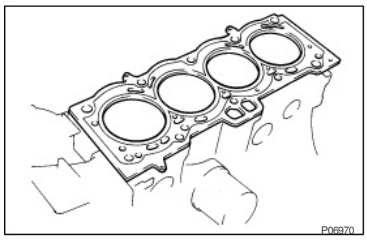


EM1DO-02

INSTALLATION

1. INSTALL CYLINDER HEAD

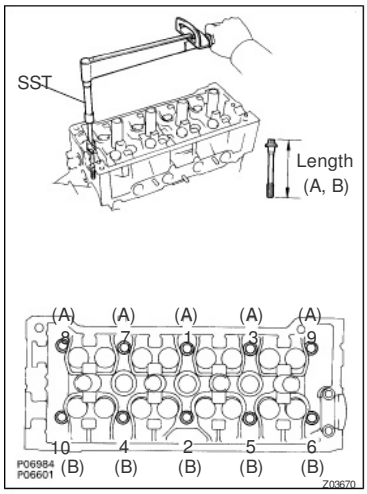
(a) Place cylinder head on cylinder block.

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

NOTICE:

Be careful of the installation direction.

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



(b) Install the cylinder head bolts.

HINT:

- The cylinder head bolts are tightened in 3 progressive steps (steps (b), (d) and (e)).
- If any bolt 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) Using SST, install and uniformly tighten the 10 cylinder head bolts, in several passes, in the sequence shown.

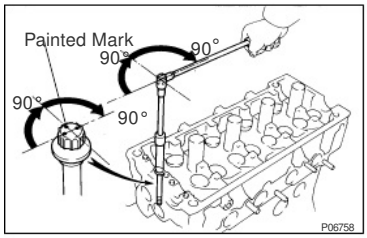
SST 09205-16010

Torque: 29 N·m (300 kgf·cm, 22 ft·lbf)

HINT:

Cylinder head bolts are in lengths of 90 mm (3.54 in.) and 108 mm (4.25 in.). Install the 90 mm (3.54 in.) bolts (A) in intake manifold side positions.

(3) Install the 108 mm (4.25 in.) bolts (B) in exhaust manifold side positions.



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

(5) Retighten the cylinder head bolts by 90° in the numerical order shown on the previous page.

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

(7) Check that the painted mark is now turned to the rear.

2. ASSEMBLE INTAKE CAMSHAFT

(a) Mount the hexagonal wrench head portion of the camshaft in a vise.

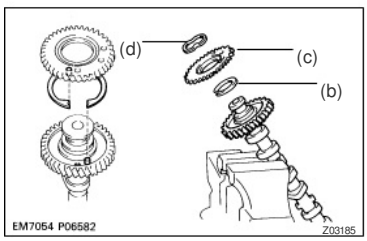
(b) Install the camshaft gear spring.

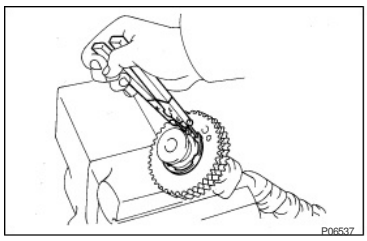
(c) Install the camshaft sub-gear.

(d) Install the wave washer.

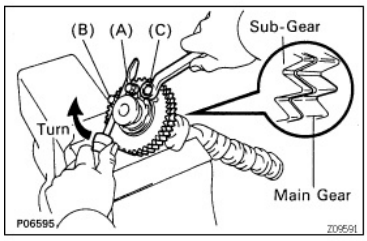
HINT:

Align the pins on the gears with the gear spring ends.





(e) Using snap ring pliers, install the snap ring.

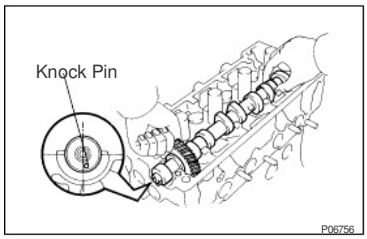


(f) Insert service bolts (A) and (B) into the service hole of the camshaft sub-gear.
(g) Using a screwdriver, align the holes of the camshaft main gear and sub-gear by turning the camshaft sub-gear clockwise, and install service bolt (C).

NOTICE:
Be careful not to damage the camshaft.

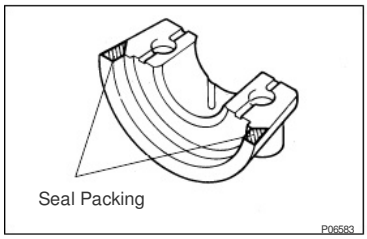
3. INSTALL INTAKE AND EXHAUST CAMSHAFTS

NOTICE:
Since the thrust clearance of the camshaft is small, the camshaft must be kept level while it is being installed. If the camshaft is not kept level, the portion of the cylinder head receiving the shaft thrust may crack or be damaged, causing the camshaft to seize or break. To avoid this, the following steps should be carried out.



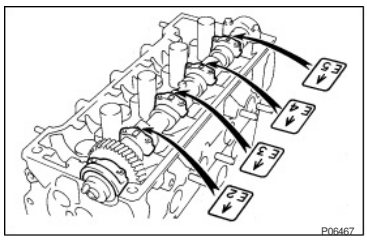
(a) Install the exhaust camshaft
  (1) Apply MP grease to the thrust portion of the camshaft.
  (2) Place the exhaust camshaft so the knock pin is located slightly counterclockwise from the vertical axis of the camshaft.

HINT:
The above angle allows the No.1 and No.3 cylinder cam lobes of the exhaust camshaft to push their valve lifters evenly.

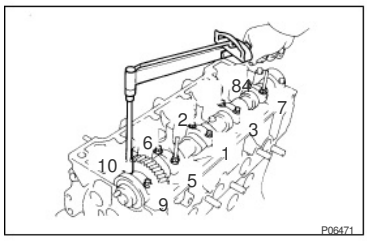


  (3) Remove any old packing (FIPG) material.
  (4) Apply seal packing to the cylinder head as shown in the illustration.

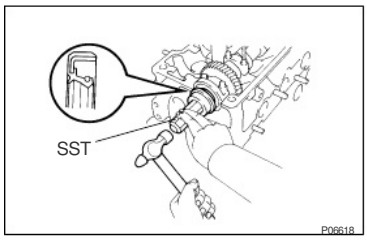
  Seal packing:
  Part No. 08826-00080 or equivalent



(5) Install the 5 bearing caps in their proper locations.



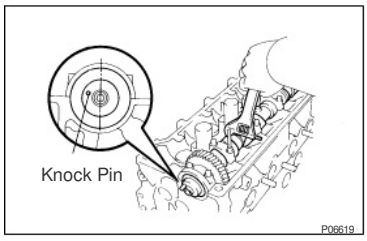
(6) Apply a light coat of engine oil on the threads and under the heads of the bearing cap bolts.
(7) Install and uniformly tighten the 10 bearing cap bolts, in several passes, in the sequence shown.
Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)
(8) Apply MP grease to a new oil seal lip.



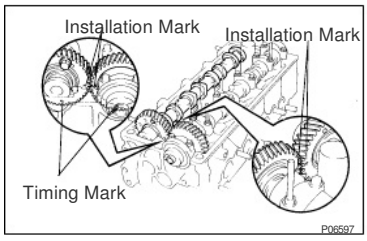
(9) Using SST, tap in the oil seal.
SST 09223-4601 1

HINT:

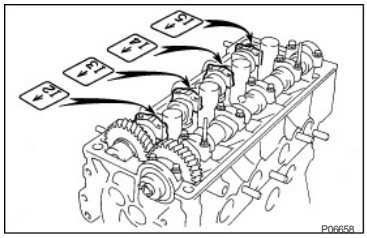
- Do not install the oil seal with the lip facing the wrong direction.
- Insert the oil seal into the deepest part of the cylinder head.



(b) Install the intake camshaft.
(1) Set the exhaust camshaft so that the knock pin is slightly above the top of the cylinder head.



(2) Apply MP grease to the thrust portion of the camshaft.



(3) Engage the intake camshaft gear to the exhaust camshaft gear by matching the assembly installation marks on each gear.

NOTICE:

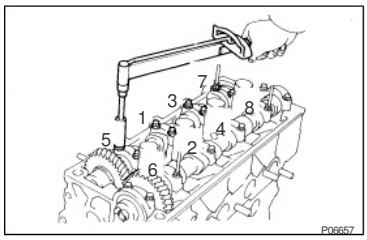
There are also timing marks (for TDC) on each gear as shown in the illustration. Do not use these marks.

(4) Roll down the intake camshaft onto the bearing journals while engaging gears with each other.

HINT:

The above angle allows the No.1 and No.3 cylinder cam lobes of the intake camshaft to push their valve lifters evenly.

(5) Install the 4 bearing caps in their proper locations.



(6) Apply a light coat of engine oil on the threads and under the heads of bearing cap bolts.

(7) Install and uniformly tighten the 8 bearing cap bolts, in several passes, in the sequence shown.

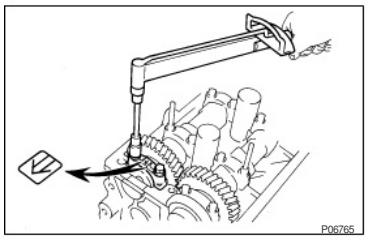
Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)

(8) Remove the service bolt.

(9) Install the No.1 bearing cap with the arrow mark facing forward.

NOTICE:

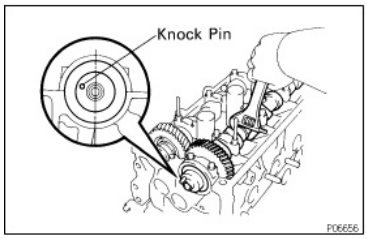
If the No.1 bearing cap does not fit properly, push the camshaft gear backwards by prying apart the cylinder head and camshaft gear with a screwdriver.



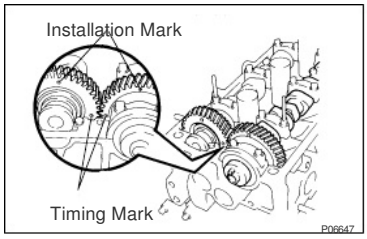
(10) Apply a light coat of engine oil on the threads and under the heads of bearing cap bolts.

(11) Install and alternately tighten the 2 bolts in several passes.

Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)



(12) Turn the exhaust camshaft clockwise, and set it with the knock pin facing upward.



(13) Check that the timing marks of the camshaft gears are aligned.

HINT:

The assembly installation marks are on the upside.

4. CHECK AND ADJUST VALVE CLEARANCE (See page EM-4)

Turn the camshaft and position the cam lobe upward, and check adjust the valve clearance.

Valve clearance (Cold):
Intake
0.15 - 0.25 mm (0.006 - 0.010 in.)
Exhaust
0.25 - 0.35 mm (0.010 - 0.014 in.)

5. INSTALL WATER INLET NO.2

(a) Connect the water inlet to the water inlet hose.
(b) Install the water inlet with the 2 nuts.
Torque:15 N·m (150 kgf·cm, 11 ft·lbf)

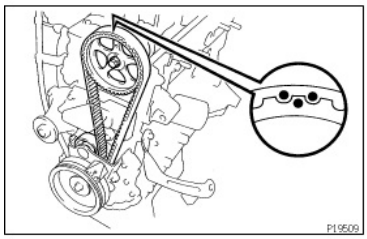
6. INSTALL OIL DIPSTICK GUIDE AND DIPSTICK

(a) Install a new O-ring to the dipstick guide.
(b) Apply a small amount of engine oil to the O-ring.
(c) Push in the dipstick guide together with the dipstick.
(d) Install the dipstick guide and bracket with the bolt.
Torque: 9 N·m (95 kgf·cm, 82 in.·lbf)
(e) Connect the crankshaft position sensor connector to the dipstick guide.

7. INSTALL GENERATOR BRACKET

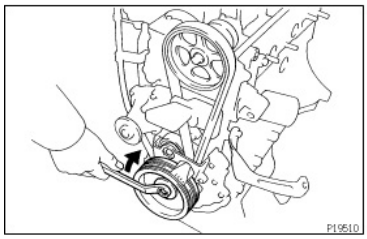
Install the bracket with the 3 bolts.
Torque: 26 N·m (270 kgf·cm, 20 ft·lbf)

8. INSTALL CAMSHAFT TIMING PULLEY (See page EM-25)



9. INSTALL TIMING BELT

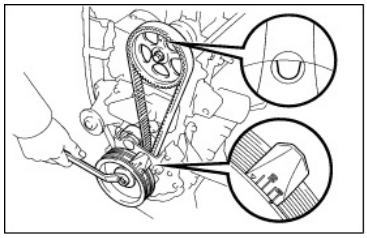
(a) Align the matchmarks of the timing belt and camshaft timing pulley.
(b) Remove any oil or water on the camshaft timing pulley, and keep it clean.
(c) Install the timing belt, checking the tension between the crankshaft timing pulley and camshaft timing pulley.



10. CHECK VALVE TIMING

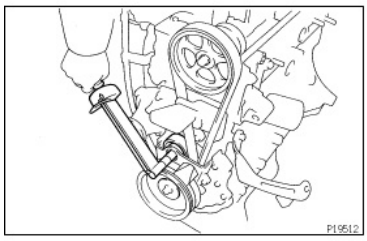
(a) Loosen the idler pulley bolt 1/2 turn.
(b) Turn the crankshaft pulley 2 revolutions from TDC to TDC.

NOTICE:
Always turn the crankshaft clockwise.

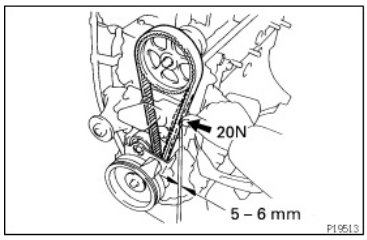


(c) Check that each pulley aligns with the timing marks as shown in the illustration.

If the timing marks do not align, remove the timing belt and reinstall it.



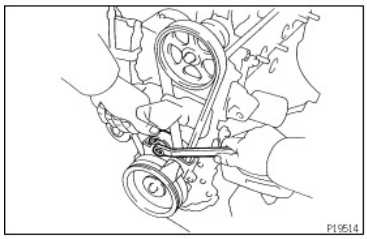
(d) Tighten the idler pulley bolt.
Torque: 37 N·m (375 kgf·cm, 27 ft·lbf)



11. REFERENCE:
INSTALL TIMING BELT DEFLECTION

Check that there is belt tension at the position indicated in the illustration.

Deflection:
At 20 N (2 kgf, 4.4 lbf): 5 - 6 mm (0.20 - 0.24 in.)



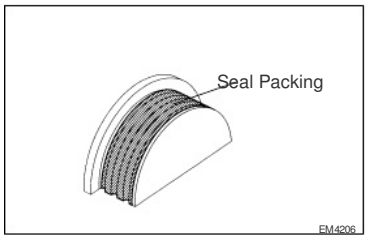
If the deflection is not as specified, adjust with the idler pulley.

12. INSTALL NO.2 AND NO.3 TIMING BELT COVERS

Install the No. 2 and No. 3 timing belt covers with the 6 bolts.

Torque: 7.4 N·m (75 kgf·cm, 65 in.·lbf)

13. INSTALL SPARK PLUGS

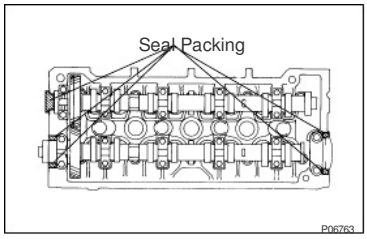


14. INSTALL SEMI-CIRCULAR PLUG

(a) Remove any old packing (FIPG) material.

(b) Apply seal packing to the circular plug.
Seal packing:
Part No. 08826-00080 or equivalent

(c) Install the semi-circular plug to the cylinder head.



15. INSTALL CYLINDER HEAD COVER

(a) Remove any old packing (FIPG) material.

(b) Apply seal packing to the cylinder head as shown in the illustration.

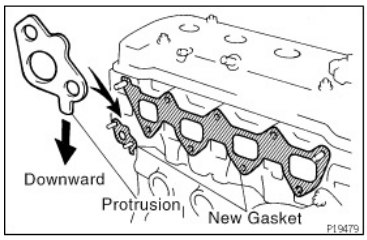
Seal packing:
Part No. 08826-00080 or equivalent

(c) Install the gasket to the head cover.

(d) Install the head cover with the 4 seal washers, and cap nuts.

Torque: 5.9 N·m (60 kgf·cm, 52 in.·lbf)

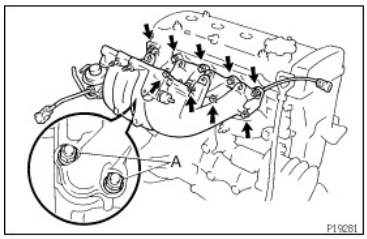
16. INSTALL RH ENGINE MOUNTING INSULATOR (See page EM-25)



17. INSTALL INTAKE MANIFOLD

(a) Place a new intake manifold gasket to the cylinder head.

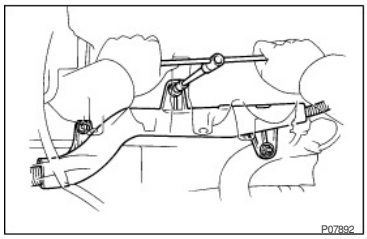
(b) Place a new EGR inlet gasket to the cylinder head, facing the protrusion downward.



(c) Install the intake manifold with the 7 bolts, ground strap and 4 nuts.

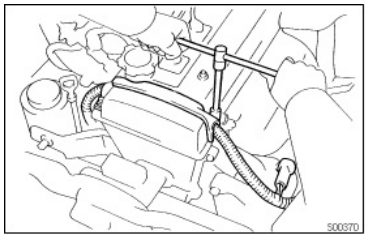
(d) Uniformly tighten the bolts and nuts in several passes.

Torque:
A: 19 N·m (195 kgf·cm, 14 ft·lbf)
Others: 19 N·m (195 kgf·cm, 14 ft·lbf)



18. CONNECT ENGINE WIRE

(a) Connect the engine wire with the bolt and 2 nuts.



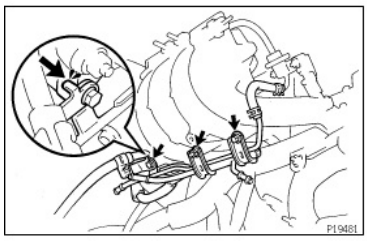
(b) Connect the engine wire to cylinder head cover, and install the engine wire cover with the 2 bolts.
(c) w/ A/C:
Connect the A/C compressor connector.
(d) Connect the oil pressure switch connector.
(e) Connect the crankshaft position sensor connector.

19. INSTALL INJECTORS AND DELIVERY PIPE (See page SF-27)

20. INSTALL AIR INTAKE CHAMBER (See page SF-27)

21. INSTALL THROTTLE BODY (See page SF-38)

22. INSTALL AIR PIPE



(a) Install the air pipe and fuel hose clamp with the 2 bolts and nut.

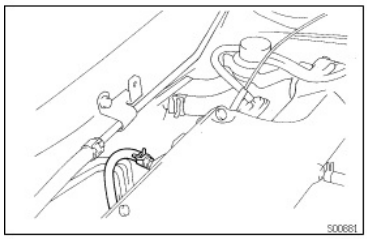
HINT:

Attach the clamp claw of the fuel hose to the intake manifold.

(b) Connect the fuel return hose to pressure regulator.
(c) Connect the air hose (from IAC valve) to air pipe.

23. INSTALL INTAKE MANIFOLD STAY
Torque:
12 mm head bolt: 19 N·m (195 kgf·cm, 14 ft·lbf)
14 mm head bolt: 39 N·m (400 kgf·cm, 29 ft·lbf)

24. w/ EGR:
INSTALL EGR VSV

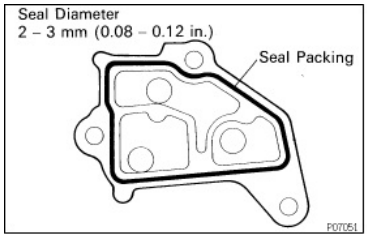


25. CONNECT HOSES
(a) Connect the MAP sensor hose.
(b) Connect the brake booster vacuum hose.
(c) w/ PS
Connect the air hose from air pipe.

26. CONNECT GROUND STRAP CONNECTOR

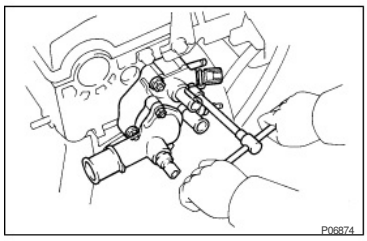
27. INSTALL WATER INLET WITH HOUSING
(a) Remove any old packing material and be careful not to drop any oil on the contact surfaces of the water inlet housing and cylinder head.
Using a razor blade and gasket scraper, remove all the packing (FIPG) material from the gasket surfaces.

NOTICE:
Do not use a solvent which will affect painted surfaces.



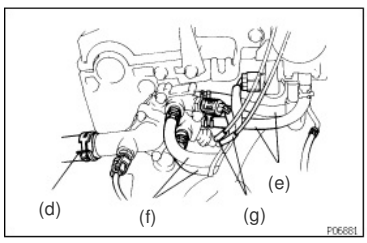
(b) Apply seal packing to the water inlet housing as shown in the illustration.
Seal packing:
Part No. 08826-00100 or equivalent
- Install a nozzle that has been cut to a 2 - 3 mm (0.08 - 0.12 in.) opening.

HINT:
Avoid applying an excessive amount to the surface.



- Parts must be assembled within 15 minutes of application. Otherwise, the material must be removed and reapplied.
- Immediately remove the nozzle from the tube and reinstall the cap.

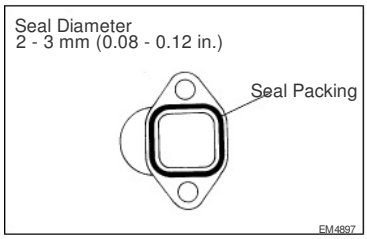
(c) Install the water inlet and inlet housing assembly with the bolt and 2 nuts.
Torque: 20 N·m (200 kgf·cm, 14 ft·lbf)



(d) Connect the radiator outlet hose
(e) Connect the 2 water bypass hoses
(f) Connect the 2 heater water hoses
(g) Connect the 2 EVAP TVV vacuum hoses
(h) Connect the ECT sensor connector
(i) Connect the ECT switch connector
(j) Connect the IAC valve connector

28. INSTALL WATER OUTLET

(a) Remove any old packing (FIPG) material and be careful not to drop any oil on the contact surfaces of the water outlet and cylinder head.
(1) Using a razor blade and gasket scraper, remove all the oil packing (FIPG) material from the gasket surfaces and sealing groove.
(2) Thoroughly clean all components to remove all the loose material.
(3) Using a non-solvent, clean both sealing surfaces.



(b) Apply seal packing to the water outlet groove.
Seal packing:
Part No.08826 - 00100 or equivalent
(1) Install a nozzle that has been cut to a 2-3 mm (0.08-0.12 in.) opening.

HINT:
Avoid applying an excessive amount to the surface.
(2) Parts must be assembled within 15 minutes of application. Otherwise the material must be removed and reapplied.

(3) Immediately remove nozzle from the tube and reinstall cap.

(c) Install the water outlet with the 2 bolts.
Torque: 19.5 N·m (200 kgf·cm, 14 ft·lbf)

29. INSTALL EXHAUST MANIFOLD

(a) Install the lower heat insulator to the exhaust manifold with the 3 bolts.

(b) Install a new gasket and the exhaust manifold with the 5 nuts. Uniformly tighten the bolts in several passes.
Torque: 34 N·m (350 kgf·cm, 25 ft·lbf)

(c) Install the manifold stay with the 3 bolts. Alternately tighten the bolts.
Torque: 59 N·m (600 kgf·cm, 46 ft·lbf)

(d) Install the upper heat insulator with the 5 bolts.

30. INSTALL FRONT EXHAUST PIPE

(a) Place 2 new gaskets to the front and rear of the front exhaust pipe.

(b) Using a 14 mm deep socket wrench, install the front exhaust pipe with 2 new nuts.
Torque: 62 N·m (630 kgf·cm, 46 ft·lbf)

(c) Install the 2 bolts and support bracket holding the front exhaust pipe to the TWC.
Torque: 43 N·m (440 kgf·cm, 32 ft·lbf)

(d) Install the 2 bolts holding the front exhaust pipe bracket to the mounting bracket.
Torque: 19 N·m (195 kgf·cm, 14 ft·lbf)

(e) Connect the oxygen sensor connector.

31. INSTALL DISTRIBUTOR (See page IG-13)

32. INSTALL GENERATOR (See page CH-22)

33. CONNECT ACCELERATOR CABLE BRACKET TO THROTTLE BODY

34. INSTALL AIR CLEANER HOSE AND CAP

(a) Connect the air cleaner hose, and install the air cleaner cap with the 4 clips.

(b) Tighten the air cleaner hose clamp bolt.

(c) Connect the IAT sensor connector to the air cleaner cap.

35. FILL RADIATOR WITH ENGINE COOLANT

36. START ENGINE AND CHECK FOR LEAKS

Warm up the engine and inspect for leaks.

37. INSTALL RH ENGINE UNDER COVER

38. CHECK IGNITION TIMING (See page EM-12 , EM-14)

39. PERFORM ROAD TEST

Check for abnormal noise, shock, slippage, correct shift points and smooth operation.

40. RECHECK ENGINE COOLANT LEVEL AND OIL LEVEL