-1 (PR+) and P14-2 (PR-) of connector "C".

NOTICE:

- **Twist the end of the service wire in order to insert it into the connector.**
- **Do not forcibly insert the twisted service wire into the terminals of the connector when connecting.**

(c) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Clear the DTCs stored in memory (see page 05-1215).
(f) Turn the ignition switch to the LOCK position.
(g) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(h) Check the DTCs (see page 05-1215).

OK:

DTC B0131/64 is not output.

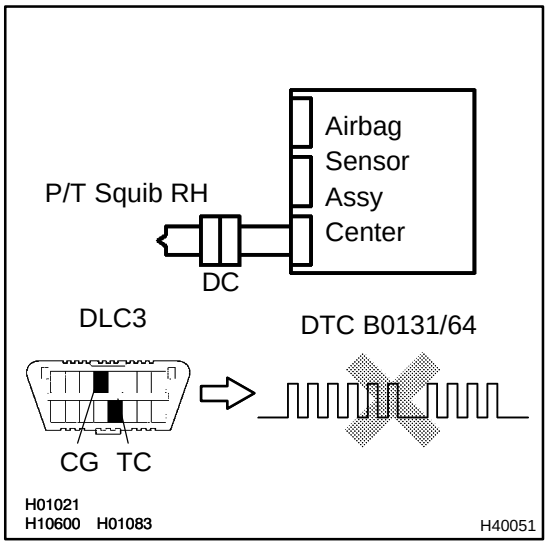
HINT:

Codes other than code B0131/64 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG SENSOR ASSY CENTER (SEE PAGE 60-53)**

OK

3	CHECK FRONT SEAT OUTER BELT ASSY RH(P/T SQUIB RH)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the service wire from connector "C".
(d) Connect the connector to the front seat outer belt assy RH.
(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(g) Clear the DTCs stored in memory (see page 05-1215).
(h) Turn the ignition switch to the LOCK position.
(i) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(j) Check the DTCs (see page 05-1215).

OK:

DTC B0131/64 is not output.

HINT:

Codes other than code B0131/64 may be output at this time, but they are not relevant to this check.

NG → **REPLACE FRONT SEAT OUTER BELT ASSY RH (SEE PAGE 61-4)**

OK

USE SIMULATION METHOD TO CHECK

HINT:

- Before performing the simulation method, check that the airbag sensor assy center is in check mode (see page 05-1218).
- Perform the simulation method by selecting the check mode with the hand-held tester (see page 05-1218).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05-1218).

DTC	B0132/61	SHORT IN P/T SQUIB (RH) CIRCUIT (TO GROUND)

CIRCUIT DESCRIPTION

The P/T squib RH circuit consists of the airbag sensor assy center and the front seat outer belt assy RH (seat belt pretensioner RH).
This circuit instructs the SRS to deploy when deployment conditions are met.
DTC B0132/61 is recorded when a short to ground is detected in the P/T squib RH circuit.

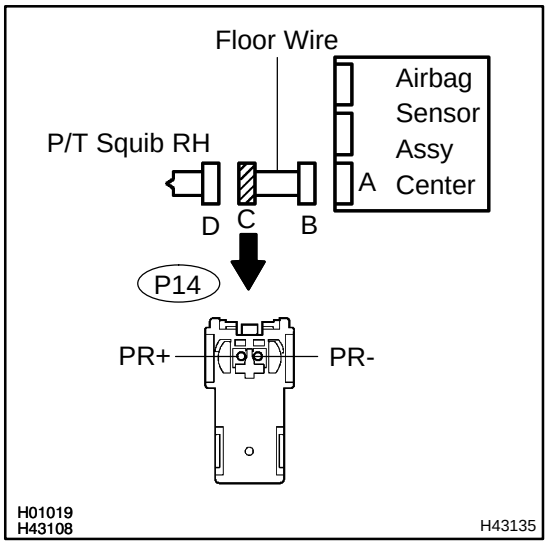
DTC No.	DTC Detecting Condition	Trouble Area
B0132/61	・Short circuit in P/T squib (RH) wire harness (to ground) ・P/T squib (RH) malfunction ・Airbag sensor assy center malfunction	・Front seat outer belt assy RH (P/T squib RH) ・Airbag sensor assy center ・Floor wire

WIRING DIAGRAM

see page 05-1293 .

INSPECTION PROCEDURE

1	CHECK FLOOR WIRE(P/T SQUIB RH CIRCUIT)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Disconnect the connectors from the airbag sensor assy center and the front seat outer belt assy RH.
(d) Measure the resistance according to the value(s) in the table below.

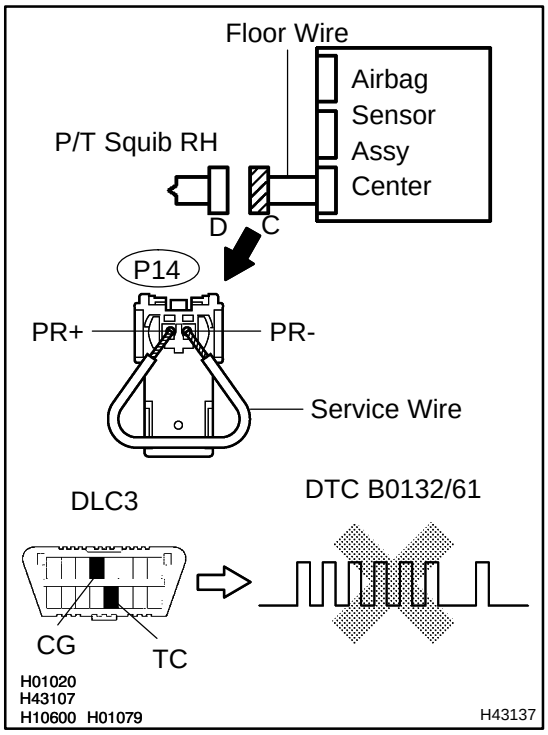
Standard:

Tester connection	Condition	Specified condition
P14-1 (PR+) - Body ground	Always	1 MΩ or Higher
P14-2 (PR-) - Body ground	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

2 CHECK AIR BAG SENSOR ASSY CENTER



(a) Connect the connector to the airbag sensor assy center.
(b) Using a service wire, connect P14-1 (PR+) and P14-2 (PR-) of connector "C".

NOTICE:

- **Twist the end of the service wire in order to insert it into the connector.**
- **Do not forcibly insert the twisted service wire into the terminals of the connector when connecting.**

(c) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Clear the DTCs stored in memory (see page 05-1215).
(f) Turn the ignition switch to the LOCK position.
(g) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(h) Check the DTCs (see page 05-1215).

OK:

DTC B0132/61 is not output.

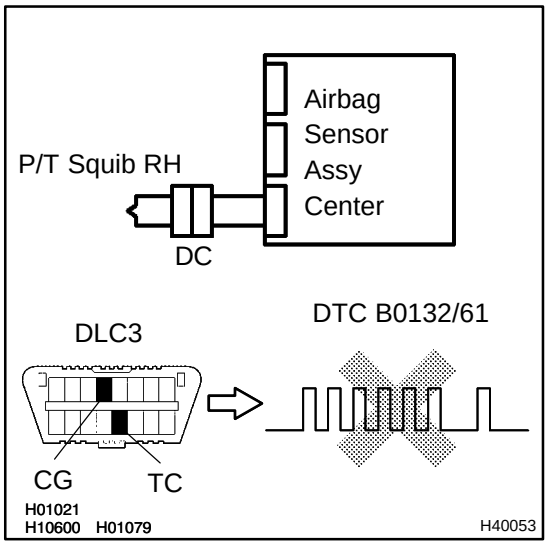
HINT:

Codes other than code B0132/61 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG SENSOR ASSY CENTER (SEE PAGE 60-53)**

OK

3 CHECK FRONT SEAT OUTER BELT ASSY RH(P/T SQUIB RH)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the service wire from connector "C".
(d) Connect the connector to the front seat outer belt assy RH.
(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(g) Clear the DTCs stored in memory (see page 05-1215).
(h) Turn the ignition switch to the LOCK position.
(i) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(j) Check the DTCs (see page 05-1215).

OK:

DTC B0132/61 is not output.

HINT:

Codes other than code B0132/61 may be output at this time, but they are not related to this check.

NG → **REPLACE FRONT SEAT OUTER BELT ASSY RH (SEE PAGE 61-4)**

OK

USE SIMULATION METHOD TO CHECK

HINT:

- Before performing the simulation method, check that the airbag sensor assy center is in check mode (see page 05-1218).
- Perform the simulation method by selecting the check mode with the hand-held tester (see page 05-1218).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05-1218).

DTC B0133/62 SHORT IN P/T SQUIB (RH) CIRCUIT (TO B+)

CIRCUIT DESCRIPTION

The P/T squib RH circuit consists of the airbag sensor assy center and the front seat outer belt assy RH (seat belt pretensioner RH).
This circuit instructs the SRS to deploy when deployment conditions are met.
DTC B0133/62 is recorded when a short to B+ is detected in the P/T squib RH circuit.

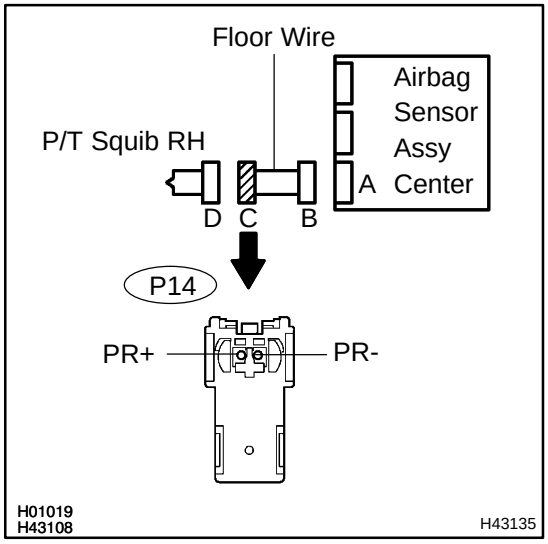
DTC No.	DTC Detecting Condition	Trouble Area
B0133/62	・Short circuit in seat belt pretensioner (RH) wire harness (to B+) ・P/T squib (RH) malfunction ・Airbag sensor assy center malfunction	・Front seat outer belt assy RH (P/T squib RH) ・Airbag sensor assy center ・Floor wire

WIRING DIAGRAM

see page 05-1293 .

INSPECTION PROCEDURE

1 CHECK FLOOR WIRE(P/T SQUIB RH CIRCUIT)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag sensor assy center and the front seat outer belt assy RH.
(d) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(e) Turn the ignition switch to the ON position.
(f) Measure the voltage according to the value(s) in the table below.

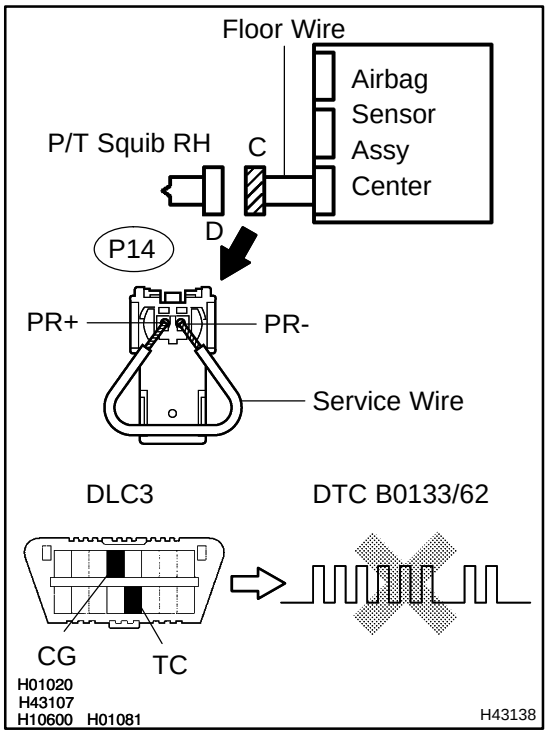
Standard:

Tester connection	Condition	Specified condition
P14-1 (PR+) - Body ground	Ignition switch ON	Below 1 V
P14-2 (PR-) - Body ground	Ignition switch ON	Below 1 V

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

2 CHECK AIR BAG SENSOR ASSY CENTER



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Connect the connector to the airbag sensor assy center.
(d) Using a service wire, connect P14-1 (PR+) and P14-2 (PR-) of connector "C".

NOTICE:

- **Twist the end of the service wire in order to insert it into the connector.**
- **Do not forcibly insert the twisted service wire into the terminal of the connector when connecting.**

(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(g) Clear the DTCs stored in memory (see page 05-1215).
(h) Turn the ignition switch to the LOCK position.
(i) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(j) Check the DTCs (see page 05-1215).

OK:

DTC B0133/62 is not output.

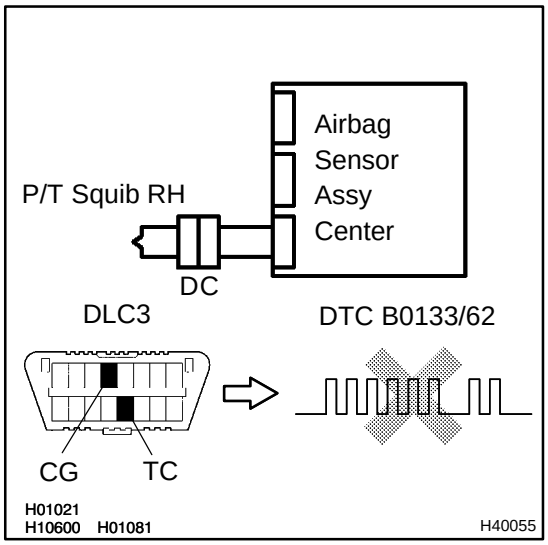
HINT:

Codes other than code B0133/62 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG SENSOR ASSY CENTER (SEE PAGE 60-53)**

OK

3 CHECK FRONT SEAT OUTER BELT ASSY RH(P/T SQUIB RH)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the service wire from connector "C".
(d) Connect the connector to the front seat outer belt assy RH.
(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(g) Clear the DTCs stored in memory (see page 05-1215).
(h) Turn the ignition switch to the LOCK position.
(i) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(j) Check the DTCs (see page 05-1215).

OK:

DTC B0133/62 is not output.

HINT:

Codes other than code B0133/62 may be output at this time, but they are not related to this check.

NG → **REPLACE FRONT SEAT OUTER BELT ASSY RH (SEE PAGE 61-4)**

OK

USE SIMULATION METHOD TO CHECK

HINT:

- Before performing the simulation method, check that the airbag sensor assy center is in check mode (see page 05-1218).
- Perform the simulation method by selecting the check mode with the hand-held tester (see page 05-1218).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05-1218).

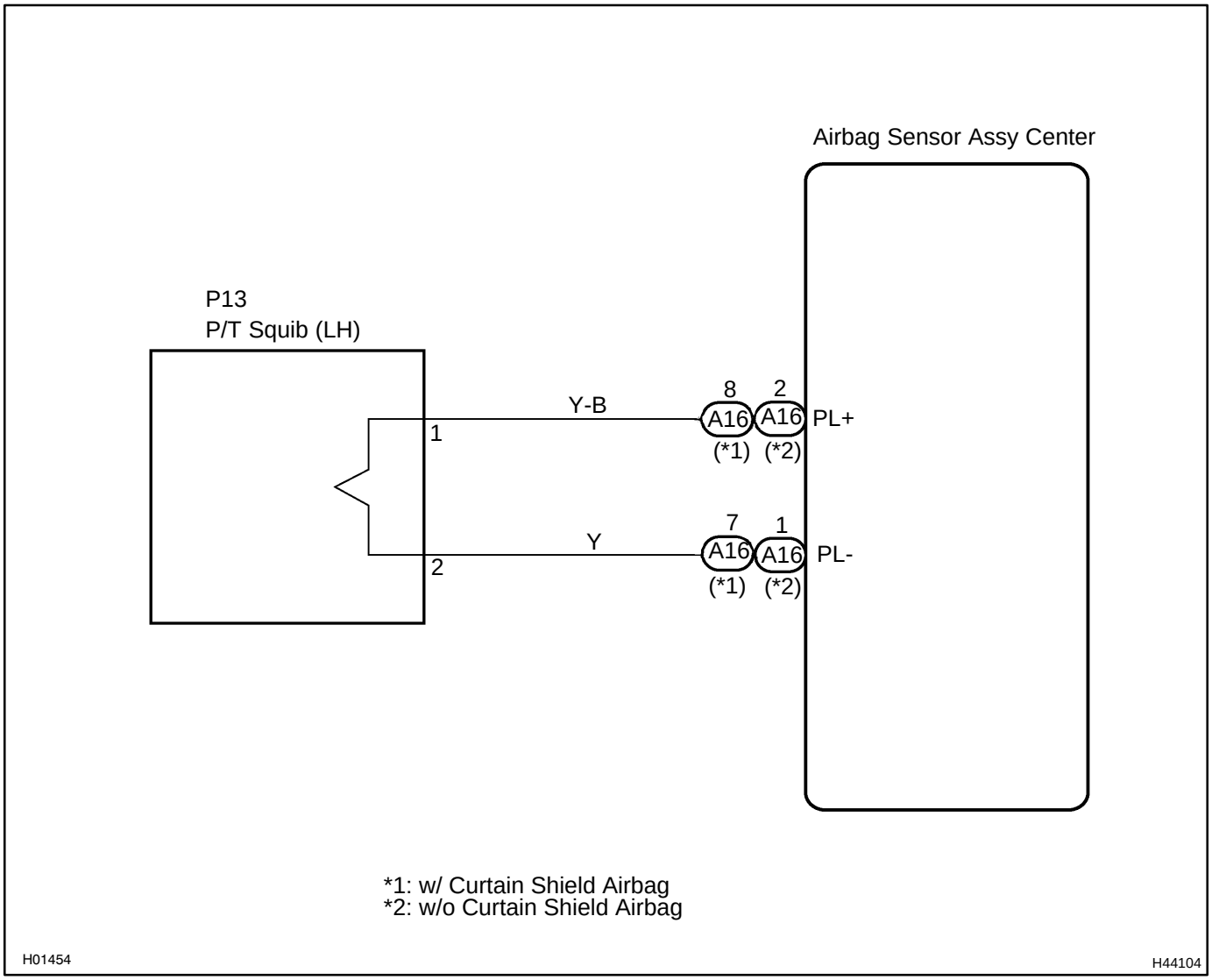
DTC B0135/73 SHORT IN P/T SQUIB (LH) CIRCUIT

CIRCUIT DESCRIPTION

The P/T squib LH circuit consists of the airbag sensor assy center and the front seat outer belt assy LH (seat belt pretensioner LH).
This circuit instructs the SRS to deploy when deployment conditions are met.
DTC B0135/73 is recorded when a short circuit is detected in the P/T squib LH circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B0135/73	・Short circuit between PL+ wire harness and PL- wire harness of P/T squib LH ・P/T squib (LH) malfunction ・Airbag sensor assy center malfunction	・Front seat outer belt assy LH (P/T squib LH) ・Airbag sensor assy center ・Floor wire No.2

WIRING DIAGRAM



INSPECTION PROCEDURE

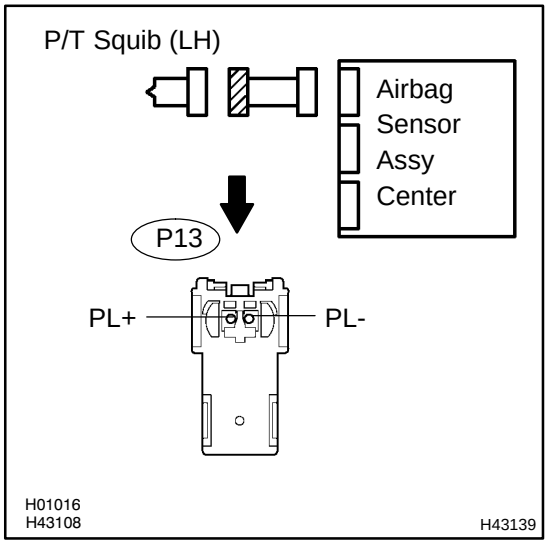
1	CHECK CONNECTOR

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connector from the front seat outer belt assy LH.
(d) Check that the floor wire No.2 connector (on the front seat outer belt assy LH side) is not damaged.
OK:
The lock button is not disengaged, or the claw of the lock is not deformed or damaged.

NG → **REPAIR OR REPLACE FLOOR WIRE NO.2**

OK

2	CHECK FLOOR WIRE NO.2(P/T SQUIB LH CIRCUIT)



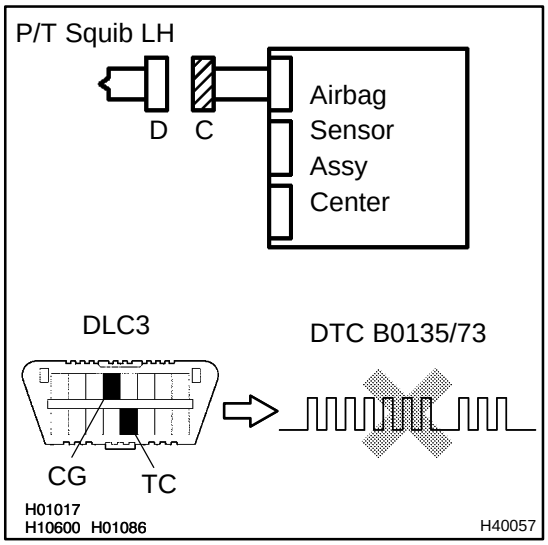
(a) Disconnect the connector from the airbag sensor assy center.
(b) Release the activation prevention mechanism built into connector "B" (see page 05-1207).
(c) Measure the resistance according to the value(s) in the table below.
Standard:

Tester connection	Condition	Specified condition
P13-1 (PL+) - P13-2 (PL-)	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FLOOR WIRE NO.2**

OK

3	CHECK AIR BAG SENSOR ASSY CENTER



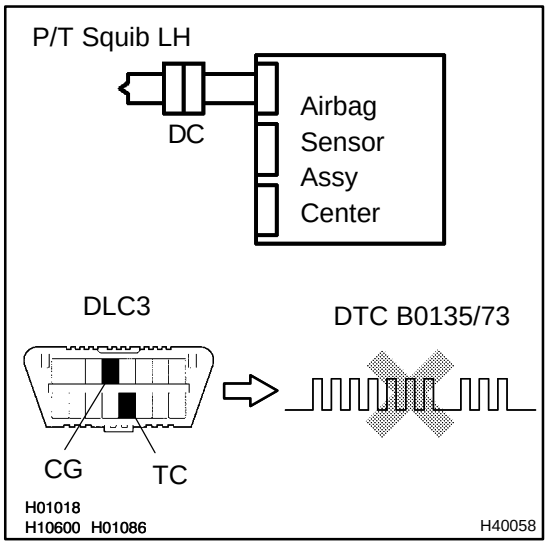
(a) Connect the connector to the airbag sensor assy center.
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(d) Clear the DTCs stored in memory (see page 05-1215).
(e) Turn the ignition switch to the LOCK position.
(f) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(g) Check the DTCs (see page 05-1215).
OK:
DTC B0135/73 is not output.

HINT:
Codes other than code B0135/73 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG SENSOR ASSY CENTER (SEE PAGE 60-53)**

OK

4	CHECK FRONT SEAT OUTER BELT ASSY LH(P/T SQUIB LH)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Connect the connector to the front seat outer belt assy LH.
(d) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(e) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(f) Clear the DTCs stored in memory (see page 05-1215).
(g) Turn the ignition switch to the LOCK position.
(h) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(i) Check the DTCs (see page 05-1215).

OK:

DTC B0135/73 is not output.

HINT:

Codes other than code B0135/73 may be output at this time, but they are not related to this check.

NG → **REPLACE FRONT SEAT OUTER BELT ASSY LH (SEE PAGE 61-4)**

OK

USE SIMULATION METHOD TO CHECK

HINT:

- Before performing the simulation method, check that the airbag sensor assy center is in check mode (see page 05-1218).
- Perform the simulation method by selecting the check mode with the hand-held tester (see page 05-1218).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05-1218).

DTC B0136/74 OPEN IN P/T SQUIB (LH) CIRCUIT

CIRCUIT DESCRIPTION

The P/T squib LH circuit consists of the airbag sensor assy center and the front seat outer belt assy LH (seat belt pretensioner LH).
This circuit instructs the SRS to deploy when deployment conditions are met.
DTC B0136/74 is recorded when an open circuit is detected in the P/T squib LH circuit.

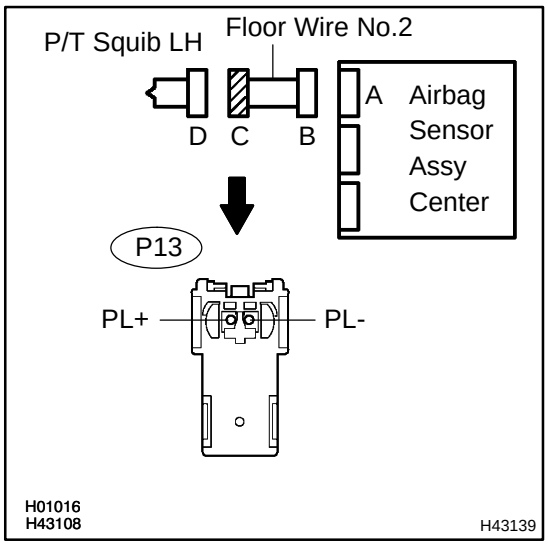
DTC No.	DTC Detecting Condition	Trouble Area
B0136/74	・Open circuit in PL+ wire harness or PL- wire harness of P/T squib LH ・P/T squib (LH) malfunction ・Airbag sensor assy center malfunction	・Front seat outer belt assy LH (P/T squib LH) ・Airbag sensor assy center ・Floor wire No.2

WIRING DIAGRAM

see page 05-1306 .

INSPECTION PROCEDURE

1 CHECK FLOOR WIRE NO.2(P/T SQUIB LH CIRCUIT)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag sensor assy center and the front seat outer belt assy LH.
(d) Measure the resistance according to the value(s) in the table below.

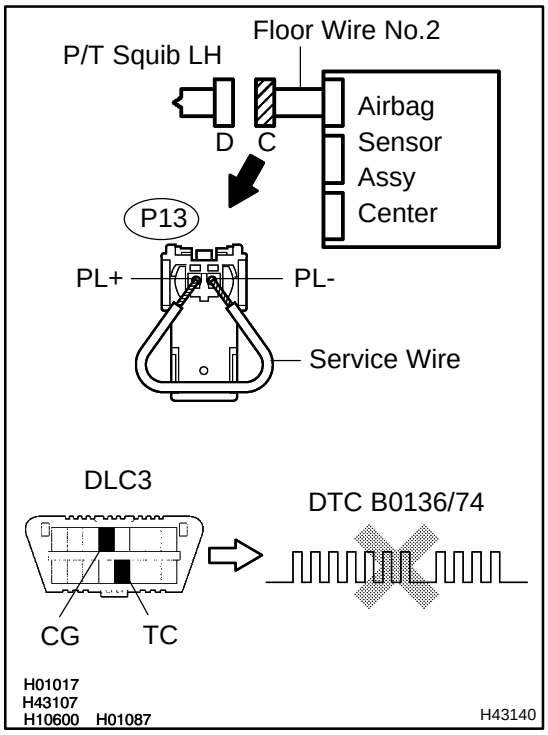
Standard:

Tester connection	Condition	Specified condition
P13-1 (PL+) - P13-2 (PL-)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE FLOOR WIRE NO.2**

OK

2	CHECK AIR BAG SENSOR ASSY CENTER



(a) Connect the connector to the airbag sensor assy center.
(b) Using a service wire, connect P13-1 (PL+) and P13-2 (PL-) of connector "C".

NOTICE:

* **Twist the end of the service wire in order to insert it into the connector.**
* **Do not forcibly insert the twisted service wire into the terminal of the connector when connecting.**

(c) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Clear the DTCs stored in memory (see page 05-1215).
(f) Turn the ignition switch to the LOCK position.
(g) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(h) Check the DTCs (see page 05-1215).

OK:

DTC B0136/74 is not output.

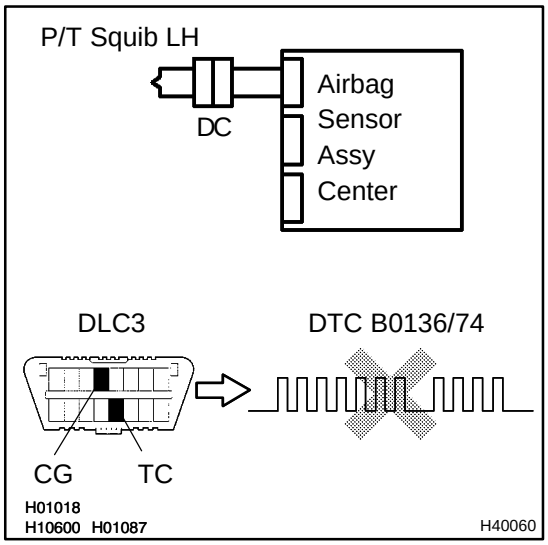
HINT:

Codes other than code B0136/74 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG SENSOR ASSY CENTER (SEE PAGE 60-53)**

OK

3 CHECK FRONT SEAT OUTER BELT ASSY LH(P/T SQUIB LH)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the service wire from connector "C".
(d) Connect the connector to the front seat outer belt assy LH.
(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(g) Clear the DTCs stored in memory (see page 05-1215).
(h) Turn the ignition switch to the LOCK position.
(i) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(j) Check the DTCs (see page 05-1215).

OK:

DTC B0136/74 is not output.

HINT:

Codes other than code B0136/74 may be output at this time, but they are not related to this check.

NG → **REPLACE FRONT SEAT OUTER BELT ASSY LH (SEE PAGE 61-4)**

OK

USE SIMULATION METHOD TO CHECK

HINT:

- Before performing the simulation method, check that the airbag sensor assy center is in check mode (see page 05-1218).
- Perform the simulation method by selecting the check mode with the hand-held tester (see page 05-1218).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05-1218).

DTC	B0137/71	SHORT IN P/T SQUIB (LH) CIRCUIT (TO GROUND)

CIRCUIT DESCRIPTION

The P/T squib LH circuit consists of the airbag sensor assy center and the front seat outer belt assy LH (seat belt pretensioner LH).
This circuit instructs the SRS to deploy when deployment conditions are met.
DTC B0137/71 is recorded when a short to ground is detected in the P/T squib LH circuit.

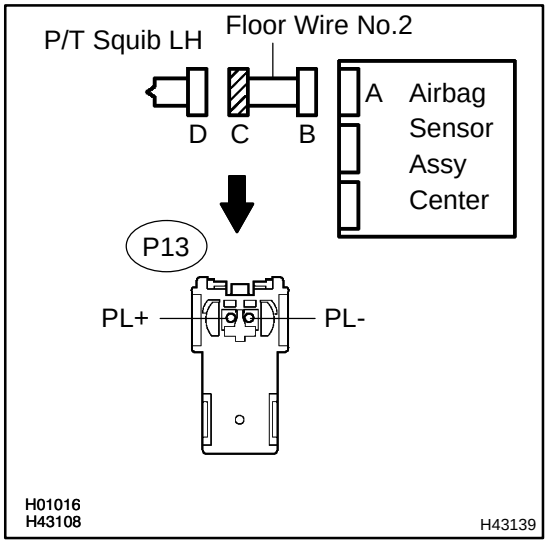
DTC No.	DTC Detecting Condition	Trouble Area
B0137/71	・Short circuit in P/T squib (LH) wire harness (to ground) ・P/T squib (LH) malfunction ・Airbag sensor assy center malfunction	・Front seat outer belt assy LH (P/T squib LH) ・Airbag sensor assy center ・Floor wire No.2

WIRING DIAGRAM

see page 05-1306 .

INSPECTION PROCEDURE

1	CHECK FLOOR WIRE NO.2(P/T SQUIB LH CIRCUIT)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Disconnect the connector from the airbag sensor assy center and the front seat outer belt assy LH.
(d) Measure the resistance according to the value(s) in the table below.

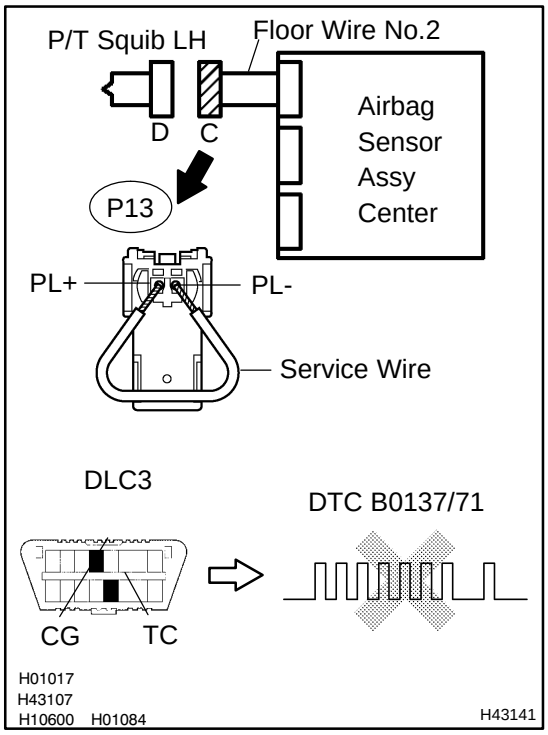
Standard:

Tester connection	Condition	Specified condition
P13-1 (PL+) - Body ground	Always	1 MΩ or Higher
P13-2 (PL-) - Body ground	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FLOOR WIRE NO.2**

OK

2 CHECK AIR BAG SENSOR ASSY CENTER



(a) Connect the connector to the airbag sensor assy center.
(b) Using a service wire, connect P13-1 (PL+) and P13-2 (PL-) of connector "C".

NOTICE:

- **Twist the end of the service wire in order to insert it into the connector.**
- **Do not forcibly insert the twisted service wire into the terminal of the connector when connecting.**

(c) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Clear the DTCs stored in memory (see page 05-1215).
(f) Turn the ignition switch to the LOCK position.
(g) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(h) Check the DTCs (see page 05-1215).

OK:

DTC B0137/71 is not output.

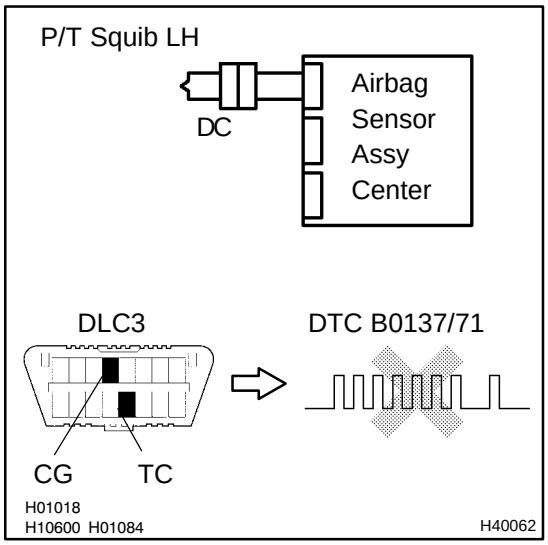
HINT:

Codes other than code B0137/71 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG SENSOR ASSY CENTER (SEE PAGE 60-53)**

OK

3 CHECK FRONT SEAT OUTER BELT ASSY LH(P/T SQUIB LH)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the service wire from connector "C".
(d) Connect the connector to the front seat outer belt assy LH.
(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(g) Clear the DTCs stored in memory (see page 05-1215).
(h) Turn the ignition switch to the LOCK position.
(i) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(j) Check the DTCs (see page 05-1215).

OK:

DTC B0137/71 is not output.

HINT:

Codes other than code B0137/71 may be output at this time, but they are not related to this check.

NG → **REPLACE FRONT SEAT OUTER BELT ASSY LH (SEE PAGE 61-4)**

OK

USE SIMULATION METHOD TO CHECK

HINT:

- Before performing the simulation method, check that the airbag sensor assy center is in check mode (see page 05-1218).
- Perform the simulation method by selecting the check mode with the hand-held tester (see page 05-1218).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05-1218).

DTC B0138/72 SHORT IN P/T SQUIB (LH) CIRCUIT (TO B+)

CIRCUIT DESCRIPTION

The P/T squib LH circuit consists of the airbag sensor assy center and the front seat outer belt assy LH (seat belt pretensioner LH).
This circuit instructs the SRS to deploy when deployment conditions are met.
DTC B0137/71 is recorded when a short to ground is detected in the P/T squib LH circuit.

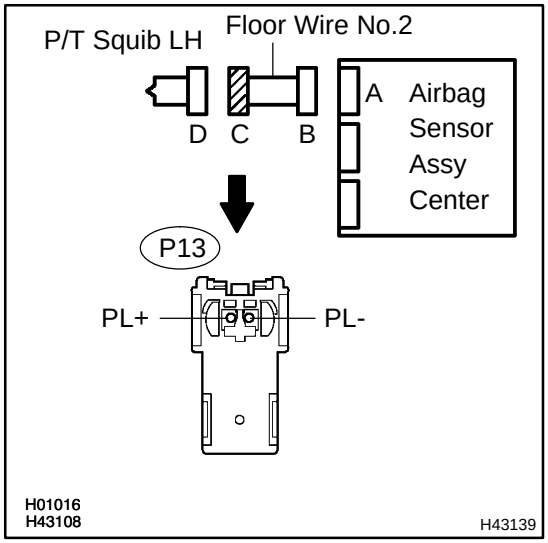
DTC No.	DTC Detecting Condition	Trouble Area
B0138/72	・Short circuit in seat belt pretensioner (LH) wire harness (to B+) ・P/T squib (LH) malfunction ・Airbag sensor assy center malfunction	・Front seat outer belt assy LH (P/T squib LH) ・Airbag sensor assy center ・Floor wire No.2

WIRING DIAGRAM

see page 05-1306 .

INSPECTION PROCEDURE

1	CHECK FLOOR WIRE NO.2(P/T SQUIB CIRCUIT)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Disconnect the connectors from the airbag sensor assy center and the front seat outer belt assy LH.
(d) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(e) Turn the ignition switch to the ON position.
(f) Measure the voltage according to the value(s) in the table below.

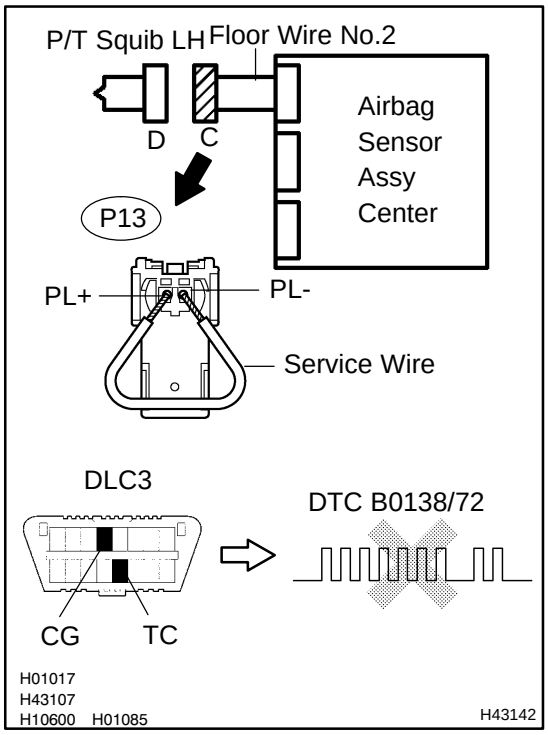
Standard:

Tester connection	Condition	Specified condition
P13-1 (PL+) - Body ground	Ignition switch ON	Below 1 V
P13-2 (PL-) - Body ground	Ignition switch ON	Below 1 V

NG → **REPAIR OR REPLACE FLOOR WIRE NO.2**

OK

2 CHECK AIR BAG SENSOR ASSY CENTER



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the connector to the airbag sensor assy center.
(d) Using a service wire, connect P13-1 (PL+) and P13-2 (PL-) of connector "C".

NOTICE:

- **Twist the end of the service wire in order to insert it into the connector.**
- **Do not forcibly insert the twisted service wire into the terminal of the connector when connecting.**

(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(g) Clear the DTCs stored in memory (see page 05-1215).
(h) Turn the ignition switch to the LOCK position.
(i) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(j) Check the DTCs (see page 05-1215).

OK:

DTC B0138/72 is not output.

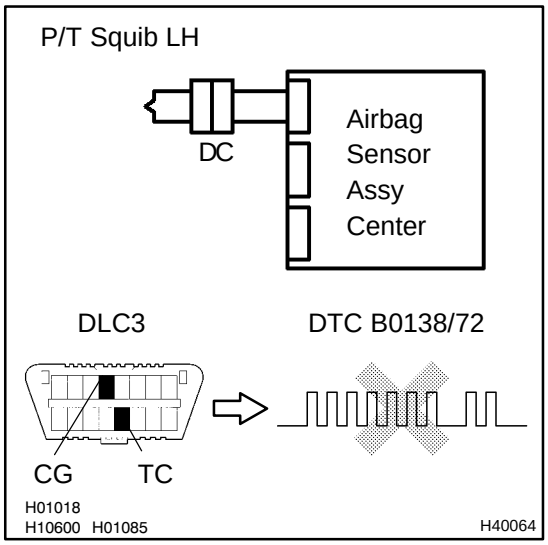
HINT:

Codes other than code B0138/72 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG SENSOR ASSY CENTER (SEE PAGE 60-53)**

OK

3 CHECK FRONT SEAT OUTER BELT ASSY LH(P/T SQUIB LH)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the service wire from connector "C".
(d) Connect the connector to the front seat outer belt assy LH.
(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(g) Clear the DTCs stored in memory (see page 05-1215).
(h) Turn the ignition switch to the LOCK position.
(i) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(j) Check the DTCs (see page 05-1215).

OK:

DTC B0138/72 is not output.

HINT:

Codes other than code B0138/72 may be output at this time, but they are not related to this check.

NG → **REPLACE FRONT SEAT OUTER BELT ASSY LH (SEE PAGE 61-4)**

OK

USE SIMULATION METHOD TO CHECK

HINT:

- Before performing the simulation method, check that the airbag sensor assy center is in check mode (see page 05-1218).
- Perform the simulation method by selecting the check mode with the hand-held tester (see page 05-1218).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05-1218).

DTC	B1100/31	AIRBAG SENSOR ASSY CENTER MALFUNCTION

CIRCUIT DESCRIPTION

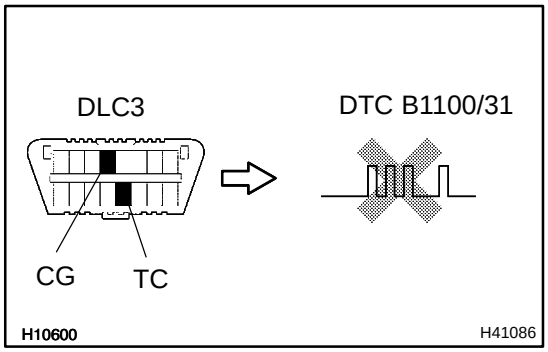
The airbag sensor assy center consists of a airbag sensor assy center, safing sensor, drive circuit, diagnosis circuit and ignition control, etc.
It receives signals from the airbag sensor, judges whether or not the SRS must be activated, and detects diagnosis system malfunction.
DTC B1100/31 is recorded when occurrence of a malfunction in the airbag sensor assy center is detected.

DTC No.	DTC Detecting Condition	Trouble Area
B1100/31	Airbag sensor assy center malfunction	Airbag sensor assy center

HINT:
When a trouble code is displayed simultaneously with B1100/31, repair the malfunction indicated by this code (except B1100/31) first.

INSPECTION PROCEDURE

1	CHECK AIR BAG SENSOR ASSY CENTER



(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(b) Clear the DTCs stored in memory (see page 05-1215).
(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Check the DTCs (see page 05-1215).
OK:
DTC B1100/31 is not output.

NG → **REPLACE AIR BAG SENSOR ASSY CENTER (SEE PAGE 60-53)**

OK

USE SIMULATION METHOD TO CHECK

DTC	B1135/24	HALF CONNECTION IN AIRBAG SENSOR ASSY CENTER CONNECTORS

CIRCUIT DESCRIPTION

The airbag sensor assy center detects partial connection of connector.
DTC B1135/24 is recorded when the airbag sensor assy center detects an open in the electrical connection check mechanism of the airbag sensor connector or in the airbag sensor circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1135/24	・Malfunction of electrical connection check mechanism of airbag sensor assy center connector ・Airbag sensor assy center malfunction	・Electrical connection check mechanism ・Airbag sensor assy center

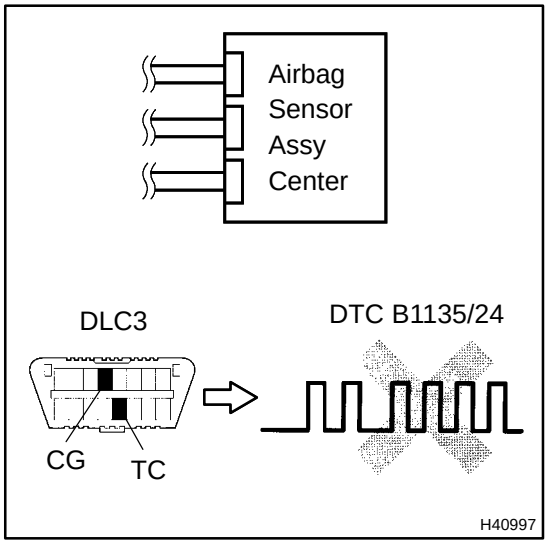
INSPECTION PROCEDURE

1 CHECK AIRBAG SENSOR ASSY CENTER CONNECTOR

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Check the connection of the airbag sensor assy center connectors.
OK:
The connectors are connected.

HINT:
When the connectors are not firmly connected, disconnect them once and reconnect them securely.

2 CHECK AIR BAG SENSOR ASSY CENTER



(a) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
(b) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(c) Clear the DTCs stored in memory (see page 05-1215).
(d) Turn the ignition switch to the LOCK position.
(e) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(f) Check the DTCs (see page 05-1215).
OK:
DTC B1135/24 is not output.

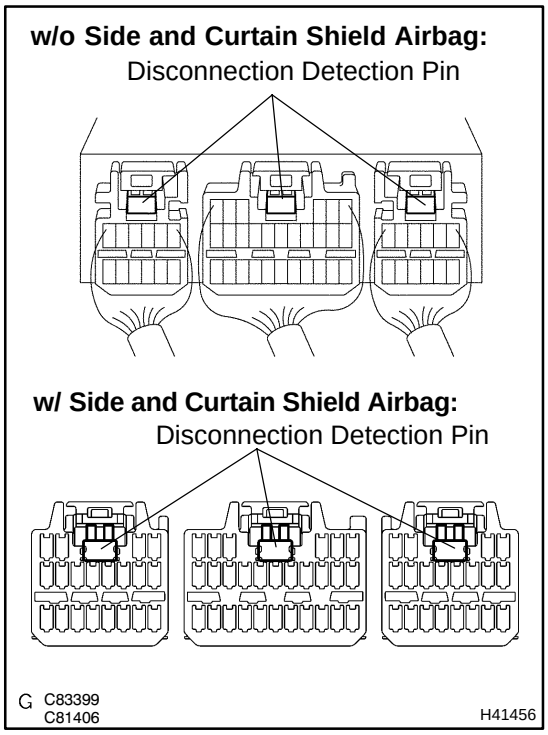
HINT:
Codes other than code B1135/24 may be output at this time, but they are not related to this check.

NG → **Go to step 3**

OK

USE SIMULATION METHOD TO CHECK

3	PERFORM A VISUAL CHECK OF THE DISCONNECTION DETECTION PIN



(a) Check the disconnection detection pin of the connector.

HINT:

Compare one connector with the other 2 connectors.

OK:

No deformation is identified.

NG → **REPAIR OR REPLACE AIRBAG SENSOR ASSY CENTER CONNECTOR**

OK

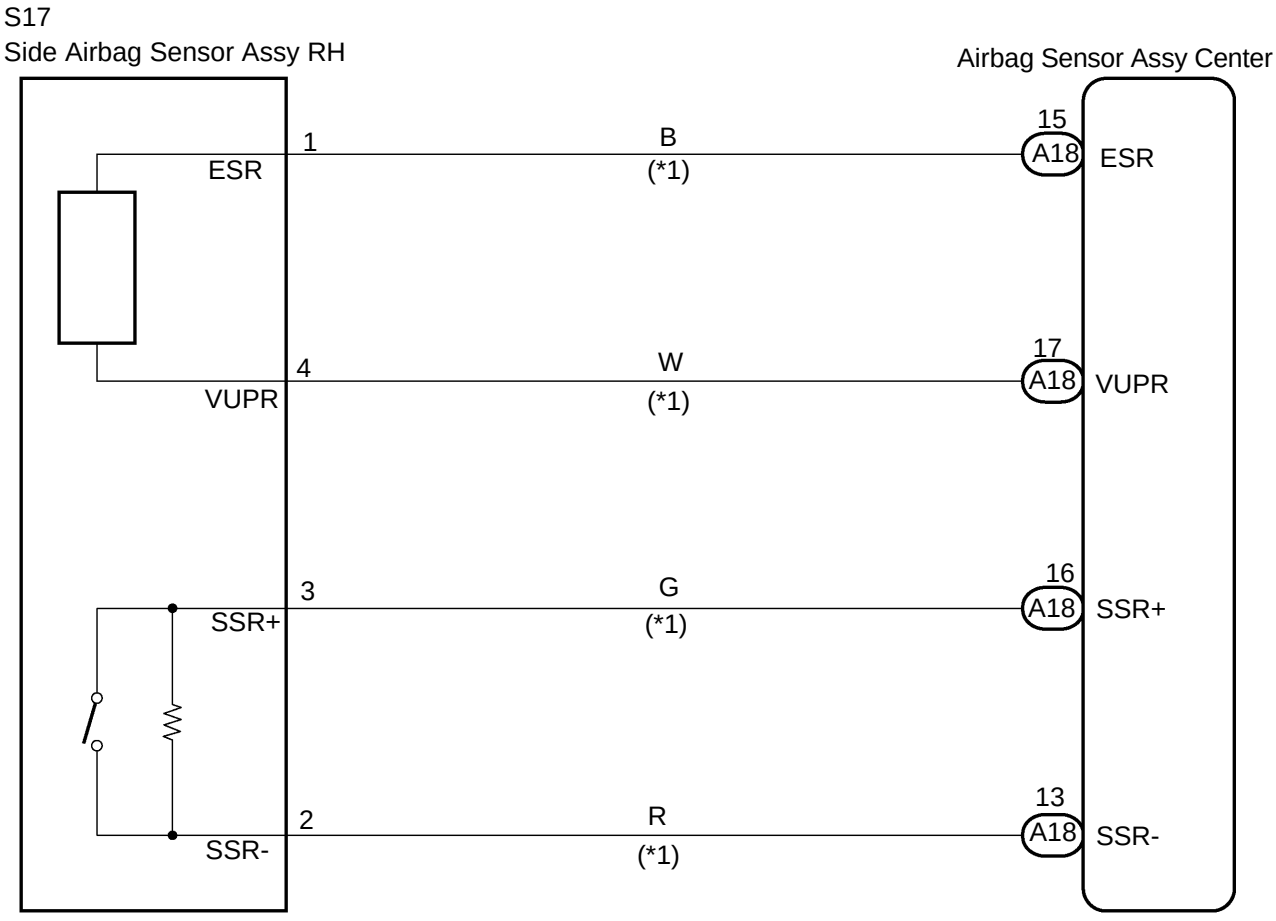
REPLACE AIR BAG SENSOR ASSY CENTER (SEE PAGE 60-53)

DTC B1140/32 SIDE AIRBAG SENSOR ASSY (RH) MALFUNCTION

The side airbag sensor assy RH consists of the safing sensor, diagnosis circuit and lateral deceleration sensor, etc.
It receives signals from the lateral deceleration sensor, judges whether or not the SRS must be activated, and detects diagnosis system malfunction.
DTC B1140/32 is recorded when occurrence of a malfunction in the side airbag sensor assy RH (RH) is detected.

DTC No.	DTC Detecting Condition	Trouble Area
B1140/32	・Side airbag sensor assy RH circuit malfunction	・Side airbag sensor assy RH ・Floor wire ・Airbag sensor assy center

WIRING DIAGRAM



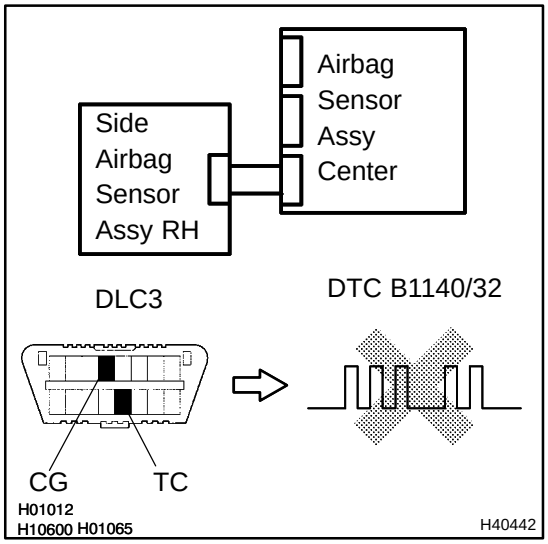
*1: w/ Curtain Shield Airbag

C

H43054

INSPECTION PROCEDURE

1	CHECK DTC



(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(b) Clear the DTCs stored in memory (see page 05-1215).
(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Check the DTCs (see page 05-1215).
OK:
DTC B1140/32 is not output.

HINT:
Codes other than code B1140/32 may be output at this time, but they are not related to this check.

NG → **Go to step 2**

OK

USE SIMULATION METHOD TO CHECK

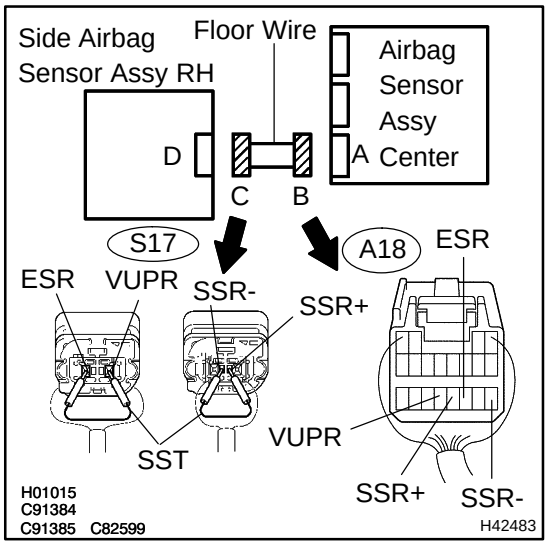
2	CHECK CONNECTION OF CONNECTORS

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Check that the connector is properly connected to the airbag sensor assy center and the side airbag sensor assy RH.

NG → **CONNECT CONNECTORS, THEN GO TO STEP 1**

OK

3 CHECK FLOOR WIRE(OPEN)



(a) Disconnect the connectors from the airbag sensor assy center and the side airbag sensor assy RH.

(b) Using SST, connect S17-4 (VUPR) and S17-1 (ESR), and connect S17-3 (SSR+) and S17-2 (SSR-) of connector "C".
SST 09843-18040

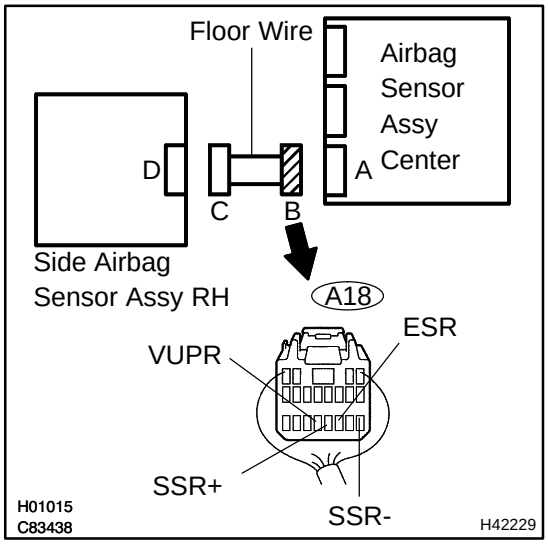
(c) Measure the resistance according to the value(s) in the table below.
Standard:

Tester connection	Condition	Specified condition
A18-17 (VUPR) - A18-15 (ESR)	Always	Below 1 Ω
A18-16 (SSR+) - A18-13 (SSR-)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

4 CHECK FLOOR WIRE(TO GROUND)



(a) Disconnect the SST from connector "C".

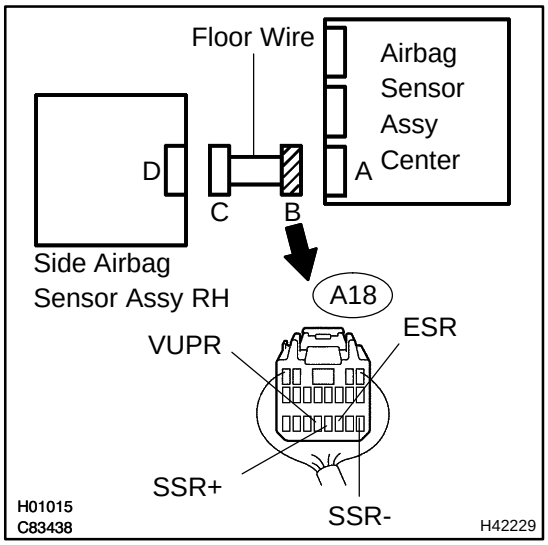
(b) Measure the resistance according to the value(s) in the table below.
Standard:

Tester connection	Condition	Specified condition
A18-17 (VUPR) - Body ground	Always	1 MΩ or Higher
A18-15 (ESR) - Body ground	Always	1 MΩ or Higher
A18-16 (SSR+) - Body ground	Always	1 MΩ or Higher
A18-13 (SSR-) - Body ground	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

5 CHECK FLOOR WIRE(TO B+)



(a) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(b) Turn the ignition switch to the ON position.
(c) Measure the voltage according to the value(s) in the table below.

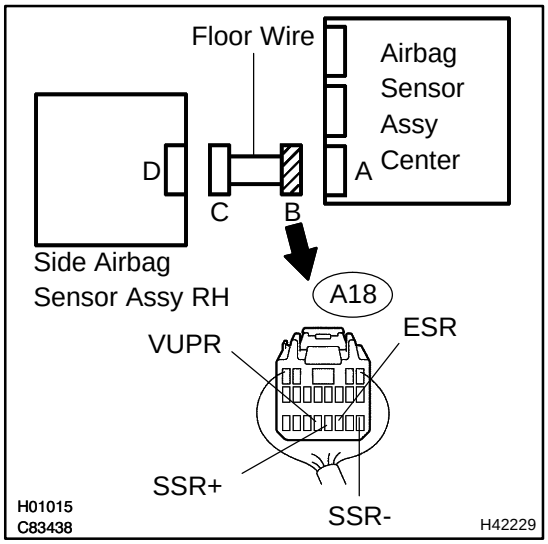
Standard:

Tester connection	Condition	Specified condition
A18-17 (VUPR) - Body ground	Ignition switch ON	Below 1 V
A18-15 (ESR) - Body ground	Ignition switch ON	Below 1 V
A18-16 (SSR+) - Body ground	Ignition switch ON	Below 1 V
A18-13 (SSR-) - Body ground	Ignition switch ON	Below 1 V

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

6 CHECK FLOOR WIRE(SHORT)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Measure the resistance according to the value(s) in the table below.

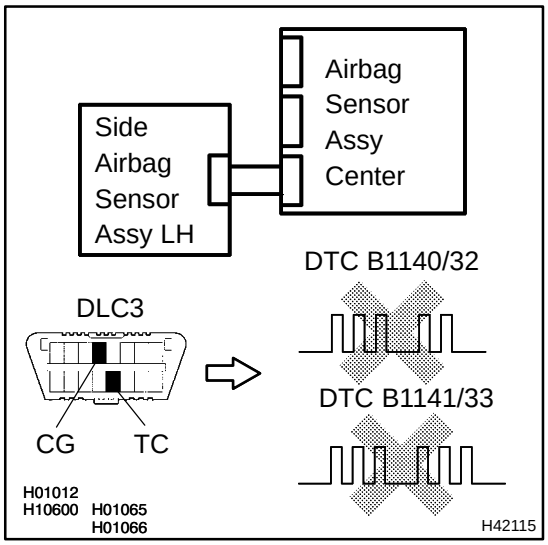
Standard:

Tester connection	Condition	Specified condition
A18-17 (VUPR) - A18-15 (ESR)	Always	1 MΩ or Higher
A18-16 (SSR+) - A18-13 (SSR-)	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

7 CHECK SIDE AIR BAG SENSOR ASSY RH



(a) Connect the connector to the airbag sensor assy center.
(b) Interchange the side airbag sensor assy RH with LH and connect the connectors to them.
(c) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Clear the DTCs stored in memory (see page 05-1215).
(f) Turn the ignition switch to the LOCK position.
(g) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(h) Check the DTCs (see page 05-1215).

Result:

NG: A	DTC B1140/32 is output.
NG: B	DTC B1141/33 is output.
OK	DTC B1140/32 and B1141/33 are not output.

NG:A → **REPLACE AIR BAG SENSOR ASSY CENTER (SEE PAGE 60-53)**

NG:B → **REPLACE SIDE AIR BAG SENSOR ASSY RH (SEE PAGE 60-57)**

OK

USE SIMULATION METHOD TO CHECK

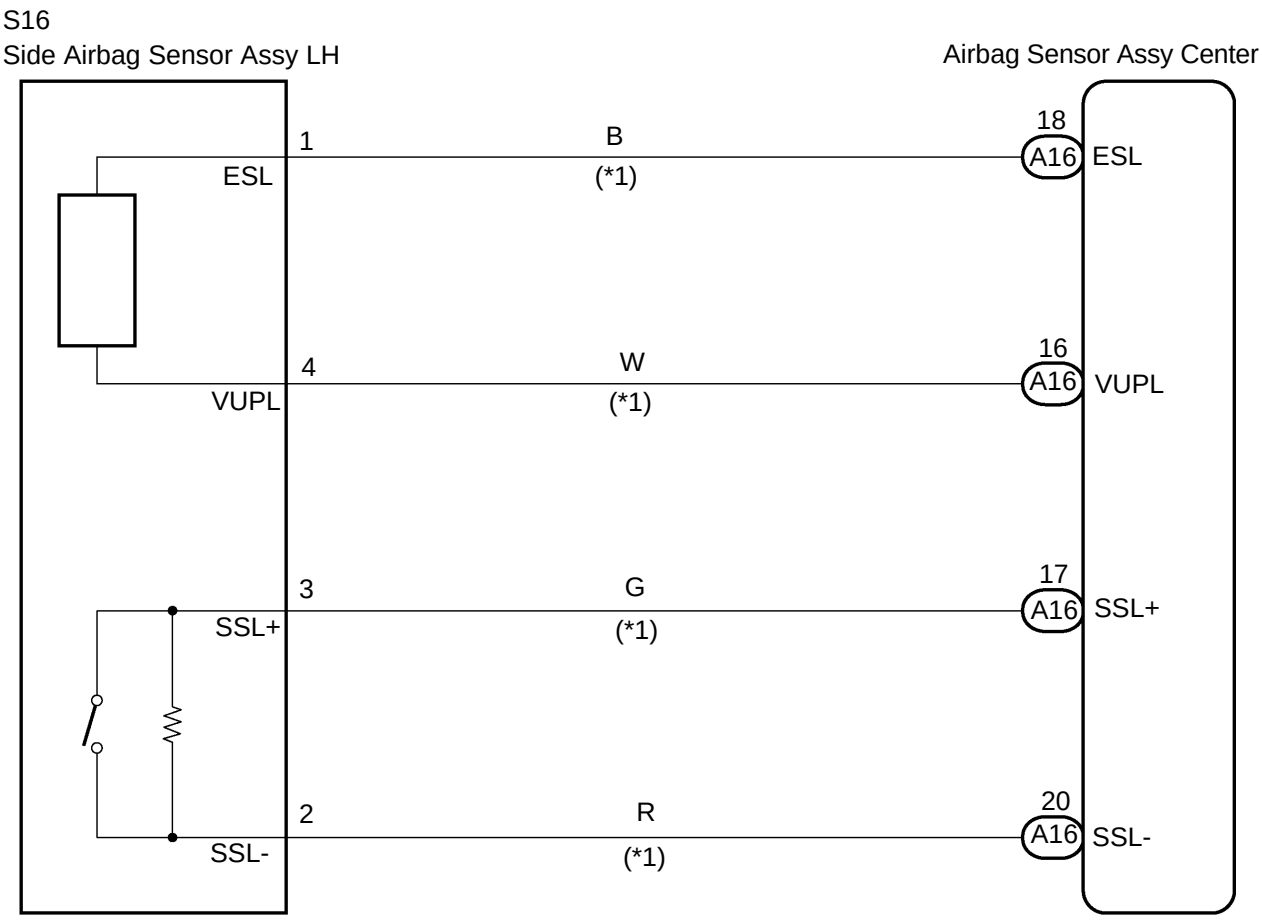
DTC	B1141/33	SIDE AIRBAG SENSOR ASSY (LH) MALFUNCTION

CIRCUIT DESCRIPTION

The side airbag sensor assy LH consists of the safing sensor, diagnosis circuit and lateral deceleration sensor, etc.
It receives signals from the lateral deceleration sensor, judges whether or not the SRS must be activated, and detects diagnosis system malfunction.
DTC B1141/33 is recorded when occurrence of a malfunction in the side airbag sensor assy LH is detected.

DTC No.	DTC Detecting Condition	Trouble Area
B1141/33	・Side airbag sensor assy LH malfunction	・Side airbag sensor assy LH ・Floor wire No.2 ・Airbag sensor assy center

WIRING DIAGRAM



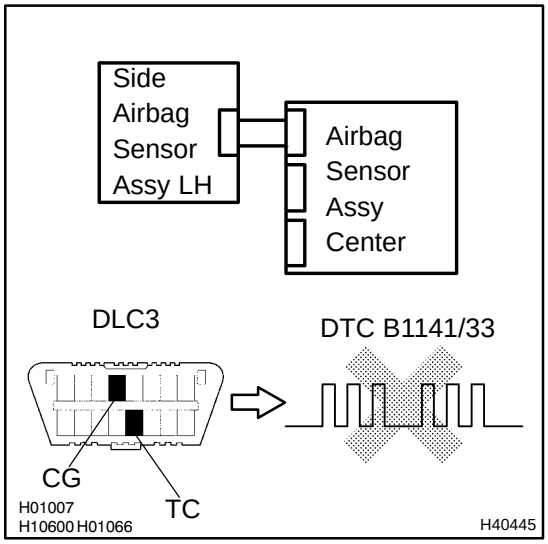
*1: w/ Curtain Shield Airbag

C

H43054

INSPECTION PROCEDURE

1	CHECK DTC



(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(b) Clear the DTCs stored in memory (see page 05-1215).
(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Check the DTCs (see page 05-1215).
OK:
DTC B1141/33 is not output.

HINT:
Codes other than code B1141/33 may be output at this time, but they are not related to this check.

NG → **Go to step 2**

OK

USE SIMULATION METHOD TO CHECK

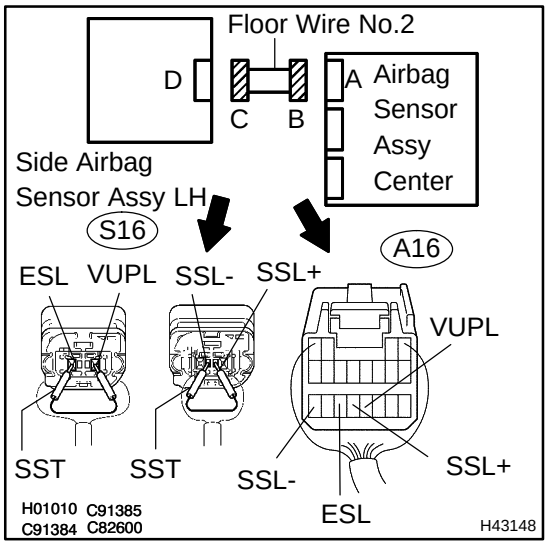
2	CHECK AIRBAG SENSOR ASSY CENTER CONNECTOR

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Check that the connectors are properly connected to the airbag sensor assy center and the side airbag sensor assy LH.

NG → **CONNECT CONNECTORS, THEN GO TO STEP 1**

OK

3 CHECK FLOOR WIRE NO.2(OPEN)



(a) Disconnect the connectors from the airbag sensor assy center and the side airbag sensor assy LH.

(b) Using SST, connect S16-4 (VUPL) and S16-1 (ESL), and connect S16-3 (SSL+) and S16-2 (SSL-) of connector "C".
SST 09843 - 18040

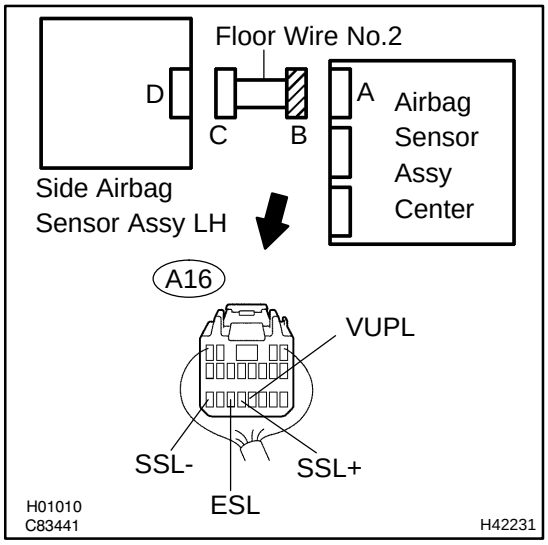
(c) Measure the resistance according to the value(s) in the table below.
Standard:

Tester connection	Condition	Specified condition
A16-16 (VUPL) - A16-18 (ESL)	Always	Below 1 Ω
A16-17 (SSL+) - A16-20 (SSL-)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE FLOOR WIRE NO.2**

OK

4 CHECK FLOOR WIRE NO.2(TO GROUND)



(a) Disconnect the SST from connector "C"

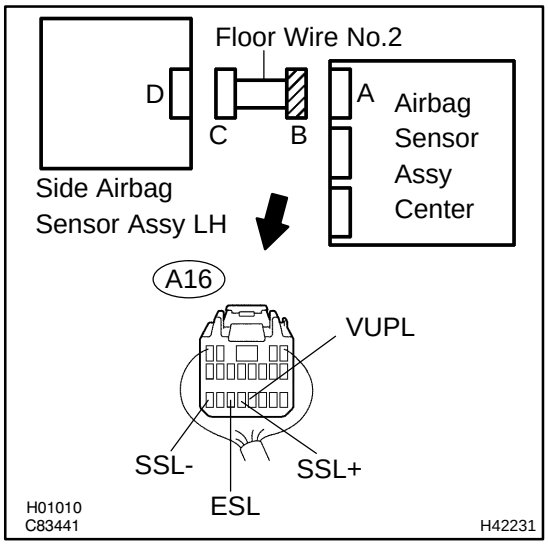
(b) Measure the resistance according to the value(s) in the table below.
Standard:

Tester connection	Condition	Specified condition
A16-16 (VUPL) - Body ground	Always	1 MΩ or Higher
A16-18 (ESL) - Body ground	Always	1 MΩ or Higher
A16-17 (SSL+) - Body ground	Always	1 MΩ or Higher
A16-20 (SSL-) - Body ground	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FLOOR WIRE NO.2**

OK

5 CHECK FLOOR WIRE NO.2(TO B+)



(a) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(b) Turn the ignition switch to the ON position.
(c) Measure the voltage according to the value(s) in the table below.

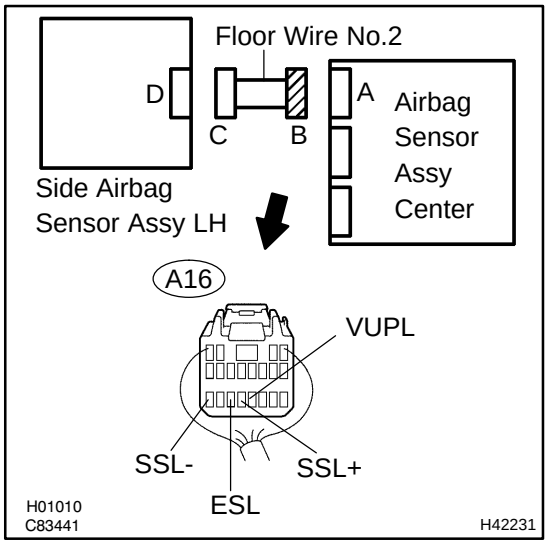
Standard:

Tester connection	Condition	Specified condition
A16-16 (VUPL) - Body ground	Ignition switch ON	Below 1 V
A16-18 (ESL) - Body ground	Ignition switch ON	Below 1 V
A16-17 (SSL+) - Body ground	Ignition switch ON	Below 1 V
A16-20 (SSL-) - Body ground	Ignition switch ON	Below 1 V

NG → **REPAIR OR REPLACE FLOOR WIRE NO.2**

OK

6 CHECK FLOOR WIRE NO.2(SHORT)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Measure the resistance according to the value(s) in the table below.

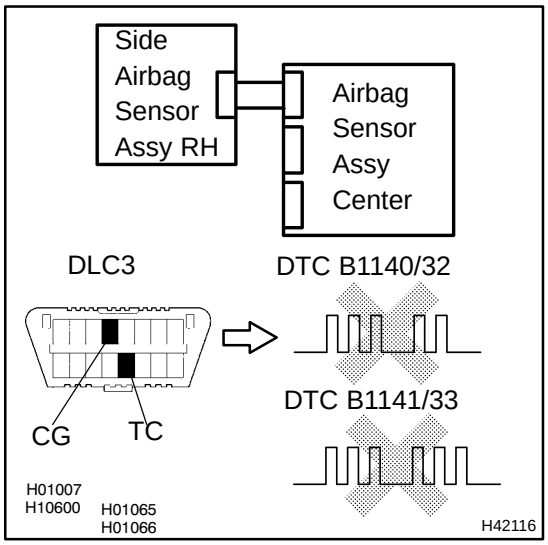
Standard:

Tester connection	Condition	Specified condition
A16-16 (VUPL) - A16-18 (ESL)	Always	1 MΩ or Higher
A16-17 (SSL+) - A16-20 (SSL-)	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FLOOR WIRE NO.2**

OK

7	CHECK DTC



(a) Connect the airbag sensor assy center connector.
(b) Interchange the side airbag sensor assy RH with LH and connect the connectors to them.
(c) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Clear the DTCs stored in memory (see page 05-1215).
(f) Turn the ignition switch to the LOCK position.
(g) Turn the ignition switch to the ON position, and wait at for least 60 seconds.
(h) Check the DTC (see page 05-1215).

Result:

NG: A	DTC B1140/32 is output.
NG: B	DTC B1141/33 is output.
OK	DTC B1140/32 and B1141/33 are not output.

NG:A → **REPLACE SIDE AIR BAG SENSOR ASSY LH (SEE PAGE 60-57)**

NG:B → **REPLACE AIR BAG SENSOR ASSY CENTER (SEE PAGE 60-53)**

OK

USE SIMULATION METHOD TO CHECK

DTC	B1148/36	FRONT AIRBAG SENSOR (RH) MALFUNCTION

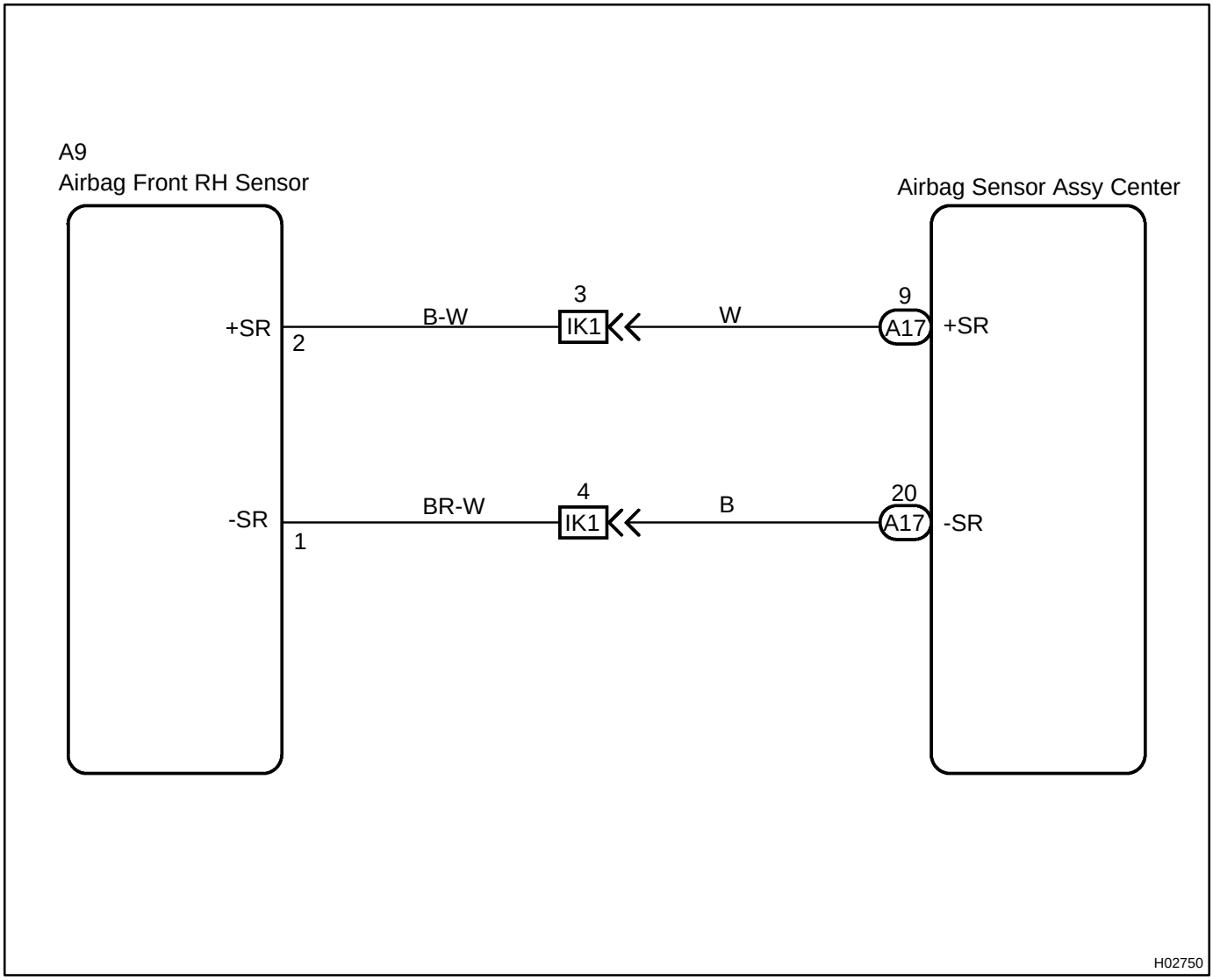
CIRCUIT DESCRIPTION

The airbag front RH sensor circuit consists of the diagnostic circuit and the frontal deceleration sensor, etc. If the airbag sensor assy center receives signals from the frontal deceleration sensor, it judges whether or not the SRS should be activated.

DTC B1148/36 is recorded when a malfunction in the airbag front RH sensor is detected.

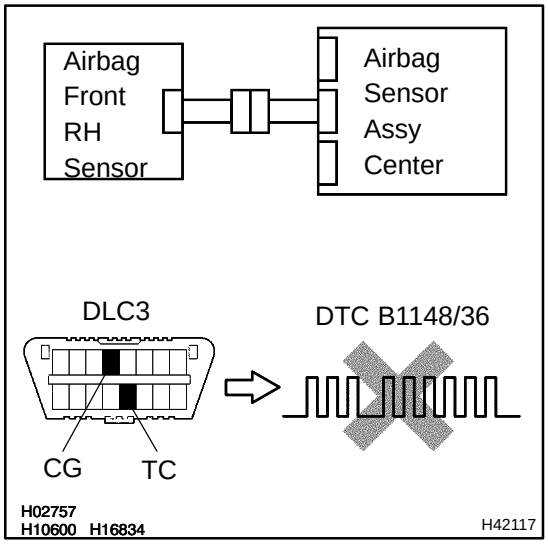
DTC No.	DTC Detecting Condition	Trouble Area
B1148/36	・Short circuit in front airbag sensor RH wire harness (to B+) ・Short circuit in front airbag sensor RH wire harness (to ground) ・Open circuit in +SR wire harness or -SL wire harness of front airbag sensor RH ・Airbag front RH sensor malfunction ・Airbag sensor assy center malfunction	・Airbag front RH sensor ・Airbag sensor assy center ・Cowl wire ・Engine room main wire

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK DTC



(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(b) Clear the DTCs stored in memory (see page 05-1215).
(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Check the DTCs (see page 05-1215).
OK:
DTC B1148/36 is not output.

HINT:
Codes other than code B1148/36 may be output at this time, but they are not related to this check.

NG → **Go to step 2**

OK

USE SIMULATION METHOD TO CHECK

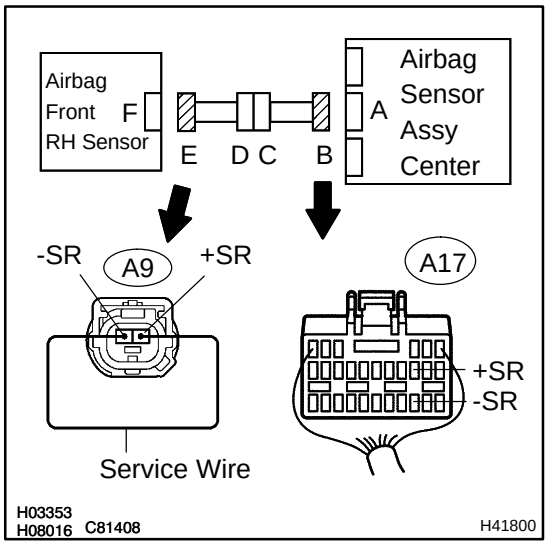
2	CHECK CONNECTION OF CONNECTORS

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Check that the connectors are properly connected to the airbag sensor assy center and the airbag front RH sensor.
OK:
The connectors are connected.

NG → **CONNECT CONNECTORS, THEN GO TO STEP 1**

OK

3 CHECK FRONT AIRBAG SENSOR (RH) CIRCUIT (OPEN)



(a) Disconnect the connectors from the airbag sensor assy center and the airbag front RH sensor.
(b) Using a service wire, connect A9-2 (+SR) and A9-1 (-SR) of connector "E".

NOTICE:
Do not forcibly insert a service wire into the terminals of the connector when connecting.

(c) Measure the resistance according to the value(s) in the table below.

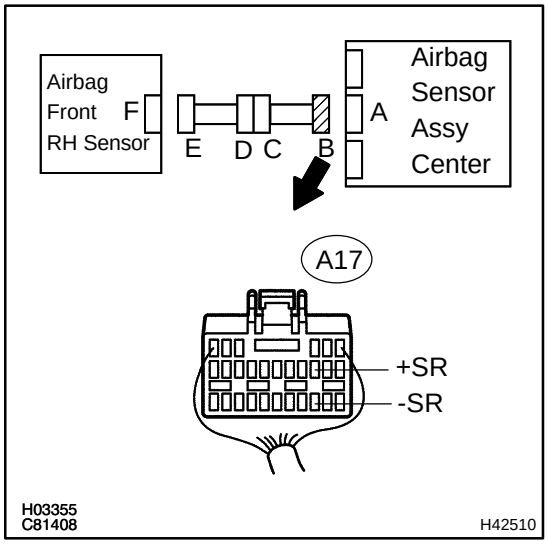
Standard:

Tester connection	Condition	Specified condition
A17-9 (+SR) - A17-20 (-SR)	Always	Below 1 Ω

NG → **Go to step 8**

OK

4 CHECK FRONT AIRBAG SENSOR (RH) CIRCUIT (TO B+)



(a) Disconnect the service wire from connector "E".
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the ignition switch to the ON position.
(d) Measure the voltage according to the value(s) in the table below.

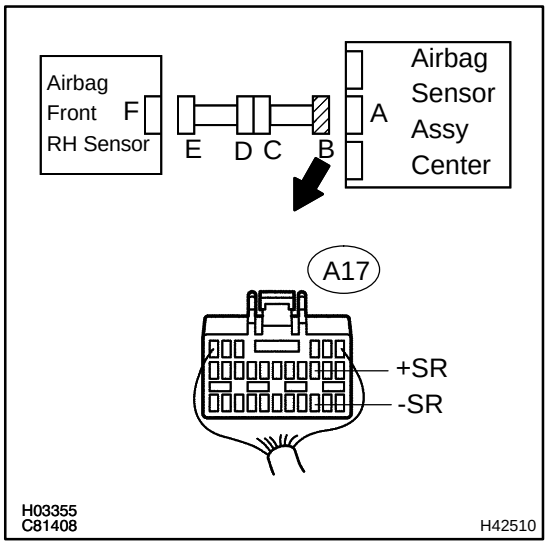
Standard:

Tester connection	Condition	Specified condition
A17-9 (+SR) - Body ground	Ignition switch ON	Below 1 V
A17-20 (-SR) - Body ground	Ignition switch ON	Below 1 V

NG → **Go to step 9**

OK

5 CHECK FRONT AIRBAG SENSOR (RH) CIRCUIT (TO GROUND)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Measure the resistance according to the value(s) in the table below.

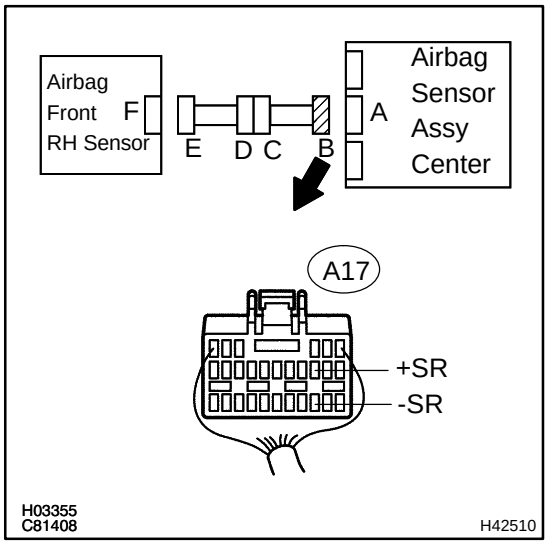
Standard:

Tester connection	Condition	Specified condition
A17-9 (+SR) - Body ground	Always	1 MΩ or Higher
A17-20 (-SR) - Body ground	Always	1 MΩ or Higher

NG → **Go to step 10**

OK

6 CHECK FRONT AIRBAG SENSOR (RH) CIRCUIT (SHORT)



(a) Measure the resistance according to the value(s) in the table below.

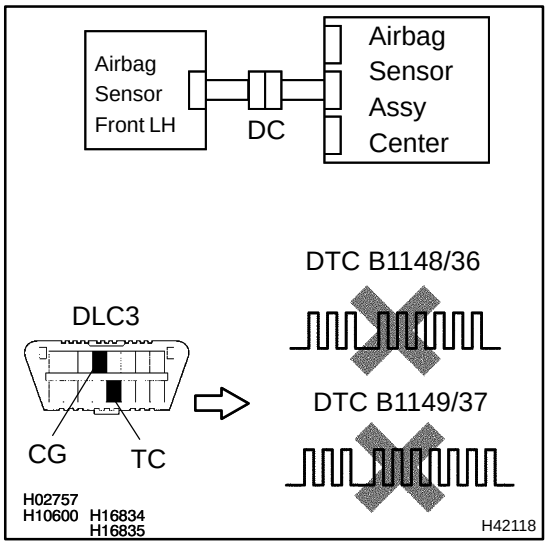
Standard:

Tester connection	Condition	Specified condition
A17-9 (+SR) - A17-20 (-SR)	Always	1 MΩ or Higher

NG → **Go to step 11**

OK

7 CHECK AIR BAG FRONT RH SENSOR



(a) Connect the connector to the airbag sensor assy center.
(b) Interchange the airbag front RH sensor with the airbag sensor front LH and connect the connectors to them.
(c) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Clear the DTCs stored in memory (see page 05-1215).
(f) Turn the ignition switch to the LOCK position.
(g) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(h) Check the DTCs (see page 05-1215).

Result:

NG: A	DTC B1149/37 is output.
NG: B	DTC B1148/36 is output.
OK	DTC B1148/36 and B1149/37 are not output.

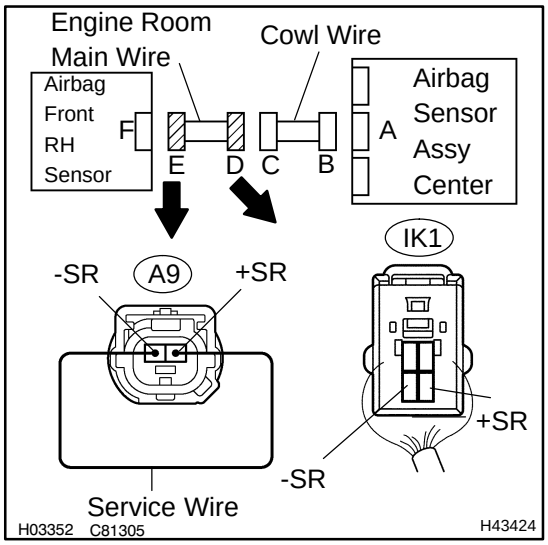
NG:A → **REPLACE AIR BAG SENSOR FRONT RH (SEE PAGE 60-55)**

NG:B → **REPLACE AIR BAG SENSOR ASSY CENTER (SEE PAGE 60-53)**

OK

USE SIMULATION METHOD TO CHECK

8 CHECK ENGINE ROOM MAIN WIRE(OPEN)



(a) Disconnect the engine room main wire connector from the cowl wire.

HINT:

Connector "E" has already been inserted into the service wire.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

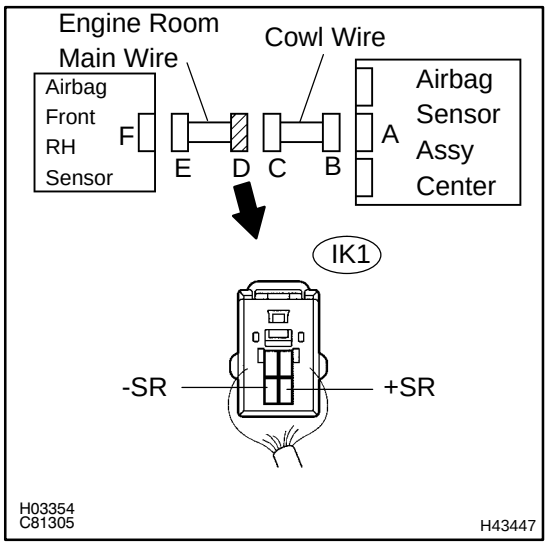
Tester connection	Condition	Specified condition
IK1-3 (+SR) - IK1-4 (-SR)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE ENGINE ROOM MAIN WIRE**

OK

REPAIR OR REPLACE COWL WIRE

9 CHECK ENGINE ROOM MAIN WIRE(TO B+)



(a) Turn the ignition switch to the LOCK position.

(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.

(c) Disconnect the engine room main wire connector from the cowl wire.

(d) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.

(e) Turn the ignition switch to the ON position.

(f) Measure the voltage according to the value(s) in the table below.

Standard:

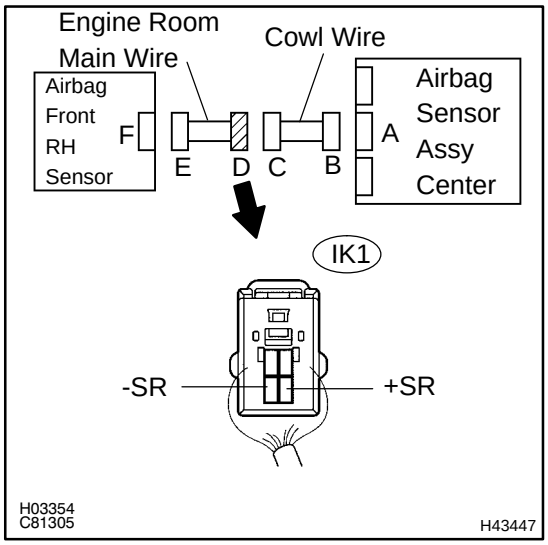
Tester connection	Condition	Specified condition
IK1-3 (+SR) - Body ground	Ignition switch ON	Below 1 V
IK1-4 (-SR) - Body ground	Ignition switch ON	Below 1 V

NG → **REPAIR OR REPLACE ENGINE ROOM MAIN WIRE**

OK

REPAIR OR REPLACE COWL WIRE

10 CHECK ENGINE ROOM MAIN WIRE(TO GROUND)



(a) Disconnect the engine room main wire connector from the cowl wire.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

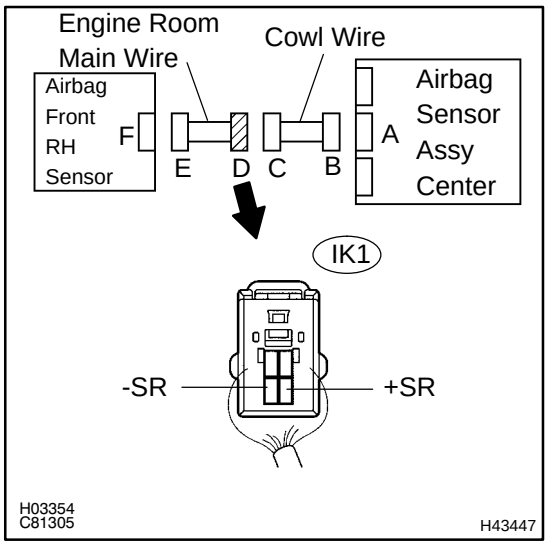
Tester connection	Condition	Specified condition
IK1-3 (+SR) - Body ground	Always	1 MΩ or Higher
IK1-4 (-SR) - Body ground	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE ENGINE ROOM MAIN WIRE**

OK

REPAIR OR REPLACE COWL WIRE

11 CHECK ENGINE ROOM MAIN WIRE(SHORT)



(a) Disconnect the engine room main wire connector from the cowl wire.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
IK1-3 (+SR) - IK1-4 (-SR)	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE ENGINE ROOM MAIN WIRE**

OK

REPAIR OR REPLACE COWL WIRE

DTC	B1149/37	FRONT AIRBAG SENSOR (LH) MALFUNCTION

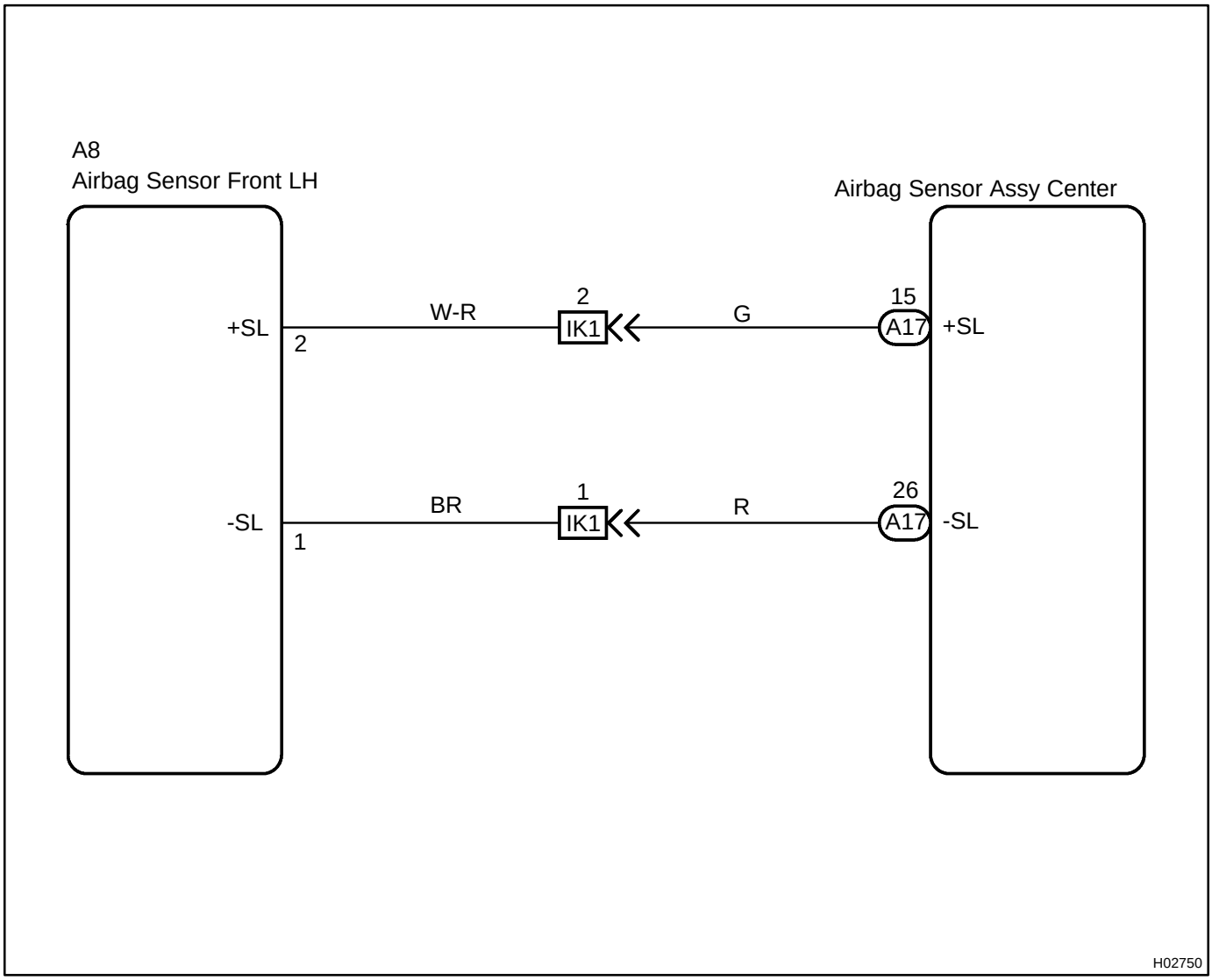
CIRCUIT DESCRIPTION

The airbag sensor front LH circuit consists of the diagnostic circuit and the frontal deceleration sensor, etc. If the airbag sensor assy center receives signals from the frontal deceleration sensor, it judges whether or not the SRS should be activated.

DTC B1149/37 is recorded when a malfunction is detected in the airbag sensor front LH circuit.

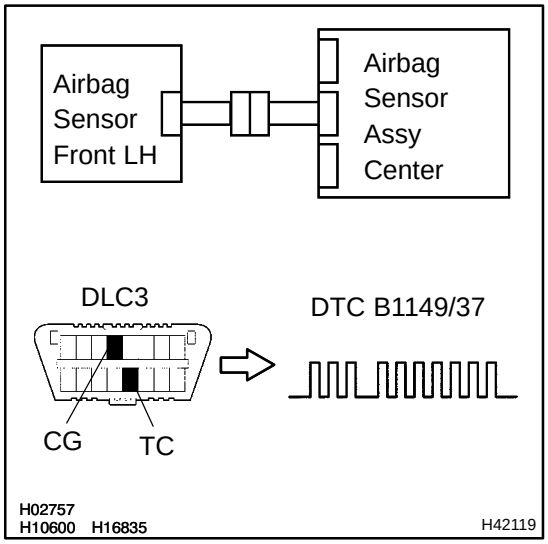
DTC No.	DTC Detecting Condition	Trouble Area
B1149/37	・Short circuit in front airbag sensor LH wire harness (to B+) ・Short circuit in front airbag sensor LH wire harness (to ground) ・Open circuit in +SL wire harness or -SL wire harness of front airbag sensor LH ・Airbag sensor front LH malfunction ・Airbag sensor assy center malfunction	・Airbag sensor front LH ・Airbag sensor assy center ・Cowl wire ・Engine room main wire

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK DTC



(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(b) Clear the DTCs stored in memory (see page 05-1215).
(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Check the DTCs (see page 05-1215).
OK:
DTC B1149/37 is not output.

HINT:
Codes other than code B1149/37 may be output at this time, but they are not related to this check.

NG → **Go to step 2**

OK

USE SIMULATION METHOD TO CHECK

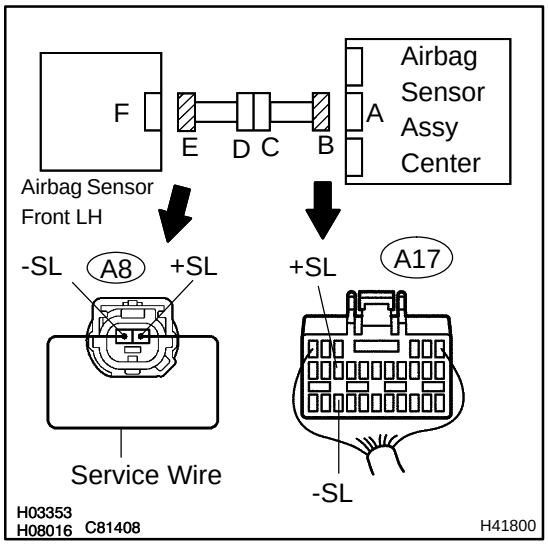
2	CHECK CONNECTION OF CONNECTORS

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Check that the connector is properly connected to the airbag sensor assy center and the airbag sensor front LH.
OK:
The connectors are connected.

NG → **CONNECT CONNECTORS, THEN GO TO STEP 1**

OK

3 CHECK FRONT AIRBAG SENSOR (LH) CIRCUIT (OPEN)



(a) Disconnect the connectors from the airbag sensor assy center and the airbag sensor front LH.

(b) Using a service wire, connect A8-2 (+SL) and A8-1 (-SL) of connector "E".

NOTICE:

Do not forcibly insert a service wire into the terminals of the connector when connecting.

(c) Measure the resistance according to the value(s) in the table below.

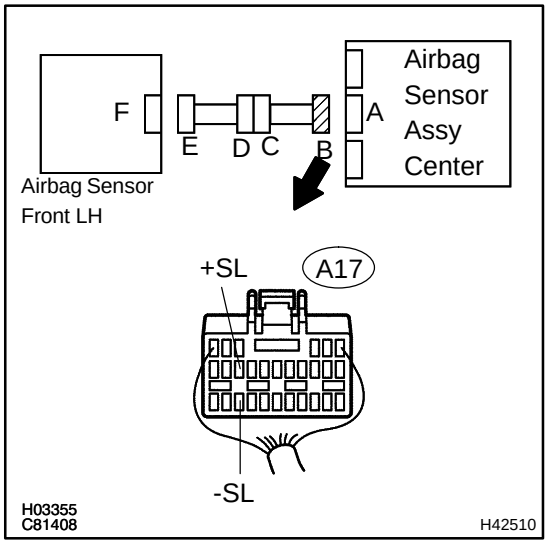
Standard:

Tester connection	Condition	Specified condition
A17-15 (+SL) - A17-26 (-SL)	Always	Below 1 Ω

NG → **Go to step 8**

OK

4 CHECK FRONT AIRBAG SENSOR (LH) CIRCUIT (TO B+)



(a) Disconnect the service wire from connector "E".

(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.

(c) Turn the ignition switch to the ON position.

(d) Measure the voltage according to the value(s) in the table below.

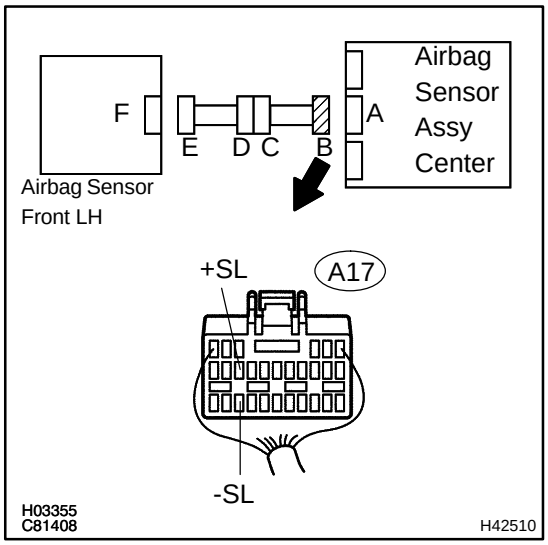
Standard:

Tester connection	Condition	Specified condition
A17-15 (+SL) - Body ground	Ignition switch ON	Below 1 V
A17-26 (-SL) - Body ground	Ignition switch ON	Below 1 V

NG → **Go to step 9**

OK

5 CHECK FRONT AIRBAG SENSOR (LH) CIRCUIT (TO GROUND)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Measure the resistance according to the value(s) in the table below.

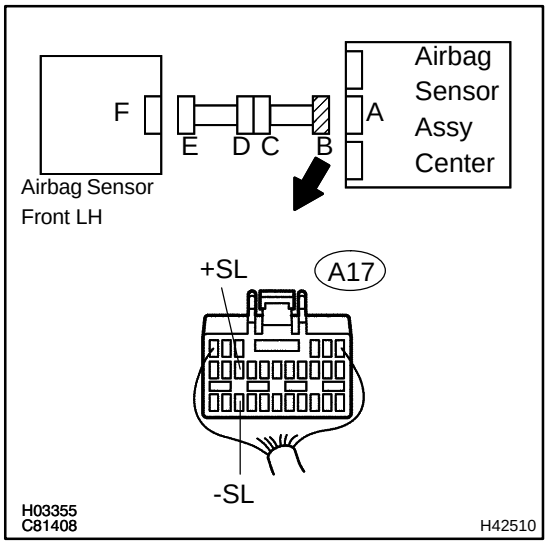
Standard:

Tester connection	Condition	Specified condition
A17-15 (+SL) - Body ground	Always	1 MΩ or Higher
A17-26 (-SL) - Body ground	Always	1 MΩ or Higher

NG → **Go to step 10**

OK

6 CHECK FRONT AIRBAG SENSOR (LH) CIRCUIT (SHORT)



(a) Measure the resistance according to the value(s) in the table below.

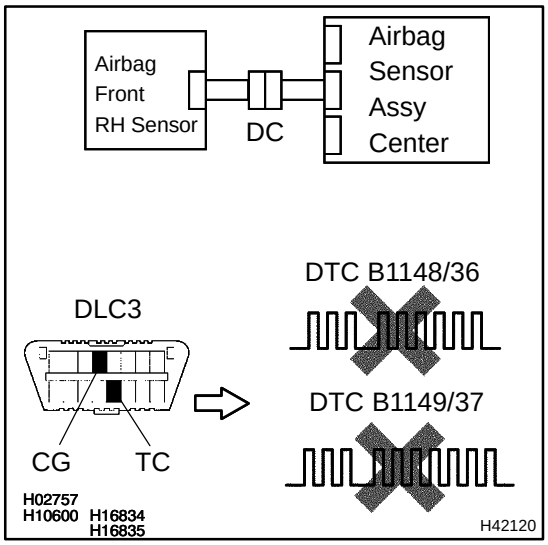
Standard:

Tester connection	Condition	Specified condition
A17-15 (+SL) - A17-26 (-SL)	Always	1 MΩ or Higher

NG → **Go to step 11**

OK

7 CHECK AIR BAG SENSOR FRONT LH



(a) Connect the connector to the airbag sensor assy center.
(b) Interchange the airbag front sensor RH with the airbag sensor front LH and connect the connectors to them.
(c) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Clear the DTCs stored in memory (see page 05-1215).
(f) Turn the ignition switch to the LOCK position.
(g) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(h) Check the DTCs (see page 05-1215).

Result:

NG: A	DTC B1149/37 is output.
NG: B	DTC B1148/36 is output.
OK	DTC B1148/36 and B1149/37 are not output.

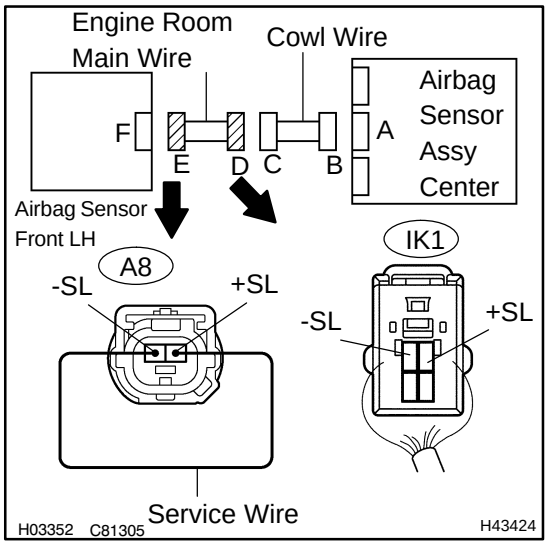
NG:A → **REPLACE AIR BAG SENSOR ASSY CENTER (SEE PAGE 60-53)**

NG:B → **REPLACE AIR BAG SENSOR FRONT LH (SEE PAGE 60-55)**

OK

USE SIMULATION METHOD TO CHECK

8 CHECK ENGINE ROOM MAIN WIRE(OPEN)



(a) Disconnect the engine room main wire connector from the cowl wire.

HINT:

Connector "E" has already been inserted into the service wire.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

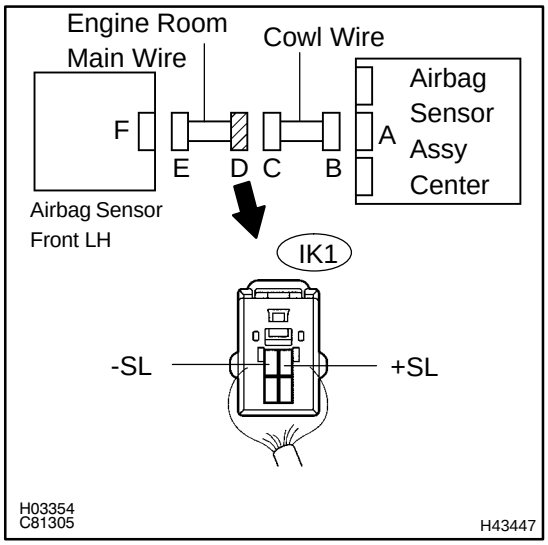
Tester connection	Condition	Specified condition
IK1-1 (-SL) - IK1-2 (+SL)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE ENGINE ROOM MAIN WIRE**

OK

REPAIR OR REPLACE COWL WIRE

9 CHECK ENGINE ROOM MAIN WIRE(TO B+)



(a) Turn the ignition switch to the LOCK position.

(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.

(c) Disconnect the engine room main wire connector from the cowl wire.

(d) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.

(e) Turn the ignition switch to the ON position.

(f) Measure the voltage according to the value(s) in the table below.

Standard:

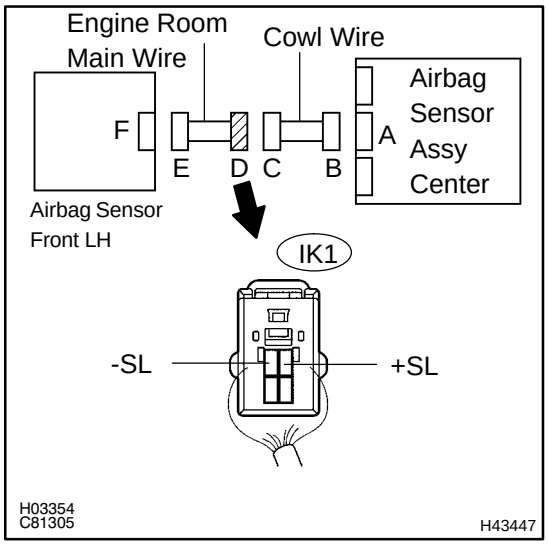
Tester connection	Condition	Specified condition
IK1-1 (-SL) - Body ground	Ignition switch ON	Below 1 V
IK1-2 (+SL) - Body ground	Ignition switch ON	Below 1 V

NG → **REPAIR OR REPLACE ENGINE ROOM MAIN WIRE**

OK

REPAIR OR REPLACE COWL WIRE

10 CHECK ENGINE ROOM MAIN WIRE(TO GROUND)



(a) Disconnect the engine room main wire connector from the cowl wire.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

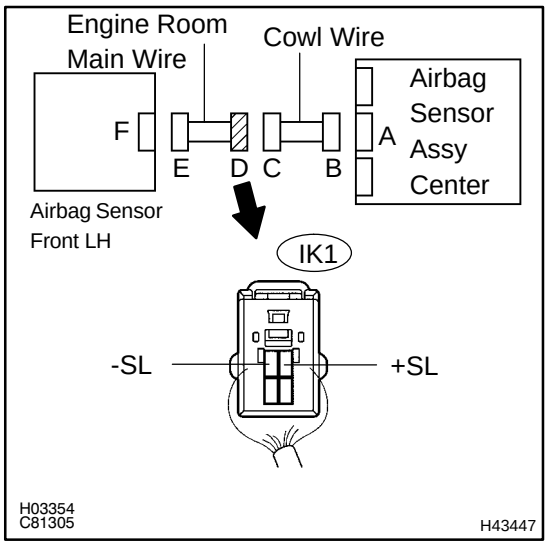
Tester connection	Condition	Specified condition
IK1-1 (-SL) - Body ground	Always	1 MΩ or Higher
IK1-2 (+SL) - Body ground	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE ENGINE ROOM MAIN WIRE**

OK

REPAIR OR REPLACE COWL WIRE

11 CHECK ENGINE ROOM MAIN WIRE(SHORT)



(a) Disconnect the engine room main wire connector from the cowl wire.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
IK1-1 (-SL) - IK1-2 (+SL)	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE ENGINE ROOM MAIN WIRE**

OK

REPAIR OR REPLACE COWL WIRE

DTC	B1150/23	OCCUPANT CLASSIFICATION SYSTEM MALFUNCTION

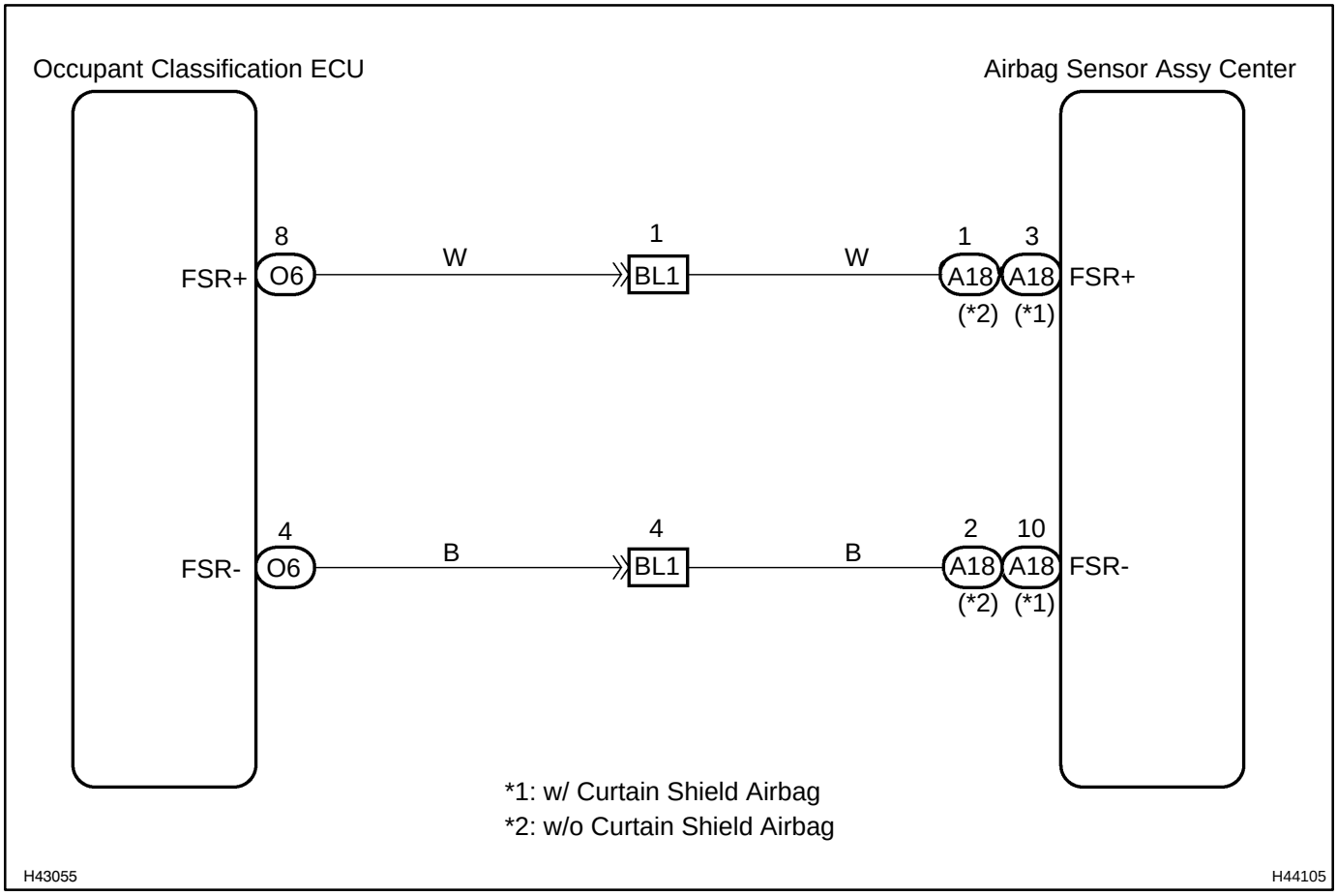
CIRCUIT DESCRIPTION

The occupant classification system circuit consists of the airbag sensor assy center and the occupant classification system.

DTC B1150/23 is recorded when a malfunction is detected in the occupant classification system circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1150/23	・Occupant classification system malfunction	・Floor wire ・Front seat wire RH ・Occupant classification ECU ・Airbag sensor assy center

WIRING DIAGRAM



INSPECTION PROCEDURE

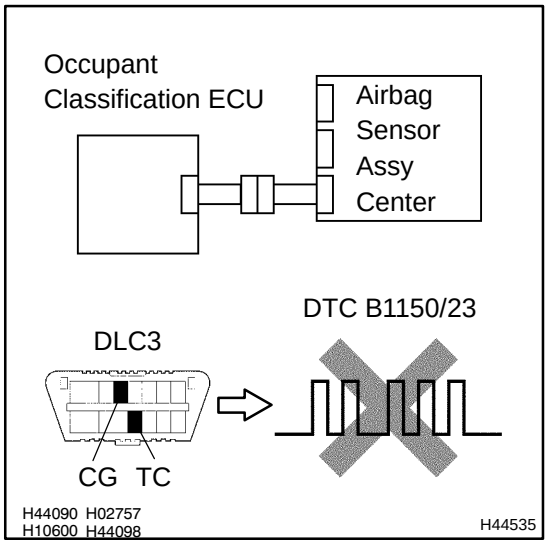
1 CHECK DTC(OCCUPANT CLASSIFICATION ECU)

(a) Turn the ignition switch to the ON position, and wait for at least 10 seconds.
(b) Using the hand-held tester, check the DTCs of the occupant classification ECU (see page 05-1215).
OK:
DTC is not output.

NG → **GO TO INSPECTION PROCEDURE OF DTC OUTPUT**

OK

2 CHECK DTC (AIRBAG SENSOR ASSY CENTER)



(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(b) Clear the DTCs stored in memory (see page 05-1215).
(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Check the DTCs (see page 05-1215).
OK:
DTC B1150/23 is not output.

HINT:
Codes other than code B1150/23 may be output at this time, but they are not related to this check.

NG → **Go to step 3**

OK

USE SIMULATION METHOD TO CHECK

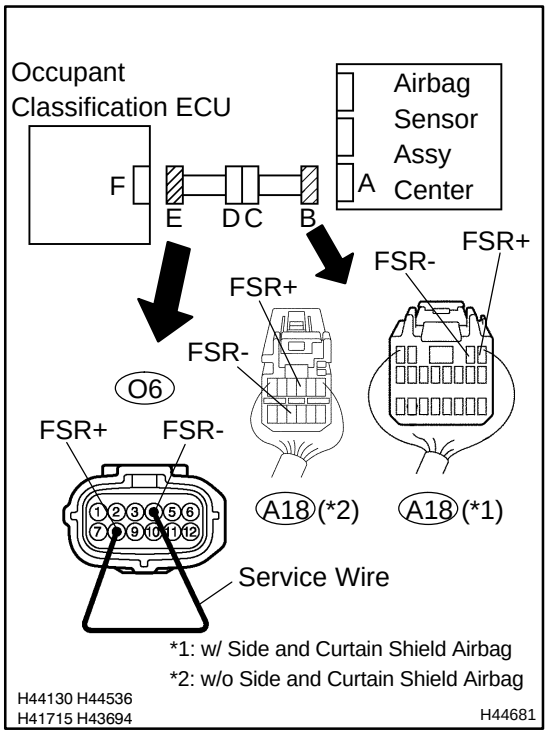
3 CHECK CONNECTION OF CONNECTORS

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Check that the connectors are properly connected to the airbag sensor assy center and the occupant classification ECU.
OK:
The connectors are connected.

NG → **CONNECT CONNECTORS, THEN GO TO STEP 1**

OK

4 CHECK OCCUPANT CLASSIFICATION ECU CIRCUIT(OPEN)



(a) Disconnect the connectors from the airbag sensor assy center and the occupant classification ECU.

(b) Using a service wire, connect O6-8 (FSR+) and O6-4 (FSR-) of connector "E".

NOTICE:

Do not forcibly insert a service wire into the terminals of the connector when connecting.

(c) Measure the resistance according to the value(s) in the table below.

Standard:

w/ Side and curtain shield airbag:

Tester connection	Condition	Specified condition
A18-3 (FSR+) - A18-10 (FSR-)	Always	Below 1 Ω

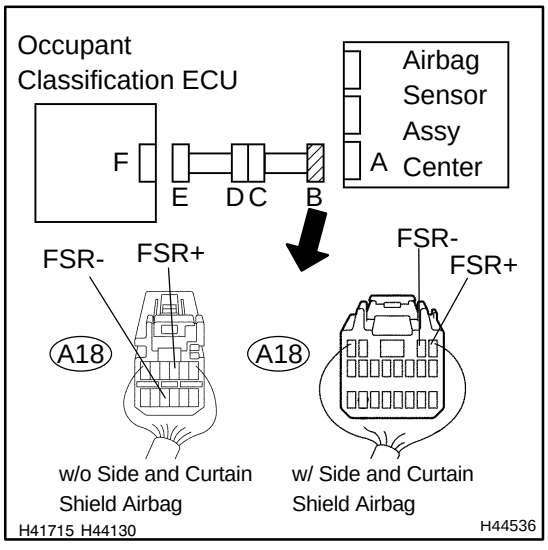
w/o Side and curtain shield airbag:

Tester connection	Condition	Specified condition
A18-1 (FSR+) - A18-2 (FSR-)	Always	Below 1 Ω

NG → **Go to step 8**

OK

5 CHECK OCCUPANT CLASSIFICATION ECU CIRCUIT (SHORT)



(a) Disconnect the service wire from connector "E".

(b) Measure the resistance according to the value(s) in the table below.

Standard:

w/ Side and curtain shield airbag:

Tester connection	Condition	Specified condition
A18-3 (FSR+) - A18-10 (FSR-)	Always	1 MΩ or Higher

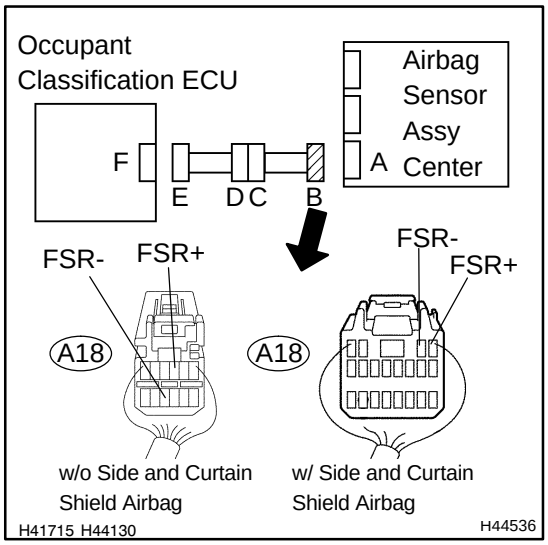
w/o Side and curtain shield airbag:

Tester connection	Condition	Specified condition
A18-1 (FSR+) - A18-2 (FSR-)	Always	1 MΩ or Higher

NG → **Go to step 9**

OK

6 CHECK OCCUPANT CLASSIFICATION ECU CIRCUIT (TO B+)



(a) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(b) Turn the ignition switch to the ON position.
(c) Measure the voltage according to the value(s) in the table below.

Standard:

w/ Side and curtain shield airbag:

Tester connection	Condition	Specified condition
A18-3 (FSR+) - Body ground	Ignition switch ON	Below 1 V
A18-10 (FSR-) - Body ground	Ignition switch ON	Below 1 V

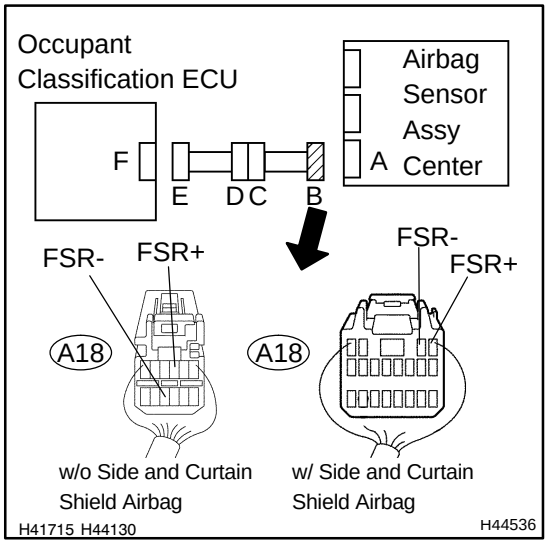
w/o Side and curtain shield airbag:

Tester connection	Condition	Specified condition
A18-1 (FSR+) - Body ground	Ignition switch ON	Below 1 V
A18-2 (FSR-) - Body ground	Ignition switch ON	Below 1 V

NG → **Go to step 10**

OK

7 CHECK OCCUPANT CLASSIFICATION ECU CIRCUIT (TO GROUND)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Measure the resistance according to the value(s) in the table below.

Standard:

w/ Side and curtain shield airbag:

Tester connection	Condition	Specified condition
A18-3 (FSR+) - Body ground	Always	1 MΩ or Higher
A18-10 (FSR-) - Body ground	Always	1 MΩ or Higher

w/o Side and curtain shield airbag:

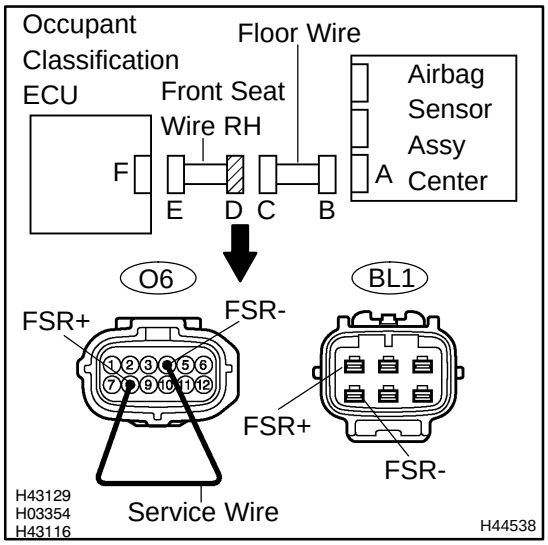
Tester connection	Condition	Specified condition
A18-1 (FSR+) - Body ground	Always	1 MΩ or Higher
A18-2 (FSR-) - Body ground	Always	1 MΩ or Higher

NG → **Go to step 11**

OK

REPLACE AIR BAG SENSOR ASSY CENTER (SEE PAGE 60-53)

8 CHECK FRONT SEAT WIRE RH(OPEN)



(a) Disconnect the front seat wire RH connector from the floor wire.

HINT:

Connector "E" has already been inserted into the service wire.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

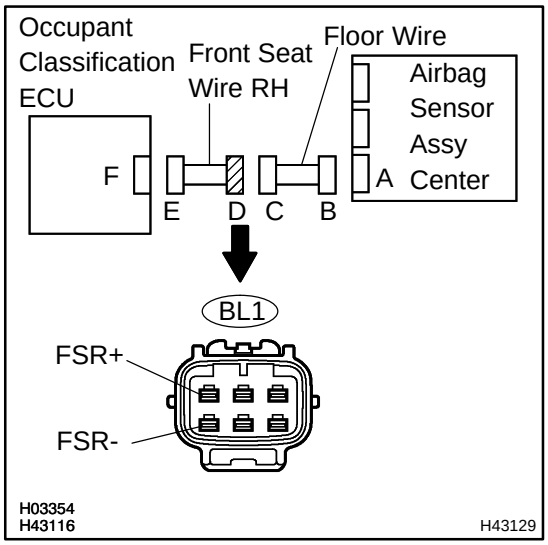
Tester connection	Condition	Specified condition
BL1-1 (FSR+) - BL1-4 (FSR-)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

REPAIR OR REPLACE FLOOR WIRE

9 CHECK FRONT SEAT WIRE RH(SHORT)



(a) Disconnect the front seat wire RH connector from the floor wire.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

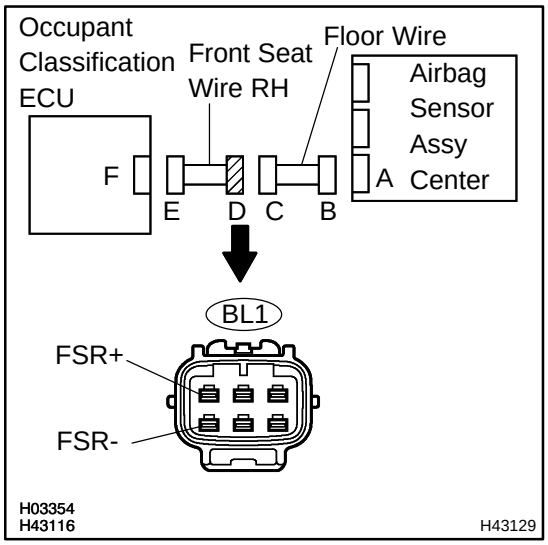
Tester connection	Condition	Specified condition
BL1-1 (FSR+) - BL1-4 (FSR-)	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

REPAIR OR REPLACE FLOOR WIRE

10 CHECK FRONT SEAT WIRE RH(TO B+)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from battery, and wait for at least 90 seconds.
(c) Disconnect the front seat wire RH connector from the floor wire.
(d) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(e) Turn the ignition switch to the ON position.
(f) Measure the voltage according to the value(s) in the table below.

Standard:

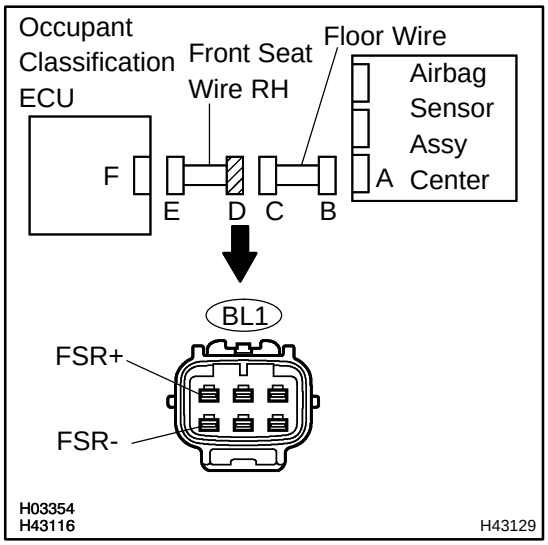
Tester connection	Condition	Specified condition
BL1-1 (FSR+) - Body ground	Ignition switch ON	Below 1 V
BL1-4 (FSR-) - Body ground	Ignition switch ON	Below 1 V

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

REPAIR OR REPLACE FLOOR WIRE

11 CHECK FRONT SEAT WIRE RH(TO GROUND)



(a) Disconnect the front seat wire RH connector from the floor wire.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
BL1-1 (FSR+) - Body ground	Always	1 MΩ or Higher
BL1-4 (FSR-) - Body ground	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

REPAIR OR REPLACE FLOOR WIRE

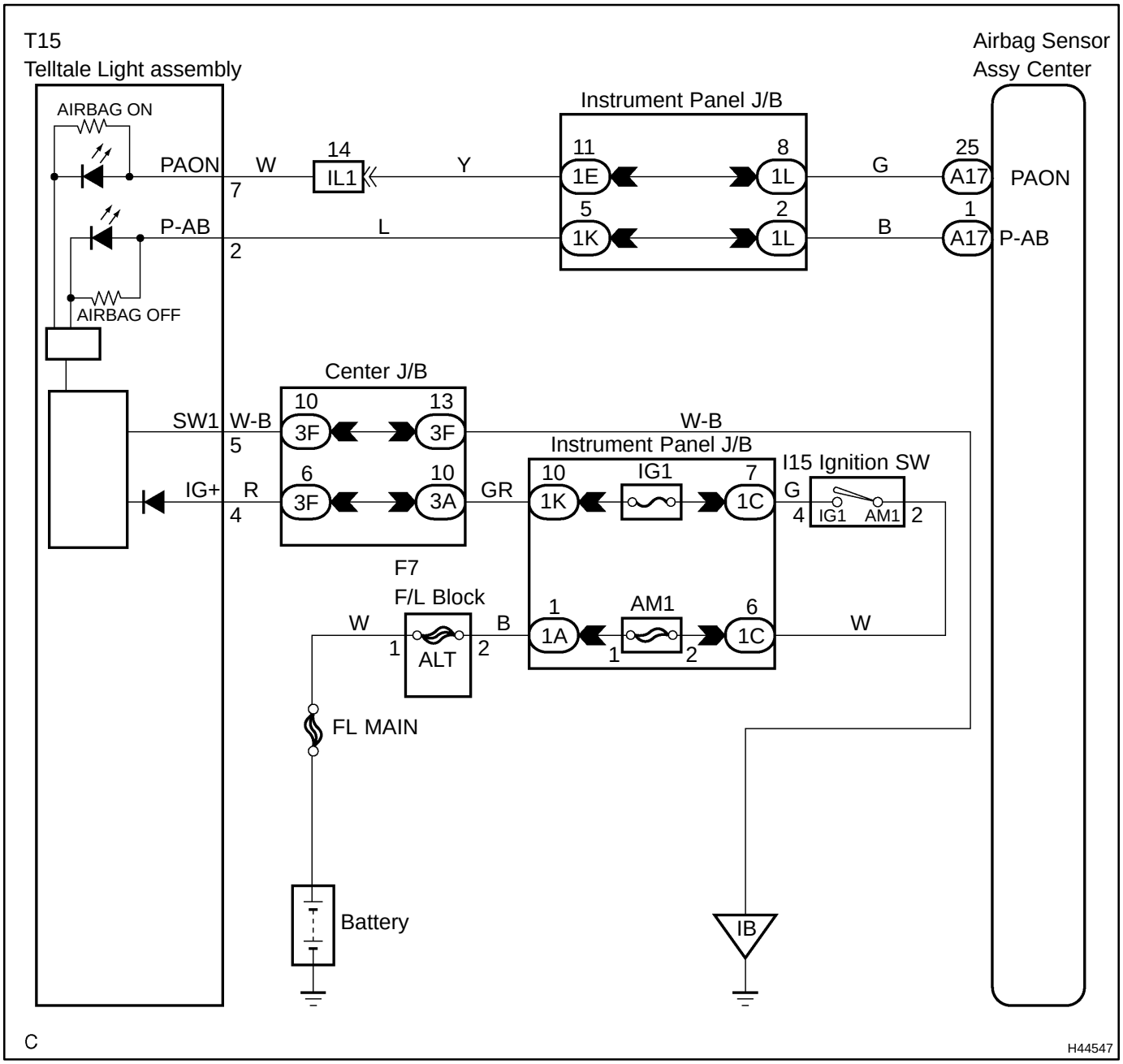
DTC	B1152/28	PASSENGER AIRBAG ON/OFF INDICATOR LIGHT CIRCUIT MALFUNCTION

CIRCUIT DESCRIPTION

The passenger airbag ON/OFF indicator light circuit consists of the airbag sensor assy center and the telltale lamp assy (passenger airbag ON/OFF indicator).
This circuit indicates the operation condition of the front passenger airbag assy and the front seat airbag assy RH and passenger side seat belt pretensioner.
DTC B1152/28 is recorded when a malfunction is detected in the passenger airbag ON/OFF indicator light circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1152/28	・When the airbag sensor assy center receives a line short signal, open signal, short to ground signal or B+ short signal in the passenger airbag ON/OFF indicator light circuit for 2 seconds. ・Telltale lamp assy malfunction ・Airbag sensor assy center malfunction	・Telltale lamp (Passenger airbag ON/OFF indicator) ・Airbag sensor assy center ・Cowl wire

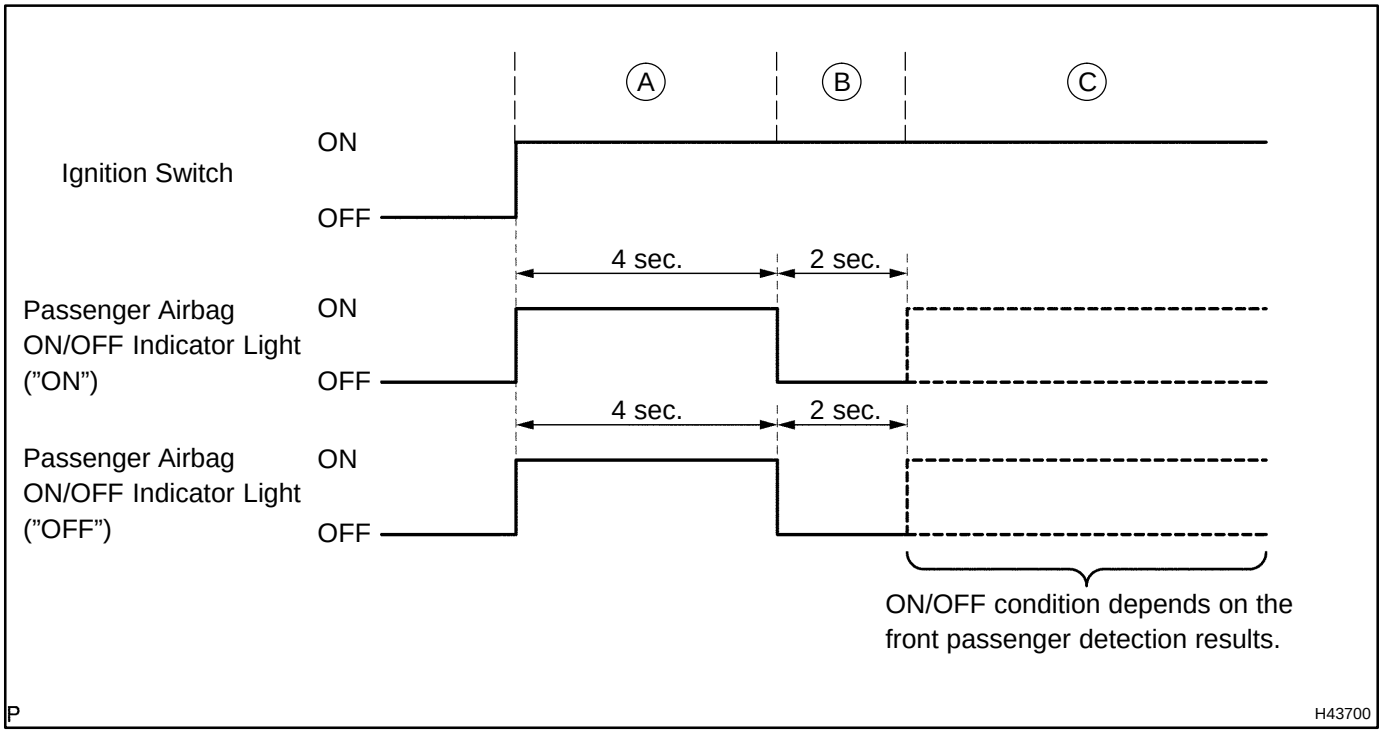
WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK PASSENGER AIRBAG ON/OFF INDICATOR LIGHT OPERATION

(a) Turn the ignition switch to the ON position.
(b) Check the passenger airbag ON/OFF indicator light operation.
HINT:
Refer to the normal condition of the passenger airbag ON/OFF indicator light (see page 05-1207).



Result:

A:

During period "A" in the illustration, even if both the "ON" and "OFF" passenger airbag ON/OFF indicator lights normally come on, both of them do not go off during period "B".

During periods "A" and "B" in the illustration, even if both the "ON" and "OFF" passenger airbag ON/OFF indicator lights normally come on, both of them come on during period "C".

B:

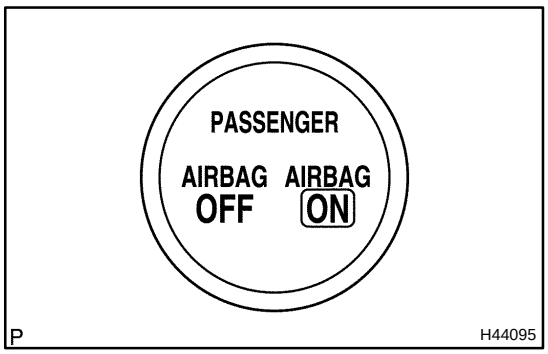
During period "A", neither the "ON" nor "OFF" passenger airbag ON/OFF indicator lights come on, or one of them does not come on.

During period "C", even if the front passenger seat is occupied, neither the "ON" nor "OFF" passenger airbag ON/OFF indicator lights come on.

B	Go to step 6

A

2	CHECK TELLTALE LAMP ASSY (PASSENGER AIRBAG ON/OFF INDICATOR LIGHT)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connector from the telltale lamp assy.
(d) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(e) Turn the ignition switch to the ON position.
(f) Check the passenger airbag ON/OFF indicator light operation.

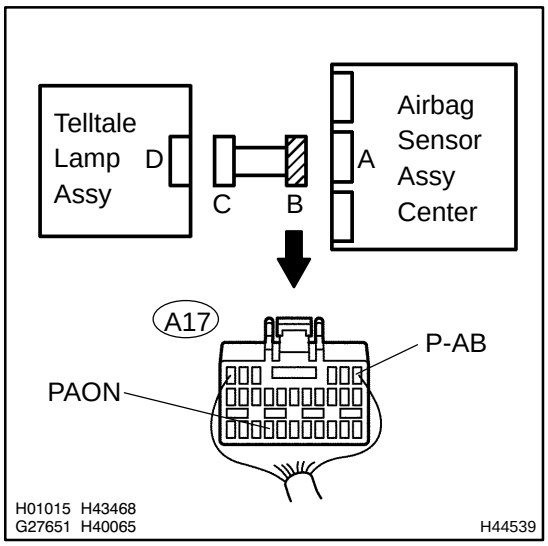
OK:

The passenger airbag ON/OFF indicator light (”ON” and ”OFF”) do not come on.

NG → **REPLACE TELLTALE LAMP ASSY (SEE PAGE 71-10)**

OK

3	CHECK WIRE HARNESS (TO GROUND)



(a) Measure the resistance according to the value(s) in the table below.

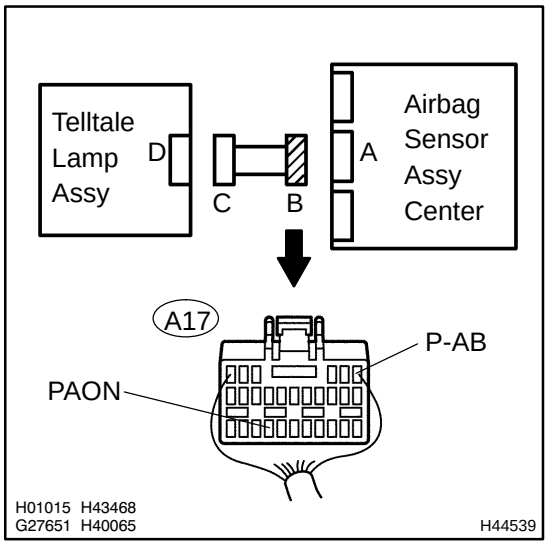
Standard:

Tester connection	Condition	Specified condition
A17-1 (P-AB) - Body ground	Always	1 MΩ or Higher
A17-25 (PAON) - Body ground	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE WIRE HARNESS**

OK

4 CHECK WIRE HARNESS (SHORT)



(a) Measure the resistance according to the value(s) in the table below.

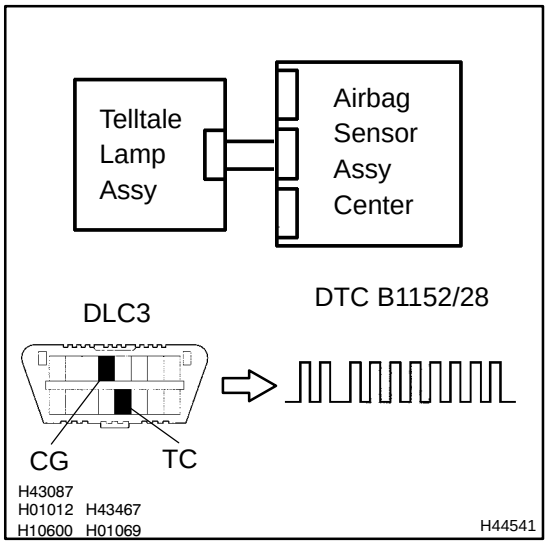
Standard:

Tester connection	Condition	Specified condition
A17-1 (P-AB) - A17-25 (PAON)	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE WIRE HARNESS**

OK

5 CHECK AIR BAG SENSOR ASSY CENTER



(a) Connect the connectors to the airbag sensor assy center.
(b) Connect the connector to the clock assy.
(c) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Clear the DTCs stored in memory (see page 05-1215).
(f) Turn the ignition switch to the LOCK position.
(g) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(h) Check the DTCs (see page 05-1215).

OK:

DTC B1152/28 is not output.

HINT:

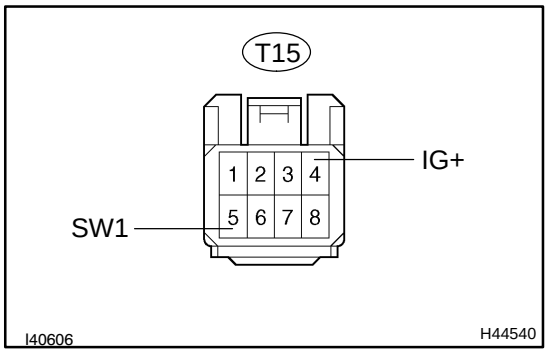
Codes other than code B1152/28 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG SENSOR ASSY CENTER (SEE PAGE 60-53)**

OK

USE SIMULATION METHOD TO CHECK

6 WIRE HARNESS (SOURCE VOLTAGE)



(a) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(b) Turn the ignition switch to the ON position.
(c) Measure the voltage and resistance according to the value(s) in the table below.

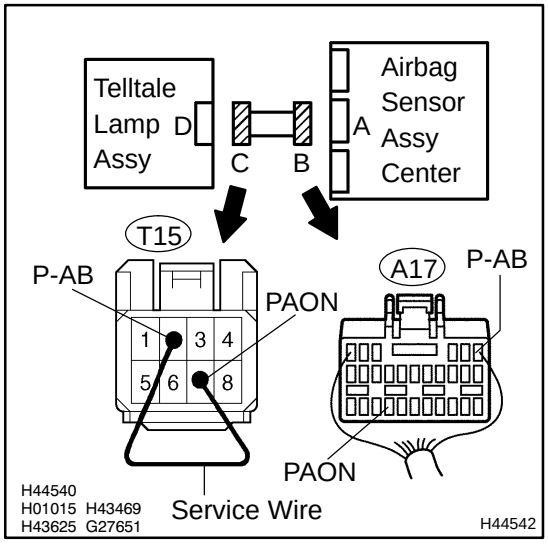
Standard:

Tester connection	Condition	Specified condition
T15-4 (IG+) - Body ground	Ignition switch ON	10 to 14 V
T15-5 (SW1) - Body ground	Always	Below 1 Ω

NG → **REPLACE TELLTALE LAMP ASSY OR WIRE HARNESS (TELLTALE LAMP ASSY - BATTERY) OR BATTERY**

OK

7 CHECK WIRE HARNESS (OPEN)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Using a service wire, connect T15-2 (P-AB) and T15-7 (PAON) of connector "C".

NOTICE:

Do not forcibly insert a service wire into the terminals of connector when connecting.

(d) Measure the resistance according to the value(s) in the table below.

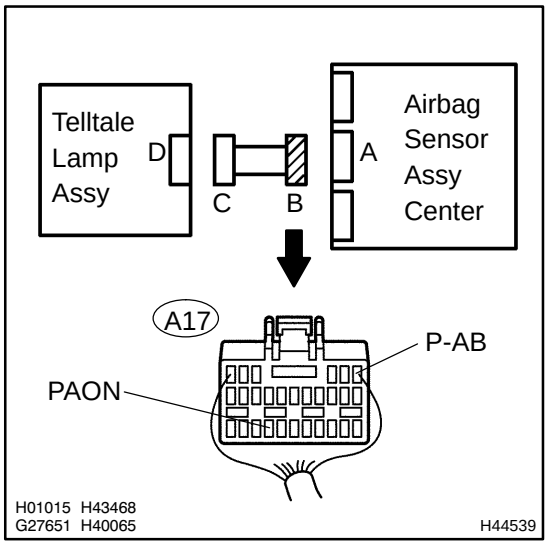
Standard:

Tester connection	Condition	Specified condition
A17-1 (P-AB) - A17-25 (PAON)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE WIRE HARNESS**

OK

8 CHECK WIRE HARNESS (TO B+)



(a) Disconnect the service wire from connector "C".
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the ignition switch to the ON position.
(d) Measure the voltage according to the value(s) in the table below.

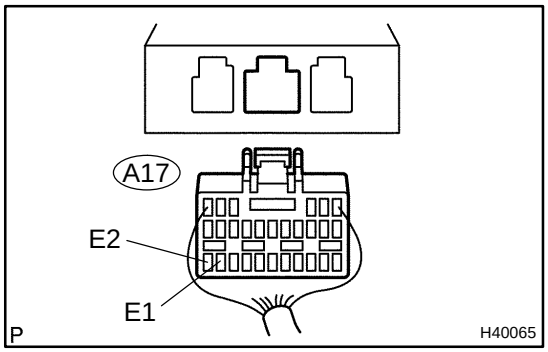
Standard:

Tester connection	Condition	Specified condition
A17-25 (PAON) - Body ground	Ignition switch ON	Below 1 V
A17-1 (P-AB) - Body ground	Ignition switch ON	Below 1 V

NG → **REPAIR OR REPLACE WIRE HARNESS**

OK

9 CHECK WIRE HARNESS (AIRBAG SENSOR ASSY CENTER - BODY GROUND)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Measure the resistance according to the value(s) in the table below.

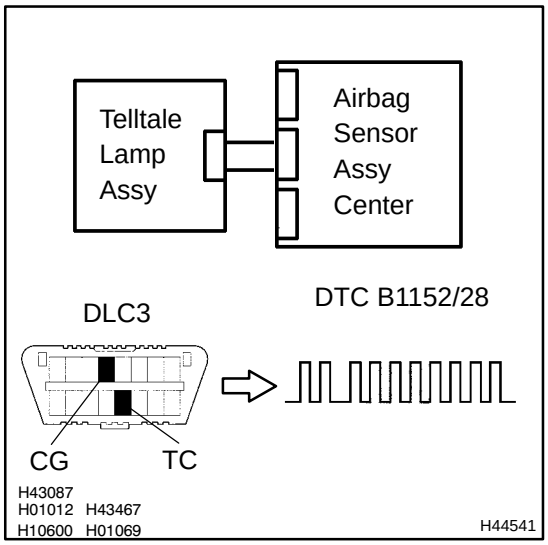
Standard:

Tester connection	Condition	Specified condition
A17-27 (E1) - Body ground	Always	Below 1 Ω
A17-28 (E2) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE WIRE HARNESS**

OK

10	CHECK AIR BAG SENSOR ASSY CENTER



(a) Connect the connectors to the airbag sensor assy center.
(b) Connect the connector to the clock assy.
(c) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Clear the DTCs stored in memory (see page 05-1215).
(f) Turn the ignition switch to the LOCK position.
(g) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(h) Check the DTCs (see page 05-1215).

OK:

DTC B1152/28 is not output.

HINT:

Codes other than code B1152/28 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG SENSOR ASSY CENTER (SEE PAGE 60-53)**

OK

USE SIMULATION METHOD TO CHECK

DTC B1153/25 SEAT POSITION AIRBAG SENSOR MALFUNCTION

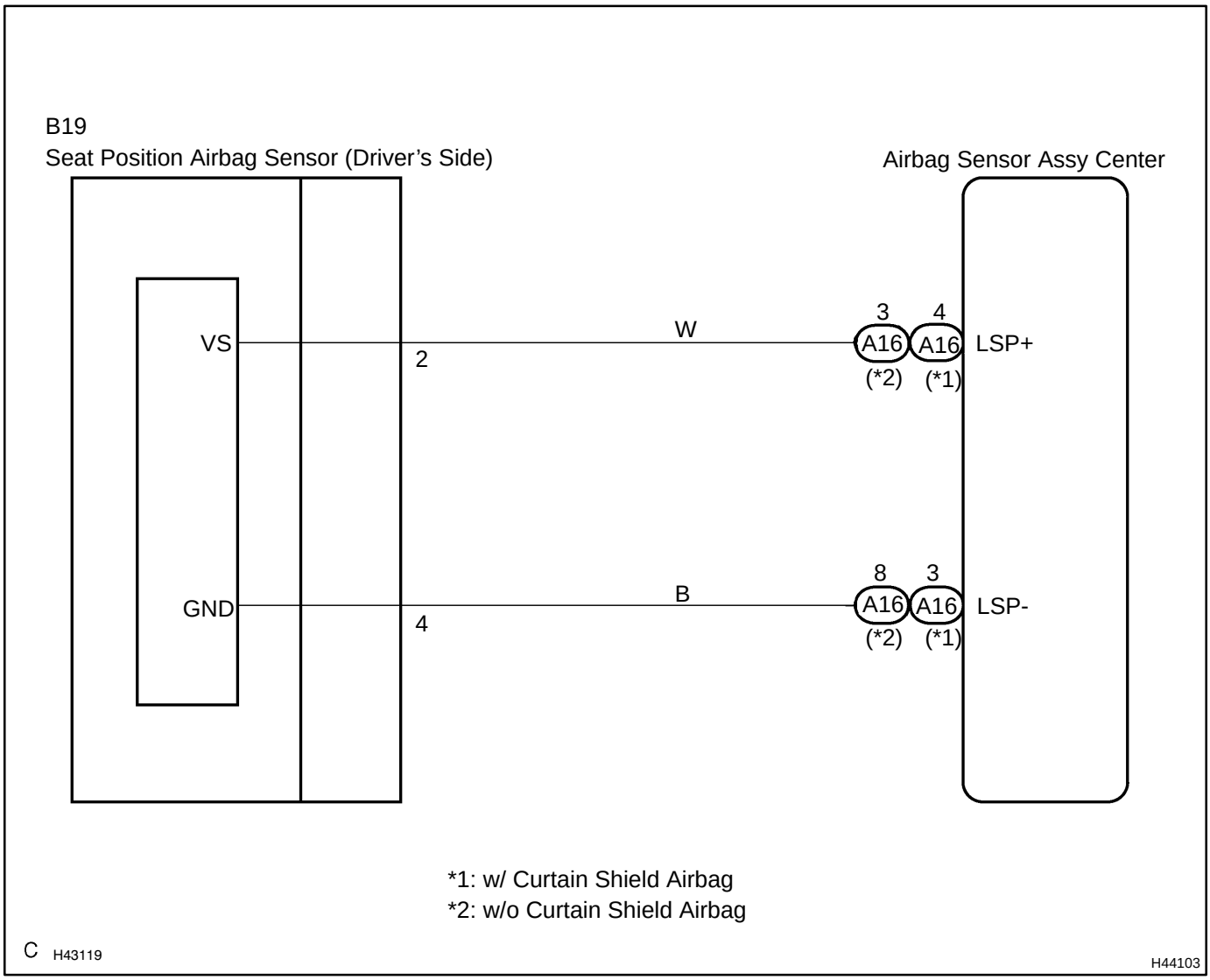
CIRCUIT DESCRIPTION

The seat position airbag sensor circuit consists of the airbag sensor assy center and the seat position airbag sensor.

DTC B1153/25 is recorded when a malfunction is detected in the seat position airbag sensor circuit.

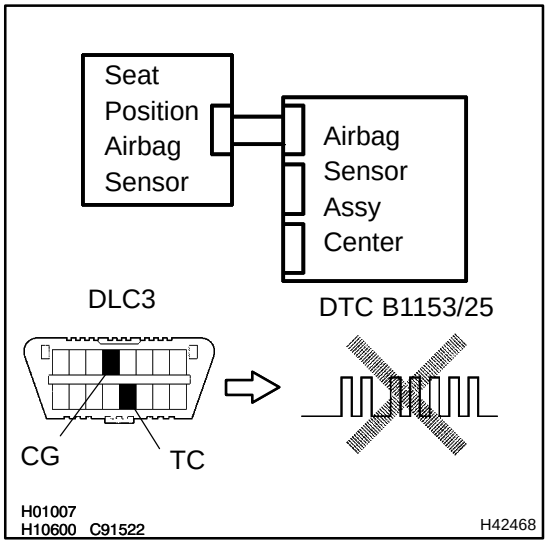
DTC No.	DTC Detecting Condition	Trouble Area
B1153/25	・Open circuit in LSP+ wire harness or LSP- wire harness of seat position airbag sensor ・Short circuit in seat position airbag sensor wire harness (to ground) ・Short circuit in seat position airbag sensor wire harness (to B+) ・Seat position airbag sensor malfunction ・Airbag sensor assy center malfunction	・Seat position airbag sensor ・Airbag sensor assy center ・Floor wire No.2

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK DTC



(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(b) Clear the DTCs stored in memory (see page 05-1215).
(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position and wait for at least 60 seconds.
(e) Check the DTCs (see page 05-1215).
OK:
DTC B1153/25 is not output.

HINT:
Codes other than code B1153/25 may be output at this time, but they are not related to this check.

NG → **Go to step 2**

OK

USE SIMULATION METHOD TO CHECK

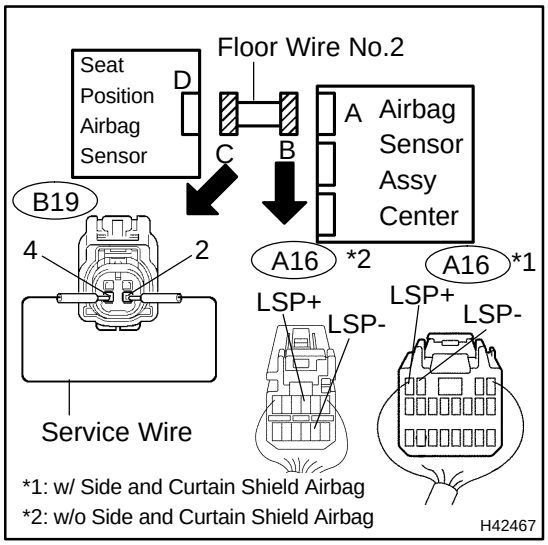
2	CHECK CONNECTION OF CONNECTORS

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Check that the connectors are properly connected to the airbag sensor assy center and the seat position airbag sensor.
OK:
The connectors are connected.

NG → **CONNECT CONNECTORS, THEN GO TO STEP 1**

OK

3 CHECK FLOOR WIRE NO.2(OPEN)



(a) Disconnect the connectors from the airbag sensor assy center and the seat position airbag sensor.
(b) Using a service wire, connect B19-2 and B19-4 of connector ”C”.

NOTICE:
Do not forcibly insert a service wire into the terminals of the connector when connecting.

(c) Measure the resistance according to the value(s) in the table below.
Standard:

w/ Side and curtain shield airbag:

Tester connection	Condition	Specified condition
A16-4 (LSP+) - A16-3 (LSP-)	Always	Below 1 Ω

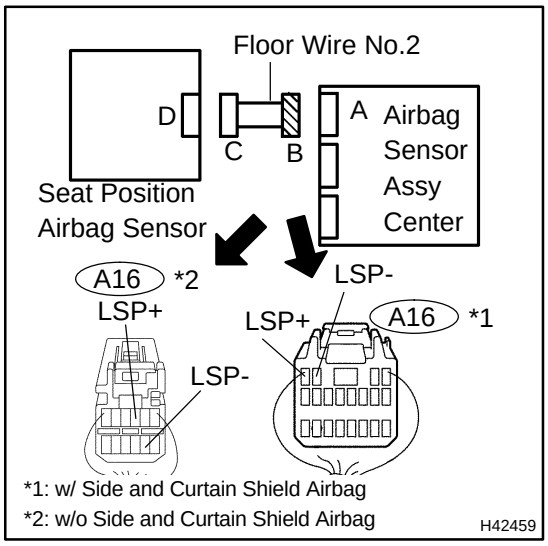
w/o Side and curtain shield airbag:

Tester connection	Condition	Specified condition
A16-3 (LSP+) - A16-8 (LSP-)	Always	Below 1 Ω

NG > **REPAIR OR REPLACE FLOOR WIRE NO.2**

OK

4 CHECK FLOOR WIRE NO.2(TO B+)



(a) Disconnect the service wire from connector ”C”.
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the ignition switch to the ON position.
(d) Measure the voltage according to the value(s) in the table below.
Standard:

w/ Side and curtain shield airbag:

Tester connection	Condition	Specified condition
A16-4 (LSP+) - Body ground	Ignition switch ON	Below 1 V
A16-3 (LSP-) - Body ground	Ignition switch ON	Below 1 V

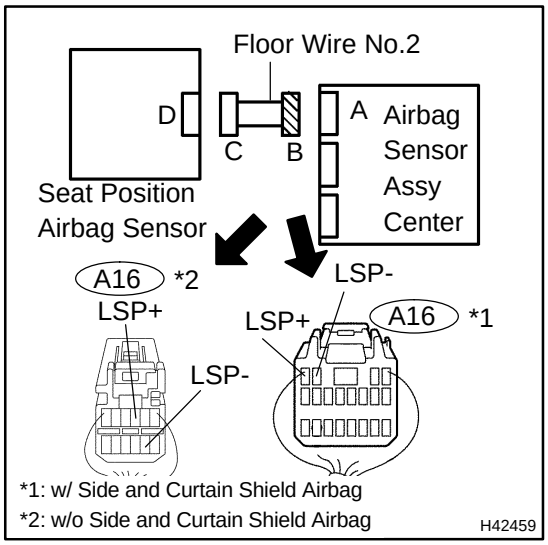
w/o Side and curtain shield airbag:

Tester connection	Condition	Specified condition
A16-3 (LSP+) - Body ground	Ignition switch ON	Below 1 V
A16-8 (LSP-) - Body ground	Ignition switch ON	Below 1 V

NG > **REPAIR OR REPLACE FLOOR WIRE NO.2**

OK

5 CHECK FLOOR WIRE NO.2(TO GROUND)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Measure the resistance according to the value(s) in the table below.

Standard:

w/ Side and curtain shield airbag:

Tester connection	Condition	Specified condition
A16-4 (LSP+) - Body ground	Always	1 MΩ or Higher
A16-3 (LSP-) - Body ground	Always	1 MΩ or Higher

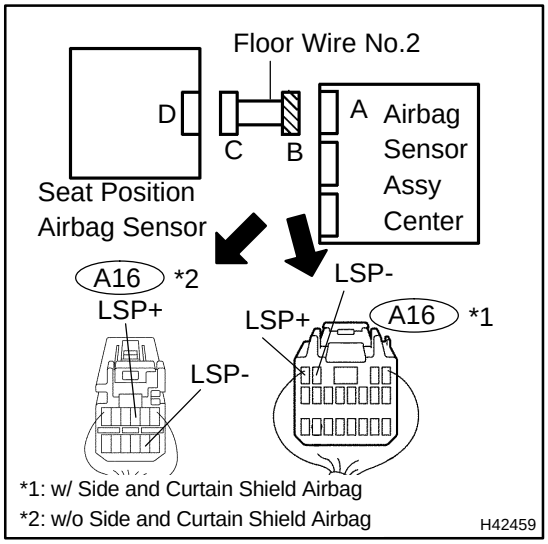
w/o Side and curtain shield airbag:

Tester connection	Condition	Specified condition
A16-3 (LSP+) - Body ground	Always	1 MΩ or Higher
A16-8 (LSP-) - Body ground	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FLOOR WIRE NO.2**

OK

6 CHECK FLOOR WIRE NO.2(SHORT)



(a) Measure the resistance according to the value(s) in the table below.

Standard:

w/ Side and curtain shield airbag:

Tester connection	Condition	Specified condition
A16-4 (LSP+) - A16-3 (LSP-)	Always	1 MΩ or Higher

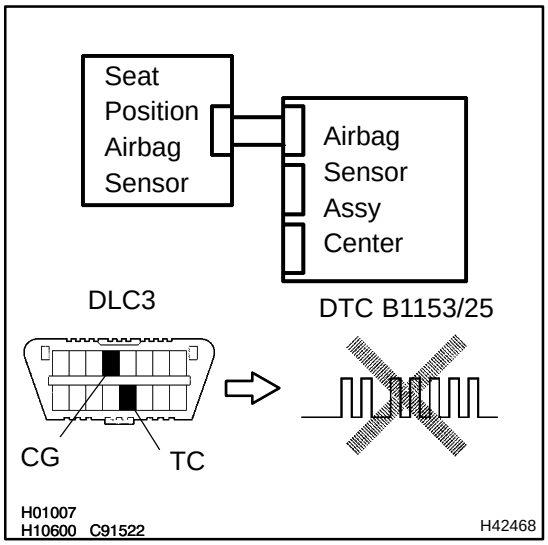
w/o Side and curtain shield airbag:

Tester connection	Condition	Specified condition
A16-3 (LSP+) - A16-8 (LSP-)	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FLOOR WIRE NO.2**

OK

7 CHECK SEAT POSITION AIR BAG SENSOR



(a) Connect the connectors to the seat position airbag sensor and the airbag sensor assy center.
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(d) Clear the DTCs stored in memory (see page 05-1215).
(e) Turn the ignition switch to the LOCK position.
(f) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(g) Check the DTCs (see page 05-1215).

OK:

DTC B1153/25 is not output.

HINT:

Codes other than code B1153/25 may be output at this time, but they are not related to this check.

NG → **Go to step 8**

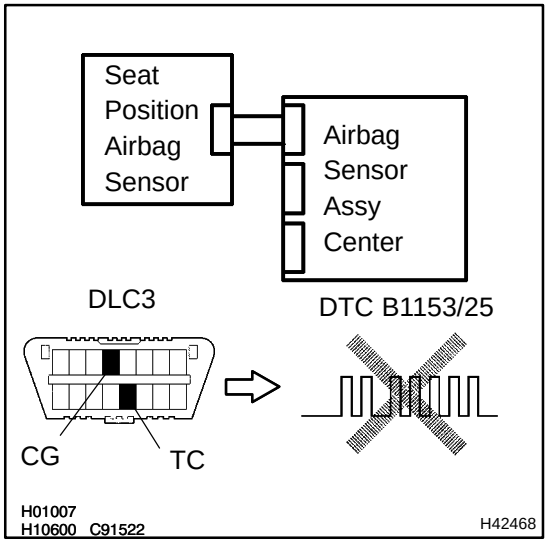
OK

USE SIMULATION METHOD TO CHECK

8	REPLACE SEAT POSITION AIR BAG SENSOR

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Replace the seat position airbag sensor (see page 60-61).

9	CHECK AIR BAG SENSOR ASSY CENTER



(a) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(b) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(c) Clear the DTCs stored in memory (see page 05-1215).
(d) Turn the ignition switch to the LOCK position.
(e) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(f) Check the DTCs (see page 05-1215).

OK:

DTC B1153/25 is not output.

HINT:

Codes other than code B1153/25 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG SENSOR ASSY CENTER (SEE PAGE 60-53)**

OK

END

DTC	B1154/38	AIRBAG SENSOR REAR (RH) MALFUNCTION

CIRCUIT DESCRIPTION

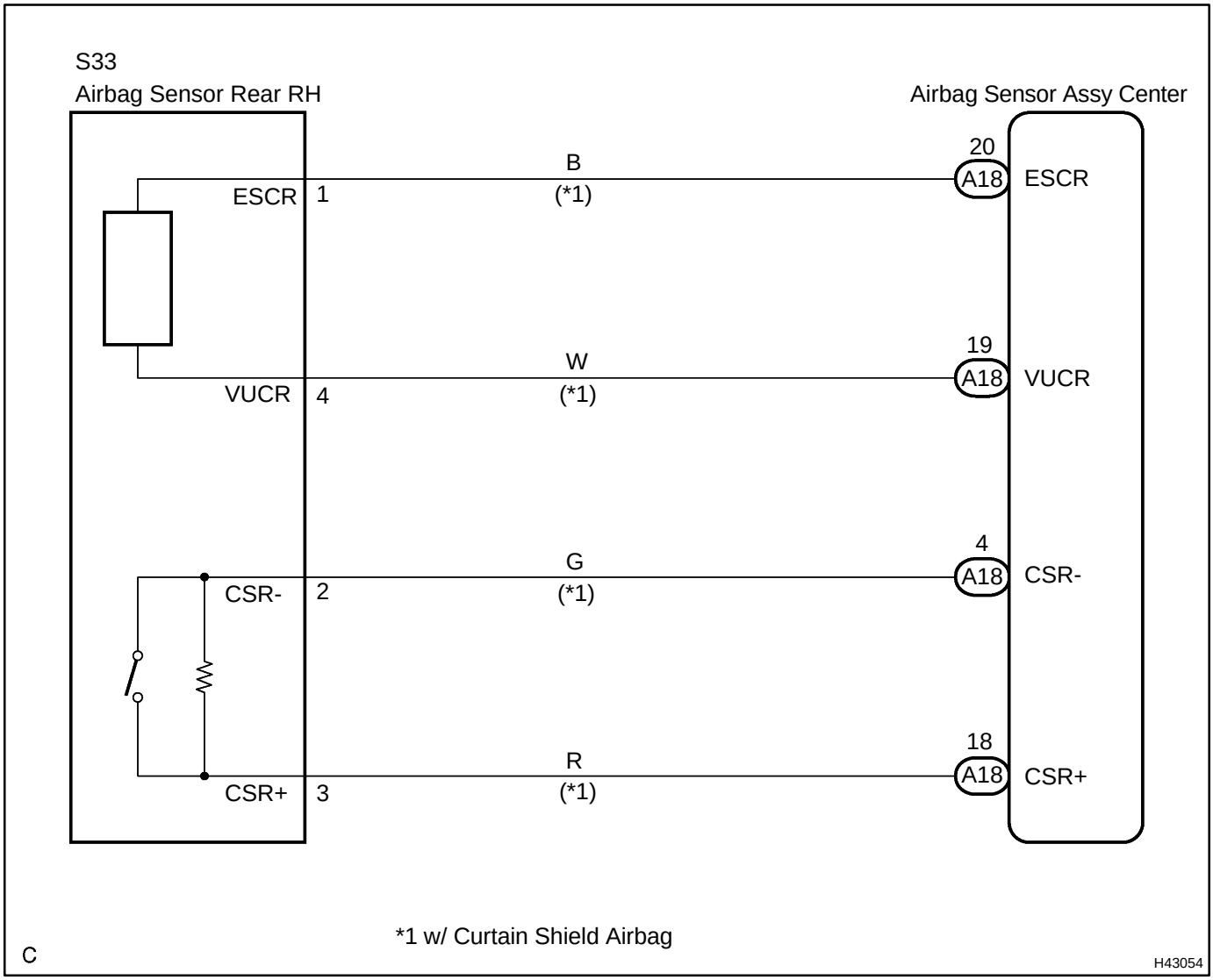
The airbag sensor rear RH consists of the safing sensor, the diagnostic circuit and the lateral deceleration sensor, etc.

If the airbag sensor assy center receives signals from the lateral deceleration sensor, it judges whether or not the SRS should be activated.

DTC B1154/38 is recorded when a malfunction in the airbag sensor rear RH is detected.

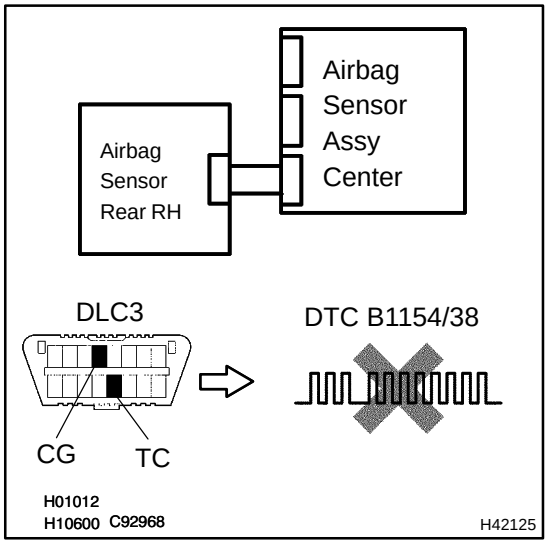
DTC No.	DTC Detecting Condition	Trouble Area
B1154/38	⋊Short circuit in airbag sensor rear RH wire harness (to ground) ⋊Short circuit in airbag sensor rear RH wire harness (to B+) ⋊Open circuit in airbag sensor rear RH wire harness ⋊Short circuit in airbag sensor rear RH wire harness ⋊Airbag sensor rear RH malfunction ⋊Airbag sensor assy center malfunction	⋊Airbag sensor rear RH ⋊Airbag sensor assy center ⋊Floor wire

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK DTC



(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(b) Clear the DTCs stored in memory (see page 05-1215).
(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Check the DTCs (see page 05-1215).
OK:
DTC B1154/38 is not output.

HINT:
Codes other than code B1154/38 may be output at this time, but they are not related to this check.

NG → **Go to step 2**

OK

USE SIMULATION METHOD TO CHECK

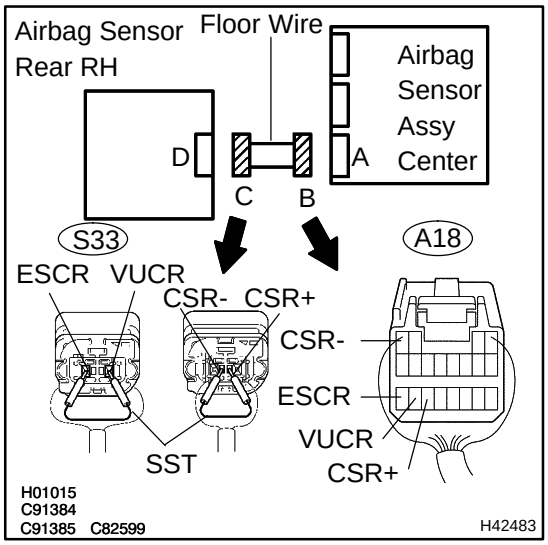
2	CHECK CONNECTION OF CONNECTORS

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Check that the connectors are properly connected to the airbag sensor assy center and the airbag sensor rear RH.
OK:
The connectors are connected.

NG → **CONNECT CONNECTORS, THEN GO TO STEP 1**

OK

3 CHECK FLOOR WIRE(OPEN)



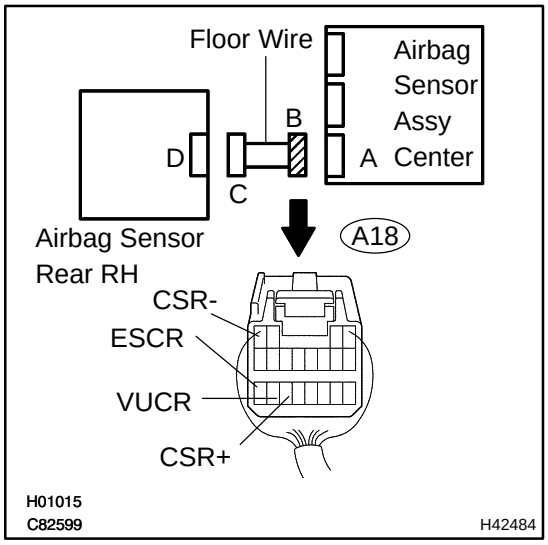
(a) Disconnect the connectors from the airbag sensor assy center and the airbag sensor rear assy RH.
(b) Using SST, connect S33-4 (VUCR) to S33-1 (ESCR), and connect S33-3 (CSR+) to S33-2 (CSR-) of connector "C".
SST 09843-18040
(c) Measure the resistance according to the value(s) in the table below.
Standard:

Tester connection	Condition	Specified condition
A18-19 (VUCR) - A18-20 (ESCR)	Always	Below 1 Ω
A18-18 (CSR+) - A18-4 (CSR-)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

4 CHECK FLOOR WIRE(TO B+)



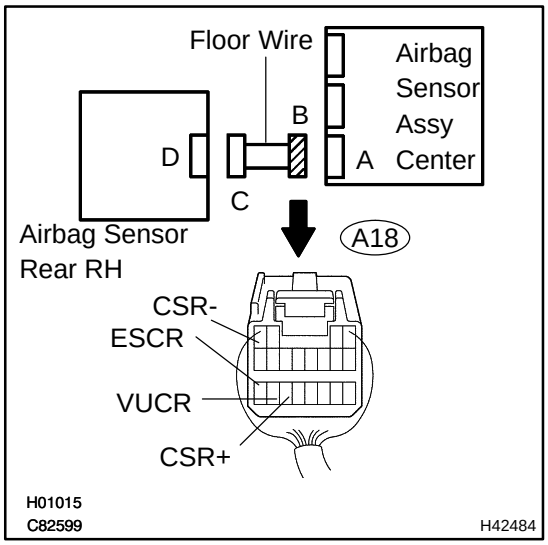
(a) Disconnect the SST from connector "C".
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the ignition switch to the ON position.
(d) Measure the voltage according to the value(s) in the table below.
Standard:

Tester connection	Condition	Specified condition
A18-19 (VUCR) - Body ground	Ignition switch ON	Below 1 V
A18-20 (ESCR) - Body ground	Ignition switch ON	Below 1 V
A18-18 (CSR+) - Body ground	Ignition switch ON	Below 1 V
A18-4 (CSR-) - Body ground	Ignition switch ON	Below 1 V

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

5 CHECK FLOOR WIRE(TO GROUND)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Measure the resistance according to the value(s) in the table below.

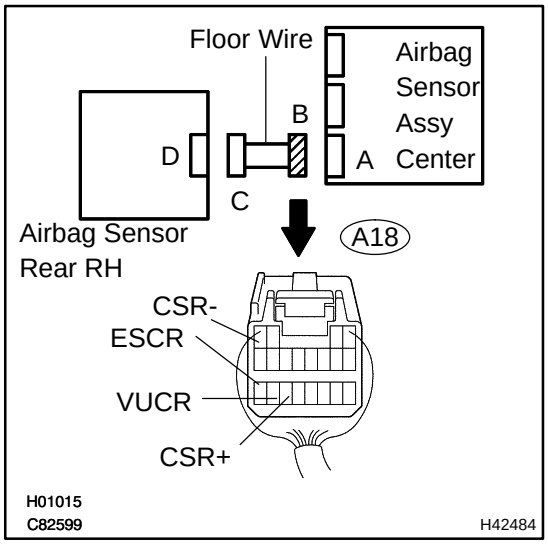
Standard:

Tester connection	Condition	Specified condition
A18-19 (VUCR) - Body ground	Always	1 MΩ or Higher
A18-20 (ESCR) - Body ground	Always	1 MΩ or Higher
A18-18 (CSR+) - Body ground	Always	1 MΩ or Higher
A18-4 (CSR-) - Body ground	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

6 CHECK FLOOR WIRE(SHORT)



(a) Measure the resistance according to the value(s) in the table below.

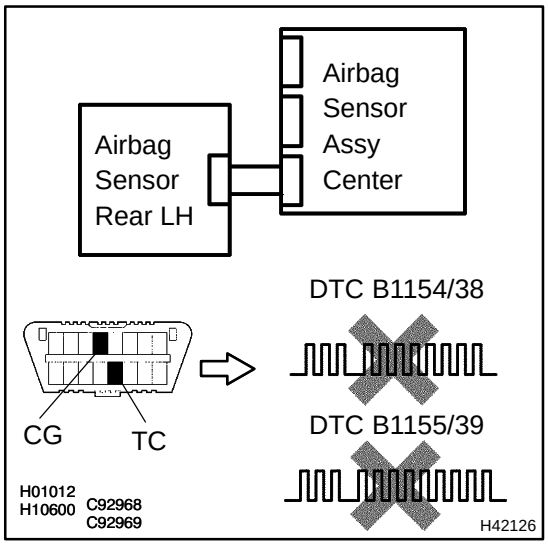
Standard:

Tester connection	Condition	Specified condition
A18-19 (VUCR) - A18-20 (ESCR)	Always	1 MΩ or Higher
A18-18 (CSR+) - A18-4 (CSR-)	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

7 CHECK AIR BAG SENSOR REAR RH



(a) Connect the connector to the airbag sensor assy center.
(b) Interchange the airbag sensor rear LH with RH and connect the connectors to them.
(c) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Clear the DTCs stored in memory (see page 05-1215).
(f) Turn the ignition switch to the LOCK position.
(g) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(h) Check the DTCs (see page 05-1215).

Result:

NG: A	DTC B1154/38 is output.
NG: B	DTC B1155/39 is output.
OK	DTC B1154/38 and B1155/39 are not output.

NG:A → **REPLACE AIR BAG SENSOR ASSY CENTER (SEE PAGE 60-53)**

NG:B → **REPLACE AIR BAG SENSOR REAR RH (SEE PAGE 60-59)**

OK

USE SIMULATION METHOD TO CHECK

DTC	B1155/39	AIRBAG SENSOR REAR (LH) MALFUNCTION

CIRCUIT DESCRIPTION

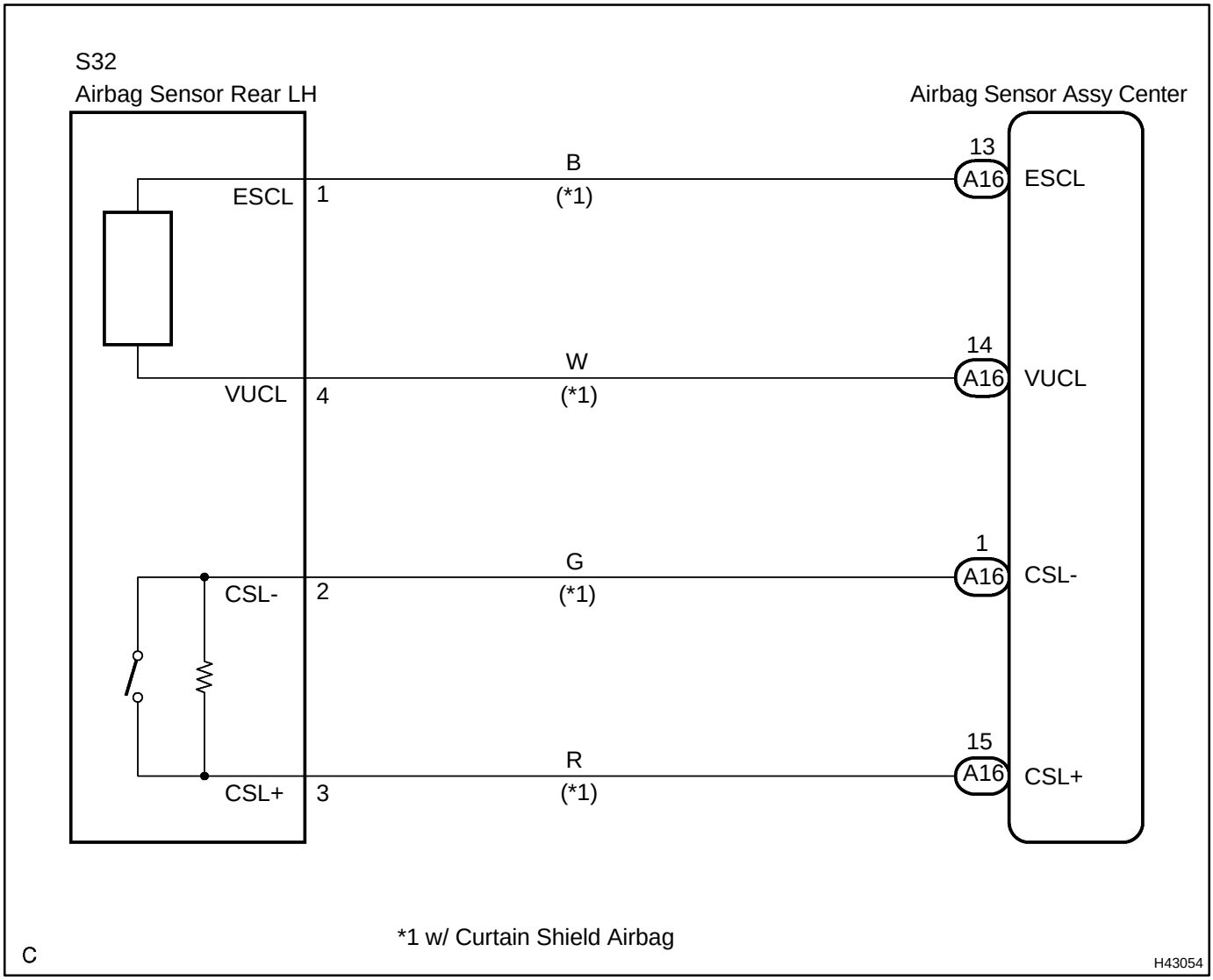
The airbag sensor rear LH consists of the safing sensor, the diagnostic circuit and the lateral deceleration sensor, etc.

If the airbag sensor assy center receives signals from the lateral deceleration sensor, it judges whether or not the SRS should be activated.

DTC B1155/39 is recorded when a malfunction in the airbag sensor rear LH is detected.

DTC No.	DTC Detecting Condition	Trouble Area
B1155/39	⋊Short circuit in airbag sensor rear LH wire harness (to ground) ⋊Short circuit in airbag sensor rear LH wire harness (to B+) ⋊Open circuit in airbag sensor rear LH wire harness ⋊Short circuit in airbag sensor rear LH wire harness ⋊Airbag sensor rear LH malfunction ⋊Airbag sensor assy center malfunction	⋊Airbag sensor rear LH ⋊Airbag sensor assy center ⋊Floor wire No.2

WIRING DIAGRAM



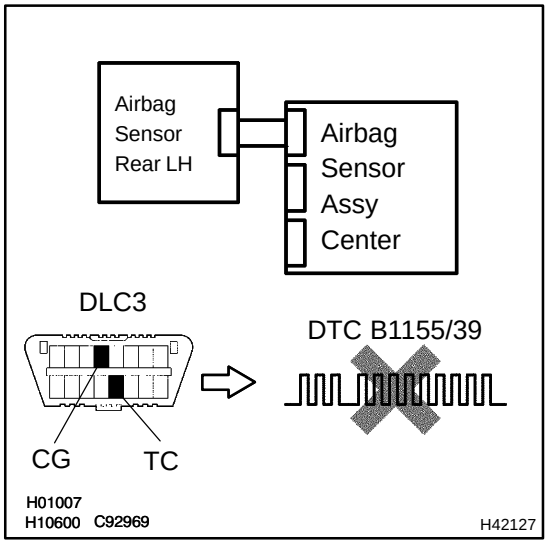
*1 w/ Curtain Shield Airbag

C

H43054

INSPECTION PROCEDURE

1	CHECK DTC



(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(b) Clear the DTCs stored in memory (see page 05-1215).
(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Check the DTCs (see page 05-1215).
OK:
DTC B1155/39 is not output.

HINT:
Codes other than code B1155/39 may be output at this time, but they are not related to this check.

NG → **Go to step 2**

OK

USE SIMULATION METHOD TO CHECK

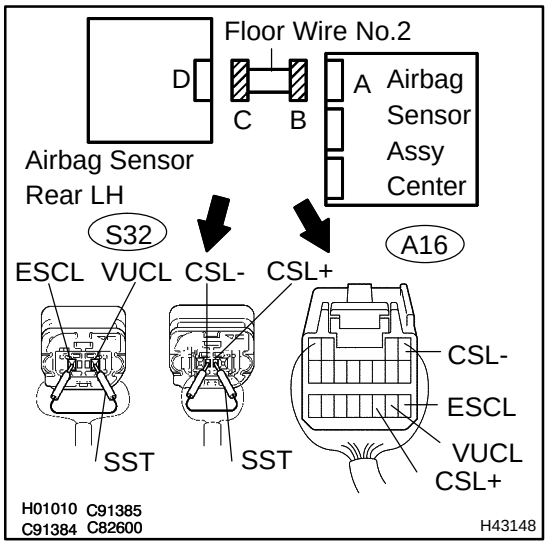
2	CHECK CONNECTION OF CONNECTORS

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Check that the connectors are properly connected to the airbag sensor assy center and the airbag sensor rear LH.
OK:
The connectors are connected.

NG → **CONNECT CONNECTORS, THEN GO TO STEP 1**

OK

3 CHECK FLOOR WIRE NO.2(OPEN)



(a) Disconnect the connectors from the airbag sensor assy center and the airbag sensor rear assy LH.
(b) Using SST, connect S32-1 (VUCL) to S32-4 (ESCL), and connect S32-3 (CSL+) to S32-2 (CSL-) of connector "C".
SST 09843-18040
(c) Measure the resistance according to the value(s) in the table below.

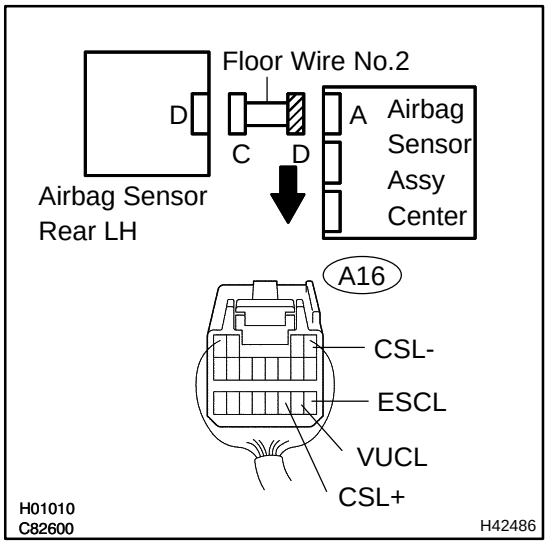
Standard:

Tester connection	Condition	Specified condition
A16-14 (VUCL) - A16-13 (ESCL)	Always	Below 1 Ω
A16-15 (CSL+) - A16-1 (CSL-)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE FLOOR WIRE NO.2**

OK

4 CHECK FLOOR WIRE NO.2(TO B+)



(a) Disconnect the SST from connector "C".
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the ignition switch to the ON position.
(d) Measure the voltage according to the value(s) in the table below.

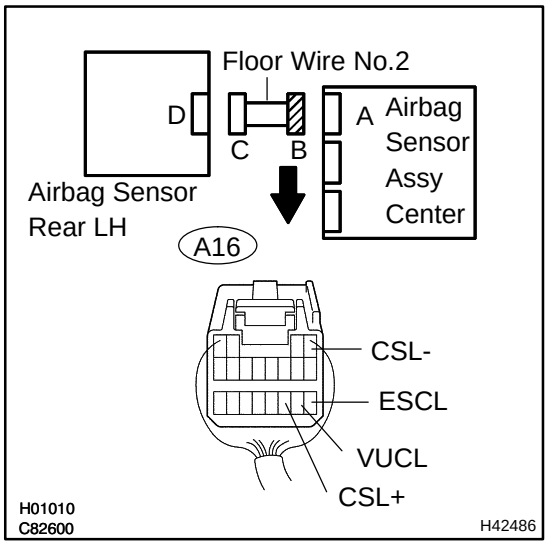
Standard:

Tester connection	Condition	Specified condition
A16-14 (VUCL) - Body ground	Ignition switch ON	Below 1 V
A16-13 (ESCL) - Body ground	Ignition switch ON	Below 1 V
A16-15 (CSL+) - Body ground	Ignition switch ON	Below 1 V
A16-1 (CSL-) - Body ground	Ignition switch ON	Below 1 V

NG → **REPAIR OR REPLACE FLOOR WIRE NO.2**

OK

5 CHECK FLOOR WIRE NO.2(TO GROUND)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Measure the resistance according to the value(s) in the table below.

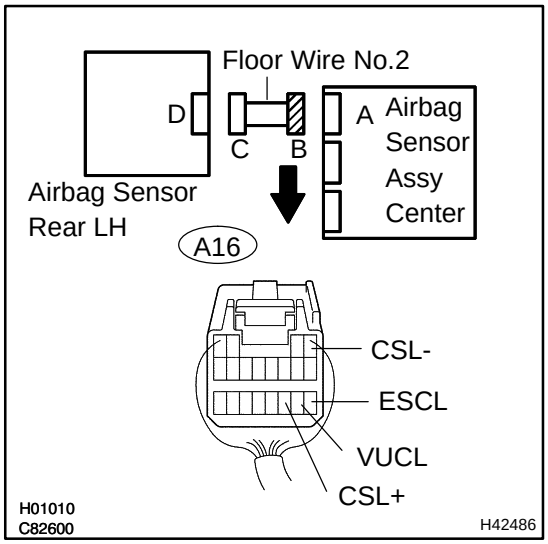
Standard:

Tester connection	Condition	Specified condition
A16-14 (VUCL) - Body ground	Always	1 MΩ or Higher
A16-13 (ESCL) - Body ground	Always	1 MΩ or Higher
A16-15 (CSL+) - Body ground	Always	1 MΩ or Higher
A16-1 (CSL-) - Body ground	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FLOOR WIRE NO.2**

OK

6 CHECK FLOOR WIRE NO.2(SHORT)



(a) Measure the resistance according to the value(s) in the table below.

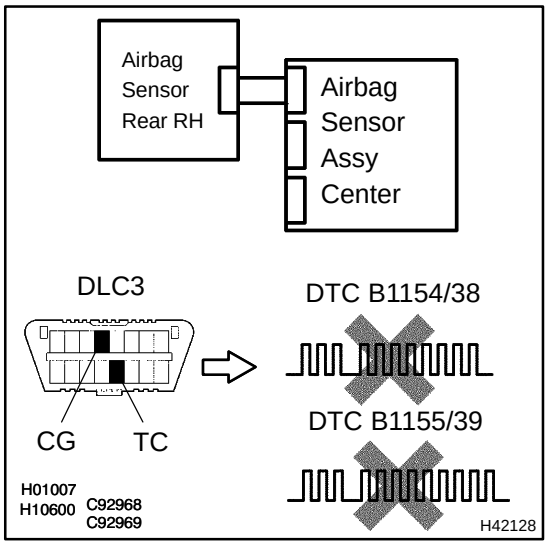
Standard:

Tester connection	Condition	Specified condition
A16-14 (VUCL) - A16-13 (ESCL)	Always	1 MΩ or Higher
A16-15 (CSL+) - A16-1 (CSL-)	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FLOOR WIRE NO.2**

OK

7 CHECK AIR BAG SENSOR REAR LH



(a) Connect the connector to the airbag sensor assy center.
(b) Interchange the airbag sensor rear LH with RH and connect the connectors to them.
(c) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Clear the DTCs stored in memory (see page 05-1215).
(f) Turn the ignition switch to the LOCK position.
(g) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(h) Check the DTCs (see page 05-1215).

Result:

NG: A	DTC B1154/38 is output.
NG: B	DTC B1155/39 is output.
OK	DTC B1154/38 and B1155/39 are not output.

NG:A → **REPLACE AIR BAG SENSOR REAR LH (SEE PAGE 60-59)**

NG:B → **REPLACE AIR BAG SENSOR ASSY CENTER (SEE PAGE 60-53)**

OK

USE SIMULATION METHOD TO CHECK

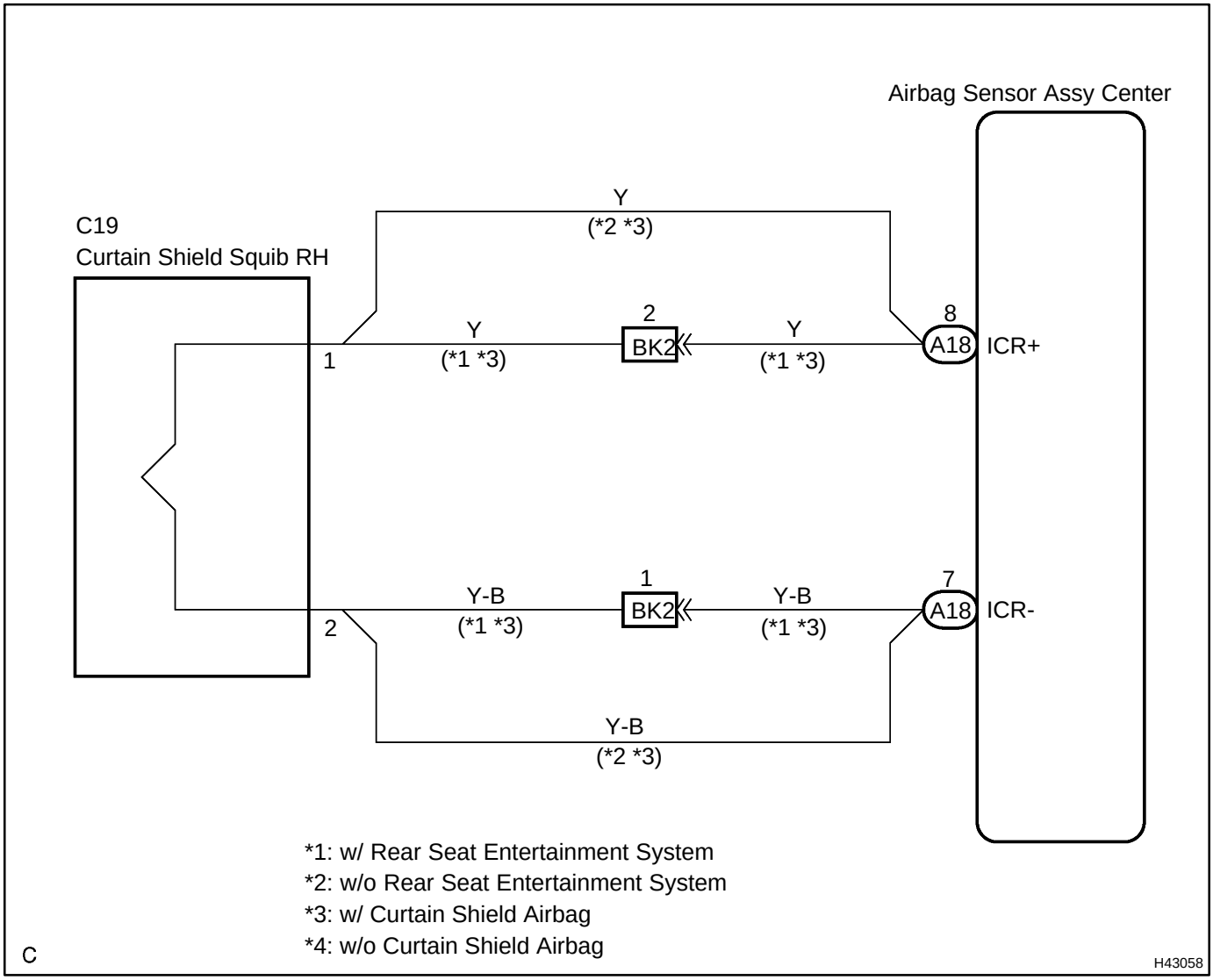
DTC B1160/83 SHORT IN CURTAIN SHIELD SQUIB (RH) CIRCUIT

CIRCUIT DESCRIPTION

The curtain shield squib RH circuit consists of the airbag sensor assy center and the curtain shield airbag assy RH.
The circuit instructs the SRS to deploy when deployment conditions are met.
DTC B1160/83 is recorded when a short circuit is detected in the curtain shield squib RH circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1160/83	⋊Short circuit between ICR+ wire harness and ICR- wire harness of curtain shield squib RH ⋊Curtain shield squib RH malfunction ⋊Airbag sensor assy center malfunction	⋊Curtain shield airbag assy RH (Curtain shield squib RH) ⋊Airbag sensor assy center ⋊Floor wire ⋊Roof wire No.2 (w/ Rear seat entertainment system)

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK VEHICLE CONDITION

(a) Check whether or not the vehicle is equipped with the rear seat entertainment system.
Result:
A: w/o Rear seat entertainment system
B: w/ Rear seat entertainment system

B → **Go to step 6**

A

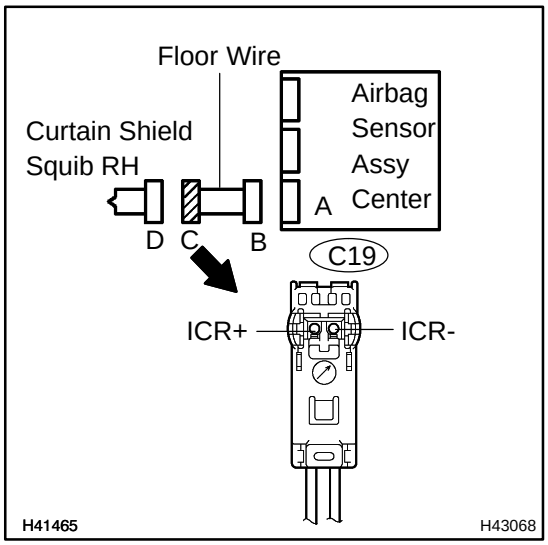
2	CHECK CONNECTOR

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least for 90 seconds.
(c) Disconnect the connectors from the curtain shield airbag assy RH.
(d) Check that the floor wire connector (on the curtain shield airbag assy RH side) is not damaged.
OK:
The lock button is not disengaged, or the claw of the lock is not deformed or damaged.

B → **REPAIR OR REPLACE FLOOR WIRE**

A

3	CHECK FLOOR WIRE(CURTAIN SHIELD SQUIB RH CIRCUIT)



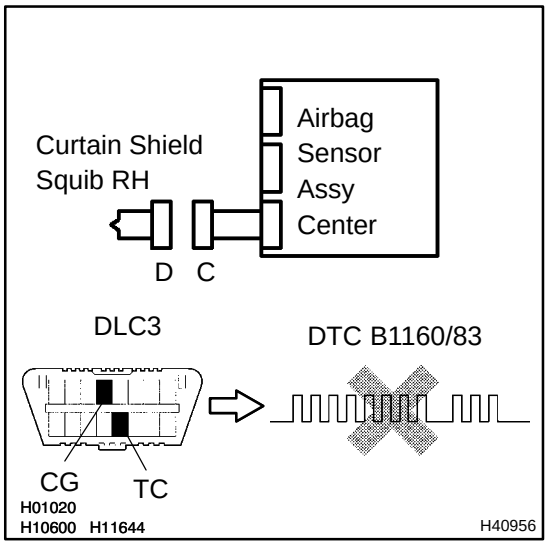
(a) Disconnect the connector from the airbag sensor assy center.
(b) Release the activation prevention mechanism built into connector "B" (see page 05-1207).
(c) Measure the resistance according to the value(s) in the table below.
Standard:

Tester connection	Condition	Specified condition
C19-1 (ICR+) - C19-2 (ICR-)	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

4	CHECK AIR BAG SENSOR ASSY CENTER



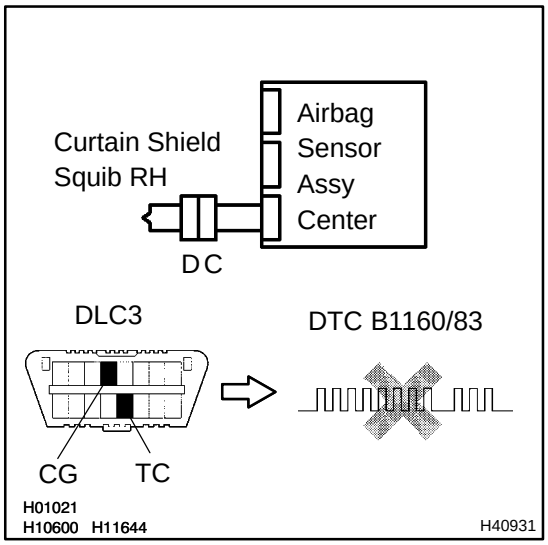
(a) Connect the connector to the airbag sensor assy center.
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(d) Clear the DTCs stored in memory (see page 05-1215).
(e) Turn the ignition switch to the LOCK position.
(f) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(g) Check the DTCs (see page 05-1215).
OK:
DTC B1160/83 is not output.

HINT:
Codes other than code B1160/83 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG SENSOR ASSY CENTER (SEE PAGE 60-53)**

OK

5	CHECK CURTAIN SHIELD AIR BAG ASSY RH(CURTAIN SHIELD SQUIB RH)



(a) Turn the ignition switch to the LOCK position.
(b) Cconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Connect the connector to the curtain shield airbag assy RH.
(d) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(e) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(f) Clear the DTCs stored in memory (see page 05-1215).
(g) Turn the ignition switch to the LOCK position.
(h) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(i) Check the DTCs (see page 05-1215).

OK:

DTC B1160/83 is not output.

HINT:

Codes other than code B1160/83 may be output at this time, but they are not related to this check.

NG	REPLACE CURTAIN SHIELD AIR BAG ASSY RH (SEE PAGE 60-38)

OK

USE SIMULATION METHOD TO CHECK

HINT:

- Before performing the simulation method, check that the airbag sensor assy center is in check mode (see page 05-1218).
- Perform the simulation method by selecting the check mode with the hand-held tester (see page 05-1218).
- After selecting the check mode, perform the simulation method by wiggling each connector of the air-bag system or driving the vehicle on a city or rough road (see page 05-1218).

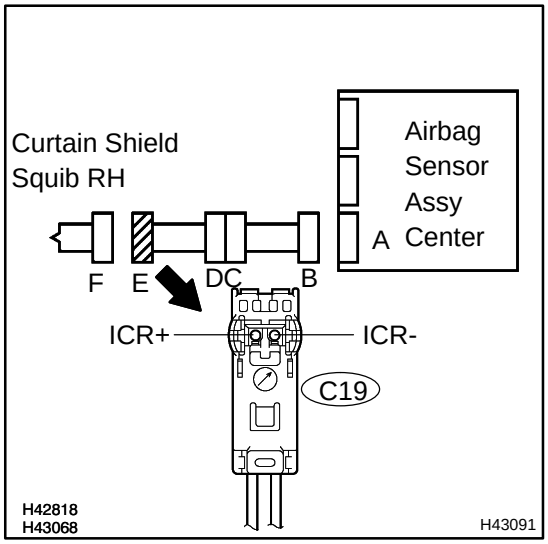
6 CHECK CONNECTOR

(a) Turn the ignition switch to the ON position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least for 90 seconds.
(c) Disconnect the connectors from the curtain shield airbag assy RH.
(d) Check that the roof wire No.2 connector (on the curtain shield airbag assy RH side) is not damaged.
OK:
The lock button is not disengaged, or the claw of the lock is not deformed or damaged.

NG → **REPAIR OR REPLACE ROOF WIRE NO.2**

OK

7 CHECK CURTAIN SHIELD SQUIB (RH) CIRCUIT



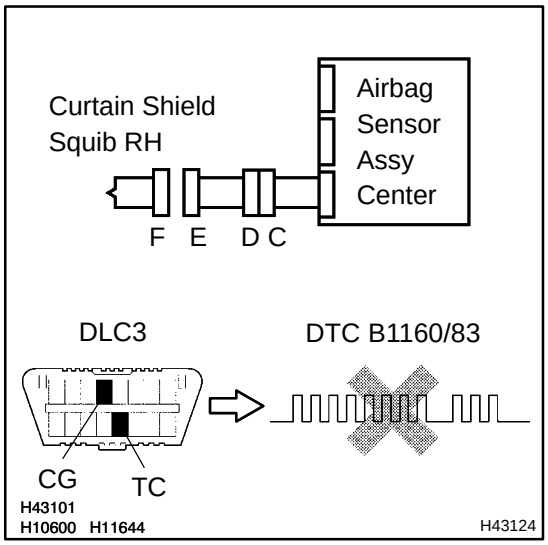
(a) Disconnect the connector from the airbag sensor assy center.
(b) Release the activation prevention mechanism built into connector "B" (see page 05-1207).
(c) Measure the resistance according to the value(s) in the table below.
Standard:

Tester connection	Condition	Specified condition
C19-1 (ICR+) - C19-2 (ICR-)	Always	1 MΩ or Higher

NG → **Go to step 10**

OK

8	CHECK AIR BAG SENSOR ASSY CENTER



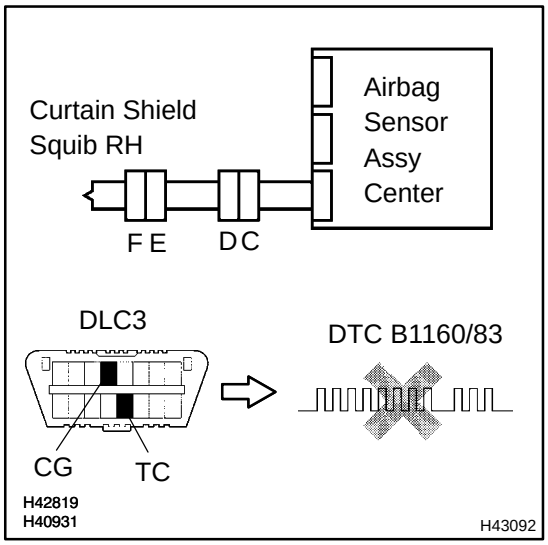
(a) Connect the connector to the airbag sensor assy center.
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(d) Clear the DTCs stored in memory (see page 05-1215).
(e) Turn the ignition switch to the LOCK position.
(f) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(g) Check the DTCs (see page 05-1215).
OK:
DTC B1160/83 is not output.

HINT:
Codes other than code B1160/83 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG SENSOR ASSY CENTER (SEE PAGE 60-53)**

OK

9	CHECK CURTAIN SHIELD AIR BAG ASSY RH



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Connect the connector to the curtain shield airbag assy RH.
(d) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(e) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(f) Clear the DTCs stored in memory (see page 05-1215).
(g) Turn the ignition switch to the LOCK position.
(h) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(i) Check the DTCs (see page 05-1215).

OK:

DTC B1160/83 is not output.

HINT:

Codes other than code B1160/83 may be output at this time, but they are not related to this check.

NG	REPLACE CURTAIN SHIELD AIR BAG ASSY RH (SEE PAGE 60-38)

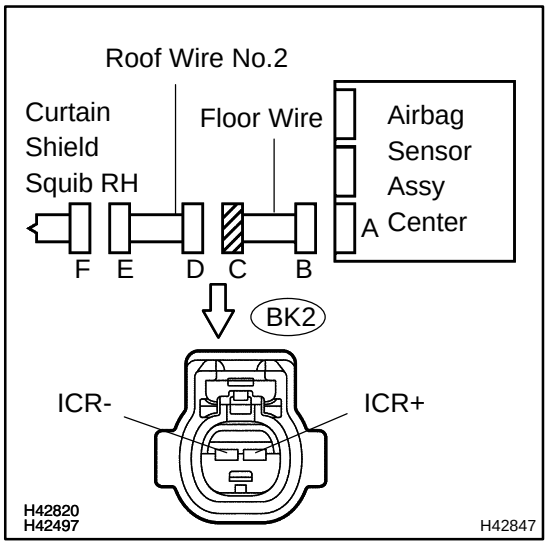
OK

USE SIMULATION METHOD TO CHECK

HINT:

- Before performing the simulation method, check that the airbag sensor assy center is in check mode (see page 05-1218).
- Perform the simulation method by selecting the check mode with the hand-held tester (see page 05-1218).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05-1218).

10 CHECK FLOOR WIRE



(a) Disconnect the floor wire connector from the roof wire No.2.

HINT:

The activation prevention mechanism of connector "B" has already been released.

(b) Measure the resistance according to the value(s) in the table below.

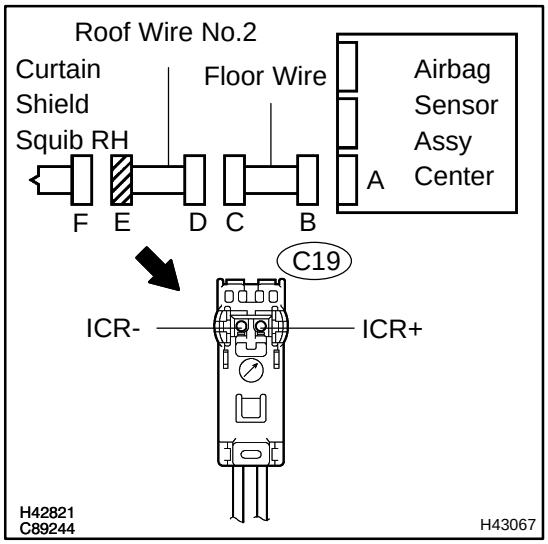
Standard:

Tester connection	Condition	Specified condition
BK2-2 (ICR+) - BK2-1 (ICR-)	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

11 CHECK ROOF WIRE NO.2



(a) Release the activation prevention mechanism built into connector "D" (see page 05-1207).

(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
C19-1 (ICR+) - C19-2 (ICR-)	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE ROOF WIRE NO.2**

OK

USE SIMULATION METHOD TO CHECK

HINT:

- Before performing the simulation method, check that the airbag sensor assy center is in check mode (see page 05-1218).
- Perform the simulation method by selecting the check mode with the hand-held tester (see page 05-1218).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05-1218).

DTC B1161/84 OPEN IN CURTAIN SHIELD SQUIB (RH) CIRCUIT

CIRCUIT DESCRIPTION

The curtain shield squib RH circuit consists of the airbag sensor assy center and the curtain shield airbag assy RH.
The circuit instructs the SRS to deploy when deployment conditions are met.
DTC B1161/84 is recorded when an open circuit is detected in the curtain shield squib RH circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1161/84	⋊Open circuit in ICR+ wire harness or ICR- wire harness of curtain shield squib RH ⋊Curtain shield squib RH malfunction ⋊Airbag sensor assy center malfunction	⋊Curtain shield airbag assy RH (Curtain shield squib RH) ⋊Airbag sensor assy center ⋊Floor wire ⋊Roof wire No.2 (w/ Rear seat entertainment system)

WIRING DIAGRAM

see page 05-1376 .

INSPECTION PROCEDURE

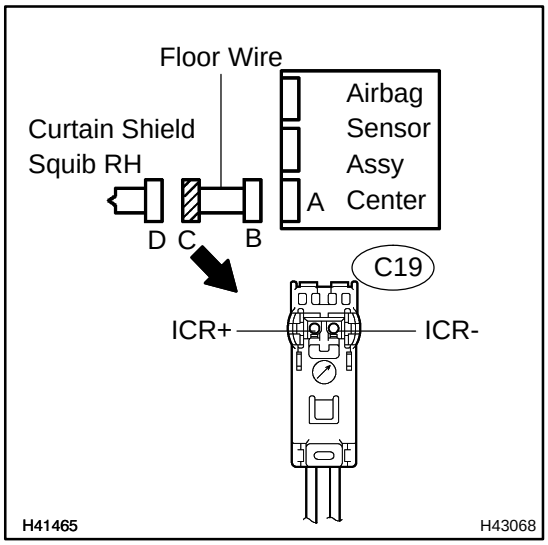
1 CHECK VEHICLE CONDITION

(a) Check whether or not the vehicle is equipped with the rear seat entertainment system.
Result:
A: w/o Rear seat entertainment system
B: w/ Rear seat entertainment system

B → **Go to step 5**

A

2 CHECK FLOOR WIRE(CURTAIN SHIELD SQUIB RH CIRCUIT)



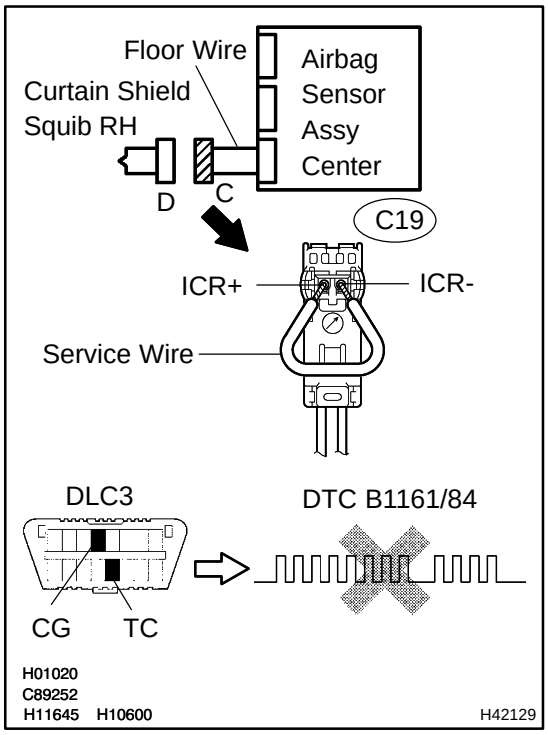
(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag sensor assy center and the curtain shield airbag assy RH.
(d) Measure the resistance according to the value(s) in the table below.
Standard:

Tester connection	Condition	Specified condition
C19-1 (ICR+) - C19-2 (ICR-)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

3	CHECK AIR BAG SENSOR ASSY CENTER



(a) Connect the connector to the airbag sensor assy center.
(b) Using a service wire, connect C19-1 (ICR+) and C19-2 (ICR-) of connector "C".

NOTICE:

* **Twist the end of the service wire in order to insert it into the connector.**
* **Do not forcibly insert the twisted service wire into the terminals of the connector when connecting.**

(c) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Clear the DTCs stored in memory (see page 05-1215).
(f) Turn the ignition switch to the LOCK position.
(g) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(h) Check the DTCs (see page 05-1215).

OK:

DTC B1161/84 is not output.

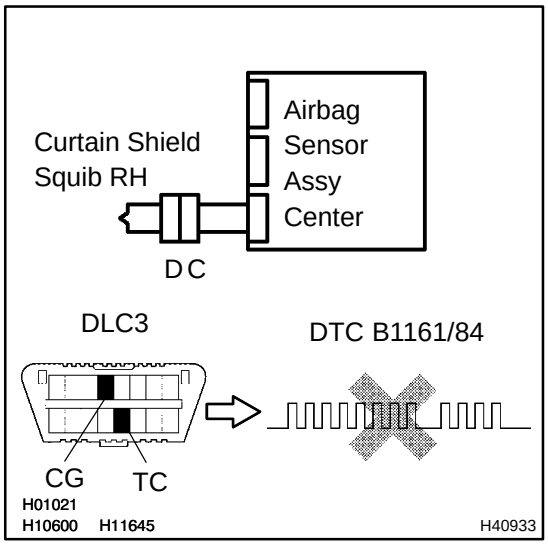
HINT:

Codes other than code B1161/84 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG SENSOR ASSY CENTER (SEE PAGE 60-53)**

OK

4	CHECK CURTAIN SHIELD AIR BAG ASSY RH(CURTAIN SHIELD SQUIB RH)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the service wire from connector "C".
(d) Connect the connector to the curtain shield airbag assy RH.
(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(g) Clear the DTCs stored in memory (see page 05-1215).
(h) Turn the ignition switch to the LOCK position.
(i) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(j) Check the DTCs (see page 05-1215).

OK:

DTC B1161/84 is not output.

HINT:

Codes other than code B1161/84 may be output at this time, but they are not related to this check.

NG → **REPLACE CURTAIN SHIELD AIR BAG ASSY RH (SEE PAGE 60-38)**

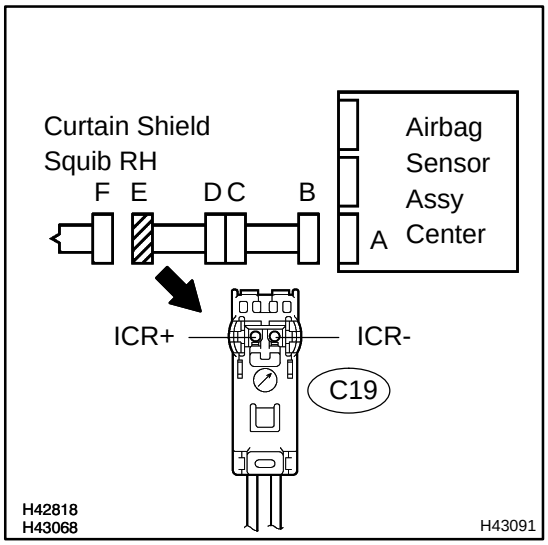
OK

USE SIMULATION METHOD TO CHECK

HINT:

- Before performing the simulation method, check that the airbag sensor assy center is in check mode (see page 05-1218).
- Perform the simulation method by selecting the check mode with the hand-held tester (see page 05-1218).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05-1218).

5 CHECK CURTAIN SHIELD SQUIB (RH) CIRCUIT



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag sensor assy center assy and the curtain shield airbag assy RH.
(d) Measure the resistance according to the value(s) in the table below.

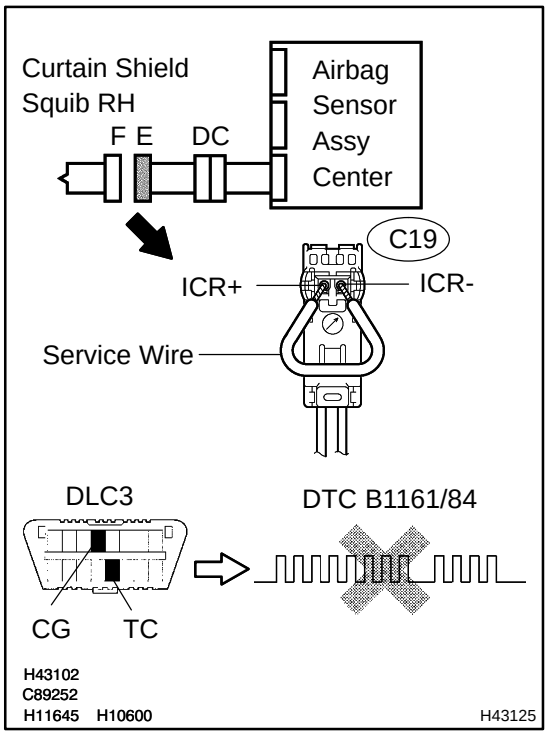
Standard:

Tester connection	Condition	Specified condition
C19-1 (ICR+) - C19-2 (ICR-)	Always	Below 1 Ω

NG → **Go to step 8**

OK

6 CHECK AIR BAG SENSOR ASSY CENTER



(a) Connect the connector to the airbag sensor assy center.
(b) Using a service wire, connect C19-1 (ICR+) and C19-2 (ICR-) of connector "E".

NOTICE:

* **Twist the end of the service wire in order to insert it into the connector.**
* **Do not forcibly insert the twisted service wire into the terminals of the connector when connecting.**

(c) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Clear the DTCs stored in memory (see page 05-1215).
(f) Turn the ignition switch to the LOCK position.
(g) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(h) Clear the DTCs (see page 05-1215).

OK:

DTC B1161/84 is not output.

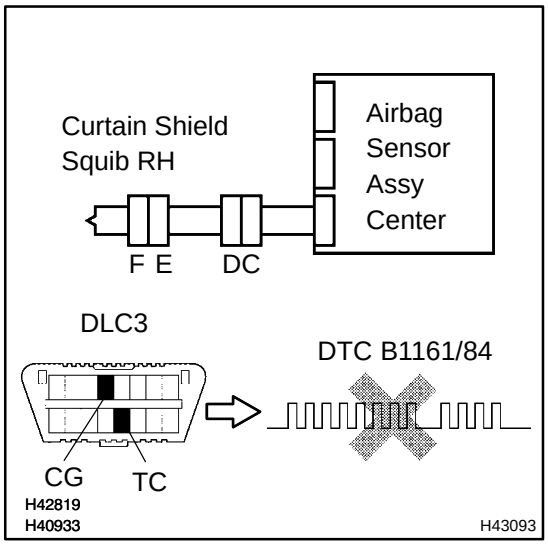
HINT:

Codes other than code B1161/84 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG SENSOR ASSY CENTER (SEE PAGE 60-53)**

OK

7	CHECK CURTAIN SHIELD AIR BAG ASSY RH(CURTAIN SHIELD SQUIB RH)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the service wire from connector "E".
(d) Connect the connector to the curtain shield airbag assy RH.
(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(g) Clear the DTCs stored in memory (see page 05-1215).
(h) Turn the ignition switch to the LOCK position.
(i) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(j) Check the DTCs (see page 05-1215).

OK:

DTC B1161/84 is not output.

HINT:

Codes other than code B1161/84 may be output at this time, but they are not related to this check.

NG → **REPLACE CURTAIN SHIELD AIR BAG ASSY RH (SEE PAGE 60-38)**

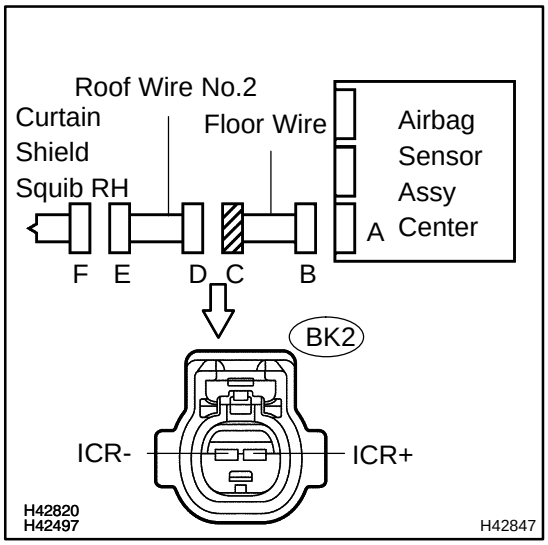
OK

USE SIMULATION METHOD TO CHECK

HINT:

- Before performing the simulation method, check that the airbag sensor assy center is in check mode (see page 05-1218).
- Perform the simulation method by selecting the check mode with the hand-held tester (see page 05-1218).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05-1218).

8 CHECK FLOOR WIRE



(a) Disconnect the floor wire connector from the roof wire No.2.

(b) Measure the resistance according to the value(s) in the table below.

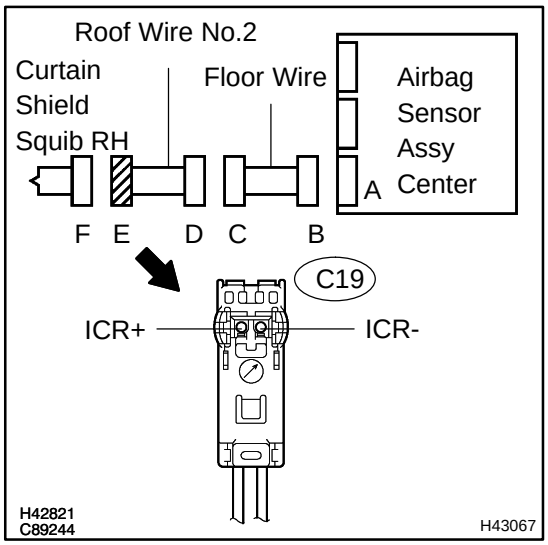
Standard:

Tester connection	Condition	Specified condition
BK2-2 (ICR+) - BK2-1 (ICR-)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

9 CHECK ROOF WIRE NO.2



(a) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
C19-1 (ICR+) - C19-2 (ICR-)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE ROOF WIRE NO.2**

OK

USE SIMULATION METHOD TO CHECK

HINT:

- Before performing the simulation method, check that the airbag sensor assy center is in check mode (see page 05-1218).
- Perform the simulation method by selecting the check mode with the hand-held tester (see page 05-1218).
- After selecting the check mode, perform the simulation method by wiggling each connector of the air-bag system or driving the vehicle on a city or rough road (see page 05-1218).

DTC B1162/81 SHORT IN CURTAIN SHIELD SQUIB (RH) CIRCUIT (TO GROUND)

CIRCUIT DESCRIPTION

The curtain shield squib RH circuit consists of the airbag sensor assy center and the curtain shield airbag assy RH.
The circuit instructs the SRS to deploy when deployment conditions are met.
DTC B1162/81 is recorded when a short to ground is detected in the curtain shield squib RH circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1162/81	・Short circuit in curtain shield squib RH wire harness (to ground) ・Curtain shield squib RH malfunction ・Airbag sensor assy malfunction	・Curtain shield airbag assy RH (Curtain shield squib RH) ・Airbag sensor assy center ・Floor wire ・Roof wire No.2 (w/ Rear seat entertainment system)

WIRING DIAGRAM

see page 05-1376 .

INSPECTION PROCEDURE

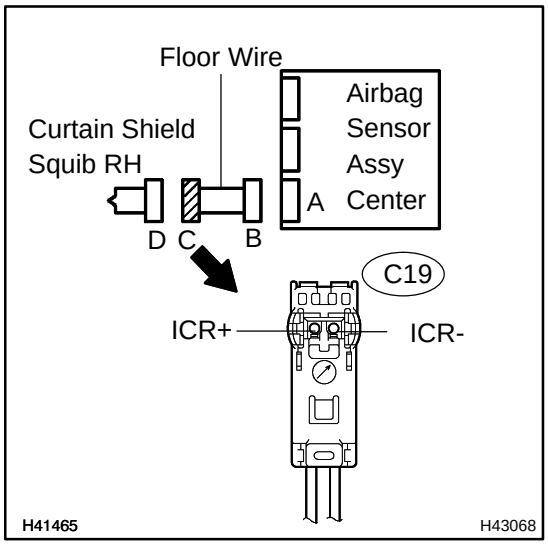
1 CHECK VEHICLE CONDITION

(a) Check whether or not the vehicle is equipped with the rear seat entertainment system.
Result:
A: w/o Rear seat entertainment system
B: w/ Rear seat entertainment system

B → **Go to step 5**

A

2 CHECK FLOOR WIRE(CURTAIN SHIELD SQUIB RH CIRCUIT)



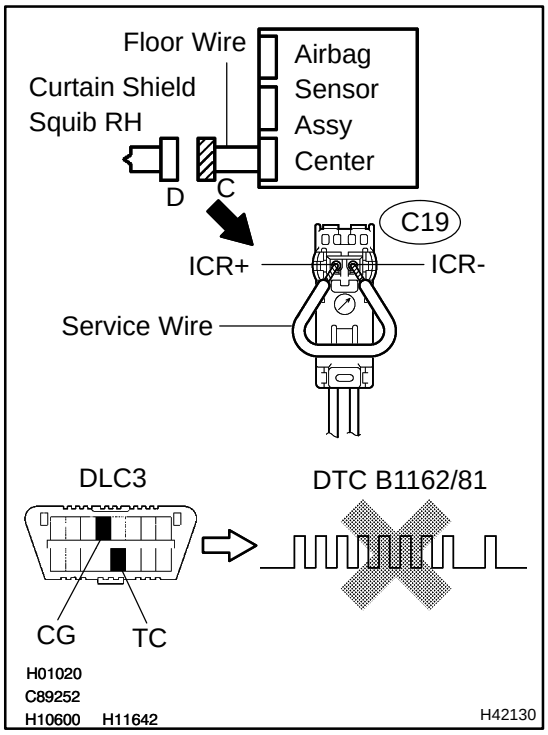
(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag sensor assy center and the curtain shield airbag assy RH.
(d) Measure the resistance according to the value(s) in the table below.
Standard:

Tester connection	Condition	Specified condition
C19-1 (ICR+) - Body ground	Always	1 MΩ or Higher
C19-2 (ICR-) - Body ground	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

3	CHECK AIR BAG SENSOR ASSY CENTER



(a) Connect the connector to the airbag sensor assy center.
(b) Using a service wire, connect C19-1 (ICR+) and C19-2 (ICR-) of connector "C".

NOTICE:

* **Twist the end of the service wire in order to insert it into the connector.**
* **Do not forcibly insert the twisted service wire into the terminals of the connector when connecting.**

(c) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Clear the DTCs stored in memory (see page 05-1215).
(f) Turn the ignition switch to the LOCK position.
(g) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(h) Check the DTCs (see page 05-1215).

OK:

DTC B1162/81 is not output.

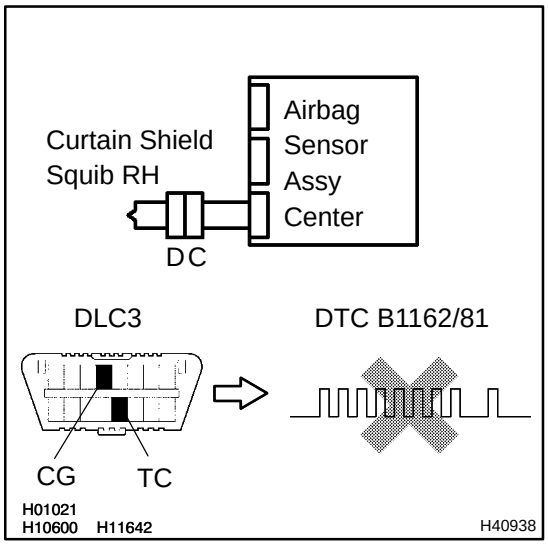
HINT:

Codes other than code B1162/81 may be output at this time, but they are not related to this check.

NG	REPLACE AIR BAG SENSOR ASSY CENTER (SEE PAGE 60-53)

OK

4	CHECK CURTAIN SHIELD AIR BAG ASSY RH(CURTAIN SHIELD SQUIB RH)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the service wire from connector "C".
(d) Connect the connector to the curtain shield airbag assy RH.
(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(g) Clear the DTCs stored in memory (see page 05-1215).
(h) Turn the ignition switch to the LOCK position.
(i) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(j) Check the DTCs (see page 05-1215).
OK:
DTC B1162/81 is not output.

HINT:
Codes other than code B1162/81 may be output at this time, but they are not related to this check.

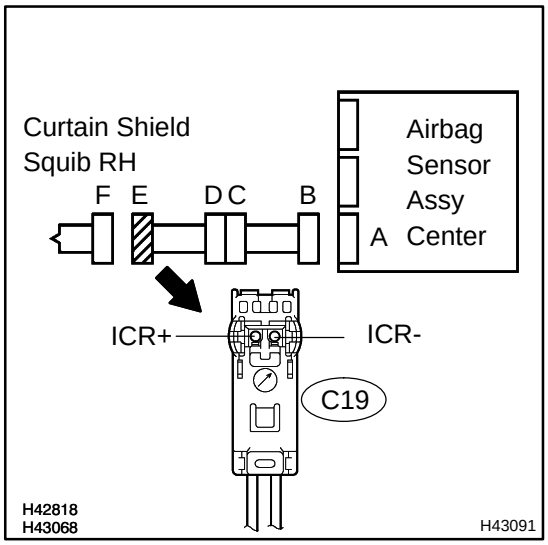
NG → **REPLACE CURTAIN SHIELD AIR BAG ASSY RH (SEE PAGE 60-38)**

OK

USE SIMULATION METHOD TO CHECK

HINT:
- Before performing the simulation method, check that the airbag sensor assy center is in check mode (see page 05-1218).
- Perform the simulation method by selecting the check mode with the hand-held tester (see page 05-1218).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05-1218).

5 CHECK CURTAIN SHIELD SQUIB (RH) CIRCUIT



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag sensor assy center and the curtain shield airbag assy RH.
(d) Measure the resistance according to the value(s) in the table below.

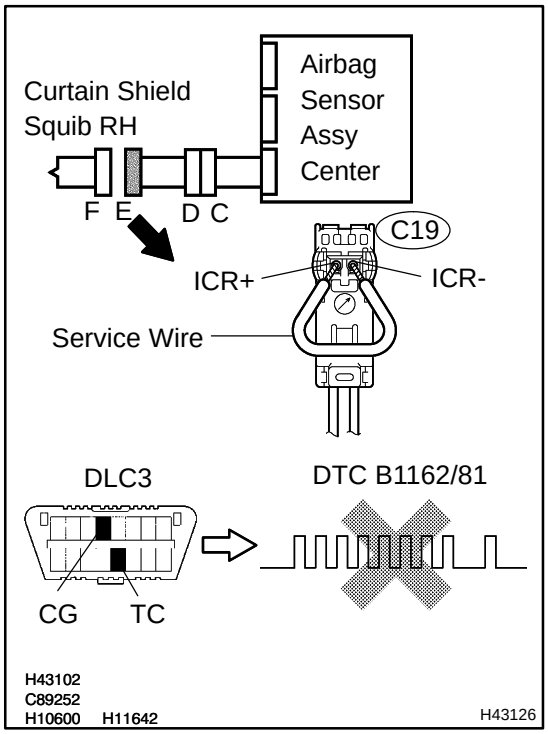
Standard:

Tester connection	Condition	Specified condition
C19-1 (ICR+) - Body ground	Always	1 MΩ or Higher
C19-2 (ICR-) - Body ground	Always	1 MΩ or Higher

NG → **Go to step 8**

OK

6 CHECK AIR BAG SENSOR ASSY CENTER



(a) Connect the connector to the airbag sensor assy center.
(b) Using a service wire, connect C19-1 (ICR+) and C19-2 (ICR-) of connector "E".

NOTICE:

- **Twist the end of the service wire in order to insert it into the connector.**
- **Do not forcibly insert the twisted service wire into the terminals of the connector when connecting.**

(c) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Clear the DTCs stored in memory (see page 05-1215).
(f) Turn the ignition switch to the LOCK position.
(g) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(h) Check the DTCs (see page 05-1215).

OK:

DTC B1162/81 is not output.

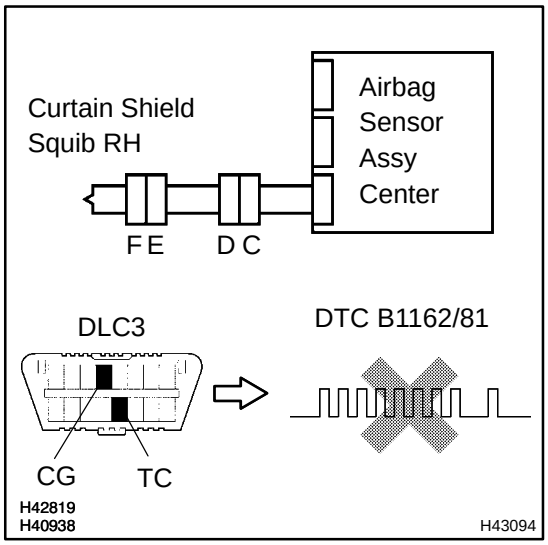
HINT:

Codes other than code B1162/81 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG SENSOR ASSY CENTER (SEE PAGE 60-53)**

OK

7 CHECK CURTAIN SHIELD AIR BAG ASSY RH(CURTAIN SHIELD SQUIB RH)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the service wire from connector "E".
(d) Connect the connector to the curtain shield airbag assy RH.
(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(g) Clear the DTCs stored in memory (see page 05-1215).
(h) Turn the ignition switch to the LOCK position.
(i) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(j) Check the DTCs (see page 05-1215).

OK:

DTC B1162/81 is not output.

HINT:

Codes other than code B1162/81 may be output at this time, but they are not related to this check.

NG → **REPLACE CURTAIN SHIELD AIR BAG ASSY RH (SEE PAGE 60-61)**

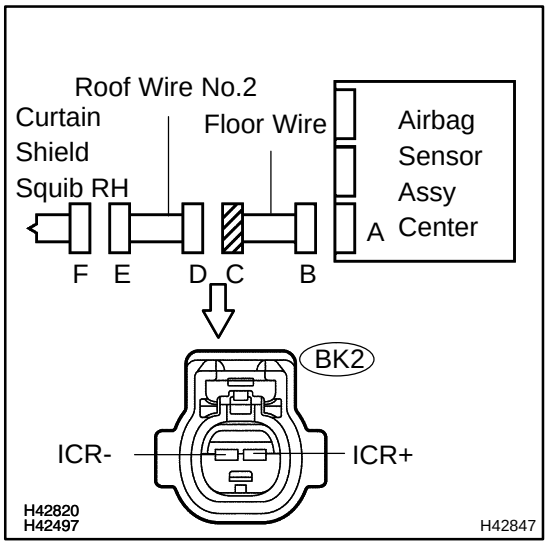
OK

USE SIMULATION METHOD TO CHECK

HINT:

- Before performing the simulation method, check that the airbag sensor assy center is in check mode (see page 05-1218).
- Perform the simulation method by selecting the check mode with the hand-held tester (see page 05-1218).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05-1218).

8 CHECK FLOOR WIRE



(a) Disconnect the floor wire connector from the roof wire No.2.

(b) Measure the resistance according to the value(s) in the table below.

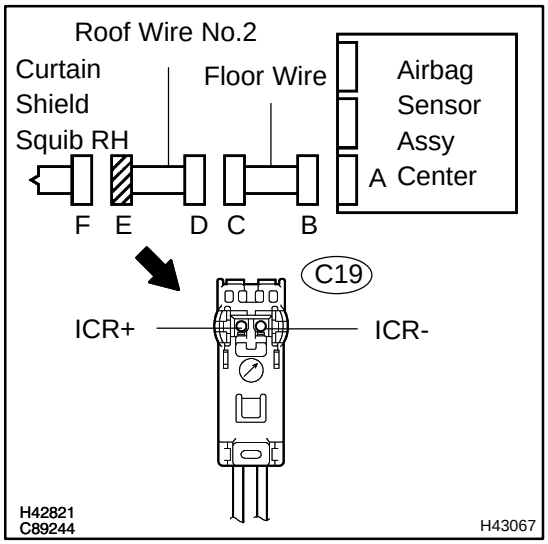
Standard:

Tester connection	Condition	Specified condition
BK2-2 (ICR+) - Body ground	Always	1 MΩ or Higher
BK2-1 (ICR-) - Body ground	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

9 CHECK ROOF WIRE NO.2



(a) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
C19-1 (ICR+) - Body ground	Always	1 MΩ or Higher
C19-2 (ICR-) - Body ground	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE ROOF WIRE NO.2**

OK

USE SIMULATION METHOD TO CHECK

HINT:

- Before performing the simulation method, check that the airbag sensor assy center is in check mode (see page 05-1218).
- Perform the simulation method by selecting the check mode with the hand-held tester (see page 05-1218).
- After selecting the check mode, perform the simulation method by wiggling each connector of the air-bag system or driving the vehicle on a city or rough road (see page 05-1218).

DTC B1163/82 SHORT IN CURTAIN SHIELD SQUIB (RH) CIRCUIT (TO B+)

CIRCUIT DESCRIPTION

The curtain shield squib RH circuit consists of the airbag sensor assy center and the curtain shield airbag assy RH.
The circuit instructs the SRS to deploy when deployment conditions are met.
DTC B1163/82 is recorded when a short to B+ is detected in the curtain shield squib RH circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1163/82	・Short circuit in curtain shield squib RH wire harness (to B+) ・Curtain shield squib RH malfunction ・Airbag sensor assy center malfunction	・Curtain shield airbag assy RH (Curtain shield squib RH) ・Airbag sensor assy center ・Floor wire ・Roof wire No.2 (w/ Rear seat entertainment system)

WIRING DIAGRAM

see page 05-1376 .

INSPECTION PROCEDURE

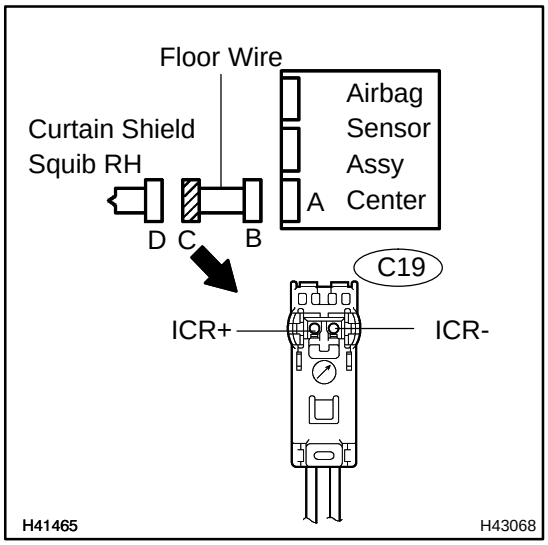
1 CHECK VEHICLE CONDITION

(a) Check whether or not the vehicle is equipped with the rear seat entertainment system.
Result:
A: w/o Rear seat entertainment system
B: w/ Rear seat entertainment system

B → **Go to step 5**

A

2 CHECK FLOOR WIRE(CURTAIN SHIELD SQUIB RH CIRCUIT)



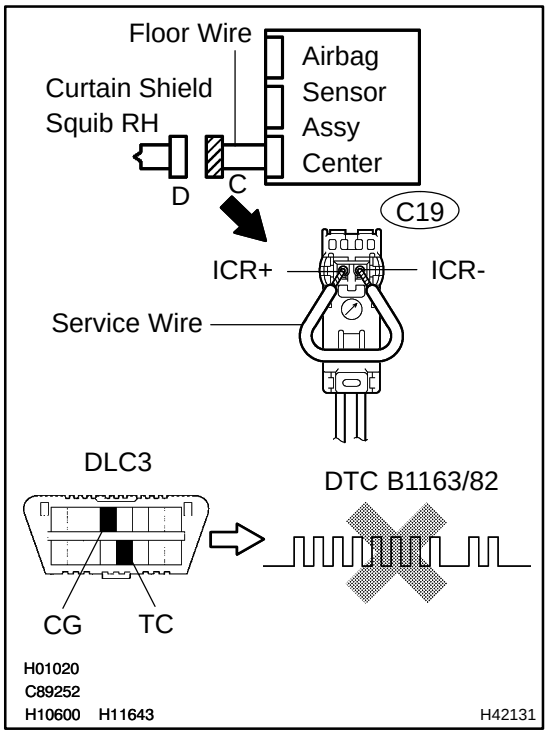
(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag sensor assy center and the curtain shield airbag assy RH.
(d) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(e) Turn the ignition switch to the ON position.
(f) Measure the voltage according to the value(s) in the table below.
Standard:

Tester connection	Condition	Specified condition
C19-1 (ICR+) - Body ground	Ignition switch ON	Below 1 V
C19-2 (ICR-) - Body ground	Ignition switch ON	Below 1 V

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

3 CHECK AIR BAG SENSOR ASSY CENTER



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Connect the connector to the airbag sensor assy center.
(d) Using a service wire, connect C19-1 (ICR+) and C19-2 (ICR-) of connector "C".

NOTICE:

- **Twist the end of the service wire in order to insert it into the connector.**
- **Do not forcibly insert the twisted service wire into the terminals of the connector when connecting.**

(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(g) Clear the DTCs stored in memory (see page 05-1215).
(h) Turn the ignition switch to the LOCK position.
(i) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(j) Check the DTCs (see page 05-1215).

OK:

DTC B1163/82 is not output.

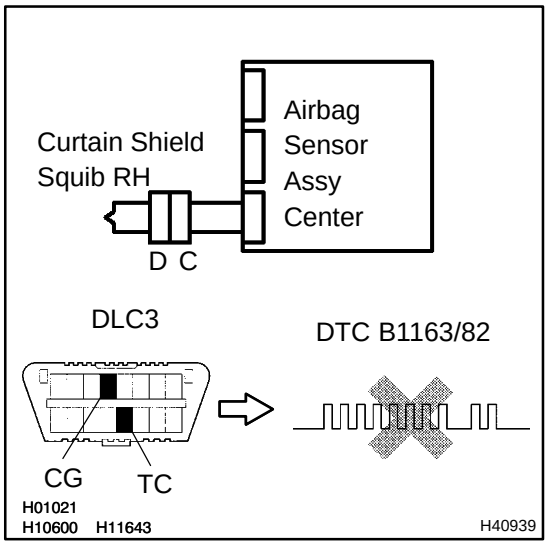
HINT:

Codes other than code B1163/82 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG SENSOR ASSY CENTER (SEE PAGE 60-53)**

OK

4	CHECK CURTAIN SHIELD AIR BAG ASSY RH(CURTAIN SHIELD SQUIB RH)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the service wire from connector "C".
(d) Connect the connector to the curtain shield airbag assy RH.
(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(g) Clear the DTCs stored in memory (see page 05-1215).
(h) Turn the ignition switch to the LOCK position.
(i) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(j) Check the DTCs (see page 05-1215).
OK:
DTC B1163/82 is not output.

HINT:
Codes other than code B1163/82 may be output at this time, but they are not related to this check.

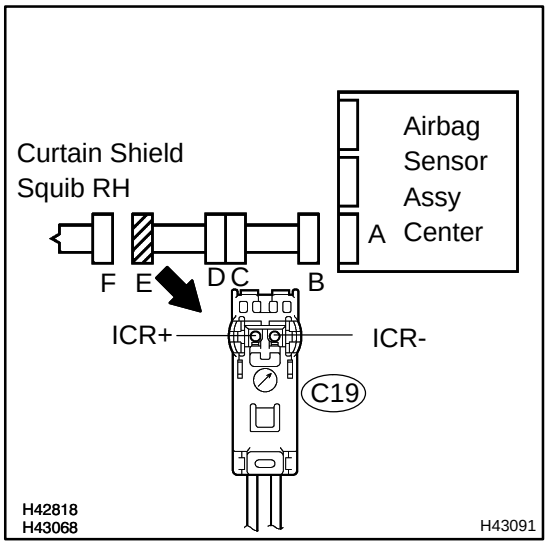
NG → **REPLACE CURTAIN SHIELD AIR BAG ASSY RH (SEE PAGE 60-38)**

OK

USE SIMULATION METHOD TO CHECK

HINT:
- Before performing the simulation method, check that the airbag sensor assy center is in check mode (see page 05-1218).
- Perform the simulation method by selecting the check mode with the hand-held tester (see page 05-1218).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05-1218).

5 CHECK CURTAIN SHIELD SQUIB (RH) CIRCUIT



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag sensor assy center and the curtain shield airbag assy RH.
(d) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(e) Turn the ignition switch to the ON position.
(f) Measure the voltage according to the value(s) in the table below.

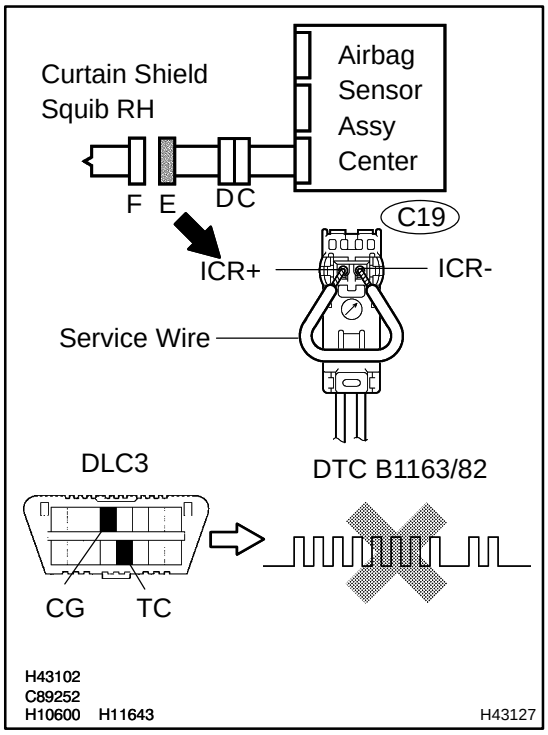
Standard:

Tester connection	Condition	Specified condition
C19-1 (ICR+) - Body ground	Ignition switch ON	Below 1 V
C19-2 (ICR-) - Body ground	Ignition switch ON	Below 1 V

NG → **Go to step 8**

OK

6	CHECK AIR BAG SENSOR ASSY CENTER



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Connect the connector to the airbag sensor assy center.
(d) Using a service wire, connect C19-1 (ICR+) and C19-2 (ICR-) of connector "E".

NOTICE:

- **Twist the end of the service wire in order to insert it into the connector.**
- **Do not forcibly insert the twisted service wire into the terminals of the connector when connecting.**

(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(g) Clear the DTCs stored in memory (see page 05-1215).
(h) Turn the ignition switch to the LOCK position.
(i) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(j) Check the DTCs (see page 05-1215).

OK:

DTC B1163/82 is not output.

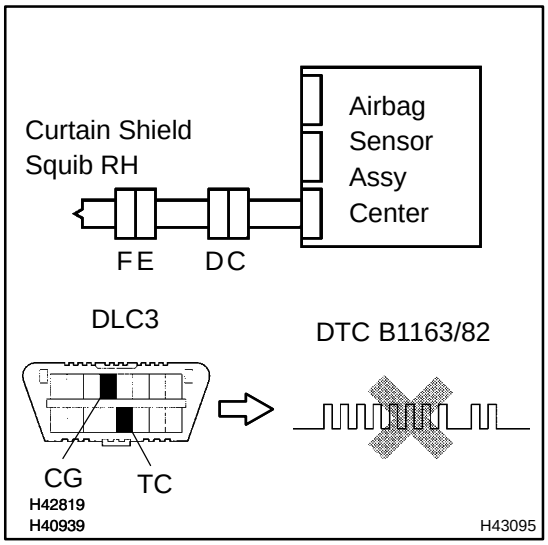
HINT:

Codes other than code B1163/82 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG SENSOR ASSY CENTER (SEE PAGE 60-53)**

OK

7	CHECK CURTAIN SHIELD AIR BAG ASSY RH(CURTAIN SHIELD SQUIB RH)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the service wire from connector "E".
(d) Connect the connector to the curtain shield airbag assy RH.
(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(g) Clear the DTCs stored in memory (see page 05-1215).
(h) Turn the ignition switch to the LOCK position.
(i) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(j) Check the DTCs (see page 05-1215).
OK:
DTC B1163/82 is not output.

HINT:
Codes other than code B1163/82 may be output at this time, but they are not related to this check.

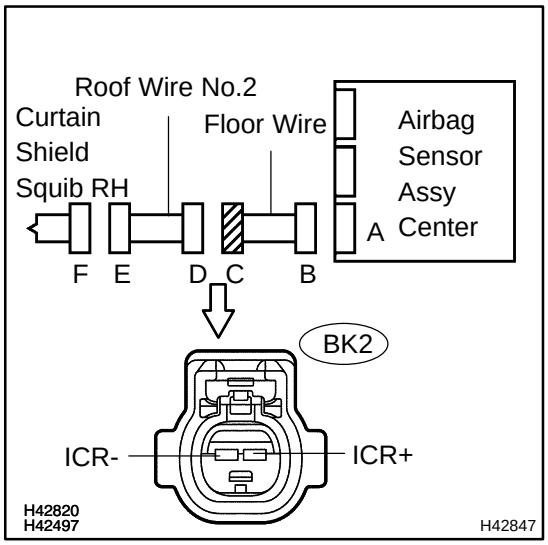
NG → **REPLACE CURTAIN SHIELD AIR BAG ASSY RH (SEE PAGE 60-38)**

OK →

USE SIMULATION METHOD TO CHECK

HINT:
- Before performing the simulation method, check that the airbag sensor assy center is in check mode (see page 05-1218).
- Perform the simulation method by selecting the check mode with the hand-held tester (see page 05-1218).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05-1218).

8 CHECK FLOOR WIRE



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the floor wire connector from the roof wire No.2.
(d) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(e) Turn the ignition switch to the ON position.
(f) Measure the voltage according to the value(s) in the table below.

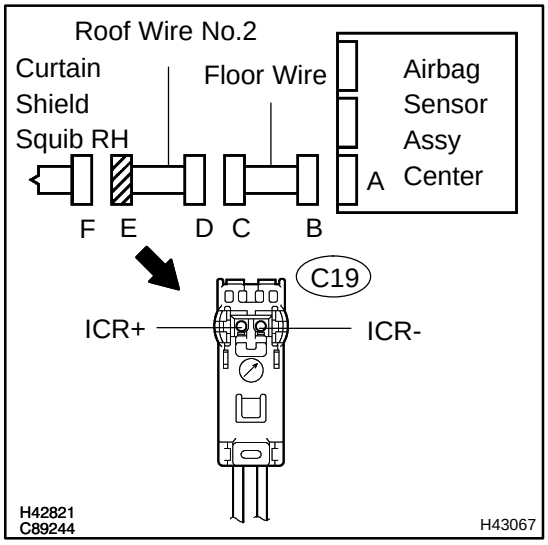
Standard:

Tester connection	Condition	Specified condition
BK2-2 (ICR+) - Body ground	Ignition switch ON	Below 1 V
BK2-1 (ICR-) - Body ground	Ignition switch ON	Below 1 V

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

9 CHECK ROOF WIRE NO.2



(a) Measure the voltage according to the value(s) in the table below when the ignition switch remains in the ON position.

Standard:

Tester connection	Condition	Specified condition
C19-1 (ICR+) - Body ground	Ignition switch ON	Below 1 V
C19-2 (ICR-) - Body ground	Ignition switch ON	Below 1 V

NG → **REPAIR OR REPLACE ROOF WIRE NO.2**

OK

USE SIMULATION METHOD TO CHECK

HINT:

- Before performing the simulation method, check that the airbag sensor assy center is in check mode (see page 05-1218).
- Perform the simulation method by selecting the check mode with the hand-held tester (see page 05-1218).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05-1218).

DTC	B1165/87	SHORT IN CURTAIN SHIELD SQUIB (LH) CIRCUIT

CIRCUIT DESCRIPTION

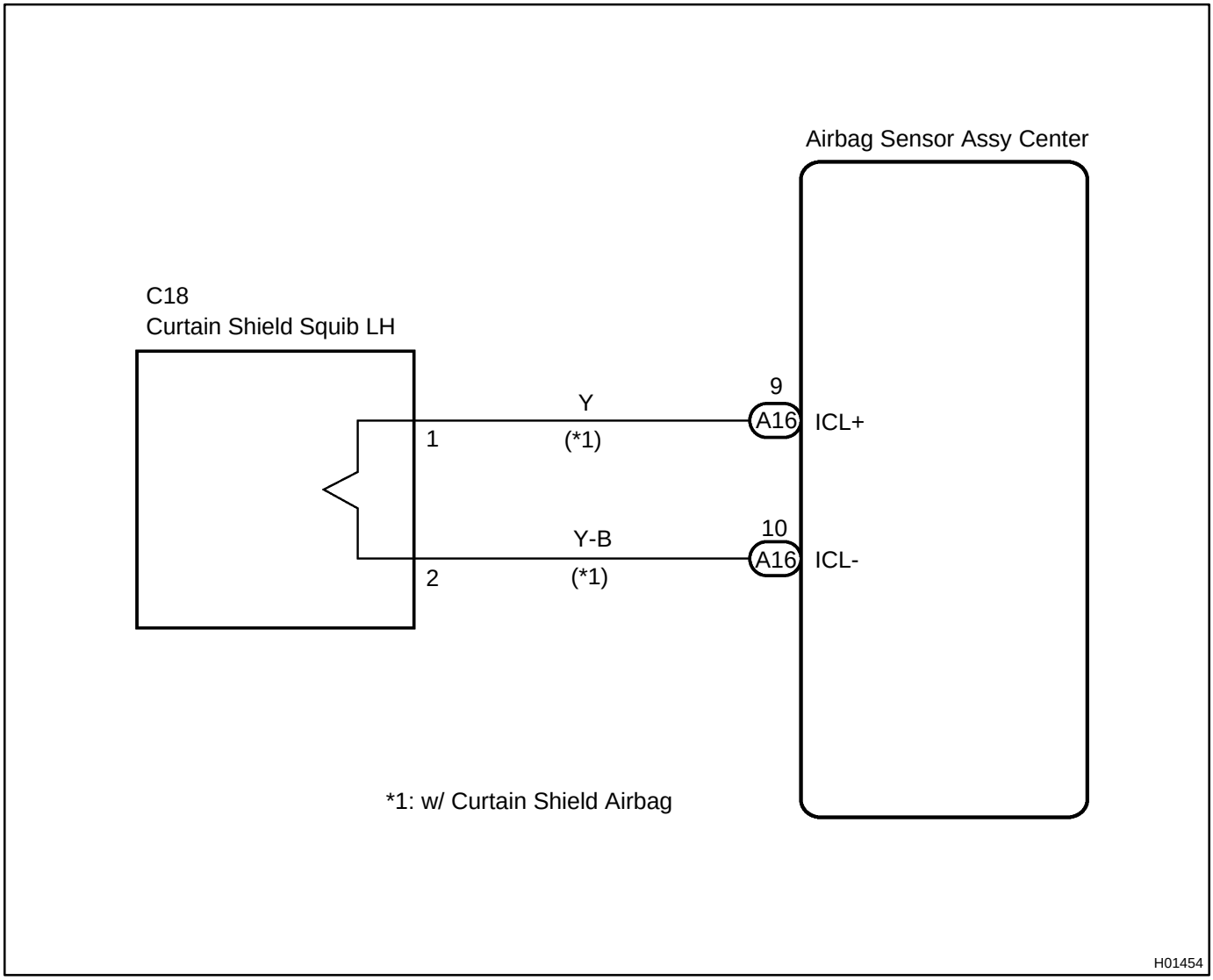
The curtain shield squib LH circuit consists of the airbag sensor assy center and the curtain shield airbag assy LH.

The circuit instructs the SRS to deploy when deployment conditions are met.

DTC B1165/87 is recorded when a short circuit is detected in the curtain shield squib LH circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1165/87	・Short circuit between ICL+ wire harness and ICL- wire harness of curtain shield squib LH ・Curtain shield squib LH malfunction ・Airbag sensor assy center malfunction	・Curtain shield airbag assy LH (Curtain shield squib LH) ・Airbag sensor assy center ・Floor wire No.2

WIRING DIAGRAM



INSPECTION PROCEDURE

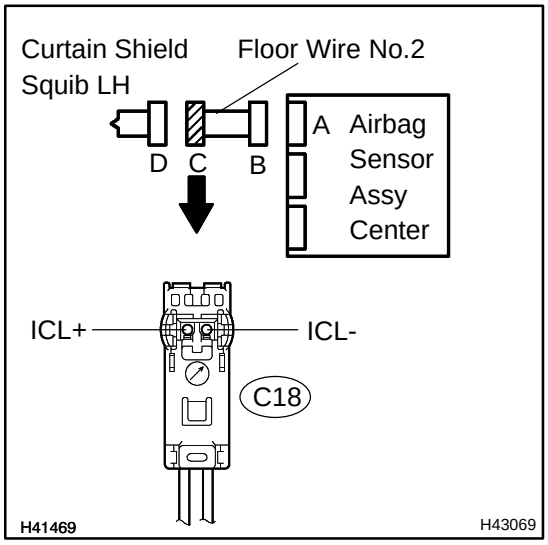
1	CHECK CONNECTOR

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Disconnect the connectors from the curtain shield airbag assy LH.
(d) Check that the floor wire No.2 connector (on the curtain shield airbag assy LH side) is not damaged.
OK:
The lock button is not disengaged, or the claw of the lock is not deformed or damaged.

NG → **REPAIR OR REPLACE FLOOR WIRE NO.2**

OK

2	CHECK FLOOR WIRE NO.2(CURTAIN SHIELD SQUIB LH CIRCUIT)



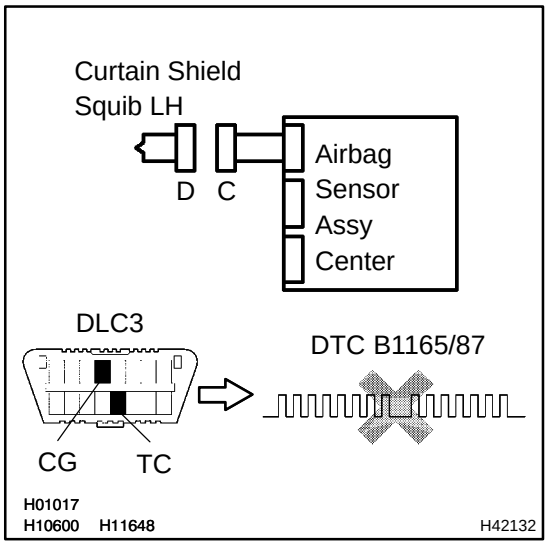
(a) Disconnect the connector from the airbag sensor assy center.
(b) Release the activation prevention mechanism built into connector "B" (see page 05-1207).
(c) Measure the resistance according to the value(s) in the table below.
Standard:

Tester connection	Condition	Specified condition
C18-1 (ICL+) - C18-2 (ICL-)	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FLOOR WIRE NO.2**

OK

3	CHECK AIR BAG SENSOR ASSY CENTER



(a) Connect the connector to the airbag sensor assy center.
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(d) Clear the DTCs stored in memory (see page 05-1215).
(e) Turn the ignition switch to the LOCK position.
(f) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(g) Check the DTCs (see page 05-1215).

OK:

DTC B1165/87 is not output.

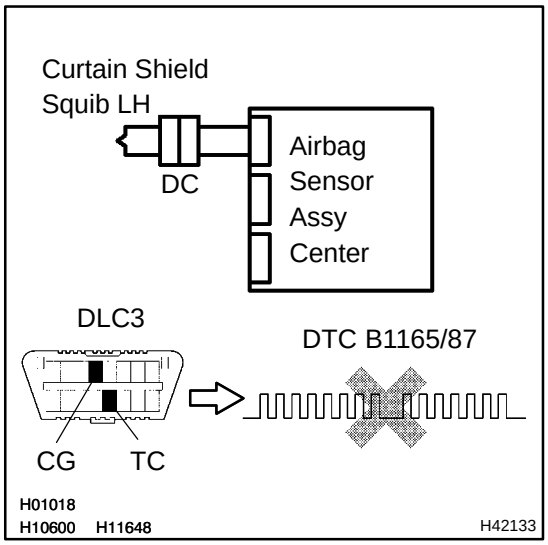
HINT:

Codes other than code B1165/87 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG SENSOR ASSY CENTER (SEE PAGE 60-53)**

OK

4	CHECK CURTAIN SHIELD AIR BAG ASSY LH(CURTAIN SHIELD SQUIB LH)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Connect the connector to the curtain shield airbag assy LH.
(d) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(e) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(f) Clear the DTCs stored in memory (see page 05-1215).
(g) Turn the ignition switch to the LOCK position.
(h) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(i) Check the DTCs (see page 05-1215).

OK:

DTC B1165/87 is not output.

HINT:

Codes other than code B1165/87 may be output at this time, but they are not related to this check.

NG	REPLACE CURTAIN SHIELD AIR BAG ASSY LH (SEE PAGE 60-38)

OK

USE SIMULATION METHOD TO CHECK

HINT:

- Before performing the simulation method, check that the airbag sensor assy center is in check mode (see page 05-1218).
- Perform the simulation method by selecting the check mode with the hand-held tester (see page 05-1218).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05-1218).

DTC	B1166/88	OPEN IN CURTAIN SHIELD SQUIB (LH) CIRCUIT

CIRCUIT DESCRIPTION

The curtain shield squib LH circuit consists of the airbag sensor assy center and the curtain shield airbag assy LH.
The circuit instructs the SRS to deploy when deployment conditions are met.
DTC B1166/88 is recorded when an open circuit is detected in the curtain shield squib LH circuit.

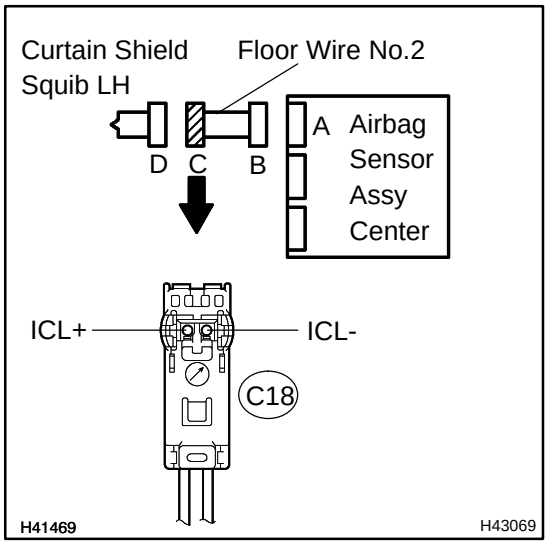
DTC No.	DTC Detecting Condition	Trouble Area
B1166/88	・Open circuit in ICL+ wire harness or ICL- wire harness of curtain shield squib LH ・Curtain shield squib LH malfunction ・Airbag sensor assy center malfunction	・Curtain shield airbag assy LH (Curtain shield squib LH) ・Airbag sensor assy center ・Floor wire No.2

WIRING DIAGRAM

see page 05-1403 .

INSPECTION PROCEDURE

1	CHECK FLOOR WIRE NO.2(CURTAIN SHIELD SQUIB LH CIRCUIT)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag sensor assy center and the curtain shield airbag assy LH.
(d) Measure the resistance according to the value(s) in the table below.

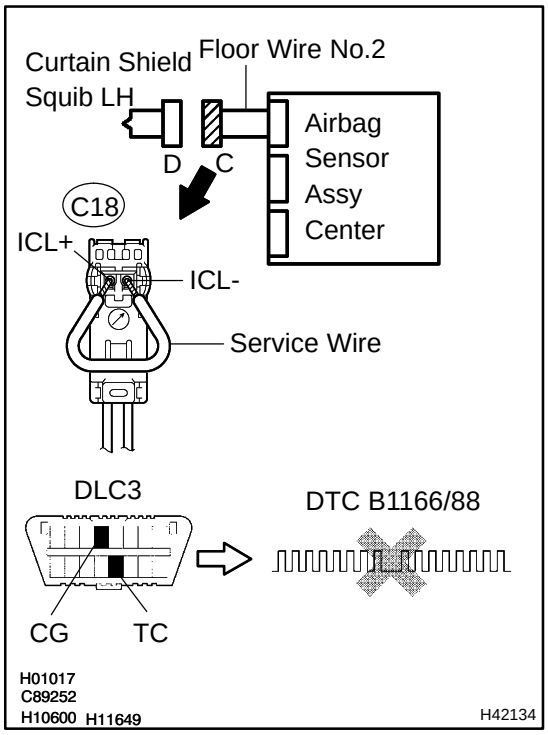
Standard:

Tester connection	Condition	Specified condition
C18-1 (ICL+) - C18-2 (ICL-)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE FLOOR WIRE NO.2**

OK

2 CHECK AIR BAG SENSOR ASSY CENTER



(a) Connect the connector to the airbag sensor assy center.
(b) Using a service wire, connect C18-1 (ICL+) and C18-2 (ICL-) of connector "C".

NOTICE:

* **Twist the end of the service wire in order to insert it into the connector.**
* **Do not forcibly insert the twisted service wire into the terminals of the connector when connecting.**

(c) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Clear the DTCs stored in memory (see page 05-1215).
(f) Turn the ignition switch to the LOCK position.
(g) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(h) Check the DTCs (see page 05-1215).

OK:

DTC B1166/88 is not output.

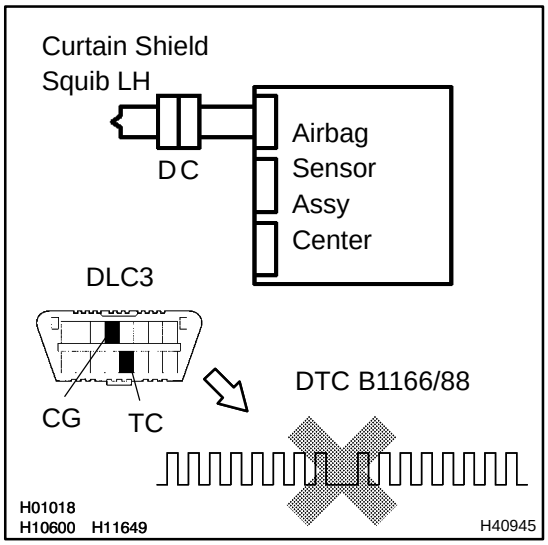
HINT:

Codes other than code B1166/88 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG SENSOR ASSY CENTER (SEE PAGE 60-53)**

OK

3	CHECK CURTAIN SHIELD AIR BAG ASSY LH(CURTAIN SHIELD SQUIB LH)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the service wire from connector "C".
(d) Connect the connector to the curtain shield airbag assy LH.
(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(g) Clear the DTCs stored in memory (see page 05-1215).
(h) Turn the ignition switch to the LOCK position.
(i) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(j) Check the DTCs (see page 05-1215).
OK:
DTC B1166/88 is not output.

HINT:
Codes other than code B1166/88 may be output at this time, but they are not related to this check.

NG → **REPLACE CURTAIN SHIELD AIR BAG ASSY LH (SEE PAGE 60-38)**

OK →

USE SIMULATION METHOD TO CHECK

HINT:
- Before performing the simulation method, check that the airbag sensor assy center is in check mode (see page 05-1218).
- Perform the simulation method by selecting the check mode with the hand-held tester (see page 05-1218).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05-1218).

DTC	B1167/85	SHORT IN CURTAIN SHIELD SQUIB (LH) CIRCUIT (TO GROUND)

CIRCUIT DESCRIPTION

The curtain shield squib LH circuit consists of the airbag sensor assy center and the curtain shield airbag assy LH.
The circuit instructs the SRS to deploy when deployment conditions are met.
DTC B1167/85 is recorded when a short to ground is detected in the curtain shield squib LH circuit.

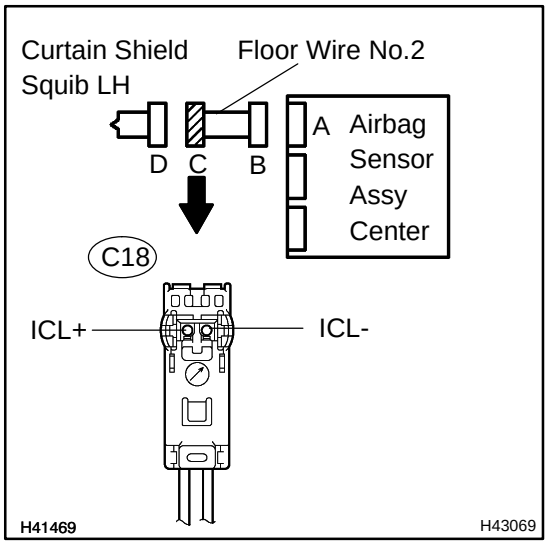
DTC No.	DTC Detecting Condition	Trouble Area
B1167/85	・Short circuit in curtain shield squib LH wire harness (to ground) ・Curtain shield squib LH malfunction ・Airbag sensor assy malfunction	・Curtain shield airbag assy LH (Curtain shield squib LH) ・Airbag sensor assy center ・Floor wire No.2

WIRING DIAGRAM

see page 05-1403 .

INSPECTION PROCEDURE

1	CHECK FLOOR WIRE NO.2(CURTAIN SHIELD SQUIB LH CIRCUIT)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag sensor assy center and the curtain shield airbag assy LH.
(d) Measure the resistance according to the value(s) in the table below.

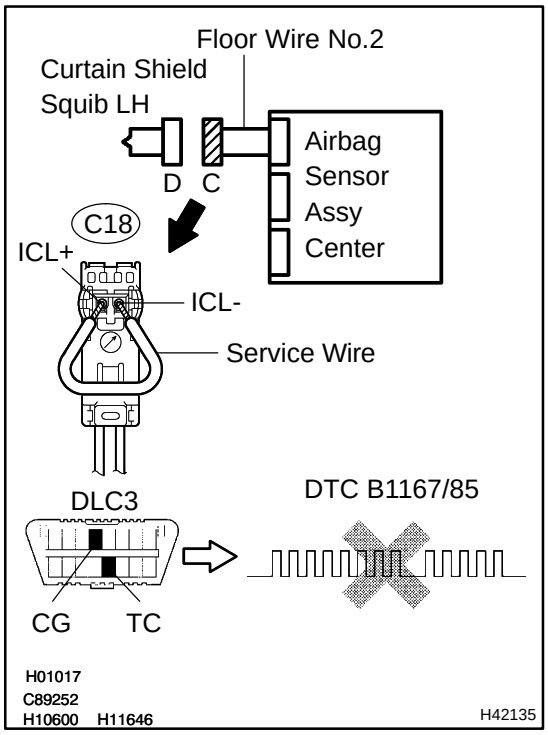
Standard:

Tester connection	Condition	Specified condition
C18-1 (ICL+) - Body ground	Always	1 MΩ or Higher
C18-2 (ICL-) - Body ground	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FLOOR WIRE NO.2**

OK

2	CHECK AIR BAG SENSOR ASSY CENTER



(a) Connect the connector to the airbag sensor assy center.
(b) Using a service wire, connect C18-1 (ICL+) and C18-2 (ICL-) of connector "C".

NOTICE:

* **Twist the end of the service wire in order to insert it into the connector.**
* **Do not forcibly insert the twisted service wire into the terminals of the connector when connecting.**

(c) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Clear the DTCs stored in memory (see page 05-1215).
(f) Turn the ignition switch to the LOCK position.
(g) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(h) Check the DTCs (see page 05-1215).

OK:

DTC B1167/85 is not output.

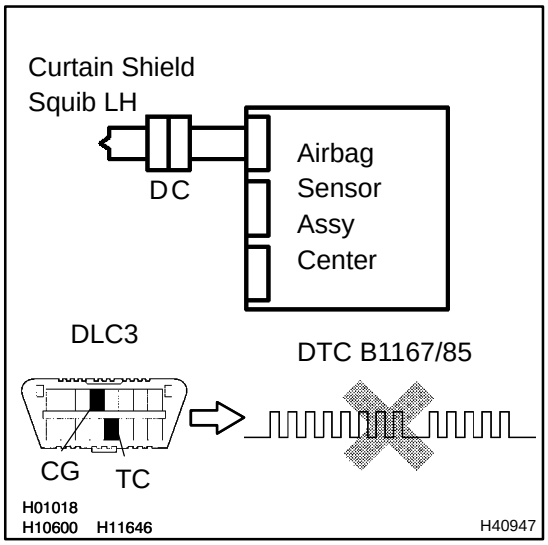
HINT:

Codes other than code B1167/85 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG SENSOR ASSY CENTER (SEE PAGE 60-53)**

OK

3	CHECK CURTAIN SHIELD AIR BAG ASSY LH(CURTAIN SHIELD SQUIB LH)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the service wire from connector "C".
(d) Connect the connector to the curtain shield airbag assy LH.
(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(g) Clear the DTCs stored in memory (see page 05-1215).
(h) Turn the ignition switch to the LOCK position.
(i) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(j) Check the DTCs (see page 05-1215).
OK:
DTC B1167/85 is not output.

HINT:
Codes other than code B1167/85 may be output at this time, but they are not related to this check.

NG → **REPLACE CURTAIN SHIELD AIR BAG ASSY LH (SEE PAGE 60-38)**

OK

USE SIMULATION METHOD TO CHECK

HINT:
- Before performing the simulation method, check that the airbag sensor assy center is in check mode (see page 05-1218).
- Perform the simulation method by selecting the check mode with the hand-held tester (see page 05-1218).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05-1218).

DTC	B1168/86	SHORT IN CURTAIN SHIELD SQUIB (LH) CIRCUIT (TO B+)

CIRCUIT DESCRIPTION

The curtain shield squib LH circuit consists of the airbag sensor assy center and the curtain shield airbag assy LH.
The circuit instructs the SRS to deploy when deployment conditions are met.
DTC B1168/86 is recorded when a short to B+ is detected in the curtain shield squib LH circuit.

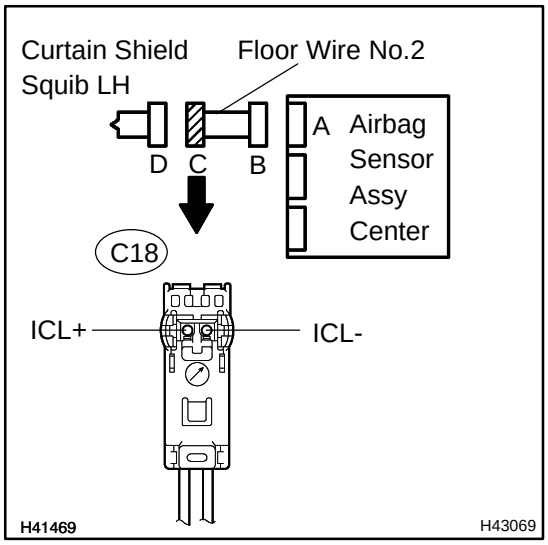
DTC No.	DTC Detecting Condition	Trouble Area
B1168/86	・Short circuit in curtain shield squib LH wire harness (to B+) ・Curtain shield squib LH malfunction ・Airbag sensor assy center malfunction	・Curtain shield airbag assy LH (Curtain shield squib LH) ・Airbag sensor assy center ・Floor wire No.2

WIRING DIAGRAM

see page 05-1403 .

INSPECTION PROCEDURE

1	CHECK FLOOR WIRE NO.2(CURTAIN SHIELD SQUIB LH CIRCUIT)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag sensor assy center and the curtain shield airbag assy LH.
(d) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(e) Turn the ignition switch to the ON position.
(f) Measure the voltage according to the value(s) in the table below.

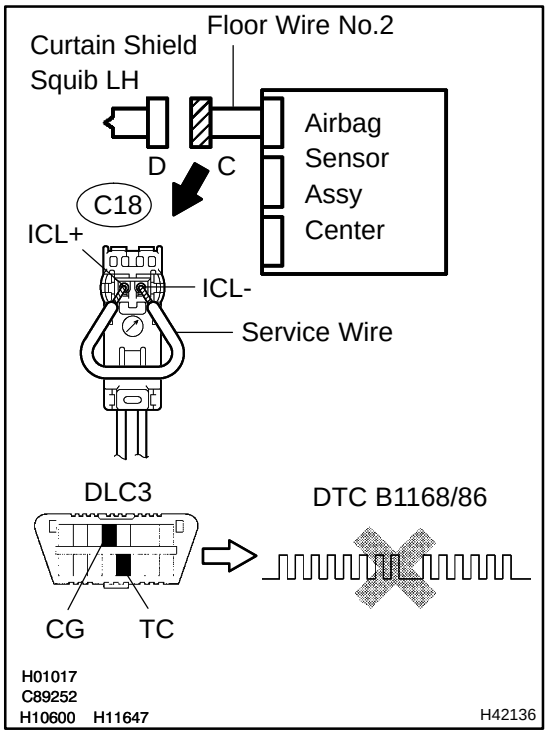
Standard:

Tester connection	Condition	Specified condition
C18-1 (ICL+) - Body ground	Ignition switch ON	Below 1 V
C18-2 (ICL-) - Body ground	Ignition switch ON	Below 1 V

NG → **REPAIR OR REPLACE FLOOR WIRE NO.2**

OK

2 CHECK AIR BAG SENSOR ASSY CENTER



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Connect the connector to the airbag sensor assy center.
(d) Using a service wire, connect C18-1 (ICL+) and C18-2 (ICL-) of connector "C".

NOTICE:

- **Twist the end of the service wire in order to insert it into the connector.**
- **Do not forcibly insert the twisted service wire into the terminals of the connector when connecting.**

(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(g) Clear the DTCs stored in memory (see page 05-1215).
(h) Turn the ignition switch to the LOCK position.
(i) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(j) Check the DTCs (see page 05-1215).

OK:

DTC B1168/86 is not output.

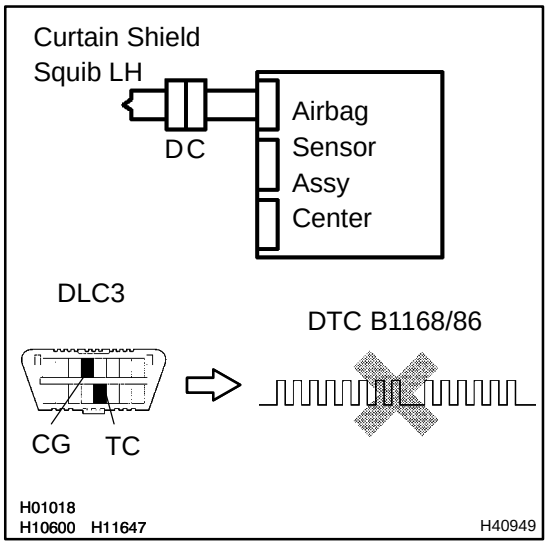
HINT:

Codes other than code B1168/86 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG SENSOR ASSY CENTER (SEE PAGE 60-53)**

OK

3 CHECK CURTAIN SHIELD AIR BAG ASSY LH(CURTAIN SHIELD SQUIB LH)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the service wire from connector "C".
(d) Connect the connector to the curtain shield airbag assy LH.
(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(g) Clear the DTCs stored in memory (see page 05-1215).
(h) Turn the ignition switch to the LOCK position.
(i) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(j) Check the DTCs (see page 05-1215).

OK:

DTC B1168/86 is not output.

HINT:

Codes other than code B1168/86 may be output at this time, but they are not related to this check.

NG → **REPLACE CURTAIN SHIELD AIR BAG ASSY LH (SEE PAGE 60-38)**

OK

USE SIMULATION METHOD TO CHECK

HINT:

- Before performing the simulation method, check that the airbag sensor assy center is in check mode (see page 05-1218).
- Perform the simulation method by selecting the check mode with the hand-held tester (see page 05-1218).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05-1218).

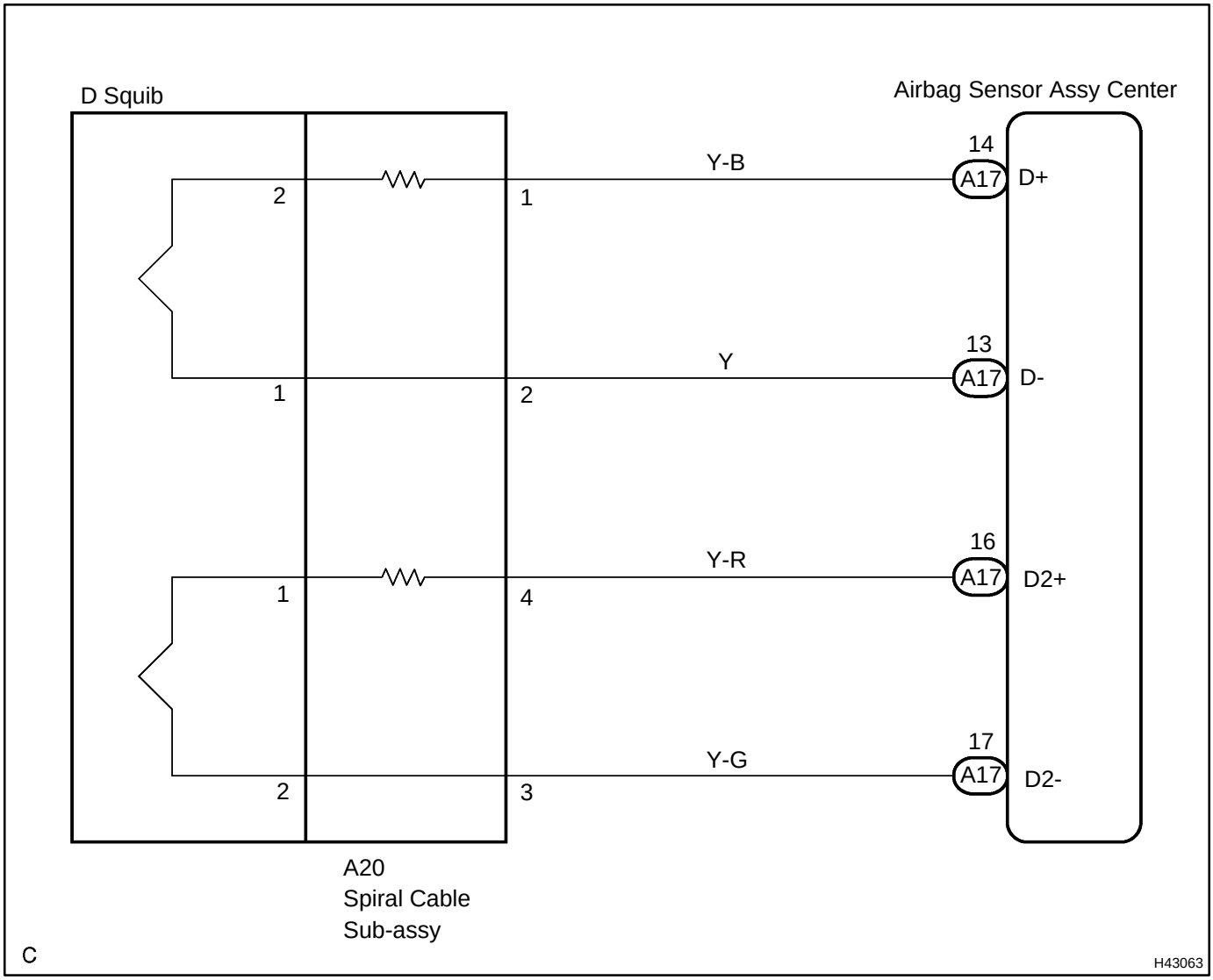
DTC	B1180/17	SHORT IN D SQUIB (DUAL STAGE - 2ND STEP) CIRCUIT

CIRCUIT DESCRIPTION

The D squib (Dual stage - 2nd step) circuit consists of the airbag sensor assy center, the spiral cable sub-assy and the horn button assy.
The circuit instructs the SRS to deploy when deployment conditions are met.
DTC B1180/17 is recorded when a short circuit is detected in the D squib (Dual stage - 2nd step) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1180/17	・Short circuit between D2+ wire harness and D2- wire harness of D squib (Dual stage - 2nd step) ・D squib (Dual stage - 2nd step) malfunction ・Spiral cable sub-assy malfunction ・Airbag sensor assy center malfunction	・Horn button assy (D squib, Dual stage - 2nd step) ・Spiral cable sub-assy ・Airbag sensor assy center ・Cowl wire

WIRING DIAGRAM



INSPECTION PROCEDURE

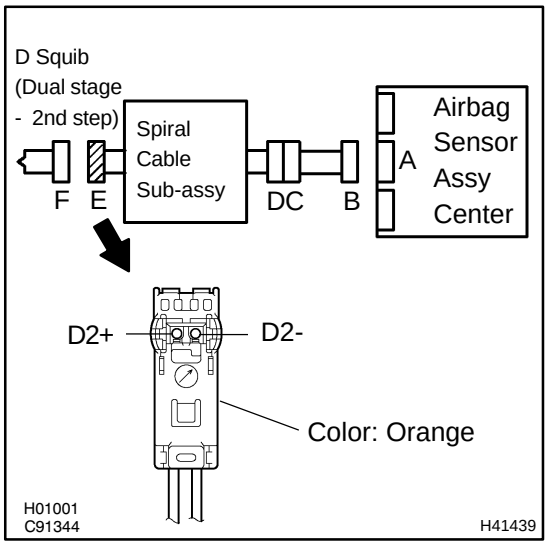
1	CHECK CONNECTOR

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the horn button assy.
(d) Check that the spiral cable sub-assy connectors (on the horn button assy side) are not damaged.
OK:
The lock button is not disengaged, or the claw of the lock is not deformed or damaged.

NG → **REPLACE SPIRAL CABLE SUB-ASSY (SEE PAGE 60-26)**

OK

2	CHECK D SQUIB CIRCUIT(DUAL STAGE - 2ND STEP, AIRBAG SENSOR ASSY CENTER - HORN BUTTON ASSY)



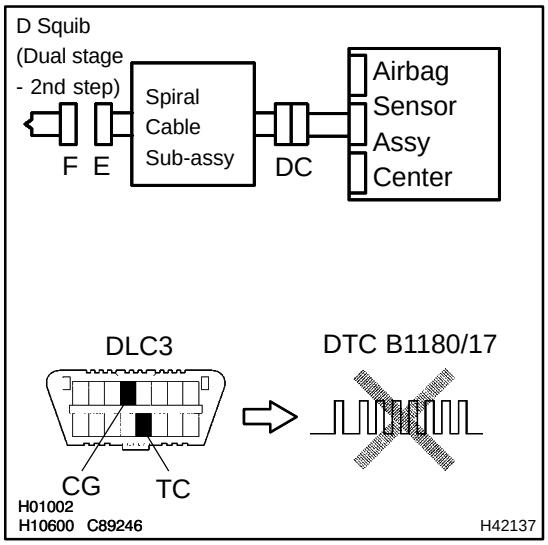
(a) Disconnect the connector from the airbag sensor assy center.
(b) Release the activation prevention mechanism built into connector "B" (see page 05-1207).
(c) Measure the resistance according to the value(s) in the table below.
Standard:

Tester connection	Condition	Specified condition
D2+ - D2-	Always	1 MΩ or Higher

NG → **Go to step 5**

OK

3	CHECK AIR BAG SENSOR ASSY CENTER



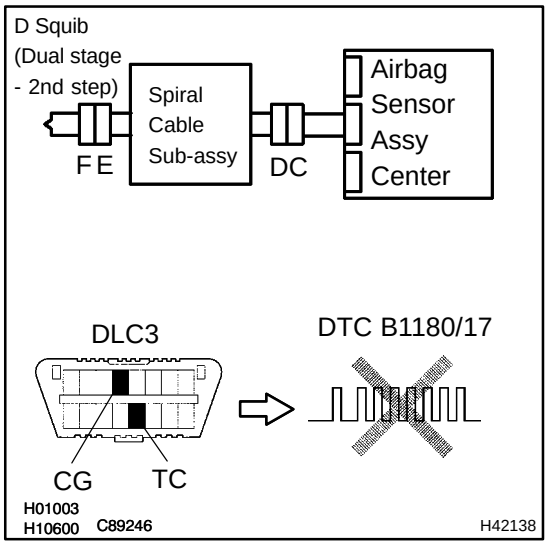
(a) Connect the connector to the airbag sensor assy center.
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(d) Clear the DTCs stored in memory (see page 05-1215).
(e) Turn the ignition switch to the LOCK position.
(f) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(g) Check the DTCs (see page 05-1215).
OK:
DTC B1180/17 is not output.

HINT:
Codes other than code B1180/17 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG SENSOR ASSY CENTER (SEE PAGE 60-53)**

OK

4 CHECK HORN BUTTON ASSY(D SQUIB, DUAL STAGE - 2ND STEP)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Connect the connectors to the horn button assy.
(d) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(e) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(f) Clear the DTCs stored in memory (see page 05-1215).
(g) Turn the ignition switch to the LOCK position.
(h) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(i) Check the DTCs (see page 05-1215).

OK:

DTC B1180/17 is not output.

HINT:

Codes other than code B1180/17 may be output at this time, but they are not related to this check.

NG → **REPLACE HORN BUTTON ASSY (SEE PAGE 60-17)**

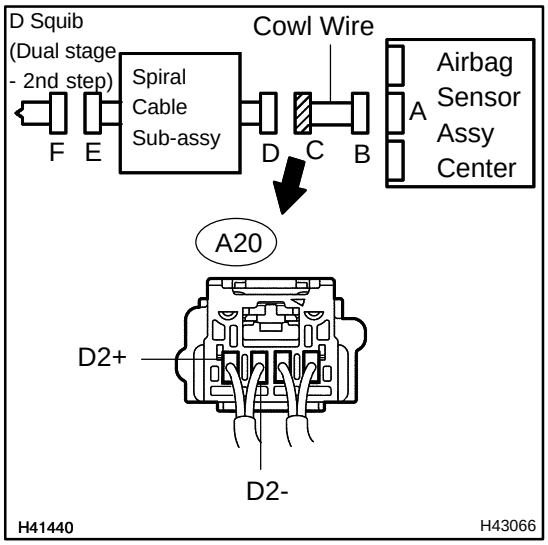
OK

USE SIMULATION METHOD TO CHECK

HINT:

- Before performing the simulation method, check that the airbag sensor assy center is in check mode (see page 05-1218).
- Perform the simulation method by selecting the check mode with the hand-held tester (see page 05-1218).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05-1218).

5 CHECK COWL WIRE



(a) Disconnect the cowl wire connector from the spiral cable sub-assy .

HINT:

The activation prevention mechanism of connector "B" has already been released.

(b) Measure the resistance according to the value(s) in the table below.

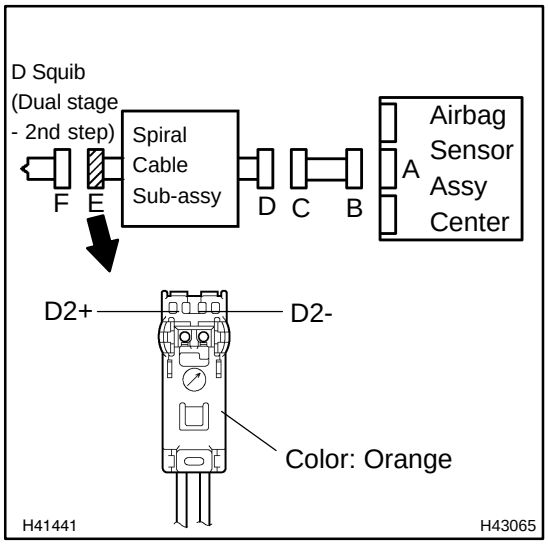
Standard:

Tester connection	Condition	Specified condition
A20-4 (D2+) - A20-3 (D2-)	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE COWL WIRE**

OK

6 CHECK SPIRAL CABLE SUB-ASSY



(a) Release the activation prevention mechanism built into connector "D" (see page 05-1207).

(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
D2+ - D2-	Always	1 MΩ or Higher

NG → **REPLACE SPIRAL CABLE SUB-ASSY (SEE PAGE 60-26)**

OK

USE SIMULATION METHOD TO CHECK

HINT:

- Before performing the simulation method, check that the airbag sensor assy center is in check mode (see page 05-1218).
- Perform the simulation method by selecting the check mode with the hand-held tester (see page 05-1218).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05-1218).

DTC	B1181/18	OPEN IN D SQUIB (DUAL STAGE - 2ND STEP) CIRCUIT

CIRCUIT DESCRIPTION

The D squib (Dual stage - 2nd step) circuit consists of the airbag sensor assy center, the spiral cable sub-assy and the horn button assy.
The circuit instructs the SRS to deploy when deployment conditions are met.
DTC B1182/19 is recorded when a short to ground is detected in the D squib (Dual stage - 2nd step) circuit.

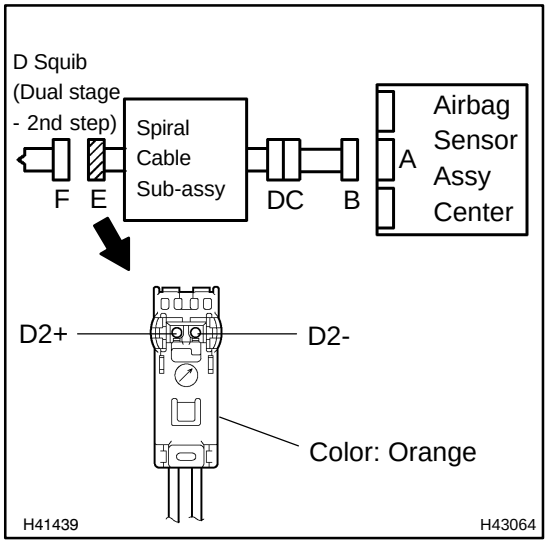
DTC No.	DTC Detecting Condition	Trouble Area
B1182/19	・Short circuit in D squib (Dual stage - 2nd step) wire harness (to ground) ・D squib (Dual stage - 2nd step) malfunction ・Spiral cable sub-assy malfunction ・Airbag sensor assy center malfunction	・Horn button assy (D squib, Dual stage - 2nd step) ・Spiral cable sub-assy ・Airbag sensor assy center ・Cowl wire

WIRING DIAGRAM

see page 05-1416 .

INSPECTION PROCEDURE

1	CHECK D SQUIB CIRCUIT(DUAL STAGE - 2ND STEP, AIRBAG SENSOR ASSY CENTER - HORN BUTTON ASSY)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag sensor assy center and the horn button assy.
(d) Measure the resistance according to the value(s) in the table below.

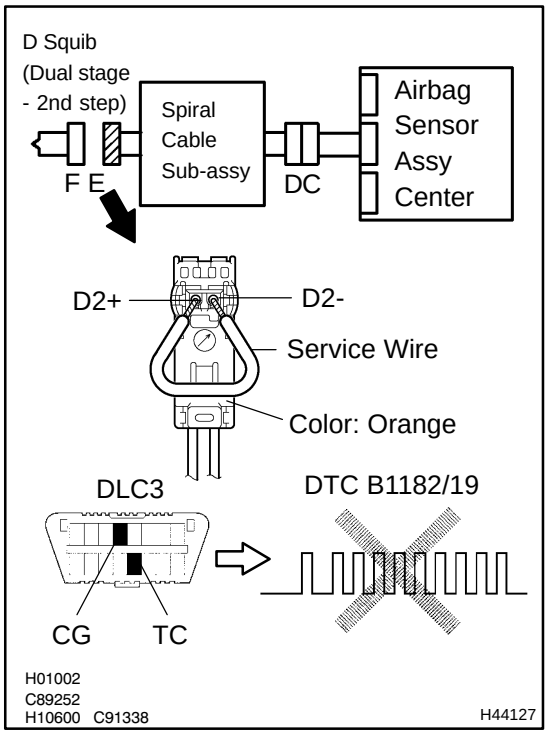
Standard:

Tester connection	Condition	Specified condition
D2+ - D2-	Always	Below 1 Ω

NG → **Go to step 4**

OK

2 CHECK AIR BAG SENSOR ASSY CENTER



(a) Connect the connector to the airbag sensor assy center.
(b) Using a service wire, connect D2+ and D2- of connector "E".

NOTICE:

- **Twist the end of the service wire in order to insert it into the connector.**
- **Do not forcibly insert the twisted service wire into the terminals, of the connector when connecting.**

(c) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Clear the DTCs stored in memory (see page 05-1215).
(f) Turn the ignition switch to the LOCK position.
(g) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(h) Check the DTCs (see page 05-1215).

OK:

DTC B1182/19 is not output.

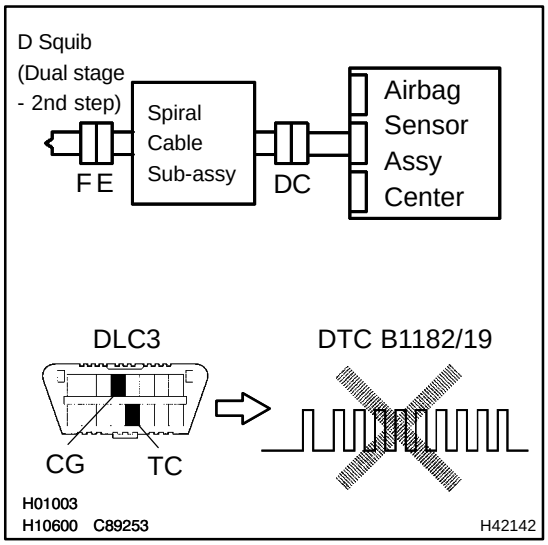
HINT:

Codes other than code B1182/19 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG SENSOR ASSY CENTER (SEE PAGE 60-53)**

OK

3 CHECK HORN BUTTON ASSY(D SQUIB, DUAL STAGE - 2ND STEP)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the service wire from connector "E".
(d) Connect the connectors to the horn button assy.
(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(g) Clear the DTCs stored in memory (see page 05-1215).
(h) Turn the ignition switch to the LOCK position.
(i) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(j) Check the DTCs (see page 05-1215).

OK:

DTC B1182/19 is not output.

HINT:

Codes other than code B1182/19 may be output at this time, but they are not related to this check.

NG	REPLACE HORN BUTTON ASSY (SEE PAGE 60-17)

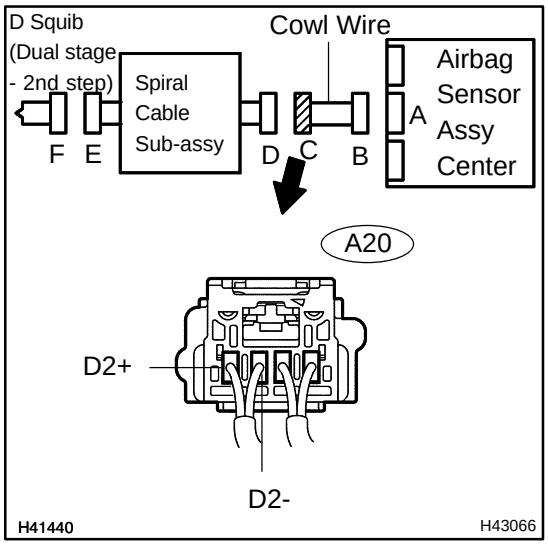
OK

USE SIMULATION METHOD TO CHECK

HINT:

- Before performing the simulation method, check that the airbag sensor assy center is in check mode (see page 05-1218).
- Perform the simulation method by selecting the check mode with the hand-held tester (see page 05-1218).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05-1218).

4 CHECK COWL WIRE



(a) Disconnect the cowl wire connector from the spiral cable sub-assy .

(b) Measure the resistance according to the value(s) in the table below.

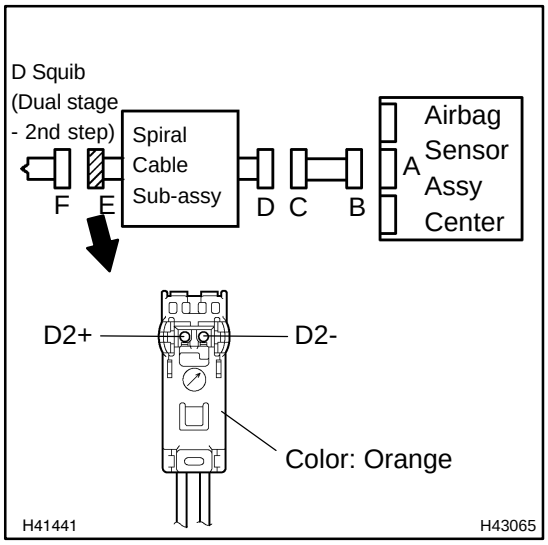
Standard:

Tester connection	Condition	Specified condition
A20-4 (D2+) - A20-3 (D2-)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE COWL WIRE**

OK

5 CHECK SPIRAL CABLE SUB-ASSY



(a) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
D2+ - D2-	Always	Below 1 Ω

NG → **REPLACE SPIRAL CABLE SUB-ASSY (SEE PAGE 60-26)**

OK

USE SIMULATION METHOD TO CHECK

HINT:

- Before performing the simulation method, check that the airbag sensor assy center is in check mode (see page 05-1218).
- Perform the simulation method by selecting the check mode with the hand-held tester (see page 05-1218).
- After selecting the check mode, perform the simulation method by wiggling each connector of the air-bag system or driving the vehicle on a city or rough road (see page 05-1218).

DTC	B1182/19	SHORT IN D SQUIB (DUAL STAGE - 2ND STEP) CIRCUIT (TO GROUND)

CIRCUIT DESCRIPTION

The D squib (Dual stage - 2nd step) circuit consists of the airbag sensor assy center, the spiral cable sub-assy and the horn button assy.
The circuit instructs the SRS to deploy when deployment conditions are met.
DTC B1182/19 is recorded when a short to ground is detected in the D squib (Dual stage - 2nd step) circuit.

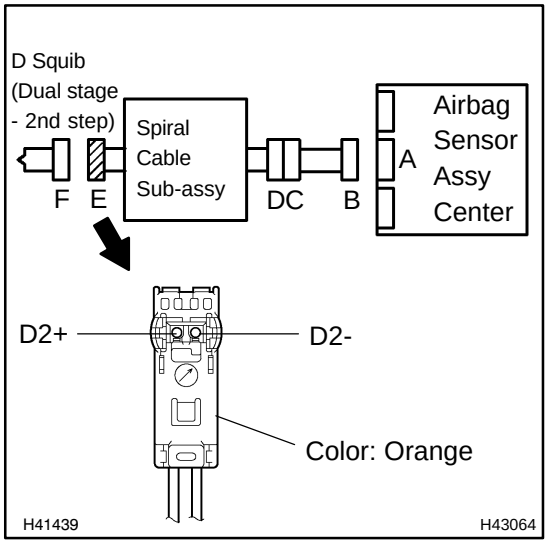
DTC No.	DTC Detecting Condition	Trouble Area
B1182/19	・Short circuit in D squib (Dual stage - 2nd step) wire harness (to ground) ・D squib (Dual stage - 2nd step) malfunction ・Spiral cable sub-assy malfunction ・Airbag sensor assy center malfunction	・Horn button assy (D squib, Dual stage - 2nd step) ・Spiral cable sub-assy ・Airbag sensor assy center ・Cowl wire

WIRING DIAGRAM

see page 05-1416 .

INSPECTION PROCEDURE

1	CHECK D SQUIB CIRCUIT(DUAL STAGE - 2ND STEP, AIRBAG SENSOR ASSY CENTER - HORN BUTTON ASSY)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag sensor assy center and the horn button assy.
(d) Measure the resistance according to the value(s) in the table below.

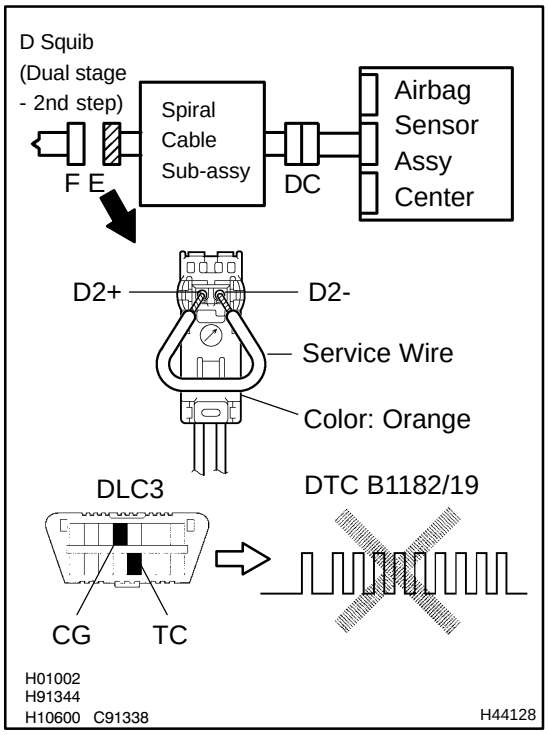
Standard:

Tester connection	Condition	Specified condition
D2+ - Body ground	Always	1 MΩ or Higher
D2- - Body ground	Always	1 MΩ or Higher

NG → **Go to step 4**

OK

2 CHECK AIR BAG SENSOR ASSY CENTER



(a) Connect the connector to the airbag sensor assy center.
(b) Using a service wire, connect D2+ and D2- of connector "E".

NOTICE:

- **Twist the end of the service wire in order to insert it into the connector.**
- **Do not forcibly insert the twisted service wire into the terminals of the connector when connecting.**

(c) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Clear the DTCs stored in memory (see page 05-1215).
(f) Turn the ignition switch to the LOCK position.
(g) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(h) Check the DTCs (see page 05-1215).

OK:

DTC B1182/19 is not output.

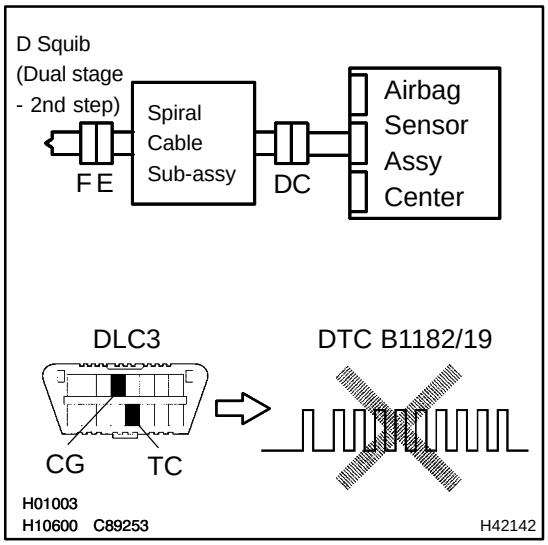
HINT:

Codes other than code B1182/19 may be output at this time, but they are not related to this check.

NG	**REPLACE AIR BAG SENSOR ASSY CENTER (SEE PAGE 60-53)**

OK

3 CHECK HORN BUTTON ASSY(D SQUIB, DUAL STAGE - 2ND STEP)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the service wire from connector "E".
(d) Connect the connectors to the horn button assy.
(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(g) Clear the DTCs stored in memory (see page 05-1215).
(h) Turn the ignition switch to the LOCK position.
(i) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(j) Check the DTCs (see page 05-1215).

OK:

DTC B1182/19 is not output.

HINT:

Codes other than code B1182/19 may be output at this time, but they are not related to this check.

NG	REPLACE HORN BUTTON ASSY (SEE PAGE 60-17)

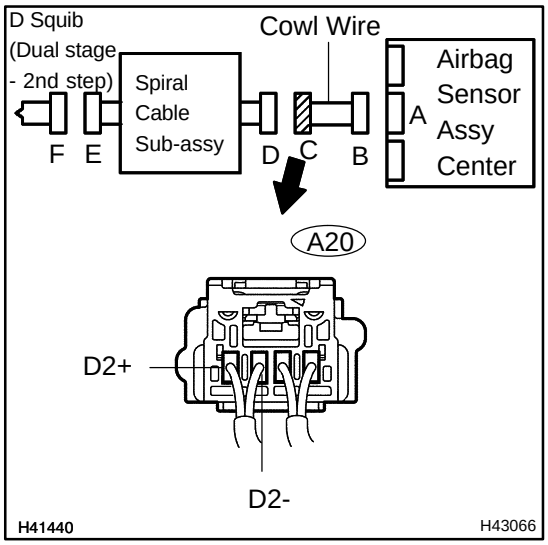
OK

USE SIMULATION METHOD TO CHECK

HINT:

- Before performing the simulation method, check that the airbag sensor assy center is in check mode (see page 05-1218).
- Perform the simulation method by selecting the check mode with the hand-held tester (see page 05-1218).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05-1218).

4 CHECK COWL WIRE



(a) Disconnect the cowl wire connector from the spiral cable sub-assy .

(b) Measure the resistance according to the value(s) in the table below.

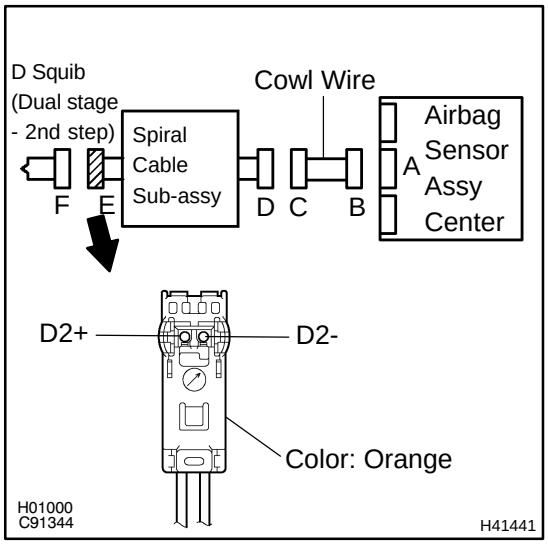
Standard:

Tester connection	Condition	Specified condition
A20-4 (D2+) - Body ground	Always	1 MΩ or Higher
A20-3 (D2-) - Body ground	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE COWL WIRE**

OK

5 CHECK SPIRAL CABLE SUB-ASSY



(a) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
D2+ - Body ground	Always	1 MΩ or Higher
D2- - Body ground	Always	1 MΩ or Higher

NG → **REPAIR SPIRAL CABLE SUB-ASSY (SEE PAGE 60-26)**

OK

USE SIMULATION METHOD TO CHECK

HINT:

- Before performing the simulation method, check that the airbag sensor assy center is in check mode (see page 05-1218).
- Perform the simulation method by selecting the check mode with the hand-held tester (see page 05-1218).
- After selecting the check mode, perform the simulation method by wiggling each connector of the air-bag system or driving the vehicle on a city or rough road (see page 05-1218).

DTC	B1183/22	SHORT IN D SQUIB (DUAL STAGE - 2ND STEP) CIRCUIT (TO B+)

CIRCUIT DESCRIPTION

The D squib (Dual stage - 2nd step) circuit consists of the airbag sensor assy center, the spiral cable sub-assy and the horn button assy.
The circuit instructs the SRS to deploy when deployment conditions are met.
DTC B1183/22 is recorded when a short to B+ is detected in the D squib (Dual stage - 2nd step) circuit.

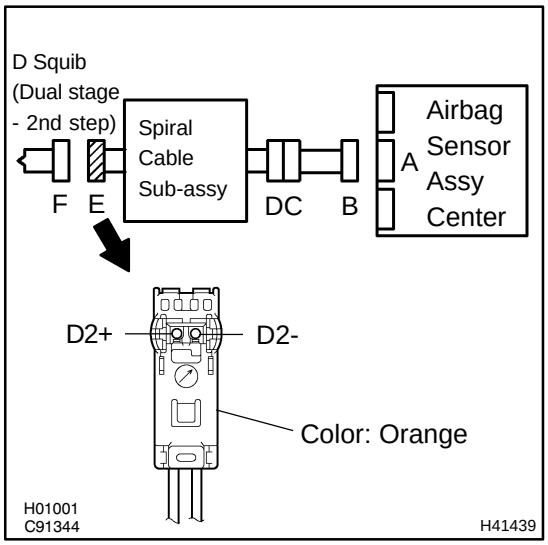
DTC No.	DTC Detecting Condition	Trouble Area
B1183/22	・Short circuit in D squib (Dual stage - 2nd step) wire harness (to B+) ・D squib (Dual stage - 2nd step) malfunction ・Spiral cable sub-assy malfunction ・Airbag sensor assy center malfunction	・Horn button assy (D squib, Dual stage - 2nd step) ・Spiral cable sub-assy ・Airbag sensor assy center ・Cowl wire

WIRING DIAGRAM

see page 05-1416 .

CIRCUIT INSPECTION

1	CHECK D SQUIB CIRCUIT(DUAL STAGE - 2ND STEP, AIRBAG SENSOR ASSY CENTER - HORN BUTTON ASSY)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag sensor assy center and the horn button assy.
(d) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(e) Turn the ignition switch to the ON position.
(f) Measure the voltage according to the value(s) in the table below.

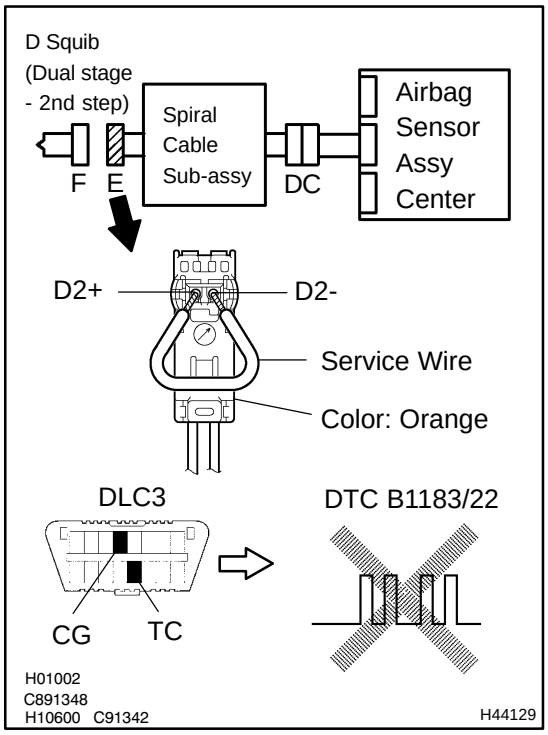
Standard:

Tester connection	Condition	Specified condition
D2+ - Body ground	Ignition switch ON	Below 1 V
D2- - Body ground	Ignition switch ON	Below 1 V

NG → **Go to step 4**

OK

2 CHECK AIR BAG SENSOR ASSY CENTER



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Connect the connector to the airbag sensor assy center.
(d) Using a service wire, connect D2+ and D2- of connector "E".

NOTICE:

- **Twist the end of the service wire in order to insert it into the connector.**
- **Do not forcibly insert the twisted service wire into the terminals of the connector when connecting.**

(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(g) Clear the DTCs stored in memory (see page 05-1215).
(h) Turn the ignition switch to the LOCK position.
(i) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(j) Check the DTCs (see page 05-1215).

OK:

DTC B1183/22 is not output.

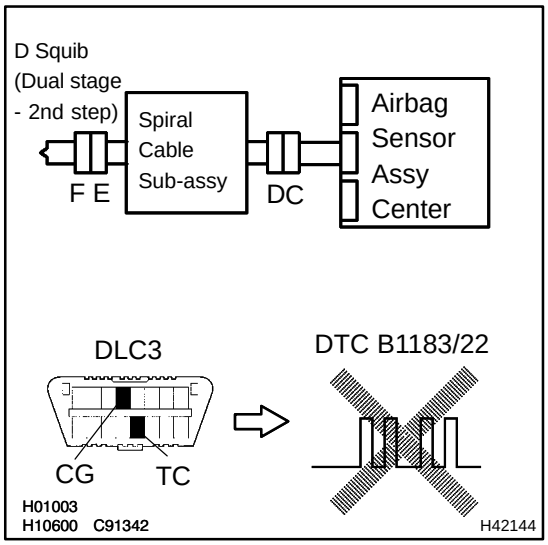
HINT:

Codes other than code B1183/22 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG SENSOR ASSY CENTER (SEE PAGE 60-53)**

OK

3 CHECK HORN BUTTON ASSY(D SQUIB, DUAL STAGE - 2ND STEP)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the service wire from connector "E".
(d) Connect the connectors to the horn button assy.
(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(g) Clear the DTCs stored in memory (see page 05-1215).
(h) Turn the ignition switch to the LOCK position.
(i) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(j) Check the DTCs (see page 05-1215).

OK:

DTC B1183/22 is not output.

HINT:

Codes other than code B1183/22 may be output at this time, but they are not related to this check.

NG	REPLACE HORN BUTTON ASSY (SEE PAGE 60-17)

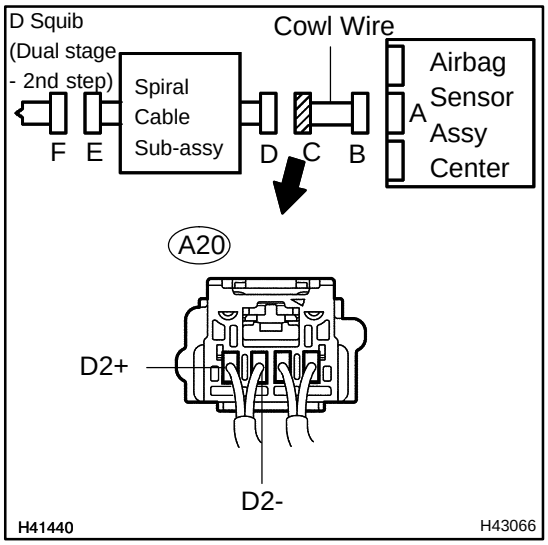
OK

USE SIMULATION METHOD TO CHECK

HINT:

- Before performing the simulation method, check that the airbag sensor assy center is in check mode (see page 05-1218).
- Perform the simulation method by selecting the check mode with the hand-held tester (see page 05-1218).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05-1218).

4	CHECK COWL WIRE



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the cowl wire connector from the spiral cable sub-assy .
(d) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(e) Turn the ignition switch to the ON position.
(f) Measure the voltage according to the value(s) in the table below.

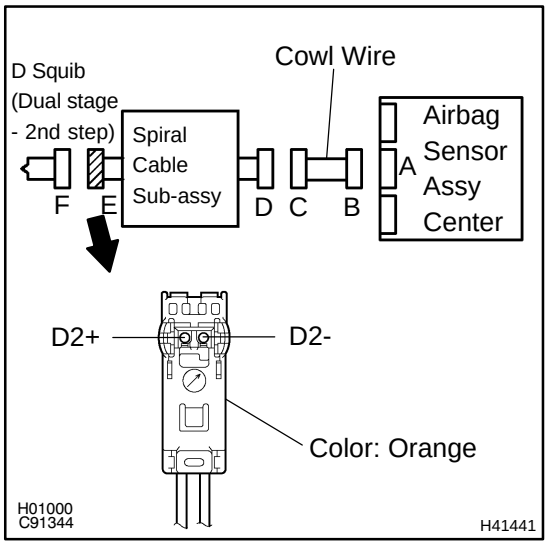
Standard:

Tester connection	Condition	Specified condition
A20-4 (D2+) - Body ground	Ignition switch ON	Below 1 V
A20-3 (D2-) - Body ground	Ignition switch ON	Below 1 V

NG → **REPAIR OR REPLACE COWL WIRE**

OK

5 CHECK SPIRAL CABLE SUB-ASSY



(a) Measure the voltage according to the value(s) in the table below when the ignition switch remains in the ON position.

Standard:

Tester connection	Condition	Specified condition
D2+ - Body ground	Ignition switch ON	Below 1 V
D2- - Body ground	Ignition switch ON	Below 1 V

NG → **REPLACE SPIRAL CABLE SUB-ASSY (SEE PAGE 60-26)**

OK

USE SIMULATION METHOD TO CHECK

HINT:

- Before performing the simulation method, check that the airbag sensor assy center is in check mode (see page 05-1218).
- Perform the simulation method by selecting the check mode with the hand-held tester (see page 05-1218).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05-1218).

DTC	B1185/57	SHORT IN P SQUIB (DUAL STAGE - 2ND STEP) CIRCUIT

CIRCUIT DESCRIPTION

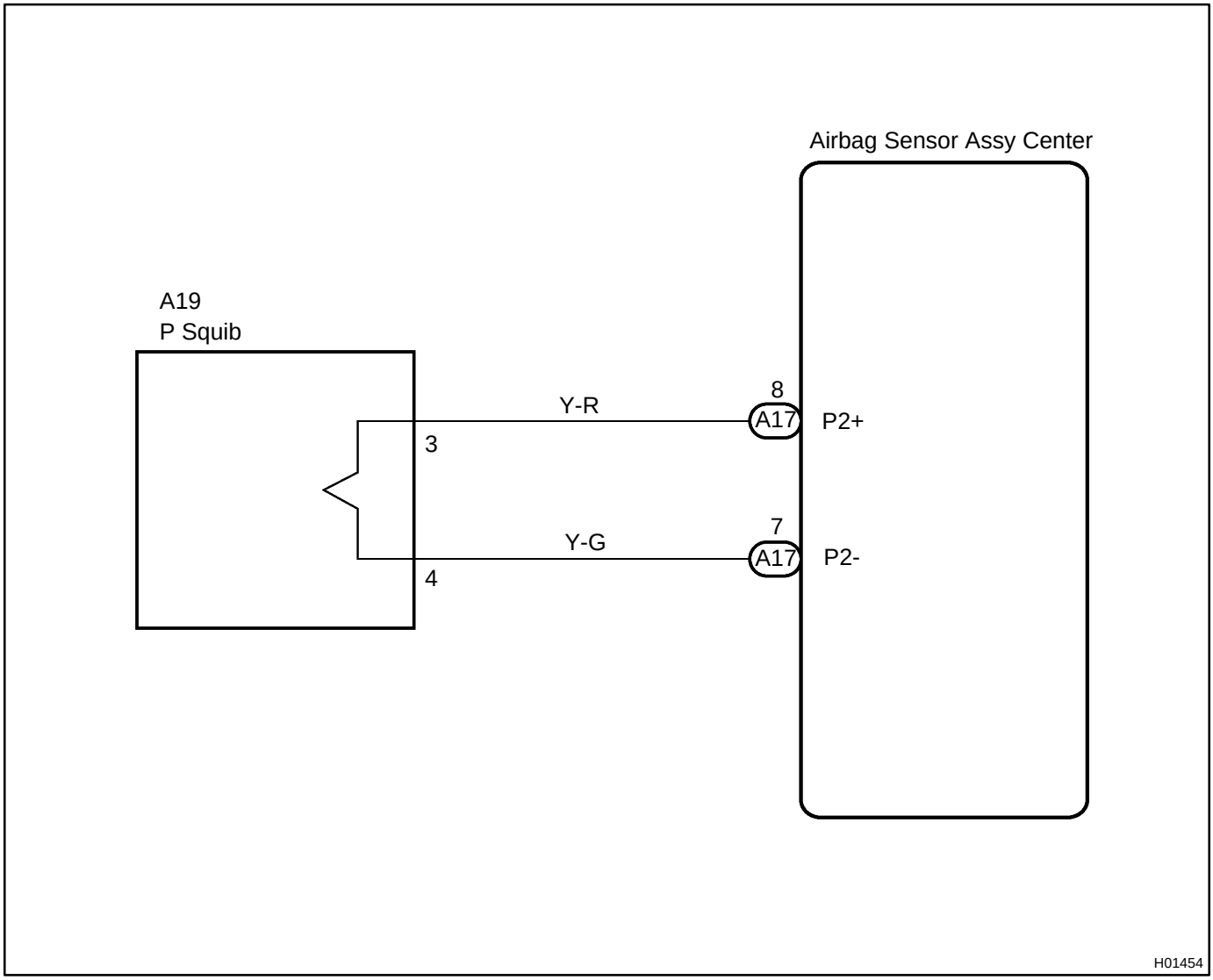
The P squib (Dual stage - 2nd step) circuit consists of the airbag sensor assy center and the front passenger airbag assy.

The circuit instructs the SRS to deploy when deployment conditions are met.

DTC B1185/57 is recorded when a short circuit is detected in the P squib (Dual stage - 2nd step) circuit.

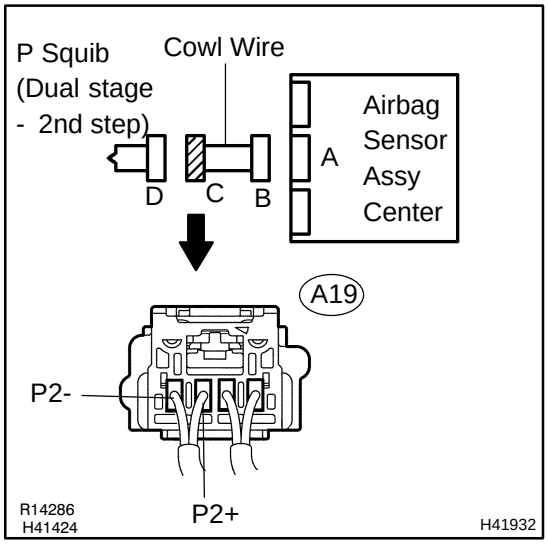
DTC No.	DTC Detecting Condition	Trouble Area
B1185/57	・Short circuit between P2+ wire harness and P2- wire harness of P squib (Dual stage - 2nd step) ・P squib (Dual stage - 2nd step) malfunction ・Airbag sensor assy center malfunction	・Front passenger airbag assy (P squib, Dual stage - 2nd step) ・Airbag sensor assy center ・Cowl wire

WIRING DIAGRAM



INSPECTION PROCEDURE

1 CHECK COWL WIRE(P SQUIB, DUAL STAGE - 2ND STEP CIRCUIT)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag sensor assy center and the front passenger airbag assy.
(d) Release the activation prevention mechanism built into connector "B" (see page 05-1207).
(e) Measure the resistance according to the value(s) in the table below.

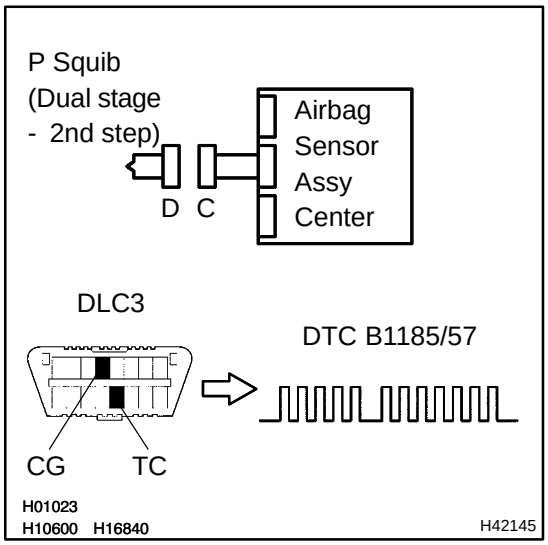
Standard:

Tester connection	Condition	Specified condition
A19-3 (P2+) - A19-4 (P2-)	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE COWL WIRE**

OK

2 CHECK AIR BAG SENSOR ASSY CENTER



(a) Connect the connector to the airbag sensor assy center.
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(d) Clear the DTCs stored in memory (see page 05-1215).
(e) Turn the ignition switch to the LOCK position.
(f) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(g) Check the DTCs (see page 05-1215).

OK:

DTC B1185/57 is not output.

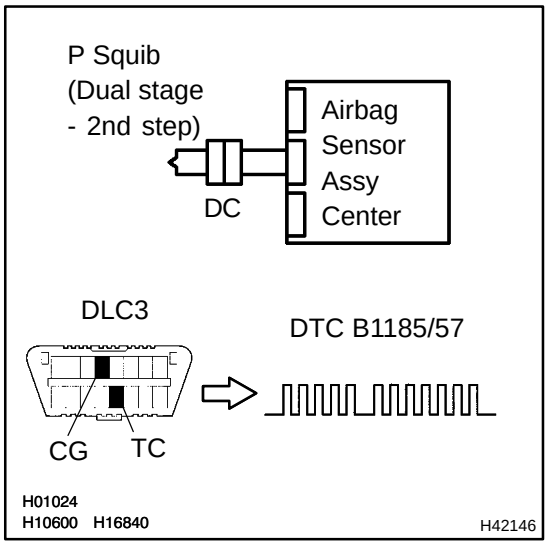
HINT:

Codes other than code B1185/57 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG SENSOR ASSY CENTER (SEE PAGE 60-53)**

OK

3 CHECK FRONT PASSENGER AIRBAG ASSY(P SQUIB, DUAL STAGE - 2ND STEP)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Connect the connector to the front passenger airbag assy.
(d) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(e) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(f) Clear the DTCs stored in memory (see page 05-1215).
(g) Turn the ignition switch to the LOCK position.
(h) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(i) Check the DTCs (see page 05-1215).

OK:

DTC B1185/57 is not output.

HINT:

Codes other than code B1185/57 may be output at this time, but they are not related to this check.

NG → **REPLACE FRONT PASSENGER AIRBAG ASSY (SEE PAGE 60-29)**

OK

USE SIMULATION METHOD TO CHECK

HINT:

- Before performing the simulation method, check that the airbag sensor assy center is in check mode (see page 05-1218).
- Perform the simulation method by selecting the check mode with the hand-held tester (see page 05-1218).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05-1218).

DTC	B1186/58	OPEN IN P SQUIB (DUAL STAGE - 2ND STEP) CIRCUIT

CIRCUIT DESCRIPTION

The P squib (Dual stage - 2nd step) circuit consists of the airbag sensor assy center and the front passenger airbag assy.
The circuit instructs the SRS to deploy when deployment conditions are met.
DTC B1186/58 is recorded when an open circuit is detected in the P squib (Dual stage - 2nd step) circuit.

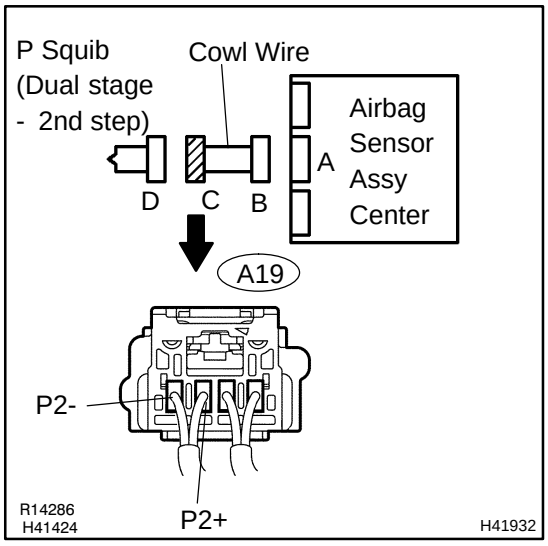
DTC No.	DTC Detecting Condition	Trouble Area
B1186/58	⋊Open circuit in P2+ wire harness or P2- wire harness of P squib (Dual stage - 2nd step) ⋊P squib (Dual stage - 2nd step) malfunction ⋊Airbag sensor assy center malfunction	⋊Front passenger airbag assy (P squib, Dual stage - 2nd step) ⋊Airbag sensor assy center ⋊Cowl wire

WIRING DIAGRAM

see page 05-1434 .

INSPECTION PROCEDURE

1	CHECK COWL WIRE(P SQUIB, DUAL STAGE - 2ND STEP CIRCUIT)



(a) Turn the ignition switch to the LOCK position
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag sensor assy center and the front passenger airbag assy.
(d) Measure the resistance according to the value(s) in the table below.

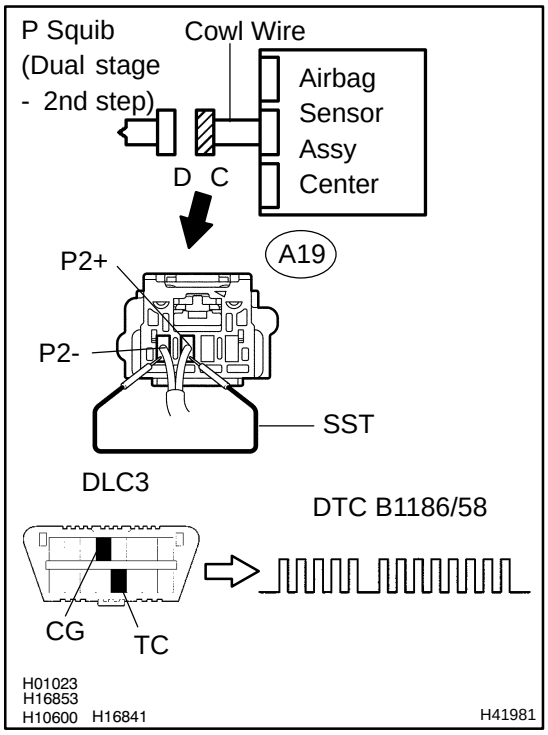
Standard:

Tester connection	Condition	Specified condition
A19-3 (P2+) - A19-4 (P2-)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE COWL WIRE**

OK

2	CHECK AIR BAG SENSOR ASSY CENTER



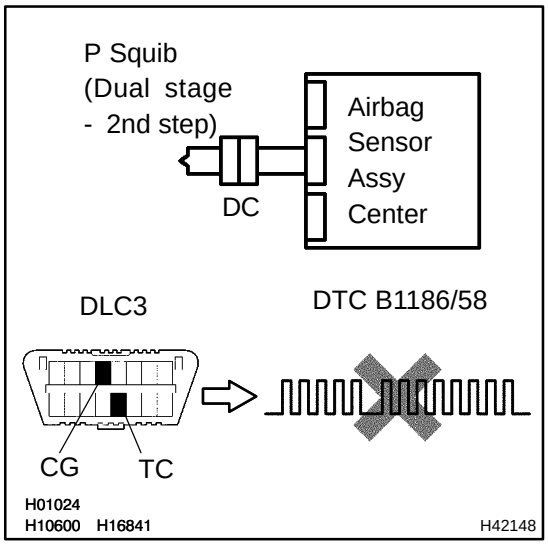
(a) Connect the connector to the airbag sensor assy center.
(b) Using SST, connect A19-3 (P2+) and A19-4 (P2-) of connector "C".
SST 09843-18040
(c) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Clear the DTCs stored in memory (see page 05-1215).
(f) Turn the ignition switch to the LOCK position.
(g) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(h) Check the DTCs (see page 05-1215).
OK:
DTC B1186/58 is not output.

HINT:
Codes other than code B1186/58 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG SENSOR ASSY CENTER (SEE PAGE 60-53)**

OK

3 CHECK FRONT PASSENGER AIRBAG ASSY(P SQUIB, DUAL STAGE - 2ND STEP)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the SST from connector "C".
(d) Connect the connector to the front passenger airbag assy.
(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(g) Clear the DTCs stored in memory (see page 05-1215).
(h) Turn the ignition switch to the LOCK position.
(i) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(j) Check the DTCs (see page 05-1215).

OK:

DTC B1186/58 is not output.

HINT:

Codes other than code B1186/58 may be output at this time, but they are not related to this check.

NG → **REPLACE FRONT PASSENGER AIRBAG ASSY (SEE PAGE 60-29)**

OK

USE SIMULATION METHOD TO CHECK

HINT:

- Before performing the simulation method, check that the airbag sensor assy center is in check mode (see page 05-1218).
- Perform the simulation method by selecting the check mode with the hand-held tester (see page 05-1218).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05-1218).

DTC	B1187/55	SHORT IN P SQUIB (DUAL STAGE - 2ND STEP) CIRCUIT (TO GROUND)

CIRCUIT DESCRIPTION

The P squib (Dual stage - 2nd step) circuit consists of the airbag sensor assy center and the front passenger airbag assy.
The circuit instructs the SRS to deploy when deployment conditions are met.
DTC B1187/55 is recorded when a short to ground is detected in the P squib (Dual stage - 2nd step) circuit.

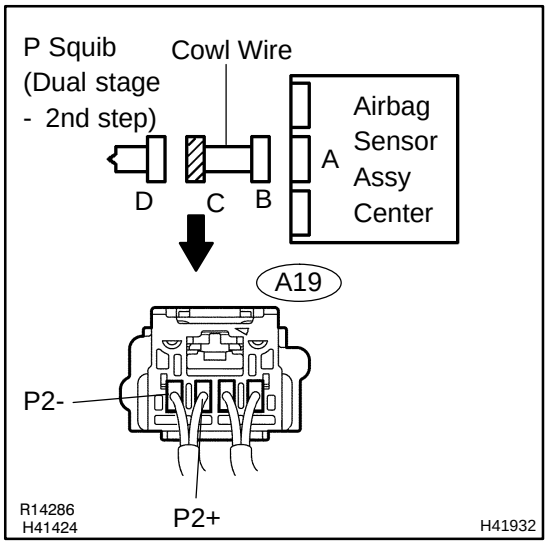
DTC No.	DTC Detecting Condition	Trouble Area
B1187/55	・Short circuit in P squib (Dual stage - 2nd step) wire harness (to ground) ・P squib (Dual stage - 2nd step) malfunction ・Airbag sensor assy center malfunction	・Front passenger airbag assy (P squib, Dual stage - 2nd step) ・Airbag sensor assy center ・Cowl wire

WIRING DIAGRAM

see page 05-1434 .

INSPECTION PROCEDURE

1	CHECK COWL WIRE(P SQUIB, DUAL STAGE - 2ND STEP CIRCUIT)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag sensor assy center and the front passenger airbag assy.
(d) Measure the resistance according to the value(s) in the table below.

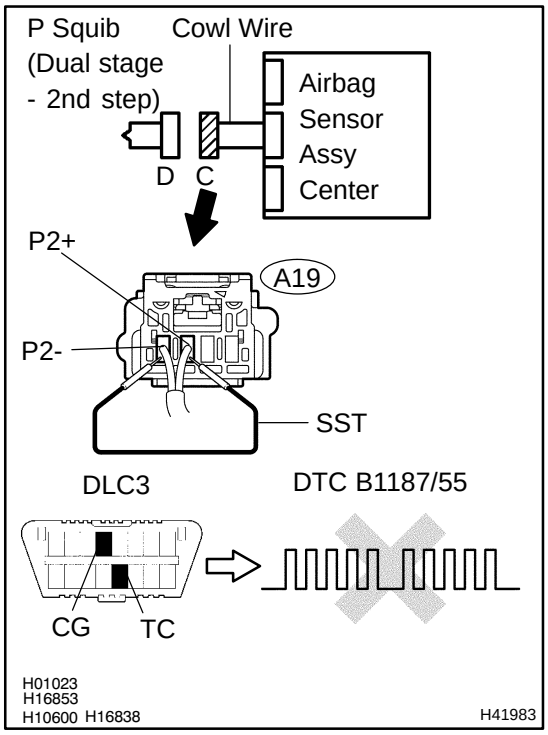
Standard:

Tester connection	Condition	Specified condition
A19-3 (P2+) - Body ground	Always	1 MΩ or Higher
A19-4 (P2-) - Body ground	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE COWL WIRE**

OK

2 CHECK AIR BAG SENSOR ASSY CENTER



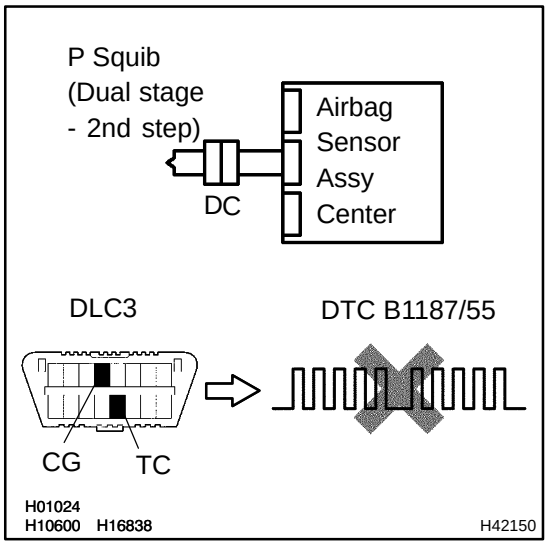
(a) Connect the connector to the airbag sensor assy center.
(b) Using SST, connect A19-3 (P2+) and A19-4 (P2-) of connector "C".
SST 09843-18040
(c) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Clear the DTCs stored in memory (see page 05-1215).
(f) Turn the ignition switch to the LOCK position.
(g) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(h) Check the DTCs (see page 05-1215).
OK:
DTC B1187/55 is not output.

HINT:
Codes other than code B1187/55 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG SENSOR ASSY CENTER (SEE PAGE 60-53)**

OK

3 CHECK FRONT PASSENGER AIRBAG ASSY(P SQUIB, DUAL STAGE - 2ND STEP)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the SST from connector "C".
(d) Connect the connector to the front passenger airbag assy.
(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(g) Clear the DTCs stored in memory (see page 05-1215).
(h) Turn the ignition switch to the LOCK position.
(i) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(j) Check the DTCs (see page 05-1215).

OK:

DTC B1187/55 is not output.

HINT:

Codes other than code B1187/55 may be output at this time, but they are not related to this check.

NG → **REPLACE FRONT PASSENGER AIRBAG ASSY (SEE PAGE 05-1215)**

OK

USE SIMULATION METHOD TO CHECK

HINT:

- Before performing the simulation method, check that the airbag sensor assy center is in check mode (see page 05-1218).
- Perform the simulation method by selecting the check mode with the hand-held tester (see page 05-1218).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05-1218).

DTC	B1188/56	SHORT IN P SQUIB (DUAL STAGE - 2ND STEP) CIRCUIT (TO B+)

CIRCUIT DESCRIPTION

The P squib (Dual stage - 2nd step) circuit consists of the airbag sensor assy center and the front passenger airbag assy.
The circuit instructs the SRS to deploy when deployment conditions are met.
DTC B1188/56 is recorded when a short to B+ is detected in the P squib (Dual stage - 2nd step) circuit.

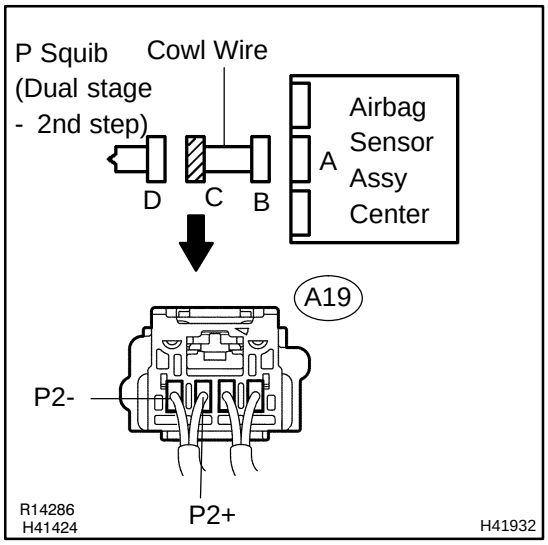
DTC No.	DTC Detecting Condition	Trouble Area
B1188/56	⋊Short circuit in P squib (Dual stage - 2nd step) wire harness (to B+) ⋊P squib (Dual stage - 2nd step) malfunction ⋊Airbag sensor assy center malfunction	⋊Front passenger airbag assy (P squib, Dual stage - 2nd step) ⋊Airbag sensor assy center ⋊Cowl wire

WIRING DIAGRAM

see page 05-1434 .

INSPECTION PROCEDURE

1	CHECK COWL WIRE(P SQUIB, DUAL STAGE - 2ND STEP CIRCUIT)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag sensor assy center and the front passenger airbag assy.
(d) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(e) Turn the ignition switch to the ON position.
(f) Measure the voltage according to the value(s) in the table below.

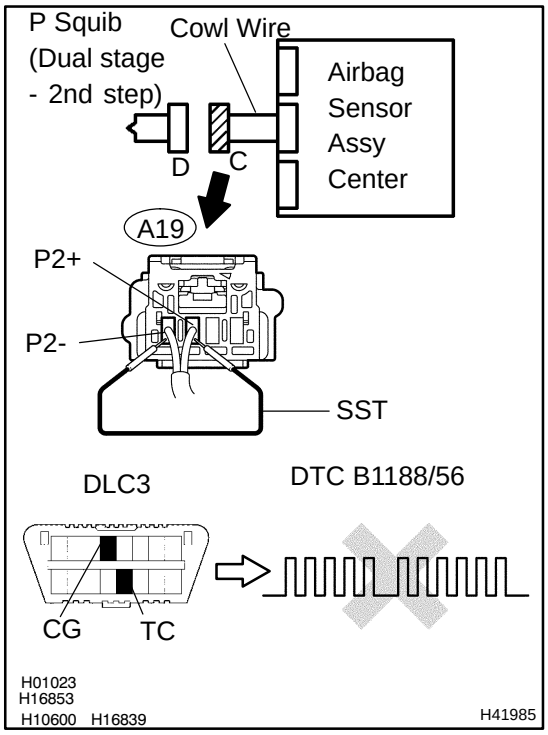
Standard:

Tester connection	Condition	Specified condition
A19-3 (P2+) - Body ground	Ignition switch ON	Below 1 V
A19-4 (P2-) - Body ground	Ignition switch ON	Below 1 V

NG → **REPAIR OR REPLACE COWL WIRE**

OK

2 CHECK AIR BAG SENSOR ASSY CENTER



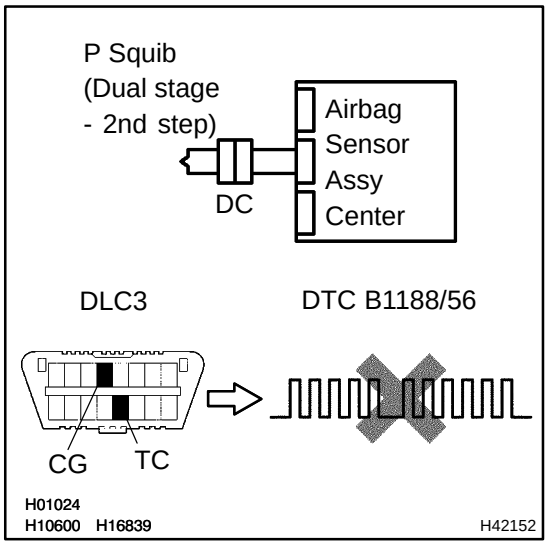
(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
SST 09843-18040
(c) Connect the connector to the airbag sensor assy center.
(d) Using SST, connect A19-3 (P2+) and A19-4 (P2-) of connector "C".
(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(g) Clear the DTCs stored in memory (see page 05-1215).
(h) Turn the ignition switch to the LOCK position.
(i) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(j) Check the DTCs (see page 05-1215).
OK:
DTC B1188/56 is not output.

HINT:
Codes other than code B1188/56 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG SENSOR ASSY CENTER (SEE PAGE 60-53)**

OK

3	CHECK FRONT PASSENGER AIRBAG ASSY(P SQUIB, DUAL STAGE - 2ND STEP)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the SST from connector "C".
(d) Connect the connector to the front passenger airbag assy.
(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(g) Clear the DTCs stored in memory (see page 05-1215).
(h) Turn the ignition switch to the LOCK position.
(i) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(j) Check the DTCs (see page 05-1215).

OK:

DTC B1188/56 is not output.

HINT:

Codes other than code B1188/56 may be output at this time, but they are not related to this check.

NG → **REPLACE FRONT PASSENGER AIRBAG ASSY (SEE PAGE 60-29)**

OK

USE SIMULATION METHOD TO CHECK

HINT:

- Before performing the simulation method, check that the airbag sensor assy center is in check mode (see page 05-1218).
- Perform the simulation method by selecting the check mode with the hand-held tester (see page 05-1218).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page 05-1218).

DTC	B1771	PASSENGER SIDE BUCKLE SWITCH CIRCUIT MALFUNCTION

CIRCUIT DESCRIPTION

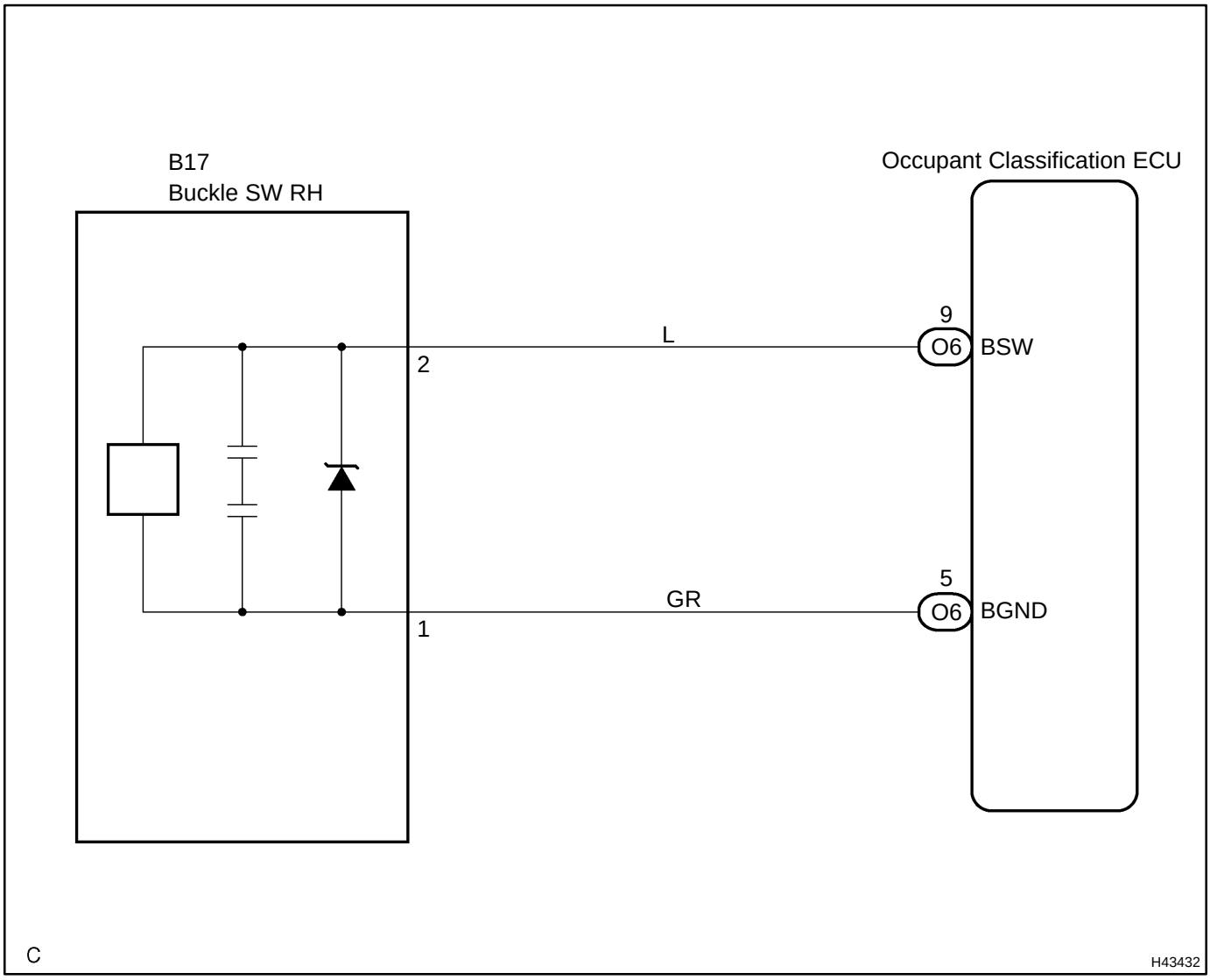
The passenger side buckle switch circuit consists of the occupant classification ECU and the front seat inner belt assy RH (buckle switch RH).
DTC B1771 is recorded when a malfunction is detected in the passenger side buckle switch circuit.
Troubleshoot DTC B1771 first when the DTC B1771 and B1795 are output simultaneously.

DTC No.	DTC Detecting Condition	Trouble Area
B1771	⁎When the occupant classification ECU receives a line short signal, open signal, short to ground signal or B+ short signal in the passenger side buckle switch circuit for 2 seconds. ⁎Passenger side buckle switch malfunction ⁎Occupant classification ECU malfunction	⁎Front seat inner belt assy RH (Buckle switch RH) ⁎Front seat wire RH ⁎Occupant classification ECU

HINT:

- ⁎ When DTC B1150/23 is detected as a result of troubleshooting for the supplemental restraint system, perform troubleshooting for DTC B1771 of the occupant classification system.
- ⁎ Use the hand-held tester to check the DTC of the occupant classification ECU, otherwise the DTC cannot be read.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If troubleshooting (wire harness inspection) is difficult to perform, remove the front RH seat assy installation bolts to see the under surface of seat cushion.
- In the above case, hold the seat so that it does not fall down. Holding the seat for a long period of time may cause a problem, such as seat rail deformation. Hold the seat only as necessary.

1	CHECK DTC

(a) Turn the ignition switch to the ON position.
(b) Clear the DTCs stored in memory (see page 05-1215).

HINT:

- First clear DTCs stored in the occupant classification ECU memory and then in the airbag sensor assy center memory.
- Use the hand-held tester to clear the DTC of the occupant classification ECU, otherwise the DTC cannot be cleared.

(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position.
(e) Using the hand-held tester, check the DTCs (see page 05-1215).

OK:

DTC B1771 is not output.

HINT:

Codes other than code B1771 may be output at this time, but they are not related to this check.

NG → **Go to step 2**

OK

USE SIMULATION METHOD TO CHECK (SEE PAGE 05-1207)

2	CHECK CONNECTION OF CONNECTORS

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Check that the connectors are properly connected to the occupant classification ECU and the front seat inner belt assy RH.

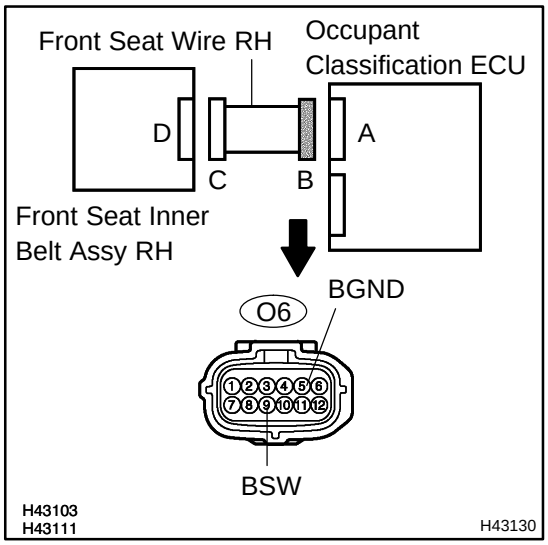
OK:

The connectors are connected.

NG → **CONNECT CONNECTORS, THEN GO TO STEP 1**

OK

3 CHECK FRONT SEAT WIRE RH (TO B+)



(a) Disconnect the connectors from the occupant classification ECU and the front seat inner belt assy RH.
(b) Connect the negative (-) terminal cable to the battery.
(c) Turn the ignition switch to the ON position.
(d) Measure the voltage according to the value(s) in the table below.

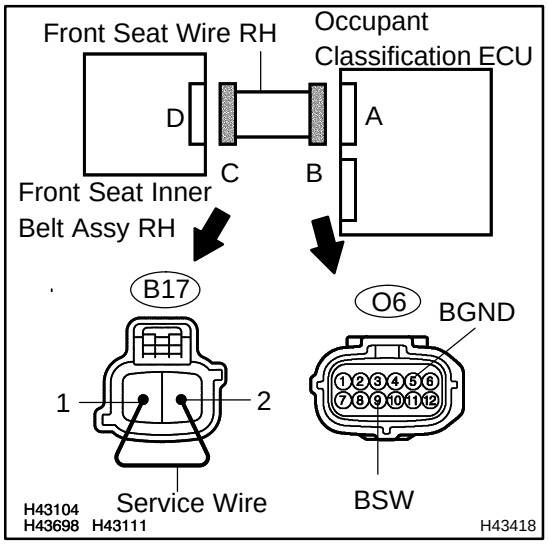
Standard:

Tester connection	Condition	Specified condition
O6-9 (BSW) - Body ground	Ignition switch ON	Below 1 V
O6-5 (BGND) - Body ground	Ignition switch ON	Below 1 V

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

4 CHECK FRONT SEAT WIRE RH (OPEN)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Using a service wire, connect B17-1 and B17-2 of connector ”C”.

NOTICE:

Do not forcibly insert a service wire into the terminals of the connector when connecting.

(d) Measure the resistance according to the value(s) in the table below.

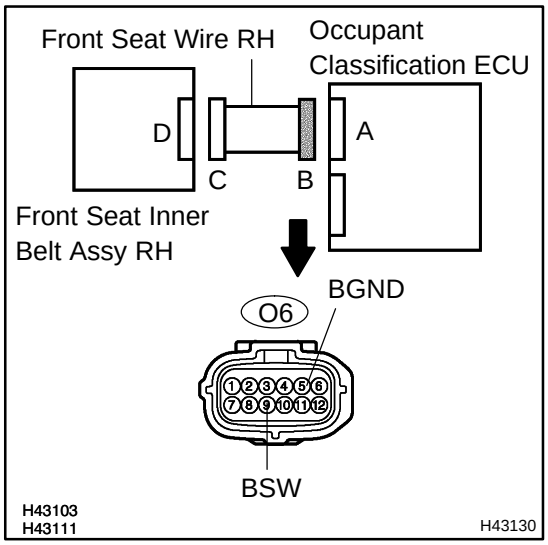
Standard:

Tester connection	Condition	Specified condition
O6-9 (BSW) - O6-5 (BGND)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

5 CHECK FRONT SEAT WIRE RH (SHORT)



(a) Disconnect the service wire from connector "C".
(b) Measure the resistance according to the value(s) in the table below.

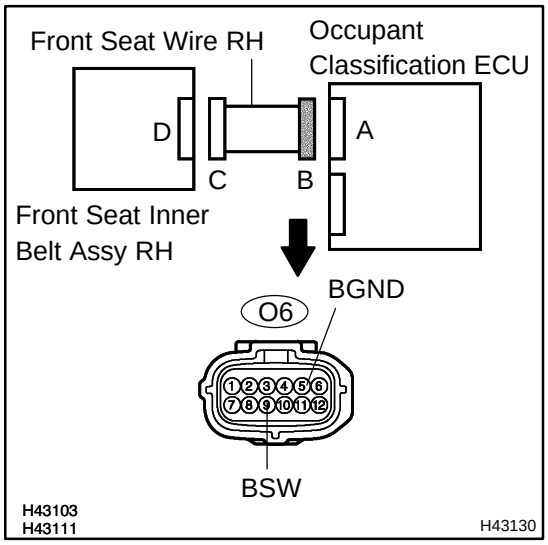
Standard:

Tester connection	Condition	Specified condition
O6-9 (BSW) - O6-5 (BGND)	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

6 CHECK FRONT SEAT WIRE RH (TO GROUND)



(a) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
O6-9 (BSW) - Body ground	Always	1 MΩ or Higher
O6-5 (BGND) - Body ground	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

7	RECHECK DTC

(a) Connect the connectors to the occupant classification ECU and the front seat inner belt assy RH.
(b) Connect the negative (-) terminal cable to the battery.
(c) Turn the ignition switch to the ON position.
(d) Clear the DTCs stored in memory (see page 05-1215).

HINT:

- First clear DTCs stored in the occupant classification ECU memory and then in the airbag sensor assy center memory.
- Use the hand-held tester to clear the DTC of the occupant classification ECU, otherwise the DTC cannot be cleared.

(e) Turn the ignition switch to the LOCK position.
(f) Turn the ignition switch to the ON position.
(g) Using the hand-held tester, check the DTCs (see page 05-1215).

OK:

DTC B1771 is not output.

HINT:

Codes other than code B1771 may be output at this time, but they are not related to this check.

NG → **Go to step 8**

OK

USE SIMULATION METHOD TO CHECK (SEE PAGE 05-1207)

8	REPLACE FRONT SEAT INNER BELT ASSY RH

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Replace the front seat inner belt assy RH (see page 72-1 1, 72-19).
(d) Connect the negative (-) terminal cable to the battery.
(e) Turn the ignition switch to the ON position.
(f) Clear the DTCs stored in memory (see page 05-1215).

HINT:

- First clear DTCs stored in the occupant classification ECU memory and then in the airbag sensor assy center memory.
- Use the hand-held tester to clear the DTC of the occupant classification ECU, otherwise the DTC cannot be cleared.

(g) Turn the ignition switch to the LOCK position.
(h) Turn the ignition switch to the ON position.
(i) Using the hand-held tester, check the DTCs (see page 05-1215).

OK:

DTC B1771 is not output.

HINT:

Codes other than code B1771 may be output at this time, but they are not related to this check.

NG → **Go to step 9**

OK

END

9	REPLACE OCCUPANT CLASSIFICATION ECU

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Replace the occupant classification ECU (see page 60-64).

10	PERFORM ZERO POINT CALIBRATION

(a) Using the hand-held tester, perform ”Zero point calibration” (see page 05-1203).
OK:
The ”COMPLETED” is displayed.

11	PERFORM SENSITIVITY CHECK

(a) Using the hand-held tester, perform ”Sensitivity check” (see page 05-1203).
Standard value: 27 to 33 kg (59.52 to 72.75 lb)

END

DTC	B1780	OCCUPANT CLASSIFICATION SENSOR FRONT LH CIRCUIT MALFUNCTION

CIRCUIT DESCRIPTION

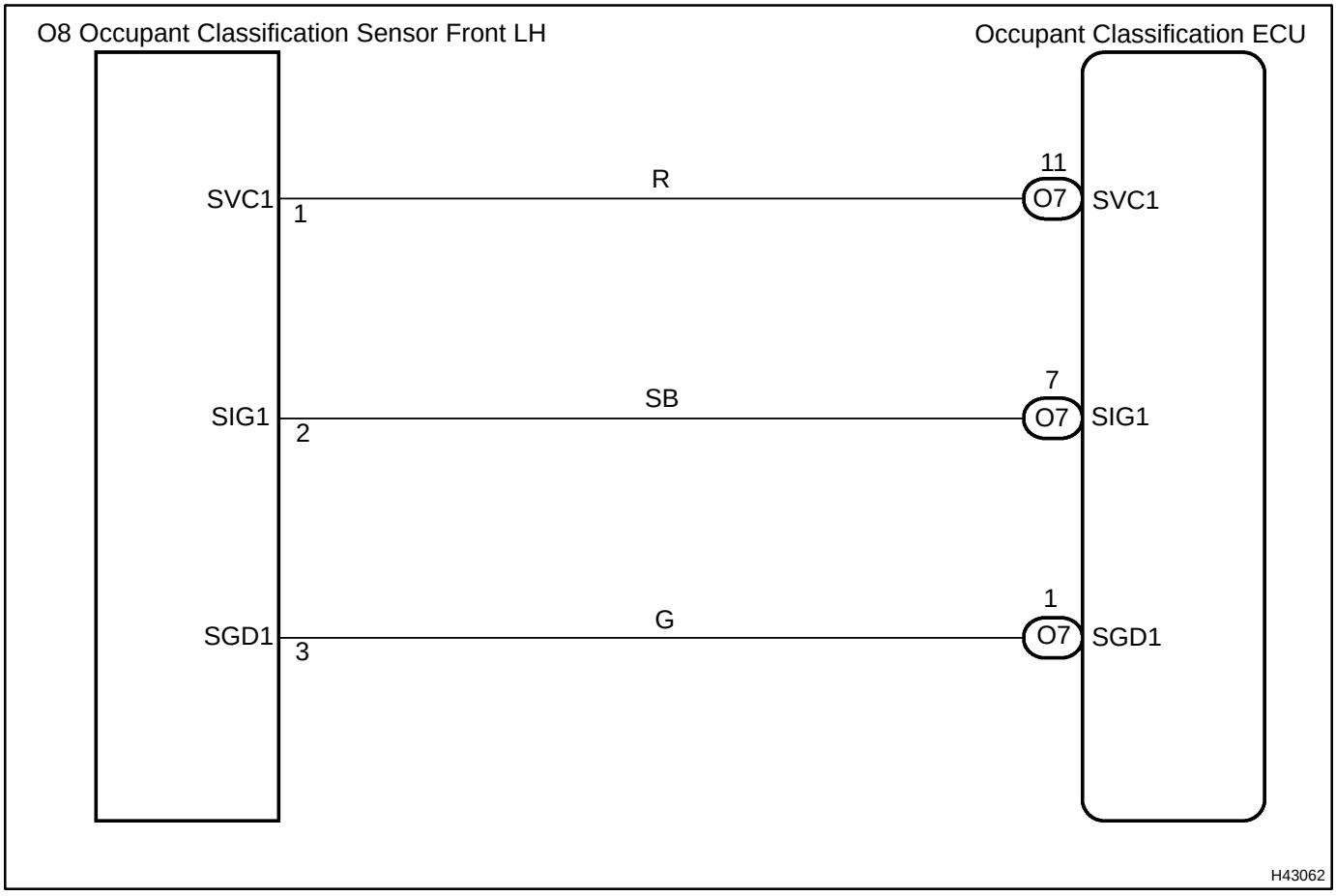
The occupant classification sensor front LH circuit consists of the occupant classification ECU and the occupant classification sensor front LH.
DTC B1780 is recorded when a malfunction is detected in the occupant classification sensor front LH circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1780	⁎When the occupant classification ECU receives a line short signal, open signal, short to ground signal or B+ short signal in the occupant classification sensor front LH circuit for 2 seconds. ⁎Occupant classification sensor front LH malfunction ⁎Occupant classification ECU malfunction	⁎Seat adjuster frame assy (Occupant classification sensor front LH) ⁎Front seat wire RH ⁎Occupant classification ECU

HINT:

- ⁎ When DTC B1150/23 is detected as a result of troubleshooting for the supplemental restraint system, perform troubleshooting for the DTC B1780 of the occupant classification system.
- ⁎ Use the hand-held tester to check the DTC of the occupant classification ECU, otherwise the DTC cannot be read.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If troubleshooting (wire harness inspection) is difficult to perform, remove the front RH seat assy installation bolts to see the under surface of seat cushion.
- In the above case, hold the seat so that it does not fall down. Holding the seat for a long period of time may cause a problem, such as seat rail deformation. Hold the seat only as necessary.

1	CHECK DTC

(a) Turn the ignition switch to the ON position.
(b) Clear the DTCs stored in memory (see page 05-1215).

HINT:

- First clear DTCs stored in the occupant classification ECU memory and then in the airbag sensor assy center memory.
- Use the hand-held tester to clear the DTC of the occupant classification ECU, otherwise the DTC cannot be cleared.

(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position.
(e) Using the hand-held tester, check the DTCs (see page 05-1215).
OK:
DTC B1780 is not output.

HINT:

Codes other than code B1780 may be output at this time, but they are not related to this check.

NG → **Go to step 2**

OK

USE SIMULATION METHOD TO CHECK (SEE PAGE 05-1207)

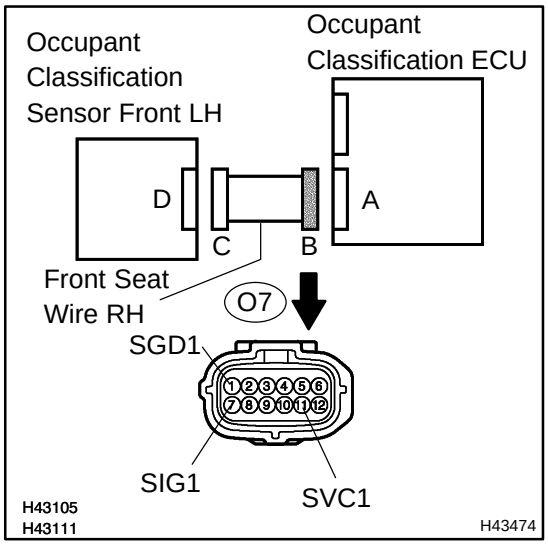
2	CHECK CONNECTION OF CONNECTORS

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Check that the connectors are properly connected to the occupant classification ECU and the occupant classification sensor front LH.
OK:
The connectors are connected.

NG → **CONNECT CONNECTORS, THEN GO TO STEP 1**

OK

3 CHECK FRONT SEAT WIRE RH (TO B+)



(a) Disconnect the connectors from the occupant classification ECU and the occupant classification sensor front LH.
(b) Connect the negative (-) terminal cable to the battery.
(c) Turn the ignition switch to the ON position.
(d) Measure the voltage according to the value(s) in the table below.

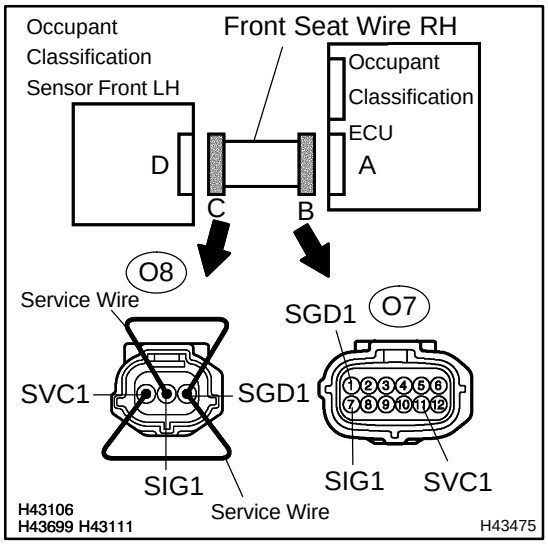
Standard:

Tester connection	Condition	Specified condition
O7-1 (SGD1) - Body ground	Ignition switch ON	Below 1 V
O7-7 (SIG1) - Body ground	Ignition switch ON	Below 1 V
O7-11 (SVC1) - Body ground	Ignition switch ON	Below 1 V

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

4 CHECK FRONT SEAT WIRE RH (OPEN)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Using a service wire, connect O8-1 (SVC1) and O8-3 (SGD1), and connect O8-2 (SIG1) and O8-3 (SGD1) of connector "C".

NOTICE:

Do not forcibly insert a service wire into the terminals of the connector when connecting.

(d) Measure the resistance according to the value(s) in the table below.

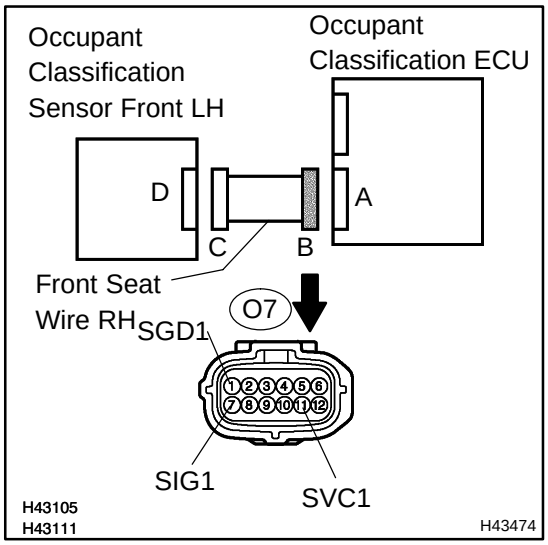
Standard:

Tester connection	Condition	Specified condition
O7-7 (SIG1) - O7-1 (SGD1)	Always	Below 1 Ω
O7-11 (SVC1) - O7-1 (SGD1)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

5 CHECK FRONT SEAT WIRE RH (SHORT)



(a) Disconnect the service wire from connector "C".
(b) Measure the resistance according to the value(s) in the table below.

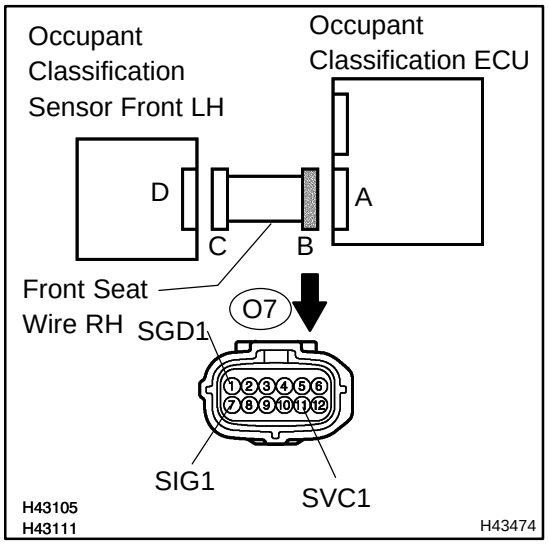
Standard:

Tester connection	Condition	Specified condition
O7-7 (SIG1) - O7-1 (SGD1)	Always	1 MΩ or Higher
O7-11 (SVC1) - O7-1 (SGD1)	Always	1 MΩ or Higher
O7-7 (SIG1) - O7-11 (SVC1)	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

6 CHECK FRONT SEAT WIRE RH (TO GROUND)



(a) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
O7-1 (SGD1) - Body ground	Always	1 MΩ or Higher
O7-7 (SIG1) - Body ground	Always	1 MΩ or Higher
O7-11 (SVC1) - Body ground	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

7	RECHECK DTC

(a) Connect the connectors to the occupant classification ECU and the occupant classification sensor front LH.
(b) Connect the negative (-) terminal cable to the battery.
(c) Turn the ignition switch to the ON position.
(d) Clear the DTCs stored in memory (see page 05-1215).

HINT:

- First clear DTCs stored in the occupant classification ECU memory and then in the airbag sensor assy center memory.
- Use the hand-held tester to clear the DTC of the occupant classification ECU, otherwise the DTC cannot be cleared.

(e) Turn the ignition switch to the LOCK position.
(f) Turn the ignition switch to the ON position.
(g) Using the hand-held tester, check the DTCs (see page 05-1215).
OK:
DTC B1780 is not output.

HINT:
Codes other than code B1780 may be output at this time, but they are not related to this check.

NG → **Go to step 8**

OK

USE SIMULATION METHOD TO CHECK (SEE PAGE 05-1207)

8	REPLACE OCCUPANT CLASSIFICATION ECU

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Replace the occupant classification ECU (see page 60-64).

HINT:
Perform the inspection using parts from a normal vehicle when possible.

9	PERFORM ZERO POINT CALIBRATION

(a) Using the hand-held tester, perform ”Zero point calibration” (see page 05-1203).
OK:
The ”COMPLETED” is displayed.

NG → **Go to step 12**

OK

10	PERFORM SENSITIVITY CHECK

(a) Using the hand-held tester, perform ”Sensitivity check” (see page 05-1203).
Standard value: 27 to 33 kg (59.52 to 72.75 lb)

NG → **Go to step 12**

OK

11	RECHECK DTC

(a) Connect the negative (-) terminal cable to the battery.
(b) Turn the ignition switch to the ON position.
(c) Clear the DTCs stored in memory (see page 05-1215).
HINT:
- First clear DTCs stored in the occupant classification ECU memory and then in the airbag sensor assy center memory.
- Use the hand-held tester to clear the DTC of the occupant classification ECU, otherwise the DTC cannot be cleared.

(d) Turn the ignition switch to the LOCK position.
(e) Turn the ignition switch to the ON position.
(f) Using the hand-held tester, check the DTCs (see page 05-1215).
OK:
DTC B1780 is not output.
HINT:
Codes other than code B1780 may be output at this time, but they are not related to this check.

NG → **Go to step 12**

OK

END

12	REPLACE SEAT ADJUSTER FRAME ASSY

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Replace the seat adjuster frame assy (see page 72-1 1, 72-19).

13	PERFORM ZERO POINT CALIBRATION

(a) Using the hand-held tester, perform ”Zero point calibration” (see page 05-1203).
OK:
The ”COMPLETED” is displayed.

14	PERFORM SENSITIVITY CHECK

(a) Using the hand-held tester, perform ”Sensitivity check” (see page 05-1203).
Standard value: 27 to 33 kg (59.52 to 72.75 lb)

END

DTC	B1781	OCCUPANT CLASSIFICATION SENSOR FRONT RH CIRCUIT MALFUNCTION

CIRCUIT DESCRIPTION

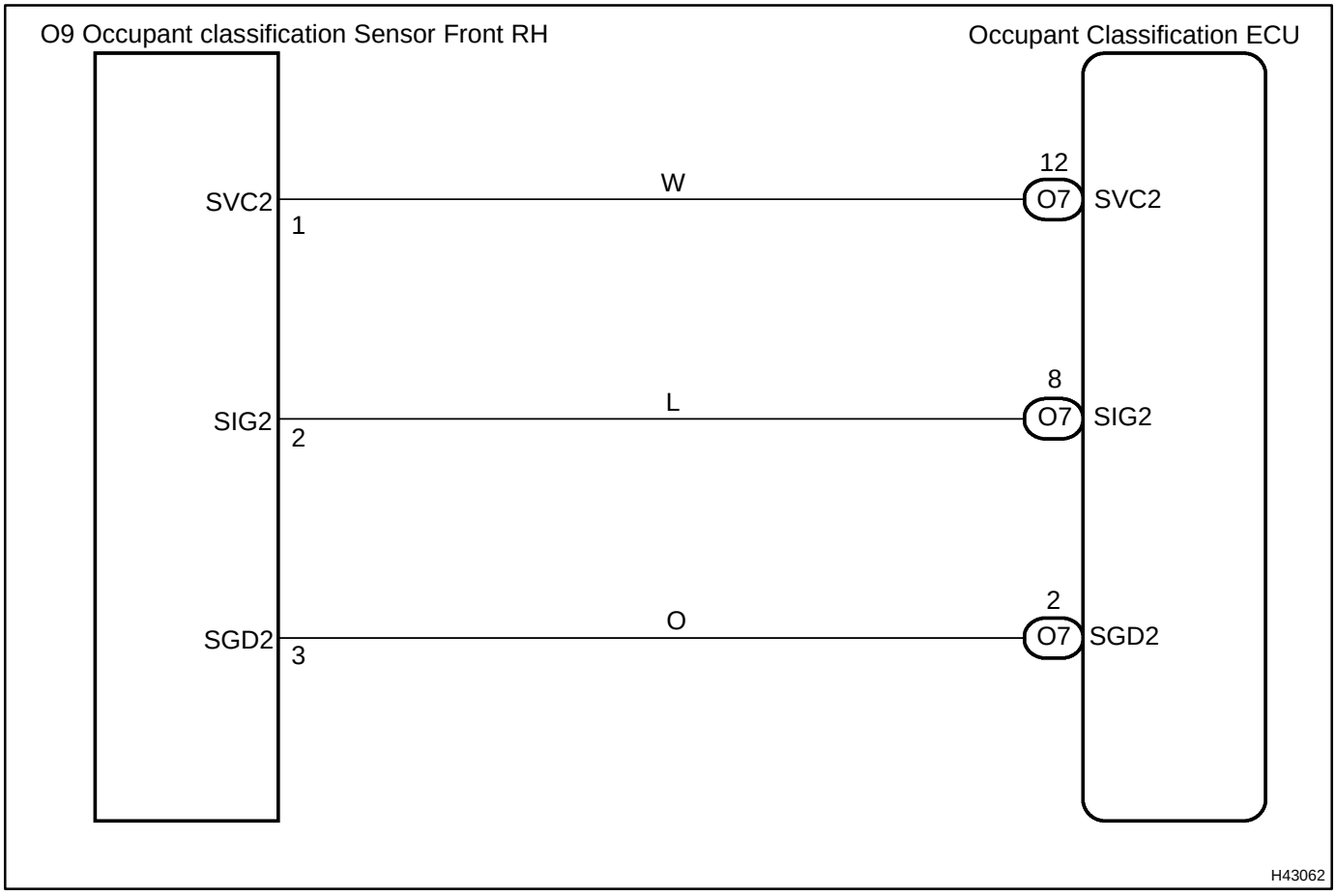
The occupant classification sensor front RH circuit consists of the occupant classification ECU and the occupant classification sensor front RH.
DTC B1781 is recorded when a malfunction is detected in the occupant classification sensor front RH circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1781	⁎ When the occupant classification ECU receives a line short signal, open signal, short to ground signal or B+ short signal in the occupant classification sensor front RH circuit for 2 seconds. ⁎ Occupant classification sensor front RH malfunction ⁎ Occupant classification ECU malfunction	⁎ Seat adjuster frame assy (Occupant classification sensor front RH) ⁎ Front seat wire RH ⁎ Occupant classification ECU

HINT:

- ⁎ When DTC B1150/23 is detected as a result of troubleshooting for the supplemental restraint system, perform troubleshooting for DTC B1781 of the occupant classification system.
- ⁎ Use the hand-held tester to check the DTC of the occupant classification ECU, otherwise the DTC cannot be read.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If troubleshooting (wire harness inspection) is difficult to perform, remove the front RH seat assy installation bolts to see the under surface of seat cushion.
- In the above case, hold the seat so that it does not fall down. Holding the seat for a long period of time may cause a problem, such as seat rail deformation. Hold the seat only as necessary.

1	CHECK DTC

(a) Turn the ignition switch to the ON position.
(b) Clear the DTCs stored in memory (see page 05-1215).

HINT:

- First clear DTCs stored in the occupant classification ECU memory and then in the airbag sensor assy center memory.
- Use the hand-held tester to clear the DTC of the occupant classification ECU, otherwise the DTC cannot be cleared.

(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position.
(e) Using the hand-held tester, check the DTCs (see page 05-1215).
OK:
DTC B1781 is not output.

HINT:

Codes other than code B1781 may be output at this time, but they are not related to this check.

NG → **Go to step 2**

OK

USE SIMULATION METHOD TO CHECK (SEE PAGE 05-1207)

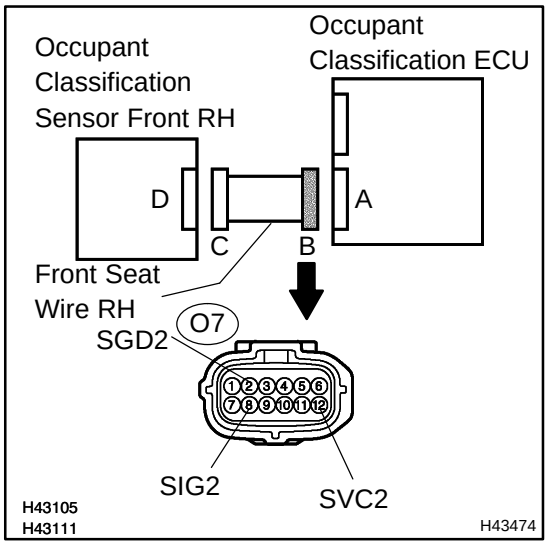
2	CHECK CONNECTION OF CONNECTORS

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Check that the connectors are properly connected to the occupant classification ECU and the occupant classification sensor front RH.
OK:
The connectors are connected.

NG → **CONNECT CONNECTORS, THEN GO TO STEP 1**

OK

3 CHECK FRONT SEAT WIRE RH (TO B+)



(a) Disconnect the connectors from the occupant classification ECU and the occupant classification sensor front RH.
(b) Connect the negative (-) terminal cable to the battery.
(c) Turn the ignition switch to the ON position.
(d) Measure the voltage according to the value(s) in the table below.

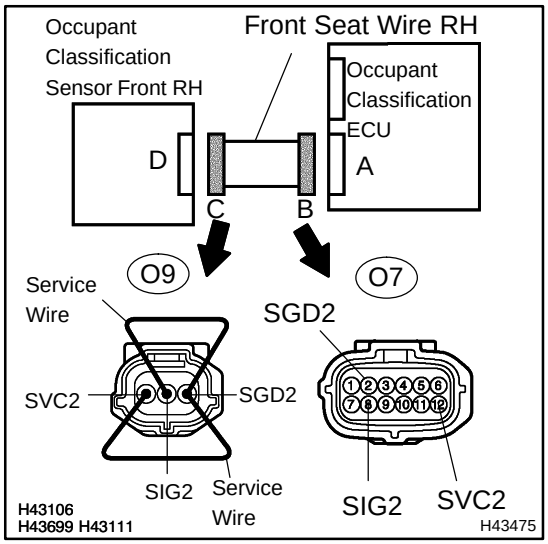
Standard:

Tester connection	Condition	Specified condition
O7-2 (SGD2) - Body ground	Ignition switch ON	Below 1 V
O7-8 (SIG2) - Body ground	Ignition switch ON	Below 1 V
O7-12 (SVC2) - Body ground	Ignition switch ON	Below 1 V

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

4 CHECK FRONT SEAT WIRE RH (OPEN)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Using a service wire, connect O9-1 (SVC2) and O9-3 (SGD2), and connect O9-2 (SIG2) and O9-3(SGD2) of connector "C".

NOTICE:

Do not forcibly insert a service wire into the terminals of the connector when connecting.

(d) Measure the resistance according to the value(s) in the table below.

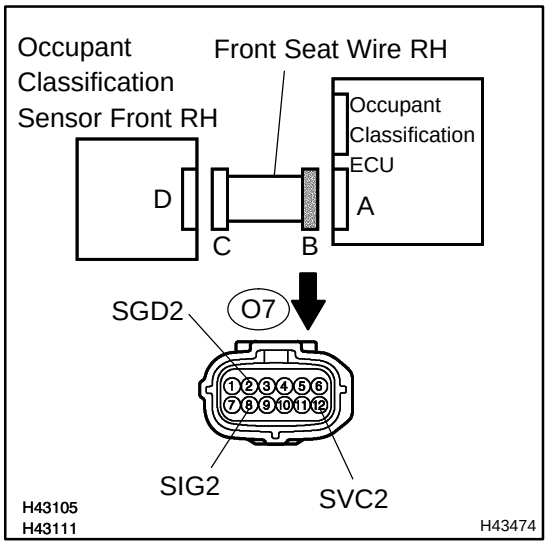
Standard:

Tester connection	Condition	Specified condition
O7-8 (SIG2) - O7-2 (SGD2)	Always	Below 1 Ω
O7-12 (SVC2) - O7-2 (SGD2)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

5 CHECK FRONT SEAT WIRE RH (SHORT)



(a) Disconnect the service wire from connector "C".
(b) Measure the resistance according to the value(s) in the table below.

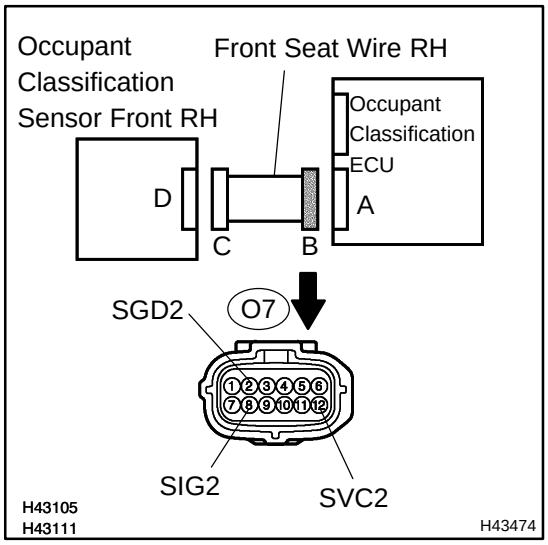
Standard:

Tester connection	Condition	Specified condition
O7-8 (SIG2) - O7-2 (SGD2)	Always	1 MΩ or Higher
O7-12 (SVC2) - O7-2 (SGD2)	Always	1 MΩ or Higher
O7-8 (SIG2) - O7-12 (SVC2)	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

6 CHECK FRONT SEAT WIRE RH (TO GROUND)



(a) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
O7-2 (SGD2) - Body ground	Always	1 MΩ or Higher
O7-8 (SIG2) - Body ground	Always	1 MΩ or Higher
O7-12 (SVC2) - Body ground	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

7	RECHECK DTC

(a) Connect the connectors to the occupant classification ECU and the occupant classification sensor front RH.
(b) Connect the negative (-) terminal cable to the battery.
(c) Turn the ignition switch to the ON position.
(d) Clear the DTCs stored in memory (see page 05-1215).

HINT:

- First clear DTCs stored in the occupant classification ECU memory and then in the airbag sensor assy center memory.
- Use the hand-held tester to clear the DTC of the occupant classification ECU, otherwise the DTC cannot be cleared.

(e) Turn the ignition switch to the LOCK position.
(f) Turn the ignition switch to the ON position.
(g) Using the hand-held tester, check the DTCs (see page 05-1215).
OK:
DTC B1781 is not output.

HINT:
Codes other than code B1781 may be output at this time, but they are not related to this check.

NG → **Go to step 8**

OK

USE SIMULATION METHOD TO CHECK (SEE PAGE 05-1207)

8	REPLACE OCCUPANT CLASSIFICATION ECU

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Replace the occupant classification ECU (see page 60-64).

HINT:
Perform the inspection using parts from a normal vehicle when possible.

9	PERFORM ZERO POINT CALIBRATION

(a) Using the hand-held tester, perform ”Zero point calibration” (see page 05-1203).
OK:
The ”COMPLETED” is displayed.

NG → **Go to step 12**

OK

10	PERFORM SENSITIVITY CHECK

(a) Using the hand-held tester, perform ”Sensitivity check” (see page 05-1203).
Standard value: 27 to 33 kg (59.52 to 72.75 lb)

NG → **Go to step 12**

OK

11	RECHECK DTC

(a) Connect the negative (-) terminal cable to the battery.
(b) Turn the ignition switch to the ON position.
(c) Clear the DTCs stored in memory (see page 05-1215).
HINT:
- First clear DTCs stored in the occupant classification ECU memory and then in the airbag sensor assy center memory.
- Use the hand-held tester to clear the DTC of the occupant classification ECU, otherwise the DTC cannot be cleared.

(d) Turn the ignition switch to the LOCK position.
(e) Turn the ignition switch to the ON position.
(f) Using the hand-held tester, check the DTCs (see page 05-1215).
OK:
DTC B1781 is not output.
HINT:
Codes other than code B1781 may be output at this time, but they are not related to this check.

NG → **Go to step 12**

OK

END

12	REPLACE SEAT ADJUSTER FRAME ASSY

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Replace the seat adjuster frame assy (see page 72-1 1, 72-19).

13	PERFORM ZERO POINT CALIBRATION

(a) Using the hand-held tester, perform ”Zero point calibration” (see page 05-1203).
OK:
The ”COMPLETED” is displayed.

14	PERFORM SENSITIVITY CHECK

(a) Using the hand-held tester, perform ”Sensitivity check” (see page 05-1203).
Standard value: 27 to 33 kg (59.52 to 72.75 lb)

END

DTC	B1782	OCCUPANT CLASSIFICATION SENSOR REAR LH CIRCUIT MALFUNCTION

CIRCUIT DESCRIPTION

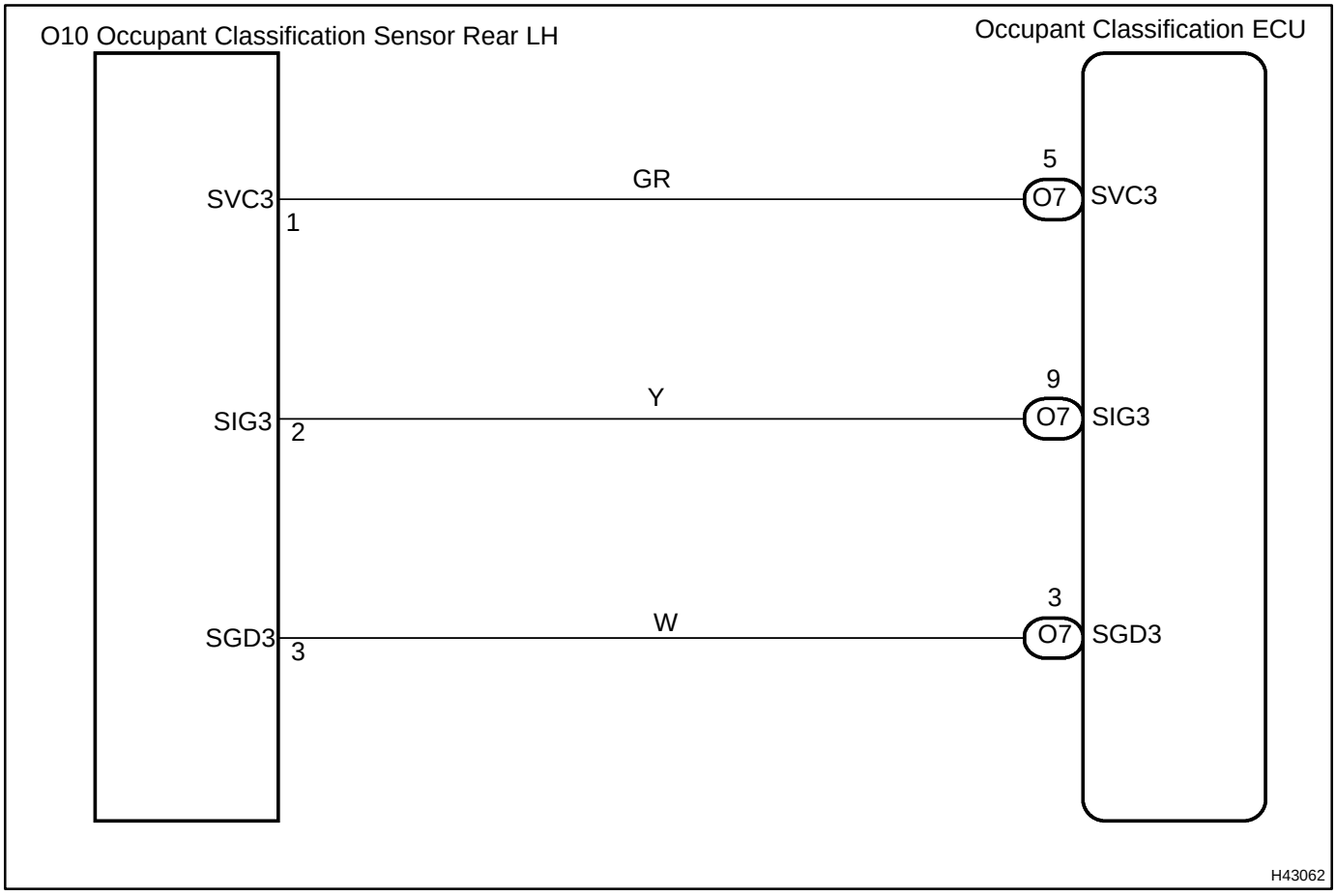
The occupant classification sensor rear LH circuit consists of the occupant classification ECU and the occupant classification sensor rear LH.
DTC B1782 is recorded when a malfunction is detected in the occupant classification sensor rear LH circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1782	⁎When the occupant classification ECU receives a line short signal, open signal, short to ground signal or B+ short signal in the occupant classification sensor rear LH circuit for 2 seconds. ⁎Occupant classification sensor rear LH malfunction ⁎Occupant classification ECU malfunction	⁎Seat adjuster frame assy (Occupant classification sensor rear LH) ⁎Front seat wire RH ⁎Occupant classification ECU

HINT:

- ⁎ When DTC B1150/23 is detected as a result of troubleshooting for the supplemental restraint system, perform troubleshooting for DTC B1782 of the occupant classification system.
- ⁎ Use the hand-held tester to check the DTC of the occupant classification ECU, otherwise the DTC cannot be read.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If troubleshooting (wire harness inspection) is difficult to perform, remove the front RH seat assy installation bolts to see the under surface of seat cushion.
- In the above case, hold the seat so that it does not fall down. Holding the seat for a long period of time may cause a problem, such as seat rail deformation. Hold the seat only as necessary.

1	CHECK DTC

(a) Turn the ignition switch to the ON position.
(b) Clear the DTCs stored in memory (see page 05-1215).

HINT:

- First clear DTCs stored in the occupant classification ECU memory and then in the airbag sensor assy center memory.
- Use the hand-held tester to clear the DTC of the occupant classification ECU, otherwise the DTC cannot be cleared.

(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position.
(e) Using the hand-held tester, check the DTCs (see page 05-1215).
OK:
DTC B1782 is not output.

HINT:

Codes other than code B1782 may be output at this time, but they are not related to this check.

NG → **Go to step 2**

OK

USE SIMULATION METHOD TO CHECK (SEE PAGE 05-1207)

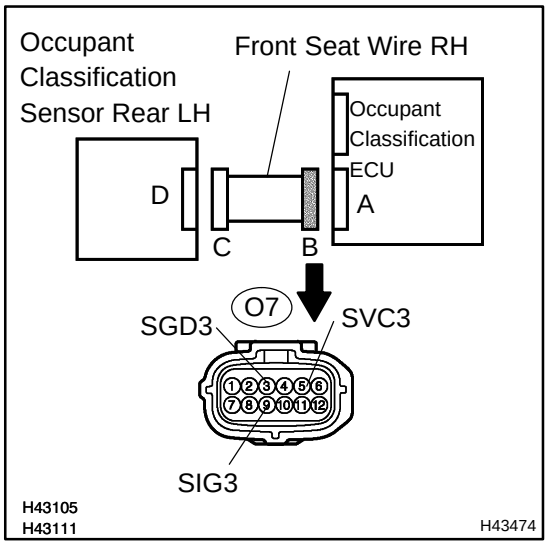
2	CHECK CONNECTION OF CONNECTORS

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Check that the connectors are properly connected to the occupant classification ECU and the occupant classification sensor rear LH.
OK:
The connectors are connected.

NG → **CONNECT CONNECTORS, THEN GO TO STEP 1**

OK

3 CHECK FRONT SEAT WIRE RH(TO B+)



(a) Disconnect the connectors from the occupant classification ECU and the occupant classification sensor rear LH.
(b) Connect the negative (-) terminal cable to the battery.
(c) Turn the ignition switch to the ON position.
(d) Measure the voltage according to the value(s) in the table below.

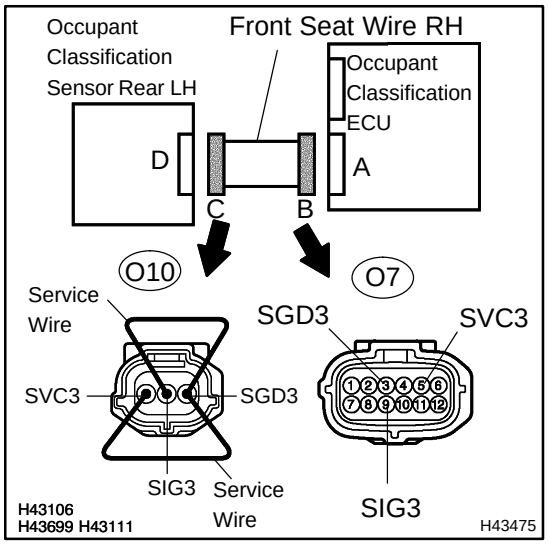
Standard:

Tester connection	Condition	Specified condition
O7-3 (SGD3) - Body ground	Ignition switch ON	Below 1 V
O7-5 (SVC3) - Body ground	Ignition switch ON	Below 1 V
O7-9 (SIG3) - Body ground	Ignition switch ON	Below 1 V

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

4 CHECK FRONT SEAT WIRE RH(OPEN)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Using a service wire, connect O10-1 (SVC3) and O10-3 (SGD3), and connect O10-2 (SIG3) and O10-3 (SGD3) of connector "C".

NOTICE:

Do not forcibly insert a service wire into the terminals of the connector when connecting.

(d) Measure the resistance according to the value(s) in the table below.

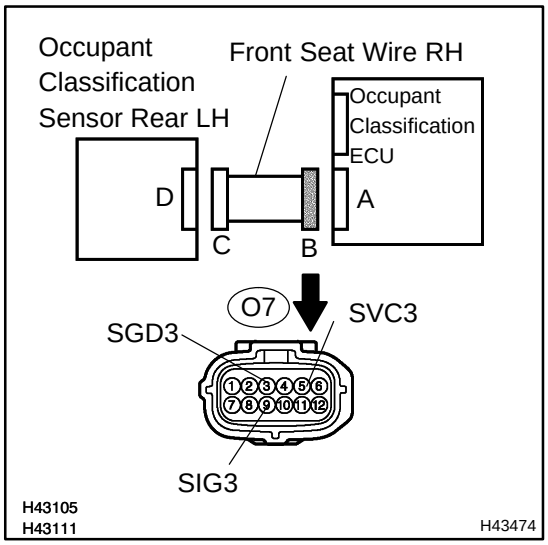
Standard:

Tester connection	Condition	Specified condition
O7-5 (SVC3) - O7-3 (SGD3)	Always	Below 1 Ω
O7-9 (SIG3) - O7-3 (SGD3)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

5 CHECK FRONT SEAT WIRE RH(SHORT)



(a) Disconnect the service wire from connector "C".
(b) Measure the resistance according to the value(s) in the table below.

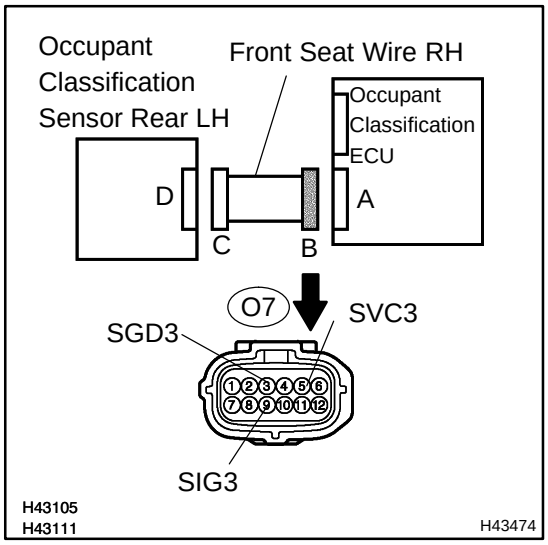
Standard:

Tester connection	Condition	Specified condition
O7-5 (SVC3) - O7-3 (SGD3)	Always	1 MΩ or Higher
O7-9 (SIG3) - O7-3 (SGD3)	Always	1 MΩ or Higher
O7-5 (SVC3) - O7-9 (SIG3)	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

6 CHECK FRONT SEAT WIRE RH(TO GROUND)



(a) Measure the resistance according to value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
O7-3 (SGD3) - Body ground	Always	1 MΩ or Higher
O7-5 (SVC3) - Body ground	Always	1 MΩ or Higher
O7-9 (SIG3) - Body ground	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

7	RECHECK DTC

(a) Connect the connectors to the occupant classification ECU and the occupant classification sensor rear LH.
(b) Connect the negative (-) terminal cable to the battery.
(c) Turn the ignition switch to the ON position.
(d) Clear the DTCs stored in memory (see page 05-1215).

HINT:

- First clear DTCs stored in the occupant classification ECU memory and then in the airbag sensor assy center memory.
- Use the hand-held tester to clear the DTC of the occupant classification ECU, otherwise the DTC cannot be cleared.

(e) Turn the ignition switch to the LOCK position.
(f) Turn the ignition switch to the ON position.
(g) Using the hand-held tester, check the DTCs (see page 05-1215).
OK:
DTC B1782 is not output.

HINT:
Codes other than code B1782 may be output at this time, but they are not related to this check.

NG → **Go to step 8**

OK

USE SIMULATION METHOD TO CHECK (SEE PAGE 05-1207)

8	REPLACE OCCUPANT CLASSIFICATION ECU

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Replace the occupant classification ECU (see page 60-64).

HINT:
Perform the inspection using parts from a normal vehicle when possible.

9	PERFORM ZERO POINT CALIBRATION

(a) Using the hand-held tester, perform ”Zero point calibration” (see page 05-1203).
OK:
The ”COMPLETED” is displayed.

NG → **Go to step 12**

OK

10	PERFORM SENSITIVITY CHECK

(a) Using the hand-held tester, perform ”Sensitivity check” (see page 05-1203).
Standard value: 27 to 33 kg (59.52 to 72.75 lb)

NG → **Go to step 12**

OK

11	RECHECK DTC

(a) Connect the negative (-) terminal cable to the battery.
(b) Turn the ignition switch to the ON position.
(c) Clear the DTCs stored in memory (see page 05-1215).
HINT:
- First clear DTCs stored in the occupant classification ECU memory and then in the airbag sensor assy center memory.
- Use the hand-held tester to clear the DTC of the occupant classification ECU, otherwise the DTC cannot be cleared.

(d) Turn the ignition switch to the LOCK position.
(e) Turn the ignition switch to the ON position.
(f) Using the hand-held tester, check the DTCs (see page 05-1215).
OK:
DTC B1782 is not output.
HINT:
Codes other than code B1782 may be output at this time, but they are not related to this check.

NG → **Go to step 12**

OK

END

12	REPLACE SEAT ADJUSTER FRAME ASSY

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Replace the seat adjuster frame assy (see page 72-1 1, 72-19).

13	PERFORM ZERO POINT CALIBRATION

(a) Using the hand-held tester, perform ”Zero point calibration” (see page 05-1203).
OK:
The ”COMPLETED” is displayed.

14	PERFORM SENSITIVITY CHECK

(a) Using the hand-held tester, perform ”Sensitivity check” (see page 05-1203).
Standard value: 27 to 33 kg (59.52 to 72.75 lb)

END

DTC	B1783	OCCUPANT CLASSIFICATION SENSOR REAR RH CIRCUIT MALFUNCTION

CIRCUIT DESCRIPTION

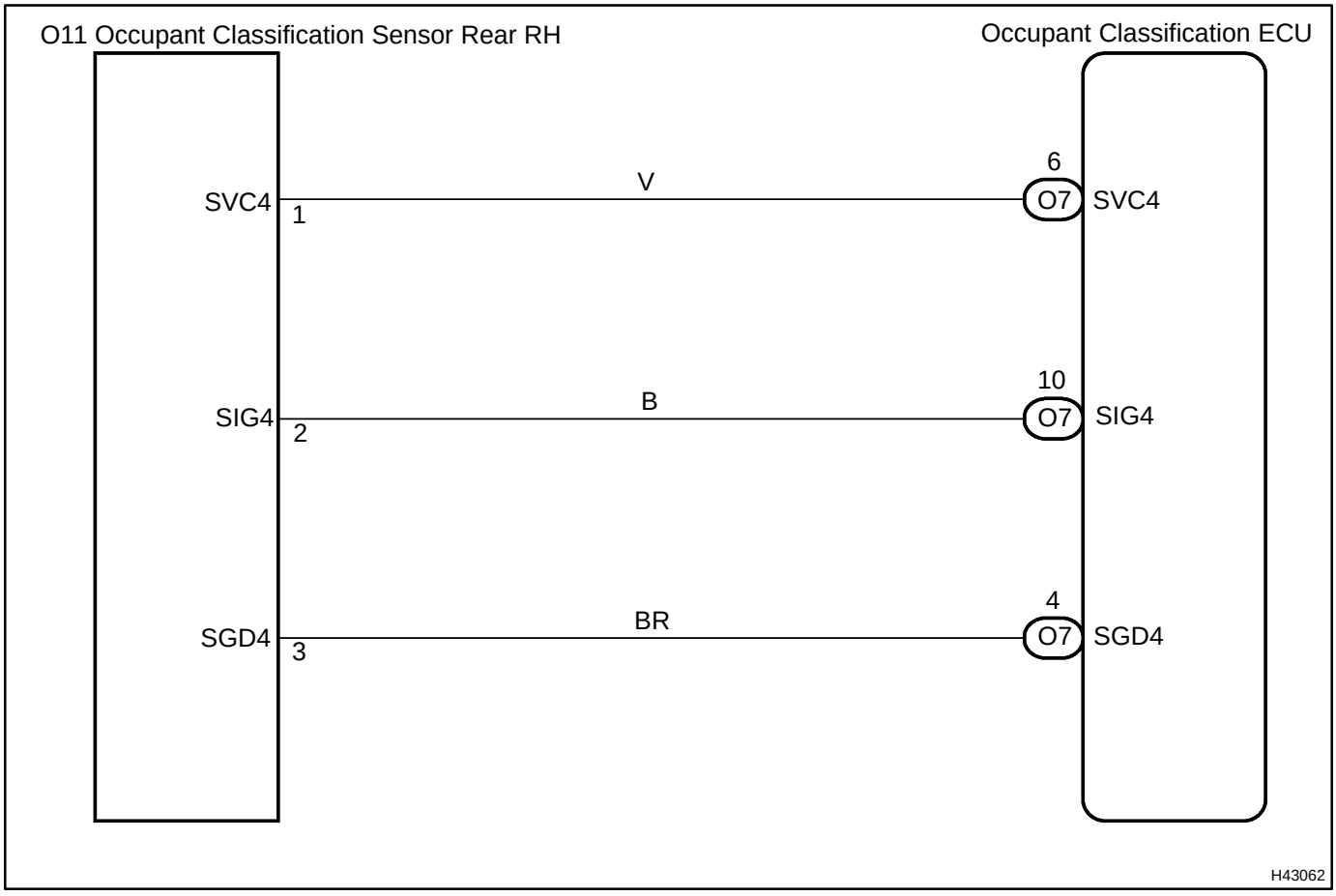
The occupant classification sensor rear RH circuit consists of the occupant classification ECU and the occupant classification sensor rear RH.
DTC B1783 is recorded when a malfunction is detected in the occupant classification sensor rear RH circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1783	⁎When the occupant classification ECU receives a line short signal, open signal, short to ground signal or B+ short signal in the occupant classification sensor rear RH circuit for 2 seconds. ⁎Occupant classification sensor rear RH malfunction ⁎Occupant classification ECU malfunction	⁎Seat adjuster frame assy (Occupant classification sensor rear RH) ⁎Front seat wire RH ⁎Occupant classification ECU

HINT:

- ⁎ When DTC B1150/23 is detected as a result of troubleshooting for the supplemental restraint system, perform troubleshooting for DTC B1783 of the occupant classification system.
- ⁎ Use the hand-held tester to check the DTC of the occupant classification ECU, otherwise the DTC cannot be read.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If troubleshooting (wire harness inspection) is difficult to perform, remove the front RH seat assy installation bolts to see the under surface of seat cushion.
- In the above case, hold the seat so that it does not fall down. Holding the seat for a long period of time may cause a problem, such as seat rail deformation. Hold the seat only as necessary.

1	CHECK DTC

(a) Turn the ignition switch to the ON position.
(b) Clear the DTCs stored in memory (see page 05-1215).

HINT:

- First clear DTCs stored in the occupant classification ECU memory and then in the airbag sensor assy center memory.
- Use the hand-held tester to clear the DTC of the occupant classification ECU, otherwise the DTC cannot be cleared.

(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position.
(e) Using the hand-held tester, check the DTCs (see page 05-1215).
OK:
DTC B1783 is not output.

HINT:

Codes other than code B1783 may be output at this time, but they are not related to this check.

NG → **Go to step 2**

OK

USE SIMULATION METHOD TO CHECK (SEE PAGE 05-1207)

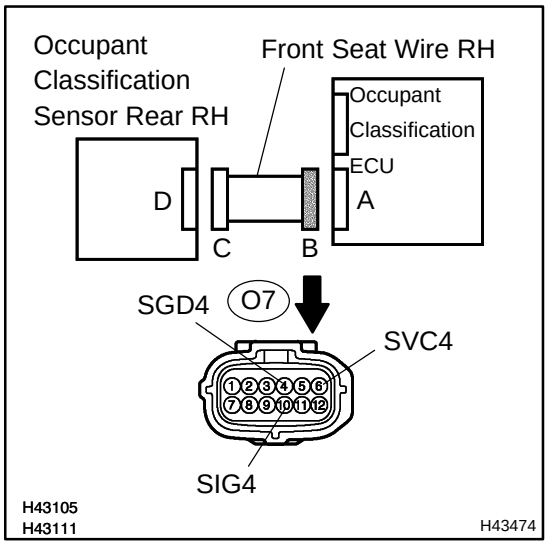
2	CHECK CONNECTION OF CONNECTORS

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Check that the connectors are properly connected to the occupant classification ECU and the occupant classification sensor rear RH.
OK:
The connectors are connected.

NG → **CONNECT CONNECTORS, THEN GO TO STEP 1**

OK

3 CHECK FRONT SEAT WIRE RH (TO B+)



(a) Disconnect the connectors from the occupant classification ECU and the occupant classification sensor rear RH.
(b) Connect the negative (-) terminal cable to the battery.
(c) Turn the ignition switch to the ON position.
(d) Measure the voltage according to the value(s) in the table below.

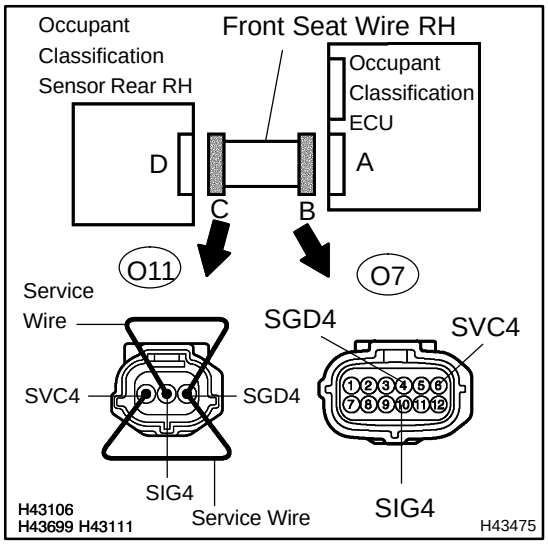
Standard:

Tester connection	Condition	Specified condition
O7-4 (SGD4) - Body ground	Ignition switch ON	Below 1 V
O7-6 (SVC4) - Body ground	Ignition switch ON	Below 1 V
O7-10 (SIG4) - Body ground	Ignition switch ON	Below 1 V

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

4 CHECK FRONT SEAT WIRE RH (OPEN)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Using a service wire, connect O11-1 (SVC4) and O11-3 (SGD4), and connect O11-2 (SIG4) and O11-3 (SGD4) of connector "C".

NOTICE:

Do not forcibly insert a service wire into the terminals of the connector when connecting.

(d) Measure the resistance according to the value(s) in the table below.

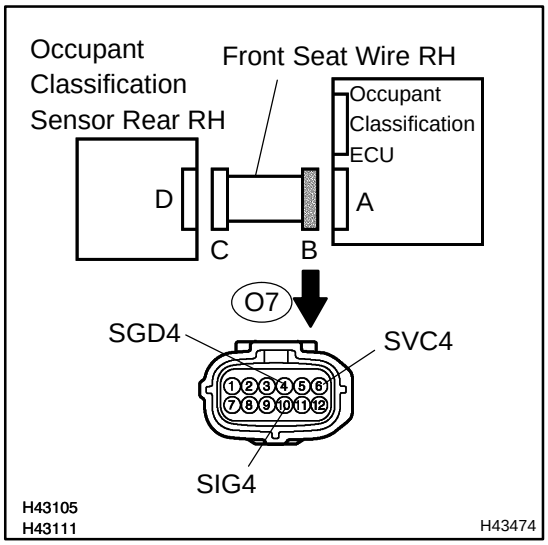
Standard:

Tester connection	Condition	Specified condition
O7-6 (SVC4) - O7-4 (SGD4)	Always	Below 1 Ω
O7-10 (SIG4) - O7-4 (SGD4)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

5 CHECK FRONT SEAT WIRE RH (SHORT)



(a) Disconnect the service wire from connector "C".
(b) Measure the resistance according to the value(s) in the table below.

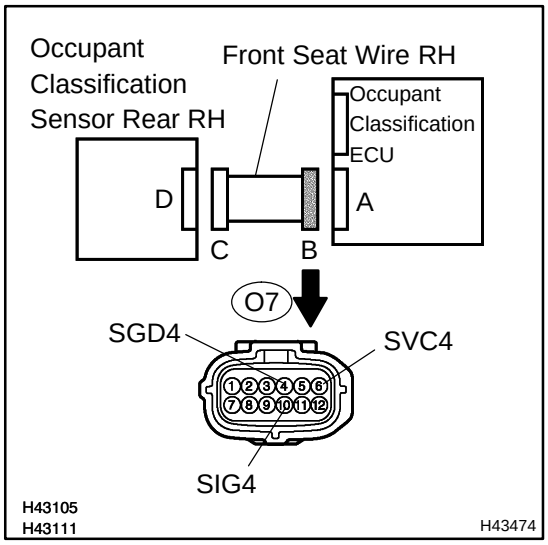
Standard:

Tester connection	Condition	Specified condition
O7-6 (SVC4) - O7-4 (SGD4)	Always	1 MΩ or Higher
O7-10 (SIG4) - O7-4 (SGD4)	Always	1 MΩ or Higher
O7-6 (SVC4) - O7-10 (SIG4)	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

6 CHECK FRONT SEAT WIRE RH (TO GROUND)



(a) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
O7-4 (SGD4) - Body ground	Always	1 MΩ or Higher
O7-6 (SVC4) - Body ground	Always	1 MΩ or Higher
O7-10 (SIG4) - Body ground	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

7	RECHECK DTC

(a) Connect the connectors to the occupant classification ECU and the occupant classification sensor rear RH.
(b) Connect the negative (-) terminal cable to the battery.
(c) Turn the ignition switch to the ON position.
(d) Clear the DTCs stored in memory (see page 05-1215).

HINT:

- First clear DTCs stored in the occupant classification ECU memory and then in the airbag sensor assy center memory.
- Use the hand-held tester to clear the DTC of the occupant classification ECU, otherwise the DTC cannot be cleared.

(e) Turn the ignition switch to the LOCK position.
(f) Turn the ignition switch to the ON position.
(g) Using the hand-held tester, check the DTCs (see page 05-1215).
OK:
DTC B1783 is not output.

HINT:
Codes other than code B1783 may be output at this time, but they are not related to this check.

NG → **Go to step 8**

OK

USE SIMULATION METHOD TO CHECK (SEE PAGE 05-1207)

8	REPLACE OCCUPANT CLASSIFICATION ECU

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Replace the occupant classification ECU (see page 60-64).

HINT:
Perform the inspection using parts from a normal vehicle when possible.

9	PERFORM ZERO POINT CALIBRATION

(a) Using the hand-held tester, perform ”Zero point calibration” (see page 05-1203).
OK:
The ”COMPLETED” is displayed.

NG → **Go to step 12**

OK

10	PERFORM SENSITIVITY CHECK

(a) Using the hand-held tester, perform ”Sensitivity check” (see page 05-1203).
Standard value: 27 to 33 kg (59.52 to 72.75 lb)

NG → **Go to step 12**

OK

11	RECHECK DTC

(a) Connect the negative (-) terminal cable to the battery.
(b) Turn the ignition switch to the ON position.
(c) Clear the DTCs stored in memory (see page 05-1215).
HINT:
- First clear DTCs stored in the occupant classification ECU memory and then in the airbag sensor assy center memory.
- Use the hand-held tester to clear the DTC of the occupant classification ECU, otherwise the DTC cannot be cleared.

(d) Turn the ignition switch to the LOCK position.
(e) Turn the ignition switch to the ON position.
(f) Using the hand-held tester, check the DTCs (see page 05-1215).
OK:
DTC B1783 is not output.
HINT:
Codes other than code B1783 may be output at this time, but they are not related to this check.

NG → **Go to step 12**

OK

END

12	REPLACE SEAT ADJUSTER FRAME ASSY

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Replace the seat adjuster frame assy (see page 72-1 1, 72-19).

13	PERFORM ZERO POINT CALIBRATION

(a) Using the hand-held tester, perform ”Zero point calibration” (see page 05-1203).
OK:
The ”COMPLETED” is displayed.

14	PERFORM SENSITIVITY CHECK

(a) Using the hand-held tester, perform ”Sensitivity check” (see page 05-1203).
Standard value: 27 to 33 kg (59.52 to 72.75 lb)

END

DTC	B1785	OCCUPANT CLASSIFICATION SENSOR FRONT LH COLLISION DETECTION

CIRCUIT DESCRIPTION

DTC B1785 is output when the occupant classification ECU receives a collision detection signal sent by the occupant classification sensor front LH if an accident occurs.
DTC B1785 is also output when the seat adjuster frame assy is subjected to a strong impact, even if an actual accident does not occur.
However, when the occupant classification ECU outputs a collision detection signal, even if the vehicle is not in a collision, DTC B1785 can be cleared by ”Zero point calibration” and ”Sensitivity check”.
Therefore, If DTC B1785 is output, first perform ”Zero point calibration” and ”Sensitivity check”.

DTC No.	DTC Detecting Condition	Trouble Area
B1785	⁎Seat adjuster frame assy malfunction ⁎Occupant classification ECU malfunction ⁎Occupant classification sensor front LH sensed large load	⁎Occupant classification ECU ⁎Seat adjuster frame assy (Occupant classification sensor front LH)

HINT:

- ⁎ When DTC B1150/23 is detected as a result of troubleshooting for the supplemental restraint system, perform troubleshooting for DTC B1785 of the classification system.
- ⁎ Use the hand-held tester to check the DTC of the occupant classification ECU, otherwise the DTC cannot be read.

WIRING DIAGRAM

see page 05-1453 .

INSPECTION PROCEDURE

1	PERFORM ZERO POINT CALIBRATION

(a) Using the hand-held tester, perform ”Zero point calibration” (see page 05-1203).
OK:
The ”COMPLETED” is displayed.

NG → **Go to step 4**

OK

2	PERFORM SENSITIVITY CHECK

(a) Using the hand-held tester, perform ”Sensitivity check” (see page 05-1203).
Standard value: 27 to 33 kg (59.52 to 72.75 lb)

NG → **Go to step 4**

OK

3	CHECK DTC

(a) Turn the ignition switch to the ON position.
(b) Clear the DTCs stored in airbag sensor assy center memory (see page 05-1215).
(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position.
(e) Using the hand-held tester, check the DTCs (see page 05-1215).
OK:
DTC B1785 is not output.

HINT:
Codes other than code B1785 may be output at this time, but they are not related to this check.

NG → **Go to step 4**

OK

END

4	REPLACE SEAT ADJUSTER FRAME ASSY

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Replace the seat adjuster frame assy (see page 72-1 1, 72-19).

HINT:
Perform the inspection using parts from a normal vehicle when possible.

5	PERFORM ZERO POINT CALIBRATION

(a) Using the hand-held tester, perform ”Zero point calibration” (see page 05-1203).
OK:
The ”COMPLETED” is displayed.

NG → **Go to step 8**

OK

6	PERFORM SENSITIVITY CHECK

(a) Using the hand-held tester, perform ”Sensitivity check” (see page 05-1203).
Standard value: 27 to 33 kg (59.52 to 72.75 lb)

NG → **Go to step 8**

OK

7	CHECK DTC

(a) Connect the connectors to the occupant classification ECU and the occupant classification sensor front LH.
(b) Connect the negative (-) terminal cable to the battery.
(c) Turn the ignition switch to the ON position.
(d) Clear the DTCs stored in memory (see page 05-1215).

HINT:

- First clear DTCs stored in the occupant classification ECU memory and then in the airbag sensor assy center memory.
- Use the hand-held tester to clear the DTC of the occupant classification ECU, otherwise the DTC cannot be cleared.

(e) Turn the ignition switch to the LOCK position.
(f) Turn the ignition switch to the ON position.
(g) Using the hand-held tester, check the DTCs (see page 05-1215).
OK:
DTC B1785 is not output.

HINT:
Codes other than code B1785 may be output at this time, but they are not related to this check.

NG → **Go to step 8**

OK

END

8	REPLACE OCCUPANT CLASSIFICATION ECU

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Replace the occupant classification ECU (see page 60-64).

9	PERFORM ZERO POINT CALIBRATION

(a) Using the hand-held tester, perform ”Zero point calibration” (see page 05-1203).
OK:
The ”COMPLETED” is displayed.

10	PERFORM SENSITIVITY CHECK

(a) Using the hand-held tester, perform ”Sensitivity check” (see page 05-1203).
Standard value: 27 to 33 kg (59.52 to 72.75 lb)

END

DTC	B1786	OCCUPANT CLASSIFICATION SENSOR FRONT RH COLLISION DETECTION

CIRCUIT DESCRIPTION

DTC B1786 is output when the occupant classification ECU receives a collision detection signal sent by the occupant classification sensor front RH if an accident occurs.
DTC B1786 is also output when the seat adjuster frame assy is subjected to a strong impact, even if an actual accident does not occur.
However, when the occupant classification ECU outputs a collision detection signal, even if the vehicle is not in a collision, DTC B1786 can be cleared by ”Zero point calibration” and ”Sensitivity check”.
Therefore, if DTC B1786 is output, first perform ”Zero point calibration” and ”Sensitivity check”.

DTC No.	DTC Detecting Condition	Trouble Area
B1786	⁎Seat adjuster frame assy malfunction ⁎Occupant classification ECU malfunction ⁎Occupant classification sensor front RH sensed large load	⁎Occupant classification ECU ⁎Seat adjuster frame assy (Occupant classification sensor front RH)

HINT:

- ⁎ When DTC B1150/23 is detected as a result of troubleshooting for the supplemental restraint system, perform troubleshooting for DTC B1786 of the classification system.
- ⁎ Use the hand-held tester to check the DTC of the occupant classification ECU, otherwise the DTC cannot be read.

WIRING DIAGRAM

see page 05-1460 .

INSPECTION PROCEDURE

1	PERFORM ZERO POINT CALIBRATION

(a) Using the hand-held tester, perform ”Zero point calibration” (see page 05-1203).
OK:
The ”COMPLETED” is displayed.

NG → **Go to step 4**

OK

2	PERFORM SENSITIVITY CHECK

(a) Using the hand-held tester, perform ”Sensitivity check” (see page 05-1203).
Standard value: 27 to 33 kg (59.52 to 72.75 lb)

NG → **Go to step 4**

OK

3	CHECK DTC

(a) Turn the ignition switch to the ON position.
(b) Clear the DTCs stored in airbag sensor assy center memory (see page 05-1215).
(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position.
(e) Using the hand-held tester, check the DTCs (see page 05-1215).
OK:
DTC B1786 is not output.

HINT:
Codes other than code B1786 may be output at this time, but they are not related to this check.

NG → **Go to step 4**

OK

END

4	REPLACE SEAT ADJUSTER FRAME ASSY

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Replace the seat adjuster frame assy (see page 72-1 1, 72-19).

HINT:
Perform the inspection using parts from a normal vehicle when possible.

5	PERFORM ZERO POINT CALIBRATION

(a) Using the hand-held tester, perform ”Zero point calibration” (see page 05-1203).
OK:
The ”COMPLETED” is displayed.

NG → **Go to step 8**

OK

6	PERFORM SENSITIVITY CHECK

(a) Using the hand-held tester, perform ”Sensitivity check” (see page 05-1203).
Standard value: 27 to 33 kg (59.52 to 72.75 lb)

NG → **Go to step 8**

OK

7	CHECK DTC

(a) Connect the connectors to the occupant classification ECU and the occupant classification sensor front RH.
(b) Connect the negative (-) terminal cable to the battery.
(c) Turn the ignition switch to the ON position.
(d) Clear the DTCs stored in memory (see page 05-1215).

HINT:

- First clear DTCs stored in the occupant classification ECU memory and then in the airbag sensor assy center memory.
- Use the hand-held tester to clear the DTC of the occupant classification ECU, otherwise the DTC cannot be cleared.

(e) Turn the ignition switch to the LOCK position.
(f) Turn the ignition switch to the ON position.
(g) Using the hand-held tester, check the DTCs (see page 05-1215).
OK:
DTC B1786 is not output.

HINT:
Codes other than code B1786 may be output at this time, but they are not related to this check.

NG → **Go to step 8**

OK

END

8	REPLACE OCCUPANT CLASSIFICATION ECU

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Replace the occupant classification ECU (see page 60-64).

9	PERFORM ZERO POINT CALIBRATION

(a) Using the hand-held tester, perform ”Zero point calibration” (see page 05-1203).
OK:
The ”COMPLETED” is displayed.

10	PERFORM SENSITIVITY CHECK

(a) Using the hand-held tester, perform ”Sensitivity check” (see page 05-1203).
Standard value: 27 to 33 kg (59.52 to 72.75 lb)

END

DTC	B1787	OCCUPANT CLASSIFICATION SENSOR REAR LH COLLISION DETECTION

CIRCUIT DESCRIPTION

DTC B1787 is output when the occupant classification ECU receives a collision detection signal sent by the occupant classification sensor rear LH if an accident occurs.
DTC B1787 is also output when the seat adjuster frame assy is subjected to a strong impact, even if an actual accident does not occur.
However, when the occupant classification ECU outputs a collision detection signal, even if the vehicle is not in a collision, DTC B1787 can be cleared by ”Zero point calibration” and ”Sensitivity check”.
Therefore, if DTC B1787 is output, first perform ”Zero point calibration” and ”Sensitivity check”.

DTC No.	DTC Detecting Condition	Trouble Area
B1787	⁎Seat adjuster frame assy malfunction ⁎Occupant classification ECU malfunction ⁎Occupant classification sensor rear LH sensed large load	⁎Occupant classification ECU ⁎Seat adjuster frame assy (Occupant classification sensor rear LH)

HINT:

- ⁎ When DTC B1150/23 is detected as a result of troubleshooting for the supplemental restraint system, perform troubleshooting for DTC B1787 of the classification system.
- ⁎ Use the hand-held tester to check the DTC of the occupant classification ECU, otherwise the DTC cannot be read.

WIRING DIAGRAM

see page 05-1467 .

INSPECTION PROCEDURE

1	PERFORM ZERO POINT CALIBRATION

(a) Using the hand-held tester, perform ”Zero point calibration” (see page 05-1203).
OK:
The ”COMPLETED” is displayed.

NG → **Go to step 4**

OK

2	PERFORM SENSITIVITY CHECK

(a) Using the hand-held tester, perform ”Sensitivity check” (see page 05-1203).
Standard value: 27 to 33 kg (59.52 to 72.75 lb)

NG → **Go to step 4**

OK

3	CHECK DTC

(a) Turn the ignition switch to the ON position.
(b) Clear the DTCs stored in airbag sensor assy center memory (see page 05-1215).
(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position.
(e) Using the hand-held tester, check the DTCs (see page 05-1215).
OK:
DTC B1787 is not output.

HINT:
Codes other than code B1787 may be output at this time, but they are not related to this check.

NG → **Go to step 4**

OK

END

4	REPLACE SEAT ADJUSTER FRAME ASSY

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Replace the seat adjuster frame assy (see page 72-1 1, 72-19).

HINT:
Perform the inspection using parts from a normal vehicle when possible.

5	PERFORM ZERO POINT CALIBRATION

(a) Using the hand-held tester, perform ”Zero point calibration” (see page 05-1203).
OK:
The ”COMPLETED” is displayed.

NG → **Go to step 8**

OK

6	PERFORM SENSITIVITY CHECK

(a) Using the hand-held tester, perform ”Sensitivity check” (see page 05-1203).
Standard value: 27 to 33 kg (59.52 to 72.75 lb)

NG → **Go to step 8**

OK

7	CHECK DTC

(a) Connect the connectors to the occupant classification ECU and the occupant classification sensor rear LH.
(b) Connect the negative (-) terminal cable to the battery.
(c) Turn the ignition switch to the ON position.
(d) Clear the DTCs stored in memory (see page 05-1215).

HINT:

- First clear DTCs stored in the occupant classification ECU memory and then in the airbag sensor assy center memory.
- Use the hand-held tester to clear the DTC of the occupant classification ECU, otherwise the DTC cannot be cleared.

(e) Turn the ignition switch to the LOCK position.
(f) Turn the ignition switch to the ON position.
(g) Using the hand-held tester, check the DTCs (see page 05-1215).
OK:
DTC B1787 is not output.

HINT:
Codes other than code B1787 may be output at this time, but they are not related to this check.

NG → **Go to step 8**

OK

END

8	REPLACE OCCUPANT CLASSIFICATION ECU

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Replace the occupant classification ECU (see page 60-64).

9	PERFORM ZERO POINT CALIBRATION

(a) Using the hand-held tester, perform ”Zero point calibration” (see page 05-1203).
OK:
The ”COMPLETED” is displayed.

10	PERFORM SENSITIVITY CHECK

(a) Using the hand-held tester, perform ”Sensitivity check” (see page 05-1203).
Standard value: 27 to 33 kg (59.52 to 72.75 lb)

END

DTC	B1788	OCCUPANT CLASSIFICATION SENSOR REAR RH COLLISION DETECTION

CIRCUIT DESCRIPTION

DTC B1788 is output when the occupant classification ECU receives a collision detection signal sent by the occupant classification sensor rear RH if an accident occurs.
DTC B1788 is also output when the seat adjuster frame assy is subjected to a strong impact, even if an actual accident does not occur.
However, when the occupant classification ECU outputs a collision detection signal, even if the vehicle is not in a collision, DTC B1788 can be cleared by ”Zero point calibration” and ”Sensitivity check”.
Therefore, if DTC B1788 is output, first perform ”Zero point calibration” and ”Sensitivity check”.

DTC No.	DTC Detecting Condition	Trouble Area
B1788	⁎Seat adjuster frame assy malfunction ⁎Occupant classification ECU malfunction ⁎Occupant classification sensor rear RH sensed large load	⁎Occupant classification ECU ⁎Seat adjuster frame assy (Occupant classification sensor rear RH)

HINT:

- ⁎ When DTC B1150/23 is detected as a result of troubleshooting for the supplemental restraint system, perform troubleshooting for DTC B1788 of the classification system.
- ⁎ Use the hand-held tester to check the DTC of the occupant classification ECU, otherwise the DTC cannot be read.

WIRING DIAGRAM

see page 05-1474 .

INSPECTION PROCEDURE

1	PERFORM ZERO POINT CALIBRATION

(a) Using the hand-held tester, perform ”Zero point calibration” (see page 05-1203).
OK:
The ”COMPLETED” is displayed.

NG → **Go to step 4**

OK

2	PERFORM SENSITIVITY CHECK

(a) Using the hand-held tester, perform ”Sensitivity check” (see page 05-1203).
Standard value: 27 to 33 kg (59.52 to 72.75 lb)

NG → **Go to step 4**

OK

3	CHECK DTC

(a) Turn the ignition switch to the ON position.
(b) Clear the DTCs stored in airbag sensor assy center memory (see page 05-1215).
(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position.
(e) Using the hand-held tester, check the DTCs (see page 05-1215).
OK:
DTC B1788 is not output.

HINT:
Codes other than code B1788 may be output at this time, but they are not related to this check.

NG → **Go to step 4**

OK

END

4	REPLACE SEAT ADJUSTER FRAME ASSY

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Replace the seat adjuster frame assy (see page 72-1 1, 72-19).

HINT:
Perform the inspection using parts from a normal vehicle when possible.

5	PERFORM ZERO POINT CALIBRATION

(a) Using the hand-held tester, perform ”Zero point calibration” (see page 05-1203).
OK:
The ”COMPLETED” is displayed.

NG → **Go to step 8**

OK

6	PERFORM SENSITIVITY CHECK

(a) Using the hand-held tester, perform ”Sensitivity check” (see page 05-1203).
Standard value: 27 to 33 kg (59.52 to 72.75 lb)

NG → **Go to step 8**

OK

7	CHECK DTC

(a) Connect the connectors to the occupant classification ECU and the occupant classification sensor rear RH.
(b) Connect the negative (-) terminal cable to the battery.
(c) Turn the ignition switch to the ON position.
(d) Clear the DTCs stored in memory (see page 05-1215).

HINT:

* First clear DTCs stored in the occupant classification ECU memory and then in the airbag sensor assy center memory.
* Use the hand-held tester to clear the DTC of the occupant classification ECU, otherwise the DTC cannot be cleared.

(e) Turn the ignition switch to the LOCK position.
(f) Turn the ignition switch to the ON position.
(g) Using the hand-held tester, check the DTCs (see page 05-1215).
OK:
DTC B1788 is not output.

HINT:

Codes other than code B1788 may be output at this time, but they are not related to this check.

NG → **Go to step 8**

OK

END

8	REPLACE OCCUPANT CLASSIFICATION ECU

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Replace the occupant classification ECU (see page 60-64).

9	PERFORM ZERO POINT CALIBRATION

(a) Using the hand-held tester, perform ”Zero point calibration” (see page 05-1203).
OK:
The ”COMPLETED” is displayed.

10	PERFORM SENSITIVITY CHECK

(a) Using the hand-held tester, perform ”Sensitivity check” (see page 05-1203).
Standard value: 27 to 33 kg (59.52 to 72.75 lb)

END

DTC	B1790	AIRBAG SENSOR ASSY CENTER COMMUNICATION CIRCUIT MALFUNCTION

CIRCUIT DESCRIPTION

The airbag sensor assy center communication circuit consists of the occupant classification ECU and the airbag sensor assy center.

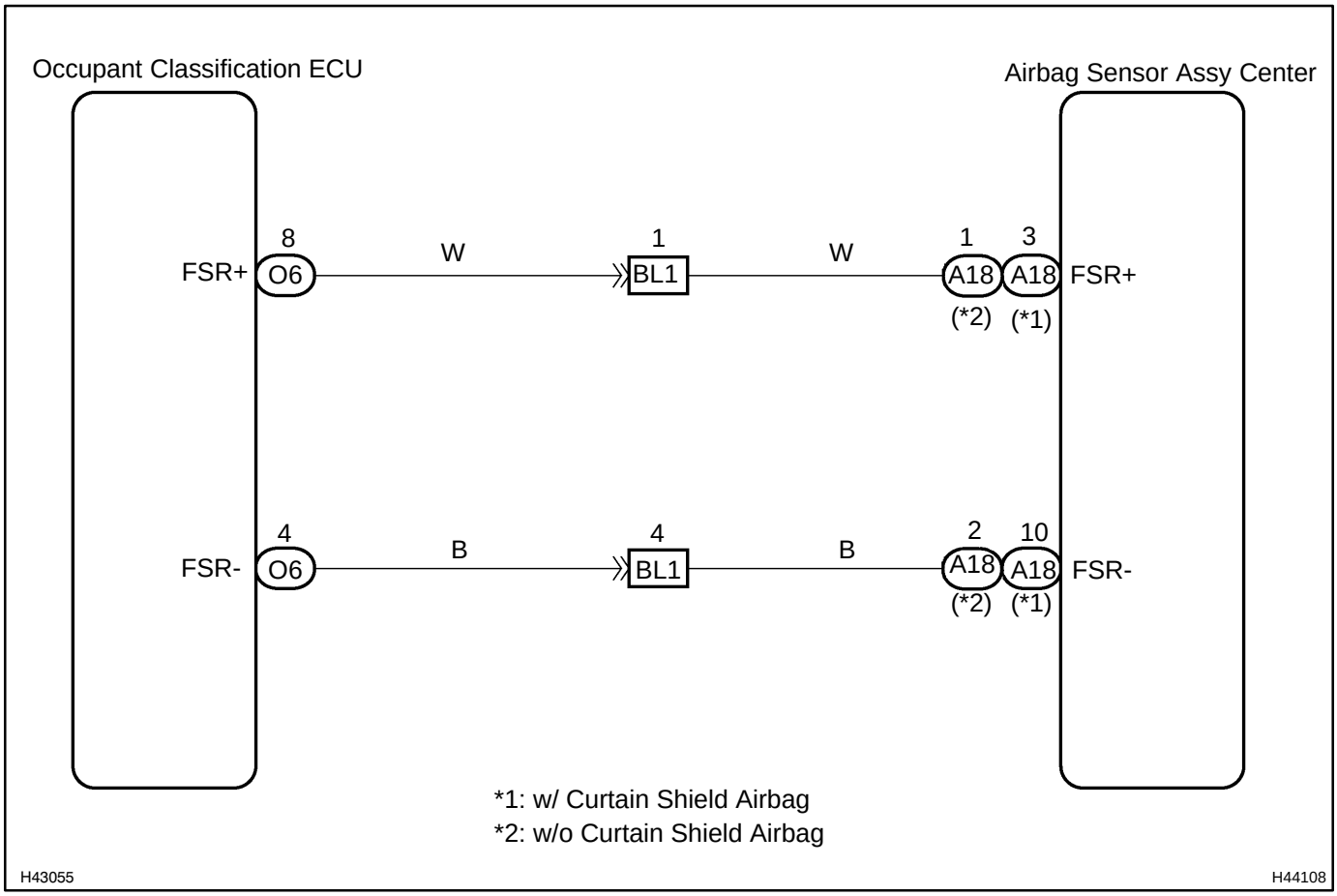
DTC B1790 is recorded when a malfunction is detected in the airbag sensor assy center communication circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1790	・When the occupant classification ECU receives a line short signal, open signal, short to ground signal or B+ short signal in the airbag sensor assy center communication circuit for 2 seconds. ・Airbag sensor assy center malfunction ・Occupant classification ECU malfunction	・Occupant classification ECU ・Airbag sensor assy center ・Floor wire ・Front seat wire RH

HINT:

- When DTC B1150/23 is detected as a result of troubleshooting for the supplemental restraint system, perform troubleshooting for DTC B1790 of the occupant classification system.
- Use the hand-held tester to check the DTC of the occupant classification ECU, otherwise the DTC cannot be read.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If troubleshooting (wire harness inspection) is difficult to perform, remove the front RH seat assy installation bolts to see the under surface of seat cushion.
- In the above case, hold the seat so that it does not fall down. Holding the seat for a long period of time may cause a problem, such as seat rail deformation. Hold the seat only as necessary.

1	CHECK DTC

(a) Turn the ignition switch to the ON position.
(b) Clear the DTCs stored in memory (see page 05-1215).

HINT:

- First clear DTCs stored in the occupant classification ECU memory and then in the airbag sensor assy center memory.
- Use the hand-held tester to clear the DTC of the occupant classification ECU, otherwise the DTC cannot be cleared.

(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position.
(e) Using the hand-held tester, check the DTCs (see page 05-1215).

OK:

DTC B1790 is not output.

HINT:

Codes other than code B1790 may be output at this time, but they are not related to this check.

NG → **Go to step 2**

OK

USE SIMULATION METHOD TO CHECK (SEE PAGE 05-1207)

2	CHECK CONNECTION OF CONNECTORS

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Check that the connectors are properly connected to the occupant classification ECU and the airbag sensor assy center.

OK:

The connectors are connected.

NG → **CONNECT CONNECTORS, THEN GO TO STEP 1**

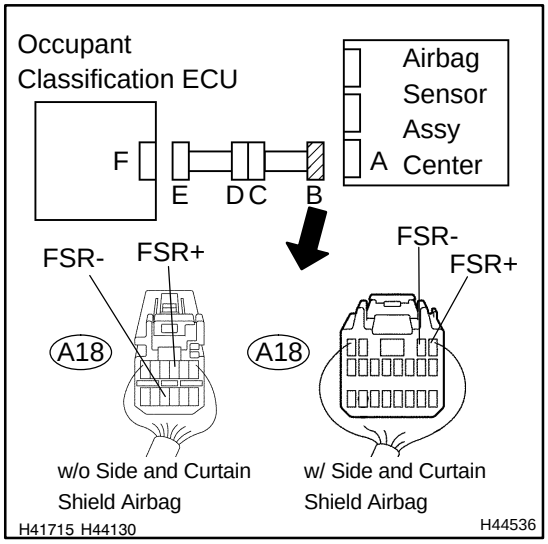
OK

3	PREPARE FOR INSPECTION

CAUTION:
Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag sensor assy center.
(d) Disconnect the connectors from the horn button assy.
(e) Disconnect the connectors from the front passenger airbag assy.
(f) Disconnect the connector from the front seat airbag assy LH
(g) Disconnect the connector from the front seat airbag assy RH.
(h) Disconnect the connector from the curtain shield airbag assy LH.
(i) Disconnect the connector from the curtain shield airbag assy RH
(j) Disconnect the connector from the front seat outer belt assy LH.
(k) Disconnect the connector from the front seat outer belt assy RH.

4	CHECK WIRE HARNESS (TO B+)



(a) Disconnect the connector from the occupant classification ECU.
(b) Connect the negative (-) terminal cable to the battery.
(c) Turn the ignition switch to the ON position.
(d) Measure the voltage according to the value(s) in the table below.

Standard:

w/ Side and curtain shield airbag:

Tester connection	Condition	Specified condition
A18-3 (FSR+) - Body ground	Ignition switch ON	Below 1 V
A18-10 (FSR-) - Body ground	Ignition switch ON	Below 1 V

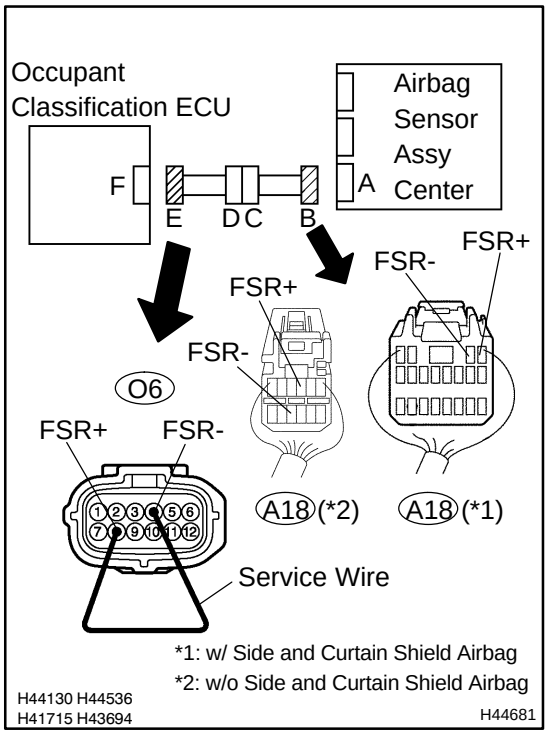
w/o Side and curtain shield airbag:

Tester connection	Condition	Specified condition
A18-1 (FSR+) - Body ground	Ignition switch ON	Below 1 V
A18-2 (FSR-) - Body ground	Ignition switch ON	Below 1 V

NG → **Go to step 13**

OK

5 CHECK WIRE HARNESS (OPEN)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Using a service wire, connect the O6-8 (FSR+) and O6-4 (FSR-) of connector "E".

NOTICE:

Do not forcibly insert a service wire into the terminal of the connector when connecting.

(d) Measure the resistance according to the value(s) in the table below.

Standard:

w/ Side and curtain shield airbag:

Tester connection	Condition	Specified condition
A18-3 (FSR+) - A18-10 (FSR-)	Always	Below 1 Ω

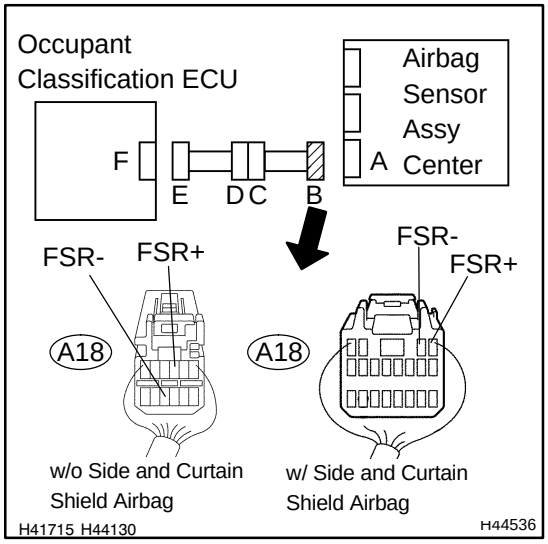
w/o Side and curtain shield airbag:

Tester connection	Condition	Specified condition
A18-1 (FSR+) - A18-2 (FSR-)	Always	Below 1 Ω

NG → **Go to step 14**

OK

6 CHECK WIRE HARNESS (SHORT)



(a) Disconnect the service wire from connector "E".
(b) Measure the resistance according to the value(s) in the table below.

w/ Side and curtain shield airbag:

Tester connection	Condition	Specified condition
A18-3 (FSR+) - A18-10 (FSR-)	Always	1 MΩ or Higher

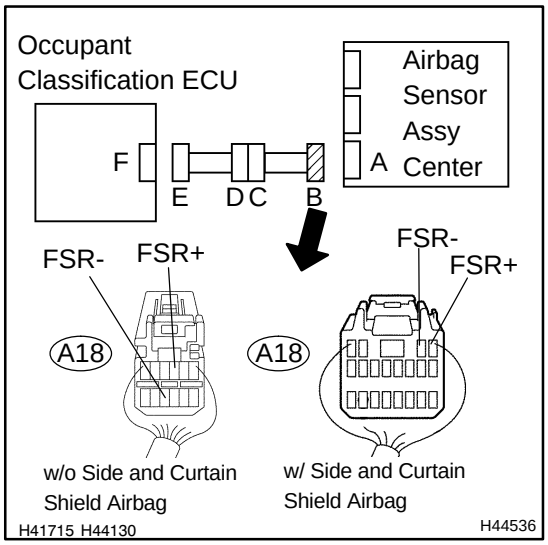
w/o Side and curtain shield airbag:

Tester connection	Condition	Specified condition
A18-1 (FSR+) - A18-2 (FSR-)	Always	1 MΩ or Higher

NG → **Go to step 15**

OK

7 CHECK WIRE HARNESS (TO GROUND)



(a) Measure the resistance according to the value(s) in the table below.

Standard:

w/ Side and curtain shield airbag:

Tester connection	Condition	Specified condition
A18-3 (FSR+) - Body ground	Always	1 MΩ or Higher
A18-10 (FSR-) - Body ground	Always	1 MΩ or Higher

w/o Side and curtain shield airbag:

Tester connection	Condition	Specified condition
A18-1 (FSR+) - Body ground	Always	1 MΩ or Higher
A18-2 (FSR-) - Body ground	Always	1 MΩ or Higher

NG → **Go to step 16**

OK

8 RECHECK DTC

(a) Connect the connectors to the occupant classification ECU and the airbag sensor assy center.
(b) Connect the negative (-) terminal cable to the battery.
(c) Turn the ignition switch to the ON position.
(d) Clear the DTCs stored in memory (see page 05-1215).

HINT:

- First clear DTCs stored in the occupant classification ECU memory and then in the airbag sensor assy center memory.
- Use the hand-held tester to clear the DTC of the occupant classification ECU, otherwise the DTC cannot be cleared.

(e) Turn the ignition switch to the LOCK position.
(f) Turn the ignition switch to the ON position.
(g) Using the hand-held tester, check the DTCs (see page 05-1215).

OK:

DTC B1790 is not output.

HINT:

Codes other than code B1790 may be output at this time, but they are not related to this check.

NG → **Go to step 9**

OK

USE SIMULATION METHOD TO CHECK (SEE PAGE 05-1207)

9	REPLACE OCCUPANT CLASSIFICATION ECU

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Replace the occupant classification ECU (see page 60-64).

HINT:
Perform the inspection using parts from a normal vehicle when possible.

10	PERFORM ZERO POINT CALIBRATION

(a) Using the hand-held tester, perform ”Zero point calibration” (see page 05-1203).
OK:
The ”COMPLETED” is displayed.

11	PERFORM SENSITIVITY CHECK

(a) Using the hand-held tester, perform ”Sensitivity check” (see page 05-1203).
Standard value: 27 to 33 kg (59.52 to 72.75 lb)

12	RECHECK DTC

(a) Connect the connector to the occupant classification ECU.
(b) Connect the negative (-) terminal cable to the battery.
(c) Turn the ignition switch to the ON position.
(d) Clear the DTCs stored in memory (see page 05-1215).

HINT:
- First clear DTCs stored in the occupant classification ECU memory and then in the airbag sensor assy center memory.
- Use the hand-held tester to clear the DTC of the occupant classification ECU, otherwise the DTC cannot be cleared.

(e) Turn the ignition switch to the LOCK position.
(f) Turn the ignition switch to the ON position.
(g) Using the hand-held tester, check the DTCs (see page 05-1215).
OK:
DTC B1790 is not output.

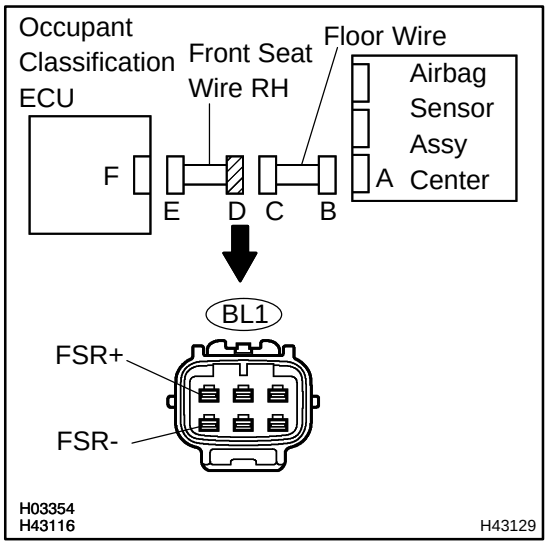
HINT:
Codes other than code B1790 may be output at this time, but they are not related to this check.

NG → **REPLACE AIR BAG SENSOR ASSY CENTER (SEE PAGE 60-53)**

OK

END

13 CHECK FRONT SEAT WIRE RH (TO B+)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from battery, and wait for at least 90 seconds.
(c) Disconnect the front seat wire RH connector from the floor wire.
(d) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(e) Turn the ignition switch to the ON position.
(f) Measure the voltage according to the value(s) in the table below.

Standard:

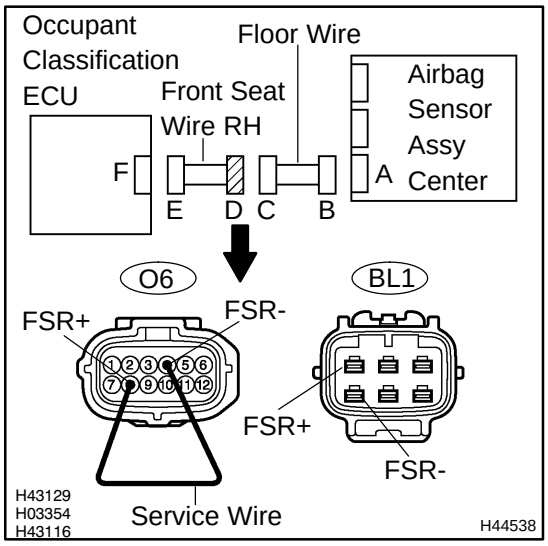
Tester connection	Condition	Specified condition
BL1-1 (FSR+) - Body ground	Ignition switch ON	Below 1 V
BL1-4 (FSR-) - Body ground	Ignition switch ON	Below 1 V

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

REPAIR OR REPLACE FLOOR WIRE

14 CHECK FRONT SEAT WIRE RH (OPEN)



(a) Disconnect the front seat wire RH connector from the floor wire.

HINT:

Connector "E" has already been inserted into the service wire.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

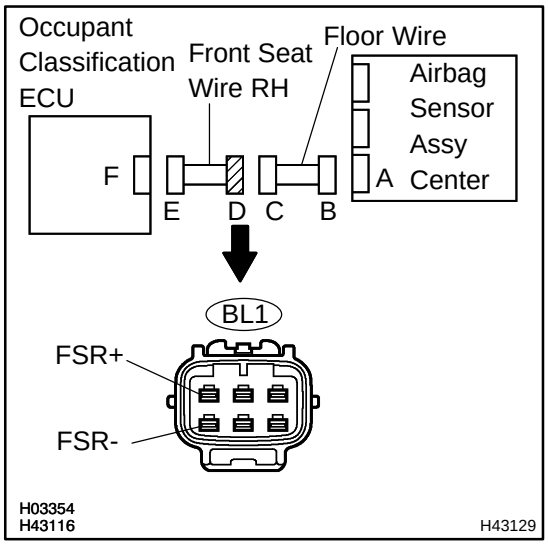
Tester connection	Condition	Specified condition
BL1-1 (FSR+) - BL1-4 (FSR-)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

REPAIR OR REPLACE FLOOR WIRE

15 CHECK FRONT SEAT WIRE RH (SHORT)



(a) Disconnect the front seat wire RH connector from the floor wire.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

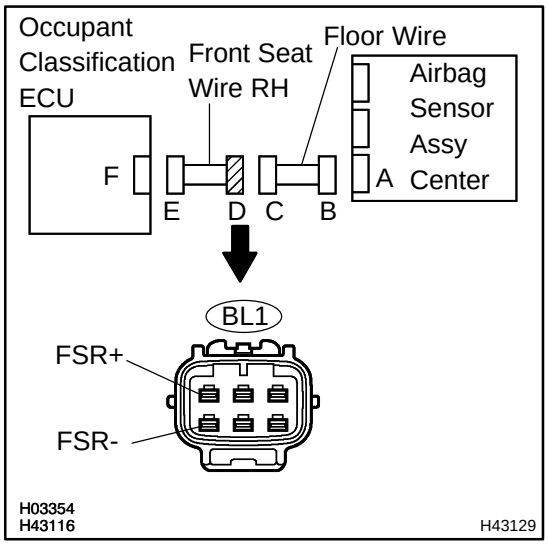
Tester connection	Condition	Specified condition
BL1-1 (FSR+) - BL1-4 (FSR-)	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

REPAIR OR REPLACE FLOOR WIRE

16 CHECK FRONT SEAT WIRE RH (TO GROUND)



(a) Disconnect the front seat wire RH connector from the floor wire.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
BL1-1 (FSR+) - Body ground	Always	1 MΩ or Higher
BL1-4 (FSR-) - Body ground	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

REPAIR OR REPLACE FLOOR WIRE

DTC	B1793	OCCUPANT CLASSIFICATION SENSOR POWER SUPPLY CIRCUIT MALFUNCTION

CIRCUIT DESCRIPTION

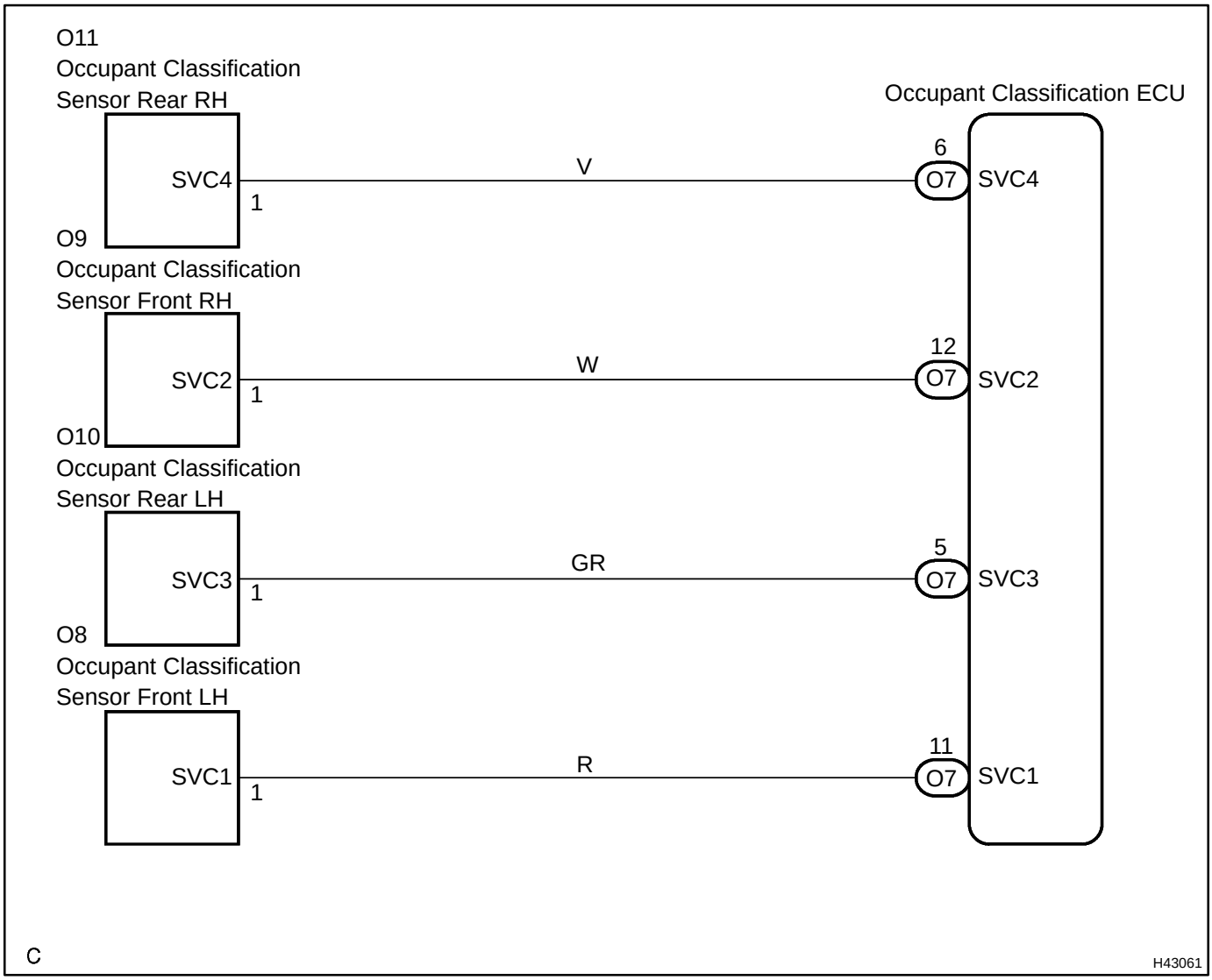
The occupant classification sensor power supply circuit consists of the occupant classification ECU and the occupant classification sensors.
DTC B1793 is recorded when a malfunction is detected in the occupant classification sensor power supply circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1793	・When the occupant classification ECU receives a line short signal, an open signal, short to ground signal or B+ short signal in the occupant classification sensor power supply circuit for 2 seconds. ・Open circuit in occupant classification sensors wire harness ・Occupant classification ECU malfunction	・Seat adjuster frame assy (Occupant classification sensors) ・Front seat wire RH ・Occupant classification ECU

HINT:

- When DTC B1150/23 is detected as a result of troubleshooting for the supplemental restraint system, perform troubleshooting for DTC B1793 of the occupant classification sensor.
- Use the hand-held tester to check the DTC of the occupant classification ECU, otherwise the DTC cannot be read.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If troubleshooting (wire harness inspection) is difficult to perform, remove the front RH seat assy installation bolts to see the under surface of seat cushion.
- In the above case, hold the seat so that it does not fall down. Holding the seat for a long period of time may cause a problem, such as seat rail deformation. Hold the seat only as necessary.

1	CHECK DTC

(a) Turn the ignition switch to the ON position.
(b) Clear the DTCs stored in memory (see page 05-1215).

HINT:

- First clear DTCs stored in the occupant classification ECU memory and then in the airbag sensor assy center memory.
- Use the hand-held tester to clear the DTC of the occupant classification ECU, otherwise the DTC cannot be cleared.

(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position.
(e) Using the hand-held tester, check the DTCs (see page 05-1215).
OK:
DTC B1793 is not output.

HINT:

Codes other than code B1793 may be output at this time, but they are not related to this check.

NG → **Go to step 2**

OK

USE SIMULATION METHOD TO CHECK (SEE PAGE 05-1207)

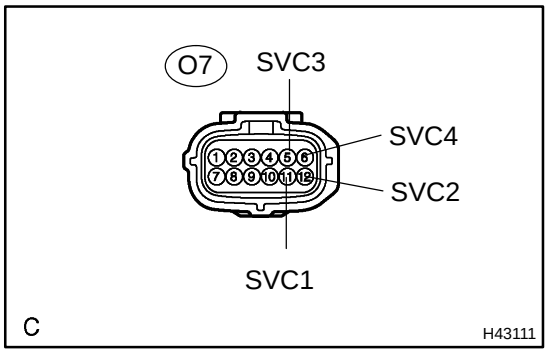
2	CHECK CONNECTION OF CONNECTORS

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Check that the connectors are properly connected to the occupant classification ECU and the occupant classification sensors.
OK:
The connectors are connected.

NG → **CONNECT CONNECTORS, THEN GO TO STEP 1**

OK

3 CHECK FRONT SEAT WIRE RH (TO B+)



(a) Disconnect the occupant classification ECU connector and the 4 occupant classification sensor connectors.
(b) Connect the negative (-) terminal cable to the battery.
(c) Turn the ignition switch to the ON position.
(d) Measure the voltage according to the value(s) in the table below.

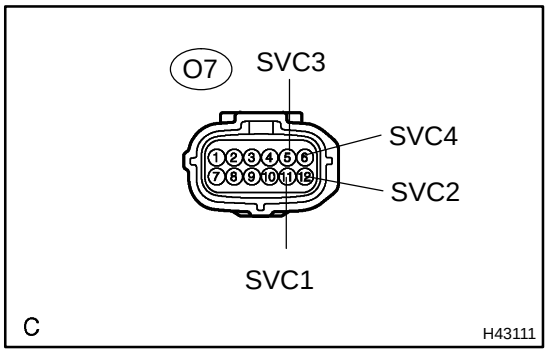
Standard:

Tester connection	Condition	Specified condition
O7-5 (SVC3) - Body ground	Ignition switch ON	Below 1 V
O7-6 (SVC4) - Body ground	Ignition switch ON	Below 1 V
O7-11 (SVC1) - Body ground	Ignition switch ON	Below 1 V
O7-12 (SVC2) - Body ground	Ignition switch ON	Below 1 V

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

4 CHECK FRONT SEAT WIRE RH (TO GROUND)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Measure the resistance according to the value(s) in the table below.

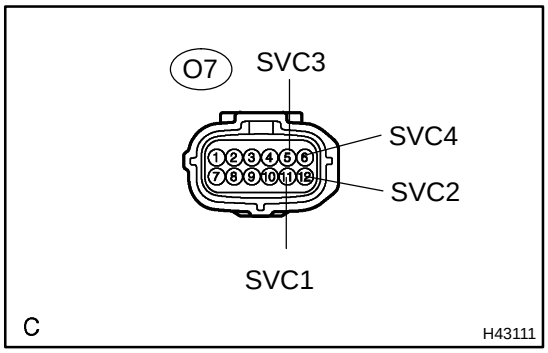
Standard:

Tester connection	Condition	Specified condition
O7-5 (SVC3) - Body ground	Always	1 MΩ or Higher
O7-6 (SVC4) - Body ground	Always	1 MΩ or Higher
O7-11 (SVC1) - Body ground	Always	1 MΩ or Higher
O7-12 (SVC2) - Body ground	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

5 CHECK FRONT SEAT WIRE RH (OPEN)



(a) Measure the resistance according to the value(s) in the table below.

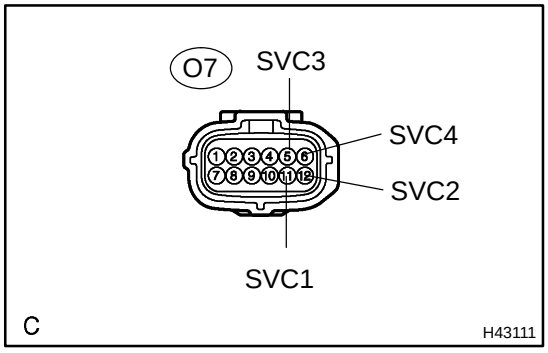
Standard:

Tester connection	Condition	Specified condition
O7-5 (SVC3) - O10-1 (SVC3)	Always	Below 1 Ω
O7-6 (SVC4) - O11-1 (SVC4)	Always	Below 1 Ω
O7-11 (SVC1) - O8-1 (SVC1)	Always	Below 1 Ω
O7-12 (SVC2) - O9-1 (SVC2)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

6 CHECK FRONT SEAT WIRE RH (SHORT)



(a) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
O7-5 (SVC3) - O7-6 (SVC4)	Always	1 MΩ or Higher
O7-6 (SVC4) - O7-11 (SVC1)	Always	1 MΩ or Higher
O7-11 (SVC1) - O7-12 (SVC2)	Always	1 MΩ or Higher
O7-12 (SVC2) - O7-5 (SVC3)	Always	1 MΩ or Higher
O7-12 (SVC2) - O7-6 (SVC4)	Always	1 MΩ or Higher
O7-11 (SVC1) - O7-5 (SVC3)	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

7	RECHECK DTC

(a) Connect the occupant classification ECU connector and the 4 occupant classification sensor connectors.
(b) Connect the negative (-) terminal cable to the battery.
(c) Turn the ignition switch to the ON position.
(d) Clear the DTCs stored in memory (see page 05-1215).

HINT:

- First clear DTCs stored in the occupant classification ECU memory and then in the airbag sensor assy center memory.
- Use the hand-held tester to clear the DTC of the occupant classification ECU, otherwise the DTC cannot be cleared.

(e) Turn the ignition switch to the LOCK position.
(f) Turn the ignition switch to the ON position.
(g) Using the hand-held tester, check the DTCs (see page 05-1215).
OK:
DTC B1793 is not output.

HINT:
Codes other than code B1793 may be output at this time, but they are not related to this check.

NG → **Go to step 8**

OK

USE SIMULATION METHOD TO CHECK (SEE PAGE 05-1207)

8	REPLACE OCCUPANT CLASSIFICATION ECU

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Replace the occupant classification ECU (see page 60-64).

HINT:
Perform the inspection using parts from a normal vehicle when possible.

9	PERFORM ZERO POINT CALIBRATION

(a) Using the hand-held tester, perform ”Zero point calibration” (see page 05-1203).
OK:
The ”COMPLETED” is displayed.

NG → **Go to step 12**

OK

10	PERFORM SENSITIVITY CHECK

(a) Using the hand-held tester, perform ”Sensitivity check” (see page 05-1203).
Standard value: 27 to 33 kg (59.52 to 72.75 lb)

NG → **Go to step 12**

OK

11	RECHECK DTC

(a) Connect the negative (-) terminal cable to the battery.
(b) Turn the ignition switch to the ON position.
(c) Clear the DTCs stored in memory (see page 05-1215).
HINT:
- First clear DTCs stored in the occupant classification ECU memory and then in the airbag sensor assy center memory.
- Use the hand-held tester to clear the DTC of the occupant classification ECU, otherwise the DTC cannot be cleared.

(d) Turn the ignition switch to the LOCK position.
(e) Turn the ignition switch to the ON position.
(f) Using the hand-held tester, check the DTCs (see page 05-1215).
OK:
DTC B1793 is not output.
HINT:
Codes other than code B1793 may be output at this time, but they are related to this check.

NG → **Go to step 12**

OK

END

12	REPLACE SEAT ADJUSTER FRAME ASSY

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Replace the seat adjuster frame assy (see page 72-1 1, 72-19).

13	CHECK PERFORM ZERO POINT CALIBRATION

(a) Using the hand-held tester, perform ”Zero point calibration” (see page 05-1203).
OK:
The ”COMPLETED” is displayed.

14	CHECK PERFORM SENSITIVITY CHECK

(a) Using the hand-held tester, perform ”Sensitivity check” (see page 05-1203).
Standard value: 27 to 33 kg (59.52 to 72.75 lb)

END

DTC	B1795	OCCUPANT CLASSIFICATION ECU MALFUNCTION

CIRCUIT DESCRIPTION

DTC B1795 is recorded when a malfunction is detected in the occupant classification ECU.
Troubleshoot DTC B1771 first when the DTC B1771 and B1795 are output simultaneously.

DTC No.	DTC Detecting Condition	Trouble Area
B1795	・Occupant classification ECU circuit malfunction ・Occupant classification ECU malfunction ・When the occupant classification ECU receives a short to ground signal in the passenger side buckle switch circuit for 2 seconds. ・The occupant classification ECU receives the ignition switch LOCK to ON signal 50 times in a row when a malfunction occurs in the power circuit for the occupant classification ECU (LOCK to ON to LOCK should be counted as once).	・Occupant classification ECU ・Front seat wire RH ・ECU-B Fuse ・Front seat inner belt assy RH (Buckle switch RH)

HINT:

- When DTC B1150/23 is detected as a result of troubleshooting for the supplemental restraint system, perform troubleshooting for DTC B1795 of the occupant classification sensor.
- Use the hand-held tester to check the DTC of the occupant classification ECU, otherwise the DTC cannot be read.

INSPECTION PROCEDURE

1	CHECK DTC

(a) Turn the ignition switch to the ON position, and wait for at least 10 seconds.
(b) Using the hand-held tester, check the DTCs (see page 05-1215).
Result:
A: DTC B1771 and B1795 are output.
B: DTC B1795 is output.

HINT:
Codes other than code B1771 and B1795 may be output at this time, but they are not related to this check.

A → **GO TO DTC B1771 (SEE PAGE 05-1446)**

B

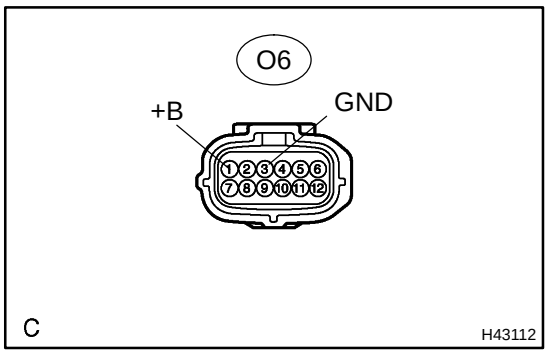
2	CHECK FUSE

(a) Check the ECU-B fuse.
Standard: Below 1 Ω

NG → **REPLACE FUSE**

OK

3	CHECK WIRE HARNESS(SOURCE VOLTAGE)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the "O6" connector from the occupant classification ECU.
(d) Connect the negative (-) terminal cable to the battery.
(e) Turn the ignition switch to the ON position.
(f) Measure the voltage and resistance according to the value(s) in the table below.
Standard:

Tester connection	Condition	Specified condition
O6-1 (+B) - Body ground	Ignition switch ON	10 to 14 V
O6-3 (GND) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE WIRE HARNESS OR BATTERY**

OK

CHECK USE SIMULATION METHOD TO CHECK (SEE PAGE 05-1207)

4	REPLACE OCCUPANT CLASSIFICATION ECU

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Replace the occupant classification ECU (see page 60-64).

5	PERFORM ZERO POINT CALIBRATION

(a) Using the hand-held tester, perform ”Zero point calibration” (see page 05-1203).
OK:
The ”COMPLETED” is displayed.

6	PERFORM SENSITIVITY CHECK

(a) Using the hand-held tester, perform ”Sensitivity check” (see page 05-1203).
Standard value: 27 to 33 kg (59.52 to 72.75 lb)

END

DTC	B1796	SLEEP OPERATION FAILURE OF OCCUPANT CLASSIFICATION ECU

CIRCUIT DESCRIPTION

During sleep mode, the occupant classification ECU reads the condition of each sensor while the ignition switch is off. In this mode, if occupant classification ECU detects an internal malfunction, DTC B1796 is output.

DTC No.	DTC Detecting Condition	Trouble Area
B1796	⁎Occupant classification ECU malfunction	⁎Occupant classification ECU

HINT:

- ⁎ When DTC B1150/23 is detected as a result of troubleshooting for the supplemental restraint system, perform troubleshooting for the DTC B1796 of the occupant classification ECU.
- ⁎ Use the hand-held tester to check the DTC of the occupant classification ECU, otherwise the DTC cannot be read.

INSPECTION PROCEDURE

1	CHECK DTC

(a) Turn the ignition switch to the ON position.
(b) Clear the DTCs stored in memory (see page 05-1215).

HINT:

- ⁎ First clear DTCs stored in the occupant classification ECU memory and then in the airbag sensor assy center memory.
- ⁎ Use the hand-held tester to check the DTC of the occupant classification ECU, otherwise the DTC cannot be cleared.

(c) Turn the ignition switch to the LOCK position, and wait for at least 10 seconds.
(d) Turn the ignition switch to the ON position.
(e) Using the hand-held tester, check the DTCs (see page 05-1215).
OK:
DTC B1796 is not output.

HINT:

Codes other than code B1796 may be output at this time, but they are not related to this check.

NG → **Go to step 2**

OK

USE SIMULATION METHOD TO CHECK (SEE PAGE 05-1207)

2	REPLACE OCCUPANT CLASSIFICATION ECU

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Replace the occupant classification ECU (see page 60-64).

3	PERFORM ZERO POINT CALIBRATION

(a) Using the hand-held tester, perform ”Zero point calibration” (see page 05-1203).
OK:
The ”COMPLETED” is displayed.

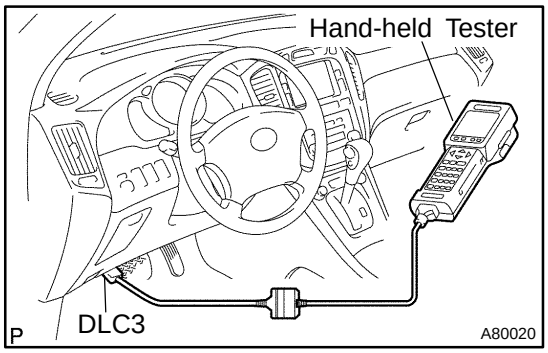
4	PERFORM SENSITIVITY CHECK

(a) Using the hand-held tester, perform ”Sensitivity check” (see page 05-1203).
Standard value: 27 to 33 kg (59.52 to 72.75 lb)

END

05MOH-01

CHECK MODE PROCEDURE

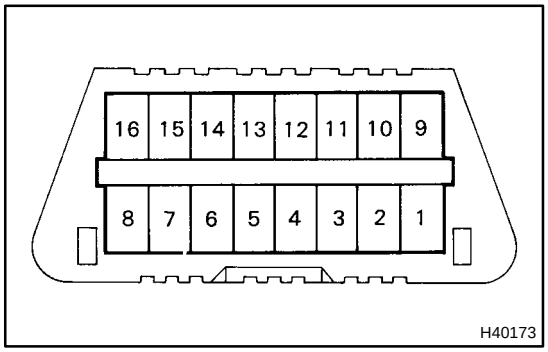


1. SIGNAL CHECK (CHECK MODE) (USING HAND-HELD TESTER)

(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch to the ON position.
(c) Select the ”SIGNAL CHECK”, and proceed checking with the hand-held tester.

05IV5-02

DIAGNOSIS SYSTEM



1. CHECK DLC3

(a) The vehicle's ECM conforms to ISO 9141-2 for communication protocol. The terminal arrangement of the DLC3 complies with SAE J1962 and meets the ISO 9141-2 format.

Terminal No.	Connection/Voltage or Resistance	Condition
7	Bus + Line/Pulse generation	During Transmission
4	Chassis Ground ⇔ Body Ground/ Below 1 Ω	Always
16	Battery Positive ⇔ Body Ground/10 to 14 V	Always

HINT:

If the display shows UNABLE TO CONNECT TO VEHICLE when you connect the cable of the hand-held tester to the DLC3, turn the ignition switch to the ON position and operate the hand-held tester, there is a problem on the vehicle side or tool side.

- If communication is normal when the tool is connected to another vehicle, inspect the DLC3 on the original vehicle.
- If communication is still not possible when the tool is connected to another vehicle, the problem is probably in the tool itself. Consult the Service Department listed in the tool's instruction manual.

2. FUNCTION OF SRS WARNING LIGHT

(a) Primary check.

(1) Turn the ignition switch to the LOCK position. Wait for at least 2 seconds, then turn the ignition switch to the ON position. The SRS warning light comes on for approximately 6 seconds and the airbag system diagnosis (including the seat belt protensioner and occupant classification system) is performed.

HINT:

If trouble is detected during the primary check, the SRS warning light remains on or blinks even after the primary check period (for approximately 6 seconds) has elapsed.

(b) Constant check.

(1) After the primary check, the airbag sensor assy center constantly monitors the SRS airbag system for trouble.

HINT:

If trouble is detected during the constant check, the airbag sensor assy center functions as follows:

- The SRS warning light comes on or blinks.
- The SRS warning light goes off, and then comes on. This blinking pattern indicates the source voltage drop. The SRS warning light goes off 10 seconds after the source voltage returns to normal.

(c) Review.

(1) When the airbag system is normal:
The SRS warning light comes on only during the primary check period (for approximately 6 seconds after the ignition switch is turned to the ON position).

(2) When the airbag system has trouble:
- The SRS warning light remains on or blinks even after the primary check period has elapsed.
- The SRS warning light goes off after the primary check, but comes on or blinks again during the constant check.
- The SRS warning light does not come on when turning the ignition switch from the LOCK to ON position.

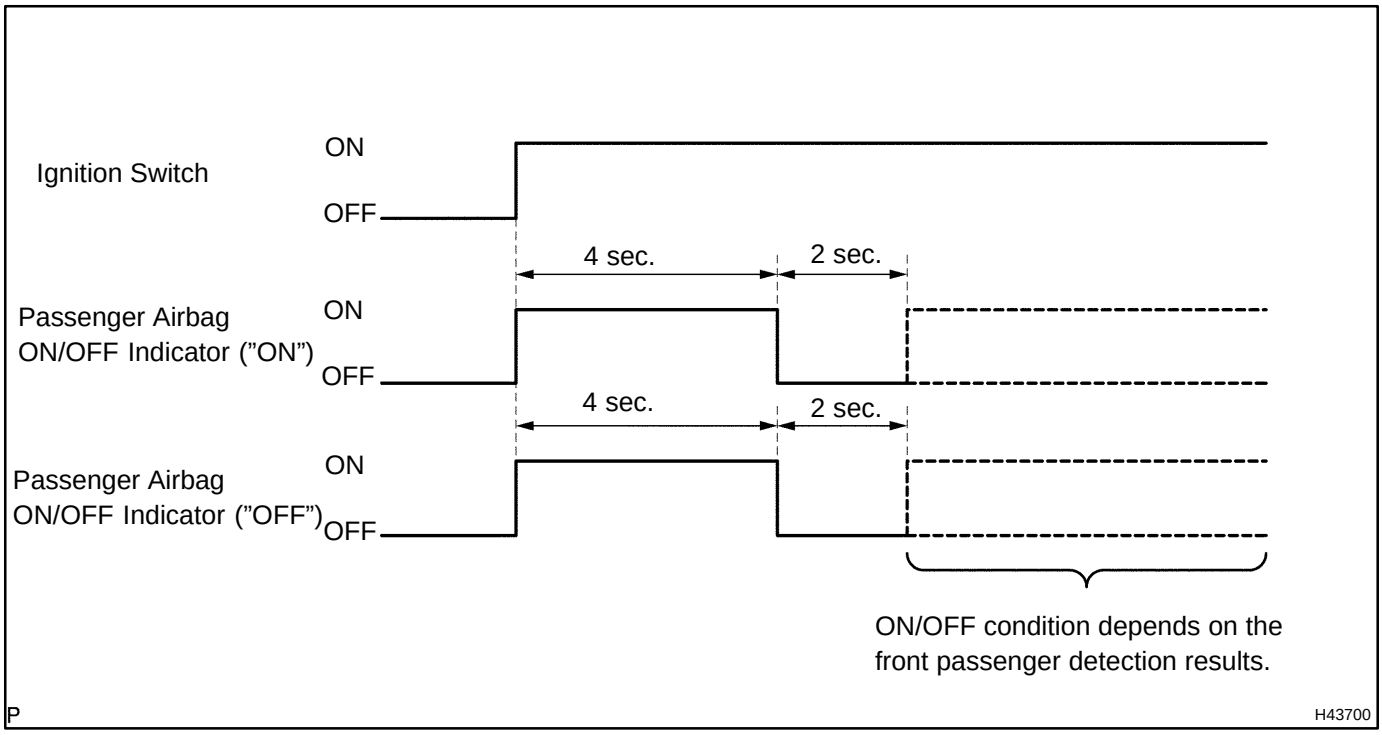
HINT:
The airbag sensor assy center keeps the SRS waning light on if the airbag has been deployed.

3. FUNCTION OF PASSENGER AIRBAG ON/OFF INDICATOR

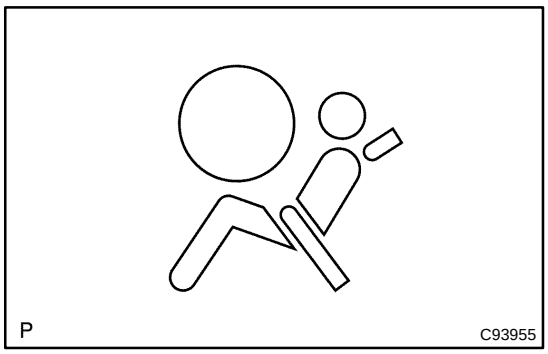
(a) Initial check.
(1) Turn the ignition switch to the ON position.
(2) The passenger airbag ON/OFF indicator (”ON” and ”OFF”) comes on for approximately 4 seconds, then goes off for approximately 2 seconds.
(3) Approximately 6 seconds after the ignition switch is turned to the ON position, the passenger airbag ON/OFF indicator will be ON/OFF depending on the conditions listed below.

Condition	”ON” indicator	”OFF” indicator
Vacant	OFF	OFF
Adult is seated.	ON	OFF
Child is seated.	OFF	ON
Child restraint system is set.	OFF	ON
Front passenger occupant classification system failure	OFF	ON

HINT:
- The passenger airbag ON/OFF indicator is based on the timing chart below in order to check the indicator light circuit



- When the occupant classification system has trouble, both the SRS warning light and the passenger airbag OFF indicator come on. In this case, check the DTCs in the supplemental restraint system first. Then troubleshoot the occupant classification system if DTC B1150/23 is indicated and troubleshoot the passenger airbag ON/OFF indicator (supplemental restraint system) if DTC B1152/28 is detected.



4. SRS WARNING LIGHT CHECK

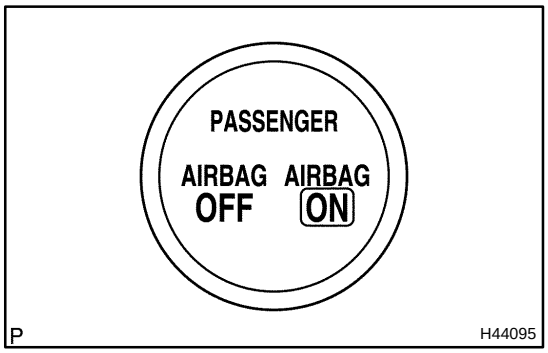
(a) Turn the ignition switch to the ON position, and check that the SRS warning light comes on for approximately 6 seconds (primary check).

(b) Check that the SRS warning light goes off approximately 6 seconds after the ignition switch is turned to the ON position (constant check).

HINT:

When any of the following symptoms occur, refer to the "Problem Symptoms Table" (see page 05-1227).

- The SRS warning light comes on occasionally, even after the primary check period has elapsed.
- The SRS warning light comes on, but a DTC is not output.
- The ignition switch is turned from the LOCK to ON position, both the SRS warning light does not come on.



5. PASSENGER AIRBAG ON/OFF INDICATOR CHECK

(a) Turn the ignition switch to the ON position.

(b) Check that the passenger airbag ON/OFF indicator ("ON" and "OFF") come on for approximately 4 seconds, then goes off for approximately 2 seconds.

HINT:

Refer to the table in step 3 regarding the passenger airbag ON/OFF indicator when the ignition switch is turned to the ON position and approximately 6 seconds pass.

6. RELEASE METHOD OF ACTIVATION PREVENTION MECHANISM

(a) The activation prevention mechanism is built into the connector for the squib circuit of the SRS. As explained in the troubleshooting section, insert a piece of paper that is the same thickness as the male terminal between the terminal and the short spring to release it (Refer to the illustrations on the next 5 pages).

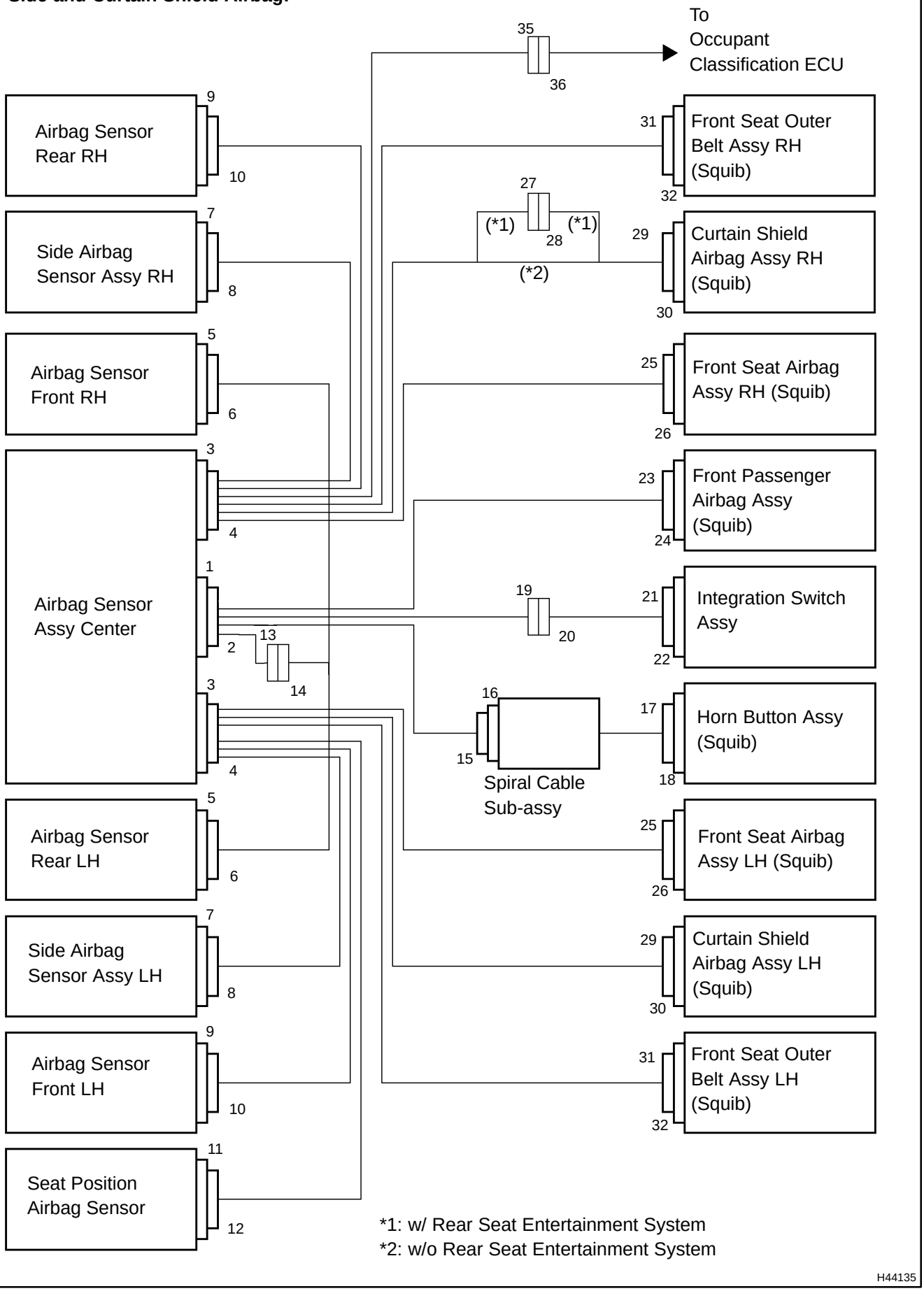
CAUTION:

Never release the activation prevention mechanism on the squib connector even when inspecting with the squib disconnected.

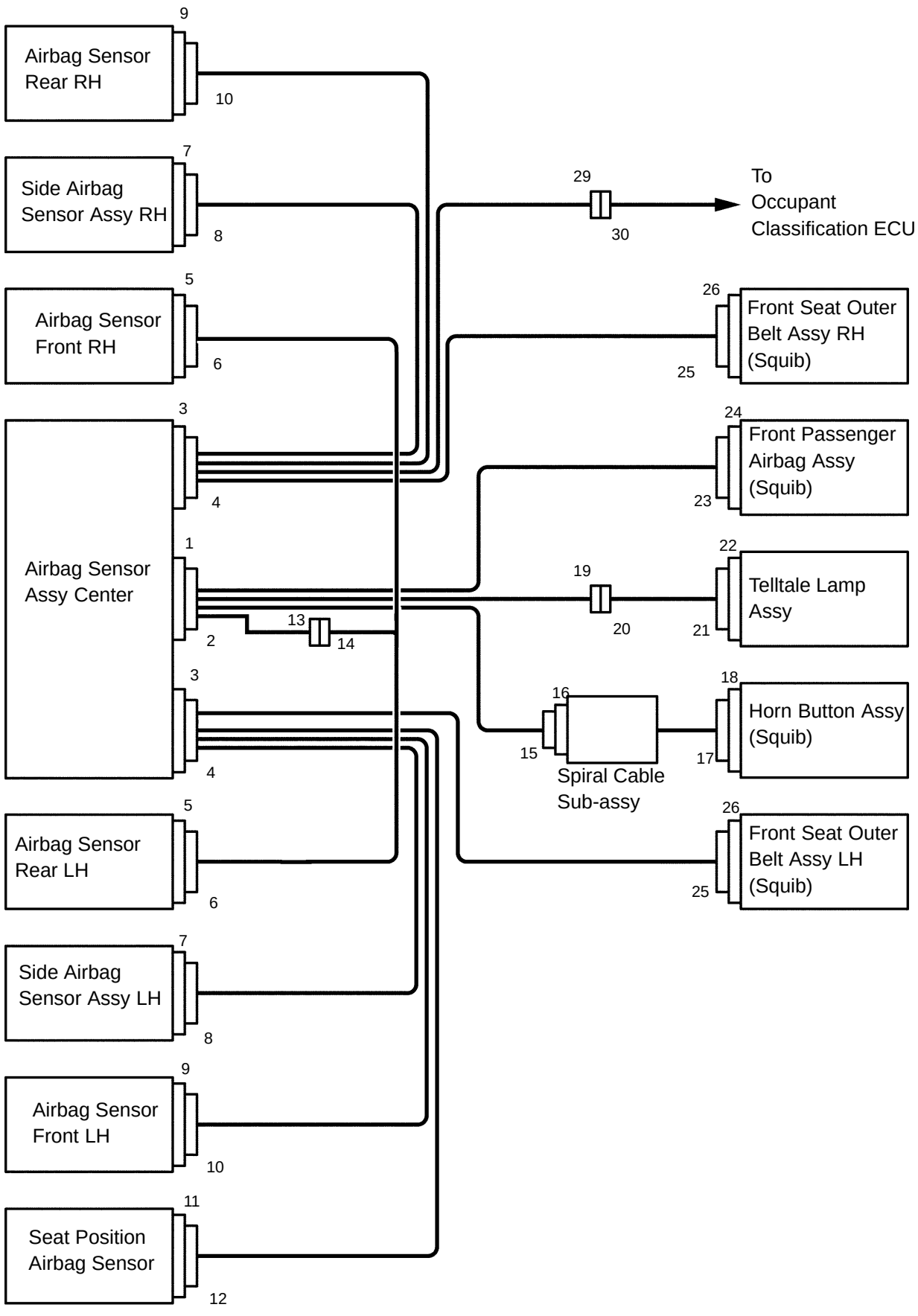
NOTICE:

- **Never release the activation prevention mechanism unless specially directed by the troubleshooting procedure.**
- **To prevent the terminal and the short spring from being damaged, always use a piece of paper that is the same thickness as the male terminal.**

w/ Side and Curtain Shield Airbag:

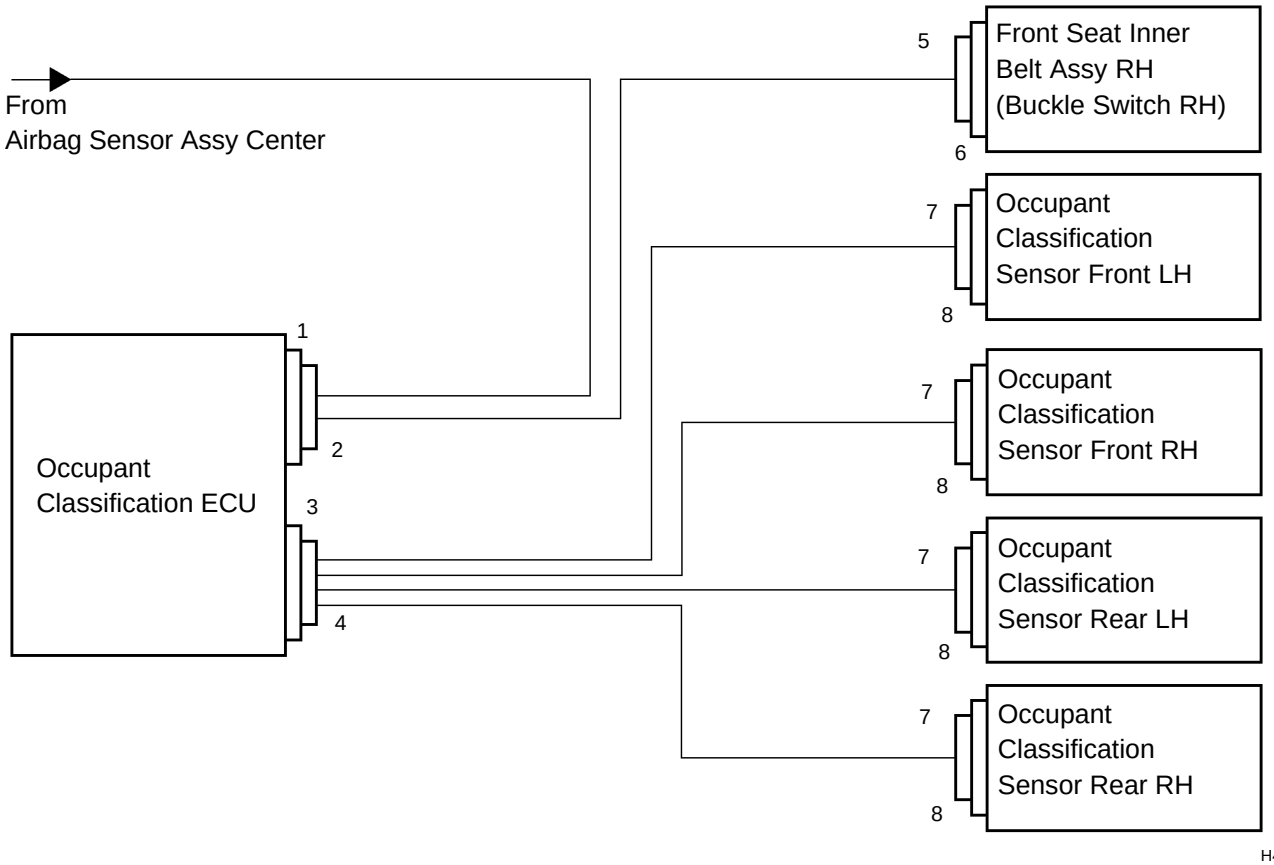


w/o Side and Curtain Shield Airbag:



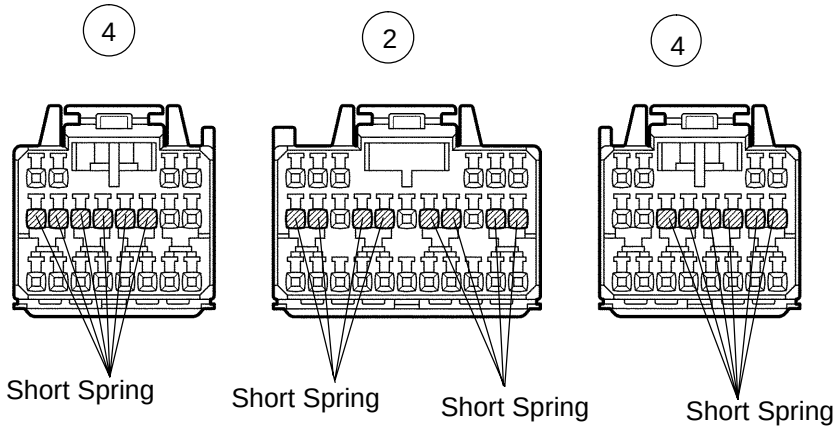
P H44087

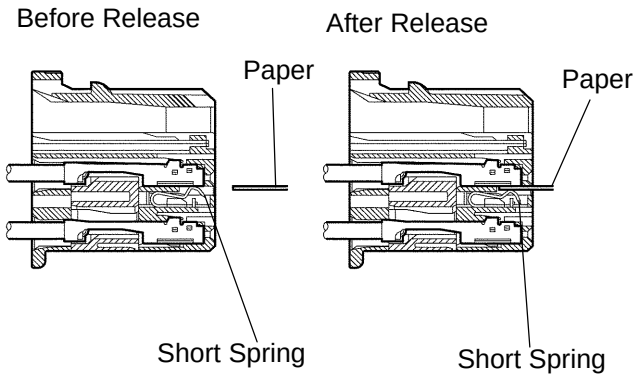
Occupant Classification ECU:

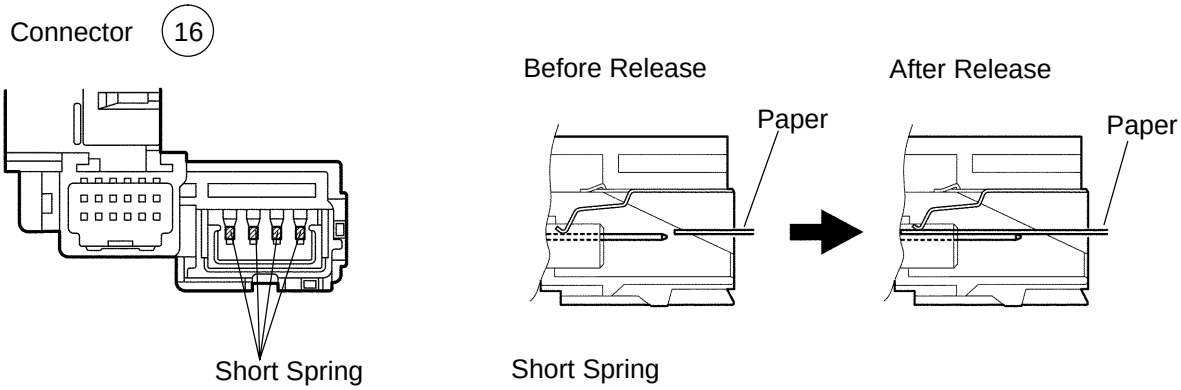


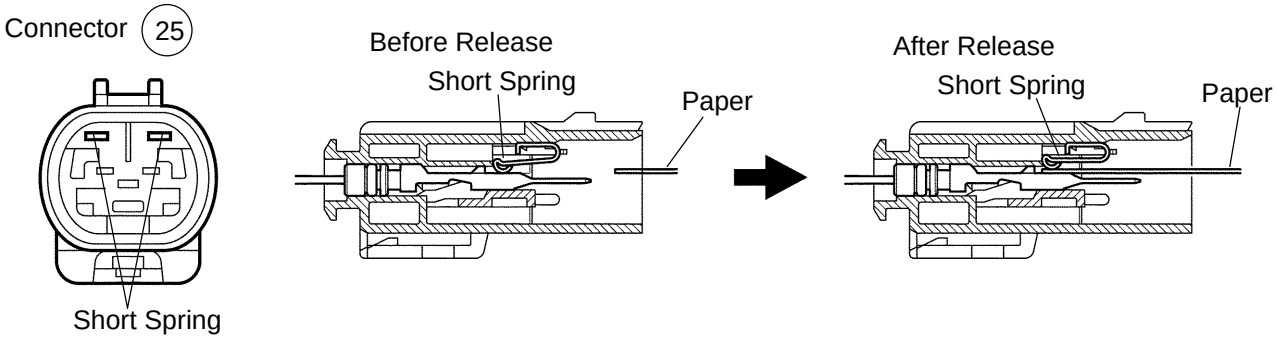
w/ Side and Curtain Shield Airbag:

Airbag Sensor Assy Center Side Connector





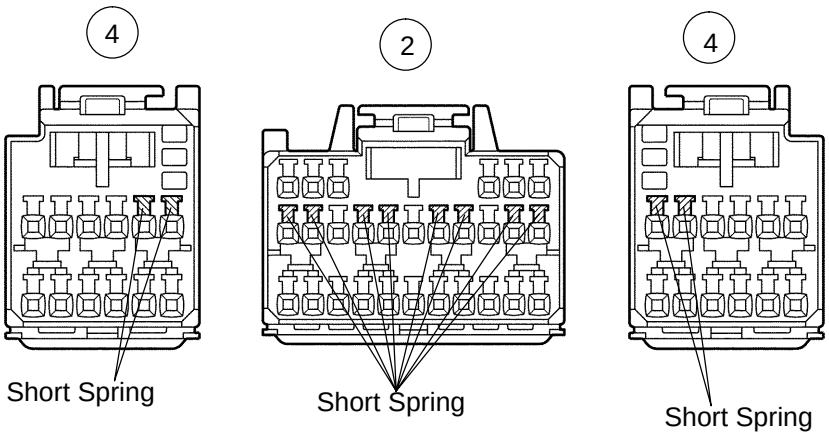


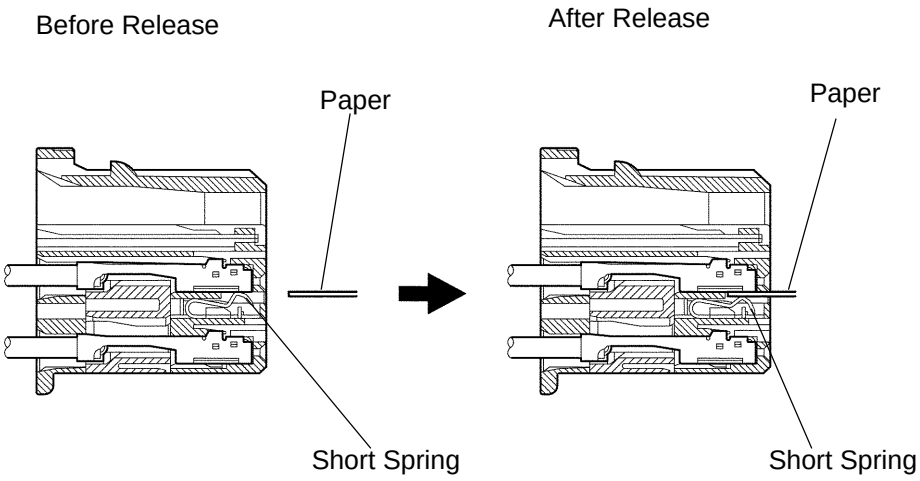


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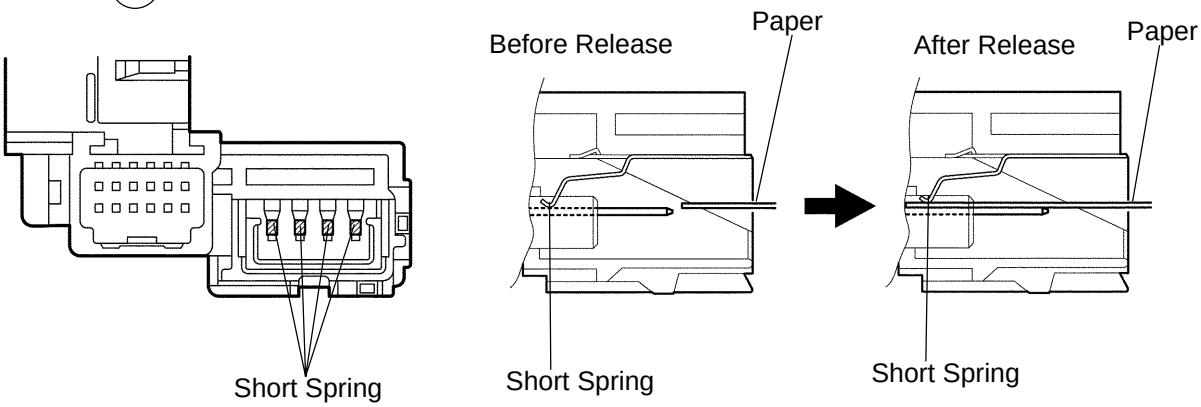
w/o Side and Curtain Shield Airbag:

Airbag Sensor Assy Center Side Connector





Connector 16



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05IV8-02

DATA LIST/ACTIVE TEST

HINT:

By accessing the DATA LIST displayed by the hand-held tester, you can perform such functions as reading the values of switches and sensors without removing any parts. Reading the DATA LIST is the first step of troubleshooting and is one method to shorten labor time.

(d) Connect the hand-held tester to the DLC3.

(e) Turn the ignition switch to the ON position.

(f) Following the display on the tester screen, read the ”DATA LIST”.

1. DATA LIST FOR AIRBAG SENSOR ASSY CENTER

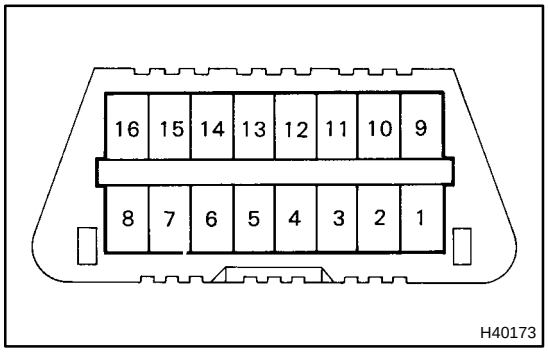
Item	Measurement Item/ Range (Display)	Normal Condition	Diagnostic Note
D SEAT POSITION	Seat position (Driver side)/ FORWARD: Seat position is forward BKWARD: Seat position is rearward FAIL: A failure is detected	FORWARD/BKWARD	-
PASSENGER CLASS	Passenger classification/ NG: A date is not determined NONE: Vacant CHILD: Child (less than 36 kg (79.37 lb)) is seated SMALL: Adult (36 to 54 kg (79.37 to 119.05 lb)) is seated REGULAR: Adult (more than 54 kg (119.05 lb)) is seated FAIL: A failure is detected	NG/NONE/CHILD/SMALL/ REGULAR	-
D BUCKLE SW	Buckle switch (Driver side)/ ON: The seat belt is fastened OFF: The seat belt is not fastened NG: A data is not determined	ON/OFF	-
P BUCKLE SW	Buckle switch (Passenger side)/ ON: The seat belt is fastened OFF: The seat belt is not fastened NG: A data is not determined	ON/OFF	-
#CODES	Number of past DTC recorded/ Min.: 0, Max.: 255	0	-

2. DATA LIST FOR OCCUPANT CLASSIFICATION ECU

Item	Measurement Item/ Range (Display)	Normal Condition	Diagnostic Note
IG SW	Ignition switch condition/ ON: Ignition switch ON OFF: Ignition switch OFF	ON/OFF	-
P BUCKLE SW	Buckle switch (Passenger side)/ OFF: Unfasten the passenger side seat belt ON: Fasten the passenger side seat belt NG: Passenger side seat belt has trouble	OFF/ON	-
PASSENGER CLASS	Passenger classification/ AF05: Adult (36 to 54 kg (79.37 to 119.05 lb)) is seated AM50: Adult (more than 54 kg (119.05 lb)) is seated CHILD: Child (less than 36 kg (79.37 lb) is seated CRS: Child restraint system (less than 7 kg (15.43 lb)) and passenger side buckle switch is ON, then 7 to 36 kg (15.43 to 79.37 lb)) is set OFF: Vacant	AF05/AM50/CHILD/CRS/ OFF	-
SENS RANGE INF	Sensor range information/ OK: The value of a sensor is within the range NG: The value of a sensor is over the range	OK	-
FL SENS RANGE	Front left sensor range information/ OK: Sensor range is -17 to 27 kg (-37.48 to 59.52 lb) Min.: Less than -17 kg (-37.48 lb) Max.: More than 27 kg (59.52 lb)	OK	-
FR SENS RANGE	Front right sensor range information/ OK: Sensor range is -17 to 27 kg (-37.48 to 59.52 lb) Min.: Less than -17 kg (-37.48 lb) Max.: More than 27 kg (59.52 lb)	OK	-
RL SENS RANGE	Rear left sensor range information/ OK: Sensor range is -17 to 37 kg (-37.48 to 81.57 lb) Min.: Less than -17 kg (-37.48 lb) Max.: More than 37 kg (81.57 lb)	OK	-

Item	Measurement Item/ Range (Display)	Normal Condition	Diagnostic Note
RR SENS RANGE	Rear right sensor range information/ OK: Sensor range is -17 to 37 kg (-37.48 to 81.57 lb) Min.: Less than -17 kg (-37.48 lb) Max.: More than 37 kg (81.57 lb)	OK	-
FL SENS VOL	Front left sensor voltage/ Min.: 0 V Max.: 19.8 V	0 to 4.7 V	-
FR SENS VOL	Front right sensor voltage/ Min.: 0 V Max.: 19.8 V	0 to 4.7 V	-
RL SENS VOL	Rear left sensor voltage/ Min.: 0 V Max.: 19.8 V	0 to 4.7 V	-
RR SENS VOL	Rear right sensor voltage/ Min.: 0 V Max.: 19.8 V	0 to 4.7 V	-
FL SENS WEIGHT	Front left sensor weight information/ Min.: -17 kg (-37.48 lb) Max.: 27 kg (59.52 lb)	-17 to 27 kg (-37.48 to 59.52 lb)	-
FR SENS WEIGHT	Front right sensor weight information/ Min.: -17 kg (-37.48 lb) Max.: 27 kg (59.52 lb)	-17 to 27 kg (-37.48 to 59.52 lb)	-
RL SENS WEIGHT	Rear left sensor weight information/ Min.: -17 kg (-37.48 lb) Max.: 37 kg (81.57 lb)	-17 to 37 kg (-37.48 to 81.57 lb)	-
RR SENS WEIGHT	Rear right sensor weight information/ Min.: -17 kg (-37.48 lb) Max.: 37 kg (81.57 lb)	-17 to 37 kg (-37.48 to 81.57 lb)	-
TOTAL WEIGHT	Total weight information/ Min.: -68 kg (-88.18 lb) Max.: 128 kg (220.46 lb)	-68 to 128 kg (-149.91 to 282.19 lb)	-
#CODES	Number of DTC recorded/ Min.: 0, Max.: 255	0	-

DTC CHECK/CLEAR



1. SUPPLEMENTAL RESTRAINT SYSTEM DTC CHECK (USING SST CHECK WIRE)

(a) Check the DTCs (Present trouble code).

(1) Turn the ignition switch to the ON position, and wait for approximately 60 seconds.

(2) Using SST, connect terminals TC and CG of the DTC3.

SST 09843-18040

NOTICE:

Connect the terminals to the correct positions to avoid a malfunction.

(b) Check the DTCs (Past trouble code).

(1) Using SST, connect terminals TC and CG of the DTC3.

SST 09843-18040

NOTICE:

Connect the terminals to the correct positions to avoid a malfunction.

(2) Turn the ignition switch to the ON position, and wait for approximately 60 seconds.

(c) Read the DTCs.

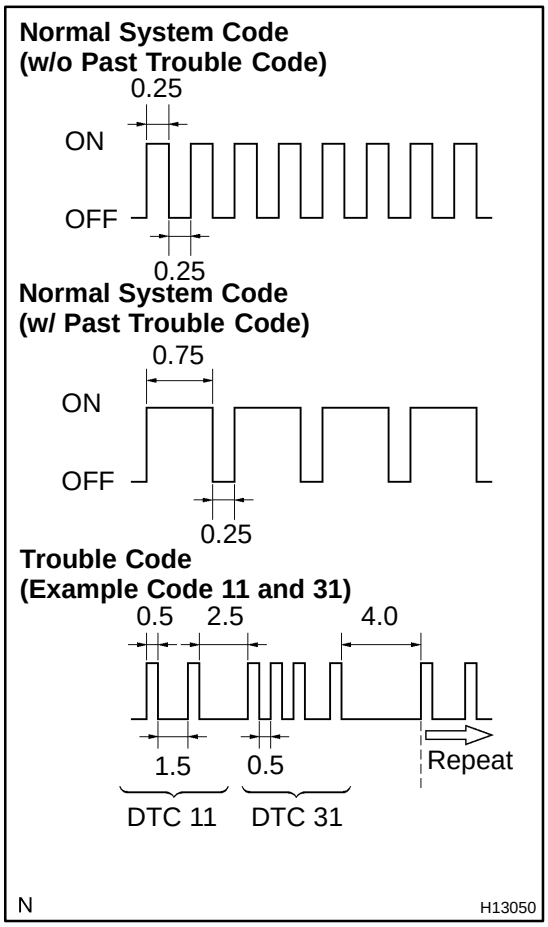
(1) Read the blinking patterns of the DTCs. Examples, the blinking patterns for the normal system code and trouble codes 11 and 31 are shown in the illustration to the left.

* Normal system code indication (w/o past trouble code)
  The light blinks twice per second.
* Normal system code indication (w/ past trouble code)
  When the past trouble code is stored in the airbag sensor assy center, the light blinks only ones per second.
* Trouble code indication
  The first blinking indicates the first DTC. The second blinking occurs after a 1.5-second pause.

If there are more than 1 code, there will be a 2.5-second pause between each code. After all the codes are shown, there will be a 4.0-second pause, and they will all be repeated.

HINT:

* If 2 or more malfunctions are found, the indication begins will the smallest numbered code.
* If DTCs are inspection without connecting the terminals, proceed to the "Tc terminal circuit" on page 05-1522 .



2. DTC CLEAR (USING SST CHECK WIRE)

(a) Clear the DTCs.

(1) When the ignition switch is turned off, the DTCs are cleared.

HINT:

Depending on the DTC, the code may not be cleared by turning off the ignition switch. In this case, proceed to the next procedure.

(2) Using SST, connect terminals TC and CG of the DLC3, and then turn the ignition switch to the ON position.

SST 09843-18040

(3) Disconnect terminal TC of the DLC3 within 3 to 10 seconds after the DTCs are output, and check if the SRS warning light comes on after 3 seconds.

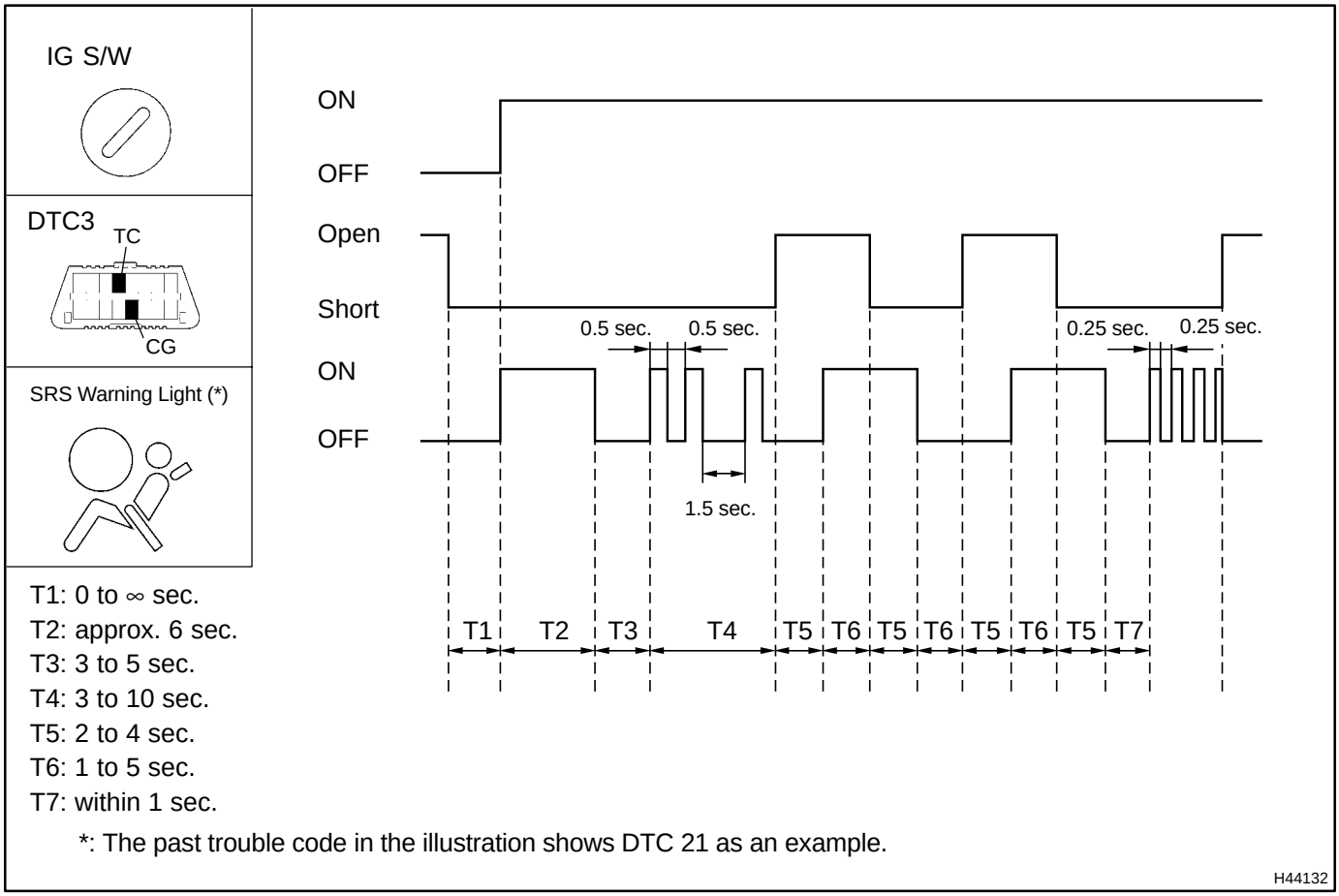
(4) Within 2 to 4 seconds after the SRS warning light comes on, connect terminals TC and CG of the DLC3.

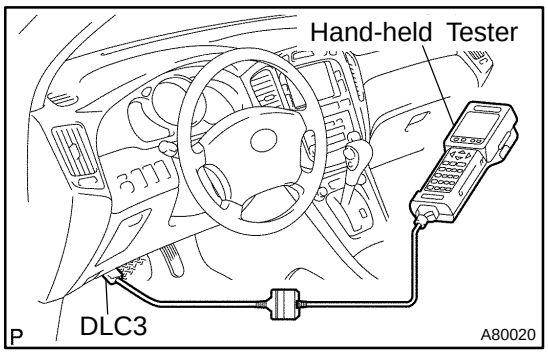
(5) The SRS warning light should go off within 2 to 4 seconds after connecting the terminals TC and CG of the DLC3. Then, disconnect terminal TC within 2 to 4 seconds after the SRS warning light goes off.

(6) The SRS warning light comes on again within 2 to 4 seconds after disconnecting terminal TC. Then, reconnect terminals TC and CG within 2 to 4 seconds after the SRS warning light comes on, connect terminals TC and CG of the DLC3.

(7) Check if the SRS warning light goes off 2 to 4 seconds after connecting terminals TC and CG of the DLC3. Also check if and the normal system code is output within 1 second after the SRS warning light goes off.

If DTCs are to cleared, repeat this above procedure until the codes are cleared.





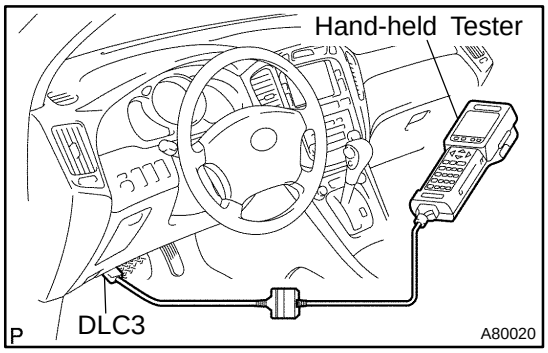
3. SUPPLEMENTAL RESTRAINT SYSTEM DTC CHECK (USING HAND-HELD TESTER)

(a) Check the DTCs.
  (1) Connect the hand-held tester to the DLC3.
  (2) Turn the ignition switch to the ON position.
  (3) Check the DTCs by following the prompts on the tester screen.

HINT:
Refer to the hand-held tester operator's manual for further details.

(b) Clear the DTCs.
  (1) Connect the hand-held tester to the DLC3.
  (2) Turn the ignition switch to the ON position.
  (3) Clear the DTCs by following the prompts on the tester screen.

HINT:
Refer to the hand-held tester operator's manual for further details.



4. OCCUPANT CLASSIFICATION SYSTEM DTC CHECK (USING HAND-HELD TESTER)

HINT:
- When DTC B1150/23 is detected as a result of troubleshooting the supplemental restraint system, perform troubleshooting for the occupant classification system.
- Since the DTCs for the occupant classification system can only be output by the hand-held tester, use the hand-held tester to output the DTCs.

(a) Check the DTCs.
  (1) Connect the hand-held tester to the DLC3.
  (2) Turn the ignition switch to the ON position.
  (3) Check the DTCs by following the prompts on the tester screen.

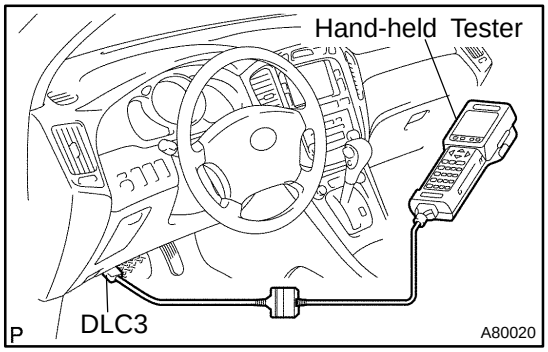
HINT:
Refer to the hand-held tester operator's manual for further details.

(b) Clear the DTCs.
  (1) Connect the hand-held tester to the DLC3.
  (2) Turn the ignition switch to the ON position.
  (3) Clear the DTCs by following the prompts on the tester screen.

HINT:
Refer to the hand-held tester operator's manual for further details.

05MOF-01

INITIALIZATION



1. ZERO POINT CALIBRATION AND SENSITIVITY CHECK

NOTICE:

Make sure that the seat is not occupied before performing the operation.

HINT:

Perform the zero point calibration and sensitivity check if any of the following conditions occur.

- The occupant classification ECU is replaced.
- Accessories (seatback tray and seat cover, etc.) are installed.
- The passenger seat is removed from the vehicle.
- The passenger airbag ON/OFF indicator (”OFF”) comes on when the passenger seat is not occupied.
- The vehicle is brought to the workshop for repair due to an accident or a collision.

(a) Zero point calibration and sensitivity check procedures.

HINT:

Make sure that zero point calibration has finished normally, and then perform the sensitivity check.

(1) Adjust the seat position according to the table below.

Adjustment Component	Position
Slide Direction	Rearmost position
Reclining Angle	Upright position
Headrest Height	Lowest position
Lifter Height	Lowest position

(2) Connect the hand-held tester to the DLC3.

(3) Turn the ignition switch to the ON position.

(4) Perform the zero point calibration by following the prompts on the tester screen shown in 2 pages later.

HINT:

Refer to the hand-held tester operator’s manual for further details.

OK: ”COMPLETE” is displayed.

(5) Perform the sensitivity check by following the prompts on the tester screen shown in 2 pages later.

(6) Confirm that the beginning sensor reading is within the standard value.

Standard value: -3.2 to 3.2 kg (-7 to 7 lb)

(7) Place a 30 kg (66.14 lb) weight (eg. a 30 kg (66.14 lb) of lead mass) onto the passenger seat.

(8) Confirm that the sensitivity is within the standard value.

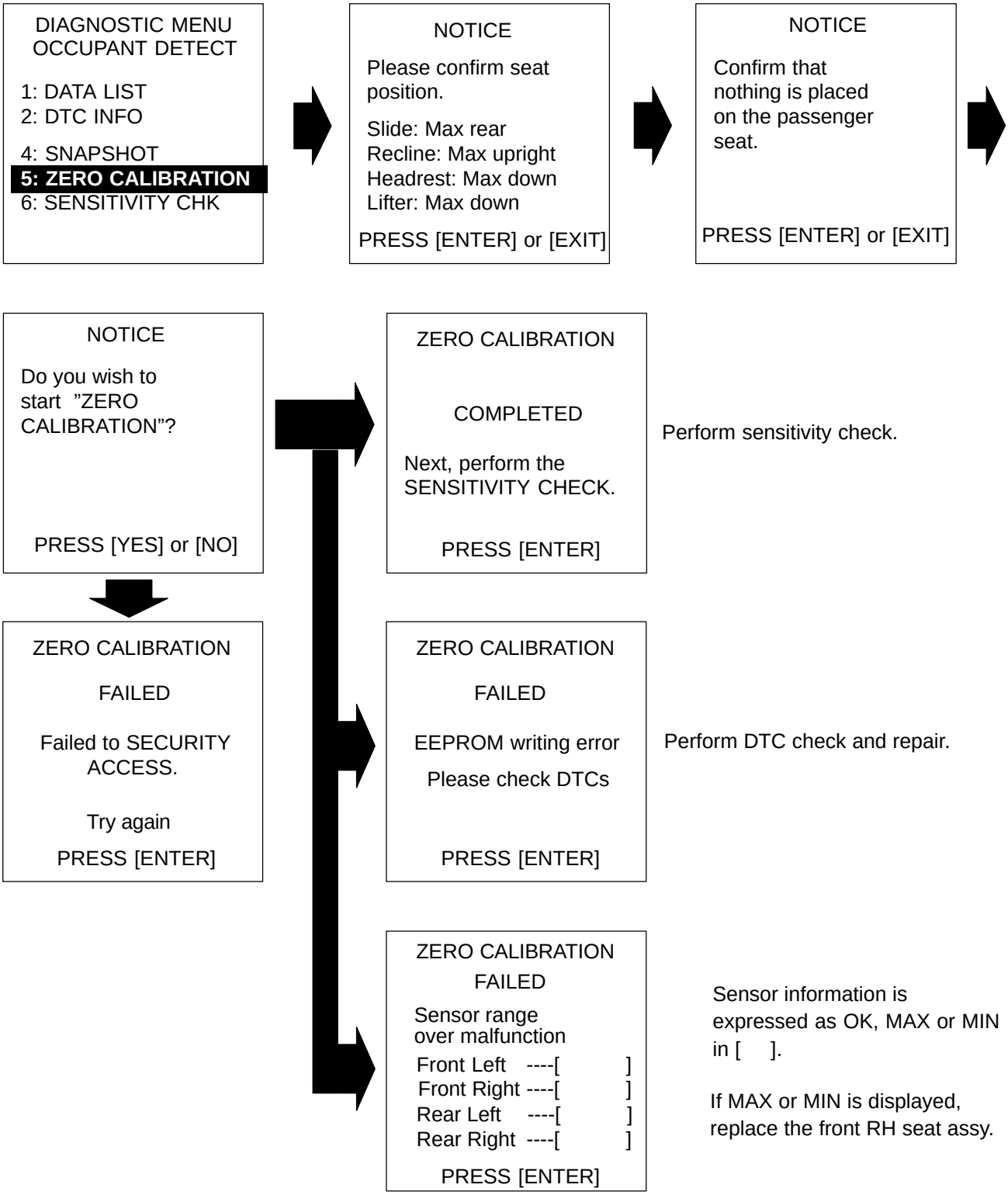
Standard value: 27 to 33 kg (59.52 to 72.75 lb)

HINT:

* When performing the sensitivity check, use a solid metal weight (the check result may not appear properly if the weight made from liquid is used).
* When the sensitivity deviates from the standard value, retighten the bolts of the passenger seat taking care not to deform the seat rail. After performing this procedure, if the sensitivity is not within the standard value, replace the front RH seat assy.
* When zero point calibration has not finished normally, replace the front RH seat assy.

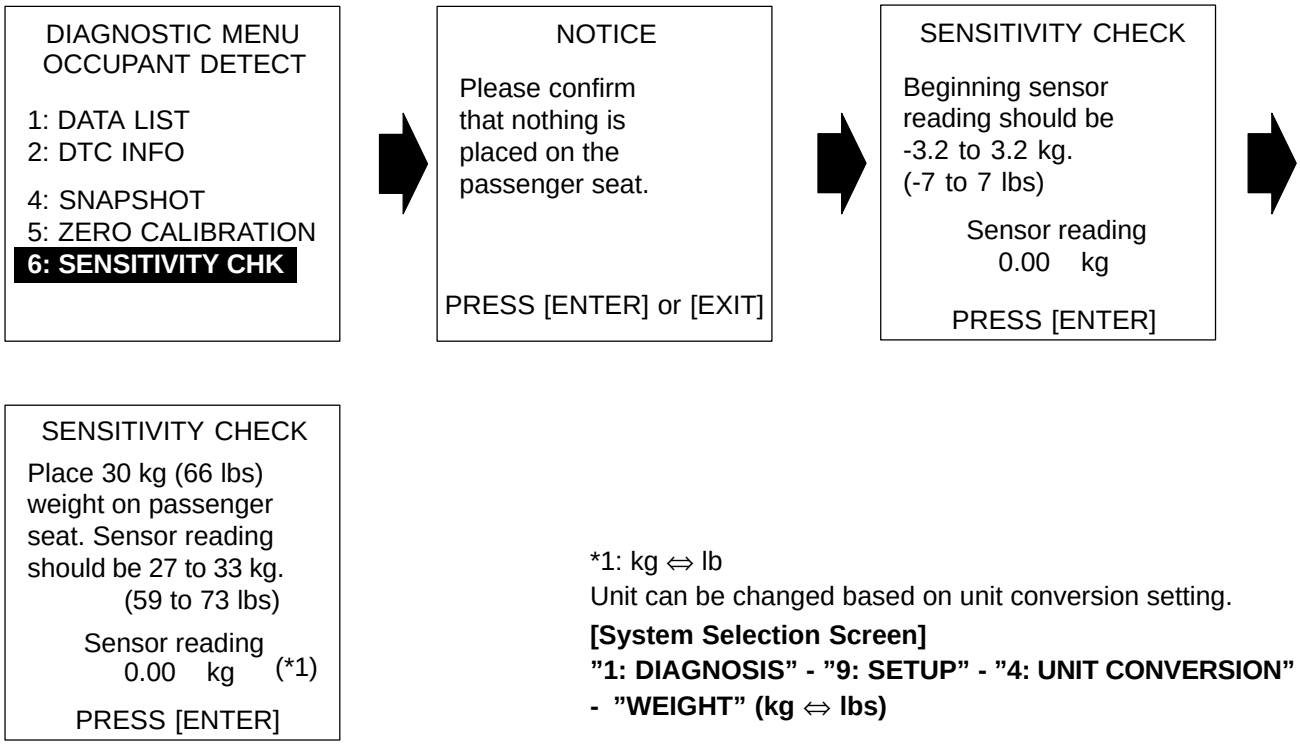
ZERO POINT CALIBRATION PROCEDURE

”1: DIAGNOSIS” - ”1: OBD/MOBD” - ”MODEL YEAR” - ”MODEL SELECTION = HIGH LANDER” - Select the option parts - ”9: OCCUPANT DETECT” - Refer to the following screen flow.



SENSITIVITY CHECK PROCEDURE

”1: DIAGNOSIS” - ”1: OBD/MOBD” - ”MODEL YEAR” - ”MODEL SELECTION = HIGH LANDER” - Select the option parts - ”9: OCCUPANT DETECT” - Refer to the following screen flow.



*1: kg ⇔ lb
Unit can be changed based on unit conversion setting.
[System Selection Screen]
”1: DIAGNOSIS” - ”9: SETUP” - ”4: UNIT CONVERSION” - ”WEIGHT” (kg ⇔ lbs)

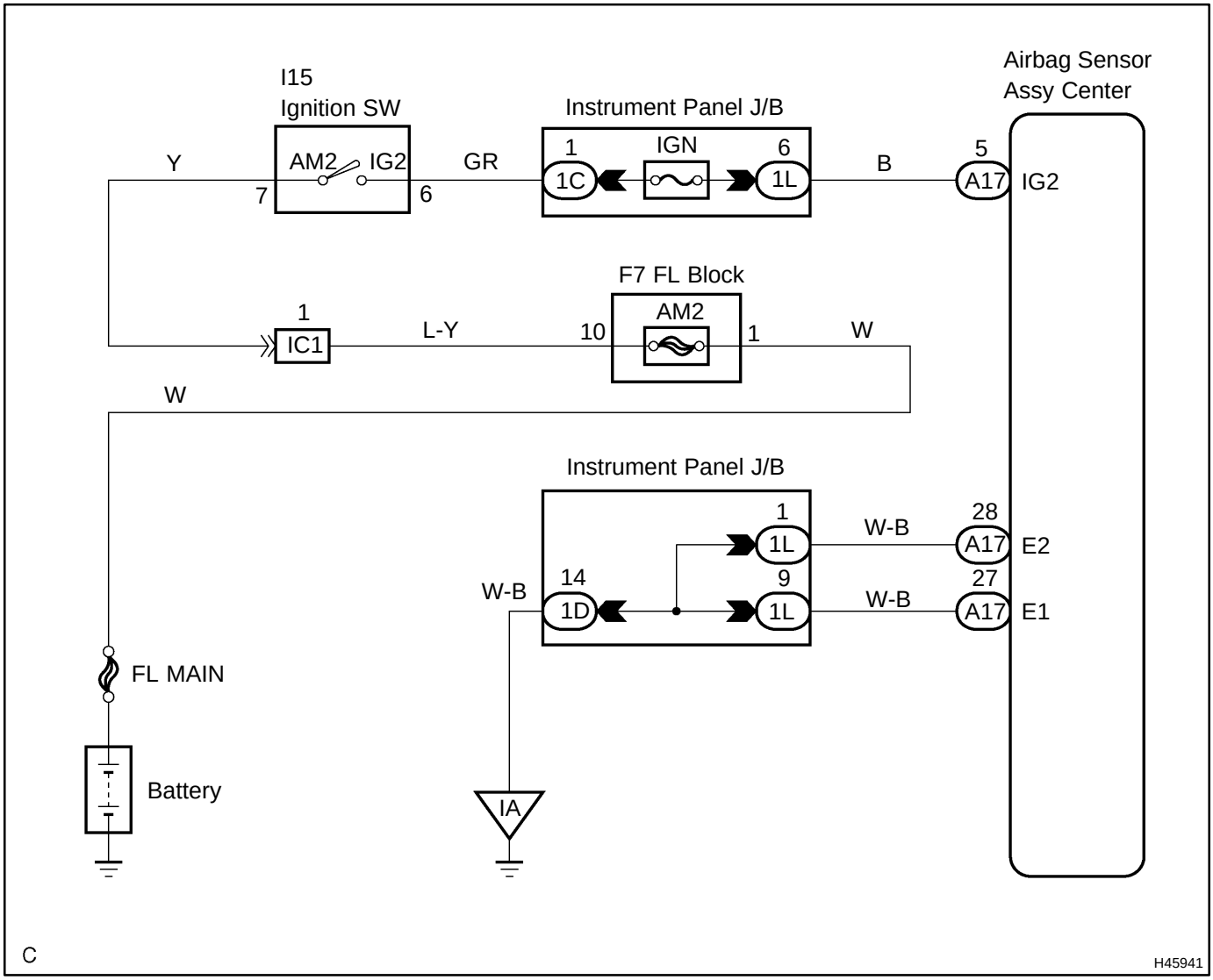
SOURCE VOLTAGE DROP

CIRCUIT DESCRIPTION

The SRS is equipped with a voltage-increase circuit (DC-DC converter) in the airbag sensor assy center in case the source voltage drops.
When the battery voltage drops, the voltage-increase circuit (DC-DC converter) functions to increase the voltage of the SRS to normal voltage.
A malfunction in this circuit is displayed differently from other codes. The source voltage drop is indicated when the SRS warning light comes on without showing any DTCs.
A malfunction in this circuit is not recorded in the airbag sensor assy center. The SRS warning light automatically goes off when the source voltage returns to normal.

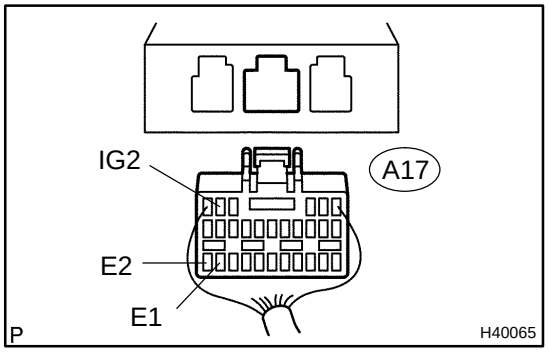
DTC No.	Diagnosis
(Normal)	Source voltage drop

WIRING DIAGRAM



INSPECTION PROCEDURE

1 CHECK SOURCE VOLTAGE



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connector of the airbag sensor assy center.
(d) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(e) Turn the ignition switch to the ON position.
(f) Measure the voltage and resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
A17-5 (IG2) - Body ground	Ignition switch ON	10 to 14 V
A17-27 (E1) - Body ground	Always	Below 1 Ω
A17-28 (E2) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE WIRE HARNESS (BATTERY - AIRBAG SENSOR ASSY CENTER), CHARGING SYSTEM AND BATTERY**

OK

2 CHECK SRS WARNING LIGHT

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Connect the airbag sensor assy center connectors.
(d) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(e) Turn the ignition switch to the ON position.
(f) Operate all components of the electrical system (defogger, wiper, headlight, heater blower, etc.) and check the SRS warning light operation.

OK:

SRS warning light does not come on.

NG → **REPLACE AIR BAG SENSOR ASSY CENTER (SEE PAGE 60-53)**

OK

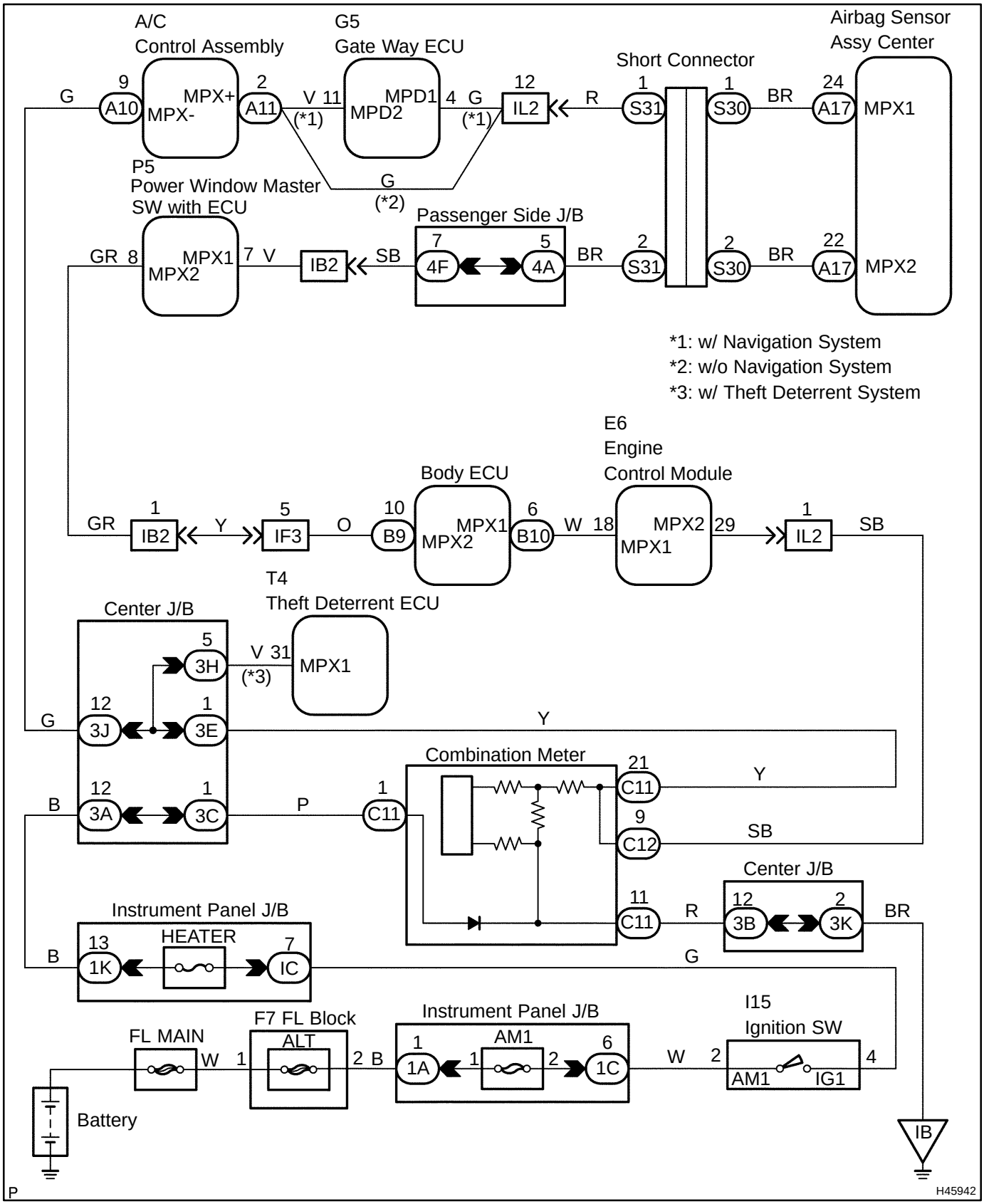
END

SRS WARNING LIGHT CIRCUIT MALFUNCTION (ALWAYS LIGHT UP, WHEN DTC IS NOT OUTPUT.)

CIRCUIT DESCRIPTION

The SRS warning light is located on the combination meter.
When the SRS is normal, the SRS warning light lights up for approx. 6 seconds after the ignition switch is turned from the LOCK position to ON position, and then turns off automatically.
If there is a malfunction in the SRS, the SRS warning light lights up to inform the driver of the abnormality. When terminals Tc and CG of the DLC3 are connected, the DTC is displayed by blinking the SRS warning light.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK CONNECTOR

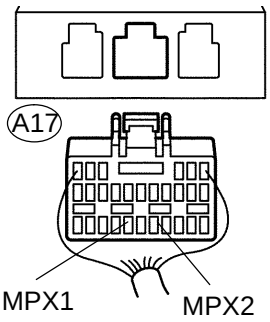
(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Check that the connectors are properly connected to the airbag sensor assy center and the combination meter assy.
OK:
The connectors are connected.

NG → **CONNECT CONNECTORS**

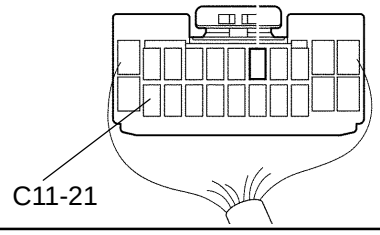
OK

2	CHECK WIRE HARNESS

Airbag Sensor Assy Center:



Combination Meter Assy:



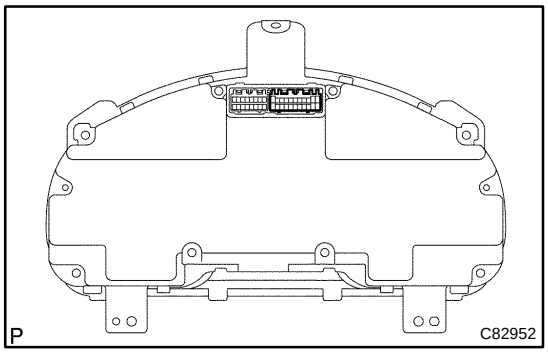
(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connector from the airbag sensor assy center.
(d) Measure the resistance according to the value(s) in the table below.
Standard:

Tester connection	Condition	Specified condition
A17-24 (MPX1) - C11-21	Always	Below 1 Ω
A17-24 (MPX1) - A17-22 (MPX2)	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE WIRE HARNESS (AIRBAG SENSOR ASSY CENTER - COMBINATION METER ASSY)**

OK

3	CHECK COMBINATION METER ASSY



(a) Disconnect the connector from the combination meter assy.

(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.

(c) Turn the ignition switch to the ON position.

(d) Measure the voltage according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
C11-21 - Body ground	Ignition switch ON	8 to 14 V

NG → **REPLACE COMBINATION METER ASSY (SEE PAGE 71-10)**

OK

REPLACE AIR BAG SENSOR ASSY CENTER (SEE PAGE 60-53)

SRS WARNING LIGHT CIRCUIT MALFUNCTION (DOES NOT LIGHT UP, WHEN IGNITION SWITCH IS TURNED TO ON)

CIRCUIT DESCRIPTION

The SRS warning light is located on the combination meter.
When the SRS is normal, the SRS warning light lights up for approx. 6 seconds after the ignition switch is turned from the LOCK position to ON position, and then turns off automatically.
If there is a malfunction is the SRS, the SRS warning light lights up to inform the driver of the abnormality.
When terminals Tc and CG of the DLC3 are connected, the DTC is displayed by blinking the SRS warning light.

WIRING DIAGRAM

see page 05-1517 .

INSPECTION PROCEDURE

1	CHECK BATTERY

(a) Measure the voltage of the battery.
Standard: 11 to 14 V

NG → **REPLACE BATTERY**

OK

2	CHECK WIRE HARNESS

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connector from the airbag sensor assy center.
(d) Connect the negative (-) terminal cable from the battery, and wait for at least 2 seconds.
(e) Turn the ignition switch to the ON position.
(f) Measure the resistance according to the value(s) in the table below.
OK:
The SRS warning light comes on.

NG → **REPAIR OR REPLACE WIRE HARNESS (COMBINATION METER - BATTERY)**

OK

REPLACE COMBINATION METER ASSEMBLY (SEE PAGE 71-10)

05MOE-01

SYSTEM DESCRIPTION

1. DESCRIPTION OF SUPPLEMENTAL RESTRAINT SYSTEM

(a) General description.

(1) In this system, the airbag sensor assy center installed on the floor under the A/C unit determines whether or not to activate the SRS airbags (driver airbag, passenger airbag, front seat airbags and curtain shield airbags) and seat belt pretensioners by receiving the collision signal from each sensor (excluding the airbag sensor assy center). When there is trouble in the system, the airbag sensor assy center turns on the SRS warning light on the combination meter assy to inform the driver.

(b) Description of the dual stage control.

(1) The airbag sensor assy center controls the dual stage deployment of the driver airbag in the horn button assy and the passenger airbag on the instrument panel. The airbag sensor assy center controls the dual stage deployment of the driver airbag according to the collision impact, seat position and seat belt ON/OFF state. It also controls the dual stage deployment of the passenger airbag according to the collision impact and seat belt ON/OFF state.

(c) Description of check mode (signal check).

(1) This airbag sensor assy center is operable using the check mode of the hand-held tester function. Check mode can detect and output DTC by using a hand-held tester to switch the airbag sensor assy center to the check mode.

A simulation method is used, if the malfunction cannot be reproduced during troubleshooting (the malfunction is temporarily solved, etc.). In this case, joggling each connector, or driving on a city or rough road with the airbag sensor assy center in check mode makes it possible to obtain a more accurate malfunction condition.

2. IGNITION JUDGEMENT AND CONDITIONS

(a) Operation in case of front collision.

(1) When the vehicle collides in the hatched area (Fig.1) and shock is larger than a predetermined level, the airbags (driver and front passenger) are activated automatically. The deceleration sensor of the airbag sensor assy center determines the need for ignition in response to collisions within the hatched area based on the signal from the deceleration sensor of the front airbag sensor.

(2) Safing sensor of the airbag sensor assy center is designed to activate at a smaller deceleration rate than the deceleration sensor. As illustrated in Fig.2 below, when both the safing sensor and deceleration sensor go on simultaneously, current flows to the squib and ignition occurs.

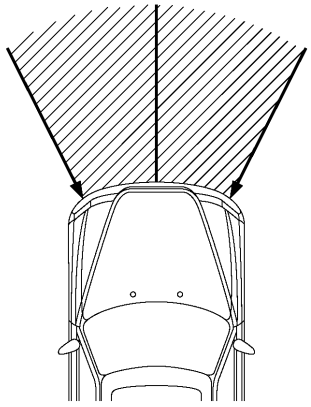


Fig.1

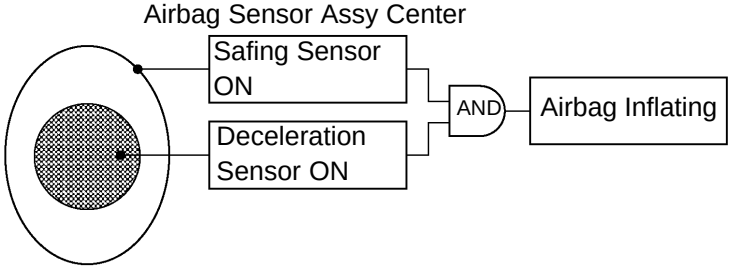


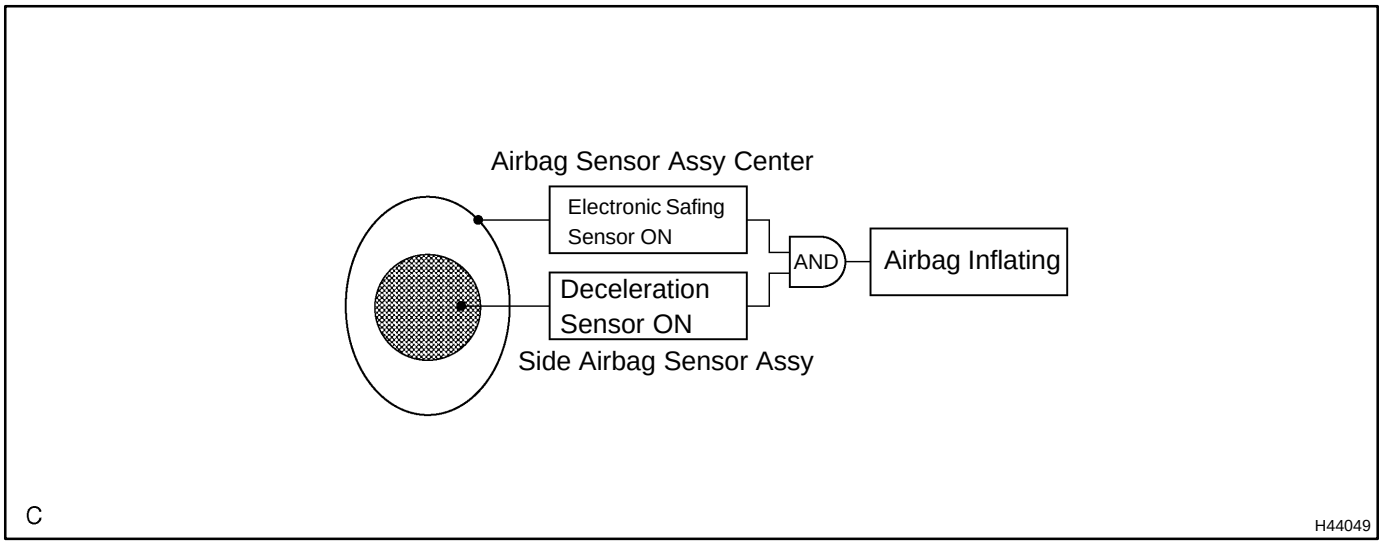
Fig.2

C

H44048

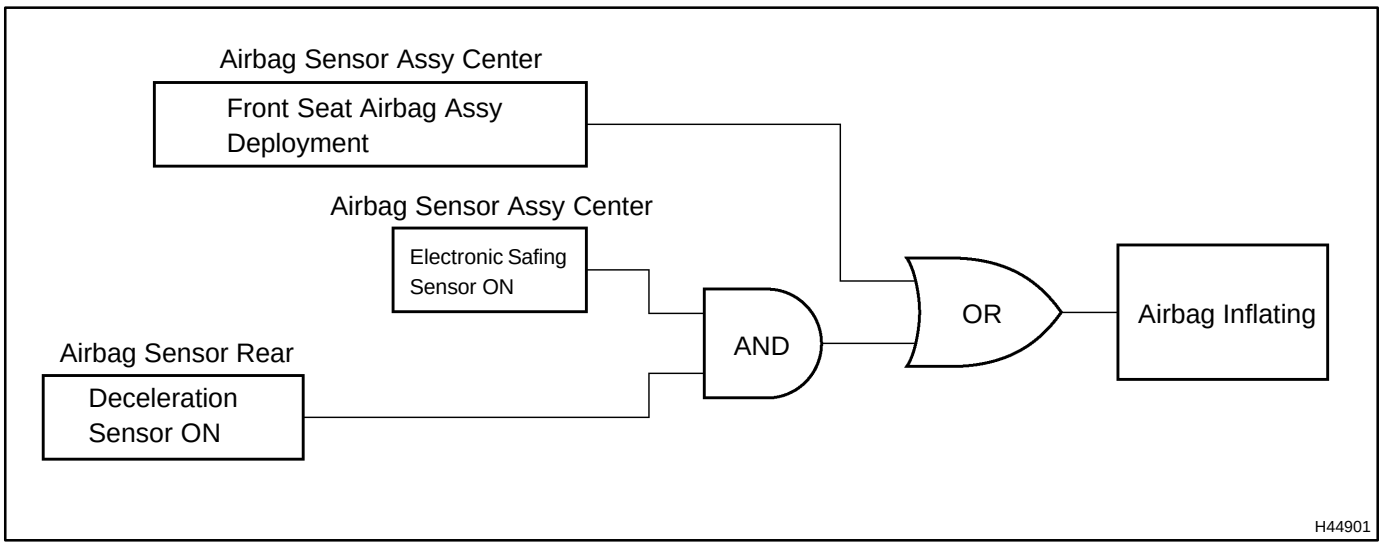
(b) w/ Side and curtain shield airbag: Operation in case of front side collision.

(1) Electronic safing sensor of the side airbag sensor assy is designed to activate at a smaller deceleration rate than the deceleration sensor of the side airbag sensor assy. As illustrated below, when both the safing sensor and deceleration sensor go on simultaneously, current flows to the squib and ignition occurs.



(c) w/ Side and curtain shield airbag: Operation in case of rear side collision.

(1) Electronic safing sensor of the airbag sensor assy center is designed to activate at a smaller deceleration rate than the deceleration sensor of the airbag sensor rear. As illustrated below, when both the safing sensor and deceleration sensor go on simultaneously, current flows to the squib and ignition occurs.



3. DESCRIPTION OF PASSENGER OCCUPANT CLASSIFICATION SYSTEM

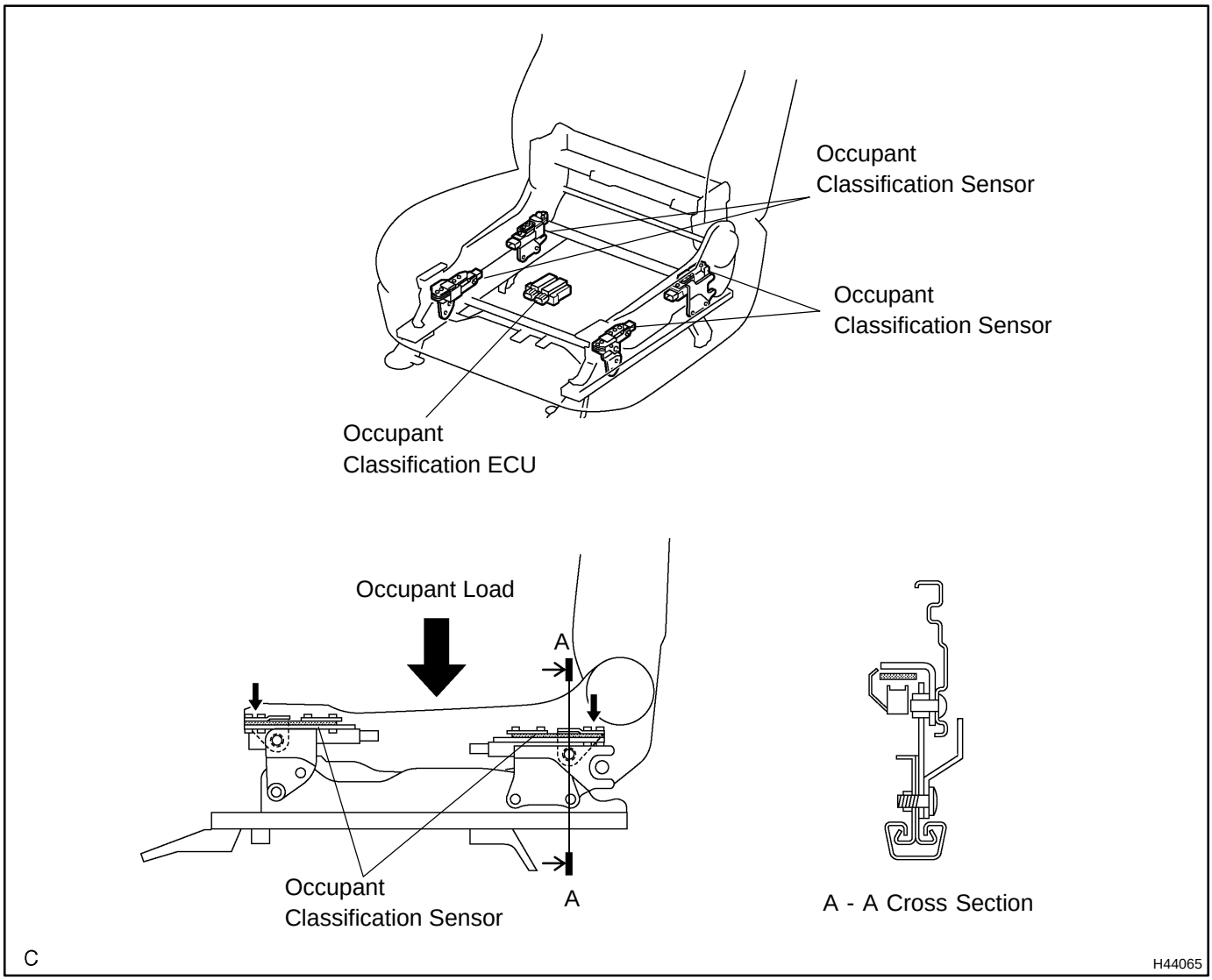
(a) GENERAL DESCRIPTION.

(1) In the passenger occupant classification system, the occupant classification ECU calculates the weight of the occupant based on a signal from the occupant classification sensor. This system recognizes the occupant to be a child if it detects a weight of less than 36 kg (79.37 lb), and disables the front and side airbags.

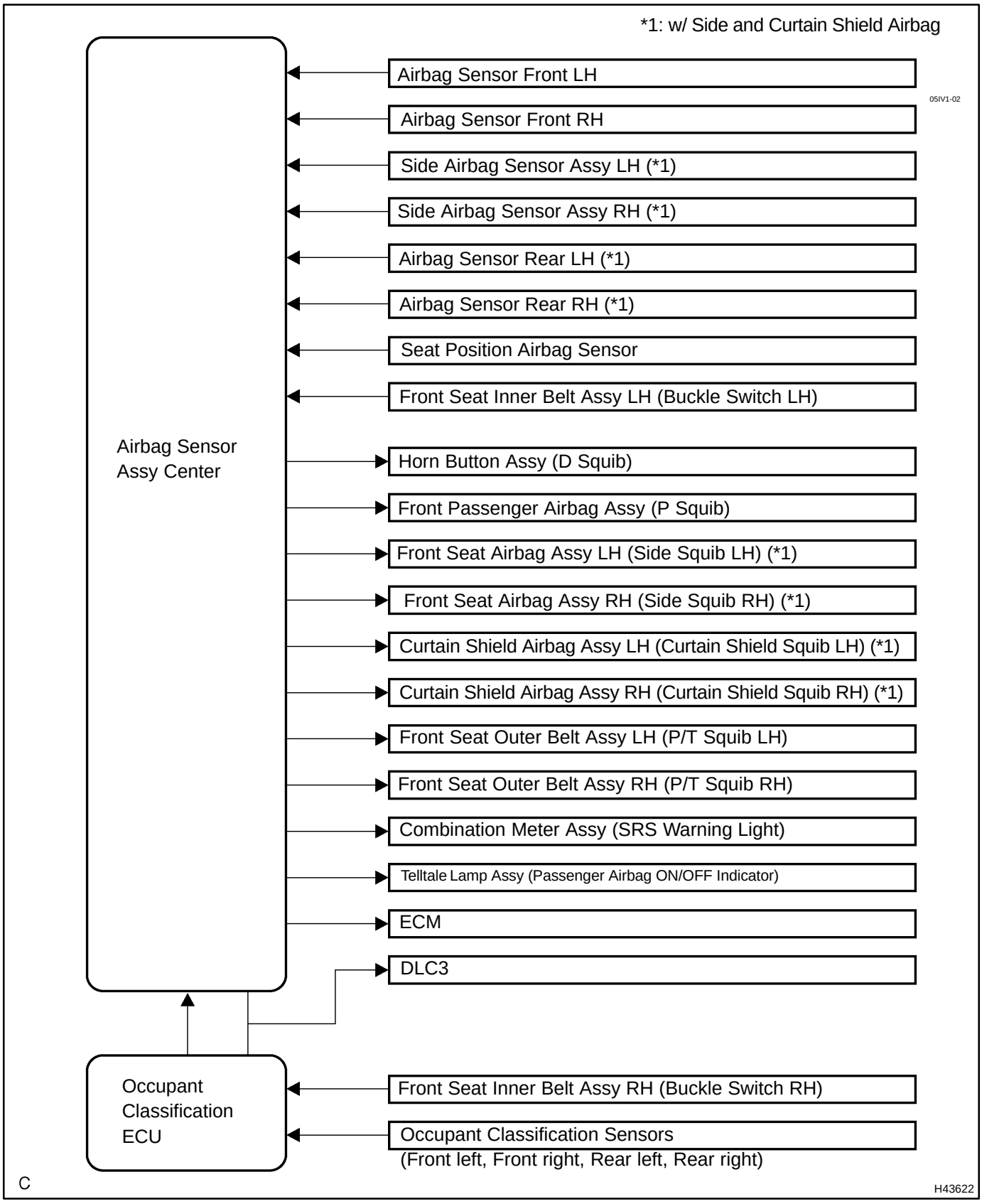
(2) This system is mainly comprised of 4 occupant classification sensors that detect the load on the front passenger seat. The occupant classification ECU controls the system, and the passenger airbag ON/OFF indicator indicates the ON/OFF condition of the front passenger airbag assy and front passenger seat airbag assy.

(b) OCCUPANT CLASSIFICATION SENSOR.

(1) The occupant classification sensors are installed on 4 brackets connecting the seat rail and seat frame. Accordingly, when load is applied to the passenger seat by an occupant sitting in it, the occupant classification sensors register a distortion.



SYSTEM DIAGRAM



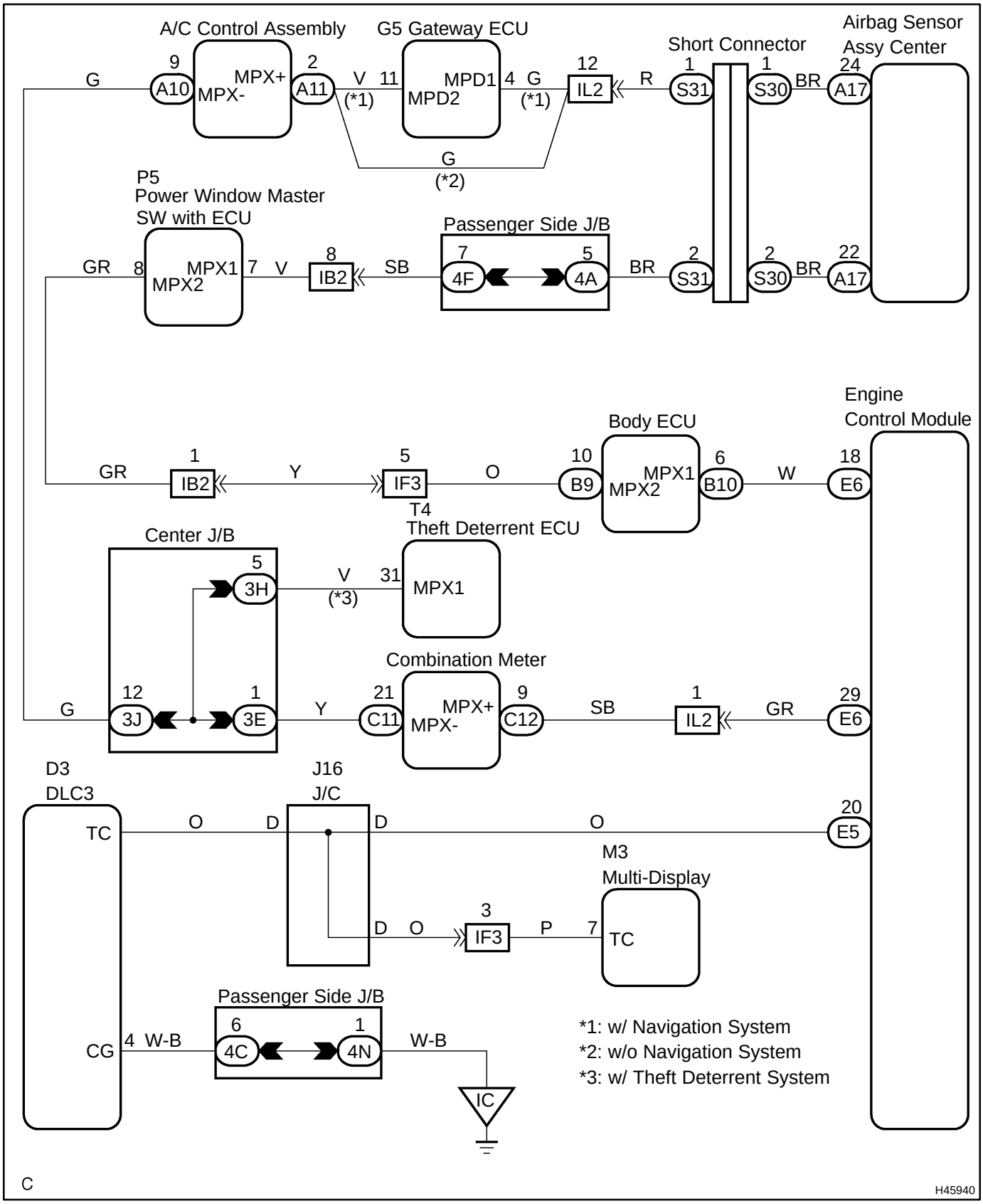
TC TERMINAL CIRCUIT

CIRCUIT DESCRIPTION

The DTCs output mode is set by connecting terminals TC and CG of the DLC3.
The DTCs are displayed by blinking the SRS warning light.
HINT:

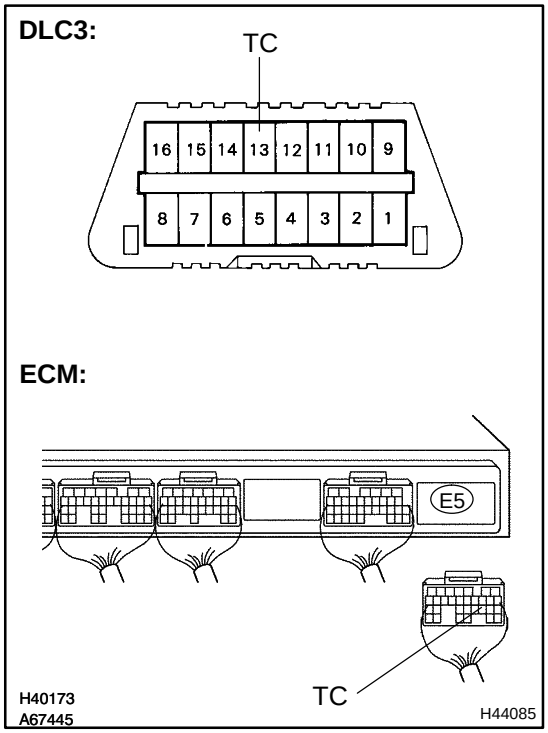
- Make sure that DTC B1281 has not been output. If DTC B1281 has been output, refer to the multiplex communication system.
- When each warning light stays blinking, a ground short in the wiring of terminal TC of the DLC3 or an internal ground short in each ECU is suspected.
- The DTC output mode signal is transmitted through BEAN to each ECU including the airbag sensor assy center, except for the skid control ECU with actuator. Thus when all systems except the ABS system do not enter DTC output mode, it can be suspected that there is an ECM malfunction.

WIRING DIAGRAM



INSPECTION PROCEDURE

1 CHECK WIRE HARNESS(DLC3 - ECM)



(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the airbag sensor assy center connector.
(c) Measure the resistance according to the value(s) in the table below.

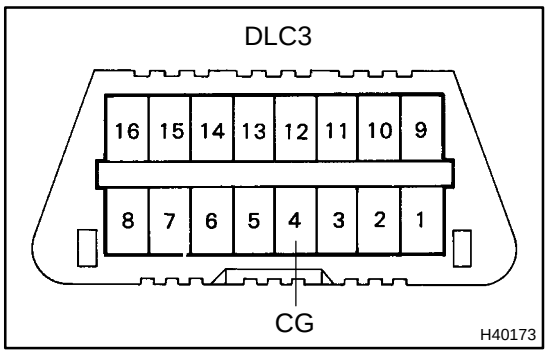
Standard:

Tester connection	Condition	Specified condition
DLC3 (TC) - E5-20 (TC)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE WIRE HARNESS(TC of DLC3 - TC of ECM)**

OK

2 CHECK WIRE HARNESS(CG of DLC3 - BODY GROUND)



(a) Measure the resistance according to the value(s) in the table below.

Standard:

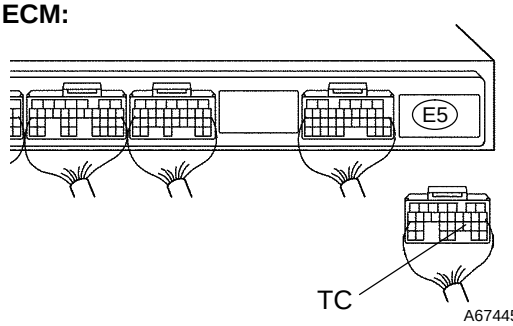
Tester connection	Condition	Specified condition
DLC3 (CG) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE WIRE HARNESS(CG of DLC3 - BODY GROUND)**

OK

3	CHECK WIRE HARNESS(TC of ECM - BODY GROUND)

ECM:



(a) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
E5-20 (TC) - Body ground	Always	1MΩ or Higher

NG → **REPAIR OR REPLACE WIRE HARNESS AND EACH ECU**

OK

4	REPLACE ECM

(a) Check that the ECM.

Result:

A: Normal system code is output.

B: DTC is output.

C: ECM does not set the DTC output mode.

A → **END**

B → **GO TO INSPECTION PROCEDURE OF DTC OUTPUT**

C

REPLACE AIRBAG SENSOR ASSY CENTER (SEE PAGE 60-53)

05IV3-02

CUSTOMER PROBLEM ANALYSIS CHECK

Supplemental Restraint System Check Sheet	Inspector's Name

Customer's Name		VIN	
		Production Date	/ /
		Licence Plate No.	
Date Vehicle Brought In		Odometer Reading	km Miles

Date Problem Occurred	
Weather	☐ Fine ☐ Cloudy ☐ Rainy ☐ Snowy ☐ Other
Temperature	Approx.

Vehicle Operation	☐ Starting ☐ Idling ☐ Driving [☐ Constant speed ☐ Acceleration ☐ Deceleration ☐ Other]
Road Condition	
Details of Problem	

Vehicle Inspection, and Repair History Prior to Occurrence of Malfunction (Including Supplemental Restraint System)	

Diagnostic System Inspection

SRS Warning Light Inspection	1st Time	☐ Remains ON ☐ Sometimes comes on ☐ Does not come on
	2nd Time	☐ Remains ON ☐ Sometimes comes on ☐ Does not come on
Passenger Airbag ON/OFF Indicator Inspection	1st Time	☐ Remains ON ☐ Does not come on
	2nd Time	☐ Remains ON ☐ Does not come on
DTC Inspection	1st Time	☐ Normal System Code ☐ Trouble Code [Code.]
	2nd Time	☐ Normal System Code ☐ Trouble Code [Code.]

05259-22

DIAGNOSTIC TROUBLE CODE CHART

1. DTCS FOR SUPPLEMENTAL RESTRAINT SYSTEM

If a trouble code is displayed during the DTC check, check the circuit listed for the code in the table below (Proceed to the page listed for that circuit.).

HINT:

- When the SRS warning light remains on and the DTC output is the normal system code, a voltage source drop is likely to occur. This malfunction is not stored in memory by the airbag sensor assy center. If the power source voltage returns to normal, the SRS warning light will automatically go off.
- When 2 or more codes are indicated, the code with the lower number appears first.
- If a code is not listed on the display chart, the airbag sensor assy center may have failed.
- In the case of any malfunction concerning an open circuit, short to ground, or short to B+ due to an squib, other trouble codes may not detected. In this case, repair the malfunction currently indicated and then perform malfunction diagnosis again.
- Mark in the check mode column:
  "○": DTC is corresponding to the check mode.
  "—": DTC is not corresponding to the check mode.
- When DTC B1150/23 is detected as a result of troubleshooting for the Supplemental Restraint System, perform troubleshooting for the occupant classification system as shown in the chart below.

DTC No. (See Page)	Detection Item	Trouble Area	Check Mode	SRS Warning Light
B0100/13 (05-1233)	Short in D squib circuit	・Horn button assy (squib) ・Spiral cable sub-assy ・Airbag sensor assy center ・Cowl wire	○	ON
B0101/14 (05-1238)	Open in D squib circuit	・Horn button assy (squib) ・Spiral cable sub-assy ・Airbag sensor assy center ・Cowl wire	○	ON
B0102/11 (05-1242)	Short in D squib circuit (to ground)	・Horn button assy (squib) ・Spiral cable sub-assy ・Airbag sensor assy center ・Cowl wire	○	ON
B0103/12 (05-1246)	Short in D squib circuit (to B+)	・Horn button assy (squib) ・Spiral cable sub-assy ・Airbag sensor assy center ・Cowl wire	○	ON
B0105/53 (05-1251)	Short in P squib circuit	・Front passenger airbag assy (squib) ・Airbag sensor assy center ・Cowl wire	○	ON
B0106/54 (05-1254)	Open in P squib circuit	・Front passenger airbag assy (squib) ・Airbag sensor assy center ・Cowl wire	○	ON
B0107/51 (05-1257)	Short in P squib circuit (to ground)	・Front passenger airbag assy (squib) ・Airbag sensor assy center ・Cowl wire	○	ON
B0108/52 (05-1260)	Short in P squib circuit (to B+)	・Front passenger airbag assy (squib) ・Airbag sensor assy center ・Cowl wire	○	ON
B0110/43 (*1) (05-1263)	Short in side squib (RH) circuit	・Separate type front seat back assy (squib) ・Airbag sensor assy center ・Floor wire	○	Blink
B0111/44 (*1) (05-1266)	Open in side squib (RH) circuit	・Separate type front seat back assy (squib) ・Airbag sensor assy center ・Floor wire	○	Blink

B0112/41 (*1) (05-1269)	Short in side squib (RH) circuit (to ground)	・Separate type front seat back assy (squib) ・Airbag sensor assy center ・Floor wire	○	Blink
B0113/42 (*1) (05-1272)	Short in side squib (RH) circuit (to B+)	・Separate type front seat back assy (squib) ・Airbag sensor assy center ・Floor wire	○	Blink
B0115/47 (*1) (05-1275)	Short in side squib (LH) circuit	・Separate type front seat back assy (squib) ・Airbag sensor assy center ・Floor wire No.2	○	Blink
B0116/48 (*1) (05-1278)	Open in side squib (LH) circuit	・Separate type front seat back assy (squib) ・Airbag sensor assy center ・Floor wire No.2	○	Blink
B0117/45 (*1) (05-1281)	Short in side squib (LH) circuit (to ground)	・Separate type front seat back assy (squib) ・Airbag sensor assy center ・Floor wire No.2	○	Blink
B0118/46 (*1) (05-1284)	Short in side squib (LH) circuit (to B+)	・Separate type front seat back assy (squib) ・Airbag sensor assy center ・Floor wire No.2	○	Blink
B0126/27 (05-1287)	Seat belt buckle switch (LH) malfunction	・Front seat inner belt assy LH ・Airbag sensor assy center ・Floor wire No.2	—	ON
B0130/63 (05-1293)	Short in P/T squib (RH) circuit	・Front seat outer belt assy RH (squib) ・Airbag sensor assy center ・Floor wire	○	Blink
B0131/64 (05-1297)	Open in P/T squib (RH) circuit	・Front seat outer belt assy RH (squib) ・Airbag sensor assy center ・Floor wire	○	Blink
B0132/61 (05-1300)	Short in P/T squib (RH) circuit (to ground)	・Front seat outer belt assy RH (squib) ・Airbag sensor assy center ・Floor wire	○	Blink
B0133/62 (05-1303)	Short in P/T squib (RH) circuit (to B+)	・Front seat outer belt assy RH (squib) ・Airbag sensor assy center ・Floor wire	○	Blink
B0135/73 (05-1306)	Short in P/T squib (LH) circuit	・Front seat outer belt assy LH (squib) ・Airbag sensor assy center ・Floor wire No.2	○	Blink
B0136/74 (05-1310)	Open in P/T squib (LH) circuit	・Front seat outer belt assy LH (squib) ・Airbag sensor assy center ・Floor wire No.2	○	Blink
B0137/71 (05-1313)	Short in P/T squib (LH) circuit (to ground)	・Front seat outer belt assy LH (squib) ・Airbag sensor assy center ・Floor wire No.2	○	Blink
B0138/72 (05-1316)	Short in P/T squib (LH) circuit (to B+)	・Front seat outer belt assy LH (squib) ・Airbag sensor assy center ・Floor wire No.2	○	Blink
B1100/31 (05-1319)	Airbag sensor assy center malfunction	・Airbag sensor assy center	—	ON
B1135/24 (05-1320)	Half connection in airbag sensor assy center connctors	・Electrical connection check mechanism ・Airbag sensor assy center	○	ON
B1140/32 (*1) (05-1322)	Side airbag sensor assy (RH) malfunction	・Side airbag sensor assy RH ・Floor wire ・Airbag sensor assy center	○	Blink
B1141/33 (*1) (05-1327)	Side airbag sensor assy (LH) malfunction	・Side airbag sensor assy LH ・Airbag sensor assy center ・Floor wire No.2	○	Blink
B1148/36 (05-1332)	Front airbag sensor (RH) malfunction	・Airbag front RH sensor ・Airbag sensor assy center ・Engine room main wire ・Cowl wire	—	ON

B1149/37 (05-1339)	Front airbag sensor (LH) malfunction	⊹Airbag front sensor LH ⊹Airbag sensor assy center ⊹Engine room main wire ⊹Cowl wire	—	ON
B1150/23 (05-1346)	Occupant classification system malfunction	⊹Occupant classification ECU ⊹Airbag sensor assy center ⊹Floor wire ⊹Front seat wire RH	—	ON
B1152/28 (05-1352)	Passenger airbag ON/OFF indicator circuit malfunction	⊹Telltale lamp assy ⊹Airbag sensor assy center ⊹Cowl wire	○	ON
B1153/25 (05-1360)	Seat position airbag sensor assy malfunction	⊹Seat position airbag sensor ⊹Airbag sensor assy center ⊹Floor wire No.2	—	ON
B1154/38 (05-1366)	Airbag sensor rear (RH) malfunction	⊹Airbag sensor rear RH ⊹Airbag sensor assy center ⊹Floor wire	—	Blink
B1155/39 (05-1371)	Airbag sensor rear (LH) malfunction	⊹Airbag sensor rear LH ⊹Airbag sensor assy center ⊹Floor wire No.2	—	Blink
B1160/83 (*1) (05-1376)	Short in curtain shield squib (RH) circuit	⊹Curtain shield airbag assy RH (squib) ⊹Airbag sensor assy center ⊹Floor wire ⊹Roof wire No.2	○	Blink
B1161/84 (*1) (05-1384)	Open in curtain shield squib (RH) circuit	⊹Curtain shield airbag assy RH (squib) ⊹Airbag sensor assy center ⊹Floor wire ⊹Roof wire No.2	○	Blink
B1162/81 (*1) (05-1390)	Short in curtain shield squib (RH) circuit (to ground)	⊹Curtain shield airbag assy RH (squib) ⊹Airbag sensor assy center ⊹Floor wire ⊹Roof wire No.2	○	Blink
B1163/82 (*1) (05-1396)	Short in curtain shield squib (RH) circuit (to B+)	⊹Curtain shield airbag assy RH (squib) ⊹Airbag sensor assy center ⊹Floor wire ⊹Roof wire No.2	○	Blink
B1165/87 (*1) (05-1403)	Short in curtain shield squib (LH) circuit	⊹Curtain shield airbag assy LH (squib) ⊹Airbag sensor assy center ⊹Floor wire No.2	○	Blink
B1166/88 (*1) (05-1407)	Open in curtain shield squib (LH) circuit	⊹Curtain shield airbag assy LH (squib) ⊹Airbag sensor assy center ⊹Floor wire No.2	○	Blink
B1167/85 (*1) (05-1410)	Short in curtain shield squib (LH) circuit (to ground)	⊹Curtain shield airbag assy LH (squib) ⊹Airbag sensor assy center ⊹Floor wire No.2	○	Blink
B1168/86 (*1) (05-1413)	Short in curtain shield squib (LH) circuit (to B+)	⊹Curtain shield airbag assy LH (squib) ⊹Airbag sensor assy center ⊹Floor wire No.2	○	Blink
B1180/17 (05-1416)	Short in D squib (Dual stage - 2nd step) circuit	⊹Horn button assy (squib, Dual stage - 2nd step) ⊹Spiral cable sub-assy ⊹Airbag sensor assy center ⊹Cowl wire	○	ON
B1181/18 (05-1421)	Open in D squib (Dual stage - 2nd step) circuit	⊹Horn button assy (squib, Dual stage - 2nd step) ⊹Spiral cable sub-assy ⊹Airbag sensor assy center ⊹Cowl wire	○	ON
B1182/19 (05-1425)	Short in D squib (Dual stage - 2nd step) circuit (to ground)	⊹Horn button assy (squib, Dual stage - 2nd step) ⊹Spiral cable sub-assy ⊹Airbag sensor assy center ⊹Cowl wire	○	ON

B1183/22 (05-1429)	Short in D squib (Dual stage - 2nd step) circuit (to B+)	・Horn button assy (squib, Dual stage - 2nd step) ・Spiral cable sub-assy ・Airbag sensor assy center ・Cowl wire	○	ON
B1185/57 (05-1434)	Short in P squib (Dual stage - 2nd step) circuit	・Front passenger airbag assy (squib, Dual stage - 2nd step) ・Airbag sensor assy center ・Cowl wire	○	ON
B1186/58 (05-1437)	Open in P squib (Dual stage - 2nd step) circuit	・Front passenger airbag assy (squib, Dual stage - 2nd step) ・Airbag sensor assy center ・Cowl wire	○	ON
B1187/55 (05-1440)	Short in P squib (Dual stage - 2nd step) circuit (to ground)	・Front passenger airbag assy (squib, Dual stage - 2nd step) ・Airbag sensor assy center ・Cowl wire	○	ON
B1188/56 (05-1443)	Short in P squib (Dual stage - 2nd step) circuit (to B+)	・Front passenger airbag assy (squib, Dual stage - 2nd step) ・Airbag sensor assy center ・Cowl wire	○	ON
Normal (05-1515)	System normal	-	—	OFF
	Voltage source drop	・Battery ・Airbag sensor assy center	—	ON

*1: w/ Side and curtain shield airbag

2. DTCS FOR FRONT PASSENGER OCCUPANT CLASSIFICATION SYSTEM

HINT:

When DTC B1150/23 is detected as a result of troubleshooting for the Supplemental Restraint System, perform troubleshooting for the occupation classification system as shown in the chart below.

DTC No. (See page)	Detection Item	Trouble Area	Passenger Airbag OFF Indicator
B1771 (05-1446)	・Passenger side buckle switch circuit malfunction	・Front seat inner belt assy RH ・Occupant classification ECU ・Front seat wire RH	ON
B1780 (05-1453)	・Occupant classification sensor front LH circuit malfunction	・Occupant classification sensor front LH ・Occupant classification ECU ・Front seat wire RH	ON
B1781 (05-1460)	・Occupant classification sensor front RH circuit malfunction	・Occupant classification sensor front RH ・Occupant classification ECU ・Front seat wire RH	ON
B1782 (05-1467)	・Occupant classification sensor rear LH circuit malfunction	・Occupant classification sensor rear LH ・Occupant classification ECU ・Front seat wire RH	ON
B1783 (05-1474)	・Occupant classification sensor rear RH circuit malfunction	・Occupant classification sensor rear RH ・Occupant classification ECU ・Front seat wire RH	ON
B1785 (05-1481)	・Occupant classification sensor front LH collision detection	・Occupant classification ECU ・Front RH seat assy (seat frame) ・Occupant classification sensor front LH	ON
B1786 (05-1484)	・Occupant classification sensor front RH collision detection	・Occupant classification ECU ・Front RH seat assy (seat frame) ・Occupant classification sensor front RH	ON
B1787 (05-1487)	・Occupant classification sensor rear LH collision detection	・Occupant classification ECU ・Front RH seat assy (seat frame) ・Occupant classification sensor rear LH	ON
B1788 (05-1490)	・Occupant classification sensor rear RH collision detection	・Occupant classification ECU ・Front RH seat assy (seat frame) ・Occupant classification sensor rear RH	ON
B1790 (05-1493)	・Airbag sensor assy center communication circuit malfunction	・Occupant classification ECU ・Airbag sensor assy center ・Floor wire ・Front seat wire RH	ON

B1793 (05-1502)	›Occupant classification sensor power supply circuit malfunction	›Seat adjuster frame assy (Occupant classification sensors) ›Front seat wire RH ›Occupant classification ECU	ON
B1795 (05-1510)	›Occupant classification ECU malfunction	›Occupant classification ECU ›Front seat wire RH ›ECU-B Fuse ›Front seat inner belt assy RH (Buckle switch RH)	ON
B1796 (05-1513)	›Sleep operation failure of occupant classification ECU	›Occupant classification ECU	ON

05256-33

HOW TO PROCEED WITH TROUBLESHOOTING

The hand-held tester can be used in step 3, 4, 6, 9 and 10.

1	VEHICLE BROUGHT TO WORKSHOP

NEXT

2	CUSTOMER PROBLEM ANALYSIS (SEE PAGE 05-1202)

NEXT

3	CHECK MULTIPLEX COMMUNICATION SYSTEM (SEE PAGE 05-2044)

- DTC IS OUTPUT: CHECK MULTIPLEX COMMUNICATION CIRCUIT (SEE PAGE 05-2044)
- DTC IS NOT OUTPUT: Go to step 4

4	CHECK DTC (Present and Past DTC) (SEE PAGE 05-1215)

- DTC IS OUTPUT: Go to step 5
- DTC IS NOT OUTPUT: PROBLEM SYMPTOMS TABLE (SEE PAGE 05-1227)
- DTC B1150/23 IS OUTPUT: Go to step 5

5	DTC CHART (SEE PAGE 05-1228)

NEXT

6	CIRCUIT INSPECTION (SEE PAGE 05-1233 TO 05-1521)

- MALFUNCTION CODE IS OUTPUT: Go to step 7
- NORMAL CODE IS OUTPUT: Go to step 12

7	IDENTIFICATION OF PROBLEM

NEXT

8	REPAIR

NEXT

9	CLEAR DTC (Present and Past DTC's) (SEE PAGE 05-1215)

NEXT

10	CHECK DTC (SEE PAGE 05-1215)

DTC CODE IS NOT OUTPUT: Go to step 11

DTC CODE IS OUTPUT: Go to step 5

11	SYMPTOM SIMULATION (SEE PAGE 01-36)

WARNING LIGHT REMAINS OFF: Go to step 12

WARNING LIGHT IS ON: Go to step 5

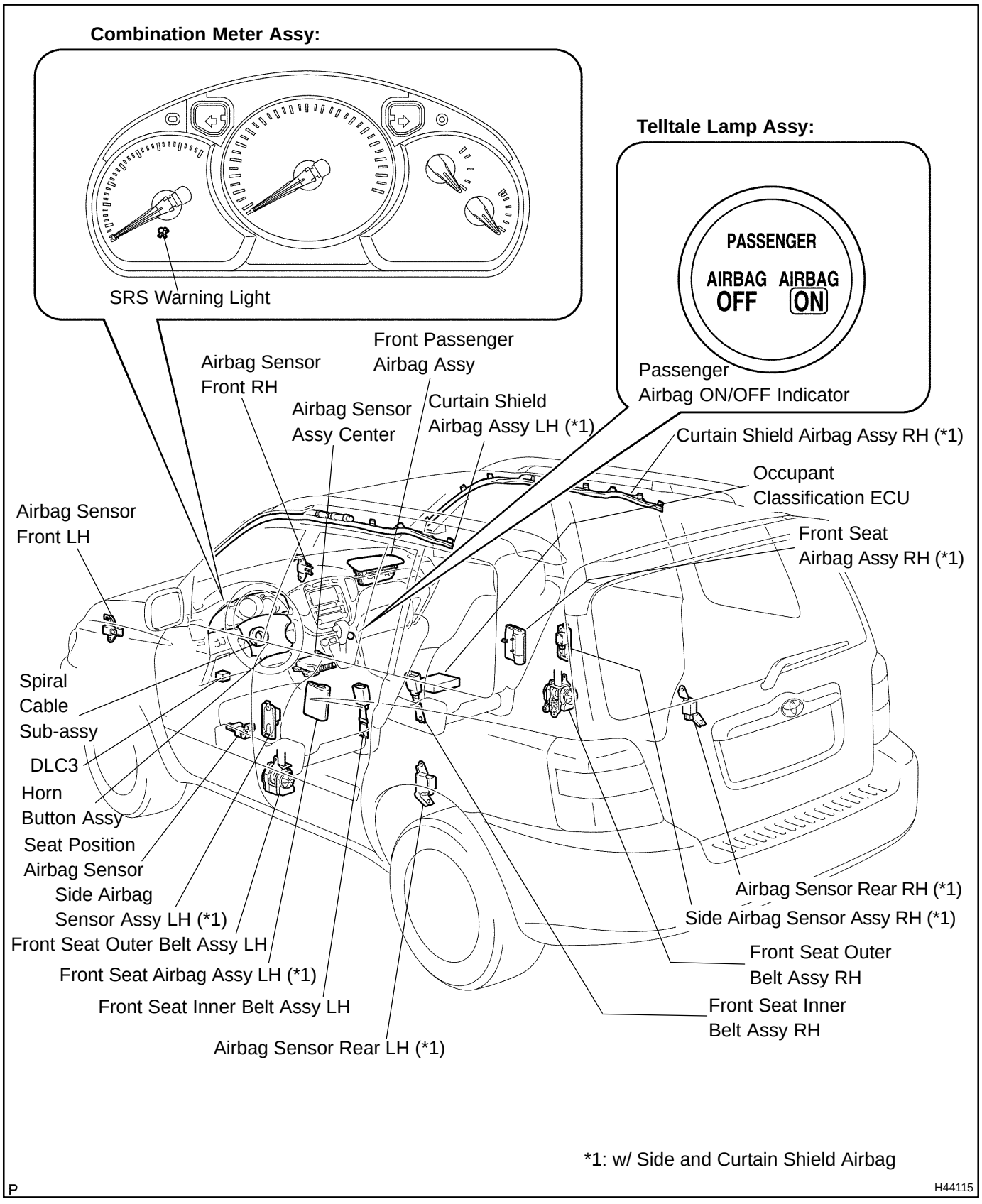
12	CONFIRMATION TEST

NEXT

END

0525A-30

LOCATION



SUPPLEMENTAL RESTRAINT SYSTEM

05IV0-02

PRECAUTION

1. HANDLING PRECAUTIONS AIRBAG SENSOR

HINT:

In this section, the airbag sensor assy center, airbag sensor front LH, airbag sensor front RH, side airbag sensor assy LH, side airbag sensor assy RH, airbag sensor rear LH, airbag sensor rear RH and seat position airbag sensor are collectively referred to as the airbag sensor.

(a) Before starting the following operations, wait at least 90 seconds after disconnection the negative (-) terminal of the battery:
  (1) Replacement of the airbag sensor.
  (2) Adjustment of the front/rear door of the vehicle equipped with the side airbag and curtain shield airbag (fitting adjustment).

(b) When connecting or disconnecting the airbag sensor connector, ensure that all of the sensor are installed in the vehicle.

(c) Do not use an airbag sensor which has been dropped during the operation or transportation.

(d) Do not disassemble the airbag sensor.

2. INSPECTION PROCEDURE FOR VEHICLE INVOLVED IN ACCIDENT

(a) When the airbag has not deployed, confirm the DTC by checking the SRS warning light. If there is any malfunction in the SRS airbag system, perform troubleshooting.

(b) When any of the airbags have deployed, replace the airbag sensor and check the installation condition.

(c) Perform the zero point calibration and sensitivity check if any of the following conditions occur.
  - The occupant classification ECU is replaced.
  - Accessories (seatback tray and seat cover, etc.) are installed.
  - The passenger seat is removed from the vehicle.
  - The passenger airbag ON/OFF indicator (”OFF”) comes on when the passenger seat is not occupied.
  - The vehicle is brought to the workshop for repair due to an accident or collision.

NOTICE:

When an accident vehicle is brought into the workshop for repair, check the flatness of the body side that is equipped with the passenger seat. If the flatness is not within ≦ 3.0 mm (0.118 in.), adjust it to the specified range.

0525C-21

PROBLEM SYMPTOMS TABLE

HINT:

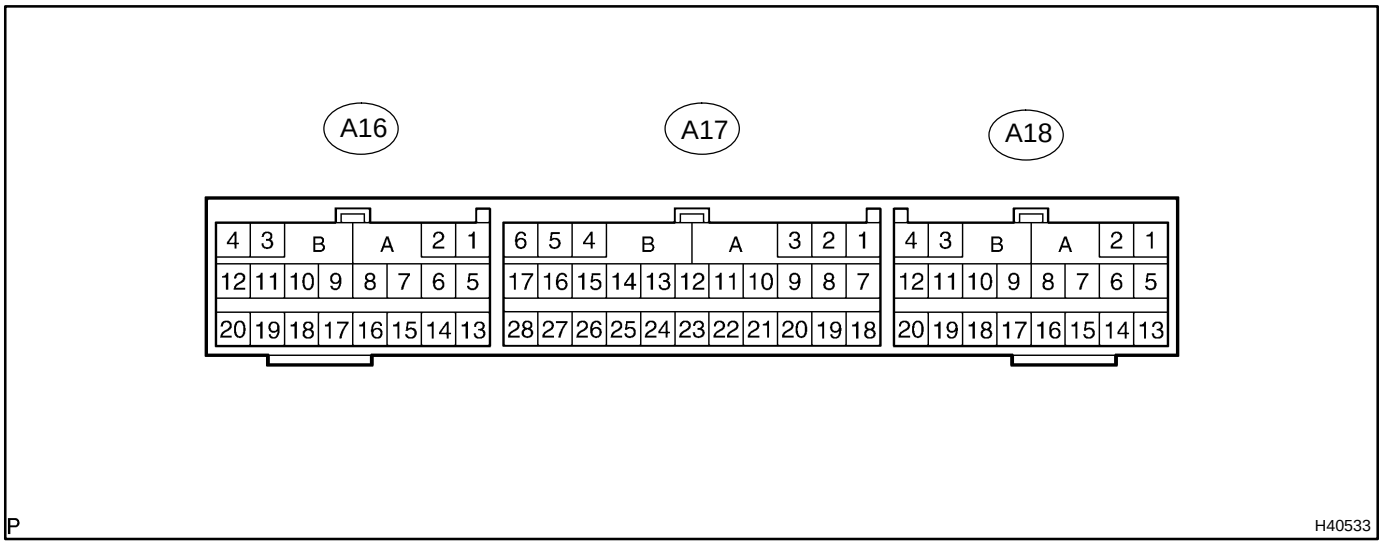
Proceed with troubleshooting of each circuit in the table below.

Symptom	Suspect Area	See Page
When the ignition switch is in the ON position, the SRS warning light sometimes comes on after approximately 6 seconds.	SRS warning light circuit malfunction (Always lights up, when DTC is not output).	05-1517
SRS warning light always comes on even when DTC is not position.	SRS warning light circuit malfunction (Always lights up, when DTC is not output).	05-1517
With the ignition switch in the ON position, the SRS warning light does not come on.	SRS warning light circuit malfunction (Does not light up, when ignition switch is turned to the ON position).	05-1521
Although a SRS warning light oprates normal, DTC or a normal system code is not displayed.	TC Terminal Circuit	05-1522
Although terminals TC and CG are not connected, DTC or a normal system code is displayed.	TC Terminal Circuit	05-1522

05IV9-02

TERMINALS OF ECU

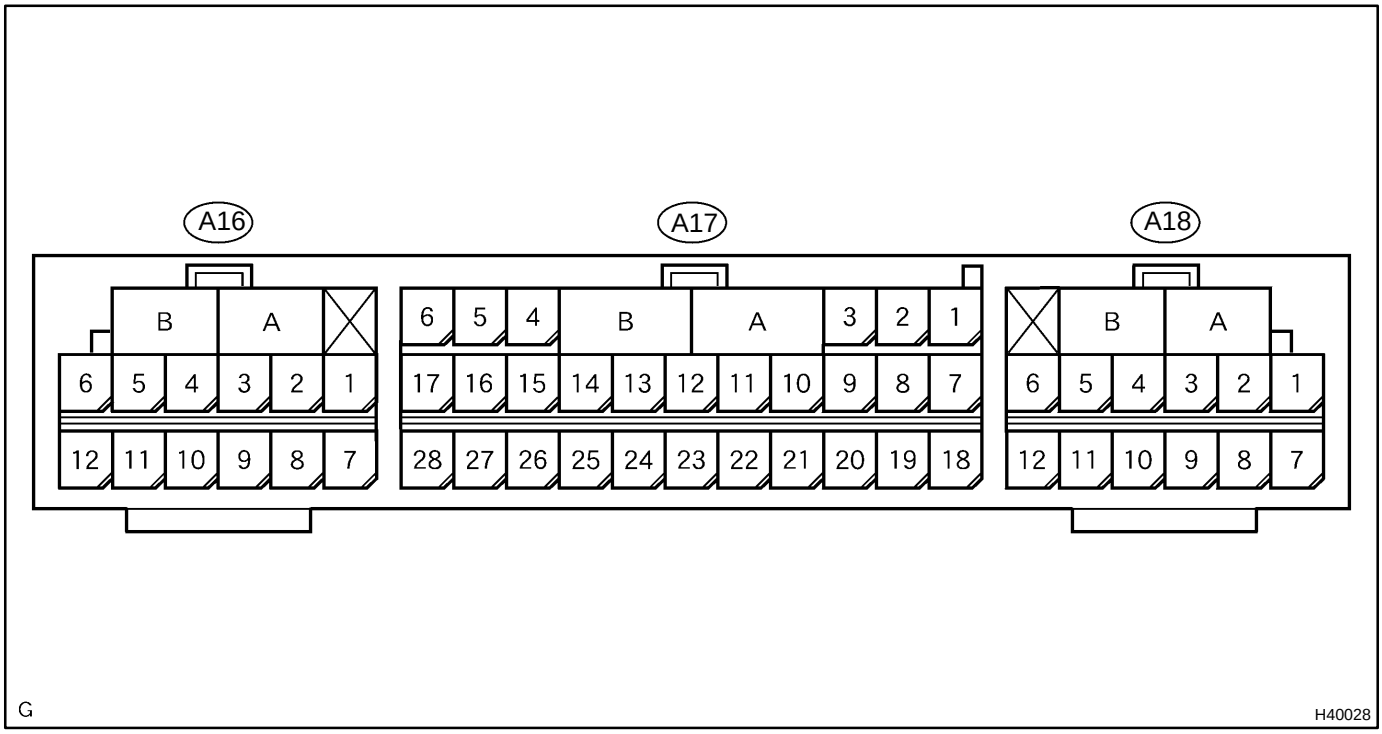
1. AIRBAG SENSOR ASSY CENTER (w/ Side and curtain shield airbag)



No.	Symbol	Destination
A	-	Electrical Connector Check Mechanism
B	-	Electrical Connector Check Mechanism
A16-1	CSL-	Airbag Sensor Rear LH
A16-2	LBE-	Front Seat Inner Belt Assy LH (Buckle SW)
A16-3	LSP-	Seat Position Airbag Sensor
A16-4	LSP+	Seat Position Airbag Sensor
A16-7	PL-	Front Seat Outer Belt Assy LH (P/T Squib LH)
A16-8	PL+	Front Seat Outer Belt Assy LH (P/T Squib LH)
A16-9	ICL+	Curtain Shield Airbag Assy LH (Curtain Shield Squib LH)
A16-10	ICL-	Curtain Shield Airbag Assy LH (Curtain Shield Squib LH)
A16-11	SFL-	Front Seat Airbag Assy LH (Side Squib LH)
A16-12	SFL+	Front Seat Airbag Assy LH (Side Squib LH)
A16-13	ESCL	Airbag Sensor Rear LH
A16-14	VUCL	Airbag Sensor Rear LH
A16-15	CSL+	Airbag Sensor Rear LH
A16-16	VUPL	Side Airbag Sensor Assy LH
A16-17	SSL+	Side Airbag Sensor Assy LH
A16-18	ESL	Side Airbag Sensor Assy LH
A16-19	LBE+	Front Seat Inner Belt Assy LH (Buckle SW)
A16-20	SSL-	Side Airbag Sensor Assy LH
A17-1	P-AB	Passenger Airbag ON/OFF Indicator
A17-5	IG2	IGN Fuse
A17-7	P2-	Front Passenger Airbag Assy (P Squib, Dual stage - 2nd step)
A17-8	P2+	Front Passenger Airbag Assy (P Squib, Dual stage - 2nd step)
A17-9	+SR	Airbag Sensor Front RH
A17-10	P+	Front Passenger Airbag Assy (P Squib)
A17-11	P-	Front Passenger Airbag Assy (P Squib)
A17-12	SIL	Diagnosis
A17-13	D-	Horn Button Assy (D Squib)
A17-14	D+	Horn Button Assy (D Squib)
A17-15	+SL	Airbag Sensor Front LH

No.	Symbol	Destination
A17-16	D2+	Horn Button Assy (D Squib, Dual stage - 2nd step)
A17-17	D2-	Horn Button Assy (D Squib, Dual stage - 2nd step)
A17-20	-SR	Airbag Sensor Front RH
A17-22	MPX2	Combination Meter Assy
A17-24	MPX1	Combination Meter Assy
A17-25	PAON	Passenger Airbag ON/OFF Indicator
A17-26	-SL	Airbag Sensor Front LH
A17-27	E1	Ground
A17-28	E2	Ground
A18-1	FSR+	Occupant Classification ECU
A18-2	FSR-	Occupant Classification ECU
A18-4	CSR-	Airbag Sensor Rear RH
A18-5	SFR+	Front Seat Airbag Assy RH (Side Squib RH)
A18-6	SFR-	Front Seat Airbag Assy RH (Side Squib RH)
A18-7	ICR-	Curtain Shield Airbag Assy RH (Curtain Shield Squib RH)
A18-8	ICR+	Curtain Shield Airbag Assy RH (Curtain Shield Squib RH)
A18-9	PR+	Front Seat Outer Belt Assy RH (P/T Squib RH)
A18-10	PR-	Front Seat Outer Belt Assy RH (P/T Squib RH)
A18-13	SSR-	Side Airbag Sensor Assy RH
A18-15	ESR	Side Airbag Sensor Assy RH
A18-16	SSR+	Side Airbag Sensor Assy RH
A18-17	VUPR	Side Airbag Sensor Assy RH
A18-18	CSR+	Airbag Sensor Rear RH
A18-19	VUCR	Airbag Sensor Rear RH
A18-20	ESCR	Airbag Sensor Rear RH

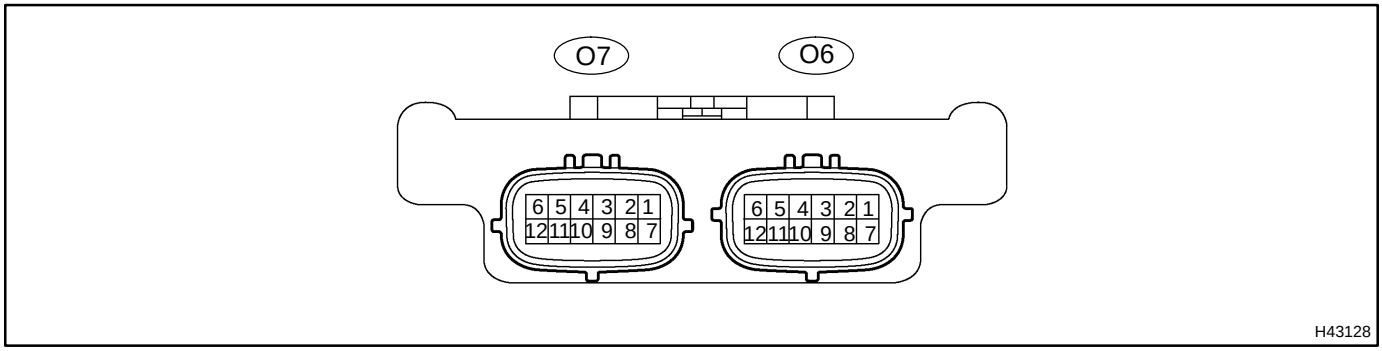
2. AIRBAG SENSOR ASSY CENTER (w/o Side and curtain shield airbag)



No.	Symbol	Destination
A	-	Electrical Connector Check Mechanism
B	-	Electrical Connector Check Mechanism
A16-1	PL-	Front Seat Outer Belt Assy LH (P/T Squib LH)
A16-2	PL+	Front Seat Outer Belt Assy LH (P/T Squib LH)
A16-3	LSP+	Seat Position Airbag Sensor
A16-6	LBE-	Front Seat Inner Belt Assy LH (Buckle SW)
A16-8	LSP-	Seat Position Airbag Sensor
A16-11	LBE+	Front Seat Inner Belt Assy LH (Buckle SW)
A17-1	P-AB	Passenger Airbag ON/OFF Indicator
A17-5	IG2	IGN Fuse
A17-7	P2-	Front Passenger Airbag Assy (P Squib, Dual stage - 2nd step)
A17-8	P2+	Front Passenger Airbag Assy (P Squib, Dual stage - 2nd step)
A17-9	+SR	Airbag Sensor Front RH
A17-10	P+	Front Passenger Airbag Assy (P Squib)
A17-11	P-	Front Passenger Airbag Assy (P Squib)
A17-12	SIL	Diagnosis
A17-13	D-	Horn Button Assy (D Squib)
A17-14	D+	Horn Button Assy (D Squib)
A17-15	+SL	Airbag Sensor Front LH
A17-16	D2+	Horn Button Assy (D Squib, Dual stage - 2nd step)
A17-17	D2-	Horn Button Assy (D Squib, Dual stage - 2nd step)
A17-20	-SR	Airbag Sensor Front RH
A17-22	MPX2	Combination Meter Assy
A17-24	MPX1	Combination Meter Assy
A17-25	PAON	Passenger Airbag ON/OFF Indicator
A17-26	-SL	Airbag Sensor Front LH
A17-27	E1	Ground

No.	Symbol	Destination
A17-28	E2	Ground
A18-3	FSR+	Occupant Classification ECU
A18-5	PR+	Front Seat Outer Belt Assy RH (P/T Squib RH)
A18-6	PR-	Front Seat Outer Belt Assy RH (P/T Squib RH)
A18-10	FSR-	Occupant Classification ECU

3. OCCUPANT CLASSIFICATION ECU



Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specification
+B (O6-1) - GND (O6-3)	R - W-B	Power Source	IG switch ON	10 to 14 V
DIA (O6-2) - GND (O6-3)	V - W-B	Diagnosis (DLC3)	IG switch ON	Pulse generation
GND (O6-3) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
FSR- (O6-4) - GND (O6-3)	B - W-B	Airbag sensor assy center communication line (-)	Always	Below 1 Ω
BGND (O6-5) - GND (O6-3)	GR - W-B	Passenger side buckle switch ground line	Always	Below 1 Ω
IG (O6-7) - GND (O6-3)	BR - W-B	Power Source	IG switch ON	10 to 14 V
FSR+ (O6-8) - FSR- (O6-4)	W - B	Airbag sensor assy center communication line	IG switch ON	Pulse generation
BSW (O6-9) - BGND (O6-5)	L - GR	Passenger side buckle switch line	Buckle switch ON Buckle switch OFF	10 to 14 V Below 1 V
SGD1 (O7-1) - GND (O6-3)	G - W-B	Passenger side buckle switch circuit	Always	Below 1 Ω
SGD2 (O7-2) - GND (O6-3)	O - W-B	Occupant classification sensor front RH ground line	Always	Below 1 Ω
SGD3 (O7-3) - GND (O6-3)	W - W-B	Occupant classification sensor rear LH ground line	Always	Below 1 Ω
SGD4 (O7-4) - GND (O6-3)	BR - W-B	Occupant classification sensor rear RH ground line	Always	Below 1 Ω
SVC3 (O7-5) - SGD3 (O7-3)	GR - W	Occupant classification sensor rear LH power supply line	IG switch ON, a load is applied to occupant classification sensor rear LH	4.5 to 5.1 V
SVC4 (O7-6) - SGD4 (O7-4)	V - BR	Occupant classification sensor rear RH power supply line	IG switch ON, a load is applied to occupant classification sensor rear RH	4.5 to 5.1 V
SIG1 (O7-7) - SGD1 (O7-1)	SB - G	Occupant classification sensor front LH signal line	IG switch ON, a load is applied to occupant classification sensor front LH	0.2 to 4.9 V
SIG2 (O7-8) - SGD2 (O7-2)	L - O	Occupant classification sensor rear RH signal line	IG switch ON, a load is applied to occupant classification sensor front RH	0.2 to 4.9 V

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specification
SIG3 (O7-9) - SGD3 (O7-3)	Y - W	Occupant classification sensor rear LH signal line	IG switch ON, a load is applied to occupant classification sensor rear LH	0.2 to 4.9 V
SIG4 (O7-10) - SGD4 (O7-4)	B - BR	Occupant classification sensor front RH signal line	IG switch ON, a load is applied to occupant classification sensor rear RH	0.2 to 4.9 V
SVC1 (O7-11) - SGD4 (O7-4)	R - BR	Occupant classification sensor rear LH power supply line	IG switch ON, a load is applied to occupant classification sensor front LH	4.5 to 5.1 V
SVC2 (O7-12) - SGD2 (O7-2)	W - O	Occupant classification sensor rear LH power supply line	IG switch ON, a load is applied to occupant classification sensor front RH	4.5 to 5.1 V

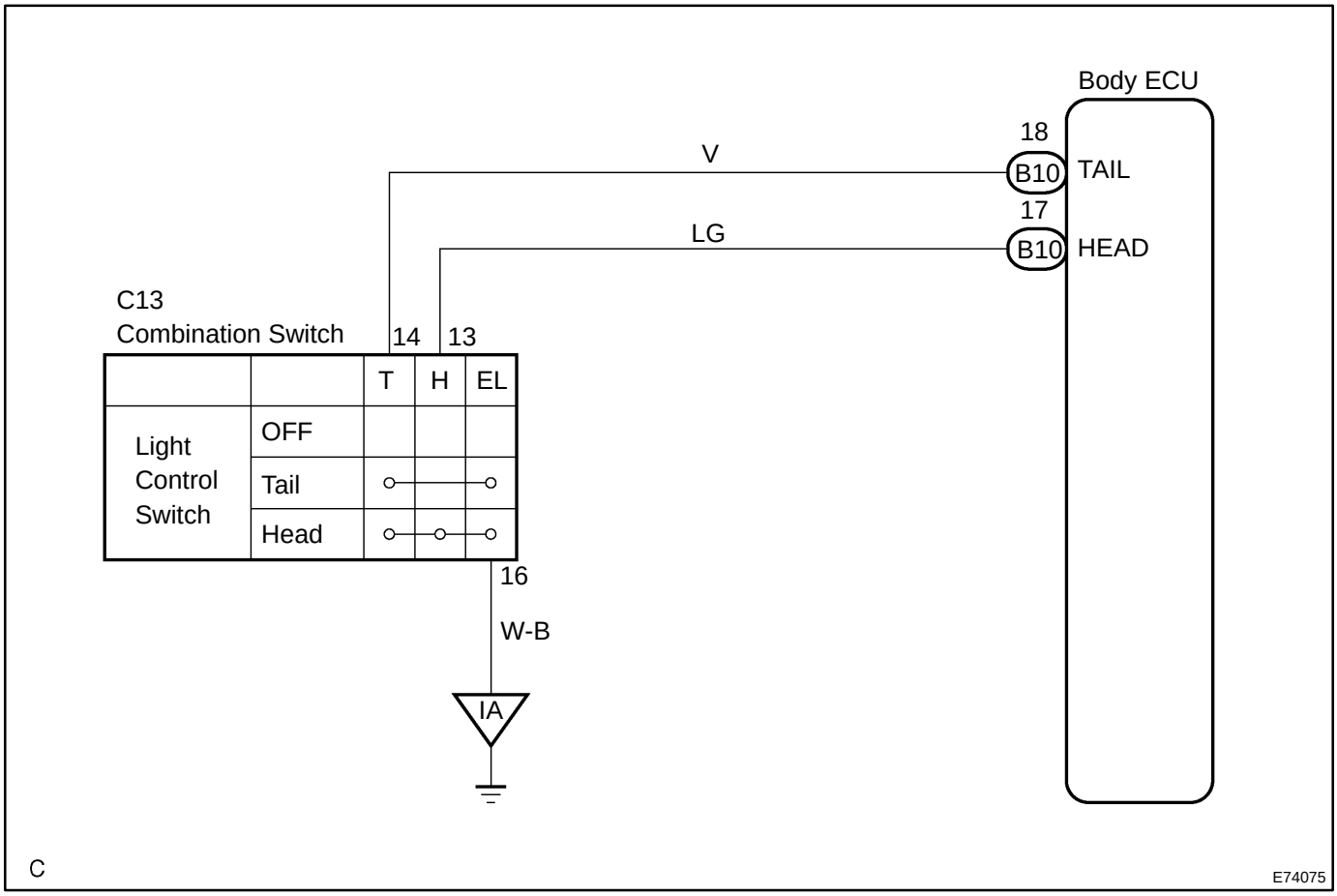
DTC B1241 BODY ECU SWITCH CIRCUIT DIAGNOSIS

CIRCUIT DESCRIPTION

The following explains when this DTC is output:
This DTC is not output when the switches are operated but fail to make contact. It is only output when the switches are stuck or held on. For example, this code is output when checking the DTC while the switches are on:
System is normal:
(a) DTC is output during DTC check with the switches on.
(b) DTC is not output during DTC check with the switches off.
Inspect the switches and replace if necessary. If there is no problem with the switches, inspect the wire harness.

DTC No.	DTC Detecting Condition	Trouble Area
B1241	Switch is stuck	・Headlamp dimmer switch assy ・Wire harness or connector ・Multiplex network body ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1 READ VALUE OF HAND-HELD TESTER

(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch to the ON position and turn the hand-held tester main switch on.
(c) Select the item below in the DATA LIST and read the display on hand-held tester.

BODY NO.1 (MULTIPLEX NETWORK BODY ECU):

Item	Measurement Item/ Display (Range)	Normal Condition	Diagnostic Note
HEAD LIGHT SW	Headlight control SW signal/ ON or OFF	ON: Light control switch is in HEAD position OFF: Light control switch is in except HEAD position	-
TAIL LIGHT SW	Tail light SW signal/ ON or OFF	ON: Light control switch is in TAIL position OFF: Light control switch is in except TAIL position	-

OK: Condition sign can be displayed.

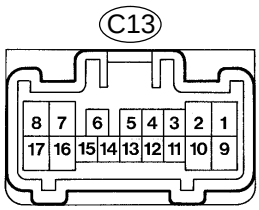
NG → **Go to step 2**

OK

REPLACE MULTIPLEX NETWORK BODY ECU

2 INSPECT HEADLAMP DIMMER SWITCH ASSY

Connector Front View:



E11948

(a) Inspect light control switch.
(1) Measure the resistance according to the value(s) in the table below.

Standard:

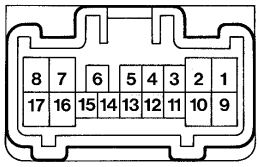
Tester connection	Condition	Specified condition
14 - 16	TAIL	Below 1 Ω
13 - 16 14 - 16	HEAD	Below 1 Ω

NG → **REPLACE HEADLAMP DIMMER SWITCH ASSY (SEE PAGE 65-25)**

OK

3	**CHECK HARNESS AND CONNECTOR(HEADLAMP DIMMER SWITCH ASSY - MULTIPLEX NETWORK BODY ECU)**

Headlamp Dimmer Switch Connector
Front View: C13



E11948

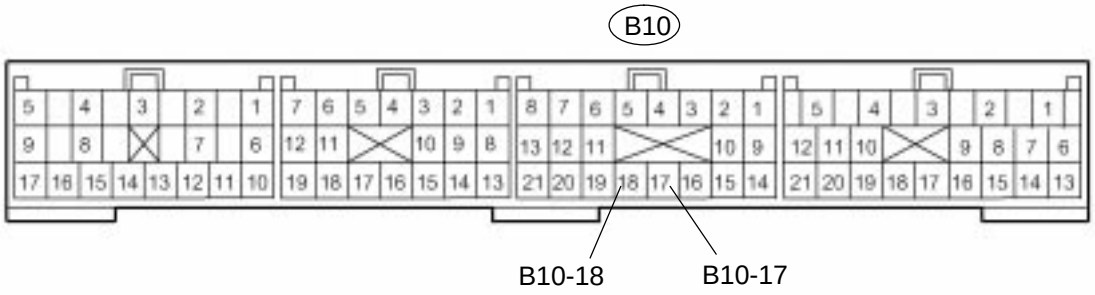
(a) Disconnect the headlamp dimmer switch assy connector and B10 connector from the multiplex network body ECU.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
C13-13 - B10-17	Always	Below 1 Ω
C13-14 - B10-18	Always	Below 1 Ω
B10-17 - Body ground	Always	10 kΩ or higher
B10-18 - Body ground	Always	10 kΩ or higher
C13-16 - Body ground	Always	Below 1 Ω

Multiplex Network Body ECU
Connector Front View:



H

E74263

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE MULTIPLEX NETWORK BODY ECU

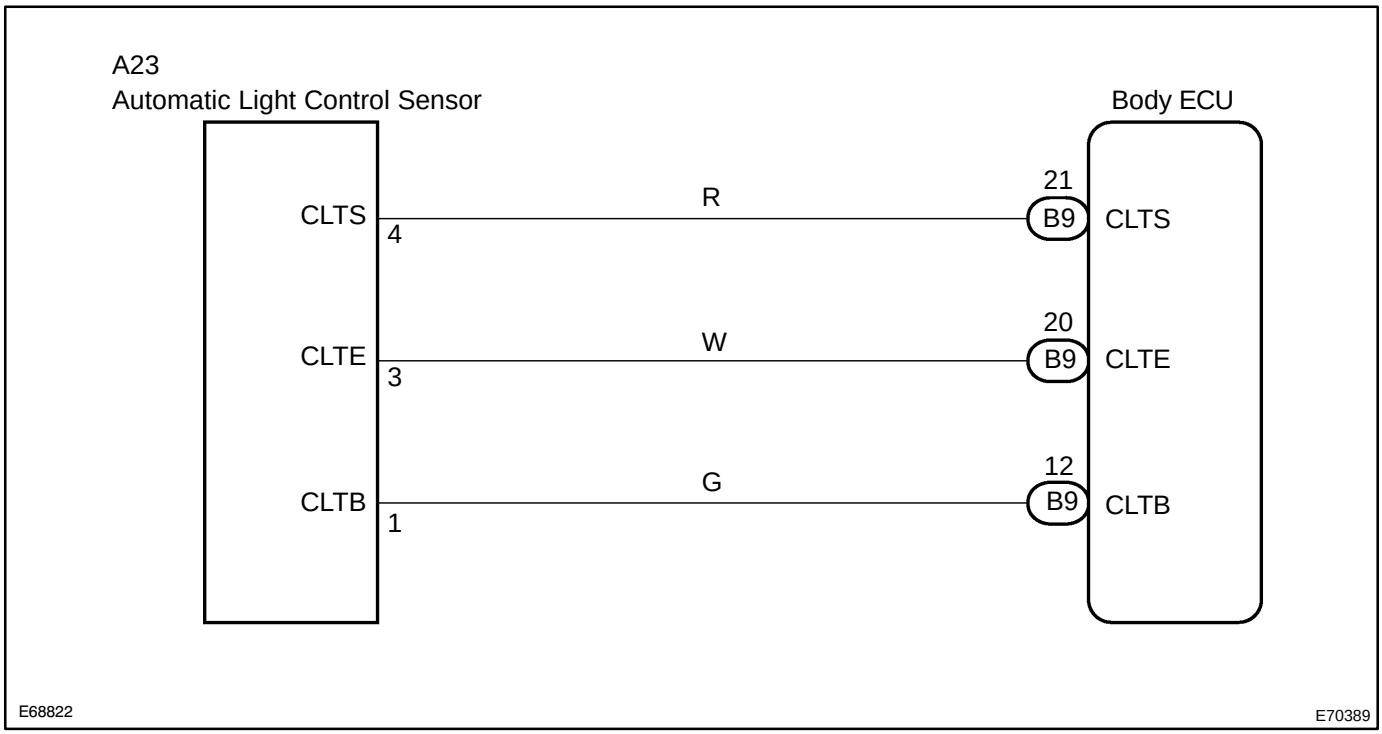
DTC B1244 LIGHT SENSOR CIRCUIT MALFUNCTION

CIRCUIT DESCRIPTION

This DTC is output when a failure in the automatic light control sensor circuit is detected.

DTC No.	DTC Detecting Condition	Trouble Area
B1244	・Malfunction of automatic light control sensor ・Open or short in automatic light control sensor circuit	・Automatic light control sensor ・Wire harness or connector ・Multiplex network body ECU

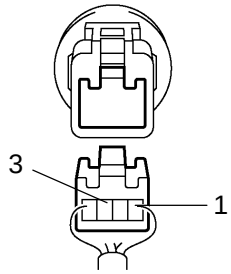
WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR(AUTOMATIC LIGHT CONTROL SENSOR POWER SOURCE CIRCUIT)

Wire Harness View:
A23 Automatic Light Control Sensor



(a) Disconnect the automatic light control sensor connector.
(b) Measure the voltage according to the value(s) in the table below.

Standard:

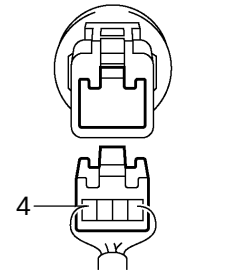
Tester connection	Condition	Specified condition
A23-1 - A23-3	Ignition switch ON	10 to 14 V

NG → **Go to step 4**

OK

2	CHECK HARNESS AND CONNECTOR(MULTIPLEX NETWORK BODY ECU - AUTOMATIC LIGHT CONTROL SENSOR)

Wire Harness View:
A23 Automatic Light Control Sensor

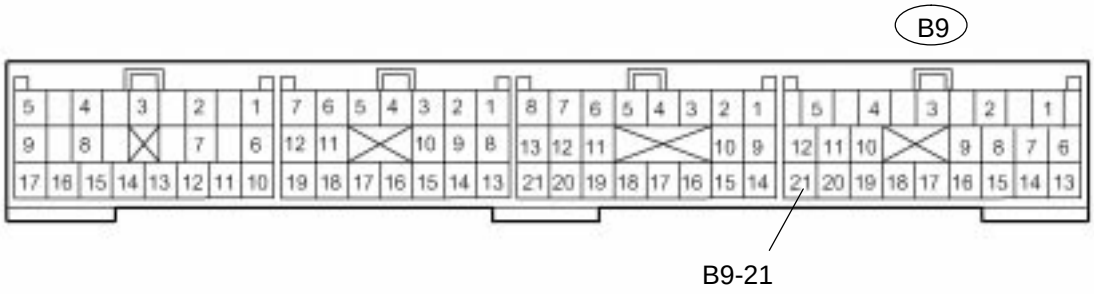


(a) Disconnect the B9 connector from the multiplex network body ECU.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
A23-4 - B9-21	Always	Below 1 Ω

Multiplex Network Body ECU
Connector Front View:



NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3	REPLACE AUTOMATIC LIGHT CONTROL SENSOR

OK: Return to normal condition.

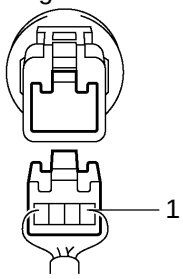
NG → **REPLACE MULTIPLEX NETWORK BODY ECU**

OK

END

4	CHECK HARNESS AND CONNECTOR(MULTIPLEX NETWORK BODY ECU - AUTOMATIC LIGHT CONTROL SENSOR)

Wire Harness View:
A23 Automatic Light Control Sensor



(a) Measure the voltage according to the value(s) in the table below.

Standard:

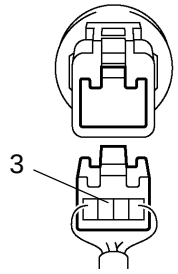
Tester connection	Condition	Specified condition
A23-1 - Body ground	Ignition switch ON	10 to 14 V

NG → **Go to step 6**

OK

5	CHECK HARNESS AND CONNECTOR(MULTIPLEX NETWORK BODY ECU - AUTOMATIC LIGHT CONTROL SENSOR)

Wire Harness View:
A23 Automatic Light Control Sensor

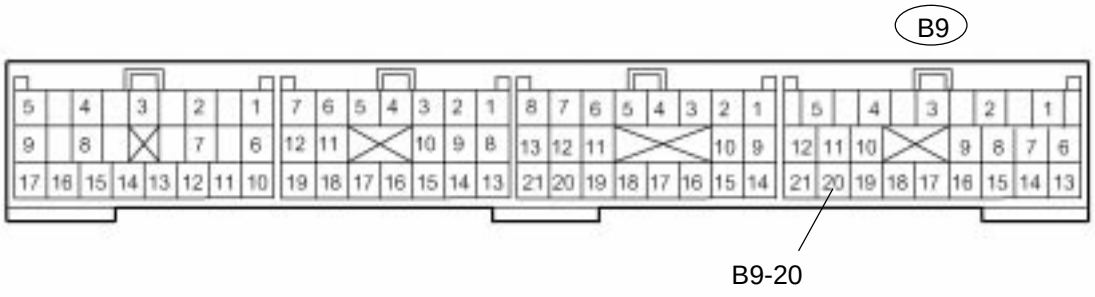


(a) Disconnect the B9 connector from the multiplex network body ECU.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
A23-3 - B9-20	Always	Below 1 Ω

Multiplex Network Body ECU
Connector Front View:



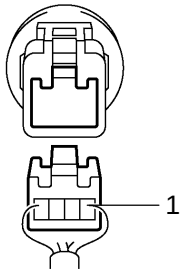
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK →

REPLACE MULTIPLEX NETWORK BODY ECU

6	**CHECK HARNESS AND CONNECTOR(MULTIPLEX NETWORK BODY ECU - AUTOMATIC LIGHT CONTROL SENSOR)**

Wire Harness View:
A23 Automatic Light Control Sensor

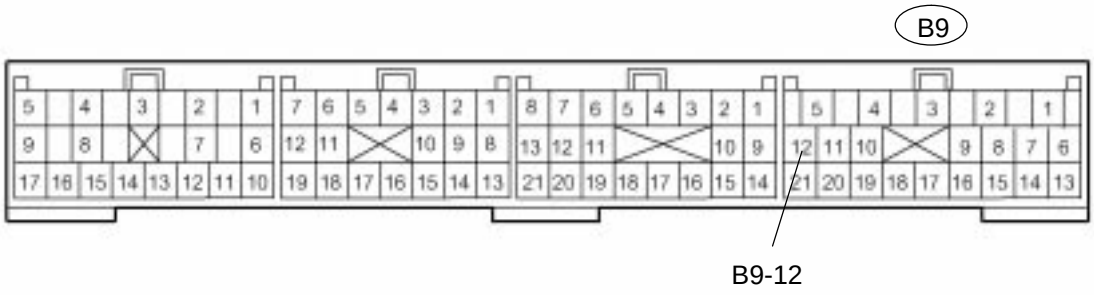


(a) Disconnect the B9 connector from the multiplex network body ECU.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
A23-1 - B9-12	Always	Below 1 Ω

Multiplex Network Body ECU
Connector Front View:



NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

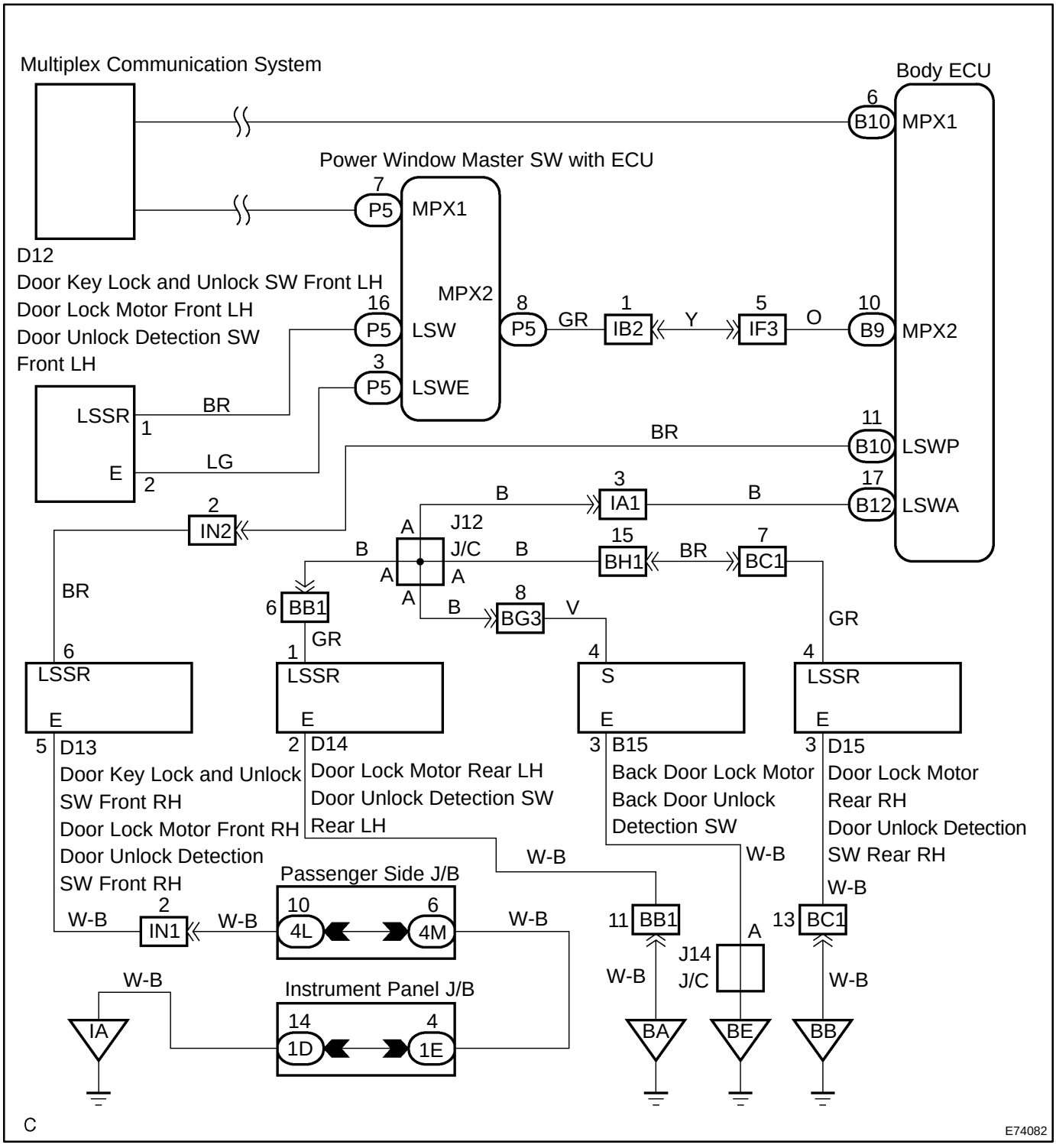
REPLACE MULTIPLEX NETWORK BODY ECU

DOOR LOCK POSITION CIRCUIT

CIRCUIT DESCRIPTION

This circuit detects the state of the door lock detection sensor and sends it to the multiplex network body ECU.

WIRING DIAGRAM



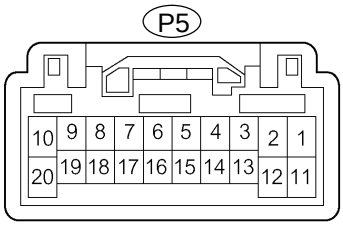
INSPECTION PROCEDURE

HINT:

Inspect if the door lock system is normal before performing this procedure.

1	CHECK HARNESS AND CONNECTOR(FRONT DOOR LOCK POSITION CIRCUIT)

Power Window Master SW with ECU Connector Front View:



(a) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
P5-3 - P5-16	Driver side door is locked.	10 to 14 V
P5-3 - P5-16	Driver side door is unlocked.	Below 1 V

NG → **GO TO POWER DOOR LOCK CONTROL SYSTEM (SEE PAGE 05-1935)**

OK

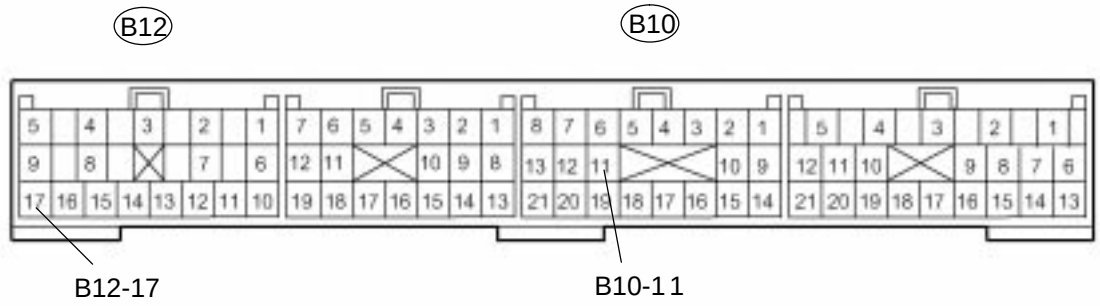
2	CHECK HARNESS AND CONNECTOR(PASSENGER AND REAR DOOR LOCK POSITION CIRCUIT)

(a) Measure the voltage according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
B10-11 - Body ground	Passenger side door is locked. Passenger side door is unlocked.	10 to 14 V Below 1 V
B12-17 - Body ground	Rear doors and back door are locked. One of the rear doors or back door is unlocked.	10 to 14 V Below 1 V

Multiplex Network Body ECU Connector Front View:



NG → **GO TO POWER DOOR LOCK CONTROL SYSTEM (SEE PAGE 05-1935)**

OK

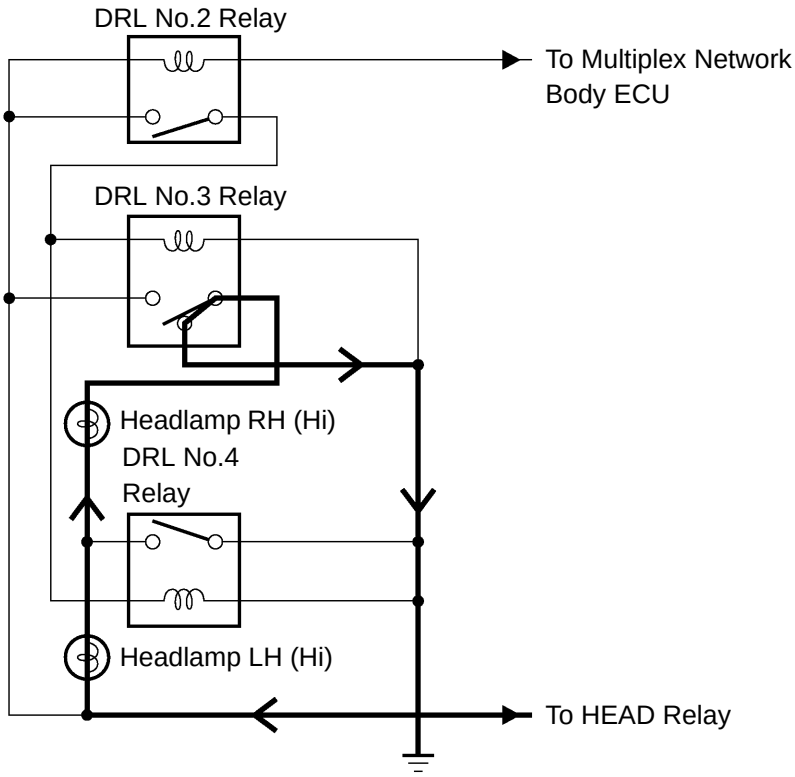
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-1538)

DRL RELAY CIRCUIT

CIRCUIT DESCRIPTION

The multiplex network body ECU controls DRL No.2, No.3 and No.4 relays.
The headlamp (High) is connected in serial when the daytime running light system operates.

When Daytime Running Light System is Operated:

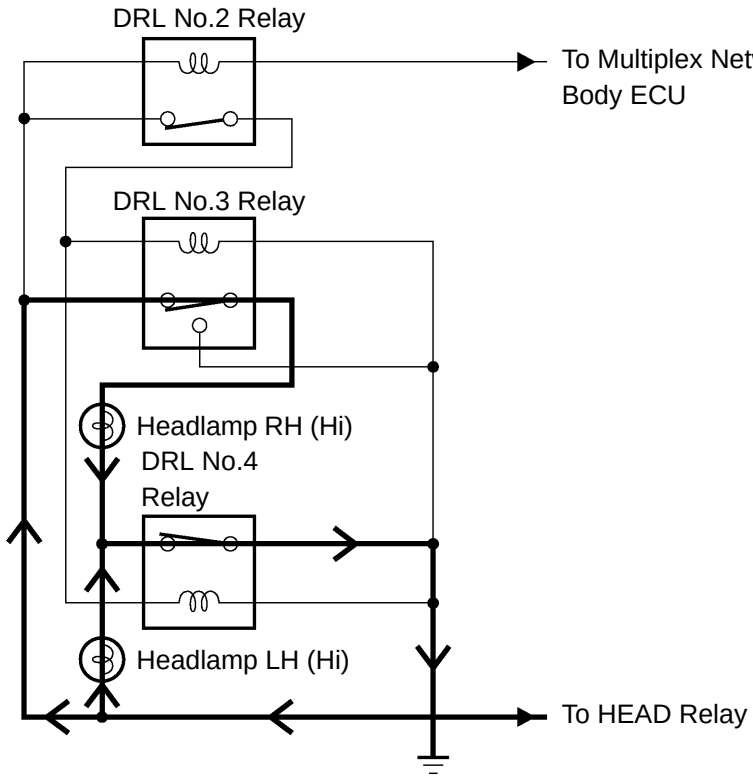


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I40822

The headlamp (High) is connected in parallel when the HI BEAM or FLASH operates.

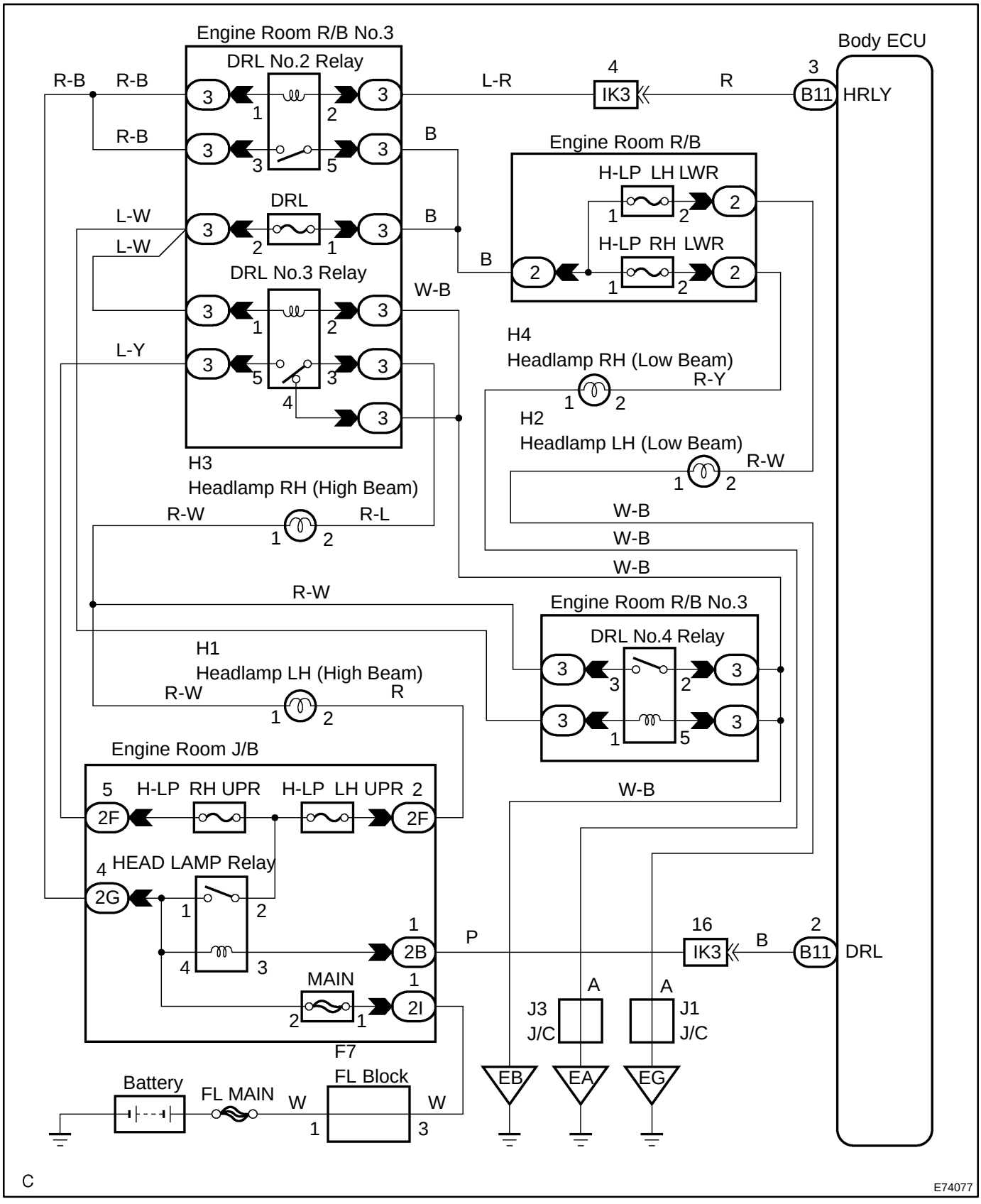
When HI Beam or Flash is Operated:



C

I40823

WIRING DIAGRAM



INSPECTION PROCEDURE

1	PERFORM ACTIVE TEST USING HAND-HELD TESTER

(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch to the ON position and turn the hand-held tester main switch on.
(c) Select the item below in the ACTIVE TEST and then check the relay operation.

BODY NO.1 (MULTIPLEX NETWORK BODY ECU):

Item	Test Details	Diagnostic Note
HEAD LIGHT	Headlamp relay ON/OFF	-

OK: Headlamp (low) comes on.

BODY NO.1 (MULTIPLEX NETWORK BODY ECU):

Item	Test Details	Diagnostic Note
DIMMER SIG	DRL No.2 relay ON/OFF	-

OK: Headlamp (high) comes on.

NG → **Go to step 2**

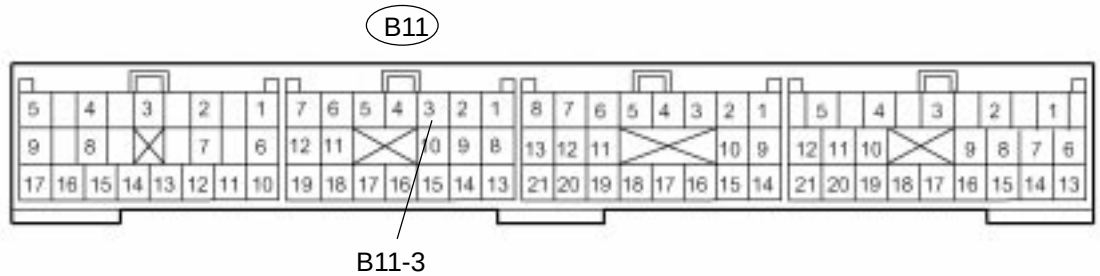
OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-1538)

2	INSPECT MULTIPLEX NETWORK BODY ECU

(a) Disconnect the B11 connector from the multiplex network body ECU.
(b) Using a service wire, connect B11-3 of the wire harness side and body ground.
OK: Headlamp (low) comes on.

Multiplex Network Body ECU
Connector Front View:



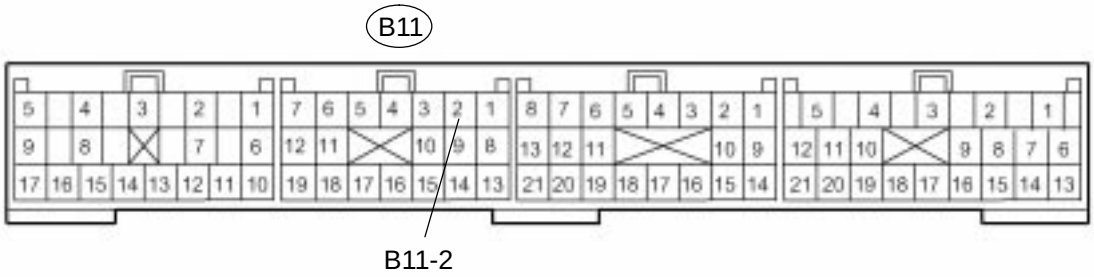
NG → **Go to step 5**

OK

3	INSPECT MULTIPLEX NETWORK BODY ECU

(a) Using a service wire, connect B11-2 of the wire harness side and body ground.
OK: Headlamp (high) comes on (decrease mode).

Multiplex Network Body ECU
Connector Front View:



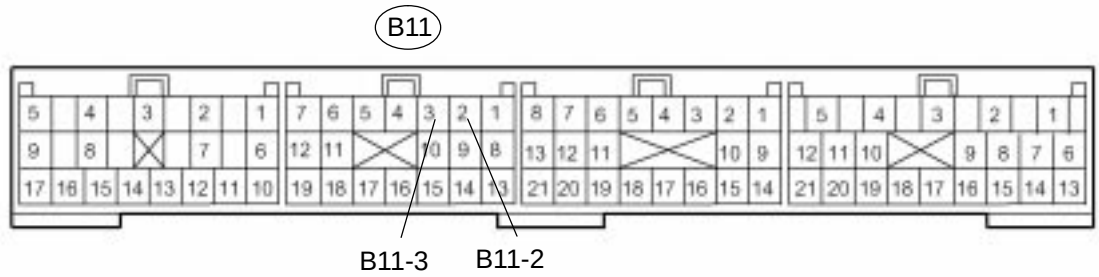
NG → **Go to step 7**

OK

4	INSPECT MULTIPLEX NETWORK BODY ECU

(a) Using a service wire, connect B11-3 of the wire harness side and body ground.
(b) Using a service wire, connect B11-2 of the wire harness side and body ground.
OK: Headlamp (high) comes on.

Multiplex Network Body ECU
Connector Front View:



NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

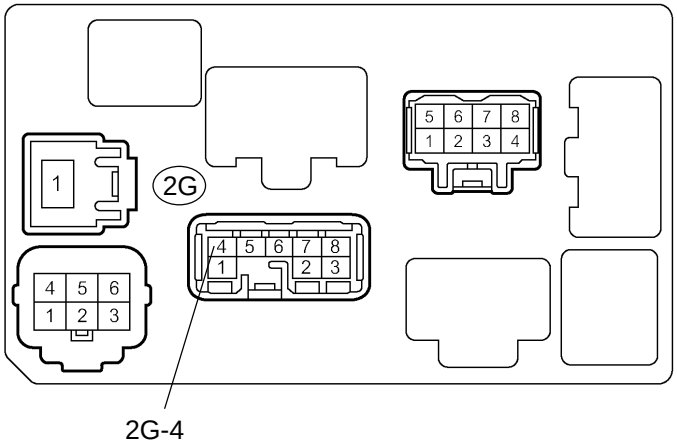
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-1538)

5	INSPECT ENGINE ROOM J/B

(a) Measure the voltage according to the value(s) in the table below.
Standard:

Tester connection	Condition	Specified condition
2G-4 - Body ground	Always	10 to 14 V

Engine Room J/B
Connector Front View:



H

E72985

NG → **Go to step 6**

OK

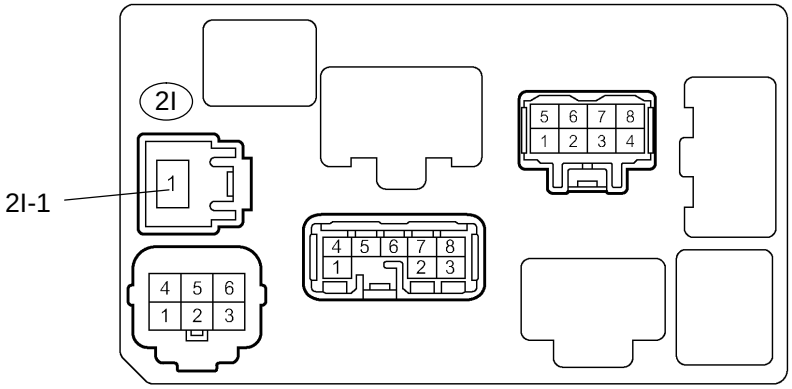
REPAIR OR REPLACE HARNESS OR CONNECTOR (ENGINE ROOM J/B - MULTIPLEX NETWORK BODY ECU)

6	CHECK HARNESS AND CONNECTOR(POWER SOURCE CIRCUIT)

(a) Disconnect the 2I connector from the engine room J/B.
(b) Measure the voltage according to the value(s) in the table below.
Standard:

Tester connection	Condition	Specified condition
2I-1 - Body ground	Always	10 to 14 V

Engine Room J/B
Connector Front View:



H

E72985

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

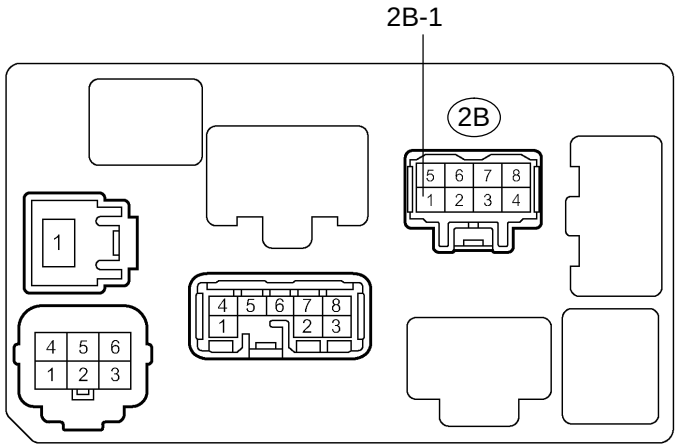
OK →

REPLACE ENGINE ROOM J/B

7	INSPECT ENGINE ROOM J/B

(a) Disconnect the 2B connector from the engine room J/B.
(b) Using a service wire, connect 2B-1 of the engine room J/B side and body ground.
OK: Headlamp (high) comes on (decrease mode).

Engine Room J/B
Connector Front View:



H

E72985

NG → **Go to step 8**

OK →

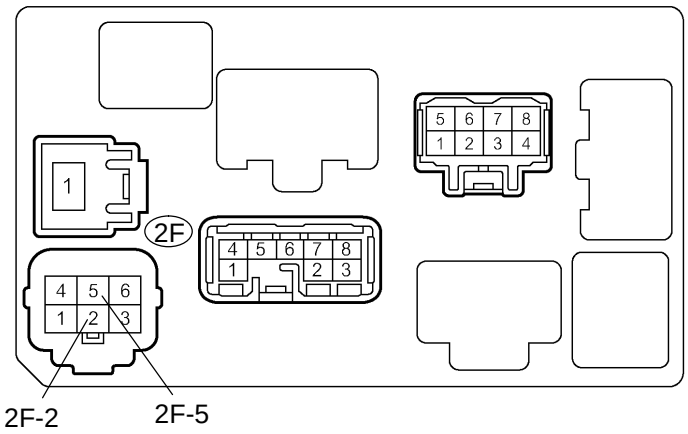
REPAIR OR REPLACE HARNESS OR CONNECTOR (ENGINE ROOM J/B - MULTIPLEX NETWORK BODY ECU)

8	**INSPECT ENGINE ROOM J/B**

(a) Measure the voltage according to the value(s) in the table below.
Standard:

Tester connection	Condition	Specified condition
2F-2 - Body ground	Connect 2B-1 and body ground	10 to 14 V
2F-5 - Body ground	Connect 2B-1 and body ground	10 to 14 V

Engine Room J/B
Connector Front View:



H

E72985

NG → **Go to step 9**

OK

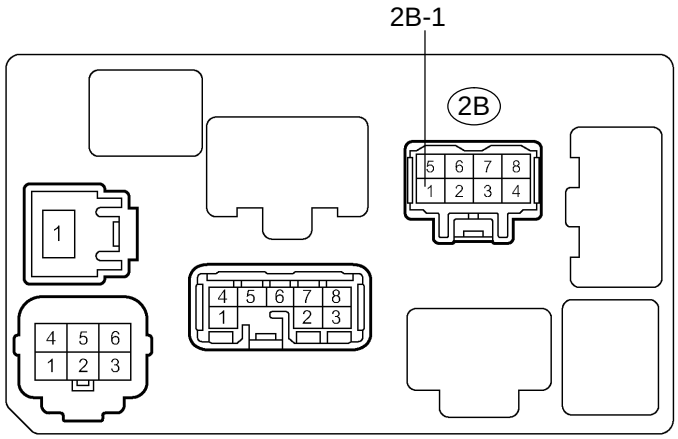
REPAIR OR REPLACE HARNESS OR CONNECTOR (EACH OF HEADLAMP CIRCUIT)

9	INSPECT ENGINE ROOM J/B

(a) Measure the voltage according to the value(s) in the table below.
Standard:

Tester connection	Condition	Specified condition
2B-1 - Body ground	Always	10 to 14 V

Engine Room J/B
Connector Front View:



H

E72985

NG → **Go to step 10**

OK

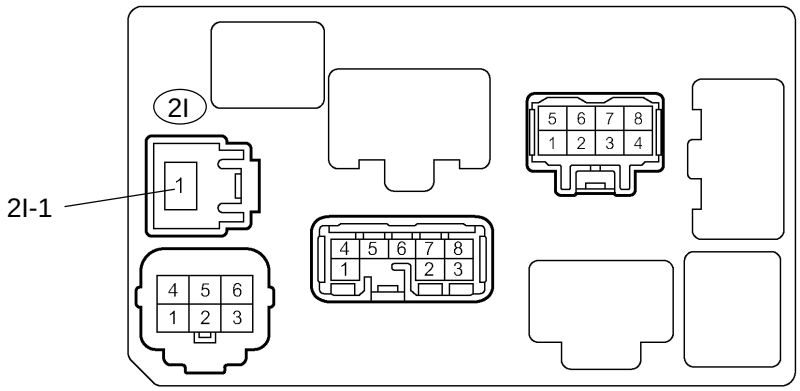
REPLACE ENGINE ROOM J/B

10	CHECK HARNESS AND CONNECTOR(POWER SOURCE CIRCUIT)

(a) Disconnect the 2I connector from the engine room J/B.
(b) Measure the voltage according to the value(s) in the table below.
Standard:

Tester connection	Condition	Specified condition
2I-1 - Body ground	Always	10 to 14 V

Engine Room J/B
Connector Front View:



H

E72985

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK →

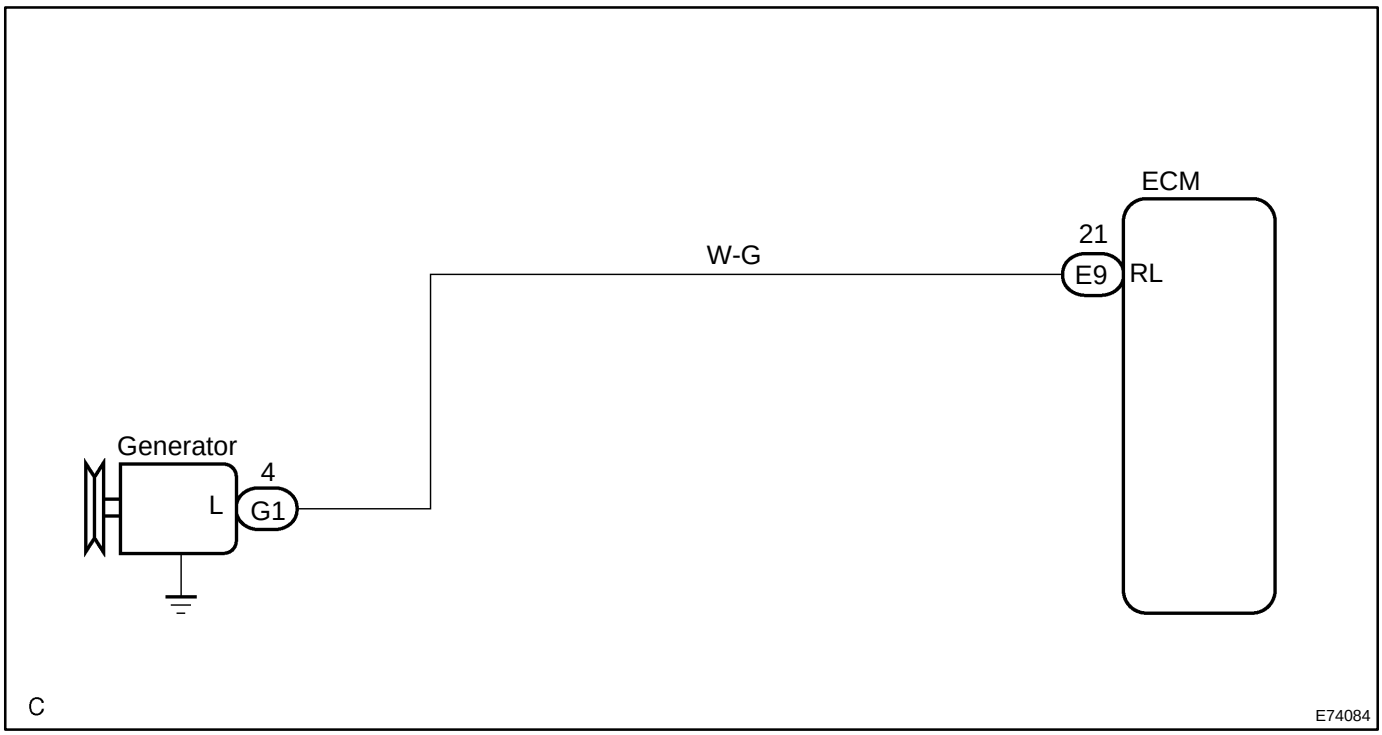
REPLACE ENGINE ROOM J/B

GENERATOR SIGNAL CIRCUIT

CIRCUIT DESCRIPTION

The multiplex network body ECU receives an engine condition signal via a generator.

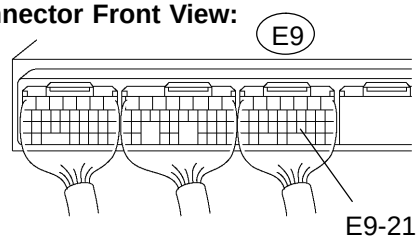
WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK ECM

ECM
Connector Front View:



E74382

(a) Measure the voltage according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
E9-21 - Body ground	Engine running	10 to 14 V

NG → **Go to step 2**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-1538)

2	INSPECT GENERATOR ASSY

(a) Inspect generator assy (see page 19-17 or 19-42).

NG → **CHECK AND REPLACE GENERATOR ASSY**

OK

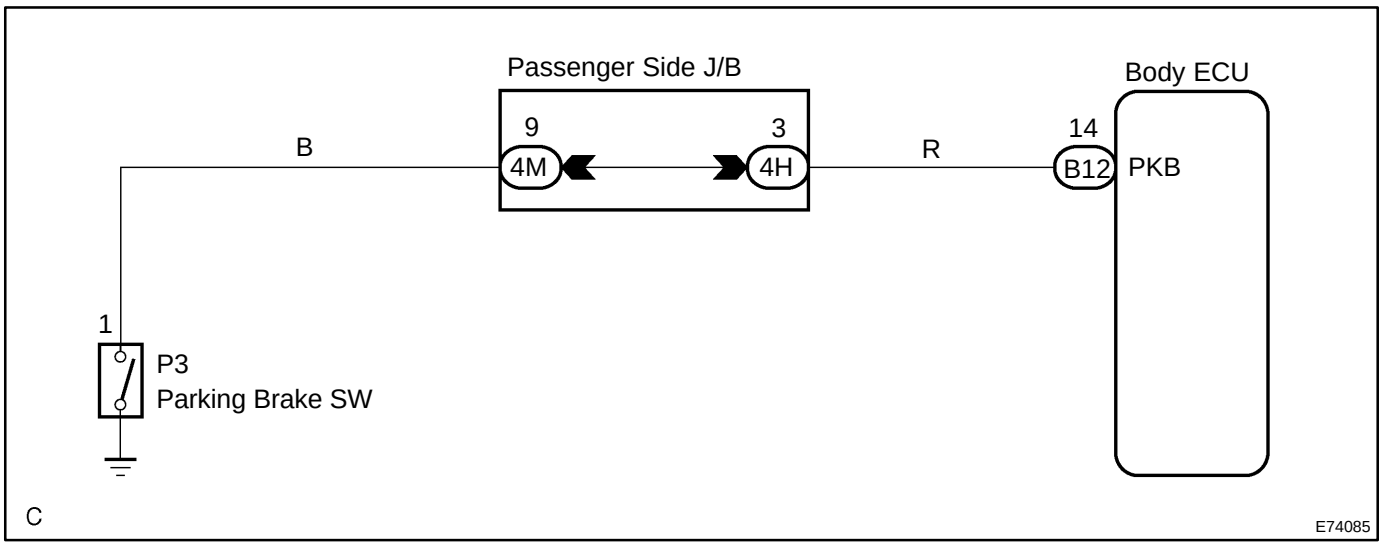
REPAIR OR REPLACE HARNESS OR CONNECTOR (GENERATOR ASSY - ECM)

PARKING BRAKE SWITCH CIRCUIT

CIRCUIT DESCRIPTION

The multiplex network body ECU receives the parking brake switch signal.

WIRING DIAGRAM



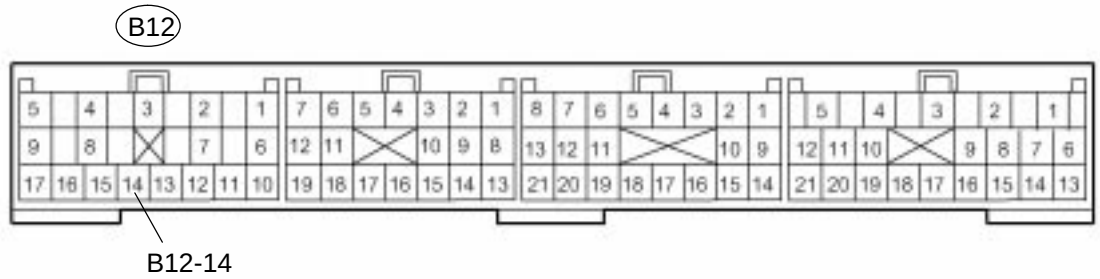
INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR(PARKING BRAKE SWITCH CIRCUIT)

(a) Disconnect the B12 connector from the multiplex network body ECU.
(b) Measure the resistance according to the value(s) in the table below.
Standard:

Tester connection	Condition	Specified condition
B12-14 - Body ground	Shaft of parking brake switch is pressed	10 kΩ or higher
B12-14 - Body ground	Shaft of parking brake switch is not pressed	Below 1 Ω

Multiplex Network Body ECU
Connector Front View:

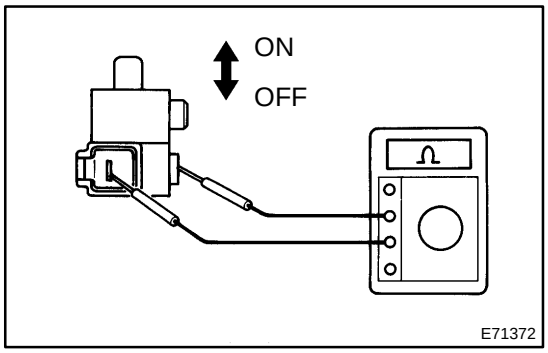


NG → **Go to step 2**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-1538)

2	INSPECT PARKING BRAKE SWITCH ASSY



(a) Remove the parking brake switch.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
1 - Switch body	OFF (When shaft is pressed)	10 kΩ or higher
1 - Switch body	ON (When shaft is not pressed)	Below 1 Ω

NG → **REPLACE PARKING BRAKE SWITCH ASSY**

OK

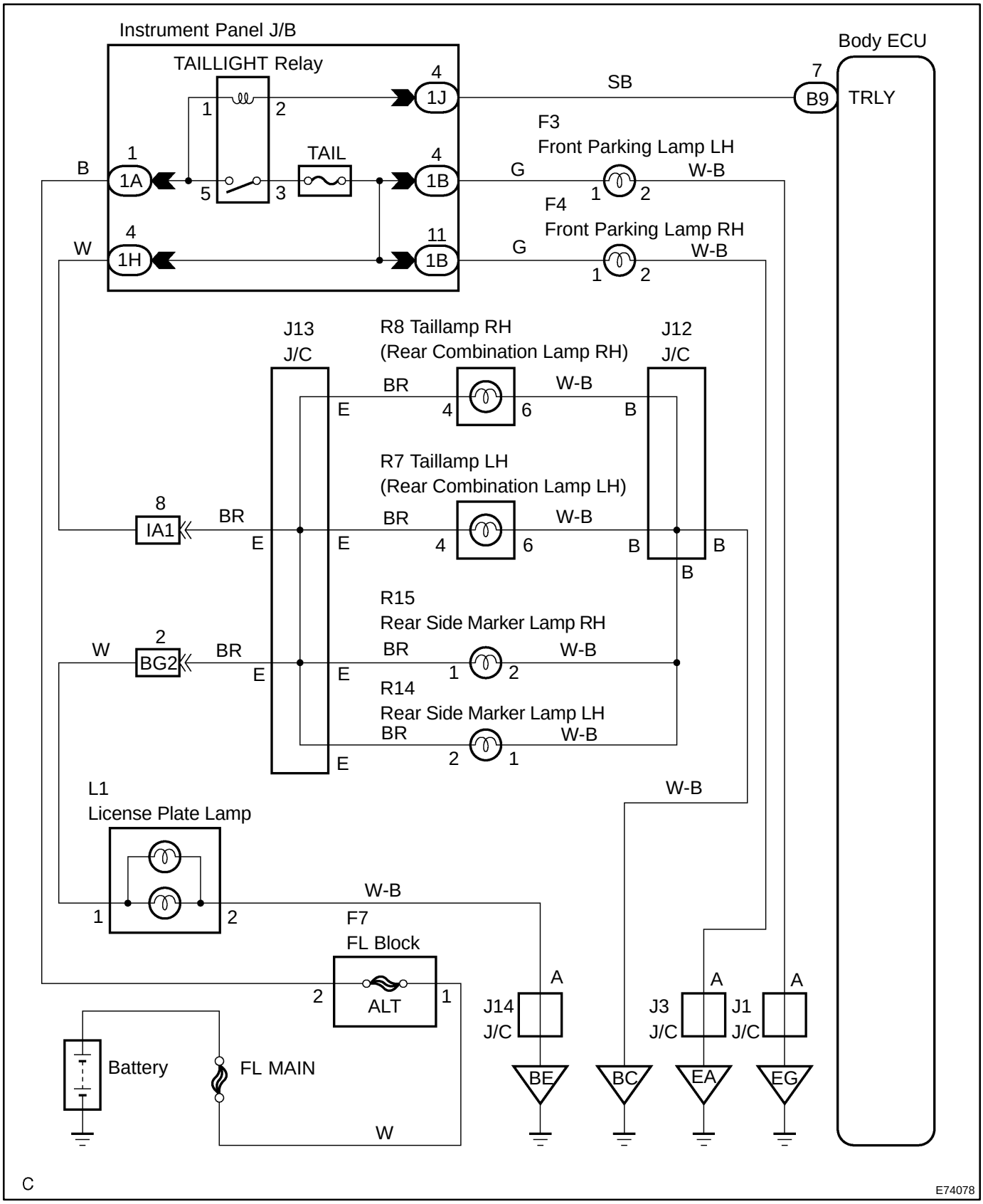
REPAIR OR REPLACE HARNESS OR CONNECTOR (PARKING BRAKE SWITCH CIRCUIT)

TAIL RELAY CIRCUIT

CIRCUIT DESCRIPTION

The multiplex network body ECU controls the TAIL relay when a signal is received from the headlamp dimmer switch assy.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	PERFORM ACTIVE TEST USING HAND-HELD TESTER

(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch to the ON position and turn the hand-held tester main switch on.
(c) Select the item below in the ACTIVE TEST and then check the relay operation.

BODY NO.1 (MULTIPLEX NETWORK BODY ECU):

Item	Test Details	Diagnostic Note
TAIL LIGHT	Taillamp relay ON/OFF	-

OK: Taillamp comes on.

NG → **Go to step 2**

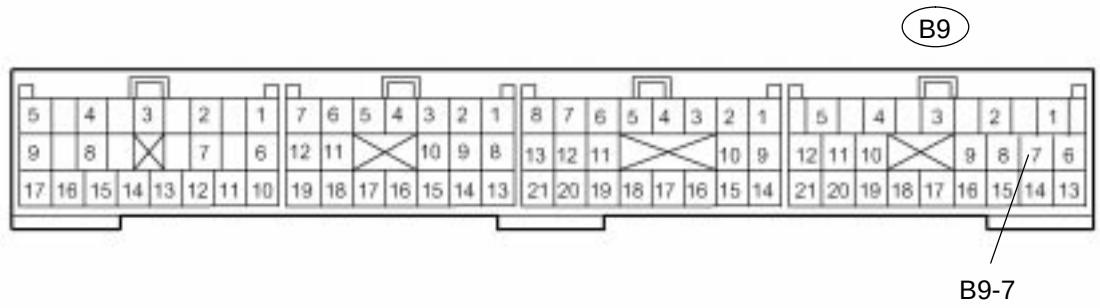
OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE
(SEE PAGE 05-1538)

2	INSPECT MULTIPLEX NETWORK BODY ECU

(a) Disconnect the B9 connector from the multiplex network body ECU.
(b) Using a service wire, connect B9-7 of the wire harness side and body ground.
OK: Taillamp comes on.

Multiplex Network Body ECU
Connector Front View:



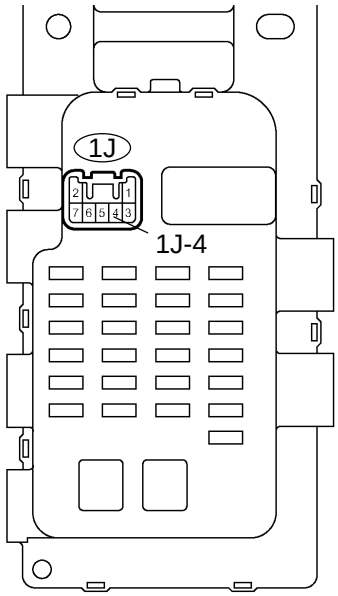
NG → **Go to step 3**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-1538)

3	INSPECT INSTRUMENT PANEL JUNCTION BLOCK ASSY

Instrument Panel Junction Block Front Side View:



(a) Disconnect the 1J connector from the instrument panel junction block assy.

(b) Using a service wire, connect 1J-4 of the instrument panel junction block side and body ground.
OK: Taillamp comes on.

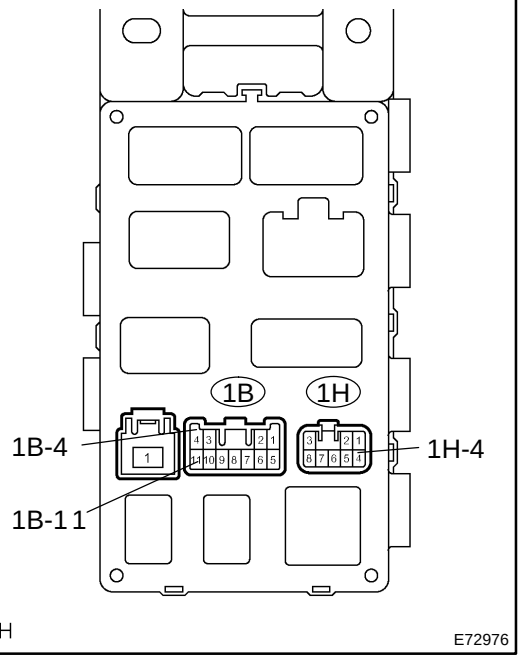
NG → **Go to step 4**

OK

REPAIR OR REPLACE HARNESS OR CONNECTOR (INSTRUMENT PANEL JUNCTION BLOCK ASSY - MULTIPLEX NETWORK BODY ECU)

4	INSPECT INSTRUMENT PANEL JUNCTION BLOCK ASSY

Instrument Panel Junction Block Back Side View:



(a) Measure the voltage according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
1B-4 - Body ground	Connect 1J-4 and body ground	10 to 14 V
1B-11 - Body ground	Connect 1J-4 and body ground	10 to 14 V
1H-4 - Body ground	Connect 1J-4 and body ground	10 to 14 V

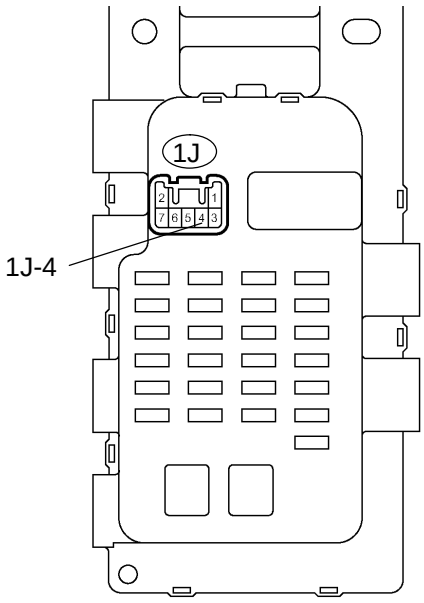
NG → **Go to step 5**

OK

REPAIR OR REPLACE HARNESS OR CONNECTOR (EACH OF TAILLAMP CIRCUIT)

5	INSPECT INSTRUMENT PANEL JUNCTION BLOCK ASSY

Instrument panel Junction Block
Front Side View:



(a) Measure the voltage according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
1J-4 - Body ground	Always	10 to 14 V

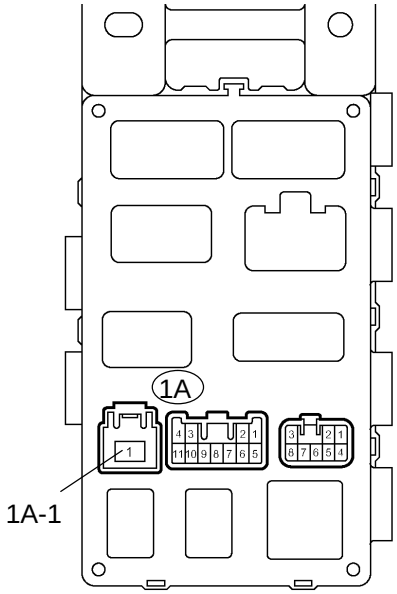
NG → **Go to step 6**

OK

REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSY

6	CHECK HARNESS AND CONNECTOR(POWER SOURCE CIRCUIT)

Instrument Panel Junction Block
Back Side View:



(a) Disconnect the 1A connector from the instrument panel junction block assy.

(b) Measure the voltage according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
1A-1 - Body ground	Always	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSY

05IQ2-01

CUSTOMIZE PARAMETERS

HINT:

The followings are the possible items to be customized.

NOTICE:

- **After confirming whether the items of the customer's request are applicable or not for the customized items, perform the customize operation.**
- **Be sure to record the current value before customizing.**
- **In case of performing the troubleshooting, pay attention as there is a possibility that the function is OFF by customizing. (Example: In case of the symptom in which "The wireless operation does not function", check that the wireless operation is not OFF by customizing, then perform the troubleshooting.)**

ILLUMINATED ENTRY

DISPLAY(ITEM)	DEFAULT	CONTENTS	SETTING
I/L ON / UNLOCK (Interior lamp ON w/ door key unlock)	ON	Function to light up the interior lamp*, ignition lamp and step lamp when unlocking with the door key cylinder. *: Interior lamp comes on when the interior lamp switch is at the DOOR position.	ON / OFF
LIGHTING TIME (Lighting Time)	15 s	To change the lighting time after closing the door. (It will quickly fade out in case of turning the ignition ON.)	7.5 s / 15 s / 30 s

LIGHT CONTROL

HINT:

Sensitivity adjustment can hardly be confirmed. Please check by customer's actual driving.

DISPLAY(ITEM)	DEFAULT	CONTENTS	SETTING
SENSITIVITY (Turn ON luminous intensity)	NORMAL	To adjust the sensitivity of the lighting illumination. Refer to the *1 illustration.	DARK2 / DARK1 / NORMAL / LIGHT1 / LIGHT2
LIGHT CTRL TYPE (Control Type)	CURRENT	To change the control logic when the light control switch is in the AUTO position. Refer to the *2 illustration.	CURRENT / OLD

Illustration of *1

Lighting brightness	**Dark** ◀				▶ **Bright**
Setting	DARK2	DARK1	NORMAL	LIGHT1	LIGHT2

Illustration of *2

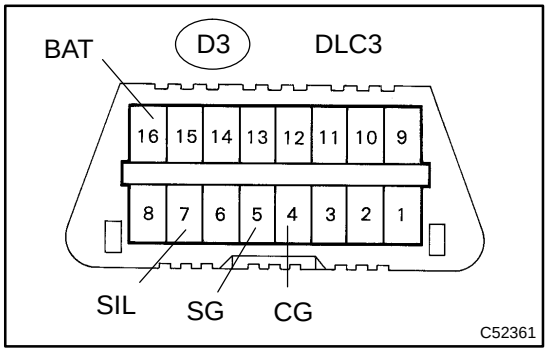
	Brightness of the surrounding when lighting	Lighting delay	Delay of turning light off	**2
OLD	Old logic	6 sec.	6 sec.	3 sec.
CURRENT	New logic **1 ('97/8-)	15 sec.	15 sec.	15 sec.

**1: The new one has the logic to light up two times brighter than the old logic.

**2: Delay time until the headlamp is turned on when it suddenly gets dark.

05IQ4-01

DIAGNOSIS SYSTEM



1. CHECK DLC3

(a) The vehicle's ECU uses BEAN conforming to ISO 9141-2 for communication.
The terminal arrangement of DLC3 complies with SAE J1962 and matches the ISO 9141-2 format.

Standard:

Symbols (Terminals No.)	Terminal Description	Condition	Specified condition
SIL (7) - SG (5)	Bus "+" line	During transmission	Pulse generation
CG (4) - Body ground	Chassis ground	Always	Below 1 Ω
SG (5) - Body ground	Signal ground	Always	Below 1 Ω
BAT (16) - Body ground	Battery positive	Always	11 to 14 V

HINT:

If the screen displays UNABLE TO CONNECT TO VEHICLE after you have connected the cable of the hand-held tester to the DLC3, turned the ignition switch ON and used the hand-held tester, there is a problem on the vehicle side or tester side.

- If communication is normal when the tester is connected to another vehicle, inspect the DLC3 of the original vehicle.
- If communication is still impossible when the tester is connected to another vehicle, the problem is probably in the tester itself, so consult the Service Department listed in the tester's manual.

05IQ6-01

DATA LIST/ACTIVE TEST

1. DATA LIST

HINT:

Using the DATA LIST displayed on the hand-held tester, you can read the value of the switch, sensor, actuator, etc. without removing any parts. Reading the DATA LIST as the first step of troubleshooting is one of the methods to shorten labor time.

(a) Connect the hand-held tester to the DLC3.

(b) Turn the ignition switch to the ON position.

(c) According to the display on the tester, read the ”DATA LIST”.

BODY NO.1 (MULTIPLEX NETWORK BODY ECU):

Item	Measurement Item/ Display (Range)	Normal Condition	Diagnostic Note
I/L ON/UNLOCK	Interior light ON w/unlock/ON or OFF	Customized value will be displayed	-
LIGHTING TIME	Lighting time/ 7.5s or 15s or 30s	Customized value will be displayed	-
SENSITIVITY	Turn on luminous intensity/ DARK2 or DARK1 or NO	Customized value will be displayed	-
LIGHT CTRL TYPE	Light control system/ CURRENT or OLD	Customized value will be displayed	-
PARKING BRAKE SW	Parking brake SW signal/ON or OFF	ON: Parking brake switch is ON OFF: Parking brake switch is released	-
LUGG COURTSY SW	Luggage door courtesy switch/ ON or OFF	ON: Luggage door is open OFF: Luggage door is closed	-
F FOG LIGHT SW	Front fog light SW signal/ON or OFF	ON: Front fog light switch is in ON position OFF: Front fog light switch is in OFF position	-
AUTO LIGHT SW	Auto light SW signal/ ON or OFF	ON: Light control switch is in AUTO position OFF: Light control switch is in except AUTO position	-
HEAD LIGHT SW	Headlight control SW signal/ON or OFF	ON: Light control switch is in HEAD position OFF: Light control switch is in except HEAD position	-
TAIL LIGHT SW	Tail light SW signal/ ON or OFF	ON: Light control switch is in TAIL or HEAD position OFF: Light control switch is in OFF position	-
ILLUMINATE RATE	Illumination rate information	Condition value will be displayed	-

2. ACTIVE TEST

HINT:

Performing the ACTIVE TEST using the hand-held tester allows the relay, VSV, actuator, etc. to operate without removing any parts. Performing the ACTIVE TEST as the first step of troubleshooting is one of the methods to shorten labor time. The DATA LIST can be displayed during the ACTIVE TEST.

(a) Connect the hand-held tester to the DLC3.

(b) Turn the ignition switch to the ON position.

(c) According to the display on the tester, perform the ”ACTIVE TEST”.

BODY NO.1 (MULTIPLEX NETWORK BODY ECU):

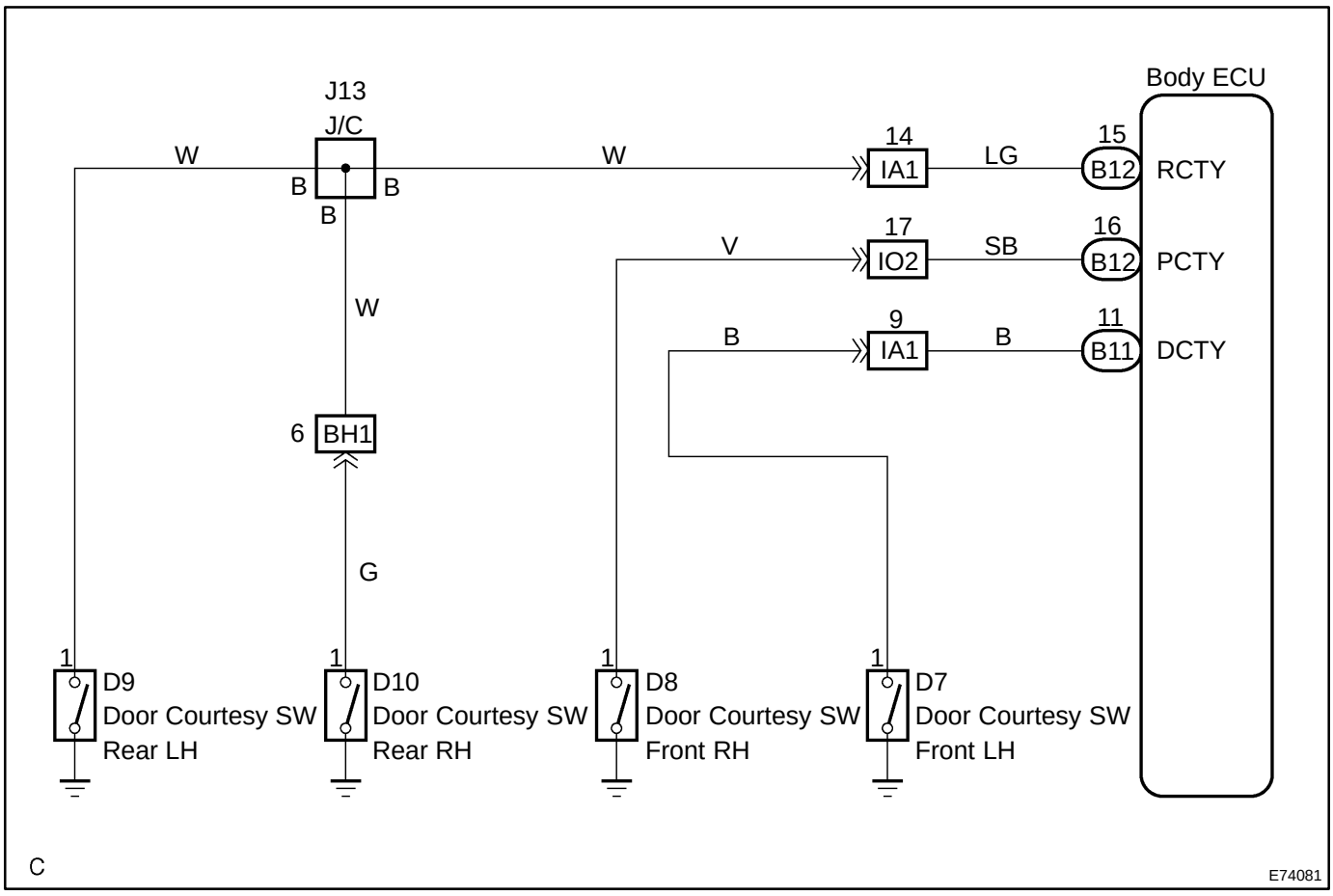
Item	Test Details	Diagnostic Note
HEAD LIGHT	Turn Headlight relay ON/OFF	-
TAIL LIGHT	Turn Tail light relay ON/OFF	-
DIMMER SIG	Turn Dimmer relay ON/OFF	-
ILLUMI OUTPUT	(Test Details) Turn Interior light and Key illumination ON/OFF (Vehicle Condition) Interior light SW is in DOOR position and all doors are closed	-

DOOR COURTESY SWITCH CIRCUIT

CIRCUIT DESCRIPTION

The multiplex network body ECU detects the condition of the door courtesy switch assy.

WIRING DIAGRAM



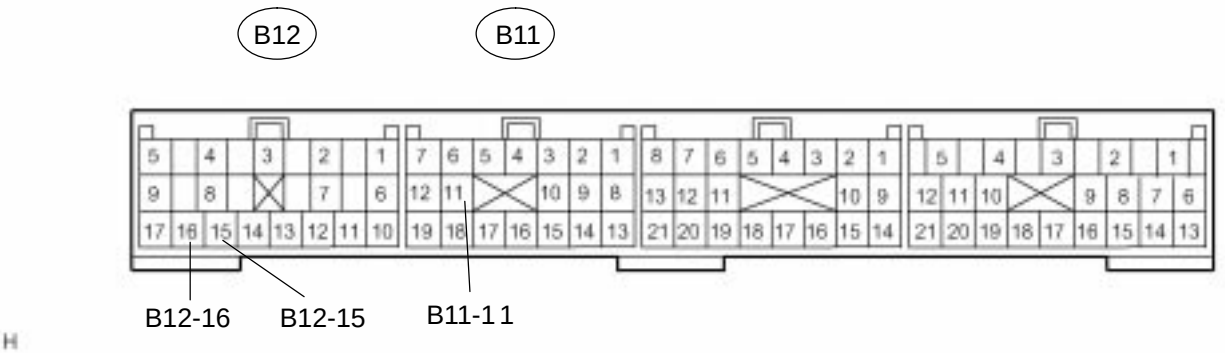
INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR(COURTESY LAMP SWITCH - MULTIPLEX NETWORK BODY ECU)

(a) Disconnect the B11 and B12 connectors from the multiplex network body ECU.
(b) Measure the resistance according to the value(s) in the table below.
Standard:

Tester connection	Condition	Specified condition
B11-11 - Body ground	Driver side door is open. Driver side door is closed.	Below 1 Ω 10 kΩ or higher
B12-16 - Body ground	Front passenger side door is open. Front passenger side door is closed.	Below 1 Ω 10 kΩ or higher
B12-15 - Body ground	One of the rear side doors is open. Both rear side doors are closed.	Below 1 Ω 10 kΩ or higher

Multiplex Network Body ECU
Connector Front View:

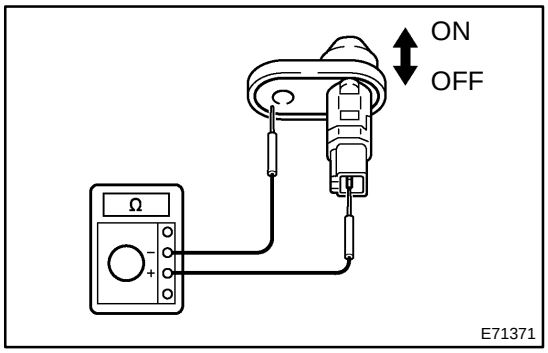


NG → **Go to step 2**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-1538)

2 INSPECT COURTESY LAMP SWITCH



(a) Remove the courtesy lamp switch.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
1 - Body ground	OFF (When shaft is pressed)	10 kΩ or higher
1 - Body ground	ON (When shaft is not pressed)	Below 1 Ω

NG → **REPLACE COURTESY LAMP SWITCH**

OK

REPAIR OR REPLACE HARNESS OR CONNECTOR (EACH OF COURTESY SWITCH CIRCUIT)

05IQ5-01

DTC CHECK/CLEAR

1. DTC CHECK

(a) Connect the hand-held tester to the DLC3.

(b) Turn the ignition switch to the ON position.

(c) Read DTCs by following the prompts on the tester screen.

HINT:

Please refer to the hand-held tester operator's manual for further details.

2. DTC CLEAR

(a) DTC can be erased by operating the hand-held tester.

HINT:

Please refer to the hand-held tester operator's manual for further details.

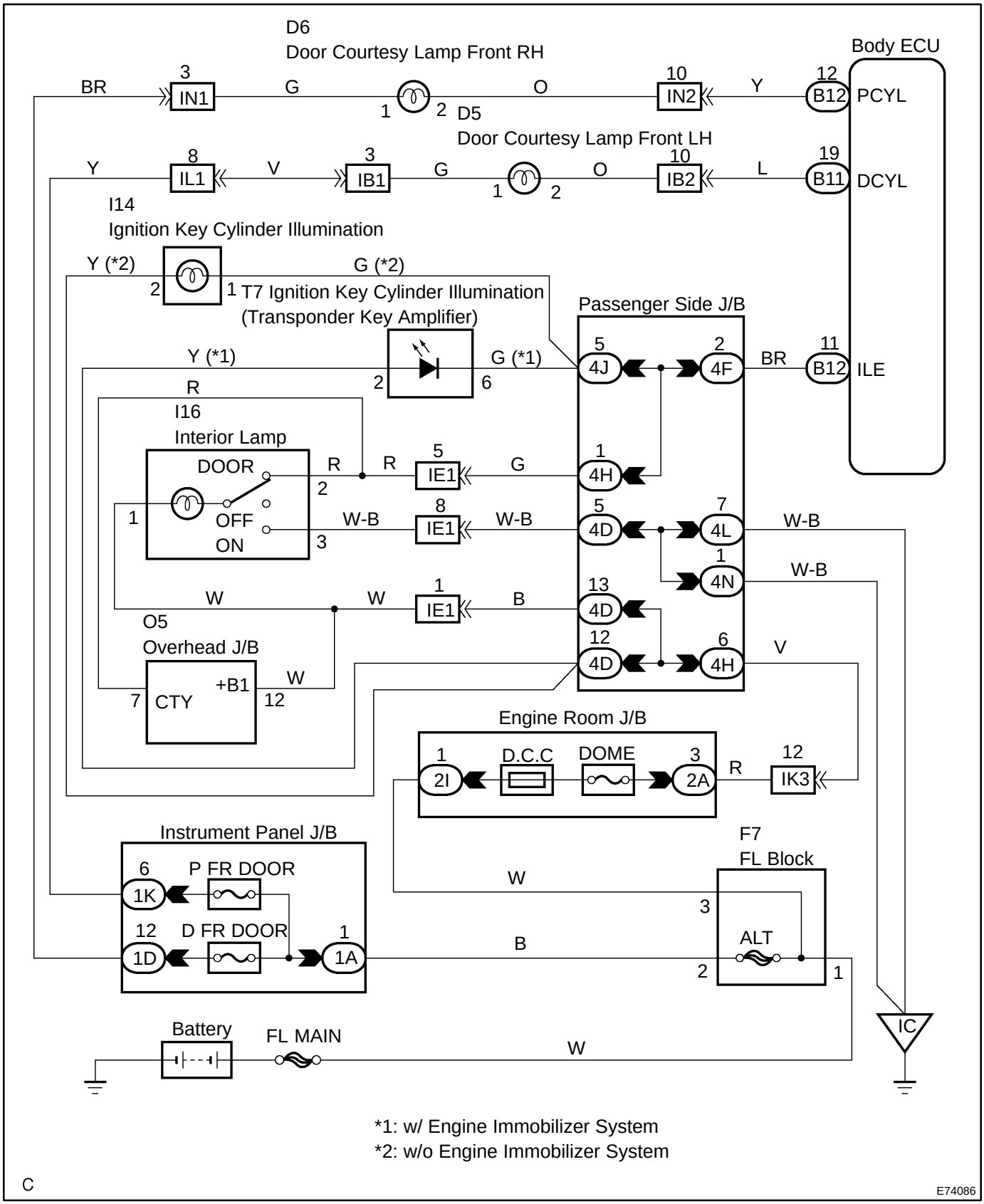
ILLUMINATION CIRCUIT

CIRCUIT DESCRIPTION

The multiplex network body ECU controls the following.

(1) Key cylinder lamp
(2) Interior lamp
(3) Personal lamp (overhead J/B)
(4) Door courtesy lamp

WIRING DIAGRAM



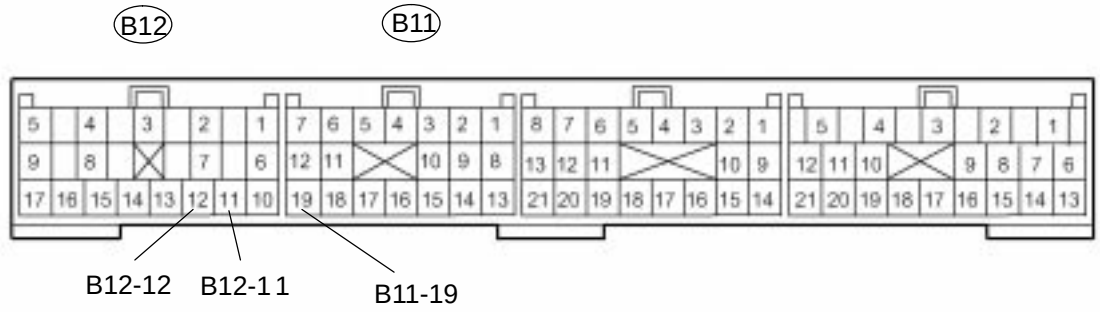
INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR(ILLUMINATION CIRCUIT)

(a) Disconnect the B11 and B12 connectors from the multiplex network body ECU.
(b) Measure the resistance according to the value(s) in the table below.
Standard:

Tester connection	Condition	Specified condition
B11-19 - Body ground	Always	10 to 14 V
B12-11 - Body ground	Always	10 to 14 V
B12-12 - Body ground	Always	10 to 14 V

Multiplex Network Body ECU
Connector Front View:

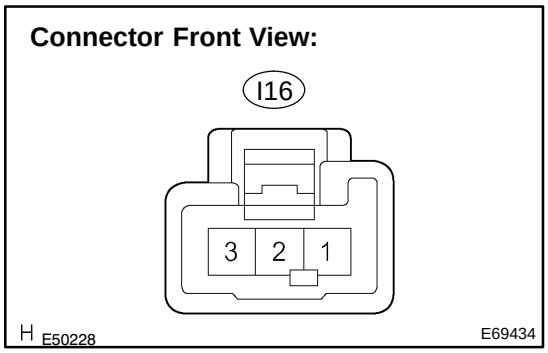


NG → **Go to step 2**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-1538)

2 INSPECT INTERIOR LIGHT



(a) Inspect room lamp assy No.1 (interior light).

(1) Measure the resistance according to the value(s) in the table below.

Standard:

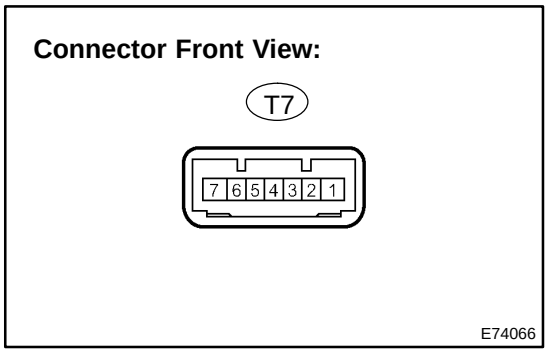
Tester connection	Condition	Specified resistance
1 - 2	Switch is OFF	Below 1 Ω
1 - 3	Switch is OFF	Below 1 Ω

(2) Connect the positive (+) lead from the battery to terminal 1 and negative (-) lead to terminal 2, then check that the lamp comes on when the switch is in the DOOR position.

OK: Lamp comes on.

(3) Connect the positive (+) lead from the battery to terminal 1 and negative (-) lead to terminal 3, then check that the lamp comes on when the switch is in the ON position.

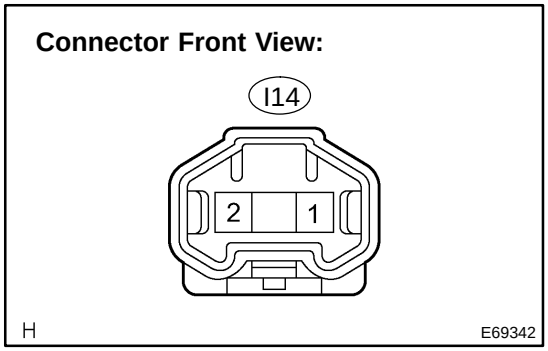
OK: Lamp comes on.



(b) Inspect key cylinder illumination.

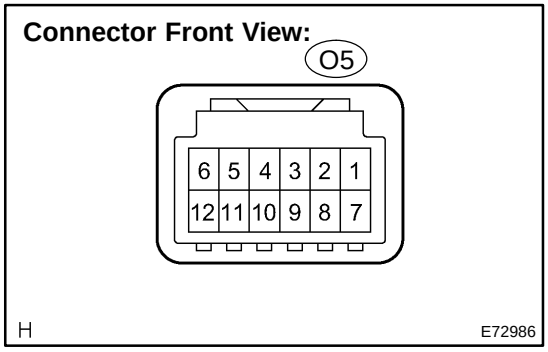
(1) w/ Theft deterrent system:
Connect the positive (+) lead from the battery to terminal 2 and negative (-) lead to terminal 6, then check that the lamp comes on.

OK: Illumination comes on.



(2) w/o Theft deterrent system:
Connect the positive (+) lead from the battery to terminal 2 and negative (-) lead to terminal 1, then check that the lamp comes on.

OK: Illumination comes on.

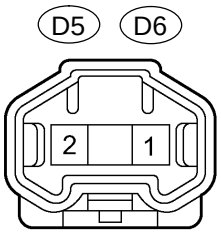


(c) Inspect personal lamp (overhead J/B).

(1) Connect the positive (+) lead from the battery to terminal 12 and negative (-) lead to terminal 7, then check that the lamp comes on when switch is in the DOOR position.

OK: Lamp comes on.

Connector Front View:



H E69342

(d) Inspect courtesy lamp.
(1) Connect the positive (+) lead from the battery to terminal 1 and negative (-) lead to terminal 2, then check that the lamp comes on.

OK: Lamp comes on.

NG → **REPLACE INTERIOR LIGHT (EACH OF ILLUMINATION LAMP)**

OK

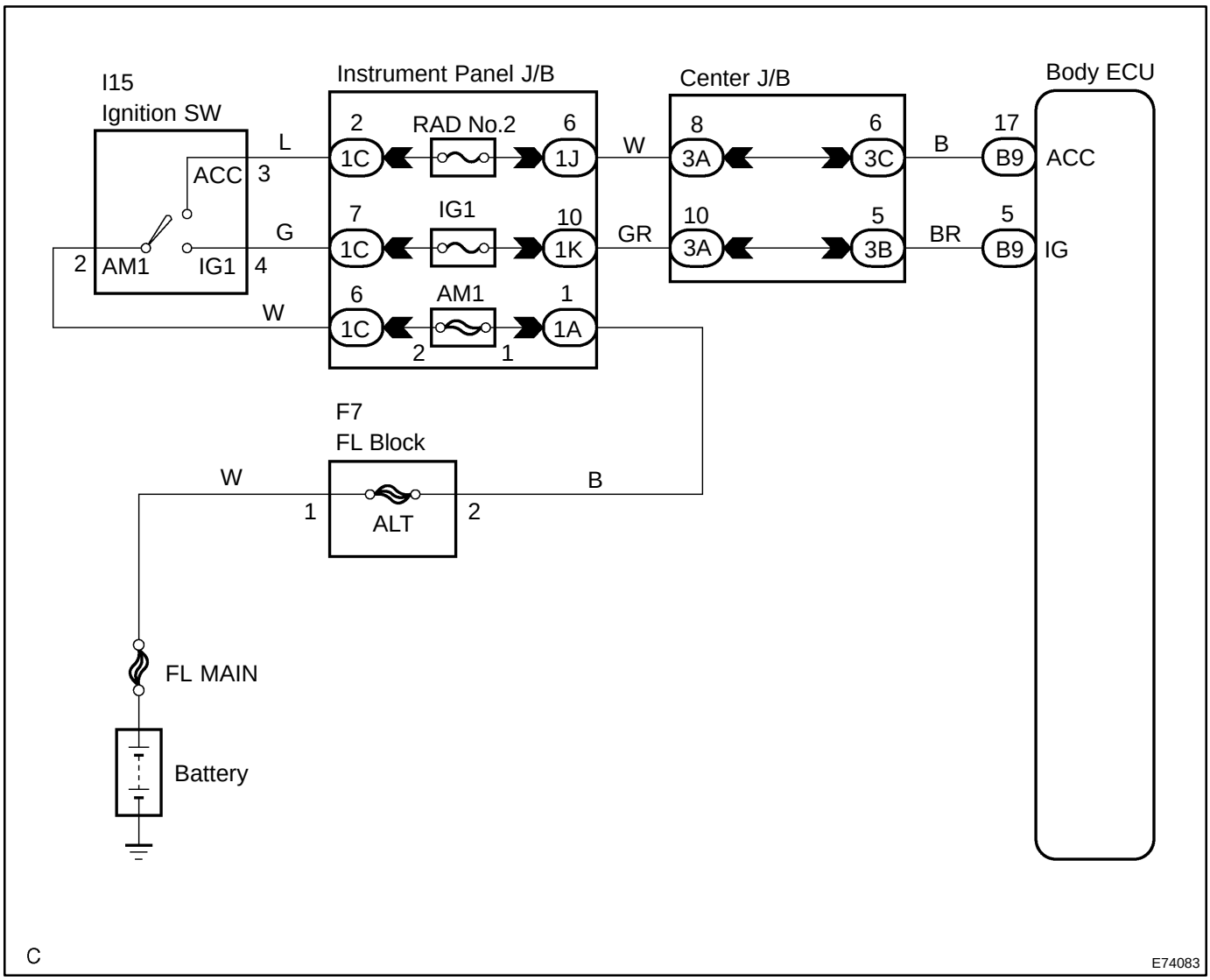
REPAIR OR REPLACE HARNESS OR CONNECTOR (EACH OF ILLUMINATION CIRCUIT)

IGNITION SWITCH CIRCUIT

CIRCUIT DESCRIPTION

This circuit detects the state of the ignition switch and sends it to the multiplex network body ECU.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Inspect if another system (engine, wiper and so on) is normal before performing this procedure.

1	CHECK HARNESS AND CONNECTOR(IGNITION SWITCH CIRCUIT)

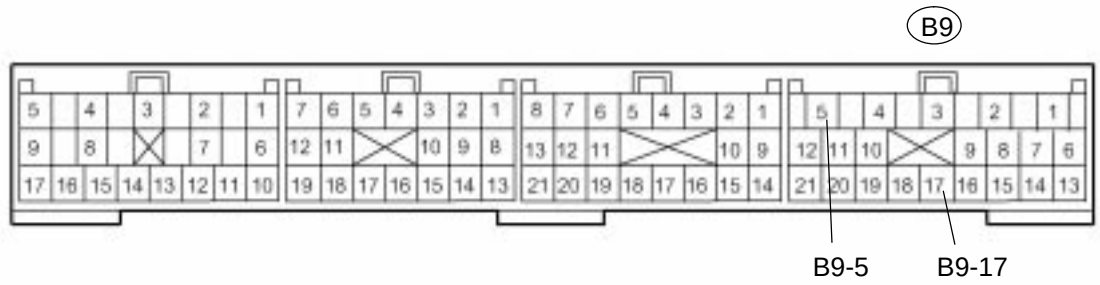
(a) Disconnect the B9 connector from multiplex network body ECU.

(b) Measure the voltage according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
B9-5 - Body ground	Ignition switch is ON Ignition switch is OFF	10 to 14 V Below 1 V
B9-17 - Body ground	Ignition switch is ACC Ignition switch is OFF	10 to 14 V Below 1 V

Multiplex Network Body ECU
Connector Front View:



NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (IGNITION SWITCH - MULTIPLEX NETWORK BODY ECU)**

OK

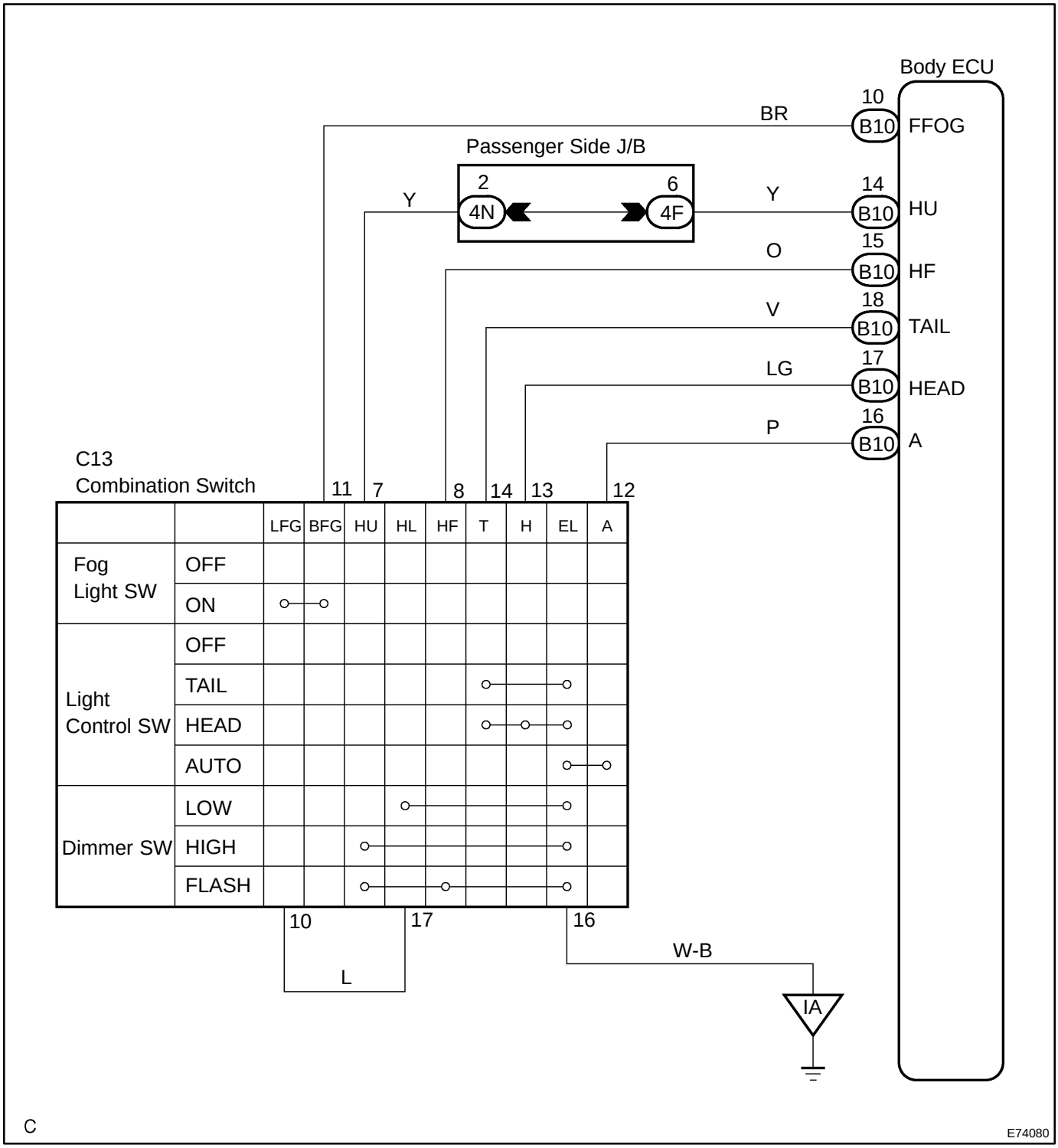
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-1538)

LIGHT CONTROL SWITCH CIRCUIT

CIRCUIT DESCRIPTION

This circuit detects the state of the headlamp dimmer switch.

WIRING DIAGRAM



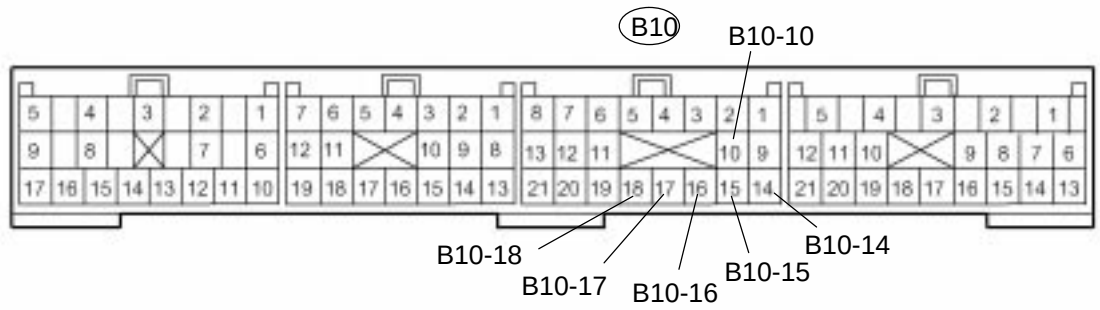
INSPECTION PROCEDURE

1	INSPECT MULTIPLEX NETWORK BODY ECU

(a) Disconnect the B10 connector from the multiplex network body ECU.
(b) Measure the voltage according to the value(s) in the table below.
Standard:

Tester connection	Condition	Specified condition
B10-10 - Body ground	Front fog light switch OFF → ON	10 kΩ or higher → Below 1 Ω
B10-14 - Body ground	Headlamp Dimmer switch LOW → HIGH	10 kΩ or higher → Below 1 Ω
B10-15 - Body ground	Headlamp Dimmer switch LOW → FLASH	10 kΩ or higher → Below 1 Ω
B10-16 - Body ground	Light control switch OFF → AUTO	10 kΩ or higher → Below 1 Ω
B10-17 - Body ground	Light control switch OFF → HEAD	10 kΩ or higher → Below 1 Ω
B10-18 - Body ground	Light control switch OFF → TAIL	10 kΩ or higher → Below 1 Ω

Multiplex Network Body ECU
Connector Front View:



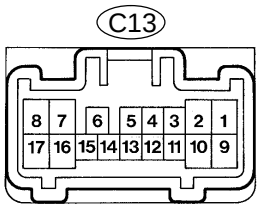
NG → **Go to step 2**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-1538)

2 INSPECT HEADLAMP DIMMER SWITCH ASSY

Connector Front View:



E11948

(a) Inspect light control switch (when headlamp is malfunctioning).

(1) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
12 - 16 13 - 16 14 - 16	OFF	10 kΩ or higher
14 - 16	TAIL	Below 1 Ω
13 - 16 14 - 16	HEAD	Below 1 Ω
12 - 16	AUTO	Below 1 Ω

(b) Inspect headlamp dimmer switch (when headlamp is malfunctioning).

(1) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
16 - 17	LOW	Below 1 Ω
7 - 16	HIGH	Below 1 Ω
7 - 16 8 - 16	FLASH	Below 1 Ω

(c) Inspect front fog light switch (when fog lamp is malfunctioning).

(1) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
10 - 11	OFF	10 kΩ or higher
10 - 11	ON	Below 1 Ω

NG → **REPLACE HEADLAMP DIMMER SWITCH ASSY (SEE PAGE 65-25)**

OK

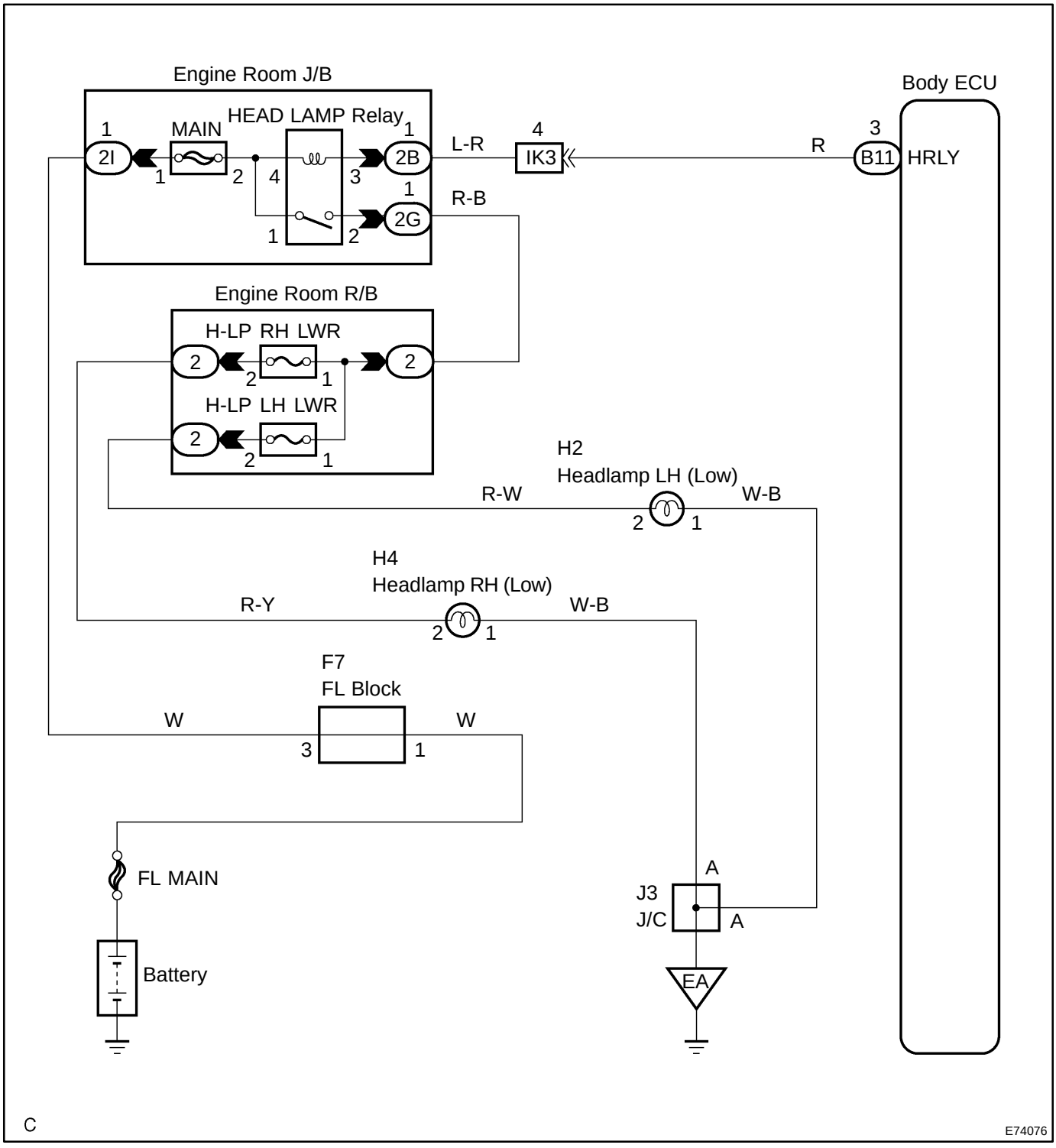
REPAIR OR REPLACE HARNESS OR CONNECTOR

HEADLIGHT RELAY CIRCUIT

CIRCUIT DESCRIPTION

The multiplex network body ECU controls the HEAD relay when a signal is received from the headlamp dimmer switch assy.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	PERFORM ACTIVE TEST USING HAND-HELD TESTER

(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch to the ON position and turn the hand-held tester main switch on.
(c) Select the item below in the ACTIVE TEST and then check the relay operation.

BODY NO.1 (MULTIPLEX NETWORK BODY ECU):

Item	Test Details	Diagnostic Note
HEAD LIGHT	Headlamp relay ON/OFF	-

OK: Headlamp comes on.

NG → **Go to step 2**

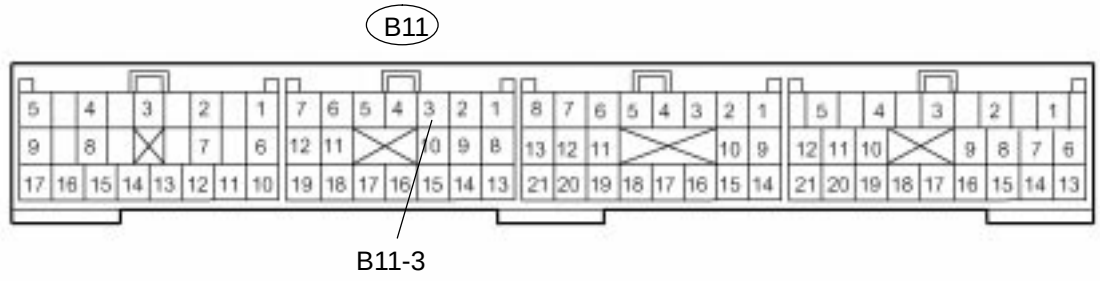
OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-1538)

2	INSPECT MULTIPLEX NETWORK BODY ECU

(a) Disconnect the B11 connector from the multiplex network body ECU.
(b) Using a service wire, connect B11-3 of the wire harness side and body ground.
OK: Headlamp comes on.

Multiplex Network Body ECU
Connector Front View:



NG → **Go to step 3**

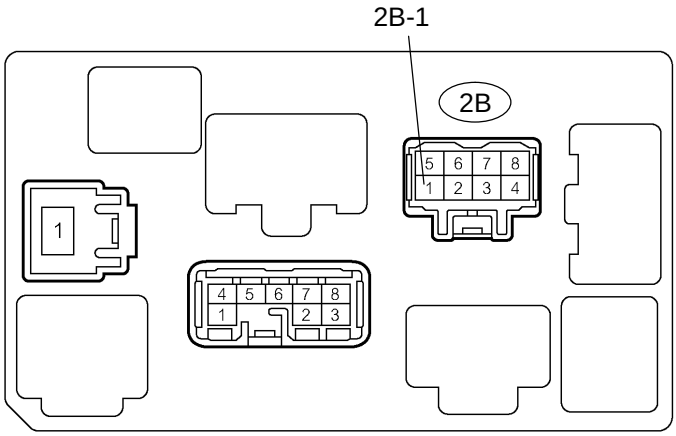
OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-1538)

3	INSPECT ENGINE ROOM J/B

(a) Disconnect the 2B connector from the engine room J/B.
(b) Using a service wire, connect 2B-1 of the engine room J/B side and body ground.
OK: Headlamp comes on.

Engine Room J/B
Connector Front View:



NG → **Go to step 4**

OK

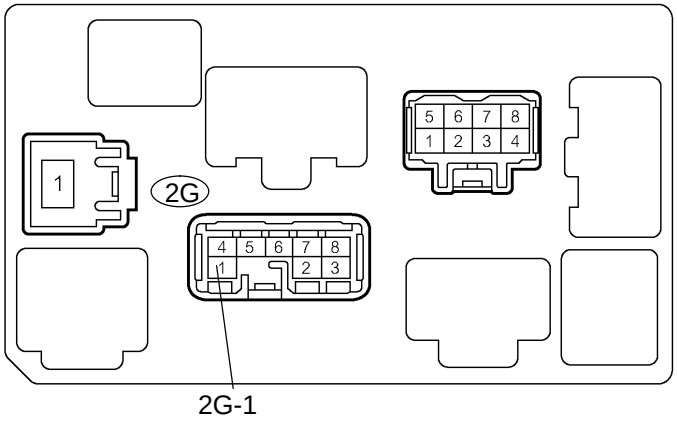
REPAIR OR REPLACE HARNESS OR CONNECTOR (ENGINE ROOM J/B - MULTIPLEX NETWORK BODY ECU)

4	INSPECT ENGINE ROOM J/B

(a) Measure the voltage according to the value(s) in the table below.
Standard:

Tester connection	Condition	Specified condition
2G-1 - Body ground	Connect 2B-1 and body ground	10 to 14 V

Engine Room J/B
Connector Front View:



H

E72974

NG → **Go to step 5**

OK

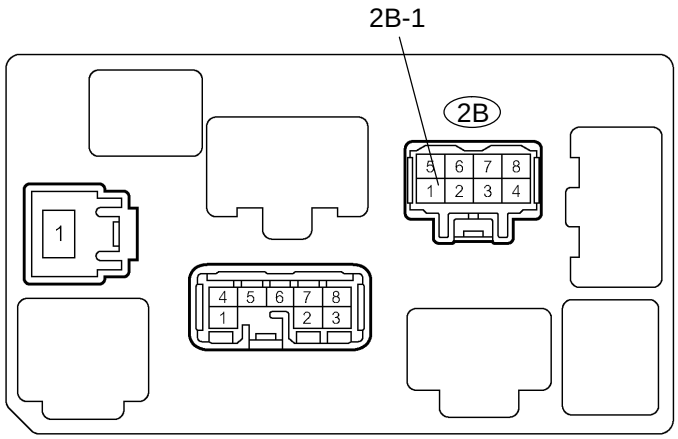
REPAIR OR REPLACE HARNESS OR CONNECTOR (EACH OF HEADLAMP CIRCUIT)

5	INSPECT ENGINE ROOM J/B

(a) Measure the voltage according to the value(s) in the table below.
Standard:

Tester connection	Condition	Specified condition
2B-1 - Body ground	Always	10 to 14 V

Engine Room J/B
Connector Front View:



H

E72974

NG → **Go to step 6**

OK

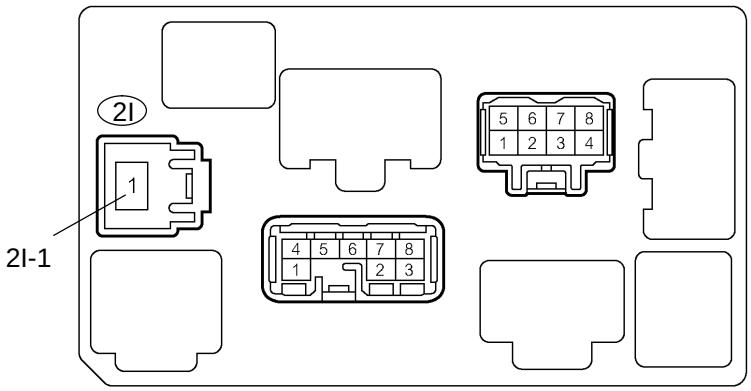
REPLACE ENGINE ROOM J/B

6	CHECK HARNESS AND CONNECTOR(POWER SOURCE CIRCUIT)

(a) Disconnect the 2I connector from the engine room J/B.
(b) Measure the voltage according to the value(s) in the table below.
Standard:

Tester connection	Condition	Specified condition
2I-1 - Body ground	Always	10 to 14 V

Engine Room J/B
Connector Front View:



H

E72974

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

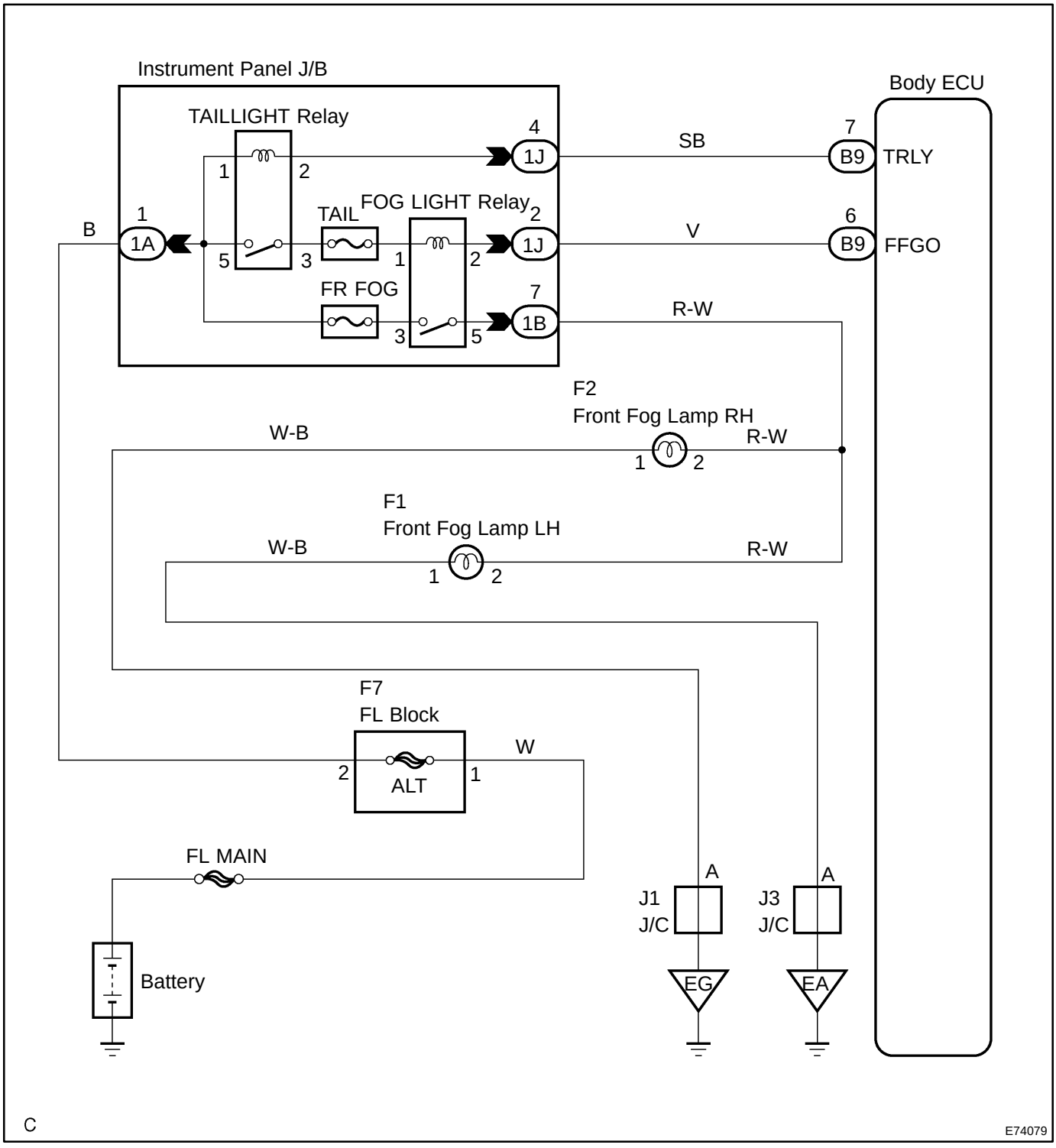
REPLACE ENGINE ROOM J/B

FRONT FOG LIGHT CIRCUIT

CIRCUIT DESCRIPTION

The multiplex network body ECU controls the FOG relay when a signal is received from the headlamp dimmer switch assy.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Inspect if the taillamp system is normal before performing this procedure.

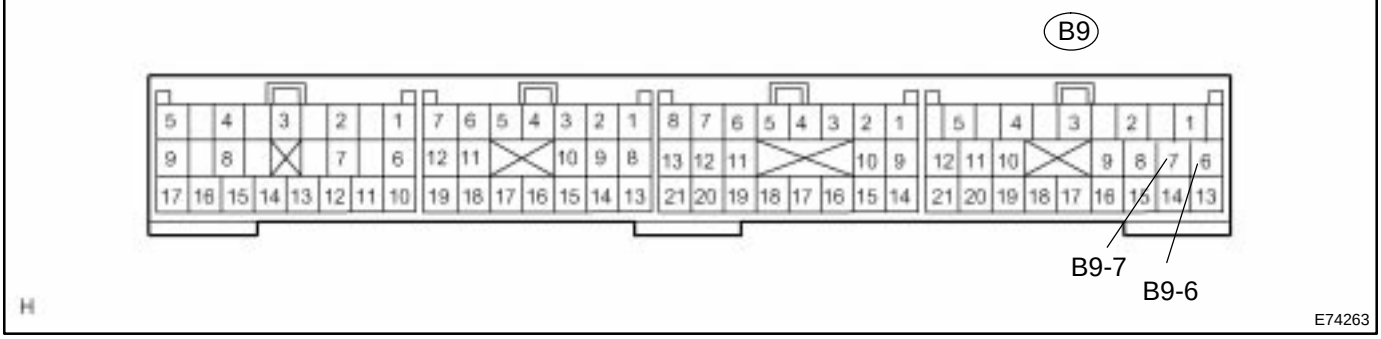
1	INSPECT MULTIPLEX NETWORK BODY ECU

(a) Disconnect the B9 connector from the multiplex network body ECU.

(b) Using a service wire, connect B9-6 and B9-7 of the wire harness side and body ground.

OK: Front fog lamp comes on.

Multiplex Network Body ECU
Connector Front View:



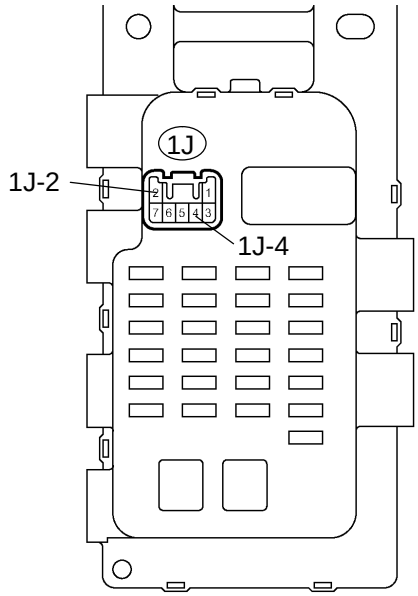
NG → **Go to step 2**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE
(SEE PAGE 05-1538)

2	INSPECT INSTRUMENT PANEL JUNCTION BLOCK ASSY

Instrument Panel Junction Block Front Side View:



(a) Disconnect the 1J connector from the instrument panel junction block.

(b) Using a service wire, connect 1J-2, 1J-4 of the instrument panel junction block side and body ground.
OK: Front fog lamp comes on.

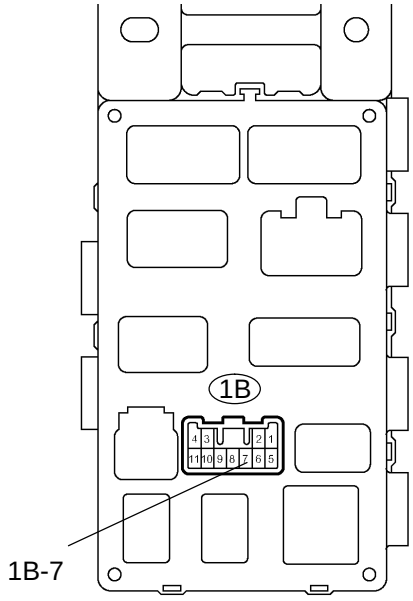
NG → **Go to step 3**

OK

REPAIR OR REPLACE HARNESS OR CONNECTOR (INSTRUMENT PANEL JUNCTION BLOCK ASSY - MULTIPLEX NETWORK BODY ECU)

3 INSPECT INSTRUMENT PANEL JUNCTION BLOCK ASSY

Instrument Panel Junction Block
Back Side View:



(a) Measure the voltage according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
1B-7 - Body ground	Connect 1J-2, 1J-4 and body ground	10 to 14 V

NG → **REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSY**

OK

REPAIR OR REPLACE HARNESS OR CONNECTOR (EACH OF FOG LAMP CIRCUIT)

AUTOMATIC LIGHT CONTROL SENSOR CIRCUIT

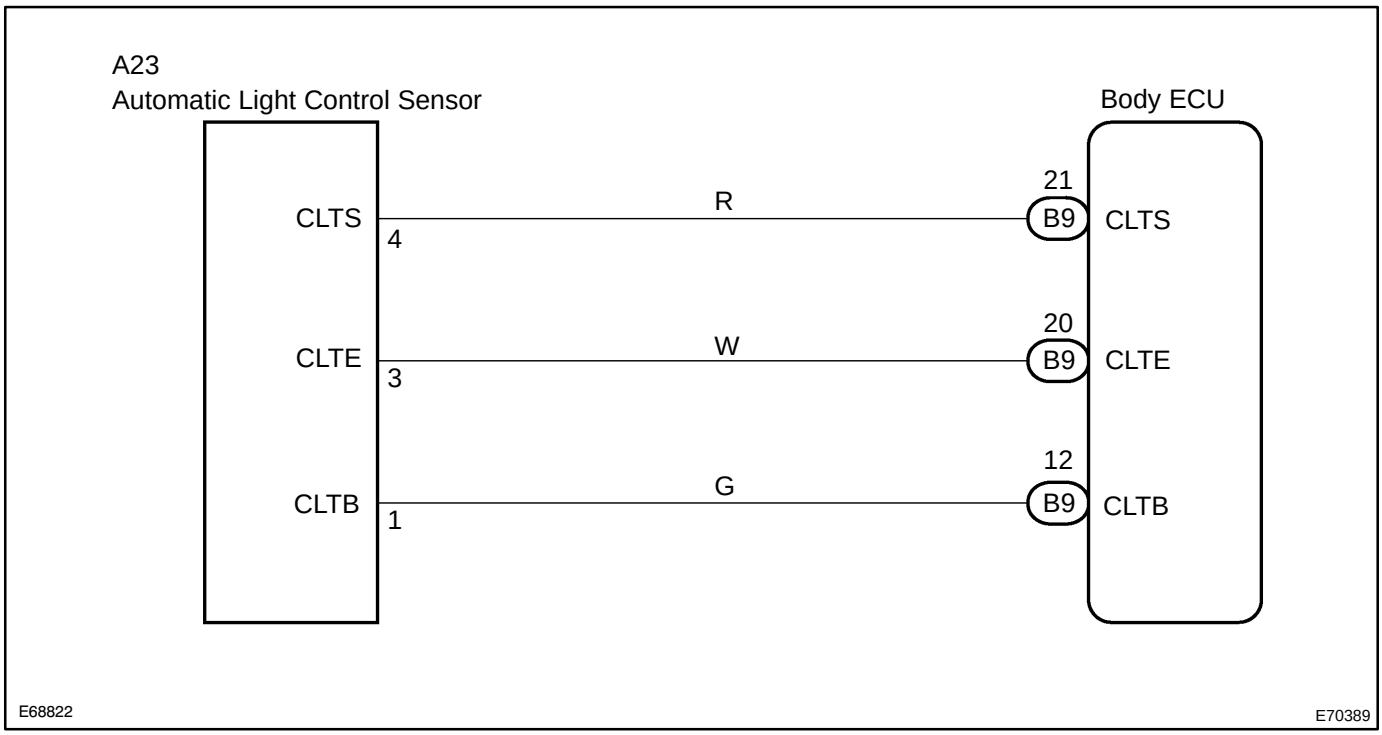
CIRCUIT DESCRIPTION

The multiplex network body ECU receives a signal from the automatic light control sensor.

HINT:

A DTC code is output when the automatic light control sensor is malfunctioning or there is an open or short circuit in the automatic light control sensor (see page 05-1551).

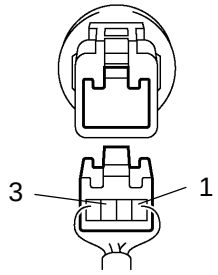
WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR(AUTOMATIC LIGHT CONTROL SENSOR POWER SOURCE CIRCUIT)

Wire Harness View:
A23 Automatic Light Control Sensor



(a) Disconnect the automatic light control sensor connector.
(b) Measure the voltage according to the value(s) in the table below.

Standard:

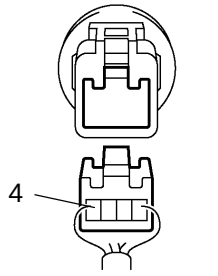
Tester connection	Condition	Specified condition
A23-1 - A23-3	Ignition switch ON	10 to 14 V

NG → **Go to step 4**

OK

2	CHECK HARNESS AND CONNECTOR(MULTIPLEX NETWORK BODY ECU - AUTOMATIC LIGHT CONTROL SENSOR)

Wire Harness View:
A23 Automatic Light Control Sensor

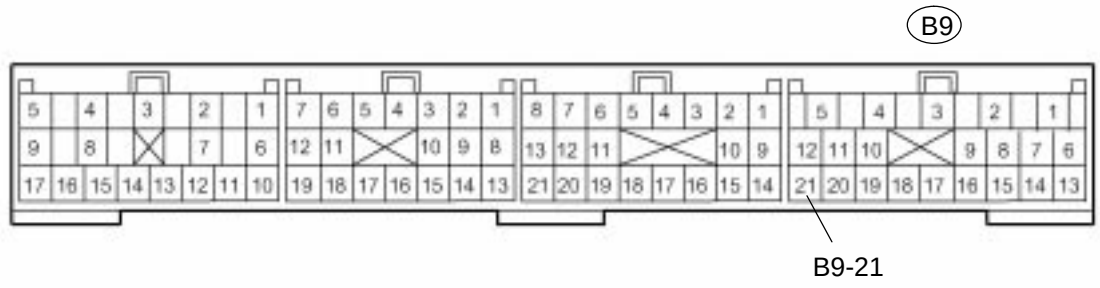


(a) Disconnect the B9 connector from the multiplex network body ECU.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
A23-4 - B9-21	Always	Below 1 Ω

Multiplex Network Body ECU
Connector Front View:



NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3	REPLACE AUTOMATIC LIGHT CONTROL SENSOR

OK: Return to normal condition.

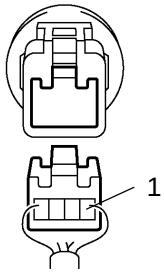
NG → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-1538)**

OK

END

4	CHECK HARNESS AND CONNECTOR(MULTIPLEX NETWORK BODY ECU - AUTOMATIC LIGHT CONTROL SENSOR)

Wire Harness View:
A23 Automatic Light Control Sensor



(a) Measure the voltage according to the value(s) in the table below.

Standard:

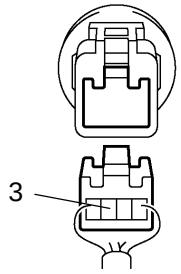
Tester connection	Condition	Specified condition
A23-1 - Body ground	Ignition switch ON	10 to 14 V

NG → **Go to step 6**

OK

5	CHECK HARNESS AND CONNECTOR(MULTIPLEX NETWORK BODY ECU - AUTOMATIC LIGHT CONTROL SENSOR)

Wire Harness View:
A23 Automatic Light Control Sensor

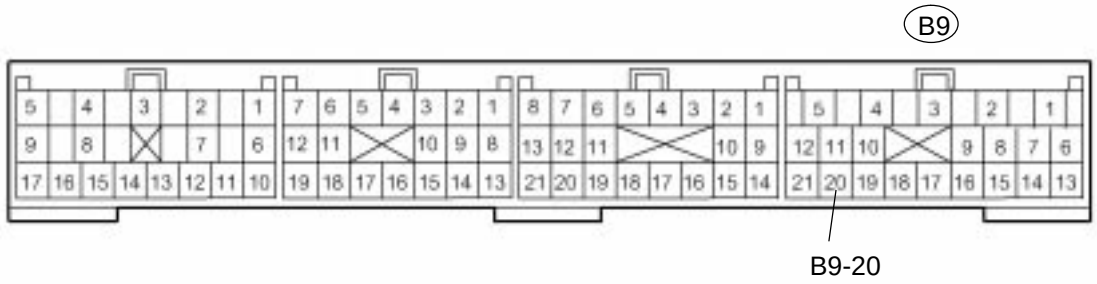


(a) Disconnect the B9 connector from the multiplex network body ECU.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
A23-3 - B9-20	Always	Below 1 Ω

Multiplex Network Body ECU
Connector Front View:



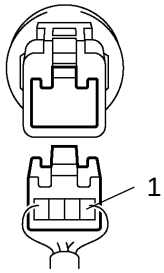
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK →

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-1538)

6	CHECK HARNESS AND CONNECTOR(MULTIPLEX NETWORK BODY ECU - AUTOMATIC LIGHT CONTROL SENSOR)

Wire Harness View:
A23 Automatic Light Control Sensor



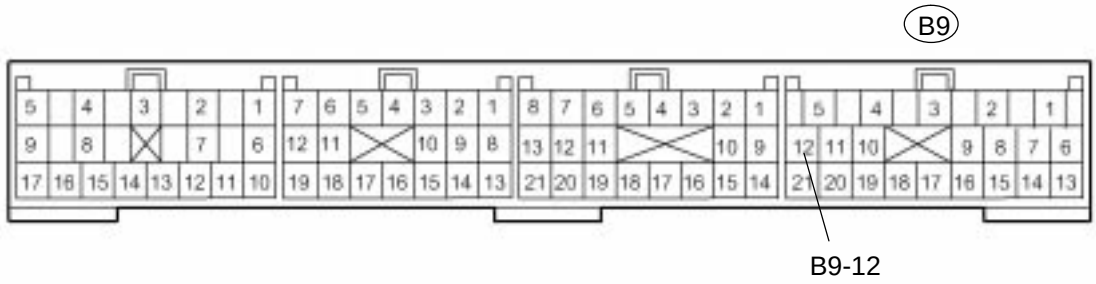
(a) Disconnect the B9 connector from the multiplex network body ECU.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
A23-1 - B9-12	Always	Below 1 Ω

Multiplex Network Body ECU
Connector Front View:



NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK →

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-1538)

05ETG-02

OPERATION CHECK

1. ILLUMINATED ENTRY SYSTEM OPERATION CHECK

(a) Illuminated entry system controls the following lamps:
- ⁎ Ignition key cylinder lamp
- ⁎ Interior lamp (Room lamp assy No.1)
- ⁎ Personal lamp (Overhead J/B)

(b) Check that the lamps come on after:
- (1) Unlocking any door that was closed and locked with the ignition switch off.

(c) Check that the lamps fade out after:
- (1) Leaving the doors unlocked for 15 seconds
- (2) Turning the ignition switch to the ACC or ON position
- (3) Locking all the doors

(d) Check that the lamps stay ON for at least 15 seconds after opening any of the doors, then fade out again after 15 seconds.

(e) Check that the lamps fade out after:
- (1) Leaving the doors unlocked for 15 seconds
- (2) Locking all the doors

(f) Check that the lamps stay ON for at least 15 seconds after opening any of the doors, then fade out again in 15 seconds after closing all the doors.

(g) Check that the lamps come on when opening any of the doors or turning the ignition switch off from the ACC or ON position.

2. LIGHT AUTO TURN OFF OPERATION CHECK

(a) Turn the ignition switch to the ON position, and switch the headlamps into the TAIL or HEAD position.

(b) Turn the ignition switch off and open the driver's door, and check that the headlamps go off immediately.

(c) Turn the ignition switch to the ON position, and switch the headlamps into the AUTO position.

(d) Turn the ignition switch off and open the driver's door when operating the automatic light control system, and check that the headlamps go off immediately.

3. AUTOMATIC LIGHT CONTROL OPERATION CHECK

HINT:

Perform the operation check at a location with bright surroundings.

(a) Turn the ignition switch to the ON position.

(b) Turn the headlamp dimmer switch to the AUTO position.

(c) Cover the automatic light control sensor and check that the taillamp and headlamp in order.

(d) Uncover the automatic light control sensor and check that the headlamp and taillamp go off in order.

4. DAYTIME RUNNING LIGHT OPERATION CHECK

(a) Check that the high beams come on when the headlamp switch is off with the engine running and parking brake released.

(b) Check that the high beams go off when turning the headlamp dimmer switch into the TAIL or HEAD (LOW) position under the condition as shown in (a).

(c) Check that the high beams go off when turning the ignition switch off under the condition as shown in (a).

05ETF-02

SYSTEM DESCRIPTION

1. LIGHTING SYSTEM

(a) Illumination control system (Illuminated entry system):

When a door is unlocked through a key or transmitter operation, or if a door is opened or closed, the illuminated entry system turns on the interior lamp and the ignition key illumination.

(1) The multiplex network body ECU receives the following.
- ⁎ Door courtesy switch signal
- ⁎ Door detection switch signal
- ⁎ Ignition switch signal

(2) The multiplex network body ECU controls the following based on the signals listed in (1).
- ⁎ Illumination operation signal

(3) The multiplex network body ECU controls the on/off and fade-in/fade-out operation of the following.
- ⁎ Room lamp assy No.1
- ⁎ Ignition key cylinder lamp
- ⁎ Personal lamp (Overhead J/B)

(b) Manual light control system:

This system functions if lights such as the headlamps and taillamps come on by manual operation of the light control switch.

(1) The multiplex network body ECU receives the following.
- ⁎ Light control switch signal
- ⁎ Fog lamp switch signal

(2) The multiplex network body ECU controls the following based on the signals listed in (1).
- ⁎ HEAD relay operation signal
- ⁎ TAIL relay operation signal
- ⁎ FOG relay operation signal
- ⁎ DRL relay No.2
- ⁎ DRL relay No.3
- ⁎ DRL relay No.4

(3) The multiplex network body ECU controls the on/off operation of the following signals based on the signals listed in (2).
- ⁎ Headlamp (Low)
- ⁎ Clearance lamp
- ⁎ Taillamp
- ⁎ License plate lamp
- ⁎ Fog lamp

(c) Light auto turn off system:

When the headlamps and taillamps are on through the operation of the automatic light control system or through the light control switch, if the ignition switch is turned off and driver side door is opened, this system will turn the headlamps and taillamps off immediately.

(1) The multiplex network body ECU receives the following.
- ⁎ Door courtesy switch signal
- ⁎ Ignition switch signal

(2) The multiplex network body ECU controls the following based on the signals listed in (1).
- ⁎ HEAD relay operation signal
- ⁎ TAIL relay operation signal

(3) The multiplex network body ECU controls the illuminating period based on the signals listed in (2).
- Headlamp (Low)
- Headlamp (Hi)
- Clearance lamp
- Taillamp
- License plate lamp
- Fog lamp

(d) Automatic light control system:
When the light control switch is in the AUTO position, the automatic light control sensor detects ambient light and automatically turns the headlamps and taillamps on or off accordingly.
(1) The multiplex network body ECU receives the following.
- Light control switch signal
- Automatic light control sensor signal

(2) The multiplex network body ECU controls the following based on the signals listed in (1).
- HEAD relay operation signal
- TAIL relay operation signal

(3) The multiplex network body ECU controls the on/off operation of the following.
- Headlamp (Low)
- Clearance lamp
- Taillamp
- License plate lamp

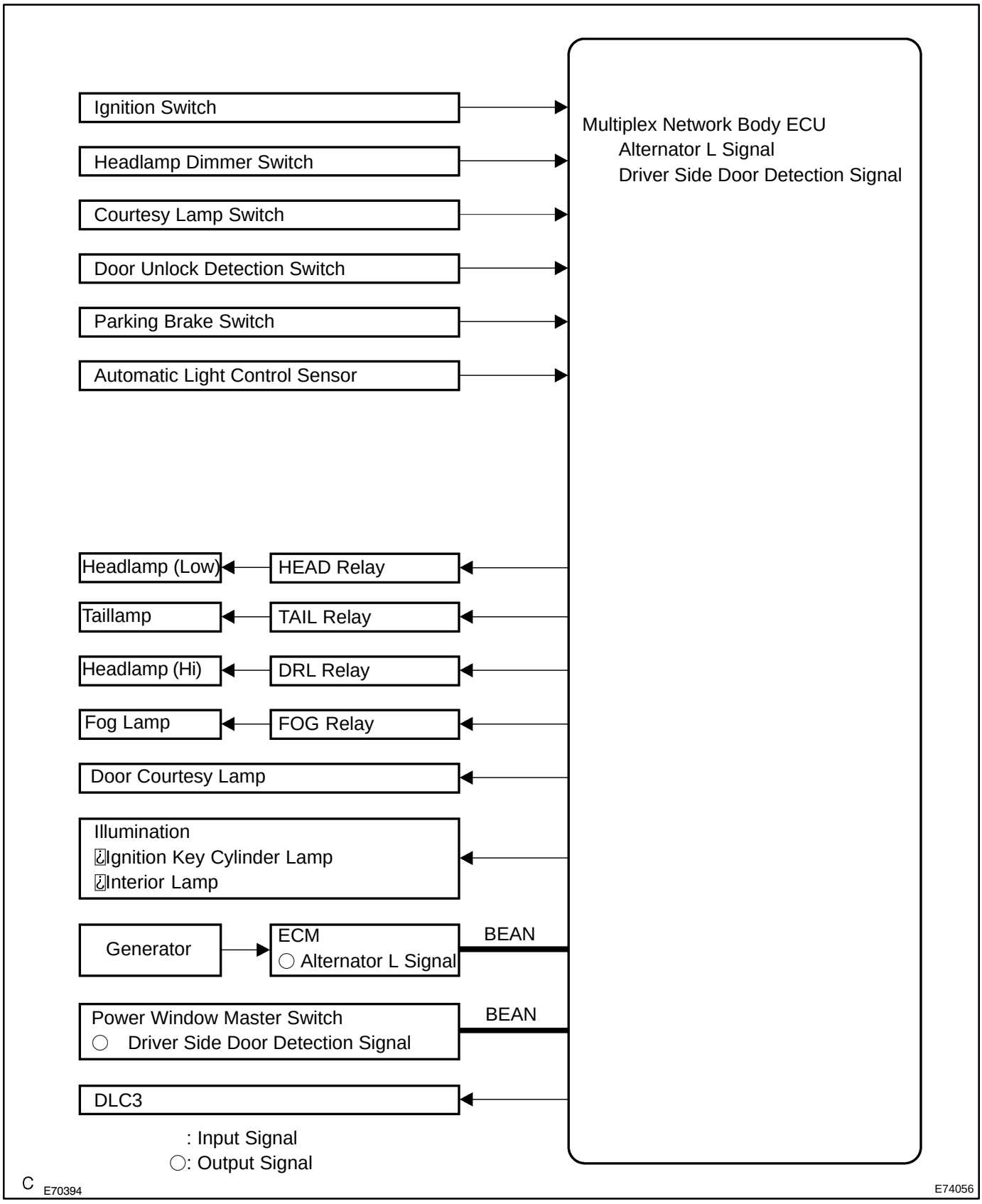
(e) Daytime running light system:
This system is directly connected to the high-beam headlamps and is designed to automatically activate the daytime running light in order to remain highly visible to other vehicles.
(1) The multiplex network body ECU receives the following.
- Ignition switch signal
- Generator signal
- Parking brake switch signal
- Light control switch signal

(2) The multiplex network body ECU controls the following based on the signals listed in (1).
- DRL relay operation signal

(3) The multiplex network body ECU controls the on/off operation of the following.
- Headlamp (Hi)

05ETD-02

SYSTEM DIAGRAM



05CTX-05

CUSTOMER PROBLEM ANALYSIS CHECK

LIGHTING SYSTEM Check Sheet

Inspector's name: _____

Customer's Name		**VIN**	
		Production Date	
		Licence Plate No.	
Date Vehicle Brought in	/ /	**Odometer Reading**	**km mile**

Date Problem First Occurred		/ /
Frequency Problem Occurs		☐ Always ☐ Sometimes (times per day, month) ☐ Once only
Weather Conditions When Problem Occurred	**Weather**	☐ Fine ☐ Cloudy ☐ Rainy ☐ Snowy ☐ Various/ Others
	Outdoor Temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold (Approx. °F (°C))

Malfunctioning System:	✳Headlamp system
	✳Taillight system
	✳Automatic light control system
	✳Light auto turn off system
	✳Daytime running light system
	✳Fog light system
	✳Turn signal and hazard warning system
	✳Stop light system
	✳Back-up light system
	✳Illuminated entry system
	✳Others
	✳
	✳
	✳
	✳

N

I34763

05CTZ-05

DIAGNOSTIC TROUBLE CODE CHART

1. DTC CHECK

If a trouble code is displayed during the DTC check, check the suspected area listed for that code in the table below, and proceed to the appropriate page.

DTC No. (See Page)	Symptom	Suspected Area
B1241 (05-1548)	Body ECU switch circuit diagnosis	・Headlamp dimmer switch assy ・Wire harness or connector ・Multiplex network body ECU
B1244 (05-1551)	Light sensor circuit malfunction	・Automatic light control sensor ・Wire harness or connector ・Multiplex network body ECU

05CUG-05

HOW TO PROCEED WITH TROUBLESHOOTING

The hand-held tester can be used at steps 4, 5, 6 and 13.

1	VEHICLE BROUGHT TO WORK SHOP

2	CUSTOMER PROBLEM ANALYSIS (SEE PAGE 05-1535)

(a) Confirm problem symptoms.

3	PROBLEM SYMPTOM CONFIRMATION

- SYMPTOM DOES NOT OCCUR (GO TO STEP 4)
- SYMPTOM OCCURS (GO TO STEP 5)

4	SYMPTOM SIMULATION

5	CHECK BODY MULTIPLEX COMMUNICATION SYSTEM (SEE PAGE 05-2040)

(a) Check for the DTC output.

- MULTIPLEX DTC OUTPUT (PROCEED TO "BODY MULTIPLEX COMMUNICATION SYSTEM")
- NO MULTIPLEX DTC (GO TO STEP 6)

6	DTC CHECK (SEE PAGE 05-1545)

- MALFUNCTION CODE (GO TO STEP 7)
- NORMAL SYSTEM CODE (GO TO STEP 8)

7	DTC CHART (SEE PAGE 05-1547)

- GO TO STEP 10

8	PROBLEM SYMPTOMS TABLE (SEE PAGE 05-1538)

9	TERMINALS OF ECU (SEE PAGE 05-1541)

10	CIRCUIT INSPECTION (SEE PAGE 05-1548 TO 05-1606)

11	IDENTIFICATION OF PROBLEM

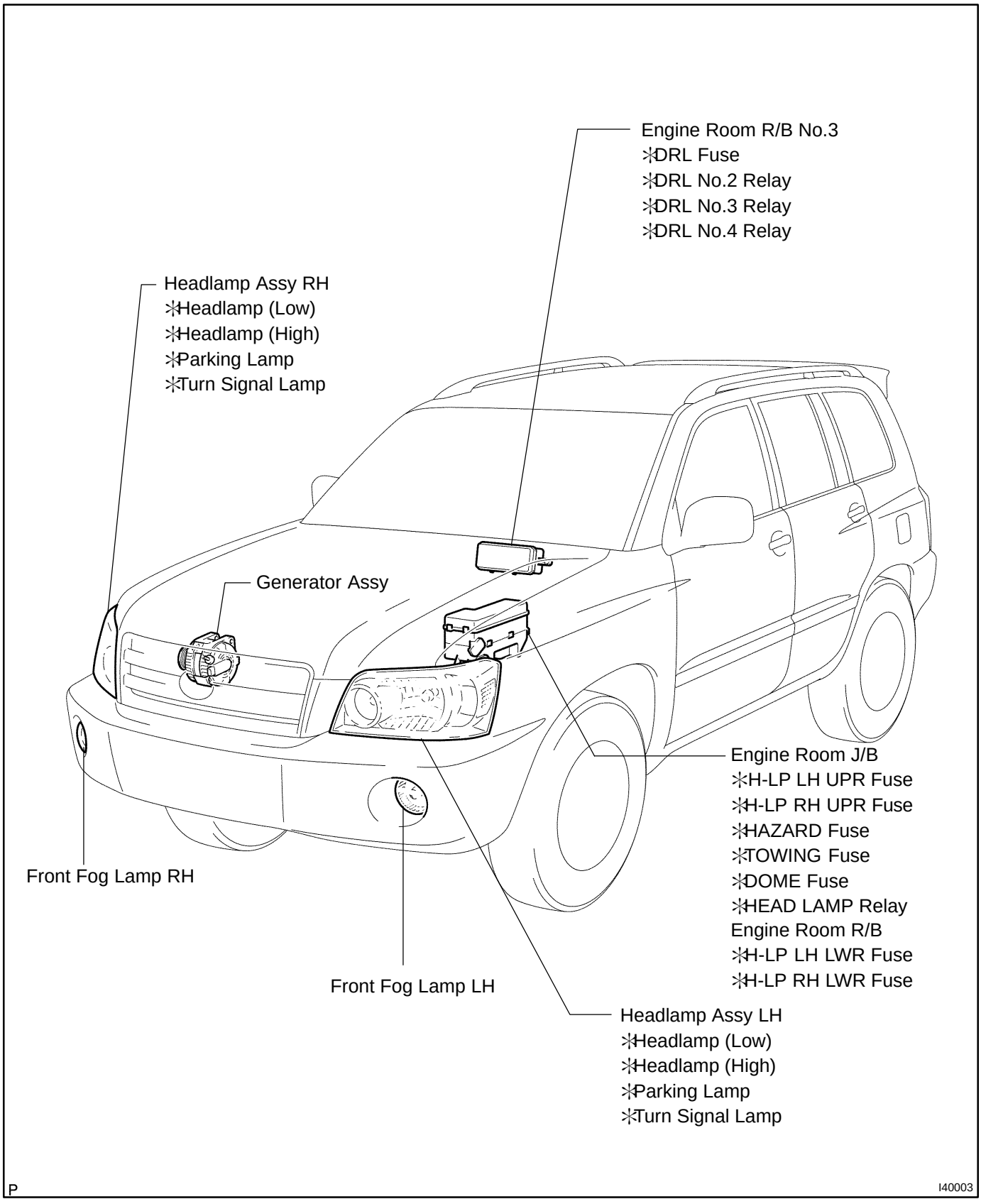
12	REPAIR OR REPLACE

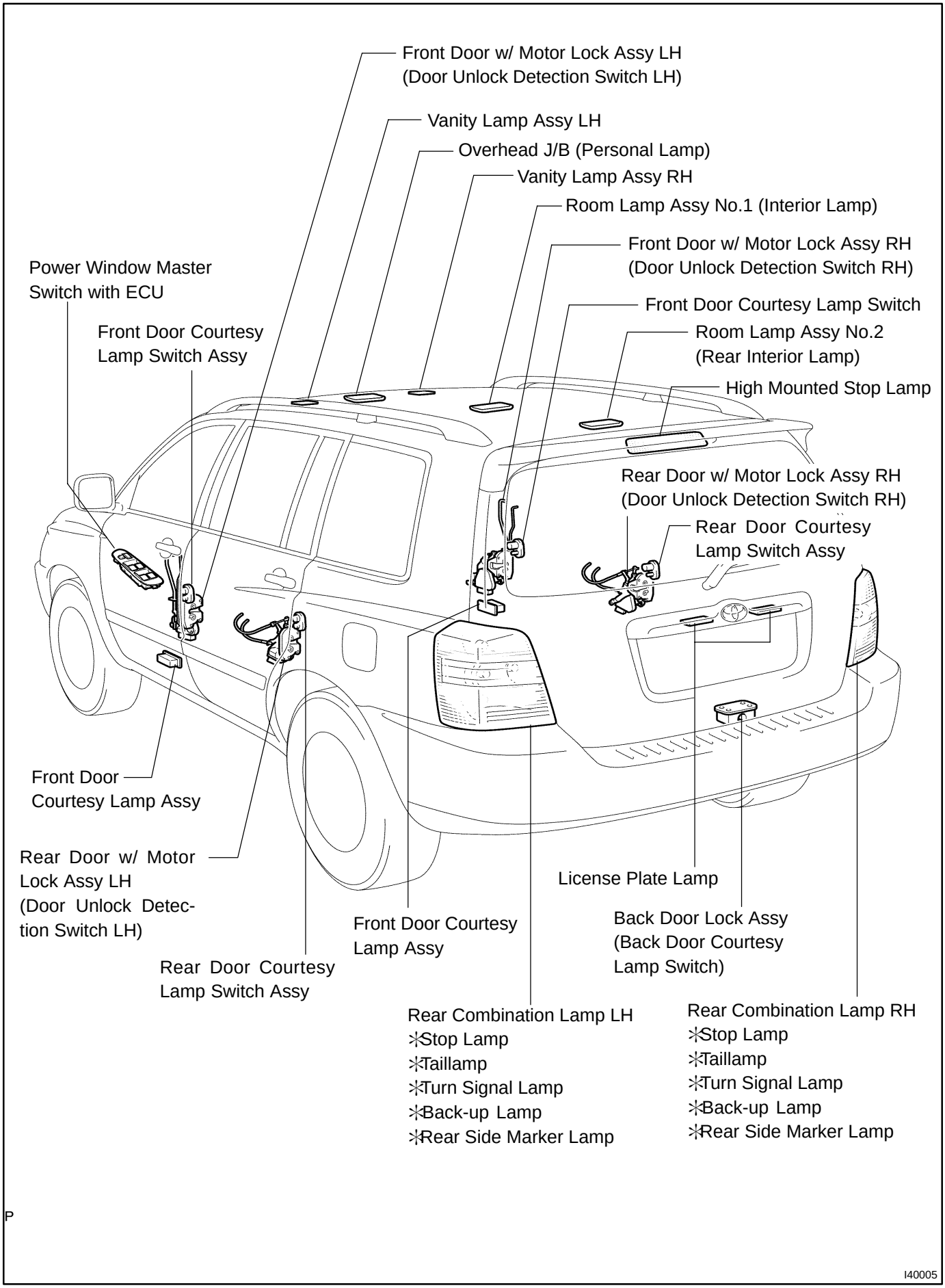
13	CONFIRMATION TEST

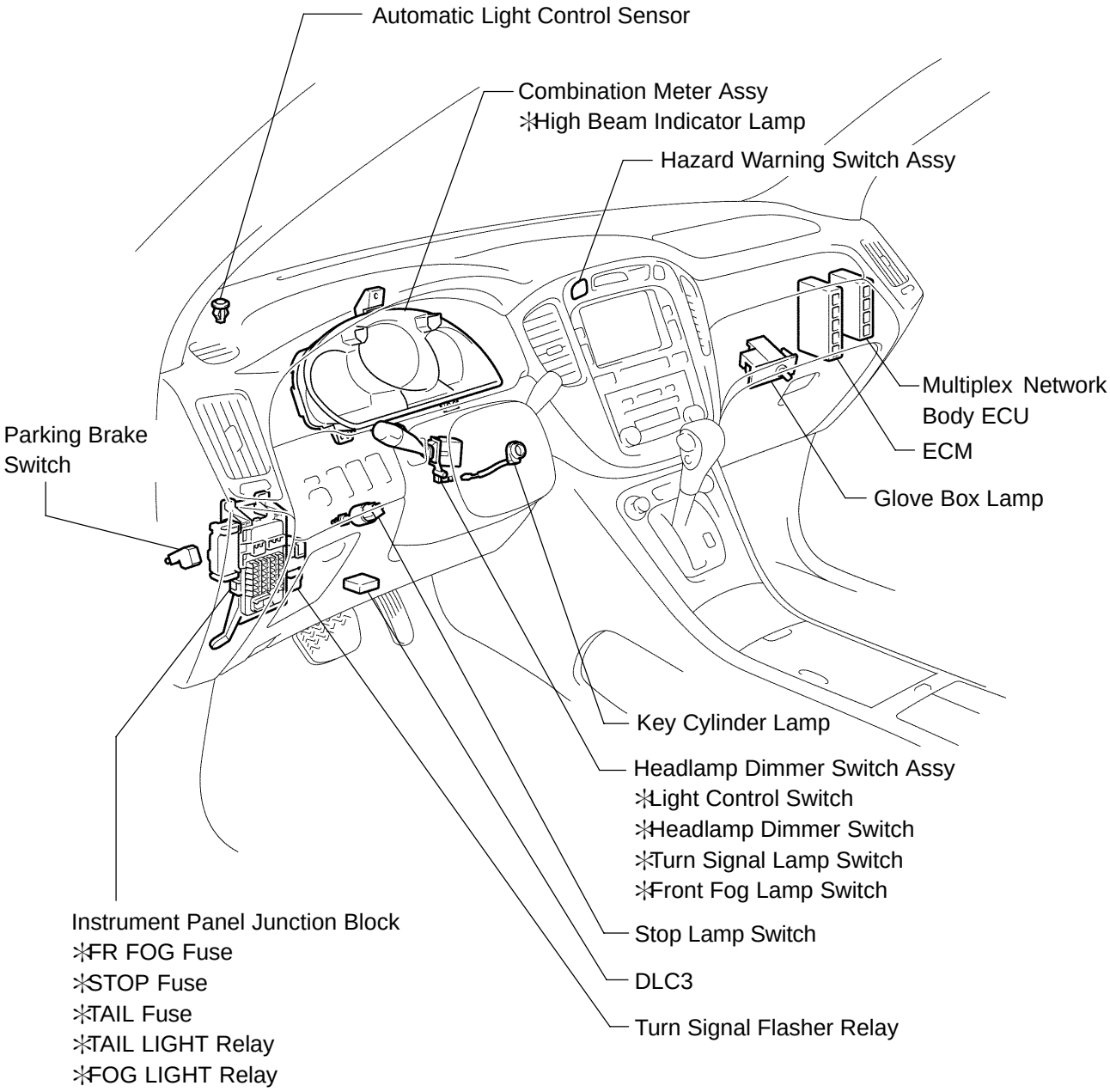
END

05ETC-02

LOCATION




Front Door w/ Motor Lock Assy LH
(Door Unlock Detection Switch LH)
Vanity Lamp Assy LH
Overhead J/B (Personal Lamp)
Vanity Lamp Assy RH
Room Lamp Assy No.1 (Interior Lamp)
Front Door w/ Motor Lock Assy RH
(Door Unlock Detection Switch RH)
Power Window Master
Switch with ECU
Front Door Courtesy Lamp Switch
Front Door Courtesy
Lamp Switch Assy
Room Lamp Assy No.2
(Rear Interior Lamp)
High Mounted Stop Lamp
Rear Door w/ Motor Lock Assy RH
(Door Unlock Detection Switch RH)
Rear Door Courtesy
Lamp Switch Assy
Front Door
Courtesy Lamp Assy
Rear Door w/ Motor
Lock Assy LH
(Door Unlock Detec-
tion Switch LH)
Rear Door Courtesy
Lamp Switch Assy
Front Door Courtesy
Lamp Assy
License Plate Lamp
Back Door Lock Assy
(Back Door Courtesy
Lamp Switch)
Rear Combination Lamp LH
Stop Lamp
Taillamp
Turn Signal Lamp
Back-up Lamp
Rear Side Marker Lamp
Rear Combination Lamp RH
Stop Lamp
Taillamp
Turn Signal Lamp
Back-up Lamp
Rear Side Marker Lamp
P
I40005


Automatic Light Control Sensor
Combination Meter Assy
*High Beam Indicator Lamp
Hazard Warning Switch Assy
Multiplex Network Body ECU
ECM
Glove Box Lamp
Parking Brake Switch
Key Cylinder Lamp
Headlamp Dimmer Switch Assy
*Light Control Switch
*Headlamp Dimmer Switch
*Turn Signal Lamp Switch
*Front Fog Lamp Switch
Instrument Panel Junction Block
*FR FOG Fuse
*STOP Fuse
*TAIL Fuse
*TAIL LIGHT Relay
*FOG LIGHT Relay
Stop Lamp Switch
DLC3
Turn Signal Flasher Relay

P I40007

LIGHTING SYSTEM

05CTV-05

PRECAUTION

1. PRECAUTION OF HEADLAMP BULB REPLACEMENT

(a) If even a thin film of oil is left on the surface of the halogen lamp, the bulb may be damaged because the lamp will burn at a higher temperature.

(b) Handle any halogen lamp with great care. Dropping, hitting or damaging the bulb, in any way, may result in it exploding and shattering because the internal pressure is high.

(c) Always prepare a new bulb for immediate replacement. While replacing the bulb, the lens may attract dust and moisture if removed from the vehicle for too long.

(d) Always use a bulb of the same wattage for replacement.

(e) Firmly reinstall the socket after bulb replacement. The lens may become cloudy or the light cavity may fill with water through the gaps around the socket.

05CU2-05

PROBLEM SYMPTOMS TABLE

If a normal system code is displayed during the DTC check but the problem still occurs, check the circuits for each problem symptom in the order given in the table below and proceed to the relevant troubleshooting page.

HINT:

Inspect the fuse and relay before confirming the suspected area as shown in the charts below.

Inspect each malfunction circuit in numerical order for the corresponding symptom.

If the malfunction still exists even after checking and confirming that all the circuits are normal, replace the ECU.

1. HEADLAMP AND TAIL LAMP SYSTEM

Symptom	Suspected Area	See page
”Low beam” does not come on (One side).	3. Bulb 4. Wire harness or connector	- -
”Low beam” does not come on (Both sides).	1. Bulb 2. Light control switch circuit 3. Headlight relay circuit (w/o Daytime running light) 4. DRL relay circuit (w/ Daytime running light) 5. Multiplex network body ECU	- 05-1586 05-1556 05-1562 -
”High beam” does not come on (One side).	1. Bulb 2. Wire harness or connector	- -
”High beam” does not come on (Both sides). (Low beam is normal)	1. Bulb 1. Light control switch circuit 2. DRL relay circuit (w/ Daytime running light) 3. Multiplex network body ECU	- 05-1586 05-1562 -
”Flash” does not come on. (Low beam and High beam are normal)	1. Light control switch circuit 2. Multiplex network body ECU	05-1586 -
Headlamp is dark.	1. Bulb 2. Wire harness or connector	- -
Tail lamp does not come on (All).	1. Light control switch circuit 2. TAIL relay circuit 3. Ignition switch circuit 4. Door courtesy switch circuit 5. Multiplex network body ECU	05-1586 05-1574 05-1594 05-1601 -
Only one tail lamp comes on.	1. Bulb 2. Wire harness or connector	- -
Daytime running light system does not operate.	1. Light control switch circuit 2. Generator signal circuit 3. Parking brake switch circuit 4. Ignition switch circuit 5. DRL relay circuit 6. Multiplex network body ECU	05-1586 05-1596 05-1598 05-1594 05-1562 -

2. AUTOMATIC LIGHT CONTROL SYSTEM

Symptom	Suspected Area	See page
Automatic light control system does not operate.	1. Light control switch circuit 2. Ignition switch circuit 3. Automatic light control sensor circuit 4. Multiplex network body ECU	05-1586 05-1594 05-1589 -

3. LIGHT AUTO TURN OFF SYSTEM

Symptom	Suspected Area	See page
Light auto turn off system does not operate.	1. Light control switch circuit 2. Ignition switch circuit 3. Door courtesy switch circuit 4. Multiplex network body ECU	05-1586 05-1594 05-1601 -

4. FOG LAMP SYSTEM

Symptom	Suspected Area	See page
Front fog lamp does not come on with light control switch in the TAIL or HEAD position.	1. Light control switch circuit 2. Front fog light circuit 3. Multiplex network body ECU	05-1586 05-1582 -
Only one front fog lamp does not come on.	1. Bulb 2. Wire harness or connector	- -

5. TURN SIGNAL AND HAZARD WARNING SYSTEM

Symptom	Suspected Area	See page
”Hazard” and ”Turn” do not come on.	1. Ignition switch 2. Turn signal flasher relay 3. Wire harness or connector	- 65-2 -
Hazard warning light does not come on. (Turn is normal)	1. Hazard warning switch 2. Wire harness or connector	65-4 -
Turn signal does not come on. (Hazard is normal)	1. Headlamp dimmer switch (turn signal switch) 2. Wire harness or connector	65-4 -
Turn signal does not come on in one direction.	1. Headlamp dimmer switch (turn signal switch) 2. Wire harness or connector	65-4 -
Only one bulb does not come on.	1. Bulb 2. Wire harness or connector	- -

6. STOP LIGHT SYSTEM

Symptom	Suspected Area	See page
Stop light does not operate (All).	1. Stop light switch 2. Wire harness or connector	65-4 -
Only one stop light does not operate.	1. Bulb 2. Wire harness or connector	- -

7. ILLUMINATED ENTRY SYSTEM

Symptom	Suspected Area	See page
Illuminated entry of multiplex network body ECU control does not operate (All).	1. Ignition switch circuit 2. Door lock position circuit 3. Door courtesy switch circuit 4. Illumination circuit 5. Multiplex network body ECU	05-1594 05-1604 05-1601 05-1606 -

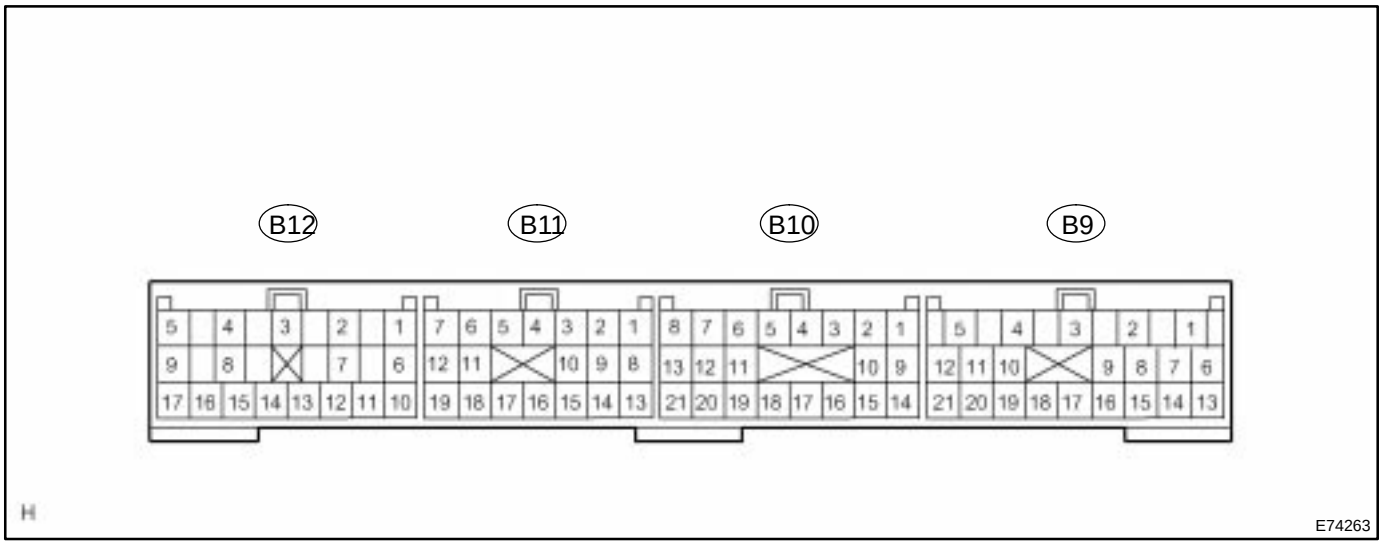
8. OTHERS

Symptom	Suspected Area	See page
Back up lamp does not come on (All).	1. Park/neutral position switch 2. Wire harness or connector	05-922 or 05-1036 -
Vanity light does not operate.	1. Bulb 2. Wire harness or connector	- -
Door courtesy lamp does not come on.	1. Bulb 2. Door courtesy switch circuit 3. Wire harness or connector 4. Multiplex network body ECU	- 05-1601 - -
Luggage compartment light does not come on. (When back door is opened)	1. Rear interior light 2. Back door courtesy switch 3. Wire harness or connector	65-4 65-4 -
Luggage compartment light does not come on. (When rear door is opened)	1. Rear interior light 2. Door courtesy switch circuit 3. Wire harness or connector 4. Multiplex network body ECU	65-4 05-1601 - -

05IQ3-01

TERMINALS OF ECU

1. MULTIPLEX NETWORK BODY ECU



Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	Specified Condition
GND2 (B9-2) - Body ground	W-B - Body ground	Body ground	Always	Below 1 V
IG (B9-5) - GND1 (B12-7)	BR - W-B	Ignition switch signal	・Ignition switch is OFF ・Ignition switch is in the ON position	・Below 1 V ・10 to 14 V
FFGO (B9-6) - GND1 (B12-7)	V - W-B	Front fog relay (Front fog circuit)	・Front fog lamp is in the OFF position ・Front fog lamp is in the ON position	・10 to 14 V ・Below 1 V
TRLY (B9-7) - GND1 (B12-7)	SB - W-B	TAIL Relay (TAIL signal)	・Light control switch is in the TAIL position ・Light control switch is in the OFF position	・10 to 14 V ・Below 1 V
MPX2 (B9-10) - GND1 (B12-7)	O - W-B	Multiplex communication circuit	Ignition switch is in the ON position	Signal waveform
CLTB (B9-12) - GND1 (B12-7)	G - W-B	Automatic light control sensor (Power source circuit)	・Ignition switch is OFF ・Ignition switch is in the ON position	・Below 1 V ・10 to 14 V
ACC (B9-17) - GND1 (B12-7)	B - W-B	Ignition switch signal	・Ignition switch is OFF ・Ignition switch is in the ACC position	・Below 1 V ・10 to 14 V
CLTE (B9-20) - GND1 (B12-7)	W - W-B	Automatic light control sensor (Ground circuit)	Always	Below 1 V
CLTS (B9-21) - GND1 (B12-7)	R - W-B	Automatic light control sensor (Signal circuit)	Ignition switch is in the ON position	Signal waveform
MPX1 (B10-6) - GND1 (B12-7)	W - W-B	Multiplex communication circuit	Ignition switch is in the ON position	Signal waveform
FFOG (B10-10) - GND1 (B12-7)	BR - W-B	Front fog lamp switch (Front fog lamp signal)	・Fog lamp switch is in the OFF position ・Fog lamp switch is in the ON position	・10 to 14 V ・Below 1 V

LSWP (B10-11) - GND1 (B12-7)	BR - W-B	Door lock position switch (Front passenger side door circuit)	・Front passenger side door is in the unlock position ・Front passenger side door is in the lock position	・Below 1 V ・10 to 14 V
HU (B10-14) - GND1 (B12-7)	Y - W-B	Headlamp dimmer switch (HIGH signal)	・Headlamp dimmer switch is in the LOW position ・Headlamp dimmer switch is in the HIGH or FLASH position	・10 to 14 V ・Below 1 V
HF (B10-15) - GND1 (B12-7)	O - W-B	Headlamp dimmer switch (FLASH signal)	・Headlamp dimmer switch is in the LOW position ・Headlamp dimmer switch is in the FLASH position	・10 to 14 V ・Below 1 V
A (B10-16) - GND1 (B12-7)	P - W-B	Light control switch (AUTO signal)	・Light control switch is in the OFF position ・Light control switch is in the AUTO position	・10 to 14 V ・Below 1 V
HEAD (B10-17) - GND1 (B12-7)	LG - W-B	Light control switch (HEAD signal)	・Light control switch is in the OFF position ・Light control switch is in the HEAD position	・Below 1 V ・10 to 14 V
TAIL (B10-18) - GND1 (B12-7)	V - W-B	Light control switch (TAIL signal)	・Light control switch is in the OFF position ・Light control switch is in the TAIL position	・10 to 14 V ・Below 1 V
DRL (B11-2) - GND1 (B12-7) (*1)	B - W-B	DRL Relay (DRL signal)	・Light control switch is in the OFF or TAIL position ・Light control switch is in the HEAD position	・10 to 14 V ・Below 1 V
HRLY (B11-3) - GND1 (B12-7)	R - W-B	HEAD Relay (HEAD signal)	・Light control switch is in the OFF or TAIL position ・Light control switch is in the HEAD position	・10 to 14 V ・Below 1 V
BCTY (B11-6) - GND1 (B12-7)	G - W-B	Luggage room light (Illumination signal)	・Luggage room light is OFF (When switch is in the DOOR position) ・Luggage room light is ON (When switch is in the DOOR position)	・10 to 14 V ・Below 1 V
DCTY (B11-11) - GND1 (B12-7)	B - W-B	Courtesy switch (Driver side door circuit)	・Driver side door is open ・Driver side door is closed	・Below 1 V ・10 to 14 V
DCYL (B11-19) - GND1 (B12-7)	L - W-B	Door courtesy light circuit	・Driver side courtesy light is OFF ・Driver side courtesy light is ON	・10 to 14 V ・Below 1 V
GND1 (B12-7) - Body ground	W-B - Body ground	Body ground	Always	Below 1 V
BECU (B12-9) - GND1 (B12-7)	G - W-B	Battery (B+ circuit)	Always	10 to 14 V
ILE (B12-11) - GND1 (B12-7)	BR - W-B	Each of interior light (Illumination signal)	・Interior light is OFF ・Interior light is ON	・10 to 14 V ・Below 1 V
PCYL (B12-12) - GND1 (B12-7)	Y - W-B	Door courtesy light circuit	・Front passenger side courtesy light is OFF ・Front passenger side courtesy light is ON	・10 to 14 V ・Below 1 V
PKB (B12-14) - GND1 (B12-7)	R - W-B	Parking brake switch	・Parking brake is ON ・Parking brake is released	・Below 1 V ・10 to 14 V
RCTY (B12-15) - GND1 (B12-7)	LG - W-B	Courtesy switch (Rear door circuit)	・One of the rear doors is open ・Rear doors are closed	・Below 1 V ・10 to 14 V

PCTY (B12-16) - GND1 (B12-7)	SB - W-B	Courtesy switch (Front passenger side door circuit)	›¦Front passenger door is open ›¦Front passenger door is closed	›¦Below 1 V ›¦10 to 14 V
LSWA (B12-17) - GND1 (B12-7)	B - W-B	Door lock position switch (Rear and back door circuit)	›¦One of the rear and back doors is in the unlock position ›¦Rear and back doors are in the lock position	›¦Below 1 V ›¦10 to 14 V

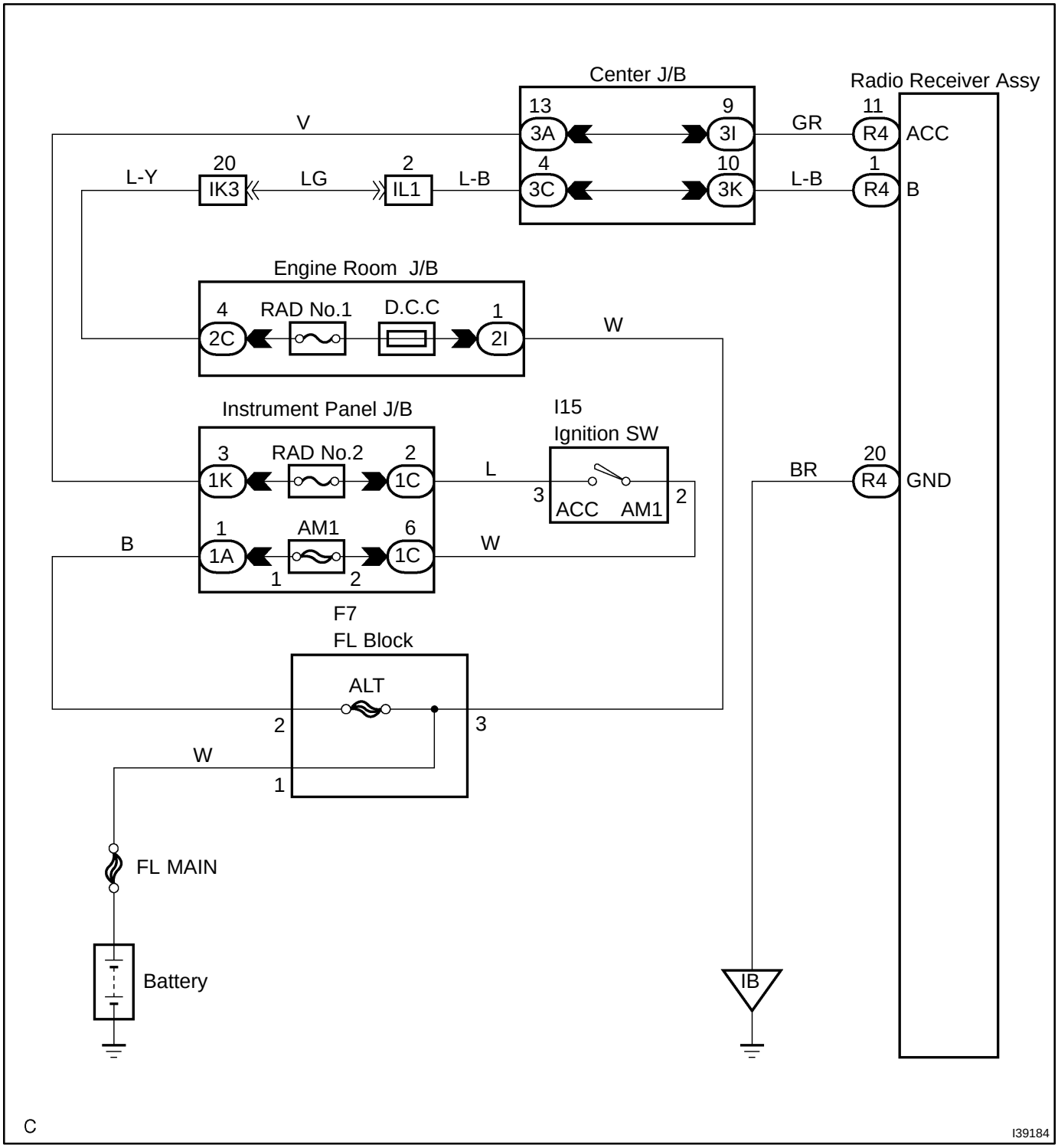
*1: w/ Daytime running light

POWER SOURCE CIRCUIT (RADIO RECEIVER ASSY)

CIRCUIT DESCRIPTION

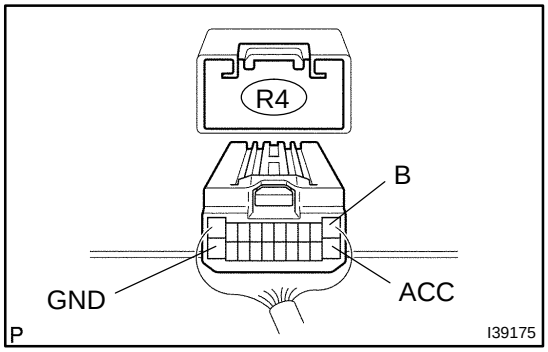
This circuit provides power to the radio receiver assy.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT RADIO RECEIVER ASSY(B, ACC, GND)



(a) Disconnect the radio receiver assy connector R4.

(b) Measure the resistance according to the value in the table below.

Standard:

Tester connection	Condition	Specified condition
GND - Body ground	Always	Below 1 Ω

(c) Measure the voltage according to the values in the table below.

Standard:

Tester connection	Condition	Specified condition
B - GND	Always	10 to 14 V
ACC - GND	Ignition SW ACC	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

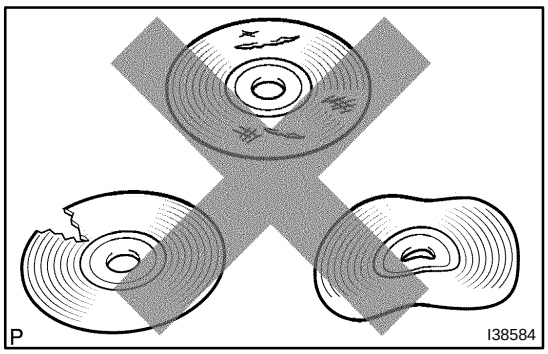
OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN DIAGNOSTIC TROUBLE CODE CHART (SEE PAGE 05-1791)

MAP DISC CANNOT BE INSERTED

INSPECTION PROCEDURE

1	CHECK MAP DISC



(a) Check that the map disc is not deformed or cracked.
OK: No deformations or cracks appear on the map disc.

NG → **REPLACE THE MAP DISC**

OK

2	CHECK NAVIGATION ECU

(a) Check that the ”PUSH” indicator near the disc slot comes on.
OK: It does not come on.

NG → **PRESS THE EJECT SWITCH TO EJECT THE DISC**

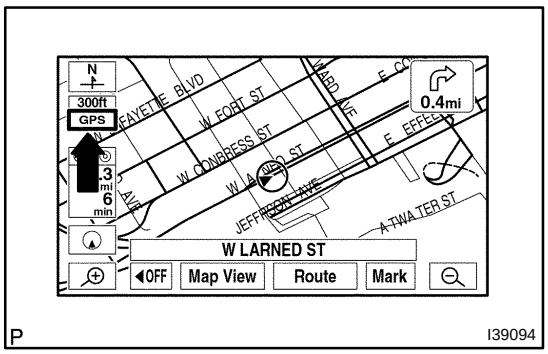
OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-1778)

VEHICLE POSITION MARK DEVIATES GREATLY

INSPECTION PROCEDURE

1	CHECK THE GPS MARK



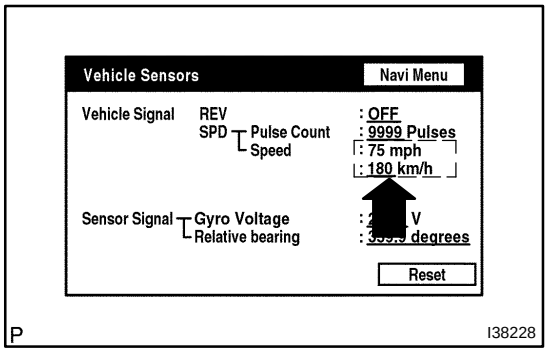
(a) Check that the GPS mark is displayed.
OK:The GPS mark is displayed.

NG → **GO TO "GPS MARK IS NOT DISPLAYED" IN THE FLOW CHART (SEE PAGE 05-1818)**

OK

2	NAVIGATION CHECK MODE(VEHICLE SENSORS)

(a) Enter the "Navigation Check" mode (Vehicle Sensors) (see page 05-1765).

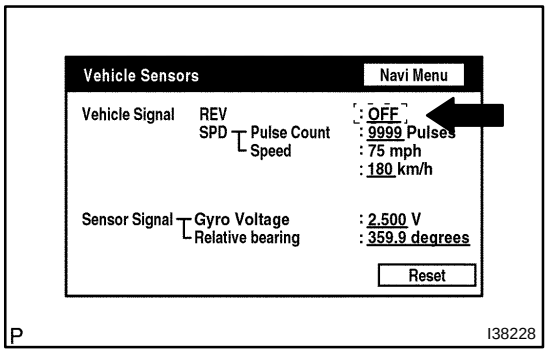


(b) While driving, compare the "SPD" indicator to the reading on the speedometer. Check that these readings are almost the same.
OK: The readings are almost the same.

NG → **GO TO "SPEED SIGNAL CIRCUIT (NAVIGATION ECU - COMBINATION METER ASSY)" IN THE FLOW CHART (SEE PAGE 05-1838)**

OK

3 NAVIGATION CHECK MODE(VEHICLE SENSORS)



(a) Move the shift lever to the R or P position.

Standard:

Shift lever	Display
P	OFF
R	ON

HINT:

The display is updated once per second. As a result, it is normal for the display to lag behind the actual change in the switch.

NG → **GO TO "REVERSE SIGNAL CIRCUIT" IN THE FLOW CHART (SEE PAGE 05-1844)**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-1778)

BLACK SCREEN (NO IMAGE APPEARS ON NAVIGATION AND AUDIO SCREEN)

INSPECTION PROCEDURE

1	CHECK DISPLAY SETTING

(a) Check that the display is not in ”Screen OFF” mode.
OK: The display setting is not in ”Screen OFF” mode.

NG → **CHANGE SCREEN TO ”SCREEN ON” MODE**

OK

2	CHECK IMAGE QUALITY SETTING

(a) Check if screen color quality can be set.
OK: Switching is possible.

OK → **PRESS PANEL SWITCH ”DISPLAY” AND SET SCREEN COLOR QUALITY TO NORMAL**

NG

3	CHECK CABIN

(a) Check if condensation is likely to occur, or the temperature is high or low (extremely cold) in the cabin.
HINT:
This problem occurs when the cabin is humid and the temperature rapidly changes. This condition may produce condensation, resulting in a short circuit.
OK: The above condition is not observed.

NG → **SET CABIN TEMPERATURE TO APPROPRIATE DEGREES (20 TO 30°C) (68 TO 86°F)**

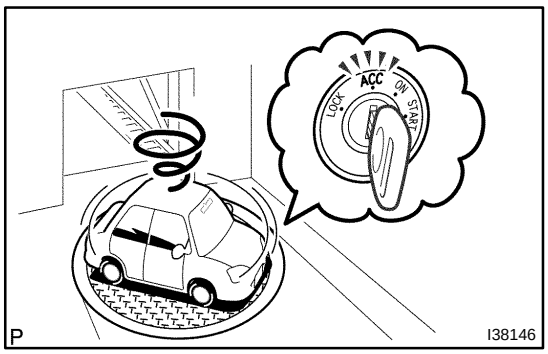
OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-1778)

CURSOR OR MAP ROTATES WHEN VEHICLE IS STOPPED

INSPECTION PROCEDURE

1	CHECK CONDITION



(a) Check with the customer if the vehicle has been turned by a turn-table at parking.

OK: The vehicle has not been turned by a turntable.

HINT:

If the ignition switch is turned to the ACC or ON position while the vehicle is being turned by a turntable, the system may store the angular velocity at this time. For this reason, the vehicle position cursor could deviate.

NG → **TURN IGNITION SWITCH TO ON POSITION WHEN VEHICLE IS COMPLETELY STOPPED**

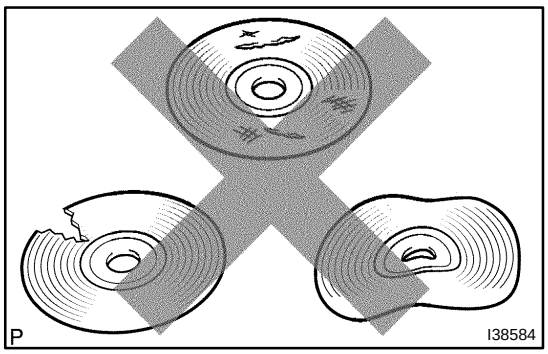
OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-1778)

VEHICLE POSITION MARK IS NOT UPDATED

INSPECTION PROCEDURE

1	CHECK THE MAP DISC



(a) Check that the map disc is not deformed or cracked.
OK: No deformations or cracks appear on the map disc.

NG → **REPLACE THE MAP DISC**

OK

2	CHECK THE MAP DISPLAY

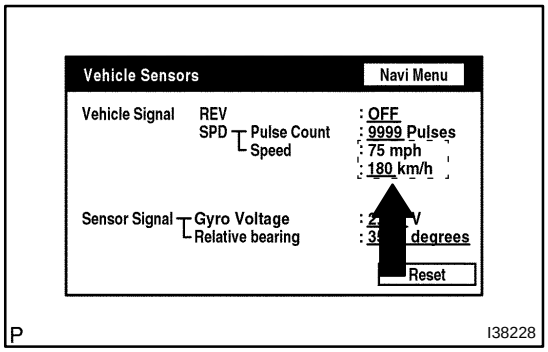
(a) Check if a touch scroll can be performed on the map display.
OK: Touch scroll can be performed.

NG → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-1778)**

OK

3	NAVIGATION CHECK MODE(VEHICLE SENSORS)

(a) Enter the ”Navigation Check” mode (Vehicle Sensors) (see page 05-1765).



(b) While driving, compare the ”SPEED” indicator to the reading on the speedometer. Check if these readings are almost the same.
OK: The readings are almost the same.

NG → **GO TO ”SPEED SIGNAL CIRCUIT (NAVIGATION ECU - COMBINATION METER ASSY)” IN THE FLOW CHART (SEE PAGE 05-1838)**

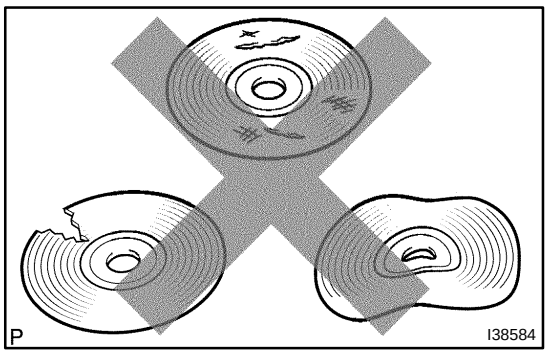
OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-1778)

CURRENT POSITION DISPLAY DOES NOT APPEAR

INSPECTION PROCEDURE

1	CHECK THE MAP DISC



(a) Check that the map disc is not deformed or cracked.
OK: No deformations or cracks appear on the map disc.

NG → **REPLACE THE MAP DISC**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-1778)

GPS MARK IS NOT DISPLAYED

INSPECTION PROCEDURE

1	CHECK CABIN

(a) Check the cabin for any object that might interrupt radio reception on the instrument panel. If such an object exists, remove it and check if the GPS mark appears.

HINT:

GPS works using extremely weak radio waves originating from satellites. If the signal is interrupted by obstructions or another radio wave, the GPS system may not be able to properly receive the signal.

OK: Mark appears.

OK → **NORMAL OPERATION**

NG

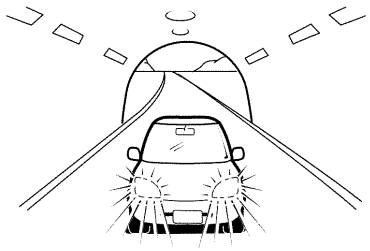
2	CHECK SURROUNDINGS

(a) Check if the vehicle is in a location where GPS signal reception is bad. If the vehicle is in such a place, move it elsewhere and check if the GPS mark appears.

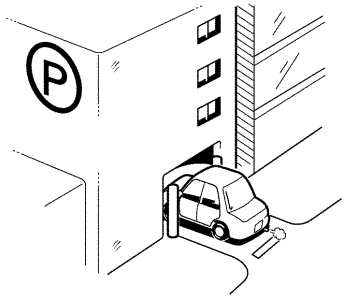
HINT:

- GPS uses 24 satellites in 6 orbits so that at any time 5 satellites will be in line-of-sight of your vehicle.
- GPS signals may not be received, however, depending on surroundings, vehicle direction, and time.

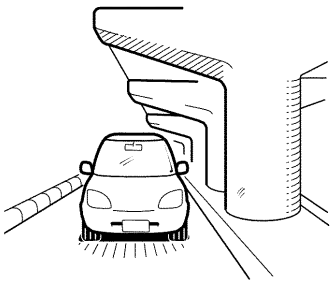
* The following illustrations show some conditions where it may be difficult to receive GPS signals.



In a tunnel



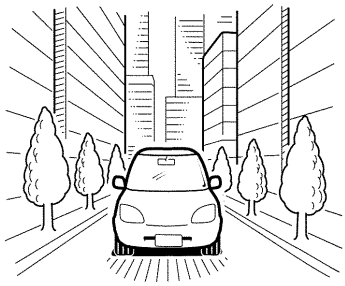
In a building



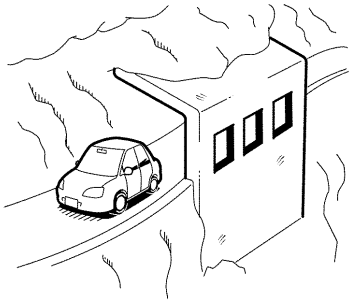
Under an overpass



Forest or tree-lined path



Between tall buildings



Under a cliff, overhang

P I38586

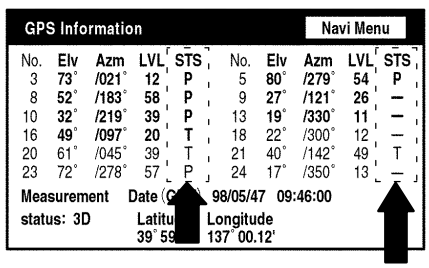
OK: GPS mark is displayed.

OK	RETURNS TO NORMAL

NG

3 NAVIGATION CHECK MODE(GPS IMFORMATION)

(a) Enter the "Navigation Check" mode (GPS information) (see page 05-1764).



P I38226

(b) Check how many of the following codes occur in the "STS" column.

OK: At least 3 codes occur.

OK	REPLACE NAVIGATION ECU (SEE PAGE 67-9)

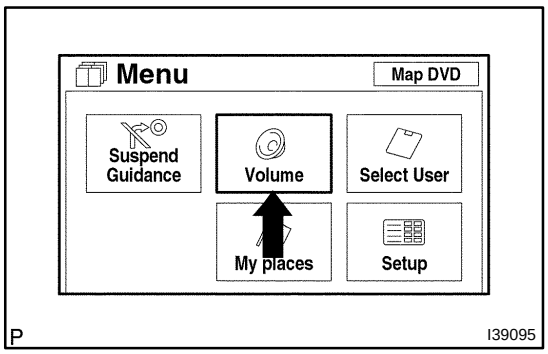
NG

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-1778)

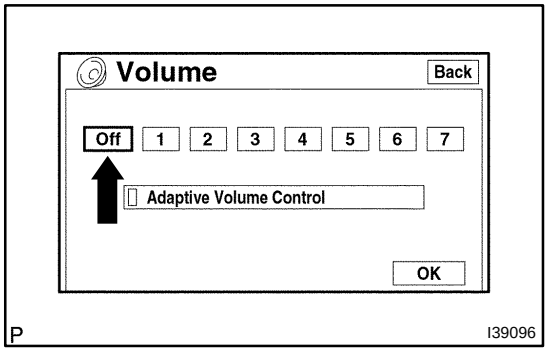
VOICE GUIDANCE DOES NOT FUNCTION

INSPECTION PROCEDURE

1	CHECK NAVIGATION SYSTEM SETTING



(a) Enter the ”MENU” screen by pressing the ”MENU” switch.
(b) Enter the volume adjustment screen by pressing the ”Volume” switch.

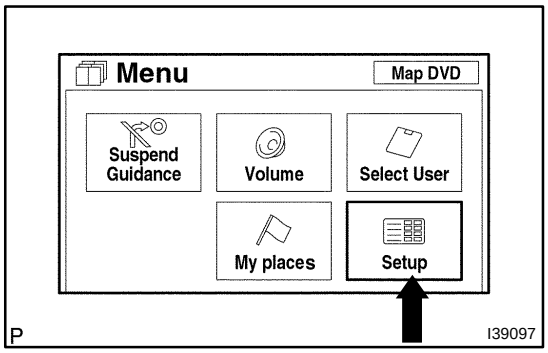


(c) Check that ”OFF” is not selected.
OK: OFF is not selected.

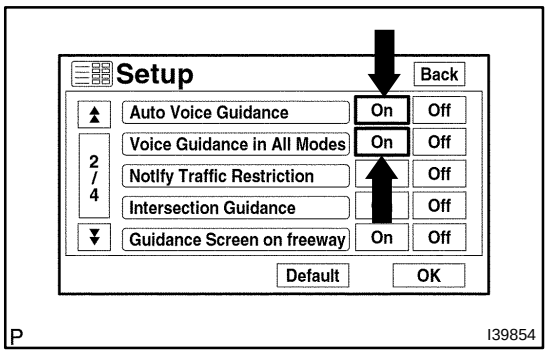
NG → **TURN VOICE GUIDANCE VOLUME UP TO 4 USING VOICE ADJUSTMENT SWITCHES**

OK

2 CHECK NAVIGATION SETTING



(a) Enter the ”MENU” screen by pressing the ”MENU” switch.
(b) Enter the ”Setup” screen by pressing the ”Setup” switch.

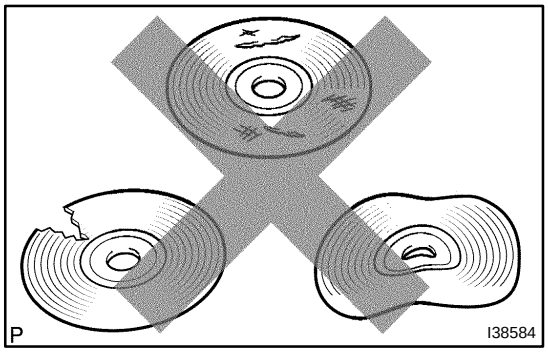


(c) Check that ”Auto Voice Guidance” is not OFF.
OK: Auto voice guidance is not OFF.
(d) Check if ”Voice Guidance in All Modes” is ON.
OK: Voice guidance in all modes is ON.

NG → **TURN AUTO VOICE GUIDANCE TO ”ON”**

OK

3 CHECK THE MAP DISC



(a) Check that the map disc is not deformed or cracked.
OK: No deformations or cracks appear on the map disc.

NG → **REPLACE THE MAP DISC**

OK

4	CHECK RADIO RECEIVER ASSY

(a) Check if audio sound can be heard from the driver's side speaker.
OK: Audio sound can be heard.

NG → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-1778)**

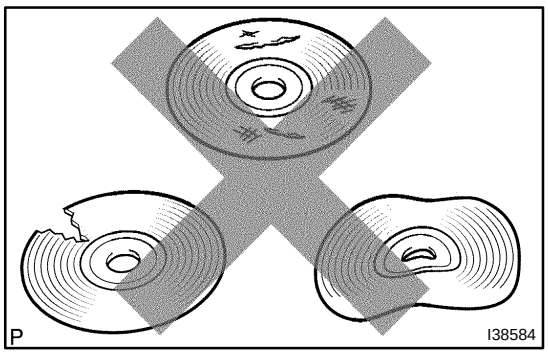
OK

REPLACE NAVIGATION ECU (SEE PAGE 67-9)

MAP DISPLAY INCOMPLETE

INSPECTION PROCEDURE

1	CHECK THE MAP DISC



(a) Check that the map disc is not deformed or cracked.
OK: No deformations or cracks appear on the map disc.

NG → **REPLACE THE MAP DISC**

OK

2	CHECK THE DISPLAY

(a) Check that displays other than the navigation display are complete.
OK: No other incomplete displays are found.

OK → **REPLACE NAVIGATION ECU (SEE PAGE 67-9)**

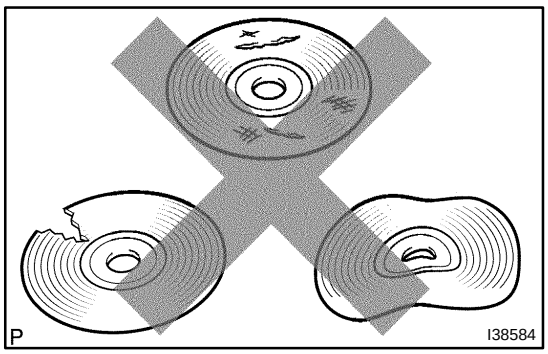
NG

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-1778)

ROUTE CANNOT BE CALCULATED

INSPECTION PROCEDURE

1	CHECK THE MAP DISC



(a) Check that the map disc is not deformed or cracked.
OK: No deformations or cracks appear on the map disc.

NG → **REPLACE THE MAP DISC**

OK

2	SET DESTINATION

(a) Set another destination and check if the system can calculate the route correctly.
OK: Route can be correctly calculated.

OK → **NORMAL OPERATION**

NG

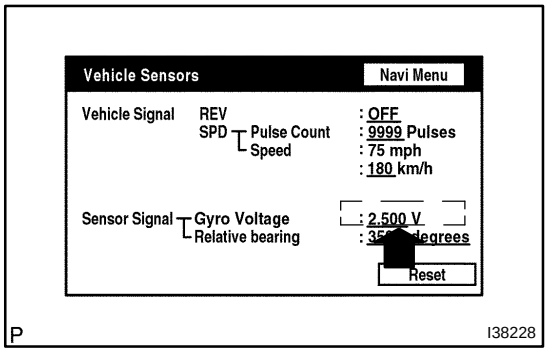
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-1778)

GYRO ERROR

INSPECTION PROCEDURE

1	NAVIGATION CHECK MODE(VEHICLE SENSORS)

(a) Enter the ”Navigation Check” mode (Vehicle Sensors) (see page 05-1765).



(b) Check the gyro voltage.

Standard: 0.1 to 4.5 V

NG → **REPLACE NAVIGATION ECU (SEE PAGE 67-9)**

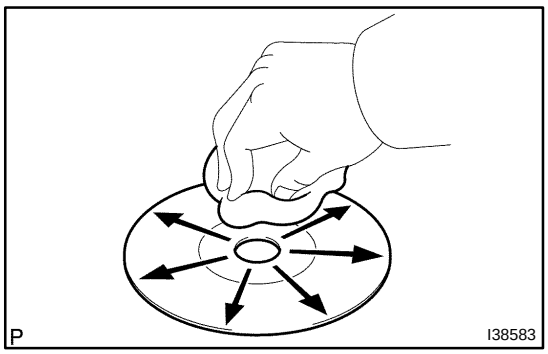
OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN DIAGNOSTIC TROUBLE CODE CHART (SEE PAGE 05-1791)

MAP DISC READ ERROR

INSPECTION PROCEDURE

1	CHECK THE MAP DISC



(a) Check for dirt on the map disc surface.
OK: No dirt is on the map disc surface.

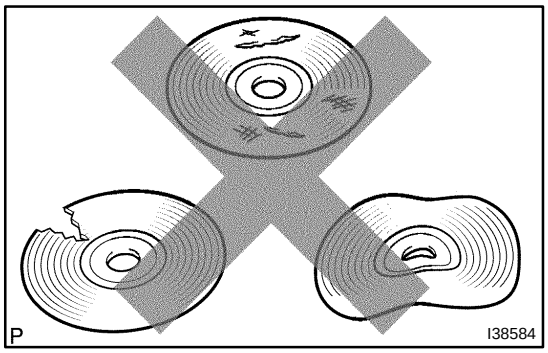
HINT:
If dirt is on the map disc surface, wipe it with a soft cloth from inside to outside in a radial direction.

NOTICE:
Do not use conventional record cleaner or anti-static preservative.

NG → **CLEAN THE MAP DISC**

OK

2	CHECK THE MAP DISC



(a) Check that the map disc is not deformed or cracked.
OK: No deformations or cracks appear on the map disc.

NG → **REPLACE THE MAP DISC**

OK

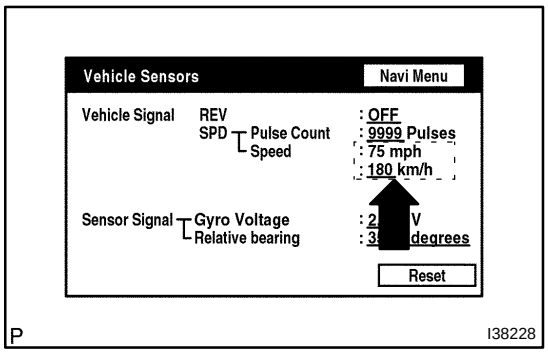
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN DIAGNOSTIC TROUBLE CODE CHART (SEE PAGE 05-1791)

SPEED SIGNAL ERROR

INSPECTION PROCEDURE

1	NAVIGATION CHECK MODE(VEHICLE SENSORS)

(a) Enter the ”Navigation Check” mode (Vehicle Sensors) (see page 05-1765).



(b) While driving, compare the ”SPD” indicator to the reading on the speedometer. Check if these readings are almost the same.

OK: The readings are almost the same.

OK → **REPLACE NAVIGATION ECU (SEE PAGE 67-9)**

NG

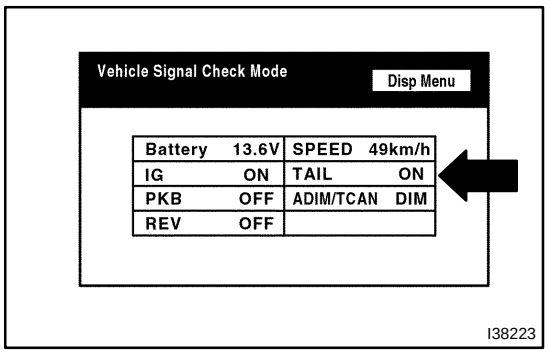
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN DIAGNOSTIC TROUBLE CODE CHART (SEE PAGE 05-1791)

ILLUMINATION FOR PANEL SWITCH DOES NOT COME ON WITH TAIL SWITCH ON

INSPECTION PROCEDURE

1	DISPLAY CHECK MODE(VEHICLE SIGNAL CHECK MODE)

(a) Enter the ”Display Check” mode (Vehicle Signal Check Mode) (see page 05-1763).



(b) Turn the light control switch TAIL or ON and OFF.

Standard:

TAIL Switch	Display
TAIL or ON	ON
OFF	OFF

HINT:

This display is updated once per second. As a result, it is normal for the display to lag behind the actual change in the switch.

OK → **REPLACE MULTI-DISPLA Y (SEE PAGE 67-8)**

NG

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-1778)

DISPLAY DOES NOT DIM (NIGHT SCREEN) WITH TAIL SWITCH ON

INSPECTION PROCEDURE

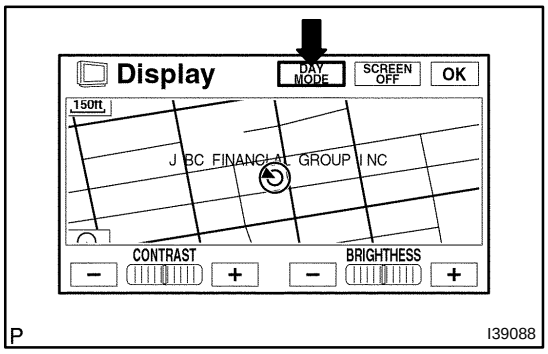
1	CHECK SYSTEM

(a) Turn the light control switch to the TAIL or HEAD position.
Check if the illumination of the switches such as on the radio receiver assy comes on.
OK: Illumination of the switches comes on.

NG → **GO TO COMBINATION METER SYSTEM (SEE PAGE 05-1868)**

OK

2	CHECK IMAGE QUALITY SETTING



(a) Enter the display adjustment screen by pressing the "DISPLAY" switch.
(b) Turn the light control switch to TAIL.
(c) Check if "DAY MODE" on the display adjustment is ON.
OK: "DAY MODE" is ON.

OK → **TURN FORCED "DAY MODE" SETTING OFF**

NG

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-1778)

PANEL SWITCH DOES NOT FUNCTION

INSPECTION PROCEDURE

1	CHECK THE PANEL SWITCH

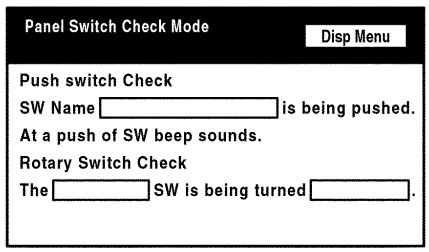
(a) Check for foreign matter around the switch that might prevent operation.
OK: No foreign matter is found.

NG → **REMOVE ANY FOREIGN MATTER FOUND**

OK

2	DISPLAY CHECK MODE(PANEL SWITCH CHECK MODE)

(a) Enter the ”Display Check” mode (Panel Switch Check Mode) (see page 05-1762).



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(b) Operate the abnormal switch and check if the switch name and status are correctly displayed.
OK: The switch name and status are correctly displayed as operated.

OK → **REPLACE MULTI-DISPLA Y (SEE PAGE 67-8)**

NG

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-1778)

TOUCH PANEL SWITCH DOES NOT FUNCTION

INSPECTION PROCEDURE

1	CHECK TOUCH PANEL

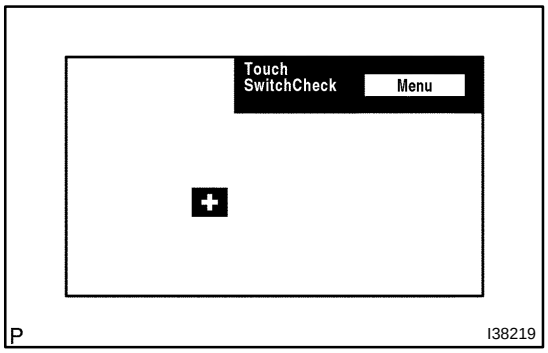
(a) Check for dirt on the display surface.
OK: The display surface is clean.

NG → **REMOVE ANY DIRT FOUND AND RECHECK TOUCH PANEL**

OK

2	DISPLAY CHECK MODE(TOUCH SWITCH CHECK)

(a) Enter the ”Display Check” mode (Touch Switch Check) (see page 05-1761).



(b) Touch the display in the area where the abnormal switch occurs.
OK: A ”+” mark appears at the touched position.

OK → **REPLACE MULTI-DISPLA Y (SEE PAGE 67-8)**

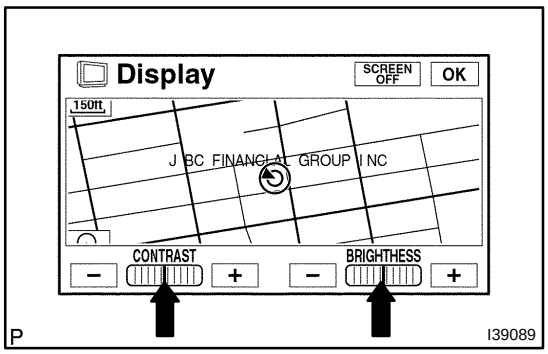
NG

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-1778)

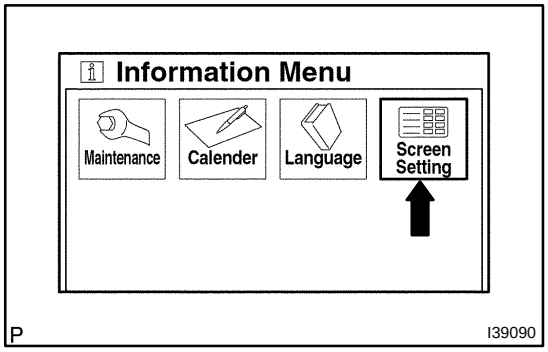
SCREEN FLICKER OR COLOR DISTORTION

INSPECTION PROCEDURE

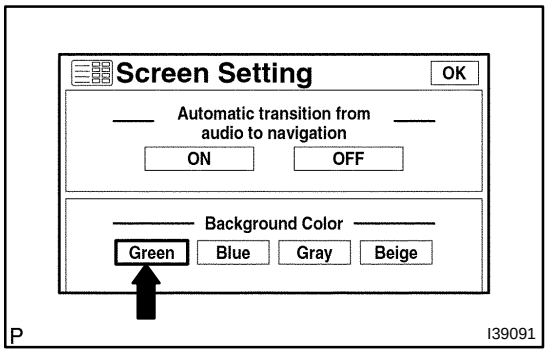
1	CHECK DISPLAY SETTING



(a) Enter the display adjustment screen by pressing the "DISPLAY" switch.
(b) Reset display settings (contrast, brightness) and check if the screen appears normal.



(c) Press the "INFO" switch and then the "Screen Setting" switch.



(d) Set the "Background Color" to "Green" (initial setting) and check if it is normal.
OK: Returns to normal.

OK → **END**

NG

2	CHECK CABIN

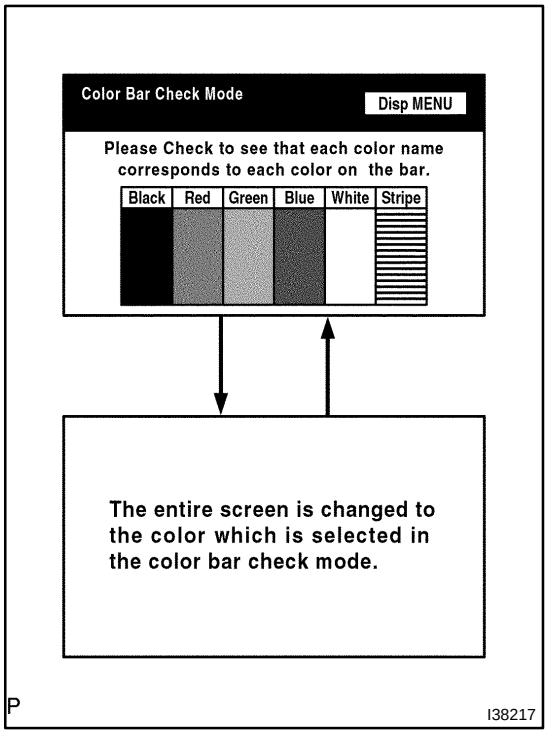
(a) Check if the cabin temperature is -20°C (-4.0°F) or less.
OK: Cabin is warmer than -20°C (-4.0°F).

NG → **HEAT THE CABIN AND RECHECK THE TEMPERATURE**

OK

3 DISPLAY CHECK MODE(COLOR BAR CHECK MODE)

(a) Enter the ”Display Check” mode (Color Bar Check Mode) (see page 05-1760).



(b) Check that color bars match the displayed names.

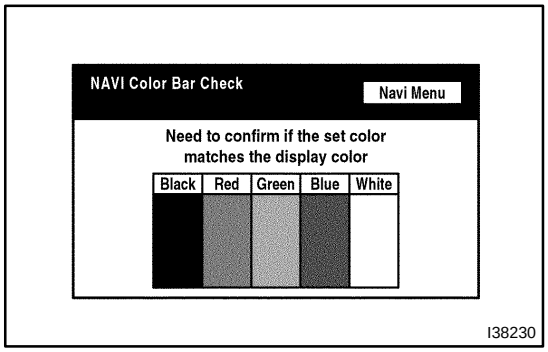
OK: Color bars match the displayed names.

NG → **REPLACE MULTI-DISPLA Y (SEE PAGE 67-8)**

OK

4 NAVIGATION CHECK MODE(NAVI COLOR BAR CHECK)

(a) Enter the ”Navigation Check” mode (NAVI Color Bar Check) (see page 05-1766).



(b) Check that color bars match the displayed names.

OK: Color bars match the displayed names.

OK → **REPLACE MULTI-DISPLA Y (SEE PAGE 67-8)**

NG

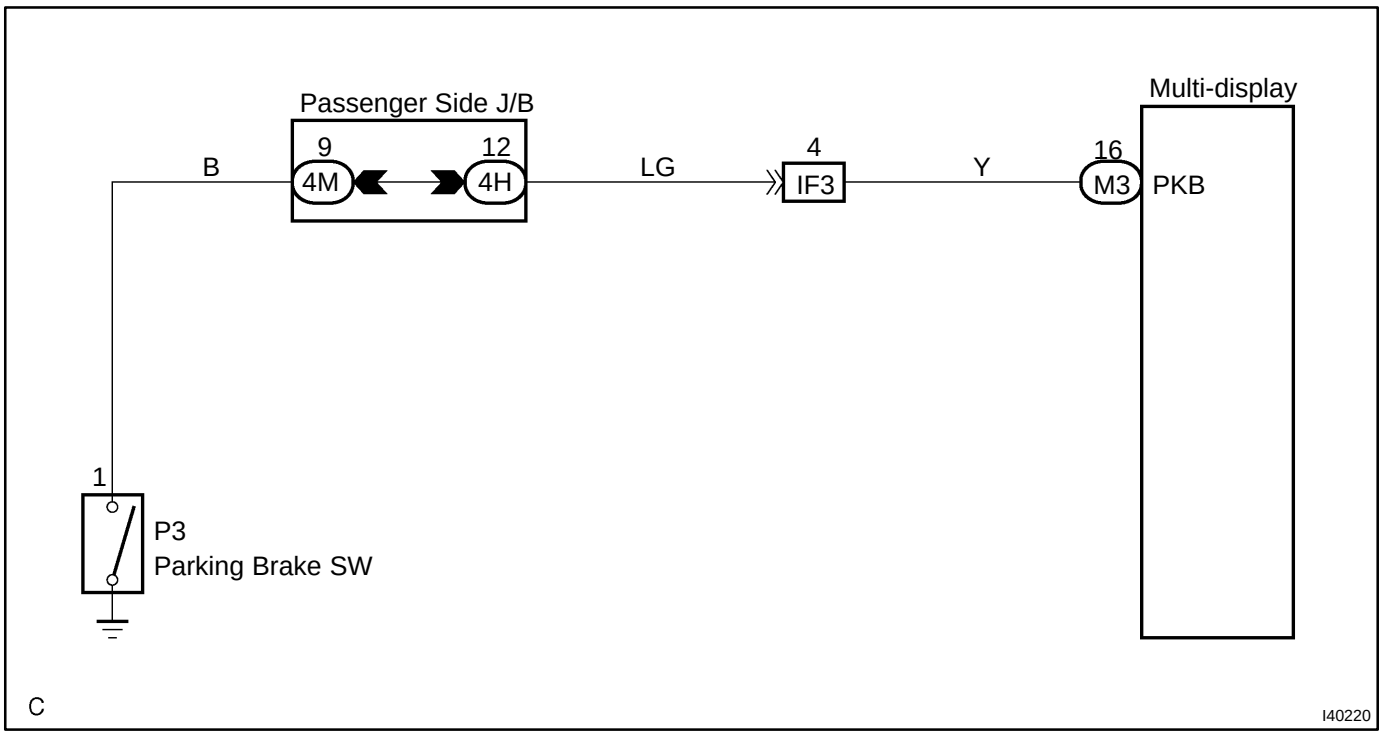
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-1778)

PARKING BRAKE SWITCH CIRCUIT

CIRCUIT DESCRIPTION

This is circuit from the parking brake switch to the multi-display.

WIRING DIAGRAM



INSPECTION PROCEDURE

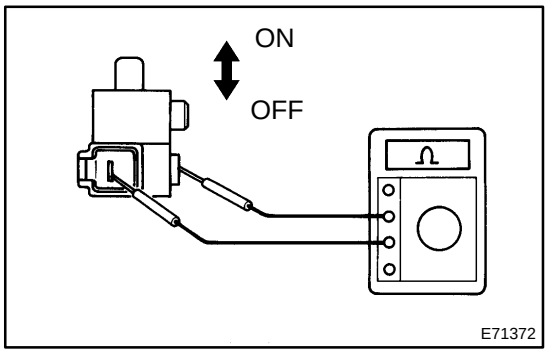
1	CHECK BRAKE WARNING LIGHT

(a) Check that the brake warning light comes on when parking brake pedal is depressed, and goes off when the parking brake pedal is released.

OK → **Go to step 3**

NG

2	INSPECT PARKING BRAKE SWITCH ASSY



(a) Disconnect the parking brake switch assy.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

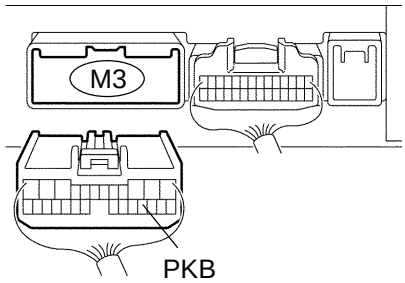
Tester connection	Condition	Specified condition
Switch connector - Switch body	ON (When shaft is not pressed)	Below 1 Ω
Switch connector - Switch body	OFF (When shaft is pressed)	10 kΩ or higher

NG → **REPLACE PARKING BRAKE SWITCH ASSY**

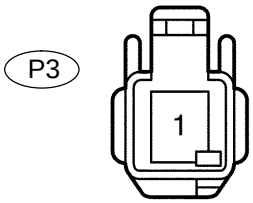
OK

3	CHECK HARNESS AND CONNECTOR(PARKING BRAKE SWITCH - MULTI-DISPLAY)

Multi-Display:



Wire Harness Side (Parking Brake Switch):



(a) Disconnect the connector from multi-display and parking brake switch assy.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
PKB - P3-1	Always	Below 1 Ω
PKB - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE MULTI-DISPLAY (SEE PAGE 67-8)

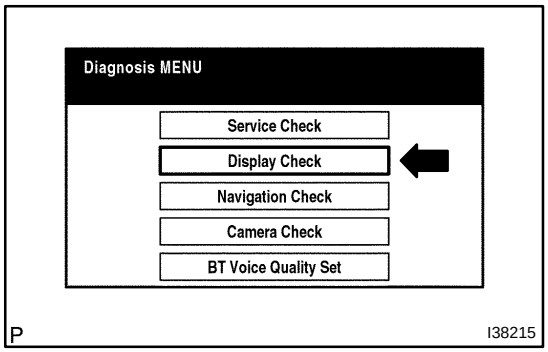
05IRZ-02

DISPLAY CHECK MODE (COLOR BAR CHECK)

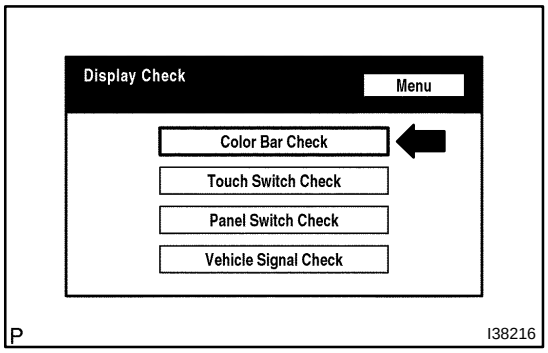
HINT:

- This mode checks the color display on the multi-display.
- Illustrations may differ from the actual vehicle depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle.

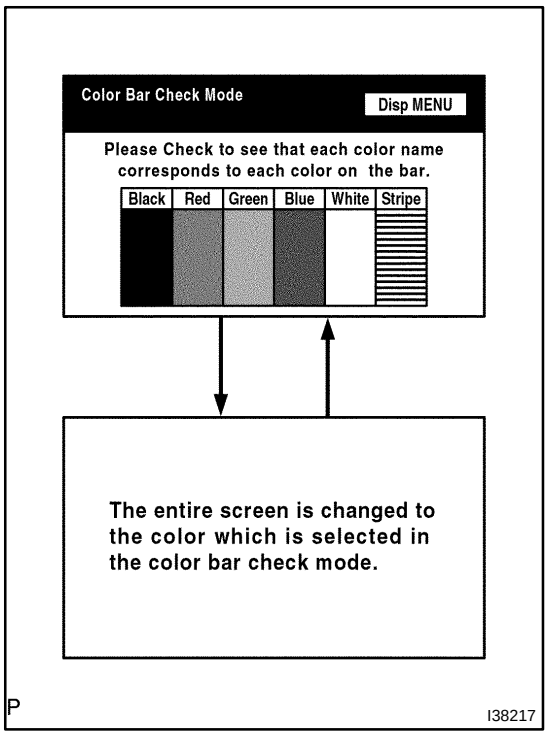
1. Enter diagnostic mode (see page 05-1784).



2. Select "Display Check" from the "Diagnosis MENU" screen.



3. Select "Color Bar Check" from the "Display Check" screen.



4. Select a color bar from the "Color Bar Check Mode" screen.

HINT:

- The entire screen turns to the color or stripe selected.
- Touching the display will return to the "Color Bar Check" screen.

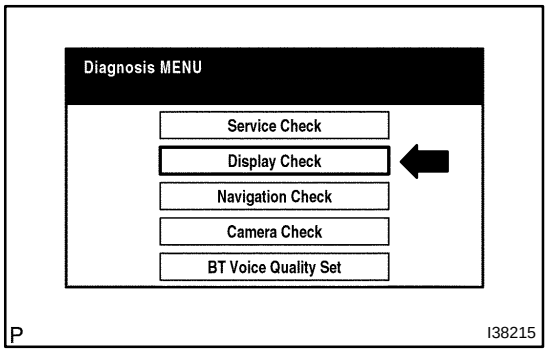
05IS1-02

DISPLAY CHECK MODE (PANEL SWITCH CHECK)

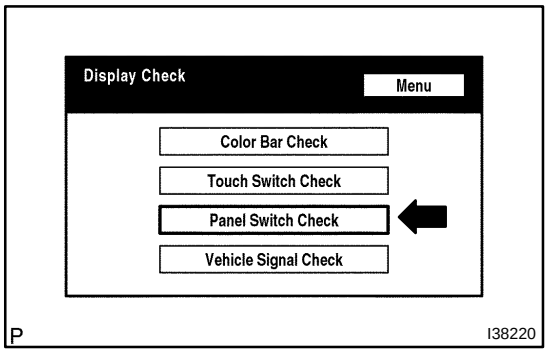
HINT:

- This mode checks the panel switch operation response on the multi-display.
- Illustrations may differ from the actual vehicle depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle.

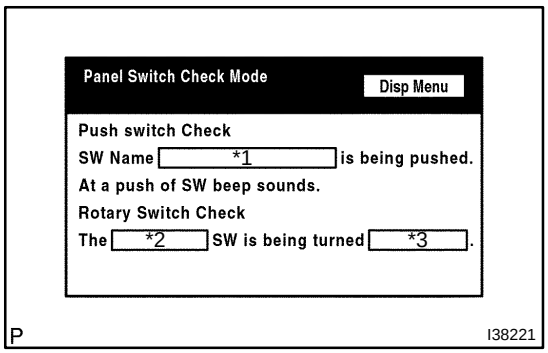
1. Enter diagnostic mode (see page 05-1784).



2. Select ”Display Check” from the ”Diagnosis Menu” screen.



3. Select ”Panel Switch Check” from the ”Display Check” screen.



4. Operate each switch and check that the switch name and condition is correctly displayed.

HINT:

- Pressing the ”DISPLAY” switch for 3 seconds will exit the diagnostic mode.

Display	Contents
Push switch name/*1	・Name of the pressed switch is displayed. ・If more than one switch is pressed, ”MULTIPLE” is displayed.
Rotary switch name/*2	Name of the rotary switch is displayed.
Rotary switch direction/*3	Direction of the rotary switch is rotated.

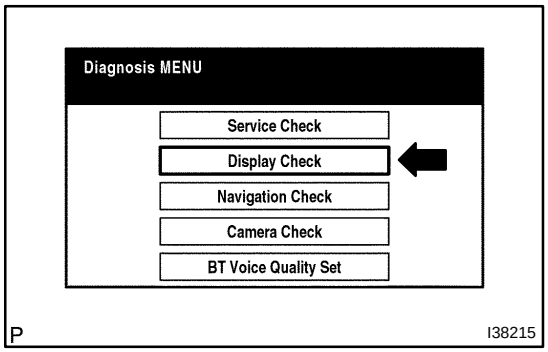
05IS0-02

DISPLAY CHECK MODE (TOUCH SWITCH CHECK)

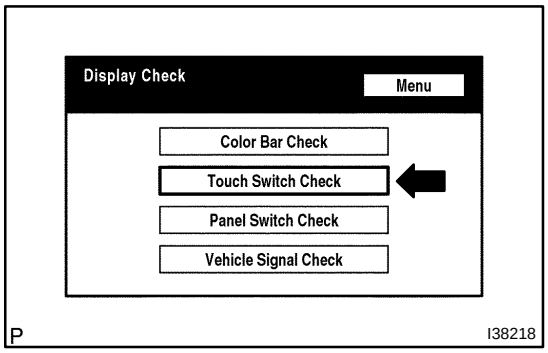
HINT:

- This mode checks the touch switch operation condition on the multi-display.
- Illustrations may differ from the actual vehicle depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle.

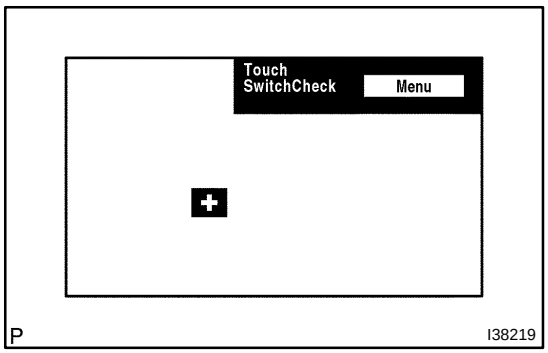
1. Enter diagnostic mode (see page 05-1784).



2. Select "Display Check" from the "Diagnosis MENU" screen.



3. Select "Touch Switch Check" from the "Display Check" screen.



4. Touch the display anywhere in the open area to perform the check when the "Touch Switch Check" screen is displayed.

HINT:

- A "+" mark is displayed where the display is touched.
- The "+" mark remains on the display even after the finger is removed.

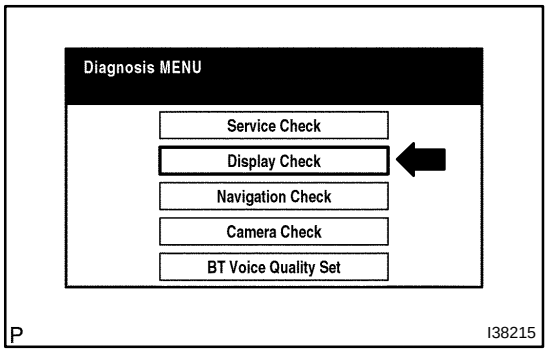
05IS2-02

DISPLAY CHECK MODE (VEHICLE SIGNAL CHECK)

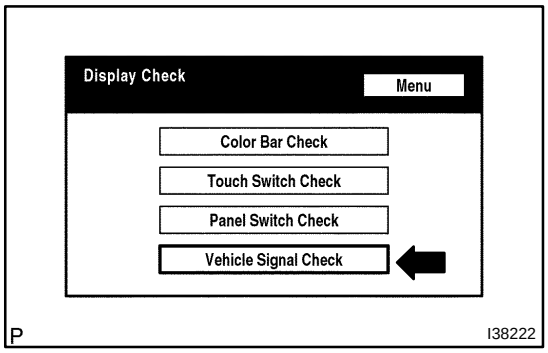
HINT:

- This mode checks the vehicle signal status input to the multi-display.
- Illustrations may differ from the actual vehicle depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle.

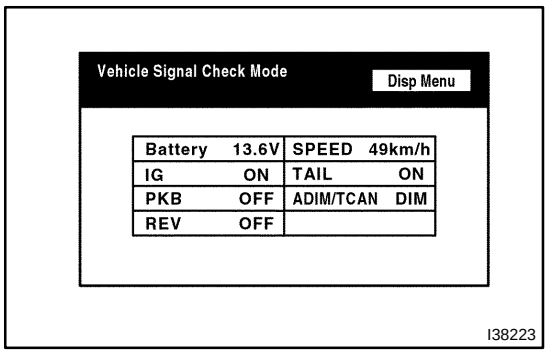
1. Enter diagnostic mode (see page 05-1784).



2. Select "Display Check" from the "Diagnosis MENU" screen.



3. Select "Vehicle Signal Check" from the "Display Check" screen.



4. When the "Vehicle Signal Check Mode" screen is displayed, check all the vehicle signal conditions.

HINT:

- Only conditions having inputs are displayed.
- This screen is updated once per second when input signals to the vehicle are changed.

05IS7-02

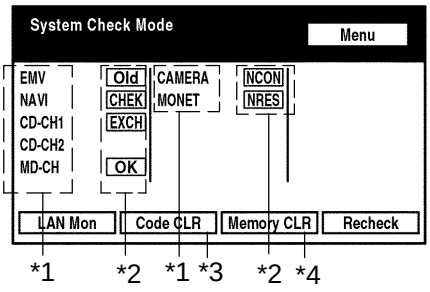
DIAGNOSIS DISPLAY DETAILED DESCRIPTION

HINT:

- This section contains a detailed description of displays within diagnostic mode.
- Illustrations may differ from the actual vehicle depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle.

1. System Check

(a) System Check Mode Display



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Device Names and Hardware Address/*1

HINT:

- Registered device names are displayed below.
- If a device name is unknown to the system, its physical address is shown instead.

Address No.	Name	Address No.	Name
110	EMV	120	AVX
128	1DIN TV	140	AVN
144	G-BOOK	178	NAVI
17C	MONET	190	AUDIO H/U
1AC	CAMERA-C	1B0	Rr-TV
1C0	Rr-CONT	1C2	TV-TUNER2
1C4	PANEL	1C6	G/W
1C8	FM-M-LCD	1D8	CONT-SW
1EC	Body	1F0	RADIO TUNER
1F1	XM	1F2	SIRIUS
230	TV-TUNER	240	CD-CH2
250	DVD-CH	280	CAMERA
360	CD-CH1	3A0	MD-CH
17D	TEL	440	DSP-AMP
530	ETC	5C8	MAYDAY
1A0	DVD-P	1C6	CLOCK
1F4	RSA	1F6	RSE
480	AMP		

Check Result/*2

HINT:

Result codes for all devices are shown below.

Result	Meaning	Action
OK	The device did not respond with a DTC (excluding communication DTCs from the AVC-LAN).	-
EXCH	The device responds with a ”replace”-type DTC.	Look up the DTC in ”Unit Check Mode” and replace the device.
CHEK	The device responds with a ”check”-type DTC.	Look up the DTC in ”Unit Check Mode”.
NCON	The device was previously present, but does not respond in diagnostic mode.	1. Check power supply wire harness of the device. 2. Check the AVC-LAN of the device.
Old	The device responds with an ”old”-type DTC.	Look up the DTC in ”Unit Check Mode”.
NRES	The device responds in diagnostic mode, but gives no DTC information.	1. Check power supply wire harness of the device. 2. Check the AVC-LAN of the device.

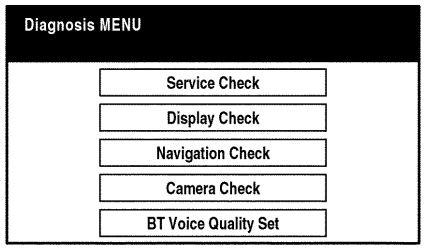
Code Clear/*3

Present DTCs are cleared.

Memory Clear/*4

Present and past DTCs and registered connected device names are cleared.

(b) Diagnosis MENU Display

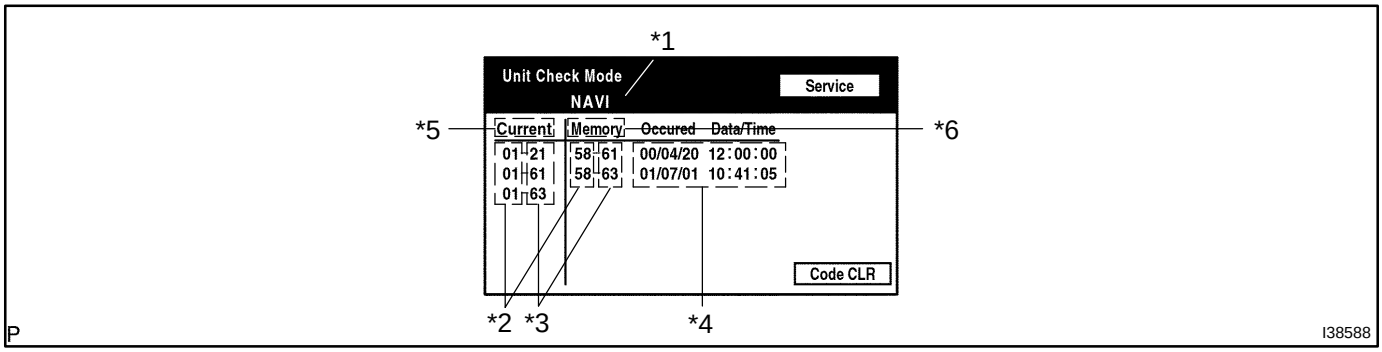


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HINT:

Each item is grayed out or not displayed based on the device settings.

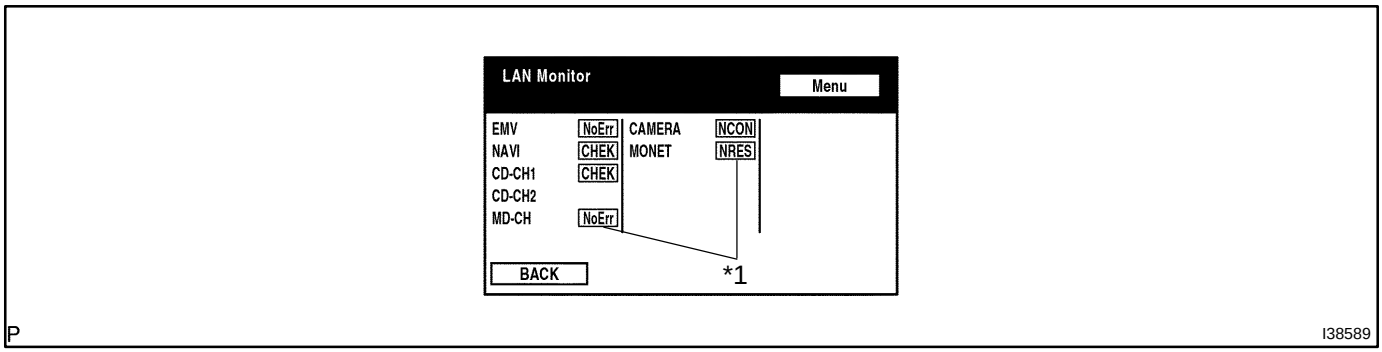
(c) Unit Check Mode Screen



Screen Description

Display	Contents
Device name/*1	Target Device
Segment/*2	Target Device Logical address
DTC/*3	DTC (Diagnostic Trouble Code)
Timestamp/*4	The time and date of past DTCs are displayed. (The year is displayed in 2 digit format.)
Present Code/*5	The DTC output at the service check is displayed.
Past Code/*6	Diagnostic memory results and recorded DTCs are displayed.

(d) LAN Monitor (Original) Screen



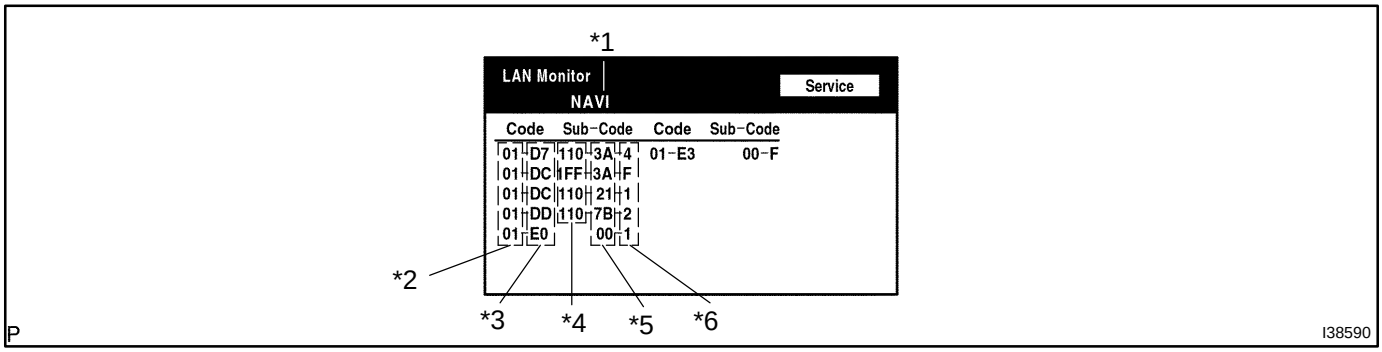
Check Result

HINT:

Check results of all the devices are displayed.

Result	Meaning	Action
No Err (OK)	There are no communication DTCs.	-
CHEK	The device responds with a ”check”-type DTC.	Look up the DTC in ”Unit Check Mode”.
NCON	The device was previously present, but does not respond in diagnostic mode.	1. Check power supply wire harness of the device. 2. Check the AVC-LAN of the device.
Old	The device responded with an old-type DTC.	Look up the DTC in ”Unit Check Mode”.
NRES	Device responds in diagnostic mode, but gives no DTC information.	1. Check power supply wire harness of the device. 2. Check the AVC-LAN of the device.

(e) LAN Monitor (Individual) Screen

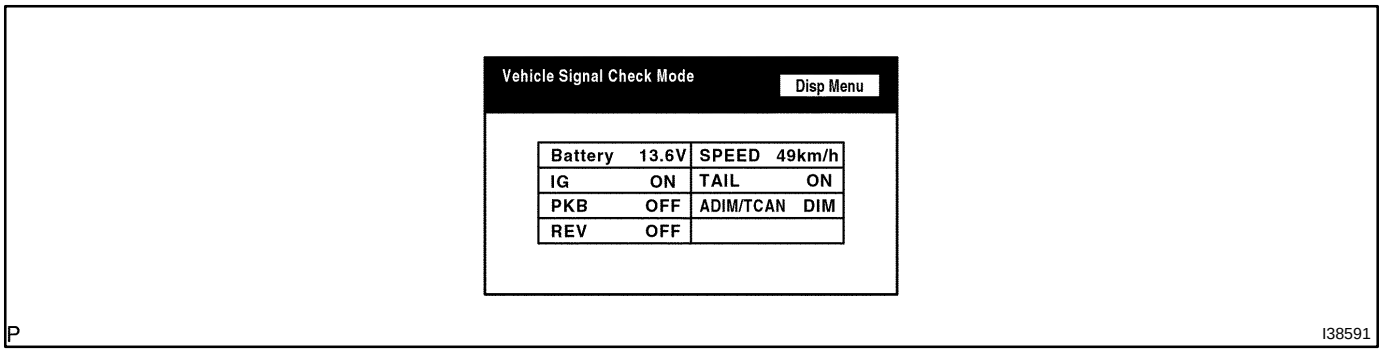


Screen Description

Display	Contents
Device name/*1	Target device
Segment/*2	Target logical address
DTC/*3	DTC (Diagnostic Trouble Code)
Sub-Code (device address)/*4	Physical address stored with DTC. (If there is no address, nothing is displayed.)
Connection check No./*5	Connection check number stored with DTC.
DTC occurrence/*6	Number of times the same DTC has been recorded.

2. DISPLAY CHECK

(a) Vehicle Signal Check Mode Screen



Screen Description

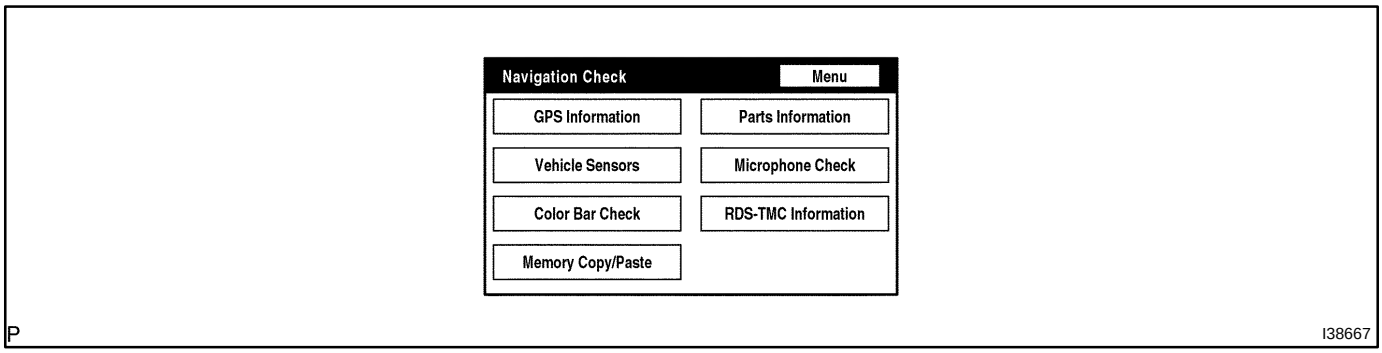
Name	Contents
Battery	Battery voltage is displayed.
PKB	Parking brake ON/OFF state is displayed.
REV	Reverse signal ON/OFF state is displayed.
IG	IG switch ON/OFF state is displayed.
ADIM/TCAN	Brightness state DIM (with)/ BRIGHT (without) is displayed.
SPEED	The vehicle speed, displayed in km/h.
TAIL	TAIL signal (Head lamp dimmer switch) ON/OFF state is displayed.

HINT:

- Only items sending a vehicle signal will be displayed.
- This screen is updated once per second when input signals to the vehicle are changed.

3. NAVIGATION CHECK

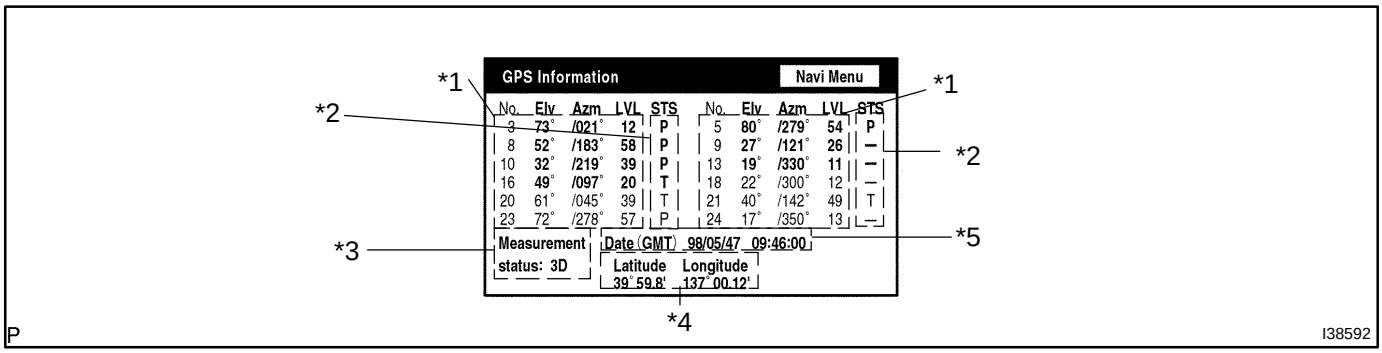
(a) Navigation Check MENU Screen



HINT:

Each item is grayed out or not displayed based on the device settings.

(b) GPS information Screen



Satellite information/*1

Information from a maximum of 12 satellites is displayed on the screen. This information includes the target GPS satellite number, elevation angle, direction and signal level.

Receiving condition/*2

(DENSO model)

Display	Contents
T	The system is receiving a GPS signal, but is not using it for location.
P	The system is using the GPS signal for location.
-	The system cannot receive a GPS signal.

(AISIN AW Model)

Display	Contents
01H	The system cannot receive a GPS signal.
02H	The system is tracing a satellite.
03H	The system is receiving a GPS signal, but is not using it for location.
04H	The system is using the GPS signal for location.

Measurement information/*3

Display	Contents
2D	2-dimensional location method is being used.
3D	3-dimensional location method is being used.
NG	Location data cannot be used.
Error	Reception error has occurred.
-	Any other state.

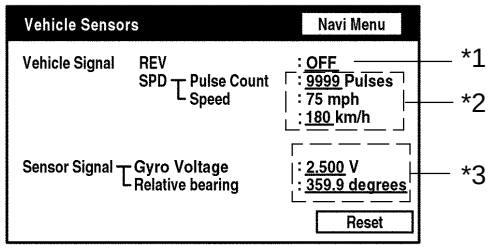
Position information/*4

Display	Contents
Position	Latitude and longitude information on the current position is displayed.

Date information/*5

Display	Contents
Date	The date/time information obtained from GPS signal is displayed in Greenwich mean time (GMT). The last 4 digits are displayed.

(c) Vehicle Signal Check Screen



P I38593

Vehicle signal

Display	Contents
REV/*1	REV signal ON/OFF state is displayed.
SPD/*2	SPD signal condition is displayed.

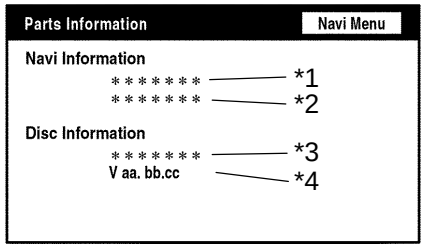
Sensor signal

Display	Contents
Gyro sensor/*3	Gyro sensor output condition is displayed (when the vehicle runs straight or is stationary, the voltage is approximately 2.5 V).

HINT:

Signals are updated once per second only when vehicle sensor signals are changed.

(d) Parts Information Screen

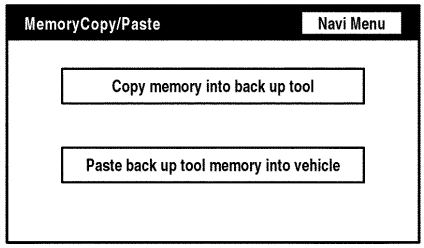


P I38594

Screen description

Display	Contents
Navigation Manufacturer/*1	Navigation ECU manufacturer is displayed.
Navigation Version No./*2	Navigation ECU version is displayed.
Disc Manufacturer/*3	Map disc manufacturer is displayed.
Disc Version No./*4	Map disc version is displayed.

(e) Memory Copy/Paste Screen



P I38595

HINT:
This function cannot be used.

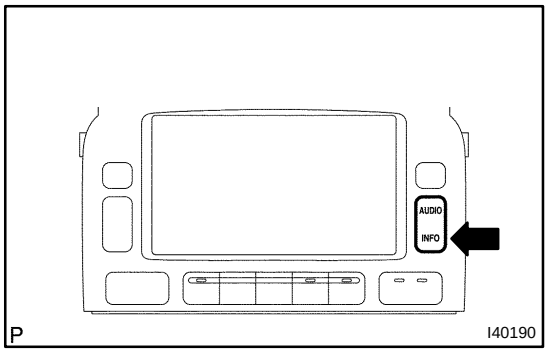
05ISA-02

DIAGNOSTIC START-UP/FINISH

HINT:

- Illustrations may differ from the actual vehicle depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle.
- After the ignition switch is turned on, check that the map is displayed before starting the diagnostic mode. Otherwise, some items cannot be checked.

1. There are 2 methods to start diagnostic mode. Start the mode by using one of them.

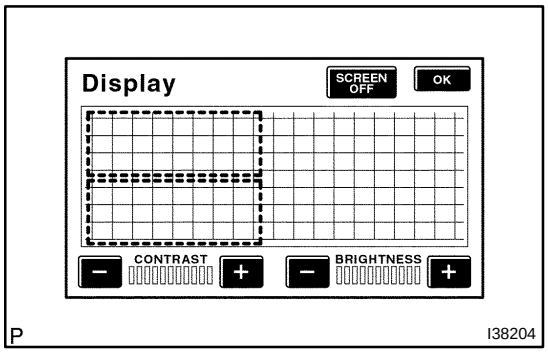


2. Method 1

(a) Start the engine.

(b) While pressing and holding ”INFO” switch, operate light control switch, OFF → TAIL → OFF → TAIL → OFF → TAIL → OFF.

(c) The diagnostic mode starts and the service check screen (”System Check Mode”) will be displayed. Service inspection starts automatically and the result will be displayed.



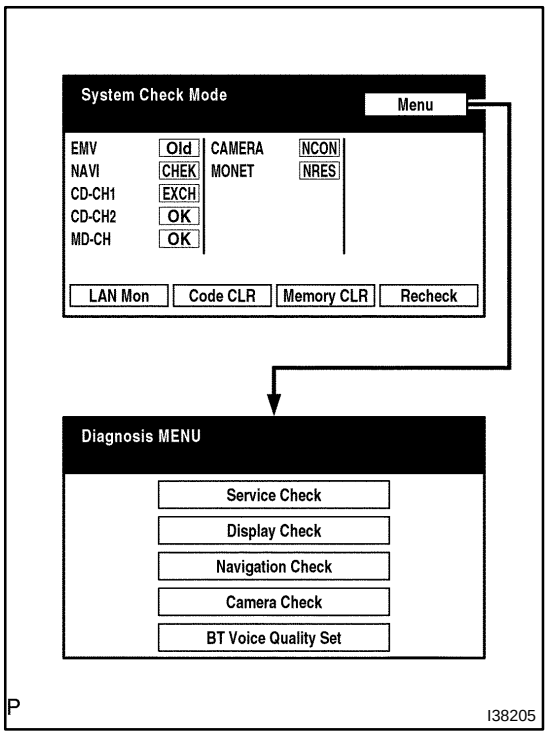
3. Method 2

(a) Start the engine.

(b) Switch to the ”Display Check” screen.

(c) From the display adjustment screen, touch the corners of the screen in the following order: upper left → lower left →upper left → lower left → upper left → lower left.

(d) The diagnostic mode starts and ”Service Check” screen will be displayed. Service inspection starts automatically and the result will be displayed.



4. Diagnosis MENU

(a) Diagnostic screen will be displayed by pressing the menu switch on the service check screen.

5. There are 2 methods to exit. Use one of them.

(a) Turn the ignition switch off.

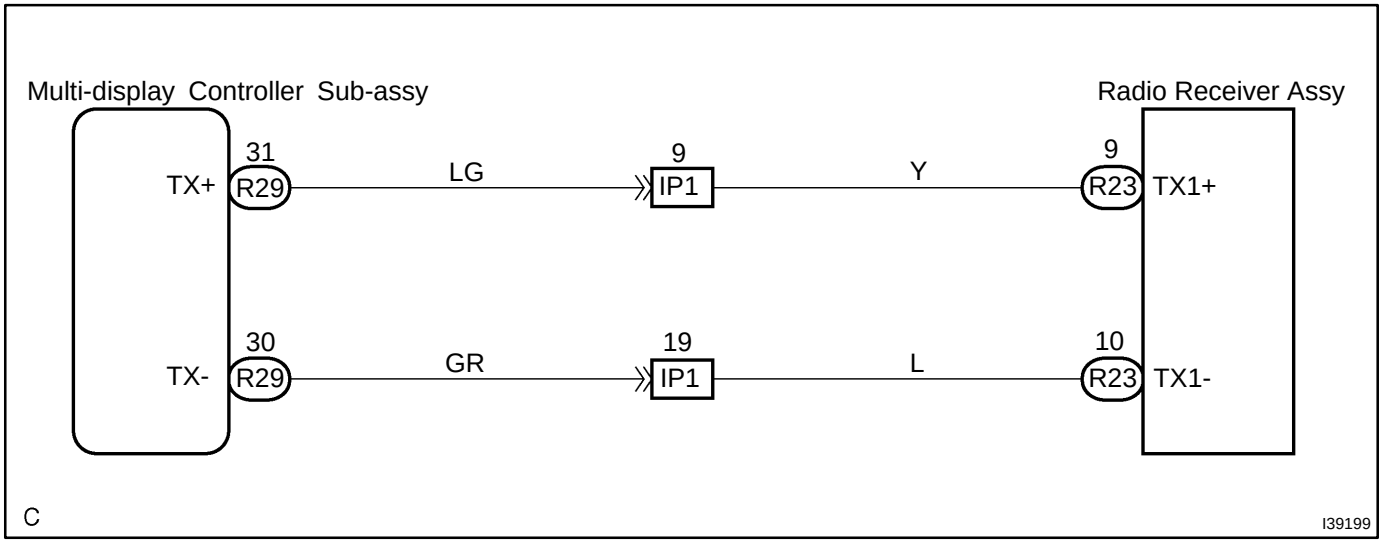
(b) Press the ”Display” switch for 3 seconds.

AVC-LAN CIRCUIT (MULTI-DISPLAY CONTROLLER SUB-ASSY - RADIO RECEIVER ASSY

CIRCUIT DESCRIPTION

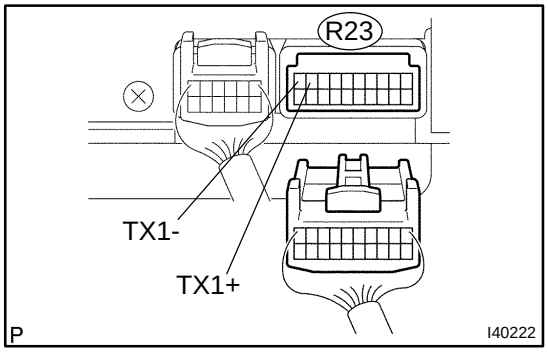
Each unit of the navigation system connected to AVC-LAN (communication bus) communicates by transferring the signals from each switch.
When +B short and GND short occur in this AVC-LAN, navigation system will not function normally as communication is discontinued.
In AVC-LAN, multi-display becomes the communication master, and the radio receiver assy has enough resistance necessary for transmitting the communication.

WIRING DIAGRAM



INSPECTION PROCEDURE

1 INSPECT RADIO RECEIVER ASSY



(a) Measure the resistance according to the value(s) in the table below.

Standard:

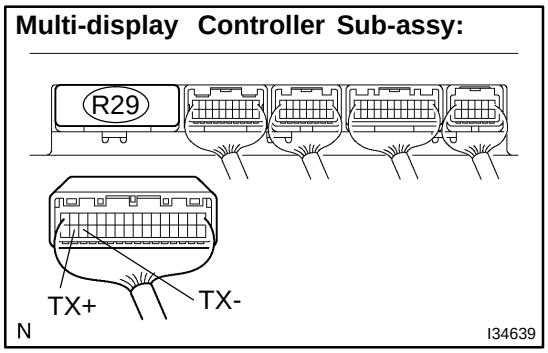
Tester connection	Condition	Specified condition
TX1+ - TX1-	Always	60 to 80 Ω

NG → **REPLACE RADIO RECEIVER ASSY (SEE PAGE 67-6)**

OK

2 CHECK HARNESS AND CONNECTOR(MULTI-DISPLA Y CONTROLLER SUB-ASSY - RADIO RECEIVER ASSY)

Multi-display Controller Sub-assy:



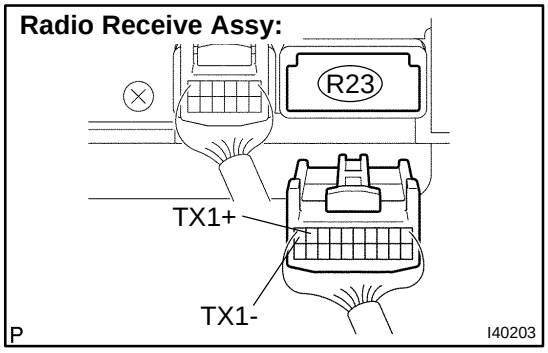
(a) Disconnect the connectors from the multi-display controller sub-assy R29 and radio receiver assy R23.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
TX+ - TX1+	Always	Below 1 Ω
TX- - TX1-	Always	Below 1 Ω
TX+ - Body ground	Always	10 kΩ or higher
TX- - Body ground	Always	10 kΩ or higher

Radio Receive Assy:



NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

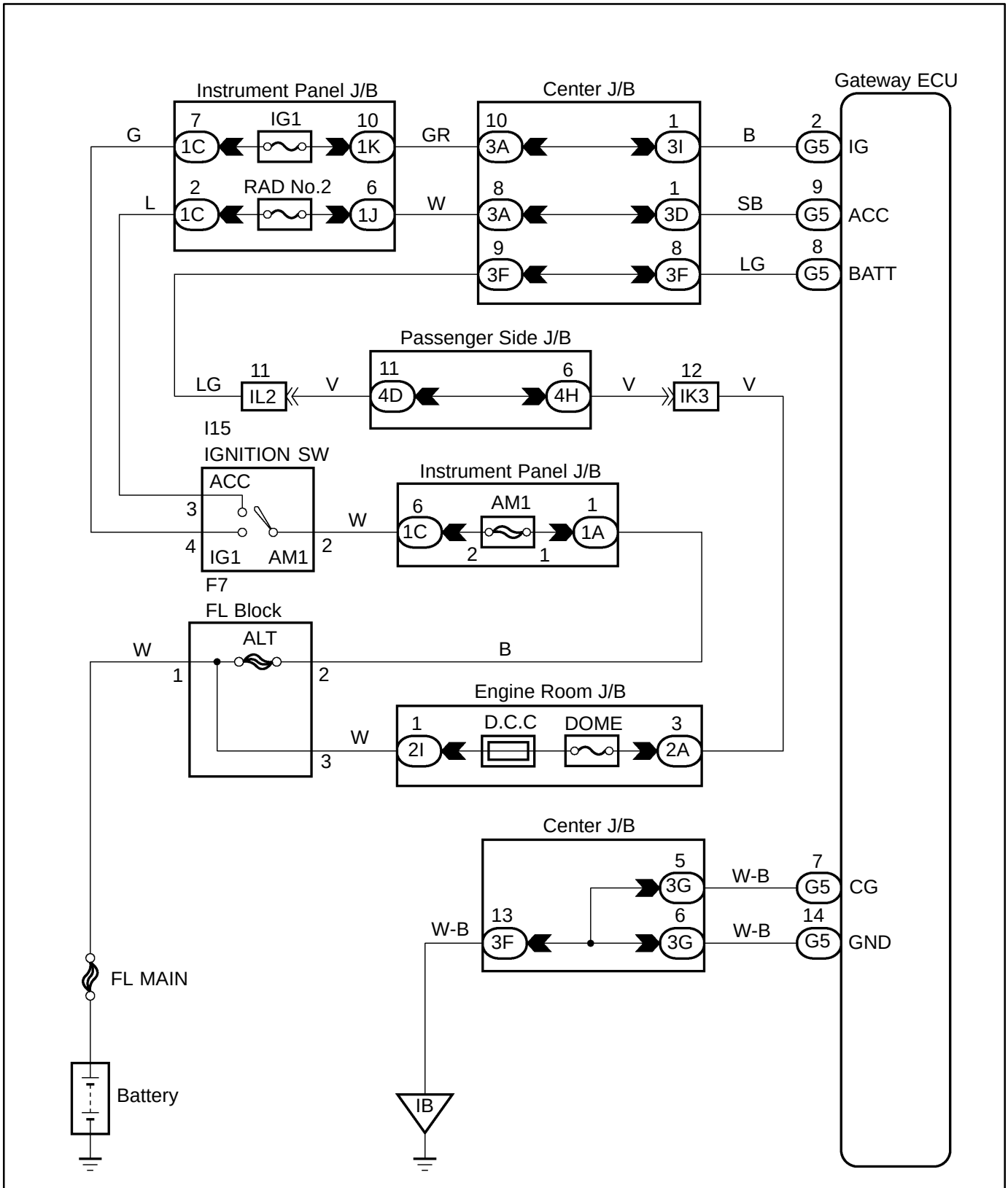
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN DIAGNOSTIC TROUBLE CODE CHART (SEE PAGE 05-1791)

POWER SOURCE CIRCUIT (GATEWAY ECU)

CIRCUIT DESCRIPTION

This circuit provides power to the gateway ECU.

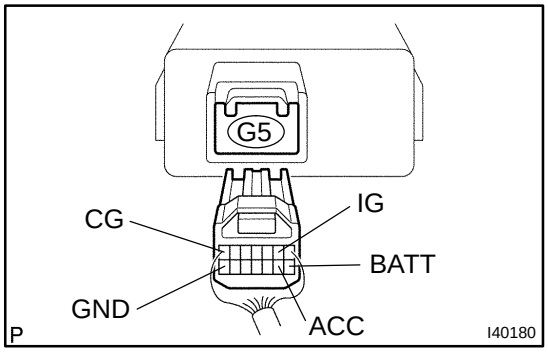
WIRING DIAGRAM



Author : Date : 2024

INSPECTION PROCEDURE

1	INSPECT GATEWAY ECU(BATT, ACC, IG, GND ,CG)



(a) Disconnect the gateway ECU connector G5.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
GND - Body ground	Always	Below 1 Ω
CG - Body ground	Always	Below 1 Ω

(c) Measure the voltage according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
BATT - GND or CG	Always	10 to 14 V
ACC - GND or CG	Ignition SW ACC	10 to 14 V
IG - GND or CG	Ignition SW ON	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

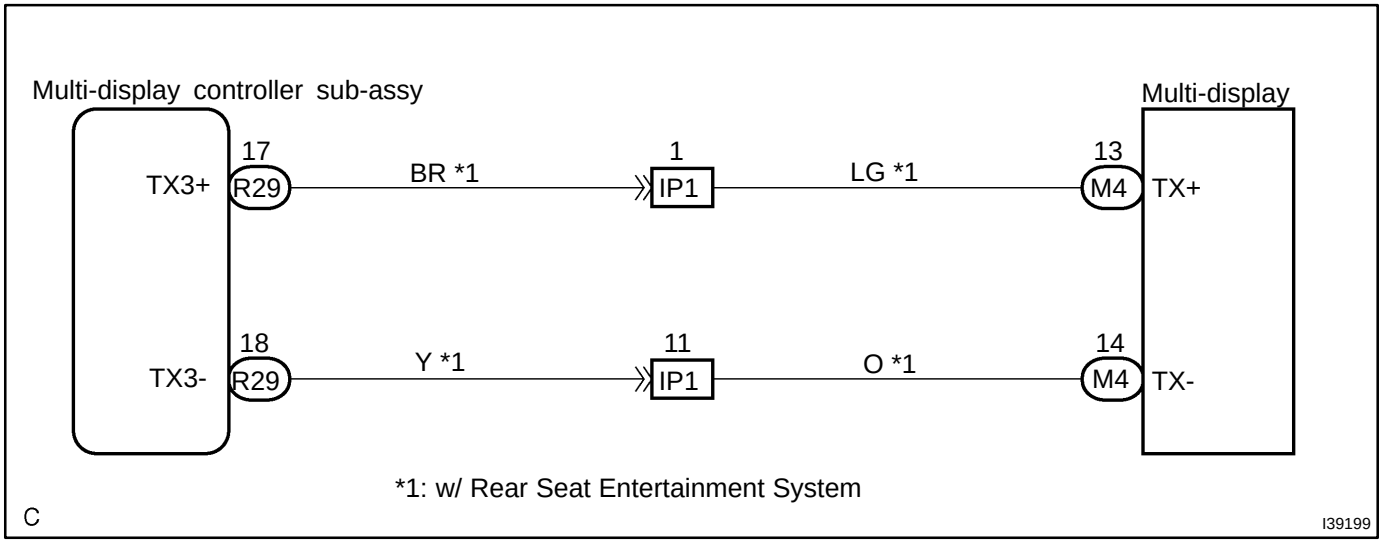
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN DIAGNOSTIC TROUBLE CODE CHART (SEE PAGE 05-1791)

AVC-LAN CIRCUIT (MULTI-DISPLAY CONTROLLER SUB-ASSY - MULTI-DISPLAY)

CIRCUIT DESCRIPTION

Each unit of the navigation system connected to AVC-LAN (communication bus) communicates by transferring the signals from each switch.
When +B short and GND short occur in this AVC-LAN, navigation system will not function normally as communication is discontinued.
In AVC-LAN, multi-display becomes the communication master, and the radio receiver assy has enough resistance necessary for transmitting the communication.

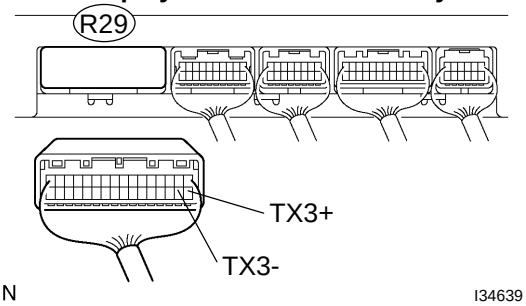
WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR(MULTI-DISPLA Y CONTROLLER SUB-ASSY - MULTI-DISPLA Y)

Multi-display Controller Sub-assy:



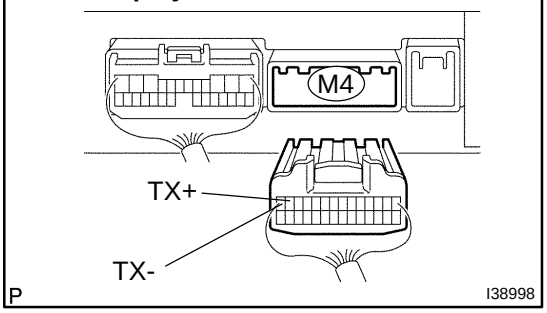
(a) Disconnect the connector from the multi-display controller sub-assy R29 and multi-display M4.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
TX3+ - TX+	Always	Below 1 Ω
TX3- - TX-	Always	Below 1 Ω
TX3+ - Body ground	Always	10 kΩ or higher
TX3- - Body ground	Always	10 kΩ or higher

Multi-Display:



NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

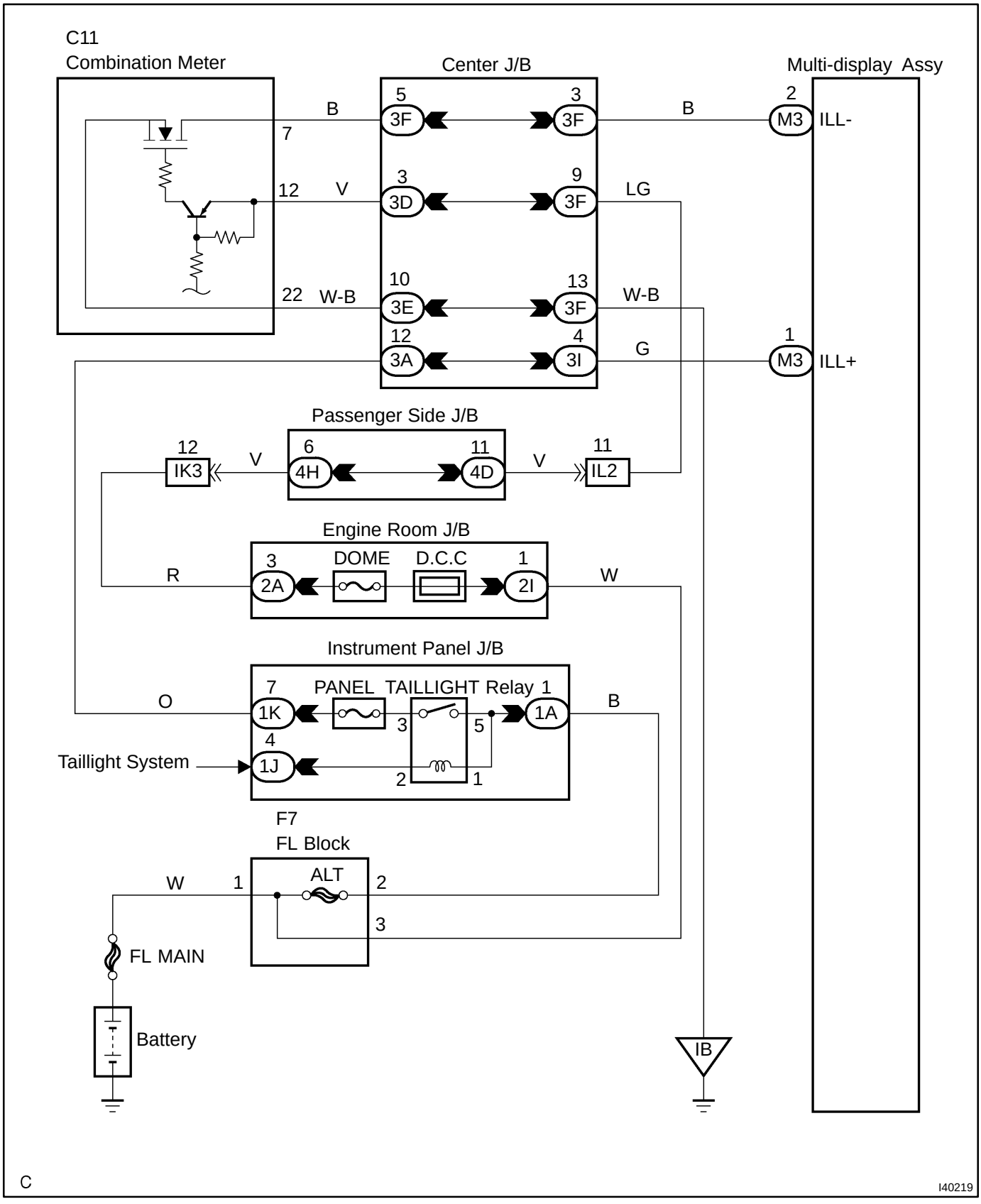
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN DIAGNOSTIC TROUBLE CODE CHART (SEE PAGE 05-1791)

DIMMER SIGNAL CIRCUIT

CIRCUIT DESCRIPTION

When the light control switch is in the TAIL or HEAD position, the TAILLIGHT relay activates and supplies power to illuminate the multi-display panel.

WIRING DIAGRAM



INSPECTION PROCEDURE

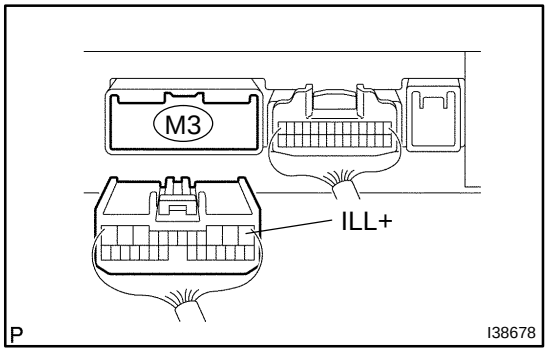
1	CHECK SYSTEM

(a) Turn the light control switch to the TAIL or HEAD position.
Check if the illumination of the switches such as on the radio receiver assy comes on.
OK: Illumination of the switches comes on.

NG → **GO TO COMBINATION METER SYSTEM (SEE PAGE 05-1868)**

OK

2	INSPECT MULTI-DISPLA Y(ILL+)



(a) Disconnect the connector from the multi-display.
(b) Measure the voltage according to the values in the table below.
Standard:

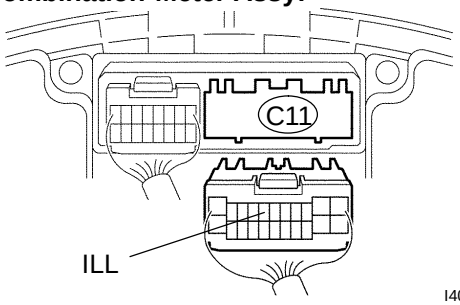
Tester connection	Condition	Specified condition
ILL+ - Body ground	Light control switch TAIL or HEAD	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3	CHECK HARNESS AND CONNECTOR(COMBINATION METER ASSY - MULTI-DISPLAY)

Combination Meter Assy:



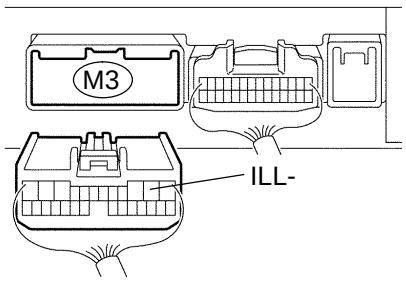
(a) Disconnect the connectors from the combination meter assy and Multi-display.

(b) Measure the resistance according to the values in the table below.

Standard:

Tester connection	Condition	Specified condition
ILL - ILL-	Always	Below 1 Ω
ILL - Body ground	Always	10 kΩ or higher

Multi-Display:



NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK →

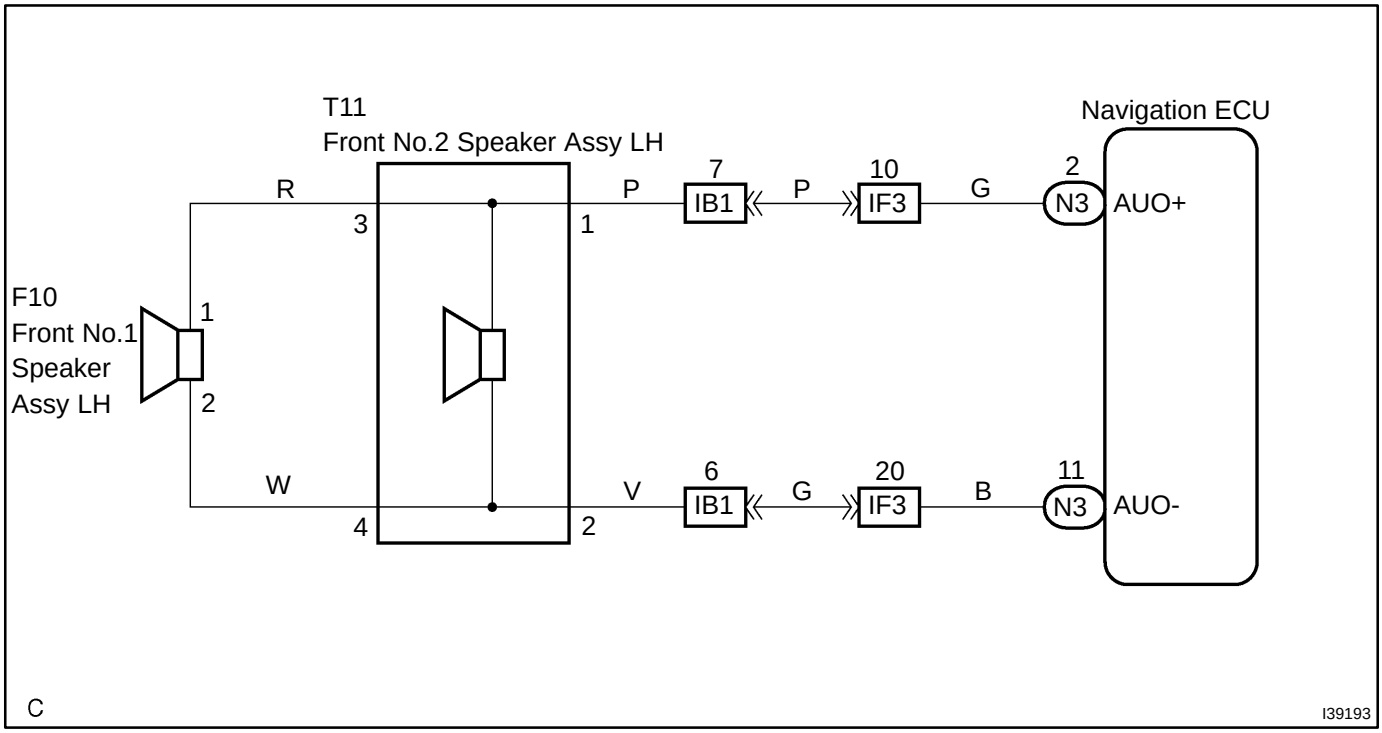
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE (SEE PAGE 05-1778)

SPEAKER CIRCUIT (NAVIGATION VOICE)

CIRCUIT DESCRIPTION

This circuit is used when the voice guidance in the navigation system is on.

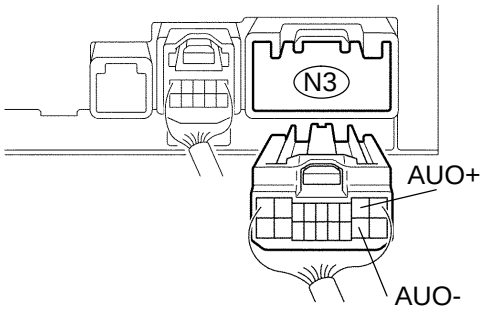
WIRING DIAGRAM



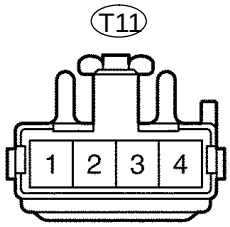
INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR(FRONT NO. 2 SPEAKER ASSY - NAVIGATION ECU)

Navigation ECU:



Wire Harness Side:
Front No.2 Speaker Assy



I40178
I38999
I40553

(a) Disconnect the connectors from the navigation ECU and speaker.
(b) Measure the resistance according to the value(s) in the table below.
Standard:

Tester connection	Condition	Specified condition
AUO+ - T11-1	Always	Below 1 Ω
AUO- - T11-2	Always	Below 1 Ω
AUO+ - Body ground	Always	10 kΩ or higher
AUO- - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

2	INSPECT FRONT NO. 2 SPEAKER ASSY

(a) Check that malfunction disappears when another speaker in a good condition is installed.
OK: Malfunction disappears

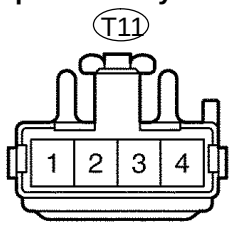
HINT:
- Connect all the connectors to the speakers.
- When there is a possibility that either right or left front speaker is defective, inspect by interchanging the right one and the left one.

OK → **REPLACE FRONT NO. 2 SPEAKER ASSY (SEE PAGE 67-1 1)**

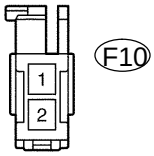
NG

3	CHECK HARNESS AND CONNECTOR(FRONT NO. 2 SPEAKER ASSY - FRONT NO. 1 SPEAKER ASSY)

Wire Harness Side:
Front No.2 Speaker Assy



Wier Harness Side:
Front No.1 Speaker Assy



I38999
I38233
I40554

(a) Disconnect the connectors from the front No.2 speaker assy and front No.1 speaker assy.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
3 (No.2 speaker) - 1 (No.1 speaker)	Always	Below 1 Ω
4 (No.2 speaker) - 2 (No.1 speaker)	Always	Below 1 Ω
3 (No.2 speaker) - Body ground	Always	10 kΩ or higher
4 (No.2 speaker) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4	INSPECT FRONT NO. 1 SPEAKER ASSY

(a) Resistance check.
(1) Measure the resistance between the terminals of the speaker.

NOTICE:
The speaker should not be removed for checking.

Standard: Approximately 4 Ω

NG → **REPLACE FRONT NO. 1 SPEAKER ASSY (SEE PAGE 67-10)**

OK

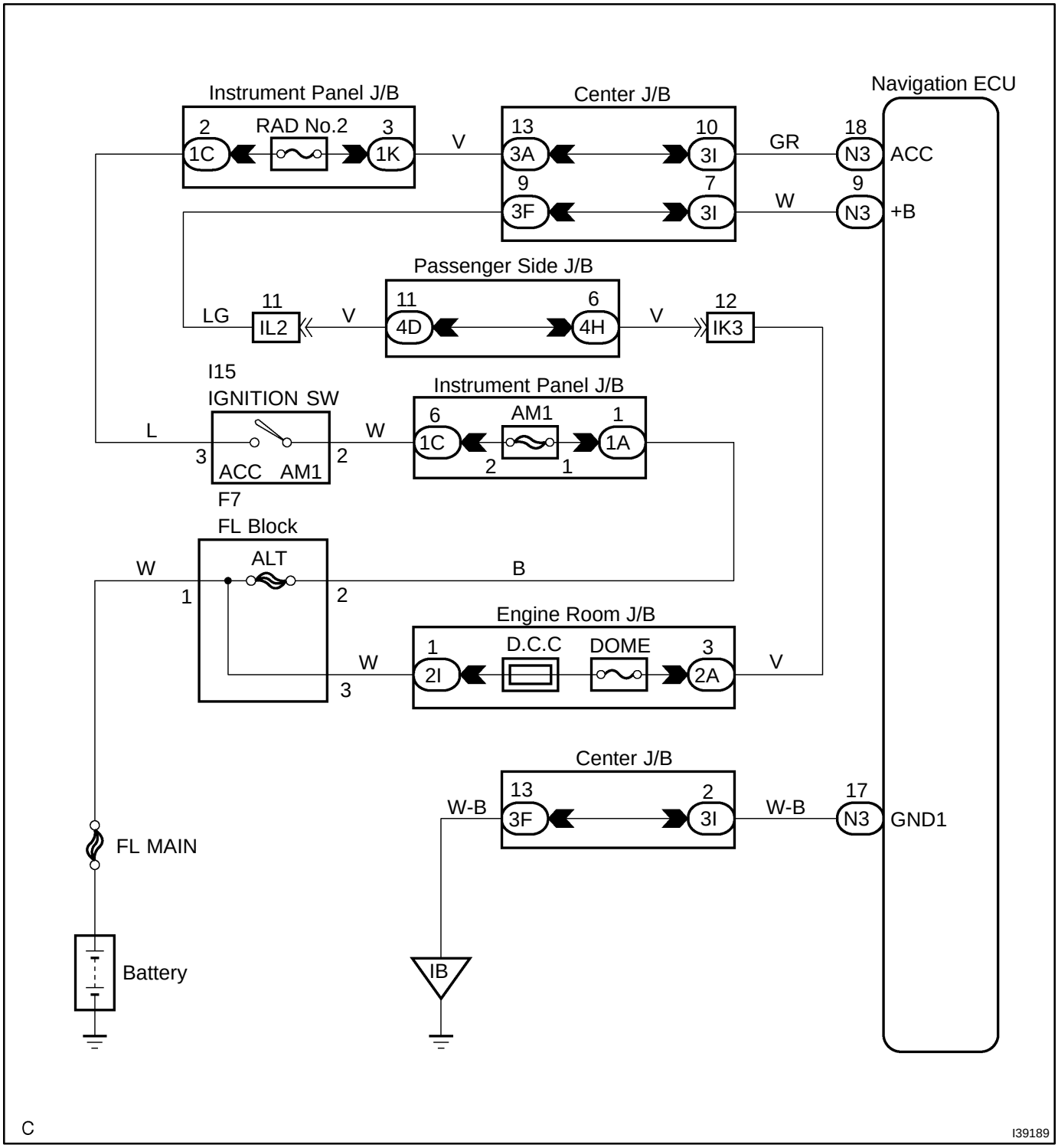
REPLACE NAVIGATION ECU (SEE PAGE 67-9)

POWER SOURCE CIRCUIT (NAVIGATION ECU)

CIRCUIT DESCRIPTION

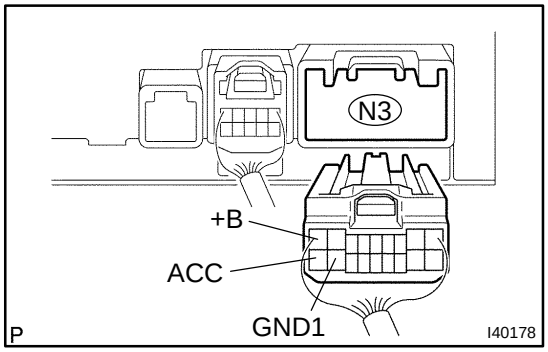
This circuit provides power to the navigation ECU.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**INSPECT NAVIGATION ECU(+B, ACC, GND1)**



(a) Disconnect the navigation ECU connector N3.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
GND1 - Body ground	Always	Below 1 Ω

(c) Measure the voltage according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
+B - GND1	Always	10 to 14 V
ACC - GND1	Ignition SW ACC	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

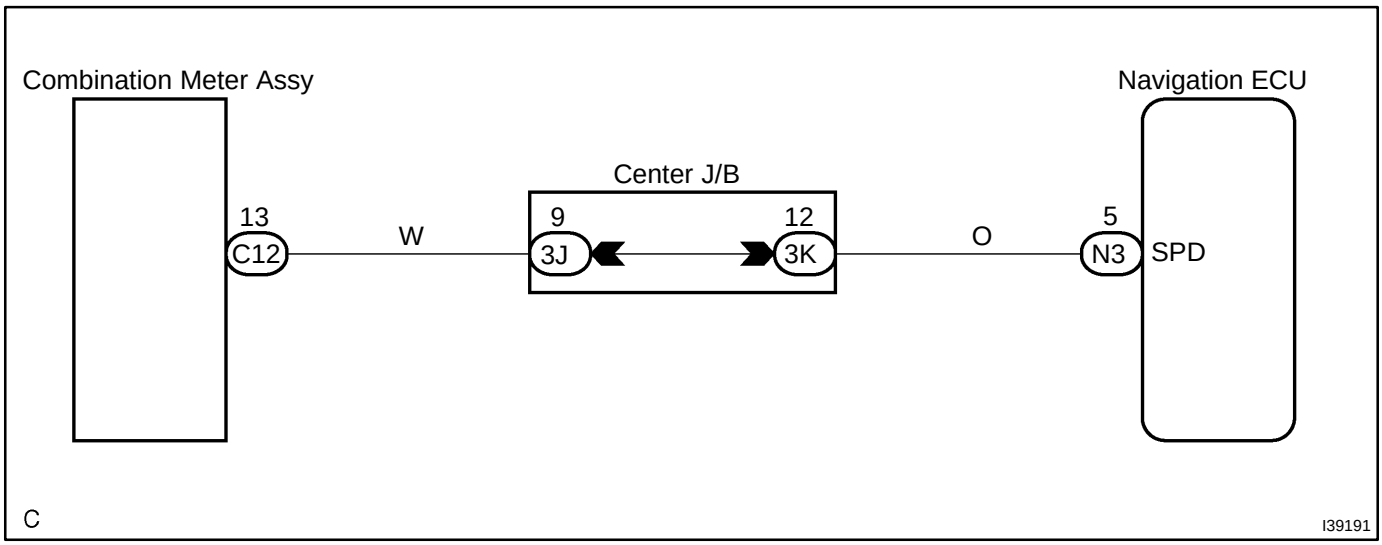
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE OR DIAGNOSTIC TROUBLE CODE CHART (SEE PAGE 05-1778 OR 05-1791)

SPEED SIGNAL CIRCUIT (NAVIGATION ECU - COMBINATION METER ASSY)

CIRCUIT DESCRIPTION

The navigation ECU receives the vehicle speed signal and information about the GPS antenna, and then adjusts the vehicle position.

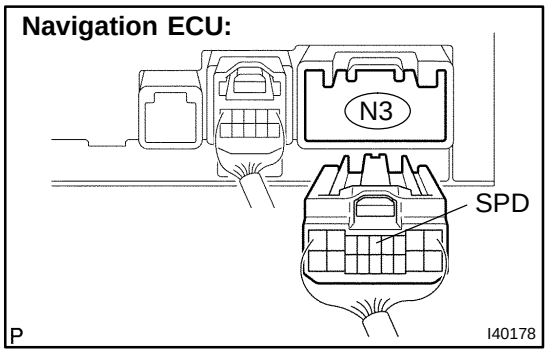
WIRING DIAGRAM



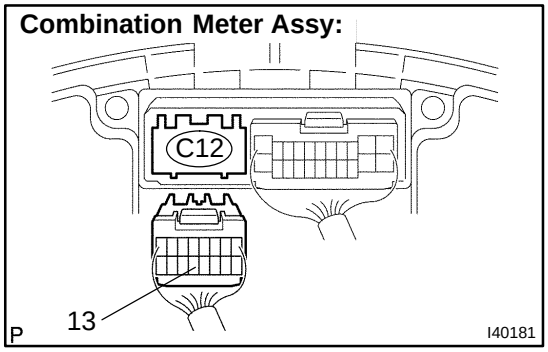
INSPECTION PROCEDURE

1	**CHECK HARNESS AND CONNECTOR(COMBINATION METER ASSY - NAVIGATION ECU)**

Navigation ECU:



Combination Meter Assy:



(a) Disconnect the connector from the navigation ECU N3 and combination meter assy C12.

(b) Measure the resistance according to the value(s) in the table below.

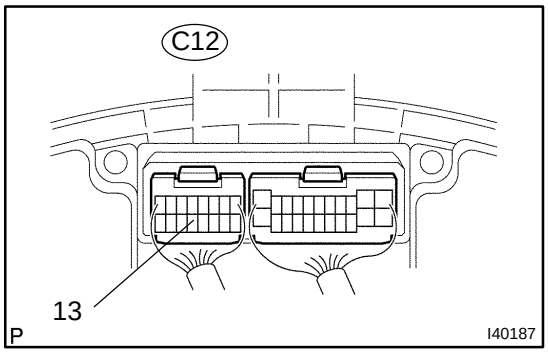
Standard:

Tester connection	Condition	Specified condition
SPD - C12-13	Always	Below 1 Ω
SPD - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

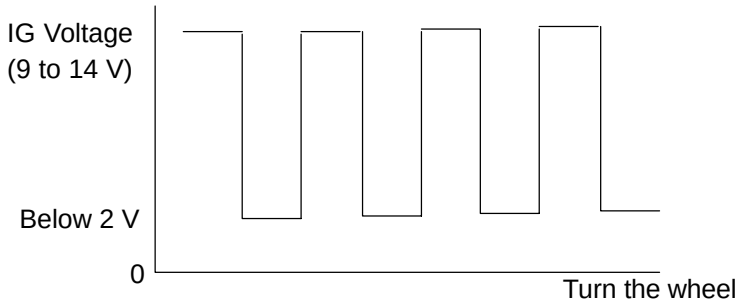
OK

2	INSPECT COMBINATION METER ASSY



(a) Connect the combination meter assy connector C12.
(b) Measure voltage.
  (1) Adjust the shift lever to the neutral position.
  (2) Jack up either one of the front wheels.
  (3) Turn ignition switch to the ON position.
  (4) Measure the voltage between terminal C12-13 and body ground of combination meter assy when the front wheels are turned slowly.

OK: Voltage is pulsed as shown below.



NG → **GO TO COMBINATION METER SYSTEM (SEE PAGE 05-1868)**

OK

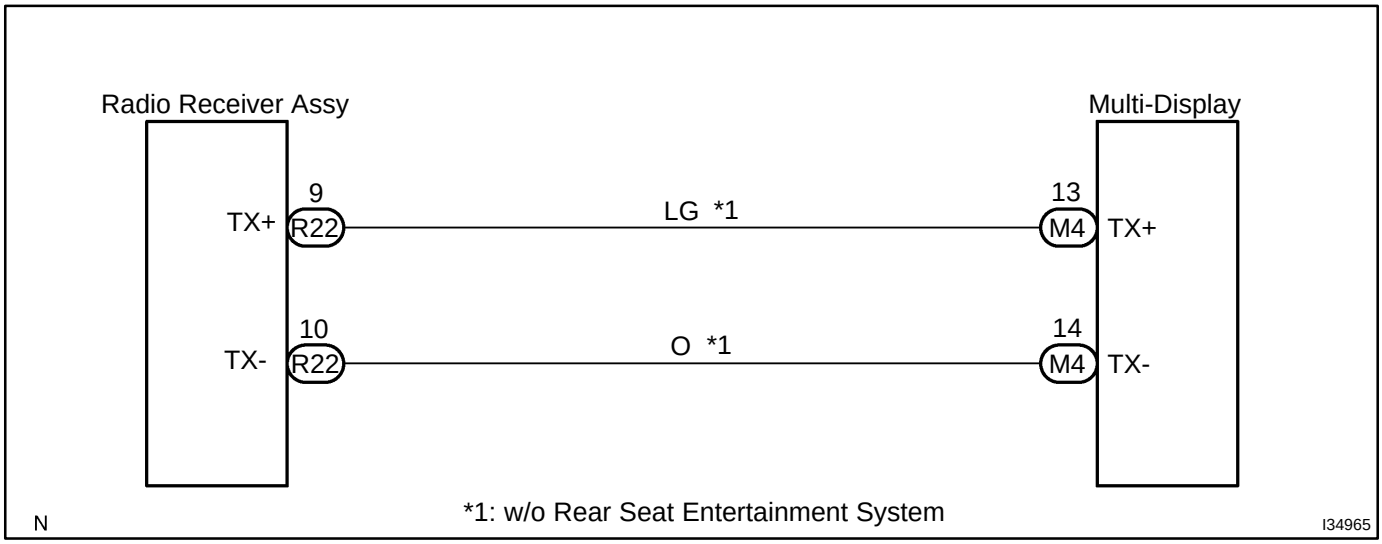
REPLACE NAVIGATION ECU (SEE PAGE 67-9)

AVC-LAN CIRCUIT (RADIO RECEIVER ASSY - MULTI-DISPLAY)

CIRCUIT DESCRIPTION

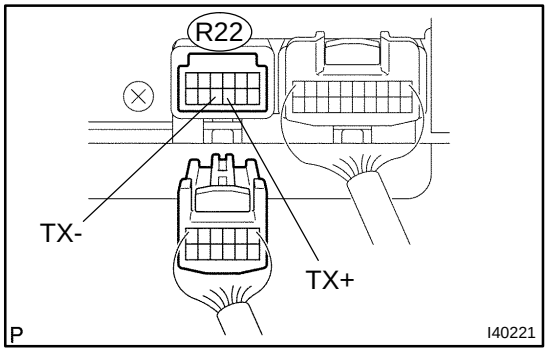
Each unit of the navigation system connected to AVC-LAN (communication bus) communicates by transferring the signals from each switch.
When +B short and GND short occur in this AVC-LAN, navigation system will not function normally as communication is discontinued.
In AVC-LAN, multi-display becomes the communication master, and the radio receiver assy has enough resistance necessary for transmitting the communication.

WIRING DIAGRAM



INSPECTION PROCEDURE

1 INSPECT RADIO RECEIVER ASSY



(a) Measure the resistance according to the value(s) in the table below.

Standard:

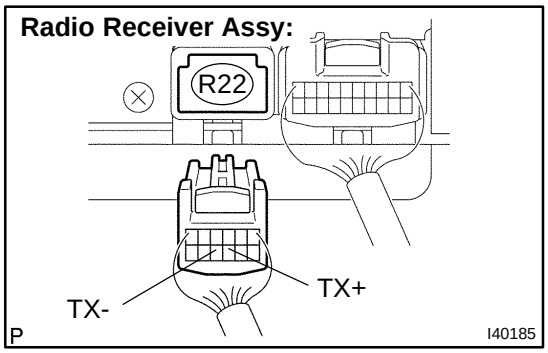
Tester connection	Condition	Specified condition
TX+ - TX-	Always	60 to 80 Ω

NG → **REPLACE RADIO RECEIVER ASSY (SEE PAGE 67-6)**

OK

2 CHECK HARNESS AND CONNECTOR(RADIO RECEIVER ASSY - MULTI-DISPLA Y)

Radio Receiver Assy:



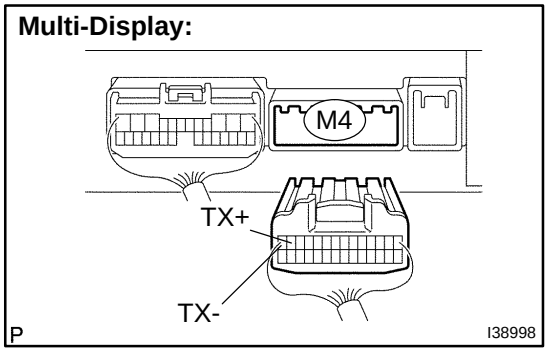
(a) Disconnect the connector from the radio receiver assy and multi-display.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
TX+ - TX+	Always	Below 1 Ω
TX- - TX-	Always	Below 1 Ω
TX+ - Body ground	Always	10 kΩ or higher
TX- - Body ground	Always	10 kΩ or higher

Multi-Display:



NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

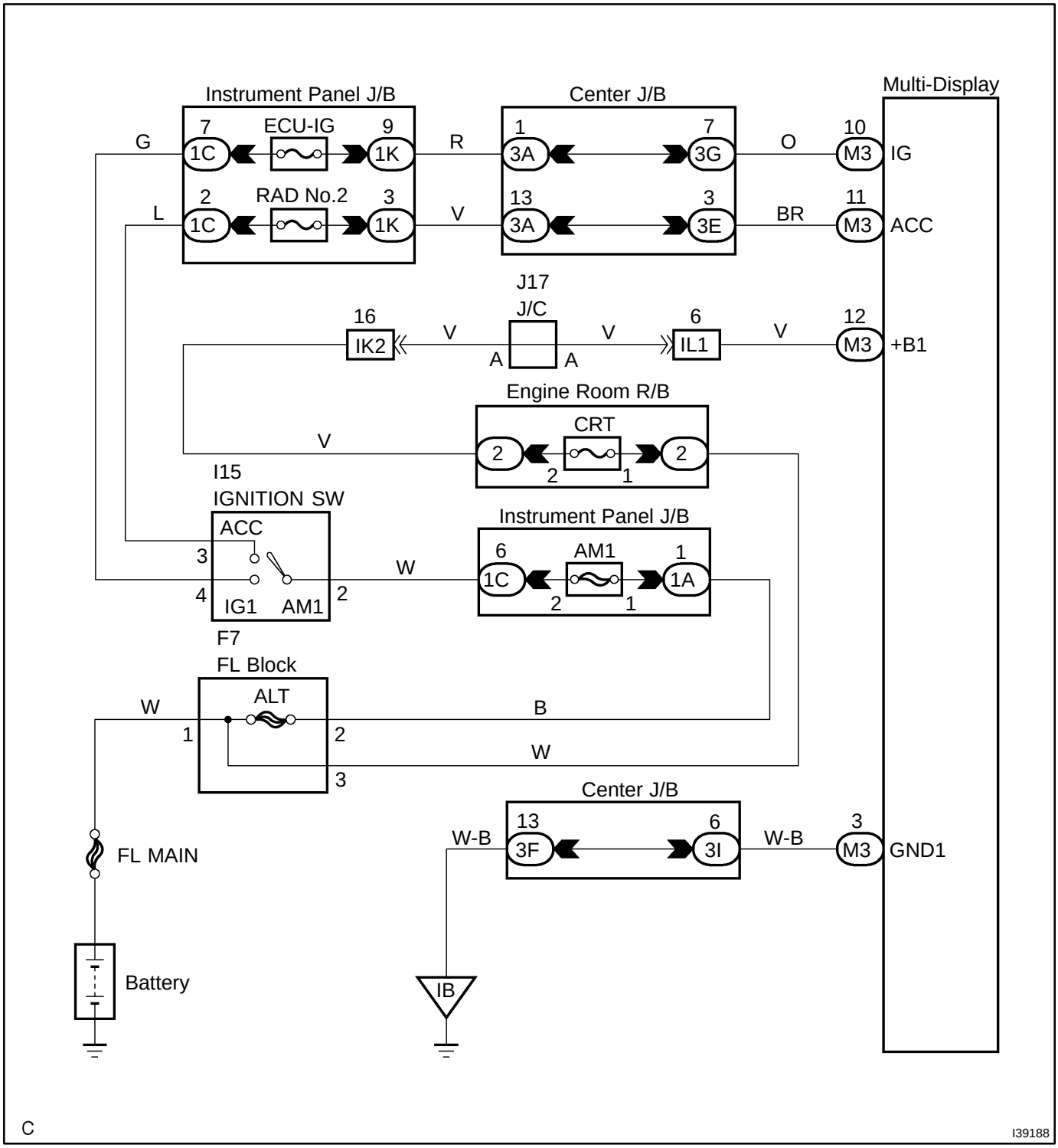
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN DIAGNOSTIC TROUBLE CODE CHART (SEE PAGE 05-1791)

POWER SOURCE CIRCUIT (MULTI-DISPLA Y)

CIRCUIT DESCRIPTION

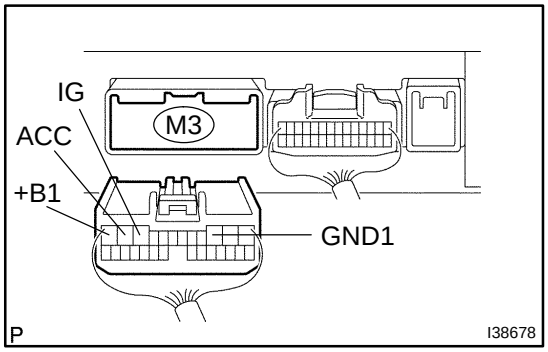
This circuit provides power to the multi-display.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT MULTI-DISPLAY(+B1, ACC, IG, GND1)



(a) Disconnect the multi-display connector M3.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
GND1 - Body ground	Always	Below 1 Ω

(c) Measure the voltage according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
+B1 - GND1	Always	10 to 14 V
ACC - GND1	Ignition SW ACC	10 to 14 V
IG - GND1	Ignition SW ON	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

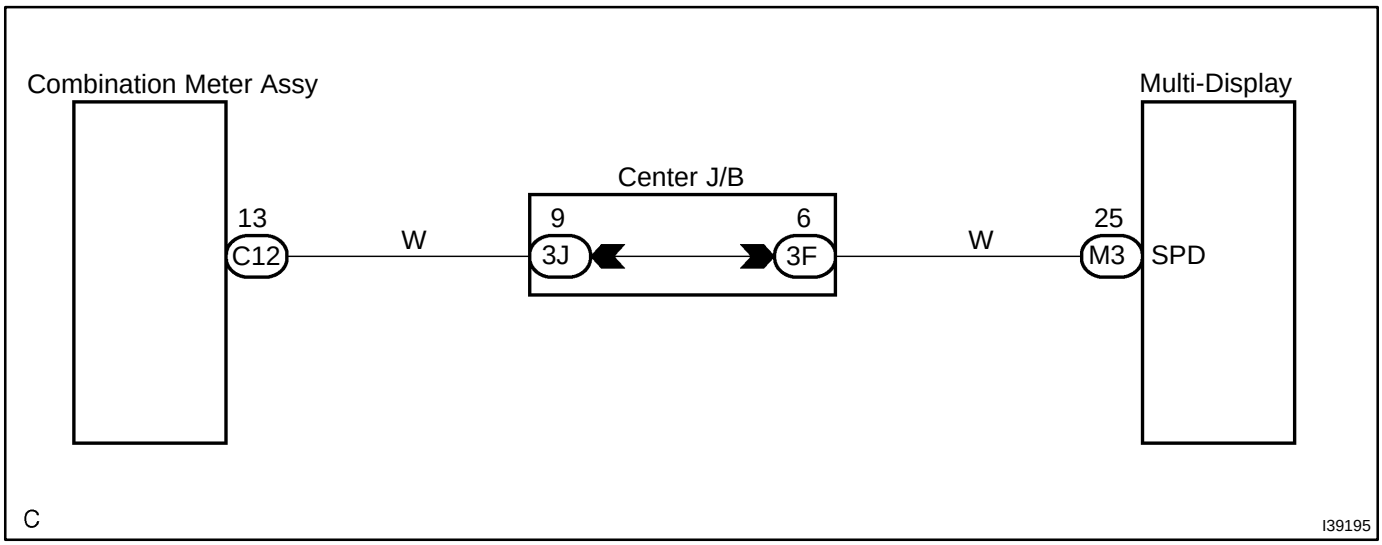
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE OR DIAGNOSTIC TROUBLE CODE CHART (SEE PAGE 05-1778 OR 05-1791)

SPEED SIGNAL CIRCUIT (MULTI-DISPLAY - COMBINATION METER ASSY

CIRCUIT DESCRIPTION

The multi-display performs the switch operation control during running by receiving the vehicle speed signal from the combination meter assy.

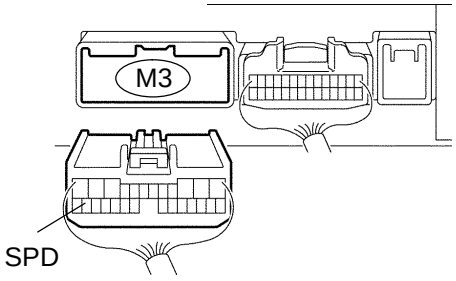
WIRING DIAGRAM



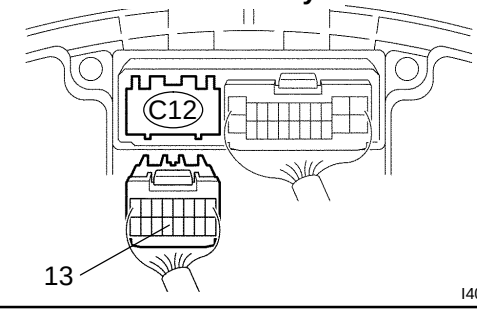
INSPECTION PROCEDURE

1	**CHECK HARNESS AND CONNECTOR(COMBINATION METER ASSY - MULTI-DISPLAY)**

Multi-Display:



Combination Meter Assy:



(a) Disconnect the connector from the multi-display M3 and combination meter assy C12.

(b) Measure the resistance according to the value(s) in the table below.

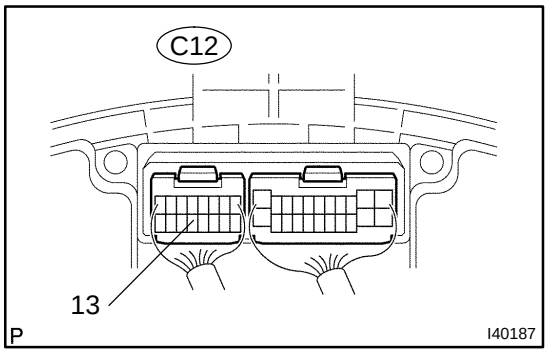
Standard:

Tester connection	Condition	Specified condition
SPD - C12-13	Always	Below 1 Ω
SPD - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

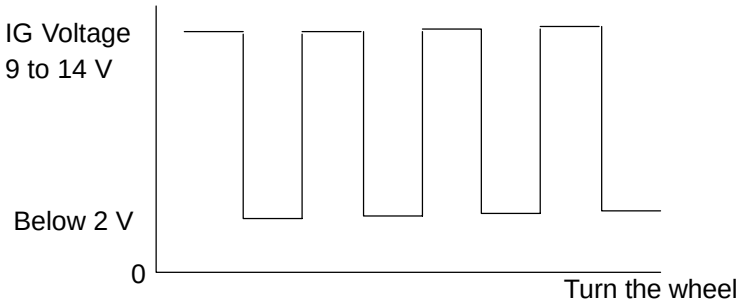
OK

2	INSPECT COMBINATION METER ASSY



(a) Connect the combination meter assy connector C12.
(b) Measure voltage.
  (1) Adjust the shift lever to the neutral position.
  (2) Jack up either one of the front wheels.
  (3) Turn ignition switch to the ON position.
  (4) Measure the voltage between terminal C12-13 and body ground of combination meter assy when the front wheels are turned slowly.

OK: Voltage is pulsed as shown below.



NG → **GO TO COMBINATION METER SYSTEM (SEE PAGE 05-1868)**

OK

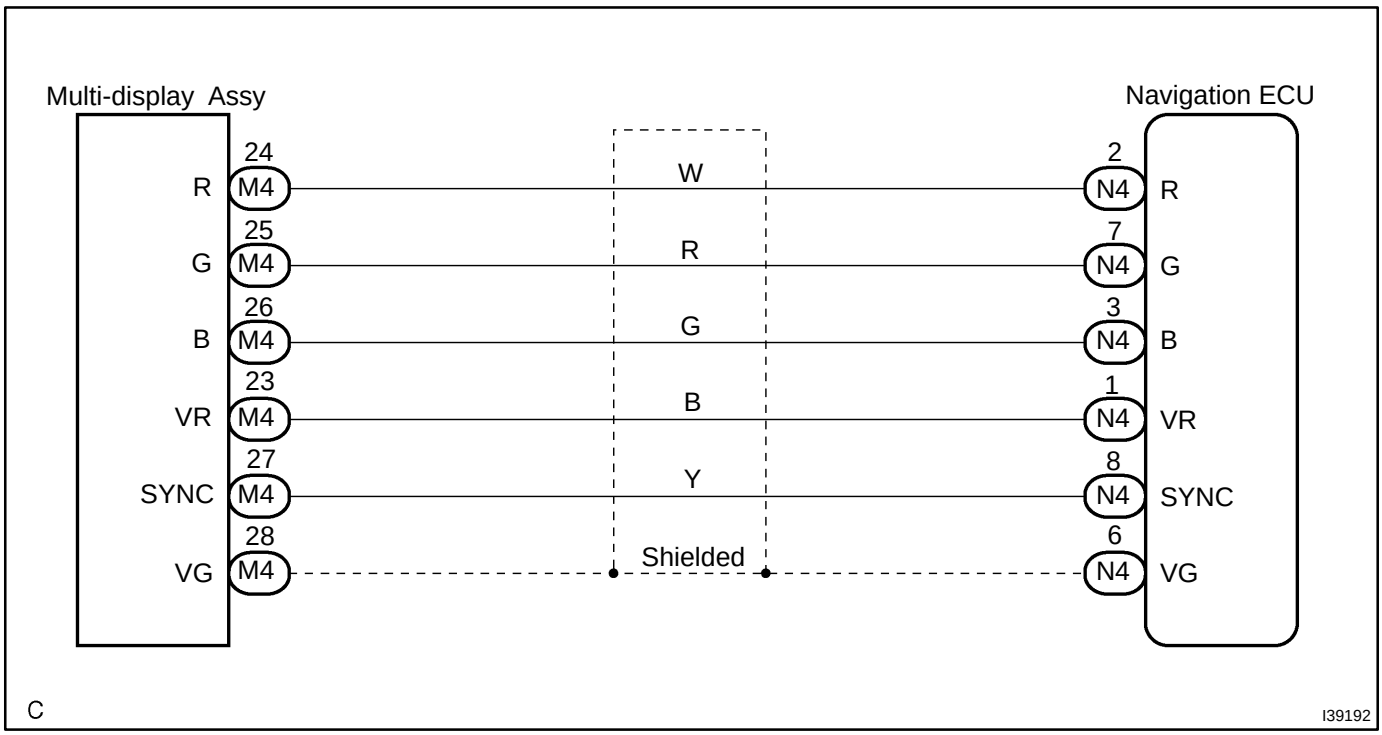
REPLACE MULTI-DISPLA Y(SEE PAGE 67-8)

DISPLAY SIGNAL CIRCUIT (NAVIGATION ECU - MULTI-DISPLAY)

CIRCUIT DESCRIPTION

This is the display signal circuit from the navigation ECU to the multi-display.

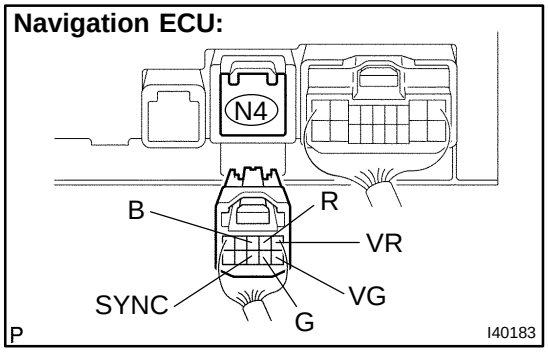
WIRING DIAGRAM



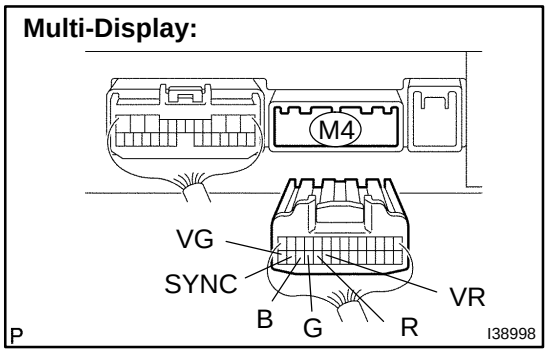
INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR(NAVIGATION ECU - MULTI-DISPLAY)

Navigation ECU:



Multi-Display:



(a) Disconnect the connector from the navigation ECU N4 and multi-display M4.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
R (N4) - R (M4)	Always	Below 1 Ω
G (N4) - G (M4)	Always	Below 1 Ω
B (N4) - B (M4)	Always	Below 1 Ω
SYNC (N4) - SYNC (M4)	Always	Below 1 Ω
VR (N4) - VR (M4)	Always	Below 1 Ω
VG (N4) - VG (M4)	Always	Below 1 Ω
R (N4 or M4) - Body ground	Always	10 kΩ or higher
G (N4 or M4) - Body ground	Always	10 kΩ or higher
B (N4 or M4) - Body ground	Always	10 kΩ or higher
SYNC (N4 or M4) - Body ground	Always	10 kΩ or higher
VR (N4 or M4) - Body ground	Always	10 kΩ or higher
VG (N4 or M4) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

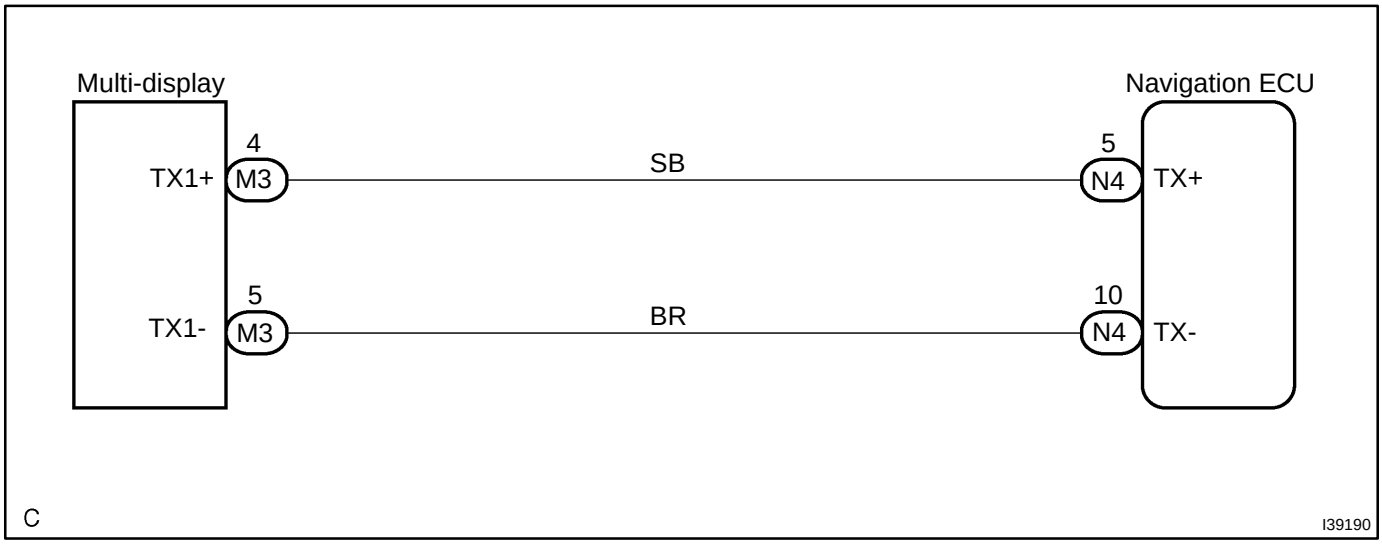
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE (SEE PAGE 05-1778)

AVC-LAN CIRCUIT (NAVIGATION ECU - MULTI-DISPLAY)

CIRCUIT DESCRIPTION

Each unit of the navigation system connected to AVC-LAN (communication bus) communicates by transferring the signals from each switch.
When +B short and GND short occur in this AVC-LAN, navigation system will not function normally as communication is discontinued.
In AVC-LAN, multi-display becomes the communication master, and the radio receiver assy has enough resistance necessary for transmitting the communication.

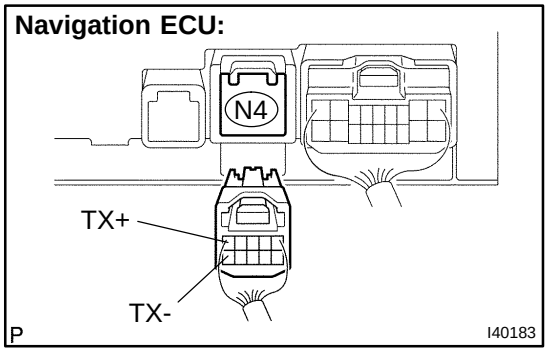
WIRING DIAGRAM



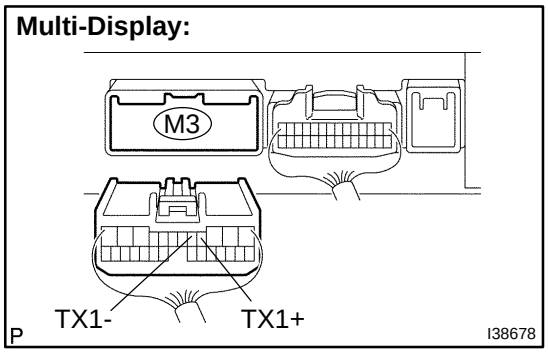
INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR(NAVIGATION ECU - MULTI-DISPLAY)

Navigation ECU:



Multi-Display:



(a) Disconnect the connector from the navigation ECU N4 and multi-display M3.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
TX1+ - TX+	Always	Below 1 Ω
TX1- - TX-	Always	Below 1 Ω
TX1+ - Body ground	Always	10 kΩ or higher
TX1- - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

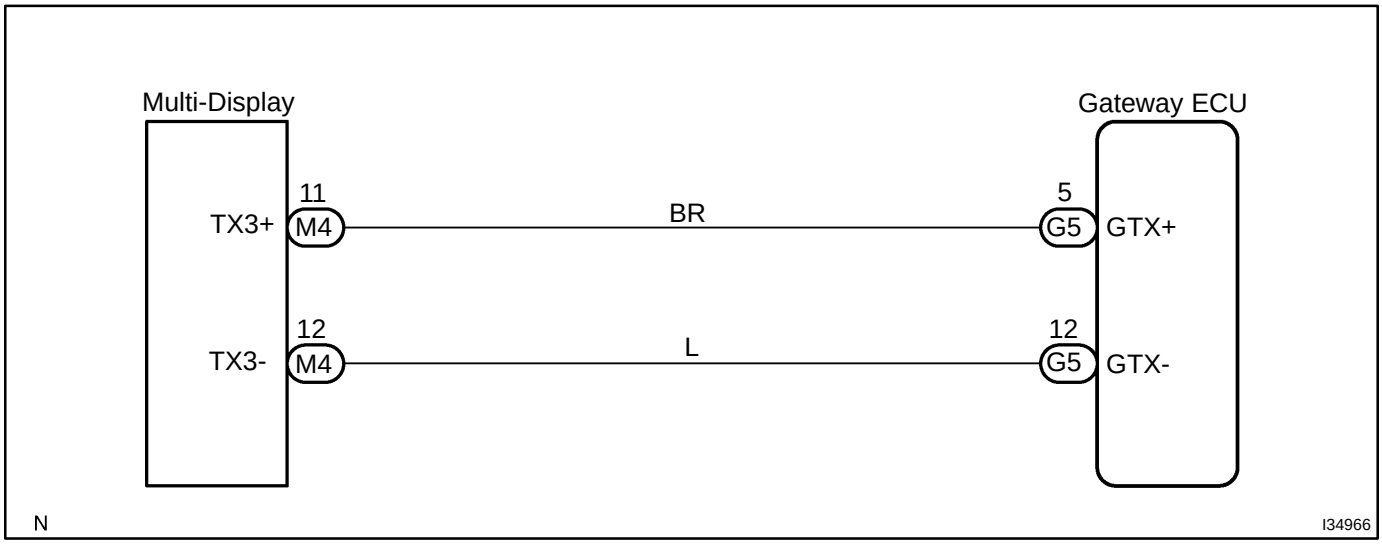
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN DIAGNOSTIC TROUBLE CODE CHART (SEE PAGE 05-1791)

AVC-LAN CIRCUIT (MULTI-DISPLAY - GATEWAY ECU)

CIRCUIT DESCRIPTION

Each unit of the navigation system connected to AVC-LAN (communication bus) communicates by transferring the signals from each switch.
When +B short and GND short occur in this AVC-LAN, navigation system will not function normally as communication is discontinued.
In AVC-LAN, multi-display becomes the communication master, and the radio receiver assy has enough resistance necessary for transmitting the communication.

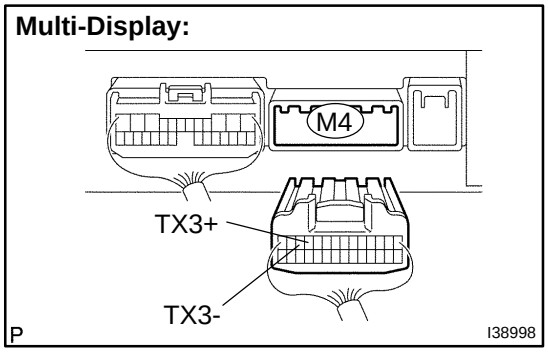
WIRING DIAGRAM



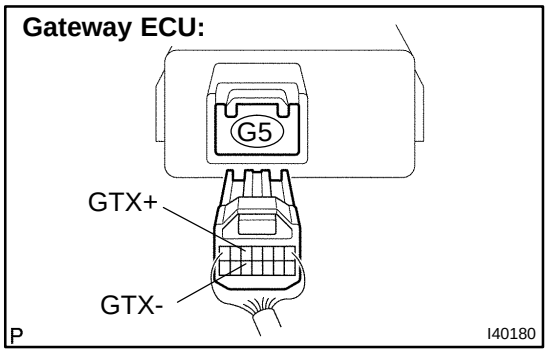
INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR(MULTI-DISPLA Y - GATEWAY ECU)

Multi-Display:



Gateway ECU:



(a) Disconnect the connector from the multi-display M4 and gateway ECU G5.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
TX3+ - GTX+	Always	Below 1 Ω
TX3- - GTX-	Always	Below 1 Ω
TX3+ - Body ground	Always	10 kΩ or higher
TX3- - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN DIAGNOSTIC TROUBLE CODE CHART (SEE PAGE 05-1791)

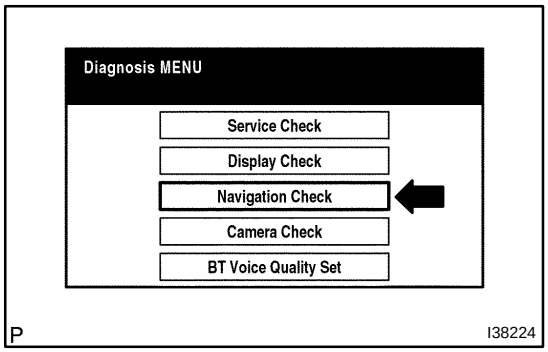
05IS3-02

NAVIGATION CHECK MODE (GPS INFORMATION)

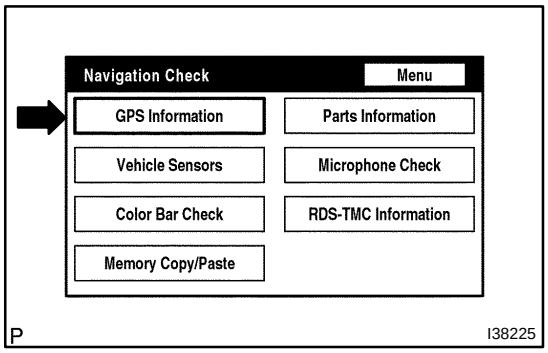
HINT:

- This mode displays GPS satellite information.
- Illustrations may differ from the actual vehicle depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle.

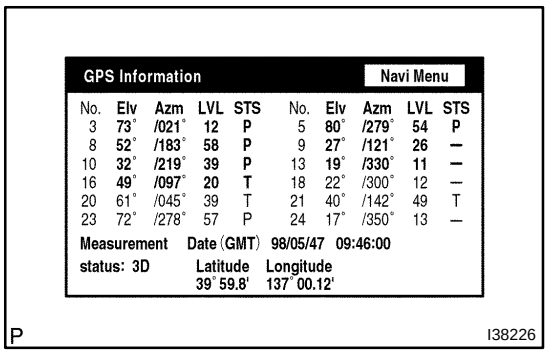
1. Enter diagnostic mode (see page 05-1784).



2. Select "Navigation Check" from the "Diagnosis MENU" screen.



3. Select "GPS Information" from the "Navigation Check" screen.



4. When GPS information is displayed, check the GPS conditions.

HINT:

This screen is updated once per second when input signals to the vehicle are changed.

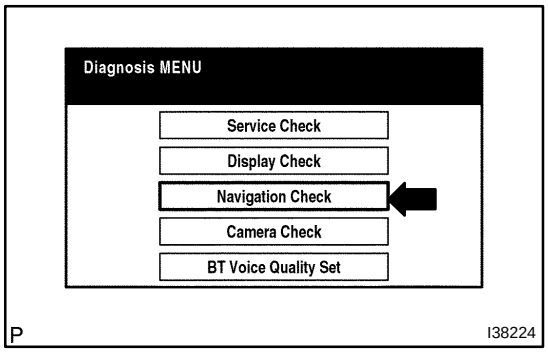
05IS5-02

NAVIGATION CHECK MODE (NAVI COLOR BAR CHECK)

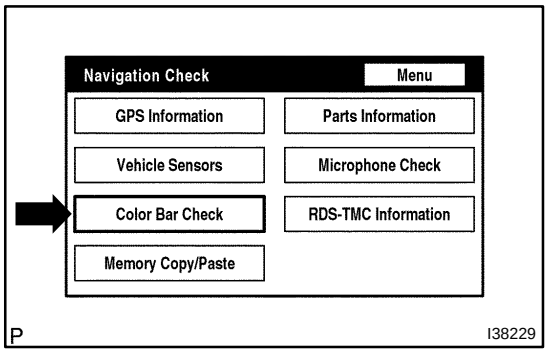
HINT:

- This mode checks the color display on the navigation ECU.
- Illustrations may differ from the actual vehicle depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle.

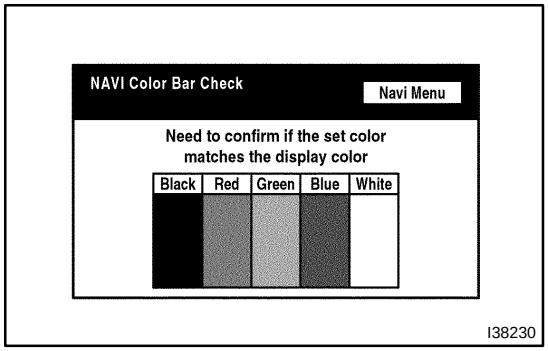
1. Enter diagnostic mode (see page 05-1784).



2. Select "Navigation Check" from the "Diagnosis MENU" screen.



3. Select "Color Bar Check" from the "Navigation Check" screen.



4. Check each color of the color bar when the "NAVI Color Bar Check" screen is displayed.

HINT:

Colors will not be displayed full-screen as in "Display Check Mode".

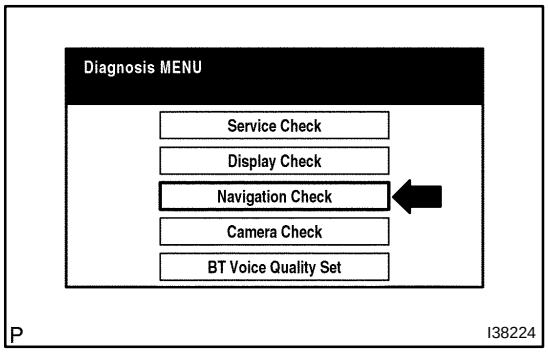
05IS6-02

NAVIGATION CHECK MODE (PARTS INFORMATION)

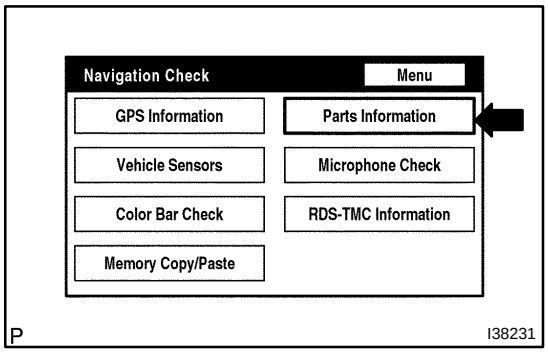
HINT:

- This mode displays product information on the navigation systems and discs.
- Illustrations may differ from the actual vehicle depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle.

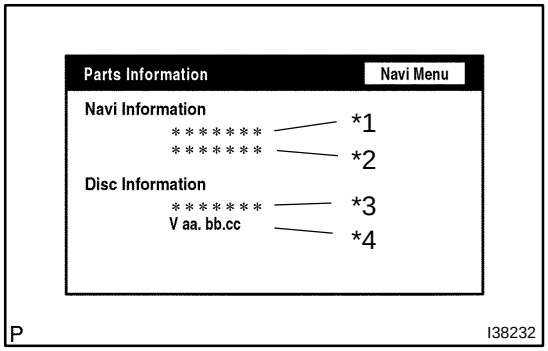
1. Enter diagnostic mode (see page 05-1784).



2. Select "Navigation Check" from the "Diagnosis MENU" screen.



3. Select "Parts Information" from the "Navigation Check" screen.



4. Check the navigation and disc information when the "Parts Information" screen is displayed.

Display	Contents
Navigation Manufacturer/*1	Navigation ECU manufacturer name is displayed.
Navigation Version/*2	Navigation ECU version is displayed.
Disc Manufacturer/*3	Map disc manufacturer is displayed.
Disc Version/*4	Map disc version is displayed.

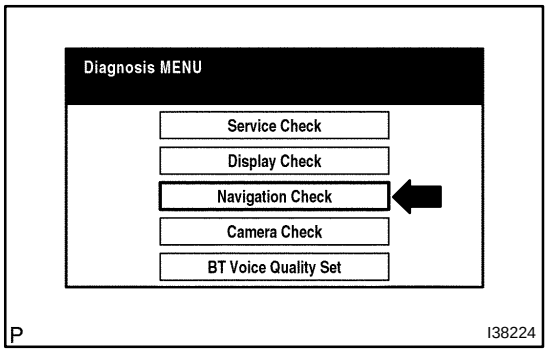
05IS4-02

NAVIGATION CHECK MODE (VEHICLE SENSORS)

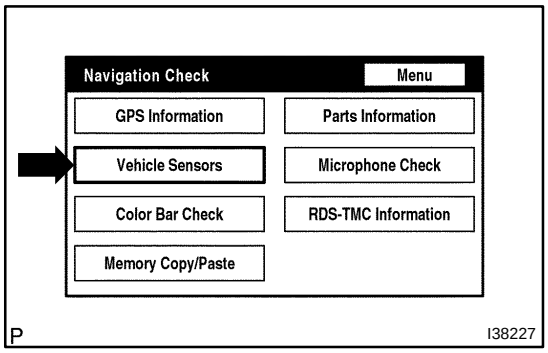
HINT:

- This mode checks the vehicle signal status to the navigation ECU.
- Illustrations may differ from the actual vehicle depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle.

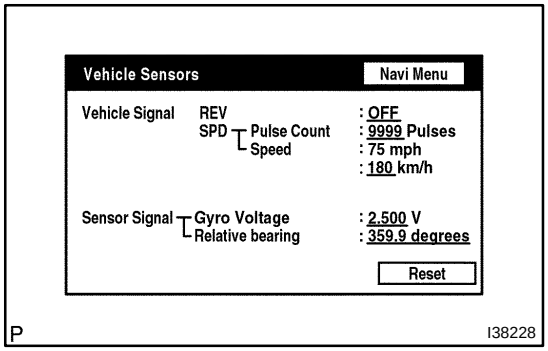
1. Enter diagnostic mode (see page 05-1784).



2. Select "Navigation Check" from the "Diagnosis MENU" screen.



3. Select "Vehicle Sensors" from the "Navigation Check" screen.



4. Check all the signals and sensors when vehicle signal information is displayed.

HINT:

This screen is updated once per second when input signals to the vehicle are changed.

05IS9-02

PROBLEM SYMPTOMS TABLE

HINT:

- Before performing verification listed in the table below, check the fuse and relay.
- Methods used to verify the cause of the problem are listed in order of probability in the verification column.
- If there are two or more parts to be replaced in the verification column, check the symptom after replacing each part. If the symptom still occurs, replace the following part in the columnn.

Display function

Symptom	Verification	See page
Black screen (No image appears on navigation/audio screen).	1. "BLACK SCREEN (NO IMAGE APPEARS ON NAVIGATION AND AUDIO SCREEN)" 2. Power source circuit (multi-display) 3. Replace multi-display	05-1805 05-1828 67-8
Illumination for panel switch does not come on with TAIL switch on.	1. "ILLUMINATION FOR PANEL SWITCH DOES NOT COME ON WITH TAIL SWITCH ON" 2. Dimmer signal circuit 3. Replace multi-display	05-1806 05-1854 67-8
Display does not dim (Night Screen) with TAIL switch on.	1. "DISPLAY DOES NOT DIM (NIGHT SCREEN) WITH TAIL SWITCH ON" 2. Replace multi-display 3. Replace gateway ECU 4. Replace combination meter assy	05-1807 67-8 67-21 71-18
Power does not turn off (The screen remains on).	1. Power source circuit (multi-display) 2. Replace multi-display	05-1828 67-8
Panel switch does not function.	1. "PANEL SWITCH DOES NOT FUNCTION" 2. Power source circuit (multi-display) 3. Replace multi-display	05-1808 05-1828 67-8
Touch panel switch does not function.	1. "TOUCH PANEL SWITCH DOES NOT FUNCTION" 2. Power source circuit (multi-display) 3. Replace multi-display	05-1809 05-1828 67-8
Screen is distorted.	1. Display signal circuit (navigation ECU - multi-display) 2. Replace navigation ECU 3. Replace multi-display	05-1852 67-9 67-8
Screen flicker or color distortion.	1. "SCREEN FLICKER OR COLOR DISTORTION" 2. Display signal circuit (navigation ECU - multi-display) 3. Replace navigation ECU 4. Replace multi-display	05-1810 05-1852 67-9 67-8
Switches can be operated while vehicle is running	1. Speed signal circuit (multi-display - combination meter assy)	05-1841
DVD image cannot be displayed on front screen. (Parking brake is on.) *1	1. Parking brake switch circuit	05-1846

*1: w/ Rear Seat Entertainment System

Navigation function

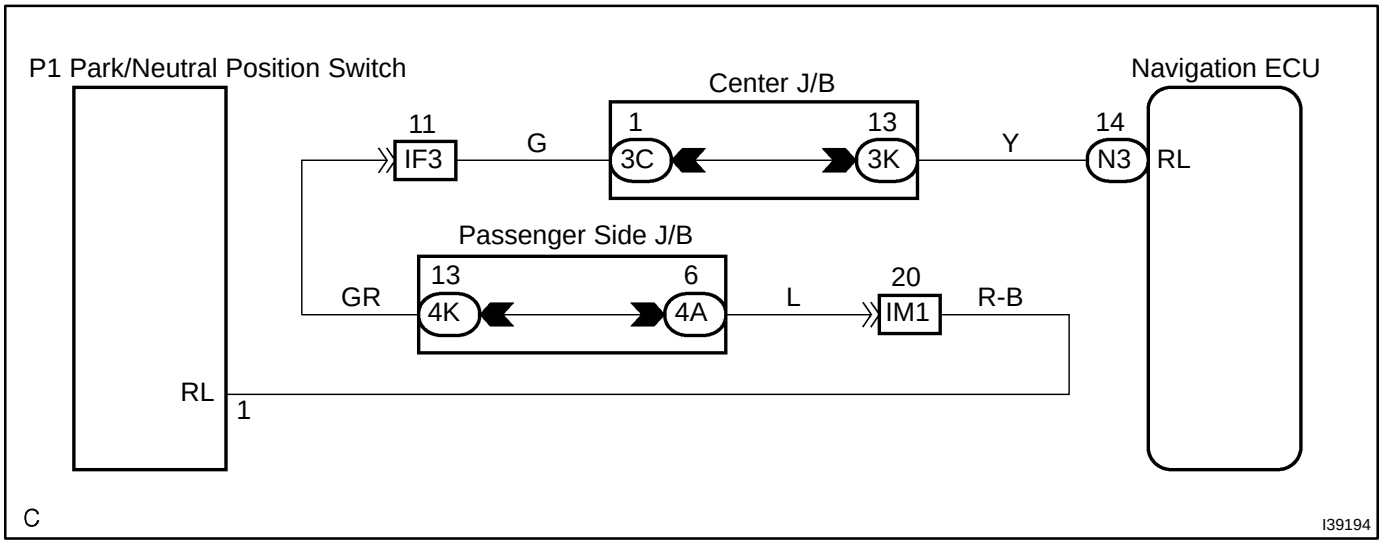
Symptom	Verification	See page
Map disc cannot be inserted.	1. "MAP DISC CANNOT BE INSERTED" 2. Power source circuit (navigation ECU) 3. Replace navigation ECU	05-1812 05-1830 67-9
Vehicle position mark deviates greatly.	1. "VEHICLE POSITION MARK DEVIATES GREATLY" 2. Replace GPS antenna assy 3. Replace navigation ECU	05-1813 67-19 67-9
Cursor or map rotates when vehicle is stopped.	1. "CURSOR OR MAP ROTATES WHEN VEHICLE IS STOPPED" 2. Replace navigation ECU	05-1815 67-9
Vehicle position mark is not updated.	1. "VEHICLE POSITION MARK IS NOT UPDATED" 2. Replace map disc 3. Replace navigation ECU	05-1816 - 67-9
Current position display does not appear.	1. "CURRENT POSITION DISPLAY DOES NOT APPEAR" 2. Replace map disc 3. Replace navigation ECU	05-1817 - 67-9
GPS mark is not displayed.	1. "GPS MARK IS NOT DISPLAYED" 2. Replace GPS antenna assy 3. Replace navigation ECU	05-1818 67-19 67-9
Voice guidance does not function.	1. "VOICE GUIDANCE DOES NOT FUNCTION" 2. Speaker circuit (navigation voice)	05-1820 05-1849
Map display is incomplete.	1. "MAP DISPLAY INCOMPLETE" 2. Replace map disc 3. Replace navigation ECU	05-1823 - 67-9
Route cannot be calculated.	1. "ROUTE CANNOT BE CALCULATED" 2. Replace map disc 3. Replace navigation ECU	05-1824 - 67-9

REVERSE SIGNAL CIRCUIT

CIRCUIT DESCRIPTION

The navigation ECU receives the reverse signal from the park/neutral position switch and information about the GPS antenna, and then adjusts the vehicle position.

WIRING DIAGRAM



INSPECTION PROCEDURE

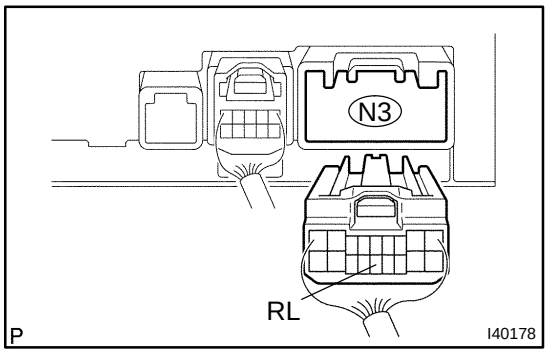
1	INSPECT REVERSE POSITION INDICATOR(COMBINATION METER ASSY)

(a) When moving the shift lever to the R position, check if "R" lights up in the combination meter.
OK: "R" lights up.

NG → **Go to step 3**

OK

2	INSPECT NAVIGATION ECU(RL)



(a) Disconnect the navigation ECU connector N3.
(b) Measure the voltage according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
RL - Body ground	Shift lever R position → Except R position	10 to 14 V → Below 1 V

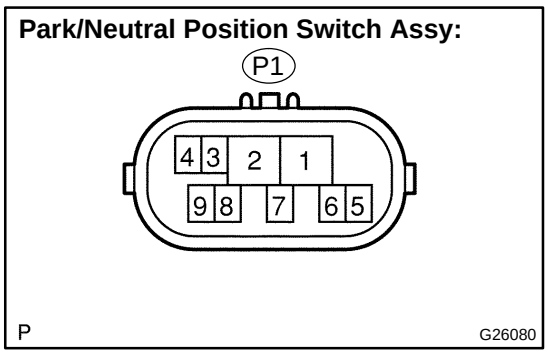
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE NAVIGATION ECU (SEE PAGE 67-9)

3	INSPECT PARK/NEUTRAL POSITION SWITCH ASSY

Park/Neutral Position Switch Assy:



(a) Disconnect the park/neutral position switch connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
P1-1 - P1-2	Shift lever is moved to R position.	Below 1 Ω
P1-1 - P1-2	Shift lever is moved to except R position.	10 kΩ or higher

NG → **REPLACE PARK/NEUTRAL POSITION SWITCH ASSY**

OK

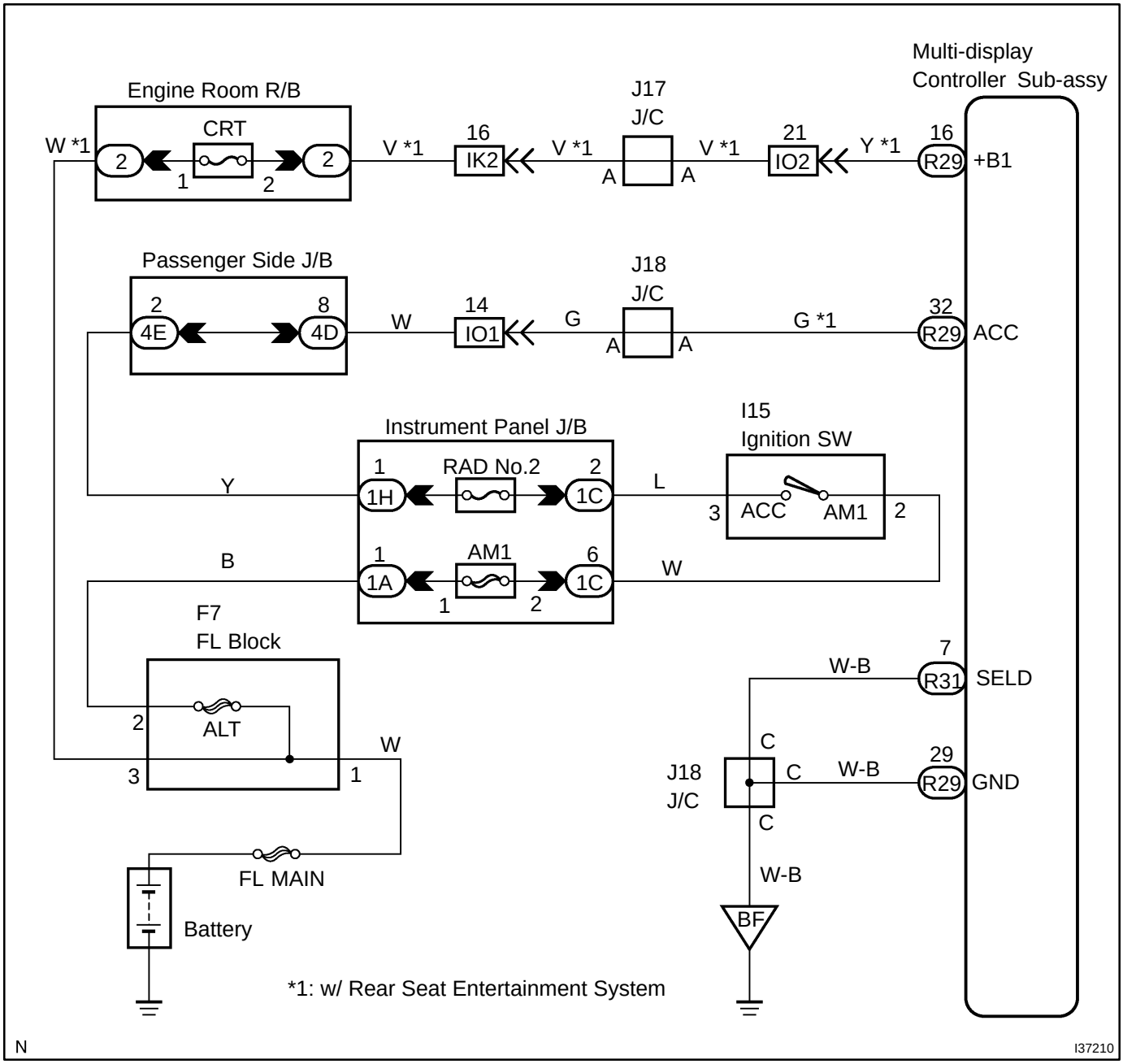
REPAIR OR REPLACE HARNESS OR CONNECTOR

POWER SOURCE CIRCUIT(MULTI-DISPLA Y CONTROLLER SUB-ASSY)

CIRCUIT DESCRIPTION

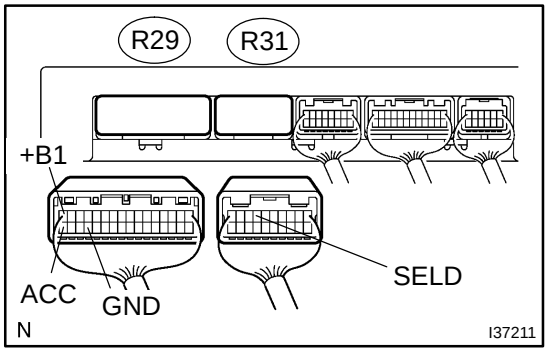
This circuit provides power to the multi-display controller sub-assy.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT MULTI-DISPLA Y CONTROLLER SUB-ASSY(+B1, ACC, GND, SELD)



(a) Disconnect the connectors from the multi-display controller sub-assy.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
GND - Body ground	Always	Below 1 Ω
SELD - Body ground	Always	Below 1 Ω

(c) Measure the voltage according to the value(s) in the table below.

Standard:

Tester connection	Condition	Specified condition
+B1 - GND	Always	10 - 14 V
ACC - GND	Ignition SW ACC	10 - 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN DIAGNOSTIC TROUBLE CODE CHART (SEE PAGE 05-1791)

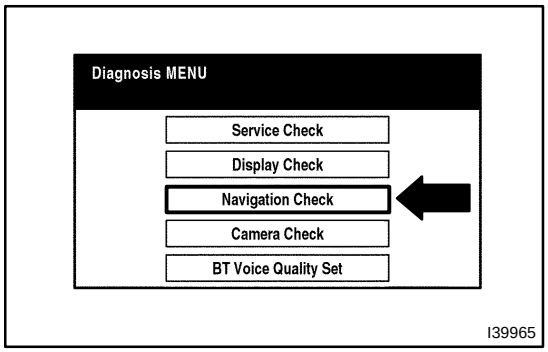
05ISE-02

SCREEN NOISE AUTOMATIC ADJUSTMENT

HINT:

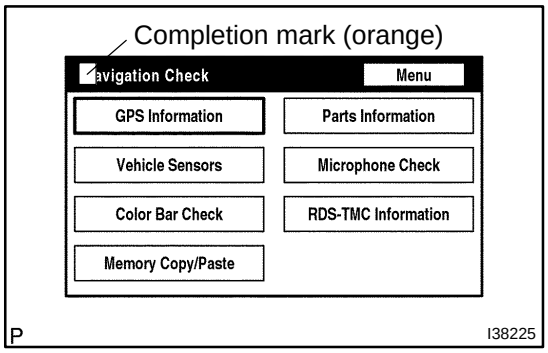
- This adjustment is performed to reduce noise when screen noise occurs upon replacing the multi-display, the navigation ECU or the television camera ECU.
- Illustrations may differ from the actual vehicle depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle.
- Perform both procedures below when the multi-display is replaced.

1. When either the multi-display or the navigation ECU is replaced:



(a) Turn the ignition switch to the ACC position and wait for at least 6 seconds to activate the diagnostic mode (see page 05-1784).

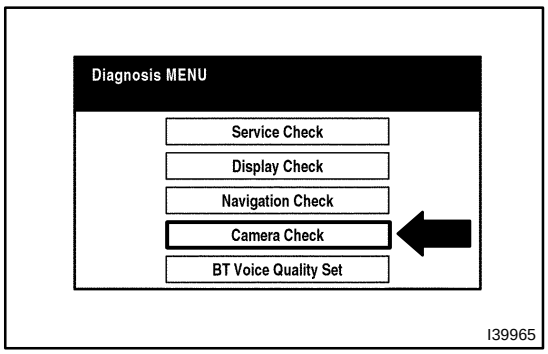
(b) Select ”Navigation Check” from the ”Diagnosis MENU” screen.



(c) The screen enters ”Navigation Check” with a beeping sound. Adjustment is completed when the completion mark is displayed.

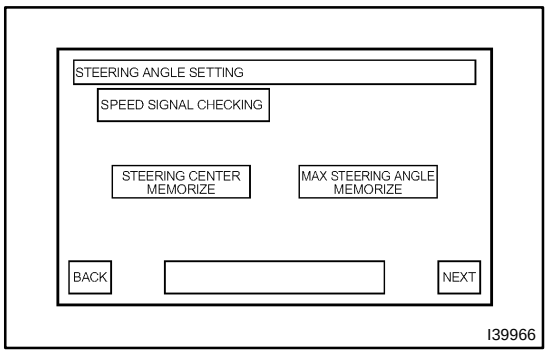
(d) Cancel the diagnostic mode (see page 05-1784).

2. When either the multi-display or the television camera ECU is replaced:



(a) Turn the ignition switch to the ACC position and wait for at least 6 seconds to activate the diagnostic mode (see page 05-1784).

(b) Select ”Camera Check” from the ”Diagnosis MENU” screen.



(c) Adjustment is completed when the steering angle setting screen is displayed.

(d) Cancel the diagnostic mode (see page 05-1784).

HINT:

* If the automatic adjustment is not performed (only step 1) only upon replacing the multi-display, a beeping sound can be heard for 3 seconds (while the initial screen is displayed) after turning the ignition switch to the ACC position.
* Perform the automatic adjustment again if a beeping sound can be heard within 3 seconds.

05IRW-01

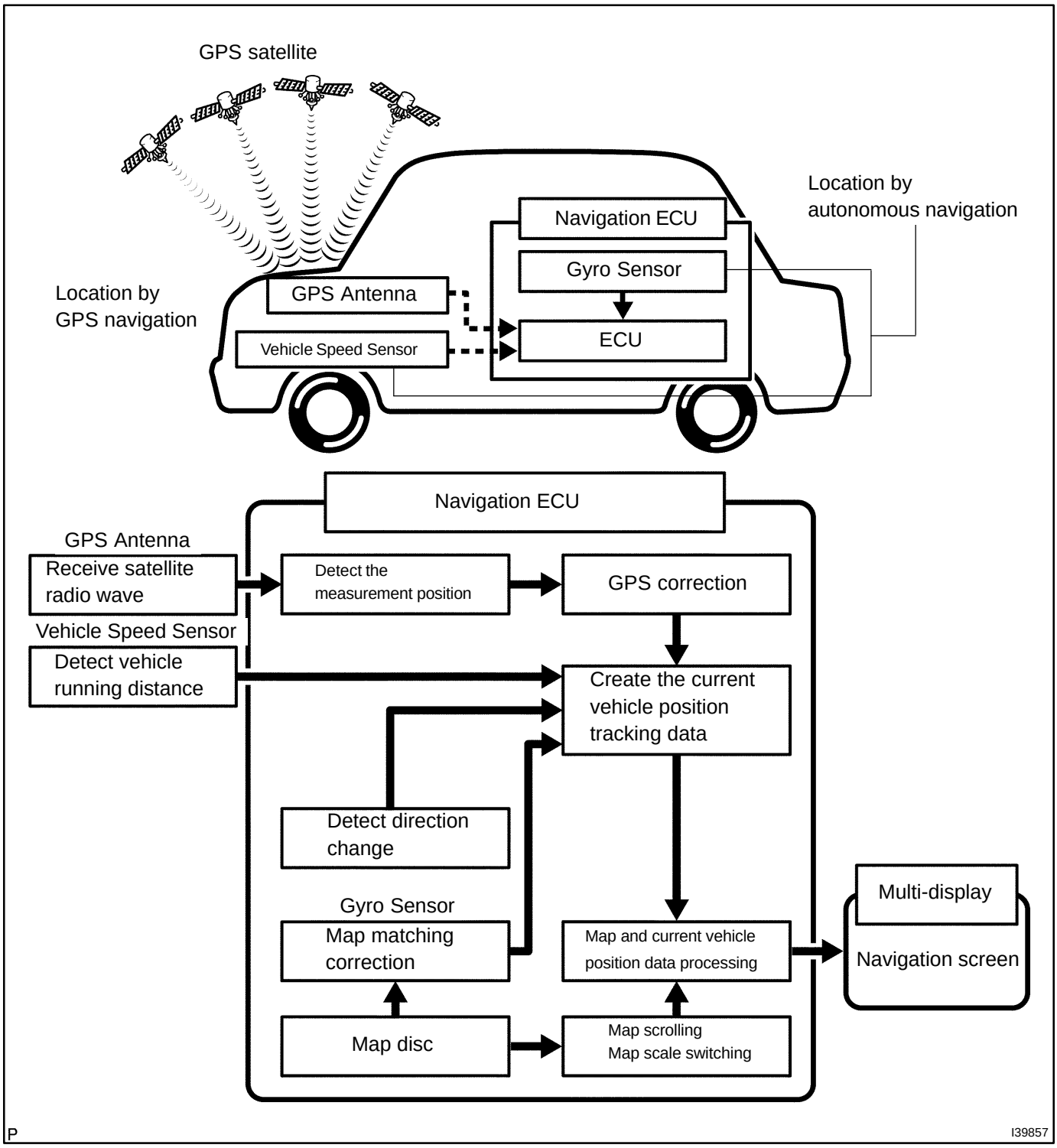
SYSTEM DESCRIPTION

1. Navigation system outline

(a) Vehicle position tracking methods

It is essential that the navigation system correctly tracks the current vehicle position and displays it on the map. There are 2 methods to track the current vehicle position: autonomous (dead reckoning) and GPS* (satellite) navigation. Both navigation methods are used in conjunction with each other.

*GPS (Global Positioning System)

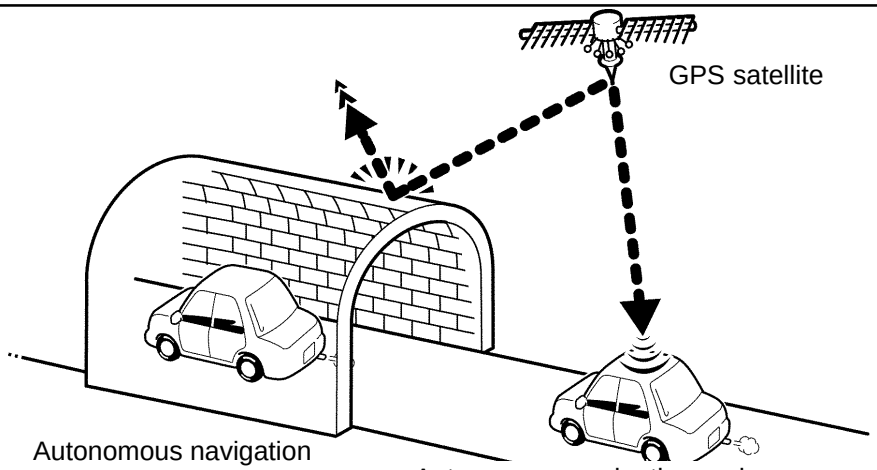


Operation	Description
Vehicle Position Calculation	The navigation ECU calculates the current vehicle position (direction and current position) using the direction deviation signal from the gyro sensor and the running distance signal from the vehicle speed sensor and creates the driving route.
Map Display processing	The navigation ECU displays the vehicle track on the map by processing the vehicle position data, vehicle running track, and map data from the map disc.
Map Matching	The map data from the map disc is compared to the vehicle position and running track data. Then, the vehicle position is matched with the nearest road.
GPS Correction	The vehicle position is matched to the position measured by GPS. Then, the measurement position data from the GPS unit is compared with the vehicle position and running track data. If the position is widely different, the GPS measurement position is used.
Distance Correction	The running distance signal from the vehicle speed sensor includes the error caused by tire wear and slippage between the tires and road surface. Distance correction is performed to account for this. The navigation ECU automatically offsets the running distance signal to make up for the difference between it and the distance data of the map. The offset is automatically updated.

HINT:

The combination of autonomous and GPS navigation makes it possible to display the vehicle position even when the vehicle is in places where the GPS radio wave cannot receive a signal. When only autonomous navigation is used, however, the mapping accuracy may slightly decline.

Navigation performed even where the GPS radio wave does not reach.
- ⁎ In a tunnel
- ⁎ In an indoor parking lot
- ⁎ Between tall buildings
- ⁎ Under an overpass
- ⁎ On a forest or tree-lined path



P I38172

(b) Autonomous navigation

This method determines the relative vehicle position based on the running track determined by the gyro and vehicle speed sensors located in the navigation ECU.

(1) Gyro sensor

Calculates the direction by detecting angular velocity. It is located in the radio and navigation assy.

(2) Vehicle speed sensor

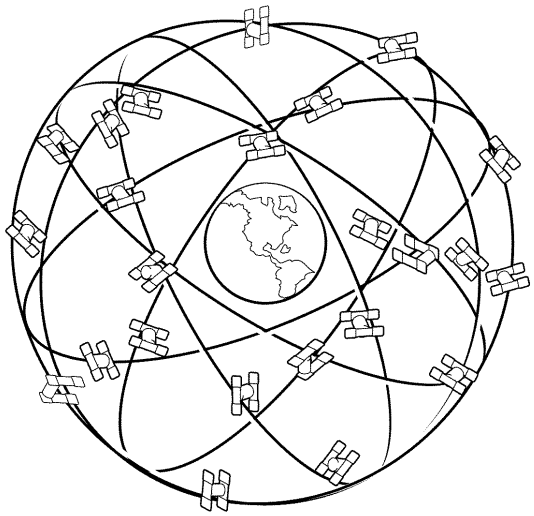
Used to calculate the vehicle running distance.

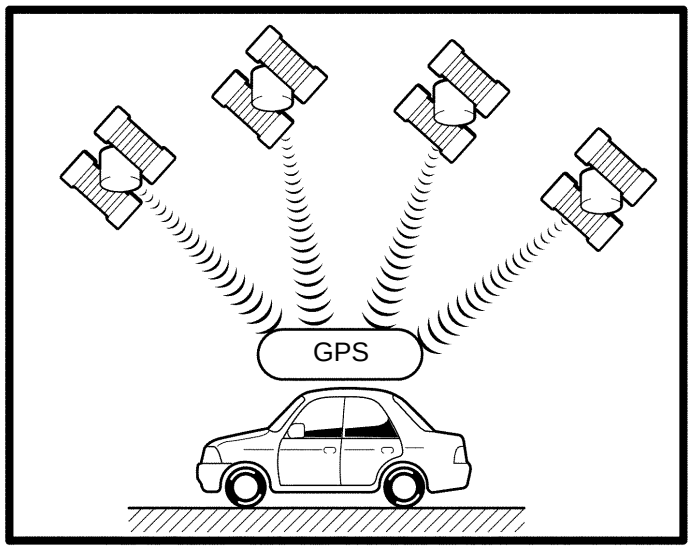
(c) GPS navigation (Satellite navigation)

This method detects the absolute vehicle position using radio wave from a GPS satellite.

* GPS satellites were launched by the U.S. Department of Defence for military purposes.

Current longitude/latitude/altitude is determined using the radio wave arrival time from four satellites.



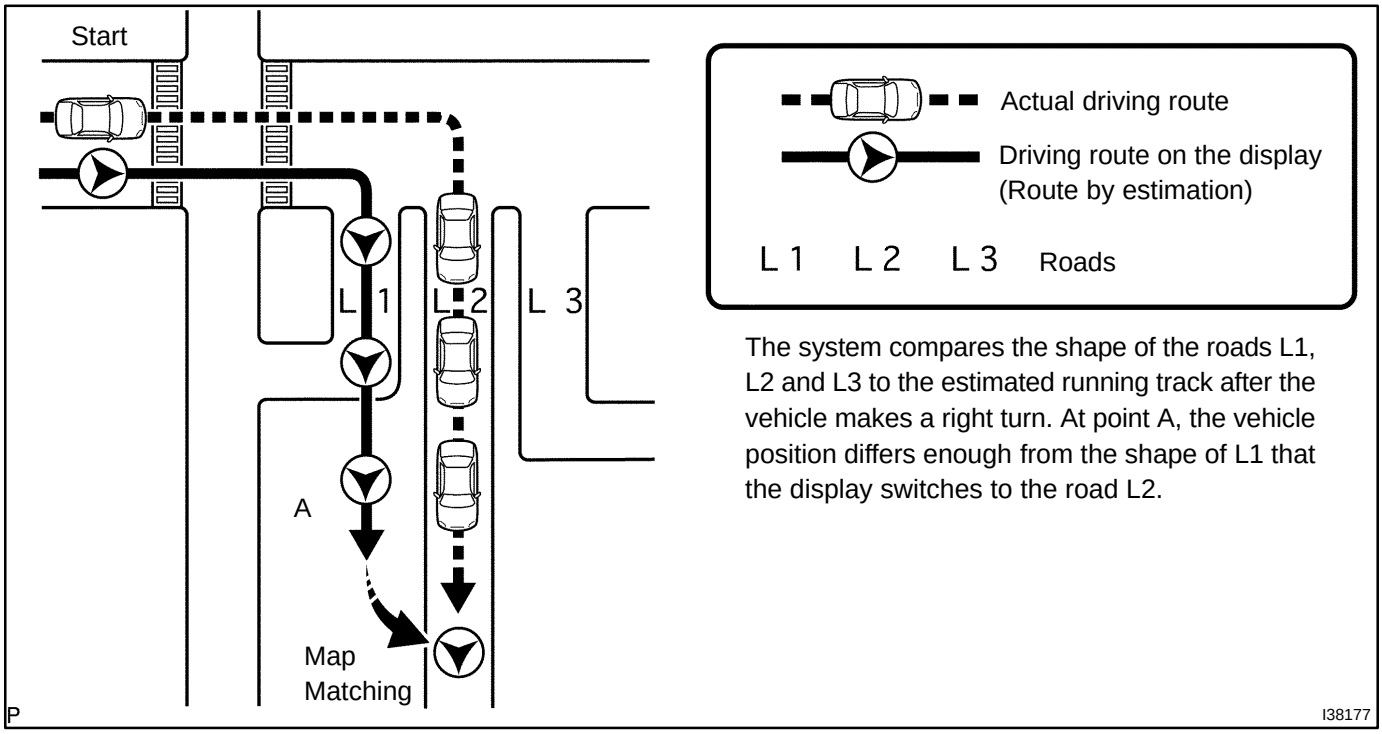


P I38174

Number of satellites	Measurement	Description
2 or less	Measurement impossible	Vehicle position cannot be obtained because the number of satellites is not enough.
3	2-dimensional measurement is possible	Vehicle position is obtained based on the current longitude and latitude. (This is less precise than 3-dimensional measurement)
4	3-dimensional measurement is possible	Vehicle position is obtained based on the current longitude, latitude and altitude.

(d) Map matching

The current driving route is calculated by autonomous navigation (according to the gyro sensor and vehicle speed sensor) and GPS navigation. This information is then compared with possible road shapes from the map data in the map disc and the vehicle position is set onto the most appropriate road.



2. DVD (Digital Versatile Disc) player outline (for navigation map)

(a) The navigation ECU uses a laser pickup to read the digital signals recorded on a DVD.

HINT:

- ○ Do not disassemble any part of the navigation ECU.
- ○ Do not apply oil to the navigation ECU.
- ○ Do not insert anything but a DVD into the navigation ECU.

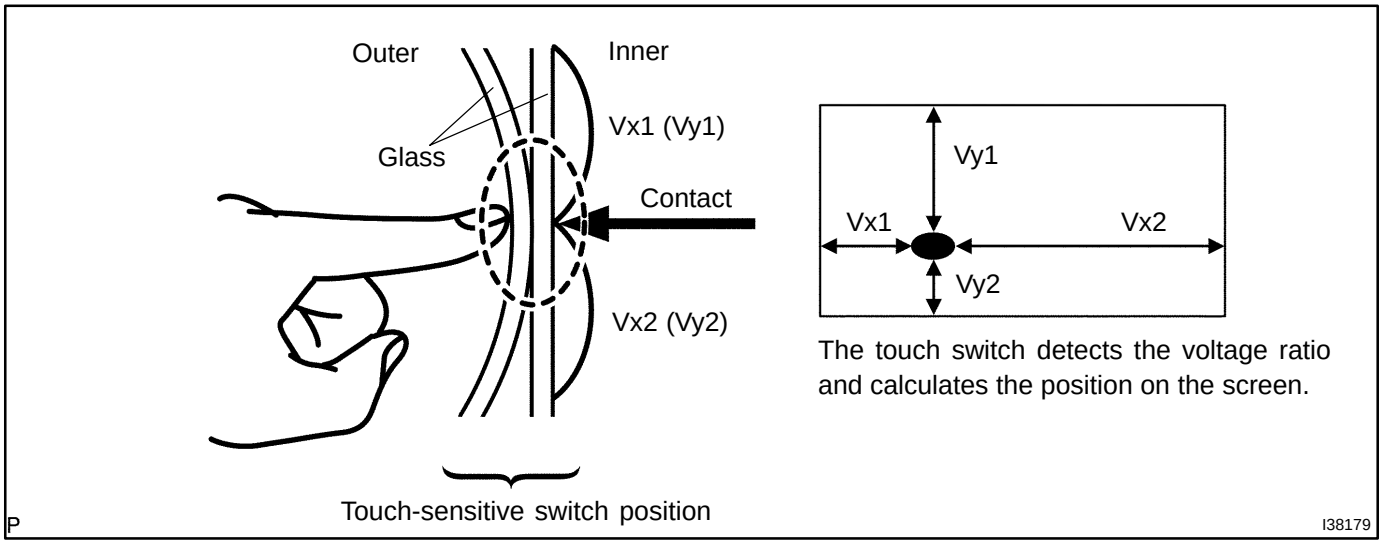
CAUTION:

Because the navigation ECU uses an invisible laser beam, do not look directly at the laser pickup. Be sure to only operate the navigation as instructed.

3. Multi-display outline

(a) Touch switch

Touch switches are touch-sensitive (interactive) switches operated by touching the screen. When a switch is pressed, the outer glass bends in to contact the inner glass at the pressed position. By doing this, the voltage ratio is measured and the pressed position is detected.

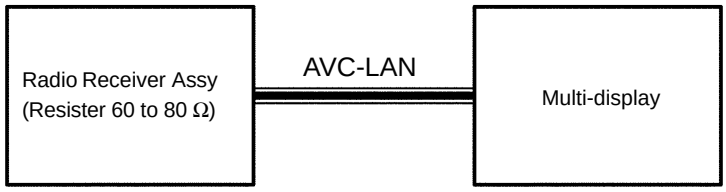


4. AVC-LAN Description

(a) What is AVC-LAN?

AVC-LAN, an abbreviation for ”Audio Visual Communication Local Area Network”, is a unified standard developed by the manufacturers in affiliation with Toyota Motor Corporation. This standard pertains to audio and visual signals as well as switch and communication signals.

Example:



P I39082

(b) Purpose:

Recently, car audio systems have rapidly developed and the functions vastly changed. The conventional car audio system is being integrated with multi-media interfaces similar to those in navigation systems. At the same time, customers are demanding higher quality from their audio systems. This is merely an overview of the standardization background. The specific purposes are as follows.

(1) To solve sound problems, etc. caused by using components of different manufacturers through signal standardization.

(2) To allow each manufacturer to concentrate on developing products they do best. From this, reasonably priced products can be produced.

HINT:

- ○ If a +B or GND short is detected in the AVC-LAN circuit, communication is interrupted and the audio system will stop functioning.
- ○ If an audio system is equipped with a navigation system, the multi-display unit acts as the master unit. If the navigation system is not equipped, the audio head unit acts as the master unit instead. If the radio and navigation assy is equipped, it is the master unit.
- ○ The radio receiver assy provides resistance to make communication possible.
- ○ The car audio system with an AVC-LAN circuit has a diagnostic function.
- ○ Each component has a specified number (3-digit) called a physical address. Each function has a number (2-digit) called a logical address.

5. Communication system outline

(a) Components of the navigation system communicate with each other via the AVC-LAN.

(b) Radio receiver assy has enough resistance (60 to 80 Ω) necessary for transmitting the communication. This is essential for communication.

(c) If a short circuit or open circuit occurs in the AVC-LAN circuit, communication is interrupted and the navigation system will stop functioning.

6. Diagnostic function outline

(a) The audio system has a diagnostic function (the result is indicated on the master unit).

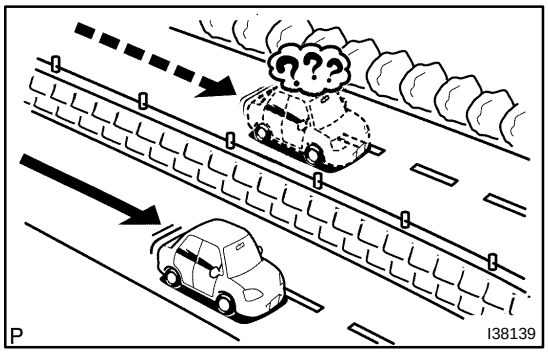
(b) A 3-digit hexadecimal component code (physical address) is allocated to each component on the AVC-LAN. Using this code, the component in the diagnostic function can be displayed.

05IS8-02

SYSTEM NORMAL CONDITION CHECK

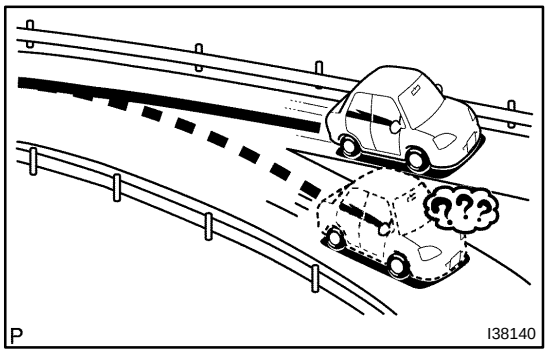
(f) If the symptom is applicable to any of the following, it is intended behavior, and not a malfunction.

Symptom	Answer
A longer route than expected is chosen.	Depending on the road conditions, the navigation ECU may determine that a longer route is quicker.
Even when distance priority is high, the shortest route is not shown.	Some paths may not be advised due to safety concerns.
When the vehicle is put into motion immediately after the engine starts, the navigation system deviates from the actual position.	If the vehicle starts before the navigation system activates, the system may not react.
When running on certain types of roads, especially new roads, the vehicle position deviates from the actual position.	When the vehicle is driving on new roads not available on the map disc, the system attempts to match it to another nearby road, causing the position mark to deviate.

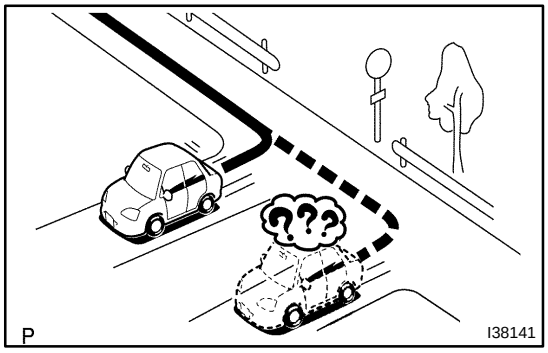


(g) The following symptoms are not a malfunction, but are caused by errors inherent in the GPS, gyro sensor, speed sensor, and navigation ECU.

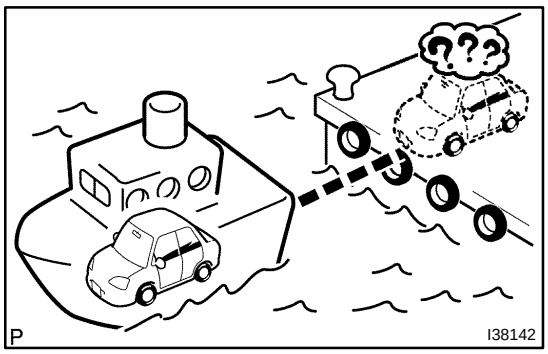
(1) The current position mark may be displayed on a nearby parallel road the vehicle actually runs on.



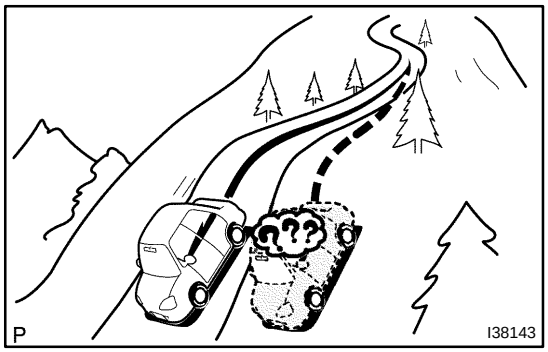
(2) Immediately after a fork in the road, the current vehicle position mark may be displayed on the wrong road.



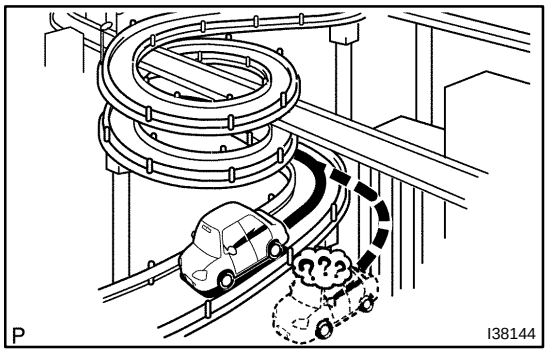
(3) When the vehicle turns right or left at an intersection, the current vehicle position mark may be displayed on a nearby parallel road.



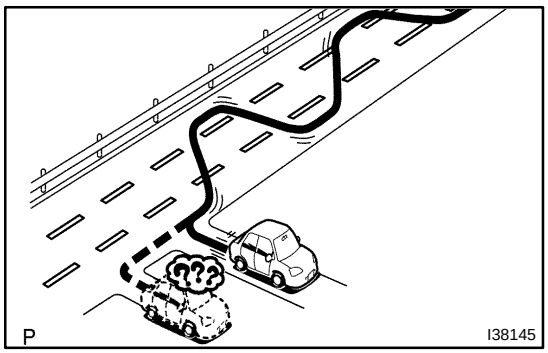
(4) When the vehicle is carried, such as on a ferry, and the vehicle itself is not running, the current vehicle position mark may be displayed in the position where the vehicle was until a measurement can be performed by GPS.



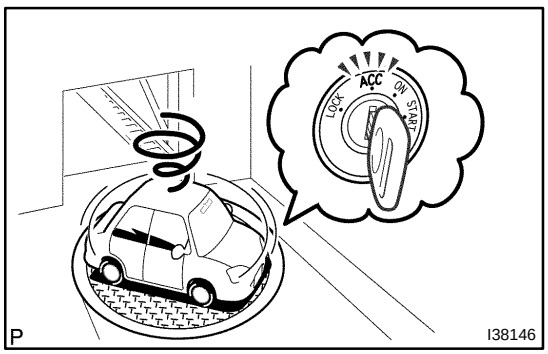
(5) When the vehicle runs on a steep hill, the current vehicle position mark may deviate from the correct position.



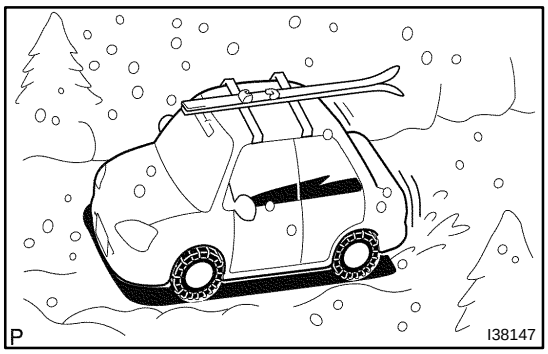
(6) When the vehicle makes a continuous turn of 360, 720, 1,080, etc. degrees, the current vehicle position mark may deviate from the correct position.



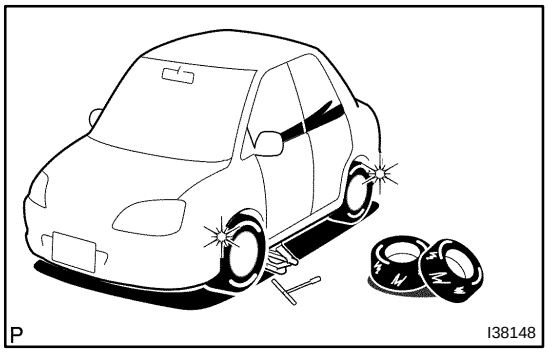
(7) When the vehicle moves erratically, such as constant lane changes, the current vehicle position mark may deviate from the correct position.



(8) When the ignition switch is put into the ACC/OFF position on a turn table before parking, the current vehicle position mark may not point in the correct direction. The same will occur when the vehicle comes out of parking.



(9) When the vehicle runs on the snowy road or a mountain path with the chains installed or using a spare tire, the current vehicle position mark may deviate from the correct position.



(10) When a tire is changed, the current vehicle position mark may deviate from the correct position.

HINT:

* Diameter of the tire may change, causing a speed sensor error.
* Performing the ”tire change” in calibration mode will allow the system to correct the current vehicle position faster.

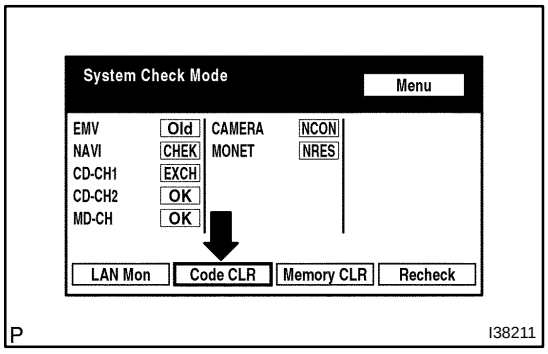
05ISC-02

SYSTEM CHECK MODE (DTC CLEAR/RECHECK)

HINT:

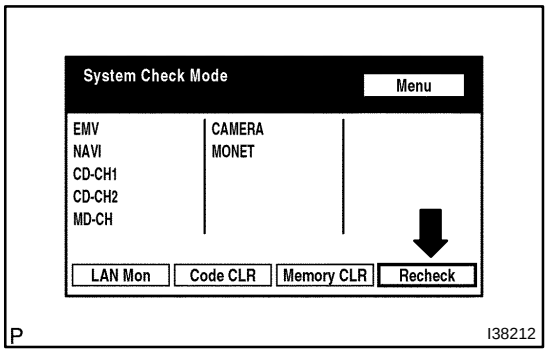
Illustrations may differ from the actual vehicle depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle.

1. Enter the diagnostic mode (see page 05-1784).



2. Clear DTC

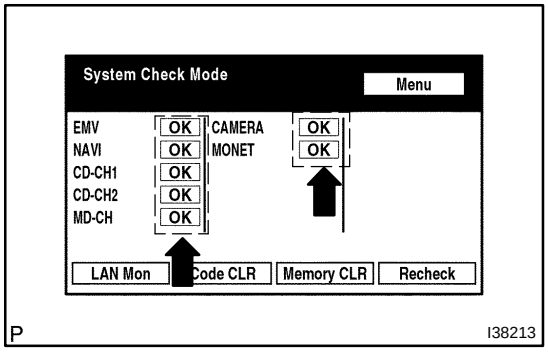
(a) Press the ”Code CLR” switch for 3 seconds.



(b) Check result is cleared.

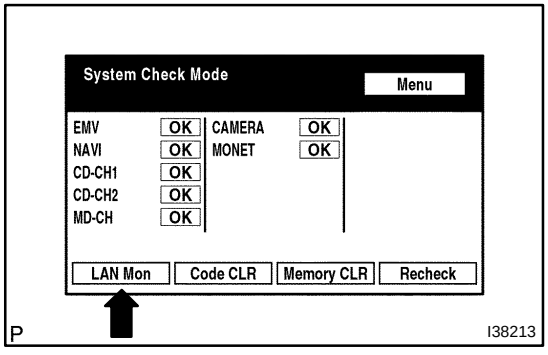
3. Recheck

(a) Press the ”Recheck” switch.

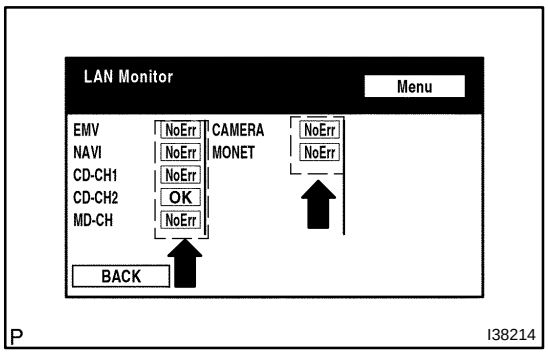


(b) Confirm that all diagnostic codes are ”OK” when the check results are displayed.

If a code other than ”OK” is displayed, troubleshoot again.



(c) Press the ”LAN Mon” switch to change to ”LAN Monitor” mode.



(d) Confirm that all diagnostic codes are ”No Err”.
If a code other than ”No Err” is displayed, troubleshoot again.

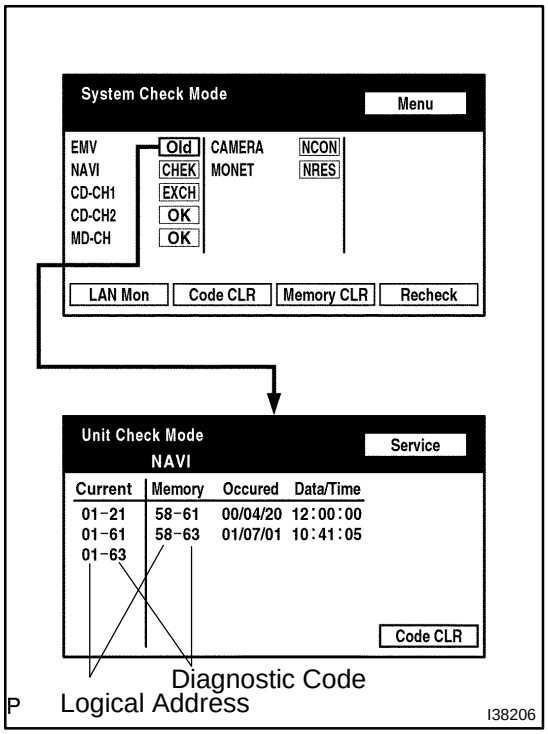
05ISB-02

SYSTEM CHECK MODE (DTC CHECK)

HINT:

Illustrations may differ from the actual vehicle depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle.

1. Enter the diagnostic mode (see page 05-1784).

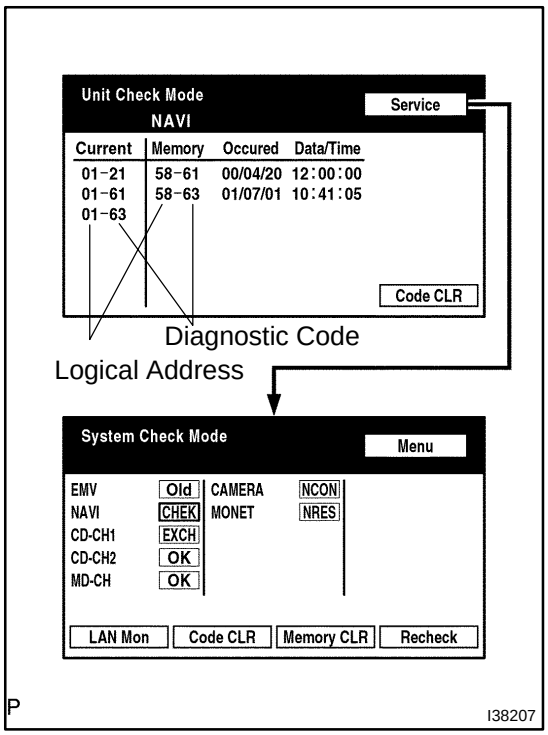


2. Read the system check result.

(a) If all check results of other devices are "EXCH," "CHEK" or "Old," touch the display to check the contents on the "Unit Check Mode" screen and record them on the customer problem analysis check sheet.

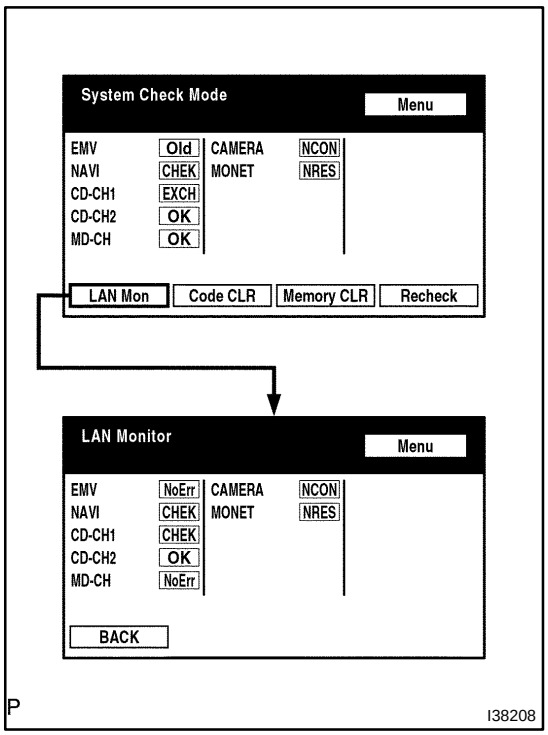
HINT:

- If all check results are "OK," go to communication DTC check (go to step 3).
- If a device name is not known, its physical address is displayed.



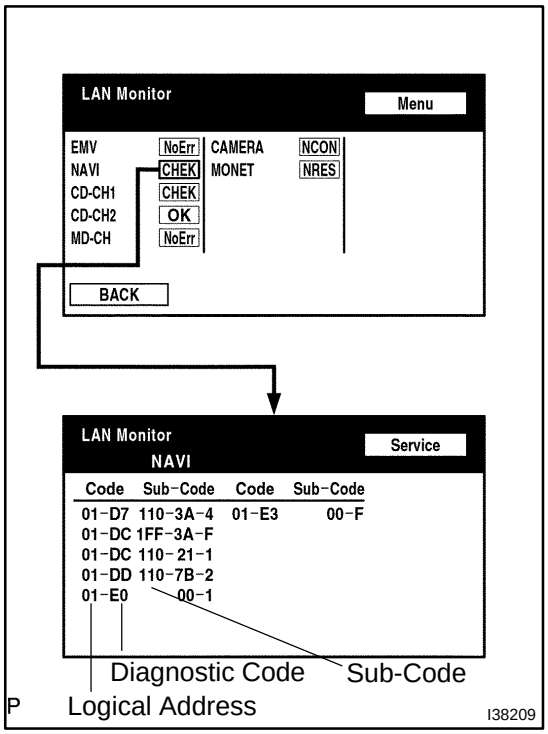
HINT:

If "EXCH", "CHEK" and "Old" as well as "OK" exist, press the service switch to return to the "System Check Mode". Then, check the "Unit Check Mode" screen and record them on the customer problem analysis check sheet.



3. Read the communication diagnostic check result.

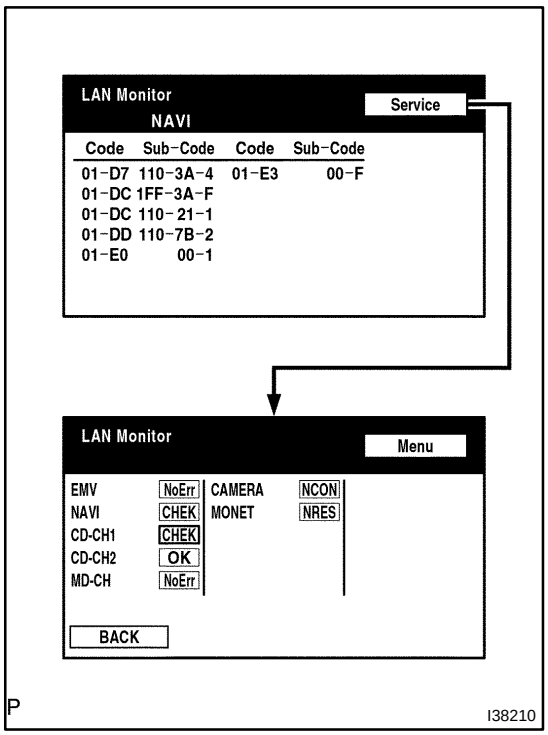
(a) Return to the "System Check Mode", and press "LAN Mon" switch to enter the LAN monitor screen.



(b) If the result is "CHEK" or "Old," touch the result switch to check the contents on the individual communication diagnostic screen and record them on the customer problem analysis check sheet.

HINT:

- If all check results are "No Err," the system judges that no DTC exists.
- The sub-code (relevant device) will be indicated by its physical address.



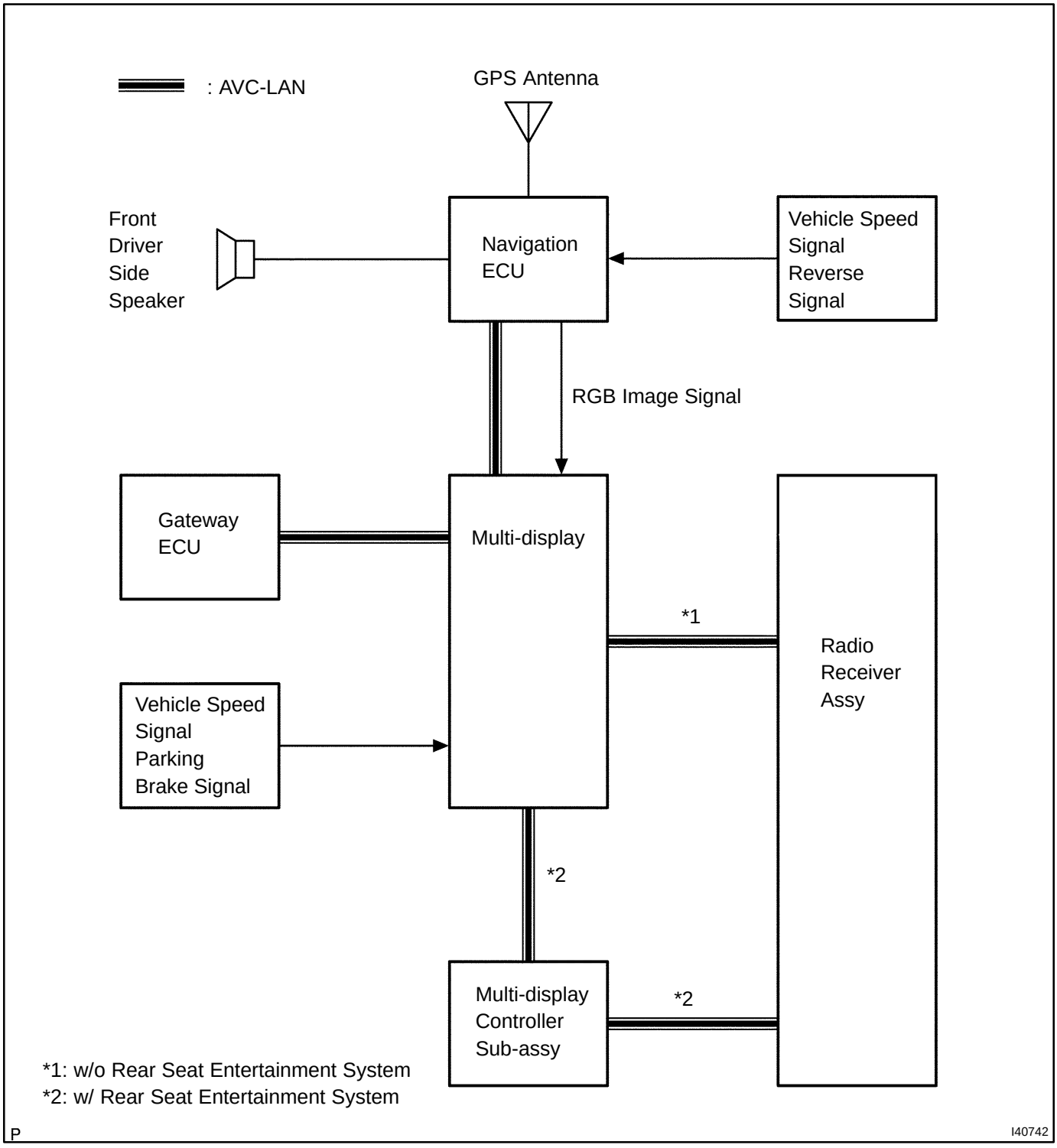
HINT:

If check results of other devices are ”CHEK,” press the ”Service” switch to return to the original ”LAN Monitor” screen. Then, check the individual communication diagnostic screen for the next device and record the result on the customer problem analysis check sheet.

NAVIGATION SYSTEM

05IRV-01

SYSTEM DIAGRAM



05IRY-02

CUSTOMER PROBLEM ANALYSIS CHECK

NAVIGATION SYSTEM Check Sheet

Inspector's name: _____

Customer's Name		**VIN**	
		Production Date	
		Licence Plate No.	
Date Vehicle Brought in	/ /	**Odometer Reading**	**km mile**

Date Problem First Occurred	/ /
Frequency Problem Occurs	⁎ Always ⁎ Intermittently (Times a day)

DTC Check

1st time trouble code.

Unit Check Mode		LAN Monitor	
Current	Memory Occured Data/Time	Code Sub-Code	Code Sub-Code

2nd time trouble code.

Unit Check Mode		LAN Monitor	
Current	Memory Occured Data/Time	Code Sub-Code	Code Sub-Code

Problem Symptom

I38696 I39529

05ISD-02

DIAGNOSTIC TROUBLE CODE CHART

Terms	Description
Physical address	3-digit, hexadecimal code assigned to all components connected to the AVC-LAN. Individual symbols are specified based on function. Units whose names are unknown or relevant units are displayed with physical addresses.
Logical address	2-digit, hexadecimal code assigned to all the functions in the AVC-LAN system.

HINT:

Titles for each unit are stated in the following order: parts name (physical address) [Name indicated by DTC]

1. MULTI-DISPLA Y (physical address: 110) [EMV]

(a) Logical address: 01 (Communication control)

DTC	Name	Diagnosis	Verification	See page
D5 *1 *5	Absence of registration unit	A device that the sub code shows is (was) disconnected from the system when turning the ignition switch to the ACC or ON position. The communication condition with the device that the code shows cannot be obtained when the engine starts.	Inspection for the device indicated by the sub code. (Refer to the inspection list for the device indicated by the sub code.)	Refer to step 6
D8 *2 *5	No response for connection check	The device indicated by the sub code is (was) disconnected from the system after engine start.	Inspection for the device indicated by the sub code. (Refer to the inspection list for the device indicated by the sub code.)	Refer to step 6
D9 *1 *5	Last mode error	The device (for audio visual system) that had functioned before the engine stopped is (was) disconnected from the system when the ignition switch is (was) in the ACC or ON position.	Inspection for the device indicated by the sub code. (Refer to the inspection list for the device indicated by the sub code.)	Refer to step 6
DA *5	No response against ON/OFF command	No response is identified when changing mode (audio and visual mode change). Detected when sound and image do not change by switch operation.	Inspection for the device indicated by the sub code. (Refer to the inspection list for the device indicated by the sub code.)	Refer to step 6
DB *1 *5	Mode status error	This code detects a dual alarm.	Inspection for the device indicated by the sub code. (Refer to the inspection list for the device indicated by the sub code.)	Refer to step 6
DC *3 *5	Failure in transmission	This code indicates a transmission failure to the device indicated by the sub code. NOTE: This DTC may have no direct relationship with the malfunction.	Inspection for the device indicated by the sub code. (Refer to the inspection list for the device indicated by the sub code.)	Refer to step 6
DE *4 *5	Slave reset	This code is stored when a slave device has been disconnected after engine start.	Inspection for the device indicated by the sub code. (Refer to the inspection list for the device indicated by the sub code.)	Refer to step 6
21	ROM error	This code is output when a malfunction exists in ROM.	Replace multi-display	67-8
22	RAM error	This code is output when a malfunction exists in RAM.	Replace multi-display	67-8

HINT:

- *1: This code may be recorded depending on the battery condition or engine start voltage even if no failure is detected.
- *2: If the power connector is disconnected after the engine starts, this code is recorded after 180 seconds.
- *3: This code may be stored if the ignition key is turned to the START position again with the engine running.
- *4: This code may be stored if the ignition key is held in the START position for 1 minute or more before returning to the ON position.
- *5: If the device is reported as not existing during verification, check the power source circuit and AVC-LAN circuit for the device.

(b) Logical address: 21 (SW): 23 (SW with name): 24 (SW converting): 25 (command SW)

DTC	Name	Diagnosis	Verification	See page
10	Panel switch error	The panel SW detection circuit has a failure.	Replace multi-display	67-8

2. NAVIGATION ECU (Physical address: 178) [NAVI]

(a) Logical address: 01 (Communication control)

HINT:

Methods used to verify the cause of the problem are listed in order of probability in the verification column.

DTC	Name	Diagnosis	Verification	See page
D6 *1	No master	When either the following condition meets. ・The device that stores (stored) the code has (had) been disconnected when the ignition switch is in ACC or ON position. ・The master device has (had) been disconnected when this code is stored.	1. Power source circuit (multi-display) 2. AVC-LAN circuit (multi-display - navigation ECU) 3. Power source circuit (navigation ECU) 4. Replace multi-display 5. Replace navigation ECU	05-1828 05-1860 05-1830 67-8 67-9
D7	Connection check error	When either the following condition meets. ・The device that stored this code has (had) been disconnected after the engine starts (started). ・The master device has (had) been disconnected when this code is (was) stored.	1. Power source circuit (multi-display) 2. AVC-LAN circuit (multi-display - navigation ECU) 3. Power source circuit (navigation ECU) 4. Replace multi-display 5. Replace navigation ECU	05-1828 05-1860 05-1830 67-8 67-9
DC *3 *5	Failure in transmission	This code indicates a transmission failure to the device indicated by the sub code. NOTE: This DTC may have no direct relationship with the malfunction.	Inspection for the device indicated by the sub code (Refer to the inspection list for the device indicated by the sub code)	Refer to step 6
DD *3	Master reset	When the device that should be the master has been disconnected after engine starts.	1. Power source circuit (multi-display) 2. AVC-LAN circuit (multi-display - navigation ECU) 3. Replace multi-display	05-1828 05-1860 67-8
DF *4	Master error	When the device with a display fails and the master is switched to the audio device. Also when a communication error between sub master (audio) and master occurs, this code is stored.	1. Power source circuit (multi-display) 2. AVC-LAN circuit (multi-display - navigation ECU) 3. Replace multi-display	05-1828 05-1860 67-8
E0 *1	Registration complete indication error	When ”Registration complete” command from the master device cannot be received.	This code will be detected when signal receiving time is delayed	-
E1 *1	Voice processing device ON error	When the AMP device records that the AMP output does not function even while the source device operates.	1. Power source circuit (multi-display) 2. AVC-LAN circuit (multi-display - navigation ECU) 3. Replace multi-display	05-1828 05-1860 67-8
E2	ON/OFF indication parameter error	When the command for ON/OFF control from the master device has a problem.	Replace multi-display	67-8
E3 *1	Registration demand transmission	When the registration demand command from the slave device is output, or when the registration demand command is output by receiving connection confirmation command from the sub master device.	-	-
E4	Multiple frame incomplete	When the multiple frame transmission ends incomplete.	-	-

HINT:

- *1: This code may be recorded depending on the battery condition or engine start voltage even if no failure is detected.
- *2: If the power connector is disconnected after the engine starts, this code is recorded after 180 seconds.
- *3: This code may be stored if the ignition key is turned to the START position again with the engine running.
- *4: This code may be stored if the ignition key is held in the START position for 1 minute or more before returning to the ON position.
- *5: If the device is reported as not existing during verification, check the power source circuit and AVC-LAN circuit for the device.

(b) Logical address: 58 (Navigation): 80 (GPS)

HINT:

Methods used to verify the cause of the problem are listed in order of probability in the verification column.

DTC	Name	Diagnosis	Verification	See page
10	Gyro error	Ground short, power supply short, or open circuit in the gyro signal, gyro failure.	1. Inspect the gyro error 2. Replace GPS antenna 3. Replace navigation ECU	05-1825 67-19 67-9
11	GPS receiver error	RTC, ROM, and RAM of the GPS receiver and TCXO errors. GPS receiver is failed.	Replace navigation ECU	67-9
40	GPS antenna error	GPS antenna error	1. Replace GPS antenna 2. Replace navigation ECU	67-19 67-9
41	GPS antenna power source error	Error of the power source to the GPS antenna	1. Replace GPS antenna 2. Replace navigation ECU	67-19 67-9
42	Map disc read error	Player error. A scratch or dirt on the disc. Access to an invalid address due to software error.	1. Inspect map disc read error 2. Replace map disc 3. Replace navigation ECU	05-1826 - 67-9
43	SPD signal error	The difference between the GPS speed and SPD pulse is detected.	1. Inspect speed signal error 2. Speed signal circuit 3. Replace navigation ECU	05-1827 05-1838 67-9
44	Player error	Map player error is detected.	1. Check if the disc can be inserted and ejected. If a malfunction is found, replace the navigation ECU 2. If the same code is detected again, replace the navigation ECU	67-9 67-9
45	High temperature	High map player temperature is detected.	1. Park the vehicle in a cool place. Turn the engine off. After checking that the temperature of the radio and navigation assy becomes sufficiently low, turn the engine on to verify the malfunction symptom. 2. If the same code is detected, replace the navigation ECU	- 67-9

3. RADIO RECEIVER ASSY (Physical address: 190) [AUDIO H/U]

(a) Logical address: 01 (Communication control)

HINT:

Methods used to verify the cause of the problem are listed in order of probability in the verification column.

DTC	Name	Diagnosis	Verification	See page
D6 *1	No master	When either of the following conditions meets. ・The device that stores (stored) the code has (had) been disconnected when the ignition switch is (was) in ACC or ON position. ・The master device has (had) been disconnected when this code is (was) stored.	1. Power source circuit (multi-display) 2. AVC-LAN circuit (multi-display - radio receiver assy) *6 3. Power source circuit (radio receiver assy) 4. Power source circuit (multi-display controller sub-assy) 5. AVC-LAN circuit (multi-display controller sub-assy-radio receiver assy) 6. AVC-LAN circuit (multi-display controller sub-assy-multi-display) 7. Replace multi-display 8. Replace radio receiver assy 9. Replace multi-display controller sub-assy	05-1828 05-1866 05-1832 05-1836 05-1864 05-1858 67-8 67-6 67-23
D7	Connection check error	When either of the following conditions meets. ・The device that stored this code has (had) been disconnected after the engine starts (started). ・The master device has (had) been disconnected when this code is (was) stored.	1. Power source circuit (multi-display) 2. AVC-LAN circuit (multi-display - radio receiver assy) *6 3. Power source circuit (radio receiver assy) 4. Power source circuit (multi-display controller sub-assy) 5. AVC-LAN circuit (multi-display controller sub-assy-radio receiver assy) 6. AVC-LAN circuit (multi-display controller sub-assy-multi-display) 7. Replace multi-display 8. Replace radio receiver assy 9. Replace multi-display controller sub-assy	05-1828 05-1866 05-1832 05-1836 05-1864 05-1858 67-8 67-6 67-23
DC *3 *5	Failure in transmission	This code indicates a transmission failure to the device indicated by the sub code. NOTE: This DTC may have no direct relationship with the malfunction.	Inspection for the device indicated by the sub code. (Refer to the inspection list for the device indicated by the sub code.)	Refer to step 6

DD *3	Master reset	When the device that should be the master has been disconnected after engine starts.	1. Power source circuit (multi-display) 2. AVC-LAN circuit (multi-display - radio receiver assy) *6 3. Power source circuit (radio receiver assy) 4. Power source circuit (multi-display controller sub-assy) 5. AVC-LAN circuit (multi-display controller sub-assy-radio receiver assy) 6. AVC-LAN circuit (multi-display controller sub-assy-multi-display) 7. Replace multi-display 8. Replace radio receiver assy 9. Replace multi-display controller sub-assy	05-1828 05-1866 05-1832 05-1836 05-1864 05-1858 67-8 67-6 67-23
DF *4	Master error	When the device with a display fails and the master is switched to the audio device. Also when a communication error between sub master (audio) and master occurs, this code is stored.	1. Power source circuit (multi-display) 2. AVC-LAN circuit (multi-display - radio receiver assy) *6 3. Power source circuit (radio receiver assy) 4. Power source circuit (multi-display controller sub-assy) 5. AVC-LAN circuit (multi-display controller sub-assy-radio receiver assy) 6. AVC-LAN circuit (multi-display controller sub-assy-multi-display) 7. Replace multi-display 8. Replace radio receiver assy 9. Replace multi-display controller sub-assy	05-1828 05-1866 05-1832 05-1836 05-1864 05-1858 67-8 67-6 67-23
E0 *1	Registration complete indication error	When "Registration complete" command from the master device cannot be received.	This code will be detected when signal receiving time is delayed.	-
E1 *1	Voice processing device ON error	When the AMP device records that the AMP output does not function even while the source device operates.	1. Power source circuit (multi-display) 2. AVC-LAN circuit (multi-display - radio receiver assy) *6 3. Power source circuit (radio receiver assy) 4. Power source circuit (multi-display controller sub-assy) 5. AVC-LAN circuit (multi-display controller sub-assy-radio receiver assy) 6. AVC-LAN circuit (multi-display controller sub-assy-multi-display) 7. Replace multi-display 8. Replace radio receiver assy 9. Replace multi-display controller sub-assy	05-1828 05-1866 05-1832 05-1836 05-1864 05-1858 67-8 67-6 67-23
E2	ON/OFF indication parameter error	When the command for ON/OFF control from the master device has a problem.	Replace multi-display	67-8

E3 *1	Registration demand transmission	When the registration demand command from the slave device is output, or when the registration demand command is output by receiving connection confirmation command from the sub master device.	-	-
E4	Multiple frame incomplete	When the multiple frame transmission ends incompletely	-	-

*6: w/o Rear Seat Entertainment System

(b) Logical address: 01 (Communication control)

DTC	Name	Diagnosis	Verification	See page
D5 *1 *5	Absence of registration unit	A device that the sub code shows is (was) disconnected from the system when turning the ignition switch to the ACC or ON position. The communication condition with the device that the code shows cannot be obtained when the engine starts.	Inspection for the device indicated by the sub code. (Refer to the inspection list for the device indicated by the sub code.)	Refer to step 6
D8 *2 *5	No response for connection check	The device indicated by the sub code is (was) disconnected from the system after engine start	Inspection for the device indicated by the sub code. (Refer to the inspection list for the device indicated by the sub code.)	Refer to step 6
D9 *1 *5	Last mode error	The device (for audio visual system) that had functioned before the engine stopped is (was) disconnected from the system when the ignition switch is (was) in the ACC or ON position.	Inspection for the device indicated by the sub code. (Refer to the inspection list for the device indicated by the sub code.)	Refer to step 6
DA *5	No response against ON/OFF command	No response is identified when changing mode (audio and visual mode change). Detected when sound and image do not change by switch operation.	Inspection for the device indicated by the sub code. (Refer to the inspection list for the device indicated by the sub code.)	Refer to step 6
DB *1 *5	Mode status error	This code detects a dual alarm.	Inspection for the device indicated by the sub code. (Refer to the inspection list for the device indicated by the sub code.)	Refer to step 6
DC *3 *5	Failure in transmission	This code indicates a transmission failure to the device indicated by the sub code. NOTE: This DTC may have no direct relationship with the malfunction.	Inspection for the device indicated by the sub code. (Refer to the inspection list for the device indicated by the sub code.)	Refer to step 6
DE *4 *5	Slave reset	This code is stored when a slave device has been disconnected after engine start.	Inspection for the device indicated by the sub code. (Refer to the inspection list for the device indicated by the sub code.)	Refer to step 6

HINT:

- *1: This code may be recorded depending on the battery condition or engine start voltage even if no failure is detected.
- *2: If the power connector is disconnected after the engine starts, this code is recorded after 180 seconds.
- *3: This code may be stored if the ignition key is turned to the START position again with the engine running.
- *4: This code may be stored if the ignition key is held in the START position for 1 minute or more before returning to the ON position.
- *5: If the device is reported as not existing during verification, check the power source circuit and AVC-LAN circuit for the device.

(c) Logical address: 62 (CD): 63 (CD changer)

HINT:

Methods used to verify the cause of the problem are listed in order of probability in the verification column.

DTC	Name	Diagnosis	Verification	See page
10	CD player mechanical error	A mechanical error in the CD player is detected while the CD is not being inserted or ejected.	Replace radio receiver assy	67-6
11	CD insertion & eject error	CD insertion or ejection is failed.	Replace radio receiver assy	67-6
12	CD reading abnormal	CD reading problem occurs.	Replace radio receiver assy	67-6
40	No disc	No disc is inserted.	1. Check whether the CD is inserted or not. If the CD is inserted, check whether it can be ejected or not. If it cannot be ejected, replace radio receiver assy. 2. Inspect CD 3. If the same code is detected, replace the radio receiver assy	67-6 05-1682 67-6
41	Wrong disc	An unsuitable disc is inserted.	1. Inspect CD 2. If the same code is detected, replace the radio receiver assy	05-1682 67-6
42	Disc cannot be read	The disc cannot be read.	1. Inspect CD 2. If the same code is detected, replace the radio receiver assy	05-1682 67-6
43	CD-ROM abnormal	CD-ROM operation is abnormal.	Replace radio receiver assy	67-6
44	CD abnormal	Operation error in the CD mechanism (except for code 10).	1. After clearing the DTC, check the malfunction symptom 2. If the same code is detected, replace the radio receiver assy	- 67-6
45	EJECT error	Magazine cannot be ejected.	Replace radio receiver assy	67-6
46	Disc has scratches in the reverse surface	CD has dirt or scratches in the reverse side.	1. Inspect CD 2. If the same code is detected, replace the radio receiver assy	05-1682 67-6
47	CD temperature is high	The sensor detects that the CD unit temperature is high.	1. Park the vehicle in a cool place. Turn the engine off. After checking that the temperature of the radio and navigation assy becomes sufficiently low, turn the engine on in order to verify the malfunction symptom. 2. If the same code is detected, replace the radio receiver assy	- 67-6
48	Excess current	Excess current is applied to disc player changer.	Replace radio receiver assy	67-6
50	Tray insertion/ejection error	Malfunction in insertion/ejection system	Replace radio receiver assy	67-6
51	Elevator error	Mechanical error occurred during elevator operation	Replace radio receiver assy	67-6
52	Clamp error	Clamp unusually generating	Replace radio receiver assy	67-6

(d) Logical address: 61 (Cassette)

HINT:

Methods used to verify the cause of the problem are listed in order of probability in the verification column.

DTC	Name	Diagnosis	Verification	See page
10	Belt cut	The inside belt is cut or came off.	Replace radio receiver assy	67-6
40	Mechanical error of media	A malfunction due to mechanical problem, cassette tape is cut or entangled.	1. Replace the cassette tape and recheck the symptom 2. If the same code is detected, replace the radio receiver assy	- 67-6
41	EJECT error	A malfunction due to mechanical problem.	Replace radio receiver assy	67-6
42	Tape tangling	Cassette tape is tangled.	Replace radio receiver assy	67-6
43	Head dirt	Head is dirty.	1. Clean the head and recheck the symptom 2. If the same code is detected, replace the radio receiver assy	- 67-6
44	Device power supply problem	A short or open in the power circuit.	1. Power source circuit (radio receiver assy) 2. Replace radio receiver assy	05-1832 67-6

4. MULTI-DISPLA Y CONTROLLER SUB-ASSY (Physical address: 1F6, 16C, 16D) [RSE ECU]

(a) Logical address: 01 (Communication control)

HINT:

Methods used to verify the cause of the problem are listed in order of probability in the verification column.

DTC	Name	Diagnosis	Verification	See page
D6 *1	No master	When either of the following conditions meets. ・The device that stores (stored) the code has (had) been disconnected when the ignition switch is (was) in ACC or ON position. ・The master device has (had) been disconnected when this code is (was) stored.	1. Power source circuit (multi-display) 2. AVC-LAN circuit (multi-display - multi-display controller sub-assy) 3. Power source circuit (multi-display controller sub-assy) 4. Replace multi-display 5. Replace multi-display controller sub-assy	05-1828 05-1858 05-1836 67-8 67-23
D7	Connection check error	When either of the following conditions meets. ・The device that stored this code has (had) been disconnected after the engine starts (started). ・The master device has (had) been disconnected when this code is (was) stored.	1. Power source circuit (multi-display) 2. AVC-LAN circuit (multi-display - multi-display controller sub-assy) 3. Power source circuit (multi-display controller sub-assy) 4. Replace multi-display 5. Replace multi-display controller sub-assy	05-1828 05-1858 05-1836 67-8 67-23
DC *2 *5	Transmission error	The device stores the fact that transmission to the device indicated by the sub code has failed.	Inspection for the device indicated by the sub code (Refer to the inspection list for the device indicated by the sub code)	Refer to step 6
DD *3	Master reset	When the device that should be the master has been disconnected after engine starts.	1. Power source circuit (multi-display) 2. AVC-LAN circuit (multi-display - multi-display controller sub-assy) 3. Power source circuit (multi-display controller sub-assy) 4. Replace multi-display 5. Replace multi-display controller sub-assy	05-1828 05-1858 05-1836 67-8 67-23
DF *4	Master error	When the device with a display fails and the master is switched to the audio device. Also when a communication error between sub master (audio) and master occurs, this code is stored.	1. Power source circuit (multi-display) 2. AVC-LAN circuit (multi-display - multi-display controller sub-assy) 3. Power source circuit (multi-display controller sub-assy) 4. Replace multi-display 5. Replace multi-display controller sub-assy	05-1828 05-1858 05-1836 67-8 67-23
E0 *1	Registration complete indication error	When ”Registration complete” command from the master device cannot be received.	This code is detected when signal receiving time is delayed.	-

E1 *1	Voice processing device ON error	When the AMP device records that the AMP output does not function even while the source device operates.	1. Power source circuit (multi-display) 2. AVC-LAN circuit (multi-display - multi-display controller sub-assy) 3. Power source circuit (multi-display controller sub-assy) 4. Replace multi-display 5. Replace multi-display controller sub-assy	05-1828 05-1858 05-1836 67-8 67-23
E2	ON/OFF indication parameter error	When the command for ON/OFF control from the master device has a problem.	Replace multi-display	67-8
E3 *1	Registration demand transmission	When the registration demand command from the slave device is output, or when the registration demand command is output by receiving connection confirmation command from the sub master device.	-	-
E4	Multiple frame incomplete	When the multiple frame transmission ends incomplete	-	-
21	ROM error	This code is output when a malfunction exists in ROM.	Replace multi-display	67-8
22	RAM error	This code is output when a malfunction exists in RAM.	Replace multi-display	67-8

HINT:

- *1: This code may be recorded depending on the battery condition or engine start voltage even if no failure is detected.
- *2: If the power connector is disconnected after the engine starts, this code is recorded after 180 seconds.
- *3: This code may be stored if the ignition key is turned to the START position again with the engine running.
- *4: This code may be stored if the ignition key is held in the START position for 1 minute or more before returning to the ON position.
- *5: If the device is reported as not existing during verification, check the power source circuit and AVC-LAN circuit for the device.

5. GATEWAY ECU (Physical address: 1C6) [G/W]

(a) Logical address: 01 (Communication control)

HINT:

Methods used to verify the cause of the problem are listed in order of probability in the verification column.

DTC	Name	Diagnosis	Verification	See page
D4	Regular Communication Error	Component in which this code is recorded has been disconnected from system with ignition in the ACC or ON position. Either that, or the multi-display was disconnected when this code was recorded.	1. Power source circuit (multi-display) 2. AVC-LAN circuit (multi-display - gateway ECU) 3. Power source circuit (gateway ECU) 4. Replace multi-display 5. Replace gateway ECU	05-1828 05-1862 05-1834 67-8 67-21

HINT:

This code is stored 210 seconds after the power supply connector of the master component is disconnected with the ignition switch in the ACC or ON position.

6. THE INSPECTION LIST FOR THE DEVICE INDICATED BY THE SUB CODE

HINT:

Methods used to verify the cause of the problem are listed in order of probability in the verification column.

Sub code address (Device name)	Verification	See page
110 (Multi-display)	1. Power source circuit (multi-display) 2. AVC-LAN circuit (multi-display - radio receiver assy) *1 3. Replace multi-display	05-1828 05-1866 67-8
178 (Navigation ECU)	1. Power source circuit (navigation ECU) 2. AVC-LAN circuit (multi-display - navigation ECU) 3. Replace navigation ECU	05-1830 05-1860 67-9
190 (Radio receiver assy)	1. Power source circuit (radio receiver assy) 2. AVC-LAN circuit (multi-display controller sub-assy - radio receiver assy) *2 3. Replace radio receiver assy	05-1832 05-1864 67-6
IF6, 16C, 16D (Multi-display controller sub-assy)	1. Power source circuit (multi-display controller sub-assy) *2 2. AVC-LAN circuit (multi-display controller sub-assy - multi-display) *2 3. Replace multi-display controller sub-assy *2	05-1836 05-1858 67-23
1C6 (Gateway ECU)	1. Power source circuit (gateway ECU) 2. AVC-LAN circuit (multi-display - gateway ECU) 3. Replace gateway ECU	05-1834 05-1862 67-21

*1: w/o Rear Seat Entertainment System

*2: w/ Rear Seat Entertainment System

05IRX-02

HOW TO PROCEED WITH TROUBLESHOOTING

1	Vehicle brought into a workshop

2	Diagnostic questioning and symptom confirmation (SEE PAGE 05-1759)

Ask the customer about symptoms and confirm malfunctions. Fill out the Customer Problem Analysis check sheet.

- The screen displays nothing (GO TO STEP 7, proceed to "BLACK SCREEN (NO IMAGE APPEARS ON NAVIGATION/AUDIO SCREEN)")
- Other symptoms (GO TO STEP 3)

3	Check multiplex communication system (SEE PAGE 05-2040)

Use the hand-held tester to check for normal function of the body multiplex communication system.

- A code is output (PROCEED TO "BODY MULTIPLEX COMMUNICATION SYSTEM")
- A code is not output (GO TO STEP 4)

4	Confirm the system normal condition (SEE PAGE 05-1775)

- Applicable (This is not a malfunction.)
- Not applicable (GO TO STEP 5)

5	Check the diagnostic trouble codes (SEE PAGE 05-1791)

HINT:

- If the system cannot enter the diagnosis mode, inspect each AVC-LAN communication signal and repair or replace problem parts (see page 05-1828 - 05-1866).
- Even if the malfunction symptom is not confirmed, check the diagnostic trouble codes. This is because the system stores past diagnostic trouble codes.
- Refer to the detailed description on the diagnostic screen, as necessary (see page 05-1768).
- Check and clear the past diagnostic trouble code. Check the diagnostic trouble code and inspect the area the code indicates.

- A code is output (GO TO STEP 6)
- A code is not output (GO TO STEP 7)

6	**Diagnostic trouble code chart (SEE PAGE 05-1791)**

Find the output code on the diagnostic trouble code chart.

Output the diagnostic trouble code (GO TO STEP 9)

7	**Problem symptoms table (SEE PAGE 05-1778)**

Find the applicable symptom code in the problem symptoms table.
HINT:
If the symptom does not recur and no code is output, perform the symptom reproduction method (see page 01-26).

There is an applicable symptom code in the table (GO TO STEP 9)

There is no applicable symptom code in the table (GO TO STEP 8)

8	**Check the ECU terminal arrangement based on the malfunction symptom (SEE PAGE 05-1780)**

9	**Check the circuit**

Adjust, repair or replace as necessary.

10	**Recheck the diagnostic trouble code (SEE PAGE 05-1791)**

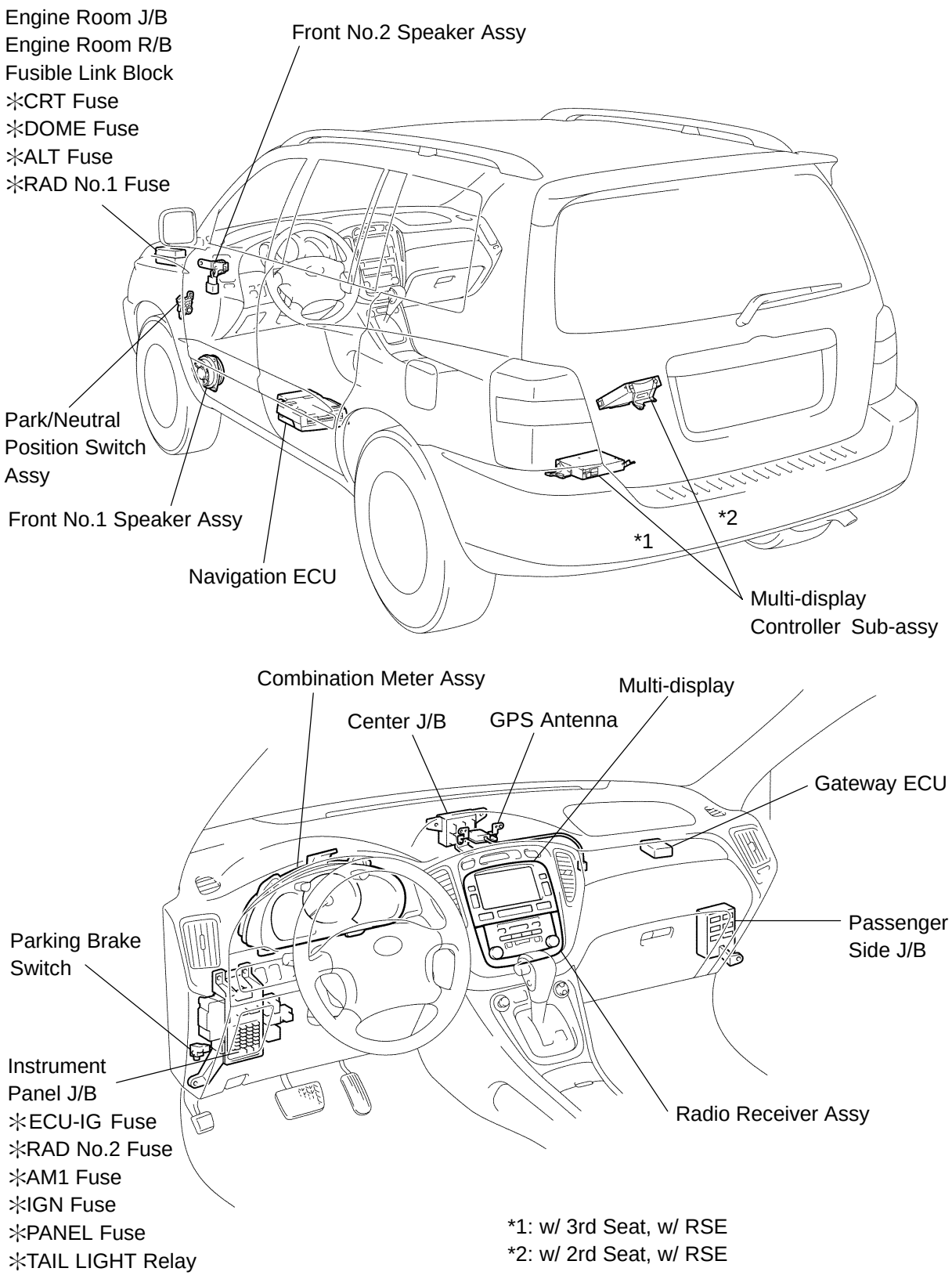
HINT:
- After deleting the DTC, recheck the diagnostic trouble code.
- Perform the screen noise adjustment when the multi-display or the navigation ECU is replaced (see page 05-1803).

11	**Perform confirmation test**

END

05CE7-07

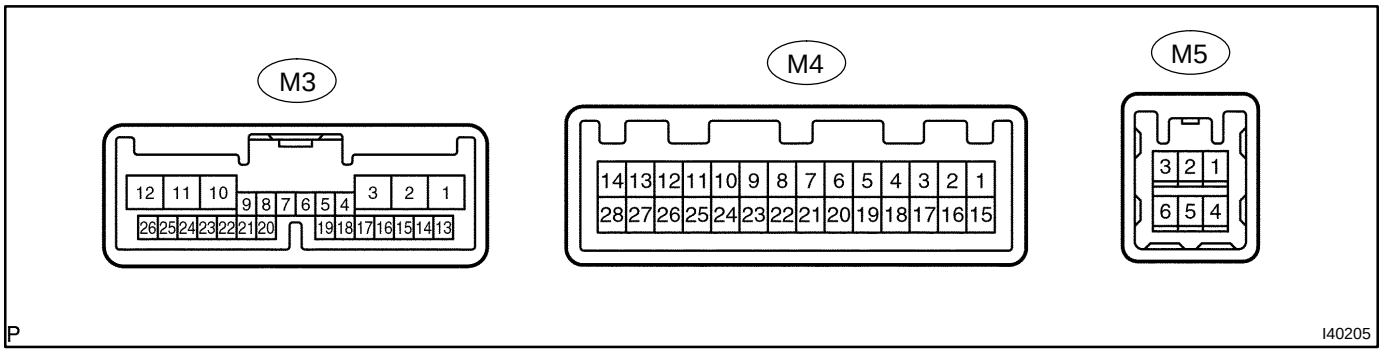
LOCATION



05CEE-06

TERMINALS OF ECU

1. MULTI-DISPLA Y ASSY:

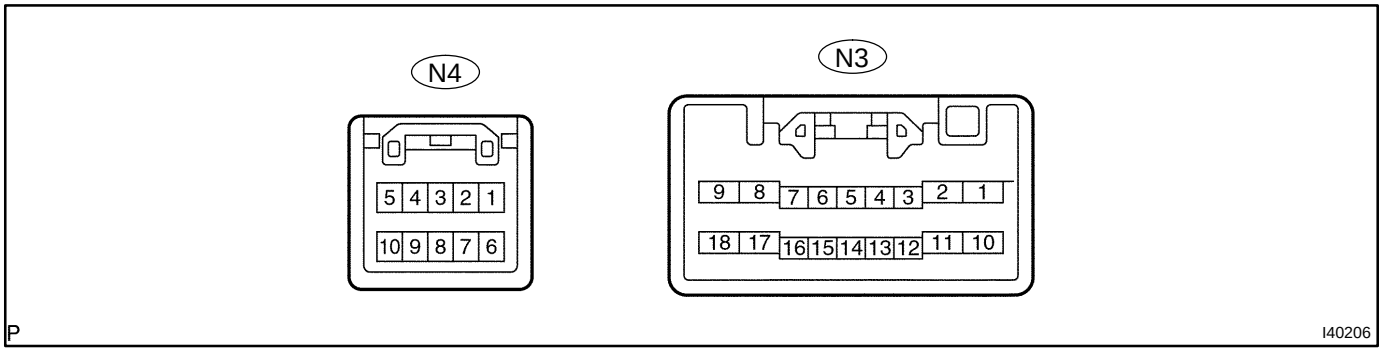


Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	Specification
ILL+ (M3-1) - GND1 (M3-3)	G - W-B	Illumination (rheostat) signal	Turn light control switch OFF → TAIL or HEAD	Below 1 V → 10 to 14 V
ILL- (M3-2) - Body ground	B - Body ground	Illumination (rheostat) signal	Turn light control switch OFF → TAIL or HEAD	10 to 14 V → Below 1 V
GND1 (M3-3) - Body ground	W-B - Body ground	Ground	Always	Below 1 V
TX1+ (M3-4) - GND1 (M3-3)	SB - W-B	AVC-LAN communication signal	Turn ignition switch to ACC	2 to 3 V
TX1- (M3-5) - GND1 (M3-3)	BR - W-B	AVC-LAN communication signal	Turn ignition switch to ACC	2 to 3 V
TC (M3-7) - GND1 (M3-3)	P - W-B	Diagnosis ON signal	Ignition switch to OFF and connect terminals TC and GND1 of check connector	Below 1 Ω
IG (M3-10) - GND1 (M3-3)	O - W-B	Ignition (ON)	Turn ignition switch OFF → ON	Below 1 V → 10 to 14 V
ACC (M3-11) - GND1 (M3-3)	BR - W-B	Accessory (ON)	Turn ignition switch OFF → ACC or ON	Below 1 V → 10 to 14 V
+B1 (M3-12) - GND1 (M3-3)	V - W-B	Battery	Always	10 to 14 V
PKB (M3-16) - GND1 (M3-3)	Y - W-B	Parking brake signal	Turn parking brake switch ON → OFF	Below 1 V → 10 to 14 V
SPD (M3-25) - GND1 (M3-3)	W - W-B	Speed signal from combination meter	See ”vehicle signal check mode”	-
TX3+ (M4-11) -GND1 (M3-3)	BR - W-B	AVC-LAN communication signal	Turn ignition switch to ACC	2 to 3 V
TX3- (M4-12) - GND1 (M3-3)	L - W-B	AVC-LAN communication signal	Turn ignition switch to ACC	2 to 3 V
TX+ (M4-13) - GND1 (M3-3) *1	LG - W-B	AVC-LAN communication signal	Turn ignition switch to ACC	2 to 3 V
TX- (M4-14) - GND1 (M3-3) *1	O - W-B	AVC-LAN communication signal	Turn ignition switch to ACC	2 to 3 V
VR (M4-23) - GND1 (M3-3)	B - W-B	Video return signal	Turn ignition switch OFF	Below 1 V
R (M4-24) - GND1 (M3-3)	W - W-B	Display signal (red)	Navigation display is on	-
G (M4-25) - GND1 (M3-3)	R - W-B	Display signal (green)	Navigation display is on	-
B (M4-26) - GND1 (M3-3)	G - W-B	Display signal (blue)	Navigation display is on	-
SYNC (M4-27) - GND1 (M3-3)	Y - W-B	Display signal (synchronize)	Navigation display is on	-

VG (M4-28) - Body ground	Shielded - Body ground	Shielded ground	Always	Below 1 V
NTSC (M5-1) - GND1 (M3-3) *1	G - W-B	Display signal	DVD is playing on multi-display	-
SGD1 (M5-4) - Body ground *1	R - Body ground	Shielded ground	Always	Below 1 V
SGND (M5-5) - Body ground *1	Shielded - Body ground	Shielded ground	Always	Below 1 V

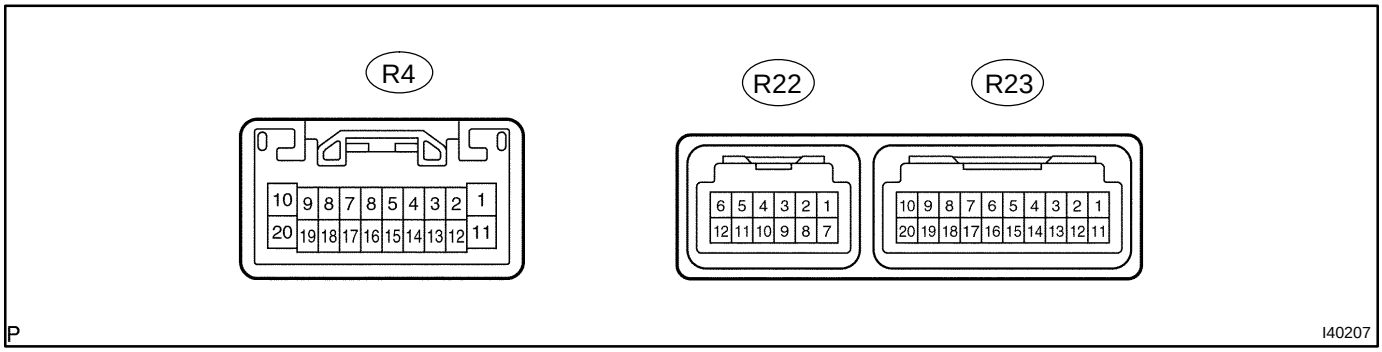
*1: w/ Rear Seat Entertainment System

2. NAVIGATION ECU:



Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	Specification
AUI+ (N3-1) - GND1 (N3-17)	LG - W-B	Sound signal (input)	Audio system is playing	-
AUO+ (N3- 2) - GND1 (N3-17)	G - W-B	Sound signal (output)	Audio system is playing	-
SPD (N3-5) - GND1 (N3-17)	O - W-B	Speed signal from combination meter	See "Vehicle Signal Check Mode" (see page 05-1763)	-
+B (N3-9) - GND1 (N3-17)	W - W-B	Battery	Always	10 to 14 V
AUI- (N3-10) - GND1 (N3-17)	R - W-B	Sound signal (input)	Audio system is playing	-
AUO- (N3-11) - GND1 (N3-17)	B - W-B	Sound signal (output)	Audio system is playing	-
RL (N3-14) - GND1 (N3-17)	Y - W-B	Reverse signal from park/neutral position switch	Park/neutral position switch is "R" position	10 to 14 V
GND1 (N3-17) - Body ground	W-B - Body ground	Ground	Always	Below 1 V
ACC (N3-18) - GND1 (N3-17)	GR - W-B	Accessory (ON)	Turn ignition switch OFF → ACC or ON	Below 1 V → 10 to 14 V
VR (N4-1) - GND1 (N3-17)	B - W-B	Video return signal	Turn ignition switch OFF	Below 1 V
R (N4-2) - GND1 (N3-17)	W - W-B	Display signal (red)	Navigation display is on	-
B (N4-3) - GND1 (N3-17)	G - W-B	Display signal (blue)	Navigation display is on	-
TX+ (N4-5) - GND1 (N3-17)	SB - W-B	AVC-LAN communication signal	Turn ignition switch to ACC	2 to 3 V
VG (N4-6) - Body ground	Shielded - Body ground	Shielded ground	Always	Below 1 V
G (N4-7) - GND1 (N3-17)	R - W-B	Display signal (green)	Navigation display is on	-
SYNC (N4-8) - GND1 (N3-17)	Y - W-B	Display signal (synchronize)	Navigation display is on	-
TX- (N4-10) - GND1 (N3-17)	BR - W-B	AVC-LAN communication signal	Turn ignition switch to ACC	2 to 3 V

3. RADIO RECEIVER ASSY:

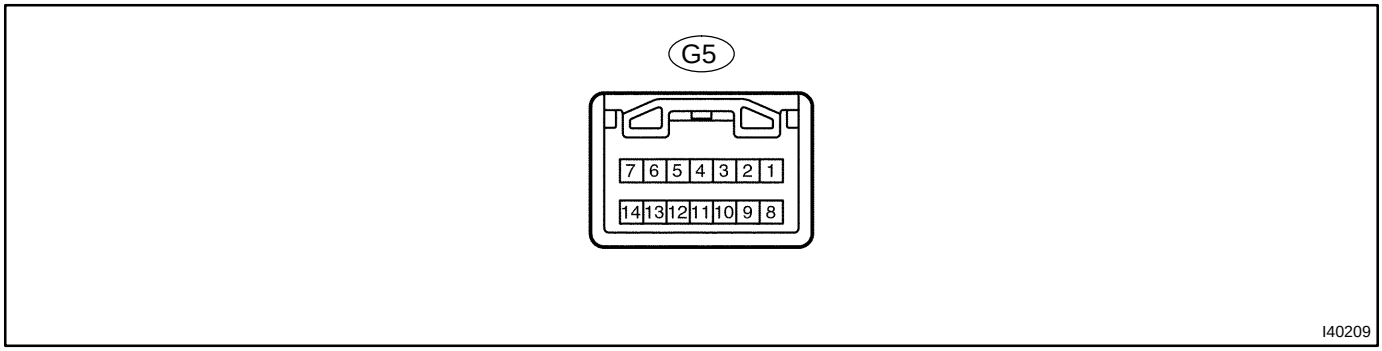


Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specification
B (R4-1) - GND (R4-20)	L-B - BR	Battery	Always	10 to 14 V
ACC (R4-11) - GND (R4-20)	GR - BR	Accessory (ON)	Turn ignition switch OFF → ACC or ON	Below 1 V → 10 to 14 V
GND (R4-20) - Body ground	BR - Body ground	Ground	Always	Below 1 V
TX+ (R22-9) - GND (R4-20) *2	LG - BR	AVC-LAN communication signal	Turn ignition switch to ACC	2 to 3 V
TX- (R22-10) - GND (R4-20) *2	O - BR	AVC-LAN communication signal	Turn ignition switch to ACC	2 to 3 V
TX1+ (R23-9) - GND (R4-20) *1	Y - BR	AVC-LAN communication signal	Turn ignition switch to ACC	2 to 3 V
TX1- (R23-10) - GND (R4-20) *1	L - BR	AVC-LAN communication signal	Turn ignition switch to ACC	2 to 3 V

*1: w/ Rear Seat Entertainment System

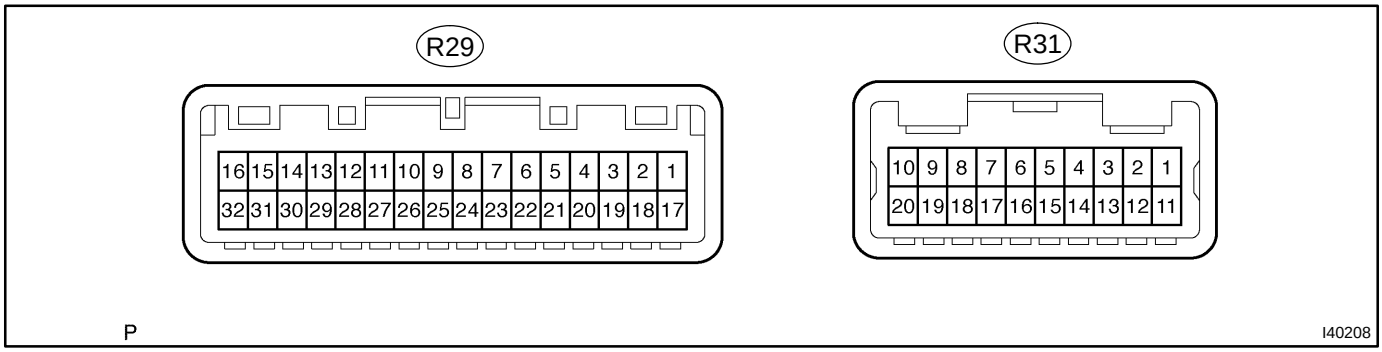
*2: w/o Rear Seat Entertainment System

4. GATEWAY ECU



Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specification
IG (G5-2) - GND (G5-14)	B - W-B	Ignition (ON)	Turn ignition switch OFF → ON	Below 1 V → 10 to 14 V
GTX+ (G5-5) - GND (G5-14)	BR - W-B	AVC-LAN communication signal	Turn ignition switch to ACC	2 to 3 V
CG (G5-7) - Body ground	W-B - Body ground	Ground	Always	Below 1 V
BATT (G5-8) - GND (G5-14)	LG - W-B	Battery	Always	10 to 14 V
ACC (G5-9) - GND (G5-14)	SB - W-B	Accessory (ON)	Turn ignition switch OFF → ACC or ON	Below 1 V → 10 to 14 V
GTX- (G5-12) - GND (G5-14)	L - W-B	AVC-LAN communication signal	Turn ignition switch to ACC	2 to 3 V
GND (G5-14) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω

5. MULTI DISPLAY CONTROLLER SUB-ASSY:



Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specification
+B1 (R29-16) - GND (R29-29) *1	Y - W-B	Battery	Always	10 to 14 V
TX3+ (R29-17) - GND (R29-29)	BR - W-B	AVC-LAN communication signal	Turn ignition switch to ACC	2 to 3 V
TX3- (R29-18) - GND (R29-29)	Y - W-B	AVC-LAN communication signal	Turn ignition switch to ACC	2 to 3 V
GND (R29-29) - Body ground	W-B - Body ground	Ground	Always	Below 1 V
TX- (R29-30) - GND (R29-29) *1	GR - W-B	AVC-LAN communication signal	Turn ignition switch to ACC	2 to 3 V
TX+ (R29-31) - GND (R29-29) *1	LG - W-B	AVC-LAN communication signal	Turn ignition switch to ACC	2 to 3 V
ACC (R29-32) - GND (R29-29)	G - W-B	Accessory (ON)	Turn ignition switch OFF → ACC or ON	Below 1 V → 10 to 14 V
SELD (R31-7) - Body ground	W-B - Body ground	Ground	Always	Below 1 V

*1: w/ Rear Seat Entertainment System

05EK3-06

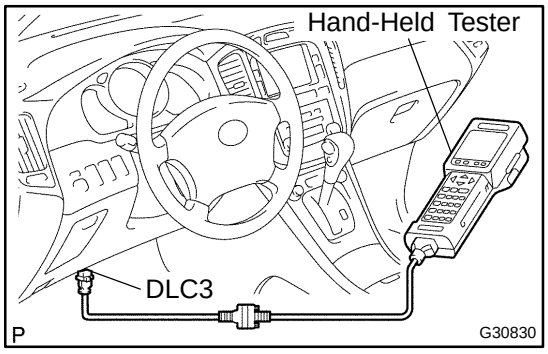
CHECK MODE PROCEDURE

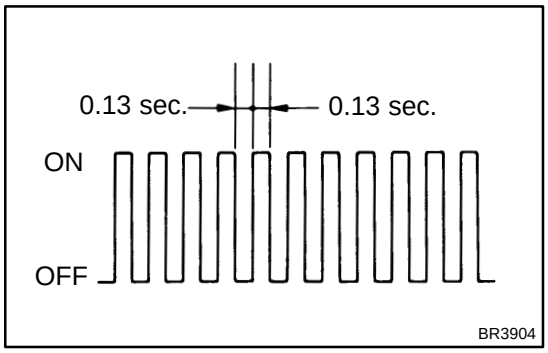
1. DTC CHECK (CHECK MODE)

HINT:

Hand-held tester only:

Compared to the normal mode, the check mode has more sensing ability to detect malfunctions. Furthermore, the same diagnostic items which are detected in the normal mode can also be detected in the check mode.





(a) Procedure for Check Mode using the hand-held tester.

(1) Check the initial conditions.
- Battery positive voltage 11 V or more
- Throttle valve fully closed
- Transaxle in the P or N position
- A/C switch is off

(2) Turn the ignition switch off.

(3) Connect the hand-held tester to the DLC3.

(4) Turn the ignition switch to the ON position and push the hand-held tester main switch on.

(5) When you use hand-held tester:
Select the item "DIAGNOSIS/ENHANCED OBD II/ CHECK MODE" (Check that the MIL flashes).

NOTICE:

All DTCs and freeze frame data recorded will be erased if: 1) the hand-held tester is used to change the ECM from normal mode to check mode or vice-versa; or 2) during check mode, the ignition switch is turned from ON to ACC or OFF.

(6) Start the engine (MIL goes off after the engine starts).

(7) Perform "MONITOR DRIVE PATTERN" for the ECT test (see page 05-1014).
(Or, simulate the conditions of the malfunction described by the customer).

NOTICE:

Leave the ignition switch in the ON position until you have checked the DTCs, etc.

(8) After simulating malfunction conditions, use the hand-held tester diagnosis selector to check the DTCs and freeze frame data, etc.

(9) When you use hand-held tester:
Select the item "DIAGNOSIS/ENHANCED OBD II/ DTC INFO/CURRENT CODES".

(10) After checking the DTC, inspect the applicable circuit.

(11) See page 05-1034 to confirm the details of the DTCs.

2. DTC CLEAR

(a) When using the OBD II scan tool or hand-held tester:
Clearing the DTCs.
  (1) Connect the OBD II scan tool or hand-held tester to the DLC3.
  (2) Turn the ignition switch to the ON position and push the OBD II scan tool or the hand-held tester main switch on.
  (3) When you use hand-held tester:
  Select the item ”DIAGNOSIS/ENHANCED OBD II/ DTC INFO/CLEAR CODES [YES] button”.

HINT:

When operating the OBD II scan tool (complying with SAE J1978) or hand-held tester to erase the codes, the DTCs and freeze frame data will be erased. (See the OBD II scan tool’s instruction book for operating instructions.)

(b) When not using the OBD II scan tool or hand-held tester:
Clearing the DTCs.
  (1) Disconnecting the battery terminal or remove the EFI and ETCS fuses from the engine room J/B for 60 seconds or more. But if you disconnect the battery terminal, you should do the ”INITIALIZE” procedure.

05EK7-06

DEFINITION OF TERMS

Term	Definition
Monitor description	Description of what the ECM monitors and how it detects malfunctions (monitoring purpose and its details).
Related DTCs	A group of diagnostic trouble codes that are output by the ECM based on the same malfunction detection logic.
Typical enabling condition	Preconditions that allow the ECM to detect malfunctions. With all preconditions satisfied, the ECM sets the DTC when the monitored value(s) exceeds the malfunction threshold(s).
Sequence of operation	The priority order that is applied to monitoring, if multiple sensors and components are used to detect the malfunction. While another sensor is being monitored, the next sensor or component will not be monitored until the previous monitoring has concluded.
Required sensor/components	The sensors and components that are used by the ECM to detect malfunctions.
Frequency of operation	The number of times that the ECM checks for malfunctions per driving cycle. ”Once per driving cycle” means that the ECM detects malfunction only one time during a single driving cycle. ”Continuous” means that the ECM detects malfunction every time when enabling condition is met.
Duration	The minimum time that the ECM must sense a continuous deviation in the monitored value(s) before setting a DTC. This timing begins after the ”typical enabling conditions” are met.
Malfunction thresholds	Beyond this value, the ECM will conclude that there is a malfunction and set a DTC.
MIL operation	MIL illumination timing after a defect is detected. ”Immediately” means that the ECM illuminates MIL the instant the ECM determines that there is a malfunction. ”2 driving cycle” means that the ECM illuminates MIL if the same malfunction is detected again in the 2nd driving cycle.
Component operating range	Normal operation range of sensors and solenoids under normal driving conditions. Use these ranges as a reference. They cannot be used to judge if a sensor or solenoid is defective or not.

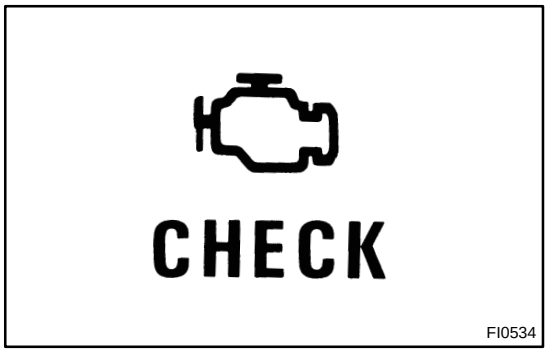
05EK0-05

DIAGNOSIS SYSTEM

1. DIAGNOSIS SYSTEM

(a) Description

(1) When troubleshooting OBD II vehicles, the only difference from the usual troubleshooting procedure is that you need to connect an OBD II scan tool complying with SAE J1987 or a hand-held tester to the vehicle, and read off various data output from the vehicle's ECM.



(2) OBD II regulations require that the vehicle's on-board computer illuminate the Malfunction Indicator Lamp (MIL) on the instrument panel when the computer detects a malfunction in the computer itself or in the drive system components which affect the vehicle emissions. In addition to the MIL illuminating when a malfunction is detected, the applicable DTCs prescribed by SAE J2012 are recorded in the ECM memory (see page 05-1034).

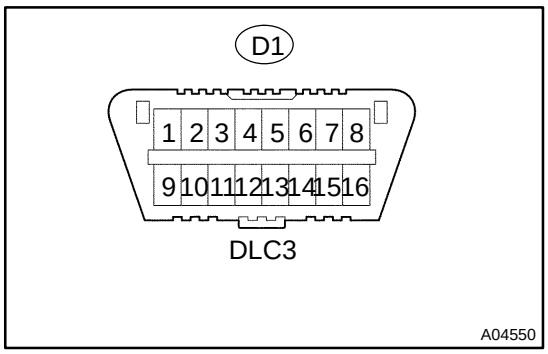
If the malfunction does not occur in 3 consecutive trips, the MIL goes off but the DTCs remain in the ECM memory.

(3) To check the DTCs, connect the OBD II scan tool or hand-held tester to the DLC3 of the vehicle. The OBD II scan tool or hand-held tester also enables you to erase the DTCs and check freeze frame data and various forms of engine data (For instruction book).

(4) The DTCs include SAE controlled codes and Manufacturer controlled codes. SAE controlled codes must be set as prescribed by the SAE, while Manufacturer controlled codes can be set freely by a manufacturer within the prescribed limits (see the DTC chart on page 05-1034).

(5) The diagnosis system operates in the normal mode during the normal vehicle use, and also has a check mode for technicians to simulate malfunction symptoms and perform troubleshooting. Most DTCs use 2 trip detection logic(*) to prevent erroneous detection. By switching the ECM to the check mode when troubleshooting, the technician can cause the MIL to illuminate for a malfunction that is only detected once or momentarily (hand-held tester).

(6) *2 trip detection logic:
When a malfunction is first detected, the malfunction is temporarily stored in the ECM memory. If the same malfunction is detected again during the second test drive, this second detection causes the MIL to illuminate.



(b) Inspect the DLC3.

The vehicle's ECM uses ISO 9141-2 for communication. The terminal arrangement of DLC3 complies with SAE J1962 and matches the ISO 9141-2 format.

Tester connection	Condition	Specified condition
7 (Bus ≦ Line) - 5 (Signal ground)	During communication	Pulse generation
4 (Chassis Ground) - Body	Always	1 Ω or less
5 (Signal Ground) - Body	Always	1 Ω or less
16 (B+) - Body	Always	9 to 14 V

HINT:

If your display shows UNABLE TO CONNECT TO VEHICLE when you have connected the cable of the OBD II scan tool or hand-held tester to the DLC3, turned the ignition switch to the ON position and operated the scan tool, there is a problem on the vehicle side or tool side.

- If the communication is normal when the tool is connected to another vehicle, inspect the DLC3 on the original vehicle.
- If the communication is still impossible when the tool is connected to another vehicle, the problem is probably in the tool itself, so consult the Service Department listed in the tool's instruction manual.

(c) Measure the battery voltage.

Battery Voltage: 11 to 14 V

If voltage is below 11 V, recharge the battery before proceeding.

(d) Check the MIL.

(1) The MIL comes on when the ignition switch is turned to the ON position and the engine is not running.

HINT:

If the MIL does not light up, troubleshoot the combination meter.

(2) When the engine is started, the MIL should go off. If the lamp remains on, it means that the diagnosis system has detected a malfunction or abnormality in the system.

05EK5-07

DATA LIST/ACTIVE TEST

1. DATA LIST

HINT:

According to the DATA LIST displayed by the OBD II scan tool or hand-held tester, you can read the value of the switch, sensor, actuator and so on without parts removal. Reading the DATA LIST as the first step of troubleshooting is one method to shorten labor time.

(a) Warm up the engine.
(b) Turn the ignition switch off.
(c) Connect the OBD II scan tool or hand-held tester to the DLC3.
(d) Turn the ignition switch to the ON position.
(e) Push the "ON" button of the OBD II scan tool or the hand-held tester.
(f) When you use hand-held tester:
Select the item "DIAGNOSIS/ENHANCED OBD II/DATA LIST".
(g) According to the display on tester, read the "DATA LIST".

Item	Measurement Item/ Range (display)	Normal Condition	Diagnostic Note
STOP LIGHT SW	Stop light SW Status/ ON or OFF	・Brake Pedal is depressed: ON ・Brake Pedal is released: OFF	-
PNP SW [NSW]	PNP SW Status/ ON or OFF	Shift lever position is; P and N: ON Except P and N: OFF	When the shift lever position displayed on the hand-held tester differs from the actual position, adjustment of the PNP switch or the shift cable may be incorrect. HINT: When the failure still occurs even after adjusting these parts, see page 05-1036.
LOW	PNP SW Status/ ON or OFF	Shift lever position is; L: ON Except L: OFF	↑
2ND	PNP SW Status/ ON or OFF	Shift lever position is; 2 and L: ON Except 2 and L: OFF	↑
REVERSE	PNP SW Status/ ON or OFF	Shift lever position is; R: ON Except R: OFF	↑
DRIVE	PNP SW Status/ ON or OFF	Shift lever position is; D: ON Except D: OFF	↑
OVERDRV CUT SW2	O/D SW Status/ ON or OFF	・IG SW ON: ON ↓ ・O/D SW Push: OFF ↓ ・O/D SW Push: ON	-
SHIFT	Actual Gear Position/ 1st, 2nd, 3rd, 4th or 5th (O/D)	Shift lever position is; ・L: 1st ・2: 1st or 2nd ・3: 1st, 2nd or 3rd ・D(O/D OFF): 1st, 2nd, 3rd or 4th ・D(O/D ON): 1st, 2nd, 3rd, 4th or 5th	-
LOCK UP SOL	Lock Up Solenoid Status/ ON or OFF	・Lock Up: ON ・Except Lock Up: OFF	-
SOLENOID (SLT)	Shift Solenoid SLT Status/ ON or OFF	・Accelerator pedal is depressed: OFF ・Accelerator pedal is released: ON	-

AT FLUID TEMP	ATF Temp. Sensor Value/ min.: -40°C (-40°F) max.: 215°C (419°F)	・After Stall Test; Approx. 80°C (176°F) ・Equal to ambient temperature when the engine is cold	If the value is "-40°C (-40°F)" or "215°C (419°F)", ATF temp. sensor circuit is opened or shorted.
SPD (NC)	Counter Gear Speed/ display: 50 r/min	[HINT] 3rd when shift lever position is D position (After warming up the engine); ・Intermediate shaft speed (NC) becomes close to the engine speed.	-

2. ACTIVE TEST

HINT:

Performing the ACTIVE TEST using the hand-held tester allows the relay, VSV, actuator and so on to operate without parts removal. Performing the ACTIVE TEST as the first step of troubleshooting is one method to shorten labor time.

It is possible to display the DATA LIST during the ACTIVE TEST.

(a) Warm up the engine.
(b) Turn the ignition switch off.
(c) Connect the hand-held tester to the DLC3.
(d) Turn the ignition switch to the ON position.
(e) Push the "ON" button of the hand-held tester.
(f) Select the item "DIAGNOSIS/ENHANCED OBD II/ACTIVE TEST".
(g) According to the display on tester, perform the "ACTIVE TEST".

Item	Test Details	Diagnostic Note
SHIFT	[Test Details] Operate the shift solenoid valve and set the each shift position by yourself. [Vehicle Condition] Less than 50 km/h (31 mph) [Others] ・Press "→" button: Shift up ・Press "←" button: Shift down	Possible to check the operation of the shift solenoid valves.
LOCK UP	[Test Details] Control the shift solenoid DSL to set the automatic transaxle to the lock-up condition. [Vehicle Condition] Vehicle Speed: 60 km/h (37 mph) or more, and 5th gear	Possible to check the DSL operation.
LINE PRESS UP *	[Test Details] Operate the shift solenoid SLT and raise the line pressure. [Vehicle Condition] ・Vehicle Stopped. ・DL: ON [HINT] OFF: Line pressure up (When the active test of "LINE PRESS UP" is performed, the ECM commands the SLT solenoid to turn off). ON: No action (normal operation)	-

*: "LINE PRESS UP" in the ACTIVE TEST is performed to check the line pressure changes by connecting the SST to the automatic transaxle, which is used in the HYDRAULIC TEST (see page 05-1002) as well.

HINT:

The pressure values in ACTIVE TEST and HYDRAULIC TEST are different from each other.

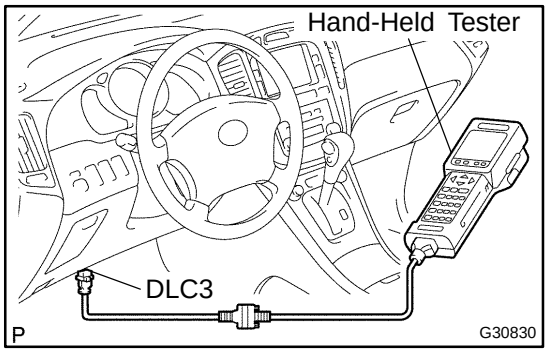
05EK1-06

DTC CHECK/CLEAR

1. DTC CHECK (NORMAL MODE)

NOTICE:

When the diagnostic system is switched from the normal mode to the check mode, all the DTCs and freeze frame data recorded in the normal mode will be erased. So before switching modes, always check the DTCs and freeze frame data, and note them down.



(a) Checking DTCs using the OBD II scan tool or hand-held tester.

(1) Turn the ignition switch off.

(2) Connect the OBD II scan tool or hand-held tester to DLC3.

(3) Turn the ignition switch to the ON position and push the OBD II scan tool or the hand-held tester main switch on.

(4) When you use hand-held tester:
Select the item ”DIAGNOSIS/ENHANCED OBD II/ DTC INFO/CURRENT CODES”.

(5) Use the OBD II scan tool or hand-held tester to check the DTCs and freeze frame data and note them down (For operating instructions, see the OBD II scan tool’s instruction book).

(6) See page 05-1034 to confirm the details of the DTCs.

NOTICE:

When simulating symptoms with an OBD II scan tool (excluding hand-held tester) to check the DTCs, use the normal mode. For codes on the DTCs chart subject to ”2 trip detection logic”, turn the ignition switch off after the symptom is simulated once. Then repeat the simulation process again. When the problem has been simulated twice, the MIL is indicated on the instrument panel and DTCs are recorded in the ECM.

2. DTC CLEAR

(a) When using the OBD II scan tool or hand-held tester:
Clearing the DTCs.
  (1) Connect the OBD II scan tool or hand-held tester to the DLC3.
  (2) Turn the ignition switch to the ON position and push the OBD II scan tool or the hand-held tester main switch on.
  (3) When you use hand-held tester:
  Select the item ”DIAGNOSIS/ENHANCED OBD II/ DTC INFO/CLEAR CODES [YES] button”.

HINT:

When operating the OBD II scan tool (complying with SAE J1978) or hand-held tester to erase the codes, the DTCs and freeze frame data will be erased. (See the OBD II scan tool’s instruction book for operating instructions.)

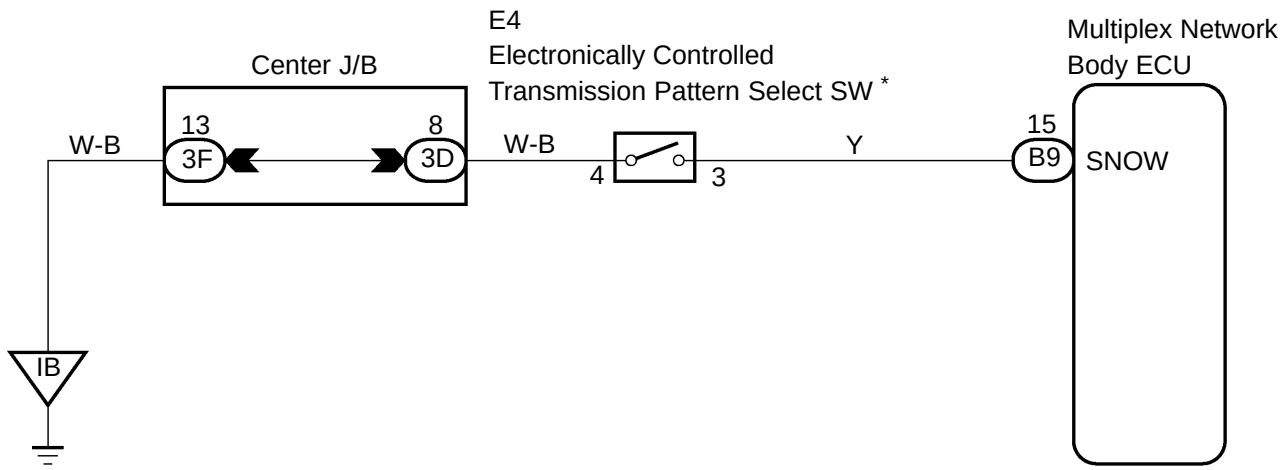
(b) When not using the OBD II scan tool or hand-held tester:
Clearing the DTCs.
  (1) Disconnecting the battery terminal or remove the EFI and ETCS fuses from the engine room J/B for 60 seconds or more. But if you disconnect the battery terminal, you should do the ”INITIALIZE” procedure.

PATTERN SELECT SWITCH CIRCUIT

CIRCUIT DESCRIPTION

Multiplex network body ECU receives pattern select switch information, and sends it through the multiplex communication system to the ECM.
ECT SNOW is the system that operates the throttle motor to control engine output to reduce skidding of the driving wheels, guarantee takeoff acceleration, driving straightness and turning stability.

WIRING DIAGRAM



(*) Pattern Select Switch (ECT SNOW Switch)
When the ECT SNOW switch is pushed, the switch contact is made and the ECT SNOW mode is selected. To cancel the ECT SNOW mode, push the ECT SNOW switch once again. The ECT SNOW mode is automatically cancelled when the ignition switch is turned ”OFF”.

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INSPECTION PROCEDURE

1	DRIVING TEST

(a) Start the engine.
(b) Turn the ECT SNOW switch ”OFF” (Normal drive mode).
(c) Confirm vehicle response by driving from a parked position to fully depressing the accelerator pedal.
(d) Turn the ECT SNOW switch ”ON” and perform the same check as (c).
Confirm that there is a difference between ECT SNOW switch ”ON” and ”OFF”.

HINT:
* Driving test should be done on a paved road (a nonskid road).
* Make sure not to use the TRAC system when testing a vehicle equipped with one.

OK:
There is a difference in acceleration between ”ON” and ”OFF”.

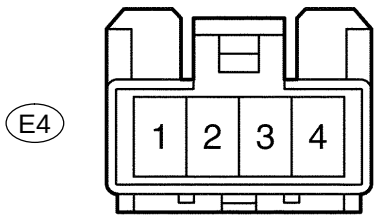
NG → **Go to step 2**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-1016)

2	CHECK HARNESS AND CONNECTOR(PATTERN SELECT SWITCH ASSY NO.1 - BODY GROUND)

Wire Harness Side:
(Connector Front View):



(a) Disconnect the connector of pattern select switch (ECT SNOW switch).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

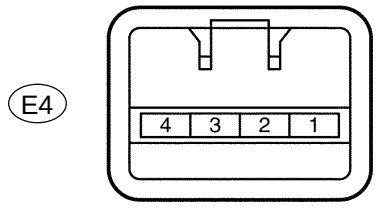
Tester Connection	Specified Condition
4 - Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (SEE PAGE 01-36)**

OK

3	INSPECT PATTERN SELECT SWITCH ASSY NO.1

Switch Side:
(Connector Front View):



(a) Measure the resistance according to the value(s) in the table below.

Standard:

Switch Condition	Tester Connection	Specified Condition
Press continuously Pattern select switch	3 - 4	Below 1 Ω
Release Pattern select switch		10 kΩ or higher

NG → **REPLACE PATTERN SELECT SWITCH ASSY NO.1**

OK

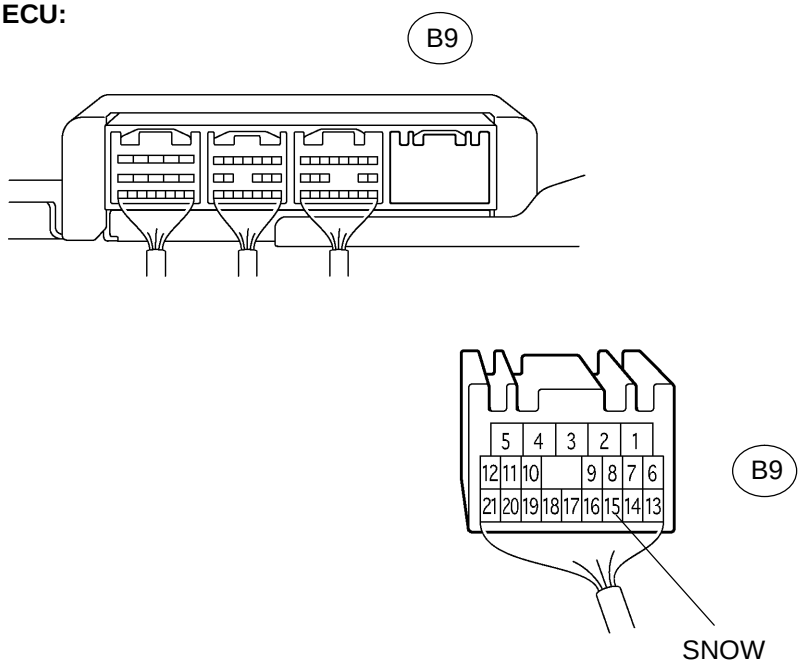
4	CHECK HARNESS AND CONNECTOR(PATTERN SELECT SWITCH ASSY NO.1 - MULTIPLEX NETWORK BODY ECU)

(a) Connect the connector of pattern select switch (ECT SNOW switch).
(b) Disconnect the multiplex network body ECU connector.
(c) Measure the resistance between terminals SNOW of multiplex network body ECU and body ground.

Standard:

Switch Condition	Tester Connection	Specified Condition
Press continuously Pattern select switch	B9 - 15 (SNOW) - Body ground	Below 1 Ω
Release Pattern select switch		10 kΩ or higher

Multiplex Network Body ECU:
Back Side:



NG → REPAIR OR REPLACE HARNESS OR CONNECTOR (SEE PAGE 01-36)

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-1016)

05EK2-05

FAIL-SAFE CHART

1. FAIL-SAFE

This function minimizes the loss of the ECT functions when any malfunction occurs in each sensor or solenoid.

(a) ATF (Automatic Transmission Fluid) temperature sensor:
When the ATF temperature sensor has a malfunction, 5th upshift is prohibited.

(b) Counter gear speed sensor NC (Speed sensor NC):
When the counter gear speed sensor has a malfunction, 5th upshift is prohibited.

(c) Shift solenoid valve DSL:
When the solenoid valve DSL has a malfunction, the current to the solenoid valve is stopped. This stops lock-up control, then fuel economy decreases.

(d) Shift solenoid valve SL1, SL2, SL3 and S4:

Fail safe function:

If either of the shift solenoid valve circuits develops an open or short, the ECM turns the other shift solenoid "ON" and "OFF" in order to shift into the gear positions shown in the table below.

Manual shifting as shown in the following table must be done (In case of a short circuit, the ECM stops sending the current to the short circuit solenoid).

Even if starting the engine in the fail-safe mode, the gear position remain in the same position.

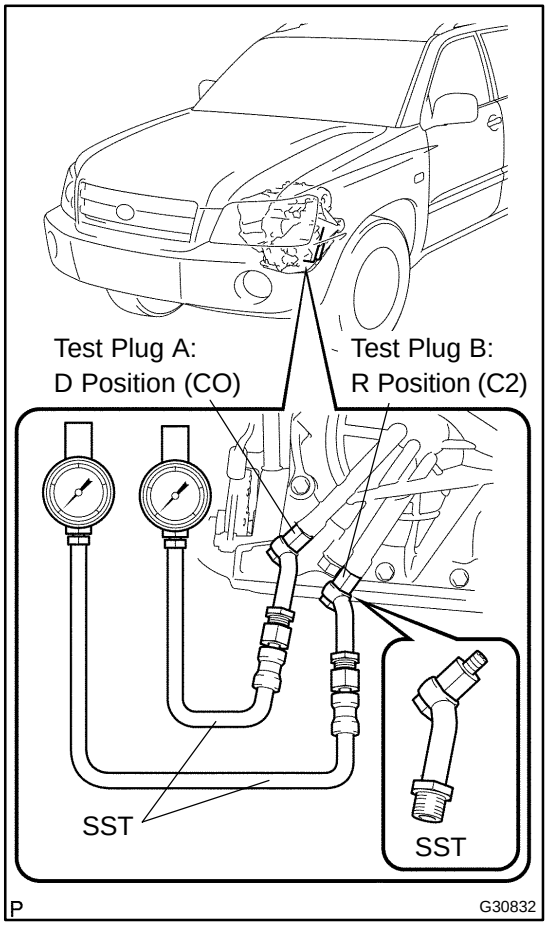
○ : ON △ : According to Flex Lock-up × : OFF

→ : Condition in the normal operation is shown on the left of "→".
Condition in the fail-safe mode is shown on the right of "→".

Normal	Solenoid Valve	SL1	○	×	○	×	×
		SL2	○	○	×	△	△
		SL3	×	×	×	○	○
		S4	×	×	×	×	○
	Gear Position		1st	2nd	3rd	4th	5th
SL1 Malfunction (During driving at 1st or 2nd)	Solenoid Valve	SL1	×				
		SL2	○	○	×→○	△→○	△→○
		SL3	×	×	×	○→×	○→×
		S4	×	×	×	×	○→×
	Gear Position		1st → 2nd	2nd	3rd → 2nd	4th → 2nd	5th → 2nd
SL1 Malfunction (During driving at 3rd)	Solenoid Valve	SL1	×				
		SL2	○→△	○→△	×→△	△	△
		SL3	×	×	×	○→×	○→×
		S4	×→○	×→○	×→○	×→○	○
	Gear Position		1st → 4th	2nd→ 4th	3rd → 4th	4th	5th → 4th
SL1 Malfunction (During driving at 4th or 5th)	Solenoid Valve	SL1	×				
		SL2	○→△	○→△	×→△	△	△
		SL3	×→○	×→○	×→○	○	○
		S4	×	×	×	×	○
	Gear Position		1st → 4th	2nd→ 4th	3rd → 4th	4th	5th → 4th
SL2 Malfunction	Solenoid Valve	SL1	○	×→○	○	×→○	×→○
		SL2	×				
		SL3	×	×	×	○→×	○→×
		S4	×→○	×→○	×→○	×→○	○
	Gear Position		1st → 4th	2nd→ 4th	3rd → 4th	4th	5th → 4th
SL3 Malfunction	Solenoid Valve	SL1	○	×	○	×→○	×→○
		SL2	○	○	×	△	△
		SL3	×				
		S4	×	×	×	×→○	○
	Gear Position		1st	2nd	3rd	4th	5th → 4th
S4 Malfunction	Solenoid Valve	SL1	○	×	○	×	×
		SL2	○	○	×	△	△
		SL3	×	×	×	○	○
		S4	×				
	Gear Position		1st	2nd	3rd	4th	5th → 4th
SL1, SL2, SL3, and S4 Malfunction	Solenoid Valve	SL1	×				
		SL2	×				
		SL3	×				
		S4	×				
	Gear Position		1st → 4th	2nd→ 4th	3rd → 4th	4th	5th → 4th

05EJX-05

HYDRAULIC TEST



1. PERFORM HYDRAULIC TEST

(a) Measure the line pressure.

NOTICE:

- **Perform the test at the normal operation fluid temperature the 50 to 80˚C (122 to 176˚F)**
- **The line pressure test should always be carried out in pairs. One technician should observe the conditions of wheels or wheel stoppers outside the vehicle while the other is performing the test.**
- **Be careful to prevent SST hose from interfering with the exhaust pipe.**
- **This check must be conducted after checking and adjusting engine.**
- **Perform under condition that A/C is OFF.**
- **When conducting stall test, do not continue more than 10 seconds.**

(1) Warm up the ATF (Automatic Transmission Fluid).

(2) Lift the vehicle up.

(3) Remove the engine under cover.

(4) Connect hand-held tester to DLC3.

(5) Remove the test plug A on the transaxle case front left side and install the SST.

SST 09992-00095 (09992- 00231, 09992-00271)

NOTICE:

There is a difference in installation point between D position and R position.

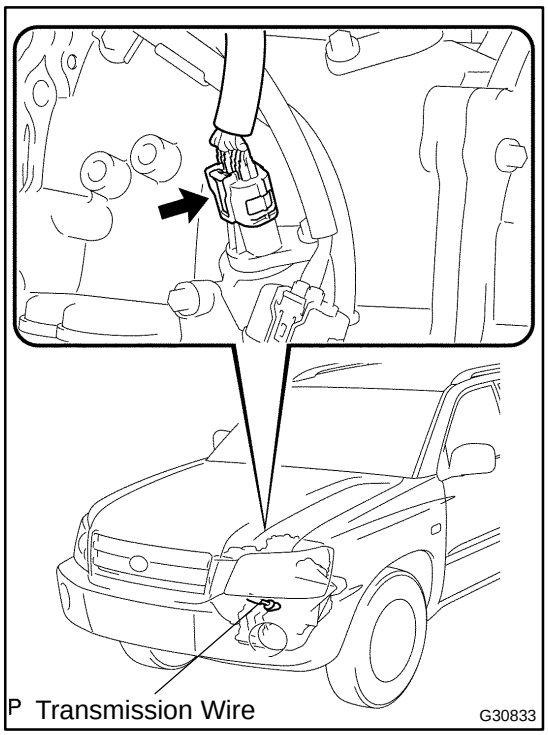
(6) Start the engine.

(7) Using hand-held tester, shift to D position and hold 3rd gear by active test, and measure the line pressure in idling.

Specified line pressure:

Condition	D position
Idling	372 to 412 kPa (3.8 to 4.2 kgf/cm^2, 54 to 60 psi)

(8) Turn the ignition switch off.



(9) Disconnect the connector of the transmission wire.

HINT:

Disconnect the connector only when performing the D position stall test.

(10) Start the engine.

(11) Firmly depress the brake pedal, shift to the D position, depress the accelerator pedal all the way down and check the line pressure while the stall test is performed.

Specified line pressure:

Condition	D position
Stall test	931 to 1,031 kPa (9.5 to 10.5 kgf/cm^2, 135 to 150 psi)

(12) Turn the ignition switch off.

(13) Remove the SST, install the test plug A.

(14) Remove the test plug B, install the SST and start engine.

SST 09992-00095 (09992- 00231, 09992-00271)

(15) Connect the transmission wire connector, depress the brake pedal firmly, shift to the R position and check that the line pressure while the engine is idling and during the stall test.

Specified line pressure:

Condition	R position
Idling	672 to 742 kPa (6.9 to 7.6 kgf/cm^2, 97 to 108 psi)
Stall test	1,768 to 1,968 kPa (18.0 to 20.1 kgf/cm^2, 256 to 285 psi)

(16) Remove the SST, install the test plug B.

(17) Clear the DTC.

Evaluation:

Problem	Possible cause
If the measured values at all position are higher	・Shift solenoid valve (SLT) defective ・Regulator valve defective
If the measured values at all position are lower	・Shift solenoid valve (SLT) defective ・Regulator valve defective ・Oil pump defective ・U/D (Underdrive) direct clutch defective
If pressure is low in the D position only	・D position circuit fluid leak ・Forward clutch defective
If pressure is low in the R position only	・R position circuit fluid leak ・Reverse clutch defective ・1st and reverse brake defective

05EJZ-07

INITIALIZATION

1. RESET MEMORY

CAUTION:

Perform the RESET MEMORY (AT initialization) when replacing the automatic transaxle assy, engine assy or ECM.

NOTICE:

Hand-held tester only

HINT:

The ECM memorizes the condition that the ECT controls the automatic transaxle assy and engine assy according to those characteristics. Therefore, when the automatic transaxle assy, engine assy, or ECM has been replaced, it is necessary to reset the memory so that the ECM can memorize the new information. Reset procedure is as follows.

(a) Turn the ignition switch off.
(b) Connect the hand-held tester to the DLC3.
(c) Turn the ignition switch to the ON position and push the hand-held tester main switch on.
(d) Select the item ”DIAGNOSIS/ENHANCED OBD II”.
(e) Perform the reset memory procedure from the ENGINE menu.

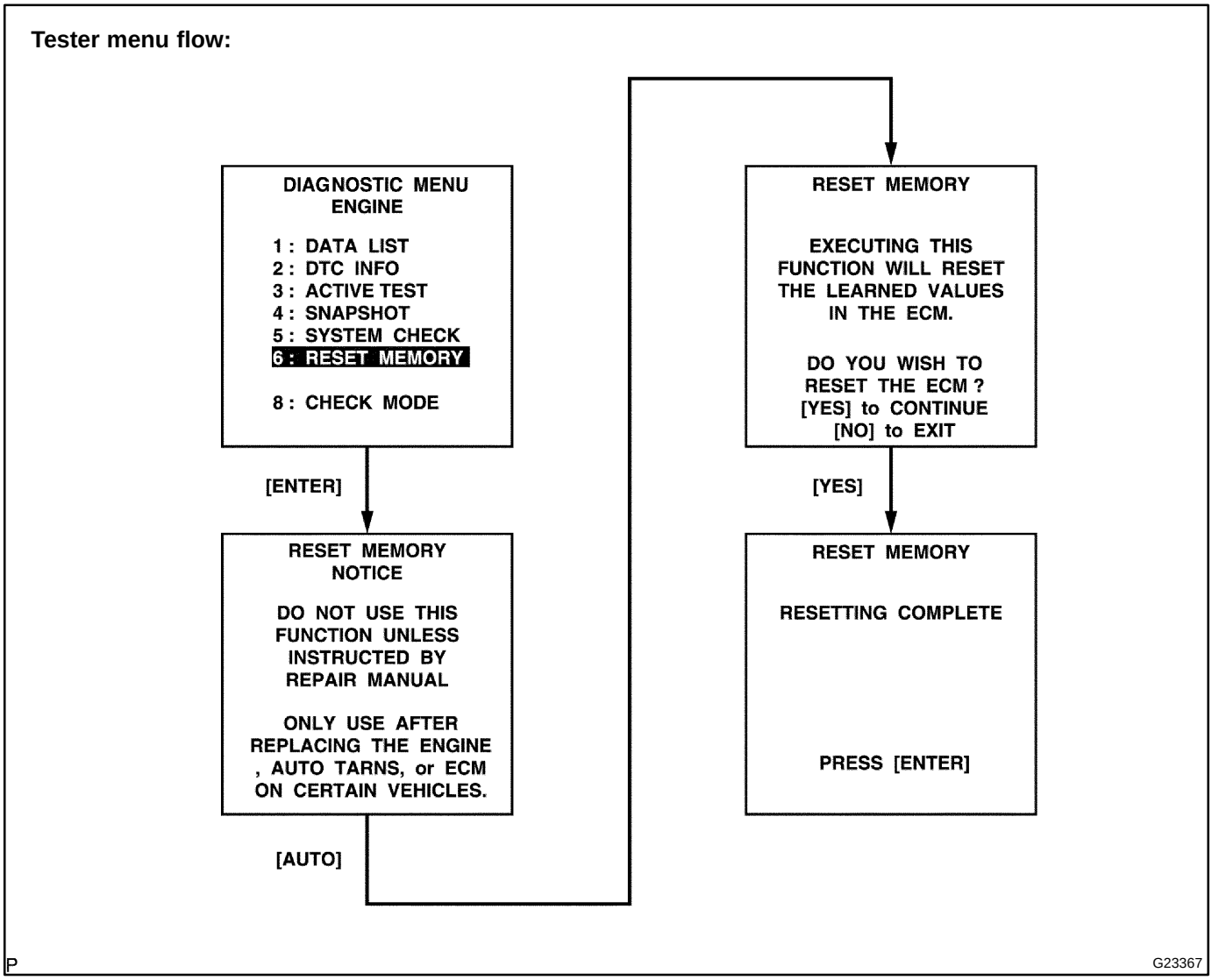
CAUTION:

After performing the RESET MEMORY, be sure to perform the ROAD TEST (see page 05-997) described earlier.

HINT:

The ECM is learned by performing the ROAD TEST.

Tester menu flow:



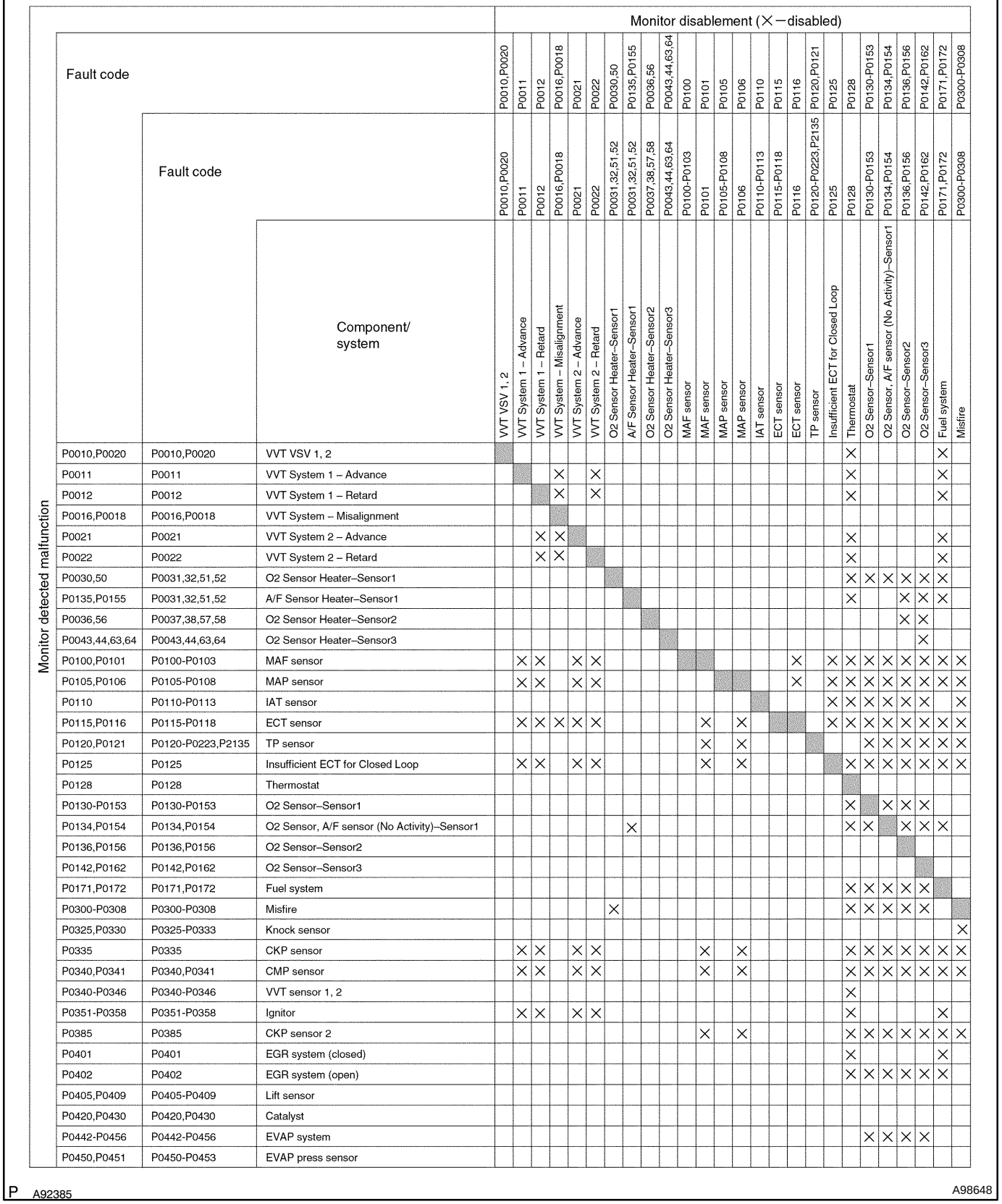
05IRB-02

LIST OF DISABLE A MONITOR

HINT:

This table indicates ECM monitoring status for the items in the upper columns if the DTCs in each line on the left are being set.

As for the ”X” mark, when the DTC on the left is stored, detection of the DTC in the upper column is not performed.



Monitor detected malfunction	Fault code	Fault code	Component/ system	Monitor disablement (×−disabled)																												
				P0010,P0020	P0011	P0012	P0016,P0018	P0021	P0022	P0030,50	P0135,P0155	P0036,56	P0043,44,63,64	P0100	P0101	P0105	P0106	P0110	P0115	P0116	P0120,P0121	P0125	P0128	P0130-P0153	P0134,P0154	P0136,P0156	P0142,P0162	P0171,P0172	P0300-P0308			
				P0010,P0020	P0011	P0012	P0016,P0018	P0021	P0022	P0031,32,51,52	P0031,32,51,52	P0037,38,57,58	P0043,44,63,64	P0100-P0103	P0101	P0105-P0108	P0106	P0110-P0113	P0115-P0118	P0116	P0120-P0223,P2135	P0125	P0128	P0130-P0153	P0134,P0154	P0136,P0156	P0142,P0162	P0171,P0172	P0300-P0308			
				VVT VSV 1, 2	VVT System 1 – Advance	VVT System 1 – Retard	VVT System – Misalignment	VVT System 2 – Advance	VVT System 2 – Retard	O2 Sensor Heater–Sensor1	A/F Sensor Heater–Sensor1	O2 Sensor Heater–Sensor2	O2 Sensor Heater–Sensor3	MAF sensor	MAF sensor	MAP sensor	MAP sensor	IAT sensor	ECT sensor	ECT sensor	TP sensor	Insufficient ECT for Closed Loop	Thermostat	O2 Sensor–Sensor1	O2 Sensor, A/F sensor (No Activity)–Sensor1	O2 Sensor–Sensor2	O2 Sensor–Sensor3	Fuel system	Misfire			
	P0010,P0020	P0010,P0020	VVT VSV 1, 2	■																		×					×					
	P0011	P0011	VVT System 1 – Advance		■		×		×														×					×					
	P0012	P0012	VVT System 1 – Retard			■	×		×														×					×					
	P0016,P0018	P0016,P0018	VVT System – Misalignment				■																										
	P0021	P0021	VVT System 2 – Advance			×	×	■															×					×					
	P0022	P0022	VVT System 2 – Retard			×	×		■														×					×					
	P0030,50	P0031,32,51,52	O2 Sensor Heater–Sensor1							■													×	×	×	×	×	×					
	P0135,P0155	P0031,32,51,52	A/F Sensor Heater–Sensor1								■												×			×	×	×					
	P0036,56	P0037,38,57,58	O2 Sensor Heater–Sensor2									■														×	×						
	P0043,44,63,64	P0043,44,63,64	O2 Sensor Heater–Sensor3										■														×						
	P0100,P0101	P0100-P0103	MAF sensor		×	×		×	×					■	■					×		×	×	×	×	×	×	×	×	×			
	P0105,P0106	P0105-P0108	MAP sensor		×	×		×	×							■	■			×		×	×	×	×	×	×	×	×	×			
	P0110	P0110-P0113	IAT sensor															■				×	×	×	×	×	×			×			
	P0115,P0116	P0115-P0118	ECT sensor		×	×	×	×	×						×		×		■	■		×	×	×	×	×	×	×	×	×			
	P0120,P0121	P0120-P0223,P2135	TP sensor												×		×				■			×	×	×	×	×	×	×			
	P0125	P0125	Insufficient ECT for Closed Loop		×	×		×	×						×		×					■	×	×	×	×	×	×	×	×			
	P0128	P0128	Thermostat																				■										
	P0130-P0153	P0130-P0153	O2 Sensor–Sensor1																				×	■	×	×	×						
	P0134,P0154	P0134,P0154	O2 Sensor, A/F sensor (No Activity)–Sensor1								×												×	×	■	×	×	×					
	P0136,P0156	P0136,P0156	O2 Sensor–Sensor2																							■							
	P0142,P0162	P0142,P0162	O2 Sensor–Sensor3																								■						
	P0171,P0172	P0171,P0172	Fuel system																				×	×	×	×	×	■					
	P0300-P0308	P0300-P0308	Misfire							×													×	×	×	×	×		■				
	P0325,P0330	P0325-P0333	Knock sensor																											×			
	P0335	P0335	CKP sensor		×	×		×	×						×		×						×	×	×	×	×	×	×	×			
	P0340,P0341	P0340,P0341	CMP sensor		×	×		×	×						×		×						×	×	×	×	×	×	×	×			
	P0340-P0346	P0340-P0346	VVT sensor 1, 2																				×										
	P0351-P0358	P0351-P0358	Ignitor		×	×		×	×														×						×				
	P0385	P0385	CKP sensor 2												×		×						×	×	×	×	×	×	×	×			
	P0401	P0401	EGR system (closed)																				×						×				
	P0402	P0402	EGR system (open)																				×	×	×	×	×	×					
	P0405,P0409	P0405-P0409	Lift sensor																														
	P0420,P0430	P0420,P0430	Catalyst																														
	P0442-P0456	P0442-P0456	EVAP system																					×	×	×	×						
	P0450,P0451	P0450-P0453	EVAP press sensor																														

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A98648

Monitor detected malfunction

Fault code	Fault code	Component/ system	Monitor disablement (×−disabled)																										
			P0010,P0020	P0011	P0012	P0016,P0018	P0021	P0022	P0030,50	P0135,P0155	P0036,56	P0043,44,63,64	P0100	P0101	P0105	P0106	P0110	P0115	P0116	P0120,P0121	P0125	P0128	P0130-P0153	P0134,P0154	P0136,P0156	P0142,P0162	P0171,P0172	P0300-P0308
	P0010,P0020	VVT VSV 1, 2																											
	P0011	VVT System 1 – Advance																											
	P0012	VVT System 1 – Retard																											
	P0016,P0018	VVT System – Misalignment																											
	P0021	VVT System 2 – Advance																											
	P0022	VVT System 2 – Retard																											
	P0031,32,51,52	O2 Sensor Heater–Sensor1																											
	P0031,32,51,52	A/F Sensor Heater–Sensor1																											
	P0037,38,57,58	O2 Sensor Heater–Sensor2																											
	P0043,44,63,64	O2 Sensor Heater–Sensor3																											
	P0100-P0103	MAF sensor																											
P0500	P0500	VSS																			×	×	×	×	×	×	×	×	
P0511	P0511	IAC valve																				×							
P0510	P0510	Idle switch												×		×					×	×			×	×	×	×	
P0560	P0560	System Voltage																											
P0617	P0617	Starter signal																											
P0705	P0705	Shift lever position switch																											
P0710	P0710-P0713	Trans fluid temp sensor																											
P0720-P0793	P0720-P0793	Output speed sensor																											
P0715-P0717	P0715-P0717	Input speed sensor																											
P0724	P0724	Stop lamp switch																											
P0741-P0796	P0741-P0796	Trans solenoid (function)																											
P0748-P0798	P0748-P0798	Trans solenoid (range)																											
P0850	P0850	PNP switch																											×
P1010,P1020	P1010,P1020	VVTL																			×						×		
P1011,12(,21,22)	P1011,12(,21,22)	VVTL system1(,2)																			×						×		
P1126	P1126	Electronic magnet clutch																											
P1129	P1129	Electronic throttle system																											
P1430	P1430	HC adsorber ACT press sensor																											
P2004,6	P2004,6	Intake Manifold Runner Control																											
P2009,10	P2009,10	Intake Manifold Runner Control Circuit																											
P2014,16,17	P2014,16,17	Intake Manifold Runner Position Sensor																											
P2102,P2103	P2102,P2103	Throttle motor																											
P2120-P2138	P2120-P2138	Accel position sensor																											
P2196,P2198	P2196,P2198	A/F sensor (rationality)																			×				×	×			
P2226	P2226	BARO sensor																				×			×	×			
P2237,2240	P2237,2240	A/F sensor (open)																			×				×	×			
P2423,24	P2423,24	HC Absorption Catalyst																											
P2430,2,3	P2430,2,3	A/R Pressure Sensor (Low/High)																											
P2431	P2431	A/R Pressure Sensor (Rationality)																											
P2440	P2440	A/R control valve stuck open																				×	×	×	×	×			
P2441	P2441	A/R control valve stuck close																				×	×	×	×	×			
P2444	P2444	AIP stuck On																				×	×	×	×	×			
P2445	P2445	AIP stuck Off																				×	×	×	×	×			
P2714-P2759	P2714-P2759	Trans solenoid (SLU-SLD)																											
P2A00,P2A03	P2A00,P2A03	A/F sensor (slow response)																			×				×	×			

P

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Monitor detected malfunction

Fault code	Fault code	Component/ system	Monitor disablement (×−disabled)																													
			P0325,P0330	P0335	P0340,P0341	P0340-P0346	P0351-P0358	P0385	P0401	P0402	P0405	P0409	P0420,P0430	P0440-P0446	P0450,P0451	P0500	P0500	P0500	P0500	P0511	P0510	P0560	P0617	P0705	P0710-P0713	P0720-P0793	P0715-P0717	P0724	P0741-P0796			
			P0325-P0333	P0335	P0340,P0341	P0340-P0346	P0351-P0358	P0385	P0401	P0402	P0405,P0406	P0409	P0420,P0430	P0440-P0446	P0450-P0453	P0500	P0500	P0500	P0500	P0511	P0510	P0560	P0617	P0705	P0710-P0713	P0720-P0793	P0715-P0717	P0724	P0741-P0796			
			Knock sensor	CKP sensor	CMP sensor	VVT sensor 1, 2	Ignitor	CKP sensor 2	EGR system (closed)	EGR system (open)	EGR Lift sensor	EGR Lift sensor	Catelyst	EVAP system	EVAP press sensor	VSS (ECT2 sensor)	VSS (ECT1 sensor, non-ECT)	VSS (M/T)	IAC valve	Idle switch	System Voltage	Starter signal	Shift lever position switch	Trans fluid temp sensor	Output speed sensor	Input speed sensor	Stop lamp switch	Trans solenoid (function)*1			
P0010,P0020	P0010,P0020	VVT VSV 1, 2																														×
P0011	P0011	VVT System 1 – Advance							×	×			×	×						×												
P0012	P0012	VVT System 1 – Retard							×	×			×	×						×												
P0016,P0018	P0016,P0018	VVT System – Misalignment																														
P0021	P0021	VVT System 2 – Advance							×	×			×	×						×												
P0022	P0022	VVT System 2 – Retard							×	×			×	×						×												
P0030,50	P0031,32,51,52	O2 Sensor Heater–Sensor1							×	×			×							×												×
P0135,P0155	P0031,32,51,52	A/F Sensor Heater–Sensor1							×	×			×							×												
P0036,56	P0037,38,57,58	O2 Sensor Heater–Sensor2											×																			
P0043,44,63,64	P0043,44,63,64	O2 Sensor Heater–Sensor3																														
P0100,P0101	P0100-P0103	MAF sensor							×	×			×	×					×	×												×
P0105,P0106	P0105-P0108	MAP sensor							×	×			×	×					×	×												×
P0110	P0110-P0113	IAT sensor							×	×				×																		×
P0115,P0116	P0115-P0118	ECT sensor							×	×		×	×	×				×	×													×
P0120,P0121	P0120-P0223,P2135	TP sensor							×	×			×	×			×		×													×
P0125	P0125	Insufficient ECT for Closed Loop							×	×		×	×	×				×	×													×
P0128	P0128	Thermostat																														
P0130-P0153	P0130-P0153	O2 Sensor–Sensor1							×	×			×							×												×
P0134,P0154	P0134,P0154	O2 Sensor, A/F sensor (No Activity)–Sensor1							×	×			×							×												×
P0136,P0156	P0136,P0156	O2 Sensor–Sensor2											×																			
P0142,P0162	P0142,P0162	O2 Sensor–Sensor3																														
P0171,P0172	P0171,P0172	Fuel system							×	×			×	×						×												×
P0300-P0308	P0300-P0308	Misfire											×	×						×												×
P0325,P0330	P0325-P0333	Knock sensor							×	×																						×
P0335	P0335	CKP sensor							×	×			×	×						×												×
P0340,P0341	P0340,P0341	CMP sensor							×	×			×	×						×												×
P0340-P0346	P0340-P0346	VVT sensor 1, 2																														
P0351-P0358	P0351-P0358	Ignitor							×	×			×	×						×												×
P0385	P0385	CKP sensor 2							×	×			×	×						×												
P0401	P0401	EGR system (closed)											×																			×
P0402	P0402	EGR system (open)											×	×						×												×
P0405,P0409	P0405-P0409	Lift sensor																														
P0420,P0430	P0420,P0430	Catalyst																														
P0442-P0456	P0442-P0456	EVAP system																		×												
P0450,P0451	P0450-P0453	EVAP press sensor												×																		

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Monitor detected malfunction

Fault code	Fault code	Component/ system	Monitor disablement (×−disabled)																												
			P0325,P0330	P0335	P0340,P0341	P0340-P0346	P0351-P0358	P0385	P0401	P0402	P0405	P0409	P0420,P0430	P0440-P0446	P0450,P0451	P0500	P0500	P0500	P0500	P0511	P0510	P0560	P0617	P0705	P0710	P0720-P0793	P0715-P0717	P0724	P0741-P0796
			P0325-P0333	P0335	P0340,P0341	P0340-P0346	P0351-P0358	P0385	P0401	P0402	P0405,P0406	P0409	P0420,P0430	P0440-P0446	P0450-P0453	P0500	P0500	P0500	P0500	P0511	P0510	P0560	P0617	P0705	P0710-P0713	P0720-P0793	P0715-P0717	P0724	P0741-P0796
			Knock sensor	CKP sensor	CMP sensor	VVT sensor 1, 2	Ignitor	CKP sensor 2	EGR system (closed)	EGR system (open)	EGR Lift sensor	EGR Lift sensor	Catelyst	EVAP system	EVAP press sensor	VSS (ECT2 sensor)	VSS (ECT1 sensor, non-ECT)	VSS (M/T)	IAC valve	Idle switch	System Voltage	Starter signal	Shift lever position switch	Trans fluid temp sensor	Output speed sensor	Input speed sensor	Stop lamp switch	Trans solenoid (function)*1
P0500	P0500	VSS							×	×			×	×					×						×	×		×
P0511	P0511	IAC valve																										
P0510	P0510	Idle switch								×			×	×					×									×
P0560	P0560	System Voltage																										
P0617	P0617	Starter signal																										
P0705	P0705	Shift lever position switch																										
P0710	P0710-P0713	Trans fluid temp sensor																										
P0720-P0793	P0720-P0793	Output speed sensor																										×
P0715-P0717	P0715-P0717	Input speed sensor																										
P0724	P0724	Stop lamp switch																										
P0741-P0796	P0741-P0796	Trans solenoid (function)																										
P0748-P0798	P0748-P0798	Trans solenoid (range)																							×	×		×
P0850	P0850	PNP switch																	×									×
P1010,P1020	P1010,P1020	VVTL																										
P1011,12(,21,22)	P1011,12(,21,22)	VVTL system1(,2)							×	×			×	×					×									
P1126	P1126	Electronic magnet clutch																										
P1129	P1129	Electronic throttle system																										
P1430	P1430	HC adsorber ACT press sensor												×	×													
P2004,6	P2004,6	Intake Manifold Runner Control																										
P2009,10	P2009,10	Intake Manifold Runner Control Circuit																										
P2014,16,17	P2014,16,17	Intake Manifold Runner Position Sensor																										
P2102,P2103	P2102,P2103	Throttle motor																										
P2120-P2138	P2120-P2138	Accel position sensor																										
P2196,P2198	P2196,P2198	A/F sensor (rationality)							×	×			×						×									×
P2226	P2226	BARO sensor																										×
P2237,2240	P2237,2240	A/F sensor (open)							×	×			×						×									×
P2423,24	P2423,24	HC Absorption Catalyst																										
P2430,2,3	P2430,2,3	A/R Pressure Sensor (Low/High)																										
P2431	P2431	A/R Pressure Sensor (Rationality)																										
P2440	P2440	A/R control valve stuck open							×	×			×															
P2441	P2441	A/R control valve stuck close							×	×			×															
P2444	P2444	AIP stuck On							×	×			×															
P2445	P2445	AIP stuck Off							×	×			×															
P2714-P2759	P2714-P2759	Trans solenoid (SLU-SLD)																										×
P2A00,P2A03	P2A00,P2A03	A/F sensor (slow response)							×	×			×						×									×

P

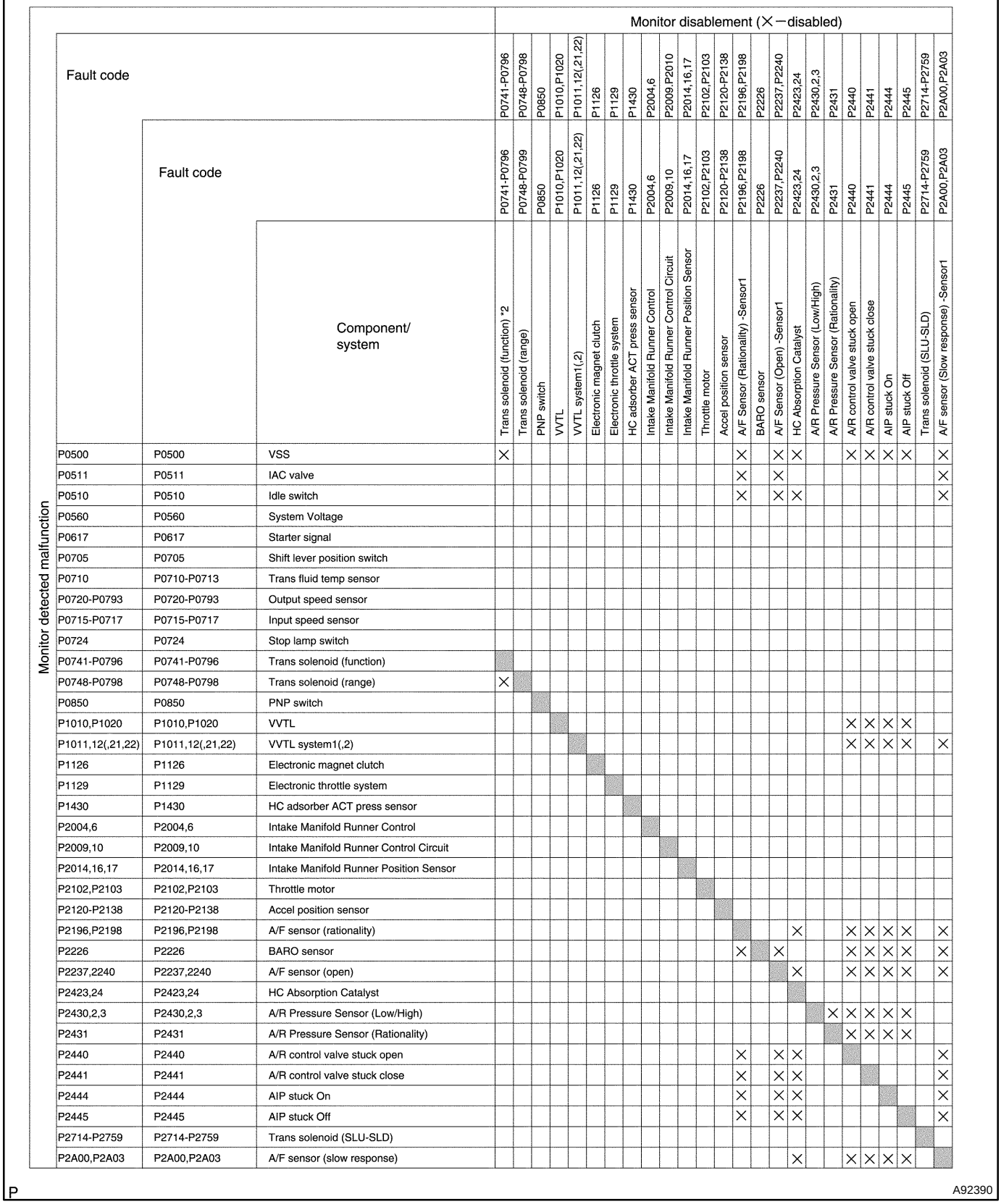
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Monitor detected malfunction

Fault code	Fault code	Component/ system	Monitor disablement (×—disabled)																										
			P0741-P0796	P0748-P0798	P0850	P1010,P1020	P1011,12(,21,22)	P1126	P1129	P1430	P2004,6	P2009,P2010	P2014,16,17	P2102,P2103	P2120-P2138	P2196,P2198	P2226	P2237,P2240	P2423,24	P2430,2,3	P2431	P2440	P2441	P2444	P2445	P2714-P2759	P2A00,P2A03
			P0741-P0796	P0748-P0799	P0850	P1010,P1020	P1011,12(,21,22)	P1126	P1129	P1430	P2004,6	P2009,10	P2014,16,17	P2102,P2103	P2120-P2138	P2196,P2198	P2226	P2237,P2240	P2423,24	P2430,2,3	P2431	P2440	P2441	P2444	P2445	P2714-P2759	P2A00,P2A03
			Trans solenoid (function) *2	Trans solenoid (range)	PNP switch	VVTL	VVTL system1(,2)	Electronic magnet clutch	Electronic throttle system	HC adsorber ACT press sensor	Intake Manifold Runner Control	Intake Manifold Runner Control Circuit	Intake Manifold Runner Position Sensor	Throttle motor	Accel position sensor	A/F Sensor (Rationality) -Sensor1	BARO sensor	A/F Sensor (Open) -Sensor1	HC Absorption Catalyst	A/R Pressure Sensor (Low/High)	A/R Pressure Sensor (Rationality)	A/R control valve stuck open	A/R control valve stuck close	AIP stuck On	AIP stuck Off	Trans solenoid (SLU-SLD)	A/F sensor (Slow response) -Sensor1
P0010,P0020	P0010,P0020	VVT VSV 1, 2																				×	×	×	×			
P0011	P0011	VVT System 1 – Advance																				×	×	×	×			
P0012	P0012	VVT System 1 – Retard																				×	×	×	×			
P0016,P0018	P0016,P0018	VVT System – Misalignment																				×	×	×	×			
P0021	P0021	VVT System 2 – Advance																				×	×	×	×			
P0022	P0022	VVT System 2 – Retard																				×	×	×	×			
P0030,50	P0031,32,51,52	O2 Sensor Heater–Sensor1																	×			×	×	×	×			
P0135,P0155	P0031,32,51,52	A/F Sensor Heater–Sensor1														×		×	×			×	×	×	×			×
P0036,56	P0037,38,57,58	O2 Sensor Heater–Sensor2														×			×									
P0043,44,63,64	P0043,44,63,64	O2 Sensor Heater–Sensor3																	×									
P0100,P0101	P0100-P0103	MAF sensor				×	×									×		×	×			×	×	×	×			×
P0105,P0106	P0105-P0108	MAP sensor				×	×									×		×	×			×	×	×	×			×
P0110	P0110-P0113	IAT sensor									×					×		×				×	×	×	×			×
P0115,P0116	P0115-P0118	ECT sensor	×			×	×				×					×		×	×			×	×	×	×			×
P0120,P0121	P0120-P0223,P2135	TP sensor														×		×	×			×	×	×	×			×
P0125	P0125	Insufficient ECT for Closed Loop	×			×										×		×	×			×	×	×	×			×
P0128	P0128	Thermostat																										
P0130-P0153	P0130-P0153	O2 Sensor–Sensor1																	×			×	×	×	×			
P0134,P0154	P0134,P0154	O2 Sensor, A/F sensor (No Activity)–Sensor1														×		×	×			×	×	×	×			×
P0136,P0156	P0136,P0156	O2 Sensor–Sensor2														×			×									
P0142,P0162	P0142,P0162	O2 Sensor–Sensor3																	×									
P0171,P0172	P0171,P0172	Fuel system														×		×	×			×	×	×	×			×
P0300-P0308	P0300-P0308	Misfire														×		×	×			×	×	×	×			×
P0325,P0330	P0325-P0333	Knock sensor																				×	×	×	×			
P0335	P0335	CKP sensor				×	×									×		×	×			×	×	×	×			×
P0340,P0341	P0340,P0341	CMP sensor				×	×									×		×	×			×	×	×	×			×
P0340-P0346	P0340-P0346	VVT sensor 1, 2																				×	×	×	×			
P0351-P0358	P0351-P0358	Ignitor																	×			×	×	×	×			
P0385	P0385	CKP sensor 2				×	×									×		×	×			×	×	×	×			×
P0401	P0401	EGR system (closed)																	×									
P0402	P0402	EGR system (open)														×		×	×			×	×	×	×			×
P0405,P0409	P0405-P0409	Lift sensor																										
P0420,P0430	P0420,P0430	Catalyst																										
P0442-P0456	P0442-P0456	EVAP system														×		×				×	×	×	×			×
P0450,P0451	P0450-P0453	EVAP press sensor																				×	×	×	×			

P

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Monitor detected malfunction
Fault code
Fault code
Component/ system
Monitor disablement (×−disabled)
P0741-P0796
P0748-P0798
P0850
P1010,P1020
P1011,12(,21,22)
P1126
P1129
P1430
P2004,6
P2009.P2010
P2014,16,17
P2102,P2103
P2120-P2138
P2196,P2198
P2226
P2237,P2240
P2423,24
P2430,2,3
P2431
P2440
P2441
P2444
P2445
P2714-P2759
P2A00,P2A03
Trans solenoid (function) *2
Trans solenoid (range)
PNP switch
VVTL
VVTL system1(,2)
Electronic magnet clutch
Electronic throttle system
HC adsorber ACT press sensor
Intake Manifold Runner Control
Intake Manifold Runner Control Circuit
Intake Manifold Runner Position Sensor
Throttle motor
Accel position sensor
A/F Sensor (Rationality) -Sensor1
BARO sensor
A/F Sensor (Open) -Sensor1
HC Absorption Catalyst
A/R Pressure Sensor (Low/High)
A/R Pressure Sensor (Rationality)
A/R control valve stuck open
A/R control valve stuck close
AIP stuck On
AIP stuck Off
Trans solenoid (SLU-SLD)
A/F sensor (Slow response) -Sensor1
P0500 P0500 VSS
P0511 P0511 IAC valve
P0510 P0510 Idle switch
P0560 P0560 System Voltage
P0617 P0617 Starter signal
P0705 P0705 Shift lever position switch
P0710 P0710-P0713 Trans fluid temp sensor
P0720-P0793 P0720-P0793 Output speed sensor
P0715-P0717 P0715-P0717 Input speed sensor
P0724 P0724 Stop lamp switch
P0741-P0796 P0741-P0796 Trans solenoid (function)
P0748-P0798 P0748-P0798 Trans solenoid (range)
P0850 P0850 PNP switch
P1010,P1020 P1010,P1020 VVTL
P1011,12(,21,22) P1011,12(,21,22) VVTL system1(,2)
P1126 P1126 Electronic magnet clutch
P1129 P1129 Electronic throttle system
P1430 P1430 HC adsorber ACT press sensor
P2004,6 P2004,6 Intake Manifold Runner Control
P2009,10 P2009,10 Intake Manifold Runner Control Circuit
P2014,16,17 P2014,16,17 Intake Manifold Runner Position Sensor
P2102,P2103 P2102,P2103 Throttle motor
P2120-P2138 P2120-P2138 Accel position sensor
P2196,P2198 P2196,P2198 A/F sensor (rationality)
P2226 P2226 BARO sensor
P2237,2240 P2237,2240 A/F sensor (open)
P2423,24 P2423,24 HC Absorption Catalyst
P2430,2,3 P2430,2,3 A/R Pressure Sensor (Low/High)
P2431 P2431 A/R Pressure Sensor (Rationality)
P2440 P2440 A/R control valve stuck open
P2441 P2441 A/R control valve stuck close
P2444 P2444 AIP stuck On
P2445 P2445 AIP stuck Off
P2714-P2759 P2714-P2759 Trans solenoid (SLU-SLD)
P2A00,P2A03 P2A00,P2A03 A/F sensor (slow response)
P
A92390

05F2S-04

MONITOR DRIVE PATTERN

1. MONITOR DRIVE PATTERN FOR ECT TEST

(a) Perform this drive pattern as one method to simulate the detection conditions of the ECT malfunctions. (The DTCs may not be detected due the actual driving conditions. And some codes may not be detected through this drive pattern).

HINT:

Preparation for driving

- Warm up the engine sufficiently. (Engine coolant temperature is 60 °C (140 °F) or higher)
- Drive the vehicle when the atmospheric temperature is -10 °C (14 °F) or higher. (Malfunction is not detected when the atmospheric temperature is -10 °C (14 °F) or less)

Driving note

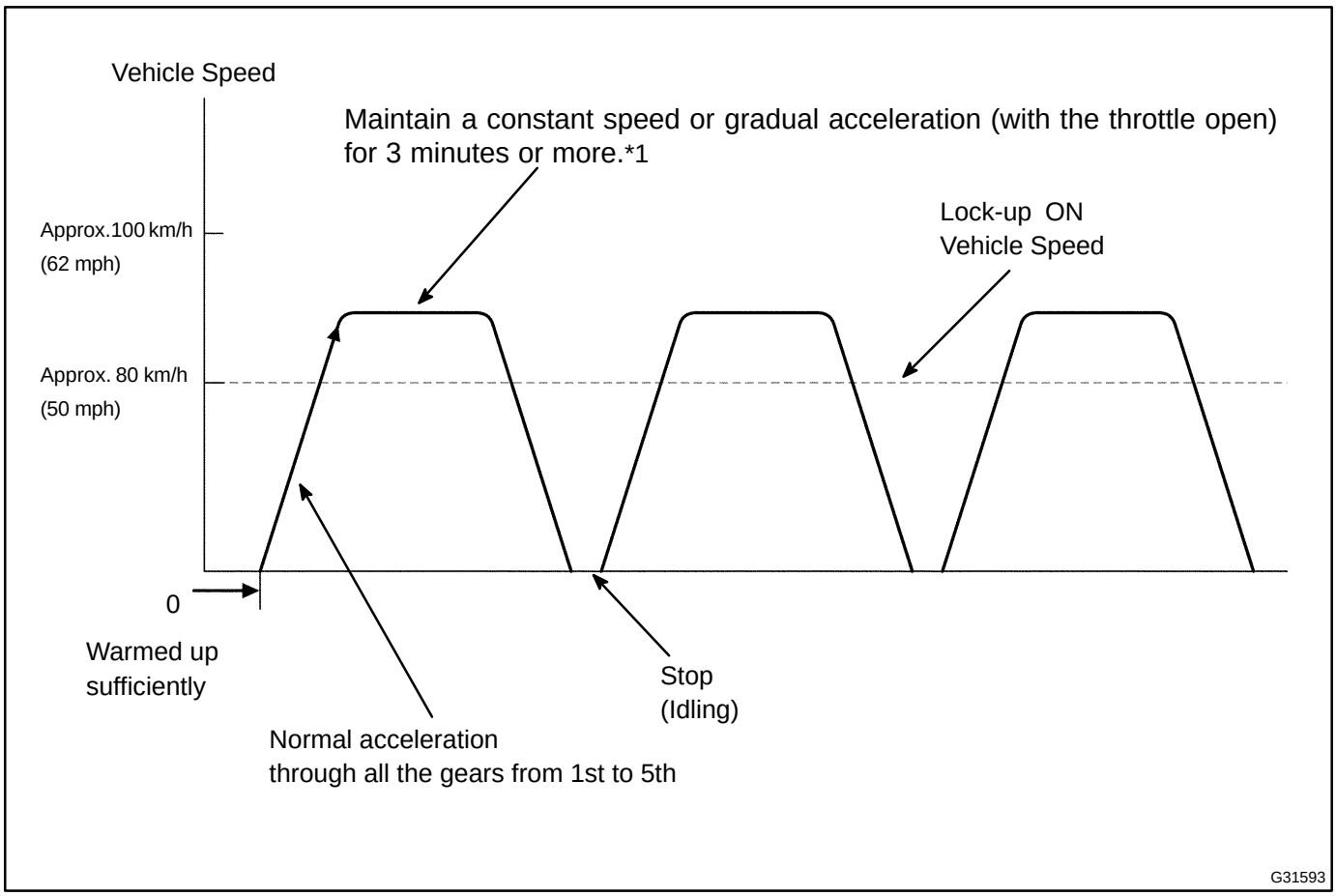
- Drive the vehicle through all gears.
  Stop → 1st → 2nd → 3rd → 4th → 5th → 5th (lock-up ON).
- Repeat the above driving pattern three times or more.

NOTICE:

- **The monitor status can be checked using the OBD II scan tool. When using the hand-held tester, monitor status can be found in the "ENHANCED OBD II/DATA LIST" or under "CARB OBD II".**
- **In the event that the drive pattern must be interrupted (possibly due to traffic conditions or other factors) the drive pattern can be resumed and, in most cases, the monitor can be completed.**

CAUTION:

Perform this drive pattern on a level road as much as possible and strictly observe the posted speed limits and traffic laws while driving.



HINT:

*1: Drive at such a speed in the uppermost gear, to engage lock-up. The vehicle can be driven at a speed lower than that in the above diagram under the lock-up condition.

NOTICE:

It is necessary to drive the vehicle for approximately 30 minutes to detect DTC P0711 (ATF temperature sensor malfunction).

05EJW-06

MECHANICAL SYSTEM TESTS

1. PERFORM MECHANICAL SYSTEM TESTS

(a) Measure the stall speed.

The object of this test is to check the overall performance of the transaxle and engine by measuring the stall speeds in the D positions.

NOTICE:

- **Perform the test at the normal operating ATF (Automatic Transmission Fluid) temperature 50 to 80°C (122 to 176°F).**
- **Do not continuously run this test for longer than 10 seconds.**
- **To ensure safety, do this test in a wide, clear level area which provides good traction.**
- **The stall test should always be carried out in pairs. One technician should observe the conditions of wheels or wheel stoppers outside the vehicle while the other is doing the test.**

(1) Chock the 4 wheels.

(2) Connect an OBD II scan tool or hand-held tester to the DLC3.

(3) Fully apply the parking brake.

(4) Keep your left foot pressed firmly on the brake pedal.

(5) Start the engine.

(6) Shift into the D position. Press all the way down on the accelerator pedal with your right foot.

(7) Quickly read the stall speed at this time.

Stall speed:

U151E: 2,240 ≦ 150 rpm

U151F: 2,550 ≦ 150 rpm

Evaluation:

Problem	Possible cause
(a) Stall engine speed is low in D and R positions	・Engine power output may be insufficient ・Stator one-way clutch not operating properly HINT: If the value is less than the specified value by 600 rpm or more, the torque converter could be faulty.
(b) Stall engine speed is high in D position	・Line pressure is too low ・Forward clutch slipping ・U/D (Underdrive) brake slipping ・U/D (Underdrive) one-way clutch not operating properly ・No.1 one-way clutch not operating properly ・Line pressure is too low ・Improper fluid level

(b) Measure the time lag.

(1) When the shift lever is shifted while the engine is idling, there will be a certain time lapse or lag before the shock can be felt. This is used for checking the condition of the direct clutch, forward clutch, and 1st and reverse brake.

NOTICE:

- **Perform the test at the normal operating ATF temperature 50 to 80°C (122 to 176°F).**
- **Be sure to allow 1 minute interval between tests.**
- **Perform the test three times, and measure the time lags. Calculate the average value of the three time lags.**

(2) Connect an OBD II scan tool or hand-held tester to the DLC3.

(3) Fully apply the parking brake.

(4) Start and warm up the engine and check idle speed.

Idle speed: approx. 700 rpm (In N position and A/C OFF)

(5) Shift the lever from N to D position. Using a stop watch, measure the time from when the lever is shifted until the shock is felt.

Time lag: N → D less than 1.2 seconds

(6) In the same way, measure the time lag for N → R.

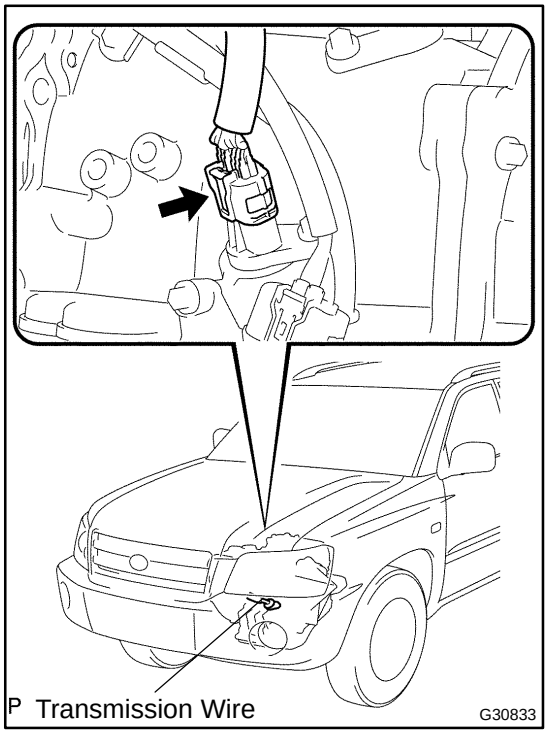
Time lag: N → R less than 1.5 seconds

Evaluation (If N → D or N → R time lag is longer than the specified):

Problem	Possible cause
N → D time lag is longer	・Line pressure is too low ・Forward clutch worn ・No.1 one-way clutch not operating properly ・U/D (Underdrive) one-way clutch not operating ・U/D (Underdrive) brake worn
N → R time lag is longer	・Line pressure is too low ・Reverse clutch worn ・1st and reverse brake worn ・U/D (Underdrive) brake worn

05EJY-07

MANUAL SHIFTING TEST



1. PERFORM MANUAL SHIFTING TEST

HINT:

- With this test, it can be determined whether the trouble occurs in the electrical circuit or is a mechanical problem in the transaxle.
- If any abnormalities are found in the following test, the problem is in the transaxle itself.

(a) Disconnect the transmission wire connector.

(b) Drive with the transmission wire disconnected.
Shifting the shift lever to the L, 2, 3 and D position to check whether the shifting condition changes the table below.

Shift Position	Shifting Condition
L ⇔ 2	No Shift (Not Change)
2 ⇔ 3	Down Shift ⇔ Up Shift
3 ⇔ D	No Shift (Not Change)

HINT:

When driving with the transmission wire disconnected, the gear position will be as follows:

- When the shift lever is in the L or the 2 position, the gear is held in the 3rd position.
- When the shift lever is in the D position, the gear is held in the 4th position.
- When the shift lever is in the R or the P position, the gear is also in the R or the P position respectively.

(c) Connect the transmission wire connector.

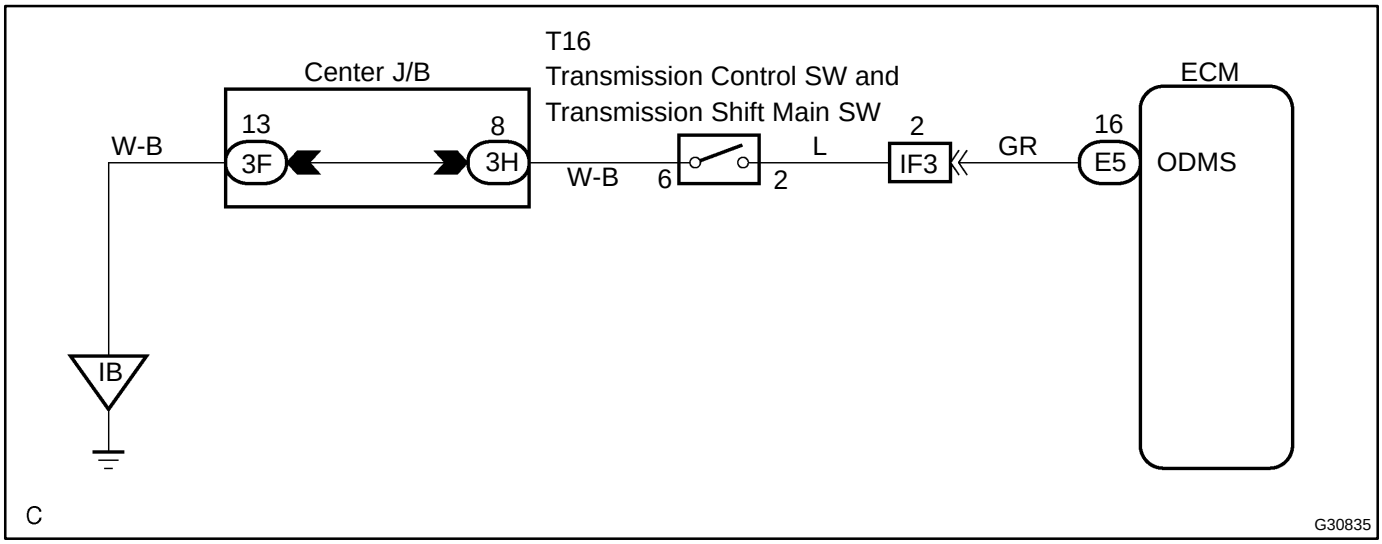
(d) Clear the DTC (see page 05-1026).

O/D MAIN SWITCH CIRCUIT

CIRCUIT DESCRIPTION

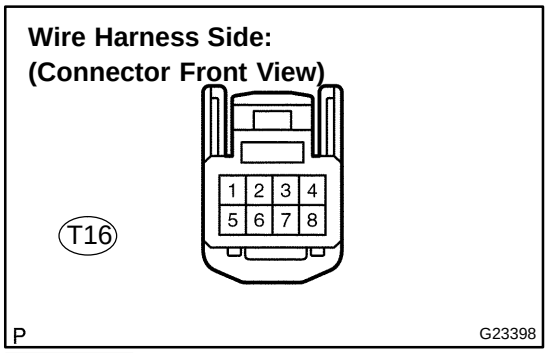
The O/D main switch (transmission control switch) is a momentary type switch. When pressing the O/D main switch, the O/D OFF indicator light lights up and the ECM prohibits shifting into O/D, and when pressing it once again, the O/D OFF indicator light goes off and the ECM allows shifting into O/D. Turning the IG switch OFF will reset the O/D OFF indicator light.

WIRING DIAGRAM



INSPECTION PROCEDURE

1 CHECK HARNESS AND CONNECTOR(TRANSMISSION CONTROL SWITCH-BODY GROUND)



(a) Disconnect the transmission control switch connector.
(b) Measure the resistance according to the value(s) in the table below.

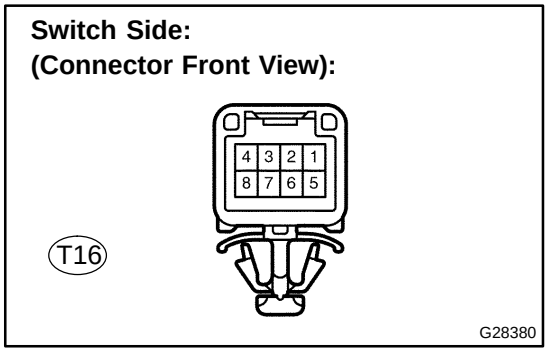
Standard:

Tester Connection	Specified Condition
6 - Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (SEE PAGE 01-36)**

OK

2 INSPECT TRANSMISSION CONTROL SWITCH



(a) Measure the resistance according to the value(s) in the table below.

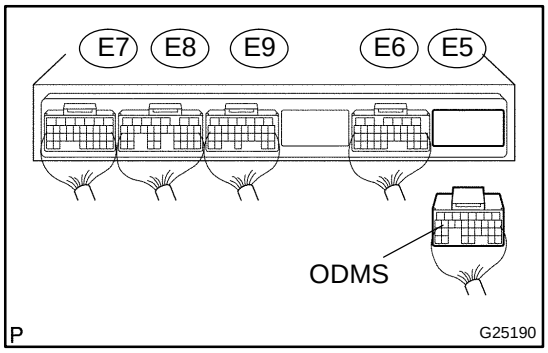
Standard:

Switch Condition	Tester Connection	Specified Condition
Press continuously transmission control switch	2 - 6	Below 1 Ω
Release transmission control switch	↑	10 kΩ or higher

NG → **REPLACE TRANSMISSION CONTROL SWITCH (SEE PAGE 40-61)**

OK

3 CHECK HARNESS AND CONNECTOR(TRANSMISSION CONTROL SWITCH-ECM)



(a) Connect the transmission control switch connector.
(b) Disconnect the ECM connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard:

Switch Condition	Tester Connection	Specified Condition
Press continuously transmission control switch	E5 - 16 (ODMS) - Body ground	Below 1 Ω
Release transmission control switch	↑	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (SEE PAGE 01-36)**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-1016)

DTC	P0705	TRANSMISSION RANGE SENSOR CIRCUIT MALFUNCTION (PRNDL INPUT)

CIRCUIT DESCRIPTION

The park/neutral position switch detects the shift lever position and sends signals to the ECM.

DTC No.	DTC Detection Condition	Trouble Area
P0705	(A) Any 2 or more signals of the following are ON simultaneously (2-trip detection logic) ・P input signal is ON. ・N input signal is ON. ・R input signal is ON. ・D input signal is ON. ・3 input signal is ON. ・2 input signal is ON. (B) Any 2 or more signals of the following are ON simultaneously (2-trip detection logic) ・NSW input signal is ON. ・R input signal is ON. ・D input signal is ON. ・3 input signal is ON. ・2 input signal is ON.	・Open or short in park/neutral position switch circuit ・Park/neutral position switch ・ECM

MONITOR DESCRIPTION

The park/neutral position switch detects the shift lever position and sends a signal to the ECM.
For security, the park/neutral position switch detects the shift lever position so that engine can be started only when the vehicle is in P or N shift position.
When the park/neutral position switch sends more than one signal at a time from switch positions P, R, N or D, the ECM interprets this as a fault in the switch. The ECM will turn on the MIL and store the DTC.

MONITOR STRATEGY

Related DTCs	P0705: Park/neutral position switch/Verify switch input
Required sensors/Components	Park/neutral position switch
Frequency of operation	Continuous
Duration	2 sec.
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

Condition (A)

The monitor will run whenever this DTC is not present.	See page 05-1007
Ignition switch	ON
Battery voltage	10.5 V or more

Condition (B)

The monitor will run whenever this DTC is not present.	See page 05-1007
Ignition switch	ON
Battery voltage	10.5 V or more

TYPICAL MALFUNCTION THRESHOLDS

One of the following conditions is met: Condition (A) or (B)

Condition (A)

Number of the following signal input at the same time	2 or more
P switch	ON
R switch	ON
N switch	ON
D switch	ON
3 switch	ON
2 switch	ON

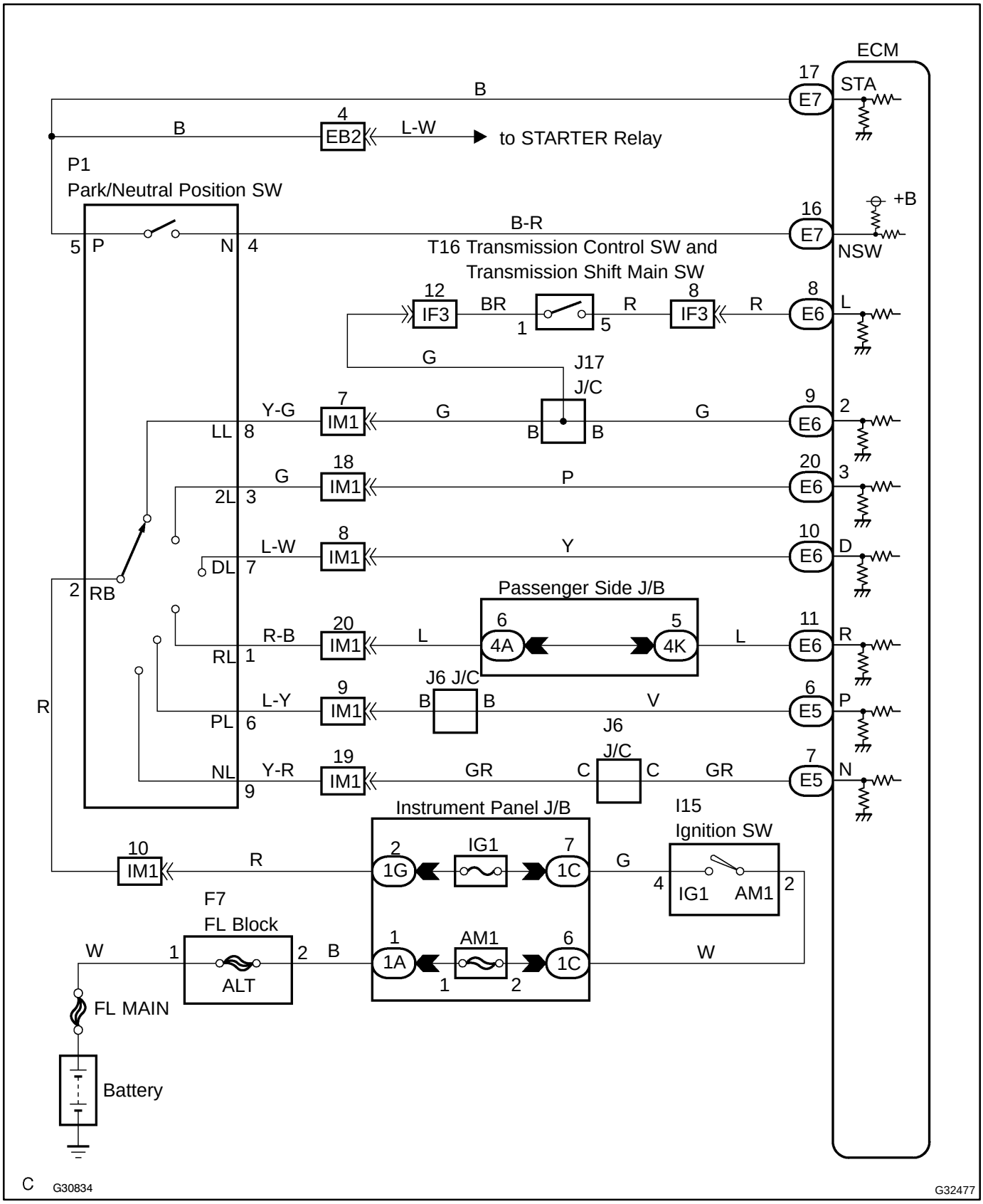
Condition (B)

Number of the following signal input at the same time	2 or more
NSW switch	ON
R switch	ON
D switch	ON
3 switch	ON
2 switch	ON

COMPONENT OPERATING RANGE

Park/neutral Position switch	The park/neutral position switch sends only one signal to the ECM.

WIRING DIAGRAM



INSPECTION PROCEDURE

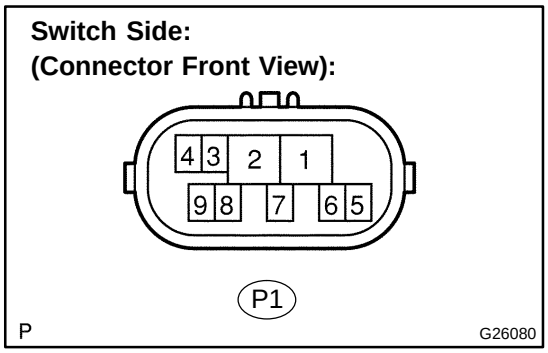
HINT:

According to the DATA LIST displayed by the OBD II scan tool or hand-held tester, you can read the value of the switch, sensor, actuator and so on without parts removal. Reading the DATA LIST as the first step of troubleshooting is one method to shorten labor time.

(a) Turn the ignition switch off.
(b) Connect the OBD II scan tool or hand-held tester to the DLC3.
(c) Turn the ignition switch to the ON position.
(d) Push the ”ON” button of the OBD II scan tool or the hand-held tester.
(e) When you use hand-held tester:
Select the item ”DIAGNOSIS/ENHANCED OBD II/DATA LIST”.
(f) According to the display on tester, read the ”DATA LIST”.

Item	Measurement Item/ Range (display)	Normal Condition	Diagnostic Note
PNP SW [NSW]	PNP SW Status/ ON or OFF	Shift lever position is; P and N: ON Except P and N: OFF	When the shift lever position displayed on the hand-held tester differs from the actual position, adjustment of the PNP switch or the shift cable may be incorrect.
LOW	PNP SW Status/ ON or OFF	Shift lever position is; L: ON Except L: OFF	↑
2ND	PNP SW Status/ ON or OFF	Shift lever position is; 2 and L: ON Except 2 and L: OFF	↑
REVERSE	PNP SW Status/ ON or OFF	Shift lever position is; R: ON Except R: OFF	↑
DRIVE	PNP SW Status/ ON or OFF	Shift lever position is; D: ON Except D: OFF	↑

1 INSPECT PARK/NEUTRAL POSITION SWITCH ASSY



(a) Disconnect the park/neutral position switch connector.
(b) Measure resistance according to the value(s) in the table below when the shift lever is moved to each position.

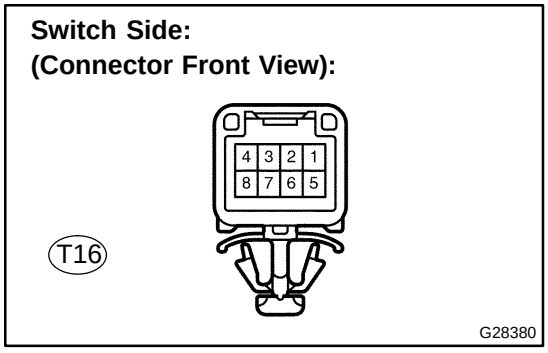
Standard:

Shift Position	Tester Connection	Specified Condition
P	2 - 6 and 4 - 5	Below 1 Ω
Except P	↑	10 kΩ or higher
R	2 - 1	Below 1 Ω
Except R	↑	10 kΩ or higher
N	2 - 9 and 4 - 5	Below 1 Ω
Except N	↑	10 kΩ or higher
D	2 - 7	Below 1 Ω
Except D	↑	10 kΩ or higher
3	2 - 3	Below 1 Ω
Except 3	↑	10 kΩ or higher
2 and L	2 - 8	Below 1 Ω
Except 2 and L	↑	10 kΩ or higher

NG → **REPLACE PARK/NEUTRAL POSITION SWITCH ASSY (SEE PAGE 40-7)**

OK

2 INSPECT TRANSMISSION SHIFT MAIN SWITCH



(a) Connect the park/neutral position switch connector.
(b) Disconnect the transmission control switch connector of shift lever assy.
(c) Measure resistance according to the value(s) in the table below when the shift lever is moved to each position.

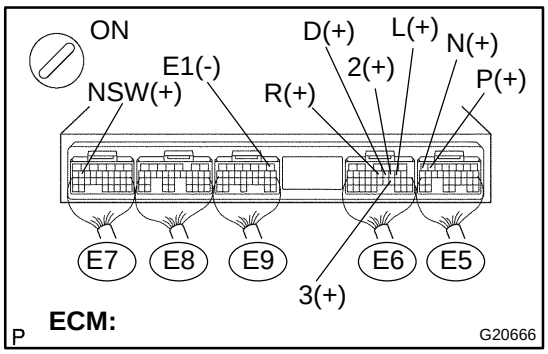
Standard:

Shift Position	Tester Connection	Specified Condition
2	1 - 5	10 kΩ or higher
L	↑	Below 1 Ω

NG → **REPLACE TRANSMISSION SHIFT MAIN SWITCH (SEE PAGE 40-61)**

OK

3	CHECK HARNESS AND CONNECTOR(PARK/NEUTRAL POSITION SWITCH - ECM)



(a) Connect the transmission control switch connector of shift lock control unit assy.

(b) Turn the ignition switch to the ON position, and measure the voltage according to the value(s) in the table below when the shift lever is moved to each position.

Standard:

Shift Position	Tester connection	Specified condition
P and N	E7 - 16 (NSW) - Body ground	Below 1 V
Except P and N	↑	10 to 14 V
P	E5 - 6 (P) - Body ground	10 to 14 V
Except P	↑	Below 1 V
N	E5 - 7 (N) - Body ground	10 to 14 V
Except N	↑	Below 1 V
R	E6 - 11 (R) - Body ground	10 to 14 V*
Except R	↑	Below 1 V
D	E6 - 10 (D) - Body ground	10 to 14 V
Except D	↑	Below 1 V
3	E6 - 20 (3) - Body ground	10 to 14 V
Except 3	↑	Below 1 V
2 and L	E6 - 9 (2) - Body ground	10 to 14 V
Except 2 and L	↑	Below 1 V
L	E6 - 8 (L) - Body ground	10 to 14 V
Except L	↑	Below 1 V

HINT:

*: The voltage will drop slightly due to lighting up of the back up light.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (SEE PAGE 01-36)**

OK

REPLACE ECM (SEE PAGE 10-24)

DTC	P0710	TRANSMISSION FLUID TEMPERATURE SENSOR ”A” CIRCUIT

DTC	P0712	TRANSMISSION FLUID TEMPERATURE SENSOR ”A” CIRCUIT LOW INPUT

DTC	P0713	TRANSMISSION FLUID TEMPERATURE SENSOR ”A” CIRCUIT HIGH INPUT

CIRCUIT DESCRIPTION

The ATF (Automatic Transmission Fluid) temperature sensor converts the fluid temperature into a resistance value which is input into the ECM.
The ECM applies a voltage to the temperature sensor through ECM terminal THO1.
The sensor resistance changes with the transmission fluid temperature. As the temperature becomes higher, the sensor resistance decreases.
One terminal of the sensor is grounded so that the sensor resistance decreases and the voltage goes down as the temperature becomes higher.
The ECM calculates the fluid temperature based on the voltage signal.

DTC No.	DTC Detection Condition	Trouble Area
P0710	(a) and (b) is detected momentary within 0.5 sec. when neither P0712 or P0713 is not detected (1-trip detection logic) (a) ATF temperature sensor resistance is less than 79 Ω. (b) ATF temperature sensor resistance is more than 156 kΩ. HINT: Within 0.5 sec., the malfunction switches from (a) to (b) or from (b) to (a)	・Open or short in ATF temperature sensor circuit ・Transmission wire (ATF temperature sensor) ・ECM
P0712	ATF temperature sensor resistance is less than 79 Ω for 0.5 sec. or more (1-trip detection logic)	・Short in ATF temperature sensor circuit ・Transmission wire (ATF temperature sensor) ・ECM
P0713	ATF temperature sensor resistance is more than 156 kΩ when 15 minutes or more after the engine start DTC is detected for 0.5 sec. or more (1-trip detection logic)	・Open in ATF temperature sensor circuit ・Transmission wire (ATF temperature sensor) ・ECM

MONITOR DESCRIPTION

The automatic transmission fluid (ATF) temperature sensor converts ATF temperature to an electrical resistance value. Based on the resistance, the ECM determines the ATF temperature, and the ECM detects an opens or shorts in the ATF temperature circuit. If the resistance value of the ATF temperature is less than 79 Ω*1 or more than 156 kΩ*2, the ECM interprets this as a fault in the ATF sensor or wiring. The ECM will turn on the MIL and store the DTC.
*1: 150°C (302°F) or more is indicated regardless of the actual ATF temperature.
*2: -40°C (-40°F) is indicated regardless of the actual ATF temperature.
HINT:
The ATF temperature can be checked on the OBD II scan tool or hand-held tester display.

MONITOR STRATEGY

Related DTCs	P0710: ATF temperature sensor/Range check (Fluttering) P0712: ATF temperature sensor/Range check (Low resistance) P0713: ATF temperature sensor/Range check (High resistance)
Required sensors/Components	ATF temperature sensor (TFT sensor)
Frequency of operation	Continuous
Duration	0.5 sec.
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

P0710: Range check (Fluttering)

P0712: Range check (Low resistance)

The monitor will run whenever these DTCs are not present.	See page 05-1007
The typical enabling condition is not available.	-

P0713: Range check (High resistance)

The monitor will run whenever this DTC is not present.	See page 05-1007
Time after engine start	15 min. or more

TYPICAL MALFUNCTION THRESHOLDS

P0710: Range check (Fluttering)

TFT (transmission fluid temperature) sensor	Less than 79 Ω or More than 156 kΩ

P0712: Range check (Low resistance)

TFT (transmission fluid temperature) sensor	Less than 79 Ω

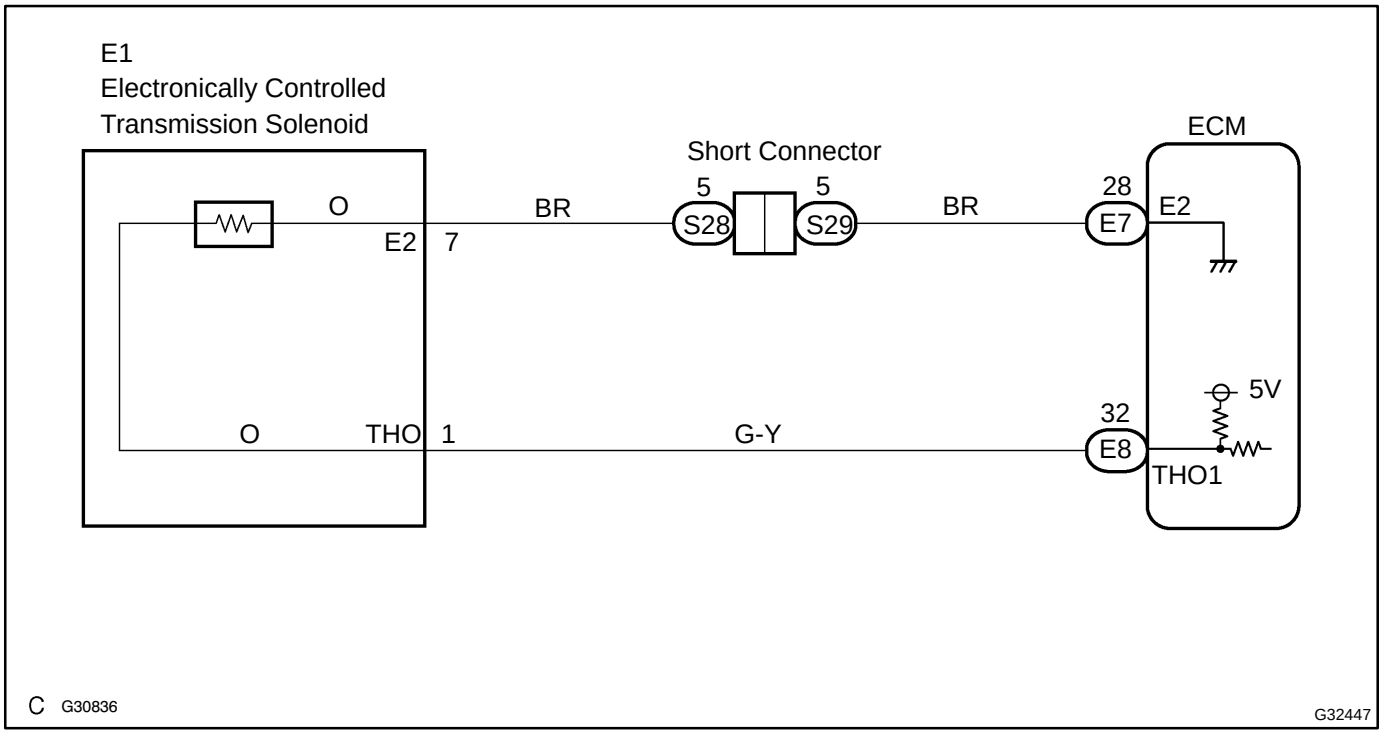
P0713: Range check (High resistance)

TFT (transmission fluid temperature) sensor	More than 156 kΩ

COMPONENT OPERATING RANGE

TFT (transmission fluid temperature)	Atmospheric temperature - approx. 130°C (266°F)

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
According to the DATA LIST displayed by the OBD II scan tool or hand-held tester, you can read the value of the switch, sensor, actuator and so on without parts removal. Reading the DATA LIST as the first step of troubleshooting is one method to shorten labor time.

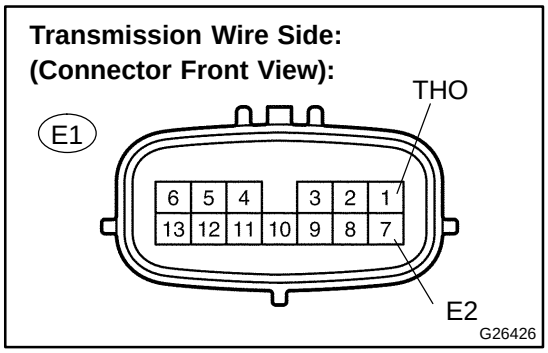
(a) Warm up the engine.
(b) Turn the ignition switch off.
(c) Connect the OBD II scan tool or hand-held tester to the DLC3.
(d) Turn the ignition switch to the ON position.
(e) Push the ”ON” button of the OBD II scan tool or the hand-held tester.
(f) When you use hand-held tester:
Select the item ”DIAGNOSIS/ENHANCED OBD II/DATA LIST”.
(g) According to the display on tester, read the ”DATA LIST”.

Item	Measurement Item/ Range (display)	Normal Condition
AT FLUID TEMP	ATF Temp. Sensor Value/ min.: -40°C (-40°F) max.: 215°C (419°F)	Approx. 80°C (176°F) (After Stall Test)

HINT:
When DTC P0712 is output and OBD II scan tool or hand-held tester output is 150°C (302°F), there is a short circuit.
When DTC P0713 is output and OBD II scan tool or hand-held tester output is -40°C (-40°F), there is an open circuit.
Measure the resistance between terminal THO1 (THO) and body ground.

Temperature Displayed	Malfunction
-40 °C (-40 °F)	Open circuit
150 °C (302 °F) or more	Short circuit

1 INSPECT TRANSMISSION WIRE(ATF TEMPERATURE SENSOR)



(a) Disconnect the transmission wire connector from the transaxle.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition
1 (THO) - 7 (E2)	79 Ω to 156 kΩ

(c) Measure the resistance according to the value(s) in the table below.

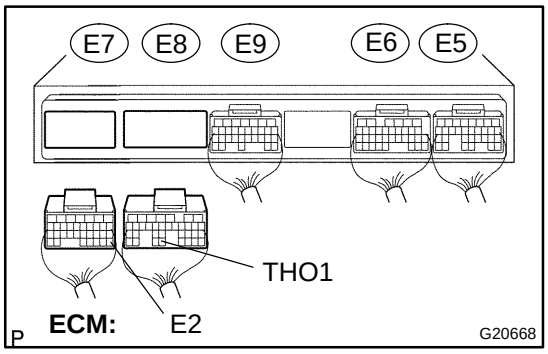
Standard (Check for short):

Tester Connection	Specified Condition
1 (THO) - Body ground	10 kΩ or higher
7 (E2) - Body ground	↑

NG → **REPAIR OR REPLACE TRANSMISSION WIRE (SEE PAGE 40-37)**

OK

2 CHECK HARNESS AND CONNECTOR(TRANSMISSION WIRE - ECM)



(a) Connect the transmission wire connector to the transaxle.

(b) Disconnect the ECM connectors.

(c) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition
E8 - 32 (THO1) - E7 - 28 (E2)	79 Ω to 156 kΩ

(d) Measure the resistance according to the value(s) in the table below.

Standard (Check for short):

Tester Connection	Specified Condition
E8 - 32 (THO1) - Body ground	10 kΩ or higher
E7 - 28 (E2) - Body ground	↑

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (SEE PAGE 01-36)**

OK

REPLACE ECM (SEE PAGE 10-24)

DTC	P0711	TRANSMISSION FLUID TEMPERATURE SENSOR "A" PERFORMANCE

CIRCUIT DESCRIPTION

The ATF (Automatic Transmission Fluid) temperature sensor converts the fluid temperature into a resistance value which is input into the ECM.

DTC No.	DTC Detection Condition	Trouble Area
P0711	Both (a) and (b) are detected: (2-trip detection logic) (a) Intake air and engine coolant temperatures are more than -10°C (14°F) at engine start (b) After normal driving for over 19 min. and 9 km (6 mile) or more, ATF temp. is less than 10°C (50°F)	・Open or short in ATF temperature sensor circuit ・Transmission wire (ATF temperature sensor) ・ECM

MONITOR DESCRIPTION

The ATF temperature sensor converts the ATF temperature to an electrical resistance value. Based on the resistance, the ECM determines the ATF temperature and detects an opens or shorts in the ATF temperature circuit or a fault of the ATF temperature sensor.

After running the vehicle for a certain period, the ATF temperature should increase. If the ATF temperature is below 10°C (50°F) after running the vehicle for a certain period, the ECM interprets this as a fault, and turns on the MIL.

MONITOR STRATEGY

Related DTCs	P0711: ATF temperature sensor/Rationality check
Required sensors/Components	ATF temperature sensor (TFT sensor)
Frequency of operation	Continuous
Duration	3 sec.
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever this DTC is not present.	See page 05-1007
Time after engine start	16 min. and 40 sec. or more
ECT (Engine coolant temperature)	-15°C (5°F) or more
TFT (transmission fluid temperature) sensor circuit	Not circuit malfunction
ECT sensor circuit	Not circuit malfunction
IAT (Intake air temperature) sensor circuit	Not circuit malfunction
Time after engine start	18 min. and 20 sec.
Driving distance after engine start	9 km (5.6 mile) or more
IAT (12 sec. after starting engine)	-10°C (14°F) or more
ECT (12 sec. after starting engine)	-10°C (14°F) or more

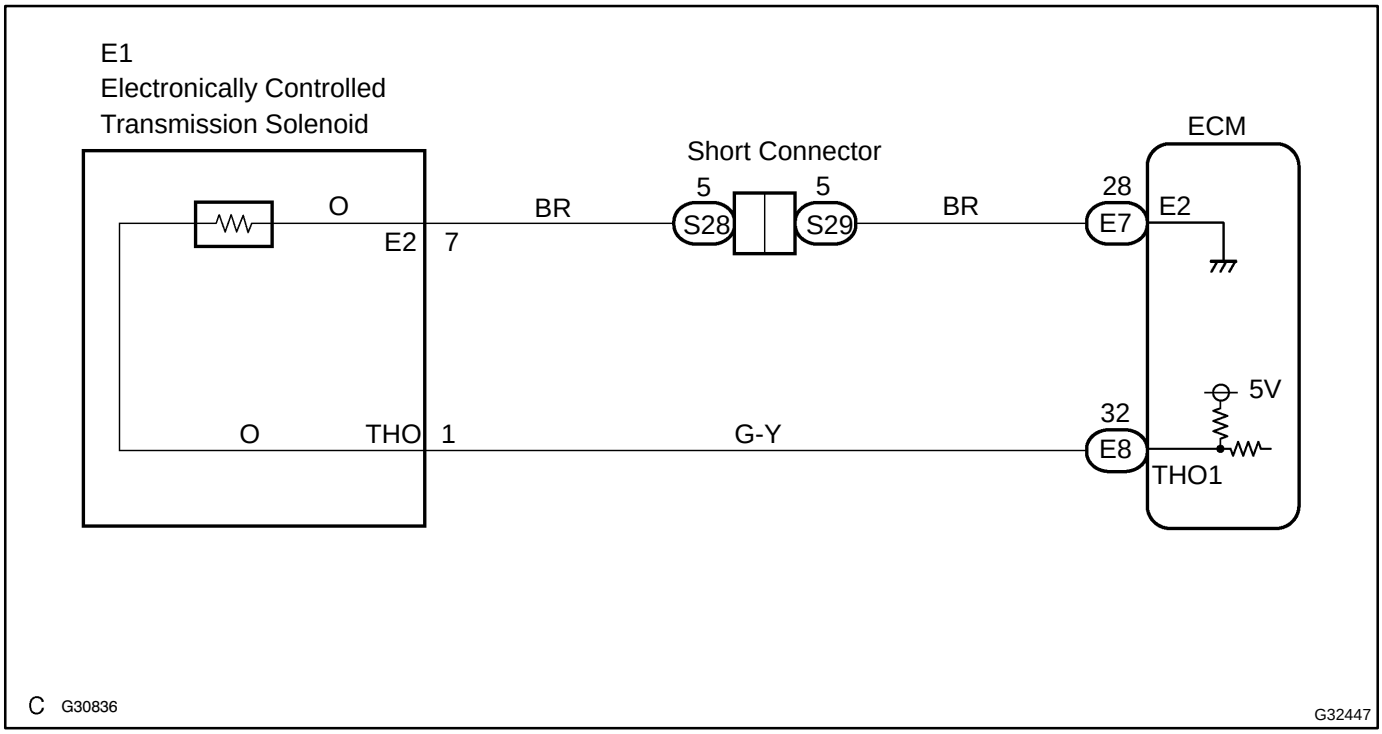
TYPICAL MALFUNCTION THRESHOLDS

TFT (transmission fluid temperature)	Less than 10°C (50°F)

COMPONENT OPERATING RANGE

TFT (transmission fluid temperature)	Atmospheric temperature to approx. 130°C (266°F)

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
According to the DATA LIST displayed by the OBD II scan tool or hand-held tester, you can read the value of the switch, sensor, actuator and so on without parts removal. Reading the DATA LIST as the first step of troubleshooting is one method to shorten labor time.

(a) Warm up the engine.
(b) Turn the ignition switch off.
(c) Connect the OBD II scan tool or hand-held tester to the DLC3.
(d) Turn the ignition switch to the ON position.
(e) Push the ”ON” button of the OBD II scan tool or the hand-held tester.
(f) When you use hand-held tester:
Select the item ”DIAGNOSIS/ENHANCED OBD II/DATA LIST”.
(g) According to the display on tester, read the ”DATA LIST”.

Item	Measurement Item/ Range (display)	Normal Condition
AT FLUID TEMP	ATF Temp. Sensor Value/ min.: -40°C (-40°F) max.: 215°C (419°F)	Approx. 80°C (176°F) (After Stall Test)

HINT:
When DTC P0712 is output and OBD II scan tool or hand-held tester output is 150°C (302°F), there is a short circuit.
When DTC P0713 is output and OBD II scan tool or hand-held tester output is -40°C (-40°F), there is an open circuit.
Measure the resistance between terminal THO1 (THO) and body ground.

Temperature Displayed	Malfunction
-40 °C (-40 °F)	Open circuit
150°C (302°F) or more	Short circuit

HINT:
If a circuit related to the ATF temperature sensor becomes open, P0713 is immediately set (in 0.5 second). When P0713 is set, P0711 cannot be detected.
It is not necessary to inspect the circuit when P0711 is set.

1	CHECK OTHER DTCS OUTPUT(IN ADDITION TO DTC P0711)

(a) Connect the OBD II scan tool or the hand-held tester to the DLC3.
(b) Turn the ignition switch to the ON position and push the OBD II scan tool or the hand-held tester main switch ON.
(c) When you use hand-held tester:
Select the item ”DIAGNOSIS/ENHANCED OBD II/DTC INFO/CURRENT CODES”.
(d) Read the DTCs using the OBD II scan tool or the hand-held tester.

Result:

Display (DTC output)	Proceed to
Only ”P0711” is output	A
”P0711” and other DTCs	B

HINT:
If any other codes besides ”P0711” is output, perform the troubleshooting for those DTCs first.

B → **GO TO RELEVANT DTC CHART (SEE PAGE 05-1034)**

A

2	CHECK TRANSAXLE FLUID LEVEL (SEE PAGE 40-2)

OK:
Automatic transaxle fluid level is correct.

NG → **ADD FLUID**

OK

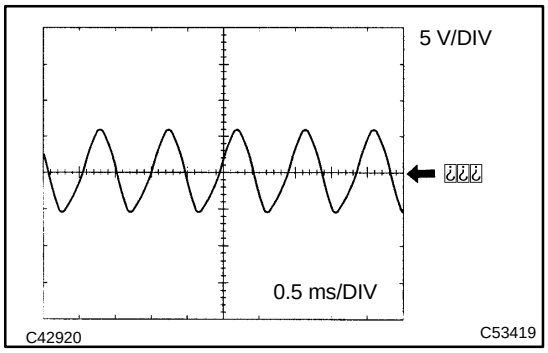
REPLACE TRANSMISSION WIRE (SEE PAGE 40-37)

DTC	P0717	TURBINE SPEED SENSOR CIRCUIT NO SIGNAL

CIRCUIT DESCRIPTION

This sensor detects the rotation speed of the input turbine. By comparing the input turbine speed signal (NT) with the counter gear speed sensor signal (NC), the ECM detects the shift timing of the gears and appropriately controls the engine torque and hydraulic pressure according to various conditions. Thus, providing smooth gear shift.

DTC No.	DTC Detection Condition	Trouble Area
P0717	ECM detects conditions (a), (b) and (c) continuity for 5 sec. or more: (1-trip detection logic) (a) Vehicle speed: 50 km/h (31 mph) or more (b) Park/neutral position switch (NSW and R) is OFF (c) Speed sensor (NT): less than 300 rpm	・Open or short in transmission revolution sensor NT (speed sensor NT) circuit ・Transmission revolution sensor NT (speed sensor NT) ・ECM ・Automatic transaxle assembly



Reference (Using an oscilloscope):

Check the waveform between the terminals NT+ and NT- of the ECM connector.

Standard: Refer to the illustration.

Terminal	NT+ - NT-
Tool setting	5V/DIV, 0.5ms/DIV
Vehicle condition	Vehicle speed 20 km/h (12 mph)

MONITOR DESCRIPTION

The NT terminal of the ECM detects a revolution signal from the speed sensor (NT) (input RPM). The ECM calculates a gearshift comparing the speed sensor (NT) with the speed sensor (NC).

While the vehicle is operating in 2nd, 3rd, 4th or 5th gear in the shift position of D, if the input shaft revolution is less than 300 rpm*1 although the output shaft revolution is more than 1,000 rpm*2, the ECM detects the trouble, illuminates the MIL and stores the DTC.

*1: Pulse is not output or is irregularly output.

*2: The vehicle speed is 50 km/h (31 mph) or more.

MONITOR STRATEGY

Related DTCs	P0717: Speed sensor (NT)/Verify pulse input
Required sensors/Components	Speed sensor (NT), Speed sensor (NC)
Frequency of operation	Continuous
Duration	5 sec.
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever this DTC is not present.	See page 05-1007
Shift change	Shift change is completed and before starting next shift change operation
ECM selected gear	2nd, 3rd, 4th or 5th
Output shaft rpm	1,000 rpm or more
NSW switch	OFF
R switch	OFF
L switch	OFF
Engine	Running
Ignition switch	ON
Starter	OFF

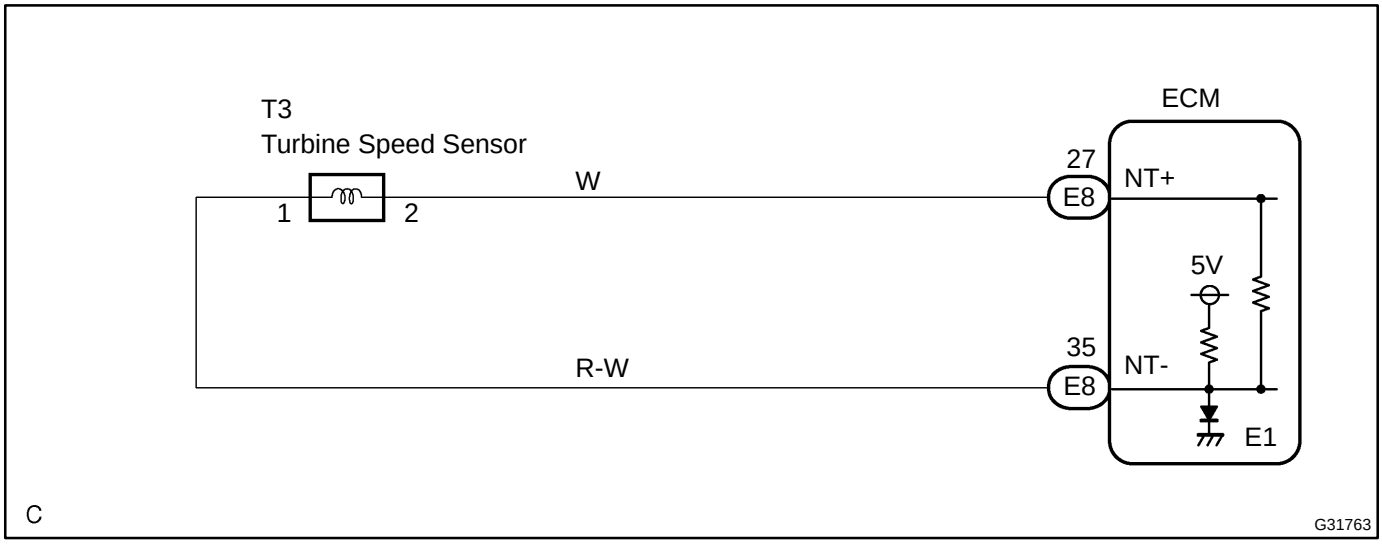
TYPICAL MALFUNCTION THRESHOLDS

Sensor signal rpm	Less than 300 rpm

COMPONENT OPERATING RANGE

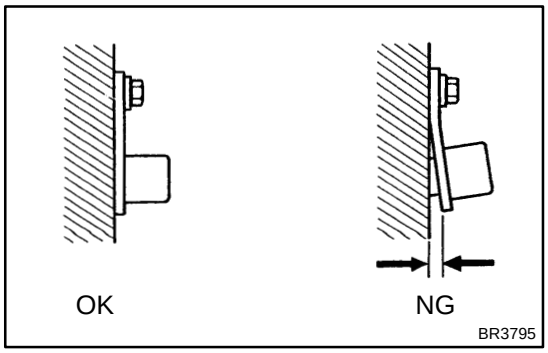
Speed sensor (NT)	Turbine speed is equal to engine speed when lock-up ON

WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT SPEED SENSOR INSTALLATION



(a) Check the speed sensor installation.

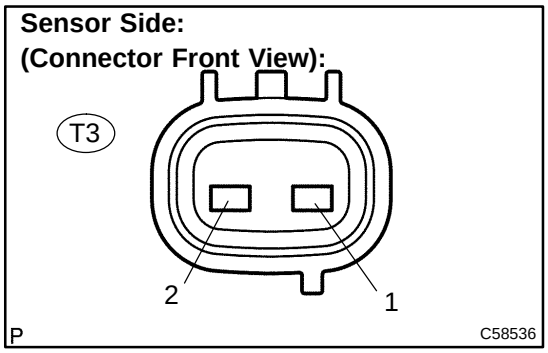
OK:

The installation bolt is tightened properly and there is no clearance between the sensor and transaxle case.

NG → **REPLACE SPEED SENSOR(NT)**

OK

2 INSPECT SPEED SENSOR(NT)



(a) Disconnect the speed sensor connector from the transaxle.

(b) Measure the resistance according to the value(s) in the table below.

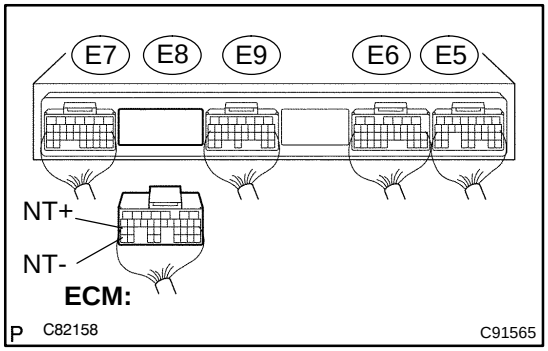
Standard:

Tester Connection	Specified Condition 20 ℃ (68 ℉)
1 - 2	560 to 680 Ω

NG → **REPLACE SPEED SENSOR(NT)**

OK

3 CHECK HARNESS AND CONNECTOR(SPEED SENSOR - ECM)



(a) Connect the speed sensor connector.

(b) Disconnect the ECM connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition 20℃ (68℉)
E8 - 27 (NT+) - E8 - 35 (NT-)	560 to 680 Ω

(d) Measure the resistance according to the value(s) in the table below.

Standard (Check for short):

Tester Connection	Specified Condition
E8 - 27 (NT+) - Body ground	10 kΩ or higher
E8 - 35 (NT-) - Body ground	↑

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (SEE PAGE 01-36)**

OK

REPLACE ECM (SEE PAGE 10-24)

DTC P0724 BRAKE SWITCH ”B” CIRCUIT HIGH

CIRCUIT DESCRIPTION

The purpose of this circuit is to prevent the engine from stalling while driving in lock-up condition, when brakes are suddenly applied.
When the brake pedal is depressed, this switch sends a signals to the ECM. Then the ECM cancels the operation of the lock-up clutch while braking is in progress.

DTC No.	DTC Detecting Condition	Trouble Area
P0724	The stop light switch remains ON even when the vehicle is driven in a GO (30 km/h) and STOP (3 km/h) fashion 5 times. (2-trip detection logic).	›¦Short in stop light switch signal circuit ›¦Stop light switch ›¦ECM

MONITOR DESCRIPTION

This DTC indicates that the stop light switch remains on. When the stop light switch remains ON during ”stop and go” driving, the ECM interprets this as a fault in the stop light switch and the MIL comes on and the ECM stores the DTC. The vehicle must stop (less than 3 km/h (2 mph)) and go (30 km/h (19 mph) or more) 5 times for two driving cycles in order to detect malfunction.

MONITOR STRATEGY

Related DTCs	P0724: Stop light switch/Rationality
Required sensors/Components	Stop light switch, Vehicle speed sensor
Frequency of operation	Continuous
Duration	GO and STOP 5 times
MIL operation	2 driving cycles
Sequence of operation	None

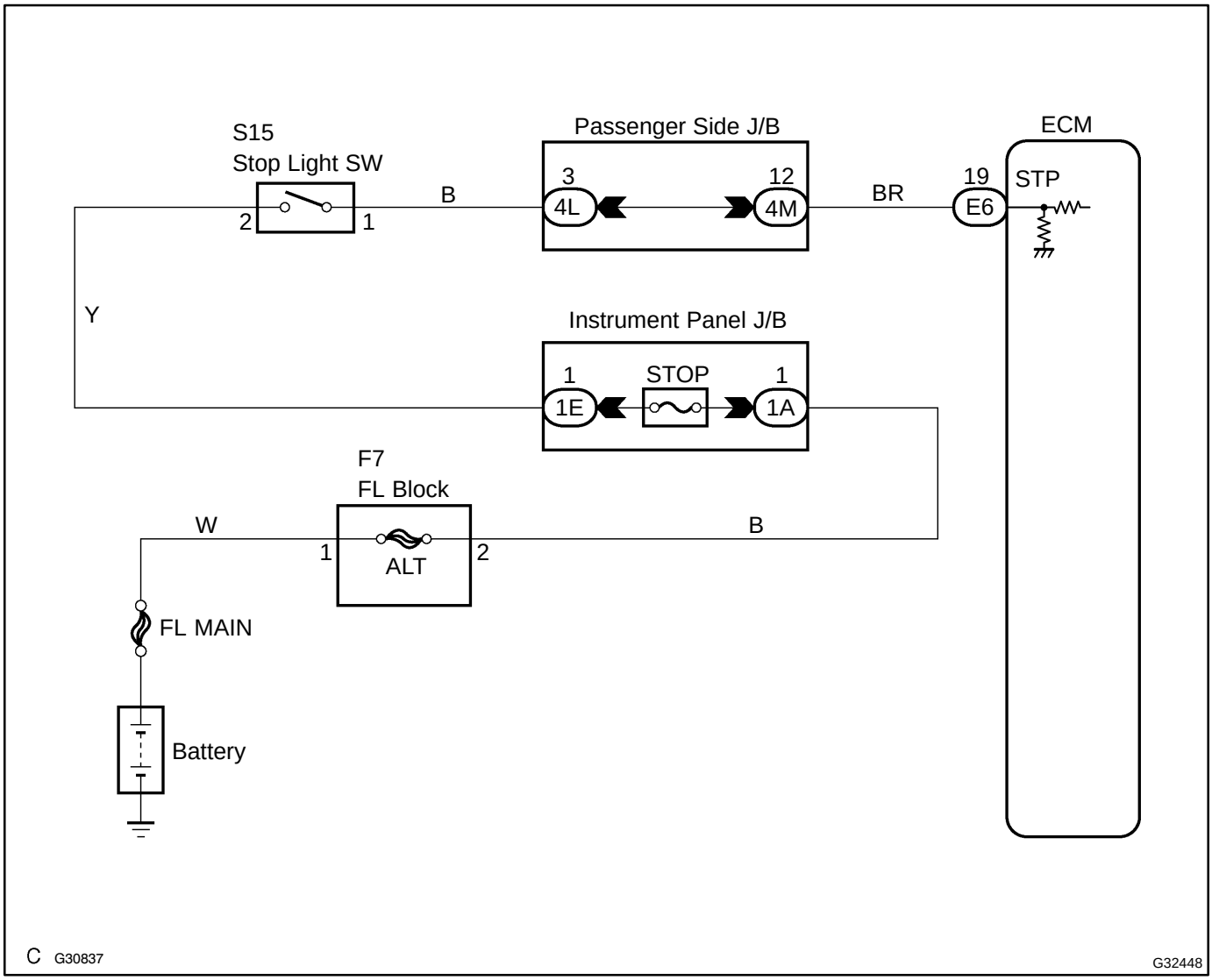
TYPICAL ENABLING CONDITIONS

The monitor will run whenever this DTC is not present.	See page 05-1007
Battery voltage	8 V or more
Ignition switch	ON
Starter	OFF
GO (Vehicle speed is 30 km/h (18.63 mph) or more)	Once
STOP (Vehicle speed is less than 3 km/h (1.86 mph))	Once

TYPICAL MALFUNCTION THRESHOLDS

Brake switch	Remain ON during GO and STOP 5 times

WIRING DIAGRAM



INSPECTION PROCEDURE

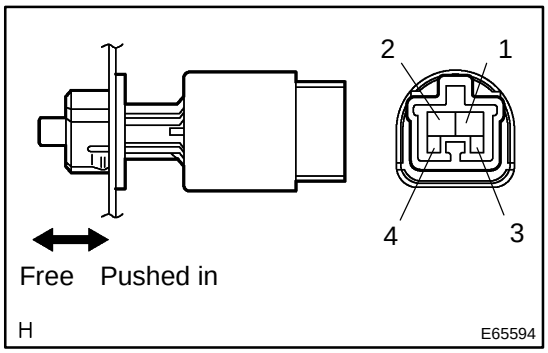
HINT:

According to the DATA LIST displayed by the OBD II scan tool or hand-held tester, you can read the value of the switch, sensor, actuator and so on without parts removal. Reading the DATA LIST as the first step of troubleshooting is one method to shorten labor time.

(a) Turn the ignition switch off.
(b) Connect the OBD II scan tool or hand-held tester to the DLC3.
(c) Turn the ignition switch to the ON position.
(d) Push the "ON" button of the OBD II scan tool or the hand-held tester.
(e) When you use hand-held tester:
Select the item "DIAGNOSIS/ENHANCED OBD II/DATA LIST".
(f) According to the display on tester, read the "DATA LIST".

Item	Measurement Item/ Range (display)	Normal Condition
STOP LIGHT SW	Stop light SW Status/ ON or OFF	・Brake Pedal is depressed: ON ・Brake Pedal is released: OFF

1 INSPECT STOP LAMP SWITCH ASSY



(a) Remove the stop lamp switch assy.
(b) Measure the resistance according to the value(s) in the table below.

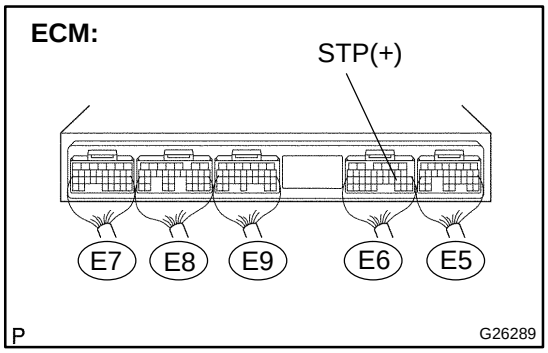
Standard:

Switch position	Tester Connection	Specified Condition
Switch pin free	1 - 2	10 kΩ or higher
Switch pin pushed in	↑	Below 1 Ω
Switch pin free	3 - 4	Below 1 Ω
Switch pin pushed in	↑	10 kΩ or higher

NG → **REPLACE STOP LAMP SWITCH ASSY**

OK

2 CHECK HARNESS AND CONNECTOR(STOP LAMP SWITCH ASSY - ECM)



(a) Install the stop lamp switch assy.

(b) Measure the voltage according to the value(s) in the table below when the brake pedal is depressed and released.

Standard:

Condition	Tester Connection	Specified Condition
Brake pedal is depressed	E6 - 19 (STP) - Body ground	10 to 14 V
Brake pedal is released	↑	Below 1 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (SEE PAGE 01-36)**

OK

REPLACE ECM (SEE PAGE 10-24)

DTC	P0741	TORQUE CONVERTER CLUTCH SOLENOID PERFORMANCE (SHIFT SOLENOID VALVE DSL)

SYSTEM DESCRIPTION

The ECM uses the signals from the throttle position sensor, Air-flow meter, turbine (input) speed sensor, intermediate (counter) shaft speed sensor and crankshaft position sensor to monitor the engagement condition of the lock-up clutch.

Then the ECM compares the engagement condition of the lock-up clutch with the lock-up schedule in the ECM memory to detect a mechanical problems of the shift solenoid valve DSL, valve body and torque converter clutch.

DTC No.	DTC Detection Condition	Trouble Area
P0741	Lock-up does not occur when driving in lock-up range or lock-up remains ON in lock-up OFF range (2-trip detection logic)	・Shift solenoid valve DSL remains open or closed ・Valve body is blocked ・Shift solenoid valve DSL ・Torque converter clutch ・Automatic transaxle (clutch, brake or gear etc.) ・Line pressure is too low ・ECM

MONITOR DESCRIPTION

Torque converter lock-up is controlled by the ECM based on speed sensor (NT), speed sensor (NC), engine rpm, engine load, engine temperature, vehicle speed, transmission temperature, and gear selection. The ECM determines the lock-up status of the torque converter by comparing the engine rpm (NE) to the input turbine rpm (NT). The ECM calculates the actual transmission gear by comparing input turbine rpm (NT) to counter gear rpm (NC). When conditions are appropriate, the ECM requests ”lock-up” by applying control voltage to shift solenoid DSL. When the DSL is turned on, solenoid DSL applies pressure to the lock-up relay valve and locks the torque converter clutch.

If the ECM detects no lock-up after lock-up has been requested or if it detects lock-up when it is not requested, the ECM interprets this as a fault in the shift solenoid valve DSL or lock-up system performance. The ECM will turn on the MIL and store the DTC.

Example:

When any of the following is met, the system judges it as a malfunction.

(a) There is a difference in rotation between before and after torque converters even when the ECM commands lock-up.
(Engine speed is at least 75 rpm greater than input turbine speed.)

(b) There is no difference in rotation between before and after torque converters even when the ECM commands lock-up off.
(The difference between engine speed and input turbine speed is less than 35 rpm.)

MONITOR STRATEGY

Related DTCs	P0741: Shift solenoid valve DSL/OFF malfunction P0741: Shift solenoid valve DSL/ON malfunction
Required sensors/Components	Shift solenoid valve DSL, Speed sensor (NT), Speed sensor (NC),Crankshaft position sensor (NE), Throttle position sensor (VPA1), Mass air flow sensor (MAF), Transmission temperature sensor (THO1), Engine coolant temperature sensor (ECT)
Frequency of operation	Continuous
Duration	OFF malfunction 3.5 sec. ON malfunction 1.8 sec.
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

ALL:

Transmission range	”D”
ECT (Engine coolant temperature)	10°C (50°F) or more
TFT (Transmission fluid temperature)	-20 °C (-4°F) or more
TFT sensor circuit	Not circuit malfunction
ECT sensor circuit	Not circuit malfunction
Turbine speed sensor circuit	Not circuit malfunction
Intermediate shaft speed sensor circuit	Not circuit malfunction
Output speed sensor circuit	Not circuit malfunction
Shift solenoid valve SL1 circuit	Not circuit malfunction
Shift solenoid valve SL2 circuit	Not circuit malfunction
Shift solenoid valve SL3 circuit	Not circuit malfunction
Shift solenoid valve S4 circuit	Not circuit malfunction
Shift solenoid valve SR circuit	Not circuit malfunction
Shift solenoid valve DSL circuit	Not circuit malfunction

OFF malfunction

ECM lock-up command	ON
Duration time from lock-up on command	3 sec. or more
ECM selected gear	3rd, 4th or 5th
Vehicle speed	25 km/h (15.5 mph) or more

ON malfunction

ECM lock-up command	OFF
ECM selected gear	3rd, 4th or 5th
Throttle valve opening angle	10% or more
Vehicle speed	25 to 60 km/h (15.5 to 37.3 mph)

TYPICAL MALFUNCTION THRESHOLDS

Either of the following conditions is met: OFF malfunction or ON malfunction

OFF malfunction

Engine speed - Input (turbine) speed	100 rpm or more

ON malfunction

Diffierence between engine speed and input (turbine) speed	Less than 35 rpm

INSPECTION PROCEDURE

HINT:

Performing the ACTIVE TEST using the hand-held tester allows the relay, VSV, actuator and so on to operate without parts removal. Performing the ACTIVE TEST as the first step of troubleshooting is one method to shorten labor time.

It is possible to display the DATA LIST during the ACTIVE TEST.

(a) Warm up the engine.
(b) Turn the ignition switch off.
(c) Connect the hand-held tester to the DLC3.
(d) Turn the ignition switch to the ON position.
(e) Push the "ON" button of the hand-held tester.
(f) When you use hand-held tester:
Select the item "DIAGNOSIS/ENHANCED OBD II/ACTIVE TEST".
(g) According to the display on tester, perform the "ACTIVE TEST".

Item	Test Details	Diagnostic Note
LOCK UP	[Test Details] Control the shift solenoid DSL to set the automatic transaxle to the lock-up condition. [Vehicle Condition] Vehicle Speed: 60 km/h (37 mph) or more	Possible to check the DSL operation.

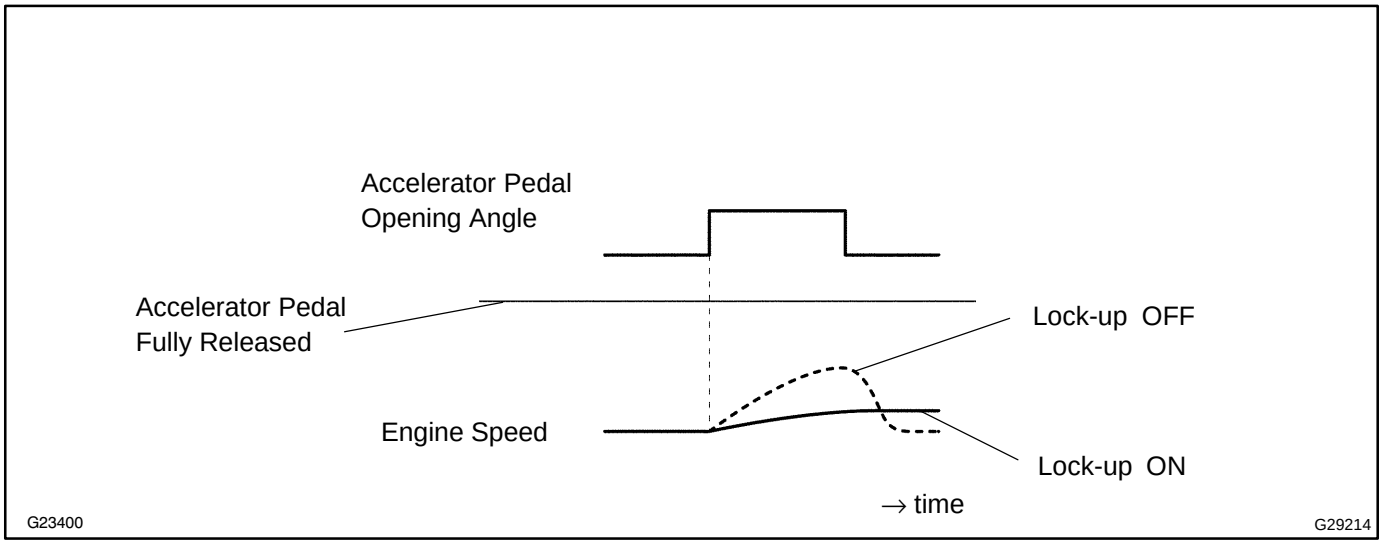
HINT:

- This test can be conducted when the vehicle speed is 60 km/h (37 mph) or more.
- This test can be conducted with the 5th gear.

(h) Lightly depress the accelerator pedal and check that the engine speed does not change abruptly.

HINT:

- When changing the accelerator pedal opening angle while driving, if the engine speed does not change, lock-up is on.
- Slowly release, but not fully, the accelerator pedal in order to decelerate. (Fully releasing the pedal will close the throttle valve and lock-up may be turned off.)



1 CHECK OTHER DTCS OUTPUT(IN ADDITION TO DTC P0741)

(a) Connect the OBD II scan tool or the hand-held tester to the DLC3.
(b) Turn the ignition switch to the ON position and push the OBD II scan tool or the hand-held tester main switch ON.
(c) When you use hand-held tester:
Select the item "DIAGNOSIS/ENHANCED OBD II/DTC INFO/CURRENT CODES".
(d) Read the DTCs using the OBD II scan tool or the hand-held tester.

Result:

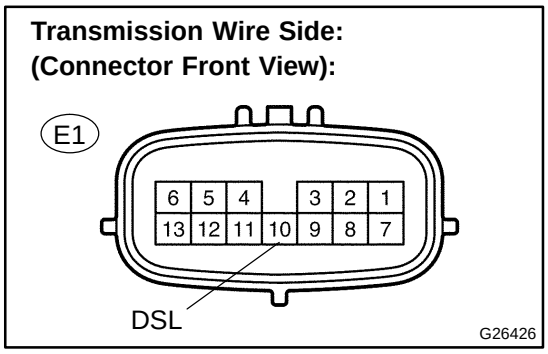
Display (DTC output)	Proceed to
Only "P0741" is output	A
"P0741" and other DTCs	B

HINT:
If any other codes besides "P0741" is output, perform the troubleshooting for those DTCs first.

B → **GO TO RELEVANT DTC CHART (SEE PAGE 05-1034)**

A

2 INSPECT TRANSMISSION WIRE(DSL)



(a) Disconnect the transmission wire connector from the transaxle.
(b) Measure the resistance according to the value(s) in the table below.

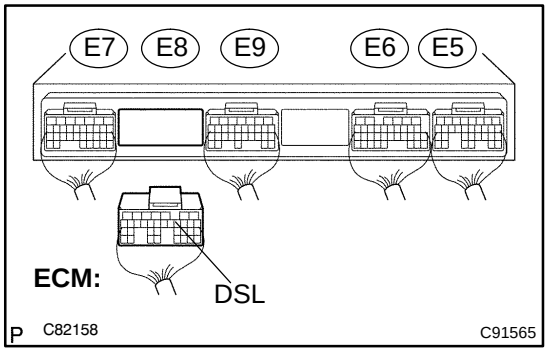
Standard:

Tester Connection	Specified Condition 20℃ (68℉)
10 - Body ground	11 to 13 Ω

NG → **Go to step 4**

OK

3 CHECK HARNESS AND CONNECTOR(TRANSMISSION WIRE - ECM)



(a) Connect the transmission wire connector.
(b) Disconnect the ECM connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard:

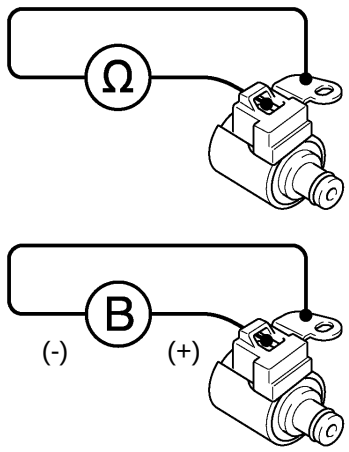
Tester Connection	Specified Condition 20℃ (68℉)
E8 - 11 (DSL) - Body ground	11 to 13 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (SEE PAGE 01-36)**

OK

4	INSPECT SHIFT SOLENOID VALVE(DSL)

Shift Solenoid Valve DSL:



(a) Remove the shift solenoid valve DSL.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition 20℃ (68℉)
Solenoid Connector (DSL) - Solenoid Body (DSL)	11 to 13 Ω

(c) Connect positive (+) lead to the terminal of solenoid connector, negative (-) lead to the solenoid body.

OK:

The solenoid valve makes an operating noise.

NG → **REPLACE SHIFT SOLENOID VALVE(DSL)**

OK

5	CHECK TRANSMISSION WIRE (SEE PAGE 01-36)

OK:

The connectors and pins are securely installed.

There is no open or short on the wire harness.

NG → **REPAIR OR REPLACE TRANSMISSION WIRE (SEE PAGE 40-37)**

OK

6	INSPECT TRANSMISSION VALVE BODY ASSY(See chapter 2 in the problem symptoms table) (SEE PAGE 05-1016)

OK:

There are no foreign objects on each valve and they operate smoothly.

NG → **REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSY (SEE PAGE 40-44)**

OK

7	INSPECT TORQUE CONVERTER CLUTCH ASSY (SEE PAGE 40-29)

OK:

The torque converter clutch operates normally.

NG → **REPLACE TORQUE CONVERTER CLUTCH ASSY**

OK

REPAIR AUTOMATIC TRANSAXLE ASSY (SEE PAGE 40-18)

DTC	P0746	PRESSURE CONTROL SOLENOID ”A” PERFORMANCE (SHIFT SOLENOID VALVE SL1)

SYSTEM DESCRIPTION

The ECM uses signals from the vehicle speed sensor to detect the actual gear position (1st, 2nd, 3rd, 4th or 5th gear).
Then the ECM compares the actual gear with the shift schedule in the ECM memory to detect mechanical problems of the shift solenoid valves and valve body.

DTC No.	DTC Detecting Condition	Trouble Area
P0746	The gear required by the ECM does not match the actual gear when driving (2-trip detection logic)	・Shift solenoid valve SL1 remains open or closed ・Valve body is blocked ・Shift solenoid valve SL1 ・Automatic transaxle (clutch, brake or gear etc.) ・ECM

MONITOR DESCRIPTION

The ECM commands gear shifts by turning the shift solenoid valves ”ON/OFF”. According to the input shaft revolution, intermediate (counter) shaft revolution and output shaft revolution, the ECM detects the actual gear position (1st, 2nd, 3rd, 4th or 5th gear position). When the gear position commanded by the ECM and the actual gear position are not same, the ECM illuminates the MIL.
Example:
When either condition (a) or (b) is met, the ECM detects a malfunction.
(a) The ECM commands the 1st gear, but the actual gear is 2nd.
(b) The ECM commands the 2nd gear, but the actual gear is 1st.

MONITOR STRATEGY

Related DTCs	P0746: Shift solenoid valve SL1/OFF malfunction Shift solenoid valve SL1/ON malfunction
Required sensors/Components	Shift solenoid valve SL1, Speed sensor (NT), Speed sensor (NC), Crankshaft position sensor (NE)
Frequency of operation	Continuous
Duration	0.8 sec.
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

ALL:

Transmission range	”D”
ECT (Engine coolant temperature)	10°C (50°F) or more
TFT (Transmission fluid temperature)	-20 °C (-4°F) or more
TFT sensor circuit	Not circuit malfunction
ECT sensor circuit	Not circuit malfunction
Turbine speed sensor circuit	Not circuit malfunction
Intermediate shaft speed sensor circuit	Not circuit malfunction
Output speed sensor circuit	Not circuit malfunction
Shift solenoid valve SL1 circuit	Not circuit malfunction
Shift solenoid valve SL2 circuit	Not circuit malfunction
Shift solenoid valve SL3 circuit	Not circuit malfunction
Shift solenoid valve S4 circuit	Not circuit malfunction
Shift solenoid valve SR circuit	Not circuit malfunction
Shift solenoid valve DSL circuit	Not circuit malfunction

OFF malfunction

ECM selected gear	1st
Vehicle speed	Less than 40 km/h (24.9 mph)
Throttle valve opening angle	4.5% or more at engine speed 1,900 rpm (Varies with engine speed)

ON malfunction

ECM selected gear	2nd
Throttle valve opening angle	4.5% or more at engine speed 1,900 rpm (Varies with engine speed)

TYPICAL MALFUNCTION THRESHOLDS

Either of the following conditions is met: OFF malfunction or ON malfunction

OFF malfunction

2 detections are necessary per driving cycle:

1st detection; temporary flag ON

2nd detection; pending fault code ON

Input (turbine) speed/Intermediate shaft speed	1.49 to 1.63

ON malfunction

Input (turbine) speed/Intermediate shaft speed	2.72 to 2.86

INSPECTION PROCEDURE

HINT:

Performing the ACTIVE TEST using the hand-held tester allows the relay, VSV, actuator and so on to operate without parts removal. Performing the ACTIVE TEST as the first step of troubleshooting is one method to shorten labor time.

It is possible to display the DATA LIST during the ACTIVE TEST.

(a) Turn the ignition switch off.
(b) Connect the hand-held tester to the DLC3.
(c) Turn the ignition switch to the ON position.
(d) Push the "ON" button of the hand-held tester.
(e) Select the item "DIAGNOSIS/ENHANCED OBD II/ACTIVE TEST/SHIFT".
(f) According to the display on tester, perform the "ACTIVE TEST".

HINT:

While driving, the shift position can be forcibly changed with the hand-held tester.

Comparing the shift position commanded by the ACTIVE TEST with the actual shift position enables you to confirm the problem (see page 05-1030).

Item	Test Details	Diagnostic Note
SHIFT	[Test Details] Operate the shift solenoid valve and set the each shift position by yourself. [Vehicle Condition] Less than 50 km/h (31 mph) [Others] *Press "→" button: Shift up *Press "←" button: Shift down	Possible to check the operation of the shift solenoid valves.

HINT:

* This test can be conducted when the vehicle speed is 50 km/h (31 mph) or less.
* The shift position commanded by the ECM is shown in the DATA LIST/SHIFT display on the hand-held tester.

1	CHECK OTHER DTCS OUTPUT(IN ADDITION TO DTC P0746)

(a) Connect the OBD II scan tool or the hand-held tester to the DLC3.
(b) Turn the ignition switch to the ON position and push the OBD II scan tool or the hand-held tester main switch ON.
(c) When you use hand-held tester:
Select the item "DIAGNOSIS/ENHANCED OBD II/DTC INFO/CURRENT CODES".
(d) Read the DTCs using the OBD II scan tool or the hand-held tester.

Result:

Display (DTC output)	Proceed to
Only "P0746" is output	A
"P0746" and other DTCs	B

HINT:

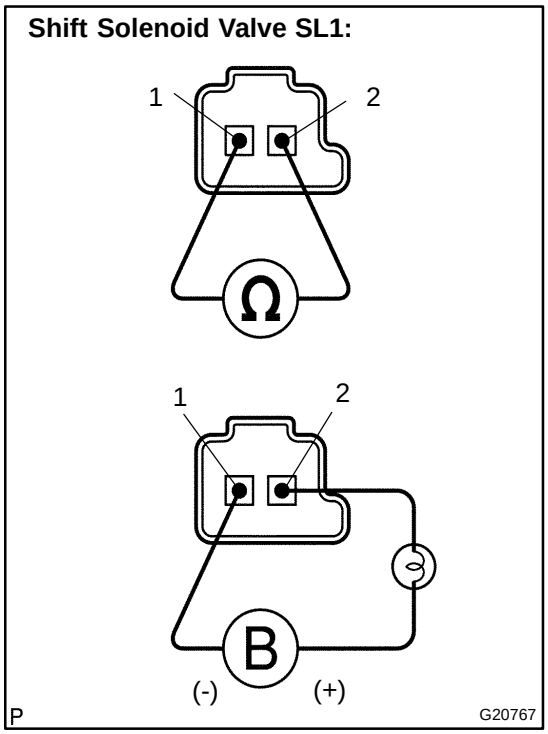
If any other codes besides "P0746" is output, perform the troubleshooting for those DTCs first.

B → **GO TO RELEVANT DTC CHART (SEE PAGE 05-1034)**

A

2	INSPECT SHIFT SOLENOID VALVE(SL1)

Shift Solenoid Valve SL1:



(a) Remove the shift solenoid valve SL1.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition 20℃ (68℉)
1 - 2	5.0 to 5.6 Ω

(c) Connect the positive (+) lead with a 21 W bulb to terminal 2 and the negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.

OK:

The solenoid makes an operating noise.

NG → **REPLACE SHIFT SOLENOID VALVE(SL1)**

OK

3	INSPECT TRANSMISSION VALVE BODY ASSY(See chapter 2 in the problem symptoms table) (SEE PAGE 05-1016)

OK:

There are no foreign objects on each valve and they operate smoothly.

NG → **REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSY (SEE PAGE 40-44)**

OK

4	INSPECT TORQUE CONVERTER CLUTCH ASSY (SEE PAGE 40-29)

OK:

The torque converter clutch operates normally.

NG → **REPLACE TORQUE CONVERTER CLUTCH ASSY**

OK

REPAIR OR REPLACE AUTOMATIC TRANSAXLE ASSY (SEE PAGE 40-18)

DTC	P0748	PRESSURE CONTROL SOLENOID ”A” ELECTRICAL (SHIFT SOLENOID VALVE SL1)

CIRCUIT DESCRIPTION

Shifting from 1st to 5th is performed in combination with ”ON” and ”OFF” operation of the shift solenoid valves SL1, SL2, SL3, S4 and SR which is controlled by the ECM. If an open or short circuit occurs in either of the shift solenoid valves, the ECM controls the remaining normal shift solenoid valve to allow the vehicle to be operated smoothly (Fail safe function).

DTC No.	DTC Detection Condition	Trouble Area
P0748	ECM checks for an open or short circuit in shift solenoid valves SL1 (1-trip detection logic) ・Output signal duty equals to 100%	・Open or short in shift solenoid valve SL1 circuit ・Shift solenoid valve SL1 ・ECM

MONITOR DESCRIPTION

The ECM commands gear shifts by turning the shift solenoid valves ”ON/OFF”. When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem and illuminates the MIL and stores the DTC. And the ECM performs the fail-safe function and turns the other shift solenoid valves in good condition ”ON/OFF” (In case of an open or short circuit, the ECM stops sending current to the circuit.) (see page 05-1030).

MONITOR STRATEGY

Related DTCs	P0748: Shift solenoid valve SL1/Range check
Required sensors/Components	Shift solenoid valve SL1
Frequency of operation	Continuous
Duration	1 sec.
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever this DTC is not present.	See page 05-1007
Battery voltage	10 V or more
Ignition switch	ON
Starter	OFF

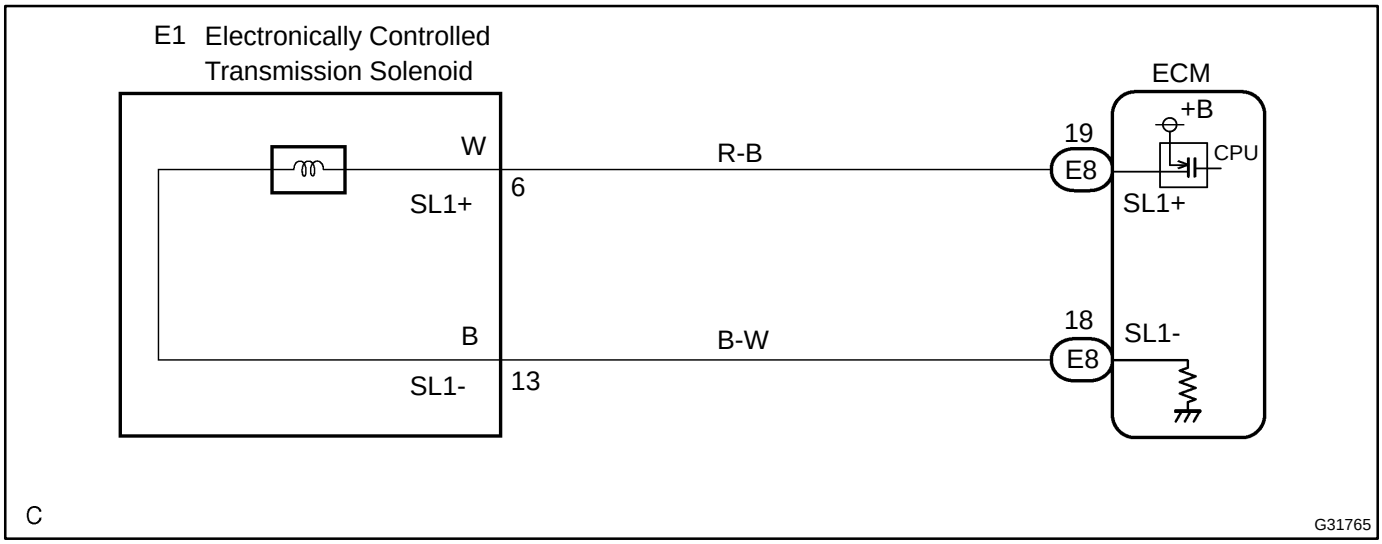
TYPICAL MALFUNCTION THRESHOLDS

Output signal duty	100%

COMPONENT OPERATING RANGE

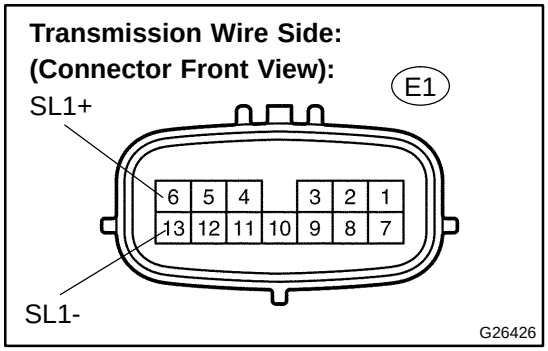
Output signal duty	Less than 100%

WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT TRANSMISSION WIRE(SL1)



(a) Disconnect the transmission wire connector from the transaxle.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition 20℃ (68℉)
6 (SL1+) - 13 (SL1-)	5.0 to 5.6 Ω

(c) Measure the resistance according to the value(s) in the table below.

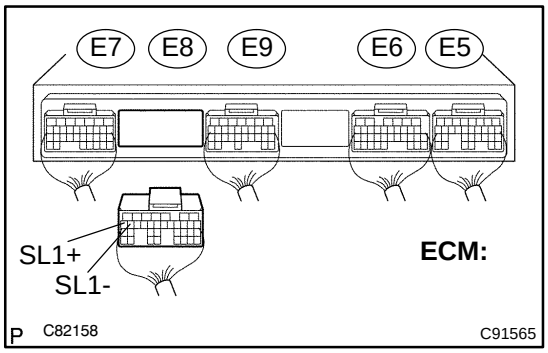
Standard (Check for short):

Tester Connection	Specified Condition
SL1+ - Body ground	10 kΩ or higher
SL1- - Body ground	↑

NG → **Go to step 3**

OK

2 CHECK HARNESS AND CONNECTOR(TRANSMISSION WIRE - ECM)



(a) Connect the transmission connector to the transaxle.
(b) Disconnect the connector from the ECM.
(c) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition 20℃ (68℉)
E8 - 19 (SL1+) - E8 - 18 (SL1-)	5.0 to 5.6 Ω

(d) Measure the resistance according to the value(s) in the table below.

Standard (Check for short):

Tester Connection	Specified Condition
E8 - 19 (SL1+) - Body ground	10 kΩ or higher
E8 - 18 (SL1-) - Body ground	↑

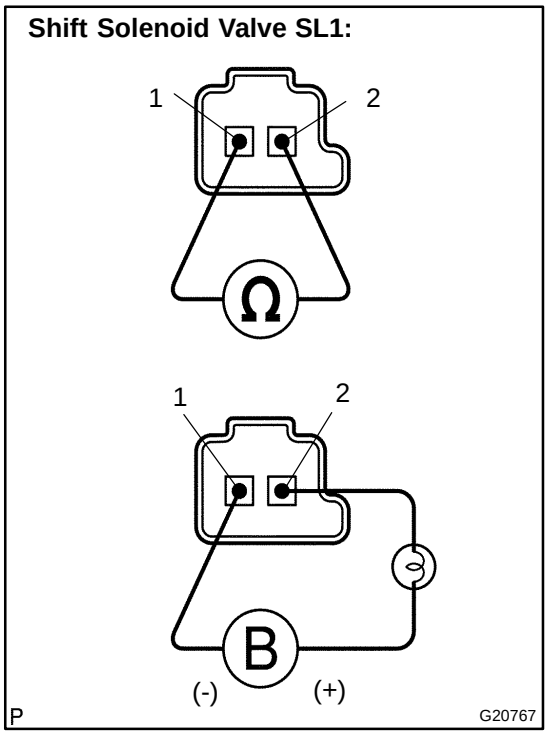
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (SEE PAGE 01-36)**

OK

REPLACE ECM (SEE PAGE 10-24)

3 INSPECT SHIFT SOLENOID VALVE(SL1)

Shift Solenoid Valve SL1:



(a) Remove the shift solenoid valve SL1.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition 20℃ (68℉)
1 - 2	5.0 to 5.6 Ω

(c) Connect the positive (+) lead with a 21 W bulb to terminal 2 and the negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.

OK:

The solenoid makes an operating noise.

NG → **REPLACE SHIFT SOLENOID VALVE(SL1)**

OK

REPAIR OR REPLACE TRANSMISSION WIRE (SEE PAGE 40-37)

DTC P0766 SHIFT SOLENOID ”D” PERFORMANCE (SHIFT SOLENOID VALVE S4)

SYSTEM DESCRIPTION

The ECM uses signals from the vehicle speed sensor to detect the actual gear position (1st, 2nd, 3rd, 4th or 5th gear).
Then the ECM compares the actual gear with the shift schedule in the ECM memory to detect mechanical problems of the shift solenoid valves and valve body.

DTC No.	DTC Detecting Condition	Trouble Area
P0766	The gear required by the ECM does not match the actual gear when driving (2-trip detection logic)	・Shift solenoid valve S4 remains open or closed ・Valve body is blocked ・Shift solenoid valve S4 ・Automatic transaxle (clutch, brake or gear etc.) ・ECM

MONITOR DESCRIPTION

The ECM commands gear shifts by turning the shift solenoid valves ”ON/OFF”. According to the input shaft revolution, intermediate (counter) shaft revolution and output shaft revolution, the ECM detects the actual gear position (1st, 2nd, 3rd, 4th or 5th gear position). When the gear position commanded by the ECM and the actual gear position are not same, the ECM illuminates the MIL and stores the DTC.

MONITOR STRATEGY

Related DTCs	P0766: Shift solenoid valve S4/ON malfunction Shift solenoid valve S4/OFF malfunction
Required sensors/Components	Shift solenoid valve S4, Speed sensor (NT), Speed sensor (NC), Crankshaft position sensor (NE)
Frequency of operation	Continuous
Duration	OFF malfunction (A) and ON malfunction (B) 1 sec. OFF malfunction (B) 1.2 sec. ON malfunction (A) 0.8 sec.
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

All:

Transmission range	"D"
ECT (Engine coolant temperature)	10°C (50°F) or more
TFT (Transmission fluid temperature)	-20°C (-4°F) or more
TFT sensor circuit	Not circuit malfunction
ECT sensor circuit	Not circuit malfunction
Turbine speed sensor circuit	Not circuit malfunction
Intermediate shaft speed sensor circuit	Not circuit malfunction
Output speed sensor circuit	Not circuit malfunction
Shift solenoid valve SL1 circuit	Not circuit malfunction
Shift solenoid valve SL2 circuit	Not circuit malfunction
Shift solenoid valve SL3 circuit	Not circuit malfunction
Shift solenoid valve S4 circuit	Not circuit malfunction
Shift solenoid valve SR circuit	Not circuit malfunction
Shift solenoid valve DSL circuit	Not circuit malfunction

OFF malfunction (A)

ECM selected gear	5th
Throttle valve opening angle	5% or more
Vehicle speed	10 km/h (6.2 mph) or more

OFF malfunction (B)

ECM lock-up command	ON
ECM selected gear	3rd, 4th or 5th
Throttle valve opening angle	10% or more
Vehicle speed	25 to 100 km/h (15.5 to 62.1 mph)

ON malfunction (A)

ECM selected gear	4th or 5th
Throttle valve opening angle	4.5% or more at engine speed 1,900 rpm (Varies with engine speed)

ON malfunction (B)

ECM selected gear	4th
Throttle valve opening angle	5% or more
Vehicle speed	10 km/h (6.2 mph) or more

TYPICAL MALFUNCTION THRESHOLDS

Either of the following conditions is met:

OFF malfunction (A) and (B), or ON malfunction (A) and (B)

2 detections are necessary per driving cycle:

1st detection; temporary flag ON

2nd detection; pending fault code ON

OFF malfunction (A)

Intermediate shaft speed/Output speed	1.44 to 1.58

OFF malfunction (B)

Difference between engine speed and input (turbine) speed	Less than 35 rpm

ON malfunction (A)

Input (turbine) speed/Intermediate shaft speed	0.64 to 0.74

ON malfunction (B)

Intermediate shaft speed/Output speed	1.02 to 1.16

INSPECTION PROCEDURE

HINT:

Performing the ACTIVE TEST using the hand-held tester allows the relay, VSV, actuator and so on to operate without parts removal. Performing the ACTIVE TEST as the first step of troubleshooting is one method to shorten labor time.

It is possible to display the DATA LIST during the ACTIVE TEST.

(a) Turn the ignition switch off.
(b) Connect the hand-held tester to the DLC3.
(c) Turn the ignition switch to the ON position.
(d) Push the "ON" button of the hand-held tester.
(e) Select the item "DIAGNOSIS/ENHANCED OBD II/ACTIVE TEST/SHIFT".
(f) According to the display on tester, perform the "ACTIVE TEST".

HINT:

While driving, the shift position can be forcibly changed with the hand-held tester.

Comparing the shift position commanded by the ACTIVE TEST with the actual shift position enables you to confirm the problem (see page 05-1030).

Item	Test Details	Diagnostic Note
SHIFT	[Test Details] Operate the shift solenoid valve and set the each shift position by yourself. [Vehicle Condition] Less than 50 km/h (31 mph) [Others] *Press "→" button: Shift up *Press "←" button: Shift down	Possible to check the operation of the shift solenoid valves.

HINT:

* This test can be conducted when the vehicle speed is 50 km/h (31 mph) or less.
* The shift position commanded by the ECM is shown in the DATA LIST/SHIFT display on the hand-held tester.

1	CHECK OTHER DTCS OUTPUT(IN ADDITION TO DTC P0766)

(a) Connect the OBD II scan tool or the hand-held tester to the DLC3.
(b) Turn the ignition switch to the ON position and push the OBD II scan tool or the hand-held tester main switch ON.
(c) When you use hand-held tester:
Select the item "DIAGNOSIS/ENHANCED OBD II/DTC INFO/CURRENT CODES".
(d) Read the DTCs using the OBD II scan tool or the hand-held tester.

Result:

Display (DTC output)	Proceed to
Only "P0766" is output	A
"P0766" and other DTCs	B

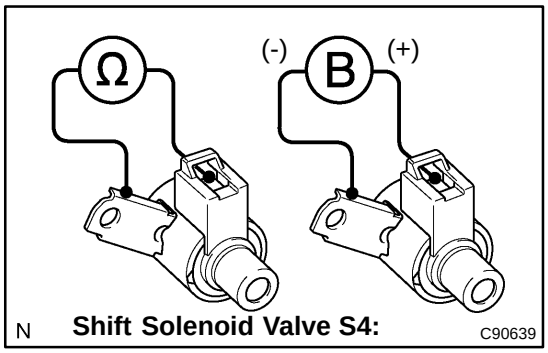
HINT:

If any other codes besides "P0766" is output, perform the troubleshooting for those DTCs first.

B → **GO TO RELEVANT DTC CHART (SEE PAGE 05-1034)**

A

2	INSPECT SHIFT SOLENOID VALVE(S4)



(a) Remove the shift solenoid valve S4.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition 20℃ (68℉)
Solenoid Connector (S4) - Solenoid Body (S4)	11 to 15 Ω

(c) Connect positive (+) lead to the terminal of solenoid connector, negative (-) lead to the solenoid body.

OK:

The solenoid makes an operating noise.

NG → **REPLACE SHIFT SOLENOID VALVE(S4)**

OK

3	INSPECT TRANSMISSION VALVE BODY ASSY(See chapter 2 in the problem symptoms table) (SEE PAGE 05-1016)

OK:

There are no foreign objects on each valve and they operate smoothly.

NG → **REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSY (SEE PAGE 40-44)**

OK

4	INSPECT TORQUE CONVERTER CLUTCH ASSY (SEE PAGE 40-29)

OK:

The torque converter clutch operates normally.

NG → **REPLACE TORQUE CONVERTER CLUTCH ASSY**

OK

REPAIR OR REPLACE AUTOMATIC TRANSAXLE ASSY (SEE PAGE 40-18)

DTC P0771 SHIFT SOLENOID ”E” PERFORMANCE (SHIFT SOLENOID VALVE SR)

SYSTEM DESCRIPTION

The ECM uses signals from the vehicle speed sensor to detect the actual gear position (1st, 2nd, 3rd, 4th or 5th gear).
Then the ECM compares the actual gear with the shift schedule in the ECM memory to detect mechanical problems of the shift solenoid valves and valve body.

DTC No.	DTC Detecting Condition	Trouble Area
P0771	The gear required by the ECM does not match the actual gear when driving (2-trip detection logic)	・Shift solenoid valve SR remains open or closed ・Valve body is blocked ・Shift solenoid valve SR ・Automatic transaxle (clutch, brake or gear etc.) ・ECM

MONITOR DESCRIPTION

The ECM commands gear shifts by turning the shift solenoid valves ”ON/OFF”. According to the input shaft revolution, intermediate (counter) shaft revolution and output shaft revolution, the ECM detects the actual gear position (1st, 2nd, 3rd, 4th or 5th gear position). When the gear position commanded by the ECM and the actual gear position are not same, the ECM illuminates the MIL and stores the DTC.

MONITOR STRATEGY

Related DTCs	P0771: Shift solenoid valve SR/Rationality check
Required sensors/Components	Shift solenoid valve SR, Speed sensor (NT), Speed sensor (NC), Crankshaft position sensor (NE)
Frequency of operation	Continuous
Duration	OFF malfunction (A) 1 sec. OFF malfunction (B) 3.5 sec. ON malfunction (A) Continuous ON malfunction (B) and (C) 0.8 sec.
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

All:

Transmission range	”D”
ECT (Engine coolant temperature)	10◌C (50◌F) or more
TFT (Transmission fluid temperature)	-20 ◌C (-4◌F) or more
TFT sensor circuit	Not circuit malfunction
ECT sensor circuit	Not circuit malfunction
Turbine speed sensor circuit	Not circuit malfunction
Intermediate shaft speed sensor circuit	Not circuit malfunction
Output speed sensor circuit	Not circuit malfunction
Shift solenoid valve SL1 circuit	Not circuit malfunction
Shift solenoid valve SL2 circuit	Not circuit malfunction
Shift solenoid valve SL3 circuit	Not circuit malfunction
Shift solenoid valve S4 circuit	Not circuit malfunction
Shift solenoid valve SR circuit	Not circuit malfunction
Shift solenoid valve DSL circuit	Not circuit malfunction

OFF malfunction (A)

ECM selected gear	5th
Throttle valve opening angle	5% or more
Vehicle speed	10 km/h (6.2 mph) or more

OFF malfunction (B)

ECM lock-up command	ON
ECM selected gear	3rd, 4th or 5th
Vehicle speed	25 km/h (15.5 mph)

ON malfunction (A)

ECM lock-up command	OFF

ON malfunction (B)

ECM selected gear	1st
Vehicle speed	Less than 40 km/h (24.9 mph)
Throttle valve opening angle	4.5% or more at engine speed 1,900 rpm (Varies with engine speed)

ON malfunction (C)

ECM selected gear	3rd
Throttle valve opening angle	4.5% or more at engine speed 1,900 rpm (Varies with engine speed)

ON malfunction (D)

ECM selected gear	4th or 5th
Duration time from shift command of ECM	15 sec. or more

TYPICAL MALFUNCTION THRESHOLDS

Either of the following conditions is met:

OFF malfunction (A) and (B), or ON malfunction (A), (B), (C) and (D)

OFF malfunction (A)

Intermediate shaft speed/Output speed	1.44 to 1.58

OFF malfunction (B)

Engine speed - Input (turbine) speed	
When condition "OFF malfunction (A)" of shift solenoid "D" is detected;	75 rpm or more
When condition "OFF malfunction (A)" of shift solenoid "D" is not detected;	100 rpm or more

ON malfunction (A)

Difference between engine speed and input (turbine) speed	150 rpm or more

ON malfunction (B)

Input (turbine) speed/Intermediate shaft speed	0.93 to 1.07

ON malfunction (C)

Input (turbine) speed/Intermediate shaft speed	0.93 to 1.07

ON malfunction (D)

Input (turbine) speed/Intermediate shaft speed	0.64 to 0.74

INSPECTION PROCEDURE

HINT:

Performing the ACTIVE TEST using the hand-held tester allows the relay, VSV, actuator and so on to operate without parts removal. Performing the ACTIVE TEST as the first step of troubleshooting is one method to shorten labor time.

It is possible to display the DATA LIST during the ACTIVE TEST.

(a) Turn the ignition switch off.
(b) Connect the hand-held tester to the DLC3.
(c) Turn the ignition switch to the ON position.
(d) Push the "ON" button of the hand-held tester.
(e) Select the item "DIAGNOSIS/ENHANCED OBD II/ACTIVE TEST/SHIFT".
(f) According to the display on tester, perform the "ACTIVE TEST".

HINT:

While driving, the shift position can be forcibly changed with the hand-held tester.

Comparing the shift position commanded by the ACTIVE TEST with the actual shift position enables you to confirm the problem (see page 05-1030).

Item	Test Details	Diagnostic Note
SHIFT	[Test Details] Operate the shift solenoid valve and set the each shift position by yourself. [Vehicle Condition] Less than 50 km/h (31 mph) [Others] *Press "→" button: Shift up *Press "←" button: Shift down	Possible to check the operation of the shift solenoid valves.

HINT:

* This test can be conducted when the vehicle speed is 50 km/h (31 mph) or less.
* The shift position commanded by the ECM is shown in the DATA LIST/SHIFT display on the hand-held tester.

1	CHECK OTHER DTCS OUTPUT(IN ADDITION TO DTC P0771)

(a) Connect the OBD II scan tool or the hand-held tester to the DLC3.
(b) Turn the ignition switch to the ON position and push the OBD II scan tool or the hand-held tester main switch ON.
(c) When you use hand-held tester:
Select the item "DIAGNOSIS/ENHANCED OBD II/DTC INFO/CURRENT CODES".
(d) Read the DTCs using the OBD II scan tool or the hand-held tester.

Result:

Display (DTC output)	Proceed to
Only "P0771" is output	A
"P0771" and other DTCs	B

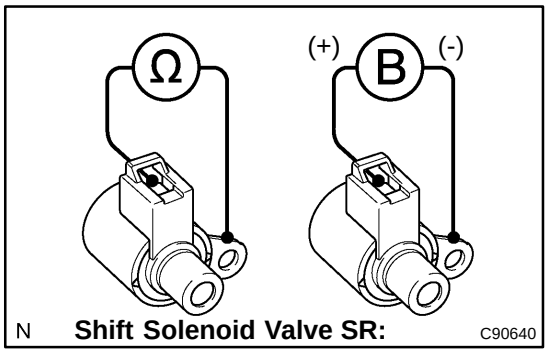
HINT:

If any other codes besides "P0771" is output, perform the troubleshooting for those DTCs first.

B → **GO TO RELEVANT DTC CHART (SEE PAGE 05-1034)**

A

2	INSPECT SHIFT SOLENOID VALVE(SR)



N Shift Solenoid Valve SR: C90640

(a) Remove the shift solenoid valve SR.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition 20℃ (68℉)
Solenoid Connector (SR) - Solenoid Body (SR)	11 to 15 Ω

(c) Connect positive (+) lead to the terminal of solenoid connector, negative (-) lead to the solenoid body.

OK:

The solenoid makes an operating noise.

NG → **REPLACE SHIFT SOLENOID VALVE(SR)**

OK

3	INSPECT TRANSMISSION VALVE BODY ASSY(See chapter 2 in the problem symptoms table) (SEE PAGE 05-1016)

OK:

There are no foreign objects on each valve and they operate smoothly.

NG → **REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSY (SEE PAGE 40-44)**

OK

4	INSPECT TORQUE CONVERTER CLUTCH ASSY (SEE PAGE 40-29)

OK:

The torque converter clutch operates normally.

NG → **REPLACE TORQUE CONVERTER CLUTCH ASSY**

OK

REPAIR OR REPLACE AUTOMATIC TRANSAXLE ASSY (SEE PAGE 40-18)

DTC	P0776	PRESSURE CONTROL SOLENOID ”B” PERFORMANCE (SHIFT SOLENOID VALVE SL2)

SYSTEM DESCRIPTION

The ECM uses signals from the vehicle speed sensor to detect the actual gear position (1st, 2nd, 3rd, 4th or 5th gear).
Then the ECM compares the actual gear with the shift schedule in the ECM memory to detect mechanical problems of the shift solenoid valves and valve body.

DTC No.	DTC Detecting Condition	Trouble Area
P0776	The gear required by the ECM does not match the actual gear when driving (2-trip detection logic)	・Shift solenoid valve SL2 remains open or closed ・Valve body is blocked ・Shift solenoid valve SL2 ・Automatic transaxle (clutch, brake or gear etc.) ・ECM

MONITOR DESCRIPTION

The ECM commands gear shifts by turning the shift solenoid valves ”ON/OFF”. According to the input shaft revolution, intermediate (counter) shaft revolution and output shaft revolution, the ECM detects the actual gear position (1st, 2nd, 3rd, 4th or 5th gear position). When the gear position commanded by the ECM and the actual gear position are not same, the ECM illuminates the MIL and stores the DTC.

MONITOR STRATEGY

Related DTCs	P0776: Shift solenoid valve SL2/OFF malfunction Shift solenoid valve SL2/ON malfunction
Required sensors/Components	Shift solenoid valve SL2, Speed sensor (NT), Speed sensor (NC), Crankshaft position sensor (NE)
Frequency of operation	Continuous
Duration	OFF malfunction (A) 1.8 sec. OFF malfunction (B) and (C) 0.8 sec. ON malfunction (A) and (B) 0.8 sec. ON malfunction (C) 0.4 sec.
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

All:

Transmission range	”D”
ECT (Engine coolant temperature)	10℃ (50℉) or more
TFT (Transmission fluid temperature)	-20 ℃ (-4℉) or more
TFT sensor circuit	Not circuit malfunction
ECT sensor circuit	Not circuit malfunction
Turbine speed sensor circuit	Not circuit malfunction
Intermediate shaft speed sensor circuit	Not circuit malfunction
Output speed sensor circuit	Not circuit malfunction
Shift solenoid valve SL1 circuit	Not circuit malfunction
Shift solenoid valve SL2 circuit	Not circuit malfunction
Shift solenoid valve SL3 circuit	Not circuit malfunction
Shift solenoid valve S4 circuit	Not circuit malfunction
Shift solenoid valve SR circuit	Not circuit malfunction
Shift solenoid valve DSL circuit	Not circuit malfunction

OFF malfunction (A)

ECM lock-up command	OFF
Vehicle speed	Less than 60 km/h (37.3 mph)
Throttle valve opening angle	10% or more

OFF malfunction (B)

ECM selected gear	1st
Vehicle speed	Less than 40 km/h (24.9 mph)
Throttle valve opening angle	4.5% or more at engine speed 1,900 rpm (Varies with engine speed)

OFF malfunction (C)

ECM selected gear	3rd
Throttle valve opening angle	4.5% or more at engine speed 1,900 rpm (Varies with engine speed)

OFF malfunction (D)

ECM select gear	4th or 5th
Duration time from shift command of ECM	15 sec. or more

ON malfunction (A)

ECM select gear	1st
Vehicle speed	Less than 40 km/h (24.9 mph)
Throttle valve opening angle	4.5% or more at engine speed 1,900 rpm (Varies with engine speed)

ON malfunction (B)

ECM selected gear	3rd
Throttle valve opening angle	7.0% or more at output speed 1,400 rpm (Varies with engine speed)
Malfunction of pressure control solenoid ”B” (SL2) and ”C” (SL3)	Not detected

ON malfunction (C)

Throttle valve opening angle	7.0% or more at output speed 1,050 rpm (Varies with engine speed)
Malfunction of pressure control solenoid ”B” (SL2)	Not detected

TYPICAL MALFUNCTION THRESHOLDS

Either of the following conditions is met:

OFF malfunction (A), (B), (C) and (D), or ON malfunction (A), (B) and (C)

OFF malfunction (A)

Difference between engine speed and input (turbine) speed	Less than 35 rpm

OFF malfunction (B)

Input (turbine) speed/Intermediate shaft speed	0.93 to 1.07

OFF malfunction (C)

Input (turbine) speed/Intermediate shaft speed	0.93 to 1.07

OFF malfunction (D)

Input (turbine) speed/Intermediate shaft speed	0.64 to 0.74

ON malfunction (A)

Input (turbine) speed/Intermediate shaft speed	2.72 to 2.86

ON malfunction (B)

Input (turbine) speed - Intermediate shaft speed	700 rpm or more

ON malfunction (C)

Input (turbine) speed - Intermediate shaft speed	Less than -500 rpm or 700 rpm or more

INSPECTION PROCEDURE

HINT:

Performing the ACTIVE TEST using the hand-held tester allows the relay, VSV, actuator and so on to operate without parts removal. Performing the ACTIVE TEST as the first step of troubleshooting is one method to shorten labor time.

It is possible to display the DATA LIST during the ACTIVE TEST.

(a) Turn the ignition switch off.
(b) Connect the hand-held tester to the DLC3.
(c) Turn the ignition switch to the ON position.
(d) Push the "ON" button of the hand-held tester.
(e) Select the item "DIAGNOSIS/ENHANCED OBD II/ACTIVE TEST/SHIFT".
(f) According to the display on tester, perform the "ACTIVE TEST".

HINT:

While driving, the shift position can be forcibly changed with the hand-held tester.

Comparing the shift position commanded by the ACTIVE TEST with the actual shift position enables you to confirm the problem (see page 05-1030).

Item	Test Details	Diagnostic Note
SHIFT	[Test Details] Operate the shift solenoid valve and set the each shift position by yourself. [Vehicle Condition] Less than 50 km/h (31 mph) [Others] *Press "→" button: Shift up *Press "←" button: Shift down	Possible to check the operation of the shift solenoid valves.

HINT:

* This test can be conducted when the vehicle speed is 50 km/h (31 mph) or less.
* The shift position commanded by the ECM is shown in the DATA LIST/SHIFT display on the hand-held tester.

1	CHECK OTHER DTCS OUTPUT(IN ADDITION TO DTC P0776)

(a) Connect the OBD II scan tool or the hand-held tester to the DLC3.
(b) Turn the ignition switch to the ON position and push the OBD II scan tool or the hand-held tester main switch ON.
(c) When you use hand-held tester:
Select the item "DIAGNOSIS/ENHANCED OBD II/DTC INFO/CURRENT CODES".
(d) Read the DTCs using the OBD II scan tool or the hand-held tester.

Result:

Display (DTC output)	Proceed to
Only "P0776" is output	A
"P0776" and other DTCs	B

HINT:

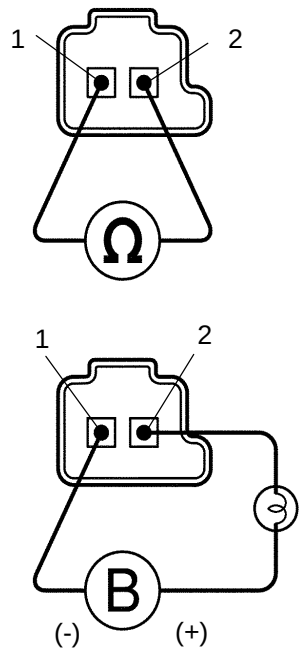
If any other codes besides "P0776" is output, perform the troubleshooting for those DTCs first.

B → GO TO RELEVANT DTC CHART (SEE PAGE 05-1034)

A

2	INSPECT SHIFT SOLENOID VALVE(SL2)

Shift Solenoid Valve SL2:



(a) Remove the shift solenoid valve SL2.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition 20℃ (68℉)
1 - 2	5.0 to 5.6 Ω

(c) Connect the positive (+) lead with a 21 W bulb to terminal 2 and the negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.

OK:

The solenoid makes an operating noise.

NG → **REPLACE SHIFT SOLENOID VALVE(SL2)**

OK

3	INSPECT TRANSMISSION VALVE BODY ASSY(See chapter 2 in the problem symptoms table) (SEE PAGE 05-1016)

OK:

There are no foreign objects on each valve and they operate smoothly.

NG → **REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSY (SEE PAGE 40-44)**

OK

4	INSPECT TORQUE CONVERTER CLUTCH ASSY (SEE PAGE 40-29)

OK:

The torque converter clutch operates normally.

NG → **REPLACE TORQUE CONVERTER CLUTCH ASSY**

OK

REPAIR OR REPLACE AUTOMATIC TRANSAXLE ASSY (SEE PAGE 40-18)

DTC	P0778	PRESSURE CONTROL SOLENOID ”B” ELECTRICAL (SHIFT SOLENOID VALVE SL2)

CIRCUIT DESCRIPTION

Shifting from 1st to 5th is performed in combination with ”ON” and ”OFF” operation of the shift solenoid valves SL1, SL2, SL3, S4 and SR which is controlled by the ECM. If an open or short circuit occurs in either of the shift solenoid valves, the ECM controls the remaining normal shift solenoid valve to allow the vehicle to be operated smoothly (Fail safe function).

DTC No.	DTC Detection Condition	Trouble Area
P0778	ECM checks for an open or short circuit in shift solenoid valves SL2 (1-trip detection logic) Hybrid IC for solenoid indicates fail.	・Open or short in shift solenoid valve SL2 circuit ・Shift solenoid valve SL2 ・ECM

MONITOR DESCRIPTION

The ECM commands gear shifts by turning the shift solenoid valves ”ON/OFF”. When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem and illuminates the MIL and stores the DTC. And the ECM performs the fail-safe function and turns the other shift solenoid valves in good condition ”ON/OFF” (In case of an open or short circuit, the ECM stops sending current to the circuit.) (see page 05-1030).

MONITOR STRATEGY

Related DTCs	P0778: Shift solenoid valve SL2/Range check
Required sensors/Components	Shift solenoid valve SL2
Frequency of operation	Continuous
Duration	1 sec.
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever this DTC is not present.	See page 05-1007
Solenoid current cut status	Not cut
Battery voltage	11 V or more
CPU commanded duty ratio to SL2	19% or more
Ignition switch	ON
Starter	OFF

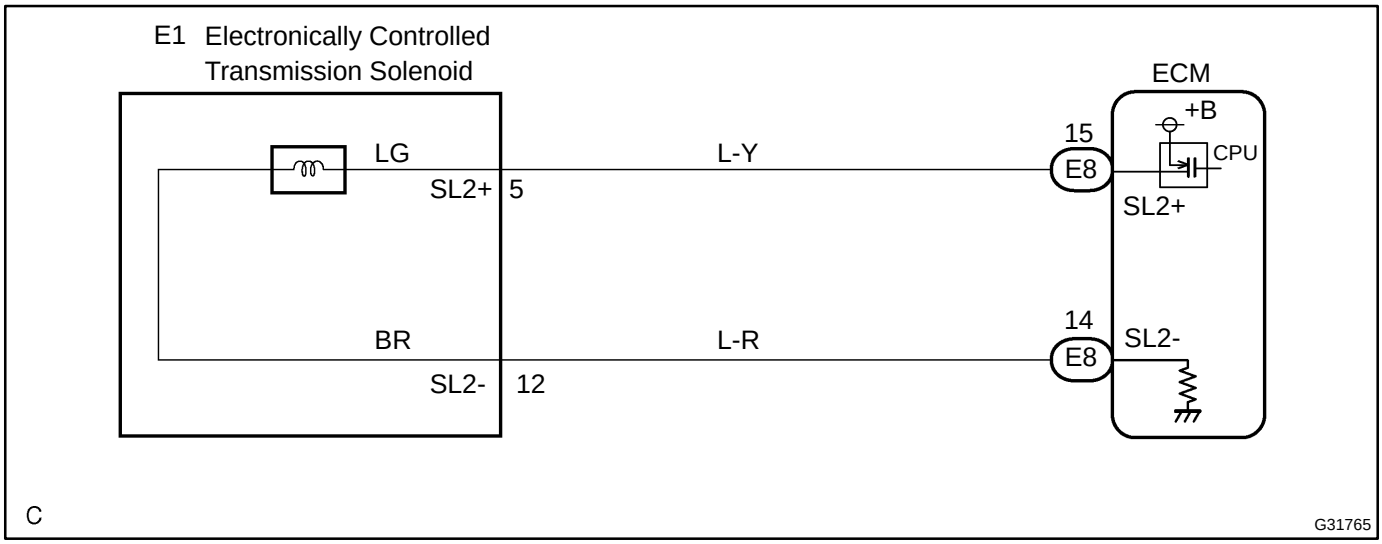
TYPICAL MALFUNCTION THRESHOLDS

Solenoid status from IC	Fail (Open or short)

COMPONENT OPERATING RANGE

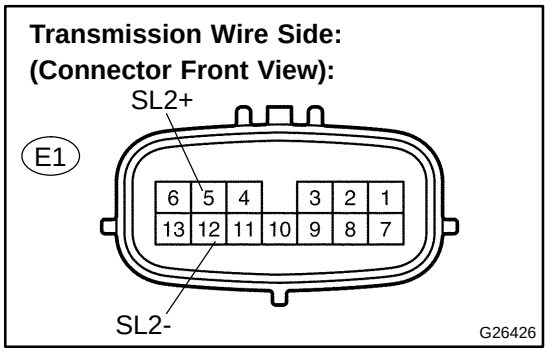
Output signal duty	Less than 100%

WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT TRANSMISSION WIRE(SL2)



(a) Disconnect the transmission wire connector from the transaxle.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition 20℃ (68℉)
5 (SL2+) - 12 (SL2-)	5.0 to 5.6 Ω

(c) Measure the resistance according to the value(s) in the table below.

OK:

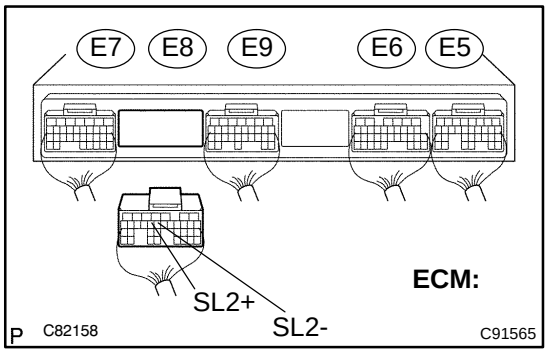
Standard (Check for short):

Tester Connection	Specified Condition
5 (SL2+) - Body ground	10 kΩ or higher
12 (SL2-) - Body ground	↑

NG → **Go to step 3**

OK

2 CHECK HARNESS AND CONNECTOR(TRANSMISSION WIRE - ECM)



(a) Connect the transmission connector to the transaxle.
(b) Disconnect the connector from the ECM.
(c) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition 20℃ (68℉)
E8 - 15 (SL2+) - E8 - 14 (SL2-)	5.0 to 5.6 Ω

(d) Measure the resistance according to the value(s) in the table below.

Standard (Check for short):

Tester Connection	Specified Condition
E8 - 15 (SL2+) - Body ground	10 kΩ or higher
E8 - 14 (SL2-) - Body ground	↑

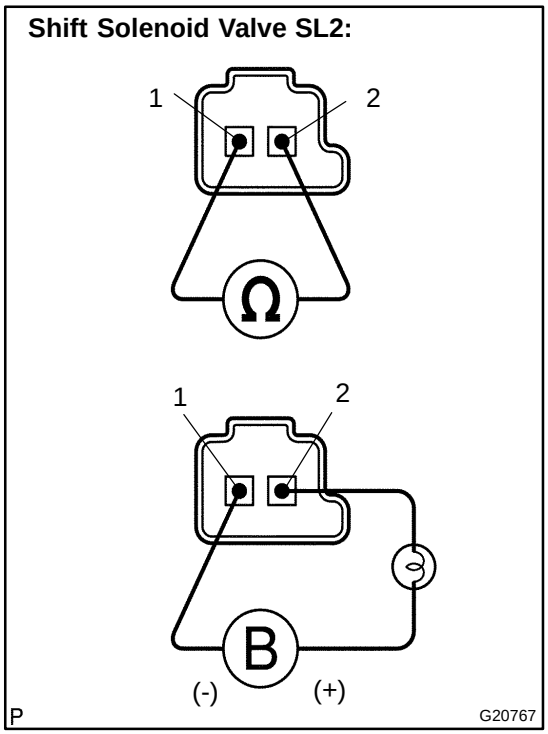
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (SEE PAGE 01-36)**

OK

REPLACE ECM (SEE PAGE 10-24)

3 INSPECT SHIFT SOLENOID VALVE(SL2)

Shift Solenoid Valve SL2:



(a) Remove the shift solenoid valve SL2.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition 20℃ (68℉)
1 - 2	5.0 to 5.6 Ω

(c) Connect the positive (+) lead with a 21 W bulb to terminal 2 and the negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.

OK:

The solenoid makes an operating noise.

NG → **REPLACE SHIFT SOLENOID VALVE(SL2)**

OK

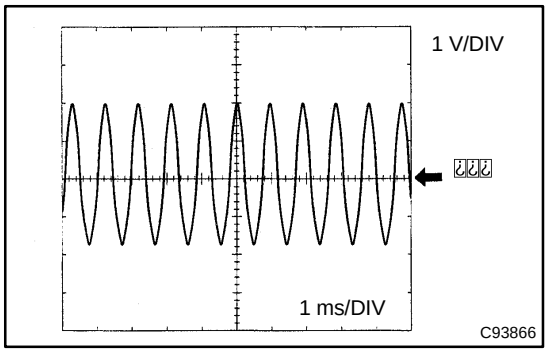
REPAIR OR REPLACE TRANSMISSION WIRE (SEE PAGE 40-37)

DTC	P0793	INTERMEDIATE SHAFT SPEED SENSOR "A"

CIRCUIT DESCRIPTION

This sensor detects the rotation speed of the counter gear. By comparing the counter gear speed signal (NC) with the direct clutch speed sensor signal (NT), the ECM detects the shift timing of the gears and appropriately controls the engine torque and hydraulic pressure according to various conditions. Thus smooth gear shifting is performed.

DTC No.	DTC Detection Condition	Trouble Area
P0793	ECM detects conditions (a), (b) and (c) continuity for 5 sec. or more: (1-trip detection logic) (a) Vehicle speed: 50 km/h (31 mph) or more (b) Park/neutral position switch (NSW) is OFF (c) Speed sensor (NC): less than 300 rpm	・Open or short in transmission revolution sensor NC (speed sensor NC) circuit ・Transmission revolution sensor NC (speed sensor NC) ・ECM



Reference (Using an oscilloscope):

Check the waveform between the terminals NC+ and NC- of the ECM connector.

Standard: Refer to the illustration.

Terminal	NC+ - NC-
Tool setting	1V/DIV, 1ms/DIV
Vehicle condition	Vehicle speed 30 km/h (19 mph): (3rd gear) Engine speed 1,400 rpm

MONITOR DESCRIPTION

The NC terminal of ECM detects a revolution signal from the speed sensor (NC) (counter gear rpm). The ECM calculates a gearshift comparing the speed sensor (NT) with the speed sensor (NC).

While the vehicle is operating in 2nd, 3rd, 4th or 5th gear in the shift position of D, if the counter gear revolution is less than 300 rpm*1 although the output shaft revolution is more than 1,000 rpm*2, the ECM detects the trouble, illuminates the MIL and stores the DTC.

*1: Pulse is not output or is irregularly output.

*2: The vehicle speed is 50 km/h (31 mph) or more.

MONITOR STRATEGY

Related DTCs	P0793: Speed sensor (NC)/Verify pulse input
Required sensors/Components	Speed sensor (NC), Speed sensor (NT), Park/neutral position switch
Frequency of operation	Continuous
Duration	5 sec.
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever this DTC is not present.	See page 05-1007
Engine	Running
NSW switch	OFF
Output shaft rpm	1,000 rpm or more

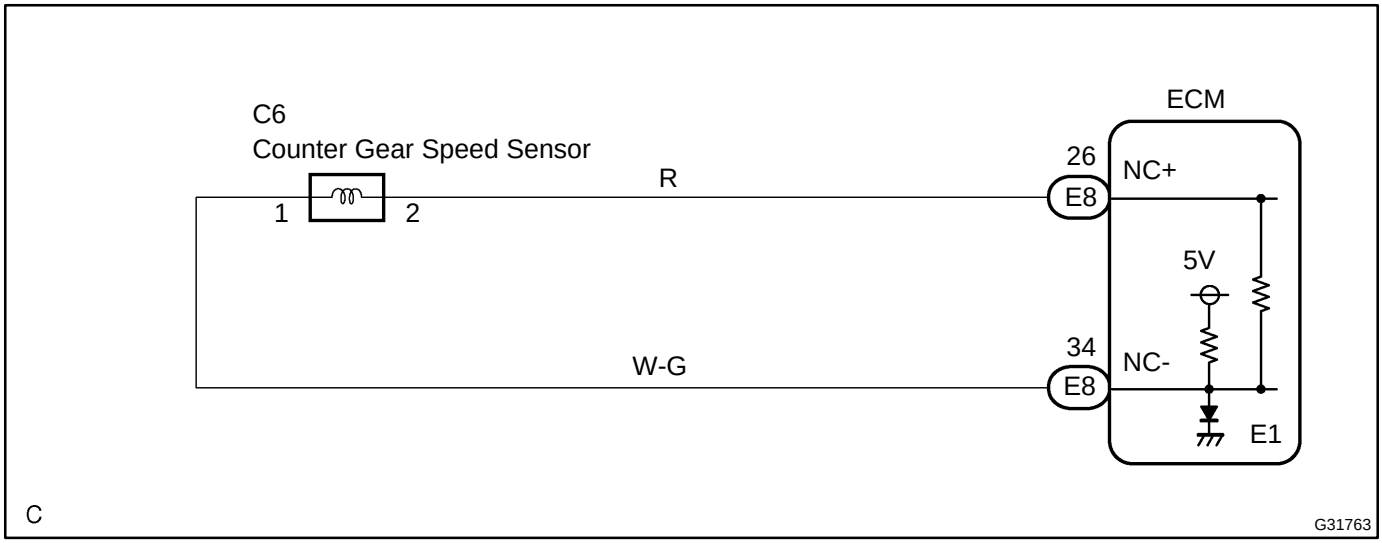
TYPICAL MALFUNCTION THRESHOLDS

Sensor signal rpm	Less than 300 rpm

COMPONENT OPERATING RANGE

Counter gear speed sensor (NC)	[HINT] 3rd when shift lever position is D position (After warming up the engine); ・Intermediate shaft speed (NC) becomes close to the engine speed.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

According to the DATA LIST displayed by the OBD II scan tool or hand-held tester, you can read the value of the switch, sensor, actuator and so on without parts removal. Reading the DATA LIST as the first step of troubleshooting is one method to shorten labor time.

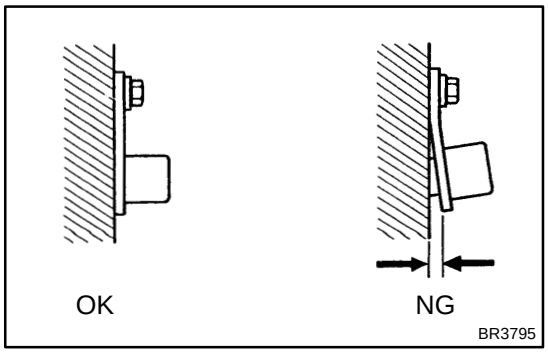
(a) Warm up the engine.
(b) Turn the ignition switch off.
(c) Connect the OBD II scan tool or hand-held tester to the DLC3.
(d) Turn the ignition switch to the ON position.
(e) Push the "ON" button of the OBD II scan tool or the hand-held tester.
(f) When you use hand-held tester:
Select the item "DIAGNOSIS/ENHANCED OBD II/DATA LIST".
(g) According to the display on tester, read the "DATA LIST".

Item	Measurement Item/ Range (display)	Normal Condition
SPD (NC)	Counter Gear Speed/ display: 50 r/min	[HINT] 3rd when shift lever position is D position (After warming up the engine); * Intermediate shaft speed (NC) becomes close to the engine speed.

HINT:

* SPD (NC) is always 0 while driving:
Open or short in the sensor or circuit.
* SPD (NC) is always more than 0 and less than 300 rpm while driving the vehicle at 50 km/h (31 mph) or more:
Sensor trouble, improper installation, or intermittent connection trouble of the circuit.

1	INSPECT SPEED SENSOR INSTALLATION

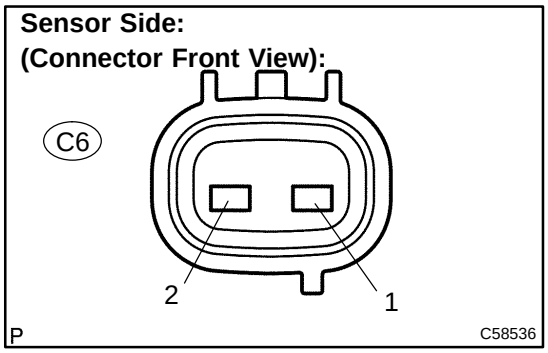


(a) Check the speed sensor installation.
OK:
The installation bolt is tightened properly and there is no clearance between the sensor and transaxle case.

NG → **REPLACE SPEED SENSOR(NC)**

OK

2 INSPECT SPEED SENSOR(NC)



(a) Disconnect the speed sensor connector from the transaxle.

(b) Measure the resistance according to the value(s) in the table below.

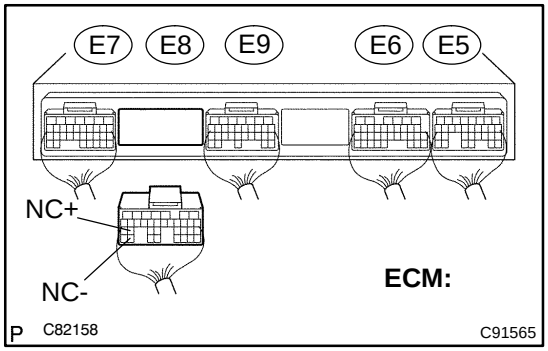
Standard:

Tester Connection	Specified Condition 20 ℃ (68 ℉)
1 - 2	560 to 680 Ω

NG → **REPLACE SPEED SENSOR(NC)**

OK

3 CHECK HARNESS AND CONNECTOR(SPEED SENSOR - ECM)



(a) Connect the speed sensor connector.

(b) Disconnect the ECM connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition 20 ℃ (68 ℉)
E8 - 26 (NC+) - E8 - 34 (NC-)	560 to 680 Ω

(d) Measure the resistance according to the value(s) in the table below.

Standard (Check for short):

Tester Connection	Specified Condition
E8 - 26 (NC+) - Body ground	10 kΩ or higher
E8 - 34 (NC-) - Body ground	↑

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (SEE PAGE 01-36)**

OK

REPLACE ECM (SEE PAGE 10-24)

DTC	P0796	PRESSURE CONTROL SOLENOID ”C” PERFORMANCE (SHIFT SOLENOID VALVE SL3)

SYSTEM DESCRIPTION

The ECM uses signals from the vehicle speed sensor to detect the actual gear position (1st, 2nd, 3rd, 4th or 5th gear).
Then the ECM compares the actual gear with the shift schedule in the ECM memory to detect mechanical troubles of the shift solenoid valves and valve body.

DTC No.	DTC Detecting Condition	Trouble Area
P0796	The gear required by the ECM does not match the actual gear when driving (2-trip detection logic)	・Shift solenoid valve SL3 remains open or closed ・Valve body is blocked ・Shift solenoid valve SL3 ・Automatic transaxle (clutch, brake or gear etc.) ・ECM

MONITOR DESCRIPTION

The ECM commands gear shifts by turning the shift solenoid valves ”ON/OFF”. According to the input shaft revolution, intermediate (counter) shaft revolution and output shaft revolution, the ECM detects the actual gear position (1st, 2nd, 3rd, 4th or 5th gear position). When the gear position commanded by the ECM and the actual gear position are not same, the ECM illuminates the MIL and stores the DTC.

MONITOR STRATEGY

Related DTCs	P0796: Shift solenoid valve SL3/OFF malfunction Shift solenoid valve SL3/ON malfunction
Required sensors/Components	Shift solenoid valve SL3, Speed sensor (NT), Speed sensor (NC), Crankshaft position sensor (NE)
Frequency of operation	Continuous
Duration	OFF malfunction (A) 0.8 sec. OFF malfunction (B) 1 sec. ON malfunction (A) and (B) 0.8 sec. ON malfunction (C) 0.4 sec.
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

All:

Transmission range	”D”
ECT (Engine coolant temperature)	10◌C (50◌F) or more
TFT (Transmission fluid temperature)	-20 ◌C (-4◌F) or more
TFT sensor circuit	Not circuit malfunction
ECT sensor circuit	Not circuit malfunction
Turbine speed sensor circuit	Not circuit malfunction
Intermediate shaft speed sensor circuit	Not circuit malfunction
Output speed sensor circuit	Not circuit malfunction
Shift solenoid valve SL1 circuit	Not circuit malfunction
Shift solenoid valve SL2 circuit	Not circuit malfunction
Shift solenoid valve SL3 circuit	Not circuit malfunction
Shift solenoid valve S4 circuit	Not circuit malfunction
Shift solenoid valve SR circuit	Not circuit malfunction
Shift solenoid valve DSL circuit	Not circuit malfunction

OFF malfunction (A)

ECM selected gear	4th or 5th
Throttle valve opening angle	4.5% or more at engine speed 1,900 rpm (Varies with engine speed)

OFF malfunction (B)

ECM selected gear	4th
Throttle valve opening angle	5% or more
Vehicle speed	10 km/h (6.2 mph) or more

ON malfunction (A)

ECM selected gear	1st
Vehicle speed	Less than 40 km/h (24.9 mph)
Throttle valve opening angle	4.5% or more at engine speed 1,900 rpm (Varies with engine speed)

ON malfunction (B)

ECM selected gear	3rd
Throttle valve opening angle	7.0% or more at output speed 1,400 rpm (Varies with engine speed)
Malfunction of pressure control solenoid ”B” (SL2) and ”C” (SL3)	Not detected

ON malfunction (C)

Throttle valve opening angle	7.0% or more at output speed 1,050 rpm (Varies with engine speed)
Malfunction of pressure control solenoid ”B” (SL2)	Not detected

TYPICAL MALFUNCTION THRESHOLDS

Either of the following conditions is met:

OFF malfunction (A) and (B), or ON malfunctions (A), (B) and (C)

2 detections are necessary per driving cycle:

1st detection; temporary flag ON

2nd detection; pending fault code ON

OFF malfunction (A)

Input (turbine) speed/Intermediate shaft speed	0.93 to 1.07

OFF malfunction (B)

Intermediate shaft speed/Output speed	1.02 to 1.16

ON malfunction (A)

Input (turbine) speed/Intermediate shaft speed	0.93 to 1.07

ON malfunction (B)

Input (turbine) speed - Intermediate shaft speed	700 rpm or more

ON malfunction (C)

Input (turbine) speed - Intermediate shaft speed	Less than -500 rpm or 700 rpm or more

INSPECTION PROCEDURE

HINT:

Performing the ACTIVE TEST using the hand-held tester allows the relay, VSV, actuator and so on to operate without parts removal. Performing the ACTIVE TEST as the first step of troubleshooting is one method to shorten labor time.

It is possible to display the DATA LIST during the ACTIVE TEST.

(a) Turn the ignition switch off.
(b) Connect the hand-held tester to the DLC3.
(c) Turn the ignition switch to the ON position.
(d) Push the "ON" button of the hand-held tester.
(e) Select the item "DIAGNOSIS/ENHANCED OBD II/ACTIVE TEST/SHIFT".
(f) According to the display on tester, perform the "ACTIVE TEST".

HINT:

While driving, the shift position can be forcibly changed with the hand-held tester.

Comparing the shift position commanded by the ACTIVE TEST with the actual shift position enables you to confirm the problem (see page 05-1030).

Item	Test Details	Diagnostic Note
SHIFT	[Test Details] Operate the shift solenoid valve and set the each shift position by yourself. [Vehicle Condition] Less than 50 km/h (31 mph) [Others] *Press "→" button: Shift up *Press "←" button: Shift down	Possible to check the operation of the shift solenoid valves.

HINT:

* This test can be conducted when the vehicle speed is 50 km/h (31 mph) or less.
* The shift position commanded by the ECM is shown in the DATA LIST/SHIFT display on the hand-held tester.

1	CHECK OTHER DTCS OUTPUT(IN ADDITION TO DTC P0796)

(a) Connect the OBD II scan tool or the hand-held tester to the DLC3.
(b) Turn the ignition switch to the ON position and push the OBD II scan tool or the hand-held tester main switch ON.
(c) When you use hand-held tester:
Select the item "DIAGNOSIS/ENHANCED OBD II/DTC INFO/CURRENT CODES".
(d) Read the DTCs using the OBD II scan tool or the hand-held tester.

Result:

Display (DTC output)	Proceed to
Only "P0796" is output	A
"P0796" and other DTCs	B

HINT:

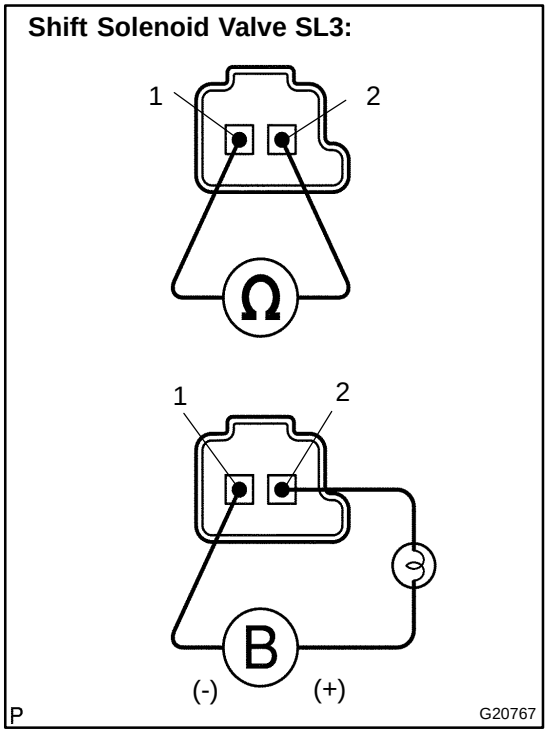
If any other codes besides "P0796" is output, perform the troubleshooting for those DTCs first.

B → GO TO RELEVANT DTC CHART (SEE PAGE 05-1034)

A

2	INSPECT SHIFT SOLENOID VALVE(SL3)

Shift Solenoid Valve SL3:



(a) Remove the shift solenoid valve SL3.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition 20℃ (68℉)
1 - 2	5.0 to 5.6 Ω

(c) Connect the positive (+) lead with a 21 W bulb to terminal 2 and the negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.

OK:

The solenoid makes an operating noise.

NG → **REPLACE SHIFT SOLENOID VALVE(SL3)**

OK

3	INSPECT TRANSMISSION VALVE BODY ASSY(See chapter 2 in the problem symptoms table) (SEE PAGE 05-1016)

OK:

There are no foreign objects on each valve and they operate smoothly.

NG → **REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSY (SEE PAGE 40-44)**

OK

4	INSPECT TORQUE CONVERTER CLUTCH ASSY (SEE PAGE 40-29)

OK:

The torque converter clutch operates normally.

NG → **REPLACE TORQUE CONVERTER CLUTCH ASSY**

OK

REPAIR OR REPLACE AUTOMATIC TRANSAXLE ASSY (SEE PAGE 40-18)

DTC	P0798	PRESSURE CONTROL SOLENOID ”C” ELECTRICAL (SHIFT SOLENOID VALVE SL3)

CIRCUIT DESCRIPTION

Shifting from 1st to 5th is performed in combination with ”ON” and ”OFF” operation of the shift solenoid valves SL1, SL2, SL3, S4 and SR which is controlled by the ECM. If an open or short circuit occurs in either of the shift solenoid valves, the ECM controls the remaining normal shift solenoid valve to allow the vehicle to be operated smoothly (Fail safe function).

DTC No.	DTC Detection Condition	Trouble Area
P0798	ECM checks for an open or short circuit in shift solenoid valves SL3 (1-trip detection logic) ・Output signal duty equals to 100%	・Open or short in shift solenoid valve SL3 circuit ・Shift solenoid valve SL3 ・ECM

MONITOR DESCRIPTION

The ECM commands gear shifts by turning the shift solenoid valves ”ON/OFF”. When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem and illuminates the MIL and stores the DTC. And the ECM performs the fail-safe function and turns the other shift solenoid valves in good condition ”ON/OFF” (In case of an open or short circuit, the ECM stops sending current to the circuit.) (see page 05-1030).

MONITOR STRATEGY

Related DTCs	P0798: Shift solenoid valve SL3/Range check
Required sensors/Components	Shift solenoid valve SL3
Frequency of operation	Continuous
Duration	1 sec.
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever this DTC is not present.	See page 05-1007
Battery voltage	10 V or more
Ignition switch	ON
Starter	OFF

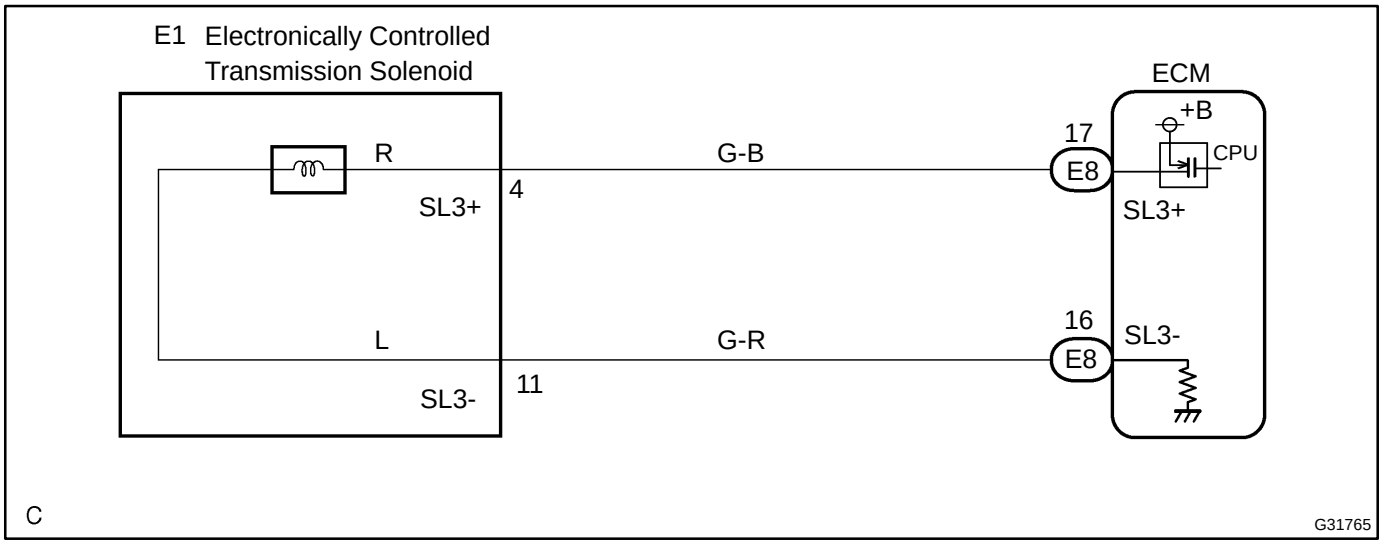
TYPICAL MALFUNCTION THRESHOLDS

Output signal duty	100%

COMPONENT OPERATING RANGE

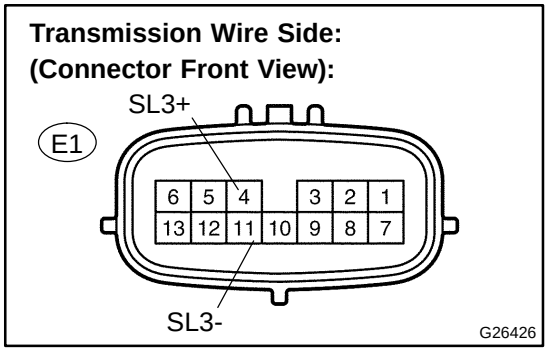
Output signal duty	Less than 100%

WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT TRANSMISSION WIRE(SL3)



(a) Disconnect the transmission wire connector from the transaxle.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition 20℃ (68℉)
4 (SL3+) - 11 (SL3-)	5.0 to 5.6 Ω

(c) Measure the resistance according to the value(s) in the table below.

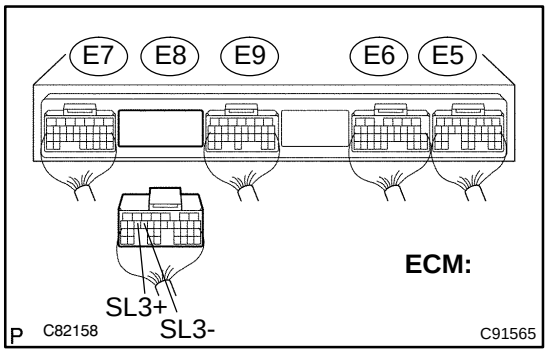
Standard (Check for short):

Tester Connection	Specified Condition
4 (SL3+) - Body ground	10 kΩ or higher
11 (SL3-) - Body ground	↑

NG → **Go to step 3**

OK

2 CHECK HARNESS AND CONNECTOR(TRANSMISSION WIRE - ECM)



(a) Connect the transmission connector to the transaxle.
(b) Disconnect the connector from the ECM.
(c) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition 20℃ (68℉)
E8 - 17 (SL3+) - E8 - 16 (SL3-)	5.0 to 5.6 Ω

(d) Measure the resistance according to the value(s) in the table below.

Standard (Check for short):

Tester Connection	Specified Condition
E8 - 17 (SL3+) - Body ground	10 kΩ or higher
E8 - 16 (SL3-) - Body ground	↑

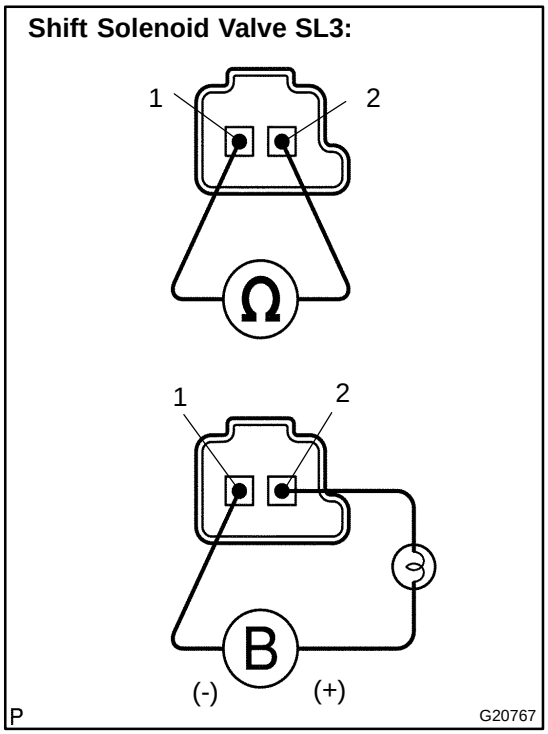
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (SEE PAGE 01-36)**

OK

REPLACE ECM (SEE PAGE 10-24)

3 INSPECT SHIFT SOLENOID VALVE(SL3)

Shift Solenoid Valve SL3:



(a) Remove the shift solenoid valve SL3.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition 20℃ (68℉)
1 - 2	5.0 to 5.6 Ω

(c) Connect the positive (+) lead with a 21 W bulb to terminal 2 and the negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.

OK:

The solenoid makes an operating noise.

NG → **REPLACE SHIFT SOLENOID VALVE(SL3)**

OK

REPAIR OR REPLACE TRANSMISSION WIRE (SEE PAGE 40-37)

DTC	P0982	SHIFT SOLENOID ”D” CONTROL CIRCUIT LOW (SHIFT SOLENOID VALVE S4)

DTC	P0983	SHIFT SOLENOID ”D” CONTROL CIRCUIT HIGH (SHIFT SOLENOID VALVE S4)

CIRCUIT DESCRIPTION

Shifting from 1st to 5th is performed in combination with ”ON” and ”OFF” operation of the shift solenoid valves SL1, SL2, SL3, S4 and SR which is controlled by the ECM. If an open or short circuit occurs in either of the shift solenoid valves, the ECM controls the remaining normal shift solenoid valve to allow the vehicle to be operated smoothly (Fail safe function).

DTC No.	DTC Detection Condition	Trouble Area
P0982	ECM detects short in solenoid valve S4 circuit 2 times when solenoid valve S4 is operated (1-trip detection logic)	⋇Short in shift solenoid valve S4 circuit ⋇Shift solenoid valve S4 ⋇ECM
P0983	ECM detects open in solenoid valve S4 circuit 2 times when solenoid valve S4 is not operated (1-trip detection logic)	⋇Open in shift solenoid valve S4 circuit ⋇Shift solenoid valve S4 ⋇ECM

MONITOR DESCRIPTION

The ECM commands gear shifts by turning the shift solenoid valves ”ON/OFF”. When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem and illuminates the MIL and stores the DTC. And the ECM performs the fail-safe function and turns the other shift solenoid valves in good condition ”ON/OFF” (In case of an open or short circuit, the ECM stops sending current to the circuit.) (see page 05-1030).

MONITOR STRATEGY

Related DTCs	P0982: Shift solenoid valve S4/Range check (Low resistance) P0983: Shift solenoid valve S4/Range check (High resistance)
Required sensors/Components	Shift solenoid valve S4
Frequency of operation	Continuous
Duration	0.064 sec.
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

P0982: Range check (Low resistance)

The monitor will run whenever this DTC is not present.	See page 05-1007
Shift solenoid valve S4	ON
Battery voltage	8 V or more
Ignition switch	ON
Starter	OFF

P0983: Range check (High resistance)

The monitor will run whenever this DTC is not present.	See page 05-1007
Shift solenoid valve S4	OFF
Battery voltage	8 V or more
Ignition switch	ON
Starter	OFF

TYPICAL MALFUNCTION THRESHOLDS

P0982: Range check (Low resistance)

Shift solenoid valve S4 resistance	8 Ω or less

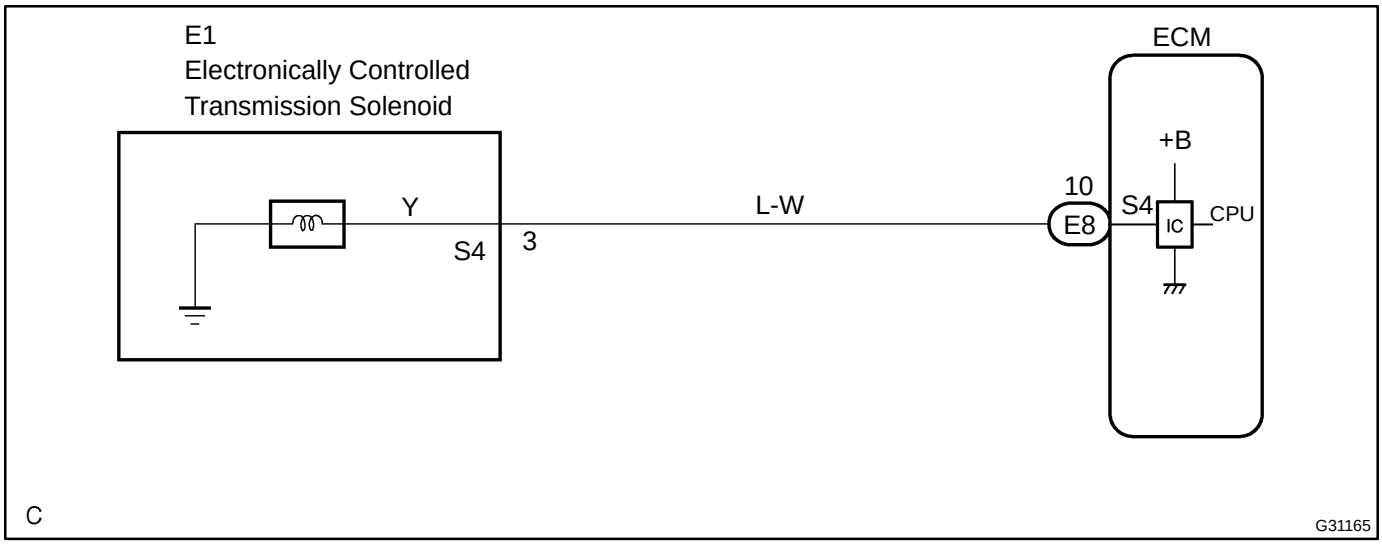
P0983: Range check (High resistance)

Shift solenoid valve S4 resistance	100 kΩ or more

COMPONENT OPERATING RANGE

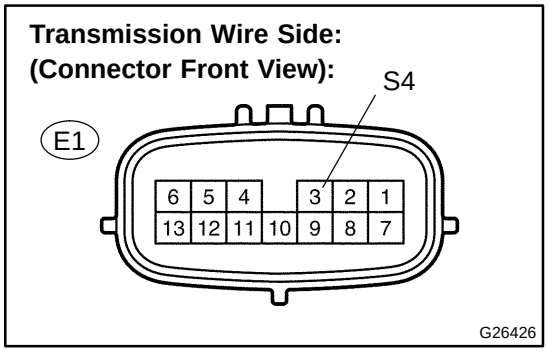
Shift solenoid valve S4	Resistance: 11 to 15 Ω at 20°C (68°F)

WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT TRANSMISSION WIRE(S4)



(a) Disconnect the transmission wire connector from the transaxle.

(b) Measure the resistance according to the value(s) in the table below.

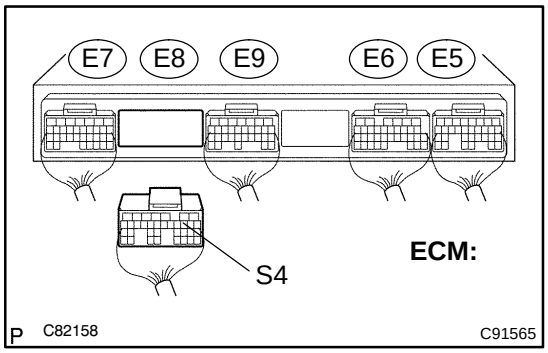
Standard:

Tester Connection	Specified Condition 20°C (68°F)
3 - Body ground	11 to 15 Ω

NG → **Go to step 3**

OK

2 CHECK HARNESS AND CONNECTOR(TRANSMISSION WIRE - ECM)



(a) Connect the transmission connector to the transaxle.
(b) Disconnect the connector from the ECM.
(c) Measure the resistance according to the value(s) in the table below.

Standard:

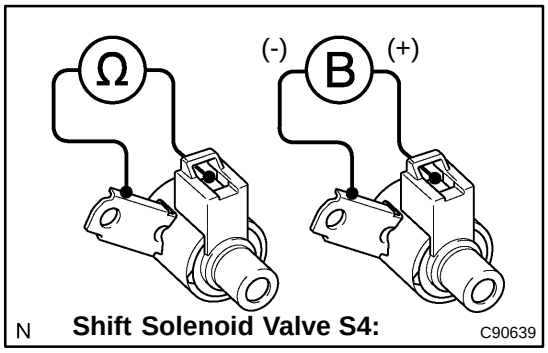
Tester Connection	Specified Condition 20℃ (68℉)
E8 - 10 (S4) - Body ground	11 to 15 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (SEE PAGE 01-36)**

OK

REPLACE ECM (SEE PAGE 10-24)

3 INSPECT SHIFT SOLENOID VALVE(S4)



(a) Remove the shift solenoid valve S4.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition 20℃ (68℉)
Solenoid Connector (S4) - Solenoid Body (S4)	11 to 15 Ω

(c) Connect positive (+) lead to the terminal of solenoid connector, negative (-) lead to the solenoid body.

OK:

The solenoid makes an operating noise.

NG → **REPLACE SHIFT SOLENOID VALVE(S4)**

OK

REPAIR OR REPLACE TRANSMISSION WIRE (SEE PAGE 40-37)

DTC	P0985	SHIFT SOLENOID ”E” CONTROL CIRCUIT LOW (SHIFT SOLENOID VALVE SR)

DTC	P0986	SHIFT SOLENOID ”E” CONTROL CIRCUIT HIGH (SHIFT SOLENOID VALVE SR)

CIRCUIT DESCRIPTION

Shifting from 1st to 5th is performed in combination with ”ON” and ”OFF” operation of the shift solenoid valves SL1, SL2, SL3, S4 and SR which is controlled by the ECM. If an open or short circuit occurs in either of the shift solenoid valves, the ECM controls the remaining normal shift solenoid valve to allow the vehicle to be operated smoothly (Fail safe function).

DTC No.	DTC Detection Condition	Trouble Area
P0985	ECM detects short in solenoid valve SR circuit 2 times when solenoid valve SR is operated (1-trip detection logic)	・Short in shift solenoid valve SR circuit ・Shift solenoid valve SR ・ECM
P0986	ECM detects open in solenoid valve SR circuit 2 times when solenoid valve SR is not operated (1-trip detection logic)	・Open in shift solenoid valve SR circuit ・Shift solenoid valve SR ・ECM

MONITOR DESCRIPTION

The ECM commands gear shifts by turning the shift solenoid valves ”ON/OFF”. When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem and illuminates the MIL and stores the DTC. And the ECM performs the fail-safe function and turns the other shift solenoid valves in good condition ”ON/OFF” (In case of an open or short circuit, the ECM stops sending current to the circuit.) (see page 05-1030).

MONITOR STRATEGY

Related DTCs	P0985: Shift solenoid valve SR/Range check (Low resistance) P0986: Shift solenoid valve SR/Range check (High resistance)
Required sensors/Components	Shift solenoid valve SR
Frequency of operation	Continuous
Duration	0.064 sec.
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

P0985: Range check (Low resistance)

The monitor will run whenever this DTC is not present.	See page 05-1007
Shift solenoid valve SR	ON
Battery voltage	8 V or more
Ignition switch	ON
Starter	OFF

P0986: Range check (High resistance)

The monitor will run whenever this DTC is not present.	See page 05-1007
Shift solenoid valve SR	OFF
Battery voltage	8 V or more
Ignition switch	ON
Starter	OFF

TYPICAL MALFUNCTION THRESHOLDS

P0985: Range check (Low resistance)

Shift solenoid valve SR resistance	8 Ω or less

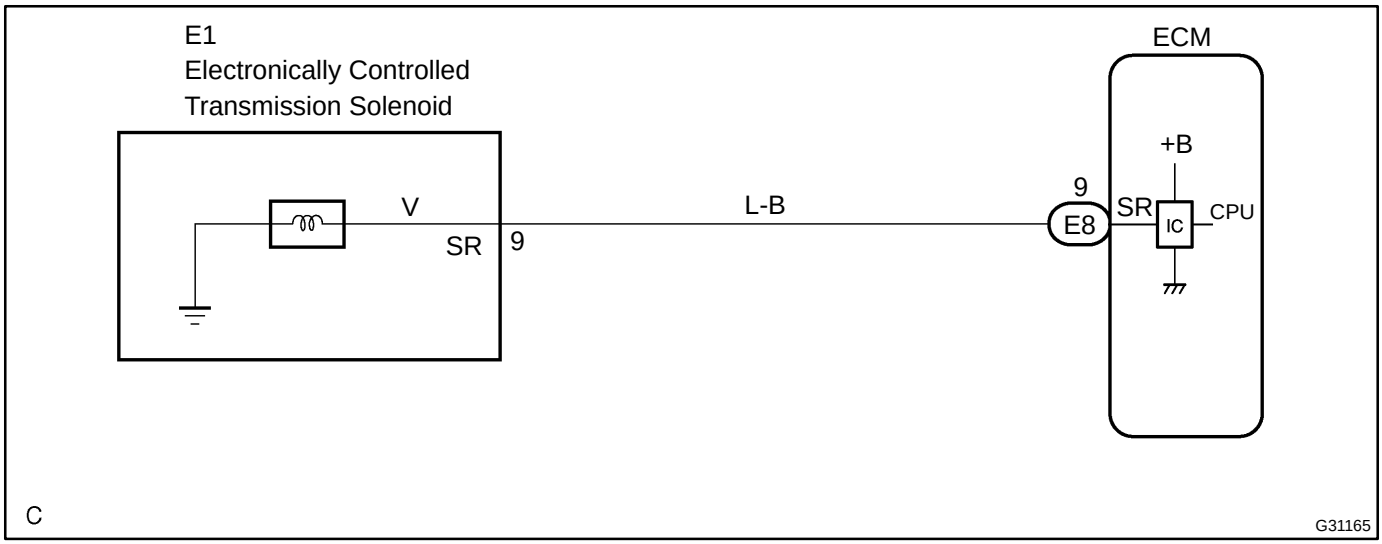
P0986: Range check (High resistance)

Shift solenoid valve SR resistance	100 kΩ or more

COMPONENT OPERATING RANGE

Shift solenoid valve SR	Resistance: 11 to 15 Ω at 20℃ (68℉)

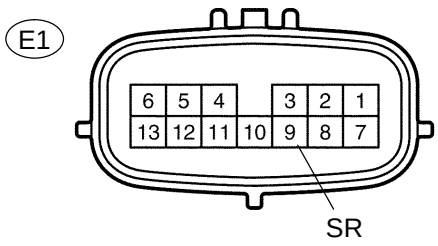
WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT TRANSMISSION WIRE(SR)

Transmission Wire Side:
(Connector Front View):



(a) Disconnect the transmission wire connector from the transaxle.

(b) Measure the resistance according to the value(s) in the table below.

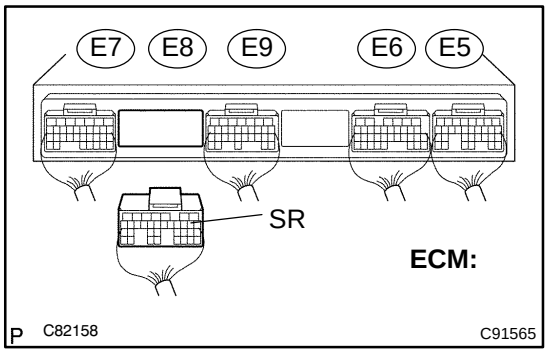
Standard:

Tester Connection	Specified Condition 20℃ (68℉)
9 - Body ground	11 to 15 Ω

NG → **Go to step 3**

OK

2 CHECK HARNESS AND CONNECTOR(TRANSMISSION WIRE - ECM)



(a) Connect the transmission connector to the transaxle.
(b) Disconnect the connector from the ECM.
(c) Measure the resistance according to the value(s) in the table below.

Standard:

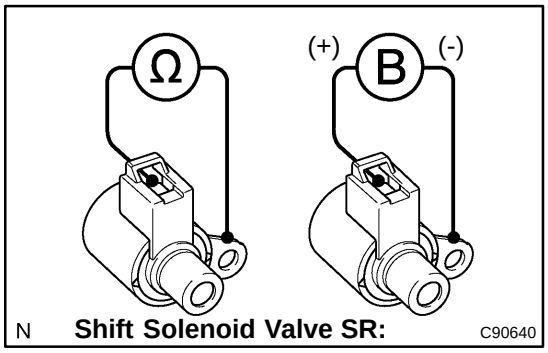
Tester Connection	Specified Condition 20℃ (68℉)
E8 - 9 (SR) - Body ground	11 to 15 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (SEE PAGE 01-36)**

OK

REPLACE ECM (SEE PAGE 10-24)

3 INSPECT SHIFT SOLENOID VALVE(SR)



(a) Remove the shift solenoid valve SR.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition 20℃ (68℉)
Solenoid Connector (SR) - Solenoid Body (SR)	11 to 15 Ω

(c) Connect positive (+) lead to the terminal of solenoid connector, negative (-) lead to the solenoid body.

OK:

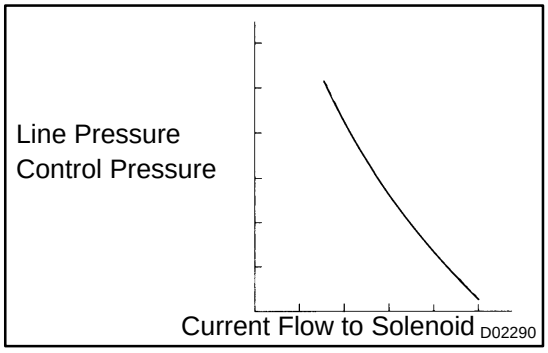
The solenoid makes an operating noise.

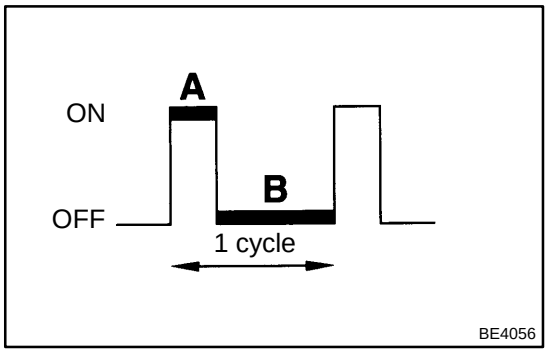
NG → **REPLACE SHIFT SOLENOID VALVE(SR)**

OK

REPAIR OR REPLACE TRANSMISSION WIRE (SEE PAGE 40-37)

DTC P2716 PRESSURE CONTROL SOLENOID "D" ELECTRICAL (SHIFT SOLENOID SLT)





CIRCUIT DESCRIPTION

The linear solenoid valve (SLT) controls the transmission line pressure for smooth transmission operation based on signals from the throttle position sensor and the vehicle speed sensor. The ECM adjusts the duty cycle of the SLT solenoid valve to control hydraulic line pressure coming from the primary regulator valve. Appropriate line pressure assures smooth shifting with varying engine outputs.

(*): Duty Ratio

The duty ratio is the ratio of the period of continuity in one cycle. For example, if A is the period of continuity in one cycle, and B is the period of non-continuity, then

Duty Ratio=A/(A+B) x 100 (%)

DTC No.	DTC Detection Condition	Trouble Area
P2716	Condition (a) or (b) below is detected 1 sec. or more: (1-trip detection logic) (a) SLT- terminal: 0V (b) SLT- terminal: 12V	⁜Open or short in shift solenoid valve SLT circuit ⁜Shift solenoid valve SLT ⁜ECM

MONITOR DESCRIPTION

When an open or short in the linear solenoid valve (SLT) circuit is detected, the ECM interprets this as a fault. The ECM will turn ON the MIL and store the DTC.

MONITOR STRATEGY

Related DTCs	P2716: Shift solenoid valve SLT/Range check
Required sensors/Components	Shift solenoid valve SLT
Frequency of operation	Continuous
Duration	1 sec.
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever this DTC is not present.	See page 05-1007
Solenoid current cut status	Not cut
Battery voltage	11 V or more
CPU commanded duty ratio to SLT	19% or more
Ignition switch	ON
Starter	OFF

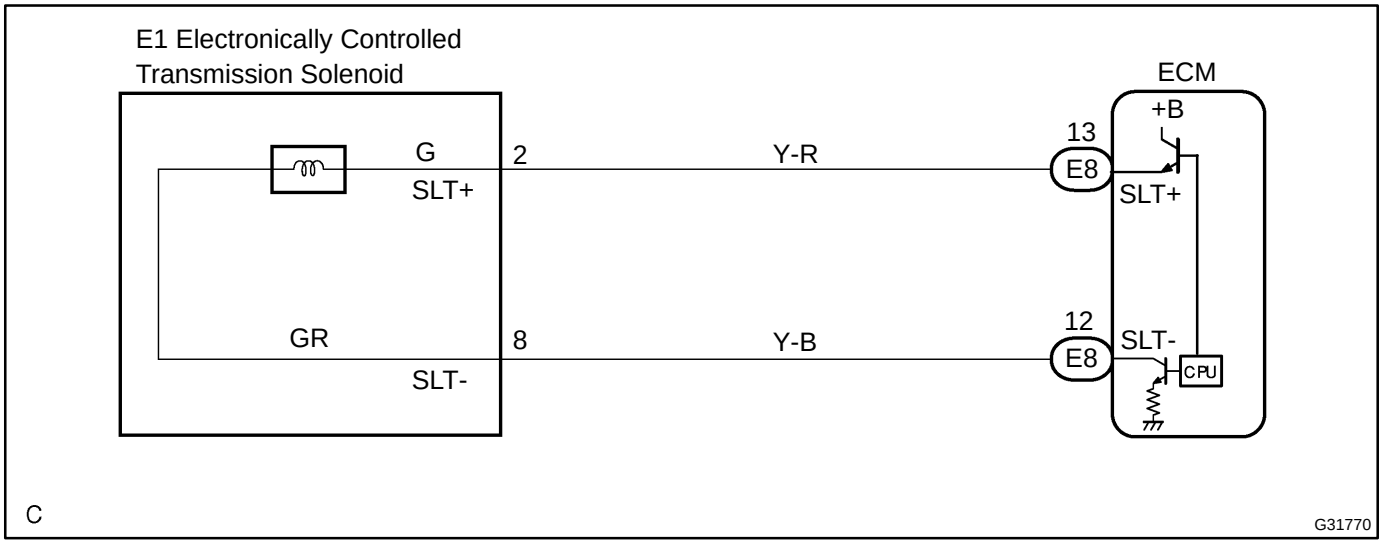
TYPICAL MALFUNCTION THRESHOLDS

Solenoid status from IC	Fail (Open or short)

COMPONENT OPERATING RANGE

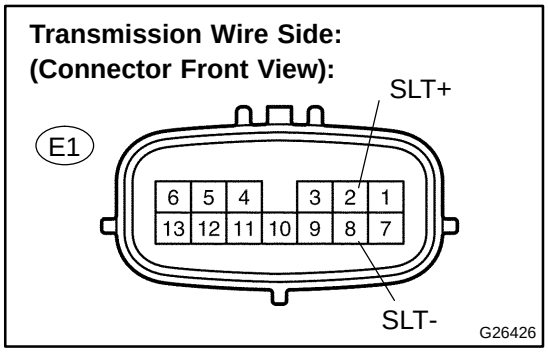
Shift solenoid valve SLT	Resistance: 5.0 to 5.6 Ω at 20℃ (68℉)

WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT TRANSMISSION WIRE(SLT)



(a) Disconnect the transmission wire connector from the transaxle.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition 20℃ (68℉)
2 (SLT+) - 8 (SLT-)	5.0 to 5.6 Ω

(c) Measure the resistance according to the value(s) in the table below.

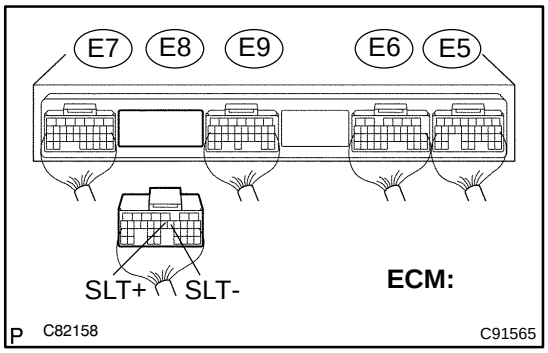
Standard (Check for short):

Tester Connection	Specified Condition
2 (SLT+) - Body ground	10 kΩ or higher
8 (SLT-) - Body ground	↑

NG → **Go to step 3**

OK

2 CHECK HARNESS AND CONNECTOR(TRANSMISSION WIRE - ECM)



(a) Connect the transmission wire connector to the transaxle.
(b) Disconnect the ECM connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition 20℃ (68℉)
E8 - 13 (SLT+) - E8 - 12 (SLT-)	5.0 to 5.6 Ω

(d) Measure the resistance according to the value(s) in the table below.

Standard (Check for short):

Tester Connection	Specified Condition
E8 - 13 (SLT+) - Body ground	10 kΩ or higher
E8 - 12 (SLT-) - Body ground	↑

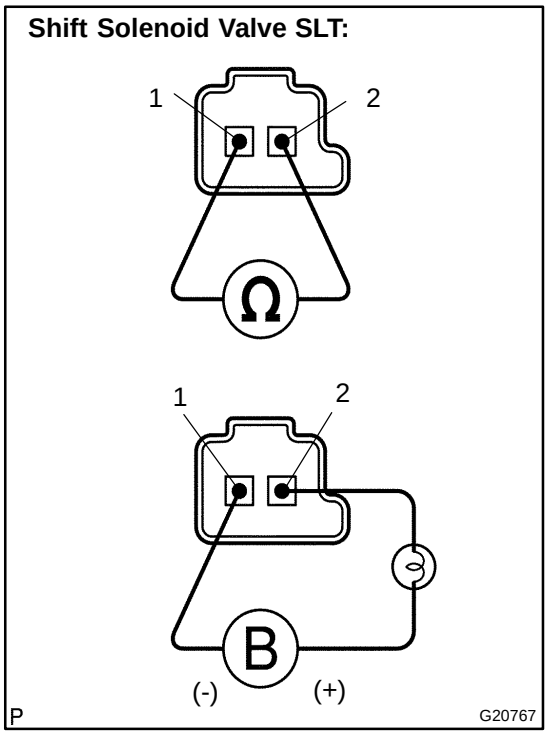
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (SEE PAGE 01-36)**

OK

REPLACE ECM (SEE PAGE 10-24)

3 INSPECT SHIFT SOLENOID VALVE(SLT)

Shift Solenoid Valve SLT:



(a) Remove the shift solenoid valve (SLT).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition 20℃ (68℉)
1 - 2	5.0 to 5.6 Ω

(c) Connect the positive (+) lead with a 21 W bulb to terminal 2 and the negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.

OK:

The solenoid makes an operating noise.

NG → **REPLACE SHIFT SOLENOID VALVE(SLT)**

OK

REPAIR OR REPLACE TRANSMISSION WIRE (SEE PAGE 40-37)

DTC	P2769	TORQUE CONVERTER CLUTCH SOLENOID CIRCUIT LOW (SHIFT SOLENOID VALVE DSL)

DTC	P2770	TORQUE CONVERTER CLUTCH SOLENOID CIRCUIT HIGH (SHIFT SOLENOID VALVE DSL)

CIRCUIT DESCRIPTION

The shift solenoid valve DSL is turned ”ON” and ”OFF” by signals from the ECM in order to control the hydraulic pressure operation, the lock-up relay valve, which then the controls operation of the lock-up clutch.

DTC No.	DTC Detection Condition	Trouble Area
P2769	ECM detects short in solenoid valve DSL circuit (0.1 sec.) when solenoid valve DSL is operated (2-trip detection logic)	・Short in shift solenoid valve DSL circuit ・Shift solenoid valve DSL ・ECM
P2770	ECM detects open in solenoid valve DSL circuit (0.1 sec.) when solenoid valve DSL is not operated (2-trip detection logic)	・Open in shift solenoid valve DSL circuit ・Shift solenoid valve DSL ・ECM

MONITOR DESCRIPTION

Torque converter lock-up is controlled by the ECM based on engine rpm, engine load, engine temperature, vehicle speed, transmission temperature, and shift range selection. The ECM determines the lock-up status of the torque converter by comparing the engine rpm (NE) to the input turbine rpm (NT). The ECM calculates the actual transmission gear by comparing input turbine rpm (NT) to counter gear rpm (NC). When conditions are appropriate, the ECM requests ”lock-up” by applying control voltage to shift solenoid DSL. When the DSL is opened, solenoid DSL applies pressure to the lock-up relay valve and locks the torque converter clutch. If the ECM detects an open or short in the DSL solenoid circuit, the ECM interprets this as a fault in the DSL solenoid or circuit. The ECM will turn on the MIL and store the DTC.

MONITOR STRATEGY

Related DTCs	P2769: Shift solenoid valve DSL/Range check (Low resistance) P2770: Shift solenoid valve DSL/Range check (High resistance)
Required sensors/Components	Shift solenoid valve DSL
Frequency of operation	Continuous
Duration	0.064 sec.
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

P2769: Range check (Low resistance)

The monitor will run whenever this DTC is not present.	See page 05-1007
Shift solenoid valve DSL	ON
Solenoid current cut status	Not cut
Battery voltage	8 V or more
Ignition switch	ON
Starter	OFF

P2770: Range check (High resistance)

The monitor will run whenever this DTC is not present.	See page 05-1007
Shift solenoid valve DSL	ON
Battery voltage	8 V or more
Ignition switch	ON
Starter	OFF

TYPICAL MALFUNCTION THRESHOLDS

P2769: Range check (Low resistance)

Shift solenoid valve DSL resistance	8 Ω or less

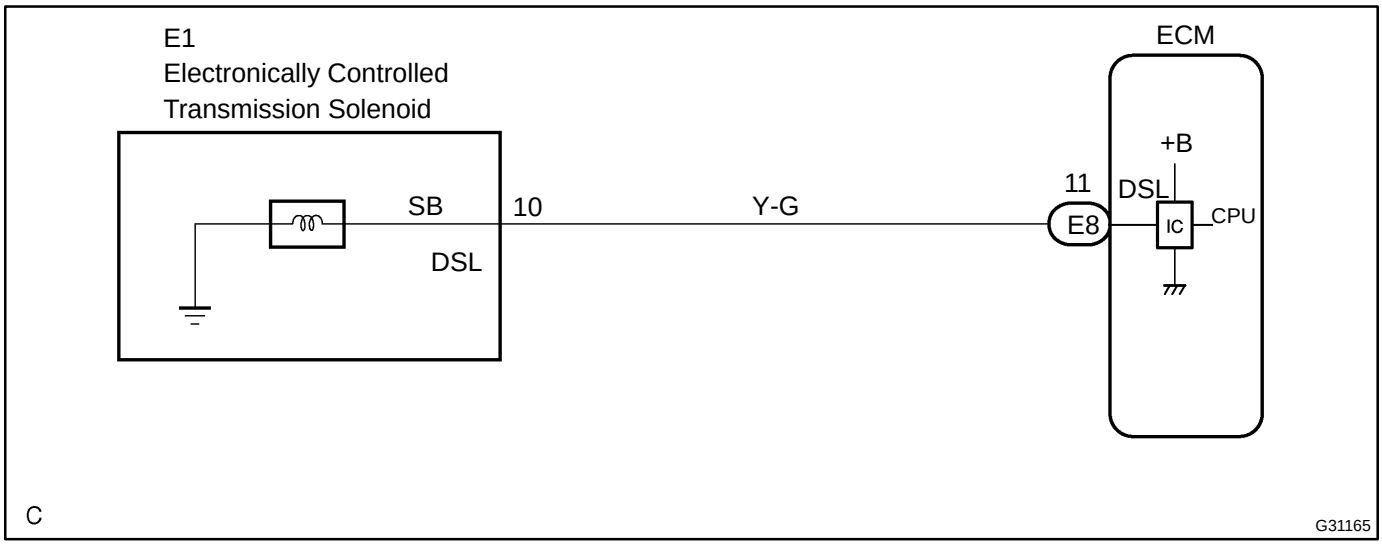
P2770: Range check (High resistance)

Shift solenoid valve DSL resistance	100 kΩ or more

COMPONENT OPERATING RANGE

Shift solenoid valve DSL	Resistance: 11 to 13 Ω at 20℃ (68℉)

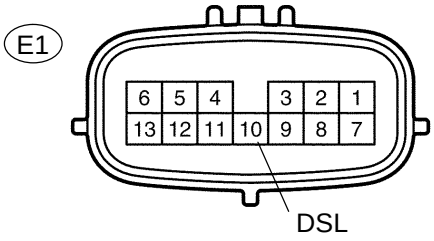
WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT TRANSMISSION WIRE(DSL)

Transmission Wire Side:
(Connector Front View):



(a) Disconnect the transmission wire connector from the transaxle.

(b) Measure the resistance according to the value(s) in the table below.

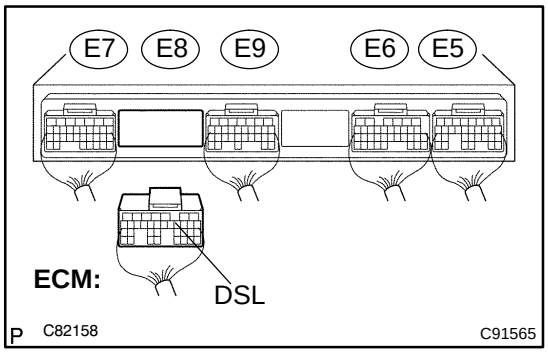
Standard:

Tester Connection	Specified Condition 20℃ (68℉)
10 - Body ground	11 to 13 Ω

NG → **Go to step 3**

OK

2 CHECK HARNESS AND CONNECTOR(TRANSMISSION WIRE - ECM)



(a) Connect the transmission wire connector.
(b) Disconnect the ECM connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard:

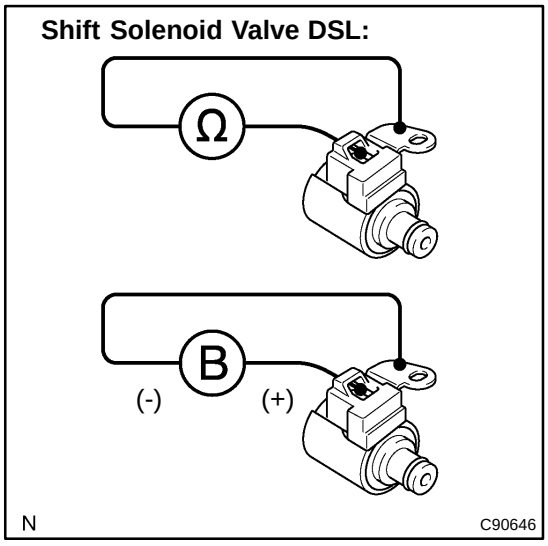
Tester Connection	Specified Condition 20℃ (68℉)
E8 - 11 (DSL) - Body ground	11 to 13 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (SEE PAGE 01-36)**

OK

REPLACE ECM (SEE PAGE 10-24)

3 INSPECT SHIFT SOLENOID VALVE(DSL)



(a) Remove the shift solenoid valve DSL.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition 20℃ (68℉)
Solenoid Connector (DSL) - Solenoid Body (DSL)	11 to 13 Ω

(c) Connect positive (+) lead to the terminal of solenoid connector, negative (-) lead to the solenoid body.

OK:

The solenoid valve makes an operating noise.

NG → **REPLACE SHIFT SOLENOID VALVE(DSL)**

OK

REPAIR OR REPLACE TRANSMISSION WIRE (SEE PAGE 40-37)

05EJV-07

ROAD TEST

1. PROBLEM SYMPTOM CONFIRMATION

(a) Based on the result of the customer problem analysis, try to reproduce the symptoms. If the problem is that the transaxle does not shift up, shift down, or the shift point is too high or too low, conduct the following road test referring to the automatic shift schedule and simulate the problem symptoms.

2. ROAD TEST

NOTICE:

Perform the test at the ATF (Automatic Transmission Fluid) temperature 50 to 80˚C (122 to 176˚F) in the normal operation.

(a) D position test:

Shift into the D position and fully depress the accelerator pedal and check the following points.

(1) Check up-shift operation.

Check that 1 → 2, 2 → 3, 3 → 4 and 4 → 5th up-shifts take place, and that the shift points conform to the automatic shift schedule (see page 03-51).

HINT:

5th Gear Up-shift Prohibition Control

- Engine coolant temperature is 68 ˚C (154 ˚F) or less and vehicle speed is at 70 km/h (43 mph) or less.
- ATF temperature is -2 ˚C (28 ˚F) or less.

4th Gear Up-shift Prohibition Control

- Engine coolant temperature is 65 ˚C (149 ˚F) or less and vehicle speed is at 55 km/h (34 mph) or less.

5th and 4th Gear Lock-up Prohibition Control

- Brake pedal is depressed.
- Accelerator pedal is released.
- Engine coolant temperature is 60 ˚C (140 ˚F) or less.

(2) Check for shift shock and slip.

Check for shock and slip at the 1 → 2, 2 → 3, 3 → 4 and 4 → 5th up-shifts.

(3) Check for abnormal noise and vibration.

Check for abnormal noise and vibration when up-shifting from 1 → 2, 2 → 3, 3 → 4 and 4 → 5 while driving with the shift lever in the D position, and check while driving in the lock-up condition.

HINT:

The check for the cause of abnormal noise and vibration must be done thoroughly as it could also be due to loss of balance in the differential, torque converter clutch, etc.

(4) Check kick-down operation.

Check vehicle speeds when the 2nd to 1st, 3rd to 2nd, 4th to 3rd, and 5th to 4th kick-downs take place while driving with the shift lever in the D position. Confirm that each speed is within the applicable vehicle speed range indicated in the automatic shift schedule (see page 03-51).

(5) Check abnormal shock and slip at kick-down.

(6) Check the lock-up mechanism.

- Drive in D position (5th gear), at a steady speed (lock-up ON).
- Lightly depress the accelerator pedal and check that the engine speed does not change abruptly.

HINT:

- There is no lock-up function in the 1st, 2nd and 3rd gear.
- 4th lock-up operates while uphill-downhill control is active in the D position.
- If there is a big jump in engine speed, there is no lock-up.

(b) 4 position (O/D OFF) test:

Shift into the 4 position and fully depress the accelerator pedal and check the following points.

(1) Check up-shift operation.

Check that the 1 → 2, 2 → 3 and 3 → 4 up-shift takes place and that the shift point conforms to the automatic shift schedule (see page 03-51).

HINT:

There is no 5th up-shift in the 4 position.

(2) Check engine braking.

While driving in the 4 position and 4th gear, release the accelerator pedal and check the engine braking effect.

(3) Check for abnormal noises during acceleration and deceleration, and for shock at up-shift and down-shift.

(c) 3 position test:

Shift into the 3 position and fully depress the accelerator pedal and check the following points.

(1) Check up-shift operation.

Check that the 1 → 2 and 2 → 3 up-shift takes place and that the shift point conforms to the automatic shift schedule (see page 03-51).

HINT:

There is no 4th up-shift and lock-up in the 3 position.

(2) Check engine braking.

While running in the 3 position and 3rd gear, release the accelerator pedal and check the engine braking effect.

(3) Check for abnormal noises during acceleration and deceleration, and for shock at up-shift and down-shift.

(d) 2 position test:

Shift into the 2 position and fully depress the accelerator pedal and check the following points.

(1) Check up-shift operation.

Check that the 1 → 2 up-shift takes place and that the shift point conforms to the automatic shift schedule (see page 03-51).

HINT:

There is no 3rd up-shift and lock-up in the 2 position.

(2) Check engine braking.

While running in the 2 position and 2nd gear, release the accelerator pedal and check the engine braking effect.

(3) Check for abnormal noises during acceleration and deceleration, and for shock at up-shift and down-shift.

(e) L position test:

Shift into the L position and fully depress the accelerator pedal and check the following points.

(1) Check no up-shift.

While running in the L position, check that there is no up-shift to 2nd gear.

HINT:

There is no lock-up in the L position.

(2) Check engine braking.

While running in the L position, release the accelerator pedal and check the engine braking effect.

(3) Check for abnormal noises during acceleration and deceleration.

(f) R position test:
Shift into the R position, lightly depress the accelerator pedal, and check that the vehicle moves backward without any abnormal noise or vibration.

CAUTION:
Before conducting this test ensure that the test area is free from people and obstruction.

(g) P position test:
Stop the vehicle on a grade (more than 5˚) and after shifting into the P position, release the parking brake. Then, check that the parking lock pawl holds the vehicle in place.

(h) Uphill/downhill control function test:
(1) Check that the gear does not up-shift to the 4th or 5th gear while the vehicle is driving uphill.
(2) Check that the gear automatically down-shifts from the 5th to 4th or from the 4th to 3rd gear when brake is applied while the vehicle is driving downhill.

05EJU-06

SYSTEM DESCRIPTION

1. SYSTEM DESCRIPTION

(a) The ECT (Electronic controlled automatic transmission/transaxle) is an automatic transmission/transaxle that electronically controls shift timing using the ECM. The ECM detects electrical signals that indicate engine and driving conditions, controls the shift point, and selects the appropriate shift pattern based on driver habits and road conditions. As a result, fuel efficiency and power transmission/transaxle performance are improved.

Shift shock has been reduced by controlling the engine and transmission/transaxle simultaneously.

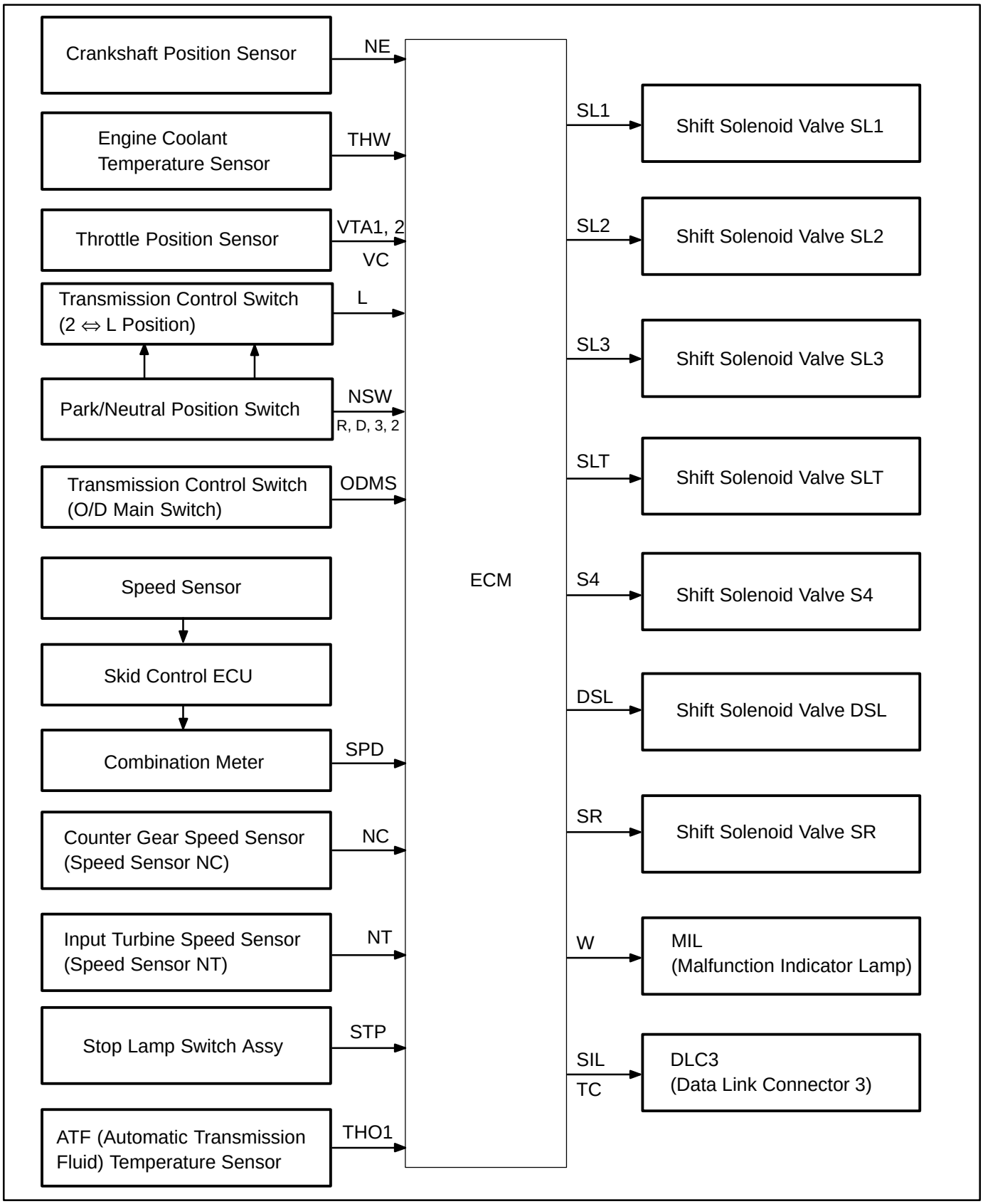
In addition, the ECT has the following features:

- Diagnostic function.
- Fail-safe function when a malfunction occurs.

05EJT-05

SYSTEM DIAGRAM

The configuration of the electronic control system in the U151E/U151F automatic transaxles is as shown in the following chart.



05EK8-06

PART AND SYSTEM NAME LIST

This reference list indicates the part names used in this manual along with their definitions.

Part and system name	Definition
Toyota HCAC system, Hydrocarbon adsorptive Catalyst (HCAC) system, HC adsorptive three-way catalyst	HC adsorptive three-way catalytic converter
Variable Valve Timing sensor, VVT sensor	Camshaft position sensor
Variable valve timing system, VVT system	Camshaft timing control system
Camshaft timing oil control valve, Oil control valve OCV, VVT, VSV	Camshaft timing oil control valve
Variable timing and lift, VVTL	Camshaft timing and lift control
Crankshaft position sensor ”A”	Crankshaft position sensor
Engine speed sensor	Crankshaft position sensor
THA	Intake air temperature
Knock control module	Engine knock control module
Knock sensor	Engine knock sensor
Mass or volume air flow circuit	Mass air flow sensor circuit
Vacuum sensor	Manifold air pressure sensor
Internal control module, Control module, Engine control ECU, PCM	Power train control module
FC idle	Deceleration fuel cut
Idle air control valve	Idle speed control
VSV for CCV, Canister close valve VSV for canister control	Evaporative emissions canister vent valve
VSV for EVAP, Vacuum switching valve assembly No. 1, EVAP VAV, Purge VSV	Evaporative emissions canister purge valve
VSV for pressure switching valve, Bypass VSV	Evaporative emission pressure switching valve
Vapor pressure sensor, EVAP pressure sensor, Evaporative emission control system pressure sensor	Fuel tank pressure sensor
Charcoal canister	Evaporative emissions canister
ORVR system	On-boad refueling vapor recovery system
Intake manifold runner control	Intake manifold tuning system
Intake manifold runner valve, IMRV, IACV (runner valve)	Intake manifold tuning valve
Intake control VSV	Intake manifold tuning solenoid valve
AFS	Air fuel ratio sensor
O2 sensor	Heater oxygen sensor
Oxygen sensor pumping current circuit	Oxygen sensor output signal
Oxygen sensor reference ground circuit	Oxygen sensor signal ground
Accel position sensor	Accelerator pedal position sensor
Throttle actuator control motor, Actuator control motor, Electronic throttle motor, Throttle control motor	Electronic throttle actuator
Electronic throttle control system, Throttle actuator control system	Electronic throttle control system
Throttle/pedal position sensor, Throttle/pedal position switch, Throttle position sensor/switch	Throttle position sensor
Turbo press sensor	Turbocharger pressure sensor
Turbo VSV	Turbocharger pressure control solenoid valve
P/S pressure switch	Power-steering pressure switch
VSV for ACM	Active control engine mount
Speed sensor, Vehicle speed sensor ”A”, Speed sensor for skid control ECU	Vehicle speed sensor
ATF temperature sensor, Trans. fluid temp. sensor, ATF temperature sensor ”A”	Transmission fluid temperature sensor
Electronic controlled automatic transmission, ECT	Electronically controlled automatic
Intermediate shaft speed sensor ”A”	Counter gear speed sensor

Part and system name	Definition
Output speed sensor	Output shaft speed sensor
Input speed sensor, Input turbine speed sensor ”A”, Speed sensor (NT), Turbine speed sensor	Input turbine speed sensor
PNP switch, NSW	Park/neutral position switch
Pressure control solenoid	Transmission pressure control solenoid
Shift solenoid	Transmission shift solenoid valve
Transmission control switch, Shift lock control unit	Shift lock control module
Engine immobilizer system, Immobilizer system	Vehicle anti-theft system

0527I-44

CUSTOMER PROBLEM ANALYSIS CHECK

Automatic Transaxle System Check Sheet	Inspector's Name :

Customer's Name		VIN	
		Production Date	/ /
		Licence plate No.	
Date Vehicle Brought In	/ /	Odometer Reading	km mile

Date Problem Occurred	/ /
How Often Does Problem Occur?	☐ Continuous ☐ Intermittent (times a day)

Symptoms	☐ Vehicle does not move (☐ Any position ☐ particular position)
	☐ No up-shift (☐ 1st → 2nd ☐ 2nd → 3rd ☐ 3rd → 4th ☐ 4th → 5th)
	☐ No down-shift (☐ 5th → 4th ☐ 4th → 3rd ☐ 3rd → 2nd ☐ 2nd → 1st)
	☐ Lock-up malfunction
	☐ Shift point too high or too low
	☐ Harsh engagement (☐ N → D ☐ Lock-up ☐ Any drive position)
	☐ Slip or shudder
	☐ No kick-down
	☐ Others ( )

Check Item	Malfunction Indicator Lamp	☐ Normal ☐ Remains ON

DTC Check	1st Time	☐ Normal code ☐ Malfunction code (DTC)
	2nd Time	☐ Normal code ☐ Malfunction code (DTC)

0527K-49

DIAGNOSTIC TROUBLE CODE CHART

If a DTC is displayed during the DTC check, check the parts listed in the table below and proceed to the page given.

HINT:

- ○ *1 : ⚹ ... MIL (Malfunction Indicator Lamp) light up
- ○ *2 : ... Mark means ECM memorizes the malfunction code if the ECM detects the DTC detection condition.
- ○ This DTC may be output when the clutch, brake and gear components etc. inside the automatic transaxle are damaged.

DTC No. (See Page)	Detection Item	Trouble Area	MIL *1	Memory *2
P0500 (05-578)	Vehicle Speed Sensor "A"	○Combination meter ○Open or short in vehicle speed sensor circuit ○Vehicle speed sensor ○ECM	⚹	
P0705 (05-1036)	Transmission Range Sensor Circuit Malfunction (PRNDL Input)	○Open or short in park/neutral position switch circuit ○Park/neutral position switch ○ECM	⚹	
P0710 (05-1042)	Transmission Fluid Temperature Sensor "A" Circuit	○Open or short in ATF temperature sensor circuit ○Transmission wire (ATF temperature sensor) ○ECM	⚹	
P0711 (05-1046)	Transmission Fluid Temperature Sensor "A" Performance	○Open or short in ATF temperature sensor circuit ○Transmission wire (ATF temperature sensor) ○ECM	⚹	
P0712 (05-1042)	Transmission Fluid Temperature Sensor "A" Circuit Low Input	○Short in ATF temperature sensor circuit ○Transmission wire (ATF temperature sensor) ○ECM	⚹	
P0713 (05-1042)	Transmission Fluid Temperature Sensor "A" Circuit High Input	○Open in ATF temperature sensor circuit ○Transmission wire (ATF temperature sensor) ○ECM	⚹	
P0717 (05-1049)	Turbine Speed Sensor Circuit No Signal	○Open or short in transmission revolution sensor NT (speed sensor NT) circuit ○Transmission revolution sensor NT (speed sensor NT) ○ECM ○Automatic transaxle assembly	⚹	
P0724 (05-1052)	Brake Switch "B" Circuit High	○Short in stop light switch signal circuit ○Stop light switch ○ECM	⚹	
P0741 (05-1056)	Torque Converter Clutch Solenoid Performance (Shift Solenoid Valve DSL)	○Shift solenoid valve DSL remains open or closed ○Valve body is blocked ○Shift solenoid valve DSL ○Torque converter clutch ○Automatic transaxle (clutch, brake or gear etc.) ○Line pressure is too low ○ECM	⚹	
P0746 (05-1061)	Pressure Control Solenoid "A" Performance (Shift Solenoid Valve SL1)	○Shift solenoid valve SL1 remains open or closed ○Valve body is blocked ○Shift solenoid valve SL1 ○Automatic transaxle (clutch, brake or gear etc.) ○ECM	⚹	
P0748 (05-1065)	Pressure Control Solenoid "A" Electrical (Shift Solenoid Valve SL1)	○Open or short in shift solenoid valve SL1 circuit ○Shift solenoid valve SL1 ○ECM	⚹	

P0766 (05-1068)	Shift Solenoid "D" Performance (Shift Solenoid Valve S4)	○Shift solenoid valve S4 remains open or closed ○Valve body is blocked ○Shift solenoid valve S4 ○Automatic transaxle (clutch, brake or gear etc.) ○ECM	✳	
P0771 (05-1072)	Shift Solenoid "E" Performance (Shift Solenoid Valve SR)	○Shift solenoid valve SR remains open or closed ○Valve body is blocked ○Shift solenoid valve SR ○Automatic transaxle (clutch, brake or gear etc.) ○ECM	✳	
P0776 (05-1077)	Pressure Control Solenoid "B" Performance (Shift Solenoid Valve SL2)	○Shift solenoid valve SL2 remains open or closed ○Valve body is blocked ○Shift solenoid valve SL2 ○Automatic transaxle (clutch, brake or gear etc.) ○ECM	✳	
P0778 (05-1082)	Pressure Control Solenoid "B" Electrical (Shift Solenoid Valve SL2)	○Open or short in shift solenoid valve SL2 circuit ○Shift solenoid valve SL2 ○ECM	✳	
P0793 (05-1085)	Intermediate Shaft Speed Sensor "A"	○Open or short in transmission revolution sensor NC (speed sensor NC) circuit ○Transmission revolution sensor NC (speed sensor NC) ○ECM	✳	
P0796 (05-1089)	Pressure Control Solenoid "C" Performance (Shift Solenoid Valve SL3)	○Shift solenoid valve SL3 remains open or closed ○Valve body is blocked ○Shift solenoid valve SL3 ○Automatic transaxle (clutch, brake or gear etc.) ○ECM	✳	
P0798 (05-1094)	Pressure Control Solenoid "C" Electrical (Shift Solenoid Valve SL3)	○Open or short in shift solenoid valve SL3 circuit ○Shift solenoid valve SL3 ○ECM	✳	
P0982 (05-1097)	Shift Solenoid "D" Control Circuit Low (Shift Solenoid Valve S4)	○Short in shift solenoid valve S4 circuit ○Shift solenoid valve S4 ○ECM	✳	
P0983 (05-1097)	Shift Solenoid "D" Control Circuit High (Shift Solenoid Valve S4)	○Open in shift solenoid valve S4 circuit ○Shift solenoid valve S4 ○ECM	✳	
P0985 (05-1100)	Shift Solenoid "E" Control Circuit Low (Shift Solenoid Valve SR)	○Short in shift solenoid valve SR circuit ○Shift solenoid valve SR ○ECM	✳	
P0986 (05-1100)	Shift Solenoid "E" Control Circuit High (Shift Solenoid Valve SR)	○Open in shift solenoid valve SR circuit ○Shift solenoid valve SR ○ECM	✳	
P2716 (05-1103)	Pressure Control Solenoid "D" Electrical (Shift Solenoid Valve SLT)	○Open or short in shift solenoid valve SLT circuit ○Shift solenoid valve SLT ○ECM	✳	
P2769 (05-1106)	Torque Converter Clutch Solenoid Circuit Low (Shift Solenoid Valve DSL)	○Short in shift solenoid valve DSL circuit ○Shift solenoid valve DSL ○ECM	✳	
P2770 (05-1106)	Torque Converter Clutch Solenoid Circuit High (Shift Solenoid Valve DSL)	○Open in shift solenoid valve DSL circuit ○Shift solenoid valve DSL ○ECM	✳	

0527H-45

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- The ECM of this system is connected to the multiplex communication system. Therefore, before starting troubleshooting, make sure to check that there is no trouble in the multiplex communication system.
- The hand-held tester can be used at steps 3, 4, 6, and 9.

1	**Vehicle Brought to Workshop**

2	**Customer Problem Analysis (SEE PAGE 05-996)**

3	**Connect the OBD II scan tool or hand-held tester to DLC3**

4	**Check and Clear DTC and Freeze Frame Data (SEE PAGE 05-1026)**

5	**Visual Inspection**

6	**Setting the Check Mode Diagnosis (SEE PAGE 05-1028)**

7	**Problem Symptom Confirmation (SEE PAGE 05-997)**

- **Symptom does not occur: Go to step 8**
- **Symptom occur: Go to step 9**

8	**Symptom Simulation (SEE PAGE 01-26)**

9	**DTC Check (SEE PAGE 05-1026)**

- **DTC is not output: Go to step 10**
- **DTC is output: Go to step 17**

10	Basic Inspection (SEE PAGE 40-2 , 40-1 1 and 40-71)

NG → Go to step 19

OK

11	Mechanical System Test (SEE PAGE 05-1000)

NG → Go to step 16

OK

12	Hydraulic Test (SEE PAGE 05-1002)

NG → Go to step 16

OK

13	Manual Shifting Test (SEE PAGE 05-1004)

NG → Go to step 15

OK

14	Problem Symptoms Table Chapter 1 (SEE PAGE 05-1016)

NG → Go to step 18

OK

15	Problem Symptoms Table Chapter 2 (SEE PAGE 05-1016)

16	Part Inspection

→ Go to step 19

17	DTC Chart (SEE PAGE 05-1034)

18	Circuit Inspection

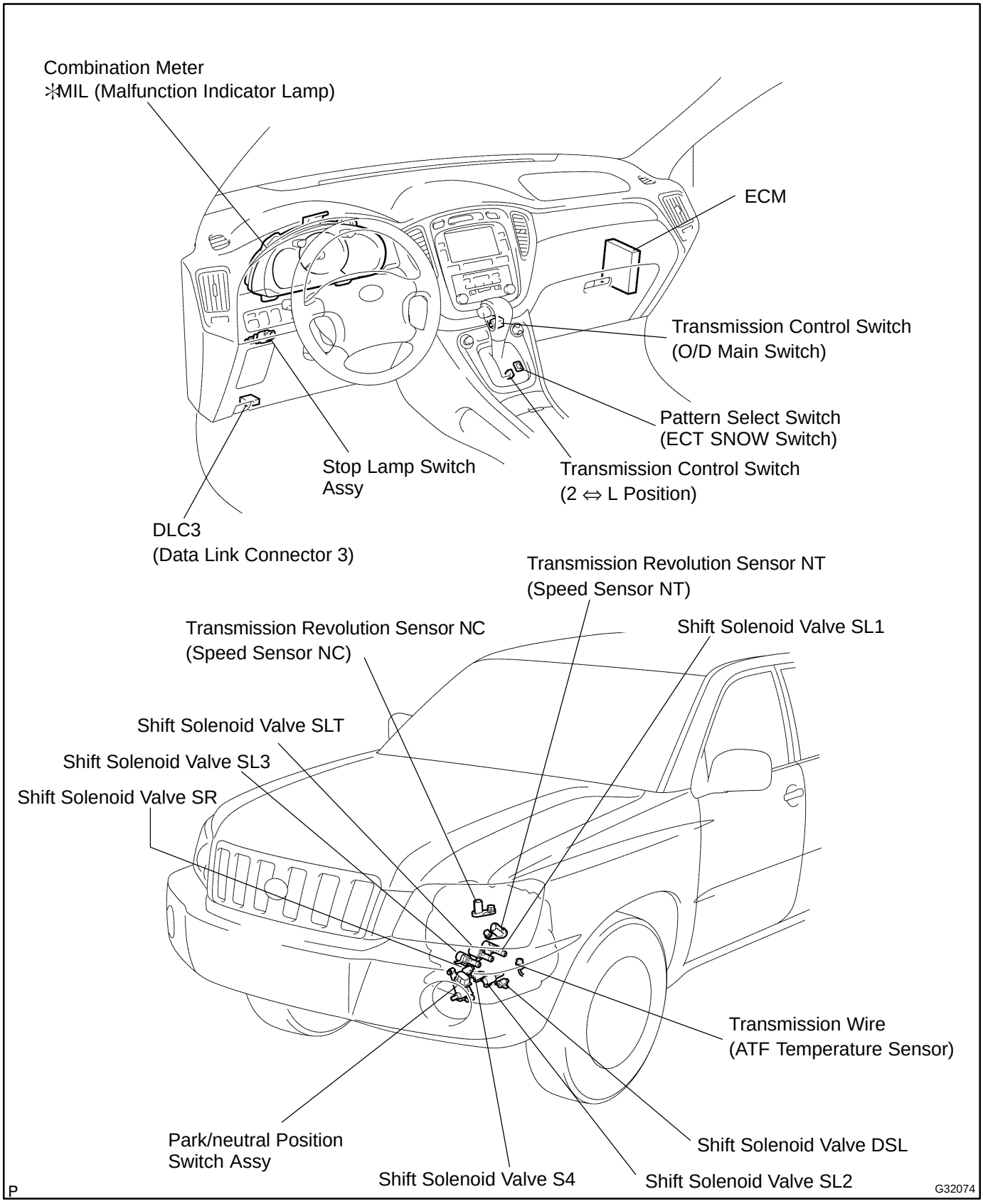
19	**Repair or Replace**

20	**Confirmation Test**

End

0527L-45

LOCATION



ELECTRONIC CONTROLLED AUTOMATIC TRANSAXLE [ECT] (U151E/U151F)

05C0T-30

PRECAUTION

NOTICE:

Perform the RESET MEMORY (AT initialization) when replacing the automatic transaxle assy, engine assy or ECM (see page 05-1005).

HINT:

Initialization can not be completed by only disconnecting the battery terminal.

0527M-48

PROBLEM SYMPTOMS TABLE

HINT:

If a normal code is displayed during the diagnostic trouble code check although the trouble still occurs, check the electrical circuits for each symptom in the order given in the charts on the following pages and proceed to the page given for troubleshooting.

The Matrix Chart is divided into 2 chapters.

1. Chapter 1: Electronic Circuit Matrix Chart

- ○ Refer to the table below when the trouble cause is considered to be electrical.
- ○ If the instruction "Proceed to next circuit inspection shown on matrix chart" is given in the flow chart of each circuit, proceed to the circuit with the next highest number in the table to continue the check.
- ○ If the trouble still occurs even though there are no abnormalities in any of the other circuits, check and replace the ECM.

HINT:

*1: When the circuit on which mark *1 is attached is a malfunction, DTC could be output (see page 05-1026).

Symptom	Suspect Area	See page
No down-shift (A particular gear, from 1st to 4th gear, is not down-shifted)	1. Shift solenoid valve (SL1) circuit *1 2. Shift solenoid valve (SL2) circuit *1 3. Shift solenoid valve (SL3) circuit *1 4. Shift solenoid valve (SR) circuit *1 5. ECM	05-1061 05-1077 05-1089 05-1072 01-36
No down-shift (5th → 4th)	1. Transmission control switch (O/D OFF) circuit 2. Shift solenoid valve (S4) circuit *1 3. ECM	05-1109 05-1068 01-36
No up-shift (A particular gear, from 1st to 4th gear, is not up-shifted)	1. Shift solenoid valve (SL1) circuit *1 2. Shift solenoid valve (SL2) circuit *1 3. ECM	05-1061 05-1077 01-36
No up-shift (4th → 5th)	1. Transmission control switch (O/D OFF) circuit 2. Shift solenoid valve (S4) circuit *1 3. ECM	05-1109 05-1068 01-36
No lock-up	1. Shift solenoid valve (DSL) circuit *1 2. Stop light switch circuit *1 3. Engine coolant temp. sensor circuit *1 4. ECM	05-1056 05-1052 05-412 01-36
No lock-up off	1. Shift solenoid valve (DSL) circuit *1 2. ECM	05-1056 01-36
Shift point too high or too low	1. Throttle position sensor circuit *1 2. Shift solenoid valve (SLT) circuit *1 3. ECM	05-412 05-1103 01-36
Up-shift to 5th from 4th while shift lever is D (O/D OFF) position	1. Transmission control switch (O/D OFF) circuit 2. ECM	05-1109 01-36
Up-shift to 5th from 4th while engine is cold	1. Engine coolant temp. sensor circuit *1 2. ECM	05-412 01-36
Up-shift to 2nd from 1st while shift lever is L position	1. Transmission control switch (2 ⇔ L position) circuit *1 2. ECM	05-1036 01-36
Harsh engagement (N → D)	1. Shift solenoid valve (SL1) circuit *1 2. ECM	05-1061 01-36
Harsh engagement (Lock-up)	1. Shift solenoid valve (SL2) circuit *1 2. ECM	05-1077 01-36
Harsh engagement (Any driving position)	1. Shift solenoid valve (SLT) circuit *1 2. ECM	05-1103 01-36

Poor acceleration	1. Shift solenoid valve (SLT) circuit *1 2. ECM	05-1103 01-36
No kick-down	ECM	01-36
Engine stalls when starting off or stopping	1. Shift solenoid valve (DSL) circuit *1 2. ECM	05-1056 01-36
Malfunction in shifting	1. Park/neutral position switch circuit *1 2. Transmission control switch (O/D OFF) circuit 3. ECM	05-1036 05-1109 01-36

2. Chapter 2: On-Vehicle Repair and Off-Vehicle Repair (✳: U151E, U151F AUTOMATIC TRANSAXLE Repair Manual Pub. No. RM1021U)

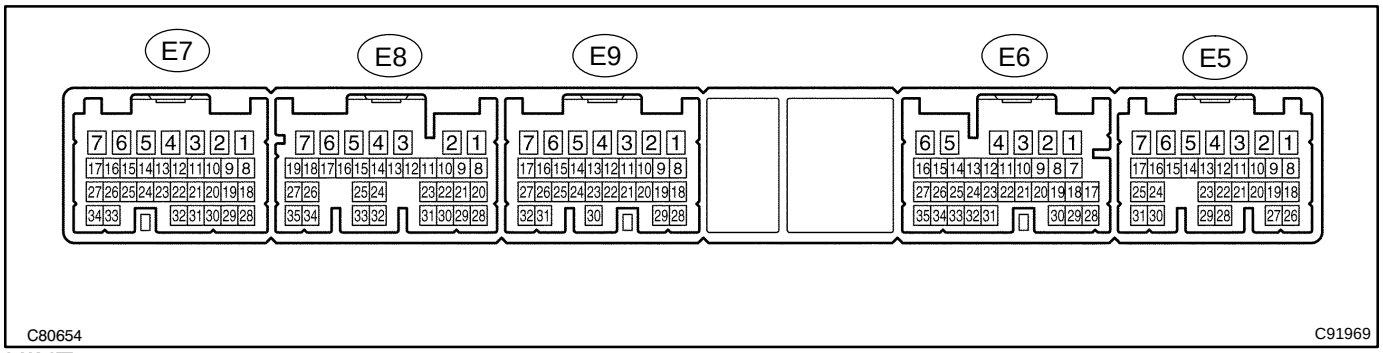
Symptom	Suspect Area	See page
Vehicle does not move in forward position and in reverse positions	1. Valve body assy 2. U/D brake (B_3) 3. Torque converter clutch	40-44 ✳ 40-29
Vehicle does not move in R position	1. Valve body assy 2. Reverse clutch (C_2) 3. 1st & reverse brake (B_2)	40-44 ✳ ✳
No up-shift (1st → 2nd)	1. Valve body assy 2. 2nd & O/D brake (B_1)	40-44 ✳
No up-shift (2nd → 3rd)	1. Valve body assy 2. Direct and O/D clutch (C_0)	40-44 ✳
No up-shift (3rd → 4th)	1. Valve body assy 2. 2nd & O/D brake (B_1)	40-44 ✳
No up-shift (4th → 5th)	1. Valve body assy 2. U/D clutch (C_3)	40-44 ✳
No down-shift (5th → 4th)	Valve body assy	40-44
No down-shift (4th → 3rd)	Valve body assy	40-44
No down-shift (3rd → 2nd)	Valve body assy	40-44
No down-shift (2nd → 1st)	Valve body assy	40-44
No lock-up or No lock-up off	1. Valve body assy 2. Torque converter clutch	40-44 40-29
Harsh engagement (N → D)	1. Valve body assy 2. C_1 accumulator 3. Forward clutch (C_1) 4. One-way clutch No.1 (F_1) 5. U/D one-way clutch (F_2)	40-44 ✳ ✳ ✳ ✳
Harsh engagement (Lock-up)	1. Valve body assy 2. Torque converter clutch	40-44 40-29
Harsh engagement (N → R)	1. Valve body assy 2. C_2 accumulator 3. Reverse clutch (C_2) 4. 1st & reverse brake (B_2)	40-44 ✳ ✳ ✳
Harsh engagement (1st →2nd → 3rd → 4th → 5th)	Valve body assy	40-44
Harsh engagement (1st → 2nd)	1. Valve body assy 2. 2nd & O/D brake (B_1)	40-44 ✳
Harsh engagement (2nd → 3rd)	1. Valve body assy 2. C_0 accumulator 3. Direct and O/D clutch (C_0)	40-44 ✳ ✳
Harsh engagement (3rd → 4th)	1. Valve body assy 2. 2nd & O/D brake (B_1)	40-44 ✳
Harsh engagement (4th → 5th)	1. Valve body assy 2. C_3 accumulator 3. U/D clutch (C_3)	40-44 ✳ ✳
Harsh engagement (5th → 4th)	1. Valve body assy 2. B_3 accumulator	40-44 ✳

Slip or shudder (Forward and reverse: After warm-up)	1. Valve body assy 2. Oil strainer 3. Direct and O/D clutch (C_0) 4. Forward clutch (C_1) 5. U/D clutch (C_3) 6. 2nd & O/D brake (B_1) 7. U/D brake (B_3) 8. One-way clutch No.1 (F_1) 9. U/D one-way clutch (F_2) 10.Torque converter clutch	40-44 40-44 * * * * * * * 40-29
Slip or shudder (Particular position: Just after engine starts)	Torque converter clutch	40-29
Slip or shudder (R position)	1. Reverse clutch (C_2) 2. 1st & reverse brake (B_2)	* *
Slip or shudder (1st)	1. Forward clutch (C_1) 2. One-way clutch No.1 (F_1) 3. U/D one-way clutch (F_2)	* *
Slip or shudder (2nd)	2nd & O/D brake (B_1)	*
Slip or shudder (3rd)	Direct and O/D clutch (C_0)	*
Slip or shudder (4th)	2nd & O/D brake (B_1)	*
Slip or shudder (5th)	U/D clutch (C_3)	*
No engine braking (1st – 4th: D position)	U/D brake (B_3)	*
No engine braking (1st: L (1) position)	1. Valve body assy 2. 1st & reverse brake (B_2)	40-44 *
No engine braking (2nd: 2 position)	1. Valve body assy 2. 2nd & O/D brake (B_1)	40-44 *
No engine braking (3rd: 3 position)	U/D brake (B_3)	*
Poor acceleration (All positions)	Torque converter clutch	40-29
Poor acceleration (5th)	1. U/D clutch (C_3) 2. U/D planetary gear unit	* *
Engine stalls when starting off or stopping	Torque converter clutch	40-29
No kick-down	Valve body assy	40-44

05EK6-06

TERMINALS OF ECM

1. ECM



HINT:

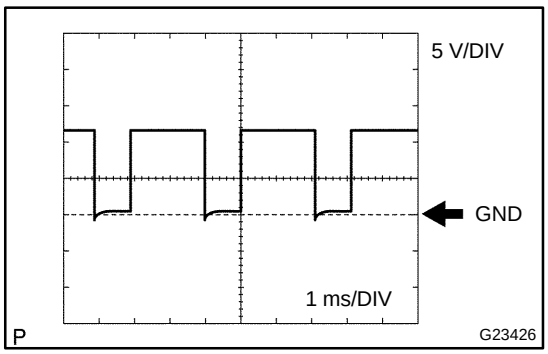
Each ECM terminal's standard voltage is shown in the table below.

In the table, first follow the information under "Condition". Look under "Symbols (Terminal No.)" for the terminals to be inspected. The standard voltage between the terminals is shown under "Specific Condition".

Use the illustration above as a reference for the ECM terminals.

Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	Specified Condition
P (E5-6) - E1 (E9-1)	V - BR	P shift position switch signal	IG switch ON and shift lever P position	10 to 14 V
			IG switch ON and shift lever except P position	Below 1 V
N (E5-7) - E1 (E9-1)	GR - BR	N shift position switch signal	IG switch ON and shift lever N position	10 to 14 V
			IG switch ON and shift lever except N position	Below 1 V
L (E6-8) - E1 (E9-1)	R - BR	L shift position switch signal	IG switch ON and shift lever L position	10 to 14 V
			IG switch ON and shift lever except L position	Below 1 V
2 (E6-9) - E1 (E9-1)	G - BR	2 shift position switch signal	IG switch ON and shift lever 2 and L position	10 to 14 V
			IG switch ON and shift lever except 2 and L position	Below 1 V
D (E6-10) - E1 (E9-1)	Y - BR	D shift position switch signal	IG switch ON and shift lever D position	10 to 14 V
			IG switch ON and shift lever except D position	Below 1 V
R (E6-11) - E1 (E9-1)	L - BR	R shift position switch signal	IG switch ON and shift lever R position	10 to 14 V
			IG switch ON and shift lever except R position	Below 1 V
SPD (E6-17) - E1 (E9-1)	Y - BR	Speed signal	Vehicle speed 20 km/h (12 mph)	Pulse generation (See waveform 8)
STP (E6-19) - E1 (E9-1)	BR - BR	Stop lamp switch signal	Brake pedal is depressed	7.5 to 14 V
			Brake pedal is released	Below 1.5 V
3 (E6-20) - E1 (E9-1)	P - BR	3 shift position switch signal	IG switch ON and shift lever 3 position	10 to 14 V
			IG switch ON and shift lever except 3 position	Below 1 V

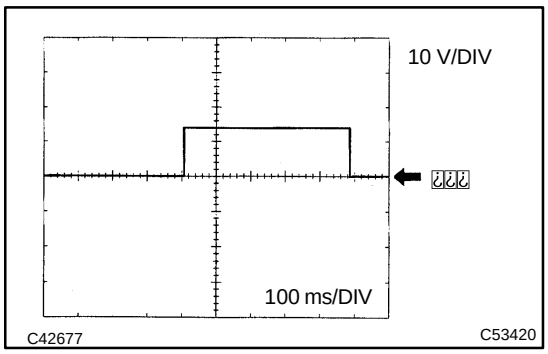
NSW (E7-16) - E1 (E9-1)	B-R - BR	Park neutral switch signal	IG switch ON and shift lever P and N position	Below 1 V
			IG switch ON and shift lever except P and N position	10 to 14 V
DSL (E8-11) - E1 (E9-1)	Y-G - BR	DSL solenoid signal	Vehicle speed 65 km/h (40 mph), lock-up (ON to OFF)	Pulse generation (See waveform 2)
SR (E8-9) - E1 (E9-1)	L-B - BR	SR solenoid signal	IG switch ON	Below 1 V
			3rd, 4th or 5th gear	10 to 14 V
			1st or 2nd gear	Below 1 V
ODMS (E5-16) - E1 (E9-1)	GR - BR	O/D main switch	IG switch ON	10 to 14 V
↑	↑	↑	IG switch ON and press continuously O/D main switch	Below 1 V
S4 (E8-10) - E1 (E9-1)	L-W - BR	S4 solenoid signal	IG switch ON	Below 1 V
			5th gear	10 to 14 V
			Except 5th gear	Below 1 V
SL3+ (E8-17) - SL3- (E8-16)	G-B - G-R	SL3 solenoid signal	Engine idle speed	Pulse generation (See waveform 3)
SL2+ (E8-15) - SL2- (E8-14)	L-Y - L-R	SL2 solenoid signal	Engine idle speed	Pulse generation (See waveform 4)
SL1+ (E8-19) - SL1- (E8-18)	R-B - B-W	SL1 solenoid signal	Engine idle speed	Pulse generation (See waveform 5)
NC+ (E8-26) - NC- (E8-34)	R - W-G	Speed sensor (NC) signal	Vehicle speed 30 km/h (19 mph): (3rd gear) Engine speed 1,400 rpm	Pulse generation (See waveform 6)
NT+ (E8-27) - NT- (E8-35)	W - R-W	Speed sensor (NT) signal	Vehicle speed 20 km/h (12 mph)	Pulse generation (See waveform 7)
SLT+ (E8-13) - SLT- (E8-12)	Y-R - Y-B	SLT solenoid signal	Engine idle speed	Pulse generation (See waveform 1)
THO1 (E8-32) - E2 (E7-28)	G-Y - BR	ATF temperature sensor signal	ATF temperature: 115 ℃ (239 ℉) or more	Below 1.5 V



Waveform 1

Reference:

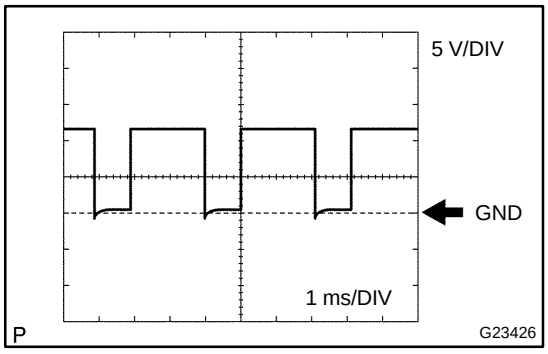
Terminal	SLT+ - SLT-
Tool setting	5V/DIV, 1ms/DIV
Vehicle condition	Engine idle speed



Waveform 2

Reference:

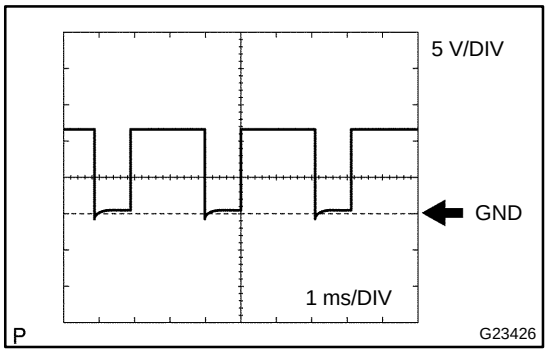
Terminal	DSL - E1
Tool setting	10V/DIV, 100ms/DIV
Vehicle condition	Vehicle speed 65 km/h (40 mph), lock-up (ON to OFF)



Waveform 3

Reference:

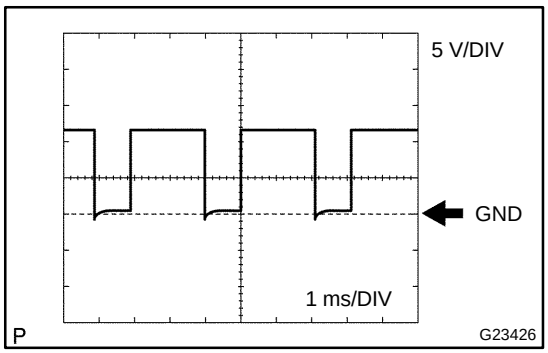
Terminal	SL3+ - SL3-
Tool setting	5V/DIV, 1ms/DIV
Vehicle condition	Engine idle speed



Waveform 4

Reference:

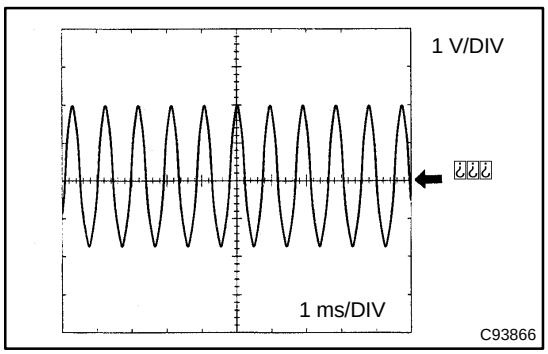
Terminal	SL2+ - SL2-
Tool setting	5V/DIV, 1ms/DIV
Vehicle condition	Engine idle speed



Waveform 5

Reference:

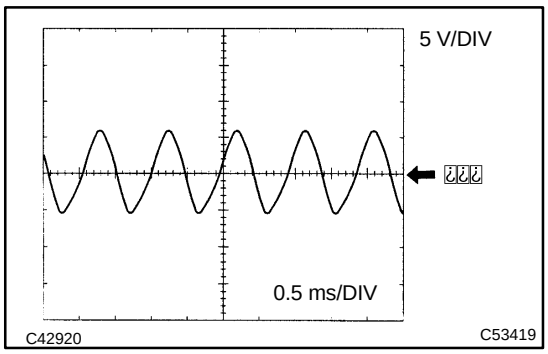
Terminal	SL1+ - SL1-
Tool setting	5V/DIV, 1ms/DIV
Vehicle condition	Engine idle speed



Waveform 6

Reference:

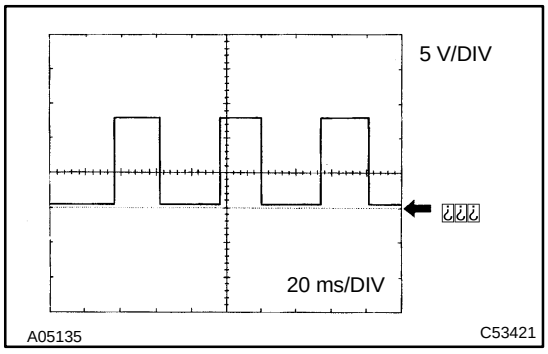
Terminal	NC+ - NC-
Tool setting	1V/DIV, 1ms/DIV
Vehicle condition	Vehicle speed 30 km/h (19 mph): (3rd gear) Engine speed 1,400 rpm



Waveform 7

Reference:

Terminal	NT+ - NT-
Tool setting	5V/DIV, 0.5ms/DIV
Vehicle condition	Vehicle speed 20 km/h (12 mph)



Waveform 8

Reference:

Terminal	SPD - E1
Tool setting	5V/DIV, 20ms/DIV
Vehicle condition	Vehicle speed 20 km/h (12 mph)

05F33-05

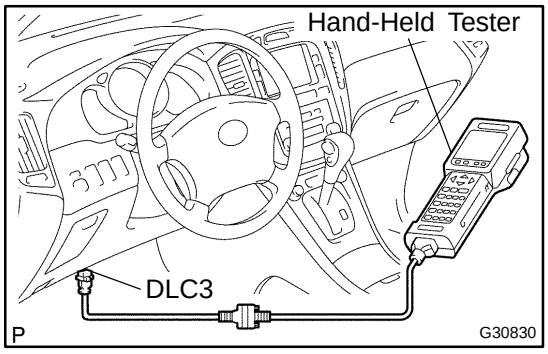
CHECK MODE PROCEDURE

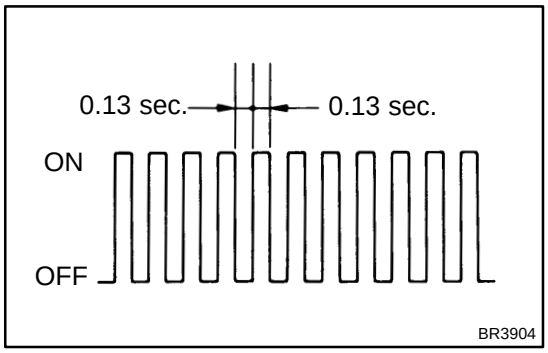
1. DTC CHECK (CHECK MODE)

HINT:

Hand-held tester only:

Compared to the normal mode, the check mode has more sensing ability to detect malfunctions. Furthermore, the same diagnostic items which are detected in the normal mode can also be detected in the check mode.





(a) Procedure for Check Mode using the hand-held tester.

(1) Check the initial conditions.
- Battery positive voltage 11 V or more
- Throttle valve fully closed
- Transaxle in the P or N position
- A/C switch is off

(2) Turn the ignition switch off.

(3) Connect the hand-held tester to the DLC3.

(4) Turn the ignition switch to the ON position and push the hand-held tester main switch on.

(5) When you use hand-held tester:
Select the item "DIAGNOSIS/ENHANCED OBD II/ CHECK MODE" (Check that the MIL flashes).

NOTICE:

All DTCs and freeze frame data recorded will be erased if: 1) the hand-held tester is used to change the ECM from normal mode to check mode or vice-versa; or 2) during check mode, the ignition switch is turned from ON to ACC or OFF.

(6) Start the engine (MIL goes off after the engine starts).

(7) Perform "MONITOR DRIVE PATTERN" for the ECT test (see page 05-902).
(Or, simulate the conditions of the malfunction described by the customer).

NOTICE:

Leave the ignition switch in the ON position until you have checked the DTCs, etc.

(8) After simulating malfunction conditions, use the hand-held tester diagnosis selector to check the DTCs and freeze frame data, etc.

(9) When you use hand-held tester:
Select the item "DIAGNOSIS/ENHANCED OBD II/ DTC INFO/CURRENT CODES".

(10) After checking the DTC, inspect the applicable circuit.

(11) See page 05- 920 to confirm the details of the DTCs.

2. DTC CLEAR

(a) When using the OBD II scan tool or hand-held tester:
Clearing the DTCs.
(1) Connect the OBD II scan tool or hand-held tester to the DLC3.
(2) Turn the ignition switch to the ON position and push the OBD II scan tool or the hand-held tester main switch on.
(3) When you use hand-held tester:
Select the item ”DIAGNOSIS/ENHANCED OBD II/ DTC INFO/CLEAR CODES [YES] button”.

HINT:

When operating the OBD II scan tool (complying with SAE J1978) or hand-held tester to erase the codes, the DTCs and freeze frame data will be erased. (See the OBD II scan tool’s instruction book for operating instructions.)

(b) When not using the OBD II scan tool or hand-held tester:
Clearing the DTCs.
(1) Disconnecting the battery terminal or remove the EFI and ETCS fuses from the engine room J/B for 60 seconds or more. But if you disconnect the battery terminal, you should do the ”INITIALIZE” procedure.

05F37-05

DEFINITION OF TERMS

Term	Definition
Monitor description	Description of what the ECM monitors and how it detects malfunctions (monitoring purpose and its details).
Related DTCs	A group of diagnostic trouble codes that are output by the ECM based on the same malfunction detection logic.
Typical enabling condition	Preconditions that allow the ECM to detect malfunctions. With all preconditions satisfied, the ECM sets the DTC when the monitored value(s) exceeds the malfunction threshold(s).
Sequence of operation	The priority order that is applied to monitoring, if multiple sensors and components are used to detect the malfunction. While another sensor is being monitored, the next sensor or component will not be monitored until the previous monitoring has concluded.
Required sensor/components	The sensors and components that are used by the ECM to detect malfunctions.
Frequency of operation	The number of times that the ECM checks for malfunctions per driving cycle. ”Once per driving cycle” means that the ECM detects malfunction only one time during a single driving cycle. ”Continuous” means that the ECM detects malfunction every time when enabling condition is met.
Duration	The minimum time that the ECM must sense a continuous deviation in the monitored value(s) before setting a DTC. This timing begins after the ”typical enabling conditions” are met.
Malfunction thresholds	Beyond this value, the ECM will conclude that there is a malfunction and set a DTC.
MIL operation	MIL illumination timing after a defect is detected. ”Immediately” means that the ECM illuminates MIL the instant the ECM determines that there is a malfunction. ”2 driving cycle” means that the ECM illuminates MIL if the same malfunction is detected again in the 2nd driving cycle.
Component operating range	Normal operation range of sensors and solenoids under normal driving conditions. Use these ranges as a reference. They cannot be used to judge if a sensor or solenoid is defective or not.

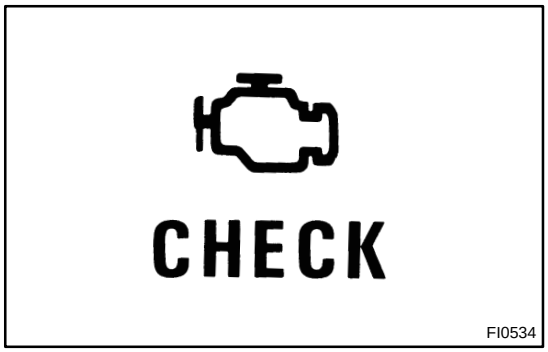
05F30-05

DIAGNOSIS SYSTEM

1. DIAGNOSIS SYSTEM

(a) Description

(1) When troubleshooting OBD II vehicles, the only difference from the usual troubleshooting procedure is that you need to connect an OBD II scan tool complying with SAE J1987 or a hand-held tester to the vehicle, and read off various data output from the vehicle's ECM.



(2) OBD II regulations require that the vehicle's on-board computer illuminate the Malfunction Indicator Lamp (MIL) on the instrument panel when the computer detects a malfunction in the computer itself or in the drive system components which affect the vehicle emissions. In addition to the MIL illuminating when a malfunction is detected, the applicable DTCs prescribed by SAE J2012 are recorded in the ECM memory (see page 05-920).

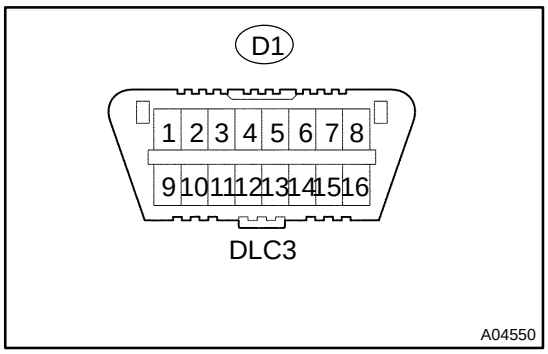
If the malfunction does not occur in 3 consecutive trips, the MIL goes off but the DTCs remain in the ECM memory.

(3) To check the DTCs, connect the OBD II scan tool or hand-held tester to the DLC3 of the vehicle. The OBD II scan tool or hand-held tester also enables you to erase the DTCs and check freeze frame data and various forms of engine data (For instruction book).

(4) The DTCs include SAE controlled codes and Manufacturer controlled codes. SAE controlled codes must be set as prescribed by the SAE, while Manufacturer controlled codes can be set freely by a manufacturer within the prescribed limits (see the DTC chart on page 05-920).

(5) The diagnosis system operates in the normal mode during the normal vehicle use, and also has a check mode for technicians to simulate malfunction symptoms and perform troubleshooting. Most DTCs use 2 trip detection logic(*) to prevent erroneous detection. By switching the ECM to the check mode when troubleshooting, the technician can cause the MIL to illuminate for a malfunction that is only detected once or momentarily (hand-held tester).

(6) *2 trip detection logic:
When a malfunction is first detected, the malfunction is temporarily stored in the ECM memory. If the same malfunction is detected again during the second test drive, this second detection causes the MIL to illuminate.



(b) Inspect the DLC3.

The vehicle's ECM uses ISO 9141-2 for communication. The terminal arrangement of DLC3 complies with SAE J1962 and matches the ISO 9141-2 format.

Tester connection	Condition	Specified condition
7 (Bus ≦ Line) - 5 (Signal ground)	During communication	Pulse generation
4 (Chassis Ground) - Body	Always	1 Ω or less
5 (Signal Ground) - Body	Always	1 Ω or less
16 (B+) - Body	Always	9 to 14 V

HINT:

If your display shows UNABLE TO CONNECT TO VEHICLE when you have connected the cable of the OBD II scan tool or hand-held tester to the DLC3, turned the ignition switch to the ON position and operated the scan tool, there is a problem on the vehicle side or tool side.

- If the communication is normal when the tool is connected to another vehicle, inspect the DLC3 on the original vehicle.
- If the communication is still impossible when the tool is connected to another vehicle, the problem is probably in the tool itself, so consult the Service Department listed in the tool's instruction manual.

(c) Measure the battery voltage.

Battery Voltage: 11 to 14 V

If voltage is below 11 V, recharge the battery before proceeding.

(d) Check the MIL.

(1) The MIL comes on when the ignition switch is turned to the ON position and the engine is not running.

HINT:

If the MIL does not light up, troubleshoot the combination meter.

(2) When the engine is started, the MIL should go off. If the lamp remains on, it means that the diagnosis system has detected a malfunction or abnormality in the system.

05F35-05

DATA LIST/ACTIVE TEST

1. DATA LIST

HINT:

According to the DATA LIST displayed by the OBD II scan tool or hand-held tester, you can read the value of the switch, sensor, actuator and so on without parts removal. Reading the DATA LIST as the first step of troubleshooting is one method to shorten labor time.

(a) Warm up the engine.
(b) Turn the ignition switch off.
(c) Connect the OBD II scan tool or hand-held tester to the DLC3.
(d) Turn the ignition switch to the ON position.
(e) Push the "ON" button of the OBD II scan tool or the hand-held tester.
(f) When you use hand-held tester:
Select the item "DIAGNOSIS/ENHANCED OBD II/DATA LIST".
(g) According to the display on tester, read the "DATA LIST".

Item	Measurement Item/ Range (display)	Normal Condition	Diagnostic Note
STOP LIGHT SW	Stop light SW Status/ ON or OFF	·Brake Pedal is depressed: ON ·Brake Pedal is released: OFF	-
PNP SW [NSW]	PNP SW Status/ ON or OFF	Shift lever position is; P and N: ON Except P and N: OFF	When the shift lever position displayed on the hand-held tester differs from the actual position, adjustment of the PNP switch or the shift cable may be incorrect. HINT: When the failure still occurs even after adjusting these parts, see page 05-922.
LOW	PNP SW Status/ ON or OFF	Shift lever position is; L: ON Except L: OFF	↑
2ND	PNP SW Status/ ON or OFF	Shift lever position is; 2: ON Except 2: OFF	↑
REVERSE	PNP SW Status/ ON or OFF	Shift lever position is; R: ON Except R: OFF	↑
4TH/DRIVE	PNP SW Status/ ON or OFF	Shift lever position is; D: ON Except D: OFF	↑
OVERDRV CUT SW1	O/D SW Status/ ON or OFF	·IG SW ON: ON ↓ ·O/D SW Push: OFF ↓ ·O/D SW Push: ON	-
SHIFT	Actual Gear position/ 1st, 2nd, 3rd, 4th (O/D)	Shift lever position is; ·L: 1st ·2: 1st or 2nd ·3: 1st, 2nd or 3rd ·D(O/D ON): 1st, 2nd, 3rd or 4th (O/D)	-
LOCK UP SOL	Lock Up Solenoid Status/ ON or OFF	·Lock Up: ON ·Except Lock Up: OFF	-
SOLENOID (SLT)	Shift Solenoid SLT Status/ ON or OFF	·Accelerator pedal is depressed: OFF ·Accelerator pedal is released: ON	-

AT FLUID TEMP	ATF Temp. Sensor Value/ min.: -40°C (-40°F) max.: 215°C (419°F)	・After Stall Test; Approx. 80°C (176°F) ・Equal to ambient temperature when the engine is cold	If the value is "-40°C (-40°F)" or "215°C (419°F)", ATF temp. sensor circuit is opened or shorten.
SPD (NC)	Counter Gear Speed/ display: 50 r/min	[HINT] 4th (O/D) when shift lever position is D position (After warming up the engine); ・Intermediate shaft speed (NC) becomes close to the engine speed.	-

2. ACTIVE TEST

HINT:

Performing the ACTIVE TEST using the hand-held tester allows the relay, VSV, actuator and so on to operate without parts removal. Performing the ACTIVE TEST as the first step of troubleshooting is one method to shorten labor time.

It is possible to display the DATA LIST during the ACTIVE TEST.

(a) Warm up the engine.
(b) Turn the ignition switch off.
(c) Connect the hand-held tester to the DLC3.
(d) Turn the ignition switch to the ON position.
(e) Push the "ON" button of the hand-held tester.
(f) Select the item "DIAGNOSIS/ENHANCED OBD II/ACTIVE TEST".
(g) According to the display on tester, perform the "ACTIVE TEST".

Item	Test Details	Diagnostic Note
SHIFT	[Test Details] Operate the shift solenoid valve and set the each shift position by yourself. [Vehicle Condition] Less than 50 km/h (31 mph) [Others] ・Press "→" button: Shift up ・Press "←" button: Shift down	Possible to check the operation of the shift solenoid valves.
LOCK UP	[Test Details] Control the shift solenoid DSL to set the automatic transaxle to the lock-up condition. [Vehicle Condition] Vehicle Speed: 58 km/h (36 mph) or more	Possible to check the DSL operation.
LINE PRESS UP *	[Test Details] Operate the shift solenoid SLT and raise the line pressure. [Vehicle Condition] ・Vehicle Stopped. ・DL: ON [HINT] OFF: Line pressure up (When the active test of "LINE PRESS UP" is performed, the ECM commands the SLT solenoid to turn off). ON: No action (normal operation)	-

*: "LINE PRESS UP" in the ACTIVE TEST is performed to check the line pressure changes by connecting the SST to the automatic transaxle, which is used in the HYDRAULIC TEST (see page 05-891) as well.

HINT:

The pressure values in ACTIVE TEST and HYDRAULIC TEST are different from each other.

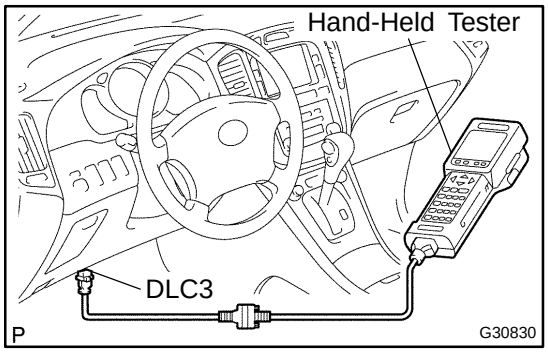
05F31-05

DTC CHECK/CLEAR

1. DTC CHECK (NORMAL MODE)

NOTICE:

When the diagnostic system is switched from the normal mode to the check mode, all the DTCs and freeze frame data recorded in the normal mode will be erased. So before switching modes, always check the DTCs and freeze frame data, and note them down.



(a) Checking DTCs using the OBD II scan tool or hand-held tester.

(1) Turn the ignition switch off.

(2) Connect the OBD II scan tool or hand-held tester to DLC3.

(3) Turn the ignition switch to the ON position and push the OBD II scan tool or the hand-held tester main switch on.

(4) When you use hand-held tester:
Select the item ”DIAGNOSIS/ENHANCED OBD II/ DTC INFO/CURRENT CODES”.

(5) Use the OBD II scan tool or hand-held tester to check the DTCs and freeze frame data and note them down (For operating instructions, see the OBD II scan tool’s instruction book).

(6) See page 05-920 to confirm the details of the DTCs.

NOTICE:

When simulating symptoms with an OBD II scan tool (excluding hand-held tester) to check the DTCs, use the normal mode. For codes on the DTCs chart subject to ”2 trip detection logic”, turn the ignition switch off after the symptom is simulated once. Then repeat the simulation process again. When the problem has been simulated twice, the MIL is indicated on the instrument panel and DTCs are recorded in the ECM.

2. DTC CLEAR

(a) When using the OBD II scan tool or hand-held tester:
Clearing the DTCs.
(1) Connect the OBD II scan tool or hand-held tester to the DLC3.
(2) Turn the ignition switch to the ON position and push the OBD II scan tool or the hand-held tester main switch on.
(3) When you use hand-held tester:
Select the item ”DIAGNOSIS/ENHANCED OBD II/ DTC INFO/CLEAR CODES [YES] button”.

HINT:

When operating the OBD II scan tool (complying with SAE J1978) or hand-held tester to erase the codes, the DTCs and freeze frame data will be erased. (See the OBD II scan tool’s instruction book for operating instructions.)

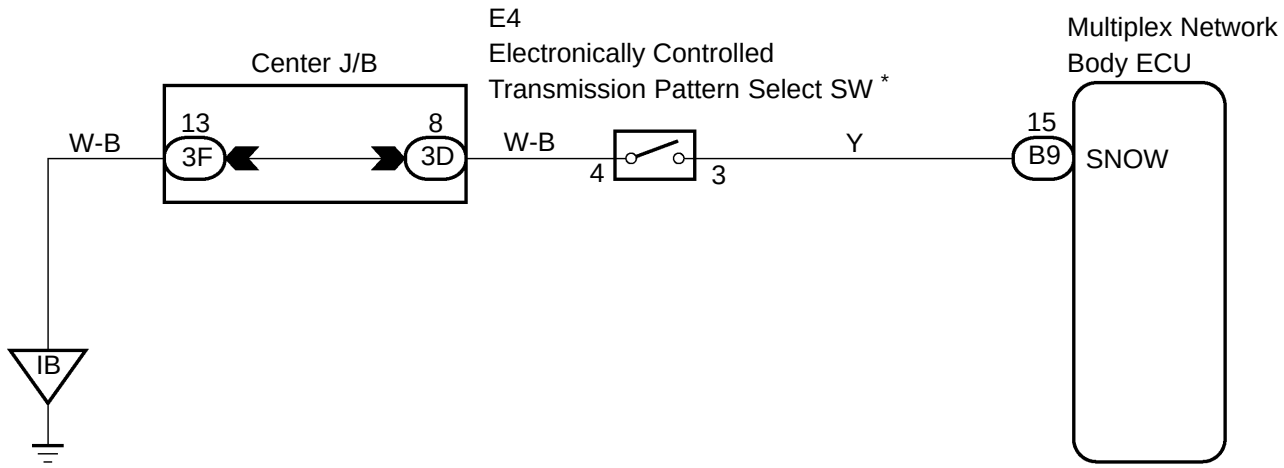
(b) When not using the OBD II scan tool or hand-held tester:
Clearing the DTCs.
(1) Disconnecting the battery terminal or remove the EFI and ETCS fuses from the engine room J/B for 60 seconds or more. But if you disconnect the battery terminal, you should do the ”INITIALIZE” procedure.

PATTERN SELECT SWITCH CIRCUIT

CIRCUIT DESCRIPTION

Multiplex network body ECU receives pattern select switch information, and sends it through the multiplex communication system to the ECM.
ECT SNOW is the system that operates the throttle motor to control engine output to reduce skidding of the driving wheels, guarantee takeoff acceleration, driving straightness and turning stability.

WIRING DIAGRAM



(*) Pattern Select Switch (ECT SNOW Switch)
When the ECT SNOW switch is pushed, the switch contact is made and the ECT SNOW mode is selected. To cancel the ECT SNOW mode, push the ECT SNOW switch once again. The ECT SNOW mode is automatically cancelled when the ignition switch is turned ”OFF”.

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INSPECTION PROCEDURE

1	DRIVING TEST

(a) Start the engine.
(b) Turn the ECT SNOW switch ”OFF” (Normal drive mode).
(c) Confirm vehicle response by driving from a parked position to fully depressing the accelerator pedal.
(d) Turn the ECT SNOW switch ”ON” and perform the same check as (c).
Confirm that there is a difference between ECT SNOW switch ”ON” and ”OFF”.

HINT:
* Driving test should be done on a paved road (a nonskid road).
* Make sure not to use the TRAC system when testing a vehicle equipped with one.

OK:
There is a difference in acceleration between ”ON” and ”OFF”.

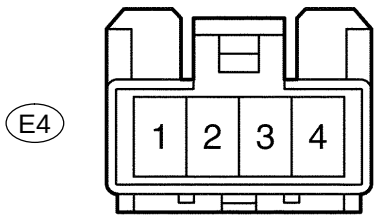
NG → **Go to step 2**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-904)

2	CHECK HARNESS AND CONNECTOR(PATTERN SELECT SWITCH ASSY NO.1 - BODY GROUND)

Wire Harness Side:
(Connector Front View):



(a) Disconnect the connector of pattern select switch (ECT SNOW switch).
(b) Measure the resistance according to the value(s) in the table below.

Standard:

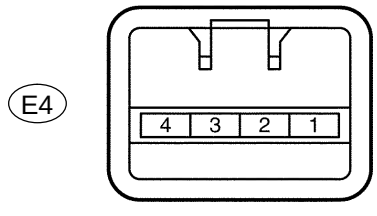
Tester Connection	Specified Condition
4 - Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (SEE PAGE 01-36)**

OK

3	INSPECT PATTERN SELECT SWITCH ASSY NO.1

Switch Side:
(Connector Front View):



(a) Measure the resistance according to the value(s) in the table below.

Standard:

Switch Condition	Tester Connection	Specified Condition
Press continuously Pattern select switch	3 - 4	Below 1 Ω
Release Pattern select switch		10 kΩ or higher

NG → **REPLACE PATTERN SELECT SWITCH ASSY NO.1**

OK

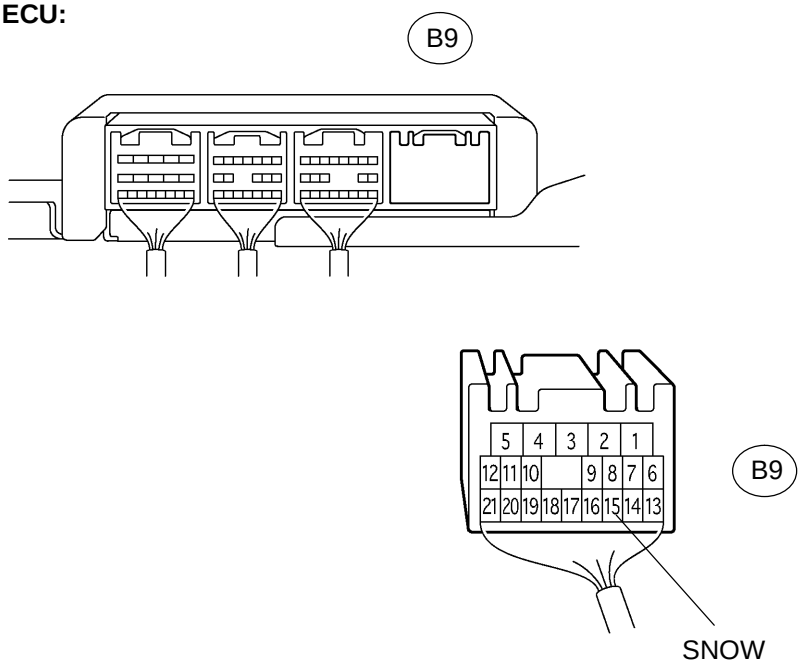
4	CHECK HARNESS AND CONNECTOR(PATTERN SELECT SWITCH ASSY NO.1 - MULTIPLEX NETWORK BODY ECU)

(a) Connect the connector of pattern select switch (ECT SNOW switch).
(b) Disconnect the multiplex network body ECU connector.
(c) Measure the resistance between terminals SNOW of multiplex network body ECU and body ground.

Standard:

Switch Condition	Tester Connection	Specified Condition
Press continuously Pattern select switch	B9 - 15 (SNOW) - Body ground	Below 1 Ω
Release Pattern select switch		10 kΩ or higher

Multiplex Network Body ECU:
Back Side:



NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (SEE PAGE 01-36)**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-904)

05F32-05

FAIL-SAFE CHART

1. FAIL-SAFE

This function minimizes the loss of the ECT functions when any malfunction occurs in each sensor or solenoid.

(a) ATF (Automatic Transmission Fluid) temperature sensor:
When the ATF temperature sensor has a malfunction, O/D upshift is prohibited.

(b) Counter gear speed sensor NC (Speed sensor NC):
When the counter gear speed sensor has a malfunction, O/D upshift is prohibited.

(c) Shift solenoid valve DSL:
When the solenoid valve DSL has a malfunction, the current to the solenoid valve is stopped. This stops lock-up control, then fuel economy decreases.

(d) Shift solenoid valve SL1, SL2 and S4:

Fail safe function:

If either of the shift solenoid valve circuits develops an open or short, the ECM turns the other shift solenoid "ON" and "OFF" in order to shift into the gear positions shown in the table below.

Manual shifting as shown in the following table must be done (In case of a short circuit, the ECM stops sending the current to the short circuit solenoid).

Even if starting the engine in the fail-safe mode, the gear position remain in the same position.

NORMAL				SHIFT SOLENOID SL1 MALFUNCTIONING				SHIFT SOLENOID SL2 MALFUNCTIONING				SHIFT SOLENOID S4 MALFUNCTIONING			
Solenoid Valve			Gear	Solenoid Valve			Gear	Solenoid Valve			Gear	Solenoid Valve			Gear
SL1	SL2	S4		SL1	SL2	S4		SL1	SL2	S4		SL1	SL2	S4	
ON	ON	OFF	1st	X	ON	OFF	2nd	ON ↓ OFF	X	OFF	3rd	ON	ON	X	1st
OFF	ON	OFF	2nd	X	ON	OFF	2nd	OFF	X	OFF	3rd	OFF	ON	X	2nd
OFF	OFF	OFF	3rd	X	OFF ↓ ON	OFF ↓ ON	3rd	OFF	X	OFF	3rd	OFF	OFF	X	3rd
OFF	OFF	ON	O/D	X	OFF ↓ ON	ON	3rd	OFF	X	ON	O/D	OFF	OFF	X	3rd

SHIFT SOLENOID SL1 AND SL2 MALFUNCTIONING				SHIFT SOLENOID SL1 AND S4 MALFUNCTIONING				SHIFT SOLENOID SL2 AND S4 MALFUNCTIONING				SHIFT SOLENOID SL1, SL2 AND S4 MALFUNCTIONING			
Solenoid Valve			Gear	Solenoid Valve			Gear	Solenoid Valve			Gear	Solenoid Valve			Gear
SL1	SL2	S4		SL1	SL2	S4		SL1	SL2	S4		SL1	SL2	S4	
X	X	OFF	3rd	X	ON	X	2nd	ON ↓ OFF	X	X	3rd	X	X	X	3rd
X	X	OFF	3rd	X	ON	X	2nd	OFF	X	X	3rd	X	X	X	3rd
X	X	OFF	3rd	X	OFF ↓ ON	X	2nd	OFF	X	X	3rd	X	X	X	3rd
X	X	ON	O/D	X	OFF ↓ ON	X	2nd	OFF	X	X	3rd	X	X	X	3rd

↓ : Condition in the normal operation is shown on the up of "↓".
Condition in the fail-safe mode is shown on the down of "↓".

05F2X-05

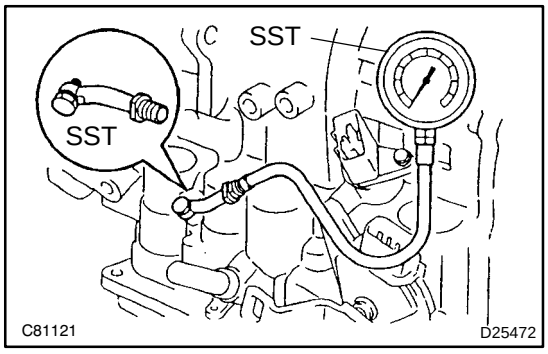
HYDRAULIC TEST

1. PERFORM HYDRAULIC TEST

(a) Measure the line pressure.

NOTICE:

- **Perform the test at the normal operating ATF (Automatic Transmission Fluid) temperature 50 to 80˚C (122 to 176˚F).**
- **The line pressure test should always be carried out in pairs. One technician should observe the conditions of wheels or wheel stopper outside the vehicle while the other is doing the test.**
- **Be careful to prevent SST's hose from interfering with the exhaust pipe.**



(1) Warm up the ATF.
(2) Remove the test plug on the front side of the transaxle case and connect SST.

SST 09992-00095 (09992- 00231, 09992-00271)

(3) Fully apply the parking brake and chock the 4 wheels.
(4) Connect an OBD II scan tool or hand-held tester to the DLC3.
(5) Start the engine and check idling speed.
(6) Keep your left foot pressing firmly on the brake pedal and shift into D position.
(7) Measure the line pressure when the engine is idling.
(8) Depress the accelerator pedal all the way down. Quickly read the highest line pressure when engine speed reaches stall speed.
(9) In the same way, do the test in R position.

Specified line pressure:

Condition	D position kPa (kgf / cm^2, psi)	R position kPa (kgf / cm^2, psi)
Idling	372 to 412 kPa (3.8 to 4.2 kgf/cm^2, 54 to 60 psi)	672 to 742 kPa (6.9 to 7.6 kgf/cm^2, 97 to 108 psi)
Stall test	931 to 1,031 kPa (9.5 to 10.5 kgf/cm^2, 135 to 150 psi)	1,768 to 1,968 kPa (18.0 to 20.0 kgf/cm^2, 256 to 285 psi)

Evaluation:

Problem	Possible cause
If the measured values at all positions are higher	⁎Line pressure control solenoid (SLT) defective ⁎Regulator valve detective
If the measured values at all positions are lower	⁎Line pressure control solenoid (SLT) defective ⁎Regulator valve detective ⁎Oil pump defective ⁎U/D (Underdrive) direct clutch defective
If pressure is low in the D position only	⁎D position circuit fluid leak ⁎Forward clutch defective
If pressure is low in the R position only	⁎R position circuit fluid leak ⁎Direct clutch defective ⁎1st and reverse brake defective

05F2Z-05

INITIALIZATION

1. RESET MEMORY

CAUTION:

Perform the RESET MEMORY (AT initialization) when replacing the automatic transaxle assy, engine assy or ECM.

NOTICE:

Hand-held tester only

HINT:

The ECM memorizes the condition that the ECT controls the automatic transaxle assy and engine assy according to those characteristics. Therefore, when the automatic transaxle assy, engine assy, or ECM has been replaced, it is necessary to reset the memory so that the ECM can memorize the new information. Reset procedure is as follows.

(a) Turn the ignition switch off.
(b) Connect the hand-held tester to the DLC3.
(c) Turn the ignition switch to the ON position and push the hand-held tester main switch on.
(d) Select the item ”DIAGNOSIS/ENHANCED OBD II”.
(e) Perform the reset memory procedure from the ENGINE menu.

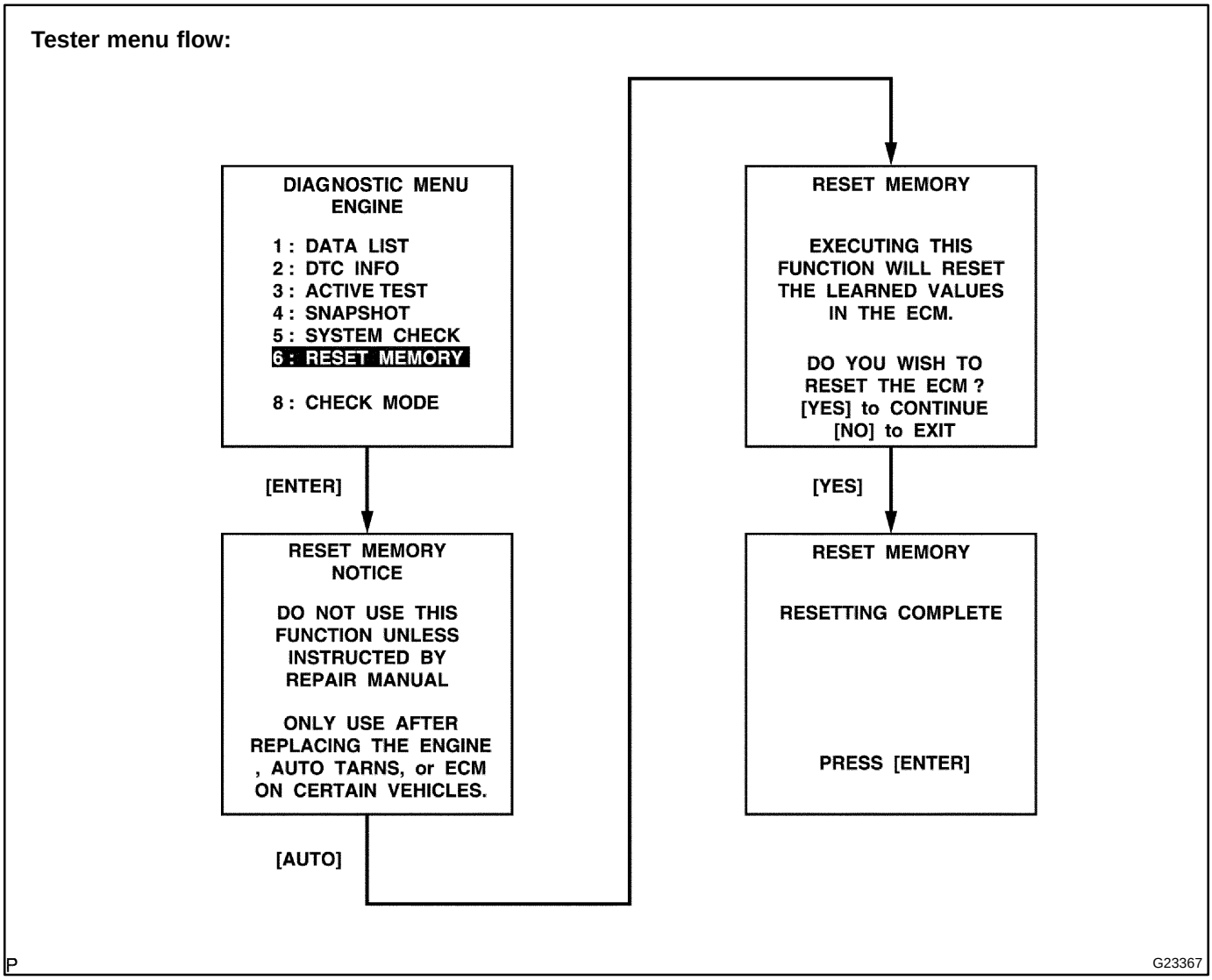
CAUTION:

After performing the RESET MEMORY, be sure to perform the ROAD TEST (see page 05-887) described earlier.

HINT:

The ECM is learned by performing the ROAD TEST.

Tester menu flow:



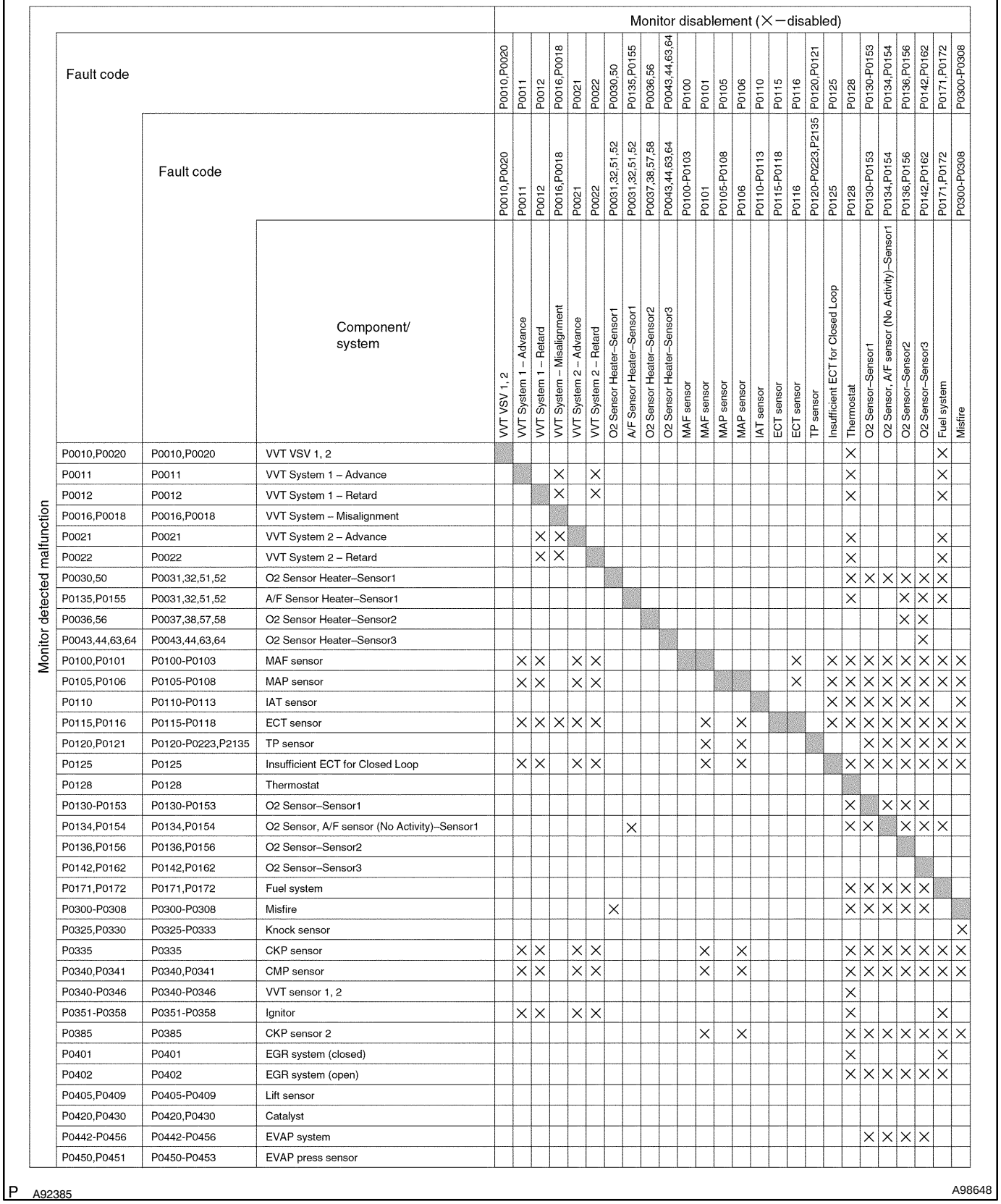
05ITI-02

LIST OF DISABLE A MONITOR

HINT:

This table indicates ECM monitoring status for the items in the upper columns if the DTCs in each line on the left are being set.

As for the ”X” mark, when the DTC on the left is stored, detection of the DTC in the upper column is not performed.



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Monitor detected malfunction

Fault code	Fault code	Component/ system	Monitor disablement (×−disabled)																										
			P0010,P0020	P0011	P0012	P0016,P0018	P0021	P0022	P0030,50	P0031,32,51,52	P0135,P0155	P0036,56	P0043,44,63,64	P0100	P0101	P0105	P0106	P0110	P0115	P0116	P0120,P0121	P0125	P0128	P0130-P0153	P0134,P0154	P0136,P0156	P0142,P0162	P0171,P0172	P0300-P0308
			P0010,P0020	P0011	P0012	P0016,P0018	P0021	P0022	P0031,32,51,52	P0031,32,51,52	P0135,P0155	P0037,38,57,58	P0043,44,63,64	P0100-P0103	P0101	P0105-P0108	P0106	P0110-P0113	P0115-P0118	P0116	P0120-P0223,P2135	P0125	P0128	P0130-P0153	P0134,P0154	P0136,P0156	P0142,P0162	P0171,P0172	P0300-P0308
			VVT VSV 1, 2	VVT System 1 – Advance	VVT System 1 – Retard	VVT System – Misalignment	VVT System 2 – Advance	VVT System 2 – Retard	O2 Sensor Heater–Sensor1	A/F Sensor Heater–Sensor1	O2 Sensor Heater–Sensor2	O2 Sensor Heater–Sensor3	MAF sensor	MAF sensor	MAP sensor	MAP sensor	IAT sensor	ECT sensor	ECT sensor	TP sensor	Insufficient ECT for Closed Loop	Thermostat	O2 Sensor–Sensor1	O2 Sensor, A/F sensor (No Activity)–Sensor1	O2 Sensor–Sensor2	O2 Sensor–Sensor3	Fuel system	Misfire
P0500	P0500	VSS																				×	×	×	×	×	×	×	×
P0511	P0511	IAC valve																					×						
P0510	P0510	Idle switch													×		×					×	×		×	×	×	×	×
P0560	P0560	System Voltage																											
P0617	P0617	Starter signal																											
P0705	P0705	Shift lever position switch																											
P0710	P0710-P0713	Trans fluid temp sensor																											
P0720-P0793	P0720-P0793	Output speed sensor																											
P0715-P0717	P0715-P0717	Input speed sensor																											
P0724	P0724	Stop lamp switch																											
P0741-P0796	P0741-P0796	Trans solenoid (function)																											
P0748-P0798	P0748-P0798	Trans solenoid (range)																											
P0850	P0850	PNP switch																											×
P1010,P1020	P1010,P1020	VVTL																				×						×	
P1011,12(,21,22)	P1011,12(,21,22)	VVTL system1(,2)																				×						×	
P1126	P1126	Electronic magnet clutch																											
P1129	P1129	Electronic throttle system																											
P1430	P1430	HC adsorber ACT press sensor																											
P2004,6	P2004,6	Intake Manifold Runner Control																											
P2009,10	P2009,10	Intake Manifold Runner Control Circuit																											
P2014,16,17	P2014,16,17	Intake Manifold Runner Position Sensor																											
P2102,P2103	P2102,P2103	Throttle motor																											
P2120-P2138	P2120-P2138	Accel position sensor																											
P2196,P2198	P2196,P2198	A/F sensor (rationality)																				×			×	×			
P2226	P2226	BARO sensor																					×		×	×			
P2237,2240	P2237,2240	A/F sensor (open)																				×			×	×			
P2423,24	P2423,24	HC Absorption Catalyst																											
P2430,2,3	P2430,2,3	A/R Pressure Sensor (Low/High)																											
P2431	P2431	A/R Pressure Sensor (Rationality)																											
P2440	P2440	A/R control valve stuck open																					×	×	×	×	×		
P2441	P2441	A/R control valve stuck close																					×	×	×	×	×		
P2444	P2444	AIP stuck On																					×	×	×	×	×		
P2445	P2445	AIP stuck Off																					×	×	×	×	×		
P2714-P2759	P2714-P2759	Trans solenoid (SLU-SLD)																											
P2A00,P2A03	P2A00,P2A03	A/F sensor (slow response)																				×			×	×			

P

A92386

Monitor detected malfunction

Fault code	Fault code	Component/ system	Monitor disablement (×−disabled)																													
			P0325,P0330	P0335	P0340,P0341	P0340-P0346	P0351-P0358	P0385	P0401	P0402	P0405	P0409	P0420,P0430	P0440-P0446	P0450,P0451	P0500	P0500	P0500	P0500	P0511	P0510	P0560	P0617	P0705	P0710-P0713	P0720-P0793	P0715-P0717	P0724	P0741-P0796			
			P0325-P0333	P0335	P0340,P0341	P0340-P0346	P0351-P0358	P0385	P0401	P0402	P0405,P0406	P0409	P0420,P0430	P0440-P0446	P0450-P0453	P0500	P0500	P0500	P0500	P0511	P0510	P0560	P0617	P0705	P0710-P0713	P0720-P0793	P0715-P0717	P0724	P0741-P0796			
			Knock sensor	CKP sensor	CMP sensor	VVT sensor 1, 2	Ignitor	CKP sensor 2	EGR system (closed)	EGR system (open)	EGR Lift sensor	EGR Lift sensor	Catelyst	EVAP system	EVAP press sensor	VSS (ECT2 sensor)	VSS (ECT1 sensor, non-ECT)	VSS (M/T)	IAC valve	Idle switch	System Voltage	Starter signal	Shift lever position switch	Trans fluid temp sensor	Output speed sensor	Input speed sensor	Stop lamp switch	Trans solenoid (function)*1			
P0010,P0020	P0010,P0020	VVT VSV 1, 2																														
P0011	P0011	VVT System 1 – Advance							×	×			×	×					×													
P0012	P0012	VVT System 1 – Retard							×	×			×	×					×													
P0016,P0018	P0016,P0018	VVT System – Misalignment																														
P0021	P0021	VVT System 2 – Advance							×	×			×	×					×													
P0022	P0022	VVT System 2 – Retard							×	×			×	×					×													
P0030,50	P0031,32,51,52	O2 Sensor Heater–Sensor1							×	×			×						×													×
P0135,P0155	P0031,32,51,52	A/F Sensor Heater–Sensor1							×	×			×						×													
P0036,56	P0037,38,57,58	O2 Sensor Heater–Sensor2											×																			
P0043,44,63,64	P0043,44,63,64	O2 Sensor Heater–Sensor3																														
P0100,P0101	P0100-P0103	MAF sensor							×	×			×	×				×	×													×
P0105,P0106	P0105-P0108	MAP sensor							×	×			×	×				×	×													×
P0110	P0110-P0113	IAT sensor							×	×				×																		×
P0115,P0116	P0115-P0118	ECT sensor							×	×		×	×	×				×	×													×
P0120,P0121	P0120-P0223,P2135	TP sensor							×	×			×	×			×		×													×
P0125	P0125	Insufficient ECT for Closed Loop							×	×		×	×	×				×	×													×
P0128	P0128	Thermostat																														
P0130-P0153	P0130-P0153	O2 Sensor–Sensor1							×	×			×						×													×
P0134,P0154	P0134,P0154	O2 Sensor, A/F sensor (No Activity)–Sensor1							×	×			×						×													×
P0136,P0156	P0136,P0156	O2 Sensor–Sensor2											×																			
P0142,P0162	P0142,P0162	O2 Sensor–Sensor3																														
P0171,P0172	P0171,P0172	Fuel system							×	×			×	×					×													×
P0300-P0308	P0300-P0308	Misfire											×	×					×													×
P0325,P0330	P0325-P0333	Knock sensor							×	×																						×
P0335	P0335	CKP sensor							×	×			×	×					×													×
P0340,P0341	P0340,P0341	CMP sensor							×	×			×	×					×													×
P0340-P0346	P0340-P0346	VVT sensor 1, 2																														
P0351-P0358	P0351-P0358	Ignitor							×	×			×	×					×													×
P0385	P0385	CKP sensor 2							×	×			×	×					×													
P0401	P0401	EGR system (closed)											×																			×
P0402	P0402	EGR system (open)											×	×					×													×
P0405,P0409	P0405-P0409	Lift sensor																														
P0420,P0430	P0420,P0430	Catalyst																														
P0442-P0456	P0442-P0456	EVAP system																	×													
P0450,P0451	P0450-P0453	EVAP press sensor												×																		

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A98729

Monitor detected malfunction

Fault code	Fault code	Component/ system	Monitor disablement (×−disabled)																												
			P0325,P0330	P0335	P0340,P0341	P0340-P0346	P0351-P0358	P0385	P0401	P0402	P0405	P0409	P0420,P0430	P0440-P0446	P0450,P0451	P0500	P0500	P0500	P0500	P0511	P0510	P0560	P0617	P0705	P0710	P0720-P0793	P0715-P0717	P0724	P0741-P0796
	P0325-P0333	Knock sensor																													
	P0335	CKP sensor																													
	P0340,P0341	CMP sensor																													
	P0340-P0346	VVT sensor 1, 2																													
	P0351-P0358	Ignitor																													
	P0385	CKP sensor 2																													
	P0401	EGR system (closed)											×	×						×						×				×	
	P0402	EGR system (open)											×	×						×						×				×	
	P0405,P0406	EGR Lift sensor																													
	P0409	EGR Lift sensor																													
	P0420,P0430	Catelyst							×	×										×						×				×	
	P0440-P0446	EVAP system							×	×										×						×				×	
	P0450-P0453	EVAP press sensor																													
	P0500	VSS (ECT2 sensor)																													
	P0500	VSS (ECT1 sensor, non-ECT)																													
	P0500	VSS (M/T)																													
	P0511	IAC valve							×	×			×	×						×						×				×	
	P0510	Idle switch								×			×	×						×						×				×	
	P0560	System Voltage																													
	P0617	Starter signal																													
	P0705	Shift lever position switch																													
	P0710-P0713	Trans fluid temp sensor																													
	P0720-P0793	Output speed sensor																													×
	P0715-P0717	Input speed sensor																													
	P0724	Stop lamp switch																													
	P0741-P0796	Trans solenoid (function)																													
	P0748-P0798	Trans solenoid (range)																								×	×				×
	P0850	PNP switch																		×											×
	P1010,P1020	VVTL																													
	P1011,12(,21,22)	VVTL system1(,2)							×	×			×	×						×											
	P1126	Electronic magnet clutch																													
	P1129	Electronic throttle system																													
	P1430	HC adsorber ACT press sensor												×	×																
	P2004,6	Intake Manifold Runner Control																													
	P2009,10	Intake Manifold Runner Control Circuit																													
	P2014,16,17	Intake Manifold Runner Position Sensor																													
	P2102,P2103	Throttle motor																													
	P2120-P2138	Accel position sensor																													
	P2196,P2198	A/F sensor (rationality)							×	×			×							×											×
	P2226	BARO sensor																													×
	P2237,2240	A/F sensor (open)							×	×			×							×											×
	P2423,24	HC Absorption Catalyst																													
	P2430,2,3	A/R Pressure Sensor (Low/High)																													
	P2431	A/R Pressure Sensor (Rationality)																													
	P2440	A/R control valve stuck open							×	×			×																		
	P2441	A/R control valve stuck close							×	×			×																		
	P2444	AIP stuck On							×	×			×																		
	P2445	AIP stuck Off							×	×			×																		
	P2714-P2759	Trans solenoid (SLU-SLD)																													×
	P2A00,P2A03	A/F sensor (slow response)							×	×			×							×											×

P

A92388

Monitor detected malfunction

Fault code	Fault code	Component/system	Monitor disablement (×—disabled)																										
			P0741-P0796	P0748-P0798	P0850	P1010,P1020	P1011,12(,21,22)	P1126	P1129	P1430	P2004,6	P2009,P2010	P2014,16,17	P2102,P2103	P2120-P2138	P2196,P2198	P2226	P2237,P2240	P2423,24	P2430,2,3	P2431	P2440	P2441	P2444	P2445	P2714-P2759	P2A00,P2A03
			P0741-P0796	P0748-P0799	P0850	P1010,P1020	P1011,12(,21,22)	P1126	P1129	P1430	P2004,6	P2009,10	P2014,16,17	P2102,P2103	P2120-P2138	P2196,P2198	P2226	P2237,P2240	P2423,24	P2430,2,3	P2431	P2440	P2441	P2444	P2445	P2714-P2759	P2A00,P2A03
			Trans solenoid (function) *2	Trans solenoid (range)	PNP switch	VVTL	VVTL system1(,2)	Electronic magnet clutch	Electronic throttle system	HC adsorber ACT press sensor	Intake Manifold Runner Control	Intake Manifold Runner Control Circuit	Intake Manifold Runner Position Sensor	Throttle motor	Accel position sensor	A/F Sensor (Rationality) -Sensor1	BARO sensor	A/F Sensor (Open) -Sensor1	HC Absorption Catalyst	A/R Pressure Sensor (Low/High)	A/R Pressure Sensor (Rationality)	A/R control valve stuck open	A/R control valve stuck close	AIP stuck On	AIP stuck Off	Trans solenoid (SLU-SLD)	A/F sensor (Slow response) -Sensor1
P0010,P0020	P0010,P0020	VVT VSV 1, 2																				×	×	×	×			
P0011	P0011	VVT System 1 – Advance																				×	×	×	×			
P0012	P0012	VVT System 1 – Retard																				×	×	×	×			
P0016,P0018	P0016,P0018	VVT System – Misalignment																				×	×	×	×			
P0021	P0021	VVT System 2 – Advance																				×	×	×	×			
P0022	P0022	VVT System 2 – Retard																				×	×	×	×			
P0030,50	P0031,32,51,52	O2 Sensor Heater–Sensor1																	×			×	×	×	×			
P0135,P0155	P0031,32,51,52	A/F Sensor Heater–Sensor1														×		×	×			×	×	×	×			×
P0036,56	P0037,38,57,58	O2 Sensor Heater–Sensor2														×			×									
P0043,44,63,64	P0043,44,63,64	O2 Sensor Heater–Sensor3																	×									
P0100,P0101	P0100-P0103	MAF sensor				×	×									×		×	×			×	×	×	×			×
P0105,P0106	P0105-P0108	MAP sensor				×	×									×		×	×			×	×	×	×			×
P0110	P0110-P0113	IAT sensor									×					×		×				×	×	×	×			×
P0115,P0116	P0115-P0118	ECT sensor	×			×	×				×					×		×	×			×	×	×	×			×
P0120,P0121	P0120-P0223,P2135	TP sensor														×		×	×			×	×	×	×			×
P0125	P0125	Insufficient ECT for Closed Loop	×			×										×		×	×			×	×	×	×			×
P0128	P0128	Thermostat																										
P0130-P0153	P0130-P0153	O2 Sensor–Sensor1																	×			×	×	×	×			
P0134,P0154	P0134,P0154	O2 Sensor, A/F sensor (No Activity)–Sensor1														×		×	×			×	×	×	×			×
P0136,P0156	P0136,P0156	O2 Sensor–Sensor2														×			×									
P0142,P0162	P0142,P0162	O2 Sensor–Sensor3																	×									
P0171,P0172	P0171,P0172	Fuel system														×		×	×			×	×	×	×			×
P0300-P0308	P0300-P0308	Misfire														×		×	×			×	×	×	×			×
P0325,P0330	P0325-P0333	Knock sensor																				×	×	×	×			
P0335	P0335	CKP sensor				×	×									×		×	×			×	×	×	×			×
P0340,P0341	P0340,P0341	CMP sensor				×	×									×		×	×			×	×	×	×			×
P0340-P0346	P0340-P0346	VVT sensor 1, 2																				×	×	×	×			
P0351-P0358	P0351-P0358	Ignitor																	×			×	×	×	×			
P0385	P0385	CKP sensor 2				×	×									×		×	×			×	×	×	×			×
P0401	P0401	EGR system (closed)																	×									
P0402	P0402	EGR system (open)														×		×	×			×	×	×	×			×
P0405,P0409	P0405-P0409	Lift sensor																										
P0420,P0430	P0420,P0430	Catalyst																										
P0442-P0456	P0442-P0456	EVAP system														×		×				×	×	×	×			×
P0450,P0451	P0450-P0453	EVAP press sensor																				×	×	×	×			

P

A92389

Monitor detected malfunction

Fault code	Fault code	Component/ system	Monitor disablement (×−disabled)																										
			P0741-P0796	P0748-P0798	P0850	P1010,P1020	P1011,12(,21,22)	P1126	P1129	P1430	P2004,6	P2009.P2010	P2014,16,17	P2102,P2103	P2120-P2138	P2196,P2198	P2226	P2237,P2240	P2423,24	P2430,2,3	P2431	P2440	P2441	P2444	P2445	P2714-P2759	P2A00,P2A03
	P0741-P0796	Trans solenoid (function) *2														×		×	×			×	×	×	×		×
	P0748-P0799	Trans solenoid (range)														×		×	×								×
	P0850	PNP switch														×		×	×								×
	P1010,P1020	VVTL																				×	×	×	×		
	P1011,12(,21,22)	VVTL system1(,2)																				×	×	×	×		×
	P1126	Electronic magnet clutch																									
	P1129	Electronic throttle system																									
	P1430	HC adsorber ACT press sensor																									
	P2004,6	Intake Manifold Runner Control																									
	P2009,10	Intake Manifold Runner Control Circuit																									
	P2014,16,17	Intake Manifold Runner Position Sensor																									
	P2102,P2103	Throttle motor																									
	P2120-P2138	Accel position sensor																									
	P2196,P2198	A/F sensor (rationality)																	×			×	×	×	×		×
	P2226	BARO sensor														×		×				×	×	×	×		×
	P2237,P2240	A/F sensor (open)																	×			×	×	×	×		×
	P2423,24	HC Absorption Catalyst																									
	P2430,2,3	A/R Pressure Sensor (Low/High)																			×	×	×	×	×		
	P2431	A/R Pressure Sensor (Rationality)																				×	×	×	×		
	P2440	A/R control valve stuck open														×		×	×								×
	P2441	A/R control valve stuck close														×		×	×								×
	P2444	AIP stuck On														×		×	×								×
	P2445	AIP stuck Off														×		×	×								×
	P2714-P2759	Trans solenoid (SLU-SLD)																									
	P2A00,P2A03	A/F sensor (Slow response) -Sensor1																	×			×	×	×	×		

P

A92390

05F3E-05

MONITOR DRIVE PATTERN

1. MONITOR DRIVE PATTERN FOR ECT TEST

(a) Perform this drive pattern as one method to simulate the detection conditions of the ECT malfunctions. (The DTCs may not be detected due the actual driving conditions. And some codes may not be detected through this drive pattern).

HINT:

Preparation for driving

- Warm up the engine sufficiently. (Engine coolant temperature is 60 °C (140 °F) or higher)
- Drive the vehicle when the atmospheric temperature is -10 °C (14 °F) or higher. (Malfunction is not detected when the atmospheric temperature is -10 °C (14 °F) or less)

Driving note

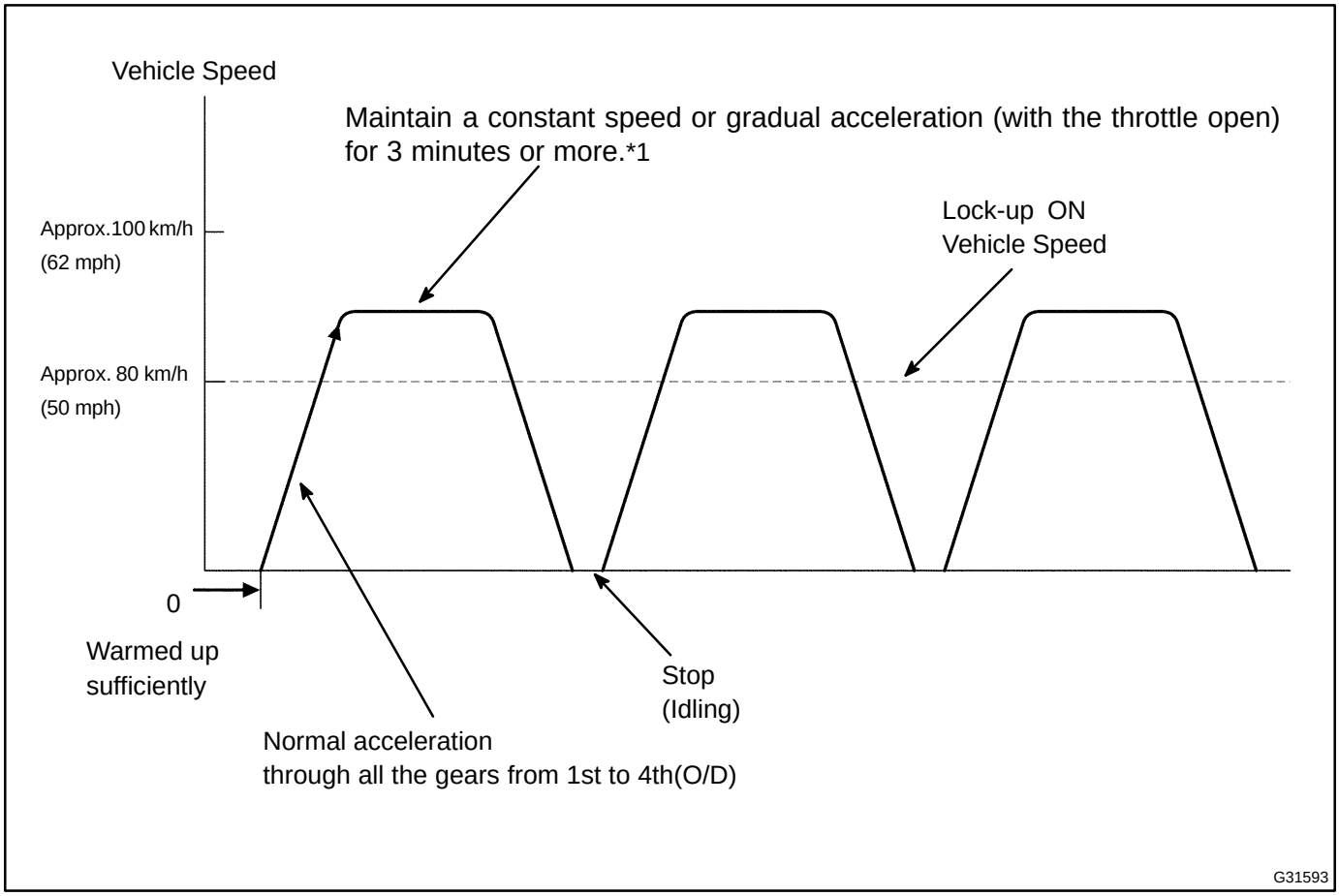
- Drive the vehicle through all gears.
  Stop → 1st → 2nd → 3rd → O/D → O/D (lock-up ON).
- Repeat the above driving pattern three times or more.

NOTICE:

- **The monitor status can be checked using the OBD II scan tool. When using the hand-held tester, monitor status can be found in the "ENHANCED OBD II/DATA LIST" or under "CARB OBD II".**
- **In the event that the drive pattern must be interrupted (possibly due to traffic conditions or other factors) the drive pattern can be resumed and, in most cases, the monitor can be completed.**

CAUTION:

Perform this drive pattern on a level road as much as possible and strictly observe the posted speed limits and traffic laws while driving.



HINT:

*1: Drive at such a speed in the uppermost gear, to engage lock-up. The vehicle can be driven at a speed lower than that in the above diagram under the lock-up condition.

NOTICE:

It is necessary to drive the vehicle for approximately 30 minutes to detect DTC P0711 (ATF temperature sensor malfunction).

05F2W-05

MECHANICAL SYSTEM TESTS

1. PERFORM MECHANICAL SYSTEM TESTS

(a) Measure the stall speed.

The object of this test is to check the overall performance of the transaxle and engine by measuring the stall speeds in the D and R positions.

NOTICE:

- **Perform the test at the normal operating ATF (Automatic Transmission Fluid) temperature 50 to 80°C (122 to 176°F).**
- **Do not continuously run this test for longer than 10 seconds.**
- **To ensure safety, do this test in a wide, clear level area which provides good traction.**
- **The stall test should always be carried out in pairs. One technician should observe the conditions of wheels or wheel stoppers outside the vehicle while the other is doing the test.**

(1) Chock the 4 wheels.

(2) Connect an OBD II scan tool or hand-held tester to the DLC3.

(3) Fully apply the parking brake.

(4) Keep your left foot pressed firmly on the brake pedal.

(5) Start the engine.

(6) Shift into the D position. Press all the way down on the accelerator pedal with your right foot.

(7) Quickly read the stall speed at this time.

Stall speed: 2,250 ≦ 150 rpm

(8) Do the same test in the R position.

Stall speed: 2,250 ≦ 150 rpm

Evaluation:

Problem	Possible cause
(a) Stall engine speed is low in D and R positions	・Engine power output may be insufficient ・Stator one-way clutch not operating properly HINT: If the value is less than the specified value by 600 rpm or more, the torque converter could be faulty.
(b) Stall engine speed is high in D position	・Line pressure is too low ・Forward clutch slipping ・No. 2 one-way clutch not operating properly ・U/D (Underdrive) clutch slipping
(c) Stall engine speed is high in R position	・Line pressure is too low ・Direct clutch slipping ・1st and reverse brake slipping ・U/D (Underdrive) clutch slipping
(d) Stall engine speed is high in D and R positions	・Line pressure is too low ・Improper fluid level ・U/D (Underdrive) one-way clutch not operating properly

(b) Measure the time lag.

(1) When the shift lever is shifted while the engine is idling, there will be a certain time lapse or lag before the shock can be felt. This is used for checking the condition of the direct clutch, forward clutch, and 1st and reverse brake.

NOTICE:

- **Perform the test at the normal operating ATF temperature 50 to 80 °C (122 to 176 °F).**
- **Be sure to allow 1 minute interval between tests.**
- **Perform the test three times, and measure the time lags. Calculate the average value of the three time lags.**

(2) Connect an OBD II scan tool or hand-held tester to the DLC3.

(3) Fully apply the parking brake.

(4) Start and warm up the engine and check idle speed.

Idle speed: approx. 700 rpm (In N position and A/C OFF)

(5) Shift the lever from N to D position. Using a stop watch, measure the time from when the lever is shifted until the shock is felt.

Time lag: N → D less than 1.2 seconds

(6) In the same way, measure the time lag for N → R.

Time lag: N → R less than 1.5 seconds

Evaluation (If N → D or N → R time lag is longer than the specified):

Problem	Possible cause
N → D time lag is longer	・Line pressure is too low ・Forward clutch worn ・U/D (Underdrive) one-way clutch not operating
N → R time lag is longer	・Line pressure is too low ・Direct clutch worn ・1st and reverse brake worn ・U/D (Underdrive) one-way clutch not operating properly

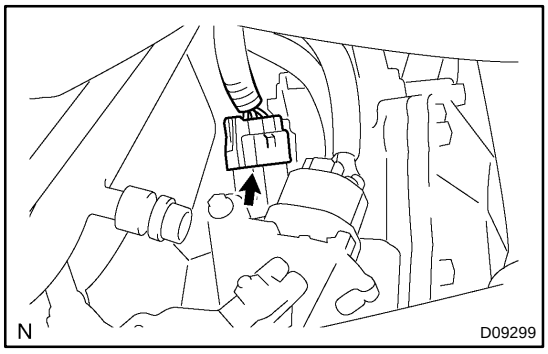
05F2Y-05

MANUAL SHIFTING TEST

1. PERFORM MANUAL SHIFTING TEST

HINT:

By this test, it can be determined whether the trouble is within the electrical circuit or is a mechanical problem in the transaxle.



(a) Disconnect the transmission wire connector.

(b) Inspect the manual driving operation.

Check that the shift and gear positions correspond to the table below.

While driving, shift through the L, 2 and D positions.

Check that the gear change corresponds to the shift position.

Shift Position	Gear Position
D	3rd
2	3rd
L	3rd
R	Reverse
P	Pawl Lock

HINT:

If the gear positions of the L, 2 and D are difficult to distinguish, do the following road test (see page 05-887).

If any abnormality is found in the above test, the problem is in the transaxle itself.

(c) Connect the transmission wire connector.

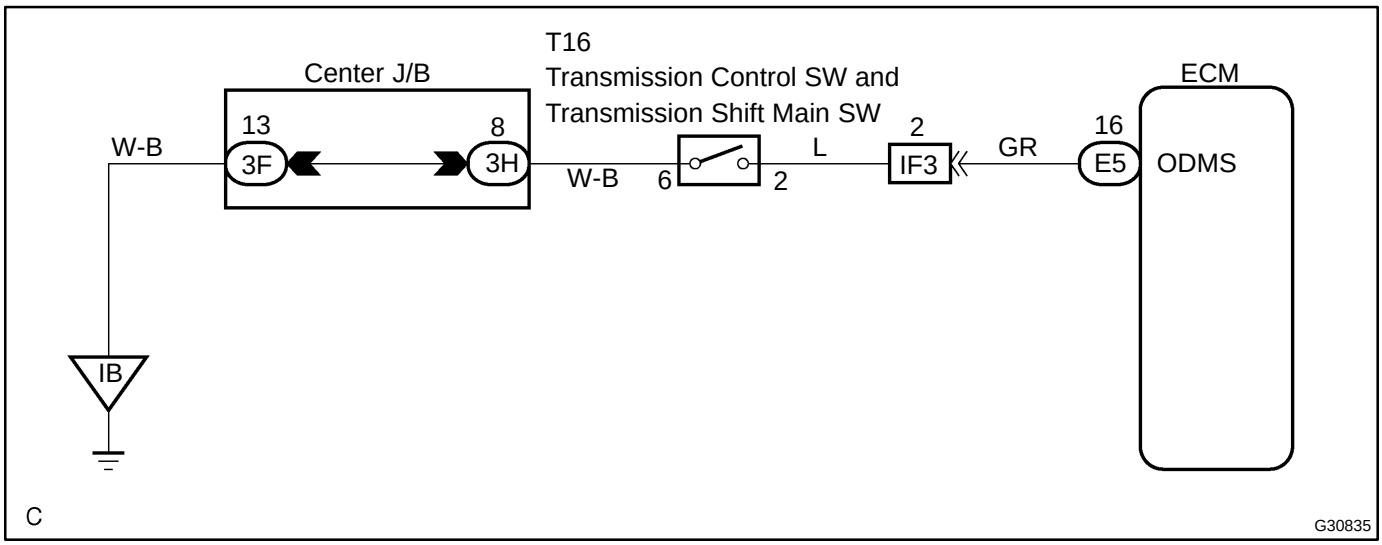
(d) Clear the DTC (see page 05-912).

O/D MAIN SWITCH CIRCUIT

CIRCUIT DESCRIPTION

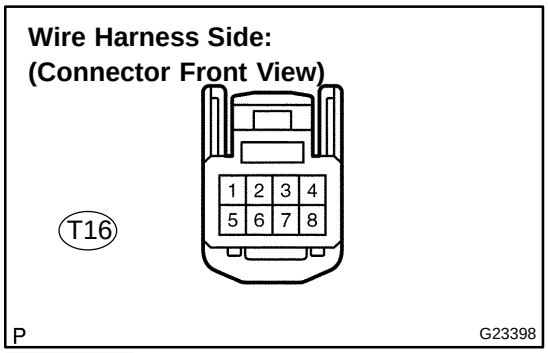
The O/D main switch (transmission control switch) is a momentary type switch. When pressing the O/D main switch, the O/D OFF indicator light lights up and the ECM prohibits shifting into O/D, and when pressing it once again, the O/D OFF indicator light goes off and the ECM allows shifting into O/D. Turning the IG switch OFF will reset the O/D OFF indicator light.

WIRING DIAGRAM



INSPECTION PROCEDURE

1 CHECK HARNESS AND CONNECTOR(TRANSMISSION CONTROL SWITCH-BODY GROUND)



(a) Disconnect the transmission control switch connector.
(b) Measure the resistance according to the value(s) in the table below.

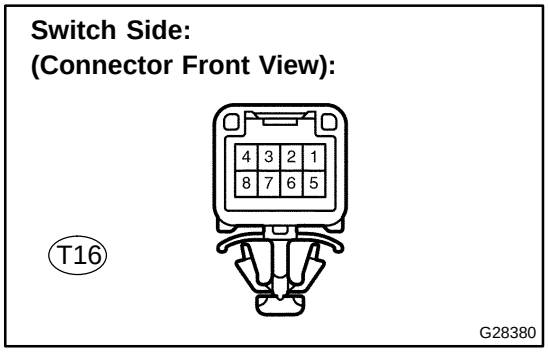
Standard:

Tester Connection	Specified Condition
6 - Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (SEE PAGE 01-36)**

OK

2 INSPECT TRANSMISSION CONTROL SWITCH



(a) Measure the resistance according to the value(s) in the table below.

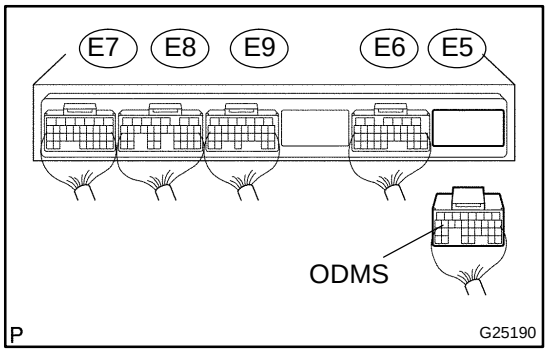
Standard:

Switch Condition	Tester Connection	Specified Condition
Press continuously transmission control switch	2 - 6	Below 1 Ω
Release transmission control switch	↑	10 kΩ or higher

NG → **REPLACE TRANSMISSION CONTROL SWITCH (SEE PAGE 40-61)**

OK

3 CHECK HARNESS AND CONNECTOR(TRANSMISSION CONTROL SWITCH-ECM)



(a) Connect the transmission control switch connector.
(b) Disconnect the ECM connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard:

Switch Condition	Tester Connection	Specified Condition
Press continuously transmission control switch	E5 - 16 (ODMS) - Body ground	Below 1 Ω
Release transmission control switch	↑	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (SEE PAGE 01-36)**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-904)

DTC	P0705	TRANSMISSION RANGE SENSOR CIRCUIT MALFUNCTION (PRNDL INPUT)

CIRCUIT DESCRIPTION

The park/neutral position switch detects the shift lever position and sends signals to the ECM.

DTC No.	DTC Detection Condition	Trouble Area
P0705	(A) Any 2 or more signals of the following are ON simultaneously (2-trip detection logic) ・NSW input signal is ON. ・R input signal is ON. ・D input signal is ON. ・2 input signal is ON. ・L input signal is ON. (B) Any 2 or more signals of the following are ON simultaneously (2-trip detection logic) ・P input signal is ON. ・R input signal is ON. ・N input signal is ON. ・D input signal is ON. ・2 input signal is ON. ・L input signal is ON.	・Open or short in park/neutral position switch circuit ・Park/neutral position switch ・ECM

MONITOR STRATEGY

Related DTCs	P0705: Park/neutral position switch/Verify switch input
Required sensors/Components	Park/neutral position switch
Frequency of operation	Continuous
Duration	2 sec.
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

Condition (A) and (B)

The monitor will run whenever this DTC is not present.	See page 05-895
Ignition switch	ON
Battery voltage	10.5 V or more

TYPICAL MALFUNCTION THRESHOLDS

Either of the following conditions is met: Condition (A) or (B)

Condition (A)

Number of the following signal input at the same time	2 or more
NSW switch	ON
R switch	ON
D switch	ON
2 switch	ON
L switch	ON

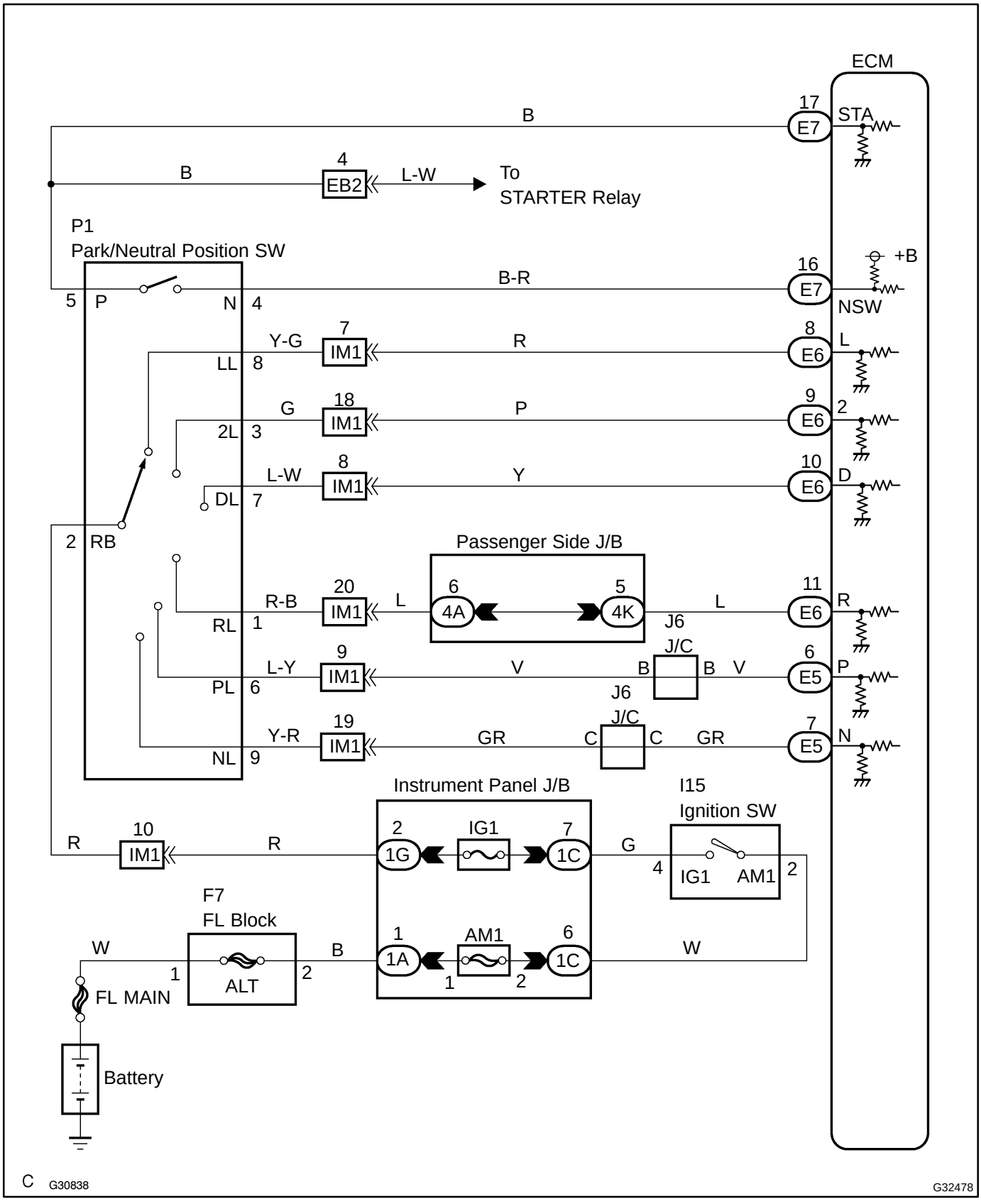
Condition (B)

Number of the following signal input at the same time	2 or more
P switch	ON
R switch	ON
N switch	ON
D switch	ON
2 switch	ON
L switch	ON

COMPONENT OPERATING RANGE

Park/neutral position switch	The park/neutral position switch sends only one signal to the ECM.

WIRING DIAGRAM



INSPECTION PROCEDURE

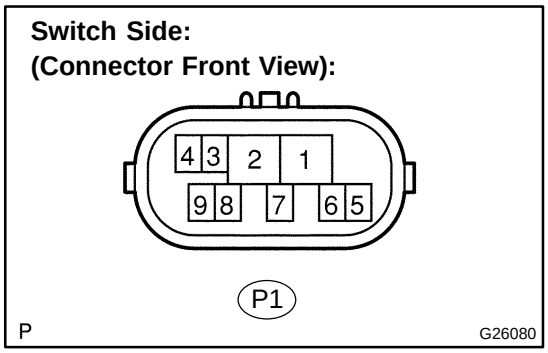
HINT:

According to the DATA LIST displayed by the OBD II scan tool or hand-held tester, you can read the value of the switch, sensor, actuator and so on without parts removal. Reading the DATA LIST as the first step of troubleshooting is one method to shorten labor time.

(a) Turn the ignition switch off.
(b) Connect the OBD II scan tool or hand-held tester to the DLC3.
(c) Turn the ignition switch to the ON position.
(d) Push the ”ON” button of the OBD II scan tool or the hand-held tester.
(e) When you use hand-held tester:
Select the item ”DIAGNOSIS/ENHANCED OBD II/DATA LIST”.
(f) According to the display on tester, read the ”DATA LIST”.

Item	Measurement Item/ Range (display)	Normal Condition	Diagnostic Note
PNP SW [NSW]	PNP SW Status/ ON or OFF	Shift lever position is; P or N: ON Except P or N: OFF	When the shift lever position displayed on the hand-held tester differs from the actual position, adjustment of the PNP switch or the shift cable may be incorrect.
LOW	PNP SW Status/ ON or OFF	Shift lever position is; L: ON Except L: OFF	↑
2ND	PNP SW Status/ ON or OFF	Shift lever position is; 2: ON Except 2: OFF	↑
REVERSE	PNP SW Status/ ON or OFF	Shift lever position is; R: ON Except R: OFF	↑
4TH/DRIVE	PNP SW Status/ ON or OFF	Shift lever position is; D: ON Except D: OFF	↑

1 INSPECT PARK/NEUTRAL POSITION SWITCH ASSY



(a) Disconnect the park/neutral position switch connector.

(b) Measure resistance according to the value(s) in the table below when the shift lever is moved to each position.

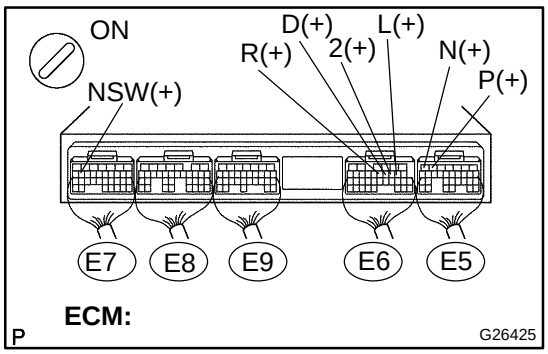
Standard:

Shift Position	Tester Connection	Specified Condition
P	2 - 6 and 4 - 5	Below 1 Ω
Except P	↑	10 kΩ or higher
R	2 - 1	Below 1 Ω
Except R	↑	10 kΩ or higher
N	2 - 9 and 4 - 5	Below 1 Ω
Except N	↑	10 kΩ or higher
D	2 - 7	Below 1 Ω
Except D	↑	10 kΩ or higher
2	2 - 3	Below 1 Ω
Except 2	↑	10 kΩ or higher
L	2 - 8	Below 1 Ω
Except L	↑	10 kΩ or higher

NG → **REPLACE PARK/NEUTRAL POSITION SWITCH ASSY (SEE PAGE 40-3)**

OK

2	CHECK HARNESS AND CONNECTOR(PARK/NEUTRAL POSITION SWITCH - ECM)



(a) Connect the transmission control switch connector of shift lock control unit assy.

(b) Turn the ignition switch to the ON position, and measure the voltage according to the value(s) in the table below when the shift lever is moved to each position.

Standard:

Shift Position	Tester Connection	Specified condition
P and N	E7 - 16 (NSW) - Body ground	Below 1 V
Except P and N	↑	10 to 14 V
P	E5 - 6 (P) - Body ground	10 to 14 V
Except P	↑	Below 1 V
N	E5 - 7 (N) - Body ground	10 to 14 V
Except N	↑	Below 1 V
R	E6 - 11 (R) - Body ground	10 to 14 V*
Except R	↑	Below 1 V
D	E6 - 10 (D) - Body ground	10 to 14 V
Except D	↑	Below 1 V
2	E6 - 9 (2) - Body ground	10 to 14 V
Except 2	↑	Below 1 V
L	E6 - 8 (L) - Body ground	10 to 14 V
Except L	↑	Below 1 V

HINT:

*: The voltage will drop slightly due to lighting up of the back up light.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (SEE PAGE 01-36)**

OK

REPLACE ECM (SEE PAGE 10-9)

DTC	P0710	TRANSMISSION FLUID TEMPERATURE SENSOR ”A” CIRCUIT

DTC	P0712	TRANSMISSION FLUID TEMPERATURE SENSOR ”A” CIRCUIT LOW INPUT

DTC	P0713	TRANSMISSION FLUID TEMPERATURE SENSOR ”A” CIRCUIT HIGH INPUT

CIRCUIT DESCRIPTION

The ATF (Automatic Transmission Fluid) temperature sensor converts the fluid temperature into a resistance value which is input into the ECM.
The ECM applies a voltage to the temperature sensor through ECM terminal THO1 (THO).
The sensor resistance changes with the transmission fluid temperature. As the temperature becomes higher, the sensor resistance decreases.
One terminal of the sensor is grounded so that the sensor resistance decreases and the voltage goes down as the temperature becomes higher.
The ECM calculates the fluid temperature based on the voltage signal.

DTC No.	DTC Detection Condition	Trouble Area
P0710	(a) and (b) is detected momentary within 0.5 sec. when neither P0712 or P0713 is not detected (1-trip detection logic) (a) ATF temperature sensor resistance is less than 79 Ω. (b) ATF temperature sensor resistance is more than 156 kΩ. HINT: Within 0.5 sec., the malfunction switches from (a) to (b) or from (b) to (a)	・Open or short in ATF temperature sensor circuit ・Transmission wire (ATF temperature sensor) ・ECM
P0712	ATF temperature sensor resistance is less than 79 Ω for 0.5 sec. or more (1-trip detection logic)	・Short in ATF temperature sensor circuit ・Transmission wire (ATF temperature sensor) ・ECM
P0713	ATF temperature sensor resistance is more than 156 kΩ when 15 minutes or more after the engine start DTC is detected for 0.5 sec. or more (1-trip detection logic)	・Open in ATF temperature sensor circuit ・Transmission wire (ATF temperature sensor) ・ECM

MONITOR DESCRIPTION

The automatic transmission fluid (ATF) temperature sensor converts ATF temperature to an electrical resistance value. Based on the resistance, the ECM determines the ATF temperature, and the ECM detects an opens or shorts in the ATF temperature circuit. If the resistance value of the ATF temperature is less than 79 Ω*1 or more than 156 kΩ*2, the ECM interprets this as a fault in the ATF sensor or wiring. The ECM will turn on the MIL and store the DTC.
*1: 150°C (302°F) or more is indicated regardless of the actual ATF temperature.
*2: -40°C (-40°F) is indicated regardless of the actual ATF temperature.
HINT:
The ATF temperature can be checked on the OBD II scan tool or hand-held tester display.

MONITOR STRATEGY

Related DTCs	P0710: ATF temperature sensor/Range check (Fluttering) P0712: ATF temperature sensor/Range check (Low resistance) P0713: ATF temperature sensor/Range check (High resistance)
Required sensors/Components	ATF temperature sensor (TFT sensor)
Frequency of operation	Continuous
Duration	0.5 sec.
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

P0710: Range check (Fluttering)

P0712: Range check (Low resistance)

The monitor will run whenever these DTCs are not present.	See page 05-895
The typical enabling condition is not available.	-

P0713: Range check (High resistance)

The monitor will run whenever this DTC is not present.	See page 05-895
Time after engine start	15 min. or more

TYPICAL MALFUNCTION THRESHOLDS

P0710: Range check (Fluttering)

TFT (transmission fluid temperature) sensor	Less than 79 Ω or More than 156 kΩ

P0712: Range check (Low resistance)

TFT (transmission fluid temperature) sensor	Less than 79 Ω

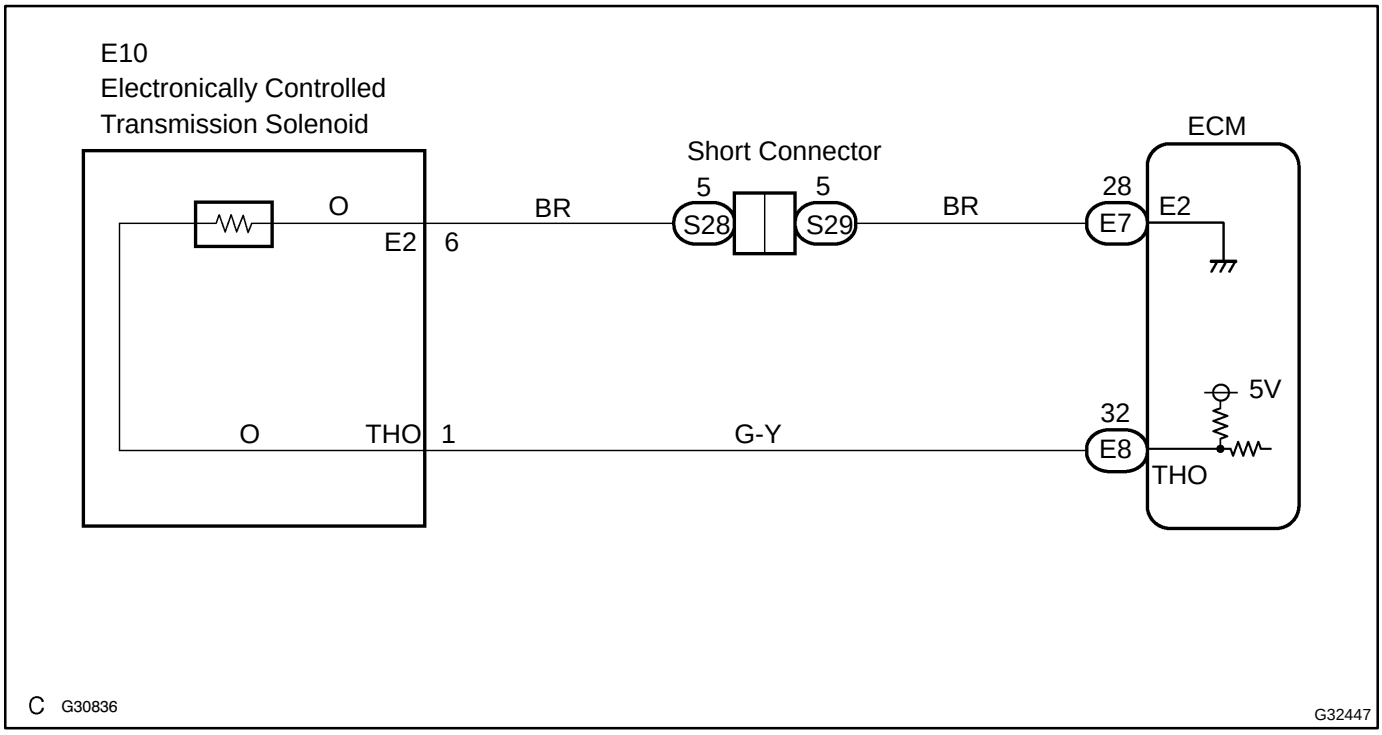
P0713: Range check (High resistance)

TFT (transmission fluid temperature) sensor	More than 156 kΩ

COMPONENT OPERATING RANGE

TFT (transmission fluid temperature)	Atmospheric temperature - approx. 130°C (266°F)

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
According to the DATA LIST displayed by the OBD II scan tool or hand-held tester, you can read the value of the switch, sensor, actuator and so on without parts removal. Reading the DATA LIST as the first step of troubleshooting is one method to shorten labor time.

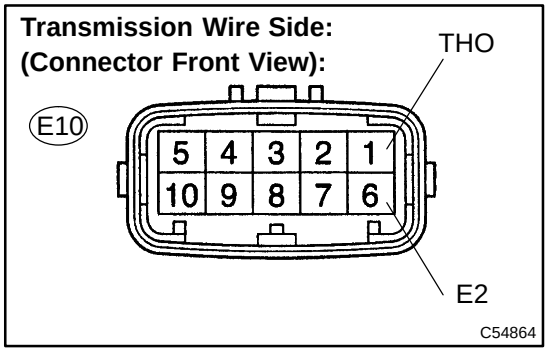
(a) Warm up the engine.
(b) Turn the ignition switch off.
(c) Connect the OBD II scan tool or hand-held tester to the DLC3.
(d) Turn the ignition switch to the ON position.
(e) Push the "ON" button of the OBD II scan tool or the hand-held tester.
(f) When you use hand-held tester:
Select the item "DIAGNOSIS/ENHANCED OBD II/DATA LIST".
(g) According to the display on tester, read the "DATA LIST".

Item	Measurement Item/ Range (display)	Normal Condition
AT FLUID TEMP	ATF Temp. Sensor Value/ min.: -40°C (-40°F) max.: 215°C (419°F)	Approx. 80°C (176°F) (After Stall Test)

HINT:
When DTC P0712 is output and OBD II scan tool or hand-held tester output is 150°C (302°F), there is a short circuit.
When DTC P0713 is output and OBD II scan tool or hand-held tester output is -40°C (-40°F), there is an open circuit.
Measure the resistance between terminal THO1 (THO) and body ground.

Temperature Displayed	Malfunction
-40 °C (-40 °F)	Open circuit
150 °C (302 °F) or more	Short circuit

1 INSPECT TRANSMISSION WIRE(ATF TEMPERATURE SENSOR)



(a) Disconnect the transmission wire connector from the transaxle.
(b) Measure the resistance according to the value(s) in the table below.
Standard:

Tester Connection	Specified Condition
1 (THO) - 6 (E2)	79 Ω to 156 kΩ

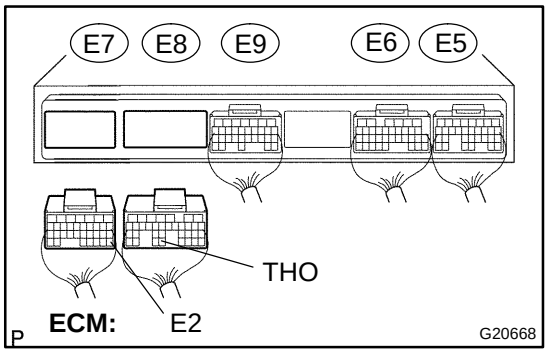
(c) Measure the resistance according to the value(s) in the table below.
Standard (Check for short):

Tester Connection	Specified Condition
1 (THO) - Body ground	10 kΩ or higher
6 (E2) - Body ground	↑

NG → **REPAIR OR REPLACE TRANSMISSION WIRE (SEE PAGE 40-34)**

OK

2	CHECK HARNESS AND CONNECTOR(TRANSMISSION WIRE - ECM)



(a) Connect the transmission wire connector to the transaxle.
(b) Disconnect the ECM connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition
E8 - 32 (THO) - E7 - 28 (E2)	79 Ω to 156 kΩ

(d) Measure the resistance according to the value(s) in the table below.

Standard (Check for short):

Tester Connection	Specified Condition
E8 - 32 (THO) - Body ground	10 kΩ or higher
E7 - 28 (E2) - Body ground	↑

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (SEE PAGE 01-36)**

OK

REPLACE ECM (SEE PAGE 10-9)

DTC	P0711	TRANSMISSION FLUID TEMPERATURE SENSOR "A" PERFORMANCE

CIRCUIT DESCRIPTION

The ATF (Automatic Transmission Fluid) temperature sensor converts the fluid temperature into a resistance value which is input into the ECM.

DTC No.	DTC Detection Condition	Trouble Area
P0711	Both (a) and (b) are detected: (2-trip detection logic) (a) Intake air and engine coolant temperatures are more than -10°C (14°F) at engine start (b) After normal driving for over 18 min. and 9 km (6 mile) or more, ATF temp. is less than 10°C (50°F)	・Open or short in ATF temperature sensor circuit ・Transmission wire (ATF temperature sensor) ・ECM

MONITOR DESCRIPTION

The ATF temperature sensor converts the ATF temperature to an electrical resistance value. Based on the resistance, the ECM determines the ATF temperature and detects an opens or shorts in the ATF temperature circuit or a fault of the ATF temperature sensor.

After running the vehicle for a certain period, the ATF temperature should increase. If the ATF temperature is below 10°C (50°F) after running the vehicle for a certain period, the ECM interprets this as a fault, and turns on the MIL.

When the ATF temperature is 110°C (230°F) or more after 17 minutes of engine cold start, the ECM also determines this as a fault, turns on the MIL, and stores the DTC.

MONITOR STRATEGY

Related DTCs	P0711: ATF temperature sensor/Rationality check
Required sensors/Components	ATF temperature sensor (TFT sensor)
Frequency of operation	Continuous
Duration	3 sec.
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever this DTC is not present.	See page 05-895
Time after engine start	16 min.and 40 sec. or more
ECT (Engine coolant temperature)	-15°C (5°F) or more
TFT (transmission fluid temperature) sensor circuit	Not circuit malfunction
ECT sensor circuit	Not circuit malfunction
IAT (Intake air temperature) sensor circuit	Not circuit malfunction
Time after engine start	18 min. and 20 sec.
Driving distance after engine start	9 km/h (5.6 mph)
IAT (12 sec. after engine start)	-10°C (14°F) or more
ECT (12 sec. after engine start)	-10°C (14°F) or more

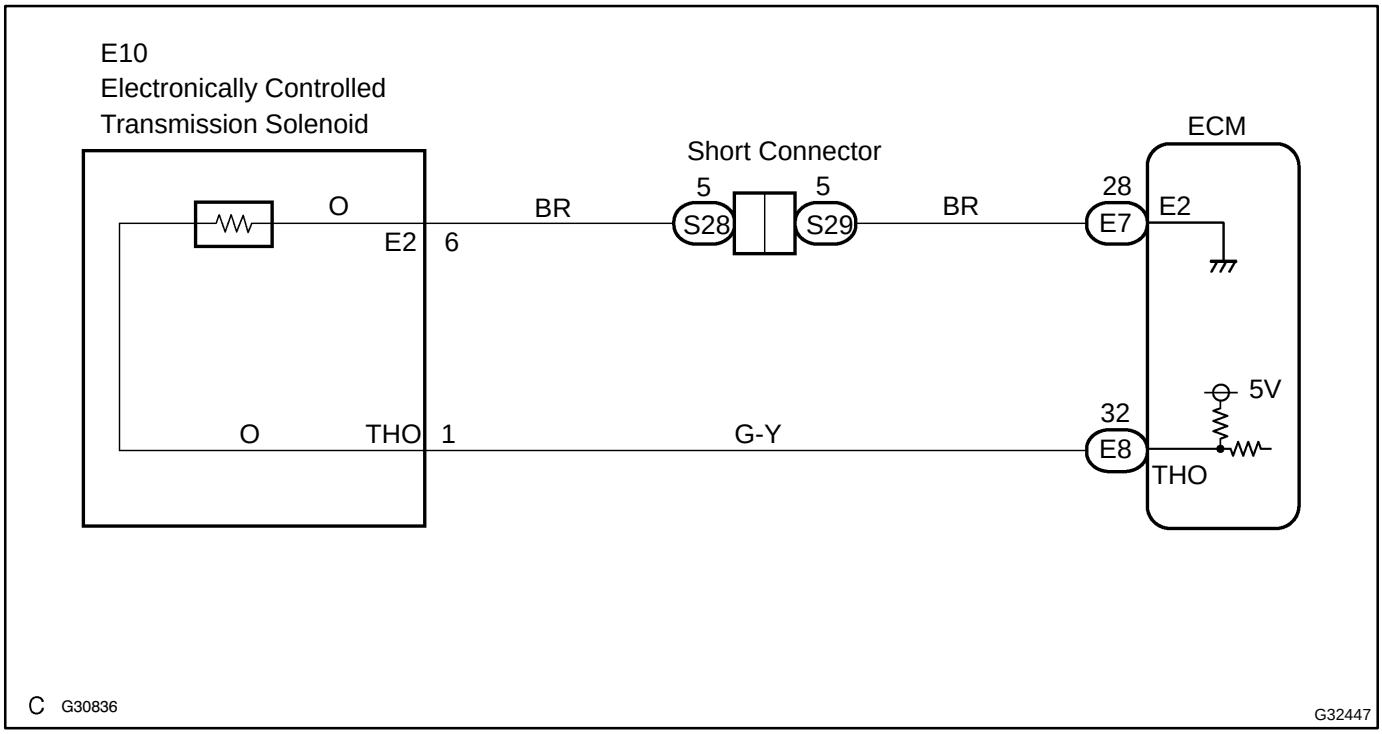
TYPICAL MALFUNCTION THRESHOLDS

TFT (transmission fluid temperature)	Less than 10°C (50°F)

COMPONENT OPERATING RANGE

TFT (transmission fluid temperature)	Atmospheric temperature - approx. 130°C (266°F)

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
According to the DATA LIST displayed by the OBD II scan tool or hand-held tester, you can read the value of the switch, sensor, actuator and so on without parts removal. Reading the DATA LIST as the first step of troubleshooting is one method to shorten labor time.

(a) Warm up the engine.
(b) Turn the ignition switch off.
(c) Connect the OBD II scan tool or hand-held tester to the DLC3.
(d) Turn the ignition switch to the ON position.
(e) Push the "ON" button of the OBD II scan tool or the hand-held tester.
(f) When you use hand-held tester:
Select the item "DIAGNOSIS/ENHANCED OBD II/DATA LIST".
(g) According to the display on tester, read the "DATA LIST".

Item	Measurement Item/ Range (display)	Normal Condition
AT FLUID TEMP	ATF Temp. Sensor Value/ min.: -40°C (-40°F) max.: 215°C (419°F)	Approx. 80°C (176°F) (After Stall Test)

HINT:
When DTC P0712 is output and OBD II scan tool or hand-held tester output is 150°C (302°F), there is a short circuit.
When DTC P0713 is output and OBD II scan tool or hand-held tester output is -40°C (-40°F), there is an open circuit.
Measure the resistance between terminal THO1 (THO) and body ground.

Temperature Displayed	Malfunction
-40 °C (-40 °F)	Open circuit
150 °C (302 °F) or more	Short circuit

HINT:
If a circuit related to the ATF temperature sensor becomes open, P0713 is immediately set (in 0.5 second). When P0713 is set, P0711 cannot be detected.
It is not necessary to inspect the circuit when P0711 is set.

1	CHECK OTHER DTCS OUTPUT(IN ADDITION TO DTC P0711)

(a) Connect the OBD II scan tool or the hand-held tester to the DLC3.
(b) Turn the ignition switch to the ON position and push the OBD II scan tool or the hand-held tester main switch ON.
(c) When you use hand-held tester:
Select the item ”DIAGNOSIS/ENHANCED OBD II/DTC INFO/CURRENT CODES”.
(d) Read the DTCs using the OBD II scan tool or the hand-held tester.

Result:

Display (DTC output)	Proceed to
Only ”P0711” is output	A
”P0711” and other DTCs	B

HINT:
If any other codes besides ”P0711” is output, perform the troubleshooting for those DTCs first.

B → **GO TO RELEVANT DTC CHART (SEE PAGE 05-920)**

A

2	CHECK TRANSAXLE FLUID LEVEL (SEE PAGE 40-2)

OK:
Automatic transaxle fluid level is correct.

NG → **ADD FLUID**

OK

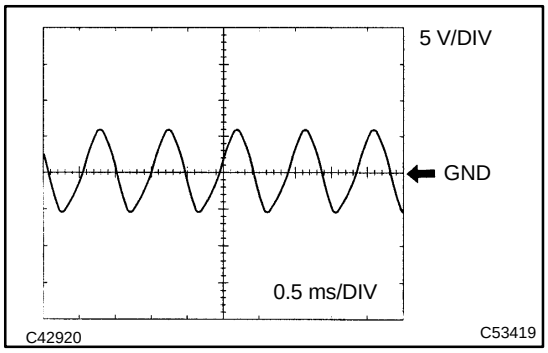
REPLACE TRANSMISSION WIRE (SEE PAGE 40-34)

DTC	P0717	TURBINE SPEED SENSOR CIRCUIT NO SIGNAL

CIRCUIT DESCRIPTION

This sensor detects the rotation speed of the input turbine. By comparing the input turbine speed signal (NT) with the counter gear speed sensor signal (NC), the ECM detects the shift timing of the gears and appropriately controls the engine torque and hydraulic pressure according to various conditions. Thus, providing smooth gear shift.

DTC No.	DTC Detection Condition	Trouble Area
P0717	ECM detects conditions (a), (b) and (c) continuity for 5 sec. or more: (1-trip detection logic) (a) Vehicle speed: 50 km/h (31 mph) or more (b) Park/neutral position switch (NSW, R and L) is OFF (c) Speed sensor (NT): less than 300 rpm	⁜ Open or short in transmission revolution sensor NT (speed sensor NT) circuit ⁜ Transmission revolution sensor NT (speed sensor NT) ⁜ ECM ⁜ Automatic transaxle assembly



Reference (Using an oscilloscope):

Check the waveform between the terminals NT+ and NT- of the ECM connector.

Standard: Refer to the illustration.

Terminal	NT+ - NT-
Tool setting	5V/DIV, 0.5ms/DIV
Vehicle condition	Vehicle speed 20 km/h (12 mph)

MONITOR DESCRIPTION

The NT terminal of the ECM detects a revolution signal from the speed sensor (NT) (input RPM). The ECM calculates a gearshift comparing the speed sensor (NT) with the speed sensor (NC).

While the vehicle is operating in 2nd, 3rd or O/D gear in the shift position of D, if the input shaft revolution is less than 300 rpm*1 although the output shaft revolution is more than 1,000 rpm*2, the ECM detects the trouble, illuminates the MIL and stores the DTC.

*1: Pulse is not output or is irregularly output.

*2: The vehicle speed is 50 km/h (31 mph) or more.

MONITOR STRATEGY

Related DTCs	P0717: Speed sensor (NT)/Verify pulse input
Required sensors/Components	Speed sensor (NT), Speed sensor (NC)
Frequency of operation	Continuous
Duration	5 sec.
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever this DTC is not present.	See page 05-895
Shift change	Shift change is completed and before starting next shift change operation
ECM selected gear	2nd, 3rd or 4th
Output shaft rpm	1,000 rpm or more
NSW switch	OFF
R switch	OFF
L switch	OFF
Engine	Running

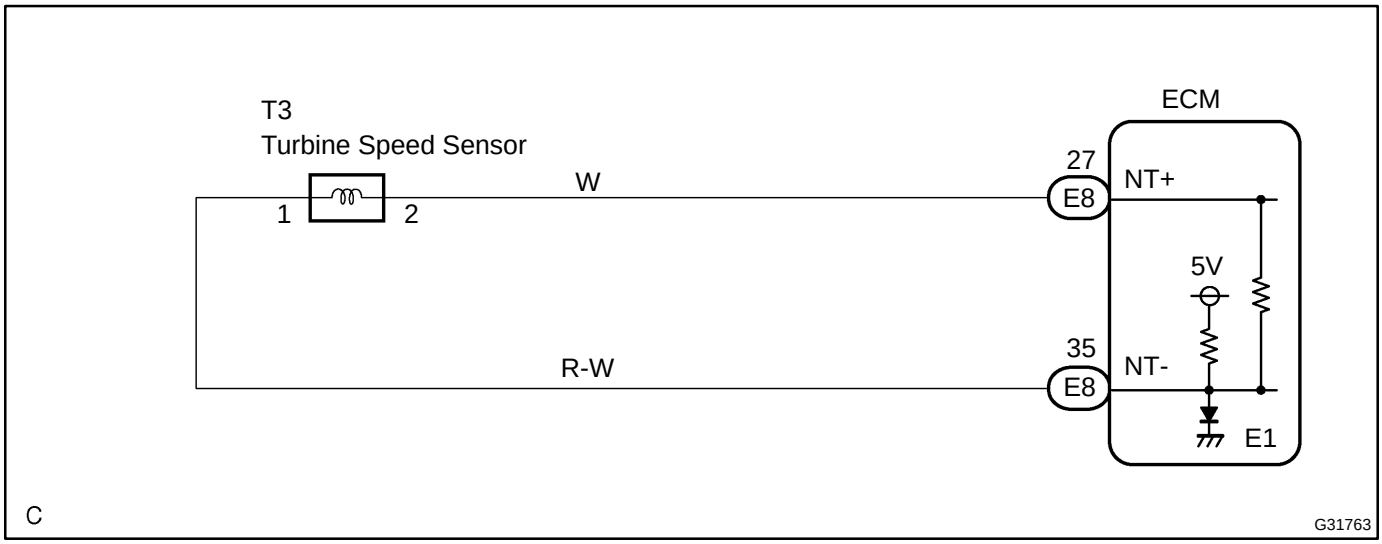
TYPICAL MALFUNCTION THRESHOLDS

Sensor signal rpm	Less than 300 rpm

COMPONENT OPERATING RANGE

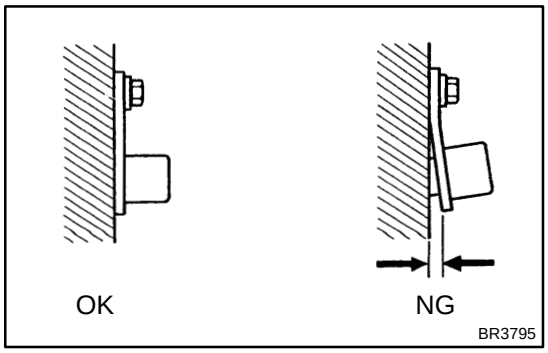
Speed sensor (NT)	Turbine speed is equal to engine speed when lock-up ON

WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT SPEED SENSOR INSTALLATION



(a) Check the speed sensor installation.

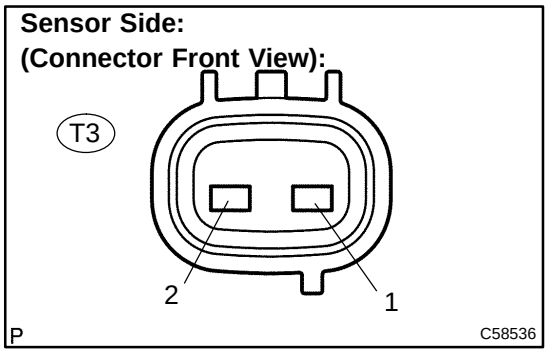
OK:

The installation bolt is tightened properly and there is no clearance between the sensor and transaxle case.

NG → **REPLACE SPEED SENSOR(NT)**

OK

2 INSPECT SPEED SENSOR(NT)



(a) Disconnect the speed sensor connector from the transaxle.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

TOYOTA made:

Tester Connection	Specified Condition 20 ℃ (68 ℉)
1 - 2	500 to 620 Ω

Standard:

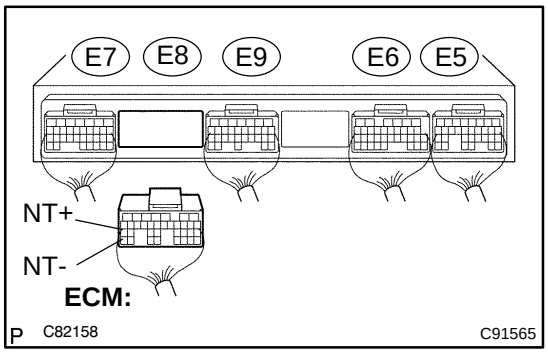
AISIN made:

Tester Connection	Specified Condition 20 ℃ (68 ℉)
1 - 2	560 to 680 Ω

NG → **REPLACE SPEED SENSOR(NT)**

OK

3 CHECK HARNESS AND CONNECTOR(SPEED SENSOR - ECM)



(a) Connect the speed sensor connector.

(b) Disconnect the ECM connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard:

TOYOTA made:

Tester Connection	Specified Condition 20 ℃ (68 ℉)
E8 - 27 (NT+) - E8 - 35 (NT-)	500 to 620 Ω

Standard:

AISIN made:

Tester Connection	Specified Condition 20 ℃ (68 ℉)
E8 - 27 (NT+) - E8 - 35 (NT-)	560 to 680 Ω

(d) Measure the resistance according to the value(s) in the table below.

Standard (Check for short):

Tester Connection	Specified Condition
E8 - 27 (NT+) - Body ground	10 kΩ or higher
E8 - 35 (NT-) - Body ground	↑

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (SEE PAGE 01-36)**

OK

REPLACE ECM (SEE PAGE 10-9)

DTC P0724 BRAKE SWITCH ”B” CIRCUIT HIGH

CIRCUIT DESCRIPTION

The purpose of this circuit is to prevent the engine from stalling while driving in lock-up condition, when brakes are suddenly applied.
When the brake pedal is depressed, this switch sends a signals to the ECM. Then the ECM cancels the operation of the lock-up clutch while braking is in progress.

DTC No.	DTC Detecting Condition	Trouble Area
P0724	The stop light switch remains ON even when the vehicle is driven in a GO (30 km/h) and STOP (3 km/h) fashion 5 times. (2-trip detection logic).	›¦Short in stop light switch signal circuit ›¦Stop light switch ›¦ECM

MONITOR DESCRIPTION

This DTC indicates that the stop light switch remains on. When the stop light switch remains ON during ”stop and go” driving, the ECM interprets this as a fault in the stop light switch and the MIL comes on and the ECM stores the DTC. The vehicle must stop (less than 3 km/h (2 mph)) and go (30 km/h (19 mph) or more) 5 times for two driving cycles in order to detect malfunction.

MONITOR STRATEGY

Related DTCs	P0724: Stop light switch/Range check/Rationality
Required sensors/Components	Stop light switch, Vehicle speed sensor
Frequency of operation	Continuous
Duration	GO and STOP 5 times
MIL operation	2 driving cycles
Sequence of operation	None

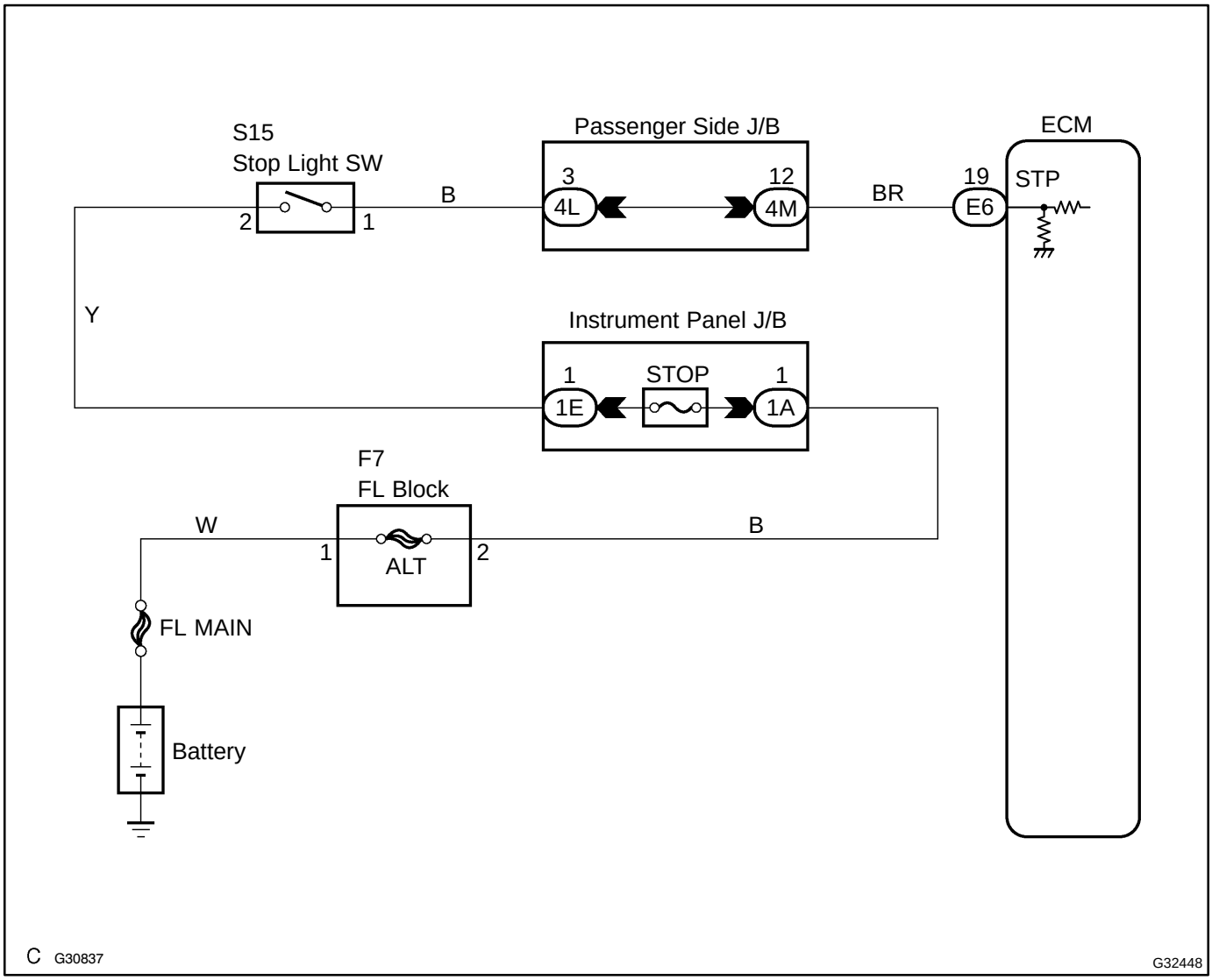
TYPICAL ENABLING CONDITIONS

The monitor will run whenever this DTC is not present.	See page 05-895
Battery voltage	8 V or more
Ignition switch	ON
Starter	OFF
GO (Vehicle speed is 30 km/h (18.63 mph) or more)	Once
STOP (Vehicle speed is less than 3 km/h (1.86 mph))	Once

TYPICAL MALFUNCTION THRESHOLDS

Brake switch	Remain ON during GO and STOP 5 times

WIRING DIAGRAM



INSPECTION PROCEDURE

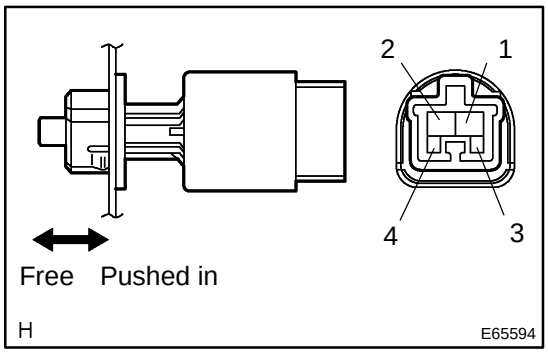
HINT:

According to the DATA LIST displayed by the OBD II scan tool or hand-held tester, you can read the value of the switch, sensor, actuator and so on without parts removal. Reading the DATA LIST as the first step of troubleshooting is one method to shorten labor time.

(a) Turn the ignition switch off.
(b) Connect the OBD II scan tool or hand-held tester to the DLC3.
(c) Turn the ignition switch to the ON position.
(d) Push the "ON" button of the OBD II scan tool or the hand-held tester.
(e) When you use hand-held tester:
Select the item "DIAGNOSIS/ENHANCED OBD II/DATA LIST".
(f) According to the display on tester, read the "DATA LIST".

Item	Measurement Item/ Range (display)	Normal Condition
STOP LIGHT SW	Stop light SW Status/ ON or OFF	・Brake Pedal is depressed: ON ・Brake Pedal is released: OFF

1 INSPECT STOP LAMP SWITCH ASSY



(a) Remove the stop lamp switch assy.
(b) Measure the resistance according to the value(s) in the table below.

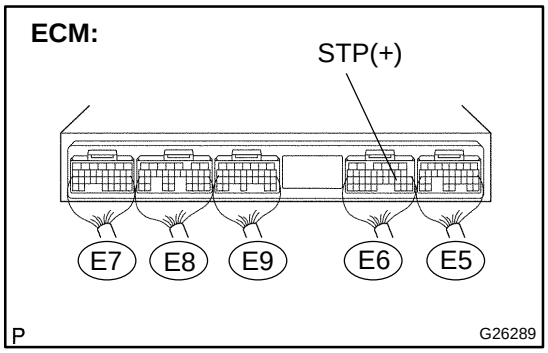
Standard:

Switch position	Tester Connection	Specified Condition
Switch pin free	1 - 2	10 kΩ or higher
Switch pin pushed in	↑	Below 1 Ω
Switch pin free	3 - 4	Below 1 Ω
Switch pin pushed in	↑	10 kΩ or higher

NG → **REPLACE STOP LAMP SWITCH ASSY**

OK

2 CHECK HARNESS AND CONNECTOR(STOP LAMP SWITCH ASSY - ECM)



(a) Connect the stop lamp switch assy connector.
(b) Measure the voltage according to the value(s) in the table below when the brake pedal is depressed and released.

Standard:

Condition	Tester Connection	Specified Condition
Brake pedal is depressed	E6 - 19 (STP) - Body ground	10 to 14 V
Brake pedal is released	↑	Below 1 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (SEE PAGE 01-36)**

OK

REPLACE ECM (SEE PAGE 10-9)

DTC	P0741	TORQUE CONVERTER CLUTCH SOLENOID PERFORMANCE (SHIFT SOLENOID VALVE DSL)

SYSTEM DESCRIPTION

The ECM uses the signals from the throttle position sensor, Air-flow meter, turbine (input) speed sensor, intermediate (counter) shaft speed sensor and crankshaft position sensor to monitor the engagement condition of the lock-up clutch.

Then the ECM compares the engagement condition of the lock-up clutch with the lock-up schedule in the ECM memory to detect a mechanical problems of the shift solenoid valve DSL, valve body and torque converter clutch.

DTC No.	DTC Detection Condition	Trouble Area
P0741	Lock-up does not occur when driving in lock-up range (normal driving at 85 km/h [53 mph]), or lock-up remains ON in lock-up OFF range (2-trip detection logic)	・Shift solenoid valve DSL remains open or closed ・Valve body is blocked ・Shift solenoid valve DSL ・Torque converter clutch ・Automatic transaxle (clutch, brake or gear etc.) ・Line pressure is too low ・ECM

MONITOR DESCRIPTION

Torque converter lock-up is controlled by the ECM based on speed sensor (NT), speed sensor (NC), engine rpm, engine load, engine temperature, vehicle speed, transmission temperature, and gear selection. The ECM determines the lock-up status of the torque converter by comparing the engine rpm (NE) to the input turbine rpm (NT). The ECM calculates the actual transmission gear by comparing input turbine rpm (NT) to counter gear rpm (NC). When conditions are appropriate, the ECM requests ”lock-up” by applying control voltage to shift solenoid DSL. When the DSL is turned on, solenoid DSL applies pressure to the lock-up relay valve and locks the torque converter clutch.

If the ECM detects no lock-up after lock-up has been requested or if it detects lock-up when it is not requested, the ECM interprets this as a fault in the shift solenoid valve DSL or lock-up system performance. The ECM will turn on the MIL and store the DTC.

Example:

When any of the following is met, the system judges it as a malfunction.

(a) There is a difference in rotation between before and after torque converters even when the ECM commands lock-up.
(Engine speed is at least 75 rpm greater than input turbine speed.)

(b) There is no difference in rotation between before and after torque converters even when the ECM commands lock-up off.
(The difference between engine speed and input turbine speed is less than 35 rpm.)

MONITOR STRATEGY

Related DTCs	P0741: Shift solenoid valve DSL/OFF malfunction Shift solenoid valve DSL/ON malfunction
Required sensors/Components	Shift solenoid valve DSL, Speed sensor (NT), Speed sensor (NC),Crankshaft position sensor (NE), Throttle position sensor (VPA1), Mass air flow sensor (MAF), Transmission temperature sensor (THO1), Engine coolant temperature sensor (ECT)
Frequency of operation	Continuous
Duration	OFF malfunction 3.5 sec. ON malfunction 1.8 sec.
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

ALL:

Transmission range	”D”
ECT (Engine coolant temperature)	60˚C (140˚F) or more
TFT (Transmission fluid temperature)	-20 ◌C (-4 ◌F) or more
TFT sensor circuit	Not circuit malfunction
ECT sensor circuit	Not circuit malfunction
Turbine speed sensor circuit	Not circuit malfunction
Intermediate shaft speed sensor circuit	Not circuit malfunction
Output speed sensor circuit	Not circuit malfunction
Shift solenoid valve SL1 circuit	Not circuit malfunction
Shift solenoid valve SL2 circuit	Not circuit malfunction
Shift solenoid valve S4 circuit	Not circuit malfunction
Shift solenoid valve DSL circuit	Not circuit malfunction
Electronic throttle system	Not circuit malfunction

OFF malfunction

ECM lock-up command	ON
ECM selected gear	3rd or 4th
Vehicle speed	25 km/h (15.5 mph) or more

ON malfunction

ECM lock-up command	OFF
ECM selected gear	3rd or 4th
Throttle valve opening angle	8% or more
Vehicle speed	25 to 60 km/h (15.5 to 37.2 mph)

TYPICAL MALFUNCTION THRESHOLDS

Either of the following conditions is met: OFF malfunction or ON malfunction

OFF malfunction

Engine speed - Input (turbine) speed	100 rpm or more

ON malfunction

2 detections are necessary per driving cycle:

1st detection; temporary flag ON

2nd detection; pending fault code ON

Vehicle speed must be under 10 km/h (6.2 mph) once before 2nd detection

Diffierence between engine speed and input (turbine) speed	Less than 35 rpm

INSPECTION PROCEDURE

HINT:

Performing the ACTIVE TEST using the hand-held tester allows the relay, VSV, actuator and so on to operate without parts removal. Performing the ACTIVE TEST as the first step of troubleshooting is one method to shorten labor time.

It is possible to display the DATA LIST during the ACTIVE TEST.

(a) Warm up the engine.
(b) Turn the ignition switch off.
(c) Connect the hand-held tester to the DLC3.
(d) Turn the ignition switch to the ON position.
(e) Push the "ON" button of the hand-held tester.
(f) Select the item "DIAGNOSIS/ENHANCED OBD II/ACTIVE TEST".
(g) According to the display on tester, perform the "ACTIVE TEST".

Item	Test Details	Diagnostic Note
LOCK UP	[Test Details] Control the shift solenoid DSL to set the automatic transaxle to the lock-up condition. [Vehicle Condition] Vehicle Speed: 58 km/h (36 mph) or more	Possible to check the DSL operation.

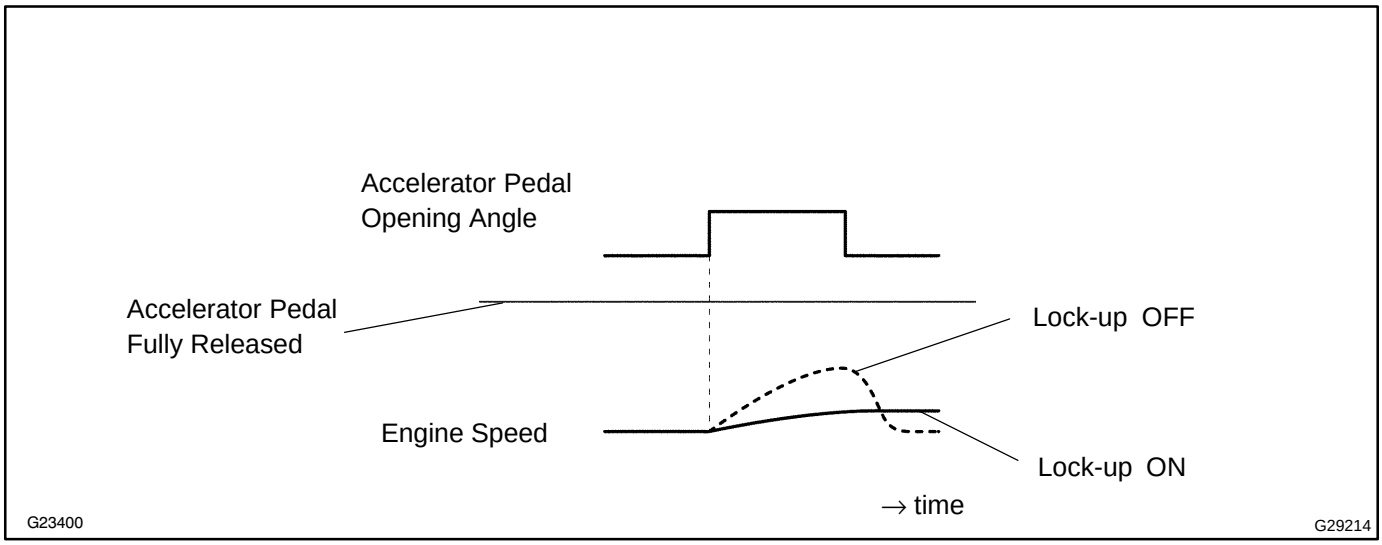
HINT:

- This test can be conducted when the vehicle speed is 58 km/h (36 mph) or more.
- This test can be conducted with the 3rd or O/D gear.

(h) Lightly depress the accelerator pedal and check that the engine speed does not change abruptly.

HINT:

- When changing the accelerator pedal opening angle while driving, if the engine speed does not change, lock-up is on.
- Slowly release, but not fully, the accelerator pedal in order to decelerate. (Fully releasing the pedal will close the throttle valve and lock-up may be turned off.)



1 CHECK OTHER DTCS OUTPUT(IN ADDITION TO DTC P0741)

(a) Connect the OBD II scan tool or the hand-held tester to the DLC3.
(b) Turn the ignition switch to the ON position and push the OBD II scan tool or the hand-held tester main switch ON.
(c) When you use hand-held tester:
Select the item "DIAGNOSIS/ENHANCED OBD II/DTC INFO/CURRENT CODES".
(d) Read the DTCs using the OBD II scan tool or the hand-held tester.

Result:

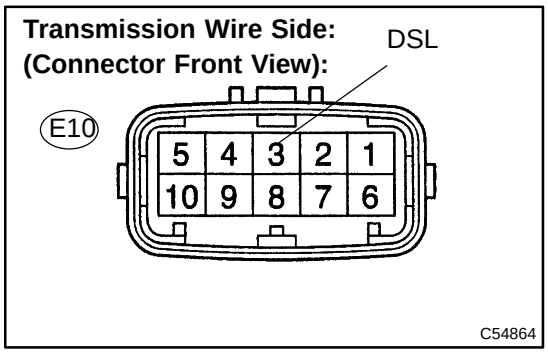
Display (DTC output)	Proceed to
Only "P0741" is output	A
"P0741" and other DTCs	B

HINT:
If any other codes besides "P0741" is output, perform the troubleshooting for those DTCs first.

NG → **GO TO RELEVANT DTC CHART (SEE PAGE 05-920)**

A

2 INSPECT TRANSMISSION WIRE(DSL)



(a) Disconnect the transmission wire connector from the transaxle.
(b) Measure the resistance according to the value(s) in the table below.

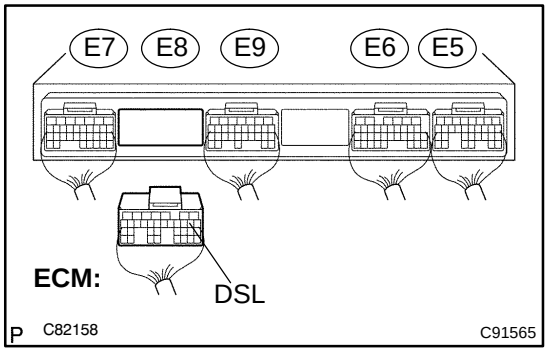
Standard:

Tester Connection	Specified Condition 20 ℃ (68 ℉)
3 - Body ground	11 to 13 Ω

NG → **Go to step 4**

OK

3 CHECK HARNESS AND CONNECTOR(TRANSMISSION WIRE - ECM)



(a) Connect the transmission wire connector.
(b) Disconnect the ECM connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard:

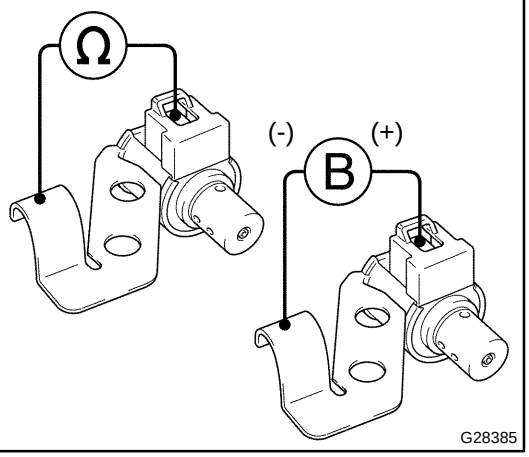
Tester Connection	Specified Condition 20 ℃ (68 ℉)
E8 - 9 (DSL) - Body ground	11 to 13 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (SEE PAGE 01-36)**

OK

4	INSPECT SHIFT SOLENOID VALVE(DSL)

Shift Solenoid Valve DSL:



(a) Remove the shift solenoid valve DSL.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition 20 ℃ (68 ℉)
Solenoid Connector (DSL) - Solenoid Body (DSL)	11 to 13 Ω

(c) Connect positive (+) lead to the terminal of solenoid connector, negative (-) lead to the solenoid body.

OK:

The solenoid valve makes an operating noise.

NG → **REPLACE SHIFT SOLENOID VALVE(DSL)**

OK

5	CHECK TRANSMISSION WIRE (SEE PAGE 01-36)

OK:

The connectors and pins are securely installed.

There is no open or short on the wire harness.

NG → **REPAIR OR REPLACE TRANSMISSION WIRE (SEE PAGE 40-34)**

OK

6	INSPECT TRANSMISSION VALVE BODY ASSY(See chapter 2 in the problem symptoms table) (SEE PAGE 05-904)

OK:

There are no foreign objects on each valve and they operate smoothly.

NG → **REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSY (SEE PAGE 40-40)**

OK

7	INSPECT TORQUE CONVERTER CLUTCH ASSY (SEE PAGE 40-29)

OK:

The torque converter clutch operates normally.

NG → **REPLACE TORQUE CONVERTER CLUTCH ASSY**

OK

REPAIR AUTOMATIC TRANSAXLE ASSY (SEE PAGE 40-12)

DTC	P0746	PRESSURE CONTROL SOLENOID ”A” PERFORMANCE (SHIFT SOLENOID VALVE SL1)

SYSTEM DESCRIPTION

The ECM uses signals from the vehicle speed sensor to detect the actual gear position (1st, 2nd, 3rd or O/D gear).
Then the ECM compares the actual gear with the shift schedule in the ECM memory to detect mechanical problems of the shift solenoid valves and valve body.

DTC No.	DTC Detecting Condition	Trouble Area
P0746	The gear required by the ECM does not match the actual gear when driving (2-trip detection logic)	・Shift solenoid valve SL1 remains open or closed ・Valve body is blocked ・Shift solenoid valve SL1 ・Automatic transaxle (clutch, brake or gear etc.) ・ECM

MONITOR DESCRIPTION

The ECM commands gear shifts by turning the shift solenoid valves ”ON/OFF”. According to the input shaft revolution, intermediate (counter) shaft revolution and output shaft revolution, the ECM detects the actual gear position (1st, 2nd, 3rd or O/D gear position). When the gear position commanded by the ECM and the actual gear position are not same, the ECM illuminates the MIL.
Example:
When either condition (a) or (b) is met, the ECM detects a malfunction.
(a) The ECM commands the 1st gear, but the actual gear is 2nd.
(b) The ECM commands the 2nd gear, but the actual gear is 1st.

MONITOR STRATEGY

Related DTCs	P0746: Shift solenoid valve SL1/OFF malfunction Shift solenoid valve SL1/ON malfunction
Required sensors/Components	Shift solenoid valve SL1, Speed sensor (NT), Speed sensor (NC), Crankshaft position sensor (NE)
Frequency of operation	Continuous
Duration	OFF malfunction, ON malfunction (A) 0.8 sec. ON malfunction (B) 1 sec.
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

ALL:

Transmission range	”D”
ECT (Engine coolant temperature)	60°C (140°F) or more
TFT (Transmission fluid temperature)	-20 ○C (-4○F) or more
TFT sensor circuit	Not circuit malfunction
ECT sensor circuit	Not circuit malfunction
Turbine speed sensor circuit	Not circuit malfunction
Intermediate shaft speed sensor circuit	Not circuit malfunction
Output speed sensor circuit	Not circuit malfunction
Shift solenoid valve SL1 circuit	Not circuit malfunction
Shift solenoid valve SL2 circuit	Not circuit malfunction
Shift solenoid valve S4 circuit	Not circuit malfunction
Electronic throttle system	Not circuit malfunction

OFF malfunction

ECM selected gear	1st
Vehicle speed	10 to 40 km/h (6.2 to 24.9 mph)
Throttle valve opening angle	4.5% or more at engine speed 1,900 rpm (Varies with engine speed)

ON malfunction (A)

ECM selected gear	2nd
Vehicle speed	10 km/h (6.2 mph) or more
Throttle valve opening angle	4.5% or more at engine speed 1,900 rpm (Varies with engine speed)

ON malfunction (B)

ECM lock-up command	OFF
ECM selected gear	3rd or 4th

TYPICAL MALFUNCTION THRESHOLDS

Either of the following conditions is met: OFF malfunction, or ON malfunction (A) and (B)

2 detections are necessary per driving cycle:

1st detection; temporary flag ON

2nd detection; pending fault code ON

OFF malfunction

Input (turbine) speed/Intermediate shaft speed	1.49 to 1.63

ON malfunction (A)

Input (turbine) speed/Intermediate shaft speed	2.72 to 2.86

ON malfunction (B)

Engine speed - Input (tubine) speed	250 rpm or more

INSPECTION PROCEDURE

HINT:

Performing the ACTIVE TEST using the hand-held tester allows the relay, VSV, actuator and so on to operate without parts removal. Performing the ACTIVE TEST as the first step of troubleshooting is one method to shorten labor time.

It is possible to display the DATA LIST during the ACTIVE TEST.

(a) Turn the ignition switch off.
(b) Connect the hand-held tester to the DLC3.
(c) Turn the ignition switch to the ON position.
(d) Push the "ON" button of the hand-held tester.
(e) Select the item "DIAGNOSIS/ENHANCED OBD II/ACTIVE TEST/SHIFT".
(f) According to the display on tester, perform the "ACTIVE TEST".

HINT:

While driving, the shift position can be forcibly changed with the hand-held tester.

Comparing the shift position commanded by the ACTIVE TEST with the actual shift position enables you to confirm the problem (see page 05-916).

Item	Test Details	Diagnostic Note
SHIFT	[Test Details] Operate the shift solenoid valve and set the each shift position by yourself. [Vehicle Condition] Less than 50 km/h (31 mph) [Others] *Press "→" button: Shift up *Press "←" button: Shift down	Possible to check the operation of the shift solenoid valves.

HINT:

* This test can be conducted when the vehicle speed is 50 km/h (31 mph) or less.
* The shift position commanded by the ECM is shown in the DATA LIST/SHIFT display on the hand-held tester.

1	CHECK OTHER DTCS OUTPUT(IN ADDITION TO DTC P0746)

(a) Connect the OBD II scan tool or the hand-held tester to the DLC3.
(b) Turn the ignition switch to the ON position and push the OBD II scan tool or the hand-held tester main switch ON.
(c) When you use hand-held tester:
Select the item "DIAGNOSIS/ENHANCED OBD II/DTC INFO/CURRENT CODES".
(d) Read the DTCs using the OBD II scan tool or the hand-held tester.

Result:

Display (DTC output)	Proceed to
Only "P0746" is output	A
"P0746" and other DTCs	B

HINT:

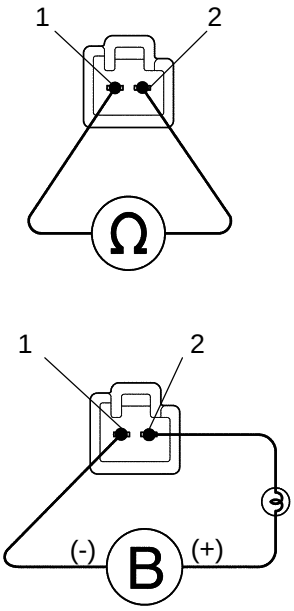
If any other codes besides "P0746" is output, perform the troubleshooting for those DTCs first.

B → GO TO RELEVANT DTC CHART (SEE PAGE 05-920)

A

2	INSPECT SHIFT SOLENOID VALVE(SL1)

Shift Solenoid Valve SL1:



(a) Remove the shift solenoid valve SL1.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition 20 ℃ (68 ℉)
1 - 2	5.0 to 5.6 Ω

(c) Connect the positive (+) lead with a 21 W bulb to terminal 2 and the negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.

OK:

The solenoid makes an operating noise.

NG → **REPLACE SHIFT SOLENOID VALVE(SL1)**

OK

3	INSPECT TRANSMISSION VALVE BODY ASSY(See chapter 2 in the problem symptoms table) (SEE PAGE 05-904)

OK:

There are no foreign objects on each valve and they operate smoothly.

NG → **REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSY (SEE PAGE 40-40)**

OK

4	INSPECT TORQUE CONVERTER CLUTCH ASSY (SEE PAGE 40-29)

OK:

The torque converter clutch operates normally.

NG → **REPLACE TORQUE CONVERTER CLUTCH ASSY**

OK

REPAIR OR REPLACE AUTOMATIC TRANSAXLE ASSY (SEE PAGE 40-12)

DTC	P0748	PRESSURE CONTROL SOLENOID ”A” ELECTRICAL (SHIFT SOLENOID VALVE SL1)

CIRCUIT DESCRIPTION

Shifting from 1st to O/D is performed in combination with ”ON” and ”OFF” operation of the shift solenoid valves SL1 and SL2 which is controlled by the ECM. If an open or short circuit occurs in either of the shift solenoid valves, the ECM controls the remaining normal shift solenoid valve to allow the vehicle to be operated smoothly (Fail safe function).

DTC No.	DTC Detection Condition	Trouble Area
P0748	ECM checks for an open or short circuit in shift solenoid valves SL1 (1-trip detection logic) ・Output signal duty equals to 100%	・Open or short in shift solenoid valve SL1 circuit ・Shift solenoid valve SL1 ・ECM

MONITOR DESCRIPTION

The ECM commands gear shifts by turning the shift solenoid valves ”ON/OFF”. When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem and illuminates the MIL and stores the DTC. And the ECM performs the fail-safe function and turns the other shift solenoid valves in good condition ”ON/OFF” (In case of an open or short circuit, the ECM stops sending current to the circuit.) (see page 05-916).

MONITOR STRATEGY

Related DTCs	P0748: Shift solenoid valve SL1/Range check
Required sensors/Components	Shift solenoid valve SL1
Frequency of operation	Continuous
Duration	1 sec.
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever this DTC is not present.	See page 05-895
Battery voltage	10 V or more
Ignition switch	ON
Starter	OFF

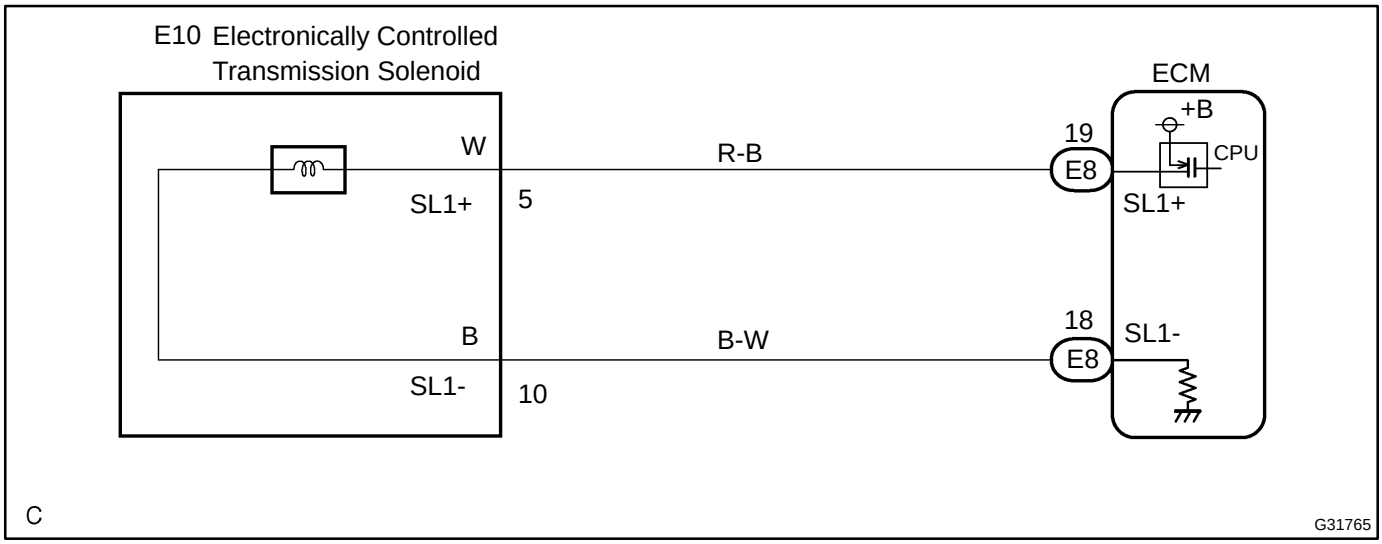
TYPICAL MALFUNCTION THRESHOLDS

Output signal duty	100%

COMPONENT OPERATING RANGE

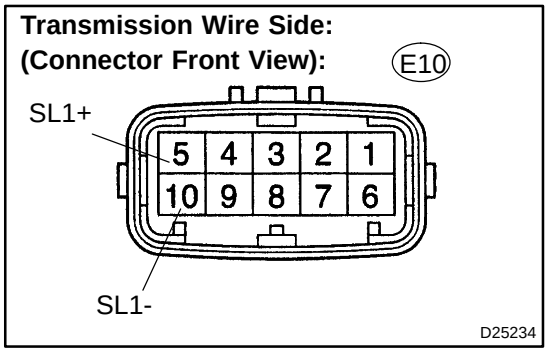
Output signal duty	Less than 100%

WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT TRANSMISSION WIRE(SL1)



(a) Disconnect the transmission wire connector from the transaxle.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition 20 ℃ (68 ℉)
5 (SL1+) - 10 (SL1-)	5.0 to 5.6 Ω

(c) Measure the resistance according to the value(s) in the table below.

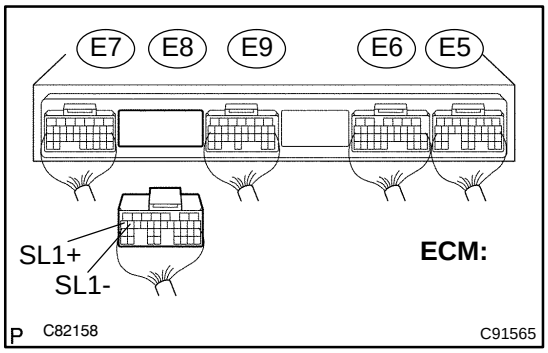
Standard (Check for short):

Tester Connection	Specified Condition
SL1+ - Body ground	10 kΩ or higher
SL1- - Body ground	↑

NG → **Go to step 3**

OK

2 CHECK HARNESS AND CONNECTOR(TRANSMISSION WIRE - ECM)



(a) Connect the transmission connector to the transaxle.
(b) Disconnect the connector from the ECM.
(c) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition 20 ℃ (68 ℉)
E8 - 19 (SL1+) - E8 - 18 (SL1-)	5.0 to 5.6 Ω

(d) Measure the resistance according to the value(s) in the table below.

Standard (Check for short):

Tester Connection	Specified Condition
E8 - 19 (SL1+) - Body ground	10 kΩ or higher
E8 - 18 (SL1-) - Body ground	↑

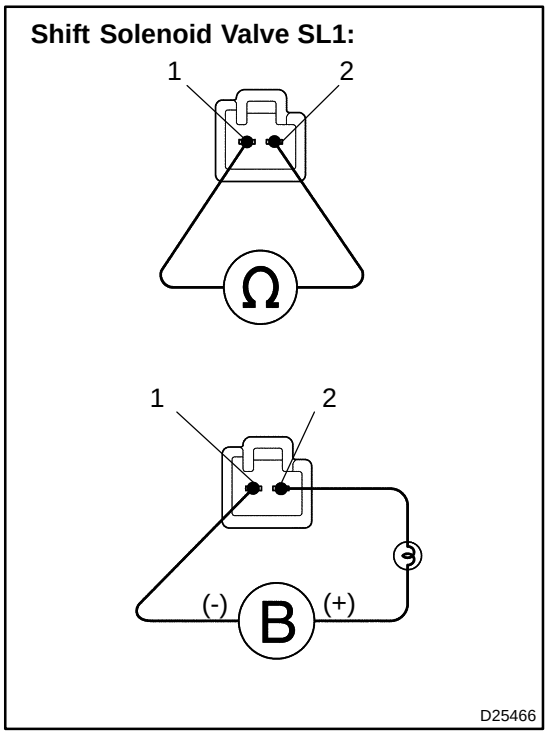
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (SEE PAGE 01-36)**

OK

REPLACE ECM (SEE PAGE 10-9)

3 INSPECT SHIFT SOLENOID VALVE(SL1)

Shift Solenoid Valve SL1:



(a) Remove the shift solenoid valve SL1.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition 20 ℃ (68 ℉)
1 - 2	5.0 to 5.6 Ω

(c) Connect the positive (+) lead with a 21 W bulb to terminal 2 and the negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.

OK:

The solenoid makes an operating noise.

NG → **REPLACE SHIFT SOLENOID VALVE(SL1)**

OK

REPAIR OR REPLACE TRANSMISSION WIRE (SEE PAGE 40-34)

DTC P0766 SHIFT SOLENOID ”D” PERFORMANCE (SHIFT SOLENOID VALVE S4)

SYSTEM DESCRIPTION

The ECM uses signals from the vehicle speed sensor to detect the actual gear position (1st, 2nd, 3rd or O/D gear).
Then the ECM compares the actual gear with the shift schedule in the ECM memory to detect mechanical problems of the shift solenoid valves and valve body.

DTC No.	DTC Detecting Condition	Trouble Area
P0766	The gear required by the ECM does not match the actual gear when driving (2-trip detection logic)	・Shift solenoid valve S4 remains open or closed ・Valve body is blocked ・Shift solenoid valve S4 ・Automatic transaxle (clutch, brake or gear etc.) ・ECM

MONITOR DESCRIPTION

The ECM commands gear shifts by turning the shift solenoid valves ”ON/OFF”. According to the input shaft revolution, intermediate (counter) shaft revolution and output shaft revolution, the ECM detects the actual gear position (1st, 2nd, 3rd or O/D gear position). When the gear position commanded by the ECM and the actual gear position are not same, the ECM illuminates the MIL and stores the DTC.

MONITOR STRATEGY

Related DTCs	P0766: Shift solenoid valve S4/ON malfunction Shift solenoid valve S4/OFF malfunction
Required sensors/Components	Shift solenoid valve S4, Speed sensor (NT), Speed sensor (NC), Crankshaft position sensor (NE)
Frequency of operation	Continuous
Duration	1 sec.
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

All:

Transmission range	”D”
ECT (Engine coolant temperature)	60°C (140°F) or more
TFT (Transmission fluid temperature)	-20 to 130°C (-4 to 266°F)
TFT sensor circuit	Not circuit malfunction
ECT sensor circuit	Not circuit malfunction
Turbine speed sensor circuit	Not circuit malfunction
Intermediate shaft speed sensor circuit	Not circuit malfunction
Output speed sensor circuit	Not circuit malfunction
Shift solenoid valve SL1 circuit	Not circuit malfunction
Shift solenoid valve SL2 circuit	Not circuit malfunction
Shift solenoid valve S4 circuit	Not circuit malfunction
Electronic throttle system	Not circuit malfunction

OFF malfunction

ECM selected gear	4th
Throttle valve opening angle	5% or more
Vehicle speed	10 km/h (6.2 mph) or more

ON malfunction

ECM selected gear	3rd
Throttle valve opening angle	5% or more
Vehicle speed	10 km/h (6.2 mph) or more

TYPICAL MALFUNCTION THRESHOLDS

Either of the following conditions is met: OFF malfunction or ON malfunction

2 detections are necessary per driving cycle:

1st detection; temporary flag ON

2nd detection; pending fault code ON

OFF malfunction

Intermediate shaft speed/Output speed	1.34 to 1.48

ON malfunction

Intermediate shaft speed/Output speed	0.95 to 1.09

INSPECTION PROCEDURE

HINT:

Performing the ACTIVE TEST using the hand-held tester allows the relay, VSV, actuator and so on to operate without parts removal. Performing the ACTIVE TEST as the first step of troubleshooting is one method to shorten labor time.

It is possible to display the DATA LIST during the ACTIVE TEST.

(a) Turn the ignition switch off.
(b) Connect the hand-held tester to the DLC3.
(c) Turn the ignition switch to the ON position.
(d) Push the "ON" button of the hand-held tester.
(e) Select the item "DIAGNOSIS/ENHANCED OBD II/ACTIVE TEST/SHIFT".
(f) According to the display on tester, perform the "ACTIVE TEST".

HINT:

While driving, the shift position can be forcibly changed with the hand-held tester.

Comparing the shift position commanded by the ACTIVE TEST with the actual shift position enables you to confirm the problem (see page 05-916).

Item	Test Details	Diagnostic Note
SHIFT	[Test Details] Operate the shift solenoid valve and set the each shift position by yourself. [Vehicle Condition] Less than 50 km/h (31 mph) [Others] *Press "→" button: Shift up *Press "←" button: Shift down	Possible to check the operation of the shift solenoid valves.

HINT:

* This test can be conducted when the vehicle speed is 50 km/h (31 mph) or less.
* The shift position commanded by the ECM is shown in the DATA LIST/SHIFT display on the hand-held tester.

1	CHECK OTHER DTCS OUTPUT(IN ADDITION TO DTC P0766)

(a) Connect the OBD II scan tool or the hand-held tester to the DLC3.
(b) Turn the ignition switch to the ON position and push the OBD II scan tool or the hand-held tester main switch ON.
(c) When you use hand-held tester:
Select the item "DIAGNOSIS/ENHANCED OBD II/DTC INFO/CURRENT CODES".
(d) Read the DTCs using the OBD II scan tool or the hand-held tester.

Result:

Display (DTC output)	Proceed to
Only "P0766" is output	A
"P0766" and other DTCs	B

HINT:

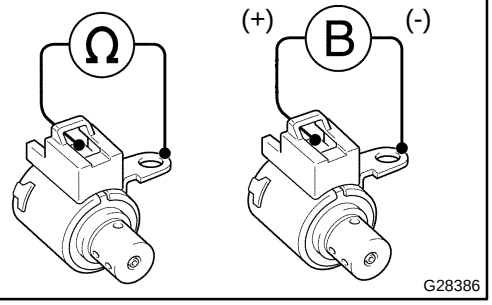
If any other codes besides "P0766" is output, perform the troubleshooting for those DTCs first.

B → GO TO RELEVANT DTC CHART (SEE PAGE 05-920)

A

2	INSPECT SHIFT SOLENOID VALVE(S4)

Shift Solenoid Valve S4:



(a) Remove the shift solenoid valve S4.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition 20 ℃ (68 ℉)
Solenoid Connector (S4) - Solenoid Body (S4)	11 to 15 Ω

(c) Connect positive (+) lead to the terminal of solenoid connector, negative (-) lead to the solenoid body.

OK:

The solenoid makes an operating noise.

NG → **REPLACE SHIFT SOLENOID VALVE(S4)**

OK

3	INSPECT TRANSMISSION VALVE BODY ASSY(See chapter 2 in the problem symptoms table) (SEE PAGE 05-904)

OK:

There are no foreign objects on each valve and they operate smoothly.

NG → **REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSY (SEE PAGE 40-40)**

OK

4	INSPECT TORQUE CONVERTER CLUTCH ASSY (SEE PAGE 40-29)

OK:

The torque converter clutch operates normally.

NG → **REPLACE TORQUE CONVERTER CLUTCH ASSY**

OK

REPAIR OR REPLACE AUTOMATIC TRANSAXLE ASSY (SEE PAGE 40-12)

DTC P0776 PRESSURE CONTROL SOLENOID "B" PERFORMANCE (SHIFT SOLENOID VALVE SL2)

SYSTEM DESCRIPTION

The ECM uses signals from the vehicle speed sensor to detect the actual gear position (1st, 2nd, 3rd or O/D gear).
Then the ECM compares the actual gear with the shift schedule in the ECM memory to detect mechanical problems of the shift solenoid valves and valve body.

DTC No.	DTC Detecting Condition	Trouble Area
P0776	The gear required by the ECM does not match the actual gear when driving (2-trip detection logic)	・Shift solenoid valve SL2 remains open or closed ・Valve body is blocked ・Shift solenoid valve SL2 ・Automatic transaxle (clutch, brake or gear etc.) ・ECM

MONITOR DESCRIPTION

The ECM commands gear shifts by turning the shift solenoid valves "ON/OFF". According to the input shaft revolution, intermediate (counter) shaft revolution and output shaft revolution, the ECM detects the actual gear position (1st, 2nd, 3rd or O/D gear position). When the gear position commanded by the ECM and the actual gear position are not same, the ECM illuminates the MIL and stores the DTC.

MONITOR STRATEGY

Related DTCs	P0776: Shift solenoid valve SL2/OFF malfunction Shift solenoid valve SL2/ON malfunction
Required sensors/Components	Shift solenoid valve SL2, Speed sensor (NT), Speed sensor (NC), Crankshaft position sensor (NE)
Frequency of operation	Continuous
Duration	0.8 sec.
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

All:

Transmission range	"D"
ECT (Engine coolant temperature)	60°C (140°F) or more
TFT (Transmission fluid temperature)	-20 to 120°C (-4 to 248°F)
TFT sensor circuit	Not circuit malfunction
ECT sensor circuit	Not circuit malfunction
Turbine speed sensor circuit	Not circuit malfunction
Intermediate shaft speed sensor circuit	Not circuit malfunction
Output speed sensor circuit	Not circuit malfunction
Shift solenoid valve SL1 circuit	Not circuit malfunction
Shift solenoid valve SL2 circuit	Not circuit malfunction
Shift solenoid valve S4 circuit	Not circuit malfunction
Electronic throttle system	Not circuit malfunction

OFF malfunction

ECM selected gear	1st
Vehicle speed	10 km/h (6.2 mph) or more
Throttle valve opening angle	15% or more 4.5% or more at engine speed 1,900 rpm (vary with engine speed)

ON malfunction

ECM selected gear	3rd or 4th
Vehicle speed	10 km/h (6.2 mph) or more
Throttle valve opening angle	4.5% or more at engine speed 1,900 rpm (Varies with engine speed)

TYPICAL MALFUNCTION THRESHOLDS

Either of the following conditions is met: OFF malfunction or ON malfunction

2 detections are necessary per driving cycle:

1st detection; temporary flag ON

2nd detection; pending fault code ON

OFF malfunction

Input (turbine) speed/Intermediate shaft speed	0.93 to 1.07

ON malfunction

Input (turbine) speed/Intermediate shaft speed	1.49 to 1.63

INSPECTION PROCEDURE

HINT:

Performing the ACTIVE TEST using the hand-held tester allows the relay, VSV, actuator and so on to operate without parts removal. Performing the ACTIVE TEST as the first step of troubleshooting is one method to shorten labor time.

It is possible to display the DATA LIST during the ACTIVE TEST.

(a) Turn the ignition switch off.
(b) Connect the hand-held tester to the DLC3.
(c) Turn the ignition switch to the ON position.
(d) Push the "ON" button of the hand-held tester.
(e) Select the item "DIAGNOSIS/ENHANCED OBD II/ACTIVE TEST/SHIFT".
(f) According to the display on tester, perform the "ACTIVE TEST".

HINT:

While driving, the shift position can be forcibly changed with the hand-held tester.

Comparing the shift position commanded by the ACTIVE TEST with the actual shift position enables you to confirm the problem (see page 05-916).

Item	Test Details	Diagnostic Note
SHIFT	[Test Details] Operate the shift solenoid valve and set the each shift position by yourself. [Vehicle Condition] Less than 50 km/h (31 mph) [Others] *Press "→" button: Shift up *Press "←" button: Shift down	Possible to check the operation of the shift solenoid valves.

HINT:

* This test can be conducted when the vehicle speed is 50 km/h (31 mph) or less.
* The shift position commanded by the ECM is shown in the DATA LIST/SHIFT display on the hand-held tester.

1	CHECK OTHER DTCS OUTPUT(IN ADDITION TO DTC P0776)

(a) Connect the OBD II scan tool or the hand-held tester to the DLC3.
(b) Turn the ignition switch to the ON position and push the OBD II scan tool or the hand-held tester main switch ON.
(c) When you use hand-held tester:
Select the item "DIAGNOSIS/ENHANCED OBD II/DTC INFO/CURRENT CODES".
(d) Read the DTCs using the OBD II scan tool or the hand-held tester.

Result:

Display (DTC output)	Proceed to
Only "P0776" is output	A
"P0776" and other DTCs	B

HINT:

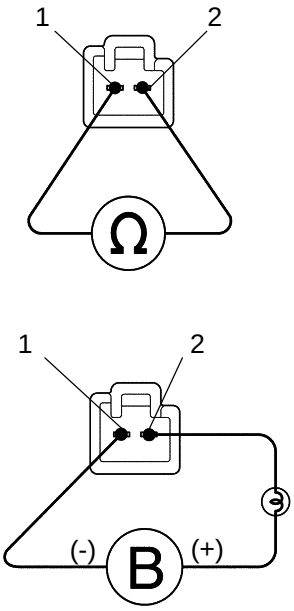
If any other codes besides "P0776" is output, perform the troubleshooting for those DTCs first.

B → GO TO RELEVANT DTC CHART (SEE PAGE 05-920)

A

2	INSPECT SHIFT SOLENOID VALVE(SL2)

Shift Solenoid Valve SL2:



(a) Remove the shift solenoid valve SL2.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition 20 ℃ (68 ℉)
1 - 2	5.0 to 5.6 Ω

(c) Connect the positive (+) lead with a 21 W bulb to terminal 2 and the negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.

OK:

The solenoid makes an operating noise.

NG → **REPLACE SHIFT SOLENOID VALVE(SL2)**

OK

3	INSPECT TRANSMISSION VALVE BODY ASSY(See chapter 2 in the problem symptoms table) (SEE PAGE 05-904)

OK:

There are no foreign objects on each valve and they operate smoothly.

NG → **REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSY (SEE PAGE 40-40)**

OK

4	INSPECT TORQUE CONVERTER CLUTCH ASSY (SEE PAGE 40-29)

OK:

The torque converter clutch operates normally.

NG → **REPLACE TORQUE CONVERTER CLUTCH ASSY**

OK

REPAIR OR REPLACE AUTOMATIC TRANSAXLE ASSY (SEE PAGE 40-12)

DTC	P0778	PRESSURE CONTROL SOLENOID ”B” ELECTRICAL (SHIFT SOLENOID VALVE SL2)

CIRCUIT DESCRIPTION

Shifting from 1st to O/D is performed in combination with ”ON” and ”OFF” operation of the shift solenoid valves SL1 and SL2 which is controlled by the ECM. If an open or short circuit occurs in either of the shift solenoid valves, the ECM controls the remaining normal shift solenoid valve to allow the vehicle to be operated smoothly (Fail safe function).

DTC No.	DTC Detection Condition	Trouble Area
P0778	ECM checks for an open or short circuit in shift solenoid valves SL2 (1-trip detection logic) ・Output signal duty equals to 100%	・Open or short in shift solenoid valve SL2 circuit ・Shift solenoid valve SL2 ・ECM

MONITOR DESCRIPTION

The ECM commands gear shifts by turning the shift solenoid valves ”ON/OFF”. When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem and illuminates the MIL and stores the DTC. And the ECM performs the fail-safe function and turns the other shift solenoid valves in good condition ”ON/OFF” (In case of an open or short circuit, the ECM stops sending current to the circuit.) (see page 05-916).

MONITOR STRATEGY

Related DTCs	P0778: Shift solenoid valve SL2/Range check
Required sensors/Components	Shift solenoid valve SL2
Frequency of operation	Continuous
Duration	1 sec.
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever this DTC is not present.	See page 05-895
Battery voltage	10 V or more
Ignition switch	ON
Starter	OFF

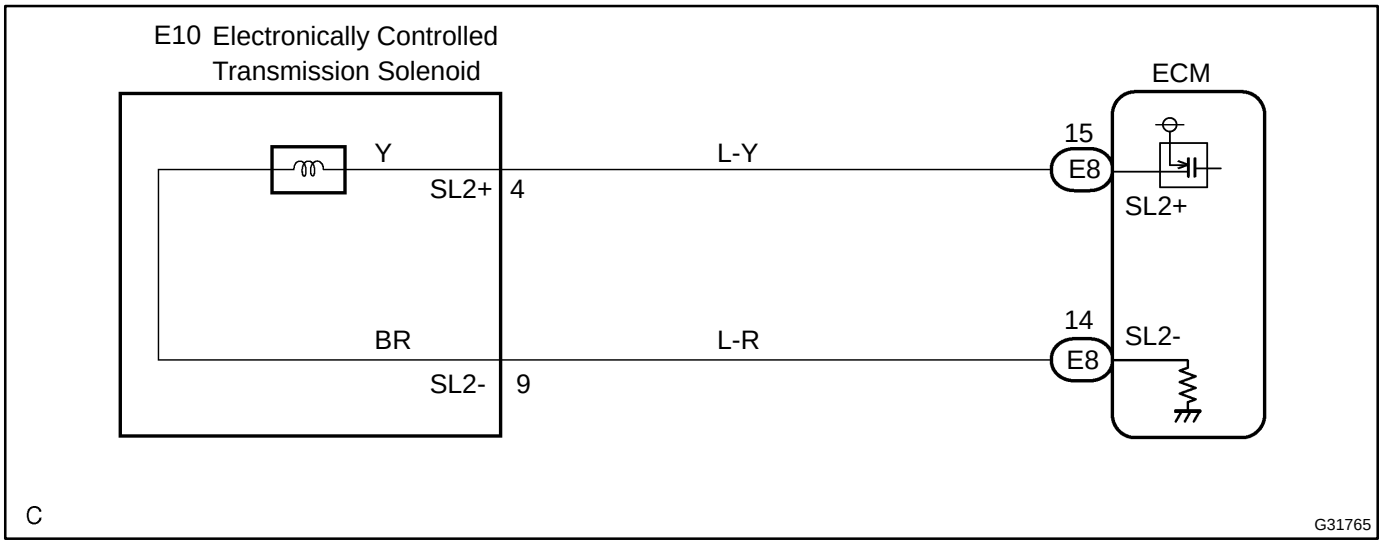
TYPICAL MALFUNCTION THRESHOLDS

Output signal duty	100%

COMPONENT OPERATING RANGE

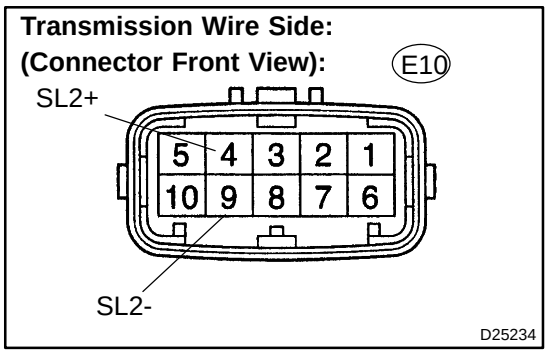
Output signal duty	Less than 100%

WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT TRANSMISSION WIRE(SL2)



(a) Disconnect the transmission wire connector from the transaxle.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition 20 ℃ (68 ℉)
4 (SL2+) - 9 (SL2-)	5.0 to 5.6 Ω

(c) Measure the resistance according to the value(s) in the table below.

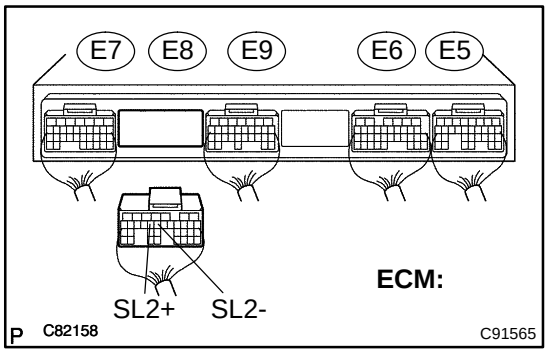
Standard (Check for short):

Tester Connection	Specified Condition
4 (SL2+) - Body ground	10 kΩ or higher
9 (SL2-) - Body ground	↑

NG → **Go to step 3**

OK

2 CHECK HARNESS AND CONNECTOR(TRANSMISSION WIRE - ECM)



(a) Connect the transmission connector to the transaxle.
(b) Disconnect the connector from the ECM.
(c) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition 20 ℃ (68 ℉)
E8 - 15 (SL2+) - E8 - 14 (SL2-)	5.0 to 5.6 Ω

(d) Measure the resistance according to the value(s) in the table below.

Standard (Check for short):

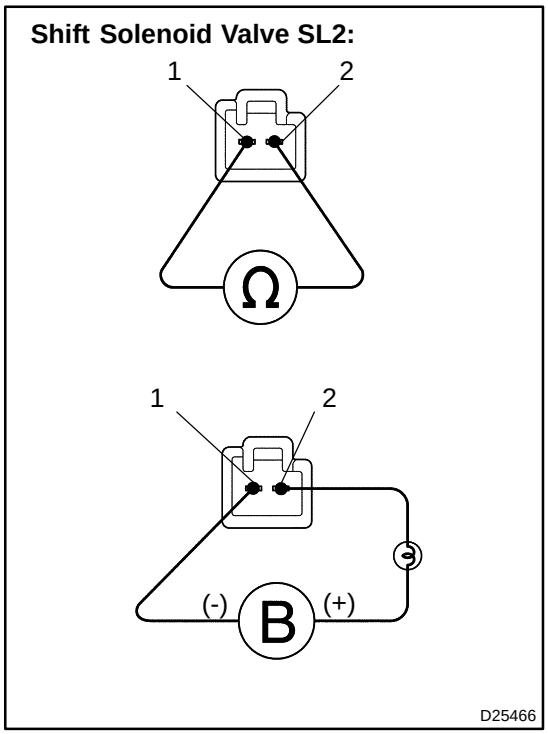
Tester Connection	Specified Condition
E8 - 15 (SL2+) - Body ground	10 kΩ or higher
E8 - 14 (SL2-) - Body ground	↑

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (SEE PAGE 01-36)**

OK

REPLACE ECM (SEE PAGE 10-9)

3 INSPECT SHIFT SOLENOID VALVE(SL2)



(a) Remove the shift solenoid valve SL2.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition 20 ℃ (68 ℉)
1 - 2	5.0 to 5.6 Ω

(c) Connect the positive (+) lead with a 21 W bulb to terminal 2 and the negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.

OK:

The solenoid makes an operating noise.

NG → **REPLACE SHIFT SOLENOID VALVE(SL2)**

OK

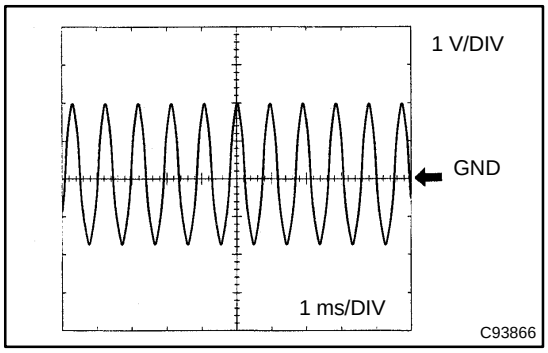
REPAIR OR REPLACE TRANSMISSION WIRE (SEE PAGE 40-34)

DTC	P0793	INTERMEDIATE SHAFT SPEED SENSOR "A"

CIRCUIT DESCRIPTION

This sensor detects the rotation speed of the counter gear. By comparing the counter gear speed signal (NC) with the direct clutch speed sensor signal (NT), the ECM detects the shift timing of the gears and appropriately controls the engine torque and hydraulic pressure according to various conditions. Thus smooth gear shifting is performed.

DTC No.	DTC Detection Condition	Trouble Area
P0793	ECM detects conditions (a), (b) and (c) continuity for 5 sec. or more: (1-trip detection logic) (a) Vehicle speed: 50 km/h (31 mph) or more (b) Park/neutral position switch (NSW) is OFF (c) Speed sensor (NC): less than 300 rpm	・Open or short in transmission revolution sensor NC (speed sensor NC) circuit ・Transmission revolution sensor NC (speed sensor NC) ・ECM



Reference (Using an oscilloscope):

Check the waveform between the terminals NC+ and NC- of the ECM connector.

Standard: Refer to the illustration.

Terminal	NC+ - NC-
Tool setting	1V/DIV, 1ms/DIV
Vehicle condition	Vehicle speed 30 km/h (19 mph): (3rd gear) Engine speed 1,400 rpm

MONITOR DESCRIPTION

The NC terminal of ECM detects a revolution signal from the speed sensor (NC) (counter gear rpm). The ECM calculates a gearshift comparing the speed sensor (NT) with the speed sensor (NC).

While the vehicle is operating in 2nd, 3rd or O/D gear in the shift position of D, if the counter gear revolution is less than 300 rpm*1 although the output shaft revolution is more than 1,000 rpm*2, the ECM detects the trouble, illuminates the MIL and stores the DTC.

*1: Pulse is not output or is irregularly output.

*2: The vehicle speed is 50 km/h (31 mph) or more.

MONITOR STRATEGY

Related DTCs	P0793: Speed sensor (NC)/Verify pulse input
Required sensors/Components	Speed sensor (NC), Speed sensor (NT), NSW switch
Frequency of operation	Continuous
Duration	5 sec.
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever this DTC is not present.	See page 05-895
Engine	Running
NSW switch	OFF
Output shaft rpm	1,000 rpm or more

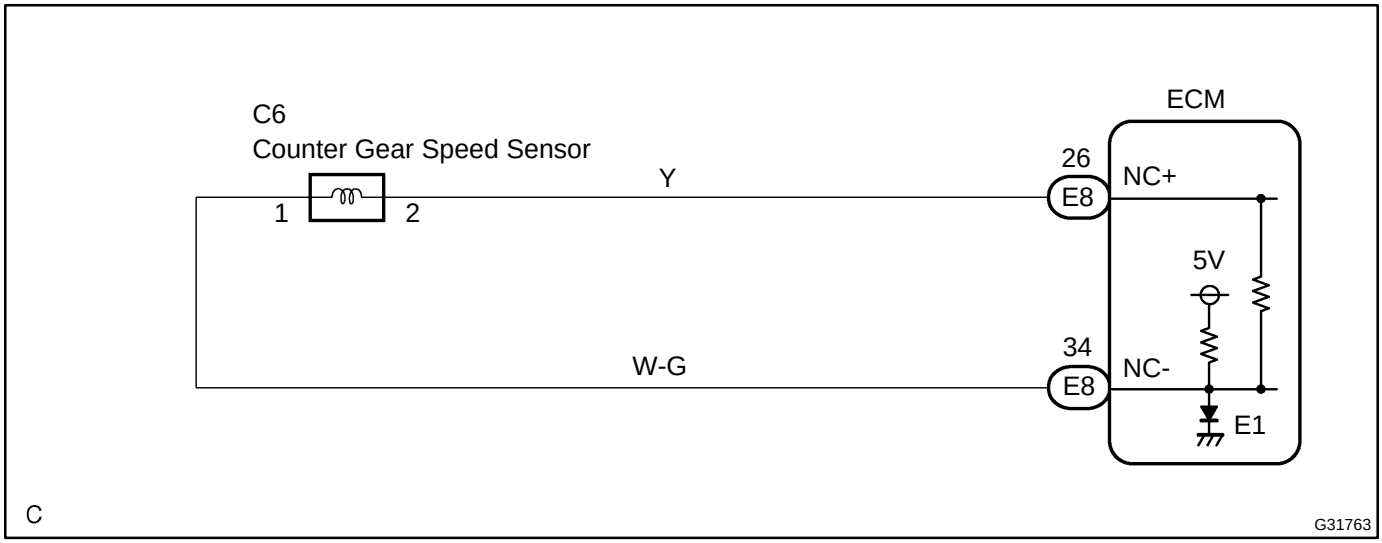
TYPICAL MALFUNCTION THRESHOLDS

Sensor signal rpm	Less than 300 rpm

COMPONENT OPERATING RANGE

Counter gear speed sensor (NC)	[HINT] 4th (O/D) when shift lever position is D position (After warming up the engine); ・Intermediate shaft speed (NC) becomes close to the engine speed.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

According to the DATA LIST displayed by the OBD II scan tool or hand-held tester, you can read the value of the switch, sensor, actuator and so on without parts removal. Reading the DATA LIST as the first step of troubleshooting is one method to shorten labor time.

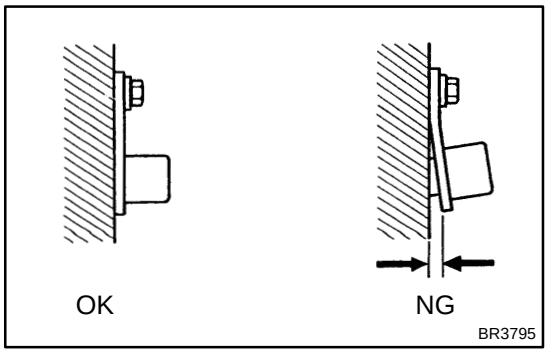
(a) Warm up the engine.
(b) Turn the ignition switch off.
(c) Connect the OBD II scan tool or hand-held tester to the DLC3.
(d) Turn the ignition switch to the ON position.
(e) Push the "ON" button of the OBD II scan tool or the hand-held tester.
(f) When you use hand-held tester:
Select the item "DIAGNOSIS/ENHANCED OBD II/DATA LIST".
(g) According to the display on tester, read the "DATA LIST".

Item	Measurement Item/ Range (display)	Normal Condition
SPD (NC)	Counter Gear Speed/ display: 50 r/min	[HINT] 4th (O/D) when shift lever position is D position (After warming up the engine); * Intermediate shaft speed (NC) becomes close to the engine speed.

HINT:

* SPD (NC) is always 0 while driving:
Open or short in the sensor or circuit.
* SPD (NC) is always more than 0 and less than 300 rpm while driving the vehicle at 50 km/h (31 mph) or more:
Sensor trouble, improper installation, or intermittent connection trouble of the circuit.

1	INSPECT SPEED SENSOR INSTALLATION

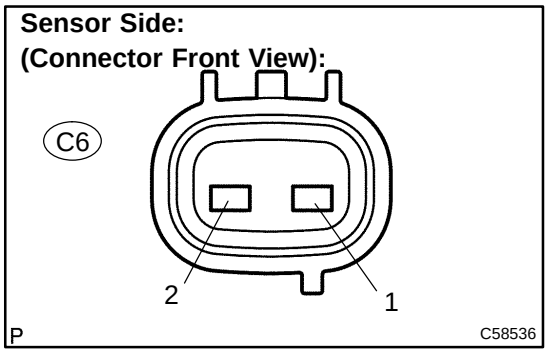


(a) Check the speed sensor installation.
OK:
The installation bolt is tightened properly and there is no clearance between the sensor and transaxle case.

NG → **REPLACE SPEED SENSOR(NC)**

OK

2 INSPECT SPEED SENSOR(NC)



(a) Disconnect the speed sensor connector from the transaxle.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

TOYOTA made:

Tester Connection	Specified Condition 20 ℃ (68 ℉)
1 - 2	500 to 620 Ω

Standard:

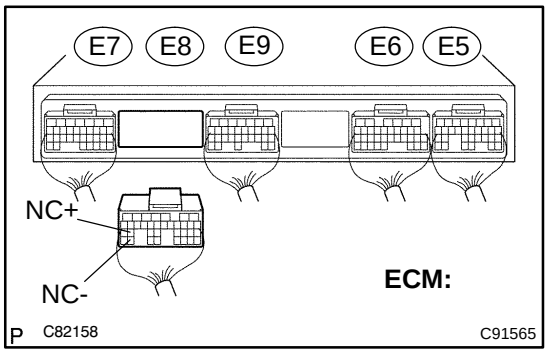
AISIN made:

Tester Connection	Specified Condition 20 ℃ (68 ℉)
1 - 2	560 to 680 Ω

NG → **REPLACE SPEED SENSOR(NC)**

OK

3 CHECK HARNESS AND CONNECTOR(SPEED SENSOR - ECM)



(a) Connect the speed sensor connector.

(b) Disconnect the ECM connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard:

TOYOTA made:

Tester Connection	Specified Condition 20 ℃ (68 ℉)
E8 - 26 (NC+) - E8 - 34 (NC-)	500 to 620 Ω

Standard:

AISIN made:

Tester Connection	Specified Condition 20 ℃ (68 ℉)
E8 - 26 (NC+) - E8 - 34 (NC-)	560 to 680 Ω

(d) Measure the resistance according to the value(s) in the table below.

Standard (Check for short):

Tester Connection	Specified Condition
E8 - 26 (NC+) - Body ground	10 kΩ or higher
E8 - 34 (NC-) - Body ground	↑

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (SEE PAGE 01-36)**

OK

REPLACE ECM (SEE PAGE 10-9)

DTC	P0982	SHIFT SOLENOID ”D” CONTROL CIRCUIT LOW (SHIFT SOLENOID VALVE S4)

DTC	P0983	SHIFT SOLENOID ”D” CONTROL CIRCUIT HIGH (SHIFT SOLENOID VALVE S4)

CIRCUIT DESCRIPTION

Shifting from 1st to O/D is performed in combination with ”ON” and ”OFF” operation of the shift solenoid valves SL1 and SL2 which is controlled by the ECM. If an open or short circuit occurs in either of the shift solenoid valves, the ECM controls the remaining normal shift solenoid valve to allow the vehicle to be operated smoothly (Fail safe function).

DTC No.	DTC Detection Condition	Trouble Area
P0982	ECM detects short in solenoid valve S4 circuit 2 times when solenoid valve S4 is operated (1-trip detection logic)	⋇Short in shift solenoid valve S4 circuit ⋇Shift solenoid valve S4 ⋇ECM
P0983	ECM detects open in solenoid valve S4 circuit 2 times when solenoid valve S4 is not operated (1-trip detection logic)	⋇Open in shift solenoid valve S4 circuit ⋇Shift solenoid valve S4 ⋇ECM

MONITOR DESCRIPTION

The ECM commands gear shifts by turning the shift solenoid valves ”ON/OFF”. When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem and illuminates the MIL and stores the DTC. And the ECM performs the fail-safe function and turns the other shift solenoid valves in good condition ”ON/OFF” (In case of an open or short circuit, the ECM stops sending current to the circuit.) (see page 05-916).

MONITOR STRATEGY

Related DTCs	P0982: Shift solenoid valve S4/Range check (Low resistance) P0983: Shift solenoid valve S4/Range check (High resistance)
Required sensors/Components	Shift solenoid valve S4
Frequency of operation	Continuous
Duration	0.064 sec.
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

P0982: Range check (Low resistance)

The monitor will run whenever this DTC is not present.	See page 05-895
Shift solenoid valve S4	ON
Battery voltage	8 V or more
Ignition switch	ON
Starter	OFF

P0983: Range check (High resistance)

The monitor will run whenever this DTC is not present.	See page 05-895
Shift solenoid valve S4	OFF
Battery voltage	8 V or more
Ignition switch	ON
Starter	OFF

TYPICAL MALFUNCTION THRESHOLDS

P0982: Range check (Low resistance)

Shift solenoid valve S4 resistance	8 Ω or less

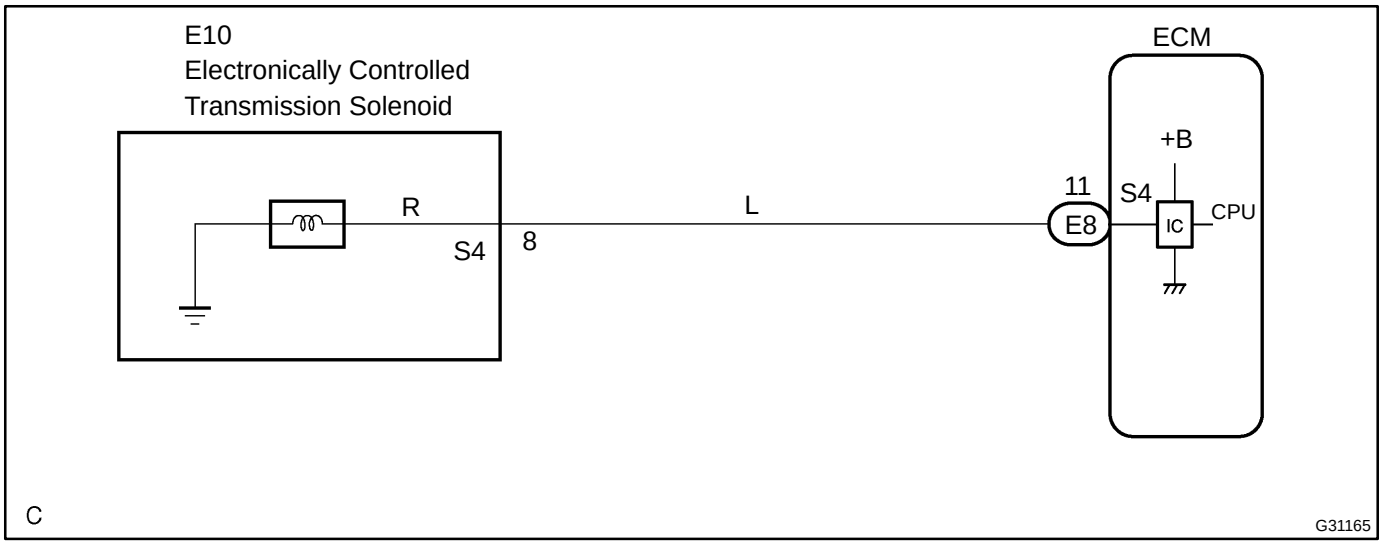
P0983: Range check (High resistance)

Shift solenoid valve S4 resistance	100 kΩ or more

COMPONENT OPERATING RANGE

Shift solenoid valve S4	Resistance: 11 to 15 Ω at 20℃ (68℉)

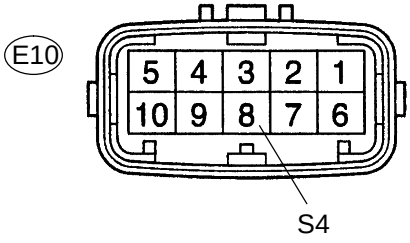
WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT TRANSMISSION WIRE(S4)

Transmission Wire Side:
(Connector Front View):



(a) Disconnect the transmission wire connector from the transaxle.

(b) Measure the resistance according to the value(s) in the table below.

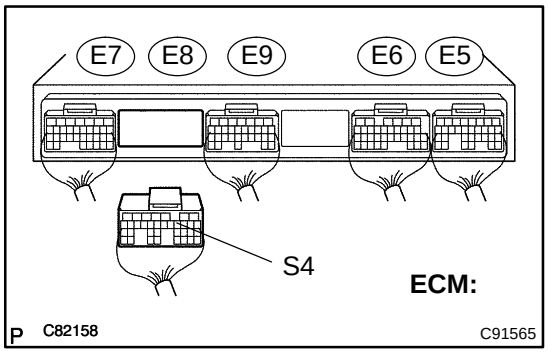
Standard:

Tester Connection	Specified Condition 20 ℃ (68 ℉)
8 - Body ground	11 to 15 Ω

NG → **Go to step 3**

OK

2 CHECK HARNESS AND CONNECTOR(TRANSMISSION WIRE - ECM)



(a) Connect the transmission connector to the transaxle.
(b) Disconnect the connector from the ECM.
(c) Measure the resistance according to the value(s) in the table below.

Standard:

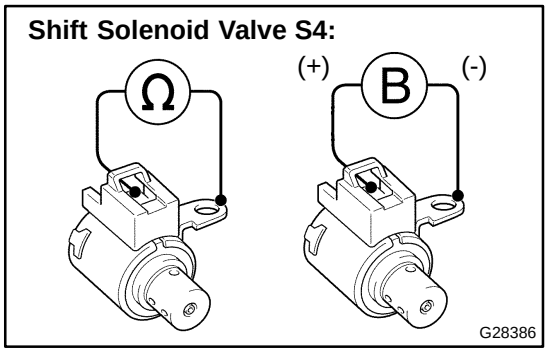
Tester Connection	Specified Condition 20 ℃ (68 ℉)
E8 - 11 (S4) - Body ground	11 to 15 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (SEE PAGE 01-36)**

OK

REPLACE ECM (SEE PAGE 10-9)

3 INSPECT SHIFT SOLENOID VALVE(S4)



(a) Remove the shift solenoid valve S4.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition 20 ℃ (68 ℉)
Solenoid Connector (S4) - Solenoid Body (S4)	11 to 15 Ω

(c) Connect positive (+) lead to the terminal of solenoid connector, negative (-) lead to the solenoid body.

OK:

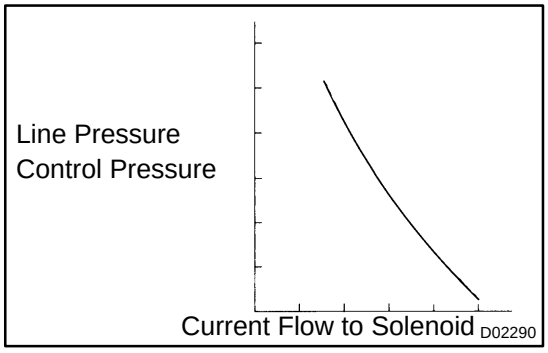
The solenoid makes an operating noise.

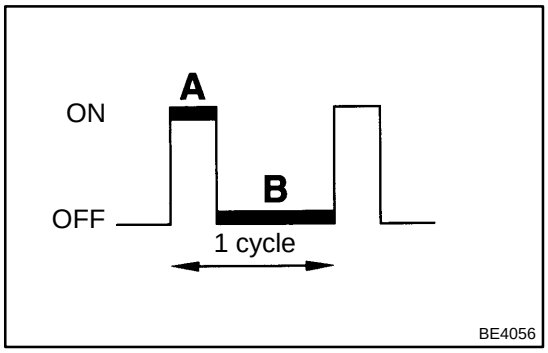
NG → **REPLACE SHIFT SOLENOID VALVE(S4)**

OK

REPAIR OR REPLACE TRANSMISSION WIRE (SEE PAGE 40-34)

DTC P2716 PRESSURE CONTROL SOLENOID "D" ELECTRICAL (SHIFT SOLENOID SLT)





CIRCUIT DESCRIPTION

The linear solenoid valve (SLT) controls the transmission line pressure for smooth transmission operation based on signals from the throttle position sensor and the vehicle speed sensor. The ECM adjusts the duty cycle of the SLT solenoid valve to control hydraulic line pressure coming from the primary regulator valve. Appropriate line pressure assures smooth shifting with varying engine outputs.

(*): Duty Ratio

The duty ratio is the ratio of the period of continuity in one cycle. For example, if A is the period of continuity in one cycle, and B is the period of non-continuity, then

Duty Ratio=A/(A+B) x 100 (%)

DTC No.	DTC Detection Condition	Trouble Area
P2716	Condition (a) or (b) below is detected 1 sec. or more: (1-trip detection logic) (a) SLT- terminal: 0V (b) SLT- terminal: 12V	・Open or short in shift solenoid valve SLT circuit ・Shift solenoid valve SLT ・ECM

MONITOR DESCRIPTION

When an open or short in the linear solenoid valve (SLT) circuit is detected, the ECM interprets this as a fault. The ECM will turn ON the MIL and store the DTC.

MONITOR STRATEGY

Related DTCs	P2716: Shift solenoid valve SLT/Range check
Required sensors/Components	Shift solenoid valve SLT
Frequency of operation	Continuous
Duration	1 sec.
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever this DTC is not present.	See page 05-895
Battery voltage	11 V or more
Solenoid current cut status	Not cut
CPU commanded duty ratio to SLT	19% or more
Ignition switch	ON
Starter	OFF

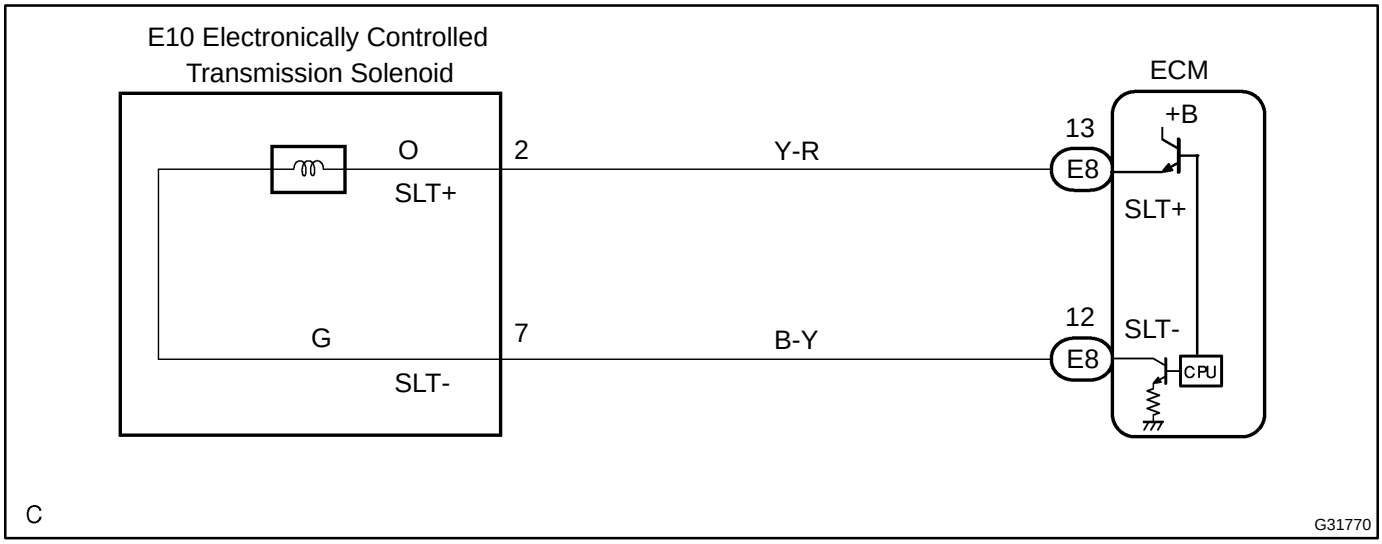
TYPICAL MALFUNCTION THRESHOLDS

Solenoid status from IC	Fail (Open or short)

COMPONENT OPERATING RANGE

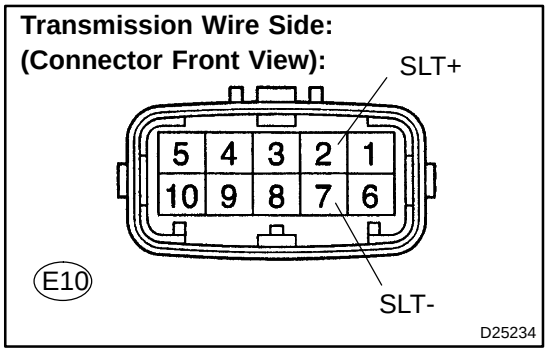
Shift solenoid valve SLT	Resistance: 5.0 to 5.6 Ω at 20℃ (68℉)

WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT TRANSMISSION WIRE(SLT)



(a) Disconnect the transmission wire connector from the transaxle.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition 20 ℃ (68 ℉)
2 (SLT+) - 7 (SLT-)	5.0 to 5.6 Ω

(c) Measure the resistance according to the value(s) in the table below.

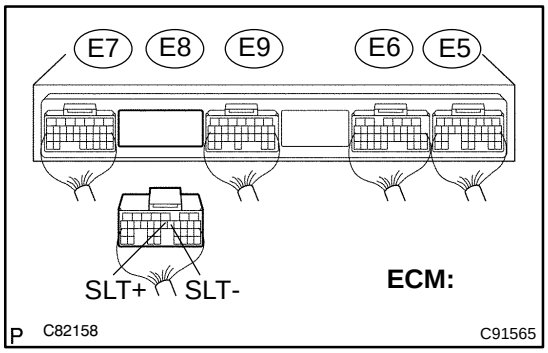
Standard (Check for short):

Tester Connection	Specified Condition
2 (SLT+) - Body ground	10 kΩ or higher
7 (SLT-) - Body ground	↑

NG → **Go to step 3**

OK

2 CHECK HARNESS AND CONNECTOR(TRANSMISSION WIRE - ECM)



(a) Connect the transmission wire connector to the transaxle.
(b) Disconnect the ECM connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition 20 ℃ (68 ℉)
E8 - 13 (SLT+) - E8 - 12 (SLT-)	5.0 to 5.6 Ω

(d) Measure the resistance according to the value(s) in the table below.

Standard (Check for short):

Tester Connection	Specified Condition
E8 - 13 (SLT+) - Body ground	10 kΩ or higher
E8 - 12 (SLT-) - Body ground	↑

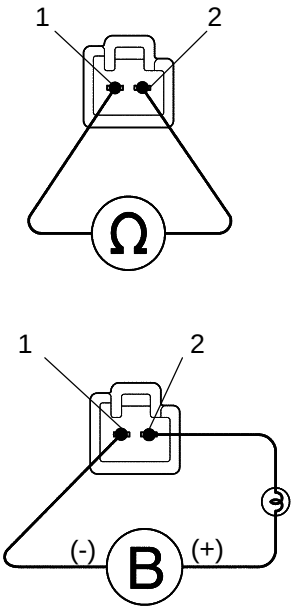
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (SEE PAGE 01-36)**

OK

REPLACE ECM (SEE PAGE 10-9)

3 INSPECT SHIFT SOLENOID VALVE(SLT)

Shift Solenoid Valve SLT:



(a) Remove the shift solenoid valve (SLT).

(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition 20 ℃ (68 ℉)
1 - 2	5.0 to 5.6 Ω

(c) Connect the positive (+) lead with a 21 W bulb to terminal 2 and the negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.

OK:

The solenoid makes an operating noise.

NG → **REPLACE SHIFT SOLENOID VALVE(SLT)**

OK →

REPAIR OR REPLACE TRANSMISSION WIRE (SEE PAGE 40-34)

DTC	P2769	TORQUE CONVERTER CLUTCH SOLENOID CIRCUIT LOW (SHIFT SOLENOID VALVE DSL)

DTC	P2770	TORQUE CONVERTER CLUTCH SOLENOID CIRCUIT HIGH (SHIFT SOLENOID VALVE DSL)

CIRCUIT DESCRIPTION

The shift solenoid valve DSL is turned ”ON” and ”OFF” by signals from the ECM in order to control the hydraulic pressure operation, the lock-up relay valve, which then the controls operation of the lock-up clutch.

DTC No.	DTC Detection Condition	Trouble Area
P2769	ECM detects short in solenoid valve DSL circuit (0.1 sec.) when solenoid valve DSL is operated (2-trip detection logic)	・Short in shift solenoid valve DSL circuit ・Shift solenoid valve DSL ・ECM
P2770	ECM detects open in solenoid valve DSL circuit (0.1 sec.) when solenoid valve DSL is not operated (2-trip detection logic)	・Open in shift solenoid valve DSL circuit ・Shift solenoid valve DSL ・ECM

MONITOR DESCRIPTION

Torque converter lock-up is controlled by the ECM based on engine rpm, engine load, engine temperature, vehicle speed, transmission temperature, and shift range selection. The ECM determines the lock-up status of the torque converter by comparing the engine rpm (NE) to the input turbine rpm (NT). The ECM calculates the actual transmission gear by comparing input turbine rpm (NT) to counter gear rpm (NC). When conditions are appropriate, the ECM requests ”lock-up” by applying control voltage to shift solenoid DSL. When the DSL is opened, solenoid DSL applies pressure to the lock-up relay valve and locks the torque converter clutch. If the ECM detects an open or short in the DSL solenoid circuit, the ECM interprets this as a fault in the DSL solenoid or circuit. The ECM will turn on the MIL and store the DTC.

MONITOR STRATEGY

Related DTCs	P2769: Shift solenoid valve DSL/Range check (Low resistance) P2770: Shift solenoid valve DSL/Range check (High resistance)
Required sensors/Components	Shift solenoid valve DSL
Frequency of operation	Continuous
Duration	0.064 sec.
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

P2769: Range check (Low resistance)

The monitor will run whenever this DTC is not present.	See page 05-895
Solenoid current cut status	Not cut
Shift solenoid valve DSL	ON
Battery voltage	8 V or more
Ignition switch	ON
Starter	OFF

P2770: Range check (High resistance)

The monitor will run whenever this DTC is not present.	See page 05-895
Shift solenoid valve DSL	ON
Battery voltage	8 V or more
Ignition switch	ON
Starter	OFF

TYPICAL MALFUNCTION THRESHOLDS

P2769: Range check (Low resistance)

Shift solenoid valve DSL resistance	8 Ω or less

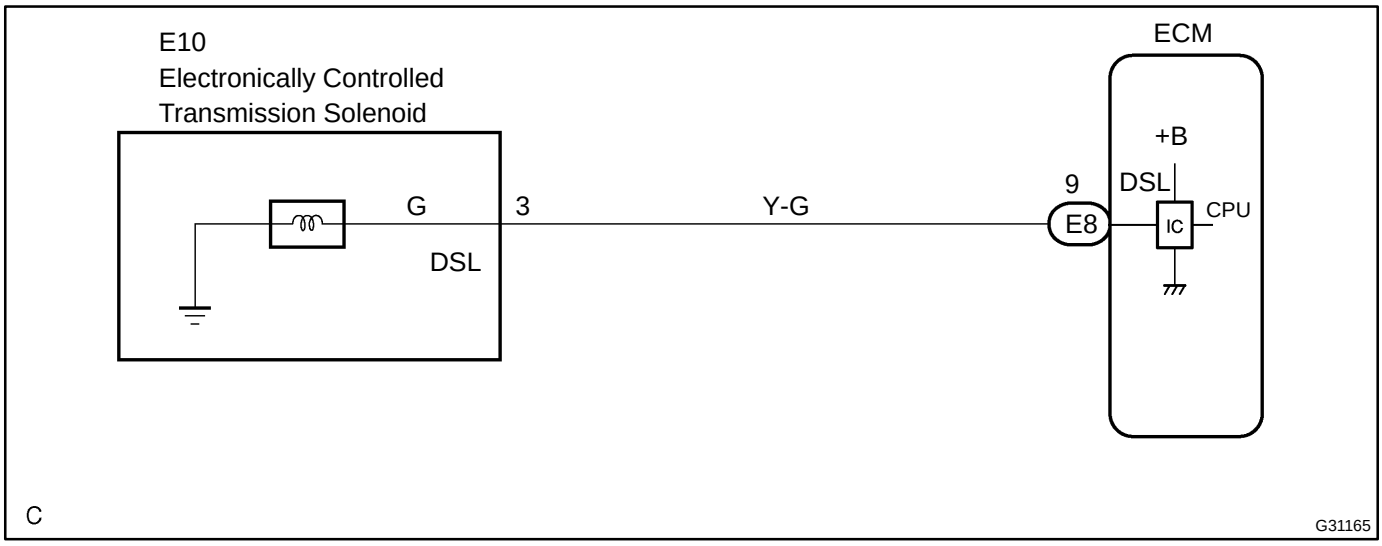
P2770: Range check (High resistance)

Shift solenoid valve DSL resistance	100 kΩ or more

COMPONENT OPERATING RANGE

Shift solenoid valve DSL	Resistance: 11 to 13 Ω at 20℃ (68℉)

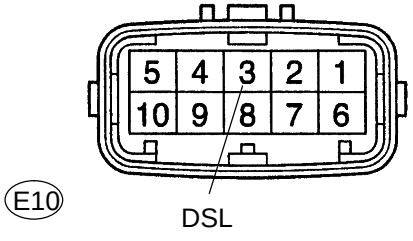
WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT TRANSMISSION WIRE(DSL)

Transmission Wire Side:
(Connector Front View):



(a) Disconnect the transmission wire connector from the transaxle.

(b) Measure the resistance according to the value(s) in the table below.

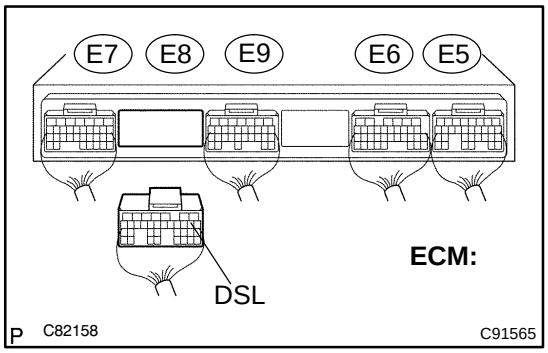
Standard:

Tester Connection	Specified Condition 20 ℃ (68 ℉)
3 - Body ground	11 to 13 Ω

NG → **Go to step 3**

OK

2 CHECK HARNESS AND CONNECTOR(TRANSMISSION WIRE - ECM)



(a) Connect the transmission wire connector.
(b) Disconnect the ECM connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition 20 ℃ (68 ℉)
E8 - 9 (DSL) - Body ground	11 to 13 Ω

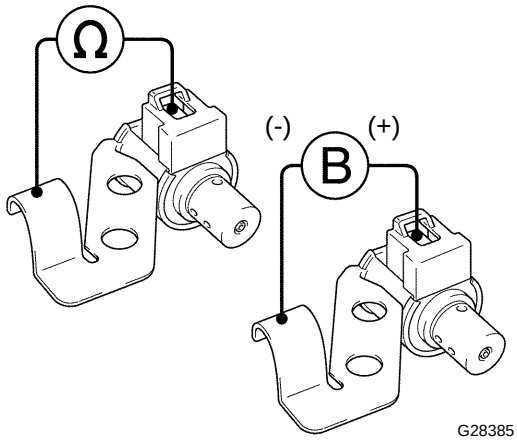
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (SEE PAGE 01-36)**

OK

REPLACE ECM (SEE PAGE 10-9)

3 INSPECT SHIFT SOLENOID VALVE(DSL)

Shift Solenoid Valve DSL:



(a) Remove the shift solenoid valve DSL.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition 20 ℃ (68 ℉)
Solenoid Connector (DSL) - Solenoid Body (DSL)	11 to 13 Ω

(c) Connect positive (+) lead to the terminal of solenoid connector, negative (-) lead to the solenoid body.

OK:

The solenoid valve makes an operating noise.

NG → **REPLACE SHIFT SOLENOID VALVE(DSL)**

OK

REPAIR OR REPLACE TRANSMISSION WIRE (SEE PAGE 40-34)

05F2V-05

ROAD TEST

1. PROBLEM SYMPTOM CONFIRMATION

(a) Based on the result of the customer problem analysis, try to reproduce the symptoms. If the problem is that the transaxle does not shift up, shift down, or the shift point is too high or too low, conduct the following road test referring to the automatic shift schedule and simulate the problem symptoms.

2. ROAD TEST

NOTICE:

Perform the test at the ATF (Automatic Transmission Fluid) temperature 50 to 80˚C (122 to 176˚F) in the normal operation.

(a) D position test:

Shift into the D position and fully depress the accelerator pedal and check the following points.

(1) Check up-shift operation.

Check that 1 → 2, 2 → 3 and 3 → O/D up-shifts take place, and that the shift points conform to the automatic shift schedule (see page 03-51).

HINT:

O/D Gear Up-shift Prohibition Control

- Engine coolant temperature is 60 ˚C (140 ˚F) or less and vehicle speed is at 70 km/h (43 mph) or less.
- ATF temperature is 10 ˚C (50 ˚F) or less.

O/D Gear Lock-up Prohibition Control

- Brake pedal is depressed.
- Accelerator pedal is released.
- Engine coolant temperature is 60 ˚C (140 ˚F) or less.

(2) Check for shift shock and slip.

Check for shock and slip at the 1 → 2, 2 → 3 and 3 → O/D up-shifts.

(3) Check for abnormal noise and vibration.

Check for abnormal noise and vibration when up-shifting from 1 → 2, 2 → 3 and 3 → O/D while driving with the shift lever in the D position, and check while driving in the lock-up condition.

HINT:

The check for the cause of abnormal noise and vibration must be done thoroughly as it could also be due to loss of balance in the differential, torque converter clutch, etc.

(4) Check kick-down operation.

Check vehicle speeds when the 2nd to 1st, 3rd to 2nd and O/D to 3rd kick-downs take place while driving with the shift lever in the D position. Confirm that each speed is within the applicable vehicle speed range indicated in the automatic shift schedule (see page 03-51).

(5) Check abnormal shock and slip at kick-down.

(6) Check the lock-up mechanism.

- Drive in D position (O/D gear), at a steady speed (lock-up ON).
- Lightly depress the accelerator pedal and check that the engine speed does not change abruptly.

HINT:

- There is no lock-up function in the 1st and 2nd gear.
- If there is a big jump in engine speed, there is no lock-up.

(b) 2 position test:

Shift into the 2 position and fully depress the accelerator pedal and check the following points.

(1) Check up-shift operation.

Check that the 1 → 2 up-shift takes place and that the shift point conforms to the automatic shift schedule (see page 03-51).

HINT:

There is no 3rd up-shift and lock-up in the 2 position.

(2) Check engine braking.

While running in the 2 position and 2nd gear, release the accelerator pedal and check the engine braking effect.

(3) Check for abnormal noise during acceleration and deceleration, and for shock at up-shift and down-shift.

(c) L position test:

Shift into the L position and fully depress the accelerator pedal and check the following points.

(1) Check no up-shift.

While running in the L position, check that there is no up-shift to 2nd gear.

HINT:

There is no lock-up in the L position.

(2) Check engine braking.

While running in the L position, release the accelerator pedal and check the engine braking effect.

(3) Check for abnormal noise during acceleration and deceleration.

(d) R position test:

Shift into the R position, lightly depress the accelerator pedal, and check that the vehicle moves backward without any abnormal noise or vibration.

CAUTION:

Before conducting this test ensure that the test area is free from people and obstruction.

(e) P position test:

Stop the vehicle on the grade (more than 5°) and after shifting into the P position, release the parking brake. Then, check that the parking lock pawl holds the vehicle in place.

05F2U-05

SYSTEM DESCRIPTION

1. SYSTEM DESCRIPTION

(a) The ECT (Electronic controlled automatic transmission/transaxle) is an automatic transmission/transaxle that electronically controls shift timing using the ECM. The ECM detects electrical signals that indicate engine and driving conditions, controls the shift point, and selects the appropriate shift pattern based on driver habits and road conditions. As a result, fuel efficiency and power transmission/transaxle performance are improved.

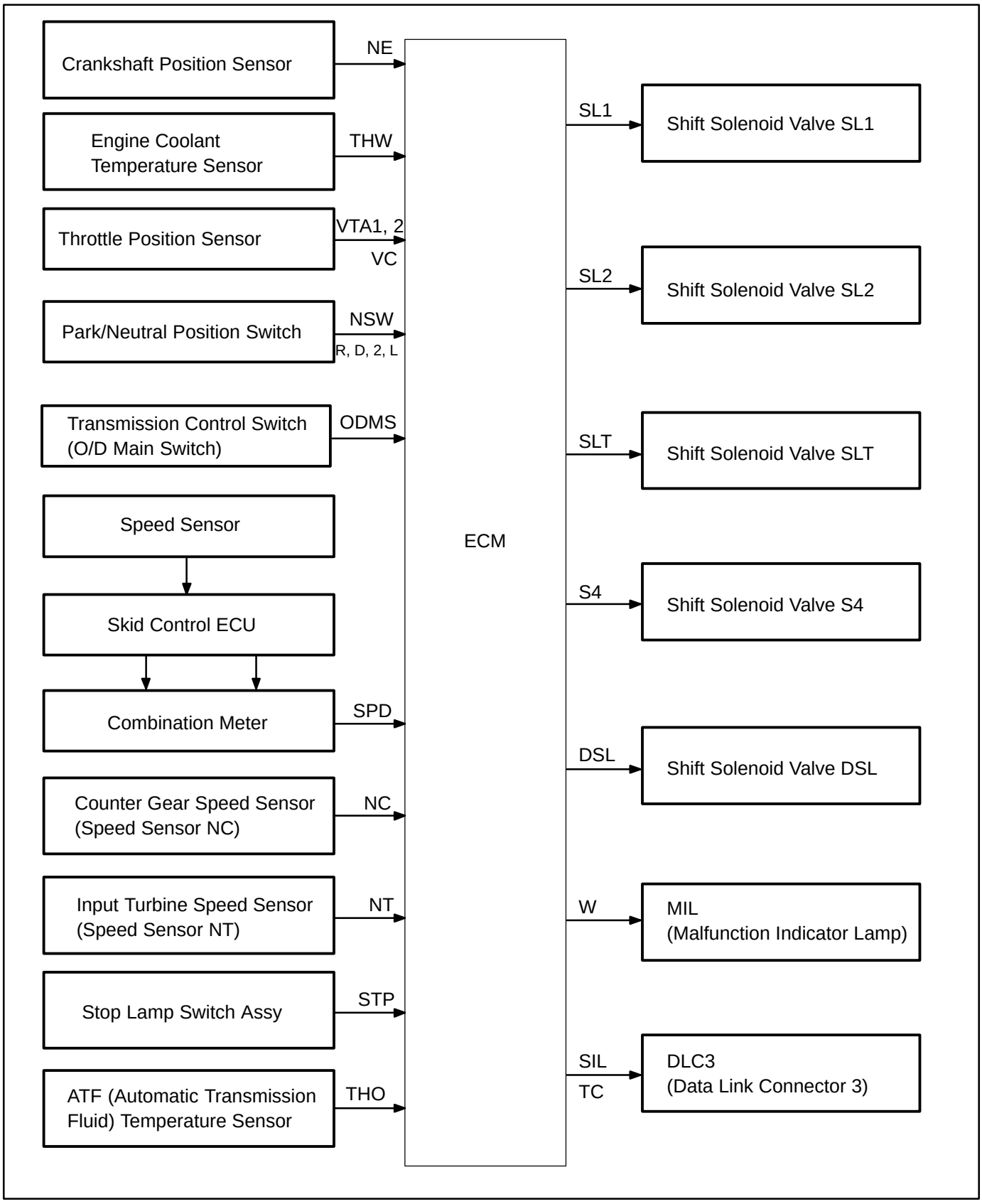
Shift shock has been reduced by controlling the engine and transmission/transaxle simultaneously. In addition, the ECT has the following features:

- Diagnostic function.
- Fail-safe function when a malfunction occurs.

05F2T-05

SYSTEM DIAGRAM

The configuration of the electronic control system in the U241E/U140F automatic transaxles is as shown in the following chart.



05F38-05

PART AND SYSTEM NAME LIST

This reference list indicates the part names used in this manual along with their definitions.

Part and system name	Definition
Toyota HCAC system, Hydrocarbon adsorptive Catalyst (HCAC) system, HC adsorptive three-way catalyst	HC adsorptive three-way catalytic converter
Variable Valve Timing sensor, VVT sensor	Camshaft position sensor
Variable valve timing system, VVT system	Camshaft timing control system
Camshaft timing oil control valve, Oil control valve OCV, VVT, VSV	Camshaft timing oil control valve
Variable timing and lift, VVTL	Camshaft timing and lift control
Crankshaft position sensor ”A”	Crankshaft position sensor
Engine speed sensor	Crankshaft position sensor
THA	Intake air temperature
Knock control module	Engine knock control module
Knock sensor	Engine knock sensor
Mass or volume air flow circuit	Mass air flow sensor circuit
Vacuum sensor	Manifold air pressure sensor
Internal control module, Control module, Engine control ECU, PCM	Power train control module
FC idle	Deceleration fuel cut
Idle air control valve	Idle speed control
VSV for CCV, Canister close valve VSV for canister control	Evaporative emissions canister vent valve
VSV for EVAP, Vacuum switching valve assembly No. 1, EVAP VAV, Purge VSV	Evaporative emissions canister purge valve
VSV for pressure switching valve, Bypass VSV	Evaporative emission pressure switching valve
Vapor pressure sensor, EVAP pressure sensor, Evaporative emission control system pressure sensor	Fuel tank pressure sensor
Charcoal canister	Evaporative emissions canister
ORVR system	On-boad refueling vapor recovery system
Intake manifold runner control	Intake manifold tuning system
Intake manifold runner valve, IMRV, IACV (runner valve)	Intake manifold tuning valve
Intake control VSV	Intake manifold tuning solenoid valve
AFS	Air fuel ratio sensor
O2 sensor	Heater oxygen sensor
Oxygen sensor pumping current circuit	Oxygen sensor output signal
Oxygen sensor reference ground circuit	Oxygen sensor signal ground
Accel position sensor	Accelerator pedal position sensor
Throttle actuator control motor, Actuator control motor, Electronic throttle motor, Throttle control motor	Electronic throttle actuator
Electronic throttle control system, Throttle actuator control system	Electronic throttle control system
Throttle/pedal position sensor, Throttle/pedal position switch, Throttle position sensor/switch	Throttle position sensor
Turbo press sensor	Turbocharger pressure sensor
Turbo VSV	Turbocharger pressure control solenoid valve
P/S pressure switch	Power-steering pressure switch
VSV for ACM	Active control engine mount
Speed sensor, Vehicle speed sensor ”A”, Speed sensor for skid control ECU	Vehicle speed sensor
ATF temperature sensor, Trans. fluid temp. sensor, ATF temperature sensor ”A”	Transmission fluid temperature sensor
Electronic controlled automatic transmission, ECT	Electronically controlled automatic
Intermediate shaft speed sensor ”A”	Counter gear speed sensor

Part and system name	Definition
Output speed sensor	Output shaft speed sensor
Input speed sensor, Input turbine speed sensor ”A”, Speed sensor (NT), Turbine speed sensor	Input turbine speed sensor
PNP switch, NSW	Park/neutral position switch
Pressure control solenoid	Transmission pressure control solenoid
Shift solenoid	Transmission shift solenoid valve
Transmission control switch, Shift lock control unit	Shift lock control module
Engine immobilizer system, Immobilizer system	Vehicle anti-theft system

0527I-43

CUSTOMER PROBLEM ANALYSIS CHECK

Automatic Transaxle System Check Sheet

Inspector's Name :

Customer's Name		VIN	
		Production Date	/ /
		Licence Plate No.	
Date Vehicle Brought In	/ /	Odometer Reading	km mile

Date Problem Occurred	/ /
How Often Does Problem Occur?	✻ Continuous ✻ Intermittent (times a day)

Symptoms	✻ Vehicle does not move (✻ Any position ✻ Particular position)
	✻ No up-shift (✻ 1st → 2nd ✻ 2nd → 3rd ✻ 3rd → O/D)
	✻ No down-shift (✻ O/D → 3rd ✻ 3rd → 2nd ✻ 2nd → 1st)
	✻ Lock-up malfunction
	✻ Shift point too high or too low
	✻ Harsh engagement (✻ N → D ✻ Lock-up ✻ Any drive position)
	✻ Slip or shudder
	✻ No kick-down
	✻ Others ( )

Check Item	MIL	☐ Normal ☐ Remains ON

DTC Check	1st Time	☐ Normal code ☐ Malfunction code (DTC)
	2nd Time	☐ Normal code ☐ Malfunction code (DTC)

0527K-48

DIAGNOSTIC TROUBLE CODE CHART

If a DTC is displayed during the DTC check, check the parts listed in the table below and proceed to the page given.

HINT:

- ○ *1 : ✳ ... MIL (Malfunction Indicator Lamp) light up
- ○ *2 : ... Mark means ECM memorizes the malfunction code if the ECM detects the DTC detection condition.
- ○ This DTC may be output when the clutch, brake and gear components etc. inside the automatic transaxle are damaged.

DTC No. (See Page)	Detection Item	Trouble Area	MIL *1	Memory *2
P0500 (05-216)	Vehicle Speed Sensor "A"	○Combination meter ○Open or short in vehicle speed sensor circuit ○Vehicle speed sensor ○ECM	✳	
P0705 (05-922)	Transmission Range Sensor Circuit Malfunction (PRNDL Input)	○Open or short in park/neutral position switch circuit ○Park/neutral position switch ○ECM	✳	
P0710 (05-928)	Transmission Fluid Temperature Sensor "A" Circuit	○Open or short in ATF temperature sensor circuit ○Transmission wire (ATF temperature sensor) ○ECM	✳	
P0711 (05-933)	Transmission Fluid Temperature Sensor "A" Performance	○Open or short in ATF temperature sensor circuit ○Transmission wire (ATF temperature sensor) ○ECM	✳	
P0712 (05-928)	Transmission Fluid Temperature Sensor "A" Circuit Low Input	○Short in ATF temperature sensor circuit ○Transmission wire (ATF temperature sensor) ○ECM	✳	
P0713 (05-928)	Transmission Fluid Temperature Sensor "A" Circuit High Input	○Open in ATF temperature sensor circuit ○Transmission wire (ATF temperature sensor) ○ECM	✳	
P0717 (05-937)	Turbine Speed Sensor Circuit No Signal	○Open or short in transmission revolution sensor NT (speed sensor NT) circuit ○Transmission revolution sensor NT (speed sensor NT) ○ECM ○Automatic transaxle assembly	✳	
P0724 (05-940)	Brake Switch "B" Circuit High	○Short in stop light switch circuit ○Stop light switch ○ECM	✳	
P0741 (05-944)	Torque Converter Clutch Solenoid Performance (Shift Solenoid Valve DSL)	○Shift solenoid valve DSL remains open or closed ○Valve body is blocked ○Shift solenoid valve DSL ○Torque converter clutch ○Automatic transaxle (clutch, brake or gear etc.) ○Line pressure is too low ○ECM	✳	
P0746 (05-949)	Pressure Control Solenoid "A" Performance (Shift Solenoid Valve SL1)	○Shift solenoid valve SL1 remains open or closed ○Valve body is blocked ○Shift solenoid valve SL1 ○Automatic transaxle (clutch, brake or gear etc.) ○ECM	✳	
P0748 (05-953)	Pressure Control Solenoid "A" Electrical (Shift Solenoid Valve SL1)	○Open or short in shift solenoid valve SL1 circuit ○Shift solenoid valve SL1 ○ECM	✳	

P0766 (05-956)	Shift Solenoid "D" Performance (Shift Solenoid Valve S4)	○Shift solenoid valve S4 remains open or closed ○Valve body is blocked ○Shift solenoid valve S4 ○Automatic transaxle (clutch, brake or gear etc.) ○ECM	✳	
P0776 (05-960)	Pressure Control Solenoid "B" Performance (Shift Solenoid Valve SL2)	○Shift solenoid valve SL2 remains open or closed ○Valve body is blocked ○Shift solenoid valve SL2 ○Automatic transaxle (clutch, brake or gear etc.) ○ECM	✳	
P0778 (05-964)	Pressure Control Solenoid "B" Electrical (Shift Solenoid Valve SL2)	○Open or short in shift solenoid valve SL2 circuit ○Shift solenoid valve SL2 ○ECM	✳	
P0793 (05-967)	Intermediate Shaft Speed Sensor "A"	○Open or short in transmission revolution sensor NC (speed sensor NC) circuit ○Transmission revolution sensor NC (speed sensor NC) ○ECM	✳	
P0982 (05-971)	Shift Solenoid "D" Control Circuit Low (Shift Solenoid Valve S4)	○Short in shift solenoid valve S4 circuit ○Shift solenoid valve S4 ○ECM	✳	
P0983 (05-971)	Shift Solenoid "D" Control Circuit High (Shift Solenoid Valve S4)	○Open in shift solenoid valve S4 circuit ○Shift solenoid valve S4 ○ECM	✳	
P2716 (05-974)	Pressure Control Solenoid "D" Electrical (Shift Solenoid Valve SLT)	○Open or short in shift solenoid valve SLT circuit ○Shift solenoid valve SLT ○ECM	✳	
P2769 (05-978)	Torque Converter Clutch Solenoid Circuit Low (Shift Solenoid Valve DSL)	○Short in shift solenoid valve DSL circuit ○Shift solenoid valve DSL ○ECM	✳	
P2770 (05-978)	Torque Converter Clutch Solenoid Circuit High (Shift Solenoid Valve DSL)	○Open in shift solenoid valve DSL circuit ○Shift solenoid valve DSL ○ECM	✳	

0527H-44

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- The ECM of this system is connected to the multiplex communication system. Therefore, before starting troubleshooting, make sure to check that there is no trouble in the multiplex communication system.
- The hand-held tester can be used at steps 3, 4, 6, and 9.

1	**Vehicle Brought to Workshop**

2	**Customer Problem Analysis (SEE PAGE 05-886)**

3	**Connect the OBD II scan tool or hand-held tester to DLC3**

4	**Check and Clear DTC and Freeze Frame Data (SEE PAGE 05-912)**

5	**Visual Inspection**

6	**Setting the Check Mode Diagnosis (SEE PAGE 05-914)**

7	**Problem Symptom Confirmation (SEE PAGE 05-887)**

- **Symptom does not occur: Go to step 8**
- **Symptom occur: Go to step 9**

8	**Symptom Simulation (SEE PAGE 01-26)**

9	**DTC Check (SEE PAGE 05-912)**

- **DTC is not output: Go to step 10**
- **DTC is output: Go to step 17**

10	Basic Inspection (SEE PAGE 40-2 , 40-6 and 40-71)

NG → Go to step 19

OK

11	Mechanical System Test (SEE PAGE 05-889)

NG → Go to step 16

OK

12	Hydraulic Test (SEE PAGE 05-891)

NG → Go to step 16

OK

13	Manual Shifting Test (SEE PAGE 05-892)

NG → Go to step 15

OK

14	Problem Symptoms Table Chapter 1 (SEE PAGE 05-904)

NG → Go to step 18

OK

15	Problem Symptoms Table Chapter 2 (SEE PAGE 05-904)

16	Part Inspection

→ Go to step 19

17	DTC Chart (SEE PAGE 05-920)

18	Circuit Inspection

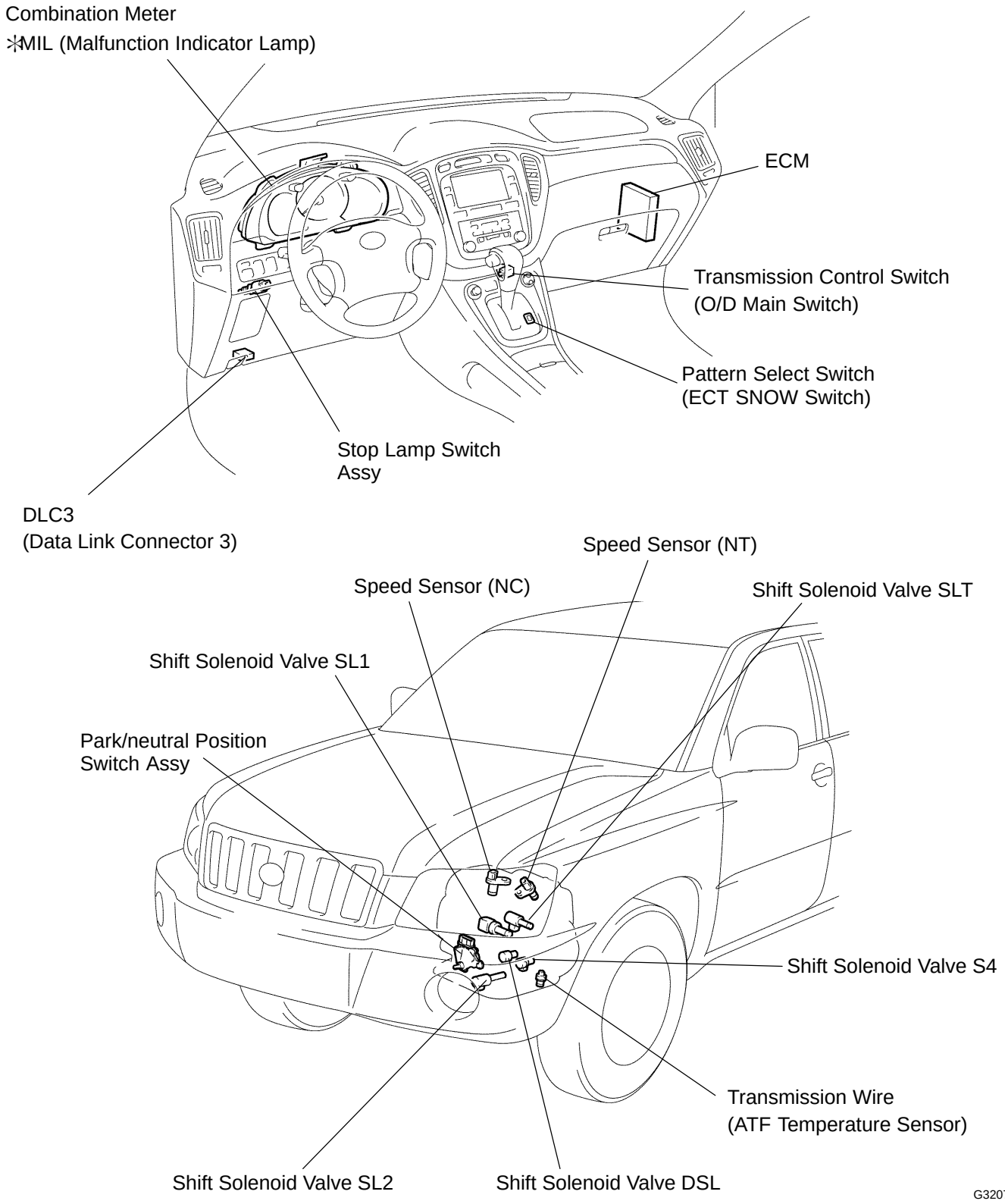
19	**Repair or Replace**

20	**Confirmation Test**

End

0527L-44

LOCATION



ELECTRONIC CONTROLLED AUTOMATIC TRANSAXLE [ECT] (U241E/U140F)

05C0T-29

PRECAUTION

NOTICE:

Perform the RESET MEMORY (AT initialization) when replacing the automatic transaxle assy, engine assy or ECM (see page 05-893).

HINT:

Initialization can not be completed by only disconnecting the battery terminal.

0527M-47

PROBLEM SYMPTOMS TABLE

HINT:

If a normal code is displayed during the diagnostic trouble code check although the trouble still occurs, check the electrical circuits for each symptom in the order given in the charts on the following pages and proceed to the page given for troubleshooting.

The Matrix Chart is divided into 2 chapters.

1. Chapter 1: Electronic Circuit Matrix Chart

- ○ Refer to the table below when the trouble cause is considered to be electrical.
- ○ If the instruction ”Proceed to next circuit inspection shown on matrix chart” is given in the flow chart of each circuit, proceed to the circuit with the next highest number in the table to continue the check.
- ○ If the trouble still occurs even though there are no abnormalities in any of the other circuits, check and replace the ECM.

HINT:

*1: When the circuit on which mark *1 is attached is a malfunction, DTC could be output (see page 05-920).

Symptom	Suspect Area	See page
No up-shift (1st → 2nd)	ECM	01-36
No up-shift (2nd → 3rd)	ECM	01-36
No up-shift (3rd → O/D)	1. Transmission control switch (O/D OFF) circuit 2. ECM	05-981 01-36
No down-shift (O/D → 3rd)	ECM	01-36
No down-shift (3rd → 2nd)	ECM	01-36
No down-shift (2nd → 1st)	ECM	01-36
No lock-up or No lock-up off	ECM	01-36
Shift point too high or too low	ECM	01-36
Up-shift to O/D from 3rd (While O/D main switch is OFF)	1. Transmission control switch (O/D OFF) circuit 2. ECM	05-981 01-36
Up-shift to O/D from 3rd while engine is cold	1. Engine coolant temp. sensor circuit *1 2. ECM	05-48 01-36
Harsh engagement (N → D)	ECM	01-36
Harsh engagement (Lock-up)	ECM	01-36
Harsh engagement (Any driving position)	ECM	01-36
Poor acceleration	ECM	01-36
Engine stalls when starting off or stopping	ECM	01-36
Malfunction in shifting	1. Park/neutral position switch circuit *1 2. ECM	05-922 01-36

2. Chapter 2: On-Vehicle Repair and Off-Vehicle Repair (⁎: U140F AUTOMATIC TRANSAXLE Repair Manual Pub. No. RM836U U241E AUTOMATIC TRANSAXLE Repair Manual Pub. No. RM840U)

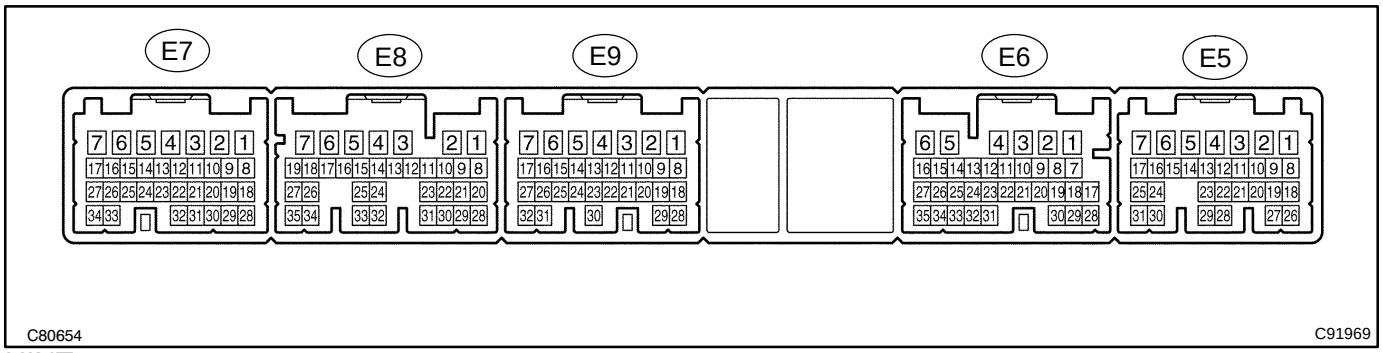
Symptom	Suspect Area	See page
Vehicle does not move in any forward positions and reverse positions	1. Manual valve 2. Primary regulator valve 3. Front and rear planetary gear 4. U/D planetary gear 5. U/D one-way clutch (F_2) 6. Forward clutch (C_1) 7. U/D brake (B_3)	⁎ ⁎ ⁎ ⁎ ⁎ ⁎ ⁎
Vehicle does not move in R position	1. Front and rear planetary gear unit 2. U/D planetary gear unit 3. Direct clutch (C_2) 4. U/D brake (C_3) 5. 1st and reverse brake (B_2)	⁎ ⁎ ⁎ ⁎ ⁎
No up-shift (1st → 2nd)	1. Valve body assy 2. No. 1 one-way clutch (F_1) 3. 2nd brake (B_1)	40-40 ⁎ ⁎
No up-shift (2nd → 3rd)	1. Valve body assy 2. Direct clutch (C_2)	40-40 ⁎
No up-shift (3rd → O/D)	1. Valve body assy 2. U/D clutch (C_3)	⁎ ⁎
No down-shift (O/D → 3rd)	Valve body assy	⁎
No down-shift (3rd → 2nd)	Valve body assy	40-40
No down-shift (2nd → 1st)	Valve body assy	40-40
No lock-up or No lock-up off	1. Lock-up relay valve 2. Torque converter clutch	⁎ 40-29
Harsh engagement (N → D)	1. C_1 accumulator 2. Valve body assy 3. Forward clutch (C_1) 4. U/D one-way clutch (F_2) 5. No. 1 one-way clutch (F_1)	⁎ 40-40 ⁎ ⁎ ⁎
Harsh engagement (N → R)	1. Valve body assy 2. Direct clutch (C_2) 3. 1st and reverse brake (B_2)	40-40 ⁎ ⁎
Harsh engagement (Lock-up)	1. Lock-up relay valve 2. Torque converter clutch	⁎ 40-29
Harsh engagement (2nd → 3rd)	Valve body assy	40-40
Harsh engagement (3rd → O/D)	Valve body assy	40-40
Harsh engagement (O/D → 3rd)	Valve body assy	40-40
Slip or shudder (Forward position: After warm-up)	1. Oil strainer 2. Torque converter clutch 3. Forward clutch (C_1) 4. Direct clutch (C_2) 5. U/D brake (C_3) 6. No. 1 one-way clutch (F_1) 7. U/D one-way clutch (F_2)	40-40 40-29 ⁎ ⁎ ⁎ ⁎ ⁎
Slip or shudder (R position)	1. Oil strainer 2. Direct clutch (C_2) 3. 1st and reverse brake (B_2)	40-40 ⁎ ⁎
Slip or shudder (1st)	No. 1 one-way clutch (F_1)	⁎

Slip or shudder (2nd)	1. U/D one-way clutch (F_2) 2. 2nd brake (B_1)	✳ ✳
Slip or shudder (3rd)	Direct clutch (C_2)	✳
Slip or shudder (O/D)	U/D clutch (C_3)	✳
No engine braking (1st ~ 3rd: D position)	U/D brake (B_3)	✳
No engine braking (1st: L position)	1st and reverse brake (B_2)	✳
No engine braking (2nd: 2 position)	2nd brake (B_1)	✳
Poor acceleration (All position)	1. Torque converter clutch 2. U/D planetary gear	40-29 ✳
Poor acceleration (O/D)	1. U/D clutch (C_3) 2. U/D planetary gear	✳ ✳
Large shift shock or engine stalls when starting off or stopping	Torque converter clutch	40-29
No kick-down	Valve body assy	40-40

05F36-05

TERMINALS OF ECM

1. ECM



HINT:

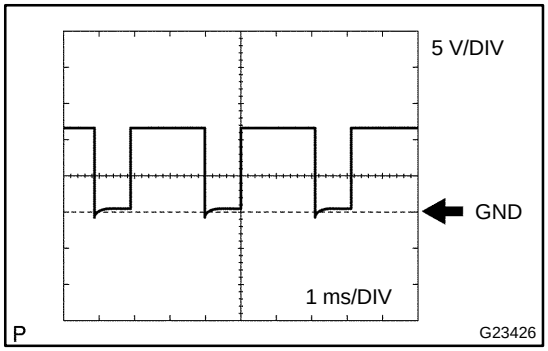
Each ECM terminal's standard voltage is shown in the table below.

In the table, first follow the information under "Condition". Look under "Symbols (Terminal No.)" for the terminals to be inspected. The standard voltage between the terminals is shown under "Specific Condition".

Use the illustration above as a reference for the ECM terminals.

Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	Specified Condition
P (E5-6) - E1 (E9-1)	V - BR	P shift position switch signal	IG switch ON and shift lever P position	10 to 14 V
↑	↑	↑	IG switch ON and shift lever except P position	Below 1 V
N (E5-7) - E1 (E9-1)	GR - BR	N shift position switch signal	IG switch ON and shift lever N position	10 to 14 V
↑	↑	↑	IG switch ON and shift lever except N position	Below 1 V
NSW (E7-16) - E1 (E9-1)	B-Y - BR	Park neutral switch signal	IG switch ON and shift lever P and N position	Below 1 V
↑	↑	↑	IG switch ON and shift lever except P and N position	10 to 14 V
DSL (E8-9) - E1 (E9-1)	Y-G - BR	DSL solenoid signal	Vehicle speed 65 km/h (40 mph), lock-up (ON to OFF)	Pulse generation (See waveform 2)
S4 (E8-11) - E1 (E9-1)	L - BR	S4 solenoid signal	IG switch ON	Below 1 V
↑	↑	↑	O/D gear	10 to 14 V
↑	↑	↑	Except O/D gear	Below 1 V
SL2+ (E8-15) - SL2- (E8-14)	L-Y - L-R	SL2 solenoid signal	Engine idle speed	Pulse generation (See waveform 3)
↑	↑	↑	IG switch ON	Below 1
↑	↑	↑	1st or 2nd gear	10 to 14 V
↑	↑	↑	3rd or O/D gear	Below 1
SL1+ (E8-19) - SL1- (E8-18)	R-B - B-W	SL1 solenoid signal	Engine idle speed	Pulse generation (See waveform 4)
↑	↑	↑	IG switch ON	10 to 14 V
↑	↑	↑	1st gear	10 to 14 V
↑	↑	↑	Except 1st gear	Below 1
NC+ (E8-26) - NC- (E8-34)	Y - W-G	Speed sensor (NC) signal	Vehicle speed 30 km/h (19 mph): (3rd gear) Engine speed 1,400 rpm	Pulse generation (See waveform 5)
NT+ (E8-27) - NT- (E8-35)	W - R-W	Speed sensor (NT) signal	Vehicle speed 20 km/h (12 mph)	Pulse generation (See waveform 6)

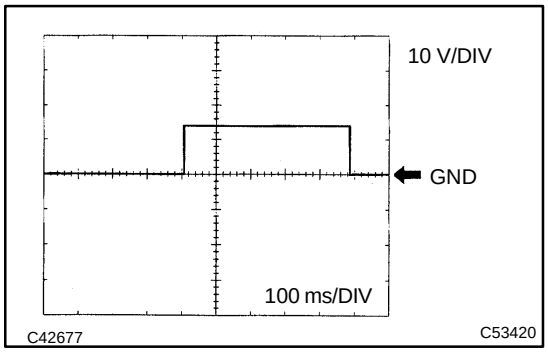
SLT+ (E8-13) - SLT- (E8-12)	Y-R - B-Y	SLT solenoid signal	Engine idle speed	Pulse generation (See waveform 1)
THO (E8-32) - E2 (E7-28)	G-Y - BR	ATF temperature sensor signal	ATF temperature: 115 °C (239 °F) or more	Below 1.5 V
L (E6-8) - E1 (E9-1)	R - BR	L shift position switch signal	IG switch ON and shift lever L position	10 to 14 V
↑	↑	↑	IG switch ON and shift lever except L position	Below 1 V
2 (E6-9) - E1 (E9-1)	P - BR	2 shift position switch signal	IG switch ON and shift lever 2 position	10 to 14 V
↑	↑	↑	IG switch ON and shift lever except 2 position	Below 1 V
D (E6-10) - E1 (E9-1)	Y - BR	D shift position switch signal	IG switch ON and shift lever D position	10 to 14 V
↑	↑	↑	IG switch ON and shift lever except D position	Below 1 V
R (E6-11) - E1 (E9-1)	L - BR	R shift position switch signal	IG switch ON and shift lever R position	10 to 14 V
↑	↑	↑	IG switch ON and shift lever except R position	Below 1 V
SPD (E6-17) - E1 (E9-1)	Y - BR	Speed signal	Vehicle speed 20 km/h (12 mph)	Pulse generation (See waveform 7)
STP (E6-19) - E1 (E9-1)	BR - BR	Stop lamp switch signal	Brake pedal is depressed	7.5 to 14 V
↑	↑	↑	Brake pedal is released	Below 1.5 V
ODMS (E5-16) - E1 (E9-1)	GR - BR	O/D main switch	IG switch ON	10 to 14 V
↑	↑	↑	IG switch ON and press continuously O/D main switch	Below 1 V



Waveform 1

Reference:

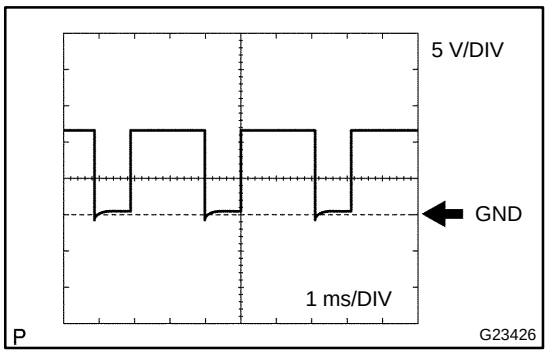
Terminal	SLT+ - SLT-
Tool setting	5V/DIV, 1ms/DIV
Vehicle condition	Engine idle speed



Waveform 2

Reference:

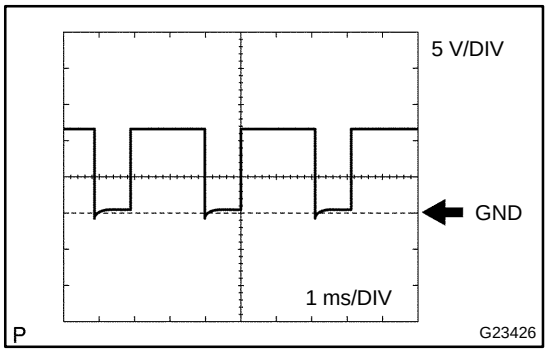
Terminal	DSL - E1
Tool setting	10V/DIV, 100ms/DIV
Vehicle condition	Vehicle speed 65 km/h (40 mph), lock-up (ON to OFF)



Waveform 3

Reference:

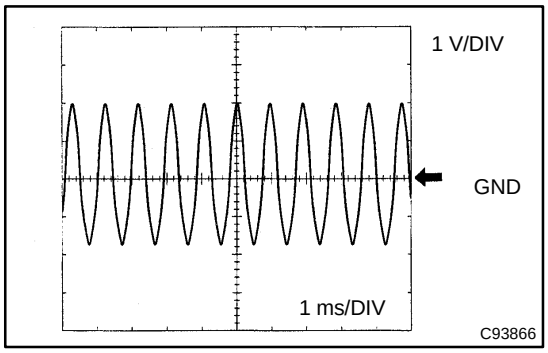
Terminal	SL2+ - SL2-
Tool setting	5V/DIV, 1ms/DIV
Vehicle condition	Engine idle speed



Waveform 4

Reference:

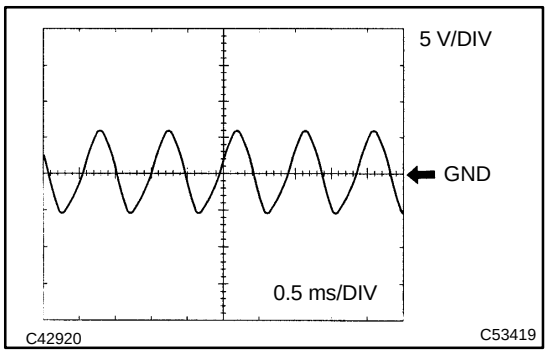
Terminal	SL1+ - SL1-
Tool setting	5V/DIV, 1ms/DIV
Vehicle condition	Engine idle speed



Waveform 5

Reference:

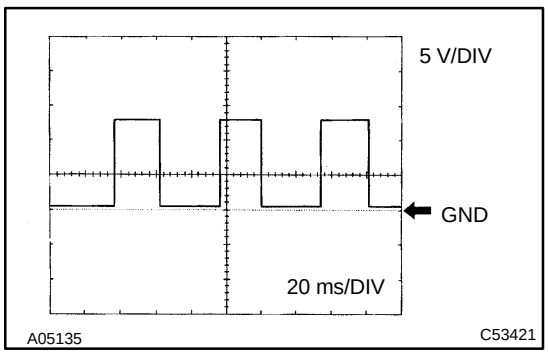
Terminal	NC+ - NC-
Tool setting	1V/DIV, 1ms/DIV
Vehicle condition	Vehicle speed 30 km/h (19 mph): (3rd gear) Engine speed 1,400 rpm



Waveform 6

Reference:

Terminal	NT+ - NT-
Tool setting	5V/DIV, 0.5ms/DIV
Vehicle condition	Vehicle speed 20 km/h (12 mph)



Waveform 7

Reference:

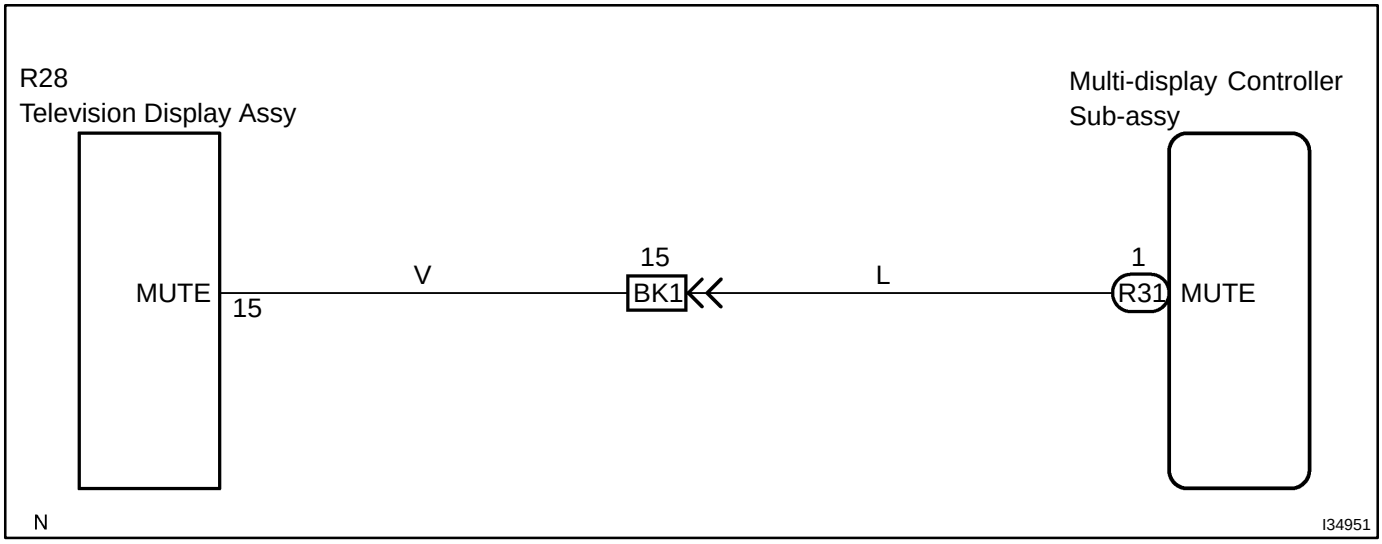
Terminal	SPD - E1
Tool setting	5V/DIV, 20ms/DIV
Vehicle condition	Vehicle speed 20 km/h (12 mph)

MUTE SIGNAL CIRCUIT (FROM TELEVISION DISPLAY ASSY)

CIRCUIT DESCRIPTION

The multi-display controller sub-assy controls the volume according to the MUTE signal from the television display assy.
The MUTE signal is sent to reduce noise and a popping sound when modes, etc. are switched.

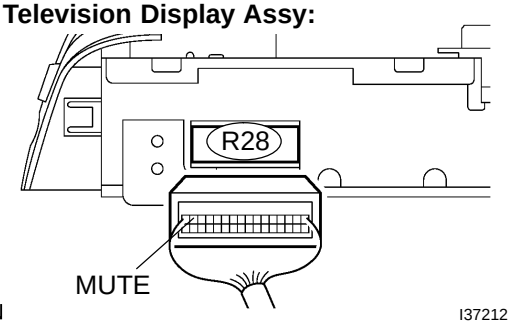
WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR(TELEVISION DISPLAY ASSY - MULTI-DISPLAY CONTROLLER SUB-ASSY)

Television Display Assy:



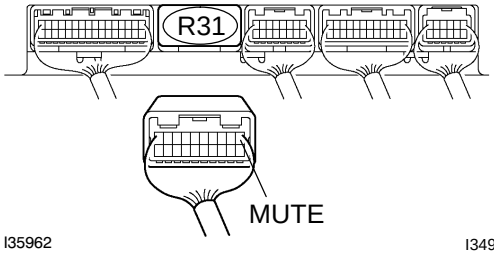
(a) Disconnect the connector from the television display assy and multi-display controller sub-assy.

(b) Measure the resistance according to the values in the table below.

Standard:

Tester connection	Condition	Specified condition
MUTE - MUTE	Always	Below 1 Ω
MUTE - Body ground	Always	10 kΩ or higher

Multi-display Controller Sub-assy:

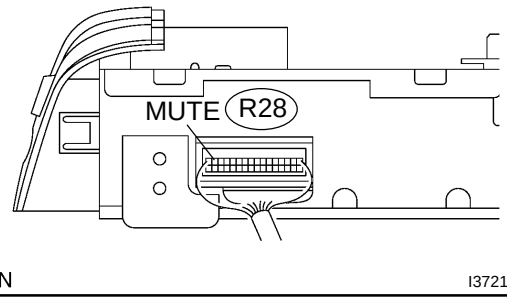


NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

2	INSPECT TELEVISION DISPLAY ASSY

Television Display Assy:



(a) Connect the television display assy connector.

(b) Measure the voltage according to the values in the table below.

Standard:

Tester connection	Condition	Specified condition
MUTE - Body ground	DVD system sounding	Approx. 3.5 V
MUTE - Body ground	DVD system changing	Below 1.0 V

NG → **REPLACE TELEVISION DISPLAY ASSY (SEE PAGE 67-26)**

OK

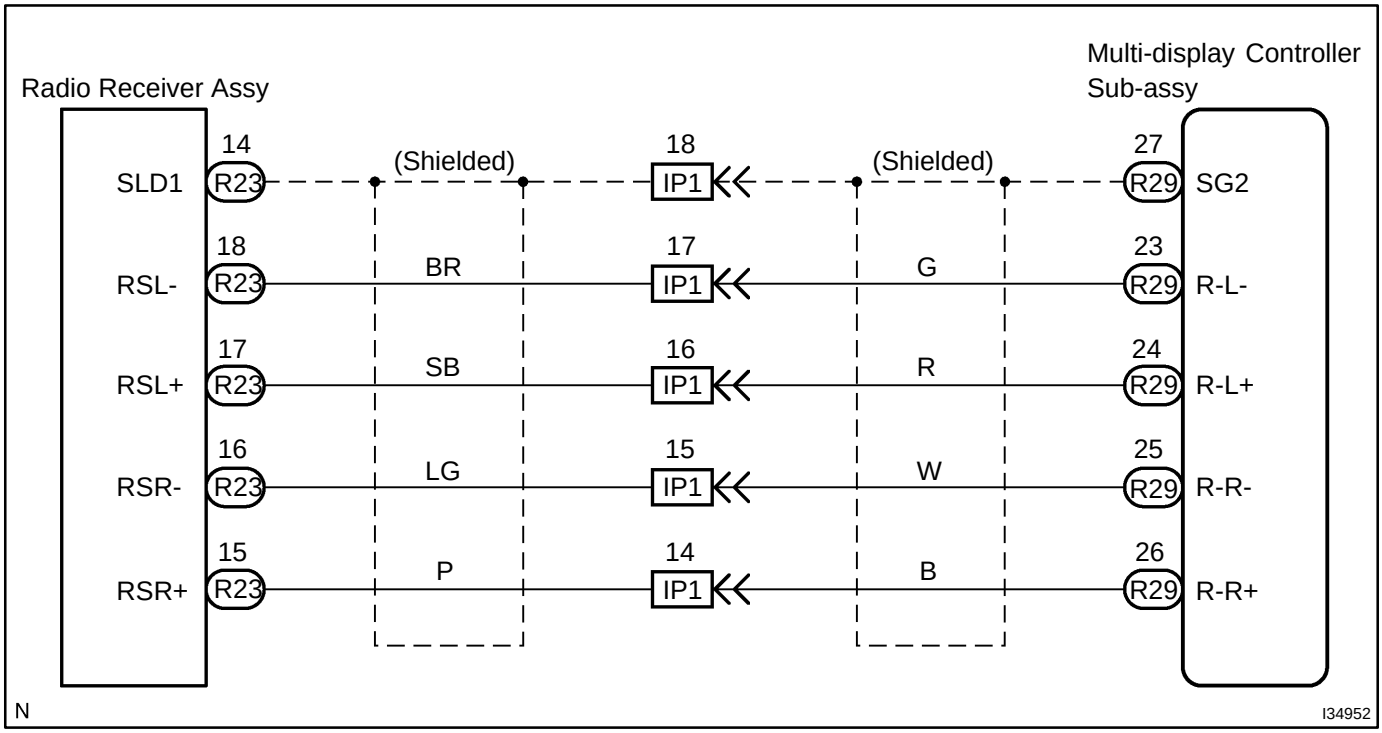
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-1704)

SOUND SIGNAL CIRCUIT (FROM RADIO RECEIVER ASSY)

CIRCUIT DESCRIPTION

This is the sound signal circuit from the radio receiver assy to the multi-display controller sub-assy.

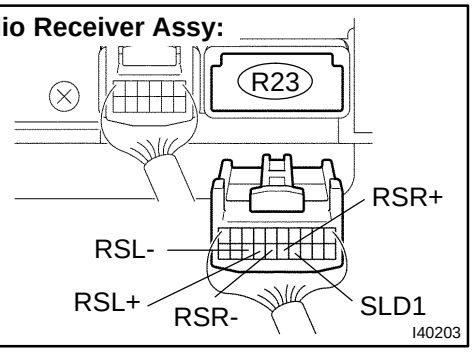
WIRING DIAGRAM



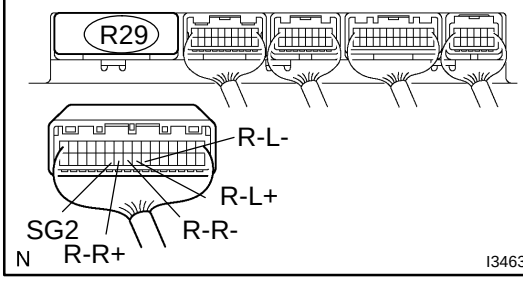
INSPECTION PROCEDURE

1	**CHECK HARNESS AND CONNECTOR(RADIO RECEIVER ASSY - MULTI-DISPLAY CONTROLLER SUB-ASSY)**

Radio Receiver Assy:



Multi-display Controller Sub-assy:



(a) Disconnect the connector from the radio receiver assy and multi-display controller sub-assy.

(b) Measure the resistance according to the values in the table below.

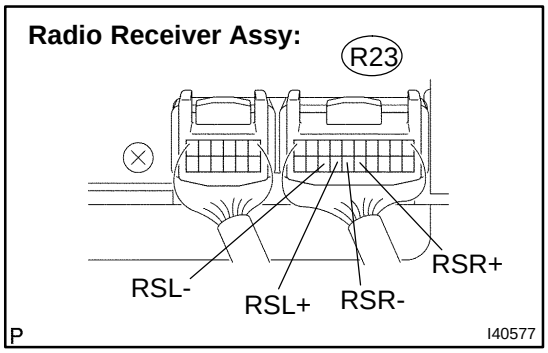
Standard:

Tester connection	Condition	Specified condition
SLD1 - SG2	Always	Below 1 Ω
RSL- - R-L-	Always	Below 1 Ω
RSL+ - R-L+	Always	Below 1 Ω
RSR- - R-R-	Always	Below 1 Ω
RSR+ - R-R+	Always	Below 1 Ω
RSL- - Body ground	Always	10 kΩ or higher
RSL+ - Body ground	Always	10 kΩ or higher
RSR- - Body ground	Always	10 kΩ or higher
RSR+ - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

2 INSPECT RADIO RECEIVER ASSY



(a) Connect the connector.
(b) Using an oscilloscope, check the signal waveform between the terminals according to the conditions, as shown in the chart.

Standard:

Tester connection	Condition	Specified condition
RSL- - Body ground	While voice sound is being produced	A waveform synchronized with sound is output
RSL+ - Body ground	While voice sound is being produced	A waveform synchronized with sound is output
RSR- - Body ground	While voice sound is being produced	A waveform synchronized with sound is output
RSR+ - Body ground	While voice sound is being produced	A waveform synchronized with sound is output

NG → **REPLACE RADIO RECEIVER ASSY (SEE PAGE 67-6)**

OK

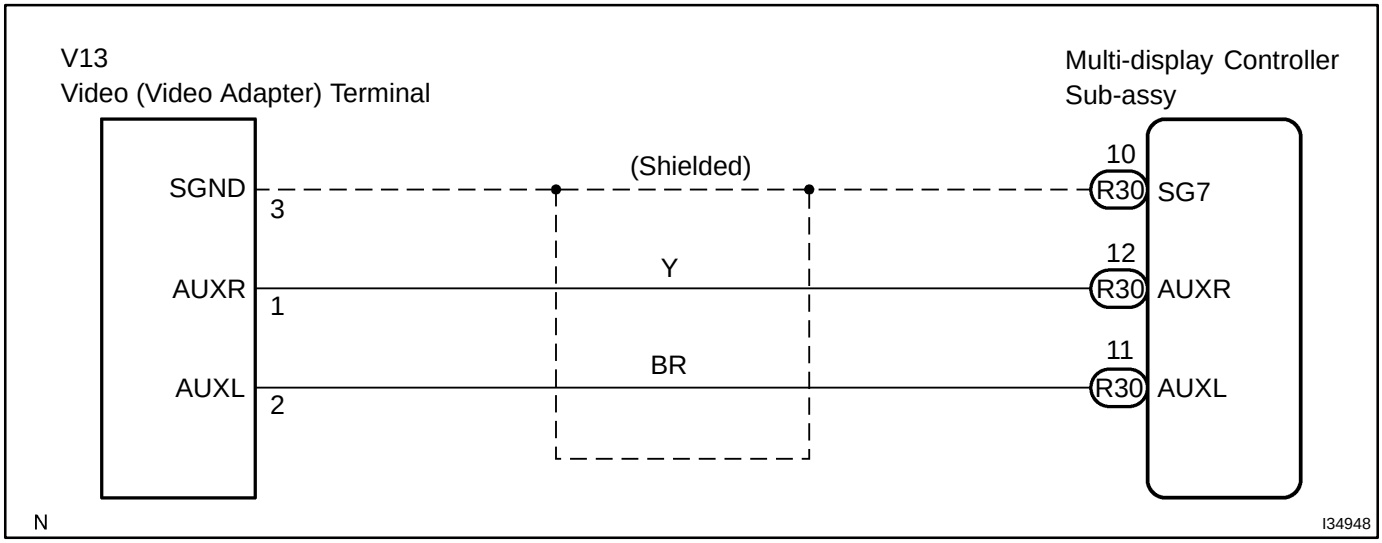
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (See page 05-1704)

SOUND SIGNAL CIRCUIT (FROM VIDEO (VIDEO ADAPTER) TERMINAL)

CIRCUIT DESCRIPTION

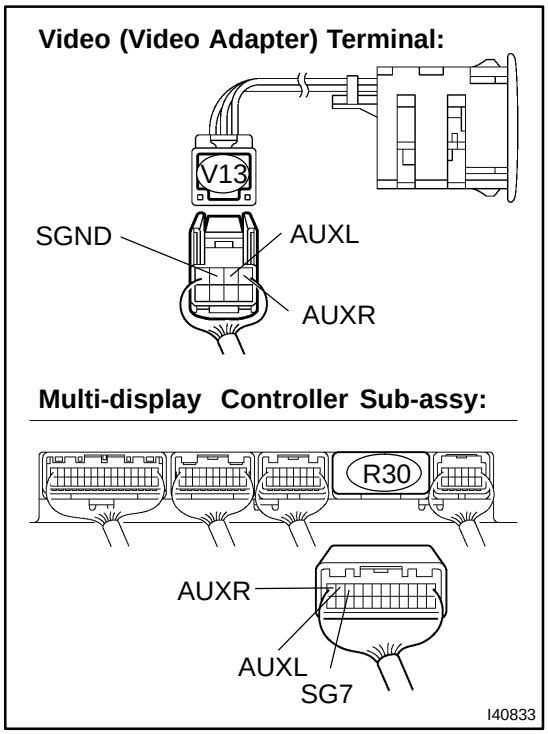
This is the sound signal circuit from the video (video adapter) terminal to the multi-display controller sub-assy.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR(MULTI-DISPLA Y CONTROLLER SUB-ASSY - VIDEO(VIDEO ADAPTER)TERMINAL)



(a) Disconnect the connector from the video (video adapter) terminal and multi-display controller sub-assy.

(b) Measure the resistance according to the values in the table below.

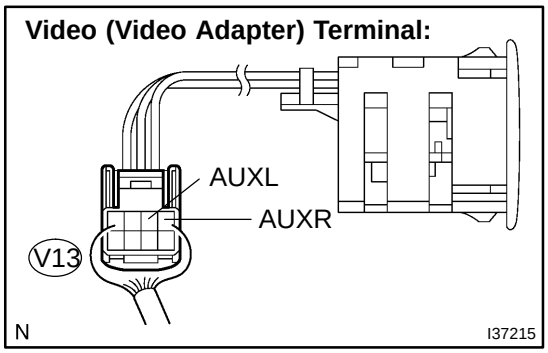
Standard:

Tester connection	Condition	Specified condition
SGND - SG7	Always	Below 1 Ω
AUXR - AUXR	Always	Below 1 Ω
AUXL - AUXL	Always	Below 1 Ω
AUXR - Body ground	Always	10 kΩ or higher
AUXL - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

2	INSPECT VIDEO(VIDEO ADAPTER) TERMINAL



(a) Connect the connector.

(b) Using an oscilloscope, check the signal waveform between the terminals according to the conditions, as shown in the chart.

HINT:

External device system is playing (When the video (video adapter) terminal is used).

Standard:

Tester connection	Condition	Specified condition
AUXR - Body ground	While voice sound is being produced	A waveform synchronized with sound is output
AUXL - Body ground	While voice sound is being produced	A waveform synchronized with sound is output

NG → **REPLACE VIDEO(VIDEO ADAPTER) TERMINAL (See page 67-27)**

OK

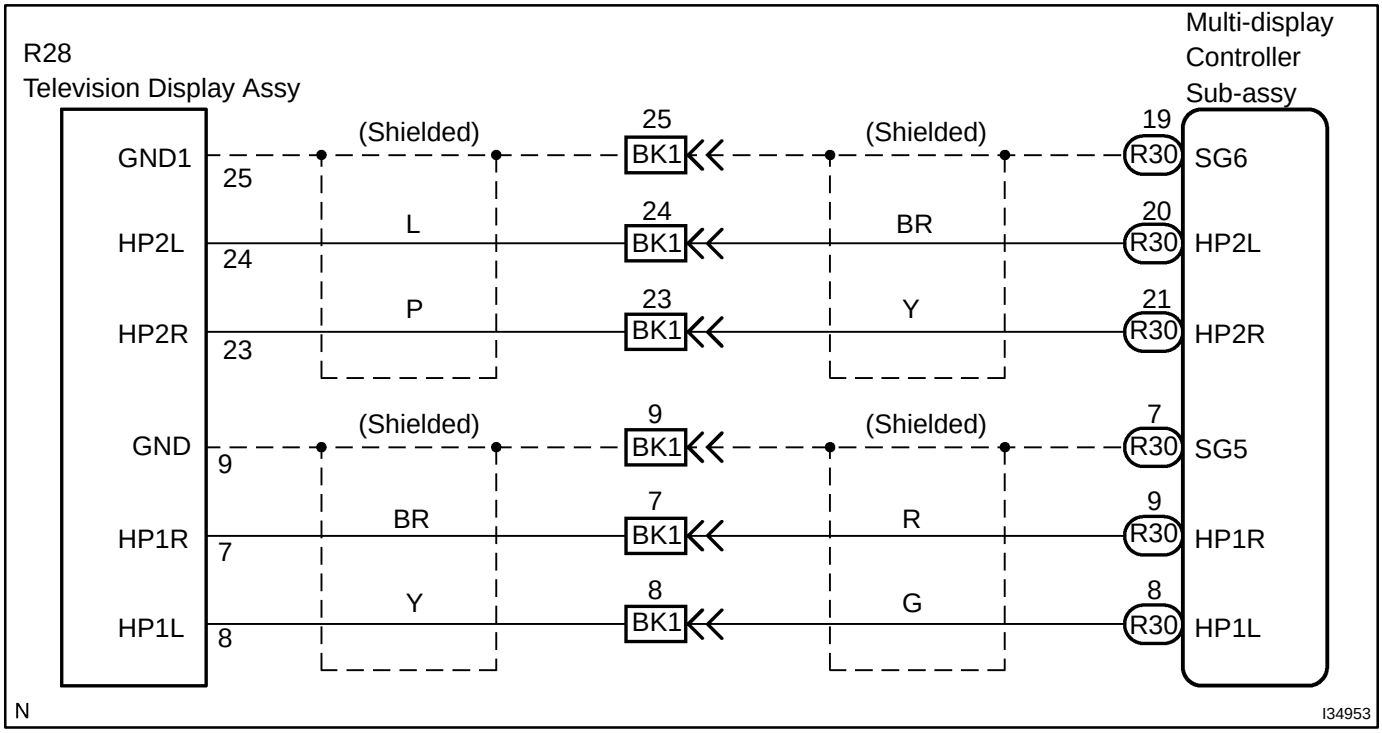
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (See page 05-1704)

SOUND SIGNAL CIRCUIT (TO TELEVISION DISPLAY ASSY (HEADPHONE))

CIRCUIT DESCRIPTION

This is the sound signal circuit from the multi-display controller sub-assy to the television display assy.

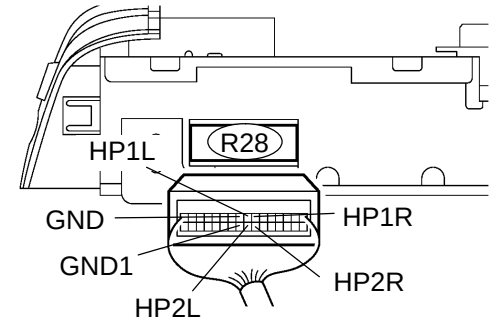
WIRING DIAGRAM



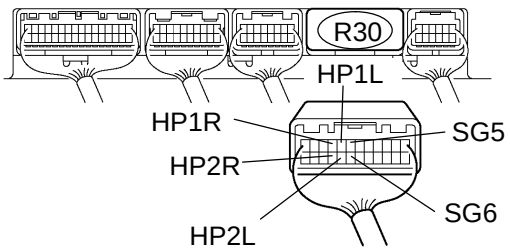
INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR(TELEVISION DISPLAY ASSY - MULTI-DISPLAY CONTROLLER SUB-ASSY)

Television Display Assy:



Multi-display Controller Sub-assy:



I37216

(a) Disconnect the connector from television display assy and multi-display controller sub-assy.

(b) Measure the resistance according to the values in the table below.

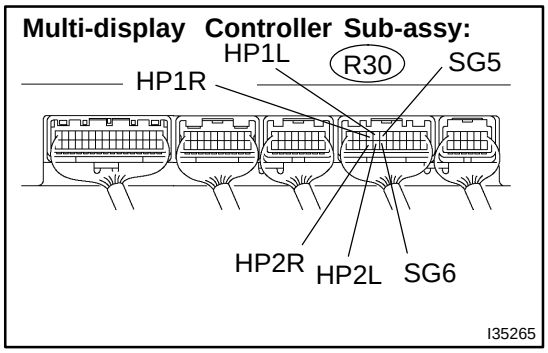
Standard:

Tester connection	Condition	Specified condition
GND1 - SG6	Always	Below 1 Ω
HP2L - HP2L	Always	Below 1 Ω
HP2R - HP2R	Always	Below 1 Ω
GND - SG5	Always	Below 1 Ω
HP1R - HP1R	Always	Below 1 Ω
HP1L - HP1L	Always	Below 1 Ω
HP2L - Body ground	Always	10 kΩ or higher
HP2R - Body ground	Always	10 kΩ or higher
HP1R - Body ground	Always	10 kΩ or higher
HP1L - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

2 INSPECT MULTI-DISPLAY CONTROLLER SUB-ASSY



(a) Connect the connector.
(b) Using an oscilloscope, check the signal waveform between the terminals according to the conditions, as shown in the chart.

Standard:

Tester connection	Condition	Specified condition
HP2L - Body ground	While voice sound is being produced	A waveform synchronized with sound is output
HP2R - Body ground	While voice sound is being produced	A waveform synchronized with sound is output
HP1R - Body ground	While voice sound is being produced	A waveform synchronized with sound is output
HP1L - Body ground	While voice sound is being produced	A waveform synchronized with sound is output

NG → **REPLACE MULTI-DISPLAY CONTROLLER SUB-ASSY (See page 67-23)**

OK

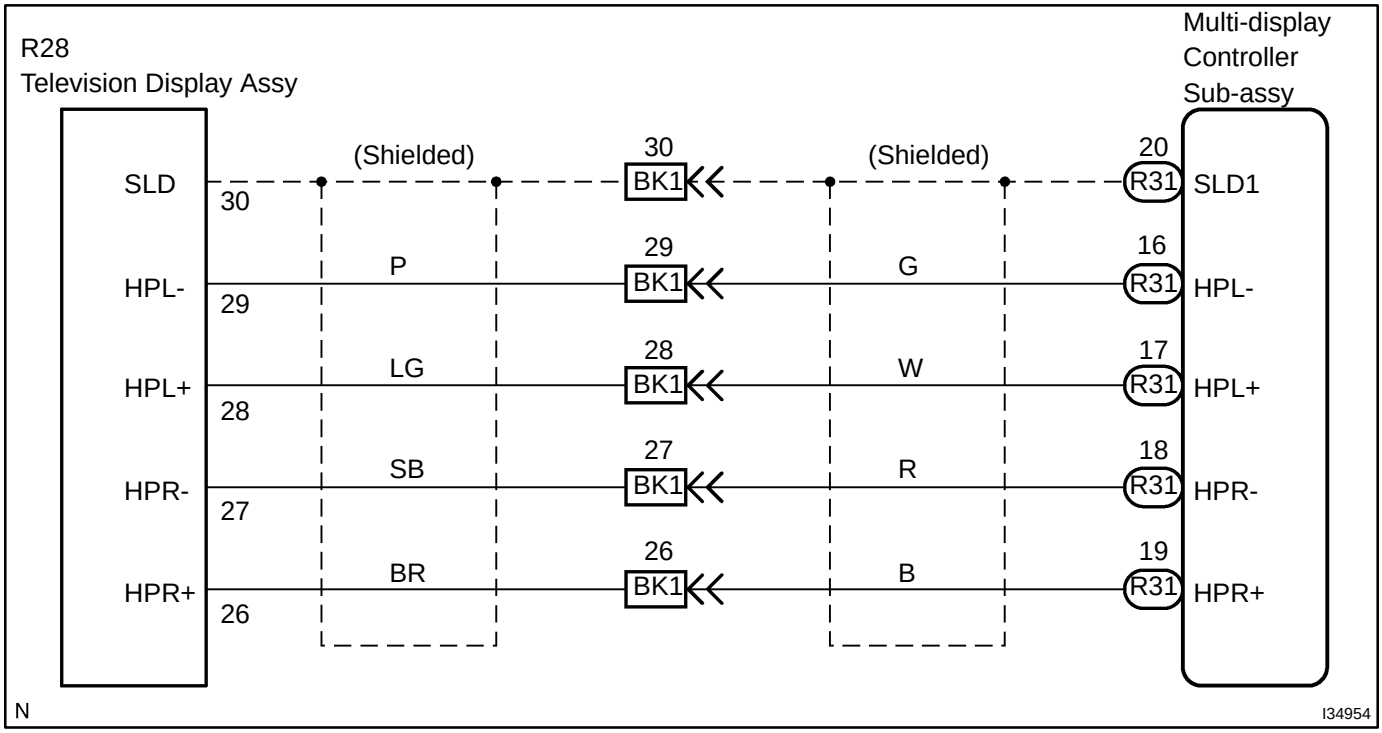
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (See page 05-1704)

SOUND SIGNAL CIRCUIT (TO TELEVISION DISPLAY ASSY (WIRELESS HEADPHONE))

CIRCUIT DESCRIPTION

This is the sound signal circuit from the television display assy to the multi-display controller sub-assy.

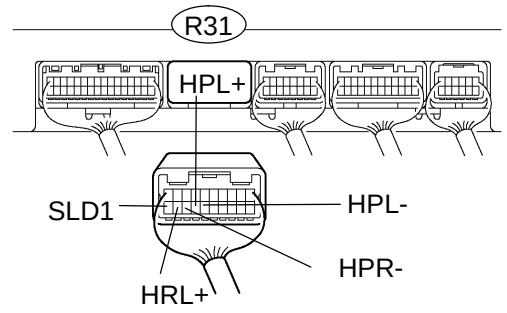
WIRING DIAGRAM



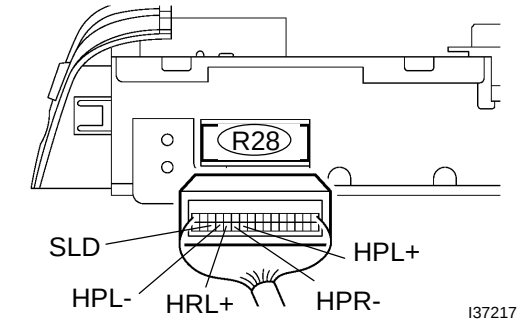
INSPECTION PROCEDURE

1	**CHECK HARNESS AND CONNECTOR(MULTI-DISPLA Y CONTROLLER SUB-ASSY - TELEVISION DISPLAY ASSY)**

Multi-display Controller Sub-assy:



Television Display Assy:



(a) Disconnect the connector from the multi-display controller sub-assy and television display assy.

(b) Measure the resistance according to the values in the table below.

Standard:

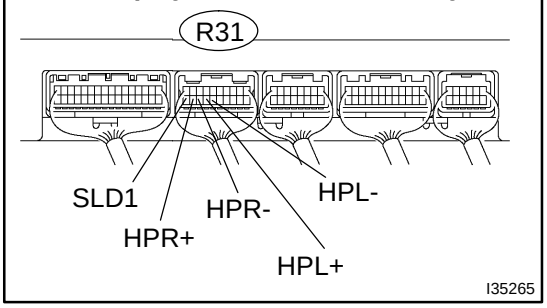
Tester connection	Condition	Specified condition
SLD - SLD1	Always	Below 1 Ω
HPL- - HPL-	Always	Below 1 Ω
HPL+ - HPL+	Always	Below 1 Ω
HPR- - HPR-	Always	Below 1 Ω
HPR+ - HPR+	Always	Below 1 Ω
HPL- - Body ground	Always	10 kΩ or higher
HPL+ - Body ground	Always	10 kΩ or higher
HPR- - Body ground	Always	10 kΩ or higher
HPR+ - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

2	INSPECT MULTI-DISPLAY CONTROLLER SUB-ASSY

Multi-display Controller Sub-assy:



(a) Connect the connector.
(b) Using an oscilloscope, check the signal waveform between the terminals according to the conditions, as shown in the chart.

Standard:

Tester connection	Condition	Specified condition
HPL- - Body ground	While voice sound is being produced	A waveform synchronized with sound is output
HPL+ - Body ground	While voice sound is being produced	A waveform synchronized with sound is output
HPR- - Body ground	While voice sound is being produced	A waveform synchronized with sound is output
HPR+ - Body ground	While voice sound is being produced	A waveform synchronized with sound is output

NG → **REPLACE MULTI-DISPLAY CONTROLLER SUB-ASSY (See page 67-23)**

OK

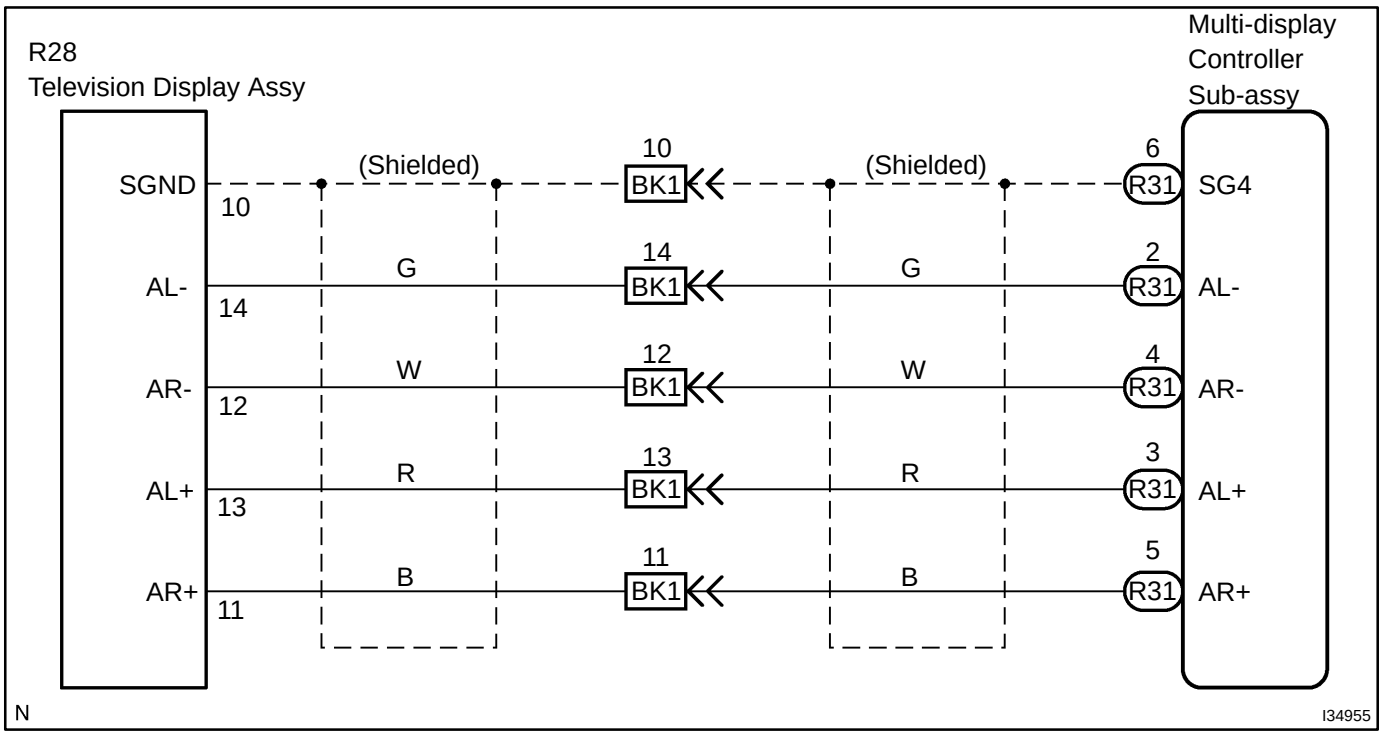
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (See page 05-1704)

SOUND SIGNAL CIRCUIT (FROM TELEVISION DISPLAY ASSY)

CIRCUIT DESCRIPTION

This is the sound signal circuit from the television display assy to the multi-display controller sub-assy.

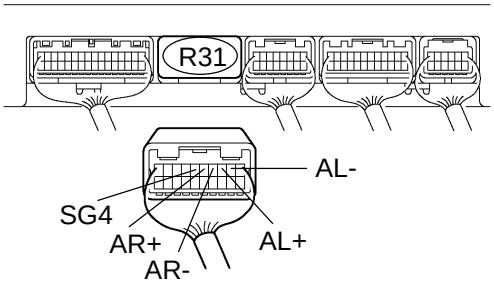
WIRING DIAGRAM



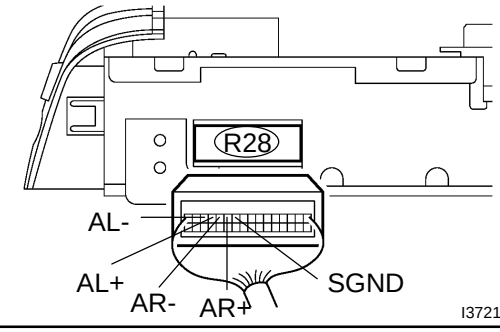
INSPECTION PROCEDURE

1	**CHECK HARNESS AND CONNECTOR(TELEVISION DISPLAY ASSY - MULTI-DISPLAY CONTROLLER SUB-ASSY)**

Multi-display Controller Sub-assy:



Television Display Assy:



(a) Disconnect the connector from the television display assy and multi-display controller sub-assy.

(b) Measure the resistance according to the values in the table below.

Standard:

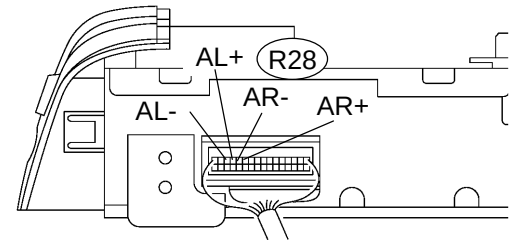
Tester connection	Condition	Specified condition
SGND - SG4	Always	Below 1 Ω
AL- - AL-	Always	Below 1 Ω
AR- - AR-	Always	Below 1 Ω
AL+ - AL+	Always	Below 1 Ω
AR+ - AR+	Always	Below 1 Ω
AL- - Body ground	Always	10 kΩ or higher
AR- - Body ground	Always	10 kΩ or higher
AL+ - Body ground	Always	10 kΩ or higher
AR+ - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

2 INSPECT TELEVISION DISPLAY ASSY

Television Display Assy:



(a) Connect the connector.
(b) Using an oscilloscope, check the signal waveform between the terminals according to the conditions, as shown in the chart.

Standard:

Tester connection	Condition	Specified condition
AL- - Body ground	While voice sound is being produced	A waveform synchronized with sound is output
AR- - Body ground	While voice sound is being produced	A waveform synchronized with sound is output
AL+ - Body ground	While voice sound is being produced	A waveform synchronized with sound is output
AR+ - Body ground	While voice sound is being produced	A waveform synchronized with sound is output

NG → **REPLACE TELEVISION DISPLAY ASSY (See page 67-26)**

OK

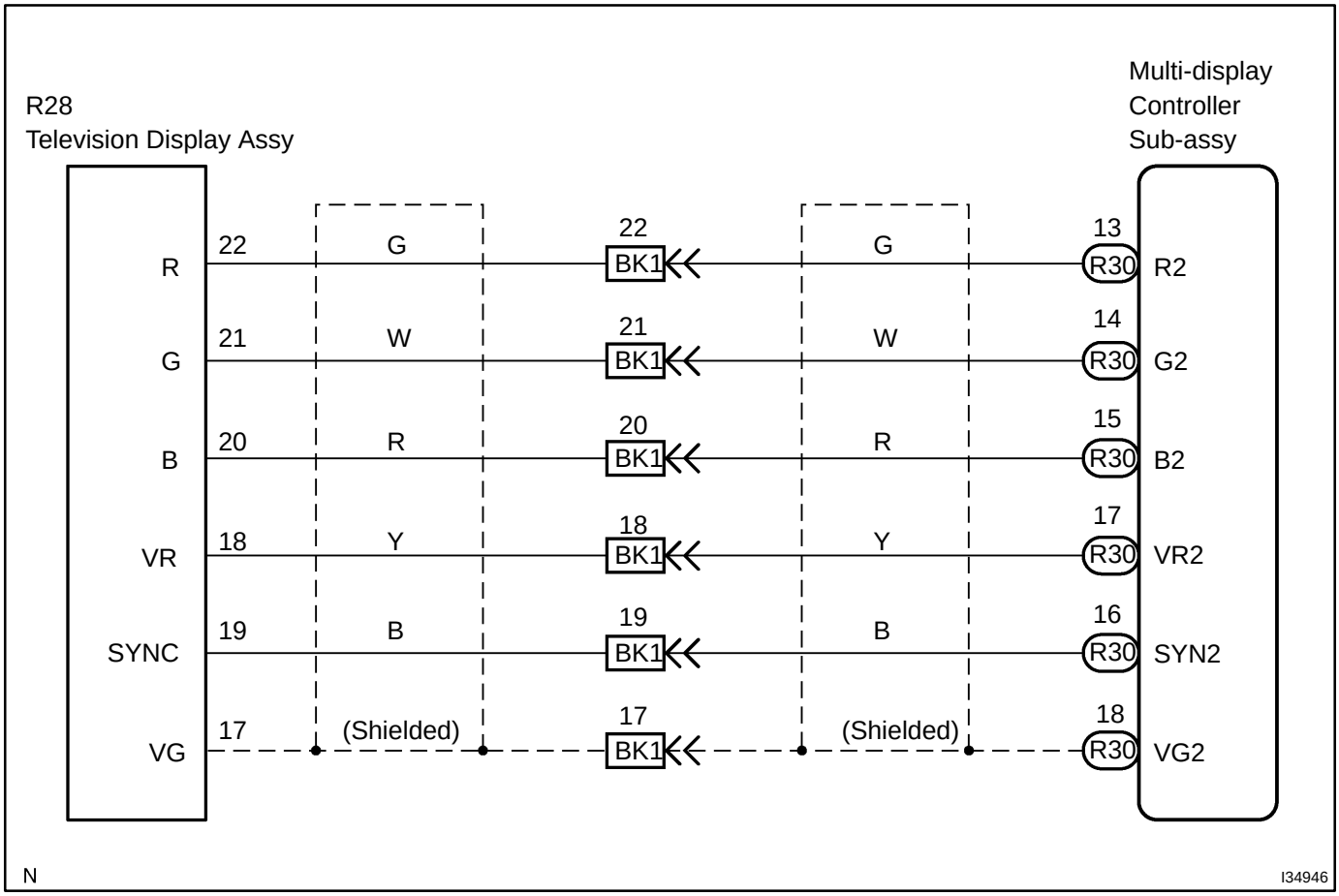
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (See page 05-1704)

DISPLAY SIGNAL CIRCUIT (TO TELEVISION DISPLAY ASSY)

CIRCUIT DESCRIPTION

This is the display signal circuit from the multi-display controller sub-assy to the television display assy.

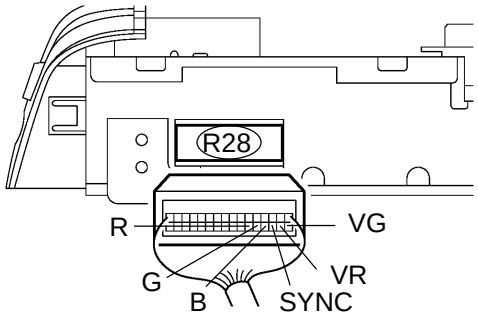
WIRING DIAGRAM



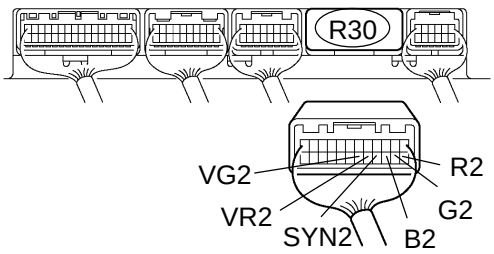
INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR(TELEVISION DISPLAY ASSY - MULTI-DISPLAY CONTROLLER SUB-ASSY)

Television Display Assy:



Multi-display Controller Sub-assy:



I37216

(a) Disconnect the connector from the television display assy and multi-display controller sub-assy.

(b) Measure the resistance according to the values in the table below.

Standard:

Tester connection	Condition	Specified condition
R - R2	Always	Below 1 Ω
G - G2	Always	Below 1 Ω
B - B2	Always	Below 1 Ω
SYNC - SYN2	Always	Below 1 Ω
VR - VR2	Always	Below 1 Ω
VG - VG2	Always	Below 1 Ω
R - Body ground	Always	10 kΩ or higher
G - Body ground	Always	10 kΩ or higher
B - Body ground	Always	10 kΩ or higher
SYNC - Body ground	Always	10 kΩ or higher
VR - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

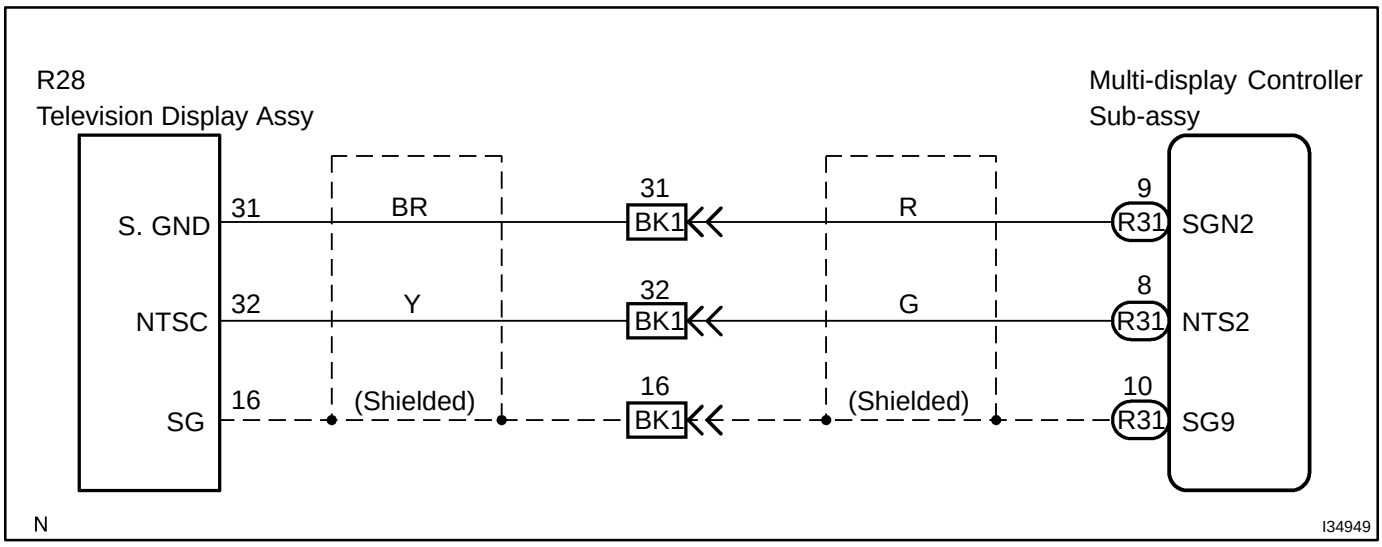
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE
(See page 05-1704)

DISPLAY SIGNAL CIRCUIT (FROM TELEVISION DISPLAY ASSY)

CIRCUIT DESCRIPTION

This is the display signal circuit from the television display assy to the multi-display controller sub-assy.

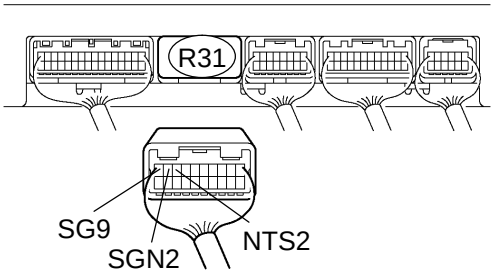
WIRING DIAGRAM



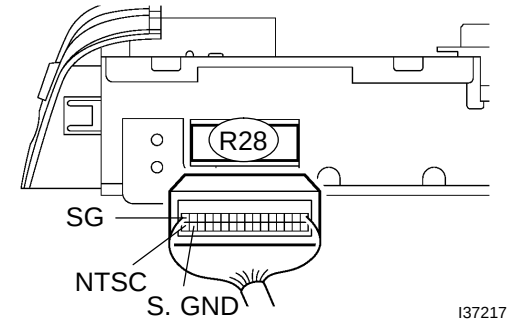
INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR(TELEVISION DISPLAY ASSY - MULTI-DISPLAY CONTROLLER SUB-ASSY)

Multi-display Controller Sub-assy:



Television Display Assy:



(a) Disconnect the connector from the television display assy and multi-display controller sub-assy.

(b) Measure the resistance according to the values in the table below.

Standard:

Tester connection	Condition	Specified condition
S. GND - SGN2	Always	Below 1 Ω
NTSC - NTS2	Always	Below 1 Ω
SG - SG9	Always	Below 1 Ω
NTSC - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

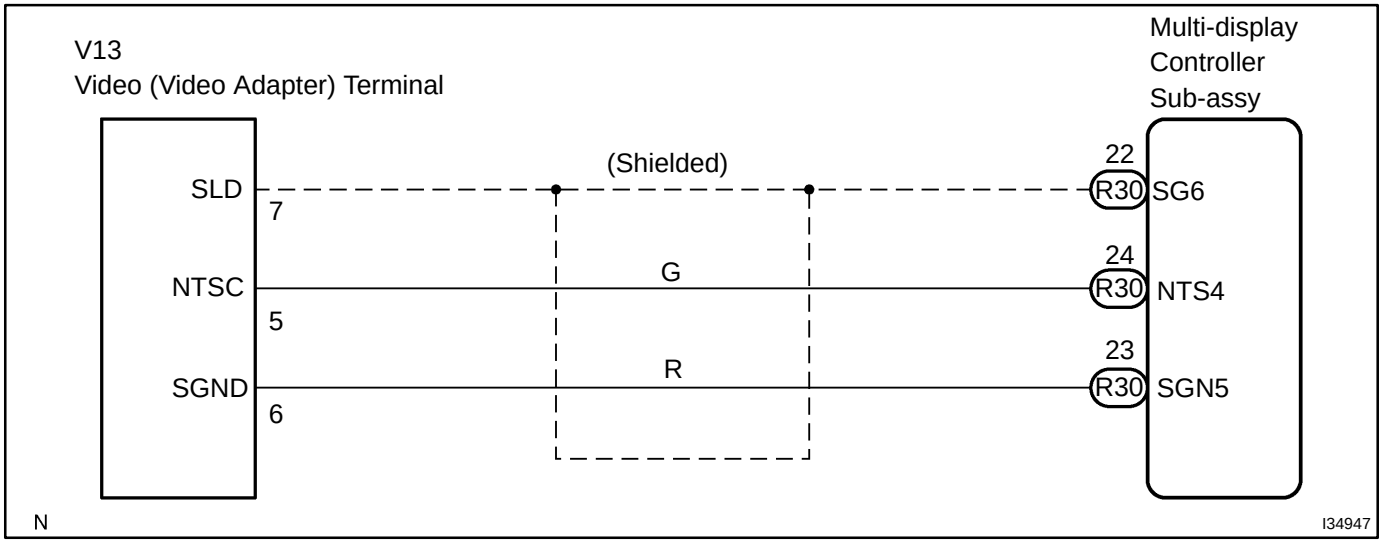
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE
(See page 05-1704)

DISPLAY SIGNAL CIRCUIT (FROM VIDEO (VIDEO ADAPTER) TERMINAL)

CIRCUIT DESCRIPTION

This is the display signal circuit from the video (video adapter) terminal to the multi-display controller sub-assy.

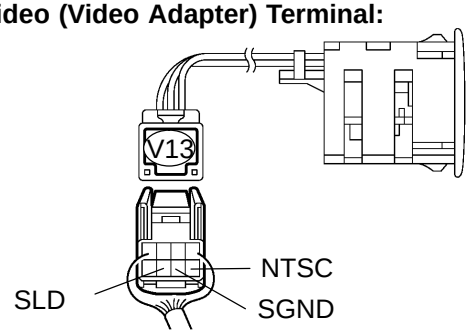
WIRING DIAGRAM



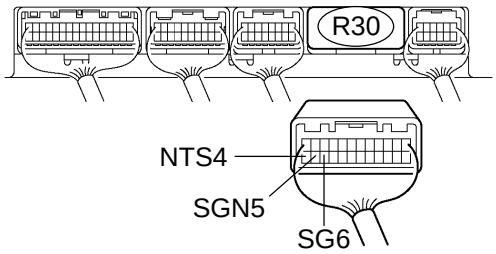
INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR(MULTI-DISPLA Y CONTROLLER SUB-ASSY - VIDEO(VIDEO ADAPTER)TERM)

Video (Video Adapter) Terminal:



Multi-display Controller Sub-assy:



I40833

(a) Disconnect the connector from the video (video adapter) terminal and multi-display controller sub-assy.

(b) Measure the resistance according to the values in the table below.

Standard:

Tester connection	Condition	Specified condition
SLD - SG6	Always	Below 1 Ω
NTSC - NTS4	Always	Below 1 Ω
SGND - SGN5	Always	Below 1 Ω
NTSC - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

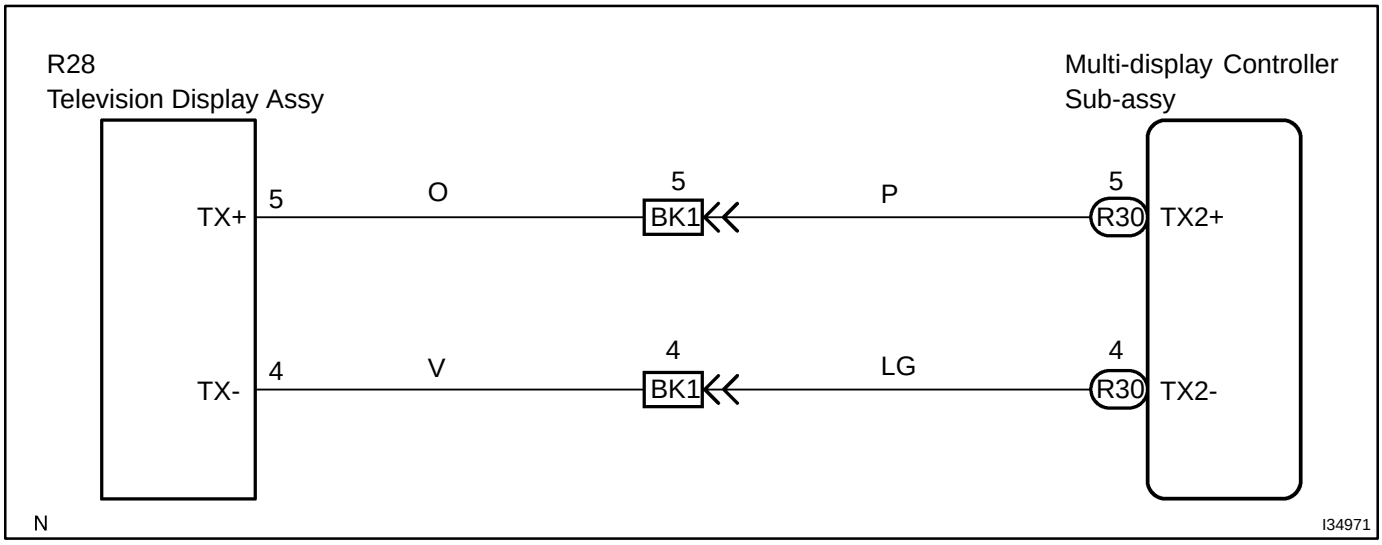
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE
(See page 05-1704)

AVC-LAN CIRCUIT (MULTI-DISPLAY CONTROLLER SUB-ASSY - TELEVISION DISPLAY ASSY)

CIRCUIT DESCRIPTION

Each unit of the rear seat entertainment system connected with AVC-LAN (communication bus) transfers the signal of each switch by communication.
When +B short and GND short occur in this AVC-LAN, the rear seat entertainment system will not function normally as the communication is discontinued.

WIRING DIAGRAM



INSPECTION PROCEDURE

1 SERVICE CHECK MODE(TELEVISION DISPLAY ASSY)

(a) Perform service check.
(1) Start the diagnosis system and read check result for television display assy.
Standard:

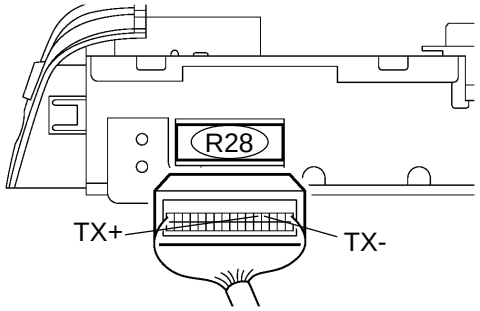
A	"NCON" is displayed or no display (Rr-TV)
B	"OK" is displayed

B → **REPLACE MULTI-DISPLAY CONTROLLER SUB-ASSY (See page 67-23)**

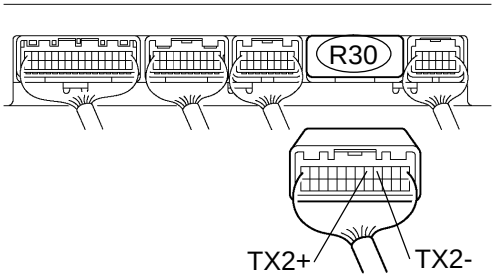
A

2 CHECK HARNESS AND CONNECTOR(TELEVISION DISPLAY ASSY - MULTI-DISPLAY CONTROLLER SUB-ASSY)

Television Display Assy:



Multi display Controller Sub-assy:



(a) Disconnect the connector from the television display assy and multi-display controller sub-assy.
(b) Measure the resistance according to the values in the table below.
Standard:

Tester connection	Condition	Specified condition
TX+ - TX2+	Always	Below 1 Ω
TX- - TX2-	Always	Below 1 Ω
TX+ - Body ground	Always	10 kΩ or higher
TX- - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

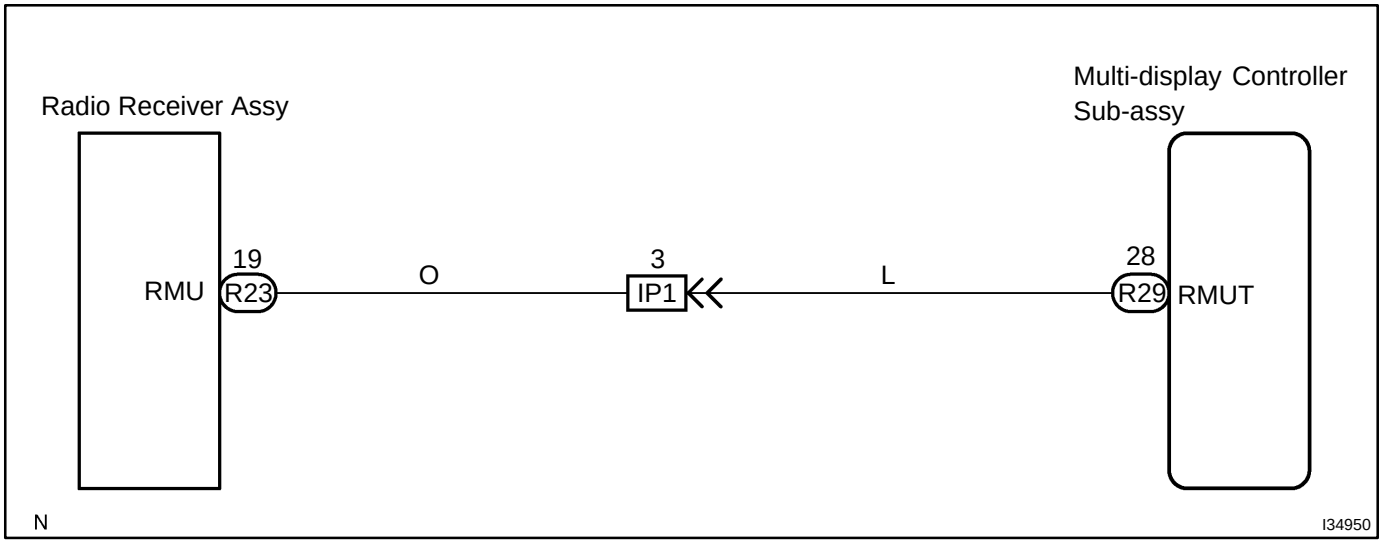
REPLACE TELEVISION DISPLAY ASSY (See page 67-26)

MUTE SIGNAL CIRCUIT (FROM RADIO RECEIVER ASSY)

CIRCUIT DESCRIPTION

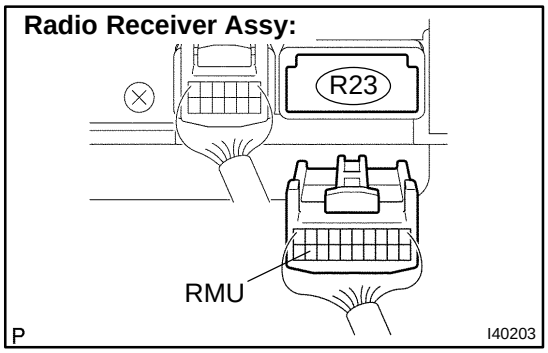
The Multi-display controller sub-assy controls the volume according to the RMUT signal from the radio receiver assy.
The RMUT signal is sent to reduce noise and a popping sound when modes, etc. are switched.

WIRING DIAGRAM



INSPECTION PROCEDURE

1 CHECK HARNESS AND CONNECTOR(RADIO RECEIVER ASSY - MULTI-DISPLAY CONTROLLER SUB-ASSY)

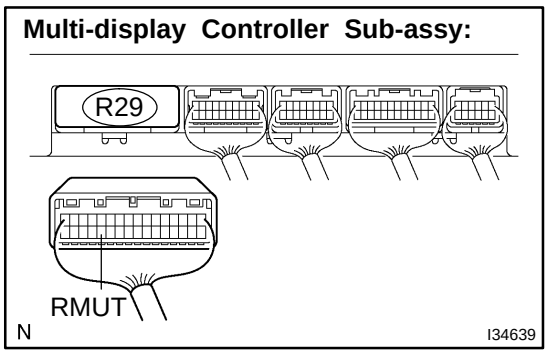


(a) Disconnect the connector from the radio receiver assy and multi-display controller sub-assy.

(b) Measure the resistance according to the values in the table below.

Standard:

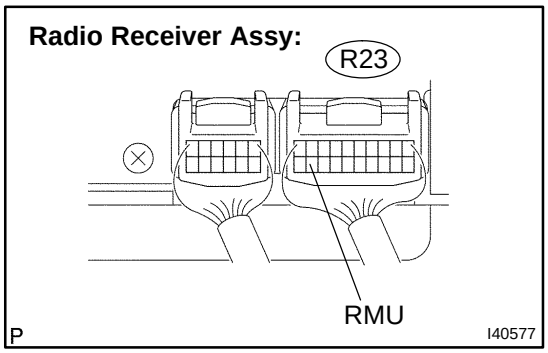
Tester connection	Condition	Specified condition
RMU - RMUT	Always	Below 1 Ω
RMU - Body ground	Always	10 kΩ or higher



NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

2 INSPECT RADIO RECEIVER ASSY



(a) Connect the radio receiver assy connector.

(b) Measure the voltage according to the values in the table below.

Standard:

Tester connection	Condition	Specified condition
RMU - Body ground	Audio system sounding	Approx. 3.5 V
RMU - Body ground	Audio system changing	Below 1.0 V

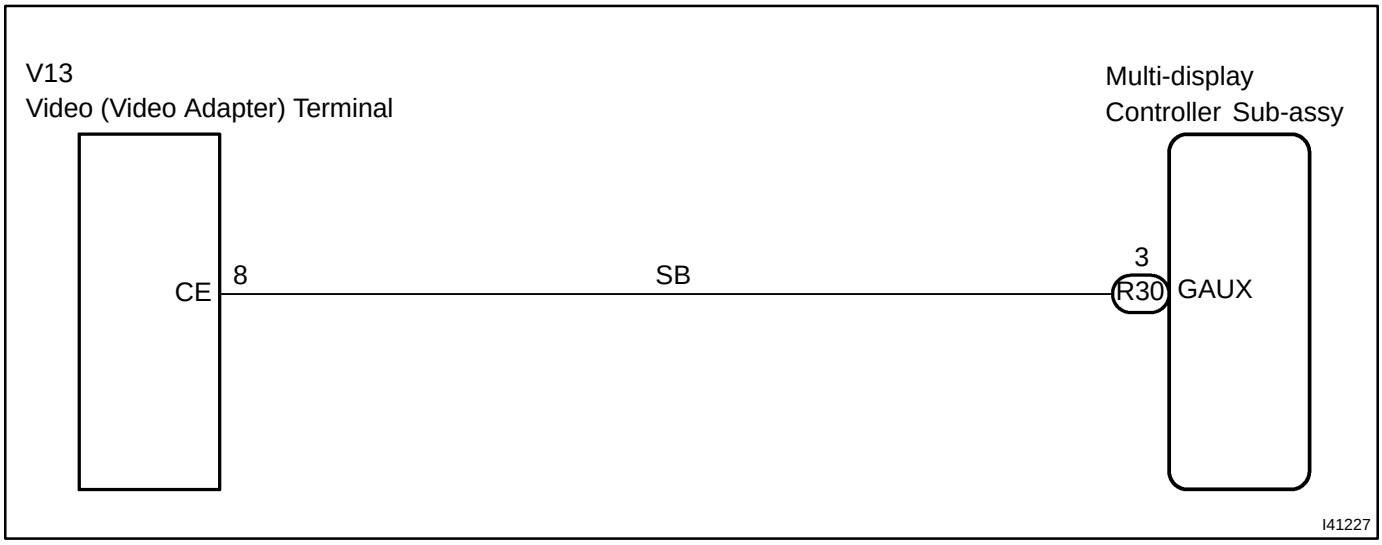
NG → **REPLACE RADIO RECEIVER ASSY (SEE PAGE 67-6)**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (SEE PAGE 05-1704)

VIDEO (VIDEO ADAPTOR) TERMINAL SET SIGNAL CIRCUIT

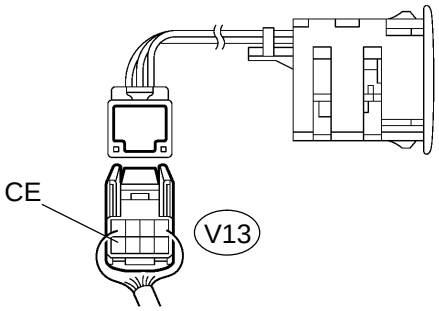
WIRING DIAGRAM



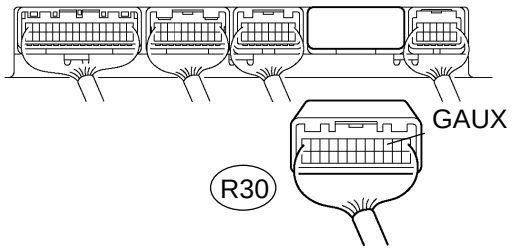
INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR(VIDEO (VIDEO ADAPTOR) TERMINAL - MULTI-DISPLAY CONTROLLER SUB-ASSY)

Video (Video Adapter) Terminal:



Multi-display Controller Sub-assy:



I40833

(a) Disconnect the video (video adapter) terminal and multi-display controller sub-assy connectors.

(b) Measure the resistance according to the values in the table below.

Standard:

Tester connection	Condition	Specified condition
CE - GAUX	Always	Below 1 Ω
CE - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE
(See page 05-1704)

A REMOTE CONTROL SYSTEM DOES NOT OPERATE

INSPECTION PROCEDURE

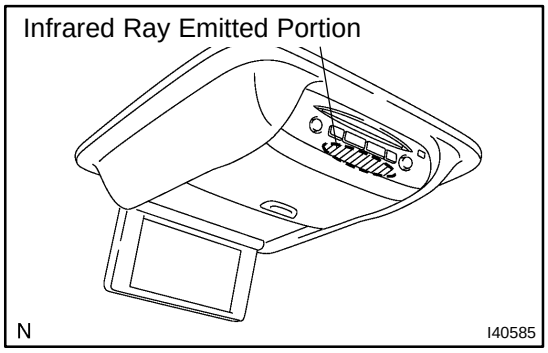
1	CHECK BATTERY(SWITCH & VOLUME ASSY)

(a) Check battery.
(1) Check that the dry-cell battery used for the switch & volume assy is not dead.
Standard: It is not dead

NG → **BATTERY IS DEAD**

OK

2	CLEAN THE INFRARED RAY EMITTED PORTION



(a) Clean the infrared ray emitted portion.
(1) Clean the infrared ray emitted portion on the television display assy.
(2) Check whether the same malfunction occurs.
Standard: The function returns to normal.

NG → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (See page 05-1704)**

OK

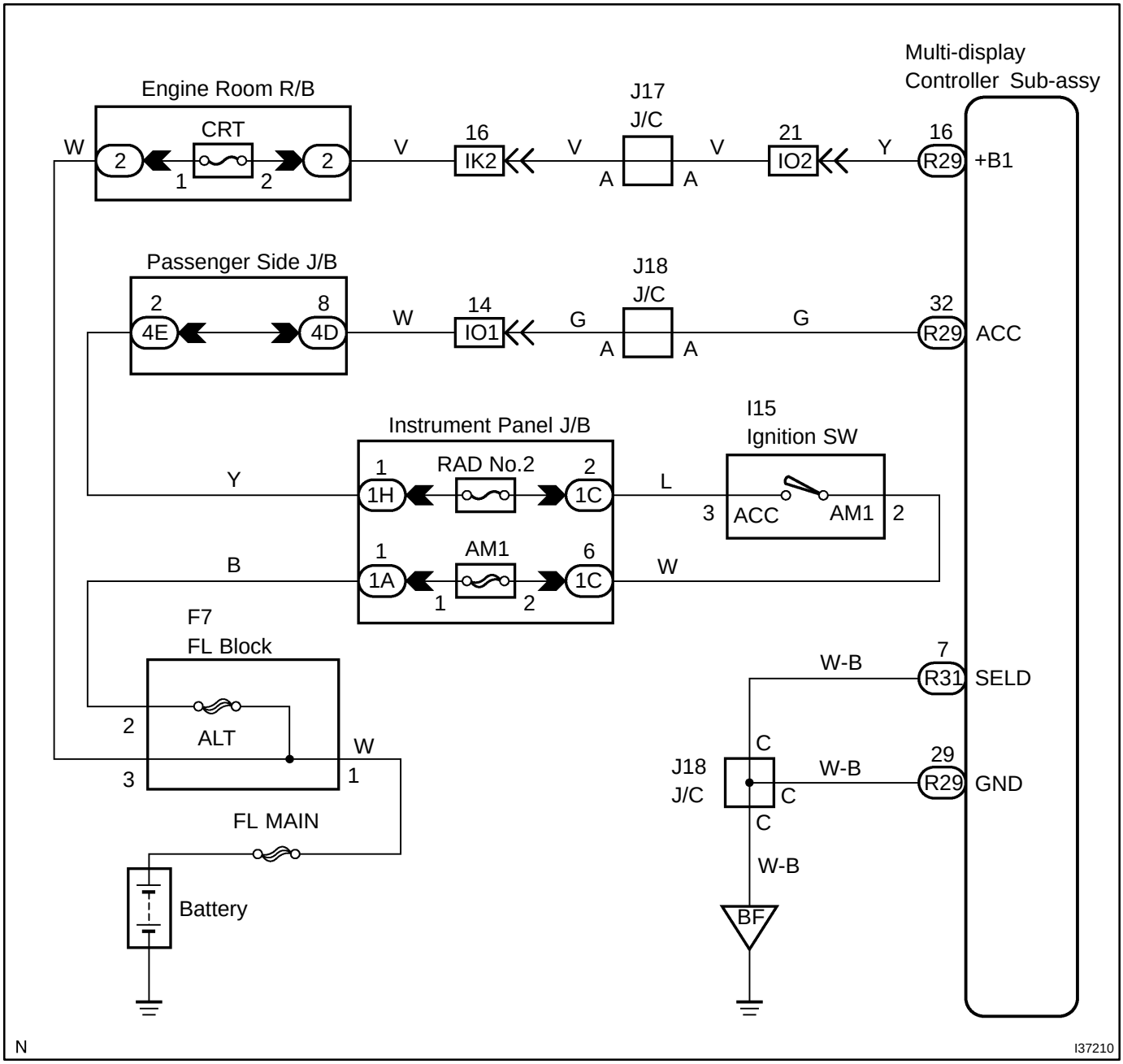
NORMAL

POWER SOURCE CIRCUIT(MULTI-DISPLA Y CONTROLLER SUB-ASSY)

CIRCUIT DESCRIPTION

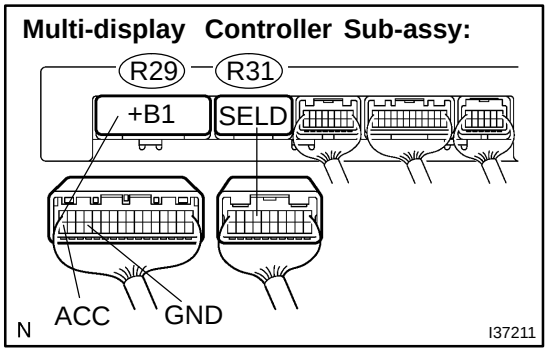
This circuit is the power source circuit to operate the multi-display controller sub-assy.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT MULTI-DISPLA Y CONTROLLER SUB-ASSY(+B1, ACC, GND, SELD)



(a) Disconnect the connector from the multi-display controller sub-assy.

(b) Measure the resistance according to the values in the table below.

Standard:

Tester connection	Condition	Specified condition
GND - Body ground	Always	Below 1 Ω
SELD - Body ground	Always	Below 1 Ω

(c) Measure the voltage according to the values in the table below.

Standard:

Tester connection	Condition	Specified condition
+B1 - GND	Always	10 to 14 V
ACC - GND	Ignition SW ACC	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

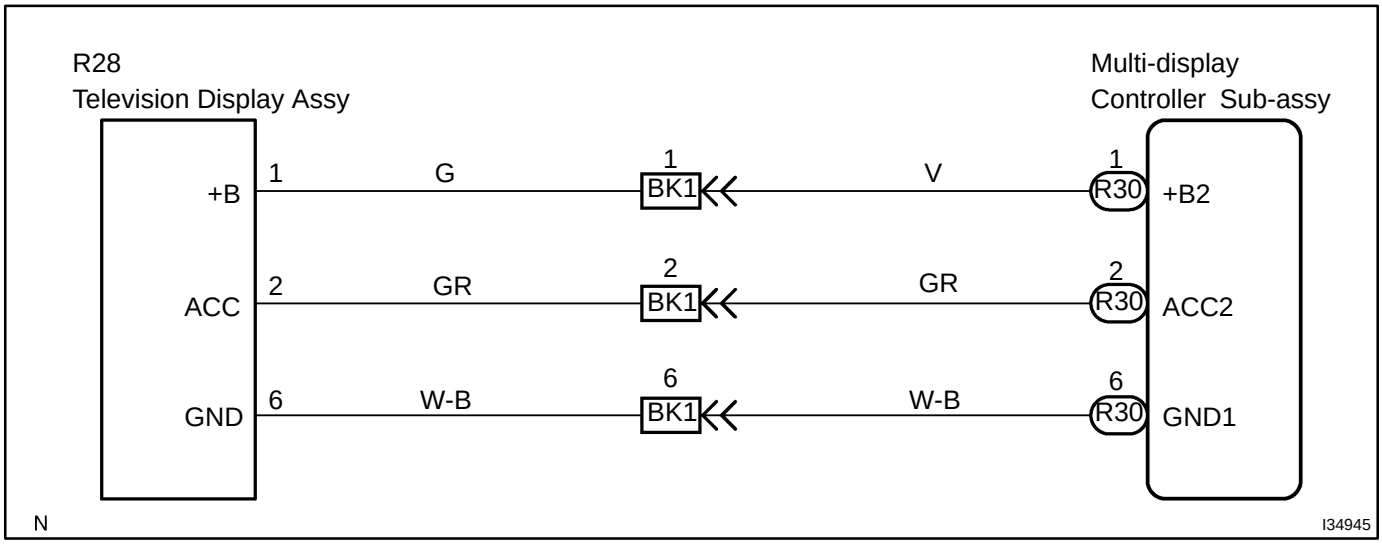
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE
(See page 05-1704)

POWER SOURCE CIRCUIT(TELEVISION DISPLAY ASSY)

CIRCUIT DESCRIPTION

This circuit is the power source circuit to operate the television display assy. The power source is sent from the battery to the television display assy through the multi-display controller sub-assy.

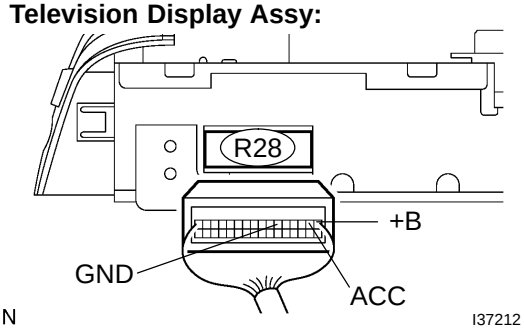
WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT TELEVISION DISPLAY ASSY(+B, ACC, GND)

Television Display Assy:



(a) Disconnect the connector from the television display assy.

(b) Measure the resistance according to the value in the table below.

Standard:

Tester connection	Condition	Specified condition
GND - Body ground	Always	Below 1 Ω

(c) Measure the voltage according to the values in the table below.

Standard:

Tester connection	Condition	Specified condition
+B - GND	Always	10 to 14 V
ACC - GND	Ignition SW ACC	10 to 14 V

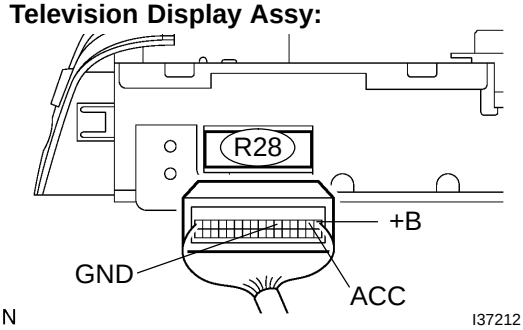
NG → **Go to step 2**

OK

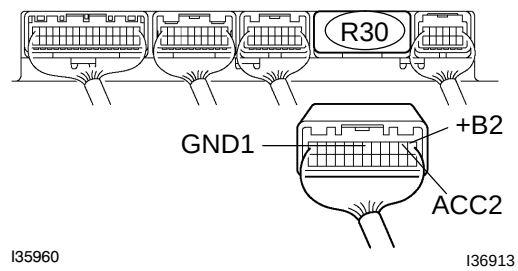
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (See page 05-1704)

2	CHECK HARNESS AND CONNECTOR(TELEVISION DISPLAY ASSY - MULTI-DISPLAY CONTROLLER SUB-ASSY)

Television Display Assy:



Multi-display Controller Sub-assy:



(a) Disconnect the connector from the multi-display controller sub-assy.

(b) Measure the resistance according to the values in the table below.

Standard:

Tester connection	Condition	Specified condition
+B - +B2	Always	Below 1 Ω
ACC - ACC2	Always	Below 1 Ω
GND - GND1	Always	Below 1 Ω
+B - Body ground	Always	10 kΩ or higher
ACC - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE
(See page 05-1704)

05ATN-04

CUSTOMER PROBLEM ANALYSIS CHECK

RSE SYSTEM Check Sheet

Inspector's name: _____

Customer's Name		**VIN**	
		Production Date	
		Licence Plate No.	
Brought-in Date	/ /	**Odometer Reading**	**km mile**

Date of First Occurrence	/ /
Frequency of Problem Occurrence	⁎ Constant ⁎ Intermittent (Times a day)

Problem Symptom	⁎ **Switch & Volume Assy**
	⁎ **Headphone**
	⁎ **Multi-display Controller Sub-assy**
	⁎ **Disc Player Controller (Built in "Television Display Assy")**
	⁎ **Television Display Assy**

	Parts name	**DTC (1st time)**	**DTC (2nd time)**
DTC Check	Multi-display Controller Sub-assy		
	Disc Player Controller		
	Television Display Assy		

05CEY-02

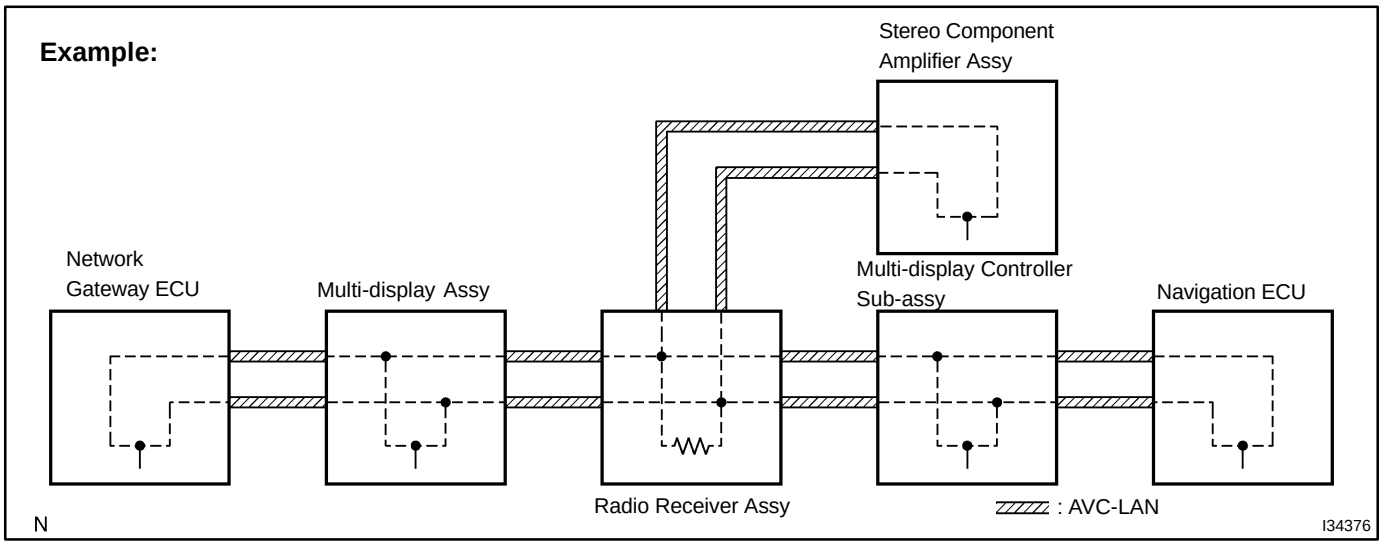
DESCRIPTION

1. OUTLINE OF AVC-LAN

(a) What is AVC-LAN?

AVC-LAN is the abbreviation for Audio Visual Communication-Local Area Network. This is a unified standard co-developed by 6 audio manufacturers associated with Toyota Motor Corporation.

The unified standard includes signals, such as audio, visual and signals for switch indication and communication.



(b) Objectives

Recently developments in car audio systems have been rapid and functions have been changed drastically. The conventional system has been switched to the multi-media type such as a navigation system. At the same time, customers want to upgrade their audio systems. This is the factor that lies behind this standardization.

The concrete objectives are explained below.

(1) When products by different manufacturers were combined together, malfunctions such as sound failure occurred. This problem can be solved by standardization of signals.

(2) Various types of after market products are available.

(3) Because of the above (2), each manufacturer has been able to concentrate on developing products in their strongest field. This has enabled the development of inexpensive products.

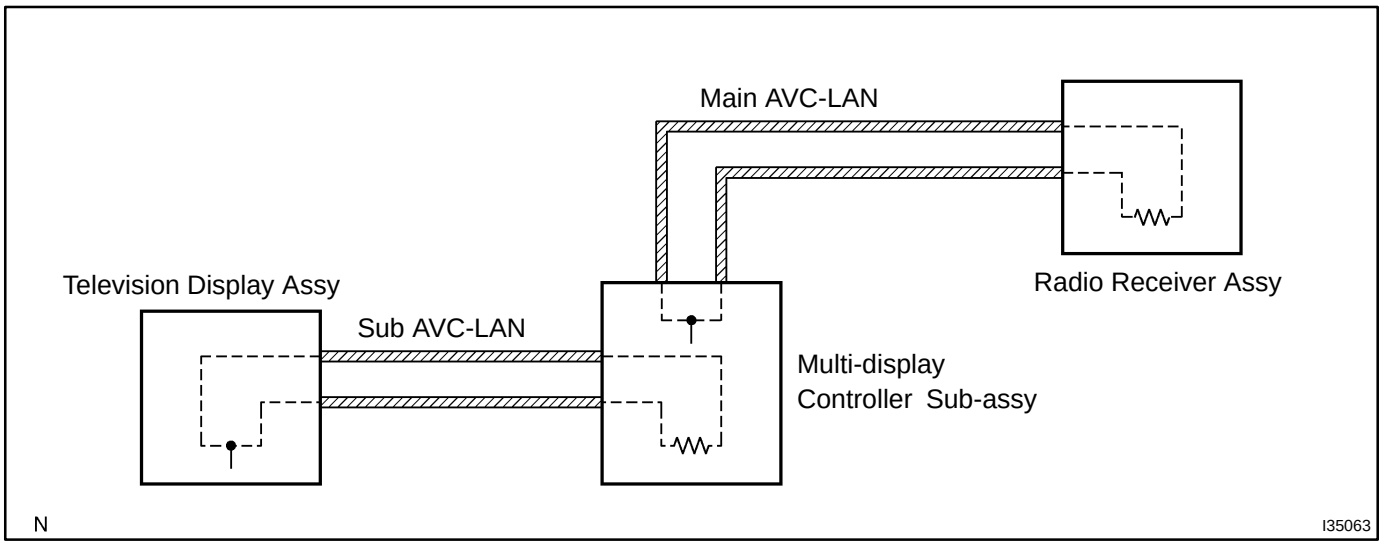
(4) In general, a new product developed by one particular manufacturer could not be used due to a lack of compatibility with other manufacturers' products. By developing this new standard, users can enjoy a range of compatible products from different manufacturers anytime they want.

HINT:

- When +B short or GND short is detected in AVC-LAN circuit, communication stops, and the audio system does not function normally.
- When audio system is not equipped with a navigation system, the audio head unit is the master unit. When the audio system is equipped with a navigation system, the radio receiver is the master unit.
- The master unit is equipped with a resistor (60 to 80 Ω) for communication.
- The car audio system using AVC-LAN circuit has a diagnosis function.
- Each product has its own specified number called a physical address (three-digit number). Numbers are also allotted to each function within a product, which are called logical addresses (two-digit number).

2. COMMUNICATION SYSTEM

(a) This system performs communication between components through the Main AVC-LAN and Sub AVC-LAN.



(b) The multi-display controller sub-assy functions as a master unit, which performs communication between the multi-display controller sub-assy and television display assy, in the Sub AVC-LAN circuit.

HINT:

Refer to "LEXUS NAVIGATION SYSTEM" (See page 05-1757) and "AUDIO SYSTEM" (See page 05-1615) for the Main AVC-LAN circuit.

(c) The multi-display controller sub-assy is equipped with a resistor (60 to 80 Ω) for communication.

3. DIAGNOSIS FUNCTION

(a) The multi-display controller sub-assy functions as a master unit in the Sub AVC-LAN circuit on this circuit. It identifies trouble in this circuit, and the identified information is displayed on the television display assy.

05ATP-05

DIAGNOSTIC TROUBLE CODE CHART

Terms	Meaning
Physical address	Three-digit code (shown in hexadecimal) which is given to each component comprising the AVC-LAN. Corresponding to the function, individual symbols are specified.
Logical address	Two-digit code (shown in hexadecimal) which is given to each function in the inner system of the AVC-LAN.

HINT:

The DTC of the Main AVC-LAN circuit is displayed on the radio receiver assy or multi-display, and the DTC of the Sub AVC-LAN circuit is displayed on the television display assy.

Titles for each unit are stated in the following order: physical address, (parts name) and [name indicated on the DTC display].

1. MULTI-DISPLA Y CONTROLLER SUB-ASSY (Physical address: 16C, 16D) [RSE-ECU]

HINT:

- ⁎ *1: Even if no failure is detected, this code may be stored depending on the battery condition or voltage for starting the engine.
- ⁎ *2: This code is stored 180 seconds after the power supply connector is disconnected after engine start.
- ⁎ *3: This code may be stored when the engine key is turned back to the ON position and then turned again to the START position after engine start.
- ⁎ *4: This code may be stored when the engine key is turned back to the ON position and then turned again to the START position in 1 minute after engine start.

(a) Logical address: 01 (Communication control)

DTC	Diagnosis item	Condition	Countermeasure and inspected parts
D8 *2	No Response To Connection Check	Component shown by sub-code is or had been disconnected from system after engine start.	1. Check harness for power supply system of component shown by sub-code. 2. Check harness for communication system of component shown by sub-code.
D9 *1	Last Mode Error	Component operated (sound and/or image was provided) before engine stop is or was disconnected with ignition switch in the ACC or ON position.	1. Check harness for power supply of component shown by sub-code. 2. Check harness for communication system of component shown by sub-code.
DA	No Response to ON/OFF Instruction	No response is identified when changing mode (audio and visual mode change). Detected when sound and picture do not change by button operation.	1. Check harness for power supply system of component shown by sub-code. 2. Check harness for communication system of component shown by sub-code. 3. If error occurs again, replace component shown by auxiliary code.
DB *1	Mode Status Error	Dual alarm is detected.	1. Check harness for power supply system of component shown by sub-code. 2. Check harness for communication system of component shown by sub-code.
DC *4	Transmission Error	Transmission to component shown by sub-code failed. (This code does not necessarily mean actual failure.)	If same sub-code is recorded in other component(s), check harness for power supply and communication system of all components shown by code.

DTC	Diagnosis item	Condition	Countermeasure and inspected parts
DE *3	Slave Reset (Momentary Interruption)	After engine start, slave component has been disconnected.	1. Check harness for power supply system of component shown by sub-code. 2. Check harness for communication system of component shown by sub-code.
E4 *1	Multiple Frame Abort	Multiple frame transmission is aborted.	Since this DTC is provided for engineering purpose, it may be detected when no actual failure exists.

2. TELEVISION DISPLAY ASSY (Physical address: 1B0) [Rr-TV]

HINT:

- *1: Even if no failure is detected, this code may be stored depending on the battery condition or voltage for starting the engine.
- *2: This code may be stored when the engine key is turned again in 1 minute after the engine start.
- *3: This code may be stored when the engine key is turned again after the engine start.
- *4: The code is stored 210 seconds after the power supply connector of the master component is disconnected with the ignition switch in the ACC or ON position.

(a) Logical address: 01 (Communication control)

DTC	Diagnosis item	Condition	Countermeasure and inspected parts
22	RAM Error	Abnormal condition of RAM is detected.	Replace television display assy
D6 *1	Absence of Master	Component in which this code is recorded was disconnected from system with the ignition switch in the ACC or ON position. Or, when this code was recorded, multi-display controller sub-assy was disconnected.	1. Check harness for power supply of multi-display controller sub-assy (see page 05-1715). 2. Check harness for communication system of multi-display controller sub-assy (see page 05-1864). 3. Check harness for power supply of television display assy (see page 05-1717). 4. Check harness for communication system of television display assy (see page 05-1746).
D7 *4	Communication Check Error	Component in which this code is recorded is or was disconnected from system after engine start. Or, when recording this code, multi-display controller sub-assy was disconnected.	1. Check harness for power supply of multi-display controller sub-assy (see page 05-1715). 2. Check harness for communication system of multi-display controller sub-assy (see page 05-1864). 3. Check harness for power supply of television display assy (see page 05-1717). 4. Check harness for communication system of television display assy (see page 05-1746).
DC *2	Transmission Error	Transmission to component shown by sub-code failed. (Detecting this DTC does not necessarily mean actual failure.)	If the same sub-code is recorded in other components, check harness for power supply and communication system of all components shown by code.

DTC	Diagnosis item	Condition	Countermeasure and inspected parts
DD *3	Master Reset (Momentary Interruption)	After engine start, multi-display controller sub-assy was disconnected from system.	1. Check harness for power supply of multi-display controller sub-assy (see page 05-1715). 2. Check harness for communication system of multi-display controller sub-assy (see page 05-1864). 3. If this error occurs frequently, replace multi-display controller sub-assy.
DF *4	Master Error	Due to defective condition of component with a display, master function is switched to audio equipment. Error occurs in communication between sub-master (audio) and master component.	1. Check harness for power supply of multi-display controller sub-assy (see page 05-1715). 2. Check harness for communication system of multi-display controller sub-assy (see page 05-1864).
E0 *1	Registration Completion Instruction Error	”Registration Completion Instruction” command from master cannot be received.	Since this DTC is provided for engineering purposes, it may be detected when no actual failure exists.
E2	ON/OFF Instruction Parameter Error	Error occurs in ON/OFF controlling command from multi-display controller sub-assy.	Replace multi-display controller sub-assy.
E3 *1	Registration Request Transmission	・Registration Request command is output from slave component. ・Registration Connection Check Instruction, Registration Request command is output from sub-master component.	Since this DTC is provided for engineering purposes, it may be detected when no actual failure exists.
E4 *1	Multiple Frame Abort	Multiple frame transmission is aborted.	Since this DTC is provided for engineering purposes, it may be detected when no actual failure exists.

(b) Logical address: 44 (DVD)

DTC	Diagnosis item	Condition	Countermeasure and inspected parts
42	No Disc Readout	Disc cannot be read.	Inspect disc
44	DVD Error	Error is detected in disc player controller.	Inspect disc, Television display assy
45	EJECT Error	Disc cannot be ejected.	Inspect disc, Television display assy
46	Disc Crack	A crack or dirt is in a disc.	Inspect disc, Television display assy
52	Player Error	Clamp malfunction occurs.	Inspect disc, Television display assy

05ATM-04

HOW TO PROCEED WITH TROUBLESHOOTING

1	Vehicle Brought to Workshop

2	Customer Problem Analysis (See page 05-1695)

(a) Interview and confirm the trouble.
  (1) Confirm the condition of the trouble.

3	Basic Inspection

(a) Basic inspection.
  (1) Measure the battery voltage.
  Standard: 11 to 14 V

(b) w/ Navigation system:
  Check the power supply to the multi-display assy.
  (1) Turn the ignition switch to the ACC position.
  (2) Check whether or not the display appears on the multi-display assy.

Display does not appear (Proceed to problem symptom table "Black Screen (Multi Display Assy)") (See page 05-1778).
Display appears (Go to step 4).

(c) w/o Navigation system:
  Check the power supply to the radio receiver assy.
  (1) Turn the ignition switch to the ACC position.
  (2) Check whether or not the display appears on the radio receiver assy.

Display does not appear (Proceed to problem symptom table) (See page 05-1632)
Display appears (Go to step 4).

4	Check Body Multiplex Communication System (See page 05-2040)

(a) Check that the DTC is output.

DTC is not output (Go to step 5).
DTC is output (Proceed to "Body Multiplex Communication System").

5	DTC Check (See page 05-1696)

(a) Check that the DTC is output.

DTC is output (Go to step 6).

DTC is not output (Go to step 7).

6	DTC Chart (See page 05-1712)

Go to step 8

7	Problem Symptom Table (See page 05-1704)

8	Circuit Inspection and Part Inspection (See page 05-1715 - 05-1748)

9	Identification of Problem

10	Repair or Replace

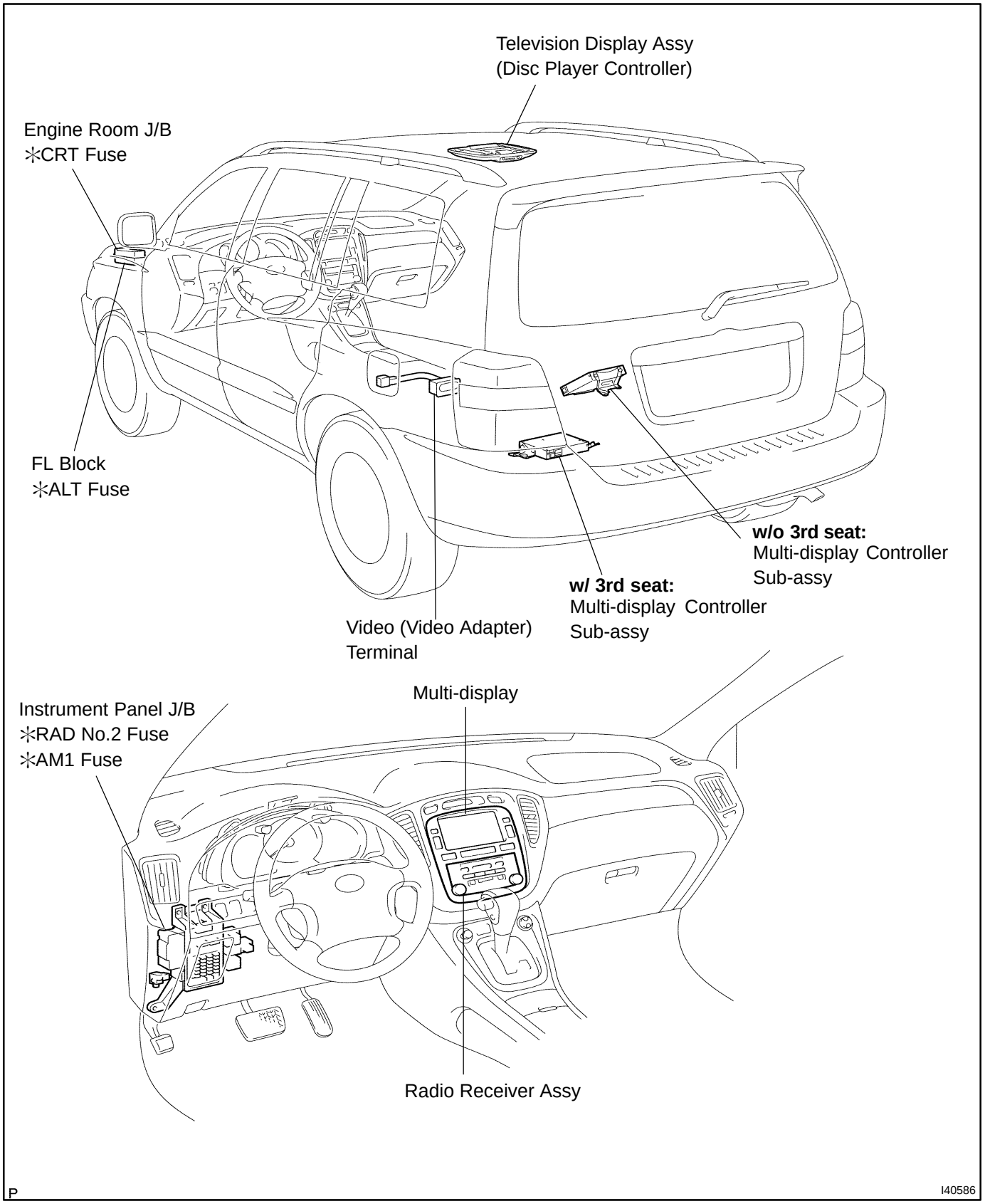
11	Confirmation Test

End

REAR SEAT ENTERTAINMENT SYSTEM

LOCATION

05ATQ-04



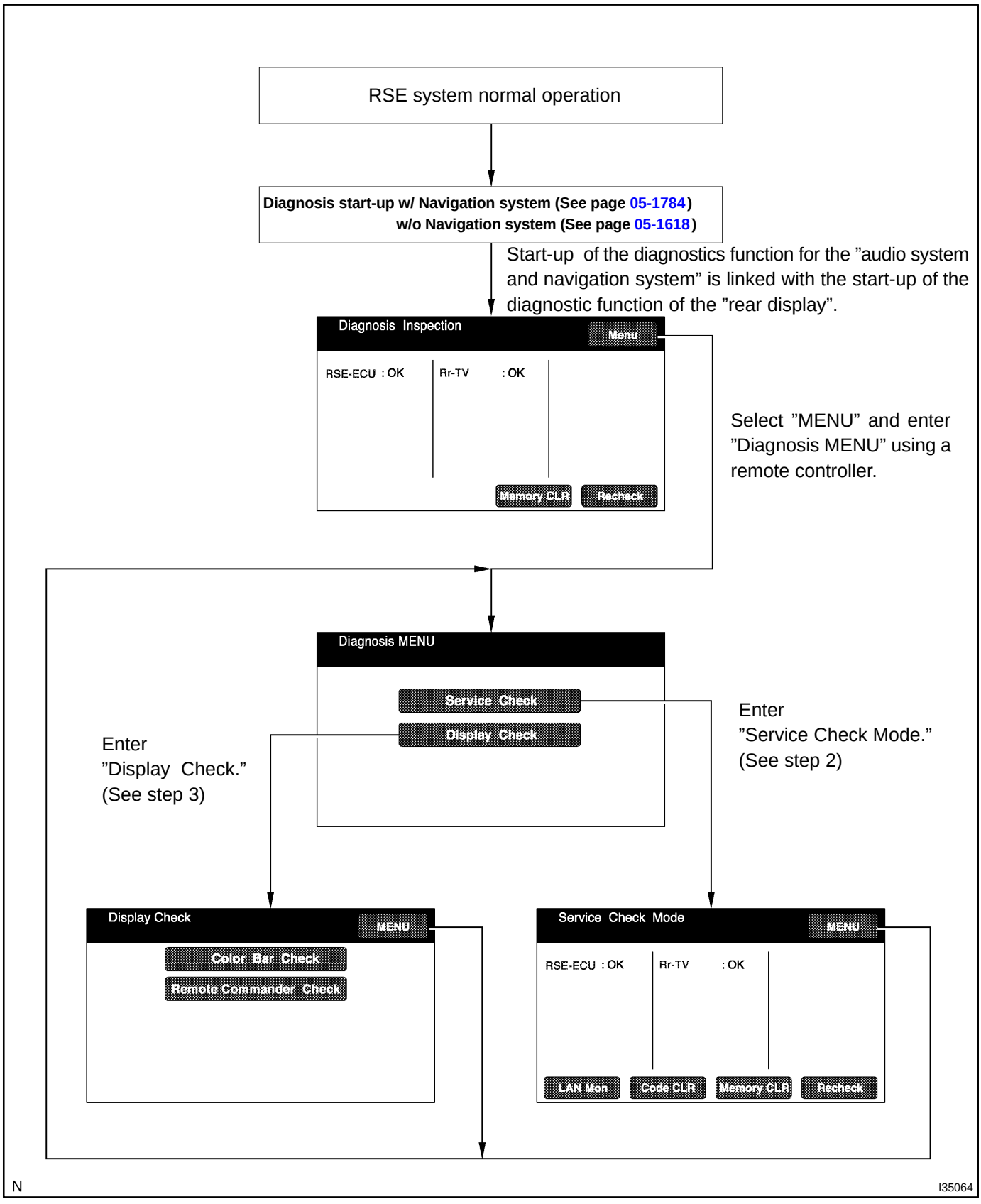
05CEZ-02

PRE-CHECK

1. DIAGNOSIS CHECK

HINT:

Diagnosis system mode is operated as follows.



HINT:

RSE system inspects the devices consisting of Sub AVC-LAN multi-display controller sub-assy.

(a) Starting Main AVC-LAN diagnosis mode (See page 05-1784 , 05-1618).

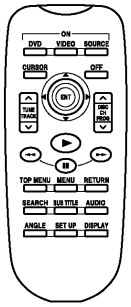
HINT:

- Starting Main AVC-LAN operates the diagnosis mode, and sub AVC-LAN also automatically enters the diagnosis mode and performs the diagnosis mode operation on the multi-display controller sub-assy.
- Use a switch & volume assy to operate diagnosis mode.

(b) Finishing the diagnosis mode.

Turn the ignition switch off to finish the diagnosis mode.

Switch & Volume Assy:

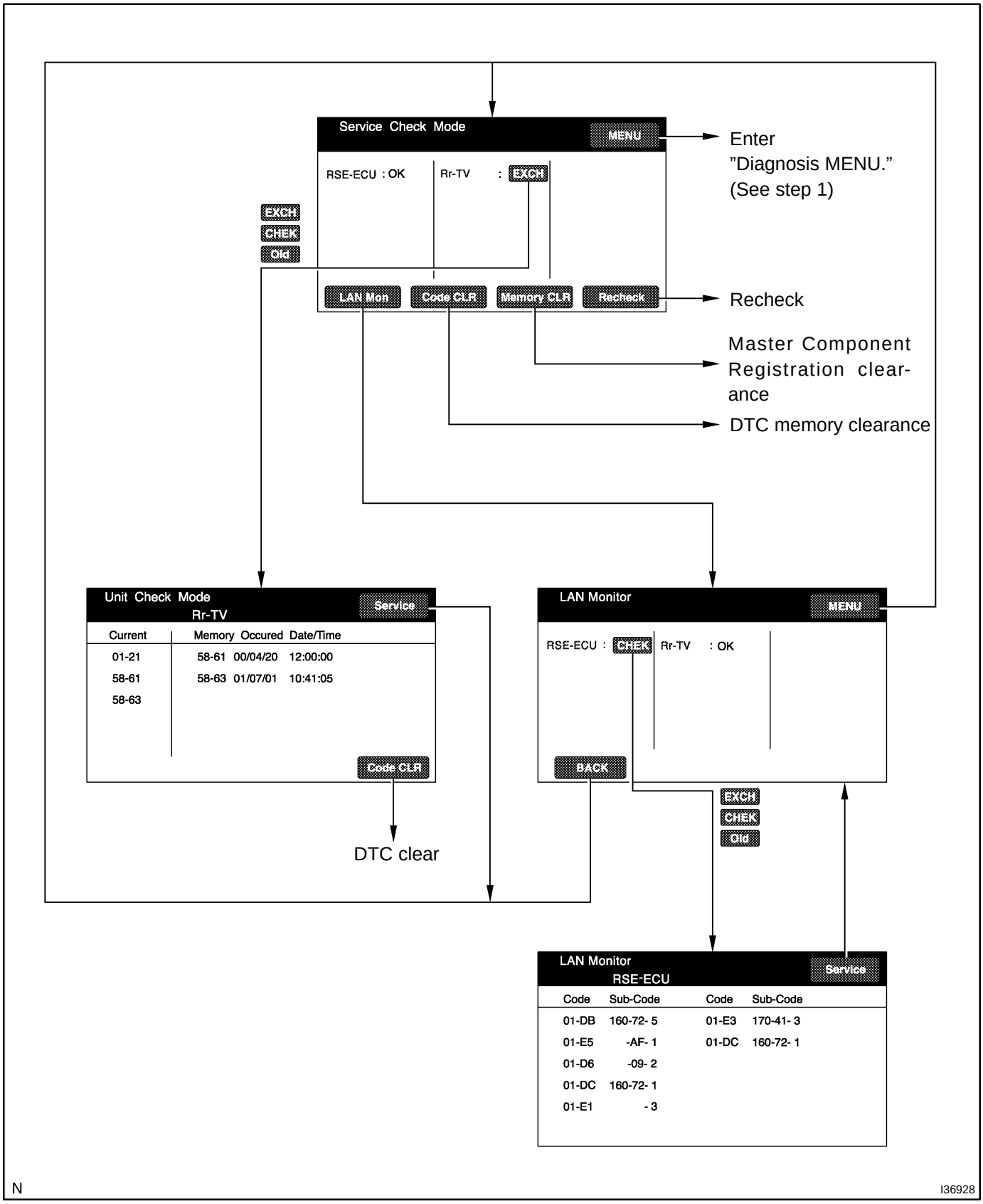


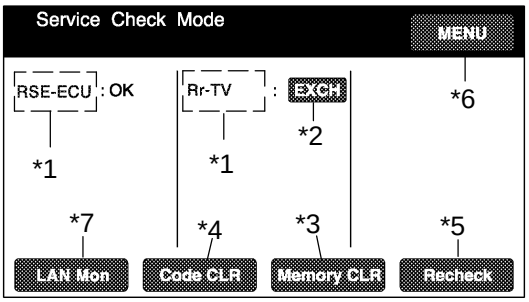
N I35000

2. SERVICE CHECK MODE

HINT:

”Service Check Mode” is operated as follows.





N I35066

(a) Service Check Mode

(1) Start the Diagnosis System.

Display Item	Function
Component Names/*1	Component names including optional components (15 components max.) are displayed. When the names are not identified, their physical addresses are displayed.
Check Result/*2	Check results are displayed.
Memory Clear switch/*3	Pressing this switch for 3 sec. deletes all the information about master component registration.
DTC Clear switch/*4	Pressing this switch for 3 sec. deletes diagnosis memory of all the components. It deletes the check results.
Recheck/*5	Pressing this switch performs Service Check again.
MENU/*6	Pressing this switch activates the Diagnosis Menu screen.
LAN Monitor screen switch/*7	Pressing this switch activates the LAN Monitor screen, which displays the logical address 01 with DTC D0 - FE.

Components:/*1

Display	Name
RSE-ECU	Multi-display Controller Sub-assy
Rr-TV	Television Display Assy

HINT:

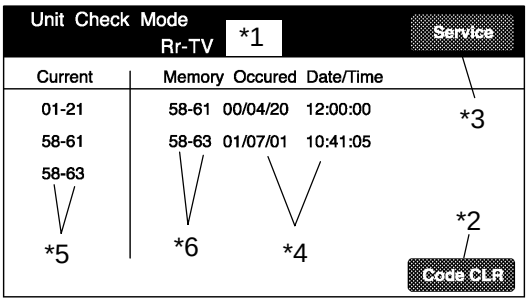
Service Check displays the check results based on the information obtained from each component's response to "System Check Execution" and "Diagnosis Memory Request", and the information of "Current DTC Notification" (the "Unit Check" that will be displayed on the next screens).

(2) Read Check Result

Check Result	Meaning
OK	No DTC is identified.
EXCH	One or more DTCs requesting an exchange are detected.
CHEK	One or more DTCs requesting a check are detected.
NCON	No connection response to Diagnosis System start-up, however it has connection response to the AVC LAN system when the power switch is turned on (when IG is turned to the ACC position).
Old	One or more DTCs are detected because of old version.
NRES	No response to the information about the Diagnosis System, whereas it responds to the Diagnosis System start-up.

HINT:

- ⁎ After repairing and checking, press "Code CLR" for more than 3 seconds to delete diagnosis memory.
- ⁎ After deleting diagnosis memory, press "Recheck" and make sure "OK" is displayed on the screen.



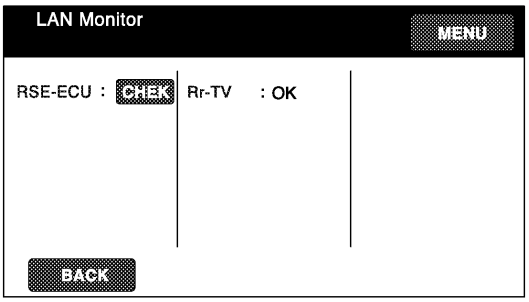
N I35067

(3) ”EXCH”, ”CHEK” and ”Old” can be used as switches to activate ”Unit Check Mode” for detailed information. When inspecting the malfunctioning area, refer to the DTC code list.

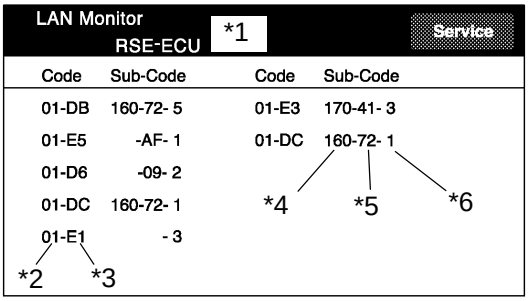
Display Item	Description
Component name/*1	Name of component to be checked is displayed.
DTC clear switch/*2	Pressing this switch for 3 sec. deletes DTC memory of the selected diagnosis component.
Service check mode screen switch/*3	Pressing this returns to the Service Check Mode screen.
Date/Time/*4	The date and time stamped at the time of DTC occurrence are displayed in the order of year-month-day-hour-minute-second. (If the date and time data is invalid, it is displayed as a blank.)
Current/ *5	Up to 6 DTC codes detected during the System Check are displayed.
Memory/ *6	DTC memories stored and current DTC notification are displayed.

HINT:

- Detecting unit DTC activates the ”Unit Check Mode” on the screen.
- In the ”Unit Check Mode”, DTCs which are identified as ”EXCH” in the ”Service Check” are classified into ”Current” DTC and ”Past” DTC.



N I35068



N I35069

(4) ”CHECK” can be used as a switch to activate ”LAN Monitor” for detailed information. When inspecting the malfunctioning area, refer to the DTC code list.

Display Item	Description
Component name/*1	Names of component to be checked are displayed.
Segment/*2	Logical address codes corresponding to DTC are displayed.
DTC/*3	DTC is displayed.
Sub-Code (address numbers of related components)/*4	Physical address codes memorized together with DTC are displayed.
Sub-code (Connection confirmation number) /*5	Connection confirmation numbers memorized together with DTC are displayed.
Sub-code (Number of occurrence) /*6	The number of occurrence of the same DTC is displayed.

HINT:

- ∗ Detecting no LAN DTC activates the LAN Monitor on the screen.
- ∗ The LAN Monitor chooses and displays the LAN DTC out of DTC of components identified as ”CHEK” in the LAN Monitor.

(5) Read Check Result

Check Result	Meaning
OK	No DTC is identified.
CHEK	One or more DTCs requesting a check are detected.
NCON	No connection response to Diagnosis System start-up, however it has connection response to the AVC-LAN system when the power switch is turned on (when IG is turned to the ACC position).
NRES	No response to the information about the Diagnosis System, whereas it responds to the Diagnosis System start-up.
Old	One or more DTCs are detected because of old version.

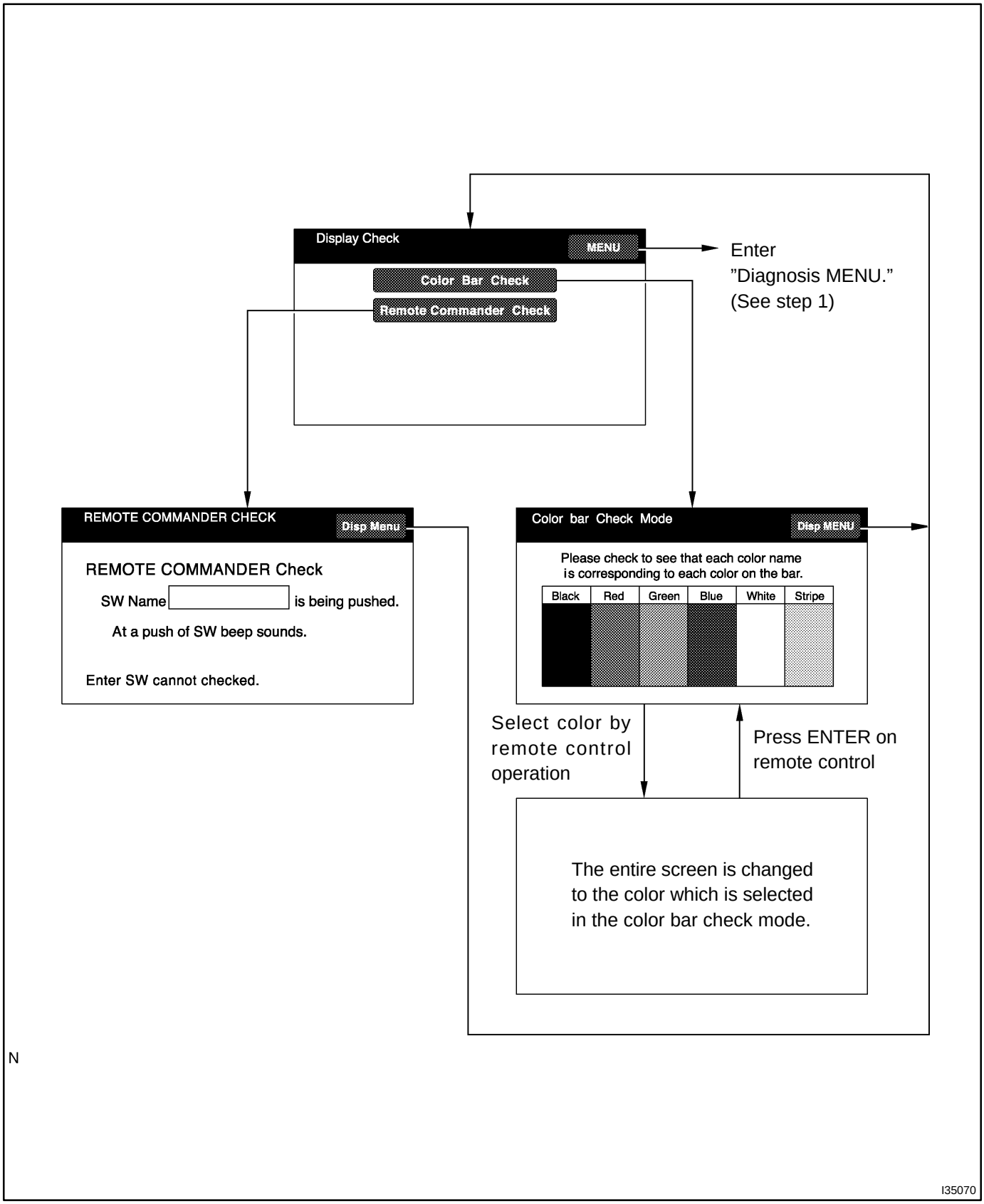
HINT:

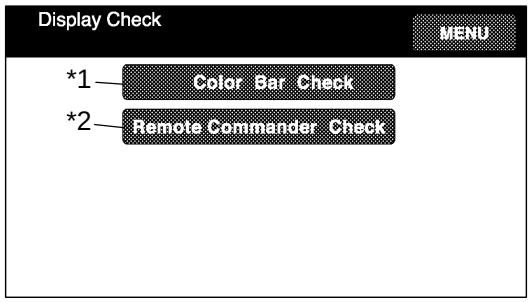
- ∗ After repairing and checking, press ”Code CLR” for more than 3 seconds to delete diagnosis memory.
- ∗ After deleting diagnosis memory, press ”Recheck” and make sure ”OK” is displayed on the screen.

3. DISPLAY CHECK MODE

HINT:

Display check mode is operated as follows.



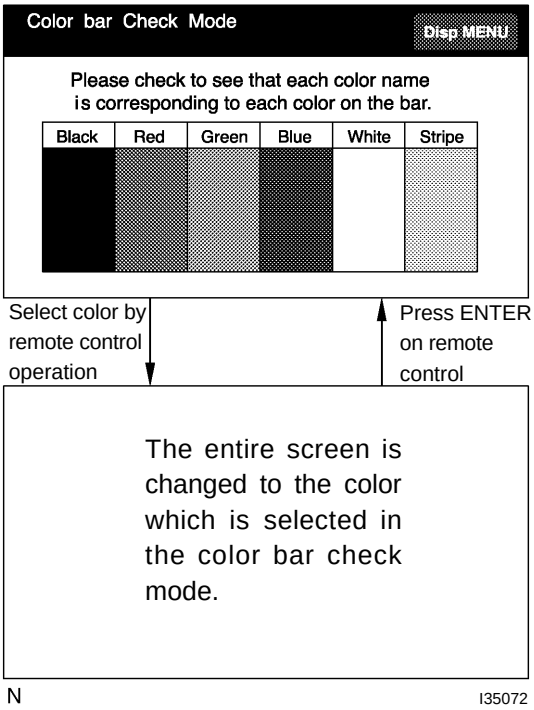


N I35071

(a) Display Check Mode

Display	Contents
Color Bar Check/*1	Color display is checked.
Remote Commander/*2	Operating condition of remote commander display is checked.

HINT:
In Display Check Mode, above checks can be performed.

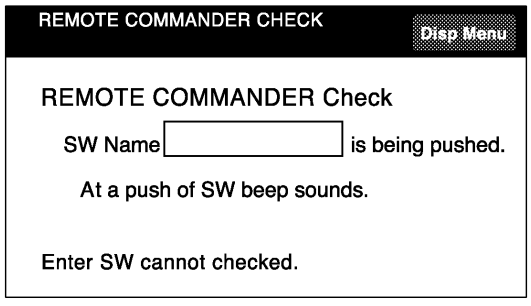


N I35072

(b) Display Color Bar Check
(1) Start the Diagnosis System.
(2) Select ”MENU”.
(3) Select ”Display Check”.
(4) Select ”Color Bar Check”.
(5) Make sure that each color name is corresponding to each color on the bar.

HINT:
Select Black, Red, Green, Blue, White and Stripe to display selected colors and stripe on the entire screen.

(6) Compare the color with the ”Color Bar Check”, and make sure that the color is the same.



N I35073

(c) Display Remote Commander Check
(1) Start the Diagnosis system.
(2) Select ”MENU”.
(3) Select ”Display Check”.
(4) Select ”Remote Commander”.
(5) Press each switch and make sure that it corresponds to the display on the screen.

05ATS-04

PROBLEM SYMPTOMS TABLE

HINT:

Inspect the ”Fuse” and ”Relay” before confirming the suspected area as shown in the charts below.

TELEVISION DISPLAY ASSY:

Symptom	Suspected Area	See page
Black screen.	1. Power source circuit (multi-display controller sub-assy) 2. Power source circuit (television display assy) 3. AVC-LAN circuit (multi-display controller sub-assy - television display assy) 4. Multi-display controller sub-assy	05-1715 05-1717 05-1746 67-23
Display screen is not stabilized (Synchronous error).	1. Power source circuit (multi-display controller sub-assy) 2. Power source circuit (television display assy) 3. Display signal circuit (To television display) 4. Television display assy 5. Multi-display controller sub-assy	05-1715 05-1717 05-1738 67-26 67-23
Color on display screen is unusual (RGB signal error).	1. Rear display color bar check of display check mode 2. Display signal circuit (To television display) 3. Television display assy 4. Multi-display controller sub-assy	05-1696 05-1738 67-26 67-23

DISC PLAYER CONTROLLER (Built in ”TELEVISION DISPLAY ASSY”):

Symptom	Suspected Area	See page
Only DVD screen is not displayed or not stabilized.	1. Power source circuit (multi-display controller sub-assy) 2. Power source circuit (television display assy) 3. Display signal circuit (From television display) 4. Television display assy 5. Multi-display controller sub-assy	05-1715 05-1717 05-1740 67-26 67-23
Only DVD is not heard or the sound quality is poor.	1. Power source circuit (multi-display controller sub-assy) 2. Power source circuit (television display assy) 3. Sound signal circuit (From television display assy) 4. RSE sound signal circuit (RSE-Radio receiver assy) 5. Mute signal circuit (From television display assy) 6. AMP mute signal circuit (From RSE ECU) 7. Multi-display controller sub-assy 8. Television display assy	05-1715 05-1717 05-1735 05-1671 05-1722 - 67-23 67-26

VIDEO (VIDEO ADAPTER) TERMINAL:

Symptom	Suspected Area	See page
Only display screen input from the external device is not displayed or not stabilized.	1. Power source circuit (multi-display controller sub-assy) 2. Power source circuit (television display assy) 3. Display signal circuit (From video (video adapter) terminal) 4. VIDEO (Video adapter) terminal 5. Multi-display controller sub-assy	05-1715 05-1717 05-1742 67-27 67-23
Only sound quality input from the external device is poor or no sound can be heard.	1. Power source circuit (multi-display controller sub-assy) 2. Power source circuit (television display assy) 3. Sound signal circuit (From video (video adapter) terminal) 4. VIDEO (Video adapter) terminal 5. Multi-display controller sub-assy	05-1715 05-1717 05-1727 67-27 67-23
The operation to the external device cannot be performed.	1. Power source circuit (multi-display controller sub-assy) 2. Power source circuit (television display assy) 3. VIDEO (Video adapter) terminal set signal circuit 4. VIDEO (Video adapter) terminal 5. Multi-display controller sub-assy	05-1715 05-1717 05-1744 67-27 67-23

RSE SYSTEM:

Symptom	Suspected Area	See page
Quality of sound from wireless headphone is poor or no sound can be heard.	1. Power source circuit (multi-display controller sub-assy) 2. Power source circuit (television display assy) 3. Sound signal circuit (Wireless headphone) 4. Multi-display controller sub-assy 5. Television display assy	05-1715 05-1717 05-1732 67-23 67-26
Quality of sound from headphone connected to headphone terminal is poor or no sound can be heard.	1. Power source circuit (multi-display controller sub-assy) 2. Power source circuit (television display assy) 3. Sound signal circuit (Headphone) 4. Multi-display controller sub-assy 5. Television display assy	05-1715 05-1717 05-1729 67-23 67-26

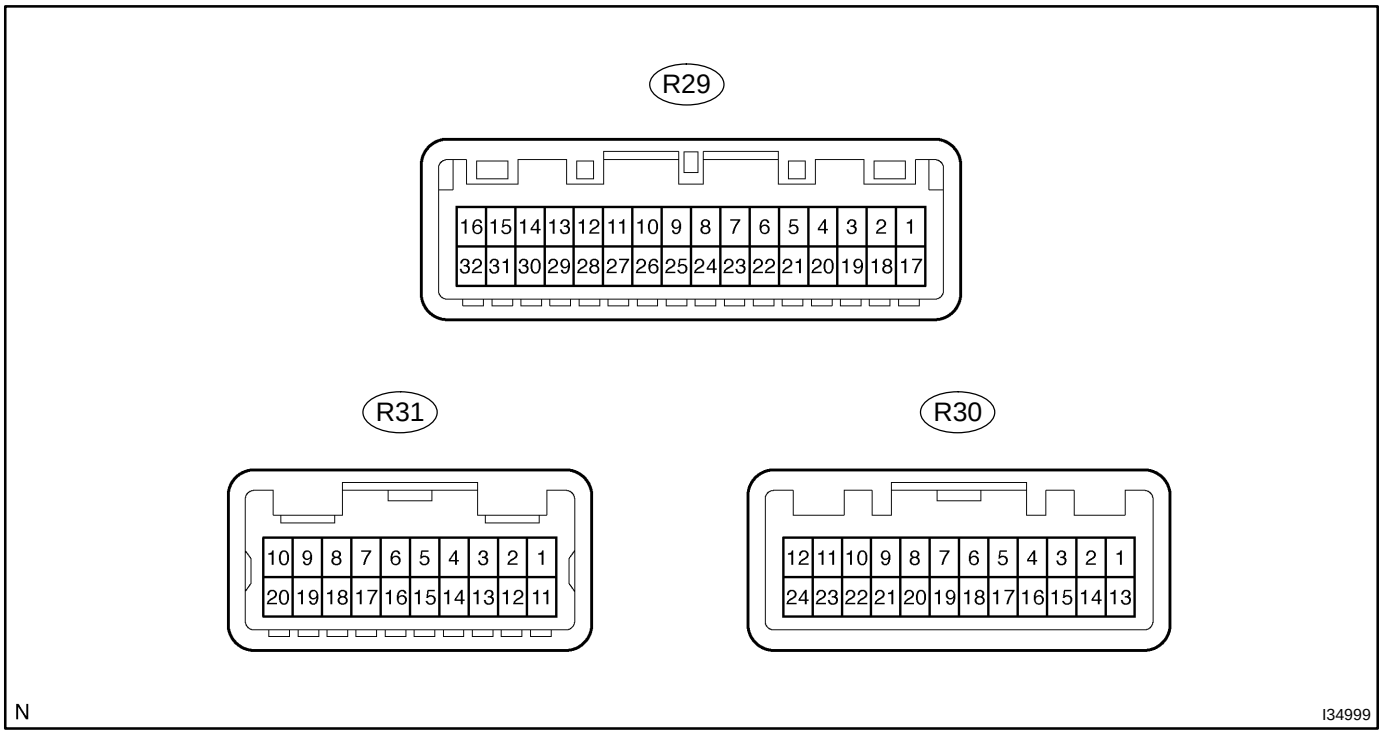
REMOTE CONTROL:

Symptom	Suspected Area	See page
A remote control system does not operate.	1. A remote control system does not operate 2. Power source circuit (multi-display controller sub-assy) 3. Power source circuit (television display assy) 4. AVC-LAN circuit (multi-display controller sub-assy - television display assy)	05-1748 05-1715 05-1717 05-1746

05CF0-03

TERMINALS OF ECU

1. MULTI-DISPLA Y CONTROLLER SUB-ASSY



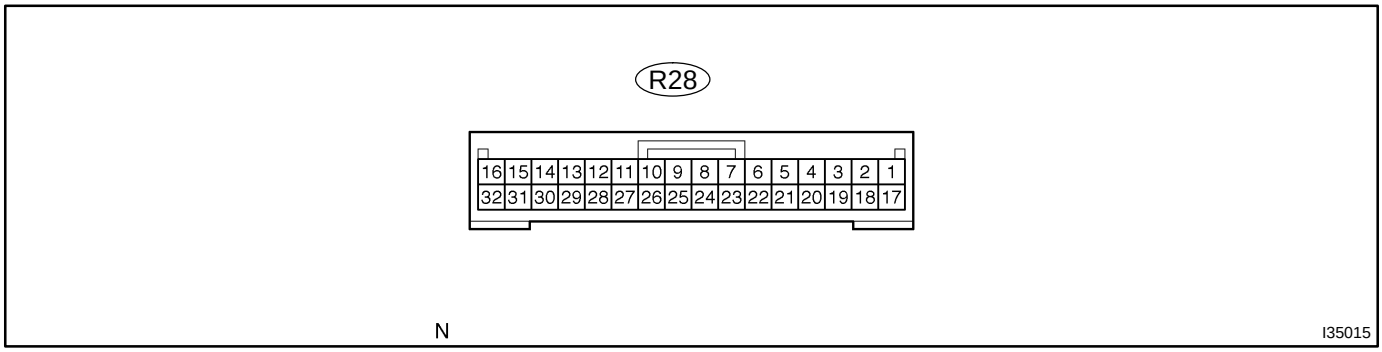
Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	Specification
L- - GND (R29-7 - R29-29)	G - W-B	Sound signal (Output)	DVD system is playing	A waveform synchronized with sound is output
L+ - GND (R29-8 - R29-29)	R - W-B	Sound signal (Output)	DVD system is playing	A waveform synchronized with sound is output
R- - GND (R29-9 - R29-29)	W - W-B	Sound signal (Output)	DVD system is playing	A waveform synchronized with sound is output
R+ - GND (R29-10 - R29-29)	B - W-B	Sound signal (Output)	DVD system is playing	A waveform synchronized with sound is output
SG1 - Body ground (R29-11 - Body ground)	Shielded - Body ground	Ground	Always	Below 1 V
LMUT - GND (R29-12 - R29-29)	V - W-B	Mute signal	Disc player changer or disc player controller is changing	Below 1 V
+B1 - GND (R29-16 - R29-29)	Y - W-B	Battery	Always	10 to 14 V
TX3+ (R29-17)	BR	AVC-LAN communication signal	See "Service Check Mode"	-
TX3- (R29-18)	Y	AVC-LAN communication signal	See "Service Check Mode"	-
TX- (R29-30)	GR	AVC-LAN communication signal	See "Service Check Mode"	-
TX+ (R29-31)	LG	AVC-LAN communication signal	See "Service Check Mode"	-

SG33 - Body ground (R29-19 - Body ground)	Shielded - Body ground	Ground	Always	Below 1 V
SGN1 - Body ground (R29-20 - Body ground)	R - Body ground	Ground	Always	Below 1 V
NTS1 - GND (R29-21 - R29-29)	G - W-B	Display signal	DVD system is displayed	Pulse generation
R-L- - GND (R29-23 - R29-29)	G - W-B	Sound signal (Input)	RSE system is playing	A waveform synchronized with sound is output
R-L+ - GND (R29-24 - R29-29)	R - W-B	Sound signal (Input)	RSE system is playing	A waveform synchronized with sound is output
R-R- - GND (R29-25 - R29-29)	W - W-B	Sound signal (Input)	RSE system is playing	A waveform synchronized with sound is output
R-R+ - GND (R29-26 - R29-29)	B - W-B	Sound signal (Input)	RSE system is playing	A waveform synchronized with sound is output
SG2 - Body ground (R29-27 - Body ground)	Shielded - Body ground	Ground	Always	Below 1 V
RMUT - GND (R29-28 - R29-29)	L - W-B	Mute signal	Audio source is changing	Below 1 V
GND - Body ground (R29-29 - Body ground)	W-B - Body ground	Ground	Always	Below 1 V
ACC - GND (R29-32 - R29-29)	G - W-B	Ignition (ACC)	Ignition switch in the ACC position	10 to 14 V
+B2 - GND (R30-1 - R29-29)	V - W-B	Battery	Always	10 to 14 V
ACC2 - GND (R30-2 - R29-29)	GR - W-B	Ignition (ACC)	Ignition switch in the ACC position	10 to 14 V
GAUX - GND (R30-3 - R29-29)	SB - W-B	Ground	External device system is playing (At that time of VTR jack use)	A waveform synchronized with sound is output
TX2- (R30-4)	LG	AVC-LAN communication signal	See "Service Check Mode"	-
TX2+ (R30-5)	P	AVC-LAN communication signal	See "Service Check Mode"	-
GND1 - Body ground (R30-6 - Body ground)	W-B - Body ground	Ground	Always	Below 1 V
SG5 - Body ground (R30-7 - Body ground)	Shielded - Body ground	Ground	Always	Below 1 V
HP1L - GND (R30-8 - R29-29)	G - W-B	Sound signal (Input)	External device system is playing (At that time of VTR jack use)	A waveform synchronized with sound is output
HP1R - GND (R30-9 - R29-29)	R - W-B	Sound signal (Input)	External device system is playing (At that time of VTR jack use)	A waveform synchronized with sound is output
SG7 - Body ground (R30-10 - Body ground)	Shielded - Body ground	Ground	Always	Below 1 V

AUXL - GND (R30-11 - R29-29)	BR - W-B	Sound signal	External device system is playing (At that time of VTR jack use)	A waveform synchronized with sound is output
AUXR - GND (R30-12 - R29-29)	Y - W-B	Sound signal	External device system is playing (At that time of VTR jack use)	A waveform synchronized with sound is output
R2 - GND (R30-13 - R29-29)	G - W-B	Display signal (Red)	Display is on (Television display assy)	Pulse generation
G2 - GND (R30-14 - R29-29)	W - W-B	Display signal (Green)	Display is on (Television display assy)	Pulse generation
B2 - GND (R30-15 - R29-29)	R - W-B	Display signal (Blue)	Display is on (Television display assy)	Pulse generation
SYN2 - GND (R30-16 - R29-29)	B - W-B	Display signal (Synchronize)	Display is on (Television display assy)	Pulse generation
VR2 - Body ground (R30-17 - Body ground)	Y - Body ground	Ground	Always	Below 1 V
VG2 - Body ground (R30-18 - Body ground)	Shielded - Body ground	Ground	Always	Below 1 V
SG6 - Body ground (R30-19 - Body ground)	Shielded - Body ground	Ground	Always	Below 1 V
HP2L - GND (R30-20 - R29-29)	BR - W-B	Sound signal (Output)	Audio system is playing (Headphone)	A waveform synchronized with sound is output
HP2R - GND (R30-21 - R29-29)	Y - W-B	Sound signal (Output)	Audio system is playing (Headphone)	A waveform synchronized with sound is output
SG6 - Body ground (R30-22 - Body ground)	Shielded - Body ground	Ground	Always	Below 1 V
SGN5 - Body ground (R30-23 - Body ground)	R - Body ground	Ground	Always	Below 1 V
NTS4 - GND (R30-24 - R29-29)	G - W-B	Display signal	External device system displayed (At that time of VTR jack use)	Pulse generation
MUTE - GND (R31-1 - R29-29)	L - W-B	Mute signal	Disc player controller is changing	Below 1 V
AL- - GND (R31-2 - R29-29)	G - W-B	Sound signal (Input)	DVD system is playing	A waveform synchronized with sound is output
AL+ - GND (R31-3 - R29-29)	R - W-B	Sound signal (Input)	DVD system is playing	A waveform synchronized with sound is output
AR- - GND (R31-4 - R29-29)	W - W-B	Sound signal (Input)	DVD system is playing	A waveform synchronized with sound is output
AR+ - GND (R31-5 - R29-29)	B - W-B	Sound signal (Input)	DVD system is playing	A waveform synchronized with sound is output
SG4 - Body ground (R31-6 - Body ground)	Shielded - Body ground	Ground	Always	Below 1 V

SELD - Body ground (R31-7 - Body ground)	W-B - Body ground	Ground	Always	Below 1 V
NTS2 - GND (R31-8 - R29-29)	G - W-B	Display signal	DVD system is displayed	Pulse generation
SGN2 - Body ground (R31-9 - Body ground)	R - Body ground	Ground	Always	Below 1 V
SG9 - Body ground (R31-10 - Body ground)	Shielded - Body ground	Ground	Always	Below 1 V
HPL- - GND (R31-16 - R29-29)	G - W-B	Sound signal (Output)	RSE system is playing	A waveform synchronized with sound is output
HPL+ - GND (R31-17 - R29-29)	W - W-B	Sound signal (Output)	RSE system is playing	A waveform synchronized with sound is output
HPR- - GND (R31-18 - R29-29)	R - W-B	Sound signal (Output)	RSE system is playing	A waveform synchronized with sound is output
HPR+ - GND (R31-19 - R29-29)	B - W-B	Sound signal (Output)	RSE system is playing	A waveform synchronized with sound is output
SLD1 - Body ground (R31-20 - Body ground)	Shielded - Body ground	Ground	Always	Below 1 V

2. TELEVISION DISPLAY ASSY



Terminals No. (Symbols)	Wiring Color	Condition	Condition	Specification
+B - GND (R28-1 - R28-6)	G - W-B	Battery	Always	10 to 14 V
ACC - GND (R28-2 - R28-6)	GR - W-B	Ignition (ACC)	Ignition switch in the ACC position	10 to 14 V
TX- (R28-4)	V	AVC-LAN communication signal	See "Service Check Mode"	-
TX+ (R28-5)	O	AVC-LAN communication signal	See "Service Check Mode"	-
GND - Body ground (R28-6 - Body ground)	W-B - Body ground	Ground	Always	Below 1 V
HP1R - GND (R28-7 - R28-6)	BR - W-B	Sound signal (Input)	While voice sound is being produced	A waveform synchronized with sound is output

HP1L - GND (R28-8 - R28-6)	Y - W-B	Sound signal (Input)	While voice sound is being produced	A waveform synchronized with sound is output
GND - Body ground (R28-9 - Body ground)	Shielded - Body ground	Ground	Always	Below 1 V
SGND - Body ground (R28-10 - Body ground)	Shielded - Body ground	Ground	Always	Below 1 V
AR+ - GND (R28-11 - R28-6)	B - W-B	Sound signal (Output)	DVD system is sounding	A waveform synchronized with sound is output
AR- - GND (R28-12 - R28-6)	W - W-B	Sound signal (Output)	DVD system is sounding	A waveform synchronized with sound is output
AL+ - GND (R28-13 - R28-6)	R - W-B	Sound signal (Output)	DVD system is sounding	A waveform synchronized with sound is output
AL- - GND (R28-14 - R28-6)	G - W-B	Sound signal (Output)	DVD system is sounding	A waveform synchronized with sound is output
MUTE - GND (R28-15 - R28-6)	V - W-B	Mute signal	DVD system is sounding → DVD system is changing	3.5 V → Below 1 V
SG - Body ground (R28-16 - Body ground)	Shielded - Body ground	Ground	Always	Below 1 V
VG - Body ground (R28-17 - Body ground)	Shielded - Body ground	Ground	Always	Below 1 V
VR - Body ground (R28-18 - Body ground)	Y - Body ground	Ground	Always	Below 1 V
SYNC - VR (R28-19 - R28-18)	B - Y	Display signal (Synchronize)	Television display is ON	Pulse generation
B - VR (R28-20 - R28-18)	R - Y	Display signal (Blue)	Television display is ON	Pulse generation
G - VR (R28-21 - R28-18)	W - Y	Display signal (Green)	Television display is ON	Pulse generation
R - VR (R28-22 - R28-18)	G - Y	Display signal (Red)	Television display is ON	Pulse generation
HP2R - GND (R28-23 - R28-6)	P - W-B	Sound signal (Input)	While voice sound is being produced	A waveform synchronized with sound is output
HP2L - GND (R28-24 - R28-6)	L - W-B	Sound signal (Input)	While voice sound is being produced	A waveform synchronized with sound is output
GND1 - Body ground (R28-25 - Body ground)	Shielded - Body ground	Ground	Always	Below 1 V
HPR+ - GND (R28-26 - R28-6)	BR - W-B	Sound signal (Input)	While voice sound is being produced	A waveform synchronized with sound is output

HPR- - GND (R28-27 - R28-6)	SB - W-B	Sound signal (Input)	While voice sound is being produced	A waveform synchronized with sound is output
HPL+ - GND (R28-28 - R28-6)	LG - W-B	Sound signal (Input)	While voice sound is being produced	A waveform synchronized with sound is output
HPL- - GND (R28-29 - R28-6)	P - W-B	Sound signal (Input)	While voice sound is being produced	A waveform synchronized with sound is output
SLD - Body ground (R28-30 - Body ground)	Shielded - Body ground	Ground	Always	Below 1 V
S. GND - Body ground (R28-31 - Body ground)	BR - Body ground	Ground	Always	Below 1 V
NTSC - GND (R28-32 - R28-6)	Y - W-B	Display signal	Rear display is on	Pulse generation

05ESL-05

BASIC INSPECTION

When the malfunction is not confirmed in the DTC check, troubleshooting should be carried out in all the possible circuits considered as possible causes of the problem. In many cases, by carrying out the basic engine check shown in the following flowchart, the problem can be found quickly and efficiently. Therefore, using this check is essential in the engine troubleshooting.

1	CHECK BATTERY VOLTAGE

NOTICE:
Carry out the battery voltage check with the engine stopped and ignition switch OFF.

	OK	NG
Voltage	11 V or more	Less than 11 V

NG → **CHARGE OR REPLACE BATTERY**

OK

2	CHECK IF ENGINE WILL CRANK

NG → **PROCEED TO PROBLEM SYMPTOMS TABLE ON PAGE 05-31**

OK

3	CHECK IF ENGINE STARTS

NG → **Go to step 7**

OK

4	CHECK AIR FILTER

Visually check if the air filter is contaminated with dirty or oily.

NG → **CLEAN OR REPLACE**

OK

5	CHECK IDLE SPEED (See page 14-1)

NG → **PROCEED TO PROBLEM SYMPTOMS TABLE ON PAGE 05-31**

OK

6	CHECK FUEL PRESSURE (See page 11-4)

NG → **PROCEED TO PAGE 11-4 AND CONTINUE TO TROUBLESHOOT**

OK

7	CHECK FOR SPARK (See page 18-3)

NG → PROCEED TO PAGE 18-1 AND CONTINUE TO TROUBLESHOOT

OK

PROCEED TO PROBLEM SYMPTOMS TABLE ON PAGE 05-31

05MOJ-01

CHECKING MONITOR STATUS

NOTICE:

The monitor status (mode 6) is not applicable to the heated oxygen sensor (HO2S). However, HO2S test values can be checked by O2S TEST RESULT (mode 5). Refer to page 05-22

1. Outline

The monitor results and the test values can be checked with the OBDII scan tool.

The engine control module (ECM) monitors the emissions-related components as the thermostat, catalyst converter and evaporative emissions (EVAP), and determines whether they are functioning normally or not. When finished monitoring, the ECM stores the monitor results and the test values.

The monitor result indicates whether the component is functioning normally or not. The test value is the value that was used to determine the monitor result. If the test value is outside the test limit (malfunction criterion), the ECM determines the component is malfunctioning. Some emissions-related components have multiple test values to determine monitor result. If one of these test values is outside test limit, the ECM determines the component is malfunctioning.

2. Description

The test value and test limit information are described as shown in the following table. This information is included under ”MONITOR RESULT” in the emissions-related DTC sections:

TID $08: Thermostat

TLT	CID	Unit Conversion	Description of Test Value	Description of Test Limit
1	$01	Multiply by 0.625 and subtract 40 [℃]	ECT sensor output when estimated ECT has reached to malfunction criterion	Malfunction criterion for thermostat

- TID (Test Identification Data) is assigned to each emissions-related component.
- TLT (Test Limit Type):
  If TLT is 0, the component is malfunctioning when the test value is higher than the test limit.
  If TLT is 1, the component is malfunctioning when the test value is lower than the test limit.
- CID (Component Identification Data) is assigned to each test value.
- Unit Conversion is used to calculate the test value indicated on generic OBDII scan tools.

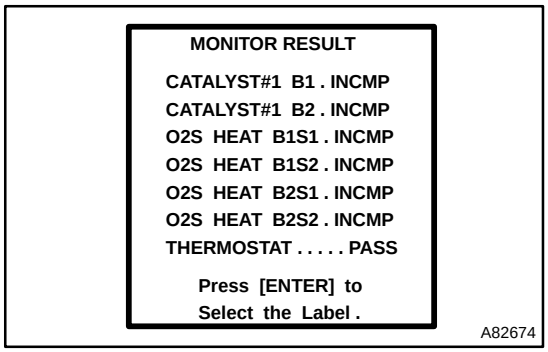
3. Procedure (using hand-held tester)

(a) Connect the hand-held tester to the DLC3.

(b) Turn the ignition switch and hand-held tester ON.

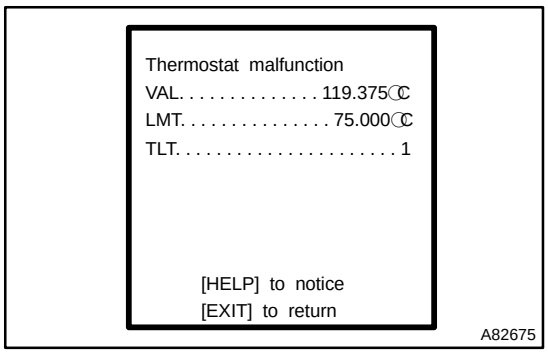
(c) Clear DTCs.

(d) Allow the vehicle to drive, in accordance with the applicable drive pattern described in the READINESS MONITOR DRIVE PATTERN section (see page 05-26).



(e) Select the hand-held tester menus: DIAGNOSIS, ENHANCED OBDII, MONITOR INFO and MONITOR RESULT. The monitor result appears after the component name.

- INCMP indicates the component has not been monitored yet.
- PASS indicates the component is functioning normally.
- FAIL indicates the component is malfunctioning.



(f) Select the component and press ENTER. If the monitor result has been PASS or FAIL, the accuracy test value appears.

- VAL indicates the test value.
- LMT indicates the test limit (malfunction criterion).
- TLT indicates the test limit type.

(g) Compare the test value with the test limit.

- If TLT is 0, the component is malfunctioning when the test value is higher than the test limit.
- If TLT is 1, the component is malfunctioning when the test value is lower than the test limit.
- If the test value is on the borderline of the test limit, a malfunction is concealed in the component.

HINT:

The monitor result might on rare occasions be PASS even if the malfunction indicator lamp (MIL) is illuminated. This indicates the system malfunctioned on a previous driving cycle. This might be caused by an intermittent problem.

05ESK-05

CHECK FOR INTERMITTENT PROBLEMS

Hand-held tester only:

Inspect the vehicle's ECM using check mode. Intermittent problems are easier to detect when the ECM is in check mode with the hand-held tester. In check mode, the ECM uses 1 trip detection logic, which has a higher sensitivity to malfunctions than normal mode (default), which uses 2 trip detection logic.

(a) Clear the DTCs (see page 05-38).
(b) Set the check mode (see page 05-40).
(c) Perform a simulation test (see page 01-26).
(d) Check the connector and terminal (see page 01-36).
(e) Wiggle the harness and the connector (see page 01-36).

05ITD-02

CHECK MODE PROCEDURE

HINT:

Hand-held tester only:

Check mode has a higher sensitivity to malfunctions and can detect malfunctions that normal mode cannot detect. Check mode can also detect all the malfunctions that normal mode can detect.

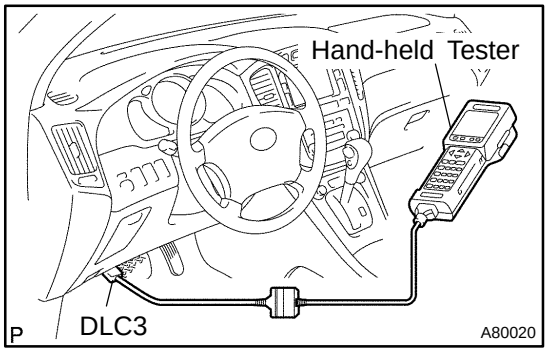
1. CHECK MODE PROCEDURE (Using the hand-held tester)

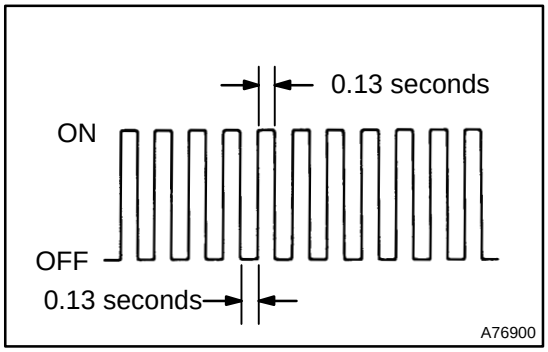
(a) Make sure that the items below are true:
  (1) Battery positive voltage 11 V or more
  (2) Throttle valve fully closed
  (3) Transmission in the P or N position
  (4) A/C switched OFF

(b) Turn the ignition switch OFF.

(c) Connect the hand-held tester to the DLC3.

(d) Turn the ignition switch ON.





(e) Change the ECM to check mode with the hand-held tester. Enter the following menus: DIAGNOSIS / ENHANCED OBD II / CHECK MODE. Make sure the MIL flashes as shown in the illustration.

NOTICE:

All DTCs and freeze frame data recorded will be erased if: 1) the hand-held tester is used to change the ECM from normal mode to check mode or vice-versa; or 2) during check mode, the ignition switch is turned from ON to ACC or OFF.

(f) Start the engine. The MIL should turn off after the engine starts.

(g) Simulate the conditions of the malfunction described by the customer.

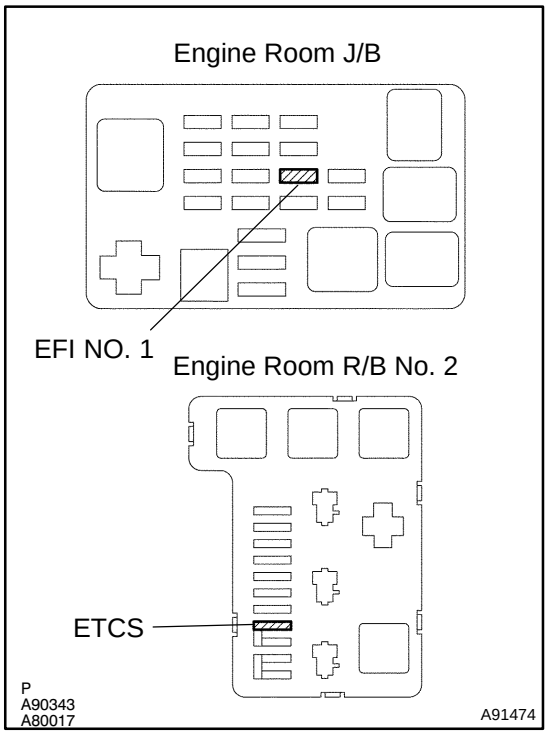
(h) After simulating the malfunction conditions, use the hand-held tester diagnosis selector to check the DTC, freeze frame data and other data.
  (1) After checking the DTC, inspect the applicable circuit.

2. CLEAR DTC (Using the OBD II scan tool or hand-held tester)

(a) Connect the OBD II scan tool or the hand-held tester to the DLC3.

(b) Turn the ignition switch ON.

(c) Erase DTCs and freeze frame data with the OBD II scan tool (complying with SAE J1978) or the hand-held tester. For the hand-held tester: 1) enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CLEAR CODES; and 2) press YES. For the OBD II scan tool, see its instruction manual.



3. CLEAR DTC (Not using the OBD II scan tool or hand-held tester)

(a) Remove the EFI NO. 1 fuse from the engine room J/B and ETCS fuse from the engine room R/B No. 2 for more than 60 seconds.

Or, disconnect the battery cable for more than 60 seconds. After disconnecting the battery terminal, perform the ”INITIALIZE” procedure (see page 05-893).

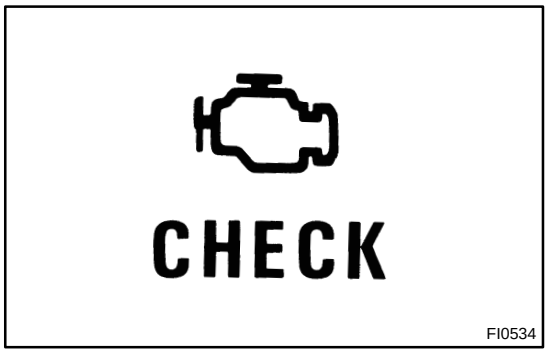
SFI SYSTEM (2AZ-FE)

05ESI-05

DEFINITION OF TERMS

Term	Definition
Monitor description	Description of what the ECM monitors and how it detects malfunctions (monitoring purpose and its details).
Related DTCs	A group of diagnostic trouble codes that are output by the ECM based on the same malfunction detection logic.
Typical enabling condition	Preconditions that allow the ECM to detect malfunctions. With all preconditions satisfied, the ECM sets the DTC when the monitored value(s) exceeds the malfunction threshold(s).
Sequence of operation	The priority order that is applied to monitoring, if multiple sensors and components are used to detect the malfunction. When a sensor is being monitored, the next sensor or component will not be monitored until the current sensor monitoring is finished.
Required sensor/components	The sensors and components that are used by the ECM to detect malfunctions.
Frequency of operation	The number of times that the ECM checks for malfunctions per driving cycle. ”Once per driving cycle” means that the ECM detects the malfunction only one time during a single driving cycle. ”Continuous” means that the ECM detects the malfunction every time an enabling condition is met.
Duration	The minimum time that the ECM must sense a continuous deviation in the monitored value(s) before setting a DTC. This timing begins after the ”typical enabling conditions” are met.
Malfunction thresholds	Beyond this value, the ECM will conclude that there is a malfunction and set a DTC.
MIL operation	MIL illumination timing after a defect is detected. ”Immediate” means that the ECM illuminates the MIL the instant the ECM determines that there is a malfunction. ”2 driving cycles” means that the ECM illuminates the MIL if the same malfunction is detected again in the 2nd driving cycle.

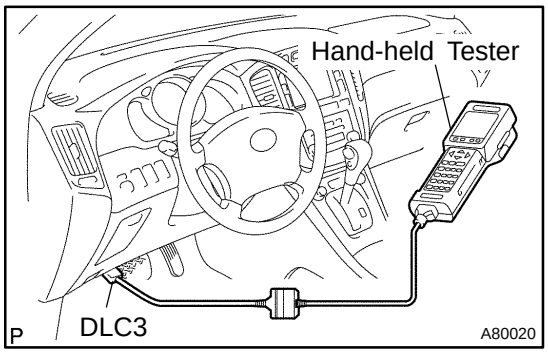
DIAGNOSIS SYSTEM



1. DESCRIPTION

* When troubleshooting On-Board Diagnostic (OBD II) vehicles, the vehicle must be connected to the OBD II scan tool (in compliance with SAE J1978) or the hand-held tester. Various data output from the vehicle's ECM can then be read.
* OBD II regulations require that the vehicle's on-board computer illuminates the Malfunction Indicator Lamp (MIL) on the instrument panel when the computer detects a malfunction in: 1) the emission control system/components, or 2) the powertrain control components (which affect vehicle emissions), or 3) the computer. In addition, the applicable Diagnostic Trouble Codes (DTCs) prescribed by SAE J2012 are recorded in the ECM memory (see page 05-48).

If the malfunction does not reoccur in 3 consecutive trips, the MIL turns off automatically but the DTCs remain recorded in the ECM memory.



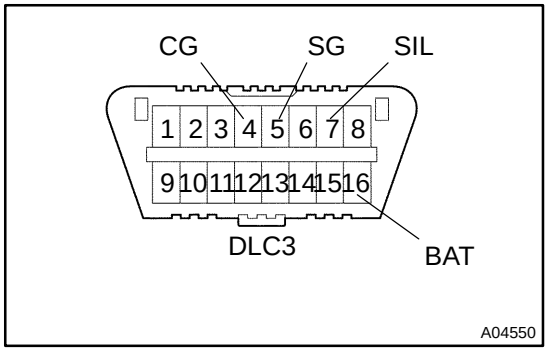
* To check DTCs, connect the hand-held tester or OBD II scan tool to the Data Link Connector 3 (DLC3) of the vehicle. The hand-held tester or OBD II scan tool also enables you to erase the DTC and check the freeze frame data and various forms of engine data (see the instruction manual for the OBD II scan tool or the hand-held tester). The DTC includes SAE controlled codes and manufacturer controlled codes. SAE controlled codes must be set according to the SAE, while manufacturer controlled codes can be set by a manufacturer with certain restrictions (see the DTC chart on page 05-48).
* The diagnosis system operates in "normal mode" during normal vehicle use. In "normal mode", 2 trip detection logic* is used to ensure accurate detection of malfunctions. A "check mode" is also available to technicians as an option. In "check mode", 1 trip detection logic is used for simulating malfunction symptoms and increasing the system's ability to detect malfunctions, including intermittent malfunctions (hand-held tester only) (see page 05-40).

* *2 trip detection logic:
  When a malfunction is first detected, the malfunction is temporarily stored in the ECM memory (1st trip). If the ignition switch is turned OFF and then ON again, and the same malfunction is detected again, the MIL will illuminate (2nd trip).
* Freeze frame data:
  The freeze frame data records the engine conditions (fuel system, calculated load, engine coolant temperature, fuel trim, engine speed, vehicle speed, etc.) when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

Priorities for troubleshooting:

When multiple DTCs occur, find out the order in which the DTCs should be inspected by checking the component's DTC chart. If no instructions are written in the DTC chart, check DTCs in the following order of priority:

(a) DTCs other than fuel trim malfunction DTCs (P0171 and P0172) and misfire DTCs (P0300 to P0304).
(b) Fuel trim malfunction DTCs (P0171 and P0172).
(c) Misfire DTCs (P0300 to P0304).



2. CHECK DLC3

The vehicle's ECM uses the ISO 9141-2 for communication protocol. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 9141-2 format.

Symbol	Terminal No.	Name	Reference terminal	Result	Condition
SIL	7	Bus "+" line	5 - Signal ground	Pulse generation	During transmission
CG	4	Chassis ground	Body ground	Below 1 Ω	Always
SG	5	Signal ground	Body ground	Below 1 Ω	Always
BAT	16	Battery positive	Body ground	9 to 14 V	Always

HINT:
Connect the cable of the OBD II scan tool or the hand-held tester to the DLC3, turn the ignition switch ON and attempt to use the OBD II scan tool or the hand-held tester. If the screen displays UNABLE TO CONNECT TO VEHICLE, a problem exists in the vehicle side or the tester side.

- If the communication is normal when the tool is connected to another vehicle, inspect the DLC3 on the original vehicle.
- If the communication is still impossible when the tool is connected to another vehicle, the problem is probably in the tool itself. Consult the Service Department listed in the tool's instruction manual.

3. CHECK BATTERY VOLTAGE
Standard: 11 to 14 V

If the voltage is below 11 V, recharge the battery before proceeding.

4. CHECK MIL

(a) The MIL turns on when the ignition switch is turned ON and the engine is not running.

HINT:
If the MIL does not turn on, troubleshoot the MIL circuit (see page 05-359).

(b) When the engine is started, the MIL should turn off. If the lamp remains on, the diagnosis system has detected a malfunction or abnormality in the system.

05ESS-05

DATA LIST/ACTIIVE TEST/SYSTEM CHECK/SYSTEM CHECK

1. DATA LIST

HINT:

Using the hand-held tester DATA LIST allows switch, sensor, actuator and other item values to be read without removing any parts. Reading the DATA LIST early in troubleshooting is one way to shorten labor time.

NOTICE:

In the table below, the values listed under ”Normal Condition” are reference values. Do not depend solely on the these reference values when deciding whether a part is faulty or not.

(a) Warm up the engine.
(b) Turn the ignition switch OFF.
(c) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(d) Turn the ignition switch ON.
(e) Turn ON the hand-held tester or the OBD II scan tool.
(f) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST.
(g) According to the display on tester, read the ”DATA LIST”.

Hand-held Tester Display	Measurement Item/Range (Display)	Normal Condition*	Diagnostic Note
INJECTOR	Injection period/ Minimum: 0 ms, Maximum: 32.64 ms	Idling: 1.92 to 3.37 ms	-
IGN ADVANCE	Ignition timing advance/ Minimum: -64 deg., Maximum: 63.5 deg.	Idling: BTDC 5 to 15 deg.	-
CALC LOAD	Calculated load by ECM/ Minimum: 0 %, Maximum: 100 %	・Idling: 3.3 to 26.7 % ・Racing without load (2500 rpm): 12.0 to 14.7 %	-
MAF	Air flow rate from MAF meter/ Minimum: 0 gm/s, Maximum: 655 gm/s	・Idling: 0.58 to 4.67 gm/second ・Racing without load (2,500 rpm): 3.33 to 9.17 gm/second	If value is approximately 0.0 gm/s: ・Mass air flow meter power source circuit open ・VG circuit open or short If value is 160.0 gm/s or more: ・EVG circuit open
ENGINE SPD	Engine Speed/ Minimum: 0 rpm, Maximum: 16,383 rpm	Idling: 550 to 750 rpm	-
COOLANT TEMP	Coolant temperature/ Minimum: -40℃, Maximum: 140℃	After warming up: 80 to 95˚C (176 to 203˚F)	・If value is -40℃ (-40℉): sensor circuit is open ・If value is 140℃ (284℉) or more: sensor circuit is shorted
INTAKE AIR	Intake air temperature/ Minimum: -40℃, Maximum: 140℃	Equivalent to ambient temperature (after cold soak)	・If value is -40℃ (-40℉): sensor circuit is open ・If value is 140℃ (284℉) or more: sensor circuit is shorted
THROTTLE POS	Absolute throttle position sensor/ Minimum: 0 %, Maximum: 100 %	・Throttle fully closed: 6 to 16 % ・Throttle fully open: 64 to 98 %	Read value with ignition switch ON (do not start engine)
CTP SW	Closed throttle position switch/ ON or OFF	・Throttle fully closed: ON ・Throttle open: OFF	-
VEHICLE SPD	Vehicle speed/ Minimum: 0 km/h, Maximum: 255 km/h	Vehicle stopped: 0 km/h (0 mph)	Speed indicated on speedometer
ACCEL POS #1	Accelerator pedal position sensor No.1 output voltage/ Minimum: 0 V, Maximum: 5 V	・Accelerator released: 0.5 to 1.1 V ・Accelerator depressed: 2.6 to 4.5 V	Read value with ignition switch ON (do not start engine)
ACCEL POS #2	Accelerator pedal position sensor No. 2 output voltage/ Minimum: 0 V, Maximum: 5 V	・Accelerator released: 1.2 to 2.0 V ・Accelerator depressed: 3.4 to 5.3 V	Read value with ignition switch ON (do not start engine)

Hand-held Tester Display	Measurement Item/Range (Display)	Normal Condition*	Diagnostic Note
THROTTLE POS #2	Throttle position sensor No. 2 output voltage/ Minimum: 0 V, Maximum: 5 V	・Throttle fully closed: 2.1 to 3.1 V ・Throttle fully open: 4.5 to 5.5 V	Read value with ignition switch ON (do not start engine)
THROTTLE TARGT	Target position of throttle valve/ Minimum: 0 V, Maximum: 5 V	Idling: 0.4 to 1.1 V	Read value with ignition switch ON (do not start engine)
THROTTLE OPN DUTY	Throttle actuator opening duty ratio/ Minimum: 0 %, Maximum: 100 %	Throttle fully closed: 0 %	・When accelerator pedal is depressed, duty ratio is increased ・Read value with ignition switch ON (do not start engine)
THROTTLE CLS DUTY	Throttle actuator closed duty ratio/ Minimum: 0 %, Maximum: 100 %	Throttle fully open: 0 %	・When accelerator pedal is quick released, duty ratio is increased ・Read value with ignition switch ON (do not start engine)
THROTTLE MOT	Whether or not throttle actuator control is permitted/ ON or OFF	Idling: ON	Read value with ignition switch ON (do not start engine)
+BM	Whether or not electric throttle control system power is input/ ON or OFF	Idling: ON	-
VAPOR PRESS	Vapor Pressure/ Minimum: 97.175 kPa, Maximum: 103.425 kPa	Usable range: 60 to 110 kPa	Pressure inside of fuel tank as read by vapor pressure sensor
O2S B1 S2	Oxygen sensor output voltage of the bank 1 sensor 2/ Minimum: 0 V, Maximum: 1.275 V	Idling: 0.1 to 0.9 V	Performing INJ VOL or A/F CONTROL function of ACTIVE TEST enables technician to check voltage output of each sensor
AFS B1 S1	A/F sensor output voltage of the bank 1 sensor 1/ Minimum: 0 V, Maximum: 7.999 V	Idling: 2.8 to 3.8 V	Performing INJ VOL or A/F CONTROL function of ACTIVE TEST enables technician to check voltage output of each sensor
ACCEL IDL POS	Whether or not accelerator pedal position sensor is detecting idle/ ON or OFF	Idling: ON	—
THROTTLE IDL POS	Whether or not throttle position sensor is detecting idle/ ON or OFF	Idling: ON	—
FAIL #1	Whether or not fail safe function is executed/ ON or OFF	ETCS has failed: ON	—
FAIL #2	Whether or not fail safe function is executed/ ON or OFF	ETCS has failed: ON	—
THROTTLE INITIAL	Throttle fully closed (learned value) Minimum: 0 V, Maximum: 5 V	0.5 to 0.9 V	—
ACCEL LEARN VAL	Accelerator fully closed (learned value) Minimum: 0 V, Maximum: 5 V	0.4 to 0.8 V	—
THROTTLE MOT	Throttle motor current Minimum: 0 A, Maximum: 20 A	Idling: 0 to 3.0 A	—
SHORT FT #1	Short term fuel trim of bank 1/ Minimum: -100 %, Maximum: 100 %	0 ± 20 %	This item is short-term fuel compensation used to maintain air-fuel ratio at stoichiometric air-fuel ratio
LONG FT #1	Long term fuel trim of bank 1/ Minimum: -100 %, Maximum: 100 %	0 ± 20 %	This item is overall, long-term fuel compensation that helps to maintain air-fuel ratio at stoichiometric air fuel ratio (steadies long term deviations of short-term fuel trim from central value).
TOTAL FT #1	Total fuel trim of bank 1/ Minimum: 0.5, Maximum: 1.496	Idling: 0.5 to 1.4	-

Hand-held Tester Display	Measurement Item/Range (Display)	Normal Condition*	Diagnostic Note
AF FT B1 S1	Short term fuel trim associated with bank 1, sensor 1/ Minimum: 0, Maximum: 1.999	・Value less than 1 (0.000 to 0.999) = LEAN ・Stoichiometric Air-Fuel Ratio=1 ・Value greater than 1 (1.001 to 1.999) = RICH	-
FUEL SYS #1	Fuel system status (Bank 1) / OL or CL or OL DRIVE or OL FAULT or CL FAULT	Idling after warming up: CL	・OL (Open Loop) : Has not yet satisfied conditions to go closed loop ・CL (Closed Loop) : Using heated oxygen sensor(s) as feed back for fuel control ・OL DRIVE: Open loop due to driving conditions (fuel enrichment) ・OL FAULT: Open loop due to detected system fault ・CL FAULT: Closed loop but one of heated oxygen sensors, which is used for fuel control, is malfunctioning
FC IDL	Idle fuel cut/ ON or OFF	Fuel cut operation: ON	FC IDL = ON when throttle valve is fully closed and engine speed is over 1,500 rpm
MIL	MIL status/ ON or OFF	MIL ON: ON	-
STARTER SIG	Starter signal/ ON or OFF	Cranking: ON	-
A/C SIG	A/C signal/ ON or OFF	A/C ON: ON	-
PNP SW [NSW]	PNP switch signal/ ON or OFF	P or N position: ON	-
ELECT LOAD SIG	Electrical load signal/ ON or OFF	Defogger switch ON: ON	-
STOP LIGHT SW	Stop lamp switch/ ON or OFF	・Brake pedal depressed: ON ・Brake pedal released: OFF	-
PS OIL PRESS SW	Power steering signal/ ON or OFF	・While turning steering wheel: ON ・While not turning steering wheel: OFF	Idle-up control is performed when PS is ON
PS SIGNAL	Power steering signal/ ON or OFF	When steering wheel is turned	This signal is usually ON until Ignition switch is turned OFF
FUEL PUMP / SPD	Fuel pump / speed status / ON/H or OFF/M,L	Idling: ON	-
A/C MAG CLUTCH	A/C magnet clutch status / ON or OFF	A/C magnet clutch ON: ON	-
EVAP VSV	EVAP VSV status control / ON or OFF	VSV operating: ON	EVAP VSV is controlled by ECM (ground side duty control)
VVT CTRL B1	VVT control status (Bank 1) / ON or OFF	VVT system operation: ON	-
IGNITION	Ignition counter/ Minimum: 0, Maximum: 400	0 to 400	-
CYL #1, #2, #3, #4	Misfire ratio of cylinder 1 to 4/ Minimum: 0 %, Maximum: 50 %	0 %	This item is displayed in only idling
MISFIRE LOAD	Engine load for first misfire range/ Minimum: 0 g/rev, Maximum: 3.98 g/rev.	Misfire 0: 0 g/rev.	—
MISFIRE RPM	Engine RPM for first misfire range/ Minimum: 0 rpm, Maximum: 6,375 rpm	Misfire 0: 0 rpm	—
FC TAU	Fuel Cut TAU: Fuel cut during very light load/ ON or OFF	Fuel cut operating: ON	Fuel cut is being performed under very light load to prevent engine combustion from becoming incomplete
CHECK MODE	Check mode/ ON or OFF	Check mode ON: ON	See page 05-40

HINT:
*: If no conditions are specifically stated for ”ldling”, the shift lever is in the N or P position, the A/C switch is OFF and all accessory switches are OFF.

2. ACTIVE TEST

HINT:
Performing the hand-held tester ACTIVE TEST allows relay, VSV, actuator and other items to be operated without removing any parts. Performing the ACTIVE TEST early in troubleshooting is one way to shorten labor time. The DATA LIST can be displayed during the ACTIVE TEST.

(a) Warm up the engine.
(b) Turn the ignition switch OFF.
(c) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(d) Turn the ignition switch ON.
(e) Turn ON the hand-held tester or the OBD II scan tool.
(f) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST.
(g) According to the display on tester, perform the ”ACTIVE TEST.

Hand-held Tester Display	Test Details	Diagnostic Note
INJ VOL	[Test Details] Control injection volume Minimum: -12.5 %, Maximum: 25 % [Vehicle Condition] Engine speed: 3000 rpm or less	・All injectors are tested at once ・Injection volume is gradually changed between -12.5 and 25 %
A/F CONTROL	[Test Details] Control injection volume -12.5 or 25 % (change the injection volume -12.5 % or 25 %) [Vehicle Condition] Engine speed: 3000 rpm or less	Following A/F CONTROL procedure enables technician to check and graph voltage outputs of both A/F sensor and heated oxygen sensor For displaying the graph, enter ”ACTIVE TEST / A/F CONTROL / USER DATA”, select ”AFS B1S1 and O2S B1S2” by pressing ”YES” and push ”ENTER”, Then press ”F4”
EVAP VSV (ALONE)	[Test Details] Activate EVAP VSV control ON or OFF	-
A/C MAG CLUTCH	[Test Details] Control A/C magnet clutch ON or OFF	-
FUEL PUMP / SPD	[Test Details] Control fuel pump ON or OFF	-
VCUUM PUMP (ALONE)	[Test Details] Vacuum pump ON or OFF	-
VENT VALVE (ALONE)	[Test Details] Vent valve ON or OFF	-
VVT CTRL B1	[Test Details] Activate VVT system (Bank 1) ON or OFF	・ON: Rough idle or engine stall ・OFF: Normal engine speed
TC/TE1	[Test Details] Connect TC and TE1 ON or OFF	-
FC IDL PROHBT	[Test Details] Control idle fuel cut prohibit ON or OFF	-

Hand-held Tester Display	Test Details	Diagnostic Note
TC/TE1	[Test Details] Connect TC and TE1 ON or OFF	-
FC IDL PROHBT	[Test Details] Control idle fuel cut prohibit ON or OFF	-

3. SYSTEM CHECK

HINT:

Performing the hand-held tester SYSTEM CHECK allows the system which is composed of multiple actuators to be operated without removing any parts.

Operate the system by performing SYSTEM CHECK and check for DTCs. And, potential malfunctions in the system can be detected on the tester.

(a) Connect the hand-held tester to the DLC3.

(b) Turn ON the ignition switch and the hand-held tester.

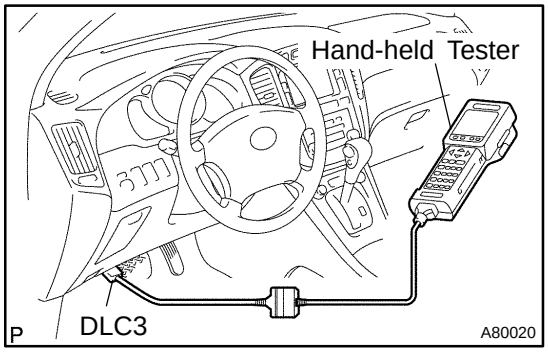
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / SYSTEM CHECK.

(d) According to the display on the tester, perform the ”SYSTEM CHECK.

Hand-held Tester Display	Test Details	Diagnostic Note
EVAP SYS CHECK (AUTO OPERATION)	EVAP key-off monitor is operated automatically by performing 7 steps in order. Fuel temperature: 35◌C (95◌F) or less is recommended	・If there is no DTC displayed on PENDING DTC after SYSTEM CHECK, system is functioning normally Refer to EVAP INSPECTION PROCEDURE (on page 05-317)
EVAP SYS CHECK (MANUAL OPERATION)	EVAP key-off monitor is operated manually by performing 7 steps in order. Fuel temperature: 35◌C (95◌F) or less is recommended	・Used to detect a malfunctioning part Refer to EVAP INSPECTION PROCEDURE (on page 05-317)

05ESP-05

DTC CHECK/CLEAR



NOTICE:

- **If no DTC appears in normal mode:**
  On the OBD II scan tool or the hand-held tester check the pending fault code using the Continuous Test Results function (Mode 7 for SAE J1979).
- **When the diagnosis system is changed from normal mode to check mode or vice-versa, all DTCs and freeze frame data recorded in normal mode will be erased. Before changing modes, always check and make a note of DTCs and freeze frame data.**

1. CHECK DTC (Using the OBD II scan tool or hand-held tester)

(a) Connect the OBD II scan tool or hand-held tester to the DLC3.

(b) Turn the ignition switch ON.

(c) Use the OBD II scan tool or the hand-held tester to check the DTCs and freeze frame data and then write them down.
For the hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES. For the OBD II scan tool, see its instruction manual.

(d) See page 05-48 to confirm the details of the DTCs.

NOTICE:
When simulating a symptom with the OBD II scan tool (excluding hand-held tester) to check for DTCs, use the normal mode. For DTCs subject to "2 trip detection logic", perform either of the following actions.

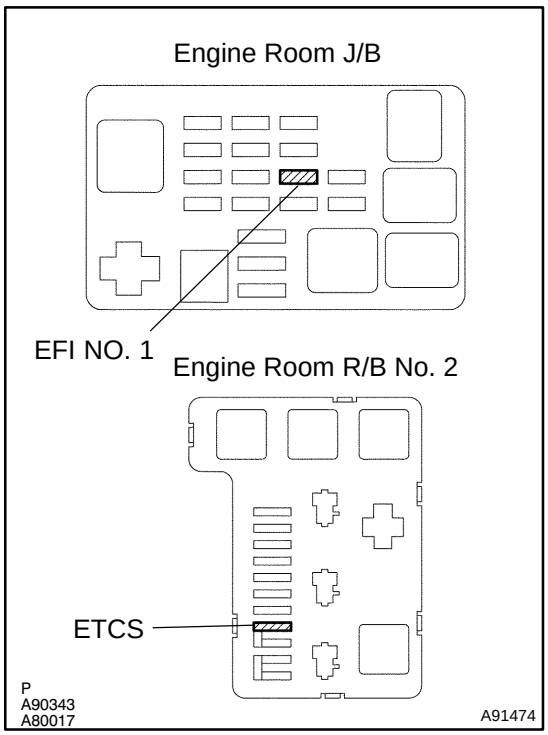
- **Turn the ignition switch OFF after the symptom is simulated once. Then repeat the simulation process again. When the problem has been simulated twice, the MIL illuminates and the DTCs are recorded in the ECM.**
- **Check the pending fault code using the Continuous Test Results function (Mode 7 for SAE J1979) on the OBD II scan tool.**

2. CLEAR DTC (Using the OBD II scan tool or hand-held tester)

(a) Connect the OBD II scan tool or the hand-held tester to the DLC3.

(b) Turn the ignition switch ON.

(c) Erase DTCs and freeze frame data with the OBD II scan tool (complying with SAE J1978) or the hand-held tester. For the hand-held tester: 1) enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CLEAR CODES; and 2) press YES. For the OBD II scan tool, see its instruction manual.



3. CLEAR DTC (Not using the OBD II scan tool or hand-held tester)

(a) Remove the EFI NO. 1 fuse from the engine room J/B and ETCS fuse from the engine room R/B No. 2 for more than 60 seconds. Or, disconnect the battery terminal for more than 60 seconds.

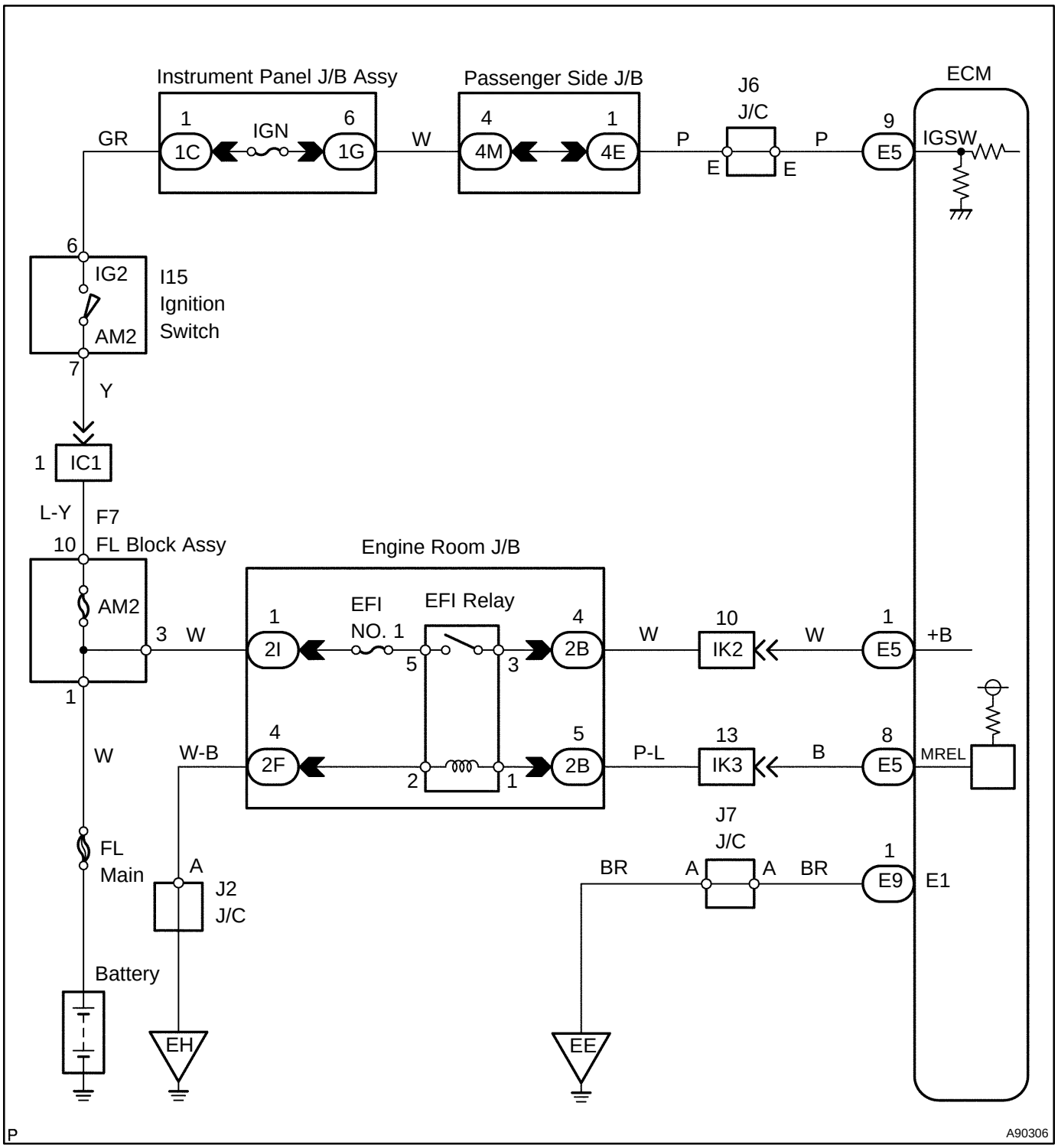
After disconnecting the battery cable, perform the ”INITIALIZE” procedure (see page 05-893).

ECM POWER SOURCE CIRCUIT

CIRCUIT DESCRIPTION

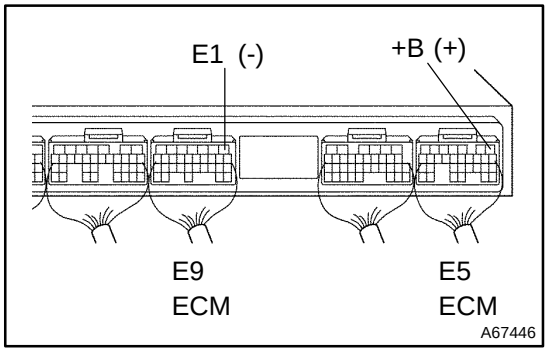
When the ignition switch is turned ON, battery voltage is applied to terminal IGSW of the ECM. The ECM "MREL" output signal causes current to flow to the coil, closing the contacts of the EFI relay (Marking: EFI) and supplying power to terminal +B of the ECM.
If the ignition switch is turned OFF, the ECM holds the EFI relay ON for a maximum of 2 seconds to allow for the initial setting of the throttle valve.

WIRING DIAGRAM



INSPECTION PROCEDURE

1 INSPECT ECM (+B VOLTAGE)



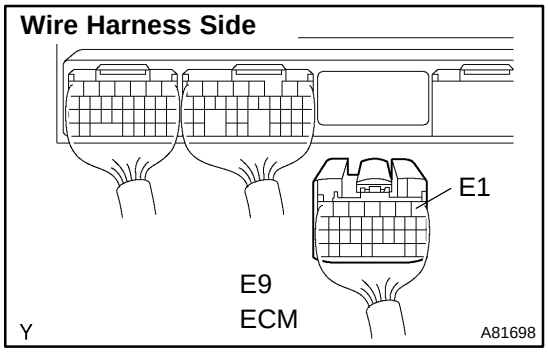
(a) Turn the ignition switch ON.
(b) Measure the voltage between of the ECM connectors.
Standard:

Tester Connection	Specified Condition
E5-1 (+B) - E9-1 (E1)	9 to 14 V

OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE (See page 05-31)**

NG

2 CHECK WIRE HARNESS (ECM - BODY GROUND)



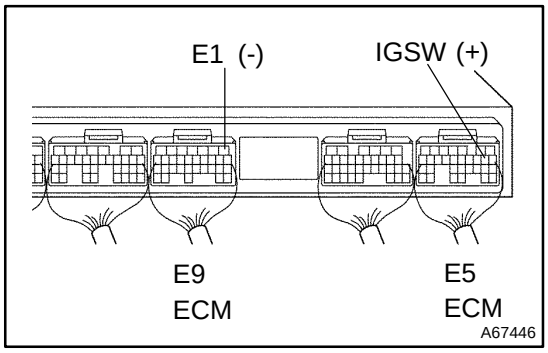
(a) Disconnect the E9 ECM connector.
(b) Measure the resistance of the wire harness side connectors.
Standard:

Tester Connection	Specified Condition
E9-1 (E1) - Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

3 INSPECT ECM (IGSW VOLTAGE)



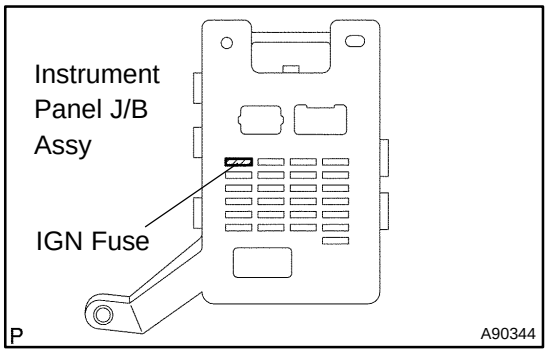
(a) Turn the ignition switch ON.
(b) Measure the voltage of the ECM connectors.
Standard:

Tester Connection	Specified Condition
E5-9 (IGSW) - E9-1 (E1)	9 to 14 V

OK → **Go to step 6**

NG

4 CHECK FUSE (IGN)

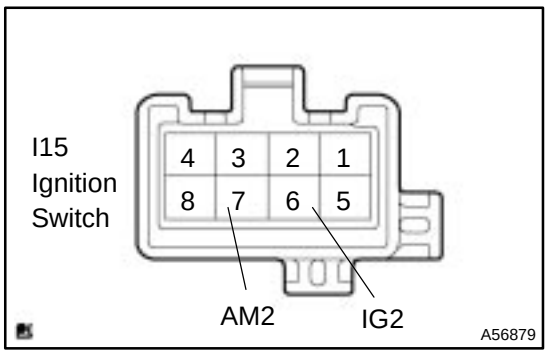


(a) Remove the IGN fuse from the instrument panel J/B Assy.
(b) Measure the resistance of the IGN fuse.
Standard: Below 1 Ω

NG → **REPLACE FUSE**

OK

5 INSPECT IGNITION OR STARTER SWITCH ASSY



(a) Measure the resistance of the ignition switch terminals.
Standard:

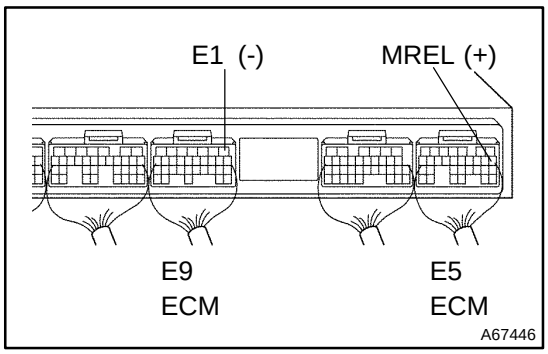
Switch Condition	Tester Condition	Specified Condition
LOCK	6 (IG2) - 7 (AM2)	10 kΩ or higher
ON	6 (IG2) - 7 (AM2)	Below 1 Ω

NG → **REPLACE IGNITION OR STARTER SWITCH ASSY**

OK

CHECK AND REPAIR HARNESS AND CONNECTOR (BATTERY - IGNITION SWITCH, IGNITION SWITCH - ECM)

6 INSPECT ECM (MREL VOLTAGE)



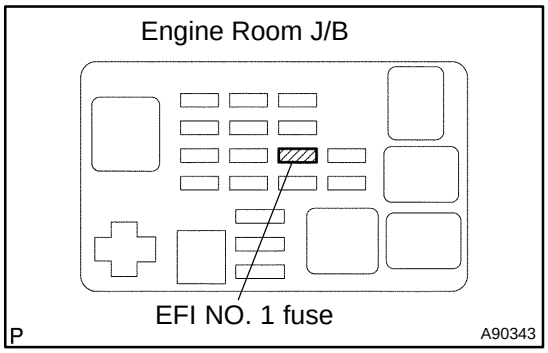
(a) Turn the ignition switch ON.
(b) Measure the voltage of the ECM connectors.
Standard:

Tester Connection	Specified Condition
E5-8 (MREL) - E9-1 (E1)	9 to 14 V

NG → **REPLACE ECM (See page 10-9)**

OK

7 CHECK FUSE (EFI NO. 1)

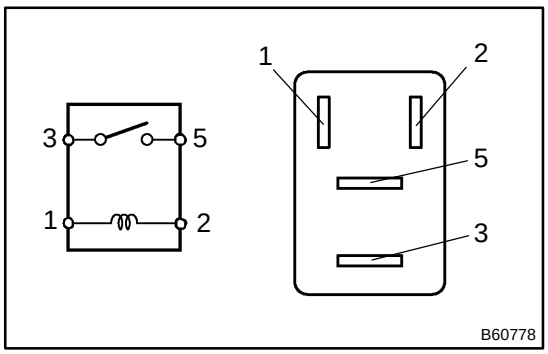


(a) Remove the EFI NO. 1 fuse from the engine room J/B.
(b) Measure the resistance of the EFI NO. 1 fuse.
Standard: Below 1 Ω

NG → **REPLACE FUSE**

OK

8 INSPECT RELAY (EFI)



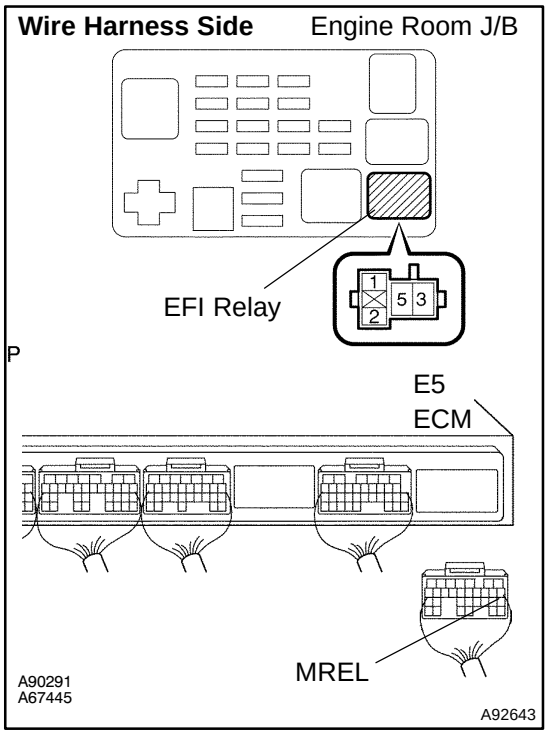
(a) Remove the EFI relay from the engine room J/B.
(b) Measure the resistance of the EFI relay.
Standard:

Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

NG → **REPLACE RELAY**

OK

9	CHECK WIRE HARNESS (EFI RELAY - ECM, EFI RELAY - BODY GROUND)



(a) Check the wire harness between the EFI relay and ECM.
  (1) Remove the EFI relay from the engine room J/B.
  (2) Disconnect the E5 ECM connector.
  (3) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
J/B EFI relay terminal 1 - E5-8 (MREL)	Below 1 Ω
J/B EFI relay terminal 1 or E5-8 (MREL) - Body ground	10 kΩ or higher

(b) Check the wire harness between the EFI relay and body ground.
  (1) Remove the EFI relay from the engine room J/B.
  (2) Measure the resistance of the wire harness side connector and the body ground.

Standard:

Tester Connection	Specified Condition
J/B EFI relay terminal 2 - Body ground	Below 1 Ω

OK → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

NG

CHECK AND REPAIR HARNESS AND CONNECTOR (TERMINAL +B OF ECM - BATTERY POSITIVE TERMINAL)

EVAP INSPECTION PROCEDURE

DTCS RELATING TO EVAP SYSTEM

DTCs	Monitoring Items	See Page
P043E	0.02 inch orifice clogged (built into pump module)	05-190
P043F	0.02 inch orifice high-flow (built into pump module)	05-190
P0441	·Purge VSV (Vacuum Switching Valve) stuck closed ·Purge VSV stuck open ·Purge flow	05-196
P0450	Pressure sensor (built into pump module) voltage abnormal fluctuation	05-202
P0451	·Pressure sensor (built into pump module) noising ·Pressure sensor stuck (built into pump module)	05-202
P0452	Pressure sensor (built into pump module) voltage low	05-202
P0453	Pressure sensor (built into pump module) voltage high	05-202
P0455	EVAP gross leak	05-211
P0456	EVAP small leak	05-211
P2401	Vacuum pump stuck OFF (built into pump module)	05-288
P2402	Vacuum pump stuck ON (built into pump module)	05-288
P2419	Vent valve stuck closed (built into pump module)	05-294
P2420	Vent valve stuck open (vent) (built into pump module)	05-294
P2610	Soak timer (built into ECM)	05-300

If any EVAP system DTCs are set, the malfunctioning area can be determined using the table below.

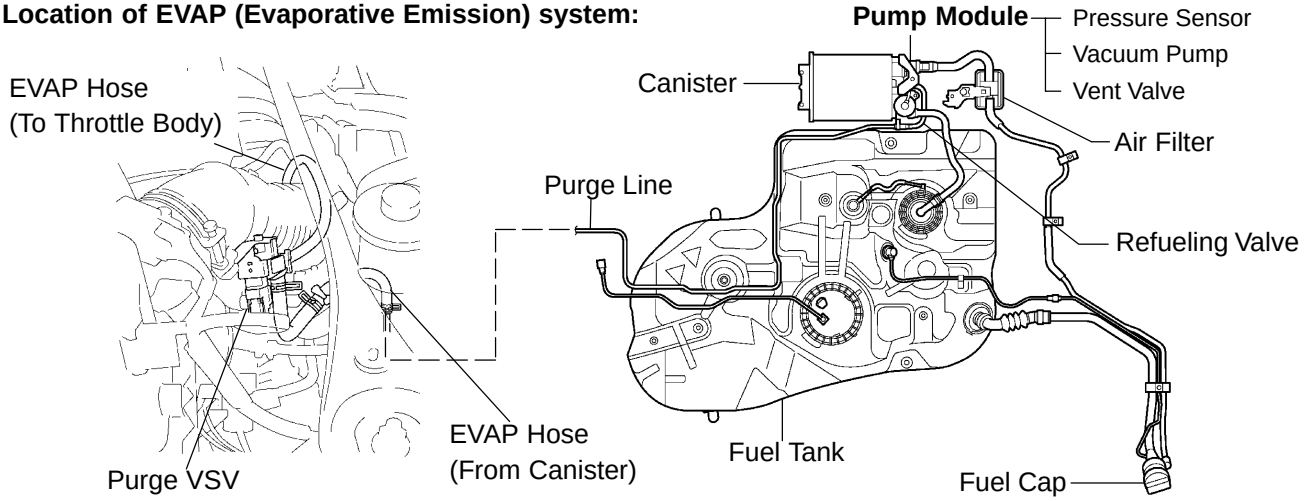
DTCs / Malfunctioning Areas	P043E P043F	P0441	P0450	P0451	P0452	P0453	P0455	P0456	P2401 P2402	P2419	P2420
0.02 inch orifice clogged	●								●	●	
0.02 inch orifice high-flow	●								●	●	
Purge VSV stuck open		●					●				
Purge VSV stuck closed		●									
Pressure sensor stuck				●							
Pressure sensor noise				●							
Pressure sensor low output			●		●						
Pressure sensor high output			●			●					
Gross leak		●					●				
Small leak								●			
Vacuum pump stuck OFF	●								●	●	
Vacuum pump stuck ON	●								●	●	
Vent valve stuck closed	●								●	●	
Vent valve stuck open (vent)											●

NOTICE:

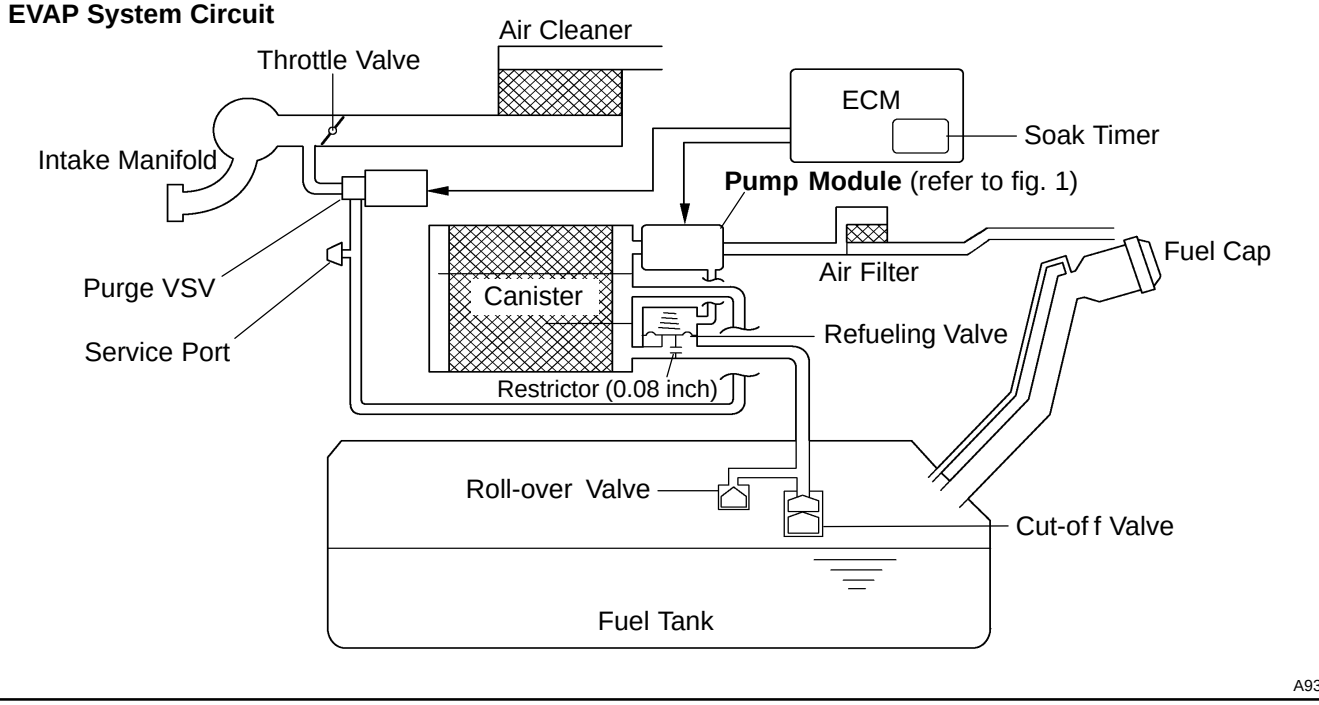
If the 0.02 inch reference pressure difference between the first and second checks is greater than the specification, the DTCs corresponding to the reference pressure (P043E, P043F, P0441, P0455, P0456, P2401, P2420) will be all stored.

CIRCUIT DESCRIPTION

Location of EVAP (Evaporative Emission) system:



EVAP System Circuit



While the engine is running, if a predetermined condition (closed-loop, etc.) is met, the purge VSV is opened by the ECM and stored fuel vapors in the canister are purged to the intake manifold. The ECM changes the duty cycle ratio of the purge VSV to control purge flow volume.

The purge flow volume is also determined by the intake manifold pressure. Atmospheric pressure is allowed into the canister through the vent valve to ensure that the purge flow is maintained when the negative pressure (vacuum) is applied to the canister.

The following two monitors run to confirm appropriate EVAP system operation.

Key-off monitor

This monitor checks for EVAP (Evaporative Emission) system leaks and pump module malfunctions. The monitor starts 5 hours* after the ignition switch is turned OFF. More than 5 hours are required to allow enough time for the fuel to cool down to stabilize the Fuel Tank Pressure (FTP), thus making the EVAP system monitor more accurate.

The electric vacuum pump creates negative pressure (vacuum) in the EVAP system and the pressure is measured. Finally, the ECM monitors for leaks from the EVAP system, and malfunctions in both the pump module and purge VSV, based on the EVAP pressure.

HINT:

*:If the engine coolant temperature is not below 35◯C 5 hours after the ignition switch is turned off, the monitor check starts 2 hours later. If it is still not below 35◯C 7 hours after the ignition switch is turned off, the monitor check starts 2.5 hours later.

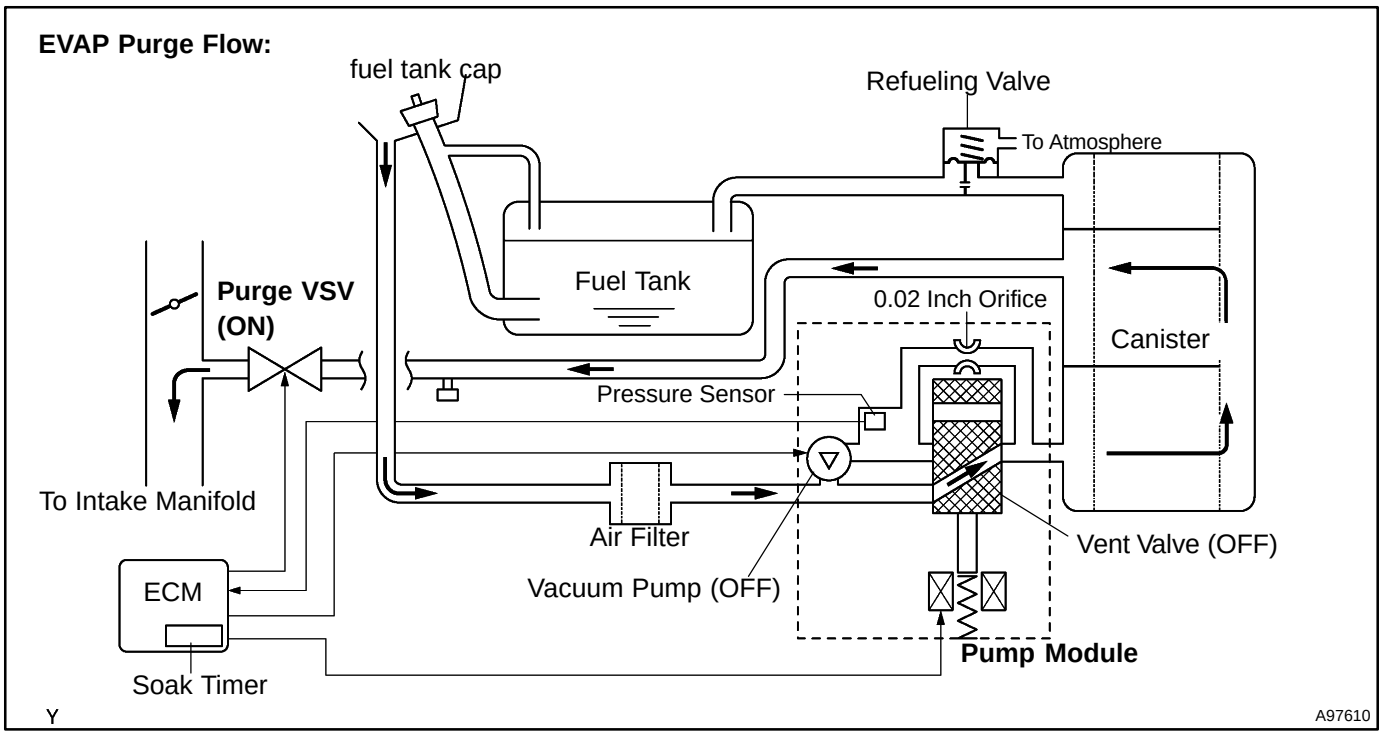
Purge flow monitor

The purge flow monitor consists of the two monitors. The 1st monitor is always conducted every time and the 2nd monitor is activated if necessary.

- The 1st monitor
  While the engine is running and the purge VSV (Vacuum Switching Valve) is ON (open), the ECM monitors the purge flow by measuring the EVAP pressure change. If negative pressure is not created, the ECM begins the 2nd monitor.
- The 2nd monitor
  The vent valve is turned ON (closed) and the EVAP pressure is then measured. If the variation in the pressure is less than 0.5 kpa (3.75 mmHg), the ECM interprets this as the purge VSV being stuck closed, and illuminates the MIL and sets DTC P0441 (2 trip detection logic).

Atmospheric pressure check:

In order to ensure reliable malfunction detection, the variation between the atmospheric pressures, before and after conduction of the purge flow monitor, is measured by the ECM.

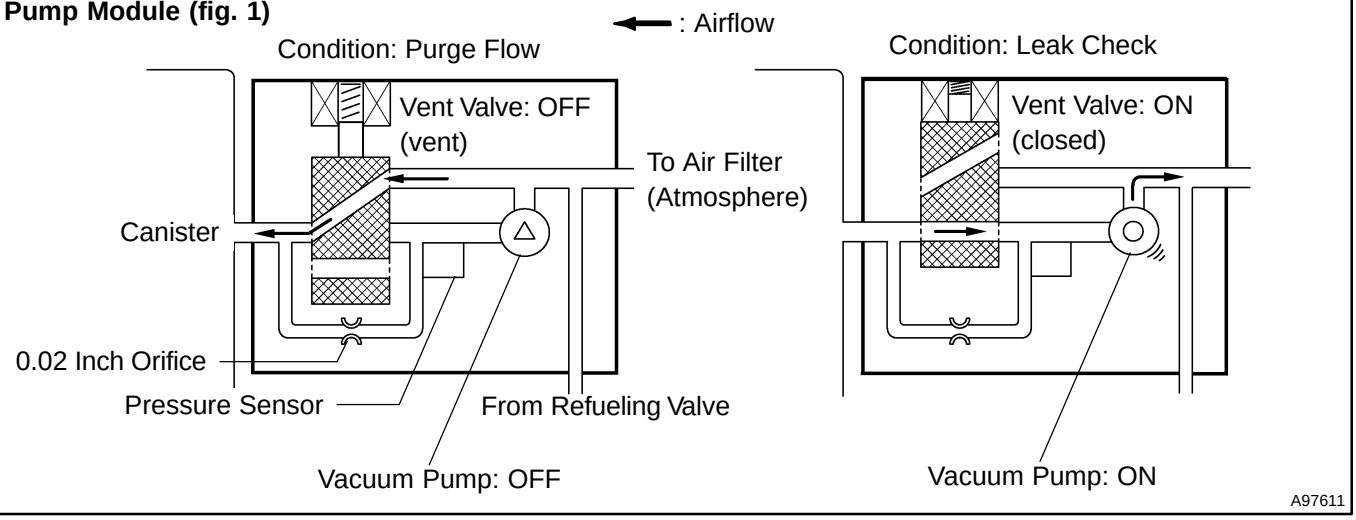


Components	Operations
Canister	Contains activated charcoal to absorb EVAP (Evaporative Emissions) generated in fuel tank.
Cut-off valve	Located in fuel tank. Valve floats and closes when fuel tank is 100 % full.
Purge VSV (Vacuum Switching Valve)	Opens or closes line between canister and intake manifold. ECM uses purge VSV to control EVAP purge flow. In order to discharge EVAP absorbed by canister to intake manifold, ECM opens purge VSV. EVAP discharge volume to intake manifold controlled by purge VSV duty cycle ratio (current-carrying time). (Open: ON, Close: OFF)
Refueling valve	Controls EVAP pressure from fuel tank to canister. Valve consists of diaphragm, spring and restrictor (diameter: 0.08 inch). When fuel vapor and pressure inside fuel tank increase, valve opens. While EVAP purged, valve closes and restrictor prevents large amount of vacuum from affecting pressure in fuel tank. Valve opened while refueling. When valve open, adding fuel into fuel tank possible.
Roll-over valve	Located in fuel tank. Valve closes by its own weight when vehicle overturns to prevent fuel from spilling out.
Service port	Used for connecting vacuum gauge for inspecting EVAP system.
Soak timer	Built into ECM. To ensure accurate EVAP monitor, measures 5 hours* after ignition switch turned to OFF. This allows fuel to cool down, stabilizing Fuel Tank Pressure (FTP). When apprx. 5 hours* elapsed, ECM activates.
Pump module	Consists of (a) to (d) below. Pump module cannot be disassembled.
(a) Vent valve	Vents and closes EVAP system. When ECM turns valve ON, EVAP system closed. When, ECM turns valve OFF, EVAP system vented. Negative pressure (vacuum) created in EVAP system to check for EVAP leaks by closing purge VSV, turning on vent valve (closed) and operating vacuum pump (refer to fig. 1).
(b) Pressure sensor	Indicates pressure as voltages. ECM supplies regulated 5 V to pressure sensor, and uses feedback from sensor to monitor EVAP system pressure (refer to fig 2).
(c) Vacuum pump	Creates negative pressure (vacuum) in EVAP system for leak check.
(d) 0.02 inch orifice	Has opening with 0.02 inch diameter. Vacuum produced through orifice by closing purge VSV, turning off vent valve and operating vacuum pump, to monitor 0.02 inch leak pressure. 0.02 inch leak pressure indicates small leak of EVAP.

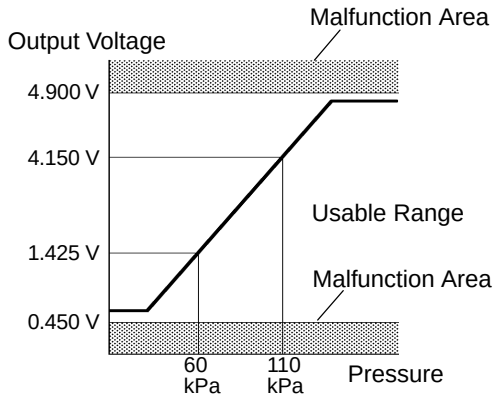
HINT:

*:If the engine coolant temperature is not below 35◯C after 5 hours after the ignition switch is turned off, the monitor check starts 2 hours later. If it is still not below 35◯C 7 hours after the ignition switch is turned off, the monitor check starts 2.5 hours later.

Pump Module (fig. 1)

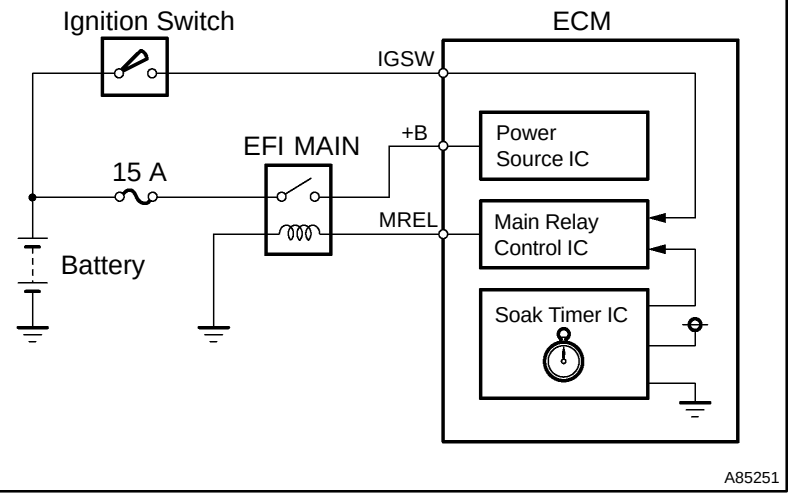


Pressure Sensor Specification (fig. 2)

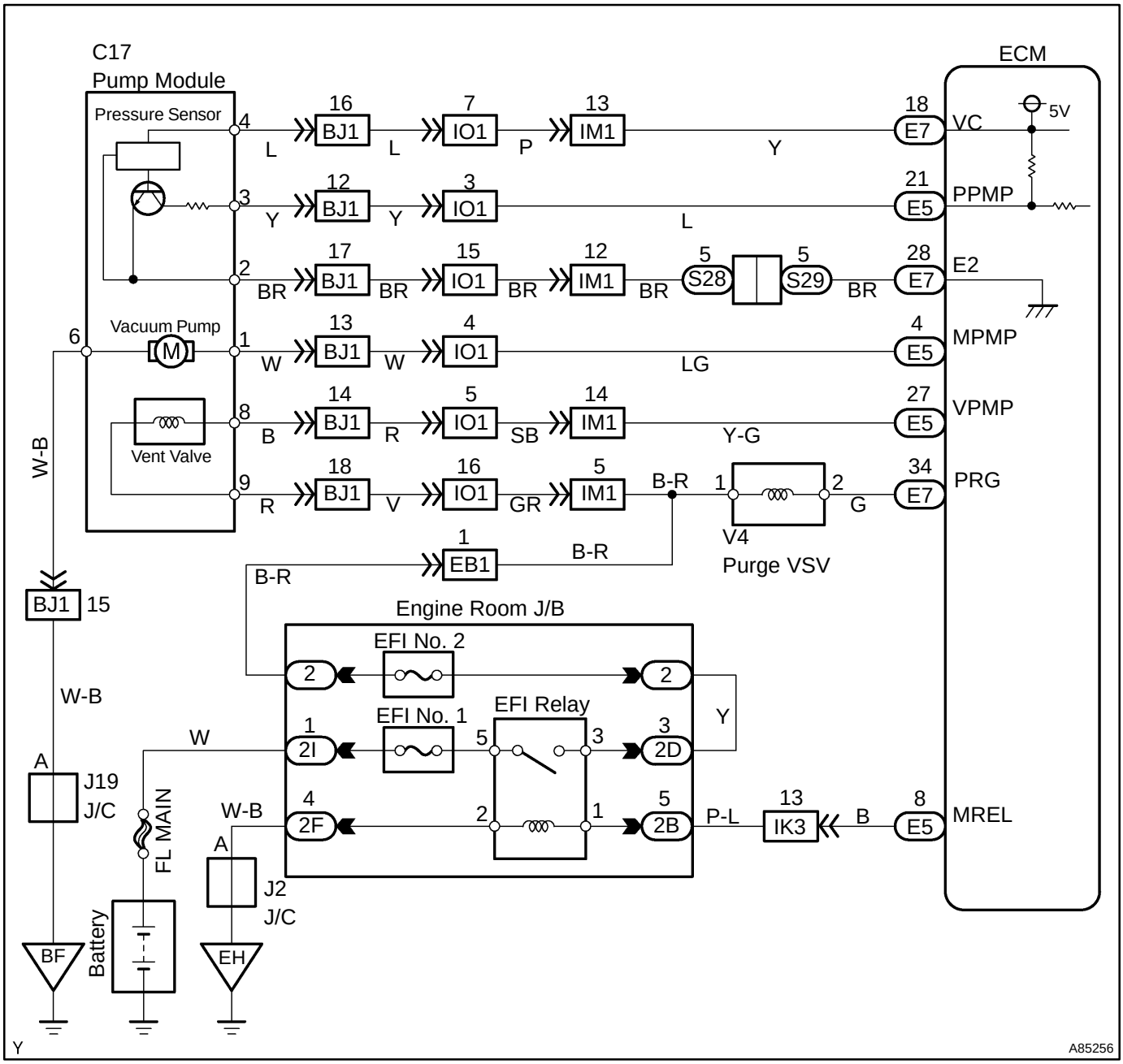


HINT:
Standard atmospheric pressure is 101.3 kPa

Soak Timer Circuit (fig. 3)



WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

A hand-held tester is required to conduct the following diagnostic troubleshooting procedure.

HINT:

- Using hand-held tester monitor results enables the EVAP (Evaporative Emission) system to be confirmed.
- Read freeze frame data using a hand-held tester Freeze frame data record the engine condition when malfunctions are detected. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data, from the time the malfunction occurred.

1	CONFIRM DTC

(a) Turn the ignition switch OFF and wait 10 seconds.
(b) Turn the ignition switch ON.
(c) Turn the ignition switch OFF and wait 10 seconds.
(d) Connect the hand-held tester to the DLC3.
(e) Turn the ignition switch ON and press the hand-held tester switch ON.
(f) Enter the following menus: DIAGNOSIS/ ENHANCED OBD II/ DTC INFO/ CURRENT CODES.
(g) Confirm the DTCs and freeze frame data.

If any EVAP system DTCs are set, the malfunctioning area can be determined using the table below.

DTCs / Malfunctioning Areas	P043E P043F	P0441	P0450	P0451	P0452	P0453	P0455	P0456	P2401 P2402	P2419	P2420
0.02 inch orifice clogged	●								●	●	
0.02 inch orifice high-flow	●								●	●	
Purge VSV stuck open		●					●				
Purge VSV stuck closed		●									
Pressure sensor stuck				●							
Pressure sensor noise				●							
Pressure sensor low output			●		●						
Pressure sensor high output			●			●					
Gross leak		●					●				
Small leak								●			
Vacuum pump stuck OFF	●								●	●	
Vacuum pump stuck ON	●								●	●	
Vent valve stuck closed	●								●	●	
Vent valve stuck open (vent)											●

NOTICE:

If the 0.02 inch reference pressure difference between the first and second checks is greater than the specification, the DTCs corresponding to the reference pressure (P043E, P043F, P0441, P0455, P0456, P2401, P2420) will be all stored.

NEXT

2	PERFORM EVAP SYSTEM CHECK(AUTO OPERATION)

NOTICE:

- **In the EVAP SYSTEM CHECK (AUTO OPERATION), the series of 5 EVAP SYSTEM CHECK steps is performed automatically. It takes a maximum of approximately 18 minutes.**
- **Do not perform the EVAP SYSTEM CHECK when the fuel tank is more than 90% full because the cut-off valve may be closed and making the leak check of the fuel tank unavailable.**
- **Do not run the engine in this step.**
- **When the temperature of the fuel is 35°C (95°F) or more, a large amount of vapor forms and any check results become inaccurate. When performing the EVAP SYSTEM CHECK, keep the temperature below 35°C (95°F).**

(a) Clear DTCs (see page 05-38).

(b) On the hand-held tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / SYSTEM CHECK / EVAP SYS CHECK / AUTO OPERATION.

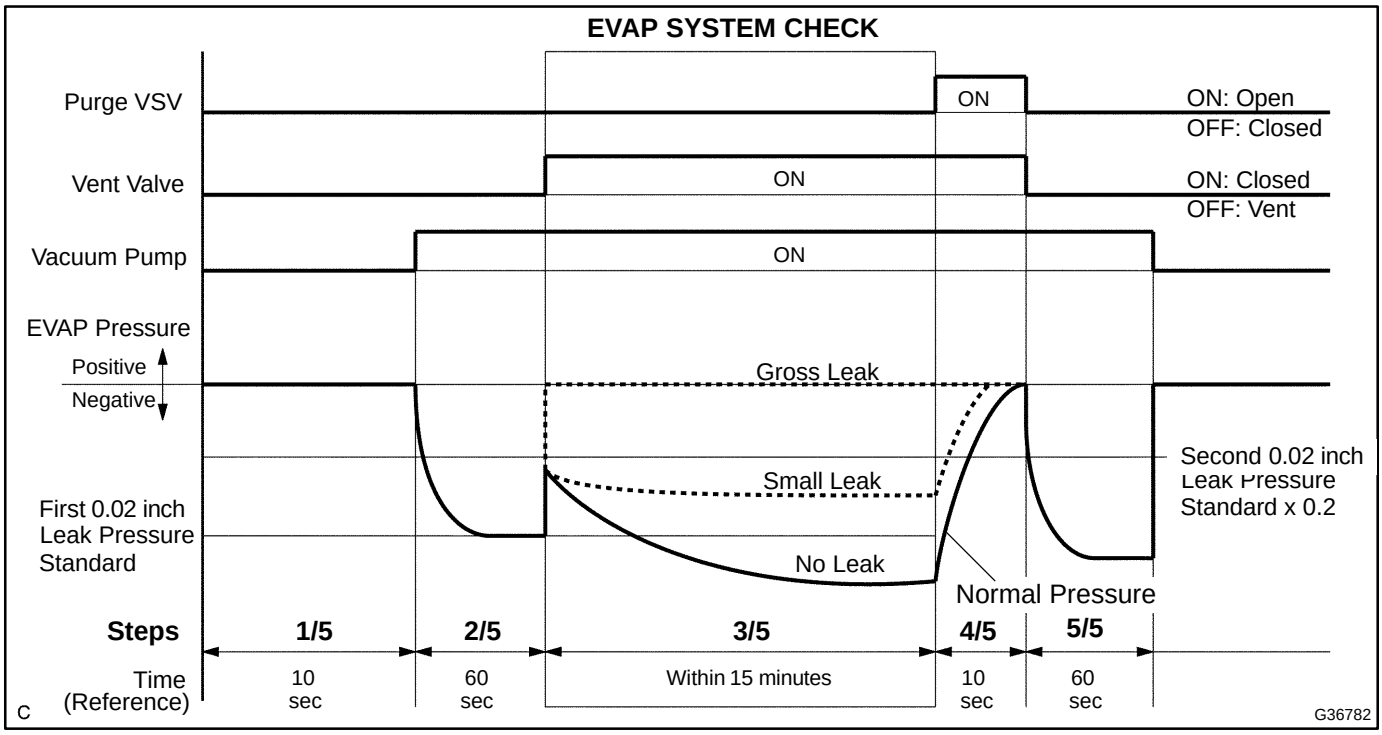
(c) After the EVAP SYSTEM CHECK is completed, check for pending DTCs by selecting the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES.

HINT:

If no pending DTC is displayed, perform the Monitor Confirmation after this repair is completed. After this confirmation, check for pending DTCs. If no DTC is displayed, the EVAP system is normal.

NEXT

3	PERFORM EVAP SYSTEM CHECK(MANUAL OPERATION)



NOTICE:

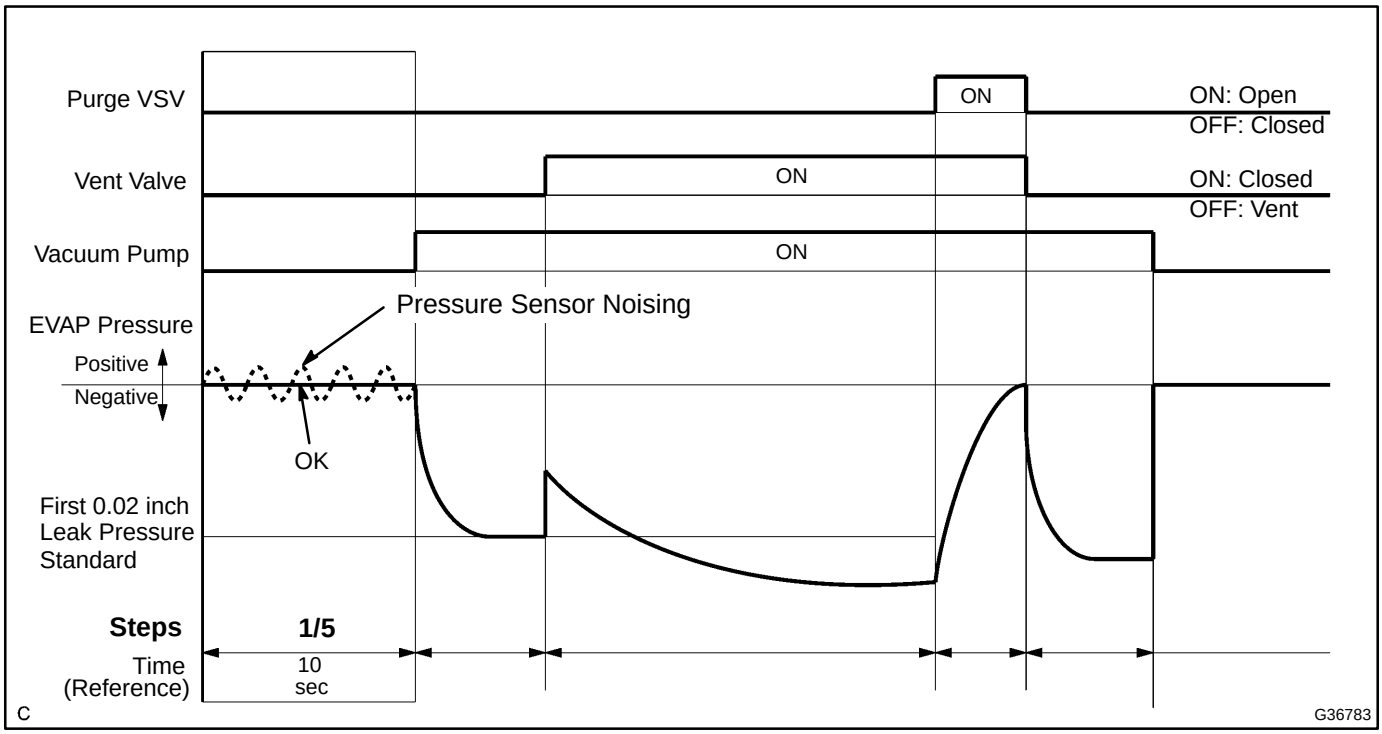
- **In the EVAP SYSTEM CHECK (MANUAL OPERATION), the series of 5 EVAP SYSTEM CHECK steps is performed manually.**
- **Do not perform the EVAP SYSTEM CHECK when the fuel tank is more than 90% full because the cut-off valve may be closed and making the leak check of the fuel tank unavailable.**
- **Do not run the engine in this step.**
- **When the temperature of the fuel is 35°C (95°F) or more, a large amount of vapor forms and any check results become inaccurate. When performing the EVAP SYSTEM CHECK, keep the temperature below 35°C (95°F).**

(a) Clear DTCs (see page 05-38).

(b) On the hand-held tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / SYSTEM CHECK / EVAP SYS CHECK / MANUAL OPERATION.

NEXT

4	PERFORM EVAP SYSTEM CHECK(STEP 1/5)



(a) Check the EVAP pressure in step 1/5.

Result:

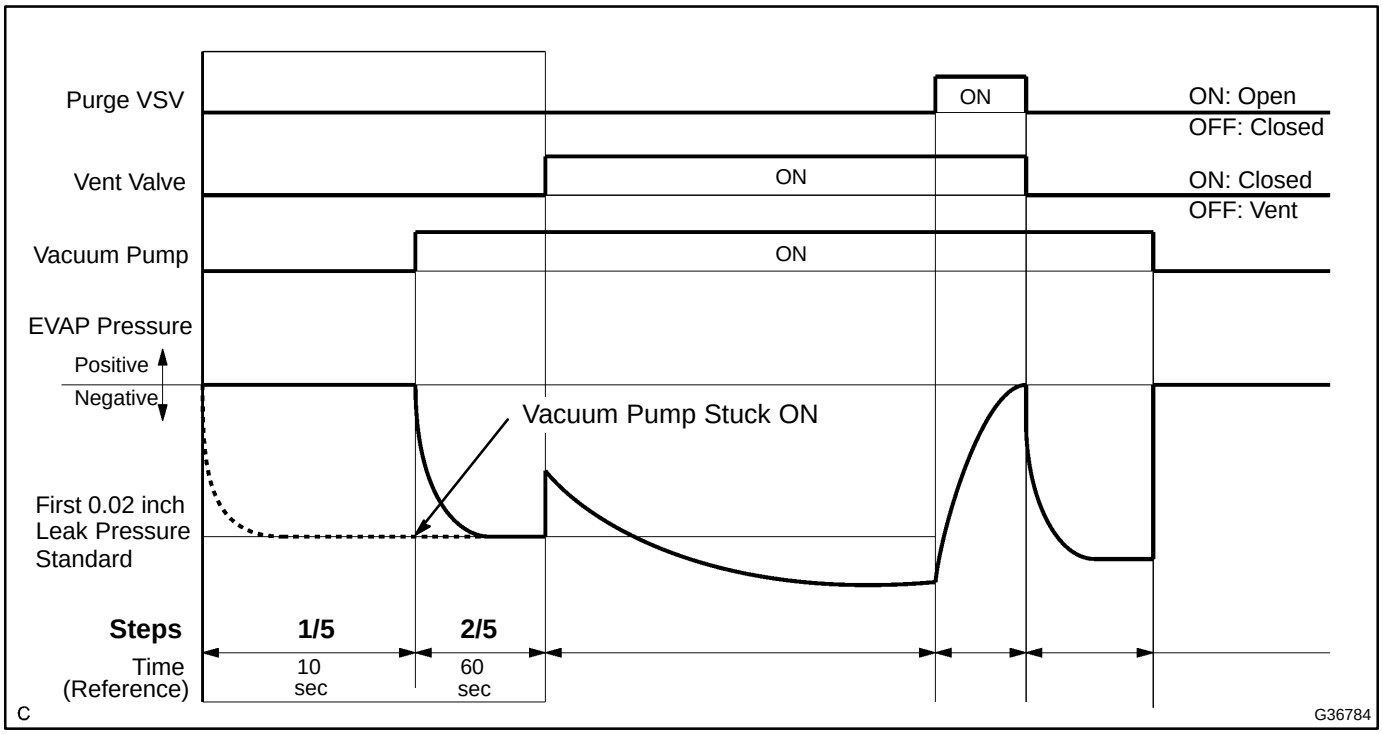
DTCs*	Test Results	Suspected Trouble Areas	Proceed To
—	Virtually no variation in EVAP pressure	Not yet determined	A
P0451	EVAP pressure fluctuates by ≦0.3 kPa (2.25 mmHg) or more	Pressure sensor noising	B

*: The DTCs relating to the EVAP system displayed on a hand-held tester when checking.

B → **Go to step 30**

A

5	**PERFORM EVAP SYSTEM CHECK(STEP 1/5 TO 2/5)**



(a) Check the EVAP pressure in step 1/5 and 2/5.

Result:

DTCs*	Test Results	Suspected Trouble Areas	Proceed To
—	Virtually no variation in EVAP pressure during step 1/5. Then decreases to 0.02 inch leak pressure standard*	Not yet determined	A
P2402	Small difference between EVAP pressures during steps 1/5 and 2/5	Vacuum pump stuck ON	B

*: The DTCs relating to the EVAP system displayed on a hand-held tester when checking.

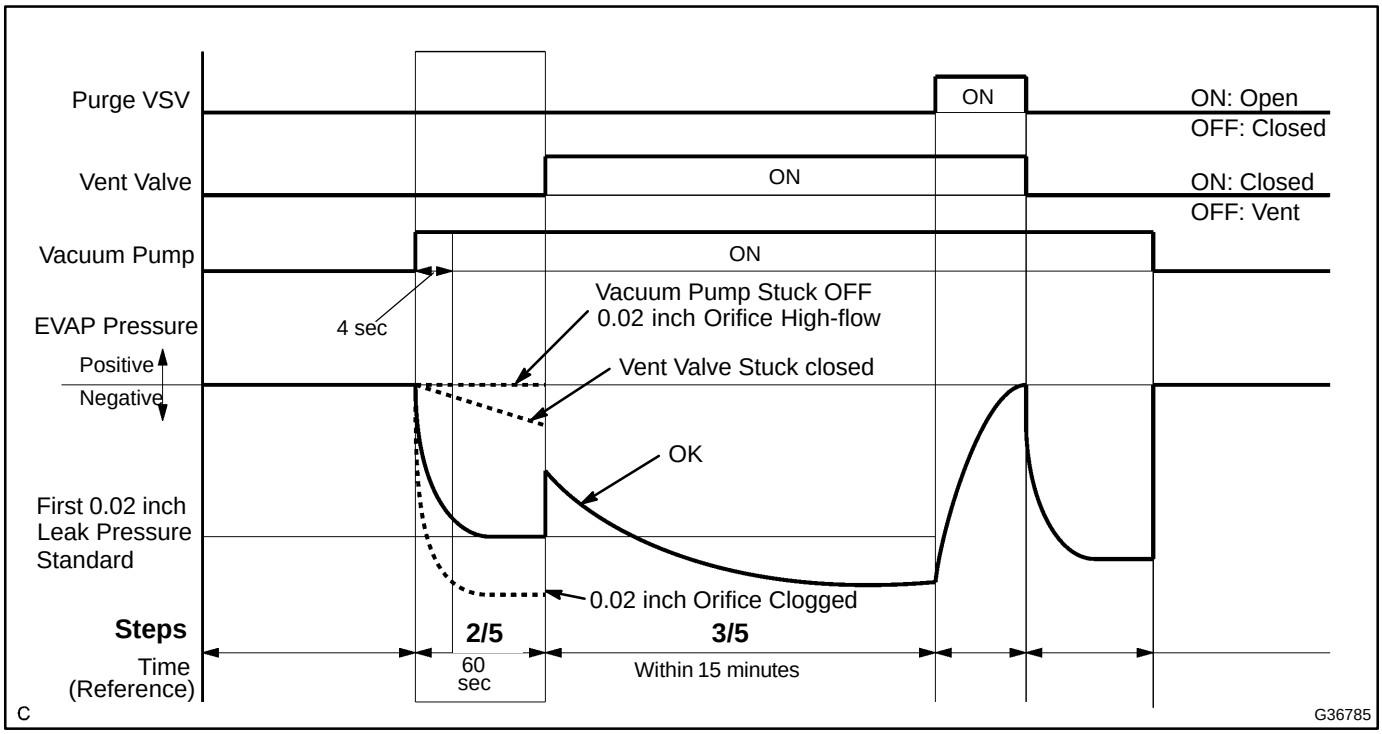
HINT:

The first 0.02 inch leak pressure standard is the value determined in step 2/5.

B → **Go to step 23**

A

6 PERFORM EVAP SYSTEM CHECK(STEP 2/5)



HINT:

Make a note of the pressures checked in steps (a) and (b) below.

(a) Check the EVAP pressure 4 seconds after the vacuum pump is activated*.

(b) Check the EVAP pressure again when it has stabilized. This pressure is the 0.02 inch leak pressure standard.

*: The vacuum pump begins to operate as step 1/5 is proceeded to step 2/5.

Result:

DTCs*	Test Results	Suspected Trouble Areas	Proceed To
—	EVAP pressure in step (b) between -4.85 kPa and -1.06 kPa (-36.38 mmHg and -7.95 mmHg)	Not yet determined	A
P043F and P2401	EVAP pressure in step (b) -1.06 kPa (-7.95 mmHg) or more	0.02 inch orifice high-flow Vacuum pump stuck OFF	B
P043E	EVAP pressure in step (b) below -4.85 kPa (-36.38 mmHg)	0.02 inch orifice clogged	C
P2419	EVAP pressure in step (a) more than -1.06 kPa (-7.95 mmHg)	Vent valve stuck closed	D

*: The DTCs relating to the EVAP system displayed on a hand-held tester when checking.

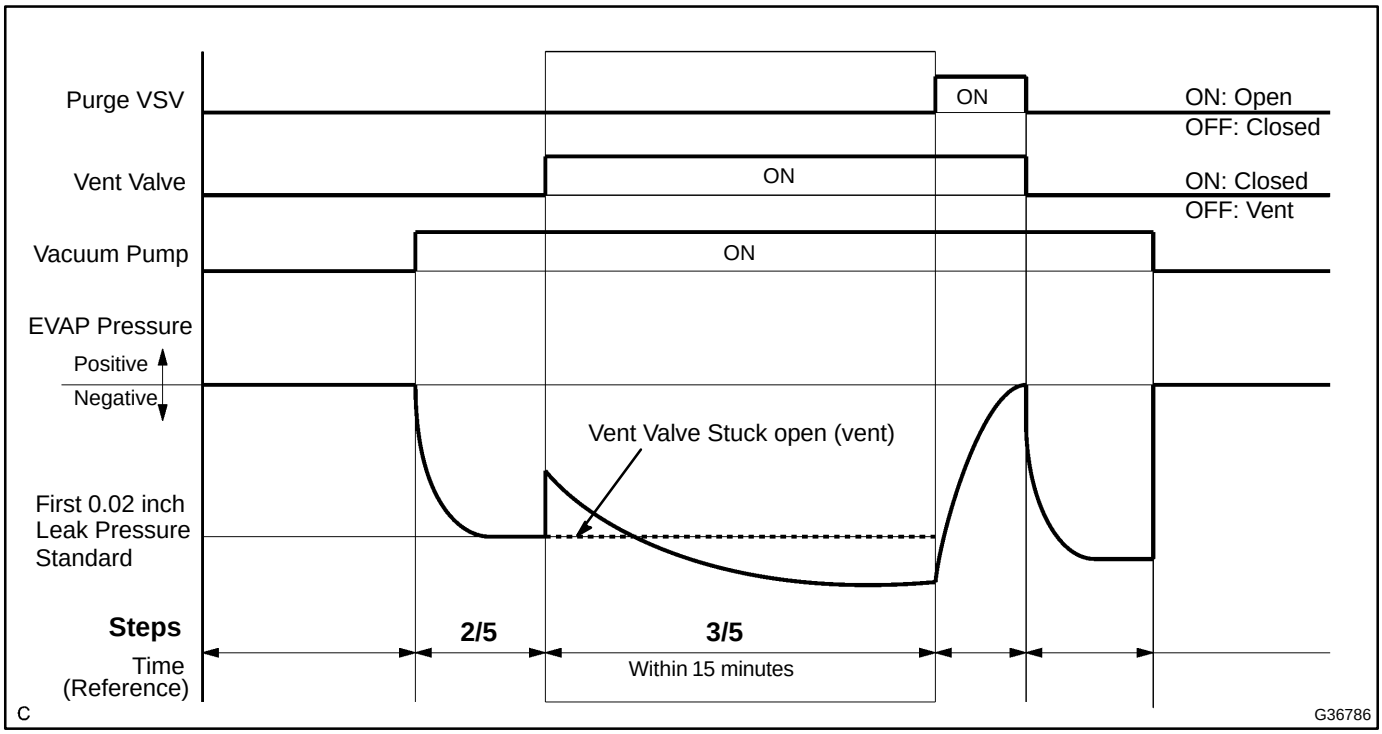
B → **Go to step 11**

C → **Go to step 30**

D → **Go to step 19**

A

7 PERFORM EVAP SYSTEM CHECK(STEP 2/5 TO 3/5)



(a) Check the EVAP pressure increase in step 3/5.

Result:

DTCs*	Test Results	Suspected Trouble Areas	Proceed To
—	EVAP pressure increases by 0.3 kPa (2.25 mmHg) or more within 10 seconds of proceeding from step 2/5 to step 3/5	Not yet determined	A
P2420	No variation in EVAP pressure despite proceeding from step 2/5 to step 3/5	Vent valve stuck open (vent)	B
P0451	No variation in EVAP pressure during steps 1/5 through 3/5	Pressure sensor malfunction stuck	C

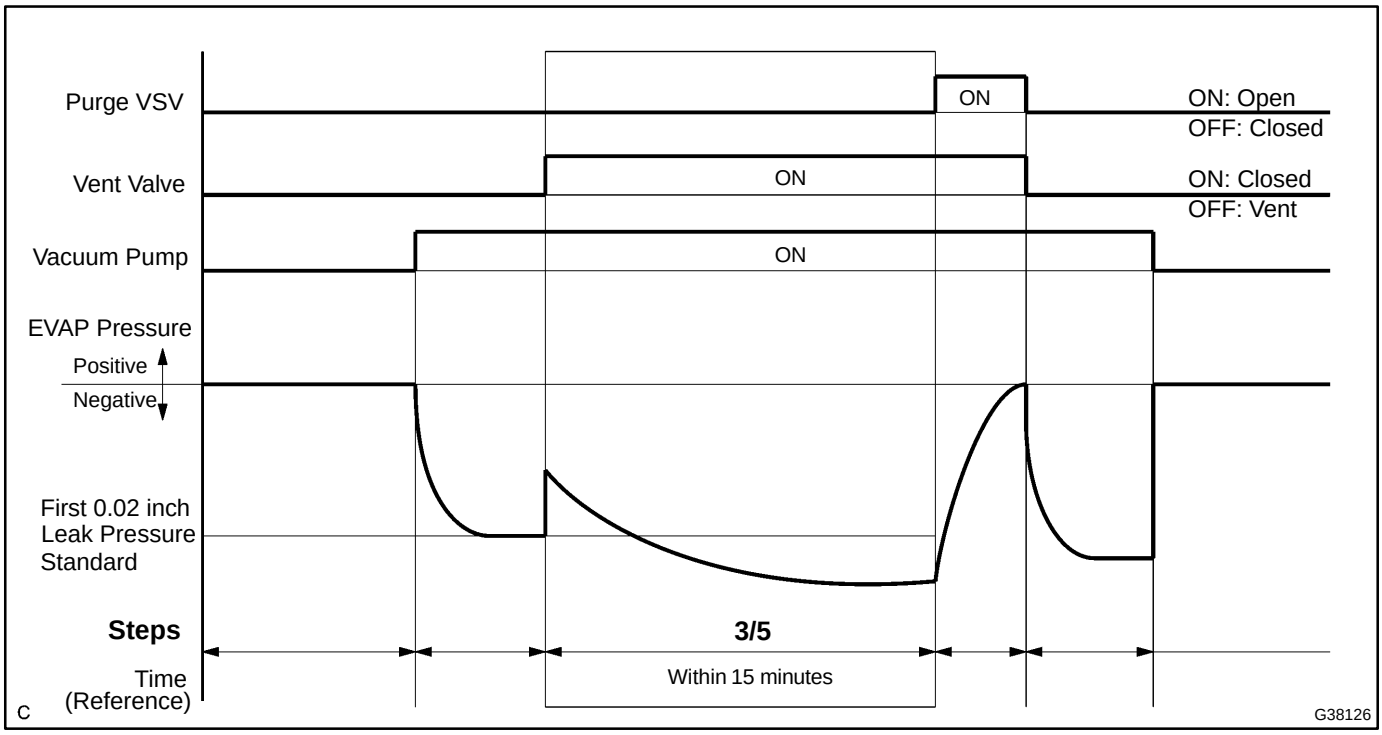
*: The DTCs relating to the EVAP system displayed on a hand-held tester when checking.

B → **Go to step 20**

C → **Go to step 30**

A

8	PERFORM EVAP SYSTEM CHECK(STEP 3/5)



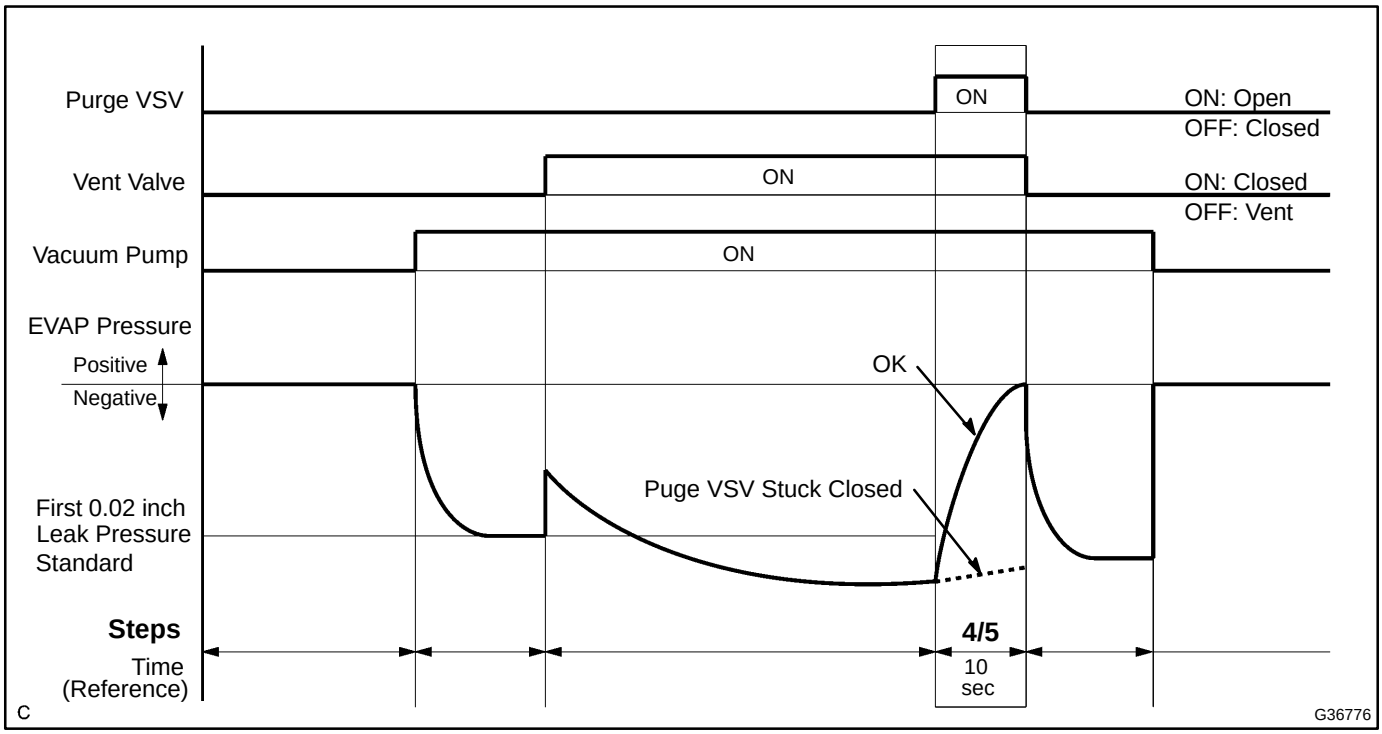
(a) Wait until the EVAP pressure change is less than 0.1 kPa (0.75 mmHg) for 30 seconds.
(b) Measure the EVAP pressure and record it.

HINT:

A few minutes are required for the EVAP pressure to become saturated. When there is little fuel in the fuel tank, it takes up to 15 minutes.

NEXT

9	PERFORM EVAP SYSTEM CHECK(STEP 4/5)



(a) Check the EVAP pressure in step 4/5.

DTCs*	Test Results	Suspected Trouble Areas	Proceed To
—	EVAP pressure increases by 0.3 kPa (2.25 mmHg) or more within 10 seconds of proceeding from step 3/5 to step 4/5	Not yet determined	A
P0441	EVAP pressure increases by 0.3 kPa (2.25 mmHg) or more within 10 seconds of proceeding from step 3/5 to step 4/5	Problems in EVAP hose between pure VSV and throttle body	B
P0441	Variation in EVAP pressure is less than 0.3 kPa (2.25 mmHg) for 10 seconds, after proceeding from step 3/5 to step 4/5	Purge VSV stuck closed	C

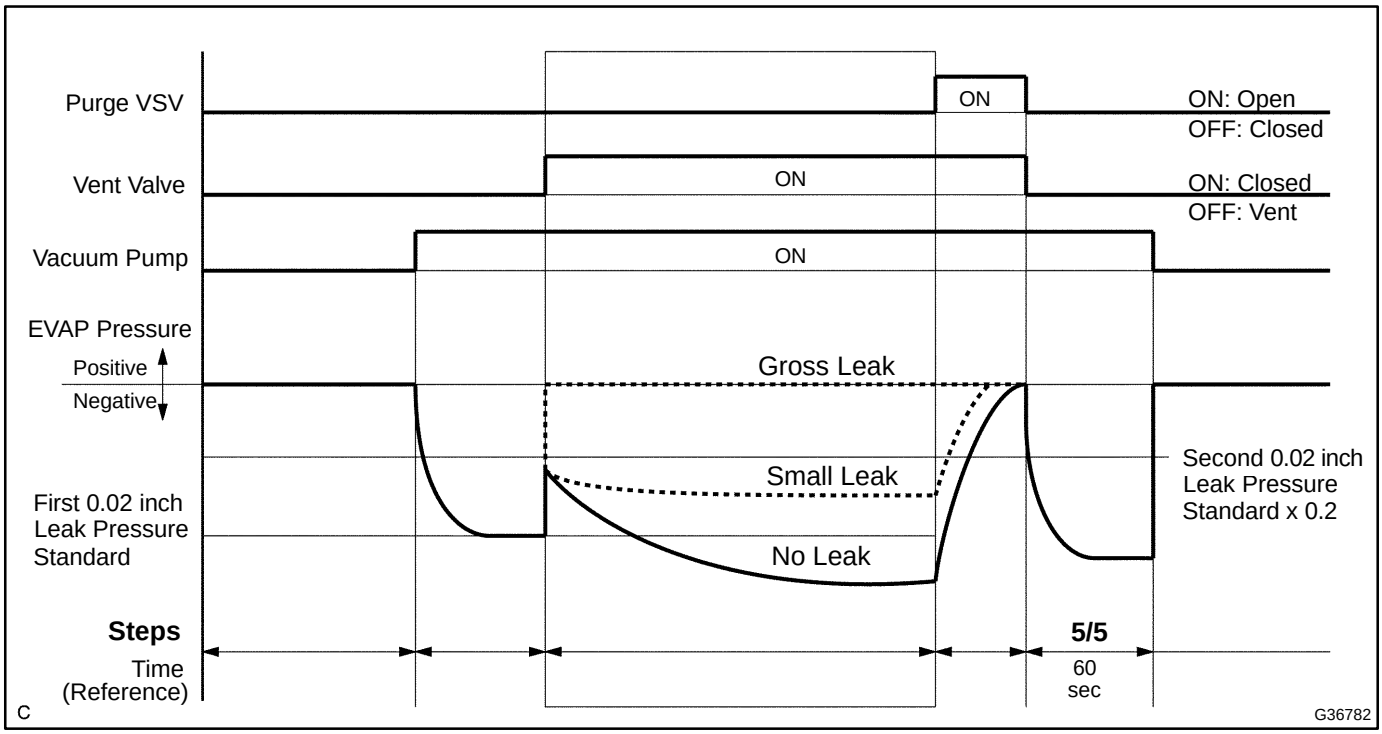
*: The DTCs relating to the EVAP system displayed on a hand-held tester when checking.

B → **Go to step 15**

C → **Go to step 12**

A

10 PERFORM EVAP SYSTEM CHECK(STEP 5/5)



(a) Check the EVAP pressure in step 5/5.

(b) Compare the EVAP pressure in step 3/5 and the second 0.02 inch leak pressure standard (step 5/5).

Result:

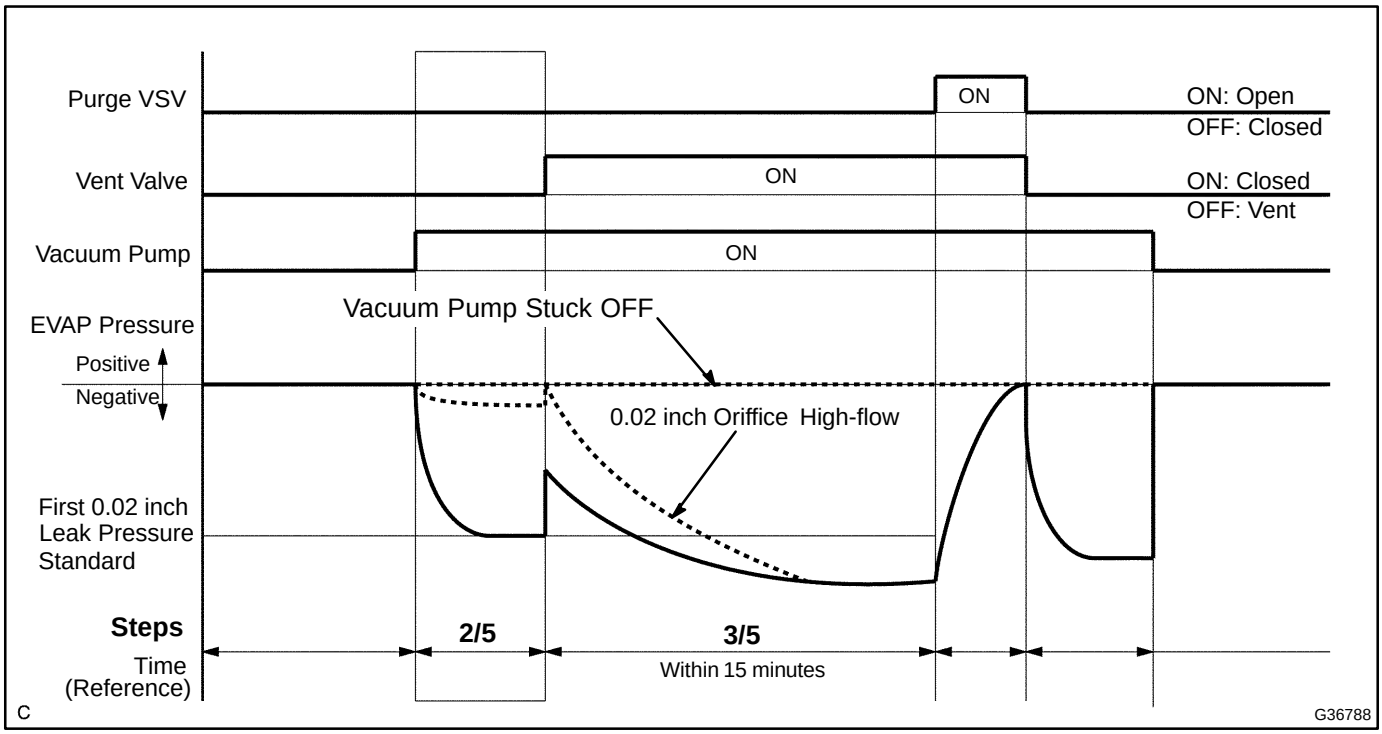
DTCs*	Test Results	Suspected Trouble Areas	Proceed To
—	EVAP pressure (step 3/5) lower than the second 0.02 inch leak pressure standard (step 5/5)	Not yet determined (no leakage from EVAP system)	A
P0441 and P0455	EVAP pressure (step 3/5) higher than [second 0.02 inch leak pressure standard (step 5/5) x 0.2]	・Purge VSV stuck open ・EVAP gross leak	B
P0456	EVAP pressure (step 3/5) higher than second 0.02 inch leak pressure standard (step 5/5)	EVAP small leak	B

*: The DTCs relating to the EVAP system displayed on a hand-held tester when checking.

A → **Go to step 36**

B → **Go to step 12**

11	PERFORM EVAP SYSTEM CHECK(STEP 3/5)



(a) Check the EVAP pressure in step 3/5.

Result:

DTCs*	Test Results	Suspected Trouble Areas	Proceed To
P043F and P2401	EVAP pressure less than [0.02 inch leak pressure standard x 0.2]	0.02 inch orifice high-flow	A
P043F and P2401	EVAP pressure more than [0.02 inch leak pressure standard x 0.2]	Vacuum pump stuck OFF	B

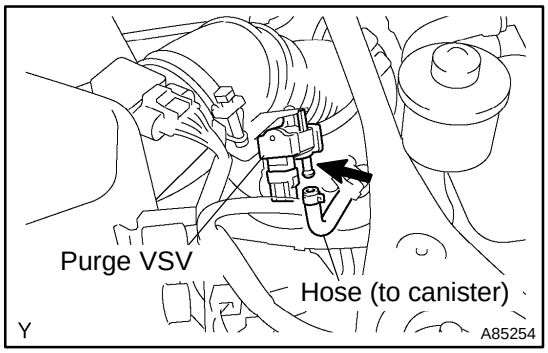
*: The DTCs relating to the EVAP system displayed on a hand-held tester when checking.

HINT:

The 0.02 inch leak pressure standard is the value determined in step 2/5.

A	**Go to step 30**
B	**Go to step 23**

12	PERFORM ACTIVE TEST(PURGE VSV)



(a) On the hand-held tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II/ ACTIVE TEST / EVAP VSV.
(b) Disconnect the hose (connected to the canister) from the purge VSV.
(c) Start the engine.
(d) On the tester, turn off the purge VSV (EVAP VSV: OFF).
(e) Use your finger to confirm that the purge VSV has no suction.
(f) Using the tester, turn on the purge VSV (EVAP VSV: ON).
(g) Use your finger to confirm that the purge VSV has suction.

Result:

Test Results	Suspected Trouble Areas	Proceed To
No suction when purge VSV turned OFF, and suction applied when tuned ON	Purge VSV normal	A
Suction applied when purge VSV turned OFF	Purge VSV stuck open	B
No suction when purge VSV turned ON	・Purge VSV stuck closed ・Problems with EVAP hose between purge VSV and throttle body	C

(h) Reconnect the hose.

B → **Go to step 14**

C → **Go to step 15**

A

13 CHECK FUEL TANK CAP ASSY

(a) Check that the fuel tank cap is correctly installed.
(b) Confirm that the fuel tank cap is tightened until a few click sounds are heard.

HINT:

If an EVAP tester is available, check the fuel tank cap using the tester.

(1) Remove the fuel tank cap and install it onto a fuel tank cap adaptor.
(2) Connect an EVAP tester pump hose to the adaptor, and pressurize to 3.2 to 3.7 kPa (24 to 28 mmHg) using an EVAP tester pump.
(3) Seal the adaptor and wait for 2 minutes.
(4) Check the pressure. If the pressure is 2 kPa (15 mmHg) or more, the fuel tank cap is normal.
(5) Reinstall the fuel tank cap.

Result:

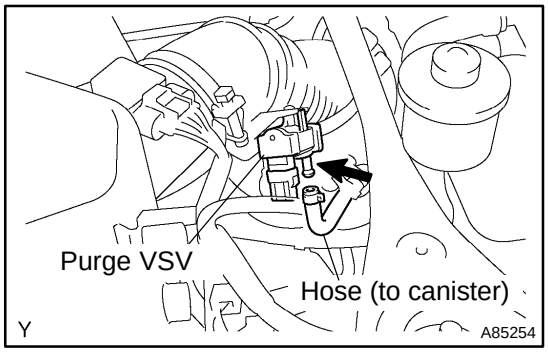
Test Results	Suspected trouble Areas	Proceed To
Fuel tank cap correctly installed	—	A
Fuel tank cap loose	・Fuel tank cap improperly installed ・Defective fuel tank cap ・Fuel tank cap does not meet OEM specifications	B
No fuel tank cap	—	C

A → **Go to step 29**

B → **Go to step 27**

C → **Go to step 28**

14 INSPECT VACUUM SWITCHING VALVE ASSY NO.1



(a) Turn the ignition switch to OFF.
(b) Disconnect the purge VSV connector.
(c) Disconnect the hose (connected to the canister) from the purge VSV.
(d) Start the engine.
(e) Use your finger to confirm that the purge VSV has no suction.

Result:

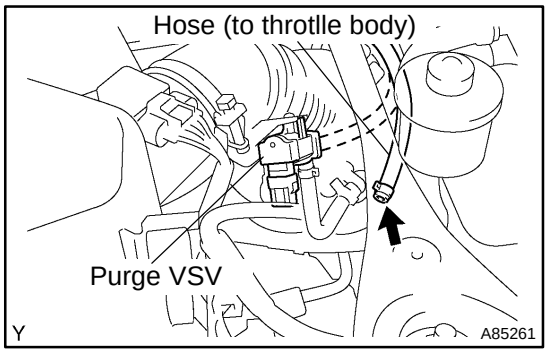
Test Results	Suspected Trouble Areas	Proceed To
No suction	ECM	A
Suction applied	Purge VSV	B

(f) Reconnect the purge VSV connector.
(g) Reconnect the hose.

A → **Go to step 35**

B → **Go to step 31**

15 CHECK EVAP HOSE(PURGE VSV - THROTTLE BODY)



(a) Disconnect the hose (connected to the throttle body) from the purge VSV.
(b) Start the engine.
(c) Use your finger to confirm that the hose has suction.

Result:

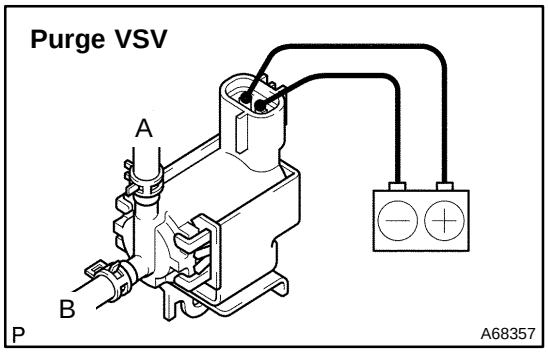
Test Results	Suspected Trouble Areas	Proceed To
Suction applied	EVAP hose between purge VSV and throttle body normal	A
No suction	・Throttle body ・EVAP hose between purge VSV and throttle body	B

(d) Reconnect the hose.

B → **Go to step 26**

A

16 NSPECT VACUUM SWITCHING VALVE ASSY NO.1(PURGE VSV)



(a) Remove the purge VSV.
(b) Apply battery voltage to the terminals of the purge VSV.
(c) Using an air gun, confirm that air flows from port A to port B.

Result:

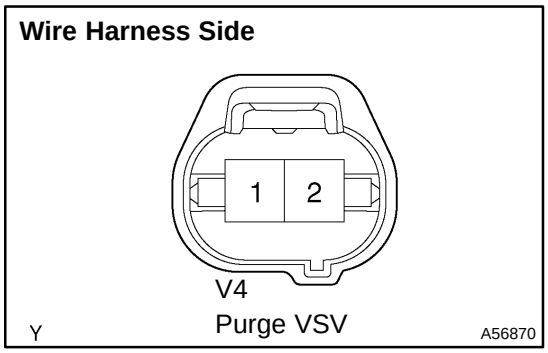
Test Results	Suspected Trouble Areas	Proceed To
Air flowed	Purge VSV normal	A
No air flow	Purge VSV	B

(d) Install the purge VSV.

B → **Go to step 31**

A

17 CHECK WIRE HARNESS AND CONNECTOR(POWER SOURCE OF PURGE VSV)



(a) Disconnect the V4 Purge VSV connector.
(b) Turn the ignition switch ON.
(c) Measure the voltage between terminal 1 of the V4 connector and the body ground.

Result:

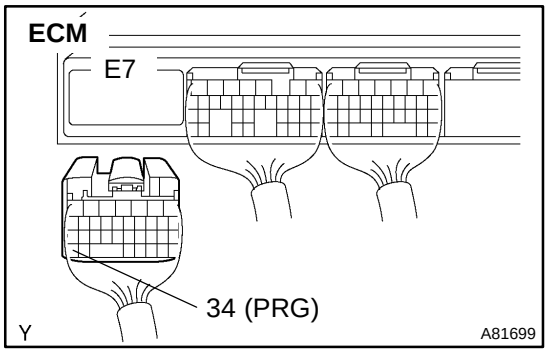
Test Results	Suspected Trouble Areas	Proceed To
Between 11 V and 14 V	Normal	A
Other than result above	Wire harness or connectors between purge VSV and ECM	B

(d) Reconnect the purge VSV connector.

B → **Go to step 32**

A

18 CHECK WIRE HARNESS AND CONNECTOR(PURGE VSV - ECM)

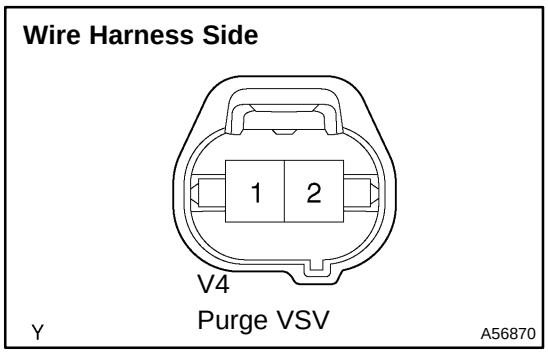


(a) Disconnect the E7 connector and the V4 purge VSV connector.
(b) Check the resistance.

Standard:

Tester Connections	Specified Conditions
E7-34 (PRG) - V1-1	Below 1 Ω
E7-34 (PRG) - Body ground	10 kΩ or higher
V4-2 - Body ground	10 kΩ or higher

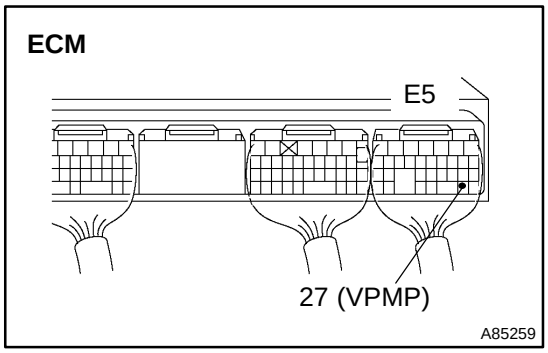
(c) Reconnect the purge VSV connector.
(d) Reconnect the ECM connector.



OK → **Go to step 35**

NG → **Go to step 32**

19	PERFORM ACTIVE TEST USING HAND-HELD TESTER(FOR VENT VALVE)



(a) Turn the ignition switch to ON.
(b) On the hand-held tester, select the following menu items: DIAGNOSIS/ ENHANCED OBD II/ ACTIVE TEST/ VENT VALVE (ALONE).
(c) Measure the voltage between terminal VPMP of the ECM connector and the body ground when the vent valve is turned ON (close) and OFF (vent) using the tester.

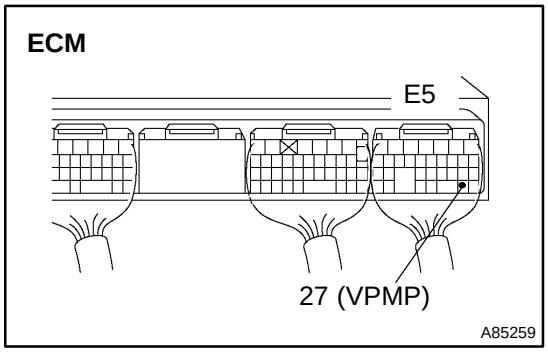
Result:

Test Results	Suspected Trouble Areas	Proceed To
Between 9 V and 14 V when OFF Below 3 V when ON	Vent valve	A
Below 3 V when OFF and ON	ECM	B

A → **Go to step 22**

B → **Go to step 35**

20	PERFORM ACTIVE TEST USING HAND-HELD TESTER(FOR VENT VALVE)



(a) Turn the ignition switch to ON.
(b) On the hand-held tester, select the following menu items: DIAGNOSIS/ ENHANCED OBD II/ ACTIVE TEST/ VENT VALVE (ALONE).
(c) Measure the voltage between terminal VPMP of the ECM connector and the body ground when the vent valve is turned ON (close) and OFF (vent) using the tester.

Result:

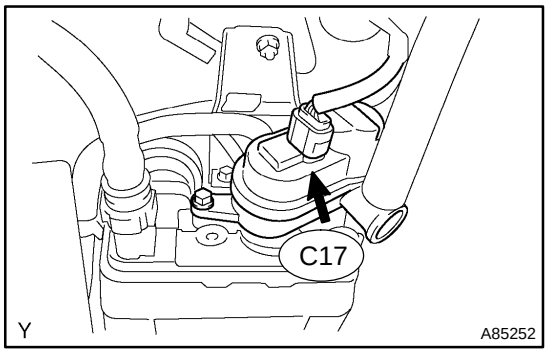
Test Results	Suspected Trouble Areas	Proceed To
Below 3 V when OFF and ON	Power source of vent valve	A
Between 9 V and 14 V when OFF Below 3 V when ON	Vent valve	B
Between 9 V and 14 V when OFF and ON	ECM	C

B → **Go to step 22**

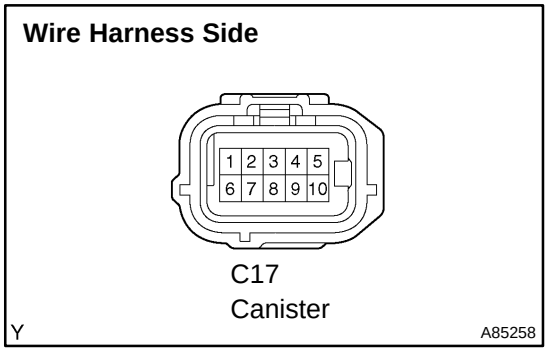
C → **Go to step 35**

A

21	INSPECT PUMP MODULE(POWER SOURCE FOR VENT VALVE)



(a) Turn the ignition switch OFF.
(b) Disconnect the C17 canister connector.
(c) Turn the ignition switch to ON.
(d) Measure the voltage between terminal 9 of the canister connector and the body ground.



Result:

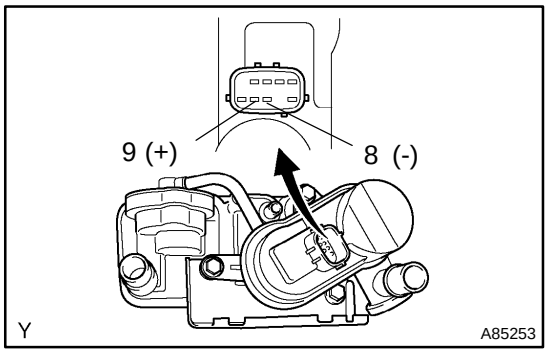
Test Results	Suspected Trouble Areas	Proceed To
Between 9 V and 14 V	Normal	A
Between 0 V and 3 V	Power source wire harness of vent valve	B

(e) Reconnect the canister connector.

B → **Go to step 32**

A

22 INSPECT PUMP MODULE(VENT VALVE OPERATION)



(a) Turn the ignition switch to OFF.
(b) Disconnect the canister connector.
(c) Apply the battery voltage to terminals 9 and 8 of the pump module.
(d) Touch the pump module to confirm the vent valve operation.

Result:

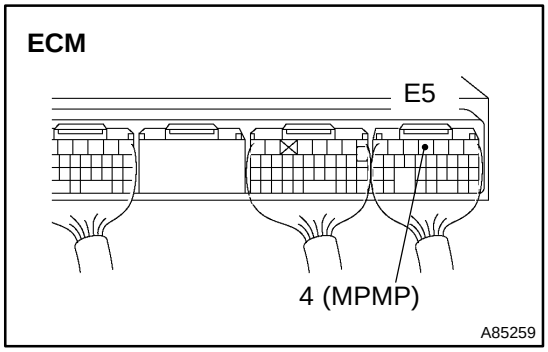
Test Results	Suspected Trouble Areas	Proceed To
Operating	Wire harness between vent valve and ECM	A
Not operating	Vent valve	B

(e) Reconnect the canister connector.

A → **Go to step 32**

B → **Go to step 30**

23 PERFORM ACTIVE TEST USING HAND-HELD TESTER(FOR PUMP MODULE(VACUUM PUMP)



(a) On the hand-held tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / VACUUM PUMP (ALONE).
(b) Measure the voltage between terminal MPMP of the ECM connector and the body ground when the vacuum pump is turned ON and OFF using the tester.

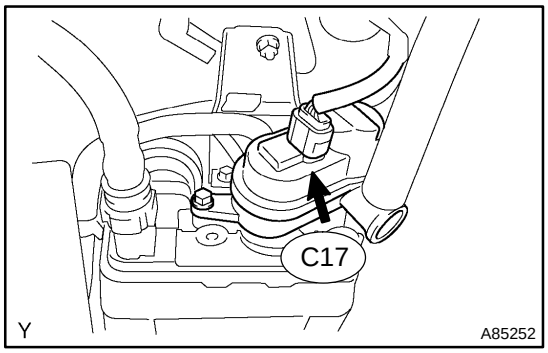
Result:

Tests Results	Suspected Trouble Areas	Proceed To
Between 0 V and 3 V when OFF Between 9 V and 14 V when ON	ECM normal	A
Between 9 V and 14 V when OFF Between 0 V and 3 V when ON	ECM	B

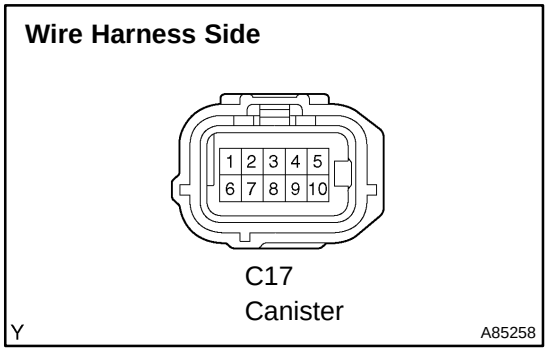
B → **Go to step 35**

A

24	CHECK WIRE HARNESS AND CONNECTOR(PUMP MODULE - ECM)



(a) Turn the ignition switch OFF.
(b) Disconnect the C17 canister connector.
(c) Turn the ignition switch to ON.
(d) On the hand- held tester, select the following menu items:DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / VACUUM PUMP (ALONE).
(e) Turn the vacuum pump ON.
(f) Measure the voltage between terminal 1 of the canister connector and the body ground.



Result:

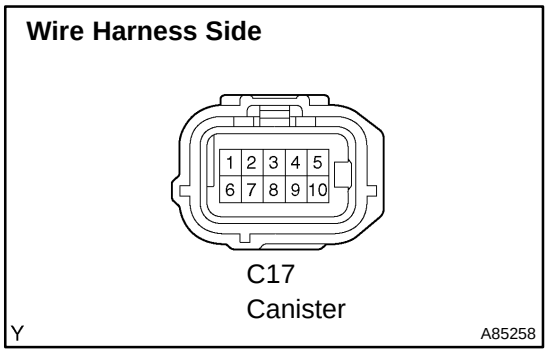
Test Results	Suspected Trouble Areas	Proceed To
Between 9 V and 14 V	Normal	A
Between 0 V and 3 V	Wire harness between ECM and vacuum pump	B

(g) Reconnect the canister connector.

B → **Go to step 32**

A

25 CHECK WIRE HARNESS AND CONNECTOR(PUMP MODULE - GROUND)



(a) Disconnect the C17 canister connector.
(b) Turn the ignition switch to OFF.
(c) Check the resistance between terminal 6 of the canister connector and the body ground.

Result:

Test Results	Suspected Trouble Areas	Proceed To
Below 1 Ω	Vacuum pump	A
10 kΩ or more	Wire harness between vacuum pump and body ground	B

(d) Reconnect the canister connector.

A → **Go to step 30**

B → **Go to step 32**

26 INSPECT THROTTLE BODY ASSY

(a) Stop the engine.
(b) Disconnect the EVAP hose from the throttle body.
(c) Start the engine.
(d) Use your finger to confirm that the port of the throttle body has suction.

Result:

Test Results	Suspected Trouble Areas	Proceed To
Suction applied	EVAP hose between throttle body and purge VSV	A
No suction	Throttle body	B

(e) Reconnect the EVAP hose.

A → **Go to step 33**

B → **Go to step 34**

27 CORRECTLY REINSTALL OR REPLACE FUEL TANK CAP

HINT:
- When reinstalling the fuel tank cap, tighten it until a few click sounds are heard.
- When replacing the fuel tank cap, use a fuel tank cap that meets OEM specifications, and tighten it until a few click sounds are heard.

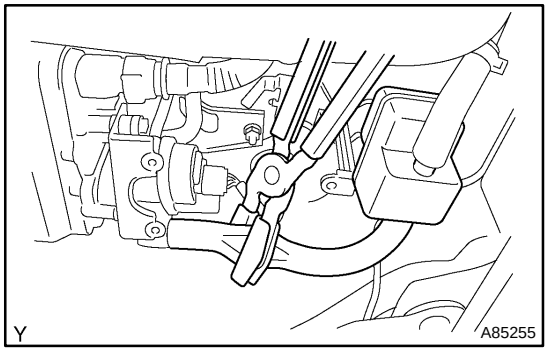
NEXT → **Go to step 37**

28	REPLACE FUEL TANK CAP ASSY

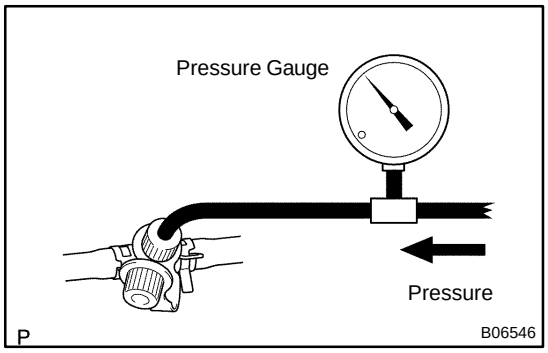
HINT:
When installing the fuel tank cap, tighten it until a few click sounds are heard.

NEXT → Go to step 37

29	REPAIR EVAP LEAK PART



(a) Reinstall the fuel cap.
(b) Remove the exhaust tail pipe.
(c) Remove the heat insulator under the canister.
(d) Pinch the atmospheric side hose of the pump module with the clip to close the canister's passage to air.



(e) Connect the pressure gauge (SST) to the service port (green cap near the air cleaner box).
(f) Pressurize the EVAP system to 3.2 to 3.7 kPa (24 to 28 mmHg).

NOTICE:
More than 35 mmHg of pressure will damage the EVAP system. Pay attention to the pressure.

(g) Apply soapy water to the piping and connecting parts of the EVAP system. Look for the area where bubbles appear. This area cause leaks.

HINT:
- If the system has leaks, a whistling sound will be heard.
- Disconnect the hose between canister and fuel tank from the canister. Close the canister on the area where the hose was connected and perform an inspection. The fuel tank can be eliminated from the suspected areas for leak checks.

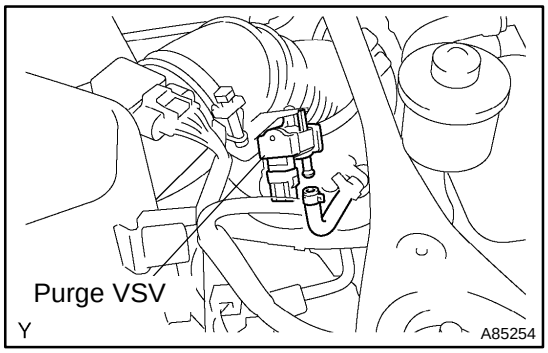
(h) Repair or replace the leak point.

NEXT → Go to step 37

30	REPLACE CHARCOAL CANISTER ASSY

NEXT → Go to step 37

31	REPLACE VACUUM SWITCHING VALVE ASSY NO.1(PURGE VSV)



(a) Disconnect the connector and the hoses from the purge VSV.
(b) Remove the purge VSV.
(c) Install a new purge VSV.
(d) Reconnect the connector and hoses.

NEXT Go to step 37

32	REPAIR OR REPLACE WIRE HARNESS AND CONNECTOR

In case that the exhaust tail pipe is removed, go to the next step before installing it.

NEXT Go to step 37

33	REPLACE EVAP HOSE(THROTTLE BODY - PURGE VSV)

NEXT Go to step 37

34	INSPECT THROTTLE BODY ASSY

(a) Remove the throttle body (see page 10-6).
(b) Check that there is no clog in the EVAP purge port of the throttle body. If necessary, replace the throttle body.

NEXT Go to step 37

35	REPLACE ECM (see page 10-9)

NEXT Go to step 37

36	REPAIR OR REPLACE PARTS AND COMPONENTS INDICATED BY OUTPUT DTCS

(a) Repair the malfunctioning areas indicated by the DTCs that had been confirmed when the vehicle was brought in.

NEXT Go to step 37

37	PERFORM EVAP SYSTEM CHECK(AUTO OPERATION)

NOTICE:

- **In the EVAP SYSTEM CHECK (AUTO OPERATION), the series of 5 EVAP SYSTEM CHECK steps is performed automatically. It takes a maximum of approximately 18 minutes.**
- **Do not perform the EVAP SYSTEM CHECK when the fuel tank is more than 90% full because the cut-off valve may be closed, making the leak check of the fuel tank unavailable.**
- **Do not run the engine in this step.**
- **When the temperature of the fuel is 35°C (95°F) or more, a large amount of vapor forms and any check results become inaccurate. When performing an EVAP SYSTEM CHECK, keep the temperature below 35°C (95°F).**

(a) Clear DTCs (see page 05-38).

(b) On the hand-held tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / SYSTEM CHECK / EVAP SYS CHECK / AUTO OPERATION.

(c) After the SYSTEM CHECK is completed, check for pending DTCs by selecting the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES.

HINT:

If no pending DTC is found, the repair has been successfully completed.

NEXT

COMPLETED

Monitor Confirmation

HINT:

After a repair, check Monitor Status by performing the Key-Off Monitor Confirmation and Purge Flow Monitor Confirmation described below.

1. KEY-OFF MONITOR CONFIRMATION

(a) Preconditions

The monitor will not run unless:

- The vehicle has been driven for 10 minutes or more (in a city area or on a free way)
- The fuel tank is less than 90% full
- The altitude is less than 8,000 ft (2,400 m)
- The Engine Coolant Temperature (ECT) is between 4.4°C and 35°C (40°F and 95°F)
- The Intake Air Temperature (IAT) is between 4.4°C and 35°C (40°F and 95°F)
- The vehicle remains stationary (the vehicle speed is 0 mph [0 km/h])

(b) Monitor Conditions

(1) Allow the engine to idle for at least 5 minutes.

(2) Turn the ignition switch OFF and wait for 6 hours (8 or 10.5 hours).

HINT:

Do not start the engine until checking MONITOR STATUS. If the engine is started, the steps described above must be repeated.

(c) Monitor Status

(1) Connect a hand-held tester to the DLC3.

(2) Turn the ignition switch ON and turn the tester ON.

(3) On the tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / MONITOR STATUS.

(4) Check the Monitor Status displayed on the tester.

HINT:

If INCMP is displayed, the monitor is not completed. Make sure that the preconditions have been met, and perform the Monitor Conditions again.

2. PURGE FLOW MONITOR CONFIRMATION (P0441)

HINT:

Perform this monitor confirmation after the Key-Off Monitor Confirmation shows COMPL (complete).

(a) Preconditions

The monitor will not run unless:

- The vehicle has been driven for 10 minutes or more (in a city area or on a free way)
- The ECT is between 4.4°C and 35°C (40°F and 95°F)
- The IAT is between 4.4°C and 35°C (40°F and 95°F)

(b) Monitor Conditions

(1) Release the pressure from the fuel tank by removing and reinstalling the fuel tank cap.

(2) Warm the engine up until the ECT reaches more than 75°C (167°F).

(3) Increase the engine speed to 3,000 rpm once.

(4) Allow the engine to idle and turn A/C ON for 1 minute.

(c) Monitor Status

(1) Turn the ignition switch OFF (where ON or the engine is running).

(2) Connect a hand-held tester to the DLC3.

(3) Turn the ignition switch to ON and turn the tester ON.

(4) On the tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / MONITOR STATUS.

(5) Check the Monitor Status displayed on the tester.

HINT:
If INCMP is displayed, the monitor is not completed. Make sure that the preconditions have been met, and perform the Monitor Conditions again.

MONITOR RESULT

Refer to page 05-26 for detailed information.
The test value and test limit information are described as shown in the following table. Check the monitor result and test values after performing the monitor drive pattern (Refer to ”Confirmation Monitor”).

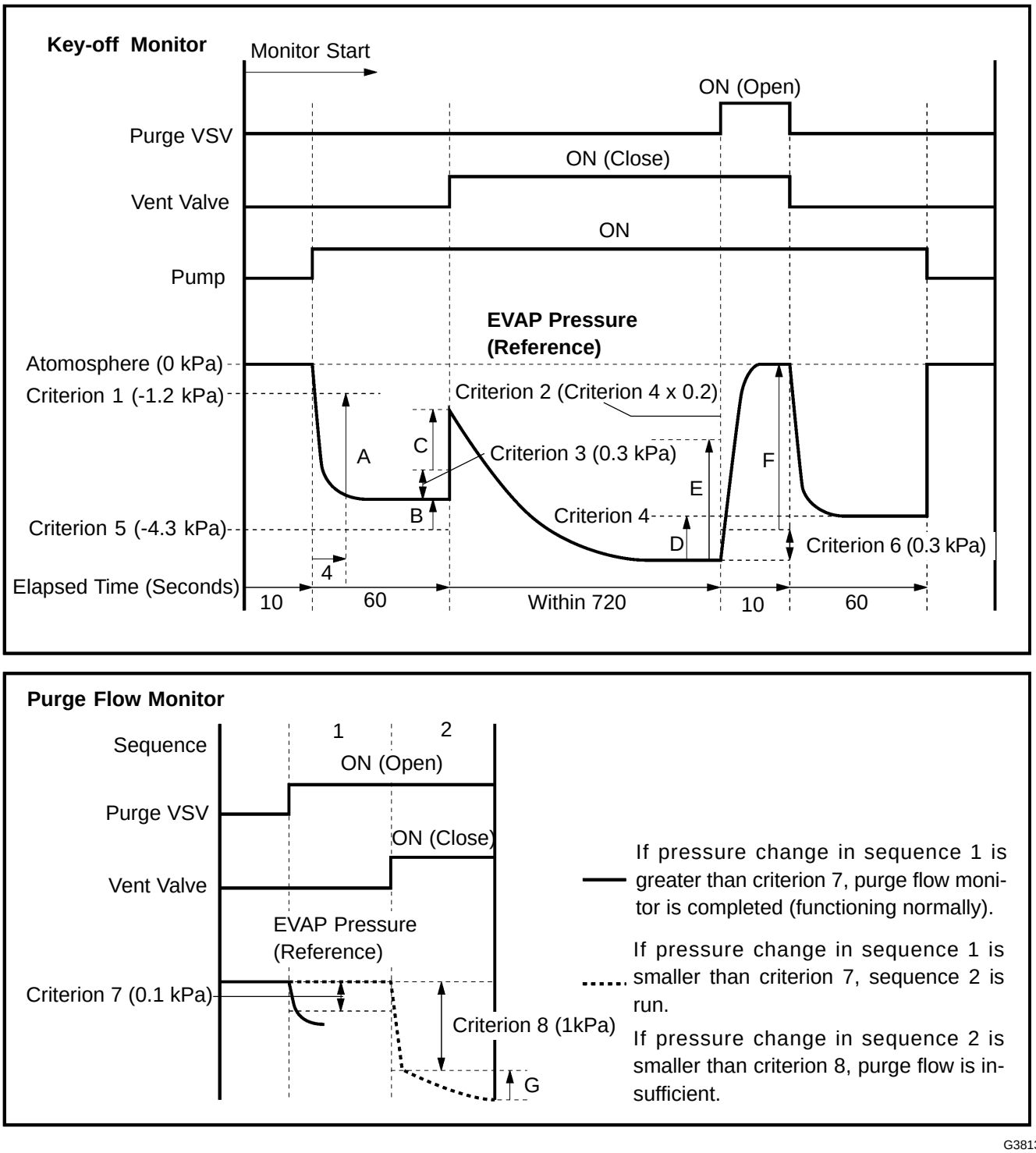
- TID (Test Identification Data) is assigned to each emissions-related component.
- TLT (Test Limit Type):
  If TLT is 0, the component is malfunctioning when the test value is higher than the test limit.
  If TLT is 1, the component is malfunctioning when the test value is lower than the test limit.
- CID (Component Identification Data) is assigned to each test value.
- Unit Conversion is used to calculate the test value indicated on generic OBD ll scan tools.

(d) Key - off

TID $02: EVAP system (Key-off monitor)

TLT	CID	Unit Conversion	Description of Test Data	Description of Test Limit
1	$01	Multiplied by 0.0156 subtract 2 (kPa)	Test value for small leak (P0456): Refer to pressure D*	Malfunction criteria (0 kPa)
1	$02	Multiplied by 0.0156 subtract 2 (kPa)	Test value for gross leak (P0455): Refer to pressure E*	Malfunction criteria (0 kPa)
1	$03	Multiplied by 0.0156 subtract 2 (kPa)	Test value for vacuum pump stuck OFF (P2401): Refer to pressure A*	Malfunction criteria (0 kPa)
1	$04	Multiplied by 0.0156 subtract 2 (kPa)	Test value for vacuum pump stuck ON (P2402): Refer to pressure A*	Malfunction criteria (0 kPa)
1	$05	Multiplied by 0.0156 subtract 2 (kPa)	Test value for vent valve stuck OFF (vent) (P2420): Refer to pressure C*	Malfunction criteria (0 kPa)
1	$06	Multiplied by 0.0156 subtract 2 (kPa)	Test value for vent valve stuck ON (closed) (P2419): Refer to pressure A*	Malfunction criteria (0 kPa)
1	$07	Multiplied by 0.0156 subtract 2 (kPa)	Test value for 0.02 inch orifice low flow (P043E): Refer to pressure B*	Malfunction criteria (0 kPa)
1	$08	Multiplied by 0.0156 subtract 2 (kPa)	Test value for 0.02 inch orifice high flow (P043F): Refer to pressure A*	Malfunction criteria (0 kPa)
1	$11	Multiplied by 0.0156 subtract 2 (kPa)	Test value for purge VSV stuck close (P0441): Refer to pressure F*	Malfunction criteria (0 kPa)
1	$12	Multiplied by 0.0156 subtract 2 (kPa)	Test value for purge VSV stuck open (P0441): Refer to pressure E*	Malfunction criteria (0 kPa)
1	$13	Multiplied by 0.0156 subtract 2 (kPa)	Test value for purge flow (P0441): Refer to pressure G*	Malfunction criteria (0 kPa)

* Pressures A to G are indicated as shown in the diagram below.


Key-off Monitor
Monitor Start
ON (Open)
Purge VSV
ON (Close)
Vent Valve
ON
Pump
EVAP Pressure
(Reference)
Atomosphere (0 kPa)
Criterion 1 (-1.2 kPa)
Criterion 2 (Criterion 4 x 0.2)
A
C
Criterion 3 (0.3 kPa)
F
E
B
Criterion 4
Criterion 5 (-4.3 kPa)
D
Criterion 6 (0.3 kPa)
4
Elapsed Time (Seconds)
10
60
Within 720
10
60
Purge Flow Monitor
1
2
Sequence
ON (Open)
Purge VSV
ON (Close)
Vent Valve
EVAP Pressure
(Reference)
Criterion 7 (0.1 kPa)
Criterion 8 (1kPa)
G
If pressure change in sequence 1 is greater than criterion 7, purge flow monitor is completed (functioning normally).
If pressure change in sequence 1 is smaller than criterion 7, sequence 2 is run.
If pressure change in sequence 2 is smaller than criterion 8, purge flow is insufficient.
C
G38136

05ESR-05

FAIL-SAFE CHART

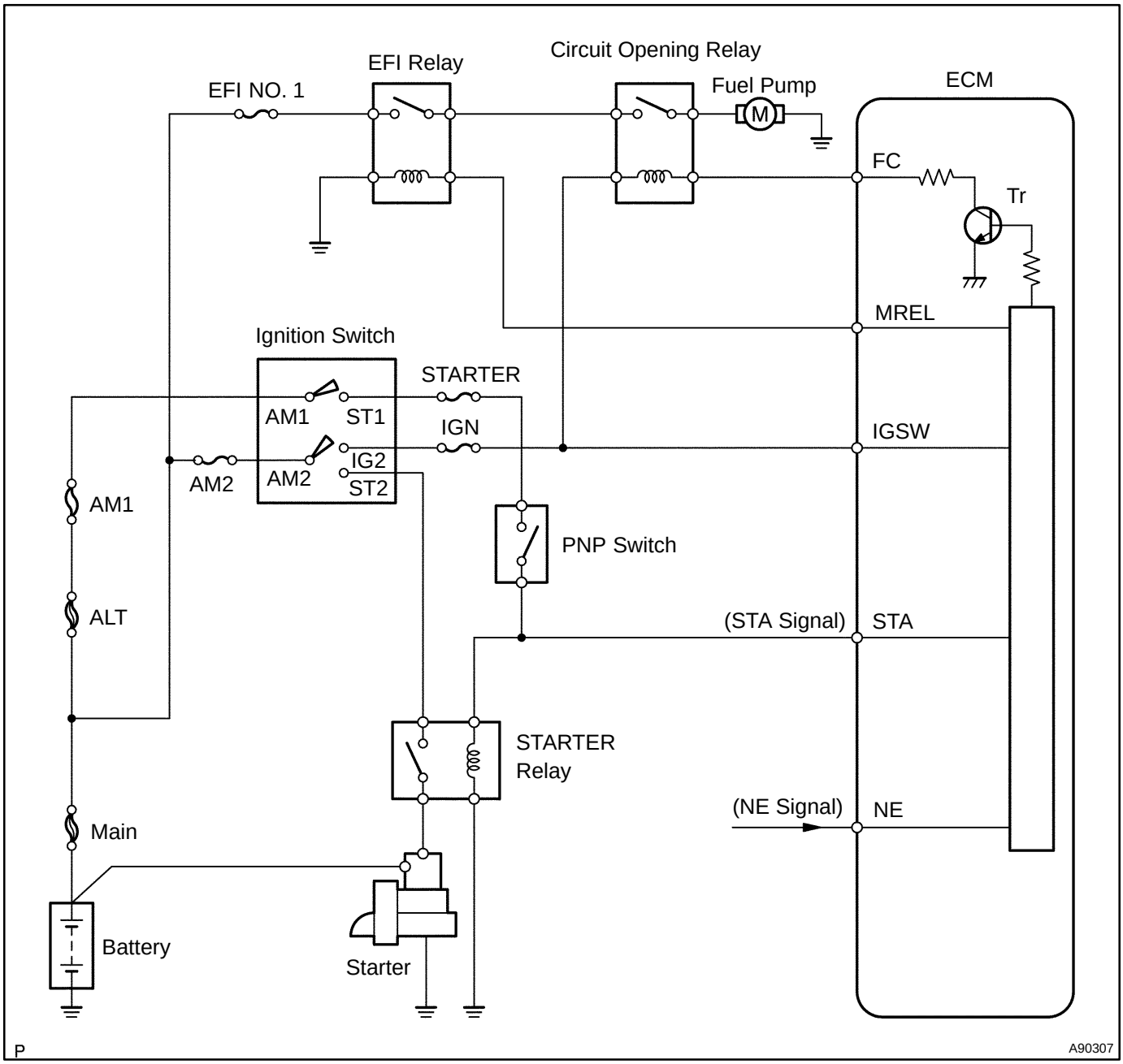
If any of the following codes are recorded, the ECM enters fail-safe mode.

DTC No.	Fail-Safe Operation	Fail-Safe Deactivation Conditions
P0031 P0032 P0037 P0038	Turn off heater	Ignition switch OFF
P0100 P0102 P0103	Ignition timing is calculated from engine speed and throttle angle	”Pass” condition detected
P0110 P0112 P0113	Intake air temperature is fixed at 20˚C (68˚F)	”Pass” condition detected
P0115 P0116 P0117 P0118	Engine coolant temperature is fixed at 80˚C (176˚F)	”Pass” condition detected
P0120 P0121 P0122 P0123 P0220 P0222 P0223 P0604 P0606 P0607 P0657 P2102 P2103 P2111 P2112 P2118 P2119 P2135	If Electronic Throttle Control System (ETCS) has malfunction, ECM cuts off current to throttle control motor. Throttle control valve returns to predetermined opening angle (approximately 16°) by force of return spring. ECM then adjusts engine output by controlling fuel injection (intermittent fuel-cut) and ignition timing in accordance with accelerator pedal opening angle to enable vehicle to continue at minimal speed. If accelerator pedal is depressed firmly and slowly, vehicle can be driven slowly. If accelerator pedal is depressed quickly, vehicle may speed up and slow down erratically.	”Pass” condition is detected and then ignition switch is turned OFF, fail-safe operation will stop and system will return to normal condition
P0325 P0327 P0328	Maximum timing retardation	Ignition switch OFF
P0351 P0352 P0353 P0354	Fuel is cut	”Pass” condition detected
P2120 P2121 P2122 P2123 P2125 P2127 P2128 P2138	Accelerator pedal position sensor has two (main and sub) sensor circuits. If malfunction occurs in either of sensor circuits, ECM detects abnormal signal voltage difference between two sensor circuits and switches to limp mode. In limp mode, remaining circuit is used to calculate accelerator pedal opening to allow vehicle to continue driving. If both circuits malfunction, ECM regards opening angle of accelerator pedal to be fully closed. In this case, throttle valve will remain closed as if engine is idling.	”Pass” condition is detected and then ignition switch is turned OFF, fail-safe operation will stop and system will return to normal condition

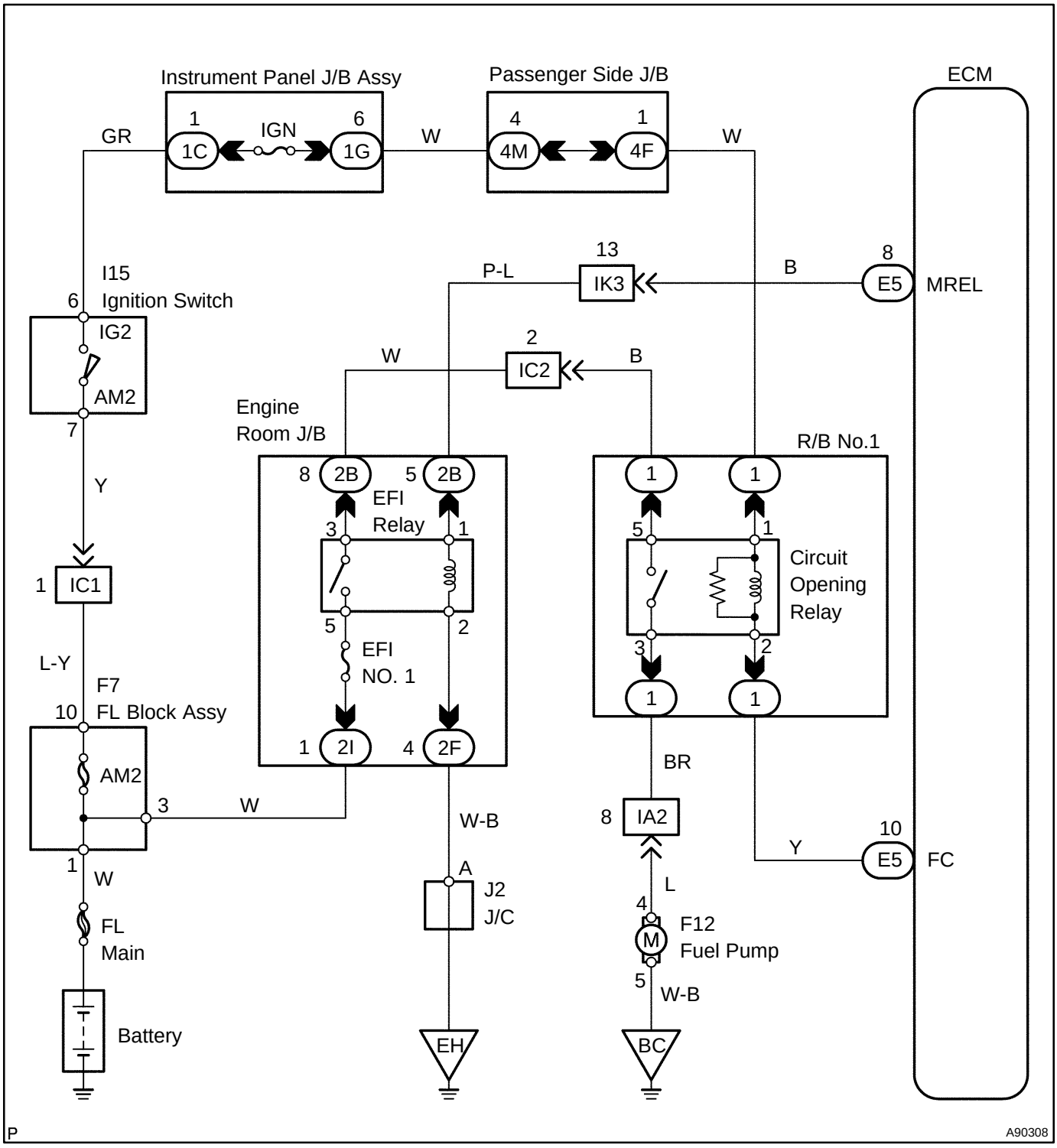
FUEL PUMP CONTROL CIRCUIT

CIRCUIT DESCRIPTION

When the engine is cranked, current flows from the ignition switch terminal ST1 to the starter relay coil (Marking: STARTER), and current flows to terminal STA of the ECM (STA signal).
When the STA signal and NE signal are input to the ECM, Tr is turned ON, current flows to coil of the circuit opening relay, (Marking) the relay switches on, power is supplied to the fuel pump and the fuel pump operates.
While the NE signal is generated and the engine is running, the ECM keeps Tr ON (Circuit Opening relay ON) and the fuel pump also keeps operating.



WIRING DIAGRAM



INSPECTION PROCEDURE

Hand-held tester:

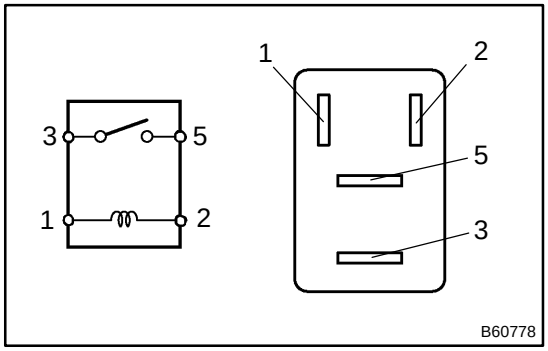
1	PERFORM ACTIVE TEST USING HAND-HELD TESTER (OPERATE CIRCUIT OPENING RELAY)

(a) Connect the hand-held tester to the DLC3.
(b) Turn ON the ignition switch. Push the hand-held tester main switch.
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / FUEL PUMP / SPD.
(d) Check the relay operation while operating it with the hand-held tester.
OK: Operating noise can be heard from the relay.

OK → **Go to step 5**

NG

2	INSPECT CIRCUIT OPENING RELAY



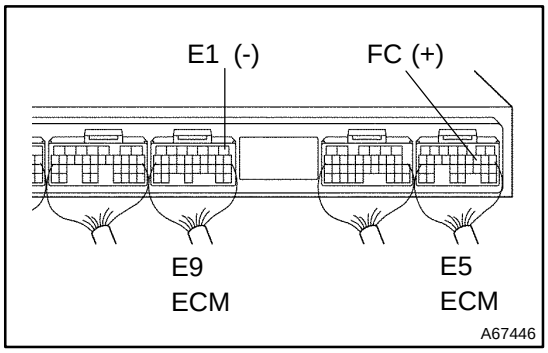
(a) Remove the circuit opening relay from the R/B sub-assy.
(b) Measure the resistance of the circuit opening relay.
Standard:

Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

NG → **REPLACE CIRCUIT OPENING RELAY**

OK

3	INSPECT ECM (FC VOLTAGE)



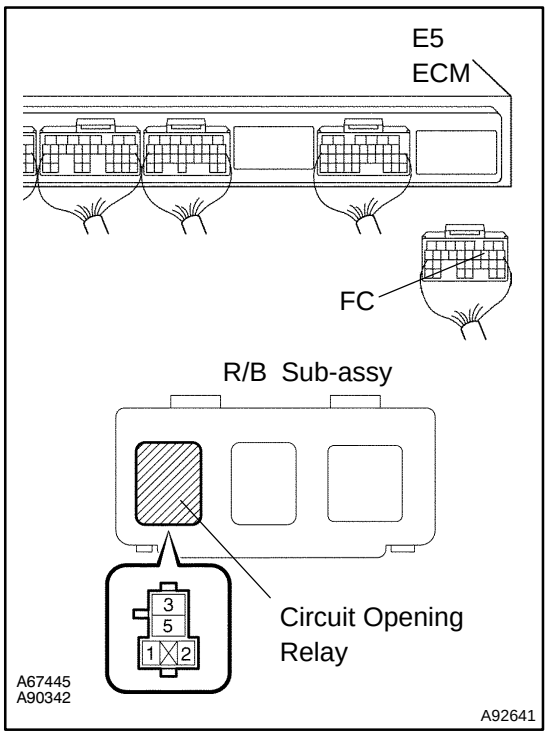
(a) Turn the ignition switch ON.
(b) Measure the voltage of the ECM connectors.
Standard:

Tester Connection	Specified Condition
E5-10 (FC) - E9-1 (E1)	9 to 14 V

OK → **REPLACE ECM (See page 10-9)**

NG

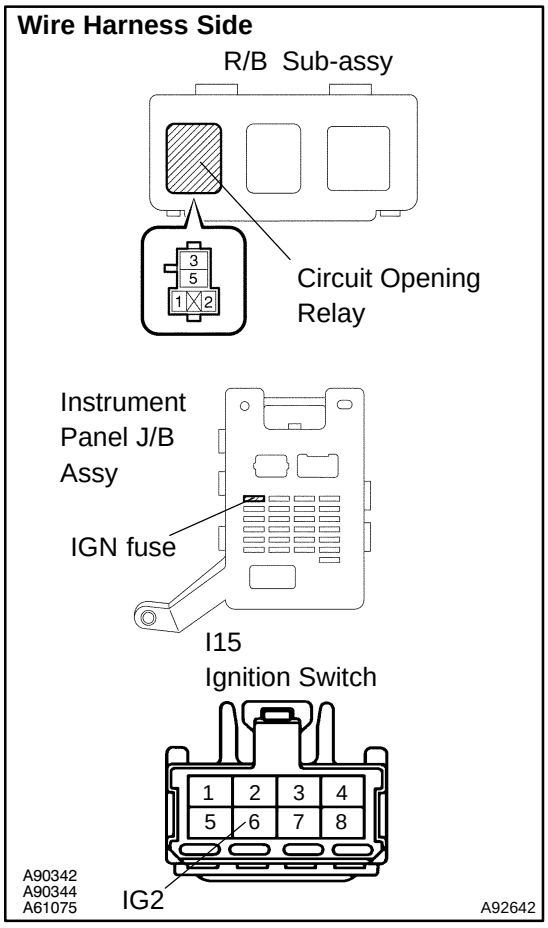
4	CHECK WIRE HARNESS (ECM - CIRCUIT OPENING RELAY, CIRCUIT OPENING RELAY - IGNITION SWITCH)



(a) Check the wire harness between the ECM and circuit opening relay.
(1) Disconnect the E5 ECM connector.
(2) Remove the circuit opening relay from the R/B sub-assy.
(3) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
E5-10 (FC) - R/B sub-assy circuit opening relay terminal 2	Below 1 Ω
E5-10 (FC) or R/B sub-assy circuit opening relay terminal 2 - Body ground	10 kΩ or higher



(b) Check the wire harness between the circuit opening relay and ignition switch.
(1) Check the IGN fuse.
* Remove the IGN fuse from the instrument panel J/B.
* Measure the resistance of the IGN fuse.

Standard: Below 1 Ω

* Reinstall the IGN fuse.

(2) Remove the circuit opening relay from the R/B sub-assy.
(3) Disconnect the I15 ignition switch connector.
(4) Measure the resistance of the wire harness side connectors.

Standard:

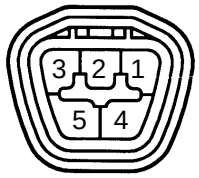
Tester Connection	Specified Condition
R/B sub-assy circuit opening relay terminal 1 - I15-6 (IG2)	Below 1 Ω
I15-6 (IG2) or R/B sub-assy circuit opening relay terminal 1 - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE ECM (See page 10-9)

5 INSPECT FUEL PUMP ASSY



F12
Fuel Pump

A74356

(a) Measure the resistance of the fuel pump terminals.
Standard:

Tester Condition	Condition	Specified Condition
4 - 5	20°C (68°F)	0.2 to 0.3 Ω

(b) Check operation of the fuel pump.
(1) Apply battery voltage to both the terminals. Check that the pump operates.

NOTICE:

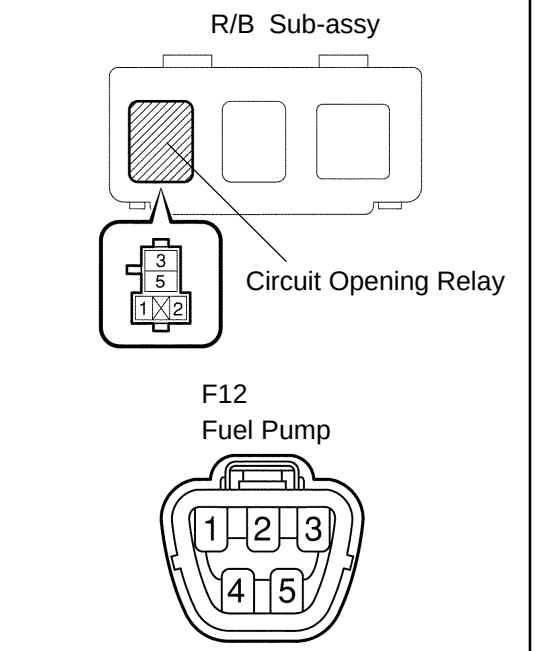
- **These tests must be done quickly (within 10 seconds) to prevent the coil from burning out.**
- **Keep the fuel pump as far away from the battery as possible.**
- **Always turn ON and OFF the voltage on the battery side, not the fuel pump side.**

NG → **REPLACE FUEL PUMP ASSY (See page 11-16)**

OK

6 CHECK WIRE HARNESS (CIRCUIT OPENING RELAY - FUEL PUMP, FUEL PUMP - BODY GROUND)

Wire Harness Side

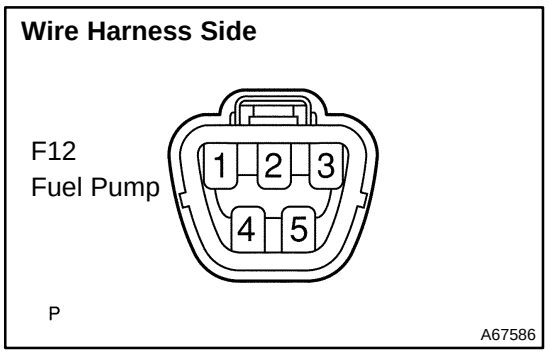


A90342
A67586

A92648

(a) Check the wire harness between the circuit opening relay and fuel pump.
(1) Remove the circuit opening relay from the R/B sub-assy.
(2) Disconnect the F12 fuel pump connector.
(3) Measure the resistance of the wire harness side connectors.
Standard:

Tester Connection	Specified Condition
R/B sub-assy circuit opening relay terminal 3 - F12-4	Below 1 Ω
F12-4 or R/B sub-assy circuit opening relay terminal 3 - Body ground	10 kΩ or higher



(b) Check the wire harness between the fuel pump and body ground.
(1) Disconnect the F12 fuel pump connector.
(2) Measure the resistance between the wire harness side connector and body ground.

Standard:

Tester Connection	Specified Condition
F12-5 - Body ground	Below 1 Ω

OK	**REPAIR OR REPLACE HARNESS AND CONNECTOR**

NG

REPLACE ECM (See page 10-9)

OBD II scan tool (excluding hand-held tester):

1	**CHECK FUEL PUMP OPERATION (See Page 11-4)**

(a) Check if there is pressure in the fuel inlet hose.

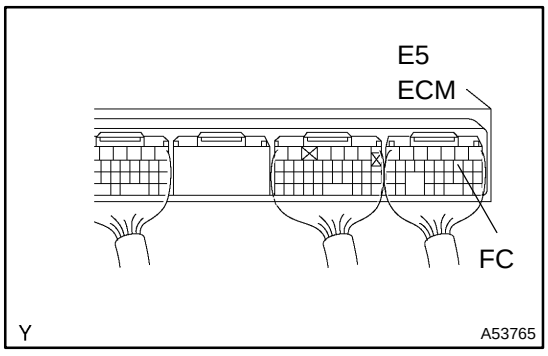
HINT:

The pipe has fuel pressure if the sound of flowing fuel can be heard.

OK	**PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE (See page 05-31)**

NG

2	**CHECK RELAY OPERATION (CIRCUIT OPENING RELAY)**



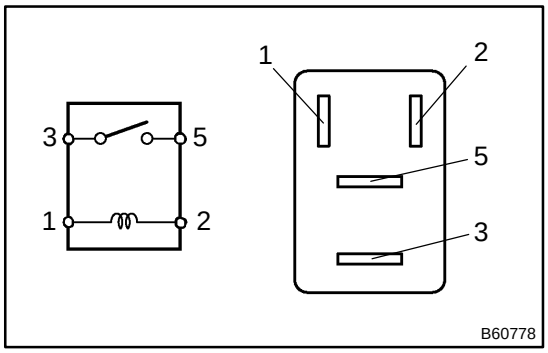
(a) When connecting between terminal FC of the ECM connector and body ground, check relay operation.

OK: Noise can be heard from the circuit opening relay.

OK	**Go to step 6**

NG

3 INSPECT CIRCUIT OPENING RELAY



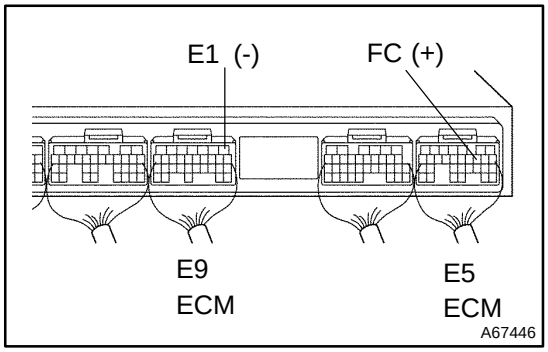
(a) Remove the circuit opening relay from the R/B sub-assy.
(b) Measure the resistance of the circuit opening relay.
Standard:

Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

NG → **REPLACE CIRCUIT OPENING RELAY**

OK

4 INSPECT ECM (FC VOLTAGE)



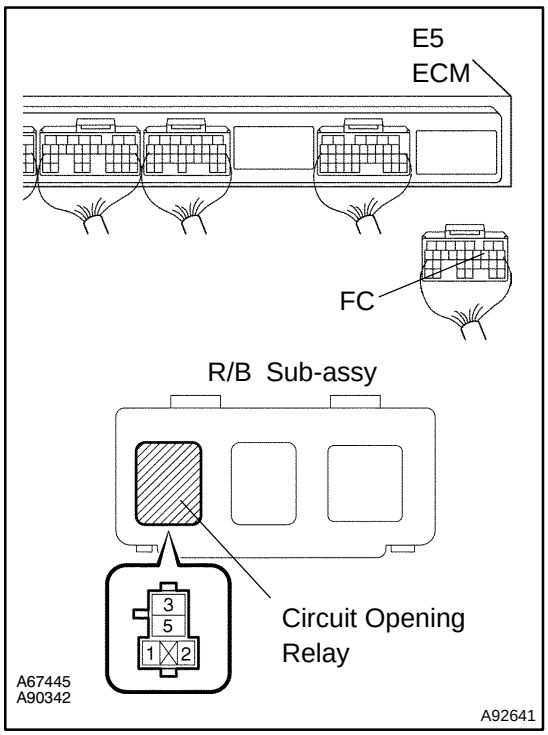
(a) Turn the ignition switch ON.
(b) Measure the voltage of the ECM connectors.
Standard:

Tester Connection	Specified Condition
E5-10 (FC) - E9-1 (E1)	9 to 14 V

OK → **REPLACE ECM (See page 10-9)**

NG

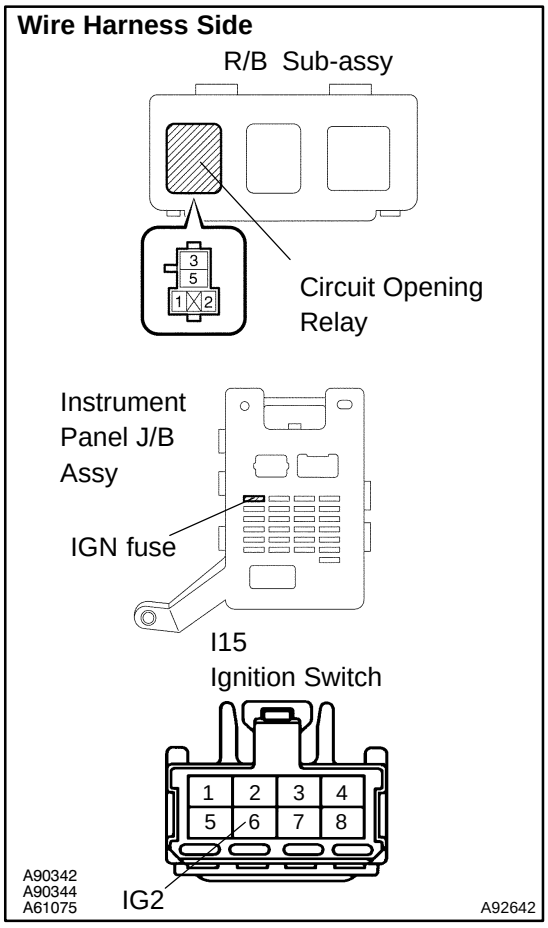
5	CHECK WIRE HARNESS (ECM - CIRCUIT OPENING RELAY, CIRCUIT OPENING RELAY - IGNITION SWITCH)



(a) Check the wire harness between the ECM and circuit opening relay.
  (1) Disconnect the E5 ECM connector.
  (2) Remove the circuit opening relay from the R/B sub-assy.
  (3) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
E5-10 (FC) - R/B sub-assy circuit opening relay terminal 2	Below 1 Ω
E5-10 (FC) or R/B sub-assy circuit opening relay terminal 2 - Body ground	10 kΩ or higher



(b) Check the wire harness between the circuit opening relay and ignition switch.
  (1) Check the IGN fuse.
    ⁎ Remove the IGN fuse from the instrument panel J/B Assy.
    ⁎ Check the resistance of the IGN fuse.

Standard: Below 1 Ω

    ⁎ Reinstall the IGN fuse.
  (2) Remove the circuit opening relay from the R/B sub-assy.
  (3) Disconnect the I15 ignition switch connector.
  (4) Measure the resistance of the wire harness side connectors.

Standard:

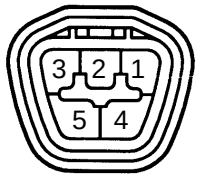
Tester Connection	Specified Condition
R/B sub-assy circuit opening relay terminal 1 - I15-6 (IG2)	Below 1 Ω
I15-6 (IG2) or R/B sub-assy circuit opening relay terminal 1 - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE ECM (See page 10-9)

6 INSPECT FUEL PUMP ASSY



F12
Fuel Pump

A74356

(a) Measure the resistance of the fuel pump terminals.
Standard:

Tester Condition	Condition	Specified Condition
4 - 5	20°C (68°F)	0.2 to 0.3 Ω

(b) Check operation of the fuel pump.
(1) Apply battery voltage to both the terminals. Check that the pump operates.

NOTICE:

- **These tests must be done quickly (within 10 seconds) to prevent the coil from burning out.**
- **Keep the fuel pump as far away from the battery as possible.**
- **Always turns ON and OFF the voltage on the battery side, not the fuel pump side.**

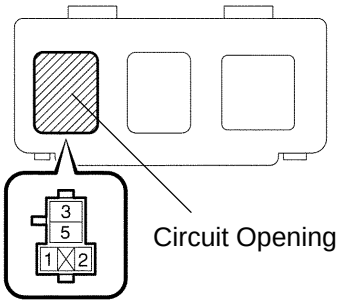
NG → **REPLACE FUEL PUMP ASSY (See page 11-16)**

OK

7 CHECK WIRE HARNESS (CIRCUIT OPENING RELAY - FUEL PUMP, FUEL PUMP - BODY GROUND)

Wire Harness Side

R/B Sub-assy



Circuit Opening Relay

F12
Fuel Pump



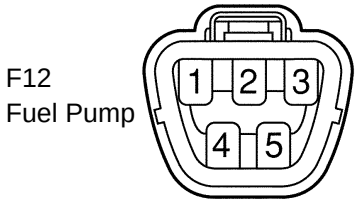
A90342
A67586

A92648

(a) Check the wire harness between the circuit opening relay and fuel pump.
(1) Remove the circuit opening relay from the R/B Sub-Assy.
(2) Disconnect the F12 fuel pump connector.
(3) Measure the resistance of the wire harness side connectors.
Standard:

Tester Connection	Specified Condition
R/B sub-assy circuit opening relay terminal 3 - F12-4	Below 1 Ω
F12-4 or R/B sub-assy circuit opening relay terminal 3 - Body ground	10 kΩ or higher

Wire Harness Side



(b) Check the wire harness between the fuel pump and body ground.
(1) Disconnect the F12 fuel pump connector.
(2) Measure the resistance between the wire harness side connector and body ground.

Standard:

Tester Connection	Specified Condition
F12-5 - Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE ECM (See page 10-9)

05ITB-02

LIST OF DISABLE A MONITOR

HINT:

The table below shows the ECM monitoring status for the components listed in the top of the table when the DTCs on the left of the table are set.

Monitor detected malfunction

Fault code	Fault code	Component/ system	Monitor disablement (X - disabled)																												
			P0010,P0020	P0011	P0012	P0016,P0018	P0021	P0022	P0030,50	P0135,P0155	P0036,56	P0043,44,63,64	P0100	P0101	P0105	P0106	P0110	P0115	P0116	P0120,P0121	P0125	P0128	P0130-P0153	P0134,P0154	P0136,P0156	P0142,P0162	P0171,P0172	P0300-P0308			
	P0010,P0020	P0010,P0020	P0010,P0020	P0011	P0012	P0016,P0018	P0021	P0022	P0031,32,51,52	P0031,32,51,52	P0037,38,57,58	P0043,44,63,64	P0100-P0103	P0101	P0105-P0108	P0106	P0110-P0113	P0115-P0118	P0116	P0120-P0223,P2135	P0125	P0128	P0130-P0153	P0134,P0154	P0136,P0156	P0142,P0162	P0171,P0172	P0300-P0308			
			VVT VSV1,2	VVT System1 -Advance	VVT System1 - Retard	VVT System - Misalignment	VVT System2 - Advance	VVT System2 - Retard	O2 Sensor Heater - Sensor1	A/F Sensor Heater - Sensor1	O2 Sensor Heater - Sensor2	O2 Snesor Heater - Sensor3	MAF sensor	MAF sensor	MAP sensor	MAP sensor	IAT sensor	ECT sensor	ECT sensor	TP sensor	Insufficient ECT for Closed Loop	Thermostat	O2 Sensor -Sensor1	O2 Sensor, A/F Sensor(No Activity) - Sensor1	O2 Sensor - Sensor2	O2 Snesor - Sensor3	Fuel system	Misfire			
P0010,P0020	P0010,P0020	VVT VSV1,2																			X					X					
P0011	P0011	VVT System1 - Advance				X		X														X					X					
P0012	P0012	VVT System1 - Retard				X		X														X					X					
P0016,P0018	P0016,P0018	VVT System - Misalignment																													
P0021	P0021	VVT System2 - Advance			X	X																X					X					
P0022	P0022	VVT System2 - Retard			X																	X					X					
P0030,50	P0031,32,51,52	O2 Sensor Heater - Sensor1																				X	X	X	X	X	X					
P0135,P0155	P0031,32,51,52	A/F Sensor Heater - Sensor1																				X			X	X	X					
P0036,56	P0037,38,57,58	O2 Sensor Heater - Sensor2																							X	X						
P0043,44,63,64	P0043,44,63,64	O2 Sensor Heater - Sensor3																								X						
P0100,P0101	P0100-P0103	MAF sensor		X	X		X	X											X		X	X	X	X	X	X	X	X				
P0105,P0106	P0105-P0108	MAP sensor		X	X		X	X											X		X	X	X	X	X	X	X	X				
P0110	P0110-P0113	IAT sensor																			X	X	X	X	X	X		X				
P0115,P0116	P0115-P0118	ECT sensor		X	X	X	X	X						X		X					X	X	X	X	X	X	X	X				
P0120,P0121	P0120-P0223,P2135	TP sensor												X		X							X	X	X	X	X	X				
P0125	P0125	Insufficient ECT for Closed Loop		X	X		X	X						X		X						X	X	X	X	X	X	X				
P0128	P0128	Thermostat																														
P0130-P0153	P0130-P0153	O2 Sensor - Sensor1																				X		X	X	X						
P0134,P0154	P0134,P0154	O2 Sensor, A/F Sensor(No Activity) - Sensor1								X												X	X		X	X	X					
P0136,P0156	P0136,P0156	O2 Sensor - Sensor2																														
P0142,P0162	P0142,P0162	O2 Sensor - Sensor3																														
P0171,P0172	P0171,P0172	Fuel system																				X	X	X	X	X						
P0300-P0308	P0300-P0308	Misfire							X													X	X	X	X	X						
P0325,P0330	P0325-P0333	Knock sensor																										X				
P0335	P0335	CKP sensor		X	X		X	X						X		X						X	X	X	X	X	X	X				
P0340, P0341	P0340, P0341	CMP sensor		X	X		X	X						X		X						X	X	X	X	X	X	X				
P0340-P0346	P0340-P0346	VVT sensor1,2																				X										
P0351-P0358	P0351-P0358	Ignitor		X	X		X	X														X										
P0385	P0385	CKP sensor 2												X		X						X	X	X	X	X	X	X				
P0401	P0401	EGR system (closed)																				X					X					
P0402	P0402	EGR system (open)																				X	X	X	X	X	X					
P0405,P0409	P0405-P0409	Lift sensor																									X					
P0420,P0430	P0420,P0430	Catalyst																														
P0442-P0456	P0442-P0456	EVAP system																					X	X	X	X						
P0450,P0451	P0450-P0453	EVAP press sensor																														

C

A92556

Monitor detected malfunction

Fault code	Fault code	Component/ system	Monitor disablement (X - disabled)																												
			P0010,P0020	P0011	P0012	P0016,P0018	P0021	P0022	P0030,50	P0135,P0155	P0036,56	P0043,44,63,64	P0100	P0101	P0105	P0106	P0110	P0115	P0116	P0120,P0121	P0125	P0128	P0130-P0153	P0134,P0154	P0136,P0156	P0142,P0162	P0171,P0172	P0300-P0308			
			P0010,P0020	P0011	P0012	P0016,P0018	P0021	P0022	P0031,32,51,52	P0031,32,51,52	P0037,38,57,58	P0043,44,63,64	P0100-P0103	P0101	P0105-P0108	P0106	P0110-P0113	P0115-P0118	P0116	P0120-P0223,P2135	P0125	P0128	P0130-P0153	P0134,P0154	P0136,P0156	P0142,P0162	P0171,P0172	P0300-P0308			
			VVT VSV1,2	VVT System1 -Advance	VVT System1 - Retard	VVT System - Misalignment	VVT System2 - Advance	VVT System2 - Retard	O2 Sensor Heater - Sensor1	A/F Sensor Heater - Sensor1	O2 Sensor Heater - Sensor2	O2 Snesor Heater - Sensor3	MAF sensor	MAF sensor	MAP sensor	MAP sensor	IAT sensor	ECT sensor	ECT sensor	TP sensor	Insufficient ECT for Closed Loop	Thermostat	O2 Sensor -Sensor1	O2 Sensor, A/F Sensor(No Activity) - Sensor1	O2 Sensor - Sensor2	O2 Snesor - Sensor3	Fuel system	Misfire			
P0500	P0500	VSS																				X	X	X	X	X	X	X	X		
P0511	P0511	IAC valve																					X								
P0510	P0510	Idle switch												X		X						X	X		X	X	X	X	X		
P0560	P0560	System Voltage																													
P0617	P0617	Starter signal																													
P0705	P0705	Shift lever position switch																													
P0710	P0710-P0713	Trans fluid temp sensor																													
P0720-P0793	P0720-P0793	Output speed sensor																													
P0715-P0717	P0715-P0717	Input speed sensor																													
P0724	P0724	Stop lamp switch																													
P0741-P0796	P0741-P0796	Trans solenoid (function)																													
P0748-P0798	P0748-P0799	Trans solenoid (range)																													
P0850	P0850	PNP switch																													X
P1010,P1020	P1010,P1020	VVTL																				X					X			
P1011,12(,21,22)	P1011,12(,21,22)	VVTL system1(,2)																				X					X			
P1126	P1126	Electronic magnet clutch																													
P1129	P1129	Electronic throttle system																													
P1430	P1430	HC adsorber ACT press sensor																													
P2004,6	P2004,6	Intake Manifold Runner Control																													
P2009,10	P2009,10	Intake Manifold Runner Control Circuit																													
P2014,16,17	P2014,16,17	Intake Manifold Runner Position Sensor																													
P2102,P2103	P2102,P2103	Throttle motor																													
P2120-P2138	P2120-P2138	Accel position sensor																													
P2196,P2198	P2196,P2198	A/F sensor (rationality)																				X			X	X					
P2226	P2226	BARO sensor																					X		X	X					
P2237,P2240	P2237,P2240	A/F sensor (open)																				X			X	X					
P2423,24	P2423,24	HC Absorption Catalyst																													
P2430,2,3	P2430,2,3	AIR Pressure Sensor(Low/High)																													
P2431	P2431	AIR Pressure Sensor(Rationality)																													
P2440	P2440	AIR control valve stuck open																					X	X	X	X	X				
P2441	P2441	AIR control valve stuck close																					X	X	X	X	X				
P2444	P2444	AIP stuck On																					X	X	X	X	X				
P2445	P2445	AIP stuck Off																					X	X	X	X	X				
P2714-P2759	P2714-P2759	Trans solenoid(SLU-SLD)																													
P2A00,P2A03	P2A00,P2A03	A/F sensor (slow response)																				X			X	X					

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Monitor detected malfunction

| Fault code | Fault code | Component/ system | Monitor disablement (X - disabled) | | |

Monitor detected malfunction

Fault code	Fault code	Component/ system	Monitor disablement (X - disabled)																														
			P0325,P0330	P0335	P0340,P0341	P0340-P0346	P0351-P0358	P0385	P0401	P0402	P0405	P0409	P0420,P0430	P0440-P0446	P0450,P0451	P0500	P0500	P0500	P0511	P0510	P0560	P0617	P0705	P0710	P0720-P0793	P0715-P0717	P0724	P0741-P0796						
			P0325-P0333	P0335	P0340,P0341	P0340-P0346	P0351-P0358	P0385	P0401	P0402	P0405,P0406	P0409	P0420,P0430	P0440-P0446	P0450-P0453	P0500	P0500	P0500	P0511	P0510	P0560	P0617	P0705	P0710-P0713	P0720-P0793	P0715-P0717	P0724	P0741-P0796						
			Knock sensor	CKP sensor	CMP sensor	VVT sensor1,2	Ignitor	CKP sensor 2	EGR system (closed)	EGR system (open)	EGR Lift sensor	EGR Lift sensor	Catalyst	EVAP system	EVAP press sensor	VSS(ECT2sensor)	VSS(ECT1sensor, non-ECT)	VSS(M/T)	IAC valve	Idle switch	System Voltage	Starter signal	Shift lever position switch	Trans fluid temp sensor	Output speed sensor	Input speed sensor	Stop lamp switch	Trans solenoid (function)*1						
P0500	P0500	VSS							X	X			X	X					X							X	X						
P0511	P0511	IAC valve																															
P0510	P0510	Idle switch								X			X	X					X									X					
P0560	P0560	System Voltage																															
P0617	P0617	Starter signal																															
P0705	P0705	Shift lever position switch																															
P0710	P0710-P0713	Trans fluid temp sensor																															
P0720-P0793	P0720-P0793	Output speed sensor																										X					
P0715-P0717	P0715-P0717	Input speed sensor																															
P0724	P0724	Stop lamp switch																															
P0741-P0796	P0741-P0796	Trans solenoid (function)																															
P0748-P0798	P0748-P0799	Trans solenoid (range)																							X	X		X					
P0850	P0850	PNP switch																	X									X					
P1010,P1020	P1010,P1020	VVTL																															
P1011,12(,21,22)	P1011,12(,21,22)	VVTL system1(,2)							X	X			X	X					X														
P1126	P1126	Electronic magnet clutch																															
P1129	P1129	Electronic throttle system																															
P1430	P1430	HC adsorber ACT press sensor												X	X																		
P2004,6	P2004,6	Intake Manifold Runner Control																															
P2009,10	P2009,10	Intake Manifold Runner Control Circuit																															
P2014,16,17	P2014,16,17	Intake Manifold Runner Position Sensor																															
P2102,P2103	P2102,P2103	Throttle motor																															
P2120-P2138	P2120-P2138	Accel position sensor																															
P2196,P2198	P2196,P2198	A/F sensor (rationality)							X	X			X						X									X					
P2226	P2226	BARO sensor																										X					
P2237,P2240	P2237,P2240	A/F sensor (open)							X	X			X						X									X					
P2423,24	P2423,24	HC Absorption Catalyst																															
P2430,2,3	P2430,2,3	AIR Pressure Sensor(Low/High)																															
P2431	P2431	AIR Pressure Sensor(Rationality)																															
P2440	P2440	AIR control valve stuck open							X	X			X																				
P2441	P2441	AIR control valve stuck close							X	X			X																				
P2444	P2444	AIP stuck On							X	X			X																				
P2445	P2445	AIP stuck Off							X	X			X																				
P2714-P2759	P2714-P2759	Trans solenoid(SLU-SLD)																										X					
P2A00,P2A03	P2A00,P2A03	A/F sensor (slow response)							X	X			X						X									X					

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Note *1: Without input speed sensor

Note *2: With input speed sensor

Monitor detected malfunction

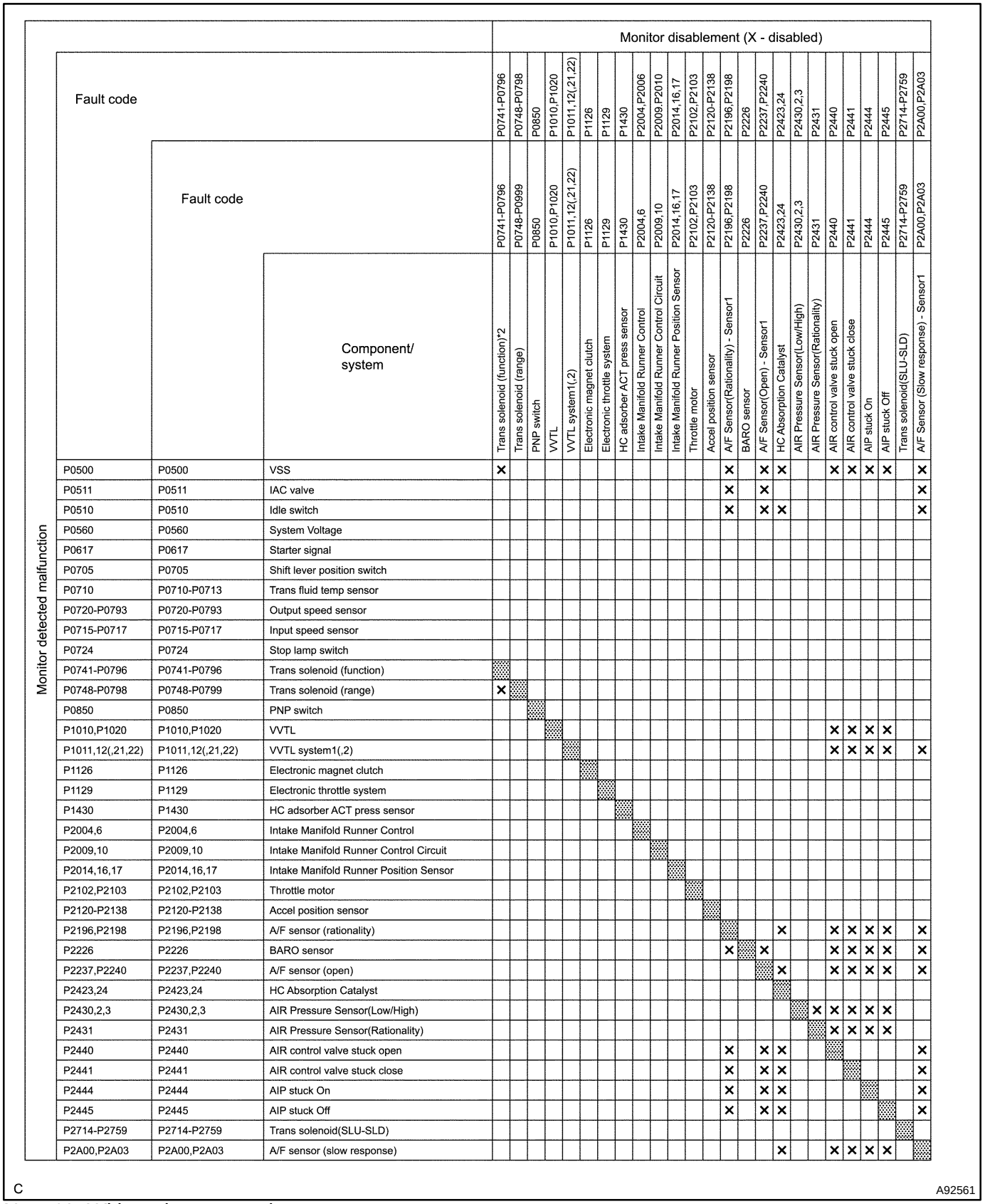
Fault code	Fault code	Component/ system	Monitor disablement (X - disabled)																												
			P0741-P0796	P0748-P0798	P0850	P1010,P1020	P1011,12(,21,22)	P1126	P1129	P1430	P2004,P2006	P2009,P2010	P2014,16,17	P2102,P2103	P2120-P2138	P2196,P2198	P2226	P2237,P2240	P2423,24	P2430,2,3	P2431	P2440	P2441	P2444	P2445	P2714-P2759	P2A00,P2A03
	P0741-P0796	Trans solenoid (function)*2																													
	P0748-P0999	Trans solenoid (range)																													
	P0850	PNP switch																													
	P1010,P1020	VVTL																													
	P1011,12(,21,22)	VVTL system1(,2)																													
	P1126	Electronic magnet clutch																													
	P1129	Electronic throttle system																													
	P1430	HC adsorber ACT press sensor																													
	P2004,6	Intake Manifold Runner Control																													
	P2009,10	Intake Manifold Runner Control Circuit																													
	P2014,16,17	Intake Manifold Runner Position Sensor																													
	P2102,P2103	Throttle motor																													
	P2120-P2138	Accel position sensor																													
	P2196,P2198	A/F Sensor(Rationality) - Sensor1																													
	P2226	BARO sensor																													
	P2237,P2240	A/F Sensor(Open) - Sensor1																													
	P2423,24	HC Absorption Catalyst																													
	P2430,2,3	AIR Pressure Sensor(Low/High)																													
	P2431	AIR Pressure Sensor(Rationality)																													
P0010,P0020	P0010,P0020	VVT VSV1,2																				X	X	X	X		
P0011	P0011	VVT System1 - Advance																				X	X	X	X		
P0012	P0012	VVT System1 - Retard																				X	X	X	X		
P0016,P0018	P0016,P0018	VVT System - Misalignment																				X	X	X	X		
P0021	P0021	VVT System2 - Advance																				X	X	X	X		
P0022	P0022	VVT System2 - Retard																				X	X	X	X		
P0030,50	P0031,32,51,52	O2 Sensor Heater - Sensor1																	X			X	X	X	X		
P0135,P0155	P0031,32,51,52	A/F Sensor Heater - Sensor1														X		X	X			X	X	X	X		X
P0036,56	P0037,38,57,58	O2 Sensor Heater - Sensor2														X			X								
P0043,44,63,64	P0043,44,63,64	O2 Sensor Heater - Sensor3																	X								
P0100,P0101	P0100-P0103	MAF sensor				X	X									X		X	X			X	X	X	X		X
P0105,P0106	P0105-P0108	MAP sensor				X	X									X		X	X			X	X	X	X		X
P0110	P0110-P0113	IAT sensor									X					X		X				X	X	X	X		X
P0115,P0116	P0115-P0118	ECT sensor	X			X	X				X					X		X	X			X	X	X	X		X
P0120,P0121	P0120-P0223,P2135	TP sensor														X		X	X			X	X	X	X		X
P0125	P0125	Insufficient ECT for Closed Loop	X			X										X		X	X			X	X	X	X		X
P0128	P0128	Thermostat																									
P0130-P0153	P0130-P0153	O2 Sensor - Sensor1																	X			X	X	X	X		
P0134,P0154	P0134,P0154	O2 Sensor, A/F Sensor(No Activity) - Sensor1														X		X	X			X	X	X	X		X
P0136,P0156	P0136,P0156	O2 Sensor - Sensor2														X			X								
P0142,P0162	P0142,P0162	O2 Sensor - Sensor3																	X								
P0171,P0172	P0171,P0172	Fuel system														X		X	X			X	X	X	X		X
P0300-P0308	P0300-P0308	Misfire														X		X	X			X	X	X	X		X
P0325,P0330	P0325-P0333	Knock sensor																				X	X	X	X		
P0335	P0335	CKP sensor				X	X									X		X	X			X	X	X	X		X
P0340, P0341	P0340, P0341	CMP sensor				X	X									X		X	X			X	X	X	X		X
P0340-P0346	P0340-P0346	VVT sensor1,2																				X	X	X	X		
P0351-P0358	P0351-P0358	Ignitor																	X			X	X	X	X		
P0385	P0385	CKP sensor 2				X	X									X		X	X			X	X	X	X		X
P0401	P0401	EGR system (closed)																	X								
P0402	P0402	EGR system (open)														X		X	X			X	X	X	X		X
P0405,P0409	P0405-P0409	Lift sensor																									
P0420,P0430	P0420,P0430	Catalyst																									
P0442-P0456	P0442-P0456	EVAP system														X		X				X	X	X	X		X
P0450,P0451	P0450-P0453	EVAP press sensor																				X	X	X	X		

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Note *1: Without input speed sensor

Note *2: With input speed sensor



Monitor detected malfunction	Fault code	Fault code	Component/ system	Monitor disablement (X - disabled)																										
				P0741-P0796	P0748-P0798	P0850	P1010,P1020	P1011,12(,21,22)	P1126	P1129	P1430	P2004,P2006	P2009,P2010	P2014,16,17	P2102,P2103	P2120-P2138	P2196,P2198	P2226	P2237,P2240	P2423,24	P2430,2,3	P2431	P2440	P2441	P2444	P2445	P2714-P2759	P2A00,P2A03
				P0741-P0796	P0748-P0999	P0850	P1010,P1020	P1011,12(,21,22)	P1126	P1129	P1430	P2004,6	P2009,10	P2014,16,17	P2102,P2103	P2120-P2138	P2196,P2198	P2226	P2237,P2240	P2423,24	P2430,2,3	P2431	P2440	P2441	P2444	P2445	P2714-P2759	P2A00,P2A03
				Trans solenoid (function)*2	Trans solenoid (range)	PNP switch	VVTL	VVTL system1(,2)	Electronic magnet clutch	Electronic throttle system	HC adsorber ACT press sensor	Intake Manifold Runner Control	Intake Manifold Runner Control Circuit	Intake Manifold Runner Position Sensor	Throttle motor	Accel position sensor	A/F Sensor(Rationality) - Sensor1	BARO sensor	A/F Sensor(Open) - Sensor1	HC Absorption Catalyst	AIR Pressure Sensor(Low/High)	AIR Pressure Sensor(Rationality)	AIR control valve stuck open	AIR control valve stuck close	AIP stuck On	AIP stuck Off	Trans solenoid(SLU-SLD)	A/F Sensor (Slow response) - Sensor1
	P0500	P0500	VSS	X													X		X	X			X	X	X	X		X
	P0511	P0511	IAC valve														X		X									X
	P0510	P0510	Idle switch														X		X	X								X
	P0560	P0560	System Voltage																										
	P0617	P0617	Starter signal																										
	P0705	P0705	Shift lever position switch																										
	P0710	P0710-P0713	Trans fluid temp sensor																										
	P0720-P0793	P0720-P0793	Output speed sensor																										
	P0715-P0717	P0715-P0717	Input speed sensor																										
	P0724	P0724	Stop lamp switch																										
	P0741-P0796	P0741-P0796	Trans solenoid (function)																										
	P0748-P0798	P0748-P0799	Trans solenoid (range)	X																									
	P0850	P0850	PNP switch																										
	P1010,P1020	P1010,P1020	VVTL																				X	X	X	X			
	P1011,12(,21,22)	P1011,12(,21,22)	VVTL system1(,2)																				X	X	X	X			X
	P1126	P1126	Electronic magnet clutch																										
	P1129	P1129	Electronic throttle system																										
	P1430	P1430	HC adsorber ACT press sensor																										
	P2004,6	P2004,6	Intake Manifold Runner Control																										
	P2009,10	P2009,10	Intake Manifold Runner Control Circuit																										
	P2014,16,17	P2014,16,17	Intake Manifold Runner Position Sensor																										
	P2102,P2103	P2102,P2103	Throttle motor																										
	P2120-P2138	P2120-P2138	Accel position sensor																										
	P2196,P2198	P2196,P2198	A/F sensor (rationality)																	X			X	X	X	X			X
	P2226	P2226	BARO sensor														X		X				X	X	X	X			X
	P2237,P2240	P2237,P2240	A/F sensor (open)																	X			X	X	X	X			X
	P2423,24	P2423,24	HC Absorption Catalyst																										
	P2430,2,3	P2430,2,3	AIR Pressure Sensor(Low/High)																			X	X	X	X	X			
	P2431	P2431	AIR Pressure Sensor(Rationality)																				X	X	X	X			
	P2440	P2440	AIR control valve stuck open														X		X	X									X
	P2441	P2441	AIR control valve stuck close														X		X	X									X
	P2444	P2444	AIP stuck On														X		X	X									X
	P2445	P2445	AIP stuck Off														X		X	X									X
	P2714-P2759	P2714-P2759	Trans solenoid(SLU-SLD)																										
	P2A00,P2A03	P2A00,P2A03	A/F sensor (slow response)																	X			X	X	X	X			

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Note *1: Without input speed sensor

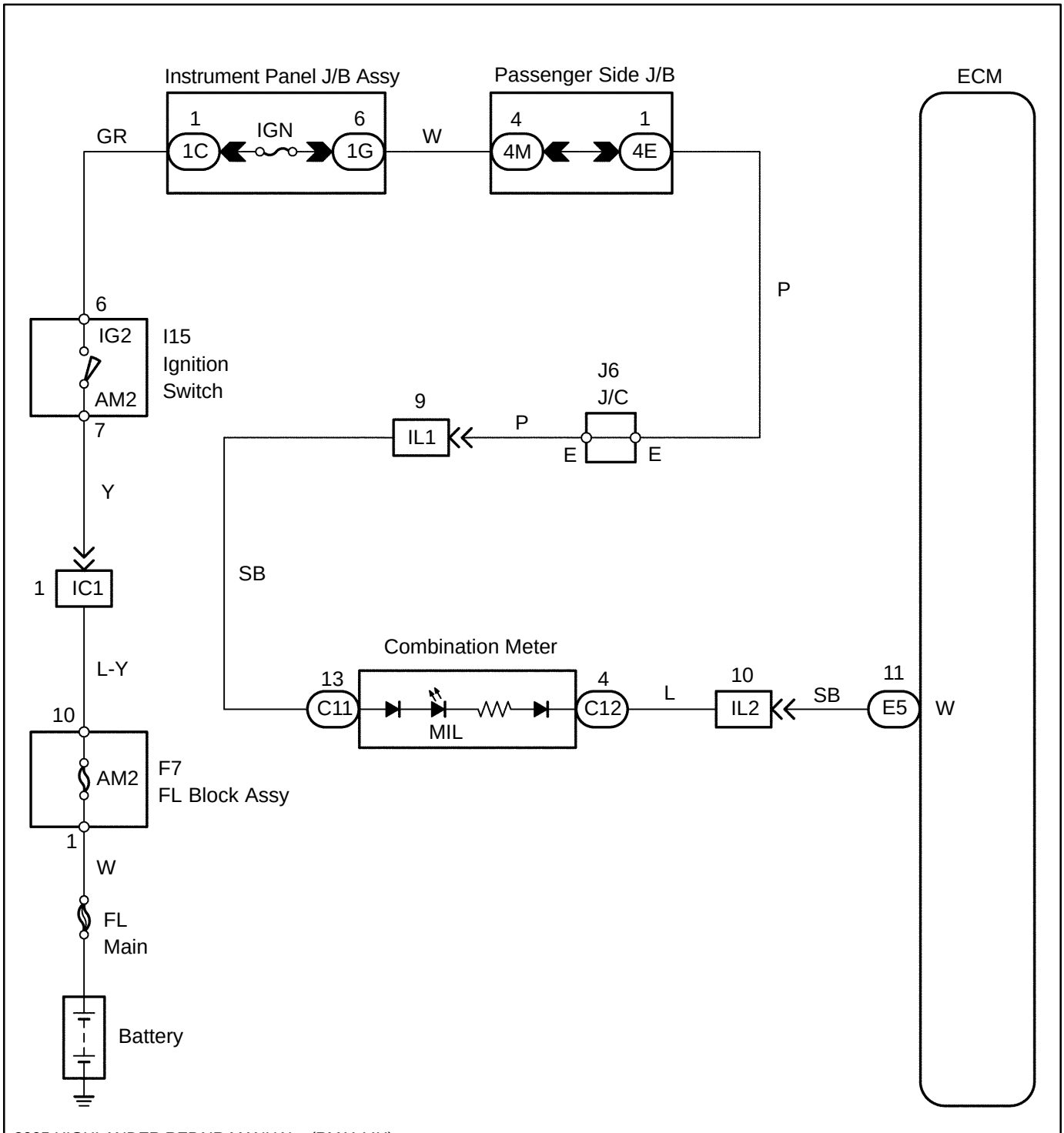
Note *2: With input speed sensor

MIL CIRCUIT

CIRCUIT DESCRIPTION

The Malfunction Indicator Lamp (MIL) is used to indicate the ECM's detection of a vehicle malfunction.
The instrument panel IG2 fuse provides circuit power and the ECM provides the circuit ground that illuminates the MIL.
MIL operations should be checked visually:
The MIL should be illuminated when the ignition is first turned ON. If the MIL is always ON or OFF, use the hand-held tester or OBD II scan tool and follow the procedures to determine the cause of problem.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Troubleshoot each trouble symptom in accordance with the chart below.

MIL remains on	Start inspection from step 1
MIL is not illuminated	Start inspection from step 3

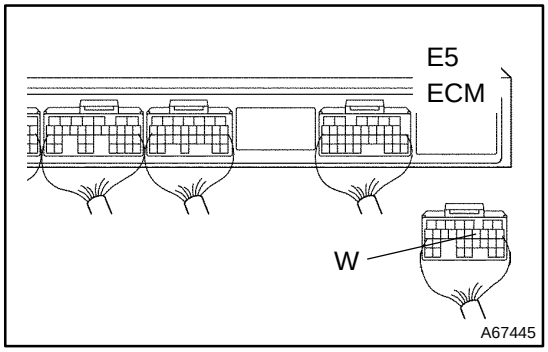
1 CLEAR DTC

(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester or the OBD II scan tool main switch ON.
(c) Read the DTC.
(d) Clear the DTC (see page 05-38).
(e) Check that the MIL is not illuminated.
OK: MIL is not illuminated

OK → **REPAIR CIRCUIT INDICATED BY OUTPUT DTC (See page 05-48)**

NG

2 CHECK WIRE HARNESS (CHECK FOR SHORT IN WIRE HARNESS)



(a) Disconnect the E5 ECM connector.
(b) Turn the ignition switch ON.
(c) Check that the MIL is not illuminated.
OK: MIL is not illuminated

OK → **REPLACE ECM (See page 10-9)**

NG

CHECK AND REPLACE HARNESS AND CONNECTOR

3 CHECK THAT MIL IS ILLUMINATED

(a) Check that the MIL is illuminated when turning the ignition switch ON.
OK: MIL is illuminated

NG → **SYSTEM OK**

NG

4	INSPECT COMBINATION METER ASSY (MIL CIRCUIT)

(a) See the combination meter troubleshooting on page 05-1889 .

NG → REPAIR OR REPLACE BULB OR COMBINATION METER ASSEMBLY

OK

CHECK AND REPAIR HARNESS AND CONNECTOR (COMBINATION METER - ECM)

05F45-05

O2S TEST RESULT

1. INTRODUCTION

The O2S TEST RESULT refers to the results of the engine control module (ECM) when it monitors the oxygen sensor (O2S), and it can be read using the hand-held tester or the generic OBD II scan tool. Based on this, you can find the O2S's conditions.

The ECM monitors the O2S for various data. You can read the monitor result (TEST DATA) of each monitor item using the O2S TEST RESULT. However, the output value of the TEST DATA is the latest "snapshot" value that is taken after monitoring and therefore it is not dynamic.

In this repair manual, the description of the O2S TEST RESULT (for O2S related DTCs) are written in a table.

This table consists of 5 items:

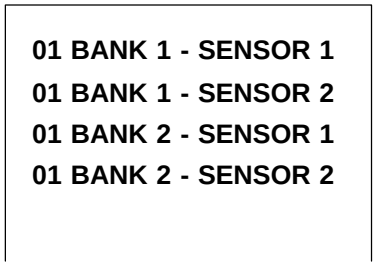
(1) TEST ID (a code applied to each TEST DATA)
(2) Description of TEST DATA
(3) Conversion Factor (When conversion factor has a value written in the table, multiply the TEST DATA value appearing on the scan tool by the conversion factor value. The result will be the required value.)
(4) Unit
(5) Standard Value

If the TEST DATA value appearing on the scan tool is out of the standard value, the O2S is malfunctioning. If it is within the standard value, the O2S is functioning normally. However, if the value is on the borderline of the standard value, the O2S may malfunction very soon.

2. HOW TO READ O2S TEST RESULT USING HAND-HELD TESTER

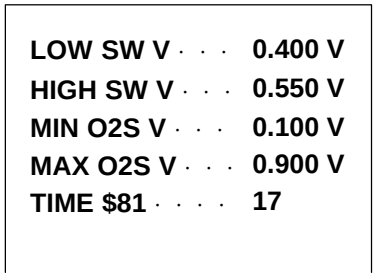
(a) Connect the hand-held tester to the DLC3.

O2S TEST RESULT Screen



(b) On the tester screen, select the following menus: DIAGNOSIS / CARB OBDII / O2S TEST RESULT. A list of the O2S equipped on the vehicle will be displayed.

TEST DATA Screen



(c) Select the desired O2S and press ENTER. The following screen will appear.

(d) Press HELP and ⁜ simultaneously. More information will appear.

(e) Example:

(1) The hand-held tester displays ”17” as a value of the ”TIME $81” (see the illustration on the left).

(2) Find the conversion factor value of ”TIME $81” in the O2S TEST RESULT chart below. 0.3906 is specified for $81 in this chart.

(3) Multiply ”17” in step (1) by 0.3906 (conversion factor) in the step (2).

17 x 0.3906 = 6.6 %

(4) If the answer is within the standard value, the ”TIME $81” can be confirmed to be normal.

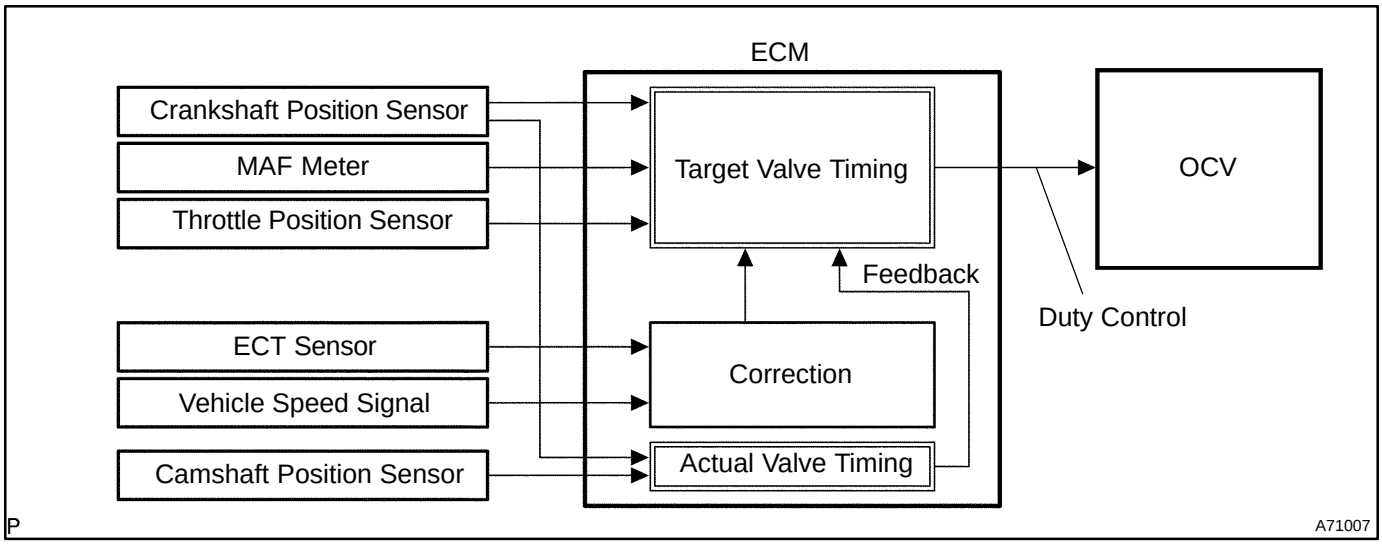
O2S TEST RESULT Chart:

TEST ID	Description of TEST DATA	Conversion Factor	Unit	Standard Value
$81	Percentage of monitoring time when the O2S voltage is less than 0.05 V	Multiply 0.3906	%	Within 60 %

DTC	P0010	CAMSHAFT POSITION "A" ACTUATOR CIRCUIT (BANK 1)

CIRCUIT DESCRIPTION

The Variable Valve Timing (VVT) system includes the ECM, the Oil Control Valve (OCV) and the VVT controller. The ECM sends a target duty-cycle control signal to the OCV. This control signal, sent to the OCV, regulates the oil pressure applied to the VVT controller. Camshaft timing control is performed based on engine operation conditions such as intake air volume, throttle position and engine coolant temperature.
The ECM controls the OCV based on the signals output from several sensors. The VVT controller regulates the intake camshaft angle using oil pressure through the OCV. As a result, the relative position between the camshaft and the crankshaft is optimized. Also, the engine torque and fuel economy improve, and exhaust emissions decrease. The ECM detects the actual valve timing using signals from the camshaft position sensor and the crankshaft position sensor. The ECM performs feedback control and verifies target valve timing.



DTC No.	DTC Detection Condition	Trouble Area
P0010	Open or short in OCV circuit	・Open or short in OCV circuit ・OCV ・ECM

MONITOR DESCRIPTION

After the ECM sends the ”target” duty-cycle signal to the OCV, the ECM monitors the OCV current to establish an ”actual” duty-cycle. When the actual duty-cycle ratio varies from the target duty-cycle ratio, the ECM sets a DTC.

MONITOR STRATEGY

Related DTCs	P0010: VVT OCV range check
Required sensors / components (Main)	VVT OCV
Required sensors / components (Related)	-
Frequency of operation	Continuous
Duration	1 sec.
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever this DTC is not present	See page 05-16
Battery voltage	11 V or more
Target duty ratio for the OCV	70 % or less
Starter	OFF
Current cut status for the OCV	Not cut

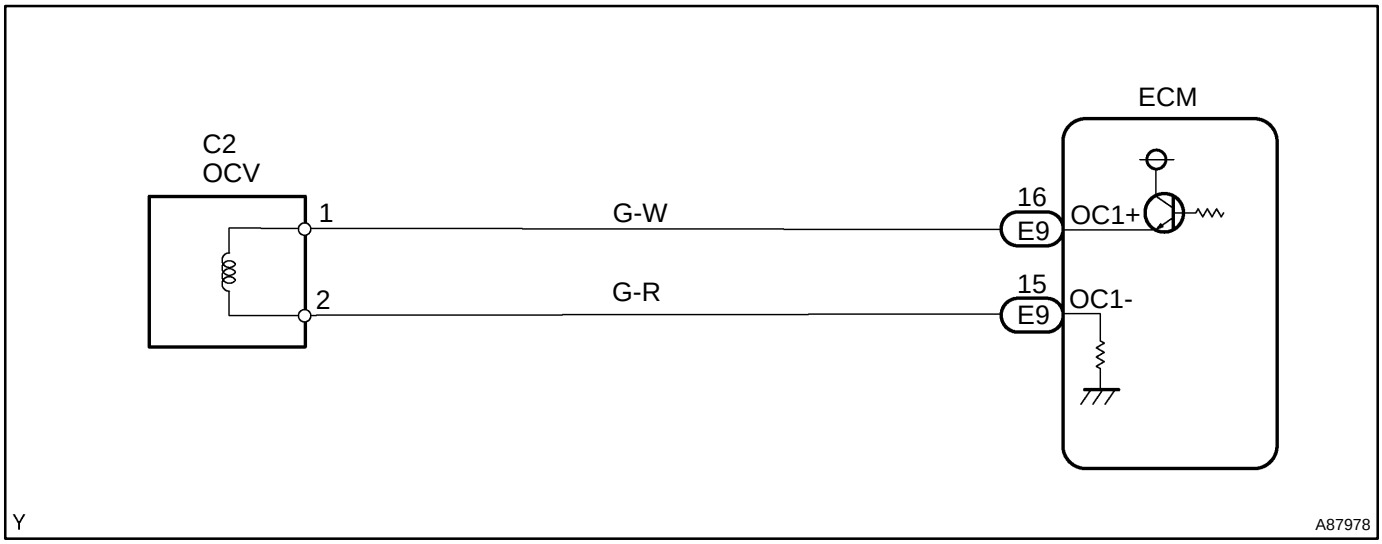
TYPICAL MALFUNCTION THRESHOLDS

Either of the following condition is met:	
OCV duty ratio	100 % (always ON) despite the target duty ratio is less than 70 %
OCV duty ratio when ECM supplies current to OCV	3 % or less despite the ECM is supplying current to the OCV

COMPONENT OPERATING RANGE

VVT OCV duty ratio	More than 3 % and less than 100 %

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

Hand-held tester:

1	**PERFORM ACTIVE TEST USING HAND-HELD TESTER (OCV OPERATION)**

(a) Start the engine and warm it up.
(b) Connect the hand-held tester to the DLC3.
(c) Turn ON the ignition switch. Push the hand-held tester main switch.
(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / VVT CTRL B1.
(e) Using the hand-held tester, operate the OCV and check the engine speed.

Standard:

Tester Operation	Specified Condition
OCV is OFF	Normal engine speed
OCV is ON	Rough idle or engine stall

OK → **CHECK FOR INTERMITTENT PROBLEMS (See page 05-9)**

NG

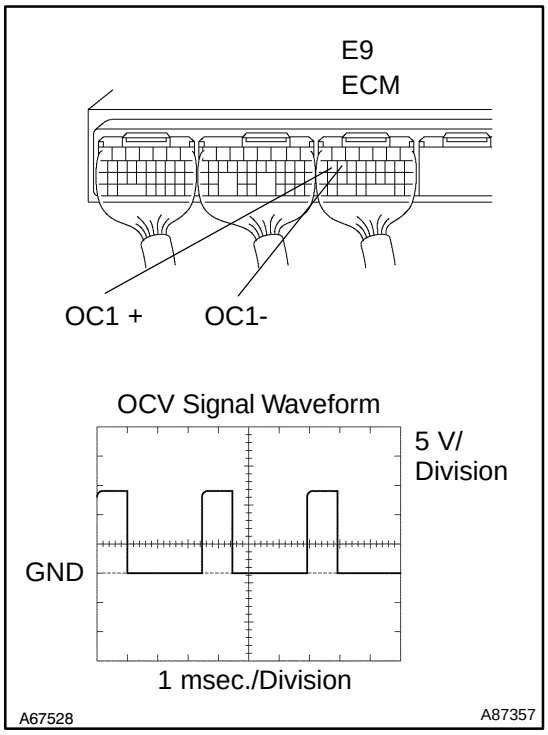
2	**INSPECT CAMSHAFT TIMING OIL CONTROL VALVE ASSY (OCV) (See page 10-2)**

OK: OCV has no contamination and moves smoothly.

NG → **REPLACE CAMSHAFT TIMING OIL CONTROL VALVE ASSY**

OK

3 CHECK ECM (OCV SIGNAL)



(a) During idling, check the waveform of the ECM connector using an oscilloscope.

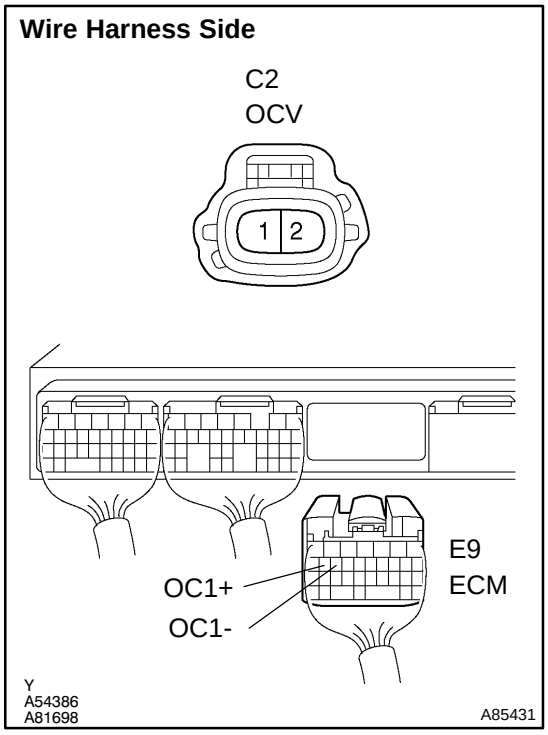
Standard:

Tester Connection	Specified Condition
E9-16 (OC1+) - E9-15 (OC1-)	Correct waveform is as shown

NG → **REPLACE ECM (See page 10-9)**

OK

4 CHECK WIRE HARNESS (OCV - ECM)



(a) Disconnect the C2 OCV connector.
(b) Disconnect the E9 ECM connector.
(c) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
C2-1 (OCV) - E9-16 (OC1+) C2-2 (OCV) - E9-15 (OC1-)	Below 1 Ω
C2-1 (OCV) or E9-16 (OC1+) - Body ground C2-2 (OCV) or E9-15 (OC1-) - Body ground	10 kΩ or higher

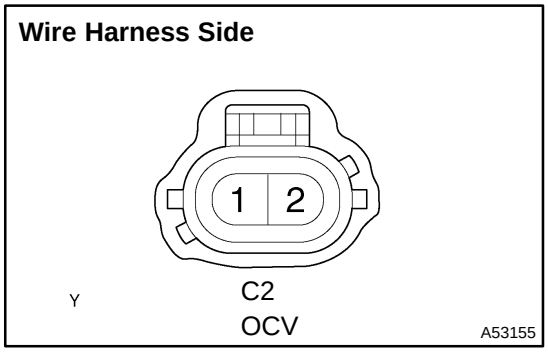
NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

CHECK FOR INTERMITTENT PROBLEMS

OBD II scan tool (excluding hand-held tester):

1	CHECK CAMSHAFT TIMING OIL CONTROL VALVE ASSY (OPERATE OCV)

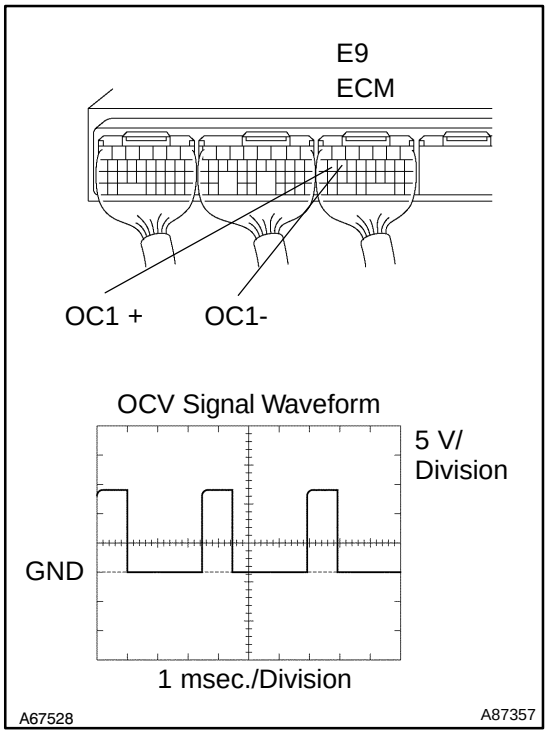


(a) Start the engine and warm it up.
(b) Disconnect the OCV connector.
(c) Apply battery positive voltage to the terminals of the OCV.
(d) Check the engine speed.
OK: Rough idle or engine stalled.

NG → **REPLACE CAMSHAFT TIMING OIL CONTROL VALVE ASSY**

OK

2	CHECK ECM (OCV SIGNAL)



(a) During idling, check the waveform of the ECM connector using an oscilloscope.
Standard:

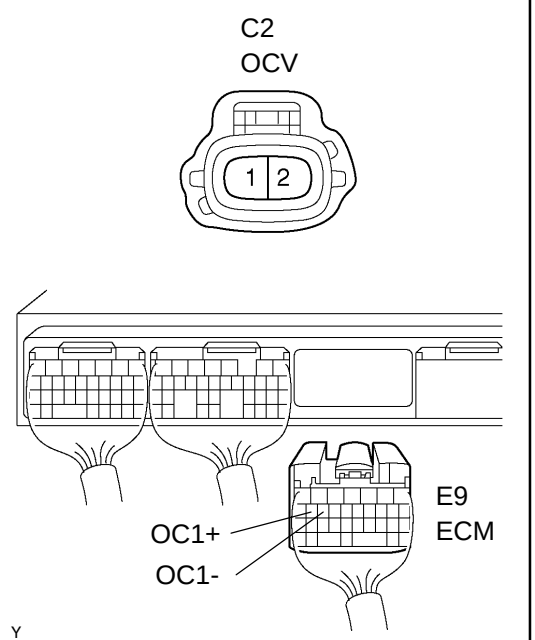
Tester Connection	Specified Condition
E9-16 (OC1+) - E9-15 (OC1-)	Correct waveform is as shown

NG → **REPLACE ECM (See page 10-9)**

OK

3	CHECK WIRE HARNESS (OCV - ECM)

Wire Harness Side



(a) Disconnect the C2 OCV connector.
(b) Disconnect the E9 ECM connector.
(c) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
C2-1 (OCV) - E9-16 (OC1+) C2-2 (OCV) - E9-15 (OC1-)	Below 1 Ω
C2-1 (OCV) or E9-16 (OC1+) - Body ground C2-2 (OCV) or E9-15 (OC1-) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

CHECK FOR INTERMITTENT PROBLEMS

DTC	P0011	CAMSHAFT POSITION ”A” -TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE (BANK 1)

DTC	P0012	CAMSHAFT POSITION ”A” -TIMING OVER-RETARDED (BANK 1)

CIRCUIT DESCRIPTION

Refer to DTC P0010 on page 05-55 .

DTC No.	DTC Detection Condition	Trouble Area
P0011	After engine is warmed up and engine speed is at 550 to 4,000 rpm, condition (a) continues (1 trip detection logic) (a) Valve timing does not change from current valve timing (Problem of advanced valve timing)	·Valve timing ·OCV ·VVT controller assembly ·ECM
P0012	After engine is warmed up and engine speed is at 550 to 4,000 rpm, condition (a) continues (2 trip detection logic) (a) Valve timing does not change from current valve timing (Problem of retarded valve timing)	·Same as DTC No. P0011

MONITOR DESCRIPTION

The ECM optimizes the valve timing using the Variable Valve Timing (VVT) system to control the intake valve camshaft. The VVT system includes the ECM, the Oil Control Valve (OCV) and the VVT controller. The ECM sends a target duty-cycle control signal to the OCV. This control signal, sent to the OCV, regulates the oil pressure applied to the VVT controller. The VVT controller can advance or retard the intake valve camshaft.
Example:
A DTC will be set if: 1) the difference between the ”target” and ”actual” valve timing is more than 5 degrees of the camshaft angle (CA) and the condition continues for more than 4.5 seconds; or 2) the OCV is forcibly activated 63 times or more.
Advanced cam DTCs are subject to ”1 trip” detection logic.
Retarded cam DTCs are subject to ”2 trip” detection logic.

MONITOR STRATEGY

Related DTCs	P0011: Advanced camshaft timing P0012: Retarded camshaft timing
Required sensors / components (Main)	VVT OCV and VVT Actuators
Required sensors / components (Related)	CKP, CMP and ECT sensors
Frequency of operation	Once per driving cycle
Duration	Within 10 sec.
MIL operation	P0011: Immediate P0012: 2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever these DTCs are not present	See page 05-16
Battery voltage	11 V or more
Throttle position learning	Completed
Engine RPM	550 to 4,000 rpm
ECT	75 to 100°C (167 to 212°F)

TYPICAL MALFUNCTION THRESHOLDS

Deviation of valve timing	More than 5°CA (Crankshaft Angle)
OCV activation	63 times or more
Response of valve timing	1 sec./°CA or more (valve timing does not change)

If the difference between ”target” and ”actual” camshaft timing is larger than the specified value, the ECM operates the VVT actuator.
The ECM then monitors the camshaft timing change for 5 seconds.

WIRING DIAGRAM

Refer to DTC P0010 on page 05-55 .

INSPECTION PROCEDURE

HINT:

Abnormal bank	Problem of advanced OCV	Problem of retarded OCV
Bank 1	P0011	P0012

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

Hand-held tester:

1 CHECK VALVE TIMING (See page 14-68)

(a) Check for a loose or jumped tooth of the timing chain.
OK: The matchmarks of the crankshaft pulley and camshaft pulley are aligned.

NG → ADJUST VALVE TIMING (See page 14-68)

OK

2 PERFORM ACTIVE TEST USING HAND-HELD TESTER (OPERATE OF OCV)

(a) Connect the hand-held tester to the DLC3.
(b) Start the engine and warm it up.
(c) Turn ON the ignition switch. Push the hand-held tester main switch.
(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / VVT CTRL B1.
(e) Using the hand-held tester, operate the OCV and check the engine speed.
Standard:

Tester Operation	Specified Condition
OCV is OFF	Normal engine speed
OCV is ON	Rough idle or engine stall

NG → Go to step 4

OK

3 CHECK IF DTC OUTPUTS REOCCUR

(a) Erase the DTC(s) using one of the following methods: 1) use the hand-held tester, 2) disconnect the battery cable for more than 60 seconds, or 3) remove the EFI NO. 1 and ETCS fuses for more than 60 seconds.

HINT:

After disconnecting the battery cable, perform the "INITIALIZE" procedure (see page 05-893).

(b) Start and warm up the engine.

(c) Drive the vehicle for 10 minutes or more.

(d) Read output DTC using the hand-held tester.

OK: No DTC is output.

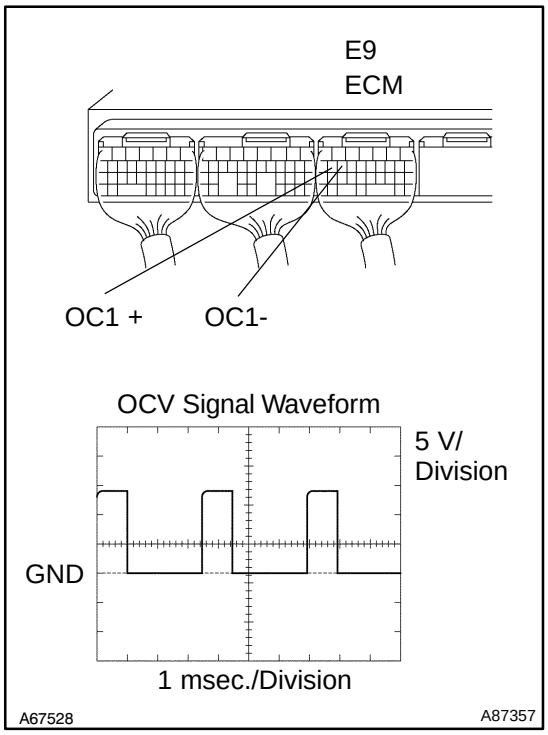
OK → **VVT SYSTEM OK***

HINT:

*: DTCs P0011 and P0012 are output when a foreign object in the engine oil enters the system. These codes will stay even if the system returns to normal after a short time. Foreign objects are filtered out by the oil filter.

NG

4 CHECK ECM (OCV SIGNAL)



(a) During idling, check the waveform of the ECM connector using an oscilloscope.

Standard:

Tester Connection	Specified Condition
E9-16 (OC1+) - E9-15 (OC1-)	Correct waveform is as shown

NG → **REPLACE ECM (See page 10-9)**

OK

5	CHECK OIL CONTROL VALVE FILTER

OK: The filter is not clogged.

NG → REPLACE OIL CONTROL VALVE FILTER

OK

6	CHECK CAMSHAFT TIMING OIL CONTROL VALVE ASSY (OCV) (See page 10-2)

OK: OCV has no contamination and moves smoothly.

OK → Go to step 8

NG

7	REPLACE CAMSHAFT TIMING OIL CONTROL VALVE ASSY (OCV)

GO

8	CHECK CAMSHAFT TIMING GEAR ASSY (See page 14-79)

OK: Camshaft timing gear rotates smoothly when pressure is applied.

OK → Go to step 10

NG

9	REPLACE CAMSHAFT TIMING GEAR ASSY

GO

10	CHECK FOR BLOCKAGE (OCV, OIL CHECK VALVE AND OIL HOLE)

OK: No blockage

NG → REPAIR OR REPLACE

OK

11	CHECK IF DTC OUTPUTS REOCCUR

(a) Erase the DTC(s) using one of the following methods: 1) use the hand-held tester, 2) disconnect the battery cable for more than 60 seconds, or 3) remove the EFI NO. 1 and ETCS fuses for more than 60 seconds.

HINT:

After disconnecting the battery cable, perform the "INITIALIZE" procedure (see page 05-893).

(b) Start and warm up the engine.

(c) Drive the vehicle for 10 minutes or more.

(d) Read output DTC using the hand-held tester.

OK: No DTC is output.

OK → **VVT SYSTEM OK***

HINT:

*: DTCs P0011 and P0012 are output when a foreign object in the engine oil enters the system. These codes will stay even if the system returns to normal after a short time. Foreign objects are filtered out by the oil filter.

NG

REPLACE ECM (See page 10-9)

OBD II scan tool (excluding hand-held tester):

1	CHECK VALVE TIMING (See page 14-68)

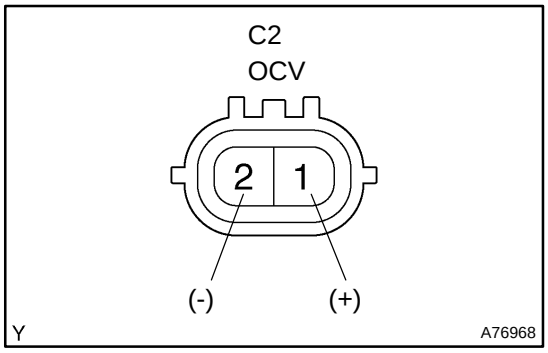
(a) Check for loose or jumped tooth of timing chain.

OK: The matchmarks of the crankshaft pulley and camshaft pulley are alined.

NG → **ADJUST VALVE TIMING (See page 14-68)**

OK

2	INSPECT OPERATION OF OCV



(a) Start the engine.

(b) Check the engine speed with (1) and (2).

(1) Disconnect the C2 OCV connector.

(2) Apply battery positive voltage between the terminals of the OCV.

Result:

Proceed to	Check (1)	Check (2)
A	Normal engine speed	Rough idle or engine stall
B	Conditions other than A	Conditions other than A

B → **Go to step 4**

A

3 CHECK IF DTC OUTPUTS REOCCUR

(a) Erase the DTC(s) using one of the following methods: 1) use the hand-held tester, 2) disconnect the battery cable for more than 60 seconds, or 3) remove the EFI NO. 1 and ETCS fuses for more than 60 seconds.

HINT:

After disconnecting the battery cable, perform the "INITIALIZE" procedure (see page 05-893).

(b) Start and warm up the engine.

(c) Drive the vehicle for 10 minutes or more.

(d) Read output DTC using the hand-held tester.

OK: No DTC is output.

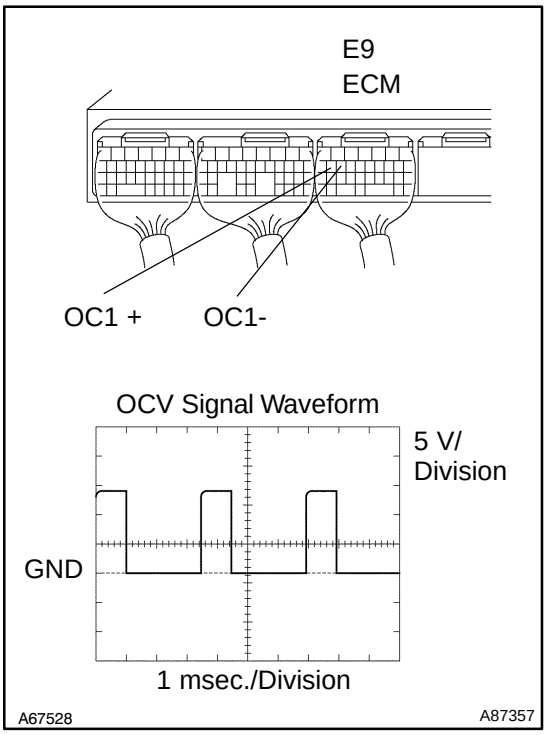
OK → **VVT SYSTEM OK***

HINT:

*: DTCs P0011 and P0012 are output when a foreign object in the engine oil enters the system. These codes will stay even if the system returns to normal after a short time. Foreign objects are filtered out by the oil filter.

NG

4 CHECK ECM (OCV SIGNAL)



(a) During idling, check the waveform of the ECM connector using an oscilloscope.

Standard:

Tester Connection	Specified Condition
E9-16 (OC1+) - E9-15 (OC1-)	Correct waveform is as shown

NG → **REPLACE ECM (See page 10-9)**

OK

5	CHECK OIL CONTROL VALVE FILTER

OK: The filter is not clogged.

NG → REPLACE OIL CONTROL VALVE FILTER

OK

6	CHECK CAMSHAFT TIMING OIL CONTROL VALVE ASSY (OCV) (See page 10-2)

OK: OCV has no contamination and moves smoothly.

OK → Go to step 8

NG

7	REPLACE CAMSHAFT TIMING OIL CONTROL VALVE ASSY (OCV)

GO

8	CHECK CAMSHAFT TIMING GEAR ASSY (See page 14-79)

OK: Camshaft timing gear rotates smoothly when pressure is applied.

OK → Go to step 10

NG

9	REPLACE CAMSHAFT TIMING GEAR ASSY

GO

10	CHECK FOR BLOCKAGE (OCV, OIL CHECK VALVE AND OIL HOLE)

OK: No blockage

NG → REPAIR OR REPLACE

OK

11	CHECK IF DTC OUTPUTS REOCCUR

(a) Erase the DTC(s) using one of the following methods: 1) use the hand-held tester, 2) disconnect the battery cable for more than 60 seconds, or 3) remove the EFI NO. 1 and ETCS fuses for more than 60 seconds.

HINT:

After disconnecting the battery cable, perform the ”INITIALIZE” procedure (see page 05-893).

(b) Start and warm up the engine.

(c) Drive the vehicle for 10 minutes or more.

(d) Read output DTC using the hand-held tester.

OK: No DTC is output.

OK → **VVT SYSTEM OK***

HINT:

*: DTCs P0011 and P0012 are output when a foreign object in the engine oil enters the system. These codes will stay even if the system returns to normal after a short time. Foreign objects are filtered out by the oil filter.

NG

REPLACE ECM (See page 10-9)

DTC	P0016	CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION (BANK 1 SENSOR A)

CIRCUIT DESCRIPTION

Refer to DTC P0335 and P0339 on page 05-166 .

DTC No.	DTC Detection Condition	Trouble Area
P0016	Deviation in crankshaft position sensor signal and VVT sensor (bank 1) signal (2 trip detection logic)	・Mechanical system (jumped tooth of timing chain, chain stretched) ・ECM

MONITOR DESCRIPTION

The ECM optimizes the valve timing using the Variable Valve Timing (VVT) system to control the intake valve camshaft. The VVT system includes the ECM, the Oil Control Valve (OCV) and the VVT controller. The ECM sends a target duty-cycle control signal to the OCV. This control signal, sent to the OCV, regulates the oil pressure applied to the VVT controller. The VVT controller can advance or retard the intake valve camshaft. The ECM calibrates the valve timing of the VVT system by setting the camshaft to the maximum retard angle when the engine is idling. The ECM closes the OCV to retard the cam. The ECM stores this value as a VVT learning value. When the difference between the target valve timing and the actual valve timing is 5 degrees or less, the ECM stores this in its memory.

If the learning value meets both of the following conditions (”a” and ”b”), the ECM interprets this as a defect in the VVT system and sets a DTC.

(a) The VVT learning value is less than 27°CA or more than 49°CA.

(b) The Above condition continues for more than 18 seconds.

MONITOR STRATEGY

Related DTCs	P0016: Camshaft timing misalignment at Idling
Required sensors / components (Main)	VVT actuator
Required sensors / components (Related)	CMP and CKP sensors
Frequency of operation	Once per driving cycle
Duration	Within 60 sec.
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever this DTC is not present	See page 05-16
Engine RPM	550 to 1,400 rpm

TYPICAL MALFUNCTION THRESHOLDS

Duration that either of the following conditions 1 or 2 is met	18 sec. or more
1. VVT angle when camshaft is retarded maximum	Less than 27°CA
2. VVT angle when camshaft is retarded maximum	More than 49°CA

WIRING DIAGRAM

Refer to DTCs P0335 and P0339 on page 05-166 .

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	**CHECK VALVE TIMING (See page 14-68)**

(a) Check for loose or jumped tooth of timing chain.
OK: The matchmarks of the crankshaft pulley and camshaft pulley are alined.

NG → **ADJUST VALVE TIMING (See page 14-68)**

OK

REPLACE ECM (See page 10-9)

DTC	P0031	OXYGEN (A/F) SENSOR HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 1)

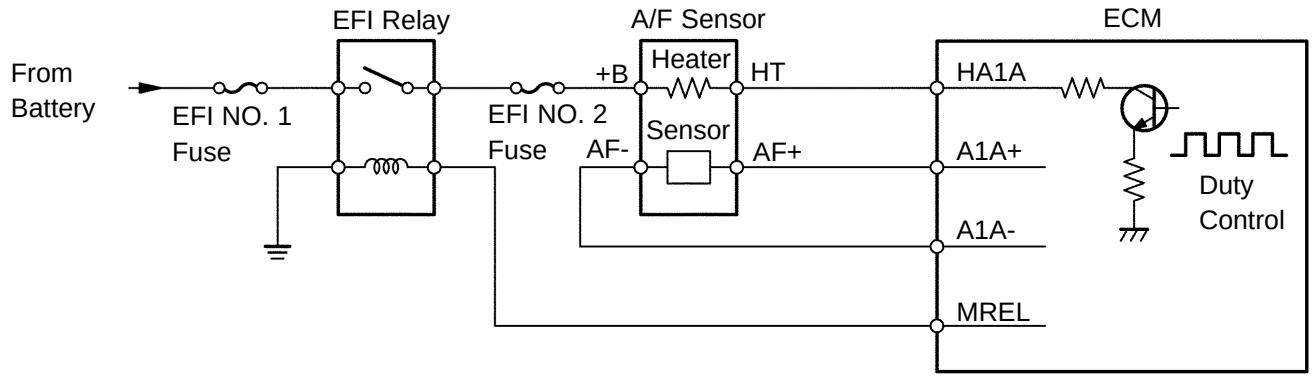
DTC	P0032	OXYGEN SENSOR HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 1)

HINT:
Although the title (DTC description) says ”oxygen sensor”, this DTC is related to the ”A/F sensor”.

CIRCUIT DESCRIPTION

Refer to DTC P2195 on page 05-269 .
HINT:
The ECM provides a pulse width modulated control circuit to adjust current through the heater. The A/F sensor heater circuit uses a relay on the +B side of the circuit.

Reference



DTC No.	DTC Detection Condition	Trouble Area
P0031	Heater current of 0.8 A or less when heater operates (1 trip detection logic)	⋮Open in heater circuit of A/F sensor ⋮A/F sensor heater ⋮EFI relay ⋮ECM
P0032	Heater current exceeds 10 A when heater operates (1 trip detection logic)	⋮Short in heater circuit of A/F sensor ⋮A/F sensor heater ⋮EFI relay ⋮ECM

HINT:
Sensor 1 is the sensor closest to the engine assembly.

MONITOR DESCRIPTION

The ECM uses A/F sensor information to keep the air/fuel ratio close to the stoichiometric ratio. This maximizes the catalytic converter's ability to purify exhaust gas. The sensor detects oxygen levels in the exhaust gas and sends this signal to the ECM.

The inner surface of the sensor element is exposed to outside air. The outer surface of the sensor element is exposed to exhaust gas. The sensor element is made of platinum coated zirconia and includes an integrated heating element. The zirconia element generates small voltage when there is a large difference in the oxygen concentrations of the exhaust and the outside air. The platinum coating amplifies the voltage generation. When heated, the sensor becomes very efficient. If the temperature of the exhaust is low, the sensor will not generate useful voltage signals without supplemental heating. The ECM regulates the supplemental heating using a duty-cycle approach to regulate the average current in the heater element. If the heater current is out of the normal range, the sensor's output signals will be inaccurate and the ECM cannot regulate the A/F ratio properly.

When the heater current is out of the normal operating range, the ECM interprets this as a malfunction and sets a DTC.

MONITOR STRATEGY

Related DTCs	P0031: A/F sensor heater range check (Low current) P0032: A/F sensor heater range check (High current)
Required sensors / components (Main)	A/F sensor heater
Required sensors / components (Related)	-
Frequency of operation	Continuous
Duration	10 sec.
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

All:

The monitor will run whenever these DTCs are not present	See page 05-16

P0031:

Battery voltage	Less than 10.5 V
A/F sensor heater duty ratio	50 % or more
Time after engine start	10 sec. or more

P0032:

Time after engine start	10 sec. or more

TYPICAL MALFUNCTION THRESHOLDS

P0031:

A/F sensor heater current	Less than 0.8 A

P0032:

A/F sensor heater current	More than 10 A

COMPONENT OPERATING RANGE

A/F sensor heater current	1.8 to 3.4 A at 20°C (68°F)

MONITOR RESULT

Refer to page 05-24 for detailed information.

The test value and test limit information are described as shown in the following table. Check the monitor result and test values after performing the monitor drive pattern (see page 05-26).

- TID (Test Identification Data) is assigned to each emissions-related component.
- TLT (Test Limit Type):
  If TLT is 0, the component is malfunctioning when the test value is higher than the test limit.
  If TLT is 1, the component is malfunctioning when the test value is lower than the test limit.
- CID (Component Identification Data) is assigned to each test value.
- Unit Conversion is used to calculate the test value indicated on generic OBD II scan tools.

TID $07: A/F sensor heater

TLT	CID	Unit Conversion	Description of Test Data	Description of Test Limit
1	$01	Multiply by 0.00017 (A)	Maximum heater current	Malfunction criterion for A/F sensor heater

WIRING DIAGRAM

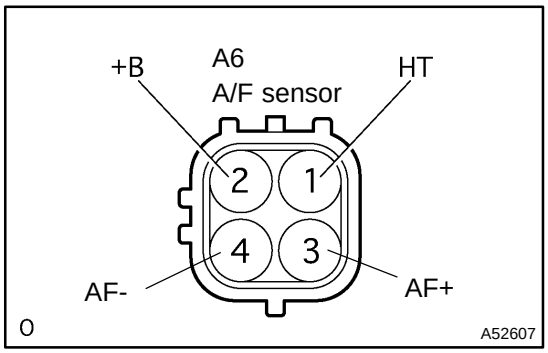
Refer to DTC P2195 on page 05-269 .

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	INSPECT AIR FUEL RATIO SENSOR (HEATER RESISTANCE)



(a) Disconnect the A6 A/F sensor connector.

(b) Measure the resistance between the terminals of the A/F sensor.

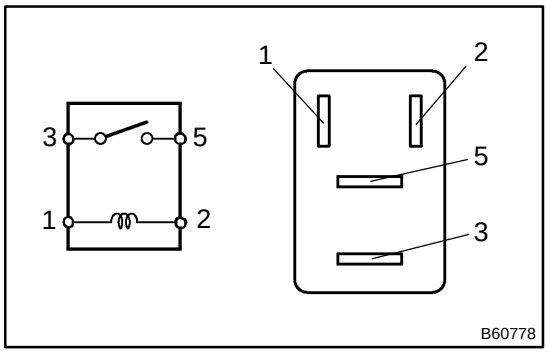
Standard:

Tester Connection	Condition	Specified Condition
1 (HT) - 2 (+B)	20°C (68°F)	1.8 to 3.4 Ω
1 (HT) - 4 (AF-)	-	10 kΩ or higher

NG → **REPLACE AIR FUEL RATIO SENSOR**

OK

2 INSPECT RELAY (EFI)



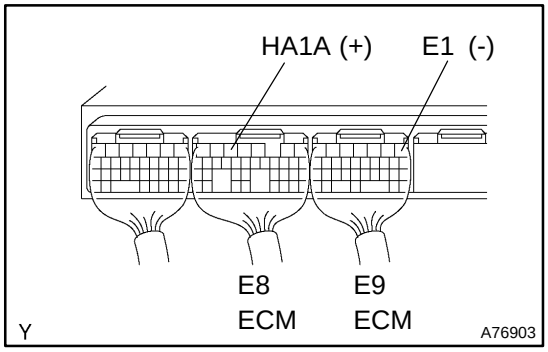
(a) Remove the EFI relay from the engine room J/B.
(b) Measure the resistance of the EFI relay.
Standard:

Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

NG → **REPLACE RELAY**

OK

3 CHECK ECM (HA1A VOLTAGE)



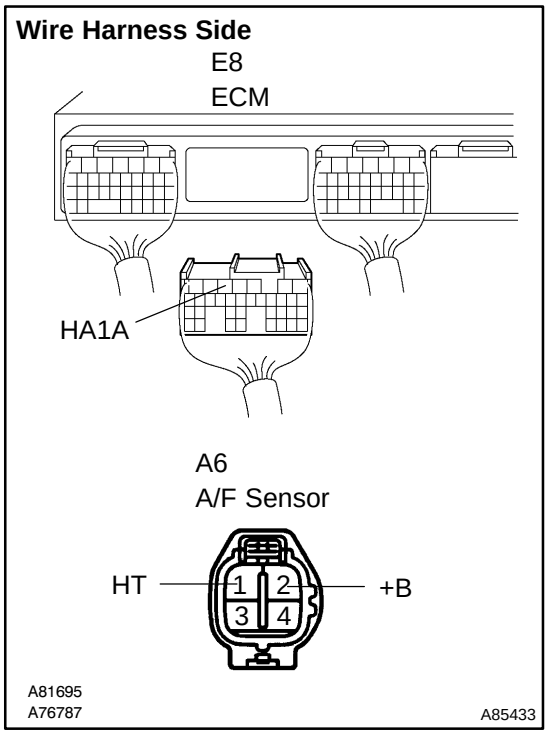
(a) Turn the ignition switch ON.
(b) Measure the voltage of the ECM connectors.
Standard:

Tester Connection	Specified Condition
E8-5 (HA1A) - E9-1 (E1)	9 to 14 V

OK → **REPLACE ECM (See page 10-9)**

NG

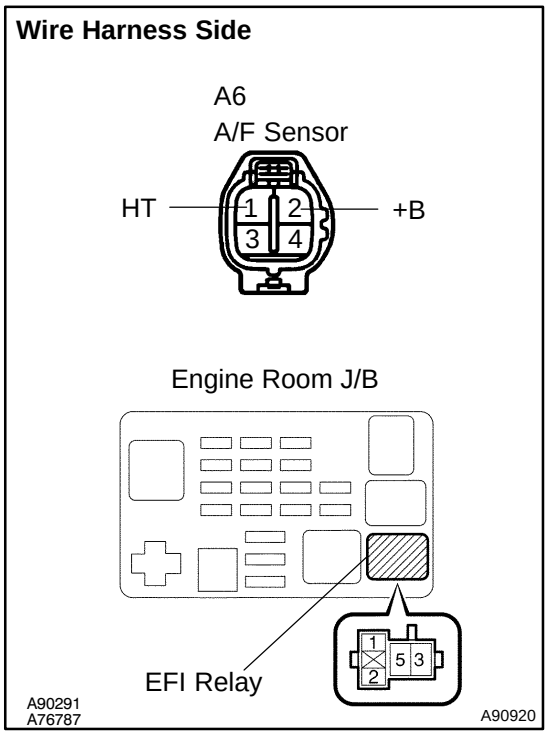
4 CHECK WIRE HARNESS (ECM - A/F SENSOR, A/F SENSOR - EFI RELAY)



(a) Check the wire harness between the ECM and A/F sensor.
(1) Disconnect the E8 ECM connector.
(2) Disconnect the A6 A/F sensor connector.
(3) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
A6-1 (HT) - E8-5 (HA1A)	Below 1 Ω
A6-1 (HT) or E8-5 (HA1A) - Body ground	10 kΩ or higher



(b) Check the wire harness between the A/F sensor and EFI relay.
(1) Disconnect the A6 A/F sensor connector.
(2) Remove the EFI relay from the engine room J/B.
(3) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
A6-2 (+B) - J/B EFI relay terminal 3	Below 1 Ω
A6-2 (+B) or J/B EFI relay terminal 3 - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE ECM (See page 10-9)

DTC	P0037	OXYGEN SENSOR HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 2)

DTC	P0038	OXYGEN SENSOR HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 2)

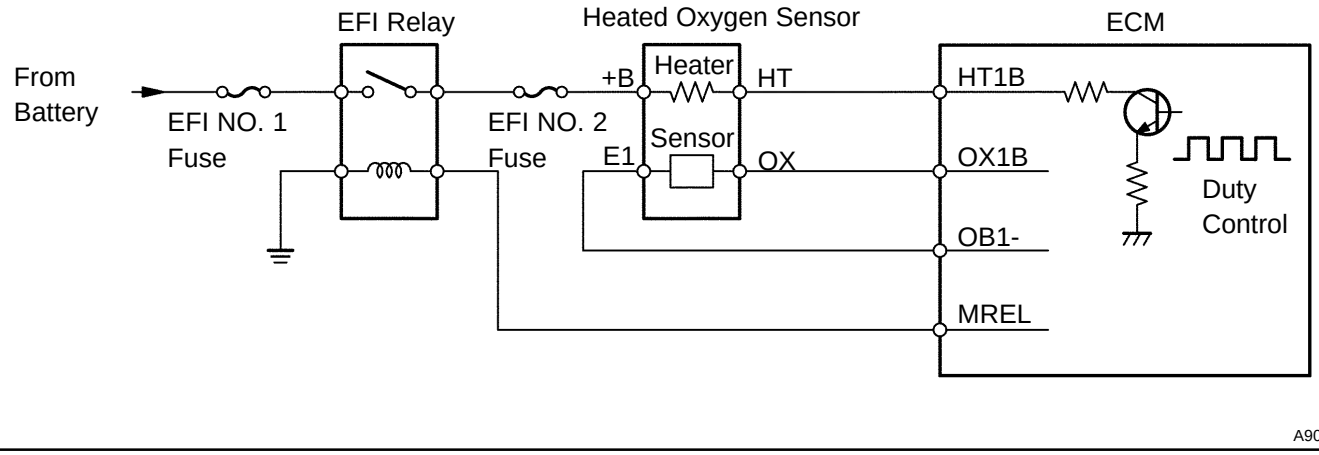
CIRCUIT DESCRIPTION

Refer to DTC P0136 on page 05-1 18.

HINT:

The ECM provides a pulse width a modulated control circuit to adjust current through the heater. The oxygen sensor heater circuit uses a relay on the +B side of the circuit.

Reference



DTC No.	DTC Detection Condition	Trouble Area
P0037	Heater current of less than 0.3 A when the heater operates with +B greater than 10.5 V (1 trip detection logic)	・Open or short in heater circuit of heated oxygen sensor ・Heated oxygen sensor heater ・EFI relay ・ECM
P0038	Heater current exceeds 2 A when heater operates (1 trip detection logic)	・Same as DTC No. P0037

HINT:

Sensor 2 is the sensor farthest away from the engine assembly.

MONITOR DESCRIPTION

The sensing portion of the heated oxygen sensor has a zirconia element that is used to detect oxygen concentration in the exhaust. If the zirconia element is at the proper temperature and the difference of the oxygen concentration between the inside and outside surface of the sensor is large, the zirconia element will generate voltage signals. In order to increase the oxygen concentration detecting capacity in the zirconia element, the ECM supplements the heat from the exhaust with heat from a heating element inside the sensor. When current in the sensor is out of the standard operating range, the ECM interprets this as a fault in the heated oxygen sensor and sets a DTC.

Example:

The ECM will set a high current DTC if the current in the sensor is more than 2 A when the heater is OFF. Similarly, the ECM will set a low current DTC if the current is less than 0.25 A when the heater is ON.

MONITOR STRATEGY

Related DTCs	P0037: HO2S heater range check (Low current) P0038: HO2S heater range check (High current)
Required sensors / components (Main)	Heated oxygen sensor (HO2S) heater
Required sensors / components (Related)	Vehicle speed sensor (VSS)
Frequency of operation	Continuous
Duration	0.3 sec.
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

All:

The monitor will run whenever these DTCs are not present	See page 05-16

P0037:

Battery voltage	10.5 V or more
Engine	Running
Starter	OFF
Intrusive heating	Not operated

P0038 (Case 1):

Battery voltage	10.5 V or more
Engine	Running
Starter	OFF
Intrusive heating	Not operated

P0038 (Case 2):

Battery voltage	10.5 V or more
All heater is turned OFF and intrusive heating is operated when the following conditions are met	Condition 1 and 2
1. Heater	ON
2. Heater current	2 A or more

TYPICAL MALFUNCTION THRESHOLDS

P0037:

HO2S heater current intrusive heating	Less than 0.3 A

P0038 (Case 1):

HO2S heater current	2 A or more

P0038 (Case 2):

HO2S heater current intrusive heating	More than 2 A

COMPONENT OPERATING RANGE

HO2S heater current	0.4 to 1 A (when engine is idle, warmed-up and battery voltage is 11 to 14 V)

MONITOR RESULT

Refer to page 05-24 for detailed information.

The test value and test limit information are described as shown in the following table. Check the monitor result and test values after performing the monitor drive pattern (see page 05-26).

- TID (Test Identification Data) is assigned to each emissions-related component.
- TLT (Test Limit Type):
  If TLT is 0, the component is malfunctioning when the test value is higher than the test limit.
  If TLT is 1, the component is malfunctioning when the test value is lower than the test limit.
- CID (Component Identification Data) is assigned to each test value.
- Unit Conversion is used to calculate the test value indicated on generic OBD II scan tools.

TID $04: HO2S heater

TLT	CID	Unit Conversion	Description of Test Data	Description of Test Limit
1	$02	Multiply by 0.000076 (A)	Maximum HO2S heater current (Bank 1 Sensor 2)	Malfunction threshold for HO2S heater

WIRING DIAGRAM

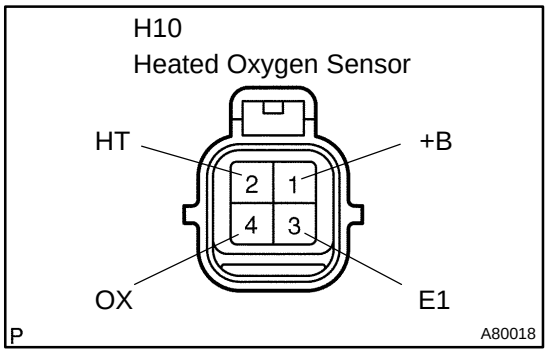
Refer to DTC P0136 on page 05-1 18.

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1 INSPECT HEATED OXYGEN SENSOR (HEATER RESISTANCE)



(a) Disconnect the H10 heated oxygen sensor connector.

(b) Measure the resistance of the heated oxygen sensor terminals.

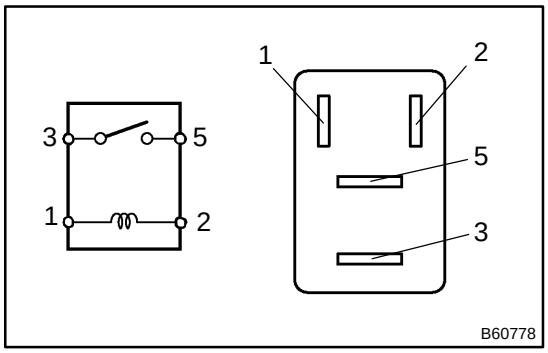
Standard:

Tester Connection	Condition	Specified Condition
H10-2 (HT) - H10-1 (+B)	20°C (68°F)	11 to 16 Ω
H10-2 (HT) - H10-1 (+B)	800°C (1,472°F)	23 to 32 Ω

NG → **REPLACE HEATED OXYGEN SENSOR**

OK

2 INSPECT RELAY (EFI)



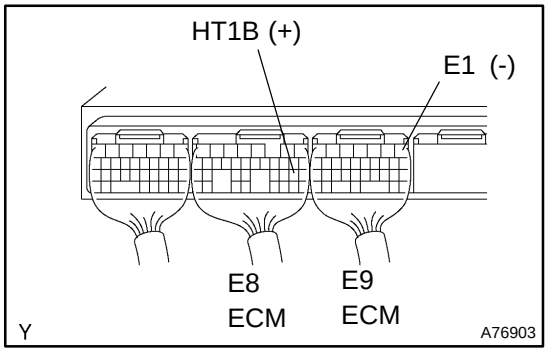
(a) Remove the EFI relay from the engine room J/B.
(b) Measure the resistance of the EFI relay.
Standard:

Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

NG → **REPLACE RELAY**

OK

3 INSPECT ECM (HT1B VOLTAGE)



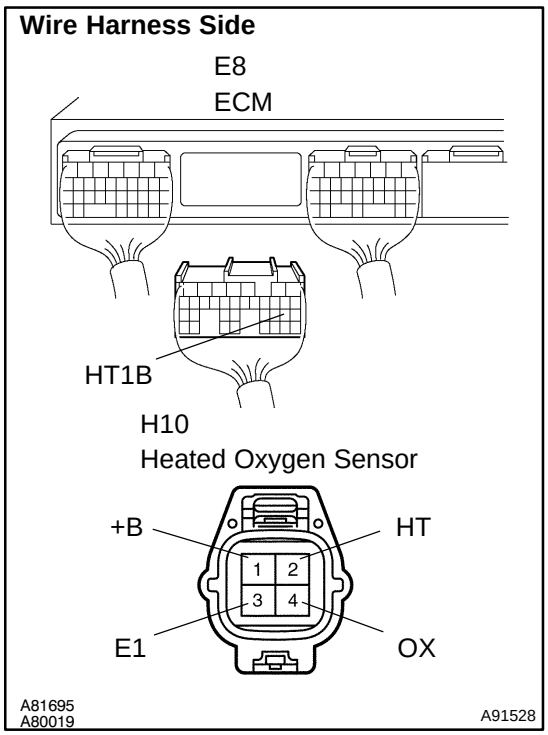
(a) Turn the ignition switch ON.
(b) Measure the voltage of the ECM connectors.
Standard:

Tester Connection	Specified Condition
E8-21 (HT1B) - E9-1 (E1)	9 to 14 V

OK → **REPLACE ECM (See page 10-9)**

NG

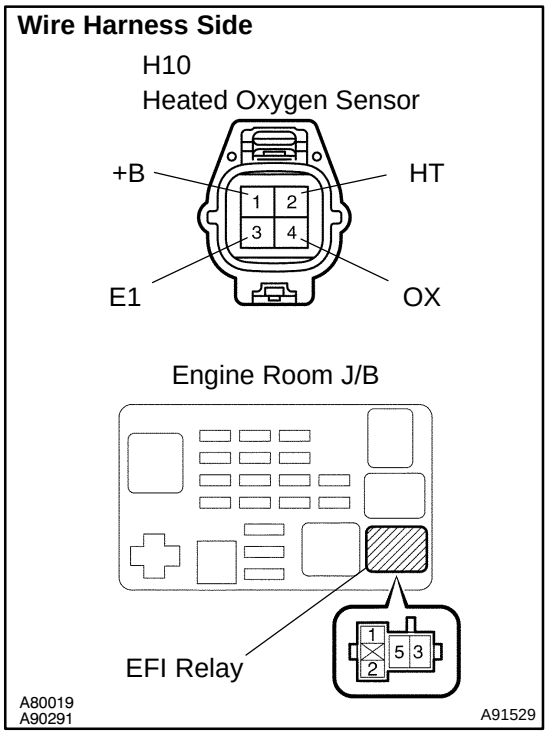
4	CHECK WIRE HARNESS (ECM - HEATED OXYGEN SENSOR, HEATED OXYGEN SENSOR - EFI RELAY)



(a) Check the wire harness between the ECM and heated oxygen sensor.
(1) Disconnect the E8 ECM connector.
(2) Disconnect the H10 heated oxygen sensor connector.
(3) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
H10-2 (HT) - E8-21 (HT1B)	Below 1 Ω
H10-2 (HT) or E8-21 (HT1B) - Body ground	10 kΩ or higher



(b) Check the wire harness between the heated oxygen sensor and EFI relay.
(1) Disconnect the H10 heated oxygen sensor connector.
(2) Remove the EFI relay from the engine room J/B.
(3) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
H10-1 (+B) - J/B EFI relay terminal 3	Below 1 Ω
H10-1 (+B) or J/B EFI relay terminal 3 - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE ECM (See page 10-9)

DTC	P0100	MASS OR VOLUME AIR FLOW CIRCUIT

DTC	P0102	MASS OR VOLUME AIR FLOW CIRCUIT LOW INPUT

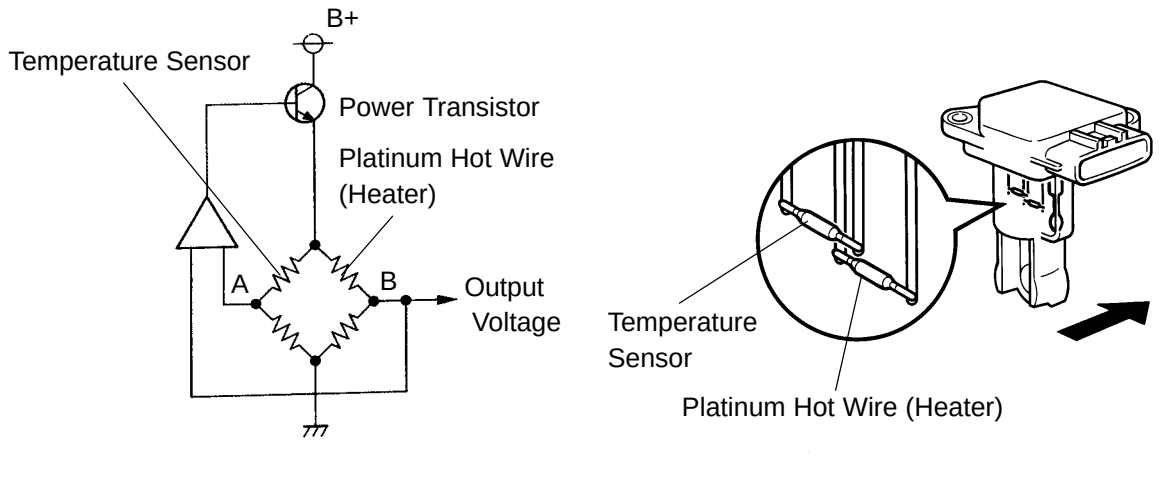
DTC	P0103	MASS OR VOLUME AIR FLOW CIRCUIT HIGH INPUT

CIRCUIT DESCRIPTION

The Mass Air Flow (MAF) meter measures the amount of air flowing through the throttle valve. The ECM uses this information to determine the fuel injection time and provide a proper air fuel ratio. Inside the MAF meter, there is a heated platinum wire exposed to the flow of intake air.

By applying a specific current to the wire, the ECM heats this wire to a given temperature. The flow of incoming air cools the wire and an internal thermistor, changing their resistance. To maintain a constant current value, the ECM varies the voltage applied to these components in the MAF meter. The voltage level is proportional to the air flow through the sensor. The ECM interprets this voltage as the intake air amount.

The circuit is constructed so that the platinum hot wire and temperature sensor provide a bridge circuit, with the power transistor controlled so that the potential of A and B remains equal to maintain the set temperature.



DTC No.	DTC Detection Condition	Trouble Area
P0100	When MAF meter circuit has an open or a short for more than 3 seconds	⋇Open or short in MAF meter circuit ⋇MAF meter ⋇ECM
P0102	When MAF meter circuit has an open for more than 3 seconds	⋇Same as DTC No. P0100
P0103	When MAF meter circuit has a short for more than 3 seconds	⋇Same as DTC No. P0100

HINT:

After confirming DTC P0100, P0102 or P0103, use the hand-held tester or the OBD II scan tool to confirm the MAF ratio from the ALL menu (to reach the ALL menu: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL).

Air Flow Value (g/s)	Malfunction
Approximately 0.0	⋇Open in MAF meter power source circuit ⋇Open or short in VG circuit
271.0 or more	⋇Open in EVG circuit

MONITOR DESCRIPTION

If there is a defect in the sensor, or an open or short circuit, the voltage level will deviate from the normal operating range. The ECM interprets this deviation as a defect in the MAF meter and sets a DTC.
Example:
The sensor voltage output is less than 0.2 V or more than 4.9 V and either condition continues for more than 3 seconds.

MONITOR STRATEGY

Related DTCs	P0100: MAF meter range check (Chattering) P0102: MAF meter range check(Low voltage) P0103: MAF meter range check (High voltage)
Required sensors / components (Main)	MAF Meter
Required sensors / components (Related)	CKP (Crank shaft position) sensor
Frequency of operation	Continuous
Duration	3 sec.
MIL operation	Immediate: Engine RPM is less than 4,000 rpm 2 driving cycles: Engine RPM is 4,000 rpm or more
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever these DTCs are not present	See page 05-16

TYPICAL MALFUNCTION THRESHOLDS

P0100:

MAF meter voltage	Less than 0.2 V, or more than 4.9 V

P0102:

MAF meter voltage	Less than 0.2 V

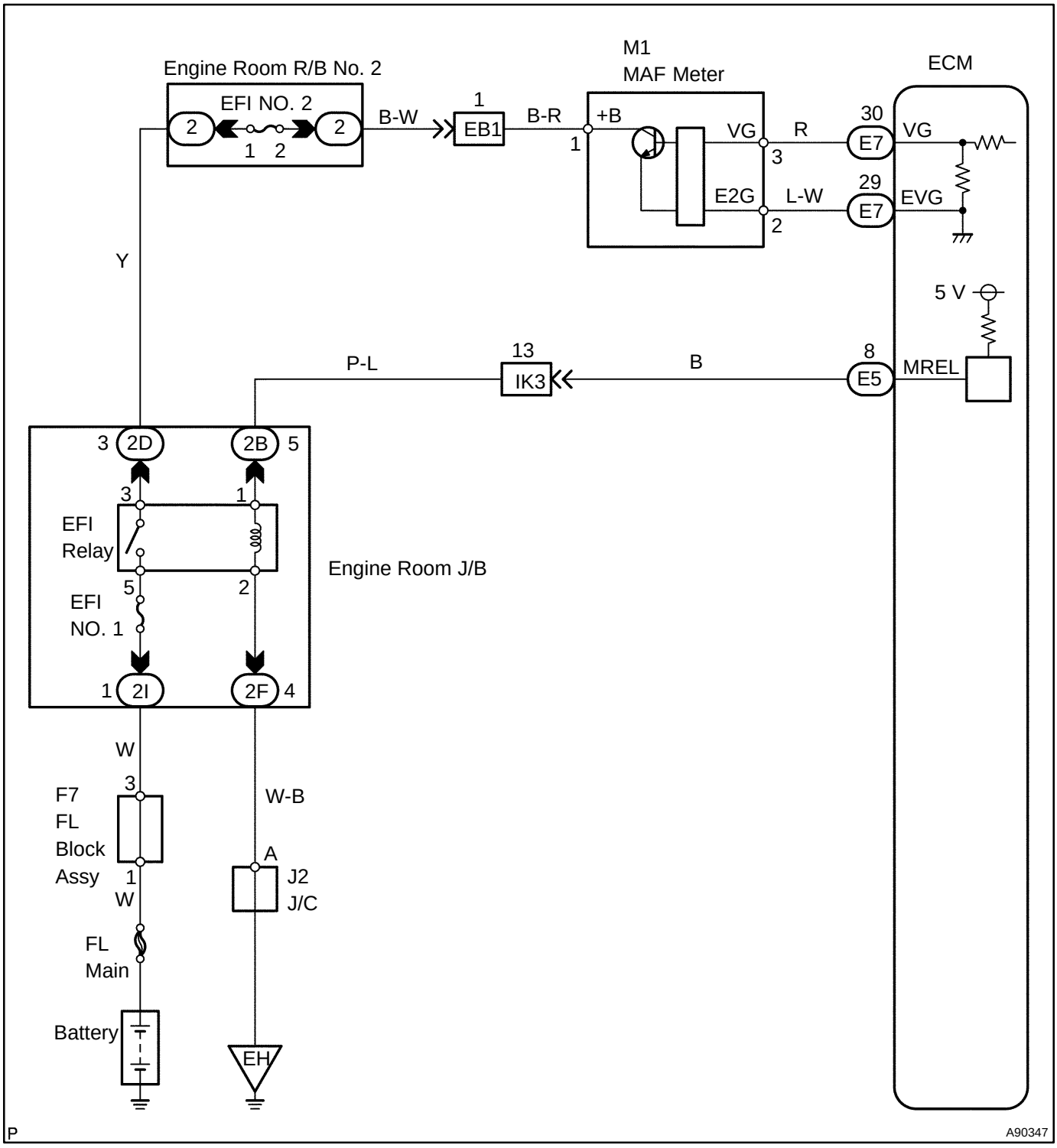
P0103:

MAF meter voltage	More than 4.9 V

COMPONENT OPERATING RANGE

MAF meter voltage	Between 0.4 and 2.2 V

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	READ VALUE OF HAND-HELD TESTER OR OBD II SCAN TOOL (MAF RATE)

(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(b) Start the engine.
(c) Push the hand-held tester or the OBD II scan tool main switch ON.
(d) On the hand-held tester or the OBD II scan tool, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / MAF. Read the values.

Result:

Air Flow Rate (gm/second)	Proceed to
0.0	A
271.0 or more	B
MAF rate greater than 1 but less than 270.0 *	C

HINT:

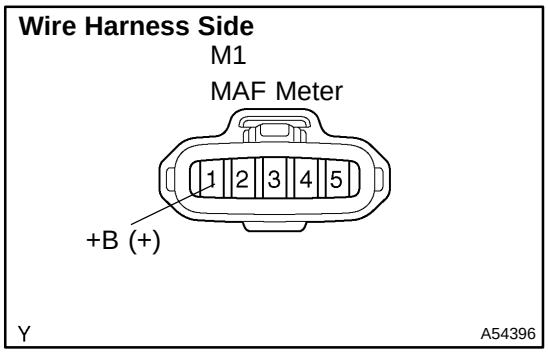
*: The value must change when the throttle valve is opened or closed.

B → **Go to step 6**

C → **CHECK FOR INTERMITTENT PROBLEMS (See page 05-9)**

A

2	CHECK MASS AIR FLOW METER (POWER SOUCE VOLTAGE)



(a) Turn the ignition switch ON.
(b) Disconnect the M1 MAF meter connector.
(c) Measure the voltage of the wire harness side connector.

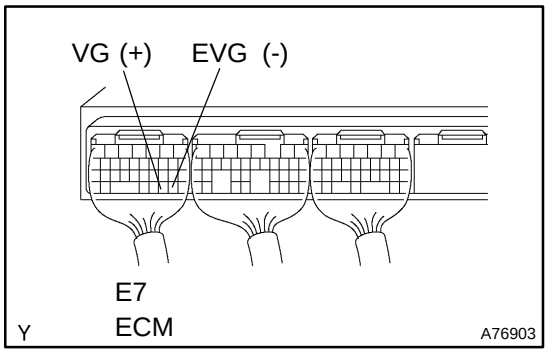
Standard:

Tester Connection	Specified Condition
M1-1 (+B) - Body ground	9 to 14 V

NG → **Go to step 5**

OK

3 INSPECT ECM (VG VOLTAGE)



(a) Start the engine.
(b) Measure the voltage of the ECM connector.
Standard:

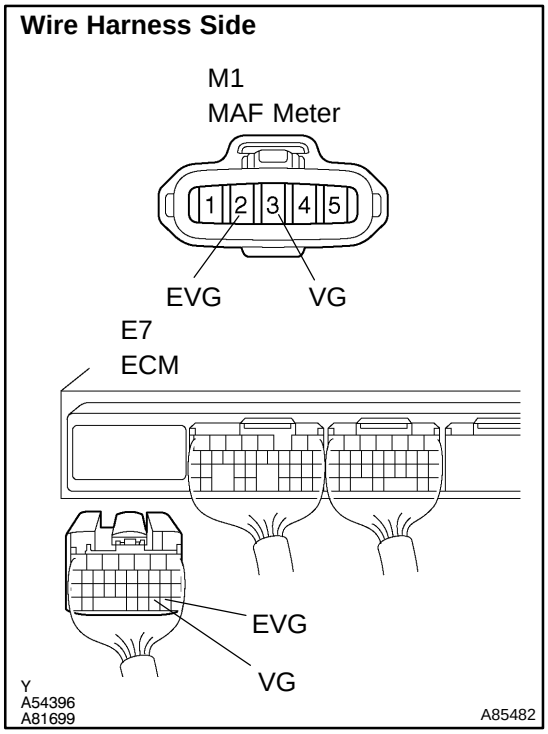
Tester Connection	Condition	Specified Condition
E7-30 (VG) - E7-29 (EVG)	Engine is idling	0.5 to 3.0 V

HINT:
The shift position should be P or N and the A/C switch should be turned OFF.

OK → **REPLACE ECM (See page 10-9)**

NG

4 CHECK WIRE HARNESS (MAF METER - ECM)



(a) Disconnect the M1 MAF meter connector.
(b) Disconnect the E7 ECM connector.
(c) Measure the resistance of the wire harness side connectors.
Standard:

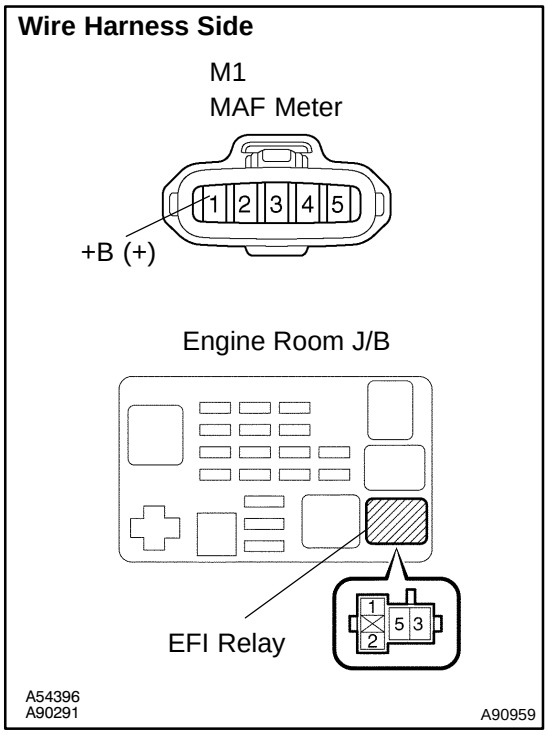
Tester Connection	Specified Condition
M1-3 (VG) - E7-30 (VG) M1-2 (EVG) - E7-29 (EVG)	Below 1 Ω
M1-3 (VG) or E7-30 (VG) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE MASS AIR FLOW METER

5 CHECK WIRE HARNESS (MAF METER - EFI RELAY)



(a) Disconnect the M1 MAF meter connector.
(b) Remove the EFI relay from the engine room J/B.
(c) Measure the resistance of the wire harness side connectors.

Standard:

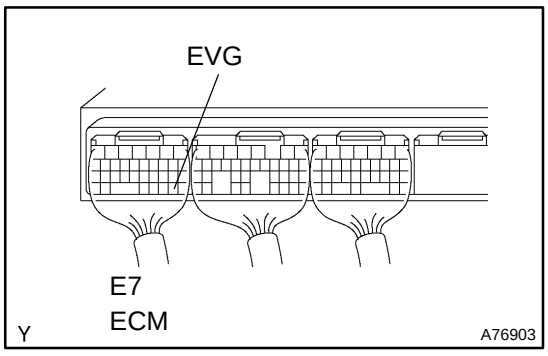
Tester Connection	Specified Condition
M1-1 (+B) - J/B EFI relay terminal 3	Below 1 Ω
M1-1 (+B) or J/B EFI relay terminal 3 - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

INSPECT ECM POWER SOURCE CIRCUIT (See page 05-312)

6 INSPECT ECM (SENSOR GROUND)



(a) Measure the resistance of the ECM connector.

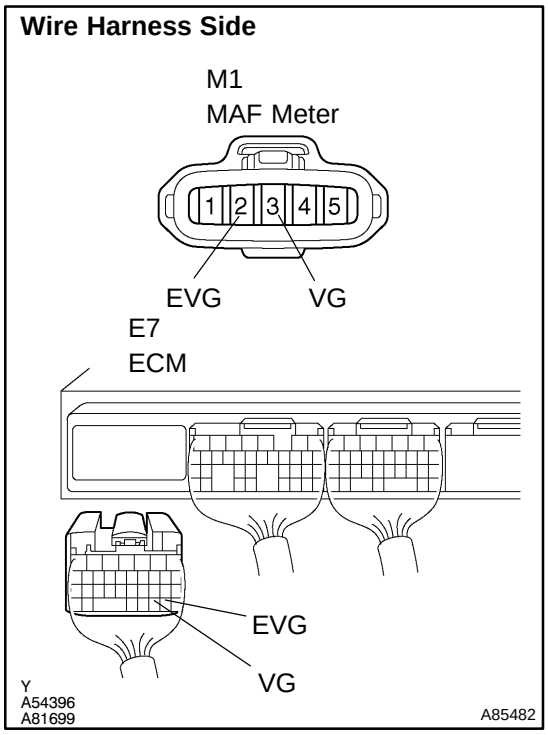
Standard:

Tester Connection	Specified Condition
E7-29 (EVG) - Body ground	Below 1 Ω

NG → **REPLACE ECM (See page 10-9)**

OK

7 CHECK WIRE HARNESS (MAF METER - ECM)



(a) Disconnect the M1 MAF meter connector.
(b) Disconnect the E7 ECM connector.
(c) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
M1-3 (VG) - E7-30 (VG) M1-2 (EVG) - E7-29 (EVG)	Below 1 Ω
M1-3 (VG) or E7-30 (VG) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE MASS AIR FLOW METER

DTC	P0101	MASS OR VOLUME AIR FLOW CIRCUIT RANGE/PERFORMANCE PROBLEM

CIRCUIT DESCRIPTION

Refer to DTC P0100 on page 05-81 .

DTC No.	DTC Detection Condition	Trouble Area
P0101	・High voltage: Conditions (a), (b) and (c) continue for more than 10 seconds (2 trip detection logic): (a) Engine speed less than 2,000 rpm (b) Engine coolant temperature 70°C (158°F) or higher (c) Voltage output of Mass Air Flow (MAF) meter more than 2.2 V (varies with Throttle Position [TP] sensor voltage) ・Low voltage: Conditions (a) and (b) continue for more than 10 seconds (2 trip detection logic): (a) Engine speed more than 300 rpm (b) Voltage output of MAF meter less than 0.65 V (varies with TP sensor voltage)	・MAF meter

MONITOR DESCRIPTION

The MAF meter is a sensor that measures the amount of air flowing through the throttle valve. The ECM uses this information to determine the fuel injection time and to provide an appropriate air-fuel ratio.
Inside the MAF meter, there is a heated platinum wire which is exposed to the flow of intake air. By applying a specific electrical current to the wire, the ECM heats it to a specific temperature. The flow of incoming air cools both the wire and an internal thermistor, changing their resistance. To maintain a constant current value, the ECM varies the voltage applied to these components of the MAF meter. The voltage level is proportional to the air flow through the sensor, and the ECM uses it to calculate the intake air volume.
If there is a defect in the sensor, or an open or short in the circuit, the voltage level deviates from the normal operating range. The ECM interprets this deviation as a malfunction in the MAF meter and sets the DTC.
Example:
If the voltage is more than 2.2 V, or less than 0.65 V while idling, the ECM determines that there is a malfunction in the MAF meter and sets the DTC.

MONITOR STRATEGY

Related DTCs	P0101: MAF Meter Rationality (Low voltage) P0101: MAF Meter Rationality (High voltage)
Required sensors/ components (Main)	MAF meter
Required sensors/ components (Related)	Crankshaft position sensor, ECT sensor, Throttle position sensor
Frequency of operation	Continuous
Duration	10 seconds
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

All:

The monitor will run whenever this DTC is not present	See page 05-16

MAF Meter Rationality (High Voltage):

Engine RPM	Less than 2,000 rpm
ECT	70°C (158°F) or more
MAF meter voltage	4.9 V or less

MAF Meter Rationality (Low Voltage):

Engine RPM	More than 300 rpm
MAF meter voltage	0.2 V or more
Fuel cut	OFF

TYPICAL MALFUNCTION THRESHOLDS

MAF Meter Rationality (High Voltage):

MAF meter voltage	More than 2.2 V (varies with throttle position sensor voltage)

MAF Meter Rationality (Low Voltage):

MAF meter voltage	Less than 0.65 V (varies with throttle position sensor voltage)

WIRING DIAGRAM

Refer to DTC P0100 on page 05-81 .

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	CHECK OTHER DTC OUTPUT (IN ADDITION TO DTC P0101)

(a) Read the DTC using the hand-held tester or the OBD II scan tool.

Result:

Display (DTC Output)	Proceed to
P0101 and other DTCs are output	A
Only P0101 is output	B

HINT:

If any other codes besides P0101 are output, perform the troubleshooting for those codes first.

B → **REPLACE MASS AIR FLOW METER**

A

GO TO RELEVANT DTC CHART (See page 05-48)

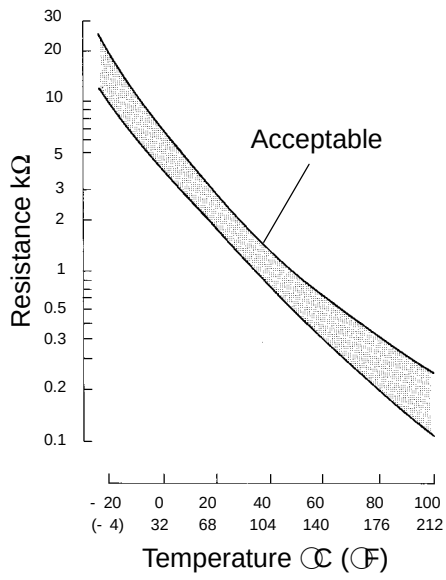
DTC	P0110	INTAKE AIR TEMPERATURE CIRCUIT

DTC	P0112	INTAKE AIR TEMPERATURE CIRCUIT LOW INPUT

DTC	P0113	INTAKE AIR TEMPERATURE CIRCUIT HIGH INPUT

CIRCUIT DESCRIPTION

Fig. 1



The Intake Air Temperature (IAT) sensor, mounted on the Mass Air Flow (MAF) meter, monitors the intake air temperature. The IAT sensor has a thermistor that varies its resistance depending on the temperature of the intake air. When the air temperature is low, the resistance in the thermistor increases. When the temperature is high, the resistance drops. The variations in resistance are reflected as changes in voltage applied to the ECM terminal (see Fig. 1).

The IAT sensor is connected to the ECM (see below). The 5 V power source voltage in the ECM is applied to the IAT sensor from terminal THA via resistor R.

That is, the resistor R and the IAT sensor are connected in series. When the resistance value of the IAT sensor changes in accordance with changes in the IAT, the voltage at terminal THA also changes. Based on this signal, the ECM increases the fuel injection volume to improve the driveability during cold engine operation.

DTC No.	Proceed to	DTC Detection Condition	Trouble Area
P0110	Step 1	Open or short in IAT (Intake air temperature) sensor circuit for 0.5 seconds (1 trip detection logic)	・Open or short in IAT sensor circuit ・IAT sensor (built-in MAF meter) ・ECM
P0112	Step 4	Short in IAT sensor circuit for 0.5 seconds (1 trip detection logic)	・Same as DTC No. P0110
P0113	Step 2	Open in IAT sensor circuit for 0.5 seconds (1 trip detection logic)	・Same as DTC No. P0110

HINT:

After confirming DTC P0110, P0112 or P0113, use the hand-held tester or the OBD II scan tool to confirm the IAT from the ALL menu (to reach the ALL menu: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL).

Temp. Displayed	Malfunction
-40 ˚C (-40˚F)	Open circuit
140˚C (284˚F) or more	Short circuit

MONITOR DESCRIPTION

The ECM monitors the sensor voltage and uses this value to calculate the intake air temperature. When the sensor output voltage deviates from the normal operating range, the ECM interprets this as a fault in the IAT sensor and sets a DTC.

Example:

The sensor voltage output is -40°C (-40°F), or more than 140°C (284°F) and either condition continues for 0.5 seconds or more.

MONITOR STRATEGY

Related DTCs	P0110: IAT sensor range check (Chattering) P0112: IAT sensor range check (Low Resistance) P0113: IAT sensor range check (High Resistance)
Required sensors / components (Main)	IAT sensor
Required sensors / components (Related)	-
Frequency of operation	Continuous
Duration	0.5 sec.
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever these DTCs are not present	See page 05-16

TYPICAL MALFUNCTION THRESHOLDS

P0110:

IAT sensor resistance	Less than 98.5 Ω, or more than 156 kΩ

P0112:

IAT sensor resistance [IAT]	Less than 98.5 Ω [More than 140°C (284°F)]

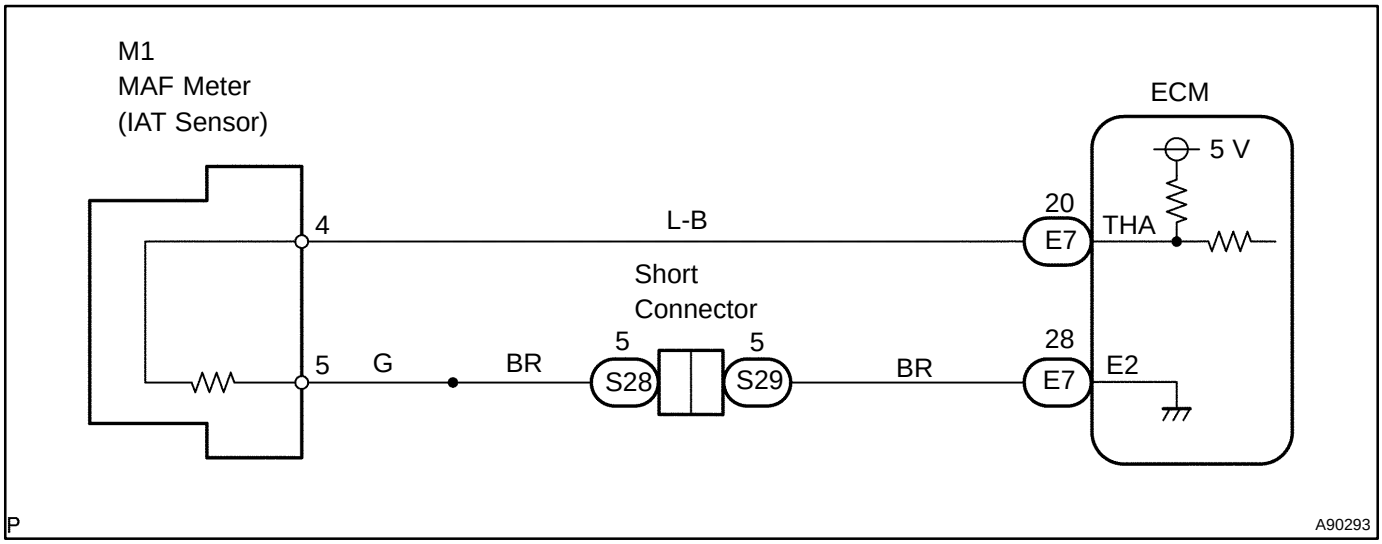
P0113:

IAT sensor resistance [IAT]	More than 156 kΩ [-40°C (-40°F)]

COMPONENT OPERATING RANGE

IAT sensor resistance [IAT]	98.5 Ω to 156 kΩ [-39 to 140°C (-40 to 284°F)]

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If DTCs that are related to different systems are output simultaneously while terminal E2 is used as a ground terminal, terminal E2 may have an open circuit.
- Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	**READ VALUE OF HAND-HELD TESTER OR OBD II SCAN TOOL (INTAKE AIR TEMPERATURE)**

(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(b) Turn ON the ignition switch. Push the hand-held tester or the OBD II scan tool main switch ON.
(c) On the hand-held tester or the OBD II scan tool, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / INTAKE AIR. Read the values.
Temperature: The same as actual intake air temperature.
Result:

Display	Proceed to
-40 ˚C (-40˚F)	A
140˚C (284˚F) or more	B
OK (same as present temperature)	C

HINT:

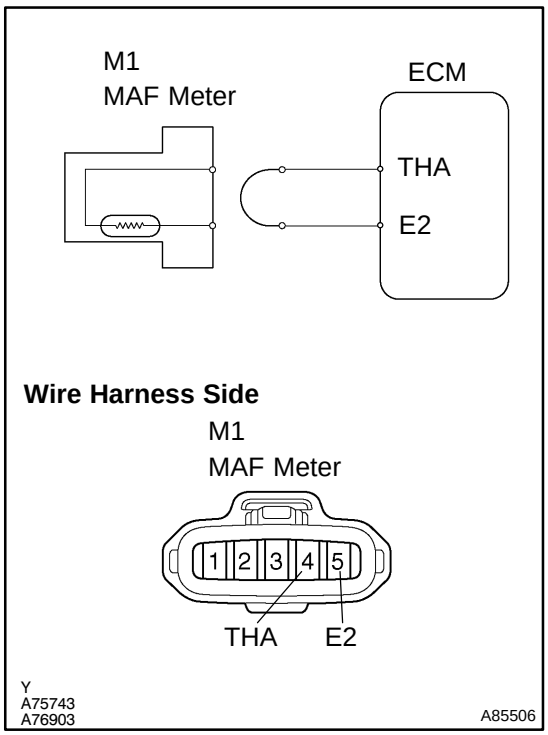
- If there is an open circuit, the hand-held tester or the OBD II scan tool indicates -40˚C (-40˚F).
- If there is a short circuit, the hand-held tester or the OBD II scan tool indicates 140˚C (284˚F) or more.

B → **Go to step 4**

C → **CHECK FOR INTERMITTENT PROBLEMS (See page 05-9)**

A

2	READ VALUE OF HAND-HELD TESTER OR OBD II SCAN TOOL (CHECK FOR OPEN IN HARNESS)

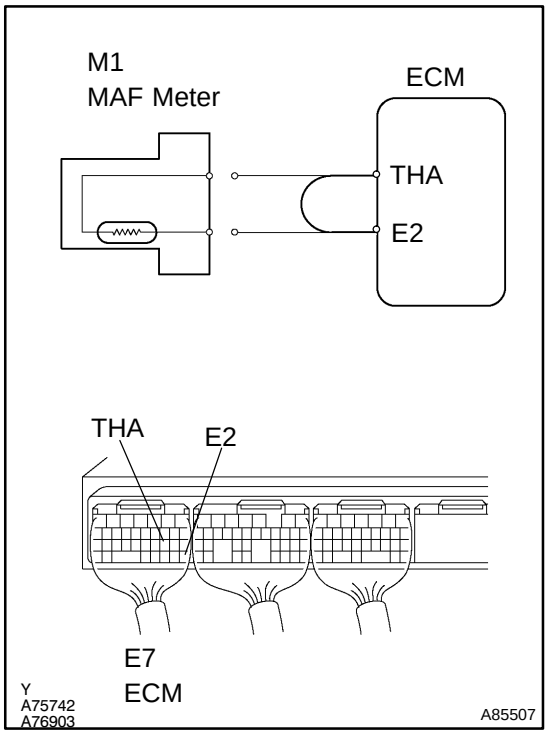


(a) Disconnect the M1 MAF meter connector.
(b) Connect terminals THA and E2 of the M1 MAF meter wire harness side connector.
(c) Turn the ignition switch ON.
(d) On the hand-held tester or the OBD II scan tool, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / INTAKE AIR. Read the values.
OK:
Temperature value: 140°C (284°F) or more

OK → **REPLACE MASS AIR FLOW METER (IAT SENSOR)**

NG

3	READ VALUE OF HAND-HELD TESTER OR OBD II SCAN TOOL (CHECK FOR OPEN IN ECM)



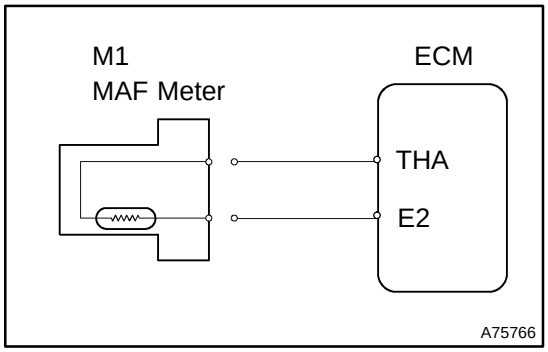
(a) Disconnect the M1 MAF meter connector.
(b) Connect terminals THA and E2 of the E7 ECM connector.
HINT:
Before checking, do a visual and contact pressure check for the ECM connector.
(c) Turn the ignition switch ON.
(d) On the hand-held tester or the OBD II scan tool, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / INTAKE AIR. Read the values.
OK:
Temperature value: 140°C (284°F) or more

OK → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

NG

CONFIRM GOOD CONNECTION AT ECM. IF OK, REPLACE ECM (See page 10-9)

4	READ VALUE OF HAND-HELD TESTER OR OBD II SCAN TOOL (CHECK FOR SHORT IN HARNESS)

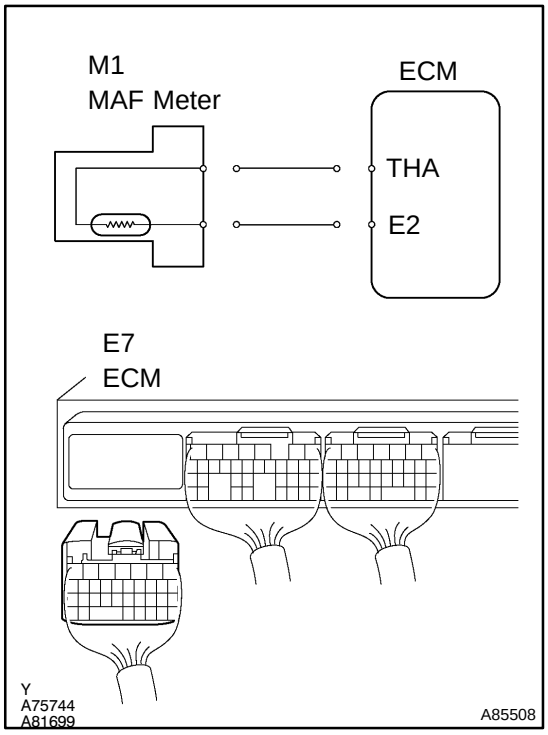


(a) Disconnect the M1 MAF meter connector.
(b) Turn the ignition switch ON.
(c) On the hand-held tester or the OBD II scan tool, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / INTAKE AIR. Read the values.
OK:
Temperature value: -40°C (-40°F)

OK → **REPLACE MASS AIR FLOW METER**

NG

5	READ VALUE OF HAND-HELD TESTER OR OBD II SCAN TOOL (CHECK FOR SHORT IN ECM)



(a) Disconnect the E7 ECM connector.
(b) Turn the ignition switch ON.
(c) On the hand-held tester or the OBD II scan tool, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / INTAKE AIR. Read the values.
OK:
Temperature value: -40°C (-40°F)

OK → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

NG

REPLACE ECM (See page 10-9)

DTC	P0115	ENGINE COOLANT TEMPERATURE CIRCUIT

DTC	P0117	ENGINE COOLANT TEMPERATURE CIRCUIT LOW INPUT

DTC	P0118	ENGINE COOLANT TEMPERATURE CIRCUIT HIGH INPUT

CIRCUIT DESCRIPTION

A thermistor is built into the Engine Coolant Temperature (ECT) sensor and changes the resistance value according to the engine coolant temperature.

The structure of the sensor and connection to the ECM are the same as the Intake Air Temperature (IAT) sensor.

HINT:

If the ECM detects the DTC P0115, P0117 or P0118, it operates the fail-safe function in which the ECT is assumed to be 80°C (176°F).

DTC No.	Proceed to	DTC Detection Condition	Trouble Area
P0115	Step 1	Open or short in ECT (Engine coolant temperature) sensor circuit for 0.5 seconds	・Open or short in ECT sensor circuit ・ECT sensor ・ECM
P0117	Step 4	Short in ECT sensor circuit for 0.5 seconds	・Same as DTC No. P0115
P0118	Step 2	Open in ECT sensor circuit for 0.5 seconds	・Same as DTC No. P0115

HINT:

After confirming DTC P0115, P0117 or P0118, use the hand-held tester or the OBD II scan tool to confirm the ECT from the ALL menu (to reach the ALL menu: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL).

Temperature Displayed	Malfunction
-40 °C (-40 °F)	Open circuit
140 °C (284 °F) or more	Short circuit

MONITOR DESCRIPTION

The ECT sensor is used to monitor the engine coolant temperature. The ECT sensor has a thermistor that varies its resistance depending on the temperature of the engine coolant. When the coolant temperature is low, the resistance in the thermistor increases. When the temperature is high, the resistance drops. The variations in resistance are reflected in the voltage output from the sensor.

The ECM monitors the sensor voltage and uses this value to calculate the engine coolant temperature. When the sensor output voltage deviates from the normal operating range, the ECM interprets this as a fault in the ECT sensor and sets a DTC.

Example:

When the ECM calculates that the ECT is -40°C (-40°F) or more than 140°C (284°F) and if either condition continues for 0.5 seconds or more, the ECM will set a DTC.

MONITOR STRATEGY

Related DTCs	P0115: ECT sensor range check (Chattering) P0117: ECT sensor range check (Low resistance) P0118: ECT sensor range check (High resistance)
Required sensors / components (Main)	ECT sensor
Required sensors / components (Related)	-
Frequency of operation	Continuous
Duration	0.5 sec.
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever these DTCs are not present	See page 05-16

TYPICAL MALFUNCTION THRESHOLDS

P0115:

ECT sensor resistance	Less than 79 Ω or more than 156 kΩ

P0117:

ECT sensor resistance [ECT]	Less than 79 Ω [More than 140°C (284°F)]

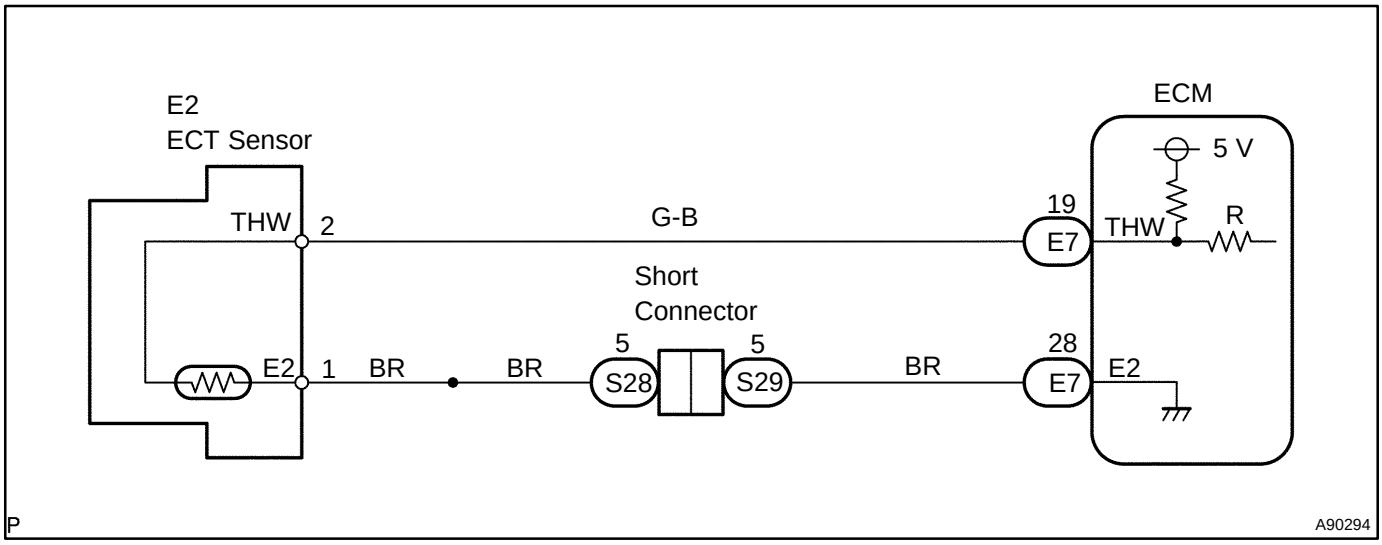
P0118:

ECT sensor resistance [ECT]	More than 156 kΩ [-40°C (-40°F)]

COMPONENT OPERATING RANGE

ECT sensor resistance [ECT]	79 Ω to 156 KΩ [-39 to 140°C (-40 to 284°F)]

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If DTCs that are related to different systems are output simultaneously while terminal E2 is used as a ground terminal, terminal E2 may have an open circuit.
- Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	READ VALUE OF HAND-HELD TESTER OR OBD II SCAN TOOL (ENGINE COOLANT TEMPERATURE)

(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(b) Turn ON the ignition switch. Push the hand-held tester or the OBD II scan tool main switch ON.
(c) On the hand-held tester or the OBD II scan tool, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / COOLANT TEMP. Read the values.
Temperature: Same value as the actual engine coolant temperature.
Result:

Temperature Displayed	Proceed to
-40 ˚C (-40˚F)	A
140˚C (284˚F) or more	B
OK (same as present temperature)	C

HINT:

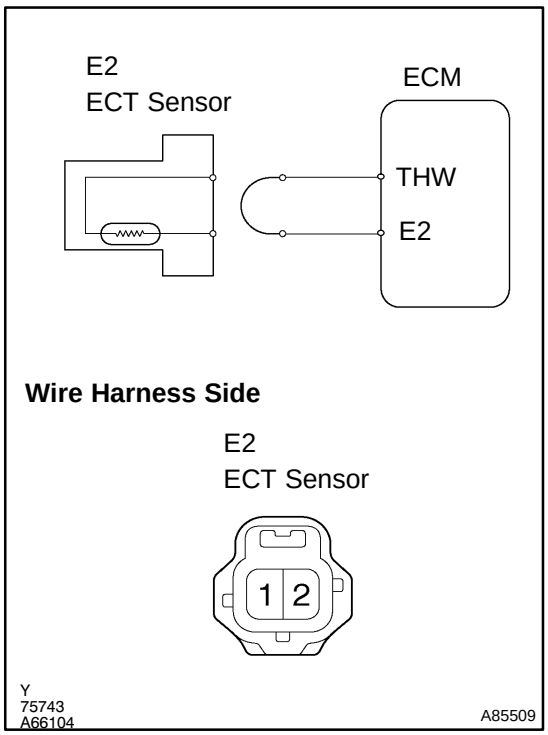
- If there is an open circuit, the hand-held tester or the OBD II scan tool indicates -40˚C (-40˚F).
- If there is a short circuit, the hand-held tester or the OBD II scan tool indicates 140˚C (284˚F) or more.

B → **Go to step 4**

C → **CHECK FOR INTERMITTENT PROBLEMS (See page 05-9)**

A

2	READ VALUE OF HAND-HELD TESTER OR OBD II SCAN TOOL (CHECK FOR OPEN IN WIRE HARNESS)

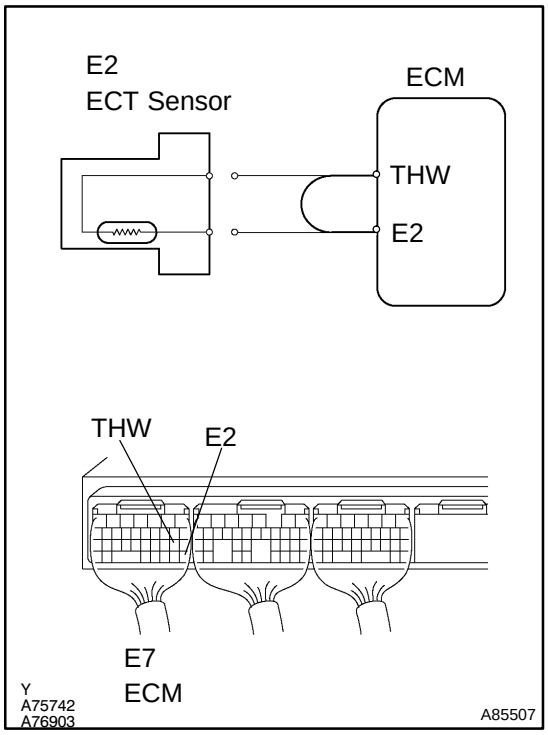


(a) Disconnect the E2 ECT sensor connector.
(b) Connect terminals 1 and 2 of the E2 ECT sensor wire harness side connector.
(c) Turn the ignition switch ON.
(d) On the hand-held tester or the OBD II scan tool, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / COOLANT TEMP. Read the values.
OK:
Temperature value: 140°C (284°F) or more

OK	CONFIRM GOOD CONNECTION AT SENSOR. IF OK, REPLACE ENGINE COOLANT TEMP. SENSOR

NG

3	READ VALUE OF HAND-HELD TESTER OR OBD II SCAN TOOL (CHECK FOR OPEN IN ECM)



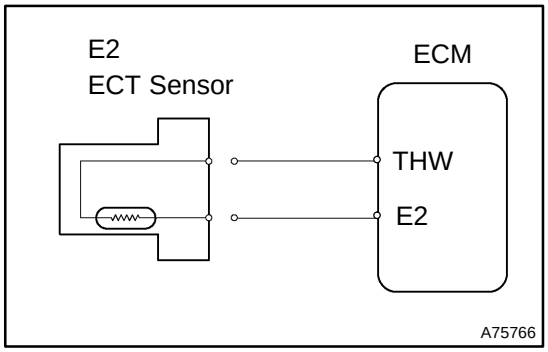
(a) Disconnect the E2 ECT sensor connector.
(b) Connect terminals THW and E2 of the E7 ECM connector.
HINT:
Before checking, do a visual and contact pressure check for the ECM connector.
(c) Turn the ignition switch ON.
(d) On the hand-held tester or the OBD II scan tool, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / COOLANT TEMP. Read the values.
OK:
Temperature value: 140°C (284°F) or more

OK	REPAIR OR REPLACE HARNESS AND CONNECTOR

NG

CONFIRM GOOD CONNECTION AT ECM. IF OK, REPLACE ECM (See page 10-9)

4	READ VALUE OF HAND-HELD TESTER OR OBD II SCAN TOOL (CHECK FOR SHORT IN WIRE HARNESS)

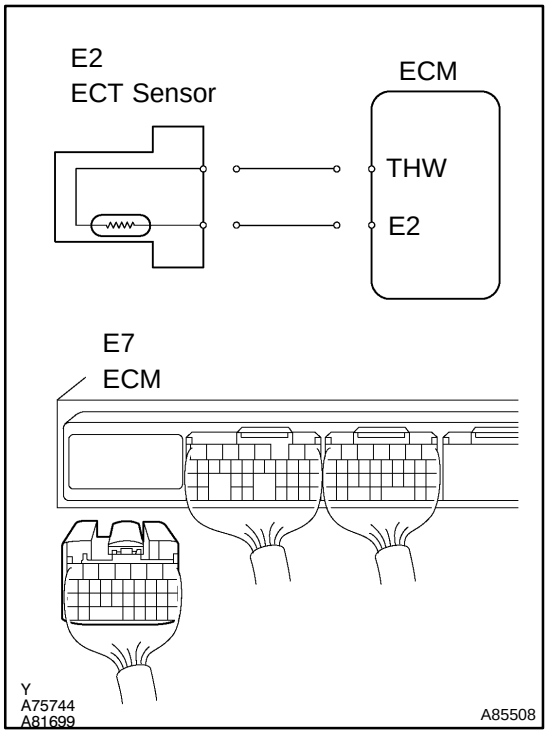


(a) Disconnect the E2 ECT sensor connector.
(b) Turn the ignition switch ON.
(c) On the hand-held tester or the OBD II scan tool, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / COOLANT TEMP. Read the values.
OK:
Temperature value: -40°C (-40°F)

OK	REPLACE ENGINE COOLANT TEMPERATURE SENSOR

NG

5	READ VALUE OF HAND-HELD TESTER OR OBD II SCAN TOOL (CHECK FOR SHORT IN ECM)



(a) Disconnect the E7 ECM connector.
(b) Turn the ignition switch ON.
(c) On the hand-held tester or the OBD II scan tool, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / COOLANT TEMP. Read the values.
OK:
Temperature value: -40°C (-40°F)

OK	REPAIR OR REPLACE HARNESS AND CONNECTOR

NG

REPLACE ECM (See page 10-9)

DTC	P0116	ENGINE COOLANT TEMP. CIRCUIT RANGE/PERFORMANCE PROBLEM

CIRCUIT DESCRIPTION

Refer to DTC P0115 on page 05-95 .

DTC No.	DTC Detection Condition	Trouble Area
P0116	ECT is between 35°C (95°F) and 60°C (140°F) when engine is started, and conditions (a) and (b) are met: (a) Vehicle has accelerated and decelerated (b) ECT remains within 3°C (5.4°F) of initial engine coolant temperature (2 trip detection logic)	・Cooling system ・ECT sensor
	・ECT is more than 60°C (140°F) when engine is started and vehicle has accelerated and decelerated ・ECT sensor records a temperature variation is within 1°C (1.8°F) successively 6 times (6 trip detection logic)	

MONITOR DESCRIPTION

The Engine Coolant Temperature (ECT) sensor is used to monitor the engine coolant temperature. The ECT sensor has a thermistor that varies its resistance depending on the temperature of the engine coolant. When the coolant temperature is low, the resistance in the thermistor increases. When the temperature is high, the resistance drops. The variations in resistance are reflected in the voltage output from the sensor. The ECM monitors the sensor voltage and uses this value to calculate the engine coolant temperature. When the sensor output voltage deviates from the normal operating range, the ECM interprets this as a fault in the ECT sensor and sets a DTC.

Examples:

1) Upon starting the engine, the ECT is between 35°C (95°F) and 60°C (140°F). If, after driving for 250 seconds, the ECT still remains within 3°C (5.4°F) of the starting temperature, a DTC will be set (2 trip detection logic).

2) Upon starting the engine, the ECT is over 60°C (140°F). If, after driving for 250 seconds, the ECT still remains within 1°C (1.8°F) of the starting temperature, a DTC will be set (6 trip detection logic).

MONITOR STRATEGY

Related DTCs	P0116: ECT sensor stuck P0116: ECT sensor stuck at high
Required sensors / components (Main)	ECT sensor
Required sensors / components (Related)	CKP sensor, IAT sensor, MAF meter
Frequency of operation	Continuous
Duration	250 sec. or more
MIL operation	2 driving cycles: ECT sensor stuck 6 driving cycles: ECT sensor stuck at high
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever this DTC is not present	See page 05-16

ECT Sensor Stuck at Low ECT:

Cumulative idle off period	250 sec. or more
Speed increase by 30 km/h (18.6 mph) or more	10 times or more
ECT	35 to 60°C (95 to 140°F)
IAT	-6.7°C (20°F) or more

ECT Sensor Stuck at High ECT:

ECT	60°C (140°F) or more
IAT	-6.7°C (20°F) or more
"Stop and go"*1	Once or more
"Steady driving and stop*2	Once or more

*1 Vehicle is stopped for 20 seconds or more and accelerated to more than 43.5 mph (70 km/h) within 40 seconds.

*2 Vehicle is driven by 40.4 mph (65 km/h) or more for 30 seconds or more and the vehicle speed reaches 43.5 mph (70 km/h). The vehicle is decelerated from 40.4 mph (65 km/h) to 1.86 mph (3 km/h) or less within 35 seconds and stopped for 10 seconds.

TYPICAL MALFUNCTION THRESHOLDS

ECT Sensor Stuck at Low ECT:

ECT change	Less than 3°C (5.4°F)

ECT sensor Stuck at High ECT:

ECT change	1°C (1.8°F) or less

COMPONENT OPERATING RANGE

ECT	Varies with actual ECT (Engine coolant temperature)

INSPECTION PROCEDURE

HINT:

- If DTCs P0115, P0116, P0117, P0118 and P0125 are output simultaneously, the ECT sensor circuit may be open or shorted. Perform the troubleshooting of DTC P0115, P0117 or P0118 first.
- Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

REPLACE ENGINE COOLANT TEMPERATURE SENSOR

DTC	P0120	THROTTLE/PEDAL POSITION SENSOR/SWITCH ”A” CIRCUIT

DTC	P0122	THROTTLE/PEDAL POSITION SENSOR/SWITCH ”A” CIRCUIT LOW INPUT

DTC	P0123	THROTTLE/PEDAL POSITION SENSOR/SWITCH ”A” CIRCUIT HIGH INPUT

DTC	P0220	THROTTLE/PEDAL POSITION SENSOR/SWITCH ”B” CIRCUIT

DTC	P0223	THROTTLE/PEDAL POSITION SENSOR/SWITCH ”B” CIRCUIT HIGH INPUT

DTC	P2135	THROTTLE/PEDAL POSITION SENSOR/SWITCH ”A”/”B” VOLTAGE CORRELATION

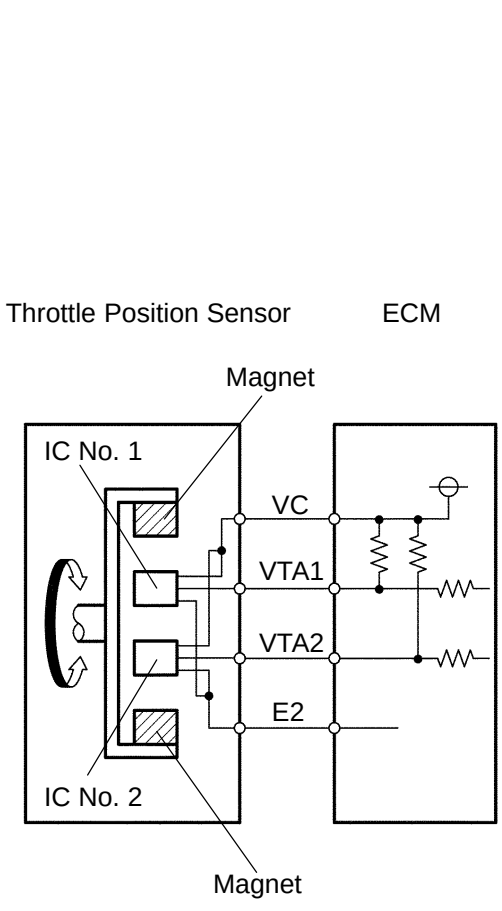
CIRCUIT DESCRIPTION

HINT:

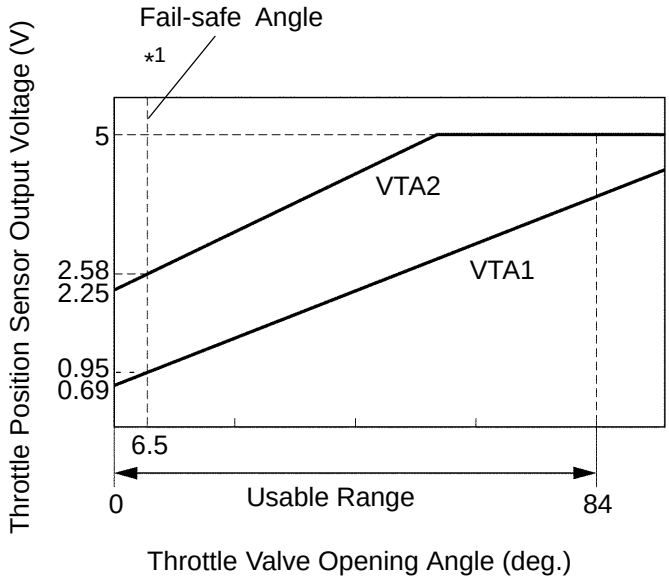
- ∗ This Electronic Throttle Control System (ETCS) does not use a throttle cable.
- ∗ This throttle position sensor is a non-contact type.

The throttle position sensor is mounted on the throttle body and it detects the opening angle of the throttle valve. This sensor is electronically controlled and uses Hall-effect elements, so that accurate control and reliability can be obtained. The throttle position sensor has 2 sensor elements/signal outputs: VTA1 and VTA2. VTA1 is used to detect the throttle opening angle and VTA2 is used to detect malfunctions in VTA1. Voltage applied to VTA1 and VTA2 change between 0 V and 5 V in proportion to the opening angle of the throttle valve. There are several checks that the ECM performs to confirm proper operation of the throttle position sensor and VTA1.

The ECM judges the current opening angle of the throttle valve from these signals input from terminals VTA1 and VTA2, and the ECM controls the throttle motor to make the throttle valve angle properly in response to driver inputs.



A19755



A19802

Throttle Valve Fully Closed
(Throttle Position expressed as percentage
(VTA1) 10 to 24 %)

Throttle Valve Fully Opened
(Throttle Position expressed as percentage
(VTA1) 64 to 96 %)

*1: Fail-safe Angle 6.5°
(Throttle Position expressed as percentage
(VTA1) about 16 %)

DTC No.	DTC Detection Condition	Trouble Area
Condition (a) of DTC P0120, P0122, P0123, P0220, P0222 or P0223 continues for 2 seconds (open or short in the throttle position sensor circuit)		
P0120	Detection conditions for DTCs P0122 and P0123 are not satisfied but condition (a) is satisfied (a) VTA1 is 0.2 V or less or VTA1 is 4.8 V or more	・Throttle position sensor ・ECM
P0122	(a) VTA1 is 0.2 V or less	・Throttle position sensor ・Short in VTA1 circuit ・Open in VC circuit ・ECM
P0123	(a) VTA1 is 4.8 V or more	・Throttle position sensor ・Open in VTA1 circuit ・Open in E2 circuit ・Short in VC and VTA1 circuits ・ECM
P0220	Detection conditions for DTCs P0222 and P0223 are not satisfied but condition (a) is satisfied (a) VTA2 is 0.5 V or less or VTA2 is 4.8 V or more and VTA1 is 0.2 V or more and VTA1 is 1.8 V or less	・Throttle position sensor ・ECM
P0222	(a) VTA2 is 0.5 V or less	・Throttle position sensor ・Short in VTA2 circuit ・Open in VC circuit ・ECM
P0223	(a) VTA2 is 4.8 V or more and VTA1 is 0.2 V or more and VTA1 is 1.8 V or less	・Throttle position sensor ・Open in VTA2 circuit ・Open in E2 circuit ・Short in VC and VTA2 circuits ・ECM
P2135	Condition (a) continues for 0.5 seconds or more, or condition (b) continues for 0.4 seconds or more: (a) Difference between VTA1 and VTA2 is 0.02 V or less (b) VTA1 is 0.2 V or less and VTA2 is 0.5 V or less	・Short in VTA1 and VTA2 circuits ・Throttle position sensor ・ECM

HINT:

- After confirming DTCs, use the hand-held tester or the OBD II scan tool to confirm the throttle valve opening percentage and closed throttle position switch condition.
- "THROTTLE POS" is the VTA1 signal. "THROTTLE POS #2" is the VTA2 signal.

Reference (Normal condition):

Tester display	Accelerator pedal released	Accelerator pedal fully depressed
THROTTLE POS	10 to 24 %	64 to 96 %
THROTTLE POS #2	2.1 to 3.1 V	4.5 to 5.5 V

MONITOR DESCRIPTION

The ECM uses the throttle position sensor to monitor the throttle valve opening angle.

(a) There is a specific voltage difference between VTA1 and VTA2 for each throttle opening angle.

* If the difference between VTA1 and VTA2 deviates from the specified range, the ECM interprets this as a fault and will set a DTC.

(b) VTA1 and VTA2 have each specific voltage operating range.

* If VTA1 or VTA2 is out of the normal operating range, the ECM interprets this as a fault and will set a DTC.

(c) VTA1 and VTA2 should never be close to the same voltage levels.

* If the difference between VTA1 and VTA2 is within 0.02 V, the ECM interprets this as a short circuit in the throttle position sensor system and will set a DTC.

FAIL-SAFE

If the Electronic Throttle Control System (ETCS) has a malfunction, the ECM cuts off current to the throttle control motor. The throttle control valve returns to a predetermined opening angle (approximately 16°) by the force of the return spring. The ECM then adjusts the engine output by controlling the fuel injection (intermittent fuel-cut) and ignition timing in accordance with the accelerator pedal opening angle to enable the vehicle to continue at a minimal speed.

If the accelerator pedal is depressed firmly and slowly, the vehicle can be driven slowly.

If a ”pass” condition is detected and then the ignition switch is turned OFF, the fail-safe operation will stop and the system will return to normal condition.

MONITOR STRATEGY

Related DTCs	P0120: TP sensor 1 range check (Chattering) P0122: TP sensor 1 range check (Low voltage) P0123: TP sensor 1 range check (High voltage) P0220: TP sensor 2 range check (Chattering) P0222: TP sensor 2 range check (Low voltage) P0223: TP sensor 2 range check (High voltage) P2135: TP sensor range check (Correlation)
Required sensors/components (Main)	TP (Throttle position) sensor
Required sensors/components (Related)	-
Frequency of operation	Continuous
Duration	Accelerator pedal ON: 2 seconds Accelerator pedal OFF: 10 seconds 0.5 seconds or 0.4 seconds (P2135)
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever these DTCs are not present	See page 05-16

TYPICAL MALFUNCTION THRESHOLDS

P0120:

VTA1 voltage	0.2 V or less or 4.8 V or more

P0122:

VTA1 voltage	0.2 V or less

P0123:

VTA1 voltage	4.8 V or more

P0220:

VTA2 voltage	0.5 V or less or 4.8 V or more

P0222:

VTA2 voltage	0.5 V or less

P0223:

VTA2 voltage when the VTA1 is 0.2 to 1.8 V	4.8 V or more

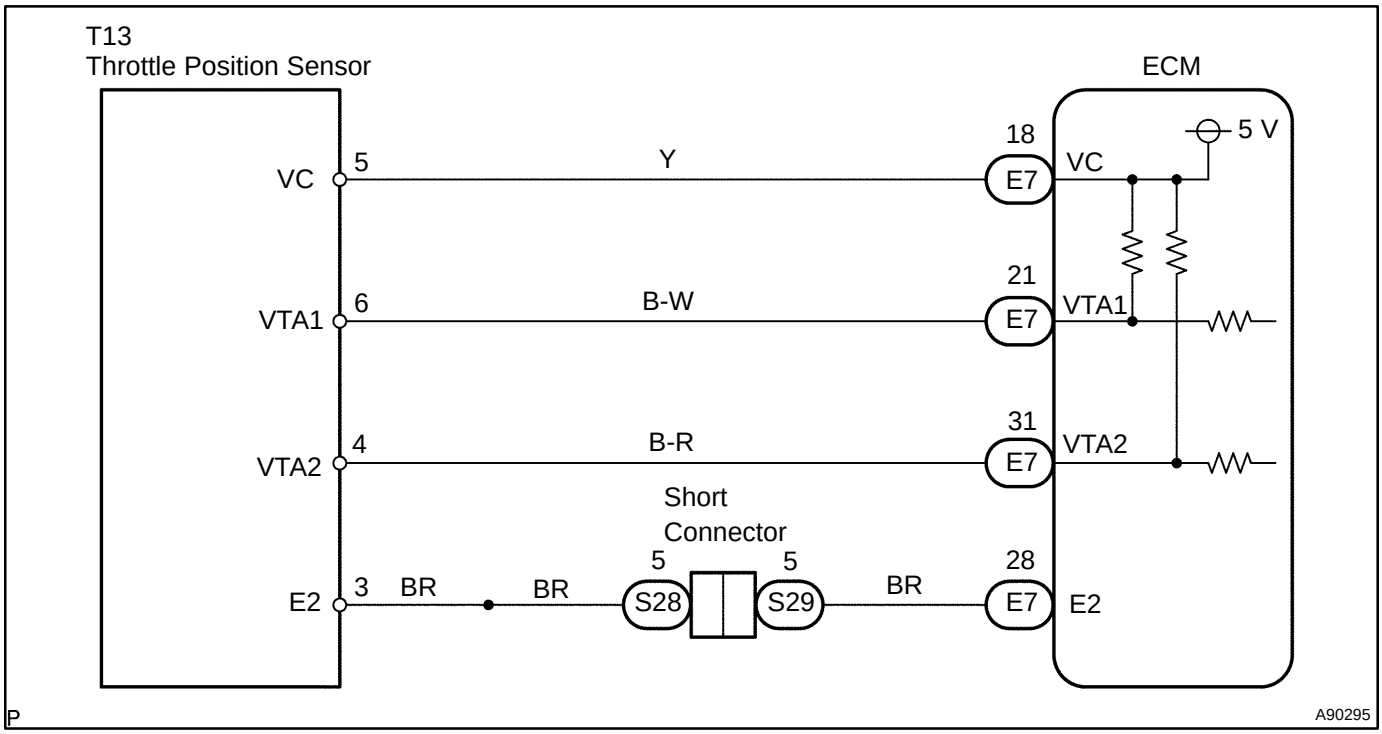
P2135:

Either of the following condition(s) is met:	Condition A or B
Condition A	-
Difference between VTA1 and VTA2 voltages	0.02 V or less
Condition B	-
VTA1 voltage	0.2 V or less
VTA2 voltage	0.5 V or less

COMPONENT OPERATING RANGE

VTA1 voltage	0.6 to 3.96 V
VTA2 voltage	2.25 to 4.8 V

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If DTCs that are related to different systems are output simultaneously while terminal E2 is used as a ground terminal, terminal E2 may have an open circuit.
- Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

Hand-held tester:

1	READ VALUE OF HAND-HELD TESTER (THROTTLE POS AND THROTTLE POS #2)

(a) On the hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / THROTTLE POS and THROTTLE POS #2. Read the values.

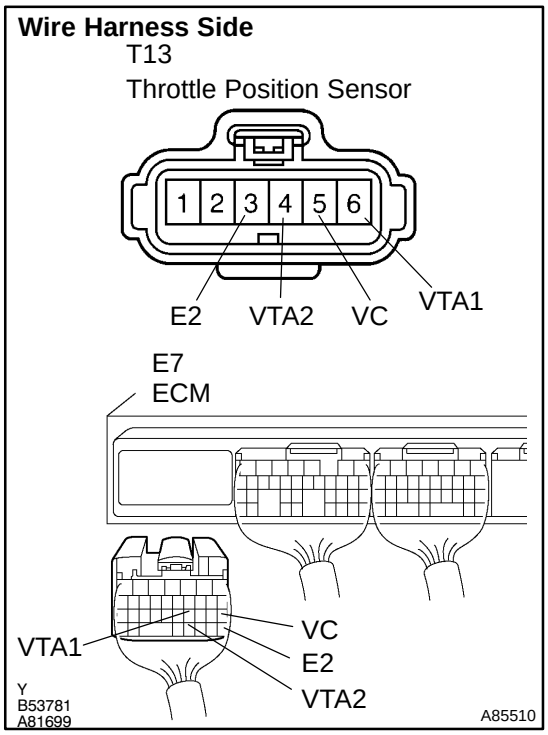
Result:

Throttle position expressed as percentage and voltage				Trouble Area	Proceed to
Accelerator pedal released		Accelerator pedal depressed			
THROTTLE POS (VTA1)	THROTTLE POS #2 (VTA2)	THROTTLE POS (VTA1)	THROTTLE POS #2 (VTA2)		
0 %	0 to 0.2 V	0 %	0 to 0.2 V	VC circuit open	A
100 %	4.5 to 5.5 V	100 %	4.5 to 5.5 V	E2 circuit open	
0 % or 100 %	2.1 to 3.1 V (fail safe)	0 % or 100 %	2.1 to 3.1 V (fail safe)	VTA1 circuit open or ground short	
about 16 % (fail safe)	0 to 0.2 or 4.5 to 5.5 V	about 16 % (fail safe)	0 to 0.2 or 4.5 to 5.5 V	VTA2 circuit open or ground short	
10 to 24 %	2.1 to 3.1 V	64 to 96 % (does not fail safe)	4.5 to 5.5 V (does not fail safe)	Throttle position sensor circuit is normal	B

B → **Go to step 5**

A

2	CHECK WIRE HARNESS (THROTTLE POSITION SENSOR - ECM)



(a) Disconnect the T13 throttle position sensor connector.
(b) Disconnect the E7 ECM connector.
(c) Measure the resistance of the wire harness side connectors.

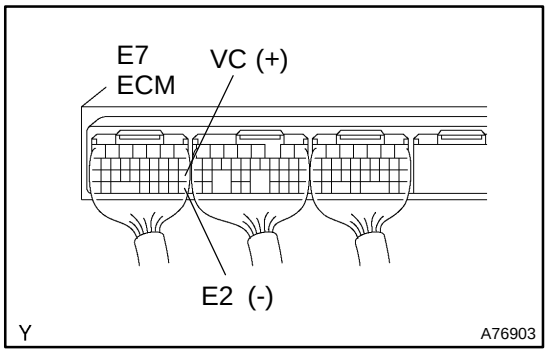
Standard:

Tester Connection	Specified Condition
T13-5 (VC) - E7-18 (VC) T13-6 (VTA1) - E7-21 (VTA1) T13-4 (VTA2) - E7-31 (VTA2) T13-3 (E2) - E7-28 (E2)	Below 1 Ω
T13-5 (VC) or E7-18 (VC) - Body ground T13-6 (VTA1) or E7-21 (VTA1) - Body ground T13-4 (VTA2) or E7-31 (VTA2) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

3	INSPECT ECM (VC VOLTAGE)



(a) Disconnect the T13 throttle position sensor connector.
(b) Turn the ignition switch ON.
(c) Measure the voltage of the ECM connector.

Standard:

Tester Connection	Specified Condition
E7-18 (VC) - E7-28 (E2)	4.5 to 5.5 V

NG → **REPLACE ECM (See page 10-9)**

OK

4	REPLACE THROTTLE BODY ASSY (See page 10-6)

GO

5	READ OUTPUT DTC (THROTTLE POSITION SENSOR DTCS ARE OUTPUT AGAIN)

(a) Clear the DTC (see page 05-38).
(b) Start the engine.
(c) Run the engine at idle for 15 seconds or more.
(d) Read the DTC.

Result:

Display (DTC Output)	Proceed to
P0120, P0122, P0123, P0220, P0222, P0223 and/or P2135 are output again	A
No DTC output	B

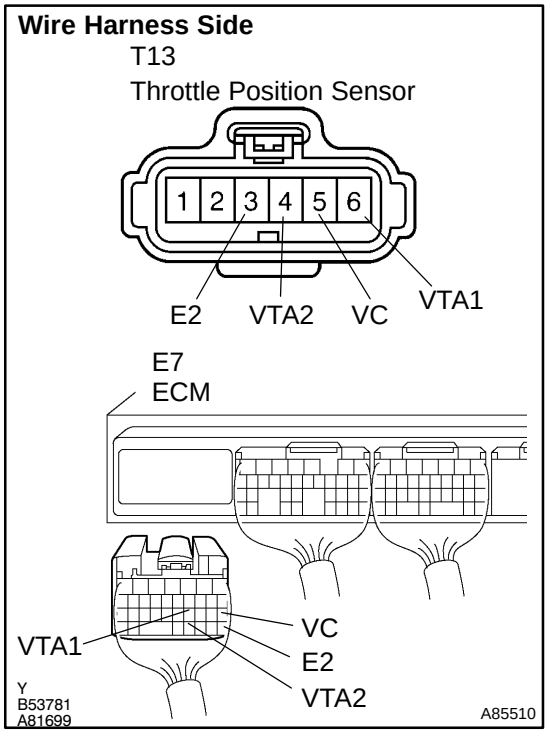
B → **SYSTEM OK**

A

REPLACE ECM (See page 10-9)

OBD II scan tool (excluding hand-held tester):

1	CHECK WIRE HARNESS (THROTTLE POSITION SENSOR - ECM)



(a) Disconnect the T13 throttle position sensor connector.
(b) Disconnect the E7 ECM connector.
(c) Measure the resistance of the wire harness side connectors.

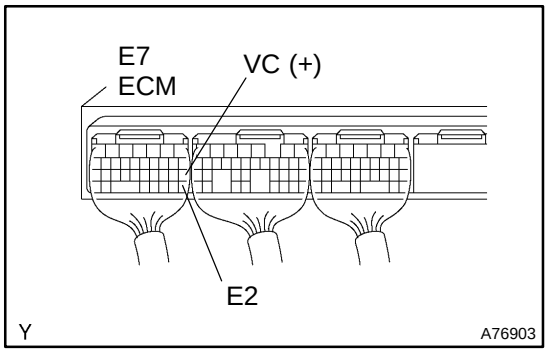
Standard:

Tester Connection	Specified Condition
T13-5 (VC) - E7-18 (VC) T13-6 (VTA1) - E7-21 (VTA1) T13-4 (VTA2) - E7-31 (VTA2) T13-3 (E2) - E7-28 (E2)	Below 1 Ω
T13-5 (VC) or E7-18 (VC) - Body ground T13-6 (VTA1) or E7-21 (VTA1) - Body ground T13-4 (VTA2) or E7-31 (VTA2) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

2	INSPECT ECM (VC VOLTAGE)



(a) Disconnect the T13 throttle position sensor connector.
(b) Turn the ignition switch ON.
(c) Measure the voltage of the ECM connector.

Standard:

Tester Connection	Specified Condition
E7-18 (VC) - E7-28 (E2)	4.5 to 5.5 V

NG → **REPLACE ECM (See page 10-9)**

OK

3	REPLACE THROTTLE BODY ASSY (See page 10-6)

G0

4	READ OUTPUT DTC (THROTTLE POSITION SENSOR DTCS ARE OUTPUT AGAIN)

(a) Clear the DTC (see page 05-38).
(b) Start the engine.
(c) Run the engine at idle for 15 seconds or more.
(d) Read the DTC.

Result:

Display (DTC Output)	Proceed to
P0120, P0122, P0123, P0220, P0222, P0223 and/or P2135 are output again	A
No DTC output	B

B → **SYSTEM OK**

A

REPLACE ECM (See page 10-9)

DTC	P0121	THROTTLE/PEDAL POSITION SENSOR/SWITCH ”A” CIRCUIT RANGE/PERFORMANCE PROBLEM

HINT:
This is the purpose of the ”throttle position sensor”.

CIRCUIT DESCRIPTION

Refer to DTC P0120 on page 05-102 .

DTC No.	DTC Detection Condition	Trouble Area
P0121	Condition (a) continues for 2.0 seconds: (a) Difference between VTA1 and VTA2 deviates from threshold	Throttle position sensor

MONITOR DESCRIPTION

The ECM uses the throttle position sensor to monitor the throttle valve opening angle.
This sensor includes 2 signals: VTA1 and VTA2. VTA1 is used to detect the throttle opening angle and VTA2 is used to detect malfunctions in VTA1. There are several checks that the ECM performs to confirm proper operation of the throttle position sensor and VTA1.
There is a specific voltage difference between VTA1 and VTA2 for each throttle opening angle.
If the voltage output difference between the VTA1 and VTA2 deviates from the normal operating range, the ECM interprets this as a malfunction of the throttle position sensor. The ECM will turn on the MIL and will set a DTC.

FAIL-SAFE

If the Electronic Throttle Control System (ETCS) has a malfunction, the ECM cuts off current to the throttle control motor. The throttle control valve returns to a predetermined opening angle (approximately 16°) by the force of the return spring. The ECM then adjusts the engine output by controlling the fuel injection (intermittent fuel-cut) and ignition timing in accordance with the accelerator pedal opening angle to enable the vehicle to continue at a minimal speed.
If the accelerator pedal is depressed firmly and slowly, the vehicle can be driven slowly.
If a ”pass” condition is detected and then the ignition switch is turned OFF, the fail-safe operation will stop and the system will return to normal condition.

MONITOR STRATEGY

Related DTCs	P0121: TP (Throttle position) sensor rationality
Required sensors / components (Main)	TP sensor
Required sensors / components (Related)	-
Frequency of operation	Continuous
Duration	2 sec.
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever this DTC is not present	See page 05-16

TYPICAL MALFUNCTION THRESHOLDS

Difference in learning voltage value of (VTA1 - VTA2 × 0.8)	Less than 0.8 V, or more than 1.6 V

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

REPLACE THROTTLE POSITION SENSOR (See page 10-6)

DTC	P0125	INSUFFICIENT COOLANT TEMPERATURE FOR CLOSED LOOP FUEL CONTROL

CIRCUIT DESCRIPTION

Refer to DTC P0115 on page 05-95 .

DTC No.	DTC Detection Condition	Trouble Area
P0125	・If ECT (engine coolant temperature) or IAT (intake air temperature) is less than -19.45°C (-3°F) at engine start; 20 minutes or more after starting engine, ECT sensor value is 20°C (68°F) or less (2 trip detection logic) ・If ECT and IAT are between -19.45°C (-3°F) and -8.34°C (17°F) at engine start; 5 minutes or more after starting engine, ECT sensor value is 20°C (68°F) or less (2 trip detection logic) ・If ECT and IAT greater than -8.34°C (17°F) at engine start; 2 minutes or more after starting engine, ECT sensor value is 20°C (68°F) or less (2 trip detection logic)	・Cooling system ・ECT sensor ・Thermostat

MONITOR DESCRIPTION

The Engine Coolant Temperature (ECT) sensor is used to monitor the temperature of the engine coolant. The resistance of the sensor varies with the actual coolant temperature. The ECM applies a voltage to the sensor and the varying resistance of the sensor causes the signal voltage to vary. The ECM monitors the ECT signal voltage after engine start-up. If, after sufficient time has passed, the sensor still reports that the engine is not warm enough for closed-loop fuel control, the ECM interprets this as a fault in the sensor or cooling system and sets a DTC.

Example:

The ECT is 0°C (32°F) at engine start. After 5 minutes running time, the ECT sensor still indicates that the engine is not warm enough to begin active feedback control of the air-fuel ratio. The ECM interprets this as a fault in the sensor or cooling system and sets a DTC.

MONITOR STRATEGY

Related DTCs	P0125: Insufficient ECT (Engine coolant temperature) for closed loop
Required sensors/components (Main)	Thermostat, cooling sysem
Required sensors/components (Related)	ECT sensor, MAF meter
Frequency of operation	Continuous
Duration	2 minutes: Engine start ECT is -8.34°C (17°F) or more 5 minutes: Engine start ECT is -19.45 to -8.34°C (-3 to 17°F) 20 minutes: Engine start ECT is less than -19.45°C (-3°F)
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTCs are not present	See page 05-16
Fuel cut	OFF
Engine	Running
Idle	OFF

TYPICAL MALFUNCTION THRESHOLDS

Time until "actual ECT" reaches "Closed Loop ECT"	2 minutes: Engine start ECT is -8.34°C (17°F) or more 5 minutes: Engine start ECT is -19.45 to -8.34°C (-3 to 17°F) 20 minutes: Engine start ECT is less than -19.45°C (-3°F)

INSPECTION PROCEDURE

HINT:

- If DTCs P0115, P0116, P0117, P0118 and P0125 are output simultaneously, engine coolant temperature sensor circuit may be open or short. Perform the troubleshooting of DTC P0115, P0117 or P0118 first.
- Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	CHECK OTHER DTC OUTPUT (IN ADDITION TO DTC P0125)

(a) Read the DTC using the hand-held tester or the OBD II scan tool.
Result:

Display (DTC Output)	Proceed to
Only P0125 are output	A
P0125 and other DTCs are output	B

HINT:
If any other codes besides P0125 is output, perform the troubleshooting for those codes first.

B → **GO TO RELEVANT DTC CHART (See page 05-48)**

A

2	INSPECT THERMOSTAT (See page 16-2)

(a) Check the valve opening temperature of the thermostat.
OK:
Valve opening temperature: 80 to 84°C (176 to 183°F)

HINT:
Also check that the valve is completely closed under opening temperature as above.

NG → **REPLACE THERMOSTAT (See page 16-11)**

OK

3	CHECK COOLING SYSTEM

(a) Check the cooling system for excessive cooling, such as abnormal radiator fan operation, modified cooling system and other defects.
OK:
There is no modification of cooling system.

NG → **REPAIR OR REPLACE COOLING SYSTEM**

OK

REPLACE ENGINE COOLANT TEMPERATURE SENSOR

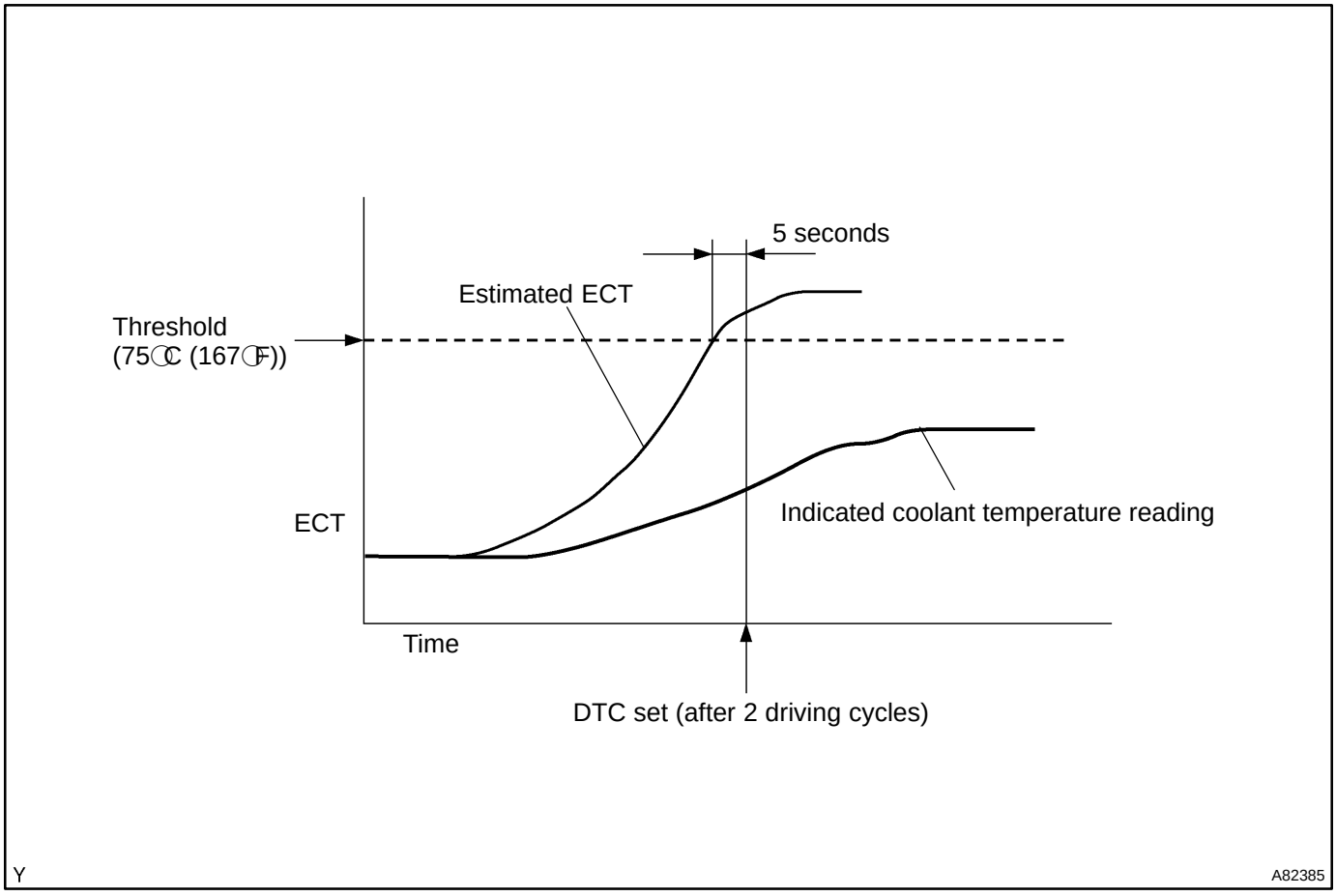
DTC	P0128	COOLANT THERMOSTAT (COOLANT TEMPERATURE BELOW THERMOSTAT REGULATING TEMPERATURE)

CIRCUIT DESCRIPTION

This DTC is output when the Engine Coolant Temperature (ECT) does not reach 75˚C (167˚F) despite sufficient engine warm-up time.

DTC No.	DTC Detection Condition	Trouble Area
P0128	Conditions (a), (b) and (c) are met: (a) Cold start (b) Sufficient warm-up time has elapsed (c) ECT is less than 75˚C (167˚F)	·Thermostat ·Cooling system ·ECT sensor ·ECM

MONITOR DESCRIPTION



The ECM estimates the coolant temperature based on starting temperature, engine loads, and engine speeds. The ECM then compares the estimated temperature with the actual ECT. When the estimated coolant temperature reaches 75°C (167°F), the ECM checks the actual ECT. If the actual ECT is less than 75°C (167°F), the ECM will interpret this as a fault in the thermostat or the engine cooling system and set a DTC.

MONITOR STRATEGY

Related DTCs	P0128: Coolant thermostat
Required sensors/components (Main)	Thermostat
Required sensors/components (Related)	ECT sensor, IAT sensor, VSS
Frequency of operation	Once per driving cycle
Duration	500 sec.
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever this DTC is not present	See page 05-16
Battery voltage	11 V or more
Throttle position learning	Completed
Either of the following conditions is met:	Condition 1 or 2
1. All of the following conditions are met:	Condition (a), (b) and (c)
(a) ECT at engine start - IAT at engine start	-15 to 7°C (-27 to 12.6°F)
(b) ECT at engine start	-10 to 56°C (14 to 132.8°F)
(c) IAT at engine start	-10 to 56°C (14 to 132.8°F)
2. All of the following conditions are met:	Condition (a), (b) and (c)
(a) ECT at engine start - IAT at engine start	More than 7°C (12.6°F)
(b) ECT at engine start	56°C (132.8°F) or less
(c) IAT at engine start	-10 °C (14°F) or more
Accumulated time that vehicle speed is 80 mph (128 km/h) or more	Less than 20 seconds

TYPICAL MALFUNCTION THRESHOLDS

Duration that both of the following conditions 1 and 2 are met:	5 seconds or more
1. Estimated ECT	120.5°C (248.9°F) or more
2. ECT sensor output	Less than 120.5°C (248.9°F)

MONITOR RESULT

Refer to page 05-24 for detailed information.

The test value and test limit information are described as shown in the following table. Check the monitor result and test values after performing the monitor drive pattern (see page 05-26).

- TID (Test Identification Data) is assigned to each emissions-related component.
- TLT (Test Limit Type):
  If TLT is 0, the component is malfunctioning when the test value is higher than the test limit.
  If TLT is 1, the component is malfunctioning when the test value is lower than the test limit.
- CID (Component Identification Data) is assigned to each test value.
- Unit Conversion is used to calculate the test value indicated on generic OBD ll scan tools.

TID $08: Thermostat

TLT	CID	Unit Conversion	Description of Test Data	Description of Test Limit
1	$01	Multiply by 0.625 and subtract 40 (°C)	ECT sensor output when estimated ECT has reached to malfunction criterion	Malfunction criteria for thermostat

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	CHECK COOLING SYSTEM

(a) Check the cooling system for excessive cooling, such as abnormal radiator fan operation, modified cooling system and other defects.

NG → **REPAIR OR REPLACE COOLING SYSTEM**

OK

2	INSPECT THERMOSTAT (See page 16-2)

(a) Check the valve opening temperature of the thermostat.

OK:

Valve opening temperature: 80 to 84°C (176 to 183°F)

HINT:

Also check that the valve is completely closed under opening temperature as above.

NG → **REPLACE THERMOSTAT(See page 16-1 1)**

OK

REPLACE ECM(See page 10-9)

DTC	P0136	OXYGEN SENSOR CIRCUIT MALFUNCTION (BANK 1 SENSOR 2)

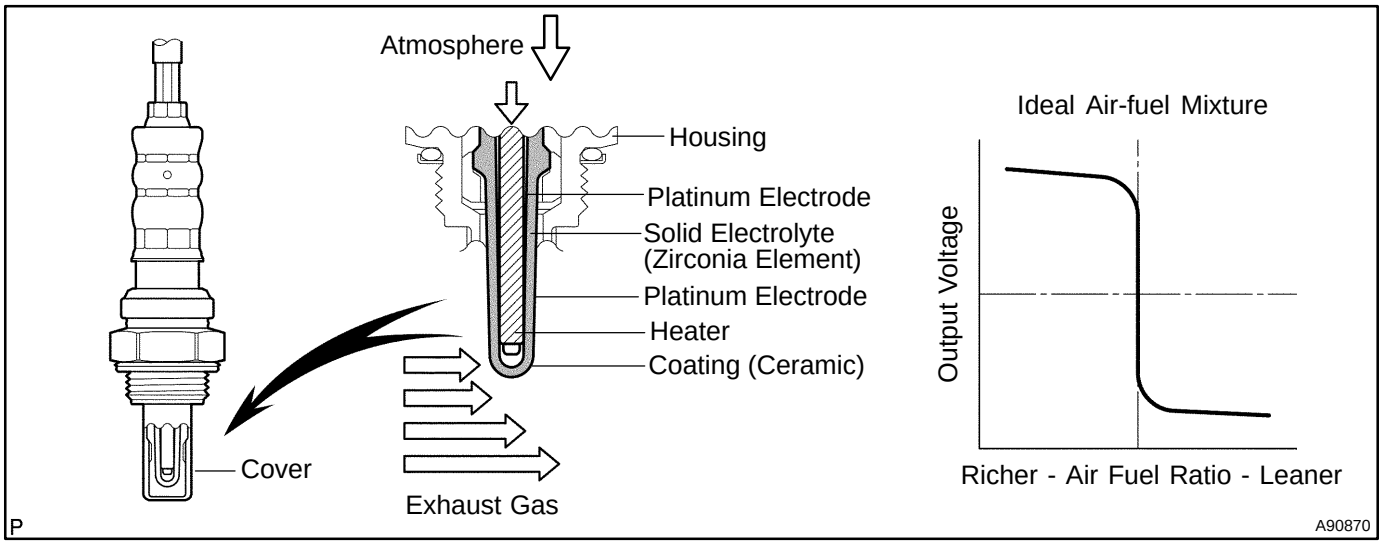
DTC	P0137	OXYGEN SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 2)

DTC	P0138	OXYGEN SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 2)

CIRCUIT DESCRIPTION

The heated oxygen sensor (HO2S) is used to monitor oxygen in the exhaust gas. For optimum catalyst operation, the air fuel mixture (air-fuel ratio) must be maintained near the ideal stoichiometric ratio. The HO2S output voltage changes suddenly in the vicinity of the stoichiometric ratio. The ECM adjusts the fuel injection time so that the air-fuel ratio is nearly stoichiometric.

The HO2S generates a voltage between 0.1 and 0.9 V in response to oxygen in the exhaust gas. If the oxygen in the exhaust gas increases, the air-fuel ratio becomes Lean. The ECM interprets Lean when the HO2S voltage is below 0.45 V. If the oxygen in the exhaust gas decreases, the air-fuel ratio becomes Rich. The ECM interprets Rich when the HO2S voltage is above 0.45 V.



DTC No.	DTC Detection Condition	Trouble Area
P0136	・Following condition (a) (b) or (c) is met: (a) During driving with engine warmed up, heated oxygen sensor output does not change for 8 minutes (b) Heated oxygen sensor output is very low most of time for 220 seconds (c) The rear heated oxygen sensor voltage does not drop to below 0.2 V immediately when vehicle decelerates and fuel cut is operating ・Both (a) and (b) continue for more than 30 seconds: (a) Estimated rear oxygen sensor temperature is less than 800°C (b) Rear oxygen sensor impedance is less than 5Ω	・Open or short in heated oxygen sensor (bank 1 sensor 2) circuit ・Heated oxygen sensor (bank 1 sensor 2) ・Heated oxygen sensor heater (bank 1 sensor 2) ・A/F sensor ・A/F sensor heater ・EFI relay
P0137	Both (a) and (b) continue for more than 240 seconds: (a) Estimated rear oxygen sensor temperature is more than 450°C (b) Rear oxygen sensor impedance is more than 15kΩ	・Open or short in heated oxygen sensor (bank 1 sensor 2) circuit (sensor to ECM) ・Open or short in heated oxygen sensor (bank 1 sensor 2) internal
P0138	Rear oxygen sensor output voltage is over 1.2 V for more than 30 seconds	・Short in heated oxygen sensor (bank 1 sensor 2) circuit ・Short in heated oxygen sensor (bank 1 sensor 2) circuit ・ECM internal circuit malfunction

MONITOR DESCRIPTION

The ECM monitors the rear heated oxygen sensor (HO2S) in the following 4 items:
1. The HO2S voltage changes between Rich (more than 0.45 V) and Lean (less than 0.45 V) while the vehicle is running (repeating acceleration and deceleration) for 8 minutes. If not, the ECM interprets this as a malfunction, illuminates the MIL, and then sets a DTC.
2. The HO2S voltage does not remain at less than 0.05 V for a long time while the vehicle is running (60 % of the time in the 220 second-monitor, the sensor output is less than 0.05 V). If it does, the ECM interprets this as a malfunction, illuminates the MIL, and then sets a DTC.
3. The sensor's voltage drops to below 0.2 V (extremely Lean status) immediately when the vehicle decelerates and the fuel cut is working for 7 seconds. If not, the ECM interprets this to mean the sensor's response feature has deteriorated, illuminates the MIL, and then sets a DTC.
4. The rear oxygen sensor impedance is 5 Ω or less, 15 kΩ or more, or output voltage is 1.2 V or more (normal voltage: 0 to 1.0 V). If so, the ECM will determine that the rear oxygen sensor or a related circuit has an open or short circuit, illuminates the MIL and sets a DTC.
Impedance is detected by the IC inside the ECM.

MONITOR STRATEGY

Related DTCs	P0136: Heated oxygen sensor output voltage (Output voltage) P0136: Heated oxygen sensor impedance (Low impedance) P0137: Heated oxygen sensor impedance (High impedance) P0138: Heated oxygen sensor output voltage (High voltage) P0138: Heated oxygen sensor output voltage (During fuel-cut)
Required Sensors/Components (Main)	Heated oxygen sensor
Required Sensors/Components (Related)	Crankshaft position sensor, engine coolant temperature sensor, mass air flow meter and throttle position sensor
Frequency of Operation	Once per driving cycle: Active air-fuel ratio control detection Continuous: Others
Duration	Within 480 seconds
MIL Operation	2 driving cycles: P0136 (Rear HO2S output voltage - case 1) P0136 (Rear HO2S output voltage - case 2) P0138 (Rear HO2S voltage during fuel-cut) Immediate: Others
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

All:

The monitor will run whenever these DTCs are not present	See page 05-16

P0136 (Rear HO2S output voltage - case 1):

All of the following conditions are met:	Conditions 1, 2, 3 and 4
1. Malfunction determination in this driving cycle	Not detected
2. Engine	Running
3. Time after engine start	0 second or more
4. Either of the following conditions is met:	Conditions (a) or (b)
(a) Cumulative time while HO2S heater is operating	22 seconds or more
(b) HO2S voltage	Has reached to 0.2 V or more

P0136 (Rear HO2S output voltage - case 2):

Engine	Running

P0136 (Rear HO2S low impedance):

Battery voltage	11 V or more
Estimated HO2S temperature	Less than 700°C (1,292°F)
ECM monitor	Completed
P0606	Not set

P0137 (Rear HO2S high impedance):

Battery voltage	11 V or more
Estimated HO2S temperature	450°C (842°F) or higher
ECM monitor	Completed
P0606	Not set

P0138 (Rear HO2S output voltage - case 3):

Battery voltage	11 V or more
Time after engine start	2 seconds or more

P0138 (Rear HO2S output voltage during fuel-cut):

Engine coolant temperature	70°C (158°F) or more
Catalyst temperature	400°C (752°F) or more
Fuel-cut	Executing

TYPICAL MALFUNCTION THRESHOLDS

P0136 (Rear HO2S output voltage - case 1):

Both of the following conditions are met:	Conditions 1 and 2
1. Frequency that HO2S voltage changes between (a) and (b)	0 time
(a) Maximum voltage	0.6 V or more
(b) Minimum voltage	Less than 0.45 V
2. Cumulative monitor time *1 of rear HO2S	320 seconds or more
*1: Monitor time is counted when all of the following conditions are met:	Conditions (a) and (b)
(a) Fuel system status	Closed-loop
(b) Idle	OFF

P0136 (Rear HO2S output voltage - case 2):

All of the following conditions are met:	Conditions 1, 2, 3, 4 and 5
1. Cumulative monitor time *2 of HO2S	220 seconds or more
2. Duration while HO2S voltage is below 0.05 V	132 seconds or more
3. Duration while HO2S voltage is higher than 0.7 V	Less than 44 seconds
4. Duration while HO2S voltage is 0.45 V to 0.7 V	Less than 88 seconds
5. Duration while HO2S voltage is 0.45 V or more	Less than 20 seconds

*2: Monitor time is counted when all of the following conditions are met:	Conditions 1, 2, 3 and 4
1. Intake air amount per revolution	0.32 g/rev or more
2. Vehicle speed	3 km/h (1.875 mph) or more
3. Idle	OFF
4. Fuel-cut	OFF

P0136 (Rear HO2S low impedance):

Duration of the following condition:	30 seconds or more
Rear HO2S impedance	Less than 5 Ω

P0137 (Rear HO2S high impedance):

Duration of the following condition:	90 seconds or more
Rear HO2S impedance	15 kΩ or more

P0138 (Rear HO2S output voltage - case 3):

Duration of the following condition:	10 seconds or more
Rear HO2S voltage	1.2 V or more

P0138 (Rear HO2S output voltage during fuel-cut):

Either of the following conditions is met:	Conditions 1 or 2
1. Duration until rear HO2S voltage drops to 0.2 V after fuel-cut start	7 seconds or more
2. Both of the following conditions are met:	Conditions (a) and (b)
(a) Rear HO2S voltage when fuel-cut starts	0.5 V or more
(b) Duration that HO2S voltage is 0.2 to 0.35 V	1 second or more

COMPONENT OPERATING RANGE

HO2S voltage	Varies between 0.1 and 0.9 V

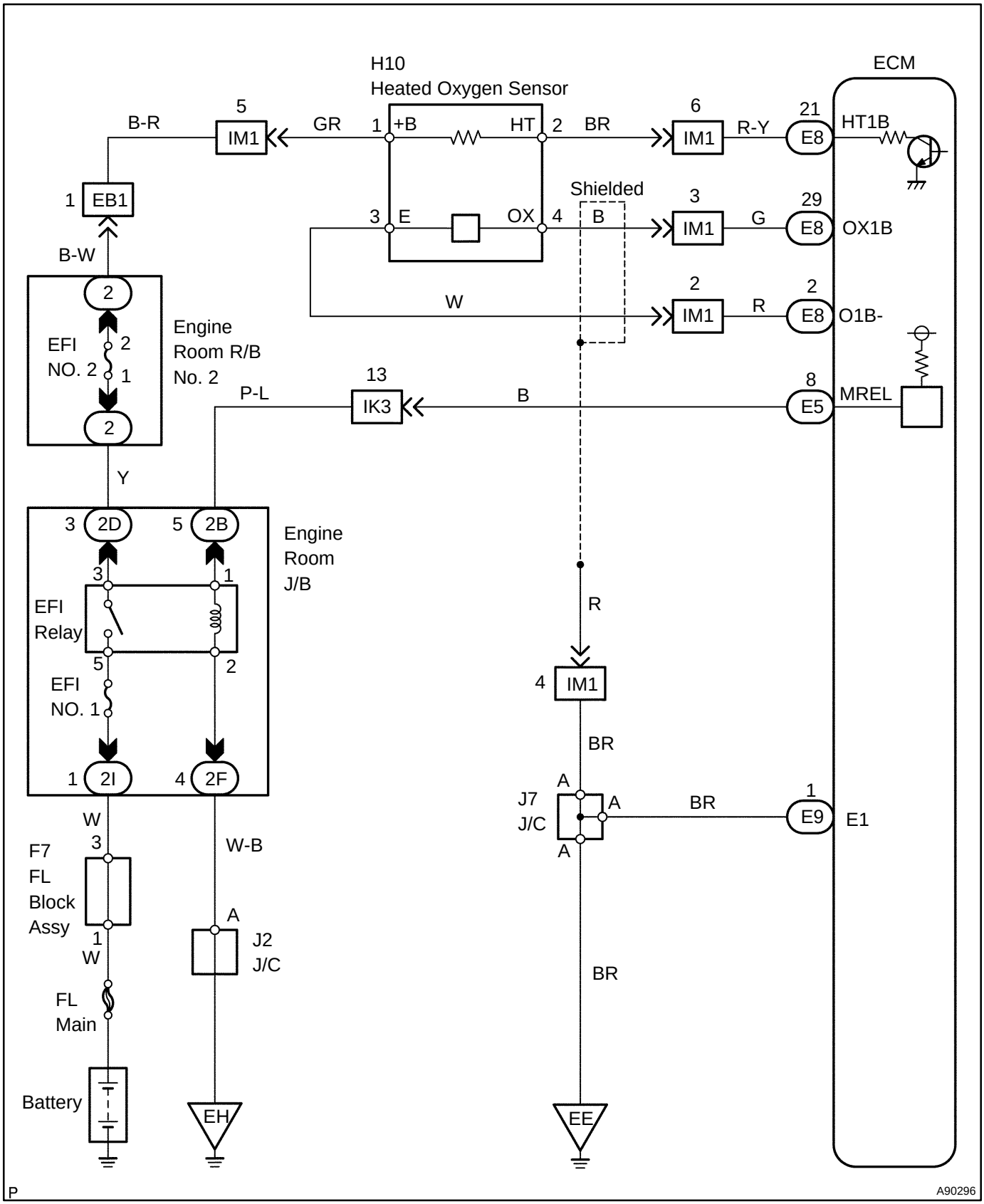
O2S TEST RESULT

Refer to page 05-22 for detailed information.

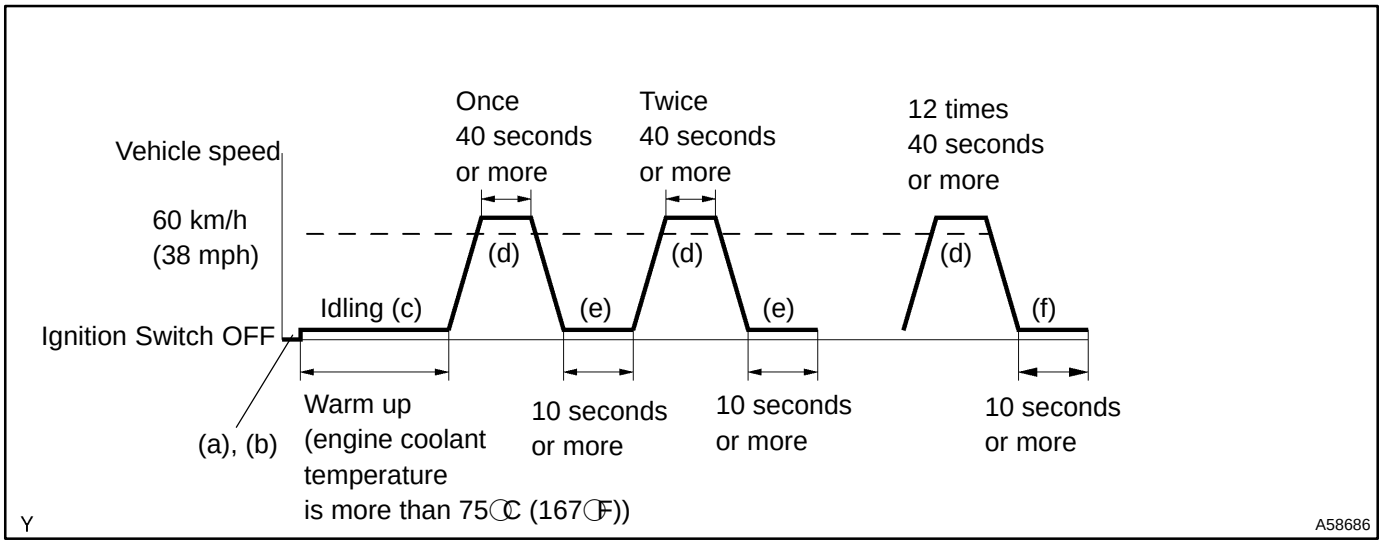
HO2S Output voltage (Minimum and Maximum):

TEST ID	Description of TEST VALUE	Conversion Factor (Unit)	Unit	Standard Value
$07	Minimum HO2S voltage	N/A	V	Less than TEST LIMIT
$08	Maximum HO2S voltage	N/A	V	More than TEST LIMIT
$31	Minimum time per one-cycle of HO2S frequency that HO2S switches Lean to Rich	N/A	Second	Less than TEST LIMIT
$32	Minimum time per one-cycle of HO2S frequency that HO2S switches Rich to Lean	N/A	Second	Less than TEST LIMIT
$37	Time until HO2S voltage drops to 0.2 V during fuel-cut	N/A	Second	Less than TEST LIMIT
$81	Percentage in monitoring time while HO2S voltage is lower than 0.05 V	Multiply 0.39	%	Less than TEST LIMIT
$84	Percentage in monitoring time while HO2S voltage is higher than 0.7 V	Multiply 0.39	%	More than TEST LIMIT
$85	Continuous time while HO2S voltage is higher than 0.45 V	Multiply 0.262	Second	More than TEST LIMIT
$87	Percentage in monitoring time while HO2S voltage is higher than 0.45 V	Multiply 0.39	%	More than TEST LIMIT

WIRING DIAGRAM



CONFIRMATION DRIVING PATTERN (P0136)



(a) Connect the hand-held tester to the DLC3.
(b) Switch the hand-held tester from normal mode to check (test) mode (see page 05-40).
(c) Start the engine and warm it up until the engine coolant temperature becomes more than 75°C.
(d) Drive the vehicle at 60 km/h (38 mph) or more for 40 seconds or more.
(e) Let the engine idle for 10 seconds or more.
(f) Perform steps (d) to (e) 12 times.

HINT:

If a malfunction exists, the MIL will illuminate during step (f).

NOTICE:

If the conditions in this test are not strictly followed, detection of a malfunction will not occur. If you do not have a hand-held tester, turn the ignition switch OFF after performing steps from (c) to (f), then perform steps from (c) to (f) again.

CONFIRMATION DRIVING PATTERN (P0137)

Warm up the engine and run the engine at 60 km/h (38 mph) for 7 minutes.

CONFIRMATION DRIVING PATTERN (P0138)

Warm up the engine and run the engine at idle for 30 seconds.

INSPECTION PROCEDURE

HINT:

Hand-held tester only:

It is possible the malfunctioning area can be found using the ACTIVE TEST A/F CONTROL operation. The A/F CONTROL operation can determine if the A/F sensor, heated oxygen sensor or other potential trouble areas are malfunctioning or not.

(a) Perform the ACTIVE TEST A/F CONTROL operation.

HINT:

The A/F CONTROL operation lowers the injection volume 12.5 % or increases the injection volume 25 %.

(1) Connect the hand-held tester to the DLC3 on the vehicle.
(2) Turn the ignition switch ON.
(3) Warm up the engine by running the engine at 2,500 rpm for approximately 90 seconds.
(4) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL.
(5) Perform the A/F CONTROL operation with the engine idle (press the right or left button).

Result:

A/F sensor reacts in accordance with increase and decrease of injection volume:

+25 % → rich output: Less than 3.0 V

-12.5 % → lean output: More than 3.35 V

Heated oxygen sensor reacts in accordance with increase and decrease of injection volume:

+25 % → rich output: More than 0.55 V

-12.5 % → lean output: Less than 0.4 V

NOTICE:

The A/F sensor output has a few seconds of delay and the heated oxygen sensor output has about 20 seconds of delay at maximum.

	Output voltage of A/F sensor (sensor 1)	Output voltage of heated oxygen sensor (sensor 2)	Main suspect trouble area
Case 1	Injection volume +25 % -12.5 % Output voltage More than 3.35 V Less than 3.0 V **OK**	Injection volume +25 % -12.5 % Output voltage More than 0.55 V Less than 0.4V **OK**	—
Case 2	Injection volume +25 % -12.5 % Output voltage Almost No reaction **NG**	Injection volume +25 % -12.5 % Output voltage More than 0.55 V Less than 0.4V **OK**	A/F sensor (A/F sensor, heater, A/F sensor circuit)
Case 3	Injection volume +25 % -12.5 % Output voltage More than 3.35 V Less than 3.0V **OK**	Injection volume +25 % -12.5 % Output voltage Almost No reaction **NG**	Heated oxygen sensor (heated oxygen sensor, heater, heated oxygen sensor circuit)
Case 4	Injection volume +25 % -12.5 % Output voltage Almost No reaction **NG**	Injection volume +25 % -12.5 % Output voltage Almost No reaction **NG**	Extremely rich or lean actual air-fuel ratio (Injector, fuel pressure, gas leakage in exhaust system, etc.)

The following A/F CONTROL procedure enables a technician to check and graph the voltage outputs of both the A/F sensor and the heated oxygen sensor.

For displaying the graph, enter ”ACTIVE TEST / A/F CONTROL / USER DATA”, select ”AFS B1S1 and O2S B1S2” by pressing ”YES” and push ”ENTER”. Then press ”F4”.

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1 CHECK OTHER DTC OUTPUT

(a) Read the DTC using the hand-held tester or the OBD II scan tool.
Result:

Display (DTC Output)	Proceed to
P0138 is output	A
P0137 is output	B
P0136 is output	C

HINT:
If any other codes besides P0136, P0137 and/or P138 are output, perform the troubleshooting for those codes first.

B → **Go to step 9**

C → **Go to step 6**

A

2 READ VALUE OF HAND-HELD TESTER OR OBD II SCAN TOOL (OUTPUT VOLTAGE OF HEATED OXYGEN SENSOR)

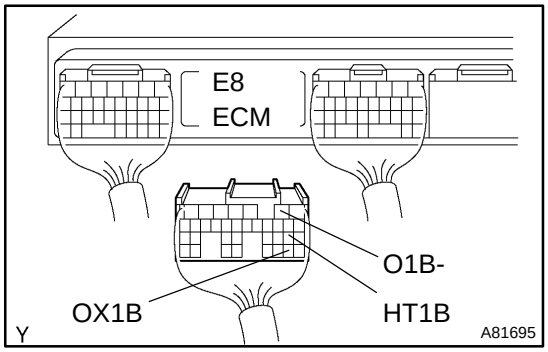
(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(b) Turn ON the ignition switch. Push the hand-held tester or the OBD II scan tool main switch ON.
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / O2S B1S2.
(d) Run the engine at idle.
(e) Read the output voltage of the heated oxygen sensor during idling.

Heated oxygen sensor output voltage	Proceed to
More than 1.2 V	A
Less than 1.0 V	B

B → **READ OUTPUT DTC**

A

3 CHECK WIRE HARNESS (CHECK FOR SHORT)



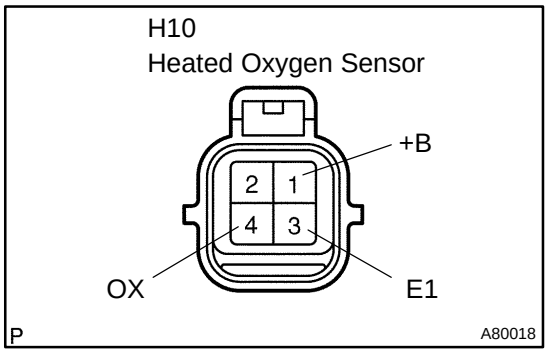
(a) Turn the ignition switch OFF and wait for 5 minutes.
(b) Disconnect the E8 ECM connector.
(c) Measure the resistance of the wire harness side connectors.
Standard:

Tester Connection	Specified Condition
E8-21 (HT1B) - E8-29 (OX1B)	10 kΩ or higher
E8-21 (HT1B) - E8-2 (O1B-)	10 kΩ or higher

OK → **REPLACE ECM (See page 10-9)**

NG

4 INSPECT HEATED OXYGEN SENSOR (CHECK FOR SHORT)



(a) Disconnect the H10 heated oxygen sensor connector.
(b) Measure the resistance of the sensor side connectors.
Standard:

Tester Connection	Specified Condition
H10-1 (+B) - H10-3 (E1)	10 kΩ or higher
H10-1 (+B) - H10-4 (OX)	10 kΩ or higher

OK → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

NG

REPLACE HEATED OXYGEN SENSOR

5 READ OUTPUT DTC (CHECK MODE)

(a) Change the ECM to check mode with the hand-held tester.
Enter the following menus: DIAGNOSIS / ENHANCED OBD II / CHECK MODE.
(b) Warm up the engine and drive the vehicle at over 25 mph (40 km/h) for an accumulated total of 10 minutes.

HINT:
The 10 minutes of driving should be driven in one instance, but it is not necessary to maintain a speed of 25 mph (40 km/h) for 10 minutes consecutively.

(c) Read the DTC.
Result:

Display (DTC output)	Proceed to
P0136 is output	A
No DTC	B

B → **CHECK FOR INTERMITTENT PROBLEMS (See page 05-9)**

A

REPLACE HEATED OXYGEN SENSOR

6 READ VALUE OF HAND-HELD TESTER OR OBD II SCAN TOOL (OUTPUT VOLTAGE OF HEATED OXYGEN SENSOR)

(a) After warming up the engine, run the engine at 2,500 rpm for 3 minutes.
(b) Read the output voltage of the heated oxygen sensor when the engine rpm is suddenly increased.

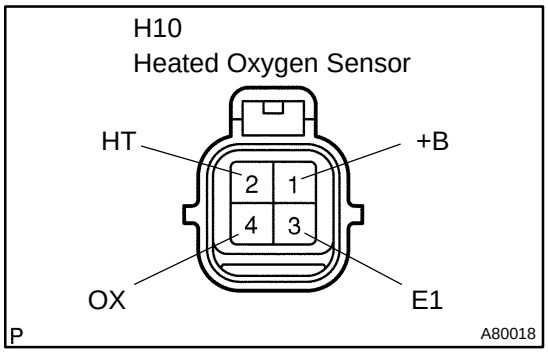
HINT:
Quickly accelerate the engine to 4,000 rpm 3 times by using the accelerator pedal.

Heated oxygen sensor output voltage: Alternates 0.4 V or less and 0.5 V or more.

OK → **Go to step 10**

NG

7 INSPECT HEATED OXYGEN SENSOR (HEATER RESISTANCE)



(a) Disconnect the H10 heated oxygen sensor connector.
(b) Measure the resistance of the heated oxygen sensor terminals.

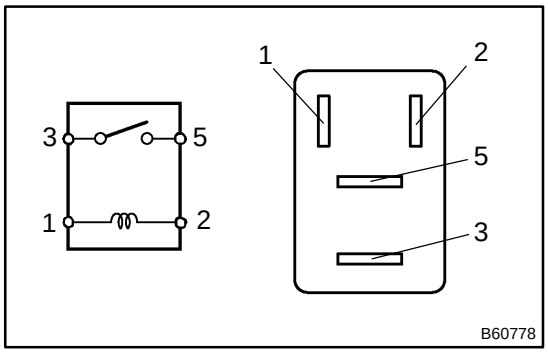
Standard:

Tester Connection	Condition	Specified Condition
H10-1 (+B) - H10-2 (HT)	20°C (68°F)	11 to 16 Ω
H10-1 (+B) - H10-2 (HT)	800°C (1,472°F)	23 to 32 Ω

NG → **REPLACE HEATED OXYGEN SENSOR**

OK

8 INSPECT RELAY (EFI)



(a) Remove the EFI relay from the engine room J/B.
(b) Measure the resistance of the EFI relay.

Standard:

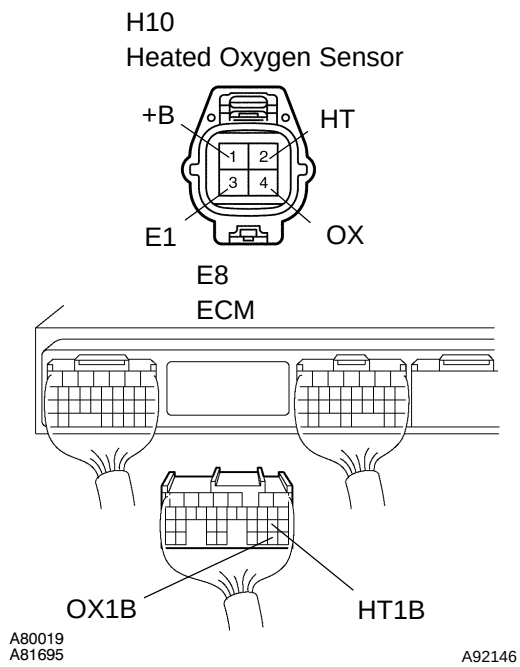
Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

NG → **REPLACE RELAY**

OK

9	CHECK WIRE HARNESS

Wire Harness Side

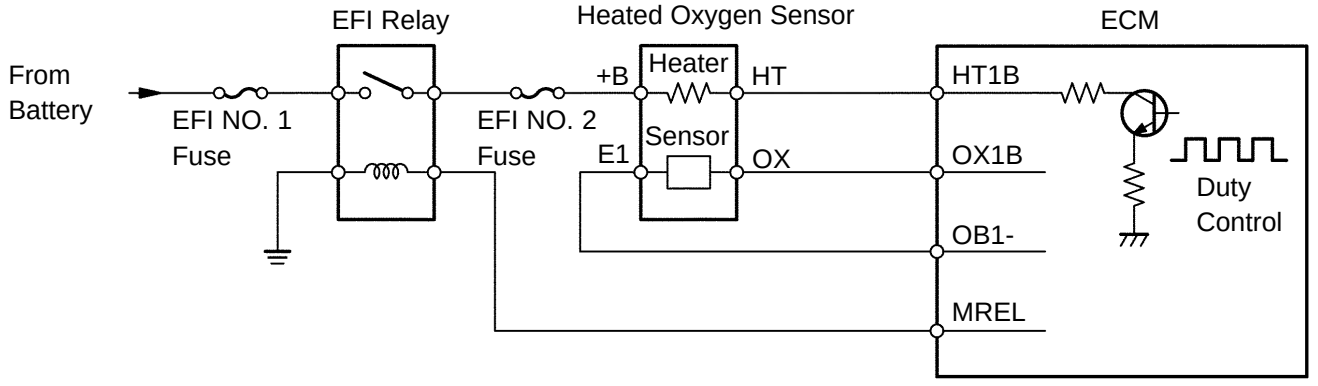


(a) Check the wire harness between the ECM and heated oxygen sensor.
  (1) Disconnect the H10 heated oxygen sensor connector.
  (2) Disconnect the E8 ECM connector.
  (3) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
H10-2 (HT) - E8-21 (HT1B) H10-4 (OX) - E8-29 (OX1B)	Below 1 Ω
H10-2 (HT) or E8-21 (HT1B) - Body ground H10-4 (OX) or E8-29 (OX1B) - Body ground	10 kΩ or higher

Reference (Bank 1 Sensor 2 System Drawing)



NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE HEATED OXYGEN SENSOR

10	PERFORM CONFIRMATION DRIVING PATTERN

HINT:
Clear all DTCs prior to performing the confirmation driving pattern.

GO

11	READ OUTPUT DTC (DTC P0136 IS OUTPUT AGAIN)

(a) Read the DTC using the hand-held tester or the OBD II scan tool.
Result:

Display (DTC Output)	Proceed to
P0136 is not output again	A
P0136 is output again	B

A → **CHECK FOR INTERMITTENT PROBLEMS**

B

12	REPLACE HEATED OXYGEN SENSOR

GO

13	PERFORM CONFIRMATION DRIVING PATTERN

HINT:
Clear all DTCs prior to performing the confirmation driving pattern.

GO

14	READ OUTPUT DTC (DTC P0136 IS OUTPUT AGAIN)

(a) Read the DTC using the hand-held tester or the OBD II scan tool.
Result:

Display (DTC Output)	Proceed to
P0136 is not output again	A
P0136 is output again	B

A → **REPAIR COMPLETED**

B

15	PERFORM ACTIVE TEST USING HAND-HELD TESTER

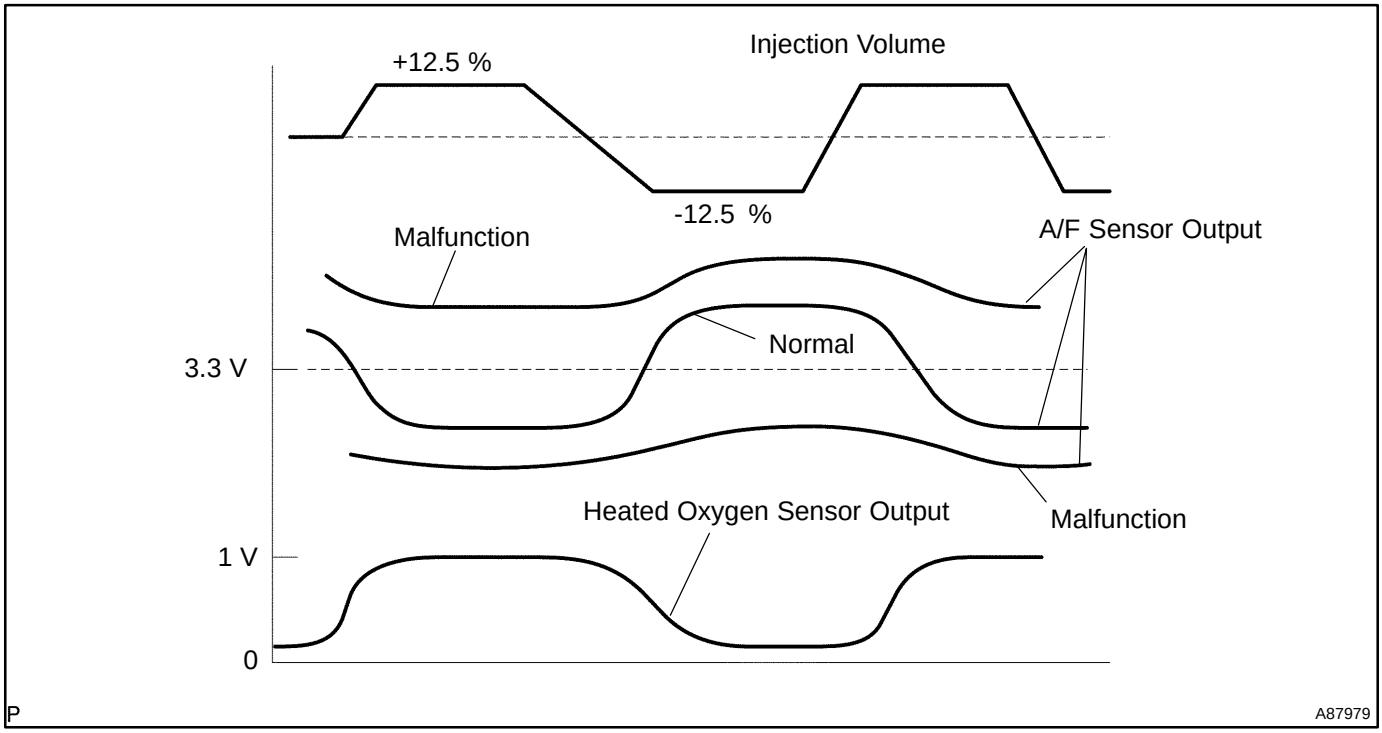
(a) Start the engine and warm it up.
(b) Connect the hand-held tester to the DLC3.
(c) Turn ON the ignition switch and the hand-held tester main switch.
(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / INJ VOL.
(e) Using the hand-held tester, change the injection volume to check the A/F sensor output and heated oxygen sensor output values below.

HINT:

Change the injection volume from -12.5 % to +12.5 %.

Result:

A/F sensor output remains more than 3.3 V or A/F sensor output remains less than 3.3 V (Heated oxygen sensor reacts in accordance with increase and decrease of injection volume)



OK → **REPLACE AIR FUEL RATIO SENSOR**

NG

CHECK AND REPLACE EXTREMLY RICH OR LEAN ACTUAL AIR FUEL RATIO (INJECTOR, FUEL PRESSURE, GAS LEAKAGE IN EXHAUST SYSTEM, ETC.)

DTC	P0171	SYSTEM TOO LEAN (BANK 1)

DTC	P0172	SYSTEM TOO RICH (BANK 1)

CIRCUIT DESCRIPTION

The fuel trim is related to the feedback compensation value, not to the basic injection time. The fuel trim includes the short-term fuel trim and the long-term fuel trim.

The short-term fuel trim is the short-term fuel compensation used to maintain the ideal stoichiometric air-fuel ratio. The signal from the A/F sensor indicates whether the air-fuel ratio is RICH or LEAN compared to the stoichiometric air-fuel ratio. This variance triggers a reduction in the fuel volume if the air-fuel ratio is RICH, and an increase in the fuel volume if it is LEAN.

The short-term fuel trim varies from the central value due to individual engine differences, wear over time and changes in the operating environment. The long-term fuel trim, which controls overall fuel compensation, steadies long-term deviations of the short-term fuel trim from the central value.

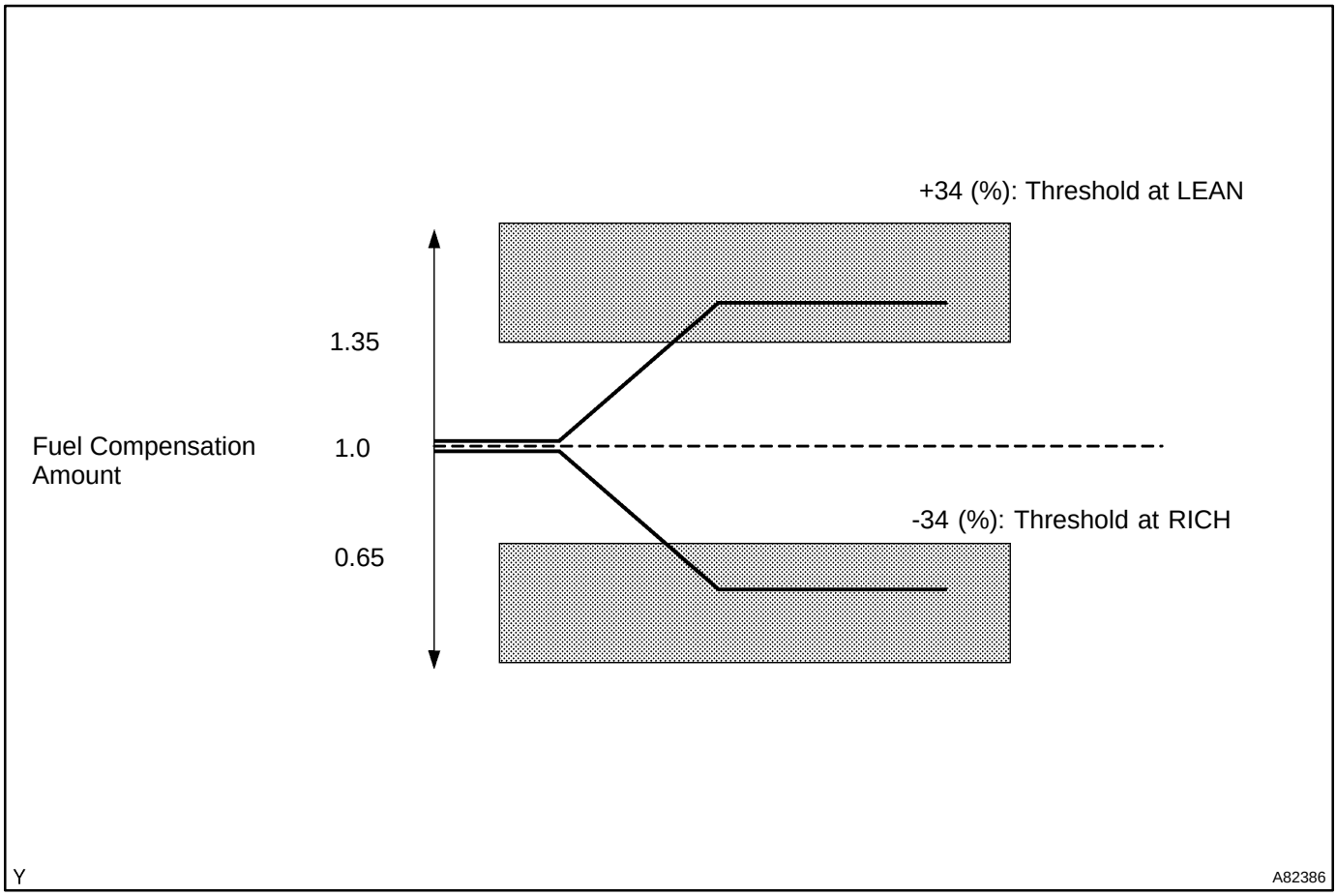
If both the short-term fuel trim and the long-term fuel trim are LEAN or RICH beyond a certain value, it is detected as a malfunction, the MIL is illuminated and a DTC is set.

DTC No.	DTC Detection Condition	Trouble Area
P0171	When air-fuel ratio feedback is stable after warming up engine, fuel trim is considerably in error on LEAN side (2 trip detection logic)	・Air induction system ・Injector blockage ・MAF meter ・ECT sensor ・Fuel pressure ・Gas leakage in exhaust system ・Open or short in A/F sensor (bank 1 sensor 1) circuit ・A/F sensor (bank 1 sensor 1) ・A/F sensor heater (bank 1 sensor 1) ・EFI relay ・Open or short in A/F sensor heater and EFI relay circuits ・PCV hose connection ・PCV hose
P0172	When air-fuel ratio feedback is stable after warming up engine, fuel trim is considerably in error on RICH side (2 trip detection logic)	・Injector leak, blockage ・MAF meter ・ECT sensor ・Ignition system ・Fuel pressure ・Gas leakage in exhaust system ・Open or short in A/F sensor (bank 1 sensor 1) circuit ・A/F sensor (bank 1 sensor 1) ・A/F sensor heater ・Open or short in A/F sensor heater and EFI relay circuits ・EFI relay

HINT:

- ・ When DTC P0171 is recorded, the actual air-fuel ratio is on the LEAN side. When DTC P0172 is recorded, the actual air-fuel ratio is on the RICH side.
- ・ If the vehicle runs out of fuel, the air-fuel ratio is LEAN and DTC P0171 is recorded. The MIL then illuminates.

MONITOR DESCRIPTION



Under closed-loop fuel control, fuel injection amounts that deviate from the ECM's estimated fuel amount will cause a change in the long-term fuel trim compensation value. This long-term fuel trim is adjusted when there are persistent deviations in the short-term fuel trim values. And, the deviation from the simulated fuel injection amount by the ECM affects the smoothed fuel trim learning value. The smoothed fuel trim learning value is the combination of smoothed short-term fuel trim (fuel feedback compensation value) and smoothed long-term fuel trim (learning value of the air-fuel ratio). When the smoothed fuel trim learning value exceeds the DTC threshold, the ECM interprets this as a fault in the fuel system and sets a DTC.
Example:
The smoothed fuel trim learning value is more than +34 % or less than -34 %. The ECM interprets this as a failure in the fuel system.

MONITOR STRATEGY

Related DTCs	P0171: Fuel System Lean P0172: Fuel System Rich
Required sensors/ components (Main)	Fuel system
Required sensors / components (Related)	A/F sensor, MAF meter, CKP sensor
Frequency of operation	Continuous
Duration	10 sec.
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever these DTCs are not present	See page 05-16
Fuel system status	Closed Loop
Battery voltage	11 V or more
Throttle position learning	Completed
Either of the following conditions is met:	Condition 1 or 2
1. Engine RPM	Less than 1,100 rpm
2. Intake air amount per revolution	0.22 g/rev or more

TYPICAL MALFUNCTION THRESHOLDS

Purge-cut	Excecuting
Either of the following conditions is met:	Condition 1 or 2
1. Average between short-term fuel trim and long-term fuel trim	34% or more (varies with ECT)
2. Average between short-term fuel trim and long-term fuel trim	-34% or less (varies with ECT)

WIRING DIAGRAM

Refer to DTC P2195 on page 05-269 .

INSPECTION PROCEDURE

HINT:

Hand-held tester only:

It is possible the malfunctioning area can be found using the ACTIVE TEST A/F CONTROL operation. The A/F CONTROL operation can determine if the A/F sensor, heated oxygen sensor or other potential trouble areas are malfunctioning or not.

(a) Perform the ACTIVE TEST A/F CONTROL operation.

HINT:

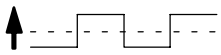
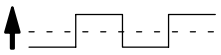
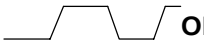
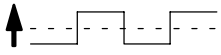
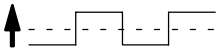
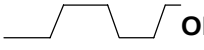
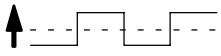
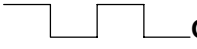
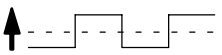
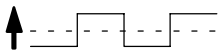
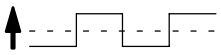
The A/F CONTROL operation lowers the injection volume by 12.5 % or increases the injection volume by 25 %.

(1) Connect the hand-held tester to the DLC3 on the vehicle.
(2) Turn the ignition switch ON.
(3) Warm up the engine by running the engine at 2,500 rpm for approximately 90 seconds.
(4) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL.
(5) Perform the A/F CONTROL operation with the engine idling (press the right or left button).

Result:

A/F sensor reacts in accordance with increase and decrease of injection volume:
+25 % → RICH output: Less than 3.0 V
-12.5 % → LEAN output: More than 3.35 V
Heated oxygen sensor reacts in accordance with increase and decrease of injection volume:
+25 % → RICH output: More than 0.55 V
-12.5 % → LEAN output: Less than 0.4 V

NOTICE:
The A/F sensor output has a few seconds of delay and the heated oxygen sensor output has about 20 seconds of delay at maximum.

	Output voltage of A/F sensor (sensor 1)	Output voltage of heated oxygen sensor (sensor 2)	Main suspect trouble area
Case 1	Injection volume +25 % -12.5 %  Output voltage More than 3.35 V Less than 3.0 V  **OK**	Injection volume +25 % -12.5 %  Output voltage More than 0.55 V Less than 0.4V  **OK**	—
Case 2	Injection volume +25 % -12.5 %  Output voltage Almost No reaction **NG**	Injection volume +25 % -12.5 %  Output voltage More than 0.55 V Less than 0.4V  **OK**	A/F sensor (A/F sensor, heater, A/F sensor circuit)
Case 3	Injection volume +25 % -12.5 %  Output voltage More than 3.35 V Less than 3.0V  **OK**	Injection volume +25 % -12.5 %  Output voltage Almost No reaction **NG**	Heated oxygen sensor (heated oxygen sensor, heater, heated oxygen sensor circuit)
Case 4	Injection volume +25 % -12.5 %  Output voltage Almost No reaction **NG**	Injection volume +25 % -12.5 %  Output voltage Almost No reaction **NG**	Extremely rich or lean actual air-fuel ratio (Injector, fuel pressure, gas leakage in exhaust system, etc.)

The following A/F CONTROL procedure enables a technician to check and graph the voltage outputs of both the A/F sensor and the heated oxygen sensor.
For displaying the graph, enter ”ACTIVE TEST / A/F CONTROL / USER DATA”, select ”AFS B1S1 and O2S B1S2” by pressing ”YES” and push ”ENTER”. Then press ”F4”.
HINT:

- Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.
- A high A/F sensor voltage could be caused by a RICH air fuel mixture. Check the conditions that might cause the engine to run with a RICH air fuel mixture.
- A low A/F sensor voltage could be caused by a LEAN air fuel mixture. Check the conditions that might cause the engine to run with a LEAN air fuel mixture.

1	CHECK AIR INDUCTION SYSTEM

(a) Check for vacuum leaks in air induction system.
OK: No vacuum leak.

NG → **REPAIR OR REPLACE AIR INDUCTION SYSTEM**

OK

2	CHECK CONNECTION OF PCV HOSE

OK: PCV hose is connected correctly and PCV hose is not damaged.

NG → **REPAIR OR REPLACE PCV HOSE**

OK

3	INSPECT FUEL INJECTOR ASSY (INJECTION AND VOLUME) (See page 11-4)

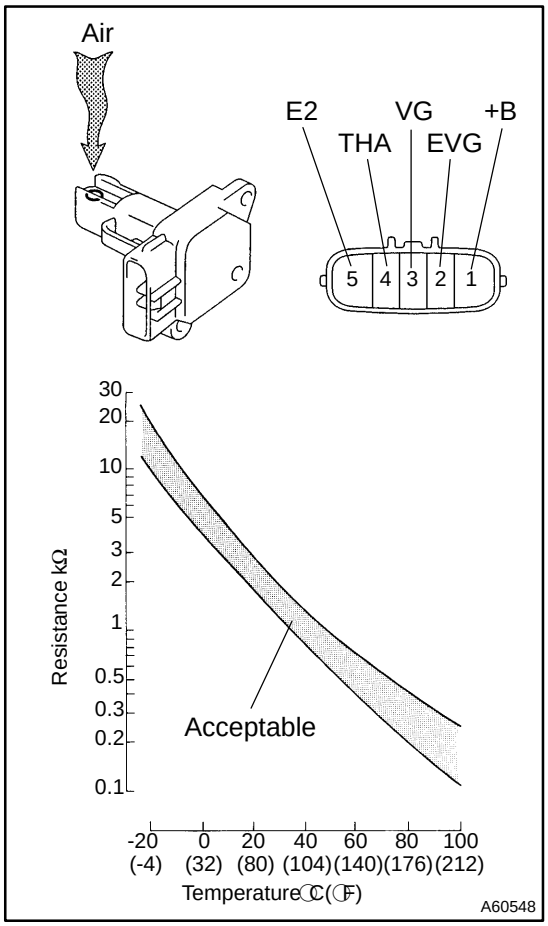
Standard:

Injection Volume	Difference Between Each Injector
76 to 91 cm^3 (4.6 to 5.5 cu in.) / 15 seconds	15 cm^3 (0.9 cu in.) or less

NG → **REPLACE FUEL INJECTOR ASSY (See page 11-10)**

OK

4 INSPECT MASS AIR FLOW METER



(a) Remove the MAF meter.

(b) Check the output voltage.

(1) Apply battery voltage across terminals +B and EVG.

(2) Connect the positive (+) tester probe to terminal VG, and negative (-) tester probe to terminal EVG.

(3) Blow air into the MAF meter, and check that the voltage fluctuates.

(c) Measure the resistance of the IAT terminals.

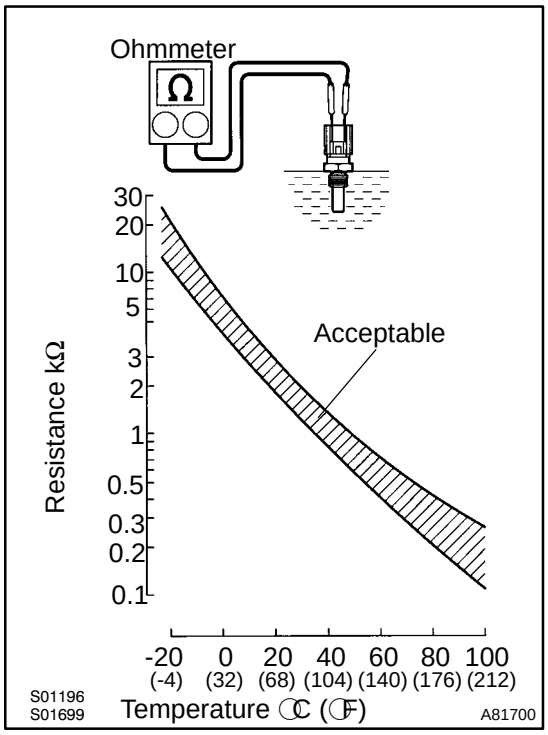
Standard:

Tester Connection	Condition	Specified Condition
4 (THA) - 5 (E2)	-20℃ (-4℉)	13.6 to 18.4 kΩ
4 (THA) - 5 (E2)	20℃ (68℉)	2.21 to 2.69 kΩ
4 (THA) - 5 (E2)	60℃ (140℉)	0.49 to 0.67 kΩ

NG → **REPLACE MASS AIR FLOW METER**

OK

5 INSPECT ENGINE COOLANT TEMPERATURE SENSOR (RESISTANCE)



(a) Remove the ECT sensor.

(b) Measure the resistance of the ECT sensor terminals.

Standard:

Tester Connection	Condition	Specified Condition
1 - 2	20℃ (68℉)	2.32 to 2.59 kΩ
1 - 2	80℃ (176℉)	0.310 to 0.326 kΩ

NOTICE:

When checking the ECT sensor in water, be careful not to allow water to go into the terminals. After the check, dry the sensor.

HINT:

Alternate procedure: Connect an ohmmeter to the installed ECT sensor and read the resistance. Use an infrared thermometer to measure the engine temperature in the immediate vicinity of the sensor. Compare these values to the resistance/temperature graph. Change the engine temperature (warm up or allow to cool down) and repeat the test.

NG → **REPLACE ENGINE COOLANT TEMPERATURE SENSOR**

OK

6 CHECK FOR SPARK AND IGNITION (See page 18-1)

OK: Spark occurs.

NG → **REPAIR OR REPLACE**

OK

7 CHECK FUEL PRESSURE (See page 11-4)

(a) Check the fuel pressure (high or low pressure).

Standard:

Item	Specified Condition
Fuel pressure	304 to 343 kPa (3.1 to 3.5 kgf/cm^2, 44 to 55 psi)

NG → **REPLACE FUEL SYSTEM**

OK

8	CHECK FOR EXHAUST GAS LEAKS

OK: No gas leak.

NG → **REPAIR OR REPLACE EXHAUST GAS LEAKAGE POINT (See page 15-2)**

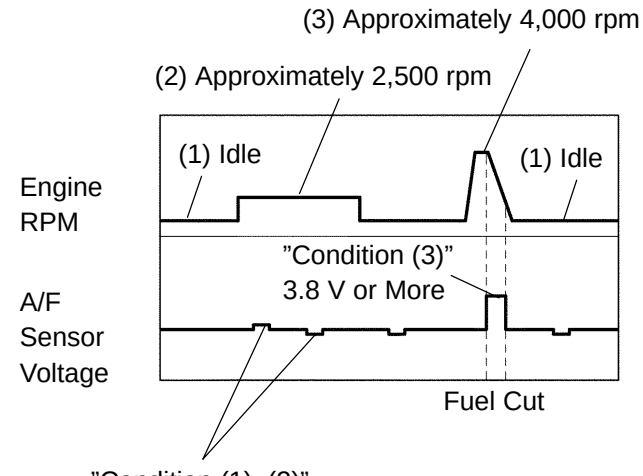
OK

9	READ VALUE OF HAND-HELD TESTER OR OBD II SCAN TOOL (OUTPUT VOLTAGE OF AIR FUEL RATIO SENSOR (BANK 1 SENSOR 1))

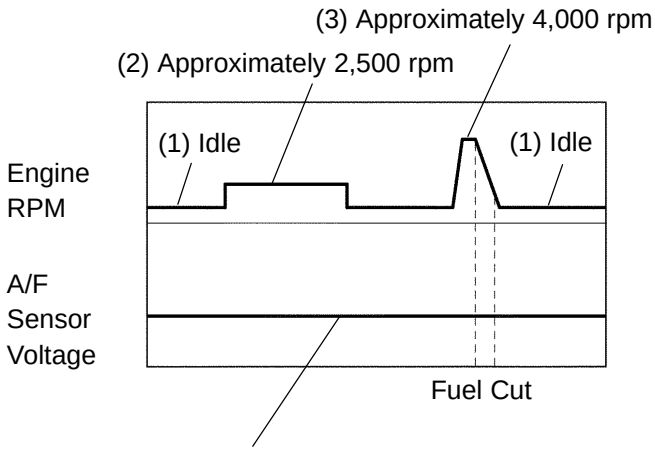
(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(b) Warm up the A/F sensor (bank 1 sensor 1) by running the engine at 2,500 rpm for approximately 90 seconds.
(c) Read A/F sensor voltage output on the hand-held tester or the OBD II scan tool.
(d) Hand-held tester only:
Enter the following menus: ENHANCED OBD II / SNAPSHOT / MANUAL SNAPSHOT / USER DATA.
(e) Select ”AFS B1 S1 / ENGINE SPD” and press YES.
(f) Monitor the A/F sensor voltage carefully.
(g) Check the A/F sensor voltage output under the following conditions:
(1) Allow the engine to idle for 30 seconds.
(2) Running the engine at approximately 2,500 rpm (where engine RPM is not suddenly changed).
(3) Raise the engine speed to 4,000 rpm and quickly release the accelerator pedal so that the throttle is fully closed.

Standard:
Condition (1) and (2)
Voltage change of 3.3 V (0.66 V)* (between approximately 3.1 to 3.5 V), as shown in the illustration.
Condition (3)
A/F sensor voltage increases to 3.8 V (0.76 V)* or more when fuel is cut during engine deceleration, as shown in the illustration.
***: Voltage when using the OBD II scan tool.**

Normal Condition



Malfunction Condition



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A72304

HINT:

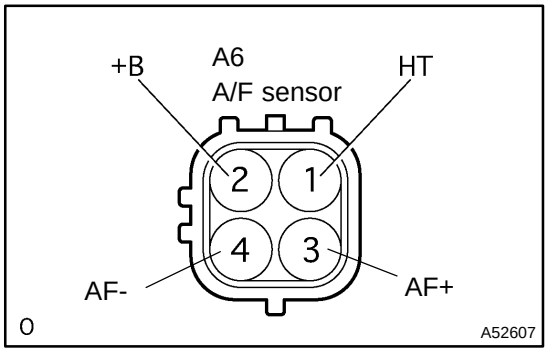
- Whenever the output voltage of the A/F sensor remains at approximately 3.3 V (0.660 V)* (see ”Malfunction Condition” graphic) under any condition as well as the above conditions, the A/F sensor may have an open circuit (this will happen also when the A/F sensor heater has an open circuit).
- Whenever the output voltage of the A/F sensor remains at a certain value of approximately 3.8 V (0.76 V)* or more, or 2.8 V (0.56 V)* or less (see ”Malfunction Condition” graphic) under any condition as well as the above conditions, the A/F sensor may have a short circuit.
- The ECM will stop fuel injection (fuel cut) during engine deceleration. This will cause a LEAN condition and should result in a momentary increase in A/F sensor voltage output.
- The ECM must establish a closed throttle position learned value to perform fuel cut. If the battery terminal has been disconnected, the vehicle must be driven over 10 mph (16 km/h) to allow the ECM to learn the closed throttle position.
- When the vehicle is driven:
  You may notice that the output voltage of the A/F sensor is below 2.8 V (0.76 V)* during fuel enrichment. For example, when the vehicle tries to overtake another vehicle on a highway, the vehicle speed is suddenly increased with the accelerator pedal fully depressed. The A/F sensor is functioning normally.
- The A/F sensor is a current output element, and therefore the current is converted into voltage inside the ECM. If measuring voltage at connectors of A/F sensor or ECM, you will observe a constant voltage.

*: Voltage when using the OBD II scan tool.

OK	**Go to step 17**

NG

10 INSPECT AIR FUEL RATIO SENSOR (HEATER RESISTANCE)



(a) Disconnect the A6 A/F sensor connector.

(b) Measure the resistance of the A/F sensor terminals.

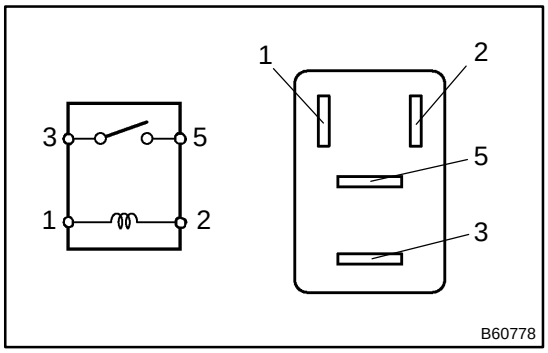
Standard:

Tester Connection	Condition	Specified Condition
1 (HT) - 2 (+B)	20°C (68°F)	1.8 to 3.4 Ω
1 (HT) - 4 (AF-)	-	10 kΩ or higher

NG	**REPLACE AIR FUEL RATIO SENSOR**

OK

11	INSPECT RELAY (EFI)



(a) Remove the EFI relay from the engine room J/B.
(b) Measure the resistance of the EFI relay.
Standard:

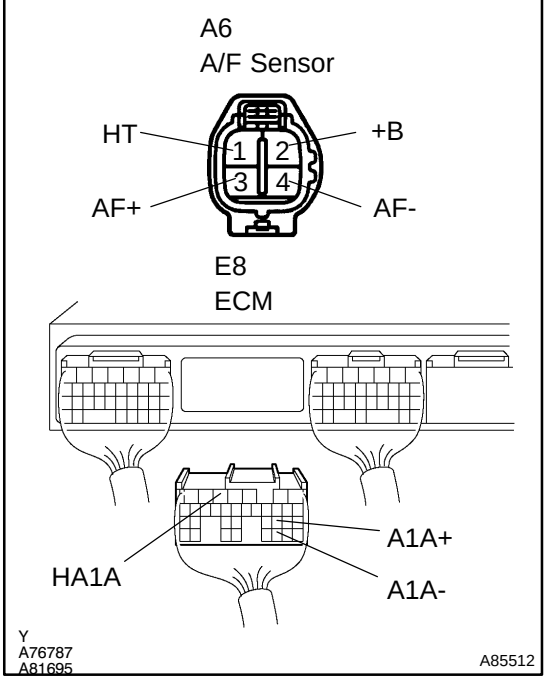
Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

NG → **REPLACE RELAY**

OK

12 CHECK WIRE HARNESS (A/F SENSOR - ECM)

Wire Harness Side

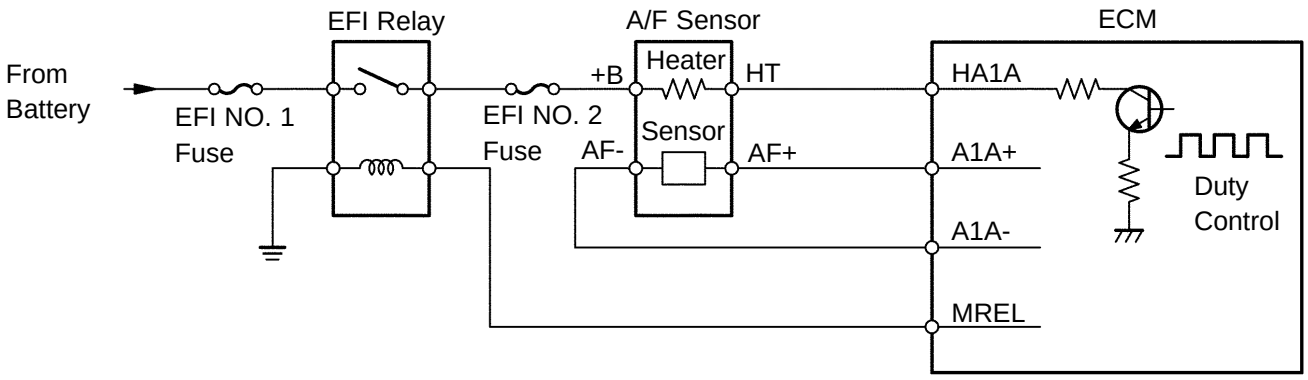


(a) Disconnect the A6 A/F sensor connector.
(b) Disconnect the E8 ECM connector.
(c) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
A6-3 (AF+) - E8-23 (A1A+) A6-4 (AF-) - E8-31 (A1A-) A6-1 (HT) - E8-5 (HA1A)	Below 1 Ω
A6-3 (AF+) or E8-23 (A1A+) - Body ground A6-4 (AF-) or E8-31 (A1A-) - Body ground A6-1 (HT) or E8-5 (HA1A) - Body ground	10 kΩ or higher

Reference (Bank 1 Sensor 1 System Drawing)



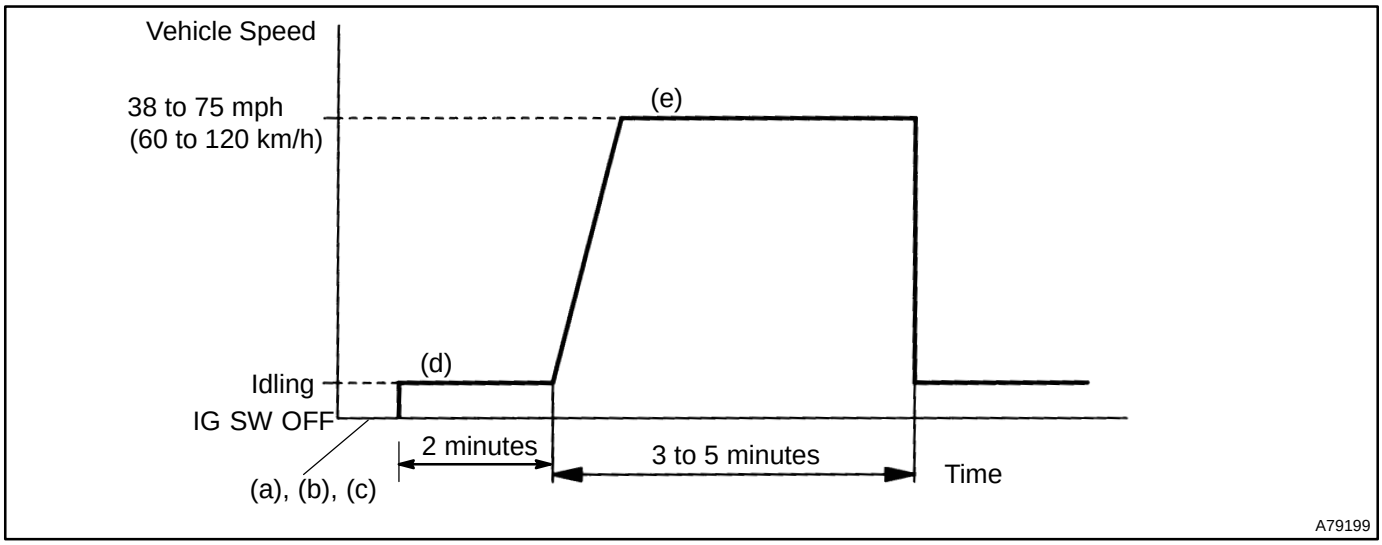
NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

13 REPLACE AIR FUEL RATIO SENSOR

GO

14	PERFORM CONFIRMATION DRIVING PATTERN



(a) Clear the DTCs.
  (1) Disconnect the battery cable or remove the EFI NO. 1 and ETCS fuses for 60 seconds or more.
(b) Connect the hand-held tester to the DLC3.
(c) Switch the hand-held tester from the normal mode to the check mode (see page 05-40).
(d) Start the engine and warm it up with all the accessory switches OFF.
(e) Drive the vehicle at 38 to 75 mph (60 to 120 km/h) and engine speed at 1,400 to 3,200 rpm for 3 to 5 minutes.

HINT:
If a malfunction exists, the MIL will be illuminated during step (e).

NOTICE:
If the conditions in this test are not strictly followed, detecting a malfunction may be difficult. If you do not have a hand-held tester, turn the ignition switch OFF after performing steps (d) to (e), and then do step (e) again.

GO

15	READ OUTPUT DTC (DTC P0171, P0172 ARE OUTPUT AGAIN)

(a) Read the DTC using the hand-held tester or the OBD II scan tool.
  Result:

Display (DTC Output)	Proceed to
DTC P0171, P0172 are not output again	A
DTC P0171, P0172 are output again	B

B → **REPLACE ECM (See page 10-9) AND PERFORM CONFIRMATION DRIVING PATTERN (Refer to step 14)**

A

16	CONFIRM IF VEHICLE HAS RUN OUT OF FUEL IN PAST

NO → CHECK FOR INTERMITTENT PROBLEMS (See page 05-9)

YES

DTC IS CAUSED BY RUNNING OUT OF FUEL (DTCS P0171, P0172)

17	PERFORM CONFIRMATION DRIVING PATTERN

HINT:
Clear all DTCs prior to performing the confirmation driving pattern (refer to step 14).

GO

18	READ OUTPUT DTC (DTC P0171, P0172 ARE OUTPUT AGAIN)

(a) Read the DTC using the hand-held tester or the OBD II scan tool.
Result:

Display (DTC Output)	Proceed to
DTC P0171, P0172 are output again	A
DTC P0171, P0172 are not output again	B

B → Go to step 22

A

19	REPLACE AIR FUEL RATIO SENSOR

GO

20	PERFORM CONFIRMATION DRIVING PATTERN

HINT:
Clear all DTCs prior to performing the confirmation driving pattern (refer to step 14).

GO

21	READ OUTPUT DTC (DTC P0171, P0172 ARE OUTPUT AGAIN)

(a) Read the DTC using the hand-held tester or the OBD II scan tool.
Result:

Display (DTC Output)	Proceed to
DTC P0171, P0172 are not output again	A
DTC P0171, P0172 are output again	B

B → **REPLACE ECM (See page 10-9) AND PERFORM CONFIRMATION DRIVING PATTERN (Refer to step 14)**

A

22	CONFIRM IF VEHICLE HAS RUN OUT OF FUEL IN PAST

NO → **CHECK FOR INTERMITTENT PROBLEMS (See page 05-9)**

YES

DTC IS CAUSED SHORTAGE OF FUEL (DTCS P0171, P0172)

DTC	P0300	RANDOM/MULTIPLE CYLINDER MISFIRE DETECTED

DTC	P0301	CYLINDER 1 MISFIRE DETECTED

DTC	P0302	CYLINDER 2 MISFIRE DETECTED

DTC	P0303	CYLINDER 3 MISFIRE DETECTED

DTC	P0304	CYLINDER 4 MISFIRE DETECTED

CIRCUIT DESCRIPTION

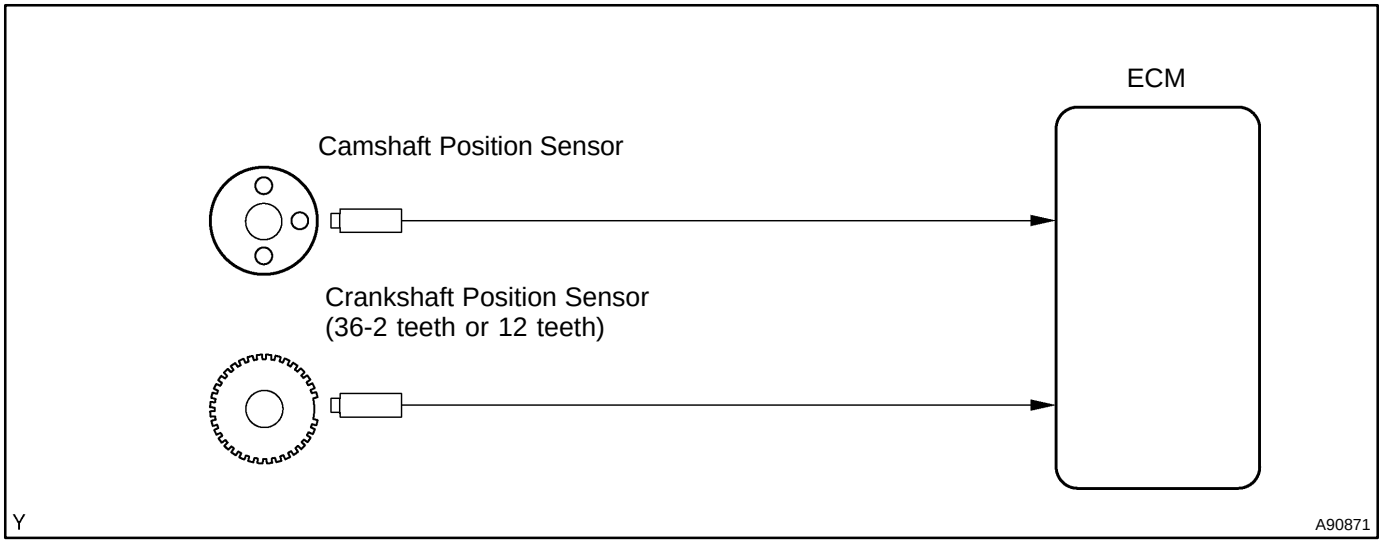
When a misfire occurs in the engine, hydrocarbons (HC) are output in high concentrations. If this HC concentration is high enough, there could be an increase in exhaust emission levels. High concentrations of HC can also cause the temperature of the catalyst to increase, possibly damaging the catalyst. To prevent increases in emissions and limit the possibility of thermal damage, the ECM monitors the misfire rate. When the temperature of the catalyst reaches a point of thermal degradation, the ECM will blink the MIL. For monitoring misfires, the ECM uses both the camshaft position sensor and the crankshaft position sensor. The camshaft position sensor is used to identify misfiring cylinders and the crankshaft position sensor is used to measure variations in the crankshaft rotation speed. A misfire is counted when crankshaft rotation speed variations exceed threshold values.

If the misfiring rate exceeds the threshold value and could cause emission deterioration, the ECM illuminates the MIL.

DTC No.	DTC Detection Condition	Trouble Area
P0300	Misfiring of random cylinders is detected	⋇Open or short in engine wire ⋇Connector connection ⋇Vacuum hose connection ⋇Ignition system ⋇Injector ⋇Fuel pressure ⋇MAF meter ⋇ECT sensor ⋇Compression pressure ⋇Valve clearance ⋇Valve timing ⋇PCV hose connection ⋇PCV hose ⋇ECM
P0301 P0302 P0303 P0304	Misfiring of each cylinder is detected	⋇Same as DTC No. P0300

HINT:
When several codes for a misfiring cylinder are recorded repeatedly but no random misfire code is recorded, the misfires have been detected and recorded at different times.

MONITOR DESCRIPTION



The ECM illuminates the MIL (2 trip detection logic) if:

- ⋇ The misfiring rate exceeds a threshold value and could cause emission deterioration.
- ⋇ During the first 1,000 engine revolutions after the engine starts, an excessive misfire rate (approximately 20 to 50 misfires per 1,000 engine revolutions) occurs 1 time.
- ⋇ After the first 1,000 engine revolutions after the engine starts, an excessive misfire rate (approximately 20 to 50 misfires per 1,000 engine revolutions) occurs 4 times.

The ECM blinks the MIL (MIL blinks immediately) if:

- ⋇ Within 200 engine revolutions at a high rpm, the threshold for ”percentage of misfire causing catalyst damage” is reached 1 time.
- ⋇ Within 200 engine revolutions at a normal rpm, the threshold for ”percentage of misfire causing catalyst damage” is reached 3 times. (for the 2nd trip, reaching the threshold once will cause the MIL to flash)

MONITOR STRATEGY

Related DTCs	P0300: Multiple cylinder misfire P0301: cylinder 1 misfire P0302: cylinder 2 misfire P0303: cylinder 3 misfire P0304: cylinder 4 misfire
Required sensors / components (Main)	Injector, ignition coil, spark plug
Required sensors / components (Related)	CKP, CMP, ECT, IAT and MAF meter
Frequency of operation	Continuous
Duration	1,000 revolutions: Emission-related-misfire 200 revolutions: Catalyst-damaged-misfire
MIL operation	2 driving cycles (MIL flashes immediately when Catalyst-damaged-misfire occurs)
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

All:

The monitor will run whenever these DTCs are not present	See page 05-16
Battery voltage	8 V or more
Throttle position learning	Completed
VVT system	Not operated by scan tool
Engine RPM	400 to 6,200 rpm
All of the following conditions are met:	Condition 1 and 2
1. Engine Coolant Temperature (ECT)	-10 °C (14 °F) or more
2. Either of the following conditions is met:	Condition (a) or (b)
(a) ECT at engine start	More than -7 °C (19.4 °F)
(b) ECT	More than 20 °C (68 °F)
Fuel-cut	OFF

Monitor Period of Emission-related-misfire:

First 1,000 revolutions after engine start, or check mode	Crankshaft 1,000 revolutions
Except above	Crankshaft 1,000 revolutions × 4

Monitor Period of Catalyst-damage-misfire (MIL blinks):

All of the following conditions 1, 2 and 3 met:	Crankshaft 200 revolutions
1. Driving cycles	1st
2. Check Mode	OFF
3. Engine RPM	Less than 3,800 rpm
Except above	Crankshaft 200 revolutions x 3

TYPICAL MALFUNCTION THRESHOLDS

Monitor Period of Emission-related-misfire:

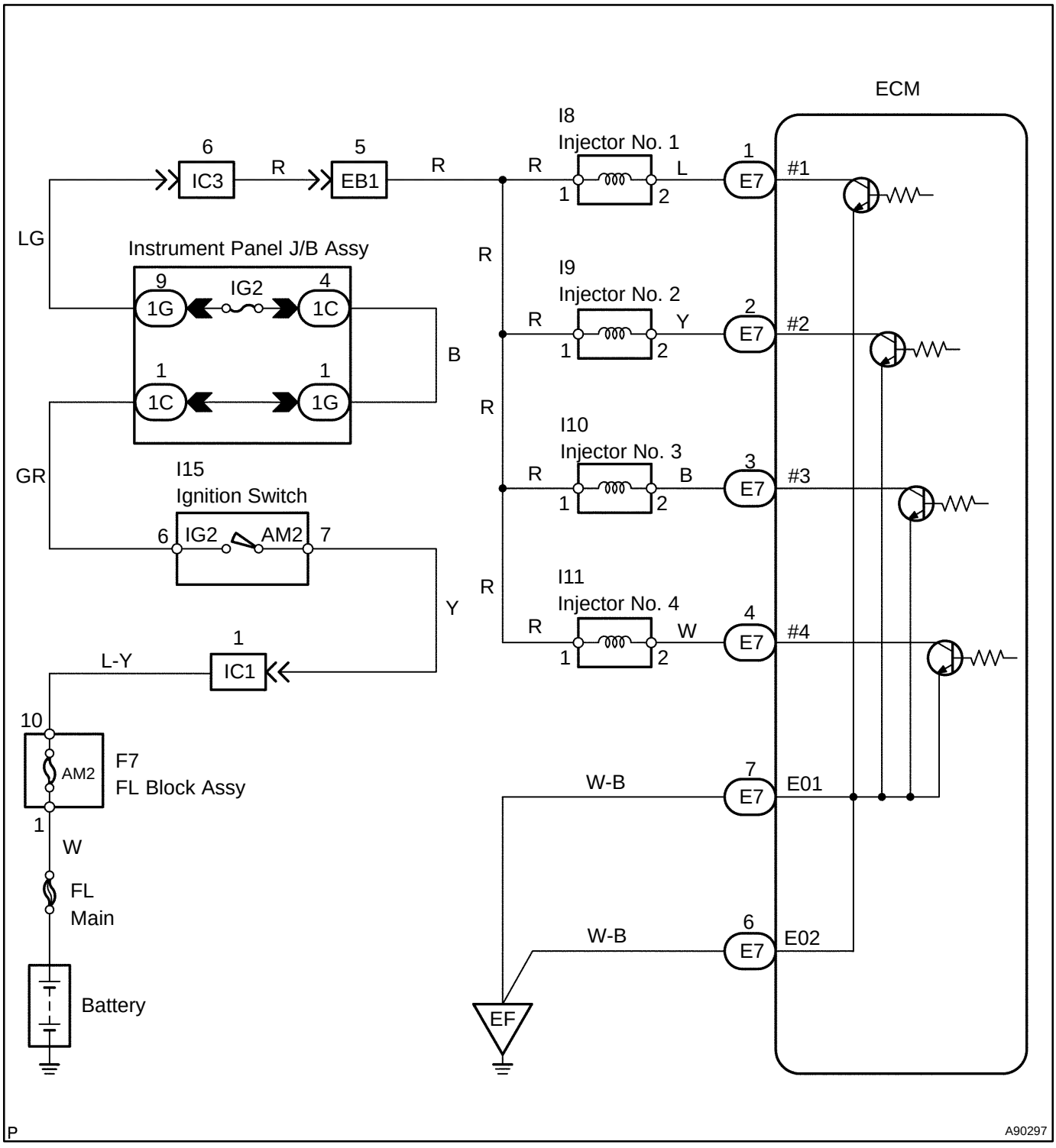
Misfire rate	4.0 % or more

Monitor Period of Catalyst-damage-misfire (MIL blinks):

Number of misfire per 200 revolutions	129 or more (varies with intake air amount and engine RPM)

WIRING DIAGRAM

Refer to DTC P0351 on page 05-174 for the wiring diagram of the ignition system.



CONFIRMATION DRIVING PATTERN

(a) Connect the hand-held tester to the DLC3.
(b) Record the DTCs, freeze frame data and misfire counter data.
(c) Set the hand-held tester to check mode (see page 05-40).
(d) Read the value on the misfire counter for each cylinder when idling. If the value is displayed on the misfire counter, skip the following procedure of confirmation driving.
(e) Drive the vehicle several times with the engine speed, load and its surrounding range shown with ENGINE SPD, CALC LOAD in the freeze frame data or MISFIRE RPM, MISFIRE LOAD in the DATA LIST.

If you have no hand-held tester, turn the ignition switch OFF after the symptom is simulated once. Then repeat the simulation process again.

HINT:

In order to memorize the misfire DTC, it is necessary to drive with MISFIRE RPM, MISFIRE LOAD in the DATA LIST for the period of time in the chart below. Take care not to turn the ignition switch OFF. Turning the ignition switch OFF switches the diagnosis system from check mode to normal mode and all DTCs, freeze frame data and other data are erased.

Engine Speed	Time
Idling	3 minutes 30 seconds or more
1,000 rpm	3 minutes or more
2,000 rpm	1 minute 30 seconds or more
3,000 rpm	1 minute or more

(f) Check if there is misfire or not by monitoring, DTC and the freeze frame data. Record the DTCs, freeze frame data and misfire counter data.
(g) Turn the ignition switch OFF and wait for at least 5 seconds.

INSPECTION PROCEDURE

HINT:

- If DTCs besides misfire DTCs are memorized simultaneously, troubleshoot the non-misfire DTCs first.
- Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.
- If the misfire does not occur when the vehicle is brought to the workshop, the misfire can be confirmed by reproducing the condition of the freeze frame data. Also, after finishing the repair, confirm that there is no misfire (see confirmation driving pattern).
- On 6 and 8 cylinder engines, cylinder specific misfire fault codes are disabled at high engine speeds. If the misfire starts in a high engine speed area or the misfire occurs only in a high engine speed area, only the general fault code P0300 will be stored.

  When only a general misfire fault code like P0300 is stored:

  (1) Erase the general misfire fault code from the ECM using the hand-held tester or OBD II scan tool.
  (2) Start the engine and drive the confirmation pattern.
  (3) Read the value of the misfire ratio for each cylinder. Or read the DTC.
  (4) Perform repairs on the cylinder that has a high misfire ratio. Or repair the cylinder indicated by the DTC.
  (5) After finishing repairs, drive the confirmation pattern again and confirm that no misfire occurs.
- When either of SHORT FT #1, LONG FT #1 in the freeze frame data is over the range of ±20 %, there is a possibility that the air-fuel ratio is becoming to RICH (-20 % or less) or LEAN (+20 % or more).
- When COOLANT TEMP in the freeze frame data is less than 80˚C (176˚F), there is a possibility of misfire only during engine warm-up.

* If the misfire cannot be reproduced, the following reasons may apply: 1) the vehicle has low fuel, 2) improper fuel is being used, and 3) the ignition plug is contaminated.
* Be sure to check the value on the misfire counter after the repair.

1	CHECK OTHER DTC OUTPUT (IN ADDITION TO MISFIRE DTCS)

(a) Read the DTC using the hand-held tester to the OBD II scan tool.
Result:

Display (DTC Output)	Proceed to
Only P0300, P0301, P0302, P0303, P0304 are output	A
P0300, P0301, P0302, P0303, P0304 and other DTCs are output	B

HINT:
If any other codes besides P0300, P0301, P0302, P0303, P0304 are output, perform the troubleshooting for those codes first.

B → **GO TO RELEVANT DTC CHART (See page 05-48)**

A

2	CHECK WIRE HARNESS, CONNECTOR AND VACUUM HOSE IN ENGINE ROOM

(a) Check the connection conditions of the wire harness and connector.
(b) Check for the disconnection, piping and break of the vacuum hose.
OK: Connected correctly and no damage on wire harness.

NG → **REPAIR OR REPLACE, THEN CONFIRM THAT THERE IS NO MISFIRE**

OK

3	CHECK CONNECTION OF PCV HOSE

OK: PCV hose is connected correctly and PCV hose has no damage.

NG → **REPAIR OR REPLACE PCV HOSE**

OK

4	READ VALUE OF HAND-HELD TESTER OR OBD II SCAN TOOL (NUMBER OF MISFIRE)

(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(b) Turn ON the ignition switch. Push the hand-held tester or the OBD II scan tool main switch ON.
(c) Start the engine.
(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / CYL#1 to CYL#4.
(e) Read the number of misfires on the hand-held tester or the OBD II scan tool.

HINT:
When a misfire is not reproduced, be sure to branch below based on the stored DTC.

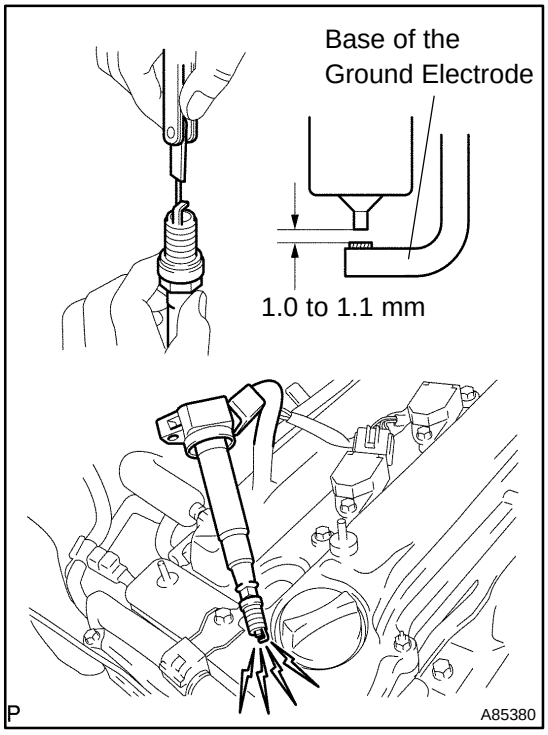
Result:

High Misfire Rate Cylinder	Proceed to
1 or 2 cylinders	A
More than 3 cylinders	B

B → **Go to step 15**

A

5	CHECK SPARK PLUG AND SPARK OF MISFIRING CYLINDER



(a) Remove the ignition coil.
(b) Remove the spark plug.
(c) Check the spark plug type.

Recommended spark plug:

DENSO made	SK20R11
NGK made	IFR6A11

(d) Measure the spark plug electrode gap.

Standard: 1.0 to 1.1 mm (0.039 to 0.043 in.)
Maximum: 1.3 mm (0.051 in.)

NOTICE:

If adjusting the gap of a new spark plug, bend only the base of the ground electrode. Do not touch the tip. Never attempt to adjust the gap on a used plug.

(e) Check the electrode for carbon deposits.
(f) Perform a spark test.

CAUTION:

Always disconnect each injector connector.

NOTICE:

Do not crank the engine for more than 2 seconds.

(1) Install the spark plug to the ignition coil and connect the ignition coil connector.
(2) Disconnect the injector connector.
(3) Ground the spark plug.
(4) Check if spark occurs while the engine is being cranked.

OK: Spark jumps across electrode gap.

OK → **Go to step 8**

NG

6	CHANGE NORMAL SPARK PLUG AND CHECK SPARK OF MISFIRING CYLINDER

(a) Change to a normal spark plug.
(b) Perform a spark test.

CAUTION:
Always disconnect each injector connector.
NOTICE:
Do not crank the engine for more than 2 seconds.

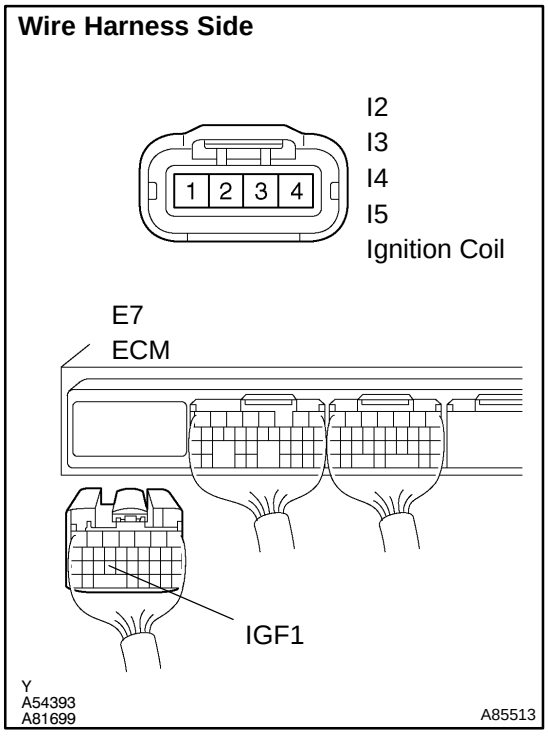
(1) Install the spark plug to the ignition coil and connect the ignition coil connector.
(2) Disconnect the injector connector.
(3) Ground the spark plug.
(4) Check if spark occurs while the engine is being cranked.

OK: Spark jumps across electrode gap.

OK → **REPLACE SPARK PLUG**

NG

7	CHECK WIRE HARNESS OF MISFIRING CYLINDER (IGNITION COIL - ECM)



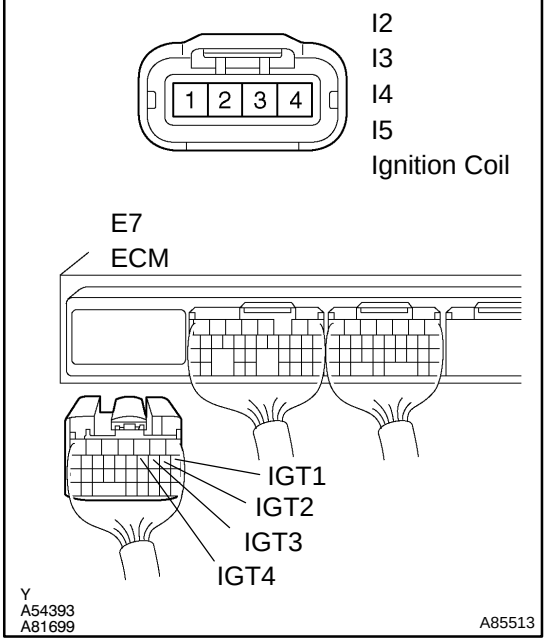
(a) Check the wire harness between the ignition coil and ECM.
(1) Disconnect the I2, I3, I4 and I5 ignition coil connectors.
(2) Disconnect the E7 ECM connector.
(3) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
I2-2 - E7-24 (IGF1) I3-2 - E7-24 (IGF1) I4-2 - E7-24 (IGF1) I5-2 - E7-24 (IGF1)	Below 1 Ω
I2-2 or E7-24 (IGF1) - Body ground I3-2 or E7-24 (IGF1) - Body ground I4-2 or E7-24 (IGF1) - Body ground I5-2 or E7-24 (IGF1) - Body ground	10 kΩ or higher

(4) Disconnect the I2, I3, I4 and I5 ignition coil connectors.

Wire Harness Side



(b) Check the wire harness between the ignition coil and ECM.
(1) Disconnect the I2, I3, I4 and I5 ignition coil connectors.
(2) Disconnect the E7 ECM connector.
(3) Measure the resistance of the wire harness side connectors.

Standard:

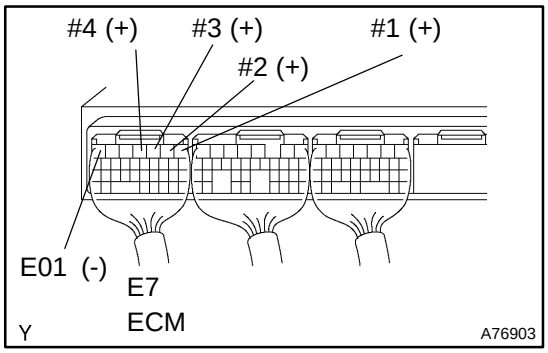
Tester Connection	Specified Condition
I2-3 - E7-8 (IGT1) I3-3 - E7-9 (IGT2) I4-3 - E7-10 (IGT3) I5-3 - E7-11 (IGT4)	Below 1 Ω
I2-3 or E7-8 (IGT1) - Body ground I3-3 or E7-9 (IGT2) - Body ground I4-3 or E7-10 (IGT3) - Body ground I5-3 or E7-11 (IGT4) - Body ground	10 kΩ or higher

OK → **REPLACE IGNITION COIL ASSY (THEN CONFIRM THAT THERE IS NO MISFIRE)**

NG

REPAIR OR REPLACE HARNESS AND CONNECTOR

8	INSPECT ECM TERMINAL OF MISFIRING CYLINDER (#1, #2, #3, #4 VOLTAGE)



(a) Turn the ignition switch ON.
(b) Measure the voltage of the ECM connectors.

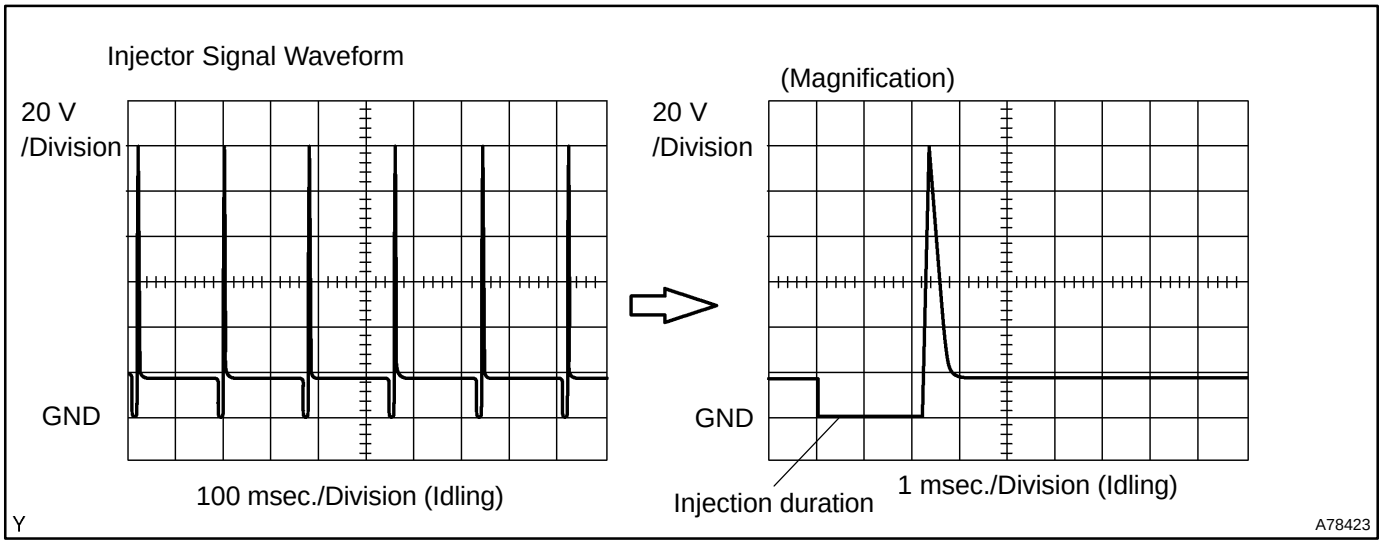
Standard:

Tester Connection	Specified Condition
E7-1 (#1) - E7-7 (E01) E7-2 (#2) - E7-7 (E01) E7-3 (#3) - E7-7 (E01) E7-4 (#4) - E7-7 (E01)	9 to 14 V

HINT:
Reference: Inspection using an oscilloscope.
Check the waveform of the ECM connectors.

Standard:

Tester Connection	Condition	Specified Condition
#1 to #4 - E01	Engine idling	Connect waveform is as shown



OK → **Go to step 11**

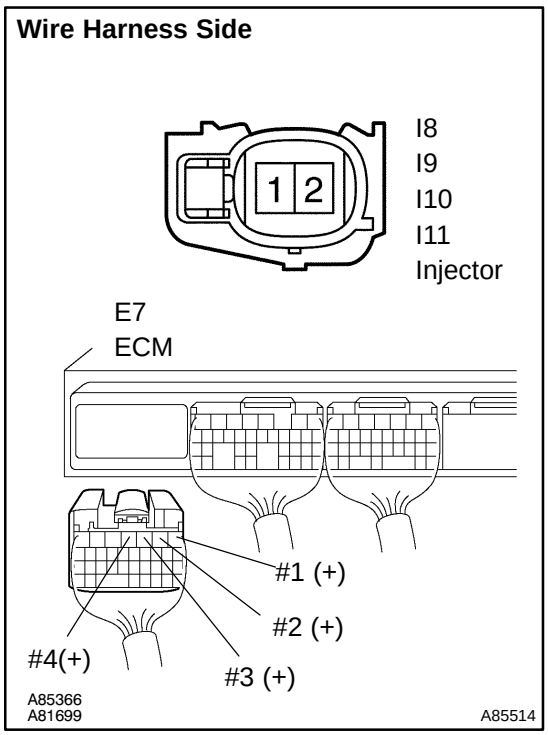
NG

9	INSPECT FUEL INJECTOR RESISTANCE OF MISFIRING CYLINDER (See page 11-7)

NG → **REPLACE FUEL INJECTOR ASSY (See page 11-10)**

OK

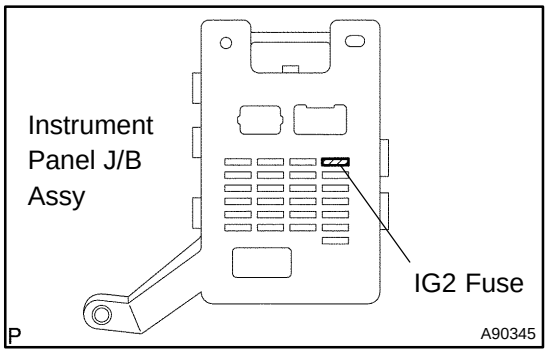
10	**CHECK WIRE HARNESS OF MISFIRING CYLINDER (INJECTOR - ECM, INJECTOR - IGNITION SWITCH)**



(a) Check the wire harness between the injector and ECM.
(1) Disconnect the I8, I9, I10 and I11 injector connectors.
(2) Disconnect the E7 ECM connector.
(3) Measure the resistance of the wire harness side connectors.

Standard:

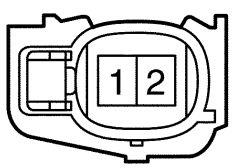
Tester Connection	Specified Condition
I8-1 - E7-1 (#1) I9-1 - E7-2 (#2) I10-1 - E7-3 (#3) I11-1 - E7-4 (#4)	Below 1 Ω
I8-1 or E7-1 (#1) - Body ground I9-1 or E7-2 (#2) - Body ground I10-1 or E7-3 (#3) - Body ground I11-1 or E7-4 (#4) - Body ground	10 kΩ or higher



(b) Check the IG2 fuse.
(1) Remove the IG2 fuse from the instrument panel J/B.
(2) Measure the resistance of the IG2 fuse.

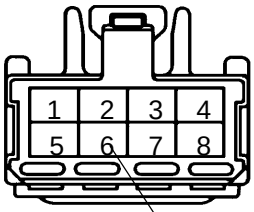
Standard: Below 1 Ω

Wire Harness Side



I8
I9
I10
I11
Injector

I15
Ignition Switch



A85366
A61075
A90538

(c) Check the wire harness between the injector and ignition switch.
(1) Disconnect the I8, I9, I10 and I11 injector connectors.
(2) Disconnect the I15 ignition switch connector.
(3) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
I8-2 - I15-6 (IG2) I9-2 - I15-6 (IG2) I10-2 - I15-6 (IG2) I11-2 - I15-6 (IG2)	Below 1 Ω
I8-2 or I15-6 (IG2) - Body ground I9-2 or I15-6 (IG2) - Body ground I10-2 or I15-6 (IG2) - Body ground I11-2 or I15-6 (IG2) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

11	**INSPECT FUEL INJECTOR INJECTION AND VOLUME OF MISFIRING CYLINDER (See page 11-7)**

Standard:

Injection Volume	Difference Between Each Injector
76 to 91 cm^3 (4.6 to 5.5 cu in.) / 15 seconds	15 cm^3 (0.9 cu in.) or less

NG → **REPLACE FUEL INJECTOR ASSY**

OK

12	**CHECK CYLINDER COMPRESSION PRESSURE OF MISFIRING CYLINDER (See page 14-1)**

Standard:

Item	Specified Condition
Compression pressure	1.360 MPa (13.9 kgf/cm^2, 198 psi)
Minimum pressure	0.98 MPa (10 kgf/cm^2, 142 psi)
Difference between each cylinder	0.1 MPa (1.0 kgf/cm^2, 14 psi)

NG → **REPAIR OR REPLACE**

OK

13	CHECK VALVE CLEARANCE OF MISFIRING CYLINDER (See page 14-6)

Standard (cold):

Item	Specified Condition
Intake	0.19 to 0.29 mm (0.0075 to 0.0114 in.)
Exhaust	0.30 to 0.40 mm (0.0118 to 0.0157 in.)

NG → **ADJUST VALVE CLEARANCE (See page 14-6)**

OK

14	SWITCH STEP BY NUMBER OF MISFIRE CYLINDER (REFER TO RESULTS OF STEP 4)

HINT:

- If the result of step 4 is ”1 or 2 cylinders”, proceed to A.
- If the result of step 4 is ”more than 3 cylinders”, proceed to B.

B → **CHECK FOR INTERMITTENT PROBLEMS (See page 05-9)**

A

15	CHECK VALVE TIMING (See page 14-68)

(a) Check for loose or jumped tooth of the timing chain.
OK: The matchmarks of the crankshaft pulley and camshaft pulley are alined.

NG → **ADJUST VALVE TIMING (See page 14-68)**

OK

16	CHECK FUEL PRESSURE (See page 11-4)

Standard:

Item	Specified Condition
Fuel pressure	304 to 343 kPa (3.1 to 3.5 kgf/cm^2, 44 to 55 psi)

NG → **CHECK AND REPLACE FUEL PUMP, PRESSURE REGULATOR, FUEL PIPE LINE AND FILTER**

OK

17	READ VALUE OF HAND-HELD TESTER OR OBD II SCAN TOOL (INTAKE AIR TEMPERATURE AND MASS AIR FLOW RATE)

(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(b) Turn the ignition switch ON.
(c) Check the intake air temperature.
  (1) On the hand-held tester or the OBD II scan tool, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / INTAKE AIR. Read the values.

Temperature: Equivalent to ambient temperature

(d) Check the air flow rate.
  (1) On the hand-held tester or the OBD II scan tool, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / MAF. Read the values.

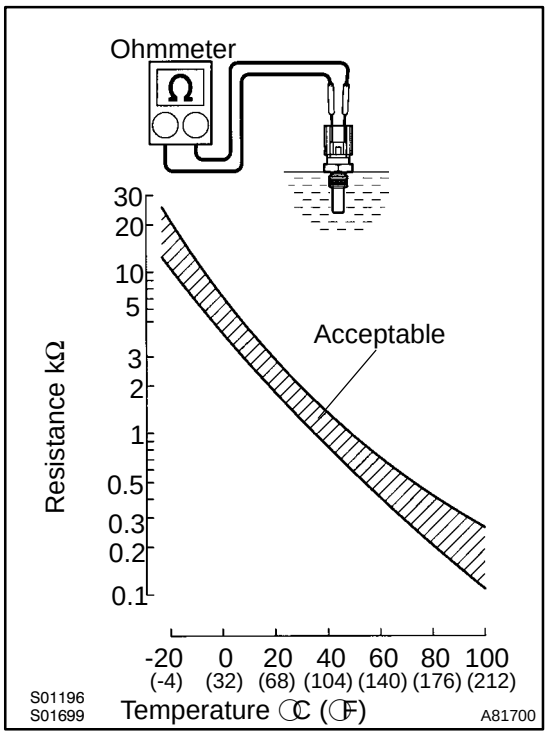
Standard:

Condition	Air Flow Rate (gm/s)
Ignition switch ON (do not start engine)	0
Idling	0.5 to 5
Running without load (2,500 rpm)	3 to 10
Idling to quickly accelerating	Air flow rate fluctuates

NG → **REPLACE MASS AIR FLOW METER**

OK

18	INSPECT ENGINE COOLANT TEMPERATURE SENSOR (RESISTANCE)



(a) Remove the ECT sensor.
(b) Measure the resistance between the terminals.

Standard:

Tester Connection	Condition	Specified Condition
1 - 2	20℃ (68℉)	2.32 to 2.59 kΩ
1 - 2	80℃ (176℉)	0.310 to 0.326 kΩ

NOTICE:

If checking the ECT sensor in water, be careful not to allow water to contact the terminals. After the check, dry the sensor.

HINT:

Alternate procedure: Connect an ohmmeter to the installed ECT sensor and read the resistance. Use an infrared thermometer to measure the engine temperature in the immediate vicinity of the sensor. Compare these values to the resistance/temperature graph. Change the engine temperature (warm up or allow to cool down) and repeat the test.

NG → **REPLACE ENGINE COOLANT TEMPERATURE SENSOR**

OK

19	**SWITCH STEP BY NUMBER OF MISFIRE CYLINDER (REFER TO RESULTS OF STEP 4)**

HINT:

- If the result of step 4 is ”1 or 2 cylinders”, proceed to A.
- If the result of step 4 is ”more than 3 cylinders”, proceed to B.

B → **AGAIN GO TO STEP 5**

A

CHECK FOR INTERMITTENT PROBLEMS (See page 05-9)

DTC	P0325	KNOCK SENSOR 1 CIRCUIT (BANK 1 OR SINGLE SENSOR)

DTC	P0327	KNOCK SENSOR 1 CIRCUIT LOW INPUT (BANK 1 OR SINGLE SENSOR)

DTC	P0328	KNOCK SENSOR 1 CIRCUIT HIGH INPUT (BANK 1 OR SINGLE SENSOR)

CIRCUIT DESCRIPTION

A flat type knock sensor (non-resonant type) can detect vibrations in a wide band of frequency (about 6 kHz to 15 kHz) and has the following features:

- Knock sensors is fitted on the cylinder block to detect the engine knocking.
- The sensor contains a piezoelectric element which generates a voltage when the cylinder block vibrates. If engine knocking occurs, the ignition timing is retarded to suppress it.

DTC No.	DTC Detection Condition	Trouble Area
P0325	Open or short in knock sensor circuit (1 trip detection logic)	·Open or short in knock sensor circuit ·Knock sensor ·ECM
P0327	Output voltage of the knock sensor is 0.5 V or less (1 trip detection logic)	·Short in knock sensor circuit ·Knock sensor ·ECM
P0328	Output voltage of the knock sensor is 4.5 V or more (1 trip detection logic)	·Open in knock sensor circuit ·Knock sensor ·ECM

HINT:

If the ECM detects the DTC P0325, it enters the fail-safe mode in which the corrective retarded angle value is set to the maximum value.

MONITOR DESCRIPTION

The knock sensor, located on the cylinder block, detects spark knock. When a spark knock occurs, the sensor vibrates in a specific frequency range. When the ECM detects the voltage in this frequency range, it retards the ignition timing to suppress the spark knock.

The ECM also senses background engine noise with the knock sensor and uses this noise to check for faults in the sensor. If the knock sensor signal level is too low for more than 10 seconds, and if the knock sensor output voltage is out of normal range, the ECM interprets this as a fault in the knock sensor and sets a DTC.

MONITOR STRATEGY

Related DTCs	P0325: Knock sensor range check (chattering) P0327: Knock sensor range check (low voltage) P0328: Knock sensor range check (high voltage)
Required sensors / components (Main)	Knock sensor
Required sensors / components (Related)	MAF meter, CKP sensor, ECT sensor
Frequency of operation	Continuous
Duration	1 sec.
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever these DTCs are not present	See page 05-16
Battery voltage	10.5 V or more
Time after engine start	5 sec. or more

TYPICAL MALFUNCTION THRESHOLDS

Knock Sensor Range Check (Chattering) P0325:

Knock sensor voltage	Less than 0.5 V, or more than 4.5 V

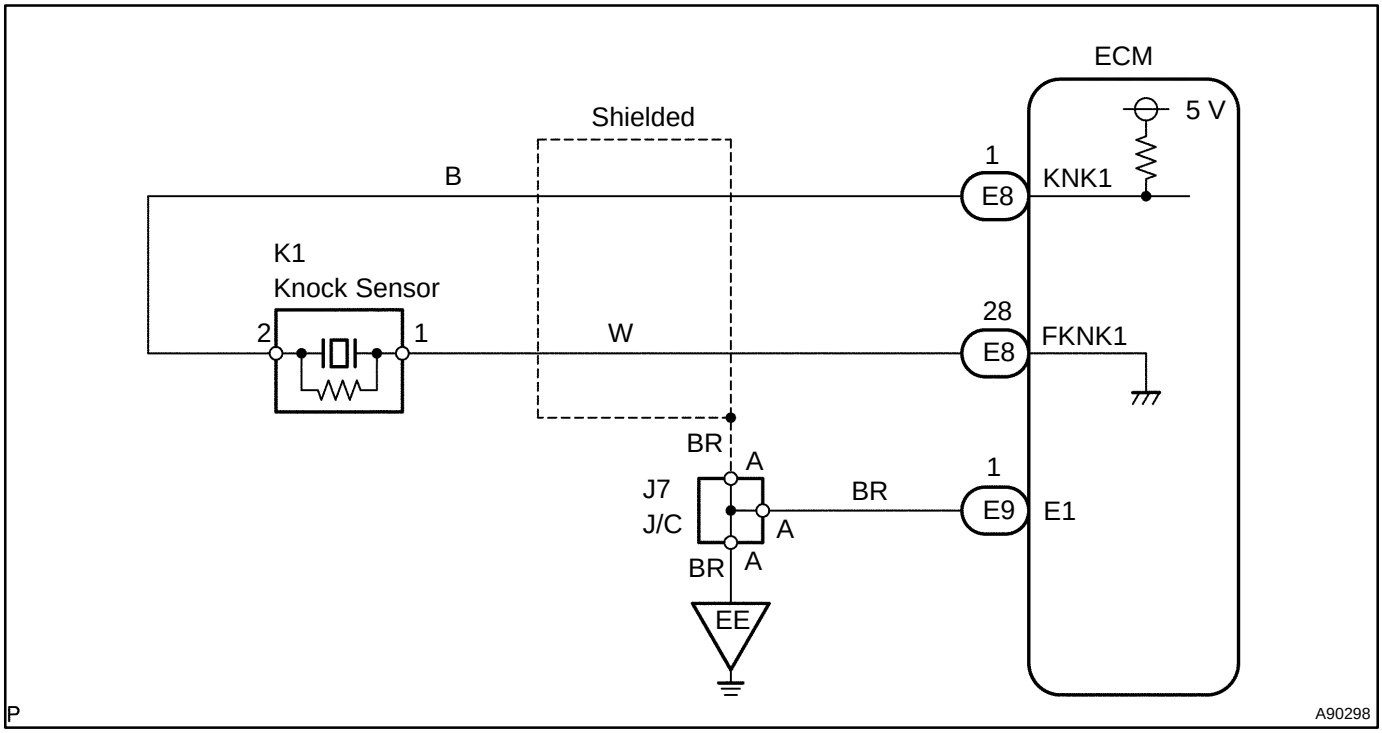
Knock Sensor Range Check (Low voltage) P0327:

Knock sensor voltage	Less than 0.5 V

Knock Sensor Range Check (High voltage) P0328:

Knock sensor voltage	More than 4.5 V

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	READ OUTPUT DTC

(a) Clear the DTC (see page 05-38).
(b) Warm up the engine.
(c) Run the engine at 3,000 rpm for 10 seconds or more.
(d) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(e) Turn ON the ignition switch. Push the hand-held tester or the OBD II scan tool main switch ON.
(f) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(g) Read the DTC.

Result:

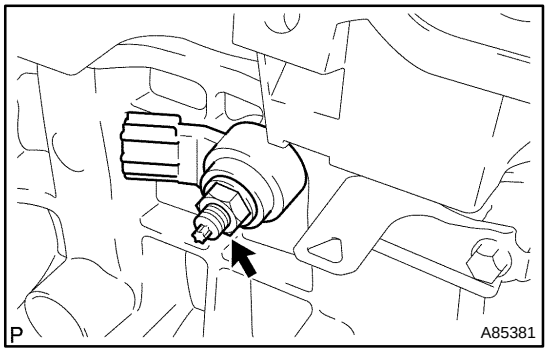
Display (DTC output)	Proceed to
Only P0325 is output again	A
P0325, P0327 and/or P0328 are output again	B
P0325, P0327 and/or P0328 are not output again	C

B → **Go to step 3**

C → **CHECK FOR INTERMITTENT PROBLEMS (See page 05-9)**

A

2	INSPECT KNOCK SENSOR



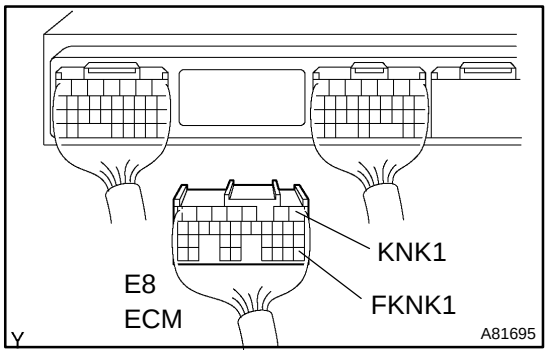
(a) Check the knock sensor installation.
OK: Torque is 20 N·m (204 kgf·cm, 15 ft·lbf)

NG → **TIGHTEN SENSOR**

OK

REPLACE KNOCK SENSOR

3 CHECK WIRE HARNESS (ECM - KNOCK SENSOR)



(a) Disconnect the E8 ECM connector.
(b) Measure the resistance of the wire harness side connector.

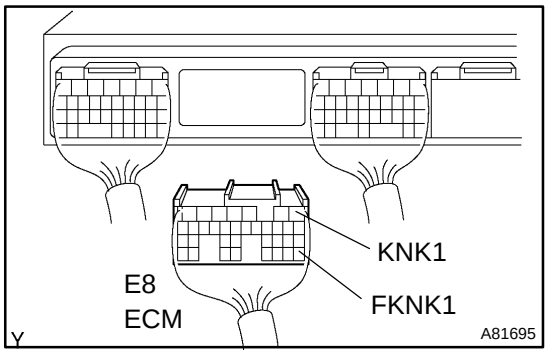
Standard:

Tester Connection	Condition	Specified Condition
E8-1 (KNK1) - E8-28 (FKNK1)	20°C (68°F)	120 to 280 kΩ

NG → **Go to step 5**

OK

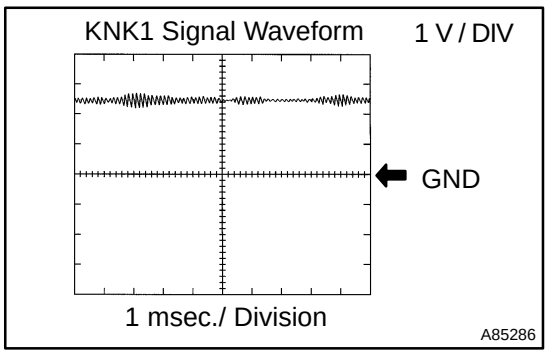
4 INSPECT ECM (KNK1 VOLTAGE)



(a) Disconnect the E8 ECM connector.
(b) Turn the ignition switch ON.
(c) Measure the voltage of the ECM terminals.

Voltage:

Tester Connection	Specified Condition
E8-1 (KNK1) - E8-28 (FKNK1)	4.5 to 5.5 V



HINT:
Reference: Inspection using an oscilloscope.
After warming up, run the engine at 4,000 rpm. Check the waveform between terminal KNK1 and FKNK1 of the ECM connector.

Standard:

Tester Connection	Specified Condition
E8-1 (KNK1) - E8-28 (FKNK1)	Correct waveform is as shown

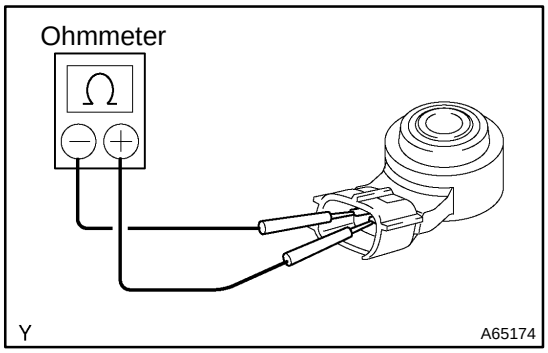
NG → **REPLACE ECM (See Page 10-9)**

OK

CHECK FOR INTERMITTENT PROBLEMS

NOTICE:
Fault may be intermittent. Check the harness and connectors carefully.

5	INSPECT KNOCK SENSOR



(a) Remove the knock sensor.
(b) Measure the resistance between the terminals.
OK: Resistance is 120 to 280 kΩ at 20°C (68°F)

NG → **REPLACE KNOCK SENSOR**

OK

REPAIR OR REPLACE HARNESS AND CONNECTOR

DTC	P0335	CRANKSHAFT POSITION SENSOR ”A” CIRCUIT

DTC	P0339	CRANKSHAFT POSITION SENSOR ”A” CIRCUIT INTERMITTENT

CIRCUIT DESCRIPTION

The crankshaft position sensor (CKP) system consists of a crankshaft position sensor plate and a pickup coil.

The sensor plate has 34 teeth and is installed on the crankshaft. The pickup coil is made of an iron core and magnet. The sensor plate rotates and as each tooth passes through the pickup coil, a pulse signal is generated. The pickup coil generates 34 signals for each engine revolution. Based on these signals, the ECM calculates the crankshaft position and engine RPM. Using these calculations, the fuel injection time and ignition timing are controlled.

DTC No.	DTC Detection Condition	Trouble Area
P0335	・No crankshaft position sensor signal to ECM during cranking (2 trip detection logic) ・No crankshaft position sensor signal to ECM with engine speed 600 rpm or more (2 trip detection logic)	・Open or short in crankshaft position sensor circuit ・Crankshaft position sensor ・Signal plate (Crankshaft position sensor plate No. 1) ・ECM
P0339	No crankshaft position sensor signal is input to ECM for 0.05 seconds or more, and conditions (a), (b) and (c) are met: (a) Engine is at 1,000 rpm or more (b) STA signal is OFF (c) 3 seconds or more have elapsed after STA signal is switched from ON to OFF	・Same as DTC No. P0355

MONITOR DESCRIPTION

If there is no signal from the crankshaft sensor even though the engine is cranking, the ECM interprets this as a malfunction of the sensor.

MONITOR STRATEGY

Related DTCs	P0335: CKP sensor range check during cranking P0335: CKP sensor range check during engine running
Required sensors/ components (Main)	CKP (Crankshaft position) sensor
Required sensors / components (Related)	-
Frequency of operation	Continuous
Duration	4.7 sec.: CKP Sensor Range Check during Cranking 0.5 sec.: CKP Sensor Range Check during Engine Running
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever these DTCs are not present	See page 05-16

CKP Sensor Range Check during Cranking P0335:

Starter	ON
Minimum battery voltage while starter is ON	Less than 11 V

CKP Sensor Range Check during Engine Running P0335:

Engine RPM	600 rpm or more
Starter	OFF
Time after starter turns from ON to OFF	3 sec. or more

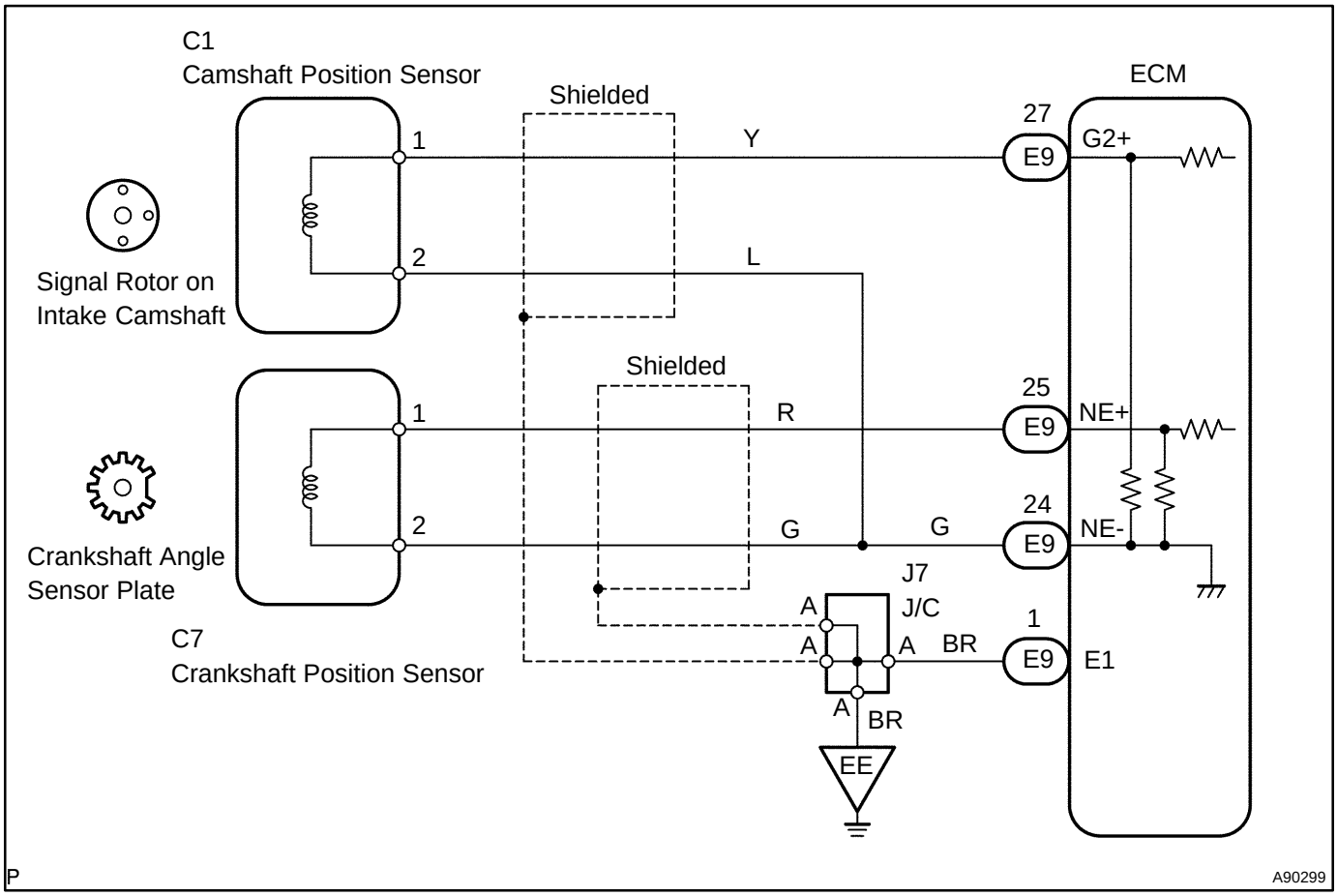
TYPICAL MALFUNCTION THRESHOLDS

CKP signal	No signal

COMPONENT OPERATING RANGE

CKP signal	CKP sensor voltage fluctuates when the crankshaft rotates 34 CKP signals per 1 revolution crankshaft

WIRING DIAGRAM

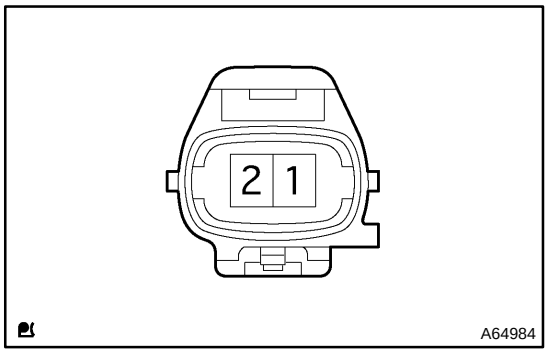


INSPECTION PROCEDURE

HINT:

- Read values on the hand-held tester or OBD II scan tool.
  (a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
  (b) Start the engine and push the hand-held tester or the OBD II scan tool main switch ON.
  (c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / ENGINE SPD.
- The engine speed can be confirmed in DATA LIST using the hand-held tester or OBD II scan tool. If there are no NE signals from the crankshaft position sensor despite the engine revolving, the engine speed will be indicated as zero. If voltage output of the crankshaft position sensor is insufficient, the engine speed will be indicated as lower than the actual rpm.
- Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1 INSPECT CRANKSHAFT POSITION SENSOR (RESISTANCE)



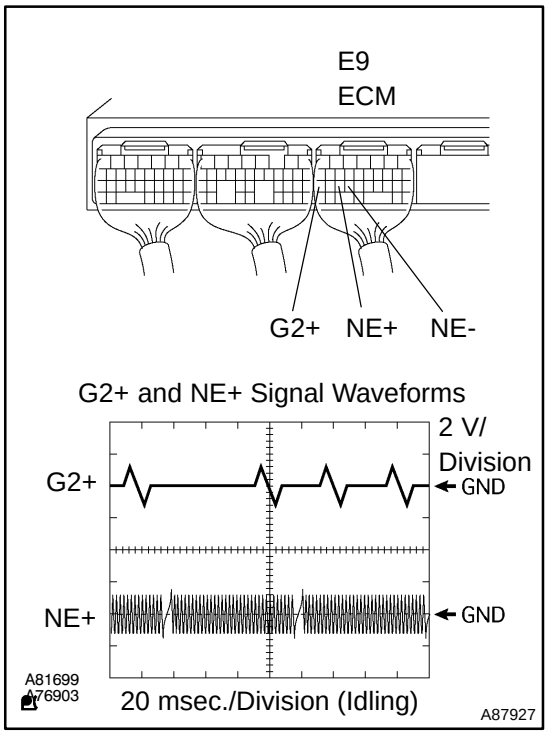
(a) Disconnect the C7 sensor connector.
(b) Measure the resistance between the terminals of the sensor.

Standard:

Tester Connection	Condition	Specified Condition
1 - 2	Cold	985 to 1,600 Ω
1 - 2	Hot	1,265 to 1,890 Ω

NOTICE:

In the above section, the terms "cold" and "hot" refer to the temperature of the coils. "Cold" means approximately -10 °C to 50 °C (14 °F to 122 °F). "Hot" means approximately 50 °C to 100 °C (122 °F to 212 °F).



HINT:

Reference: Inspection using an oscilloscope.

During cranking or idling, check the waveform between the terminals of the ECM connector.

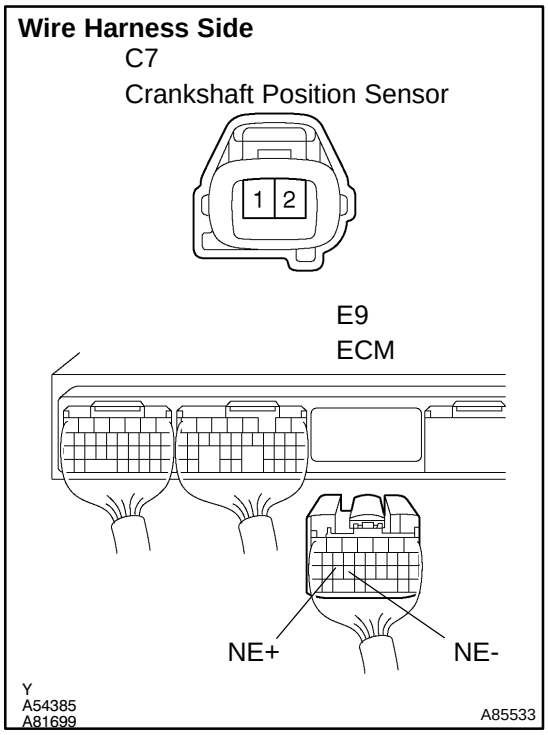
Standard:

Tester Connection	Specified Condition
E9-27 (G2+) - E9-24 (NE-) E9-25 (NE+) - E9-24 (NE-)	Correct waveform is as shown

NG → **REPLACE CRANKSHAFT POSITION SENSOR (See page 18-6)**

OK

2 CHECK WIRE HARNESS (CRANKSHAFT POSITION SENSOR - ECM)



(a) Disconnect the C7 sensor connector.
(b) Disconnect the E9 ECM connector.
(c) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
C7-1 - E9-25 (NE+) C7-2 - E9-24 (NE-)	Below 1 Ω
C7-1 or E9-25 (NE+) - Body ground C7-2 or E9-24 (NE-) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

3 CHECK SENSOR INSTALLATION (CRANKSHAFT POSITION SENSOR)

(a) Check the crankshaft position sensor installation.
OK: Sensor is installed correctly.

NG → **TIGHTEN SENSOR**

OK

4 INSPECT CRANKSHAFT POSITION SENSOR PLATE NO.1 (TEETH OF SIGNAL PLATE)

(a) Remove the crankshaft position sensor plate No. 1 (see page 14-41).
(b) Check the teeth of the signal plate.
OK: The pulley does not have any cracks or deformation.

NG → **REPLACE CRANKSHAFT POSITION SENSOR PLATE NO.1**

OK

REPLACE ECM (See page 10-9)

DTC	P0340	CAMSHAFT POSITION SENSOR ”A” CIRCUIT (BANK 1 OR SINGLE SENSOR)

DTC	P0341	CAMSHAFT POSITION SENSOR ”A” CIRCUIT RANGE/PERFORMANCE (BANK 1 OR SINGLE SENSOR)

CIRCUIT DESCRIPTION

The Camshaft Position (CMP) sensor, like the Crankshaft Position (CKP) sensor, consists of a magnet and an iron core wrapped in copper wire. The camshaft has 3 teeth and the CMP sensor is installed so that it can detect these teeth passing by. When the camshaft rotates and the teeth pass by the CMP sensor, the magnet on the CMP sensor creates a magnetic field and voltage is generated in the copper wire. When the crankshaft makes two rotation, voltage will be generated in the CMP sensor 3 times. The CKP sensor is roughly the same. When the crankshaft makes one rotation, its 34 teeth pass by the CKP sensor and voltage is generated 34 times. The camshaft rotates at half the speed of the crankshaft. Therefore, the CMP sensor generates voltage 3 times in the time the crankshaft takes to make 2 rotations.
The ECM detects generation of these voltages to locate the camshaft position, which are used to indicate the cylinder.

DTC No.	DTC Detection Condition	Trouble Area
P0340	⁎ No camshaft position sensor signal to ECM during cranking (2 trip detection logic) ⁎ No camshaft position sensor signal to ECM with engine speed 600 rpm or more (1 trip detection logic)	⁎ Open or short in camshaft position sensor circuit ⁎ Camshaft position sensor ⁎ Timing chain has a jumped tooth ⁎ ECM
P0341	While crankshaft rotates twice, camshaft position sensor signal is input to ECM 12 times or more (1 trip detection logic)	⁎ Same as DTC No. P0340

HINT:

⁎ DTC P0340 indicates a malfunction related to the camshaft position sensor (+) circuit (Wire harness (ECM - camshaft position sensor) and camshaft position sensor).
⁎ DTC P0341 indicates a malfunction related to the camshaft position sensor (-) circuit (Wire harness (ECM - camshaft position sensor) and camshaft position sensor).

MONITOR DESCRIPTION

If there is no signal from the camshaft position sensor even though the engine is cranking, or if the rotations of the camshaft and the crankshaft are not synchronized, the ECM interprets this as a malfunction of the sensor.

MONITOR STRATEGY

Related DTCs	P0340: CMP sensor range check P0340: CMP/CKP misalignment P0341: CMP sensor malfunction
Required sensors/ components (Main)	CMP (Camshaft position) sensor and VVT sensor
Required sensors / components (Related)	CKP sensor
Frequency of operation	Continuous
Duration	5 sec.
MIL operation	2 driving cycles: CMP sensor range check Immediate: CMP/CKP misalignment and CMP malfunction CMP sensor malfunction
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever these DTCs are not present	See page 05-16

CMP Sensor Range Check P0340:

Starter	ON
Minimal battery voltage while starter is ON	Less than 11 V

CMP/CKP Misalignment and CMP Sensor Malfunction P0340:

Engine RPM	600 rpm or more
Starter	OFF

CMP Sensor Malfunction P0341:

Starter	After OFF to ON timing

TYPICAL MALFUNCTION THRESHOLDS

CMP Sensor Range Check P0340:

CMP signal	No signal

CMP/CKP Misalignment P0340:

CMP and CKP phase	Misaligned

CMP Sensor Malfunction P0341:

CMP and CKP phase	Misaligned
CMP signal per 2 revolutions of crankshaft	12 CMP signals or more

COMPONENT OPERATING RANGE

CMP sensor signal	CMP sensor voltage fluctuates when the camshaft rotates 3 CMP signals per 2 revolutions of crankshaft

WIRING DIAGRAM

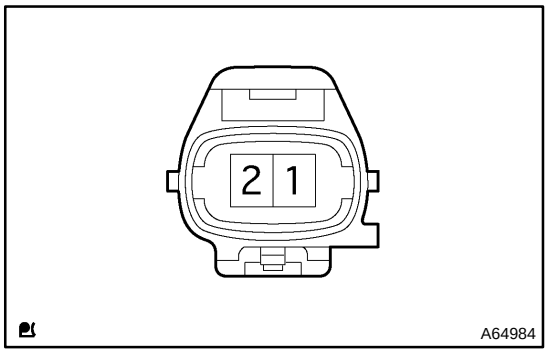
Refer to DTC P0335 on page 05-166 .

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1 INSPECT CAMSHAFT POSITION SENSOR (RESISTANCE)



(a) Disconnect the C1 sensor connector.

(b) Measure the resistance between the terminals of the sensor.

Standard:

Tester Connection	Condition	Specified Condition
1 - 2	Cold	835 to 1,400 Ω
1 - 2	Hot	1,060 to 1,645 Ω

NOTICE:

In the above section, the terms "cold" and "hot" refer to the temperature of the coils. "Cold" means approximately -10 °C to 50 °C (14 °F to 122 °F). "Hot" means approximately 50 °C to 100 °C (122 °F to 212 °F).

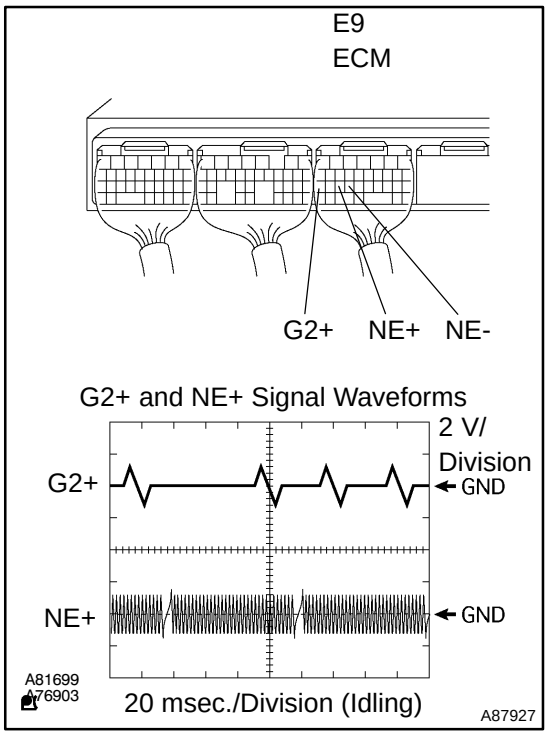
HINT:

Reference: Inspection using an oscilloscope.

During cranking or idling, check the waveform between the terminals of the ECM connector.

Standard:

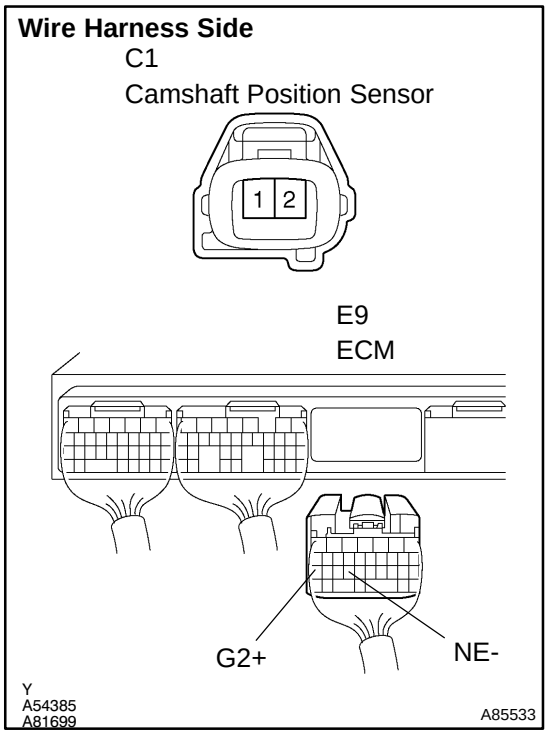
Tester Connection	Specified Condition
E9-27 (G2+) - E9-24 (NE-) E9-25 (NE+) - E9-24 (NE-)	Correct waveform is as shown



NG → **REPLACE CAMSHAFT POSITION SENSOR (See page 18-5)**

OK

2 CHECK WIRE HARNESS (CAMSHAFT POSITION SENSOR - ECM)



(a) Disconnect the C1 sensor connector.
(b) Disconnect the E9 ECM connector.
(c) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
C1-1 - E9-27 (G2+) C1-2 - E9-24 (NE-)	Below 1 Ω
C1-1 or E9-27 (G2+) - Body ground C1-2 or E9-24 (NE-) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

3 CHECK SENSOR INSTALLATION (CAMSHAFT POSITION SENSOR)

(a) Check the sensor installation.
OK: Sensor is installed correctly.

NG → **TIGHTEN SENSOR**

OK

4 INSPECT CAMSHAFT

(a) Remove the camshafts (see page 14-79).
(b) Check the camshaft lobes.
OK: The camshaft lobes do not have any cracks or deformation.

NG → **REPLACE CAMSHAFT**

OK

REPLACE ECM (See page 10-9)

DTC	P0351	IGNITION COIL ”A” PRIMARY/SECONDARY CIRCUIT

DTC	P0352	IGNITION COIL ”B” PRIMARY/SECONDARY CIRCUIT

DTC	P0353	IGNITION COIL ”C” PRIMARY/SECONDARY CIRCUIT

DTC	P0354	IGNITION COIL ”D” PRIMARY/SECONDARY CIRCUIT

HINT:

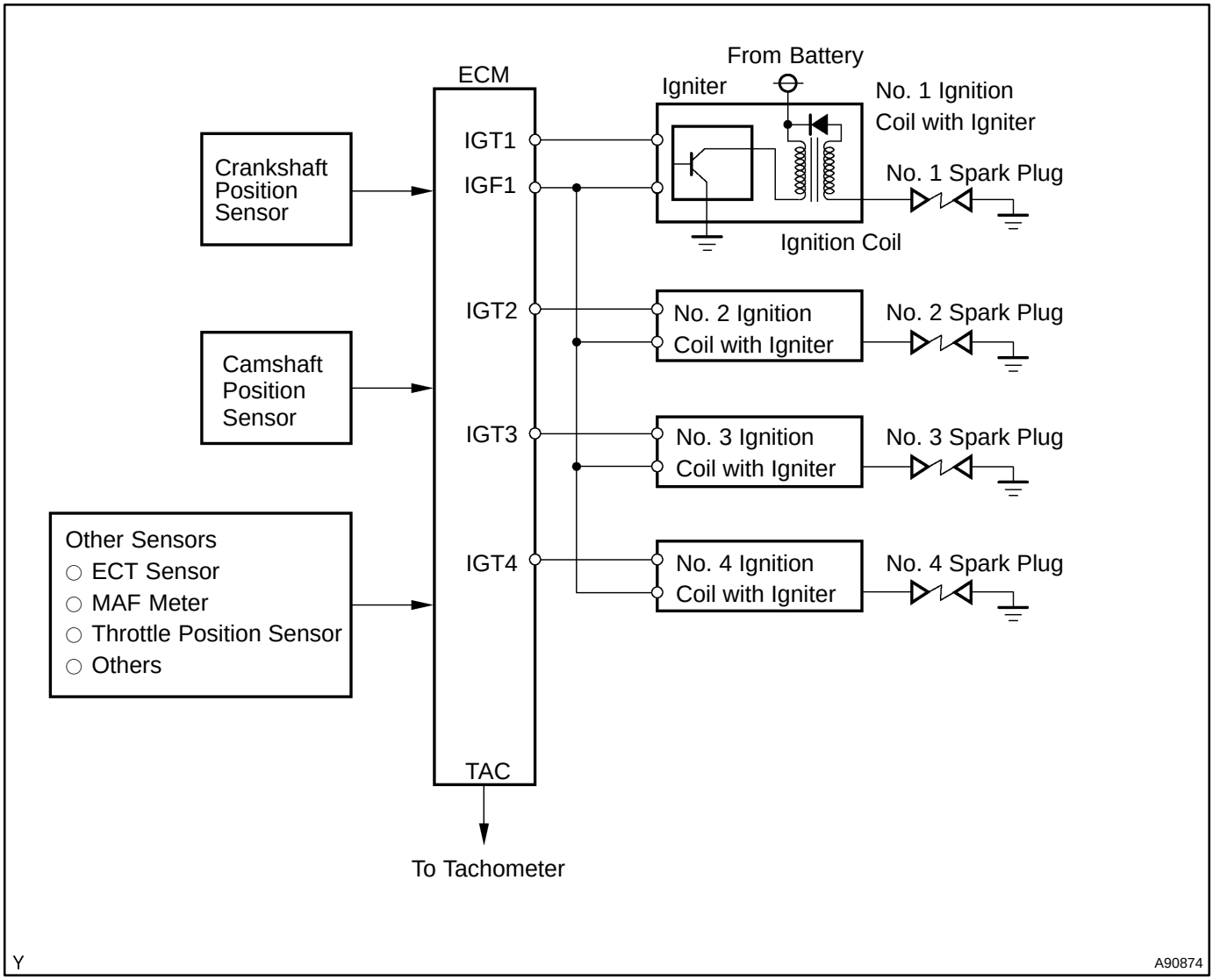
- ○ These DTCs indicate a malfunction related to primary circuit.
- ○ If DTC P0351 is displayed, check No. 1 ignition coil with igniter circuit.
- ○ If DTC P0352 is displayed, check No. 2 ignition coil with igniter circuit.
- ○ If DTC P0353 is displayed, check No. 3 ignition coil with igniter circuit.
- ○ If DTC P0354 is displayed, check No. 4 ignition coil with igniter circuit.

CIRCUIT DESCRIPTION

A Direct Ignition System (DIS) is used on this vehicle.

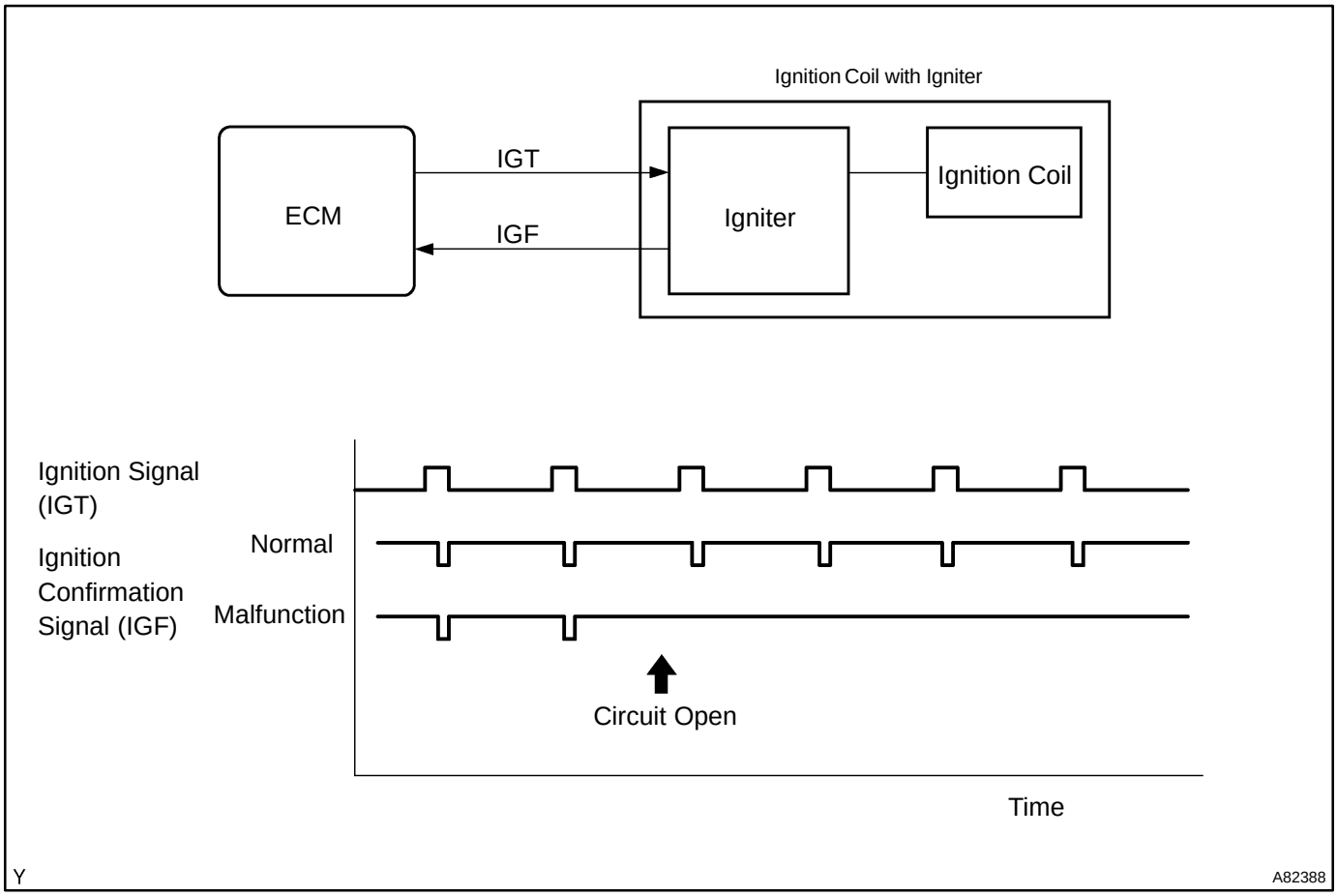
The DIS is a 1-cylinder ignition system which ignites one cylinder with one ignition coil. In the 1-cylinder ignition system, one spark plug is connected to the end of the secondary winding. High-voltage is generated in the secondary winding and is applied directly to the spark plug. The spark of the spark plug passes from the center electrode to the ground electrode.

The ECM determines the ignition timing and outputs the ignition signals (IGTs) for each cylinder. Using the IGT, the ECM turns on and off the power transistor inside the igniter, which switches on and off current to the primary coil. When current to the primary coil is cut off, high-voltage is generated in the secondary coil and this voltage is applied to the spark plugs to create sparks inside the cylinders. As the ECM cuts the current to the primary coil, the igniter sends back the ignition confirmation signal (IGF) for each cylinder ignition to the ECM.



DTC No.	DTC Detection Condition	Trouble Area
P0351 P0352 P0353 P0354	No IGF signal to ECM while engine is running (1 trip detection logic)	○ Ignition system ○ Open or short in IGF1 and IGT circuits (1 throught 4) from ignition coil assy to ECM ○ Ignition coil assy (No. 1 throught No. 4) ○ ECM

MONITOR DESCRIPTION



If the ECM does not receive the IGF after sending the IGT, it interprets this as a fault in the igniter and sets a DTC.

MONITOR STRATEGY

Related DTCs	P0351: Igniter (Cylinder 1) malfunction P0352: Igniter (Cylinder 2) malfunction P0353: Igniter (Cylinder 3) malfunction P0354: Igniter (Cylinder 4) malfunction
Required sensors/ components (Main)	Igniter
Required sensors / components (Related)	CKP sensor
Frequency of operation	Continuous
Duration	0.256 sec. + 4 sparks
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever these DTCs are not present	See page 05-16
Either of the following condition is met:	Condition 1 or 2
1. Engine RPM	1,500 rpm or less
2. Starter	OFF

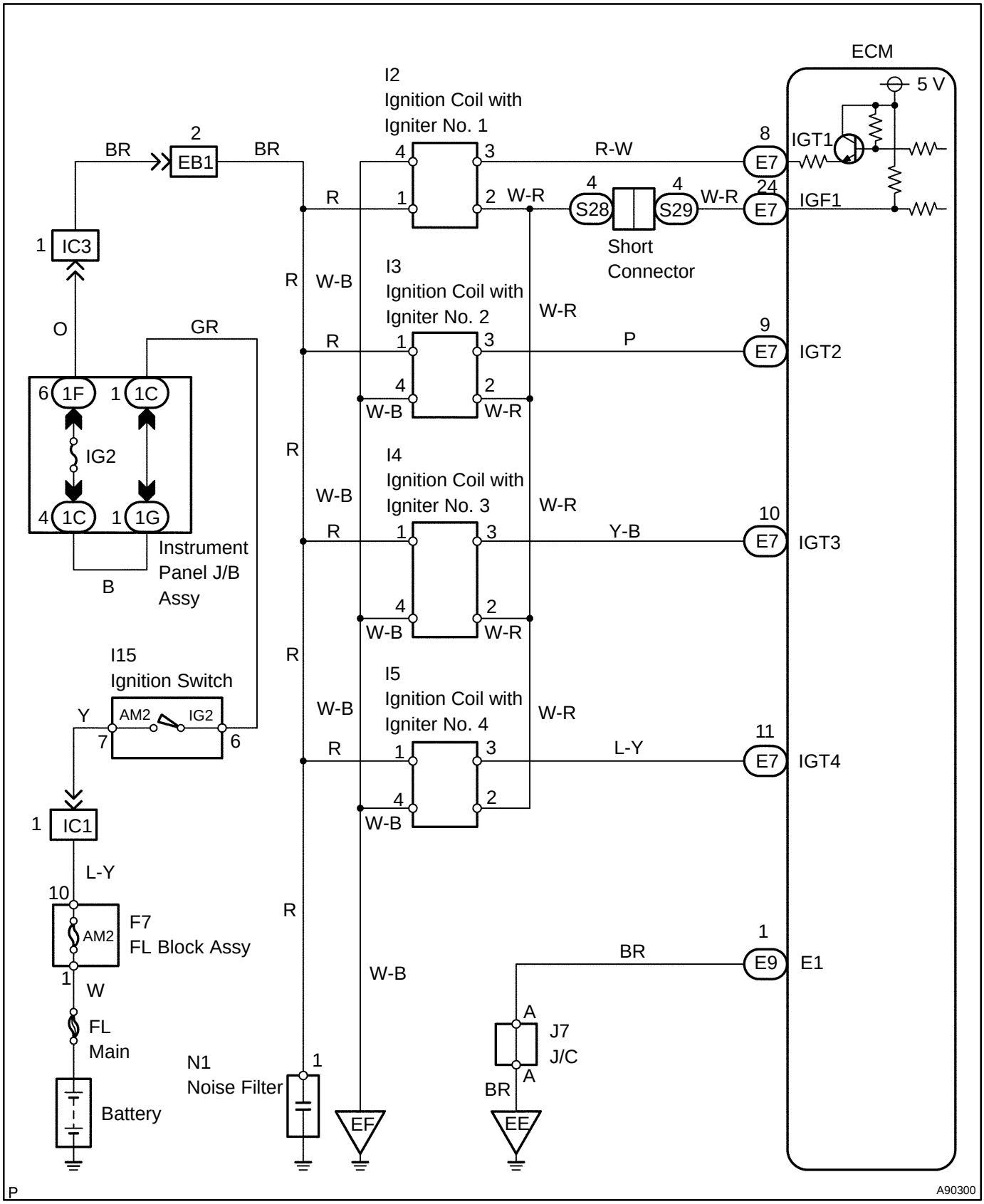
TYPICAL MALFUNCTION THRESHOLDS

IGF signal	ECM does not receive any IGF signal when ECM sends IGT signal to igniter

COMPONENT OPERATING RANGE

IGF signal	Igniter outputs IGF signal when it receives IGT signal from ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

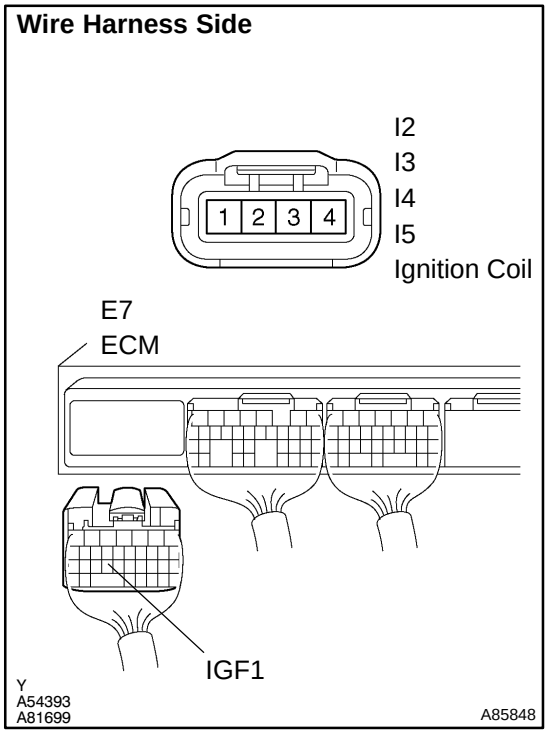
1	CHECK SPARK PLUG AND SPARK OF MISFIRING CYLINDER (See page 18-3)

OK: Spark occurs.

NG → **Go to step 4**

OK

2	CHECK WIRE HARNESS (IGNITION COIL ASSY - ECM (IGF TERMINAL))



(a) Disconnect the I2, I3, I4 and I5 ignition coil connectors.
(b) Disconnect the E7 ECM connector.
(c) Measure the resistance of the wire harness side connectors.

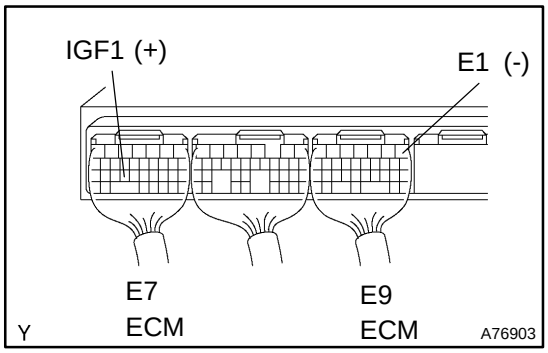
Standard:

Tester Connection	Specified Condition
I2-2 - E7-24 (IGF1) I3-2 - E7-24 (IGF1) I4-2 - E7-24 (IGF1) I5-2 - E7-24 (IGF1)	Below 1 Ω
I2-2 or E7-24 (IGF1) - Body ground I3-2 or E7-24 (IGF1) - Body ground I4-2 or E7-24 (IGF1) - Body ground I5-2 or E7-24 (IGF1) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

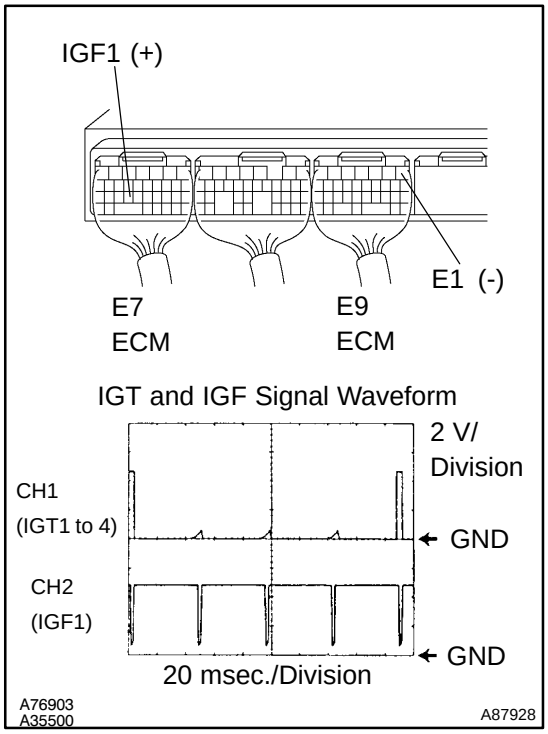
3 CHECK ECM (IGF1 VOLTAGE)



(a) Disconnect the I2, I3, I4 and I5 ignition coil connectors.
(b) Turn the ignition switch ON.
(c) Measure the voltage of the ECM connectors.

Standard:

Tester Connection	Specified Condition
E7-24 (IGF1) - E9-1 (E1)	4.5 to 5.5 V



HINT:
Reference: Inspection using the oscilloscope.
During cranking or idling, check the waveform of the ECM connectors.

Standard:

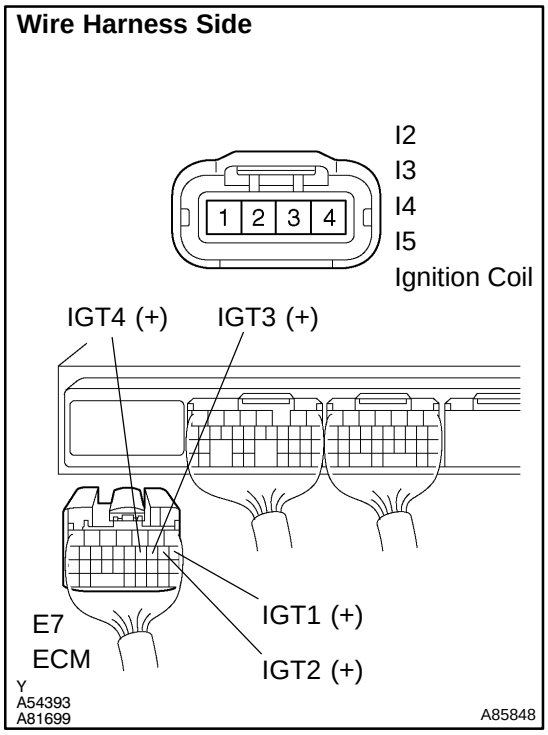
Tester Connection	Specified Condition
E7-24 (IGF1) - E9-1 (E1)	Correct waveform is as shown

NG → **REPLACE ECM (See page 10-9)**

OK

REPLACE IGNITION COIL ASSY

4	CHECK WIRE HARNESS (IGNITION COIL ASSY - ECM (IGT TERMINAL))



(a) Disconnect the I2, I3, I4 and I5 ignition coil connectors.
(b) Disconnect the E7 ECM connector.
(c) Measure the resistance of the wire harness side connectors.

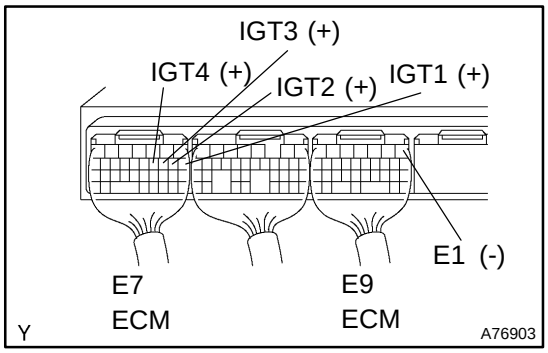
Standard:

Tester Connection	Specified Condition
I2-3 - E7-8 (IGT1) I3-3 - E7-9 (IGT2) I4-3 - E7-10 (IGT3) I5-3 - E7-11 (IGT4)	Below 1 Ω
I2-3 or E7-8 (IGT1) - Body ground I3-3 or E7-9 (IGT2) - Body ground I4-3 or E7-10 (IGT3) - Body ground I5-3 or E7-11 (IGT4) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

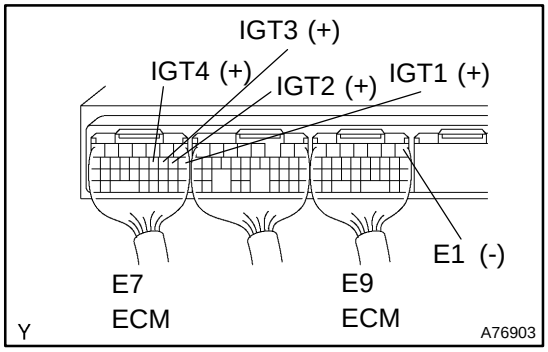
5 CHECK ECM



(a) Measure the voltage of the ECM connectors when the engine is cranked.

Standard:

Tester Connection	Specified Condition
E7-8 (IGT1) - E9-1 (E1) E7-9 (IGT2) - E9-1 (E1) E7-10 (IGT3) - E9-1 (E1) E7-11 (IGT4) - E9-1 (E1)	More than 0.1 V or less than 4.5 V

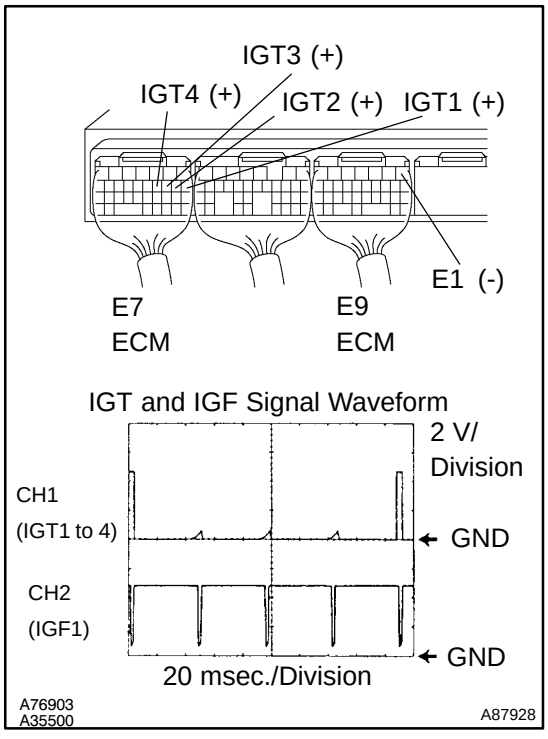


(b) Disconnect the I2, I3, I4 and I5 ignition coil connectors.

(c) Measure the voltage of the ECM connectors when the engine is cranked.

Standard:

Tester Connection	Specified Condition
E7-8 (IGT1) - E9-1 (E1) E7-9 (IGT2) - E9-1 (E1) E7-10 (IGT3) - E9-1 (E1) E7-11 (IGT4) - E9-1 (E1)	4.5 V or more



HINT:

Reference: Inspection using an oscilloscope.

During cranking or idling, check the waveform of the ECM connectors.

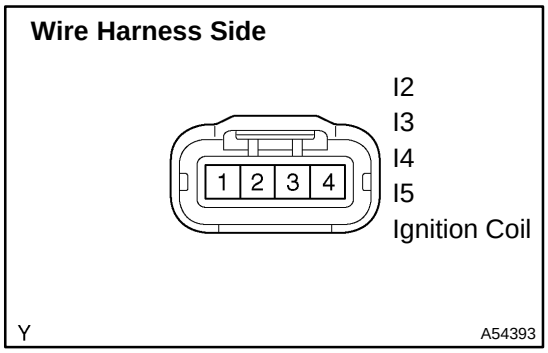
Standard:

Tester Connection	Specified Condition
E7-8 (IGT1) - E9-1 (E1) E7-9 (IGT2) - E9-1 (E1) E7-10 (IGT3) - E9-1 (E1) E7-11 (IGT4) - E9-1 (E1)	Correct waveform is as shown

NG → **REPLACE ECM (See page 10-9)**

OK

6 CHECK IGNITION COIL ASSY (POWER SOURCE)



(a) Disconnect the I2, I3, I4 and I5 ignition coil connectors.
(b) Turn the ignition switch ON.
(c) Measure the voltage of the wire harness side connector and body ground.

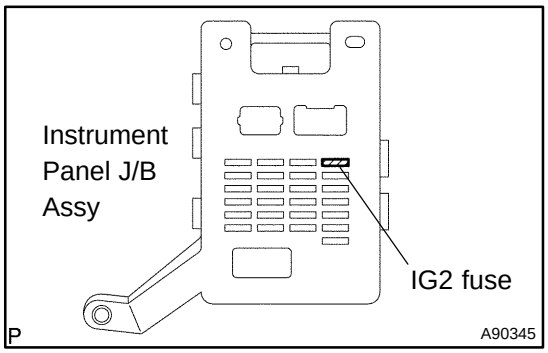
Standard:

Tester Connection	Specified Condition
I2-1 - Body ground I3-1 - Body ground I4-1 - Body ground I5-1 - Body ground	9 to 14 V

OK → **REPLACE IGNITION COIL ASSY**

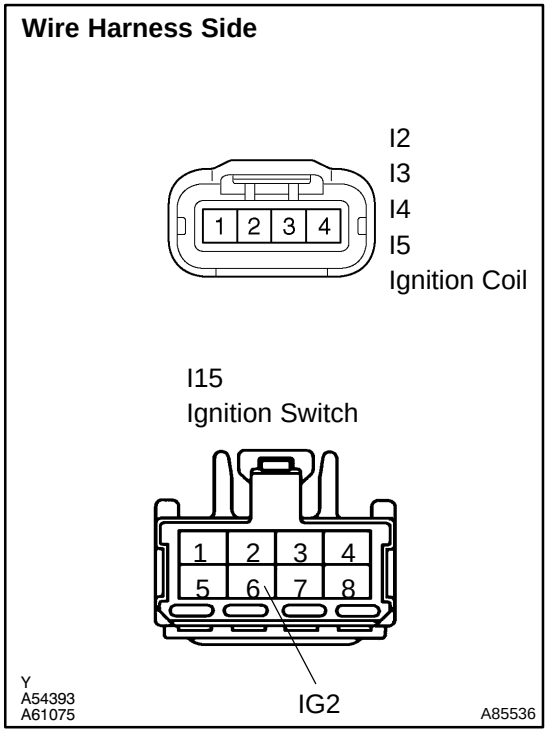
NG

7 CHECK WIRE HARNESS (IGNITION COIL ASSY - IGNITION SWITCH)



(a) Check the IG2 fuse.
  (1) Remove the IG2 fuse from the instrument panel J/B Assy.
  (2) Measure the resistance of the IG2 fuse.

Standard: Below 1 Ω



(b) Disconnect the I2, I3, I4 and I5 ignition coil connectors.
(c) Disconnect the I15 ignition switch connector.
(d) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
I2-1 - I15-6 (IG2) I3-1 - I15-6 (IG2) I4-1 - I15-6 (IG2) I5-1 - I15-6 (IG2)	Below 1 Ω
I2-1 or I15-6 (IG2) - Body ground I3-1 or I15-6 (IG2) - Body ground I4-1 or I15-6 (IG2) - Body ground I5-1 or I15-6 (IG2) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

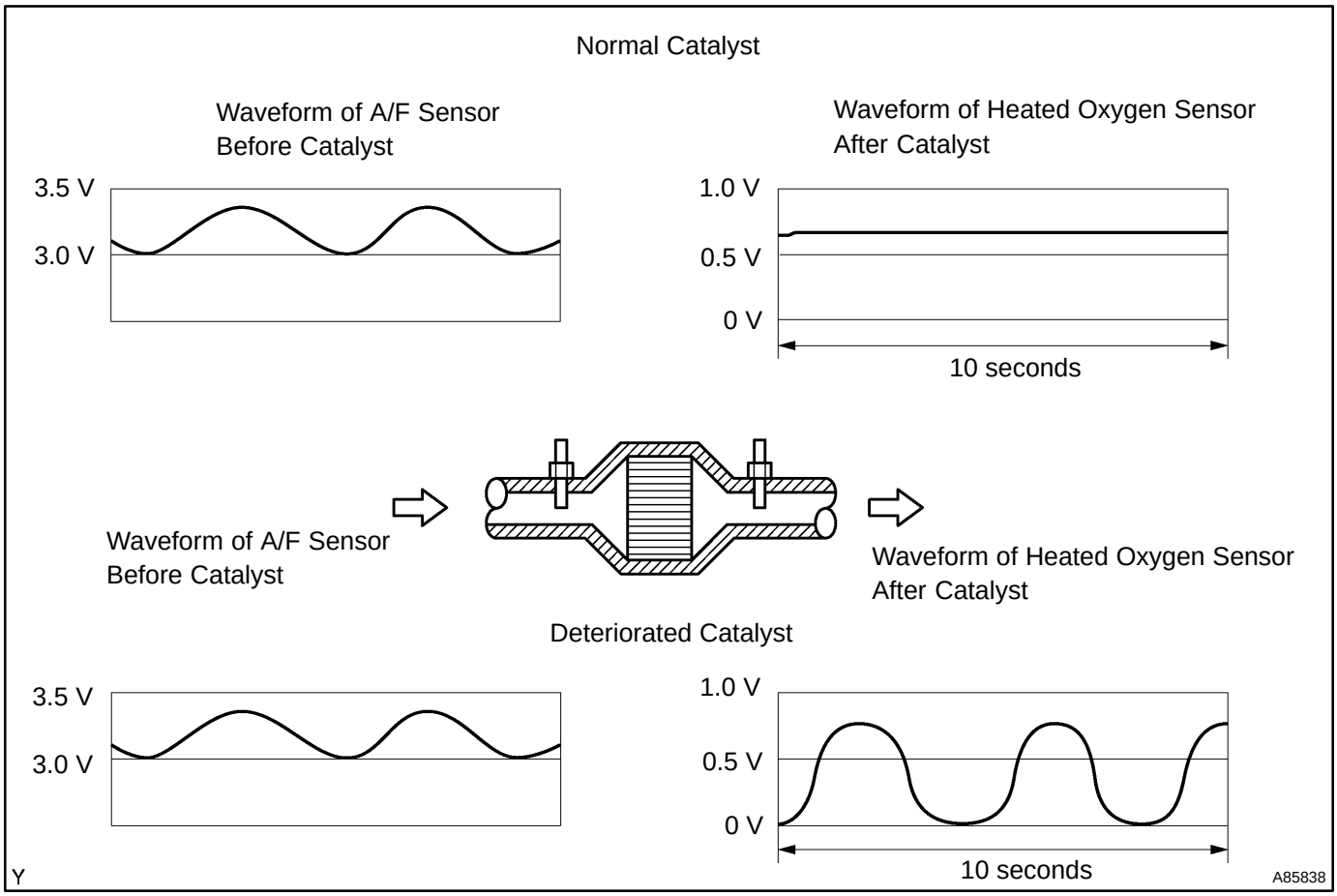
REPLACE IGNITION COIL ASSY

DTC	P0420	CATALYST SYSTEM EFFICIENCY BELOW THRESHOLD (BANK 1)

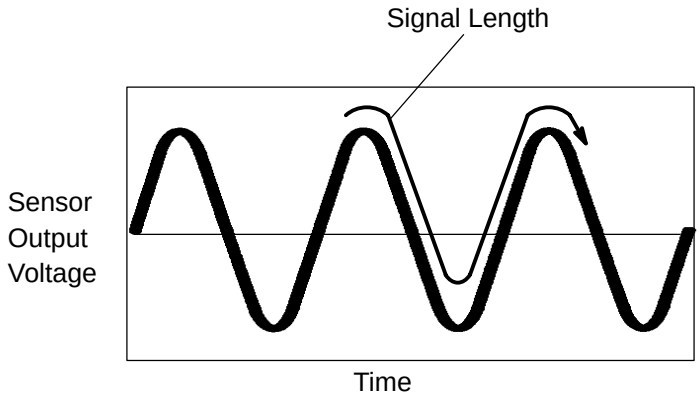
MONITOR DESCRIPTION

The ECM uses sensors mounted before and after the three-way catalyst (TWC) to monitor its efficiency. The first sensor, an Air Fuel ratio (A/F) sensor, sends pre-catalyst A/F ratio information to the ECM. The second sensor, a heated oxygen sensor (O2S), sends post-catalyst information to the ECM. The ECM compares these two signals to judge the efficiency of the catalyst and the catalyst's ability to store oxygen. During normal operation, the TWC stores and releases oxygen as needed. The capacity to store oxygen results in a low variation in the post-TWC exhaust stream as shown below.

If the catalyst is functioning normally, the waveform of the heated oxygen sensor slowly switches between RICH and LEAN. If the catalyst is deteriorated, the waveform will alternate frequently between RICH and LEAN. As the catalyst efficiency degrades, its ability to store oxygen is reduced and the catalyst output becomes more variable. When running the monitor, the ECM compares sensor 1 signals (A/F sensor) over a specific amount of time to determine catalyst efficiency. The ECM begins by calculating the signal length for both sensors (for the rear oxygen sensor, the ECM uses the output voltage signal length). If the oxygen sensor output voltage signal length is greater than the threshold (threshold is calculated based on the A/F sensor signal length), the ECM concludes that the catalyst is malfunctioning. The ECM will turn on the MIL and a DTC will be set.



Heated Oxygen Sensor Signal Length



A82718

DTC No.	DTC Detection Condition	Trouble Area
P0420	After engine and catalyst are warmed up, and while vehicle is driven within set vehicle and engine speed, waveform of heated oxygen sensor (bank 1 sensor 2) alternates frequently between RICH and LEAN (2 trip detection logic)	⁎Gas leakage in exhaust system ⁎A/F sensor (bank 1 sensor 1) ⁎Heated oxygen sensor (bank 1 sensor 2) ⁎Three-way catalytic converter (Exhaust manifold)

HINT:

⁎ Sensor 1 is the sensor closest to the engine assembly.
⁎ Sensor 2 is the sensor farthest away from the engine assembly.

MONITOR STRATEGY

Related DTCs	P0420: Catalyst deterioration
Required sensors / components (Main)	Catalyst
Required sensors / components (Related)	A/F sensor, Heated oxygen sensor (HO2S), IAT sensor, MAF meter, CKP sensor, ECT sensor
Frequency of operation	Once per driving cycle
Duration	150 sec. (30 sec. x 5)
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever this DTC is not present	See page 05-16
Accumulated time that the following conditions are met:	30 sec.
Battery voltage	11 V or more
IAT	-10 ◯C (14◯F) or more
Idle status	OFF
MAF	8 to 35 g/sec.
Engine RPM	Less than 4,500 rpm
ECT	75◯C (167◯F) or more
Rich experience after fuel cut	Yes
Fuel system status	Closed Loop
A/F sensor	Activated
Rear HO2S	Activated
Estimated catalyst temperature	Both of the following conditions 1 and 2 are met:
1. Upstream catalyst temperature	500 to 900◯C (932 to 1,652◯F)
2. Downstream catalyst temperature	350 to 900◯C (662 to 1,652◯F)

TYPICAL MALFUNCTION THRESHOLDS

Rear HO2S locus length	13 V or more (Varies with A/F sensor locus length)
Frequency of the monitor	4 times

MONITOR RESULT

Refer to page 05-24 for detailed information.

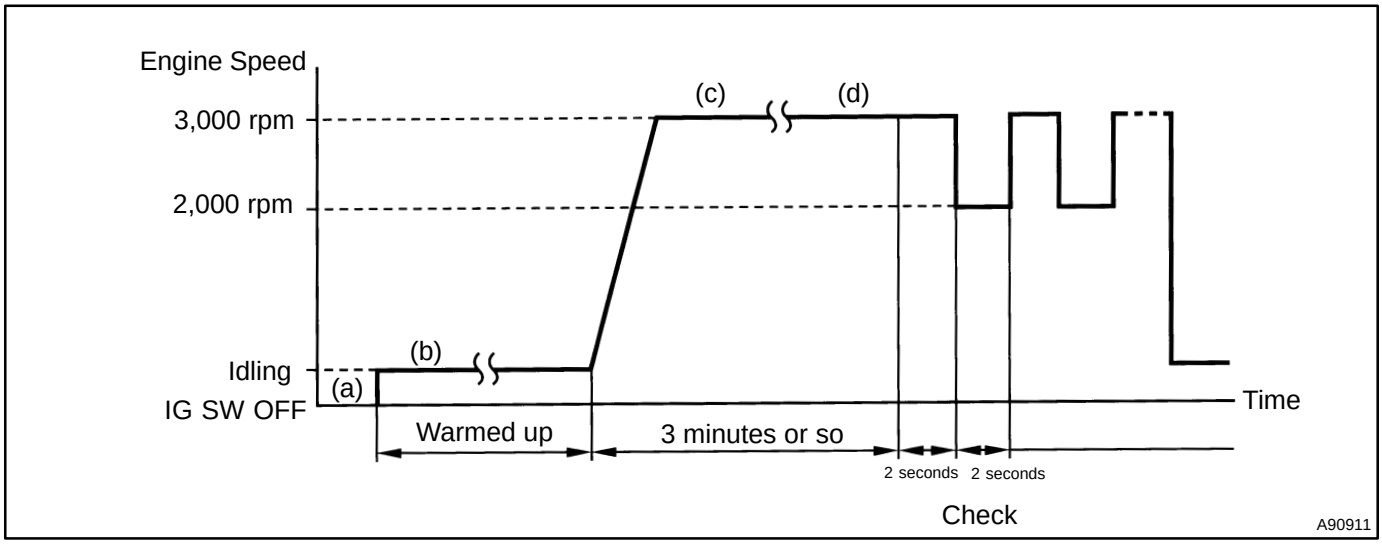
The test value and test limit information are described as shown in the following table. Check the monitor result and test values after performing the monitor drive pattern (see page 05-26).

- TID (Test Identification Data) is assigned to each emissions-related component.
- TLT (Test Limit Type):
  If TLT is 0, the component is malfunctioning when the test value is higher than the test limit.
  If TLT is 1, the component is malfunctioning when the test value is lower than the test limit.
- CID (Component Identification Data) is assigned to each test value.
- Unit Conversion is used to calculate the test value indicated on generic OBD II scan tools.

TID $01: Catalyst - Sensor 1 A/F sensor, Sensor 2 HO2S

TLT	CID	Unit Conversion	Description of Test Data	Description of Test Limit
0	$01	Multiply by 0.0078 (no dimension)	Catalyst deterioration level: Determined by waveforms of A/F sensor and HO2S	Malfunction criteria for catalyst deterioration

CONDITIONING A/F SENSOR AND HEATED OXYGEN SENSOR FOR TESTING



(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(b) Start the engine and warm it up with all the accessories switched OFF until the Engine Coolant Temperature (ECT) is stable.
(c) Run the engine at 2,500 to 3,000 rpm for about 3 minutes.
(d) When alternating the engine between 3,000 rpm and 2,000 rpm for 2 seconds respectively, check the waveform of the oxygen sensor (bank 1 sensor 2).

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	CHECK OTHER DTC OUTPUT (IN ADDITION TO DTC P0420)

(a) Read the DTC using the hand-held tester or the OBD II scan tool.
Result:

Display (DTC Output)	Proceed to
Only P0420 is output	A
P0420 and other DTCs are output	B

HINT:
If any other codes besides P0420 are output, perform the troubleshooting for those codes first.

B → **GO TO RELEVANT DTC CHART (See page 05-48)**

A

2	CHECK FOR EXHAUST GAS LEAKAGE

NG → **REPAIR OR REPLACE EXHAUST GAS LEAKAGE POINT**

OK

3	INSPECT AIR FUEL RATIO SENSOR (BANK 1 SENSOR 1) (See page 12-6)

NG → **REPLACE AIR FUEL RATIO SENSOR**

OK

4	INSPECT HEATED OXYGEN SENSOR (See page 05-1 18)

OK: During air-fuel ratio feedback, the O2S's output alternates between rich and lean.

NG → **REPLACE HEATED OXYGEN SENSOR**

OK

REPLACE EXHAUST MANIFOLD AND FRONT EXHAUST PIPE

HINT:

Hand-held tester only:

* The following procedure enables a technician to identify a trouble area if there is a malfunction in front A/F sensor or rear heated oxygen sensors other than the catalyst converter, or the malfunction that indicates the actual air-fuel ratio extremely RICH or LEAN.

It is possible the malfunctioning area can be found using the ACTIVE TEST A/F CONTROL operation. The A/F CONTROL operation can determine if the A/F sensor, heated oxygen sensor or other potential trouble areas are malfunctioning or not.

(a) Perform the ACTIVE TEST A/F CONTROL operation.

HINT:

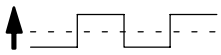
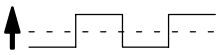
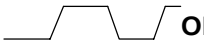
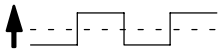
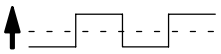
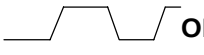
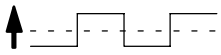
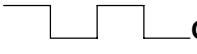
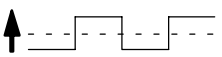
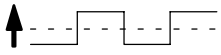
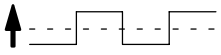
The A/F CONTROL operation lowers the injection volume 12.5 % or increases the injection volume 25 %.

(1) Connect the hand-held tester to the DLC3 on the vehicle.
(2) Turn the ignition switch ON.
(3) Warm up the engine by running the engine speed at 2,500 rpm for approximately 90 seconds.
(4) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL.
(5) Perform the A/F CONTROL operation with the engine idle (press the right or left button).

Result:

Heated oxygen sensor reacts in accordance with increase and decrease of injection volume
+25 % → rich output: More than 0.5 V
-12.5 % → lean output: Less than 0.4 V

NOTICE:
The A/F sensor output has a few seconds of delay and the heated oxygen sensor output has about 20 seconds of delay at maximum.

	Output voltage of A/F sensor (sensor 1)	Output voltage of heated oxygen sensor (sensor 2)	Main suspect trouble area
Case 1	Injection volume +25 % -12.5 %  Output voltage More than 3.35 V Less than 3.0 V  **OK**	Injection volume +25 % -12.5 %  Output voltage More than 0.55 V Less than 0.4V  **OK**	—
Case 2	Injection volume +25 % -12.5 %  Output voltage Almost No reaction **NG**	Injection volume +25 % -12.5 %  Output voltage More than 0.55 V Less than 0.4V  **OK**	A/F sensor (A/F sensor, heater, A/F sensor circuit)
Case 3	Injection volume +25 % -12.5 %  Output voltage More than 3.35 V Less than 3.0V  **OK**	Injection volume +25 % -12.5 %  Output voltage Almost No reaction **NG**	Heated oxygen sensor (heated oxygen sensor, heater, heated oxygen sensor circuit)
Case 4	Injection volume +25 % -12.5 %  Output voltage Almost No reaction **NG**	Injection volume +25 % -12.5 %  Output voltage Almost No reaction **NG**	Extremely rich or lean actual air-fuel ratio (Injector, fuel pressure, gas leakage in exhaust system, etc.)

The following of A/F CONTROL procedure enables a technician to check and graph the voltage outputs of both the heated oxygen sensors.
For displaying the graph, enter ”ACTIVE TEST / A/F CONTROL / USER DATA”, select ”AFS B1S1 and O2S B1S2” by pressing ”YES” and push ”ENTER”. Then press ”F4”.

DTC	P043E	EVAPORATIVE EMISSION SYSTEM REFERENCE ORIFICE CLOG UP

DTC	P043F	EVAPORATIVE EMISSION SYSTEM REFERENCE ORIFICE HIGH FLOW

CIRCUIT DESCRIPTION

Refer to EVAP Inspection Procedure (see page 05-317).

DTCs	Monitoring Item	Detection Condition	Trouble Area	Detection Timing	Detection Period
P043E	0.02 inch orifice clogged (built-in pump module)	To determine leak criterion (Reference pressure), vacuum pump creates negative pressure in canister pump module through 0.02 inch orifice and pressure is measured. If one of following conditions is met, ECM sets pump module related DTCs: P043E, P043F, P2401, P2402 and P2419: ・Reference pressure is -1 kPa or higher ・Reference pressure is -4.85 kPa or lower ・Reference pressure is not saturated within 60 seconds	・Pump module ・Connector / wire harness (Pump module - ECM) ・ECM	Ignition OFF	2 trips
P043F	0.02 inch orifice high-flow (built-in pump module)				

WIRING DIAGRAM

Refer to EVAP Inspection Procedure (see page 05-317).

INSPECTION PROCEDURE

Refer to EVAP Inspection Procedure (see page 05-317).

MONITOR DESCRIPTION

5 hours* after the ignition switch is turned OFF, the electric vacuum pump creates negative pressure (vacuum) in the EVAP (Evaporative Emission) system. The ECM monitors for leaks and actuator malfunctions based on the EVAP pressure.

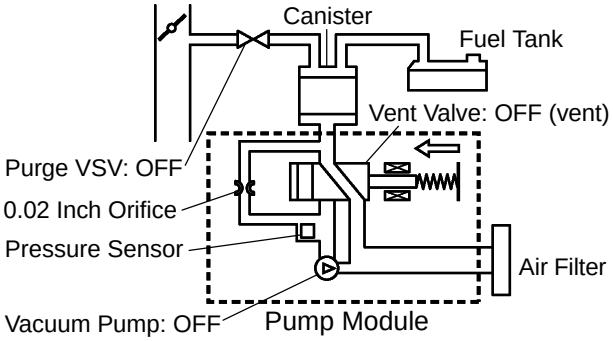
HINT:

*: If the engine coolant temperature is not below 35°C (95°F) after 5 hours after the ignition switch is turned off, the monitor check starts 2 hours later. If it is still not below 35°C (95°F) 7 hours after the ignition switch is turned off, the monitor check starts 2.5 hours later.

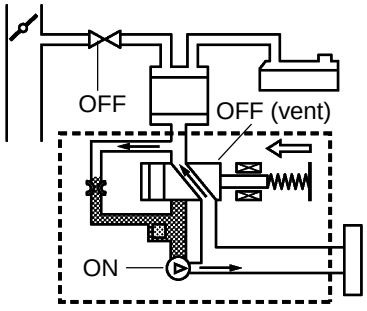
Sequence	Operations	Descriptions	Duration
-	ECM activation	Activated by soak timer, 5 hours (7 or 9.5 hours) after ignition switch turned to OFF.	-
A	Atmospheric pressure measurement	Vent valve turned OFF (vent) and EVAP system pressure measured by ECM in order to register atmospheric pressure. If EVAP pressure is not between 70 kPa and 110 kPa (525 mmHg and 825 mmHg), ECM cancels EVAP system monitor.	10 seconds
B	First 0.02 inch leak pressure measurement	In order to determine 0.02 inch leak pressure standard, vacuum pump creates negative pressure (vacuum) through 0.02 inch orifice and then ECM checks if vacuum pump and vent valve operate normally.	60 seconds
C	EVAP system pressure measurement	Vent valve turned ON (closed) to shut EVAP system. Negative pressure (vacuum) created in EVAP system, and EVAP system pressure then measured. Write down the measured value as it will be used in the leak check. If EVAP pressure does not stabilize within 15 minutes, ECM cancels EVAP system monitor.	15 minutes*
D	Purge VSV monitor	Purge VSV opened and then EVAP system pressure measured by ECM. Large increase indicates normal.	10 seconds
E	Second 0.02 inch leak pressure measurement	Leak check is performed after second 0.02 inch leak pressure standard is measured. If stabilized system pressure higher than second 0.02 inch leak pressure standard, ECM determines that EVAP system leaking.	60 seconds
F	Final check	Atmospheric pressure measured and then monitoring result recorded by ECM.	-

* If only a small amount of fuel is in the fuel tank, it takes longer for the EVAP pressure to stabilize.

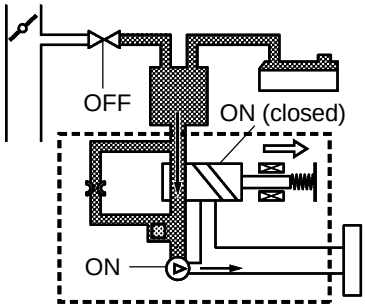
Operation A: Atmospheric Pressure Measurement

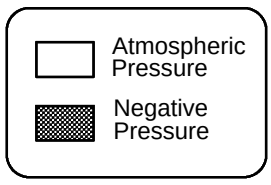


Operation B, E: 0.02 Inch Leak Pressure Measurement

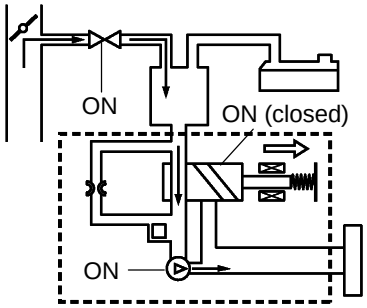


Operation C: EVAP System Pressure Measurement



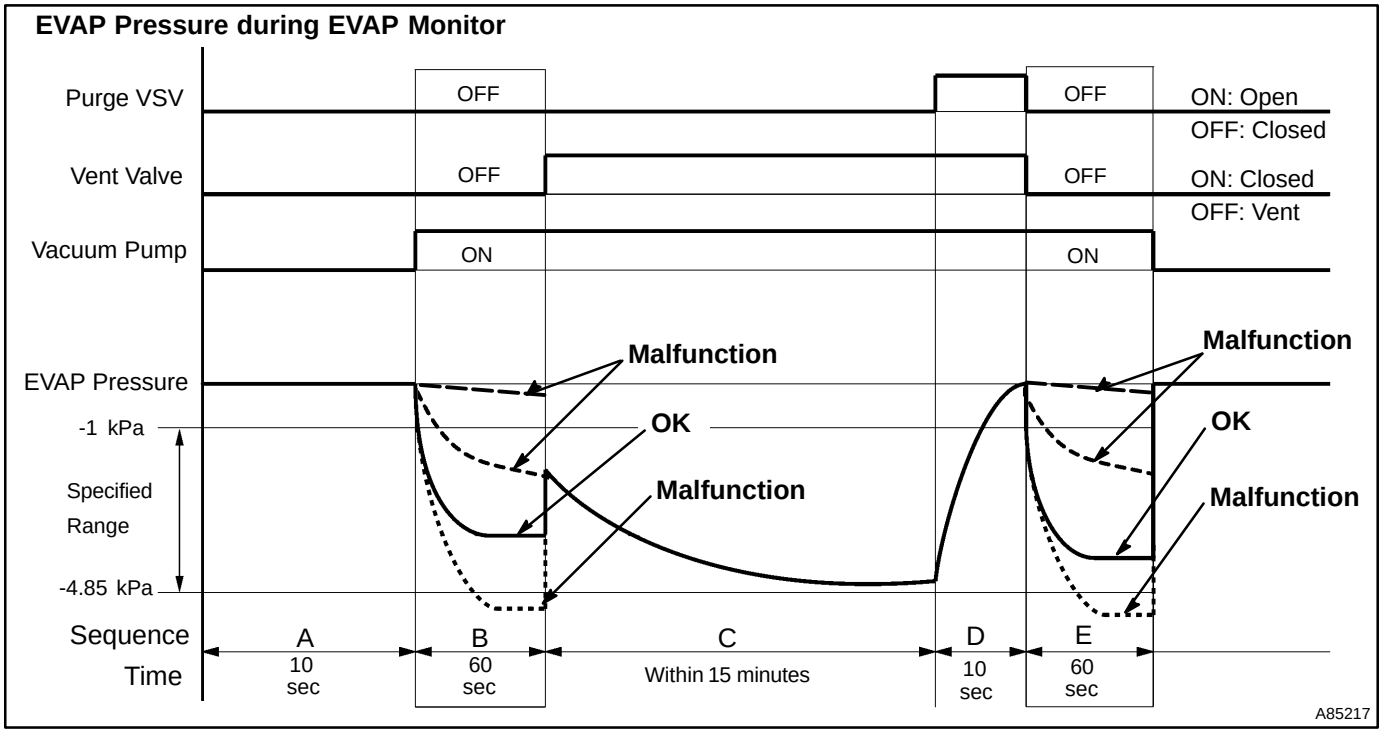


Operation D: Purge VSV monitor



Y A96746

In sequence B and E, to determine the leak criterion, the vacuum pump creates negative pressure in the canister pump module through the 0.02 inch orifice. If the pressure is out of specified range or is not saturated, the ECM illuminates the MIL and sets DTCs P043E, P043F, P2401, P2402 and P2419 (2-trip detection logic).



OBD II MONITOR SPECIFICATIONS

Monitor Strategy

Required Sensors/Components	Pump module
Frequency of Operation	Once per driving cycle
Duration	Within 15 minutes (varies with amount of fuel in tank)
MIL Operation	2 driving cycles
Sequence of Operation	None

Typical Enabling Conditions

The monitor will run whenever these DTCs are not present	See page 05-16.
EVAP key-off monitor runs when all of the following conditions met:	-
Atmospheric pressure	525 to 825 mmHg (70 to 110 kPa)
Battery voltage	10.5 V or more
Vehicle speed	Below 4 km/h (2.5 mph)
Ignition switch	OFF
Engine condition	Not running
Time after engine stopped	5 hours
FTP sensor malfunction (P0450, P0452, P0453)	Not detected
Purge VSV	Not operated by scan tool
Vent valve	Not operated by scan tool
Leak detection pump	Not operated by scan tool
Both of the following conditions are met before IG switch OFF:	Condition 1 and 2
1. Duration that vehicle is driven	5 min. or more
2. Purge flow	Executed
ECT	4.4 to 35◯C (40 to 95◯F)
IAT	4.4 to 35◯C (40 to 95◯F)

Example of re-start time

First time	7 hours
Second time	9 hours and 30 min.

Key-of f monitor sequence: 1 to 8

1. Atmospheric pressure

Next sequence is run if following condition met	-
Atmospheric pressure change for 10 sec.	Within 2.25 mmHg (0.3 kPa) for 1 sec.

2. First reference pressure

Next sequence is run if all of following conditions met	Condition 1, 2 and 3
1. FTP when 4 sec. after reference pressure measurement	-7.5 mmHg (-1 kPa) or less
2. Reference pressure	-36.47 to -7.93 mmHg (-4.85 to -1.057 kPa)
3. Reference pressure	Saturated

3. Vent valve stuck closed check

Next sequence is run if following condition met	-
FTP change for 10 sec. after vent valve ON (closed)	2.25 mmHg (0.3 kPa) or more

4. Vacuum introduction and leak

Next sequence is run if both of following conditions met	Condition 1 and 2
1. Vacuum introduction time	Within 15 min.
2. FTP	FTP was saturated

5. Purge VSV stuck closed check

Next sequence is run if following condition met	-
FTP change for 10 sec. after purge VSV ON (open)	2.25 mmHg (0.3 kPa) or more

6. Second reference pressure measurement

Next sequence is run if all of following conditions met	Condition 1, 2, 3 and 4
1. FTP when 4 sec. after reference pressure measurement	-7.5 mmHg (-1 kPa) or less
2. Reference pressure	-36.47 to -7.93 mmHg (-4.85 to -1.057 kPa)
3. Reference pressure	Saturated
4. Reference pressure difference between first and second	Less than 5.25 mmHg (0.7 kPa)

7. Leak check

Next sequence is run if following condition met	-
FTP when vacuum introduction was complete	Lower than second reference pressure

8. Atmospheric pressure

Monitor is complete if following	-
Atmospheric pressure difference between sequence 1 and 8	Within 2.25 mmHg (0.3 kPa)

Typical Malfunction Thresholds

Following values are when atmosperic pressure is 760 mmHg (100 kPa)	-
One of the following conditions is met:	Condition 1, 2, 3, 4 or 5
1. FTP when 4 seconds after reference pressure measurement began	More than -7.5 mmHg (-1 kPa)
2. Reference pressure	Less than -36.4 mmHg (-4.85 kPa)
3. Reference pressure	-7.9 mmHg (-1.057 kPa) or more
4. Reference pressure	Not saturated
5. Reference pressure difference between first and second	5.3 mmHg (0.7 kPa) or more

MONITOR RESULT (MODE 06)

Refer to page 05-317 for detailed information on Monitor Result.

-MEMO-

DTC	P0441	EVAPORATIVE EMISSION CONTROL SYSTEM INCORRECT PURGE FLOW

DTC SUMMARY

DTCs	Monitoring Items	Malfunction Detection Conditions	Trouble Areas	Detection Timings	Detection Logic
P0441	Purge VSV (Vacuum Switching Valve) stuck open	Vacuum pump creates negative pressure (vacuum) in EVAP system and EVAP system pressure measured. 0.02 inch leak pressure standard is measured at the start and at the end of the leak check. If stabilized pressure higher than [second 0.02 inch leak pressure standard x 0.2], ECM determines that purge VSV stuck open	・Purge VSV ・Connector/wire harness (Purge VSV - ECM) ・ECM ・Pump module ・Leakage from EVAP system	While ignition Switch OFF	2 trip
P0441	Purge VSV stuck closed	After EVAP leak check performed, purge VSV turned ON (open), and atmospheric air introduced into EVAP system. 0.02 inch leak pressure standard is measured at the start and at the end of the leak check. If pressure does not return to near atmospheric pressure, ECM determines that purge valve stuck closed	・Purge VSV ・Connector/wire harness (Purge VSV - ECM) ・ECM ・Pump module ・Leakage from EVAP system	While ignition Switch OFF	2 trip
P0441	Purge flow	While engine running, following conditions successively met: ・Negative pressure not created in EVAP system when purge VSV turned ON (open) ・EVAP system pressure change less than 0.5 kPa (3.75 mmHg) when vent valve turned ON (closed) ・Atmospheric pressure change before and after purge flow monitor less than 0.1 kPa (0.75 mmHg)	・Purge VSV ・Connector/wire harness (Purge VSV - ECM) ・Leakage from EVAP line (Purge VSV - Intake manifold) ・ECM	While engine running	2 trip

CIRCUIT DESCRIPTION

The circuit description can be found in the EVAP (Evaporative Emission) Inspection Procedure (see page 05-317).

INSPECTION PROCEDURE

Refer to the EVAP Inspection Procedure (see page 05-317).

MONITOR DESCRIPTION

The two monitors, Key-Off and Purge Flow, are used to detect malfunctions relating to DTC P0441. The Key-Of f monitor is initiated by the ECM internal timer, known as the soak timer, 5 hours* after the ignition switch is turned to OFF. The purge flow monitor runs while the engine is running.

1. KEY-OFF MONITOR

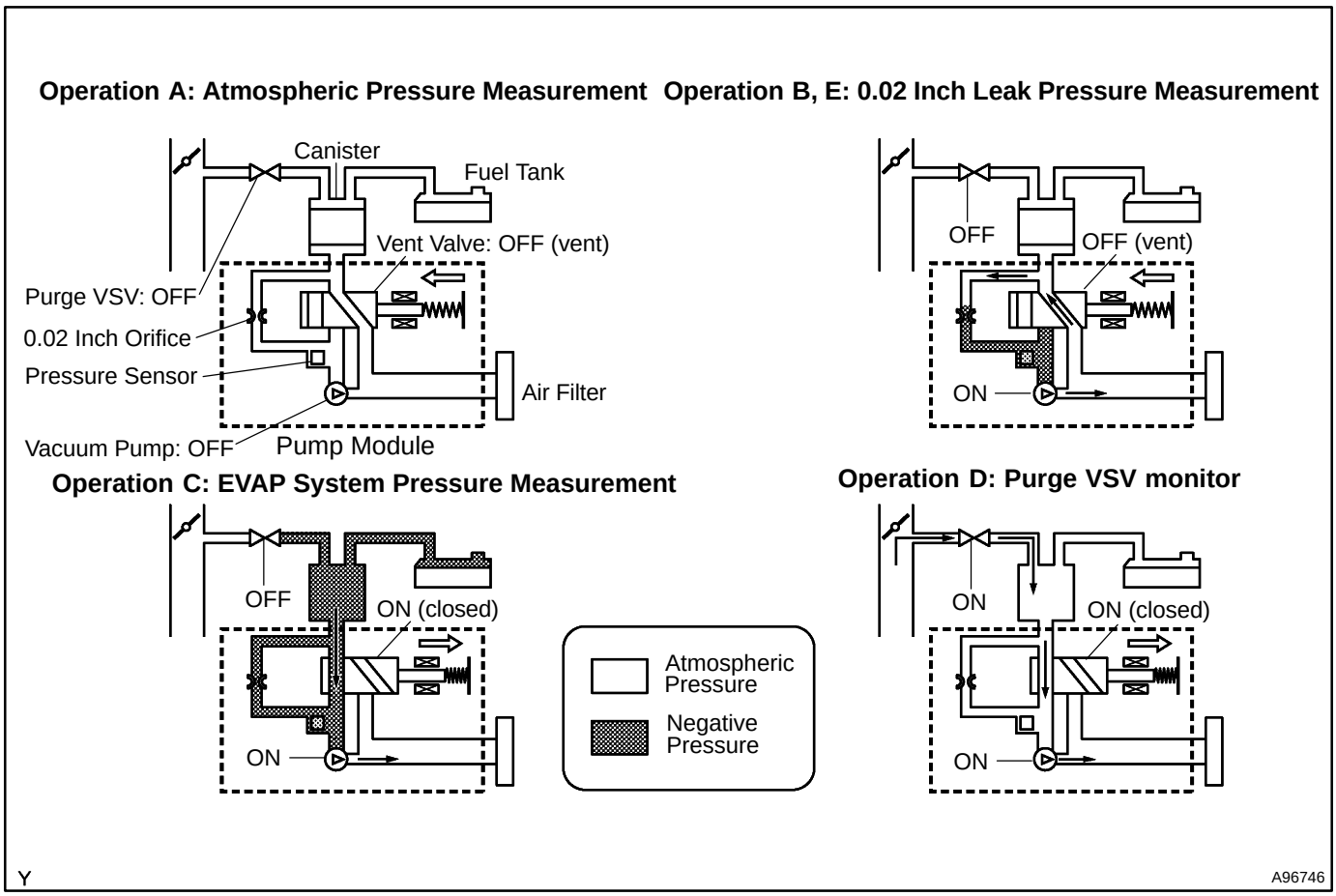
5 hours* after the ignition switch is turned OFF, the electric vacuum pump creates negative pressure (vacuum) in the EVAP (Evaporative Emission) system. The ECM monitors for leaks and actuator malfunctions based on the EVAP pressure.

HINT:

*: If the engine coolant temperature is not below 35°C (95°F) 5 hours after the ignition switch is turned off, the monitor check starts 2 hours later. If it is still not below 35°C (95°F) 7 hours after the ignition switch is turned off, the monitor check starts 2.5 hours later.

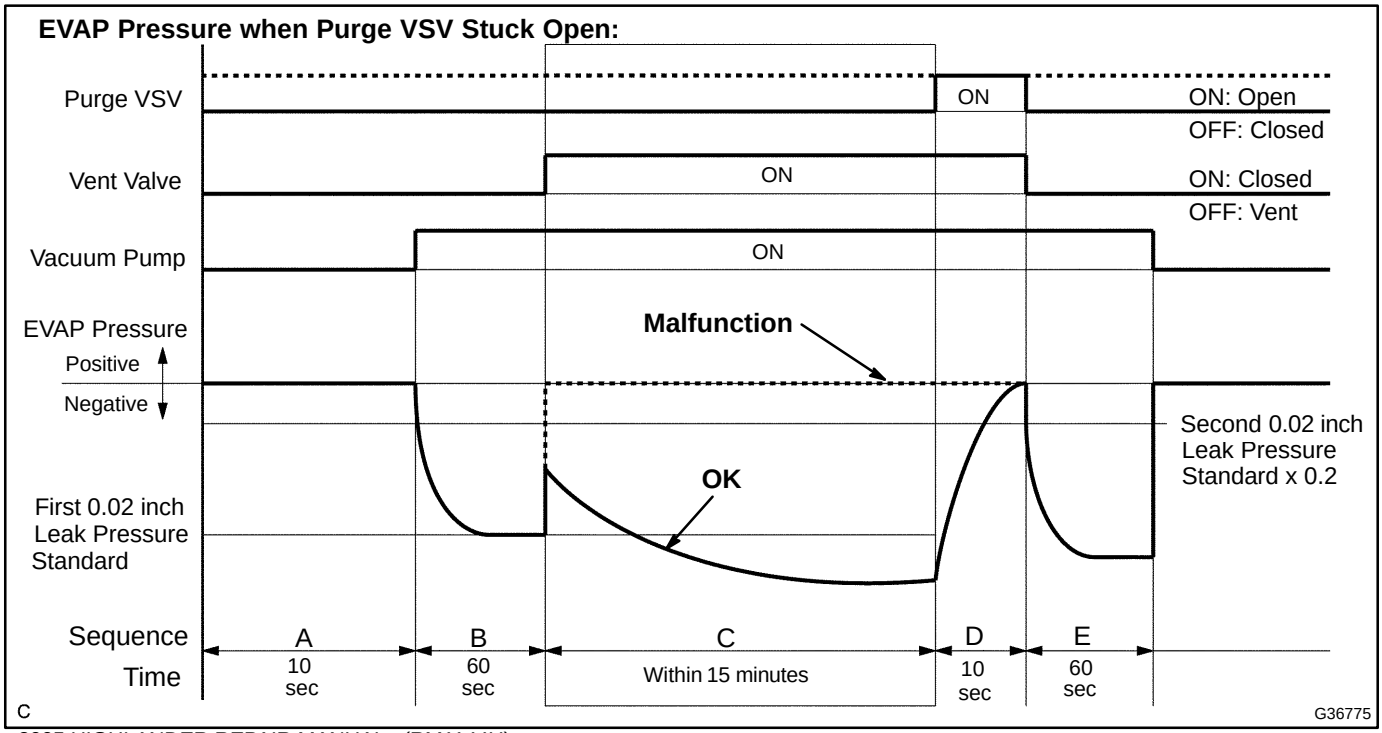
Sequence	Operations	Descriptions	Duration
-	ECM activation	Activated by soak timer, 5 hours (7 or 9.5 hours) after ignition switch turned to OFF.	-
A	Atmospheric pressure measurement	Vent valve turned OFF (vent) and EVAP system pressure measured by ECM in order to register atmospheric pressure. If EVAP pressure is not between 70 kPa and 110 kPa (525 mmHg and 825 mmHg), ECM cancels EVAP system monitor.	10 seconds
B	First 0.02 inch leak pressure measurement	In order to determine 0.02 inch leak pressure standard, vacuum pump creates negative pressure (vacuum) through 0.02 inch orifice and then ECM checks if vacuum pump and vent valve operate normally.	60 seconds
C	EVAP system pressure measurement	Vent valve turned ON (closed) to shut EVAP system. Negative pressure (vacuum) created in EVAP system, and EVAP system pressure then measured. Write down the measured value as it will be used in the leak check. If EVAP pressure does not stabilize within 15 minutes, ECM cancels EVAP system monitor.	15 minutes*
D	Purge VSV monitor	Purge VSV opened and then EVAP system pressure measured by ECM. Large increase indicates normal.	10 seconds
E	Second 0.02 inch leak pressure measurement	Leak check is performed after second 0.02 inch leak pressure standard is measured. If stabilized system pressure higher than second 0.02 inch leak pressure standard, ECM determines that EVAP system leaking.	60 seconds
F	Final check	Atmospheric pressure measured and then monitoring result recorded by ECM.	-

* If only a small amount of fuel is in the fuel tank, it takes longer for the EVAP pressure to stabilize.



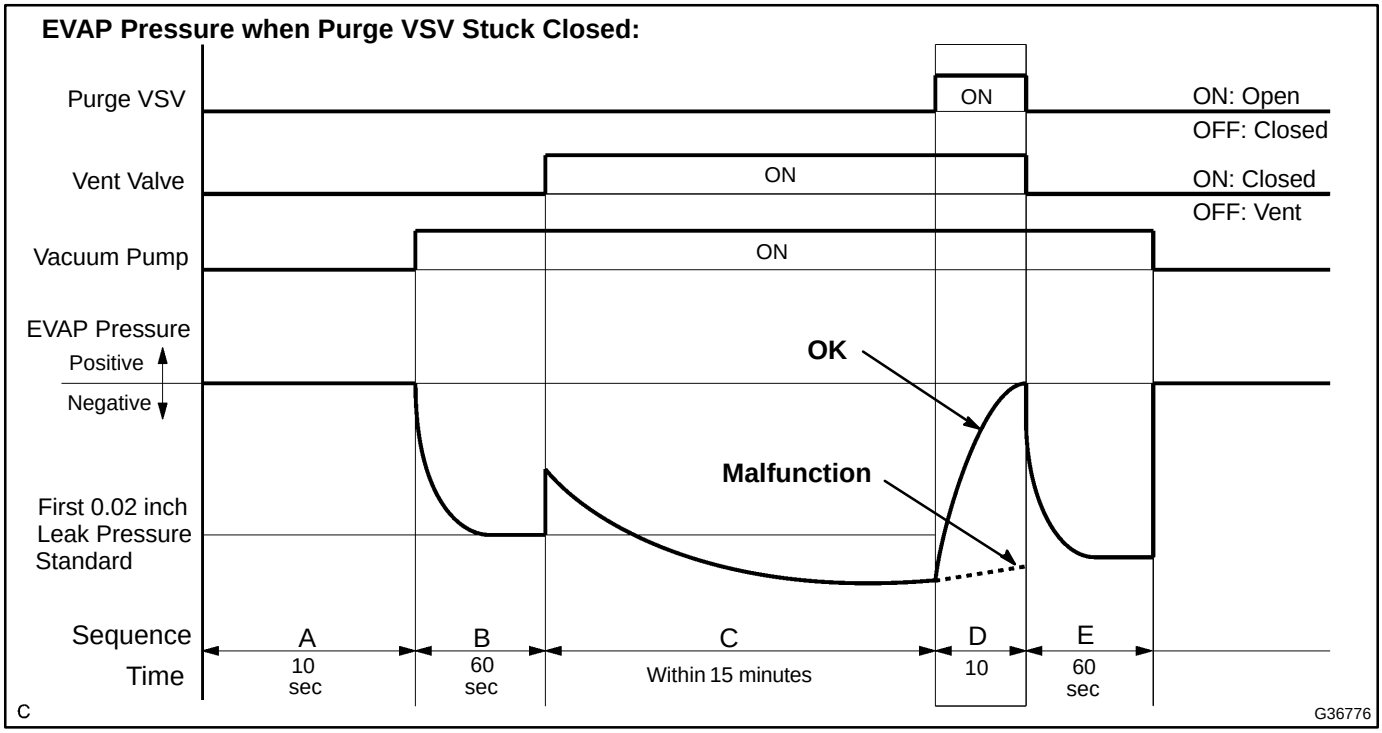
(a) Purge VSV stuck open

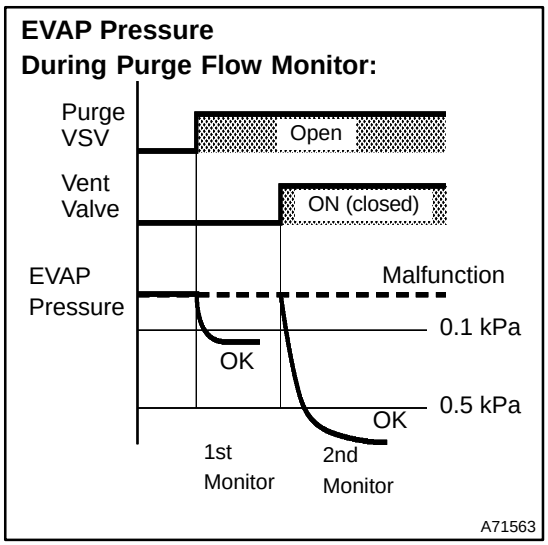
In operation C, the vacuum pump creates negative pressure (vacuum) in the EVAP (Evaporative Emission) system. The EVAP system pressure is then measured by the ECM using the pressure sensor. If the stabilized system pressure is higher than [second 0.02 inch leak pressure standard x 0.2], the ECM interprets this as the purge VSV (Vacuum Switching Valve) being stuck open. The ECM illuminates the MIL and sets the DTC (2 trip detection logic).



(b) Purge VSV stuck closed

In operation D, the pressure sensor measures the EVAP system pressure. The pressure measurement for purge VSV monitor is begun when the purge VSV is turned ON (open) after the EVAP leak check. When the measured pressure indicates an increase of 0.3 kPa (2.25 mmHg) or more, the purge VSV is functioning normally. If the pressure does not increase, the ECM interprets this as the purge VSV being stuck closed. The ECM illuminates the MIL and sets the DTC (2 trip detection logic).





2. PURGE FLOW MONITOR

The purge flow monitor consists of the two step monitors. The 1st monitor is conducted every time and the 2nd monitor is activated if necessary.

- The 1st monitor
  While the engine is running and the purge VSV (Vacuum Switching Valve) is ON (open), the ECM monitors the purge flow by measuring the EVAP pressure change. If negative pressure is not created, the ECM begins the 2nd monitor.
- The 2nd monitor
  The vent valve is turned ON (closed) and the EVAP pressure is then measured. If the variation in the pressure is less than 0.5 kPa (3.75 mmHg), the ECM interprets this as the purge VSV being stuck closed, and illuminates the MIL and sets DTC P0441 (2 trip detection logic).

Atmospheric pressure check:

In order to ensure reliable malfunction detection, the variation between the atmospheric pressures, before and after conduction of the purge flow monitor, is measured by the ECM.

OBD II MONITOR SPECIFICATIONS (Key-off Monitor)

Monitor Strategy

Required Sensors/Components	Purge VSV and pump module
Frequency of Operation	Once per driving cycle
Duration	Within 15 minutes (varies with fuel in tank)
MIL Operation	2 driving cycles
Sequence of Operation	None

Typical Enabling Conditions

The monitor will run whenever these DTCs are not present	See page 05-16
EVAP key-off monitor runs when all of the following conditions met	-
Atmospheric pressure	525 to 825 mmHg (70 to 110 kPa)
Battery voltage	10.5 V or more
Vehicle speed	Below 4 km/h (2.5 mph)
Ignition switch	OFF
Engine condition	Not running
Time after engine stopped	5 hours
FTP sensor malfunction (P0450, P0452, P0453)	Not detected
Purge VSV	Not operated by scan tool
Vent valve	Not operated by scan tool
Leak detection pump	Not operated by scan tool
Both of the following conditions are met before IG switch OFF:	Condition 1 and 2
1. Duration that vehicle is driven	5 min. or more
2. Purge flow	Executed
ECT	4.4 to 35°C (40 to 95°F)
IAT	4.4 to 35°C (40 to 95°F)

Example of re-start time

First time	7 hours
Second time	9 hours and 30 min.

Key-of f monitor sequence: 1 to 8

1. Atmospheric pressure

Next sequence is run if following condition met	-
Atmospheric pressure change for 10 sec.	Within 2.25 mmHg (0.3 kPa) for 1 sec.

2. First reference pressure

Next sequence is run if all of following conditions met	Condition 1, 2 and 3
1. FTP when 4 sec. after reference pressure measurement	-7.5 mmHg (-1 kPa) or less
2. Reference pressure	-36.47 to -7.93 mmHg (-4.85 to -1.057 kPa)
3. Reference pressure	Saturated

3. Vent valve stuck closed check

Next sequence is run if following condition met	-
FTP change for 10 sec. after vent valve ON (closed)	2.25 mmHg (0.3 kPa) or more

4. Vacuum introduction and leak

Next sequence is run if both of following conditions met	Condition 1 and 2
1. Vacuum introduction time	Within 15 min.
2. FTP	FTP was saturated

5. Purge VSV stuck closed check

Next sequence is run if following condition met	-
FTP change for 10 sec. after purge VSV ON (open)	2.25 mmHg (0.3 kPa) or more

6. Second reference pressure measurement

Next sequence is run if all of following conditions met	Condition 1, 2, 3 and 4
1. FTP when 4 sec. after reference pressure measurement	-7.5 mmHg (-1 kPa) or less
2. Reference pressure	-36.47 to -7.93 mmHg (-4.85 to -1.057 kPa)
3. Reference pressure	Saturated
4. Reference pressure difference between first and second	Less than 5.25 mmHg (0.7 kPa)

7. Leak check

Next sequence is run if following condition met	-
FTP when vacuum introduction was complete	Lower than second reference pressure

8. Atmospheric pressure

Monitor is complete if following	-
Atmospheric pressure difference between sequence 1 and 8	Within 2.25 mmHg (0.3 kPa)

Typical Malfunction Thresholds

Purge VSV stuck open

FTP when vacuum introduction was complete	Higher than reference pressure x 0.2

Purge VSV stuck closed

FTP change for 10 seconds after purge VSV ON (open)	Less than 2.25 mmHg (0.3 kPa)

OBD II MONITOR SPECIFICATIONS (Purge Flow Monitor)

Monitor Strategy

Required Sensors/Components	Purge VSV and pump module
Frequency of Operation	Once per driving cycle
Duration	Within 30 seconds
MIL Operation	2 driving cycles
Sequence Operation	None

Typical Enabling Conditions

The monitor will run whenever these DTCs are not present	See page 05-16
Engine	Running
ECT	4.4°C (40°F) or more
IAT	4.4°C (40°F) or more
FTP sensor malfunction	Not detected
Purge VSV	Not operated by scan tool
EVAP system check	Not operated by scan tool
Battery voltage	10 V or more
Purge duty cycle	8 % or more

Typical Malfunction Thresholds

Both of the following conditions are met:	Condition 1 or 2
1. FTP change when purge operation is started	Less than 0.75 mmHg (0.1 kPa)
2. FTP change during purge operation when vent valve is closed	Less than 3.75 mmHg (0.5 kPa)

MONITOR RESULT (MODE 06)

Refer to page 05-317 for detailed information on Monitor Result.

DTC	P0450	EVAPORATIVE EMISSION CONTROL SYSTEM PRESSURE SENSOR/SWITCH

DTC	P0451	EVAPORATIVE EMISSION CONTROL SYSTEM PRESSURE SENSOR RANGE/PERFORMANCE

DTC	P0452	EVAPORATIVE EMISSION CONTROL SYSTEM PRESSURE SENSOR/SWITCH LOW INPUT

DTC	P0453	EVAPORATIVE EMISSION CONTROL SYSTEM PRESSURE SENSOR/SWITCH HIGH INPUT

DTC SUMMARY

DTC	Monitoring Items	Malfunction Detection Conditions	Trouble Areas	Detection Timings	Detection Logic
P0450	Pressure sensor voltage abnormal fluctuation	Sensor output voltage rapidly fluctuates beyond upper and lower malfunction thresholds for 0.5 seconds.	・Pump module ・Connector/Wire harness (Pump module - ECM) ・ECM	・EVAP monitoring (ignition OFF) ・Ignition ON	1 trip
P0451	Pressure sensor noising	Sensor output voltage fluctuates frequently in certain time period.	・Pump module ・Connector/Wire harness (Pump module - ECM) ・ECM	・EVAP monitoring (ignition OFF) ・Engine running	2 trip
P0451	Pressure sensor stuck	Sensor output voltage does vary in certain time period.	・Pump module ・Connector/Wire harness (Pump module - ECM) ・ECM	・EVAP monitoring (ignition OFF)	2 trip
P0452	Pressure sensor voltage low	Sensor output voltage is less than 0.45 V for 0.5 seconds.	・Pump module ・Connector/Wire harness (Pump module - ECM) ・ECM	・Ignition ON ・EVAP monitoring (ignition OFF)	1 trip
P0453	Pressure sensor voltage high	Sensor output voltage is more than 4.9 V for 0.5 seconds.	・Pump module ・Connector/Wire harness (Pump module - ECM) ・ECM	・Ignition ON ・EVAP monitoring (ignition OFF)	1 trip

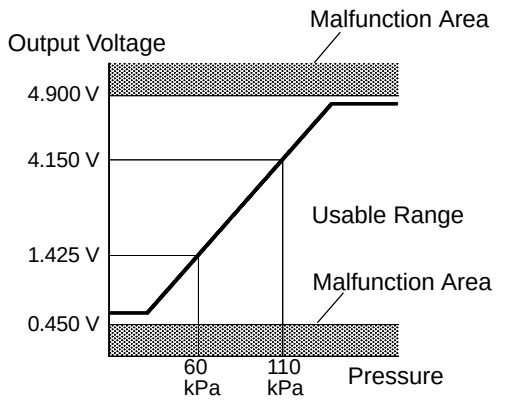
HINT:
The pressure sensor is built into the pump module.

CIRCUIT DESCRIPTION

The circuit description can be found in the EVAP (Evaporative Emission) Inspection Procedure (see page 05-317).

MONITOR DESCRIPTION

Pressure Sensor Specification:



HINT:
Standard atmospheric pressure is 101.3 kPa

(a) DTC P0450: Pressure sensor voltage abnormal fluctuation.
If the pressure sensor voltage output rapidly fluctuates between less than 0.45 V and more than 4.9 V, the ECM interprets this as an open or short circuit malfunction in the pressure sensor or its circuit, and stops the EVAP (Evaporative Emission) system monitor. The ECM then illuminates the MIL and sets the DTC (1 trip detection logic).

(b) DTC P0451: Pressure sensor noising or stuck
If the pressure sensor voltage output fluctuates rapidly for 10 seconds, the ECM stops the EVAP system monitor. The ECM interprets this as noise from the pressure sensor, and stops the EVAP system monitor. The ECM then illuminates the MIL and sets the DTC.
Alternatively, if the sensor voltage output does not change for 10 seconds, the ECM interprets this as the sensor being stuck, and stops the monitor. The ECM then illuminates the MIL and sets the DTC.
(Both the malfunctions are detected by 2 trip detection logic)

(c) DTC P0452: Pressure sensor voltage low
If the pressure sensor voltage output is below 0.45 V, the ECM interprets this as an open or short circuit malfunction in the pressure sensor or its circuit, and stops the EVAP system monitor. The ECM then illuminates the MIL and sets the DTC (1 trip detection logic).

(d) DTC P0453: Pressure sensor voltage high
If the pressure sensor voltage output is 4.9 V or more, the ECM interprets this as an open or short circuit malfunction in the pressure sensor or its circuit, and stops the EVAP system monitor. The ECM then illuminates the MIL and sets the DTC (1 trip detection logic).

OBD II MONITOR SPECIFICATIONS

Monitor Strategy

Required Sensors/Components	Pump module
Frequency of Operation	Once per driving cycle: P0451 FTP sensor output "Stuck" Continuous: P0451 FTP sensor "Noise", P0450, P0452 and P0453
Duration	0.5 sec.: P0450, P0452 and P0453 10 sec.: P0451
MIL Operation	Immediate: P0450, P0452 and P0453 2 driving cycles: P0451
Sequence of Operation	None

Typical Enabling Conditions

P0451: FTP sensor "Noise"

Monitor runs whenever these DTCs are not present	See page 05-16
Atmospheric pressure (absolute pressure)	70 kPa (525 mmHg) or more, less than 110 kPa (825 mmHg)
Battery voltage	10.5 V or more
Intake air temperature	4.4°C to 35°C (40°F to 95°F)
FTP sensor malfunction (P0450, P0452, P0453)	Not detected
Either of following conditions is met:	Condition 1 or 2
1. Engine	Running
2. Time after engine stopped	5 hours

Example of re-start time

First time	7 hours
Second time	9 hours and 30 min.

P0451: FTP sensor output "Stuck"

Monitor runs whenever these DTCs are not present	See page 05-16
Battery voltage	10.5 V or more
Intake air temperature	4.4°C to 35°C (40°F to 95°F)
FTP sensor malfunction (P0450, P0452, P0453)	Not detected
Atmospheric pressure (absolute pressure)	Less than 70 kPa (525 mmHg), or 110 kPa (825 mmHg) or more
Time after engine stopped	5 hours

Example of re-start time

First time	7 hours
Second time	9 hours and 30 min.

P0450, P0452 and P0453:

Monitor runs whenever these DTCs are not present	See page 05-16
Ignition switch	ON
Battery voltage	8 V or more
Starter	OFF

Typical Malfunction Thresholds

P0450: Pressure sensor chattering

Pressure sensor voltage	Less than 0.45 V, or more than 4.9 V

P0451: FTP sensor "Noise"

Frequency that FTP change is 2.25 mmHg (0.3 kPa) or more	10 times or more in 10 sec.

P0451: FTP sensor output "Stuck"

FTP change for 10 sec. during EVAP monitor (Reference pressure)	Less than 4.88 mmHg (0.65 kPa)

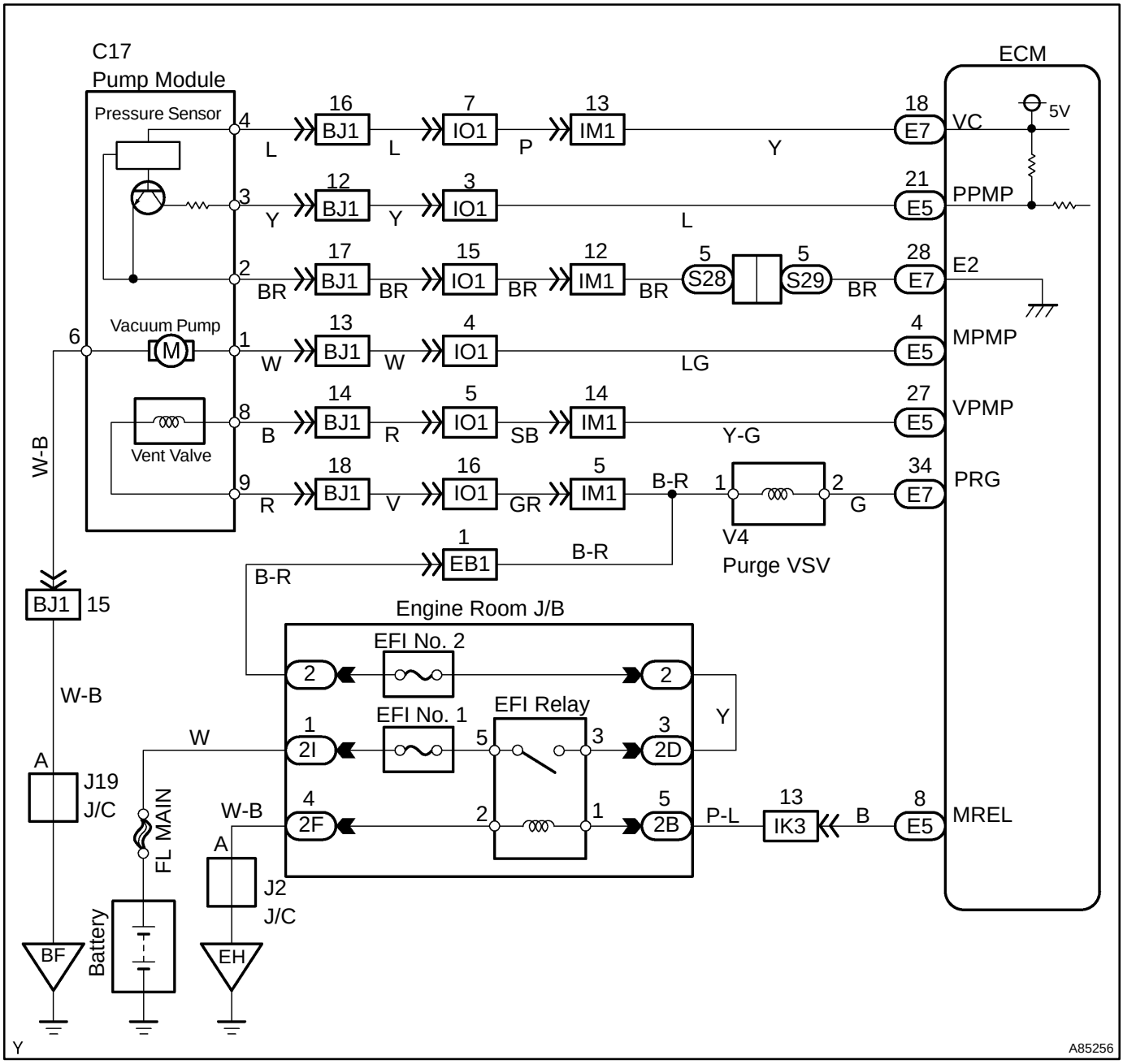
P0452: Pressure sensor low voltage

Pressure sensor voltage	Less than 0.45 V

P0453: Pressure sensor high voltage

Pressure sensor voltage	More than 4.9 V

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

- **When a vehicle is brought into the workshop, leave it as it is. Do not change the vehicle condition. For example, do not tighten the fuel tank cap.**
- **Do not disassemble the pump module.**
- **A hand-held tester is required to conduct the following diagnostic troubleshooting procedure.**

1 CONFIRM DTC AND EVAP PRESSURE

(a) Connect a hand-held tester to the DLC3.
(b) Turn the ignition switch to ON (do not start the engine).
(c) Turn the tester ON.
(d) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(e) Read DTCs.
(f) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / VAPOR PRESS.
(g) Read the EVAP (Evaporative Emission) pressure displayed on the tester.

Result:

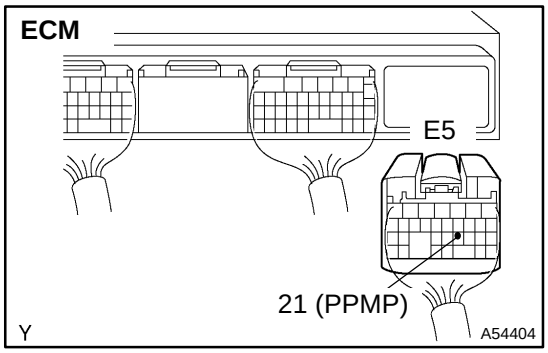
Display (DTC Output)	Test Results	Suspected Trouble Areas	Proceed To
P0451	—	• Pressure sensor	C
P0452	Less than 45 kpa (430 mmHg)	• Wire harness/connector (ECM - pressure sensor) • Pressure sensor • Short in ECM circuit	A
P0453	More than 120 kPa (900 mmHg)	• Wire harness/connector (ECM - pressure sensor) • Pressure sensor • Open in ECM circuit	B

B → **Go to step 4**

C → **Go to EVAP INSPECTION PROCEDURE (See page 05-317)**

A

2	CHECK HARNESS AND CONNECTOR(PUMP MODULE - ECM)



(a) Turn the ignition switch to OFF.
(b) Disconnect the E5 ECM connector.
(c) Measure the resistance between PPMP terminal of the ECM connector and the body ground.

Result:

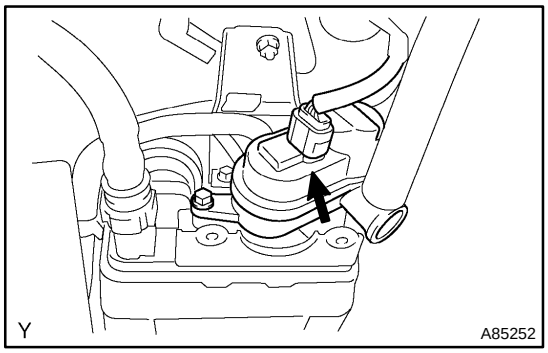
Test Results	Suspected Trouble Areas	Proceed To
10 Ω or less	・Wire harness/connector (ECM - pressure sensor) ・Short in pressure sensor circuit	A
10 kΩ or more	・Wire harness/connector (ECM - pressure sensor) ・Short in ECM circuit	B

(d) Reconnect the ECM connector.

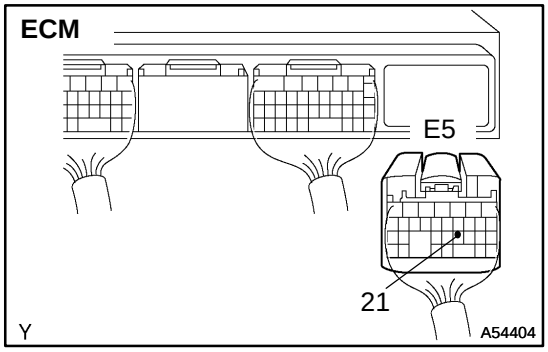
B → **Go to step 7**

A

3	CHECK HARNESS AND CONNECTOR(PUMP MODULE - ECM)



(a) Remove the exhaust tail pipe.
(b) Remove the heat insulator under the canister.
(c) Disconnect the canister connector.
(d) Disconnect the E5 ECM connector.
(e) Check the resistance between PPMP terminal of the ECM connector and the body ground.



Result:

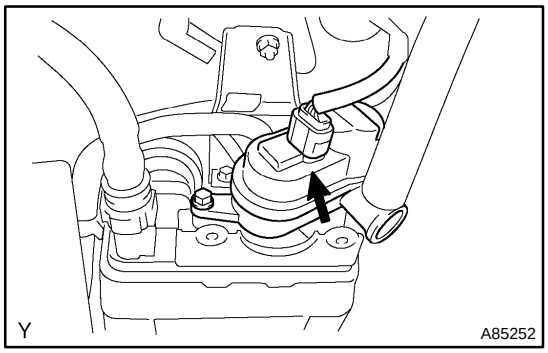
Test Results	Suspected Trouble Areas	Proceed To
10 kΩ or more	Short in pressure sensor circuit	A
10 Ω or less	Short in wire harness/connector (ECM - pressure sensor)	B

(f) Reconnect the canister connector.
(g) Reconnect the ECM connector.

A → **Go to step 5**

B → **Go to step 6**

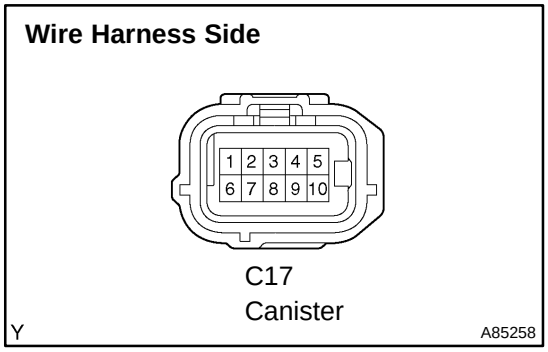
4 CHECK HARNESS AND CONNECTOR(PUMP MODULE - ECM)



(a) Turn the ignition switch to OFF.
(b) Remove the exhaust tail pipe.
(c) Remove the heat insulator under the canister.
(d) Disconnect the canister connector.
(e) Turn the ignition switch to ON.
(f) Measure the voltage and resistance of the C17 connector.

Standard:

Terminal No.	Specified Condition
C17-4 - Body ground	Between 4.5 V and 5.5 V
C17-3 - Body ground	Between 4.5 V and 5.5 V
C17-2 - Body ground	Below 1 Ω



Result:

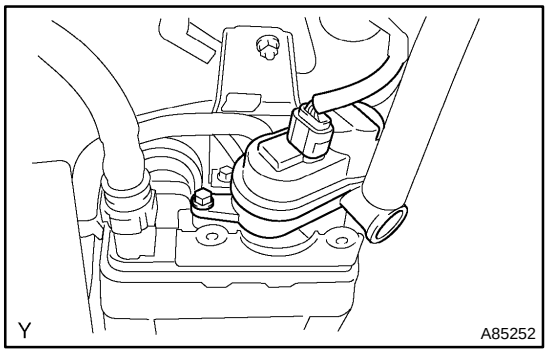
Test Results	Suspected Trouble Areas	Proceed To
Voltage and resistance within standard ranges	Open in pressure sensor circuit	A
Voltage and resistance outside standard ranges	Open in wire harness/connector (ECM - pressure sensor)	B

(g) Reconnect the canister connector.

A → **Go to step 5**

B → **Go to step 6**

5	REPLACE PUMP MODULE



(a) Remove the exhaust tail pipe.
(b) Remove the heat insulator under the canister.
(c) Disconnect the hoses and the connector.
(d) Remove the 3 bolts and the pump module with the O-ring.
(e) Install a new pump module with a new O-ring.
(f) Install the 3 bolts.
(g) Connect the hoses and the connector.
(h) Go to the next step before installing the exhaust tail pipe.

NEXT | Go to step 8

6	REPAIR OR REPLACE WIRE HARNESS AND CONNECTOR

HINT:
If the exhaust tail pipe has been removed, go to the next step before reinstalling it.

NEXT | Go to step 8

7	REPLACE ECM (see page 10-9)

NEXT | Go to step 8

8	CONFIRM DTC (AFTER REPAIR)

(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch to ON and turn the tester ON.
(c) Wait for at least 60 seconds.
(d) On the tester, select the following menu items: DIAGNOSIS /ENHANCED OBD II /DTC INFO /PENDING CODES.

HINT:
If no pending DTC is displayed on the tester, the repair has been successfully completed.

NEXT

COMPLETED

DTC	P0455	EVAPORATIVE EMISSION CONTROL SYSTEM LEAK DETECTED (GROSS LEAK)

DTC	P0456	EVAPORATIVE EMISSION CONTROL SYSTEM LEAK DETECTED (VERY SMALL LEAK)

DTC SUMMARY

DTC	Monitoring Items	Malfunction Detection Conditions	Trouble Areas	Detection Timings	Detection Logic
P0455	EVAP gross leak	Vacuum pump creates negative pressure (vacuum) in EVAP system and EVAP system pressure measured. 0.02 inch leak pressure standard is measured at the start and at the end of the leak check. If stabilized pressure higher than [second 0.02 inch leak pressure standard x 0.2], ECM determines that EVAP system has large leakage.	・Fuel tank cap (loose) ・Leakage from EVAP line (Canister - Fuel tank) ・Leakage from EVAP line (Purge VSV - Canister) ・Pump module ・Leakage from fuel tank ・Leakage from canister	While ignition switch OFF	2 trip
P0456	EVAP small leak	Vacuum pump creates negative pressure (vacuum) in EVAP system and EVAP system pressure measured. 0.02 inch leak pressure standard is measured at the start and at the end of the leak check. If stabilized pressure larger than second 0.02 inch leak pressure, ECM determines that EVAP system has small leakage.	Same above	While ignition switch OFF	2 trip

CIRCUIT DESCRIPTION

The circuit description can be found in the EVAP (Evaporative Emission) Inspection Procedure (see page 05-317).

INSPECTION PROCEDURE

Refer to the EVAP Inspection Procedure (see page 05-317).

MONITOR DESCRIPTION

5 hours* after the ignition switch is turned OFF, the electric vacuum pump creates negative pressure (vacuum) in the EVAP (Evaporative Emission) system. The ECM monitors for leaks and actuator malfunctions based on the EVAP pressure.

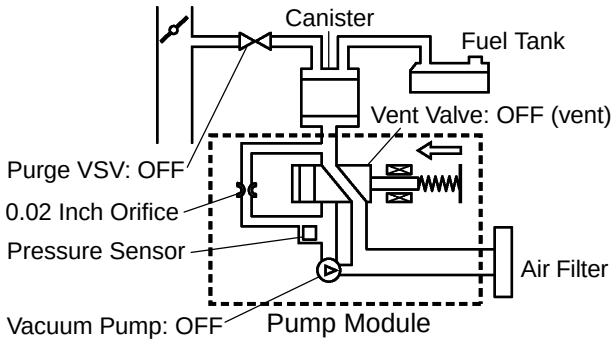
HINT:

*: If the engine coolant temperature is not below 35°C (95°F) 5 hours after the ignition switch is turned off, the monitor check starts 2 hours later. If it is still not below 35°C (95°F) 7 hours after the ignition switch is turned off, the monitor check starts 2.5 hours later.

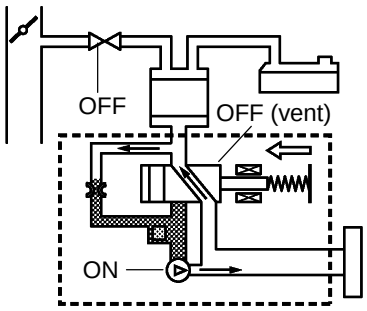
Sequence	Operations	Descriptions	Duration
-	ECM activation	Activated by soak timer, 5 hours (7 or 9.5 hours) after ignition switch turned to OFF.	-
A	Atmospheric pressure measurement	Vent valve turned OFF (vent) and EVAP system pressure measured by ECM in order to register atmospheric pressure. If EVAP pressure is not between 70 kPa and 110 kPa (525 mmHg and 825 mmHg), ECM cancels EVAP system monitor.	10 seconds
B	First 0.02 inch leak pressure measurement	In order to determine 0.02 inch leak pressure standard, vacuum pump creates negative pressure (vacuum) through 0.02 inch orifice and them ECM checks if vacuum pump and vent valve operate normally.	60 seconds
C	EVAP system pressure measurement	Vent valve turned ON (closed) to shut EVAP system. Negative pressure (vacuum) created in EVAP system, and EVAP system pressure then measured. Write down the measured value as it will be used in the leak check. If EVAP pressure does not stabilize within 15 minutes, ECM cancels EVAP system monitor.	15 minutes*
D	Purge VSV monitor	Purge VSV opened and then EVAP system pressure measured by ECM. Large increase indicates normal.	10 seconds
E	Second 0.02 inch leak pressure measurement	Leak check is performed after second 0.02 inch leak pressure standard is measured. If stabilized system pressure higher than second 0.02 inch leak pressure standard, ECM determines that EVAP system leaking.	60 seconds
F	Final check	Atmospheric pressure measured and then monitoring result recorded by ECM.	-

* If only a small amount of fuel is in the fuel tank, it takes longer for the EVAP pressure to stabilize.

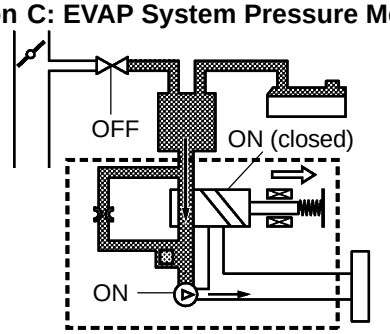
Operation A: Atmospheric Pressure Measurement

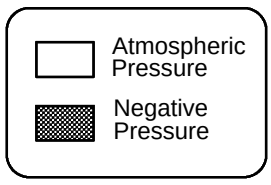


Operation B, E: 0.02 Inch Leak Pressure Measurement

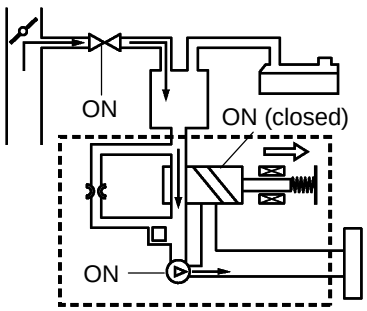


Operation C: EVAP System Pressure Measurement



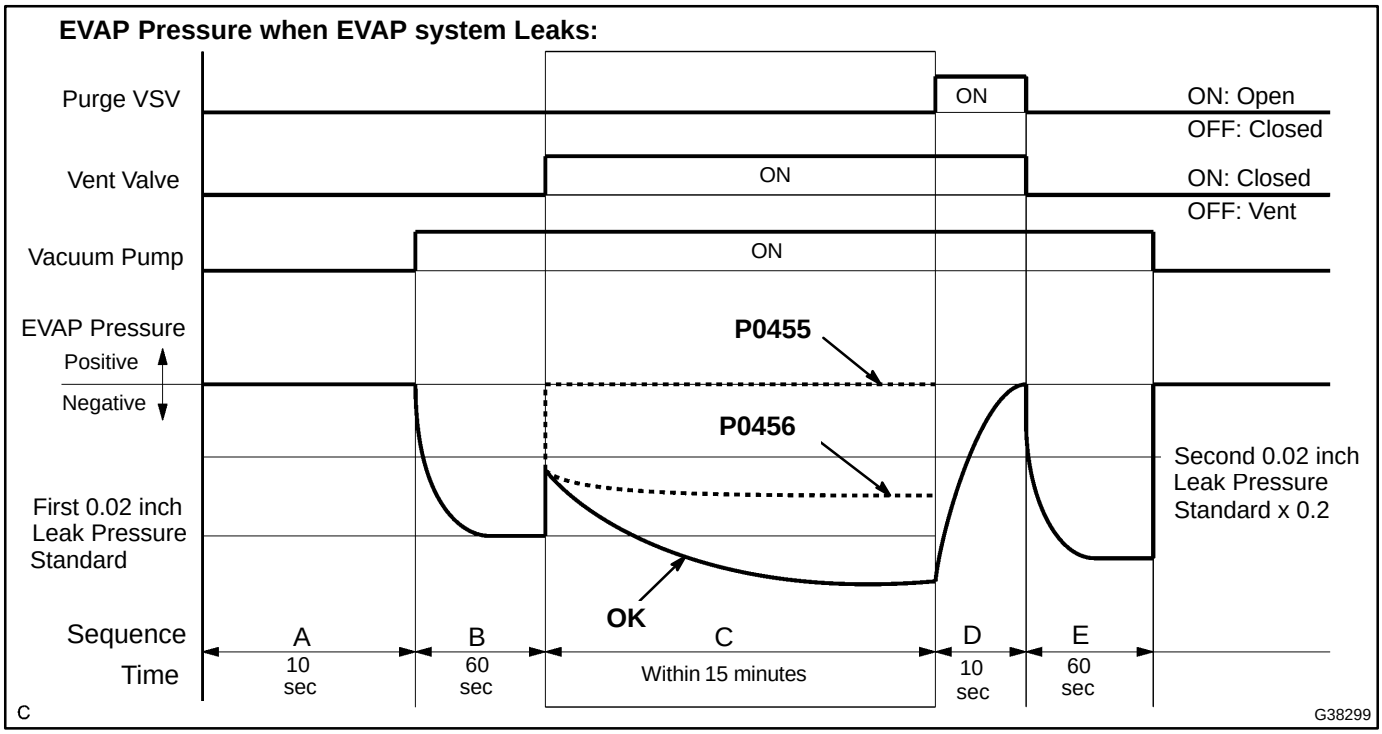


Operation D: Purge VSV monitor



A96746

(a) P0455: EVAP (Evaporative Emission) gross leak
In operation C, the vacuum pump creates negative pressure (vacuum) in the EVAP system and the EVAP system pressure is measured. If the stabilized system pressure is higher than [second 0.02 inch leak pressure standard x 0.2] (near atmospheric pressure), the ECM determines that the EVAP system has a large leakage, illuminates the MIL and sets the DTC (2 trip detection logic).
(b) P0456: EVAP very small leak
In operation C, the vacuum pump creates negative pressure (vacuum) in the EVAP system and the EVAP system pressure is measured. If the stabilized system pressure is higher than second 0.02 inch leak pressure standard, the ECM determines that the EVAP system has a small leakage, illuminates the MIL and sets the DTC (2 trip detection logic).



OBD II MONITOR SPECIFICATIONS

Monitor Strategy

Required Sensors/Components	Purge VSV and pump module
Frequency of Operation	Once per driving cycle
Duration	Within 15 minutes (varies with amount of fuel in tank)
MIL Operation	2 driving cycles
Sequence of Operation	None

Typical Enabling Conditions

The monitor will run whenever these DTCs are not present	See page 05-16
EVAP key-off monitor runs when all of the following conditions met	-
Atomspheric pressure	525 to 825 mmHg (70 to 110 kPa)
Battery voltage	10.5 V or more
Vehicle speed	Below 4 km/h (2.5 mph)
Ignition switch	OFF
Engine condition	Not running
Time after engine stopped	5 hours
FTP sensor malfunction (P0450, P0452, P0453)	Not detected
Purge VSV	Not operated by scan tool
Vent valve	Not operated by scan tool

Leak detection pump	Not operated by scan tool
Both of the following conditions are met before IG switch OFF	Condition 1 and 2
1. Duration that vehicle is driven	5 min. or more
2. Purge flow	Executed
ECT	4.4 to 35°C (40 to 95°F)
IAT	4.4 to 35°C (40 to 95°F)

Example of re-start time

First time	7 hours
Second time	9 hours and 30 min.

Key-of f monitor sequence: 1 to 8

1. Atmospheric pressure

Next sequence is run if following condition met	-
Atmospheric pressure change for 10 sec.	Within 2.25 mmHg (0.3 kPa) for 1 sec.

2. First reference pressure

Next sequence is run if all of following conditions met	Condition 1, 2 and 3
1. FTP when 4 sec. after reference pressure measurement	-7.5 mmHg (-1 kPa) or less
2. Reference pressure	-36.47 to -7.93 mmHg (-4.85 to -1.057 kPa)
3. Reference pressure	Saturated

3. Vent valve stuck closed check

Next sequence is run if following condition met	-
FTP change for 10 sec. after vent valve ON (closed)	2.25 mmHg (0.3 kPa) or more

4. Vacuum introduction and leak

Next sequence is run if both of following conditions met	Condition 1 and 2
1. Vacuum introduction time	Within 15 min.
2. FTP	FTP was saturated

5. Purge VSV stuck closed check

Next sequence is run if following condition met	-
FTP change for 10 sec. after purge VSV ON (open)	2.25 mmHg (0.3 kPa) or more

6. Second reference pressure measurement

Next sequence is run if all of following conditions met	Condition 1, 2, 3 and 4
1. FTP when 4 sec. after reference pressure measurement	-7.5 mmHg (-1 kPa) or less
2. Reference pressure	-36.47 to -7.93 mmHg (-4.85 to -1.057 kPa)
3. Reference pressure	Saturated
4. Reference pressure difference between first and second	Less than 5.25 mmHg (0.7 kPa)

7. Leak check

Next sequence is run if following condition met	-
FTP when vacuum introduction was complete	Lower than second reference pressure

8. Atmospheric pressure

Monitor is complete if following	-
Atmospheric pressure difference between sequence 1 and 8	Within 2.25 mmHg (0.3 kPa)

Typical Malfunction Thresholds

P0455: EVAP gross leak

FTP when vacuum introduction was complete	Higher than reference pressure x 0.2

P0456: EVAP small leak

FTP when vacuum introduction was complete	Between 1 and 2
Condition 1	Higher than second reference pressure
Condition 2	Lower than reference pressure x 0.2

MONITOR RESULT (MODE 06)

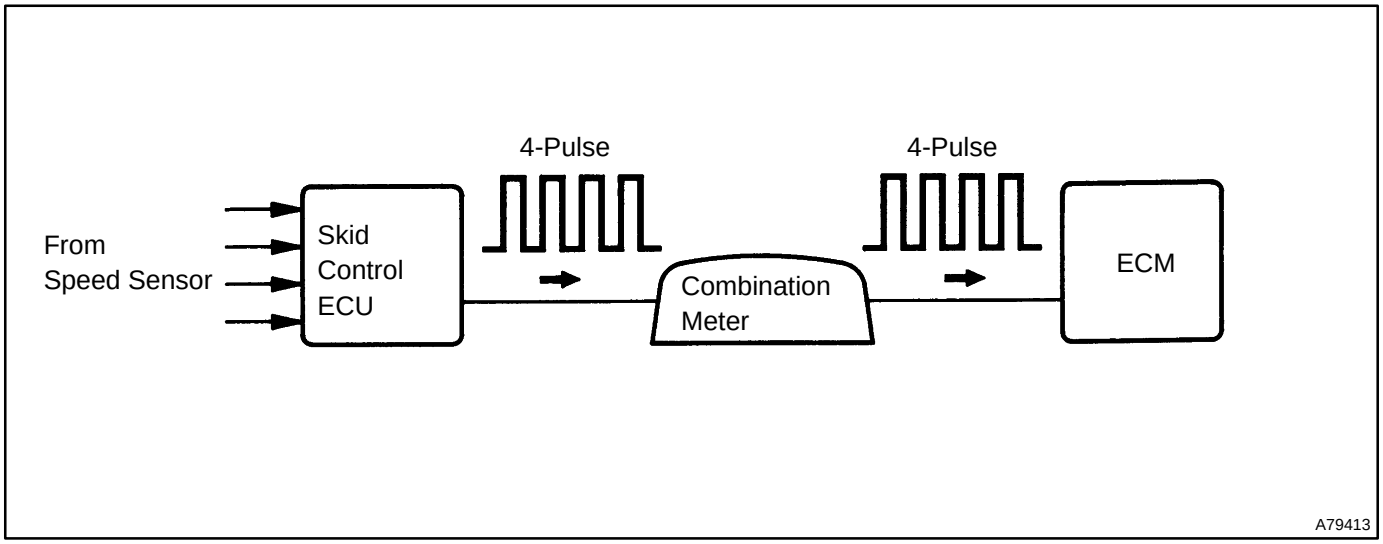
Refer to page 05-317 for detailed information on Monitor Result.

DTC	P0500	VEHICLE SPEED SENSOR ”A”

DTC	P0503	VEHICLE SPEED SENSOR ”A” INTERMITTENT/ERRATIC/HIGH

CIRCUIT DESCRIPTION

The speed sensor detects the wheel speed and sends the appropriate signals to the skid control ECU. The skid control ECU converts these wheel speed signals into a 4-pulse signal and outputs it to the ECM via the combination meter. The ECM determines the vehicle speed based on the frequency of these pulse signals.



DTC No.	DTC Detection Condition	Trouble Area
P0500 P0503	The ECM detects the following conditions simultaneously for 2 seconds (1 trip detection logic): ・No SPD (speed sensor) signal is output when ECM detects NC (transmission counter gear) signal is more than 300 rpm. ・Park/Neutral position switch is OFF (when shift lever is in other than P and N positions)	・Open or short in speed sensor circuit ・Speed sensor ・Combination meter ・ECM ・Skid control ECU

MONITOR DESCRIPTION

The ECM assumes that the vehicle is being driven when the transmission counter gear indicates more than 300 rpm and over 30 seconds have passed since the park/neutral position switch was turned OFF. If there is no signal from the vehicle speed sensor with these conditions satisfied, the ECM concludes that the vehicle speed sensor is malfunctioning. The ECM will turn on the MIL and will set a DTC.

MONITOR STRATEGY

Related DTCs	P0500: VSS Circuit
Required sensors/ components (Main)	Vehicle speed sensor (VSS), Combination meter, ABS ECU
Required sensors / components (Related)	Transmission counter gear Speed (CS) sensor, PNP switch, ECT sensor
Frequency of operation	Continuous
Duration	2 seconds
MIL operation	Immediate
Sequence of operation	None

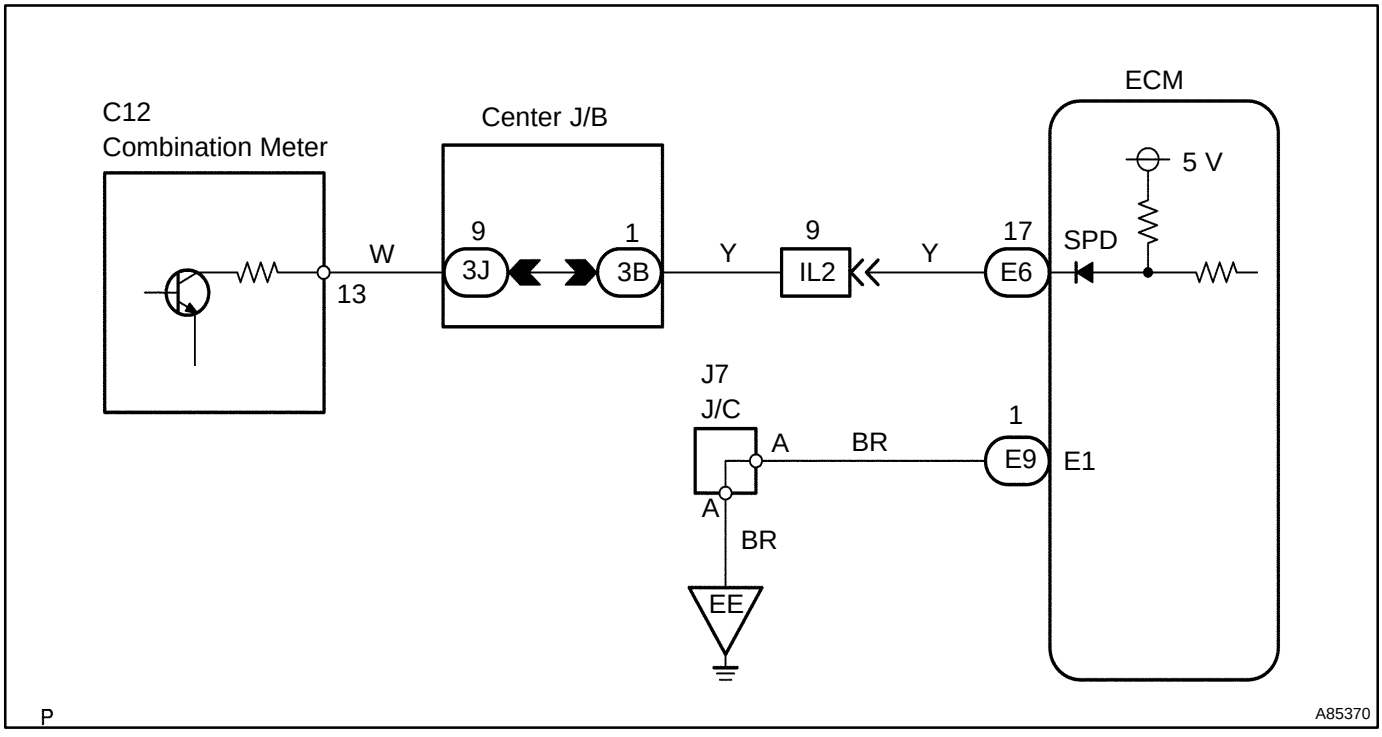
TYPICAL ENABLING CONDITIONS

The monitor will run whenever these DTCs are not present	See page 05-16
Transmission counter gear speed	300 rpm or more
Engine condition	Running
Ignition switch	ON
Battery voltage	8 V or more
Starter	OFF
Either of the following conditions is met:	Condition 1 and 2
Condition 1:	-
Time after PNP switch turns from ON to OFF	2 sec. or more
ECT and ECT sensor	ECT is 20°C (68°F) or more and ECT sensor dose not malfunction (P0115 or P0116)
Condition 2:	-
Time after PNP switch turns from ON to OFF	30 sec. or more
ECT and ECT sensor	ECT is less than 20°C (68°F) or ECT sensor fail is detected (P0115 or P0116)

TYPICAL MALFUNCTION THRESHOLDS

Sensor signal	No pulse input

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	CHECK OPERATION OF SPEEDOMETER

(a) Drive the vehicle and check if operation of the speedometer in the combination meter is normal.

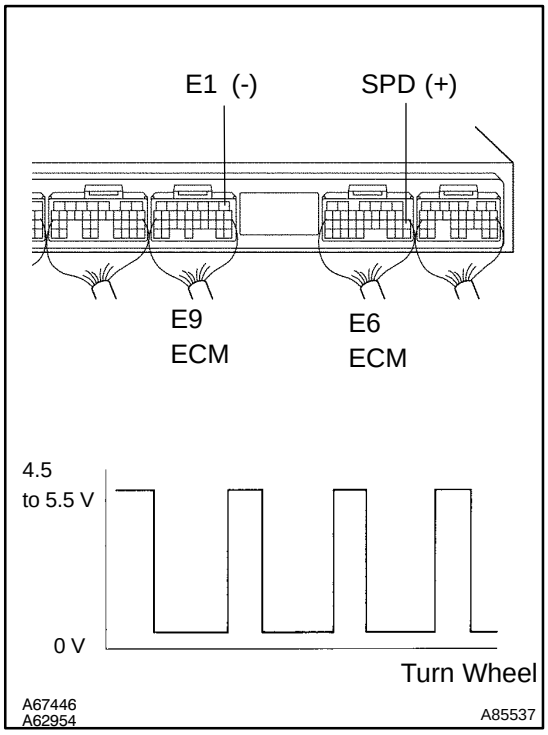
HINT:

The vehicle speed sensor is operating normally if the speedometer display is normal.

NG → **CHECK SPEEDOMETER CIRCUIT (See page 05-1885)**

OK

2	INSPECT ECM (SPD VOLTAGE)



(a) Shift the lever to the neutral position.

(b) Jack up the vehicle.

(c) Turn the ignition switch ON.

(d) Measure the voltage of the ECM connectors as the wheel is turned slowly.

Standard:

Tester Connection	Specified Condition
E6-17 (SPD) - E9-1 (E1)	Generated intermittently

HINT:

The output voltage should fluctuate up and down similarly to the diagram on the left when the wheel is turned slowly.

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE ECM (See page 10-9)

DTC P0504 BRAKE SWITCH "A"/"B" CORRELATION

CIRCUIT DESCRIPTION

In addition to turning on the stop lamp, the stop lamp switch signals are used for a variety of engine, transmission, and suspension functions as well as being an input for diagnostic checks. It is important that the switch operates properly, therefore this switch is designed with two complementary signal outputs: STP and ST1. The ECM analyzes these signal outputs to detect malfunctions in the stop lamp switch.

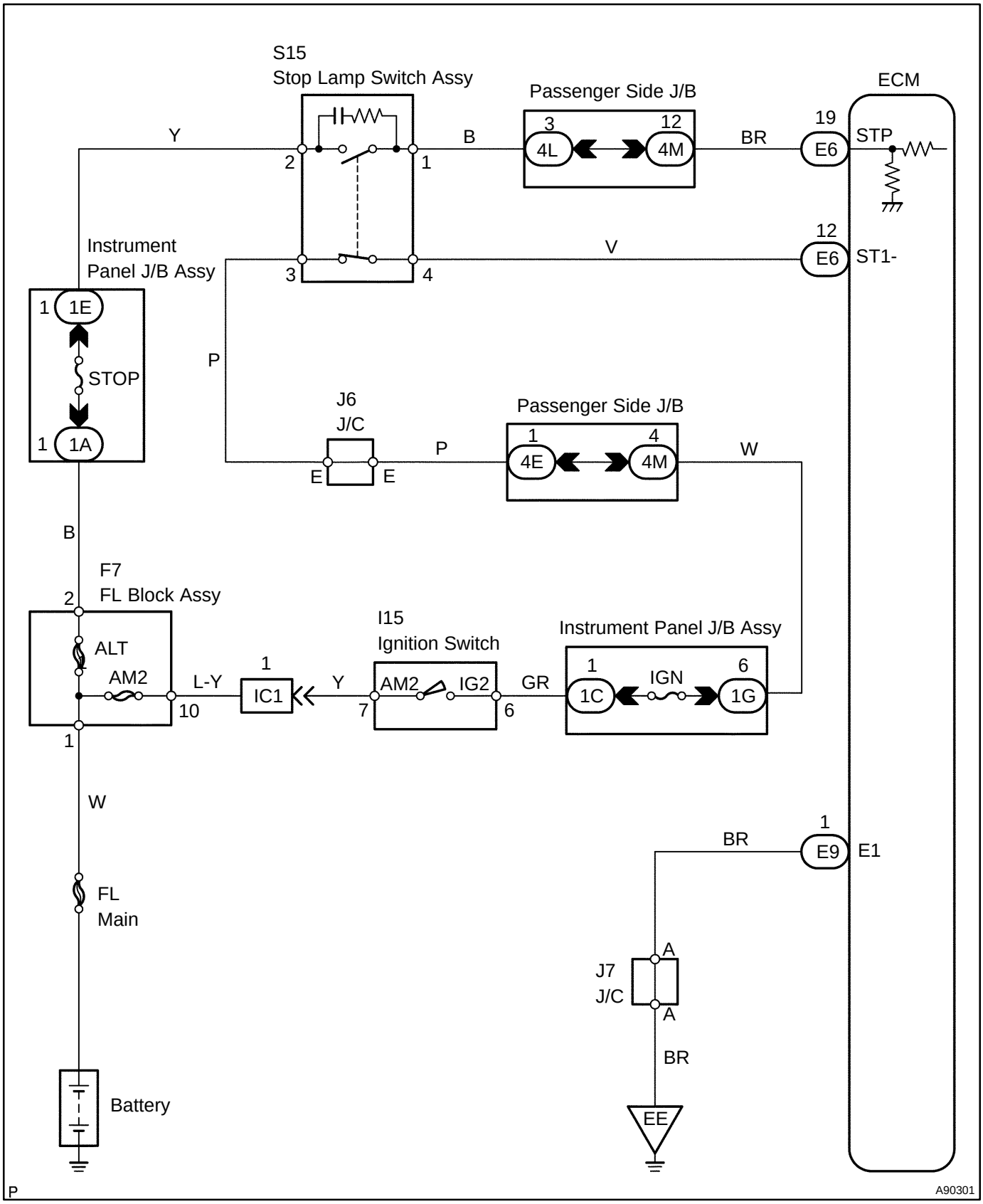
HINT:

Normal condition is as shown in the table.

Signal	Brake pedal released	In transition	Brake pedal depressed
STP	OFF	ON	ON
ST1	ON	ON	OFF

DTC No.	DTC Detection Condition	Trouble Area
P0504	Conditions (a), (b) and (c) continue for 0.5 seconds or more: (a) Ignition switch ON (b) Brake pedal released (c) STP signal is OFF when the ST1 signal is OFF	·Short in stop lamp switch signal circuit ·STOP fuse ·Stop lamp switch ·ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

Hand-held tester:

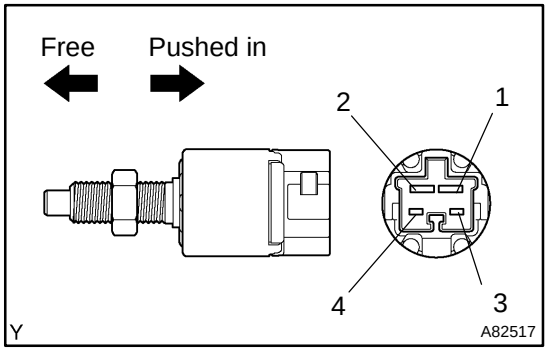
1	CHECK STOP LAMP (OPERATION)

(a) Check if the stop lamps turn on and off normally when the brake pedal is depressed and released.
OK:
The stop lamps turn on when you depress the brake pedal.

NG → **REPAIR OR REPLACE STOP LAMP SWITCH CIRCUIT**

OK

2	INSPECT STOP LAMP SWITCH ASSY (RESISTANCE)



(a) Measure the resistance of the switch terminals.
Standard:

Switch Condition	Tester Connection	Specified Condition
Switch pin free	1 - 2	Below 1.5 V
Switch pin free	3 - 4	10 kΩ or higher
Switch pin pushed in	1 - 2	10 kΩ or higher
Switch pin pushed in	3 - 4	Below 1.5 V

NG → **REPLACE STOP LAMP SWITCH ASSY**

OK

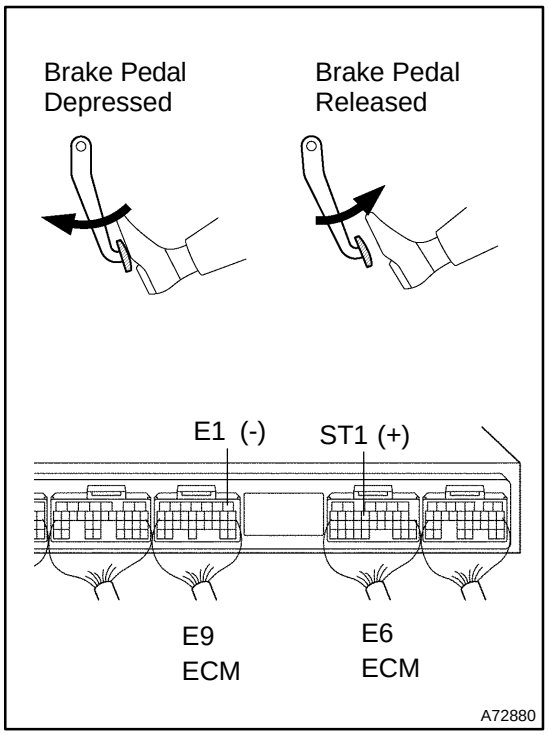
3	READ VALUE OF HAND-HELD TESTER (STP SIGNAL, ST1 VOLTAGE)

(a) Turn the ignition switch ON.

(b) On the hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / STOP LIGHT SW. Read the value.

Standard:

Brake Pedal Condition	Specified Condition
Depressed	STP Signal ON
Released	STP Signal OFF



(c) Measure the voltage of the ECM connectors.

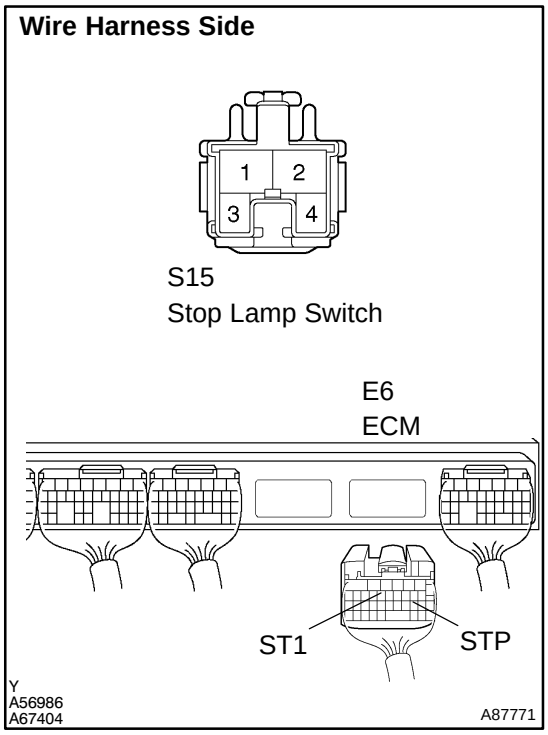
Standard:

Tester Connection	Brake Pedal Condition	Specified Condition
E6-12 (ST1) - E9-1 (E1)	Depressed	Below 1.5 V
E6-12 (ST1) - E9-1 (E1)	Released	7.5 to 14 V

NG

OK → **CHECK FOR INTERMITTENT PROBLEMS (See page 05-9)**

4	CHECK WIRE HARNESS (STOP LAMP SWITCH - ECM)



(a) Disconnect the S15 stop lamp switch connector.
(b) Disconnect the E6 ECM connector.
(c) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
S15-1 - E6-19 (STP) S15-4 - E6-12 (ST1)	Below 1 Ω
S15-1 or E6-19 (STP) - Body ground S15-4 or E6-12 (ST1) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE ECM (See page 10-9)

OBD II scan tool (excluding hand-held tester):

1	CHECK STOP LAMP (OPERATION)

(a) Check if the stop lamps turn on and off normally when the brake pedal is depressed and released.

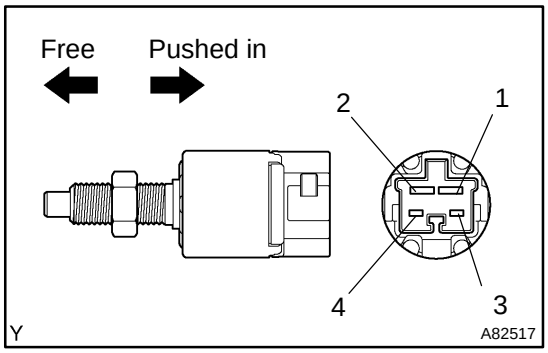
OK:

The stop lamps turn on when you depress the brake pedal.

NG → **REPAIR OR REPLACE STOP LAMP SWITCH CIRCUIT**

OK

2 INSPECT STOP LAMP SWITCH ASSY



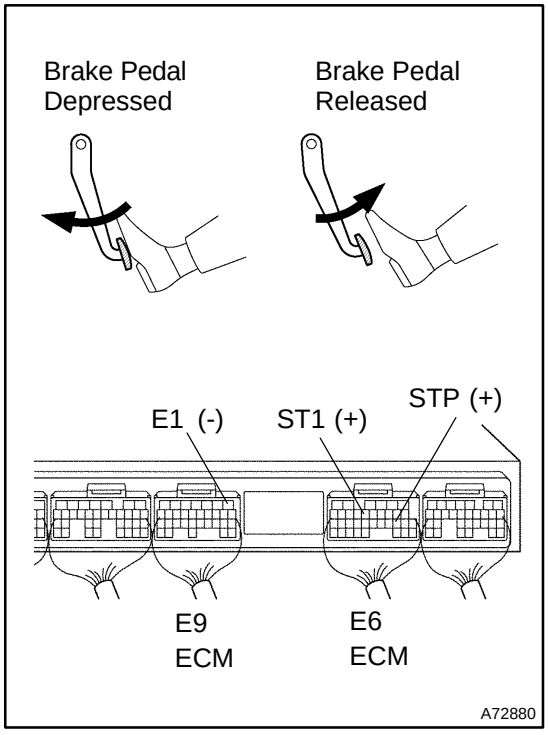
(a) Measure the resistance of the switch terminals.
Standard:

Switch Condition	Tester Connection	Specified Condition
Switch pin free	1 - 2	Below 1 Ω
Switch pin free	3 - 4	10 kΩ or higher
Switch pin pushed in	1 - 2	10 kΩ or higher
Switch pin pushed in	3 - 4	Below 1 Ω

NG → **REPLACE STOP LAMP SWITCH ASSY**

OK

3 INSPECT ECM (STP, ST1 VOLTAGE)



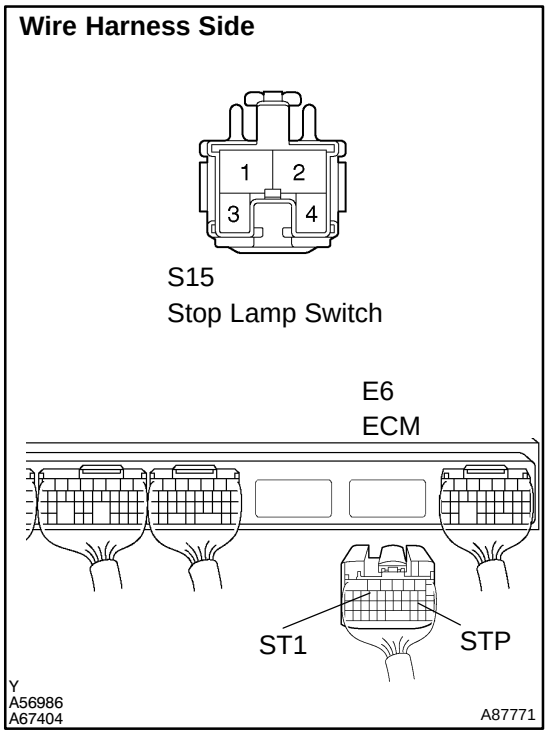
(a) Turn the ignition switch ON.
(b) Measure the voltage of the ECM connectors.
Standard:

Tester Connection	Brake Pedal Condition	Specified Condition
E6-19 (STP) - E9-1 (E1)	Depressed	7.5 to 14 V
E6-19 (STP) - E9-1 (E1)	Released	Below 1.5 V
E6-12 (ST1) - E9-1 (E1)	Depressed	Below 1.5 V
E6-12 (ST1) - E9-1 (E1)	Released	7.5 to 14 V

OK → **CHECK FOR INTERMITTENT PROBLEMS (See page 05-9)**

NG

4 CHECK WIRE HARNESS (STOP LAMP SWITCH - ECM)



(a) Disconnect the S15 stop lamp switch connector.
(b) Disconnect the E6 ECM connector.
(c) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
S15-1 - E6-19 (STP) S15-4 - E6-12 (ST1)	Below 1 Ω
S15-1 or E6-19 (STP) - Body ground S15-4 or E6-12 (ST1) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

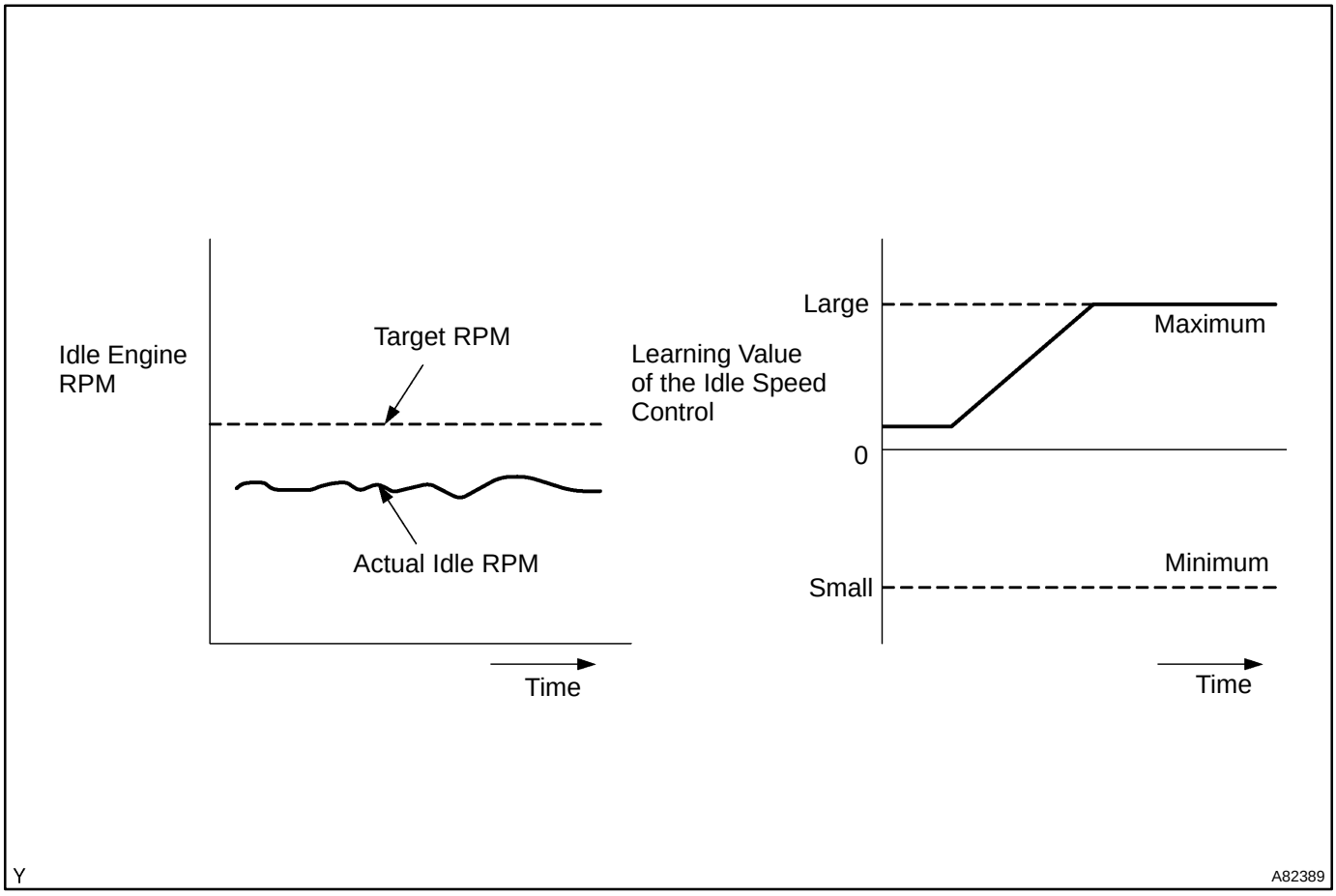
OK

REPLACE ECM (See page 10-9)

DTC P0505 IDLE AIR CONTROL SYSTEM

MONITOR DESCRIPTION

The idle speed is controlled by the Electronic Throttle Control System (ETCS).
The ETCS is composed of the throttle motor, which operates the throttle valve, and the throttle position sensor, which detects the opening angle of the throttle valve.
The ECM controls the throttle motor to provide the proper throttle valve opening angle to obtain the target idle speed.
The ECM regulates the idle speed by opening and closing the throttle valve using the ETCS. The ECM concludes that the idle speed control ECM function is malfunctioning if: 1) the actual idle RPM varies more than the specified amount five times or more during a drive cycle, or 2) a learning value of the idle speed control remains at the maximum or minimum five times or more during a drive cycle. The ECM will turn on the MIL and set a DTC.
Example:
If the actual idle RPM varies from the target idle RPM by more than 200*1 rpm five times during a drive cycle, the ECM will turn on the MIL and will set a DTC.
*1: RPM threshold varies with engine load.



DTC No.	DTC Detection Condition	Trouble Area
P0505	Idle speed continues to vary greatly from target speed	⋇Electronic throttle control system ⋇Air induction system ⋇PCV hose connection

MONITOR STRATEGY

Related DTCs	IAC Functional Check
Required sensors / components (Main)	ETCS (Electrical throttle control system)
Required sensors / components (Related)	CKP sensor, ECT sensor, and VSS
Frequency of operation	Continuous
Duration	10 min.
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever this DTC is not present	See page 05-16
Engine	Running

TYPICAL MALFUNCTION THRESHOLDS

Either of the Conditions is met:	Condition 1 or 2
1. Frequency that both of the following conditions (a) and (b) are met:	5 times
(a) Engine RPM - Target engine RPM	Less than -100 rpm or more than 150 rpm
(b) Vehicle condition	Stop after vehicle was driven at 10 km/h (6.25 mph) or more
2. Frequency that both of the following conditions (a) and (b) are met:	Once
(a) IAC flow rate learning value	Below 1.3 L/second or above 4.51 L/second
(b) Engine RPM - Target engine RPM	Less than -100 rpm or more than 150 rpm

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	CHECK OTHER DTC OUTPUT (IN ADDITION TO DTC P0505)

(a) Read the DTC using the hand-held tester or the OBD II scan tool.
Result:

Display (DTC Output)	Proceed to
Only P0505 is output	A
P0505 and other DTCs are output	B

HINT:
If any other codes besides P0505 are output, perform the troubleshooting for those codes first.

B → **GO TO RELEVANT DTC CHART (See page 05-48)**

A

2	CHECK CONNECTION OF PCV HOSE

OK: PCV hose is connected correctly and PCV hose has no damage.

NG → **REPAIR OR REPLACE PCV HOSE**

OK

3	CHECK AIR INDUCTION SYSTEM

(a) Check for vacuum leaks in the air induction system.
OK: No leak in air induction system.

NG → **REPAIR OR REPLACE AIR INDUCTION SYSTEM**

OK

CHECK ELECTRIC THROTTLE CONTROL SYSTEM (See page 10-1)

DTC P0560 SYSTEM VOLTAGE

MONITOR DESCRIPTION

The battery supplies electricity to the ECM even when the ignition switch is OFF. This electricity allows the ECM to store data such as DTC history, freeze frame data, fuel trim values and other data. If the battery voltage falls below a minimum level, the ECM will conclude that there is a fault in the power supply circuit. The next time the engine starts, the ECM will turn on the MIL and a DTC will be set.

DTC No.	DTC Detection Condition	Trouble Area
P0560	Open in ECM back-up power source circuit (1 trip detection logic)	・Open in back-up power source circuit ・ECM

HINT:

If DTC P0560 is present, the ECM will not store other DTCs.

MONITOR STRATEGY

Related DTCs	P0560: ECM system voltage
Required sensors / components (Main)	ECM
Required sensors / components (Related)	-
Frequency of operation	Continuous
Duration	3 sec.
MIL operation	Immediate (MIL will illuminate after the next engine start)
Sequence operation	None

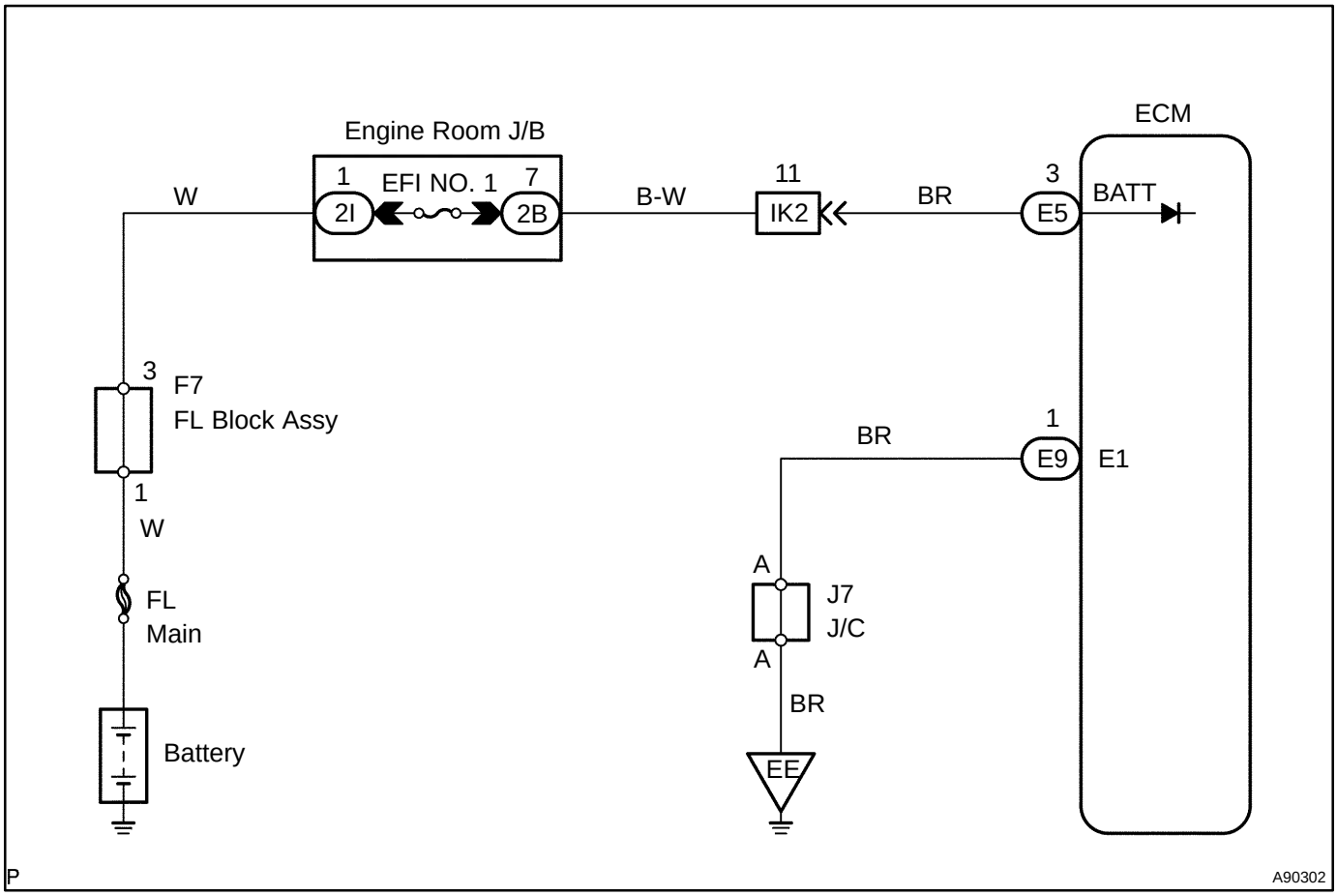
TYPICAL ENABLING CONDITIONS

The monitor will run whenever this DTC is not present	See page 05-16

TYPICAL MALFUNCTION THRESHOLDS

ECM power source	Less than 3.5 V

WIRING DIAGRAM

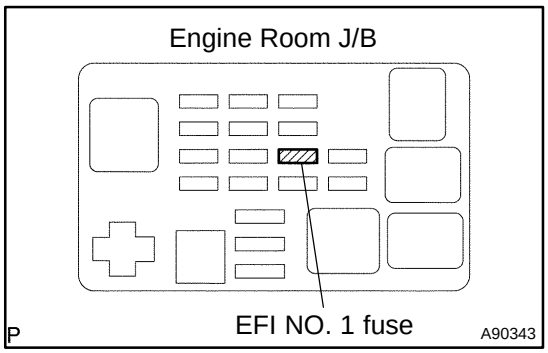


INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	INSPECT FUSE (EFI NO. 1)



(a) Remove the EFI NO. 1 fuse from the engine room J/B.

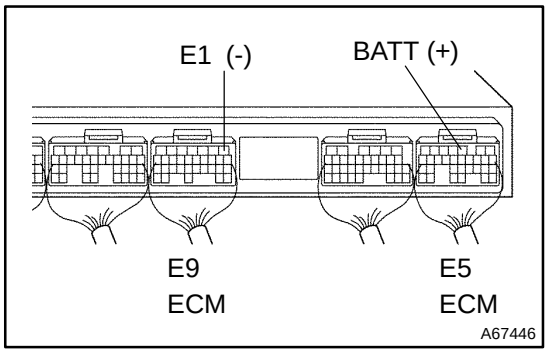
(b) Measure the resistance of the EFI NO. 1 fuse.

Standard: Below 1 Ω

OK	REPLACE FUSE

OK

2	INSPECT ECM (BATT VOLTAGE)



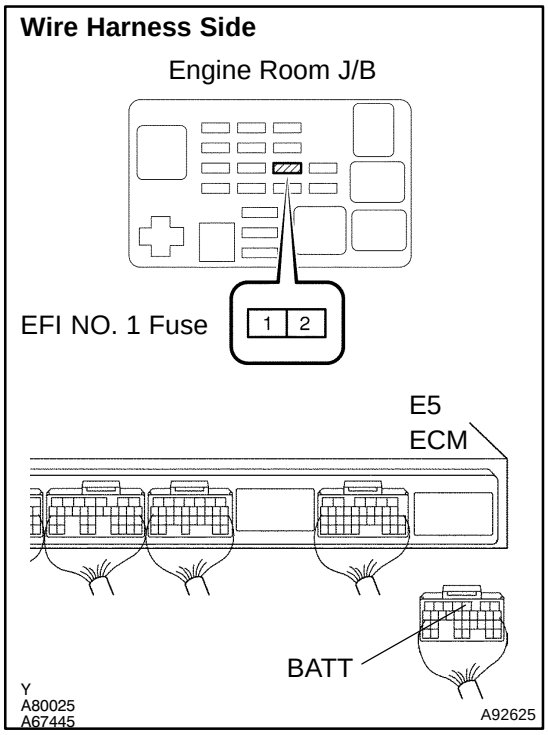
(a) Measure the voltage of the ECM connectors.
Standard:

Tester Connection	Specified Condition
E5-3 (BATT) - E9-1 (E1)	9 to 14 V

OK → **REPLACE ECM (See page 10-9)**

NG

3	CHECK WIRE HARNESS (ECM - EFI NO. 1 FUSE, EFI NO. 1 FUSE - BATTERY)



(a) Check the wire harness between the EFI NO. 1 fuse and ECM.

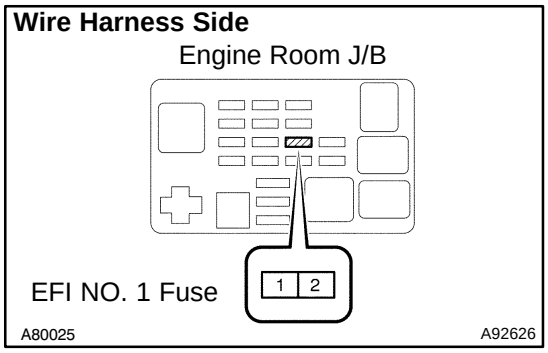
(1) Remove the EFI NO. 1 fuse from the engine room J/B.

(2) Disconnect the E5 ECM connector.

(3) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
J/B EFI NO. 1 fuse terminal 2 - E5-3 (BATT)	Below 1 Ω
J/B EFI NO. 1 fuse terminal 2 or E5-3 (BATT) - Body ground	10 kΩ or higher



(b) Check the wire harness between the EFI NO. 1 fuse and battery.

(1) Remove the EFI NO. 1 fuse from the engine room J/B.

(2) Disconnect the battery positive cable.

(3) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
Battery positive cable - J/B EFI NO. 1 fuse terminal 1	Below 1 Ω
Battery positive cable or J/B EFI NO. 1 fuse terminal 1 - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

CHECK AND REPLACE ENGINE ROOM J/B

DTC	P0604	INTERNAL CONTROL MODULE RANDOM ACCESS MEMORY (RAM) ERROR

DTC	P0606	ECM/PCM PROCESSOR

DTC	P0607	CONTROL MODULE PERFORMANCE

DTC	P0657	ACTUATOR SUPPLY VOLTAGE CIRCUIT/OPEN

MONITOR DESCRIPTION

The ECM continuously monitors its internal memory status, internal circuits, and output signals to the throttle actuator. This self-check ensures that the ECM is functioning properly. If any malfunction is detected, the ECM will set the appropriate DTC and illuminate the MIL.

The ECM memory status is diagnosed by internal ”mirroring” of the main CPU and the sub CPU to detect random access memory (RAM) errors. The two CPUs also perform continuous mutual monitoring. The ECM sets a DTC if: 1) outputs from the 2 CPUs are different and deviate from the standards, 2) the signals to the throttle actuator deviate from the standards, 3) a malfunction is found in the throttle actuator supply voltage, and 4) any other ECM malfunction is found.

DTC No.	DTC Detection Condition	Trouble Area
P0604 P0606 P0607 P0657	ECM internal error (1trip detection logic)	ECM

MONITOR STRATEGY

Related DTCs	P0604: RAM errors P0606: CPU malfunction P0607: ECM range check P0657: ETCS (Electrical throttle control) power supply circuit in ECM
Required sensors / components (Main)	ECM
Required sensors / components (Related)	-
Frequency of operation	Continuous
Duration	Within 1 sec.
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever these DTCs are not present	See page 05-16

TYPICAL MALFUNCTION THRESHOLDS

RAM Error P0604:

RAM	RAM check failure

CPU malfunction P0606:

Either of the following conditions is met:	Condition 1 or 2
1. Difference between TP of main CPU and TP of sub CPU	0.3 V or more
2. Difference between APP of main CPU and APP of sub CPU	0.3 V or more

ECM range check P0607:

Either of the following conditions is met:	Condition 1 or 2
1. All of the following conditions are met:	Conditions (a), (b) and (c)
(a) CPU reset	1 time or more
(b) Difference between TP and APP learned	0.4 V or more
(c) Electronic throttle actuator	OFF
2. CPU reset	2 times or more

ETCS power supply circuit in ECM P0657:

ETCS power supply when ignition switch turns from OFF to ON	7 V or more

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

REPLACE ECM (See page 10-9)

DTC P0617 STARTER RELAY CIRCUIT HIGH

MONITOR DESCRIPTION

While the engine is being cranked, the battery positive voltage is applied to terminal STA of the ECM. If the vehicle is being driven and the ECM detects the starter control signal (STA), the ECM concludes that the starter control circuit is malfunctioning. The ECM will turn on the MIL and will set a DTC.

DTC No.	DTC Detecting Condition	Trouble Area
P0617	When conditions (a), (b) and (c) are met and the battery (+B) voltage 10.5 V or more is applied for 20 seconds: (1 trip detection logic) (a) Vehicle speed greater than 12 mph (20 km/h) (b) Engine revolution greater than 1,000 rpm (c) STA signal ON	・Short in PNP switch assy circuit ・PNP switch assy ・Ignition switch ・ECM

MONITOR STRATEGY

Related DTCs	P0617: Starter signal
Required sensors / components (Main)	Starter relay and PNP switch
Required sensors / components (Related)	CKP sensor and vehicle speed sensor
Frequency of operation	Continuous
Duration	20 sec.
MIL operation	Immediate
Sequence of operation	None

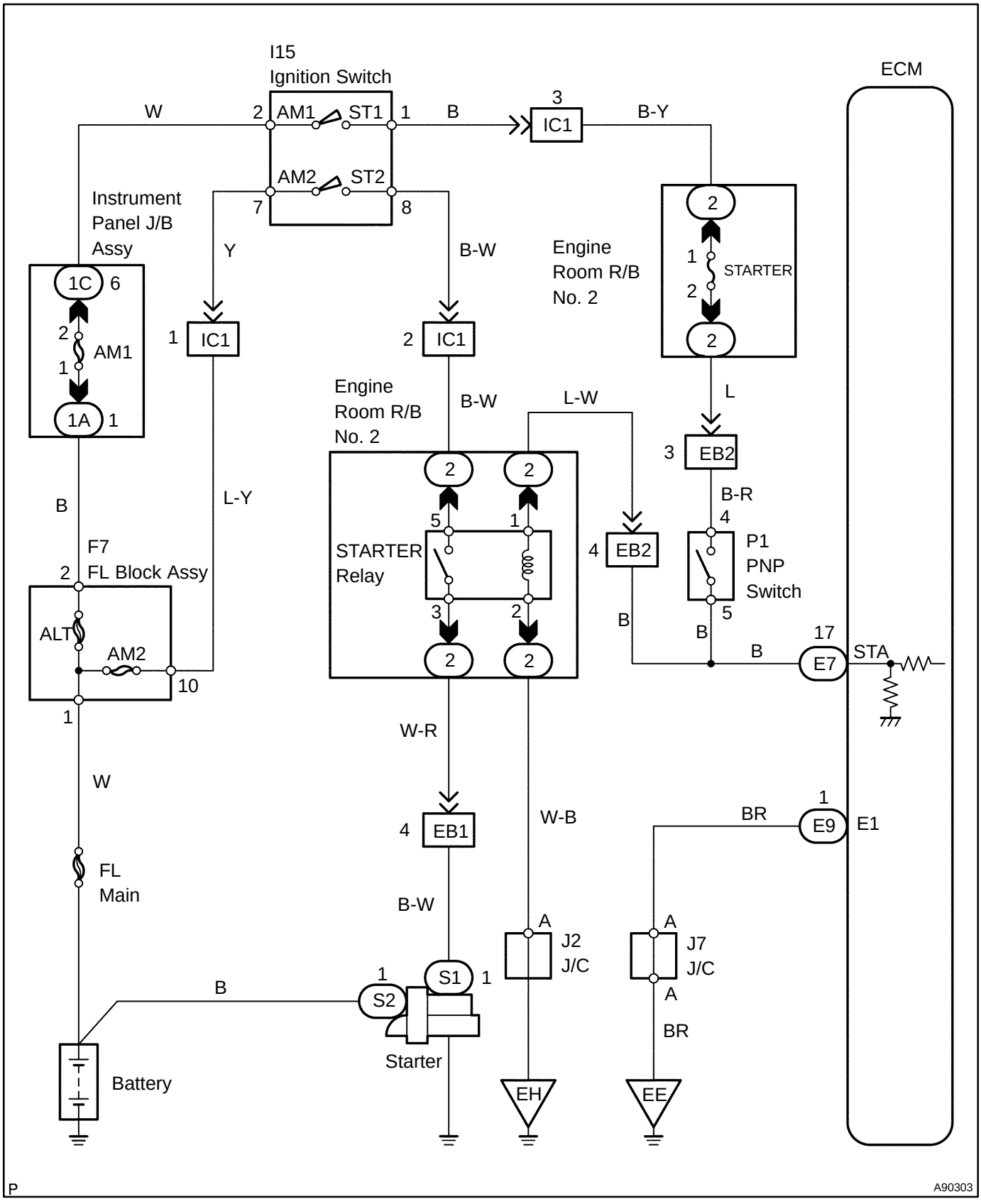
TYPICAL ENABLING CONDITIONS

The monitor will run whenever this DTC is not present	See page 05-16
Battery voltage	10.5 V or more
Vehicle speed	20 km/h (12.4 mph) or more
Engine RPM	1,000 rpm or more

TYPICAL MALFUNCTION THRESHOLDS

Starter signal	ON

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand-held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

Hand-held tester:

1	READ VALUE OF HAND-HELD TESTER (STA SIGNAL)

(a) Connect the hand-held tester to the DLC3.
(b) Turn ON the ignition switch. Push the hand-held tester main switch.
(c) On the hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / STARTER SIG. Read the values.

Result:

Ignition Switch Condition	ON	START
STA signal	OFF	ON

OK → **REPLACE ECM (See page 10-9)**

NG

2	INSPECT PARK/NEUTRAL POSITION SWITCH ASSY (See page 05-922)

OK:
When shift lever is in the N position, the PNP switch is ON.
When shift lever is in the P position, the PNP switch is OFF.

NG → **REPLACE PARK/NEUTRAL POSITION SWITCH ASSY (See page 40-3) (Go to step 3 AFTER REPLACEMENT)**

OK

3	READ VALUE OF HAND-HELD TESTER (STA SIGNAL)

(a) Connect the hand-held tester to the DLC3.
(b) Turn ON the ignition switch. Push the hand-held tester main switch.
(c) On the hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / STARTER SIG. Read the values.

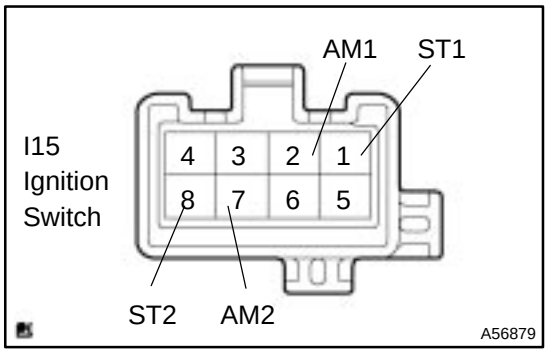
Result:

Ignition Switch Condition	ON	START
STA signal	OFF	ON

OK → **SYSTEM OK**

NG

4 INSPECT IGNITION OR STARTER SWITCH ASSY



(a) Measure the resistance of the ignition switch terminals.
Standard:

Switch Condition	Tester Connection	Specified Condition
LOCK	1 - 2 7 - 8	10 kΩ or higher
START	1 - 2 7 - 8	Below 1 Ω

NG → **REPLACE IGNITION OR STARTER SWITCH ASSY (Go to next step 5 AFTER REPLACEMENT)**

OK

5 READ VALUE OF HAND-HELD TESTER (STA SIGNAL)

(a) Connect the hand-held tester to the DLC3.
(b) Turn ON the ignition switch. Push the hand-held tester main switch.
(c) On the hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / STARTER SIG. Read the values.
Result:

Ignition Switch Condition	ON	START
STA Signal	OFF	ON

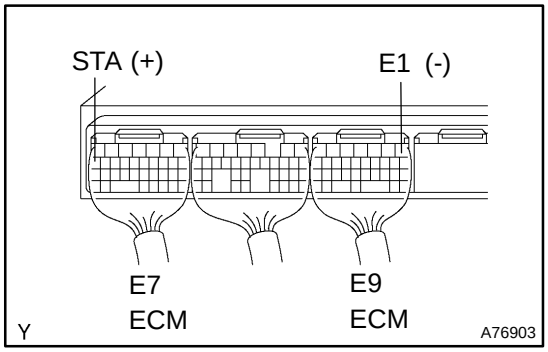
OK → **SYSTEM OK**

NG

REPAIR OR REPLACE HARNESS AND CONNECTOR

OBD II scan tool (excluding Hand-held Tester):

1	INSPECT ECM



(a) Turn the ignition switch ON.
(b) Measure the voltage of the ECM connectors.
Standard:

Tester Connection	Condition	Specified Condition
E7-17 (STA) - E9-1 (E1)	Ignition switch ON	0 V
E7-17 (STA) - E9-1 (E1)	Engine cranking	6 V or more

OK → **REPLACE ECM (See page 10-9)**

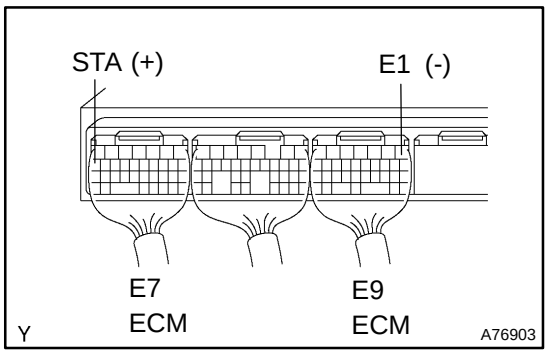
NG

2	INSPECT PARK/NEUTRAL POSITION SWITCH ASSY (See page 05-922)

NG → **REPLACE PARK/NEUTRAL POSITION SWITCH ASSY (See page 40-3) (Go to next step 3 AFTER REPLACEMENT)**

OK

3	INSPECT ECM



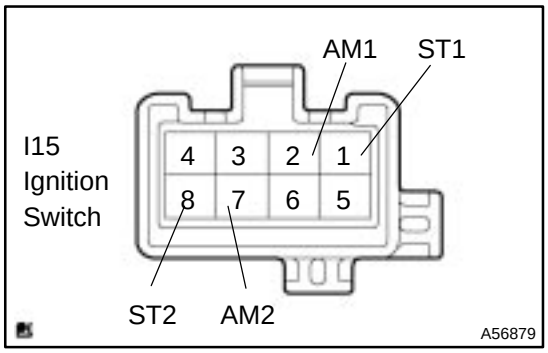
(a) Measure the voltage of the ECM connectors.
Standard:

Tester Connection	Condition	Specified Condition
E7-17 (STA) - E9-1 (E1)	Ignition switch ON	0 V
E7-17 (STA) - E9-1 (E1)	Engine cranking	6 V or more

OK → **SYSTEM OK**

NG

4 INSPECT IGNITION OR STARTER SWITCH ASSY



(a) Measure the resistance of the ignition switch terminals.

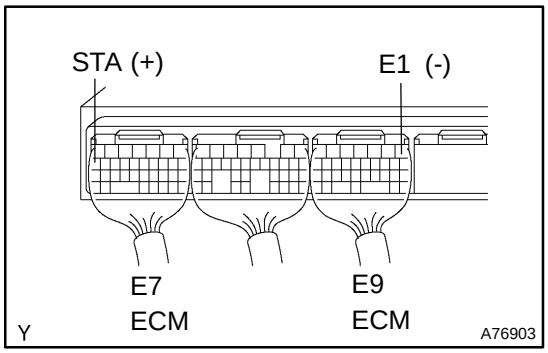
Standard:

Switch Condition	Tester Connection	Specified Condition
LOCK	1 - 2 7 - 8	10 kΩ or higher
START	1 - 2 7 - 8	Below 1 Ω

NG → **REPLACE IGNITION OR STARTER SWITCH ASSY**

OK

5 INSPECT ECM



(a) Measure the voltage of the ECM connectors.

Standard:

Tester Connection	Condition	Specified Condition
E7-17 (STA) - E9-1 (E1)	Ignition switch ON	0 V
E7-17 (STA) - E9-1 (E1)	Engine cranking	6 V or more

OK → **SYSTEM OK**

NG

REPAIR OR REPLACE HARNESS AND CONNECTOR

DTC	P0630	VIN NOT PROGRAMMED OR MISMATCH - ECM/PCM

CIRCUIT DESCRIPTION

DTC P0630 is set when the Vehicle Indication Number (VIN) is not stored in the ECM or the input VIN is not accurate. Input the VIN with the hand-held tester (see page 05-12).

DTC No.	DTC Detection Conditions	Trouble Areas
P0630	・VIN is not stored in ECM ・Input VIN in ECM is not accurate	・ECM

MONITOR STRATEGY

Related DTCs	P0630: VIN not programed
Required Sensors/Components (Main)	ECM
Required Sensors/Components (Related)	—
Frequency of Operation	Continuous
Duration	0.5 seconds
MIL Operation	Immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever these DTCs are not present	See page 05-16
Battery voltage	8 V or more
Ignition switch	ON
Stater	OFF

TYPICAL MALFUNCTION THRESHOLDS

VIN code	Not programmed

COMPONENT OPERATING RANGE

VIN code	Programmed

INSPECTION PROCEDURE

1	READ CURRENT DTC

NOTICE:
If P0630 is present, the VIN must be input to the ECM using the hand-held tester. However, all DTCs are cleared automatically by the tester when inputting the VIN. If DTCs other than P0630 are present, check them first.

NEXT

2	INPUT VIN WITH HAND-HELD TESTER (See page 05-12)

NEXT

END

DTC	P0705	TRANSMISSION RANGE SENSOR CIRCUIT MALFUNCTION (PRNDL INPUT)

CIRCUIT DESCRIPTION

When the shift lever is in the N or P position: 1) the Park/Neutral Position (PNP) switch turns on, and 2) ECM terminal NSW is grounded to the body ground via the starter relay and voltage becomes 0 V. When the shift lever is in the D, 2, L or R position: 1) the PNP switch turns off, and 2) ECM terminal NSW receives current and becomes the voltage of the ECM internal power source.
If the shift lever is moved from the N position to the D position, this signal is used for air-fuel ratio correction and for idle speed control (estimated control).

DTC No.	DTC Detection Condition	Trouble Area
P0705	2 or more switches are ON simultaneously at R, N, D, 2 and L positions (2 trip detection logic)	・Short in PNP switch circuit ・PNP switch ・ECM

HINT:
After confirming DTC P0705, use the hand-held tester to confirm the PNP switch signal in the ALL menu (to reach the ALL menu: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL).

WIRING DIAGRAM

Refer to DTC P0705 on page 05-922 .

INSPECTION PROCEDURE

Refer to DTC P0705 on page 05-922 .
HINT:
Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

DTC	P2102	THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT LOW

DTC	P2103	THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT HIGH

CIRCUIT DESCRIPTION

The throttle actuator is operated by the ECM and it opens and closes the throttle valve.
The opening angle of the throttle valve is detected by the throttle position sensor which is mounted on the throttle body. The throttle position sensor provides feedback to the ECM. This feedback allows the ECM to control the throttle actuator and monitor the throttle opening angle in response to driver inputs.
HINT:
This Electronic Throttle Control System (ETCS) does not use a throttle cable.

DTC No.	DTC Detection Condition	Trouble Area
P2102	Conditions (a) and (b) continue for 2.0 seconds: (a) Throttle actuator output duty 80 % or more (b) Throttle actuator current 0.5 A or less (1 trip detection logic)	・Open in throttle actuator circuit ・Throttle actuator ・ECM
P2103	Either of following conditions is met: ・Throttle actuator current 10 A or more (0.1 seconds) ・Throttle actuator current 7 A or more (0.6 seconds) (1 trip detection logic)	・Short in throttle actuator circuit ・Throttle actuator ・Throttle valve ・Throttle body assy ・ECM

MONITOR DESCRIPTION

The ECM monitors the flow of electrical current through the electronic throttle actuator, and detects malfunctions or open circuits in the throttle motor based on the value of the electrical current. When the current deviates from the standard, the ECM concludes that there is a fault in the throttle motor. Or, if the throttle valve is not functioning properly (for example, stuck on), the ECM concludes that there is a fault and turns on the MIL and a DTC is set.
Example:
When the current is more than 10 A, or the current is less than 0.5 A when the actuator driving duty ratio is more than 80 %, the ECM concludes that the current is deviated from the standard, turns on the MIL and a DTC is set.

FAIL-SAFE

If the ETCS has a malfunction, the ECM cuts off current to the throttle actuator. The throttle control valve returns to a predetermined opening angle (approximately 16°) by the force of the return spring. The ECM then adjusts the engine output by controlling the fuel injection (intermittent fuel-cut) and ignition timing in accordance with the accelerator pedal opening angle to enable the vehicle to continue at a minimal speed. If the accelerator pedal is depressed firmly and slowly, the vehicle can be driven slowly.
If a ”pass” condition is detected and then the ignition switch is turned OFF, the fail-safe operation will stop and the system will return to normal condition.

MONITOR STRATEGY

Related DTCs	P2102: Throttle actuator current (low current) P2103: Throttle actuator current (high current)
Required sensors / components (Main)	Throttle actuator
Required sensors / components (Related)	-
Frequency of operation	Continuous
Duration	2 sec.
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever these DTCs are not present	See page 05-16

P2102:

Throttle actuator duty ratio	80 % or more
Throttle actuator power supply	8 V or more

P2103:

Throttle actuator power supply	8 V or more
Battery voltage	8 V or more
Starter	OFF

TYPICAL MALFUNCTION THRESHOLDS

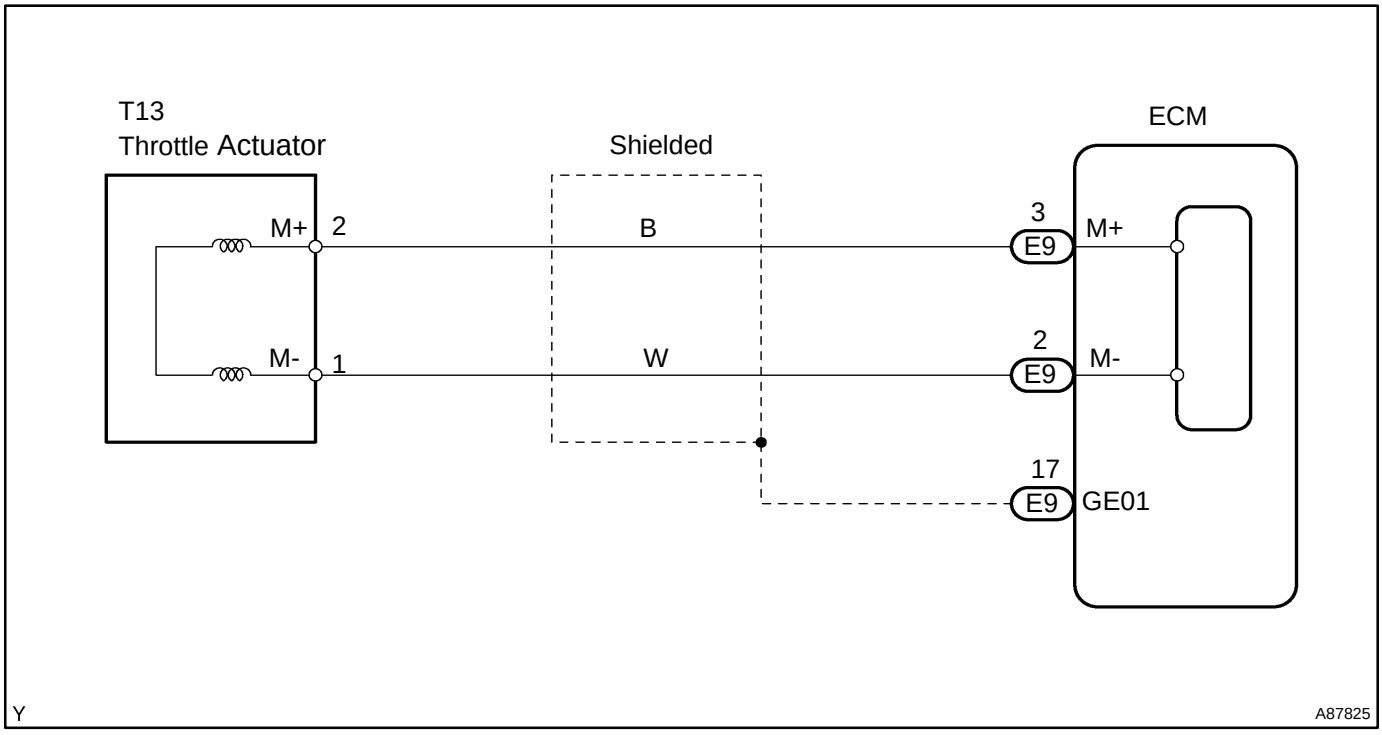
P2102:

Throttle actuator current	Less than 0.5 A

P2103:

Either of the following conditions is met:	Condition 1 or 2
1. Hybrid IC diagnosis signal	Fail (for 0.1 sec.)
2. Hybrid IC current limiter port	Fail (for 0.6 sec.)

WIRING DIAGRAM

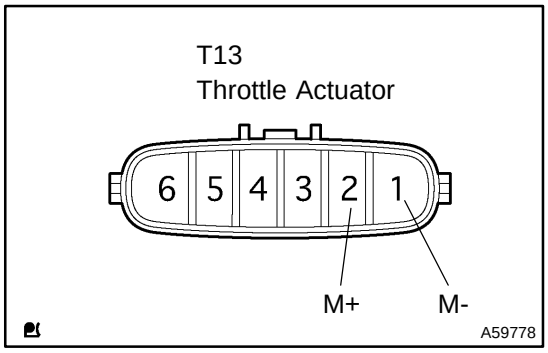


INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1 INSPECT THROTTLE BODY ASSY (THROTTLE ACTUATOR)



(a) Disconnect the T13 throttle actuator connector.
(b) Measure the resistance of the throttle actuator terminals.

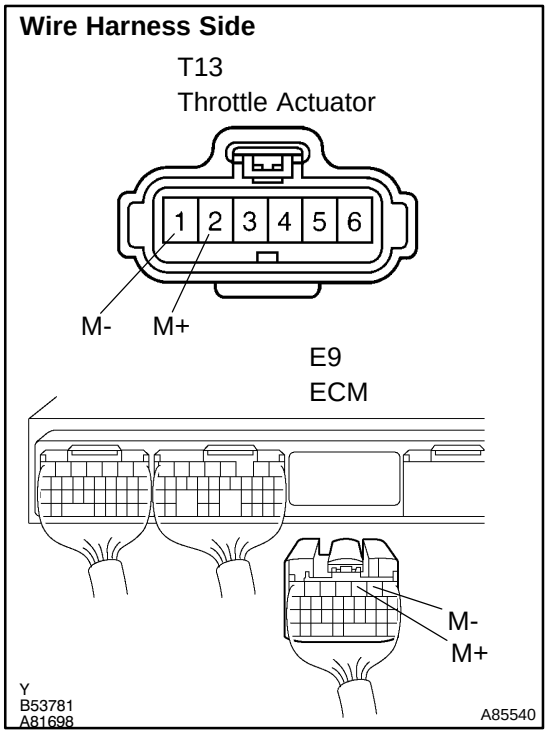
Standard:

Tester Connection	Specified Condition
T13-2 (M+) - T13-1 (M-)	0.3 to 100 Ω (20 ℃ (68 ℉))

NG → **REPLACE THROTTLE BODY ASSY**

OK

2 CHECK WIRE HARNESS (THROTTLE ACTUATOR - ECM)



(a) Disconnect the T13 throttle actuator connector.
(b) Disconnect the E9 ECM connector.
(c) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
T13-2 (M+) - E9-3 (M+) T13-1 (M-) - E9-2 (M-)	Below 1 Ω
T13-2 (M+) or E9-3 (M+) - Body ground T13-1 (M-) or E9-2 (M-) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

3	INSPECT THROTTLE BODY ASSY

(a) Visually check for foreign objects between the throttle valve and the housing.
Also, check if the valve can open and close smoothly.
OK: The throttle valve is not contaminated with foreign objects and can move smoothly.

NG → **REMOVE FOREIGN OBJECT AND CLEAN THROTTLE BODY**

OK

REPLACE ECM (See page 10-9)

DTC	P2111	THROTTLE ACTUATOR CONTROL SYSTEM - STUCK OPEN

DTC	P2112	THROTTLE ACTUATOR CONTROL SYSTEM - STUCK CLOSED

CIRCUIT DESCRIPTION

The throttle actuator is operated by the ECM and it opens and closes the throttle valve using gears. The opening angle of the throttle valve is detected by the throttle position sensor, which is mounted on the throttle body. The throttle position sensor provides feedback to the ECM to control the throttle actuator and set the throttle valve angle in response to driver inputs.

HINT:

This Electronic Throttle Control System (ETCS) does not use a throttle cable.

DTC No.	DTC Detection Condition	Trouble Area
P2111	Throttle valve locked during ECM order to close (1 trip detection logic)	・Throttle actuator circuit ・Throttle actuator ・Throttle body ・Throttle valve
P2112	Throttle valve locked during ECM order to open (1 trip detection logic)	・Same as DTC No. P2111

MONITOR DESCRIPTION

The ECM concludes that there is a malfunction of the ETCS when the throttle valve remains at a fixed angle despite high drive current from the ECM. The ECM will turn on the MIL and will set a DTC.

FAIL-SAFE

If the ETCS has a malfunction, the ECM cuts off current to the throttle actuator. The throttle control valve returns to a predetermined opening angle (approximately 16°) by the force of the return spring. The ECM then adjusts the engine output by controlling the fuel injection (intermittent fuel-cut) and ignition timing in accordance with the accelerator pedal opening angle to enable the vehicle to continue at a minimal speed. If the accelerator pedal is depressed firmly and slowly, the vehicle can be driven slowly.

If a ”pass” condition is detected and then the ignition switch is turned OFF, the fail-safe operation will stop and the system will return to normal condition.

MONITOR STRATEGY

Related DTCs	P2111: Throttle actuator stuck open P2112: Throttle actuator stuck closed
Required sensors/ components (Main)	Throttle actuator
Required sensors/ components (Related)	-
Frequency of operation	Continuous
Duration	0.5 sec.
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

All:

The monitor will run whenever these DTCs are not present	See page 05-16

P2111:

Throttle motor current	2 A or more
Throttle actuator close duty ratio	80 % or more

P2112:

Throttle motor current	2 A or more
Throttle actuator open duty ratio	80 % or more

TYPICAL MALFUNCTION THRESHOLDS

TP (throttle position) sensor voltage change for 0.016 second	Less than 0.1 V

WIRING DIAGRAM

Refer to DTC P2102 on page 05-243 .

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	CHECK OTHER DTC OUTPUT

Display (DTC output)	Proceed to
P2111 or P2112	A
P2111 or P2112 and other DTCs	B

B → **GO TO RELEVANT DTC CHART (See page 05-48)**

A

2	CHECK THROTTLE BODY ASSY (VISUALLY CHECK THROTTLE VALVE)

Check for contamination between the throttle valve and the housing. If necessary, clean the throttle body. And check that the throttle valve moves smoothly.

OK: The throttle valve is not contaminated with foreign objects and can move smoothly.

NG → **REPLACE THROTTLE BODY ASSY (See page 10-6)**

OK

3	CHECK DTC OUTPUT

(a) Clear the DTC (See page 05-38).
(b) Start the engine, and depress and release the accelerator pedal quickly (fully open and fully close).
(c) Read the DTC.

Result:

Display (DTC output)	Proceed to
No DTC	A
P2111 and/or P2112	B

B → **REPLACE ECM (See page 10-9)**

A

CHECK FOR INTERMITTENT PROBLEMS (See page 05-9)

DTC	P2118	THROTTLE ACTUATOR CONTROL MOTOR CURRENT RANGE/PERFORMANCE

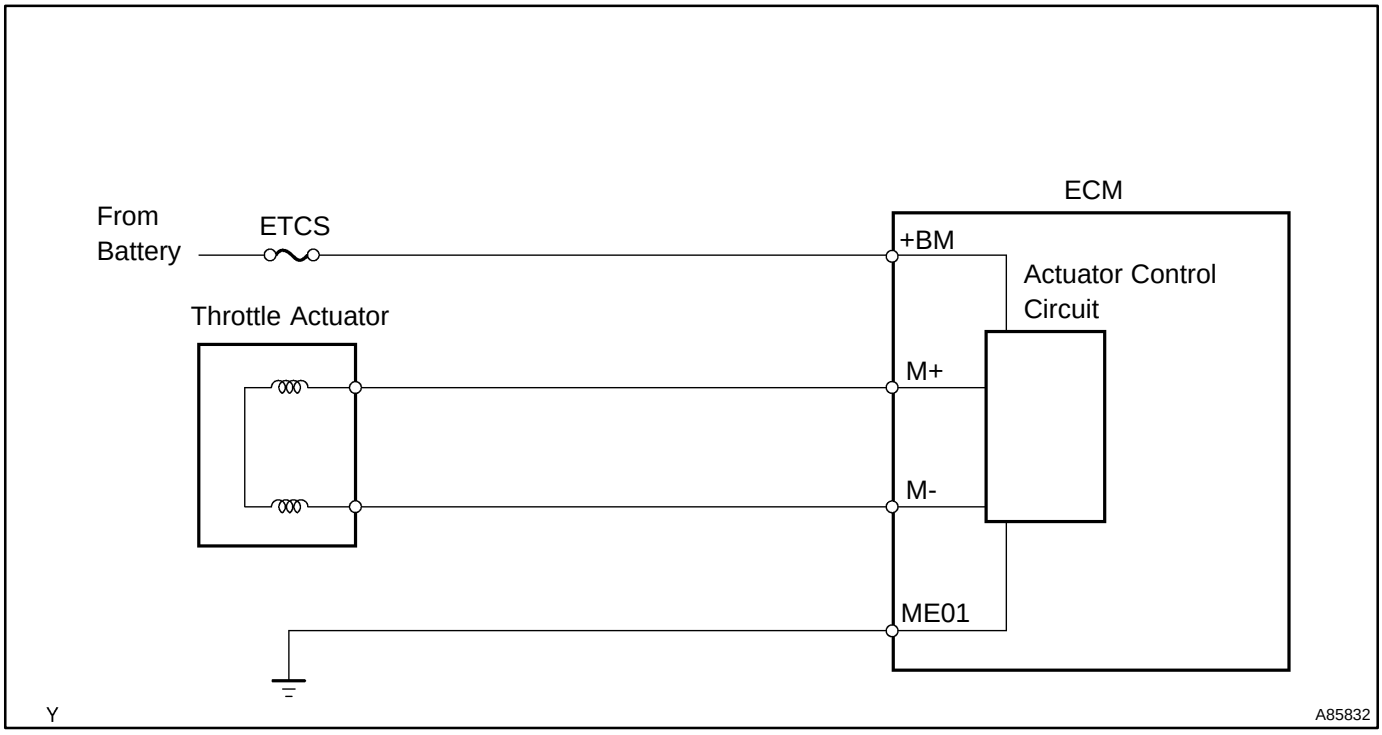
CIRCUIT DESCRIPTION

The Electronic Throttle Control System (ETCS) has a dedicated power supply circuit. The voltage (+BM) is monitored and when the voltage is low (less than 4 V), the ECM concludes that the ETCS has a fault and current to the throttle actuator is cut.

When the voltage becomes unstable, the ETCS itself becomes unstable. For this reason, when the voltage is low, the current to the actuator is cut. If repairs are made and the system has returned to normal, turn the ignition switch OFF. The ECM then allows current to flow to the actuator and actuator can be restarted.

HINT:

This ETCS does not use a throttle cable.



DTC No.	DTC Detection Condition	Trouble Area
P2118	Open in ETCS power source circuit (1 trip detection logic)	・Open in ETCS power source circuit ・ETCS fuse ・ECM

MONITOR DESCRIPTION

The ECM monitors the battery supply voltage applied to the electronic throttle actuator. When the power supply voltage drops below the threshold, the ECM concludes that the power supply circuit has an open circuit. A DTC is set and the MIL is turned on.

FAIL-SAFE

If the ETCS has a malfunction, the ECM cuts off current to the throttle actuator. The throttle control valve returns to a predetermined opening angle (approximately 16°) by the force of the return spring. The ECM then adjusts the engine output by controlling the fuel injection (intermittent fuel-cut) and ignition timing in accordance with the accelerator pedal opening angle to enable the vehicle to continue at a minimal speed. If the accelerator pedal is depressed firmly and slowly, the vehicle can be driven slowly.
If a ”pass” condition is detected and the ignition switch is turned OFF, the fail-safe operation will stop and the system will return to normal.

MONITOR STRATEGY

Related DTCs	P2118: Throttle actuator power supply
Required sensors / components (Main)	Throttle actuator, ETCS fuse
Required sensors / components (Related)	-
Frequency of operation	Continuous
Duration	0.8 seconds
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever this DTC is not present	See page 05-16
Battery voltage	More than 8 V

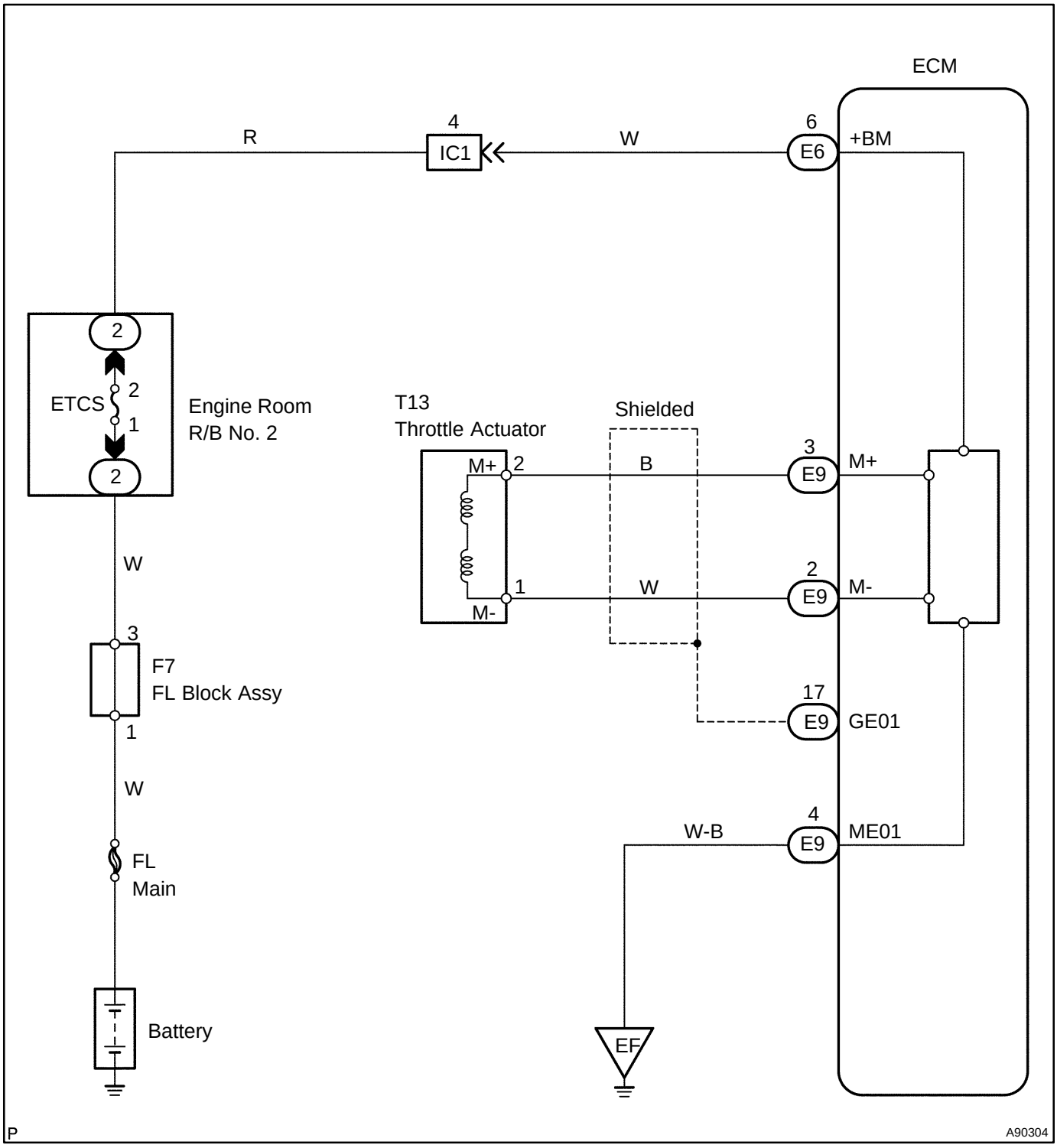
TYPICAL MALFUNCTION THRESHOLDS

Throttle actuator power supply voltage	Less than 4 V

COMPONENT OPERATING RANGE

Throttle actuator power supply voltage	9 to 14 V

WIRING DIAGRAM

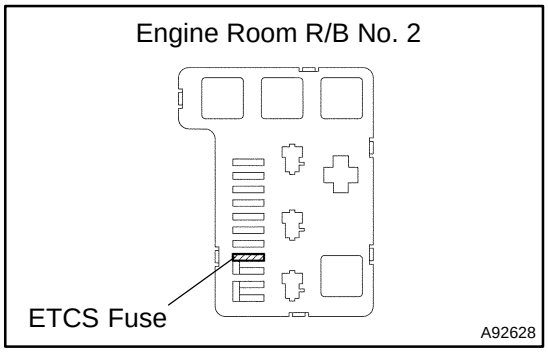


INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	CHECK FUSE (ETCS)

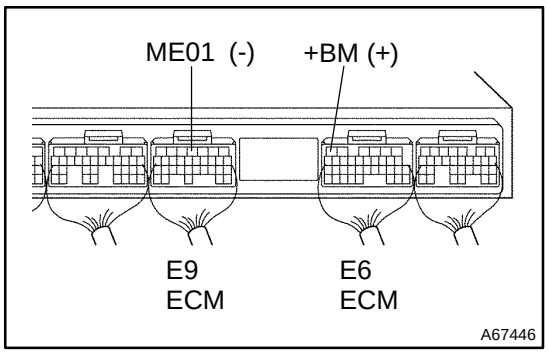


(a) Remove the ETCS fuse from the engine room R/B No. 2.
(b) Measure the resistance of the ETCS fuse.
Standard: Below 1 Ω

NG → **REPLACE FUSE**

OK

2	INSPECT ECM (+BM VOLTAGE)



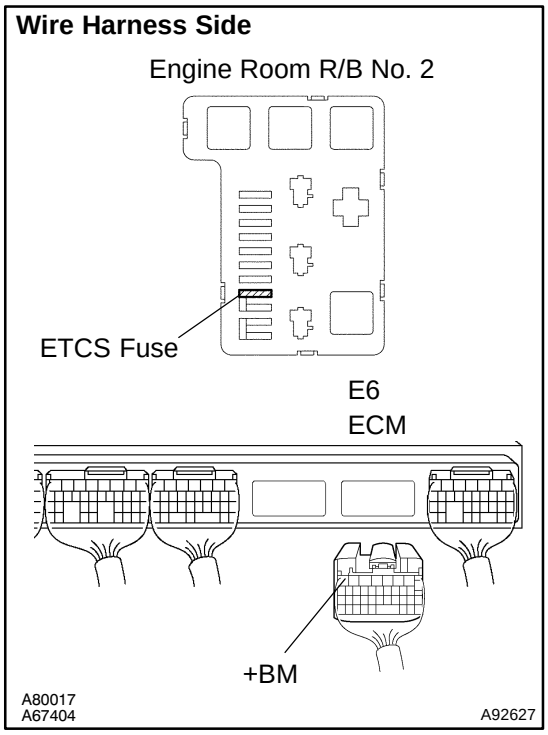
(a) Measure the voltage of the ECM connectors.
Standard:

Tester Connection	Specified Condition
E6-6 (+BM) - E9-4 (ME01)	9 to 14 V

OK → **REPLACE ECM (See page 10-9)**

NG

3 CHECK WIRE HARNESS (ECM - ETCS FUSE, ETCS FUSE - BATTERY)



(a) Check the wire harness between the ETCS fuse and ECM.

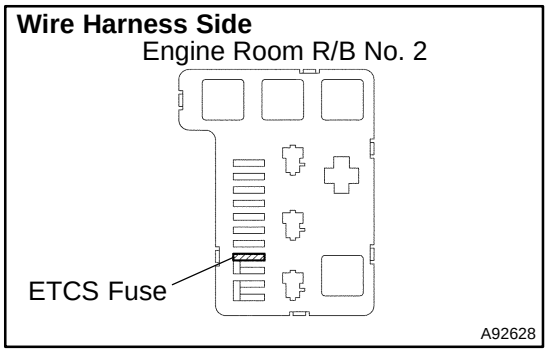
(1) Remove the ETCS fuse from the engine room R/B No. 2.

(2) Disconnect the E6 ECM connector.

(3) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
R/B No. 2 ETCS fuse terminal 2 - E6-6 (+BM)	Below 1 Ω
R/B No. 2 ETCS fuse terminal 2 or E6-6 (+BM) - Body ground	10 kΩ or higher



(b) Check the wire harness between the ETCS fuse and battery.

(1) Remove the ETCS fuse from the engine room R/B No. 2.

(2) Disconnect the battery positive cable.

(3) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
Battery positive cable - R/B No. 2 ETCS fuse terminal 1	Below 1 Ω
Battery positive cable or R/B No. 2 ETCS fuse terminal 1 - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

CHECK ENGINE ROOM RELAY BLOCK NO.2

DTC	P2119	THROTTLE ACTUATOR CONTROL THROTTLE BODY RANGE/PERFORMANCE

CIRCUIT DESCRIPTION

The Electronic Throttle Control System (ETCS) is composed of a throttle actuator that operates the throttle valve, a throttle position sensor that detects the opening angle of the throttle valve, an accelerator pedal position sensor that detects the accelerator pedal position, and the ECM that controls the ETCS system. The ECM operates the throttle actuator to position the throttle valve for proper response to driver inputs. The throttle position sensor, which is mounted on the throttle body, detects the opening angle of the throttle valve and provides this signal to the ECM so that the ECM can regulate the throttle actuator.

DTC No.	DTC Detection Condition	Trouble Area
P2119	Throttle opening angle continues to vary greatly from target throttle opening angle (1 trip detection logic)	·Electronic throttle control system ·ECM

MONITOR DESCRIPTION

The ECM determines the ”actual” throttle angle based on the throttle position sensor signal. The ”actual” throttle position is compared to the ”target” throttle position commanded by the ECM. If the difference between these two values exceeds a specified limit, the ECM interprets this as a fault in the ETCS system. The ECM turns on the MIL and a DTC is set.

FAIL-SAFE

If the ETCS has a malfunction, the ECM cuts off current to the throttle actuator. The throttle control valve returns to a predetermined opening angle (approximately 16°) by the force of the return spring. The ECM then adjusts the engine output by controlling the fuel injection (intermittent fuel-cut) and ignition timing in accordance with the accelerator pedal opening angle to enable the vehicle to continue at a minimal speed. If the accelerator pedal is depressed firmly and slowly, the vehicle can be driven slowly.
If a ”pass” condition is detected and then the ignition switch is turned OFF, the fail-safe operation will stop and the system will return to normal condition.

MONITOR STRATEGY

Related DTCs	P2119: ETCS malfunction
Required sensors / components (Main)	Throttle actuator
Required sensors / components (Related)	-
Frequency of operation	Continuous
Duration	1 sec.
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever this DTC is not present	See page 05-16

TYPICAL MALFUNCTION THRESHOLDS

Difference between ”target TP (Throttle position)” and ”actual TP”	0.3 V or more

WIRING DIAGRAM

Refer to DTC P2102 on page 05-243 .

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1 CHECK OTHER DTC OUTPUT (IN ADDITION TO DTC P2119)

Display (DTC output)	Proceed to
Only P2119 is output	A
P2119 and other codes are output	B

B → **GO TO RELEVANT DTC CHART (See page 05-48)**

A

2 CHECK IF DTC OUTPUT REOCCURS

(a) Clear the DTC (see page 05-38).
(b) Allow the engine to idle for 15 seconds.
(c) Pull the hand brake and shift the gear to D.
(d) Depress the brake pedal securely and the accelerator pedal fully for 5 seconds.
(e) Read the DTC.

HINT:

Actual throttle position (TP) sensor voltage can be confirmed using the hand-held tester [DATA LIST / ALL / THROTTLE POS #1].

OK: No DTC is output.

OK → **NORMAL**

NG

REPLACE THROTTLE BODY ASSY

DTC	P2120	THROTTLE/PEDAL POSITION SENSOR/SWITCH ”D” CIRCUIT

DTC	P2122	THROTTLE/PEDAL POSITION SENSOR/SWITCH ”D” CIRCUIT LOW INPUT

DTC	P2123	THROTTLE/PEDAL POSITION SENSOR/SWITCH ”D” CIRCUIT HIGH INPUT

DTC	P2125	THROTTLE/PEDAL POSITION SENSOR/SWITCH ”E” CIRCUIT

DTC	P2127	THROTTLE/PEDAL POSITION SENSOR/SWITCH ”E” CIRCUIT LOW INPUT

DTC	P2128	THROTTLE/PEDAL POSITION SENSOR/SWITCH ”E” CIRCUIT HIGH INPUT

DTC	P2138	THROTTLE/PEDAL POSITION SENSOR/SWITCH ”D”/”E” VOLTAGE CORRELATION

HINT:
This is the repair procedure for the ”accelerator pedal position sensor”.

CIRCUIT DESCRIPTION

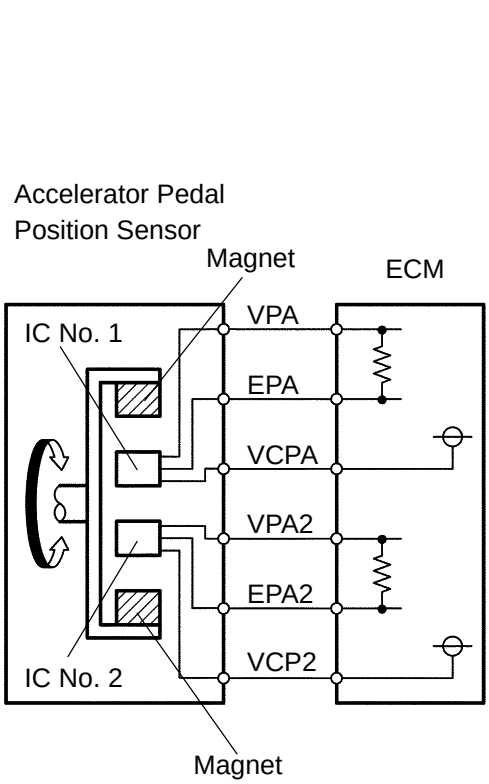
HINT:

- This Electronic Throttle Control System (ETCS) does not use a throttle cable.
- This description is for the accelerator pedal position sensor.

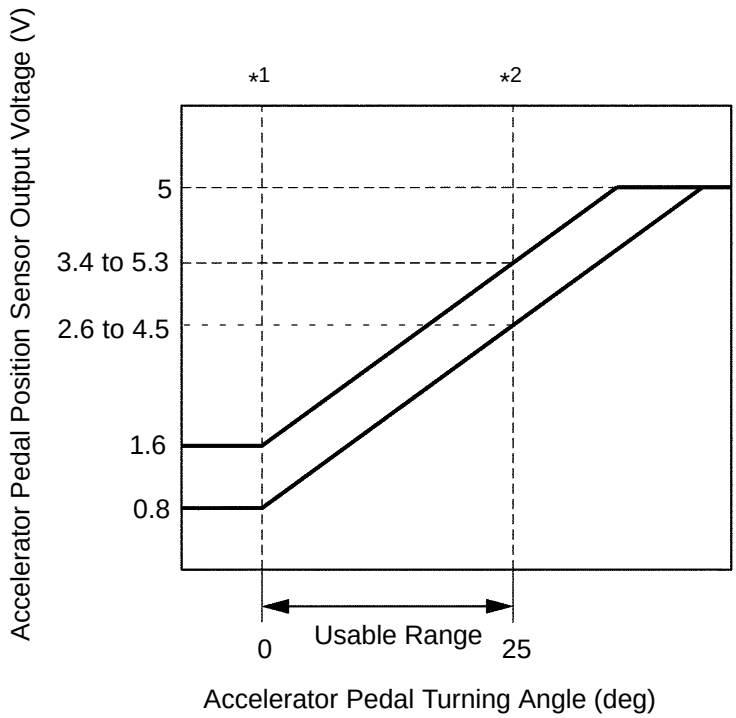
The Accelerator Pedal Position (APP) sensor is mounted on the accelerator pedal to detect the angle of the accelerator pedal. This sensor is electronically controlled and uses Hall-effect elements.

In the accelerator pedal position sensor, the voltage applied to terminals VPA and VPA2 of the ECM changes between 0 V and 5 V in proportion to the angle of the accelerator pedal. The VPA is a signal to indicate the actual accelerator pedal angle and is used for the engine control. VPA2 is used to detect malfunctions of the sensor itself.

The ECM monitors the accelerator pedal angle from VPA and VPA2 signal outputs, and controls the throttle motor based on these signals.



A19694



*1: Accelerator Pedal Released

*2: Accelerator Pedal Fully Depressed

A19803

DTC No.	DTC Detection Condition (All of the following are 1 trip detection logic)	Trouble Area
P2120	Condition (a) continues for 0.5 sec. or more: (a) VPA is 0.2 V or less or VPA is 4.8 V or more	·Accelerator pedal position sensor ·ECM
P2122	VPA is 0.2 V or less for 0.5 sec. or more when VPA2 output indicates accelerator pedal is opened	·Accelerator pedal position sensor ·Open in VCP1 circuit ·VPA circuit open or ground short ·ECM
P2123	Condition (a) continues for 2.0 sec. or more: (a) VPA is 4.8 V or more	·Accelerator pedal position sensor ·Open in EPA circuit ·ECM
P2125	Condition (a) continues for 0.5 sec. or more: (a) (VPA2 is 0.5 V or less) or (VPA2 is 4.8 V or more)	·Accelerator pedal position sensor ·ECM
P2127	VPA2 is 0.5 V or less for 0.5 sec. or more when VPA output indicates accelerator pedal is opened	·Accelerator pedal position sensor ·Open in VCP2 circuit ·VPA2 circuit open or ground short ·ECM
P2128	Conditions (a) and (b) continue for 2.0 sec. or more: (a) VPA2 is 4.8 V or more (b) VPA is 0.2 V or more and VPA is 3.45 V or less	·Accelerator pedal position sensor ·Open in EPA2 circuit ·ECM
P2138	Condition (a) or (b) continues for 2.0 sec. or more: (a) Difference between VPA and VPA2 is 0.02 V or less (b) VPA is 0.2 V or less and VPA2 is 0.5 V or less	·VPA and VPA2 circuit are short circuited ·Accelerator pedal position sensor ·ECM

HINT:

After confirming DTC P2120, P2122, P2123, P2125, P2127, P2128 and P2138, use the hand-held tester or the OBD II scan tool to confirm the accelerator pedal position sensor output voltage.

Trouble Area	Accelerator pedal position expressed as voltage output			
	Accelerator pedal released		Accelerator pedal depressed	
	ACCEL POS #1	ACCEL POS #2	ACCEL POS #1	ACCEL POS #2
VCP circuit open	0 to 0.2 V	0 to 0.2 V	0 to 0.2 V	0 to 0.2 V
VPA circuit open or ground short	0 to 0.2 V	1.2 to 2.0 V	0 to 0.2 V	3.4 to 5.3 V
VPA2 circuit open or ground short	0.5 to 1.1 V	0 to 0.2 V	2.6 to 4.5 V	0 to 0.2 V
EPA circuit open	4.5 to 5.5 V	4.5 to 5.5 V	4.5 to 5.5 V	4.5 to 5.5 V

MONITOR DESCRIPTION

When VPA or VPA2 deviates from the standard, or the difference between the voltage outputs of the two sensors is less than the threshold, the ECM concludes that there is a defect in the accelerator pedal position sensor. The ECM turns on the MIL and a DTC is set.

Example:

The voltage output of the VPA is below 0.2 V or exceeds 4.8 V.

FAIL-SAFE

The accelerator pedal position sensor has 2 (main and sub) sensor circuits. If a malfunction occurs in either of the sensor circuits, the ECM detects the abnormal signal voltage difference between the 2 sensor circuits and switches to fail-safe mode. In fail-safe mode, the remaining circuit is used to calculate the accelerator pedal opening angle to allow the vehicle to continue driving.

If both circuits malfunction, the ECM regards the opening angle of the accelerator pedal to be fully closed. In this case, the throttle valve will remain closed as if the engine is idling.

If a ”pass” condition is detected and then the ignition switch is turned OFF, the fail-safe operation will stop and the system will return to normal condition.

MONITOR STRATEGY

Related DTCs	P2120: APP (Accelerator pedal position) Sensor 1 range check (chattering) P2122: APP sensor 1 range check (low voltage) P2123: APP sensor 1 range check (high voltage) P2125: APP sensor 2 range check (chattering) P2127: APP sensor 2 range check (low voltage) P2128: APP sensor 2 range check (high voltage) P2138: APP sensor range check (correlation)
Required sensors / components (Main)	APP sensor
Required sensors / components (Related)	-
Frequency of operation	Continuous
Duration	0.5 sec.: P2120, P2122, P2125 and P2127 2 sec.: P2123, P2128 and P2138
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever these DTCs are not present	See page 05-16

TYPICAL MALFUNCTION THRESHOLDS

P2120:

Either of the following conditions is met:	Condition 1 or 2
1. VPA1 voltage when VPA2 is 0.97◯or more	0.2 V or less
2. VPA1 voltage	4.8 V or more

P2122:

VPA1 voltage when VPA2 is 0.97◯or more	0.2 V or less

P2123:

VPA1 voltage	4.8 V or more

P2125:

Either of the following conditions is met:	Condition 1 or 2
1. VPA2 voltage when VPA1 is 0.97◯or more	0.5 V or less
2. VPA2 voltage when VPA1 is 0.2 to 3.45 V	4.8 V or more

P2127:

VPA2 voltage when VPA1 is 0.97◯or more	0.5 V or less

P2128:

VPA2 voltage when VPA1 is 0.2 to 3.45 V	4.8 V or more

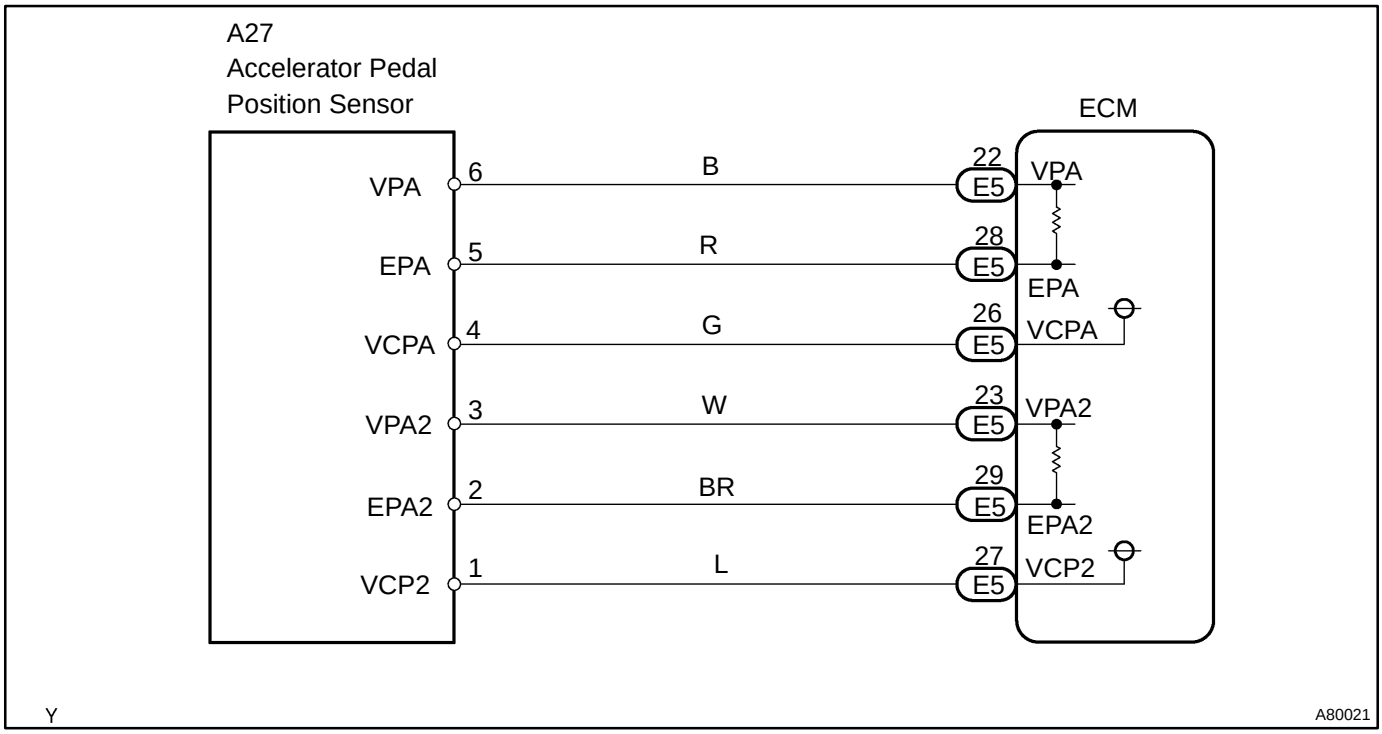
P2138:

Either of the following conditions is met:	Condition 1 or 2
1. Difference betrween VPA 1 and VPA2 voltage	0.02 V or less
Condition 2	-
VPA1 voltage	0.2 V or less
VPA2 voltage	0.5 V or less

COMPONENT OPERATING RANGE

VPA voltage	0.5 to 4.5 V
VPA2 voltage	1.2 to 4.8 V

WIRING DIAGRAM



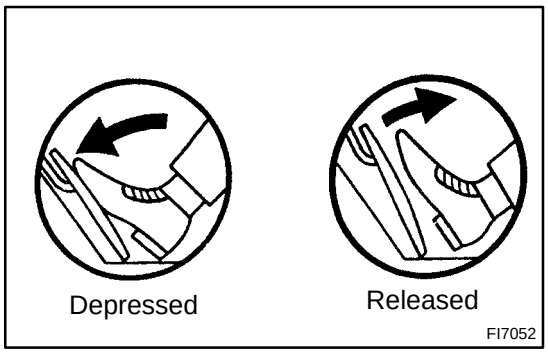
INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

Hand-held tester:

1	READ VALUE OF HAND-HELD TESTER (ACCEL POS #1 AND ACCEL POS #2)



(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON.
(c) On the hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ETCS / ACCEL POS #1 and ACCEL POS #2" and read its value displayed on the hand-held tester.

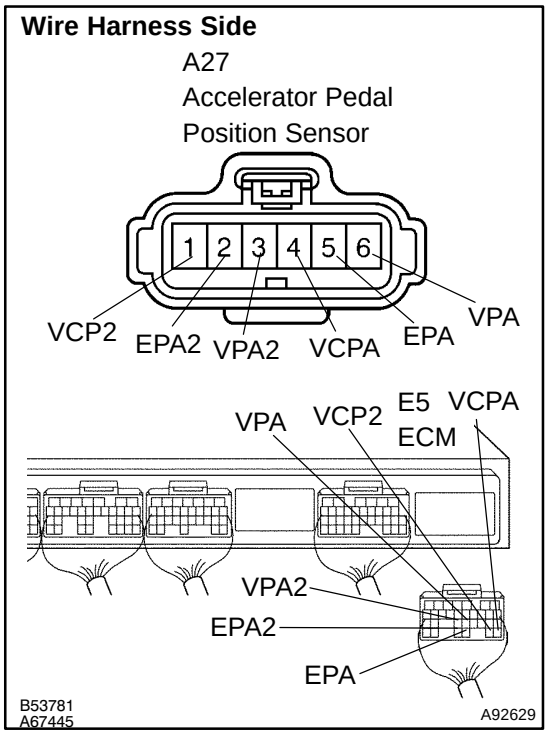
Standard:

Accelerator Pedal	ACCEL POS #1	ACCEL POS #2
Released	0.5 to 1.1 V	1.2 to 2.0 V
Depressed	2.6 to 4.5 V	3.4 to 5.3 V

OK → **Go to step 5**

NG

2 CHECK WIRE HARNESS (ACCELERATOR PEDAL POSITION SENSOR - ECM)



(a) Disconnect the A27 sensor connector.
(b) Disconnect the E5 ECM connector.
(c) Measure the resistance of the wire harness side connectors.

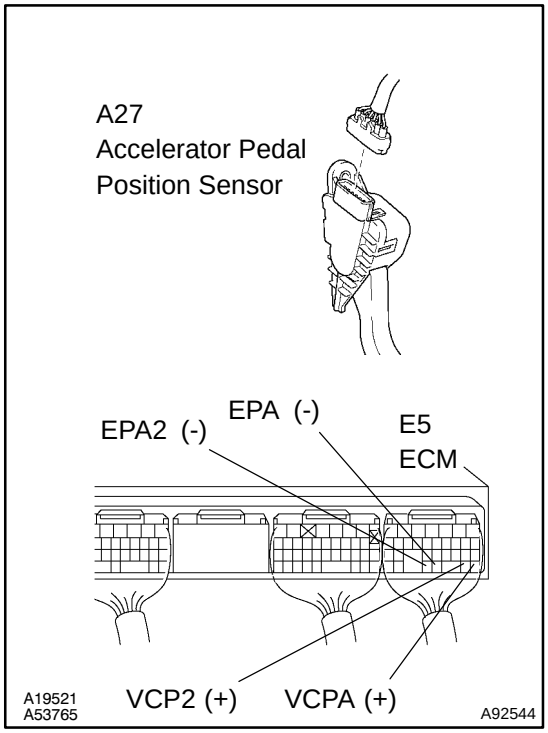
Standard:

Tester Connection	Specified Condition
VPA (A27-6) - VPA (E5-22) EPA (A27-5) - EPA (E5-28) VCPA (A27-4) - VCPA (E5-26) VPA2 (A27-3) - VPA2 (E5-23) EPA2 (A27-2) - EPA2 (E5-29) VCP2 (A27-1) - VCP2 (E5-27)	Below 1 Ω
VPA (A27-6) or VPA (E5-22) - Body ground EPA (A27-5) or EPA (E5-28) - Body ground VCPA (A27-4) or VCPA (E5-26) - Body ground VPA2 (A27-3) or VPA2 (E5-23) - Body ground EPA2 (A27-2) or EPA2 (E5-29) - Body ground VCP2 (A27-1) or VCP2 (E5-27) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

3 INSPECT ECM (VCPA AND VCP2 VOLTAGE)



(a) Disconnect the A27 sensor connector.
(b) Turn the ignition switch ON.
(c) Measure the voltage of the ECM connector.

Standard:

Tester Connection	Specified Condition
VCPA (E5-26) - EPA (E5-28) VCP2 (E5-27) - EPA2 (E5-29)	4.5 to 5.5 V

NG → **REPLACE ECM (See page 10-9)**

OK

4	REPLACE ACCELERATOR PEDAL ROD ASSY (See page 10-1 1)

GO

5	READ OUTPUT DTC (ACCELERATOR PEDAL POSITION SENSOR DTCS ARE OUTPUT AGAIN)

(a) Clear the DTC (see page 05-38).
(b) Start the engine.
(c) Run the engine at idle for 15 seconds or more.
(d) Read the DTC.

Result:

Display (DTC Output)	Proceed to
P2120, P2122, P2123, P2125, P2127, P2128 and/or P2138 are output again	A
No DTC output	B

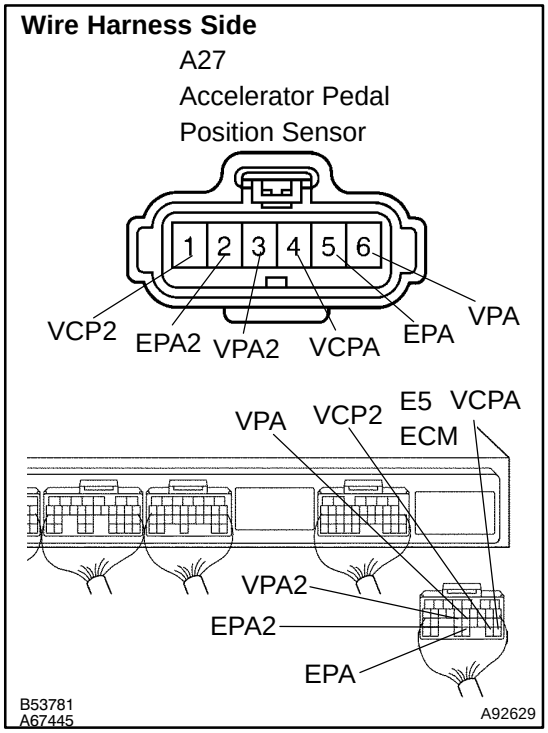
B → **SYSTEM OK**

A

REPLACE ECM (See page 10-9)

OBD II scan tool (excluding hand-held tester):

1	CHECK WIRE HARNESS (ACCELERATOR PEDAL POSITION SENSOR - ECM)



(a) Disconnect the A27 sensor connector.
(b) Disconnect the E5 ECM connector.
(c) Measure the resistance of the wire harness side connectors.

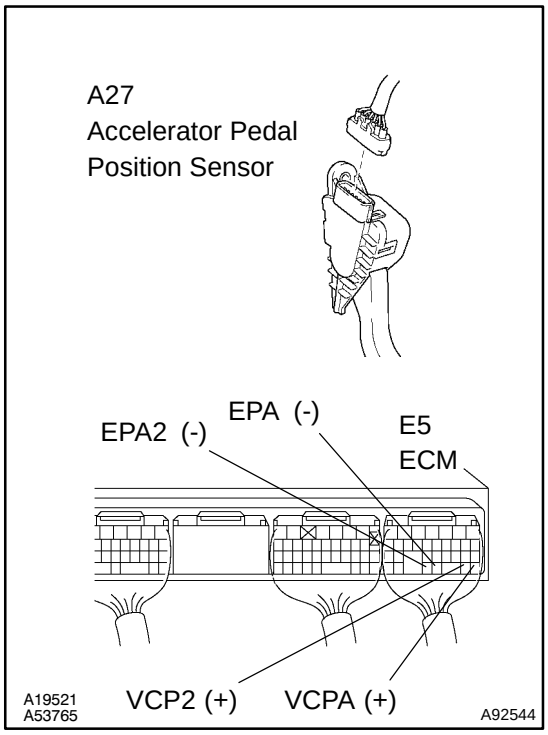
Standard:

Tester Connection	Specified Condition
VPA (A27-6) - VPA (E5-22) EPA (A27-5) - EPA (E5-28) VCPA (A27-4) - VCPA (E5-26) VPA2 (A27-3) - VPA2 (E5-23) EPA2 (A27-2) - EPA2 (E5-29) VCP2 (A27-1) - VCP2 (E5-27)	Below 1 Ω
VPA (A27-6) or VPA (E5-22) - Body ground EPA (A27-5) or EPA (E5-28) - Body ground VCPA (A27-4) or VCPA (E5-26) - Body ground VPA2 (A27-3) or VPA2 (E5-23) - Body ground EPA2 (A27-2) or EPA2 (E5-29) - Body ground VCP2 (A27-1) or VCP2 (E5-27) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

2	INSPECT ECM (VCPA AND VCP2 VOLTAGE)



(a) Disconnect the A27 sensor connector.
(b) Turn the ignition switch ON.
(c) Measure the voltage of the ECM connector.

Standard:

Tester Connection	Specified Condition
VCPA (E5-26) - EPA (E5-28) VCP2 (E5-27) - EPA2 (E5-29)	4.5 to 5.5 V

NG → **REPLACE ECM (See page 10-9)**

OK

3	REPLACE ACCELERATOR PEDAL ROD ASSY (See page 10-11)

GO

4	READ OUTPUT DTC (ACCELERATOR PEDAL POSITION SENSOR DTCS ARE OUTPUT AGAIN)

(a) Clear the DTC (see page 05-38).
(b) Start the engine.
(c) Run the engine at idle for 15 seconds or more.
(d) Read the DTC.

Result:

Display (DTC Output)	Proceed to
P2120, P2122, P2123, P2125, P2127, P2128 and/or P2138 are output again	A
No DTC output	B

B → **SYSTEM OK**

A

REPLACE ECM (See page 10-9)

DTC	P2121	THROTTLE/PEDAL POSITION SENSOR/SWITCH ”D” CIRCUIT RANGE/PERFORMANCE

HINT:
This is repair procedure for the ”accelerator pedal position sensor”.

CIRCUIT DESCRIPTION

Refer to DTC P2120 on page 05-257 .

DTC No.	DTC Detection Condition	Trouble Area
P2121	Conditions (a) continue for 0.5 seconds: (a) Difference between VPA and VPA2 exceeds the threshold (1 trip detection logic)	・Open or short in Accelerator pedal position sensor circuit ・Accelerator pedal position sensor ・ECM

MONITOR DESCRIPTION

The accelerator pedal position sensor is mounted on the accelerator pedal bracket. The accelerator pedal position sensor has two sensor elements/signal outputs: VPA and VPA2. VPA is used to detect the actual accelerator pedal angle (used for engine control) and VPA2 is used to detect malfunctions in VPA. When the difference between the voltage outputs of VPA and VPA2 deviate from the standard, the ECM concludes the accelerator pedal position sensor has a malfunction. The ECM turns on the MIL and a DTC is set.

FAIL-SAFE

The accelerator pedal position sensor has 2 (main and sub) sensor circuits. If a malfunction occurs in either of the sensor circuits, the ECM detects the abnormal signal voltage difference between the 2 sensor circuits and switches to fail-safe mode. In fail-safe mode, the remaining circuit is used to calculate the accelerator pedal opening to allow the vehicle to continue driving.
If both circuits malfunction, the ECM regards the opening angle of the accelerator pedal to be fully closed. In this case, the throttle valve will remain closed as if the engine is idling.
If a ”pass” condition is detected and then the ignition switch is turned OFF, the fail-safe operation will stop and the system will return to normal condition.

MONITOR STRATEGY

Related DTCs	P2121: TP sensor malfunction
Required sensors / components (Main)	Accelerator position sensor
Required sensors / components (Related)	-
Frequency of operation	Continuous
Duration	0.5 sec.
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever this DTC is not present	See page 05-16
Either of the following conditions is met:	Condition 1 or 2
1. Electronic throttle actuator power	ON
2. Ignition switch	ON

TYPICAL MALFUNCTION THRESHOLDS

Learned voltage value of (VTA1 - VTA2)	Less than 0.4 V, or more than 1.2 V

WIRING DIAGRAM

Refer to DTC P2120 on page 05-257 .

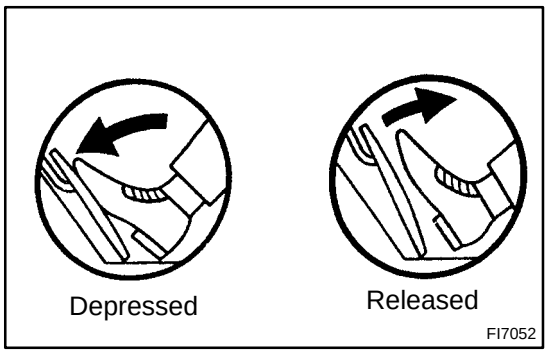
INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

Hand-held tester:

1	READ VALUE OF HAND-HELD TESTER (ACCEL POS #1, ACCEL POS #2)



(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON.
(c) On the hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ETCS / ACCEL POS #1 and ACCEL POS #2" and read its value displayed on the hand-held tester.

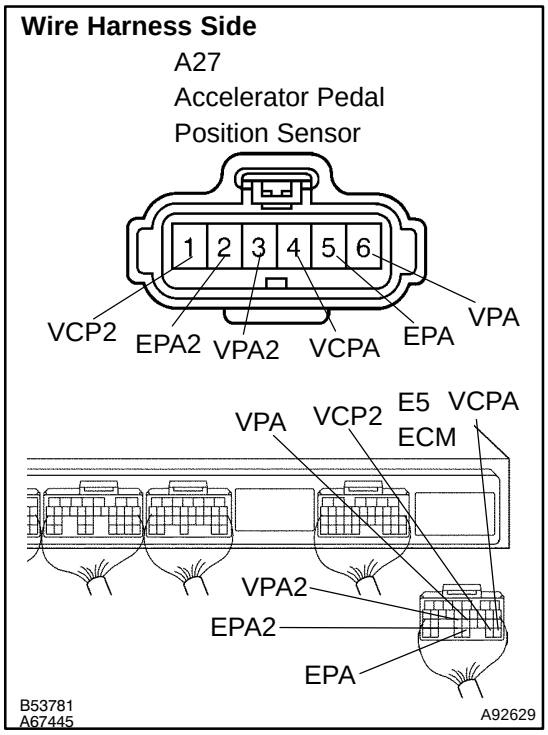
Standard:

Accelerator Pedal	ACCEL POS #1	ACCEL POS #2
Released	0.5 to 1.1 V	1.2 to 2.0 V
Depressed	2.6 to 4.5 V	3.4 to 5.3 V

OK → **REPLACE ECM (See page 10-9)**

NG

2	CHECK WIRE HARNESS (ACCELERATOR PEDAL POSITION SENSOR - ECM)



(a) Disconnect the A27 sensor connector.
(b) Disconnect the E5 ECM connector.
(c) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
VPA (A27-6) - VPA (E5-22) EPA (A27-5) - EPA (E5-28) VCPA (A27-4) - VCPA (E5-26) VPA2 (A27-3) - VPA2 (E5-23) EPA2 (A27-2) - EPA2 (E5-29) VCP2 (A27-1) - VCP2 (E5-27)	Below 1 Ω
VPA (A27-6) or VPA (E5-22) - Body ground EPA (A27-5) or EPA (E5-28) - Body ground VCPA (A27-4) or VCPA (E5-26) - Body ground VPA2 (A27-3) or VPA2 (E5-23) - Body ground EPA2 (A27-2) or EPA2 (E5-29) - Body ground VCP2 (A27-1) or VCP2 (E5-27) - Body ground	10 kΩ or higher

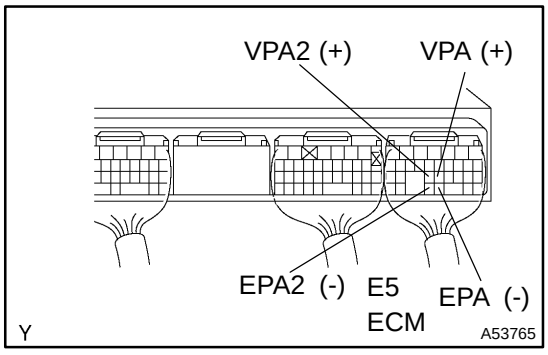
NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE ACCELERATOR PEDAL ROD ASSY (See page 10-1 1)

OBD II scan tool (excluding hand-held tester):

1	INSPECT ECM (VPA AND VPA2 VOLTAGE)



(a) Turn the ignition switch ON.
(b) Measure the voltage between the specified terminals of the E5 ECM connector.

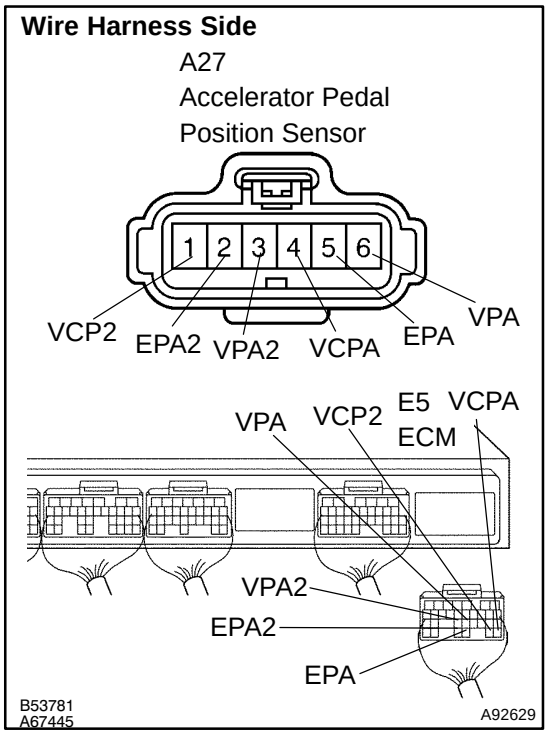
Standard:

Accelerator Pedal Position	Tester Connection VPA (E5-22) - EPA (E5-28)	Tester Connection VPA2 (E5-23) - EPA2 (E5-29)
Released	0.5 to 1.1 V	1.2 to 2.0 V
Depressed	2.6 to 4.5 V	3.4 to 5.3 V

OK → **REPLACE ECM (See page 10-9)**

NG

2 CHECK WIRE HARNESS (ACCELERATOR PEDAL POSITION SENSOR - ECM)



(a) Disconnect the A27 sensor connector.
(b) Disconnect the E5 ECM connector.
(c) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
VPA (A27-6) - VPA (E5-22) EPA (A27-5) - EPA (E5-28) VCPA (A27-4) - VCPA (E5-26) VPA2 (A17-3) - VPA2 (E5-23) EPA2 (A27-2) - EPA2 (E5-29) VCP2 (A27-1) - VCP2 (E5-27)	Below 1 Ω
VPA (A27-6) or VPA (E5-22) - Body ground EPA (A27-5) or EPA (E5-28) - Body ground VCPA (A27-4) or VCPA (E5-26) - Body ground VPA2 (A27-3) or VPA2 (E5-23) - Body ground EPA2 (A27-2) or EPA2 (E5-29) - Body ground VCP2 (A27-1) or VCP2 (E5-27) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK →

REPLACE ACCELERATOR PEDAL ROD ASSY (See page 10-1 1)

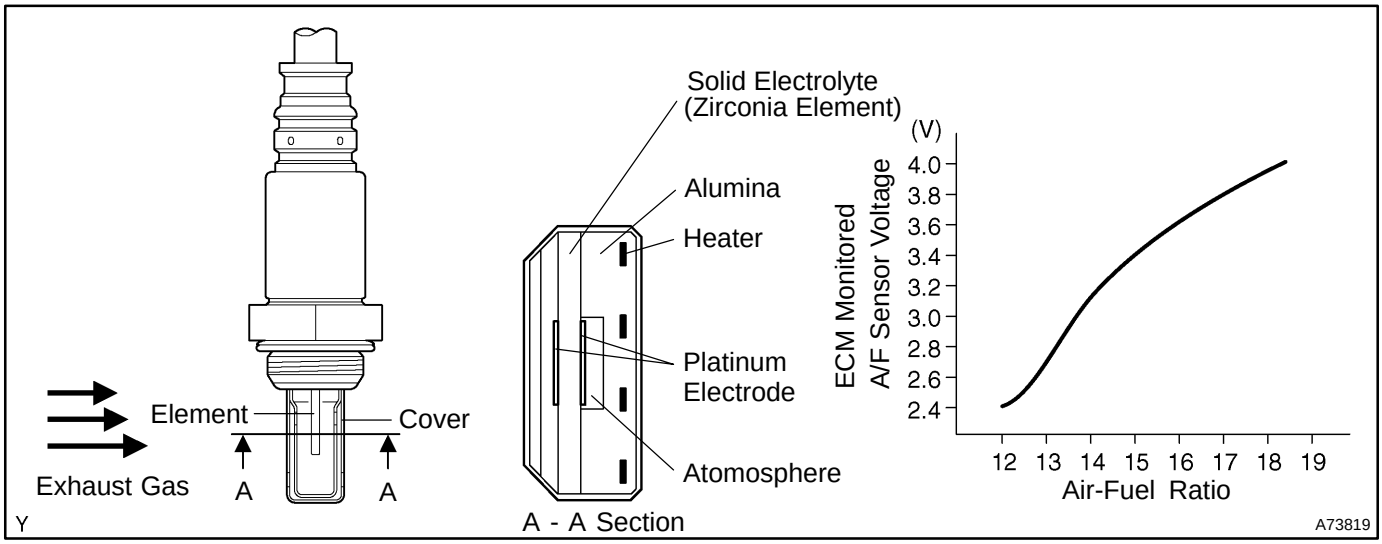
DTC	P2195	OXYGEN (A/F) SENSOR SIGNAL STUCK LEAN (BANK 1 SENSOR 1)

DTC	P2196	OXYGEN (A/F) SENSOR SIGNAL STUCK RICH (BANK 1 SENSOR 1)

HINT:
Although the title (DTC description) says ”oxygen sensor”, this DTC is related to the ”A/F sensor”.

CIRCUIT DESCRIPTION

The Air-Fuel ratio (A/F) sensor provides output voltage* approximately equal to the existing air-fuel ratio. The A/F sensor output voltage is used to provide feedback for the ECM to control the air-fuel ratio.
With the A/F sensor output, the ECM can determine deviation from the stoichiometric air-fuel ratio and control proper injection time. If the A/F sensor is malfunctioning, the ECM is unable to accurately control air-fuel ratio.
The A/F sensor is equipped with a heater which heats the zirconia element. The heater is also controlled by the ECM. When the intake air volume is low (the temperature of the exhaust gas is low), current flows to the heater which heats the sensor to facilitate detection of accurate oxygen concentration.
The A/F sensor is a planar type. Compared to a conventional type, the sensor and heater portions are narrower. Because the heat of the heater is conducted through the alumina to zirconia (of the sensor portion), sensor activation is accelerated.
To obtain a high purification rate of the CO, HC and NOx components of the exhaust gas, a three-way catalytic converter is used. The converter is most efficient when the air-fuel ratio is maintained near the stoichiometric air-fuel ratio.
HINT:
*: The voltage value changes on the inside of the ECM only.



DTC No.	DTC Detection Condition	Trouble Area
P2195	Conditions (a) and (b) continue for 2 seconds or more: (a) A/F sensor voltage is more than 3.8 V (b) Rear oxygen sensor voltage is 0.15 V or more (2 trip detection logic)	⁎ Open or short in A/F sensor circuit ⁎ A/F sensor ⁎ A/F sensor heater ⁎ EFI relay ⁎ Open or short in A/F sensor heater and EFI relay circuits ⁎ Air induction system ⁎ Fuel pressure ⁎ Injector ⁎ ECM
P2196	Conditions (a) and (b) continue for 2 seconds or more: (a) A/F sensor voltage is less than 2.8 V (b) Rear oxygen sensor voltage is less than 0.85 V (2 trip detection logic)	⁎ Same as DTC No. P2195

HINT:

- ⁎ DTCs P2195 and P2196 indicate a malfunction related to bank 1 of the A/F sensor circuit.
- ⁎ Sensor 1 is the sensor closest to the engine assembly.
- ⁎ After confirming DTC P2195 and P2196, use the hand-held tester or the OBD II scan tool to confirm A/F sensor output voltage (AFS B1S1) from the ALL menu (to reach the ALL menu: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL).
- ⁎ The A/F sensor's output voltage and the short-term fuel trim value can be read using the OBD II scan tool or the hand-held tester.
- ⁎ The ECM controls the voltage of the A1A+ and A1A- terminals of the ECM to a fixed voltage. Therefore, it is impossible to confirm the A/F sensor output voltage without the OBD II scan tool or the hand-held tester.
- ⁎ The OBD II scan tool (excluding hand-held tester) displays one fifth of the A/F sensor output voltage which is displayed on the hand-held tester.

MONITOR DESCRIPTION

Under the air-fuel ratio feedback control, if the voltage output of the A/F sensor indicates RICH or LEAN for more than a certain period of time, the ECM concludes that there is a fault in the A/F sensor system. The ECM will turn on the MIL and will set a DTC.

Example:

If the A/F sensor voltage output is less than 2.8 V (very RICH) for 10 seconds even though voltage output of the heated oxygen sensor output voltage is less than 0.85 V, the ECM sets DTC P2196 or DTC P2198. If the heated oxygen sensor output voltage is 0.15 V or more but the A/F sensor voltage output is more than 3.8 V (very LEAN) for 10 seconds, DTC P2195 is set.

MONITOR STRATEGY

Related DTCs	P2195: A/F Sensor Signal (Bank 1) Stuck Lean P2196: A/F Sensor Signal (Bank 1) Stuck Rich
Required sensors / components (Main)	A/F sensor
Required sensors / components (Related)	Rear HO2S
Frequency of operation	Continuous
Duration	10 sec.
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever these DTCs are not present	See page 05-16
Time after engine start	30 sec. or more
A/F sensor status	Activated
Fuel system status	Closed Loop
Engine condition	Running

TYPICAL MALFUNCTION THRESHOLDS

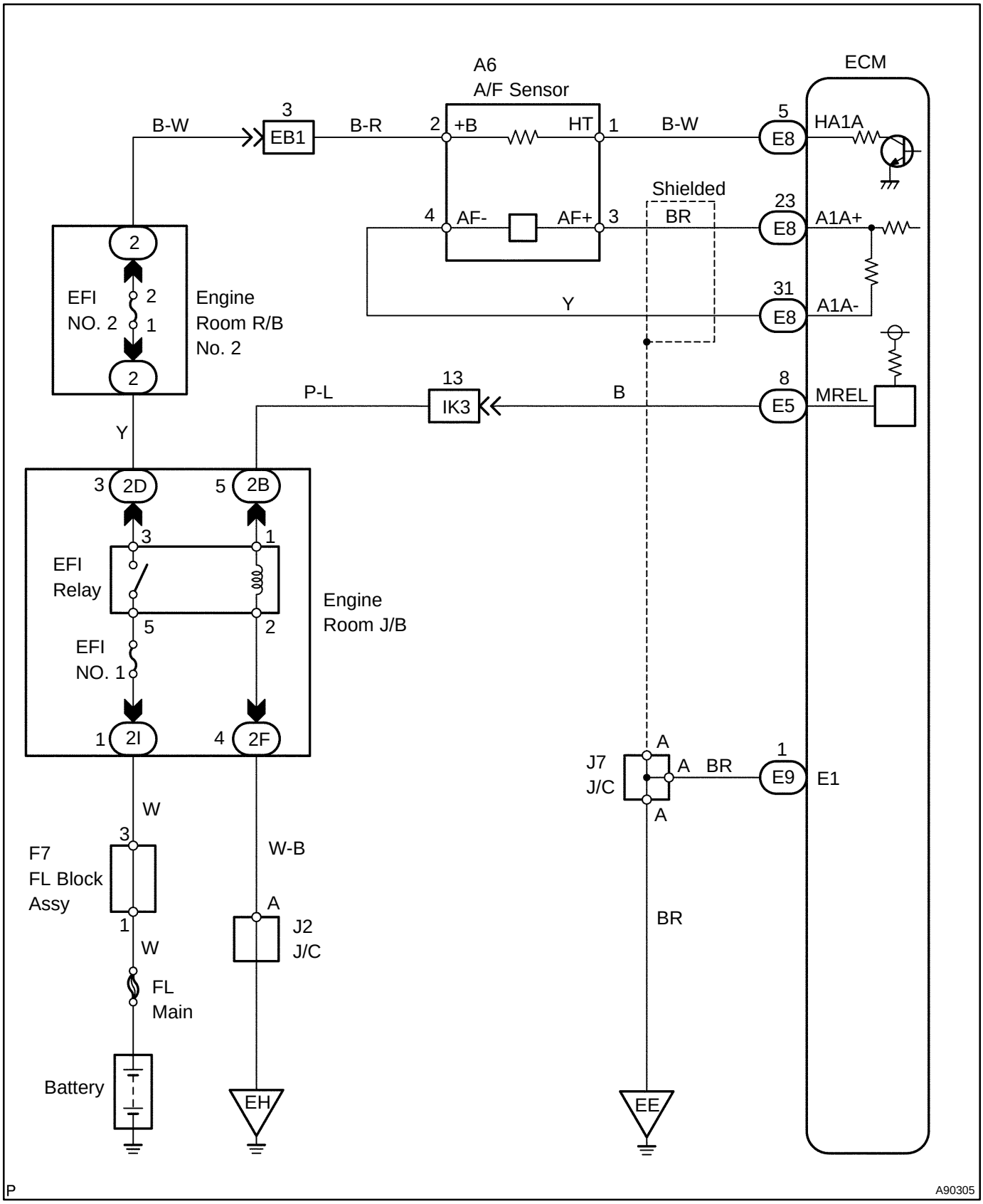
P2195:

Both of the following conditions are met:	-
A/F sensor voltage	More than 3.8 V
Rear HO2S voltage	0.15 V or more

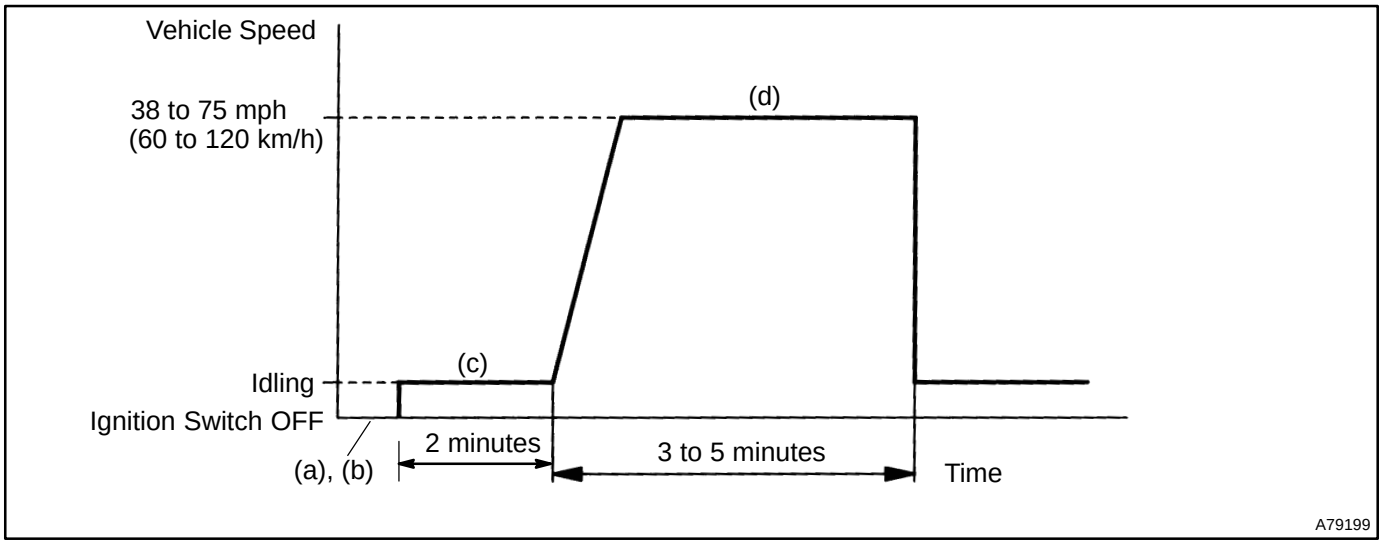
P2196:

Both of the following conditions are met:	-
A/F sensor voltage	Less than 2.8 V
Rear HO2S voltage	Less than 0.85 V

WIRING DIAGRAM



CONFIRMATION DRIVING PATTERN



(a) Connect the hand-held tester to the DLC3.
(b) Switch the hand-held tester from normal mode to check mode (see page 05-40).
(c) Start the engine and warm it up with all the accessory switched OFF.
(d) Drive the vehicle at 38 to 75 mph (60 to 120 km/h) and engine speed at 1,400 to 3,200 rpm for 3 to 5 minutes.

HINT:
If a malfunction exists, the MIL will be illuminated during step (d).

NOTICE:
If the conditions in this test are not strictly followed, detection of a malfunction will not occur. If you do not have a hand-held tester, turn the ignition switch OFF after performing steps (c) and (d), then perform steps (c) and (d) again.

INSPECTION PROCEDURE

HINT:
Hand-held tester only:
It is possible the malfunctioning area can be found using the ACTIVE TEST A/F CONTROL operation. The A/F CONTROL operation can determine if the A/F sensor, heated oxygen sensor or other potential trouble areas are malfunctioning or not.

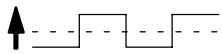
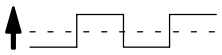
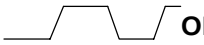
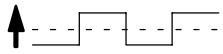
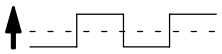
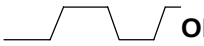
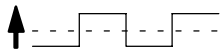
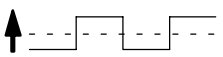
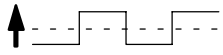
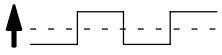
(a) Perform the ACTIVE TEST A/F CONTROL operation.

HINT:
The A/F CONTROL operation lowers the injection volume 12.5 % or increases the injection volume 25 %.

(1) Connect the hand-held tester to the DLC3 on the vehicle.
(2) Turn the ignition switch ON.
(3) Warm up the engine by running the engine at 2,500 rpm for approximately 90 seconds.
(4) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL.
(5) Perform the A/F CONTROL operation with the engine idle (press the right or left button).

Result:
A/F sensor reacts in accordance with increase and decrease of injection volume:
+25 % → RICH output: Less than 3.0 V
-12.5 % → LEAN output: More than 3.35 V
Heated oxygen sensor reacts in accordance with increase and decrease of injection volume:
+25 % → RICH output: More than 0.55 V
-12.5 % → LEAN output: Less than 0.4 V

NOTICE:
The A/F sensor output has a few seconds of delay and the heated oxygen sensor output has about 20 seconds of delay.

	Output voltage of A/F sensor (sensor 1)	Output voltage of heated oxygen sensor (sensor 2)	Main suspect trouble area
Case 1	Injection volume +25 % -12.5 %  Output voltage More than 3.35 V Less than 3.0 V  **OK**	Injection volume +25 % -12.5 %  Output voltage More than 0.55 V Less than 0.4V  **OK**	—
Case 2	Injection volume +25 % -12.5 %  Output voltage Almost No reaction **NG**	Injection volume +25 % -12.5 %  Output voltage More than 0.55 V Less than 0.4V  **OK**	A/F sensor (A/F sensor, heater, A/F sensor circuit)
Case 3	Injection volume +25 % -12.5 %  Output voltage More than 3.35 V Less than 3.0V  **OK**	Injection volume +25 % -12.5 %  Output voltage Almost No reaction **NG**	Heated oxygen sensor (heated oxygen sensor, heater, heated oxygen sensor circuit)
Case 4	Injection volume +25 % -12.5 %  Output voltage Almost No reaction **NG**	Injection volume +25 % -12.5 %  Output voltage Almost No reaction **NG**	Extremely rich or lean actual air-fuel ratio (Injector, fuel pressure, gas leakage in exhaust system, etc.)

The following A/F CONTROL procedure enables a technician to check and graph the voltage outputs of both the A/F sensor and the heated oxygen sensor.
For displaying the graph, enter ”ACTIVE TEST / A/F CONTROL / USER DATA”, select ”AFS B1S1 and O2S B1S2” by pressing ”YES” and push ”ENTER”. Then press ”F4”.
HINT:

- If DTC P2195 or P2196 is displayed, check bank 1 sensor 1 circuit.
- A low A/F sensor voltage could be caused by a RICH air-fuel mixture. Check for conditions that would cause the engine to run with a RICH air-fuel mixture.
- A high A/F sensor voltage could be caused by a LEAN air-fuel mixture. Check for conditions that would cause the engine to run with a LEAN air-fuel mixture.
- Read freeze frame data using the hand-held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	CHECK OTHER DTC OUTPUT (IN ADDITION TO A/F SENSOR DTC)

(a) Read the DTC using the hand-held tester or the OBD II scan tool.
Result:

Display	Proceed to
A/F sensor circuit DTC are output	A
A/F sensor circuit DTC and other codes are output	B

HINT:
If any other codes besides A/F sensor DTC are output, perform the troubleshooting for those DTCs first.

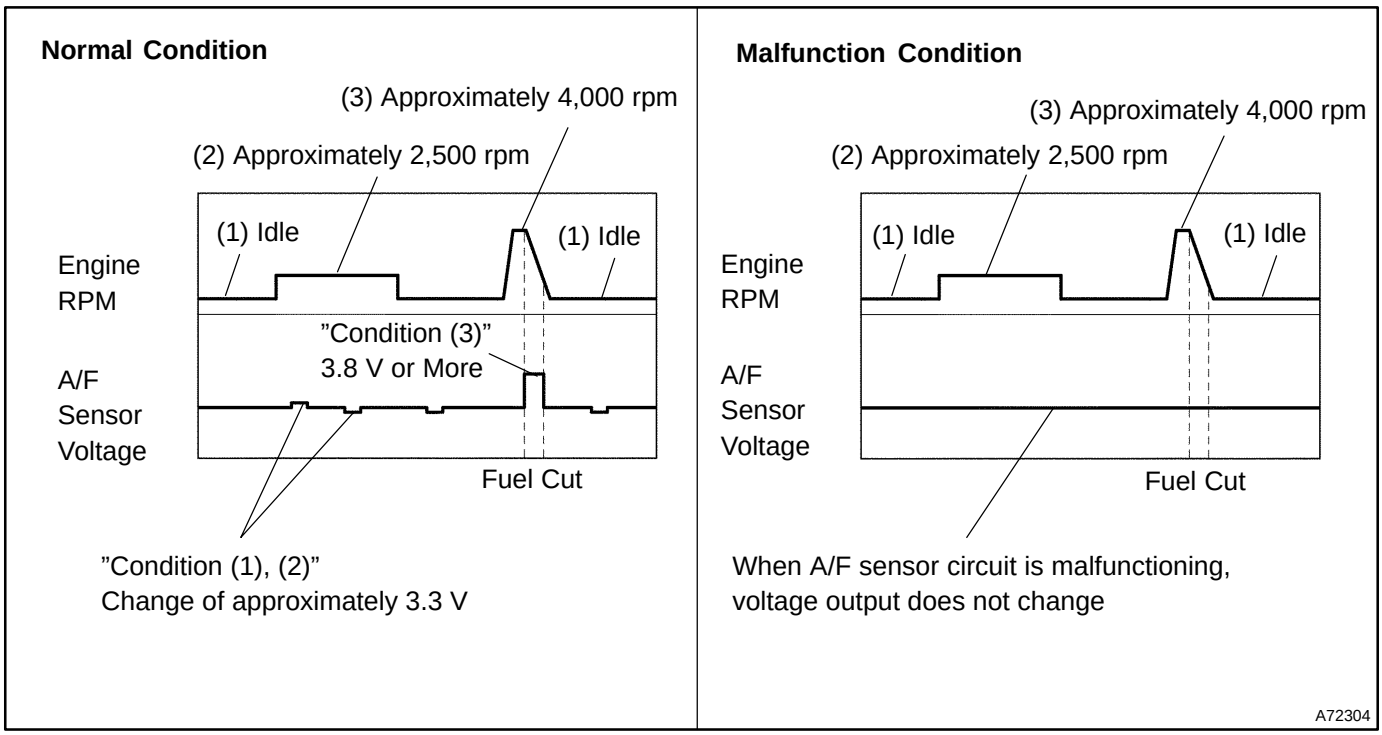
B → **GO TO RELEVANT DTC CHART**
(See page 05-48)

A

2	READ VALUE OF HAND-HELD TESTER OR OBD II SCAN TOOL (OUTPUT VOLTAGE OF A/F SENSOR)

(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(b) Warm up the A/F sensor (bank 1 sensor 1) by running the engine at 2,500 rpm for approximately 90 seconds.
(c) Read A/F sensor voltage output on the hand-held tester or the OBD II scan tool.
(d) Hand-held tester only:
On the hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / SNAPSHOT / MANUAL SNAPSHOT / USER DATA. Read the values.
(e) Select ”AFS B1S1 / ENGINE SPD” and press YES.
(f) Monitor the A/F sensor voltage carefully.
(g) Check the A/F sensor voltage output under the following conditions:
(1) Allow the engine to idle for 30 seconds.
(2) Run the engine at approximately 2,500 rpm. Do not suddenly change the rpm.
(3) Raise the engine to 4,000 rpm and quickly release the accelerator pedal so that the throttle is fully closed.

Standard:
Condition (1) and (2)
Voltage change of 3.3 V (0.66 V)* (between approximately 3.1 to 3.5 V) as shown in the illustration.
Condition (3)
A/F sensor voltage increases to 3.8 V (0.76 V)* or more during engine deceleration when fuel is cut as shown in the illustration.
***: Voltage when using the OBD II scan tool.**



HINT:

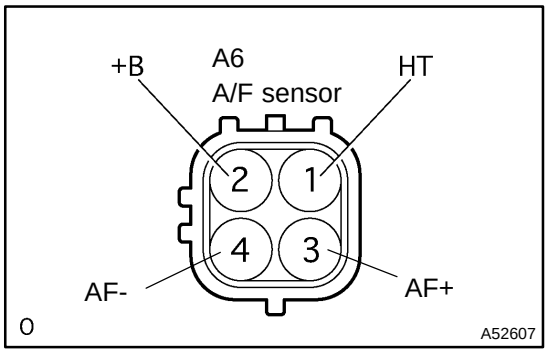
- Whenever the A/F sensor output voltage remains at approximately 3.3 V (0.660 V)* (see "Malfunction Condition" graphic) under any condition as well as the above conditions, the A/F sensor may have an open circuit. This will happen also when the A/F sensor heater has an open circuit.
- Whenever the A/F sensor output voltage remains at a certain value of approximately 3.8 V (0.76 V)* or more, or 2.8 V (0.56 V)* or less (see "Malfunction Condition" graphic) under any condition as well as the above conditions, the A/F sensor may have a short circuit.
- The ECM will stop fuel injection (fuel is cut) during engine deceleration. This will cause a LEAN condition and should result in a momentary increase in the A/F sensor output voltage.
- The ECM must establish a closed throttle position learned value to perform fuel cut. If the battery terminal has been disconnected, the vehicle must be driven over 10 mph (16 km/h) to allow the ECM to learn the closed throttle position.
- When the vehicle is driven:
  The output voltage of the A/F sensor may be below 2.8 V (0.76 V)* during fuel enrichment. For the vehicle, this translates to a sudden increase in speed with the accelerator pedal fully depressed when trying to overtake another vehicle. The A/F sensor is functioning normally.
- The A/F sensor is a current output element, and therefore the current is converted into voltage inside the ECM. If measuring voltage at connectors of A/F sensor or ECM, you will observe a constant voltage.

*: Voltage when using the OBD II scan tool.

OK	**Go to step 13**

NG

3 INSPECT AIR FUEL RATIO SENSOR (HEATER RESISTANCE)



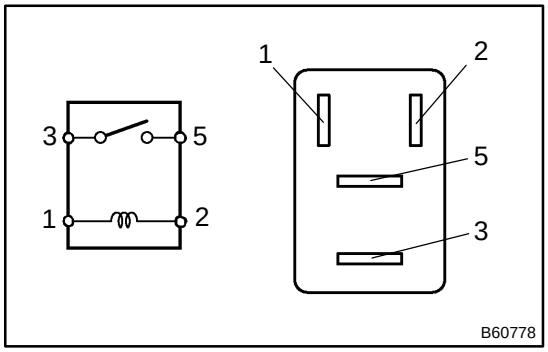
(a) Disconnect the A6 A/F sensor connector.
(b) Measure the resistance of the A/F sensor terminals.
Standard:

Tester Connection	Condition	Specified Condition
1 (HT) - 2 (+B)	20°C (68°F)	1.8 to 3.4 Ω
1 (HT) - 4 (AF-)	-	10 kΩ or higher

NG → **REPLACE AIR FUEL RATIO SENSOR**

OK

4 INSPECT RELAY (EFI)



(a) Remove the EFI relay from the engine room J/B.
(b) Measure the resistance of the EFI relay.
Standard:

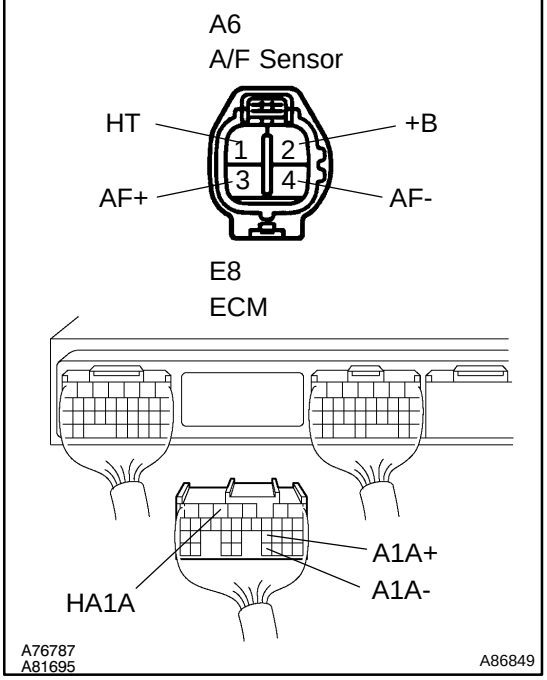
Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

NG → **REPLACE RELAY**

OK

5 CHECK WIRE HARNESS (A/F SENSOR - ECM)

Wire Harness Side

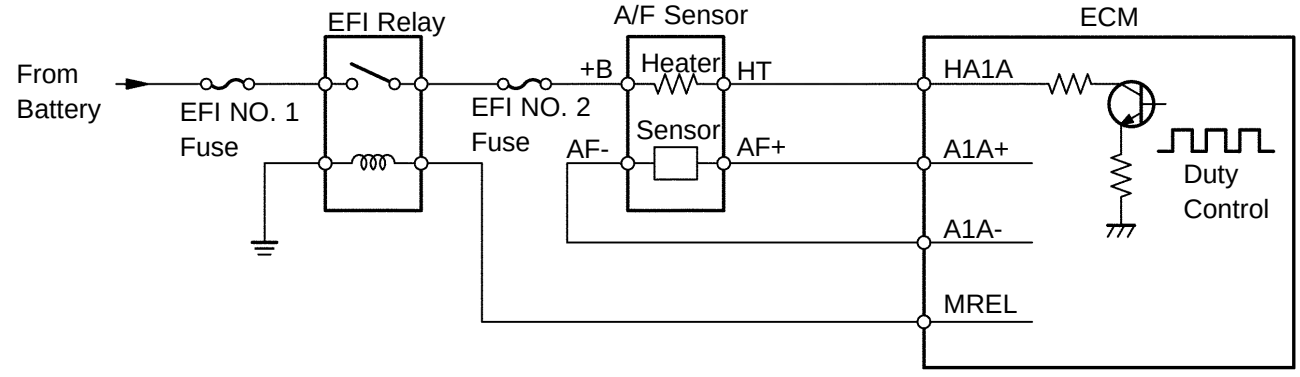


(a) Check the wire harness between the ECM and A/F sensor.
(1) Disconnect the A6 A/F sensor connector.
(2) Disconnect the E8 ECM connector.
(3) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
A6-3 (AF+) - E8-23 (A1A+) A6-4 (AF-) - E8-31 (A1A-) A6-1 (HT) - E8-5 (HA1A)	Below 1 Ω
A6-3 (AF+) or A1A+ (E8-23) - Body ground A6-4 (AF-) or A1A- (E8-31) - Body ground A6-1 (HT) or HA1A (E8-5) - Body ground	10 kΩ or higher

Reference



NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK →

6	CHECK AIR INDUCTION SYSTEM

(a) Check for vacuum leaks in the air induction system.
OK: No leak in the air induction system.

NG → **REPAIR OR REPLACE AIR INDUCTION SYSTEM**

OK

7	CHECK FUEL PRESSURE (See page 11-4)

(a) Check fuel pressure (high or low fuel pressure).
Standard:

Item	Specified Condition
Fuel pressure	304 to 343 kPa (3.1 to 3.5 kgf/cm^2, 44 to 55 psi)

NG → **REPAIR OR REPLACE FUEL SYSTEM**

OK

8	INSPECT FUEL INJECTOR ASSY (See page 11-7)

(a) Check injector injection (high or low fuel injection quantity or poor injection pattern).
Standard:

Injection Volume	Difference Between Each Injector
76 to 91 cm^3 (4.6 to 5.5 cu in.)/15 seconds	15 cm^3 (0.9 cu in.) or less

NG → **REPLACE FUEL INJECTOR ASSY (See page 11-10)**

OK

9	REPLACE AIR FUEL RATIO SENSOR

GO

10	PERFORM CONFIRMATION DRIVING PATTERN

HINT:
Clear all DTCs prior to performing the confirmation driving pattern.

GO

11	READ OUTPUT DTC

(a) Read the DTC using the hand-held tester or the OBD II scan tool.
Result:

Display	Proceed to
A/F sensor circuit DTC are not output	A
A/F sensor circuit DTC are output	B

B → **REPLACE ECM (See page 10-9) AND PERFORM CONFIRMATION DRIVING PATTERN**

A

12	CONFIRM IF VEHICLE HAS RUN OUT OF FUEL IN PAST

OK: Vehicle has run out of fuel in past.

NO → **CHECK FOR INTERMITTENT PROBLEMS (See page 05-9)**

YES

DTC IS CAUSED BY RUNNING OUT OF FUEL

13	PERFORM CONFIRMATION DRIVING PATTERN

HINT:
Clear all DTCs prior to performing the confirmation driving pattern.

GO

14	GO TO RELEVANT DTC CHART (A/F SENSOR DTC OUTPUT AGAIN)

(a) Read the DTC using the hand-held tester or the OBD II scan tool.
Result:

Display	Proceed to
A/F sensor circuit DTC are output	A
A/F sensor circuit DTC are not output	B

B → **Go to step 18**

A

15	REPLACE AIR FUEL RATIO SENSOR

GO

16	PERFORM CONFIRMATION DRIVING PATTERN

HINT:
Clear all DTCs prior to performing the confirmation driving pattern.

GO

17	READ OUTPUT DTC (A/F SENSOR DTC OUTPUT AGAIN)

(a) Read the DTC using the hand-held tester or the OBD II scan tool.
Result:

Display	Proceed to
A/F sensor circuit DTC are not output	A
A/F sensor circuit DTC are output	B

B → **REPLACE ECM (See page 10-9) AND PERFORM CONFIRMATION DRIVING PATTERN**

A

18	CONFIRM IF VEHICLE HAS RUN OUT OF FUEL IN PAST

OK: Vehicle has run out of fuel in past.

NO → **CHECK FOR INTERMITTENT PROBLEMS (See page 05-9)**

YES

DTC IS CAUSED BY RUNNING OUT OF FUEL

DTC	P2238	OXYGEN SENSOR PUMPING CURRENT CIRCUIT LOW (FOR A/F SENSOR)(BANK 1 SENSOR 1)

DTC	P2239	OXYGEN SENSOR PUMPING CURRENT CIRCUIT HIGH (FOR A/F SENSOR)(BANK 1 SENSOR 1)

DTC	P2252	OXYGEN SENSOR REFERENCE GROUND CIRCUIT LOW (FOR A/F SENSOR)(BANK 1 SENSOR 1)

DTC	P2253	OXYGEN SENSOR REFERENCE GROUND CIRCUIT HIGH (FOR A/F SENSOR)(BANK 1 SENSOR 1)

HINT:
Although the title (DTC description) says ”oxygen sensor”, this DTC is related to the ”A/F sensor”.

CIRCUIT DESCRIPTION

Refer to DTC P2195 on page 05-269 .

DTC No.	DTC Detection Condition	Trouble Area
P2238	A/F sensor (bank 1 sensor 1) circuit low A/F sensor admittance is less than 0.022 1/Ω (1 trip detection logic)	HINT: Main trouble area ・Open in A/F sensor circuit
P2238	・Condition (a) continues for 5.0 seconds or more : (a) AF+ is 0.5 V or less ・Condition (a) continues for 5.0 seconds or more : (a) (AF+) - (AF-) is 0.1 V or less (1 trip detection logic)	・Open or short in A/F sensor circuit ・A/F sensor ・A/F sensor heater ・EFI relay ・Open or short in A/F sensor heater and EFI relay circuits ・ECM
P2239	A/F sensor (bank 1 sensor 1) circuit high (1 trip detection logic)	HINT: Main trouble area ・Short in A/F sensor circuit
P2239	・Condition (a) continues for 5.0 seconds or more : (a) AF+ is more than 4.5 V ・Condition (a) continues for 5.0 seconds or more : (a) (AF+) - (AF-) is more than 0.8 V (1 trip detection logic)	・Same as DTC No. P2238
P2252	Condition (a) continues for 5.0 seconds or more : (a) AF- is 0.5 V or less (1 trip detection logic)	・Same as DTC No. P2238
P2253	Condition (a) continues for 5.0 seconds or more : (a) AF- is more than 4.5 V (1 trip detection logic)	・Same as DTC No. P2238

MONITOR DESCRIPTION

The air-fuel ratio (A/F) sensor varies its voltage output in proportion to the air-fuel ratio. If impedance (alternating current resistance) or voltage output of the sensor deviates greatly from the standard, the ECM determines that an open or short is in the A/F sensor circuit.

MONITOR STRATEGY

Related DTCs	P2238: A/F sensor (Bank1) open circuit between AF+ and AF- P2238: A/F sensor (Bank1) short circuit between AF+ and AF- P2238: A/F sensor (Bank 1) short circuit between AF+ and GND P2239: A/F sensor (Bank 1) short circuit between AF+ and +B P2252: A/F sensor (Bank 1) short circuit between AF- and GND P2253: A/F sensor (Bank 1) short circuit between AF- and +B
Required sensors/ components (Main)	A/F sensor
Required sensors/ components (Related)	ECT sensor, CKP sensor
Frequency of operation	Once per driving cycle
Duration	10 sec.
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

All:

The monitor will run whenever these DTCs are not present	See page 05-16

P2238 (open circuit between AF+ and AF-):

Duration while all of the following conditions are met:	20 seconds or more
AF+ terminal voltage	0.5 to 4.5 V
AF- terminal voltage	0.5 to 4.5 V
Difference between AF+ terminal and AF- terminal voltages	0.1 to 0.8 V
ECT	20°C (68°F) or more
Engine condition	Running
Time after engine start	20 seconds or more
Fuel-cut	OFF
A/F sensor heater duty cycle	0.5% or more
Time after A/F sensor heating	20 seconds or more
Battery voltage	10.5 V or more
Ignition switch	ON

Others:

Battery voltage	10.5 V or more
Ignition switch	ON

TYPICAL MALFUNCTION THRESHOLDS

P2238 (Open circuit between AF+ and AF-):

A/F sensor admittance	Below 0.022 1/ohm

P2238 (Short circuit between AF+ and GND):

AF+ terminal voltage	0.5 V or less

P2238 (Short circuit between AF+ and AF-):

Difference between AF+ terminal and AF- terminal voltages	0.1 V or less

P2239 (Short circuit between AF+ and +B):

AF+ terminal voltage	More than 4.5 V

P2252 (Short circuit between AF- and GND):

AF- terminal voltage	0.5 V or less

P2253 (Short circuit between AF- and +B):

AF- terminal voltage	More than 4.5 V

WIRING DIAGRAM

Refer to DTC P2195 on page 05-269 .

INSPECTION PROCEDURE

HINT:

Hand-held tester only:

The malfunctioning area can be found by the ACTIVE TEST A/F CONTROL operation. The A/F CONTROL operation can determine if the A/F sensor, heated oxygen sensor or other suspected trouble areas are malfunctioning or not.

(a) Perform the ACTIVE TEST A/F CONTROL operation.

HINT:

The A/F CONTROL operation lowers the injection volume by 12.5 % or increases the injection volume by 25 %.

(1) Connect the hand-held tester to the DLC3 on the vehicle.
(2) Turn the ignition switch ON.
(3) Warm up the engine by running the engine at 2,500 rpm for approximately 90 seconds.
(4) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL.
(5) Perform the A/F CONTROL operation with the engine idling (press the right or left button).

Result:

A/F sensor reacts in accordance with increase and decrease of injection volume:

+25 % → RICH output: Less than 3.0 V

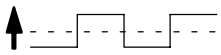
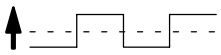
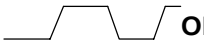
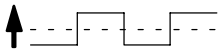
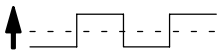
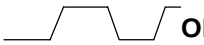
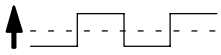
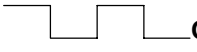
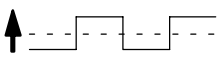
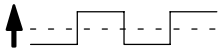
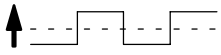
-12.5 % → LEAN output: More than 3.35 V

Heated oxygen sensor reacts in accordance with increase and decrease of injection volume:

+25 % → RICH output: More than 0.55 V

-12.5 % → LEAN output: Less than 0.4 V

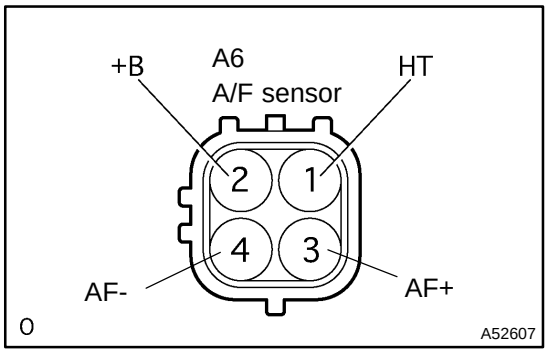
NOTICE:
The A/F sensor output has a few seconds of delay and the heated oxygen sensor output has about 20 seconds of delay at maximum.

	Output voltage of A/F sensor (sensor 1)	Output voltage of heated oxygen sensor (sensor 2)	Main suspect trouble area
Case 1	Injection volume +25 % -12.5 %  Output voltage More than 3.35 V Less than 3.0 V  **OK**	Injection volume +25 % -12.5 %  Output voltage More than 0.55 V Less than 0.4V  **OK**	—
Case 2	Injection volume +25 % -12.5 %  Output voltage Almost No reaction **NG**	Injection volume +25 % -12.5 %  Output voltage More than 0.55 V Less than 0.4V  **OK**	A/F sensor (A/F sensor, heater, A/F sensor circuit)
Case 3	Injection volume +25 % -12.5 %  Output voltage More than 3.35 V Less than 3.0V  **OK**	Injection volume +25 % -12.5 %  Output voltage Almost No reaction **NG**	Heated oxygen sensor (heated oxygen sensor, heater, heated oxygen sensor circuit)
Case 4	Injection volume +25 % -12.5 %  Output voltage Almost No reaction **NG**	Injection volume +25 % -12.5 %  Output voltage Almost No reaction **NG**	Extremely rich or lean actual air-fuel ratio (Injector, fuel pressure, gas leakage in exhaust system, etc.)

The following A/F CONTROL procedure enables a technician to check and graph the voltage outputs of both the A/F sensor and the heated oxygen sensor.
For displaying the graph, enter ”ACTIVE TEST / A/F CONTROL / USER DATA”, select ”AFS B1S1 and O2S B1S2” by pressing ”YES” and push ”ENTER”. Then press ”F4”.
HINT:

- If DTC P2237, P2238, P2239, P2251, P2252 or P2253 is displayed, check the bank 1 sensor 1 circuit.
- Read freeze frame data using the hand-held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1 INSPECT AIR FUEL RATIO SENSOR (HEATER RESISTANCE)



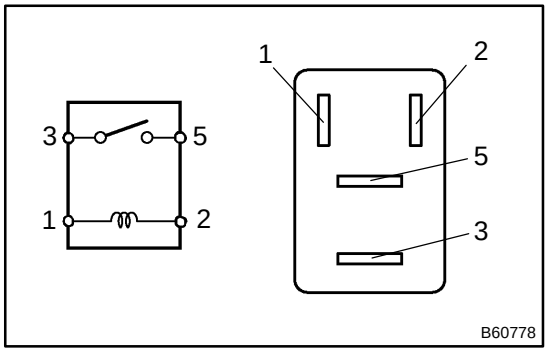
(a) Disconnect the A6 A/F sensor connector.
(b) Measure the resistance of the A/F sensor terminals.
Standard:

Tester Connection	Condition	Specified Condition
1 (HT) - 2 (+B)	20°C (68°F)	1.8 to 3.4 Ω
1 (HT) - 4 (AF-)	-	10 kΩ or higher

NG → **REPLACE AIR FUEL RATIO SENSOR**

OK

2 INSPECT RELAY (EFI)



(a) Remove the EFI relay from the engine room J/B.
(b) Measure the resistance of the EFI relay.
Standard:

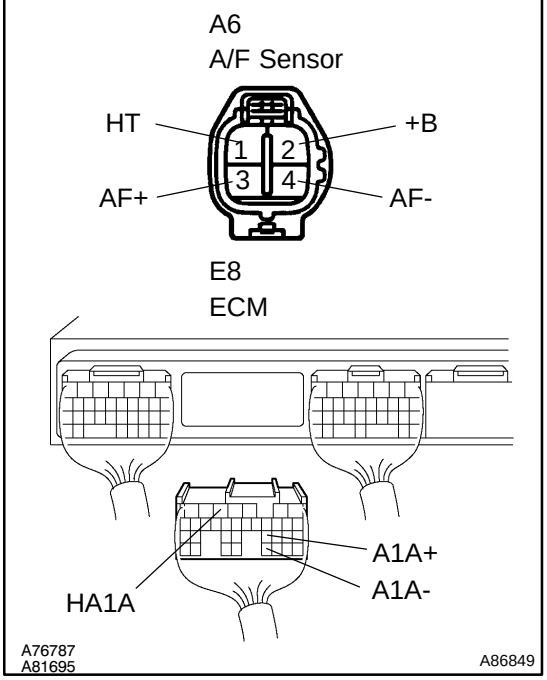
Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

NG → **REPLACE RELAY**

OK

3 CHECK WIRE HARNESS (A/F SENSOR - ECM)

Wire Harness Side

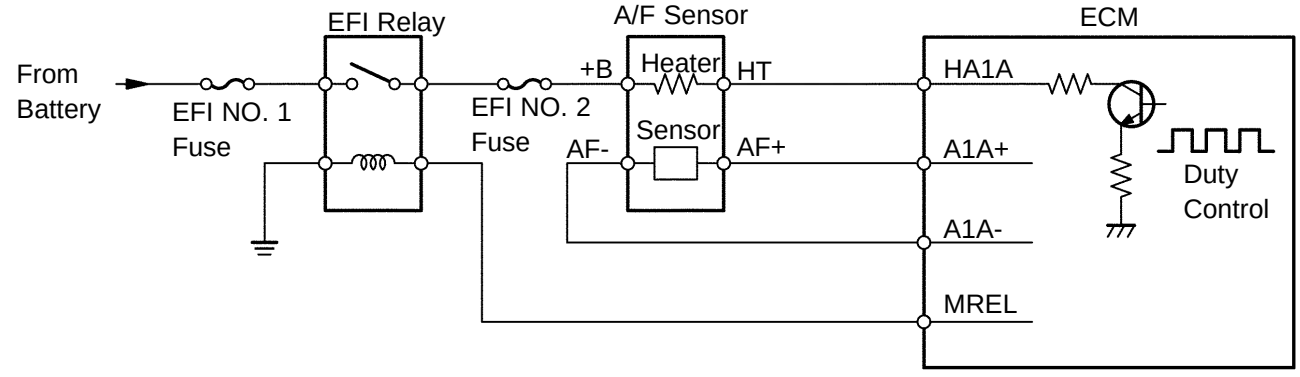


(a) Check the wire harness between the ECM and A/F sensor.
(1) Disconnect the A6 A/F sensor connector.
(2) Disconnect the E8 ECM connector.
(3) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
A6-3 (AF+) - E8-23 (A1A+) A6-4 (AF-) - E8-31 (A1A-) A6-1 (HT) - E8-5 (HA1A)	Below 1 Ω
A6-3 (AF+) or A1A+ (E8-23) - Body ground A6-4 (AF-) or A1A- (E8-31) - Body ground A6-1 (HT) or HA1A (E8-5) - Body ground	10 kΩ or higher

Reference



NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK →

REPLACE ECM (See page 10-9)

DTC	P2401	EVAPORATIVE EMISSION SYSTEM LEAK DETECTION PUMP CONTROL CIRCUIT LOW

DTC	P2402	EVAPORATIVE EMISSION SYSTEM LEAK DETECTION PUMP CONTROL CIRCUIT HIGH

CIRCUIT DESCRIPTION

Refer to EVAP Inspection Procedure (see page 05-317).

DTCs	Monitoring Item	Detection Condition	Trouble Area	Detection Timing	Detection Period
P2401	Vacuum pump stuck OFF (built-in pump module)	To determine leak criterion (Reference pressure), vacuum pump creates negative pressure in canister pump module through 0.02 inch orifice and pressure is measured. If one of following conditions is met, ECM sets pump module related DTCs: P043E, P043F, P2401, P2402 and P2419: ・Reference pressure is -1 kPa or higher ・Reference pressure is -4.85 kPa or lower ・Reference pressure is not saturated within 60 seconds	・Pump module ・Connector / wire harness (Pump module - ECM) ・ECM	Ignition OFF	2 trips
P2402	Vacuum pump stuck ON (built-in pump module)				

WIRING DIAGRAM

Refer to EVAP Inspection Procedure (see page 05-317).

INSPECTION PROCEDURE

Refer to EVAP Inspection Procedure (see page 05-317).

MONITOR DESCRIPTION

5 hours* after the ignition switch is turned OFF, the electric vacuum pump creates negative pressure (vacuum) in the EVAP (Evaporative Emission) system. The ECM monitors for leaks and actuator malfunctions based on the EVAP pressure.

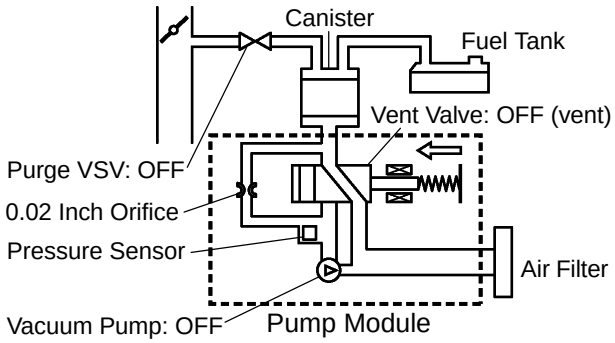
HINT:

*: If the engine coolant temperature is not below 35°C (95°F) 5 hours after the ignition switch is turned off, the monitor check starts 2 hours later. If it is still not below 35°C (95°F) 7 hours after the ignition switch is turned off, the monitor check starts 2.5 hours later.

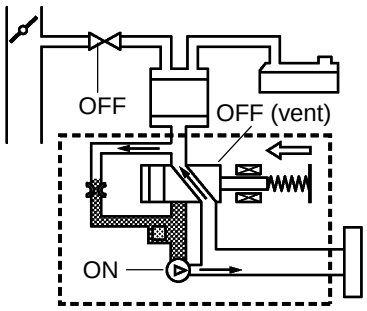
Sequence	Operations	Descriptions	Duration
-	ECM activation	Activated by soak timer, 5 hours (7 or 9.5 hours) after ignition switch turned to OFF.	-
A	Atmospheric pressure measurement	Vent valve turned OFF (vent) and EVAP system pressure measured by ECM in order to register atmospheric pressure. If EVAP pressure is not between 70 kPa and 110 kPa (525 mmHg and 825 mmHg), ECM cancels EVAP system monitor.	10 seconds
B	First 0.02 inch leak pressure measurement	In order to determine 0.02 inch leak pressure standard, vacuum pump creates negative pressure (vacuum) through 0.02 inch orifice and them ECM checks if vacuum pump and vent valve operate normally.	60 seconds
C	EVAP system pressure measurement	Vent valve turned ON (closed) to shut EVAP system. Negative pressure (vacuum) created in EVAP system, and EVAP system pressure then measured. Write down the measured value as it will be used in the leak check. If EVAP pressure does not stabilize within 15 minutes, ECM cancels EVAP system monitor.	15 minutes*
D	Purge VSV monitor	Purge VSV opened and then EVAP system pressure measured by ECM. Large increase indicates normal.	10 seconds
E	Second 0.02 inch leak pressure measurement	Leak check is performed after second 0.02 inch leak pressure standard is measured. If stabilized system pressure higher than second 0.02 inch leak pressure standard, ECM determines that EVAP system leaking.	60 seconds
F	Final check	Atmospheric pressure measured and then monitoring result recorded by ECM.	-

* If only a small amount of fuel is in the fuel tank, it takes longer for the EVAP pressure to stabilize.

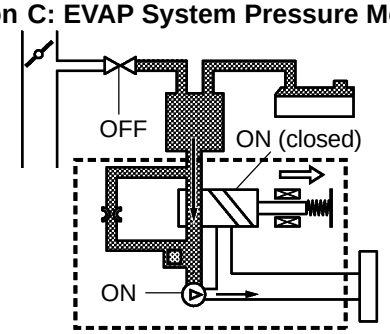
Operation A: Atmospheric Pressure Measurement

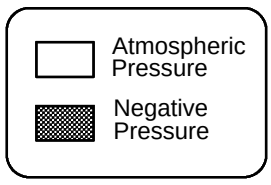


Operation B, E: 0.02 Inch Leak Pressure Measurement

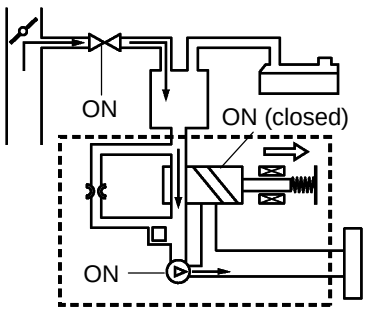


Operation C: EVAP System Pressure Measurement





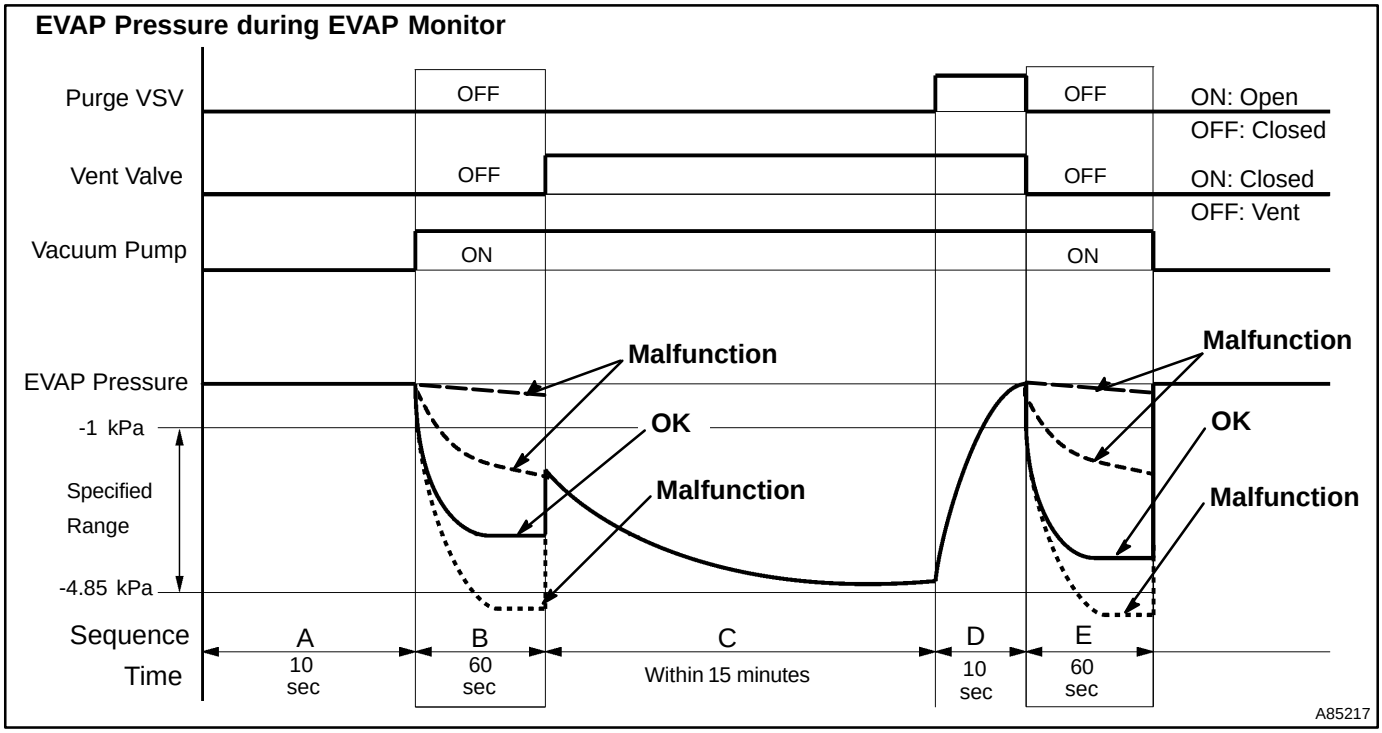
Operation D: Purge VSV monitor



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In sequence B and E, to determine the leak criterion, the vacuum pump creates negative pressure in the canister pump module through the 0.02 inch orifice. If the pressure is out of specified range or is not saturated, the ECM illuminates the MIL and sets DTCs P043E, P043F, P2401, P2402 and P2419 (2-trip detection logic).



OBD II MONITOR SPECIFICATIONS

Monitor Strategy

Required Sensors/Components	Purge VSV and pump module
Frequency of Operation	Once per driving cycle
Duration	Within 15 minutes (varies with amount of fuel in tank)
MIL Operation	2 driving cycles
Sequence of Operation	None

Typical Enabling Conditions

The monitor will run whenever these DTCs are not present	See page 05-16
EVAP key-off monitor runs when all of the following conditions are met:	-
Atomspheric pressure	525 to 825 mmHg (70 to 110 kPa)
Battery voltage	10.5 V or more
Vehicle speed	Below 4 km/h (2.5 mph)
Ignition switch	OFF
Engine condition	Not running
Time after engine is stopped	5 hours
FTP sensor malfunction (P0450, P0452, P0453)	Not detected
Purge VSV	Not operated by scan tool
Vent valve	Not operated by scan tool
Leak detection pump	Not operated by scan tool
Both of the following conditions are met before IG switch OFF:	Condition 1 and 2
1. Duration that vehicle is driven	5 min. or more
2. Purge flow	Executed
ECT	4.4 to 35◯C (40 to 95◯F)
IAT	4.4 to 35◯C (40 to 95◯F)

Example of re-start time

First time	7 hours
Second time	9 hours and 30 min.

Key-of f monitor sequence: 1 to 8

1. Atmospheric pressure

Next sequence is run if following condition met	-
Atmospheric pressure change for 10 sec.	Within 2.25 mmHg (0.3 kPa) for 1 sec.

2. First reference pressure

Next sequence is run if all of following conditions met	Condition 1, 2 and 3
1. FTP when 4 sec. after reference pressure measurement	-7.5 mmHg (-1 kPa) or less
2. Reference pressure	-36.47 to -7.93 mmHg (-4.85 to -1.057 kPa)
3. Reference pressure	Saturated

3. Vent valve stuck closed check

Next sequence is run if following condition met	-
FTP change for 10 sec. after vent valve ON (closed)	2.25 mmHg (0.3 kPa) or more

4. Vacuum introduction and leak

Next sequence is run if both of following conditions met	Condition 1 and 2
1. Vacuum introduction time	Within 15 min.
2. FTP	FTP was saturated

5. Purge VSV stuck closed check

Next sequence is run if following condition met	-
FTP change for 10 sec. after purge VSV ON (open)	2.25 mmHg (0.3 kPa) or more

6. Second reference pressure measurement

Next sequence is run if all of following conditions met	Condition 1, 2, 3 and 4
1. FTP when 4 sec. after reference pressure measurement	-7.5 mmHg (-1 kPa) or less
2. Reference pressure	-36.47 to -7.93 mmHg (-4.85 to -1.057 kPa)
3. Reference pressure	Saturated
4. Reference pressure difference between first and second	Less than 5.25 mmHg (0.7 kPa)

7. Leak check

Next sequence is run if following condition met	-
FTP when vacuum introduction was complete	Lower than second reference pressure

8. Atmospheric pressure

Monitor is complete if following	-
Atmospheric pressure difference between sequence 1 and 8	Within 2.25 mmHg (0.3 kPa)

Typical Malfunction Thresholds

One of the following conditions is met:	Condition 1, 2, 3, 4 or 5
1. FTP when 4 seconds after reference pressure measurement began	More than -7.5 mmHg (-1 kPa)
2. Reference pressure	Less than -36.4 mmHg (-4.85 kPa)
3. Reference pressure	-7.9 mmHg (-1.057 kPa) or more
4. Reference pressure	Not saturated
5. Reference pressure difference between first and second	5.2 mmHg (0.7 kPa) or more

MONITOR RESULT (MODE 06)

Refer to page 05-317 for detailed information on Monitor Result.

-MEMO-

DTC	P2419	EVAPORATIVE EMISSION SYSTEM SWITCHING VALVE CONTROL CIRCUIT LOW

DTC	P2420	EVAPORATIVE EMISSION SYSTEM SWITCHING VALVE CONTROL CIRCUIT HIGH

CIRCUIT DESCRIPTION

Refer to the EVAP Inspection Procedure (see page 05-317).

DTCs	Monitoring Items	Detection Conditions	Trouble Areas	Detection Timings	Detection Logic
P2419	Vent valve stuck ON / Closed (built-in pump module)	To determine leak criterion (Reference pressure), vacuum pump creates negative pressure in canister pump module through 0.02 inch orifice and pressure is measured. If one of following conditions is met, ECM sets pump module related DTCs: P043E, P043F, P2401, P2402 and P2419: ・Reference pressure is -1 kPa or higher ・Reference pressure is -4.85 kPa or lower ・Reference pressure is not saturated within 60 seconds	・Pump module ・Connector/Wire harness (Pump module - ECM) ・ECM	Ignition OFF	2 trips
P2420	Vent valve stuck OFF / Vent (built-in pump module)	To determine leak criterion, vacuum pump creates negative pressure in canister pump module through 0.02 inch orifice. After that, ECM turns vent valve ON (Vent) and measures pressure. If it does not change, ECM sets DTC P2420.			

WIRING DIAGRAM

Refer to the EVAP Inspection Procedure (see page 05-317).

INSPECTION PROCEDURE

Refer to the EVAP Inspection Procedure (see page 05-317).

MONITOR DESCRIPTION

5 hours* after the ignition switch is turned OFF, the electric vacuum pump creates negative pressure (vacuum) in the EVAP (Evaporative Emission) system. The ECM monitors for leaks and actuator malfunctions based on the EVAP pressure.

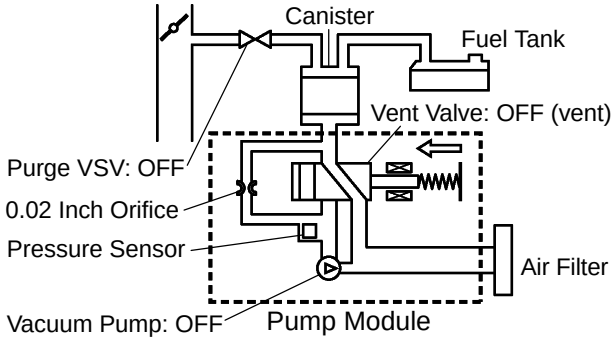
HINT:

*: If the engine coolant temperature is not below 35°C (95°F) 5 hours after the ignition switch is turned off, the monitor check starts 2 hours later. If it is still not below 35°C (95°F) 7 hours after the ignition switch is turned off, the monitor check starts 2.5 hours later.

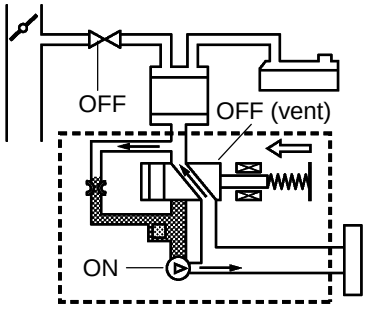
Sequence	Operations	Descriptions	Duration
-	ECM activation	Activated by soak timer, 5 hours (7 or 9.5 hours) after ignition switch turned to OFF.	-
A	Atmospheric pressure measurement	Vent valve turned OFF (vent) and EVAP system pressure measured by ECM in order to register atmospheric pressure. If EVAP pressure is not between 70 kPa and 110 kPa (525 mmHg and 825 mmHg), ECM cancels EVAP system monitor.	10 seconds
B	First 0.02 inch leak pressure measurement	In order to determine 0.02 inch leak pressure standard, vacuum pump creates negative pressure (vacuum) through 0.02 inch orifice and them ECM checks if vacuum pump and vent valve operate normally.	60 seconds
C	EVAP system pressure measurement	Vent valve turned ON (closed) to shut EVAP system. Negative pressure (vacuum) created in EVAP system, and EVAP system pressure then measured. Write down the measured value as it will be used in the leak check. If EVAP pressure does not stabilize within 15 minutes, ECM cancels EVAP system monitor.	15 minutes*
D	Purge VSV monitor	Purge VSV opened and then EVAP system pressure measured by ECM. Large increase indicates normal.	10 seconds
E	Second 0.02 inch leak pressure measurement	Leak check is performed after second 0.02 inch leak pressure standard is measured. If stabilized system pressure higher than second 0.02 inch leak pressure standard, ECM determines that EVAP system leaking.	60 seconds
F	Final check	Atmospheric pressure measured and then monitoring result recorded by ECM.	-

* If only a small amount of fuel is in the fuel tank, it takes longer for the EVAP pressure to stabilize.

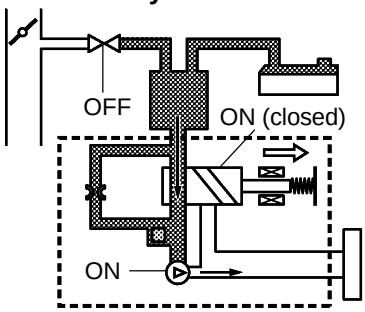
Operation A: Atmospheric Pressure Measurement

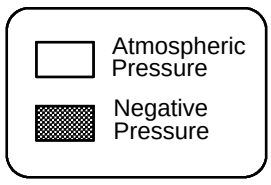


Operation B, E: 0.02 Inch Leak Pressure Measurement

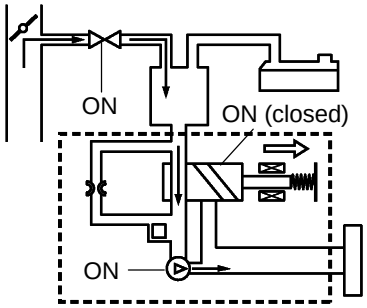


Operation C: EVAP System Pressure Measurement





Operation D: Purge VSV monitor

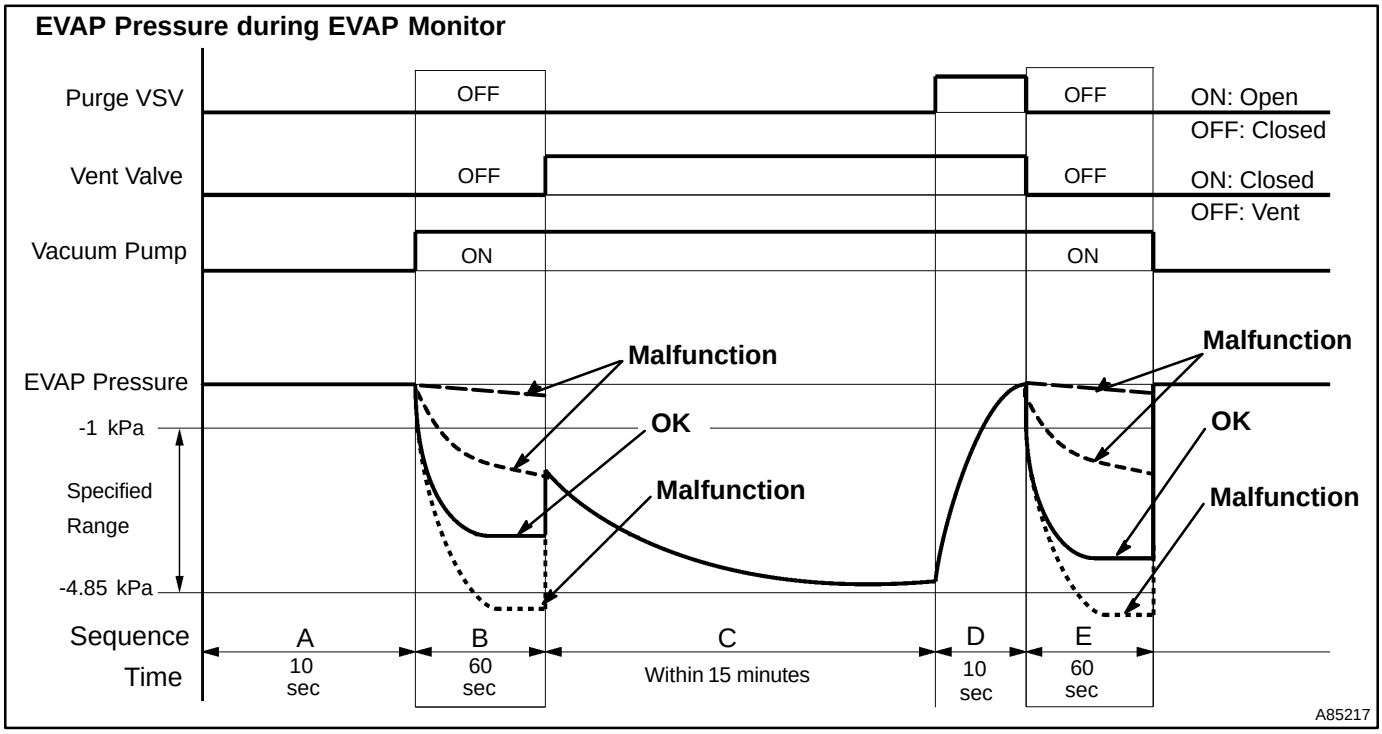


Y

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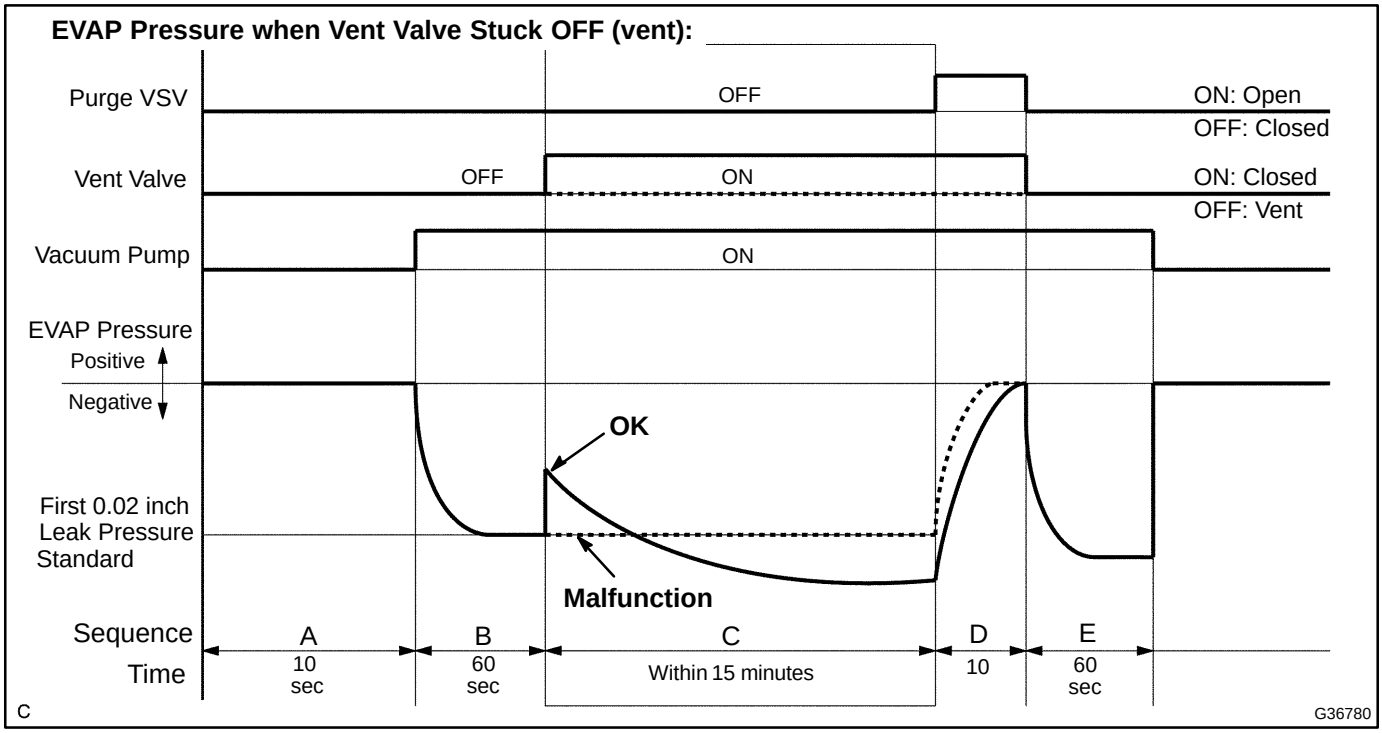
(a) P2419: Vent valve stuck ON (Closed)

In sequence B and E, to determine the leak criterion, the vacuum pump creates negative pressure in the canister pump module through the 0.02 inch orifice. If the pressure is out of specified range or is not saturated, the ECM illuminates the MIL and sets DTCs P043E, P043F, P2401, P2402 and P2419 (2-trip detection logic).



(b) P2420: Vent valve stuck OFF (Vent)

After sequence B, the ECM changes the vent valve from OFF (Vent) to ON (Closed) and measures the EVAP pressure. If the pressure does not change, the ECM illuminates the MIL and sets DTC P2420 (2-trip detection logic).



OBD II MONITOR SPECIFICATIONS

Monitor Strategy

Required Sensors/Components	Purge VSV and pump module
Frequency of Operation	Once per driving cycle
Duration	Within 15 minutes (varies with amount of fuel in tank)
MIL Operation	2 driving cycles
Sequence of Operation	None

Typical Enabling Conditions

The monitor will run whenever these DTCs are not present	See page 05-16
EVAP key-off monitor runs when all of the following conditions met:	-
Atmospheric pressure	525 to 825 mmHg (70 to 110 kPa)
Battery voltage	10.5 V or more
Vehicle speed	Below 4 km/h (2.5 mph)
Ignition switch	OFF
Engine condition	Not running
Time after engine stopped	5 hours
FTP sensor malfunction (P0450, P0452, P0453)	Not detected
Purge VSV	Not operated by scan tool
Vent valve	Not operated by scan tool
Leak detection pump	Not operated by scan tool
Both of the following conditions are met before IG switch OFF:	Condition 1 and 2
1. Duration that vehicle is driven	5 min. or more
2. Purge flow	Executed
ECT	4.4 to 35◯C (40 to 95◯F)
IAT	4.4 to 35◯C (40 to 95◯F)
Accumulated purge volume	100 g or more (varies with engine coolant temperature)

Example of re-start time

First time	7 hours
Second time	9 hours and 30 min.

Key-of f monitor sequence: 1 to 8

1. Atmospheric pressure

Next sequence is run if following condition met	-
Atmospheric pressure change for 10 sec.	Within 2.25 mmHg (0.3 kPa) for 1 sec.

2. First reference pressure

Next sequence is run if all of following conditions met	Condition 1, 2 and 3
1. FTP when 4 sec. after reference pressure measurement	-7.5 mmHg (-1 kPa) or less
2. Reference pressure	-36.47 to -7.93 mmHg (-4.85 to -1.057 kPa)
3. Reference pressure	Saturated

3. Vent valve stuck closed check

Next sequence is run if following condition met	-
FTP change for 10 sec. after vent valve ON (closed)	2.25 mmHg (0.3 kPa) or more

4. Vacuum introduction and leak

Next sequence is run if both of following conditions met	Condition 1 and 2
1. Vacuum introduction time	Within 15 min.
2. FTP	FTP was saturated

5. Purge VSV stuck closed check

Next sequence is run if following condition met	-
FTP change for 10 sec. after purge VSV ON (open)	2.25 mmHg (0.3 kPa) or more

6. Second reference pressure measurement

Next sequence is run if all of following conditions met	Condition 1, 2, 3 and 4
1. FTP when 4 sec. after reference pressure measurement	-7.5 mmHg (-1 kPa) or less
2. Reference pressure	-36.47 to -7.93 mmHg (-4.85 to -1.057 kPa)
3. Reference pressure	Saturated
4. Reference pressure difference between first and second	Less than 5.25 mmHg (0.7 kPa)

7. Leak check

Next sequence is run if following condition met	-
FTP when vacuum introduction was complete	Lower than second reference pressure

8. Atmospheric pressure

Monitor is complete if following	-
Atmospheric pressure difference between sequence 1 and 8	Within 2.25 mmHg (0.3 kPa)

Typical Malfunction Thresholds

P2419: Vent valve stuck open

Following values are when atmospheric pressure is 760 mmHg (100 kPa)	-
One of the following conditions is met:	Condition 1, 2, 3, 4 or 5
1. FTP when 4 seconds after reference pressure measurement began	More than -7.5 mmHg (-1 kPa)
2. Reference pressure	Less than -36.4 mmHg (-4.85 kPa)
3. Reference pressure	-7.9 mmHg (-1.057 kPa) or more
4. Reference pressure	Not saturated
5. Reference pressure difference between first and second	5.2 mmHg (0.7 kPa) or more

P2420: Vent valve stuck closed

FTP change for 10 sec. after vent valve opened	Less than 0.3 kPa (2.25 mmHg)

MONITOR RESULT (MODE 06)

Refer to page 05-317 for detailed information on Monitor Result.

DTC	P2610	ECM/PCM INTERNAL ENGINE OFF TIMER PERFORMANCE

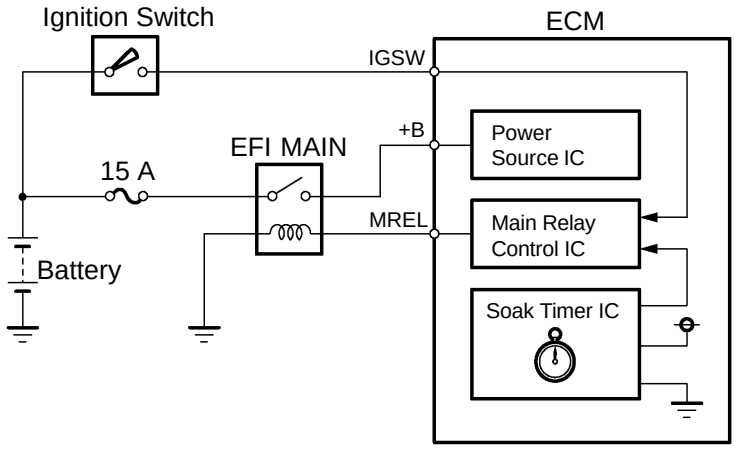
DTC SUMMARY

DTC	Monitoring Items	Malfunction Detection Conditions	Trouble Areas	Detection Timings	Detection Logic
P2610	Soak timer (built into ECM)	ECM internal malfunction	ECM	Engine running	2 trip

CIRCUIT DESCRIPTION

To ensure the accuracy of the EVAP (Evaporative Emission) monitor values, the soak timer, which is built into the ECM, measures 5 hours (≦15 minutes) from when the ignition switch is turned OFF, before the monitor is run. This allows the fuel to cool down, which stabilizes the Fuel Tank Pressure (FTP). When 5 hours have elapsed, the ECM turns on.

Soak Timer Circuit



A85251

MONITOR DESCRIPTION

5 hours after the ignition switch is turned OFF, the soak timer activates the ECM to begin the EVAP system monitor. While the engine is running, the ECM monitors the synchronization of the soak timer and the CPU clock. If these two are not synchronized, the ECM interprets this as a malfunction, illuminates the MIL and sets the DTC (2 trip detection logic).

OBD II MONITOR SPECIFICATIONS

Monitor Strategy

Required Sensors/Components	ECM
Frequency of Operation	Once per driving cycle
Duration	10 minutes
MIL Operation	2 driving cycles
Sequence of Operation	None

Typical Enabling Conditions

The monitor will run whenever this DTC is not present	See page 05-16
Ignition switch	ON
Engine	Running
Battery voltage	8 V or more
Starter	OFF

Typical Malfunction Thresholds

Soak timer measurement when ECM CPU clock counts 10 minutes	Less than 7 minutes, or more than 13 minutes

INSPECTION PROCEDURE

HINT:

- DTC P2610 is set if an internal ECM problem is detected. Diagnostic procedures are not required. ECM replacement is required.
- Read freeze frame data using a hand-held tester or OBD II scan tool. Freeze frame data record the engine condition when malfunctions are detected. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data, from the time the malfunction occurred.

1	**REPLACE ECM (see page 10-9)**

NEXT

CHECK WHETHER DTC OUTPUT RECURS

(a) Connect a hand-held tester to the DLC3.
(b) Turn the ignition switch to ON.
(c) Clear DTCs (see page 05-38).
(d) Start the engine and wait for 10 minutes or more.
(e) On the tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES.
(f) If no pending DTC is displayed, the repair has been successfully completed.

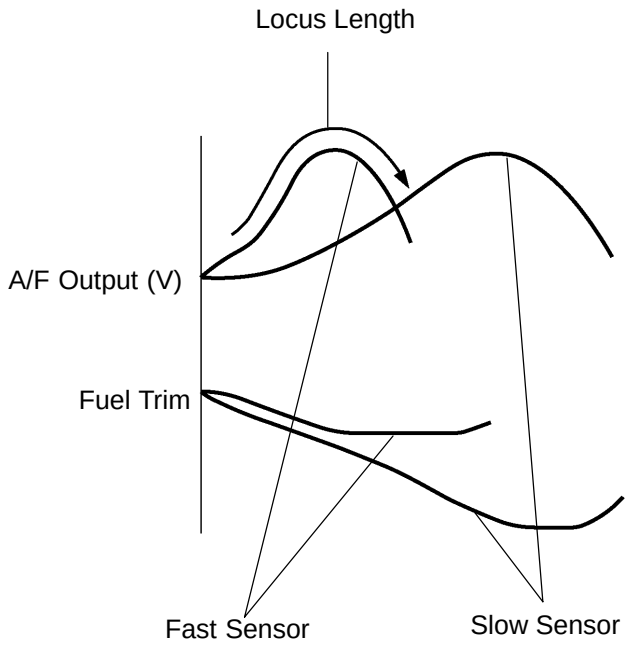
DTC	P2A00	A/F SENSOR CIRCUIT SLOW RESPONSE (BANK 1 SENSOR 1)

CIRCUIT DESCRIPTION

Refer to DTC P2195 on page 05-269 .

DTC No.	DTC Detection Condition	Trouble Area
P2A00	In conditions (a), (b) and (c), when A/F sensor output voltage change value is below regular value against fuel trim change value, ECM judges that A/F sensor circuit has slow response: (2 trip detection logic) (a) Engine is warmed up (b) Engine speed 1,400 rpm or more (c) Vehicle speed 60 to 120 km/h (37 to 74 mph)	·Open or short in A/F sensor circuit ·A/F sensor ·A/F sensor heater ·EFI relay ·Open or short in A/F sensor and EFI relay circuits ·Air induction system ·Fuel pressure ·Injector ·PCV hose connection ·ECM

MONITOR DESCRIPTION



Y A82390

The Air-Fuel ratio (A/F) sensor varies its output voltage in proportion to the air-fuel ratio. Based on the output voltage, the ECM determines if the air-fuel ratio is RICH or LEAN and adjusts the stoichiometric air-fuel ratio. The ECM also checks the fuel injection volume compensation value to check if the A/F sensor is deteriorating or not. A/F sensor response deterioration is determined by the ratio of the A/F sensor output voltage variation and fuel trim variation.

MONITOR STRATEGY

Related DTCs	P2A00: A/F sensor slow response
Required sensors / components (Main)	A/F sensor
Required sensors / components (Related)	Vehicle speed sensor (VSS) and crankshaft position (CKP) sensor
Frequency of operation	Once per driving cycle
Duration	60 sec.
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever these DTCs are not present	See page 05-16
Engine condition	Running
Time after engine start	120 sec. or more
Fuel system status	Closed Loop
A/F sensor status	Activated
Idle	OFF
Time after idle OFF	2 sec. or more
Engine RPM	1,400 to 3,200 rpm
Vehicle speed	60 to 120 km/h (37.5 to 75 mph)
Fuel cut	OFF
Time after fuel cut is OFF	2 sec. or more
Driving for 20 sec. or more	40 km/h (25 mph) or more and 900 rpm or more

TYPICAL MALFUNCTION THRESHOLDS

Response rate deterioration level	8 or more

MONITOR RESULT

Refer to page 05-24 for detailed information.

The test value and test limit information are described as shown in the following table. Check the monitor result and test values after performing the monitor drive pattern (see page 05-26).

- TID (Test Identification Data) is assigned to each emissions-related component.
- TLT (Test Limit Type):
  If TLT is 0, the component is malfunctioning when the test value is higher than the test limit.
  If TLT is 1, the component is malfunctioning when the test value is lower than the test limit.
- CID (Component Identification Data) is assigned to each test value.
- Unit Conversion is used to calculate the test value indicated on generic OBD II scan tools.

TID $06: A/F sensor

TLT	CID	Unit Conversion	Description of Test Data	Description of Test Limit
0	$01	Multiply by 0.000244 (no dimension)	Parameter for identify A/F sensor response rate	Malfunction threshold for A/F sensor deterioration

WIRING DIAGRAM

Refer to DTC P2195 on page 05-269 .

INSPECTION PROCEDURE

HINT:

Hand-held tester only:

The malfunctioning area can be found by the ACTIVE TEST A/F CONTROL operation. The A/F CONTROL operation can determine if the A/F sensor, heated oxygen sensor or other suspected trouble areas are malfunctioning or not.

(a) Perform the ACTIVE TEST A/F CONTROL operation.

HINT:

The A/F CONTROL operation lowers the injection volume by 12.5% or increases the injection volume by 25%.

(1) Connect the hand-held tester to the DLC3 on the vehicle.
(2) Turn the ignition switch ON.
(3) Warm up the engine by running the engine at 2,500 rpm for approximately 90 seconds.
(4) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL.
(5) Perform the A/F CONTROL operation with the engine idling (press the right or left button).

Result:

A/F sensor reacts in accordance with increase and decrease of injection volume:
+25 % → RICH output: Less than 3.0 V
-12.5 % → LEAN output: More than 3.35 V
Heated oxygen sensor reacts in accordance with increase and decrease of injection volume:
+25 % → RICH output: More than 0.55 V
-12.5 % → LEAN output: Less than 0.4 V

NOTICE:

The A/F sensor output has a few seconds of delay and the heated oxygen sensor output has about 20 seconds of delay at maximum.

	Output voltage of A/F sensor (sensor 1)	Output voltage of heated oxygen sensor (sensor 2)	Main suspect trouble area
Case 1	Injection volume +25 % -12.5 % Output voltage More than 3.35 V Less than 3.0 V **OK**	Injection volume +25 % -12.5 % Output voltage More than 0.55 V Less than 0.4V **OK**	—
Case 2	Injection volume +25 % -12.5 % Output voltage Almost No reaction **NG**	Injection volume +25 % -12.5 % Output voltage More than 0.55 V Less than 0.4V **OK**	A/F sensor (A/F sensor, heater, A/F sensor circuit)
Case 3	Injection volume +25 % -12.5 % Output voltage More than 3.35 V Less than 3.0V **OK**	Injection volume +25 % -12.5 % Output voltage Almost No reaction **NG**	Heated oxygen sensor (heated oxygen sensor, heater, heated oxygen sensor circuit)
Case 4	Injection volume +25 % -12.5 % Output voltage Almost No reaction **NG**	Injection volume +25 % -12.5 % Output voltage Almost No reaction **NG**	Extremely rich or lean actual air-fuel ratio (Injector, fuel pressure, gas leakage in exhaust system, etc.)

The following A/F CONTROL procedure enables a technician to check and graph the voltage outputs of both the A/F sensor and the heated oxygen sensor.

For displaying the graph, enter ”ACTIVE TEST / A/F CONTROL / USER DATA”, select ”AFS B1S1 and O2S B1S2” by pressing ”YES” and push ”ENTER”. Then press ”F4”.

HINT:

- DTC P2A00 may be also detected, when the air fuel ratio is stuck rich or lean.
- A low A/F sensor voltage could be caused by a RICH air-fuel mixture. Check for conditions that would cause the engine to run with a RICH air-fuel mixture.
- A high A/F sensor voltage could be caused by a LEAN air-fuel mixture. Check for conditions that would cause the engine to run with a LEAN air-fuel mixture.
- Read freeze frame data using the hand-held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	CHECK OTHER DTC OUTPUT (IN ADDITION TO A/F SENSOR DTC)

(a) Read the DTC using the hand-held tester or the OBD II scan tool.
Result:

Display	Proceed to
Only P2A00 is output	A
P2A00 and other codes is output	B

HINT:

If any other codes besides P2A00 is output, perform the troubleshoot on that DTC before.

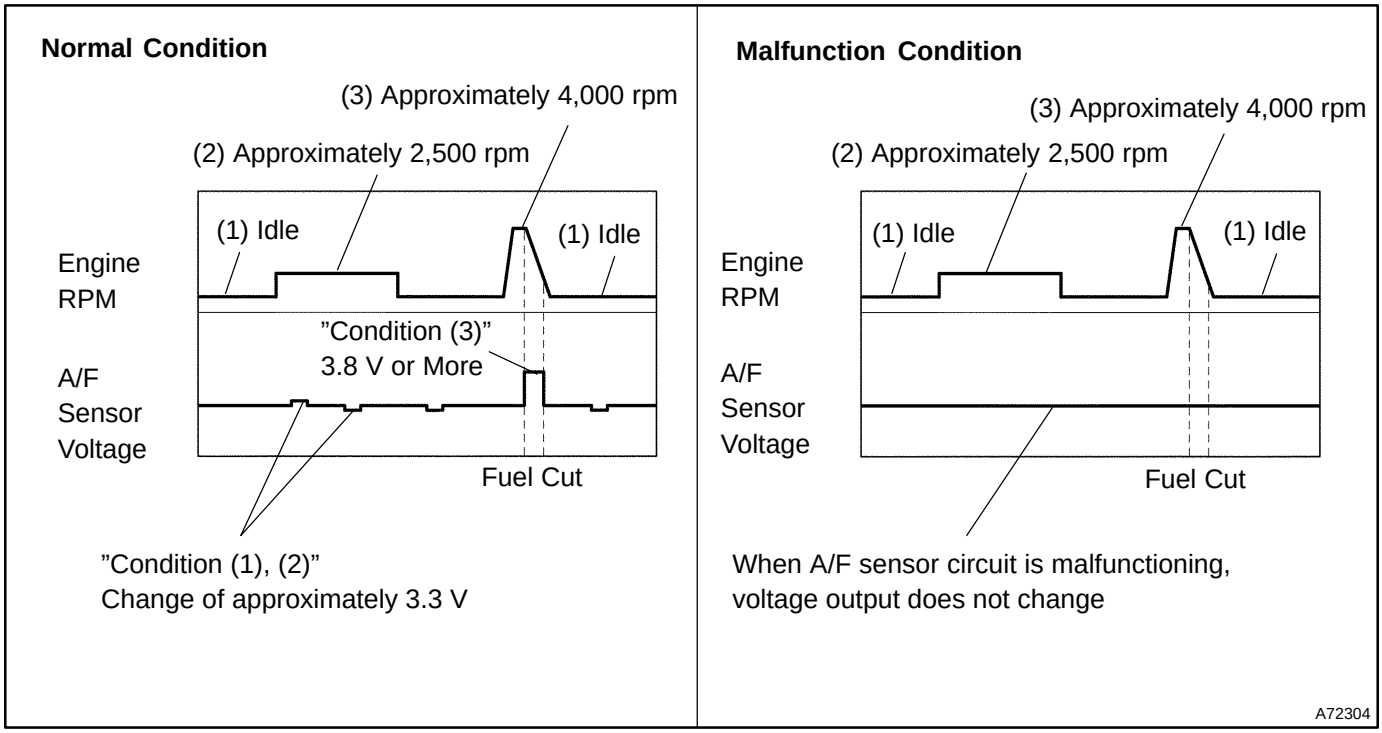
B → **GO TO RELEVANT DTC CHART (See page 05-48)**

A

2	READ VALUE OF OBD II SCAN TOOL OR HAND-HELD TESTER (OUTPUT VOLTAGE OF A/F SENSOR)

(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(b) Warm up the A/F sensor (bank 1 sensor 1) by running the engine at 2,500 rpm for approximately 90 seconds.
(c) Read the A/F sensor voltage output on the the hand-held tester or OBD II scan tool.
(d) Hand-held tester only:
On the hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / SNAPSHOT / MANUAL SNAPSHOT / USER DATA. Read the values.
(e) Select ”AFS B1 S1 / ENGINE SPD” and press YES.
(f) Monitor the A/F sensor voltage carefully.
(g) Check the A/F sensor voltage output under the following conditions:
(1) Allow the engine to idle for 30 seconds.
(2) Run the engine at approximately 2,500 rpm. Do not suddenly change the rpm.
(3) Raise the engine speed to 4,000 rpm and quickly release the accelerator pedal so that the throttle is fully closed.

Standard:
Condition (1) and (2)
Voltage change of 3.3 V (0.66 V)* (between approximately 3.1 to 3.5 V) as shown in the illustration.
Condition (3)
A/F sensor voltage increases to 3.8 V (0.76 V)* or more when fuel is cut during engine deceleration as shown in the illustration.
***: Voltage when using the OBD II scan tool.**



HINT:

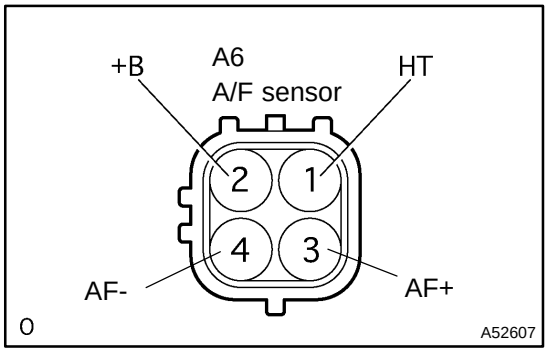
- Whenever the A/F sensor output voltage remains at approximately 3.3 V (0.660 V)* (see "Malfunction Condition" graphic) under any condition as well as the above conditions, the A/F sensor may have an open circuit. This will happen also when the A/F sensor heater has an open circuit.
- Whenever the A/F sensor output voltage remains at a certain value of approximately 3.8 V (0.76 V)* or more, or 2.8 V (0.56 V)* or less (see "Malfunction Condition" graphic) under any condition as well as the above conditions, the A/F sensor may have a short circuit.
- The ECM will stop fuel injection (fuel is cut) during engine deceleration. This will cause a LEAN condition and should result in a momentary increase in the A/F sensor output voltage.
- The ECM must establish a closed throttle position learned value to perform fuel cut. If the battery terminal has been disconnected, the vehicle must be driven over 10 mph (16 km/h) to allow the ECM to learn the closed throttle position.
- When the vehicle is driven:
  The output voltage of the A/F sensor may be below 2.8 V (0.76 V)* during fuel enrichment. For the vehicle, this translates to a sudden increase in speed with the accelerator pedal fully depressed when trying to overtake another vehicle. The A/F sensor is functioning normally.
- The A/F sensor is a current output element, and therefore the current is converted into voltage inside the ECM. If measuring voltage at connectors of the A/F sensor or ECM, you will observe a constant voltage.

*: Voltage when using the OBD II scan tool.

OK	**Go to step 14**

NG

3 INSPECT AIR FUEL RATIO SENSOR (HEATER RESISTANCE)



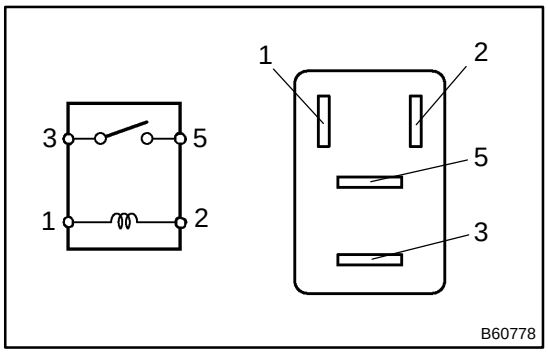
(a) Disconnect the A6 A/F sensor connector.
(b) Measure the resistance of the A/F sensor terminals.
Standard:

Tester Connection	Condition	Specified Condition
1 (HT) - 2 (+B)	20°C (68°F)	1.8 to 3.4 Ω
1 (HT) - 4 (AF-)	-	10 kΩ or higher

NG → **REPLACE AIR FUEL RATIO SENSOR**

OK

4 INSPECT RELAY (EFI)



(a) Remove the EFI relay from the engine room J/B.
(b) Measure the resistance of the EFI relay.
Standard:

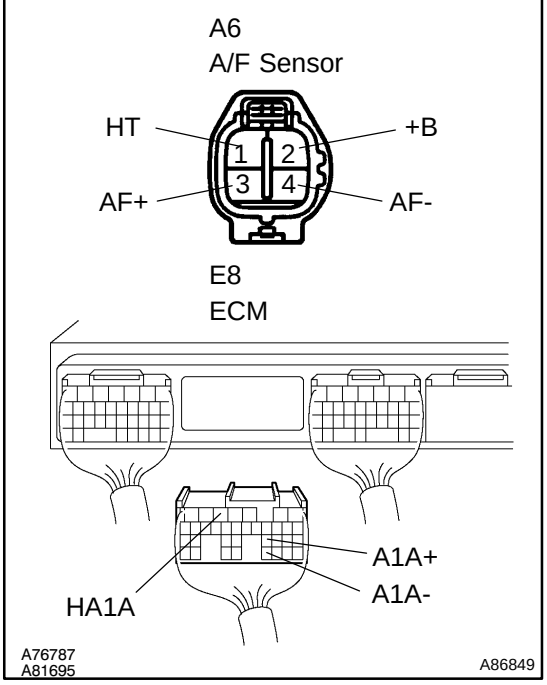
Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

NG → **REPLACE RELAY**

OK

5 CHECK WIRE HARNESS (A/F SENSOR - ECM)

Wire Harness Side

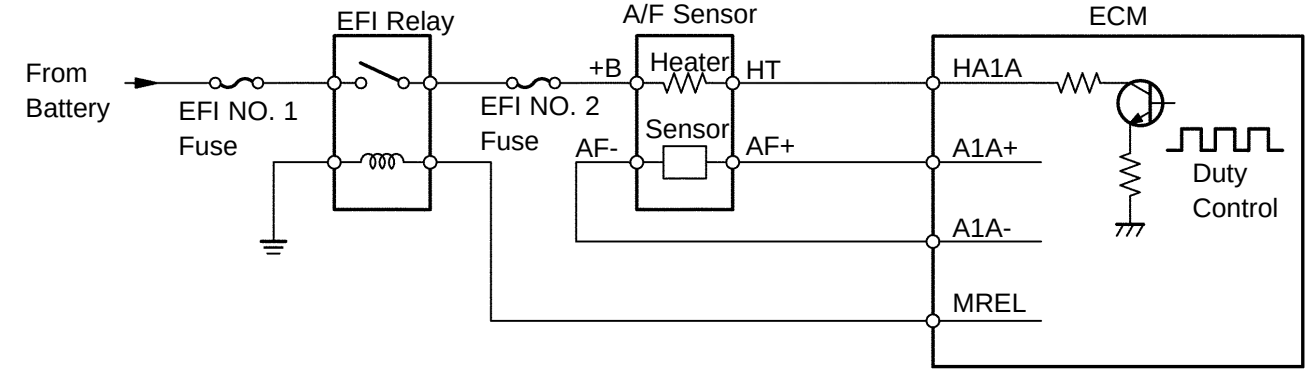


(a) Check the wire harness between the ECM and A/F sensor.
(1) Disconnect the A6 A/F sensor connector.
(2) Disconnect the E8 ECM connector.
(3) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
A6-3 (AF+) - E8-23 (A1A+) A6-4 (AF-) - E8-31 (A1A-) A6-1 (HT) - E8-5 (HA1A)	Below 1 Ω
A6-3 (AF+) or A1A+ (E8-23) - Body ground A6-4 (AF-) or A1A- (E8-31) - Body ground A6-1 (HT) or HA1A (E8-5) - Body ground	10 kΩ or higher

Reference



NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

6 CHECK AIR INDUCTION SYSTEM

(a) Check for vacuum leaks in the air induction system.
OK: There is no leak in the air induction system.

NG → **REPAIR OR REPLACE AIR INDUCTION SYSTEM**

OK

7	CHECK CONNECTION OF PCV HOSE

OK: PCV hose is connected correctly and PCV hose has no damage.

NG → **REPAIR OR REPLACE PCV HOSE**

OK

8	CHECK FUEL PRESSURE (See page 11-4)

(a) Check fuel pressure (high or low fuel pressure).
Standard:

Item	Specified Condition
Fuel pressure	304 to 343 kPa (3.1 to 3.5 kgf/cm^2, 44 to 55 psi)

NG → **REPAIR OR REPLACE FUEL SYSTEM**

OK

9	INSPECT FUEL INJECTOR ASSY (See page 11-7)

(a) Check injector injection (high or low fuel injection quantity or poor injection pattern).
Standard:

Injection Volume	Difference Between Each Injector
76 to 91 cm^3 (4.6 to 5.5cu in.) / 15 seconds	15 cm^3 (0.9 cu in.) or less

NG → **REPLACE FUEL INJECTOR ASSY (See page 11-10)**

OK

10	REPLACE AIR FUEL RATIO SENSOR

GO

11	PERFORM CONFIRMATION DRIVING PATTERN (See page 05-269)

HINT:
Clear all DTCs prior to performing the confirmation driving pattern (see page 05-269).

GO

12	READ OUTPUT DTC (A/F SENSOR DTC OUTPUT AGAIN)

(a) Read the DTC using the hand-held tester or the OBD II scan tool.
Result:

Display	Proceed to
DTC P2A00 is not output	A
DTC P2A00 is output	B

B → **REPLACE ECM (See page 10-9) AND PERFORM CONFIRMATION DRIVING PATTERN (See page 05-269)**

A

13	CONFIRM IF VEHICLE HAS RUN OUT OF FUEL IN PAST

NO → **CHECK FOR INTERMITTENT PROBLEMS (See page 05-9)**

YES

DTC IS CAUSED BY RUNNING OUT OF FUEL

14	PERFORM CONFIRMATION DRIVING PATTERN (See page 05-269)

HINT:
Clear all DTCs prior to performing the confirmation driving pattern (see page 05-269).

GO

15	READ OUTPUT DTC (A/F SENSOR DTC OUTPUT AGAIN)

(a) Read the DTC using the hand-held tester or the OBD II scan tool.
Result:

Display	Proceed to
DTC P2A00 is output	A
DTC P2A00 is not output	B

B → **Go to step 19**

A

16	REPLACE AIR FUEL RATIO SENSOR

GO

17	PERFORM CONFIRMATION DRIVING PATTERN (See page 05-269)

HINT:
Clear all DTCs prior to performing the confirmation driving pattern (see page 05-269).

GO

18	READ OUTPUT DTC (A/F SENSOR DTC OUTPUT AGAIN)

(a) Read the DTC using the hand-held tester or the OBD II scan tool.
Result:

Display	Proceed to
DTC P2A00 is not output	A
DTC P2A00 is output	B

B → **REPLACE ECM (See page 10-9) AND PERFORM CONFIRMATION DRIVING PATTERN (See page 05-269)**

A

19	CONFIRM IF VEHICLE HAS RUN OUT OF FUEL IN PAST

OK: Vehicle has run out of fuel in past.

NO → **CHECK FOR INTERMITTENT PROBLEMS (See page 05-9)**

YES

DTC IS CAUSED BY RUNNING OUT OF FUEL

05ITC-02

READINESS MONITOR DRIVE PATTERN

1. PURPOSE OF THE READINESS TESTS

- The On-Board Diagnostic (OBD II) system is designed to monitor the performance of emission-related components, and report any detected abnormalities with Diagnostic Trouble Codes (DTCs). Since various components need to be monitored during different driving conditions, the OBD II system runs separate monitoring programs called readiness monitors.
- The hand-held tester's software must be version 9.0 or newer to view the readiness monitor status. From the "ENHANCED OBD II" menu, select "MONITOR STATUS" to view the readiness monitor status.
- A generic OBD II scan tool can also be used to view the readiness monitor status.
- When the readiness monitor status reads "complete", the necessary conditions have been met for running performance tests for that readiness monitor.

HINT:

Many state Inspection and Maintenance (I/M) programs require a vehicle's readiness monitor status to show "complete".

- The readiness monitor will be reset to "incomplete" if:
  - The ECM has lost battery power or blown a fuse.
  - DTCs have been cleared.
  - The conditions for running the readiness monitor have not been met.
- If the readiness monitor status shows "incomplete", follow the appropriate readiness monitor drive pattern to change the status to "complete".

CAUTION:

Strictly observe posted speed limits, traffic laws, and road conditions when performing these drive patterns.

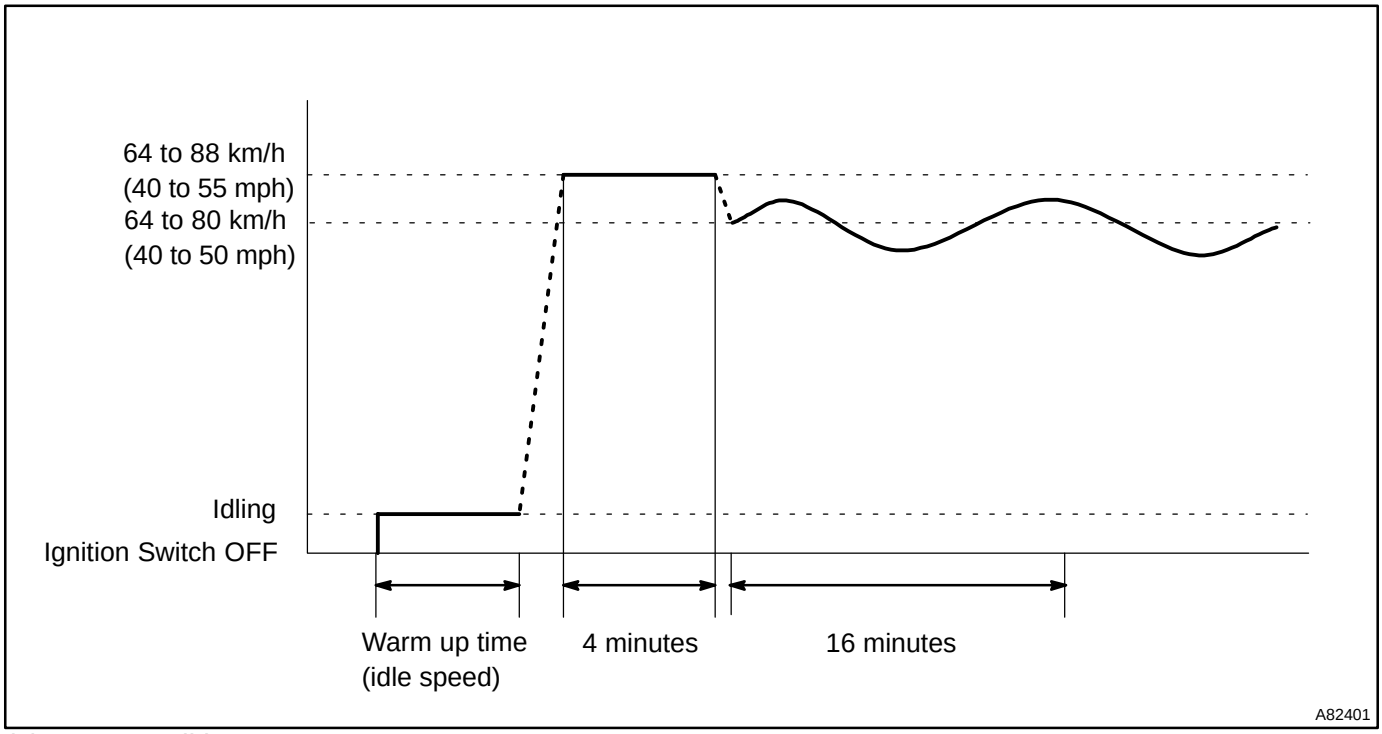
NOTICE:

The following drive patterns are the fastest method of completing all the requirements necessary for making the readiness monitor status read "complete".

If forced to momentarily stop a drive pattern due to traffic or other factors, the drive pattern can be resumed. Upon completion of the drive pattern, in most cases, the readiness monitor status will change to "complete".

Sudden changes in vehicle load and speed, such as driving up and down hills and/or sudden acceleration, hinder readiness monitor completion.

2. CATALYST MONITOR (A/F SENSOR TYPE)



(a) Preconditions

The monitor will not run unless:

- The MIL is OFF.
- Engine Coolant Temperature (ECT) is 75°C (167°F) or higher.
- Intake Air Temperature (IAT) is -10°C (14°F) or higher.*

NOTICE:

*** 2002 and later MY vehicles:**

To complete the readiness test in cold ambient conditions (less than -10°C/14°F), turn the ignition switch OFF and then back to ON. Perform the drive pattern a second time.

(b) Drive Pattern

(1) Connect the OBD II scan tool to the DLC3 to check readiness monitor status and preconditions (refer to step (a)).

(2) Drive the vehicle at 40 to 55 mph (64 to 88 km/h) for approximately 4 minutes.

NOTICE:

Drive with smooth throttle operation and avoid sudden acceleration.

If IAT was less than 10°C (50°F) when the engine was started, drive the vehicle at 40 to 55 mph (64 to 88 km/h) for an additional 4 minutes.

(3) Drive the vehicle allowing speed to fluctuate between 40 to 50 mph (64 to 80 km/h) for about 16 minutes.

NOTICE:

Drive with smooth throttle operation and avoid sudden closure of the throttle.

(4) Check the status of the readiness monitor on the scan tool display. If the readiness monitor status did not switch to complete, ensure preconditions are met, turn the ignition OFF, and then repeat steps (2) and (3).

3. EVAP MONITOR (KEY-OFF MONITOR)

(a) Preconditions

The monitor will run when all of the following conditions are met:

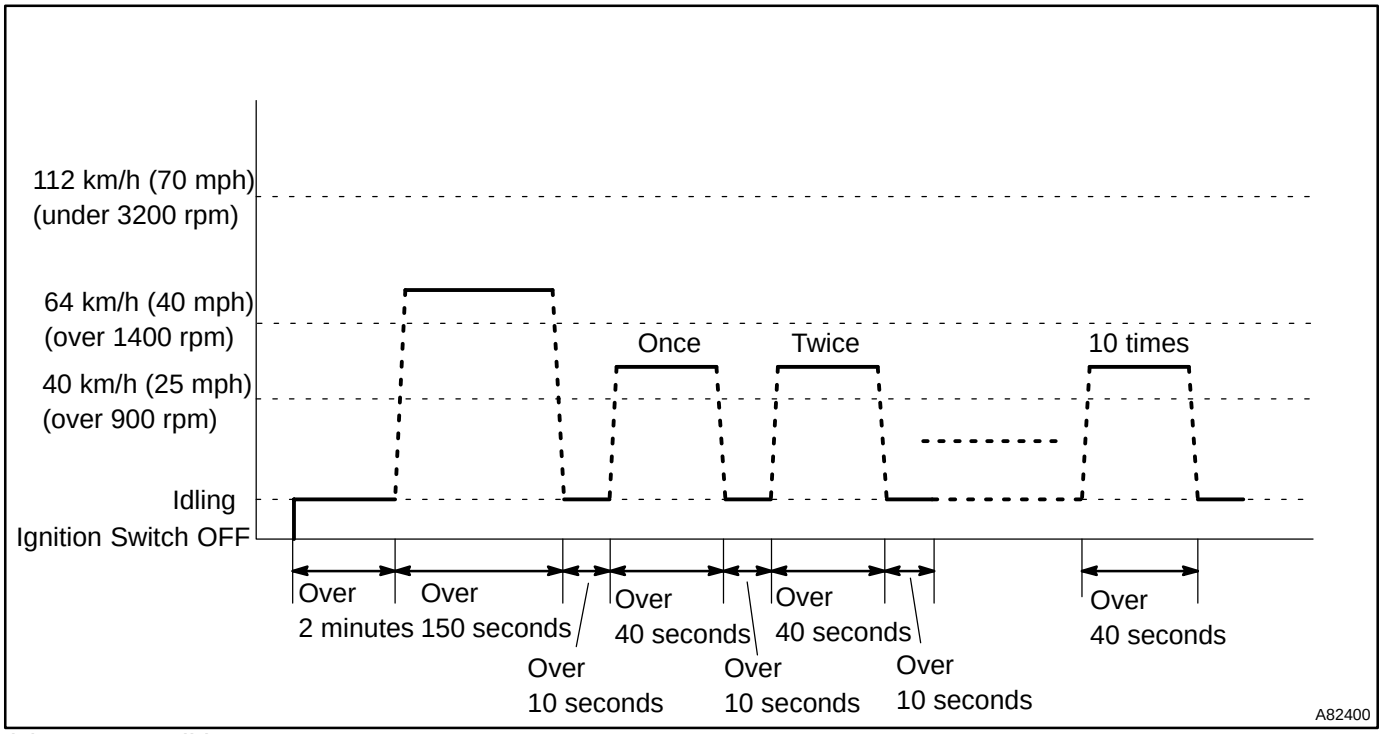
- The fuel level is less than 90 %.
- The altitude is less than 8,000 ft. (2,450 m).
- The vehicle is stopped.
- The Engine Coolant Temperature (ECT) is between 4.4 and 35˚C (40 to 95˚F).
- The Intake Air Temperature (IAT) is between 4.4 and 35˚C (40 to 95 ˚F).

(b) Monitor condition

(1) Allow the engine to idle for 300 seconds or more.
(2) Turn the ignition switch OFF and wait for 6 hours.
(3) Connect the scan tool to the DLC3 to check the monitor status and the preconditions.
(4) Check the readiness monitor status.

If ”INCMP” is displayed , the monitor is not completed. Turn the ignition switch OFF, confirm the preconditions and perform the monitor condition again.

4. OXYGEN / AIR FUEL RATIO SENSOR MONITOR (FRONT A/F SENSOR AND REAR O2S SYSTEM)



(a) Preconditions

The monitor will not run unless:

The MIL is OFF.

(b) Drive Pattern

(1) Connect the OBD II scan tool to the DLC3 to check monitor status and preconditions (refer to step (a)).

(2) Start the engine and allow it to idle for 2 minutes or more.

(3) Drive the vehicle at 64 to 112 km/h (40 to 70 mph) for at least 150 seconds.

(4) Stop the vehicle and allow the engine to idle for 10 seconds or more.

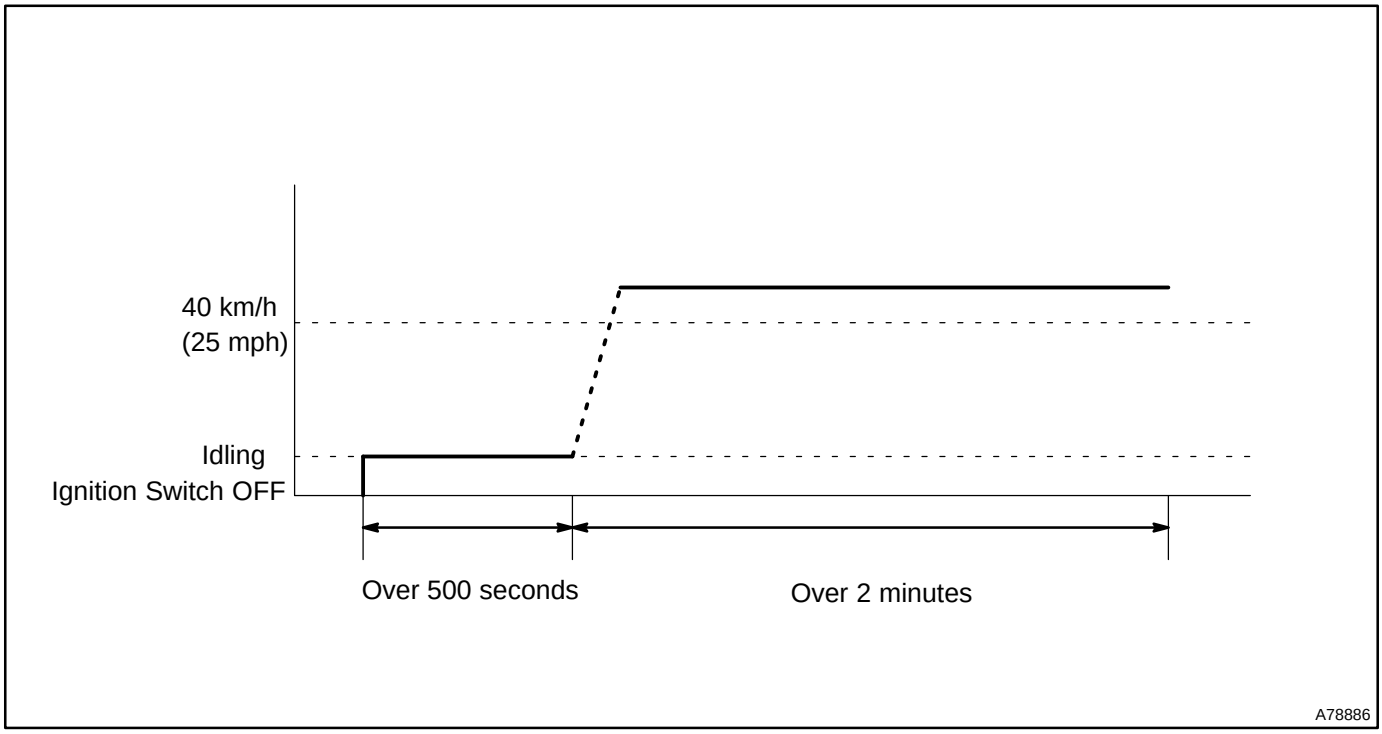
(5) Drive the vehicle at 40 to 64 km/h (25 to 40 mph) for at least 40 seconds.

(6) Stop the vehicle and allow the engine to idle for 10 seconds or more.

(7) Perform steps (5) and (6) ten times.

(8) Check the readiness monitor status. If the readiness monitor status did not change to ”complete”, check the preconditions, turn the ignition switch OFF, and repeat steps (1) to (6).

5. OXYGEN / A/F SENSOR HEATER MONITOR



(a) Preconditions
The monitor will not run unless:
The MIL is OFF.

(b) Drive Pattern
(1) Connect the OBD II scan tool to the DLC3 to check monitor status and preconditions (refer to step (a)).
(2) Start the engine and allow it to idle for 500 seconds or more.
(3) Drive the vehicle at 40 km/h (25 mph) or more for at least 2 minutes.
(4) Check the readiness monitor status. If the readiness monitor status did not change to ”complete”, check preconditions, turn the ignition switch OFF, and repeat steps (2) and (3).

05MOI-01

REGISTRATION

NOTICE:

The Vehicle Identification Number (VIN) must be input into the replaced ECM.

HINT:

The VIN is a 17-digit alphanumeric vehicle identification number. A hand-held tester is required to register the VIN.

1. DESCRIPTION

This registration section consists of three parts, Input Instructions, Read VIN and Write VIN.

(a) Input Instructions: Explains the general VIN input instructions using a hand-held tester.

(b) Read VIN: Explains the VIN reading process in a flowchart. This process allows the VIN stored in the ECM to be read, in order to confirm that the two VINs, provided with the vehicle and stored in the vehicle's ECM, are the same.

(c) Write VIN: Explains the VIN writing process in a flowchart. This process allows the VIN to be input into the ECM. If the ECM is changed, or the VINs do not match, the VIN can be registered, or overwritten in the ECM by following this procedure.

2. INPUT INSTRUCTIONS

(a) Hand-held tester

(1) The arrow buttons (UP, DOWN, RIGHT and LEFT) and numerical buttons (0 to 9) are used, in order to input the VIN.

(b) Cursor Operation

(1) To move the cursor around the tester screen, press the RIGHT and LEFT buttons.

(c) Alphabetical Character Input

(1) Press the UP and DOWN buttons to select the desired alphabetical character.

(2) After selection, the cursor should move.

(d) Numeric Character Input

(1) Press the numerical button corresponding to the number that you want to input.

(2) After input, the cursor should move.

HINT:

Numerical characters can be selected by using the UP and DOWN buttons.

(e) Correction

(1) When correcting the input character(s), put the cursor onto the character using the RIGHT or LEFT button.

(2) Select or input the correct character using the UP/DOWN buttons, or the numerical buttons.

(f) Finishing Input Operation

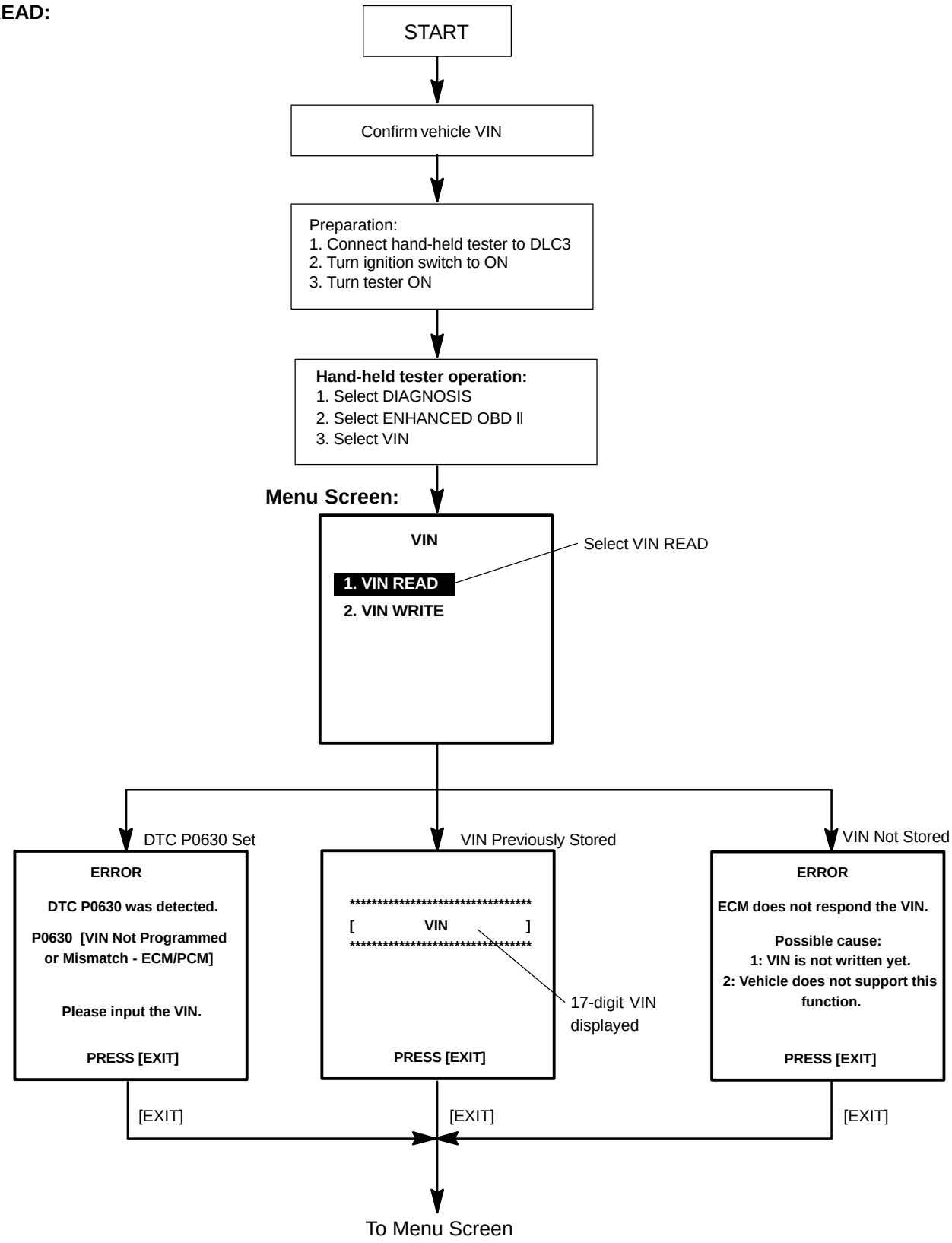
(1) Make sure that the input VIN matches the vehicle VIN after input.

(2) Press the ENTER button on the tester.

3. READ VIN (Vehicle Identification Number)

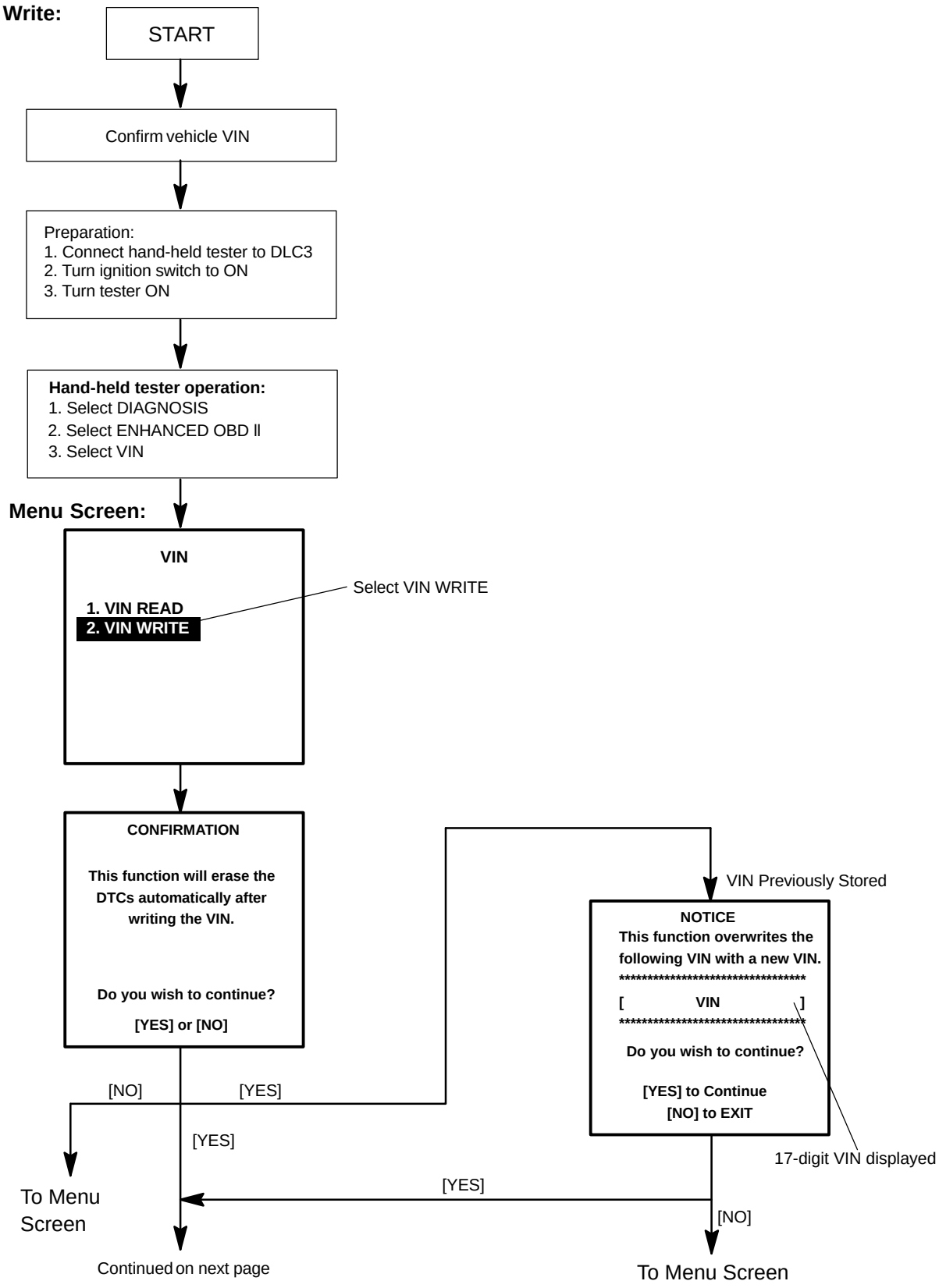
(a) Read VIN using a hand-held tester.

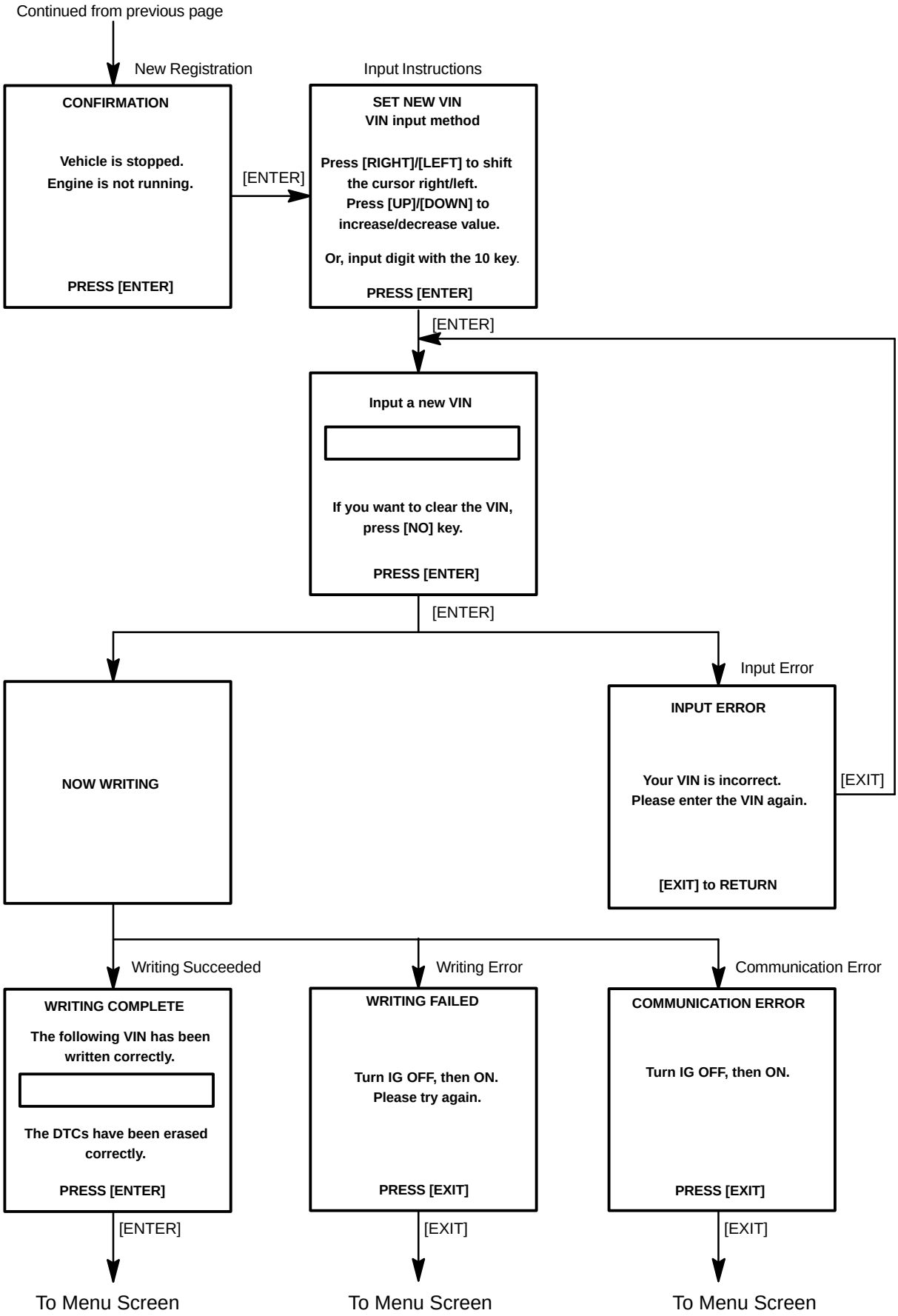
READ:



4. WRITE VIN

(a) Write VIN using the hand-held tester.




Continued from previous page
New Registration
Input Instructions
CONFIRMATION
Vehicle is stopped.
Engine is not running.
PRESS [ENTER]
[ENTER]
SET NEW VIN
VIN input method
Press [RIGHT]/[LEFT] to shift the cursor right/left.
Press [UP]/[DOWN] to increase/decrease value.
Or, input digit with the 10 key.
PRESS [ENTER]
[ENTER]
Input a new VIN
If you want to clear the VIN, press [NO] key.
PRESS [ENTER]
[ENTER]
Input Error
NOW WRITING
INPUT ERROR
Your VIN is incorrect.
Please enter the VIN again.
[EXIT] to RETURN
[EXIT]
Writing Succeeded
Writing Error
Communication Error
WRITING COMPLETE
The following VIN has been written correctly.
The DTCs have been erased correctly.
PRESS [ENTER]
WRITING FAILED
Turn IG OFF, then ON.
Please try again.
PRESS [EXIT]
COMMUNICATION ERROR
Turn IG OFF, then ON.
PRESS [EXIT]
[ENTER]
[EXIT]
[EXIT]
To Menu Screen
To Menu Screen
To Menu Screen

05ESJ-05

PART AND SYSTEM NAME LIST

This reference list indicates the part names used in this manual along with their definitions.

TOYOTA/LEXUS name	Definition
Toyota HCAC system, Hydro-carbon Adsorptive Catalyst (HCAC) system, HC adsorptive three-way catalyst	HC adsorptive three-way catalytic converter
Variable valve timing sensor, VVT sensor	Camshaft position sensor
Variable valve timing system, VVT system	Camshaft timing control system
Camshaft timing oil control valve, Oil control valve, OCV, VVT, VSV	Camshaft timing oil control valve
Variable timing and lift, VVTL	Camshaft timing and lift control
Crankshaft position sensor ”A”	Crankshaft position sensor
Engine speed sensor	Crankshaft position sensor
THA	Intake air temperature
Knock control module	Engine knock control module
Knock sensor	Engine knock sensor
Mass or volume air flow circuit	Mass air flow meter circuit
Vacuum sensor	Manifold air pressure sensor
Internal control module, Control module, Engine control ECU, PCM	Power train control module
FC idle	Deceleration fuel cut
Idle air control valve	Idle speed control
CCV, Canister close valve VSV for canister control	Evaporative emissions canister vent valve
EVAP VSV, Vacuum switching valve assembly No. 1, EVAP VSV, Purge VSV	Evaporative emissions canister purge valve
VSV for pressure switching valve, Bypass VSV	Evaporative emission pressure switching valve
Vapor pressure sensor, EVAP pressure sensor, Evaporative emission control system pressure sensor	Fuel tank pressure sensor
Charcoal canister	Evaporative emissions canister
ORVR system	On-board refueling vapor recovery system
Intake manifold runner control	Intake manifold tuning system
Intake manifold runner valve, IMRV, IACV (runner valve)	Intake manifold tuning valve
Intake control VSV	Intake manifold tuning solenoid valve
AFS	Air fuel ratio sensor
O2 sensor	Heater oxygen sensor
Oxygen sensor pumping current circuit	Oxygen sensor output signal
Oxygen sensor reference ground circuit	Oxygen sensor signal ground
Accel position sensor	Accelerator pedal position sensor
Throttle actuator control motor, Actuator control motor, Electronic throttle motor, Throttle control motor	Electronic throttle actuator
Electronic throttle control system, Throttle actuator control system	Electronic throttle control system
Throttle/pedal position sensor, Throttle/pedal position switch, Throttle position sensor/switch	Throttle position sensor
Turbo press sensor	Turbocharger pressure sensor
Turbo VSV	Turbocharger pressure control solenoid valve
P/S pressure switch	Power-steering pressure switch
VSV for ACM	Active control engine mount
Speed sensor, Vehicle speed sensor ”A”, Speed sensor for skid control ECU	Vehicle speed sensor
ATF temperature sensor, Trans. fluid temp. sensor, ATF temperature sensor ”A”	Transmission fluid temperature sensor
Electronic controlled automatic transmission, ECT	Electronically controlled automatic
Intermediate shaft speed sensor ”A”	Counter gear speed sensor

TOYOTA/LEXUS name	Definition
Output speed sensor	Output shaft speed sensor
Input speed sensor, Input turbine speed sensor ”A”, Speed sensor (NT), Turbine speed sensor	Input turbine speed sensor
PNP switch, NSW	Park/neutral position switch
Pressure control solenoid	Transmission pressure control solenoid
Shift solenoid	Transmission shift solenoid valve
Transmission control switch, Shift lock control unit	Shift lock control module
Engine immobilizer system, Immobilizer system	Vehicle anti-theft system

051ZG-11

CUSTOMER PROBLEM ANALYSIS CHECK

SFI SYSTEM Check Sheet

Inspector's Name _____

Customer's Name		**VIN**	
Date Vehicle Brought in		**Production Date**	
Licence Plate No.		**Odometer Reading**	km miles

Problem Symptoms	☐ **Engine Does Not Start**	☐ **Engine does not crank** ☐ **No initial combustion** ☐ **No complete combustion**
	☐ **Difficult to Start**	☐ **Engine cranks slowly** ☐ **Other** _____
	☐ **Poor Idling**	☐ **Incorrect first idle** ☐ **Idling rpm is abnormal** ☐ **High (rpm)** ☐ **Low (rpm)** ☐ **Rough idling** ☐ **Other** _____
	☐ **Poor Driveability**	☐ **Hesitation** ☐ **Backfire** ☐ **Muffler explosion (after-fire)** ☐ **Surging** ☐ **Knocking** ☐ **Other** _____
	☐ **Engine Stall**	☐ **Soon after starting** ☐ **After accelerator pedal depressed** ☐ **After accelerator pedal released** ☐ **During A/C operation** ☐ **Shifting from N to D** ☐ **Other** _____
	☐ **Other**	

Date Problem Occurred		
Problem Frequency		☐ **Constant** ☐ **Sometimes (times per day/month)** ☐ **Once only** ☐ **Other** _____
Condition When Problem Occurs	**Weather**	☐ **Fine** ☐ **Cloudy** ☐ **Rainy** ☐ **Snowy** ☐ **Various/Other** _____
	Outdoor Temperature	☐ **Hot** ☐ **Warm** ☐ **Cool** ☐ **Cold (approx. ____ °C/____ °F)**
	Place	☐ **Highway** ☐ **Suburbs** ☐ **Inner City** ☐ **Uphill** ☐ **Downhill** ☐ **Rough road** ☐ **Other** _____
	Engine Temp.	☐ **Cold** ☐ **Warming up** ☐ **After Warming up** ☐ **Any temp.** ☐ **Other** _____
	Engine Operation	☐ **Starting** ☐ **Just after starting (min.)** ☐ **Idling** ☐ **Racing** ☐ **Driving** ☐ **Constant speed** ☐ **Acceleration** ☐ **Deceleration** ☐ **A/C switch ON/OFF** ☐ **Other** _____

Condition of Malfunction Indicator Lamp (MIL)		☐ **Remains on** ☐ **Sometimes lights up** ☐ **Does not light up**
DTC Inspection	**Normal Mode (Pre-check)**	☐ **Normal** ☐ **Malfunction code(s) (code)** ☐ **Freeze frame data ( )**
	Check Mode	☐ **Normal** ☐ **Malfunction code(s) (code)** ☐ **Freeze frame data ( )**

051ZH-16

DIAGNOSTIC TROUBLE CODE CHART

HINT:

Parameters listed in the chart may be different than your readings depending on the type of instrument used and other factors.

During the DTC check, refer to the table below if a malfunction code is displayed. For details about each code, refer to the page number in the DTC chart's left column.

DTC No. (See Page)	Detection Item	Trouble Area	MIL*1	Memory
P0010 (05-55)	Camshaft Position "A" Actuator Circuit (Bank 1)	・Open or short in OCV circuit ・OCV valve ・ECM	○	○
P0011 (05-61)	Camshaft Position "A" -Timing Over - Advanced or System Performance (Bank 1)	・Valve timing ・OCV ・VVT controller assembly ・ECM	○	○
P0012 (05-61)	Camshaft Position "A" -Timing Over- Retarded (Bank 1)	・Same as DTC No. P0011	○	○
P0016 (05-69)	Crankshaft Position - Camshaft Position Correlation (Bank 1 Sensor 1)	・Mechanical system (jumped tooth of timing chain, chain stretched) ・ECM	○	○
P0031*3 (05-71)	Oxygen (A/F) Sensor Heater Circuit Low (Bank 1 Sensor 1)	・Open in heater circuit of A/F sensor ・A/F sensor heater ・EFI relay ・ECM	○	○
P0032*3 (05-71)	Oxygen (A/F) Sensor Heater Circuit High (Bank 1 Sensor 1)	・Short in heater circuit of A/F sensor ・A/F sensor heater ・EFI relay ・ECM	○	○
P0037 (05-76)	Oxygen Sensor Heater Control Circuit Low (Bank 1 Sensor 2)	・Open or short in heater circuit of heated oxygen sensor ・Heated oxygen sensor heater ・EFI relay ・ECM	○	○
P0038 (05-76)	Oxygen Sensor Heater Control Circuit High (Bank 1 Sensor 2)	・Same as DTC No. P0037	○	○
P0100 (05-81)	Mass or Volume Air Flow Circuit	・Open or short in mass air flow meter circuit ・Mass air flow meter ・ECM	○	○
P0101 (05-88)	Mass or Volume Air Flow Circuit Range/Performance Problem	・Mass air flow meter	○	○
P0102 (05-81)	Mass or Volume Air Flow Circuit Low Input	・Same as DTC No. P0100	○	○
P0103 (05-81)	Mass or Volume Air Flow Circuit High Input	・Same as DTC No. P0100	○	○
P0110 (05-90)	Intake Air Temperature Circuit	・Open or short in intake air temperature sensor circuit ・Intake air temperature sensor (built-in mass air flow meter) ・ECM	○	○
P0112 (05-90)	Intake Air Temperature Circuit Low Input	・Same as DTC No. P0110	○	○
P0113 (05-90)	Intake Air Temperature Circuit High Input	・Same as DTC No. P0110	○	○
P0115 (05-95)	Engine Coolant Temperature Circuit	・Open or short in engine coolant temperature sensor circuit ・Engine coolant temperature sensor ・ECM	○	○
P0116 (05-100)	Engine Coolant Temperature Circuit Range/Performance Problem	・Cooling system ・Engine coolant temperature sensor	○	○
P0117 (05-95)	Engine Coolant Temperature Circuit Low Input	・Same as DTC No. P0115	○	○

P0118 (05-95)	Engine Coolant Temperature Circuit High Input	・Same as DTC No. P0115	○	○
P0120 (05-102)	Throttle/Pedal Position Sensor/ Switch "A" Circuit	・Throttle position sensor (built-in throttle body) ・ECM	○	○
P0121 (05-111)	Throttle/Pedal Position Sensor/ Switch "A" Circuit Range/Performance Problem	・Throttle body assy (Throttle position sensor)	○	○
P0122 (05-102)	Throttle/Pedal Position Sensor/ Switch "A" Circuit Low Input	・Throttle position sensor (built-in throttle body) ・Short in VTA1 circuit ・Open in VC circuit ・ECM	○	○
P0123 (05-102)	Throttle/Pedal Position Sensor/ Switch "A" Circuit High Input	・Throttle position sensor (built-in throttle body) ・Open in VTA1 circuit ・Open in E2 circuit ・VC and VTA1 circuits are short-circuited ・ECM	○	○
P0125 (05-113)	Insufficient Coolant Temperature for Closed Loop Fuel Control	・Cooling system ・Engine coolant temperature sensor ・Thermostat	○	○
P0128 (05-115)	Coolant Thermostat (Coolant Temperature Below Thermostat Regulating Temperature)	・Thermostat ・Cooling system ・Engine coolant temperature sensor ・ECM	○	○
P0136 (05-118)	Oxygen Sensor Circuit Malfunction (Bank 1 Sensor 2)	・Open or short in heated oxygen sensor (bank 1 sensor 2) circuit ・Heated oxygen sensor (bank 1 sensor 2) ・Heated oxygen sensor heater (bank 1 sensor 2) ・A/F sensor ・A/F sensor heater ・EFI relay	○	○
P0137 (05-118)	Oxygen Sensor Circuit Low Voltage (Bank 1 Sensor 2)	・Open or short in heated oxygen sensor circuit (sensor to ECM) ・Open or short in heated oxygen sensor internal circuit	○	○
P0138 (05-118)	Oxygen Sensor Circuit High Voltage (Bank 1 Sensor 2)	・Short in heated oxygen sensor (bank 1 sensor 2) circuit ・Short in heated oxygen sensor (bank 1 sensor 2) internal circuit ・ECM internal circuit malfunction	○	○
P0171 (05-132)	System too Lean (Bank 1)	・Air induction system ・Injector blockage ・Mass air flow meter ・Engine coolant temperature sensor ・Fuel pressure ・Gas leakage in exhaust system ・Open or short in A/F sensor circuit ・A/F sensor ・A/F sensor heater ・EFI relay ・Open or short in A/F sensor heater and EFI relay circuits ・PCV hose connection ・PCV hose	○	○
P0172 (05-132)	System too Rich (Bank 1)	・Injector leak, blockage ・Mass air flow meter ・Engine coolant temperature sensor ・Ignition system ・Fuel pressure ・Gas leakage in exhaust system ・Open or short in A/F sensor circuit ・A/F sensor ・A/F sensor heater ・Open or short in A/F sensor heater and EFI relay circuits ・EFI relay	○	○

P0220 (05-102)	Throttle/Pedal Position Sensor/ Switch "B" Circuit	・Throttle position sensor (built-in throttle body) ・ECM	○	○
P0222 (05-102)	Throttle/Pedal Position Sensor/ Switch "B" Circuit Low Input	・Throttle position sensor (built-in throttle body) ・Short in VTA2 circuit ・Open in VC circuit ・ECM	○	○
P0223 (05-102)	Throttle/Pedal Position Sensor/ Switch "B" Circuit High Input	・Throttle position sensor (built-in throttle body) ・Open in VTA2 circuit ・Open in E2 circuit ・VC and VTA2 circuits are short-circuited ・ECM	○	○
P0300 (05-146)	Random/Multiple Cylinder Misfire Detected	・Open or short in engine wire ・Connector connection ・Vacuum hose connection ・Ignition system ・Injector ・Fuel pressure ・Mass air flow meter ・Engine coolant temp. sensor ・Compression pressure ・Valve clearance ・Valve timing ・PCV hose connection ・PCV hose ・ECM	○*2	○
P0301 (05-146)	Cylinder 1 Misfire Detected	・Same as DTC No. P0300	○*2	○
P0302 (05-146)	Cylinder 2 Misfire Detected	・Same as DTC No. P0300	○*2	○
P0303 (05-146)	Cylinder 3 Misfire Detected	・Same as DTC No. P0300	○*2	○
P0304 (05-146)	Cylinder 4 Misfire Detected	・Same as DTC No. P0300	○*2	○
P0325 (05-161)	Knock Sensor 1 Circuit (Bank 1 or Single Sensor)	・Open or short in knock sensor circuit ・Knock sensor (under-torqued or loose) ・ECM	○	○
P0327 (05-161)	Knock Sensor 1 Circuit Low Input (Bank 1 or Single Sensor)	・Short in knock sensor circuit ・Knock sensor ・ECM	○	○
P0328 (05-161)	Knock Sensor 1 Circuit High Input (Bank 1 or Single Sensor)	・Open in knock sensor circuit ・Knock sensor ・ECM	○	○
P0335 (05-166)	Crankshaft Position Sensor "A" Circuit	・Open or short in crankshaft position sensor circuit ・Crankshaft position sensor ・Signal plate (Crankshaft position sensor plate No. 1) ・ECM	○	○
P0339 (05-166)	Crankshaft Position Sensor "A" Circuit Intermittent	・Same as DTC No. P0335	-	○
P0340 (05-170)	Camshaft Position Sensor "A" Circuit (Bank 1 or Single Sensor)	・Open or short in camshaft position sensor circuit ・Camshaft position sensor ・Camshaft timing gear ・Timing chain has a jumped tooth ・ECM	○	○
P0341 (05-170)	Camshaft Position Sensor "A" Circuit Range/Performance (Bank 1 or Single Sensor)	・Same as DTC No. P0340	○	○

P0351 (05-174)	Ignition Coil "A" Primary/Secondary Circuit	・Ignition system ・Open or short in IGF and IGT1 to 4 circuits from ignition coil with igniter assy to ECM ・No.1 - 4 ignition coil assy ・ECM	○	○
P0352 (05-174)	Ignition Coil "B" Primary/Secondary Circuit	・Same as DTC No. P0351	○	○
P0353 (05-174)	Ignition Coil "C" Primary/Secondary Circuit	・Same as DTC No. P0351	○	○
P0354 (05-174)	Ignition Coil "D" Primary/Secondary Circuit	・Same as DTC No. P0351	○	○
P0420 (05-184)	Catalyst System Efficiency Below Threshold (Bank 1)	・Gas leakage on exhaust system ・A/F sensor ・Heated oxygen sensor ・Exhaust manifold converter (Three way catalytic converter)	○	○
P043E (05-190)	Evaporative Emission System Reference Orifice Clog Up	・Pump module ・Connector/Wire harness (Pump module - ECM) ・ECM ・Leakage from EVAP system	○	○
P043F (05-190)	Evaporative Emission System Reference Orifice High Fow	・Pump module ・Connector/Wire harness (Pump module - ECM) ・ECM ・Leakage from EVAP system	○	○
P0441 (05-196)	Evaporative Emission Control System Incorrent Purge Flow	・Purge VSV ・Connector/wire harness (Purge VSV - ECM) ・ECM ・Pump module ・Leakage from EVAP system ・Leakage from EVAP line (Purge VSV - Intake manifold)	○	○
P0450 (05-202)	Evaporative Emission Control System Pressure sensor/Switch	・Pump module ・ECM	○	○
P0451 (05-202)	Evaporative Emission Control System Pressure sensor Range/Performance	・Pump module ・Connector/Wire harness (Pump module - ECM) ・ECM	○	○
P0452 (05-202)	Evaporative Emission Control System Pressure sensor/Switch Low Input	・Pump module ・Connector/Wire harness (Pump module to ECM) ・ECM	○	○
P0453 (05-202)	Evaporative Emission Control System Pressure sensor/Switch High Input	・Pump module ・Connector/Wire harness (Pump module to ECM) ・ECM	○	○
P0455 (05-211)	Evaporative Emission Control System Leak Detected (gross leak)	・Fuel tank cap (loose) ・Leakage from EVAP line (Canister - Fuel tank) ・Leakage from EVAP line (Purge VSV - Canister) ・Pump module ・Leakage from fuel tank ・Leakage from canister	○	○
P0456 (05-211)	Evaporative Emission Control System Leak Detected (small leak)	・Same above	○	○
P0500 (05-216)	Vehicle Speed Sensor "A"	・Combination meter ・Open or short in speed sensor circuit ・Vehicle speed sensor ・ECM ・Skid control ECU	○	○
P0503 (05-216)	Vehicle Speed Sensor "A" Intermittent/Erratic/High	・Same as DTC No. P0500	-	○
P0504 (05-219)	Brake Switch Correlation	・Short in stop lamp switch signal circuit ・STOP fuse ・Stop lamp switch ・ECM	-	○

P0505 (05-226)	Idle Control System	・Electronic throttle control system ・Air induction system ・PCV hose connection ・ECM	○	○
P0560 (05-229)	System Voltage	・Open in back-up power source circuit ・ECM	○	○
P0604 (05-233)	Internal Control Module Random Access Memory (RAM) Error	・ECM	○	○
P0606 (05-233)	ECM/PCM Processor	・Same as DTC No. P0604	○	○
P0607 (05-233)	Control Module Performance	・Same as DTC No. P0604	○	○
P0617 (05-235)	Starter Relay Circuit High	・Short in PNP switch ・PNP switch ・Ignition switch ・ECM	○	○
P0630 (05-241)	VIN not Programmed or Mis-match - ECM/PCM	・ECM	○	○
P0657 (05-233)	Actuator Supply Voltage Circuit / Open	・Same as DTC No. P0604	○	○
P0705 (05-242)	Transmission Range Sensor Circuit Malfunction (PRNDL Input)	・Short in PNP switch circuit ・PNP switch ・ECM	○	○
P0710 (05-928)	Transmission Fluid Temperature Sensor ”A” circuit	・Electronic controlled automatic transmission (ECT)	○	○
P0711 (05-933)	Transmission Fluid Temperature Sensor ”A” Performance	・Electronic controlled automatic transmission (ECT)	○	○
P0712 (05-928)	Transmission Fluid Temperature Sensor ”A” Circuit Low Input	・Electronic controlled automatic transmission (ECT)	○	○
P0713 (05-928)	Transmission Fluid Temperature Sensor ”A” Circuit High Input	・Electronic controlled automatic transmission (ECT)	○	○
P0717 (05-937)	Input/Turbine Speed Sensor ”A” Circuit No Signal	・Electronic controlled automatic transmission (ECT)	○	○
P0724 (05-940)	Brake Switch ”B” Circuit High	・Electronic controlled automatic transmission (ECT)	○	○
P0741 (05-944)	Torque Converter Clutch Circuit Performance or Stuck Off	・Electronic controlled automatic transmission (ECT)	○	○
P0746 (05-949)	Pressure Control Solenoid ”A” Performance (Shift Solenoid Valve SL1)	・Electronic controlled automatic transmission (ECT)	○	○
P0748 (05-953)	Pressure Control Solenoid ”A” Electrical (Shift Solenoid Valve SL1)	・Electronic controlled automatic transmission (ECT)	○	○
P0766 (05-949)	Shift Solenoid ”D” Performance (Shift Solenoid Valve S4)	・Electronic controlled automatic transmission (ECT)	○	○
P0776 (05-949)	Pressure Control Solenoid ”B” Performance (Shift Solenoid Valve SL2)	・Electronic controlled automatic transmission (ECT)	○	○
P0778 (05-953)	Pressure Control Solenoid ”B” Electrical (Shift Solenoid Valve SL2)	・Electronic controlled automatic transmission (ECT)	○	○
P0793 (05-967)	Intermediate Shaft Speed Sensor ”A” Circuit No Signal	・Electronic controlled automatic transmission (ECT)	○	○
P0982 (05-953)	Shift Solenoid ”D” Control Low	・Electronic controlled automatic transmission (ECT)	○	○
P0983 (05-953)	Shift Solenoid ”D” Control High	・Electronic controlled automatic transmission (ECT)	○	○

P2102 (05-243)	Throttle Actuator Control Motor Circuit Low	・Open in throttle actuator circuit ・Throttle actuator ・ECM	○	○
P2103 (05-243)	Throttle Actuator Control Motor Circuit High	・Short in throttle actuator circuit ・Throttle actuator ・Throttle valve ・Throttle body assy ・ECM	○	○
P2111 (05-247)	Throttle Actuator Control System - Stuck Open	・Throttle actuator circuit ・Throttle actuator ・Throttle body ・Throttle valve	○	○
P2112 (05-247)	Throttle Actuator Control System - Stuck Closed	・Same as DTC No. P2111	○	○
P2118 (05-250)	Actuator Control Motor Current Range/Performance	・Open in ETCS power source circuit ・ECM	○	○
P2119 (05-255)	Throttle Actuator Control Throttle Body Range/Performance	・Electronic throttle control system ・ECM	○	○
P2120 (05-257)	Throttle/Pedal Position Sensor/ Switch "D" Circuit	・Accelerator pedal position sensor ・Open in VCP1 circuit ・VPA circuit open or ground short ・ECM	○	○
P2121 (05-265)	Throttle/Pedal Position Sensor/ Switch "D" Circuit Range/Performance	・Open or short in Accelerator pedal position sensor circuit ・Accelerator pedal position sensor ・ECM	○	○
P2122 (05-257)	Throttle/Pedal Position Sensor/ Switch "D" Circuit Low Input	・Accelerator pedal position sensor ・Open in VCP1 circuit ・VPA circuit open or ground short ・ECM	○	○
P2123 (05-257)	Throttle/Pedal Position Sensor/ Switch "D" Circuit High Input	・Accelerator pedal position sensor ・Open in EPA circuit ・ECM	○	○
P2125 (05-257)	Throttle/Pedal Position Sensor/ Switch "E" Circuit	・Accelerator pedal position sensor ・ECM	○	○
P2127 (05-257)	Throttle/Pedal Position Sensor/ Switch "E" Circuit Low Input	・Accelerator pedal position sensor ・Open in VCP2 circuit ・VPA2 circuit open or ground short ・ECM	○	○
P2128 (05-257)	Throttle/Pedal Position Sensor/ Switch "E" Circuit High Input	・Accelerator pedal position sensor ・Open in EPA2 circuit ・ECM	○	○
P2135 (05-102)	Throttle Pedal Position Sensor/ Switch "A"/"B" Voltage Correlation	・Same as DTC No. P0120	○	○
P2138 (05-257)	Throttle Pedal Position Sensor/ Switch "D"/"E" Voltage Correlation	・VPA and VPA2 circuit are short circuited ・Accelerator pedal position sensor ・ECM	○	○
P2195*3 (05-269)	Oxygen (A/F) Sensor Signal Stuck Lean (Bank 1 Sensor 1)	・Open or short in A/F sensor circuit ・A/F sensor ・A/F sensor heater ・EFI relay ・Open or short in A/F sensor heater and EFI relay circuits ・Air induction system ・Fuel pressure ・Injector ・ECM	○	○
P2196*3 (05-269)	Oxygen (A/F) Sensor Signal Stuck Rich (Bank 1 Sensor 1)	・Same as DTC No. P2195	○	○

P2238*3 (05-282)	Oxygen Sensor Pumping Current Circuit Low (for A/F sensor) (Bank 1 Sensor 1)	・Open or short in A/F sensor circuit ・A/F sensor ・A/F sensor heater ・EFI relay ・Open or short in A/F sensor heater and EFI relay circuits ・ECM	○	○
P2239*3 (05-282)	Oxygen Sensor Pumping Current Circuit High (for A/F sensor) (Bank 1 Sensor 1)	・Same as DTC No. P2238	○	○
P2252*3 (05-282)	Oxygen Sensor Reference Ground Circuit Low (for A/F sensor) (Bank 1 Sensor 1)	・Same as DTC No. P2238	○	○
P2253*3 (05-282)	Oxygen Sensor Reference Ground Circuit High (for A/F sensor) (Bank 1 Sensor 1)	・Same as DTC No. P2238	○	○
P2401 (05-288)	Evaporative Emission System Leak Detection Pump Control Circuit Low	・Pump module ・Connector/Wire harness (Pump module - ECM) ・ECM ・Leakage from EVAP system	○	○
P2402 (05-288)	Evaporative Emission System Leak Detection Pump Control Circuit High	・Pump module ・Connector/Wire harness (Pump module - ECM) ・ECM	○	○
P2419 (05-294)	Evaporative Emission System Switching Valve Control Circuit Low	・Pump module ・Connector/Wire harness (Pump module - ECM) ・ECM	○	○
P2420 (05-294)	Evaporative Emission System Switching Valve Control Circuit High	・Pump module ・Connector/Wire harness (Pump module - ECM) ・ECM ・Leakage from EVAP system	○	○
P2610 (05-300)	ECM/PCM Internal Engine Off Timer Performance	・ECM	○	○
P2716 (05-974)	Pressure Control Solenoid ”D” Electrical	・Electronic controlled automatic transmission (ECT)	○	○
P2A00 (05-302)	A/F Sensor Circuit Slow Response (Bank 1 Sensor 1)	・Open or short in A/F sensor circuit ・A/F sensor ・A/F sensor heater ・EFI relay ・Open or short in A/F sensor heater and EFI relay circuits ・Air induction system ・Fuel pressure ・Injector ・ECM	○	○
P2769 (05-978)	DSL Solenoid Circuit Low	・Electronic controlled automatic transmission (ECT)	○	○
P2770 (05-978)	DSL Solenoid Circuit High	・Electronic controlled automatic transmission (ECT)	○	○
B2799 (05-2010)	Engine Immobilizer System Malfunction	・Immobilizer system	-	○

HINT:

*1: MIL illuminates

*2: MIL illuminates or flashes continuously

*3: Although the title (DTC description) says ”oxygen sensor”, this DTC is related to the ”A/F sensor”.

051ZF-14

HOW TO PROCEED WITH TROUBLESHOOTING

The hand-held tester is used in steps 3, 4, 5, 7 and 10.

1	VEHICLE BROUGHT TO WORKSHOP

NEXT

2	CUSTOMER PROBLEM ANALYSIS (See page 05-8)

NEXT

3	CONNECT HAND-HELD TESTER TO DLC3

HINT:
If the display indicates a communication fault in the tool, inspect the DLC3.

NEXT

4	CHECK DTC AND FREEZE FRAME DATA (See page 05-38)

HINT:
Record or print DTC and freeze frame data, if needed.

NEXT

5	CLEAR DTC AND FREEZE FRAME DATA (See page 05-38)

NEXT

6	VISUAL INSPECTION

NEXT

7	SETTING CHECK (TEST) MODE DIAGNOSIS (See page 05-40)

NEXT

8	PROBLEM SYMPTOM CONFIRMATION

HINT:
If the engine does not start, perform steps 10 and 12 first.

Malfunction does not occur	A
Malfunction occurs	B

B → Go to step 10

A

9	SYMPTOM SIMULATION

NEXT

10	DTC CHECK (See page 05-38)

Malfunction code	A
No code	B

B → Go to step 12

A

11	DTC CHART (See page 05-48)

NEXT

Go to step 14

12	BASIC INSPECTION (See page 05-10)

Wrong parts not confirmed	A
Wrong parts confirmed	B

B → Go to step 17

A

13	PROBLEM SYMPTOMS TABLE (See page 05-31)

Wrong circuit confirmed	A
Wrong parts confirmed	B

B → Go to step 17

A

14	CHECK ECM POWER SOURCE CIRCUIT (See page 05-312)

NEXT

15	CIRCUIT INSPECTION

Malfunction not confirmed	A
Malfunction confirmed	B

B → Go to step 18

A

16	CHECK FOR INTERMITTENT PROBLEMS (See page 05-9)

NEXT

Go to step 18

17	PARTS INSPECTION

NEXT

18	IDENTIFICATION OF PROBLEM

NEXT

19	ADJUSTMENT, REPAIR

NEXT

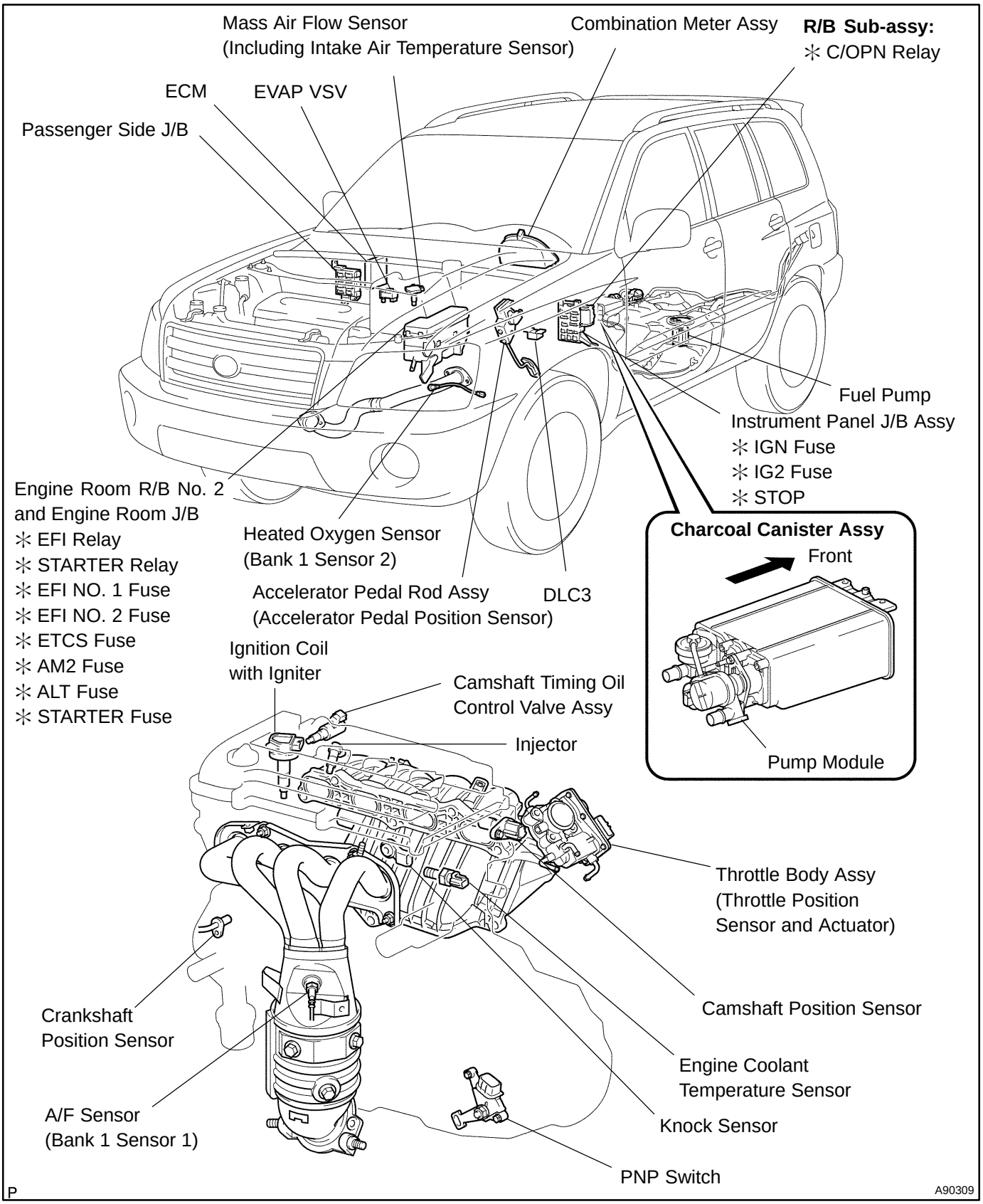
20	CONFIRMATION TEST

NEXT

END

051ZI-15

LOCATION



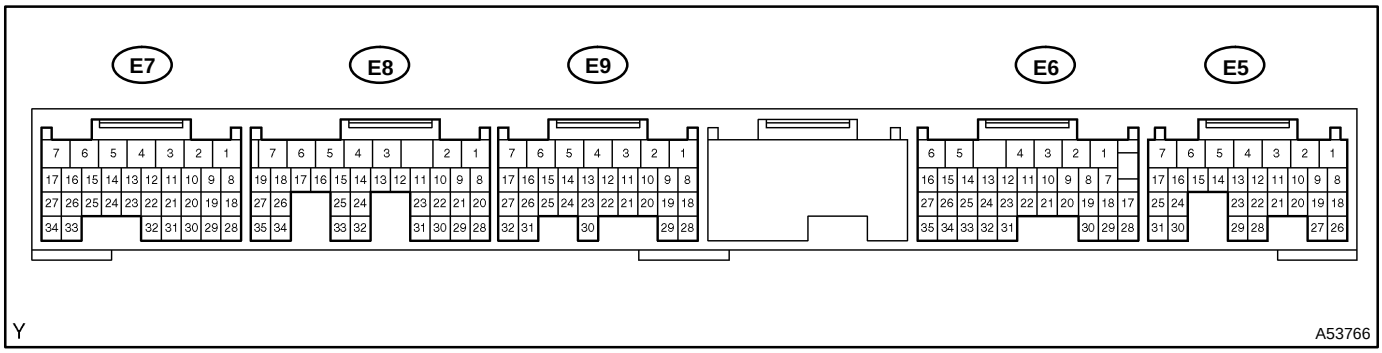
051ZK-13

PROBLEM SYMPTOMS TABLE

Symptom	Suspected Area	See Page
Engine does not crank (does not start)	1. Starter 2. STARTER relay 3. PNP switch	19-12 19-12 40-6
No initial combustion (does not start)	1. ECM power source circuit 2. Fuel pump control circuit 3. ECM	05-312 05-349 01-36
No complete combustion (does not start)	1. Fuel pump control circuit	05-349
Difficult to start (engine cranks normally)	1. Starter signal circuit 2. Fuel pump control circuit 3. Compression	05-235 05-349 14-1
Difficult to start with cold engine	1. Starter signal circuit 2. Fuel pump control circuit	05-235 05-349
Difficult to start with hot engine	1. Starter signal circuit 2. Fuel pump control circuit	05-235 05-349
High engine idle speed (poor idling)	1. A/C signal circuit (Compressor circuit) 2. ECM power source circuit	05-1190 05-312
Low engine idle speed (poor idling)	1. A/C signal circuit (Compressor circuit) 2. Fuel pump control circuit	05-1190 05-349
Rough idling (poor idling)	1. Compression 2. Fuel pump control circuit	14-1 05-349
Hunting (poor idling)	1. ECM power source circuit 2. Fuel pump control circuit	05-312 05-349
Hesitation/Poor acceleration (poor driveability)	1. Fuel pump control circuit 2. A/T faulty	05-349 05-904
Surging (poor driveability)	1. Fuel pump control circuit	05-349
Engine stalls soon after starting	1. Fuel pump control circuit	05-349
Engine stalls during A/C operation	1. A/C signal circuit (Compressor circuit) 2. ECM	05-1190 01-36
Unable to refuel/Difficult to refuel	1. ORVR system	≦

051ZJ-16

TERMINALS OF ECM



HINT:

Each ECM terminal's standard voltage is shown in the table below.

In the table, first follow the information under "Condition". Next look under "Symbols (Terminal No.)" for the terminals to be inspected. The standard voltage between the terminals is shown under "Specific Condition". Use the illustration above as a reference for the ECM terminals.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
BATT (E5-3) - E1 (E9-1)	BR - BR	Battery (for measuring battery voltage and for ECM memory)	Always	9 to 14 V
+BM (E6-6) - E1 (E9-1)	W - BR	Power source of throttle motor	Always	9 to 14 V
IGSW (E5-9) - E1 (E9-1)	P - BR	Ignition switch	Ignition switch ON	9 to 14 V
+B (E5-1) - E1 (E9-1)	W - BR	Power source of ECM	Ignition switch ON	9 to 14 V
+B2 (E5-2) - E1 (E9-1)	W - BR	Power source of ECM	Ignition switch ON	9 to 14 V
OC1+ (E9-16) - OC1- (E9-15)	G-W - G-R	Camshaft timing oil control valve (OCV)	Ignition switch ON	Pulse generation (see page 05-55)
MREL (E5-8) - E1 (E9-1)	B - BR	EFI relay	Ignition switch ON	9 to 14 V
VC (E7-18) - E2 (E7-28)	Y - BR	Power source of sensor (specific voltage)	Ignition switch ON	4.5 to 5.5 V
VG (E7-30) - EVG (E7-29)	R - L-W	Mass air flow meter	Idling, shift lever position P or N position, A/C switch OFF	0.5 to 3.0 V
THA (E7-20) - E2 (E7-28)	L-B - BR	Intake air temperature sensor	Idling, intake air temp. 20°C (68°F)	0.5 to 3.4 V
THW (E7-19) - E2 (E7-28)	G-B - BR	Engine coolant temperature sensor	Idling, engine coolant temp. 80°C (176°F)	0.2 to 1.0 V
VTA1 (E7-21) - E2 (E7-28)	B-W - BR	Throttle position sensor (for engine control)	Ignition switch ON, accelerator pedal released	0.3 to 1.0 V
VTA1 (E7-21) - E2 (E7-28)	B-W - BR	Throttle position sensor (for engine control)	Ignition switch ON, accelerator pedal depressed	3.2 to 4.9 V
VTA2 (E7-31) - E2 (E7-28)	B-R - BR	Throttle position sensor (for sensor malfunction detection)	Ignition switch ON, accelerator pedal released	2.1 to 3.1 V
VTA2 (E7-31) - E2 (E7-28)	B-R - BR	Throttle position sensor (for sensor malfunction detection)	Ignition switch ON, accelerator pedal depressed	4.5 to 5.5 V
VPA (E5-22) - EPA (E5-28)	B - R	Accelerator pedal position sensor (for engine control)	Ignition switch ON, accelerator pedal released	0.5 to 1.1 V
VPA (E5-22) - EPA (E5-28)	B - R	Accelerator pedal position sensor (for engine control)	Ignition switch ON, accelerator pedal depressed	2.6 to 4.5 V
VPA2 (E5-23) - EPA2 (E5-29)	W - BR	Accelerator pedal position sensor (for sensor malfunction detection)	Ignition switch ON, accelerator pedal released	1.2 to 2.0 V

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
VPA2 (E5-23) - EPA2 (E5-29)	W - BR	Accelerator pedal position sensor (for sensor malfunction detection)	Ignition switch ON, accelerator pedal depressed	3.4 to 5.3 V
VCPA (E5-26) - EPA (E5-28)	G - R	Power source of accelerator pedal position sensor (for VPA)	Ignition switch ON	4.5 to 5.5 V
VCP2 (E5-27) - EPA2 (E5-29)	L - BR	Power source of accelerator pedal position sensor (for VPA2)	Ignition switch ON	4.5 to 5.5 V
HA1A (E8-5) - E04 (E8-7)	B-W - W-B	A/F sensor heater	Idling	Below 3.0 V
HA1A (E8-5) - E04 (E8-7)	B-W - W-B	A/F sensor heater	Ignition switch ON	9 to 14 V
A1A+ (E8-23) - E1 (E9-1)	BR - BR	A/F sensor	Ignition switch ON	3.0 to 3.6 V
A1A- (E8-31) - E1 (E9-1)	Y - BR	A/F sensor	Ignition switch ON	2.7 to 3.3 V
HT1B (E8-21) - E1 (E9-1)	R-Y - BR	Heated oxygen sensor heater	Idling	Below 3.0 V
HT1B (E8-21) - E1 (E9-1)	R-Y - BR	Heated oxygen sensor heater	IIgnition switch ON	9 to 14 V
OX1B (E8-29) - O1B (E8-2)	G - BR	Heated oxygen sensor	Maintain engine speed at 2,500 rpm for 2 minutes after warming up	Pulse generation
#1 (E7-1) - E01 (E7-7) #2 (E7-2) - E01 (E7-7) #3 (E7-3) - E01 (E7-7) #4 (E7-4) - E01 (E7-7)	L - W-B Y - W-B B - W-B W - W-B	Injector	IIgnition switch ON	9 to 14 V
#1 (E7-1) - E01 (E7-7) #2 (E7-2) - E01 (E7-7) #3 (E7-3) - E01 (E7-7) #4 (E7-4) - E01 (E7-7)	L - W-B Y - W-B B - W-B W - W-B	Injector	Idling	Pulse generation (see page 05-146)
KNK1 (E8-1) - FKNK1 (E8-28)	B - W	Knock sensor	Maintain engine speed at 4,000 rpm after warming up	Pulse generation (see page 05-161)
G2+ (E9-27) - NE- (E9-24)	Y - G	Camshaft position sensor	Idling	Pulse generation (see page 05-166)
NE+ (E9-25) - NE- (E9-24)	R - G	Crankshaft position sensor	Idling	Pulse generation (see page 05-166)
IGT1 (E7-8) - E1 (E9-1) IGT2 (E7-9) - E1 (E9-1) IGT3 (E7-10) - E1 (E9-1) IGT4 (E7-11) - E1 (E9-1)	R-W - BR P - BR Y-B - BR L-Y - BR	Ignition coil with igniter (ignition signal)	Idling	Pulse generation (see page 05-174)
IGF1 (E7-24) - E1 (E9-1)	W-R - BR	Ignition coil with igniter (ignition confirmation signal)	IIgnition switch ON	4.5 to 5.5 V
IGF1 (E7-24) - E1 (E9-1)	W-R - BR	Ignition coil with igniter (ignition confirmation signal)	Idling	Pulse generation (see page 05-174)
PRG (E7-34) - E1 (E9-1)	G - BR	Purge valve	Ignition switch ON	9 to 14 V
VPMP (E7-27) - E1 (E9-1)	Y-G - BR	Vent valve (Build in pump module)	Ignition switch ON	9 to 14 V
MPMP (E5-4) - E1 (E9-1)	LG - BR	Vacuum pump (Build in pump module)	Vacuum pump OFF	0 to 3 V
MPMP (E5-4) - E1 (E9-1)	LG - BR	Vacuum pump (Build in pump module)	Vacuum pump ON	9 to 14 V
PPMP (E5-21) - E2 (E7-28)	L - BR	Pressure sensor (Build in pump module)	Ignition switch ON	3 to 3.6 V
SPD (E6-17) - E1 (E9-1)	Y - BR	Speed signal from combination meter	Ignition switch ON, rotate driving wheel slowly	Pulse generation (see page 05-216)

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
STA (E7-17) - E1 (E9-1)	B - BR	Starter signal	Shift lever position P or N, ignition switch START	9 to 14 V
STP (E6-19) - E1 (E9-1)	BR - BR	Stop lamp switch	Brake pedal is depressed	7.5 to 14 V
STP (E6-19) - E1 (E9-1)	BR - BR	Stop lamp switch	Brake pedal is released	Below 1.5 V
ST1 (E6-12) - E1 (E9-1)	V - BR	Stop lamp switch	Ignition switch ON, Brake pedal is depressed	Below 1.5 V
ST1 (E6-12) - E1 (E9-1)	V - BR	Stop lamp switch	Ignition switch ON, Brake pedal is released	7.5 to 14 V
NSW (E7-16) - E1 (E9-1)	B-R - BR	PNP switch	Ignition switch ON, shift position at P or N	0 to 3.0 V
NSW (E7-16) - E1 (E9-1)	B-R - BR	PNP switch	Ignition switch ON, shift position is not P or N	9 to 14 V
M+ (E9-3) - ME01 (E9-4)	B - W-B	Throttle actuator	Idling	Pulse generation
M- (E9-2) - ME01 (E9-4)	W - W-B	Throttle actuator	Idling	Pulse generation
FC (E5-10) - E1 (E9-1)	Y - BR	Fuel pump control	Ignition switch ON	9 to 14 V
W (E5-11) - E1 (E9-1)	SB - BR	MIL	Ignition switch ON	Below 3.0 V
W (E5-11) - E1 (E9-1)	SB - BR	MIL	Idling	9 to 14 V
ELS2 (E5-12) - E1 (E9-1)	G - BR	Electric load	Power outlet OFF	0 to 1.5 V
ELS2 (E5-12) - E1 (E9-1)	G - BR	Electric load	Power outlet ON	7.5 to 14 V
TC (E5-20) - E1 (E9-1)	O - BR	Terminal TC of DLC3	Ignition switch ON	9 to 14 V
SIL (E5-18) - E1 (E9-1)	R - BR	Terminal SIL of DLC3	During charge of gears	Pulse generation
TACH (E5-5) - E1 (E9-1)	B - BR	Engine speed	Idling	Pulse generation
PSW (E9-10) - E1 (E9-1)	R-L - BR	PS oil pressure switch	Ignition switch ON	9 to 14 V

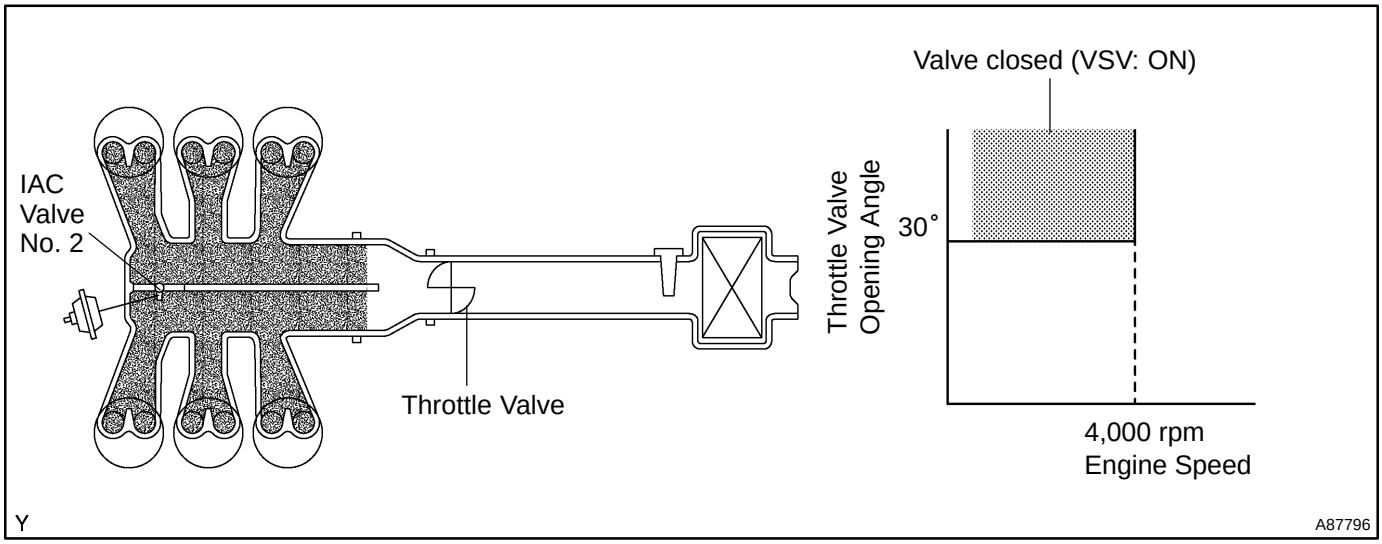
ACIS CONTROL CIRCUIT

CIRCUIT DESCRIPTION

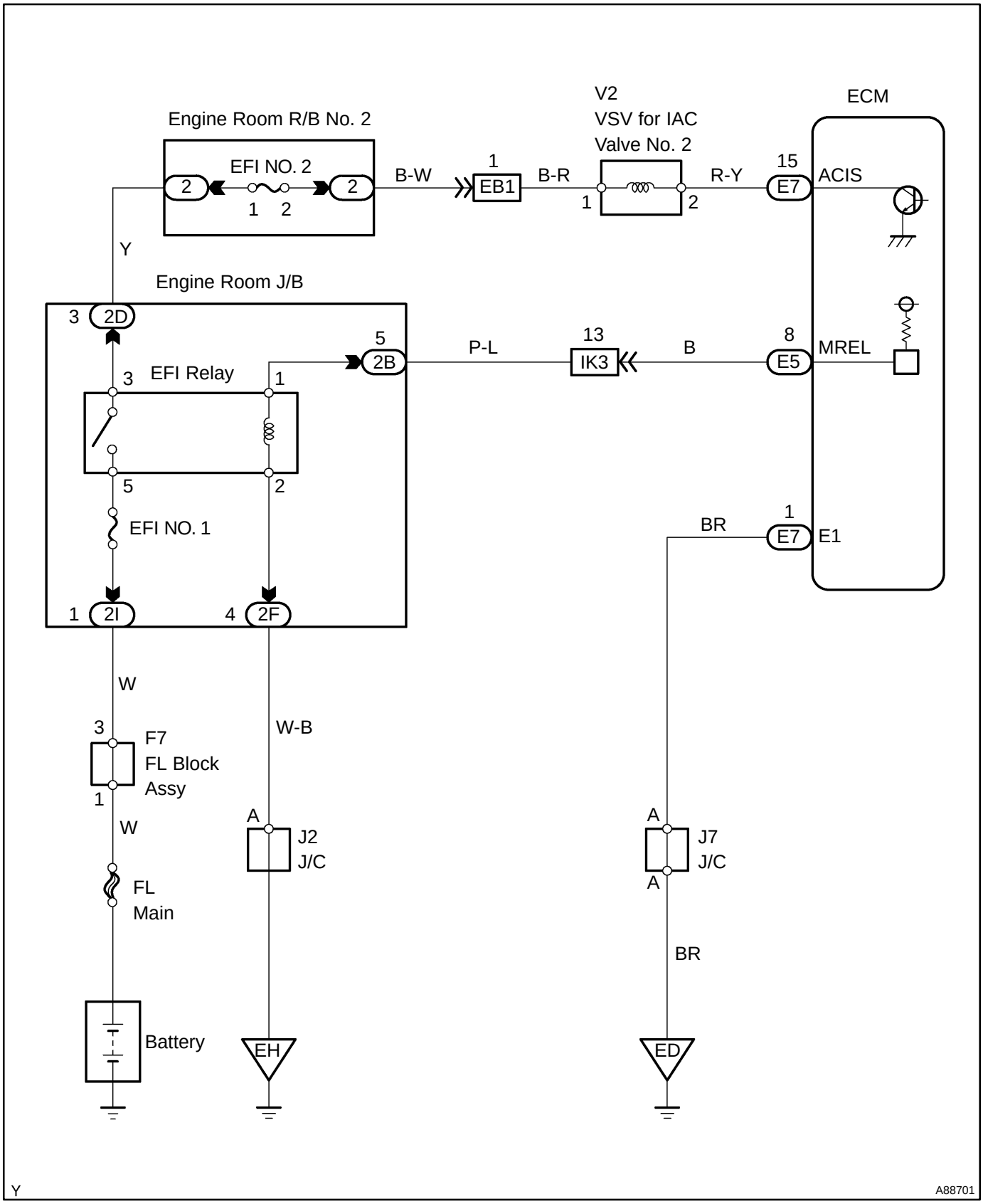
The ECM opens and closes the Intake Air Control (IAC) valve No. 2 in response to engine speed (RPM/NE). This system improves intake manifold tuning for better efficiency at low and high engine rpm. When the engine speed is 4,000 rpm or less and the throttle valve opening angle is 30◯or more, the ECM turns the VSV ON to operate the IAC valve.

HINT:

ACIS stands for ”Acoustic Control Induction System”.



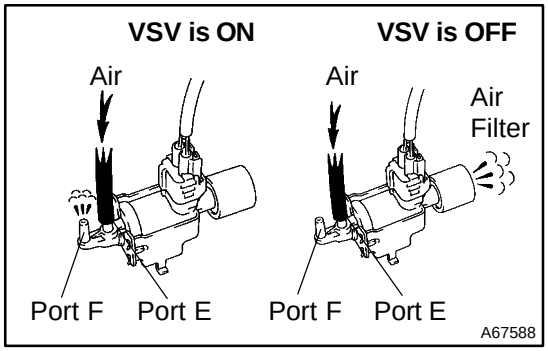
WIRING DIAGRAM



INSPECTION PROCEDURE

Hand-held tester:

1	PERFORM ACTIVE TEST USING HAND-HELD TESTER (OPERATE VSV FOR IAC VALVE NO. 2)



(a) Disconnect the vacuum hose.
(b) Connect the hand-held tester to the DLC3.
(c) Turn the ignition switch ON and push the hand-held tester main switch ON.
(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / INTAKE CTL VSV1. Operate the VSV.
(e) Check the VSV operation when it is operated by the hand-held tester.

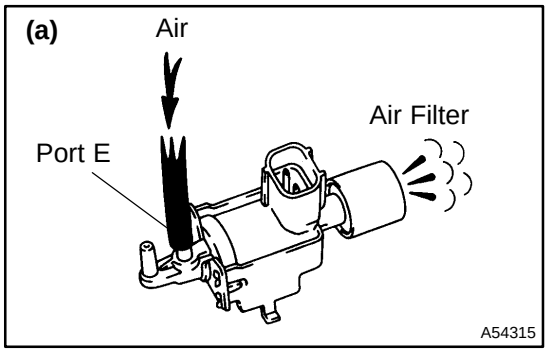
OK:

Tester Operation	Specified Condition
VSV is ON	Air from port E flows out through port F
VSV is OFF	Air from port E flows out through the air filter

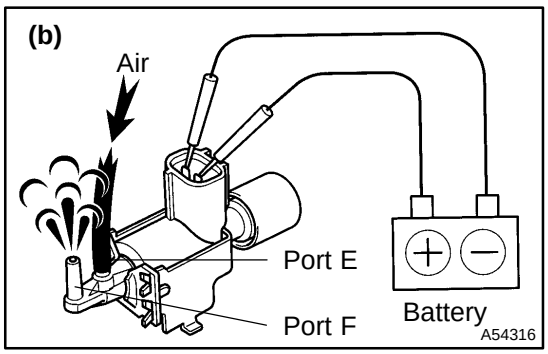
OK → **Go to step 4**

NG

2	CHECK VSV FOR IAC VALVE NO.2 (OPERATION)



(a) Check that air flows from port E to the air filter.

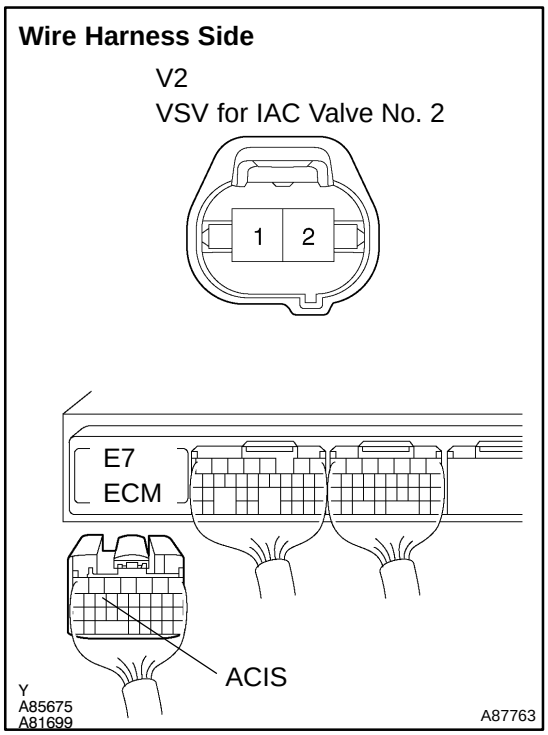


(b) Apply battery positive voltage across the terminals.
(c) Check that air flows from port E to port F.

NG → **REPLACE VSV**

OK

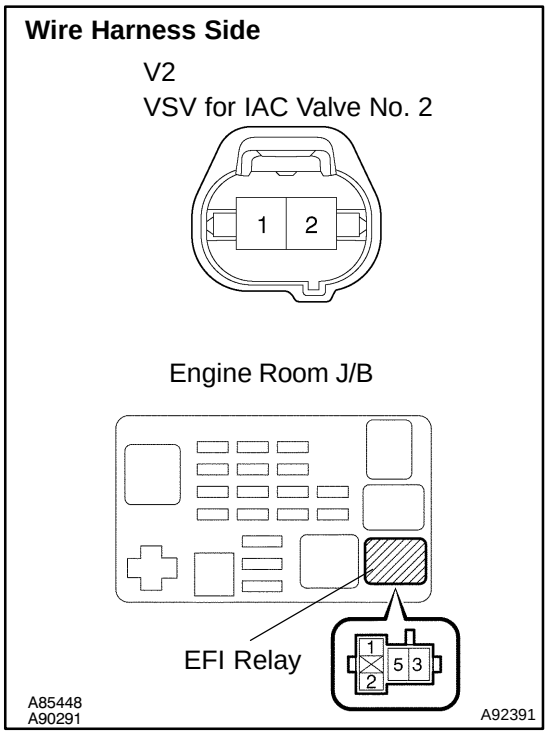
3	CHECK WIRE HARNESS (VSV FOR IAC VALVE NO. 2 - ECM, VSF FOR IAC VALVE NO. 2 - EFI RELAY)



(a) Check the wire harness between the VSV and ECM.
(1) Disconnect the V2 VSV connector.
(2) Disconnect the E7 ECM connector.
(3) Check the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
V2-2 - E7-15 (ACIS)	Below 1 Ω
V2-2 or E7-15 (ACIS) - Body ground	10 kΩ or higher



(b) Check the wire harness between the VSV and EFI relay.
(1) Disconnect the V2 VSV connector.
(2) Remove the EFI relay from the engine room J/B.
(3) Check the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
V2-1 - J/B EFI relay terminal 3	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

4	CHECK VACUUM HOSES (INTAKE MANIFOLD - INTAKE AIR CONTROL VALVE, INTAKE AIR CONTROL)

(a) Check that the vacuum hoses are:
- ∗ Connected correctly.
- ∗ Are not loose or disconnected.
- ∗ Do not have cracks, holes or damage.

NG → REPAIR OR REPLACE VACUUM HOSES

OK

5	INSPECT INTAKE AIR CONTROL VALVE (See page 13-2)

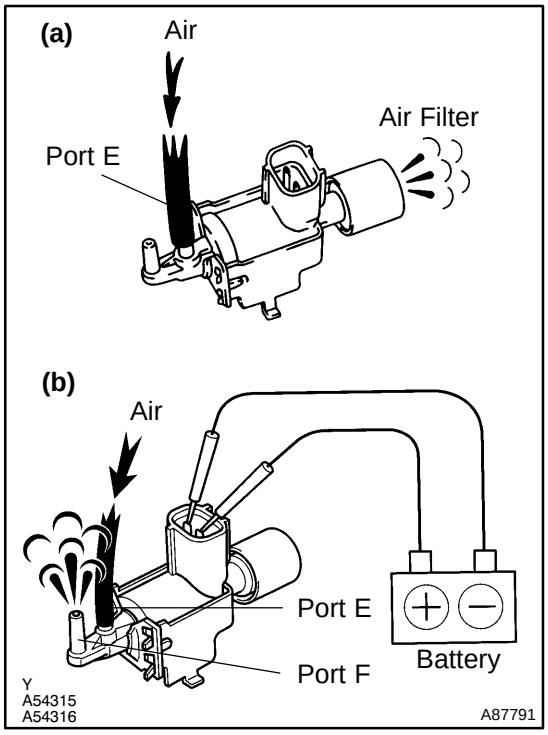
NG → REPLACE INTAKE AIR CONTROL VALVE

OK

REPLACE ECM (See page 10-24)

OBD II scan tool (excluding hand-held tester):

1	INSPECT VSV FOR IAC VALVE NO.2 (OPERATION)

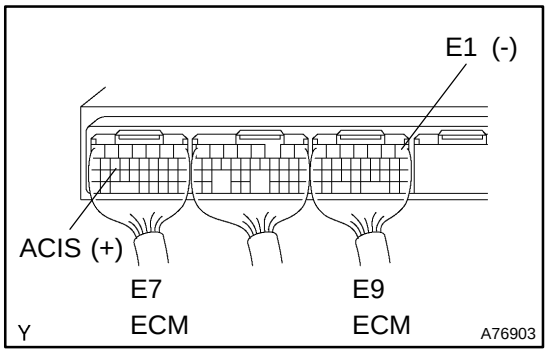


(a) Disconnect the VSV connector.
(b) Check operation of the VSV when battery positive voltage is applied to the terminals of the VSV.
OK:
Battery positive voltage is not applied:
Air from port E flows out through the air filter.
Battery positive voltage is applied:
Air from port E flows out through port F.

NG → REPLACE VSV

OK

2	CHECK ECM (ACIS VOLTAGE)



(a) Start the engine.
(b) Check the voltage of the ECM connectors.

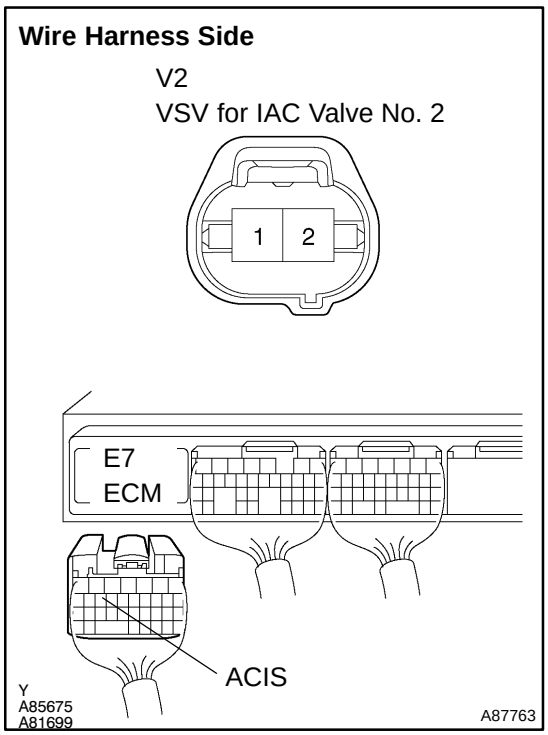
Standard

Tester Connection	Condition	Specified Condition
E7-15 (ACIS) - E9-1 (E1)	・Engine speed is 4,000 rpm or less ・Throttle valve opening angle is 30° or more	9 to 14 V

OK → **Go to step 4**

NG

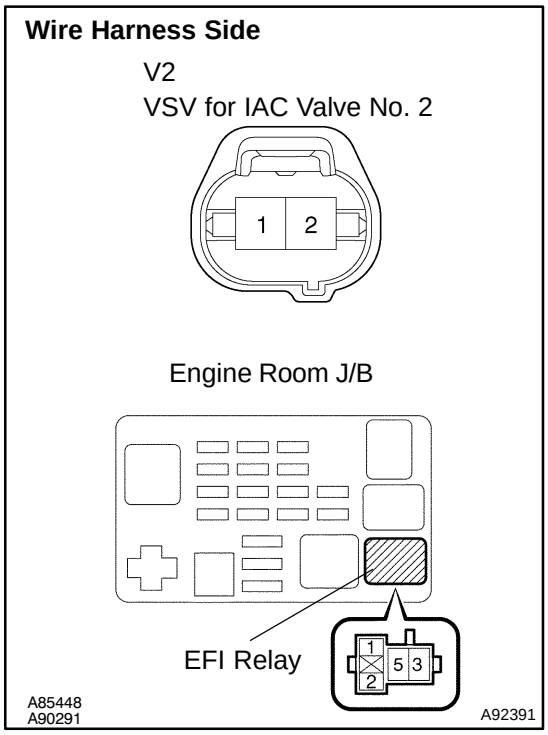
3	CHECK WIRE HARNESS (VSV FOR IAC VALVE NO. 2 - ECM, VSV FOR IAC VALVE NO.2 - EFI RELAY)



(a) Check the wire harness between the VSV and ECM.
(1) Disconnect the V2 VSV connector.
(2) Disconnect the E7 ECM connector.
(3) Check the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
V2-2 - E7-15 (ACIS)	Below 1 Ω
V2-2 or E7-15 (ACIS) - Body ground	10 kΩ or higher



(b) Check the wire harness between the VSV and EFI relay.
(1) Disconnect the V2 VSV connector.
(2) Remove the EFI relay from the engine room J/B.
(3) Check the resistance OF the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
V2-1 (VSV for ACIS) - J/B EFI relay terminal 3	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

4	CHECK VACUUM HOSES (INTAKE MANIFOLD - INTAKE AIR CONTROL VALVE, INTAKE AIR CONTROL)

(a) Check that the vacuum hoses are:
- Connected correctly.
- Are not loose or disconnected.
- Do not have cracks, holes or damage.

NG → REPAIR OR REPLACE VACUUM HOSE

OK

5	INSPECT INTAKE AIR CONTROL VALVE (See page 13-2)

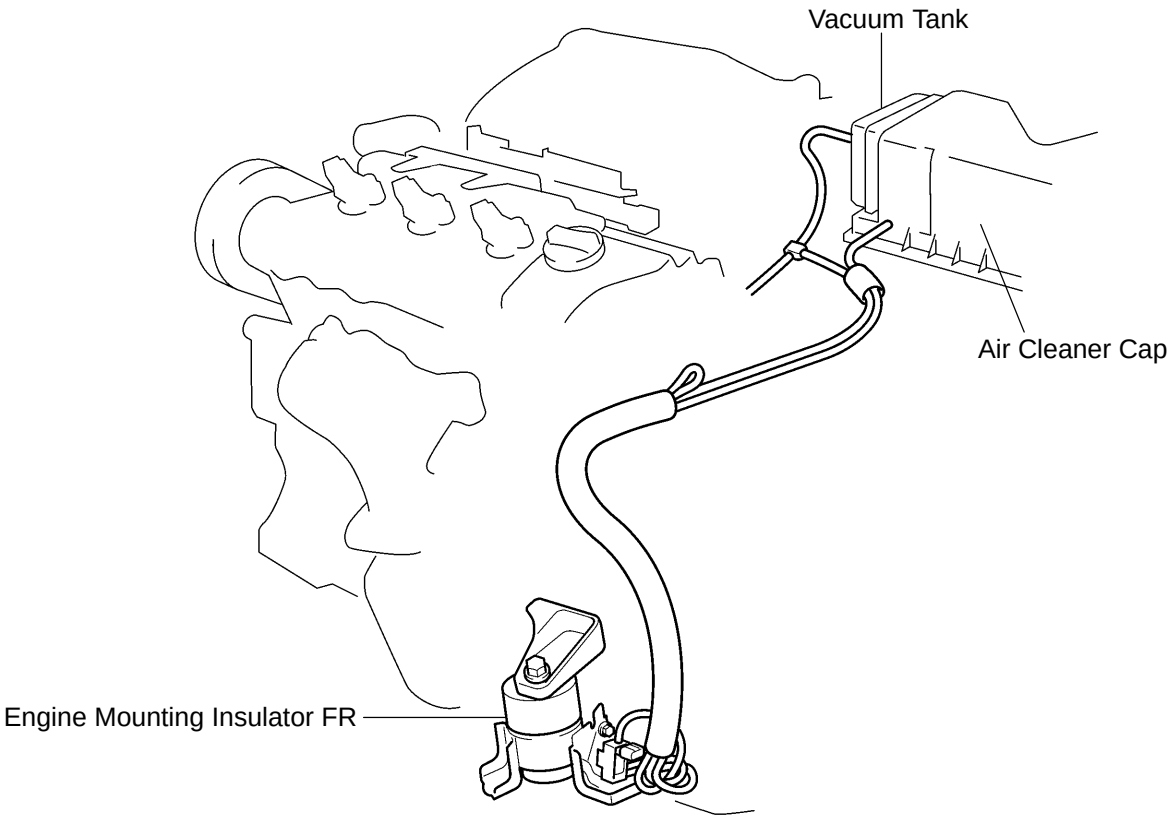
NG → REPLACE INTAKE AIR CONTROL VALVE

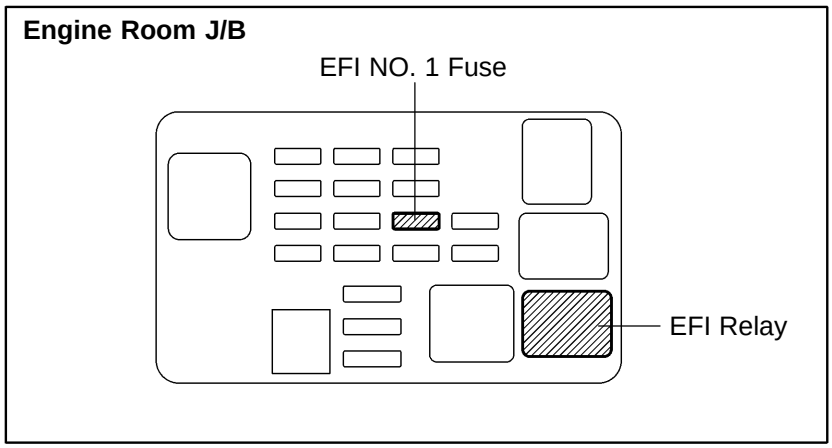
OK

REPLACE ECM (See page 10-24)

ACTIVE CONTROL ENGINE MOUNT

LOCATION





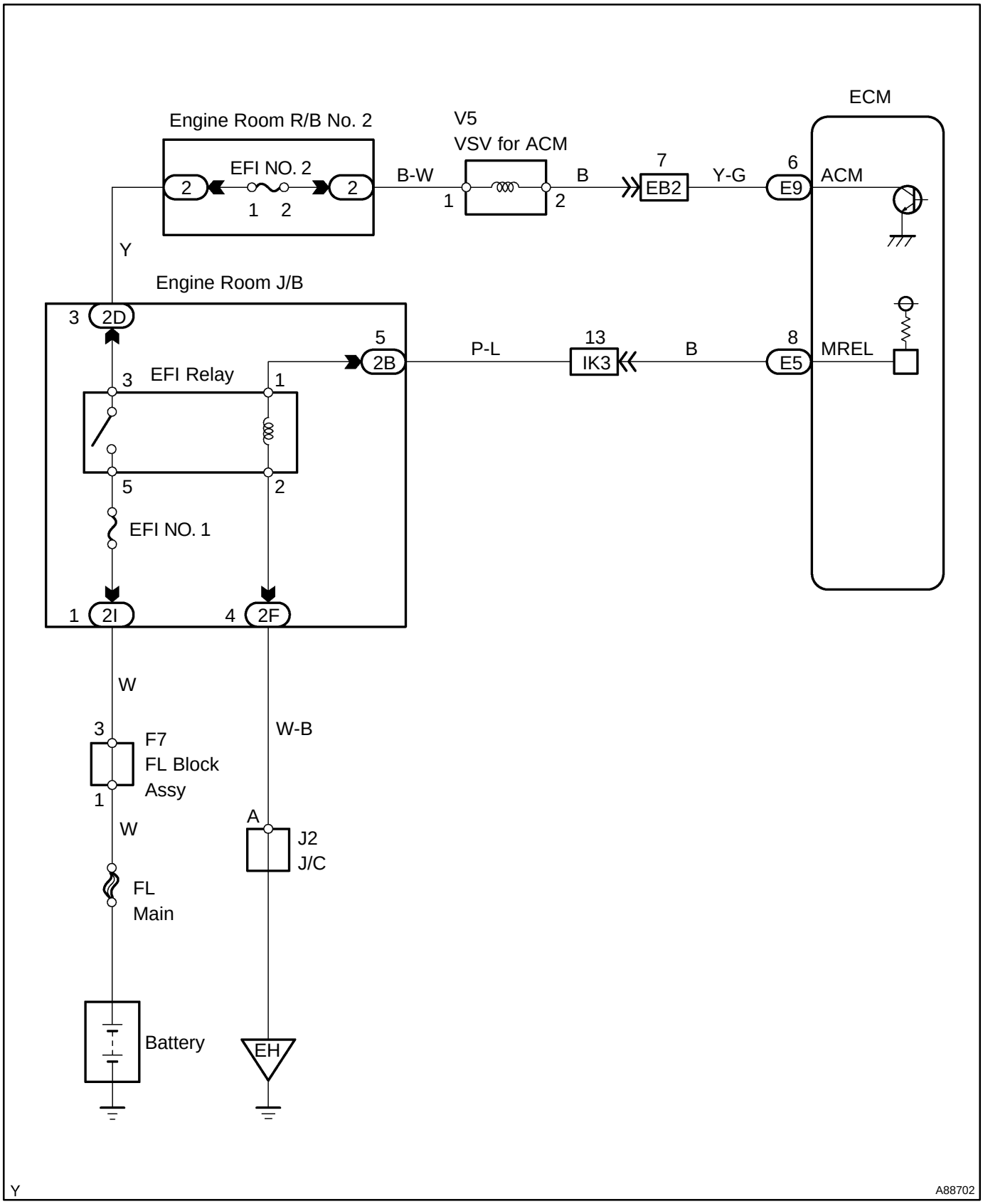
O

A87847

CIRCUIT DESCRIPTION

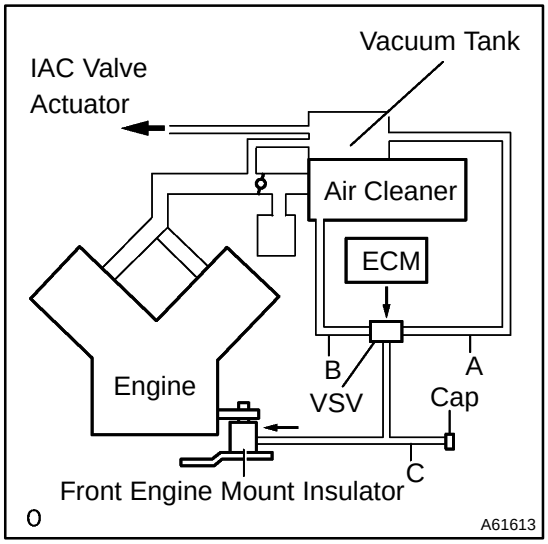
The Active Control Engine Mount (ACM) system decreases engine vibration at low engine speed using the VSV for ACM. The VSV is controlled by a pulse signal transmitted to the VSV from the ECM. The frequency of this pulse signal is matched to the engine speed to decrease engine vibration.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK VACUUM HOSES

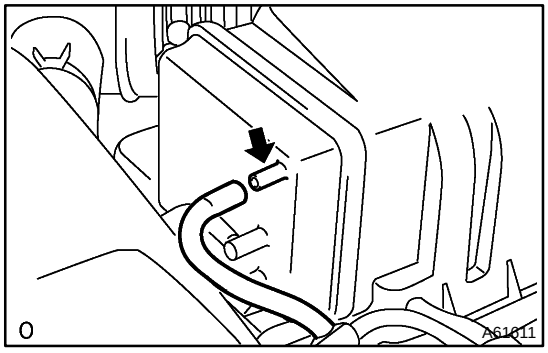


(a) Check if the vacuum hose cap is missing.
(b) If the hose is damaged, replace the vacuum hose assembly.
(c) Check the air and vacuum hoses for looseness, disconnection and blockage.

NG → **REPAIR OR REPLACE VACUUM HOSES**

OK

2	CHECK VACUUM

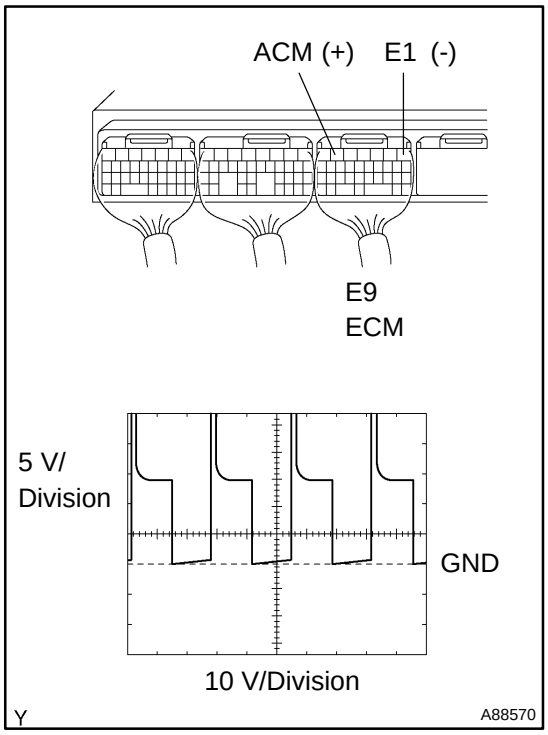


(a) Start the engine.
(b) Disconnect the vacuum hose from the vacuum tank.
(c) Check that the unconnected port located on the vacuum tank applies suction to your finger.
(d) Reconnect the vacuum hose.

NG → **CHECK AND REPLACE VACUUM SOURCE AND HOSES**

OK

3 INSPECT ECM (ACM VOLTAGE)



(a) Connect the oscilloscope between terminals ACM and E1 of the E9 ECM connector.
(b) Warm up engine to normal operating temperature.
(c) Turn the A/C switch on.
(d) Measure the voltage between terminals ACM and E1 of the E9 ECM connector.

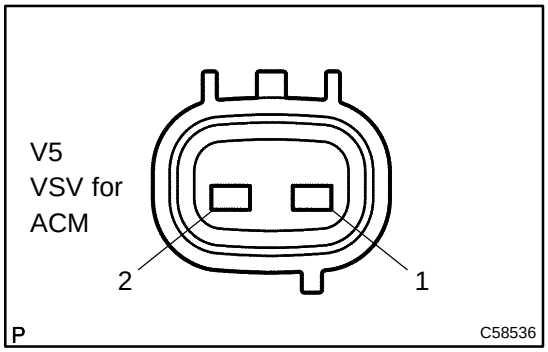
Result:

Condition	Voltage
Shift position is D range, and engine speed is 850 rpm or less	Pulse generation
Shift position is D range, and engine speed is 950 rpm or more	9 to 14 V
Shift position is P range	9 to 14 V

OK → **Go to step 6**

NG

4 INSPECT VSV FOR ACM (RESISTANCE)

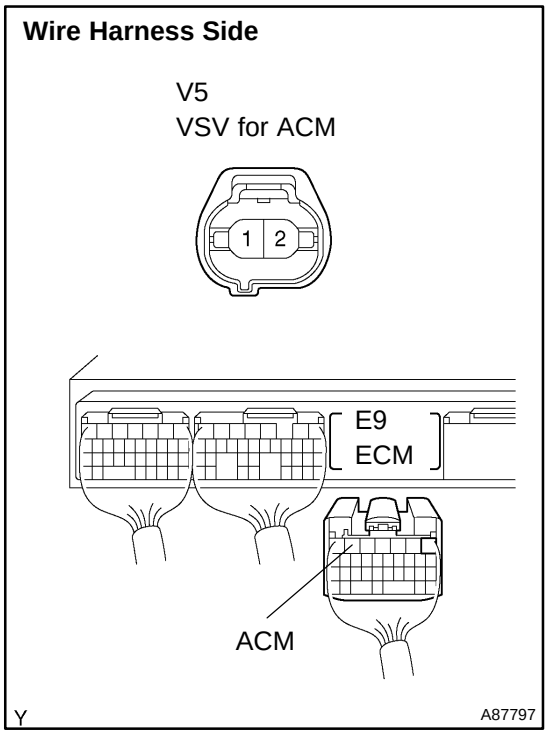


(a) Disconnect the V5 VSV connector.
(b) Measure the resistance between the terminals 1 and 2.
Standard: 19 to 21 Ω at 20°C (68°F)

NG → **REPLACE VSV**

OK

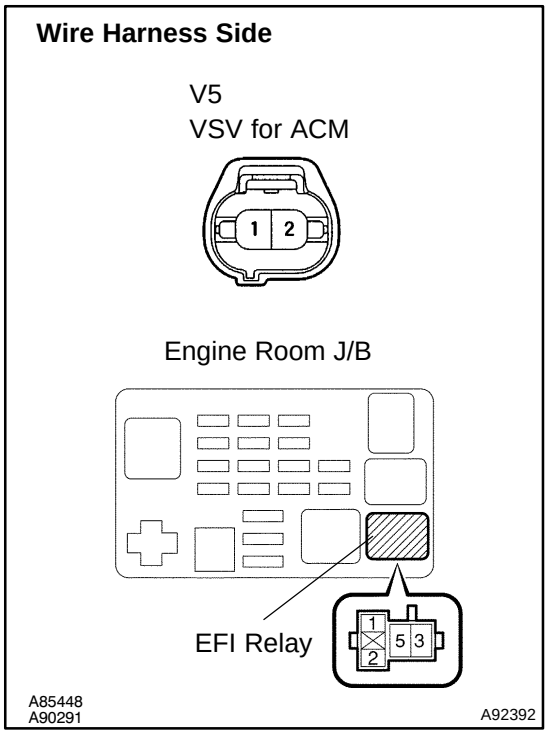
5 CHECK WIRE HARNESS (VSV FOR ACM - ECM, VSV FOR ACM - EFI RELAY)



(a) Check the wire harness between the VSV and ECM.
(1) Disconnect the V5 VSV connector for ACM.
(2) Disconnect the E9 ECM connector.
(3) Check the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
V5-2 - E9-6 (ACM)	Below 1 Ω
V5-2 or E9-6 (ACM) - Body ground	10 kΩ or higher



(b) Check the wire harness between the VSV and EFI relay.
(1) Disconnect the V5 VSV connector.
(2) Remove the EFI relay from the engine room J/B.
(3) Check the resistance of the wire harness side connectors.

Standard:

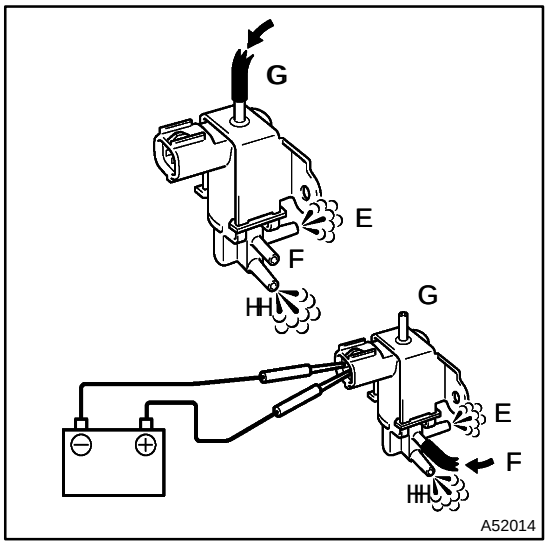
Tester Connection	Specified Condition
V5-1 (VSV for ACM) - J/B EFI relay terminal 3	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE ECM (See page 10-24)

6	INSPECT VSV FOR ACM (OPERATION)



(a) Remove the VSV.
(b) Check operation of the VSV when battery positive voltage is applied to the terminals of the VSV connector.

OK:

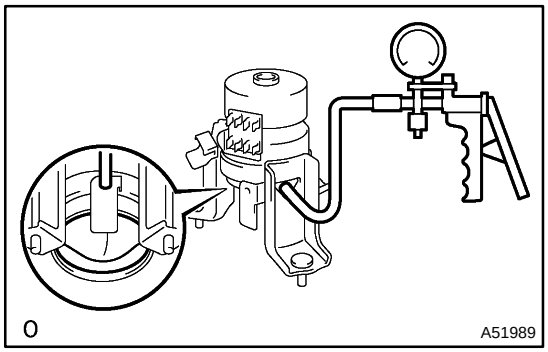
Battery positive voltage is not applied:
The air from pipe G is flowing out through pipes E and H.

Battery positive voltage is applied:
The air from pipe F is flowing out through pipes E and H.

NG → **REPLACE VSV FOR ACM**

OK

7	INSPECT TRANSVERSE ENGINE ENGINE MOUNTING INSULATOR



(a) Disconnect the vacuum hose from the front engine mount insulator.
(b) Using MITYVAC (hand-held vacuum pump), apply a vacuum of 80 kPa (600 mmHg, 25 in.Hg) and wait for 1 minute.
(c) Make sure there is no needle movement on the MITYVAC.
(d) Check that there is no fluid leakage caused by a broken lower diaphragm.

NG → **REPLACE TRANSVERSE ENGINE ENGINE MOUNTING INSULATOR**

OK

SYSTEM OK

05EX3-05

BASIC INSPECTION

When the malfunction is not confirmed in the DTC check, troubleshooting should be carried out in all the possible circuits considered as possible causes of the problem. In many cases, by carrying out the basic engine check shown in the following flowchart, the problem can be found quickly and efficiently. Therefore, using this check is essential in the engine troubleshooting.

1	CHECK BATTERY VOLTAGE

NOTICE:
Carry out the battery voltage check with the engine stopped and ignition switch OFF.

	OK	NG
Voltage	11 V or more	Less than 11 V

NG → **CHARGE OR REPLACE BATTERY**

OK

2	CHECK IF ENGINE WILL CRANK

NG → **PROCEED TO PROBLEM SYMPTOMS TABLE ON PAGE 05-393**

OK

3	CHECK IF ENGINE STARTS

NG → **Go to step 6**

OK

4	CHECK AIR FILTER

Visually check if the air filter is not contaminated dirty or oily.

NG → **CLEAN OR REPLACE**

OK

5	CHECK IDLE SPEED (See page 14-121)

NG → **PROCEED TO PROBLEM SYMPTOMS TABLE ON PAGE 05-393**

OK

6	CHECK FUEL PRESSURE (See page 11-38)

NG → **PROCEED TO PAGE 05-393 AND CONTINUE TO TROUBLESHOOT**

OK

7	CHECK FOR SPARK (See page 18-7)

NG → PROCEED TO PAGE 05-393 AND CONTINUE TO TROUBLESHOOT

OK

PROCEED TO PROBLEM SYMPTOMS TABLE ON PAGE 05-393

05MOM-01

CHECKING MONITOR STATUS

NOTICE:

The monitor status (mode 6) is not applicable to the heated oxygen sensor (HO2S). However, HO2S test values can be checked by O2S TEST RESULT (mode 5). Refer to page 05-383

1. Outline

The monitor results and the test values can be checked with the OBDII scan tool.

The engine control module (ECM) monitors the emissions-related components as the thermostat, catalyst converter and evaporative emissions (EVAP), and determines whether they are functioning normally or not. When finished monitoring, the ECM stores the monitor results and the test values.

The monitor result indicates whether the component is functioning normally or not. The test value is the value that was used to determine the monitor result. If the test value is outside the test limit (malfunction criterion), the ECM determines the component is malfunctioning. Some emissions-related components have multiple test values to determine monitor result. If one of these test values is outside test limit, the ECM determines the component is malfunctioning.

2. Description

The test value and test limit information are described as shown in the following table. This information is included under ”MONITOR RESULT” in the emissions-related DTC sections:

TID $08: Thermostat

TLT	CID	Unit Conversion	Description of Test Value	Description of Test Limit
1	$01	Multiply by 0.625 and subtract 40 [℃]	ECT sensor output when estimated ECT has reached to malfunction criterion	Malfunction criterion for thermostat

- TID (Test Identification Data) is assigned to each emissions-related component.
- TLT (Test Limit Type):
  If TLT is 0, the component is malfunctioning when the test value is higher than the test limit.
  If TLT is 1, the component is malfunctioning when the test value is lower than the test limit.
- CID (Component Identification Data) is assigned to each test value.
- Unit Conversion is used to calculate the test value indicated on generic OBDII scan tools.

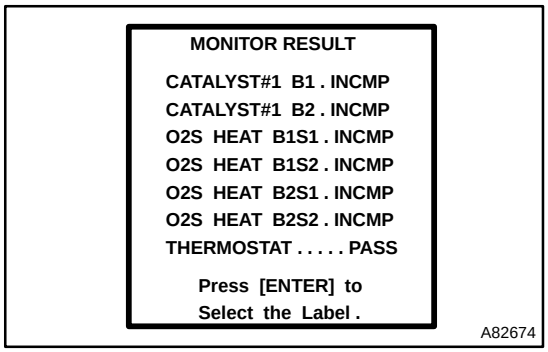
3. Procedure (using hand-held tester)

(a) Connect the hand-held tester to the DLC3.

(b) Turn the ignition switch and hand-held tester ON.

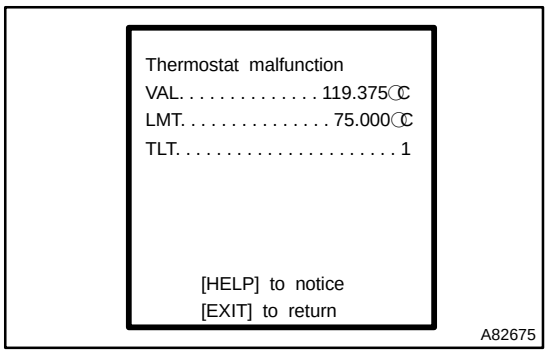
(c) Clear DTCs.

(d) Allow the vehicle to drive, in accordance with the applicable drive pattern described in the READINESS MONITOR DRIVE PATTERN section (see page 05-387).



(e) Select the hand-held tester menus: DIAGNOSIS, ENHANCED OBDII, MONITOR INFO and MONITOR RESULT. The monitor result appears after the component name.

- INCMP indicates the component has not been monitored yet.
- PASS indicates the component is functioning normally.
- FAIL indicates the component is malfunctioning.



(f) Select the component and press ENTER. If the monitor result has been PASS or FAIL, the accuracy test value appears.

- VAL indicates the test value.
- LMT indicates the test limit (malfunction criterion).
- TLT indicates the test limit type.

(g) Compare the test value with the test limit.

- If TLT is 0, the component is malfunctioning when the test value is higher than the test limit.
- If TLT is 1, the component is malfunctioning when the test value is lower than the test limit.
- If the test value is on the borderline of the test limit, a malfunction is concealed in the component.

HINT:

The monitor result might on rare occasions be PASS even if the malfunction indicator lamp (MIL) is illuminated. This indicates the system malfunctioned on a previous driving cycle. This might be caused by an intermittent problem.

05EX2-05

CHECK FOR INTERMITTENT PROBLEMS

HINT:

Hand-held tester only:

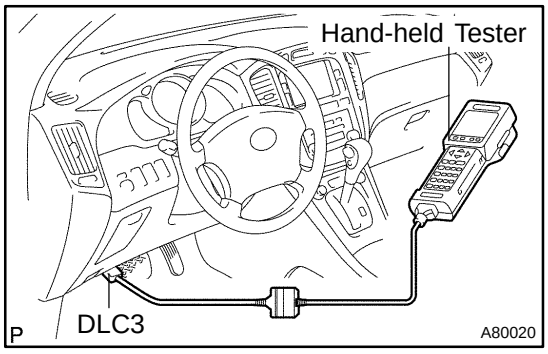
Inspect the vehicle's ECM using check mode. Intermittent problems are easier to detect when the ECM is in check mode with hand-held tester. In check mode, the ECM uses 1 trip detection logic, which has a higher sensitivity to malfunctions than normal mode (default), which uses 2 trip detection logic.

(a) Clear the DTCs (see page 05-400).
(b) Set the check mode (see page 05-402).
(c) Perform a simulation test (see page 01-26).
(d) Check the connector and terminal (see page 01-36).
(e) Wiggle the harness and the connector (see page 01-36).

05IQI-02

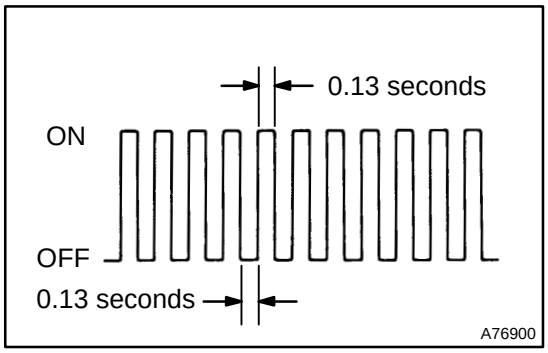
CHECK MODE PROCEDURE

HINT:
Hand-held tester only:
Check mode has a higher sensitivity to detect malfunctions and can detect malfunctions that normal mode cannot detect.
Check mode can also detect all the malfunctions that normal mode can detect.



1. CHECK MODE PROCEDURE

(a) Make sure that the items below are true:
  (1) Battery positive voltage 11 V or more
  (2) Throttle valve fully closed
  (3) Transmission in the P or N position
  (4) A/C switched OFF
(b) Turn the ignition switch OFF.
(c) Connect the hand-held tester to the DLC3.
(d) Turn the ignition switch ON.



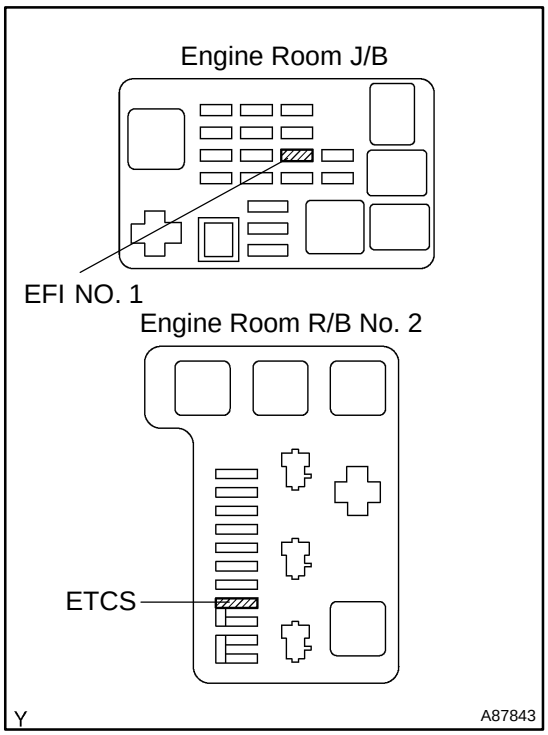
(e) Change the ECM to check mode with the hand-held tester. Enter the following menus: DIAGNOSIS / ENHANCED OBD II / CHECK MODE. Make sure the MIL flashes as shown in the illustration.

NOTICE:
All DTCs and freeze frame data recorded will be erased if: 1) the hand-held tester is used to change the ECM from normal mode to check mode or vice-versa; or 2) during check mode, the ignition switch is turned from ON to ACC or OFF.

(f) Start the engine. The MIL should turn off after the engine starts.
(g) Simulate the conditions of the malfunction described by the customer.
(h) After simulating the malfunction conditions, use the hand-held tester diagnosis selector to check the DTC, freeze frame data and other data.
(i) After checking the DTC, inspect the applicable circuit.

2. CLEAR DTC (Using the OBD II scan tool or hand-held tester)

(a) Connect the OBD II scan tool or the hand-held tester to the DLC3.
(b) Turn the ignition switch ON.
(c) Erase DTCs and freeze frame data with the OBD II scan tool (complying with SAE J1978) or the hand-held tester. For the hand-held tester: 1) enter the following menus: DIAGNOSIS ENHANCED OBD II / DTC INFO / CLEAR CODES; and 2) press YES. For the OBD II scan tool, see its instruction manual.



3. CLEAR DTC (Not using the OBD II scan tool or hand-held tester)

(a) Remove the EFI NO. 1 fuse from the engine room J/B and ETCS fuse from the engine room R/B No. 2 for more than 60 seconds.or, disconnect the battery cable for more than 60 seconds.

After disconnecting the battery terminal, perform the ”INITIALIZE” procedure (see page 05-1005).

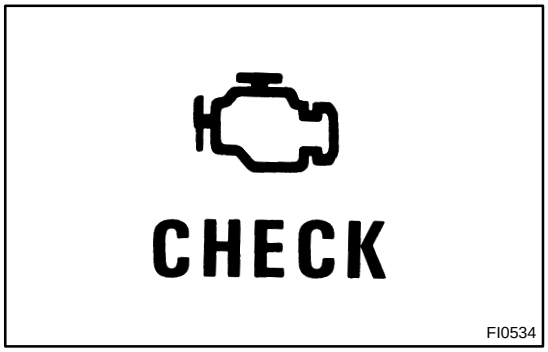
SFI SYSTEM (3MZ-FE)

05EX0-05

DEFINITION OF TERMS

Term	Definition
Monitor description	Description of what the ECM monitors and how it detects malfunctions (monitoring purpose and its details).
Related DTCs	A group of diagnostic trouble codes that are output by the ECM based on the same malfunction detection logic.
Typical enabling condition	Preconditions that allow the ECM to detect malfunctions. With all preconditions satisfied, the ECM sets the DTC when the monitored value(s) exceeds the malfunction threshold(s).
Sequence of operation	The priority order that is applied to monitoring, if multiple sensors and components are used to detect the malfunction. When a sensor is being monitored, the next sensor or component will not be monitored until the current sensor monitoring is finished.
Required sensor/components	The sensors and components that are used by the ECM to detect malfunctions.
Frequency of operation	The number of times that the ECM checks for malfunctions per driving cycle. ”Once per driving cycle” means that the ECM detects the malfunction only one time during a single driving cycle. ”Continuous” means that the ECM detects the malfunction every time an enabling condition is met.
Duration	The minimum time that the ECM must sense a continuous deviation in the monitored value(s) before setting a DTC. This timing begins after the ”typical enabling conditions” are met.
Malfunction thresholds	Beyond this value, the ECM will conclude that there is a malfunction and set a DTC.
MIL operation	MIL illumination timing after a defect is detected. ”Immediately” means that the ECM illuminates the MIL the instant the ECM determines that there is a malfunction. ”2 driving cycle” means that the ECM illuminates the MIL if the same malfunction is detected again in the 2nd driving cycle.

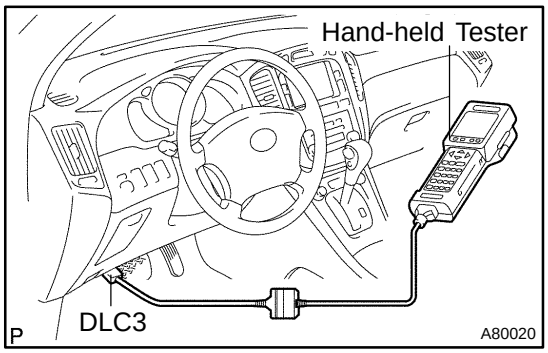
DIAGNOSIS SYSTEM



1. DESCRIPTION

* When troubleshooting On-Board Diagnostic (OBD II) vehicles, the vehicle must be connected to the OBD II scan tool (in compliance with SAE J1978) or the hand-held tester. Various data output from the vehicle's ECM can then be read.
* OBD II regulations require that the vehicle's on-board computer illuminates the Malfunction Indicator Lamp (MIL) on the instrument panel when the computer detects a malfunction in: 1) the emission control system / components, or 2) the powertrain control components (which affect vehicle emissions), or 3) the computer. In addition, the applicable Diagnostic Trouble Codes (DTCs) prescribed by SAE J2012 are recorded in the ECM memory (see page 05-412).

If the malfunction does not reoccur in 3 consecutive trips, the MIL goes off automatically but the DTCs remain recorded in the ECM memory.



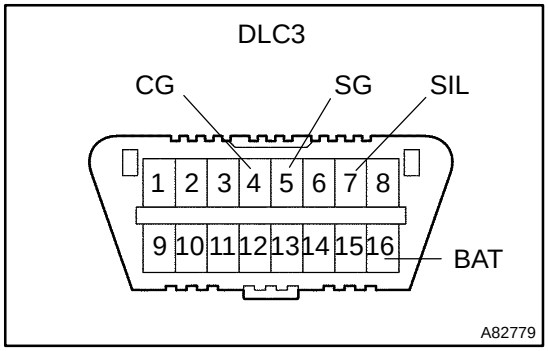
* To check DTCs, connect the hand-held tester or OBD II scan tool to the Data Link Connector 3 (DLC3) of the vehicle. The hand-held tester or OBD II scan tool also enables you to erase the DTC and check the freeze frame data and various forms of engine data (see the instruction manual for the OBD II scan tool or the hand-held tester). The DTC includes SAE controlled codes and manufacturer controlled codes. SAE controlled codes must be set according to the SAE, while manufacturer controlled codes can be set by a manufacturer with certain restrictions (see the DTC chart on page 05-412).
* The diagnosis system operates in "normal mode" during normal vehicle use. In "normal mode", 2 trip detection logic* is used to ensure accurate detection of malfunctions. A "check mode", is also available to technicians as an option. In "check mode", 1 trip detection logic is used for simulating malfunction symptoms and increasing the system's ability to detect malfunctions, including intermittent malfunctions (hand-held tester only)
(see page 05-402).

* *2 trip detection logic:
When a malfunction is first detected, the malfunction is temporarily stored in the ECM memory (1st trip). If the ignition switch is turned OFF and then ON again, and the same malfunction is detected again, the MIL will illuminate (2nd trip).
* Freeze frame data:
The freeze frame data records the engine conditions (fuel system, calculated load, engine coolant temperature, fuel trim, engine speed, vehicle speed, etc.) when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

Priorities for troubleshooting:

When multiple DTCs occur, find out the order in which the DTCs should be inspected by checking the component's DTC chart. If no instructions are written in the DTC chart, check DTCs in the following order of priority:

(a) DTCs other than fuel trim malfunction DTCs (P0171, P0172, P0174 and P0175) and misfire DTCs (P0300 to P0306).
(b) Fuel trim malfunction DTCs (P0171, P0172, P0174 and P0175).
(c) Misfire DTCs (P0300 to P0306).



2. CHECK DLC3

The vehicle's ECM uses the ISO 9141-2 for communication protocol. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 9141-2 format.

Symbol	Terminal No.	Name	Reference terminal	Result	Condition
SIL	7	Bus "+" line	5 - Signal ground	Pulse generation	During transmission
CG	4	Chassis ground	Body ground	1 Ω or less	Always
SG	5	Signal ground	Body ground	1 Ω or less	Always
BAT	16	Battery positive	Body ground	9 to 14 V	Always

HINT:

Connect the cable of the OBD II scan tool or the hand-held tester to the DLC3, turn the ignition switch ON and attempt to use the hand-held tester or the OBD II scan tool. If the screen displays UNABLE TO CONNECT TO VEHICLE, a problem exists in the vehicle side or the tester side.

- If the communication is normal when the tool is connected to another vehicle, inspect the DLC3 on the original vehicle.
- If the communication is still impossible when the tool is connected to another vehicle, the problem is probably in the tool itself. Consult the Service Department listed in the tool's instruction manual.

3. CHECK BATTERY VOLTAGE

Standard: 11 to 14 V

If voltage is below 11 V, recharge the battery before proceeding.

4. CHECK MIL

(a) The MIL turns on when the ignition switch is turned ON and the engine is not running.

HINT:

If the MIL does not turn on, troubleshoot the MIL circuit (see page 05-727).

(b) When the engine is started, the MIL should not turn off. If the lamp remains on, the diagnosis system has detected a malfunction or abnormality in the system.

05EXA-04

DATA LIST/ACTIVE TEST

1. DATA LIST

HINT:

Using the hand-held tester DATA LIST allows switch, sensor, actuator and other item values to be read without removing any parts. Reading the DATA LIST early in troubleshooting is one way to shorten labor time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

(a) Warm up the engine.
(b) Turn the ignition switch OFF.
(c) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(d) Turn the ignition switch ON.
(e) Turn ON the hand-held tester.
(f) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST.
(g) According to the display on tester, read the "DATA LIST".

Hand-held Tester Display	Measurement Item/Range (Display)	Normal Condition *	Diagnostic Note
INJECTOR	Injection period of the No. 1 cylinder/ Minimum: 0 ms, Maximum: 32.64 ms	Idling: 1.5 to 2.8 ms	—
IGN ADVANCE	Ignition timing advance for No. 1 cylinder/ Minimum: -64 deg., Maximum: 63.5 deg.	Idling: BTDC 5 to 25°	—
CALC LOAD	Calculated load by ECM/ Minimum: 0 %, Maximum: 100 %	・Idling: 10.4 to 15.6 % ・Running without load (2,500 rpm): 12.1 to 18.2 %	—
MAF	Air flow rate from MAF meter/ Minimum: 0 gm/s, Maximum: 655 gm/s	・Idling: 2.0 to 3.7 gm/s ・Running without load (2,500 rpm): 2.4 to 4.3 gm/s	If value is approximately 0.0 gm/s: ・Mass air flow meter power source circuit open ・VG circuit open or short If value is 160.0 gm/s or more: ・E2G circuit open
ENGINE SPD	Engine speed/ Minimum: 0 rpm, Maximum: 16,383 rpm	Idling: 580 to 750 rpm	—
COOLANT TEMP	Coolant temperature/ Minimum: -40℃, Maximum: 140℃	After warming up: 80 to 97°C (176 to 207°F)	・If value is -40℃ (-40℉): sensor circuit is open ・If value is 140℃ (284℉ or more): sensor circuit is shorted
INTAKE AIR	Intake air temperature/ Minimum: -40℃, Maximum: 140℃	Equivalent to ambient temp. (after cold soak)	
THROTTLE POS	Absolute throttle position sensor/ Minimum: 0 %, Maximum: 100 %	・Throttle fully closed: 10 to 24 % ・Throttle fully open: 64 to 96 %	Read value with ignition switch ON (do not start engine)
CTP SW	Closed throttle position switch/ ON or OFF	・Throttle fully closed: ON ・Throttle open: OFF	—
VEHICLE SPD	Vehicle speed/ Minimum: 0 km/h, Maximum: 255 km/h	Actual vehicle speed	Speed indicated on speedometer
ACCEL POS #1	Accelerator pedal position sensor No.1 output voltage/ Minimum: 0 V, Maximum: 5 V	・Accelerator pedal released: 0.5 to 1.1 V ・Accelerator pedal depressed: 2.6 to 4.5 V	Read value with ignition switch ON (do not start engine)

Hand-held Tester Display	Measurement Item/Range (Display)	Normal Condition *	Diagnostic Note
ACCEL POS #2	Accelerator pedal position sensor No. 2 output voltage/ Minimum: 0 V, Maximum: 5 V	・Accelerator pedal released: 1.2 to 2.0 V ・Accelerator pedal depressed: 3.4 to 5.3 V	Read value with ignition switch ON (do not start engine)
THROTTLE POS #2	Throttle position sensor No. 2 output voltage/ Minimum: 0 V, Maximum: 5 V	・Throttle fully closed: 2.1 to 3.1 V ・Throttle fully open: 4.5 to 5.5 V	Read value with ignition switch ON (do not start engine)
THROTTLE TARGT	Target position of throttle valve/ Minimum: 0 V, Maximum: 5 V	Idling: 0.4 to 1.1 V	—
THROTTLE OPN DUTY	Throttle motor opening duty ratio/ Minimum: 0 %, Maximum: 100 %	Throttle fully closed: 0 %	・When accelerator pedal is depressed, duty ratio is increased ・Read value with ignition switch ON (do not start engine)
THROTTLE CLS DUTY	Throttle motor closed duty ratio/ Minimum: 0 %, Maximum: 100 %	Throttle fully open: 0 %	・When accelerator pedal is released quickly, duty ratio is increased ・Read the value with ignition switch ON (do not start engine)
THROTTLE MOT	Whether or not throttle motor control is permitted/ ON or OFF	Idling: ON	Read value with ignition switch ON (do not start engine)
+BM	Whether or not electric throttle control system power is inputted/ ON or OFF	Idling: ON	—
ACCEL IDL POS	Whether or not accelerator pedal position sensor is detecting idle/ ON or OFF	Idling: ON	—
THROTTLE IDL POS	Whether or not throttle position sensor is detecting idle/ ON or OFF	Idling: ON	—
FAIL #1	Whether or not fail safe function is executed/ ON or OFF	ETCS has failed: ON	—
FAIL #2	Whether or not fail safe function is executed/ ON or OFF	ETCS has failed: ON	—
THROTTLE INITIAL	Throttle fully closed (learned value) Minimum: 0 V, Maximum: 5 V	0.5 to 0.9 V	—
ACCEL LEARN VAL	Accelerator fully closed (learned value) Minimum: 0 V, Maximum: 5 V	0.4 to 0.8 V	—
THROTTLE MOT	Throttle motor current Minimum: 0 A, Maximum: 20 A	Idling: 0 to 3.0 A	—
O2S B1 S2	Heated oxygen sensor output voltage for bank 1 sensor 2/ Minimum: 0 V, Maximum: 1.0 V	Driving (31 mph, 50 km/h): 0.1 to 0.9 V	Performing INJ VOL or A/F CONTROL function of ACTIVE TEST enables the technician to check voltage output of each sensor
O2S B2 S2	Heated oxygen sensor output voltage for bank 2 sensor 2/ Minimum: 0 V, Maximum: 1.0 V	Driving (31 mph, 50 km/h): 0.1 to 0.9 V	Performing INJ VOL or A/F CONTROL function of ACTIVE TEST enables the technician to check voltage output of each sensor
AFS B1 S1	A/F sensor output voltage for bank 1 sensor 1/ Minimum: 0 V, Maximum: 7.999 V	Idling 2.8 to 3.8 V	Performing INJ VOL or A/F CONTROL function of ACTIVE TEST enables the technician to check voltage output of each sensor

Hand-held Tester Display	Measurement Item/Range (Display)	Normal Condition *	Diagnostic Note
AFS B2 S1	A/F sensor output voltage for bank 2 sensor 1/ Minimum: 0 V, Maximum: 7.999 V	Idling 2.8 to 3.8 V	Performing INJ VOL or A/F CONTROL function of ACTIVE TEST enables the technician to check voltage output of each sensor
VAPOR PRESS	Vapor Pressure/ Minimum: -4.125 kPa, Maximum: 2.125 kPa	Fuel tank cap removed: 0 kPa	Pressure inside of fuel tank as read by the vapor pressure sensor
SHORT FT #1	Short term fuel trim of bank 1/ Minimum: -100 %, Maximum: 100 %	0 ± 20 %	This item is short-term fuel compensation used to maintain air-fuel ratio at stoichiometric air-fuel ratio
LONG FT #1	Long term fuel trim of bank 1/ Minimum: -100 %, Maximum: 100 %	0 ± 20 %	This item is overall, long-term fuel compensation that helps to maintain air-fuel ratio at stoichiometric air-fuel ratio (steadies long term deviations of short-term fuel trim from central value)
TOTAL FT #1	Total fuel trim of bank 1: Average value for fuel trim system of bank 1/ Minimum: 0.5, Maximum: 1.496	Idling: 0.5 to 1.4	—
SHORT FT #2	Short term fuel trim of bank 2/ Minimum: -100 %, Maximum: 100 %	0 ± 20 %	This item is short-term fuel compensation used to maintain air-fuel ratio at stoichiometric air-fuel ratio
LONG FT #2	Long term fuel trim of bank 2/ Minimum: -100 %, Maximum: 100 %	0 ± 20 %	This item is overall, long-term fuel compensation that helps to maintain air-fuel ratio at stoichiometric air-fuel ratio (steadies long term deviation of short-term fuel trim from central value)
TOTAL FT #2	Total fuel trim of bank 2: Average value for fuel trim system of bank 2/ Minimum: 0.5, Maximum: 1.496	Idling: 0.5 to 1.4	—
O2FT B1 S2	Short term fuel trim associated with the bank 1 sensor 2/ Minimum: -100 %, Maximum: 100 %	0 ± 20 %	Same as SHORT FT #1
O2FT B2 S2	Short term fuel trim associated with the bank 2 sensor 2/ Minimum: -100 %, Maximum: 100 %	0 ± 20 %	Same as SHORT FT #2
AF FT B1 S1	Short term fuel trim associated with bank 1 sensor 1/ Minimum: 0, Maximum: 1.999	・Value less than 1 (0.000 to 0.999) = Lean ・Stoichiometric air-fuel ratio = 1 ・Value greater than 1 (1.001 to 1.999) = Rich	—
AF FT B2 S1	Short term fuel trim associated with bank 2 sensor 1/ Minimum: 0, Maximum: 1.999	・Lean: 0 ≦ AF FT B2 S1 < 1 ・Stoichiometric air-fuel ratio = 1 ・Rich: 1 ≦ AF FT B2 S1< 1.999	—

Hand-held Tester Display	Measurement Item/Range (Display)	Normal Condition *	Diagnostic Note
FUEL SYS #1	Fuel system status (Bank 1) / OL or CL or OL DRIVE or OL FAULT or CL FAULT	Idling after warming up: CL	・OL (Open Loop): Has not yet satisfied conditions to go closed loop ・CL (Closed Loop): Using heated oxygen sensor(s) as feed back for fuel control ・OL DRIVE: Open loop due to driving conditions (fuel enrichment) ・OL FAULT: Open loop due to detected system fault ・CL FAULT: Closed loop but one of heated oxygen sensors, which is used for fuel control, is malfunctioning
FUEL SYS #2	Fuel system status (Bank 2) / OL or CL or OL DRIVE or OL FAULT or CL FAULT	Idling after warming up: CL	・OL (Open Loop): Has not yet satisfied conditions to go closed loop ・CL (Closed Loop): Using heated oxygen sensor(s) as feed back for fuel control ・OL DRIVE: Open loop due to driving conditions (fuel enrichment) ・OL FAULT: Open loop due to detected system fault ・CL FAULT: Closed loop but one of heated oxygen sensors, which is used for fuel control, is malfunctioning
FC IDL	Fuel cut idle/ ON or OFF	Fuel cut operation: ON	FC IDL = ON when throttle valve is fully closed and engine speed is over 1,500 rpm
MIL	MIL status/ ON or OFF	MIL ON: ON	—
STARTER SIG	Starter signal/ ON or OFF	Cranking: ON	—
A/C SIG	A/C signal/ ON or OFF	A/C ON: ON	—
PNP SW [NSW]	PNP switch signal/ ON or OFF	P or N position: ON	—
ELECT LOAD SIG	Electrical load signal/ ON or OFF	・Taillamp switch ON: ON ・Defogger switch ON: ON	—
STOP LIGHT SW	Stop light switch/ ON or OFF	・Brake pedal depressed: ON ・Brake pedal released: OFF	—
PS OIL PRESS SW	Power steering oil pressure switch signal/ ON or OFF	・While turning the steering wheel: ON ・While not turning the steering wheel: OFF	Idle-up control is performed when PS is ON
PS SIGNAL	Power steering signal/ ON or OFF	When steering wheel is turned	This signal is usually ON until the Ignition switch is turned OFF
INTAKE CTL VSV1	VSV status for intake control (bank 1)/ ON or OFF	VSV operation: ON	—
INTAKE CTL VSV 2	VSV status for intake control (bank 2)/ ON or OFF	VSV operation: ON	—
FUEL PUMP / SPD	Fuel pump/speed status/ ON/H or OFF/M, L	Idling: ON	—
A/C MAG CLUTCH	A/C magnet clutch status/ ON or OFF	A/C magnet clutch ON: ON	—

Hand-held Tester Display	Measurement Item/Range (Display)	Normal Condition *	Diagnostic Note
EVAP VSV	VSV status for EVAP control/ ON or OFF	VSV operating: ON	EVAP VSV is controlled by the ECM (ground side duty control)
BOOST PRESS VSV	VSV status for boost pressure control/ ON or OFF	VSV operating: ON	—
IGNITION	Ignition counter/ Minimum: 0, Maximum: 600	0 to 600	—
CYL #1, #2, #3, #4, #5, #6	Misfire ratio of cylinder 1 to 6/ Minimum: 0 %, Maximum: 50 %	0 %	This item is displayed in only idling
MISFIRE LOAD	Engine load for first misfire range/ Minimum: 0 g/rev, Maximum: 3.98 g/rev.	Misfire 0: 0 g/rev.	—
MISFIRE RPM	Engine RPM for first misfire range/ Minimum: 0 rpm, Maximum: 6,375 rpm	Misfire 0: 0 rpm	—
FC TAU	Fuel Cut TAU: Fuel cut during very light load/ ON or OFF	Fuel cut operating: ON	Fuel cut is being performed under very light load to prevent engine combustion from becoming incomplete
CHECK MODE	Check mode/ ON or OFF	Check mode ON: ON	See step 3

HINT:

*: If no conditions are specifically stated for ”ldling”, the shift lever is in the N or P position, the A/C switch is OFF and all accessory switches are OFF.

2. ACTIVE TEST

HINT:

Performing the hand-held tester ACTIVE TEST allows relay, VSV, actuator and other items to be operated without removing any parts. Performing the ACTIVE TEST early in troubleshooting is one way to shorten labor time. The DATA LIST can be displayed during the ACTIVE TEST.

(a) Warm up the engine.
(b) Turn the ignition switch OFF.
(c) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(d) Turn the ignition switch ON.
(e) Turn ON the hand-held tester or the OBD II scan tool.
(f) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST.
(g) According to the display on tester, perform the ”ACTIVE TEST”.

Hand-held Tester Display	Test Details	Diagnostic Note
INJ VOL	[Test Details] Control injection volume Minimum: -12.5 %, Maximum: 25 % [Vehicle Condition] Engine speed: 3,000 rpm or less	・All injectors are tested at once ・Injection volume is gradually changed between -12.5 and 25 %
A/F CONTROL	[Test Details] Control injection volume -12.5 or 25 % (change injection volume -12.5 % or 25 %) [Vehicle Condition] Engine speed: 3,000 rpm or less	Following A/F CONTROL procedure enables technician to check and graph voltage outputs of both the A/F sensor and heated oxygen sensor For displaying graph, enter ”ACTIVE TEST / A/F CONTROL / USER DATA”, select ”AFS B1S1 and O2S B1S2” by pressing ”YES” and push ”ENTER”. Then press ”F4”

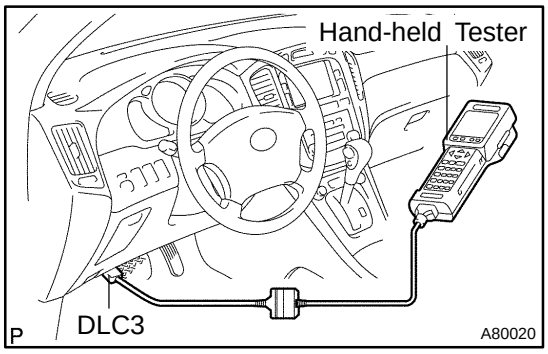
Hand-held Tester Display	Test Details	Diagnostic Note
INTAKE CTL VSV1	[Test Details] Activate VSV for intake control ON or OFF	—
CAN CTRL VSV	[Test Details] Activate VSV for canister control ON or OFF	—
EVAP VSV (ALONE)	[Test Details] Activate EVAP VSV control ON or OFF	—
A/C MAG CLUTCH	[Test Details] Control A/C magnet clutch ON or OFF	—
FUEL PUMP / SPD	[Test Details] Control the fuel pump ON or OFF	—
VVT CTRL B1	[Test Details] Active VVT system (bank 1) ON or OFF	·ON: Rough idle or engine stall ·OFF: Normal engine speed
VVT CTRL B2	[Test Details] Active VVT system (bank 2) ON or OFF	·ON: Rough idle or engine stall ·OFF: Normal engine speed
ACM INHIBIT	[Test Details] Control ACM inhibit ON or OFF	—
TC/TE1	[Test Details] Connect TC and TE1 ON or OFF	—
FC IDL PROHBT	[Test Details] Control idle fuel cut prohibit ON or OFF	—

05EX7-05

DTC CHECK/CLEAR

NOTICE:

- **If no DTC appears in normal mode:**
  On the OBD II scan tool or the hand-held tester, check the pending fault code using the Continuous Test Results function (Mode 7 for SAE J1979).
- **When the diagnosis system is changed from normal mode to check mode or vice-versa, all DTCs and freeze frame data recorded in normal mode will be erased. Before changing modes, always check and make a note of DTCs and freeze frame data.**



1. CHECK DTC (Using the OBD II scan tool or hand-held tester)

(a) Connect the OBD II scan tool or hand-held tester to the DLC3.

(b) Turn the ignition switch ON.

(c) Use the OBD II scan tool or the hand-held tester to check the DTCs and freeze frame data and then write them down.
For the hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODEDS. For the OBD II scan tool, see its instruction manual.

(d) See page 05-412 to confirm the details of the DTCs.

NOTICE:

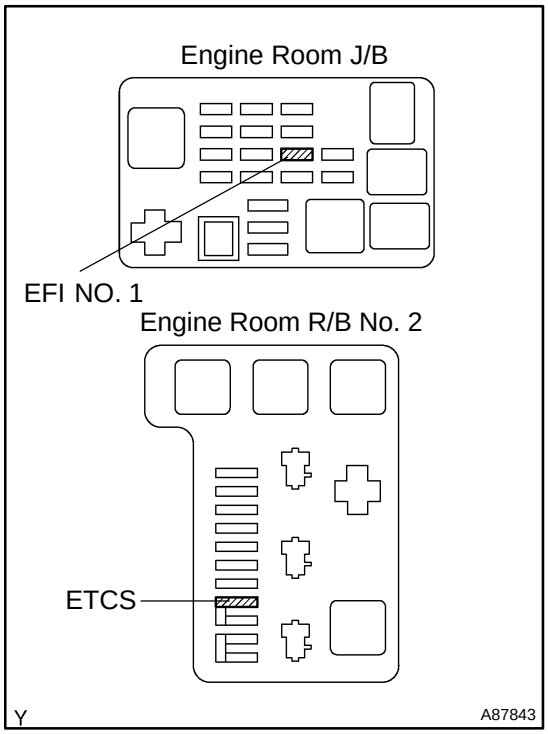
- **When simulating a symptom with the OBD II scan tool (excluding hand-held tester) to check the DTCs, use the normal mode. For DTCs subject to "2 trip detection logic", perform either of the following actions.**
- **Turn the ignition switch OFF after the symptom is simulated once. Then repeat the simulation process again. When the problem has been simulated again, the MIL illuminates and the DTCs are recorded in the ECM.**
- **Check the pending fault code using the Continuous Test Results function (Mode 7 for SAE J1979) on the OBD II scan tool.**

2. CLEAR DTC (Using the OBD II scan tool or hand-held tester)

(a) Connect the OBD II scan tool or the hand-held tester to the DLC3.

(b) Turn the ignition switch ON.

(c) Erase DTCs and freeze frame data with the OBD II scan tool (complying with SAE J1978) or the hand-held tester For the hand-held tester: 1) enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CLEAR CODES; and 2) press YES. For the OBD II scan tool, see its instruction manual.



3. CLEAR DTC (Not using OBD II scan tool or hand-held tester)

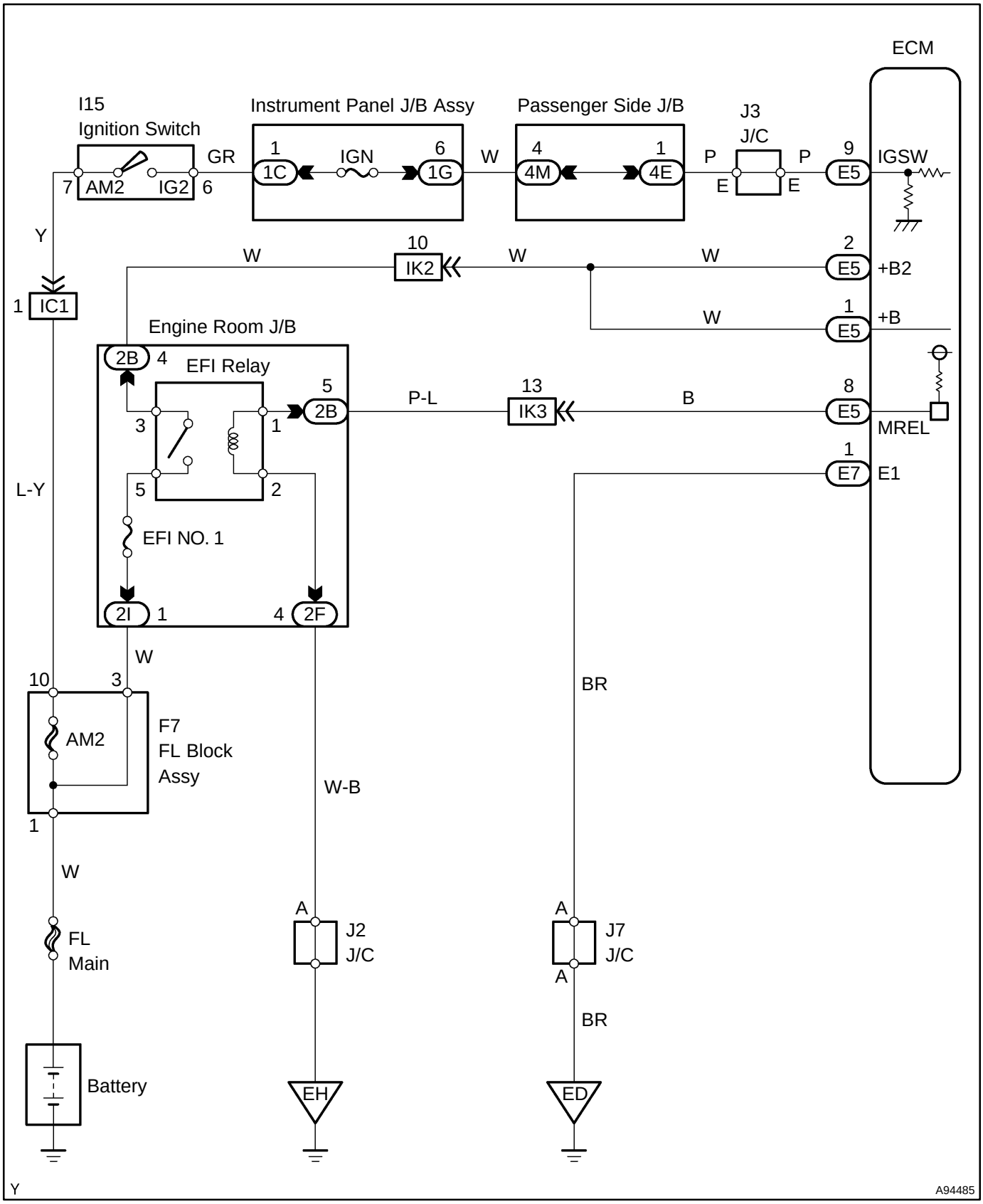
(a) Remove the EFI NO. 1 fuse from the engine room J/B and ETCS fuse from the engine room R/B No. 2 for more than 60 seconds, or disconnect the battery cable for more than 60 seconds.
After disconnecting the battery terminal, perform the "INITIALIZE" procedure (see page 05-1005).

ECM POWER SOURCE CIRCUIT

CIRCUIT DESCRIPTION

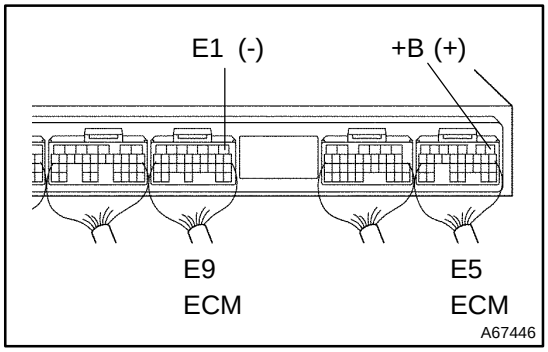
When the ignition switch is turned ON, battery voltage is applied to terminal IGSW of the ECM. The ECM "MREL" output signal causes current to flow to the coil, closing the contacts of the EFI main relay (Marking: EFI) and supplying power to terminal +B of the ECM.
If the ignition switch is turned OFF, the ECM holds the EFI main relay ON for a maximum of 2 seconds to allow for the initial setting of the throttle valve.

WIRING DIAGRAM



INSPECTION PROCEDURE

1 INSPECT ECM (+B VOLTAGE)



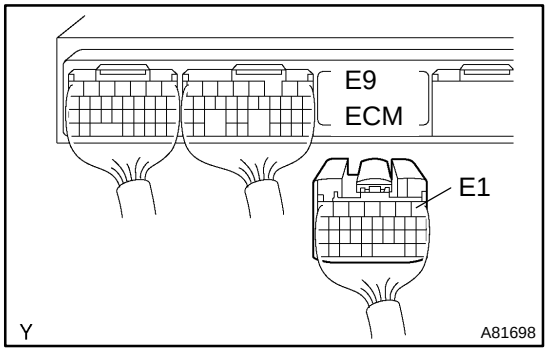
(a) Turn the ignition switch ON.
(b) Measure the voltage of the ECM connectors.
Standard:

Tester Connection	Specified Condition
E5-1 (+B) - E9-1 (E1)	9 to 14 V

OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE (See page 05-393)**

NG

2 CHECK WIRE HARNESS (ECM - BODY GROUND)



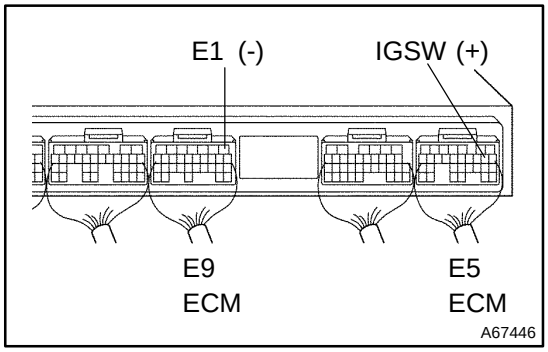
(a) Disconnect the E9 ECM connector.
(b) Check the resistance of the wire harness side connectors.
Standard:

Tester Connection	Specified Condition
E9-1 (E1) - Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

3 INSPECT ECM (IGSW VOLTAGE)



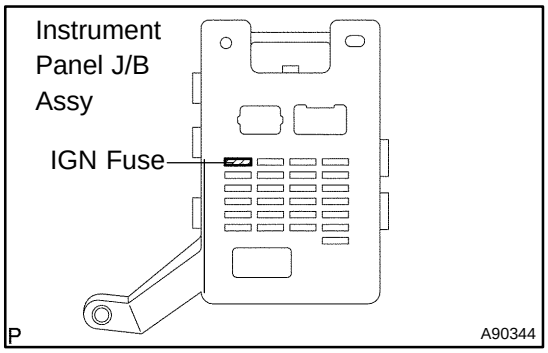
(a) Turn the ignition switch ON.
(b) Check the voltage of the ECM connectors.
Standard:

Tester Connection	Specified Condition
E5-9 (IGSW) - E9-1 (E1)	9 to 14 V

OK → **Go to step 6**

NG

4 CHECK FUSE (IGN)

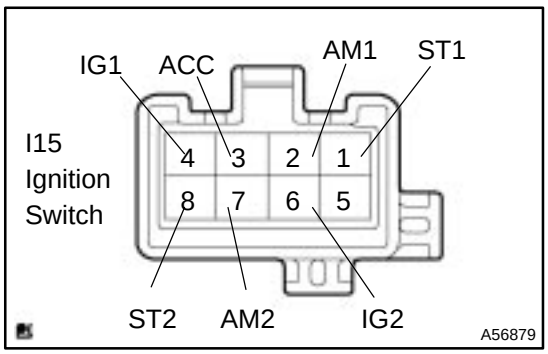


(a) Remove the IGN fuse from the instrument panel J/B assy.
(b) Check the resistance of the IGN fuse.
Standard: Below 1 Ω

NG → **REPLACE FUSE**

OK

5 INSPECT IGNITION OR STARTER SWITCH ASSY



(a) Check the resistance of the switch terminals shown in the chart below.
Standard:

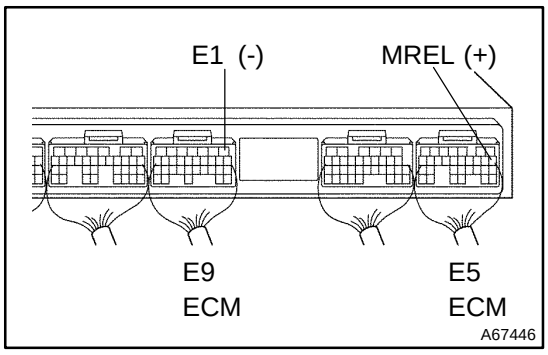
Switch Condition	Tester Connection	Specified Condition
LOCK	6 (IG2) - 7 (AM2)	10 kΩ or higher
START	6 (IG2) - 7 (AM2)	Below 1 Ω

NG → **REPLACE IGNITION OR STARTER SWITCH ASSY**

OK

CHECK AND REPAIR HARNESS AND CONNECTOR (BATTERY - IGNITION SWITCH, IGNITION SWITCH - ECM)

6 INSPECT ECM (MREL VOLTAGE)



(a) Turn the ignition switch ON.
(b) Measure the voltage of the ECM connectors.
Standard:

Tester Connection	Specified Condition
E5-8 (MREL) - E9-1 (E1)	9 to 14 V

NG → **REPLACE ECM (See page 10-24)**

OK

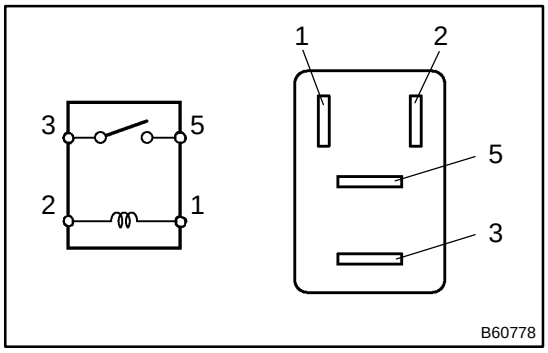
7	CHECK FUSE (EFI NO. 1)

(a) Remove the EFI NO. 1 fuse from the engine room J/B.
(b) Check the resistance of the EFI NO. 1 fuse.
Standard: Below 1 Ω

NG → **REPLACE FUSE**

OK

8	INSPECT RELAY (EFI)



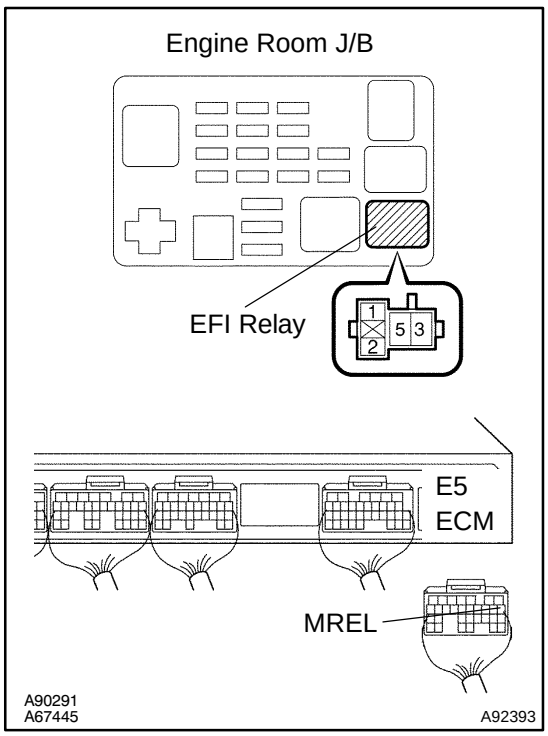
(a) Remove the EFI relay from the engine room J/B.
(b) Check the resistance of the EFI relay.
Standard:

Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

NG → **REPLACE RELAY**

OK

9	CHECK WIRE HARNESS (EFI RELAY - ECM, EFI RELAY - BODY GROUND)



(a) Check the wire harness between the EFI relay and ECM.
(1) Remove the EFI relay from the engine room J/B.
(2) Disconnect the E5 ECM connector.
(3) Check the resistance of the wire harness side connectors.
Standard:

Tester Connection	Specified Condition
J/B EFI relay terminal 1 - E5-8 (MREL)	Below 1 Ω
J/B EFI relay terminal 1 or E5-8 (MREL) - Body ground	10 kΩ or higher

(b) Check the wire harness between the EFI relay and body ground.
(1) Remove the EFI relay from the engine room J/B.
(2) Check the resistance between the wire harness side connector and body ground.
Standard:

Tester Connection	Specified Condition
J/B EFI relay terminal 2 - Body ground	Below 1 Ω

OK → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

NG

CHECK AND REPAIR HARNESS AND CONNECTOR (TERMINAL +B OF ECM - BATTERY POSITIVE TERMINAL)

EVAP INSPECTION PROCEDURE

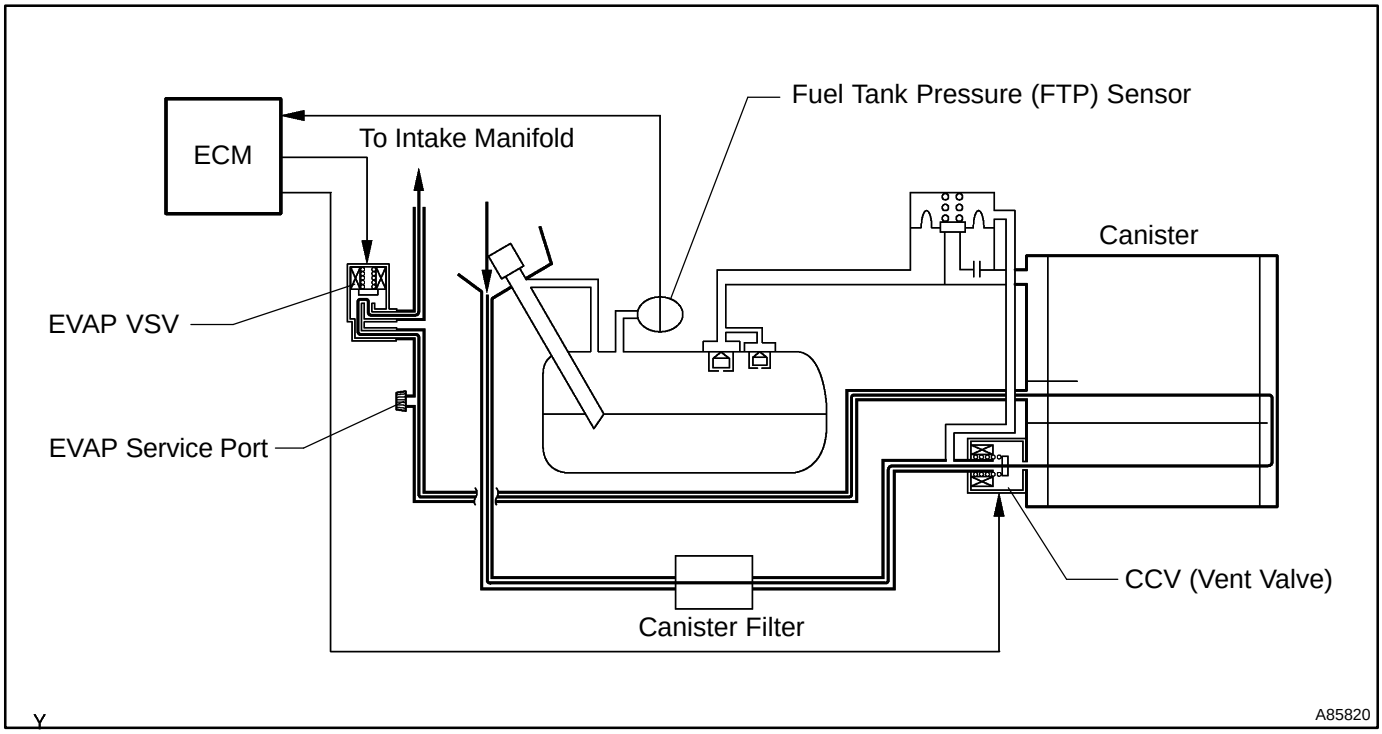
CIRCUIT DESCRIPTION

When predetermined conditions (closed loop, etc.) are met, the EVAP VSV is opened and stored fuel vapor in the canister is purged to the intake manifold. The ECM changes duty-cycle to the EVAP VSV to control purge flow volume. Purge flow volume is determined by the intake manifold pressure. Atmospheric pressure is allowed into the canister through the vent valve (CCV) to ensure that purge flow is maintained when negative pressure (vacuum) is applied to the canister. This EVAP system contains following components:

Components

Components	Operation
Canister	Contains activated charcoal to absorb EVAP that is created in fuel tank.
EVAP VSV	Opens or closes line between canister and intake manifold to control EVAP purge flow. EVAP VSV is opened and purges fuel vapor absorbed by canister to intake manifold. ECM changes duty-cycle of purge VSV to control purge volume (ON is open, OFF is closed).
Refueling Valve	Controls EVAP pressure from fuel tank to canister. Valve has diaphragm, spring and restrictor. When fuel tank pressure increase, valve opens. When EVAP is purging, valve closes and restrictor prevents strong of vacuum from affecting pressure in fuel tank. When valve opens, refueling is possible.
Service Port	Used for connecting vacuum gauge for inspecting EVAP system.
Vent Valve (CCV)	Vents and seals EVAP system. When CCV is turned ON, EVAP system is closed. When CCV is turned OFF, EVAP system is vented. When vacuum introduction, EVAP VSV is opened and CCV is closed.
Fuel Tank Pressure (FTP) Sensor	Indicates pressure as voltage. 5 V is supplied by ECM. ECM detects EVAP system pressure using this voltage.

Diagram

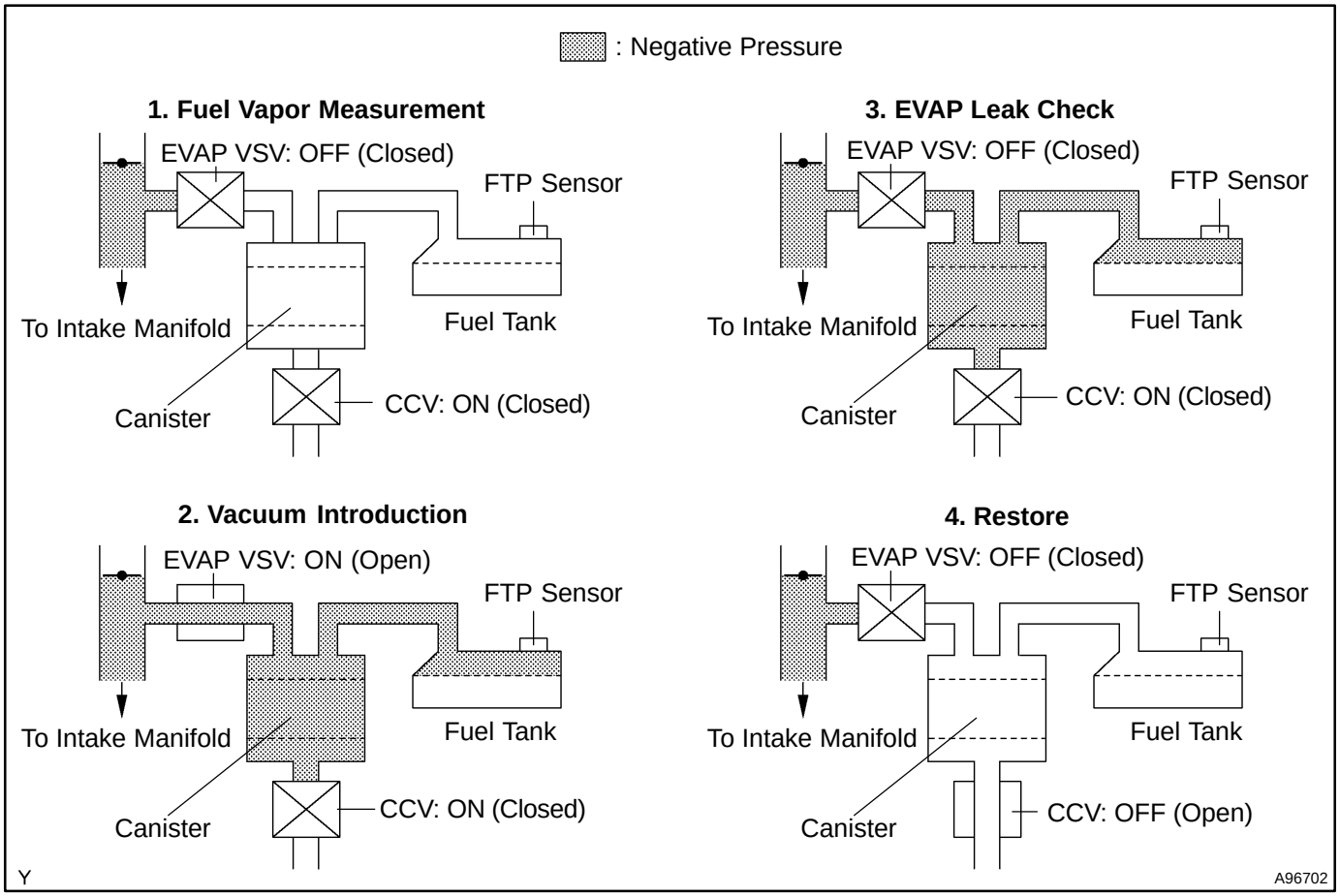


MONITOR DESCRIPTION

The EVAP monitor's purpose is to check for EVAP leaks and EVAP VSV and CCV malfunctions. The monitor performs the check by first introducing the intake manifold's negative pressure (vacuum) to the EVAP system. Then, the monitor records change in the EVAP system's pressure levels. The monitor runs when the following conditions are met:

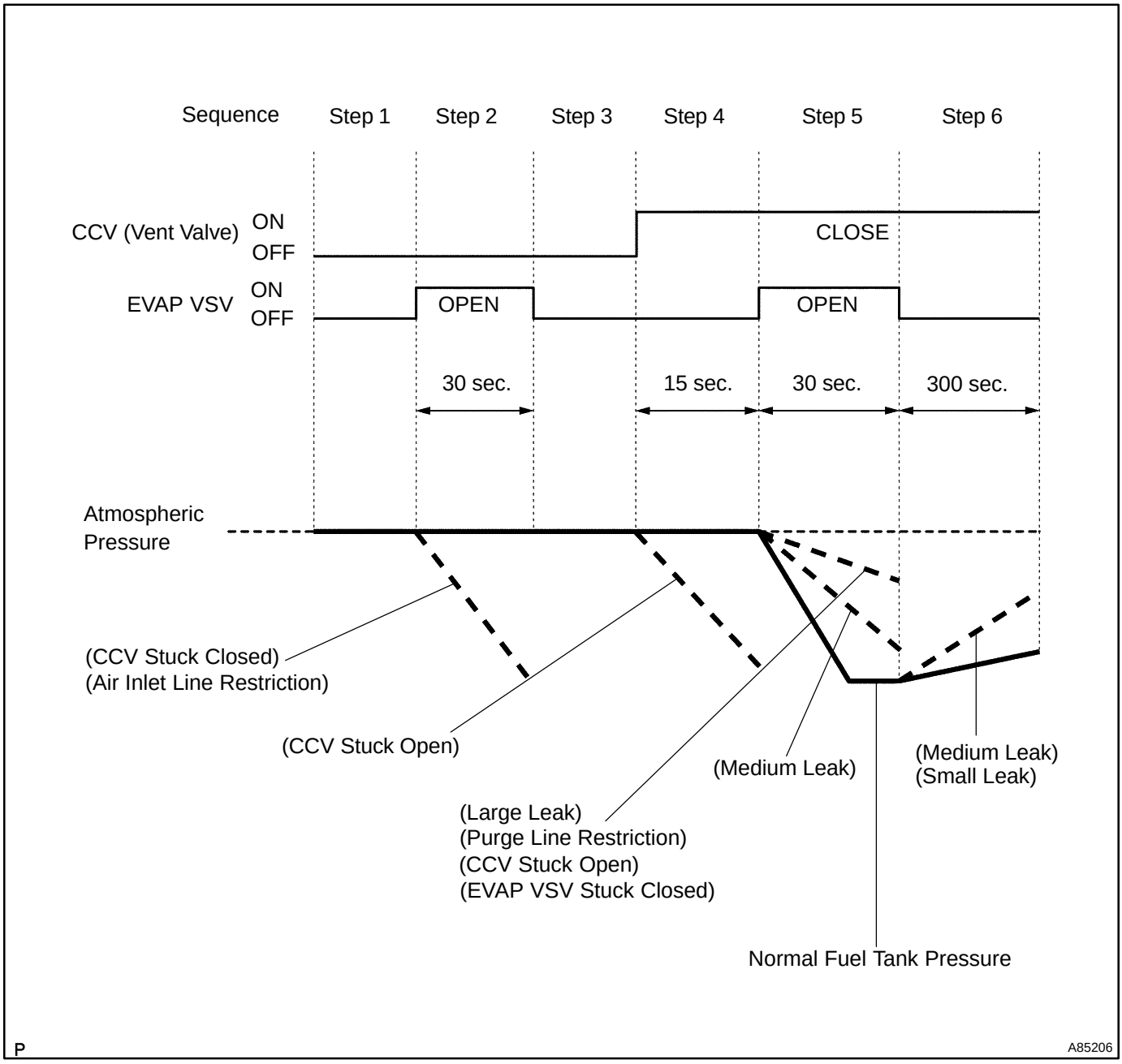
- ○ The engine coolant and intake air temperatures are 4 to 35 C (40 to 90 F).
- ○ The engine is idling or the vehicle is being driven at a steady speed.
- ○ The fuel tank pressure is stabilized.

LEVII EVAP Monitor Process



Sequence	Operation	Description
1	Fuel vapor measurement	EVAP VSV is turned OFF (closed) and EVAP pressure is measured. If EVAP pressure is not stable, EVAP monitor is canceled to prevent inaccurate monitor.
2	Vacuum introduction	EVAP VSV is turned ON (open) and CCV is turned ON (closed). As a result, intake manifold pressure (vacuum) is introduced to EVAP system.
3	EVAP leak check	EVAP VSV is turned OFF (closed) to seal EVAP system. EVAP pressure increase is measured for 5 seconds when EVAP pressure is -20 mmHg and -17 mmHg. If increase is large, ECM concludes EVAP system has leak.
4	Restore	CCV is turned OFF (open) to finish EVAP monitor.

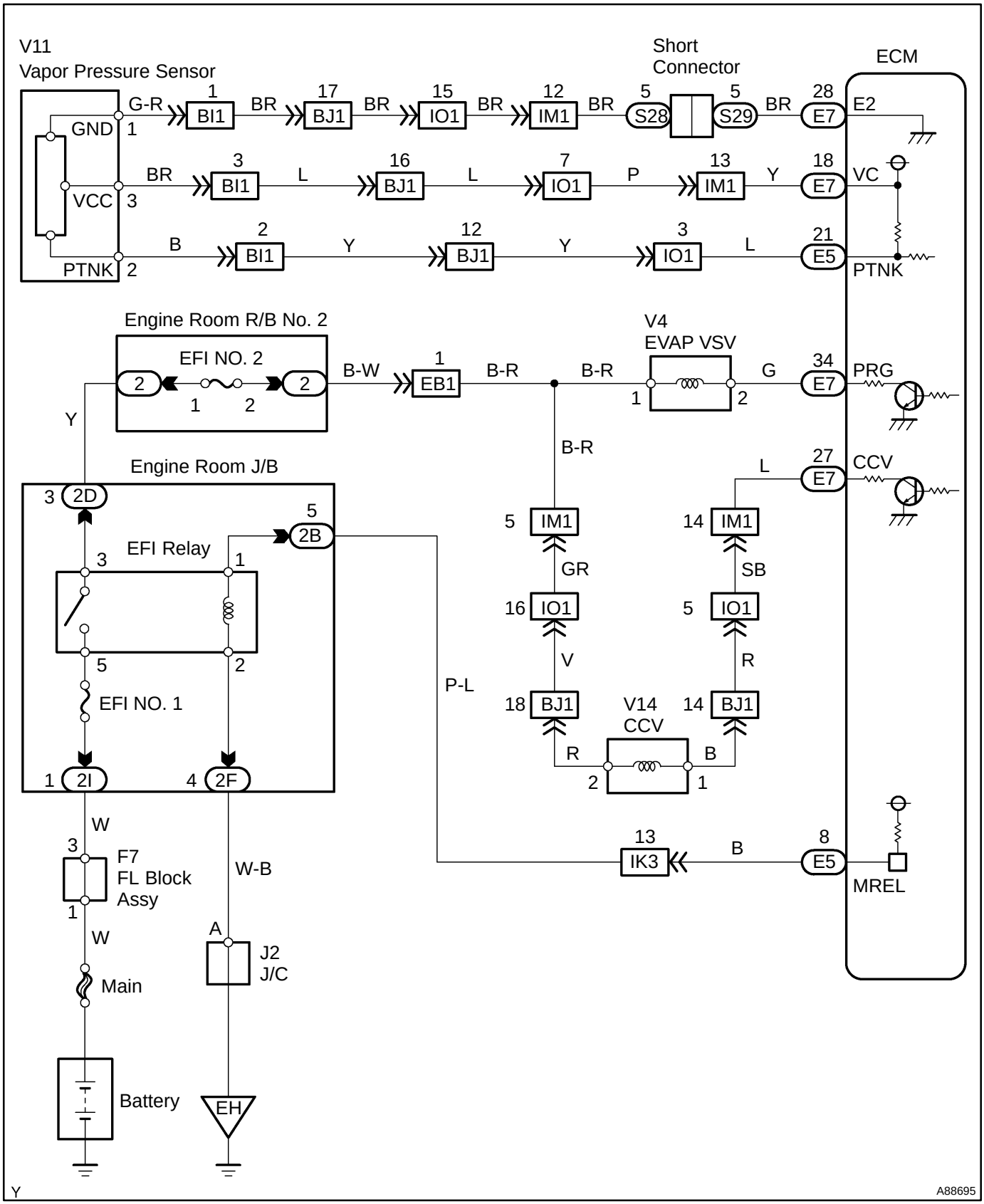
LEV II EVAP Monitor Sequence



Related DTCs

DTCs	Monitoring Item
P0441	EVAP VSV stuck closed EVAP VSV stuck open
P0442	EVAP small leak (0.04 inch)
P0446	Vent valve (CCV) stuck closed CCV stuck open
P0451	Fuel tank pressure (FTP) sensor malfunction
P0452	FTP sensor low output
P0453	FTP sensor high output
P0455	EVAP gross leak
P0456	EVAP small leak (0.02 inch)

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Read freeze frame data. Freeze frame data records engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	**CHECK OTHER DTC OUTPUT (IN ADDITION TO DTC P0441, P0442, P0446 AND/OR P0456)**

Result

Display (DTC output)	Proceed to
Only P0441, P0442, P0446 and /or P0456 are output	A
P0451, P0452 and P453 are output	B

HINT:

If any other DTCs besides P0441, P0442, P0446 and/or P0456 are output, perform the troubleshooting for those DTCs first (reference: P0451, P0452, P0453 are vapor pressure sensor malfunctions).

B → **Go to RELEVANT DTC CHART (See page 05-412)**

A

2	CHECK CURRENT AND PENDING DTC

(a) Check current DTCs. Select the hand-held tester menus: DIAGNOSIS, ENHANCED OBDII, DTC INFO and CURRENT DTCS.

(b) Check pending DTCs. Select the hand-held tester menus: DIAGNOSIS, ENHANCED OBDII, DTC INFO and PENDING DTCS.

Result

Current DTC	Pending DTC	Conclusion
Set	Set	System has been malfunctioning. Problem can be specified.
Set	-	System was malfunctioning in previous driving cycle. Problem may be specified.
-	Set	System is malfunctioning. This is intermittent problem and caused by fuel tank cap loosening. Otherwise, this problem may be difficult to eliminate.

HINT:

The ECM stores the current DTC and illuminates the MIL when an emission-related component is malfunctioning in 2 consecutive driving cycles (2 trips). The MIL is turned OFF, if the component is functioning normally in 3 consecutive driving cycles. The ECM erases the current DTC, if the component is functioning normally in 40 consecutive driving cycles.

The ECM stores the pending DTC when If the component is malfunctioning in present driving cycle (1 trip). The ECM erases the pending DTC, if the component is functioning normally in the next driving cycle.

NEXT

3 PREDICT POSSIBLE MALFUNCTION AREA

Predict possible malfunction area using the matrix below.

EVAP DTC Matrix

DTCs / Malfunction Area	P0441	P0442	P0446	P0451	P0452	P0453	P0455	P0456
EVAP VSV stuck closed	✳		✳				✳	
EVAP VSV stuck open	✳							
EVAP small leak (0.04 inch)		✳						
CCV stuck closed			✳					
CCV stuck open	✳		✳				✳	
FTP sensor malfunction				✳				
FTP sensor low output					✳			
FTP sensor high output						✳		
Gross leak	✳						✳	
EVAP small leak (0.02 inch)		✳						✳

DTCs	Suspected Malfunction Area
P0441 only	EVAP VSV stuck open
P0446 only	CCV (vent valve) stuck open
P0442 and/or P0456	Small leak

NEXT

4	PERFORM EVAP SYSTEM CHECK

NOTICE:

The EVAP system check can be used for confirmation after the EVAP system repair. Check DTCs after performing the EVAP system check. If no pending DTC is set, the EVAP system is functioning normally and the repair is complete.

(a) Select the ”mmHg” unit. Select the hand-held tester menus: DIAGNOSIS, SETUP, UNIT CONVERSION and VAPOR PRESS.

(b) Allow the engine to idle.

(c) Perform the EVAP system check to find a malfunction area. Select the hand-held tester menus: DIAGNOSIS, ENHANCED OBD ll, SYSTEM CHECK and LEV ll SYS CHECK.

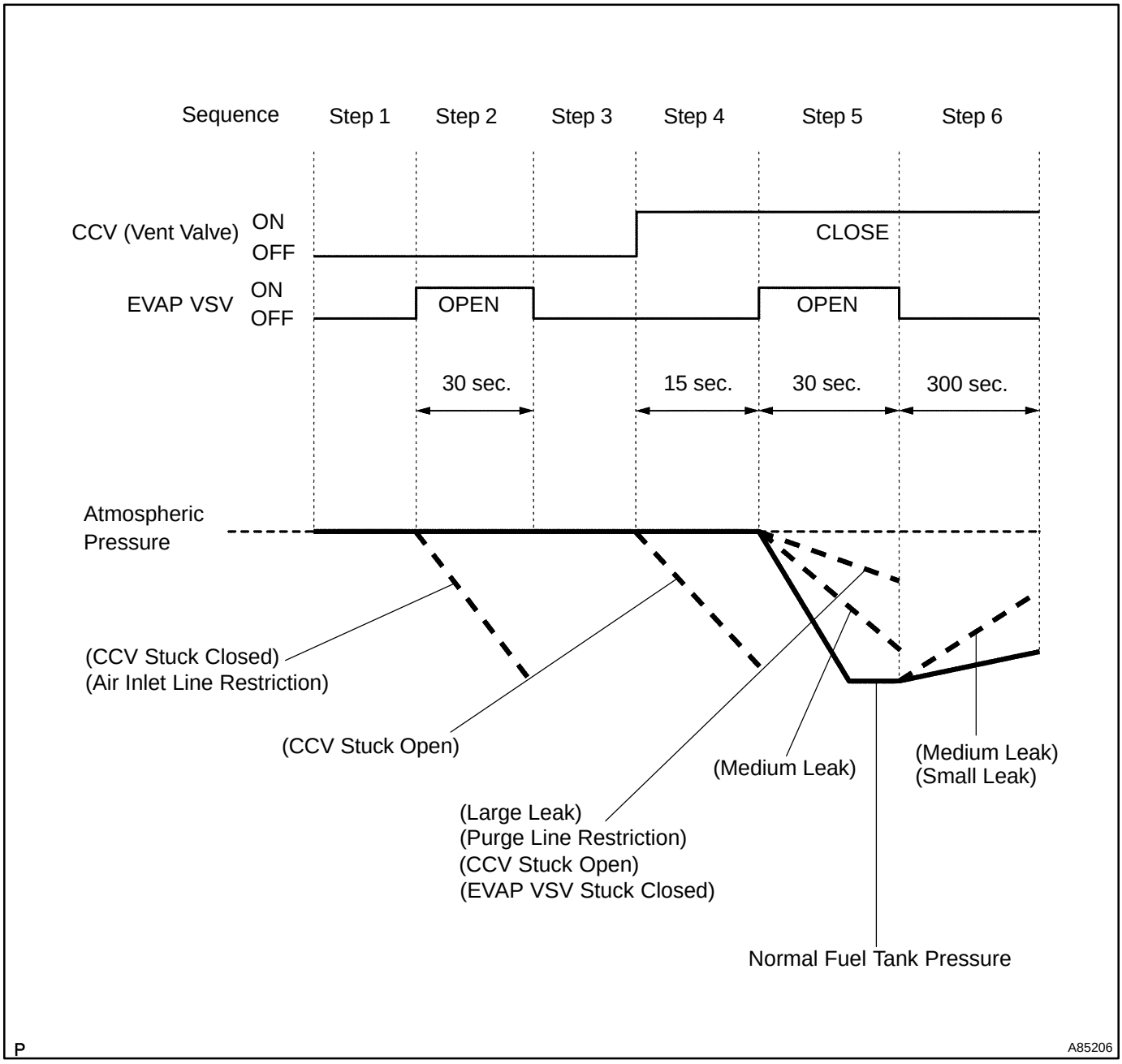
(d) Read NOTICE and press ENTER.

HINT:

The EVAP system check is most accurate when the following conditions are being set:

- ○ Atmospheric pressure is 762 mmHg (sea level).
- ○ The engine coolant and intake air temperatures are 4 to 35 C (40 to 90 F).
- ○ The fuel tank level is 1/4 to 3/4.

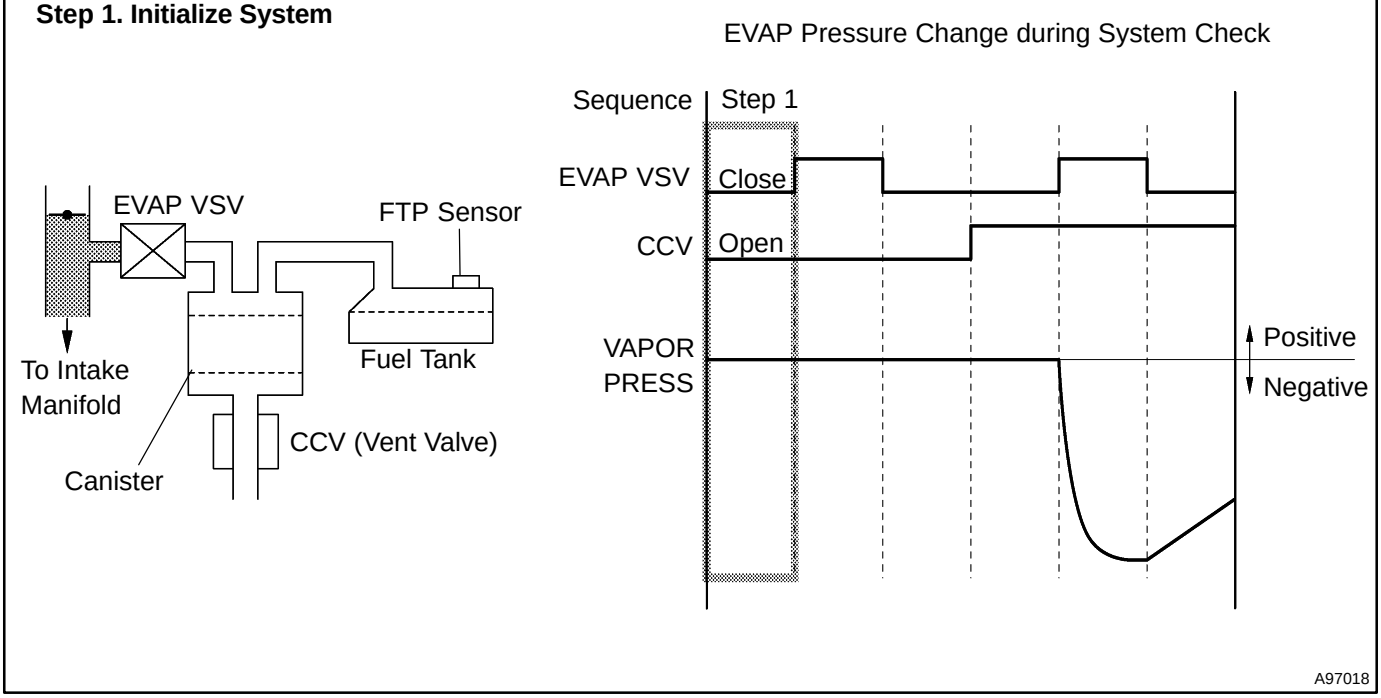
Diagram of LEVII EVAP System Check

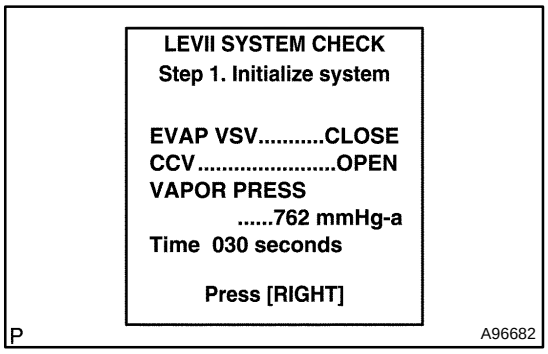


NEXT

5 EVAP SYSTEM CHECK STEP 1 (INITIALIZE SYSTEM)

Step 1. Initialize System



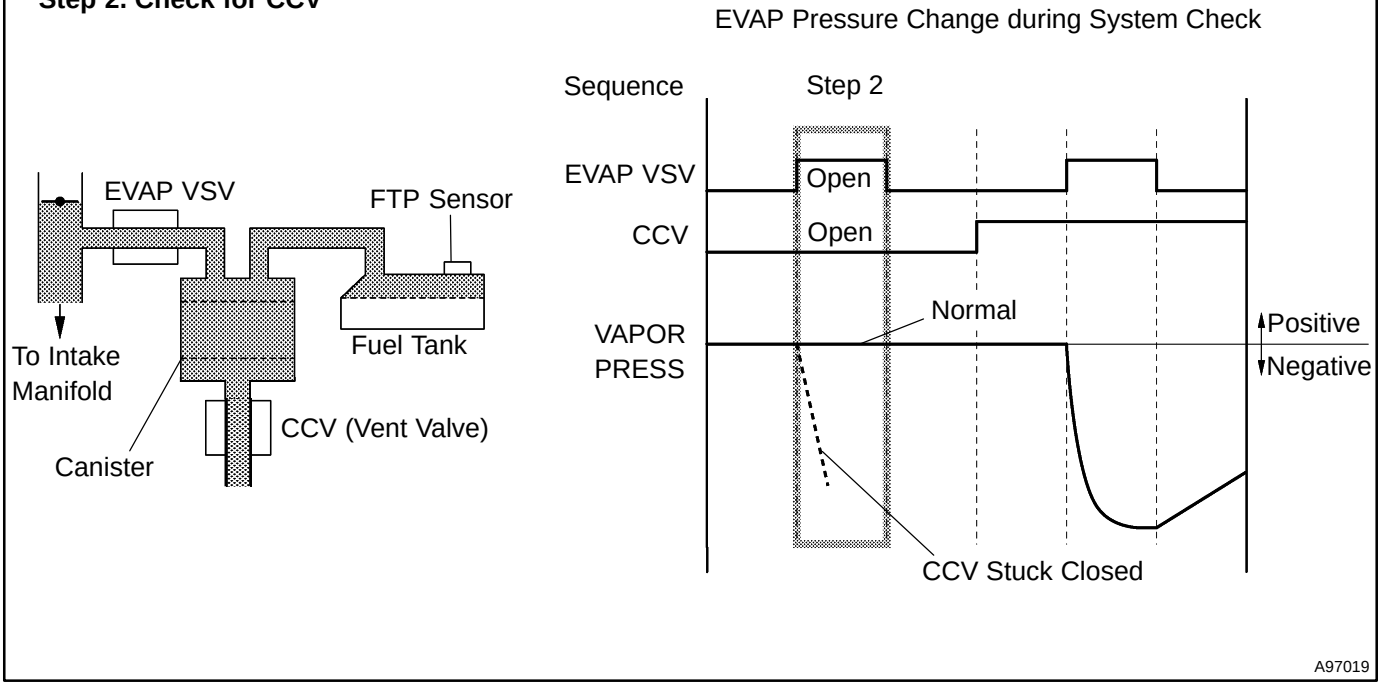


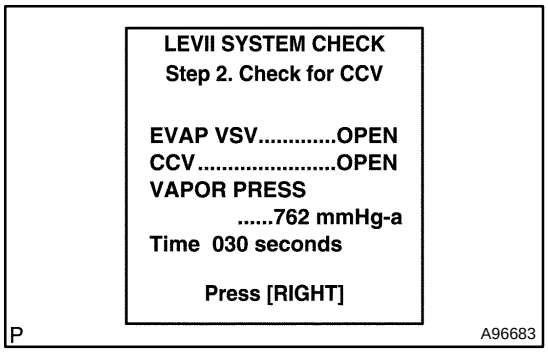
Wait for 30 seconds.

NEXT

6 EVAP SYSTEM CHECK STEP 2 (CHECK FOR CCV)

Step 2. Check for CCV





(a) Press RIGHT to go to step 2.
(b) Wait for 30 seconds and check VAPOR PRESS (EVAP pressure).

Result

VAPOR PRESS	Conclusion	Proceed to
Higher than 752 mmHg-a (-10 mmHg-g)	Trouble area has not been found yet.	OK
Lower than 752 mmHg-a (-10 mmHg-g)	Following problems are suspected: ○Air inlet line restriction ○Canister filter restriction ○CCV (vent valve) stuck closed	NG

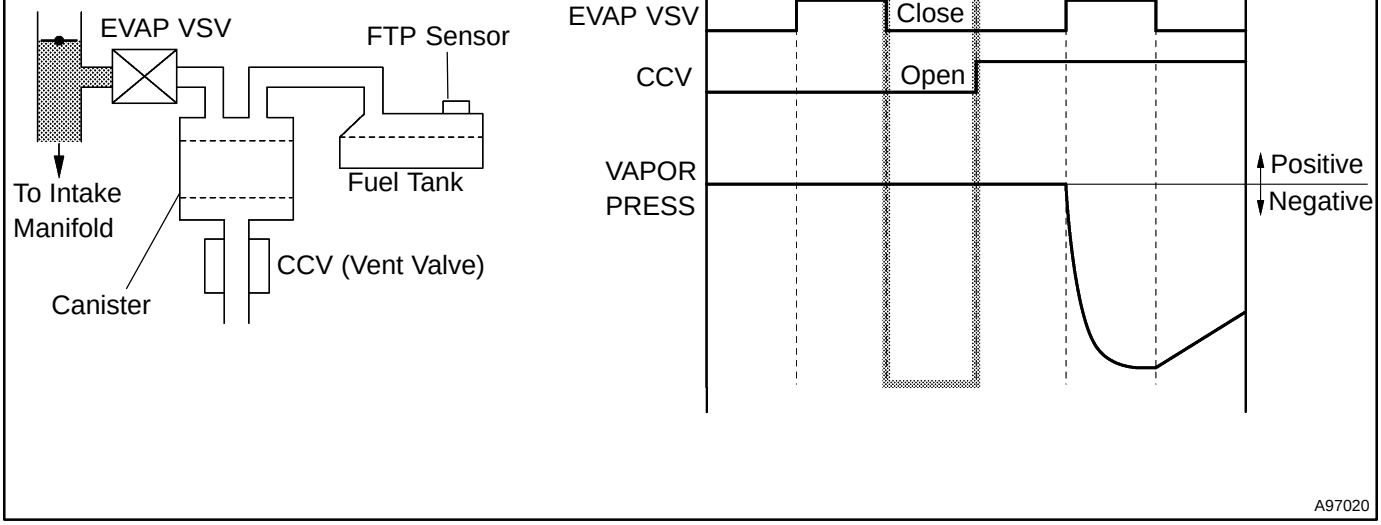
HINT:
In this step, the intake manifold pressure (vacuum) is applied to the EVAP system. However, the fuel tank pressure does not drop due to the CCV (vent valve) open.

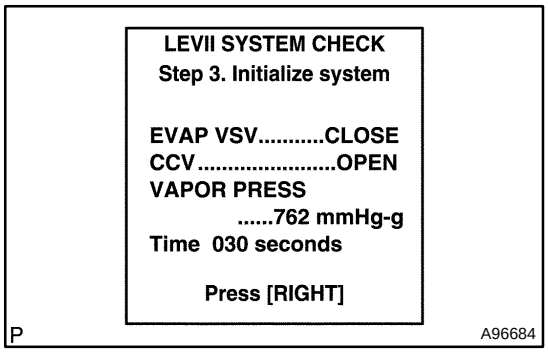
NG → **Go to step 11**

OK

7 EVAP SYSTEM CHECK STEP 3 (INITIALIZE SYSTEM)

Step 3. Initialize System



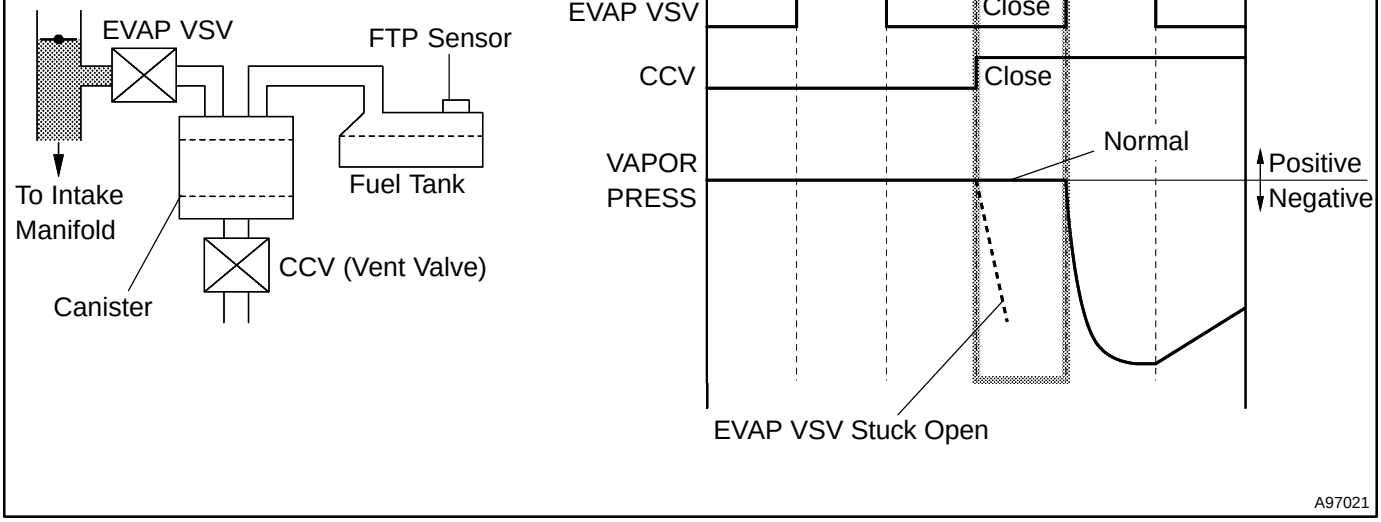


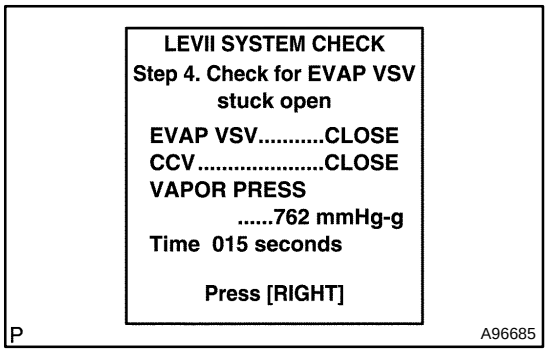
(a) Press RIGHT to go to step 3.
(b) Wait for 30 seconds.

NEXT

8 EVAP SYSTEM CHECK STEP 4 (CHECK FOR EVAP VSV STUCK OPEN)

Step 4. Check for EVAP VSV





(a) Press RIGHT to go to step 4.
(b) Wait for 15 seconds and check VAPOR PRESS (EVAP pressure).

Result

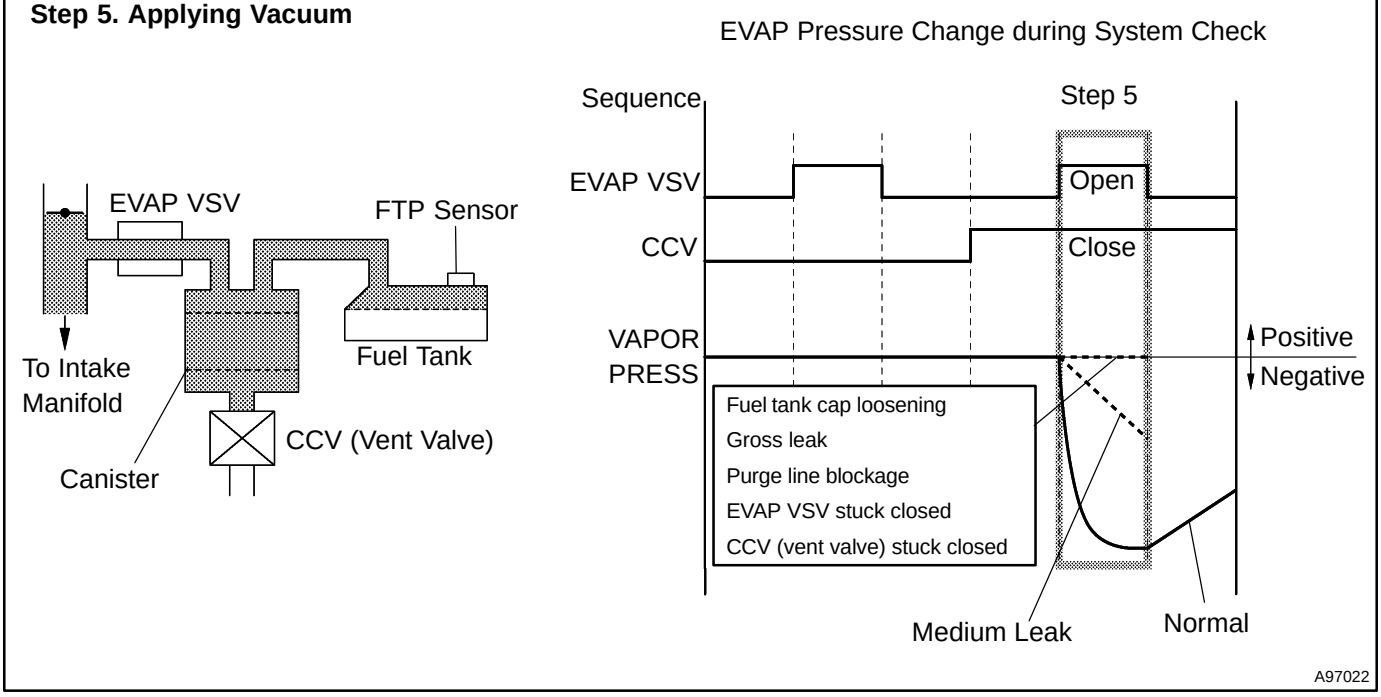
VAPOR PRESS	Conclusion	Proceed to
Higher than 758 mmHg-a (-4 mmHg-g)	Trouble area has not been found yet.	OK
Lower than 758 mmHg-a (-4 mmHg-g)	EVAP VSV stuck open	NG

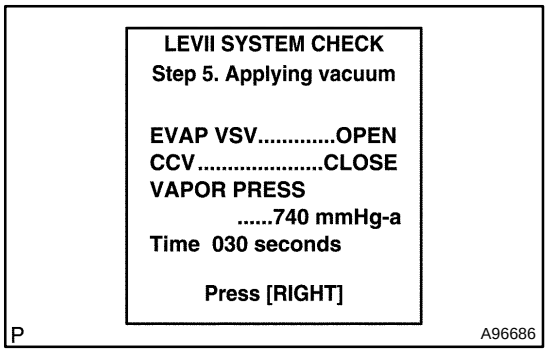
NG → **Go to step 14**

OK

9 EVAP SYSTEM CHECK STEP 5 (APPLYING VACUUM)

Step 5. Applying Vacuum



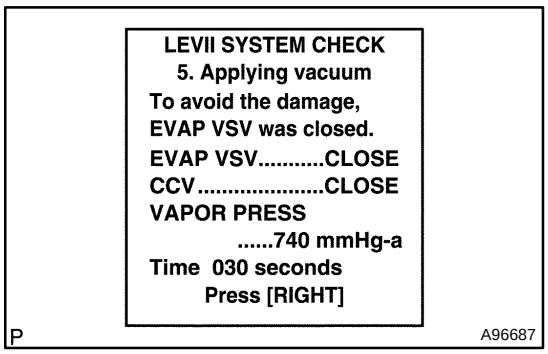


(a) Press RIGHT to go to step 5.

(b) Wait for 30 seconds and check VAPOR PRESS (EVAP pressure).

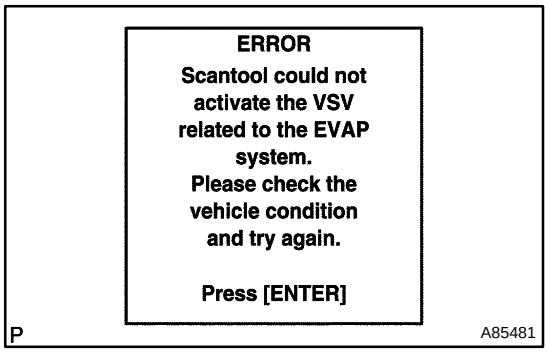
Result

VAPOR PRESS	Conclusion	Proceed to
Lower than 748 mmHg-a (-14 mmHg-g)	Trouble area has not been found yet.	A
756 to 768 mmHg-a (-6 to 6 mmHg-g)	Following problems are suspected: ○Fuel tank cap loosening ○Gross leak ○EVAP VSV stuck closed ○CCV (vent valve) stuck open ○Purge line blockage between fuel tank and canister	B
748 to 755 mmHg-a (-14 to -7 mmHg-g)	Medium leak	C



NOTICE:

- **If the pressure is lower than 740 mmHg-a (-22 mmHg-g), the hand-held tester closes the EVAP VSV.**



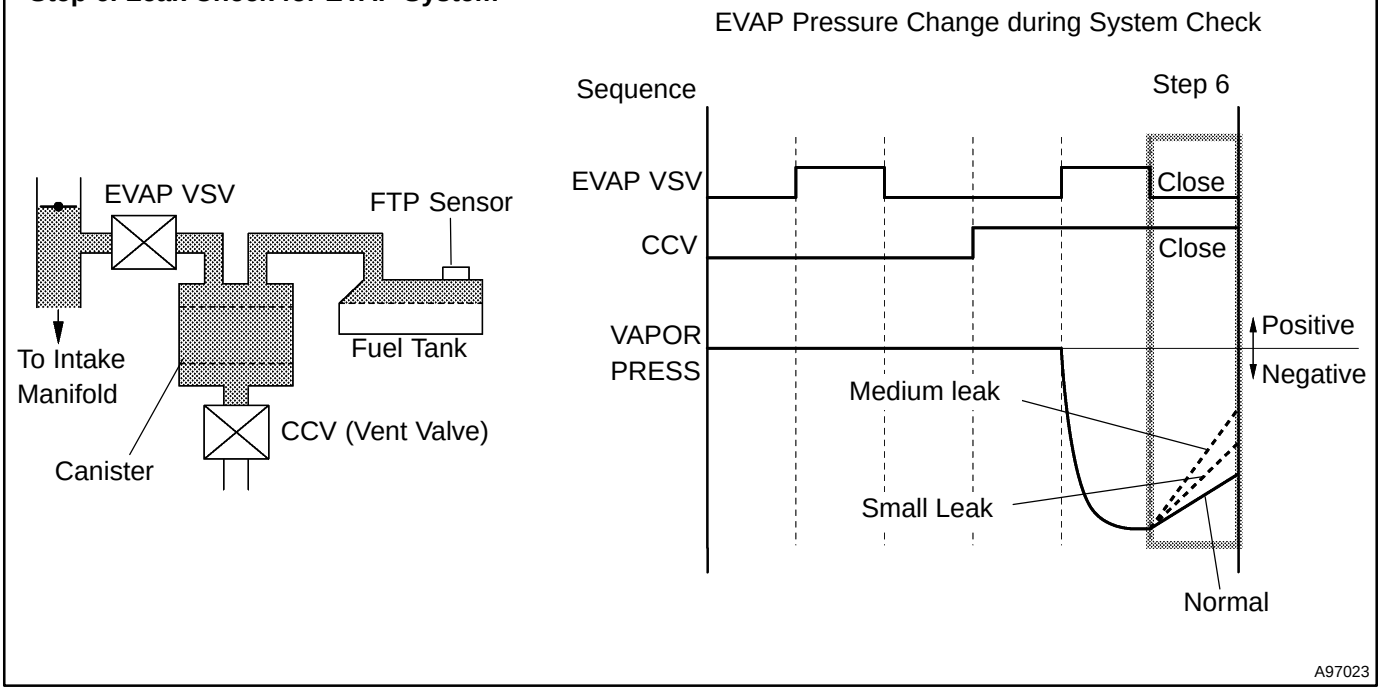
- **If the pressure is lower than 735 mmHg-a (-27 mmHg-g), the hand-held tester cancels the EVAP system check.**

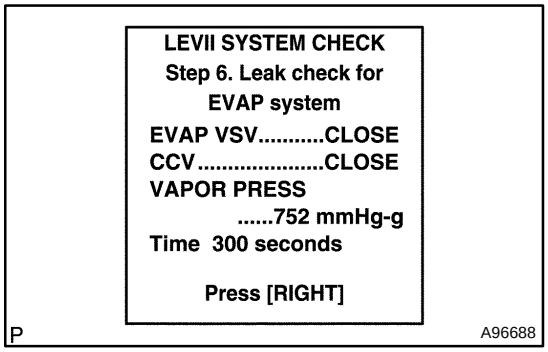
B	Go to step 15
C	Go to step 18

A

10 EVAP SYSTEM CHECK STEP 6 (LEAK CHECK FOR EVAP SYSTEM)

Step 6. Leak Check for EVAP System





(a) Press RIGHT to go to step 6 when the VAPOR PRESS (EVAP pressure) is lower than 742 mmHg-a (-20 mmHg-g).

(b) Wait for 300 seconds and check VAPOR PRESS (EVAP pressure).

Result

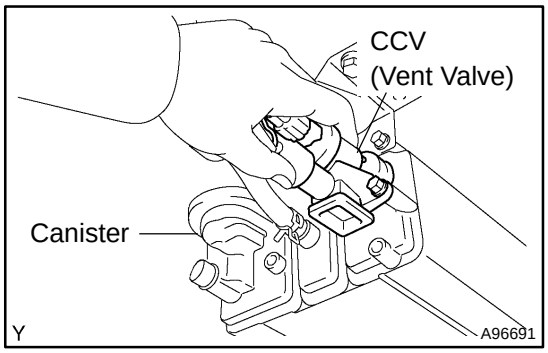
VAPOR PRESS	Conclusion	Proceed to
Less than 758 mmHg-a (-4 mmHg-g)	EVAP system is functioning normally.	OK
Higher than 758 mmHg-a (-4 mmHg-g)	Leakage	NG

NG → **Go to step 18**

OK

Go to step 40

11	CHECK CCV



(a) Turn the ignition switch OFF.
(b) Turn the ignition switch ON.
(c) Switch the CCV (vent valve) using the hand-held tester. Select the hand-held tester menus: DIAGNOSIS, ENHANCED OBD ll, ACTIVE TEST and CAN CTRL VSV.
(d) Touch the CCV and check the operation during switching the CCV.

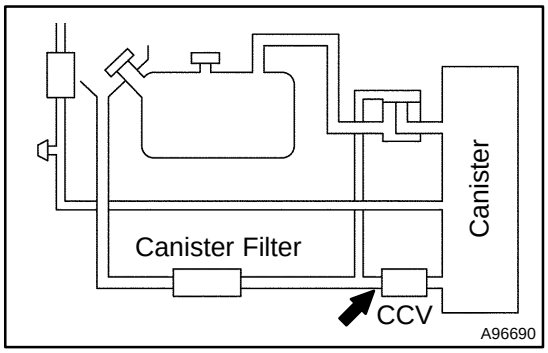
Result

CCV (Vent Valve)	Conclusion	Proceed to
CCV is operated	CCV is functioning normally.	OK
CCV is not operated	CCV is malfunctioning.	NG

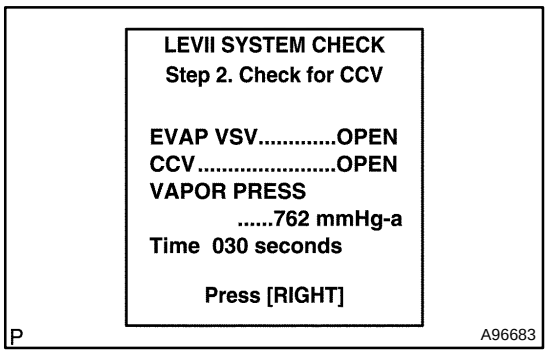
NG → **Go to step 25**

OK

12	CHECK AIR INLET LINE RESTRICTION



(a) Disconnect the air inlet line from the CCV.
(b) Remove and reinstall the fuel tank cap to release the fuel tank pressure.
(c) Allow the engine to idle.



(d) Perform step 2 of the EVAP system check.
(e) Wait for 30 seconds and check VAPOR PRESS (EVAP pressure).

Result

VAPOR PRESS	Conclusion	Proceed to
Higher than 752 mmHg-a (-10 mmHg-g)	Blockage in canister filter	A
Lower than 752 mmHg-a (-10 mmHg-g)	Blockage in CCV (vent valve) or canister	B

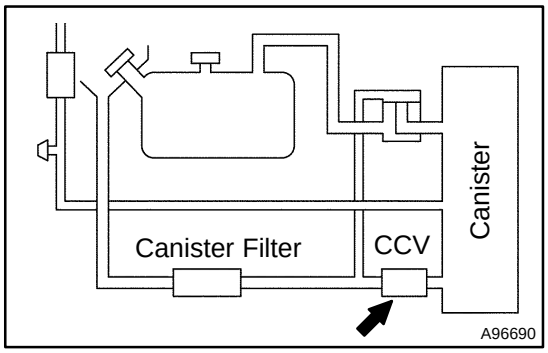
(f) Reconnect the air inlet line to the CCV.

B	Go to step 13

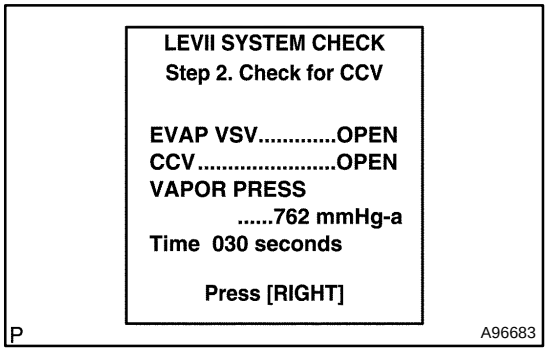
A

REPLACE CANISTER FILTER

13	CHECK CANISTER BLOCKAGE



(a) Turn the ignition switch OFF.
(b) Remove the CCV from the canister.
(c) Remove and reinstall the fuel tank cap to release the fuel tank pressure.
(d) Allow the engine to idle.



(e) Perform step 2 of the EVAP system check.
(f) Wait for 30 seconds and check VAPOR PRESS (EVAP pressure).

Result

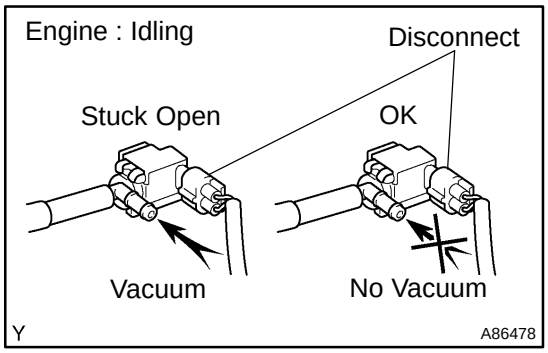
VAPOR PRESS	Conclusion	Proceed to
Higher than 752 mmHg-a (-10 mmHg-g)	CCV (vent valve) stuck closed	A
Lower than 752 mmHg-a (-10 mmHg-g)	Blockage in canister	B

B → **CHECK AND REPLACE CHARCOAL CANISTER (See page 12-28)**

A →

REPLACE CCV (VENT VALVE)

14	CHECK EVAP VSV (FOR EVAP VSV STUCK OPEN)



(a) Turn the ignition switch OFF.
(b) Disconnect the purge hose of the canister from the EVAP VSV.
(c) Disconnect the EVAP VSV connector.
(d) Allow the engine to idle.
(e) Touch the EVAP VSV port to check the vacuum.

Result

EVAP VSV	Conclusion	Proceed to
Vacuum is applied.	EVAP VSV is malfunctioning.	A
No vacuum is applied.	Electrical circuit of EVAP VSV is malfunctioning.	B

B → **Go to step 29**

A

REPLACE EVAP VSV

15	CHECK FUEL TANK CAP

(a) Remove the fuel tank cap and reinstall it until a few click sound is heard.
(b) Clear the DTCs.
(c) Check pending DTCs after the EVAP system check If no pending DTC is set, the DTC(s) was set due to the fuel cap loosening.

If necessary, replace the fuel cap.

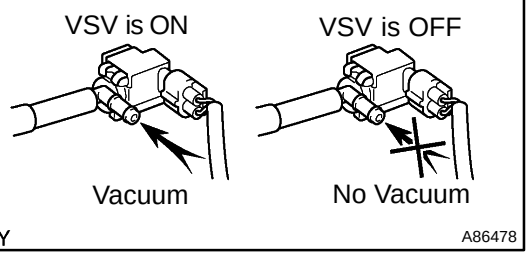
NG → **Go to step 16**

OK

REPAIR IS COMPLETE

16	CHECK EVAP VSV (FOR EVAP VSV STUCK CLOSED)

If EVAP VSV is functioning normally:



(a) Disconnect the purge hose of the canister from the EVAP VSV.
(b) Allow the engine to idle.
(c) Switch the EVAP VSV using the hand-held tester. Select the hand-held tester menus: DIAGNOSIS, ENHANCED OBD ll, ACTIVE TEST and EVAP VSV.
(d) Touch the EVAP VSV port to check the vacuum.

HINT:

The EVAP VSV can be tested with the EVAP Test Equipment (go to step 39).

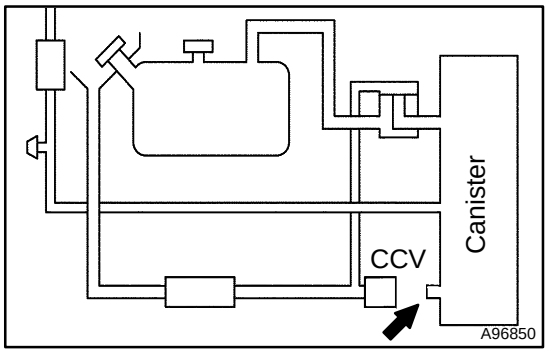
Result

EVAP VSV	Conclusion	Proceed to
Vacuum is applied when EVAP VSV is ON. No vacuum is applied when EVAP VSV is OFF.	EVAP VSV is functioning normally.	OK
No vacuum is applied when EVAP VSV is ON.	Electrical circuit of EVAP VSV is malfunctioning.	NG

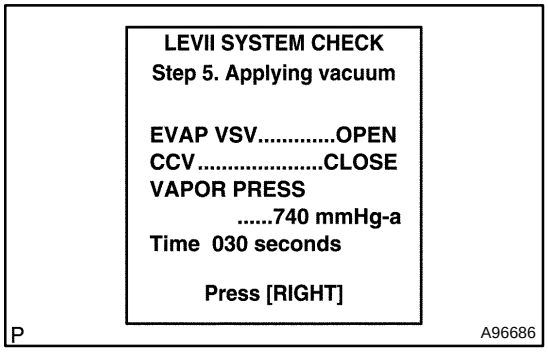
NG → **Go to step 31**

OK

17 CHECK CCV (FOR CCV STUCK OPEN)



(a) Turn the ignition switch OFF.
(b) Remove the CCV (vent valve) and plug the canister.
(c) Allow the engine to idle.



(d) Apply vacuum to the EVAP system with the EVAP system check. Perform step 5 ”Applying Vacuum”.
(e) Wait for 30 seconds and check the VAPOR PRESS (EVAP pressure).

Result

VAPOR PRESS	Conclusion	Proceed to
Lower than 747 mmHg-a (-15 mmHg-g)	CCV (vent valve) stuck open	A
Higher than 747 mmHg-a (-15 mmHg-g)	Blockage in canister Blockage in purge line (Fuel tank - Canister) Blockage in purge line (Fuel tank -EVAP VSV)	B

B → **Go to step 20**

A

Go to step 24

18	CHECK FUEL TANK CAP

(a) Remove the fuel tank cap and reinstall it until a few click sound is heard.
(b) Clear the DTCs.
(c) Check pending DTCs after the EVAP system check If no pending DTC is set, the DTC(s) was set due to the fuel cap loosening.

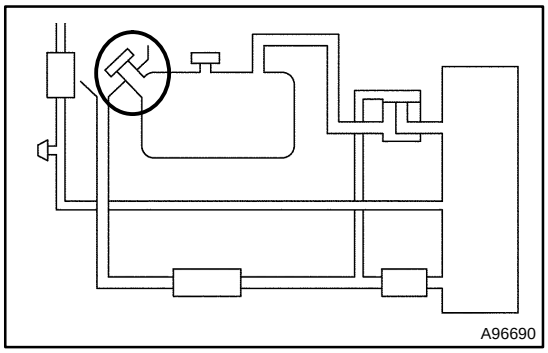
If necessary, replace the fuel cap.

NG → **Go to step 19**

OK

REPAIR IS COMPLETE

19	CHECK FILLER NECK DAMAGE



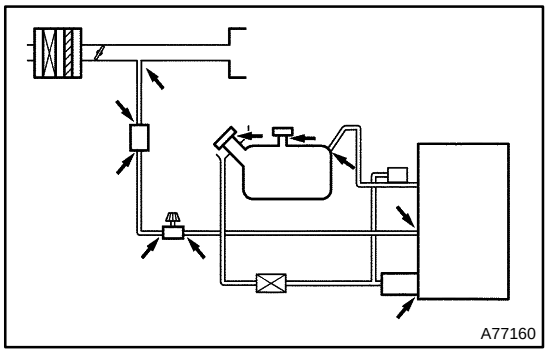
(a) Remove the fuel tank cap.
(b) Visually inspect the filler neck for damage.
(c) Reinstall the fuel tank cap.

HINT:
A leak point may be found with the EVAP Test Equipment (go to step 36).

NG → **REPLACE FUEL TANK INLET PIPE**

OK

20	CHECK PURGE LINE (CANISTER - FUEL TANK)



(a) Check that the pipes and hoses are connected correctly.
(b) Check that the pipes and hoses are not loose or disconnected.
(c) Check the pipes and hoses have no damage or blockage.

NG → **REPLACE PURGE HOSE**

OK

21	CHECK PURGE LINE (CANISTER - EVAP VSV)

(a) Check that the pipes and hoses are connected correctly.
(b) Check that the pipes and hoses are not loose or disconnected.
(c) Check the pipes and hoses have no damage or blockage.

NG → **REPLACE PURGE HOSE**

OK

22	INSPECT CANISTER (See page 12-23)

NG → **REPLACE CANISTER**

OK

23	INSPECT FUEL TANK

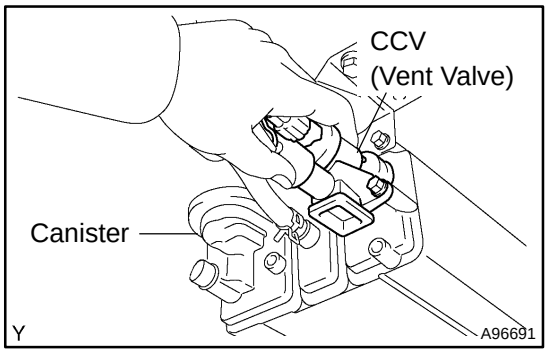
(a) Check that the fuel tank has no damage.
(b) Check the fuel inlet pipe has no damage.
(c) Check leakage from the fuel pump unit.

NG → REPAIR OR REPLACE DEFFECTIVE OR DAMAGED PARTS

OK

Go to step 40

24	CHECK CCV



(a) Stop the engine and turn the ignition switch ON.
(b) Switch the CCV (vent valve) using the hand-held tester. Select the hand-held tester menus: DIAGNOSIS, ENHANCED OBD ll, ACTIVE TEST and CAN CTRL VSV.
(c) Touch the CCV and check the operation during switching the CCV.

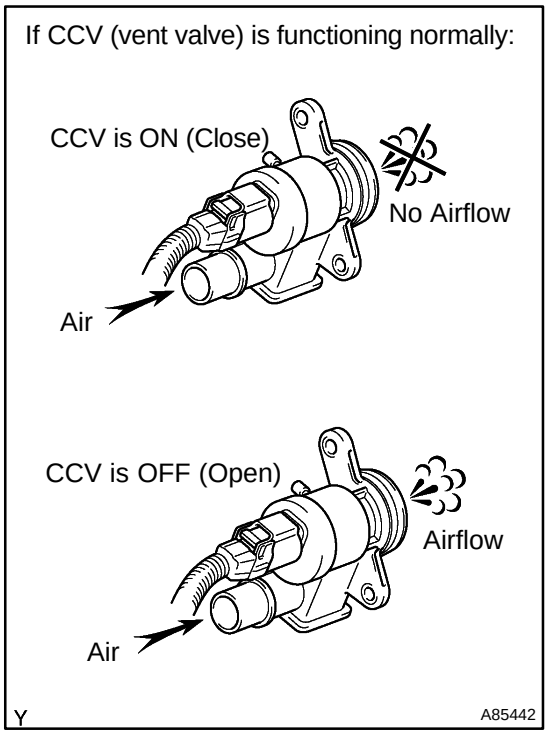
Result

CCV (Vent Valve)	Conclusion	Proceed to
CCV is operated	Electrical circuit of CCV is functioning normally.	A
CCV is not operated	Electrical circuit of CCV is malfunctioning.	B

B → **Go to step 26**

A

25	CHECK CCV



(a) Turn the ignition switch OFF.
(b) Remove the CCV (vent valve).
(c) Connect the CCV connector,
(d) Turn the ignition switch ON.
(e) Switch the CCV using the hand-held tester. Select the hand- held tester menus: DIAGNOSIS, ENHANCED OBD ll, ACTIVE TEST and CAN CTRL VSV.
(f) Apply air to the CCV port using an air gun and check the airflow.

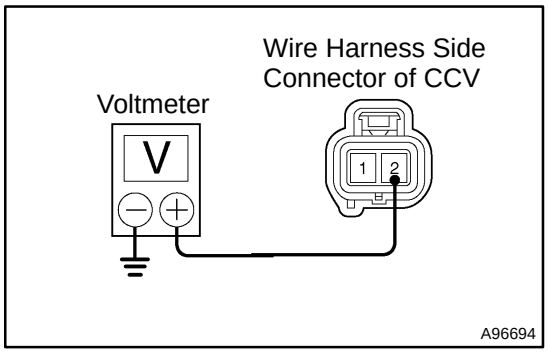
Result

CCV (Vent Valve)	Conclusion	Proceed to
Air flows when CCV is OFF (open). Air does not flows when CCV is ON (close).	CCV is functioning normally. Electrical circuit of CCV is malfunctioning.	A
Air flows when CCV is ON (close). Air does not flows when CCV is OFF (open).	CCV is malfunctioning.	B

B → **REPLACE CCV (See page 12-28)**

A

26 CHECK WIRE HARNESS AND CONNECTOR (CCV - POWER SOURCE)



(a) Turn the ignition switch OFF.
(b) Disconnect the CCV connector.
(c) Turn the ignition switch ON.
(d) Measure the voltage between terminal 2 of the wire harness side connector and body ground.

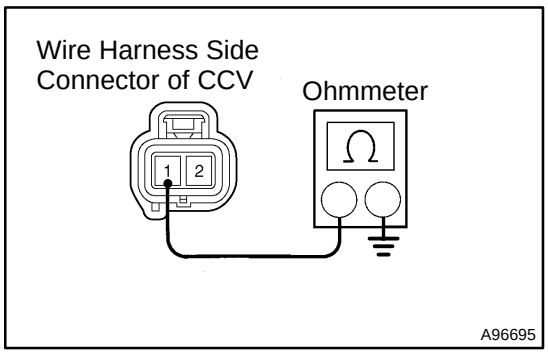
Result

Voltage	Conclusion	Proceed to
Battery voltage	Wire harness (CCV - Power source) is OK.	OK
0 to 3 V	Wire harness (CCV - Power source) is short circuit.	NG

NG → **REPAIR OR REPLACE WIRE HARNESS**

OK

27 CHECK WIRE HARNESS AND CONNECTOR (CCV - ECM)



(a) Switch the CCV using the hand-held tester. Select the hand- held tester menus: DIAGNOSIS, ENHANCED OBD ll, ACTIVE TEST and CAN CTRL VSV.
(b) Measure the resistance between terminal 1 of the wire harness side connector and body ground.

Result

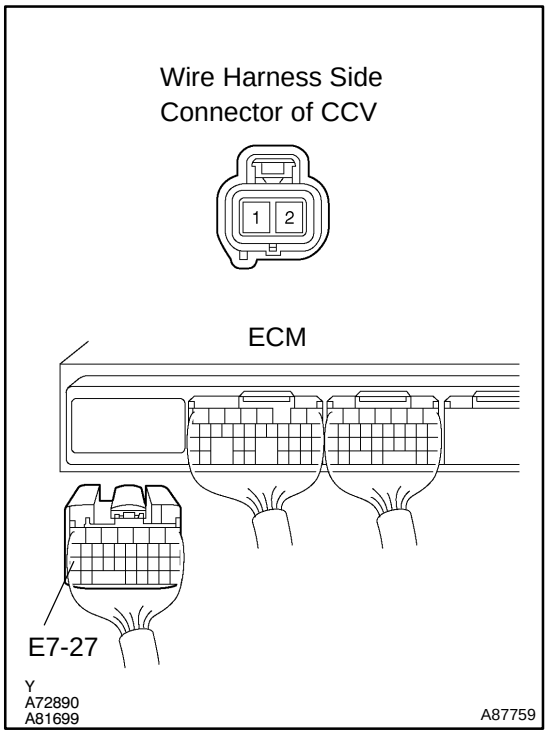
Resistance	Conclusion	Proceed to
More than 10 kΩ when CCV is OFF. Less than 10 Ω when CCV is ON.	ECM and wire harness (CCV - ECM) are OK. CCV is malfunctioning.	OK
No change	Either of wire harness (CCV - ECM) or ECM is malfunctioning.	NG

NG → **Go to step 28**

OK

REPLACE CCV

28	CHECK WIRE HARNESS AND CONNECTOR (CCV - ECM)



(a) Check the wire harness between the ECM and CCV.
(b) Turn the ignition switch OFF.
(c) Disconnect the E7 ECM connector.
(d) Measure the resistance between the CCV and ECM wire harness side connectors.

Standard

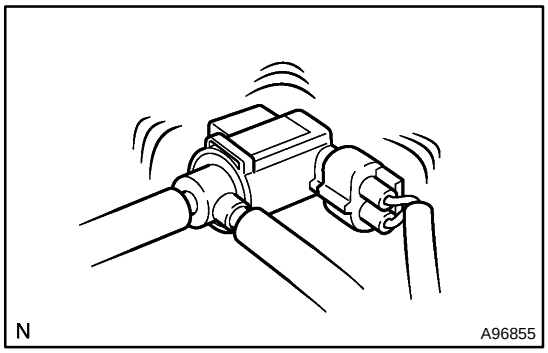
Tester Connection	Specified Condition
1 (CCV) - E7-27 (ECM)	Less than 10 Ω
1 (CCV) - Body ground	More than 10 kΩ

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

CHECK AND REPLACE ECM

29	CHECK EVAP VSV



(a) Turn the ignition switch ON.
(b) Switch the EVAP VSV using the hand-held tester. Select the hand-held tester menus: DIAGNOSIS, ENHANCED OBD ll, ACTIVE TEST and EVAP VSV (Alone).
(c) Listen to click sounds to check the EVAP VSV operation.

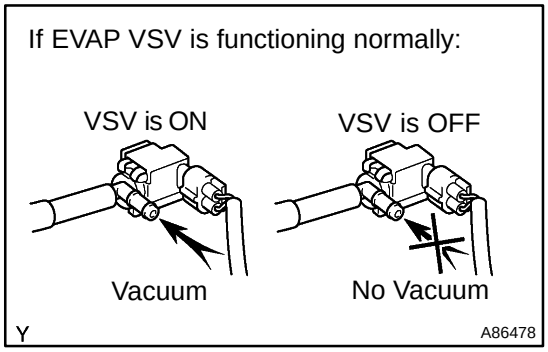
Result

EVAP VSV	Conclusion	Proceed to
Operated	Electrical circuit of EVAP VSV is functioning normally.	OK
Not operated	Electrical circuit of EVAP VSV is malfunctioning.	NG

NG → **Go to step 32**

OK

30	CHECK EVAP VSV



(a) Disconnect the purge hose of the canister from the EVAP VSV.
(b) Start the engine.
(c) Switch the EVAP VSV using the hand-held tester. Select the hand-held tester menus: DIAGNOSIS, ENHANCED OBD ll, ACTIVE TEST and EVAP VSV.
(d) Touch the EVAP VSV port to check the vacuum.

HINT:

The EVAP VSV can be tested with the EVAP Test Equipment (go to step 39).

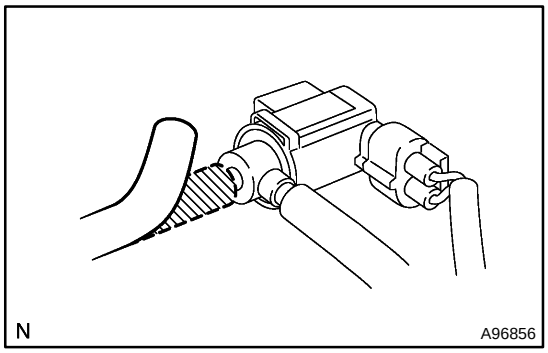
Result

EVAP VSV	Conclusion	Proceed to
Vacuum is applied when EVAP VSV is ON. No vacuum is applied when EVAP VSV is OFF.	EVAP VSV is functioning normally.	OK
No vacuum is applied when EVAP VSV is ON.	Electrical circuit of EVAP VSV is malfunctioning.	NG

NG → **Go to step 32**

OK

31	CHECK PURGE LINE (EVAP VSV - THROTTLE BODY)



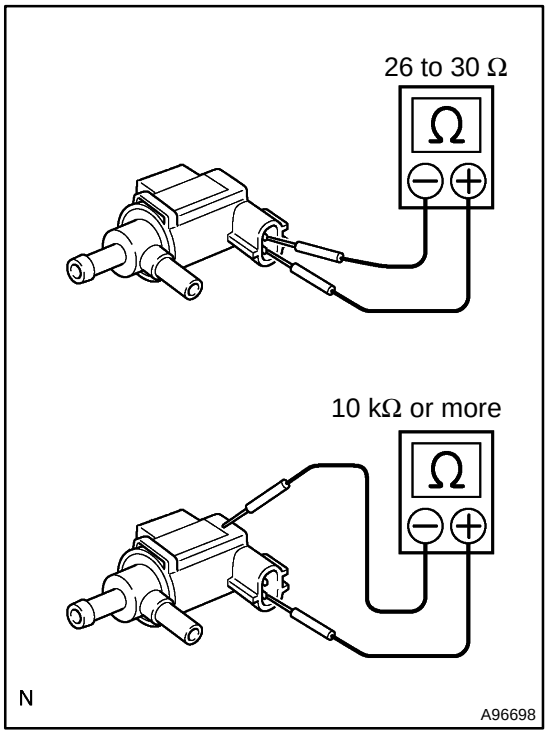
(a) Check that the vacuum hoses are connected correctly.
(b) Check that the vacuum hoses are not loose or disconnected.
(c) Check the vacuum hoses and tubes for cracks, holes, damage, or blockage.

NG → **REPLACE PURGE HOSE**

OK

REPLACE EVAP VSV

32	INSPECT EVAP VSV



(a) Turn the ignition switch OFF.
(b) Disconnect the EVAP VSV connector.
(c) Measure the resistance of the EVAP VSV.

Standard

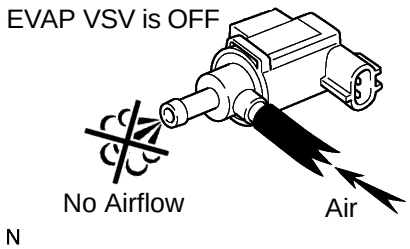
Tester Connection	Specified Condition
Between terminals	26 to 30 Ω at 20°C (68°F)
Each terminal - Body ground	10 kΩ or more

NG → **REPLACE EVAP VSV**

OK

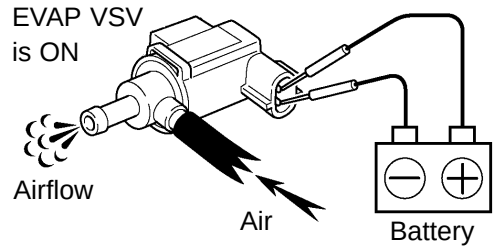
33	INSPECT EVAP VSV

If EVAP VSV is functioning normally:



(a) Remove the EVAP VSV.
(b) Apply air to the EVAP VSV using an air gun, check the airflow.

If EVAP VSV is functioning normally:



(c) Apply battery positive voltage across the terminals.
(d) Apply air to the EVAP VSV using an air gun, check the airflow.

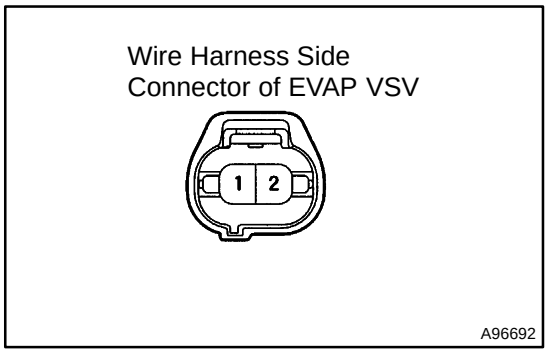
Result

EVAP VSV	Conclusion	Proceed to
Air does not flow when EVAP VSV is OFF. Air flows when EVAP VSV is ON.	EVAP VSV is functioning normally.	OK
Air flows when EVAP VSV is OFF. Air does not flow when EVAP VSV is ON.	EVAP VSV is malfunctioning.	NG

NG → **REPLACE EVAP VSV**

OK

34 CHECK WIRE HARNESS AND CONNECTOR (EVAP VSV - POWER SOURCE)



(a) Turn the ignition switch ON.
(b) Measure the voltage between the terminal 1 of the wire harness side and body ground.

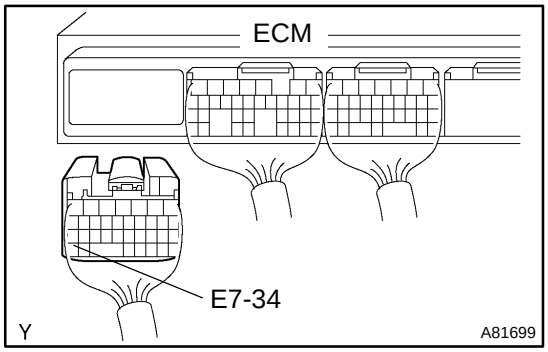
Result

Voltage	Conclusion	Proceed to
Battery voltage	Wire harness (EVAP VSV - Power source) is OK.	OK
0 to 3 V	Wire harness (EVAP VSV - Power source) is short circuit.	NG

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

35 CHECK WIRE HARNESS AND CONNECTOR (EVAP VSV - ECM)



(a) Turn the ignition switch OFF.
(b) Disconnect the E7 ECM connector.
(c) Turn the ignition switch ON.
(d) Measure the voltage between the terminal 34 of the wire harness side and body ground.

Result

Voltage	Conclusion	Proceed to
Battery voltage	Wire harness (EVAP VSV - ECM) is OK.	OK
0 to 3 V	Wire harness (EVAP VSV - ECM) is short circuit.	NG

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

CHECK AND REPLACE ECM

36	CHECK FUEL TANK CAP

(a) Connect the fuel tank cap to the gas cap adaptor.
(b) Connect the pressure hose from the pump to the gas cap adaptor.
(c) Plug the gas cap adaptor port.
(d) Turn the pump ON and pressurize the gas cap adaptor by 24 - 28 mmHg. If the pressure does not reach to 24 mmHg within 45 seconds, stop the pump. The fuel tank cap is malfunctioning.
(e) Turn the pump OFF and seal the pressure line to maintain the pressure.
(f) Measure the pressure change for 2 minutes. If the pressure drops to lower than 15 mmHg, the fuel tank cap is malfunctioning.
Standard: The fuel tank cap keeps the pressure that is 15 mmHg or higher.

NG → **REPLACE FUEL TANK CAP**

OK

37	CHECK LEAK

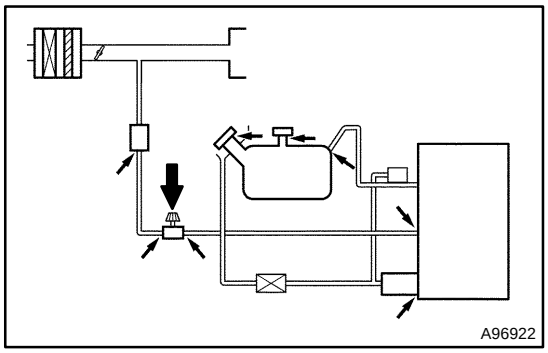
NOTICE:
DO NOT apply the EVAP system to the pressure that is higher than 35 mmHg. The EVAP system will be damaged.
(a) Connect the pressure line from the pump to the EVAP service port.
(b) Turn the ignition switch ON but the engine is not running.
(c) Turn the CCV (vent valve) is ON (close) using the hand-held tester. Select the hand-held tester menus: DIAGNOSIS, ENHANCED OBD ll, ACTIVE TEST and CAN CTRL VSV.
(d) Turn the pump ON and pressurize the EVAP system by 24 - 28 mmHg.
(e) Turn the pump OFF and seal the pressure line to maintain the pressure. If the pressure does not reach to 24 mmHg within 45 seconds, stop the pump. A leakage is in the EVAP system. If the system has a small leak, a whistling sound may be heard.
(f) Measure the pressure change for 2 minutes. If the pressure drops to lower than 15 mmHg, a leakage is in the EVAP system.
Standard: The EVAP system keeps the pressure that is 15 mmHg or higher.

NG → **Go to step 38**

OK

NO LEAKAGE IN EVAP SYSTEM

38	LOOK FOR LEAK POINT



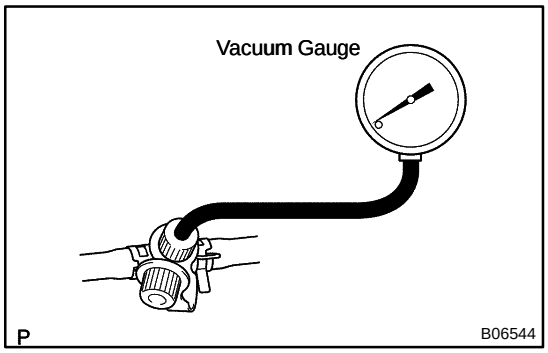
(a) Apply the soapy water on suspected components.
(b) Turn the CCV (vent valve) is ON (close) using the hand-held tester. Select the hand-held tester menus: DIAGNOSIS, ENHANCED OBD ll, ACTIVE TEST and CAN CTRL VSV.
(c) Turn the pump ON and pressurize the EVAP system by 24 - 28 mmHg.
(d) Turn the pump OFF and seal the pressure line to maintain the pressure. If the pressure does not reach to 24 mmHg within 45 seconds, stop the pump.
(e) Check bubbles to find the leak point:
- ○ EVAP service port
- ○ Canister
- ○ Hose connections/Lines
- ○ Fuel cap
- ○ Fuel filler neck
- ○ Purge line
- ○ EVAP VSV
- ○ CCV (vent valve)
- ○ Fuel pump sending unit

(f) Repair or replace the leak component.
(g) Perform the EVAP system check to confirm no leak.

NEXT

Go to step 4

39	CHECK EVAP VSV



(a) Connect the vacuum gauge to the EVAP service port.
  (1) Start the engine.
  (2) Switch the EVAP VSV using the hand-held tester. Select the hand-held tester menus: DIAGNOSIS, ENHANCED OBD ll, ACTIVE TEST and EVAP VSV.
  (3) Check the vacuum when switching the EVAP VSV. If the vacuum gauge indicates negative value when the EVAP VSV is ON, the EVAP VSV is functioning normally.

OK:

The vacuum gauge indicates negative value when the EVAP VSV is ON.

NG → **Go to step 31**

OK

Go to step 17

40	CHECK MONITOR STATUS AND DTC

(a) Clear DTCs.
(b) Perform a drive pattern test (see page 05-387).
(c) Check that the monitor result is PASS.
(d) Confirm no pending DTC.

NEXT

REPAIR IS COMPLETE

05EX9-05

FAIL-SAFE CHART

If any of the following codes are recorded, the ECM enters fail-safe mode.

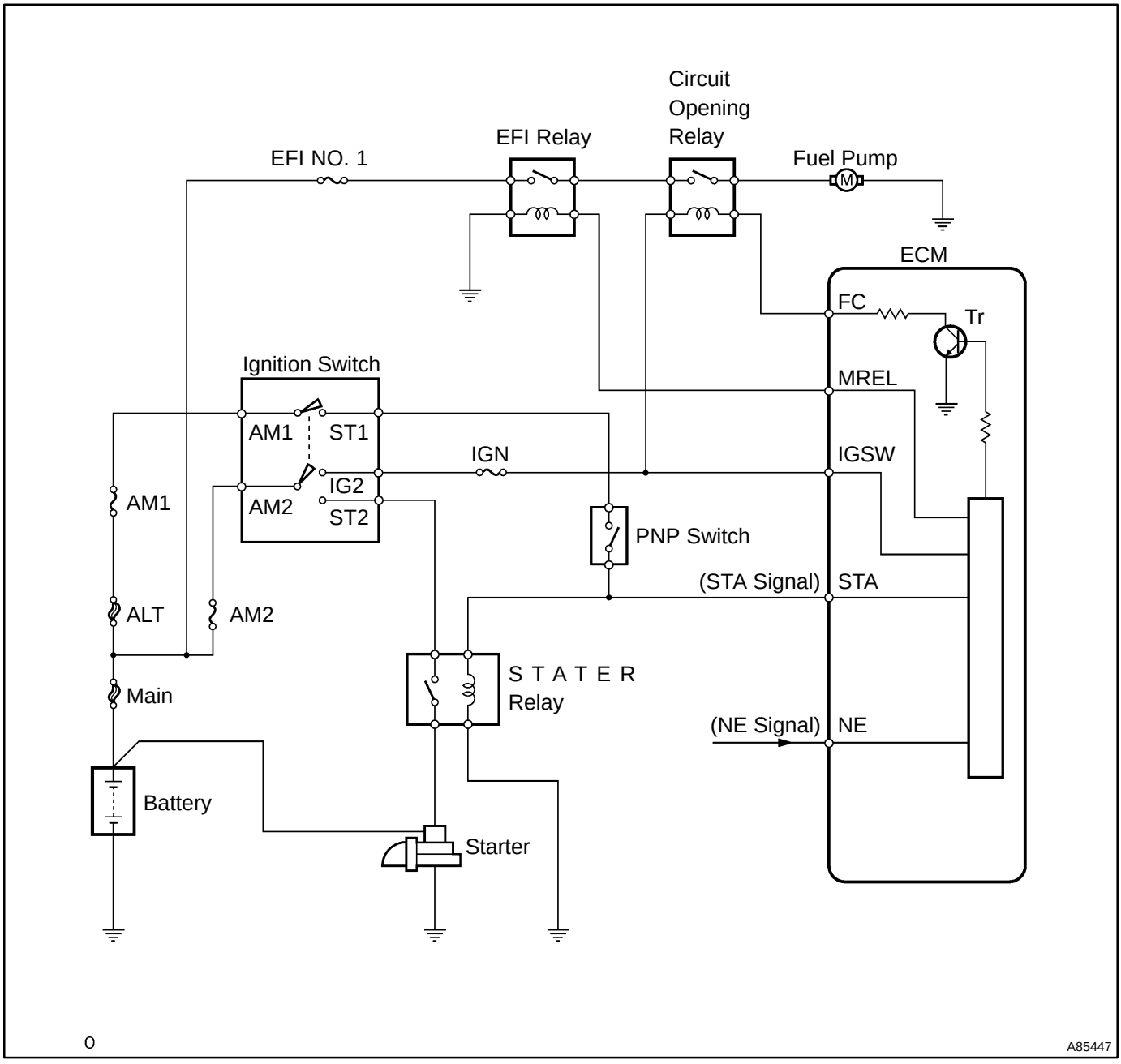
DTC No.	Fail-Safe Operation	Fail-Safe Deactivation Conditions
P0031 P0032 P0037 P0038 P0051 P0052 P0057 P0058	Turn off heater	Ignition switch OFF
P0100 P0102 P0103	Ignition timing is calculated from engine RPM and TP (Throttle Position)	”Pass” condition detected
P0110 P0112 P0113	IAT (Intake Air Temperature) is fixed at 20˚C (68˚F)	”Pass” condition detected
P0115 P0117 P0118	ECT (Engine Coolant Temperature) is fixed at 80˚C (176˚F)	”Pass” condition detected
P0120 P0121 P0122 P0123 P0220 P0222 P0223 P0604 P0606 P0607 P0657 P2102 P2103 P2111 P2112 P2118 P2119 P2135	If the Electronic Throttle Control System (ETCS) has a malfunction, the ECM cuts off current to the throttle control motor. The throttle control valve returns to a predetermined opening angle (approximately 16°) by the force of the return spring. The ECM then adjusts the engine output by controlling the fuel injection (intermittent fuel-cut) and ignition timing in accordance with the accelerator pedal opening angle to enable the vehicle to continue at a minimal speed. If the accelerator pedal is depressed firmly and slowly, the vehicle can be driven slowly. If the accelerator pedal is depressed quickly, the vehicle may speed up and slow down erratically.	”Pass” condition is detected and then the ignition switch is turned OFF.
P0325 P0327 P0328 P0330 P0332 P0333	Maximum ignition timing retardation	Ignition switch OFF

DTC No.	Fail-Safe Operation	Fail-Safe Deactivation Conditions
P0351 P0352 P0353 P0354 P0355 P0356	Fuel is cut	”Pass” condition detected
P2120 P2121 P2122 P2123 P2125 P2127 P2128 P2138	The accelerator pedal position sensor has two (main and sub) sensor circuits. If a malfunction occurs in either of the sensor circuits, the ECM detects the abnormal signal voltage difference between the two sensor circuits and switches to limp mode. In limp mode, the functioning circuit is used to calculate the accelerator pedal opening angle to allow the vehicle to continue driving. If both circuits malfunction, the ECM regards the opening angle of the accelerator pedal to be fully closed. In this case, the throttle valve will remain closed as if the engine is idling.	”Pass” condition is detected and the ignition switch is turned OFF.

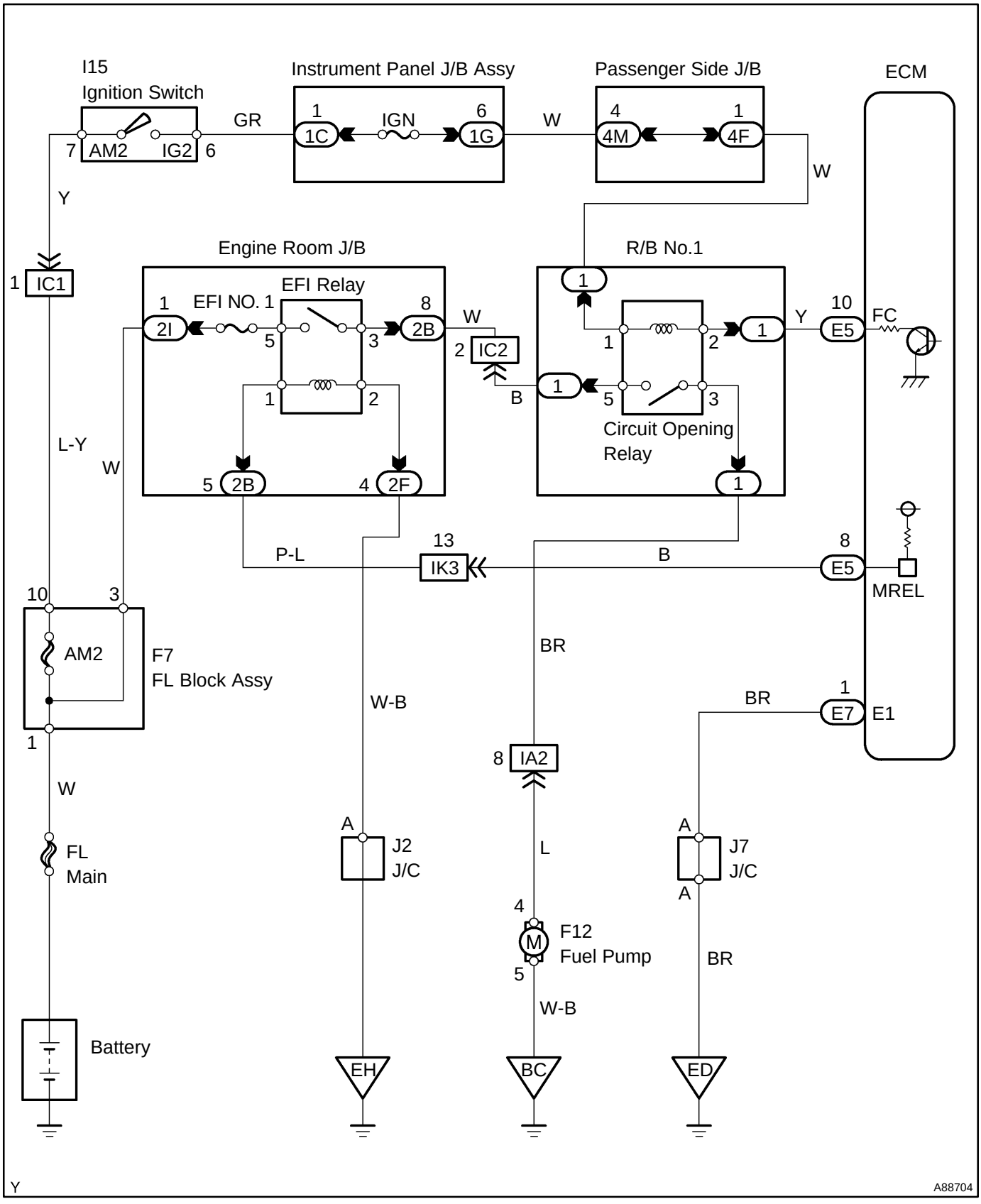
FUEL PUMP CONTROL CIRCUIT

CIRCUIT DESCRIPTION

When the engine is cranked, current flows from the ignition switch terminal ST1 to the starter relay (Marking: STARTER), and current flows to terminal STA of ECM (STA signal).
When the STA signal and NE signal are input to the ECM, Tr is turned ON, current flows to coil of the circuit opening relay, the relay switches on, power is supplied to the fuel pump and the fuel pump operates.
While the NE signal is generated and the engine is running, the ECM keeps Tr ON (Circuit Opening relay ON) and the fuel pump also keeps operating.



WIRING DIAGRAM



INSPECTION PROCEDURE

Hand-held tester:

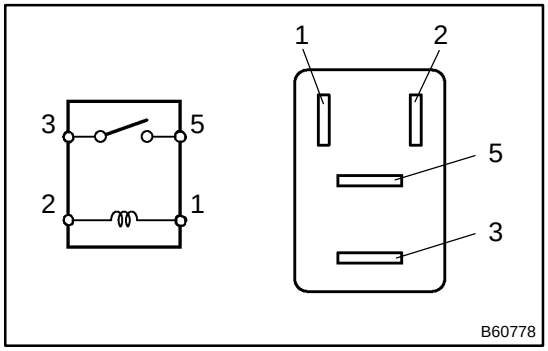
1	PERFORM ACTIVE TEST USING HAND-HELD TESTER (OPERATE C/OPN RELAY)

(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester main switch ON.
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / FUEL PUMP / SPD.
(d) Check the relay operation while operating it with the hand-held tester.
Standard: Operating noise can be heard from the relay.

OK → **Go to step 5**

NG

2	INSPECT RELAY



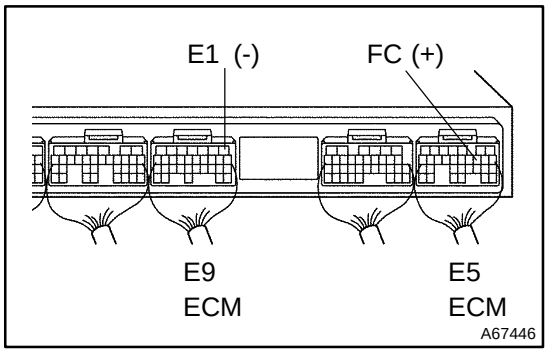
(a) Remove the circuit opening relay from the R/B sub-assy.
(b) Check the resistance of the circuit opening relay.
Standard:

Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

NG → **REPLACE RELAY**

OK

3	INSPECT ECM (FC VOLTAGE)



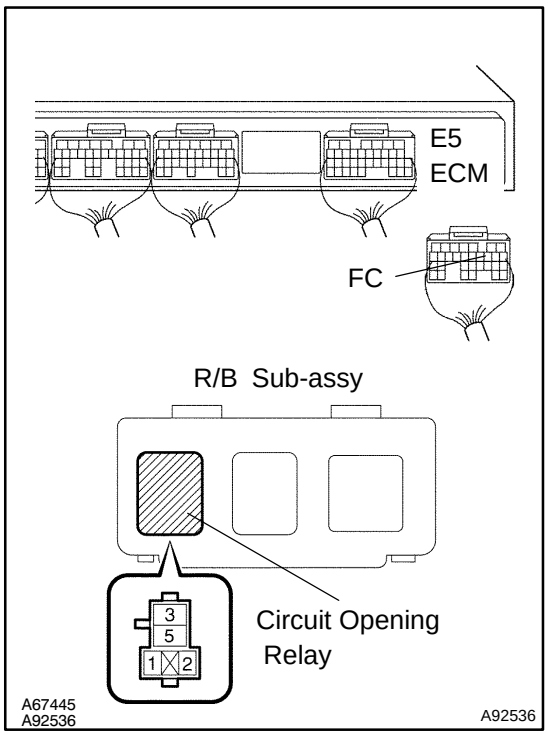
(a) Turn the ignition switch ON.
(b) Measure the voltage of the ECM connectors.
Standard:

Tester Connection	Specified Condition
E5-10 (FC) - E9-1 (E1)	9 to 14 V

OK → **REPLACE ECM (See page 10-24)**

NG

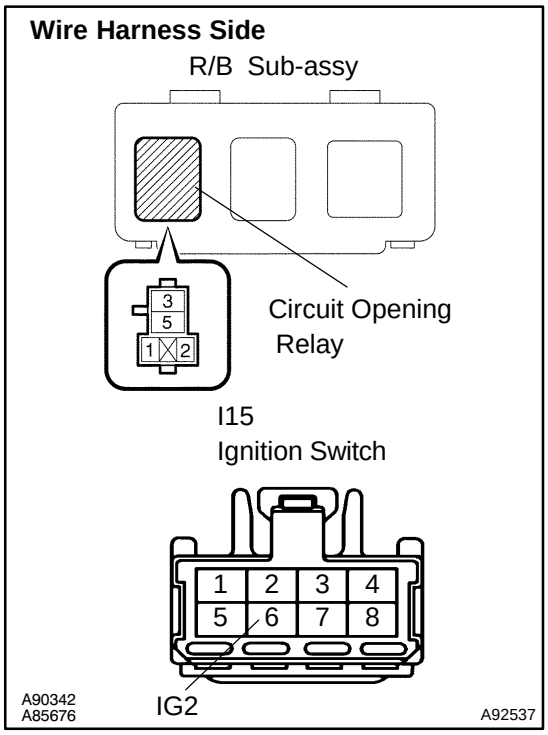
4	CHECK WIRE HARNESS (ECM - CIRCUIT OPENING RELAY, CIRCUIT OPENING RELAY - IGNITION)



(a) Check the wire harness between the ECM and circuit opening relay.
(1) Disconnect the E5 ECM connector.
(2) Remove the circuit opening relay from the R/B sub-assy.
(3) Check the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
E5-10 (FC) - R/B sub-assy circuit opening relay terminal 2	Below 1 Ω
E5-10 (FC) or R/B sub-assy circuit opening relay terminal 2 - Body ground	10 kΩ or higher



(b) Check the wire harness between the circuit opening relay and ignition switch.
(1) Check the IGN fuse.
* Remove the IGN fuse from the instrument panel J/B assy.
* Check the resistance of the IGN fuse.

Standard: Below 1 Ω

* Reinstall the IGN fuse.

(2) Remove the circuit opening relay from the R/B sub-assy.
(3) Disconnect the I15 ignition switch connector.
(4) Check the resistance of the wire harness side connectors.

Standard:

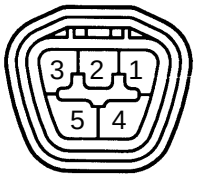
Tester Connection	Specified Condition
R/B sub-assy circuit opening relay terminal 1 - I15-6	Below 1 Ω
I15-6 or R/B sub-assy circuit opening relay terminal 1 - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE ECM (See page 10-24)

5	INSPECT FUEL PUMP ASSY



F12
Fuel Pump

A74356

(a) Check the fuel pump resistance.
(1) Measure the resistance between terminals 4 and 5.
Standard: 0.2 to 3.0 Ω at 20°C (68°F)

(b) Check the fuel pump operation
(1) Apply battery voltage to both the terminals. Check that the pump operates.

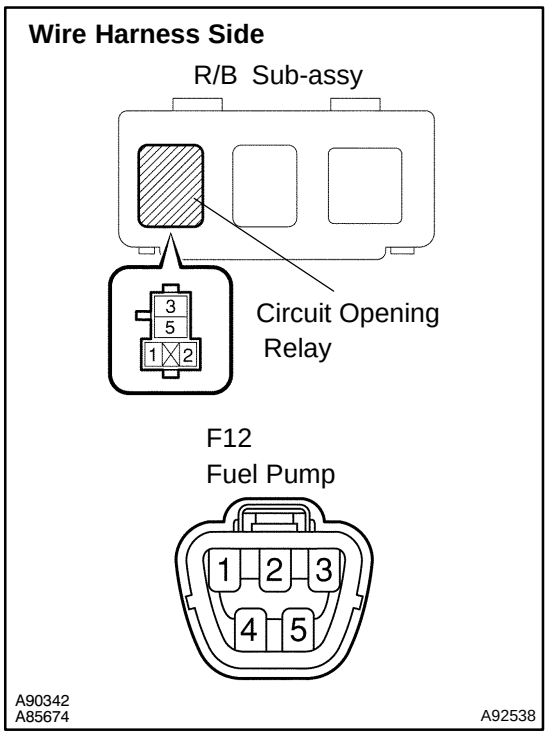
NOTICE:

- **These tests must be done quickly (within 10 seconds) to prevent the coil from burning out.**
- **Keep fuel pump as far away from the battery as possible.**
- **Always turn on and off the voltage on the battery side, not the fuel pump side.**

NG → **REPLACE FUEL PUMP ASSY**
(See page 11-55)

OK

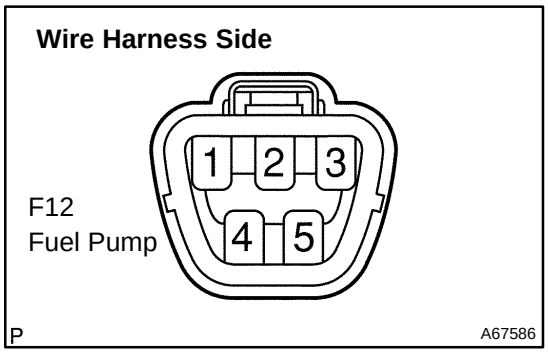
6	CHECK WIRE HARNESS (CIRCUIT OPENING RELAY - FUEL PUMP, FUEL PUMP - BODY GROUND)



(a) Check the wire harness between the circuit opening relay and fuel pump.
(1) Remove the circuit opening relay from the R/B sub-assy.
(2) Disconnect the F12 fuel pump connector.
(3) Check the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
R/B sub-assy circuit opening relay terminal 3 - F12-4	Below 1 Ω
R/B sub-assy circuit opening relay terminal 3 or F12-4 - Body ground	10 kΩ or higher



(b) Check the wire harness between the fuel pump and body ground.
(1) Disconnect the F12 fuel pump connector.
(2) Check the resistance the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
F12-5 - Body ground	Below 1 Ω

OK → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

NG

REPLACE ECM (See page 10-24)

OBD II scan tool (excluding hand-held tester):

1	CHECK FUEL PUMP OPERATION (See page 11-38)

(a) Check if there is pressure in the fuel inlet hose.

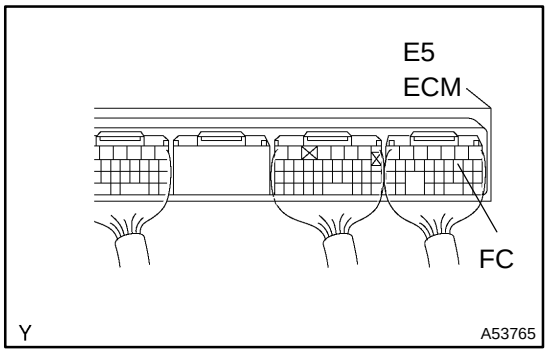
HINT:

The pipe has fuel pressure if the sound of flowing fuel can be heard.

OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE (See page 05-393)**

NG

2 CHECK RELAY OPERATION (OPERATION)



(a) When connecting between terminal FC of the E5 ECM connector and the body ground, check the relay operation.

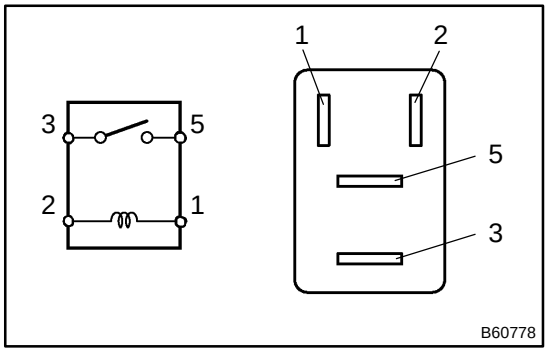
OK:

Noise can be heard from the circuit opening relay.

OK → **Go to step 6**

NG

3 INSPECT RELAY



(a) Remove the circuit opening relay from the R/B sub-assy.

(b) Check the resistance of the circuit opening relay.

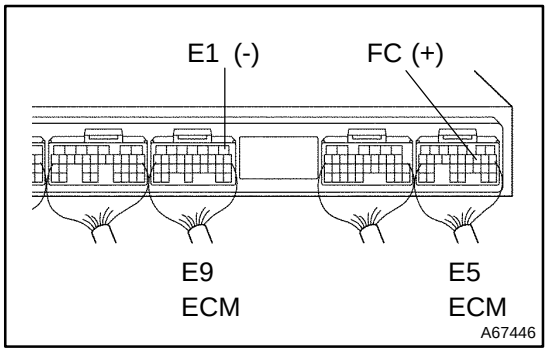
Standard:

Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

NG → **REPLACE RELAY**

OK

4 INSPECT ECM (FC VOLTAGE)



(a) Turn the ignition switch ON.

(b) Measure the voltage of the ECM connectors.

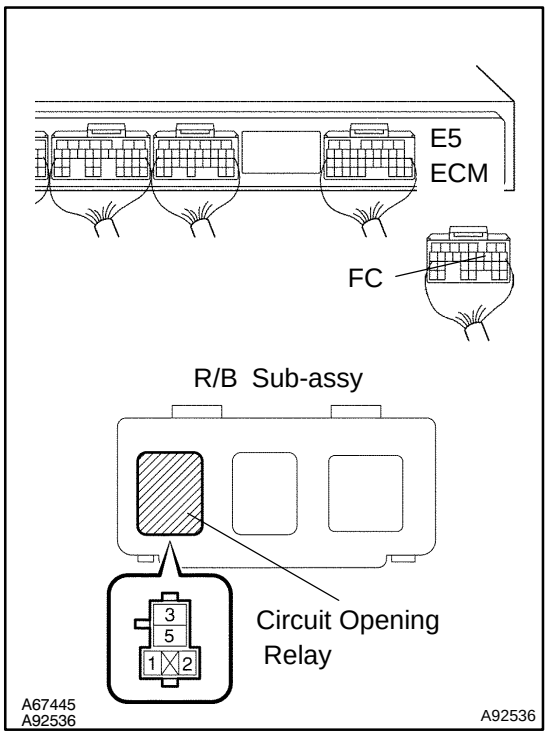
Standard:

Tester Connection	Specified Condition
E5-10 (FC) - E9-1 (E1)	9 to 14 V

OK → **REPLACE ECM (See page 10-24)**

NG

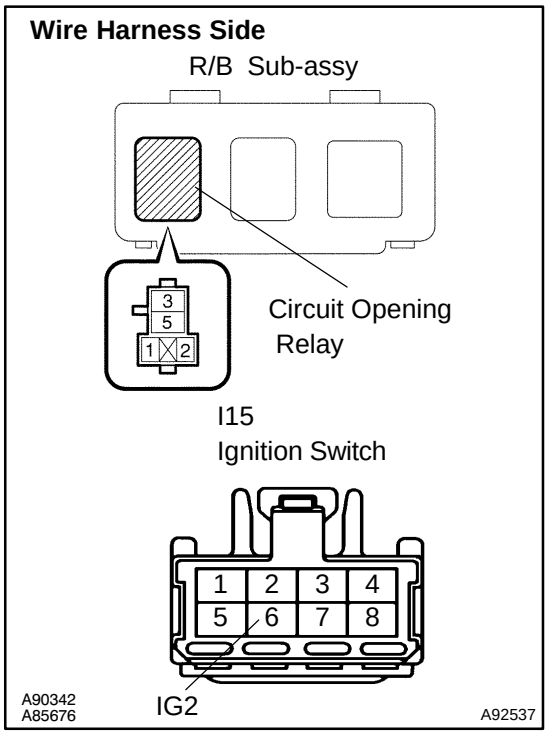
5	CHECK WIRE HARNESS (ECM - CIRCUIT OPENING RELAY, CIRCUIT OPENING RELAY - IGNITION)



(a) Check the wire harness between the ECM and circuit opening relay.
(1) Disconnect the E5 ECM connector.
(2) Remove the circuit opening relay from the R/B sub-assy.
(3) Check the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
E5-10 (FC) - R/B sub-assy circuit opening relay terminal 2	Below 1 Ω
E5-10 (FC) or R/B sub-assy circuit opening relay terminal 2 - Body ground	10 kΩ or higher



(b) Check the wire harness between the circuit opening relay and ignition switch.
(1) Check the IGN fuse.
* Remove the IGN fuse from the instrument panel J/B assy.
* Check the resistance of the IGN fuse.

Standard: Below 1 Ω

* Reinstall the IGN fuse.

(2) Remove the circuit opening relay from the R/B sub-assy.
(3) Disconnect the I15 ignition switch connector.
(4) Check the resistance of the wire harness side connectors.

Standard:

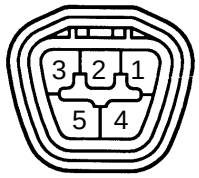
Tester Connection	Specified Condition
R/B sub-assy circuit opening relay terminal 1 - I15-6	Below 1 Ω
I15-6 or R/B sub-assy circuit opening relay terminal 1 - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE ECM (See page 10-24)

6	INSPECT FUEL PUMP ASSY



F12
Fuel Pump

A74356

(a) Check fuel pump resistance.
  (1) Measure the resistance between terminals 4 and 5.
  Standard: 0.2 to 3.0 Ω at 20°C (68°F)

(b) Check fuel pump operation
  (1) Apply battery voltage to both the terminals. Check that the pump operates.

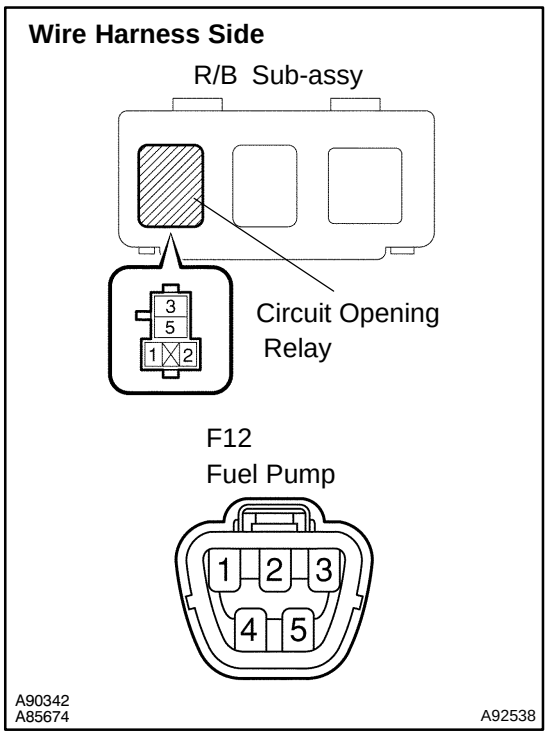
NOTICE:

- **These tests must be done quickly (within 10 seconds) to prevent the coil from burning out.**
- **Keep fuel pump as far away from the battery as possible.**
- **Always turn on and off the voltage on the battery side, not the fuel pump side.**

NG → **REPLACE FUEL PUMP ASSY**
(See page 11-55)

OK

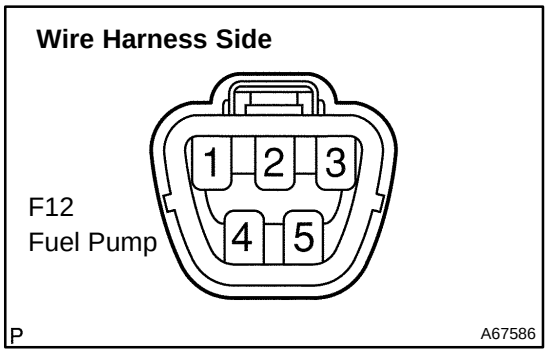
7	CHECK WIRE HARNESS (CIRCUIT OPENING RELAY - FUEL PUMP, FUEL PUMP - BODY GROUND)



(a) Check the wire harness between the circuit opening relay and fuel pump.
(1) Remove the circuit opening relay from the R/B sub-assy.
(2) Disconnect the F12 fuel pump connector.
(3) Check the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
R/B sub-assy circuit opening relay terminal 3 - F12-4	Below 1 Ω
R/B sub-assy circuit opening relay terminal 3 or F12-4 - Body ground	10 kΩ or higher



(b) Check the wire harness between the fuel pump and body ground.
(1) Disconnect the F12 fuel pump connector.
(2) Check the resistance the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
F12-5 - Body ground	Below 1 Ω

OK	REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

REPLACE ECM (See page 10-24)

05IQH-02

LIST OF DISABLE A MONITOR

HINT:

The table below shows the ECM monitoring status for the components listed in the top of the table when the DTCs on the left of the table are set.

Monitor detected malfunction

Fault code	Fault code	Component/ system	Monitor disablement (×−disabled)																												
			P0010,P0020	P0011	P0012	P0016,P0018	P0021	P0022	P0030,50	P0135,P0155	P0036,56	P0043,44,63,64	P0100	P0101	P0105	P0106	P0110	P0115	P0116	P0120,P0121	P0125	P0128	P0130-P0153	P0134,P0154	P0136,P0156	P0142,P0162	P0171,P0172	P0300-P0308			
			P0010,P0020	P0011	P0012	P0016,P0018	P0021	P0022	P0031,32,51,52	P0031,32,51,52	P0037,38,57,58	P0043,44,63,64	P0100-P0103	P0101	P0105-P0108	P0106	P0110-P0113	P0115-P0118	P0116	P0120-P0223,P2135	P0125	P0128	P0130-P0153	P0134,P0154	P0136,P0156	P0142,P0162	P0171,P0172	P0300-P0308			
			VVT VSV 1, 2	VVT System 1 – Advance	VVT System 1 – Retard	VVT System – Misalignment	VVT System 2 – Advance	VVT System 2 – Retard	O2 Sensor Heater–Sensor1	A/F Sensor Heater–Sensor1	O2 Sensor Heater–Sensor2	O2 Sensor Heater–Sensor3	MAF sensor	MAF sensor	MAP sensor	MAP sensor	IAT sensor	ECT sensor	ECT sensor	TP sensor	Insufficient ECT for Closed Loop	Thermostat	O2 Sensor–Sensor1	O2 Sensor, A/F sensor (No Activity)–Sensor1	O2 Sensor–Sensor2	O2 Sensor–Sensor3	Fuel system	Misfire			
P0010,P0020	P0010,P0020	VVT VSV 1, 2																			×					×					
P0011	P0011	VVT System 1 – Advance				×		×														×					×					
P0012	P0012	VVT System 1 – Retard				×		×														×					×					
P0016,P0018	P0016,P0018	VVT System – Misalignment																													
P0021	P0021	VVT System 2 – Advance			×	×																×					×					
P0022	P0022	VVT System 2 – Retard			×																	×					×					
P0030,50	P0031,32,51,52	O2 Sensor Heater–Sensor1																				×	×	×	×	×	×				
P0135,P0155	P0031,32,51,52	A/F Sensor Heater–Sensor1																				×			×	×	×				
P0036,56	P0037,38,57,58	O2 Sensor Heater–Sensor2																							×	×					
P0043,44,63,64	P0043,44,63,64	O2 Sensor Heater–Sensor3																								×					
P0100,P0101	P0100-P0103	MAF sensor		×	×		×	×											×		×	×	×	×	×	×	×	×			
P0105,P0106	P0105-P0108	MAP sensor		×	×		×	×											×		×	×	×	×	×	×	×	×			
P0110	P0110-P0113	IAT sensor																			×	×	×	×	×	×		×			
P0115,P0116	P0115-P0118	ECT sensor		×	×	×	×	×						×		×					×	×	×	×	×	×	×	×			
P0120,P0121	P0120-P0223,P2135	TP sensor												×		×							×	×	×	×	×	×			
P0125	P0125	Insufficient ECT for Closed Loop		×	×		×	×						×		×						×	×	×	×	×	×	×			
P0128	P0128	Thermostat																													
P0130-P0153	P0130-P0153	O2 Sensor–Sensor1																				×		×	×	×					
P0134,P0154	P0134,P0154	O2 Sensor, A/F sensor (No Activity)–Sensor1								×												×	×		×	×	×				
P0136,P0156	P0136,P0156	O2 Sensor–Sensor2																													
P0142,P0162	P0142,P0162	O2 Sensor–Sensor3																													
P0171,P0172	P0171,P0172	Fuel system																				×	×	×	×	×					
P0300-P0308	P0300-P0308	Misfire							×													×	×	×	×	×					
P0325,P0330	P0325-P0333	Knock sensor																													
P0335	P0335	CKP sensor		×	×		×	×						×		×						×	×	×	×	×	×	×			
P0340,P0341	P0340,P0341	CMP sensor		×	×		×	×						×		×						×	×	×	×	×	×	×			
P0340-P0346	P0340-P0346	VVT sensor 1, 2																				×									
P0351-P0358	P0351-P0358	Ignitor		×	×		×	×														×									
P0385	P0385	CKP sensor 2												×		×						×	×	×	×	×	×	×			
P0401	P0401	EGR system (closed)																				×					×				
P0402	P0402	EGR system (open)																				×	×	×	×	×	×				
P0405,P0409	P0405-P0409	Lift sensor																									×				
P0420,P0430	P0420,P0430	Catalyst																													
P0442-P0456	P0442-P0456	EVAP system																					×	×	×	×					
P0450,P0451	P0450-P0453	EVAP press sensor																													

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Monitor detected malfunction

Fault code	Fault code	Component/ system	Monitor disablement (×−disabled)																												
			P0010,P0020	P0011	P0012	P0016,P0018	P0021	P0022	P0030,50	P0135,P0155	P0036,56	P0043,44,63,64	P0100	P0101	P0105	P0106	P0110	P0115	P0116	P0120,P0121	P0125	P0128	P0130-P0153	P0134,P0154	P0136,P0156	P0142,P0162	P0171,P0172	P0300-P0308				
			P0010,P0020	P0011	P0012	P0016,P0018	P0021	P0022	P0031,32,51,52	P0031,32,51,52	P0037,38,57,58	P0043,44,63,64	P0100-P0103	P0101	P0105-P0108	P0106	P0110-P0113	P0115-P0118	P0116	P0120-P0223,P2135	P0125	P0128	P0130-P0153	P0134,P0154	P0136,P0156	P0142,P0162	P0171,P0172	P0300-P0308				
			VVT VSV 1, 2	VVT System 1 – Advance	VVT System 1 – Retard	VVT System – Misalignment	VVT System 2 – Advance	VVT System 2 – Retard	O2 Sensor Heater–Sensor1	A/F Sensor Heater–Sensor1	O2 Sensor Heater–Sensor2	O2 Sensor Heater–Sensor3	MAF sensor	MAF sensor	MAP sensor	MAP sensor	IAT sensor	ECT sensor	ECT sensor	TP sensor	Insufficient ECT for Closed Loop	Thermostat	O2 Sensor–Sensor1	O2 Sensor, A/F sensor (No Activity)–Sensor1	O2 Sensor–Sensor2	O2 Sensor–Sensor3	Fuel system	Misfire				
P0500	P0500	VSS																				×	×	×	×	×	×	×			
P0511	P0511	IAC valve																					×								
P0510	P0510	Idle switch												×		×						×	×		×	×	×	×			
P0560	P0560	System Voltage																													
P0617	P0617	Starter signal																													
P0705	P0705	Shift lever position switch																													
P0710	P0710-P0713	Trans fluid temp sensor																													
P0720-P0793	P0720-P0793	Output speed sensor																													
P0715-P0717	P0715-P0717	Input speed sensor																													
P0724	P0724	Stop lamp switch																													
P0741-P0796	P0741-P0796	Trans solenoid (function)																													
P0748-P0798	P0748-P0798	Trans solenoid (range)																													
P0850	P0850	PNP switch																													×
P1010,P1020	P1010,P1020	VVTL																				×					×				
P1011,12(,21,22)	P1011,12(,21,22)	VVTL system1(,2)																				×					×				
P1126	P1126	Electronic magnet clutch																													
P1129	P1129	Electronic throttle system																													
P1430	P1430	HC adsorber ACT press sensor																													
P2004,6	P2004,6	Intake Manifold Runner Control																													
P2009,10	P2009,10	Intake Manifold Runner Control Circuit																													
P2014,16,17	P2014,16,17	Intake Manifold Runner Position Sensor																													
P2102,P2103	P2102,P2103	Throttle motor																													
P2120-P2138	P2120-P2138	Accel position sensor																													
P2196,P2198	P2196,P2198	A/F sensor (rationality)																				×			×	×					
P2226	P2226	BARO sensor																					×		×	×					
P2237,2240	P2237,2240	A/F sensor (open)																				×			×	×					
P2423,24	P2423,24	HC Absorption Catalyst																													
P2430,2,3	P2430,2,3	A/R Pressure Sensor (Low/High)																													
P2431	P2431	A/R Pressure Sensor (Rationality)																													
P2440	P2440	A/R control valve stuck open																					×	×	×	×	×				
P2441	P2441	A/R control valve stuck close																					×	×	×	×	×				
P2444	P2444	AIP stuck On																					×	×	×	×	×				
P2445	P2445	AIP stuck Off																					×	×	×	×	×				
P2714-P2759	P2714-P2759	Trans solenoid (SLU-SLD)																													
P2A00,P2A03	P2A00,P2A03	A/F sensor (slow response)																				×			×	×					

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Monitor detected malfunction

| Fault code | Fault code | Component/ system | Monitor disablement (×—disabled) | | |

Monitor detected malfunction

Fault code	Fault code	Component/ system	Monitor disablement (×−disabled)																														
			P0325,P0330	P0335	P0340,P0341	P0340-P0346	P0351-P0358	P0385	P0401	P0402	P0405	P0409	P0420,P0430	P0440-P0446	P0450,P0451	P0500	P0500	P0500	P0500	P0511	P0510	P0560	P0617	P0705	P0710	P0720-P0793	P0715-P0717	P0724	P0741-P0796				
			P0325-P0333	P0335	P0340,P0341	P0340-P0346	P0351-P0358	P0385	P0401	P0402	P0405,P0406	P0409	P0420,P0430	P0440-P0446	P0450-P0453	P0500	P0500	P0500	P0500	P0511	P0510	P0560	P0617	P0705	P0710-P0713	P0720-P0793	P0715-P0717	P0724	P0741-P0796				
			Knock sensor	CKP sensor	CMP sensor	VVT sensor 1, 2	Ignitor	CKP sensor 2	EGR system (closed)	EGR system (open)	EGR Lift sensor	EGR Lift sensor	Catelyst	EVAP system	EVAP press sensor	VSS (ECT2 sensor)	VSS (ECT1 sensor, non-ECT)	VSS (M/T)	IAC valve	Idle switch	System Voltage	Starter signal	Shift lever position switch	Trans fluid temp sensor	Output speed sensor	Input speed sensor	Stop lamp switch	Trans solenoid (function)*1				
P0500	P0500	VSS							×	×			×	×						×							×	×					×
P0511	P0511	IAC valve																															
P0510	P0510	Idle switch								×			×	×						×													×
P0560	P0560	System Voltage																															
P0617	P0617	Starter signal																															
P0705	P0705	Shift lever position switch																															
P0710	P0710-P0713	Trans fluid temp sensor																															
P0720-P0793	P0720-P0793	Output speed sensor																															×
P0715-P0717	P0715-P0717	Input speed sensor																															
P0724	P0724	Stop lamp switch																															
P0741-P0796	P0741-P0796	Trans solenoid (function)																															
P0748-P0798	P0748-P0798	Trans solenoid (range)																							×	×		×					×
P0850	P0850	PNP switch																	×									×					×
P1010,P1020	P1010,P1020	VVTL																															
P1011,12(,21,22)	P1011,12(,21,22)	VVTL system1(,2)							×	×			×	×					×														
P1126	P1126	Electronic magnet clutch																															
P1129	P1129	Electronic throttle system																															
P1430	P1430	HC adsorber ACT press sensor												×	×																		
P2004,6	P2004,6	Intake Manifold Runner Control																															
P2009,10	P2009,10	Intake Manifold Runner Control Circuit																															
P2014,16,17	P2014,16,17	Intake Manifold Runner Position Sensor																															
P2102,P2103	P2102,P2103	Throttle motor																															
P2120-P2138	P2120-P2138	Accel position sensor																															
P2196,P2198	P2196,P2198	A/F sensor (rationality)							×	×			×						×														×
P2226	P2226	BARO sensor																															×
P2237,2240	P2237,2240	A/F sensor (open)							×	×			×						×														×
P2423,24	P2423,24	HC Absorption Catalyst																															
P2430,2,3	P2430,2,3	A/R Pressure Sensor (Low/High)																															
P2431	P2431	A/R Pressure Sensor (Rationality)																															
P2440	P2440	A/R control valve stuck open							×	×			×																				
P2441	P2441	A/R control valve stuck close							×	×			×																				
P2444	P2444	AIP stuck On							×	×			×																				
P2445	P2445	AIP stuck Off							×	×			×																				
P2714-P2759	P2714-P2759	Trans solenoid (SLU-SLD)																															×
P2A00,P2A03	P2A00,P2A03	A/F sensor (slow response)							×	×			×						×														×

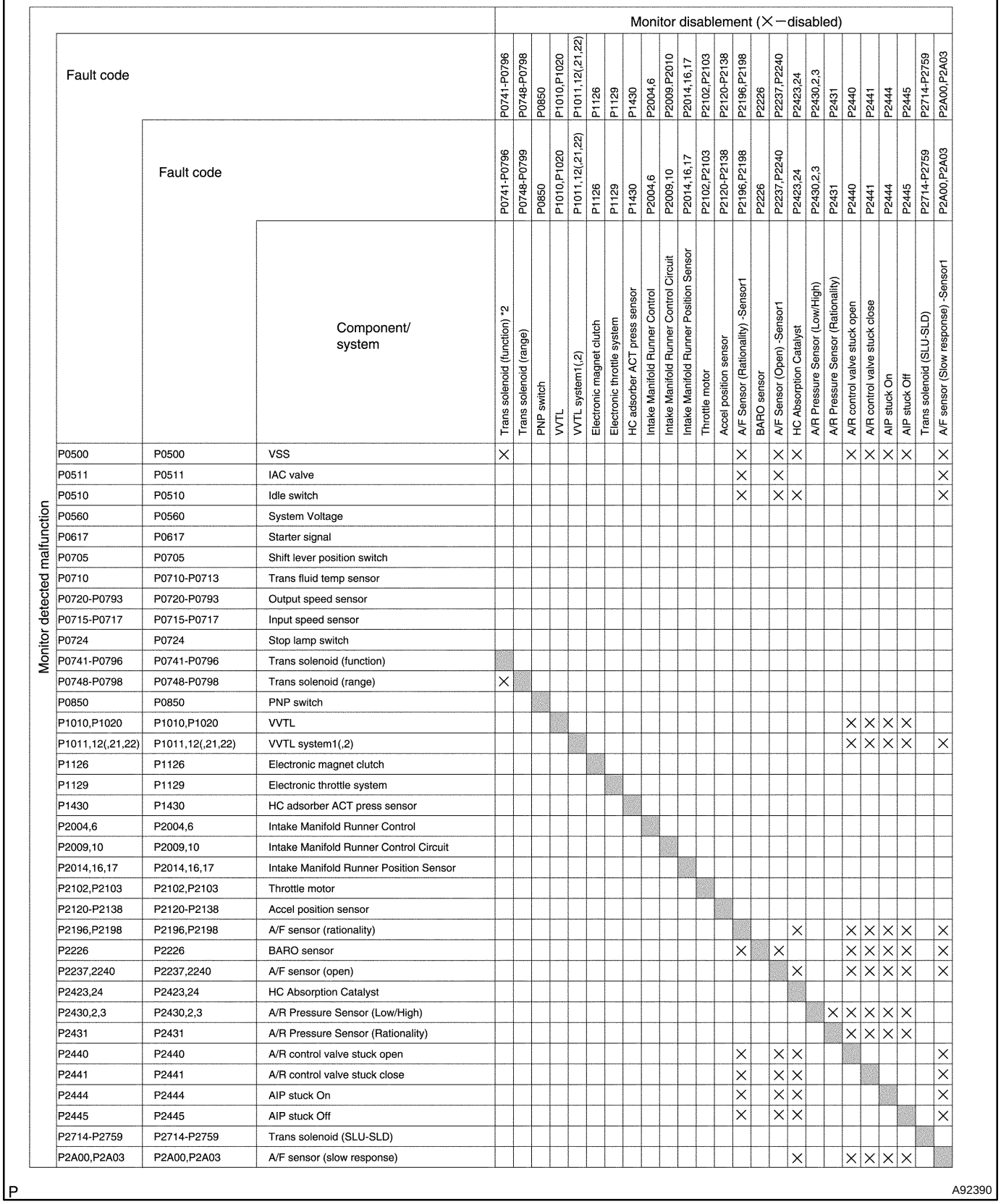
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Monitor detected malfunction			Monitor disablement (×—disabled)																												
Fault code			P0741-P0796	P0748-P0798	P0850	P1010,P1020	P1011,12(,21,22)	P1126	P1129	P1430	P2004,6	P2009,P2010	P2014,16,17	P2102,P2103	P2120-P2138	P2196,P2198	P2226	P2237,P2240	P2423,24	P2430,2,3	P2431	P2440	P2441	P2444	P2445	P2714-P2759	P2A00,P2A03				
Fault code			P0741-P0796	P0748-P0799	P0850	P1010,P1020	P1011,12(,21,22)	P1126	P1129	P1430	P2004,6	P2009,10	P2014,16,17	P2102,P2103	P2120-P2138	P2196,P2198	P2226	P2237,P2240	P2423,24	P2430,2,3	P2431	P2440	P2441	P2444	P2445	P2759	P2A00,P2A03				
	Component/ system		Trans solenoid (function) *2	Trans solenoid (range)	PNP switch	VVTL	VVTL system1(,2)	Electronic magnet clutch	Electronic throttle system	HC adsorber ACT press sensor	Intake Manifold Runner Control	Intake Manifold Runner Control Circuit	Intake Manifold Runner Position Sensor	Throttle motor	Accel position sensor	A/F Sensor (Rationality) -Sensor1	BARO sensor	A/F Sensor (Open) -Sensor1	HC Absorption Catalyst	A/R Pressure Sensor (Low/High)	A/R Pressure Sensor (Rationality)	A/R control valve stuck open	A/R control valve stuck close	AIP stuck On	AIP stuck Off	Trans solenoid (SLU-SLD)	A/F sensor (Slow response) -Sensor1				
P0010,P0020	P0010,P0020	VVT VSV 1, 2																				×	×	×	×						
P0011	P0011	VVT System 1 – Advance																				×	×	×	×						
P0012	P0012	VVT System 1 – Retard																				×	×	×	×						
P0016,P0018	P0016,P0018	VVT System – Misalignment																				×	×	×	×						
P0021	P0021	VVT System 2 – Advance																				×	×	×	×						
P0022	P0022	VVT System 2 – Retard																				×	×	×	×						
P0030,50	P0031,32,51,52	O2 Sensor Heater–Sensor1																	×			×	×	×	×						
P0135,P0155	P0031,32,51,52	A/F Sensor Heater–Sensor1														×		×	×			×	×	×	×		×				
P0036,56	P0037,38,57,58	O2 Sensor Heater–Sensor2														×			×												
P0043,44,63,64	P0043,44,63,64	O2 Sensor Heater–Sensor3																	×												
P0100,P0101	P0100-P0103	MAF sensor				×	×									×		×	×			×	×	×	×		×				
P0105,P0106	P0105-P0108	MAP sensor				×	×									×		×	×			×	×	×	×		×				
P0110	P0110-P0113	IAT sensor									×					×		×				×	×	×	×		×				
P0115,P0116	P0115-P0118	ECT sensor	×			×	×				×					×		×	×			×	×	×	×		×				
P0120,P0121	P0120-P0223,P2135	TP sensor														×		×	×			×	×	×	×		×				
P0125	P0125	Insufficient ECT for Closed Loop	×			×										×		×	×			×	×	×	×		×				
P0128	P0128	Thermostat																													
P0130-P0153	P0130-P0153	O2 Sensor–Sensor1																	×			×	×	×	×						
P0134,P0154	P0134,P0154	O2 Sensor, A/F sensor (No Activity)–Sensor1														×		×	×			×	×	×	×		×				
P0136,P0156	P0136,P0156	O2 Sensor–Sensor2														×			×												
P0142,P0162	P0142,P0162	O2 Sensor–Sensor3																	×												
P0171,P0172	P0171,P0172	Fuel system														×		×	×			×	×	×	×		×				
P0300-P0308	P0300-P0308	Misfire														×		×	×			×	×	×	×		×				
P0325,P0330	P0325-P0333	Knock sensor																				×	×	×	×						
P0335	P0335	CKP sensor				×	×									×		×	×			×	×	×	×		×				
P0340,P0341	P0340,P0341	CMP sensor				×	×									×		×	×			×	×	×	×		×				
P0340-P0346	P0340-P0346	VVT sensor 1, 2																				×	×	×	×						
P0351-P0358	P0351-P0358	Ignitor																	×			×	×	×	×						
P0385	P0385	CKP sensor 2				×	×									×		×	×			×	×	×	×		×				
P0401	P0401	EGR system (closed)																	×												
P0402	P0402	EGR system (open)														×		×	×			×	×	×	×		×				
P0405,P0409	P0405-P0409	Lift sensor																													
P0420,P0430	P0420,P0430	Catalyst																													
P0442-P0456	P0442-P0456	EVAP system														×		×				×	×	×	×		×				
P0450,P0451	P0450-P0453	EVAP press sensor																				×	×	×	×						

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Monitor detected malfunction	Fault code		Component/ system	Monitor disablement (×−disabled)																										
	Fault code			P0741-P0796	P0748-P0798	P0850	P1010,P1020	P1011,12(,21,22)	P1126	P1129	P1430	P2004,6	P2009,P2010	P2014,16,17	P2102,P2103	P2120-P2138	P2196,P2198	P2226	P2237,P2240	P2423,24	P2430,2,3	P2431	P2440	P2441	P2444	P2445	P2714-P2759	P2A00,P2A03
	Fault code			P0741-P0796	P0748-P0799	P0850	P1010,P1020	P1011,12(,21,22)	P1126	P1129	P1430	P2004,6	P2009,10	P2014,16,17	P2102,P2103	P2120-P2138	P2196,P2198	P2226	P2237,P2240	P2423,24	P2430,2,3	P2431	P2440	P2441	P2444	P2445	P2714-P2759	P2A00,P2A03
			Component/ system	Trans solenoid (function) *2	Trans solenoid (range)	PNP switch	VVTL	VVTL system1(,2)	Electronic magnet clutch	Electronic throttle system	HC adsorber ACT press sensor	Intake Manifold Runner Control	Intake Manifold Runner Control Circuit	Intake Manifold Runner Position Sensor	Throttle motor	Accel position sensor	A/F Sensor (Rationality) -Sensor1	BARO sensor	A/F Sensor (Open) -Sensor1	HC Absorption Catalyst	A/R Pressure Sensor (Low/High)	A/R Pressure Sensor (Rationality)	A/R control valve stuck open	A/R control valve stuck close	AIP stuck On	AIP stuck Off	Trans solenoid (SLU-SLD)	A/F sensor (Slow response) -Sensor1
	P0500	P0500	VSS	×													×		×	×			×	×	×	×		×
	P0511	P0511	IAC valve														×		×										×
	P0510	P0510	Idle switch														×		×	×									×
	P0560	P0560	System Voltage																										
	P0617	P0617	Starter signal																										
	P0705	P0705	Shift lever position switch																										
	P0710	P0710-P0713	Trans fluid temp sensor																										
	P0720-P0793	P0720-P0793	Output speed sensor																										
	P0715-P0717	P0715-P0717	Input speed sensor																										
	P0724	P0724	Stop lamp switch																										
	P0741-P0796	P0741-P0796	Trans solenoid (function)																										
	P0748-P0798	P0748-P0798	Trans solenoid (range)	×																									
	P0850	P0850	PNP switch																										
	P1010,P1020	P1010,P1020	VVTL																				×	×	×	×			
	P1011,12(,21,22)	P1011,12(,21,22)	VVTL system1(,2)																				×	×	×	×			×
	P1126	P1126	Electronic magnet clutch																										
	P1129	P1129	Electronic throttle system																										
	P1430	P1430	HC adsorber ACT press sensor																										
	P2004,6	P2004,6	Intake Manifold Runner Control																										
	P2009,10	P2009,10	Intake Manifold Runner Control Circuit																										
	P2014,16,17	P2014,16,17	Intake Manifold Runner Position Sensor																										
	P2102,P2103	P2102,P2103	Throttle motor																										
	P2120-P2138	P2120-P2138	Accel position sensor																										
	P2196,P2198	P2196,P2198	A/F sensor (rationality)																	×			×	×	×	×			×
	P2226	P2226	BARO sensor														×		×				×	×	×	×			×
	P2237,2240	P2237,2240	A/F sensor (open)																	×			×	×	×	×			×
	P2423,24	P2423,24	HC Absorption Catalyst																										
	P2430,2,3	P2430,2,3	A/R Pressure Sensor (Low/High)																			×	×	×	×	×			
	P2431	P2431	A/R Pressure Sensor (Rationality)																				×	×	×	×			
	P2440	P2440	A/R control valve stuck open														×		×	×									×
	P2441	P2441	A/R control valve stuck close														×		×	×									×
	P2444	P2444	AIP stuck On														×		×	×									×
	P2445	P2445	AIP stuck Off														×		×	×									×
	P2714-P2759	P2714-P2759	Trans solenoid (SLU-SLD)																										
	P2A00,P2A03	P2A00,P2A03	A/F sensor (slow response)																	×			×	×	×	×			

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Note *1: Without input speed sensor

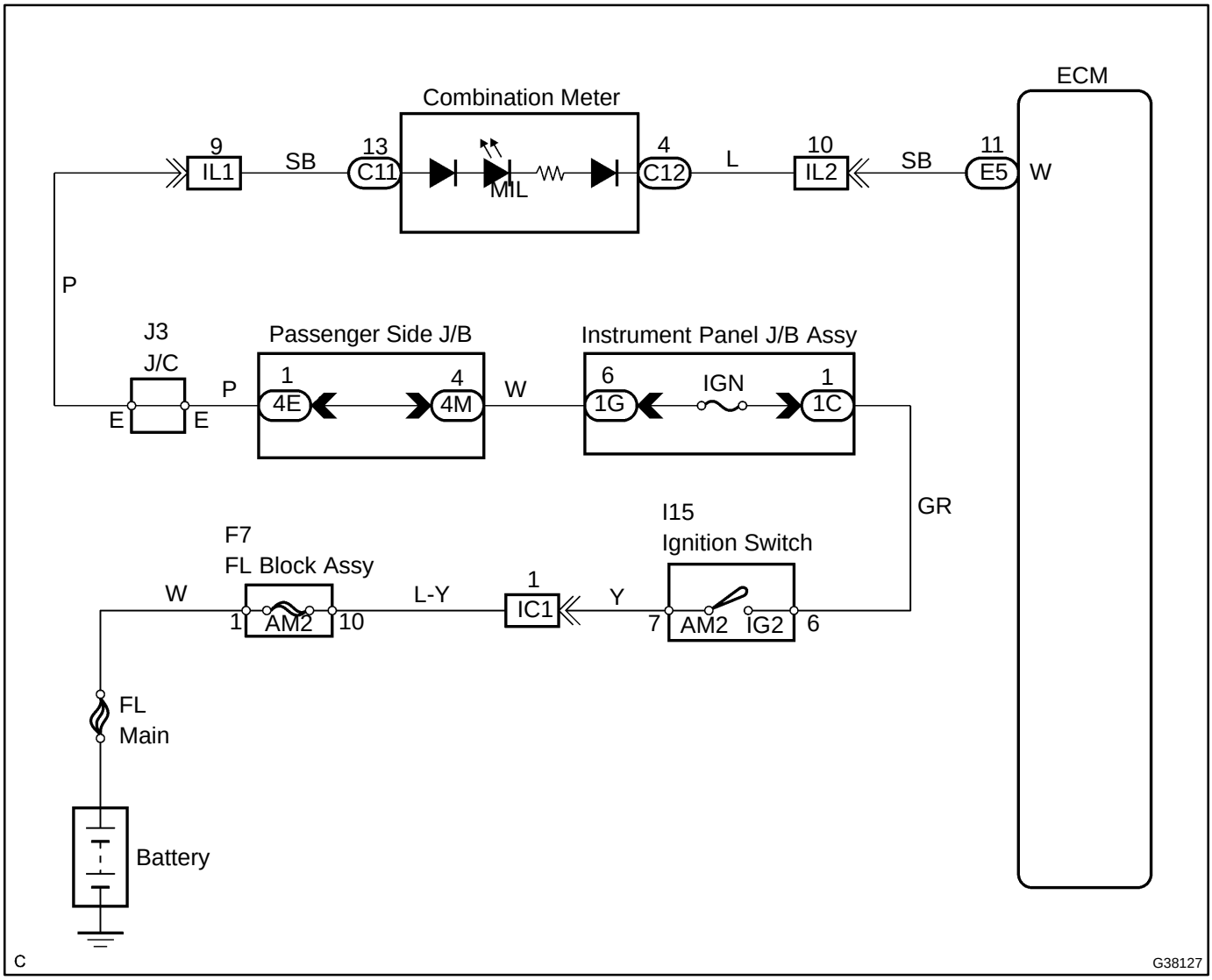
Note *2: With input speed sensor

MIL CIRCUIT

CIRCUIT DESCRIPTION

The Malfunction Indicator Lamp (MIL) is used to indicate the ECM's detection of a vehicle malfunction.
The instrument panel GAUGE fuse provides circuit power and the ECM provides the circuit ground that illuminates the MIL.
MIL operations should be checked visually:
The MIL should be illuminated when the ignition is first turned on. If the MIL is always ON or OFF, use the hand-held tester or OBD II scan tool and follow the procedures below to determine the cause of the problem.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Troubleshoot each trouble symptom in accordance with the chart below.

MIL remains on	Start inspection from step 1
MIL is not illuminated	Start inspection from step 3

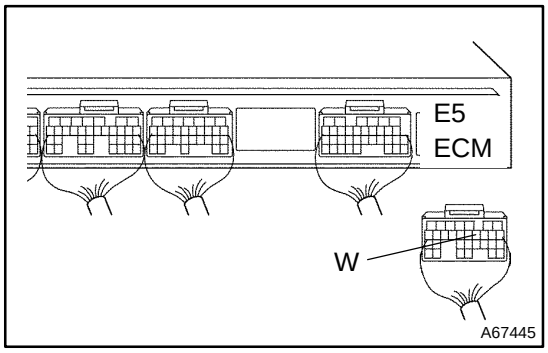
1	CLEAR DTC

(a) Connect the hand-held tester or the OBD II scan tool to the DLC 3.
(b) Turn the ignition switch ON and push the hand-held tester or the OBD II scan tool main switch ON.
(c) Read the DTC (See page 05-400).
(d) Clear the DTC (See page 05-400).
(e) Check that MIL is not illuminated.
OK: MIL is not illuminated

OK	REPAIR CIRCUIT INDICATED BY OUTPUT DTC (See page 05-412)

NG

2	CHECK HARNESS AND CONNECTOR (CHECK FOR SHORT IN WIRE HARNESS)



(a) Disconnect the E5 ECM connector.
(b) Turn the ignition switch ON.
(c) Check that MIL is not illuminated.
OK: MIL is not illuminated
(d) Reconnect the ECM connector.

OK	REPLACE ECM (See page 10-24)

NG

CHECK AND REPAIR HARNESS AND CONNECTOR

3	CHECK THAT MIL IS ILLUMINATED

(a) Check that the MIL is illuminated when turning the ignition switch ON.
OK: MIL is illuminated

OK	SYSTEM OK

NG

4	INSPECT COMBINATION METER ASSY (MIL CIRCUIT)

(a) See the combination meter troubleshooting on page 05-1882 .

NG	REPAIR OR REPLACE BULB OR COMBINATION METER ASSEMBLY

OK

CHECK AND REPAIR HARNESS AND CONNECTOR (COMBINATION METER - ECM)

05F0A-05

O2S TEST RESULT

1. INTRODUCTION

The O2S TEST RESULT refers to the results of the Engine Control Module (ECM) when it monitors the oxygen sensor (O2S), and it can be read using the hand-held tester or the generic OBD II scan tool. Based on this, you can find the O2S's conditions.

The ECM monitors the O2S for the various data. You can read the monitor result (TEST DATA) of each monitor item using the O2S TEST RESULT. However, the output value of the TEST DATA is the latest "snapshot" value that is it taken after monitoring and therefore it is not dynamic.

In this repair manual, the description of the O2S TEST RESULT (for O2S related DTCs) are written in a table.

This table consists of 5 items:

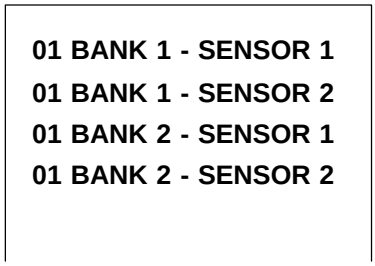
(1) TEST ID (a code applied to each TEST DATA)
(2) Description of TEST DATA
(3) Conversion Factor (When conversion factor has a value written in the table, multiply the TEST DATA value appearing on the scan tool by the conversion factor value. The result will be the required value.)
(4) Unit
(5) Standard Value

If the TEST DATA value appearing on the scan tool is out of the standard value, the O2S is malfunctioning. If it is within the standard value, the O2S is functioning normally. However, if the value is on the borderline of the standard value, the O2S may malfunction very soon.

2. HOW TO READ O2S TEST RESULT USING HAND-HELD TESTER

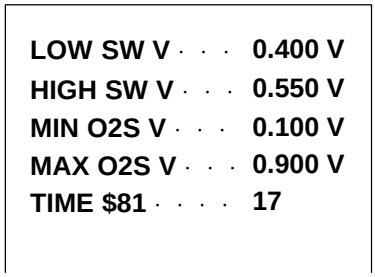
(a) Connect the hand-held tester to the DLC3.

O2S TEST RESULT Screen



(b) On the tester screen, select the following menus: DIAGNOSIS/CARB OBDII/O2S TEST RESULT. A list of the O2S equipped on the vehicle will be displayed.

TEST DATA Screen



(c) Select the desired O2S and press ENTER. The following screen will appear.

(d) Press HELP and ⁜ simultaneously. More information will appear.

(e) Example:

(1) The hand-held tester displays ”17” as a value of the ”TIME $81” (see the illustration on the left).

(2) Find the conversion factor value of ”TIME $81” in the O2S TEST RESULT chart below. 0.3906 is specified for $81 in this chart.

(3) Multiply ”17” in step (1) by 0.3906 (conversion factor) in the step (2).

17 x 0.3906 = 6.6 %

(4) If the answer is within the standard value, the ”TIME $81” can be confirmed to be normal.

O2S TEST RESULT Chart

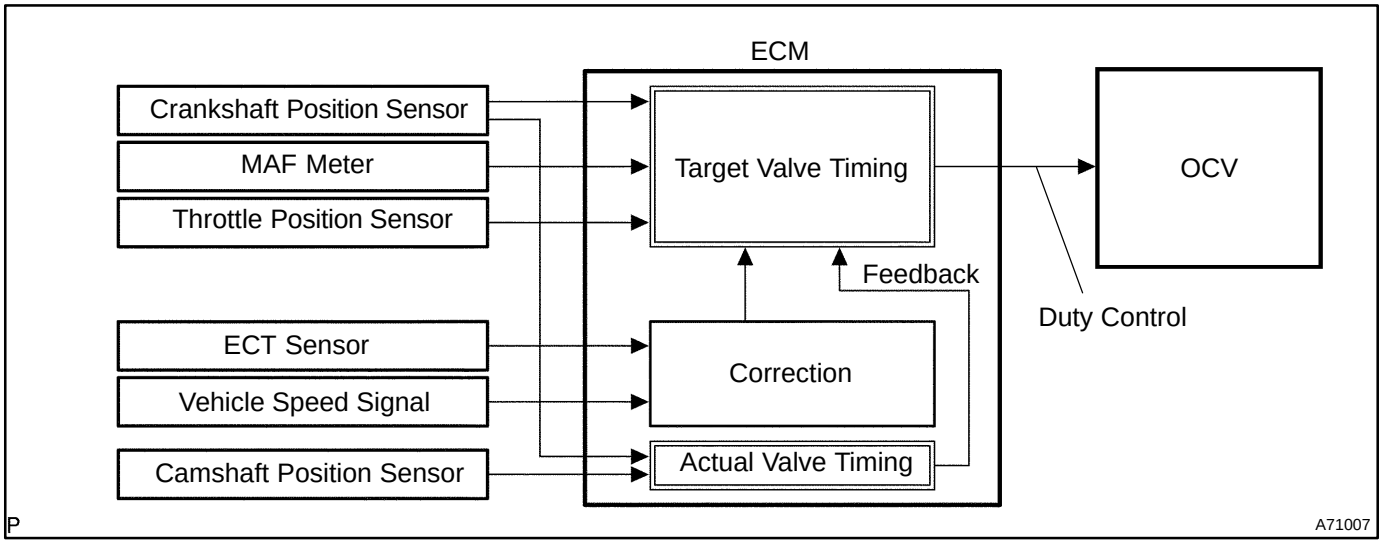
TEST ID	Description of TEST DATA	Conversion Factor	Unit	Standard Value
$81	Percentage of monitoring time when the O2S voltage is less than 0.05V	Multiply 0.3906	%	Within 60%

DTC	P0010	CAMSHAFT POSITION ”A” ACTUATOR CIRCUIT (BANK 1)

DTC	P0020	CAMSHAFT POSITION ”A” ACTUATOR CIRCUIT (BANK 2)

CIRCUIT DESCRIPTION

The Variable Valve Timing (VVT) system includes the ECM, the Oil Control Valve (OCV) and the VVT controller. The ECM sends a target duty-cycle control signal to the OCV. This control signal, sent to the OCV, regulates the oil pressure applied to the VVT controller. Camshaft timing control is performed based on engine operation conditions such as intake air volume, throttle position and engine coolant temperature.
The ECM controls the OCV based on the signals output from several sensors. The VVT controller regulates the intake camshaft angle using oil pressure through the OCV. As a result, the relative position between the camshaft and the crankshaft is optimized. Also, the engine torque and, fuel economy improve, and exhaust emissions decrease. The ECM detects the actual valve timing using signals from the camshaft position sensor and the crankshaft position sensor. The ECM performs feedback control and verifies target valve timing.



DTC No.	DTC Detection Condition	Trouble Area
P0010 P0020	Open or short in OCV circuit	・Open or short in OCV circuit ・OCV ・ECM

MONITOR DESCRIPTION

After the ECM sends the ”target” duty-cycle signal to the OCV, the ECM monitors the OCV current to establish an ”actual” duty-cycle. When the actual duty-cycle ratio varies from the target duty-cycle ratio, the ECM sets a DTC.

MONITOR STRATEGY

Related DTCs	P0010: VVT OCV (Bank 1) Range Check P0020: VVT OCV (Bank 2) Range Check
Required sensors / components (Main)	VVT OCV
Required sensors / components (Related)	-
Frequency of operation	Continuous
Duration	1 second
MIL operation	Immediate
Sequence operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever these DTCs are not present	See page 05-377
Battery voltage	11 V or more
Target duty ratio for the OCV	70 % or less
Starter	OFF
Current cut status for the OCV	Not cut

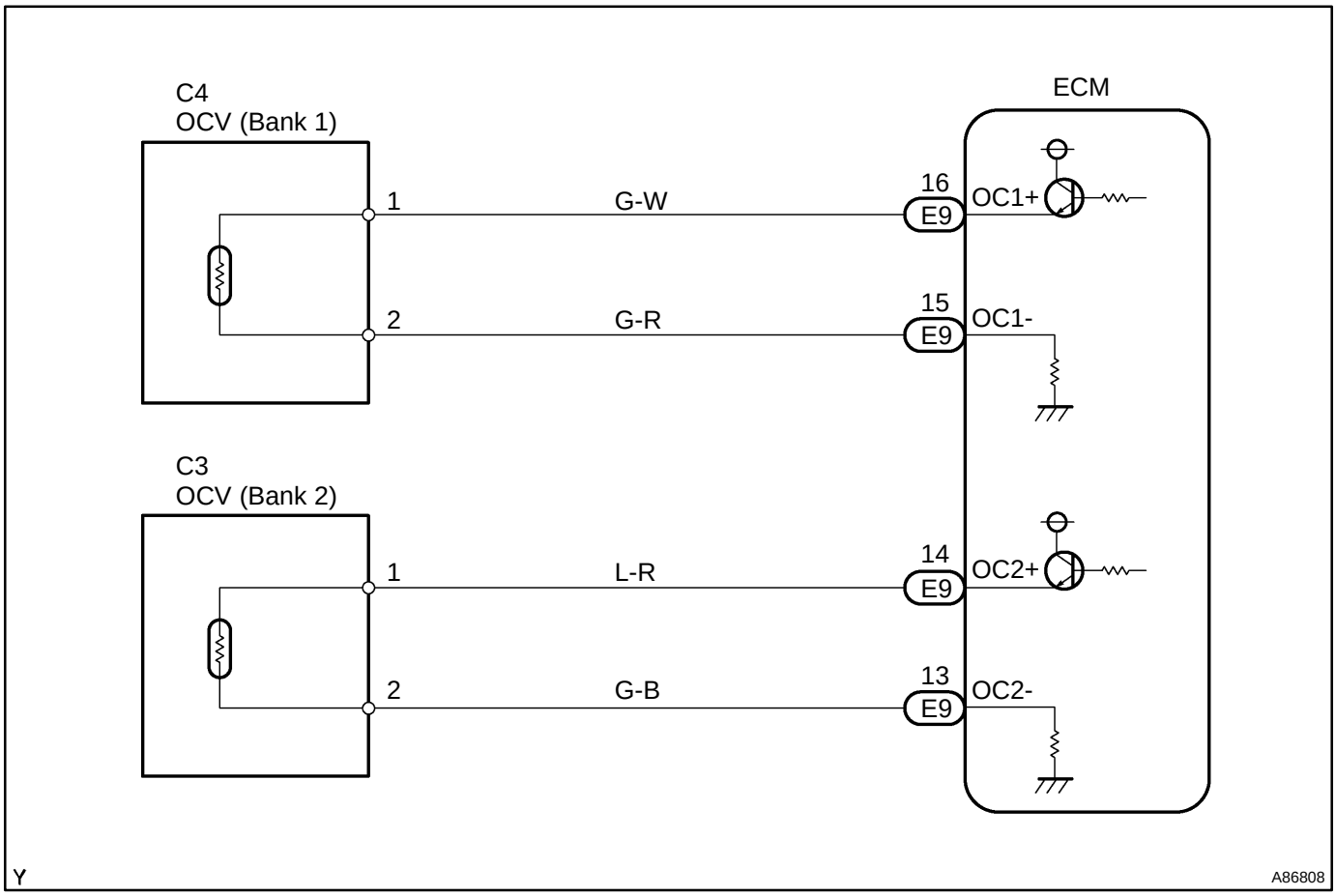
TYPICAL MALFUNCTION THRESHOLDS

Either of the following conditions is met:	Condition 1 or 2
1. OCV duty ratio	100 % (always ON) despite the target duty ratio is less than 70 %
2. OCV duty ratio when ECM supplies current to OCV	3 % or less despite the ECM supplying the current to the OCV

COMPONENT OPERATING RANGE

VVT OCV duty ratio	3 to 100 %

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If DTC P0010 is displayed, check the bank 1 VVT system circuit.
- If DTC P0020 is displayed, check the bank 2 VVT system circuit.
- Read freeze frame data using the hand-held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

Hand-held tester:

1	**PERFORM ACTIVE TEST USING HAND-HELD TESTER (OCV OPERATION)**

(a) Connect the hand-held tester to the DLC3.
(b) Start the engine and warm it up.
(c) Turn the ignition switch ON and push the hand-held tester main switch ON.
(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / VVT CTRL B1 or VVT CTRL B2.
(e) Using the hand-held tester, operate the OCV and check the engine speed.
Standard:

Tester Operation	Specified Condition
OCV is OFF	Normal engine speed
OCV is ON	Rough idle or engine stall

OK → **CHECK FOR INTERMITTENT PROBLEMS (See page 05-370)**

NG

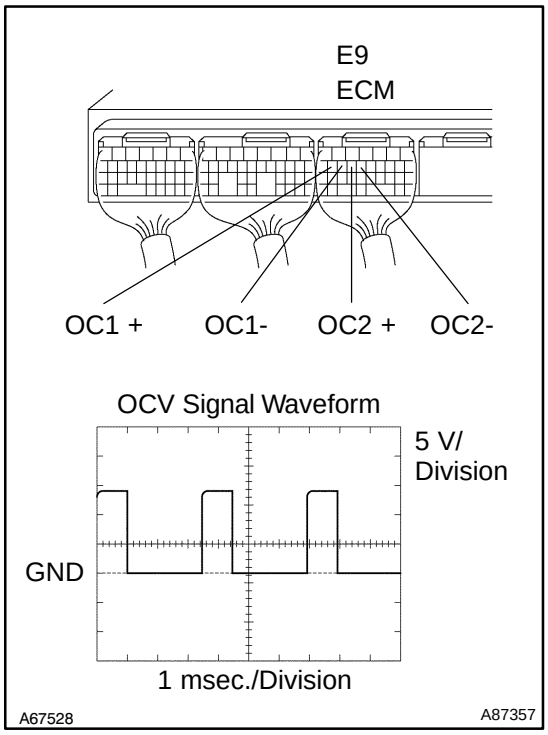
2	**INSPECT CAMSHAFT TIMING OIL CONTROL VALVE ASSY (See page 10-13)**

OK: OCV has no contamination and moves smoothly.

NG → **REPLACE CAMSHAFT TIMING OIL CONTROL VALVE ASSY**

OK

3 CHECK ECM (OCV SIGNAL)



(a) During idling, check the waveform of the ECM connector using the oscilloscope.

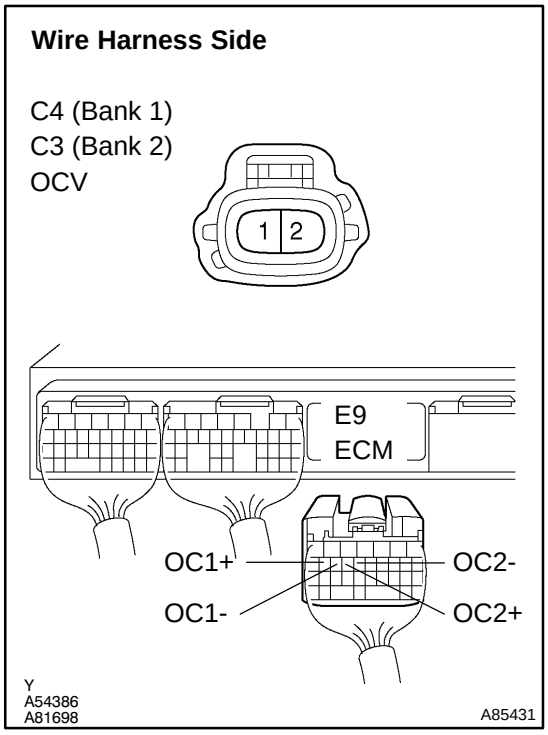
Standard:

Tester Connection	Specified Condition
E9-16 (OC1+) - E9-15 (OC1-) E9-14 (OC2+) - E9-13 (OC2-)	Correct waveform is as shown

NG → **REPLACE ECM (See page 10-24)**

OK

4 CHECK WIRE HARNESS (OCV-ECM)



(a) Disconnect the C4 or C3 OCV connector.
(b) Disconnect the E9 ECM connector.
(c) Check the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
C4-1 (OCV) - E9-16 (OC1+) C4-2 (OCV) - E9-15 (OC1-) C3-1 (OCV) - E9-14 (OC2+) C3-2 (OCV) - E9-13 (OC2-)	Below 1 Ω
C4-1 (OCV) or E9-16 (OC1+) - Body ground C4-2 (OCV) or E9-15 (OC1-) - Body ground C3-1 (OCV) or E9-14 (OC2+) - Body ground C3-2 (OCV) or E9-13 (OC2-) - Body ground	10 kΩ or higher

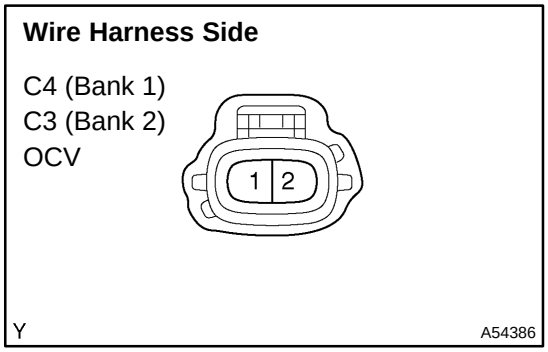
NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

CHECK FOR INTERMITTENT PROBLEMS (See page 05-370)

OBD II scan tool (excluding hand-held tester):

1	CHECK CAMSHAFT TIMING OIL CONTROL VALVE ASSY (OCV OPERATION)

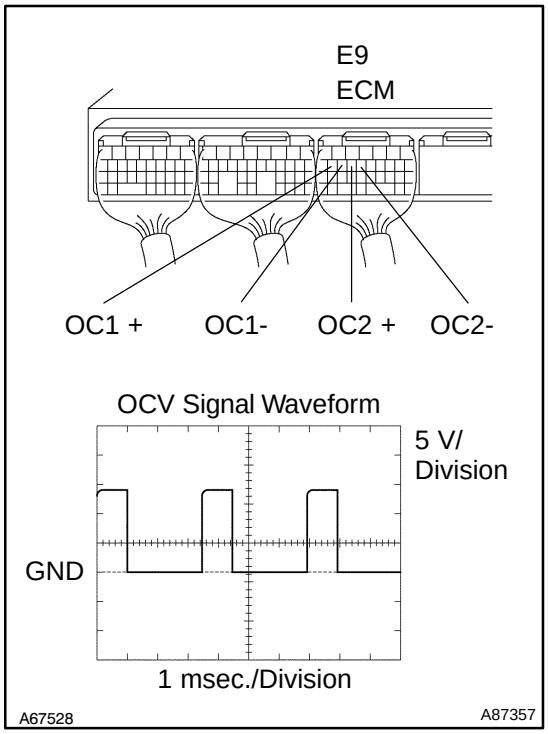


(a) Disconnect the C4 or C3 OCV connector.
(b) Apply positive battery voltage between the terminals of the OCV.
(c) Check the engine speed.
OK:
Engine speed is rough idle or engine is stalled.

NG → **REPLACE CAMSHAFT TIMING OIL CONTROL VALVE ASSY**

OK

2	CHECK ECM (OCV SIGNAL)



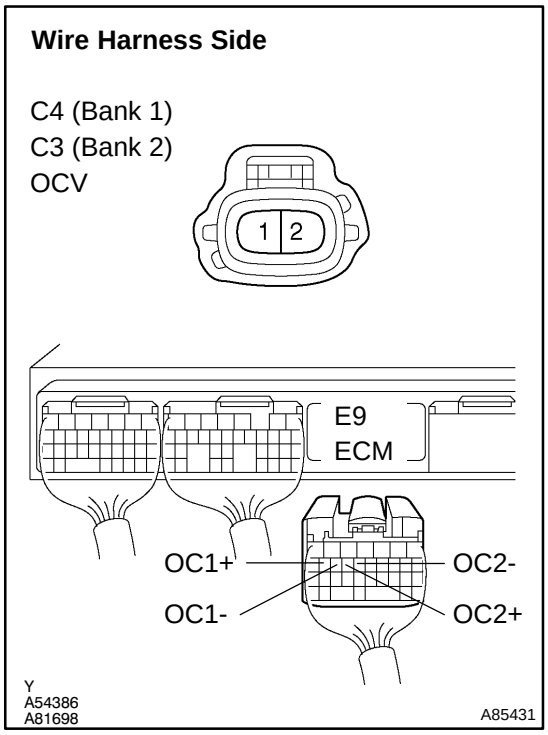
(a) During idling, check the waveform of the E9 ECM connector using the oscilloscope.
Standard:

Tester Connection	Specified Condition
E9-16 (OC1+) - E9-15 (OC1-) E9-14 (OC2+) - E9-13 (OC2-)	Correct waveform is as shown

NG → **REPLACE ECM (See page 10-24)**

OK

3 CHECK WIRE HARNESS (OCV-ECM)



(a) Disconnect the C4 or C3 OCV connector.
(b) Disconnect the E9 ECM connector.
(c) Check the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
C4-1 (OCV) - E9-16 (OC1+) C4-2 (OCV) - E9-15 (OC1-) C3-1 (OCV) - E9-14 (OC2+) C3-2 (OCV) - E9-13 (OC2-)	Below 1 Ω
C4-1 (OCV) or E9-16 (OC1+) - Body ground C4-2 (OCV) or E9-15 (OC1-) - Body ground C3-1 (OCV) or E9-14 (OC2+) - Body ground C3-2 (OCV) or E9-13 (OC2-) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

CHECK FOR INTERMITTENT PROBLEMS (See page 05-370)

DTC	P0011	CAMSHAFT POSITION ”A” -TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE (BANK 1)

DTC	P0012	CAMSHAFT POSITION ”A” -TIMING OVER-RETARDED (BANK 1)

DTC	P0021	CAMSHAFT POSITION ”A” - TIMING OVER-ADV ANCED OR SYSTEM PERFORMANCE (BANK 2)

DTC	P0022	CAMSHAFT POSITION ”A” - TIMING OVER-RET ARDED (BANK2)

CIRCUIT DESCRIPTION

Refer to DTC P0010 on page 05-422

DTC No.	DTC Detection Condition	Trouble Area
P0011 P0021	After engine is warmed up and engine speed is at 500 to 4,000 rpm, condition (a) continues (1 trip detection logic) (e) Valve timing does not change from current valve timing (Problem of advanced valve timing)	・Valve timing ・OCV ・Camshaft timing gear assy ・ECM
P0012 P0022	After engine is warmed up and engine speed is at 500 to 4,000 rpm, condition (a) continues (2 trip detection logic) (a) Valve timing does not change from current valve timing (Problem of retarded valve timing)	・Valve timing ・OCV ・Camshaft timing gear assy ・ECM

MONITOR DESCRIPTION

The ECM optimizes the valve timing using the Variable Valve Timing (VVT) system to control the intake valve camshaft. The VVT system includes the ECM, the Oil Control Valve (OCV) and the VVT controller. The ECM sends a target duty-cycle control signal to the OCV. This control signal, sent to the OCV, regulates the oil pressure applied to the VVT controller. The VVT controller can advance or retard the intake valve camshaft.
Example:
A DTC will be set if: 1) the difference between the ”target” and ”actual” valve timing is more than 5 degrees of the camshaft angle (CA) and the condition continues for more than 4.5 seconds; or 2) the OCV is forcibly activated 63 times or more.
Advanced cam DTCs are subject to ”1 trip” detection logic.
Retarded cam DTCs are subject to ”2 trip” detection logic.

MONITOR STRATEGY

Related DTCs	P0011: Advanced Camshaft Timing (Bank 1) P0012: Retarded Camshaft Timing (Bank 1) P0021: Advanced Camshaft Timing (Bank 2) P0022: Retarded Camshaft Timing (Bank 2)
Required sensors / components (Main)	VVT OCV and VVT Actuators
Required sensors / components (Related)	CKP, CMP and ECT sensors
Frequency of operation	Once per driving cycle
Duration	Within 10 seconds
MIL operation	P0011 and P0021: Immediate P0012 and P0022: 2 driving cycles
Sequence operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever these DTCs are not present	See page 05-377
Battery voltage	11 V or more
Engine RPM	500 to 4,000 rpm
ECT	75 to 100°C (167 to 212°F)
Throttle position learning	Completed

TYPICAL MALFUNCTION THRESHOLDS

Deviation of valve timing	More than 5°CA (Crankshaft Angle)
OCV activation	63 times or more
Response of valve timing	1 second/°CA or more (valve timing does not change)

If the difference between ”target” and ”actual”camshaft timing is larger than the specified value, the ECM operates the VVT actuator.
The ECM then monitors the camshaft timing change for 5 seconds.

WIRING DIAGRAM

Refer to DTC P0010 on page 05-422 .

INSPECTION PROCEDURE

HINT:

Abnormal bank	Problem of advanced OCV	Problem of retarded OCV
Bank 1	P0011	P0012
Bank 2	P0021	P0022

- If DTC P0011 and/or P0012 is displayed, check the right bank VVT system.
- If DTC P0021 and/or P0022 is displayed, check the left bank VVT system.

Read freeze frame data using the hand-held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

Hand-held tester:

1	**CHECK VALVE TIMING (CHECK FOR LOOSE OR JUMPED TOOTH OF TIMING BELT) (See page 14-206)**

OK: The matchmarks of crankshaft pulley and camshaft pulley are aligning.

NG → **ADJUST VALVE TIMING (See page 14-206)**

OK

2	**PERFORM ACTIVE TEST USING HAND-HELD TESTER (OCV OPERATION)**

(a) Connect the hand-held tester to the DLC3.
(b) Start the engine and warm it up.
(c) Turn the ignition switch ON and push the hand-held tester main switch ON.
(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / VVT CTRL B1 or VVT CTRL B2.
(e) Using the hand-held tester, operate the OCV and check the engine speed.
Standard:

Tester Operation	Specified Condition
OCV is OFF	Normal engine speed
OCV is ON	Rough idle or engine stall

NG → **Go to step 4**

OK

3	**CHECK IF DTC OUTPUTS REOCCUR**

(a) Clear the DTCs.
(1) Erase the codes using one of the following methods: 1) use the hand held tester, 2) disconnect the battery cable, or 3) remove the EFI NO. 1 and ETCS fuses for more than 60 seconds.

HINT:
After disconnecting the battery cable, perform the ”INITIALIZE” procedure (see page 05-1005).

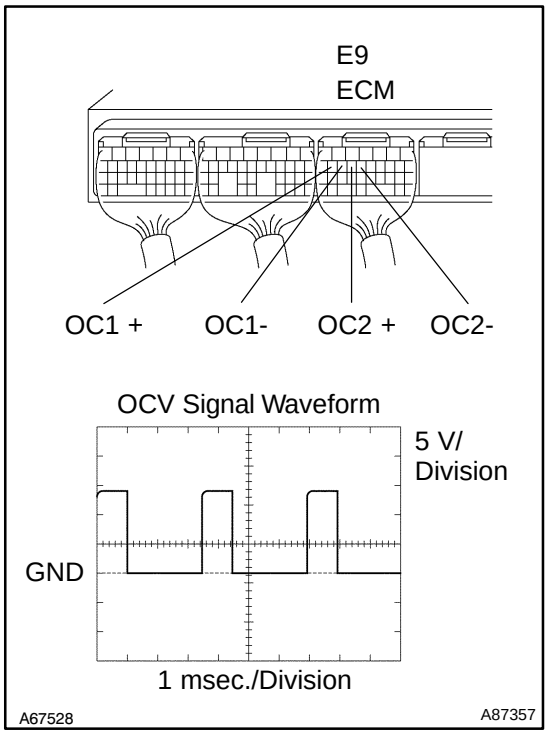
(b) Start and warm up the engine.
(c) Drive the vehicle for 10 minutes or more.
(d) Read output DTC using the hand-held tester.
OK: No DTC output.

OK → **VVT SYSTEM OK***

HINT:
*: DTC P0011, P0012, P0021 or P0022 is output when a foreign object in the engine oil enters the system. These codes will stay registered even if the system returns to normal after a short time. Foreign objects are filtered out by the oil filter.

NG

4	CHECK ECM (OCV SIGNAL)



(a) During idling, check the waveform of the ECM connector using the oscilloscope.

Standard:

Tester Connection	Specified Condition
E9-16 (OC1+) - E9-15 (OC1-) E9-14 (OC2+) - E9-13 (OC2-)	Correct waveform is as shown

NG → **REPLACE ECM (See page 10-24)**

OK

5	CHECK OIL CONTROL VALVE FILTER

OK: The filter is not clogged.

NG → **REPLACE OIL CONTROL VALVE FILTER**

OK

6	CHECK CAMSHAFT TIMING OIL CONTROL VALVE ASSY (See page 10-13)

OK: OCV has no contamination and moves smoothly.

OK → **Go to step 8**

NG

7	REPLACE CAMSHAFT TIMING OIL CONTROL VALVE ASSY

GO

8	CHECK CAMSHAFT TIMING GEAR ASSY (See page 14-213 or 14-224)

OK: Camshaft timing gear rotate smoothly when apply pressure.

OK	Go to step 10

NG

9	REPLACE CAMSHAFT TIMING GEAR ASSY

GO

10	CHECK FOR BLOCKAGE (OCV, OIL CHECK VALVE AND OIL HOLE)

OK: No blockage.

NG	REPAIR OR REPLACE

OK

11	CHECK IF DTC OUTPUTS REOCCUR

(a) Clear the DTCs.
(1) Erase the codes using one of the following methods: 1) use the hand held tester, 2) disconnect the battery cable, or 3) remove the EFI NO. 1 and ETCS fuses for more than 60 seconds.

HINT:
After disconnecting the battery cable, perform the ”INITIALIZE” procedure (see page 05-1005).

(b) Start and warm up the engine.
(c) Drive the vehicle around for 10 minutes or more.
(d) Read output DTC using the hand-held tester.
OK: No DTC output.

OK	VVT SYSTEM OK*

HINT:
*: DTC P0011, P0012, P0021 or P0022 is output when a foreign object in the engine oil enters the system. These codes will stay registered even if the system returns to normal after a short time. Foreign objects are filtered out by the oil filter.

NG

REPLACE ECM (See page 10-24)

OBD II scan tool (excluding hand-held tester):

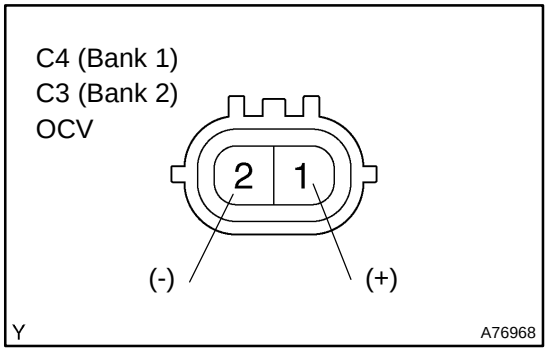
1	CHECK VALVE TIMING (CHECK FOR LOOSE OR JUMPED TOOTH OF TIMING BELT) (See page 14-206)

OK: The matchmarks of crankshaft pulley and camshaft pulley are aligning.

NG → **ADJUST VALVE TIMING (See page 14-206)**

OK

2	INSPECT OPERATION OF OCV



(a) Start the engine.
(b) Check the engine speed with (1) and (2).
(1) Disconnect the C4 or C3 OCV connector.
(2) Apply battery positive voltage between the terminals of the OCV.

Result:

Proceed to	Check (1)	Check (2)
A	Normal engine speed	Rough idle or engine stall
B	Conditions other than A	Conditions other than A

B → **Go to step 4**

A

3	CHECK IF DTC OUTPUTS REOCCUR

(a) Clear the DTCs.
(1) Erase the codes using one of the following methods: 1) use the hand held tester, 2) disconnect the battery cable, or 3) remove the EFI NO. 1 and ETCS fuses for more than 60 seconds.

HINT:
After disconnecting the battery cable, perform the ”INITIALIZE” procedure (see page 05-1005).

(b) Start and warm up the engine.
(c) Drive the vehicle around for 10 minutes or more.
(d) Read output DTC using the OBD II scan tool.

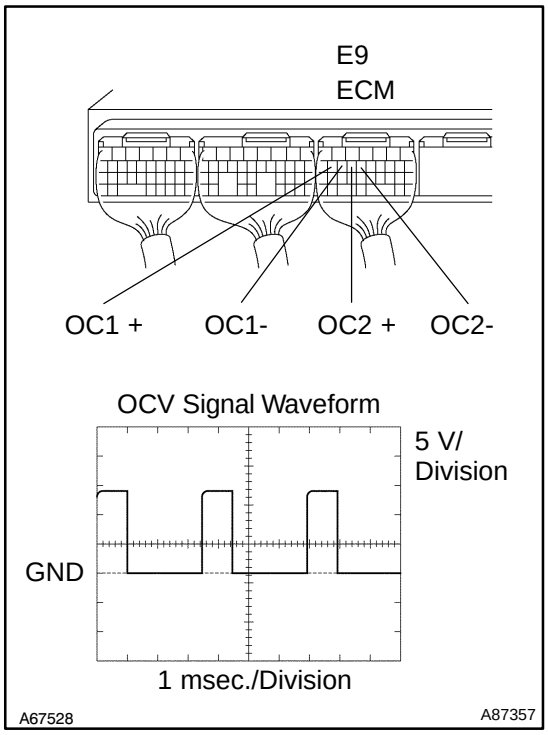
OK: No DTC output.

OK → **VVT SYSTEM OK***

HINT:
*: DTCs P0011, P0012, P0021 or P0022 is output when a foreign object in the engine oil enters the system. These codes will stay registered even if the system returns to normal after a short time. Foreign objects are filtered out by the oil filter.

NG

4	CHECK ECM (OCV SIGNAL)



(a) During idling, check the waveform of the ECM connector using the oscilloscope.

Standard:

Tester Connection	Specified Condition
E9-16 (OC1+) - E9-15 (OC1-) E9-14 (OC2+) - E9-13 (OC2-)	Correct waveform is as shown

NG → **REPLACE ECM (See page 10-24)**

OK

5	CHECK OIL CONTROL VALVE FILTER

OK: The filter is not clogged.

NG → **REPLACE OIL CONTROL VALVE FILTER**

OK

6	CHECK CAMSHAFT TIMING OIL CONTROL VALVE ASSY (See page 10-13)

OK: OCV has no contamination and moves smoothly.

OK → **Go to step 8**

NG

7	REPLACE CAMSHAFT TIMING OIL CONTROL VALVE ASSY

GO

8	CHECK CAMSHAFT TIMING GEAR ASSY (See page 14-213 or 14-224)

OK: Camshaft timing gear rotate smoothly when apply pressure.

OK	Go to step 10

NG

9	REPLACE CAMSHAFT TIMING GEAR ASSY

GO

10	CHECK FOR BLOCKAGE (OCV, OIL CHECK VALVE AND OIL HOLE)

OK: No blockage.

NG	REPAIR OR REPLACE

OK

11	CHECK IF DTC OUTPUTS REOCCUR

(a) Clear the DTCs.
  (1) Erase the codes using one of the following methods: 1) use the hand held tester, 2) disconnect the battery cable, or 3) remove the EFI NO. 1 and ETCS fuses for more than 60 seconds.

HINT:
After disconnecting the battery cable, perform the ”INITIALIZE” procedure (see page 05-1005).

(b) Start and warm up the engine.
(c) Drive the vehicle around for 10 minutes or more.
(d) Read output DTC using the OBD II scan tool.
  OK: No DTC output.

OK	VVT SYSTEM OK*

HINT:
*: DTCs P0011, P0012, P0021 or P0022 is output when a foreign object in the engine oil enters the system. These codes will stay registered even if the system returns to normal after a short time. Foreign objects are filtered out by the oil filter.

NG

REPLACE ECM (See page 10-24)

DTC	P0016	CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION (BANK 1 SENSOR A)

DTC	P0018	CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION (BANK 2 SENSOR A)

CIRCUIT DESCRIPTION

Refer to DTCs P0335 and P0339 on page 05-532 .

DTC No.	DTC Detection Condition	Trouble Area
P0016	Deviation in crankshaft position sensor signal and VVT sensor 1 signal (2 trip detection logic)	・Mechanical system (timing belt has jumped tooth, belt stretched) ・ECM
P0018	Deviation in crankshaft position sensor signal and VVT sensor 2 signal (2 trip detection logic)	・Mechanical system (timing belt has jumped tooth, belt stretched) ・ECM

MONITOR DESCRIPTION

The ECM optimizes the valve timing using the Variable Valve Timing (VVT) system to control the intake valve camshaft. The VVT system includes the ECM, the Oil Control Valve (OCV) and the VVT controller. The ECM sends a target duty-cycle control signal to the OCV. This control signal, sent to the OCV, regulates the oil pressure applied to the VVT controller. The VVT controller can advance or retard the intake valve camshaft. The ECM calibrates the valve timing of the VVT system by setting the camshaft to the maximum retard angle when the engine is idling. The ECM closes the OCV to retard the cam. The ECM stores this value as a VVT learning value. When the difference between the target valve timing and the actual valve timing is 5 degrees or less, the ECM stores this in its memory.

If the learning value meets both of the following conditions (”a” and ”b”), the ECM interprets this as a defect in the VVT system and sets a DTC.

(a) The VVT learning value is less than 21°CA (Bank 1)/22°CA (Bank 2) or more than 46°CA (Bank 1)/40°CA (Bank 2).

(b) The above condition continues for more than 18 seconds.

MONITOR STRATEGY

Related DTCs	P0016: Camshaft Timing (Bank 1) Misalignment at Idling P0018: Camshaft Timing (Bank 2) Misalignment at Idling
Required sensors / components (Main)	VVT actuator
Required sensors / components (Related)	CMP and CKP sensors
Frequency of operation	Once per driving cycle
Duration	Within 60 seconds
MIL operation	2 driving cycles
Sequence operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever this DTC is not present	See page 05-377
Engine RPM	500 to 1,400 rpm

TYPICAL MALFUNCTION THRESHOLDS

Duration that either of the following conditions 1 or 2 is met	18 seconds or more
1. VVT angle when camshaft is retarded maximum	Less than 21°(Bank 1) Less than 22°(Bank 2)
2. VVT angle when camshaft is retarded maximum	More than 46°(Bank 1) More than 40°(Bank 2)

WIRING DIAGRAM

Refer to DTCs P0335 and p0339 on page 05-532 .

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand-held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	**CHECK VALVE TIMING (CHECK FOR LOOSE OR JUMPED TOOTH OF TIMING (See page 14-206)**

OK: The matchmarks of the crankshaft pulley and camshaft pulley are aligned.

NG → **ADJUST VALVE TIMING (See page 14-206)**

OK

REPLACE ECM (See page 10-24)

DTC	P0031	OXYGEN (A/F) SENSOR HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 1)

DTC	P0032	OXYGEN (A/F) SENSOR HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 1)

DTC	P0051	OXYGEN (A/F) SENSOR HEATER CONTROL CIRCUIT LOW (BANK 2 SENSOR 1)

DTC	P0052	OXYGEN (A/F) SENSOR HEATER CONTROL CIRCUIT HIGH (BANK 2 SENSOR 1)

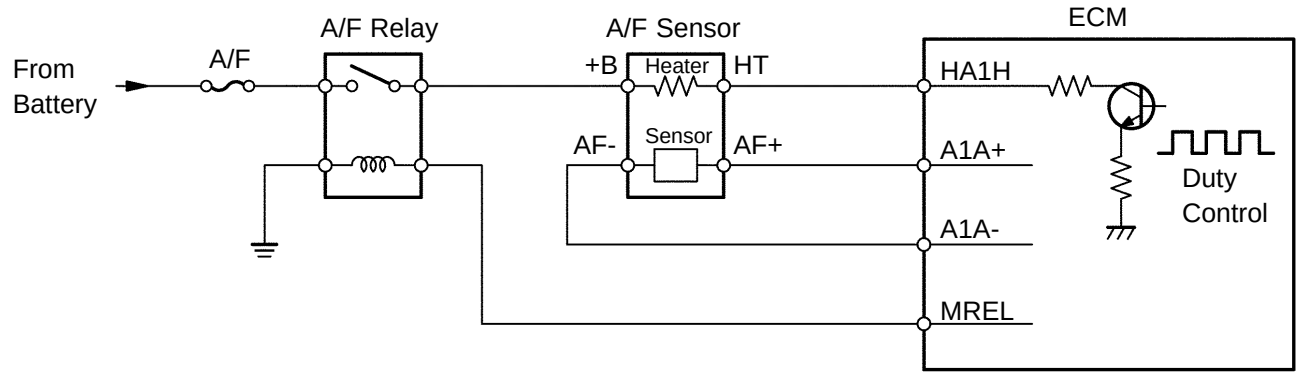
HINT:
Although the caption of detection item (DTC description) says ”oxygen sensor”, this DTC is related to the ”air fuel ratio sensor (A/F sensor)”.

CIRCUIT DESCRIPTION

Refer to DTC P2195 on page 05-629 .

HINT:
The ECM provides a pulse width modulated control circuit to adjust current through the heater. The A/F sensor heater circuit uses a relay on the +B side of the circuit.

Reference (Bank 1 Sensor 1 System Drawing)



P A87980

DTC No.	DTC Detection Condition	Trouble Area
P0031 P0051	Heated current is 0.8 A or less when heater operates (1 trip detection logic)	・Open or short in heater circuit of A/F sensor ・A/F sensor heater ・A/F relay ・ECM
P0032 P0052	Hybrid IC high current limiter port is fail (1 trip detection logic)	・Open or short in heater circuit of A/F sensor ・A/F sensor heater ・A/F relay ・ECM

HINT:

- Bank 1 is the bank that includes cylinder No. 1.
- Bank 2 is the bank that does not include cylinder No. 1.
- Sensor 1 is the sensor closest to the engine assembly.
- Sensor 2 is the sensor farthest away from the engine assembly.

MONITOR DESCRIPTION

The ECM uses the Air-Fuel Ratio (A/F) sensor information to regulate the air-fuel ratio close to the stoichiometric ratio. This maximizes the catalytic converter's ability to purify exhaust gas. The sensor detects oxygen levels in the exhaust gas and sends this signal to the ECM.

The inner surface of the sensor element is exposed to outside air. The outer surface of the sensor element is exposed to exhaust gas. The sensor element is made of platinum coated zirconia and includes an integrated heating element. The zirconia element generates small voltage when there is a large difference in the oxygen concentrations of the exhaust and the outside air. The platinum coating amplifies the voltage generation. When heated, the sensor becomes very efficient. If the temperature of the exhaust is low, the sensor will not generate useful voltage signals without supplemental heating. The ECM regulates the supplemental heating using a duty-cycle approach to regulate the average current in the heater element. If the heater current is out of the normal range, the sensor's output signals will be inaccurate and the ECM cannot regulate the air-fuel ratio properly.

When the heater current is out of the normal operating range, the ECM interprets this as a malfunction and sets a DTC.

MONITOR STRATEGY

Related DTCs	P0031: A/F Sensor Heater (Bank 1) Range Check (Low current) P0032: A/F Sensor Heater (Bank 1) Range Check (High current) P0051: A/F Sensor Heater (Bank 2) Range Check (Low current) P0052: A/F Sensor Heater (Bank 2) Range Check (High current)
Required sensors / components (Main)	A/F sensor heater
Required sensors / components (Related)	-
Frequency of operation	Continuous
Duration	10 seconds
MIL operation	Immediate
Sequence operation	None

TYPICAL ENABLING CONDITIONS

P0031 and P0051

The monitor will run whenever these DTCs are not present	See page 05-377
Battery voltage	10.5 V or more
A/F sensor heater duty ratio	50 % or more
Time after engine start	10 seconds or more

P0032 and P0052

The monitor will run whenever these DTCs are not present	See page 05-377
Time after engine start	10 seconds or more

TYPICAL MALFUNCTION THRESHOLDS

P0031 and P0051:

A/F sensor heater current	Less than 0.8 A

P0032 and P0052:

Hybrid IC high current limiter port	Fail

COMPONENT OPERATING RANGE

A/F sensor heater current	1.8 to 3.4 A at 20°C (68°F)

MONITOR RESULT

Refer to page 05-385 for detailed information.

The test value and test limit information are described as shown in the following table. Check the monitor result and test values after performing the monitor drive pattern (see page 05-387).

- TID (Test Identification Data) is assigned to each emissions-related component.
- TLT (Test Limit Type):
  If TLT is 0, the component is malfunctioning when the test value is higher than the test limit.
  If TLT is 1, the component is malfunctioning when the test value is lower than the test limit.
- CID (Component Identification Data) is assigned to each test value.
- Unit Conversion is used to calculate the test value indicated on generic OBD II scan tools.

TID $07: A/F sensor heater

TLT	CID	Unit Conversion	Description of Test Data	Description of Test Limit
1	$01	Multiply by 0.00017 (A)	Maximum heater current (Bank 1)	Malfunction criterion for A/F sensor heater
1	$10	Multiply by 0.00017 (A)	Maximum heater current (Bank 2)	Malfunction criterion for A/F sensor heater

WIRING DIAGRAM

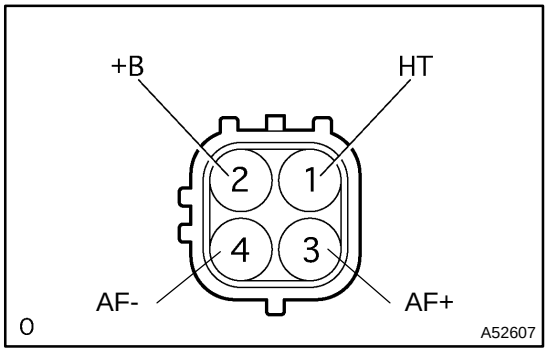
Refer to DTC P2195 on page 05-629 .

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	INSPECT AIR FUEL RATIO SENSOR (HEATER RESISTANCE)



(a) Disconnect the A6 or A7 A/F sensor connector.

(b) Check the resistance between the terminals of the A/F sensor.

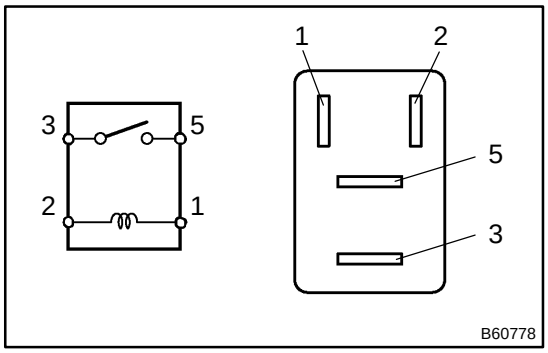
Resistance:

Tester Connection	Condition	Specified Condition
1 (HT) - 2 (+B)	20°C (68°F)	1.8 to 3.4 Ω
1 (HT) - 4 (AF-)	-	10 kΩ or higher

NG → **REPLACE AIR FUEL RATIO SENSOR**

OK

2 INSPECT RELAY (A/F)



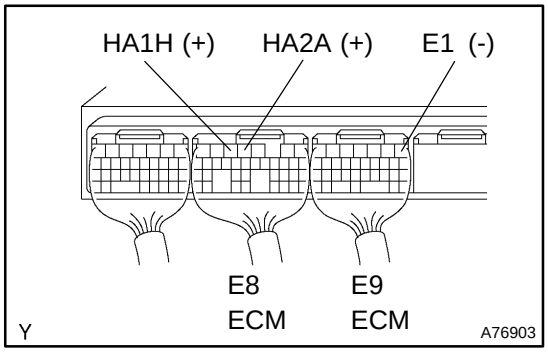
(a) Remove the A/F relay from the engine room R/B No. 2.
(b) Check the resistance of the A/F relay.
Standard:

Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1Ω (When battery voltage is applied to terminals 1 and 2)

NG → **REPLACE RELAY**

OK

3 CHECK ECM (HA1H, HA2A VOLTAGE)



(a) Turn the ignition switch ON.
(b) Check the voltage of the ECM connectors.
Standard:

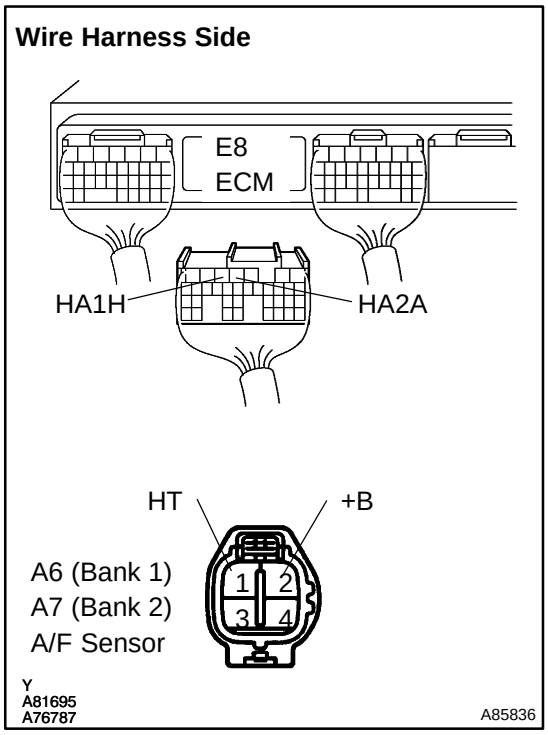
Tester Connection	Specified Condition
E8-5 (HA1H) - E9-1 (E1) E8-4 (HA2A) - E9-1 (E1)	9 to 14 V

HINT:
* The HA1H stands for the A/F sensor bank 1 sensor 1.
* The HA2A stands for the A/F sensor bank 2 sensor 1.

OK → **REPLACE ECM (See page 10-24)**

NG

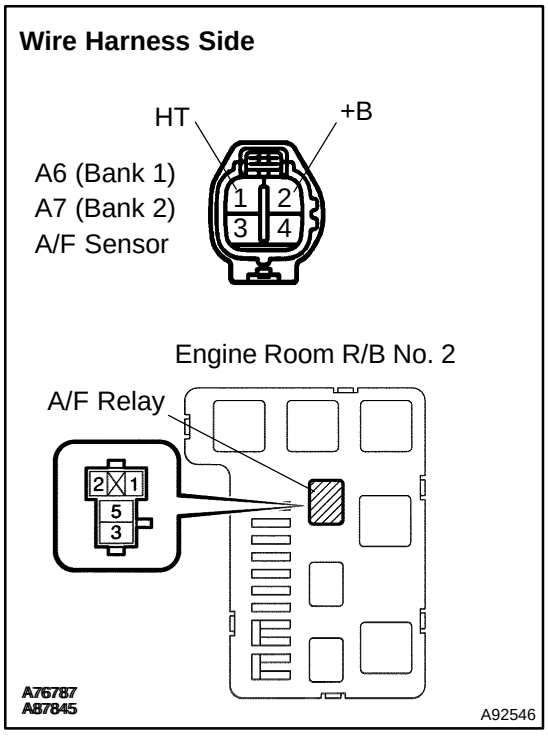
4 CHECK WIRE HARNESS (A/F SENSOR - ECM, A/F SENSOR - A/F RELAY)



(a) Check the wire harness between the ECM and A/F sensors.
(1) Disconnect the E8 ECM connector.
(2) Disconnect the A6 or A7 A/F sensor connector.
(3) Check the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
A6-1 (HT) - E8-5 (HA1H) A7-1 (HT) - E8-4 (HA2A)	Below 1 Ω
A6-1 (HT) or E8-5 (HA1H) - Body ground A7-1 (HT) or E8-4 (HA2A) - Body ground	10 kΩ or higher



(b) Check the wire harness between the A/F sensor and A/F relay.
(1) Disconnect the A6 or A7 A/F sensor connector.
(2) Remove the A/F relay from the engine room R/B No. 2.
(3) Check the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
A6-2 (+B) - R/B No. 2 A/F relay terminal 3 A7-2 (+B) - R/B No. 2 A/F relay terminal 3	Below 1 Ω
A6-2 (+B) or R/B No. 2 A/F relay terminal 3 - Body ground A7-2 (+B) or R/B No. 2 A/F relay terminal 3 - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE ECM (See page 10-24)

DTC	P0037	OXYGEN SENSOR HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 2)

DTC	P0038	OXYGEN SENSOR HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 2)

DTC	P0057	OXYGEN SENSOR HEATER CONTROL CIRCUIT LOW (BANK 2 SENSOR 2)

DTC	P0058	OXYGEN SENSOR HEATER CONTROL CIRCUIT HIGH (BANK 2 SENSOR 2)

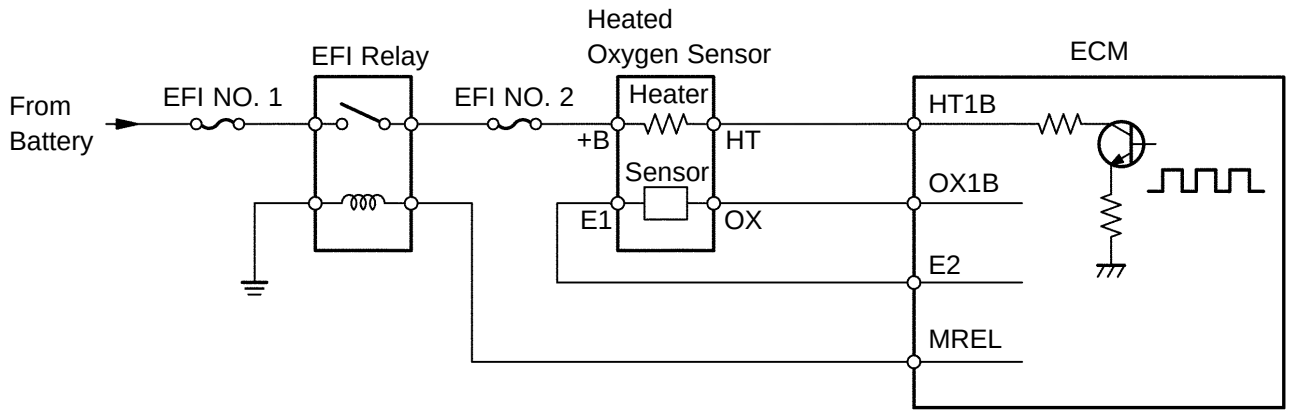
CIRCUIT DESCRIPTION

Refer to DTC P0136 on page 05-485 .

HINT:

The ECM provides a pulse width modulated control circuit to adjust current through the heater. The heated oxygen sensor heater circuit uses a relay on the +B side of the circuit.

Reference (Bank 1 Sensor 2 System Drawing)



DTC No.	DTC Detection Condition	Trouble Area
P0037 P0057	Heated current is 0.25 A or less when the heater operates with +B greater than 11.5 V (1 trip detection logic)	⋇Open or short in heater circuit of the heated oxygen sensor ⋇Heated oxygen sensor heater ⋇EFI relay ⋇ECM
P0038 P0058	Heated current exceeds 2 A when the heater operates (1 trip detection logic)	⋇Open or short in heater circuit of the heated oxygen sensor ⋇Heated oxygen sensor heater ⋇EFI relay ⋇ECM

HINT:

- ⋇ Bank 1 is the bank that includes cylinder No.1.
- ⋇ Bank 2 is the bank that does not include cylinder No.1.
- ⋇ Sensor 1 is the sensor closest to the engine assembly.
- ⋇ Sensor 2 is the sensor farthest away from the engine assembly.

MONITOR DESCRIPTION

The sensing portion of the heated oxygen sensor has a zirconia element that is used to detect oxygen concentration in the exhaust. If the zirconia element is at the proper temperature and the difference of the oxygen concentration between the inside and outside surface of the sensor is large, the zirconia element will generate voltage signals. In order to increase the oxygen concentration detecting capacity in the zirconia element, the ECM supplements the heat from the exhaust with heat from a heating element inside the sensor. When current in the sensor is out of the standard operating range, the ECM interprets this as a fault in the heated oxygen sensor and sets a DTC.

Example:

The ECM will set a high current DTC if the current in the sensor is more than 2 A when the heater is OFF. Similarly, the ECM will set a low current DTC if the current is less than 0.25 A when the heater is ON.

MONITOR STRATEGY

Related DTCs	P0037: HO2S Heater (Bank 1) Range Check (Low current) P0038: HO2S Heater (Bank 1) Range Check (High current) P0057: HO2S Heater (Bank 2) Range Check (Low current) P0058: HO2S Heater (Bank 2) Range Check (High current)
Required sensors / components (Main)	HO2S heater
Required sensors / components (Related)	Vehicle Speed Sensor (VSS)
Frequency of operation	Continuous
Duration	0.3 seconds
MIL operation	Immediate
Sequence operation	None

TYPICAL ENABLING CONDITIONS

P0037 and P0057:

The monitor will run whenever these DTCs are not present	See page 05-377
Either of the following conditions A and B is met:	-
Conditions A	-
Time after engine start	250 to 500 seconds
Vehicle speed	Within 55.9 mph (90 km/h)
Battery voltage	Less than 10.5 V
Pass or Fail detection in this driving cycle	None
Conditions B	-
Time after engine start	500 seconds or more
Vehicle speed	24.8 mph (40 km/h) or more
Battery voltage	Less than 10.5 V
Pass or Fail detection in this driving cycle	None

P0038 and P0058:

None

TYPICAL MALFUNCTION THRESHOLDS

P0037 and P0057:

HO2S heater current when HO2S heater OFF	Less than 0.25 A (when battery voltage is 11.5 V or more)

P0038 and P0058:

HO2S heater current when HO2S heater ON	More than 2 A

COMPONENT OPERATING RANGE

HO2S heater current	0.4 to 1 A (at idle, warmed-up engine and +B: 11 to 14 V)

MONITOR RESULT

Refer to page 05-385 for detailed information.

The test value and test limit information are described as shown in the following table. Check the monitor result and test values after performing the monitor drive pattern (see page 05-387).

- TID (Test Identification Data) is assigned to each emissions-related component.
- TLT (Test Limit Type):
  If TLT is 0, the component is malfunctioning when the test value is higher than the test limit.
  If TLT is 1, the component is malfunctioning when the test value is lower than the test limit.
- CID (Component Identification Data) is assigned to each test value.
- Unit Conversion is used to calculate the test value indicated on generic OBD II scan tools.

TID $04: HO2S heater

TLT	CID	Unit Conversion	Description of Test Data	Description of Test Limit
1	$02	Multiply by 0.000076 (A)	Maximum HO2S heater current (Bank 1 Sensor 2)	Malfunction threshold for HO2S heater
1	$20	Multiply by 0.000076 (A)	Maximum HO2S heater current (Bank 2 Sensor 2)	Malfunction threshold for HO2S heater

WIRING DIAGRAM

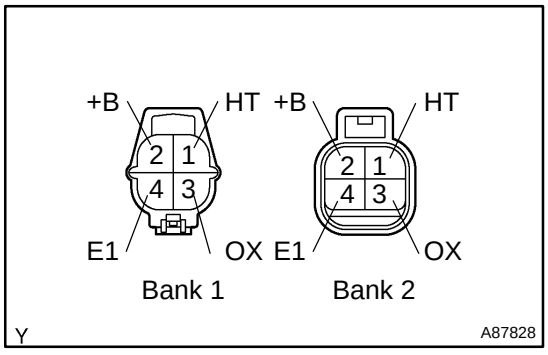
Refer to DTC P0136 on page 05-485 .

INSPECTION PROCEDURE

HINT:

- If DTCs related to different systems that have terminal E2 as the ground terminal are output simultaneously, terminal E2 may have an open circuit.
- Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1 INSPECT HEATED OXYGEN SENSOR (HEATER RESISTANCE)



(a) Disconnect the H10 or H6 heated oxygen sensor connector.

(b) Check the resistance of the heated oxygen sensor terminals.

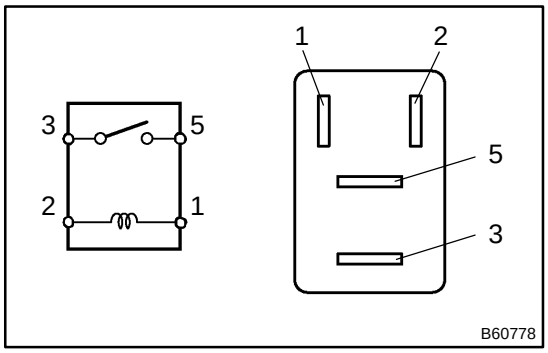
Standard (bank 1, 2 sensor 2):

Tester Connection	Condition	Specified Condition
H10-1 (HT) - H10-2 (+B) H6-1 (HT) - H6-2 (+B)	20°C (68°F)	11 to 16 Ω
H10-1 (HT) - H10-4 (E1) H6-1 (HT) - H6-4 (E1)	800°C (1,472°F)	23 to 32 Ω

NG → **REPLACE HEATED OXYGEN SENSOR**

OK

2 INSPECT RELAY (EFI)



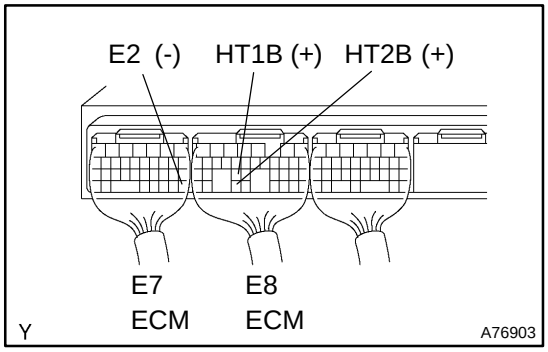
(a) Remove the EFI relay from the engine room J/B.
(b) Check the resistance of the EFI relay.
Standard:

Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1Ω (When battery voltage is applied to terminals 1 and 2)

NG → **REPLACE RELAY**

OK

3 CHECK ECM (HT1B OR HT2B VOLTAGE)



(a) Turn the ignition switch ON.
(b) Check the voltage of the ECM connectors.
Standard:

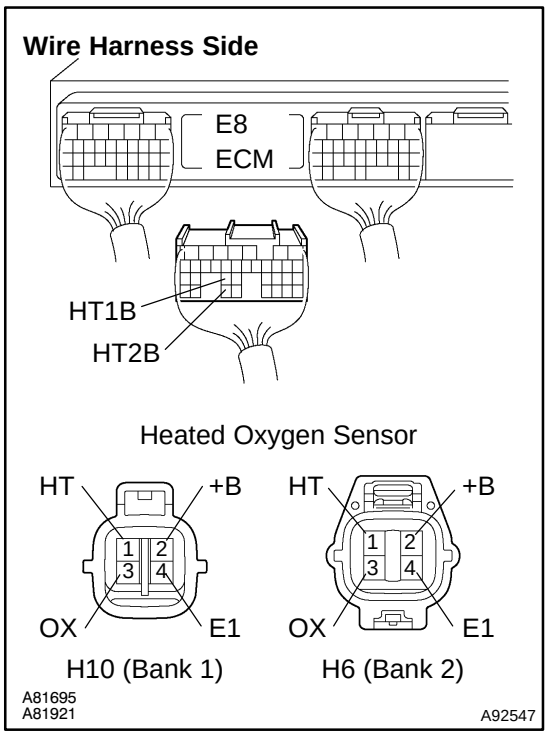
Tester Connection	Specified Condition
E8-25 (HT1B) - E7-28 (E2) E8-33 (HT2B) - E7-28 (E2)	9 to 14 V

HINT:
- The HT1B stands for the heated oxygen sensor bank 1 sensor 2.
- The HT2B stands for the heated oxygen sensor bank 2 sensor 2.

OK → **REPLACE ECM (See page 10-24)**

NG

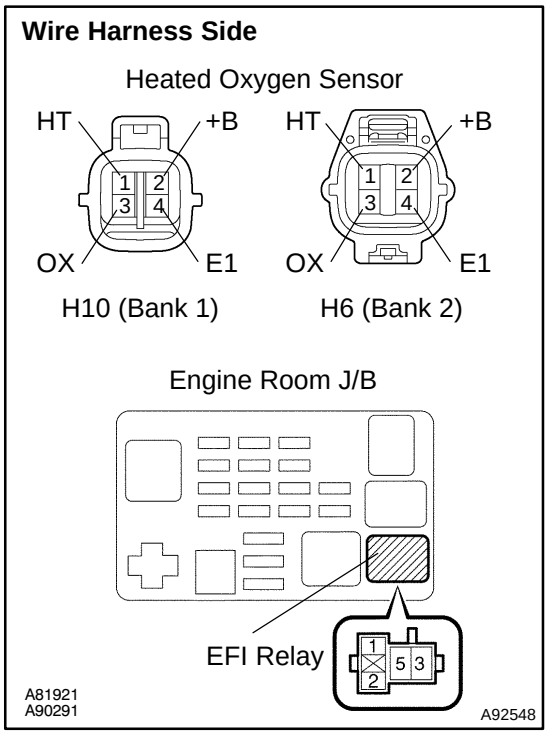
4	CHECK WIRE HARNESS (HEATED OXYGEN SENSOR - ECM, HEATED OXYGEN SENSOR - EFI RELAY)



(a) Check the wire harness between the ECM and heated oxygen sensor.
(1) Disconnect the E8 ECM connector.
(2) Disconnect the H10 or H6 heated oxygen sensor connector.
(3) Check the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
H10-1 (HT) - E8-25 (HT1B) H6-1 (HT) - E8-33 (HT2B)	Below 1 Ω
H10-1 (HT) or E8-25 (HT1B) - Body ground H6-1 (HT) or E8-33 (HT2B) - Body ground	10 kΩ or higher



(b) Check the wire harness between the heated oxygen sensor and EFI relay.
(1) Disconnect the H10 or H6 heated oxygen sensor connector.
(2) Remove the EFI relay from the engine room J/B.
(3) Check the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
H10-2 (+B) - J/B EFI relay terminal 3 H6-2 (+B) - J/B EFI relay terminal 3	Below 1 Ω
H10-2 (+B) or J/B EFI relay terminal 3 - Body ground H6-2 (+B) or J/B EFI relay terminal 3 - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE ECM (See page 10-24)

DTC	P0100	MASS OR VOLUME AIR FLOW CIRCUIT

DTC	P0102	MASS OR VOLUME AIR FLOW CIRCUIT LOW INPUT

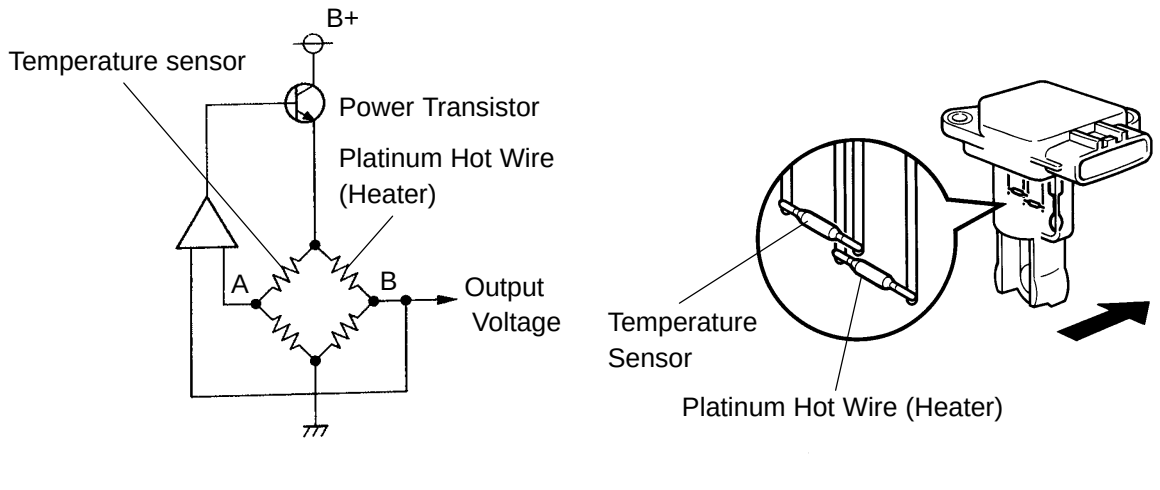
DTC	P0103	MASS OR VOLUME AIR FLOW CIRCUIT HIGH INPUT

CIRCUIT DESCRIPTION

The Mass Air Flow (MAF) meter measures the amount of air flowing through the throttle valve. The ECM uses this information to determine the fuel injection time and provide a proper air fuel ratio. Inside the MAF meter, there is a heated platinum wire exposed to the flow of intake air.

By applying a specific current to the wire, the ECM heats this wire to a given temperature. The flow of incoming air cools the wire and an internal thermistor, changing their resistance. To maintain a constant current value, the ECM varies the voltage applied to these components in the MAF meter. The voltage level is proportional to the air flow through the sensor. The ECM interprets this voltage as the intake air amount.

The circuit is constructed so that the platinum hot wire and temperature sensor provide a bridge circuit, with the power transistor controlled so that the potential of A and B remains equal to maintain the set temperature.



DTC No.	DTC Detection Condition	Trouble Area
P0100	When MAF meter circuit has an open or a short for more than 3 seconds	・Open or short in MAF meter circuit ・MAF meter ・ECM
P0102	When MAF meter circuit has an open for more than 3 seconds	・Open or short in MAF meter circuit ・MAF meter ・ECM
P0103	When MAF meter circuit has a short for more than 3 seconds	・Open or short in MAF meter circuit ・MAF meter ・ECM

HINT:
After confirming DTC P0100, P0102 or P0103, use the hand-held tester or the OBD II scan tool to confirm the MAF ratio from the ALL menu (to reach the ALL menu: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL).

Air Flow Value (gm/s)	Malfunction
Approx. 0.0	・Open in MAF meter power source circuit ・Open or short in VG circuit
271.0 or more	・Open in E2G circuit

MONITOR DESCRIPTION

If there is a defect in the sensor, or an open or short circuit, the voltage level will deviate from the normal operating range. The ECM interprets this deviation as a defect in the MAF meter and sets a DTC.
Example:
The sensor voltage output is less than 0.2 V or more than 4.9 V and either condition continues for more than 3 seconds.

MONITOR STRATEGY

Related DTCs	P0100: MAF Meter Range Check (Chattering) P0102: MAF Meter Range Check (Low voltage) P0103: MAF Meter Range Check (High voltage)
Required sensors / components (Main)	MAF meter
Required sensors / components (Related)	CKP sensor
Frequency of operation	Continuous
Duration	3 seconds
MIL operation	Immediate: Engine RPM is less than 4,000 rpm 2 driving cycles: Engine RPM if 4,000 rpm or more
Sequence operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever these DTCs are not present	See page 05-377

TYPICAL MALFUNCTION THRESHOLDS

P0100:

MAF meter voltage	Less than 0.2 V, or more than 4.9 V

P0102:

MAF meter voltage	Less than 0.2 V

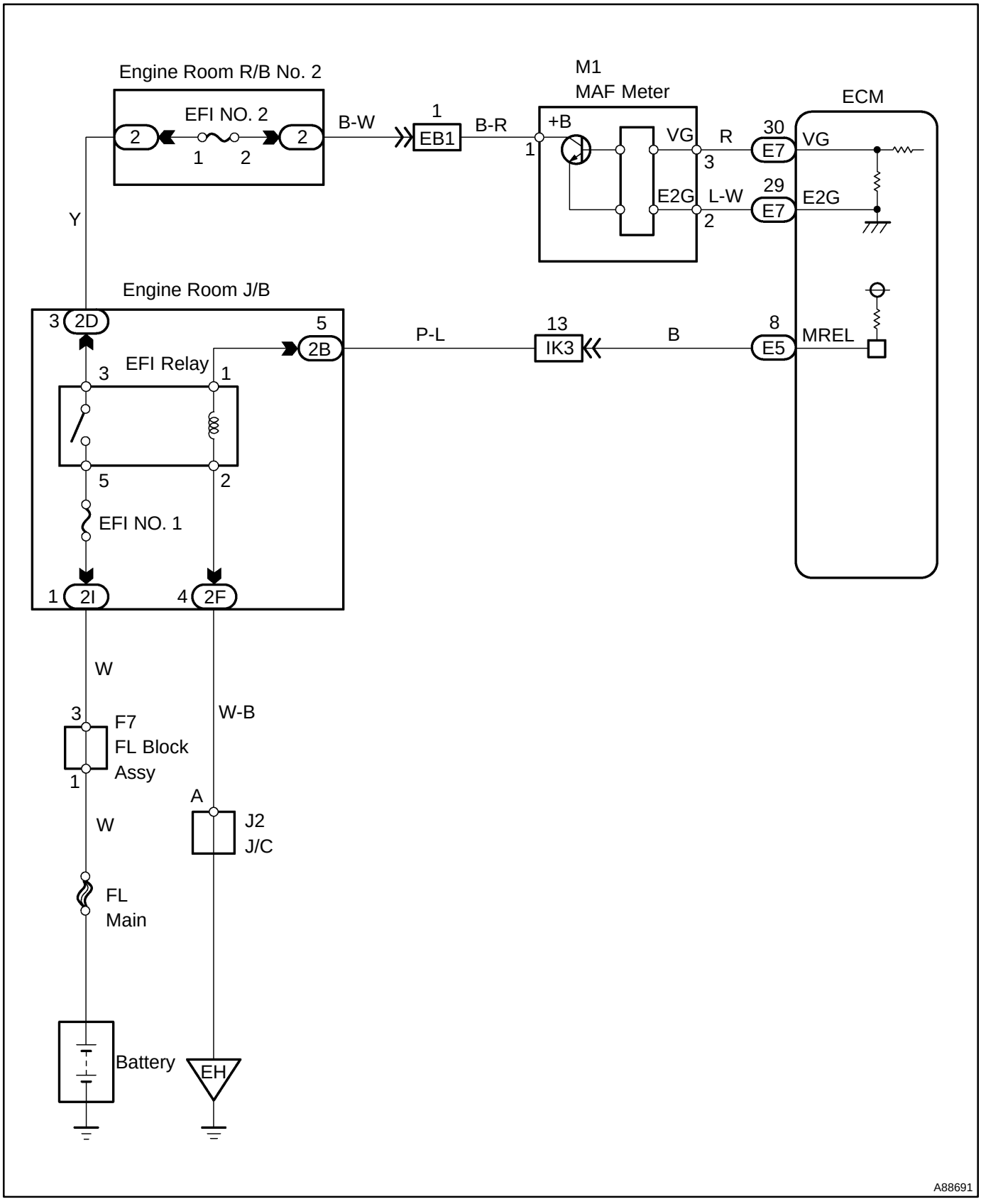
P0103:

MAF meter voltage	More than 4.9 V

COMPONENT OPERATING RANGE

MAF meter voltage	Between 0.4 and 2.2 V

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	READ VALUE OF HAND-HELD TESTER OR OBD II SCAN TOOL (MAF RATE)

(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(b) Start the engine.
(c) Push the hand-held tester or the OBD II scan tool main switch ON.
(d) On the hand-held tester or the OBD II scan tool, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / MAF. Read the values.

Result:

Air Flow Rate (gm/s)	Proceed to
0.0	A
271.0 or more	B
MAF rate greater than 1 but less than 270.0	C

HINT:

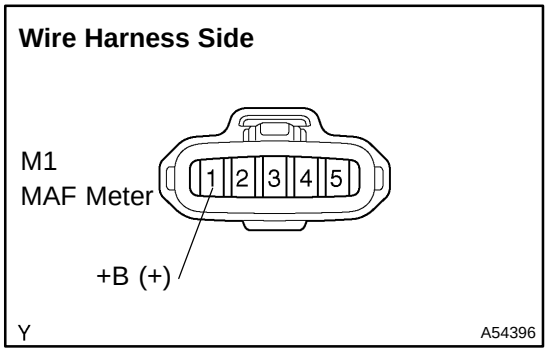
The value must change when the throttle valve is opened or closed.

B → **Go to step 6**

C → **CHECK FOR INTERMITTENT PROBLEMS (See page 05-370)**

A

2	CHECK MASS AIR FLOW METER (POWER SOURCE)



(a) Turn the ignition switch ON.
(b) Disconnect the M1 MAF meter connector.
(c) Check the voltage of the wire harness side connector.

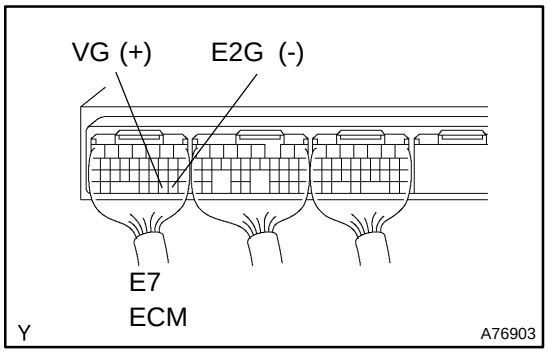
Standard:

Tester Connection	Specified Condition
M1-1 (+B) - Body ground	9 to 14 V

NG → **Go to step 5**

OK

3 CHECK ECM (VG VOLTAGE)



(a) Start the engine.
(b) Check the voltage of the ECM connector.

HINT:
The shift position should be P or N and the A/C switch should be turned OFF.

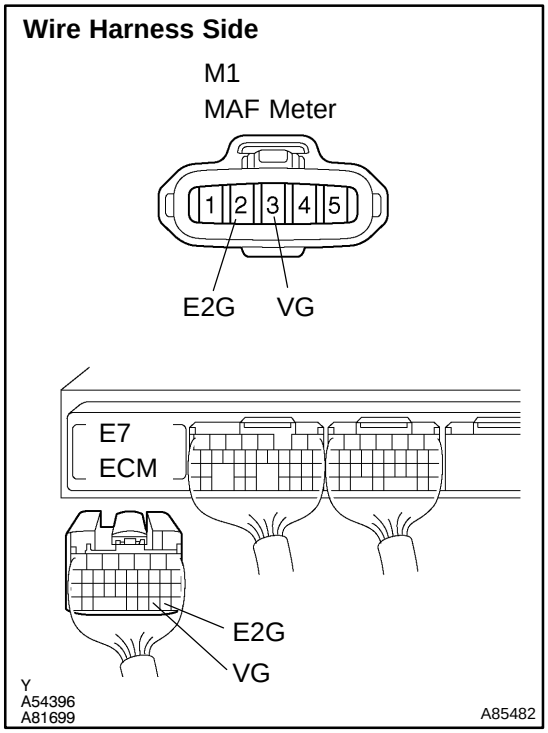
Standard:

Tester Connection	Condition	Specified Condition
E7-30 (VG) - E7-29 (E2G)	Engine is idling	0.5 to 3.0 V

OK → **REPLACE ECM (See page 10-24)**

NG

4 CHECK WIRE HARNESS (MAF METER - ECM)



(a) Disconnect the M1 MAF meter connector.
(b) Disconnect the E7 ECM connector.
(c) Check the resistance of the wire harness side connectors.

Standard:

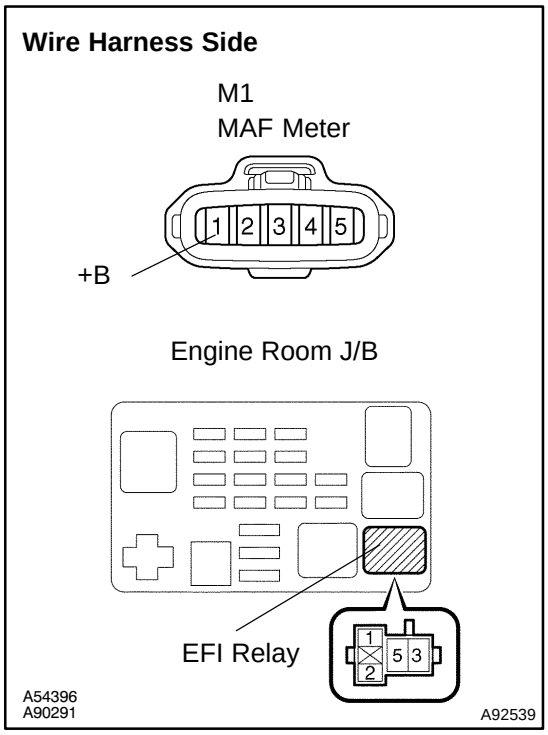
Tester Connection	Specified Condition
M1-3 (VG) - E7-30 (VG) M1-2 (E2G) - E7-29 (E2G)	Below 1 Ω
M1-3 (VG) or E7-30 (VG) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE MASS AIR FLOW METER

5 CHECK WIRE HARNESS (MAF METER - EFI RELAY)



(a) Disconnect the M1 MAF meter connector.
(b) Remove the EFI relay from the engine room J/B.
(c) Check the resistance of the wire harness side connectors.

Standard:

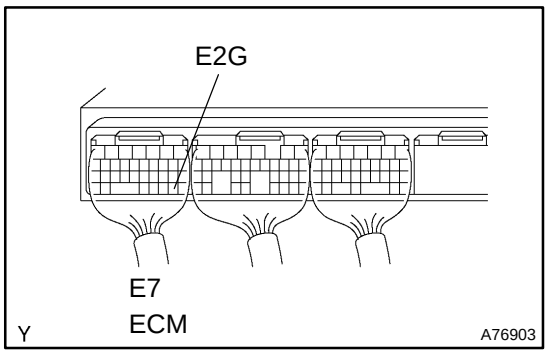
Tester Connection	Specified Condition
M1-1 (+B) - J/B EFI relay terminal 3	Below 1 Ω
M1-1 (+B) or J/B EFI relay terminal 3 - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

INSPECT ECM POWER SOURCE CIRCUIT (See page 05-674)

6 INSPECT ECM (SENSOR GROUND)



(a) Check the resistance of the ECM connector.

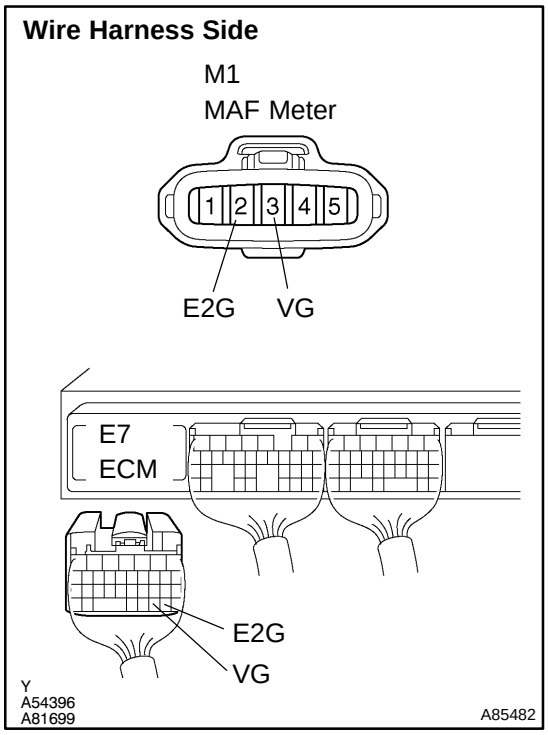
Standard:

Tester Connection	Specified Condition
E7-29 (E2G) - Body ground	Below 1 Ω

NG → **REPLACE ECM (See page 10-24)**

OK

7 CHECK WIRE HARNESS (MAF METER - ECM)



(a) Disconnect the M1 MAF meter connector.
(b) Disconnect the E7 ECM connector.
(c) Check the resistance of between the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
M1-3 (VG) - E7-30 (VG) M1-2 (E2G) - E7-29 (E2G)	Below 1 Ω
M1-3 (VG) or E7-30 (VG) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE MASS AIR FLOW METER

DTC	P0101	MASS OR VOLUME AIR FLOW CIRCUIT RANGE/PERFORMANCE PROBLEM

CIRCUIT DESCRIPTION

Refer to DTC P0100 on page 05-448 .

DTC No.	DTC Detection Condition	Trouble Area
P0101	・High voltage: Conditions (a), (b) and (c) continue for more than 10 seconds (2 trip detection logic): (a) Engine speed less than 2,000 rpm (b) Engine coolant temperature 70°C (158°F) or higher (c) Voltage output of Mass Air Flow (MAF) meter more than 2.2 V (varies with Throttle Position [TP] sensor voltage) ・Low voltage: Conditions (a) and (b) continue for more than 10 seconds (2 trip detection logic): (a) Engine speed more than 300 rpm (b) Voltage output of MAF meter less than 0.83 V (varies with TP sensor voltage)	・MAF meter

MONITOR DESCRIPTION

The MAF meter is a sensor that measures the amount of air flowing through the throttle valve. The ECM uses this information to determine the fuel injection time and to provide an appropriate air-fuel ratio.
Inside the MAF meter, there is a heated platinum wire which is exposed to the flow of intake air. By applying a specific electrical current to the wire, the ECM heats it to a specific temperature. The flow of incoming air cools both the wire and an internal thermistor, changing their resistance. To maintain a constant current value, the ECM varies the voltage applied to these components of the MAF meter. The voltage level is proportional to the air flow through the sensor, and the ECM uses it to calculate the intake air volume.
If there is a defect in the sensor, or an open or short in the circuit, the voltage level deviates from the normal operating range. The ECM interprets this deviation as a malfunction in the MAF meter and sets the DTC.
Example:
If the voltage is more than 2.2 V, or less than 0.83 V while idling, the ECM determines that there is a malfunction in the MAF meter and sets the DTC.

MONITOR STRATEGY

Related DTCs	P0101: MAF Meter Rationality (Low voltage) P0101: MAF Meter Rationality (High voltage)
Required sensors/ components (Main)	MAF meter
Required sensors/ components (Related)	Crankshaft position sensor, ECT sensor, Throttle position sensor
Frequency of operation	Continuous
Duration	10 seconds
MIL operation	2 driving cycles
Sequence operation	None

TYPICAL ENABLING CONDITIONS

All:

The monitor will run whenever this DTC is not present	See page 05-377

MAF Meter Rationality (High Voltage):

Engine RPM	Less than 2,000 rpm
ECT	70°C (158°F) or more

MAF Meter Rationality (Low Voltage):

Engine RPM	More than 300 rpm
Fuel cut	OFF

TYPICAL MALFUNCTION THRESHOLDS

MAF Meter Rationality (High Voltage):

MAF meter voltage	More than 2.2 V (varies with throttle position sensor voltage)

MAF Meter Rationality (Low Voltage):

MAF meter voltage	Less than 0.54 V (varies with throttle position sensor voltage)

WIRING DIAGRAM

Refer to DTC P0100 on page 05-448 .

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	CHECK OTHER DTC OUTPUT(IN ADDITION TO DTC P0101)

(a) Read the DTC using the hand-held tester or the OBD II scan tool.

Result:

Display (DTC Output)	Proceed to
P0101 and other DTCs are output	A
Only P0101 is output	B

HINT:

If any other codes besides P0101 are output, perform the troubleshooting for those codes first.

B → **REPLACE MASS AIR FLOW METER**

A

GO TO RELEVANT DTC CHART (See page 05-412)

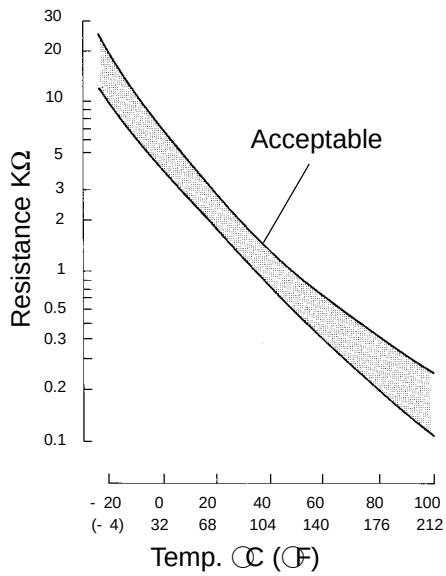
DTC	P0110	INTAKE AIR TEMPERATURE CIRCUIT

DTC	P0112	INTAKE AIR TEMPERATURE CIRCUIT LOW INPUT

DTC	P0113	INTAKE AIR TEMPERATURE CIRCUIT HIGH INPUT

CIRCUIT DESCRIPTION

Fig. 1



The Intake Air Temperature (IAT) sensor, mounted on the Mass Air Flow (MAF) meter, monitors the intake air temperature. The IAT sensor has a thermistor that varies its resistance depending on the temperature of the intake air. When the air temperature is low, the resistance in the thermistor increases. When the temperature is high, the resistance drops. The variations in resistance are reflected as changes in voltage applied to the ECM terminal (See Fig. 1).

The IAT sensor is connected to the ECM (see below). The 5 V power source voltage in the ECM is applied to the IAT sensor from terminal THA via resistor R.

That is, the resistor R and the IAT sensor are connected in series. When the resistance value of the IAT sensor changes in accordance with changes in the IAT, the voltage at terminal THA also changes. Based on this signal, the ECM increases the fuel injection volume to improve the driveability during cold engine operation.

DTC No.	Proceed to	DTC Detection Condition	Trouble Area
P0110	Step 1	Open or short in IAT (Intake air temperature) sensor circuit for 0.5 seconds (1 trip detection logic)	・Open or short in IAT sensor circuit ・IAT sensor (built in MAF meter) ・ECM
P0112	Step 4	Short in IAT sensor circuit for 0.5 seconds (1 trip detection logic)	・Open or short in IAT sensor circuit ・IAT sensor (built in MAF meter) ・ECM
P0113	Step 2	Open in IAT sensor circuit for 0.5 seconds (1 trip detection logic)	・Open or short in IAT sensor circuit ・IAT sensor (built in MAF meter) ・ECM

HINT:

After confirming DTC P0110, P0112 or P0113, use the hand-held tester or the OBD II scan tool to confirm the IAT from the ALL menu (to reach the ALL menu: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL).

Temperature Displayed	Malfunction
-40 °C (-40 °F)	Open circuit
140 °C (284 °F) or more	Short circuit

MONITOR DESCRIPTION

The ECM monitors the sensor voltage and uses this value to calculate the intake air temperature. When the sensor output voltage deviates from the normal operating range, the ECM interprets this as a fault in the IAT sensor and sets a DTC.

Example:

The sensor voltage output equals to -40°C (-40°F), or more than 140°C (284°F), and either condition continue for 0.5 seconds or more.

MONITOR STRATEGY

Related DTCs	P0110: IAT Sensor Range Check (Chattering) P0112: IAT Sensor Range Check (Low Resistance) P0113: IAT Sensor Range Check (High Resistance)
Required sensors / components (Main)	IAT sensor
Required sensors / components (Related)	-
Frequency of operation	Continuous
Duration	0.5 seconds
MIL operation	Immediate
Sequence operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever these DTCs are not present	See page 05-377

TYPICAL MALFUNCTION THRESHOLDS

P0110:

IAT sensor resistance	Less than 98.5 Ω, or more than 156 kΩ

P0112:

IAT sensor resistance [IAT]	Less than 98.5 Ω [More than 140°C (284°F)]

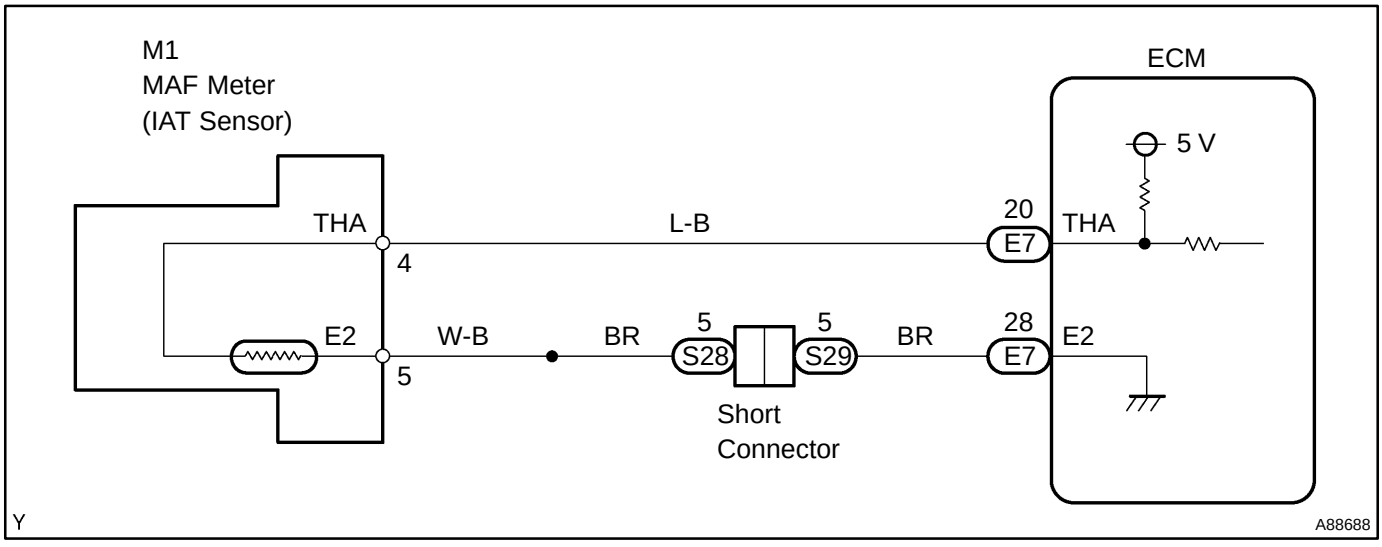
P0113:

IAT sensor resistance [IAT]	More than 156 kΩ [-40°C (-40°F)]

COMPONENT OPERATING RANGE

IAT sensor resistance [IAT]	98.5 Ω to 156 kΩ [-39 to 140°C (-40 to 284°F)]

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If DTCs related to different systems that have terminal E2 as the ground terminal are output simultaneously, terminal E2 may have an open circuit.
- Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	READ VALUE OF HAND-HELD TESTER OR OBD II SCAN TOOL (INTAKE AIR TEMPERATURE)

(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(b) Turn the ignition switch ON. Push the hand-held tester or the OBD II scan tool main switch ON.
(c) On the hand-held tester or the OBD II scan tool, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / INTAKE AIR. Read the values.
Temperature: Same value as the actual intake air temperature.
Result:

Temperature Displayed	Proceed to
-40 ˚C (-40˚F)	A
140˚C (284˚F) or more	B
OK (Same as present temperature)	C

HINT:

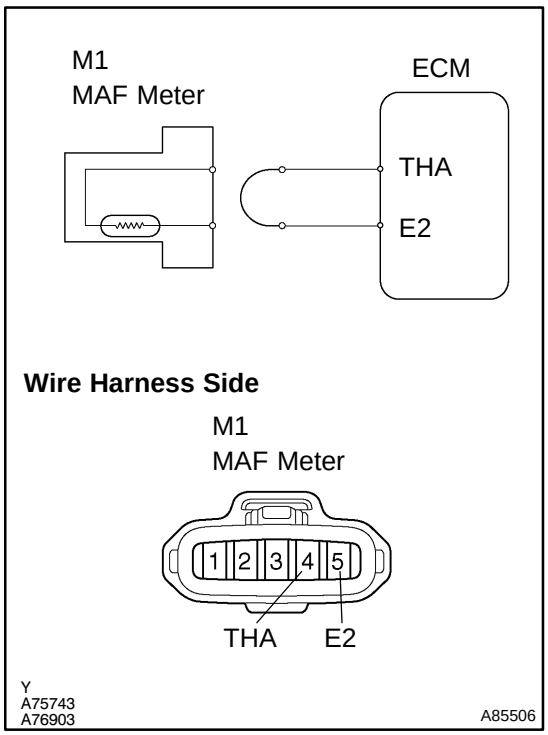
- If there is an open circuit, the hand-held tester or the OBD II scan tool indicates -40˚C (-40˚F).
- If there is a short circuit, the hand-held tester or the OBD II scan tool indicates 140˚C (284˚F) or more.

B → **Go to step 4**

C → **CHECK FOR INTERMITTENT PROBLEMS (See page 05-370)**

A

2	READ VALUE OF HAND-HELD TESTER OR OBD II SCAN TOOL (CHECK FOR OPEN IN WIRE HARNESS)

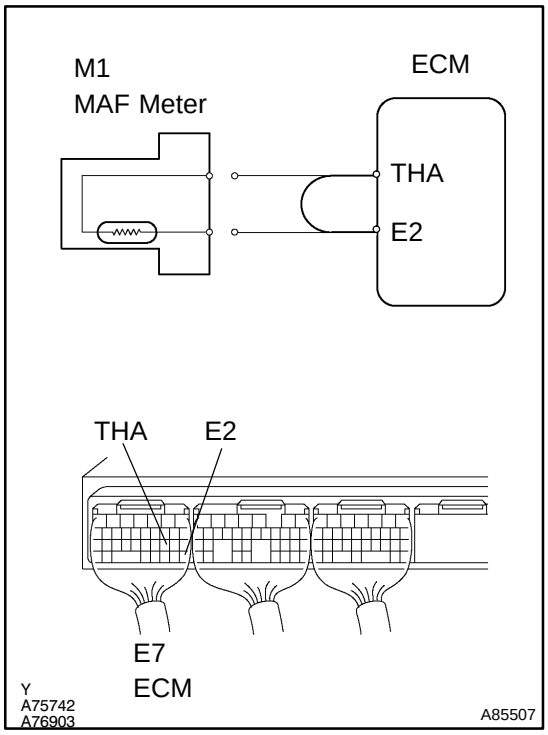


(a) Disconnect the M1 MAF meter connector.
(b) Connect terminals THA and E2 of the M1 MAF meter wire harness side connector.
(c) Turn the ignition switch ON.
(d) On the hand-held tester or the OBD II scan tool, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / INTAKE AIR. Read the values.
OK:
Temperature value: 140°C (284°F) or more

OK	CONFIRM GOOD CONNECTION AT SENSOR. IF OK, REPLACE MASS AIR FLOW METER

NG

3	READ VALUE OF HAND-HELD TESTER OR OBD II SCAN TOOL (CHECK FOR OPEN IN ECM)



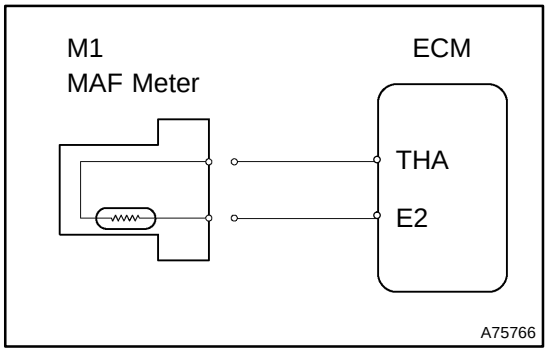
(a) Disconnect the M1 MAF meter connector.
(b) Connect terminals THA and E2 of the E7 ECM connector.
HINT:
Before checking, do a visual and contact pressure check for the ECM connector.
(c) Turn the ignition switch ON.
(d) On the hand-held tester or the OBD II scan tool, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / INTAKE AIR. Read the values.
OK:
Temperature value: 140°C (284°F) or more

OK	REPAIR OR REPLACE HARNESS AND CONNECTOR

NG

CONFIRM GOOD CONNECTION AT ECM. IF OK, REPLACE ECM (See page 10-24)

4	READ VALUE OF HAND-HELD TESTER OR OBD II SCAN TOOL (CHECK FOR SHORT IN WIRE HARNESS)

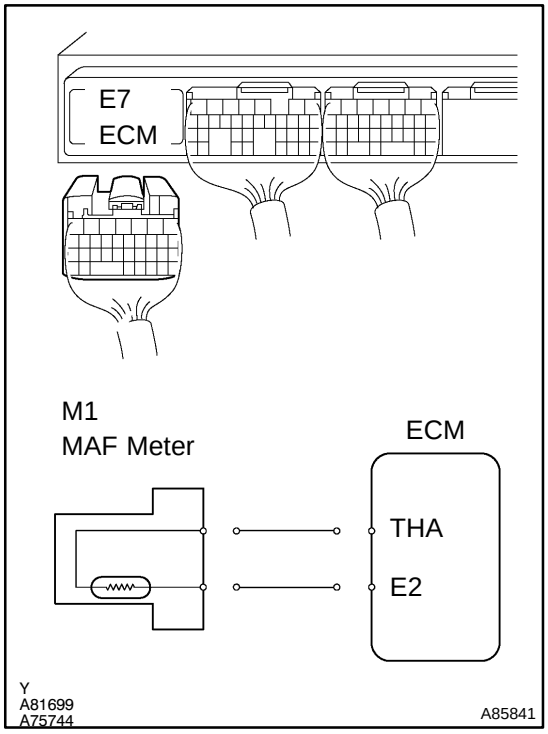


(a) Disconnect the M1 MAF meter connector.
(b) Turn the ignition switch ON.
(c) Select the item "DIAGNOSIS/ENHANCED OBD II/DATA LIST/ALL/INTAKE AIR" and read its value displayed on the hand-held tester or the OBD II scan tool.
OK:
Temperature value: -40°C (-40°F)

OK	REPLACE MASS AIR FLOW METER

NG

5	READ VALUE OF HAND-HELD TESTER OR OBD II SCAN TOOL (CHECK FOR SHORT IN ECM)



(a) Disconnect the E7 ECM connector.
(b) Turn the ignition switch ON.
(c) Select the item "DIAGNOSIS/ENHANCED OBD II/DATA LIST/ALL/INTAKE AIR" and read its value displayed on the hand-held tester or the OBD II scan tool.
OK:
Temperature value: -40°C (-40°F)

OK	REPAIR OR REPLACE HARNESS AND CONNECTOR

NG

REPLACE ECM (See page 10-24)

DTC	P0115	ENGINE COOLANT TEMPERATURE CIRCUIT

DTC	P0117	ENGINE COOLANT TEMPERATURE CIRCUIT LOW INPUT

DTC	P0118	ENGINE COOLANT TEMPERATURE CIRCUIT HIGH INPUT

CIRCUIT DESCRIPTION

A thermistor is built into the Engine Coolant Temperature (ECT) sensor and changes the resistance value according to the engine coolant temperature.
The structure of the sensor and connection to the ECM are the same as the Intake Air Temperature (IAT) sensor.
HINT:
If the ECM detects the DTC P0115, P0117 or P0118, it operates the fail-safe function in which the ECT is assumed to be 80°C (176°F).

DTC No.	Proceed to	DTC Detection Condition	Trouble Area
P0115	Step 1	Open or short in ECT sensor circuit for 0.5 seconds	・Open or short in ECT sensor circuit ・ECT sensor ・ECM
P0117	Step 4	Short in ECT sensor circuit for 0.5 seconds	・Open or short in ECT sensor circuit ・ECT sensor ・ECM
P0118	Step 2	Open in ECT sensor circuit for 0.5 seconds	・Open or short in ECT sensor circuit ・ECT sensor ・ECM

HINT:
After confirming DTC P0115, P0117 or P0118, use the hand-held tester or the OBD II scan tool to confirm the ECT from the ALL menu (to reach the ALL menu: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL).

Temperature Displayed	Malfunction
-40 °C (-40 °F)	Open circuit
140 °C (284 °F) or more	Short circuit

MONITOR DESCRIPTION

The ECT sensor is used to monitor the engine coolant temperature. The ECT sensor has a thermistor that varies its resistance depending on the temperature of the engine coolant. When the coolant temperature is low, the resistance in the thermistor increases. When the temperature is high, the resistance drops. The variations in resistance are reflected in the voltage output from the sensor.
The ECM monitors the sensor voltage and uses this value to calculate the engine coolant temperature. When the sensor output voltage deviates from the normal operating range, the ECM interprets this as a fault in the ECT sensor and sets a DTC.
Example:
When the ECM calculates that the ECT is -40°C (-40°F) or more than 140°C (284°F) and if either condition continues for 0.5 seconds or more, the ECM will set a DTC.

MONITOR STRATEGY

Related DTCs	P0115: ECT Sensor Range Check (Chattering) P0117: ECT Sensor Range Check (Low Resistance) P0118: ECT Sensor Range Check (High Resistance)
Required sensors / components (Main)	ECT sensor
Required sensors / components (Related)	-
Frequency of operation	Continuous
Duration	0.5 seconds
MIL operation	Immediate
Sequence operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever these DTCs are not present	See page 05-377

TYPICAL MALFUNCTION THRESHOLDS

P0115:

ECT sensor resistance	Less than 79 Ω, or more than 156 kΩ

P0117:

ECT sensor resistance [ECT]	Less than 79 Ω [More than 140°C (284°F)]

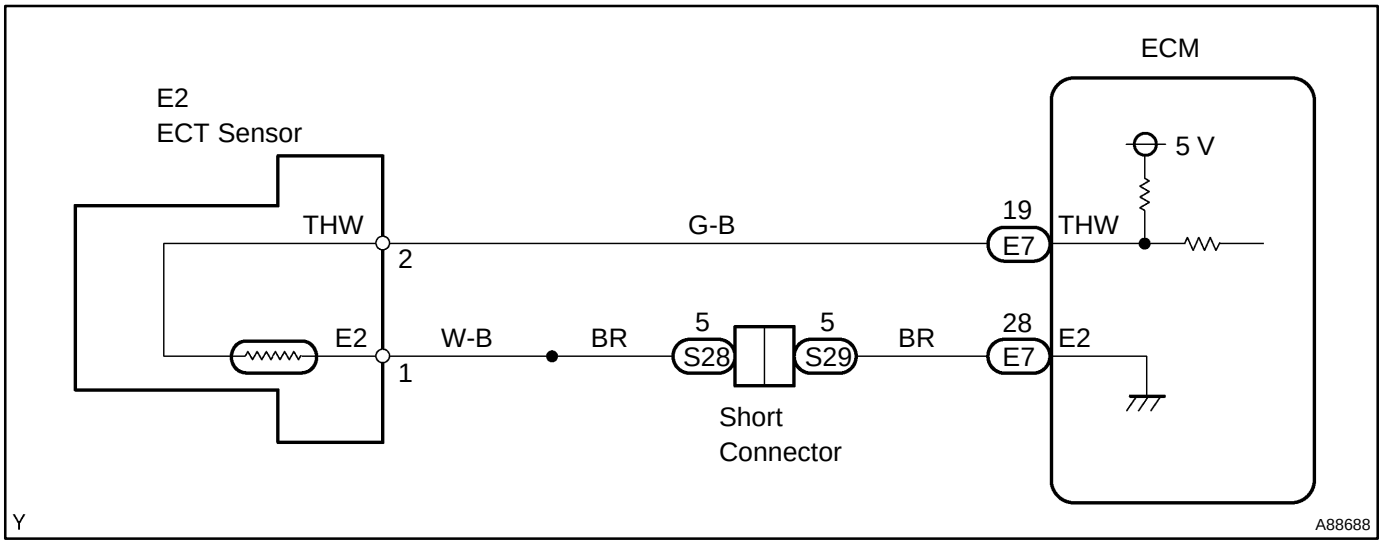
P0118:

ECT sensor resistance [ECT]	More than 156 kΩ [-40°C (-40°F)]

COMPONENT OPERATING RANGE

ECT sensor resistance [ECT]	79 Ω to 156 kΩ [-39 to 140°C (-40 to 284°F)]

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If DTCs related to different system that have terminal E2 as the ground terminal are output simultaneously, terminal E2 may have an open circuit.
- Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	READ VALUE OF HAND-HELD TESTER OR OBD II SCAN TOOL (ENGINE COOLANT TEMPERATURE)

(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(b) Turn the ignition switch ON. Push the hand-held tester or the OBD II scan tool main switch ON.
(c) On the hand-held tester or the OBD II scan tool, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / COOLANT TEMP. Read the values.
Temperature: Same value as the actual engine coolant temperature.
Result:

Temperature Displayed	Proceed to
-40 ˚C (-40˚F)	A
140˚C (284˚F) or more	B
OK (same as present temperature)	C

HINT:

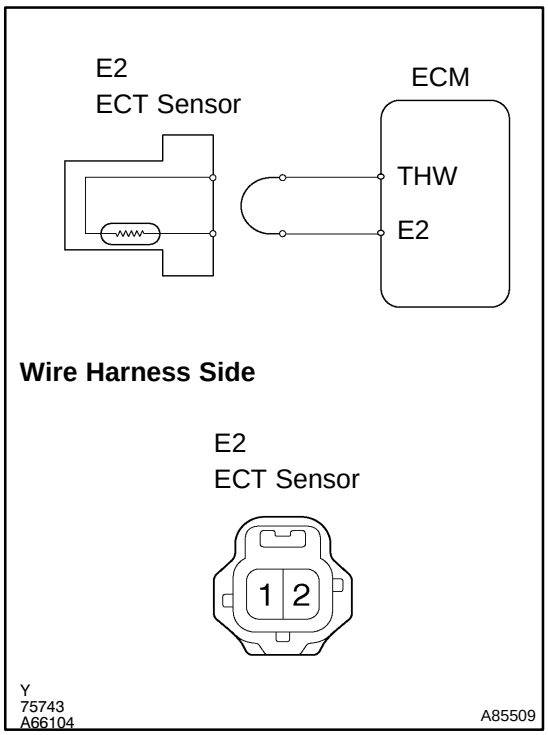
- If there is an open circuit, the hand-held tester or the OBD II scan tool indicates -40˚C (-40˚F).
- If there is a short circuit, the hand-held tester or the OBD II scan tool indicates 140˚C (284˚F) or more.

B → **Go to step 4**

C → **CHECK FOR INTERMITTENT PROBLEMS (See page 05-370)**

A

2	READ VALUE OF HAND-HELD TESTER OR OBD II SCAN TOOL (CHECK FOR OPEN IN WIRE HARNESS)

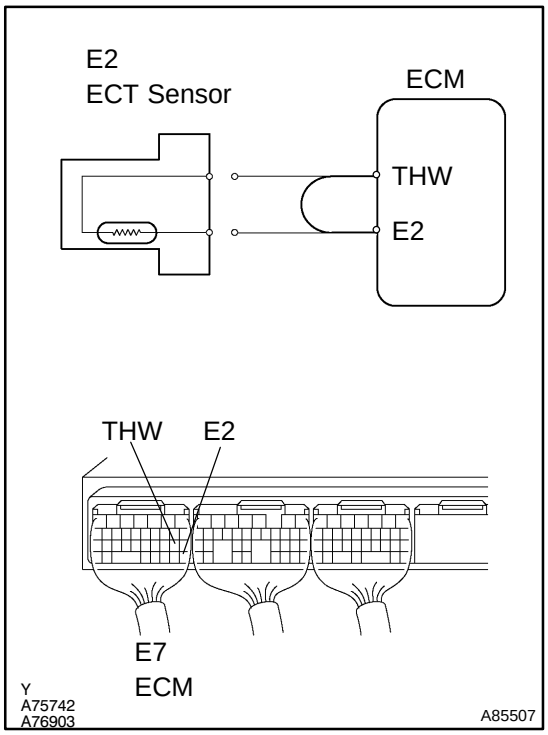


(a) Disconnect the E2 ECT sensor connector.
(b) Connect terminals 1 and 2 of the E2 ECT sensor wire harness side connector.
(c) Turn the ignition switch ON.
(d) On the hand-held tester or the OBD II scan tool, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / COOLANT TEMP. Read the values.
OK:
Temperature value: 140°C (284°F) or more

OK	CONFIRM GOOD CONNECTION AT SENSOR. IF OK, REPLACE ENGINE COOLANT TEMPERATURE SENSOR

NG

3	READ VALUE OF HAND-HELD TESTER OR OBD II SCAN TOOL (CHECK FOR OPEN IN ECM)



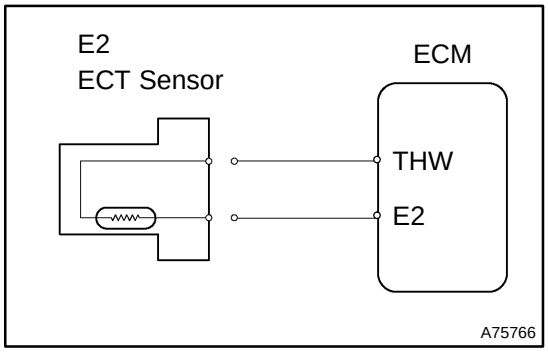
(a) Disconnect the E2 ECT sensor connector.
(b) Connect terminals THW and E2 of the E7 ECM connector.
HINT:
Before checking, do a visual and contact pressure check for the ECM connector.
(c) Turn the ignition switch ON.
(d) On the hand-held tester or the OBD II scan tool, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / COOLANT TEMP. Read the values.
OK:
Temperature value: 140°C (284°F) or more

OK	REPAIR OR REPLACE HARNESS AND CONNECTOR

NG

CONFIRM GOOD CONNECTION AT ECM. IF OK, REPLACE ECM (See page 10-24)

4	READ VALUE OF HAND-HELD TESTER OR OBD II SCAN TOOL (CHECK FOR SHORT IN WIRE HARNESS)

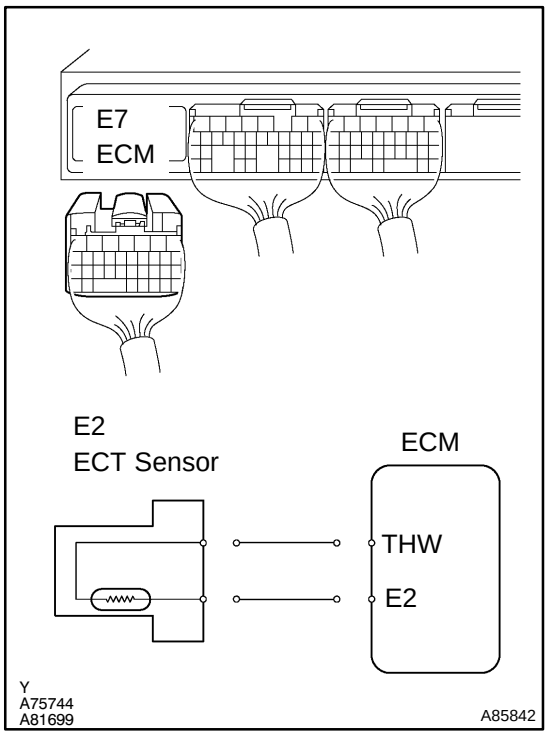


(a) Disconnect the E2 ECT sensor connector.
(b) Turn the ignition switch ON.
(c) On the hand-held tester or the OBD II scan tool, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / COOLANT TEMP. Read the values.
OK:
Temperature value: -40°C (-40°F)

OK	REPLACE ENGINE COOLANT TEMPERATURE SENSOR

NG

5	READ VALUE OF HAND-HELD TESTER OR OBD II SCAN TOOL (CHECK FOR SHORT IN ECM)



(a) Disconnect the E7 ECM connector.
(b) Turn the ignition switch ON.
(c) On the hand-held tester or the OBD II scan tool, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / COOLANT TEMP. Read the values.
OK:
Temperature value: -40°C (-40°F)

OK	REPAIR OR REPLACE HARNESS AND CONNECTOR

NG

REPLACE ECM (See page 10-24)

DTC	P0116	ENGINE COOLANT TEMPERATURE CIRCUIT RANGE/PERFORMANCE PROBLEM

CIRCUIT DESCRIPTION

Refer to DTC P0115 on page 05-462 .

DTC No.	DTC Detection Condition	Trouble Area
P0116	ECT is between 35°C (95°F) and 60°C (140°F) when engine is started, and conditions (a) and (b) are met: (a) Vehicle has accelerated and decelerated. (b) ECT remains within 3°C (5.4°F) of the initial engine coolant temperature (2 trip detection logic)	ECT
P0116	• ECT is more than 60°C (140°F) when engine is started and vehicle has accelerated and decelerated • ECT sensor records a temperature variation is within 1°C (1.8°F) successively 6 times (6 trip detection logic)	ECT

MONITOR DESCRIPTION

The Engine Coolant Temperature (ECT) sensor is used to monitor the engine coolant temperature. The ECT sensor has a thermistor that varies its resistance depending on the temperature of the engine coolant. When the coolant temperature is low, the resistance in the thermistor increases. When the temperature is high, the resistance drops. The variations in resistance are reflected in the voltage output from the sensor. The ECM monitors the sensor voltage and uses this value to calculate the engine coolant temperature. When the sensor output voltage deviates from the normal operating range, the ECM interprets this as a fault in the ECT sensor and sets a DTC.

Examples:

1) Upon starting the engine, the ECT is between 35°C (95°F) and 60°C (140°F). If, after driving for 250 seconds, the ECT still remains within 3°C (5.4°F) of the starting temperature, a DTC will be set (2 trip detection logic).

2) Upon starting the engine, the ECT is over 60°C (140°F). If, after driving for 250 seconds, the ECT still remains within 1°C (1.8°F) of the starting temperature, a DTC will be set (6 trip detection logic).

MONITOR STRATEGY

Related DTCs	P0116: ECT Sensor Stuck at Low ECT P0116: ECT Sensor Stuck at High ECT
Required sensors / components (Main)	ECT sensor
Required sensors / components (Related)	CKP sensor, IAT sensor, MAF meter
Frequency of operation	Continuous
Duration	250 seconds or more
MIL operation	2 driving cycles: ECT Sensor Stuck at Low ECT 6 driving cycles: ECT Sensor Stuck at High ECT
Sequence operation	None

TYPICAL ENABLING CONDITIONS

All:

The monitor will run whenever this DTC is not present	See page 05-377

ECT Sensor Stuck at Low ECT:

Cumulative idle off period	250 seconds or more
Speed increase by 30 km/h (18.6 mph) or more	10 times or more
ECT	35 to 60°C (95 to 140°F)
IAT	-6.7°C (20°F) or more

ECT Sensor Stuck at High ECT:

ECT	60°C (140°F) or more
IAT	-6.7°C (20°F) or more
"Stop and go"*1	Once or more
"Steady driving and stop "*2	Once or more

HINT:

*1: Vehicle is stopped for 20 seconds or more and accelerated to more than 70 km/h (43.5 mph) within 40 seconds.

*2: Vehicle is driven by 65 km/h (40.4 mph) or more for 30 seconds or more and the vehicle speed reaches 43.5 mph (70 km/h). The vehicle is decelerated from 65 km/h (40.4 mph) to 3 km/h (1.86 mph) or less within 35 seconds and stopped for 10 seconds.

TYPICAL MALFUNCTION THRESHOLDS

ECT Sensor Stuck at Low ECT:

ECT change	Less than 3°C (5.4°F)

ECT Sensor Stuck at High ECT:

ECT change	1°C (1.8°F) or less

COMPONENT OPERATING RANGE

ECT	Varies with actual ECT (Engine coolant temperature)

INSPECTION PROCEDURE

HINT:

- If DTC P0115, P0116, P0117, P0118 and P0125 are output simultaneously, the ECT sensor circuit may be open or shorted. Perform the troubleshooting of DTC P0115, P0117 or P0118 first.
- Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

REPLACE ENGINE COOLANT TEMPERATURE SENSOR

DTC	P0120	THROTTLE/PEDAL POSITION SENSOR/SWITCH ”A” CIRCUIT

DTC	P0122	THROTTLE/PEDAL POSITION SENSOR/SWITCH ”A” CIRCUIT LOW INPUT

DTC	P0123	THROTTLE/PEDAL POSITION SENSOR/SWITCH ”A” CIRCUIT HIGH INPUT

DTC	P0220	THROTTLE/PEDAL POSITION SENSOR/SWITCH ”B” CIRCUIT

DTC	P0222	THROTTLE/PEDAL POSITION SENSOR/SWITCH ”B” CIRCUIT LOW INPUT

DTC	P0223	THROTTLE/PEDAL POSITION SENSOR/SWITCH ”B” CIRCUIT HIGH INPUT

DTC	P2135	THROTTLE/PEDAL POSITION SENSOR/SWITCH ”A”/”B” VOLTAGE CORRELATION

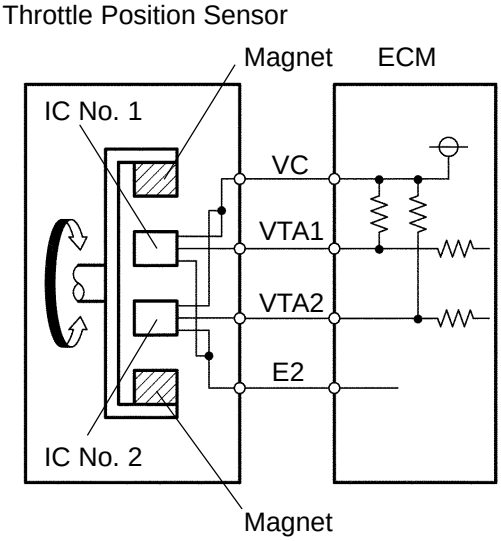
CIRCUIT DESCRIPTION

HINT:

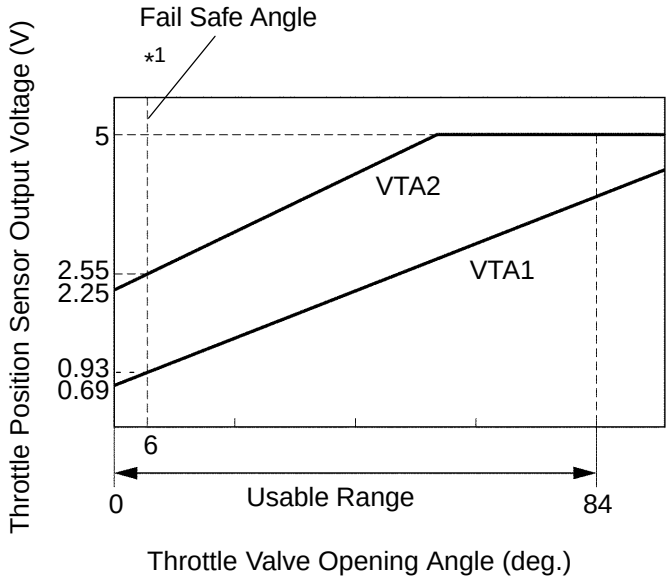
- This Electronic Throttle Control System (ECTS) does not use a throttle cable.
- This throttle position sensor is a non-contact type.

The throttle position sensor is mounted on the throttle body and it detects the opening angle of the throttle valve. This sensor is electronically controlled and uses Hall-effect elements, so that accurate control and reliability can be obtained. The throttle position sensor has 2 sensor elements/signal outputs: VTA1 and VTA2. VTA1 is used to detect the throttle opening angle and VTA2 is used to detect malfunctions in VTA1. Voltage applied to VTA1 and VTA2 changes between 0V and 5V in proportion to the opening angle of the throttle valve. There are several checks that the ECM performs to confirm proper operation of the throttle position sensor and VTA1.

The ECM judges the current opening angle of the throttle valve from these signals input from terminals VTA1 and VTA2, and the ECM controls the throttle motor to make the throttle valve angle properly in response to driver inputs.



A19755



A19802

Throttle Valve Fully Closed
(Throttle Position expressed as percentage
(VTA1) 10 to 24 %)

Throttle Valve Fully Opened
(Throttle Position expressed as percentage
(VTA1) 64 to 96 %)

*1: Fail Safe Angle 6°
(Throttle Position expressed as percentage
(VTA1) about 16 %)

	DTC Detection Condition	
DTC No.	Condition (a) of DTC P0120, P0122, P0123, P0220, P0222 or P0223 continues for 2 seconds (open or short in the throttle position sensor circuit)	Trouble Area
P0120	Detection conditions for DTCs P0122 and P0123 are not satisfied but condition (a) is satisfied (a) VTA1 is 0.2 V or less or VTA1 is 4.8 V or more	⁎Throttle position sensor ⁎ECM
P0122	(a) VTA1 is 0.2 V or less	⁎Throttle position sensor ⁎Short in VTA1 circuit ⁎Open in VC circuit ⁎ECM
P0123	(a) VTA1 is 4.8 V or more	⁎Throttle position sensor ⁎Open in VTA1 circuit ⁎Open in E2 circuit ⁎Short in VC and VTA1 circuits ⁎ECM
P0220	Detection conditions for DTCs P0222 and P0223 are not satisfied but condition (a) is satisfied (a) VTA2 is 0.5 V or less or VTA2 is 4.8 V or more and VTA1 is 0.2 V or more and VTA1 is 1.8 V or less	⁎Throttle position sensor ⁎ECM
P0222	(a) VTA2 is 0.5 V or less	⁎Throttle position sensor ⁎Short in VTA2 circuit ⁎Open in VC circuit ⁎ECM
P0223	(a) VTA2 is 4.8 V or more and VTA1 is 0.2 V or more and VTA1 is 1.8 V or less	⁎Throttle position sensor ⁎Open in VTA2 circuit ⁎Open in E2 circuit ⁎Short in VC and VTA2 circuits ⁎ECM
P2135	Condition (a) continues for 0.5 seconds or more, or condition (b) continues for 0.4 seconds or more: (a) Difference between VTA1 and VTA2 is 0.02 V or less (b) VTA1 is 0.2 V or less and VTA2 is 0.5 V or less	⁎Short in VTA1 and VTA2 circuit ⁎Throttle position sensor ⁎ECM

HINT:

⁎ After confirming DTCs, use the hand-held tester or the OBD II scan tool to confirm the throttle valve opening percentage and closed throttle position switch condition.

⁎ ”THROTTLE POS” is the VTA1 signal. ”THROTTLE POS #2” is the VTA2 signal.

Reference (Normal condition):

Tester display	Accelerator pedal released	Accelerator pedal fully depressed
THROTTLE POS	10 to 24 %	64 to 96 %
THROTTLE POS #2	2.1 to 3.1 V	4.5 to 5.5 V

MONITOR DESCRIPTION

The ECM uses the throttle position sensor to monitor the throttle valve opening angle.

(a) There is a specific voltage difference between VTA1 and VTA2 for each throttle opening angle.

* If the difference between VTA1 and VTA2 deviates from the specified range, the ECM interprets this as a default and will set a DTC.

(b) VTA1 and VTA2 have each specific voltage operating range.

* If VTA1 or VTA2 is out of the normal operating range, the ECM interprets this as a fault and will set a DTC.

(c) VTA1 and VTA2 should never be close to the same voltage levels.

* If the difference between VTA1 and VTA2 is within 0.02 V, the ECM interprets this as a short circuit in the throttle position sensor system and will set a DTC.

FAIL SAFE

If the ETCS has a malfunction, the ECM cuts off current to the throttle control motor. The throttle control valve returns to a predetermined opening angle (approximately 16°) by the force of the return spring. The ECM then adjusts the engine output by controlling the fuel injection (intermittent fuel-cut) and ignition timing in accordance with the accelerator pedal opening angle to enable the vehicle to continue at a minimal speed. If the accelerator pedal is depressed firmly and slowly, the vehicle can be driven slowly.

If a ”pass” condition is detected and then the ignition switch is turned OFF, the fail-safe operation will stop and the system will return to normal condition.

MONITOR STRATEGY

Related DTCs	P0120: TP Sensor 1 Range Check (Chattering) P0122: TP Sensor 1 Range Check (Low voltage) P0123: TP Sensor 1 Range Check (High voltage) P0220: TP Sensor 2 Range Check (Chattering) P0222: TP Sensor 2 Range Check (Low voltage) P0223: TP Sensor 2 Range Check (High voltage) P2135: TP Sensor Range Check (Correlation)
Required sensors / components (Main)	TP (Throttle position) sensor
Required sensors / components (Related)	-
Frequency of operation	Continuous
Duration	Accelerator pedal ON: 2 seconds Accelerator pedal OFF: 10 seconds 0.5 seconds or 0.4 seconds (P2135)
MIL operation	Immediate
Sequence operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever these DTCs are not present	See page 05-377

TYPICAL MALFUNCTION THRESHOLDS

P0120:

VTA1 voltage	0.2 V or less, or 4.8 V or more

P0122:

VTA1 voltage	0.2 V or less

P0123:

VTA1 voltage	4.8 V or more

P0220:

VTA2 voltage	0.5 V or less, or 4.8 V or more

P0222:

VTA2 voltage	0.5 V or less

P0223:

VTA2 voltage when the VTA is 0.2 to 1.8 V	4.8 V or more

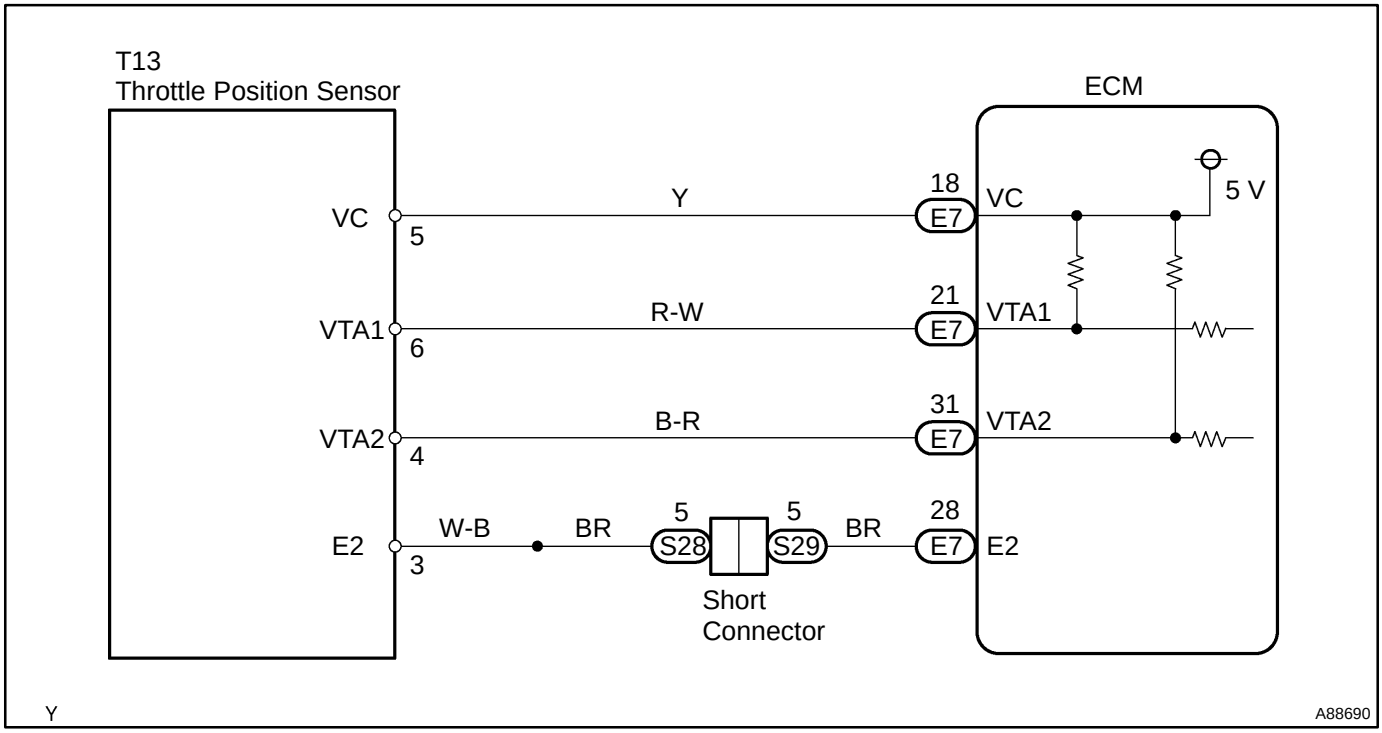
P2135:

Either of the following condition(s) is met:	Condition 1 or 2
Condition 1	-
Difference between VTA1 and VTA2 voltages	0.02 V or less
Condition 2	-
VTA1 voltage	0.2 V or less
VTA2 voltage	0.5 V or less

COMPONENT OPERATING RANGE

VTA1 voltage	0.6 to 3.96 V
VTA2 voltage	2.25 to 4.8 V

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If DTCs related to different systems that have terminal E2 as the ground terminal are output simultaneously, terminal E2 may have an open circuit.
- Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

Hand-held tester:

1	READ VALUE OF HAND-HELD TESTER (THROTTLE POS AND THROTTLE POS #2)

(a) On the hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / THROTTLE POS and THROTTLE POS #2. Read the values.

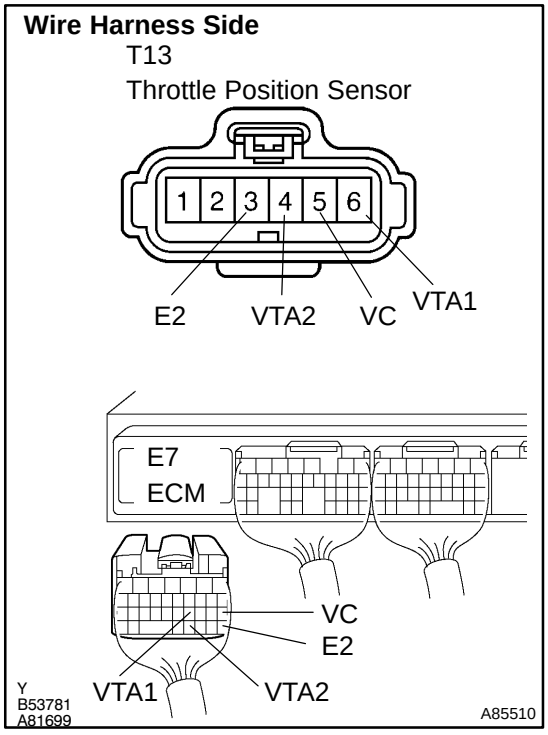
Result:

Throttle position expressed as percentage and voltage	Throttle position expressed as percentage and voltage	Throttle position expressed as percentage and voltage	Throttle position expressed as percentage and voltage		
Accelerator pedal released	Accelerator pedal released	Accelerator pedal repressed	Accelerator pedal repressed	Trouble Area	Proceed to
THROTTLE POS (VTA1)	THROTTLE POS #2 (VTA2)	THROTTLE POS (VTA1)	THROTTLE POS #2 (VTA2)		
0 %	0 to 0.2 V	0 %	0 to 0.2 V	VC circuit open	A
100 %	4.5 to 5.5 V	100 %	4.5 to 5.5 V	E2 circuit open	A
0 % or 100 %	2.1 to 3.1 V (fail safe)	0 % or 100 %	2.1 to 3.1 V (fail safe)	VTA1 circuit open or ground short	A
about 16 % (fail safe)	0 to 0.2 or 4.5 to 5.5 V	about 16 % (fail safe)	0 to 0.2 or 4.5 to 5.5 V	VTA2 circuit open or ground short	A
10 to 24 %	2.1 to 3.1 V	64 to 96 % (does not fail safe)	4.5 to 5.5 V (does not fail safe)	Throttle position sensor circuit is normal	B

B → **Go to step 5**

A

2	CHECK WIRE HARNESS (THROTTLE POSITION SENSOR - ECM)



(a) Disconnect the T13 throttle position sensor connector.
(b) Disconnect the E7 ECM connector.
(c) Check the resistance of the wire harness side connectors.

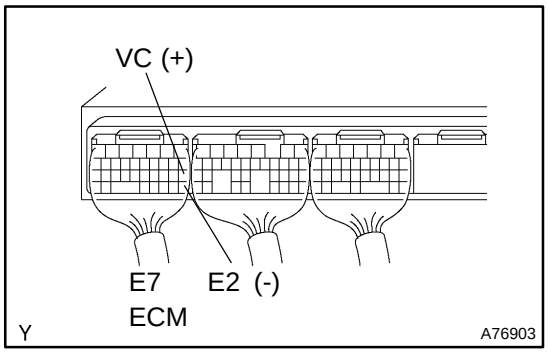
Standard:

Tester Connection	Specified Condition
T13-5 (VC) - E7-18 (VC) T13-6 (VTA1) - E7-21 (VTA1) T13-4 (VTA2) - E7-31 (VTA2) T13-3 (E2) - E7-28 (E2)	Below 1 Ω
T13-5 (VC) or E7-18 (VC) - Body ground T13-6 (VTA1) or E7-21 (VTA1) - Body ground T13-4 (VTA2) or E7-31 (VTA2) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

3	INSPECT ECM (VC VOLTAGE)



(a) Disconnect the T13 throttle position sensor connector.
(b) Turn the ignition switch ON.
(c) Check the voltage of the ECM connector.

Standard:

Tester Connection	Specified Condition
E7-18 (VC) - E7-28 (E2)	4.5 to 5.5 V

NG → **REPLACE ECM (See page 10-24)**

OK

4	REPLACE THROTTLE BODY ASSY (See page 10-18)

GO

5	READ OUTPUT DTC (THROTTLE POSITION SENSOR DTCS ARE OUTPUT AGAIN)

(a) Clear the DTC (see page 05-400).
(b) Start the engine.
(c) Run the engine at idle for 15 seconds or more.
(d) Read the DTC (see page 05-400).

Result:

Display (DTC Output)	Proceed to
P0120, P0122, P0123, P0220, P0222, P0223 and/or P2135 are output again	A
No DTC output	B

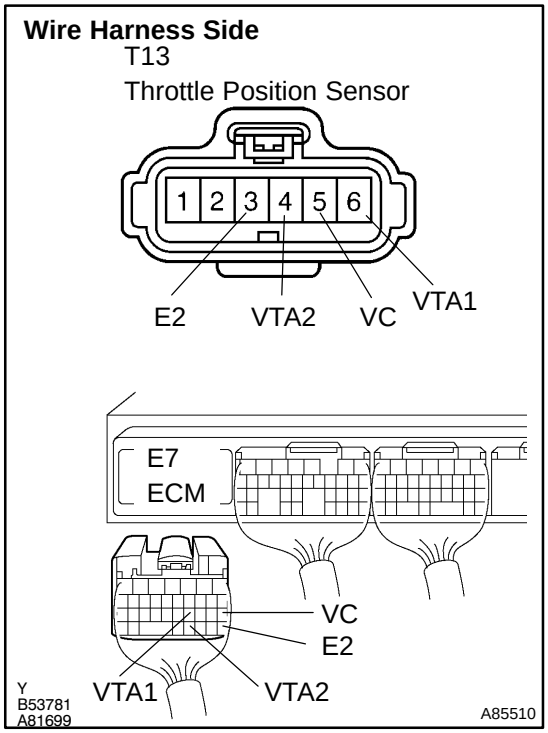
B → **SYSTEM OK**

A

REPLACE ECM (See page 10-24)

OBD II scan tool (excluding hand-held tester):

1	CHECK WIRE HARNESS (THROTTLE POSITION SENSOR - ECM)



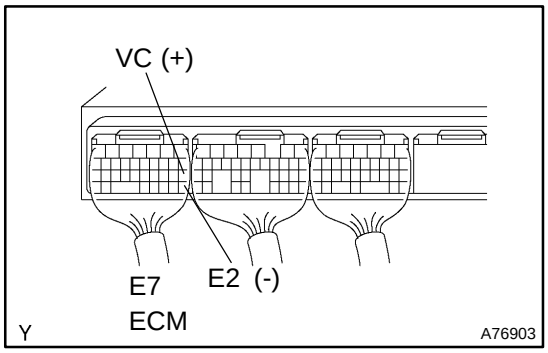
(a) Disconnect the T13 throttle position sensor connector.
(b) Disconnect the E7 ECM connector.
(c) Check the resistance of the wire harness side connectors.
Standard:

Tester Connection	Specified Condition
T13-5 (VC) - E7-18 (VC) T13-6 (VTA1) - E7-21 (VTA1) T13-4 (VTA2) - E7-31 (VTA2) T13-3 (E2) - E7-28 (E2)	Below 1 Ω
T13-5 (VC) or E7-18 (VC) - Body ground T13-6 (VTA1) or E7-21 (VTA1) - Body ground T13-4 (VTA2) or E7-31 (VTA2) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

2	INSPECT ECM (VC VOLTAGE)



(a) Disconnect the T13 throttle position sensor connector.
(b) Turn the ignition switch ON.
(c) Measure the voltage of the ECM connector.
Standard:

Tester Connection	Specified Condition
E7-18 (VC) - E7-28 (E2)	4.5 to 5.5 V

NG → **REPLACE ECM (See page 10-24)**

OK

3	REPLACE THROTTLE BODY ASSY (See page 10-18)

GO

4	READ OUTPUT DTC (THROTTLE POSITION SENSOR DTCS ARE OUTPUT AGAIN)

(a) Clear the DTC (see page 05-400).
(b) Start the engine.
(c) Run the engine at idle for 15 seconds or more.
(d) Read the DTC (see page 05-400).

Result:

Display (DTC Output)	Proceed to
P0120, P0122, P0123, P0220, P0222, P0223 and/or P2135 are output again	A
No DTC output	B

B → **SYSTEM OK**

A

REPLACE ECM (See page 10-24)

DTC	P0121	THROTTLE/PEDAL POSITION SENSOR/SWITCH ”A” CIRCUIT RANGE/PERFORMANCE PROBLEM

CIRCUIT DESCRIPTION

Refer to DTC P0120 on page 05-469 .

DTC No.	DTC Detection Condition	Trouble Area
P0121	Condition (a) continues for 2.0 sec.: (a) Difference between VTA1 and VTA2 deviates from threshold	Throttle position sensor

MONITOR DESCRIPTION

The ECM uses the throttle position sensor to monitor the throttle valve opening angle.
This sensor includes 2 signals: VTA1 and VTA2. VTA1 is used to detect the throttle opening angle and VTA2 is used to detect malfunctions in VTA1. There are several checks that the ECM performs to confirm proper operation of the throttle position sensor and VTA1.
The VTA1 and VTA2 voltage output difference should be less than 0.1V and more than 0.4V. If the voltage output difference deviates from this range, the ECM concludes the throttle position sensor has a malfunction.The ECM will turn on the MIL and a DTC will be set.

FAIL SAFE

If the Electronic Throttle Control System (ETCS) has a malfunction, the ECM cuts off current to the throttle control motor. The throttle control valve returns to a predetermined opening angle (approximately 16°) by the force of the return spring. The ECM then adjusts the engine output by controlling the fuel injection (intermittent fuel-cut) and ignition timing in accordance with the accelerator pedal opening angle to enable the vehicle to continue at a minimal speed.
If the accelerator pedal is depressed firmly and slowly, the vehicle can be driven slowly.
If a ”pass” condition is detected and then the ignition switch is turned OFF, the fail-safe operation will stop and the system will return to normal condition.

MONITOR STRATEGY

Related DTCs	P0121: TP (Throttle position) Sensor Rationality
Required sensors / components (Main)	TP sensor
Required sensors / components (Related)	-
Frequency of operation	Continuous
Duration	2 seconds
MIL operation	Immediate
Sequence operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever these DTCs are not present	See page 05-377

TYPICAL MALFUNCTION THRESHOLDS

Either of the following condition is met:	-
TP sensor 1 - (TP sensor 2 x 0.8)	Below 0.8 V or 1.6 V or more

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

REPLACE THROTTLE BODY ASSY (See page 10-18)

DTC	P0125	INSUFFICIENT COOLANT TEMPERATURE FOR CLOSED LOOP FUEL CONTROL

CIRCUIT DESCRIPTION

Refer to DTC P0115 on page 05-462 .

DTC No.	DTC Detection Condition	Trouble Area
P0125	When ECT or IAT is less than -19.45˚C (-3˚F) at engine start and 20 minutes or more after starting engine, ECT sensor value is 20˚C (68˚F) or less (2 trip detection logic)	・Cooling system ・ECT sensor ・Thermostat
P0125	When ECT and IAT are between -19.45˚C (-3˚F) and -8.34 ˚C (17˚F) at engine start, 5 minutes or more after starting engine and ECT sensor value is 20˚C (68˚F) or less (2 trip detection logic)	・Cooling system ・ECT sensor ・Thermostat
P0125	When ECT and IAT greater than -8.34˚C (17˚F) at engine start and 2 minutes or more after starting engine, ECT sensor value is 20˚C (68˚F) or less (2 trip detection logic)	・Cooling system ・ECT sensor ・Thermostat

MONITOR DESCRIPTION

The Engine Coolant Temperature (ECT) sensor is used to monitor the temperature of the engine coolant. The resistance of the sensor varies with the actual coolant temperature. The ECM applies a voltage to the sensor and the varying resistance of the sensor causes the signal voltage to vary. The ECM monitors the ECT signal voltage after engine start-up. If, after sufficient time has passed, the sensor still reports that the engine is not warm enough for closed-loop fuel control, the ECM interprets this as a fault in the sensor or cooling system and sets a DTC.

Example:

The ECT is 0°C (32°F) at engine start. After 5 minutes running time, the ECT sensor still indicates that the engine is not warm enough to begin air fuel ratio feedback control of the air-fuel ratio. The ECM interprets this as a fault in the sensor or cooling system and sets a DTC.

MONITOR STRATEGY

Related DTCs	P0125: Insufficient ECT for Closed Loop
Required sensors / components (Main)	Thermostat, Cooling system
Required sensors / components (Related)	ECT sensor, MAF meter
Frequency of operation	Continuous
Duration	2 minutes: Engine start ECT is -8.34°C (17°F) or more 5 minutes: Engine start ECT is -19.45 to -8.34°C (-3 to 17°F) 20 minutes: Engine start ECT is less than -19.45°C (-3°F)
MIL operation	2 driving cycles
Sequence operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever this DTC is not present	See page 05-377
Fuel cut	OFF
Engine	Running
Idle	OFF

TYPICAL MALFUNCTION THRESHOLDS

Time until ”actual ECT” reaches ”Closed Loop ECT”	2 minutes: Engine start ECT is -8.34°C (17°F) or more 5 minutes: Engine start ECT is -19.45 to -8.34°C (-3 to 17°F) 20 minutes: Engine start ECT is less than -19.45°C (-3°F)

INSPECTION PROCEDURE

HINT:

- If DTC P0115, P0116, P0117, P0118 and P0125 are output simultaneously, ECT sensor circuit may be open or short. Perform the troubleshooting of DTC P0115, P0117 or P0118 first.
- Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1 CHECK OTHER DTC OUTPUT (IN ADDITION TO DTC P0125)

(a) Read the DTC using the hand-held tester or the OBD II scan tool.
Result:

Display (DTC Output)	Proceed to
Only P0125 are output	A
P0125 and other DTCs are output	B

HINT:
If any other codes besides P0125 is output, perform the troubleshooting for those codes first.

B → **GO TO RELEVANT DTC CHART (See page 05-412)**

A

2 INSPECT THERMOSTAT (See page 16-21)

(a) Check the valve opening temperature of the thermostat.
OK: Valve opening temperature: 80 to 84°C (176 to 183°F).

HINT:
Also check the valve is completely closed under opening temperature as above.

NG → **REPLACE THERMOSTAT (See page 16-31)**

OK

3 CHECK COOLING SYSTEM

(a) Check the cooling system for excessive cooling, such as abnormal radiator fan operation, modified cooling system and other defects.
OK: There is no modification of cooling system.

NG → **REPAIR OR REPLACE COOLING SYSTEM**

OK

REPLACE ENGINE COOLANT TEMPERATURE SENSOR

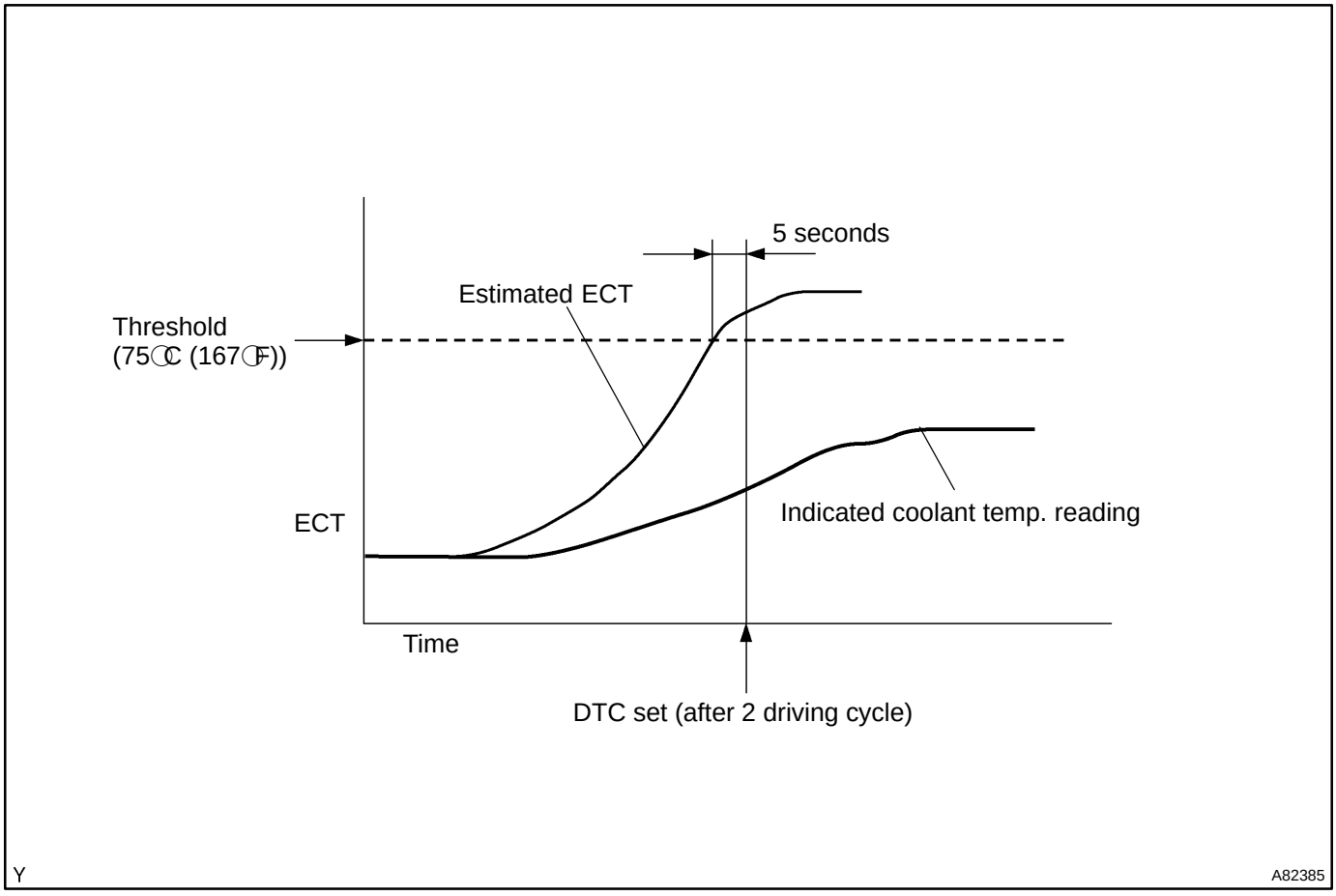
DTC	P0128	COOLANT THERMOSTAT (COOLANT TEMPERATURE BELOW THERMOSTAT REGULATING TEMPERATURE)

CIRCUIT DESCRIPTION

This DTC is output when the Engine Coolant Temperature (ECT) does not reach 75˚C (167˚F) despite sufficient engine warm-up time.

DTC No.	DTC Detection Condition	Trouble Area
P0128	Conditions (a), (b) and (c) are met: (a) Cold start (b) Sufficient warm-up time has elapsed (c) ECT is less than 75˚C (167˚F)	·Thermostat ·Cooling system ·ECT sensor ·ECM

MONITOR DESCRIPTION



The ECM estimates the coolant temperature based on starting temperature, engine loads, and engine speeds. The ECM then compares the estimated temperature with the actual ECT. When the estimated coolant temperature reaches 75°C (167°F), the ECM checks the actual ECT. If the actual ECT is less than 75°C (167°F), the ECM will interpret this as a fault in the thermostat or engine cooling system and set a DTC.

MONITOR STRATEGY

Related DTCs	P0128: Coolant Thermostat
Required sensors / components (Main)	Thermostat
Required sensors / components (Related)	ECT sensor, IAT sensor, VSS
Frequency of operation	Once per driving cycle
Duration	900 seconds
MIL operation	2 driving cycles
Sequence operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever this DTC is not present	See page 05-377
Battery voltage	11 V or more
Throttle position learning	Completed
Either of the following conditions is met:	Condition 1 or 2
1. All of the following conditions are met:	Condition (a), (b) and (c)
(a) ECT at engine start - IAT at engine start	-15 to 7°C (-27 to 12.6°F)
(b) ECT at engine start	-10 to 56°C (14 to 132.8°F)
(c) IAT at engine start	-10 to 56°C (14 to 132.8°F)
2. All of the following conditions are met:	Condition (a), (b) and (c)
(a) ECT at engine start - IAT at engine start	More than 7°C (12.6°F)
(b) ECT at engine start	56°C (132.8°F) or less
(c) IAT at engine start	-10 °C (14 °F) or more
Accumulated time that vehicle speed is 80 mph (128 km/h) or more	Less than 20 seconds

TYPICAL MALFUNCTION THRESHOLDS

Duration that both of the following conditions are met:	5 seconds or more
Estimated ECT	75°C (167°F) or more
Actual ECT	Less than 75°C (167°F)

MONITOR RESULT

Refer to page 05-385 for detailed information.

The test value and test limit information are described as shown in the following table. Check the monitor result and test values after performing the monitor drive pattern (see page 05-387).

- TID (Test Identification Data) is assigned to each emissions-related component.
- TLT (Test Limit Type):
  If TLT is 0, the component is malfunctioning when the test value is higher than the test limit.
  If TLT is 1, the component is malfunctioning when the test value is lower than the test limit.
- CID (Component Identification Data) is assigned to each test value.
- Unit Conversion is used to calculate the test value indicated on generic OBD II scan tools.

TID $08: Thermostat

TLT	CID	Unit Conversion	Description of Test Data	Description of Test Limit
1	$01	Multiply by 0.625 and subtract 40 (°C)	ECT sensor output when estimated ECT has reached to malfunction criterion	Malfunction criteria for thermostat

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	CHECK COOLING SYSTEM

(a) Check the cooling system for excessive cooling, such as abnormal radiator fan operation, modified cooling system and other defects.
OK: There is no modification of cooling system.

NG → **REPAIR OR REPLACE COOLING SYSTEM**

OK

2	INSPECT THERMOSTAT (See page 16-21)

(a) Check the valve opening temperature of the thermostat.
OK: Valve opening temperature: 80 to 84°C (176 to 183°F).

HINT:
Also check the valve is completely closed under opening temperature as above.

NG → **REPLACE THERMOSTAT (See page 16-31)**

OK

REPLACE ECM (See page 10-24)

DTC	P0136	OXYGEN SENSOR CIRCUIT MALFUNCTION (BANK 1 SENSOR 2)

DTC	P0137	OXYGEN SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 2)

DTC	P0138	OXYGEN SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 2)

DTC	P0156	OXYGEN SENSOR CIRCUIT MALFUNCTION (BANK 2 SENSOR 2)

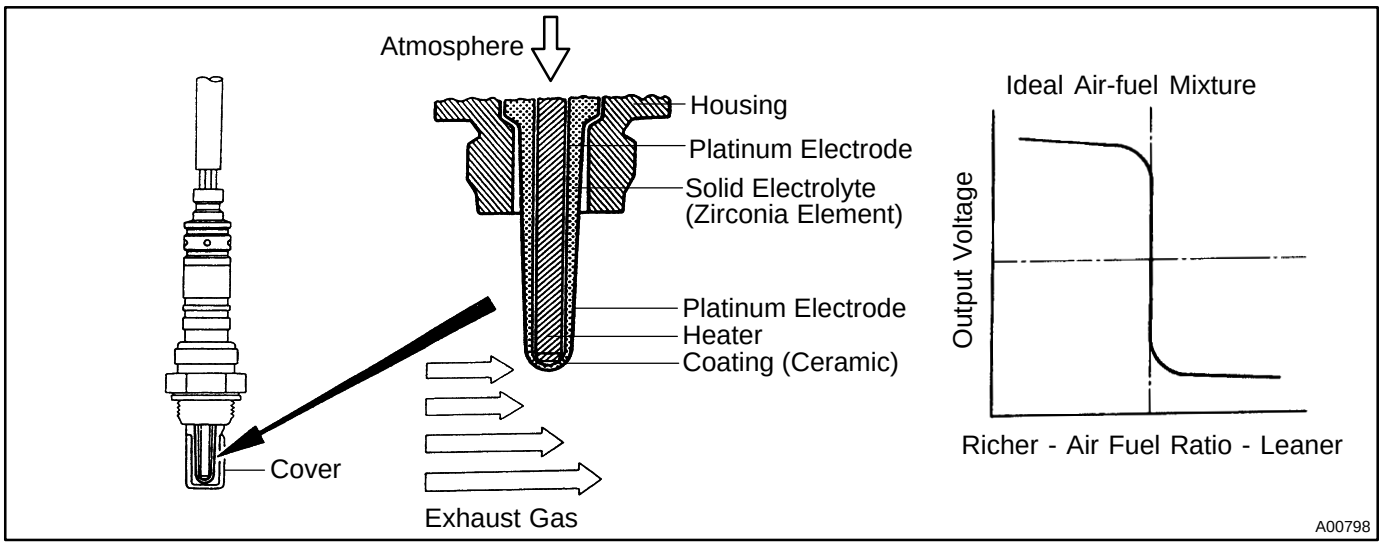
DTC	P0157	OXYGEN SENSOR CICRCUIT LOW VOLTAGE (BANK 2 SENSOR 2)

DTC	P0158	OXYGEN SENSOR CIRCUIT HIGH VOLTAGE (BANK 2 SENSOR 2)

CIRCUIT DESCRIPTION

The heated oxygen sensor (HO2S) is used to monitor oxygen in the exhaust gas. For optimum catalyst operation, the air fuel mixture (air-fuel ratio) must be maintained near the ideal stoichiometric ratio. The HO2S output voltage changes suddenly in the vicinity of the stoichiometric ratio. The ECM adjusts the fuel injection time so that the air-fuel ratio is nearly stoichiometirc.

The HO2S generates a voltage between 0.1 and 0.9 V in response to oxygen in the exhaust gas. If the oxygen in the exhaust gas increases, the air-fuel ratio becomes Lean. The ECM interprets Lean when the HO2S voltage is below 0.45 V. If the oxygen in the exhaust gas decreases, the air-fuel ratio becomes Rich. The ECM interprets Rich when the HO2S voltage is above 0.45 V.



DTC No.	DTC Detection Condition	Trouble Area
P0136	⁎Either of the following condition is met: (a) Heated oxygen sensor voltage was less than 0.05 V for a certain period (2-trip detection logic) (b) Heated oxygen sensor did not switch for a certain period (2-trip detection logic)	⁎Heated oxygen sensor circuit (bank 1) ⁎Heated oxygen sensor (bank 1) ⁎Oxygen sensor heater (bank 1) ⁎A/F sensor (bank 1) ⁎A/F sensor heater (bank 1)
P0137	Heated oxygen sensor voltage was less than 0.03 V for 90 seconds	⁎Heated oxygen sensor circuit (bank 1) ⁎Heated oxygen sensor (bank 1) ⁎Oxygen sensor heater (bank 1)
P0138	Either of the following condition is met: (a) Heated oxygen sensor voltage did not drop during fuel-cut (2-trip detection logic) (b) Heated oxygen sensor voltage was 1.2 V or higher for 10 seconds	⁎Heated oxygen sensor circuit (bank 1) ⁎Heated oxygen sensor (bank 1) ⁎Oxygen sensor heater (bank 1)
P0156	⁎Either of the following condition is met: (a) Heated oxygen sensor voltage was less than 0.05 V for a certain period (2-trip detection logic) (b) Heated oxygen sensor did not switch for a certain period (2-trip detection logic)	⁎Heated oxygen sensor circuit (bank 2) ⁎Heated oxygen sensor (bank 2) ⁎Oxygen sensor heater (bank 2) ⁎A/F sensor (bank 2) ⁎A/F sensor heater (bank 2)
P0157	Heated oxygen sensor voltage was less than 0.03 V for 90 seconds	⁎Heated oxygen sensor circuit (bank 2) ⁎Heated oxygen sensor (bank 2) ⁎Oxygen sensor heater (bank 2)
P0158	Either of the following condition is met: (a) Heated oxygen sensor voltage did not drop during fuel-cut (2-trip detection logic) (b) Heated oxygen sensor voltage was 1.2 V or higher for 10 seconds	⁎Heated oxygen sensor circuit (bank 2) ⁎Heated oxygen sensor (bank 2) ⁎Oxygen sensor heater (bank 2)

MONITOR DESCRIPTION

The ECM monitors the rear heated oxygen sensor (HO2S) in the following 3 items:

⁎ 1. The HO2S voltage changes between Rich (more than 0.45 V) and Lean (less than 0.45 V) while the vehicle is running (repeating acceleration and deceleration) for 8 minutes. If not, the ECM interprets this as a malfunction, illuminates the MIL, and then sets a DTC.

⁎ 2. The HO2S voltage does not remain at less than 0.05 V for a long time while the vehicle is running (60% of the time in the 220 seconds monitor, the sensor output is less than 0.05 V). If it does, the ECM interprets this as a malfunction, illuminates the MIL, and then sets a DTC.

⁎ 3. The sensor's voltage drops to below 0.2 V (extremely Lean status) immediately when the vehicle decelerates and the fuel cut is working for 6 seconds. If not, the ECM interprets this to mean the sensor's response feature has deteriorated, illuminates the MIL, and then sets a DTC.

MONITOR STRATEGY

Related DTCs	P0136, P0156: Heated oxygen sensor output voltage (Output voltage) P0136, P0156: Heated oxygen sensor impedance (Low impedance) P0137, P0157: Heated oxygen sensor low voltage P0138, P0158: Heated oxygen sensor high voltage P0138, P0158: Heated oxygen sensor output voltage (Extremely high)
Required sensors/components (Main)	HO2S
Required sensors/components (Related)	ECT sensor, MAF meter, VSS
Frequency of operation	Once per driving cycle
Duration	Within 480 seconds
MIL operation	Immediate: Heated oxygen sensor low/high voltage 2 driving cycles: Others
Sequence operation	None

TYPICAL ENABLING CONDITIONS

All:

The monitor will run whenever these DTCs are not present	See page 05-377

P0136, P0156 (Rear HO2S output voltage - case 1):

All of the following conditions are met:	Conditions 1, 2, 3 and 4
1. Malfunction determination in this driving cycle	Not detected
2. Engine	Running
3. Time after engine start	0 second or more
4. Either of the following conditions is met:	Conditions (a) or (b)
(a) Cumulative time while HO2S heater is operating	22 seconds or more
(b) HO2S voltage	Has reached to 0.2 V or more

P0136, P0156 (Rear HO2S output voltage - case 2):

Engine	Running

P0137, P0157 (Rear HO2S low voltage):

Battery voltage	11 V or more
Estimated heated oxygen sensor temperature	450°C (842°F) or more
Time after fuel-cut ended	30 seconds or more

P0138, P0158 (Rear HO2S high voltage):

Engine	Running
Battery voltage	11 V or more

P0138, P0158 (Rear HO2S output voltage during fuel-cut):

Engine coolant temperature	70°C (158°F) or more
Catalyst temperature	500°C (932°F) or more
Fuel-cut	Excuting

TYPICAL MALFUNCTION THRESHOLDS

P0136, P0156 (Rear HO2S output voltage - case 1):

Both of the following conditions are met:	Conditions 1 and 2
1. Frequency that HO2S voltage changes between (a) and (b)	0 time
(a) Maximum voltage	0.6 V or more
(b) Minimum voltage	Less than 0.45 V
2. Cumulative monitor time *1 of rear HO2S	320 seconds or more
*1: Monitor time is counted when all of the following conditions are met:	Conditions (a) and (b)
(a) Fuel system status	Closed-loop
(b) Idle	OFF

P0136, P0156 (Rear HO2S output voltage - case 2):

All of the following conditions are met:	Conditions 1, 2, 3, 4 and 5
1. Cumulative monitor time *2 of HO2S	160 seconds or more
2. Duration while HO2S voltage is below 0.05 V	96 seconds or more
3. Duration while HO2S voltage is higher than 0.7 V	Less than 32 seconds
4. Duration while HO2S voltage is 0.45 V to 0.7 V	Less than 48 seconds
5. Duration while HO2S voltage is 0.45 V or more	Less than 20 seconds
*2: Monitor time is counted when all of the following conditions are met:	Conditions 1, 2, 3 and 4
1. Intake air amount per revolution	7 g/rev or more
2. Vehicle speed	3 km/h (1.875 mph) or more
3. Idle	OFF
4. Fuel-cut	OFF

P0137, P0157 (Rear HO2S low voltage):

Sensor voltage	Lower than 0.03 V

P0138, P0158 (Rear HO2S high voltage):

Sensor voltage	1.2 V or more

P0138, P0158 (Rear HO2S output voltage during fuel-cut):

Either of the following conditions is met:	Conditions 1 or 2
1. Duration until rear HO2S voltage drops to 0.2 V after fuel-cut start	6 seconds or more
2. Both of the following conditions are met:	Conditions (a) and (b)
(a) Rear HO2S voltage when fuel-cut starts	0.5 V or more
(b) Duration that HO2S voltage is 0.2 to 0.35 V	1 second or more

COMPONENT OPERATING RANGE

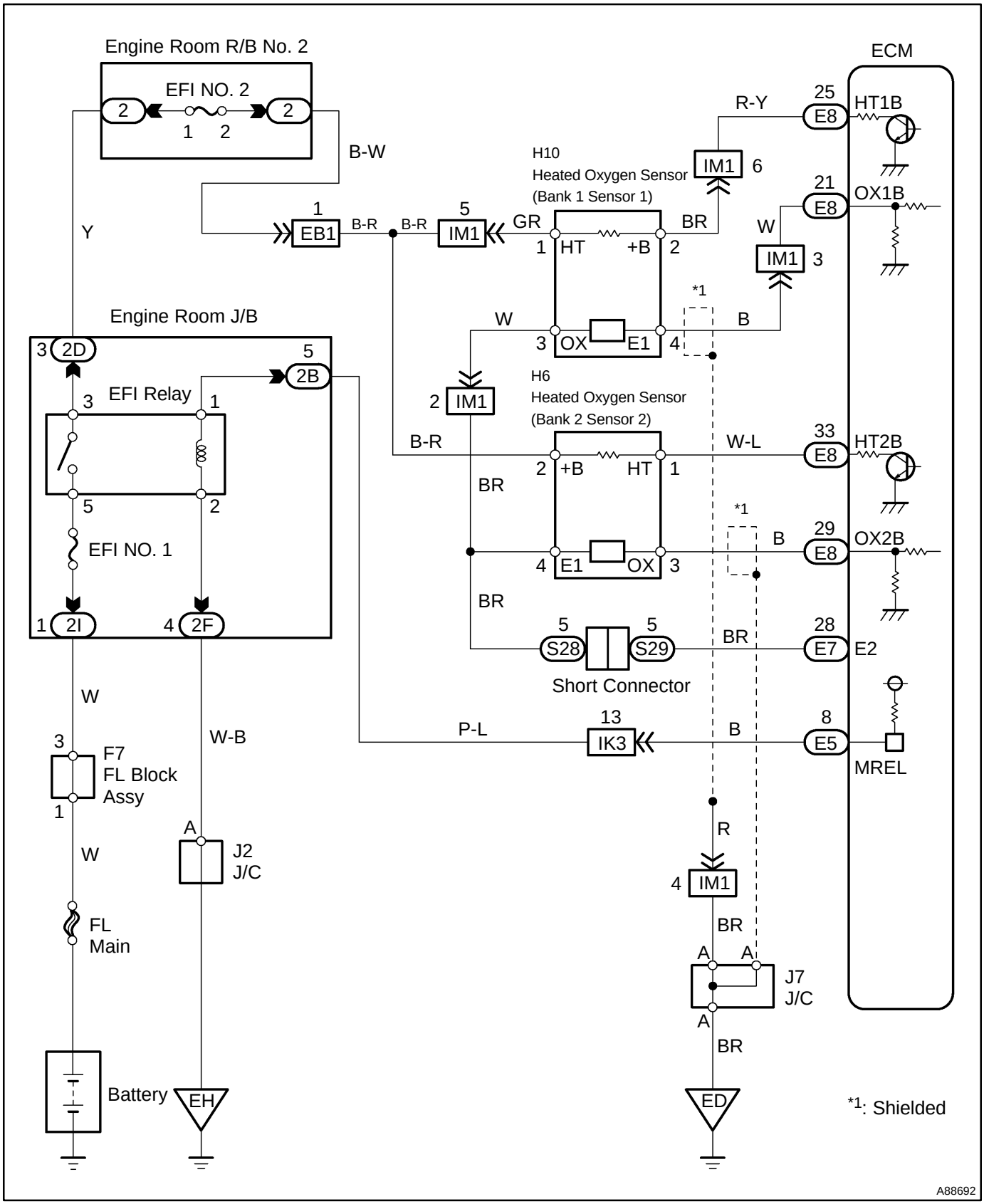
HO2S voltage	Varies between 0.1 and 0.9 V

O2S TEST RESULT (MODE 05)

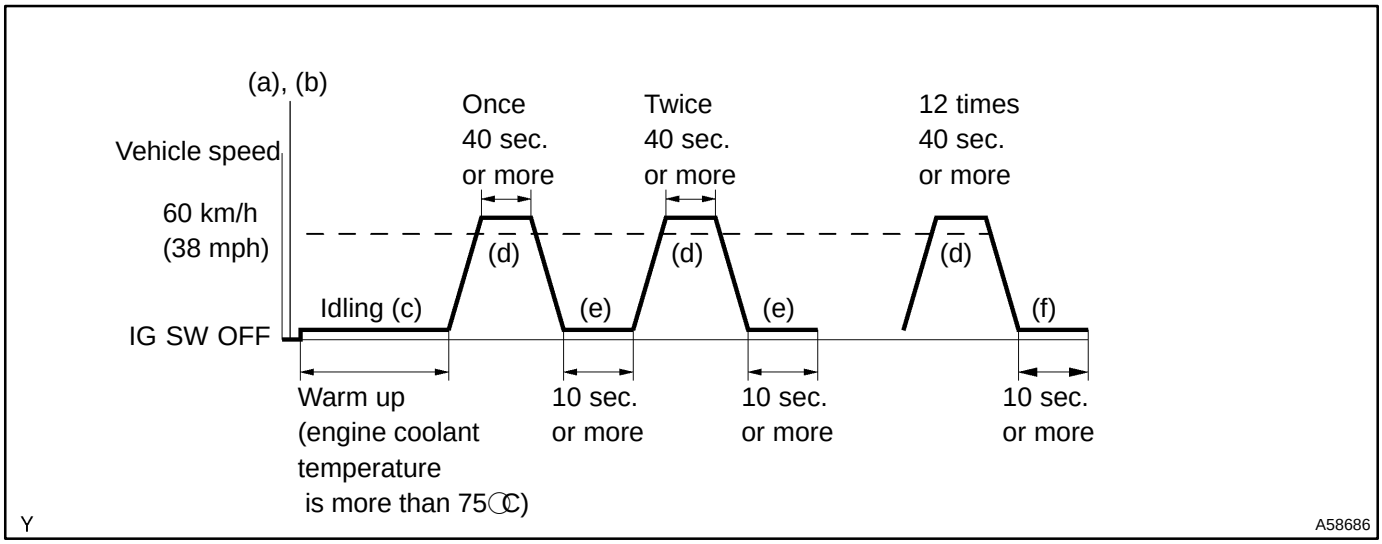
Refer to page 05-383 for detailed information.

TEST ID/COMP ID	Description of TEST VALUE	Conversion Factor	Unit	Standard Value
$07	Minimum HO2S voltage	N/A	V	Less than TEST LIMIT
$08	Maximum HO2S voltage	N/A	V	More than TEST LIMIT
$31	Average time per one-cycle of HO2S frequency that HO2S switches Rich to Lean	N/A	Second	Less than TEST LIMIT
$32	Average time per one-cycle of HO2S frequency that HO2S switches Lean to Rich	N/A	Second	Less than TEST LIMIT
$37	Time until HO2S voltage drops to 0.2 V during fuel-cut	N/A	Second	Less than TEST LIMIT
$81	Percentage in monitoring time while HO2S voltage is lower than 0.05 V	Multiply by 0.39	%	Less than TEST LIMIT
$84	Percentage in monitoring time while HO2S voltage is higher than 0.7 V	Multiply by 0.39	%	Less than TEST LIMIT
$85	Continuous time while HO2S voltage is higher than 0.45 V	Multiply by 0.262	Second	Less than TEST LIMIT
$87	Percentage in monitoring time while HO2S voltage is higher than 0.45 V	Multiply by 0.39	%	More than TEST LIMIT

WIRING DIAGRAM



CONFIRMATION DRIVING PATTERN



(a) Connect the hand-held tester to the DLC3.
(b) Switch the hand-held tester from the normal mode to the check (test) mode (see page 05-402).
(c) Start the engine and warm up the engine untill engine coolant temperature is more than 75°C.
(d) Drive the vehicle at 60 km/h (38 mph) or more for 40 seconds or more.
(e) Let the engine idle for 10 seconds or more.
(f) Perform steps (d) to (e) 12 times.

HINT:
If a malfunction exists, the MIL will illuminate during step (f).

NOTICE:
If the conditions in this test are not strictly followed, detection of a malfunction will not occur. If you do not have a hand-held tester, turn the ignition switch OFF after performing steps from (c) to (f), then perform steps from (c) to (f) again.

CONFIRMATION DRIVING PATTERN (P0137 and/or P0157)

Warm up the engine and run the engine at 60 km/h (38 mph) for 7 minutes.

CONFIRMATION DRIVING PATTERN (P0138 and/or P0158)

Warm up the engine and run the engine at idle for 30 seconds.

INSPECTION PROCEDURE

HINT:
Hand-held tester only:
It is possible the malfunctioning area can be found using the ACTIVE TEST A/F CONTROL operation. The A/F CONTROL operation can determine if the A/F sensor, heated oxygen sensor or other potential trouble areas are malfunctioning or not.

(a) Perform the ACTIVE TEST A/F CONTROL operation.

HINT:
The A/F CONTROL operation lowers the injection volume by 12.5 % or increases the injection volume by 25 %.

(1) Connect the hand-held tester to the DLC3 on the vehicle.
(2) Turn the ignition switch ON.
(3) Warm up the engine by running the engine at 2,500 rpm for approximately 90 seconds.
(4) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL.
(5) Perform the A/F CONTROL operation with the engine idle (press the right or left button).

Result:

A/F sensor reacts in accordance with increase and decrease of injection volume:

+25 % → rich output: Less than 3.0 V

-12.5 % → lean output: More than 3.35 V

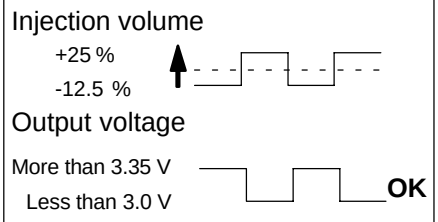
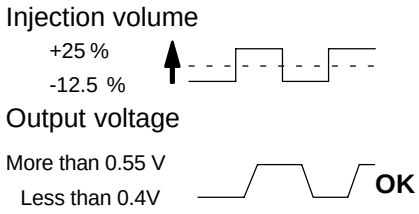
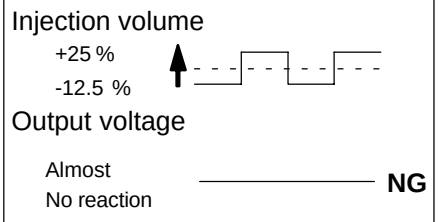
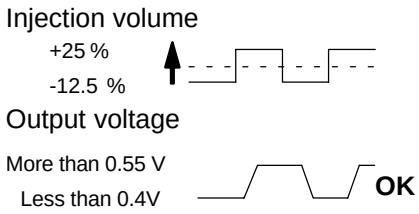
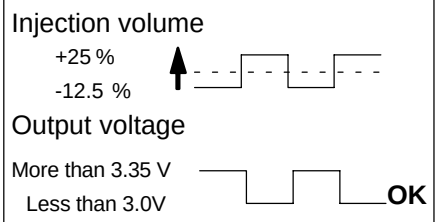
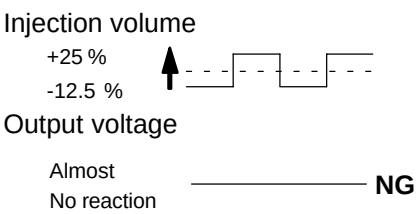
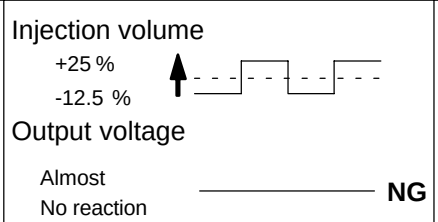
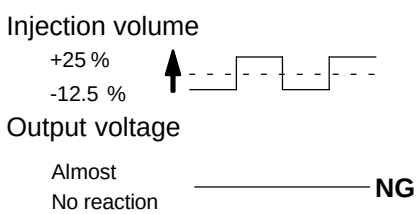
Heated oxygen sensor reacts in accordance with increase and decrease of injection volume:

+25 % → rich output: More than 0.55 V

-12.5 % → lean output: Less than 0.4 V

NOTICE:

The A/F sensor output has a few seconds of delay and the heated oxygen sensor output has about 20 seconds of delay at maximum.

	Output voltage of A/F sensor (sensor 1)	Output voltage of heated oxygen sensor (sensor 2)	Mainly suspected Trouble Area
Case 1			—
Case 2			A/F sensor (A/F sensor, heater, A/F sensor circuit)
Case 3			Heated oxygen sensor (heated oxygen sensor, heater, heated oxygen sensor circuit)
Case 4			Extremely rich or lean actual air-fuel ratio (Injector, fuel pressure, gas leakage in exhaust system, etc.)

The following A/F CONTROL procedure enables the technician to check the graph of the voltage output from both the A/F sensor and the heated oxygen sensor.

To display the graph, enter ”ACTIVE TEST / A/F CONTROL / USER DATA”, select ”AFS B1S1 and O2S B1S2” by pressing ”YES”, and then ”ENTER”. Then press ”F4”.

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	CHECK OTHER DTC OUTPUT

(a) Read the DTC using the hand-held tester or the OBD II scan tool.
Result:

Display (DTC Output)	Proceed to
P0138 and/or P0158 are output	A
P0137 and/or P0157 are output	B
P0136 and/or P0156 are output	C

HINT:
If any other codes besides P0136, P0137, P0138, P0156, P0157 and/or P0158 are output, perform the troubleshooting for those codes first.

B → **Go to step 9**

C → **Go to step 6**

A

2	READ VALUE OF HAND-HELD TESTER OR OBD II SCAN TOOL (OUTPUT VOLTAGE OF HEATED OXYGEN SENSOR)

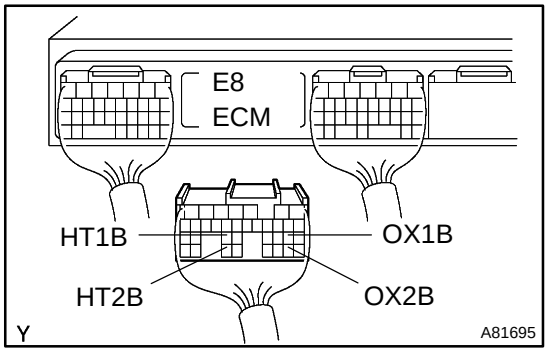
(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(b) Turn ON the ignition switch. Push the hand-held tester or the OBD II scan tool main switch ON.
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / O2S B1S2.
(d) Run the engine at idle.
(e) Read the output voltage of the heated oxygen sensor during idling.

Heated oxygen sensor output voltage	Proceed to
More than 1.2 V	A
Less than 1.0 V	B

B → **Go to step 5**

A

3	CHECK WIRE HARNESS



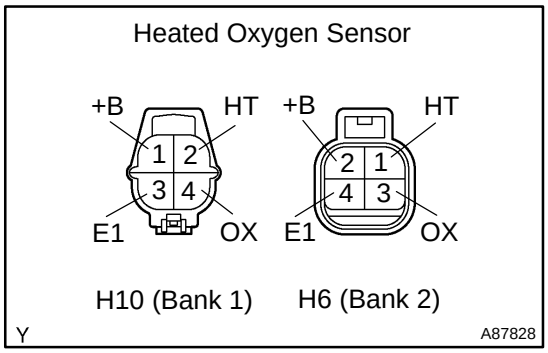
(a) Turn the ignition switch OFF and wait for 5 minutes.
(b) Disconnect the E8 ECM connector.
(c) Measure the resistance of the wire harness side connectors.
Standard:

Tester Connection	Specified Condition
E8-25 (HT1B) - E8-21 (OX1B)	10 kΩ or higher
E8-33 (HT2B) - E8-29 (OX2B)	10 kΩ or higher
E8-25 (HT1B) - Body ground	10 kΩ or higher
E8-33 (HT2B) - Body ground	10 kΩ or higher

OK → **REPLACE ECM**

NG

4 INSPECT HEATED OXYGEN SENSOR (CHECK FOR SHORT)



(a) Disconnect the H10 heated oxygen sensor connector.
(b) Measure the resistance of the sensor side connectors.
Standard:

Tester Connection	Specified Condition
H10-1 (+B) - H10-3 (E1)	10 kΩ or higher
H10-1 (+B) - H10-4 (OX)	10 kΩ or higher
H6-2 (+B) - H6-4 (E1)	10 kΩ or higher
H6-2 (+B) - H6-3 (OX)	10 kΩ or higher

OK → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

NG

REPLACE HEATED OXYGEN SENSOR

5 READ OUTPUT DTC (CHECK MODE)

(a) Change the ECM to check mode with the hand-held tester.
Enter the following menus: DIAGNOSIS / ENHANCED OBD II / CHECK MODE.
(b) Warm up the engine and drive the vehicle at over 25 mph (40 km/h) for an accumulated total of 10 minutes.

HINT:
Driving should be continued for 10 minutes consecutively, but it is not necessary to maintain a speed of 25 mph (40 km/h) during this time.

(c) Read the DTC.
Result:

Display (DTC output)	Proceed to
P0138 and/or P0158 are output	A
No DTC	B

B → **CHECK FOR INTERMITTENT PROBLEMS (See page 05-370)**

A

REPLACE HEATED OXYGEN SENSOR

6 READ VALUE OF HAND-HELD TESTER OR OBD II SCAN TOOL (OUTPUT VOLTAGE OF HEATED OXYGEN SENSOR)

(a) After warming up the engine, run the engine at 2,500 rpm for 3 minutes.
(b) Read the output voltage of the heated oxygen sensor when the engine rpm is suddenly increased.

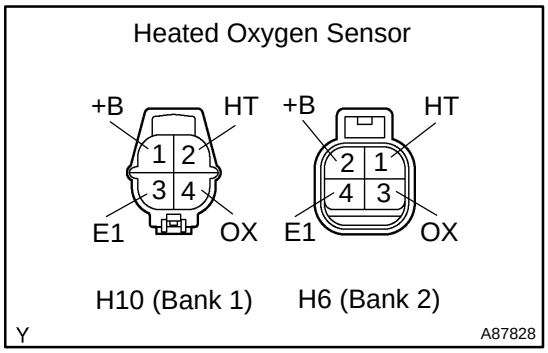
HINT:
Quickly accelerate the engine to 4,000 rpm 3 times by using the accelerator pedal.

Heated oxygen sensor output voltage: Alternates 0.4 V or less and 0.5 V or more.

OK → **Go to step 10**

NG

7 INSPECT HEATED OXYGEN SENSOR (HEATER RESISITANCE)



(a) Disconnect the H10 heated oxygen sensor connector.
(b) Measure the resistance of the heated oxygen sensor terminals.

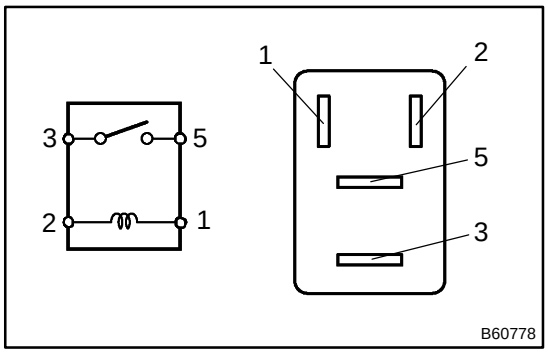
Standard:

Tester Connection	Condition	Specified Condition
H10-2 (HT) - H10-1 (+B)	20°C (68°F)	11 to 16 Ω
H6-1 (HT) - H6-2 (+B)	20°C (68°F)	11 to 16 Ω
H10-2 (HT) - H10-1 (+B)	800°C (1,472°F)	23 to 32 Ω
H6-1 (HT) - H6-2 (+B)	800°C (1,472°F)	23 to 32 Ω

NG → **REPLACE HEATED OXYGEN SENSOR**

OK

8 INSPECT RELAY (EFI)



(a) Remove the EFI relay from the engine room J/B.
(b) Measure the resistance of the EFI relay.

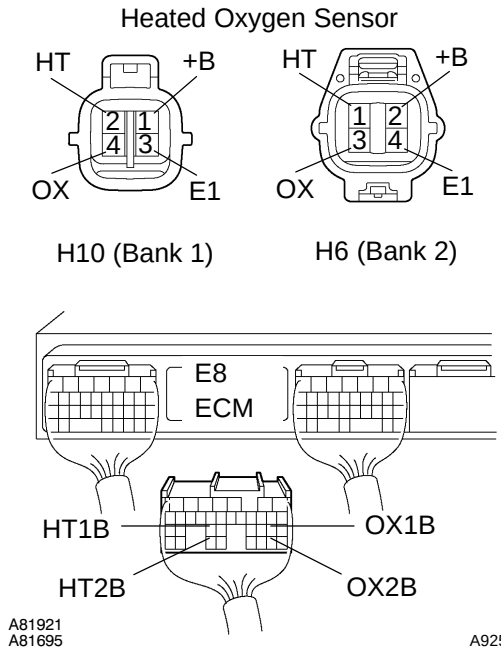
Standard:

Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

NG → **REPLACE RELAY**

OK

9	CHECK WIRE HARNESS

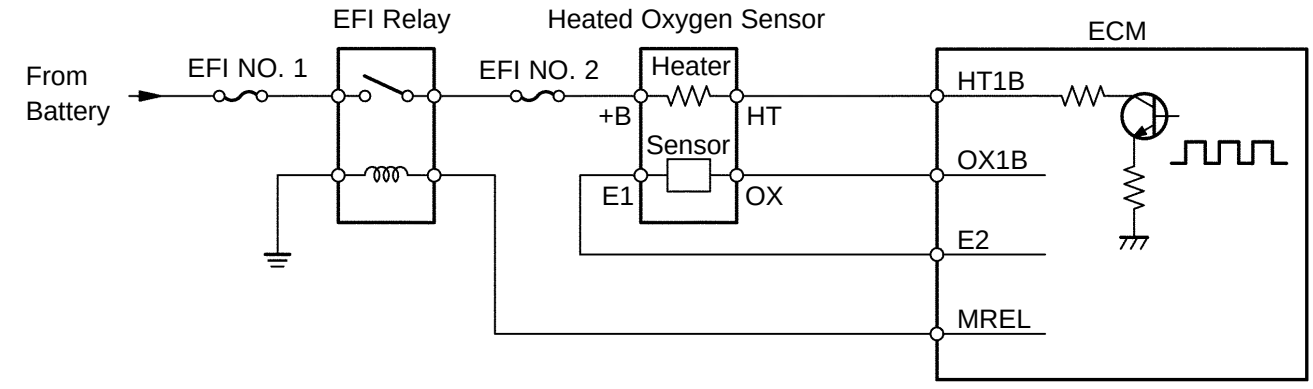


(a) Check the wire harness between the ECM and heated oxygen sensor.
  (1) Disconnect the H10 heated oxygen sensor connector.
  (2) Disconnect the E8 ECM connector.
  (3) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
H10-4 (OX) - E8-21 (OX1B)	Below 1 Ω
H10-2 (HT) - E8-25 (HT1B)	Below 1 Ω
H6-3 (OX) - E8-29 (OX2B)	Below 1 Ω
H6-1 (HT) - E8-33 (HT2B)	Below 1 Ω
H10-4 (OX) or E8-21 (OX1B) - Body ground	10 kΩ or higher
H10-2 (HT) or E8-25 (HT1B) - Body ground	10 kΩ or higher
H6-3 (OX) or E8-29 (OX2B) - Body ground	10 kΩ or higher
H6-1 (HT) or E8-33 (HT2B) - Body ground	10 kΩ or higher

Reference (Bank 1 Sensor 2 System Drawing)



NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE HEATED OXYGEN SENSOR

10	PERFORM CONFIRMATION DRIVING PATTERN

HINT:
Clear all DTCs prior to performing the confirmation driving pattern.

GO

11	READ OUTPUT DTC (DTC P0136 AND/OR P0156 ARE OUTPUT AGAIN)

(a) Read the DTC using the hand-held tester or the OBD II scan tool.
Result:

Display (DTC Output)	Proceed to
P0136 and/or P0156 are not output again	A
P0136 and/or P0156 are output again	B

A → **CHECK FOR INTERMITTENT PROBLEMS (See page 05-370)**

B

12	REPLACE HEATED OXYGEN SENSOR

GO

13	PERFORM CONFIRMATION DRIVING PATTERN

HINT:
Clear all DTCs prior to performing the confirmation driving pattern.

GO

14	READ OUTPUT DTC (DTC P0136 AND/OR P0156 ARE OUTPUT AGAIN)

(a) Read the DTC using the hand-held tester or the OBD II scan tool.
Result:

Display (DTC Output)	Proceed to
P0136 and/or P0156 are not output again	A
P0136 and/or P0156 are output again	B

A → **REPAIR COMPLETED**

B

15	PERFORM ACTIVE TEST USING HAND-HELD TESTER

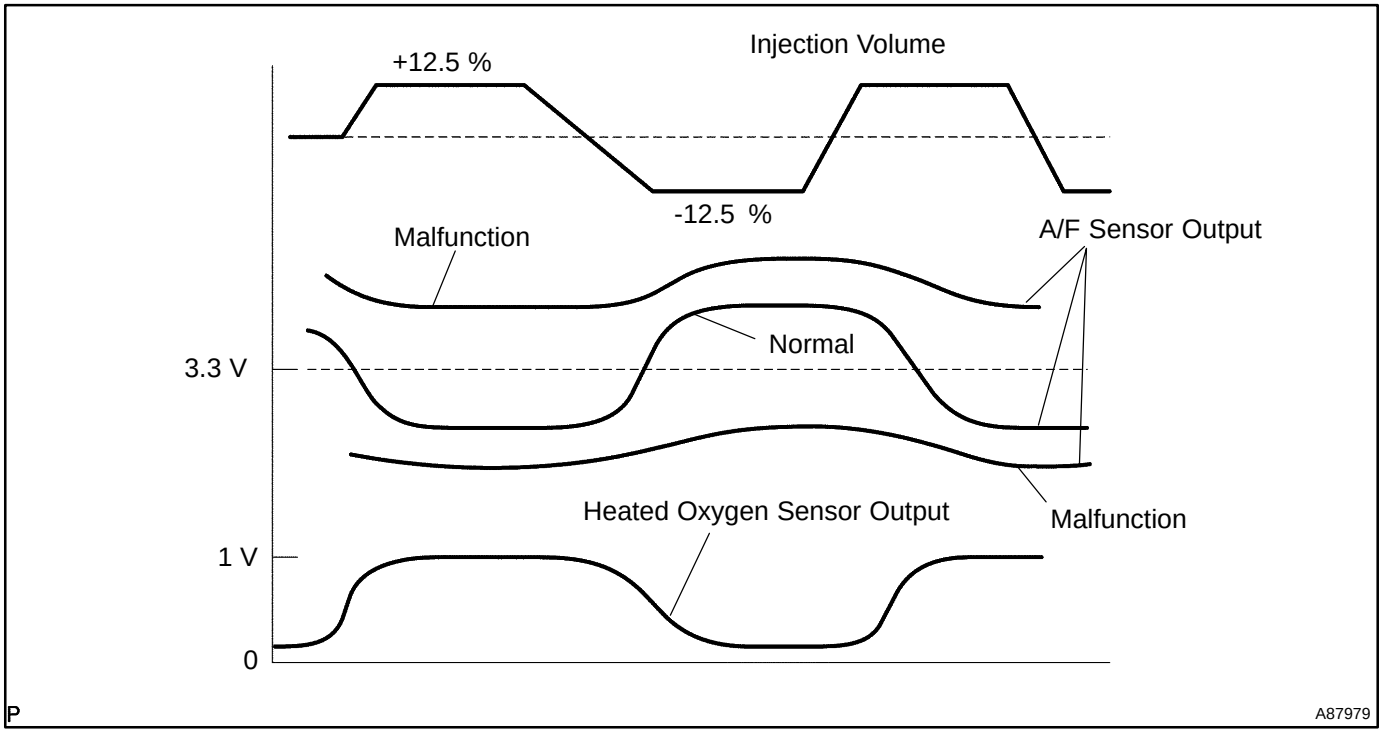
(a) Start the engine and warm it up.
(b) Connect the hand-held tester to the DLC3.
(c) Turn ON the ignition switch and the hand-held tester main switch.
(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / INJ VOL.
(e) Using the hand-held tester, change the injection volume to check the A/F sensor output and heated oxygen sensor output values below.

HINT:

Change the injection volume from -12.5 % to +12.5 %.

Result:

A/F sensor output remains more than 3.3 V or A/F sensor output remains less than 3.3 V (Heated oxygen sensor reacts in accordance with increase and decrease of injection volume)



OK → **REPLACE AIR FUEL RATIO SENSOR**

NG

CHECK AND REPLACE EXTREMLY RICH OR LEAN ACTUAL AIR FUEL RATIO(INJECTOR, FUEL PRESSURE, GAS LEAKAGE IN EXHAUST SYSTEM, ETC.)

DTC	P0171	SYSTEM TOO LEAN (BANK 1)

DTC	P0172	SYSTEM TOO RICH (BANK 1)

DTC	P0174	SYSTEM TOO LEAN (BANK 2)

DTC	P0175	SYSTEM TOO RICH (BANK 2)

CIRCUIT DESCRIPTION

The fuel trim is related to the feedback compensation value, not to the basic injection time. The fuel trim includes the short-term fuel trim and the long-term fuel trim.

The short-term fuel trim is the short-term fuel compensation used to maintain the air-fuel ratio at the stoichiometric air-fuel ratio. The signal from the A/F sensor indicates whether the air-fuel ratio is RICH or LEAN compared to the stoichiometric air-fuel ratio. This variance triggers a reduction in the fuel volume if the air-fuel ratio is RICH, and an increase in the fuel volume if it is LEAN.

The short-term fuel trim varies from the central value due to individual engine differences, wear over time and changes in the operating environment. The long-term fuel trim, which controls overall fuel compensation, steadies long-term deviations of the short-term fuel trim from the central value.

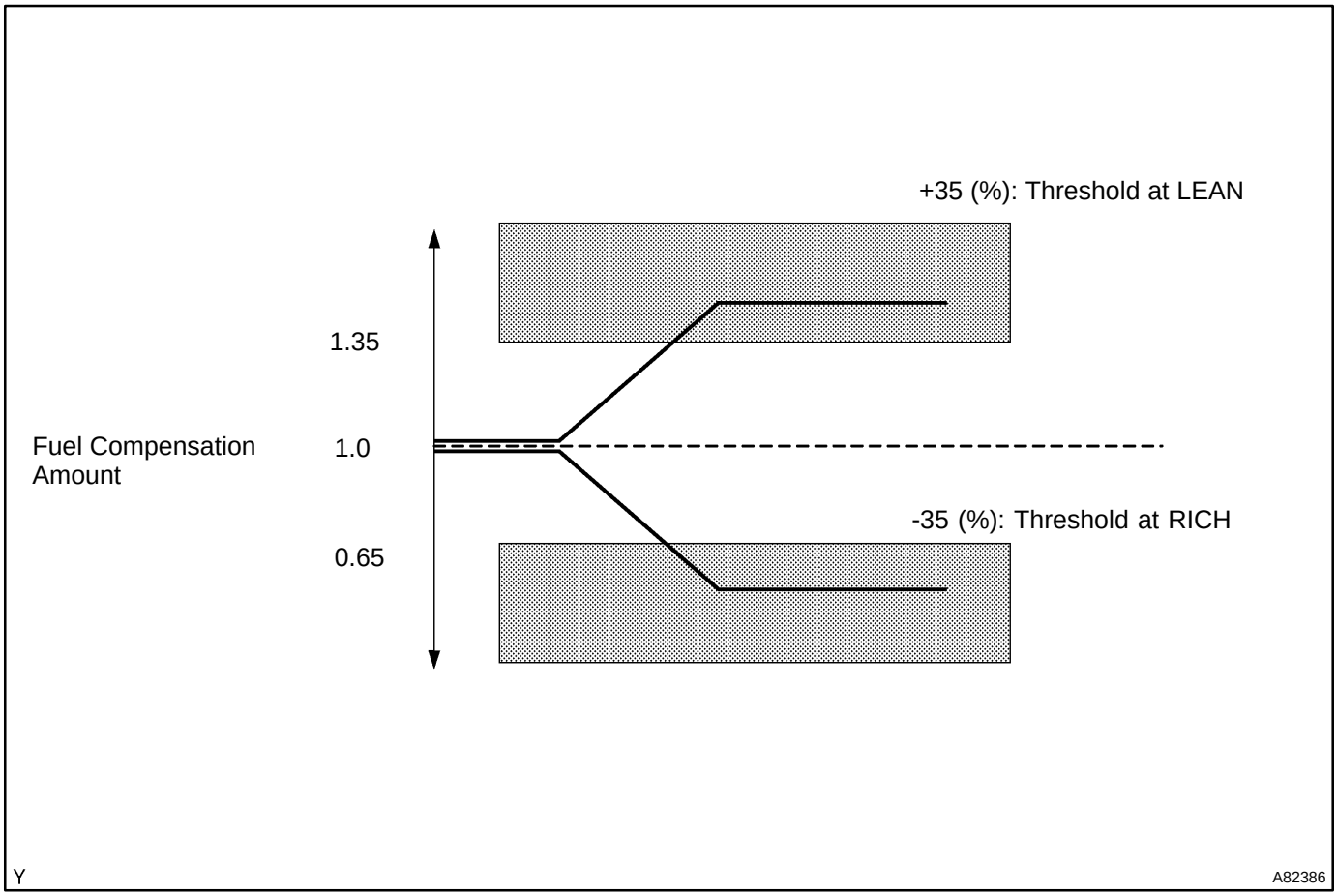
If both the short-term fuel trim and the long-term fuel trim are LEAN or RICH beyond a certain value, it is detected as a malfunction and the MIL is illuminated and a DTC is set.

DTC No.	DTC Detection Condition	Trouble Area
P0171 P0174	When air-fuel ratio feedback is stable after warming up engine, fuel trim is considerably in error on LEAN side (2 trip detection logic)	・Air induction system ・Injector blockage ・MAF meter ・ECT sensor ・Fuel pressure ・Gas leakage in exhaust system ・Open or short in A/F sensor (bank 1, 2 sensor 1) circuit ・A/F sensor (bank 1, 2 sensor 1) ・A/F sensor heater (bank 1, 2 sensor 1) ・A/F relay ・PCV valve and hose ・PCV hose connection
P0172 P0175	When air-fuel ratio feedback is stable after warming up engine, fuel trim is considerably in error on RICH side (2 trip detection logic)	・Injector leak, blockage ・MAF meter ・ECT sensor ・Ignition system ・Fuel pressure ・Gas leakage in exhaust system ・Open or short in A/F sensor (bank 1, 2 sensor 1) circuit ・A/F sensor (bank 1, 2 sensor 1) ・A/F sensor heater ・A/F relay

HINT:

- When DTC P0171 or P0174 is recorded, the actual air-fuel ratio is on the LEAN side. When DTC P0172 or P0175 is recorded, the actual air-fuel ratio is on the RICH side.
- If the vehicle runs out of fuel, the air-fuel ratio is LEAN and DTC P0171 or P0174 may be recorded. The MIL then illuminates.

MONITOR DESCRIPTION



Under closed-loop fuel control, fuel injection amounts that deviate from the ECM's estimated fuel amount will cause a change in the long-term fuel trim compensation value. This long-term fuel trim is adjusted when there are persistent deviations in the short-term fuel trim values. And the deviation from the simulated fuel injection amount by the ECM affects a smoothed fuel trim learning value. The smoothed fuel trim learning value is the combination of smoothed short-term fuel trim (fuel feedback compensation value) and smoothed long-term fuel trim (learning value of the air-fuel ratio). When the smoothed fuel trim learning value exceeds the DTC threshold, the ECM interprets this as a fault in the fuel system and sets a DTC.
Example:
The smoothed fuel trim learning value is more than +35 % or less than -35 %. The ECM interprets this as a failure in the fuel system.

MONITOR STRATEGY

Related DTCs	P0171: Fuel System Lean (Bank 1) P0172: Fuel System Rich (Bank 1) P0174: Fuel System Lean (Bank 2) P0175: Fuel System Rich (Bank 2)
Required sensors / components (Main)	Fuel system
Required sensors / components (Related)	A/F sensor, MAF meter, CKP sensor
Frequency of operation	Continuous
Duration	10 seconds
MIL operation	2 driving cycles
Sequence operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever these DTCs are not present	See page 05-377
Battery voltage	11 V or more
Fuel system	Closed Loop
Throttle position learning	Completed
Either of the following conditions is met:	-
Engine RPM	Less than 1,100 rpm
Intake air amount	0.22 g/rev or more

TYPICAL MALFUNCTION THRESHOLDS

Fuel Trim Lean:

Smoothed fuel trim learning value	35 %* or more

Fuel Trim Rich:

Smoothed fuel trim learning value	-35 %* or more

HINT:
*: The threshold value varies with the ECT.

WIRING DIAGRAM

Refer to DTC P2195 on page 05-629 .

INSPECTION PROCEDURE

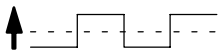
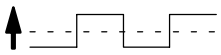
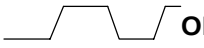
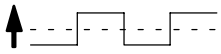
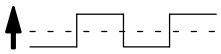
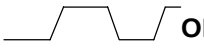
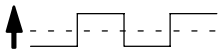
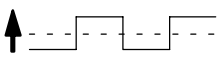
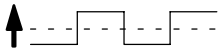
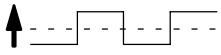
HINT:
Hand-held tester only:
It is possible the malfunctioning area can be found using the ACTIVE TEST A/F CONTROL operation. The A/F CONTROL operation can determine if the A/F sensor, heated oxygen sensor or other potential trouble areas are malfunctioning or not.
(a) Perform the ACTIVE TEST A/F CONTROL operation.
HINT:
The A/F CONTROL operation lowers the injection volume by 12.5 % or increases the injection volume by 25 %.

(1) Connect the hand-held tester to the DLC3 on the vehicle.
(2) Turn the ignition switch ON.
(3) Warm up the engine by running the engine at 2,500 rpm for approximately 90 seconds.
(4) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL.
(5) Perform the A/F CONTROL operation with the engine idling (press the right or left button).

Result:

A/F sensor reacts in accordance with increase and decrease of injection volume:
+25 % → RICH output: Less than 3.0 V
-12.5 % → LEAN output: More than 3.35 V
Heated oxygen sensor reacts in accordance with increase and decrease of injection volume:
+25 % → RICH output: More than 0.55 V
-12.5 % → LEAN output: Less than 0.4 V

NOTICE:
The A/F sensor output has a few seconds of delay and the heated oxygen sensor output has about 20 seconds of delay.

	Output voltage of A/F sensor (sensor 1)	Output voltage of heated oxygen sensor (sensor 2)	Mainly suspected Trouble Area
Case 1	Injection volume +25 % -12.5 %  Output voltage More than 3.35 V Less than 3.0 V  **OK**	Injection volume +25 % -12.5 %  Output voltage More than 0.55 V Less than 0.4V  **OK**	—
Case 2	Injection volume +25 % -12.5 %  Output voltage Almost No reaction **NG**	Injection volume +25 % -12.5 %  Output voltage More than 0.55 V Less than 0.4V  **OK**	A/F sensor (A/F sensor, heater, A/F sensor circuit)
Case 3	Injection volume +25 % -12.5 %  Output voltage More than 3.35 V Less than 3.0V  **OK**	Injection volume +25 % -12.5 %  Output voltage Almost No reaction **NG**	Heated oxygen sensor (heated oxygen sensor, heater, heated oxygen sensor circuit)
Case 4	Injection volume +25 % -12.5 %  Output voltage Almost No reaction **NG**	Injection volume +25 % -12.5 %  Output voltage Almost No reaction **NG**	Extremely rich or lean actual air-fuel ratio (Injector, fuel pressure, gas leakage in exhaust system, etc.)

The following A/F CONTROL procedure enables the technician to check and graph the voltage outputs of both the A/F sensor and the heated oxygen sensor.
For displaying the graph, enter ”ACTIVE TEST / A/F CONTROL / USER DATA”, select ”AFS B1S1 and O2S B1S2” by pressing ”YES” and push ”ENTER”. Then press ”F4”.
HINT:

- Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.
- A high A/F sensor voltage could be caused by a RICH air-fuel mixture. Check the conditions that would cause the engine to run with a RICH air-fuel mixture.
- A low A/F sensor voltage could be caused by a LEAN air-fuel mixture. Check the conditions that would cause the engine to run with a LEAN air-fuel mixture.

1	CHECK AIR INDUCTION SYSTEM

(a) Check for vacuum leaks in air induction system.
OK: No vacuum leak.

NG → **REPAIR OR REPLACE AIR INDUCTION SYSTEM**

OK

2	CHECK CONNECTION OF PCV HOSE

OK: PCV hose is connected correctly, and PCV hose is not damaged.

NG → **REPAIR OR REPLACE PCV HOSE**

OK

3	INSPECT FUEL INJECTOR ASSY (INJECTION AND VOLUME) (See page 11-38)

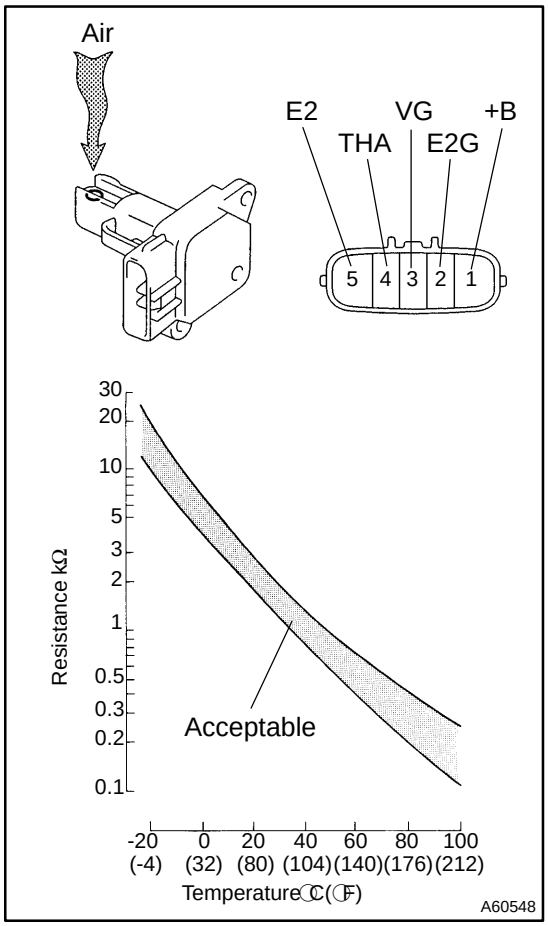
Standard:

Injection volume	Difference between each injector
60 to 73 cm^3 (3.7 to 4.5 cu in.) per 15 seconds	13 cm^3 (0.8 cu in.) or less

NG → **REPLACE FUEL INJECTOR ASSY (See page 11-46)**

OK

4 INSPECT MASS AIR FLOW METER



(a) Remove the MAF meter.

(b) Check the output voltage.

(1) Apply battery voltage across terminals +B and E2G.

(2) Connect the positive (+) tester probe to terminal VG, and negative (-) tester probe to terminal E2G.

(3) Blow air into the MAF meter, and check that the voltage fluctuates.

(c) Check the resistance of the IAT sensor terminals.

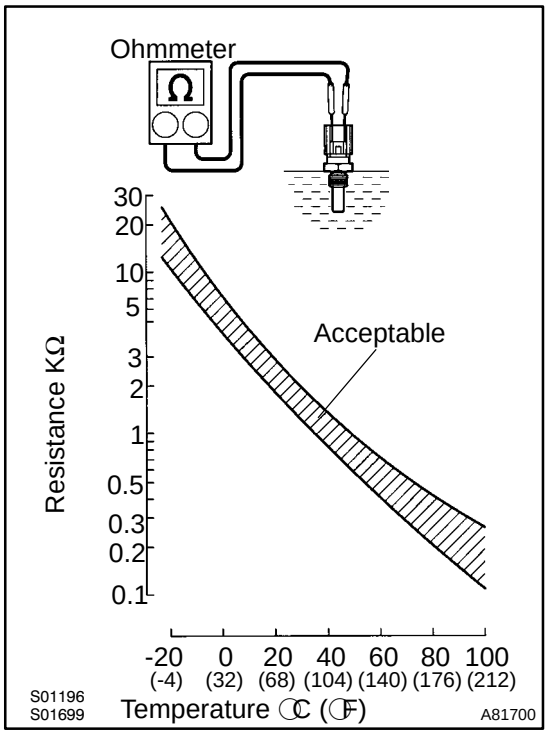
Standard:

Tester Connection	Condition	Specified Condition
THA (4) - E2 (5)	-20℃ (-4℉)	13.6 to 18.4 kΩ
THA (4) - E2 (5)	20℃ (68℉)	2.21 to 2.69 kΩ
THA (4) - E2 (5)	60℃ (140℉)	0.49 to 0.67 kΩ

NG → **REPLACE MASS AIR FLOW METER**

OK

5	INSPECT ENGINE COOLANT TEMPERATURE SENSOR (RESISTANCE)



(a) Remove the ECT sensor.
(b) Check the resistance of the ECT sensor terminals.
Standard:

Tester Connection	Condition	Specified Condition
1 - 2	20℃ (68℉)	2.32 to 2.59 kΩ
1 - 2	80℃ (176℉)	0.310 to 0.326 kΩ

NOTICE:
When checking the ECT sensor in the water, be careful not to allow water to go into the terminals. After the check, dry the sensor.
HINT:
Alternate procedure: Connect an ohmmeter to the installed ECT sensor and read the resistance. Use an infrared thermometer to measure the engine temperature in the immediate vicinity of the sensor. Compare these values to the resistance/temperature graph. Change the engine temperature (warm up or allow to cool down) and repeat the test.

NG → **REPLACE ENGINE COOLANT TEMPERATURE SENSOR**

OK

6	CHECK FOR SPARK AND IGNITION (See page 18-7)

OK: Spark occurs.

NG → **REPAIR OR REPLACE**

OK

7	CHECK FUEL PRESSURE (See page 11-38)

(a) Check the fuel pressure (high or low pressure).
Standard:
Fuel pressure: 304 to 343 kPa (3.1 to 3.5 kgf/cm^2, 44 to 50 psi)

NG → **REPLACE FUEL SYSTEM**

OK

8	CHECK FOR EXHAUST GAS LEAKAGE

OK: No gas leak.

NG → **REPAIR OR REPLACE EXHAUST GAS LEAKAGE POINT (See page 15-5)**

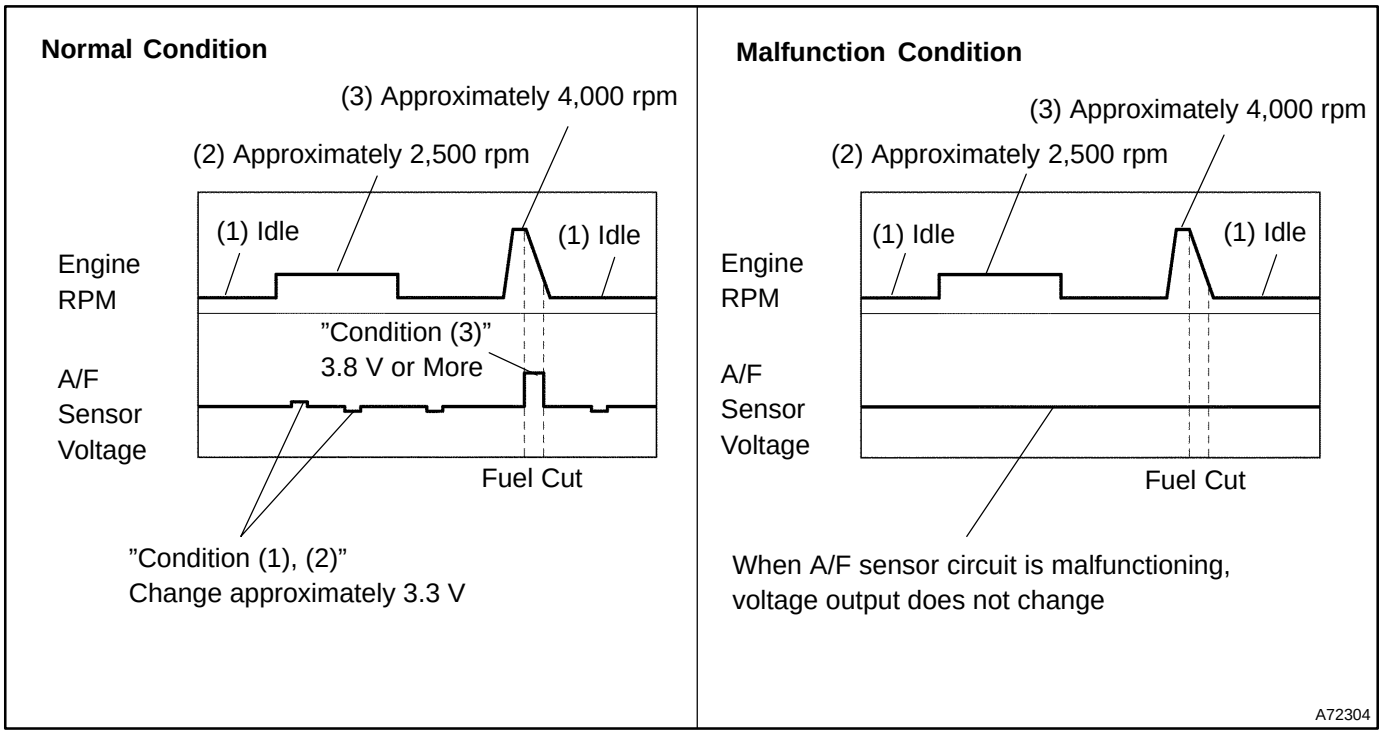
OK

9	READ VALUE OF HAND-HELD TESTER OR OBD II SCAN TOOL (OUTPUT VOLTAGE OF AIR FUEL RATIO SENSOR (BANK 1, 2 SENSOR 1))

(a) Connect the hand-held tester or the OBD II scan tool to the DLC 3.
(b) Warm up the A/F sensors (bank 1, 2 sensor 1) by running the engine at 2,500 rpm for approximately 90 seconds.
(c) Read A/F sensor voltage output on the hand-held tester or the OBD II scan tool.
(d) Hand-held tester only:
Enter the following menus: ENHANCED OBD II / SNAPSHOT / MANUAL SNAPSHOT / USER DATA.
(e) Select "AFS B1 S1 or AFS B2 S1/ENGINE SPD" and press YES.
(f) Monitor the A/F sensor voltage carefully.
(g) Check the A/F sensor voltage output under the following conditions:
(1) Allow engine to idle for 30 seconds.
(2) Running the engine at approximately 2,500 rpm (where engine RPM is not suddenly changed).
(3) Raise the engine speed to 4,000 rpm and quickly release the accelerator pedal so that the throttle is fully closed.

Standard:
Condition (1) and (2)
Voltage change of 3.3 V (0.66 V)* (between approximately 3.1 to 3.5 V) as shown in the illustration.
Condition (3)
A/F sensor voltage increases to 3.8 V (0.76 V)* or more when fuel is cut during engine deceleration, as shown in the illustration.

HINT:
*: Voltage when using the OBD II scan tool.



HINT:
* Whenever the output voltage of the A/F sensor remains at approximately 3.3 V (0.660 V)* (see "Malfunction Condition" graphic) under any condition as well as the above conditions, the A/F sensor may have an open circuit (this will happen also when the A/F sensor heater has an open circuit).

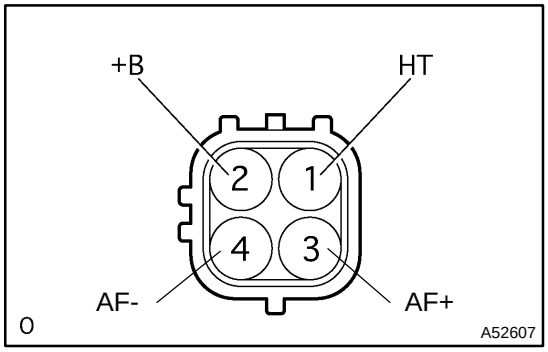
- Whenever the output voltage of the A/F sensor remains at a certain value of approximately 3.8 V (0.76 V)* or more, or 2.8 V (0.56 V)* or less (see ”Malfunction Condition” graphic) under any condition as well as the above conditions, the A/F sensor may have a short circuit.
- The ECM will stop fuel injection (fuel cut) during engine deceleration. This will cause a LEAN condition and should result in a momentary increase in A/F sensor voltage output.
- The ECM must establish a closed throttle position learned value to perform fuel cut. If the battery terminal has been disconnected, the vehicle must be driven over 10 mph to allow the ECM to learn the closed throttle position.
- When the vehicle is driven:
  The output voltage of the A/F sensor may be below 2.8 V (0.76 V)* during fuel enrichment. For the vehicle, this translates to a sudden increase in speed with the accelerator pedal fully depressed when trying to overtake another vehicle. The A/F sensor is functioning normally.
- The A/F sensor is a current output element, and therefore the current is converted into voltage inside the ECM. If measuring voltage at connectors of A/F sensor or ECM, you will observe a constant voltage.

*: Voltage when using the OBD II scan tool.

OK → **Go to step 17**

NG

10 INSPECT AIR FUEL RATIO SENSOR (HEATER RESISTANCE)



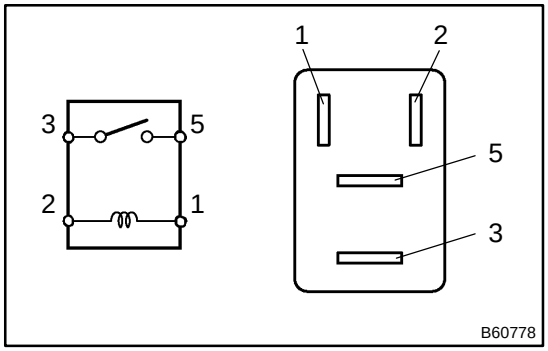
(a) Disconnect the A6 or A7 A/F sensor connector.
(b) Check the resistance of the A/F sensor terminals.
Standard:

Tester Connection	Condition	Specified Condition
1 (HT) - 2 (+B)	20°C (68°F)	1.8 to 3.4 Ω
1 (HT) - 4 (AF-)	-	10 kΩ or higher

NG → **REPLACE AIR FUEL RATIO SENSOR**

OK

11 INSPECT RELAY (A/F)



(a) Remove the A/F relay from the engine room R/B No. 2.
(b) Check the resistance of the A/F relay.
Standard:

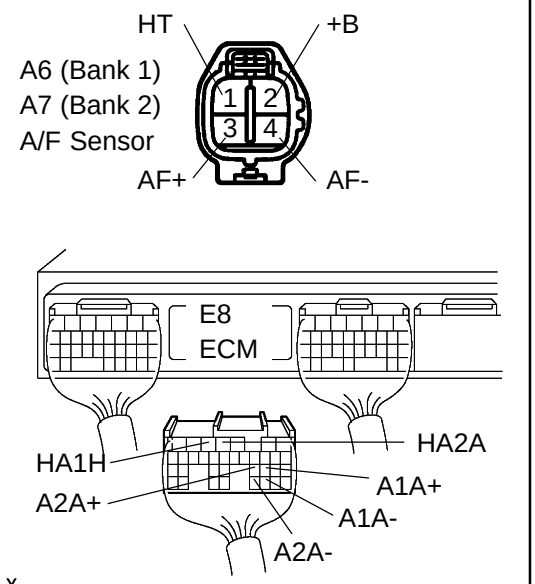
Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

NG → **REPLACE RELAY**

OK

12 CHECK WIRE HARNESS (A/F SENSOR - ECM)

Wire Harness Side

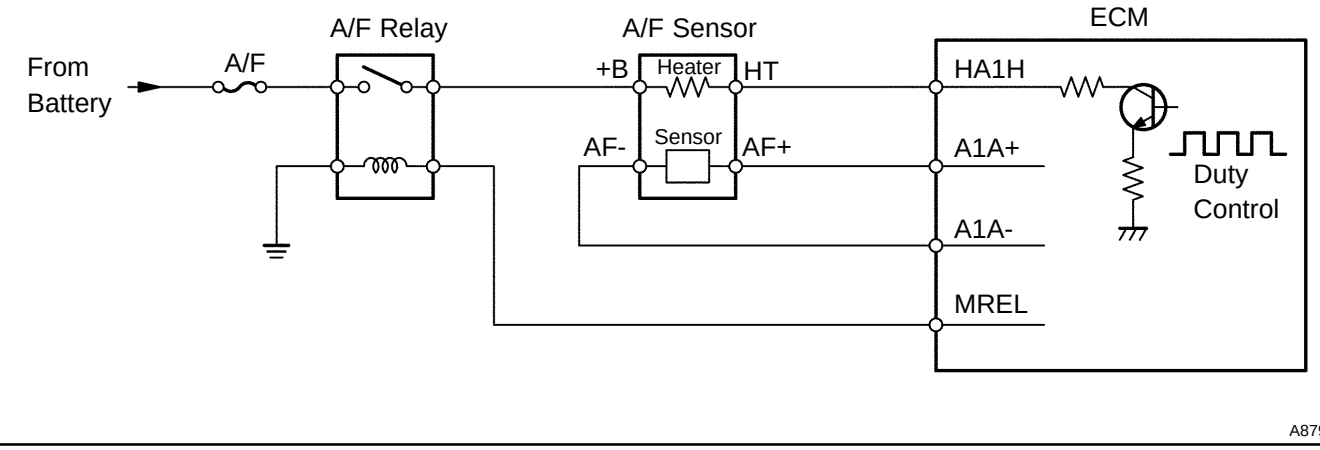


(a) Disconnect the A6 or A7 A/F sensor connector.
(b) Disconnect the E8 ECM connector.
(c) Check the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
A6-3 (AF+) - E8-22 (A1A+) A6-4 (AF-) - E8-30 (A1A-) A6-1 (HT) - E8-5 (HA1H) A7-3 (AF+) - E8-23 (A2A+) A7-4 (AF-) - E8-31 (A2A-) A7-1 (HT) - E8-4 (HA2A)	Below 1 Ω
A6-3 (AF+) or E8-22 (A1A+) - Body ground A6-4 (AF-) or E8-30 (A1A-) - Body ground A6-1 (HT) or E8-5 (HA1H) - Body ground A7-3 (AF+) or E8-23 (A2A+) - Body ground A7-4 (AF-) or E8-31 (A2A-) - Body ground A7-1 (HT) or E8-4 (HA2A) - Body ground	10 kΩ or higher

Reference (Bank 1 Sensor 1 System Drawing)



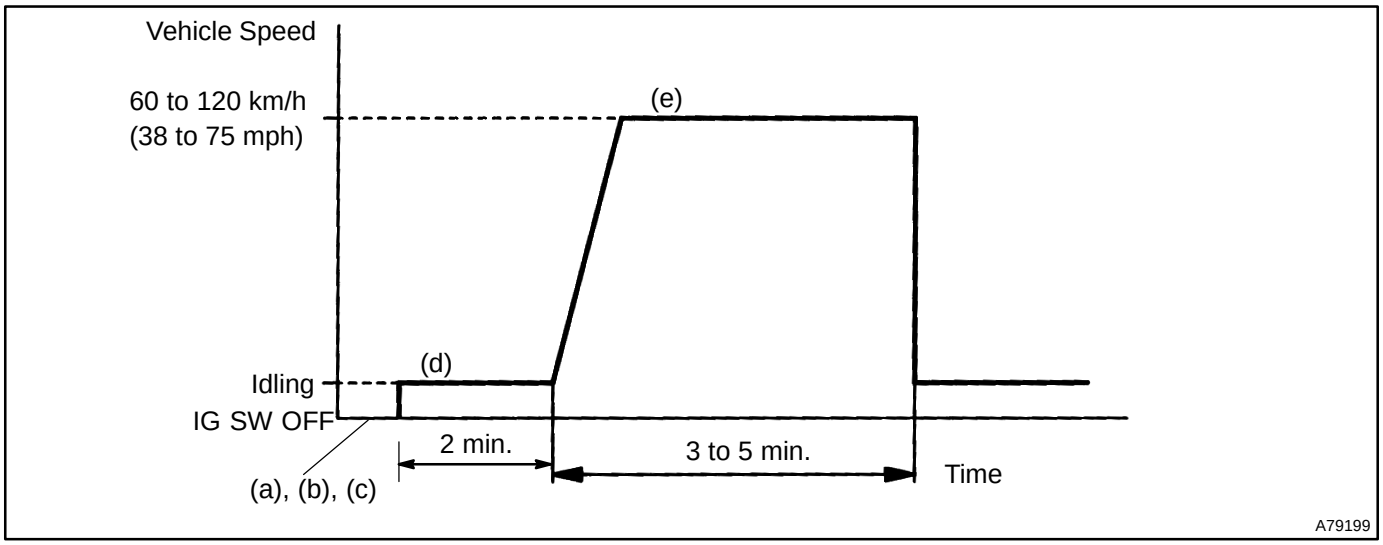
NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

13 REPLACE AIR FUEL RATIO SENSOR

GO

14	PERFORM CONFIRMATION DRIVING PATTERN



(a) Clear the DTCs.
  (1) Disconnect the battery cable or remove the EFI NO. 1 and ETCS fuses for 60 seconds or more.
(b) Connect the hand-held tester to the DLC3.
(c) Switch the hand-held tester from the normal mode to the check mode (see page 05-402).
(d) Start the engine and warm it up with all the accessory switches OFF.
(e) Drive the vehicle at 60 to 120 km/h (38 to 75 mph) and engine speed at 1,400 to 3,200 rpm for 3 to 5 minutes.

HINT:
If a malfunction exists, the MIL will be illuminated during step (e).

NOTICE:
If the conditions in this test are not strictly followed, detection of a malfunction will not occur. If you do not have a hand-held tester, turn the ignition switch OFF after performing steps (d) and (e), then perform step (e) again.

GO

15	READ OUTPUT DTC (DTC P0171, P0172, P0174 AND/OR P0175 ARE OUTPUT AGAIN)

(a) Read the DTC using the hand-held tester or the OBD II scan tool.
  Result:

Display (DTC Output)	Proceed to
DTC P0171, P0172, P0174 and/or P0175 are not output again	A
DTC P0171, P0172, P0174 and/or P0175 are output again	B

B → **REPLACE ECM (See page 10-24) AND PERFORM CONFIRMATION DRIVING PATTERN (Refer to step 14)**

A

16	CONFIRM IF VEHICLE HAS RUN OUT OF FUEL IN PAST

NO → CHECK FOR INTERMITTENT PROBLEMS (See page 05-370)

YES

DTC IS CAUSED BY RUNNING OUT OF FUEL (DTCS P0171, P0172, P0174 AND/OR P0175)

17	PERFORM CONFIRMATION DRIVING PATTERN

HINT:
Clear all DTCs prior to performing the confirmation driving pattern (refer to step 14).

GO

18	READ OUTPUT DTC (DTC P0171, P0172, P0174 AND/OR P0175 ARE OUTPUT AGAIN)

(a) Read the DTC using the hand-held tester or the OBD II scan tool.
Result:

Display (DTC Output)	Proceed to
DTC P0171, P0172, P0174 and/or P0175 are not output again	A
DTC P0171, P0172, P0174 and/or P0175 are output again	B

B → Go to step 22

A

19	REPLACE AIR FUEL RATIO SENSOR

GO

20	PERFORM CONFIRMATION DRIVING PATTERN

GO

21	READ OUTPUT DTC (DTC P0171, P0172, P0174 AND/OR P0175 ARE OUTPUT AGAIN)

(a) Read the DTC using the hand-held tester or the OBD II scan tool.
Result:

Display (DTC Output)	Proceed to
DTC "P0171, P0172, P0174 and/or P0175" are output again	A
DTC "P0171, P0172, P0174 and/or P0175" are not output again	B

B → REPLACE ECM (See page 10-24) AND PERFORM CONFIRMATION DRIVING PATTER (Refer to step 14)

A

22	CONFIRM IF VEHICLE HAS RUN OUT OF FUEL IN PAST

NO → CHECK FOR INTERMITTENT PROBLEMS (See page 05-370)

YES

DTC IS CAUSED BY RUNNING OUT OF FUEL (DTCS P0171, P0172, P0174 AND/OR P0175)

DTC	P0300	RANDOM/MULTIPLE CYLINDER MISFIRE DETECTED

DTC	P0301	CYLINDER 1 MISFIRE DETECTED

DTC	P0302	CYLINDER 2 MISFIRE DETECTED

DTC	P0303	CYLINDER 3 MISFIRE DETECTED

DTC	P0304	CYLINDER 4 MISFIRE DETECTED

DTC	P0305	CYLINDER 5 MISFIRE DETECTED

DTC	P0306	CYLINDER 6 MISFIRE DETECTED

CIRCUIT DESCRIPTION

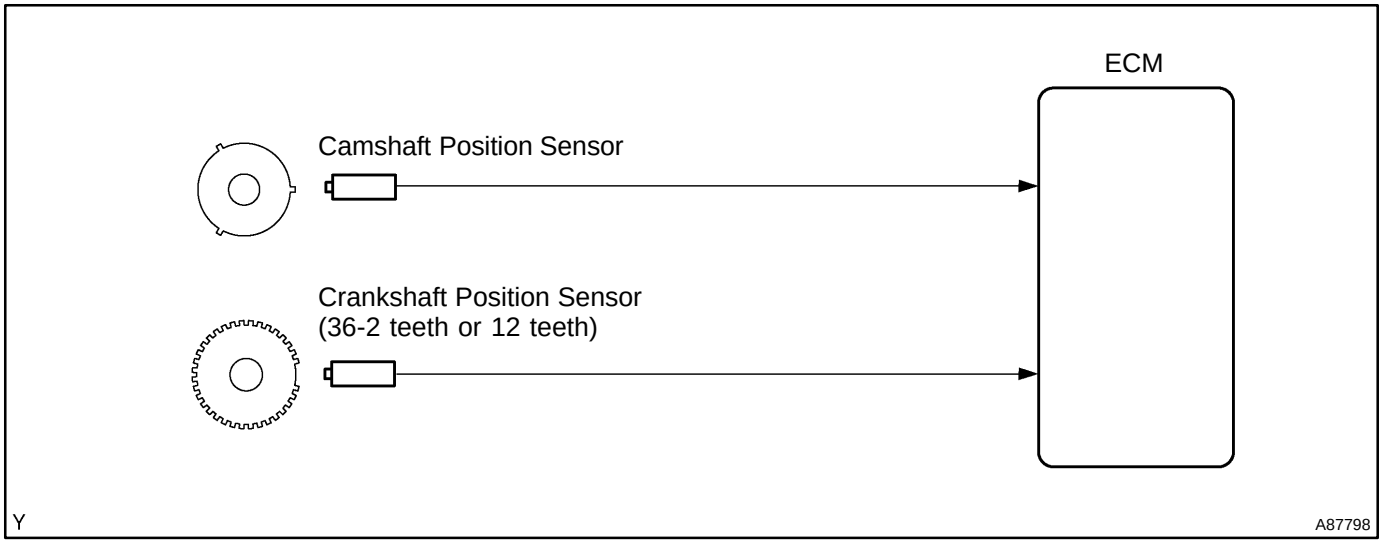
When a misfire occurs in the engine, hydrocarbons (HC) are output in high concentrations. If this HC concentration is high enough, there could be an increase in exhaust emission levels. High concentrations of HC can also cause the temperature of the catalyst to increase, possibly damaging the catalyst. To prevent this increase in emissions and limit the possibility of thermal damage, the ECM monitors the misfire rate. When the temperature of the catalyst reaches a point of thermal degradation, the ECM will blink the MIL. For monitoring misfires, the ECM uses both the camshaft position sensor and the crankshaft position sensor. The camshaft position sensor is used to identify misfiring cylinders and the crankshaft position sensor is used to measure variations in the crankshaft rotation speed. A misfire is counted when crankshaft rotation speed variations exceed threshold values.

If the misfiring rate exceeds the threshold value and could cause emission deterioration, the ECM illuminates the MIL.

DTC No.	DTC Detection Condition	Trouble Area
P0300	Misfiring of random cylinders is detected	⁎Open or short in engine wire ⁎Connector connection ⁎Vacuum hose connection ⁎Ignition system ⁎Injector ⁎Fuel pressure ⁎MAF meter ⁎ECT sensor ⁎Compression pressure ⁎Valve clearance ⁎Valve timing ⁎PCV hose connection ⁎PCV hose ⁎ECM
P0301 P0302 P0303 P0304 P0305 P0306	Misfiring of each cylinder is detected	⁎Open or short in engine wire ⁎Connector connection ⁎Vacuum hose connection ⁎Ignition system ⁎Injector ⁎Fuel pressure ⁎MAF meter ⁎ECT sensor ⁎Compression pressure ⁎Valve clearance ⁎Valve timing ⁎PCV hose connection ⁎PCV hose ⁎ECM

HINT:
When several codes for a misfiring cylinder are recorded repeatedly but no random misfire code is recorded, the misfires have been detected and recorded at different times.

MONITOR DESCRIPTION



The ECM illuminates the MIL (2 trip detection logic) if:

⁎ The misfiring rate exceeds a threshold value and could cause emission deterioration.
⁎ During the first 1,000 engine revolutions after the engine starts, an excessive misfire rate (approximately 20 to 50 misfires per 1,000 engine revolutions) occurs 1 time.
⁎ After the first 1,000 engine revolutions after the engine starts, an excessive misfire rate (approximately 20 to 50 misfires per 1,000 engine revolutions) occurs 4 times.

The ECM blinks the MIL (MIL blinks immediately) if:

- Within 200 engine revolutions at a high rpm, the threshold for ”percentage of misfire causing catalyst damage” is reached 1 time.
- Within 200 engine revolutions at a normal rpm, the threshold for ”percentage of misfire causing catalyst damage” is reached 3 times (for the 2nd trip, reaching the threshold once will cause the MIL to flash).

MONITOR STRATEGY

Related DTCs	P0300: Multiple Cylinder Misfire P0301: Cylinder 1 Misfire P0302: Cylinder 2 Misfire P0303: Cylinder 3 Misfire P0304: Cylinder 4 Misfire P0305: Cylinder 5 Misfire P0306: Cylinder 6 Misfire
Required sensors / components (Main)	Injector, Ignition coil, Spark plug
Required sensors / components (Related)	CKP, CMP, ECT, IAT and MAF meter
Frequency of operation	Continuous
Duration	1,000 revolutions x 4: Emission-related-misfire 200 revolutions x 3: Catalyst-damaged-misfire
MIL operation	2 driving cycles: emission-related misfire MIL flashes immediately: catalyst-damage misfire
Sequence operation	None

TYPICAL ENABLING CONDITIONS

All:

The monitor will run whenever these DTCs are not present	See page 05-377
Battery voltage	8 V or more
Throttle position learning	Completed
VVT system	Not operated by scan tool
Engine RPM	450 to 5,900 rpm
All of the following conditions are met:	Condition 1, 2 and 3
1. Engine Coolant Temperature (ECT)	-10°C (14°F) or more
2. Either of the following conditions is met	Condition (a) or (b)
(a) IAT	-10°C (14°F) or more
(b) ECT	75°C (167°F) or more
3. Either of the following conditions is met:	Condition (a) or (b)
(a) ECT at engine start	More than -7°C (19.4°F)
(b) ECT	More than 20°C (68°F)
Fuel-cut	OFF

Monitor Period of Emission-related-misfire:

First 1,000 revolutions after engine start, or check mode	Crankshaft 1,000 revolutions
Except above	Crankshaft 1,000 revolutions × 4

Monitor Period of Catalyst-damage-misfire (MIL blinks):

All of the following conditions 1, 2 and 3 met:	Crankshaft 200 revolutions
1. Driving cycles	1st
2. Check Mode	OFF
3. Engine RPM	Less than 3,000 rpm
Except above	Crankshaft 200 revolutions x 3

TYPICAL MALFUNCTION THRESHOLDS

Monitor Period of Emission-related-misfire:

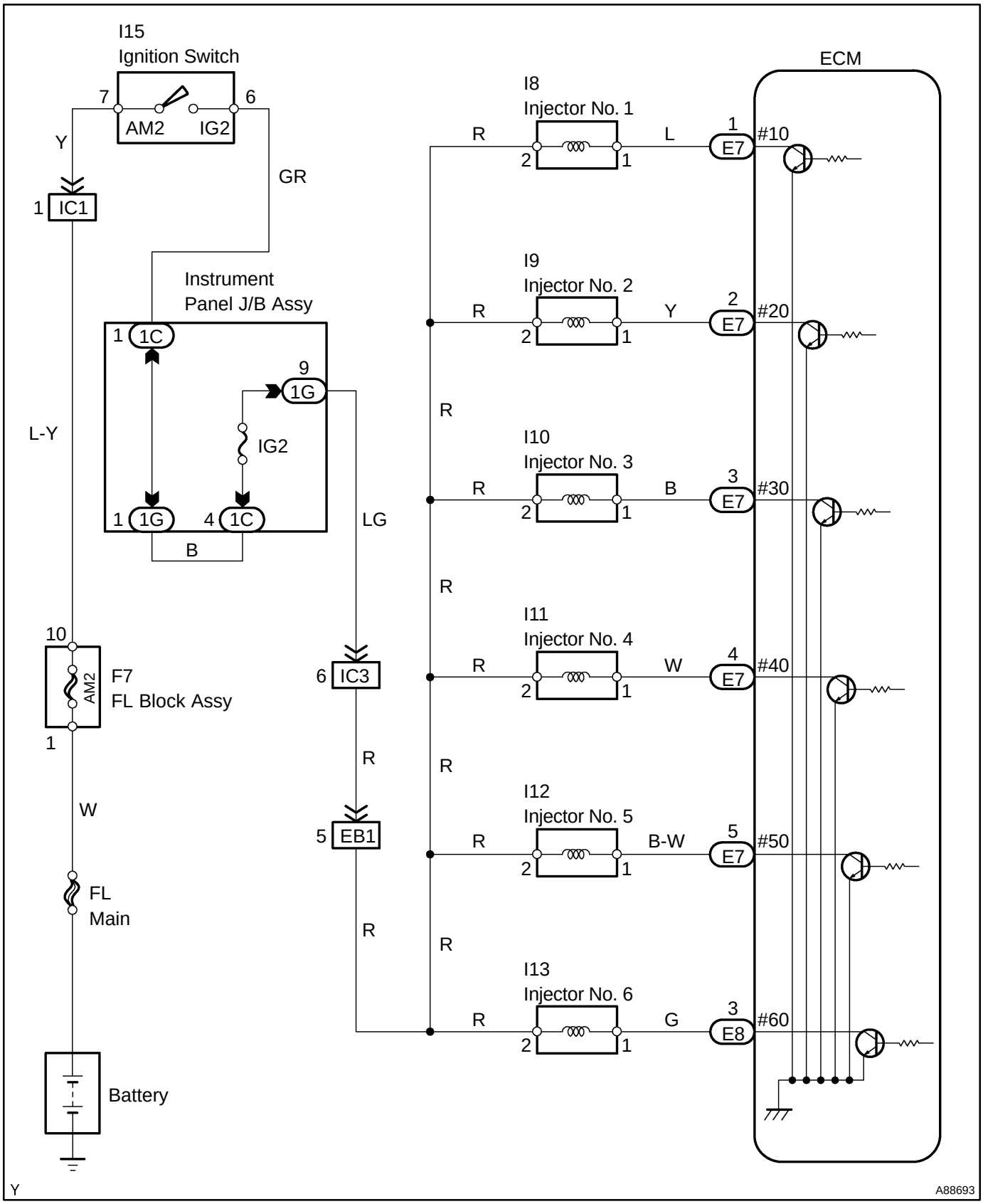
Misfire rate	1.0 % or more

Monitor Period of Catalyst-damage-misfire (MIL blinks):

Number of misfire per 200 revolutions	77 or more (varies with intake air amount and engine RPM)

WIRING DIAGRAM

Refer to DTC P0351 on page 05-541 for the wiring diagram of the ignition system.



CONFIRMATION DRIVING PATTERN

(a) Connect the hand-held tester to the DLC3.
(b) Record DTC and the freeze frame data.
(c) Set the hand-held tester to check mode (see page 05-400).
(d) Read the value on the misfire counter for each cylinder when idling. If the value is displayed on the misfire counter, skip the following procedure of confirmation driving.
(e) Drive the vehicle several times with the engine speed, load and its surrounding range shown with ENGINE SPD, CALC LOAD in the freeze frame data or MISFIRE RPM, MISFIRE LOAD in the DATA LIST.

If you have no hand-held tester, turn the ignition switch OFF after the symptom is simulated once. Then repeat the simulation process again.

HINT:

In order to memorize the misfire DTC, it is necessary to drive with MISFIRE RPM, MISFIRE LOAD in the DATA LIST for the period of time in the chart below. Take care not to turn the ignition switch OFF. Turning the ignition switch OFF switches the diagnosis system from check mode to normal mode and all DTCs, freeze frame data and other data are erased.

Engine Speed	Time
Idling	3 minutes 30 seconds or more
1,000 rpm	3 minutes or more
2,000 rpm	1 minute 30 seconds or more
3,000 rpm	1 minute or more

(f) Check if there is misfire and DTC and the freeze frame data. Record the DTC's, freeze frame date and misfire counter data.
(g) Turn the ignition switch OFF and wait for at least 5 seconds.

INSPECTION PROCEDURE

HINT:

- If DTCs besides misfire DTCs are memorized simultaneously, troubleshoot the non-misfire DTCs first.
- Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.
- If the misfire does not occur when the vehicle is brought to the workshop, the misfire can be confirmed by reproducing the condition of the freeze frame data. Also, after finishing the repair, confirm that there is no misfire (see confirmation driving pattern).
- On 6 and 8 cylinder engines, cylinder specific misfire fault codes are disabled at high engine speeds.If the misfire starts in a high engine speed area or the misfire occurs only in a high engine speed area, only the general fault code P0300 will be stored.

  When only a general misfire fault code like P0300 is stored:

  (1) Erase the general misfire fault code from the ECM using the hand-held tester or OBD II scan tool.
  (2) Start the engine and drive the confirmation patten.
  (3) Read the value of the misfire ratio for each cylinder. Or read the DTC.
  (4) Perform repairs on the cylinder that has a high misfire ratio. Or repair the cylinder indicated by the DTC.
  (5) After finishing repairs, drive the confirmation pattern again and confirm that no misfire occurs.
- When either of SHORT FT #1, LONG FT #1, SHORT FT #2 or LONG FT #2 in the freeze frame data is over the range of ±20 %, there is a possibility that the air-fuel ratio is becoming RICH (-20 % or less) or LEAN (+20 % or more).

- When COOLANT TEMP in the freeze frame data is less than 80°C (176°F), there is a possibility of misfire only during engine warm-up.
- If the misfire cannot be reproduced, the following reasons may apply: 1) the vehicle has low fuel, 2) improper fuel is being used, and 3) the ignition plug is contaminated.
- Be sure to check the value on the misfire counter after the repair.

1	CHECK OTHER DTC OUTPUT (IN ADDITION TO MISFIRE DTCS)

(a) Read the DTC using the hand-held tester or the OBD II scan tool.
Result:

Display (DTC Output)	Proceed to
Only P0300, P0301, P0302, P0303, P0304, P0305 and/or P0306 are output	A
P0300, P0301, P0302, P0303, P0304, P0305 or P0306 and other DTCs are output	B

HINT:
If any other codes besides P0300, P0301, P0302, P0303, P0304, P0305 or P0306 are output, perform the troubleshooting for those codes first.

B → **GO TO RELEVANT DTC CHART (See page 05-412)**

A

2	CHECK WIRE HARNESS, CONNECTOR AND VACUUM HOSE IN ENGINE ROOM

(a) Check the connection conditions of the wire harness and connector.
(b) Check for the disconnection, piping and break of the vacuum hose.
OK: Connected correctly and no damage ON wire harness.

NG → **REPAIR OR REPLACE, THEN CONFIRM THAT THERE IS NO MISFIRE**

OK

3	CHECK CONNECTION OF PCV HOSE

OK: PCV hose is connected correctly. And PCV hose has no damage.

NG → **REPAIR OR REPLACE PCV HOSE**

OK

4	READ VALUE OF HAND-HELD TESTER OR OBD II SCAN TOOL (NUMBER OF MISFIRE)

(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester or the OBD II scan tool main switch ON.
(c) Start the engine.
(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / CYL#1 to CYL#6.
(e) Read the number of misfires on the hand-held tester or the OBD II scan tool.

HINT:

When a misfire is not reproduced, be sure to branch below based on the stored DTC.

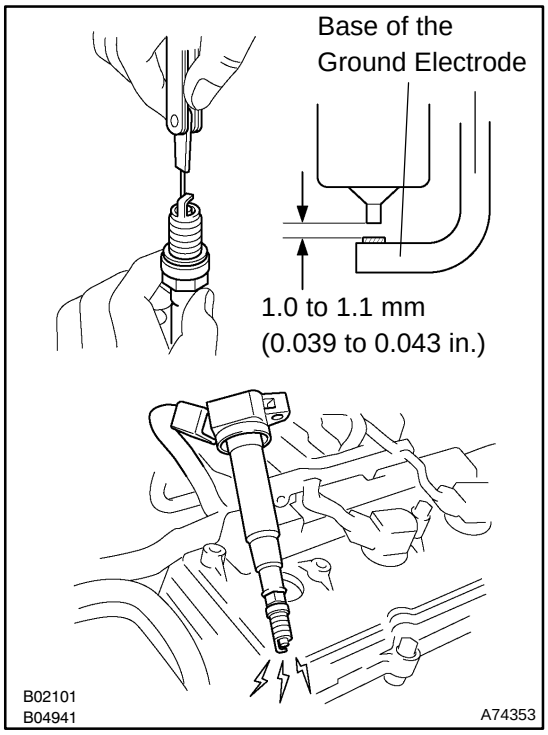
Result:

High Misfire Rate Cylinder	Proceed to
1 or 2 cylinders	A
More than 3 cylinders	B

B → **Go to step 15**

A

5 CHECK SPARK PLUG AND SPARK OF MISFIRING CYLINDER



(a) Remove the ignition coil.
(b) Remove the spark plug.
(c) Check the spark plug type.
Recommended spark plug:

DENSO made	SK20R11
NGK made	IFR6A11

(d) Check the spark plug electrode gap.
Standard: 1.0 to 1.1 mm (0.039 to 0.043 in.)
Maximum: 1.3 mm (0.051 in.)

NOTICE:
If adjusting the gap of a new spark plug, bend only the base of the ground electrode. Do not touch the tip. Never attempt to adjust the gap on a used plug.

(e) Check the electrode for carbon deposits.
(f) Perform a spark test.

CAUTION:
Always disconnect each injector connector.
NOTICE:
Do not crank the engine for more than 2 seconds.

(1) Install the spark plug to the ignition coil and connect the ignition coil connector.
(2) Disconnect the injector connector.
(3) Ground the spark plug.
(4) Check if spark occurs while the engine is being cranked.

OK: Spark jumps across electrode gap.

OK → **Go to step 8**

NG

6 CHANGE NORMAL SPARK PLUG AND CHECK SPARK OF MISFIRING CYLINDER

(a) Change to a normal spark plug.
(b) Perform a spark test.

CAUTION:
Always disconnect each injector connector.
NOTICE:
Do not crank the engine for more than 2 seconds.

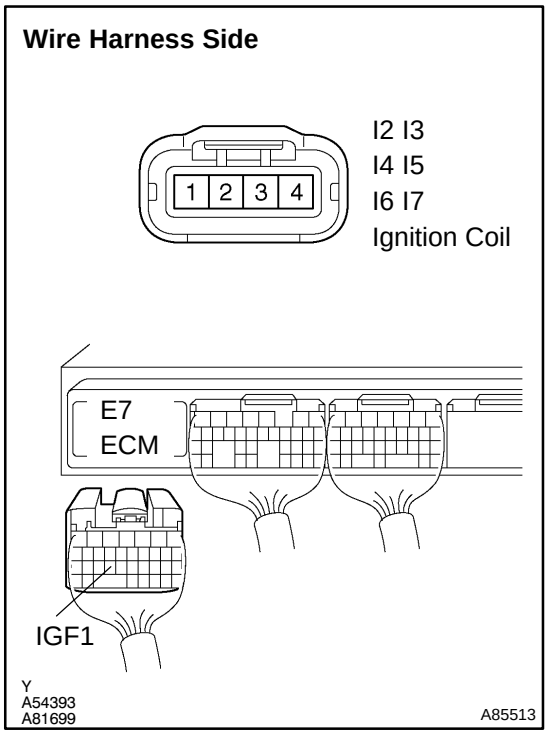
(1) Install the spark plug to the ignition coil and connect the ignition coil connector.
(2) Disconnect the injector connector.
(3) Ground the spark plug.
(4) Check if spark occurs while the engine is being cranked.

OK: Spark jumps across electrode gap.

OK → **REPLACE SPARK PLUG**

NG

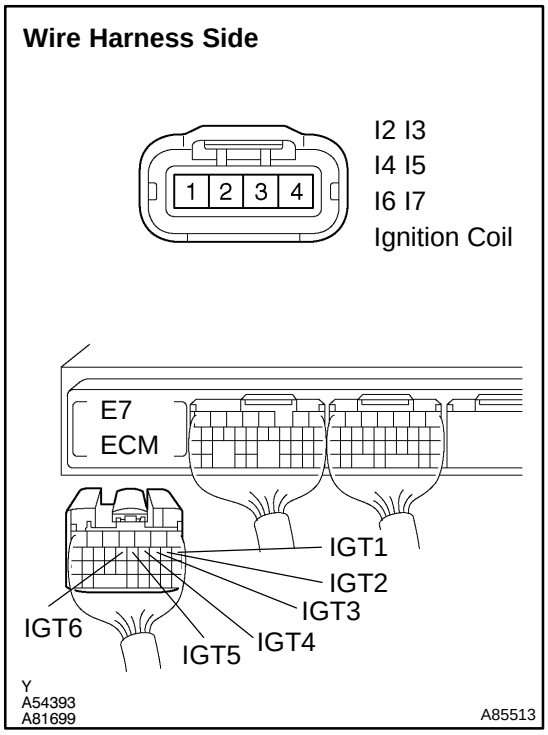
7 CHECK WIRE HARNESS OF MISFIRING CYLINDER (IGNITION COIL - ECM)



(a) Check the wire harness between the ignition coil and ECM.
(1) Disconnect the I2, I3, I4, I5, I6 and I7 ignition coil connector.
(2) Disconnect the E7 ECM connector.
(3) Check the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
I2-2 - E7-24 (IGF1) I3-2 - E7-24 (IGF1) I4-2 - E7-24 (IGF1) I5-2 - E7-24 (IGF1) I6-2 - E7-24 (IGF1) I7-2 - E7-24 (IGF1)	Below 1 Ω
I2-2 or E7-24 (IGF1) - Body ground I3-2 or E7-24 (IGF1) - Body ground I4-2 or E7-24 (IGF1) - Body ground I5-2 or E7-24 (IGF1) - Body ground I6-2 or E7-24 (IGF1) - Body ground I7-2 or E7-24 (IGF1) - Body ground	10 kΩ or higher



(b) Check the wire harness between the ignition coil and ECM.
(1) Disconnect the I2, I3, I4, I5, I6 and I7 ignition coil connector.
(2) Disconnect the E7 ECM connector.
(3) Check the resistance of the wire harness side connectors.

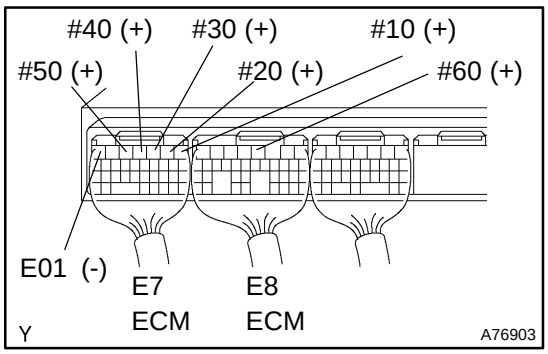
Standard:

Tester Connection	Specified Condition
I2-3 - E7-8 (IGT1) I3-3 - E7-9 (IGT2) I4-3 - E7-10 (IGT3) I5-3 - E7-11 (IGT4) I6-3 - E7-12 (IGT5) I7-3 - E7-13 (IGT6)	Below 1 Ω
I2-3 or E7-8 (IGT1) - Body ground I3-3 or E7-9 (IGT2) - Body ground I4-3 or E7-10 (IGT3) - Body ground I5-3 or E7-11 (IGT4) - Body ground I6-3 or E7-12 (IGT5) - Body ground I7-3 or E7-13 (IGT6) - Body ground	10 kΩ or higher

OK → **REPLACE IGNITION COIL ASSY (THEN CONFIRM THAT THERE IS NO MISFIRE)**

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

8	INSPECT ECM TERMINAL OF MISFIRING CYLINDER (#10, #20, #30, #40, #50, #60 VOLTAGE)



(a) Turn the ignition switch ON.

(b) Check the voltage of the ECM connectors.

Standard:

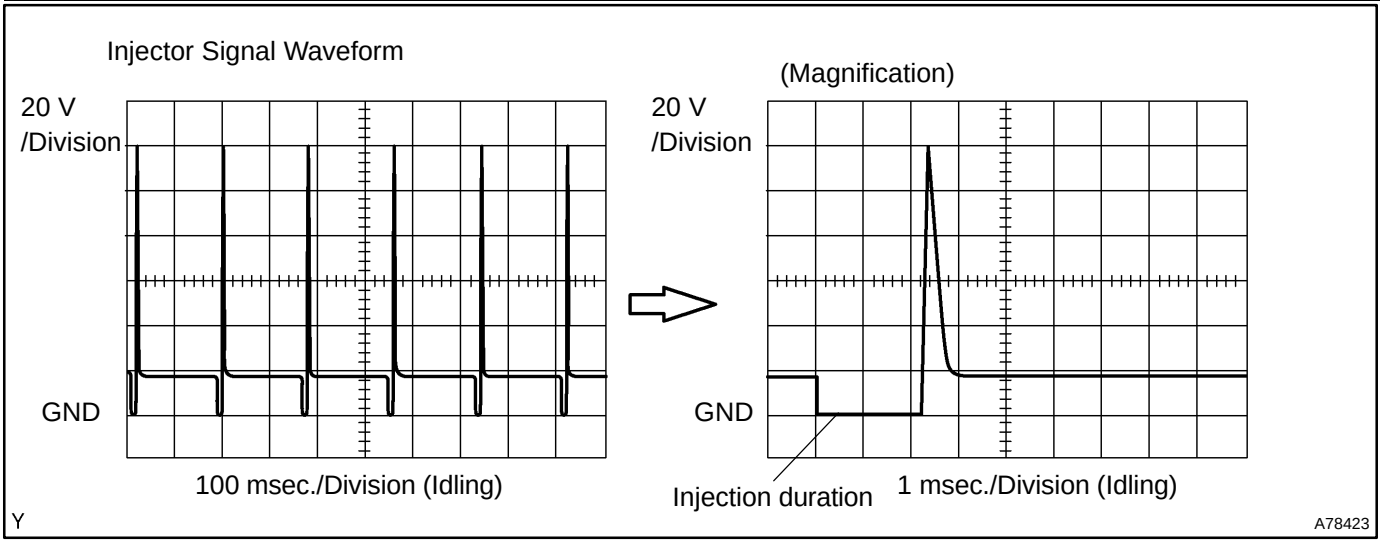
Tester Connection	Specified Condition
E7-1 (#10) - E7-7 (E01) E7-2 (#20) - E7-7 (E01) E7-3 (#30) - E7-7 (E01) E7-4 (#40) - E7-7 (E01) E7-5 (#50) - E7-7 (E01) E8-3 (#60) - E7-7 (E01)	9 to 14 V

HINT:

Reference: Inspection using the oscilloscope.

During cranking or idling, check the waveform between the terminals of the ECM connector.

Tester Connection	Condition	Specified Condition
#1 to #6 - E01	Engine idling	Connect waveform is as shown



OK → **Go to step 11**

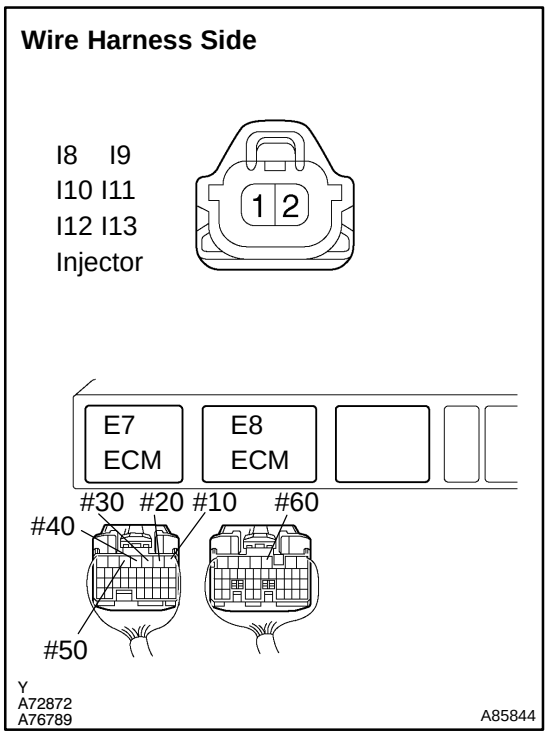
NG

9	INSPECT FUEL INJECTOR RESISTANCE OF MISFIRING CYLINDER (See page 11-41)

NG → **REPLACE FUEL INJECTOR ASSY (See page 11-46)**

OK

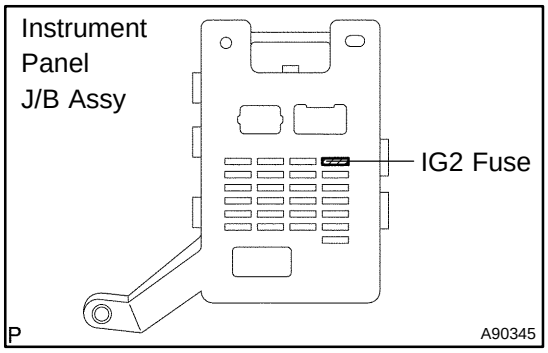
10	CHECK WIRE HARNESS OF MISFIRING CYLINDER (INJECTOR - ECM, INJECTOR - IGNITION SWITCH)



(a) Check the wire harness between the injector and ECM.
(1) Disconnect the I8, I9, I10, I11, I12 and I13 injector connectors.
(2) Disconnect the E7 or E8 ECM connector.
(3) Check the resistance of the wire harness side connectors.

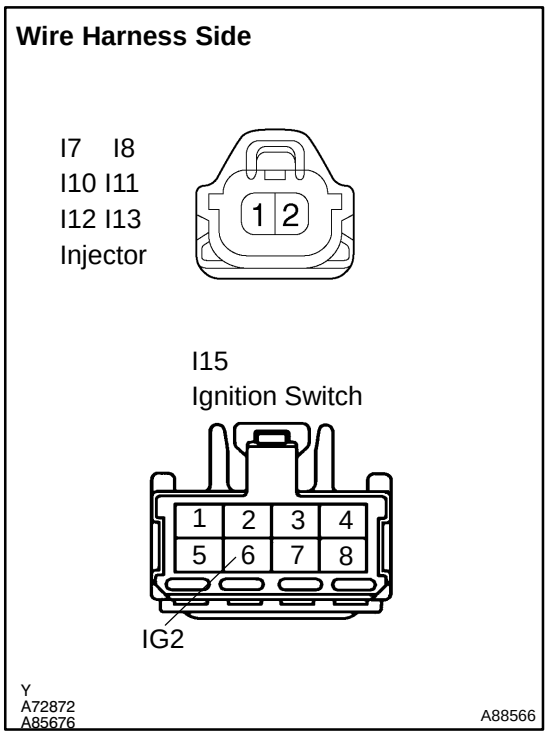
Standard:

Tester Connection	Specified Condition
I8-1 - E7-1 (#10) I9-1 - E7-2 (#20) I10-1 - E7-3 (#30) I11-1 - E7-4 (#40) I12-1 - E7-5 (#50) I13-1 - E8-3 (#60)	Below 1 Ω
I8-1 or E7-1 (#10) - Body ground I9-1 or E7-2 (#20) - Body ground I10-1 or E7-3 (#30) - Body ground I11-1 or E7-4 (#40) - Body ground I12-1 or E7-5 (#50) - Body ground I13-1 or E8-3 (#60) - Body ground	10 kΩ or higher



(b) Check the IG2 fuse.
(1) Remove the IG2 fuse from the instrument panel J/B.
(2) Check the resistance of the IG2 fuse.

OK: Below 1 Ω



(c) Check the wire harness between the injector and ignition switch.

(1) Disconnect the I8, I9, I10, I11, I12 and I13 injector connector.

(2) Disconnect the I15 ignition switch connector.

(3) Check the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
I8-2 - I15-6 (IG2) I9-2 - I15-6 (IG2) I10-2 - I15-6 (IG2) I11-2 - I15-6 (IG2) I12-2 - I15-6 (IG2) I13-2 - I15-6 (IG2)	Below 1 Ω
I8-2 or I15-6 (IG2) - Body ground I9-2 or I15-6 (IG2) - Body ground I10-2 or I15-6 (IG2) - Body ground I11-2 or I15-6 (IG2) - Body ground I12-2 or I15-6 (IG2) - Body ground I13-2 or I15-6 (IG2) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

11	**INSPECT FUEL INJECTOR INJECTION AND VOLUME OF MISFIRING CYLINDER (See page 11-41)**

Standard:

Injection volume	Difference between each injector
60 to 73 cm^3 (3.7 to 4.5 cu in.) per 15 seconds	13 cm^3 (0.8 cu in.) or less

NG → **REPLACE FUEL INJECTOR ASSY**

OK

12	**CHECK CYLINDER COMPRESSION PRESSURE OF MISFIRING CYLINDER (See page 14-121)**

Standard:

Compression pressure:	1.5 MPa (15.3 kgf/cm^2, 218 psi)
Minimum pressure:	1.0 MPa (10.2 kgf/cm^2, 145 psi)
Difference between each cylinder:	100 kPa (1.0 kgf/cm^2, 15 psi)

NG → **REPAIR OR REPLACE**

OK

13	CHECK VALVE CLEARANCE OF MISFIRING CYLINDER (See page 14-127)

Standard (cold):

Item	Specified Condition
Intake	0.15 to 0.25 mm (0.059 to 0.0098 in.)
Exhaust	0.25 to 0.35 mm (0.098 to 0.00138 in.)

NG → **ADJUST VALVE CLEARANCE (See page 14-127)**

OK

14	SWITCH STEP BY NUMBER OF MISFIRE CYLINDER (REFER TO RESULTS OF STEP 4)

HINT:

- If the result of step 4 is ”1 or 2 cylinders”, proceed to A.
- If the result of step 4 is ”more than 3 cylinders”, proceed to B.

B → **CHECK FOR INTERMITTENT PROBLEMS (See page 05-370)**

A

15	CHECK VALVE TIMING (CHECK FOR LOOSENESS OR A JUMPED TOOTH OF THE TIMING BELT) (See page 14-206)

OK: The matchmarks of crankshaft pulley and camshaft pulley are aligning.

NG → **ADJUST VALVE TIMING (See page 14-206) (REPAIR OR REPLACE TIMING BELT)**

OK

16	CHECK FUEL PRESSURE (See page 11-38)

Standard:

Fuel pressure: 304 to 343 kPa (3.1 to 3.5 kgf/cm^2, 44 to 55 psi).

NG → **CHECK AND REPLACE FUEL PUMP, PRESSURE REGULATOR, FUEL PIPE LINE AND FILTER**

OK

17	READ VALUE OF HAND-HELD TESTER OR OBD II SCAN TOOL (INTAKE AIR TEMPERATURE AND MASS AIR FLOW RATE)

(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(b) Turn the ignition switch ON.
(c) Check the intake air temperature.
  (1) On the hand-held tester or the OBD II scan tool, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / INTAKE AIR. Read the values.

  Temperature: Equivalent to ambient temperature.
(d) Check the air flow rate.
  (1) On the hand-held tester or the OBD II scan tool, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / MAF. Read the values.

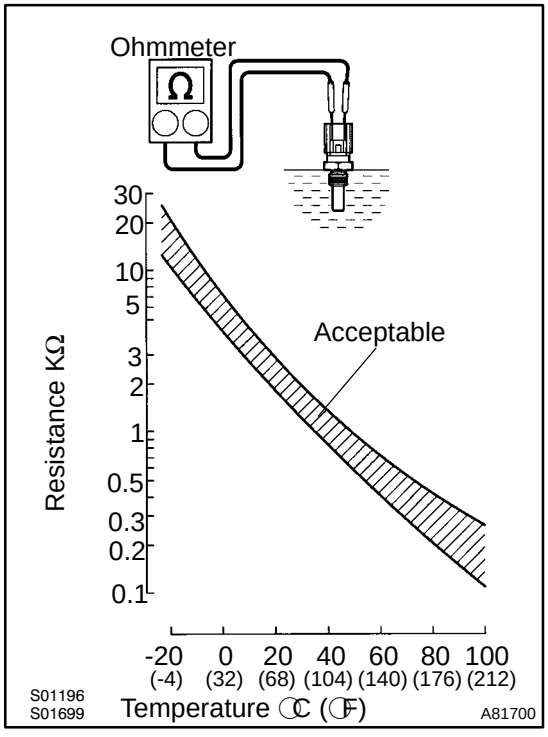
  Standard:

Condition	Air Flow Rate (gm/s)
Ignition switch ON (do not start engine)	0
Idling	4 to 6
Running without load (2,500 rpm)	13 to 20
Idling to quickly accelerating	Air flow rate fluctuates

NG → **REPLACE MASS AIR FLOW METER**

OK

18	INSPECT ENGINE COOLANT TEMPERATURE SENSOR (RESISTANCE)



(a) Remove the ECT sensor.
(b) Measure the resistance between the terminals of the sensor.

  Standard:

Tester Connection	Condition	Specified Condition
1 - 2	20℃ (68℉)	2.32 to 2.59 kΩ
1 - 2	80℃ (176℉)	0.310 to 0.326 kΩ

NOTICE:

If of checking the ECT sensor in the water, be careful not to allow water to contact the terminals. After the check, dry the sensor.

HINT:

Alternate procedure: Connect an ohmmeter to the installed ECT sensor and read the resistance. Use an infrared thermometer to measure the engine temperature in the immediate vicinity of the sensor. Compare these values to the resistance/temperature graph. Change the engine temperature (warm up or allow to cool down) and repeat the test.

NG → **REPLACE ENGINE COOLANT TEMPERATURE SENSOR**

OK

19	SWITCH STEP BY NUMBER OF MISFIRE CYLINDER (REFER TO RESULTS OF STEP 4)

HINT:

- If the result of step 4 is ”1 or 2 cylinders”, proceed to A.
- If the result of step 4 is ”more than 3 cylinders”, proceed to B.

B → AGAIN GO TO STEP 5

A

CHECK FOR INTERMITTENT PROBLEMS (See page 05-370)

DTC	P0327	KNOCK SENSOR 1 CIRCUIT LOW INPUT (BANK 1 OR SINGLE SENSOR)

DTC	P0328	KNOCK SENSOR 1 CIRCUIT HIGH INPUT (BANK 1 OR SINGLE SENSOR)

DTC	P0332	KNOCK SENSOR 2 CIRCUIT LOW INPUT (BANK 2)

DTC	P0333	KNOCK SENSOR 2 CIRCUIT HIGH INPUT (BANK 2)

CIRCUIT DESCRIPTION

A flat type knock sensor (non-resonant type) can detect vibrations in a wide band of frequency (about 6 kHz to 15 kHz) and has the following features:

- Knock sensors are fitted on the cylinder block to detect the engine knocking.
- The sensor contains a piezoelectric element which generates a voltage, when the cylinder block vibrates due to knocking. If engine knocking occurs, the ignition timing is retarded to suppress it.

DTC No.	DTC Detection Condition	Trouble Area
P0327 P0332	Output voltage of the knock sensor 1 or 2 is 0.5 V or less (1 trip detection logic)	・Short in knock sensor 1 or 2 circuit ・Knock sensor 1 or 2 ・ECM
P0328 P0333	Output voltage of the knock sensor 1 or 2 is 4.5 V or more (1 trip detection logic)	・Open in knock sensor 1 or 2 circuit ・Knock sensor 1 or 2 ・ECM

MONITOR DESCRIPTION

The knock sensor, located on the cylinder block, detects spark knock. When spark knock occurs, the sensor picks up vibrations in a specific frequency range. When the ECM detects the voltage in this frequency range, it retards the ignition timing to suppress the spark knock.

The ECM also senses background engine noise with the knock sensor and uses this noise to check for faults in the sensor. If the knock sensor signal level is too low for more than 10 seconds, and if the knock sensor output voltage is out of normal range, the ECM interprets this as a fault in the knock sensor and sets a DTC.

MONITOR STRATEGY

Related DTCs	P0327: Knock Sensor (Bank 1) Range Check (Low voltage) P0328: Knock Sensor (Bank 1) Range Check (High voltage) P0332: Knock Sensor (Bank 2) Range Check (Low voltage) P0333: Knock Sensor (Bank 2) Range Check (High voltage)
Required sensors / components (Main)	Knock Sensor
Required sensors / components (Related)	MAF meter, CKP sensor, ECT sensor
Frequency of operation	Continuous
Duration	1 second
MIL operation	Immediate
Sequence operation	None

TYPICAL ENABLING CONDITIONS

All:

The monitor will run whenever these DTCs are not present	See page 05-377

Knock Sensor Range Check P0327, P0328, P0332, P0330:

Battery voltage	10.5 V or more
Time after engine start	5 seconds or more
Ignition switch	ON
Starter	OFF

TYPICAL MALFUNCTION THRESHOLDS

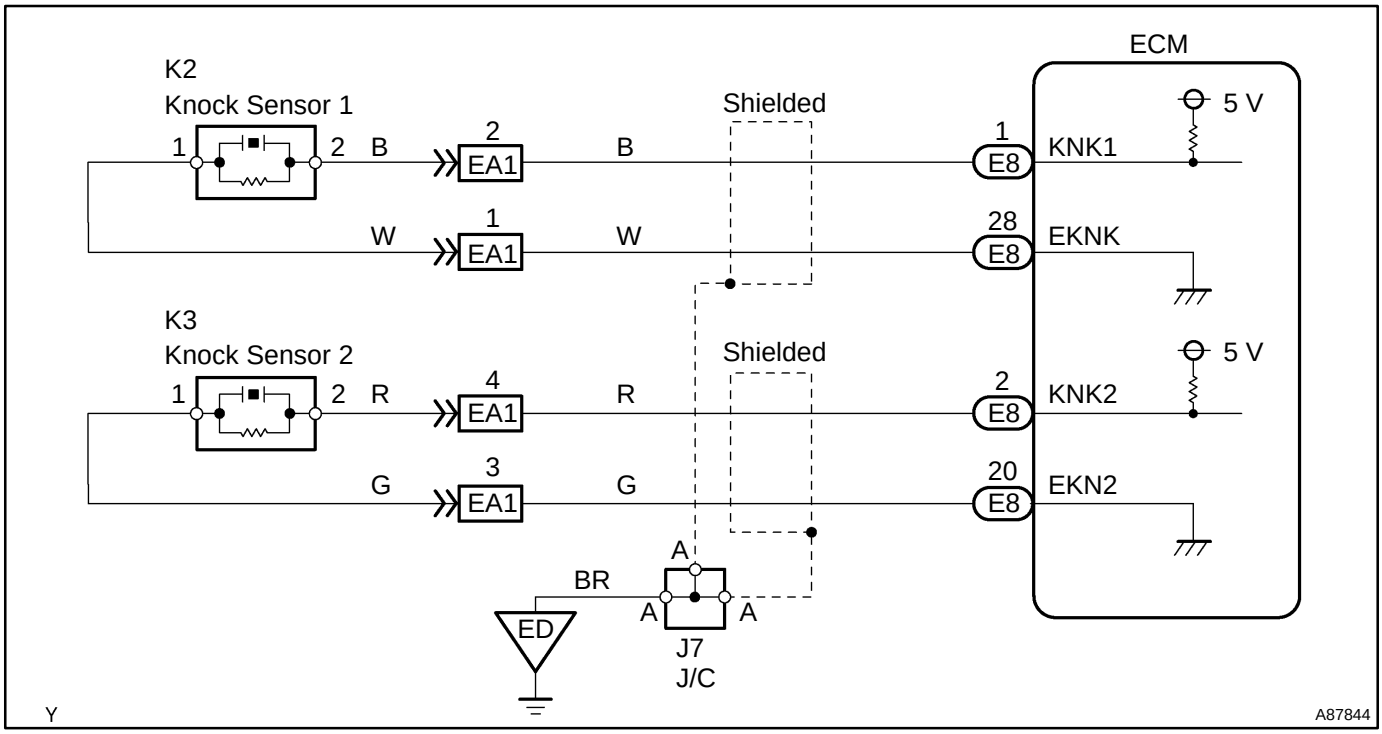
Knock Sensor Range Check (Low voltage) P0327, P0332:

Knock sensor Voltage	Less than 0.5 V

Knock Sensor Range Check (High voltage) P0328, P0333:

Knock sensor voltage	More than 4.5 V

WIRING DIAGRAM

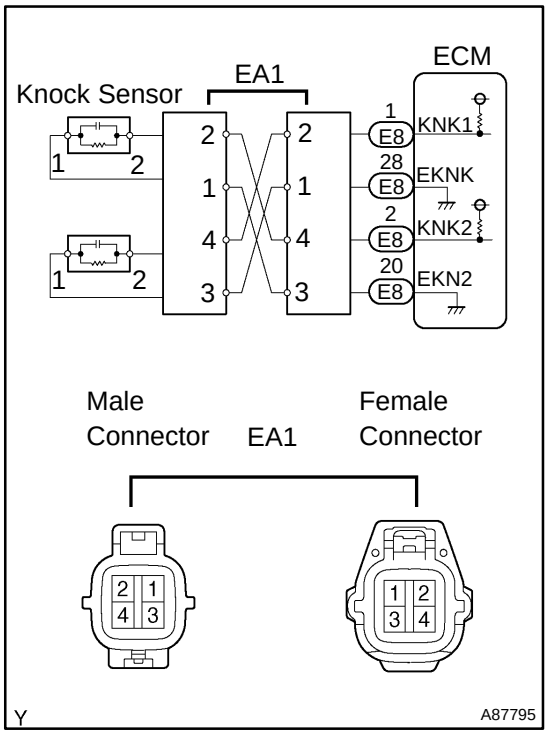


INSPECTION PROCEDURE

HINT:

- DTC P0327 and P0328 are for the bank 1 knock sensor circuit.
- DTC P0332 and P0333 are for the bank 2 knock sensor circuit.
- Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1 READ OUTPUT DTC (CHECK KNOCK SENSOR CIRCUIT)



(a) Disconnect the EA1 connector.
(b) Using lead wires, connect the EA1 terminals as follows.

Male Connector - Female Connector
Terminal 2 - Terminal 4
Terminal 1 - Terminal 3
Terminal 4 - Terminal 2
Terminal 3 - Terminal 1

(c) Warm up the engine.
(d) Run the engine at 3,000 rpm for 10 seconds or more.
(e) Check the DTC.

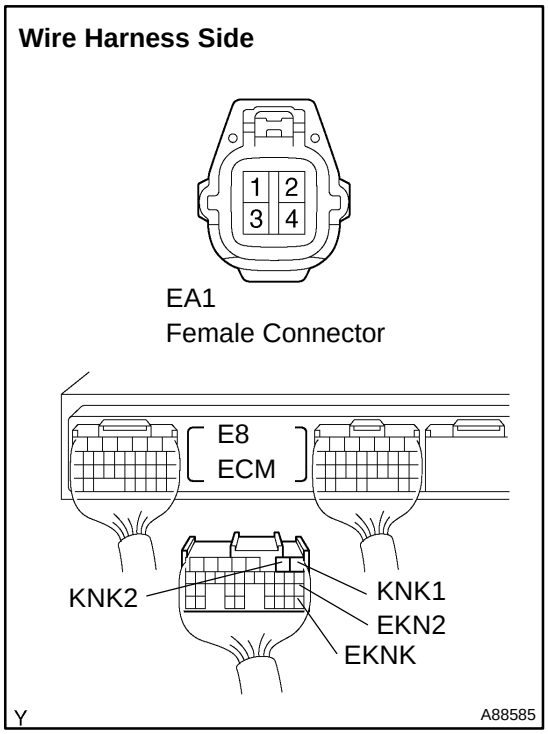
Result:

Display	Proceed to
DTC same as when vehicle brought in P0327, P0328 → P0327, P0328 or P0332, P0333 → P0332, P0333	A
DTC different from when vehicle brought in P0327, P0328 → P0332, P0333 or P0332, P0333 → P0327, P0328	B

B → **Go to step 4**

A

2 CHECK WIRE HARNESS (EA1 CONNECTOR - ECM)



(a) Disconnect the EA1 connector.
(b) Disconnect the E8 ECM connector.
(c) Check the resistance of the wire harness side connector.

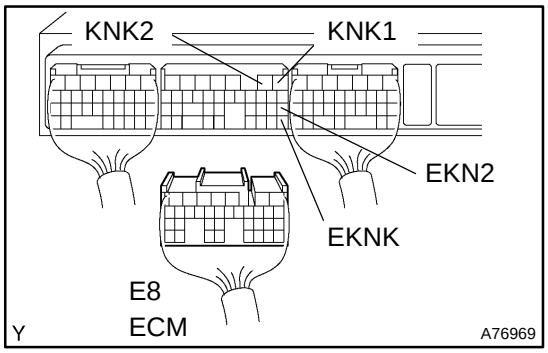
Standard:

Tester Connection	Specified Condition
2 of EA1 female connector - E8-1 (KNK1) 1 of EA1 female connector - E8-28 (EKNK) 4 of EA1 female connector 4 - E8-2 (KNK2) 3 of EA1 female connector - E8-20 (EKN2)	Below 1 Ω
2 of EA1 female connector or E8-1 (KNK1) - Body ground 1 of EA1 female connector or E8-28 (EKNK) - Body ground 4 of EA1 female connector or E8-2 (KNK2) - Body ground 3 of EA1 female connector or E8-20 (EKN2) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

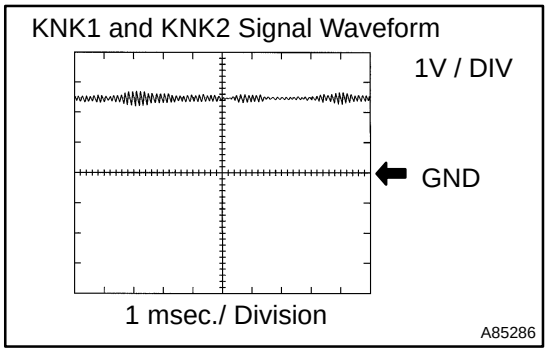
3 INSPECT ECM



(a) Disconnect the E8 ECM connector.
(b) Turn the ignition switch ON.
(c) Check the voltage of the ECM terminals.

Voltage:

Tester Connection	Specified Condition
E8-1 (KNK1) - E8-28 (EKNK) E8-2 (KNK2) - E8-20 (EKN2)	4.5 to 5.5 V



HINT:
Reference: Inspection using the oscilloscope.
After warming up, run the engine at 4,000 rpm, and check the waveform of the ECM connector.

Standard:

Tester Connection	Specified Condition
E8-1 (KNK1) - E8-28 (EKNK) E8-2 (KNK2) - E8-20 (EKN2)	Correct waveform is as shown

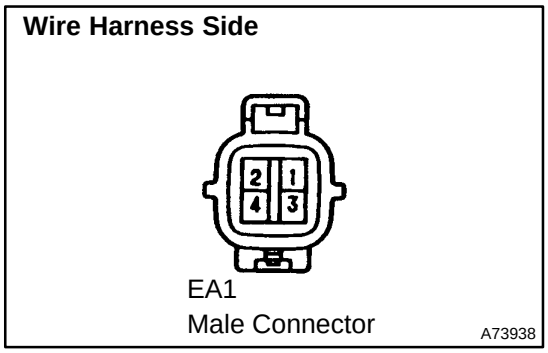
NG → **REPLACE ECM (See page 10-24)**

OK

CHECK FOR INTERMITTENT PROBLEMS (See page 05-370)

NOTICE:
Fault may be intermittent. Check harness and connectors carefully and retest.

4 INSPECT KNOCK SENSOR



(a) Disconnect the EA1 connector.
(b) Check the resistance between the terminals of the EA1 male connector.

Standard:

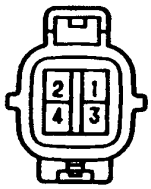
Tester Connection	Specified Condition
2 - 1 of EA1 male connector 4 - 3 of EA1 male connector	120 to 280 kΩ

OK → **CHECK FOR INTERMITTENT PROBLEMS (See page 05-370)**

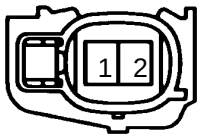
NG

5	CHECK WIRE HARNESS

Wire Harness Side



EA1
Male Connector



K2 (Bank 1)
K3 (Bank 2)
Knock Sensor

Y
A73938
A610.31

A85847

HINT:

- If DTC P0327 has changed to P0328, or if DTC P0332 has changed to P0333, check the knock sensor circuit on the bank 1 side.
- If DTC P0332 has changed to P0327, or if DTC P0333 has changed to P0338, check the knock sensor circuit on the bank 2 side.

(a) Disconnect the EA1 connector.
(b) Disconnect the K2 or K3 knock sensor connector.
(c) Check the resistance of the wire harness side connectors.
Standard:

Tester Connection	Specified Condition
2 of EA1 male connector - K2-2 1 of EA1 male connector - K2-1 4 of EA1 male connector - K3-2 3 of EA1 male connector - K3-1	Below 1 Ω
2 of EA1 male connector or K2-2 - Body ground 1 of EA1 male connector or K2-1 - Body ground 4 of EA1 male connector or K3-2 - Body ground 3 of EA1 male connector or K3-1 - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE KNOCK SENSOR (See page 10-20)

DTC	P0335	CRANKSHAFT POSITION SENSOR ”A” CIRCUIT

DTC	P0339	CRANKSHAFT POSITION SENSOR ”A” CIRCUIT INTERMITTENT

CIRCUIT DESCRIPTION

The crankshaft position (CKP) sensor system consists of a crankshaft position sensor plate and a pickup coil. The sensor plate has 34 teeth and is installed on the crankshaft. The pickup coil is made of an iron core and magnet. The sensor plate rotates and as each tooth passes through the pickup coil, a pulse signal is generated. The pickup coil generates 34 signals for each engine revolution. Based on these signals, the ECM calculates the crankshaft position and engine RPM. Using these calculations, the fuel injection time and ignition timing are controlled.

DTC No.	DTC Detection Condition	Trouble Area
P0335	No crankshaft position sensor signal to ECM during cranking (2 trip detection logic)	・Open or short in crankshaft position sensor circuit ・Crankshaft position sensor ・Crankshaft timing pulley ・ECM
P0335	No crankshaft position sensor signal to ECM with engine speed 600 rpm or more (2 trip detection logic)	・Open or short in crankshaft position sensor circuit ・Crankshaft position sensor ・Crankshaft timing pulley ・ECM
P0339	No crankshaft position sensor signal is input to ECM for 0.05 seconds. or more, and conditions (a), (b) and (c) are met: (a) Engine is at 1,000 rpm or more (b) STA signal is OFF (c) 3 seconds or more have elapsed after STA signal is switched from ON to OFF	・Open or short in crankshaft position sensor circuit ・Crankshaft position sensor ・Crankshaft timing pulley ・ECM

MONITOR DESCRIPTION

If there is no signal from the crankshaft sensor even though the engine is cranking, the ECM interprets this as a malfunction of the sensor.

MONITOR STRATEGY

Related DTCs	P0335: CKP Sensor Range Check during Cranking P0335: CKP Sensor Range Check during Engine Running
Required sensors / components (Main)	CKP (Crankshaft position) sensor
Required sensors / components (Related)	-
Frequency of operation	Continuous
Duration	4.7 seconds: CKP Sensor Range Check during Cranking 0.016 seconds: CKP Sensor Range Check during Engine Running
MIL operation	2 driving cycles
Sequence operation	None

TYPICAL ENABLING CONDITIONS

All:

The monitor will run whenever these DTCs are not present	See page 05-377

CKP Sensor Range Check during Cranking P0335:

Starter	ON
Minimum battery voltage while starter is ON	Below 11 V

CKP Sensor Check during Engine Running P0335:

Engine RPM	600 rpm or more
Starter	OFF
Time after starter turns from ON to OFF	3 seconds or more

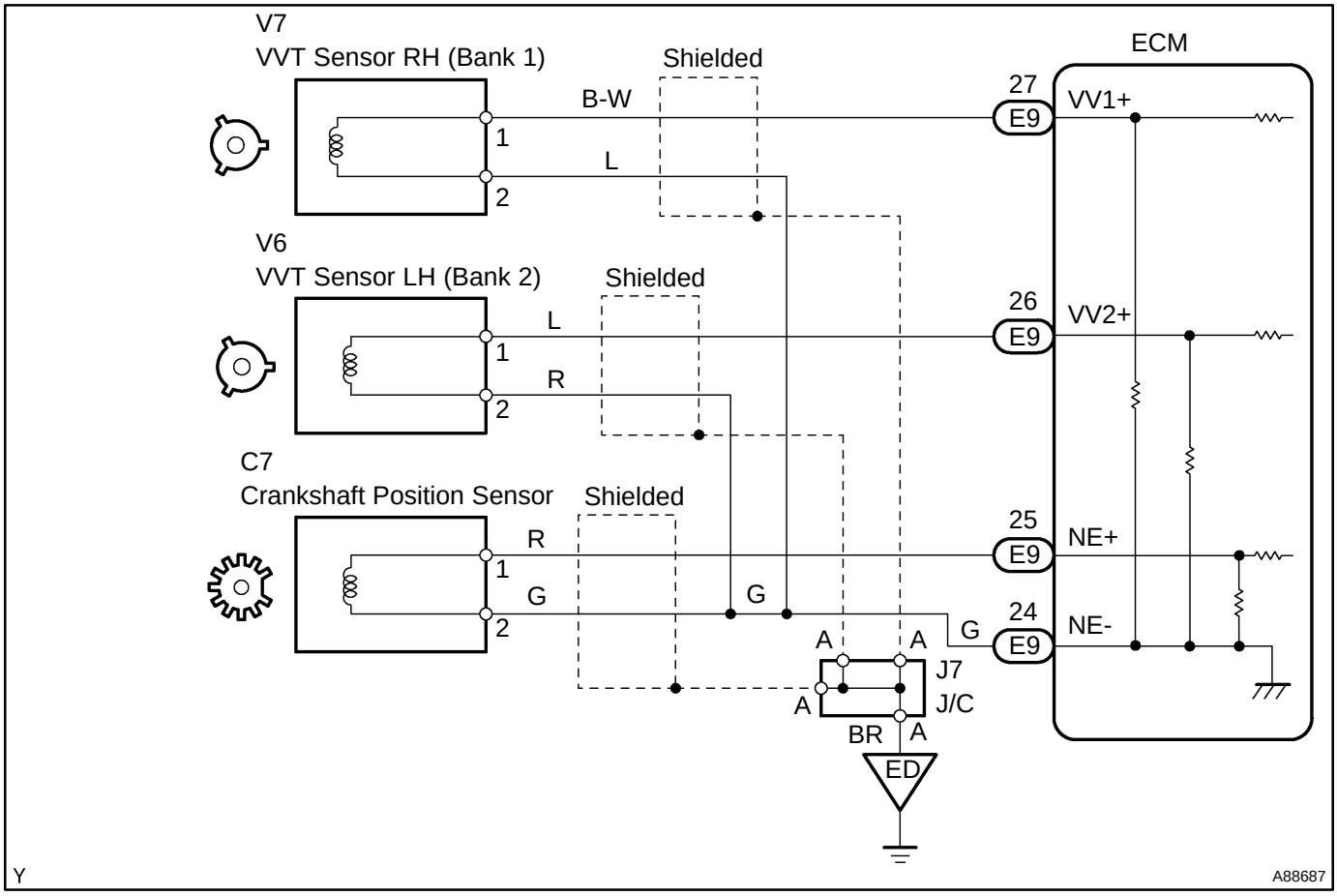
TYPICAL MALFUNCTION THRESHOLDS

CKP signal	No signal

COMPONENT OPERATING RANGE

CKP signal	CKP sensor voltage fluctuates when the crankshaft rotates 34 CKP signals per 1 revolution crankshaft

WIRING DIAGRAM



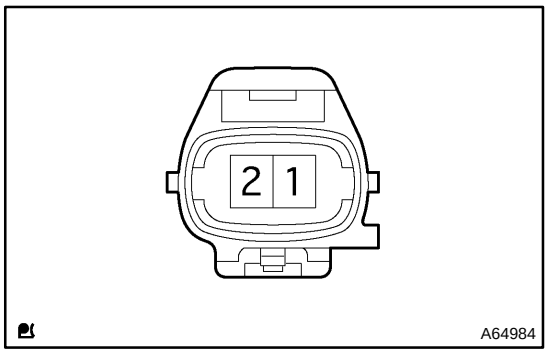
INSPECTION PROCEDURE

HINT:

- Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.
- Read values on the hand-held tester or OBD II scan tool.
  (a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
  (b) Start the engine and push the hand-held tester or the OBD II scan tool main switch ON.
  (c) Select the item ”DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / ENGINE SPD”.

* The engine speed can be confirmed in DATA LIST using the hand-held tester or OBD II scan tool. If there are no NE signals from the crankshaft position sensor despite the engine revolving, the engine speed will be indicated as zero. If voltage output of the crankshaft position sensor is insufficient, the engine speed will be indicated as lower than the actual rpm.

1	INSPECT CRANKSHAFT POSITION SENSOR (RESISTANCE)



(a) Disconnect the C7 sensor connector.
(b) Measure the resistance between the terminals of the sensor.

Standard:

Tester Connection	Condition	Specified Condition
1 - 2	Cold	1,630 to 2,740 Ω
1 - 2	Hot	2,065 to 3,225 Ω

NOTICE:

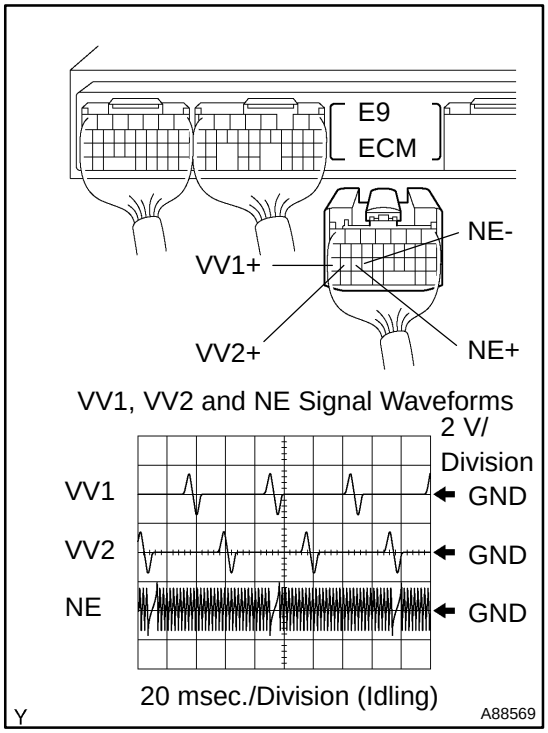
In the above section, the terms "cold" and "hot" refer to the temperature of the coils. "Cold" means approximately -10 °C to 50 °C (14 °F to 122 °F). "Hot" means approximately 50 °C to 100 °C (122 °F to 212 °F).

HINT:

Reference: Inspection using the oscilloscope.

During cranking or idling, check the waveform of the ECM connector.

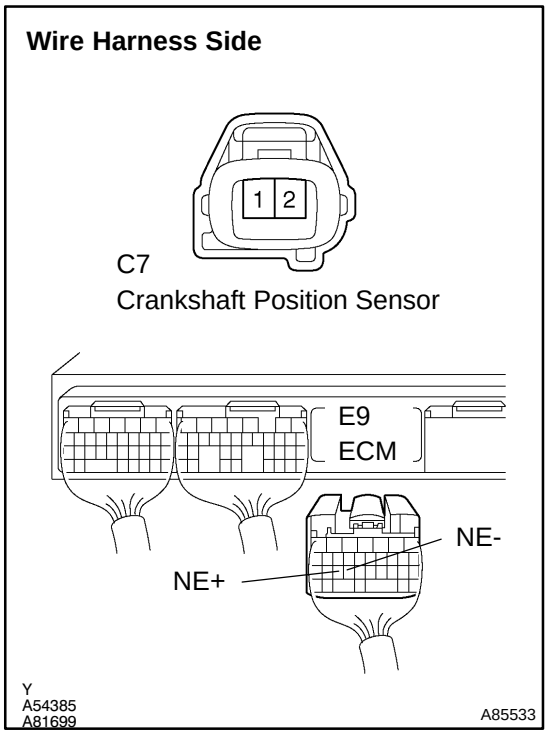
Tester Connection	Specified Condition
E9-27 (VV1+) - E9-24 (NE-) E9-26 (VV2+) - E9-24 (NE-) E9-25 (NE+) - E9-24 (NE-)	Correct waveform is as shown



NG → **REPLACE CRANKSHAFT POSITION SENSOR (See page 18-9)**

OK

2 CHECK WIRE HARNESS (CRANKSHAFT POSITION SENSOR - ECM)



(a) Disconnect the C7 sensor connector.
(b) Disconnect the E9 ECM connector.
(c) Check the resistance of the wire harness side connectors.
Standard:

Tester Connection	Specified Condition
C7-1 - E9-25 (NE+) C7-2 - E9-24 (NE-)	Below 1 Ω
C7-1 or E9-25 (NE+) - Body ground C7-2 or E9-24 (NE-) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

3 CHECK SENSOR INSTALLATION (CRANKSHAFT POSITION SENSOR)

(a) Check the crankshaft position sensor installation.
OK: Sensor is installed correctly.

NG → **TIGHTEN SENSOR**

OK

4 CHECK CRANKSHAFT TIMING PULLEY

(a) Check the teeth of the crankshaft timing pulley.
OK: The pulley does not have any cracks or deformation.

NG → **REPLACE CRANKSHAFT TIMING PULLEY**

OK

REPLACE ECM (See page 10-24)

DTC	P0340	CAMSHAFT POSITION SENSOR ”A” CIRCUIT (BANK 1 OR SINGLE SENSOR)

DTC	P0341	CAMSHAFT POSITION SENSOR ”A” CIRCUIT RANGE/PERFORMANCE (BANK 1 OR SINGLE SENSOR)

DTC	P0345	CAMSHAFT POSITION SENSOR ”A” CIRCUIT (BANK 2)

DTC	P0346	CAMSHAFT POSITION SENSOR ”A” CIRCUIT RANGE/PERFORMANCE (BANK 2)

CIRCUIT DESCRIPTION

The Variable Valve Timing (VVT) sensor (VV signal) consists of a magnet, iron core and pickup coil.
The VV signal plate has 3 teeth on its outer circumference and is installed on the camshaft timing pulley.
When the camshafts rotate, the protrusion on the signal plate and the air gap on the pickup coil change, causing fluctuations in the magnetic field and generating a voltage in the pickup coil.
This sensor monitors a timing rotor located on the camshaft and is used to detect camshaft angle by the ECM. The camshaft rotation synchronizes with the crankshaft rotation, and this sensor communicates the rotation of the camshaft timing rotor as a pulse signal to the ECM. Based on the signal, the ECM controls fuel injection time and ignition timing.

DTC No.	DTC Detection Condition	Trouble Area
P0340 P0345	⁎No VVT sensor signal to ECM during cranking (2 trip detection logic) ⁎No VVT sensor signal to ECM with engine speed 600 rpm or more (1 trip detection logic)	⁎Open or short in VVT sensor circuit ⁎VVT sensor ⁎Camshaft timing pulley ⁎Timing belt has a jumped tooth ⁎ECM
P0341	While crankshaft rotates twice, VVT sensor signal is input to ECM 12 times or more (1 trip detection logic) HINT: Under normal condition, the camshaft position sensor signal is input into the ECM 3 times per 2 engine revolutions.	⁎Open or short in VVT sensor circuit ⁎VVT sensor ⁎Camshaft timing pulley ⁎Timing belt has a jumped tooth ⁎ECM
P0346	While crankshaft rotates twice, VVT sensor signal is input to EMC 5 times or more. (1 trip detection logic) HINT: Under normal condition, the camshaft position sensor signal is input into the ECM 3 times per 2 engine revolutions.	⁎Open or short in VVT sensor circuit ⁎VVT sensor ⁎Camshaft timing pulley ⁎Timing belt has a jumped tooth ⁎ECM

HINT:

⁎ DTC P0340 and P0345 indicate a malfunction related to the VVT sensor (+) circuit (Wire harness (ECM - VVT sensor) and VVT sensor).
⁎ DTC P0341 and P0346 indicate a malfunction related to the VVT sensor (-) circuit (Wire harness (ECM - VVT sensor) and VVT sensor).

MONITOR DESCRIPTION

If there is no signal from the VVT sensor even though the engine is cranking, or if the rotations of the camshaft and the crankshaft are not synchronized, the ECM interprets this as a malfunction of the sensor.

MONITOR STRATEGY

Related DTCs	P0340: CMP Sensor (Bank 1) Range Check P0340: CMP/CKP Misalignment (Bank 1) P0341: CMP Sensor (Bank 1) Malfunction P0345: VVT Sensor (Bank 2) Range Check (Case 1) P0345: VVT Sensor (Bank 2) Range Check (Case 2) P0346: VVT Sensor (Bank 2) Malfunction
Required sensors / components (Main)	CMP (Crankshaft position) sensor VVT sensor
Required sensors / components (Related)	CKP sensor
Frequency of operation	Continuous
Duration	5 seconds
MIL operation	2 driving cycles: CMP Sensor Range Check VVT Sensor Range Check (Case 1) Immediate: Others
Sequence operation	None

TYPICAL ENABLING CONDITIONS

All:

The monitor will run whenever these DTCs are not present	See page 05-377

CMP Sensor Range Check P0340:

Starter	ON
Minimum battery voltage while starter is ON	Less than 11V

CMP/CKP Misalignment P0340:

Engine RPM	600 rpm or more
Starter	OFF

VVT Sensor Range Check P0345 (Case 1):

Starter	ON
Minimum battery voltage while starter is ON	Less than 11V

VVT Sensor Range Check P0345 (Case 2):

Engine RPM	600 rpm or more
Starter	OFF
Battery voltage	8 V or more
Ignition switch	ON

TYPICAL MALFUNCTION THRESHOLDS

CMP Sensor Range Check P0340:

CMP signal	No signal

CMP/CKP Misalignment P0340:

Alignment is judged using CMP-CKP input timing CMP sensor signal input in appropriate timing	No signal

CMP Sensor (Bank 1) Malfunction P0341:

CMP and CKP phase	Misaligned
CMP signal per 2 revolutions crankshaft	12 CMP signals or more

VVT Sensor Range Check P0345 (Case 1):

VVT sensor signal	No signal

VVT Sensor Range Check P0345 (Case 2):

VVT sensor signal	No signal

VVT Sensor (Bank 2) Malfunction P0346:

VVT sensor signal count	12 signals or more

COMPONENT OPERATING RANGE

CMP sensor signal	CMP sensor voltage fluctuates when the crankshaft rotates 3 CMP signals per 2 revolutions of crankshaft

WIRING DIAGRAM

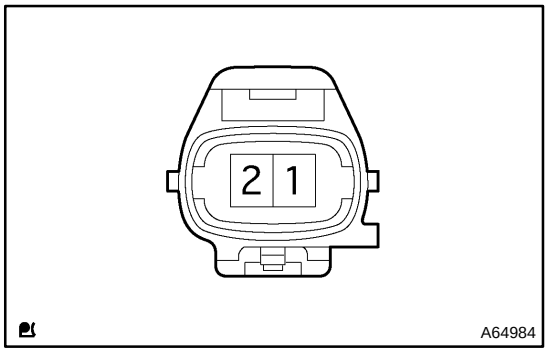
Refer to DTC P0335 on page 05-532 .

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	INSPECT VVT SENSOR (RESISTANCE)



(a) Disconnect the V7 or V6 VVT sensor connector.

(b) Measure the resistance between the terminals of the VVT sensor.

Standard:

Tester Connection	Condition	Specified Condition
1 - 2	Cold	835 to 1,400 Ω
1 - 2	Hot	1,060 to 1,645 Ω

NOTICE:

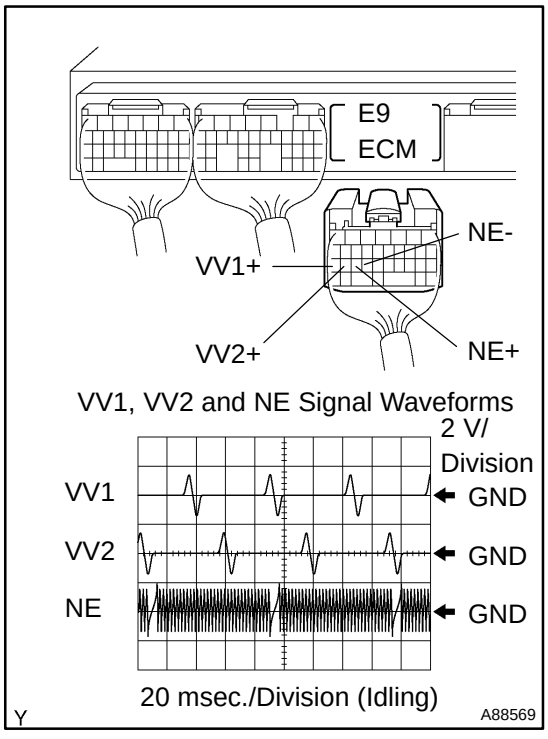
In the above section, the terms ”cold” and ”hot” refer to the temperature of the coils. ”Cold” means approximately -10 °C to 50°C (14°F to 122°F). ”Hot” means approximately 50°C to 100°C (122°F to 212°F).

HINT:

Reference: Inspection using the oscilloscope.

During cranking or idling, check the waveform of the ECM connector.

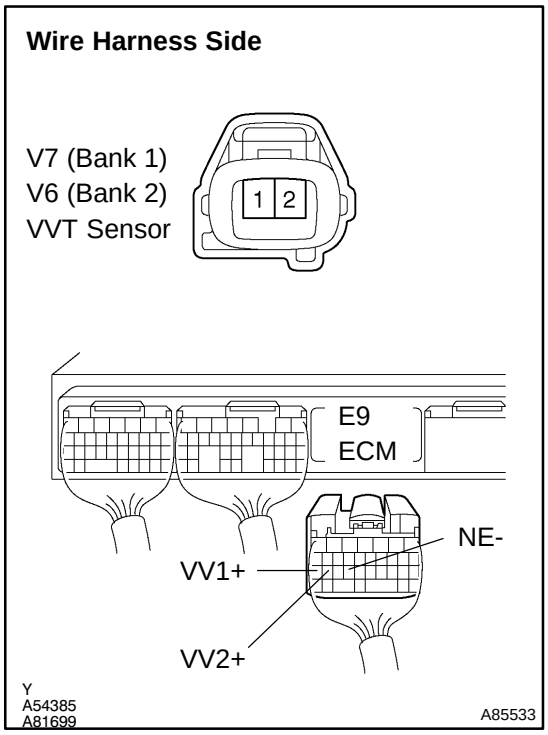
Tester Connection	Specified Condition
E9-27 (VV1+) - E9-24 (NE-) E9-26 (VV2+) - E9-24 (NE-) E9-25 (NE+) - E9-24 (NE-)	Correct waveform is as shown



NG → **REPLACE VVT SENSOR (See page 18-11)**

OK →

2 CHECK WIRE HARNESS (VVT SENSOR - ECM)



(a) Disconnect the V7 or V6 VVT sensor connector.
(b) Disconnect the E9 ECM connector.
(c) Check the resistance of the wire harness side connectors.
Standard:

Tester Connection	Specified Condition
V7-1 - E9-27 (VV1+) V6-1 - E9-26 (VV2+) V6 or V7-2 - E9-24 (NE-)	Below 1 Ω
V7-1 or E9-27 (VV1+) - Body ground V6 -1 or E9-26 (VV2+) - Body ground 2 of V6 or V7 or E9-24 (NE-) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

3 CHECK SENSOR INSTALLATION (VVT SENSOR)

(a) Check the sensor installation.
OK: Sensor is installed correctly.

NG → **TIGHTEN SENSOR**

OK

4 CHECK CAMSHAFT TIMING PULLEY

(a) Check the teeth of the camshaft timing pulley.
OK: The pulley does not have any cracks or deformation.

NG → **REPLACE CAMSHAFT TIMING PULLEY**

OK

REPLACE ECM (See page 10-24)

DTC	P0351	IGNITION COIL ”A” PRIMARY/SECONDARY CIRCUIT

DTC	P0352	IGNITION COIL ”B” PRIMARY/SECONDARY CIRCUIT

DTC	P0353	IGNITION COIL ”C” PRIMARY/SECONDARY CIRCUIT

DTC	P0354	IGNITION COIL ”D” PRIMARY/SECONDARY CIRCUIT

DTC	P0355	IGNITION COIL ”E” PRIMARY/SECONDARY CIRCUIT

DTC	P0356	IGNITION COIL ”F” PRIMARY/SECONDARY CIRCUIT

HINT:

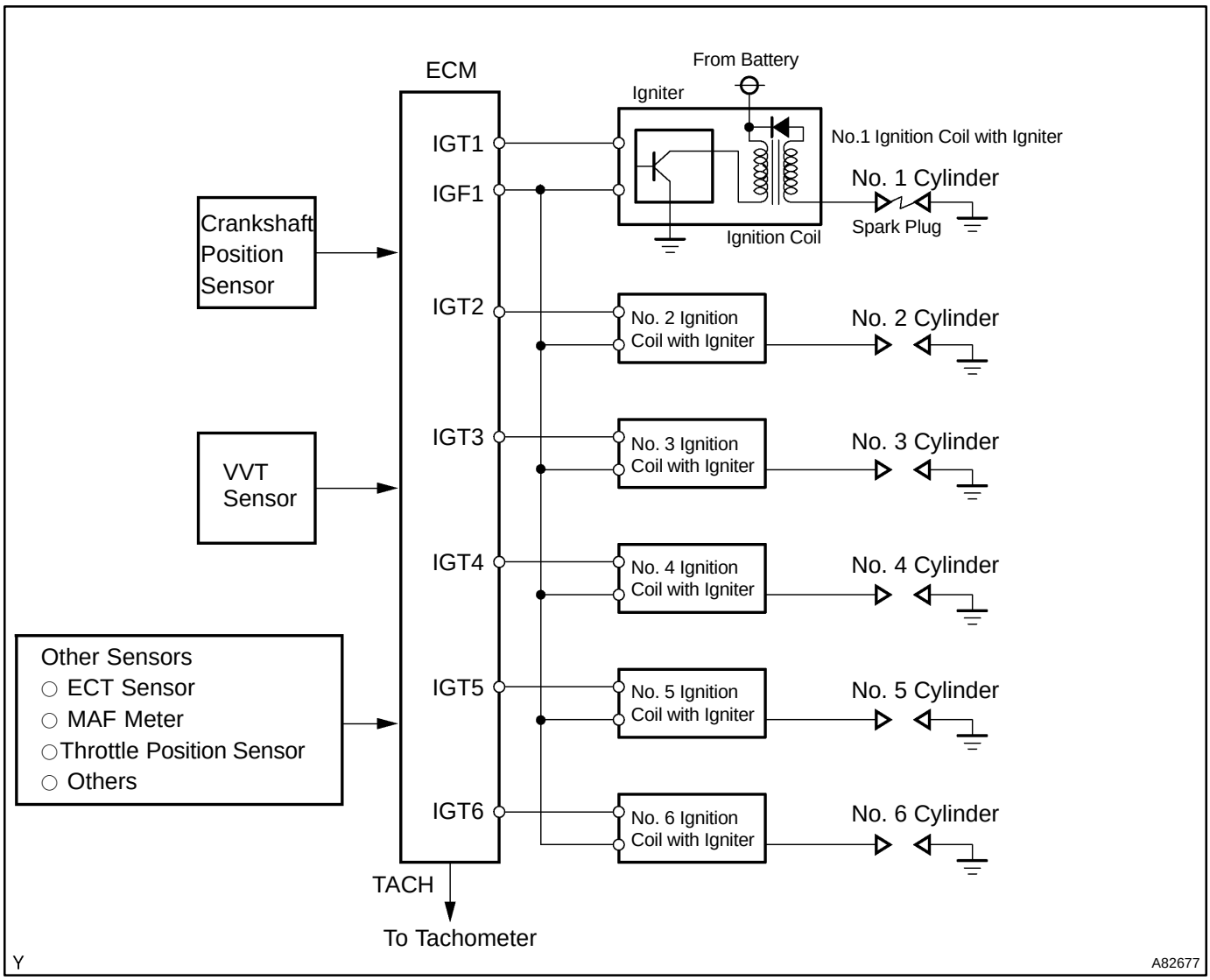
- ○ These DTCs indicate a malfunction related to primary circuit.
- ○ If DTC P0351 is displayed, check No. 1 ignition coil with igniter circuit.
- ○ If DTC P0352 is displayed, check No. 2 ignition coil with igniter circuit.
- ○ If DTC P0353 is displayed, check No. 3 ignition coil with igniter circuit.
- ○ If DTC P0354 is displayed, check No. 4 ignition coil with igniter circuit.
- ○ If DTC P0355 is displayed, check No. 5 ignition coil with igniter circuit.
- ○ If DTC P0356 is displayed, check No. 6 ignition coil with igniter circuit.

CIRCUIT DESCRIPTION

A Direct Ignition System (DIS) is used on this vehicle.

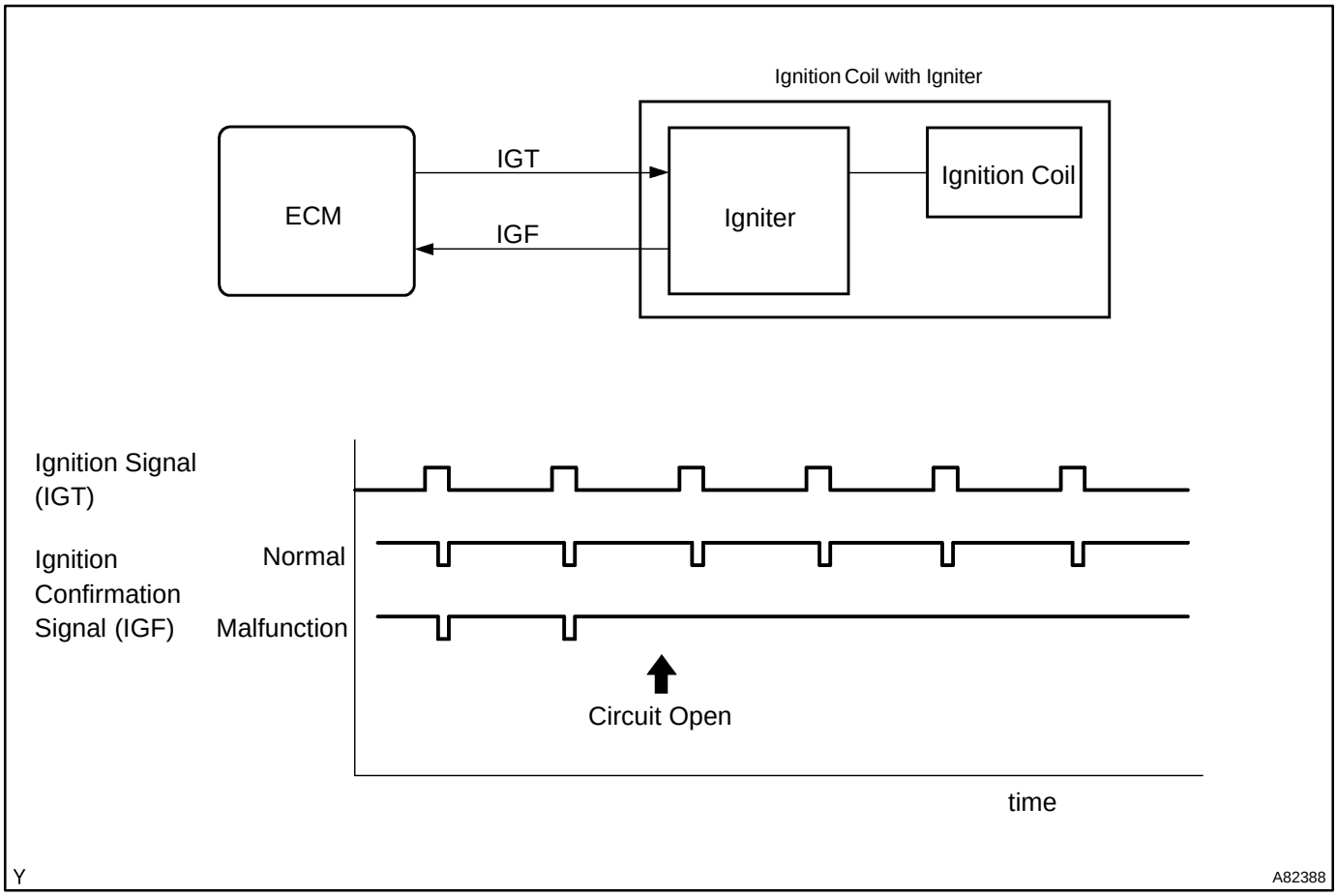
The DIS is a 1-cylinder ignition system which ignites one cylinder with one ignition coil. In the 1-cylinder ignition system, the one spark plug is connected to the end of the secondary winding. High voltage generated in the secondary winding is applied directly to the spark plug. The spark of the spark plug passes from the center electrode to the ground electrode.

The ECM determines the ignition timing and outputs the ignition signals (IGTs) for each cylinder. Using the IGT, the ECM turns on and off the power transistor inside the igniter, which switches on and off current to the primary coil. When current to the primary coil is cut off, high-voltage is generated in the secondary coil and this voltage is applied to the spark plugs to create sparks inside the cylinders. As the ECM cuts the current to the primary coil, the igniter sends back the ignition confirmation signal (IGF) for each cylinder ignition to the ECM.



DTC No.	DTC Detection Condition	Trouble Area
P0351 P0352 P0353 P0354 P0355 P0356	No IGF signal to ECM while engine is running (1 trip detection logic)	○ Ignition system ○ Open or short in IGF1 and IGT circuits (1 through 6) from ignition coil assy to ECM ○ Ignition coil assy (No. 1 through No. 6) ○ ECM

MONITOR DESCRIPTION



If the ECM does not receive the IGF after sending the IGT, it interprets this as a fault in the igniter and sets a DTC.

MONITOR STRATEGY

Related DTCs	P0351: Igniter (Cylinder 1) malfunction P0352: Igniter (Cylinder 2) malfunction P0353: Igniter (Cylinder 3) malfunction P0354: Igniter (Cylinder 4) malfunction P0355: Igniter (Cylinder 5) malfunction P0356: Igniter (Cylinder 6) malfunction
Required sensors / components (Main)	Igniter
Required sensors / components (Related)	CKP sensor
Frequency of operation	Continuous
Duration	0.256 seconds + 6 sparks
MIL operation	Immediate
Sequence operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever these DTCs are not present	See page 05-377
Either of the following conditions is met:	Condition 1 or 2
1. Engine RPM	1,500 rpm or less
2. Starter	OFF

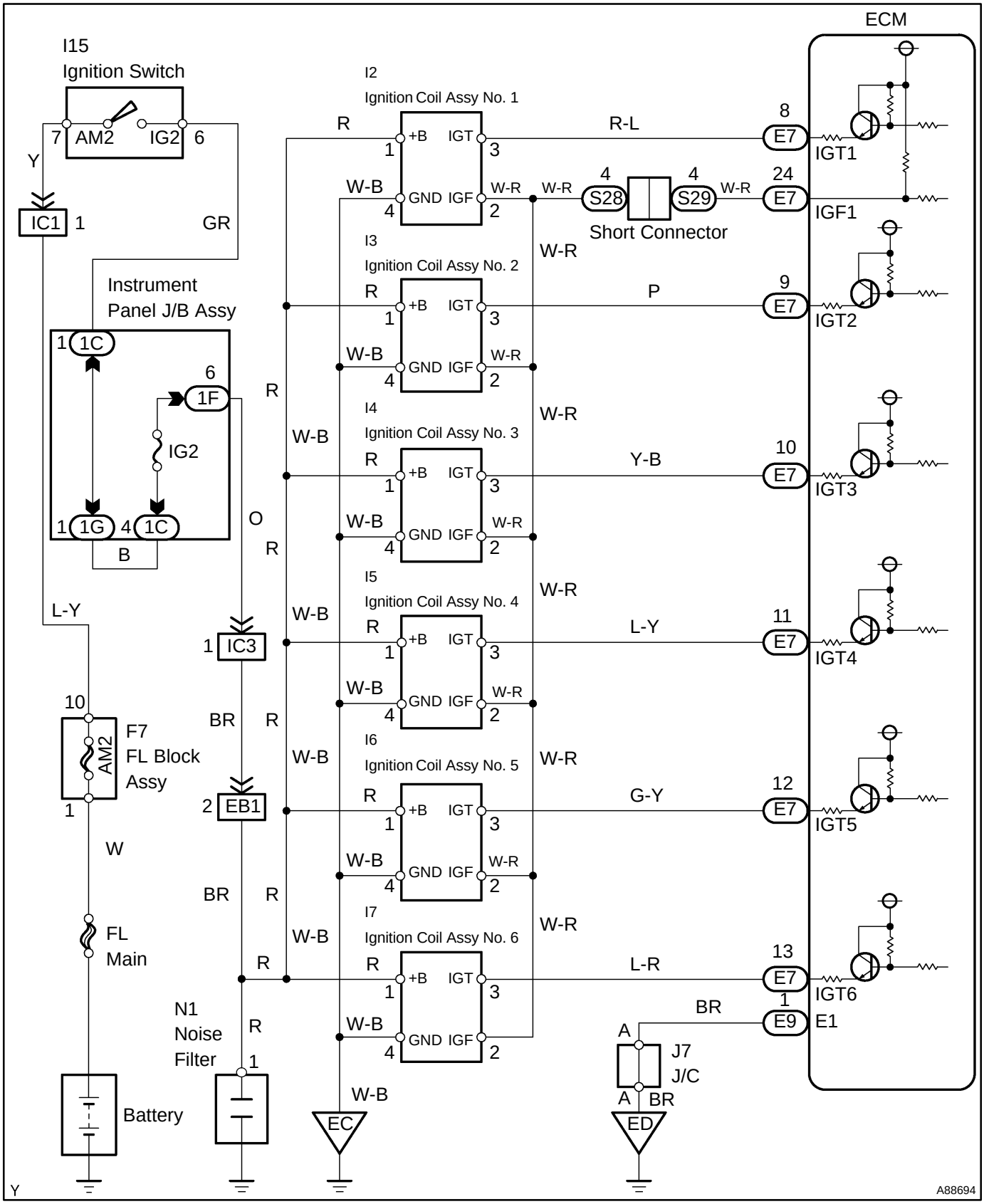
TYPICAL MALFUNCTION THRESHOLDS

IGF signal	ECM does not detect IGF signal from igniter when ECM sends IGT signal to igniter

COMPONENT OPERATING RANGE

IGF signal	Igniter outputs IGF signal when it receives IGT signal from ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

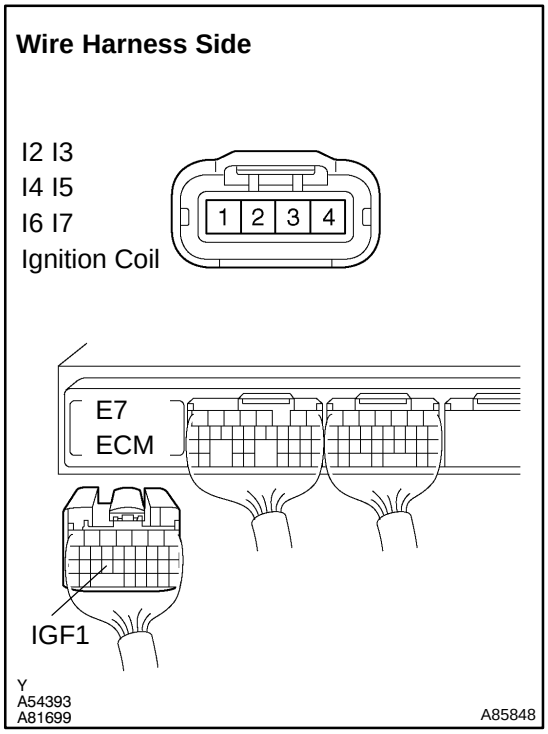
1	CHECK SPARK PLUG AND SPARK OF MISFIRING CYLINDER (See page 18-9)

OK: Spark occurs.

NG → **Go to step 4**

OK

2	CHECK WIRE HARNESS (IGNITION COIL ASSY - ECM (IGF1 TERMINAL))



(a) Disconnect the I2, I3, I4, I5, I6 and I7 ignition coil connectors.

(b) Disconnect the E7 ECM connector.

(c) Check the resistance of the wire harness side connectors.

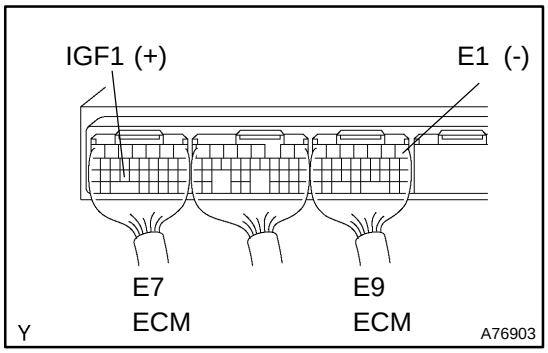
Standard:

Tester Connection	Specified Condition
I2-2 - E7-24 (IGF1) I3-2 - E7-24 (IGF1) I4-2 - E7-24 (IGF1) I5-2 - E7-24 (IGF1) I6-2 - E7-24 (IGF1) I7-2 - E7-24 (IGF1)	Below 1 Ω
I2-2 or E7-24 (IGF1) - Body ground I3-2 or E7-24 (IGF1) - Body ground I4-2 or E7-24 (IGF1) - Body ground I5-2 or E7-24 (IGF1) - Body ground I6-2 or E7-24 (IGF1) - Body ground I7-2 or E7-24 (IGF1) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

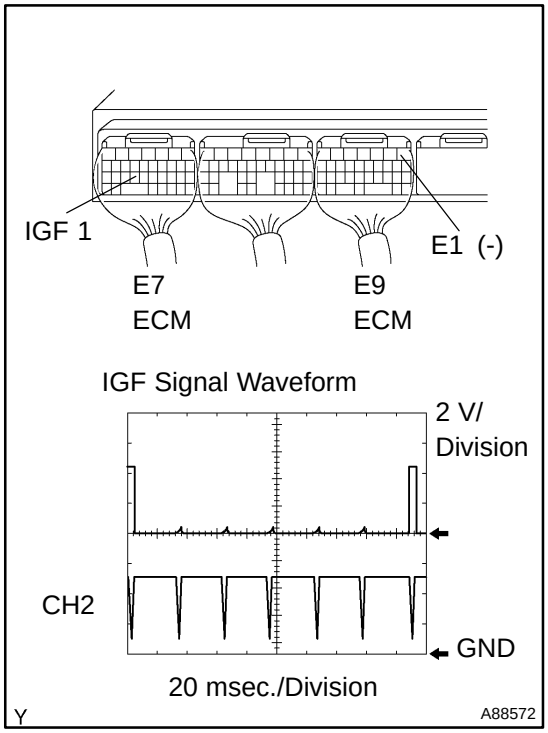
3 CHECK ECM (IGF VOLTAGE)



(a) Disconnect the I2, I3, I4, I5, I6 and I7 ignition coil connectors.
(b) Turn the ignition switch ON.
(c) Measure the voltage between the terminals of the ECM connectors.

Standard:

Tester Connection	Specified Condition
E7-24 (IGF1) - E9-1 (E1)	4.5 to 5.5 V



HINT:
Reference: Inspection using the oscilloscope.
During cranking or idling, check the waveform of the ECM connectors.

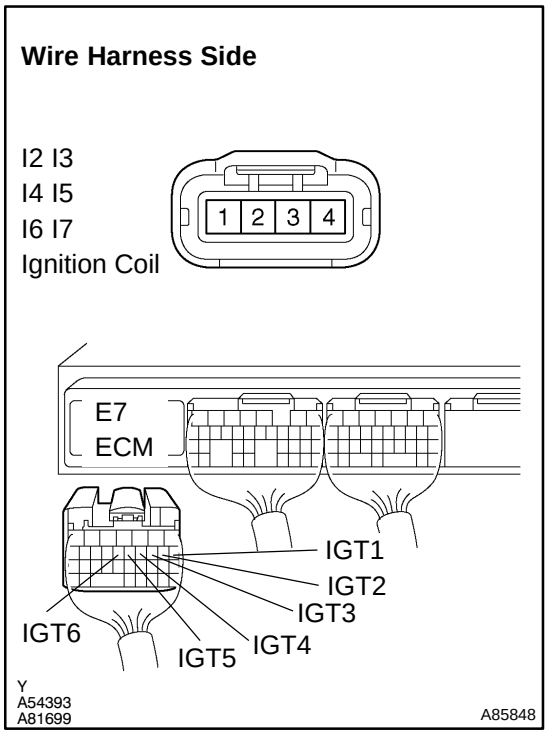
Tester Connection	Specified Condition
E7-24 (IGF1) - E9-1 (E1)	Correct waveform is as shown

NG → **REPLACE ECM (See page 10-24)**

OK

REPLACE IGNITION COIL ASSY

4	CHECK WIRE HARNESS (IGNITION COIL ASSY - ECM (IGT TERMINAL))



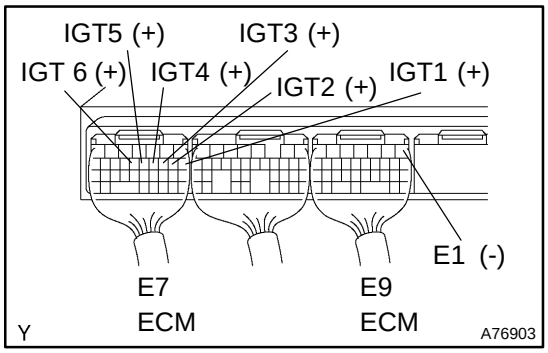
(a) Disconnect the I2, I3, I4, I5, I6 and I7 ignition coil connectors.
(b) Disconnect the E7 ECM connector.
(c) Check the resistance of the wire harness side connectors.
Standard:

Tester Connection	Specified Condition
I2-3 - E7-8 (IGT1) I3-3 - E7-9 (IGT2) I4-3 - E7-10 (IGT3) I5-3 - E7-11 (IGT4) I6-3 - E7-12 (IGT5) I7-3 - E7-13 (IGT6)	Below 1 Ω
I2-3 or E7-8 (IGT1) - Body ground I3-3 or E7-9 (IGT2) - Body ground I4-3 or E7-10 (IGT3) - Body ground I5-3 or E7-1 (1IGT4) - Body ground I6-3 or E7-12 (IGT5) - Body ground I7-3 or E7-13 (IGT6) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK →

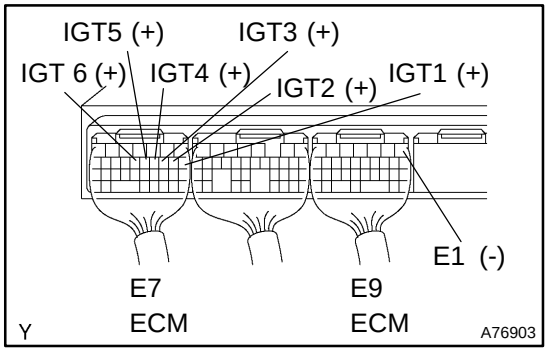
5 CHECK ECM (IGT1, IGT2, IGT3, IGT4, IGT5 OR IGT6 VOLTAGE)



(a) Check the voltage of the ECM connectors when the engine is cranked.

Standard:

Tester Connection	Specified Condition
E7-8 (GT1) - E9-1 (E1) E7-9 (IGT2) - E9-1 (E1) E7-10 (IGT3) - E9-1 (E1) E7-11 (IGT4) - E9-1 (E1) E7-12 (IGT5) - E9-1 (E1) E7-13 (IGT6) - E9-1 (E1)	More than 0.1 V or less than 4.5 V

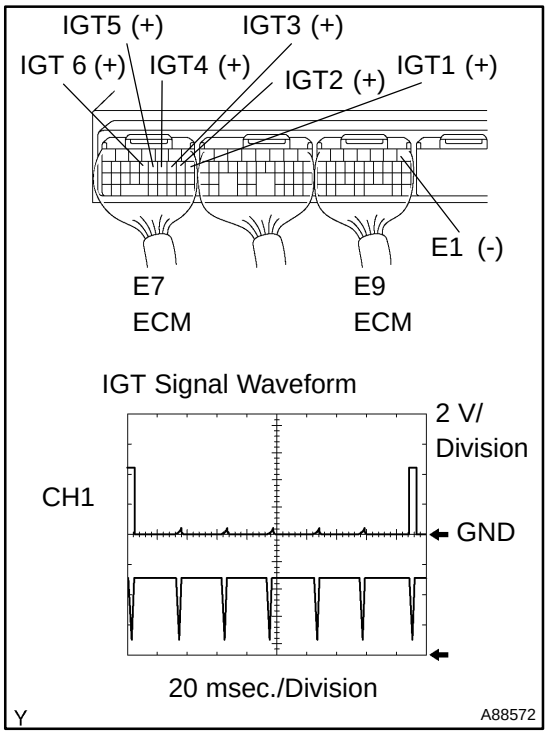


(b) Disconnect the I2, I3, I4, I5, I6 and I7 ignition coil connectors.

(c) Check the voltage of the ECM connectors when the engine is cranked.

Standard:

Tester Connection	Specified Condition
E7-8 (IGT1) - E9-1 (E1) E7-9 (IGT2) - E9-1 (E1) E7-10 (IGT3) - E9-1 (E1) E7-11 (IGT4) - E9-1 (E1) E7-12 (IGT5) - E9-1 (E1) E7-13 (IGT6) - E9-1 (E1)	4.5 V or more



HINT:

Reference: Inspection using the oscilloscope.

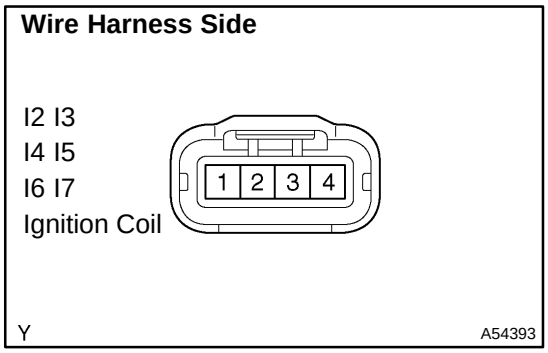
During cranking or idling, check the waveform of the ECM connectors.

Tester Connection	Specified Condition
E7-8 (GT1) - E9-1 (E1) E7-9 (IGT2) - E9-1 (E1) E7-10 (IGT3) - E9-1 (E1) E7-11 (IGT4) - E9-1 (E1) E7-12 (IGT5) - E9-1 (E1) E7-13 (IGT6) - E9-1 (E1)	Correct waveform is as shown

NG → **REPLACE ECM**

OK

6	INSPECT IGNITION COIL ASSY (POWER SOURCE)



(a) Disconnect the I2, I3, I4, I5, I6 and I7 ignition coil connectors.

(b) Turn the ignition switch ON.

(c) Check the voltage of the wire harness side connector.

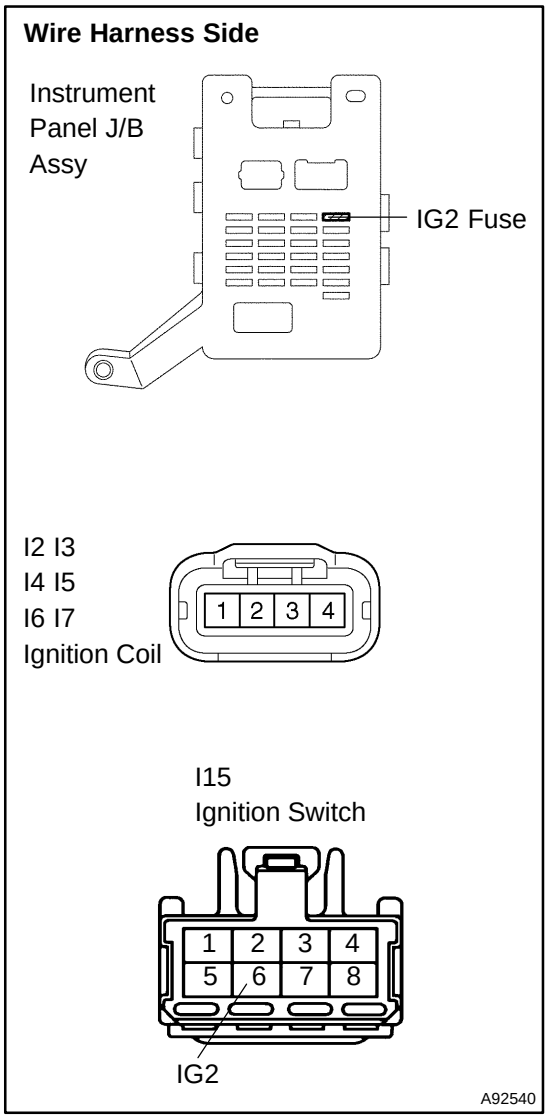
Standard:

Tester Connection	Specified Condition
I2-1 - Body ground I3-1 - Body ground I4-1 - Body ground I5-1 - Body ground I6-1 - Body ground I7-1 - Body ground	9 to 14 V

OK → **REPLACE IGNITION COIL ASSY**

NG

7 CHECK WIRE HARNESS (IGNITION COIL ASSY - IGNITION SWITCH)



(a) Check the IG2 fuse.
  (1) Remove the IG2 fuse from the instrument panel J/B assy.
  (2) Check for resistance of the IG2 fuse.
  Standard: Below 1 Ω

(b) Disconnect the I2, I3, I4, I5, I6 and I7 ignition coil connectors.

(c) Disconnect the II5 ignition switch connector.

(d) Check the resistance of the wire harness side connectors.
  Standard:

Tester Connection	Specified Condition
I2-1 - I15-6 (IG2) I3-1 - I15-6 (IG2) I4-1 - I15-6 (IG2) I5-1 - I15-6 (IG2) I6-1 - I15-6 (IG2) I7-1 - I15-6 (IG2)	Below 1 Ω
I2-1 or I15-6 (IG2) - Body ground I3-1 or I15-6 (IG2) - Body ground I4-1 or I15-6 (IG2) - Body ground I5-1 or I15-6 (IG2) - Body ground I6-1 or I15-6 (IG2) - Body ground I7-1 or I15-6 (IG2) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE IGNITION COIL ASSY

DTC	P0420	CATALYST SYSTEM EFFICIENCY BELOW THRESHOLD (BANK 1)

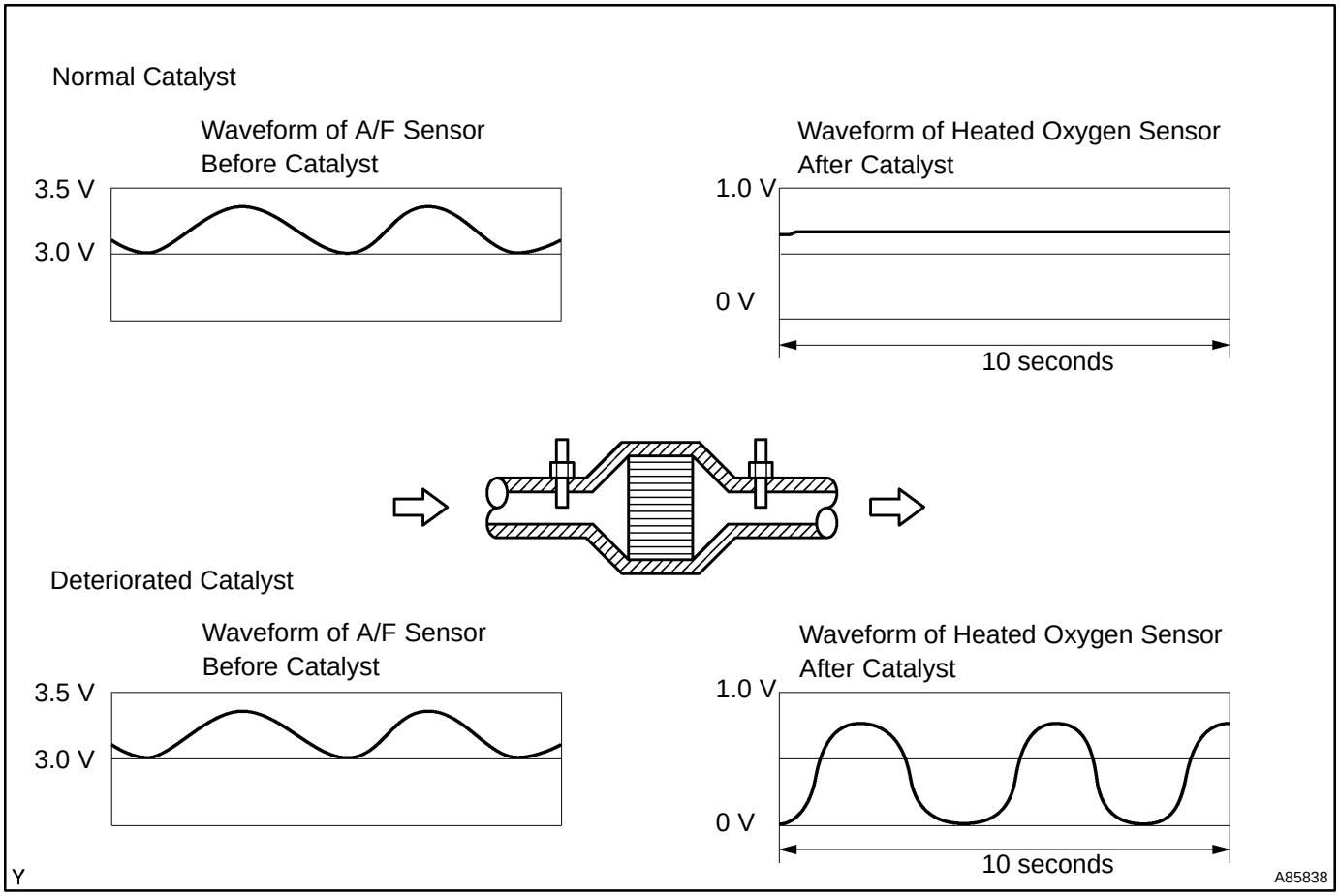
DTC	P0430	CATALYST SYSTEM EFFICIENCY BELOW THRESHOLD (BANK 2)

MONITOR DESCRIPTION

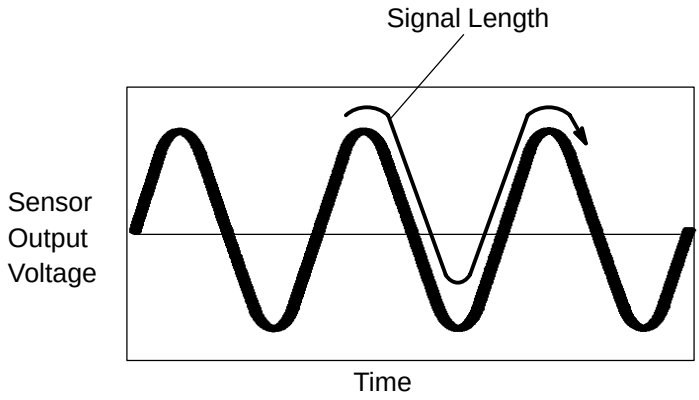
The ECM uses sensors mounted before and after the Three-Way Catalyst (TWC) to monitor its efficiency. The first sensor, an Air-Fuel Ratio (A/F) sensor 1, sends pre-catalyst A/F ratio information to the ECM. The second sensor, a heated oxygen sensor (O2S) sends post-catalyst information to the ECM. The ECM compares these two signals to judge the efficiency of the catalyst and the catalyst's ability to store oxygen. During normal operation, the TWC stores and releases oxygen as needed. The capacity to store oxygen results in a low variation in the post-TWC exhaust stream as shown below.

If the catalyst is functioning normally, the waveform of the heated oxygen sensor slowly switches between RICH and LEAN. If the catalyst is deteriorated, the waveform will alternate frequently between RICH and LEAN. As the catalyst efficiency degrades, its ability to store oxygen is reduced and the catalyst output becomes more variable.

When running the monitor, the ECM compares sensor 1 signals (A/F sensor) over a specific amount of time to determine catalyst efficiency. The ECM begins by calculating the signal length for both sensors (for the rear oxygen sensor, the ECM uses the output voltage signal length). If the oxygen sensor output voltage signal length is greater than the threshold (threshold is calculated based on the A/F sensor signal length), the ECM concludes that the catalyst is malfunctioning. The ECM will turn on the MIL and a DTC will be set.



Heated Oxygen Sensor Signal Length



A82718

DTC No.	DTC Detecting Condition	Trouble Area
P0420	After engine and catalyst are warmed up, and while vehicle is driven within set vehicle and engine speed ranges: Waveform of heated oxygen sensor (bank 1 sensor 2) alternates frequently between RICH and LEAN (2 trip detection logic)	・Gas leakage in exhaust system ・A/F sensor (bank 1 sensor 1) ・Heated oxygen sensor (bank 1 sensor 2) ・Three-way catalytic converter (exhaust manifold)
P0430	After engine and catalyst are warmed up, and while vehicle is driven within set vehicle and engine speed ranges: Waveform of heated oxygen sensor (bank 2 sensor 2) alternates frequently between RICH and LEAN (2 trip detection logic)	・Gas leakage in exhaust system ・A/F sensor (bank 2 sensor 1) ・Heated oxygen sensor (bank 2 sensor 2) ・Three-way catalytic converter (exhaust manifold)

HINT:

- ・ Bank 1 is the bank that includes cylinder No. 1.
- ・ Bank 2 is the bank that does not include cylinder No. 1.
- ・ Sensor 1 is the sensor closest to the engine assembly.
- ・ Sensor 2 is the sensor farthest away from the engine assembly.

MONITOR STRATEGY

Related DTCs	P0420: Catalyst (Bank 1) Deterioration P0430: Catalyst (Bank 2) Deterioration
Required sensors / components (Main)	Catalyst
Required sensors / components (Related)	A/F sensor, Rear HO2S, IAT sensor, MAF meter, CKP sensor, ECT sensor
Frequency of operation	Once per driving cycle
Duration	150 seconds (30 seconds x 5)
MIL operation	2 driving cycles
Sequence operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever this DTC is not present	See page 05-377
Accumulated time that all of the following conditions are met:	30 seconds
Battery voltage	11 V or more
IAT	-10 ◯C (14◯F) or more
Idle	OFF
MAF	6 to 45 g/second
Engine RPM	Less than 3,000 rpm
ECT	75◯C (167◯F) or more
Fuel system status	Closed Loop
Rich experience after fuel cut	Yes
A/F sensor	Activated
Estimated catalyst temperature	Both of the following conditions 1 and 2 are met
1. Upstream catalyst temperature	500 to 800◯C (932 to 1472◯F)
2. Downstream catalyst temperature	500 to 800◯C (932 to 1472◯F)

TYPICAL MALFUNCTION THRESHOLDS

Rear HO2S locus length	15 V or more (Varies with A/F sensor locus length)
Frequency of the monitor	3 times

MONITOR RESULT

Refer to page 05-385 for detailed information.

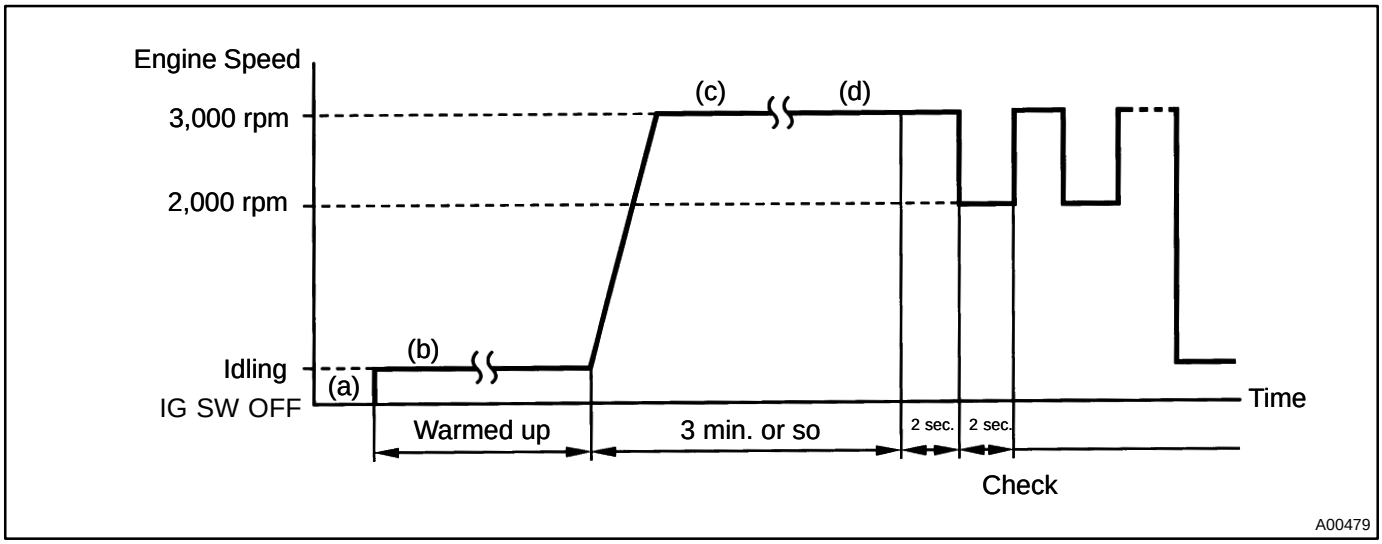
The test value and test limit information are described as shown in the following table. Check the monitor result and test values after performing the monitor drive pattern (see page 05-387).

- TID (Test Identification Data) is assigned to each emissions-related component.
- TLT (Test Limit Type):
  If TLT is 0, the component is malfunctioning when the test value is higher than the test limit.
  If TLT is 1, the component is malfunctioning when the test value is lower than the test limit.
- CID (Component Identification Data) is assigned to each test value.
- Unit Conversion is used to calculate the test value indicated on generic OBD ll scan tools.

TID $01: Catalyst - Sensor 1 A/F sensor, Sensor 2 HO2S

TLT	CID	Unit Conversion	Description of Test Data	Description of Test Limit
0	$01	Multiply by 0.0078 (no dimension)	Catalyst deterioration level (bank 1): Determined by waveforms of A/F sensor and HO2S 2	Malfunction criteria for catalyst deterioration
0	$02	Multiply by 0.0078 (no dimension)	Catalyst deterioration level (bank 2): Determined by waveforms of A/F sensor and HO2S 2	Malfunction criteria for catalyst deterioration

CONDITIONING A/F SENSOR AND HEATED OXYGEN SENSOR FOR TESTING



(a) Connect the the hand-held tester or the OBD II scan tool to the DLC3.
(b) Start the engine and warm it up with all the accessories switched OFF until the ECT is stable.
(c) Run the engine at 2,500 to 3,000 rpm for about 3 minutes.
(d) When alternating the engine between 3,000 rpm and 2,000 rpm for 2 seconds respectively, check the waveform of the oxygen sensor (bank 1 sensor 2).

INSPECTION PROCEDURE

HINT:
Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	CHECK OTHER DTC OUTPUT (IN ADDITION TO DTC P0420 AND/OR P0430)

(a) Read the DTC using the hand-held tester or the OBD II scan tool.
Result:

Display (DTC Output)	Proceed to
Only P0420 and/or P0430 are output	A
P0420 or P0430 and other DTCs are output	B

HINT:
If any other codes besides P0420 and/or P0430 are output, perform the troubleshooting for those codes first.

B → **GO TO RELEVANT DTC CHART (See page 05-412)**

A

2	CHECK FOR EXHAUST GAS LEAKAGE

OK: No gas leakage.

NG → **REPAIR OR REPLACE EXHAUST GAS LEAKAGE POINT**

OK

3	INSPECT AIR FUEL RATIO SENSOR (See page 12-23)

NG → REPLACE AIR FUEL RATIO SENSOR

OK

4	INSPECT HEATED OXYGEN SENSOR (See page 05-485)

OK: During air-fuel ratio feedback, the O2S's output alternates between rich and lean.

NG → REPLACE HEATED OXYGEN SENSOR

OK

REPLACE THREE-WAY CATALYTIC CONVERTER (EXHAUST MANIFOLD LH OR RH AND FRONT EXHAUST PIPE)

NOTICE:

On the damaged bank, replace both the front catalyst and rear catalyst.

HINT:

Hand-held tester only:

- The following procedure enables the technician to identify a trouble area if malfunction in A/F sensors front or rear heated oxygen sensors other than the catalyst converter, or the malfunction that indicates the actual air-fuel ratio extremely RICH or LEAN.
- It is possible the malfunctioning area can be found using the ACTIVE TEST A/F CONTROL operation. The A/F CONTROL operation can determine if the A/F sensor, heated oxygen sensor or other potential trouble areas are malfunctioning or not.

(a) Perform the ACTIVE TEST A/F CONTROL operation.

HINT:

The A/F CONTROL operation lowers the injection volume 12.5 % or increases the injection volume 25 %.

(1) Connect the hand-held tester to the DLC3 on the vehicle.
(2) Turn the ignition switch ON.
(3) Warm up the engine by running the engine speed at 2,500 rpm for approximately 90 seconds.
(4) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL.
(5) Perform the A/F CONTROL operation with the engine idle (press the right or left button).

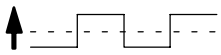
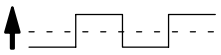
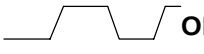
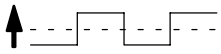
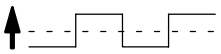
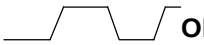
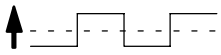
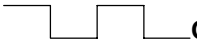
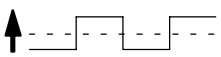
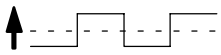
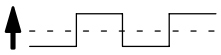
Result:

Heated oxygen sensor reacts in accordance with increase and decrease of injection volume

+25 % → rich output: More than 0.5 V

-12.5 % → lean output: Less than 0.4 V

NOTICE:
The A/F sensor output has a few seconds of delay and the heated oxygen sensor output has about 20 seconds of delay at maximum.

	Output voltage of A/F sensor (sensor 1)	Output voltage of heated oxygen sensor (sensor 2)	Mainly suspected Trouble Area
Case 1	Injection volume +25 % -12.5 %  Output voltage More than 3.35 V Less than 3.0 V  **OK**	Injection volume +25 % -12.5 %  Output voltage More than 0.55 V Less than 0.4V  **OK**	—
Case 2	Injection volume +25 % -12.5 %  Output voltage Almost No reaction **NG**	Injection volume +25 % -12.5 %  Output voltage More than 0.55 V Less than 0.4V  **OK**	A/F sensor (A/F sensor, heater, A/F sensor circuit)
Case 3	Injection volume +25 % -12.5 %  Output voltage More than 3.35 V Less than 3.0V  **OK**	Injection volume +25 % -12.5 %  Output voltage Almost No reaction **NG**	Heated oxygen sensor (heated oxygen sensor, heater, heated oxygen sensor circuit)
Case 4	Injection volume +25 % -12.5 %  Output voltage Almost No reaction **NG**	Injection volume +25 % -12.5 %  Output voltage Almost No reaction **NG**	Extremely rich or lean actual air-fuel ratio (Injector, fuel pressure, gas leakage in exhaust system, etc.)

The following of A/F CONTROL procedure enables the technician to check and graph the voltage outputs of both the heated oxygen sensors.
For displaying the graph, enter ”ACTIVE TEST / A/F CONTROL / USER DATA”, select ”AFS B1S1 and O2S B1S2” by pressing ”YES” and push ”ENTER”. Then press ”F4”.

DTC	P0441	EVAPORATIVE EMISSION CONTROL SYSTEM INCORRECT PURGE FLOW

CIRCUIT DESCRIPTION

The circuit description can be found in the EVAP INSPECTION PROCEDURE (see page 05-679).

INSPECTION PROCEDURE

Refer to the EVAP INSPECTION PROCEDURE (see page 05-679).

MONITOR DESCRIPTION

The ECM tests the Evaporative Emissions (EVAP) system using the fuel tank pressure sensor, Canister Close Valve (CCV), and EVAP VSV. The ECM closes the EVAP system and creates negative pressure (vacuum) into it. The ECM then monitors the internal pressure using the fuel tank pressure sensor.

P0441

The EVAP VSV has the following features:

(1) Purges the evaporative emissions from the fuel tank to the intake manifold.

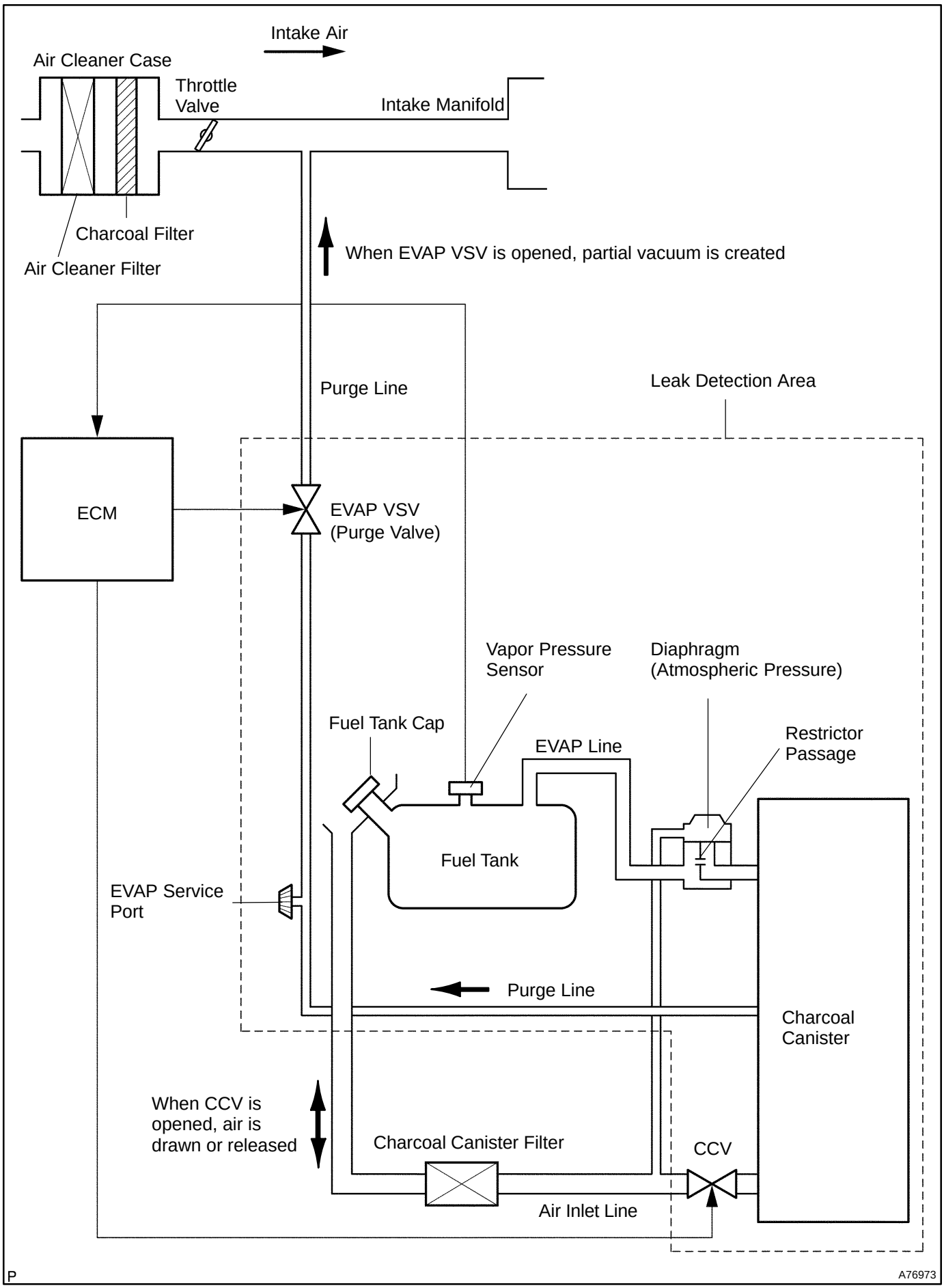
(2) Works with the CCV to create negative pressure (vacuum) inside the fuel tank and performs leak tests.

Opening or closing malfunctions in the EVAP VSV prompt the ECM to set DTC P0441.

The ECM checks if the EVAP VSV is ”stuck closed”. The ECM commands the EVAP VSV to open while the CCV is closed. Under these circumstances, a high negative pressure(vacuum) should develop in the fuel tank. If no negative pressure develops, the ECM determines that the EVAP VSV remains closed despite the open command. The ECM would then turn on the MIL and output a DTC.

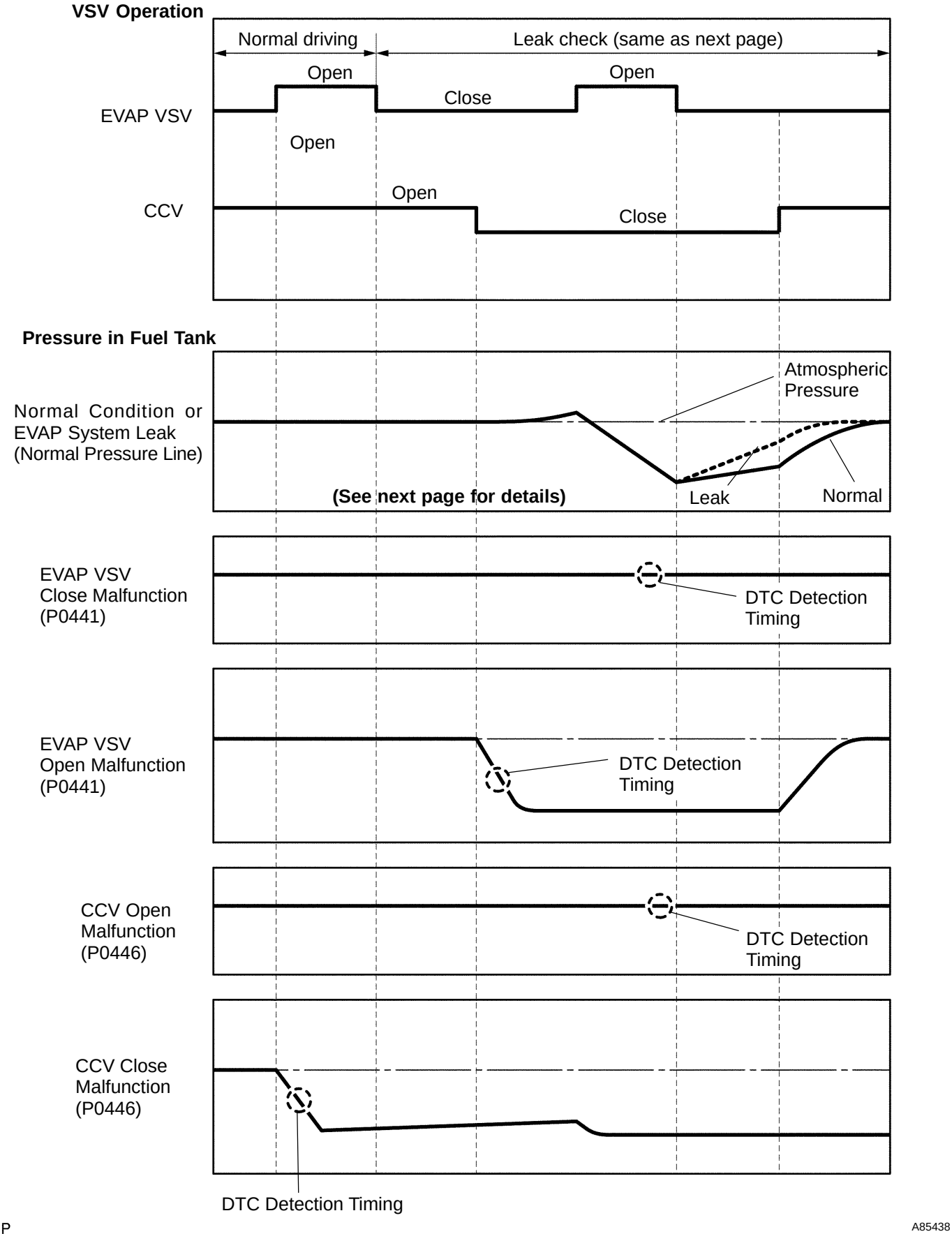
The ECM also checks if the EVAP VSV is ”stuck open”. The ECM commands the EVAP VSV to close while the CCV is closed and the fuel tank is at ambient pressure. Under these circumstances, the fuel tank should remain at ambient pressure. If negative pressure develops in the fuel tank, the ECM determines that the EVAP VSV remains open despite the close command. The ECM would then turn on the MIL and output a DTC.

DTC No.	DTC Detection Condition	Trouble Area
P0441	○Pressure in charcoal canister and fuel tank does not drop during purge control (2 trip detection logic) ○During purge cut-off, negative is pressure entering charcoal canister and fuel tank (2 trip detection logic)	○Vacuum hose has cracks, holes, or is blocked, damaged or disconnected ○Fuel tank cap incorrectly installed ○Fuel tank cap has cracks or is damaged ○Open or short in vapor pressure sensor circuit ○Vapor pressure sensor ○Open or short in EVAP VSV circuit ○EVAP VSV ○Open or short in CCV circuit ○CCV ○Fuel tank has cracks, holes, or is damaged ○Charcoal canister has cracks, holes, or is damaged ○Fuel tank over fill check valve cracks, or is damaged ○ECM


Intake Air
Air Cleaner Case
Throttle Valve
Intake Manifold
Charcoal Filter
Air Cleaner Filter
When EVAP VSV is opened, partial vacuum is created
Purge Line
Leak Detection Area
ECM
EVAP VSV (Purge Valve)
Vapor Pressure Sensor
Diaphragm (Atmospheric Pressure)
Fuel Tank Cap
EVAP Line
Restrictor Passage
Fuel Tank
EVAP Service Port
Purge Line
Charcoal Canister
When CCV is opened, air is drawn or released
Charcoal Canister Filter
CCV
Air Inlet Line
P
A76973

VSV Malfunction Condition and Leak Check

EVAP VSV is Open: ON
CCV is Open: OFF

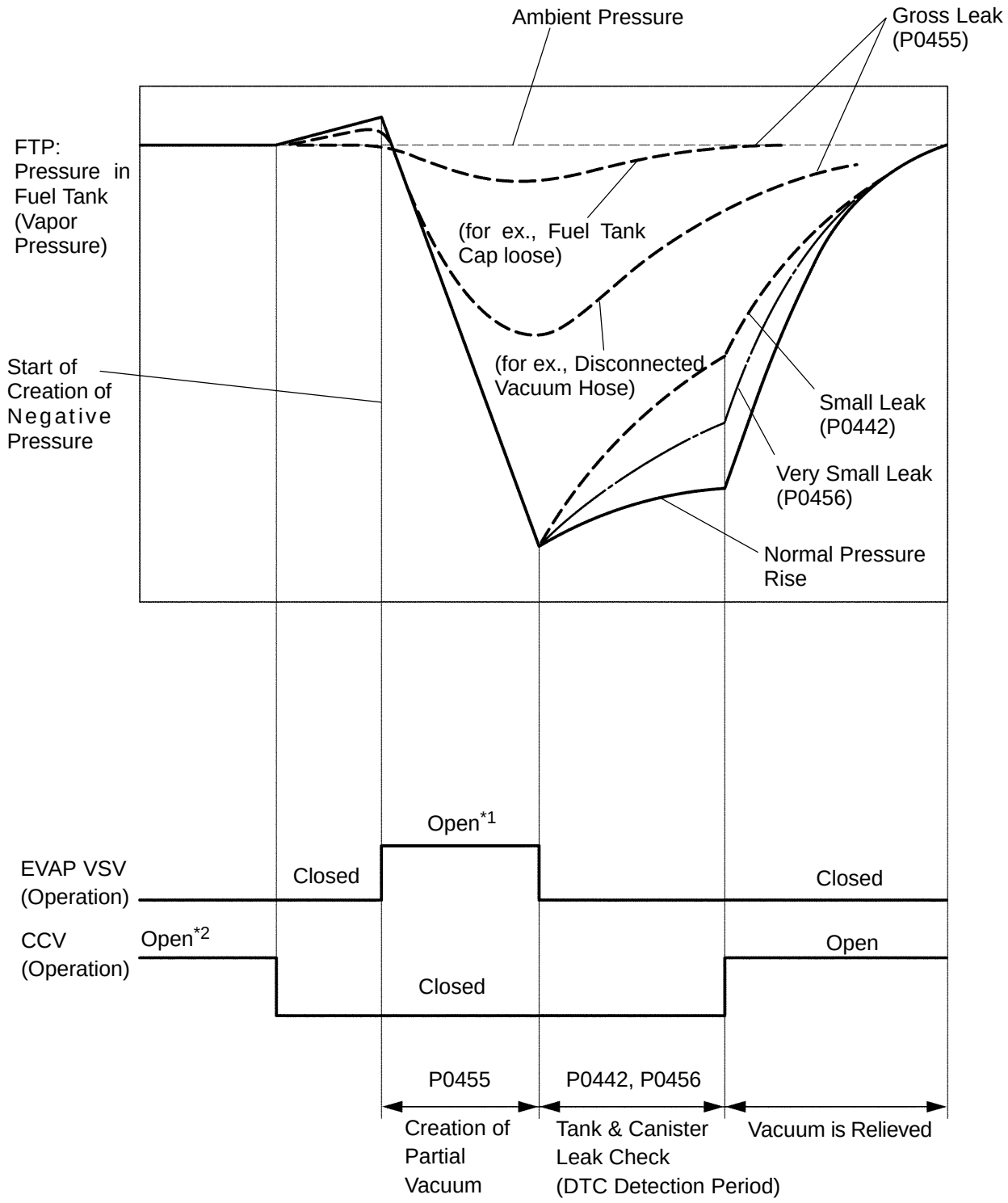


P

A85438

Leak Check

Initial Condition:
⁎Cold start
⁎Engine coolant temperature/intake air temperature are nearly the same



*1: EVAP VSV is Open: ON

*2: CCV is Open: OFF

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MONITOR STRATEGY

Related DTCs	P0441: Purge VSV stuck open P0441: purge VSV stuck close
Required sensors / components (Main)	CCV, EVAP canister, EVAP hose, Fuel cap, Fuel tank and Purge VSV
Required sensors / components (Related)	ECT sensor, FTP sensor, IAT sensor, MAF meter, Vehicle speed sensor
Frequency of operation	Once per driving cycle
Duration	Within 60 seconds
MIL operation	2 driving cycles
Sequence operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever these DTCs are not present	See page 05-377
Altitude	Less than 7,870 ft. (2,400 m)
Battery voltage	11 V or more
Throttle position learning	Completed
IAT at engine start - ECT at engine start	-7 to 11.1 C (-12.6 to 20 F)
EVAP VSV and CCV	Not operated test by scan tool
Either of the following conditions is met	Condition 1 or 2
1. Purge duty cycle	8% or more (vary with MAF)
2. Purge concentration for 30 seconds	-5 %/% or more when vehicle speed is less than 10 km/h (6.25 mph)
Refuel	Not refueled with engine running
FTP	12.75 mmHg (-1.7 kPa) or more
ECT at engine start	4.4 to 35 C (39.9 to 95 F)
IAT at engine start	4.4 to 35 C (39.9 to 95 F)
IAT	4.4 C (39.9 F) or more
Vehicle speed change	Vehicle is driven by steady speed
Fuel slosh	No sloshing (i.e. fairly smooth road)
Time after engine start	Within 50 minutes
FTP change before vacuum introduction	Minimum change
Fuel level	Less than 90 %

TYPICAL MALFUNCTION THRESHOLDS

Purge VSV stuck close P0441:

FTP change during vacuum introduction	Less than 5.25 mmHg (0.7 kPa)

Purge VSV stuck open P0441:

Duration that of the following condition is met	4 seconds or more
FTP before vacuum introduction	Less than -10 mmHg (-1.333 kPa)

MONITOR RESULT

Refer to page 05-385 for detailed information.

The test value and test limit information are described as shown in the following table. Check the monitor result and test values after performing the monitor drive pattern (see page 05-387).

- TID (Test Identification Data) is assigned to each emissions-related component.
- TLT (Test Limit Type):
  If TLT is 0, the component is malfunctioning when the test value is higher than the test limit.
  If TLT is 1, the component is malfunctioning when the test value is lower than the test limit.
- CID (Component Identification Data) is assigned to each test value.
- Unit Conversion is used to calculate the test value indicated on generic OBD ll scan tools.

TID $02: EVAP system - LEV ll Vacuum monitor

TLT	CID	Unit Conversion	Description of Test Data	Description of Test Limit
1	$01	Multiply by 0.183 (mmHg)	Test value of EVAP VSV stuck close: Determined by fuel tank pressure change during vacuum introduction	Malfunction criteria for EVAP VSV stuck closed
0	$02	Multiply by 0.0655 (seconds)	Test value of EVAP VSV stuck open: Determined by duration that fuel tank pressure is higher than criteria	Malfunction criteria for EVAP VSV stuck open
0	$03	Multiply by 0.0655 (seconds)	Test value of canister closed valve (CCV): Determined by duration that fuel tank pressure is lower than criteria	Malfunction criteria for Canister Closed Valve (CCV)
0	$04	Multiply by 0.0458 (mmHg)	Test value 0.04 inch leak: Determined by fuel tank pressure change	Malfunction criteria for 0.04 inch leak
0	$05	Multiply by 0.0458 (mmHg)	Test value 0.02 inch leak: Determined by fuel tank pressure change	Malfunction criteria for 0.02 inch leak

DTC	P0442	EVAPORATIVE EMISSION CONTROL SYSTEM LEAK DETECTED (SMALL LEAK)

DTC	P0455	EVAPORATIVE EMISSION CONTROL SYSTEM LEAK DETECTED (GROSS LEAK)

DTC	P0456	EVAPORATIVE EMISSION CONTROL SYSTEM LEAK DETECTED (VERY SMALL LEAK)

CIRCUIT DESCRIPTION

The circuit description can be found in the EVAP INSPECTION PROCEDURE (see page 05-679).

INSPECTION PROCEDURE

Refer to the EVAP INSPECTION PROCEDURE (see page 05-679).

MONITOR DESCRIPTION

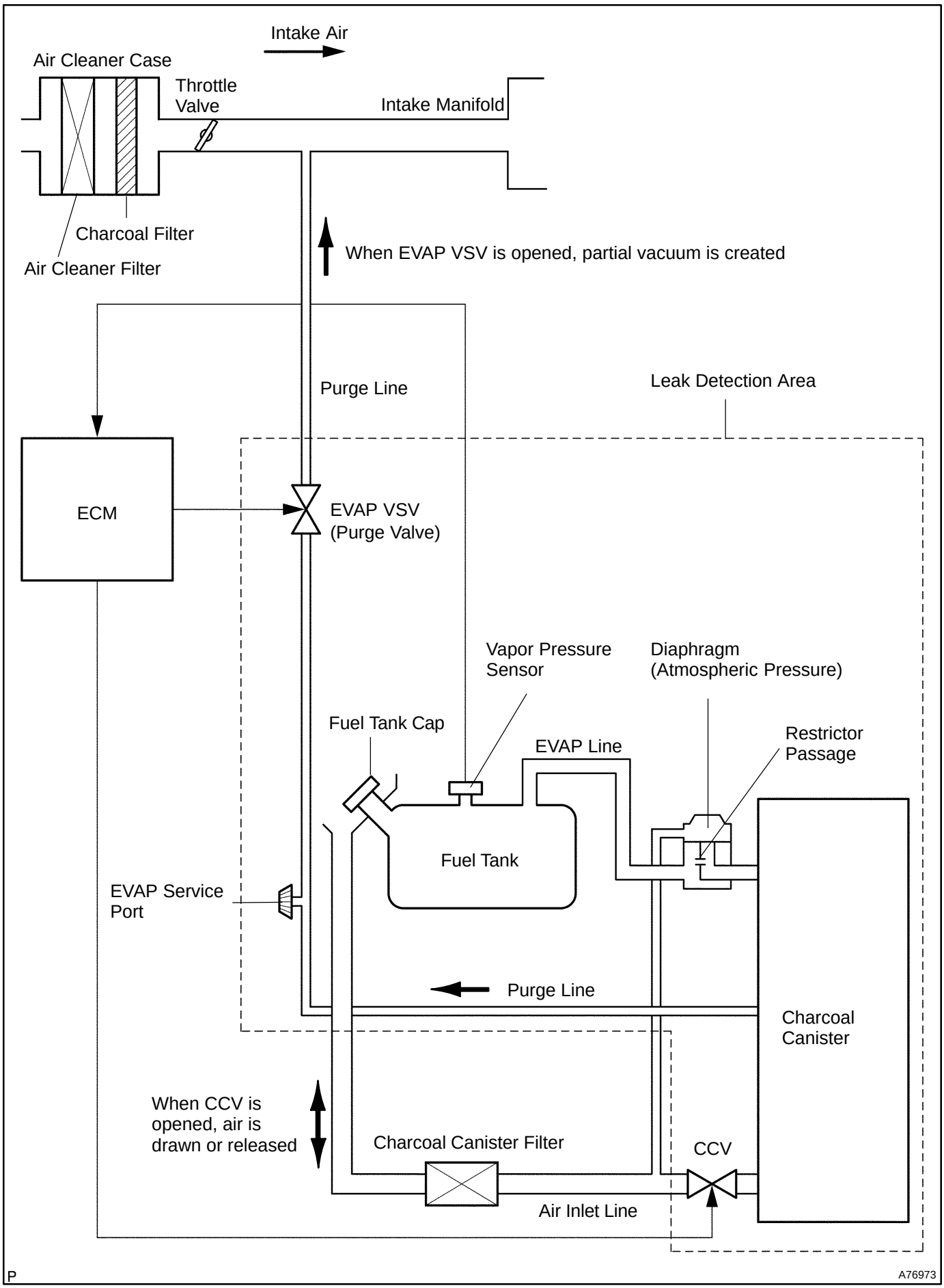
The ECM tests the Evaporative Emissions (EVAP) system using the fuel tank pressure sensor, Canister Close Valve (CCV), and EVAP VSV. The ECM closes the EVAP system and creates negative pressure (vacuum) into it. The ECM then monitors the internal pressure using the fuel tank pressure sensor (refer to the Leak Check graphic).

P0442, P0455 and P0456

A leak in the evaporative emission system prompts the ECM to set DTC P0442, P0455 or P0456.
The ECM checks if the EVAP has leaks. First, the ECM opens the EVAP VSV while the CCV is closed. After a sufficient amount of time has passed, a high negative pressure(vacuum) will develop in the fuel tank as air is drawn into the intake manifold. The EVAP VSV is then closed. The ECM then monitors the pressure increase (loss of vacuum) in the fuel tank. If the pressure rises beyond a specified amount, the ECM determines that the system has a leak, turns on the MIL and outputs a DTC.
The ECM has separate DTCs for small and large leaks:

(1) DTC P0442 is set when the internal fuel tank pressure has a large increase and the EVAP system has a small leak.
(2) DTC P0455 is set when the EVAP system has a very large leak. The ECM tries to create negative pressure (vacuum) in the fuel tank by opening the EVAP VSV while the CCV is closed. However, the fuel tank pressure does not decrease beyond a specified threshold.
(3) DTC P0456 is set when the internal fuel tank pressure increases slightly and the EVAP system has a very small leak.

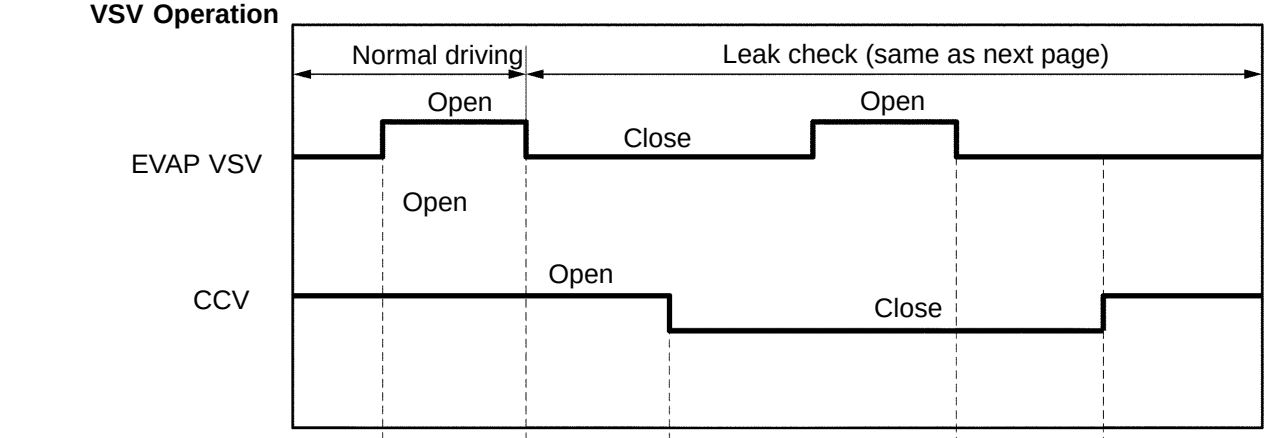
DTC No.	DTC Detection Condition	Trouble Area
P0442 P0455 P0456	○Cold engine start. ○EVAP VSV has been operated and turned OFF, sealing negative pressure (vacuum) in system. ○ECM begins to monitor fuel tank pressure increase and one of the following occurs (2 trip detection logic): (a) Rapid, sharp increase in pressure occurs, indicating small leak in EVAP system. DTC P0442 is set. (b) Negative pressure (vacuum) is not strong enough, indicating large hole in EVAP system. DTC P0455 is set. (c) Increase in pressure above expected amount occurs, indicating small leak in EVAP system. DTC P0456 is set.	○Vacuum hose has cracks, holes, or is blocked, damaged or disconnected ○Fuel tank cap incorrectly installed ○Fuel tank cap has cracks or is damaged ○Open or short in vapor pressure sensor circuit ○Vapor pressure sensor ○Open or short in EVAP VSV circuit ○EVAP VSV ○Open or short in CCV circuit ○CCV ○Fuel tank has cracks, holes, or is damaged ○Charcoal canister has cracks, holes, or is damaged ○Fuel tank over fill check valve cracks, or is damaged ○ECM


Intake Air
Air Cleaner Case
Throttle Valve
Intake Manifold
Charcoal Filter
Air Cleaner Filter
When EVAP VSV is opened, partial vacuum is created
Purge Line
Leak Detection Area
ECM
EVAP VSV (Purge Valve)
Vapor Pressure Sensor
Diaphragm (Atmospheric Pressure)
Fuel Tank Cap
EVAP Line
Restrictor Passage
Fuel Tank
EVAP Service Port
Purge Line
Charcoal Canister
When CCV is opened, air is drawn or released
Charcoal Canister Filter
CCV
Air Inlet Line
P
A76973

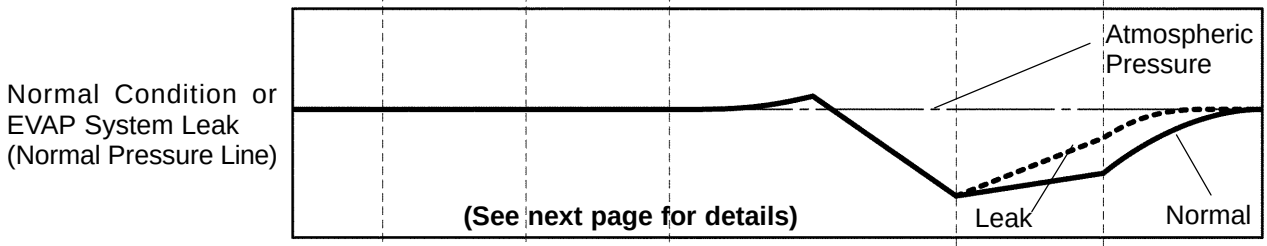
VSV Malfunction Condition and Leak Check

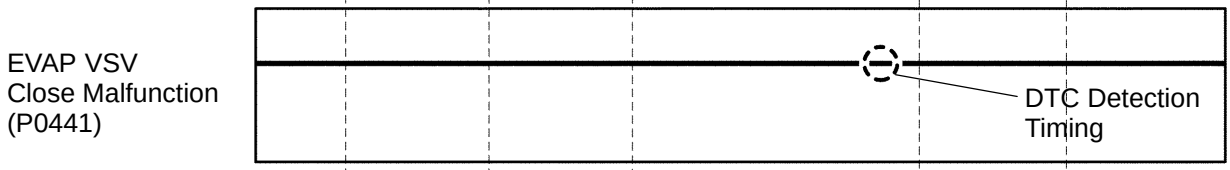
EVAP VSV is Open: ON
CCV is Open: OFF

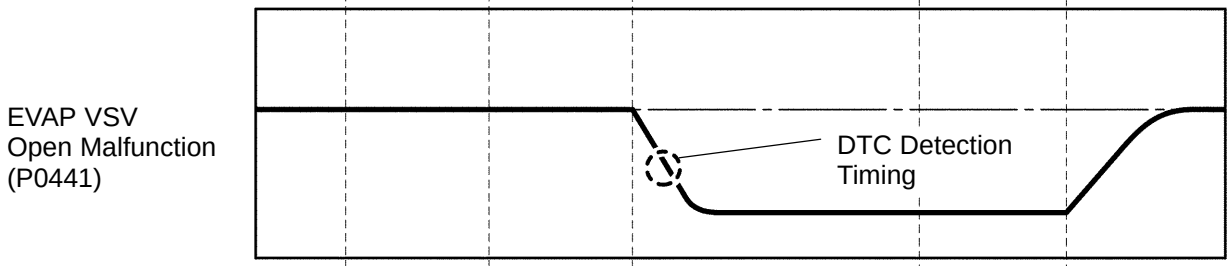
VSV Operation

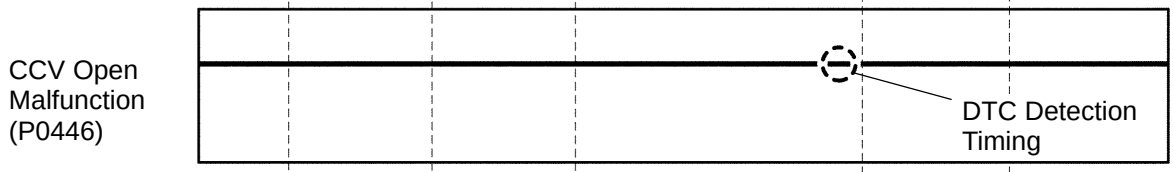


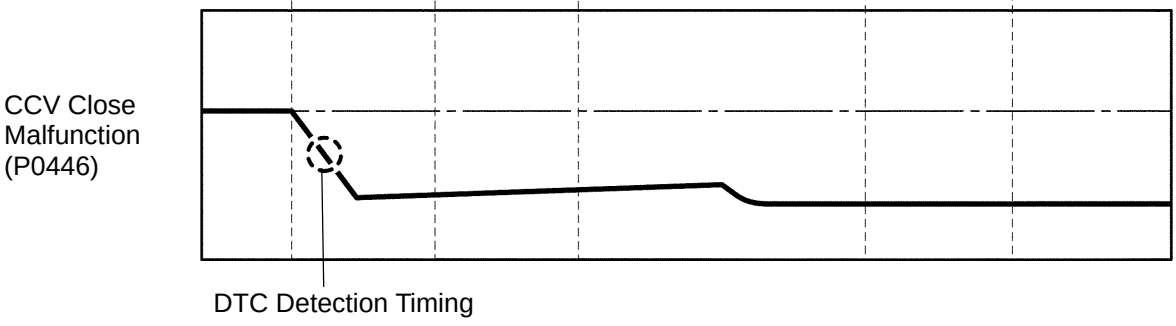
Pressure in Fuel Tank









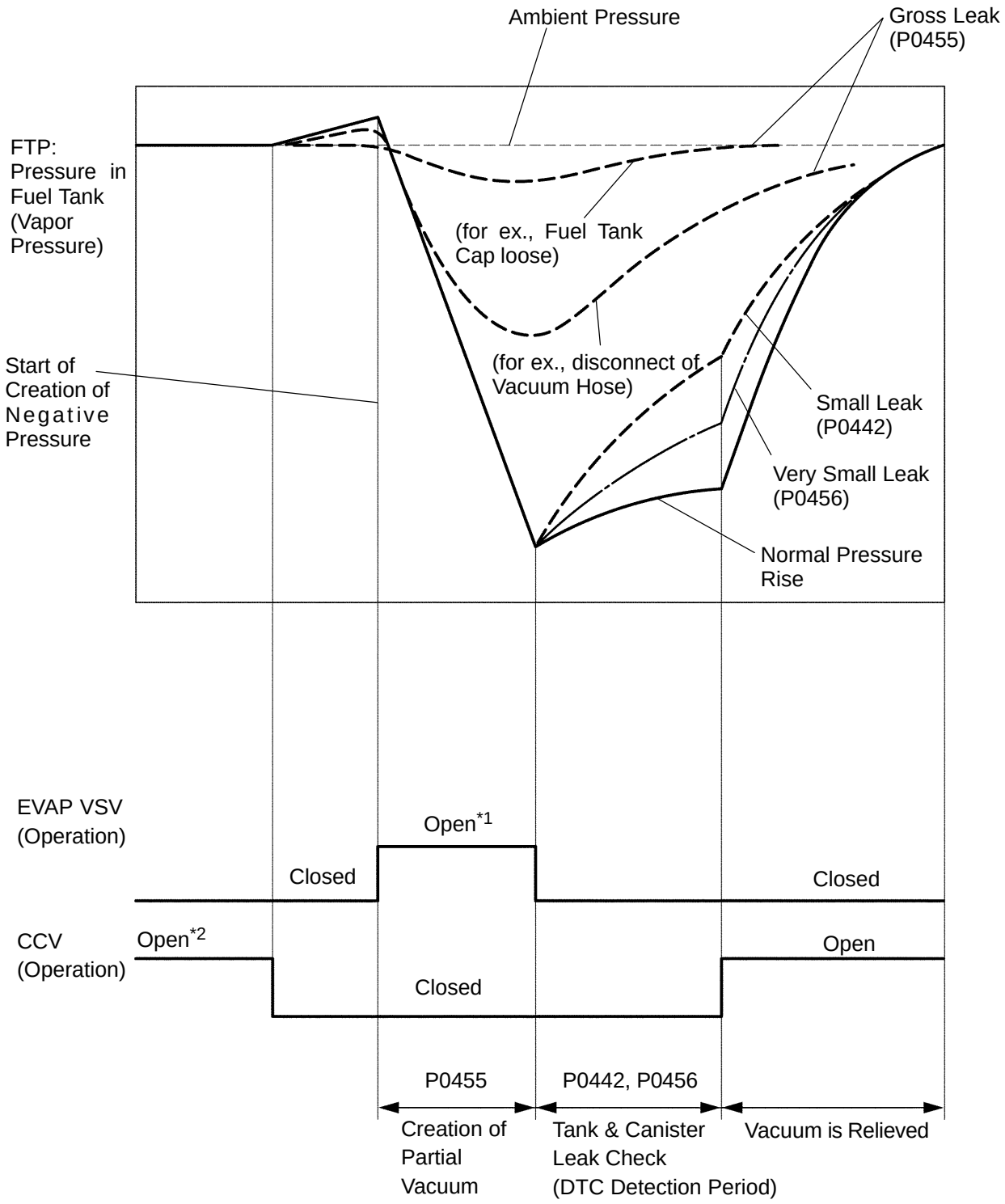


P

A85438

Leak Check

Initial Condition:
⁎Cold start
⁎Engine coolant temperature/intake air temperature are nearly the same



*1: EVAP VSV is Open: ON

*2: CCV is Open: OFF

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MONITOR STRATEGY

Related DTCs	P0442: EVAP 0.04 inch leak P0455: EVAP gross leak P0456: EVAP 0.02 inch leak
Required sensors / components (Main)	CCV, EVAP canister, EVAP hose, Fuel cap, Fuel tank and Purge VSV
Required sensors / components (Related)	ECT sensor, FTP sensor, IAT sensor, MAF meter, Vehicle speed sensor
Frequency of operation	Once per driving cycle
Duration	Within 90 seconds
MIL operation	2 driving cycles
Sequence operation	None

TYPICAL ENABLING CONDITIONS

All:

The monitor will run whenever these DTCs are not present	See page 05-377
Altitude	Less than 7,870 ft. (2,400 m)
Battery voltage	11 V or more
Throttle position learning	Completed
IAT at engine start - ECT at engine start	-7 to 11.1 C (-12.6 to 20 F)
EVAP VSV and CCV	Not operated test by scan tool
Either of the following conditions is met	Condition 1 or 2
1. Purge duty cycle	8% or more (vary with MAF)
2. Purge concentration for 30 seconds	-5 %/% or more when vehicle speed is less than 10 km/h (6.25 mph)
Refuel	Not refueled with engine running
FTP	12.75 mmHg (-1.7 kPa) or more

EVAP 0.02 inch leak P0456:

ECT at engine start	4.4 to 32 C (39.9 to 89.6 F)
IAT at engine start	4.4 to 32 C (39.9 to 89.6 F)
IAT	4.4 C (39.9 F) or more
Vehicle speed change	Vehicle is driven by steady speed
Fuel slosh	No sloshing (i.e. fairly smooth road)
Time after engine start	Within 50 minutes
FTP change before vacuum introduction	Minimum change
Fuel level	Less than 90 %
0.04 inch leak	Not detected
CCV malfunction	Not detected
Vehicle speed	Less than 81.25 mph (130 km/h)
Purge VSV malfunction	Not detected

Others:

ECT at engine start	4.4 to 35 C (39.9 to 95 F)
IAT at engine start	4.4 to 35 C (39.9 to 95 F)
IAT	4.4 C (39.9 F) or more
Vehicle speed change	Vehicle is driven by steady speed
Fuel slosh	No sloshing (i.e. fairly smooth road)
Time after engine start	Within 50 minutes
FTP change before vacuum introduction	Minimum change
Fuel level	Less than 90 %

TYPICAL MALFUNCTION THRESHOLDS

EVAP 0.04 inch leak P0442:

Both of the following conditions are met:	Condition 1 and 2
1. FTP change for 5 seconds from -20 mmHg (-2.67 kPa)	1.3 mmHg (0.17 kPa) or more
2. FTP change for 5 seconds from -17 mmHg (-2.27 kPa)	1.3 mmHg (0.17 kPa) or more

EVAP 0.02 inch leak P0456:

Both of the following conditions are met:	Condition 1 and 2
1. FTP change for 5 seconds when FTP is -17 mmHg (-2.27 kPa)	0.7 mmHg (0.09 kPa) or more
2. FTP change for 5 seconds when FTP is -20 mmHg (-2.67 kPa)	0.7 mmHg (0.09 kPa) or more

EVAP gross leak P0455:

FTP when vacuum introduction compleated	1.3 mmHg (0.17 kPa) or more

MONITOR RESULT

Refer to page 05-385 for detailed information.

The test value and test limit information are described as shown in the following table. Check the monitor result and test values after performing the monitor drive pattern (see page 05-387).

- TID (Test Identification Data) is assigned to each emissions-related component.
- TLT (Test Limit Type):
  If TLT is 0, the component is malfunctioning when the test value is higher than the test limit.
  If TLT is 1, the component is malfunctioning when the test value is lower than the test limit.
- CID (Component Identification Data) is assigned to each test value.
- Unit Conversion is used to calculate the test value indicated on generic OBD ll scan tools.

TID $02: EVAP system - LEV ll Vacuum monitor

TLT	CID	Unit Conversion	Description of Test Data	Description of Test Limit
1	$01	Multiply by 0.183 (mmHg)	Test value of EVAP VSV stuck close: Determined by fuel tank pressure change during vacuum introduction	Malfunction criteria for EVAP VSV stuck closed
0	$02	Multiply by 0.0655 (seconds)	Test value of EVAP VSV stuck open: Determined by duration that fuel tank pressure is higher than criteria	Malfunction criteria for EVAP VSV stuck open
0	$03	Multiply by 0.0655 (seconds)	Test value of canister closed valve (CCV): Determined by duration that fuel tank pressure is lower than criteria	Malfunction criteria for Canister Closed Valve (CCV)
0	$04	Multiply by 0.0458 (mmHg)	Test value 0.04 inch leak: Determined by fuel tank pressure change	Malfunction criteria for 0.04 inch leak
0	$05	Multiply by 0.0458 (mmHg)	Test value 0.02 inch leak: Determined by fuel tank pressure change	Malfunction criteria for 0.02 inch leak

DTC	P0446	EVAPORATIVE EMISSION CONTROL SYSTEM VENT CONTROL CIRCUIT

CIRCUIT DESCRIPTION

The circuit description can be found in the EVAP INSPECTION PROCEDURE (see page 05-679).

INSPECTION PROCEDURE

Refer to the EVAP INSPECTION PROCEDURE (see page 05-679).

MONITOR DESCRIPTION

The ECM tests the Evaporative Emissions (EVAP) system using the fuel tank pressure sensor, Canister Close Valve (CCV), and EVAP VSV. The ECM closes the EVAP system and creates negative pressure (vacuum) into it. The ECM then monitors the internal pressure using the fuel tank pressure sensor (refer to the graphic on page 05-557).

P0446 (FOR SYSTEM DIAGRAM AND DTC DETECTION TIMING CHART, REFER TO DTC P0441 (see page 05-557))

The CCV is open under normal conditions. The CCV has the following features:

(1) After the EVAP VSV purges the EVAP from the fuel tank into the intake manifold, the CCV draws fumes from the fuel tank into the charcoal canister.
(2) Relieves pressure inside the fuel tank when the pressure has suddenly risen.
(3) Along with the EVAP VSV, creates negative pressure (vacuum) inside the fuel tank and performs leak tests.

The ECM checks if the CCV is ”stuck closed”. The ECM commands the CCV to open while the EVAP VSV is open. If high negative pressure (vacuum) develops in the fuel tank and stays for more than 4 seconds, the ECM determines that the CCV remains closed despite the open command. The ECM would then turn on the MIL and output a DTC. The engine coolant temperature is not related to the output of this DTC.

The ECM also has a method for checking if the CCV is ”stuck open”. The ECM commands the CCV to close while the EVAP VSV is open. If a sufficient amount of negative pressure dose not develop in the fuel tank, the ECM determines that the CCV remains open despite the close command. The ECM would then turn on the MIL and output a DTC.

DTC No.	DTC Detection Condition	Trouble Area
P0446	Open or close malfunction in CCV (2 trip detection logic)	・Vacuum hose has cracks, holes, or is blocked, damaged or disconnected ・Fuel tank cap incorrectly installed ・Fuel tank cap has cracks or is damaged ・Open or short in vapor pressure sensor circuit ・Vapor pressure sensor ・Open or short in EVAP VSV circuit ・EVAP VSV ・Open or short in CCV circuit ・CCV ・Fuel tank has cracks, holes, or is damaged ・Charcoal canister has cracks, holes, or is damaged ・Fuel tank over fill check valve cracks, or is damaged ・ECM

MONITOR STRATEGY

Related DTCs	P0446: CCV stuck open P0446: CCV stuck close
Required sensors / components (Main)	CCV, EVAP canister, EVAP hose, Fuel cap, Fuel tank and Purge VSV
Required sensors / components (Related)	ECT sensor, FTP sensor, IAT sensor, MAF meter, Vehicle speed sensor
Frequency of operation	Once per driving cycle
Duration	Within 60 seconds
MIL operation	2 driving cycles
Sequence operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever these DTCs are not present	See page 05-377
Altitude	Less than 7,870 ft. (2,400 m)
Battery voltage	11 V or more
Throttle position learning	Completed
IAT at engine start - ECT at engine start	-7 to 11.1°C (-12.6 to 20°F)
EVAP VSV and CCV	Not operated test by scan tool
Either of the following conditions is met	Condition 1 or 2
1. Purge duty cycle	8% or more (vary with MAF)
2. Purge concentration for 30 seconds	-5 %/% or more when vehicle speed is less than 10 km/h (6.25 mph)
Refuel	Not refueled with engine running
FTP	12.75 mmHg (-1.7 kPa) or more
ECT at engine start	4.4 to 35°C (39.9 to 95°F)
IAT at engine start	4.4 to 35°C (39.9 to 95°F)
IAT	4.4°C (39.9°F) or more
Vehicle speed change	Vehicle is driven by steady speed
Fuel slosh	No sloshing (i.e. fairly smooth road)
Time after engine start	Within 50 minutes
FTP change before vacuum introduction	Minimum change
Fuel level	Less than 90 %

TYPICAL MALFUNCTION THRESHOLDS

CCV stuck close P0446:

Duration that the following conditions 1 and 2 are met:	4 seconds or more
1. Accumulated purge volume	0.5 g or more
2. FTP	Less than -12.75 mmHg (-1.7 kPa)

CCV stuck open P0446:

Purge VSV stuck closed	Detected

MONITOR RESULT

Refer to page 05-385 for detailed information.

The test value and test limit information are described as shown in the following table. Check the monitor result and test values after performing the monitor drive pattern (see page 05-387).

- TID (Test Identification Data) is assigned to each emissions-related component.
- TLT (Test Limit Type):
  If TLT is 0, the component is malfunctioning when the test value is higher than the test limit.
  If TLT is 1, the component is malfunctioning when the test value is lower than the test limit.
- CID (Component Identification Data) is assigned to each test value.
- Unit Conversion is used to calculate the test value indicated on generic OBD ll scan tools.

TID $02: EVAP system - LEV ll Vacuum monitor

TLT	CID	Unit Conversion	Description of Test Data	Description of Test Limit
1	$01	Multiply by 0.183 (mmHg)	Test value of EVAP VSV stuck close: Determined by fuel tank pressure change during vacuum introduction	Malfunction criteria for EVAP VSV stuck closed
0	$02	Multiply by 0.0655 (seconds)	Test value of EVAP VSV stuck open: Determined by duration that fuel tank pressure is higher than criteria	Malfunction criteria for EVAP VSV stuck open
0	$03	Multiply by 0.0655 (seconds)	Test value of canister closed valve (CCV): Determined by duration that fuel tank pressure is lower than criteria	Malfunction criteria for Canister Closed Valve (CCV)
0	$04	Multiply by 0.0458 (mmHg)	Test value 0.04 inch leak: Determined by fuel tank pressure change	Malfunction criteria for 0.04 inch leak
0	$05	Multiply by 0.0458 (mmHg)	Test value 0.02 inch leak: Determined by fuel tank pressure change	Malfunction criteria for 0.02 inch leak

DTC	P0451	EVAPORATIVE EMISSION CONTROL SYSTEM PRESSURE SENSOR RANGE/PERFORMANCE

DTC	P0452	EVAPORATIVE EMISSION CONTROL SYSTEM PRESSURE SENSOR/SWITCH LOW INPUT

DTC	P0453	EVAPORATIVE EMISSION CONTROL SYSTEM PRESSURE SENSOR/SWITCH HIGH INPUT

MONITOR DESCRIPTION

DTC "P0451, P0452 or P0453" is recorded by the ECM when the vapor pressure sensor malfunctions.

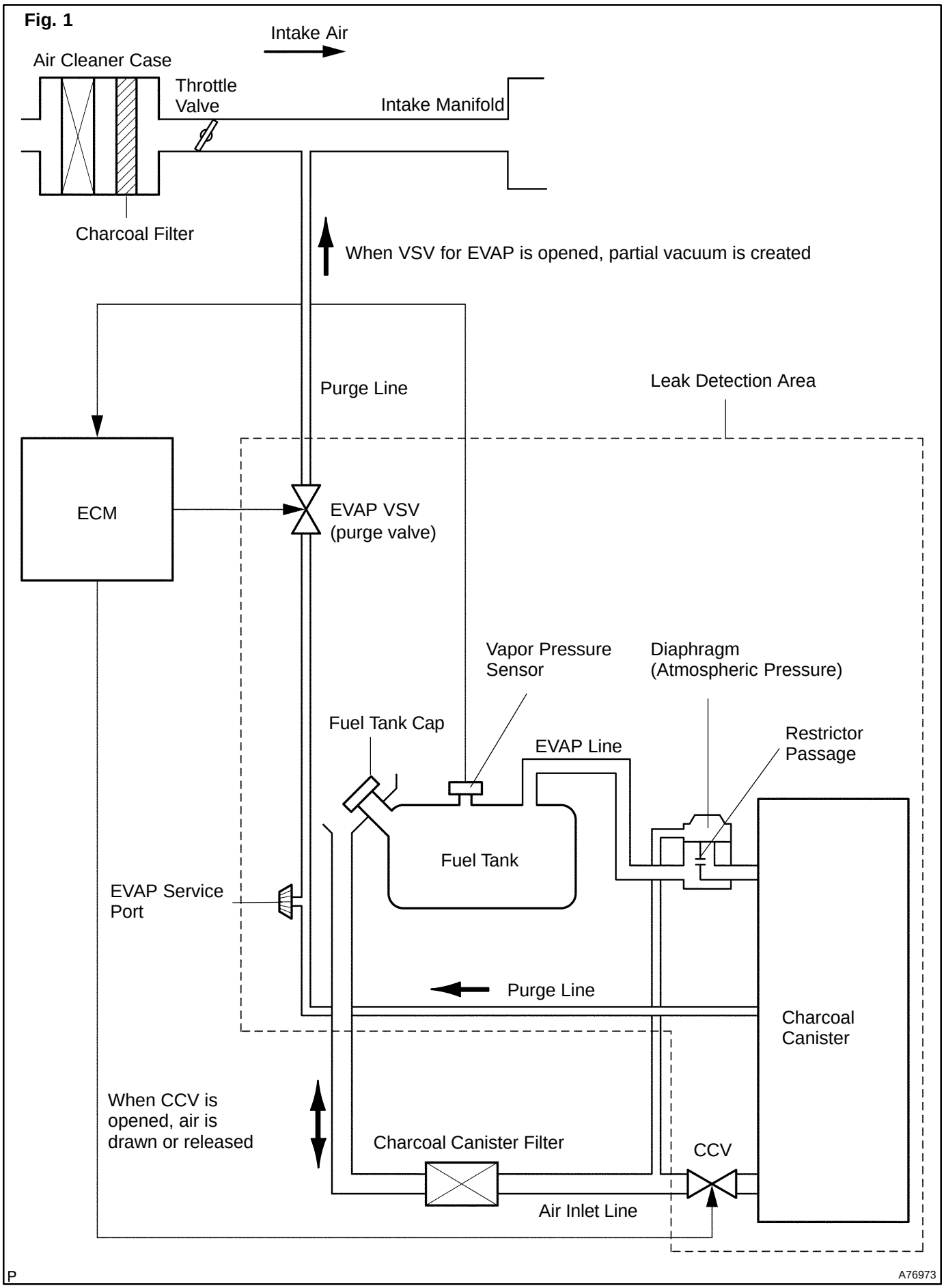
P0451

The ECM monitors the vapor pressure sensor in two ways. One method examines the fluctuation of the electrical signal while the engine is idling. If the pressure signal varies beyond the specified range more than 7 times, the ECM interprets this as a fault in the vapor pressure sensor. The ECM also verifies that the pressure signal changes within the specified range. If the output of the sensor does not vary for 5 minutes while the intake air amount has been changing, the ECM interprets this as a fault in the vapor pressure sensor. DTC P0451 will be set when either of the faults occurs and the ECM will turn on the MIL.

P0452 and P0453

When pressure indicated by the vapor pressure sensor deviates below -3.999 kPa (-30 mmHg) or above 1.999 kPa (15 mmHg), the ECM interprets this as a malfunction in the vapor pressure sensor. The ECM will turn on the MIL and a DTC will be set.

Fig. 1


Intake Air
Air Cleaner Case
Throttle Valve
Intake Manifold
Charcoal Filter
When VSV for EVAP is opened, partial vacuum is created
Purge Line
Leak Detection Area
ECM
EVAP VSV (purge valve)
Vapor Pressure Sensor
Diaphragm (Atmospheric Pressure)
Fuel Tank Cap
EVAP Line
Restrictor Passage
Fuel Tank
EVAP Service Port
Purge Line
Charcoal Canister
When CCV is opened, air is drawn or released
Charcoal Canister Filter
CCV
Air Inlet Line
P
A76973

DTC No.	DTC Detection Condition	Trouble Area
P0451	Vapor pressure sensor output changes extremely under these conditions: ・Vapor pressure sensor output changes often while vehicle speed is 0 km/h (0 mph) and the engine is idling 5 to 10 seconds (2 trip detection logic) ・Vapor pressure sensor output is stuck 5 minutes (2 trip detection logic)	・Open or short in vapor pressure sensor circuit ・Vapor pressure sensor ・ECM
P0452	Vapor pressure sensor output remains less than -30 mmHg (2 trip detection logic)	・Open or short in vapor pressure sensor circuit ・Vapor pressure sensor ・ECM
P0453	Vapor pressure sensor output remains more than 15 mmHg (2 trip detection logic)	・Open or short in vapor pressure sensor circuit ・Vapor pressure sensor ・ECM

MONITOR STRATEGY

Related DTCs	P0451: FTP Sensor Noise P0451: FTP Sensor Stuck P0452: FTP Sensor Range Check (Low voltage) P0453: FTP Sensor Range Check (High voltage)
Required sensors / components (Main)	FTP sensor
Required sensors / components (Related)	ECT sensor, IAT sensor
Frequency of operation	Once per driving cycle
Duration	7 seconds: FTP Sensor Range Check 45 seconds: FTP Sensor Noise 5 minutes: FTP Sensor Stuck
MIL operation	2 driving cycles
Sequence operation	None

TYPICAL ENABLING CONDITIONS

All:

The monitor will run whenever these DTCs are not present	See page 05-377

FTP Sensor Noise P0451:

Altitude	7,870 ft. (2,400 m) or less
Battery voltage	11 V or more
Throttle position learning	Completed
FTP sensor malfunction (P0452, P0453)	Not detected
IAT at engine start - ECT at engine start	-7 to 11.1°C (-12.6 to 20°F)
EVAP VSV, CCV	Not operated by scan tool
ECT at engine start	4.4 to 35°C (40 to 95°F)
IAT at engine start	4.4 to 35°C (40 to 95°F)

FTP Sensor Stuck P0451:

Altitude	7,870 ft. (2,400 m) or less
Battery voltage	11 V or more
Throttle position learning	Completed
FTP sensor malfunction (P0452, P0453)	Not detected
IAT at engine start - ECT at engine start	-7 to 11.1°C (-12.6 to 20°F)
EVAP VSV, CCV	Not operated by scan tool
ECT at engine start	4.4 to 35°C (40 to 95°F)
IAT at engine start	4.4 to 35°C (40 to 95°F)
Time after engine start	5 seconds or more
0.04 inch leak	Not detected
0.02 inch leak	Not detected
CCV malfunction	Not detected

FTP Sensor Range Check P0452,P0453:

ECT at engine start	10 to 35°C (50 to 95°F)
IAT at engine start	10 to 35°C (50 to 95°F)
IAT at engine start - ECT at engine start	Less than 12°C (21.6°F)
Engine condition	Running

TYPICAL MALFUNCTION THRESHOLDS

FTP Sensor Noise P0451:

Frequency that FTP change	6 times or more

FTP Sensor Stuck P0451:

FTP change	No change for 5 minutes

FTP Sensor Range Check (Low voltage) P0452:

FTP	Less than -30 mmHg (-3.999 kPa)

FTP Sensor Range Check (High voltage) P0453:

FTP	15 mmHg (1.999 kPa) or more

COMPONENT OPERATING RANGE

FTP	-26 to 11 mmHg (-3.5 to 1.5 kPa) or more [734 to 771 mmHg]

WIRING DIAGRAM

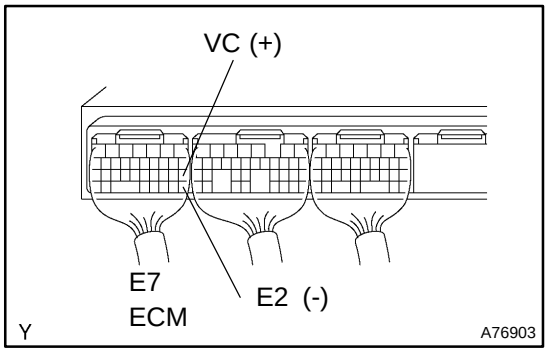
Refer to the EVAP INSPECTION PROCEDURE (see page 05-679).

INSPECTION PROCEDURE

HINT:

- If DTCs related to different system that have terminal E2 as the ground terminal are output simultaneously, terminal E2 may have an open circuit.
- Always troubleshoot DTCs P0441 (purge flow), P0446 (VSV for CCV), P0451, P0452 and P0453 (evaporative pressure sensor) before troubleshooting DTCs P0442, P0455 or P0456.
- Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time the malfunction occured.
- When the ENGINE RUN TIME in the freeze frame data is less than 200 seconds, carefully check the vapor pressure sensor.

1	INSPECT ECM (VC VOLTAGE)



(a) Turn the ignition switch ON.

(b) Check the voltage of the ECM connector.

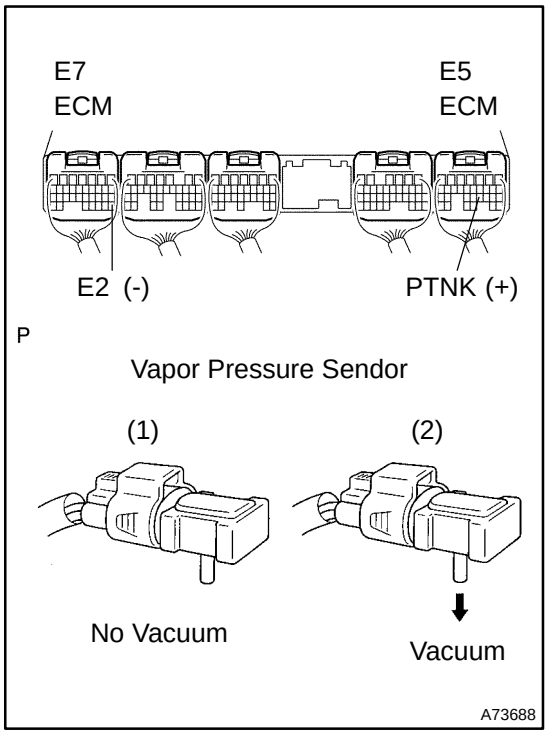
Standard:

Tester Connection	Specified Condition
E7-18 (VC) - E7-28 (E2)	4.5 to 5.5 V

NG → **REPLACE ECM (See page 10-24)**

OK

2 INSPECT ECM (PTNK VOLTAGE)



(a) Turn the ignition switch ON.
(b) Check the voltage of the ECM connectors.
(1) Disconnect the vacuum hose from the vapor pressure sensor.

Standard (1):

Tester Connection	Specified Condition
E5-21 (PTNK) - E7-28 (E2)	2.9 to 3.7 V

(2) Using a MITYVAC (hand-held vacuum pump), apply a vacuum of 4.0 kPa (30 mmHg, 1.18 in.Hg) to the vapor pressure sensor.

NOTICE:
The vacuum applied to the vapor pressure sensor must be less than 66.7 kPa (500 mmHg, 19.7 in.Hg).

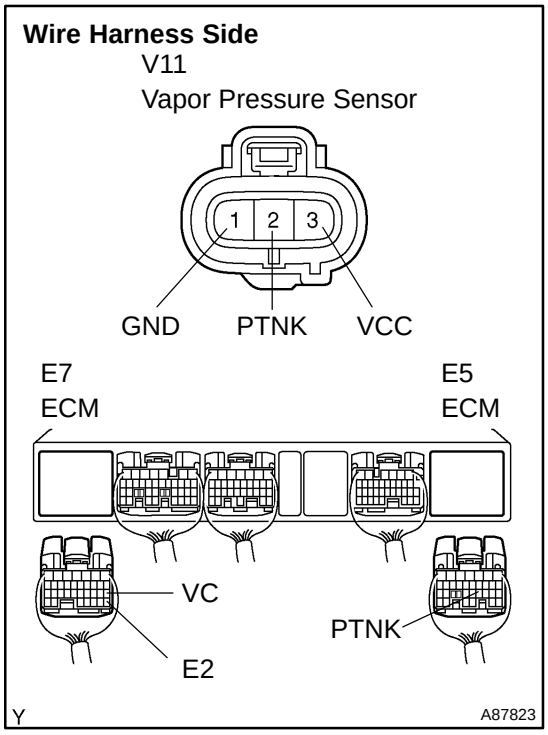
Standard (2):

Tester Connection	Specified Condition
E5-21 (PTNK) - E7-28 (E2)	0.5 V or less

OK → **REPLACE ECM (See page 10-24)**

NG

3 CHECK WIRE HARNESS (VAPOR PRESSURE SENSOR - ECM)



(a) Disconnect the V11 vapor pressure sensor connector.
(b) Disconnect the E5 and E7 ECM connectors.
(c) Check the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
V11-2 (PTNK) - E5-21 (PTNK) V11-1 (GND) - E7-28 (E2) V11-3 (VCC) - E7-18 (VC)	Below 1 Ω
V11-2 (PTNK) or E5-21 (PTNK) - Body ground V11-3 (VCC) or E7-18 (VC) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

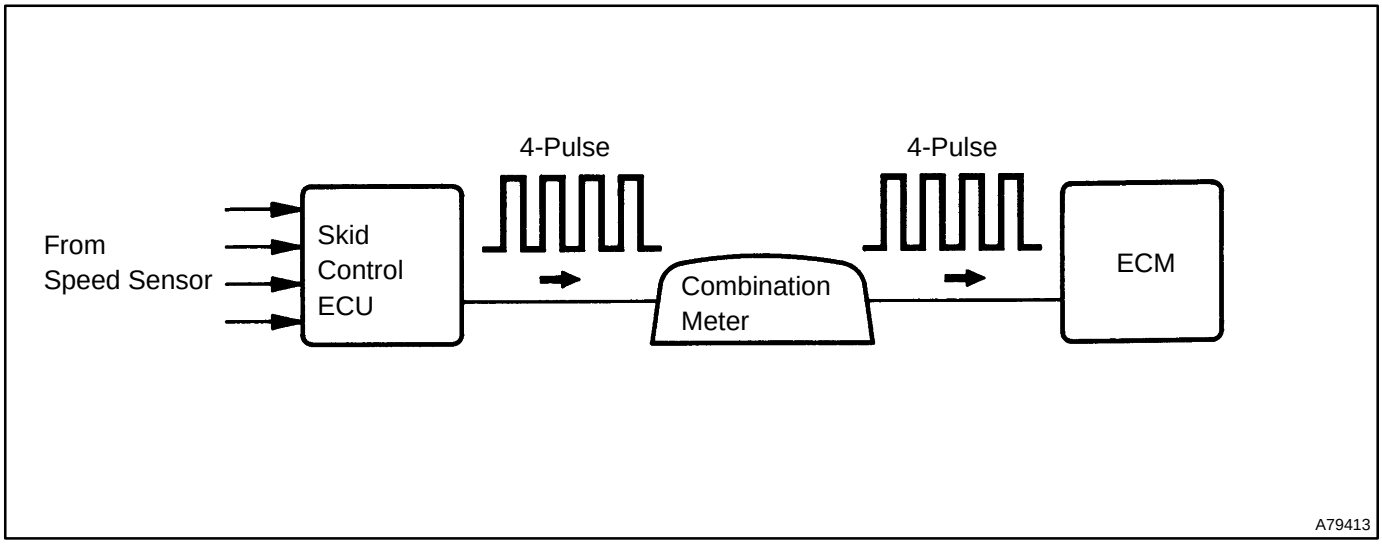
REPLACE VAPOR PRESSURE SENSOR ASSY

DTC	P0500	VEHICLE SPEED SENSOR ”A”

DTC	P0503	VEHICLE SPEED SENSOR ”A” INTERMITTENT/ERRATIC/HIGH

CIRCUIT DESCRIPTION

The Vehicle Speed Sensor (VSS) detects the wheel speed and sends the appropriate signals to the skid control ECU. The skid control ECU converts these wheel speed signals into a 4-pulse signal and outputs it to the ECM via the combination meter. The ECM determines the vehicle speed based on the frequency of these pulse signals.



DTC No.	DTC Detection Condition	Trouble Area
P0500 P0503	The ECM detects the following conditions simultaneously for 1 second (1 trip detection logic): ・No SPD (VSS) signal is output when ECM detects NC (transmission counter gear) signal is more than 300 RPM. ・PNP switch is OFF (When shift lever is in other than P and N positions)	・Open or short in VSS circuit ・VSS ・Combination meter ・ECM ・Skid control ECU

MONITOR DESCRIPTION

The ECM assumes that the vehicle is being driven when the transmission counter gear indicates more than 300 rpm and over 30 seconds have passed since the PNP switch was turned OFF. If there is no signal from the vehicle speed sensor with these conditions satisfied, the ECM concludes that the vehicle speed sensor is malfunctioning. The ECM will turn on the MIL and will set a DTC.

MONITOR STRATEGY

Related DTCs	P0500: VSS Circuit
Required sensors / components (Main)	VSS, Combination meter, ABS ECU
Required sensors / components (Related)	Transmission counter gear Speed (CS) sensor, PNP switch, ECT sensor
Frequency of operation	Continuous
Duration	2 seconds
MIL operation	Immediate
Sequence operation	None

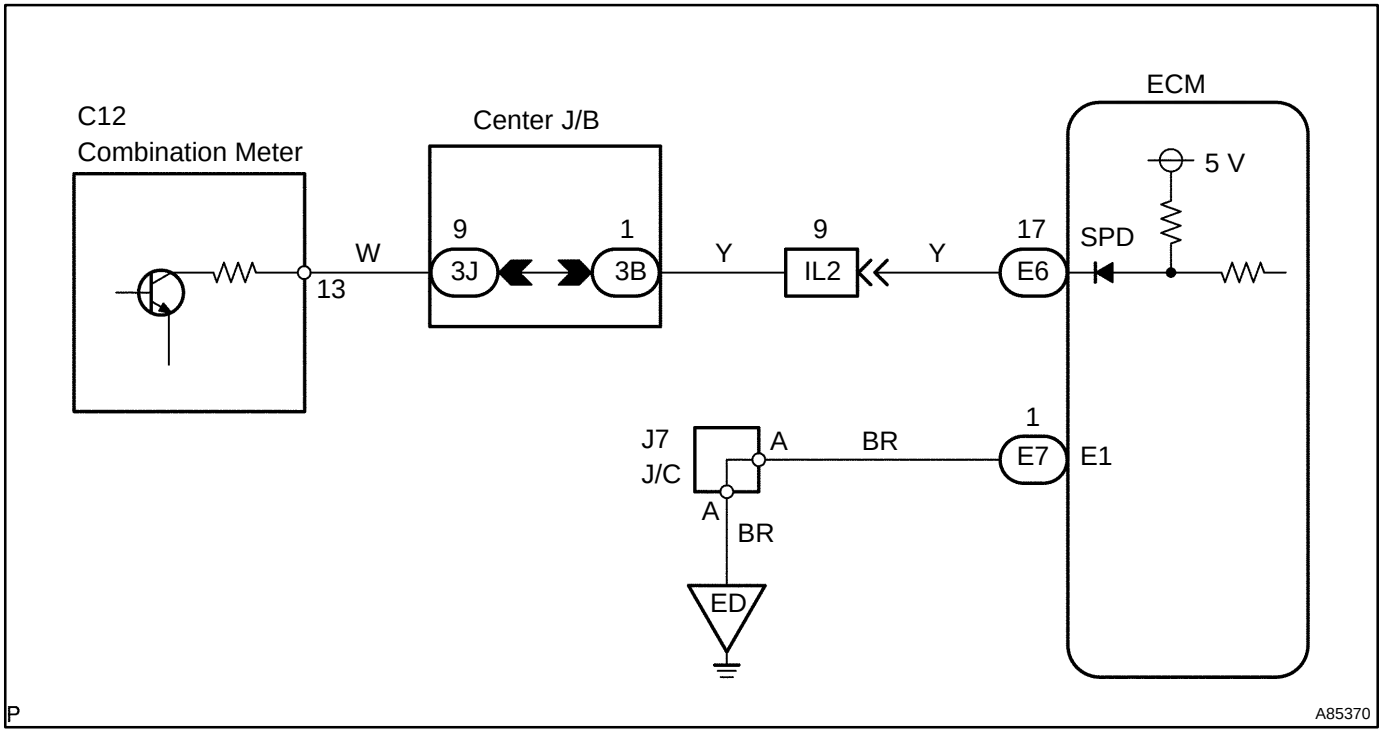
TYPICAL ENABLING CONDITIONS

The monitor will run whenever these DTCs are not present	See page 05-377
Battery voltage	8 V or more
Ignition switch	ON
Starter	OFF
Engine condition	Running
Transmission counter gear speed	300 rpm or more
Either of the following condition is met:	Condition 1 or 2
Condition 1	-
Engine coolant temperature	20°C (68°F) or more
ECT sensor	Not malfunction (P0115 or P0116)
Time after PNP switch turns from ON to OFF	2 seconds or more
Condition 2	-
Engine coolant temperature	ECT is less than 20°C (68°F)
ECT sensor	Malfunction (P0115 or P0116)
Time after PNP switch turns from ON to OFF	30 seconds or more

TYPICAL MALFUNCTION THRESHOLDS

VSS signal	No pulse input

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

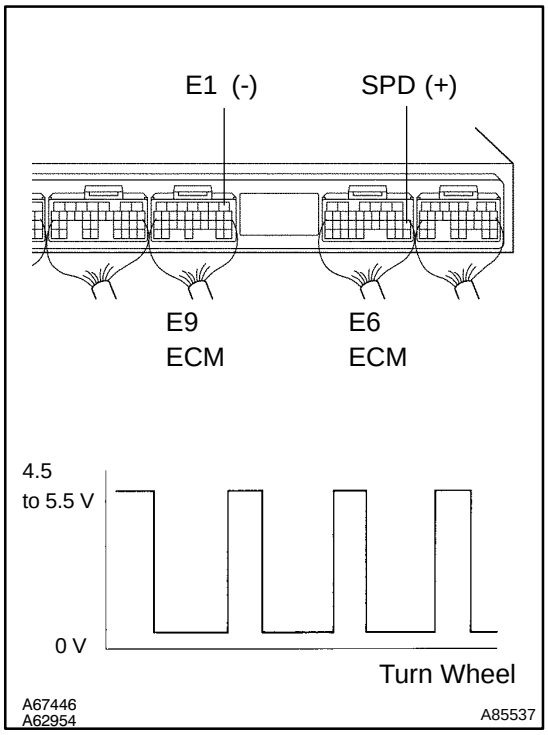
1	CHECK OPERATION OF SPEEDOMETER

(a) Drive the vehicle and check if operation of the speedometer in the combination meter is normal.
HINT:
The vehicle speed sensor is operating normally if the speedometer display is normal.

NG → **CHECK SPEEDOMETER CIRCUIT (See page 71-3)**

OK

2	INSPECT ECM (SPD VOLTAGE)



(a) Shift the lever to the neutral position.
(b) Jack up the vehicle.
(c) Turn the ignition switch ON.
(d) Check the voltage of the ECM connectors as the wheel is turned slowly.
Standard:

Tester Connection	Specified Condition
E6-17 (SPD) - E9-1 (E1)	Generated intermittently

HINT:
The output voltage should fluctuate up and down similarly to the diagram on the left when the wheel is turned slowly.

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE ECM (See page 10-24)

DTC P0504 BRAKE SWITCH "A"/"B" CORRELATION

CIRCUIT DESCRIPTION

In addition to turning on the stop lamps, the stop lamp switch signals are used for a variety of engine, transmission, and suspension functions as well as being an input for diagnostic checks. It is important that the switch operates properly, therefore this switch is designed with two complementary signal outputs: STP and ST1-. The ECM analyzes these signal outputs to detect malfunctions in the stop lamp switch.

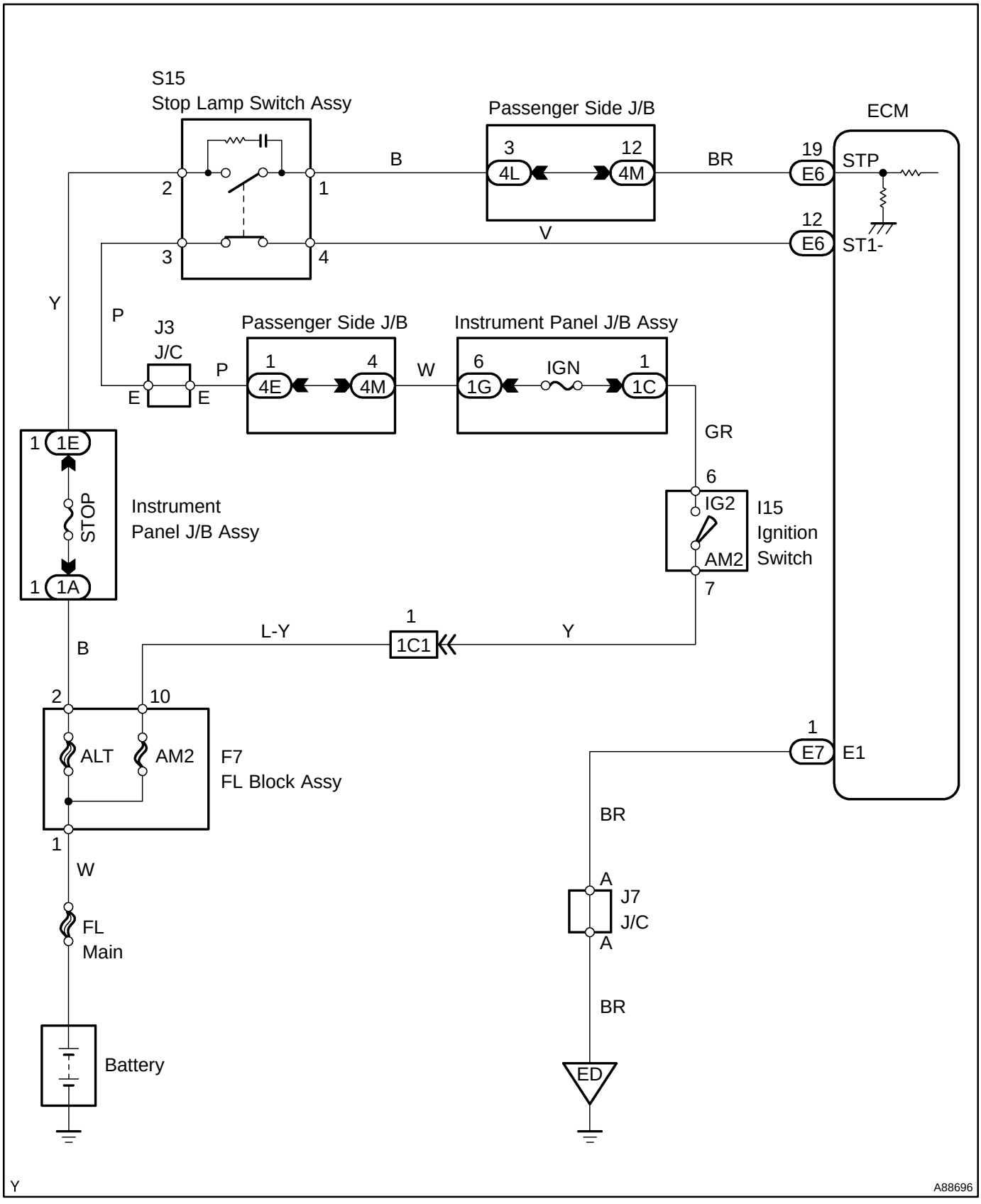
HINT:

Normal condition is as shown in the table.

Signal	Brake pedal released	In transition	Brake pedal depressed
STP	OFF	ON	ON
ST1-	ON	ON	OFF

DTC No.	DTC Detection Condition	Trouble Area
P0504	Conditions (a), (b) and (c) continue for 0.5 seconds or more: (a) Ignition switch ON (b) Brake pedal released (c) STP signal is OFF when the ST1- signal is OFF	・Short in stop lamp switch signal circuit ・STOP fuse ・Stop lamp switch ・ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

Hand-held tester:

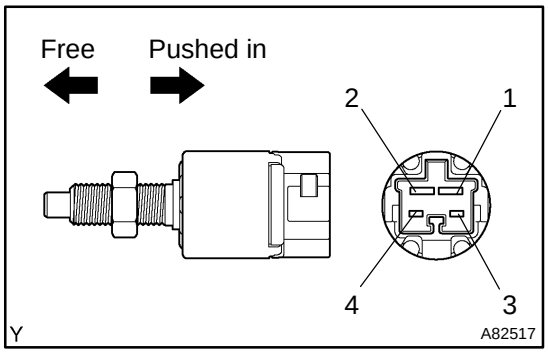
1	CHECK STOP LAMP (OPERATION)

(a) Check if the stop lamps turn on and off normally when the brake pedal is depressed and released.
OK: The stop lamps turn on when you depress the brake pedal.

NG → **REPAIR OR REPLACE STOP LAMP SWITCH CIRCUIT**

OK

2	INSPECT STOP LAMP SWITCH ASSY



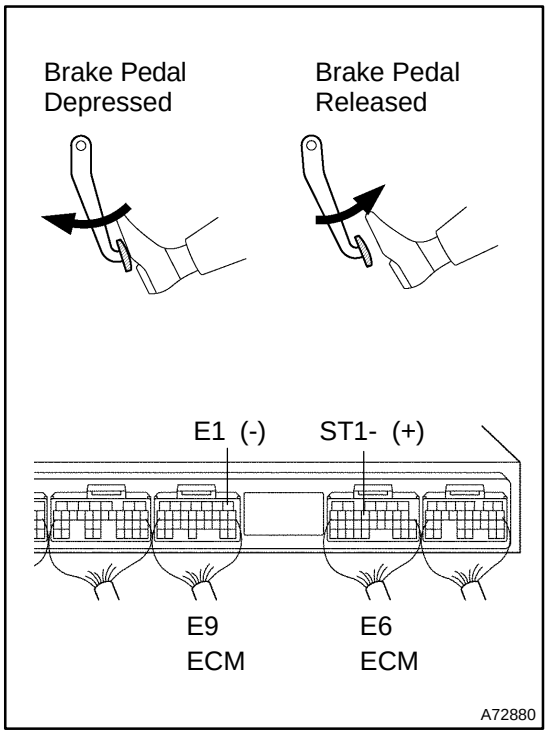
(a) Check the resistance of the switch terminals.
Standard:

Switch condition	Tester Connection	Specified Condition
Switch pin free	1 - 2	Below 1 Ω
Switch pin free	3 - 4	10 kΩ or higher
Switch pin pushed in	1 - 2	10 kΩ or higher
Switch pin pushed in	3 - 4	Below 1 Ω

NG → **REPLACE STOP LAMP SWITCH ASSY**

OK

3 READ VALUE OF HAND-HELD TESTER (STP SIGNAL, ST1- VOLTAGE)



(a) Turn the ignition switch ON.
(b) On the hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / STOP LIGHT SW. Read the values.
Standard:

Brake Pedal Condition	Specified Condition
Depressed	STP Signal ON
Released	STP Signal OFF

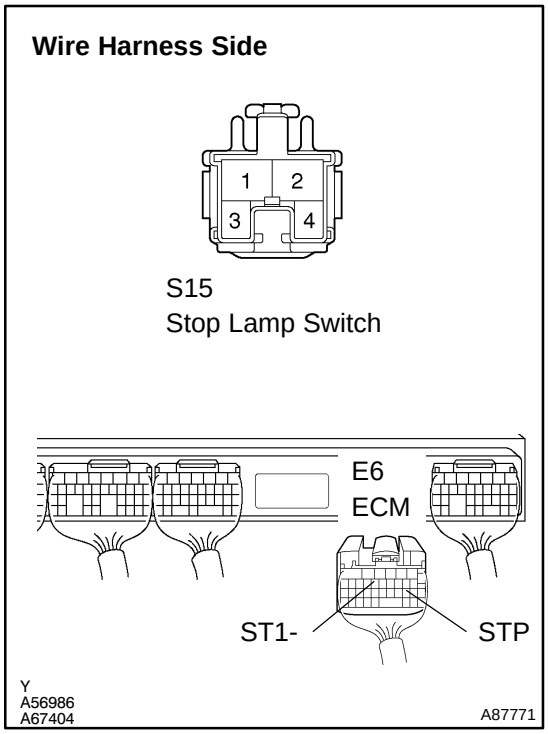
(c) Check the voltage of the ECM connectors.
OK:

Tester Connection	Brake Pedal Condition	Specified Condition
E6-12 (ST1-) - E9-1 (E1)	Depressed	Below 1.5 V
E6-12 (ST1-) - E9-1 (E1)	Released	7.5 to 14 V

OK → **CHECK FOR INTERMITTENT PROBLEMS (See page 05-370)**

NG

4 CHECK WIRE HARNESS (STOP LAMP SWITCH - ECM)



(a) Disconnect the S15 stop lamp switch connector.
(b) Disconnect the E6 ECM connector.
(c) Check the resistance of the wire harness side connectors.
Standard:

Tester Connection	Specified Condition
S15-1 - E6-19 (STP) S15-4 - E6-12 (ST1-)	Below 1 Ω
S15-1 or E6-19 (STP) - Body ground S15-4 or E6-12 (ST1-) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE ECM (See page 10-24)

OBD II scan tool (excluding hand-held tester):

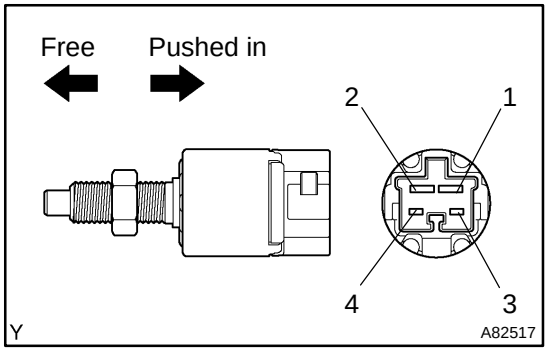
1	CHECK STOP LAMP (OPERATION)

(a) Check if the stop lamps turn on and off normally when the brake pedal is depressed and released.
OK: The stop lamps turn on when you depress the brake pedal.

NG → **REPAIR OR REPLACE STOP LAMP SWITCH CIRCUIT**

OK

2	INSPECT STOP LAMP SWITCH ASSY



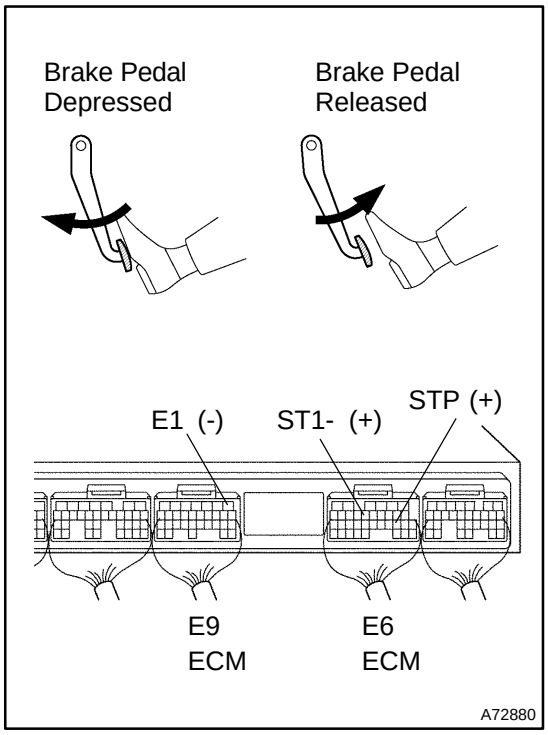
(a) Check the resistance of the switch terminals.
Standard:

Switch condition	Tester Connection	Specified Condition
Switch pin free	1 - 2	Below 1 Ω
Switch pin free	3 - 4	10 kΩ or higher
Switch pin pushed in	1 - 2	10 kΩ or higher
Switch pin pushed in	3 - 4	Below 1 Ω

NG → **REPLACE STOP LAMP SWITCH ASSY**

OK

3 INSPECT ECM (STP, ST1- VOLTAGE)



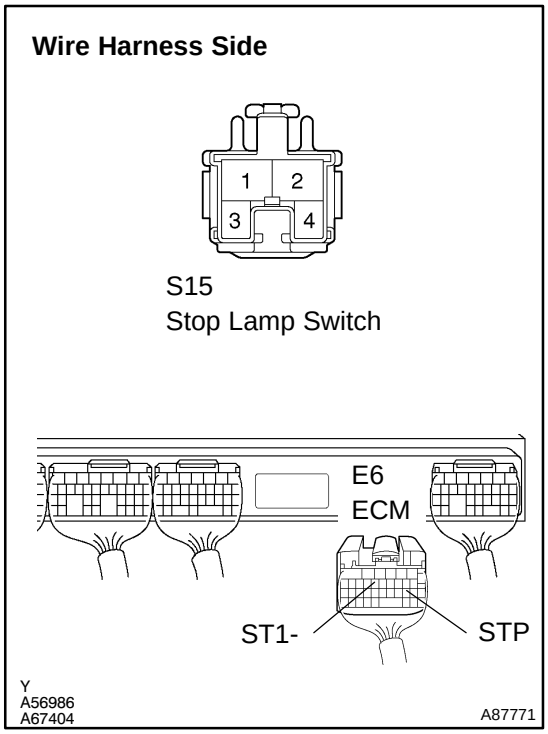
(a) Turn the ignition switch ON.
(b) Check the voltage of the ECM connectors.
Standard:

Tester Connection	Brake Pedal Condition	Specified Condition
E6-19 (STP) - E9-1 (E1)	Depressed	7.5 to 14 V
E6-19 (STP) - E9-1 (E1)	Released	Below 1.5 V
E6-12 (ST1-) - E9-1 (E1)	Depressed	Below 1.5 V
E6-12 (ST1-) - E9-1 (E1)	Released	7.5 to 14 V

OK → **CHECK FOR INTERMITTENT PROBLEMS (See page 05-370)**

NG

4 CHECK WIRE HARNESS (STOP LAMP SWITCH - ECM)



(a) Disconnect the S15 stop lamp switch connector.
(b) Disconnect the E6 ECM connector.
(c) Check the resistance of the wire harness side connectors.
Standard:

Tester Connection	Specified Condition
S15-1 - E6-19 (STP) S15-4 - E6-12 (ST1-)	Below 1 Ω
S15-1 or E6-19 (STP) - Body ground S15-4 or E6-12 (ST1-) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

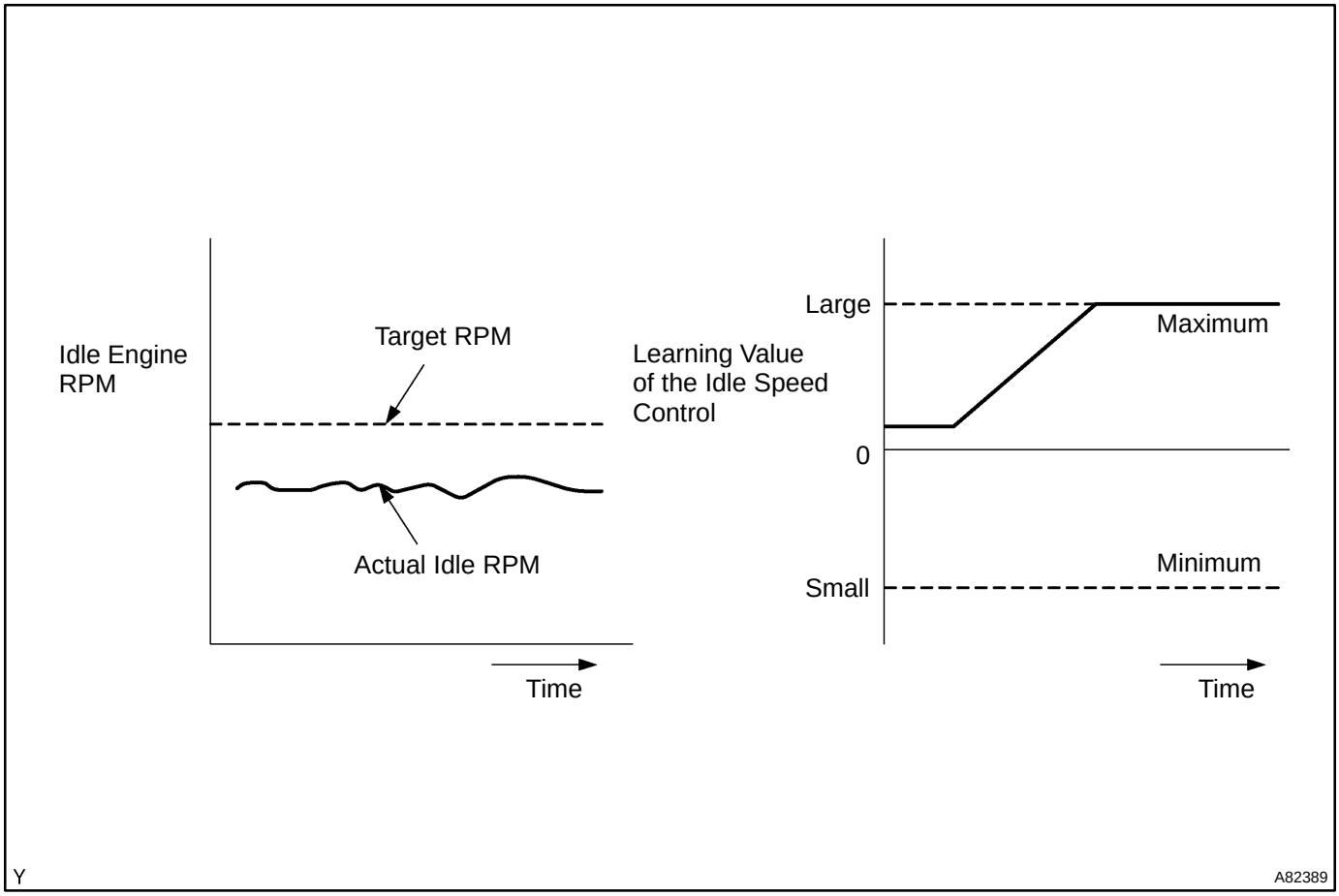
OK

REPLACE ECM (See page 10-24)

DTC	P0505	IDLE AIR CONTROL SYSTEM

MONITOR DESCRIPTION

The idle speed is controlled by the Electronic Throttle Control System (ETCS).
The ETCS is composed of the throttle motor, which operates the throttle valve, and the throttle position sensor, which detects the opening angle of the throttle valve.
The ECM controls the throttle motor to provide the proper throttle valve opening angle to obtain the target idle speed.
The ECM regulates the idle speed by opening and closing the throttle valve using the ETCS. The ECM concludes that the idle speed control ECM function is malfunctioning if: 1) the actual idle RPM varies more than the specified amount five times or more during a drive cycle, or 2) a learning value of the idle speed control remains at the maximum or minimum five times or more during a drive cycle. The ECM will turn on the MIL and set a DTC.
Example:
If the actual idle RPM varies from the target idle RPM by more than 200* rpm five times during a drive cycle, the ECM will turn on the MIL and will set a DTC.
HINT:
*: RPM threshold varies with engine load.



DTC No.	DTC Detection Condition	Trouble Area
P0505	Idle speed continues to vary greatly from target speed (1 trip detection logic)	ETCS Air induction system PCV hose connection

MONITOR STRATEGY

Related DTCs	P0505: IAC Functional Check P0505: IAC Range Check
Required sensors / components (Main)	ETCS (Electrical throttle control system)
Required sensors / components (Related)	CKP sensor, ECT sensor and VSS
Frequency of operation	Continuous
Duration	10 minutes
MIL Operation	2 driving cycles
Sequence operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever this DTC is not present	See page 05-377
Engine	Running

TYPICAL MALFUNCTION THRESHOLDS

Either of the following conditions is met:	Condition 1 or 2
1. Frequency that both of the following conditions (a) and (b) are met:	5 times or more
(a) Engine RPM - target engine RPM	Less than -100 rpm, or more than 150 rpm
(b) Vehicle condition	Stop after vehicle was driven at 10 km/h (6.25 mph) or more
2. Frequency that both of the following conditions (a) and (b) are met:	Once
(a) Engine RPM - target engine RPM	Less than -100 rpm, or more than 150 rpm
(b) ISC flow rate learning value	1.3 L/sec or less, or 9.03 L/sec or more

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	CHECK OTHER DTC OUTPUT (IN ADDITION TO DTC P0505)

(a) Read the DTC using the hand-held tester or the OBD II scan tool.
Result:

Display (DTC Output)	Proceed to
Only P0505 is output	A
P0505 and other DTCs are output	B

HINT:
If any other codes besides P0505 are output, perform the troubleshooting for those codes first.

B → **GO TO RELEVANT DTC CHART (See page 05-412)**

A

2	CHECK CONNECTION OF PCV HOSE

OK: PCV hose is connected correctly. And PCV hose has no damage.

NG → **REPAIR OR REPLACE PCV HOSE**

OK

3	CHECK AIR INDUCTION SYSTEM

(a) Check for vacuum leaks in air induction system.
OK: No leak in air induction system.

NG → **REPAIR OR REPLACE AIR INDUCTION SYSTEM**

OK

CHECK ELECTRONIC THROTTLE CONTROL SYSTEM (See page 10-12)

DTC P0560 SYSTEM VOLTAGE

MONITOR DESCRIPTION

The battery supplies electricity to the ECM even when the ignition switch is OFF. This electricity allows the ECM store data such as DTC history, freeze frame data, fuel trim values, and other data. If the battery voltage falls below a minimum level, the ECM will conclude that there is a fault in the power supply circuit. The next time the engine starts, the ECM will turn on the MIL and a DTC will be set.

DTC No.	DTC Detection Condition	Trouble Area
P0560	Open in ECM back-up power source circuit (1 trip detection logic)	・Open in back-up power source circuit ・ECM

HINT:
If DTC P0560 is present, the ECM will not store other DTCs.

MONITOR STRATEGY

Related DTCs	P0560: ECM System Voltage
Required sensors / components (Main)	ECM
Required sensors / components (Related)	-
Frequency of operation	Continuous
Duration	3 seconds
MIL operation	Immediate (MIL will illuminate after the next engine start)
Sequence operation	None

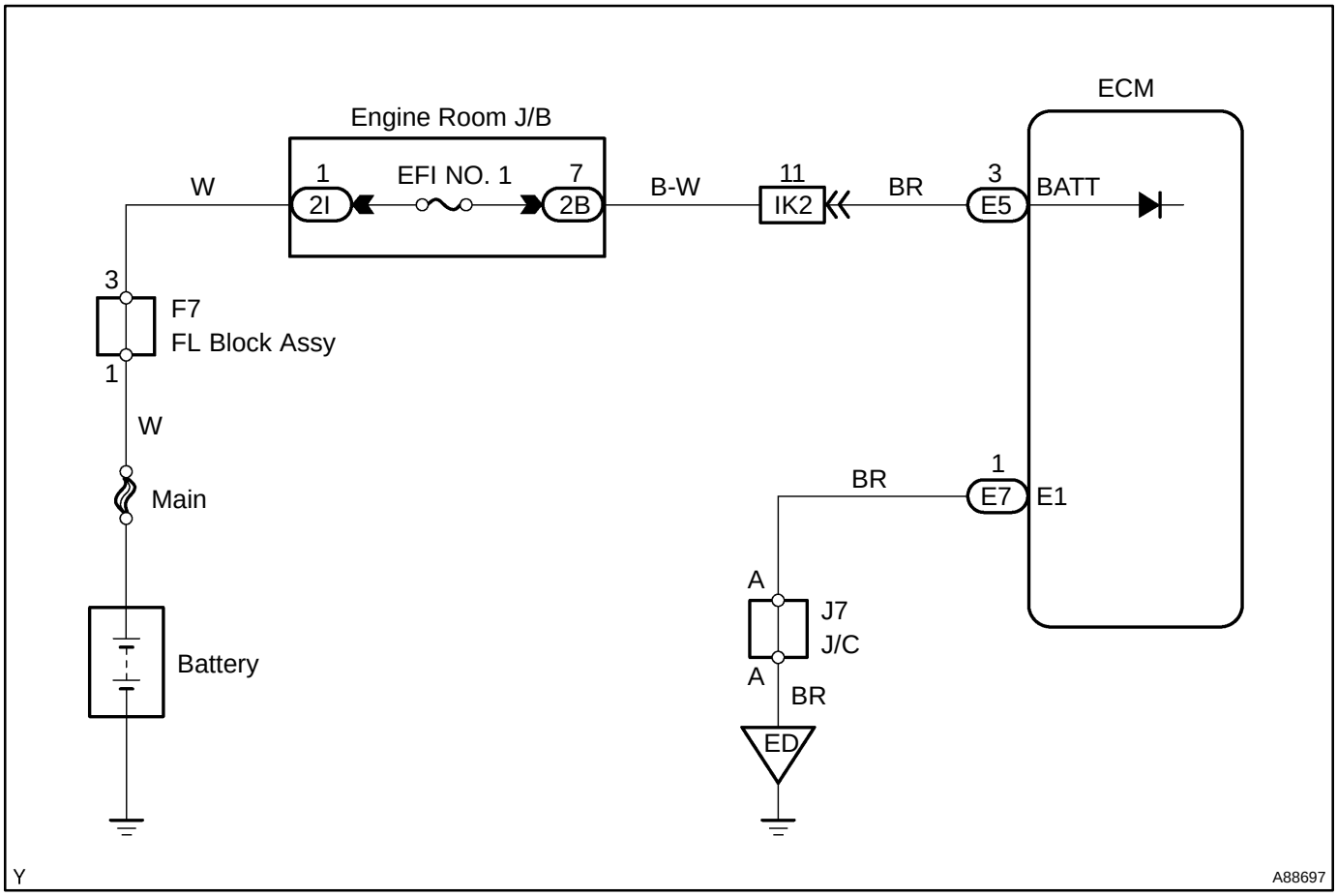
TYPICAL ENABLING CONDITIONS

The monitor will run whenever these DTCs are not present	See page 05-377

TYPICAL MALFUNCTION THRESHOLDS

ECM power source	Less than 3.5 V

WIRING DIAGRAM

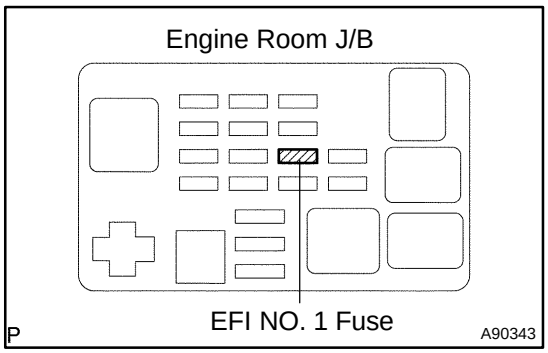


INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	INSPECT FUSE (EFI NO. 1)



(a) Remove the EFI NO. 1 fuse from the engine room J/B.

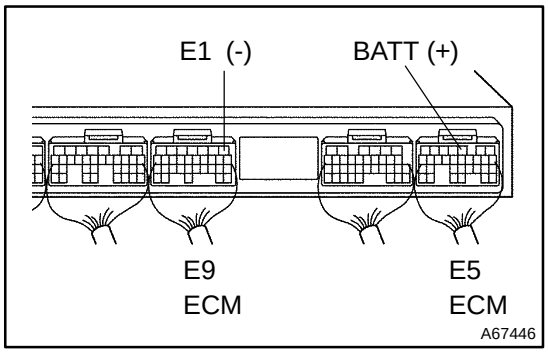
(b) Check the resistance of the EFI NO. 1 fuse.

Standard: Below 1 Ω

NG → **REPLACE FUSE**

OK

2 INSPECT ECM (BATT VOLTAGE)



(a) Check the voltage of the ECM connectors.

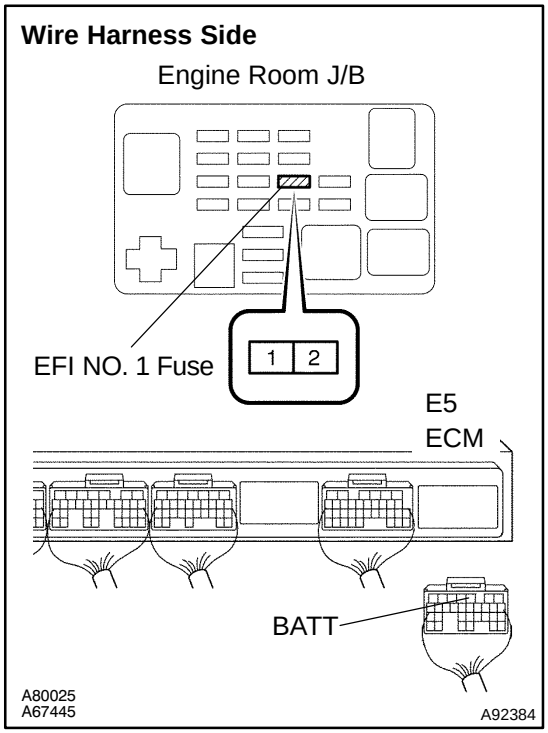
Standard:

Tester Connection	Specified Condition
E5-3 (BATT) - E9-1 (E1)	9 to 14 V

OK → **REPLACE ECM (See page 10-24)**

NG

3 CHECK WIRE HARNESS (ECM - EFI NO. 1 FUSE, EFI NO. 1 FUSE - BATTERY)



(a) Check the wire harness between the EFI NO. 1 fuse and ECM.

(1) Remove the EFI NO. 1 fuse from the engine room J/B.

(2) Disconnect the E5 ECM connector.

(3) Check the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
J/B EFI NO. 1 fuse terminal 2 - E5-3 (BATT)	Below 1 Ω
J/B EFI NO. 1 fuse terminal 2 or E5-3 (BATT) - Body ground	10 kΩ or higher

(b) Check the wire harness between the EFI NO. 1 fuse and battery.

(1) Remove the EFI NO. 1 fuse from the engine room J/B.

(2) Disconnect the battery positive cable.

(3) Check the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
Battery positive cable - J/B EFI NO. 1 fuse terminal 1	Below 1 Ω
Battery positive cable or J/B EFI NO. 1 fuse terminal 1 - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

CHECK AND REPLACE ENGINE ROOM JUNCTION BLOCK ASSY

DTC	P0604	INTERNAL CONTROL MODULE RANDOM ACCESS MEMORY (RAM) ERROR

DTC	P0606	ECM/PCM PROCESSOR

DTC	P0607	CONTROL MODULE PERFORMANCE

DTC	P0657	ACTUATOR SUPPLY VOLTAGE CIRCUIT/OPEN

MONITOR DESCRIPTION

The ECM continuously monitors its internal memory status, internal circuits, and output signals to the throttle actuator. This self-check ensures that the ECM is functioning properly. If any malfunction is detected, the ECM will set the appropriate DTC and illuminate the MIL.

The ECM memory status is diagnosed by internal ”mirroring” of the main CPU and the sub CPU to detect Random Access Memory (RAM) errors. The two CPUs also perform continuous mutual monitoring. The ECM sets a DTC if: 1) outputs from the 2 CPUs are different and deviate from the standards, 2) the signals to the throttle actuator deviate from the standards, 3) a malfunction is found in the throttle actuator supply voltage, and 4) any other ECM malfunction is found.

DTC No.	DTC Detection Condition	Trouble Area
P0604 P0606 P0607 P0657	ECM internal error	ECM

MONITOR STRATEGY

Related DTCs	P0604: RAM Error P0606: CPU Malfunction P0607: ECM Range Check P0657: ETCS Power Supply
Required sensors / components (Main)	ECM
Required sensors / components (Related)	-
Frequency of operation	Continuous
Duration	Within 1 second
MIL operation	Immediate
Sequence operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever these DTCs are not present	See page 05-377

TYPICAL MALFUNCTION THRESHOLDS

RAM Error P0604:

RAM	RAM check failure

CPU Malfunction P0606:

Either of the following conditions is met:	Condition 1 or 2
1. Difference between TP of main CPU and TP of sub CPU	0.3 V or more
2. Difference between APP of main CPU and APP of sub CPU	0.3 V or more

ECM Range Check P0607:

Either of the following conditions is met:	Condition 1 or 2
1. All of the following conditions are met:	Conditions (a), (b) and (c)
(a) CPU reset	1 time or more
(b) Difference between TP and APP learned	0.4 V or more
(c) Electronic throttle actuator	OFF
2. CPU reset	2 times or more

ETCS Power Supply P0657:

ETCS power supply when ignition switch turns from OFF to ON	7 V or more

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

REPLACE ECM (See page 10-24)

DTC P0617 STARTER RELAY CIRCUIT HIGH

MONITOR DESCRIPTION

While the engine is being cranked, the battery positive voltage is applied to terminal STA of the ECM. If the vehicle is being driven and the ECM detects the starter control signal (STA), the ECM concludes that the starter control circuit is malfunctioning. The ECM will turn on the MIL and will set a DTC.

DTC No.	DTC Detecting Condition	Trouble Area
P0617	When conditions (a), (b) and (c) are met and the battery (+B) voltage 10.5 V or more is applied for 20 seconds: (1 trip detection logic) (a) Vehicle speed greater than 20 km/h (12 mph) (b) Engine revolution greater than 1,000 rpm (c) STA signal ON	・Short in PNP switch assy circuit ・PNP switch assy ・Ignition switch ・ECM

MONITOR STRATEGY

Related DTCs	P0617: Starter Signal
Required sensors / components (Main)	Starter Relay and PNP Switch
Required sensors / components (Related)	CKP Sensor and Vehicle Speed Sensor
Frequency of operation	Continuous
Duration	20 seconds
MIL operation	Immediate
Sequence operation	None

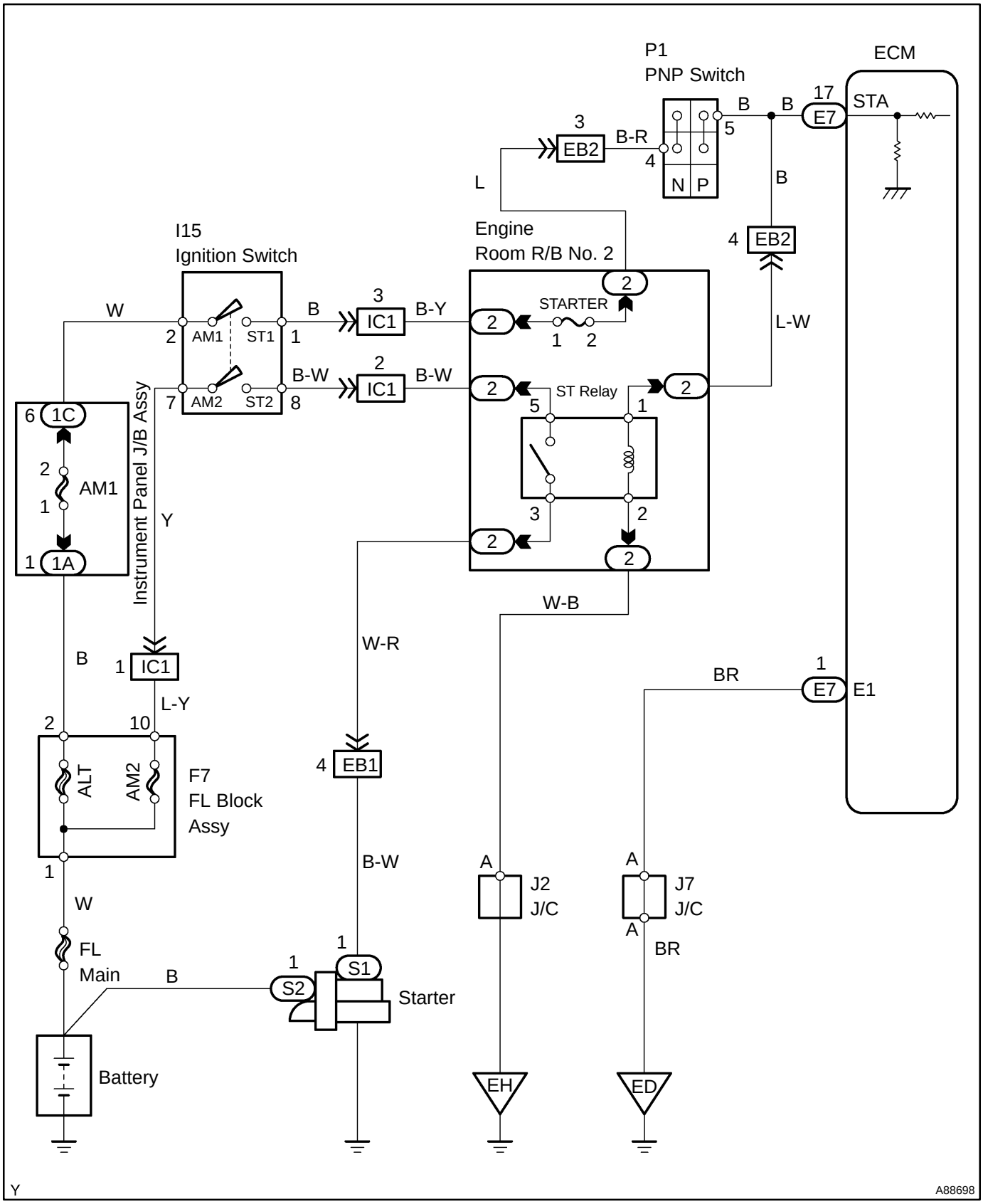
TYPICAL ENABLING CONDITIONS

The monitor will run whenever these DTCs are not present	See page 05-377
Battery voltage	10.5 V or more
Vehicle speed	20 km/h (12.4 mph) or more
Engine RPM	1,000 rpm or more

TYPICAL MALFUNCTION THRESHOLDS

Starter signal	ON

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand-held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

Hand-held tester:

1	READ VALUE OF HAND-HELD TESTER (STA SIGNAL)

(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester main switch ON.
(c) On the hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / STARTER SIG. Read the values.

Result:

Ignition Switch Condition	ON	START
STA Signal	OFF	ON

OK → **REPLACE ECM (See page 10-24)**

NG

2	INSPECT PARK/NEUTRAL POSITION SWITCH ASSY (See page 05-1036)

OK:
When shift lever is the N position, the PNP switch is ON.
When shift lever is the P position, the PNP switch is OFF.

NG → **REPLACE PARK/NEUTRAL POSITION SWITCH ASSY (See page 40-7) (Go to step 3 AFTER REPLACEMENT)**

OK

3	READ VALUE OF HAND-HELD TESTER (STA SIGNAL)

(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester main switch ON.
(c) On the hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / STARTER SIG. Read the values.

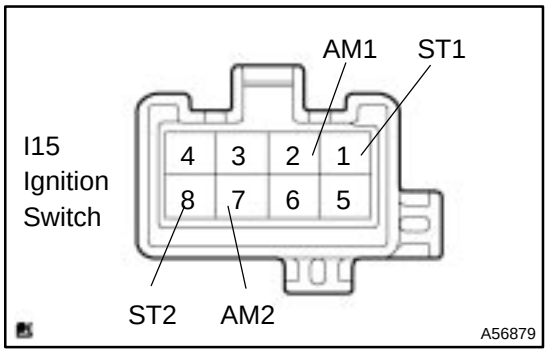
Result:

Ignition Switch Condition	ON	START
STA Signal	OFF	ON

OK → **SYSTEM OK**

NG

4	INSPECT IGNITION OR STARTER SWITCH ASSY



(a) Check the resistance of the ignition switch terminals.

Standard:

Switch Condition	Tester Connection	Specified Condition
LOCK	1 - 2 7 - 8	10 kΩ or higher
START	1 - 2 7 - 8	Below 1 Ω

NG → **REPLACE IGNITION OR STARTER SWITCH ASSY (Go to next step 5 AFTER REPLACEMENT)**

OK

5	READ VALUE OF HAND-HELD TESTER (STA SIGNAL)

(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester main switch ON.
(c) On the hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / STARTER SIG. Read the values.

Result:

Ignition Switch Condition	ON	START
STA Signal	OFF	ON

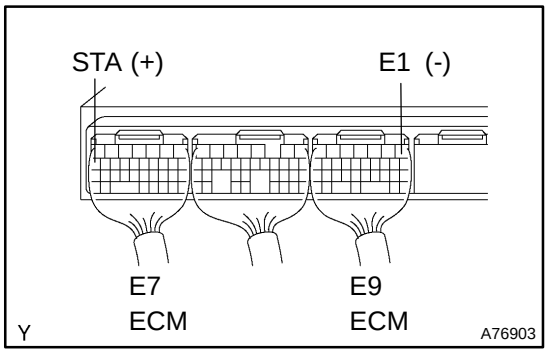
OK → **SYSTEM OK**

NG

REPAIR OR REPLACE HARNESS AND CONNECTOR

OBD II scan tool (excluding Hand-held Tester):

1	INSPECT ECM



(a) Turn the ignition switch ON.
(b) Check the voltage of the ECM connectors.

Standard:

Tester Connection	Condition	Specified Condition
E7-17 (STA) - E9-1 (E1)	Ignition switch ON	0 V
E7-17 (STA) - E9-1 (E1)	Engine cranking	6 V or more

OK → **REPLACE ECM (See page 10-24)**

NG

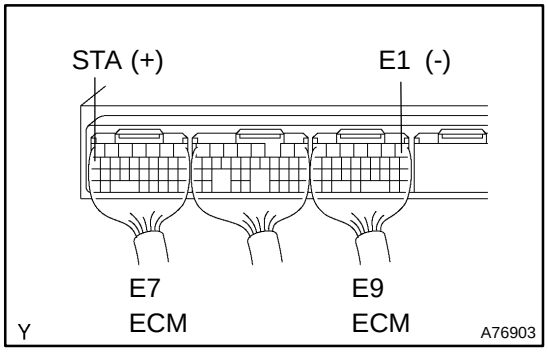
2	INSPECT PARK/NEUTRAL POSITION SWITCH ASSY (See page 05-1036)

OK:
When shift lever is the N position, the PNP switch is ON.
When shift lever is the P position, the PNP switch is OFF.

NG → **REPLACE PARK/NEUTRAL POSITION SWITCH ASSY (See page 40-7) (Go to next step 3 AFTER REPLACEMENT)**

OK

3	INSPECT ECM



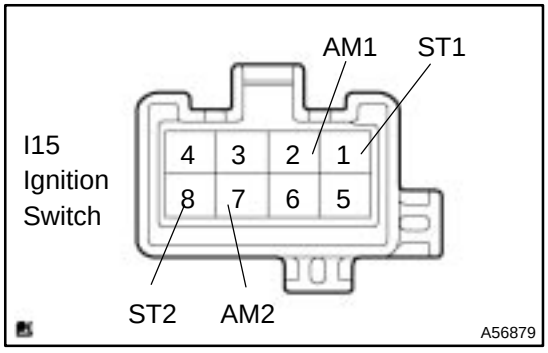
(a) Check the voltage of the ECM connectors.
Standard:

Tester Connection	Condition	Specified Condition
E7-17 (STA) - E9-1 (E1)	Ignition switch ON	0 V
E7-17 (STA) - E9-1 (E1)	Engine cranking	6 V or more

OK → **SYSTEM OK**

NG

4	INSPECT IGNITION OR STARTER SWITCH ASSY



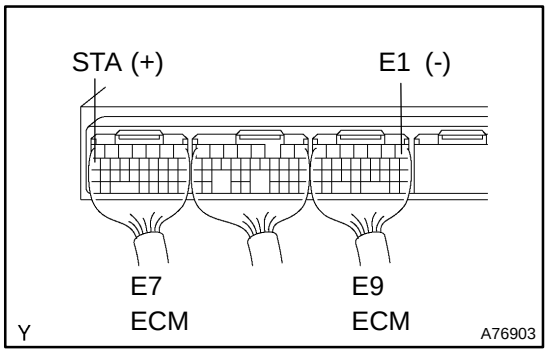
(a) Check the resistance of the ignition switch terminals.
Standard:

Switch Condition	Tester Connection	Specified Condition
LOCK	1 - 2 7 - 8	10 kΩ or higher
START	1 - 2 7 - 8	Below 1 Ω

NG → **REPLACE IGNITION OR STARTER SWITCH ASSY**

OK

5	INSPECT ECM



(a) Check the voltage of the ECM connectors.
Standard:

Tester Connection	Condition	Specified Condition
E7-17 (STA) - E9-1 (E1)	Ignition switch ON	0 V
E7-17 (STA) - E9-1 (E1)	Engine cranking	6 V or more

OK → **SYSTEM OK**

NG

REPAIR OR REPLACE HARNESS AND CONNECTOR

DTC	P0630	VIN NOT PROGRAMMED OR MISMATCH - ECM/PCM

CIRCUIT DESCRIPTION

DTC P0630 is set when the Vehicle Indication Number (VIN) is not stored in the ECM or the input VIN is not accurate. Input the VIN with the hand-held tester (see page 05-373).

DTC No.	DTC Detection Conditions	Trouble Areas
P0630	・VIN is not stored in ECM ・Input VIN in ECM is not accurate	・ECM

MONITOR STRATEGY

Related DTCs	P0630: VIN not programed
Required Sensors/Components (Main)	ECM
Required Sensors/Components (Related)	—
Frequency of Operation	Continuous
Duration	0.5 seconds
MIL Operation	Immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever these DTCs are not present	See page 05-377
Battery voltage	8 V or more
Ignition switch	ON
Stater	OFF

TYPICAL MALFUNCTION THRESHOLDS

VIN code	Not programmed

COMPONENT OPERATING RANGE

VIN code	Programmed

INSPECTION PROCEDURE

1	READ CURRENT DTC

NOTICE:
If P0630 is present, the VIN must be input to the ECM using the hand-held tester. However, all DTCs are cleared automatically by the tester when inputting the VIN. If DTCs other than P0630 are present, check them first.

NEXT

2	INPUT VIN WITH HAND-HELD TESTER (See page 05-373)

NEXT

END

DTC	P0705	TRANSMISSION RANGE SENSOR CIRCUIT MALFUNCTION (PRNDL INPUT)

CIRCUIT DESCRIPTION

When the shift lever is in the N or P position: 1) the Park/Neutral Position (PNP) switch turns on, and 2) ECM terminal NSW is grounded to the body ground via the starter relay and voltage becomes 0V. When the shift lever is in the D, 2, L or R position: 1) the PNP switch turns off, and 2) ECM terminal NSW receives current and becomes the voltage of the ECM internal power source.
If the shift lever is moved from the N position to the D position, this signal is used for air-fuel ratio correction and for idle speed control (estimated control), etc.

DTC No.	DTC Detection Condition	Trouble Area
P0705	2 or more switches are ON simultaneously at P R, N, D, 2 and L positions (2 trip detection logic)	⋇Short in PNP switch circuit ⋇PNP switch ⋇ECM

HINT:
After confirming DTC P0705, use the hand-held tester to confirm the PNP switch signal in the ALL menu (to reach the ALL menu: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL).

WIRING DIAGRAM

Refer to DTC P0705 on page 05-1036 .

INSPECTION PROCEDURE

Refer to DTC P0705 on page 05-1036 .
HINT:
Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

DTC	P2102	THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT LOW

DTC	P2103	THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT HIGH

CIRCUIT DESCRIPTION

The throttle motor is operated by the ECM and it opens and closes the throttle valve.
The opening angle of the throttle valve is detected by the throttle position sensor which is mounted on the throttle body. The throttle position sensor provides feedback to the ECM. This feedback allows the ECM to control the throttle motor and monitor the throttle opening angle in response to driver inputs.
HINT:
This Electronic Throttle Control System (ETCS) does not use a throttle cable.

DTC No.	DTC Detection Condition	Trouble Area
P2102	Conditions (a) and (b) continue for 2.0 seconds: (a) Throttle control motor output duty 80 % or more (b) Throttle control motor current 0.5 A or less (1 trip detection logic)	・Open in throttle control motor circuit ・Throttle control motor ・ECM
P2103	Either of following conditions is met: ・Throttle control motor current 10 A or more (0.1 seconds) ・Throttle control motor current 7 A or more (0.6 seconds) (1 trip detection logic)	・Short in throttle control motor circuit ・Throttle control motor ・Throttle valve ・Throttle body Assy ・ECM

MONITOR DESCRIPTION

The ECM monitors the flow of electrical current through the electronic throttle motor, and detects malfunctions or open circuits in the throttle motor based on the value of the electrical current. When the current deviates from the standard values, the ECM concludes that there is a fault in the throttle motor. Or, if the throttle valve is not functioning properly (for example, stuck ON), the ECM concludes that there is a fault and turns on the MIL and a DTC is set.
Example:
When the current is more than 10 A, or the current is less than 0.5A when the motor driving duty ratio is exceeding 80 %, the ECM concludes that the current is deviated from the standard values, turns on the MIL and a DTC is set.

FAIL SAFE

If the ETCS, has a malfunction, the ECM cuts off current to the throttle control motor. The throttle control valve returns to a predetermined opening angle (approximately 16°) by the force of the return spring. The ECM then adjusts the engine output by controlling the fuel injection (intermittent fuel-cut) and ignition timing in accordance with the accelerator pedal opening angle to enable the vehicle to continue at a minimal speed. If the accelerator pedal is depressed firmly and slowly, the vehicle can be driven slowly.
If a ”pass” condition is detected and then the ignition switch is turned OFF, the fail-safe operation will stop and the system will return to normal condition.

MONITOR STRATEGY

Related DTCs	P2102: Throttle Actuator Current (Low current) P2103: Throttle Actuator Current (High current)
Required sensors / components (Main)	Throttle actuator
Required sensors / components (Related)	-
Frequency of operation	Continuous
Duration	2 seconds
MIL operation	Immediate
Sequence operation	None

TYPICAL ENABLING CONDITIONS

All:

The monitor will run whenever these DTCs are not present	See page 05-377

P2102:

Throttle actuator duty ratio	80 % or more
Throttle actuator power supply	8 V or more

P2103:

Throttle actuator power supply	8 V or more

TYPICAL MALFUNCTION THRESHOLDS

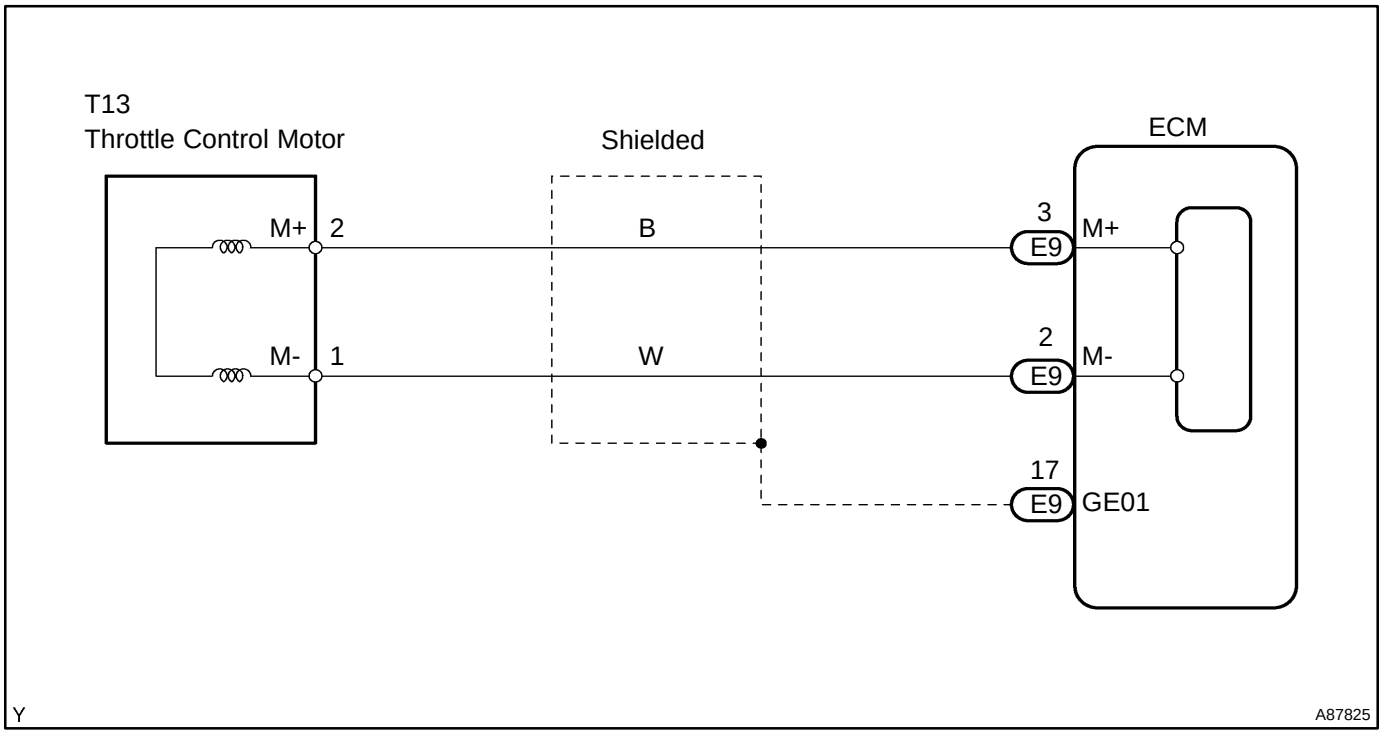
P2102:

Throttle actuator current	Less than 0.5 A

P2103:

Either of the following conditions is set:	Condition 1 or 2
1. Hybrid IC diagnosis signal (Throttle control motor current is 10 A or more)	Fail (for 0.1 seconds)
2. Hybrid IC current limiter port (Throttle control motor current is 7 A or more)	Fail (for 0.6 seconds)

WIRING DIAGRAM

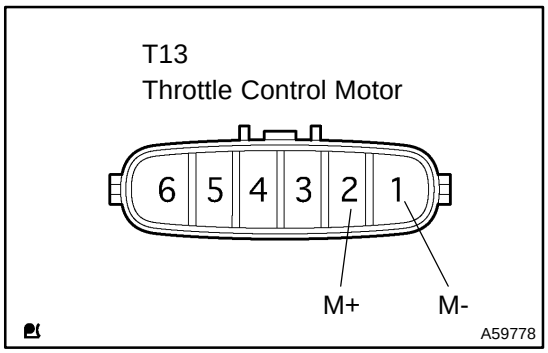


INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	INSPECT THROTTLE BODY ASSY (RESISTANCE OF THROTTLE CONTROL MOTOR)



(a) Disconnect the T13 throttle control motor connector.
(b) Check the resistance of the throttle control motor terminals.

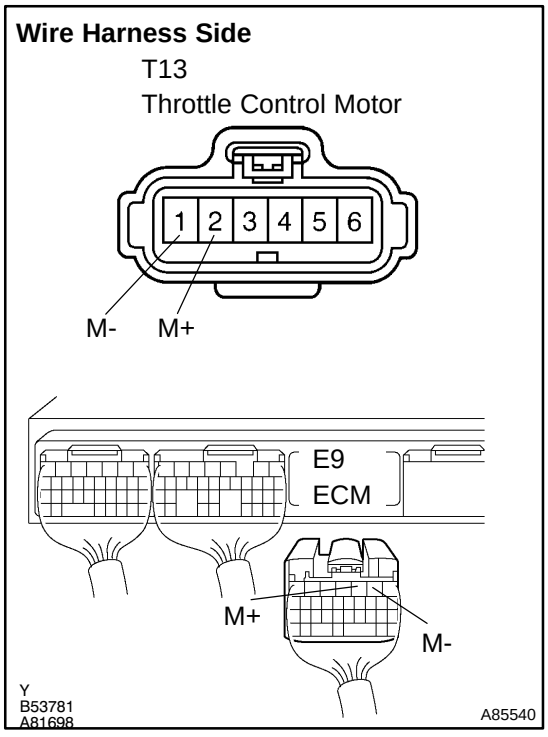
Standard:

Tester Connection	Specified Condition
T13-2 (M+) - T13-1 (M-)	0.3 to 100 Ω 20°C (68°F)

NG → **REPLACE THROTTLE BODY ASSY (See page 10-18)**

OK

2	CHECK WIRE HARNESS (THROTTLE CONTROL MOTOR - ECM)



(a) Disconnect the T13 throttle control motor connector.
(b) Disconnect the E9 ECM connector.
(c) Check the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
T13-2 (M+) - E9-3 (M+) T13-1 (M-) - E9-2 (M-)	Below 1 Ω
T13-2 (M+) or E9-3 (M+) - Body ground T13-1 (M-) or E9-2 (M-) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

3	INSPECT THROTTLE BODY ASSY

(a) Visually check between the throttle valve and the housing for foreign objects.
Also, check if the valve can open and close smoothly.
OK: The throttle valve is not contaminated by foreign objects and can move smoothly.

NG → **REMOVE FOREIGN OBJECT AND CLEAN THROTTLE BODY**

OK

REPLACE ECM (See page 10-24)

DTC	P2111	THROTTLE ACTUATOR CONTROL SYSTEM - STUCK OPEN

DTC	P2112	THROTTLE ACTUATOR CONTROL SYSTEM - STUCK CLOSED

CIRCUIT DESCRIPTION

The throttle motor is operated by the ECM and it opens and closes the throttle valve using gears. The opening angle of the throttle valve is detected by the throttle position sensor, which is mounted on the throttle body. The throttle position sensor provides feedback to the ECM to control the throttle motor and set the throttle valve angle in response to driver inputs.
HINT:
This Electronic Throttle Control System (ETCS) does not use a throttle cable.

DTC No.	DTC Detection Condition	Trouble Area
P2111	Throttle valve locked during ECM order to close (1 trip detection logic)	・Throttle control motor circuit ・Throttle control motor ・Throttle body ・Throttle valve
P2112	Throttle valve locked during ECM order to open (1 trip detection logic)	・Throttle control motor circuit ・Throttle control motor ・Throttle body ・Throttle valve

MONITOR DESCRIPTION

The ECM concludes that there is a malfunction of the ETCS when the throttle valve remains at a fixed angle despite high drive current from the ECM. The ECM will turn on the MIL and will set a DTC.

FAIL SAFE

If the ETCS has a malfunction, the ECM cuts off current to the throttle control motor. The throttle control valve returns to a predetermined opening angle (approximately 16°) by the force of the return spring. The ECM then adjusts the engine output by controlling the fuel injection (intermittent fuel-cut) and ignition timing in accordance with the accelerator pedal opening angle to enable the vehicle to continue at a minimal speed. If the accelerator pedal is depressed firmly and slowly, the vehicle can be driven slowly.
If a ”pass” condition is detected and then the ignition switch is turned OFF, the fail-safe operation will stop and the system will return to normal.

MONITOR STRATEGY

Related DTCs	P2111: Throttle actuator stuck open P2112: Throttle actuator stuck closed
Required sensors / components (Main)	Throttle actuator
Required sensors / components (Related)	-
Frequency of operation	Continuous
Duration	0.5 seconds
MIL operation	Immediate
Sequence operation	None

TYPICAL ENABLING CONDITIONS

All:

The monitor will run whenever these DTCs are not present	See page 05-377

P2111:

Throttle motor current	2 A or more
Throttle motor close duty ratio	80% or more

P2112:

Throttle actuator current	2 A or more
Throttle actuator open duty ratio	80 % or more

TYPICAL MALFUNCTION THRESHOLDS

TP (Throttle position) sensor voltage change for 0.016 seconds	Less than 0.1 V

WIRING DIAGRAM

Refer to DTC P2102 on page 05-603 .

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	**CHECK THROTTLE BODY ASSY**

Display (DTC output)	Proceed to
P2111 or P2112	A
P2111 or P2112 and other DTCs	B

NG → **REPLACE THROTTLE BODY ASSY (See page 10-18)**

OK

2	**CHECK THROTTLE BODY ASSY (VISUALLY CHECK THROTTLE VALVE)**

Check for contamination between the throttle valve and the housing. If necessary, clean the throttle body. And check that the throttle valve moves smoothly.

OK: The throttle valve is not contaminated by foreign objects and can move smoothly.

NG → **REPLACE THROTTLE BODY ASSY (See page 10-18)**

OK

3	CHECK DTC OUTPUT

(a) Clear the DTC.
(b) Start the engine, and depress and release the accelerator pedal quickly (fully open and fully close).
(c) Read DTC.

Result:

Display (DTC output)	Proceed to
No DTC	A
P2111 and/or P2112	B

B → **REPLACE ECM (See page 10-24)**

OK →

CHECK FOR INTERMITTENT PROBLEM (See page 05-370)

DTC	P2118	THROTTLE ACTUATOR CONTROL MOTOR CURRENT RANGE/PERFORMANCE

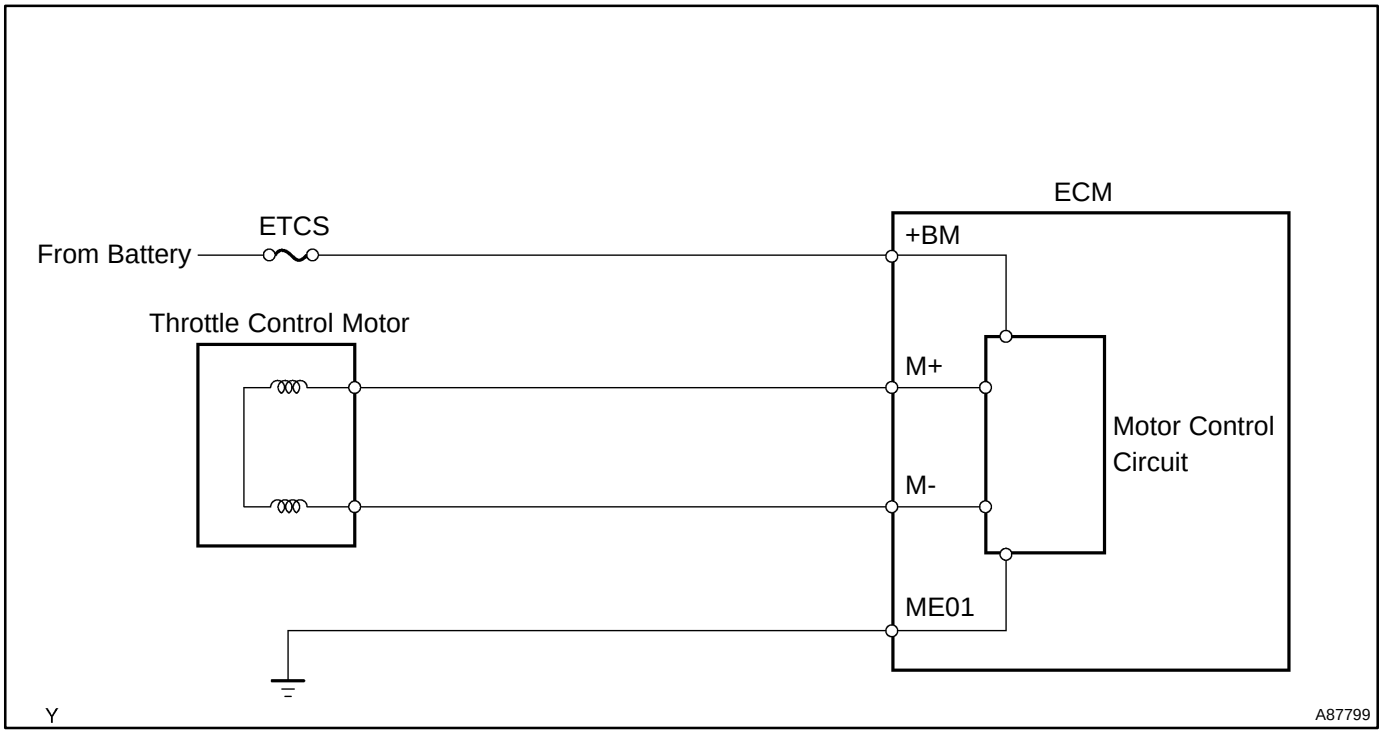
CIRCUIT DESCRIPTION

The Electronic Throttle Control System (ETCS) has a dedicated power supply circuit. The voltage (+BM) is monitored and when the voltage is low (less than 4V), the ECM concludes that the ETCS has a fault and current to the throttle control motor is cut.

When the voltage becomes unstable, the ETCS condition itself becomes unstable. For this reason, when the voltage is low, the current to the motor is cut. If repairs are made and the system has returned to normal, turn the ignition switch OFF. The ECM then allows current to flow to the motor and the motor can be restarted.

HINT:

This ETCS does not use a throttle cable.



DTC No.	DTC Detection Condition	Trouble Area
P2118	Open in ETCS power source circuit (1 trip detection logic)	・Open in ETCS power source circuit ・ETCS fuse ・ECM

MONITOR DESCRIPTION

The ECM monitors the battery supply voltage applied to the electronic throttle motor. When the power supply voltage drops below the threshold, the ECM concludes that the power supply circuit has an open circuit. A DTC is set and the MIL is turned on.

FAIL SAFE

If the ETCS has a malfunction, the ECM cuts off current to the throttle control motor. The throttle control valve returns to a predetermined opening angle (approximately 16°) by the force of the return spring. The ECM then adjusts the engine output by controlling the fuel injection (intermittent fuel-cut) and ignition timing in accordance with the accelerator pedal opening angle to enable the vehicle to continue at a minimal speed. If the accelerator pedal is depressed firmly and slowly, the vehicle can be driven slowly.
If a "pass" condition is detected and then the ignition switch is turned OFF, the fail-safe operation will stop and the system will return to normal.

MONITOR STRATEGY

Related DTCs	P2118: Throttle Actuator Power Supply
Required sensors / components (Main)	Throttle actuator, ETCS fuse
Required sensors / components (Related)	-
Frequency of operation	Continuous
Duration	0.8 seconds
MIL operation	Immediate
Sequence operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever this DTC is not present	See page 05-377
Battery voltage	More than 8 V

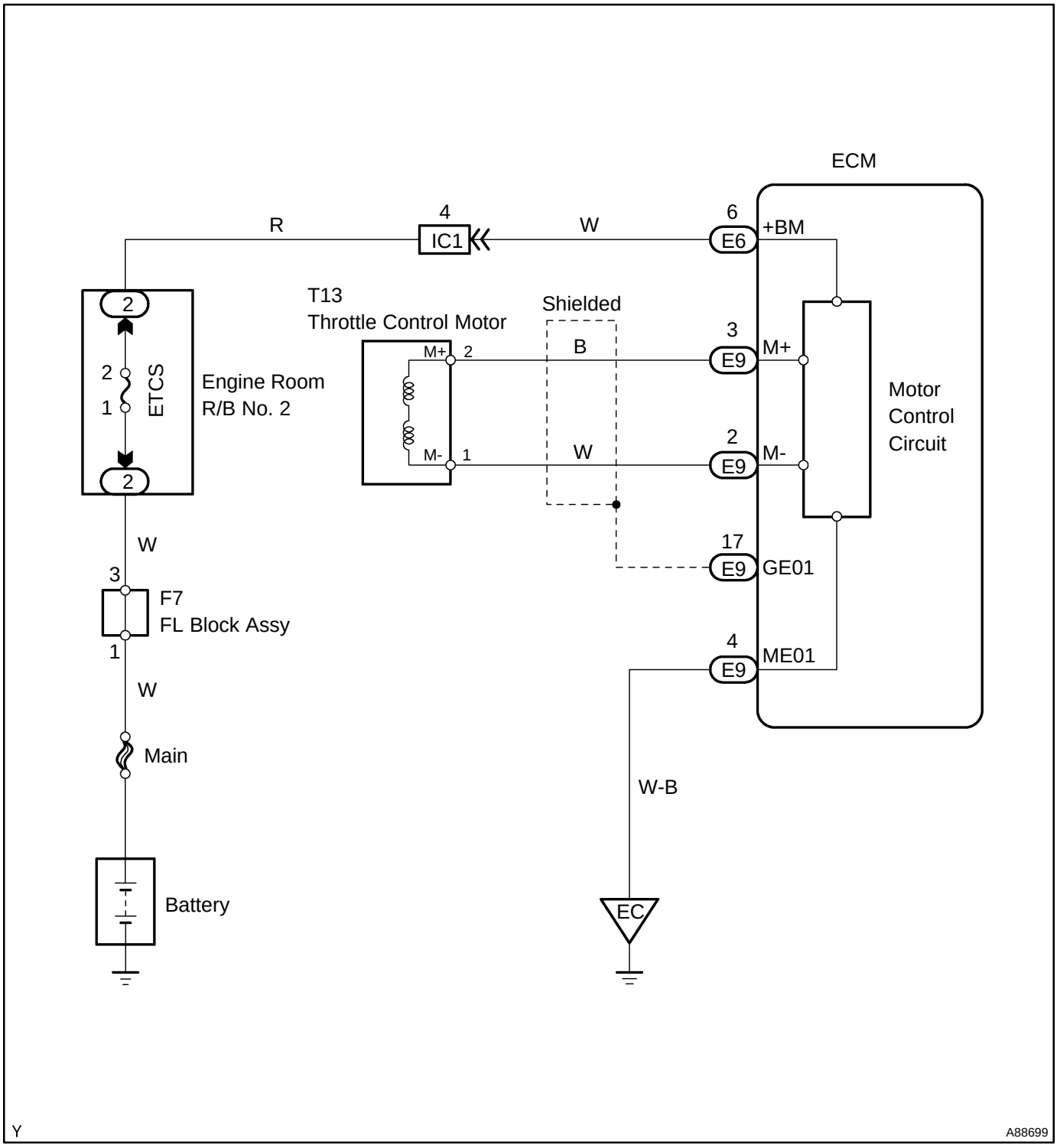
TYPICAL MALFUNCTION THRESHOLDS

Throttle actuator power supply voltage	Less than 4 V

COMPONENT OPERATING RANGE

Throttle actuator power supply voltage	9 to 14 V

WIRING DIAGRAM

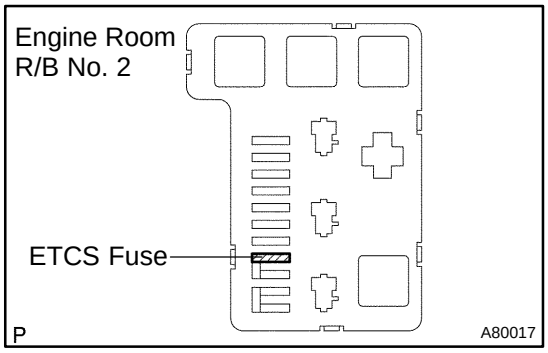


INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	CHECK FUSE (ETCS)

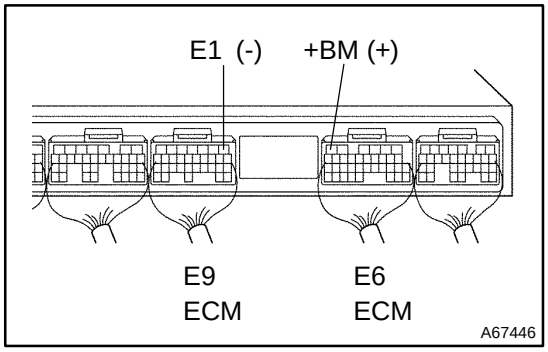


(a) Remove the ETCS fuse from the engine room R/B No. 2.
(b) Check the resistance of the ETCS fuse.
Standard: Below 1 Ω

NG → **REPLACE FUSE**

OK

2	INSPECT ECM (+BM VOLTAGE)



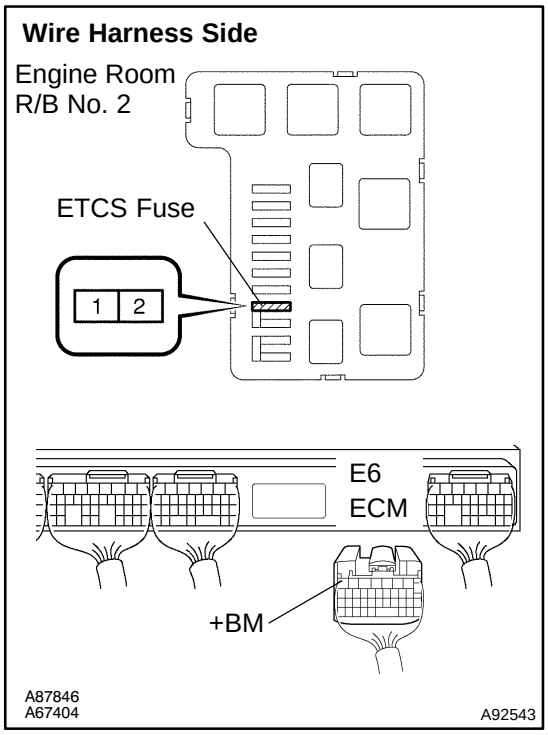
(a) Check the voltage of the ECM connectors.
Standard:

Tester Connection	Specified Condition
E6-6 (+BM) - E9-1 (E1)	9 to 14 V

OK → **REPLACE ECM (See page 10-24)**

NG

3	CHECK WIRE HARNESS (ECM - ETCS FUSE, ETCS FUSE - BATTERY)



(a) Check the wire harness between the ETCS fuse and ECM.
  (1) Remove the ETCS fuse from the engine room R/B No. 2.
  (2) Disconnect the E6 ECM connector.
  (3) Check the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
R/B No. 2 ETCS fuse terminal 2 - E6-6 (+BM)	Below 1 Ω
R/B No. 2 ETCS fuse terminal 2 or E6-6 (+BM) - Body ground	10 kΩ or higher

(b) Check the wire harness between the ETCS fuse and battery.
  (1) Remove the ETCS fuse from the engine room R/B No. 2.
  (2) Disconnect the battery positive cable.
  (3) Check the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
Battery positive cable - R/B No. 2 ETCS fuse terminal 1	Below 1 Ω
Battery positive cable or R/B No. 2 ETCS fuse terminal 1 - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

CHECK ENGINE ROOM RELAY BLOCK NO.2

DTC	P2119	THROTTLE ACTUATOR CONTROL THROTTLE BODY RANGE/PERFORMANCE

CIRCUIT DESCRIPTION

The Electronic Throttle Control System (ETCS) is composed of a throttle motor that operates the throttle valve, a throttle position sensor that detects the opening angle of the throttle valve, an accelerator pedal position sensor that detects the accelerator pedal position, and the ECM that controls the ETCS system. The ECM operates the throttle motor to position the throttle valve for proper response to driver inputs. The throttle position sensor, which is mounted on the throttle body, detects the opening angle of the throttle valve and provides this signal to the ECM so that the ECM can regulate the throttle motor.

DTC No.	DTC Detection Condition	Trouble Area
P2119	Throttle opening angle continues to vary greatly from target throttle opening angle (1 trip detection logic)	ETCS ECM

MONITOR DESCRIPTION

The ECM determines the ”actual” throttle angle based on the throttle position sensor signal. The ”actual” throttle position is compared to the ”target” throttle position commanded by the ECM. If the difference between these two values exceeds a specified limit, the ECM interprets this as a fault in the ETCS system. The ECM turns on the MIL and a DTC is set.

FAIL SAFE

If the ETCS has a malfunction, the ECM cuts off current to the throttle control motor. The throttle control valve returns to a predetermined opening angle (approximately 16°) by the force of the return spring. The ECM then adjusts the engine output by controlling the fuel injection (intermittent fuel-cut) and ignition timing in accordance with the accelerator pedal opening angle to enable the vehicle to continue at a minimal speed. If the accelerator pedal is depressed firmly and slowly, the vehicle can be driven slowly.
If a ”pass” condition is detected and then the ignition switch is turned OFF, the fail-safe operation will stop and the system will return to normal.

MONITOR STRATEGY

Related DTCs	P2119: ETCS malfunction
Required sensors / components (Main)	Throttle actuator
Required sensors / components (Related)	-
Frequency of operation	Continuous
Duration	1 second
MIL operation	Immediate
Sequence operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever these DTCs are not present	See page 05-377

TYPICAL MALFUNCTION THRESHOLDS

Difference between ”target closed TP (Throttle position) ” and ”actual closed TP”	0.3 V or more for 1 seconds
Difference between ”target open TP” and ”actual open TP”	0.3 V or more for 0.6 seconds

WIRING DIAGRAM

Refer to DTC P2102 on page 05-603 .

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1 CHECK OTHER DTC OUTPUT (IN ADDITION TO DTC P2119)

Display (DTC output)	Proceed to
Only P2119 is output	A
P2119 and other codes are output	B

B → **GO TO RELEVANT DTC CHART (See page 05-412)**

A

2 CHECK IF DTC OUTPUT REOCCUR

(a) Clear the DTC (see page 05-400).
(b) Allow the engine to idle for 15 seconds.
(c) Pull the hand brake and shift the gear to D.
(d) Depress the brake pedal securely and the accelerator pedal fully for 5 seconds.
(e) Read the DTC.

HINT:

Actual throttle position (TP) sensor voltage can be confirmed using the hand-held tester [DATA LIST/ALL/THROTTLE POS #1].

OK: No DTC output.

NG → **REPLACE THROTTLE BODY ASSY (See page 10-18)**

OK

NORMAL

DTC	P2120	THROTTLE/PEDAL POSITION SENSOR/SWITCH ”D” CIRCUIT

DTC	P2122	THROTTLE/PEDAL POSITION SENSOR/SWITCH ”D” CIRCUIT LOW INPUT

DTC	P2123	THROTTLE/PEDAL POSITION SENSOR/SWITCH ”D” CIRCUIT HIGH INPUT

DTC	P2125	THROTTLE/PEDAL POSITION SENSOR/SWITCH ”E” CIRCUIT

DTC	P2127	THROTTLE/PEDAL POSITION SENSOR/SWITCH ”E” CIRCUIT LOW INPUT

DTC	P2128	THROTTLE/PEDAL POSITION SENSOR/SWITCH ”E” CIRCUIT HIGH INPUT

DTC	P2138	THROTTLE/PEDAL POSITION SENSOR/SWITCH ”D”/”E” VOLTAGE CORRELATION

HINT:
This is the repair procedure for the ”accelerator pedal position sensor”.

CIRCUIT DESCRIPTION

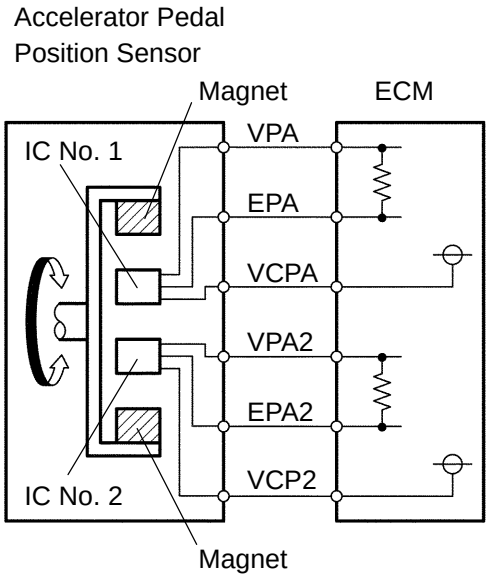
HINT:

- This electrical throttle system does not use a throttle cable.
- This accelerator pedal position sensor is a non-contact type.

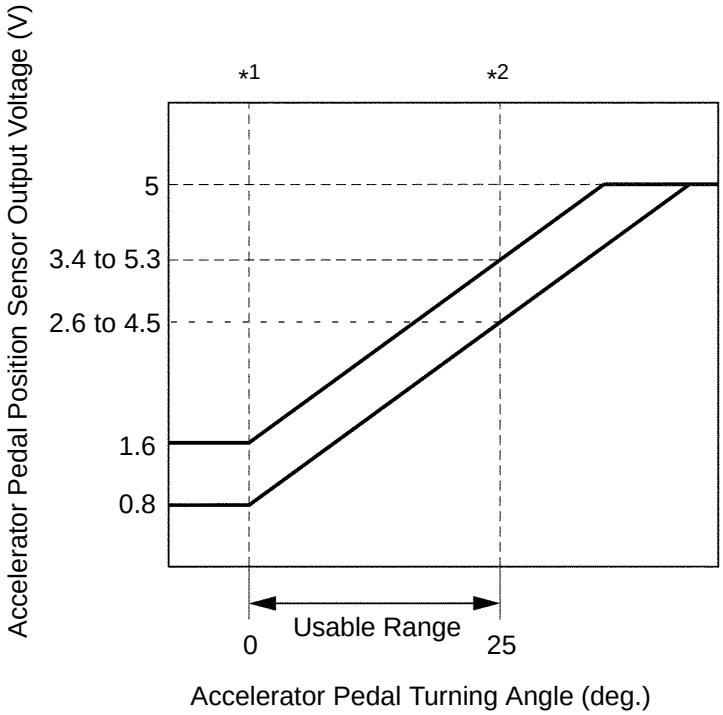
The accelerator pedal position sensor is mounted on the accelerator pedal bracket to detect the angle of the accelerator pedal. This sensor is electronically controlled and uses Hall-effect elements.

In the accelerator pedal position sensor, the voltage applied to terminals VPA and VPA2 of the ECM changes between 0 V and 5 V in proportion to the angle of the accelerator pedal. The VPA is a signal to indicate the actual accelerator pedal angle which is used for the engine control. VPA2 is used to detect malfunctions of the sensor itself.

The ECM judges the accelerator pedal angle from VPA and VPA2 signal outputs, and the ECM controls the throttle motor based on these signals.



A19694



*1: Accelerator Pedal Released

*2: Accelerator Pedal Fully Depressed

A19803

DTC No.	DTC Detection Condition (All of the following are 1trip detection logic)	Trouble Area
P2120	Condition (a) continues for 0.5 seconds or more: (a) VPA is 0.2 V or less or VPA is 4.8 V or more	・Accelerator pedal position sensor ・ECM
P2122	VPA is 0.2 V or less for 0.5 seconds or more when VPA2 output indicates accelerator pedal is opened	・Accelerator pedal position sensor ・Open in VCP1 circuit ・VPA circuit open or ground short ・ECM
P2123	Condition (a) continues for 2.0 seconds or more: (a) VPA is 4.8 V or more	・Accelerator pedal position sensor ・Open in EPA circuit ・ECM
P2125	Condition (a) continues for 0.5 seconds or more: (a) (VPA2 is 0.5 V or less or (VPA2 is 4.8 V or more	・Accelerator pedal position sensor ・ECM
P2127	VPA2 is 0.5 V or less for 0.5 seconds or more when VPA output indicates accelerator pedal is opened	・Accelerator pedal position sensor ・Open in VCP2 circuit ・VPA2 circuit open or ground short ・ECM
P2128	Conditions (a) and (b) continue for 2.0 seconds or more: (a) VPA2 is 4.8 V or more (b) VPA is 0.2 V or more and VPA is 3.45 V or less	・Accelerator pedal position sensor ・Open in EPA2 circuit ・ECM
P2138	Condition (a) or (b) continues for 2.0 seconds or more: (a) Difference between VPA and VPA2 is 0.02 V or less (b) VPA is 0.2 V or less and VPA2 is 0.5 V or less	・VPA and VPA2 circuit are short circuit ・Accelerator pedal position sensor ・ECM

HINT:

After confirming DTC P2120, P2122, P2123, P2125, P2127, P2128 and P2138, use the hand-held tester or the OBD II scan tool to confirm the accelerator pedal position sensor output voltage.

	Accelerator pedal position expressed as voltage output	Accelerator pedal position expressed as voltage output	Accelerator pedal position expressed as voltage output	Accelerator pedal position expressed as voltage output
	Accelerator pedal released	Accelerator pedal released	Accelerator pedal depressed	Accelerator pedal depressed
Trouble Area	ACCEL POS #1	ACCEL POS #2	ACCEL POS #1	ACCEL POS #2
VCP circuit open	0 to 0.2 V	0 to 0.2 V	0 to 0.2 V	0 to 0.2 V
VPA circuit open or ground short	0 to 0.2 V	1.2 to 2.0 V	0 to 0.2 V	3.4 to 5.3 V
VPA2 circuit open or ground short	0.5 to 1.1 V	0 to 0.2 V	2.6 to 4.5 V	0 to 0.2 V
EPA circuit open	4.5 to 5.5 V	4.5 to 5.5 V	4.5 to 5.5 V	4.5 to 5.5 V

MONITOR DESCRIPTION

When VPA or VPA2 deviates from the standard, or the difference between the voltage outputs of the two sensors is less than the threshold, the ECM concludes that there is a defect in the accelerator pedal position sensor. The ECM turns on the MIL and a DTC is set.

Example:

The voltage output of the VPA is below 0.2 V or exceeds 4.8 V.

FAIL SAFE

The accelerator pedal position sensor has 2 (main and sub) sensor circuits. If a malfunction occurs in either of the sensor circuits, the ECM detects the abnormal signal voltage difference between the two sensor circuits and switches to fail-safe mode. In fail-safe mode, the functioning circuit is used to calculate the accelerator pedal opening angle to allow the vehicle to continue driving. If both circuits malfunction, the ECM regards the opening angle of the accelerator pedal to be fully closed. In this case, the throttle valve will remain closed as if the engine is idling.
If a ”pass” condition is detected and then the ignition switch is turned OFF, the fail-safe operation will stop and the system will return to normal condition.

MONITOR STRATEGY

Related DTCs	P2120: APP Sensor 1 Range Check (Chattering) P2122: APP Sensor 1 Range Check (Low voltage) P2123: APP Sensor 1 Range Check (High voltage) P2125: APP Sensor 2 Range Check (Chattering) P2127: APP Sensor 2 Range Check (Low voltage) P2128: APP Sensor 2 Range Check (High voltage) P2138: APP Sensor Range Check (Correlation)
Required sensors / components (Main)	APP sensor
Required sensors / components (Related)	-
Frequency of operation	Continuous
Duration	2 seconds
MIL operation	Immediate
Sequence operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever these DTCs are not present	See page 05-377

TYPICAL MALFUNCTION THRESHOLDS

P2120:

Either of the following conditions is met:	Condition 1 or 2
1. VPA1 voltage when VPA2 is 0.97◯or more	0.2 V or less
2. VPA1 voltage	4.8 V or more

P2122:

VPA1 voltage when VPA2 is 0.97◯or more	0.2 V or less

P2123:

VPA1 voltage	4.8 V or more

P2125:

Either of the following conditions is met:	Condition 1 or 2
1. VPA2 voltage when VPA1 is 0.97◯or more	0.5 V or less
2. VPA2 voltage when VPA1 is 0.2 to 3.45 V	4.8 V or more

P2127:

VPA2 voltage when VPA1 is 0.97◯or more	0.5 V or less

P2128:

VPA2 voltage when VPA1 is 0.2 to 3.45 V	4.8 V or more

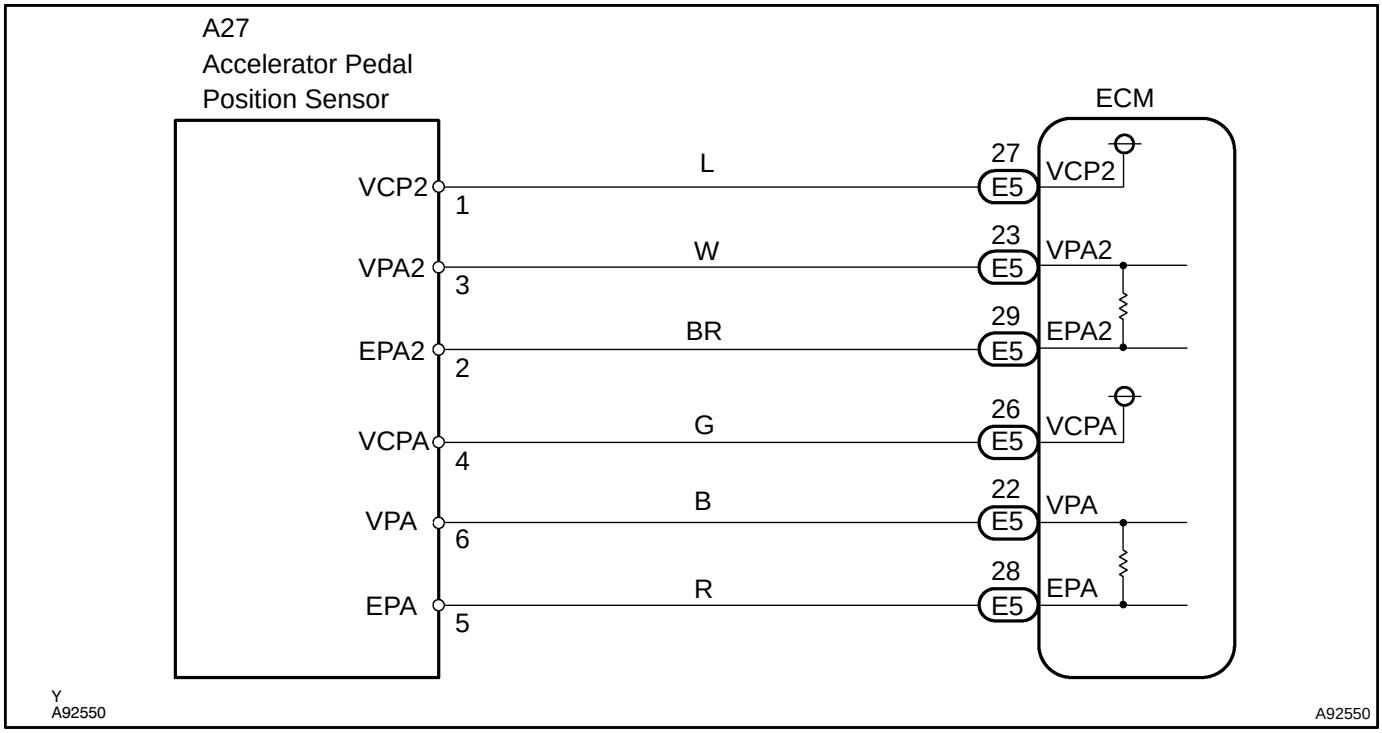
P2138:

Either of the following conditions is met:	Condition 1 or 2
1. Difference betrween VPA 1 and VPA2 voltage	0.02 V or less
Condition 2	-
VPA1 voltage	0.2 V or less
VPA2 voltage	0.5 V or less

COMPONENT OPERATING RANGE

VPA1 voltage	0.5 to 4.5 V
VPA2 voltage	1.2 to 4.8 V

WIRING DIAGRAM



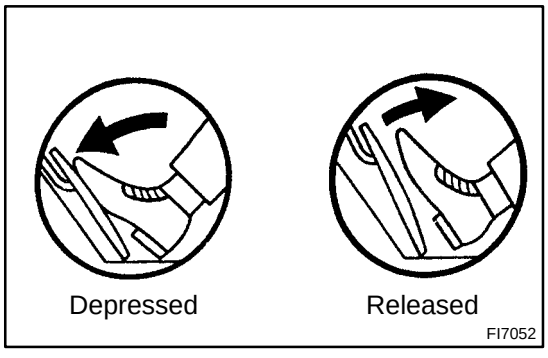
INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame date can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occured.

Hand-held tester:

1	READ VALUE OF HAND-HELD TESTER (ACCEL POS #1 AND ACCEL POS #2)



(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON.
(c) On the hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ETCS / ACCEL POS #1 and ACCEL POS #2. Read the values.

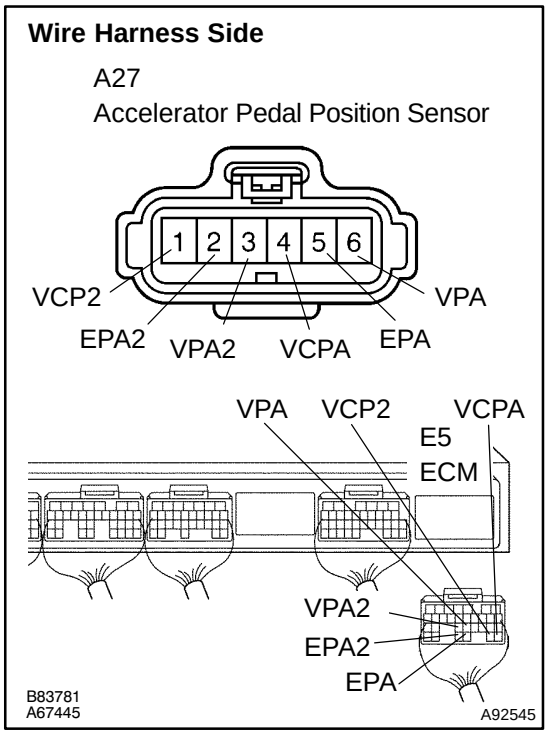
Standard:

Accelerator Pedal	ACCEL POS #1	ACCEL POS #2
Released	0.5 to 1.1 V	1.2 to 2.0 V
Depressed	2.6 to 4.5 V	3.4 to 5.3 V

OK → **Go to step 5**

NG

2 CHECK WIRE HARNESS (ACCELERATOR PEDAL POSITION SENSOR - ECM)



(a) Disconnect the A27 accelerator pedal position sensor connector.
(b) Disconnect the E5 ECM connector.
(c) Measure the resistance of the wire harness side connectors.

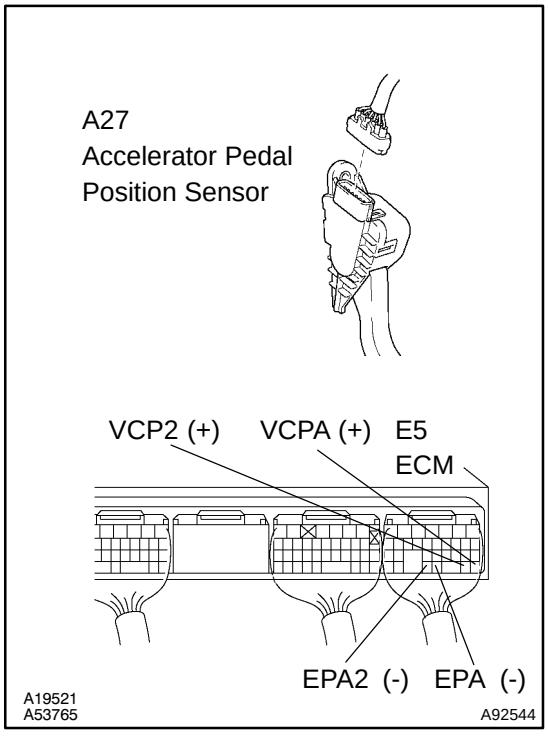
Standard:

Tester Connection	Specified Condition
A27-6 (VCP1) - E5-26 (VCPA) A27-5 (VPA1) - E5-22 (VPA) A27-4 (VCP2) - E5-27 (VCP2) A27-3 (EP1) - E5-28 (EPA) A27-2 (VPA2) - E5-23 (VPA2) A27-1 (EP2) - E5-29 (EPA2)	Below 1 Ω
A27-6 (VCP1) or E5-26 (VCPA) - Body ground A27-5 (VPA1) or E5-22 (VPA) - Body ground A27-4 (VCP2) or E5-27 (VCP2) - Body ground A27-3 (EP1) or E5-28 (EPA) - Body ground A27-2 (VPA2) or E5-23 (VPA2) - Body ground A27-1 (EP2) or E5-29 (EPA2) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

3 INSPECT ECM (VCPA AND VCP2 VOLTAGE)



(a) Disconnect the A27 accelerator pedal position sensor connector.
(b) Turn the ignition switch ON.
(c) Cheak the voltage of the E5 ECM connector.

Standard:

Tester Connection	Specified Condition
E5-26 (VCPA) - E5-28 (EPA) E5-27 (VCP2) - E5-29 (EPA2)	4.5 to 5.5 V

NG → **REPLACE ECM (See page 10-24)**

OK

4	REPLACE ACCELERATOR PEDAL ROD ASSY (See page 10-26)

GO

5	READ OUTPUT DTC (ACCELERATOR PEDAL POSITION SENSOR DTCS ARE OUTPUT AGAIN

(a) Clear the DTC (see page 05-400).
(b) Start the engine.
(c) Run the engine at idle for 15 seconds or more.
(d) Read the DTC (see page 05-400).

Result:

Display (DTC Output)	Proceed to
P2120, P2122, P2123, P2125, P2127, P2128 and/or P2138 are output again	A
No DTC output	B

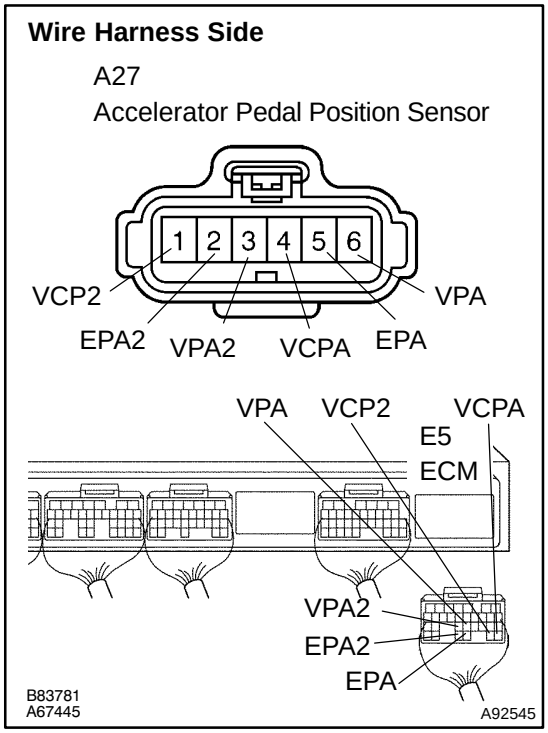
B → SYSTEM OK

A

REPLACE ECM (See page 10-24)

OBD II scan tool (excluding hand-held tester):

1	CHECK WIRE HARNESS (ACCELERATOR PEDAL POSITION SENSOR - ECM)



(a) Disconnect the A27 accelerator pedal position sensor connector.
(b) Disconnect the E5 ECM connector.
(c) Measure the resistance of the wire harness side connectors.

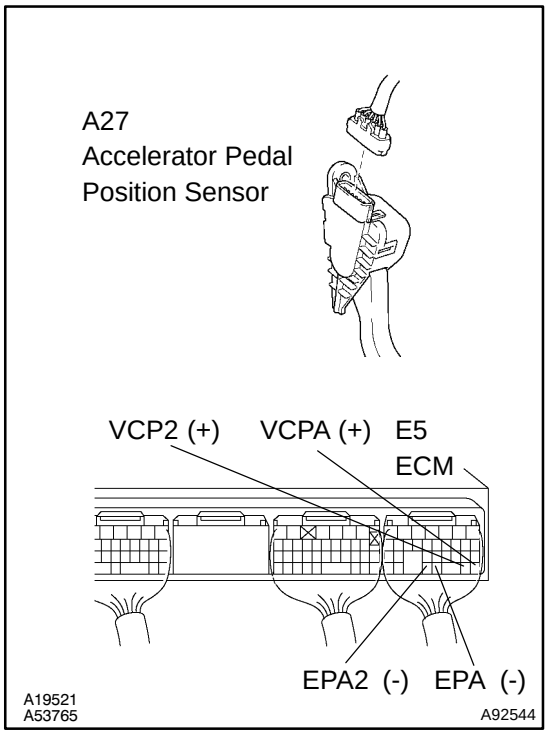
Standard:

A27-6 (VCP1) - E5-26 (VCPA) A27-5 (VPA1) - E5-22 (VPA) A27-4 (VCP2) - E5-27 (VCP2) A27-3 (EP1) - E5-28 (EPA) A27-2 (VPA2) - E5-23 (VPA2) A27-1 (EP2) - E5-29 (EPA2)	Below 1 Ω
A27-6 (VCP1) or E5-26 (VCPA) - Body ground A27-5 (VPA1) or E5-22 (VPA) - Body ground A27-4 (VCP2) or E5-27 (VCP2) - Body ground A27-3 (EP1) or E5-28 (EPA) - Body ground A27-2 (VPA2) or E5-23 (VPA2) - Body ground A27-1 (EP2) or E5-29 (EPA2) - Body ground	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

2	INSPECT ECM (VCPA AND VCP2 VOLTAGE)



(a) Disconnect the A27 accelerator pedal position sensor connector.
(b) Turn the ignition switch ON.
(c) Cheak the voltage of the E5 ECM connector.
Standard:

Tester Connection	Specified Condition
E5-26 (VCPA) - E5-28 (EPA) E5-27 (VCP2) - E5-29 (EPA2)	4.5 to 5.5 V

NG → **REPLACE ECM (See page 10-24)**

OK

3	REPLACE ACCELERATOR PEDAL ROD ASSY (See page 10-26)

GO

4	READ OUTPUT DTC (ACCELERATOR PEDAL POSITION SENSOR DTCS ARE OUTPUT AGAIN)

(a) Clear the DTC (see page 05-400).
(b) Start the engine.
(c) Run the engine at idle for 15 seconds or more.
(d) Read the DTC (see page 05-400).
Result:

Display (DTC Output)	Proceed to
P2120, P2122, P2123, P2125, P2127, P2128 and/or P2138 are output again	A
No DTC output	B

B → **SYSTEM OK**

A

REPLACE ECM (See page 10-24)

DTC	P2121	THROTTLE/PEDAL POSITION SENSOR/SWITCH ”D” CIRCUIT RANGE/PERFORMANCE

HINT:
This is repair procedure for the ”accelerator pedal position sensor”.

CIRCUIT DESCRIPTION

Refer to DTC P2120 on page 05-617 .

DTC No.	DTC Detection Condition	Trouble Area
P2121	Conditions (a) continue for 0.5 seconds: (a) Difference between VPA and VPA2 exceeds the threshold (1 trip detection logic)	・Open or short in accelerator pedal position sensor circuit ・Accelerator pedal position sensor ・ECM

MONITOR DESCRIPTION

The accelerator pedal position sensor is mounted on the accelerator pedal bracket. The accelerator pedal position sensor has 2 sensors elements/signal output: VPA and VPA2.
VPA is used to detect the actual accelerator pedal angle (used for engine control) and VPA2 is used to detect malfunctions in VPA. When the difference between the voltage outputs of VPA and VPA2 deviates from the standard, the ECM concludes the accelerator pedal position sensor has a malfunction. ECM turns on the MIL and a DTC is set.

FAIL SAFE

The accelerator pedal position sensor has 2 (main and sub) sensor circuits. If a malfunction occurs in either of the sensor circuits, the ECM detects the abnormal signal voltage difference between the 2 sensor circuits and switches to fail-sefe mode. In fail-sefe mode, the functioning circuit is used to calculate the accelerator pedal opening angle to allow the vehicle to continue driving. If both circuits malfunction, the ECM regards the opening angle of the accelerator pedal to be fully closed. In this case, the throttle valve will remain closed as if the engine is idling.
If a ”pass” condition is detected and then the ignition switch is turned OFF, the fail-safe operation will stop and the system will return to normal condition.

MONITOR STRATEGY

Related DTCs	P2121: TP sensor malfunction
Required sensors / components (Main)	Accelerator position sensor
Required sensors / components (Related)	-
Frequency of operation	Continuous
Duration	0.5 seconds
MIL operation	Immediate
Sequence operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever this DTC is not present	See page 05-377
Ignition switch	ON

TYPICAL MALFUNCTION THRESHOLDS

VPA1 - VPA2 (learning voltage)	Below 0.4 V, or more than 1.2 V

WIRING DIAGRAM

Refer to DTC P2120 on page 05-617 .

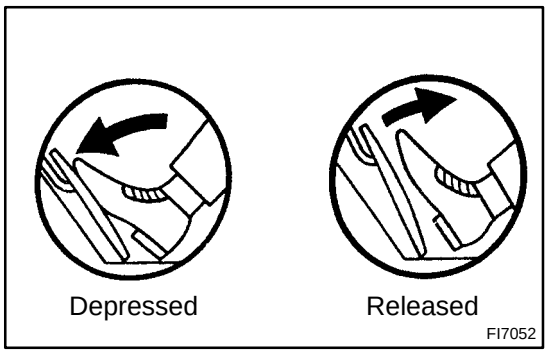
INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame date can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction.

Hand-held tester:

1	READ VALUE OF HAND-HELD TESTER (ACCEL POS #1, ACCEL POS #2)



(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON.
(c) On the hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ETCS / ACCEL POS #1 and ACCEL POS #2. Read the values.

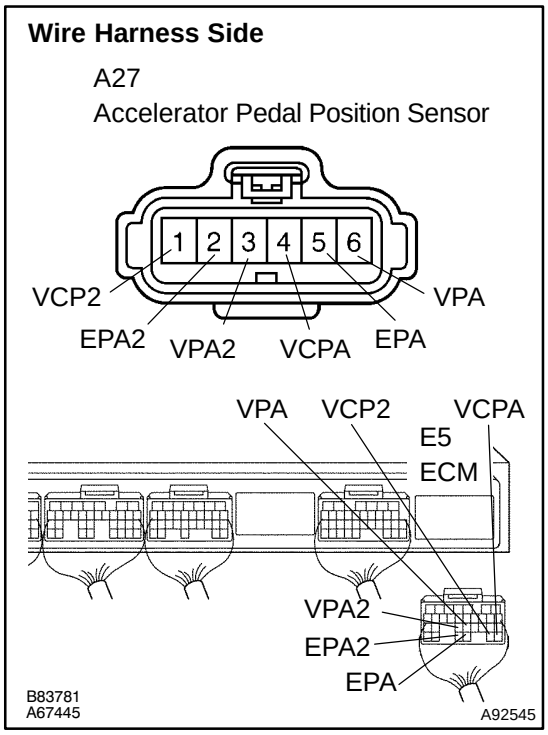
Standard:

Accelerator Pedal	ACCEL POS #1	ACCEL POS #2
Released	0.5 to 1.1 V	1.2 to 2.0 V
Depressed	2.6 to 4.5 V	3.4 to 5.3 V

OK → **REPLACE ECM (See page 10-24)**

NG

2	CHECK WIRE HARNESS (ACCELERATOR PEDAL POSITION SENSOR - ECM)



(a) Disconnect the A27 accelerator pedal position sensor connector.
(b) Disconnect the E5 ECM connector.
(c) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
A27-6 (VCP1) - E5-26 (VCPA) A27-5 (VPA1) - E5-22 (VPA) A27-4 (VCP2) - E5-27 (VCP2) A27-3 (EP1) - E5-28 (EPA) A27-2 (VPA2) - E5-23 (VPA2) A27-1 (EP2) - E5-29 (EPA2)	Below 1 Ω
A27-6 (VCP1) or E5-26 (VCPA) - Body ground A27-5 (VPA1) or E5-22 (VPA) - Body ground A27-4 (VCP2) or E5-27 (VCP2) - Body ground A27-3 (EP1) or E5-28 (EPA) - Body ground A27-2 (VPA2) or E5-23 (VPA2) - Body ground A27-1 (EP2) or E5-29 (EPA2) - Body ground	10 kΩ or higher

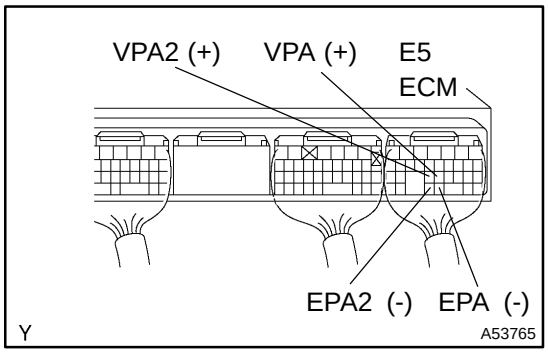
NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK →

REPLACE ACCELERATOR PEDAL ROD ASSY (See page 10-26)

OBD II scan tool (excluding hand-held tester):

1	INSPECT ECM (VPA, VPA2 VOLTAGE)



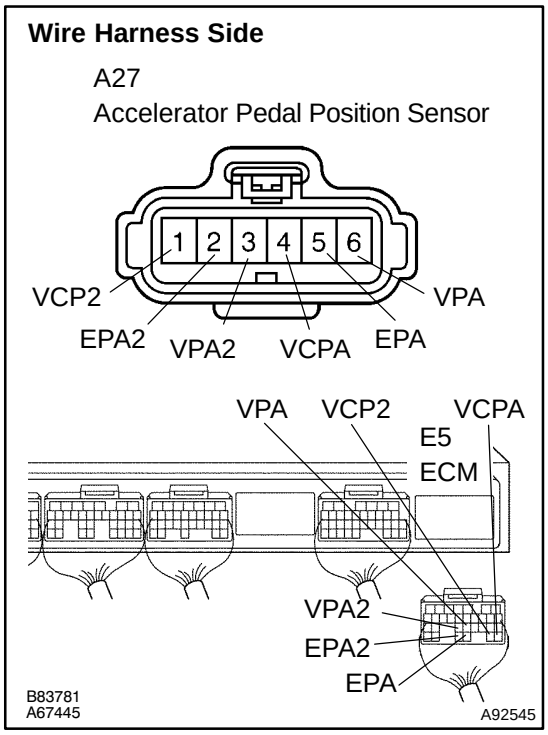
(a) Turn the ignition switch ON.
(b) Check the voltage of the ECM connector.

Tester Condition	Accelerator Pedal Condition	Specified Condition
E5-22 (VPA) - E5-28 (EPA)	Released	0.5 to 1.1 V
E5-22 (VPA) - E5-28 (EPA)	Depressed	2.6 to 4.5 V
E5-23 (VPA2) - E5-29 (EPA2)	Released	1.2 to 2.9 V
E5-23 (VPA2) - E5-29 (EPA2)	Depressed	3.4 to 5.5 V

OK → **REPLACE ECM (See page 10-24)**

NG →

2 CHECK WIRE HARNESS (ACCELERATOR PEDAL POSITION SENSOR - ECM)



(a) Disconnect the A27 accelerator pedal position sensor connector.

(b) Disconnect the E5 ECM connector.

(c) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
A27-6 (VCP1) - E5-26 (VCPA) A27-5 (VPA1) - E5-22 (VPA) A27-4 (VCP2) - E5-27 (VCP2) A27-3 (EP1) - E5-28 (EPA) A27-2 (VPA2) - E5-23 (VPA2) A27-1 (EP2) - E5-29 (EPA2)	Below 1 Ω
A27-6 (VCP1) or E5-26 (VCPA) - Body ground A27-5 (VPA1) or E5-22 (VPA) - Body ground A27-4 (VCP2) or E5-27 (VCP2) - Body ground A27-3 (EP1) or E5-28 (EPA) - Body ground A27-2 (VPA2) or E5-23 (VPA2) - Body ground A27-1 (EP2) or E5-29 (EPA2) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE ACCELERATOR PEDAL ROD ASSY (See page 10-26)

DTC	P2195	OXYGEN (A/F) SENSOR SIGNAL STUCK LEAN (BANK 1 SENSOR 1)

DTC	P2196	OXYGEN (A/F) SENSOR SIGNAL STUCK RICH (BANK 1 SENSOR 1)

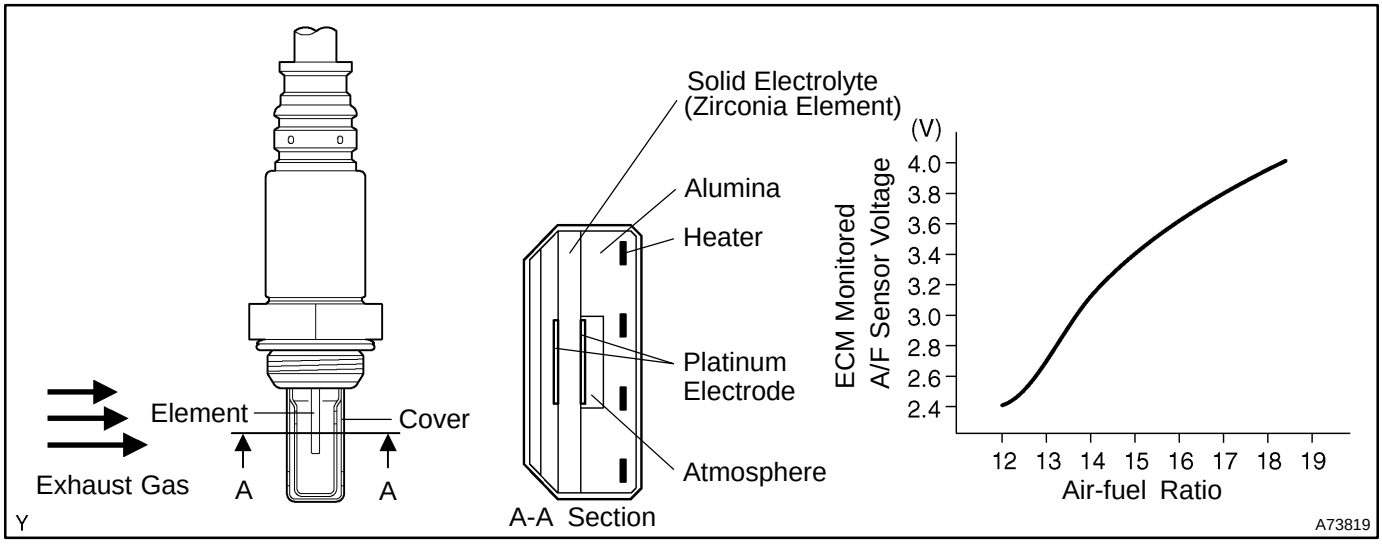
DTC	P2197	OXYGEN (A/F) SENSOR SIGNAL STUCK LEAN (BANK 2 SENSOR 1)

DTC	P2198	OXYGEN (A/F) SENSOR SIGNAL STUCK RICH (BANK 2 SENSOR 1)

HINT:
Although the title (DTC description) says ”oxygen sensor”, this DTC is related to the ”A/F sensor”.

CIRCUIT DESCRIPTION

The Air Fuel ratio sensor provides output voltage* approximately equal to the existing air-fuel ratio. The A/F sensor output voltage is used to provide feedback for the ECM to control the air-fuel ratio.
With the A/F sensor output, the ECM can determine deviation from the stoichiometric air-fuel ratio and control proper injection time. If the A/F sensor is malfunctioning, the ECM is unable to accurately control air-fuel ratio.
The A/F sensor is equipped with a heater which heats the zirconia element. The heater is also controlled by the ECM. When the intake air volume is low (the temperature of the exhaust gas is low), current flows to the heater to heat the sensor to facilitate detection of accurate oxygen concentration.
The A/F sensor is a planar type. Compared to a conventional type, the sensor and heater portions are narrower. Because the heat of the heater is conducted through the alumina to zirconia (of the sensor portion), sensor activation is accelerated.
To obtain a high purification rate of the CO, HC and NOx components of the exhaust gas, a three-way catalytic converter is used. The converter is most efficient when the air-fuel ratio is maintained near the stoichiometric air-fuel ratio.
HINT:
*: The voltage value changes on the inside of the ECM only.



DTC No.	DTC Detection Condition	Trouble Area
P2195 P2197	Conditions (a) and (b) continue for 2 sec. or more: (a) A/F sensor voltage is more than 3.8 V (b) Heated oxygen sensor voltage is 0.15 V or more (2 trip detection logic)	⁎ Open or short in A/F sensor (bank 1, 2 sensor 1) circuit ⁎ A/F sensor (bank 1, 2 sensor 1) ⁎ A/F sensor heater ⁎ A/F relay ⁎ Open or short in A/F sensor heater and relay circuits ⁎ Air induction system ⁎ Fuel pressure ⁎ Injector ⁎ PCV hose connection ⁎ ECM
P2196 P2198	Conditions (a) and (b) continue for 2 sec. or more: (a) A/F sensor voltage is less than 2.8 V (b) Heated oxygen sensor voltage is less than 0.85 V (2 trip detection logic)	⁎ Open or short in A/F sensor (bank 1, 2 sensor 1) circuit ⁎ A/F sensor (bank 1, 2 sensor 1) ⁎ A/F sensor heater ⁎ A/F relay ⁎ A/F sensor heater and relay circuit ⁎ Air induction system ⁎ Fuel pressure ⁎ Injector ⁎ PCV hose connection ⁎ ECM

HINT:

- ⁎ DTCs P2195 and P2196 indicate a malfunction related to bank 1 of the A/F sensor circuit.
- ⁎ DTCs P2197 and P2198 indicate a malfunction related to bank 2 of the A/F sensor circuit.
- ⁎ Bank 1 is the bank that includes cylinder No. 1.
- ⁎ Bank 2 is the bank that includes cylinder No. 2.
- ⁎ Sensor 1 refers to the sensor closest to the engine assembly.
- ⁎ After confirming DTC P2195, P2196, P2197 or P2198, use the hand−held tester or the OBD II scan tool to confirm A/F sensor output voltage (AFS B1S1 / AFS B2S1) from the ALL menu (to reach the ALL menu: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL).
- ⁎ The A/F sensor's output voltage and the short−term fuel trim value can be read using the OBD II scan tool or the hand−held tester.
- ⁎ The ECM controls the voltage of the A1A+, A2A+, A1A− and A2A− terminals of the ECM to a fixed voltage. Therefore, it is impossible to confirm the A/F sensor output voltage without the OBD II scan tool or the hand-held tester.
- ⁎ The OBD II scan tool (excluding hand−held tester) displays one fifth of the A/F sensor output voltage which is displayed on the hand−held tester.

MONITOR DESCRIPTION

Under the air-fuel ratio feedback control, if the voltage output of the A/F sensor indicates RICH or LEAN for more than a certain period of time, the ECM concludes that there is a fault in the A/F sensor system. The ECM will turn on the MIL and will set a DTC.

Example:

If the A/F sensor voltage output is less than 2.8 V (very RICH) for 10 seconds even though voltage output of the heated oxygen sensor output voltage is less than 0.85 V, the ECM sets DTC P2196 or DTC P2198. If the heated oxygen sensor output voltage is 0.15 V or more but the A/F sensor voltage output is more than 3.8 V (very LEAN) 10 seconds, DTC P2195 or DTC P2197 is set.

MONITOR STRATEGY

Related DTCs	P2195: A/F Sensor Signal (Bank 1) Stuck Lean P2196: A/F Sensor Signal (Bank 1) Stuck Rich P2197: A/F Sensor Signal (Bank 2) Stuck Lean P2198: A/F Sensor Signal (Bank 2) Stuck Rich
Required sensors / components (Main)	A/F sensor
Required sensors / components (Related)	Rear HO2S
Frequency of operation	Continuous
Duration	10 seconds
MIL operation	2 driving cycles
Sequence operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever these DTCs are not present	See page 05-377
Time after engine start	30 seconds or more
A/F sensor status	Activated
Fuel system status	Closed Loop
Engine condition	Running

TYPICAL MALFUNCTION THRESHOLDS

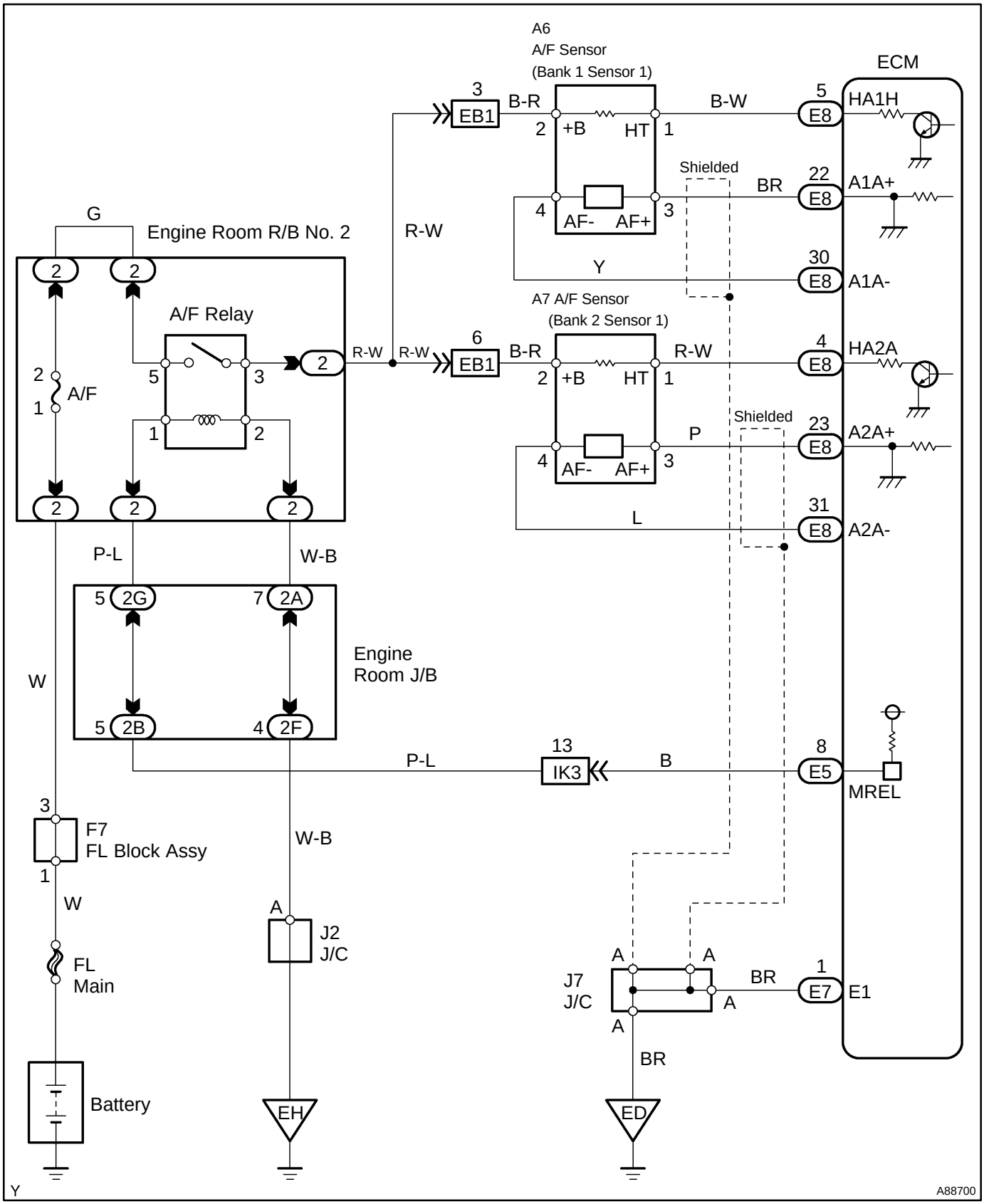
P2195 and P2197:

Both of the following conditions are met:	-
A/F sensor voltage	More than 3.8 V
Rear HO2S voltage	0.15 V or more

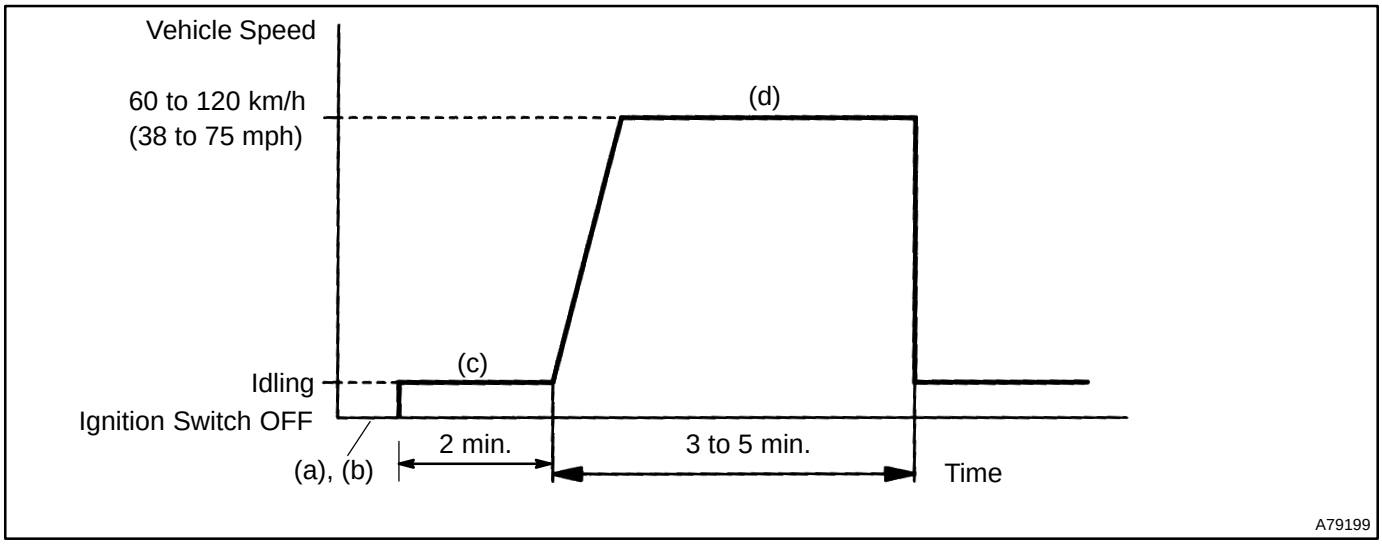
P2196 and P2198:

Both of the following conditions are met:	-
A/F sensor voltage	Less than 2.8 V
Rear HO2S voltage	Less than 0.85 V

WIRING DIAGRAM



CONFIRMATION DRIVING PATTERN



(a) Connect the hand-held tester to the DLC3.
(b) Switch the hand-held tester from the normal mode to the check mode (see page 05-402).
(c) Start the engine and warm it up with all the accessory switches OFF.
(d) Drive the vehicle at 60 to 120 km/h (38 to 75 mph) and engine speed at 1,400 to 3,200 rpm for 3 to 5 minutes.

HINT:
If a malfunction exists, the MIL will be illuminated during step (d).

NOTICE:
If the conditions in this test are not strictly followed, detection of a malfunction will not occur. If you do not have a hand-held tester, turn the ignition switch OFF after performing steps (c) and (d), then perform steps (c) and (d) again.

INSPECTION PROCEDURE

HINT:
Hand-held tester only:
It is possible the malfunctioning area can be found using the ACTIVE TEST A/F CONTROL operation. The A/F CONTROL operation can determine if the A/F sensor, heated oxygen sensor or other potential trouble areas are malfunctioning or not.

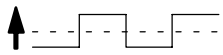
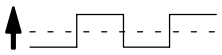
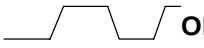
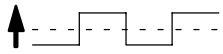
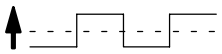
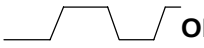
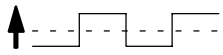
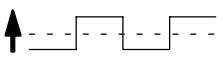
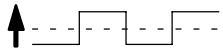
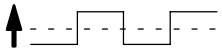
(a) Perform the ACTIVE TEST A/F CONTROL operation.

HINT:
The A/F CONTROL operation lowers the injection volume 12.5 % or increases the injection volume 25%.

(1) Connect the hand-held tester to the DLC3 on the vehicle.
(2) Turn the ignition switch ON.
(3) Warm up the engine by running the engine at 2,500 rpm for approximately 90 seconds.
(4) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL.
(5) Perform the A/F CONTROL operation with the engine idle (press the right or left button).

Result:
A/F sensor reacts in accordance with increase and decrease of injection volume:
+25 % → RICH output: Less than 3.0 V
-12.5 % → LEAN output: More than 3.35 V
Heated oxygen sensor reacts in accordance with increase and decrease of injection volume:
+25 % → RICH output: More than 0.55 V
-12.5 % → LEAN output: Less than 0.4 V

NOTICE:
The A/F sensor output has a few seconds of delay and the heated oxygen sensor output has about 20 seconds of delay at maximum.

	Output voltage of A/F sensor (sensor 1)	Output voltage of heated oxygen sensor (sensor 2)	Mainly suspected Trouble Area
Case 1	Injection volume +25 % -12.5 %  Output voltage More than 3.35 V Less than 3.0 V  **OK**	Injection volume +25 % -12.5 %  Output voltage More than 0.55 V Less than 0.4V  **OK**	—
Case 2	Injection volume +25 % -12.5 %  Output voltage Almost No reaction **NG**	Injection volume +25 % -12.5 %  Output voltage More than 0.55 V Less than 0.4V  **OK**	A/F sensor (A/F sensor, heater, A/F sensor circuit)
Case 3	Injection volume +25 % -12.5 %  Output voltage More than 3.35 V Less than 3.0V  **OK**	Injection volume +25 % -12.5 %  Output voltage Almost No reaction **NG**	Heated oxygen sensor (heated oxygen sensor, heater, heated oxygen sensor circuit)
Case 4	Injection volume +25 % -12.5 %  Output voltage Almost No reaction **NG**	Injection volume +25 % -12.5 %  Output voltage Almost No reaction **NG**	Extremely rich or lean actual air-fuel ratio (Injector, fuel pressure, gas leakage in exhaust system, etc.)

The following A/F CONTROL procedure enables the technician to check and graph the voltage outputs of both the A/F sensor and the heated oxygen sensor.
For displaying the graph, enter ”ACTIVE TEST / A/F CONTROL / USER DATA”, select ”AFS B1S1 and O2S B1S2” by pressing ”YES” and push ”ENTER”. Then press ”F4”.
HINT:

- If DTC P2195 or P2196 is displayed, check bank 1 sensor 1 circuit.
- If DTC P2197 or P2198 is displayed, check bank 2 sensor 1 circuit.
- A low A/F sensor voltage could be caused by a RICH air-fuel mixture. Check for conditions that would cause the engine to run with a RICH air-fuel mixture.
- A high A/F sensor voltage could be caused by a LEAN air-fuel mixture. Check for conditions that would cause the engine to run with a LEAN air-fuel mixture.
- Read freeze frame data using the hand-held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	CHECK OTHER DTC OUTPUT (IN ADDITION TO A/F SENSOR DTC)

(a) Read the DTC using the hand-held tester or the OBD II scan tool.
Result:

Display	Proceed to
A/F sensor circuit DTC are output	A
A/F sensor circuit DTC and other codes are output	B

HINT:
If any other codes besides A/F sensor DTC are output, perform the troubleshooting for those DTCs first.

B → **GO TO RELEVANT DTC CHART**
(See page 05-412)

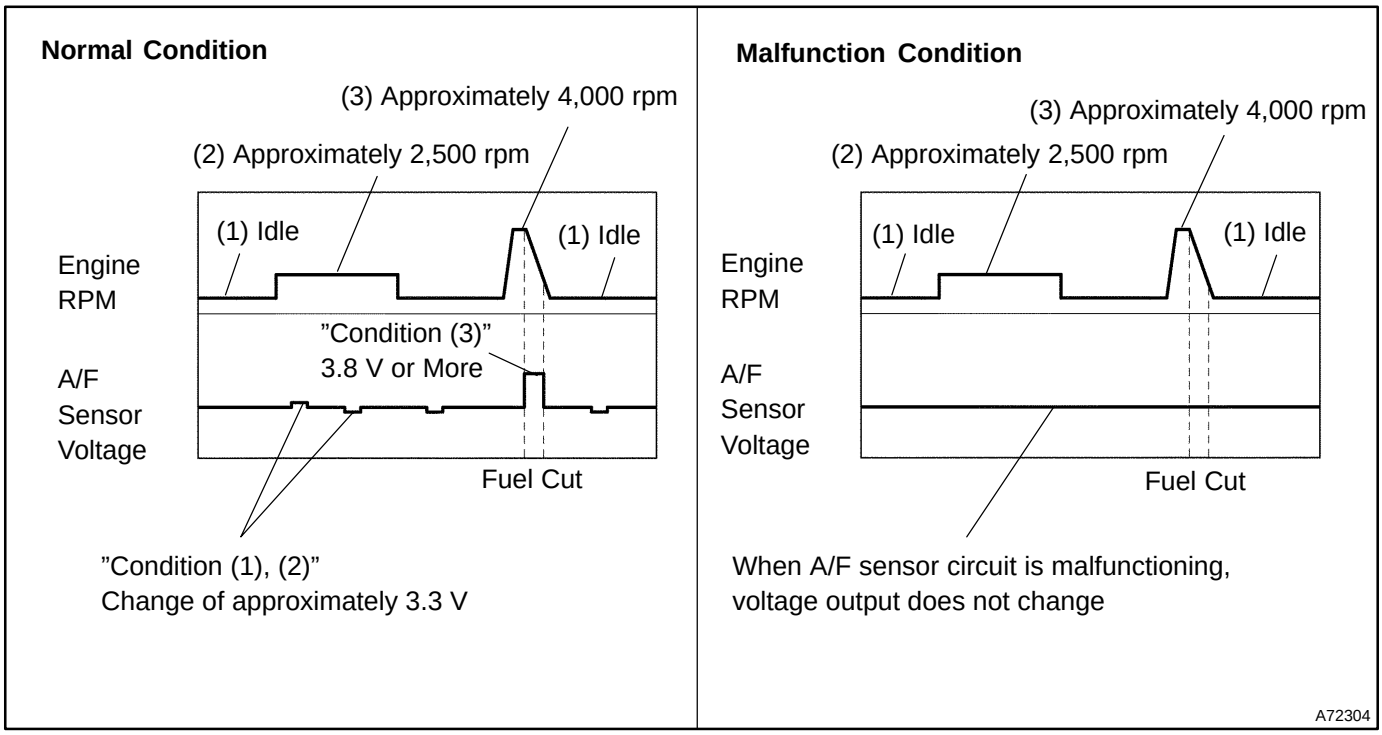
A

2	READ VALUE OF HAND-HELD TESTER OR OBD II SCAN TOOL (OUTPUT VOLTAGE OF A/F SENSOR)

(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(b) Warm up the A/F sensor (bank 1, 2 sensor 1) by running the engine at 2,500 rpm for approximately 90 seconds.
(c) Read A/F sensor voltage output on the hand-held tester or the OBD II scan tool.
(d) Hand-held tester only:
On the hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / SNAPSHOT / MANUAL SNAPSHOT / USER DATA. Read the values.
(e) Select ”AFS B1 S1 or AFS B2 S1 / ENGINE SPD” and press YES.
(f) Monitor the A/F sensor voltage carefully.
(g) Check the A/F sensor voltage output under the following conditions:
(1) Allow the engine to idle for 30 seconds.
(2) Run the engine at approximately 2,500 rpm. Do not suddenly change the rpm.
(3) Raise the engine to 4,000 rpm and quickly release the accelerator pedal so that the throttle is fully closed.

Standard:
Condition (1) and (2)
Voltage change of 3.3 V (0.66 V)* (between approximately 3.1 to 3.5 V) as shown in the illustration.
Condition (3)
A/F sensor voltage increases to 3.8 V (0.76 V)* or more during engine deceleration when fuel is cut as shown in the illustration.

HINT:
*: Voltage when using the OBD II scan tool.



HINT:

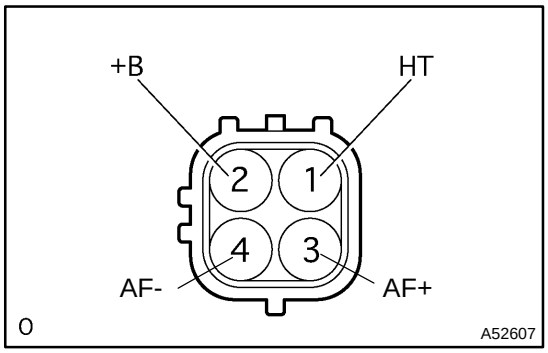
- Whenever the A/F sensor output voltage remains at approximately 3.3 V (0.660 V)* (see "Malfunction Condition" graphic) under any condition as well as the above conditions, the A/F sensor may have an open circuit. This will happen also when the A/F sensor heater has an open circuit.
- Whenever the A/F sensor output voltage remains at a certain value of approximately 3.8 V (0.76 V)* or more, or 2.8 V (0.56 V)* or less (see "Malfunction Condition" graphic) under any condition as well as the above conditions, the A/F sensor may have a short circuit.
- The ECM will stop fuel injection (fuel is cut) during engine deceleration. This will cause a LEAN condition and should result in a momentary increase in A/F sensor output voltage.
- The ECM must establish a closed throttle position learned value to perform fuel cut. If the battery terminal has been disconnected, the vehicle must be driven over 10 mph to allow the ECM to learn the closed throttle position.
- When the vehicle is driven:
  The output voltage of the A/F sensor may be below 2.8 V (0.76 V)* during fuel enrichment. For the vehicle, this translates to a sudden increase in speed with the accelerator pedal fully depressed when trying to overtake another vehicle. The A/F sensor is functioning normally.
- The A/F sensor is a current output element, and therefore the current is converted into voltage inside the ECM. If measuring voltage at connectors of A/F sensor or ECM, you will observe a constant voltage.

*: Voltage when using the OBD II scan tool.

OK	**Go to step 13**

NG

3 INSPECT AIR FUEL RATIO SENSOR (HEATR RESISTANCE)



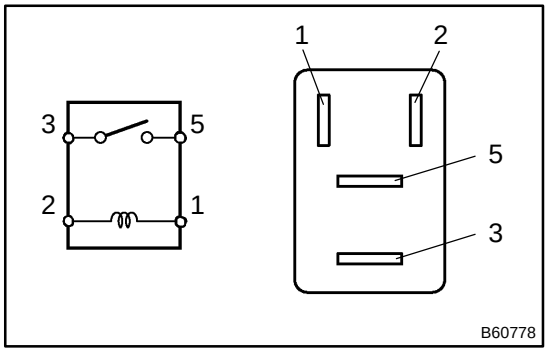
(a) Disconnect the A6 or A7 A/F sensor connector.
(b) Check the resistance of the A/F sensor terminals.
Resistance:

Tester Connection	Condition	Specified Condition
1 (HT) - 2 (+B)	20°C (68°F)	1.8 to 3.4 Ω
1 (HT) - 4 (AF-)	-	10 kΩ or higher

NG → **REPLACE AIR FUEL RATIO SENSOR**

OK

4 INSPECT RELAY (A/F)



(a) Remove the A/F relay from the engine room R/B No. 2.
(b) Check the resistance of the A/F relay.
Standard:

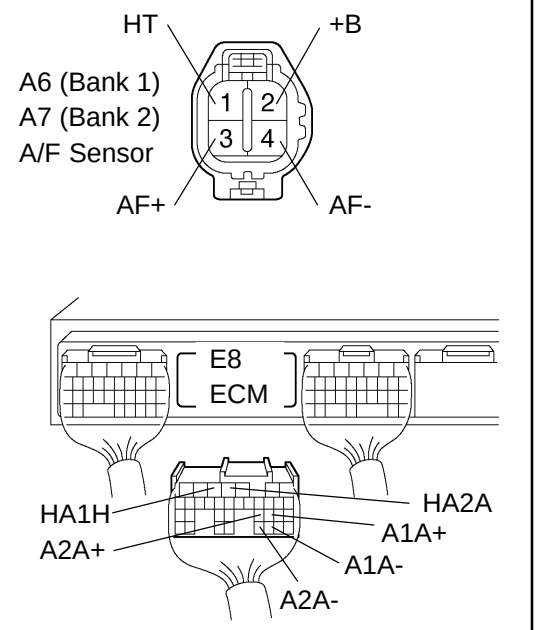
Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

NG → **REPLACE RELAY**

OK

5 CHECK WIRE HARNESS (A/F SENSOR - ECM)

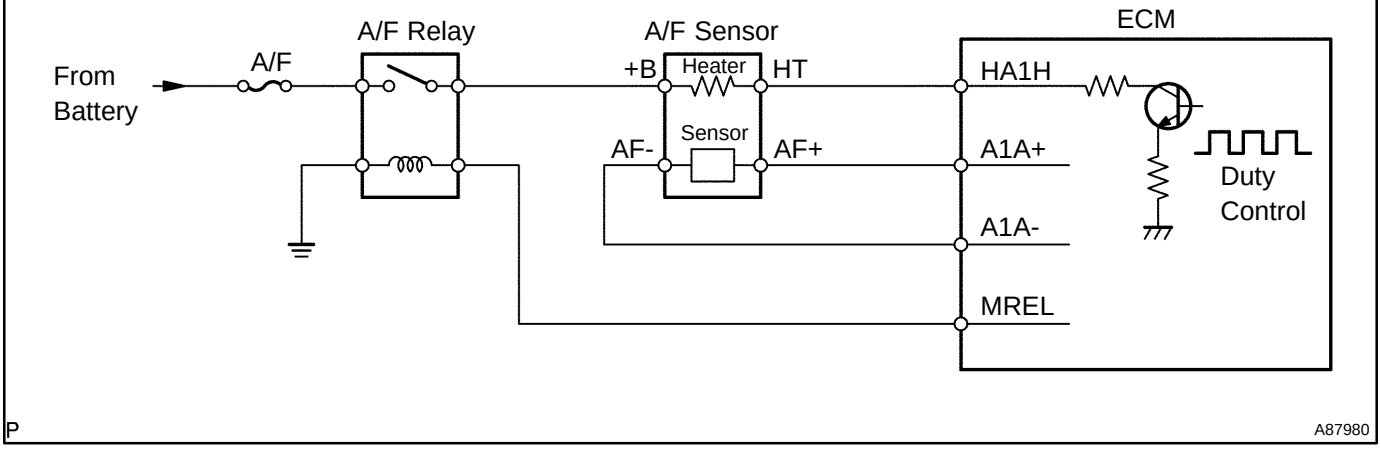
Wire Harness Side



(a) Disconnect the A6 or A7 A/F sensor connector.
(b) Disconnect the E8 ECM connector.
(c) Check the resistance of the wire harness side connectors.
Standard:

Tester Connection	Specified Condition
A6-3 (AF+) - E8-22 (A1A+) A6-4 (AF-) - E8-30 (A1A-) A6-1 (HT) - E8-5 (HA1H) A7-3 (AF+) - E8-23 (A2A+) A7-4 (AF-) - E8-31 (A2A-) A7-1 (HT) - E8-4 (HA2A)	Below 1 Ω
A6-3 (AF+) or E8-22 (A1A+) - Body ground A6-4 (AF-) or E8-30 (A1A-) - Body ground A6-1 (HT) or E8-5 (HA1H) - Body ground A7-3 (AF+) or E8-23 (A2A+) - Body ground A7-4 (AF-) or E8-31 (A2A-) - Body ground A7-1 (HT) or E8-4 (HA2A) - Body ground	10 kΩ or higher

Reference (Bank 1 Sensor 1 System Drawing)



NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

6 CHECK AIR INDUCTION SYSTEM

(a) Check for vacuum leaks in air induction system.
OK: No leak in air induction system.

NG → **REPAIR OR REPLACE AIR INDUCTION SYSTEM**

OK

7	CHECK FUEL PRESSURE (See page 11-38)

(a) Check fuel pressure (high or low fuel pressure).
Standard:
Fuel pressure: 304 to 343 kPa (3.1 to 3.5 kgf/cm^2, 44 to 50 psi).

NG → **REPAIR OR REPLACE FUEL SYSTEM**

OK

8	INSPECT FUEL INJECTOR ASSY (See page 11-41)

(a) Check injector injection (high or low fuel injection quantity or poor injection pattern).
Standard:

Injection volume	Difference between each injector
60 to 73 cm^3 (3.7 to 4.5 cu in.) per 15 seconds	13 cm^3 (0.8 cu in.) or less

NG → **REPLACE FUEL INJECTOR ASSY (See page 11-46)**

OK

9	REPLACE AIR FUEL RATIO SENSOR

GO

10	PERFORM CONFIRMATION DRIVING PATTERN

HINT:
Clear all DTCs prior to performing the confirmation driving pattern.

GO

11	READ OUTPUT DTC (A/F SENSOR DTC OUTPUT AGAIN)

(a) Read the DTC using the hand-held tester or the OBD II scan tool.
Result :

Display	Proceed to
A/F sensor circuit DTC are not output	A
A/F sensor circuit DTC are output	B

B → **REPLACE ECM (See page 10-24) AND PERFORM CONFIRMATION DRIVING PATTERN**

A

12	CONFIRM IF VEHICLE HAS RUN OUT OF FUEL IN PAST

OK: Vehicle has run out of fuel in past.

NO → **CHECK FOR INTERMITTENT PROBLEMS (See page 05-370)**

YES

DTC IS CAUSED BY RUNNING OUT OF FUEL

13	PERFORM CONFIRMATION DRIVING PATTERN

HINT:
Clear all DTCs prior to performing the confirmation driving pattern.

GO

14	READ OUTPUT DTC (A/F SENSOR DTC OUTPUT AGAIN)

(a) Read the DTC using the hand-held tester or the OBD II scan tool.
Result:

Display	Proceed to
A/F sensor circuit DTC are output	A
A/F sensor circuit DTC are not output	B

B → **Go to step 18**

A

15	REPLACE AIR FUEL RATIO SENSOR

GO

16	PERFORM CONFIRMATION DRIVING PATTERN

HINT:
Clear all DTCs prior to performing the confirmation driving pattern.

GO

17	READ OUTPUT DTC (A/F SENSOR DTC OUTPUT AGAIN)

(a) Read the DTC using the hand-held tester or the OBD II scan tool.
Result:

Display	Proceed to
A/F sensor circuit DTC are not output	A
A/F sensor circuit DTC are output	B

B → **REPLACE ECM (See page 10-24) AND PERFORM CONFIRMATION DRIVING PATTERN**

A

18	CONFIRM IF VEHICLE HAS RUN OUT OF FUEL IN PAST

OK: Vehicle has run out of fuel in past.

NO → **CHECK FOR INTERMITTENT PROBLEMS (See page 05-370)**

YES

DTC IS CAUSED BY RUNNING OUT OF FUEL

DTC	P2238	OXYGEN SENSOR PUMPING CURRENT CIRCUIT LOW (FOR A/F SENSOR)(BANK 1 SENSOR 1)

DTC	P2239	OXYGEN SENSOR PUMPING CURRENT CIRCUIT HIGH (FOR A/F SENSOR)(BANK 1 SENSOR 1)

DTC	P2241	OXYGEN SENSOR PUMPING CURRENT CIRCUIT LOW (FOR A/F SENSOR)(BANK 2 SENSOR 1)

DTC	P2242	OXYGEN SENSOR PUMPING CURRENT CIRCUIT HIGH (FOR A/F SENSOR)(BANK 2 SENSOR 1)

DTC	P2252	OXYGEN SENSOR REFERENCE GROUND CIRCUIT LOW (FOR A/F SENSOR)(BANK 1 SENSOR 1)

DTC	P2253	OXYGEN SENSOR REFERENCE GROUND CIRCUIT HIGH (FOR A/F SENSOR)(BANK 1 SENSOR 1)

DTC	P2255	OXYGEN SENSOR REFERENCE GROUND CIRCUIT LOW (FOR A/F SENSOR)(BANK 2 SENSOR 1)

DTC	P2256	OXYGEN SENSOR REFERENCE GROUND CIRCUIT HIGH (FOR A/F SENSOR)(BANK 2 SENSOR 1)

HINT:

- Although the title (DTC description) says ”oxygen sensor”, this DTC is related to the ”A/F sensor”.
- DTC P2238, P2239, P2252 and P2253 refer to the malfunction related to the bank 1 A/F sensor circuit.
- DTC P2241, P2242, P2255 and P2256 refer to the malfunction related to the bank 2 A/F sensor circuit.

CIRCUIT DESCRIPTION

Refer to DTC P2195 on page 05-629 .

DTC No.	DTC Detection Condition	Trouble Area
P2238 P2241	A/F sensor (bank 1 sensor 1) circuit low A/F sensor admittance is less than 0.022 1/Ω (2 trip detection logic)	HINT: Main trouble area
P2238 P2241	Condition (a) continues for 5.0 seconds or more : (a) A/F sensor admittance is less than 0.022 1/Ω (2 trip detection logic)	∗Open or short in A/F sensor circuit ∗A/F sensor ∗A/F sensor heater ∗A/F relay ∗Open or short in A/F sensor heater and relay circuits ∗ECM
P2239 P2242	A/F sensor (bank 1 sensor 1) circuit high (2 trip detection logic)	HINT: Main trouble area ∗Short in A/F sensor circuit
P2239 P2242	Condition (a) continues for 5.0 seconds or more : (a) AF+ is more than 4.5 V (2 trip detection logic)	∗Open or short in A/F sensor circuit ∗A/F sensor ∗A/F sensor heater ∗A/F relay ∗Open or short in A/F sensor heater and relay circuits ∗ECM
P2239 P2242	Condition (a) continues for 5.0 seconds or more : (a) (AF+) - (AF-) is more than 0.8 V (2 trip detection logic)	∗Open or short in A/F sensor circuit ∗A/F sensor ∗A/F sensor heater ∗A/F relay ∗Open or short in A/F sensor heater and relay circuits ∗ECM
P2252 P2255	Condition (a) continues for 5.0 seconds or more : (a) AF- is 0.5 V or less (2 trip detection logic)	∗Open or short in A/F sensor circuit ∗A/F sensor ∗A/F sensor heater ∗A/F relay ∗Open or short in A/F sensor heater and relay circuits ∗ECM
P2253 P2256	Condition (a) continues for 5.0 seconds or more : (a) AF- is more than 4.5 V (2 trip detection logic)	∗Open or short in A/F sensor circuit ∗A/F sensor ∗A/F sensor heater ∗A/F relay ∗Open or short in A/F sensor heater and relay circuits ∗ECM

HINT:

∗ Bank 1 is the bank that includes cylinder No.1.

∗ Bank 2 is the bank that includes cylinder No.2.

MONITOR DESCRIPTION

The Air-Fuel Ratio (A/F) sensor varies its voltage output in proportion to the air-fuel ratio. If impedance (alternating current resistance) or voltage output of the sensor deviates greatly from the standard, the ECM determines that an open or short is in the A/F sensor circuit.

MONITOR STRATEGY

Related DTCs	P2238: A/F sensor (bank 1) open circuit between AF+ and AF- P2238: A/F sensor (bank 1) short circuit between AF+ and AF- P2238: A/F sensor (bank 1) short circuit between AF+ and GND P2239: A/F sensor (bank 1) short circuit between AF+ and+B P2241: A/F sensor (bank 2) open circuit betrween AF+ and AF- P2241: A/F sensor (bank 2) short circuit between AF+ and AF- P2241: A/F sensor (bank 2) short circuit between AF+ and GND P2242: A/F sensor (bank 2) short circuit between AF+ and +B P2252: A/F sensor (bank 1) short circuit between AF-and GND P2253: A/F sensor (bank 1) short circuit between AF-and +B P2253: A/F sensor (bank 2) short circuit between AF- and GND P2256: A/F sensor (bank 2) short circuit between AF- and +B
Required sensors / components (Main)	A/F sensor
Required sensors / components (Related)	ECT sensor, CKP sensor
Frequency of operation	Once per driving cycle
Duration	10 seconds: A/F sensor open circuit between AF+ and AF= P2238, P2241 5 seconds: Others
MIL operation	Immediate
Sequence operation	None

TYPICAL ENABLING CONDITIONS

All:

The monitor will run whenever these DTCs are not present	See page 05-377

P2238, P2241 (A/F sensor open circuit between AF+ and AF-):

Duration while all of the following conditions are met:	20 seconds or more
AF+ terminal voltage	0.5 to 4.5 V
AF- terminal voltage	0.5 to 4.5 V
Difference between AF+ terminal and AF- terminal voltages	0.1 to 0.8 V
ECT	20°C (68°F) or more
Engine condition	Running
Time after engine start	20 seconds or more
Fuel-cut	OFF
A/F sensor heater duty cycle	0 % or more
Time after A/F sensor heating	20 seconds or more
Battery voltage	10.5 V or more
Ignition switch	ON

Others:

Battery voltage	10.5 V or more
Ignition switch	ON

TYPICAL MALFUNCTION THRESHOLDS

P2238, P2241 (A/F sensor open circuit between AF+ and AF-):

A/F sensor admittance	Below 0.022 1/ohm

P2238, P2241 (A/F sensor short circuit between AF+ and GND):

AF+ terminal voltage	0.5 V or less

P2238, P2241 (A/F sensor short circuit between AF+ and AF-):

Difference between AF+ terminal and AF- terminal voltages	0.1 V or less

P2239, P2242 (A/F sensor short circuit between AF+ and +B):

AF+ terminal voltage	More than 4.5 V

P2252, P2255 (A/F sensor short circuit between AF- and GND):

AF- terminal voltage	0.5 V or less

P2253, P2256 (A/F sensor short circuit between AF- and +B):

AF- terminal voltage	More than 4.5 V

WIRING DIAGRAM

Refer to DTC P2195 on page 05-629 .

INSPECTION PROCEDURE

HINT:

Hand-held tester only:

The malfunctioning area can be found by the ACTIVE TEST A/F CONTROL operation. The A/F CONTROL operation can determine if the A/F sensor, heated oxygen sensor or other suspected trouble areas are malfunctioning or not.

(a) Perform the ACTIVE TEST A/F CONTROL operation.

HINT:

The A/F CONTROL operation lowers the injection volume by 12.5% or increases the injection volume by 25%.

(1) Connect the hand-held tester to the DLC3 on the vehicle.
(2) Turn the ignition switch ON.
(3) Warm up the engine by running the engine at 2,500 rpm for approximately 90 seconds.
(4) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL.
(5) Perform the A/F CONTROL operation with the engine idling (press the right or left button).

Result:

A/F sensor reacts in accordance with increase and decrease of injection volume:

+25 % → RICH output: Less than 3.0 V

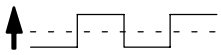
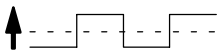
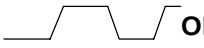
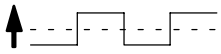
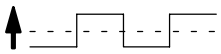
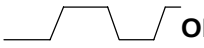
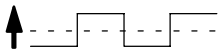
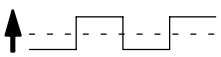
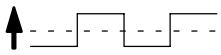
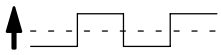
-12.5 % → LEAN output: More than 3.35 V

Heated oxygen sensor reacts in accordance with increase and decrease of injection volume:

+25 % → RICH output: More than 0.55 V

-12.5 % → LEAN output: Less than 0.4 V

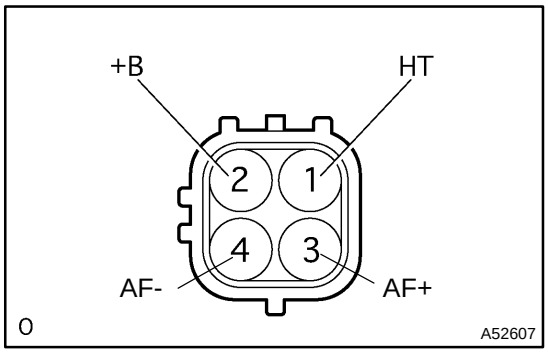
NOTICE:
The A/F sensor output has a few seconds of delay and the heated oxygen sensor output has about 20 seconds of delay at maximum.

	Output voltage of A/F sensor (sensor 1)	Output voltage of heated oxygen sensor (sensor 2)	Mainly suspected Trouble Area
Case 1	Injection volume +25 % -12.5 %  Output voltage More than 3.35 V Less than 3.0 V  **OK**	Injection volume +25 % -12.5 %  Output voltage More than 0.55 V Less than 0.4V  **OK**	—
Case 2	Injection volume +25 % -12.5 %  Output voltage Almost No reaction **NG**	Injection volume +25 % -12.5 %  Output voltage More than 0.55 V Less than 0.4V  **OK**	A/F sensor (A/F sensor, heater, A/F sensor circuit)
Case 3	Injection volume +25 % -12.5 %  Output voltage More than 3.35 V Less than 3.0V  **OK**	Injection volume +25 % -12.5 %  Output voltage Almost No reaction **NG**	Heated oxygen sensor (heated oxygen sensor, heater, heated oxygen sensor circuit)
Case 4	Injection volume +25 % -12.5 %  Output voltage Almost No reaction **NG**	Injection volume +25 % -12.5 %  Output voltage Almost No reaction **NG**	Extremely rich or lean actual air-fuel ratio (Injector, fuel pressure, gas leakage in exhaust system, etc.)

The following A/F CONTROL procedure enables the technician to check and graph the voltage outputs of both the A/F sensor and the heated oxygen sensor.
For displaying the graph, enter ”ACTIVE TEST / A/F CONTROL / USER DATA”, select ”AFS B1S1 and O2S B1S2” by pressing ”YES” and push ”ENTER”. Then press ”F4”.
HINT:

- If DTC P2238, P2239, P2252 or P2253 is displayed, check the bank 1 sensor 1 circuit.
- If DTC P2241, P2242, P2255 or P2256 is displayed, check the bank 2 sensor 1 circuit.
- Read freeze frame data using the hand-held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1 INSPECT AIR FUEL RATIO SENSOR (HEATER RESISTANCE)



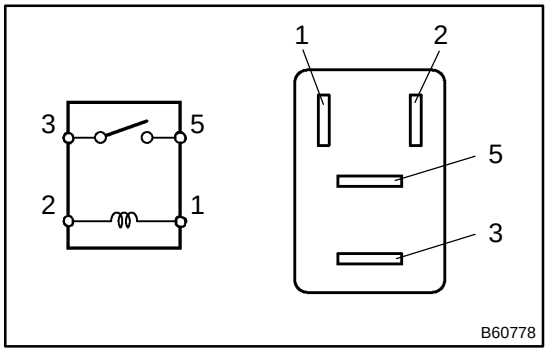
(a) Disconnect the A6 or A7 A/F sensor connector.
(b) Check the resistance of the A/F sensor terminals.
Standard:

Tester Connection	Condition	Specified Condition
1 (HT) - 2 (+B)	20°C (68°F)	1.8 to 3.4 Ω
1 (HT) - 4 (AF-)	-	10 kΩ or higher

NG → **REPLACE AIR FUEL RATIO SENSOR**

OK

2 INSPECT RELAY (A/F)



(a) Remove the A/F relay from the engine room R/B No. 2.
(b) Check the resistance of the A/F relay.
Standard:

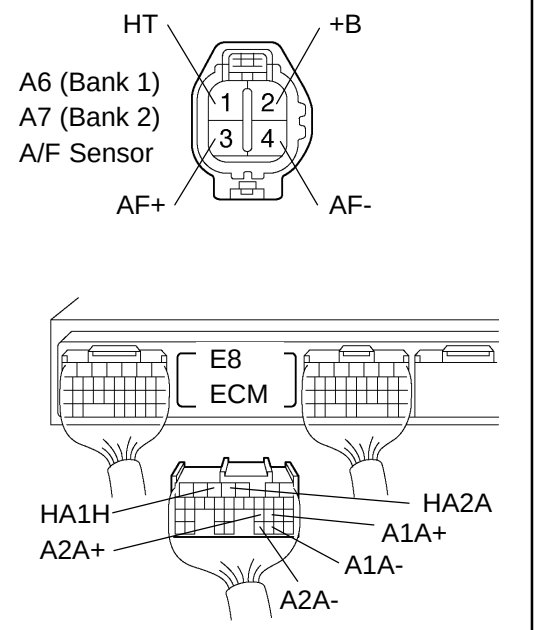
Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

NG → **REPLACE RELAY**

OK

3 CHECK WIRE HARNESS (HEATER RESISTANCE)

Wire Harness Side

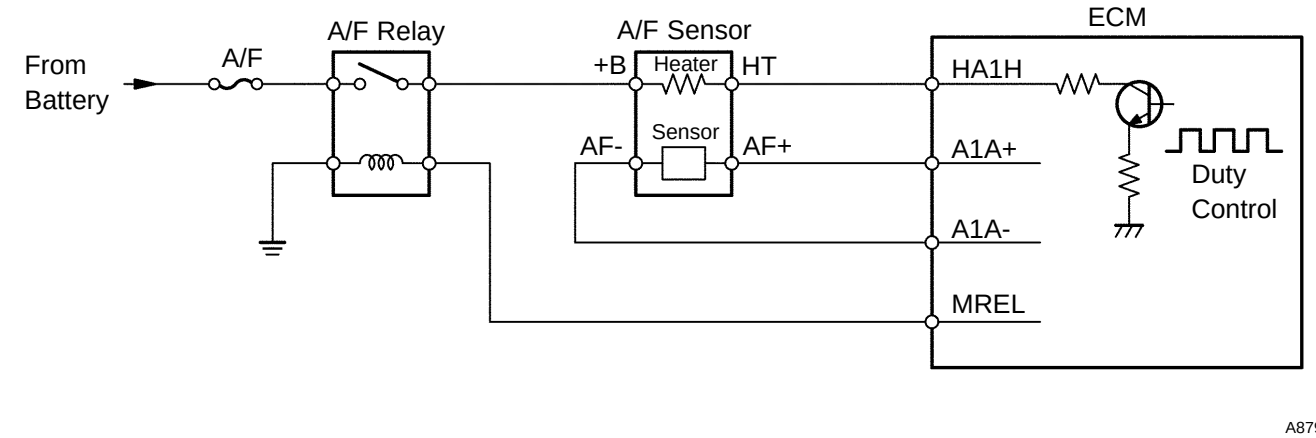


(a) Disconnect the A6 or A7 A/F sensor connector.
(b) Disconnect the E8 ECM connector.
(c) Check the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
A6-3 (AF+) - E8-22 (A1A+) A6-4 (AF-) - E8-30 (A1A-) A6-1 (HT) - E8-5 (HA1H) A7-3 (AF+) - E8-23 (A2A+) A7-4 (AF-) - E8-31 (A2A-) A7-1 (HT) - E8-4 (HA2A)	Below 1 Ω
A6-3 (AF+) or E8-22 (A1A+) - Body ground A6-4 (AF-) or E8-30 (A1A-) - Body ground A6-1 (HT) or E8-5 (HA1H) - Body ground A7-3 (AF+) or E8-23 (A2A+) - Body ground A7-4 (AF-) or E8-31 (A2A-) - Body ground A7-1 (HT) or E8-4 (HA2A) - Body ground	10 kΩ or higher

Reference (Bank 1 Sensor 1 System Drawing)



NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE ECM (See page 10-24)

DTC	P2A00	A/F SENSOR CIRCUIT SLOW RESPONSE (BANK 1 SENSOR 1)

DTC	P2A03	A/F SENSOR CIRCUIT SLOW RESPONSE (BANK 2 SENSOR 1)

HINT:

- DTC P2A00 refers to a malfunction related to the bank 1 A/F sensor.
- DTC P2A03 refers to a malfunction related to the bank 2 A/F sensor.

CIRCUIT DESCRIPTION

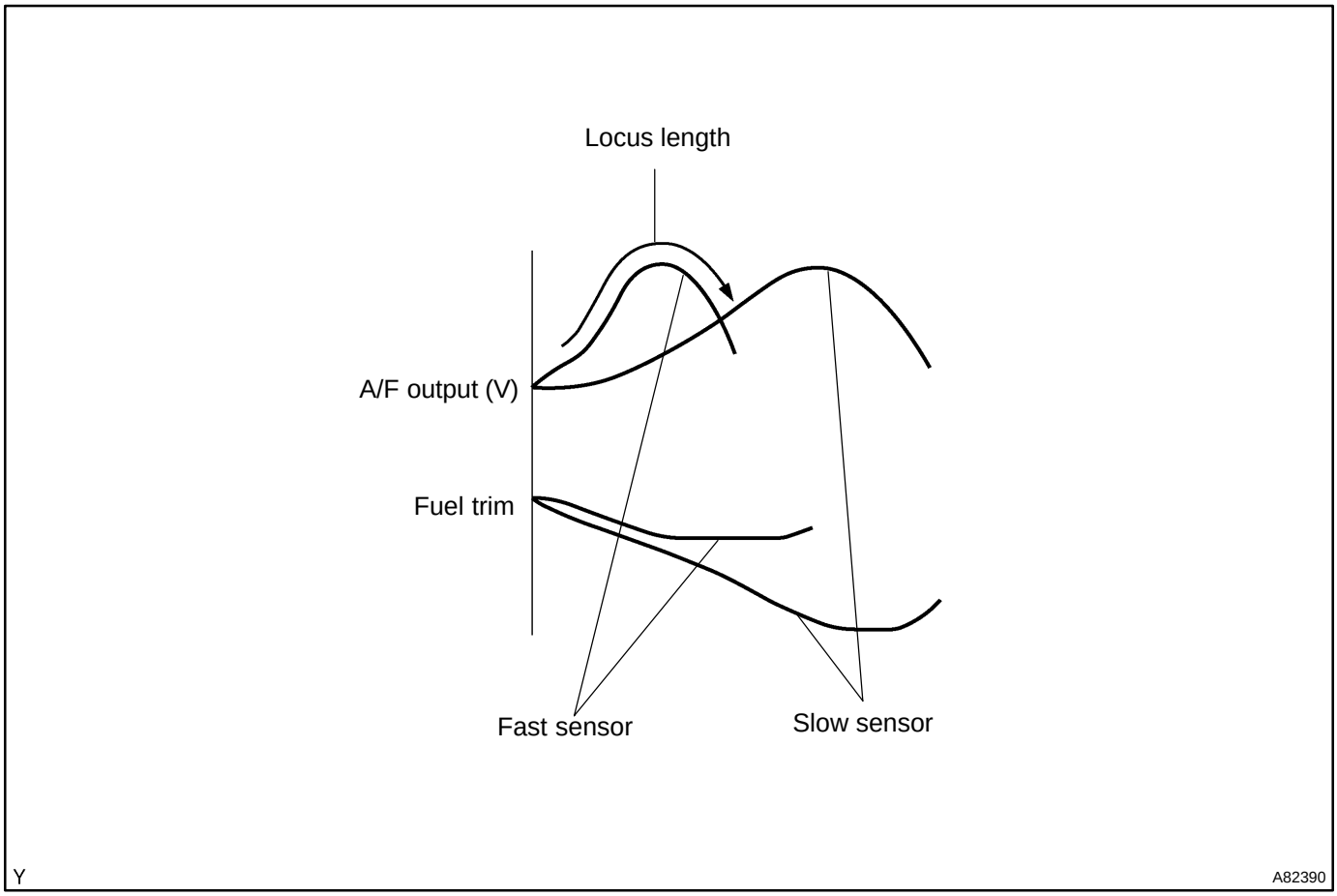
Refer to DTC P2195 on page 05-629 .

DTC No.	DTC Detection Condition	Trouble Area
P2A00 P2A03	In conditions (a), (b), and (c), when A/F sensor output voltage change value is below regular value against fuel trim change value, ECM judges that A/F sensor has slow response: (2 trip detection logic) (a) Engine is warmed up (b) Engine speed 1,400 rpm or more (c) Vehicle speed 40 km/h (25 mph) or more	- Open or short in A/F sensor (bank 1, 2 sensor 1) circuit - A/F sensor (bank 1, 2 sensor 1) - A/F sensor heater - A/F relay - Open or short in A/F sensor heater and relay circuits - Air induction system - Fuel pressure - Injector - PCV hose connection - ECM

HINT:

- Bank 1 is the bank that includes cylinder No.1.
- Bank 2 is the bank that includes cylinder No.2.
- Sensor 1 is the sensor closest to the engine assembly.

MONITOR DESCRIPTION



The Air-Fuel Ratio (A/F) sensor varies its output voltage in proportion to the air-fuel ratio. Based on the output voltage, the ECM determines if the air-fuel ratio is RICH or LEAN and adjusts the stoichiometric air-fuel ratio. The ECM also checks the fuel injection volume compensation value to check if the A/F sensor is deteriorating or not. The output voltage variation, known as locus length, should be high when the air-fuel ratio fluctuates. When the A/F sensor response rate has deteriorated, the locus length should be short.
The ECM concludes that there is a malfunction in the ratio of the A/F sensor when the locus length is short and the response rate has deteriorated.

MONITOR STRATEGY

Related DTCs	P2A00: A/F Sensor (Bank 1) Slow Response P2A03: A/F Sensor (Bank 2) Slow Response
Required sensors / components (Main)	A/F sensor
Required sensors / components (Related)	VSS, CKP sensor
Frequency of operation	Once per driving cycle
Duration	60 seconds
MIL operation	2 driving cycles
Sequence operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever this DTC is not present	See page 05-377
Engine condition	Running
Time after engine start	120 seconds or more
Fuel system status	Closed Loop
A/F sensor status	Activated
Idle	OFF
Time after idle OFF	2 seconds or more
Engine RPM	1,400 to 3,200 rpm
Vehicle speed	60 to 120 km/h (37.5 to 75 mph)
Fuel cut	OFF
Time after fuel cut is OFF	2 seconds or more
Driving for 20 seconds or more	40 km/h (25 mph) or more and 900 rpm or more

TYPICAL MALFUNCTION THRESHOLDS

Response rate deterioration level	6.0 or more

MONITOR RESULT

Refer to page 05-385 for detailed information.

The test value and test limit information are described as shown in the following table. Check the monitor result and test values after performing the monitor drive pattern (see page 05-387).

- TID (Test Identification Data) is assigned to each emissions-related component.
- TLT (Test Limit Type):
  If TLT is 0, the component is malfunctioning when the test value is higher than the test limit.
  If TLT is 1, the component is malfunctioning when the test value is lower than the test limit.
- CID (Component Identification Data) is assigned to each test value.
- Unit Conversion is used to calculate the test value indicated on generic OBD ll scan tools.

TID $06: A/F sensor

TLT	CID	Unit Conversion	Description of Test Data	Description of Test Limit
0	$01	Multiply by 0.000244 (no dimension)	Parameter for identify A/F sensor response rate (Bank 1)	Malfunction threshold for A/F sensor deterioration
0	$11	Multiply by 0.000244 (no dimension)	Parameter for identify A/F sensor response rate (Bank 2)	Malfunction threshold for A/F sensor deterioration

WIRING DIAGRAM

Refer to DTC P2195 on page 05-629 .

INSPECTION PROCEDURE

HINT:

Hand-held tester only:

The malfunctioning area can be found by the ACTIVE TEST A/F CONTROL operation. The A/F CONTROL operation can determine if the A/F sensor, heated oxygen sensor or other suspected trouble areas are malfunctioning or not.

(a) Perform the ACTIVE TEST A/F CONTROL operation.

HINT:

The A/F CONTROL operation lowers the injection volume by 12.5 % or increases the injection volume by 25%.

(1) Connect the hand-held tester to the DLC3 on the vehicle.
(2) Turn the ignition switch ON.
(3) Warm up the engine by running the engine at 2,500 rpm for approximately 90 seconds.
(4) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL.

(5) Perform the A/F CONTROL operation with the engine idling (press the right or left button).

Result:

A/F sensor reacts in accordance with increase and decrease of injection volume:

+25 % → RICH output: Less than 3.0 V

-12.5 % → LEAN output: More than 3.35 V

Heated oxygen sensor reacts in accordance with increase and decrease of injection volume:

+25 % → RICH output: More than 0.55 V

-12.5 % → LEAN output: Less than 0.4 V

NOTICE:

The A/F sensor output has a few seconds of delay and the heated oxygen sensor output has about 20 seconds of delay at maximum.

	Output voltage of A/F sensor (sensor 1)	Output voltage of heated oxygen sensor (sensor 2)	Mainly suspected Trouble Area
Case 1	Injection volume +25 % -12.5 % Output voltage More than 3.35 V Less than 3.0 V **OK**	Injection volume +25 % -12.5 % Output voltage More than 0.55 V Less than 0.4V **OK**	—
Case 2	Injection volume +25 % -12.5 % Output voltage Almost No reaction **NG**	Injection volume +25 % -12.5 % Output voltage More than 0.55 V Less than 0.4V **OK**	A/F sensor (A/F sensor, heater, A/F sensor circuit)
Case 3	Injection volume +25 % -12.5 % Output voltage More than 3.35 V Less than 3.0V **OK**	Injection volume +25 % -12.5 % Output voltage Almost No reaction **NG**	Heated oxygen sensor (heated oxygen sensor, heater, heated oxygen sensor circuit)
Case 4	Injection volume +25 % -12.5 % Output voltage Almost No reaction **NG**	Injection volume +25 % -12.5 % Output voltage Almost No reaction **NG**	Extremely rich or lean actual air-fuel ratio (Injector, fuel pressure, gas leakage in exhaust system, etc.)

The following A/F CONTROL procedure enables the technician to check and graph the voltage outputs of both the A/F sensor and the heated oxygen sensor.

For displaying the graph, enter ”ACTIVE TEST / A/F CONTROL / USER DATA”, select ”AFS B1S1 and O2S B1S2” by pressing ”YES” and push ”ENTER”. Then press ”F4”.

HINT:

- DTC P2A00 or P2A03 may be also detected, when the air fuel ratio is stuck rich or lean.
- A low A/F sensor voltage could be caused by a RICH air-fuel mixture. Check for conditions that would cause the engine to run with a RICH air-fuel mixture.
- A high A/F sensor voltage could be caused by a LEAN air-fuel mixture. Check for conditions that would cause the engine to run with a LEAN air-fuel mixture.

⁎ Read freeze frame data using the hand-held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	CHECK OTHER DTC OUTPUT (IN ADDITION TO A/F SENSOR DTC)

(a) Read the DTC using the hand-held tester or the OBD II scan tool.
Result:

Display	Proceed to
DTC P2A00 and/or P2A03 are output.	A
DTC P2A00 and/or P2A03 and other codes are output.	B

HINT:
If any other code besides P2A00 and/or P2A03 are output, perform the troubleshooting for those codes first.

B → **GO TO RELEVANT DTC CHART (See page 05-412)**

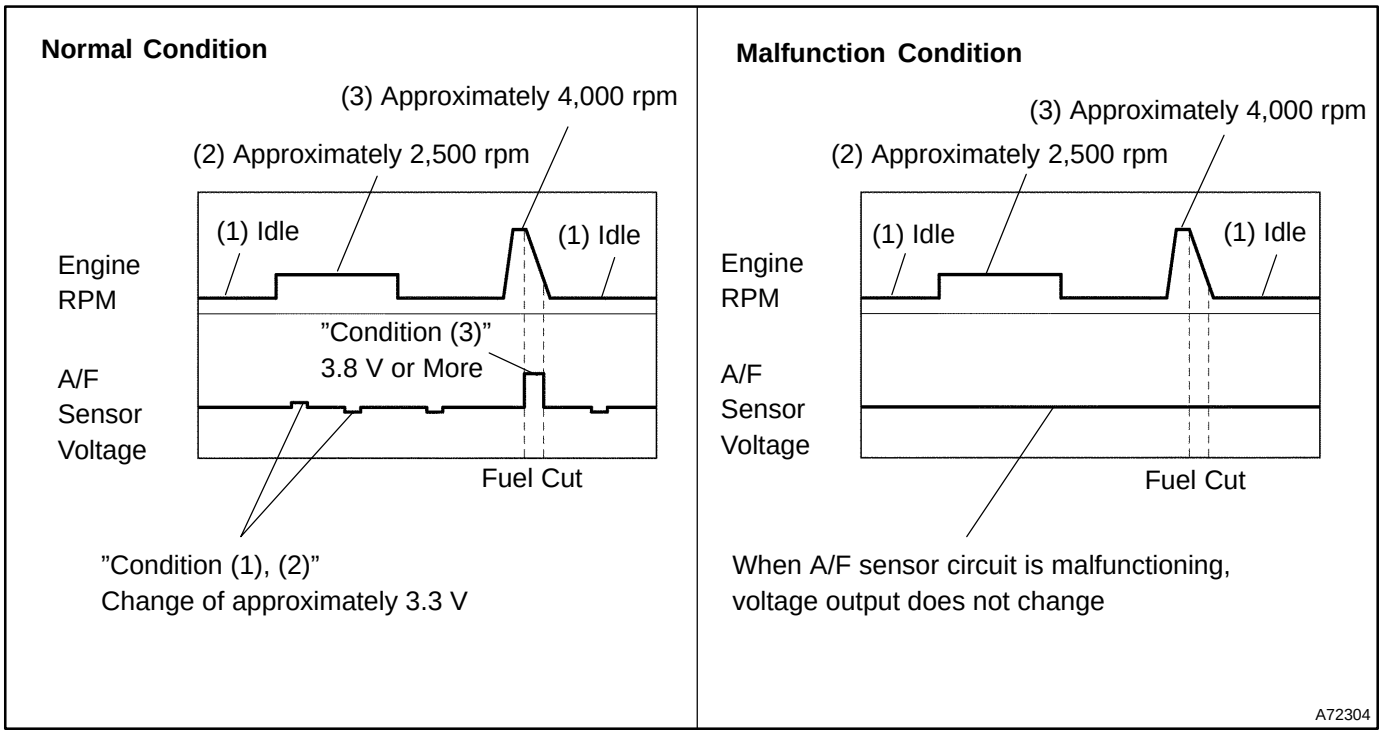
A

2	READ VALUE OF HAND-HELD TESTER OR OBD II SCAN TOOL (OUTPUT VOLTAGE OF A/F SENSOR)

(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(b) Warm up the A/F sensor (bank 1 sensor 1 and bank 2 sensor 1) by running the engine at 2,500 rpm for approximately 90 seconds.
(c) Read A/F sensor voltage output on the hand-held tester or the OBD II scan tool.
(d) Hand-held tester only:
On the hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / SNAPSHOT / MANUAL SNAPSHOT / USER DATA. Read the values.
(e) Select ”AFS B1 S1 or AFS B2 S1 / ENGINE SPD” and press YES.
(f) Monitor the A/F sensor voltage carefully.
(g) Check the A/F sensor voltage output under the following conditions:
(1) Allow the engine to idle for 30 seconds.
(2) Run the engine at approximately 2,500 rpm. Do not suddenly change the rpm.
(3) Raise the engine speed to 4,000 rpm and quickly release the accelerator pedal so that the throttle is fully closed.

Standard:
Condition (1) and (2)
Voltage change of 3.3 V (0.66 V)* (between approximately 3.1 to 3.5 V) as shown in the illustration.
Condition (3)
A/F sensor voltage increases to 3.8 V (0.76 V)* or more when fuel is cut during engine deceleration as shown in the illustration.

HINT:
*: Voltage when using the OBD II scan tool.



HINT:

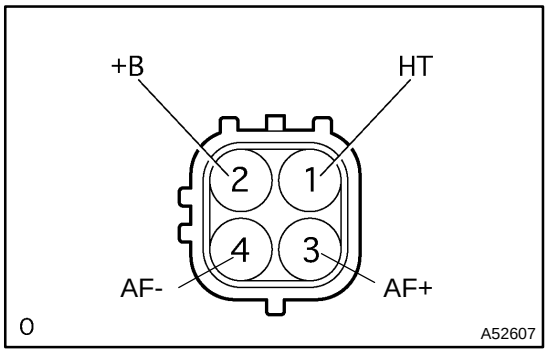
- Whenever the A/F sensor output voltage remains at approximately 3.3 V (0.660 V)* (see "Malfunction Condition" graphic) under any condition as well as the above conditions, the A/F sensor may have an open circuit. This will happen also when the A/F sensor heater has an open circuit.
- Whenever the A/F sensor output voltage remains at a certain value of approximately 3.8 V (0.76 V)* or more, or 2.8 V (0.56 V)* or less (see "Malfunction Condition" graphic) under any condition as well as the above conditions, the A/F sensor may have a short circuit.
- The ECM will stop fuel injection (fuel is cut) during engine deceleration. This will cause a LEAN condition and should result in a momentary increase in A/F sensor output voltage.
- The ECM must establish a closed throttle position learned value to perform fuel cut. If the battery terminal has been disconnected, the vehicle must be driven over 10 mph to allow the ECM to learn the closed throttle position.
- When the vehicle is driven:
  The output voltage of the A/F sensor may be below 2.8 V (0.76 V)* during fuel enrichment. For the vehicle, this translates to a sudden increase in speed with the accelerator pedal fully depressed when trying to overtake another vehicle. The A/F sensor is functioning normally.
- The A/F sensor is a current output element, and therefore the current is converted into voltage inside the ECM. If measuring voltage at connectors of A/F sensor or ECM, you will observe a constant voltage.

*: Voltage when using the OBD II scan tool.

OK	**Go to step 14**

NG

3 INSPECT AIR FUEL RATIO SENSOR (HEATER RESISTANCE)



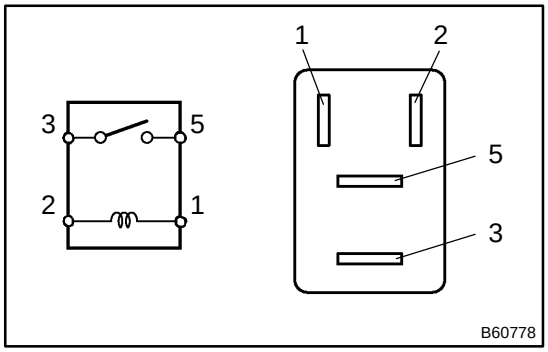
(a) Disconnect the A6 or A7 A/F sensor connector.
(b) Check the resistance of the A/F sensor terminals.
Standard:

Tester Connection	Condition	Specified Condition
1 (HT) - 2 (+B)	20°C (68°F)	1.8 to 3.4 Ω
1 (HT) - 4 (AF-)	-	10 kΩ or higher

NG → **REPLACE AIR FUEL RATIO SENSOR**

OK

4 INSPECT RELAY (A/F)



(a) Remove the A/F relay from the engine room R/B No. 2.
(b) Check the resisitance of the A/F relay.
Standard:

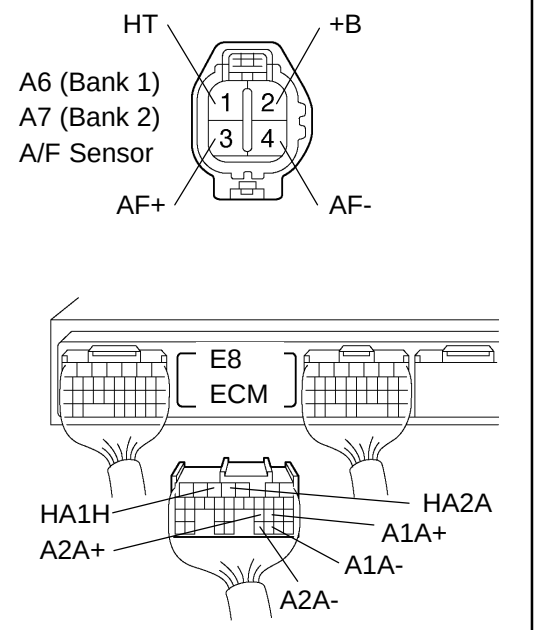
Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

NG → **REPLACE RELAY**

OK

5 CHECK WIRE HARNESS (A/F SENSOR - ECM)

Wire Harness Side

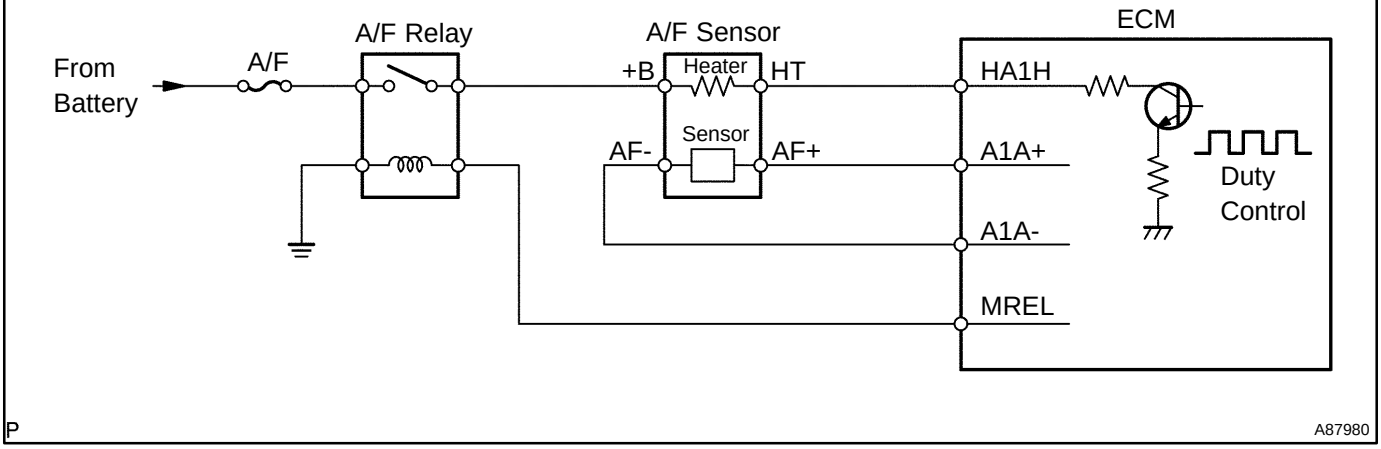


(a) Disconnect the A6 or A7 A/F sensor connector.
(b) Disconnect the E8 ECM connector.
(c) Check the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
A6-3 (AF+) - E8-22 (A1A+) A6-4 (AF-) - E8-30 (A1A-) A6-1 (HT) - E8-5 (HA1H) A7-3 (AF+) - E8-23 (A2A+) A7-4 (AF-) - E8-31 (A2A-) A7-1 (HT) - E8-4 (HA2A)	Below 1 Ω
A6-3 (AF+) or E8-22 (A1A+) - Body ground A6-4 (AF-) or E8-30 (A1A-) - Body ground A6-1 (HT) or E8-5 (HA1H) - Body ground A7-3 (AF+) or E8-23 (A2A+) - Body ground A7-4 (AF-) or E8-31 (A2A-) - Body ground A7-1 (HT) or E8-4 (HA2A) - Body ground	10 kΩ or higher

Reference (Bank 1 Sensor 1 System Drawing)



NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

6	CHECK AIR INDUCTION SYSTEM

(a) Check for vacuum leaks in the air induction system.
OK: There is no leak in air induction system.

NG → **REPAIR OR REPLACE AIR INDUCTION SYSTEM**

OK

7	CHECK CONNECTION OF PCV HOSE

OK: PCV hose is connected correctly. And PCV hose has no damage.

NG → **REPAIR OR REPLACE PCV HOSE**

OK

8	CHECK FUEL PRESSURE (See page 11-38)

(a) Check fuel pressure (high or low fuel pressure).
Standard:
Fuel pressure: 304 to 343 kPa (3.1 to 3.5 kgf/cm^2, 44 to 55 psi)

NG → **REPAIR OR REPLACE FUEL SYSTEM**

OK

9	INSPECT FUEL INJECTOR ASSY (See page 11-41)

(a) Check injector injection (high or low fuel injection quantity or poor injection pattern).
Standard:

Injection volume	Difference between each injector
60 to 73 cm^3 (3.7 to 4.5 cu in.) per 15 seconds	13 cm^3 (0.8 cu in.) or less

NG → **REPLACE FUEL INJECTOR ASSY (See page 11-46)**

OK

10	REPLACE AIR FUEL RATIO SENSOR

GO

11	PERFORM CONFIRMATION DRIVING PATTERN (See page 05-629)

HINT:
Clear all DTCs prior to performing the confirmation driving pattern (see page 05-629).

GO

12	READ OUTPUT DTC (A/F SENSOR DTC OUTPUT AGAIN)

(a) Read the DTC using the hand-held tester or the OBD II scan tool.
Result:

Display	Proceed to
DTC P2A00 and/or P2A03 are not output	A
DTC P2A00 and/or P2A03 are output again	B

B → **REPLACE ECM (See page 10-24) AND PERFORM CONFIRMATION DRIVING PATTERN (See page 05-629)**

A

13	CONFIRM IF VEHICLE HAS RUN OUT OF FUEL IN PAST

NO → **CHECK FOR INTERMITTENT PROBLEMS (See page 05-370)**

YES

DTC IS CAUSED BY RUNNING OUT OF FUEL

14	PERFORM CONFIRMATION DRIVING PATTERN (See page 05-629)

HINT:
Clear all DTCs prior to performing the confirmation driving pattern (see page 05-629).

GO

15	READ OUTPUT DTC (A/F SENSOR DTC OUTPUT AGAIN)

(a) Read the DTC using the hand-held tester or the OBD II scan tool.
Result:

Display	Proceed to
DTC P2A00 and/or P2A03 are not output	A
DTC P2A00 and/or P2A03 are output	B

B → **Go to step 19**

A

16	REPLACE AIR FUEL RATIO SENSOR

GO

17	PERFORM CONFIRMATION DRIVING PATTERN (See page 05-629)

HINT:
Clear all DTCs prior to performing the confirmation driving pattern (see page 05-629).

GO

18	READ OUTPUT DTC (A/F SENSOR DTC OUTPUT AGAIN)

(a) Read the DTC using the hand-held tester or the OBD II scan tool.
Result:

Display	Proceed to
DTC P2A00 and/or P2A03 are output	A
DTC P2A00 and/or P2A03 are not output	B

B → **REPLACE ECM (See page 10-24) AND PERFORM CONFIRMATION DRIVING PATTERN (See page 05-629)**

A

19	CONFIRM IF VEHICLE HAS RUN OUT OF FUEL IN PAST

OK: Vehicle has run out of fuel in past.

NO → **CHECK FOR INTERMITTENT PROBLEMS (See page 05-370)**

YES

DTC IS CAUSED BY RUNNING OUT OF FUEL

05C1K-10

READINESS MONITOR DRIVE PATTERN

1. PURPOSE OF READINESS TESTS

- The On-Board Diagnostic (OBD II) system is designed to monitor the performance of emission-related components, and report any detected abnormalities with Diagnostic Trouble Codes (DTCs). Since various components need to be monitored during different driving conditions, the OBD II system is designed to run separate monitoring programs called readiness monitors.
- The hand-held tester's software must be version 9.0 or newer to view the readiness monitor status. From the "ENHANCED OBD II" menu, select "MONITOR STATUS" to view the readiness monitor status.
- A generic OBD II scan tool can also be used to view the readiness monitor status.
- When the readiness monitor status reads "complete", the necessary conditions have been met for running performance tests for that readiness monitor.

HINT:

Many state Inspection and Maintenance (I/M) programs require a vehicle's readiness monitor status to show "complete".

- The Readiness Monitor will be reset to "incomplete" if:
  - The ECM has lost battery power or blown a fuse.
  - DTCs have been cleared.
  - The conditions for running the Readiness Monitor have not been met.
- If the readiness monitor status shows "incomplete", follow the appropriate readiness monitor drive pattern to change the status to "complete".

CAUTION:

Strictly observe of posted speed limits, traffic laws, and road conditions when performing these drive patterns.

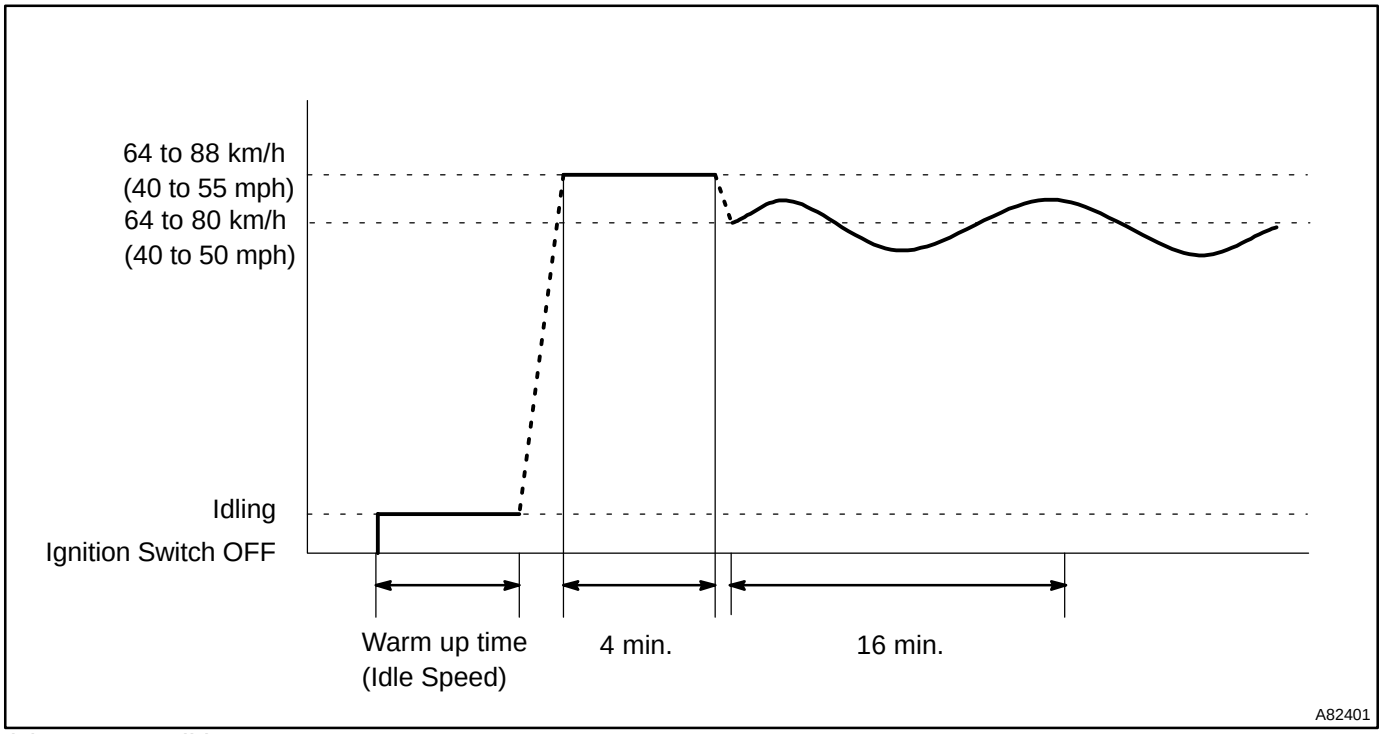
NOTICE:

The following drive patterns are the fastest method of completing all the requirements necessary for making the readiness monitor status read "complete".

If forced to momentarily stop a drive pattern due to traffic or other factors, the drive pattern can be resumed. Upon completion of the drive pattern, in most cases, the readiness monitor status will change to "complete".

Sudden changes in vehicle load and speed, such as driving up and down hills and / or sudden acceleration, hinder readiness monitor completion.

2. CATALYST MONITOR (A/F SENSOR TYPE)



(a) Preconditions

The monitor will not run unless:

- The MIL is OFF.
- Engine Coolant Temperature (ECT) is 75°C (167°F) or greater.
- Intake Air Temperature (IAT) is -10°C (14°F) or greater.*

NOTICE:

*** 2002 and later MY vehicles:**

To completed the readiness test in cold ambient conditions (less than -10°C / 14°F), turn the ignition switch to the OFF position and then back to the ON position. Perform the drive pattern a second time.

(b) Drive Pattern

(1) Connect the OBD II scan tool to DLC3 to check readiness monitor status and preconditions (refer to step (a)).

(2) Drive vehicle at 64 to 88 km/h (40 to 55 mph) for approximately 4 minutes.

NOTICE:

Drive with smooth throttle operation and avoid sudden acceleration.

If IAT was less than 10°C (50°F) when the engine was started, drive the vehicle at 64 to 88 km/h (40 to 55 mph) for an additional 4 minutes.

(3) Drive vehicle allowing speed to fluctuate between 64 to 80 km/h (40 to 50 mph) for about 16 minutes.

NOTICE:

Drive with smooth throttle operation and avoid sudden closure of the throttle.

(4) Check the status of the readiness monitor on the scan tool display. If readiness monitor status did not switch to complete, ensure preconditions are met, turn the ignition OFF, and then repeat steps (2) and (3).

3. EVAP MONITOR (VACUUM PRESSURE MONITOR)

NOTICE:

A cold soak must be performed prior to conducting the drive pattern to complete the internal pressure readiness monitor.

(a) Cold Soak Preconditions

The monitor will not run unless:

- The MIL is OFF.
- Fuel level is approximately 1/2 to 3/4 full.
- Altitude is 2,450 m (8,000 feet) or less.

(b) Cold Soak Procedure

Let vehicle cold soak for 8 hours or until "IAT - ECT" must be -7˚C (-13˚F) to 11.1˚C (20˚F)

HINT:

- Example 1

  ECT = 24˚C (75˚F)

  IAT = 16˚C (60˚F)

  Difference between ECT and IAT is 8˚C (15˚F).

  → The monitor will not run because difference between ECT and IAT is greater than 7˚C (13˚F).

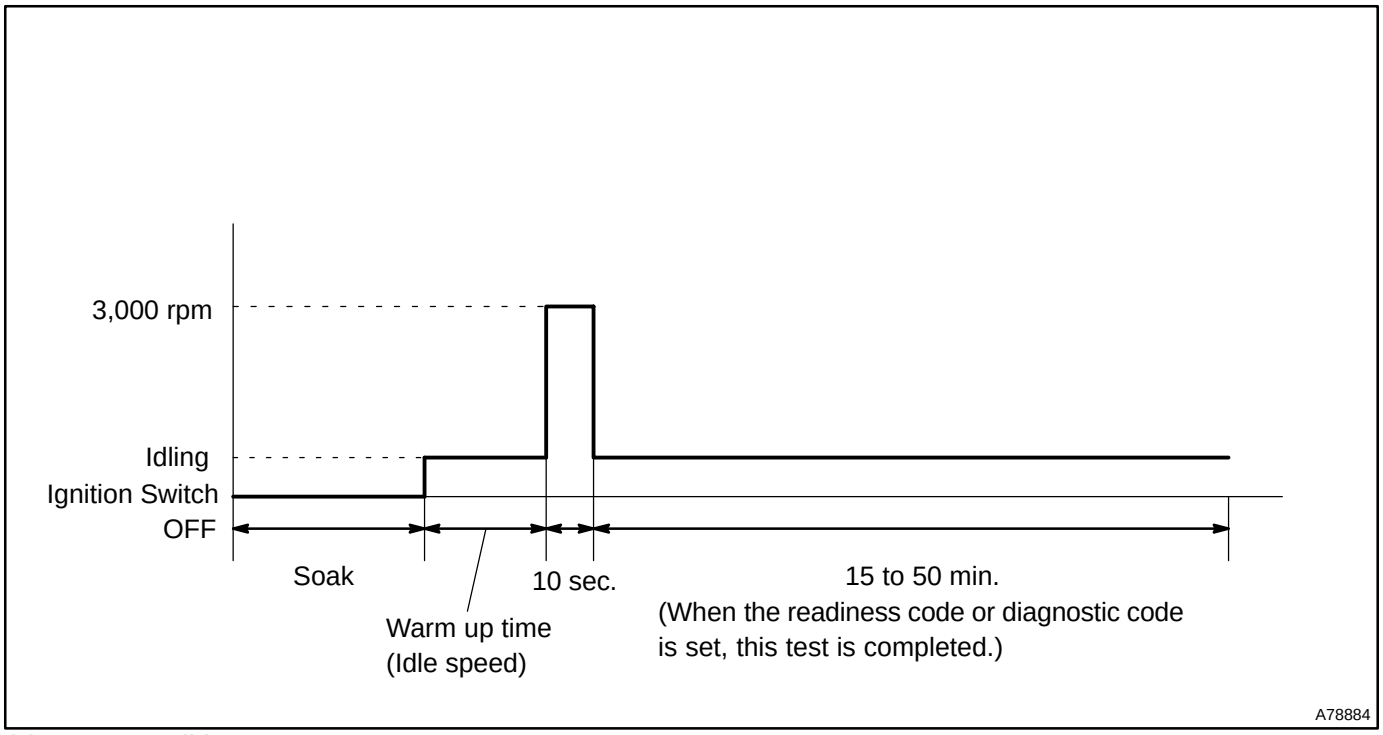
- Example 2

  ECT = 21˚C (70˚F)

  IAT = 20˚C (68˚F)

  Difference between ECT and IAT is 1˚C (2˚F).

  → The monitor will run because difference between ECT and IAT is less than 7˚C (13˚F).



(c) Preconditions

The monitor will not run unless:

- The MIL is OFF.
- Fuel level is approximately 1/2 to 3/4 full.
- The altitude is 2,450 m (8,000 feet) or less.*
- ECT is between 4.4˚C and 35˚C (40˚F and 95˚F).
- IAT is between 4.4˚C and 35˚C (40˚F and 95˚F).*
- The cold soak procedure has been completed.
- Before starting the engine, the difference between ECT and IAT must be less than 7˚C (13˚F).

HINT:

- Example 1
  ECT = 24°C (75°F)
  IAT = 16°C (60°F)
  Difference between ECT and IAT is 8°C (15°F).
  → The monitor will not run because difference between ECT and IAT is greater than 7°C (13°F).
- Example 2
  ECT = 21°C (70°F)
  IAT = 20°C (68°F)
  Difference between ECT and IAT is 1°C (2°F).
  → The monitor will run because difference between ECT and IAT is less than 7°C (13°F).

NOTICE:

*** NOTE for 2002 and later MY vehicles:**

The readiness test can be completed in cold ambient conditions (less than 4.4°C / 40°F) and / or high altitudes (more than 2,450 m/8,000 feet). Finish the drive pattern, turn the ignition switch OFF and then ON again, and repeat the drive pattern a second time.

(d) Drive Pattern

(1) Connect the OBD II scan tool to DLC3 to check monitor status and preconditions (refer to step "a").
(2) Release pressure in fuel tank by removing the fuel tank cap and then reinstalling it.
(3) Start the engine and allow it to idle until ECT is 75°C (167°F) or more.
(4) Run the engine at 3,000 rpm for about 10 seconds.
(5) With the engine idling, turn the A/C ON to create a slight electrical load. Wait 15 to 50 minutes.

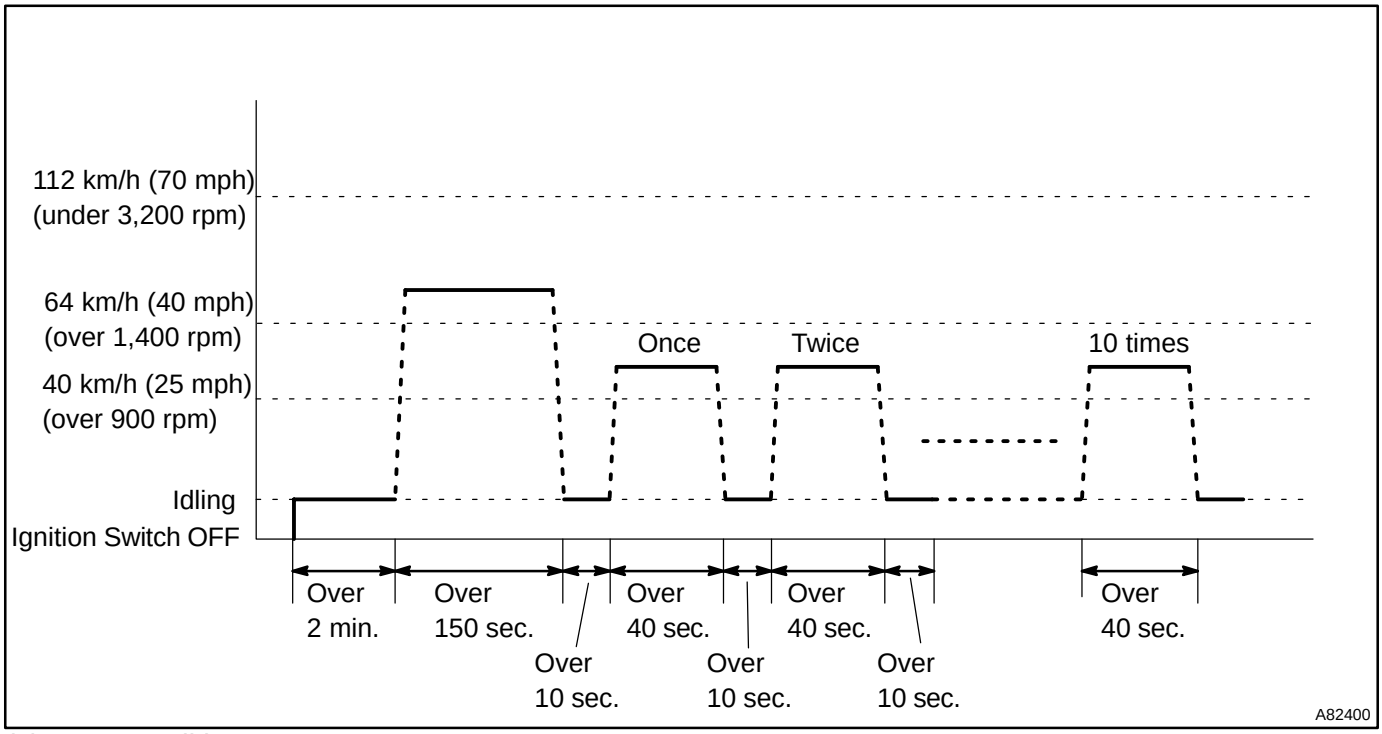
NOTICE:

If the vehicle does not have A/C, put a slight electrical load on the engine by following the steps below:

- **Set the parking brake securely.**
- **Use wheel chocks to secure the tires.**
- **Move the shift lever to drive (position D) and allow engine to idle for 15 to 50 minutes.**

Check the readiness monitor status.

4. OXYGEN / A/F SENSOR MONITOR (FRONT A/F SENSOR AND REAR O2S SYSTEM)



(a) Preconditions

The monitor will not run unless:

The MIL is OFF.

(b) Drive Pattern

(1) Connect the OBD II scan tool to DLC3 to check monitor status and preconditions (refer to step "a").

(2) Start the engine and allow it to idle for 2 minutes or more.

(3) Drive the vehicle at 64 to 112 km/h (40 to 70 mph) for at least 150 seconds.

(4) Stop the vehicle and allow the engine to idle for 10 seconds or more.

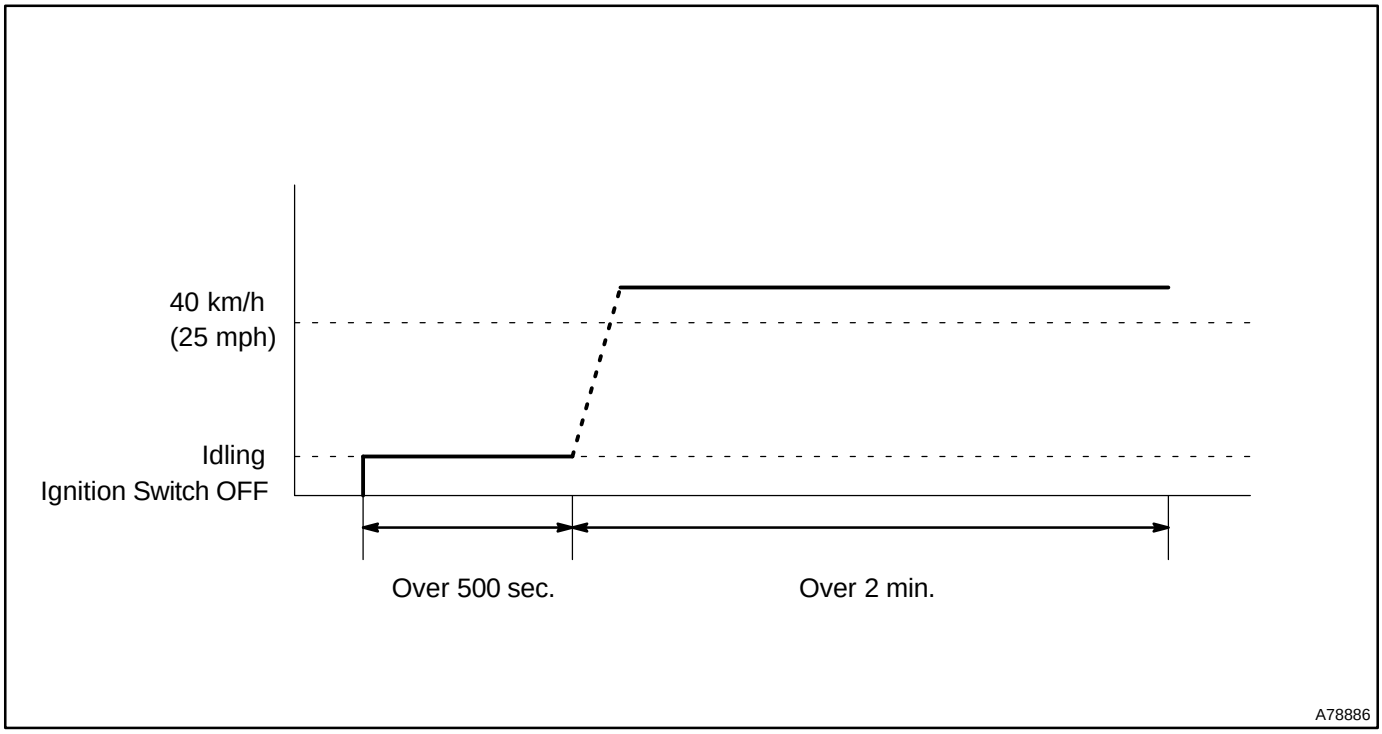
(5) Drive the vehicle at 40 to 64 km/h (25 to 40 mph) for at least 40 seconds.

(6) Stop the vehicle and allow the engine to idle for 10 seconds or more.

(7) Perform steps (5) and (6) 10 times.

(8) Check the readiness monitor status. If the readiness monitor status did not change to "complete", check the preconditions, turn the ignition switch OFF, and repeat steps (1) to (6).

5. OXYGEN / A/F SENSOR HEATER MONITOR



(a) Preconditions
The monitor will not run unless:
The MIL is OFF.

(b) Drive Pattern
(1) Connect the OBD II scan tool to DLC3 to check monitor status and preconditions (refer to step "a").
(2) Start the engine and allow it to idle for 500 seconds or more.
(3) Drive the vehicle at 40 km/h (25 mph) or more for at least 2 minutes.
(4) Check the readiness monitor status. If the readiness monitor status did not change to "complete", check the preconditions, turn the ignition switch OFF, and repeat steps (2) to (3).

05MOL-01

REGISTRATION

NOTICE:

The Vehicle Identification Number (VIN) must be input into the replaced ECM.

HINT:

The VIN is a 17-digit alphanumeric vehicle identification number. A hand-held tester is required to register the VIN.

1. DESCRIPTION

This registration section consists of three parts, Input Instructions, Read VIN and Write VIN.

(a) Input Instructions: Explains the general VIN input instructions using a hand-held tester.

(b) Read VIN: Explains the VIN reading process in a flowchart. This process allows the VIN stored in the ECM to be read, in order to confirm that the two VINs, provided with the vehicle and stored in the vehicle's ECM, are the same.

(c) Write VIN: Explains the VIN writing process in a flowchart. This process allows the VIN to be input into the ECM. If the ECM is changed, or the VINs do not match, the VIN can be registered, or overwritten in the ECM by following this procedure.

2. INPUT INSTRUCTIONS

(a) Hand-held tester

(1) The arrow buttons (UP, DOWN, RIGHT and LEFT) and numerical buttons (0 to 9) are used, in order to input the VIN.

(b) Cursor Operation

(1) To move the cursor around the tester screen, press the RIGHT and LEFT buttons.

(c) Alphabetical Character Input

(1) Press the UP and DOWN buttons to select the desired alphabetical character.

(2) After selection, the cursor should move.

(d) Numeric Character Input

(1) Press the numerical button corresponding to the number that you want to input.

(2) After input, the cursor should move.

HINT:

Numerical characters can be selected by using the UP and DOWN buttons.

(e) Correction

(1) When correcting the input character(s), put the cursor onto the character using the RIGHT or LEFT button.

(2) Select or input the correct character using the UP/DOWN buttons, or the numerical buttons.

(f) Finishing Input Operation

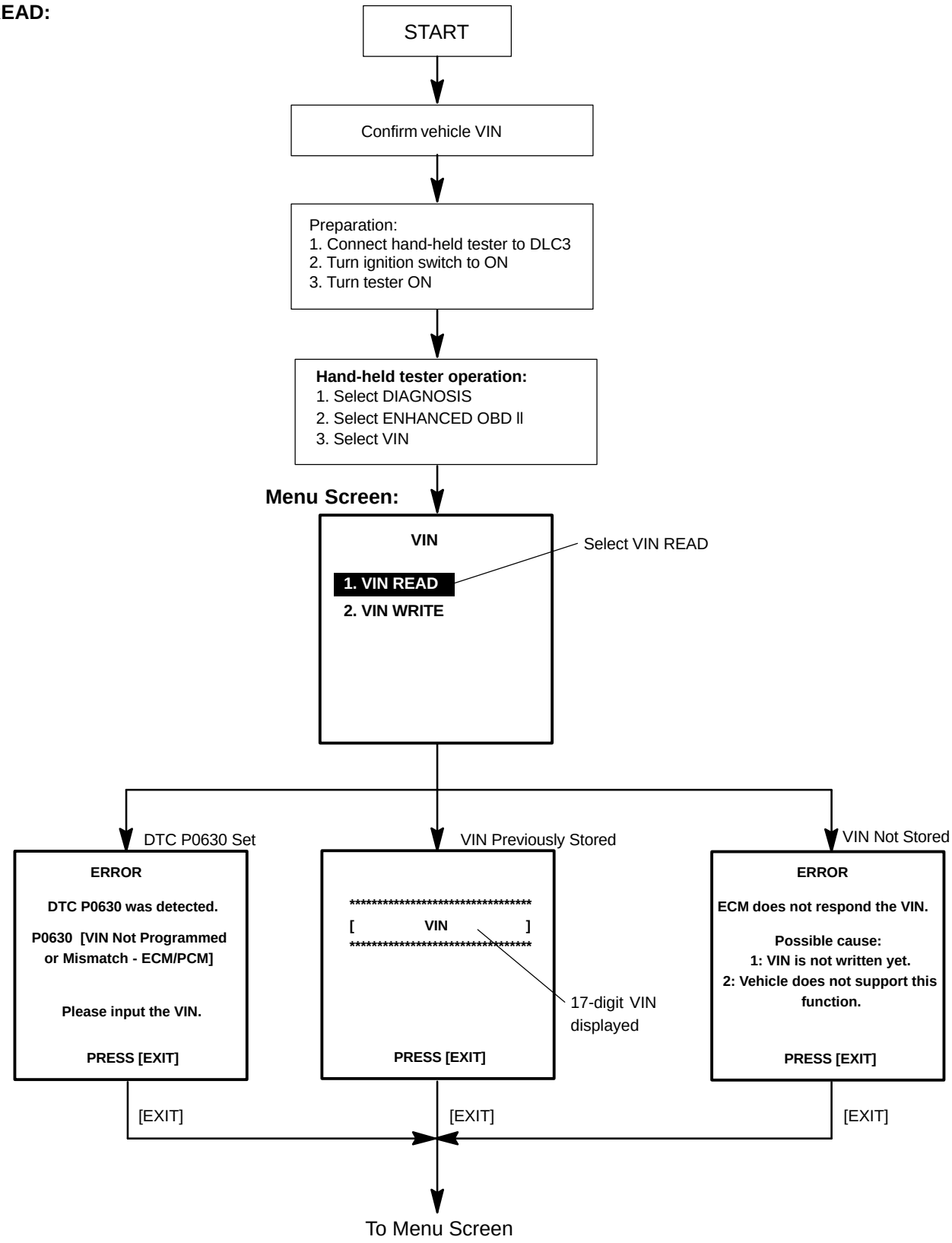
(1) Make sure that the input VIN matches the vehicle VIN after input.

(2) Press the ENTER button on the tester.

3. READ VIN (Vehicle Identification Number)

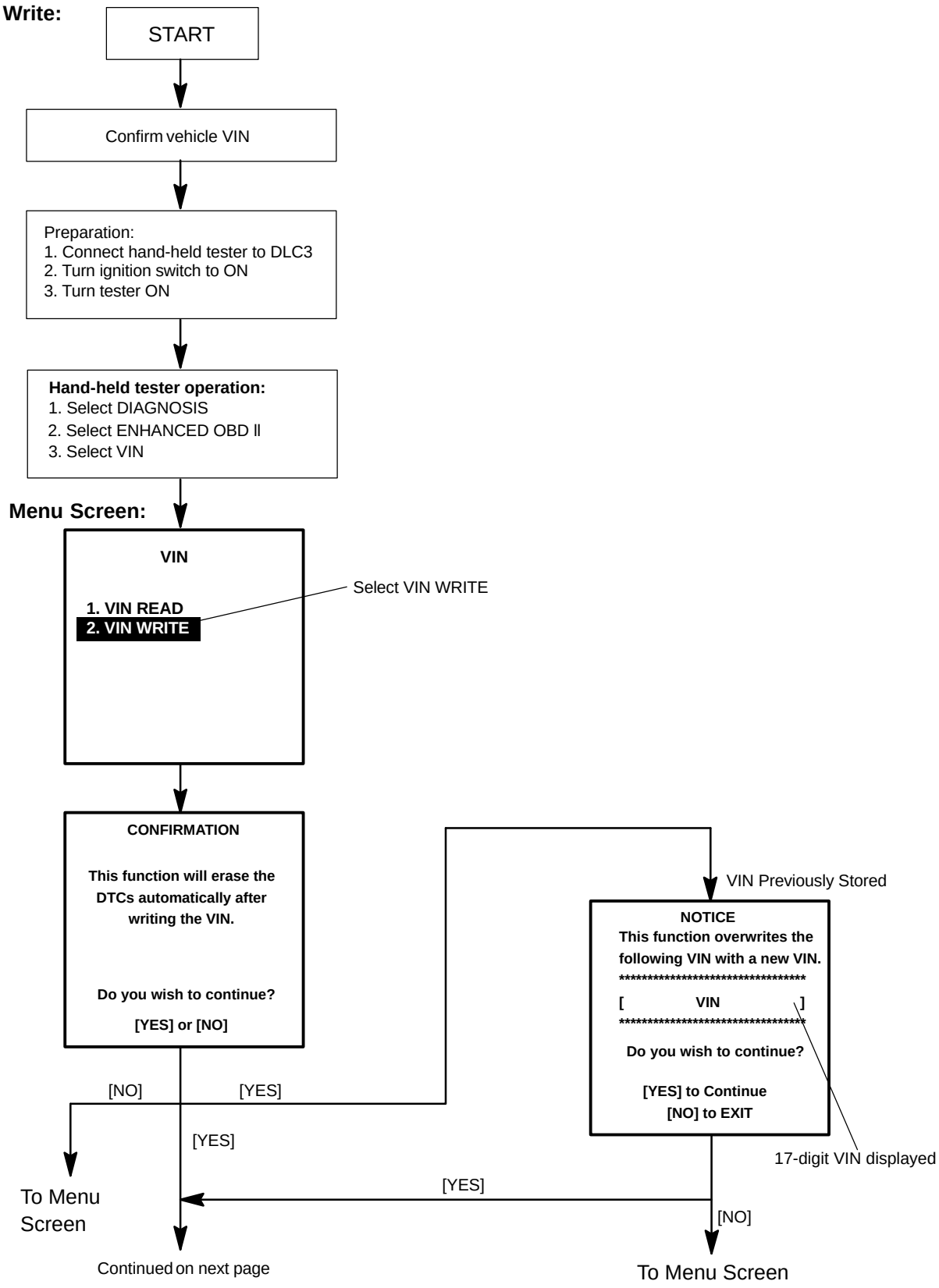
(a) Read VIN using a hand-held tester.

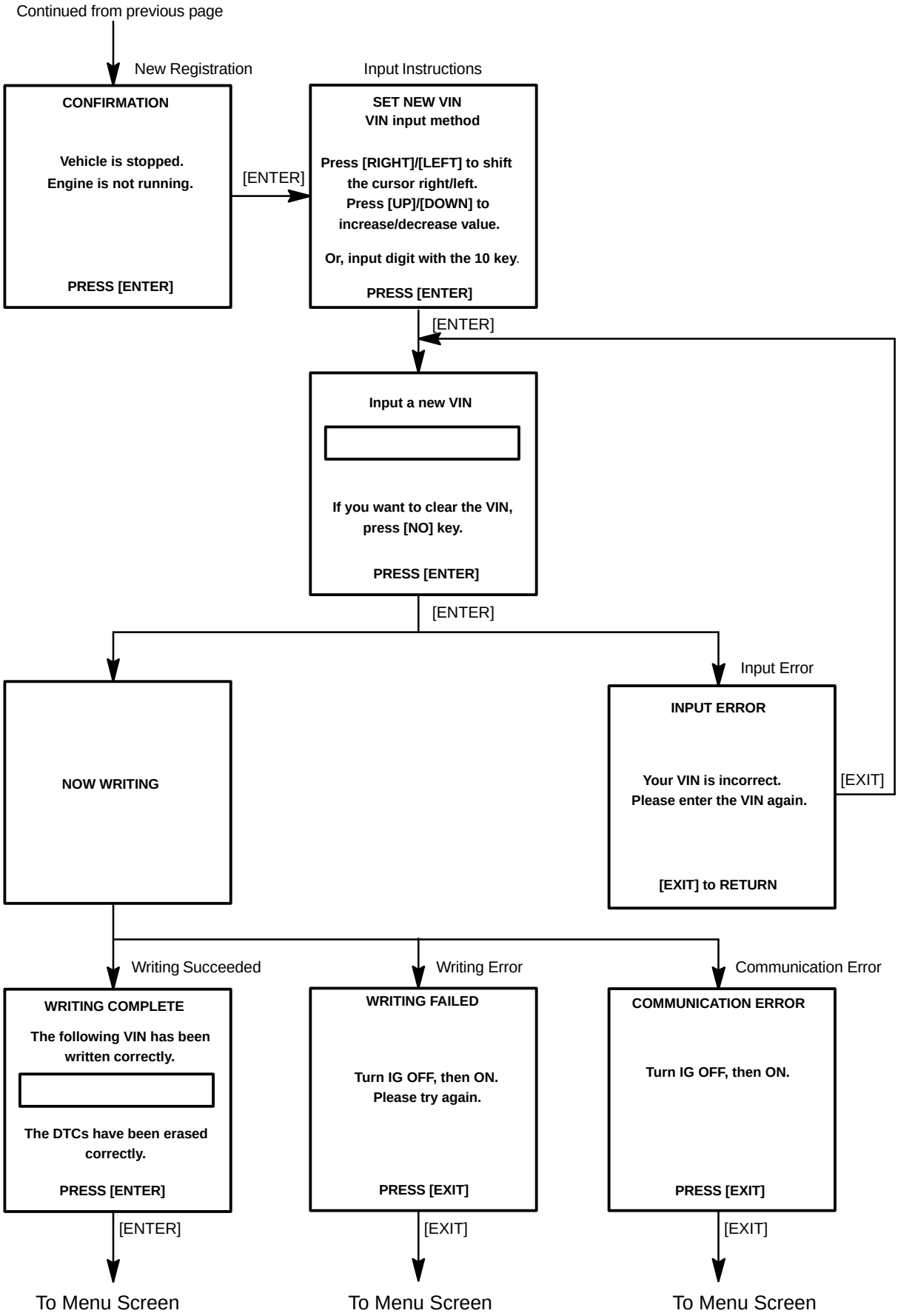
READ:



4. WRITE VIN

(a) Write VIN using the hand-held tester.




Continued from previous page
New Registration
Input Instructions
CONFIRMATION
Vehicle is stopped.
Engine is not running.
PRESS [ENTER]
[ENTER]
SET NEW VIN
VIN input method
Press [RIGHT]/[LEFT] to shift the cursor right/left.
Press [UP]/[DOWN] to increase/decrease value.
Or, input digit with the 10 key.
PRESS [ENTER]
[ENTER]
Input a new VIN
If you want to clear the VIN, press [NO] key.
PRESS [ENTER]
[ENTER]
Input Error
NOW WRITING
INPUT ERROR
Your VIN is incorrect.
Please enter the VIN again.
[EXIT] to RETURN
[EXIT]
Writing Succeeded
Writing Error
Communication Error
WRITING COMPLETE
The following VIN has been written correctly.
The DTCs have been erased correctly.
PRESS [ENTER]
WRITING FAILED
Turn IG OFF, then ON.
Please try again.
PRESS [EXIT]
COMMUNICATION ERROR
Turn IG OFF, then ON.
PRESS [EXIT]
[ENTER]
[EXIT]
[EXIT]
To Menu Screen
To Menu Screen
To Menu Screen

05EX1-05

PART AND SYSTEM NAME LIST

This reference list indicates the part names used in this manual along with their definitions.

TOYOTA/LEXUS name	Definition
Toyota HCAC system, Hydro-carbon Adsorptive Catalyst (HCAC) system, HC adsorptive three-way catalyst	HC adsorptive three-way catalytic converter
Variable Valve Timing sensor, VVT sensor	Camshaft position sensor
Variable valve timing system, VVT system	Camshaft timing control system
Camshaft timing oil control valve, Oil control valve, OCV, VVT, VSV	Camshaft timing oil control valve
Variable timing and lift, VVTL	Camshaft timing and lift control
Crankshaft position sensor ”A”	Crankshaft position sensor
Engine speed sensor	Crankshaft position sensor
THA	Intake air temperature
Knock control module	Engine knock control module
Knock sensor	Engine knock sensor
Mass or volume air flow circuit	Mass air flow meter circuit
Vacuum sensor	Manifold air pressure sensor
Internal control module, Control module, Engine control ECU, PCM	Power train control module
FC idle	Deceleration fuel cut
Idle air control valve	Idle speed control
CCV, Canister close valve VSV for canister control	Evaporative emissions canister vent valve
EVAP VSV, Vacuum switching valve assembly No. 1, EVAP VSV, Purge VSV	Evaporative emissions canister purge valve
VSV for pressure switching valve, Bypass VSV	Evaporative emission pressure switching valve
Vapor pressure sensor, EVAP pressure sensor, Evaporative emission control system pressure sensor	Fuel tank pressure sensor
Charcoal canister	Evaporative emissions canister
ORVR system	On-board refueling vapor recovery system
Intake manifold runner control	Intake manifold tuning system
Intake manifold runner valve, IMRV, IACV (runner valve)	Intake manifold tuning valve
Intake control VSV	Intake manifold tuning solenoid valve
AFS	Air fuel ratio sensor
O2 sensor	Heater oxygen sensor
Oxygen sensor pumping current circuit	Oxygen sensor output signal
Oxygen sensor reference ground circuit	Oxygen sensor signal ground
Accel position sensor	Accelerator pedal position sensor
Throttle actuator control motor, Actuator control motor, Electronic throttle motor, Throttle control motor	Electronic throttle actuator
Electronic throttle control system, Throttle actuator control system	Electronic throttle control system
Throttle/pedal position sensor, Throttle/pedal position switch, Throttle position sensor/switch	Throttle position sensor
Turbo press sensor	Turbocharger pressure sensor
Turbo VSV	Turbocharger pressure control solenoid valve
P/S pressure switch	Power-steering pressure switch
VSV for ACM	Active control engine mount
Speed sensor, Vehicle speed sensor ”A”, Speed sensor for skid control ECU	Vehicle speed sensor
ATF temperature sensor, Trans. fluid temp. sensor, ATF temperature sensor ”A”	Transmission fluid temperature sensor
Electronic controlled automatic transmission, ECT	Electronically controlled automatic
Intermediate shaft speed sensor ”A”	Counter gear speed sensor

TOYOTA/LEXUS name	Definition
Output speed sensor	Output shaft speed sensor
Input speed sensor, Input turbine speed sensor ”A”, Speed sensor (NT), Turbine speed sensor	Input turbine speed sensor
PNP switch, NSW	Park/neutral position switch
Pressure control solenoid	Transmission pressure control solenoid
Shift solenoid	Transmission shift solenoid valve
Transmission control switch, Shift lock control unit	Shift lock control module
Engine immobilizer system, Immobilizer system	Vehicle anti-theft system

05289-40

CUSTOMER PROBLEM ANALYSIS CHECK

SFI SYSTEM Check Sheet

Inspector's Name _____

Customer's Name		**VIN**	
Date Vehicle Brought in		**Production Date**	
Licence Plate No.		**Odometer Reading**	km miles

Problem Symptoms	☐ **Engine Does Not Start**	☐ **Engine does not crank** ☐ **No initial combustion** ☐ **No complete combustion**
	☐ **Difficult to Start**	☐ **Engine cranks slowly** ☐ **Other** _____
	☐ **Poor Idling**	☐ **Incorrect first idle** ☐ **Idling rpm is abnormal** ☐ **High (rpm)** ☐ **Low (rpm)** ☐ **Rough idling** ☐ **Other** _____
	☐ **Poor Driveability**	☐ **Hesitation** ☐ **Backfire** ☐ **Muffler explosion (after-fire)** ☐ **Surging** ☐ **Knocking** ☐ **Other** _____
	☐ **Engine Stall**	☐ **Soon after starting** ☐ **After accelerator pedal depressed** ☐ **After accelerator pedal released** ☐ **During A/C operation** ☐ **Shifting from N to D** ☐ **Other** _____
	☐ **Other**	

Date Problem Occurred		
Problem Frequency		☐ **Constant** ☐ **Sometimes (times per day/month)** ☐ **Once only** ☐ **Other** _____
Condition When Problem Occurs	**Weather**	☐ **Fine** ☐ **Cloudy** ☐ **Rainy** ☐ **Snowy** ☐ **Various/Other** _____
	Outdoor Temperature	☐ **Hot** ☐ **Warm** ☐ **Cool** ☐ **Cold (approx. ____ °C/____ °F)**
	Place	☐ **Highway** ☐ **Suburbs** ☐ **Inner City** ☐ **Uphill** ☐ **Downhill** ☐ **Rough road** ☐ **Other** _____
	Engine Temp.	☐ **Cold** ☐ **Warming up** ☐ **After Warming up** ☐ **Any temp.** ☐ **Other** _____
	Engine Operation	☐ **Starting** ☐ **Just after starting (min.)** ☐ **Idling** ☐ **Racing** ☐ **Driving** ☐ **Constant speed** ☐ **Acceleration** ☐ **Deceleration** ☐ **A/C switch ON/OFF** ☐ **Other** _____

Condition of Malfunction Indicator Light (MIL)		☐ **Remains on** ☐ **Sometimes lights up** ☐ **Does not light up**
DTC Inspection	**Normal Mode (Pre-check)**	☐ **Normal** ☐ **Malfunction code(s) (code)** ☐ **Freeze frame data ( )**
	Check Mode	☐ **Normal** ☐ **Malfunction code(s) (code)** ☐ **Freeze frame data ( )**

05284-46

DIAGNOSTIC TROUBLE CODE CHART

HINT:

Parameters listed in the chart may be different than your readings depending on the type of instrument used and other factors.

During the DTC check, refer to the table below if a malfunction code is displayed. For details about each code, refer to the page number in the DTC Chart's left column.

DTC No. (See Page)	Detection Item	Trouble Area	MIL*1	Memory
P0010 (05-422)	Camshaft Position "A" Actuator Circuit (Bank 1)	・Open or short in OCV (bank 1) circuit ・OCV (bank 1) ・ECM	○	○
P0011 (05-428)	Camshaft Position "A" -Timing Over-Advanced or System Performance (Bank 1)	・Valve timing ・OCV (bank 1) ・Camshaft timing gear assy ・ECM	○	○
P0012 (05-428)	Camshaft Position "A" -Timing Over- Retarded (Bank 1)	・Same as DTC No. P0011	○	○
P0016 (05-436)	Crankshaft Position - Camshaft Position Correlation (Bank 1 Sensor A)	・Mechanical system (Timing belt has jumped tooth, belt stretched) ・ECM	○	○
P0018 (05-436)	Crankshaft Position - Camshaft Position Correlation (Bank 2 Sensor A)	・Same as DTC No. P0016	○	○
P0020 (05-422)	Camshaft Position "A" Actuator Circuit (Bank 2)	・Open or short in OCV (bank 2) circuit ・OCV (bank 2) ・ECM	○	○
P0021 (05-428)	Camshaft Position "A" -Timing Over-Advanced or System Performance (Bank 2)	・Valve timing ・OCV (bank 2) ・Camshaft timing gear assy ・ECM	○	○
P0022 (05-428)	Camshaft Position "A" -Timing Over- Retarded (Bank 2)	・Same as DTC No. P0021	○	○
P0031*3 (05-438)	Oxygen (A/F) Sensor Heater Control Circuit Low (Bank 1 Sensor 1)	・Open or short in heater circuit of A/F sensor ・A/F sensor heater (bank 1 sensor 1) ・A/F relay ・ECM	○	○
P0032*3 (05-438)	Oxygen (A/F) Sensor Heater Control Circuit High (Bank 1 Sensor 1)	・Short in heater circuit of A/F sensor ・A/F sensor heater (bank 1 sensor 1) ・A/F relay ・ECM	○	○
P0037 (05-443)	Oxygen Sensor Heater Control Circuit Low (Bank 1 Sensor 2)	・Open or short in heater circuit of heated oxygen sensor ・Heated oxygen sensor heater (bank 1 sensor 2) ・EFI relay ・ECM	○	○
P0038 (05-443)	Oxygen Sensor Heater Control Circuit High (Bank 1 Sensor 2)	・Short in heater circuit of heated oxygen sensor ・Heated oxygen sensor heater (bank 1 sensor 2) ・EFI relay ・ECM	○	○
P0051*3 (05-438)	Oxygen (A/F) Sensor Heater Control Circuit Low (Bank 2 Sensor 1)	・Open or short in heater circuit of A/F sensor ・A/F sensor heater (bank 2 sensor 1) ・A/F relay ・ECM	○	○
P0052*3 (05-438)	Oxygen (A/F) Sensor Heater Control Circuit High (Bank 2 Sensor 1)	・Short in heater circuit of A/F sensor ・A/F sensor heater (bank 2 sensor 1) ・A/F relay ・ECM	○	○

DTC No. (See Page)	Detection Item	Trouble Area	MIL*1	Memory
P0057 (05-443)	Oxygen Sensor Heater Control Circuit Low (Bank 2 Sensor 2)	・Open or short in heater circuit of heated oxygen sensor ・Heated oxygen sensor heater (bank 2 sensor 2) ・EFI relay ・ECM	○	○
P0058 (05-443)	Oxygen Sensor Heater Control Circuit High (Bank 2 Sensor 2)	・Short in heater circuit of heated oxygen sensor ・Heated oxygen sensor heater (bank 2 sensor 2) ・EFI relay ・ECM	○	○
P0100 (05-448)	Mass or volume Air Flow Circuit	・Open or short in MAF meter circuit ・MAF meter ・ECM	○	○
P0101 (05-455)	Mass or volume Air Flow Circuit Range/Performance Problem	・MAF meter	○	○
P0102 (05-448)	Mass or volume Air Flow Circuit Low Input	・Open in MAF meter circuit ・Short in ground circuit ・MAF meter ・ECM	○	○
P0103 (05-448)	Mass or volume Air Flow Circuit High Input	・Short in MAF meter circuit (to +B circuit) ・MAF meter ・ECM	○	○
P0110 (05-457)	Intake Air Temperature Circuit	・Open or short in IAT sensor circuit ・IAT sensor (built in MAF meter) ・ECM	○	○
P0112 (05-457)	Intake Air Temperature Circuit Low Input	・Short in IAT sensor circuit ・IAT sensor (built in MAF meter) ・ECM	○	○
P0113 (05-457)	Intake Air Temperature Circuit High Input	・Open in IAT sensor circuit ・IAT sensor (built in MAF meter) ・ECM	○	○
P0115 (05-462)	Engine Coolant Temperature Circuit	・Open or short ECT sensor circuit ・ECT sensor ・ECM	○	○
P0116 (05-467)	Engine Coolant Temperature Circuit Range/Performance Problem	・ECT sensor	○	○
P0117 (05-462)	Engine Coolant Temperature Circuit Low Input	・Short in ECT sensor circuit ・ECT sensor ・ECM	○	○
P0118 (05-462)	Engine Coolant Temperature Circuit High Input	・Open in ECT sensor circuit ・ECT sensor ・ECM	○	○
P0120 (05-469)	Throttle/Pedal Position Sensor/ Switch "A" Circuit	・Throttle position sensor (built in throttle body) ・ECM	○	○
P0121 (05-478)	Throttle/Pedal Position Sensor/ Switch "A" Circuit Range/Performance Problem	・Throttle position sensor (built in throttle body)	○	○
P0122 (05-469)	Throttle/Pedal Position Sensor/ Switch "A" Circuit Low Input	・Throttle position sensor (built in throttle body) ・Short in VTA1 circuit ・Open in VC circuit ・ECM	○	○
P0123 (05-469)	Throttle/Pedal Position Sensor/ Switch "A" Circuit High Input	・Throttle position sensor (built in throttle body) ・Open in VTA1 circuit ・Open in E2 circuit ・VC and VTA1 circuits are short circuited ・ECM	○	○

DTC No. (See Page)	Detection Item	Trouble Area	MIL*1	Memory
P0125 (05-480)	Insufficient Coolant Temperature for Closed Loop Fuel Control	・Cooling system ・ECT sensor ・Thermostat	○	○
P0128 (05-482)	Coolant Thermostat (Coolant Temperature Below Thermostat Regulating Temperature)	・Thermostat (water inlet) ・Cooling system ・ECT sensor ・ECM	○	○
P0136 (05-485)	Oxygen Sensor Circuit Malfunction (Bank 1 Sensor 2)	・Heated oxygen sensor circuit (bank 1) ・Heated oxygen sensor (bank 1) ・Oxygen sensor heater (bank 1) ・A/F sensor (bank 1) ・A/F sensor heater (bank 1)	○	○
P0137 (05-485)	Oxygen Sensor Circuit Low Voltage (Bank 1 Sensor 2)	・Heated oxygen sensor circuit (bank 1) ・Heated oxygen sensor (bank 1) ・Oxygen sensor heater (bank 1)	○	○
P0138 (05-485)	Oxygen Sensor Circuit High Voltage (Bank 1 Sensor 2)	・Heated oxygen sensor circuit (bank 1) ・Heated oxygen sensor (bank 1) ・Oxygen sensor heater (bank 1)	○	○
P0156 (05-485)	Oxygen Sensor Circuit Malfunction (Bank 2 Sensor 2)	・Heated oxygen sensor circuit (bank 2) ・Heated oxygen sensor (bank 2) ・Oxygen sensor heater (bank 2) ・A/F sensor (bank 2) ・A/F sensor heater (bank 2)	○	○
P0157 (05-485)	Oxygen Sensor Circuit Low Voltage (Bank 2 Sensor 2)	・Heated oxygen sensor circuit (bank 2) ・Heated oxygen sensor (bank 2) ・Oxygen sensor heater (bank 2)	○	○
P0158 (05-485)	Oxygen Sensor Circuit High Voltage (Bank 2 Sensor 2)	・Heated oxygen sensor circuit (bank 2) ・Heated oxygen sensor (bank 2) ・Oxygen sensor heater (bank 2)	○	○
P0171 (05-498)	System too Lean (Bank 1)	・Air induction system ・Injector blockage ・MAF meter ・ECT sensor ・Fuel pressure ・Gas leakage in exhaust system ・Open or short in A/F sensor (bank 1 sensor 1) circuit ・A/F sensor (bank 1 sensor 1) ・A/F sensor heater (bank 1 sensor 1) ・A/F relay ・PCV valve and hose ・PCV hose connection	○	○
P0172 (05-498)	System too Rich (Bank 1)	・Injector leak, blockage ・MAF meter ・ECT sensor ・Ignition system ・Fuel pressure ・Gas leakage in exhaust system ・Open or short in A/F sensor (bank 1 sensor 1) circuit ・A/F sensor (bank 1 sensor 1) ・A/F sensor heater (bank 1 sensor 1) ・A/F relay	○	○

DTC No. (See Page)	Detection Item	Trouble Area	MIL*1	Memory
P0174 (05-498)	System too Lean (Bank 2)	・Air induction system ・Injector blockage ・MAF meter ・ECT sensor ・Fuel pressure ・Gas leakage in exhaust system ・Open or short in A/F sensor (bank 2 sensor 1) circuit ・A/F sensor (bank 2 sensor 1) ・A/F sensor heater (bank 2 sensor 1) ・A/F relay ・PCV valve and hose ・PCV hose connection	○	○
P0175 (05-498)	System too Rich (Bank 2)	・Injector leak, blockage ・MAF meter ・ECT sensor ・Ignition system ・Fuel pressure ・Gas leakage in exhaust system ・Open or short in A/F sensor (bank 2 sensor 1) circuit ・A/F sensor (bank 2 sensor 1) ・A/F sensor heater (bank 2 sensor 1) ・A/F relay	○	○
P0220 (05-469)	Throttle/Pedal Position Sensor/ Switch "B" Circuit	・Same as DTC No. P0120	○	○
P0222 (05-469)	Throttle/Pedal Position Sensor/ Switch "B" Circuit Low Input	・Throttle position sensor (built in throttle body) ・Short in VTA2 circuit ・Open in VC circuit ・ECM	○	○
P0223 (05-469)	Throttle/Pedal Position Sensor/ Switch "B" Circuit High Input	・Throttle position sensor (built in throttle body) ・Open in VTA2 circuit ・Open in E2 circuit ・VC and VTA2 circuits are short circuited ・ECM	○	○
P0300 (05-511)	Random/Multiple Cylinder Misfire Detected	・Open or short in engine wire ・Connector connection ・Vacuum hose connection ・Ignition system ・Injector ・Fuel pressure ・MAF meter ・ECT sensor ・Compression pressure ・Valve clearance ・Valve timing ・PCV hose connection ・PCV hose ・ECM	○*2	○
P0301 (05-511)	Cylinder 1 Misfire Detected	・Same as DTC No. P0300	○*2	○
P0302 (05-511)	Cylinder 2 Misfire Detected	・Same as DTC No. P0300	○*2	○
P0303 (05-511)	Cylinder 3 Misfire Detected	・Same as DTC No. P0300	○*2	○
P0304 (05-511)	Cylinder 4 Misfire Detected	・Same as DTC No. P0300	○*2	○
P0305 (05-511)	Cylinder 5 Misfire Detected	・Same as DTC No. P0300	○*2	○

DTC No. (See Page)	Detection Item	Trouble Area	MIL*1	Memory
P0306 (05-511)	Cylinder 6 Misfire Detected	・Same as DTC No. P0300	○*2	○
P0327 (05-527)	Knock Sensor 1 Circuit Low Input (Bank 1 or Single Sensor)	・Short in knock sensor 1 circuit ・Knock sensor 1 ・ECM	○	○
P0328 (05-527)	Knock Sensor 1 Circuit High Input (Bank 1 or Single Sensor)	・Open in knock sensor 1 circuit ・Knock sensor 1 ・ECM	○	○
P0332 (05-527)	Knock Sensor 2 Circuit Low Input (Bank 2)	・Short in knock sensor 2 circuit ・Knock sensor 2 ・ECM	○	○
P0333 (05-527)	Knock Sensor 2 Circuit High Input (Bank 2)	・Open in knock sensor 2 circuit ・Knock sensor 2 ・ECM	○	○
P0335 (05-532)	Crankshaft Position Sensor "A" Circuit	・Open or short in crankshaft position sensor circuit ・Crankshaft position sensor ・Crankshaft timing pulley ・ECM	○	○
P0339 (05-532)	Crankshaft Position Sensor "A" Circuit Intermittent	・Same as DTC No. P0335	—	○
P0340 (05-536)	Camshaft Position Sensor "A" Circuit (Bank 1 or Single Sensor)	・Open or short in VVT sensor circuit ・VVT sensor ・Camshaft timing pulley ・Timing belt has a jumped tooth ・ECM	○	○
P0341 (05-536)	Camshaft Position Sensor "A" Circuit Range/Performance (Bank 1 or Single Sensor)	・Same as DTC No. P0340	○	○
P0345 (05-536)	Camshaft Position Sensor "A" Circuit (Bank 2)	・Same as DTC No. P0340	○	○
P0346 (05-536)	Camshaft Position Sensor "A" Circuit Range/Performance (Bank 2)	・Same as DTC No. P0340	○	○
P0351*4 (05-541)	Ignition Coil "A" Primary/Secondary Circuit	・Ignition system ・Open or short in IGF1 or IGT1 circuit from ignition coil with igniter to ECM (ignition coil circuit 1) ・Ignition coil with igniter (ignition coil 1) ・ECM	○	○
P0352*4 (05-541)	Ignition Coil "B" Primary/Secondary Circuit	・Ignition system ・Open or short in IGF1 or IGT2 circuit from ignition coil with igniter to ECM (ignition coil circuit 2) ・Ignition coil with igniter (ignition coil 2) ・ECM	○	○
P0353*4 (05-541)	Ignition Coil "C" Primary/Secondary Circuit	・Ignition system ・Open or short in IGF1 or IGT3 circuit from ignition coil with igniter to ECM (ignition coil circuit 3) ・Ignition coil with igniter (ignition coil 3) ・ECM	○	○
P0354*4 (05-541)	Ignition Coil "D" Primary/Secondary Circuit	・Ignition system ・Open or short in IGF1 or IGT4 circuit from ignition coil with igniter to ECM (ignition coil circuit 4) ・Ignition coil with igniter (ignition coil 4) ・ECM	○	○
P0355*4 (05-541)	Ignition Coil "E" Primary/Secondary Circuit	・Ignition system ・Open or short in IGF1 or IGT5 circuit from ignition coil with igniter to ECM (ignition coil circuit 5) ・Ignition coil with igniter (ignition coil 5) ・ECM	○	○

DTC No. (See Page)	Detection Item	Trouble Area	MIL*1	Memory
P0356*4 (05-541)	Ignition Coil "F" Primary/Secondary Circuit	・Ignition system ・Open or short in IGF1 or IGT6 circuit from ignition coil with igniter to ECM (ignition coil circuit 6) ・Ignition coil with igniter (ignition coil 6) ・ECM	○	○
P0420 (05-551)	Catalyst System Efficiency Below Threshold (Bank 1)	・Gas leakage in exhaust system ・A/F sensor (bank 1 sensor 1) ・Heated oxygen sensor (bank 1 sensor 2) ・Three-way catalytic converter (inside exhaust manifold)	○	○
P0430 (05-551)	Catalyst System Efficiency Below Threshold (Bank 2)	・Gas leakage in exhaust system ・A/F sensor (bank 2 sensor 1) ・Heated oxygen sensor (bank 2 sensor 2) ・Three-way catalytic converter (inside exhaust manifold)	○	○
P0441 (05-557)	Evaporative Emission Control System Incorrect Purge Flow	・Vacuum hose has cracks, holes, or is blocked, damaged or disconnected ・Fuel tank cap is incorrectly installed ・Fuel tank cap has cracks, or is damaged ・Open or short in vapor pressure sensor circuit ・Vapor pressure sensor ・Open or short in VSV circuit for EVAP ・EVAP VSV ・Open or short in VSV circuit for CCV ・CCV ・Fuel tank has cracks, holes, or is damaged ・Charcoal canister has cracks, holes, or is damaged ・Fuel tank over fill check valve has cracks, or is damaged ・ECM	○	○
P0442 (05-563)	Evaporative Emission Control System Leak detected (small leak)	・Same as DTC No. P0441	○	○
P0446 (05-570)	Evaporative Emission Control System Vent Control Circuit	・Same as DTC No. P0441	○	○
P0451 (05-573)	Evaporative Emission Control System Pressure Sensor/Switch Range/Performance	・Open or short in vapor pressure sensor circuit ・Vapor pressure sensor ・ECM	○	○
P0452 (05-573)	Evaporative Emission Control System Pressure Sensor/Switch Low Input	・Open in vapor pressure sensor circuit ・Vapor pressure sensor ・ECM	○	○
P0453 (05-573)	Evaporative Emission Control System Pressure Sensor/Switch High Input	・Short in vapor pressure sensor circuit ・Vapor pressure sensor ・ECM	○	○
P0455 (05-563)	Evaporative Emission Control System Leak Detected (gross leak)	・Same as DTC No. P0441	○	○
P0456 (05-563)	Evaporative Emission Control System Leak Detected (very small leak)	・Same as DTC No. P0441	○	○
P0500 (05-578)	Vehicle Speed Sensor "A"	・Open or short in VSS circuit ・VSS sensor ・Combination meter ・ECM ・Skid control ECU	○	○
P0503 (05-578)	Vehicle Speed Sensor "A" Intermittent/Erratic/High	・Same as DTC No. P0500	—	○
P0504 (05-581)	Brake Switch "A"/"B" Correlation	・Short in stop lamp switch signal circuit ・Stop lamp switch ・ECM	—	○

DTC No. (See Page)	Detection Item	Trouble Area	MIL*1	Memory
P0505 (05-587)	Idle Air Control System	・Electric throttle control system ・Air induction system ・PCV hose connection	○	○
P0560 (05-590)	System Voltage	・Open in back-up power source circuit ・ECM	○	○
P0604 (05-593)	Internal Control Module Random Access Memory (RAM) Error	・ECM	○	○
P0606 (05-593)	ECM/PCM Processor	・ECM	○	○
P0607 (05-593)	Control Module Performance	・ECM	○	○
P0617 (05-595)	Starter Relay Circuit High	・Short in PNP switch circuit ・PNP switch ・Ignition switch ・ECM	○	○
P0630 (05-601)	VIN not Programmed or Mis-match - ECM/PCM	・ECM	○	○
P0657 (05-593)	Actuator Supply Voltage Circuit / Open	・ECM	○	○
P0705 (05-1036)	Transmission Range Sensor Cir-cuit Malfunction (PRNDL Input)	・Short in PNP switch circuit ・PNP switch ・ECM	○	○
P0710 (05-1042)	Transmission Fluid Temperature Sensor ”A” Circuit	・Electronic controlled automatic transmission (ECT)	○	○
P0711 (05-1046)	Transmission Fluid Temperature Sensor ”A” Performance	・Electronic controlled automatic transmission (ECT)	○	○
P0712 (05-1042)	Transmission Fluid Temperature Sensor ”A” Circuit Low Input	・Electronic controlled automatic transmission (ECT)	○	○
P0713 (05-1042)	Transmission Fluid Temperature Sensor ”A” Circuit High Input	・Electronic controlled automatic transmission (ECT)	○	○
P0717 (05-1049)	Input/Turbine Speed Sensor ”A” Circuit No Signal	・Electronic controlled automatic transmission (ECT)	○	○
P0724 (05-1052)	Brake Switch ”B” Circuit High	・Electronic controlled automatic transmission (ECT)	○	○
P0741 (05-1056)	Torque Converter Clutch Sole-noid Performance (Shift Solenoid Valve DSL)	・Electronic controlled automatic transmission (ECT)	○	○
P0746 (05-1061)	Pressure Control Solenoid ”A” Performance (Shift Solenoid Valve SL1)	・Electronic controlled automatic transmission (ECT)	○	○
P0748 (05-1065)	Pressure Control Solenoid ”A” Electrical (Shift Solenoid Valve SL1)	・Electronic controlled automatic transmission (ECT)	○	○
P0766 (05-1068)	Shift Solenoid ”D” Performance (Shift Solenoid Valve S4)	・Electronic controlled automatic transmission (ECT)	○	○
P0771 (05-1072)	Shift Solenoid ”E” Performance (Shift Solenoid Valve SR)	・Electronic controlled automatic transmission (ECT)	○	○
P0776 (05-1077)	Pressure Control Solenoid ”B” Performance (Shift Solenoid Valve SL2)	・Electronic controlled automatic transmission (ECT)	○	○
P0778 (05-1082)	Pressure Control Solenoid ”B” Electrical (Shift Solenoid Valve SL2)	・Electronic controlled automatic transmission (ECT)	○	○
P0793 (05-1085)	Intermediate Shaft Speed Sen-sor ”A” Circuit No Signal	・Electronic controlled automatic transmission (ECT)	○	○

DTC No. (See Page)	Detection Item	Trouble Area	MIL*1	Memory
P0796 (05-1089)	Pressure Control Solenoid "C" Performance (Shift Solenoid Valve SL3)	・Electronic controlled automatic transmission (ECT)	○	○
P0798 (05-1094)	Pressure Control Solenoid "C" Electrical (Shift Solenoid Valve SL3)	・Electronic controlled automatic transmission (ECT)	○	○
P0982 (05-1097)	Shift Solenoid "D" Control Low	・Electronic controlled automatic transmission (ECT)	○	○
P0983 (05-1097)	Shift Solenoid "D" Control High	・Electronic controlled automatic transmission (ECT)	○	○
P0985 (05-1100)	Pressure Control Solenoid "E" Performance (Shift Solenoid Valve SR)	・Electronic controlled automatic transmission (ECT)	○	○
P0986 (05-1100)	Pressure Control Solenoid "E" Electrical (Shift Solenoid Valve SR)	・Electronic controlled automatic transmission (ECT)	○	○
P2102 (05-603)	Throttle Actuator Control Motor Circuit Low	・Open in throttle control motor circuit ・Throttle control motor ・ECM	○	○
P2103 (05-603)	Throttle Actuator Control Motor Circuit High	・Short in throttle control motor circuit ・Throttle control motor ・Throttle body ・Throttle valve ・ECM	○	○
P2111 (05-607)	Throttle Actuator Control System - Stuck Open	・Throttle control motor circuit ・Throttle control motor ・Throttle body ・Throttle valve	○	○
P2112 (05-607)	Throttle Actuator Control System - Stuck Closed	・Same as DTC No. P2111	○	○
P2118 (05-610)	Throttle Actuator Control Motor Current Range/Performance	・Open in ETCS power source circuit ・ECM	○	○
P2119 (05-615)	Throttle Actuator Control Throttle Body Range/Performance	・ETCS ・ECM	○	○
P2120 (05-617)	Throttle/Pedal Position Sensor/ Switch "D" Circuit	・Accelerator pedal position sensor ・ECM	○	○
P2121 (05-625)	Throttle/Pedal Position Sensor/ Switch "D" Circuit Range/Perfor-mance	・Open or short in accelerator pedal position sensor circuit ・Accelerator pedal position sensor ・ECM	○	○
P2122 (05-617)	Throttle/Pedal Position Sensor/ Switch "D" Circuit Low Input	・Accelerator pedal position sensor ・VCP1 circuit open ・VPA1 circuit open or ground short ・ECM	○	○
P2123 (05-617)	Throttle/Pedal Position Sensor/ Switch "D" Circuit High Input	・Accelerator pedal position sensor ・EPA circuit open ・ECM	○	○
P2125 (05-617)	Throttle/Pedal Position Sensor/ Switch "E" Circuit	・Same as DTC No. P2120	○	○
P2127 (05-617)	Throttle/Pedal Position Sensor/ Switch "E" Circuit Low Input	・Accelerator pedal position sensor ・VCP2 circuit open ・VPA2 circuit open or ground short ・ECM	○	○
P2128 (05-617)	Throttle/Pedal Position Sensor/ Switch "E" Circuit High Input	・Accelerator pedal position sensor ・EPA2 circuit open ・ECM	○	○

DTC No. (See Page)	Detection Item	Trouble Area	MIL*1	Memory
P2135 (05-469)	Throttle Pedal Position Sensor/ Switch "A"/"B" Voltage Correlation	・VTA1 and VTA2 circuit are short circuited ・Throttle position sensor (built in throttle body) ・ECM	○	○
P2138 (05-617)	Throttle Pedal Position Sensor/ Switch "D"/"E" Voltage Correlation	・VPA1 and VPA2 circuit are short circuited ・Accelerator pedal position sensor ・ECM	○	○
P2195*3 (05-629)	Oxygen (A/F) Sensor Signal Stuck Lean (Bank 1 Sensor 1)	・Open or short in A/F sensor (bank 1 sensor 1) circuit ・A/F sensor (bank 1 sensor 1) ・A/F sensor (bank 1 sensor 1) heater ・A/F relay ・Open or short in A/F sensor heater and relay circuits ・Air induction system ・Fuel pressure ・Injector ・PCV hose connection ・ECM	○	○
P2196*3 (05-629)	Oxygen (A/F) Sensor Signal Stuck Rich (Bank 1 Sensor 1)	・Same as DTC No. P2195	○	○
P2197*3 (05-629)	Oxygen (A/F) Sensor Signal Stuck Lean (Bank 2 Sensor 1)	・Open or short in A/F sensor (bank 2 sensor 1) circuit ・A/F sensor (bank 2 sensor 1) ・A/F sensor (bank 2 sensor 1) heater ・A/F relay ・Open or short in A/F sensor heater and relay circuits ・Air induction system ・Fuel pressure ・Injector ・PCV hose connection ・ECM	○	○
P2198*3 (05-629)	Oxygen (A/F) Sensor Signal Stuck Rich (Bank 2 Sensor 1)	・Same as DTC No. P2197	○	○
P2238*3 (05-642)	Oxygen Sensor Pumping Current Circuit Low (for A/F sensor) (Bank 1 Sensor 1)	・Open or short in A/F sensor (bank 1 sensor 1) circuit ・A/F sensor (bank 1 sensor 1) ・A/F sensor (bank 1 sensor 1) heater ・A/F relay ・Open or short in A/F sensor heater and relay circuits ・ECM	○	○
P2239*3 (05-642)	Oxygen Sensor Pumping Current Circuit High (for A/F sensor) (Bank 1 Sensor 1)	・Same as DTC No. P2238	○	○
P2241*3 (05-642)	Oxygen Sensor Pumping Current Circuit Low (for A/F sensor) (Bank 2 Sensor 1)	・Open or short in A/F sensor (bank 2 sensor 1) circuit ・A/F sensor (bank 2 sensor 1) ・A/F sensor (bank 2 sensor 1) heater ・A/F relay ・A/F sensor heater and relay circuit ・ECM	○	○
P2242*3 (05-642)	Oxygen Sensor Pumping Current Circuit High (for A/F sensor) (Bank 2 Sensor 1)	・Same as DTC No. P2241	○	○
P2252*3 (05-642)	Oxygen Sensor Reference Ground Circuit Low (for A/F sensor) (Bank 1 Sensor 1)	・Same as DTC No. P2238	○	○
P2253*3 (05-642)	Oxygen Sensor Reference Ground Circuit High (for A/F sensor) (Bank 1 Sensor 1)	・Same as DTC No. P2238	○	○
P2255*3 (05-642)	Oxygen Sensor Reference Ground Circuit Low (for A/F sensor) (Bank 2 Sensor 1)	・Same as DTC No. P2241	○	○

DTC No. (See Page)	Detection Item	Trouble Area	MIL*1	Memory
P2256*3 (05-642)	Oxygen Sensor Reference Ground Circuit High (for A/F sensor) (Bank 2 Sensor 1)	⋇Same as DTC No. P2241	○	○
P2716 (05-1103)	Pressure Control Solenoid "D" Electrical	⋇Electronic controlled automatic transmission (ECT)	○	○
P2769 (05-1106)	DSL Solenoid Circuit Low	⋇Electronic controlled automatic transmission (ECT)	○	○
P2770 (05-1106)	DSL Solenoid Circuit High	⋇Electronic controlled automatic transmission (ECT)	○	○
P2A00 (05-649)	A/F Sensor Circuit Slow Response (Bank 1 Sensor 1)	⋇Open or short in A/F sensor (bank 1 sensor 1) circuit ⋇A/F sensor (bank 1 sensor 1) ⋇A/F sensor heater ⋇A/F relay ⋇Open or short in A/F sensor heater and relay circuits ⋇Air induction system ⋇Fuel pressure ⋇Injector ⋇PCV hose connection ⋇ECM	○	○
P2A03 (05-649)	A/F Sensor Circuit Slow Response (Bank 2 Sensor 1)	⋇Open or short in A/F sensor (bank 2 sensor 1) circuit ⋇A/F sensor (bank 2 sensor 1) ⋇A/F sensor heater ⋇A/F relay ⋇Open or short in A/F sensor heater and relay circuits ⋇Air induction system ⋇Fuel pressure ⋇Injector ⋇PCV hose connection ⋇ECM	○	○

HINT:

*1: MIL is illuminated.

*2: MIL is illuminated or flashes continuously.

*3: Although the title (DTC description) says "oxygen sensor", this DTC is related to the "A/F sensor".

*4: This DTC indicates a malfunction related to primary circuit.

05288-42

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

The hand-held tester is used in steps 3, 4, 5, 7 and 10.

1	VEHICLE BROUGHT TO WORKSHOP

NEXT

2	CUSTOMER PROBLEM ANALYSIS (See page 05-369)

NEXT

3	CONNECT HAND-HELD TESTER TO DLC3

HINT:

If the display indicates a communication fault in the tool, inspect DLC3.

NEXT

4	CHECK DTC AND FREEZE FRAME DATA (See page 05-400)

HINT:

Record or print DTC and freeze frame data, if needed.

NEXT

5	CLEAR DTC AND FREEZE FRAME DATA (See page 05-400)

NEXT

6	VISUAL INSPECTION

NEXT

7	SETTING CHECK (TEST) MODE DIAGNOSIS (See page 05-402)

NEXT

8	PROBLEM SYMPTOM CONFIRMATION

HINT:

If the engine does not start, perform steps 10 and 12 first.

Malfunction does not occur	A
Malfunction occurs	B

B → Go to step 10

A

9	SYMPTOM SIMULATION

NEXT

10	DTC CHECK (See page 05-400)

Malfunction code	A
No code	B

B → Go to step 12

A

11	DTC CHART (See page 05-412)

NEXT

Go to step 14

12	BASIC INSPECTION (See page 05-371)

Wrong parts not confirmed	A
Wrong parts confirmed	B

B → Go to step 17

A

13	PROBLEM SYMPTOMS TABLE (See page 05-393)

Wrong circuit confirmed	A
Wrong parts confirmed	B

B → Go to step 17

A

14	CHECK ECM POWER SOURCE CIRCUIT (See page 05-674)

NEXT

15	CIRCUIT INSPECTION

Malfunction not confirmed	A
Malfunction confirmed	B

B → Go to step 18

A

16	CHECK FOR INTERMITTENT PROBLEMS (See page 05-370)

NEXT

Go to step 18

17	PARTS INSPECTION

NEXT

18	IDENTIFICATION OF PROBLEM

NEXT

19	ADJUSTMENT, REPAIR

NEXT

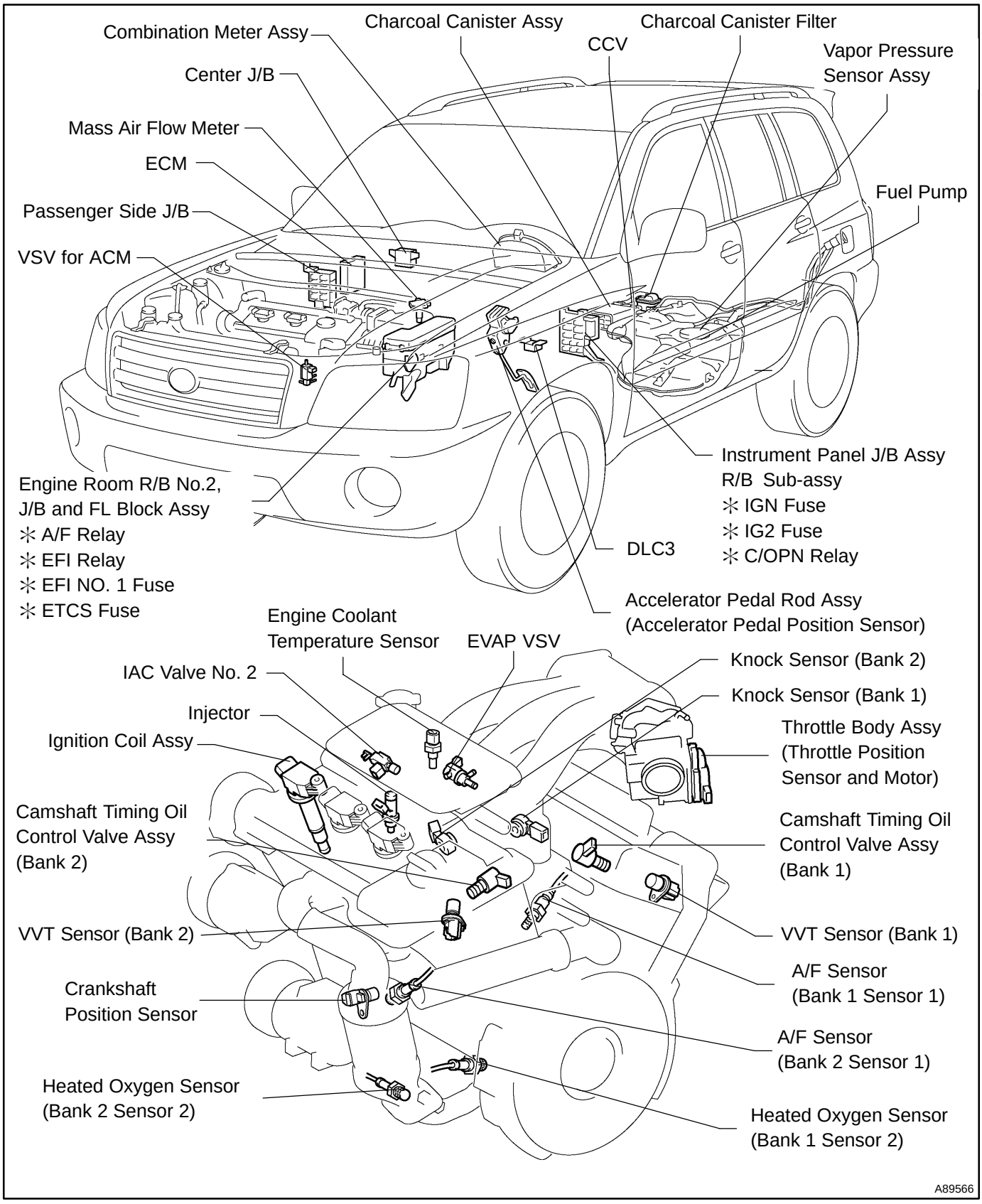
20	CONFIRMATION TEST

NEXT

END

05285-43

LOCATION



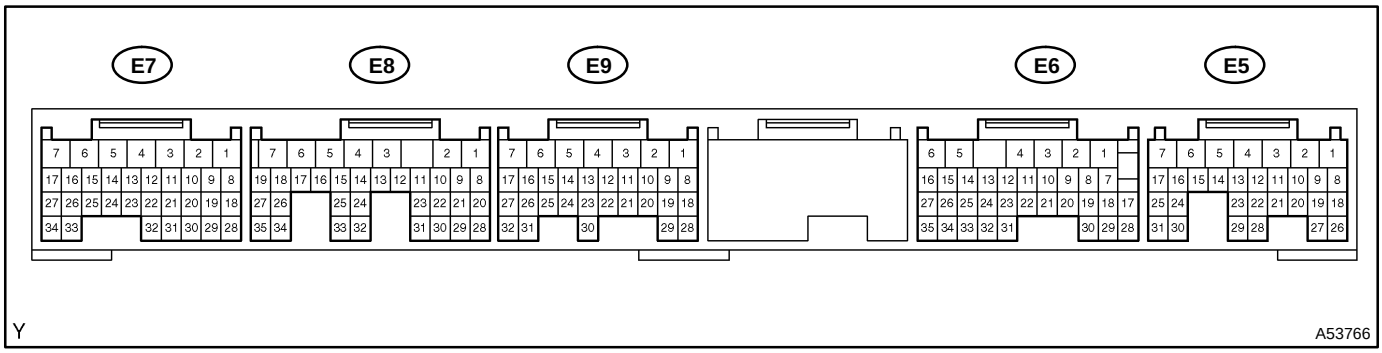
05287-44

PROBLEM SYMPTOMS TABLE

Symptom	Suspected Area	See Page
Engine does not crank (does not start)	1. Starter 2. Starter relay 3. PNP switch	19-36 19-36 40-11
No initial combustion (does not start)	1. ECM power source circuit 2. Fuel pump control circuit 3. ECM	05-674 05-717 01-36
No complete combustion (does not start)	1. Fuel pump control circuit	05-717
Difficult to start (engine cranks normally)	1. Starter signal circuit 2. Fuel pump control circuit 3. Compression	05-595 05-717 14-121
Difficult to start with cold engine	1. Starter signal circuit 2. Fuel pump control circuit	05-595 05-717
Difficult to start with hot engine	1. Starter signal circuit 2. Fuel pump control circuit	05-595 05-717
High engine idle speed (poor idling)	1. A/C signal circuit (Compressor circuit) 2. ECM power source circuit	05-1190 05-674
Low engine idle speed (poor idling)	1. A/C signal circuit (Compressor circuit) 2. Fuel pump control circuit	05-1190 05-717
Rough idling (poor idling)	1. Compression 2. Fuel pump control circuit	14-121 05-717
Hunting (poor idling)	1. ECM power source circuit 2. Fuel pump control circuit	05-674 05-717
Hesitation/Poor acceleration (poor driveability)	1. Fuel pump control circuit 2. A/T faulty	05-717 05-1016
Surging (poor driveability)	1. Fuel pump control circuit	05-717
Engine stalls soon after starting	1. Fuel pump control circuit	05-717
Engine stalls during A/C operation	1. A/C signal circuit (Compressor circuit) 2. ECM	05-1190 01-36
Unable to refuel/Difficult to refuel	1. ORVR system	-

05286-32

TERMINALS OF ECM



Each ECM terminal's standard voltage is shown in the table below.
In the table, first follow the information under "Condition". Next look under "Symbols (Terminal No.)" for the terminals to be inspected. The standard voltage between the terminals is shown under "Specific Condition". Use the illustration above as a reference for the ECM terminals.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specific Condition
BATT (E5-3) - E1 (E7-1)	BR - BR	Battery (for measuring battery voltage and for ECM memory)	Always	9 to 14 V
+BM (E6-6) - E1 (E7-1)	W - BR	Power source of throttle motor	Always	9 to 14 V
IGSW (E5-9) - E1 (E7-1)	P - BR	Ignition switch	Ignition switch ON	9 to 14 V
+B (E5-1) - E1 (E7-1)	W - BR	Power source of ECM	Ignition switch ON	9 to 14 V
+B2 (E5-2) - E1 (E7-1)	W - BR	Power source of ECM	Ignition switch ON	9 to 14 V
OC1+ (E9-16) - OC1- (E9-15)	G-W - G-R	Camshaft timing (OCV)	Ignition switch ON	Pulse generation (See page 05-448)
OC2+ (E9-14) - OC2- (E9-13)	L-R - G-B	Camshaft timing (OCV)	Ignition switch ON	Pulse generation (See page 05-448)
MREL (E5-8) - E1 (E7-1)	B - BR	EFI relay	Ignition switch ON	9 to 14 V
VC (E7-18) - E2 (E7-28)	Y - BR	Power source of sensor (specific voltage)	Ignition switch ON	4.5 to 5.5 V
VG (E7-30) - E2G (E7-29)	R - L-W	Mass air flow meter	Idling, shift lever position P or N, A/C switch OFF	0.5 to 3.0 V
THA (E7-20) - E2 (E7-28)	L-B - BR	Intake air temperature sensor	Idling, intake air temp. 20˚C (68˚F)	0.5 to 3.4 V
THW (E7-19) - E2 (E7-28)	G-B - BR	Engine coolant temperature sensor	Idling, engine coolant temp. 80˚C (176˚F)	0.2 to 1.0 V
VTA1 (E7-21) - E2 (E7-28)	R-W - BR	Throttle position sensor (for engine control)	Ignition switch ON, throttle valve fully closed	0.5 to 1.2 V
VTA1 (E7-21) - E2 (E7-28)	R-W - BR	Throttle position sensor (for engine control)	Ignition switch ON, throttle valve fully open	3.2 to 4.8 V
VTA2 (E7-31) - E2 (E7-28)	B-R - BR	Throttle position sensor (for sensor malfunction detection)	Ignition switch ON, accelerator pedal released	2.1 to 3.1 V
VTA2 (E7-31) - E2 (E7-28)	B-R - BR	Throttle position sensor (for sensor malfunction detection)	Ignition switch ON, accelerator pedal depressed	4.5 to 5.5 V
VPA (E5-22) - EPA (E5-28)	B - R	Accelerator pedal position sensor (for engine control)	Ignition switch ON, accelerator pedal released	0.5 to 1.1 V
VPA (E5-22) - EPA (E5-28)	B - R	Accelerator pedal position sensor (for engine control)	Ignition switch ON, accelerator pedal depressed	2.6 to 4.5 V

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specific Condition
VPA2 (E5-23) - EPA2 (E5-29)	W - BR	Accelerator pedal position sensor (for sensor malfunction detection)	Ignition switch ON, accelerator pedal released	1.2 to 2.0 V
VPA2 (E5-23) - EPA2 (E5-29)	W - BR	Accelerator pedal position sensor (for sensor malfunction detection)	Ignition switch ON, accelerator pedal depressed	3.4 to 5.3 V
VCPA (E5-26) - EPA (E5-28)	G - R	Power source of accelerator pedal position sensor (for VPA)	Ignition switch ON	4.5 to 5.5 V
VCP2 (E5-27) - EPA2 (E5-29)	L - BR	Power source of accelerator pedal position sensor (for VPA2)	Ignition switch ON	4.5 to 5.5 V
HA1H (E8-5) - E04 (E8-7) HA2A (E8-4) - E05 (E8-6)	B-W - W-B R-W - W-B	A/F sensor heater	Idling	Below 3.0 V
HA1H (E8-5) - E04 (E8-7) HA2A (E8-4) - E05 (E8-6)	B-W - W-B R-W - W-B	A/F sensor heater	Ignition switch ON	9 to 14 V
A1A+ (E8-22) - E1 (E7-1)	BR - BR	A/F sensor	Ignition switch ON	3.0 to 3.6 V
A2A+ (E8-23) - E1 (E7-1)	P - BR	A/F sensor	Ignition switch ON	3.0 to 3.6 V
A1A- (E8-30) - E1 (E7-1)	Y - BR	A/F sensor	Ignition switch ON	2.7 to 3.3 V
A2A- (E8-31) - E1 (E7-1)	L - BR	A/F sensor	Ignition switch ON	2.7 to 3.3 V
HT1B (E8-25) - E2 (E7-28) HT2B (E8-33) - E2 (E7-28)	R-Y - BR W-L - BR	Heated oxygen sensor heater	Idling	Below 3.0 V
HT1B (E8-25) - E2 (E7-28) HT2B (E8-33) - E2 (E7-28)	R-Y - BR W-L - BR	Heated oxygen sensor heater	Ignition switch ON	9 to 14 V
OX1B (E8-21) - E2 (E7-28) OX2B (E8-29) - E2 (E7-28)	W - BR B - BR	Heated oxygen sensor	Maintain engine speed at 2,500 rpm for 2 minutes after warming up	Pulse generation
#10 (E7-1) - E01 (E7-7) #20 (E7-2) - E01 (E7-7) #30 (E7-3) - E01 (E7-7) #40 (E7-4) - E01 (E7-7) #50 (E7-5) - E01 (E7-7) #60 (E8-3) - E01 (E7-7)	L - W-B Y - W-B B - W-B W - W-B B-W - W-B G - W-B	Injector	Ignition switch ON	9 to 14 V
#10 (E7-1) - E01 (E7-7) #20 (E7-2) - E01 (E7-7) #30 (E7-3) - E01 (E7-7) #40 (E7-4) - E01 (E7-7) #50 (E7-5) - E01 (E7-7) #60 (E8-3) - E01 (E7-7)	L - W-B Y - W-B B - W-B W - W-B B-W - W-B G - W-B	Injector	Idling	Pulse generation (See page 05-511)
KNK1 (E8-1) - EKNK (E8-28)	B - W	Knock sensor	Maintain engine speed at 4,000 rpm after warming up	Pulse generation (See page 05-527)
KNK2 (E8-2) - EKN2 (E8-20)	R - G	Knock sensor	Maintain engine speed at 4,000 rpm after warming up	Pulse generation (See page 05-527)
VV1+ (E9-27) - NE- (E9-24)	B-W - G	VVT sensor	Idling	Pulse generation (See page 05-532)
VV2+ (E9-26) - NE- (E9-24)	L - G	VVT sensor	Idling	Pulse generation (See page 05-532)
NE+ (E9-25) - NE- (E9-24)	R - G	Crankshaft position sensor	Idling	Pulse generation (See page 05-532)
IGT1 (E7-8) - E1 (E7-1) IGT2 (E7-9) - E1 (E7-1) IGT3 (E7-10) - E1 (E7-1) IGT4 (E7-11) - E1 (E7-1) IGT5 (E7-12) - E1 (E7-1) IGT6 (E7-13) - E1 (E7-1)	R-L - BR P - BR Y-B - BR L-Y - BR G-Y - BR L-R - BR	Ignition coil with igniter (ignition signal)	Idling	Pulse generation (See page 05-541)

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specific Condition
IGF1 (E7-24) - E1 (E7-1)	W-R - BR	Ignition coil with igniter (ignition confirmation signal)	Ignition switch ON	4.5 to 5.5 V
IGF1 (E7-24) - E1 (E7-1)	W-R - BR	Ignition coil with igniter (ignition confirmation signal)	Idling	Pulse generation (See page 05-541)
PRG (E7-34) - E1 (E7-1)	G - BR	EVAP VSV	Ignition switch ON	9 to 14 V
CCV (E7-27) - E1 (E7-1)	L - BR	CCV	Ignition switch ON	9 to 14 V
PTNK (E5-21) - E1 (E7-1)	L - BR	Vapor pressure sensor	Ignition switch ON	2.9 to 3.7 V
PTNK (E5-21) - E1 (E7-1)	L - BR	Vapor pressure sensor	Ignition switch ON, apply vacuum 4.0 kPa (30 mmHg, 1.18 in.Hg)	Below 0.5 V
SPD (E6-17) - E1 (E7-1)	Y - BR	Speed signal from combination meter	Ignition switch ON, rotate driving wheel slowly	Pulse generation (See page 05-578)
STA (E7-17) - E1 (E7-1)	B - BR	Starter signal	Cranking	6 V or higher
STP (E6-19) - E1 (E7-1)	BR - BR	Stop lamp switch	Ignition switch ON, brake pedal is depressed	7.5 to 14 V
STP (E6-19) - E1 (E7-1)	BR - BR	Stop lamp switch	Ignition switch ON, brake pedal is released	Below 1.5 V
ST1- (E6-12) - E1 (E7-1)	V - BR	Stop lamp switch (opposite to stop)	Ignition switch ON, brake pedal is depressed	Below 1.5 V
ST1- (E6-12) - E1 (E7-1)	V - BR	Stop lamp switch (opposite to stop)	Ignition switch ON, brake pedal is released	7.5 to 14 V
NSW (E7-16) - E1 (E7-1)	B-R - BR	PNP switch	Ignition switch ON, shift lever position in P or N	Below 3.0 V
NSW (E7-16) - E1 (E7-1)	B-R - BR	PNP switch	Ignition switch ON, except shift lever position in P or N	9 to 14 V
M+ (E9-3) - ME01 (E9-4) M- (E9-2) - ME01 (E9-4)	B - W-B W - W-B	Throttle motor	Idling	Pulse generation
FC (E5-10) - E1 (E7-1)	Y - BR	Fuel pump control	Ignition switch ON	9 to 14 V
FC (E5-10) - E1 (E7-1)	Y - BR	Fuel pump control	Idling	0 to 3 V
W (E5-11) - E1 (E7-1)	SB - BR	MIL	Ignition switch ON	Below 3.0 V
W (E5-11) - E1 (E7-1)	SB - BR	MIL	Idling	9 to 14 V
ELS2 (E5-12) - E1 (E7-1)	G - BR	Electric load	Power outlet OFF	0 to 1.5 V
ELS2 (E5-12) - E1 (E7-1)	G - BR	Electric load	Power outlet ON	7.5 to 14 V
TC (E5-20) - E1 (E7-1)	O - BR	Terminal TC of DLC 3	Ignition switch ON	9 to 14 V
SIL (E5-18) - E1 (E7-1)	R - BR	Terminal SIL of DLC3	During transmission	Pulse generation
TACH (E5-5) - E1 (E7-1)	B - BR	Engine speed	Idling	Pulse generation
ACIS (E7-15) - E1 (E7-1)	R-Y - BR	VSV for ACIS	Ignition switch ON	9 to 14 V
ACM (E9-6) - E1 (E7-1)	Y-G - BR	VSV for ACM	Ignition switch ON	9 to 14 V
ENG+ (E5-24) - ENG- (E5-30)	V - R	Electric load (from skid control ECU)	Idling	Pulse generation
TRC+ (E5-25) - TRC- (E5-31)	Y - G	Electric load (from skid control ECU)	Idling	Pulse generation
PSW (E9-10) - E1 (E9-1)	R-W - BR	PS pressure switch	Ignition switch ON	9 to 14 V