170C2–01

REPLACEMENT

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

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

2. REMOVE ENGINE UNDER COVER ASSY REAR

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

3. DRAIN COOLANT (See page 16–50)

4. DRAIN ENGINE OIL

5. REMOVE AIR CLEANER ASSY

(a) Disconnect the intake 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.

6. REMOVE RADIATOR ASSY (See page 16–55)

7. REMOVE FAN SHROUD

8. REMOVE FAN AND GENERATOR V BELT (See page 14–189)

HINT:

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

9. REMOVE FAN W/ FLUID COUPLING

(a) Remove the 4 nuts and fan w/ fluid coupling.

10. REMOVE FAN PULLEY

11. REMOVE INTERCOOLER PROTECTOR (See page 13–30)

12. REMOVE INTERCOOLER ASSY (See page 10–31)

13. REMOVE AIR HOSE NO.1

14. REMOVE VACUUM SWITCHING VALVE ASSY NO.1 (See page 10–31)

15. REMOVE DIESEL THROTTLE BODY ASSY (See page 10–31)

16. REMOVE TIMING BELT NO.1 COVER (See page 14–214)

17. REMOVE TIMING BELT (See page 14–214)

18. REMOVE COMPRESSOR AND MAGNETIC CLUTCH (W/ AIR CONDITIONING)

(a) Disconnect the connector, and remove the 4 bolts and cooler compressor assy w/ magnet clutch assy.

HINT:

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

19. REMOVE GENERATOR ASSY (See page 19–40)

20. REMOVE IDLE PULLEY ASSY (See page 13–23)

21. REMOVE COMPRESSOR MOUNTING BRACKET NO.1 (See page 13–23)

22. REMOVE GENERATOR BRACKET

(a) Remove the bolt and alternator bracket.

23. REMOVE WATER PUMP ASSY (See page 16–47)

24. REMOVE CYLINDER HEAD COVER SUB–ASSY NO.2 (See page 14–223)

25. REMOVE FUEL INLET PIPE SUB–ASSY (See page 11–122)

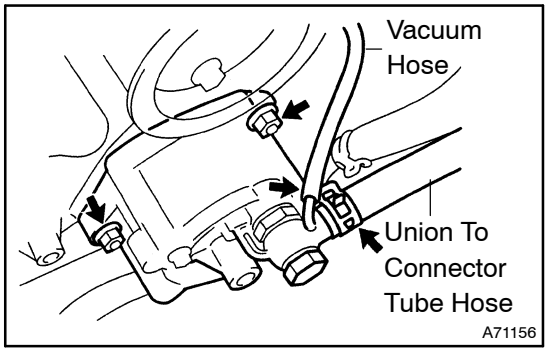
26. REMOVE INJECTION PIPE (See page 11–106)

27. REMOVE CYLINDER HEAD COVER SUB–ASSY (See page 11–106)

28. REMOVE CAMSHAFT TIMING PULLEY (See page 14–223)

29. REMOVE TIMING BELT IDLER SUB–ASSY NO.1 (See page 14–223)

30. REMOVE TIMING BELT NO.2 COVER (See page 14–223)



31. REMOVE VACUUM PUMP ASSY

(a) Remove the vacuum hose.

(b) Remove the union–to–connector tube hose (w/ VSC).

(c) Remove the 2 nuts, vacuum pump assy and the 2 O–rings.

32. REMOVE VANE PUMP OIL RESERVOIR ASSY

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

HINT:

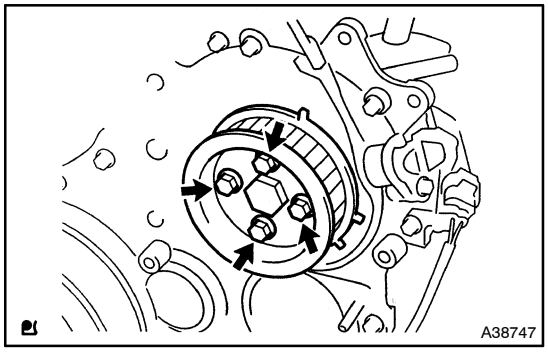
It is not necessary that remove the hose from the vane pump oil reservoir assy when you remove that assembly. Also, for your work in the rest of the following removal process, you may put and hang the removed oil reservoir assy with a rope to an appropriate location of the vehicle.

33. REMOVE VANE PUMP ASSY

(a) Remove the 2 nuts, vane pump assy and its O–ring.

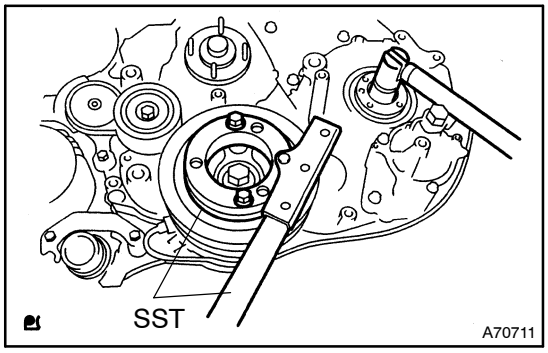
HINT:

It is not necessary that remove the hose from the vane pump assy when you remove that assembly. Also, for your work in the rest of the following removal process, you may move the removed assembly aside to an appropriate location.



34. REMOVE PUMP DRIVE SHAFT PULLEY

(a) Remove the 4 bolts, camshaft timing pulley flange No. 2 and pump drive shaft pulley.



(b) With holding the crankshaft using SST, remove the nut and O–ring.

SST 09213–58013, 09330–00021

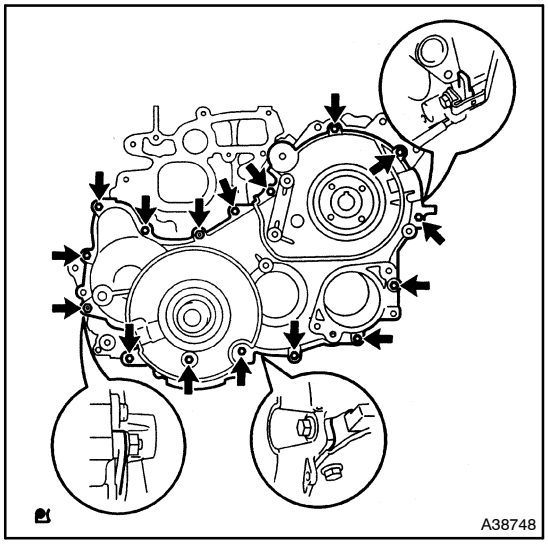
35. REMOVE CRANKSHAFT PULLEY (See page 14–244)

36. REMOVE CRANK POSITION SENSOR

(a) Disconnect the crank position sensor connector, and then remove the bolt and crank position sensor.

37. REMOVE CRANK POSITION NO.2 SENSOR

(a) Disconnect the crank position No. 2 connector, and remove the bolt and crank position No. 2 sensor.



38. REMOVE TIMING GEAR CASE

(a) Remove the wire harness clamp.

(b) Remove the 14 bolts and 2 nuts.

(c) Separate its cover from the timing gear case softly using a slotted screwdriver.

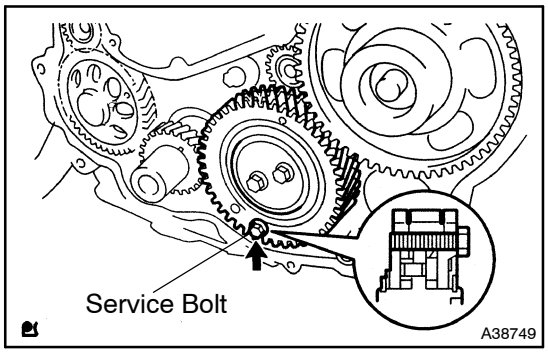
HINT:

There are some tiny slots that allow you to insert the slotted screwdriver tip for separating the timing gear case and its cover. Refer to the illustration for these slot locations.

(d) Remove the case cover and O–ring.

CAUTION:

Beware making damages to each jointing face of timing gear case and its cover in the mention above separating and removing steps.



39. FIX IDLE GEAR NO.1

(a) Fix the sub idle gears to the idle gear No. 1 with the service bolt.

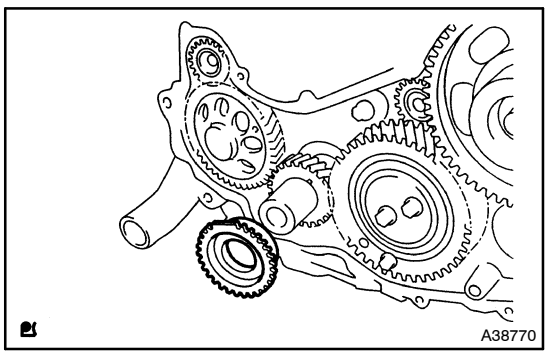
Torque: 8 N·m (82 kgf·cm, 71 in.·lbf)

HINT:

This is for eliminating a torsional force caused by the idle gear springs (which are set in between the idle gear No. 1 and each sub idle gear). Because of sub idle gear's tooth will be out of alignment from the gear tooth of the idle gear No. 1 by such a torsional force.

NOTICE:

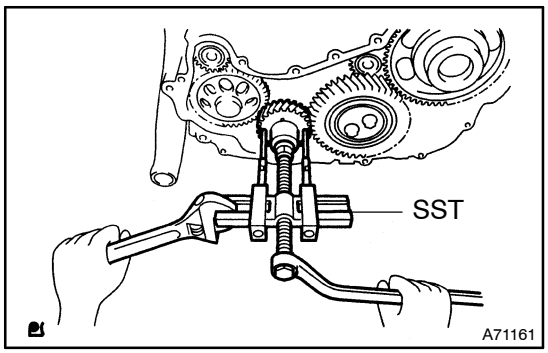
If a screw hole of the rear sub idle gear is not at a correct position, make it correction by rotating the crankshaft in counterclockwise direction, and then screw the service bolt.



40. REMOVE CRANKSHAFT TIMING GEAR OR SPROCKET

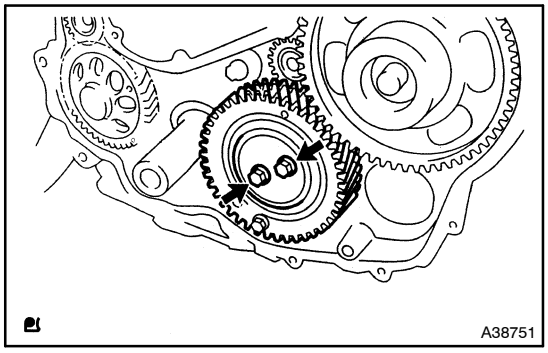
(a) Remove the crankshaft sensor plate No. 1.

(b) Install the service bolt to the crankshaft.



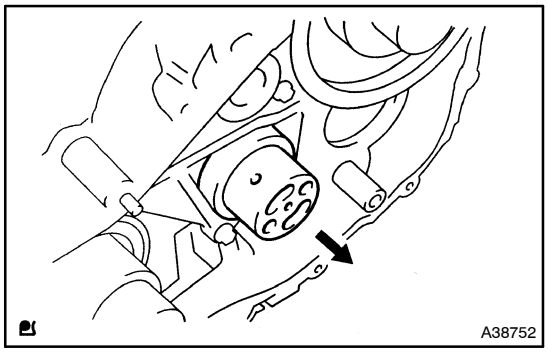
(c) Remove the crankshaft timing gear with SST.

SST 09950–50013 (09951–05010, 09952–05010, 09953–05020, 09954–05010)

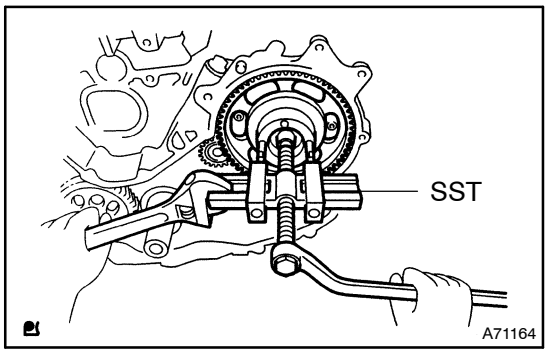


41. REMOVE IDLE GEAR NO.1

(a) Remove the 2 bolts, idle gear thrust plate and idle gear No. 1.



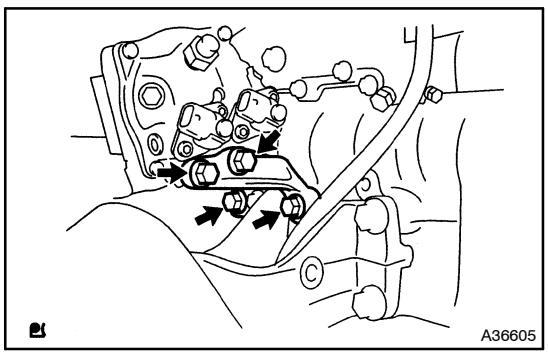
(b) Remove the idle gear shaft No. 1.



42. REMOVE INJECTION GEAR

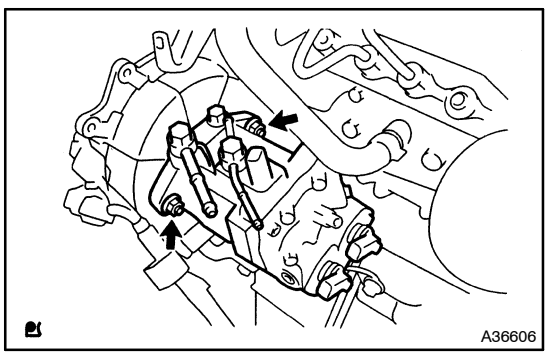
(a) Remove the injection gear with SST.

SST 09950–50013 (09951–05010, 09952–05010, 09953–05020, 09954–05021)



43. REMOVE INJECTION OR SUPPLY PUMP ASSY

(a) Remove the 4 bolts and injection pump stay.



(b) Remove the 2 nuts, supply pump assy and its O–ring.

44. REMOVE DIFFERENTIAL CARRIER ASSY FRONT (See page 29–13)

45. REMOVE TRANSMISSION ASSY

HINT:

M/T TRANSMISSION (R150F)... See page 41–13

A/T TRANSMISSION (A343F)... See page 40–33

46. REMOVE CLUTCH DISC ASSY (M/T TRANSMISSION) (See page 42–15)

47. REMOVE FLYWHEEL SUB–ASSY (See page 14–247)

48. REMOVE REAR END PLATE

(a) Remove the bolt and rear end plate.

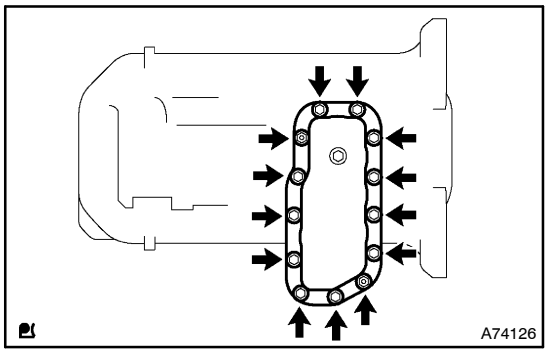
49. REMOVE OIL COOLER INLET TUBE NO.1 (A/T TRANSMISSION)

50. REMOVE OIL COOLER OUTLET TUBE NO.1 (A/T TRANSMISSION)

51. REMOVE OIL LEVEL GAGE SUB–ASSY

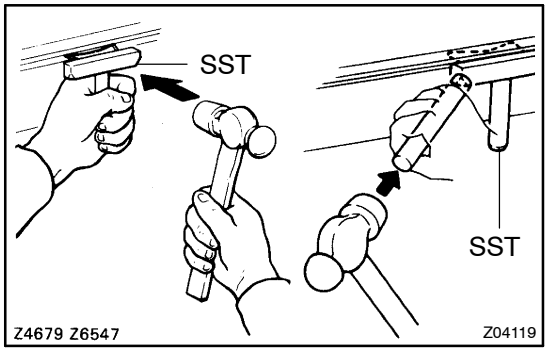
52. REMOVE OIL PAN COVER SUB–ASSY NO.1

(a) Remove the 4 bolts and oil pan cover sub–assy No. 1.

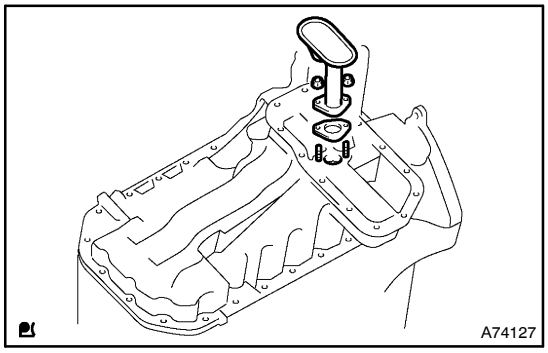


53. REMOVE OIL PAN SUB–ASSY NO.2

(a) Remove the 11 bolts and 2 nuts.



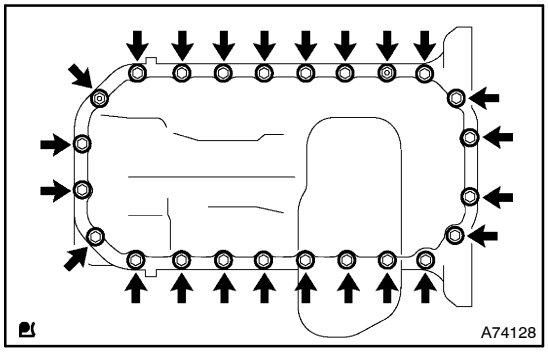
(b) Remove the oil pan No. 2 with SST.
SST 09032–00100



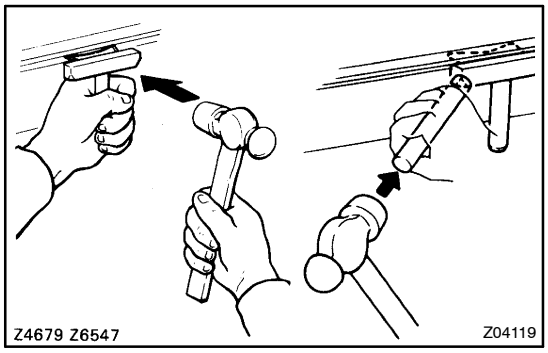
54. REMOVE OIL PAN SUB–ASSY

(a) Disconnect the engine oil level sensor connector.

(b) Remove the 2 nuts, oil strainer and gasket.



(c) Remove the 22 bolts and 2 nuts.

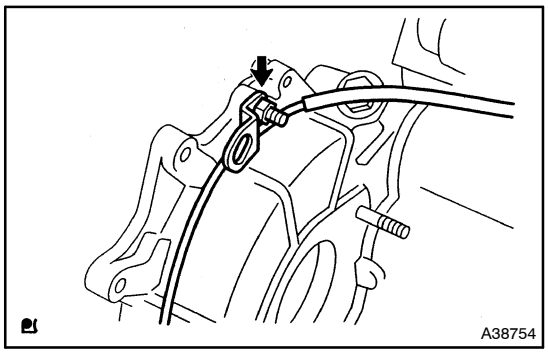


(d) Remove the oil pan sub–assy with SST.
SST 09032–00100

NOTICE:

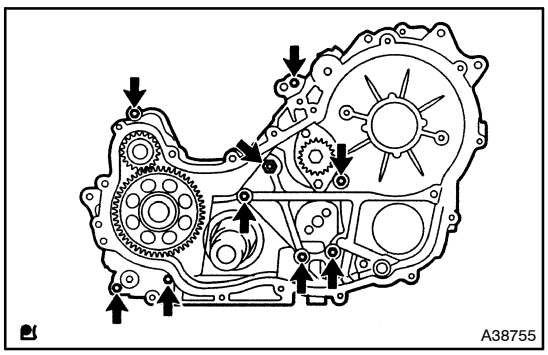
- **Do not use SST for the oil pump body side and rear oil seal retainer.**
- **Be careful not to damage the oil pan flange.**

(e) Remove the oil pan gasket.



55. REMOVE TIMING GEAR CASE ASSY

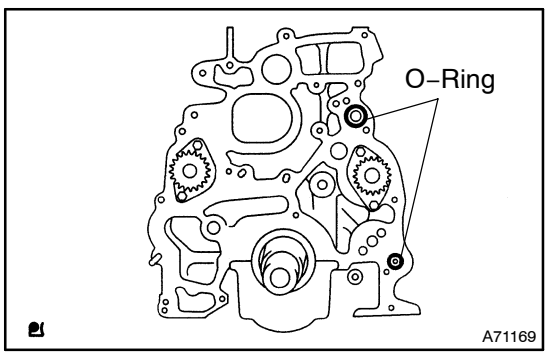
(a) Remove the nut, and remove the vacuum transmitting pipe No. 1.



(b) Remove the 8 bolts and union bolt, and then remove the timing gear case and its 2 O–rings.

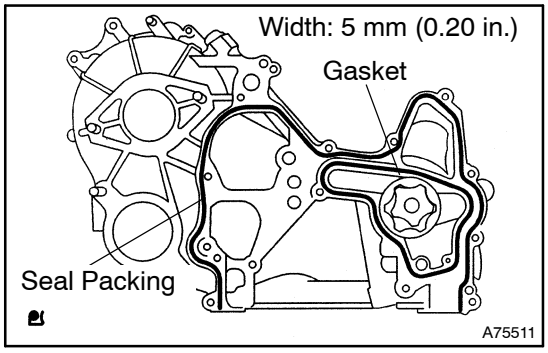
NOTICE:

Beware of dropping the oil pump rotor.



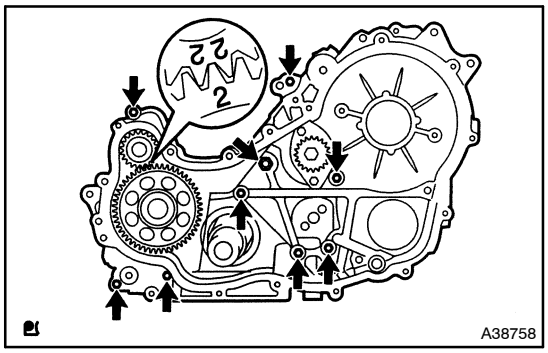
56. INSTALL TIMING GEAR CASE ASSY

(a) Set the 2 O–rings to the cylinder block.



(b) Remove old seal packing (FIPG) from the timing gear case and cylinder block.
(c) Set a new oil pump gasket to the timing gear case.
(d) Apply a seal packing to the specific places described in the illustration.
Seal packing: Part No. 08826–00080 or equivalent

NOTICE:
- **Install the timing gear case within 3 minutes and tighten the bolts within 15 minutes as soon as when applying FIPG is competed.**
- **Do not start the engine 2 hours after the installation.**



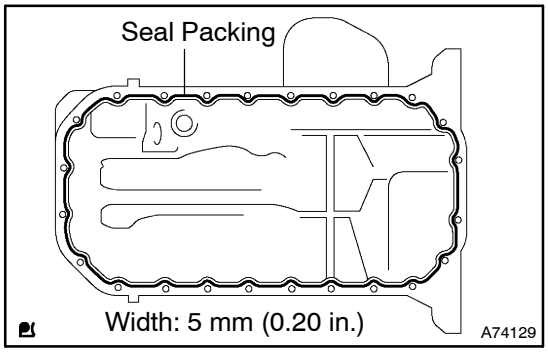
(e) With matching the match marks of the balance shaft driven gear No. 1 and oil pump drive gear, install the timing gear case to the cylinder block.
(f) Tighten the 8 bolts and union bolt.
Torque:
13 N·m (130 kgf·cm, 9 ft·lbf) for bolt
16 N·m (160 kgf·cm, 12 ft·lbf) for union bolt
(g) Make sure that the oil pump drive gear rotates smoothly.

NOTICE:
If this failed, loosen the 8 bolts and union bolt to release the oil pump drive gear, and retighten all these bolts again.

(h) Install the vacuum transmitting pipe No. 1 with the nut.
Torque: 8 N·m (82 kgf·cm, 71 in.·lbf)

57. INSTALL OIL PAN SUB–ASSY

(a) Remove old seal packing (FIPG) from the oil pan sub–assy and cylinder block.



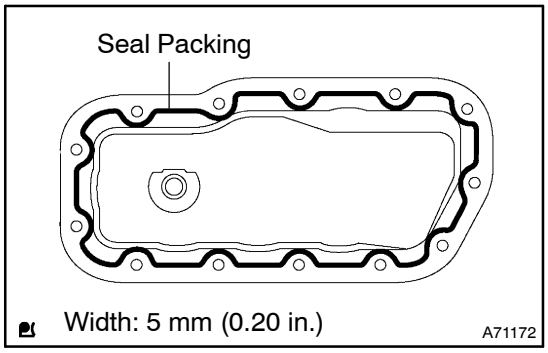
(b) Apply a seal packing to the specific places described in the illustration.
Seal pacing: Part No. 08826–00080 or equivalent

NOTICE:
- **Install the oil pan within 3 minutes and tighten its bolts within 15 minutes as soon as when applying FIPG is competed.**
- **Do not start the engine 2 hours after the installation.**

(c) Set a new oil pan gasket to the oil pan sub–assy.
(d) Install the oil pan with the 22 bolts and 2 nuts.
Torque: 15 N·m (148 kgf·cm, 11 ft·lbf)
(e) Set a new gasket, and install the oil strainer with 2 nuts.
Torque: 8 N·m (82 kgf·cm, 71 in.·lbf)
(f) Connect the engine oil level sensor connector.

58. INSTALL OIL PAN SUB–ASSY NO.2

(a) Remove old seal packing (FIPG) from the oil pan sub–assy No. 2.



(b) Apply a seal packing to the specific places described in the illustration.
Seal packing: Part No. 08826–00080 or equivalent

NOTICE:

- **Install the oil pan No. 2 within 3 minutes and tighten its bolts and nuts within 15 minutes as soon as when applying FIPG is competed.**
- **Do not start the engine 2 hours after the installation.**

(c) Install the oil pan No. 2 with the 11 bolts and 2 nuts.
Torque: 9 N·m (92 kgf·cm, 80 in.·lbf)

59. INSTALL OIL PAN COVER SUB–ASSY NO.1

(a) Install the oil pan cover sub–assy with the 4 bolts.
Torque: 9 N·m (92 kgf·cm, 80 in.·lbf)

60. INSTALL REAR END PLATE

(a) Install the rear end plate with the bolt.
Torque: 8 N·m (82 kgf·cm, 71 in.·lbf)

61. INSTALL FLYWHEEL SUB–ASSY (See page 14–247)

62. INSTALL CLUTCH DISC ASSY (M/T TRANSMISSION) (See page 42–15)

63. INSTALL OIL COOLER OUTLET TUBE NO.1 (A/T TRANSMISSION)

64. INSTALL OIL COOLER INLET TUBE NO.1 (A/T TRANSMISSION)

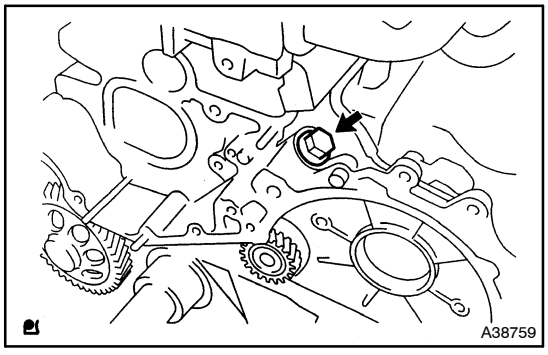
65. INSTALL TRANSMISSION ASSY

HINT:

M/T TRANSMISSION (R150F)... See page 41–13

A/T TRANSMISSION (A343F)... See page 40–33

66. INSTALL DIFFERENTIAL CARRIER ASSY FRONT (See page 29–13)



67. INSTALL INJECTION OR SUPPLY PUMP ASSY

(a) Remove the plug shown in the illustration, and then pour engine oil with 50 cc (3.05 cut in) into there.

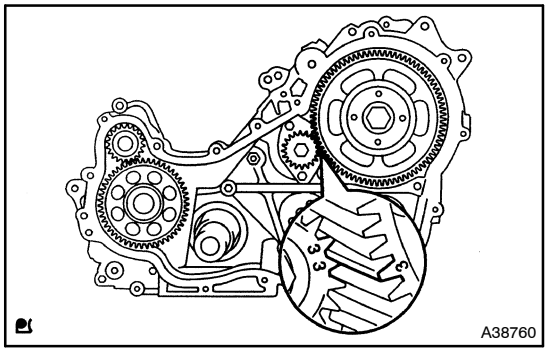
(b) Set a new gasket and reset the plug.
Torque: 44 N·m (449 kgf·cm, 33 ft·lbf)

(c) Set a new O–ring to the supply pump.

(d) Temporarily install the supply pump with the 2 nuts and supply pump stay with the 4 bolts.

(e) Tighten the 2 nuts for the supply pump.
Torque: 21 N·m (214 kgf·cm, 16 ft·lbf)

(f) Tighten the 2 bolts for the pump stay at the pump side first, and then rest the 2 bolts at cylinder block side likewise.
Torque: 21 N·m (214 kgf·cm, 16 ft·lbf)



68. INSTALL INJECTION GEAR

(a) With matching the match marks of the injection gear and balance shaft driven gear No. 2, install the injection gear.

NOTICE:

Fit a key (protrusion) of the supply pump to its key–slot of the injection gear.

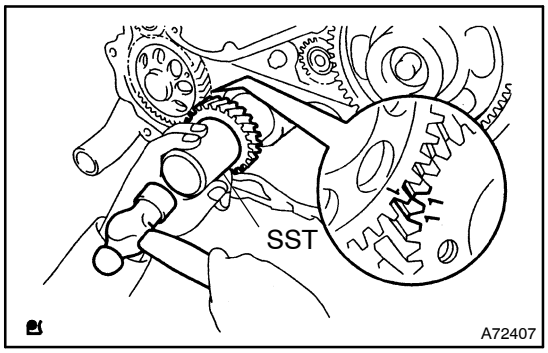
(b) Set a new O–ring, and then temporarily install the nut. Under this condition, check a thrust clearance for the supply pump drive shaft by pushing the injection gear in back and forth direction with your hand.

Thrust clearance:

0.15 – 0.55 mm (0.0059 – 0.0217 in.)

HINT:

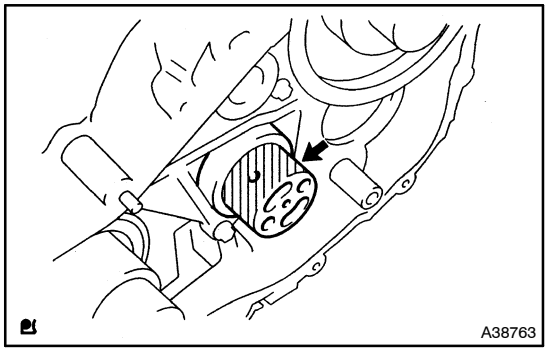
If there is no thrust clearance, remove the injection gear again and re–install it.



69. INSTALL CRANKSHAFT TIMING GEAR OR SPROCKET

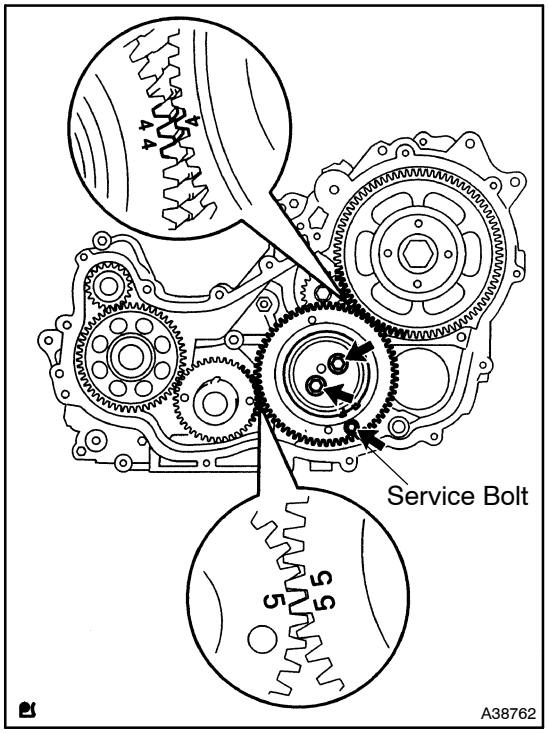
(a) With matching the match marks of the crankshaft timing gear and oil pump drive gear using SST, install the crankshaft timing gear.

SST 09223–00010



70. INSTALL IDLE GEAR NO.1

(a) Apply engine oil to specific place described in the illustration, install the idle gear shaft No. 1 to the cylinder block.

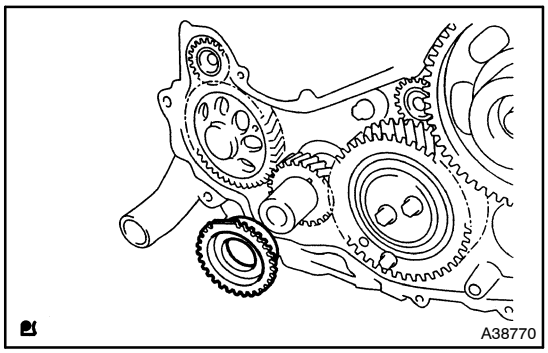


(b) With matching the match marks of the idle gear No. 1 for the match mark of the crankshaft timing gear and injection gear and install the idle gear No. 1.

(c) Fix the idle gear No. 1 with the idle gear thrust plate and 2 bolts.

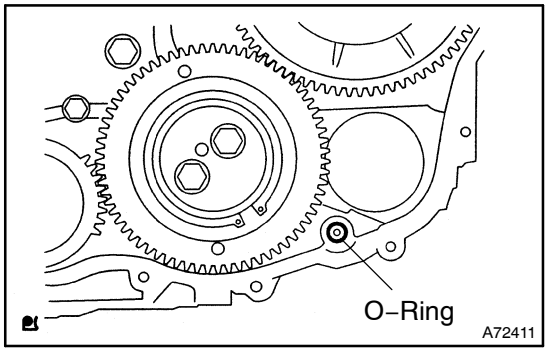
Torque: 50 N·m (510 kgf·cm, 37 ft·lbf)

(d) Remove the service bolt.



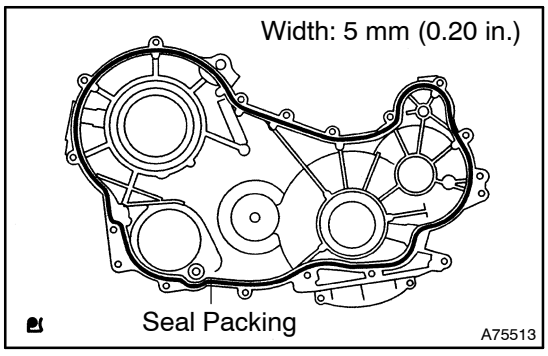
71. INSTALL CRANKSHAFT POSITION SENSOR PLATE NO.1

(a) Install the crank angle sensor plate No. 1.



72. INSTALL TIMING GEAR CASE

(a) Set a new O–ring to the timing gear case.



(b) Remove old seal packing (FIPG) from the timing gear case.

(c) Apply a seal packing to the specific places described in the illustration.

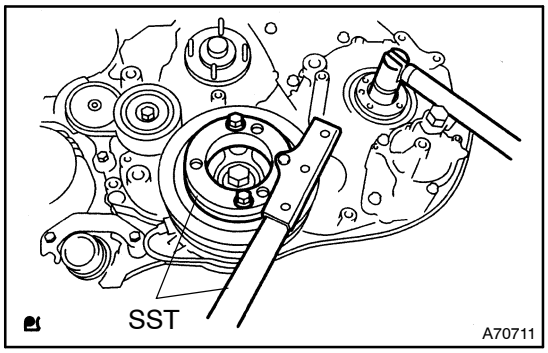
Seal packing: Part No. 08826–00080 or equivalent

NOTICE:

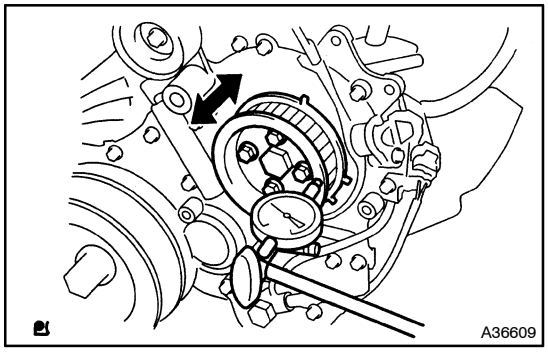
- **Install the timing case cover within 3 minutes and tighten its bolts and nuts within 15 minutes as soon as when applying FIPG is competed.**
- **Do not start the engine 2 hours after the installation.**

(d) Install the timing case cover with the 14 bolts and 2 nuts.
Torque: 13 N·m (133 kgf·cm, 10 ft·lbf)

73. INSTALL CRANK POSITION NO.2 SENSOR
(a) Apply engine oil to the O–ring.
(b) Install the crank position sensor No. 2 with the bolt.
Torque: 8 N·m (82 kgf·cm, 71 in.·lbf)
74. INSTALL CRANK POSITION SENSOR
(a) Apply engine oil to the O–ring.
(b) Install the crank position sensor with the bolt.
Torque: 8 N·m (82 kgf·cm, 71 in.·lbf)
75. INSTALL CRANKSHAFT PULLEY (See page 14–244)



76. INSTALL PUMP DRIVE SHAFT PULLEY
(a) Hold the crankshaft with SST to tighten a nut.
SST 09213–58013, 09330–00021
(b) Set the O–ring, and tighten the nut.
Torque: 103 N·m (1050 kgf·cm, 76 ft·lbf)
(c) Install the camshaft timing pulley flange No. 2 and pump drive shaft pulley with the 4 bolts.
Torque: 31 N·m (316 kgf·cm, 23 ft·lbf)



(d) Check a thrust clearance for the supply pump drive shaft by pushing the camshaft timing pulley flange No. 2 in back and forth direction with your hand.
Thrust clearance: 0.15 – 0.55 mm (0.0059 – 0.0217)

NOTICE:
The notch of the crankshaft pulley must be located at 30 degree in counterclockwise direction from TDC.
HINT:
If there is no thrust clearance, disassemble the parts to remove the timing gear case again, and reassemble them.

77. INSTALL VANE PUMP ASSY
(a) Set a new O–ring, and install the vane pump assy with the 2 nuts.
Torque: 39 N·m (398 kgf·cm, 29 ft·lbf)
78. 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)
79. INSTALL VACUUM PUMP ASSY
(a) Set a new O–ring, and install the vacuum pump assy with the 2 nuts.
Torque: 21 N·m (214 kgf·cm, 16 ft·lbf)
(b) Connect the union to connector tube hose (w/ VSC).
(c) Connect the vacuum hose.
80. INSTALL TIMING BELT NO.2 COVER (See page 14–223)
81. INSTALL TIMING BELT IDLER SUB–ASSY NO.1 (See page 14–223)
82. INSTALL CAMSHAFT TIMING PULLEY (See page 14–223)
83. INSTALL CYLINDER HEAD COVER SUB–ASSY (See page 11–106)

84. INSTALL INJECTION PIPE (See page 11–106)
85. INSTALL FUEL INLET PIPE SUB–ASSY (See page 11–122)
NOTICE:
Replace the fuel inlet pipe to new when replacing the timing gear case assy.
86. INSTALL CYLINDER HEAD COVER SUB–ASSY NO.2 (See page 14–223)
87. INSTALL WATER PUMP ASSY (See page 16–47)
88. INSTALL GENERATOR BRACKET
(a) Temporarily install the alternator bracket with the bolt.
NOTICE:
Tighten that bolt after the alternator assy installation.
89. INSTALL COMPRESSOR MOUNTING BRACKET NO.1 (See page 13–23)
90. INSTALL IDLE PULLEY ASSY (See page 13–23)
91. INSTALL GENERATOR ASSY (See page 19–40)
92. INSTALL COMPRESSOR AND MAGNETIC CLUTCH (W/ AIR CONDITIONING)
(a) Install the cooler compressor assy w/ magnet clutch assy with the 4 bolts.
Torque: 25 N·m (250 kgf·cm, 18 ft·lbf)
93. INSTALL TIMING BELT (See page 14–214)
94. 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)
95. INSTALL DIESEL THROTTLE BODY ASSY (See page 10–31)
96. INSTALL VACUUM SWITCHING VALVE ASSY NO.1 (See page 10–31)
97. INSTALL AIR HOSE NO.1
98. INSTALL INTERCOOLER ASSY (See page 10–31)
99. INSTALL INTERCOOLER PROTECTOR
(a) Install the intercooler protector with the 5 bolts.
Torque: 6.0 N·m (61 kgf·cm, 53 in.·lbf)
100. INSTALL FAN PULLEY
101. INSTALL FAN W/ FLUID COUPLING
(a) Install the fan w/ fluid coupling with the 4 nuts.
Torque: 18 N·m (184 kgf·cm, 13 ft·lbf)
102. INSTALL FAN AND GENERATOR V BELT (See page 14–189)
103. INSTALL FAN SHROUD
(a) Temporarily place the fan shroud at the correct location inside the engine room.
104. INSTALL RADIATOR ASSY (See page 16–55)
105. 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 element.
(c) Install the air cleaner cap with air cleaner hose No. 1.
(d) Connect the intake air flow meter S/A connector, and install the wire harness.
106. ADD ENGINE OIL
107. ADD ENGINE COOLANT (See page 16–50)
108. CHECK FOR ENGINE OIL LEAKS
109. CHECK FOR ENGINE COOLANT LEAKS
110. CHECK FUEL LEAK (See page 11–101)

111. 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)

112. 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)