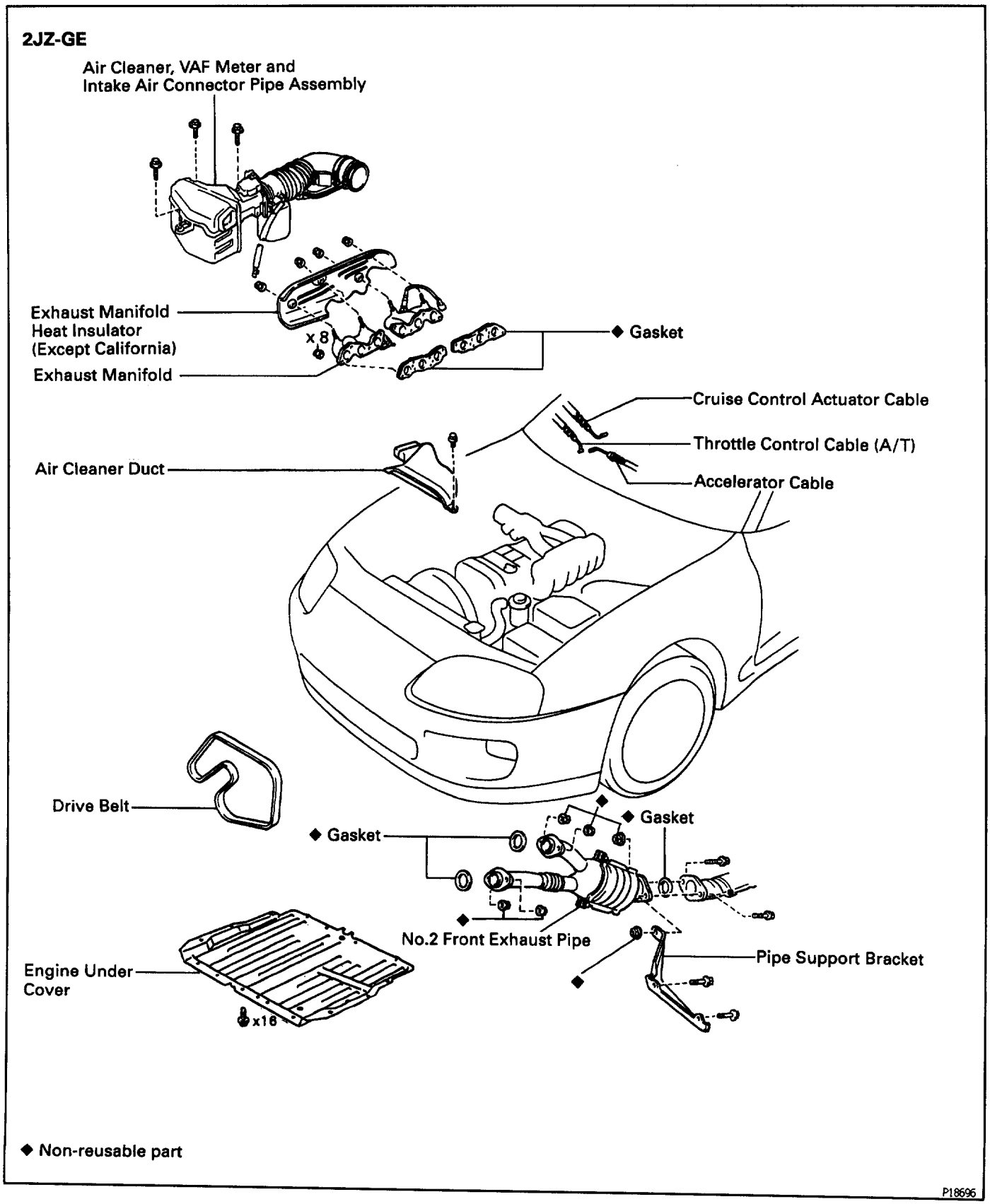
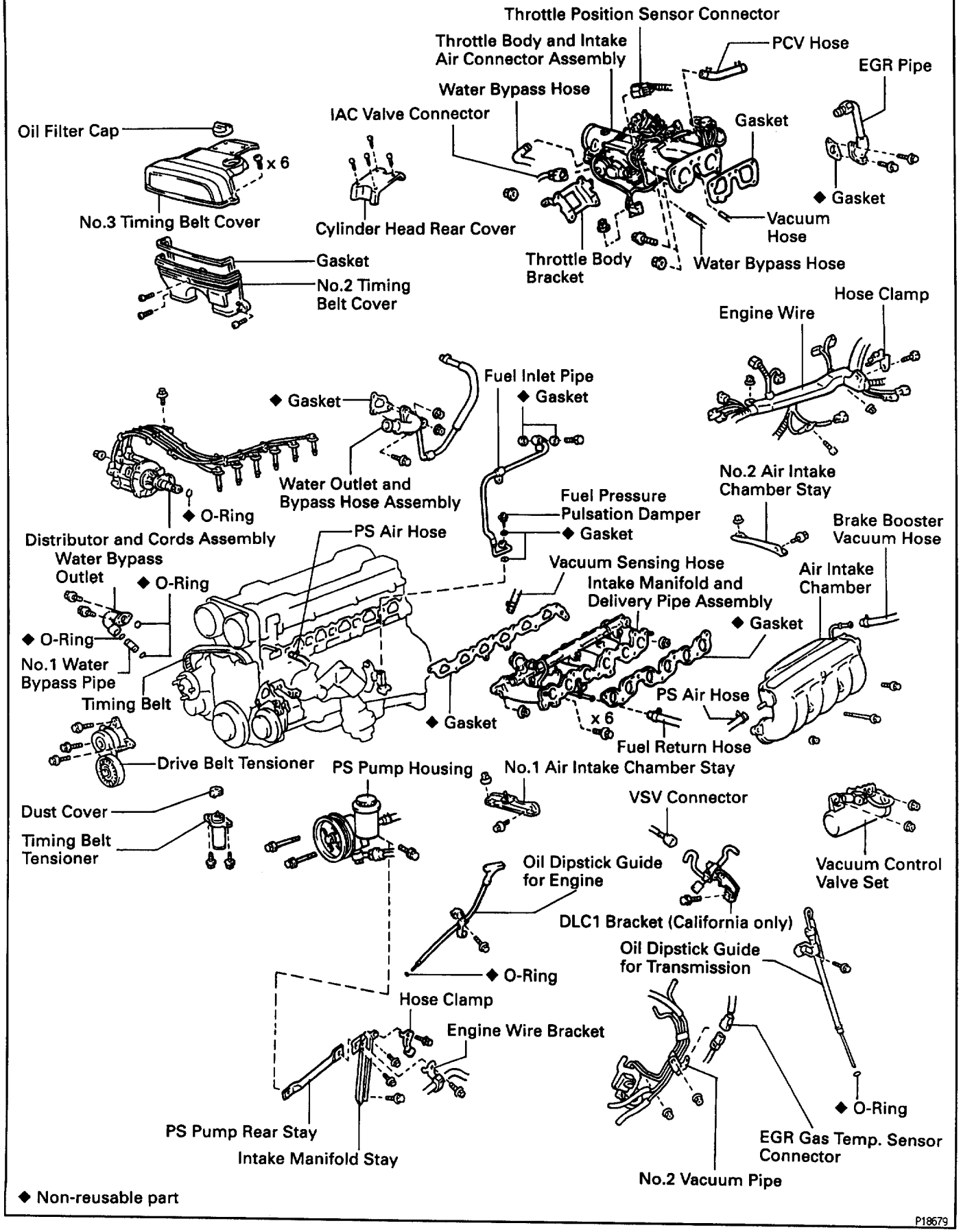
CYLINDER HEAD COMPONENTS FOR REMOVAL AND INSTALLATION



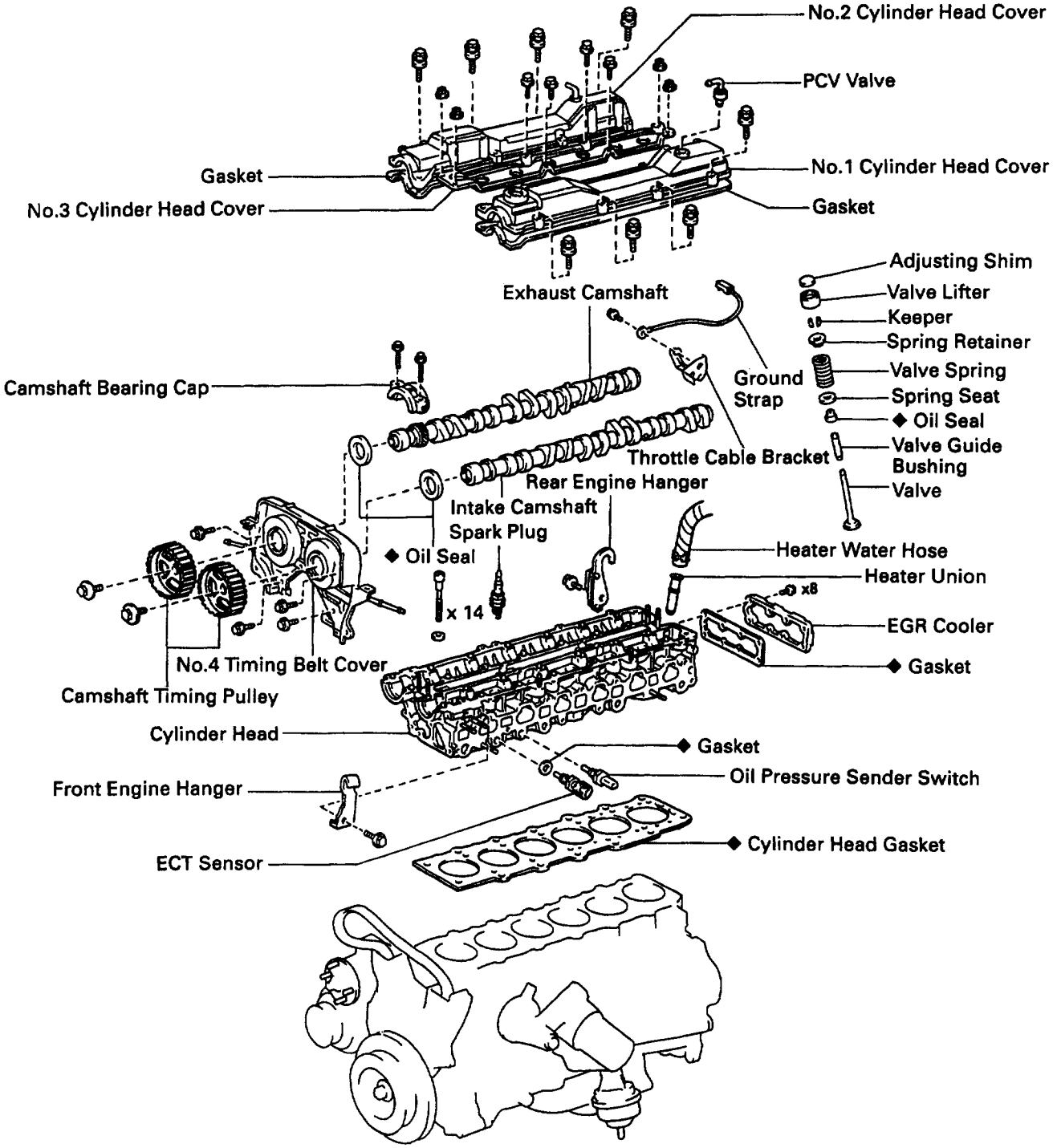
2JZ-GE



◆ Non-reusable part

P18679

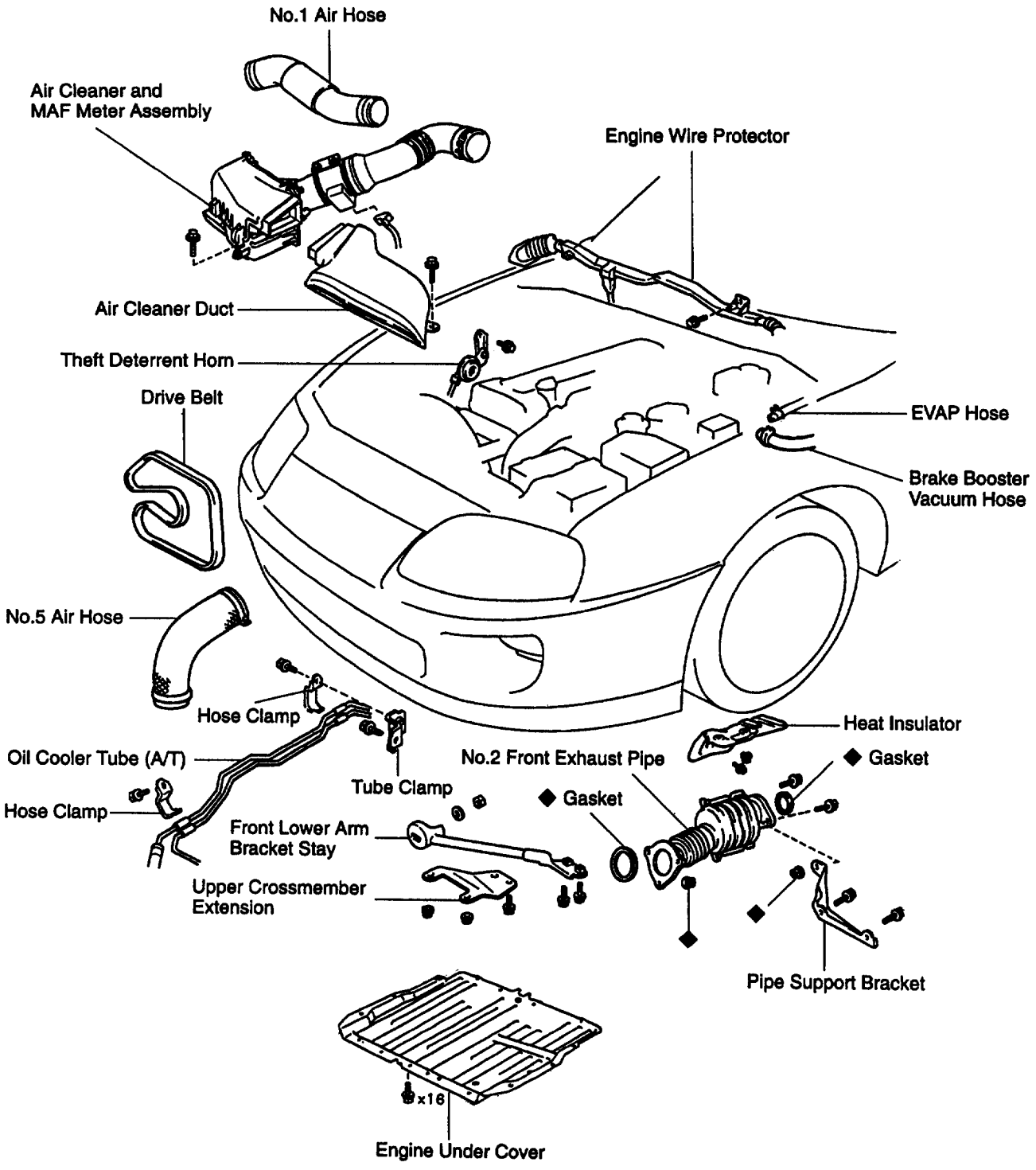
2JZ-GE



◆ Non-reusable part

P18680

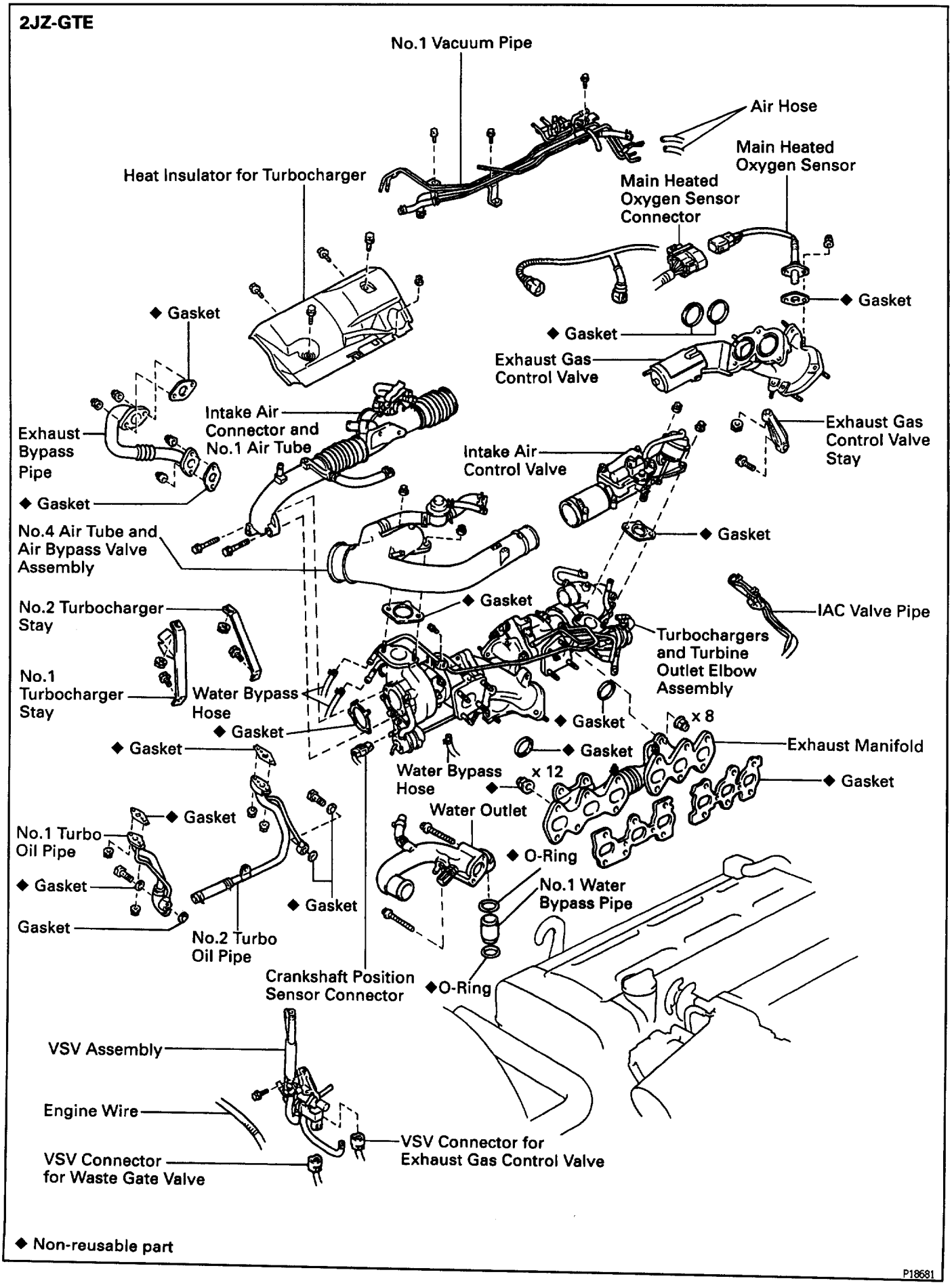
2JZ - GTE



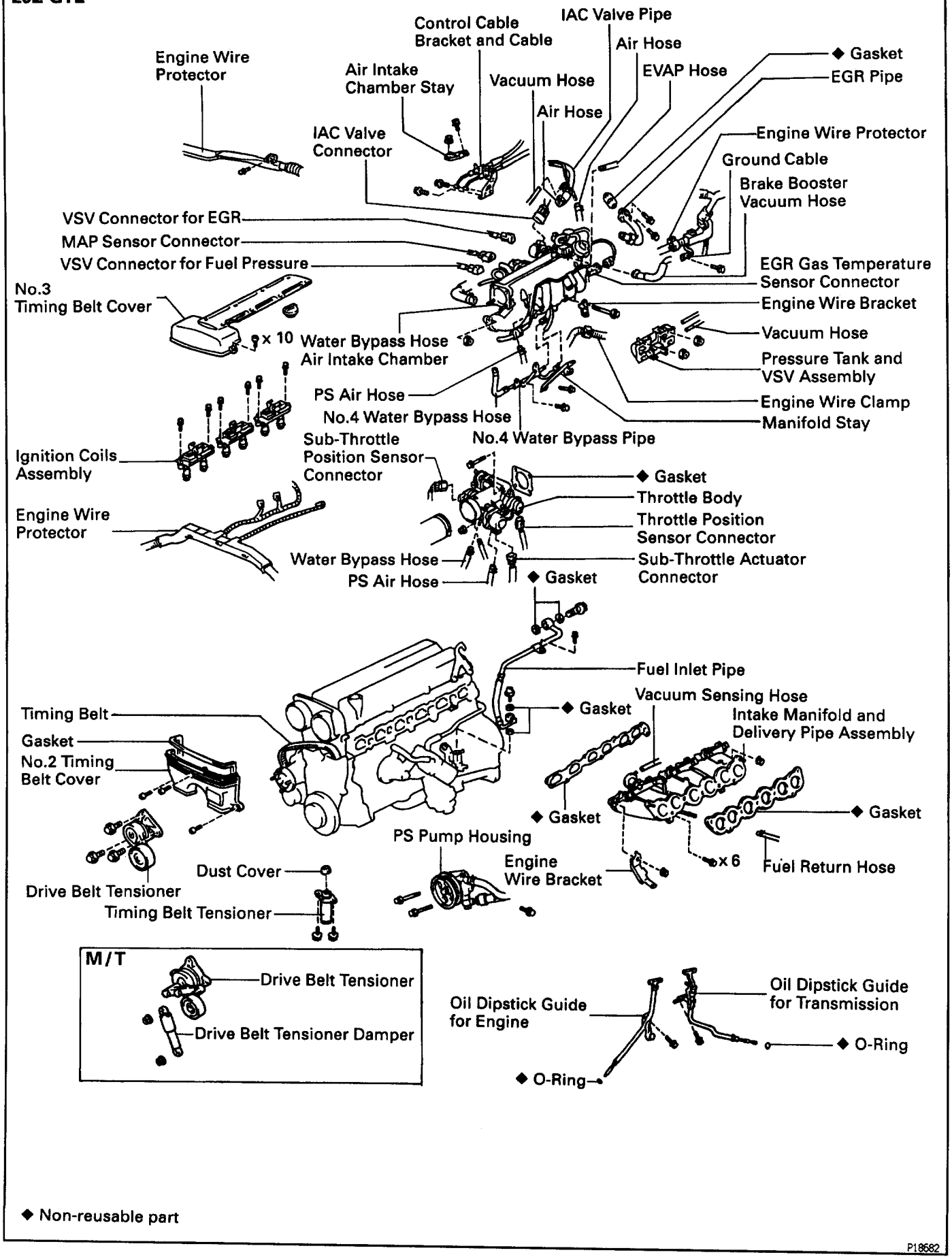
◆ Non-reusable part

P12614

Z13597


2JZ-GTE
No.1 Vacuum Pipe
Air Hose
Main Heated Oxygen Sensor
Heat Insulator for Turbocharger
Main Heated Oxygen Sensor Connector
◆ Gasket
◆ Gasket
◆ Gasket
Exhaust Gas Control Valve
Exhaust Bypass Pipe
Intake Air Connector and No.1 Air Tube
Intake Air Control Valve
Exhaust Gas Control Valve Stay
◆ Gasket
No.4 Air Tube and Air Bypass Valve Assembly
◆ Gasket
No.2 Turbocharger Stay
◆ Gasket
IAC Valve Pipe
Turbochargers and Turbine Outlet Elbow Assembly
No.1 Turbocharger Stay
Water Bypass Hose
◆ Gasket
◆ Gasket
◆ Gasket
x 8
Exhaust Manifold
◆ Gasket
Water Bypass Hose
x 12
◆ Gasket
Water Outlet
◆ Gasket
No.1 Turbo Oil Pipe
◆ O-Ring
◆ Gasket
No.1 Water Bypass Pipe
◆ Gasket
Gasket
No.2 Turbo Oil Pipe
Crankshaft Position Sensor Connector
◆ O-Ring
VSV Assembly
Engine Wire
VSV Connector for Exhaust Gas Control Valve
VSV Connector for Waste Gate Valve
◆ Non-reusable part
P18681

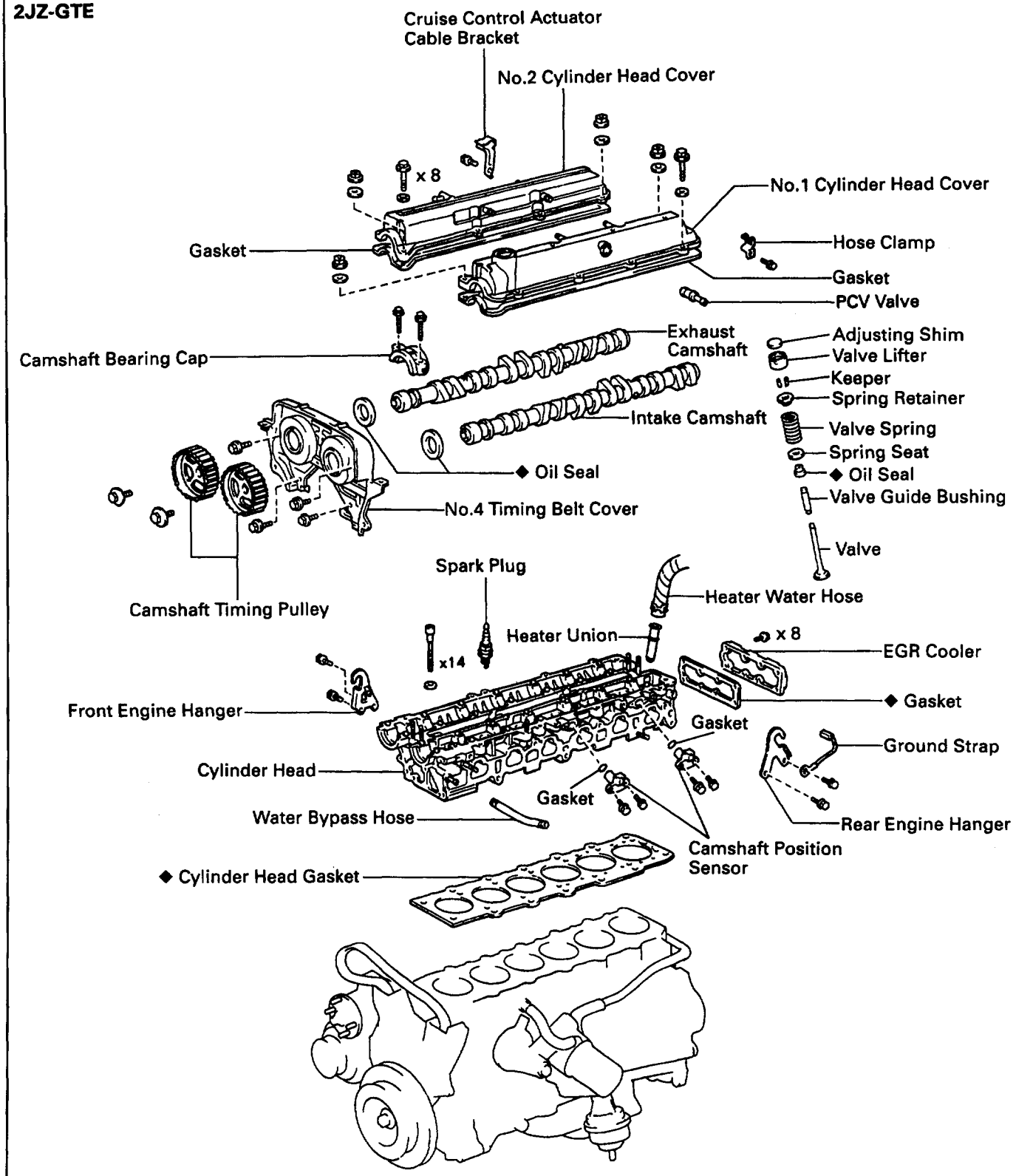
2JZ-GTE



◆ Non-reusable part

P18682

2JZ-GTE

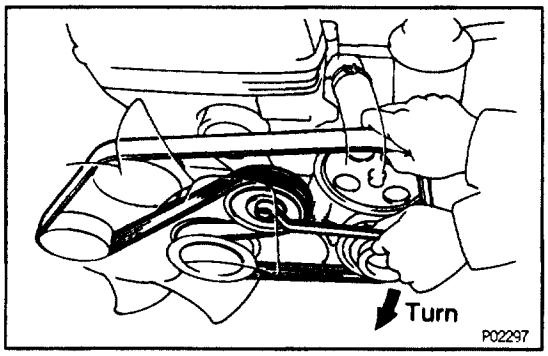


◆ Non-reusable part

P18683

CYLINDER HEAD REMOVAL (2JZ–GE)

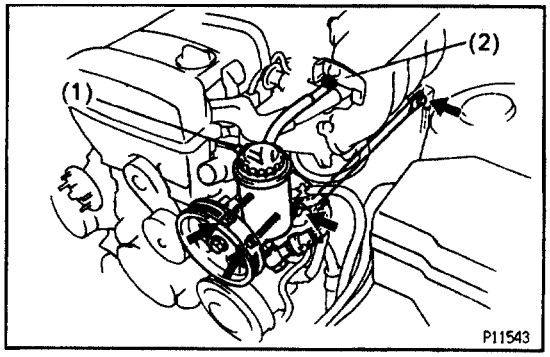
1. **REMOVE ENGINE UNDER COVER**
2. **DRAIN ENGINE COOLANT**
3. **REMOVE AIR CLEANER DUCT**
4. **REMOVE AIR CLEANER, VAF METER AND INTAKE AIR CONNECTOR PIPE ASSEMBLY**
   (See step 6 in engine removal in Engine Mechanical)



5. **REMOVE DRIVE BELT**
   Loosen the drive belt tension by turning the drive belt tensioner clockwise, and remove the drive belt.
6. **REMOVE NO.2 FRONT EXHAUST PIPE**
   (See step 22 in engine removal in Engine Mechanical)

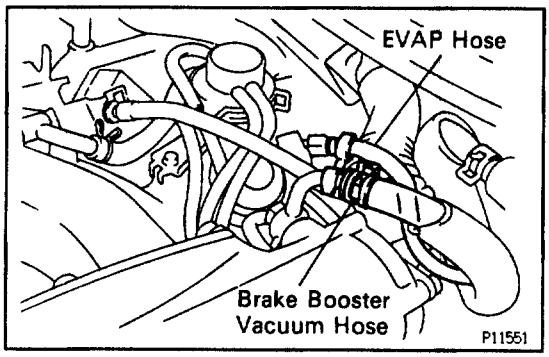
7. **REMOVE EXHAUST MANIFOLDS**

(a) Except California:
Remove the 4 nuts and manifold heat insulator.
(b) Disconnect the 2 (main heated) oxygen sensor connectors.
(c) Remove the 4 nuts, exhaust manifold and gasket.
Remove the No.1 and No.2 exhaust manifolds.

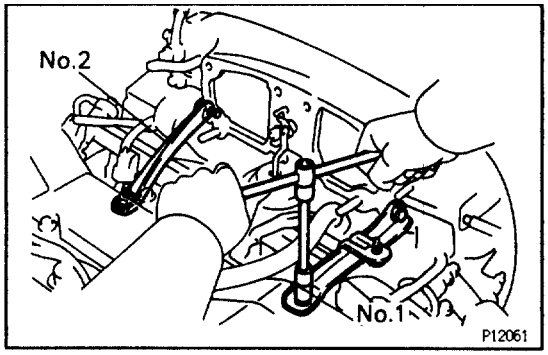


8. **DISCONNECT PS PUMP WITHOUT DISCONNECTING HOSES**

(a) Disconnect these hoses:
(1) Air hose from No.4 timing belt cover
(2) Air hose from air intake chamber
(b) Remove the 2 bolts, and disconnect the pump housing from the pump bracket.
HINT: Put aside the pump housing, and suspend it.
(c) Remove the 2 bolts and pump rear stay.



9. **DISCONNECT BRAKE BOOSTER VACUUM HOSE**
10. **DISCONNECT EVAP HOSE**
11. **REMOVE THROTTLE BODY AND INTAKE AIR CONNECTOR ASSEMBLY**
    (See injector removal in SFI System)

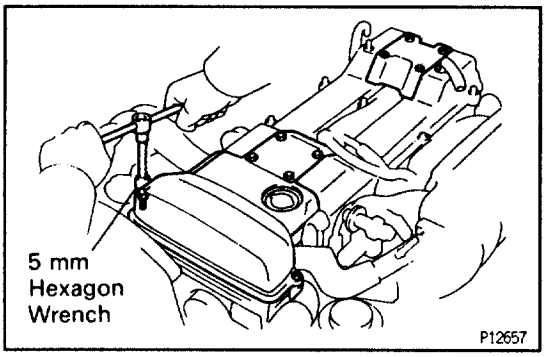


12. REMOVE AIR INTAKE CHAMBER STAYS

(a) Remove the bolt, nut and No.1 stay.

(b) Remove the bolt, nut and No.2 stay.

13. REMOVE NO.2 VACUUM PIPE AND VSV ASSEMBLY



14. REMOVE NO.3 TIMING BELT COVER

(a) Remove the oil filler cap.

(b) Using a 5 mm hexagon wrench, remove the 6 bolts and timing belt cover.

15. REMOVE CYLINDER HEAD REAR COVER

Using a 5 mm hexagon wrench, remove the 4 bolts and cylinder head rear cover.

16. DISCONNECT HIGH–TENSION CORDS FROM CYLINDER HEAD COVERS

(See step 4 in high–tension cords and cord clamps removal in Ignition System)

17. REMOVE DISTRIBUTOR AND CORDS ASSEMBLY

(See steps 1 to 3 in distributor removal in Ignition System)

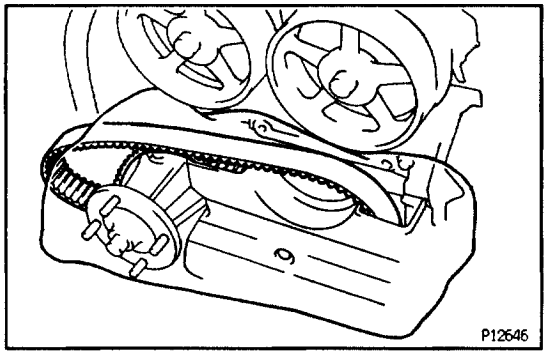
18. REMOVE SPARK PLUGS

19. REMOVE TIMING BELT FROM CAMSHAFT TIMING PULLEYS

(See steps 5 to 8 in timing belt removal)

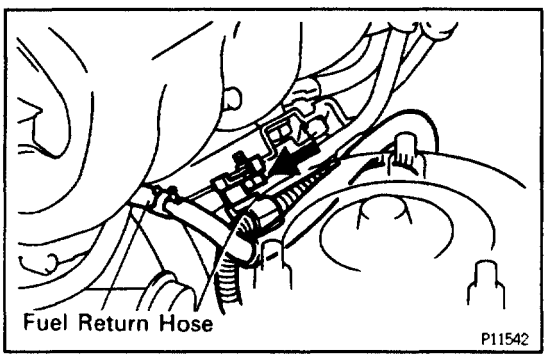
NOTICE:

- **Support the timing belt, so that the meshing of the crankshaft timing pulley and timing belt does not shift.**
- **Be careful not to drop anything inside the timing belt cover.**
- **Do not allow the timing belt to come into contact with oil, water or dust.**



20. REMOVE WATER BYPASS OUTLET AND NO.1 WATER BYPASS PIPE

(See step 13 in water pump removal in Cooling System)



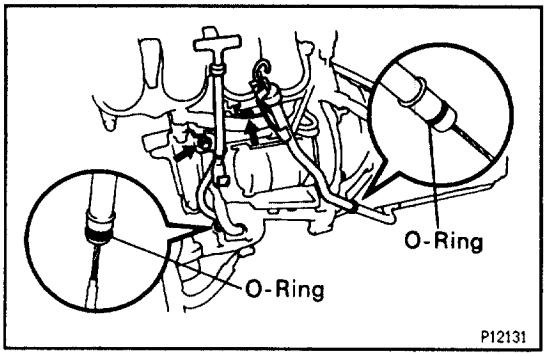
21. DISCONNECT FUEL RETURN HOSE

(a) Disconnect the fuel return hose from the fuel return pipe. Plug the hose end.

(b) Disconnect the fuel return hose from the oil dipstick guide.

22. REMOVE ENGINE WIRE BRACET

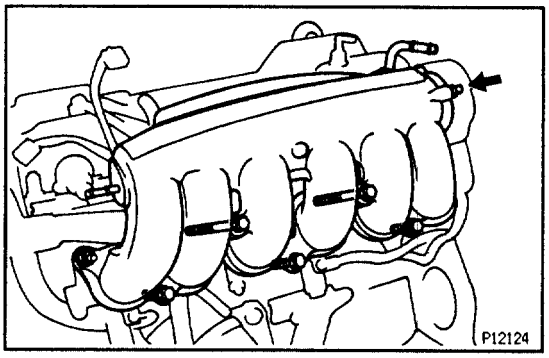
Remove the bolt and bracket, disconnect the engine wire the intake manifold stay.



23. REMOVE OIL DIPSTICK GUIDES FOR ENGINE AND TRANSMISSION

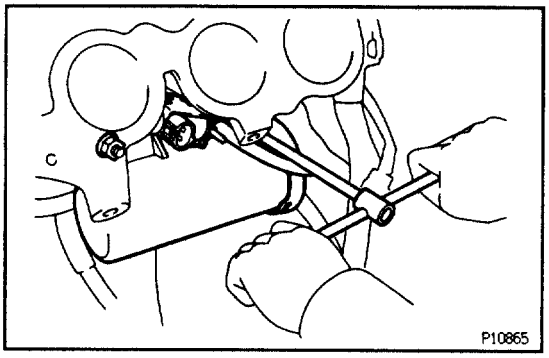
(a) Remove the 2 bolts.
(b) Pull out the dipstick guide together with the dipstick.
(c) Remove the O–ring from the dipstick guide.

24. REMOVE STARTER
(See starter removal in Starting System)



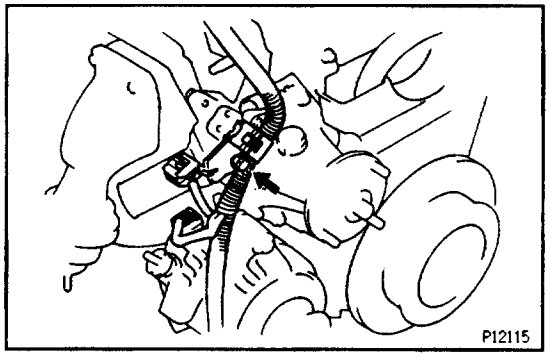
25. REMOVE AIR INTAKE CHAMBER

(a) Except California:
Disconnect the vacuum sensing hose from the fuel pressure regulator.
(b) Remove the bolt holding the engine wire protector to the the air intake chamber.
(c) Remove the 5 bolts, nut, air intake chamber and gasket.



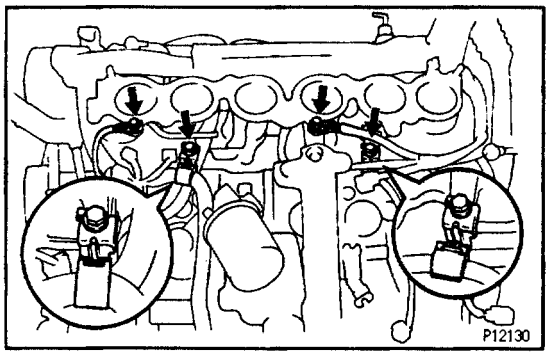
26. REMOVE VACUUM CONTROL VALVE SET

(a) Disconnect the VSV connector.
(b) Remove the 2 nuts and vacuum control valve set.

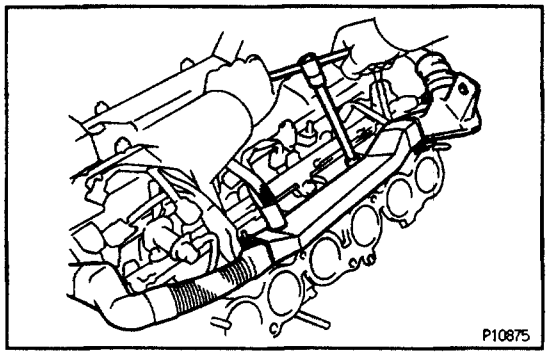


27. DISCONNECT ENGINE WIRE

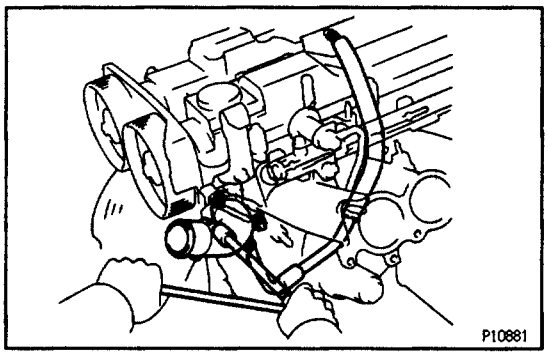
(a) Remove the bolt, and disconnect the engine wire bracket from the water pump.



(b) Remove the 2 bolts, and disconnect the 2 ground straps from the intake manifold.
(c) Remove the 2 bolts, and disconnect the 2 wire clamps from the intake manifold.
(d) Disconnect these connectors:
- 6 injector connectors
- ECT sensor connector
- ECT sender gauge connector

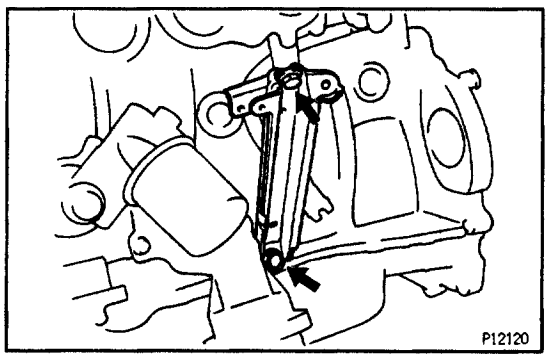


(e) Remove the 3 nuts, and disconnect the engine wire protector from the intake manifold.



28. REMOVE WATER OUTLET AND NO.1 BYPASS HOSE ASSEMBLY

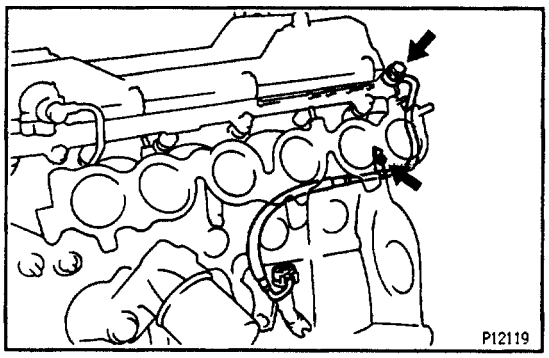
Remove the 2 nuts, bolt and water outlet.



29. REMOVE INTAKE MANIFOLD STAY

Remove the 2 bolts and manifold stay.

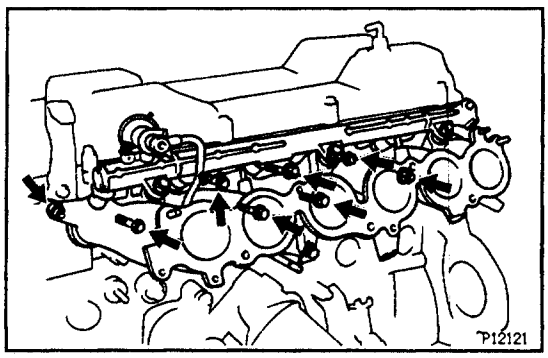
30. REMOVE FUEL PRESSURE PULSATION DAMPER (See step 2 in fuel pressure pulsation damper in SFI System)



31. REMOVE FUEL INLET PIPE

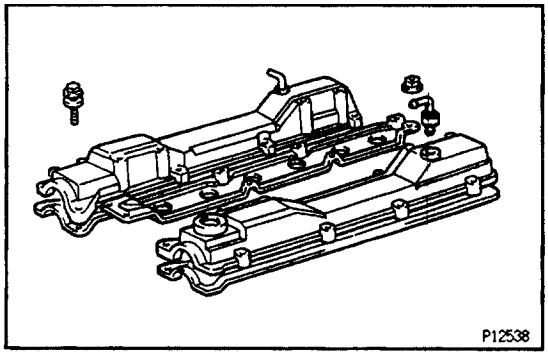
(a) Remove the clamp bolt from the intake manifold.

(b) Remove the union bolt and 2 gaskets, and disconnect the fuel inlet pipe.



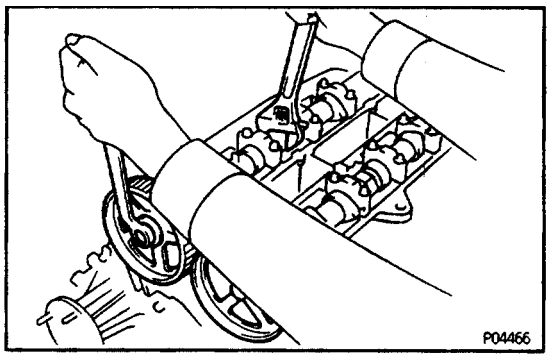
32. REMOVE INTAKE MANIFOLD AND DELIVERY PIPE ASSEMBLY

Remove the 6 bolts, 2 nuts, the intake manifold, delivery pipe assembly and gasket.



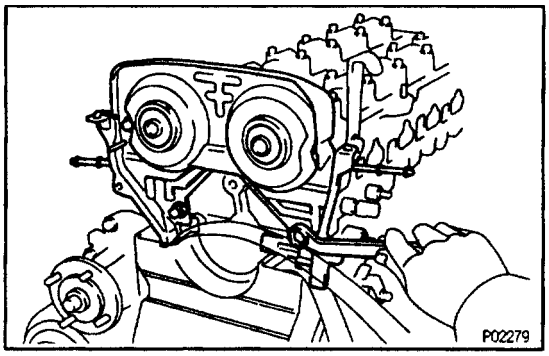
33. REMOVE NO.3, NO.1 AND NO.2 CYLINDER HEAD COVERS

(a) Remove the PCV valve.
(b) Remove the 4 bolts, 4 nuts and No.3 cylinder head cover.
(c) Remove the 4 bolts, No.1 cylinder head cover and gasket.
(d) Remove the 4 bolts, No.2 cylinder head cover and gasket.



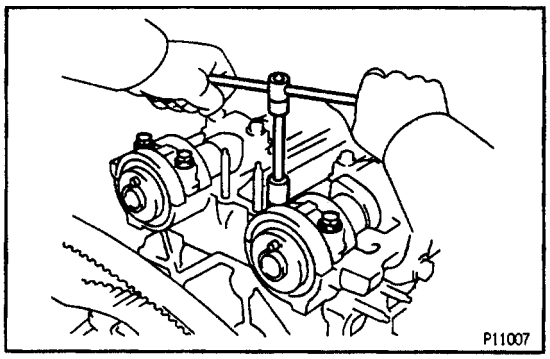
34. REMOVE CAMSHAFT TIMING PULLEYS

Hold the hexagon portion of the camshaft with a wrench, and remove the pulley mounting bolt and camshaft pulley.



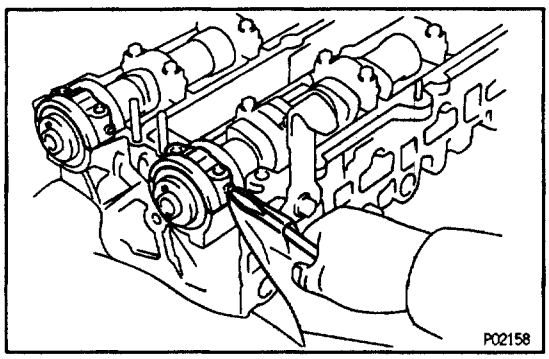
35. REMOVE NO.4 TIMING BELT COVER

Remove the 4 bolts and timing belt cover.



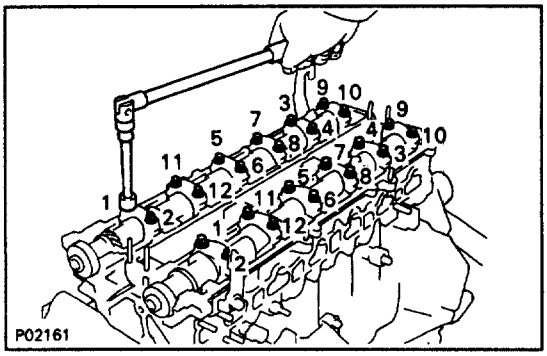
36. REMOVE CAMSHAFTS

(a) Uniformly loosen and remove the 4 No.1 bearing cap bolts.

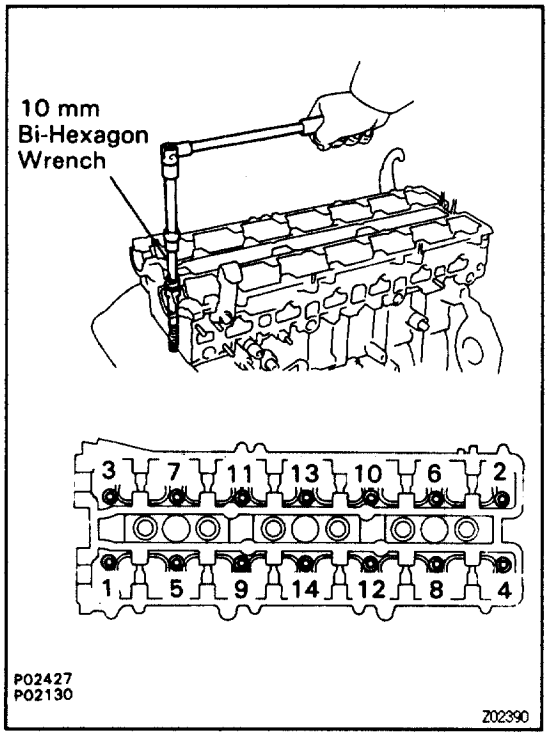


(b) Using a screwdriver, pry out the 2 No.1 camshaft bearing caps and oil seals.

NOTICE: Be careful not to damage the cap. Tape the screwdriver tip.

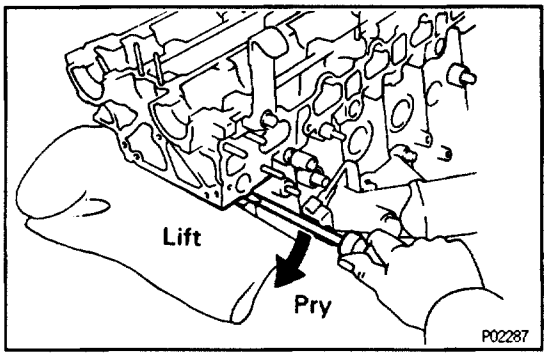


(c) Uniformly loosen and remove the 12 bearing cap bolts, in several passes, in the sequence shown, and remove the 6 bearing caps and camshaft.
(d) Remove the intake and exhaust camshafts.

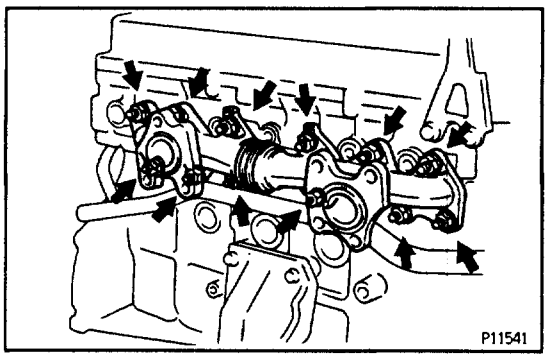


37. REMOVE CYLINDER HEAD

(a) Using a 10 mm bi–hexagon wrench, uniformly loosen and remove the 14 cylinder head bolts, in several passes, in the sequence shown.
NOTICE: Cylinder head warpage or cracking could result from removing in incorrect order.
(b) Remove the 14 plate washers.

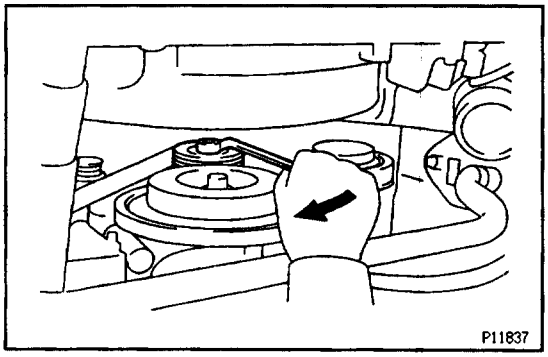


(c) Lift the cylinder head from the dowels on the cylinder block.
(d) Place the head on wooden blocks on a bench.
If the cylinder head is difficult to lift off, pry with a screwdriver between the cylinder head and block projection.
NOTICE: Be careful not to damage the contact surfaces of the cylinder head and cylinder block.



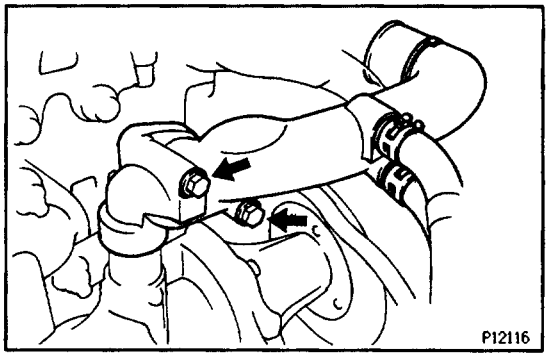
CYLINDER HEAD REMOVAL (2JZ–GTE)

1. REMOVE TURBOCHARGER
(See turbocharger removal in Turbocharger System)
2. REMOVE EXHAUST MANIFOLD
Remove the 12 nuts, exhaust manifold and 2 gaskets.
3. M/T:
REMOVE DRIVE BELT TENSIONER DAMPER
(See step 2 in timing belt removal)



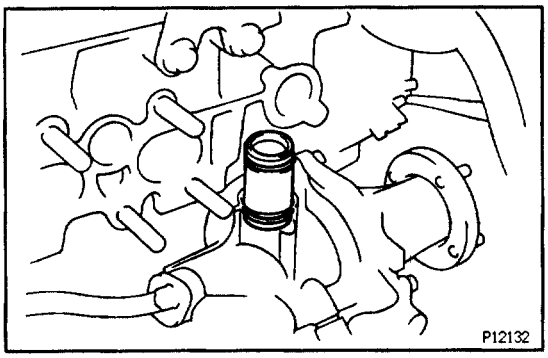
4. REMOVE DRIVE BELT

Loosen the drive belt tension by turning the drive belt tensioner clockwise, and remove the drive belt.

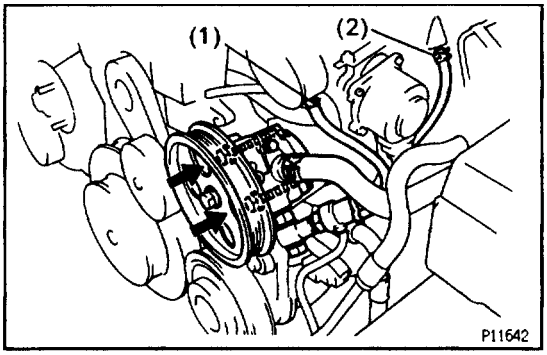


5. REMOVE WATER OUTLET AND NO.1 WATER BYPASS PIPE

(a) Disconnect the upper radiator hose from the water outlet.
(b) Disconnect the ECT sensor and sender gauge connectors.
(c) Remove the 2 bolts, water outlet and gasket.

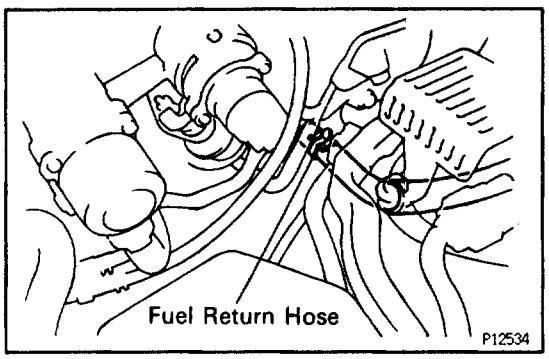


(d) Remove the No.1 water bypass pipe and 2 O–rings.



6. DISCONNECT PS PUMP WITHOUT DISCONNECTING HOSES

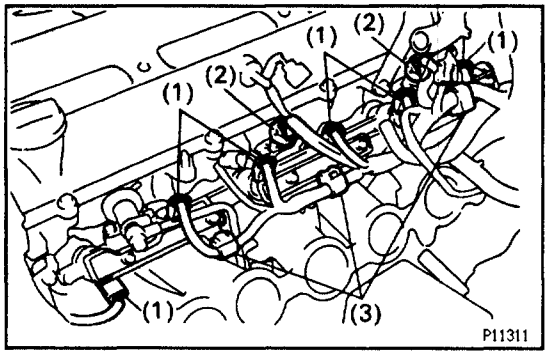
(a) Disconnect these hoses:
  (1) Air hose from throttle body
  (2) Air hose from air intake chamber
(b) Remove the 2 bolts, and disconnect the pump housing from the pump bracket.
  HINT: Put aside the pump housing, and suspend it securely.



7. DISCONNECT FUEL RETURN HOSE

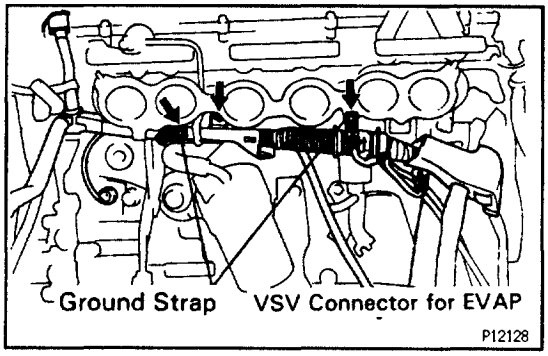
Disconnect the fuel return hose from the fuel return pipe. Plug the hose end.

8. REMOVE AIR INTAKE CHAMBER ASSEMBLY (See injector removal in SFI System)



9. DISCONNECT ENGINE WIRE

(a) Disconnect these connectors and clamps:
  (1) 6 injectors connectors
  (2) 2 camshaft position sensor connectors
  (3) 3 engine wire clamps from injector holders

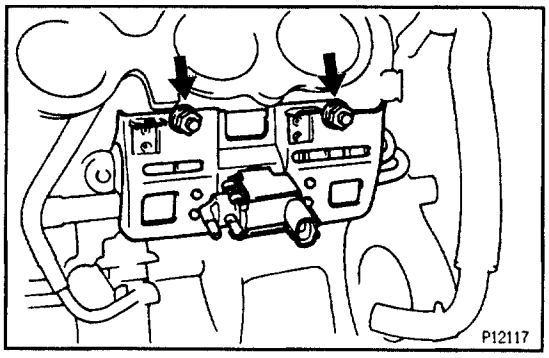


  (4) VSV connector for EVAP

(b) Remove the 2 bolts, and disconnect the 2 ground straps from the intake manifold.

(c) Remove the nut, and disconnect the engine wire protector from the intake manifold.

10. REMOVE STARTER
(See starter removal in Starting System)

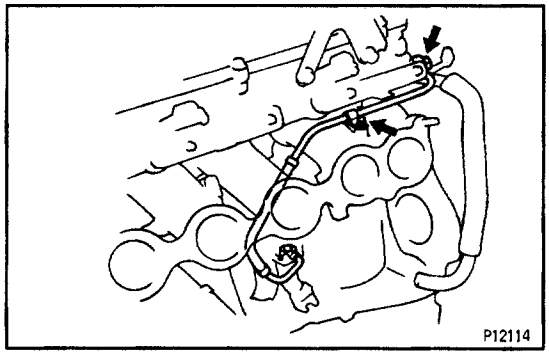


11. REMOVE PRESSURE TANK AND VSV ASSEMBLY

(a) Disconnect the 2 vacuum hoses from the pressure tank.

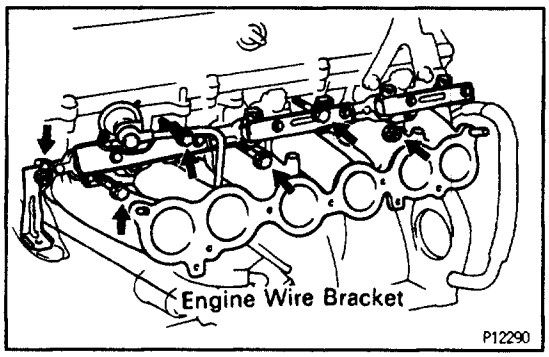
(b) Remove the 2 nuts and pressure tank and VSV assembly.

12. REMOVE FUEL PRESSURE PULSATION DAMPER
(See step 2 in fuel pressure pulsation damper in SFI System)



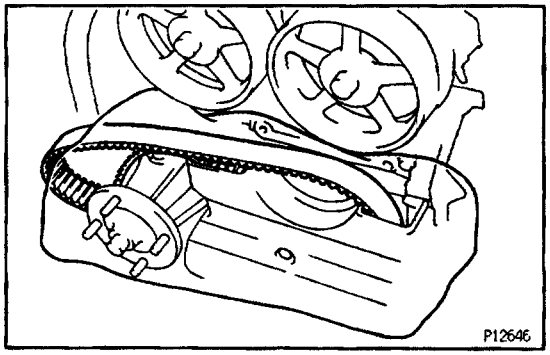
13. REMOVE FUEL INLET PIPE

Remove the union bolt, 2 gaskets, clamp bolt and fuel inlet pipe.



14. REMOVE INTAKE MANIFOLD AND DELIVERY PIPE ASSEMBLY

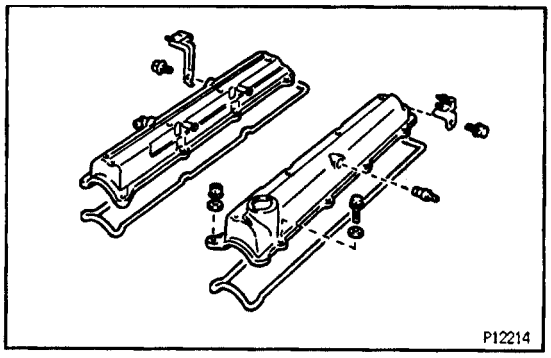
Remove the 4 bolts, 2 nuts, engine wire bracket, the intake manifold, delivery pipe assembly and gasket.



15. REMOVE TIMING BELT FROM CAMSHAFT TIMING PULLEYS
(See steps 5 to 8 in timing belt removal)
NOTICE:
- **Support the timing belt, so that the meshing of the crankshaft timing pulley and timing belt does not shift.**
- **Be careful not to drop anything inside the timing belt cover.**
- **Do not allow the timing belt to come into contact with oil, water or dust.**

16. REMOVE IGNITION COILS ASSEMBLIES
(See steps 2 to 5 in ignition coils removal in Ignition System)

17. REMOVE SPARK PLUGS



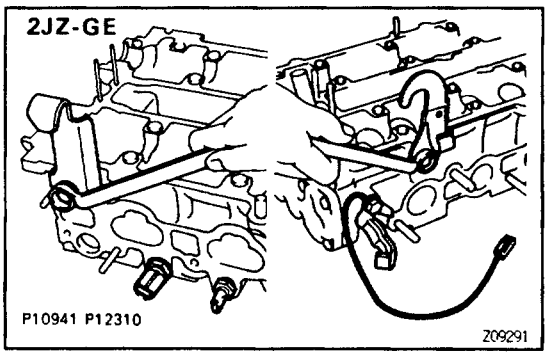
18. REMOVE NO.1 AND NO.2 CYLINDER HEAD COVERS
(a) Remove the 2 bolts, cruise control actuator cable bracket and IAC valve pipe clamp.
(b) Remove the PCV valve.
(c) Remove the 6 bolts, 2 nuts, 8 seal washers and No.1 cylinder head cover and gasket.
(d) Remove the 6 bolts, 2 nuts, 8 seal washers and No.2 cylinder head cover and gasket.

19. REMOVE CAMSHAFT TIMING PULLEYS
(See step 34 cylinder head removal (2JZ–GE))

20. REMOVE NO.4 TIMING BELT COVER
(See step 35 cylinder head removal (2JZ–GE))

21. REMOVE CAMSHAFTS
(See step 36 cylinder head removal (2JZ–GE))

22. REMOVE CYLINDER HEAD
(See step 37 cylinder head removal (2JZ–GE))

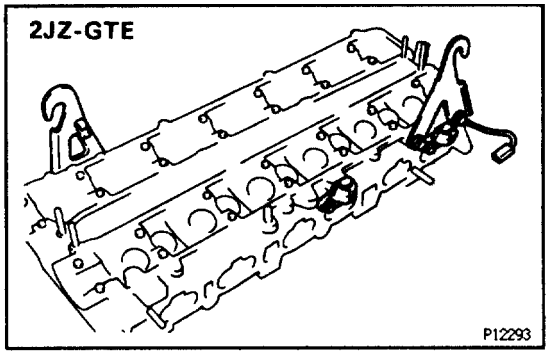


CYLINDER HEAD DISASSEMBLY

1. 2JZ–GE:
REMOVE ENGINE HANGERS

2. 2JZ–GE:
REMOVE ECT SENSOR AND SENDER GAUGE

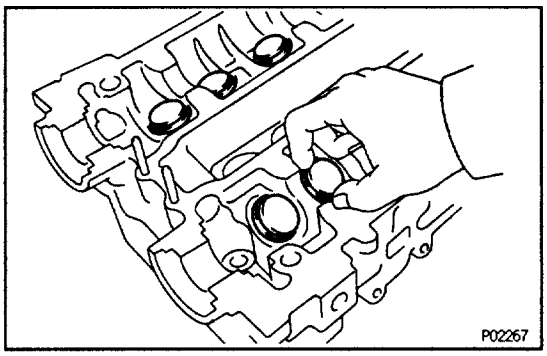
3. 2JZ–GE:
REMOVE THROTTLE CABLE BRACKET AND GROUND STRAP



4. 2JZ–GTE:
REMOVE ENGINE HANGERS AND GROUND STRAP

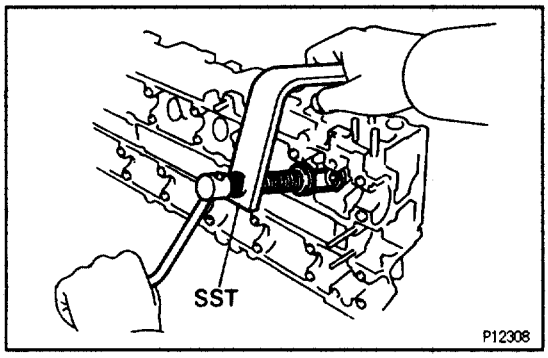
5. 2JZ–GTE:
REMOVE CAMSHAFT POSITION SENSORS

6. REMOVE EGR COOLER



7. REMOVE VALVE LIFTERS AND SHIMS

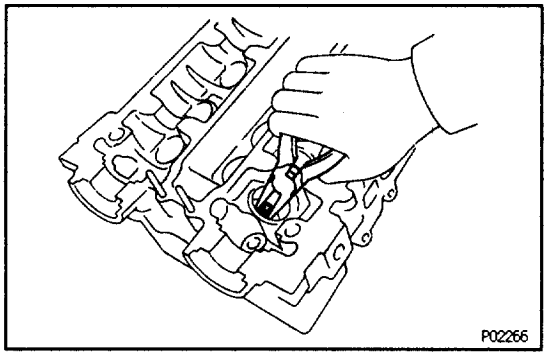
HINT: Store the valve lifters and shims in correct order.



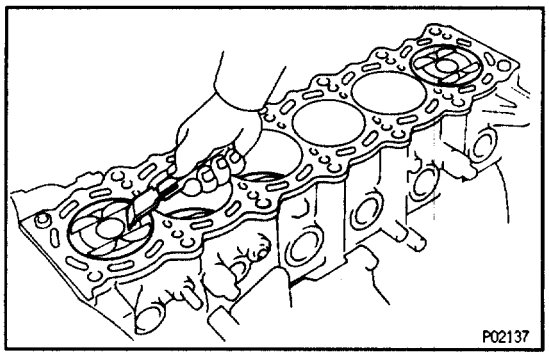
8. REMOVE VALVES

(a) Using SST, compress the valve spring and remove the 2 keepers.
SST 09202–70010

(b) Remove the spring retainer, valve spring, valve and spring seat.
HINT: Store the valves, valve springs, spring seats and spring retainers in correct order.



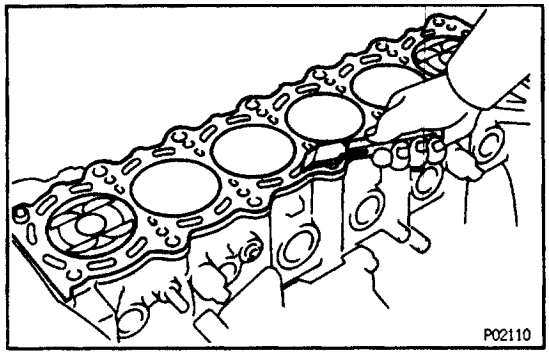
(c) Using needle–nose pliers, remove the oil seal.



CYLINDER HEAD COMPONENTS INSPECTION AND REPAIR

1. CLEAN TOP SURFACES OF PISTONS AND CYLINDER BLOCK

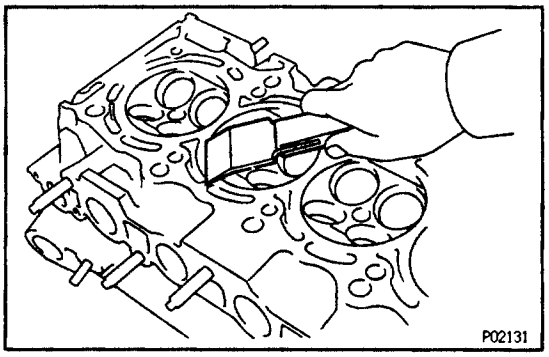
(a) Turn the crankshaft, and bring each piston to top dead center (TDC). Using a gasket scraper, remove all the carbon from the piston top surface.



(b) Using a gasket scraper, remove all the gasket material from the top surface of the cylinder block.

(c) Using compressed air, blow carbon and oil from the bolt holes.

CAUTION: Protect your eyes when using high pressure compressed air.

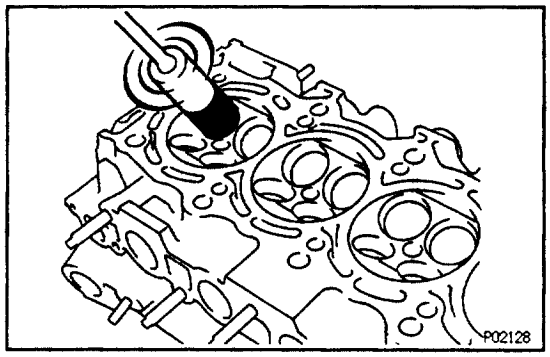


2. CLEAN CYLINDER HEAD

A. Remove gasket material

Using a gasket scraper, remove all the gasket material from the cylinder block surface.

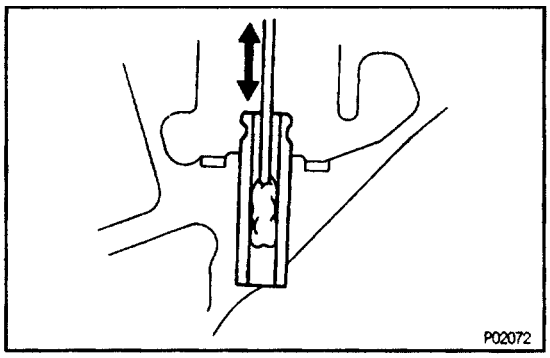
NOTICE: Be careful not to scratch the cylinder block contact surface.



B. Clean combustion chambers

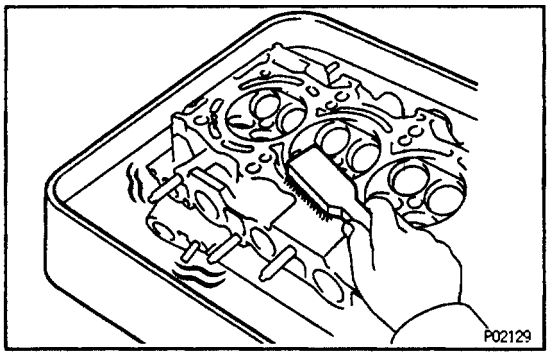
Using a wire brush, remove all the carbon from the combustion chambers.

NOTICE: Be careful not to scratch the cylinder block contact surface.



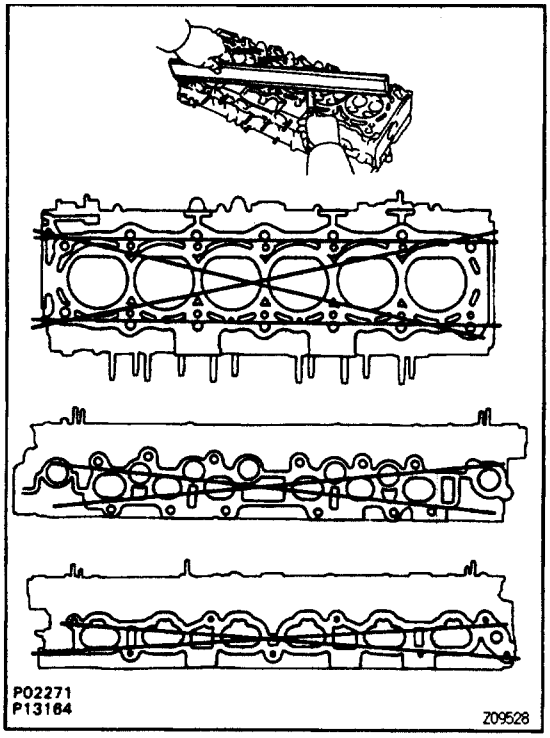
C. Clean valve guide bushings

Using a valve guide bushing brush and solvent, clean all the guide bushings.



D. Clean cylinder head

Using a soft brush and solvent, thoroughly clean the cylinder head.



3. INSPECT CYLINDER HEAD

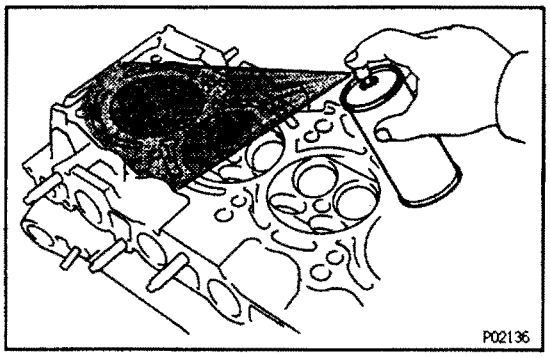
A. Inspect for flatness

Using precision straight edge and feeler gauge, measure the surfaces contacting the cylinder block, intake and exhaust manifolds for warpage.

Maximum warpage:

0.10 mm (0.0039 in.)

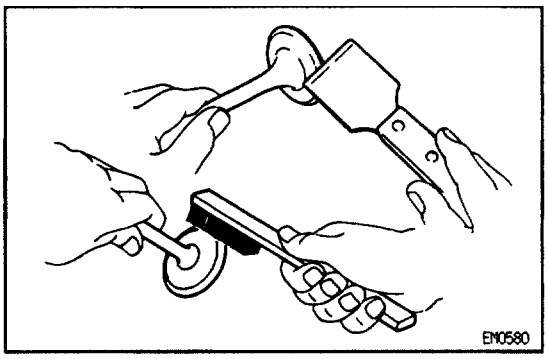
If warpage is greater than maximum, replace the cylinder head.



B. Inspect for cracks

Using a dye penetrant, check the combustion chamber, intake ports, exhaust ports and cylinder block surface for cracks.

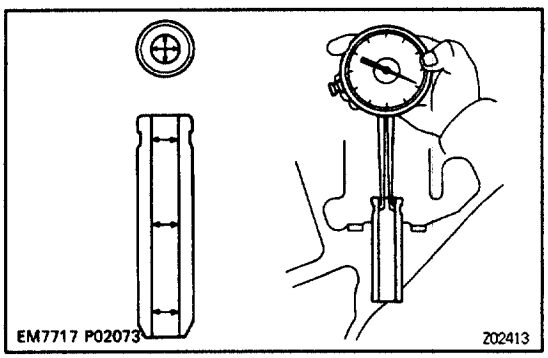
If cracked, replace the cylinder head.



4. CLEAN VALVES

(a) Using a gasket scraper, chip off any carbon from the valve head.

(b) Using a wire brush, throughly clean the valve.

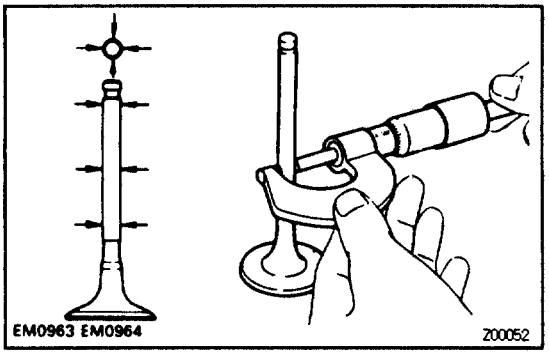


5. INSPECT VALVE STEMS AND GUIDE BUSHINGS

(a) Using a caliper gauge, measure the inside diameter of the guide bushing.

Bushing inside diameter:

6.010–6.030 mm (0.2366–0.2374 in.)



(b) Using a micrometer, measure the diameter of the valve stem.

Valve stem diameter:

Intake

5.970–5.985 mm (0.2350–0.2356 in.)

Exhaust

5.965–5.980 mm (0.2348–0.2354 in.)

(c) Subtract the valve stem diameter measurement from the guide bushing inside diameter measurement.

Standard oil clearance:

Intake

.025–0.060 mm (0.0010–0.0024 in.)

Exhaust

.030–0.065 mm (0.0012–0.0026 in.)

Maximum oil clearance:

Intake

.08 mm (0.0031 in.)

Exhaust

.10 mm (0.0039 in.)

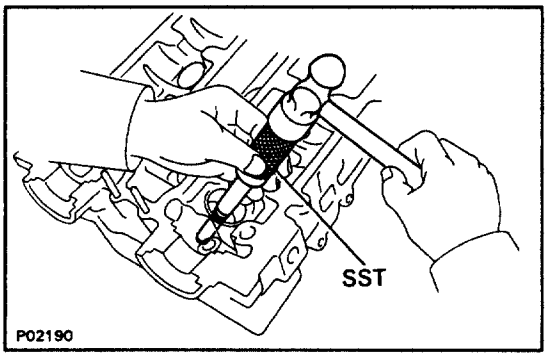
If the clearance is greater than maximum, replace the valve and guide bushing.

6. IF NECESSARY, REPLACE VALVE GUIDE BUSHINGS

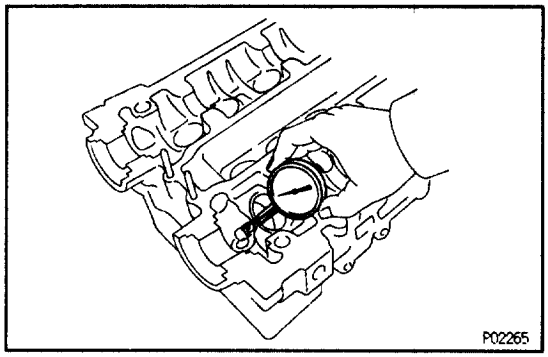
(a) Using SST and a hammer, tap out the guide bushing.

SST 09201–10000 (09201–01060).

09608–30022 (09608–05010)



(b) Using a caliper gauge, measure the bushing bore diameter of the cylinder head.



Both intake and exhaust

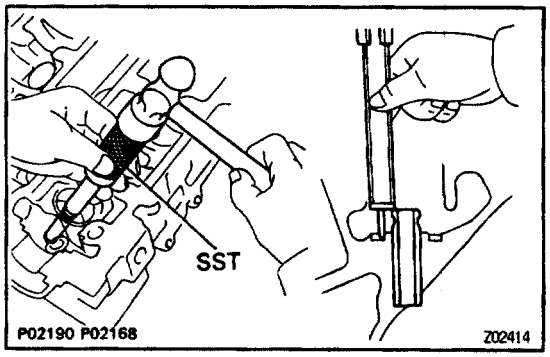
Bushing bore diameter mm (in.)	Bushing size
10.985–11.006 mm (0.4325–0.4333 in.)	Use STD
11.035–11.056 mm (0.4344–0.4353 in.)	Use O/S 0.05

Select a new guide bushing (STD or O/S 0.05).

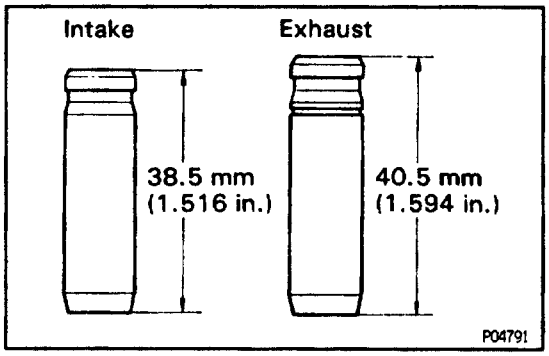
(d) If the bushing bore diameter of the cylinder head is greater than 11.006 mm (0.4333 in.), machine the bushing bore to the following dimension:

11.035–11.056 mm (0.4344–0.4353 in.)

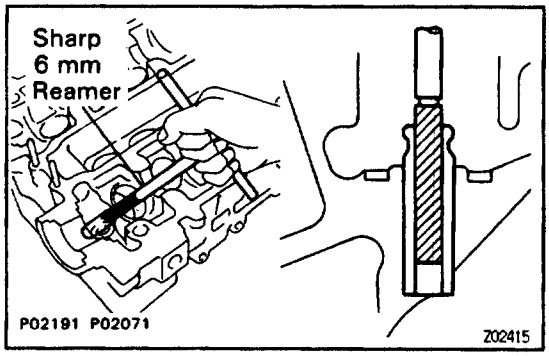
If the bushing bore diameter of the cylinder head is greater than 11.056 mm (0.4353 in.), replace the cylinder head.



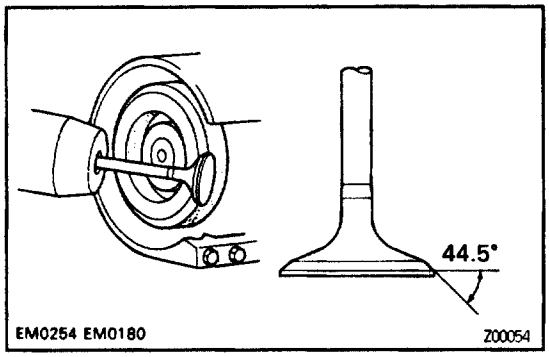
(d) Using SST and a hammer, tap in a new guide bushing to the specified protrusion height.
SST 09201–10000 (09201–01060), 09608–30022 (09608–05010)
Protrusion height:
Intake
12.3–12.7 mm (0.484–0.500 in.)
Exhaust
11.4–11.8 mm (0.449–0.465 in.)



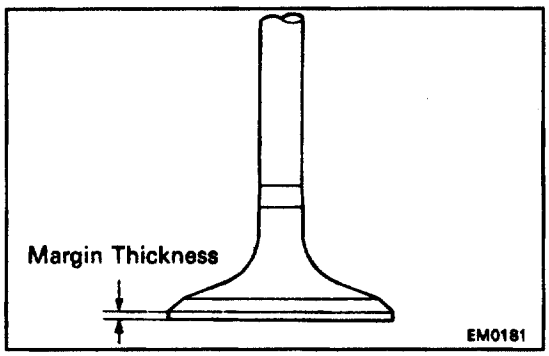
HINT: Different bushings are used for the intake and exhaust.



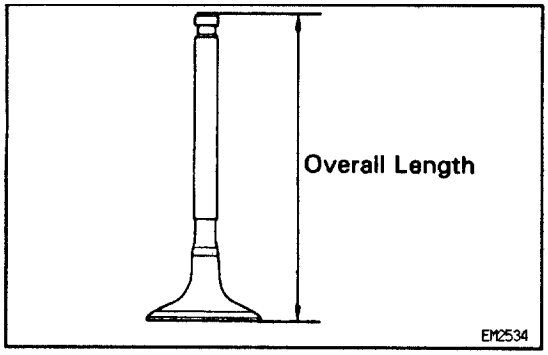
(e) Using a sharp 6 mm reamer, ream the guide bushing to obtain the standard specified clearance (See step 6) between the guide bushing and valve stem.



7. INSPECT AND GRIND VALVES
(a) Grind the valve enough to remove pits and carbon.
(b) Check that the valve is ground to the correct valve face angle.
Valve face angle:
44.5°



(c) Check the valve head margin thickness.
Standard margin thickness:
0.8–1.2 mm (0.031–0.047 in.)
Minimum margin thickness:
0.5 mm (0.020 in.)
If the margin thickness is less than minimum, replace the valve.



(d) Check the valve overall length.

Standard overall length:

Intake

98.29–98.79 mm (3.8697–3.8894 in.)

Exhaust

98.84–99.34 mm (3.8913–3.9110 in.)

Minimum overall length:

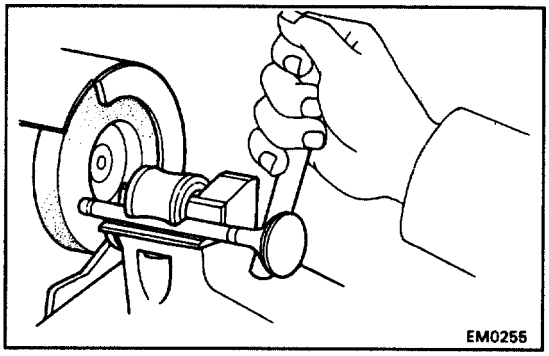
Intake

98.19 mm (3.8657 in.)

Exhaust

98.74 mm (3.8874 in.)

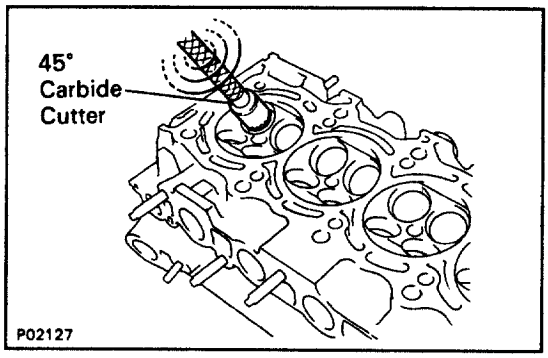
If the overall length is less than minimum, replace the valve.



(e) Check the surface of the valve stem tip for wear.

If the valve stem tip is worn, resurface the tip with a grinder or replace the valve.

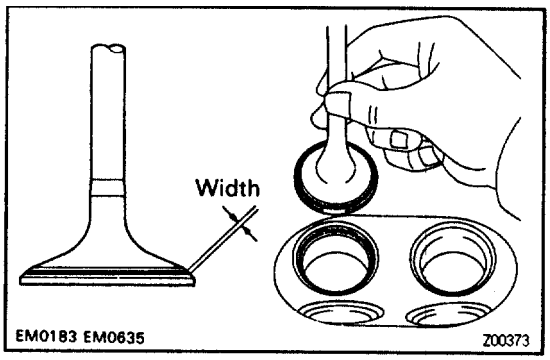
NOTICE: Do not grind off more than the minimum overall length.



8. INSPECT AND CLEAN VALVE SEATS

(a) Using a 45° carbide cutter, resurface the valve seats.

Remove only enough metal to clean the seats.

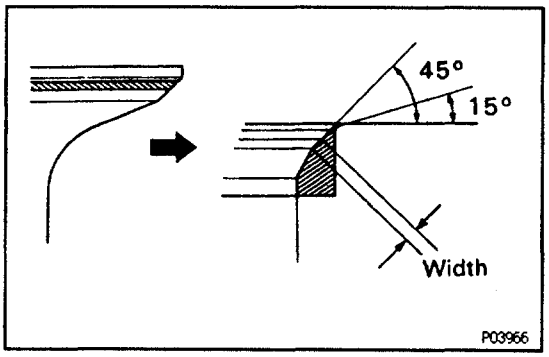


(b) Check the valve seating position.

Apply a thin coat of prussian blue (or white lead) to the valve face. Lightly press the valve against the seat. Do not rotate the valve.

(c) Check the valve face and seat for the following:

- If blue appears 360° around the face, the valve is concentric. If not, replace the valve.
- If blue appears 360° around the valve seat, the guide and face are concentric. If not, resurface the seat.



- Check that the seat contact is in the middle of the valve face with the following width:

Intake

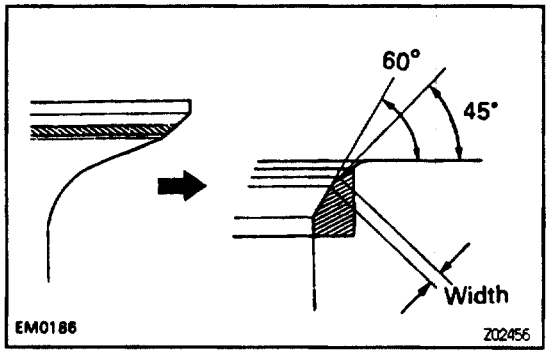
1.0–1.4 mm (0.039–0.055 in.)

Exhaust

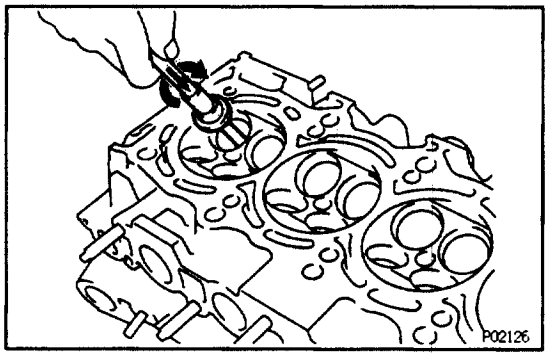
1.2–1.6 mm (0.047–0.063 in.)

If not, correct the valve seats as follows:

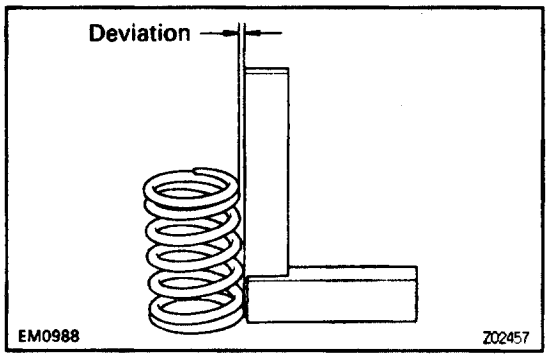
- If the seating is too high on the valve face, use 15° and 45° cutters to correct the seat.



- If the seating is too low on the valve face, use 60° and 45° cutters to correct the seat.



(d) Hand–lap the valve and valve seat with an abrasive compound.
(e) After hand–lapping, clean the valve and valve seat.



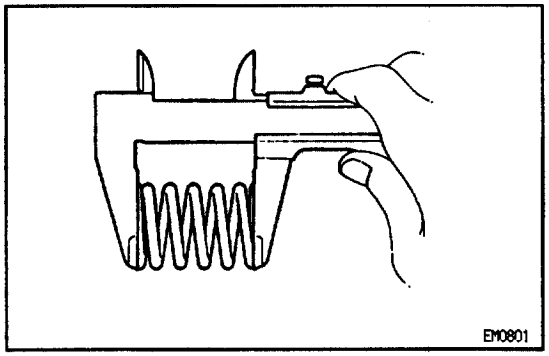
9. INSPECT VALVE SPRINGS

(a) Using a steel square, measure the deviation of the valve spring.

Maximum deviation:

2.0 mm (0.079 in.)

If deviation is greater than maximum, replace the valve spring.



(b) Using vernier calipers, measure the free length of the valve spring.

Free length:

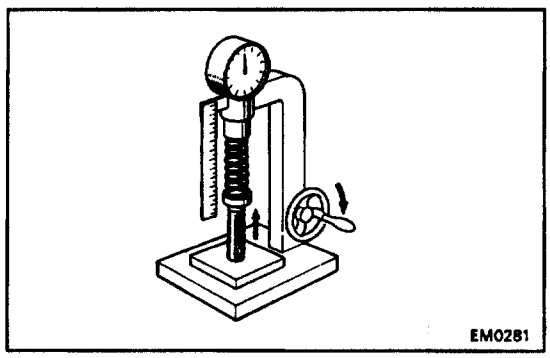
Blue painted mark

41.74 mm (1.6433 in.)

Yellow painted mark

41.70 mm (1.6417 in.)

If the free length is not as specified, replace the valve spring.

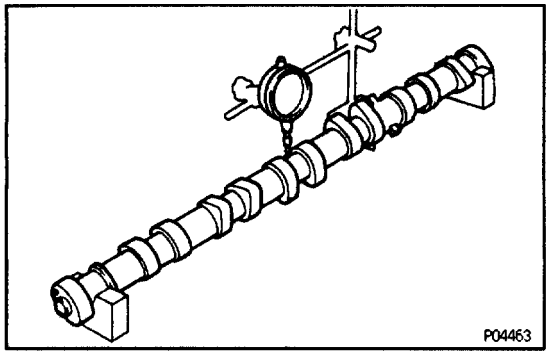


(c) Using a spring tester, measure the tension of the valve spring at the specified installed length.

Installed tension:

186–206 N (19.0–21.0 kgf, 42–46 lbf) at 34.5 mm (1.358 in.)

If the installed tension is not as specified, replace the valve spring.



10. INSPECT CAMSHAFTS AND BEARINGS

A. Inspect camshaft for runout

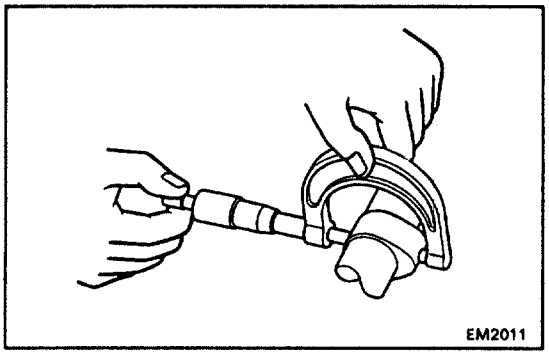
(a) Place the camshaft on V–blocks.

(b) Using a dial indicator, measure the circle runout at the center journal.

Maximum circle runout:

0.08 mm “(0.0031 in.)

If the circle runout is greater than maximum, replace the camshaft.



B. Inspect cam lobes

Using a micrometer, measure the cam lobe height.

Standard cam lobe height:

Intake

44.570–44.670 mm (1.7547–1.7587 in.)

Exhaust

44.770–44.870 mm (1.7626–1.7665 in.)

Maximum cam lobe height:

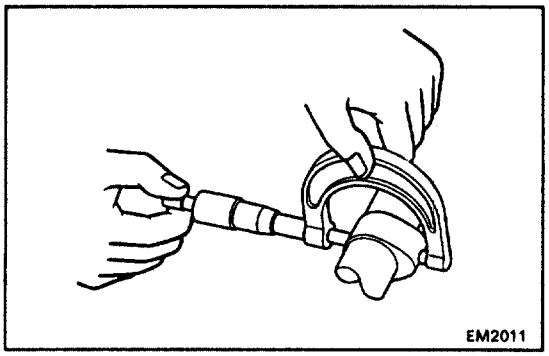
Intake

44.42 mm (1.7488 in.)

Exhaust

44.62 mm (1.7567 in.)

If the cam lobe height is less than minimum, replace the camshaft.



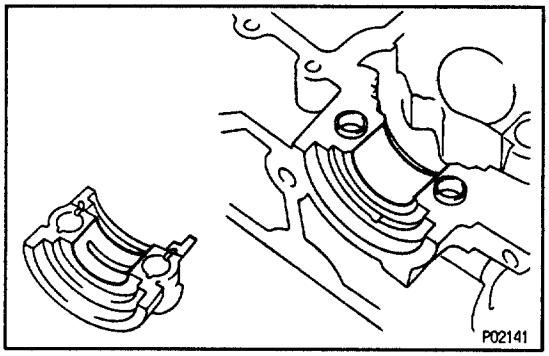
C. Inspect camshaft journals

Using a micrometer, measure the journal diameter.

Journal diameter:

28.949–28.965 mm (1.1397–1.1404 in.)

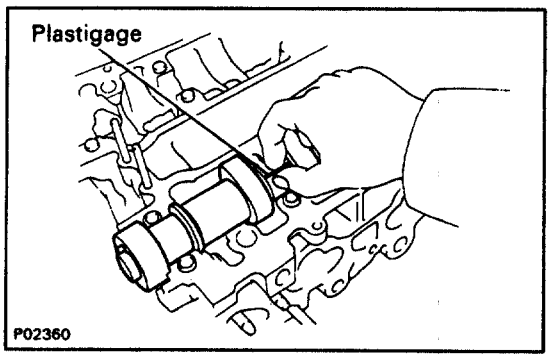
If the journal diameter is not as specified, check the oil clearance.



D. Inspect camshaft bearings

Check the bearings for flaking and scoring.

If the bearings are damaged, replace the bearing caps and cylinder head as a set.

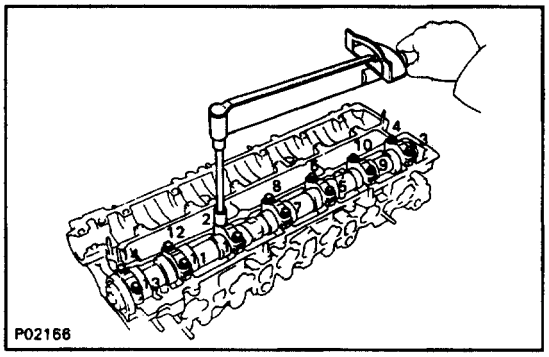


E. Inspect camshaft journal oil clearance

(a) Clean the bearing caps and camshaft journals.

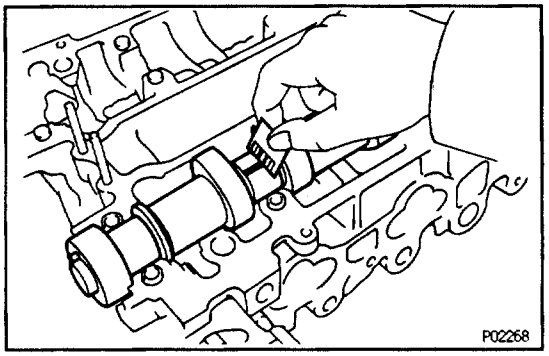
(b) Place the camshafts on the cylinder head.

(c) Lay a strip of Plastigage across each of the camshaft journals.



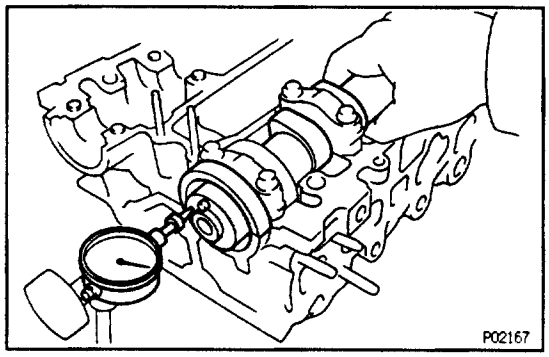
(d) Install the bearing caps.
(See step 2 in cylinder head installation (2JZ–GE))
Torque: 20 N·m (200 kgf·cm, 14 ft·lbf)
NOTICE: Do not turn the camshaft.

(e) Remove the bearing caps.



(f) Measure the Plastigage at its widest point.
Standard oil clearance:
0.035–0.072 mm (0.0014–0.0028 in.)
Maximum oil clearance:
0.10 mm (0.0039 in.)
If the oil clearance is greater than maximum, replace the camshaft. If necessary, replace the bearing caps and cylinder head as a set.

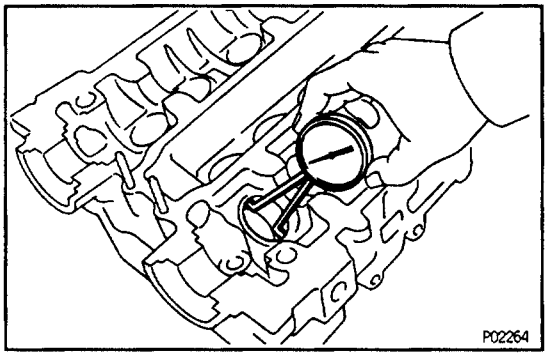
(g) Completely remove the Plastigage.



F. Inspect camshaft thrust clearance

(a) Install the camshafts.
(See step 2 in cylinder head installation (2JZ–GE))

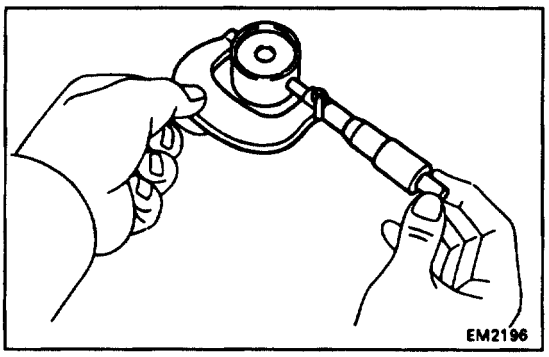
(b) Using a dial indicator, measure the thrust clearance while moving the camshaft back and forth.
Standard thrust clearance:
0.080–0.190 mm (0.0031–0.0075 in.)
Maximum thrust clearance:
0.30 mm (0.0118 in.)
If the thrust clearance is greater than maximum, replace the camshaft. If necessary, replace the bearing caps and cylinder head as a set.



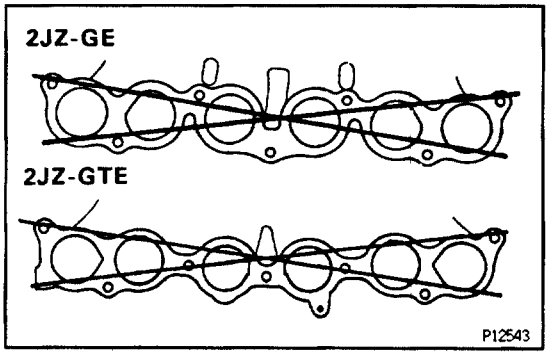
11. INSPECT VALVE LIFTERS AND LIFTER BORES

(a) Using a caliper gauge, measure the lifter bore diameter of the cylinder head.
Lifter bore diameter:
31.000–31.016 mm (1.2205–1.2211 in.)

(b) Using a micrometer, measure the lifter diameter.
Lifter diameter:
30.966–30.976 mm (1.2191–1.2195 in.)



(c) Subtract the lifter diameter measurement from the lifter bore diameter measurement.
Standard oil clearance:
0.024–0.050 mm (0.0009–0.0020 in.)
Maximum oil clearance:
0.07 mm (0.0028 in.)
If the oil clearance is greater than maximum, replace the lifter. If necessary, replace the cylinder head.



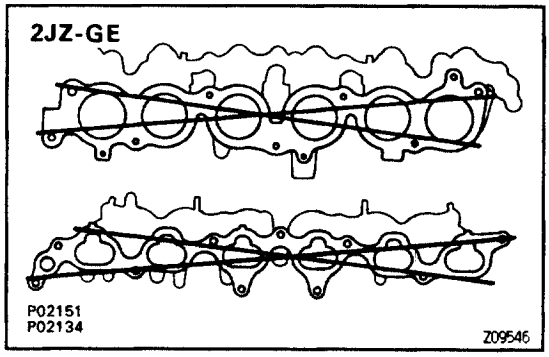
12. INSPECT AIR INTAKE CHAMBER

Using a precision straight edge and feeler gauge, measure the surfaces contacting the intake manifold for warpage.

Maximum warpage:

0.15 mm (0.0059 in.)

If warpage is greater than maximum, replace the chamber.



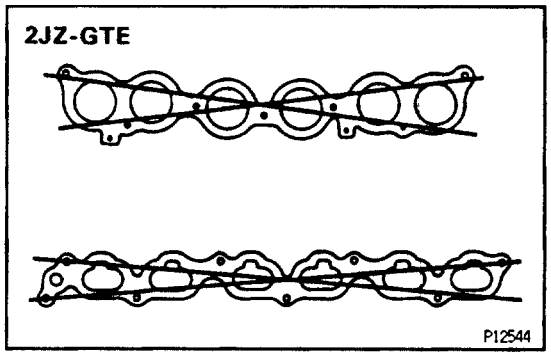
13. INSPECT INTAKE MANIFOLD

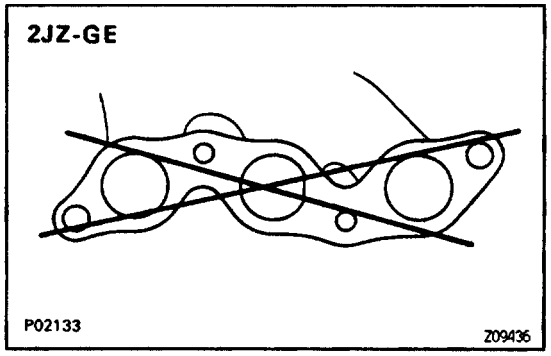
Using a precision straight edge and feeler gauge, measure the surfaces contacting the cylinder head and air intake chamber for warpage.

Maximum warpage:

0.15 mm (0.0059 in.)

If warpage is greater than maximum, replace the manifold.





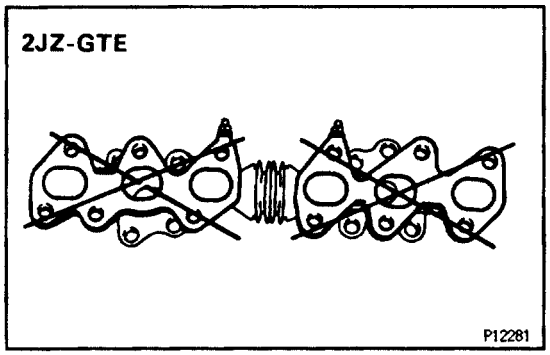
14. 2JZ–GE:
INSPECT EXHAUST MANIFOLDS

Using a precision straight edge and feeler gauge, measure the surfaces contacting the cylinder head for warpage.

Maximum warpage:

0.50 mm (0.0196 in.)

If warpage is greater than maximum, replace the manifold.



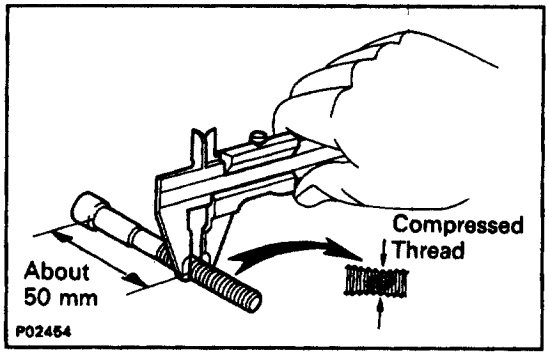
15. 2JZ–GTE:
INSPECT EXHAUST MANIFOLD

Using a precision straight edge and feeler gauge, measure the surfaces contacting the cylinder head for warpage.

Maximum warpage:

0.80 mm (0.0315 in.)

If warpage is greater than maximum, replace the manifold.



16. INSPECT CYLINDER HEAD BOLTS

Using a vernier caliper, measure the thread outside diameter of the bolt.

Standard outside diameter:

10.8–11.0 mm (0.425–0.433 in.)

Minimum outside diameter:

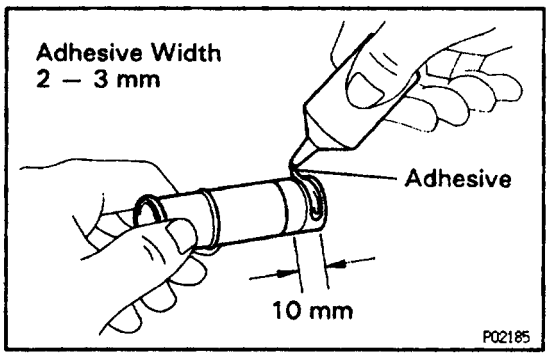
10.7 mm (0.421 in.)

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

CYLINDER HEAD ASSEMBLY

HINT:

- Thoroughly clean all parts to be assembled.
- Before installing the parts, apply new engine oil to all sliding and rotating surfaces.
- Replace all gaskets and oil seals with new ones.



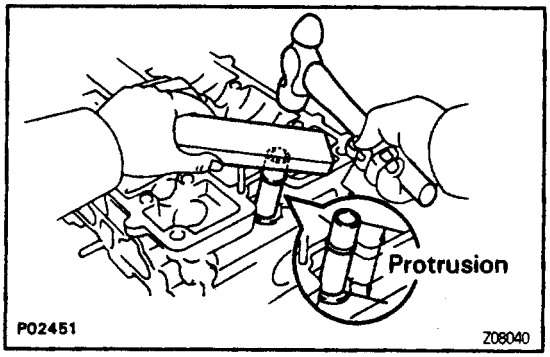
1. INSTALL HEATER UNION

HINT: When using a new cylinder head, a new heater union must be installed.

(a) Apply adhesive to the end of the heater union as shown in the illustration.

Adhesive:

Part No. 08833–00070, THREE BOND 1324 or equivalent



(b) Using a wooden block and hammer, tap in a new heater union, leaving standard position protruding from the cylinder head.

Standard protrusion:

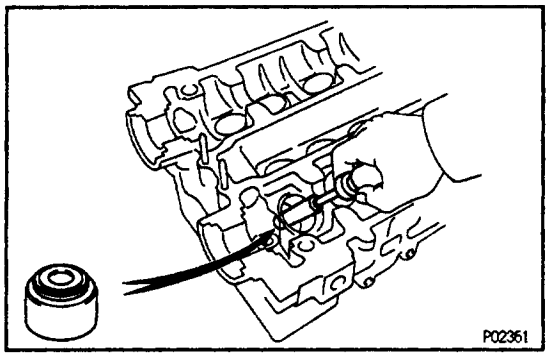
2JZ–GE

48 mm (1.89 in.)

2JZ–GTE

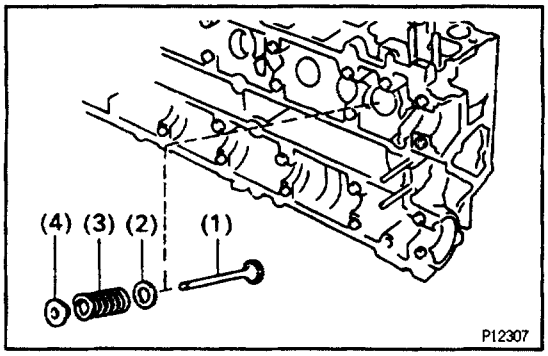
73 mm (2.87 in.)

NOTICE: Do not tap it in too far.

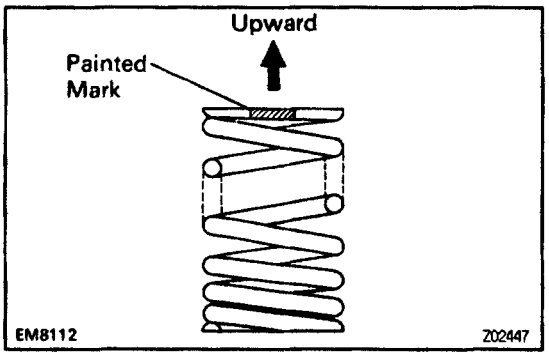


2. INSTALL VALVES

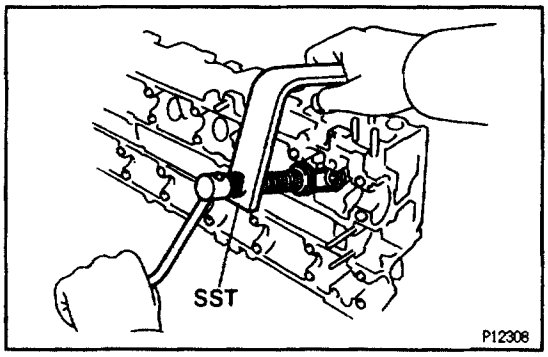
(a) Install a new oil seal on the valve guide bushing.



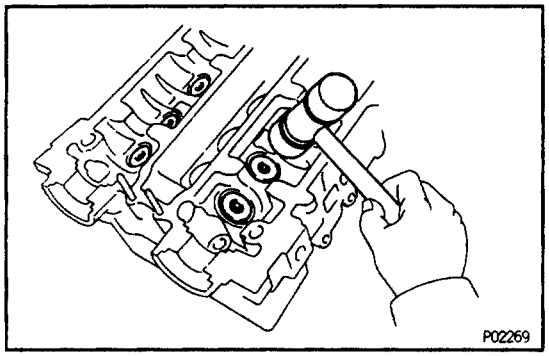
(b) Install these parts:
(1) Valve
(2) Spring seat
(3) Valve spring
(4) Spring retainer



HINT: Install the valve spring, facing the painted mark upward.



(c) Using SST, compress the valve spring and place the 2 keepers around the valve stem.
SST 09202–70010



(d) Using a plastic–faced hammer, lightly tap the valve stem tip to ensure a proper fit.

3. INSTALL VALVE LIFTERS AND SHIMS

(a) Install the valve lifter and shim.
(b) Check that the valve lifter rotates smoothly by hand.

4. INSTALL EGR COOLER

Install a new gasket and the EGR cooler with the 8 bolts.
Torque: 8.8 N·m (90 kgf·cm, 78 in.·lbf)

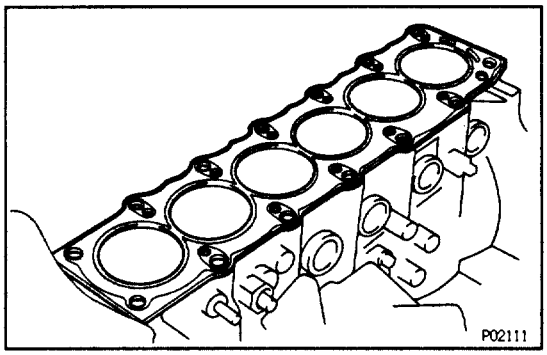
5. 2JZ–GE:
INSTALL ECT SENSOR AND SENDER GAUGE
Torque: 20 N·m (200 kgf·cm, 14 ft·lbf)

6. 2JZ–GE:
INSTALL GROUND STRAP AND THROTTLE CABLE BRACKET

7. 2JZ–GE:
INSTALL ENGINE HANGERS
Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)

8. **2JZ–GTE:**
INSTALL CAMSHAFT POSITION SENSORS
Install the gasket and sensor with the 2 bolts.
Torque: 8.8 N·m (90 kgf·cm, 78 in.·lbf)

9. **2JZ–GTE:**
INSTALL ENGINE HANGERS AND GROUND STRAP
Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)



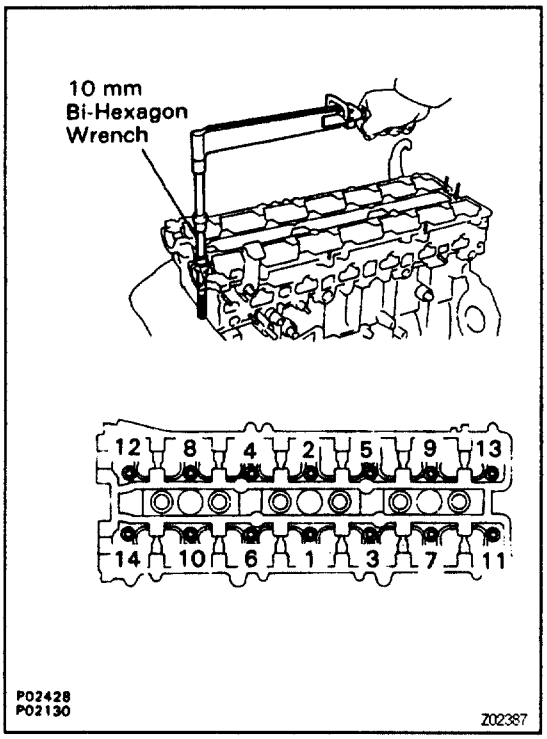
CYLINDER HEAD INSTALLATION (2JZ–GE)

1. **INSTALL CYLINDER HEAD**

A. Place cylinder head on cylinder block

(a) Place a new cylinder head gasket in position on the cylinder block.
NOTICE: Be sure to install it correctly.

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

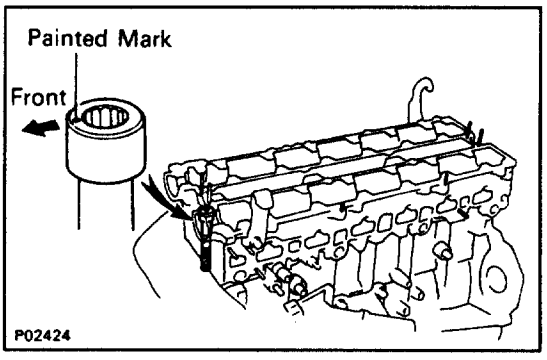


B. Install cylinder head bolts
HINT:
- The cylinder head bolts are tightened in 2 progressive steps (steps (c) and (f)).
- If any of bolts break or deform, replace them.

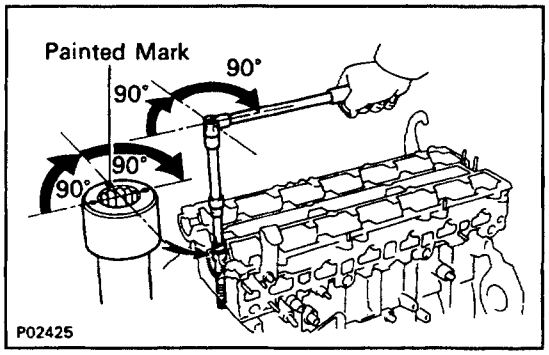
(a) Apply a light coat of engine oil on the threads and under the heads of the cylinder head bolts.

(b) Install the 14 plate washers to each cylinder head bolt.

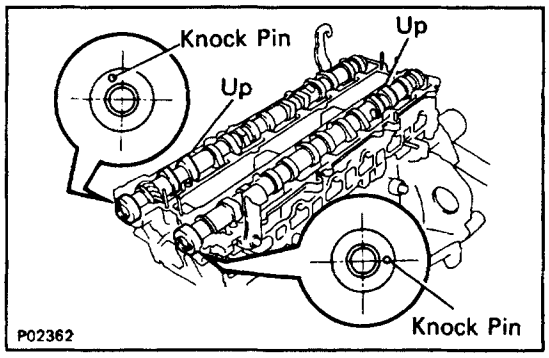
(c) Using a 10 mm bi–hexagon wrench, uniformly tighten the cylinder head bolts, in several passes, in the sequence shown.
Torque: 34 N·m (350 kgf·cm, 25 ft·lbf)
If any of the bolts do not meet the torque specification, replace the bolt.



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

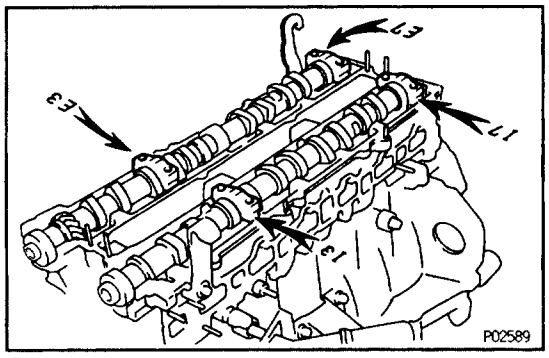


(e) Retighten the cylinder head bolts by 90° in the numerical order shown in the illustration on previous page.
(f) Retighten cylinder head bolts by an additional 90° shown in the illustration on previous page.
(g) Check that the painted mark is now turned to the rear.

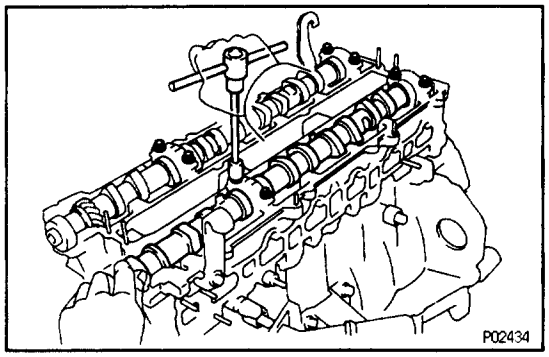


2. INSTALL CAMSHAFTS

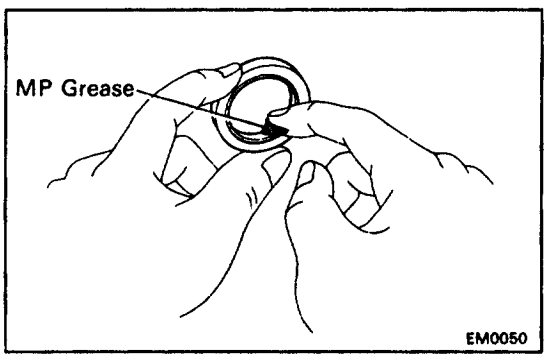
(a) Apply engine oil to the thrust portion of the camshaft.
(b) Place the camshaft on the cylinder head with the cam lobe facing up as shown.



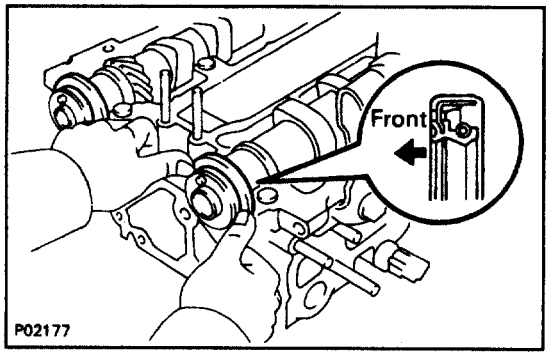
(c) Place the No.3 and No.7 bearing caps in their proper location.



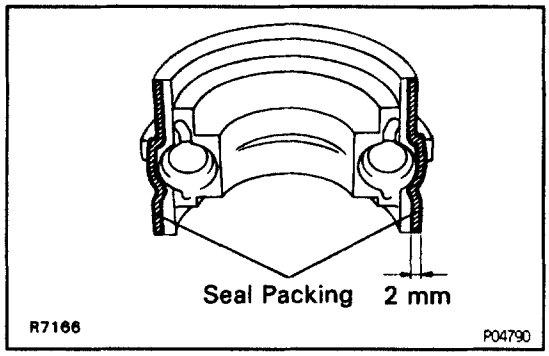
(d) Apply a light coat of engine oil on the threads and under the heads of the bearing cap bolts.
(e) Temporarily tighten these bearing cap bolts uniformly and alternately, in several passes, until the bearing caps are snug with the cylinder head.



(f) Apply MP grease to a new camshaft oil seal lip.

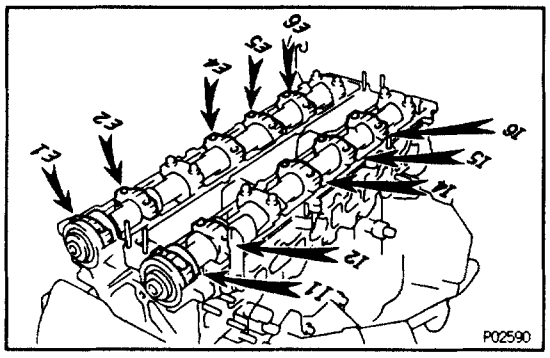


(g) Install the 2 oil seals to the camshafts.

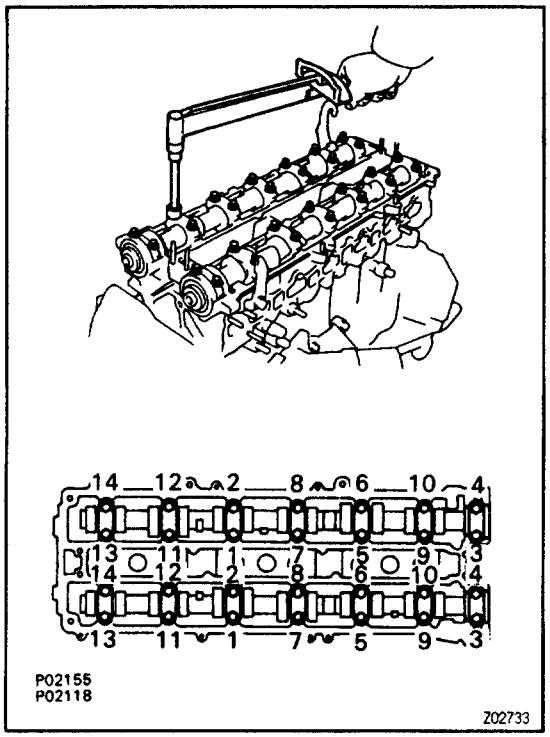


(h) Clean the installed surfaces of the No.1 bearing cap and cylinder head with cleaner.

(i) Apply seal packing to the No.1 bearing cap as shown.
Seal packing:
Part No. 08826–00080 or equivalent

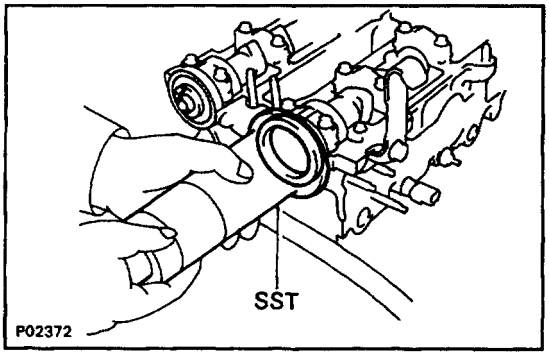


(j) Install the No.1, No.2, No.4, No.5 and No.6 bearing caps in their proper locations.

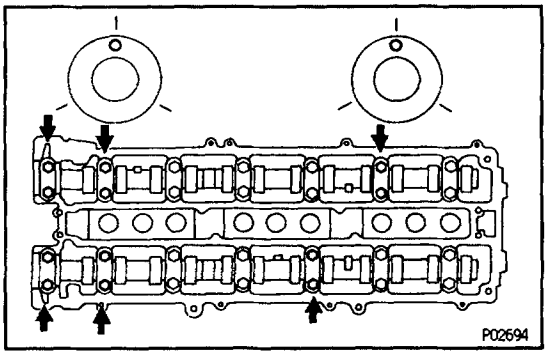


(k) Apply a light coat of engine oil on the threads and under the heads of the bearing cap bolts.

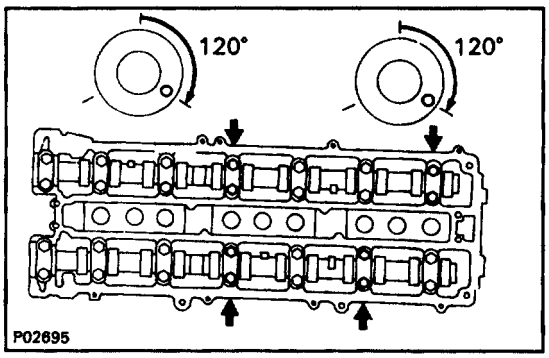
(l) Install and uniformly tighten the 14 bearing cap bolts on one side, in several passes, in the sequence shown.
Torque: 20 N·m (200 kgf·cm, 14 ft·lbf)



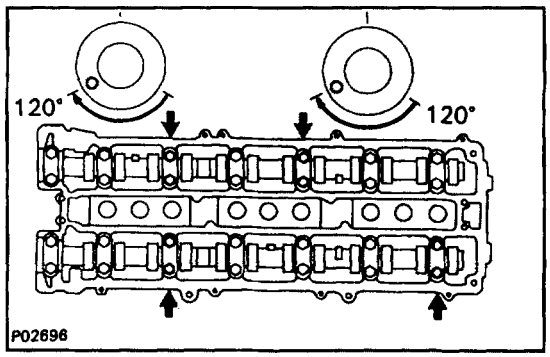
(m) Using SST, push the 2 oil seals in as far as they can go.
SST 09316–60010 (09316–00010, 09316–00050)



(n) Rotate the camshaft with a wrench at the hexagon position, bring the forward straight pin up.
(o) Loosen the 3 bearing cap bolts as shown, until they can be turned by hand; retighten, in several passes.
Torque: 20 N·m (200 kgf·cm, 14 ft·lbf)

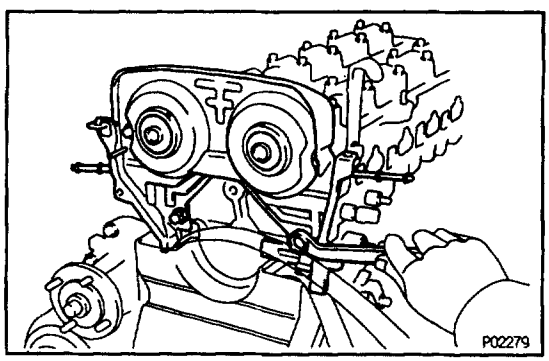


(p) Turn the camshaft 1/3 of revolution.
(q) Loosen the 2 bearing cap bolts as shown, until they can be turned by hand; retighten, in several passes.
Torque: 20 N·m (200 kgf·cm, 14 ft·lbf)

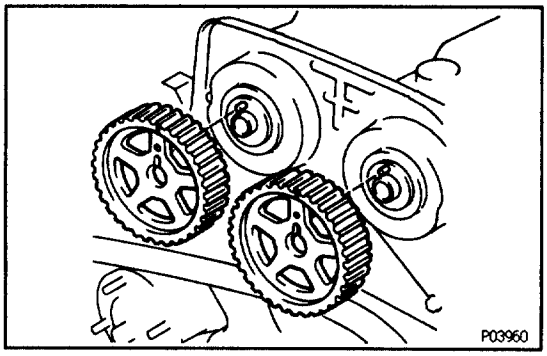


(r) Turn the camshaft a further 1/3 of a revolution.
(s) Loosen the 2 bearing cap bolts as shown, until they can be turned by hand; retighten, in several passes.
Torque: 20 N·m (200 kgf·cm, 14 ft·lbf)

3. CHECK AND ADJUST VALVE CLEARANCE
(See steps 5 to 6 in valve clearance inspection and adjustment)
Turn the camshaft, and position the cam lobe upward, check and adjust the valve clearance.



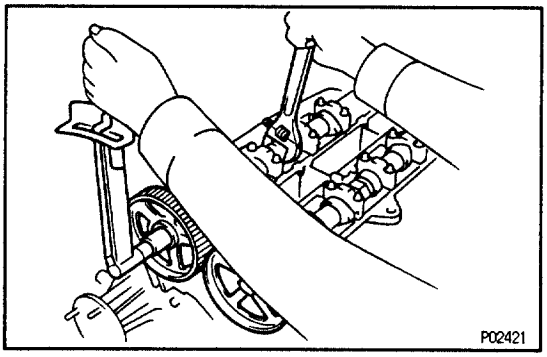
4. INSTALL NO.4 TIMING BELT COVER
Install the timing belt cover with 4 bolts.
Torque: 8.8 N·m (90 kgf·cm, 78 in.·lbf)



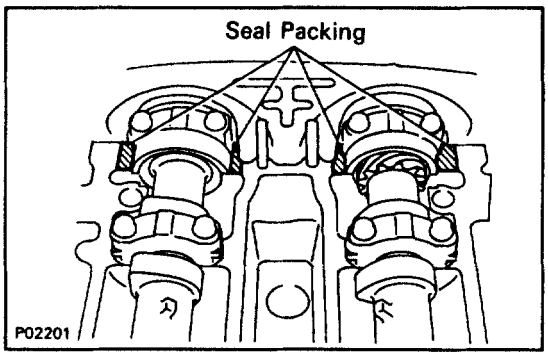
5. INSTALL CAMSHAFT TIMING PULLEYS

(a) Align the camshaft knock pin with the groove in the pulley, and slide on the pulley.

(b) Temporarily install the timing pulley bolt.



(c) Hold the hexagon portion of the camshaft with a wrench, and tighten the timing pulley bolt.
Torque: 79 N·m (810 kgf·cm, 59 ft·lbf)



6. INSTALL NO.3, NO.1 AND NO.2 CYLINDER HEAD COVERS

(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

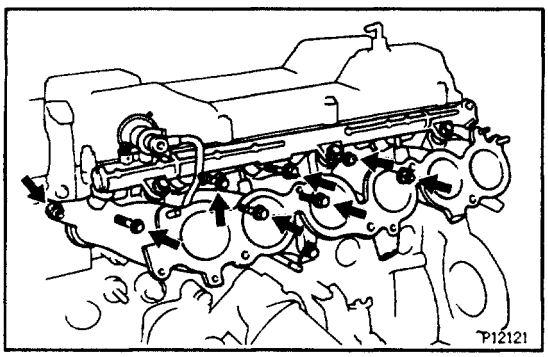
(c) Install the gaskets to the No.1 and No.2 cylinder head covers.

(d) Install the No.2 cylinder head cover with the 4 bolts.
Torque: 8.3 N·m (85 kgf·cm, 74 in.·lbf)

(e) Install the No.1 cylinder head cover with the 4 bolts.
Torque: 8.3 N·m (85 kgf·cm, 74 in.·lbf)

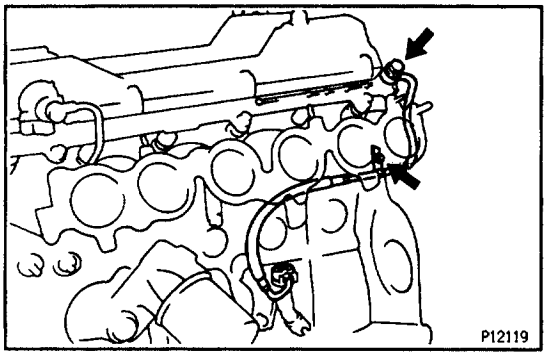
(f) Install the No.3 cylinder head cover with the 4 bolts and 4 nuts.
Torque: 8.3 N·m (85 kgf·cm, 74 in.·lbf)

(g) Install the PCV valve.



7. INSTALL INTAKE MANIFOLD AND DELIVERY PIPE ASSEMBLY

Install a new gasket, the intake manifold and delivery pipe assembly with the 6 bolts and 2 nuts.
Torque: 27 N·m (280 kgf·cm, 20 ft·lbf)



8. INSTALL FUEL INLET PIPE

(a) Connect the fuel inlet pipe with 2 new gaskets and the union bolt.
Torque: 42 N·m (420 kgf·cm, 30 ft·lbf)

(b) Install the clamp bolt to the intake manifold.

9. INSTALL FUEL PRESSURE PULSATION DAMPER
(See fuel pressure pulsation damper installation in SFI System)

10. INSTALL INTAKE MANIFOLD STAY
Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)

11. INSTALL WATER OUTLET AND NO.1 BYPASS HOSE ASSEMBLY

12. CONNECT ENGINE WIRE

(a) Install the engine wire protector to the intake manifold with the 3 nuts.

(b) Connect these connectors:
- 6 injector connectors

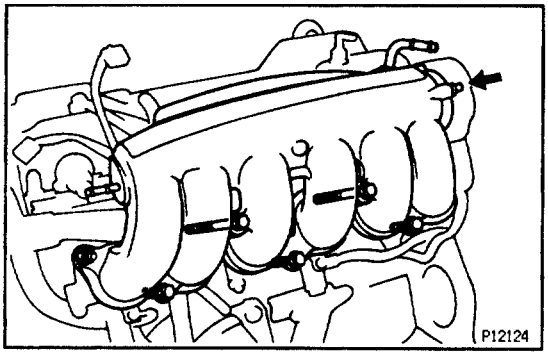
HINT: The No.1, No.3 and No.5 injector connectors are dark gray, and the No.2, No.4 and No.6 injector connectors are gray.
- ECT sensor connector
- ECT sender gauge connector

(c) Install the 2 wire clamps to the intake manifold with the bolts.

(d) Install the 2 ground straps to the intake manifold with the bolts.

(e) Install the engine wire bracket to the water pump with the bolt.

13. INSTALL VACUUM CONTROL VALVE SET
Torque: 21 N·m (210 kgf·cm, 15 ft·lbf)



14. INSTALL AIR INTAKE CHAMBER

(a) Install a new gasket and the intake chamber with the 5 bolts and nut.
Torque: 27 N·m (280 kgf·cm, 20 ft·lbf)

(b) Install the bolt holding the engine wire protector to the air intake chamber.

(c) Except California:
Connect the vacuum sensing hose to the fuel pressure regulator.

15. INSTALL STARTER
(See starter removal in Starting System)

16. INSTALL OIL DIPSTICK GUIDES FOR ENGINE AND TRANSMISSION

(a) Install a new O–ring to the dipstick guide.

(b) Apply soapy water to the O–ring.

(c) Connect the dipstick guide end to the oil pan.

(d) Install the 2 dipstick guides with the 2 bolts.

17. INSTALL ENGINE WIRE BRACKET

18. CONNECT FUEL RETURN HOSE

19. INSTALL WATER BYPASS OUTLET AND NO.1 WATER BYPASS PIPE
(See step 3 in water pump installation in Cooling System)

20. INSTALL TIMING BELT
(See steps 11 to 17 in timing belt removal)

21. INSTALL SPARK PLUGS

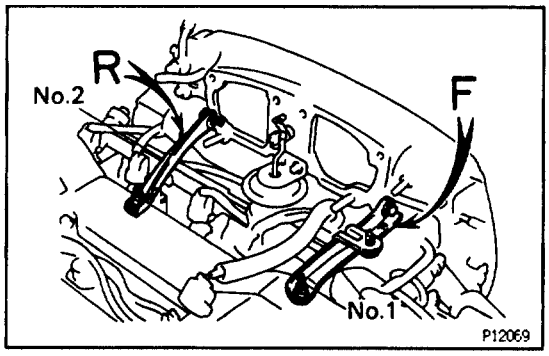
22. INSTALL DISTRIBUTOR AND CORDS ASSEMBLY
(See steps 2, 3 and 5 in distributor installation in Ignition System)

23. CONNECT HIGH–TENSION CORDS TO CYLINDER HEAD COVERS
(See step 1 in high–tension cords and cord clamps installation in Ignition System)

24. INSTALL NO.3 TIMING BELT COVER

25. INSTALL CYLINDER HEAD REAR COVER

26. INSTALL NO.2 VACUUM PIPE AND VSV ASSEMBLY



27. INSTALL AIR INTAKE CHAMBER STAYS
HINT: The No.1 stay is marked with ”F”, and No.2 stay is marked with ”R”.

(a) Install the No.1 stay with the bolt and nut.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

(a) Install the No.2 stay with the bolt and nut.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

28. INSTALL THROTTLE BODY AND INTAKE AIR CONNECTOR ASSEMBLY
(See in injector removal in SFI System)

29. CONNECT EVAP HOSE

30. CONNECT BRAKE BOOSTER VACUUM HOSE

31. INSTALL PS PUMP

(a) Install the pump rear stay with the 2 bolts.
Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)

(b) Install the pump housing with the 2 bolts.
Torque: 58 N·m (590 kgf·cm, 43 ft·lbf)

(c) Connect these hoses:
- Air hose to No.4 timing belt cover
- Air hose to air intake chamber

32. INSTALL EXHAUST MANIFOLDS

(a) Install a new gasket and the exhaust manifold with 4 new nuts. Install the No.1 and No.2 exhaust manifolds.
Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)

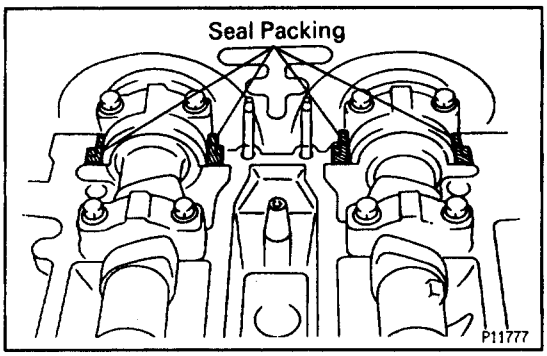
(b) Connect the 2 (main heated) oxygen sensor connectors.

(c) Except California:
Install the manifold heat insulator with the 4 nuts.

33. INSTALL NO.2 FRONT EXHAUST PIPE
(See step 6 in engine installation in Engine Mechanical)
34. INSTALL DRIVE BELT
35. INSTALL AIR CLEANER, VAF METER AND INTAKE AIR CONNECTOR PIPE ASSEMBLY
(See step 22 in engine installation in Engine Mechanical)
36. INSTALL AIR CLEANER DUCT
37. FILL WITH ENGINE COOLANT
38. START ENGINE AND CHECK FOR LEAKS
39. CHECK IGNITION TIMING
(See steps 8 to 12 in distributor installation in Ignition System)
40. INSTALL ENGINE UNDER COVER
41. PERFORM ROAD TEST
Check for abnormal noise, shock, slippage, correct shift points and smooth operation.
42. RECHECK ENGINE COOLANT LEVEL

CYLINDER HEAD INSTALLATION (2JZ–GTE)

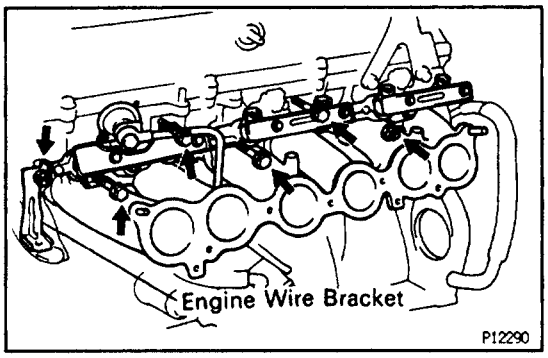
1. INSTALL CYLINDER HEAD
(See step 1 in cylinder head installation (2JZ–GE))
2. INSTALL CAMSHAFTS
(See step 2 ((a) to (m)) in cylinder head installation (2JZ–GE))
3. CHECK AND ADJUST VALVE CLEARANCE
(See steps 5 to 6 in valve clearance inspection and adjustment)
Turn the camshaft, and position the cam lobe upward, check and adjust the valve clearance.
4. INSTALL NO.4 TIMING BELT COVER
(See step 4 in cylinder head installation (2JZ–GE))
5. INSTALL CAMSHAFT TIMING PULLEYS
(See step 5 in cylinder head installation (2JZ–GE))



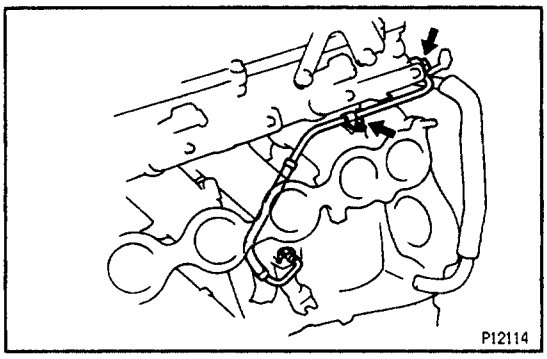
6. INSTALL NO.1 AND NO.2 CYLINDER HEAD COVERS
(a) Remove any old packing (FIPG) material.
(b) Apply seal packing to the cylinder head as shown in the illustration.
Seal packing:
Part No. 08826–00080 or equivalent
(c) Install the gaskets to the No.1 and No.2 cylinder head covers.

(d) Install the seal washers to the mounting bolts.
(e) Install the No.2 cylinder head cover with the 4 seal washers and 4 bolts.
Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)
(f) Install the No.1 cylinder head cover with the 4 seal washers and 4 bolts.
Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)
(g) Install the PCV valve.
(h) Install the cruise control actuator cable bracket and IAC valve pipe clamp with the 2 bolts.

7. INSTALL SPARK PLUGS
8. INSTALL IGNITION COILS ASSEMBLIES
(See ignition coils installation in Ignition System)
9. INSTALL TIMING BELT
(See steps 11 to 17 in timing belt installation)



10. INSTALL INTAKE MANIFOLD AND DELIVERY PIPE ASSEMBLY
Install a new gasket, the intake manifold, delivery pipe assembly and engine wire bracket with the 4 bolts and 2 nuts.
Torque: 27 N·m (280 kgf·cm, 20 ft·lbf)



11. INSTALL FUEL INLET PIPE
(a) Connect the fuel inlet pipe with 2 new gaskets and the union bolt.
Torque: 42 N·m (420 kgf·cm, 30 ft·lbf)
(b) Install the clamp bolt to the intake manifold.

12. INSTALL FUEL PRESSURE PULSATION DAMPER
(See fuel pressure pulsation damper installation in SFI System)
13. INSTALL PRESSURE TANK AND VSV ASSEMBLY
Torque: 21 N·m (210 kgf·cm, 15 ft·lbf)
14. INSTALL STATER
(See starter installation in Starting System)
15. CONNECT ENGINE WIRE
(a) Install the engine wire protector to the intake manifold with the nut.
(b) Install the 2 ground straps to the intake manifold with the bolts.
(c) Connect these connectors and clamps:
- VSV connector fo EVAP

- 6 injectors connectors

HINT: The No.1, No.3 and No.5 injector connectors are dark gray, and the No.2, No.4 and No.6 injector connectors are gray.

- 2 camshaft position sensor connectors
- 3 engine wire clamps to injector holders

16. INSTALL AIR INTAKE CHAMBER ASSEMBLY
(See injector installation in SFI System)

17. CONNECT FUEL RETURN HOSE

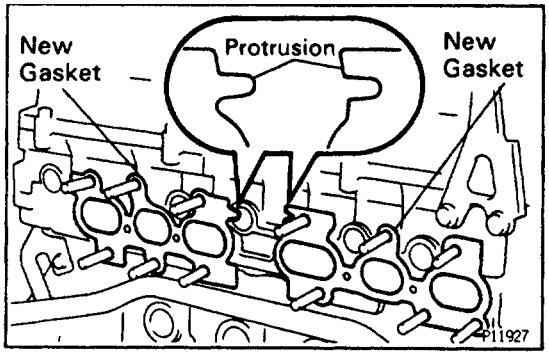
18. INSTALL PS PUMP
Torque: 58 N·m (590 kgf·cm, 43 ft·lbf)

19. INSTALL WATER OUTLET AND NO.1 WATER BYPASS PIPE

(a) Install 2 new O–rings to the No.1 water bypass pipe.
(b) Apply soapy water to the O–rings.
(c) Install the No.1 water bypass pipe to the water pump.
(d) Install a new gasket and the water outlet with the 2 bolts.
Torque: 21 N·m (210 kgf·cm, 15 ft·lbf)
(e) Connect the ECT sensor and sender gauge connectors.
(f) Connect the upper radiator hose to the water outlet.

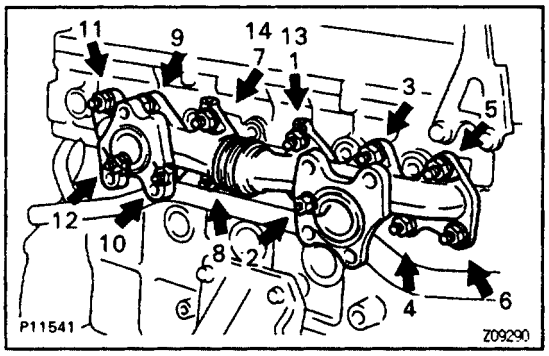
20. INSTALL DRIVE BELT
Install the drive belt by turning the drive belt tensioner clockwise.

21. M/T:
INSTALL DRIVE BELT TENSIONER DAMPER
(See step 19 in timing belt installation)



22. INSTALL EXHAUST MANIFOLD

(a) Place 2 new gaskets to the cylinder head facing the protrusion as shown.



(b) Install the exhaust manifold with 12 new nuts, in several passes, in the sequence shown.
Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)

23. INSTALL TURBOCHARGER
(See turbocharger installation in Turbocharger System)