1411E–01

REPLACEMENT

1. REMOVE ENGINE UNDER COVER SUB–ASSY NO.1
2. DRAIN ENGINE COOLANT (See page 16–18)
3. REMOVE AIR CLEANER ASSY (See page 14–91)
4. REMOVE RADIATOR SUPPORT SEAL UPPER
5. REMOVE RADIATOR HOSE NO.1
6. DISCONNECT HEATER WATER INLET HOSE A
7. DISCONNECT HEATER WATER OUTLET HOSE A (FROM HEATER UNIT)
8. DISCONNECT FUEL HOSE
9. REMOVE VANE PUMP V BELT (See page 14–77)
10. REMOVE V (COOLER COMPRESSOR TO CRANKSHAFT PULLEY) BELT NO.1 (W/ AIR CONDITIONING) (See page 14–77)
11. REMOVE FAN AND GENERATOR V BELT (W/O AIR CONDITIONING) (See page 14–77)

HINT:

Loosen the 4 fan pulley nuts.

12. REMOVE FAN AND GENERATOR V BELT (W/ AIR CONDITIONING) (See page 14–77)

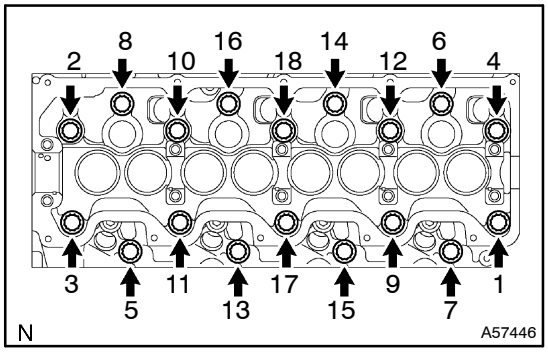
HINT:

Loosen the 4 fan pulley nuts.

13. REMOVE FLUID COUPLING ASSY (See page 14–99)
14. REMOVE FAN SHROUD
15. REMOVE INTAKE PIPE
16. REMOVE INTAKE FLANGE (See page 10–19)
17. REMOVE VENTURI ASSY (See page 10–19)
18. REMOVE STARTER ASSY (See page 19–11)
19. REMOVE INJECTION PIPE SET (See page 11–46)
20. REMOVE IDLE PULLEY BRACKET (W/ AIR CONDITIONING)
21. SEPARATE COMPRESSOR AND MAGNETIC CLUTCH (W/ AIR CONDITIONING) (See page 14–91)
22. REMOVE COMPRESSOR MOUNTING BRACKET NO.1 (W/ AIR CONDITIONING)
23. REMOVE VANE PUMP DRIVE PULLEY (W/O AIR CONDITIONING) (See page 14–99)
24. REMOVE VANE PUMP DRIVE PULLEY (W/ AIR CONDITIONING) (See page 14–99)
25. REMOVE CRANKSHAFT PULLEY (See page 14–99)

    SST 09213–54015 (91651–60855), 09330–00021, 09950–50013 (09951–05010, 09952–05010, 09953–05010, 09953–05020, 09954–05030)

26. REMOVE RADIATOR HOSE HOSE CLAMP
27. REMOVE TIMING CHAIN OR BELT COVER SUB–ASSY (See page 14–99)
28. REMOVE TIMING BELT GUIDE
29. SET NO.1 CYLINDER TO TDC/COMPRESSION (See page 14–99)
30. REMOVE TIMING BELT (See page 14–99)
31. REMOVE OIL LEVEL GAGE GUIDE (See page 17–25)
32. SEPARATE EXHAUST PIPE ASSY FRONT (See page 15–6)
33. REMOVE EXHAUST MANIFOLD HEAT INSULATOR NO.1 (See page 14–91)
34. REMOVE CYLINDER HEAD COVER SUB–ASSY (See page 14–79)



35. REMOVE CYLINDER HEAD SUB–ASSY

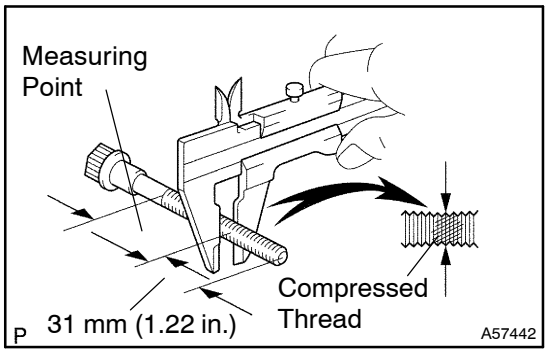
(a) Uniformly loosen and remove the 18 cylinder head bolts, in several passes, in the sequence shown.

NOTICE:

Head warpage or cracking could result from removing bolts in incorrect order.

(b) Lift the cylinder head from the dowels on the cylinder block, and place the cylinder head on wooden blocks on a bench.

36. REMOVE CYLINDER HEAD GASKET



37. INSPECT CYLINDER HEAD SET BOLT

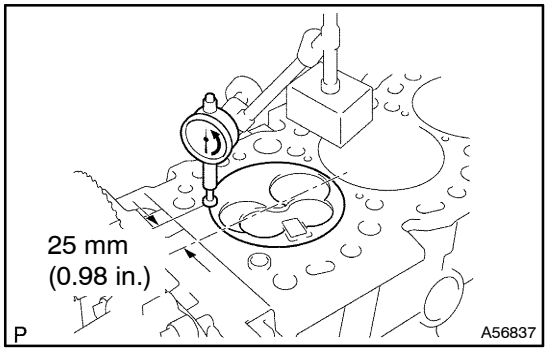
(a) Using vernier calipers, measure the minimum outer diameter of the compressed thread at the measuring point.

Standard outer diameter:

11.80 – 12.00 mm (0.4646 – 0.4724 in.)

Minimum outer diameter: 11.60 mm (0.4567 in.)

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



38. INSTALL CYLINDER HEAD GASKET

(a) Check piston protrusions for each cylinder

(1) Clean the cylinder block with solvent.

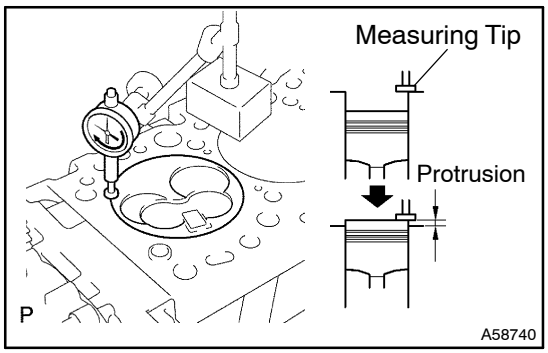
(2) Set the piston of the cylinder to be measured to slightly before TDC.

(3) Place a dial indicator on the cylinder block, set the measuring tip as shown in the illustration.

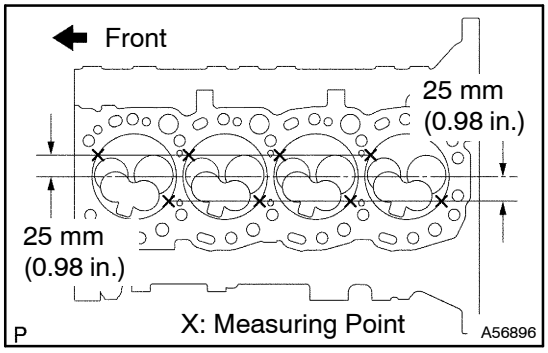
(4) Set the dial indicator at 0 mm (0 in.).

HINT:

- Use a dial indicator measuring tip as shown in the illustration.
- Make sure that the measuring tip is square to the cylinder block gasket surface and piston head when taking the measurements.



(5) Find where the piston head protrudes most by slowly turning the crankshaft clockwise and counterclockwise.



(6) Measure each cylinder at 2 places as shown in the illustration, making a total of 8 measurements.

(7) For the piston protrusion value of each cylinder, use the average of the 2 measurements of each cylinder.

Protrusion: 0.68 – 0.97 mm (0.00268 – 0.0382 in.)

HINT:

When removing piston and connecting rod assembly:
If the protrusion is not as specified, remove the piston and connecting rod assembly and reinstall it.

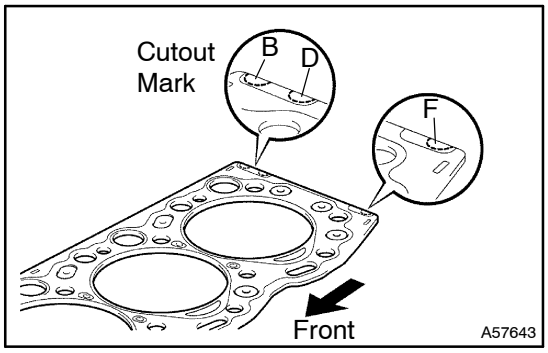
(b) Select a new cylinder head gasket

HINT:

There are 3 sizes of new cylinder head gaskets, marked "B", "D" or "F" accordingly.

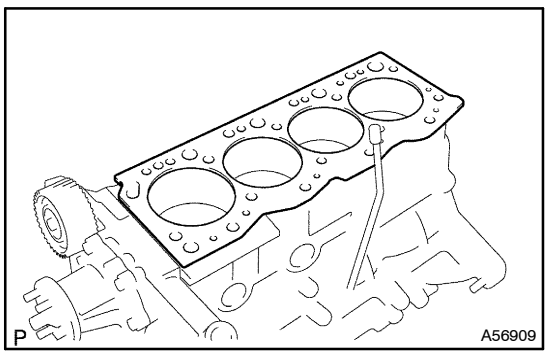
New installed cylinder head gasket thickness:

Mark B	1.40 – 1.50 mm (0.0551 – 0.0591 in.)
Mark D	1.50 – 1.60 mm (0.0591 – 0.0630 in.)
Mark F	1.60 – 1.70 mm (0.0630 – 0.0669 in.)



(1) Select the largest piston protrusion value from the measurements made, then select a new appropriate gasket according to the table below.

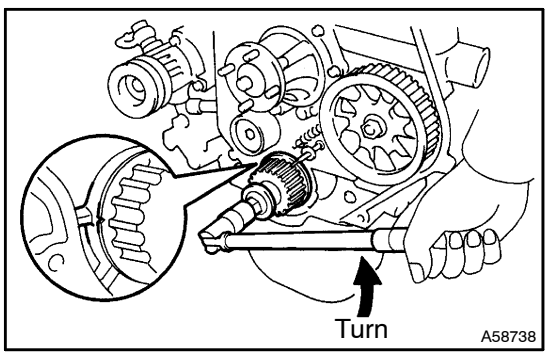
Piston protrusion mm (in.)	Gasket size
0.68 – 0.77 (0.0268 – 0.0303)	Use B
0.78 – 0.87 (0.0307 – 0.0343)	Use D
0.88 – 0.97 (0.0346 – 0.0382)	Use F



(c) Place a new cylinder head gasket in position on the cylinder block.

NOTICE:

Be careful of the installation direction.



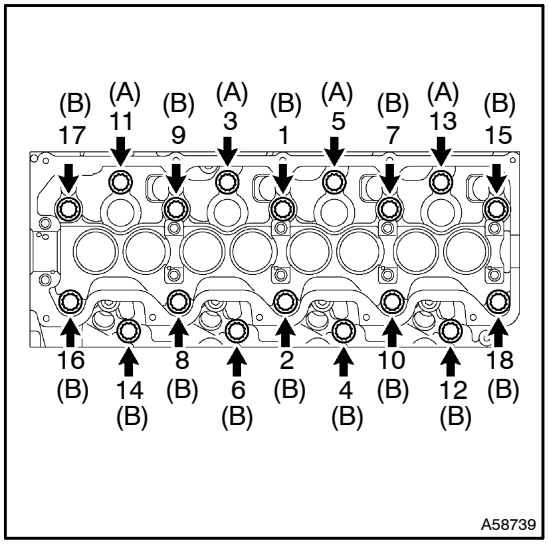
39. INSTALL CYLINDER HEAD SUB–ASSY

HINT:

Set the No.1 cylinder to 90° BTDC/compression to avoid interference with the piston top and valve head.

(a) Using the crankshaft pulley bolt, turn the crankshaft 90° counterclockwise, and put the timing mark of the crankshaft timing pulley with the protrusion of the timing belt case.

(b) Place the cylinder head in position on the cylinder head gasket.



(c) Install cylinder head bolts

HINT:

- The cylinder head bolts are tightened in 3 progressive steps (steps (2), (4) and (5)).
- If any bolts is broken or deformed, replace it.

(1) Apply a light coat of engine oil on the threads and under the heads of the cylinder head bolts.

(2) Install and uniformly tighten the 18 cylinder head bolts, in several passes, in the sequence shown.

Torque: 78 N·m (800 kgf·cm, 58 ft·lbf)

HINT:

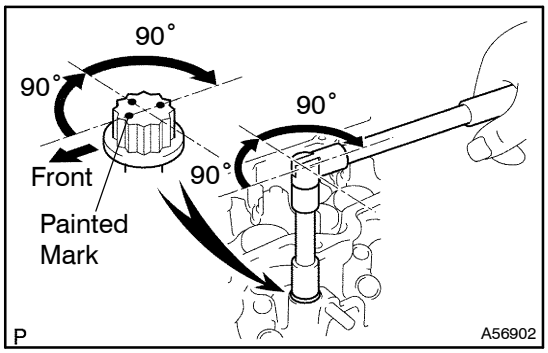
Each bolt length is indicated in the illustration.

Bolt length:

107 mm (4.12 in.) for A

127 mm (5.00 in.) for B

If any one of the cylinder head bolts does not meet the torque specification, replace the cylinder head bolt.



(3) Mark the front of the cylinder head bolt with paint.

(4) Retighten the cylinder head bolts 90° in the numerical order shown.

(5) Retighten cylinder head bolts by an additional 90°.

(6) Check that the painted mark is now facing rearward.

40. INSTALL CYLINDER HEAD COVER SUB–ASSY (See page 14–79)
41. INSTALL EXHAUST MANIFOLD HEAT INSULATOR NO.1 (See page 14–91)
42. INSTALL EXHAUST PIPE ASSY FRONT (See page 15–6)
43. INSTALL OIL LEVEL GAGE GUIDE (See page 17–25)
44. INSPECT TIMING BELT (See page 14–99)
45. INSPECT TIMING BELT IDLER SUB–ASSY NO.1 (See page 14–99)
46. INSPECT IDLER TENSION SPRING (See page 14–99)
47. INSPECT WATER PUMP ASSY (See page 14–99)
48. SET NO.1 CYLINDER TO TDC/COMPRESSION (See page 14–99)
49. INSTALL TIMING BELT (See page 14–99)
SST 09960–10010 (09962–01000, 09963–01000)
50. CHECK VALVE TIMING (See page 14–99)
51. INSTALL TIMING BELT GUIDE (See page 14–99)
52. INSTALL TIMING CHAIN OR BELT COVER SUB–ASSY (See page 14–99)
53. INSTALL RADIATOR HOSE HOSE CLAMP (See page 14–99)
54. INSTALL CRANKSHAFT PULLEY (See page 14–99)
SST 09213–54015 (91651–60855), 09330–00021
55. INSTALL VANE PUMP DRIVE PULLEY (W/O AIR CONDITIONING) (See page 14–99)
56. INSTALL VANE PUMP DRIVE PULLEY (W/ AIR CONDITIONING) (See page 14–99)

57. INSTALL COMPRESSOR MOUNTING BRACKET NO.1 (W/ AIR CONDITIONING) (See page 14–91)
58. INSTALL COMPRESSOR AND MAGNETIC CLUTCH (W/ AIR CONDITIONING) (See page 14–91)
59. INSTALL IDLE PULLEY BRACKET (W/ AIR CONDITIONING) (See page 14–91)
60. INSTALL INJECTION PIPE SET (See page 11–46)
61. INSTALL STARTER ASSY (See page 19–11)
62. INSTALL VENTURI ASSY (See page 10–19)
63. INSTALL INTAKE FLANGE (See page 10–19)
64. INSTALL INTAKE PIPE (See page 10–19)
65. INSTALL FAN SHROUD (See page 16–20)
66. TEMPORARILY TIGHTEN FLUID COUPLING ASSY (See page 14–99)
67. INSTALL FAN AND GENERATOR V BELT (W/O AIR CONDITIONING) (See page 14–77)
68. INSTALL FAN AND GENERATOR V BELT (W/ AIR CONDITIONING) (See page 14–77)
69. TIGHTEN FLUID COUPLING ASSY (See page 14–99)
70. INSTALL V (COOLER COMPRESSOR TO CRANKSHAFT PULLEY) BELT NO.1 (W/ AIR CONDITIONING) (See page 14–77)
71. INSTALL VANE PUMP V BELT (See page 14–77)
72. INSTALL AIR CLEANER ASSY (See page 14–91)
73. BLEED INJECTION PIPE (See page 11–46)
74. ADD ENGINE COOLANT (See page 16–18)
75. CHECK FOR ENGINE COOLANT LEAKS (See page 16–18)
76. CHECK FOR FUEL LEAKS (See page 11–46)
77. CHECK FOR EXHAUST GAS LEAK
78. INSTALL ENGINE UNDER COVER SUB–ASSY NO.1 (See page 14–91)