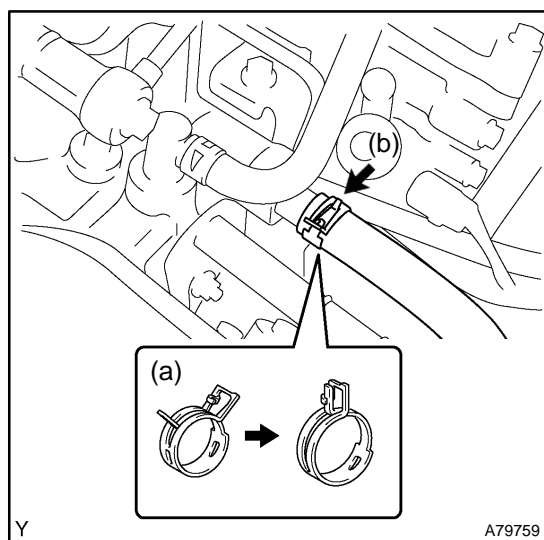


CYLINDER HEAD GASKET (3MZ-FE)

141PO-02

REPLACEMENT

1. WORK FOR PREVENTING GASOLINE FROM SPILLING OUT (See page 11-35)
2. DRAIN ENGINE COOLANT (See page 16-26)
3. DRAIN ENGINE OIL
4. REMOVE FR WIPER ARM LH (See page 66-7)
5. REMOVE FR WIPER ARM RH (See page 66-7)
6. REMOVE COWL TOP VENTILATOR LOUVER SUB-ASSY (See page 66-7)
7. REMOVE WINDSHIELD WIPER LINK ASSY (See page 66-7)
8. REMOVE COWL PANEL SUB-ASSY
9. REMOVE FRONT SUSPENSION BRACE SUB-ASSY UPPER CENTER
10. REMOVE V-BANK COVER SUB-ASSY (See page 14-149)
11. REMOVE AIR CLEANER CAP SUB-ASSY
12. REMOVE EMISSION CONTROL VALVE SET (See page 14-149)
13. REMOVE INTAKE AIR SURGE TANK (See page 14-149)
14. DISCONNECT FUEL PIPE SUB-ASSY NO.1 (See page 14-149)

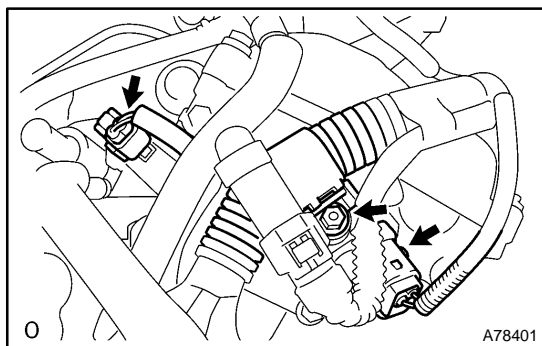


15. DISCONNECT HEATER INLET WATER HOSE
 - (a) Lock the hose clamp, as shown in the illustration.
 - (b) Disconnect the heater inlet water hose.

16. REMOVE INTAKE MANIFOLD (See page 14-149)
17. DISCONNECT RADIATOR HOSE INLET
18. REMOVE WATER OUTLET (See page 14-149)
19. REMOVE FRONT WHEEL RH
20. REMOVE ENGINE UNDER COVER NO.1
21. REMOVE FRONT FENDER APRON SEAL RH
22. REMOVE V (COOLER COMPRESSOR TO CRANKSHAFT PULLEY) BELT NO.1 (See page 14-125)
23. REMOVE VANE PUMP V BELT (See page 14-125)
24. REMOVE ENGINE MOVING CONTROL ROD (See page 14-149)
25. REMOVE ENGINE MOUNTING STAY NO.2 RH (See page 14-149)
26. REMOVE GENERATOR BRACKET NO.2
27. REMOVE CRANKSHAFT PULLEY (See page 14-173)
28. REMOVE TIMING BELT NO.1 COVER
29. REMOVE TIMING BELT NO.2 COVER (See page 14-206)

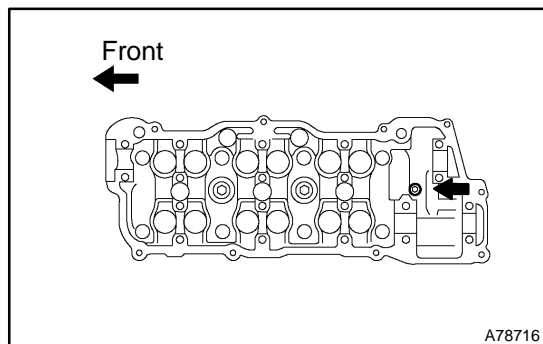
2005 HIGHLANDER REPAIR MANUAL (RM1144U)

30. REMOVE ENGINE MOUNTING BRACKET RH
31. REMOVE TIMING BELT GUIDE NO.2
32. REMOVE TIMING BELT (See page 14-206)
33. REMOVE TIMING BELT IDLER SUB-ASSY NO.2
34. REMOVE CAMSHAFT TIMING PULLEY (See page 14-213)
35. REMOVE TIMING BELT NO.3 COVER (See page 14-213)
36. SEPARATE VANE PUMP ASSY (See page 14-149)
37. REMOVE PROPELLER SHAFT (4WD TYPE) (See page 30-12)
38. DISCONNECT EXHAUST PIPE SUB-ASSY FRONT NO.3 (See page 15-5)
39. REMOVE EXHAUST MANIFOLD CONVERTER SUB-ASSY (See page 14-149)
40. REMOVE IGNITION COIL ASSY
41. REMOVE CYLINDER HEAD COVER SUB-ASSY (See page 14-173)
42. REMOVE CAMSHAFT (See page 14-213)
43. REMOVE NO.2 CAMSHAFT (See page 14-213)

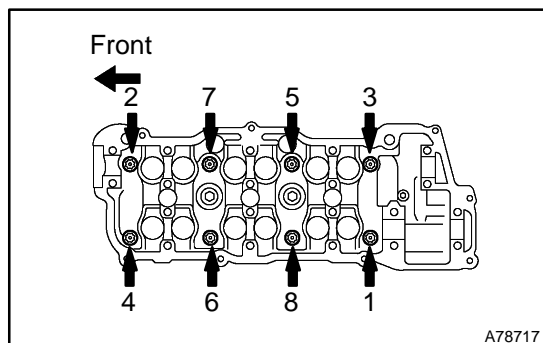


44. REMOVE CYLINDER HEAD SUB-ASSY

- (a) Disconnect the camshaft timing oil control valve connector.
- (b) Remove the nut and disconnect the engine wire harness clamp.



- (c) Using a socket hexagon wrench 8, remove the hexagon bolt.

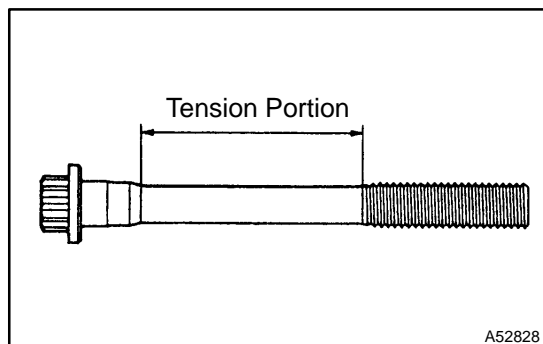


- (d) Uniformly loosen the 8 cylinder head bolts in the sequence shown in the illustration. Remove the 8 cylinder head bolts and plate washers.

NOTICE:

- Be careful not to drop the washers into the cylinder head.
- Head warpage or cracking could result from removing bolts in an incorrect order.

45. REMOVE CYLINDER HEAD GASKET

**46. INSPECT CYLINDER HEAD SET BOLT**

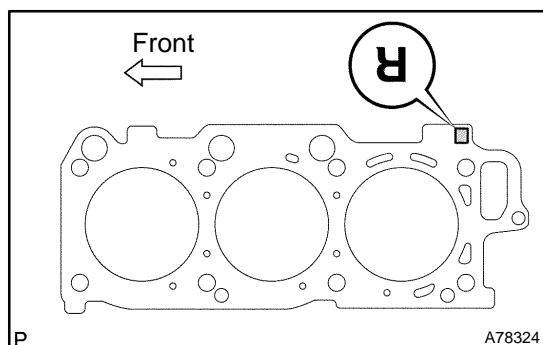
- (a) Using a vernier caliper, measure the tension portion diameter of the bolt.

Standard outside diameter:

8.95 to 9.05 mm (0.3524 to 0.3563 in.)

Minimum outside diameter: 8.75 mm (0.3445 in.)

If the diameter is less than the minimum, replace the bolt.

**47. INSTALL CYLINDER HEAD GASKET**

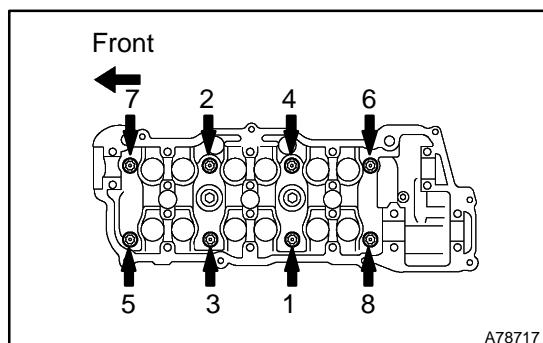
- (a) Place a new cylinder head gasket on the cylinder block with the R mark upside down, as shown in the illustration.

NOTICE:

- **Remove any oil from the contact surface.**
- **Be careful of the installation direction.**
- **To avoid damage to the gasket, place the cylinder head on the gasket carefully.**

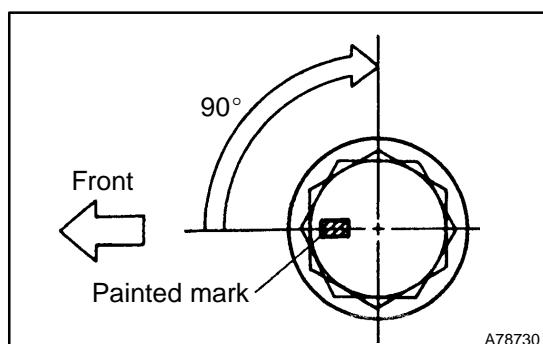
48. INSTALL CYLINDER HEAD SUB-ASSY**NOTICE:**

The cylinder head bolts are tightened in 2 successive steps.

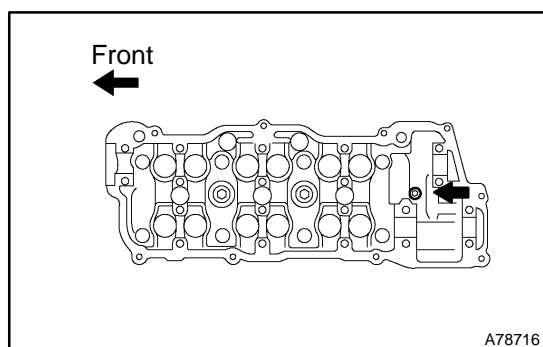


- (a) Apply a light coat of engine oil on the threads of the cylinder head bolts.
- (b) Install the plate washers to the cylinder head bolts.
- (c) Uniformly install and tighten the 8 cylinder head bolts in the sequence shown in the illustration.

Torque: 54 N·m (550 kgf·cm, 40 ft·lbf)



- (d) Mark the front side of each cylinder head bolt head with paint, as shown in the illustration.
- (e) Retighten the cylinder head bolts by 90° in the same sequence as step (c).
- (f) Check that each painted mark is now at a 90° angle to the front.



- (g) Using a socket hexagon wrench 8, install the hexagon bolt.

Torque: 19 N·m (194 kgf·cm, 14 ft·lbf)

- (h) Connect the engine wire harness clamp with the nut.

Torque: 8.0 N·m (82 kgf·cm, 71 in·lbf)

49. INSTALL NO.2 CAMSHAFT (See page [14-213](#))
50. INSTALL CAMSHAFT (See page [14-213](#))
51. INSTALL CYLINDER HEAD COVER SUB-ASSY (See page [14-213](#))
52. INSTALL IGNITION COIL ASSY
Torque: 8.0 N·m (82 kgf·cm, 71 in·lbf)
53. INSTALL EXHAUST MANIFOLD CONVERTER SUB-ASSY (See page [14-149](#))
54. CONNECT EXHAUST PIPE SUB-ASSY FRONT NO.3 (See page [15-5](#))
55. INSTALL PROPELLER SHAFT (4WD TYPE) (See page [30-12](#))
56. INSTALL VANE PUMP ASSY (See page [14-149](#))
57. INSTALL TIMING BELT NO.3 COVER (See page [14-213](#))
58. INSTALL CAMSHAFT TIMING PULLEY (See page [14-213](#))
59. INSTALL TIMING BELT IDLER SUB-ASSY NO.2
Torque: 43 N·m (438 kgf·cm, 32 ft·lbf)
60. INSPECT TIMING BELT (See page [14-206](#))
61. INSTALL TIMING BELT (See page [14-206](#))
62. INSTALL TIMING BELT TENSIONER ASSY (See page [14-206](#))
63. INSTALL TIMING BELT GUIDE NO.2 (See page [14-206](#))
64. INSTALL ENGINE MOUNTING BRACKET RH
Torque: 28 N·m (286 kgf·cm, 21 ft·lbf)
65. INSTALL TIMING BELT NO.2 COVER (See page [14-206](#))
66. INSTALL TIMING BELT NO.1 COVER (See page [14-206](#))
67. INSTALL CRANKSHAFT PULLEY (See page [14-173](#))
68. INSTALL GENERATOR BRACKET NO.2
Torque: 28 N·m (286 kgf·cm, 21 ft·lbf)
69. INSTALL ENGINE MOUNTING STAY NO.2 RH (See page [14-149](#))
70. INSTALL ENGINE MOVING CONTROL ROD (See page [14-149](#))
71. INSTALL VANE PUMP V BELT (See page [14-125](#))
72. INSTALL V (COOLER COMPRESSOR TO CRANKSHAFT PULLEY) BELT NO.1
(See page [14-125](#))
73. INSPECT DRIVE BELT TENSION (See page [14-121](#))
74. INSTALL WATER OUTLET (See page [14-149](#))
75. CONNECT RADIATOR HOSE INLET
76. INSTALL INTAKE MANIFOLD (See page [14-149](#))
77. CONNECT HEATER INLET WATER HOSE
78. CONNECT FUEL PIPE SUB-ASSY NO.1 (See page [14-149](#))
79. INSTALL INTAKE AIR SURGE TANK (See page [14-149](#))
80. INSTALL EMISSION CONTROL VALVE SET (See page [14-149](#))
81. INSTALL AIR CLEANER CAP SUB-ASSY
82. CONNECT VACUUM HOSES (See page [14-149](#))
83. INSTALL V-BANK COVER SUB-ASSY (See page [14-149](#))

84. **INSTALL FRONT SUSPENSION BRACE SUB-ASSY UPPER CENTER**
Torque: 80 N·m (816 kgf·cm, 59 ft·lbf)
85. **INSTALL COWL PANEL SUB-ASSY**
86. **INSTALL WINDSHIELD WIPER LINK ASSY (See page 66-7)**
87. **INSTALL COWL TOP VENTILATOR LOUVER SUB-ASSY (See page 66-7)**
88. **INSTALL FR WIPER ARM LH (See page 66-7)**
89. **INSTALL FR WIPER ARM RH (See page 66-7)**
90. **INSTALL FRONT WHEEL RH**
91. **ADD ENGINE OIL**
92. **ADD ENGINE COOLANT (See page 16-26)**
93. **CHECK FOR ENGINE OIL LEAKS**
94. **CHECK FOR ENGINE COOLANT LEAKS (See page 16-20)**
95. **INSPECT FOR FUEL LEAKS**
96. **CHECK FOR EXHAUST GAS LEAKS**
97. **INSPECT IGNITION TIMING (See page 14-121)**
98. **INSPECT ENGINE IDLE SPEED (See page 14-121)**
99. **INSPECT COMPRESSION (See page 14-121)**
100. **INSPECT CO/HC (See page 14-121)**