1420T–01

REPLACEMENT

1. REMOVE ENGINE UNDER COVER SUB–ASSY NO.1

(a) Remove the 4 bolts and engine under cover No.1.

2. REMOVE ENGINE UNDER COVER ASSY REAR

(a) Remove the 4 bolts and engine under cover rear.

3. DRAIN ENGINE COOLANT (SEE PUB. NO. RM990E, PAGE 16–50)

4. REMOVE AIR CLEANER ASSY

(a) Disconnect the mass air flow meter S/A connector, and remove the wire harness clamp.

(b) Loosen the hose clamp, and remove the air cleaner cap with air cleaner hose No.1.

(c) Remove the air cleaner filter element.

(d) Remove the 3 bolts and air cleaner case sub–assy.

5. REMOVE RADIATOR SUPPORT SEAL UPPER

(a) Remove the 11 clips and radiator support seal upper.

6. REMOVE WIRE HARNESS (W/ COLD AREA)

(a) Remove the wire harness from the fan shroud.

7. REMOVE RADIATOR RESERVE TANK ASSY

(a) Disconnect the water by–pass hose and water by–pass hose No.2.

(b) Remove the 3 bolts and radiator reserve tank.

8. REMOVE RADIATOR HOSE NO.1

9. REMOVE FAN AND GENERATOR V BELT (SEE PUB. NO. RM990E, PAGE 14–189)

HINT:

Loosen the 4 nuts for the fan with fluid coupling assy in advance.

10. REMOVE FAN SHROUD

(a) Remove the oil cooler inlet hose and outlet hose from the hose clamp. (AUTOMATIC TRANSMISSION)

(b) Remove the 4 nuts for the fan with fluid coupling assy and 2 bolts for the fan shroud.

(c) Remove the fan with fluid coupling assy together with the fan shroud.

11. REMOVE FAN PULLEY

12. REMOVE INTERCOOLER PROTECTOR (SEE PAGE 13–18)

13. REMOVE INTERCOOLER ASSY (SEE PAGE 13–18)

14. REMOVE INTAKE AIR CONNECTOR

(a) Loosen the hose clamp, and disconnect the intake air connector and remove the air hose No.2.

15. REMOVE DIESEL THROTTLE BODY ASSY (SEE PAGE 10–22)

16. REMOVE TIMING BELT NO.1 COVER (SEE PUB. NO. RM990E, PAGE 14–214)

17. REMOVE TIMING BELT (SEE PUB. NO. RM990E, PAGE 14–214)

18. REMOVE VISCOUS W/MAGNET CLUTCH HEATER ASSY (W/ COLD AREA)

(a) Remove the 2 hoses from the viscous heater assy.

(b) Remove the 2 bolts and viscous heater bracket No.2.

(c) Remove the 2 bolts and the viscous heater assy.

19. REMOVE VISCOUS HEATER BRACKET SUB–ASSY (W/ COLD AREA)

(a) Disconnect the connector from the cooler compressor.

(b) Remove the 4 bolts and cooler compressor assy.

HINT:

It is not necessary to remove the hose from the cooler compressor assy when you remove the assembly. Also, put and hang the removed cooler compressor to an appropriate location of the vehicle with a rope for the following removal process.

(c) Remove the 4 bolts and viscous heater bracket.

20. REMOVE VENTILATION PIPE

(a) Remove the bolt and ventilation pipe.

21. REMOVE OIL LEVEL GAUGE GUIDE

(a) Remove the oil level gauge first, and the oil level gauge guide as well.

22. REMOVE TURBOCHARGER SUB–ASSY

(a) Remove the 3 bolts and turbo insulator No.1.

(b) Remove the 3 bolts and exhaust manifold heat insulator.

(c) Remove the 3 nuts and exhaust manifold together with the turbocharger.

23. REMOVE CYLINDER HEAD COVER SUB–ASSY NO.2 (SEE PAGE 14–218)

24. REMOVE OIL FILTER SUB–ASSY (SEE PUB. NO. RM990E, PAGE 17–79)

25. REMOVE FUEL INLET PIPE SUB–ASSY (SEE PAGE 11–67)

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26. REMOVE INJECTION PIPE (SEE PAGE 11–52)

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27. REMOVE VANE PUMP OIL RESERVOIR ASSY

(a) Remove the 3 bolts and vane pump oil reservoir assy.

HINT:

It is necessary to remove the hose from the vane pump oil reservoir assy when you remove that assembly. Also, for the following removal process, put and hang the removed oil reservoir assy with a rope to an appropriate location of the vehicle.

28. DISCONNECT FUEL HOSE

29. SEPARATE HEATER WATER OUTLET HOSE A(FROM HEATER UNIT)

30. SEPARATE HEATER WATER OUTLET HOSE C (W/ COLD AREA)

31. SEPARATE WATER BY–PASS HOSE (W/ COLD AREA)

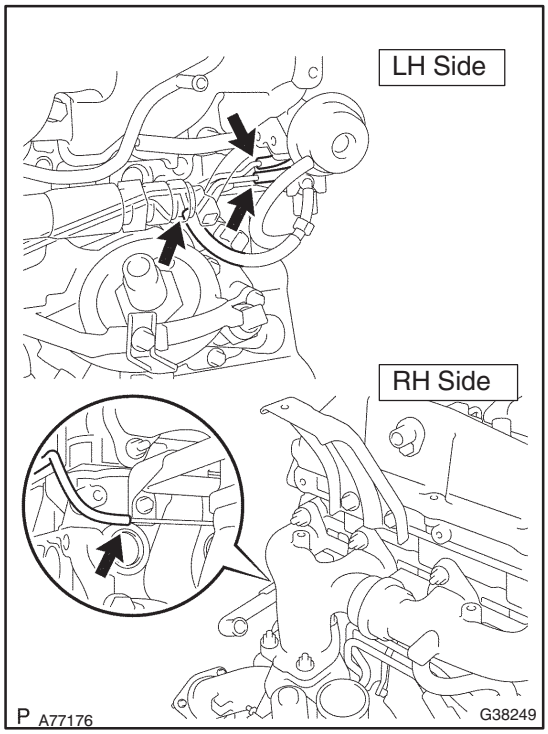
32. SEPARATE WATER BY–PASS HOSE NO.4

33. REMOVE CYLINDER HEAD COVER SUB–ASSY (SEE PAGE 11–52)

34. REMOVE CAMSHAFT TIMING PULLEY (SEE PAGE 14–218)

35. REMOVE TIMING BELT IDLER SUB–ASSY NO.1 (SEE PAGE 14–218)

36. REMOVE TIMING BELT NO.2 COVER (SEE PAGE 14–218)



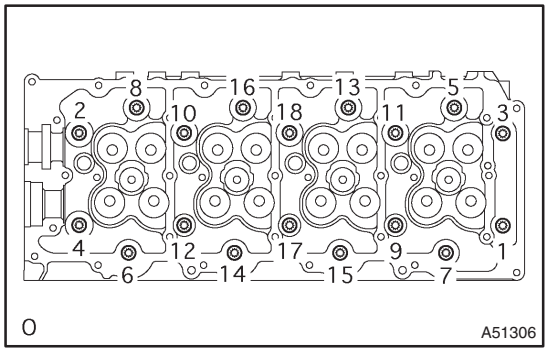
37. SEPARATE VACUUM HOSES

(a) Disconnect the 4 vacuum hoses as shown in the illustration.

38. DISCONNECT WIRE HARNESS

39. REMOVE INJECTOR ASSY (SEE PAGE 11–52)

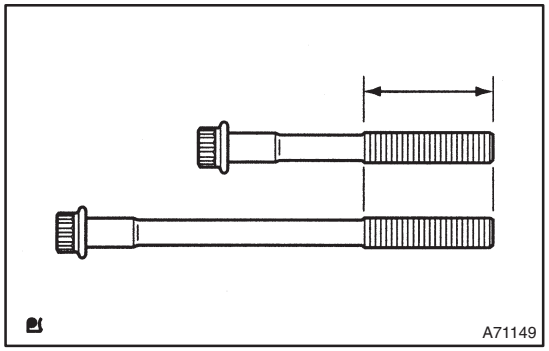
40. REMOVE CAMSHAFT (SEE PAGE 14–218)



41. REMOVE CYLINDER HEAD SUB–ASSY

(a) Loosen the cylinder head bolts equally and gradually in the order shown in the illustration to remove them and the washers.

42. REMOVE CYLINDER HEAD GASKET

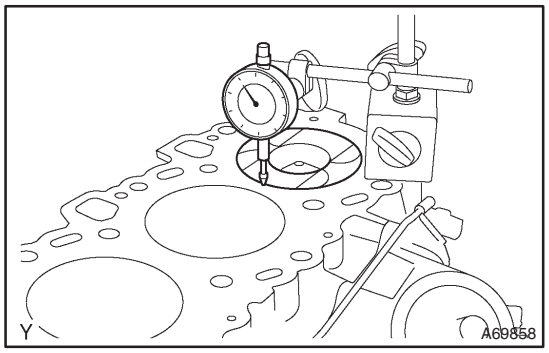


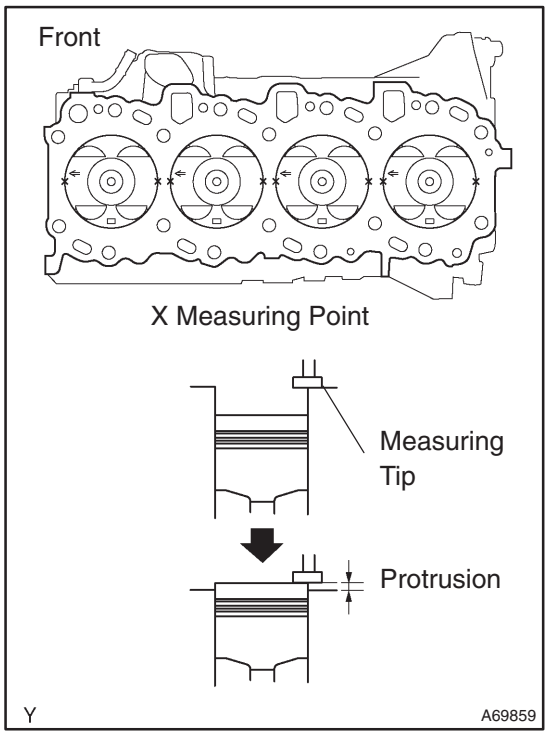
43. INSPECT CYLINDER HEAD SET BOLT

(a) Measure the outer diameter within the specified area shown in the illustration using a vernier caliper.

Standard outer diameter:
11.76 to 11.97 mm (0.463 to 0.471 in.)
Minimum outer diameter: 11.60 mm (0.457 in.)

HINT:
Measure the diameter at several locations within the specified area, and replace the bolt with a new one if a result value would be less than the minimum diameter value.





44. INSTALL CYLINDER HEAD GASKET

(a) Check each piston head protrusion.

(1) Using a dial indicator, measure the amount of each piston head protrusion, between the top surfaces of each cylinder head and piston head.

NOTICE:

Set the dial indicator in an upright position to the cylinder block.

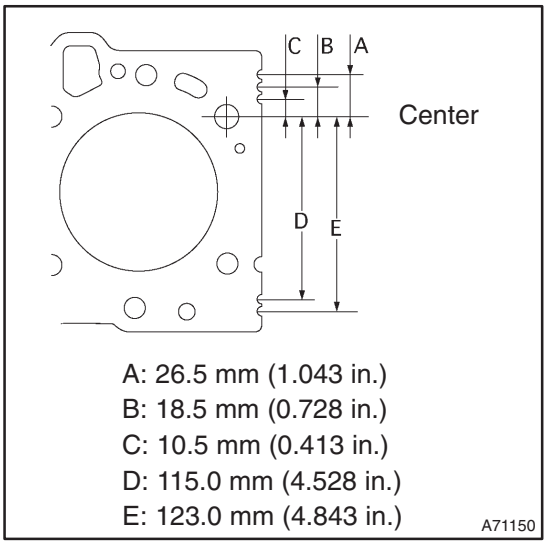
(2) Perform the measurement at 2 places for each cylinder as shown in the illustration, making a total of 8 measurements.

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

Protrusion: 0.005 to 0.255 mm (0.00020 to 0.01004 in.)

HINT:

Measurement should be done at 2 locations, right and left sides of each piston head.



(b) Select an appropriate cylinder head gasket.

HINT:

Each cylinder head gasket A to E has a unique notch position at its back–end, which helps you to identify an individual gasket.

(1) Find the maximum value among all the measured piston head protrusion length to select an appropriate cylinder head gasket from A to E.

Gasket size	Piston protrusion mm (in.)
A	0.005 to 0.054 (0.0002 to 0.00213)
B	0.055 to 0.104 (0.00217 to 0.00409)
C	0.105 to 0.154 (0.00413 to 0.00606)
D	0.155 to 0.204 (0.00610 to 0.00803)
E	0.205 to 0.255 (0.00807 to 0.01004)

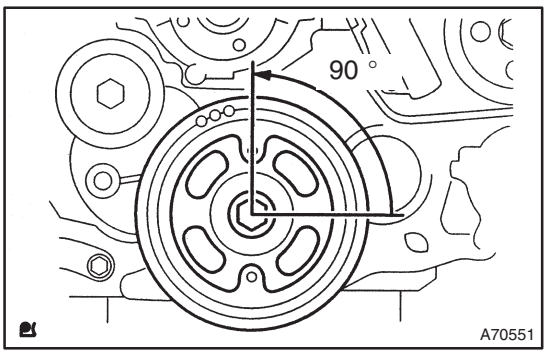
Cylinder head gasket thickness:

Gasket size	Gasket thickness mm (in.)
A	0.80 to 0.90 (0.0315 to 0.0354)
B	0.85 to 0.95 (0.0335 to 0.0374)
C	0.90 to 1.00 (0.0354 to 0.0394)
D	0.95 to 1.05 (0.0374 to 0.0413)
E	1.00 to 1.10 (0.0394 to 0.0433)

(2) Install the selected gasket to the cylinder block.

NOTICE:

Clean the top surface of the cylinder block and the underside of the cylinder head.



45. INSTALL CYLINDER HEAD SUB–ASSY

(a) Set the crankshaft at 90° position in a counterclockwise direction from the TDC.

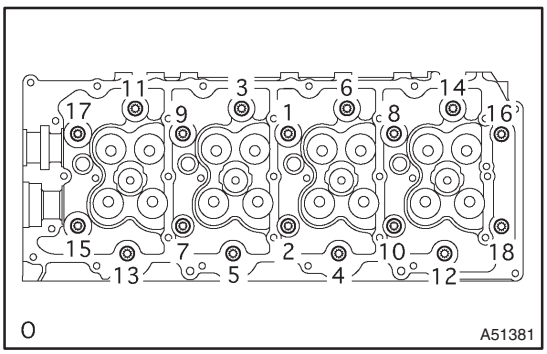
(b) Set a new cylinder head gasket and install the cylinder head.

HINT:

Temporarily set a new gasket to the turbocharger before installing the cylinder head.

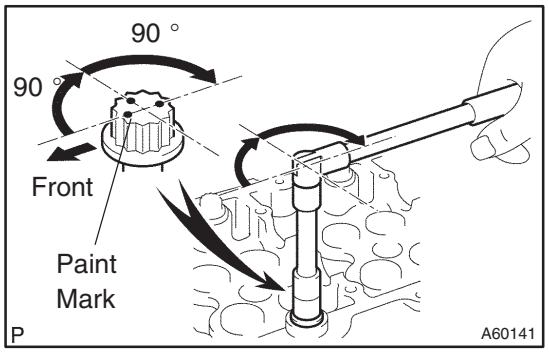
(c) Apply a small amount of engine oil to each cylinder head bolt, screw, and washer.

(d) Set the washers to the cylinder head bolts, and insert the bolts to the cylinder head.



(e) Tighten the cylinder head bolts equally in the specific order shown in the illustration in several steps, and then tighten them with the specified torque completely.

Torque: 85 N·m (867 kgf·cm, 63 ft·lbf)



(f) Mark a dot as paint mark on the top surface of the cylinder bolt head in the engine front direction.

(g) Tighten each cylinder head bolt by 90°.

HINT:

The cylinder head bolts must be tightened in the specified order.

(h) Tighten the bolts by additional 90°.

(i) Make sure that all the paint marks come toward the opposite side to the engine front.

46. INSTALL CAMSHAFT (SEE PAGE 14–218)

47. INSTALL INJECTOR ASSY (SEE PAGE 11–52)

48. INSPECT CHECK FOR FUEL LEAKS (SEE PAGE 11–46)

SST 09280–00010, 09992–00242

49. CONNECT WIRE HARNESS

50. CONNECT VACUUM HOSES

51. INSTALL TIMING BELT NO.2 COVER (SEE PAGE 14–218)

52. INSTALL TIMING BELT IDLER SUB–ASSY NO.1 (SEE PAGE 14–218)

53. INSTALL CAMSHAFT TIMING PULLEY (SEE PAGE 14–218)

54. INSTALL CYLINDER HEAD COVER SUB–ASSY (SEE PAGE 11–52)

55. CONNECT WATER BY–PASS HOSE NO.4

56. CONNECT WATER BY–PASS HOSE (W/ COLD AREA)

57. CONNECT HEATER WATER OUTLET HOSE C (W/ COLD AREA)

58. CONNECT HEATER WATER OUTLET HOSE A(FROM HEATER UNIT)

59. INSTALL FUEL HOSE

60. INSTALL VANE PUMP OIL RESERVOIR ASSY

(a) Install the vane pump oil reservoir assy with the 3 bolts.

Torque: 18 N·m (184 kgf·cm, 13 ft·lbf)

61. INSTALL INJECTION PIPE (SEE PAGE 11–52)

SST 09023–12701

62. INSTALL FUEL INLET PIPE SUB–ASSY (SEE PAGE 11–63)

NOTICE:

Replace the fuel inlet pipe assy with a new one when replacing the cylinder head gasket.

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63. INSTALL OIL FILTER SUB–ASSY (SEE PUB. NO. RM990E, PAGE 17–79)

64. INSTALL CYLINDER HEAD COVER SUB–ASSY NO.2 (SEE PAGE 14–218)

65. INSTALL TURBOCHARGER SUB–ASSY

(a) Set a new gasket, and install the exhaust manifold and turbocharger with the 3 nuts.

Torque: 52 N·m (530 kgf·cm, 38 ft·lbf)

(b) Install the exhaust manifold heat insulator with the 3 bolts.

Torque: 12 N·m (122 kgf·cm, 9 ft·lbf)

(c) Install the turbo insulator No.1 with the 3 bolts.

Torque: 12 N·m (122 kgf·cm, 9 ft·lbf)

66. INSTALL OIL LEVEL GAUGE GUIDE

(a) Install a new O–ring to the oil level gauge guide.

(b) Install the oil level gauge guide with the bolt.

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

67. INSTALL VENTILATION PIPE

(a) Install the ventilation pipe with the bolt.

Torque: 20 N·m (204 kgf·cm, 15 ft·lbf)

68. INSTALL VISCOUS HEATER BRACKET SUB–ASSY (W/ COLD AREA)

(a) Install the viscous heater bracket with the 4 bolts.
Torque: 45 N·m (459 kgf·cm, 33 ft·lbf)

(b) Install the cooler compressor assy with the 4 bolts.
Torque: 25 N·m (250 kgf·cm, 18 ft·lbf)

(c) Connect the connector to the cooler compressor assy.

69. INSTALL VISCOUS W/MAGNET CLUTCH HEATER ASSY (W/ COLD AREA)

(a) Install the viscous heater assy with the 2 bolts.
Torque: 45 N·m (459 kgf·cm, 33 ft·lbf)

(b) Install the viscous heater bracket No.2 with the 2 bolts.
Torque: 25 N·m (250 kgf·cm, 18 ft·lbf)

70. INSTALL TIMING BELT (SEE PUB. NO. RM990E, PAGE 14–214)

71. INSTALL TIMING BELT NO.1 COVER

(a) Install the timing belt cover No.1 with the 6 bolts.
Torque: 6.0 N·m (61 kgf·cm, 53 in.·lbf)

(b) Install the wire harness clamp.

(c) Install the water hose clamp with the bolt.
Torque: 18 N·m (184 kgf·cm, 13 ft·lbf)

72. INSTALL DIESEL THROTTLE BODY ASSY (SEE PAGE 10–22)

73. INSTALL INTAKE AIR CONNECTOR

(a) Connect the intake air connector, and install a new air hose No.2.

(b) Fasten the hose clamp.

74. INSTALL INTERCOOLER ASSY (SEE PAGE 13–18)

75. INSTALL INTERCOOLER PROTECTOR

(a) Install the intercooler protector with the 5 bolts.
Torque: 7.0 N·m (71 kgf·cm, 62 in.·lbf)

76. INSTALL FAN PULLEY

77. INSTALL FAN SHROUD

(a) Temporarily place the fan shroud together with the fan with fluid coupling assy to the correct location inside the engine room first.

(b) Install the fan shroud to the radiator with the 2 bolts.
Torque: 5.0 N·m (51 kgf·cm, 44 in.·lbf)

(c) Install the fan with fluid coupling assy to the water pump with the 4 nuts.
Torque: 18 N·m (184 kgf·cm, 13 ft·lbf)

(d) Install the oil cooler inlet hose and outlet hose to the hose clamp. (AUTOMATIC TRANSMISSION)

78. INSTALL FAN AND GENERATOR V BELT (SEE PUB. NO. RM990E, PAGE 14–189)

79. INSTALL RADIATOR HOSE NO.1

80. INSTALL RADIATOR RESERVE TANK ASSY

(a) Install the radiator reserve tank with the 3 bolts.
Torque: 5.0 N·m (51 kgf·cm, 44 in.·lbf)

(b) Install the radiator reserve tank hose.

81. INSTALL WIRE HARNESS (W/ COLD AREA)

(a) Install the wire harness to the fan shroud.

82. INSTALL RADIATOR SUPPORT SEAL UPPER

(a) Install the radiator support seal upper with the 11 clips.

83. INSTALL AIR CLEANER ASSY

(a) Install the air cleaner case sub–assy with the 3 bolts.
Torque: 12 N·m (122 kgf·cm, 9 ft·lbf)

(b) Install the air cleaner filter element and air cleaner cap with air cleaner hose No.1.

(c) Connect the mass air flow meter S/A and install the wire harness.

84. ADD ENGINE COOLANT (SEE PUB. NO. RM990E, PAGE 16–50)
85. CHECK FOR ENGINE COOLANT LEAKS
86. CHECK FOR FUEL LEAKS (SEE PAGE 11–46)
87. CHECK FOR EXHAUST GAS LEAKS
88. INSTALL ENGINE UNDER COVER ASSY REAR
(a) Install the engine under cover rear with the 4 bolts.
Torque: 29 N·m (296 kgf·cm, 21 ft·lbf)
89. INSTALL ENGINE UNDER COVER SUB–ASSY NO.1
(a) Install the engine under cover No.1 with the 4 bolts.
Torque: 29 N·m (296 kgf·cm, 21 ft·lbf)