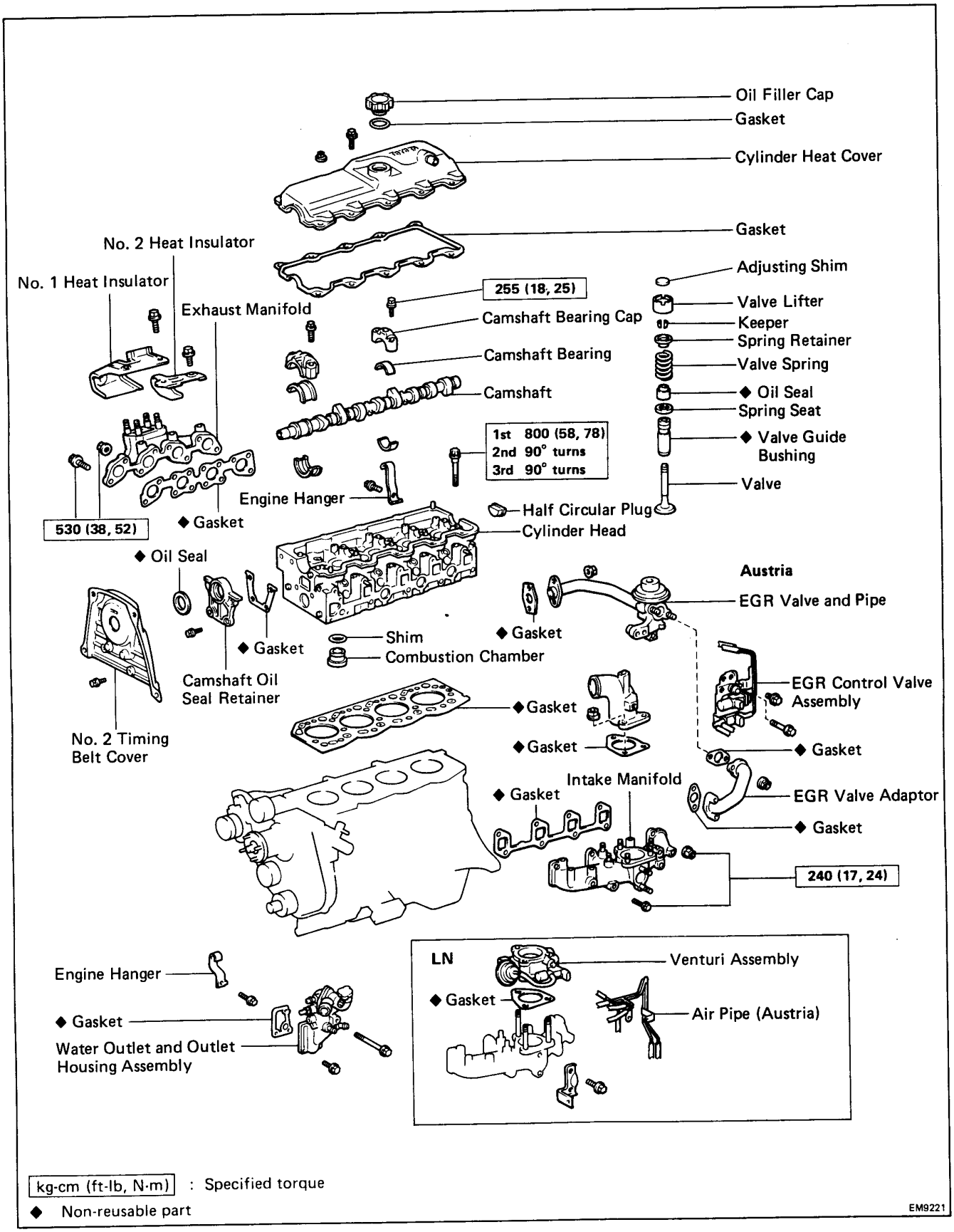
CYLINDER HEAD (2L-T)

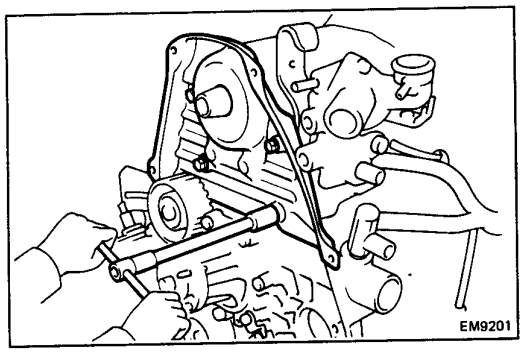
COMPONENTS



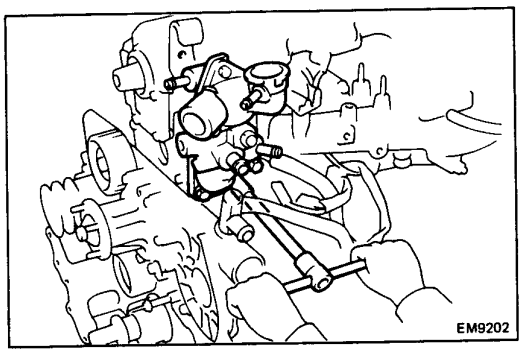
REMOVAL OF CYLINDER HEAD

(See page EM-35)

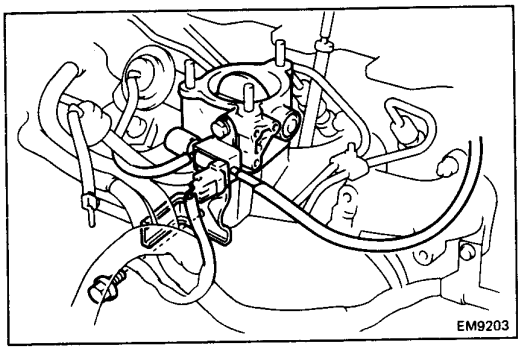
1. DRAIN ENGINE COOLANT (See page CO-4)
2. REMOVE TURBOCHARGER
   (See steps 2 to 7 on pages TC-10 and 11)
3. REMOVE TIMING BELT
   (See steps 2 to 7 on page FU-4)
4. REMOVE INJECTION PUMP
   (See steps 8 to 16 on pages FU-4 and 5)
5. REMOVE INJECTION NOZZLES
6. REMOVE CAMSHAFT TIMING PULLEY



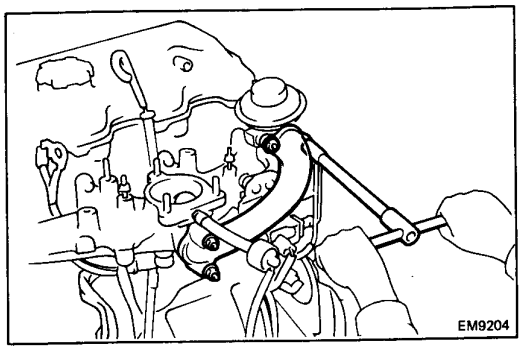
7. REMOVE NO. 2 TIMING BELT COVER
   Remove the four bolts and belt cover.



8. REMOVE WATER OUTLET AND OUTLET HOUSING ASSEMBLY
   (a) Disconnect the water temperature switch connector.
   (b) Disconnect the by-pass hose from the thermo wax of the injection pump.
   (c) Remove the three bolts, water outlet, outlet housing assembly and gasket.
9. REMOVE LH ENGINE HANGER

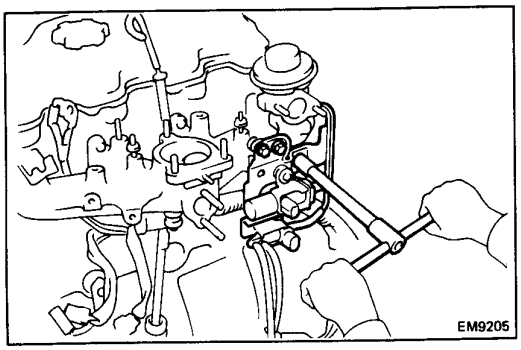


10. (LN)
    REMOVE VENTURI ASSEMBLY
    (a) Disconnect the connector and vacuum hoses from the VSV.
    (b) Remove the venturi assembly and gasket.
    (c) Remove the two bolts and wire support.



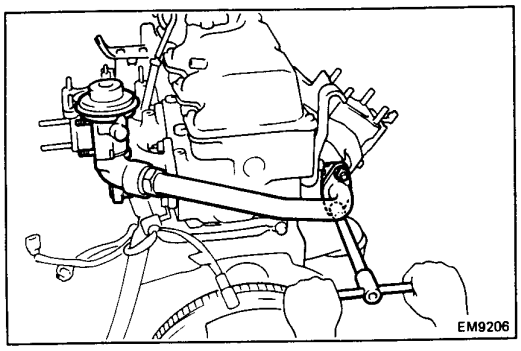
11. (Austria)
REMOVE EGR VALVE, PIPE, VALVE ADAPTOR AND CONTROL VALVE ASSEMBLY

(a) Remove the four nuts, air pipe (LN only), EGR valve adaptor and two gaskets.

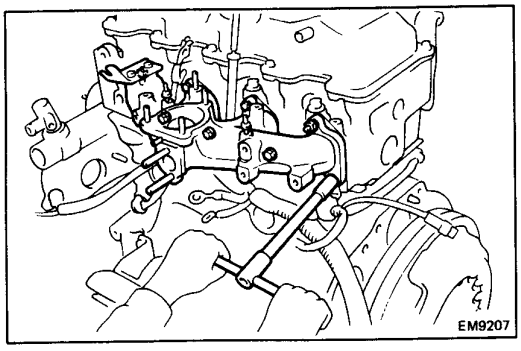


(b) Disconnect the connectors from the VSV and EVRV.

(c) Remove the three bolts and EGR control valve assembly.



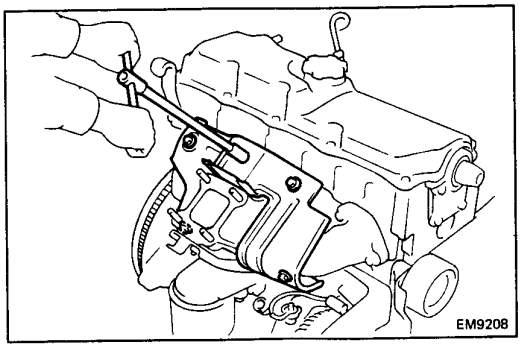
(d) Remove the two nuts, EGR valve with the pipe and gasket.



12. REMOVE INTAKE MANIFOLD

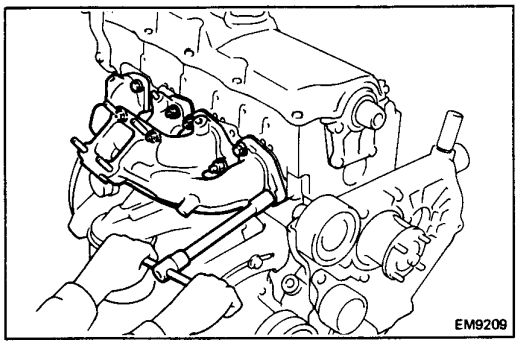
(a) Remove the nut and insulator of the glow plug resistor.

(b) Remove the six bolts, two nuts, intake manifold and gasket.



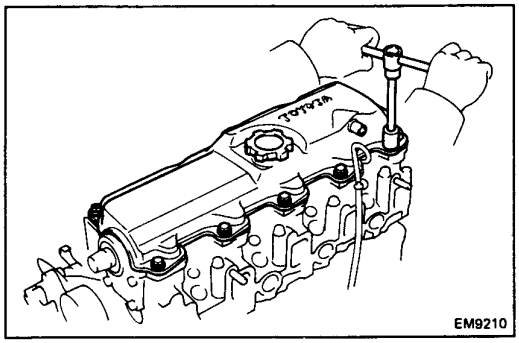
13. REMOVE EXHAUST MANIFOLD

(a) Remove the four bolts, nut and two heat insulators.



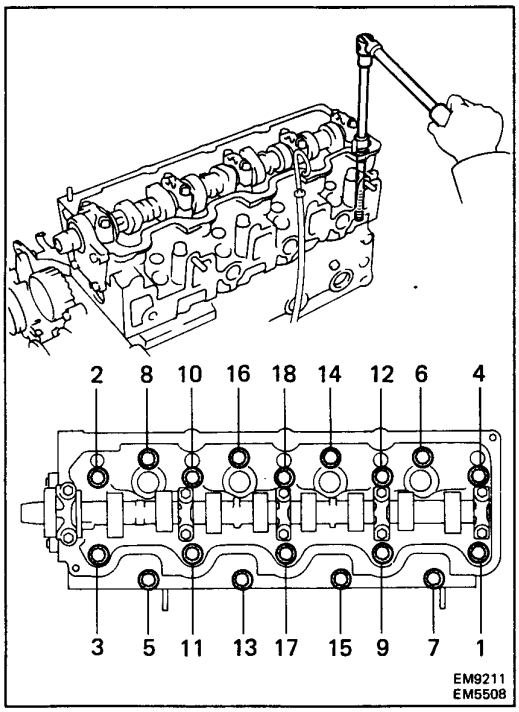
(b) Remove the four bolts, four nuts, exhaust manifold and gasket.

14. REMOVE RH ENGINE HANGER



15. REMOVE CYLINDER HEAD COVER

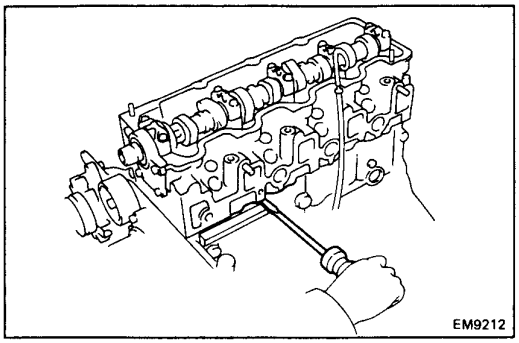
Remove the eight bolts, two nuts, cylinder head cover and gasket.



16. REMOVE CYLINDER HEAD

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

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



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

HINT: If the cylinder head is difficult to lift off, pry with a screwdriver between the cylinder head and block.

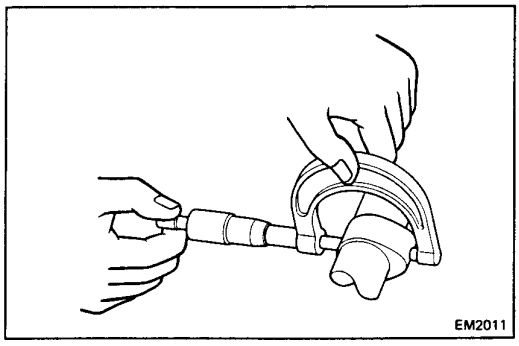
NOTICE: Be careful not to damage the cylinder head and cylinder block surfaces of cylinder head gasket side.

DISASSEMBLY OF CYLINDER HEAD

(See page EM-35)

INSPECTION, CLEANING AND REPAIR OF CYLINDER HEAD COMPONENTS

INSPECT CAMSHAFTS AND BEARINGS



B. Inspect cam lobes

Using a micrometer, measure the cam lobe height.

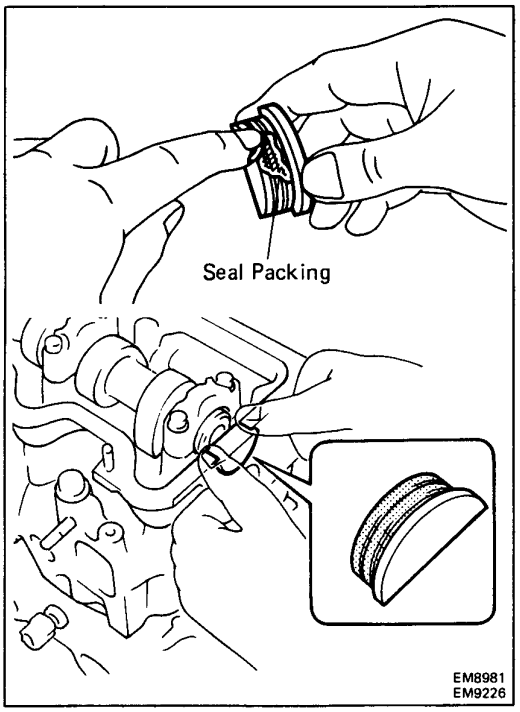
Standard cam lobe height:

Intake	2L-T	53.450 – 53.470 mm (2.1043 – 2.1051 in.)
	3L	54.290 – 54.310 mm (2.1374 – 2.1382 in.)
Exhaust		54.990 – 55.010 mm (2.1650 – 2.1657 in.)

Minimum cam lobe height:

Intake	2L-T	52.95 mm (2.0846 in.)
	3L	53.79 mm (2.1177 in.)
Exhaust		54.49 mm (2.1453 in.)

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



ASSEMBLY OF CYLINDER HEAD

(See page EM-35)

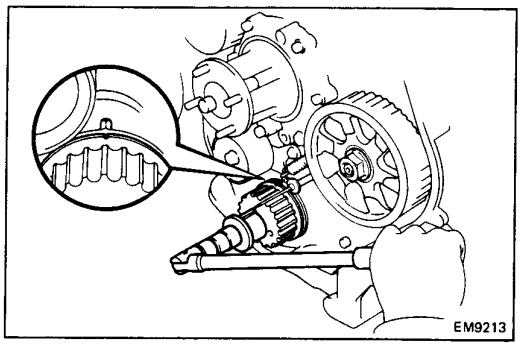
INSTALL HALF CIRCULAR PLUG

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

(b) Apply seal packing to the half circular plug as shown.

Seal packing: Part No. 08826-00080 or equivalent

(c) Install the half circular plug to the cylinder head.



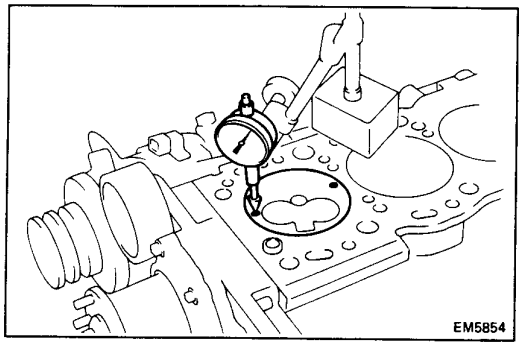
INSTALLATION OF CYLINDER HEAD

(See page EM-35)

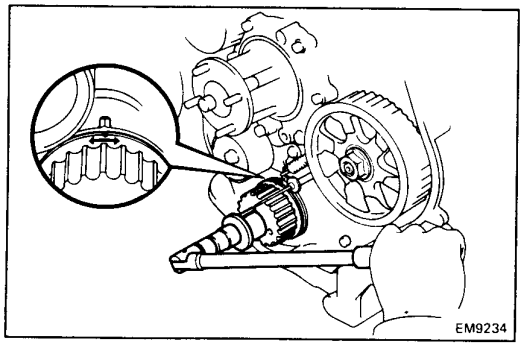
1. CHECK PISTON PROTRUSION AND SELECT CYLINDER HEAD GASKET

A. Check protrusions of No. 1 and No. 4 pistons

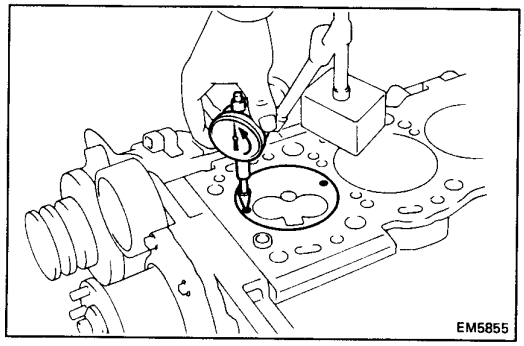
(a) Align the timing marks of the crankshaft timing pulley and timing belt case.



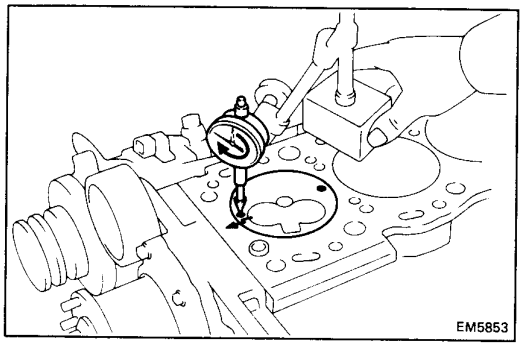
(b) Place a dial indicator on the cylinder block, and set the dial indicator needle on the piston measuring point.



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



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



(e) Measure the piston protrusion from the cylinder block by sliding the dial indicator.

Protrusion: 0.68 – 0.97 mm (0.0268 – 0.0382 in.)

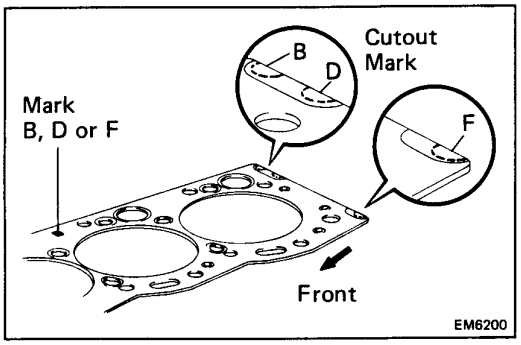
HINT: For each piston, measure the piston protrusion at two measuring points.

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

B. Check protrusions of No. 2 and No. 3 pistons

(a) Turn the crankshaft 1/2 of a revolution (180°).

(b) Measure the piston protrusions.
(See procedure steps A (b) to (e))



Piston protrusion mm (in.)	Gasket size
0.68 – 0.77 (0.0268 – 0.0303)	Use B
0.78 – 0.87 (0.0307 – 0.0343)	Use D
0.88 – 0.97 (0.0316 – 0.0382)	Use F

C. Select new cylinder head gasket

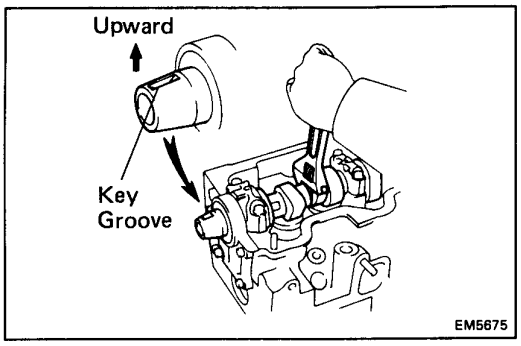
HINT: There are three sizes of new cylinder head gasket, marked either "B", "D" or "F", or indicated by a cutout mark.

New cylinder head gasket thickness:

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

When selecting a new cylinder head gasket, use the largest value from the eight measurements made of the piston protrusion.

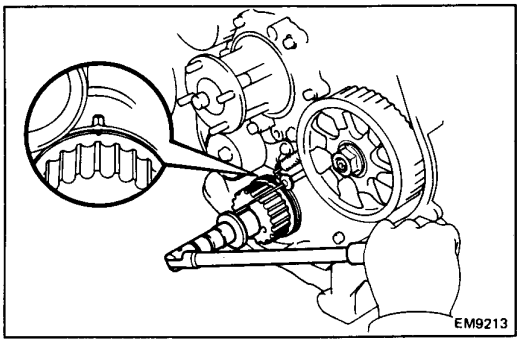
HINT: There are 6 types of cylinder head gasket (marks A to F) installed at the factory, but only 3 types for supply parts (mark B, D and F), so when replacing the gasket, choose from one of the 3 types above.



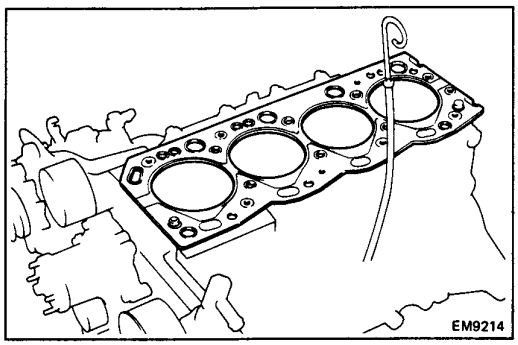
2. SET NO. 1 CYLINDER TO TDC/COMPRESSION

HINT: Set the No. 1 cylinder to TDC/compression to avoid interference with the piston top and valve head.

(a) (Camshaft Position)
Set the camshaft by turning the hexagonal wrench head portion, facing the key groove upward.



(b) (Crankshaft Position)
Using the crankshaft pulley bolt, align the timing marks of the timing pulley and timing belt case by turning the crankshaft.



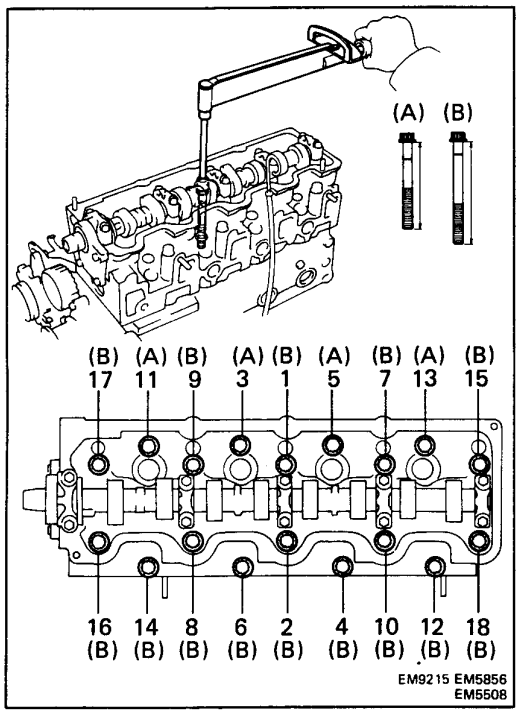
3. INSTALL CYLINDER HEAD

A. Place cylinder head on cylinder block

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

NOTICE: Be careful of the installation direction.

(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 three progressive steps.
- 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.

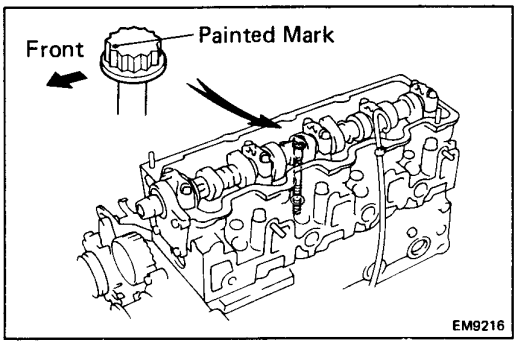
(b) First, install and uniformly tighten the eighteen cylinder head bolts in several passes in the sequence shown.

Torque: 800 kg-cm (58 ft-lb, 78 N·m)

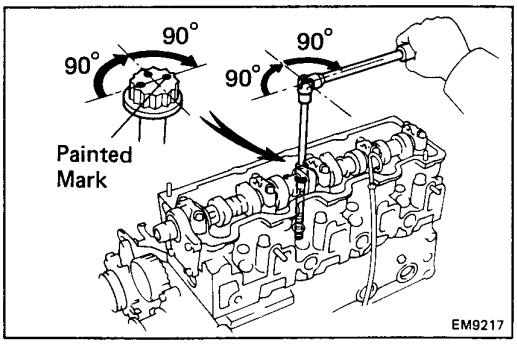
HINT: The bolt lengths for bolt types A and B shown in the illustration are:

A 107 mm (4.12 in.)
B 127 mm (5.00 in.)

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



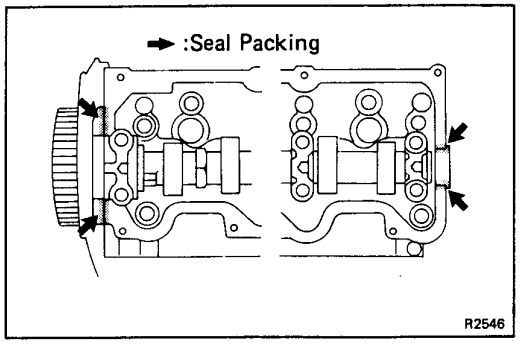
(c) Mark the front of the cylinder head bolt with paint.



(d) Second, retighten the cylinder head bolts 90° in the numerical order shown.

(e) Third, retighten cylinder head bolts by an additional 90°.

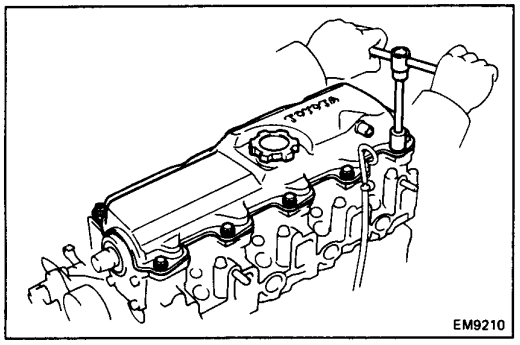
(f) Check that the painted mark is now facing rearward.



4. INSTALL CYLINDER HEAD COVER

(a) Apply seal packing to the cylinder heads as shown in the illustration.

Seal packing: Part No. 08826-00080 or equivalent



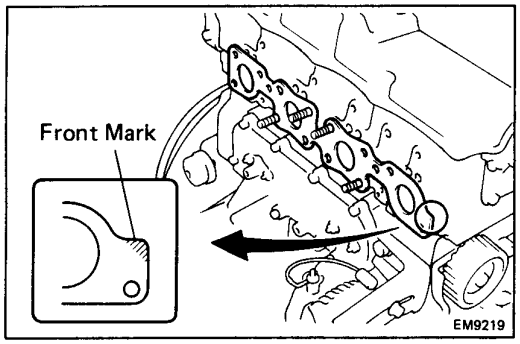
(b) Install the gasket to the cylinder head cover.

(c) Install the cylinder head cover with the eight bolts and two nuts.

Torque: 50 kg-cm (43 in.-lb, 4.9 N·m)

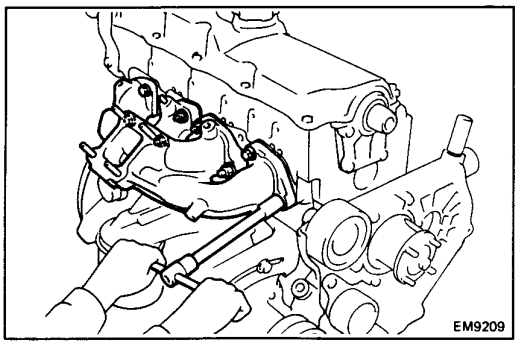
5. INSTALL RH ENGINE HANGER

Torque: 380 kg-cm (27 ft-lb, 37 N·m)



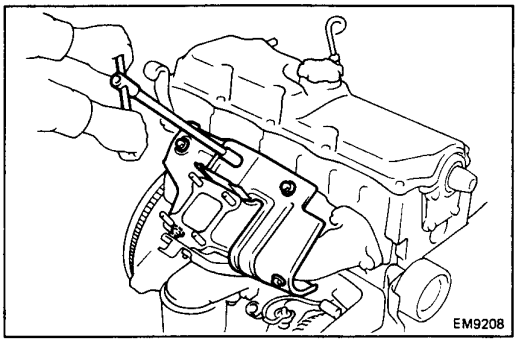
6. INSTALL EXHAUST MANIFOLD

(a) Install a new gasket in direction as shown in the illustration.



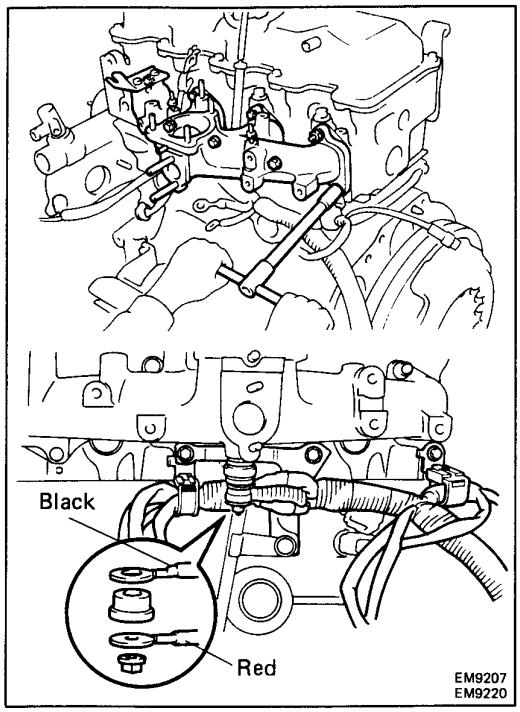
(b) Install the exhaust manifold with the four nuts and four bolts.

Torque: 530 kg-cm (38 ft-lb, 52 N·m)



(c) Install the two heat insulators with the four bolts and nut.

Torque: 120 kg-cm (9 ft-lb, 12 N·m)



7. **INSTALL INTAKE MANIFOLD**

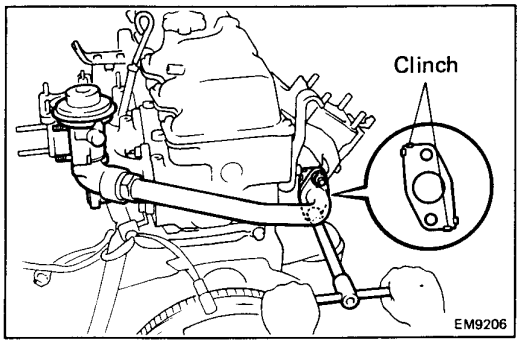
(a) Install a new gasket and the intake manifold with the six bolts and two nuts.

Torque: 240 kg-cm (17 ft-lb, 24 N·m)

HINT: Torque the three bolts on the bottom of the manifold together with the oil level gauge guide support and the clamp for the engine wires, as shown in the illustration.

(b) Install the insulator and nut to the glow plug resistor.

HINT: Install the insulator and engine wire terminals as shown in the illustration.

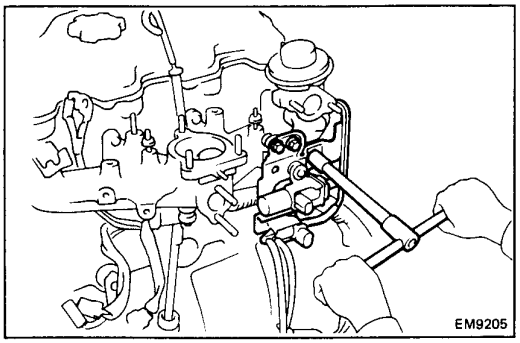


8. **(Austria)**
INSTALL EGR VALVE, PIPE, VALVE ADAPTOR AND CONTROL VALVE ASSEMBLY

(a) Place a new gasket in position on the intake manifold.

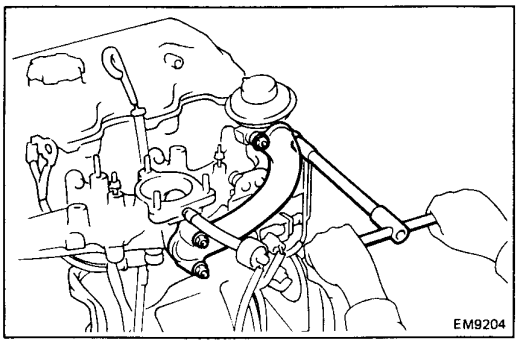
(b) Install the EGR valve and pipe with the two nuts.

Torque: 130 kg-cm (9 in.-lb, 13 N·m)



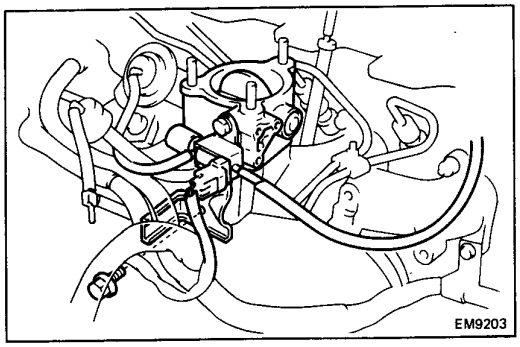
(c) Install the EGR control valve assembly with the three bolts.

(d) Connect the connectors to the VSV and EVRV.



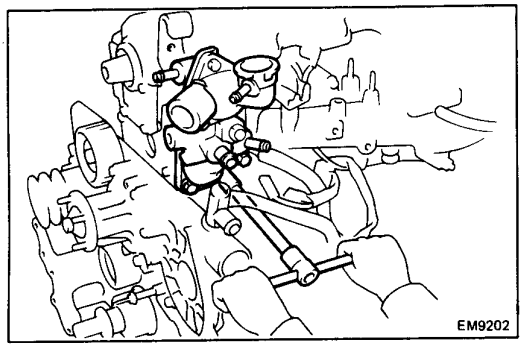
(e) Install two new gaskets, the EGR valve adaptor and air pipe (LN only) with the four nuts.

Torque: 195 kg-cm (14 ft-lb, 19 N·m)

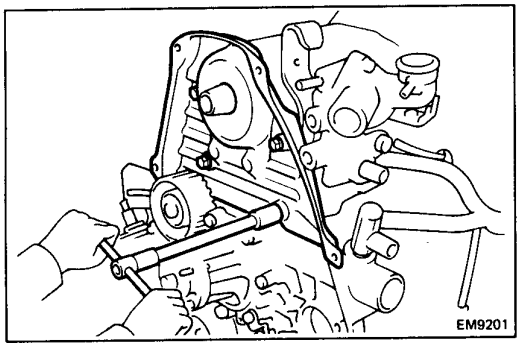


9. (LN)
INSTALL VENTURI ASSEMBLY
   (a) Install the wire support with the two bolts.
   (b) Install a new gasket and the venturi assembly.
   (c) Connect the connector and vacuum hoses to the VSV.

10. INSTALL LH ENGINE HANGER
Torque: 380 kg-cm (27 ft-lb, 37 N·m)



11. INSTALL WATER OUTLET AND OUTLET HOUSING ASSEMBLY
   (a) Install a new gasket, the water outlet and outlet housing assembly with the three bolts.
Torque: 195 kg-cm (14 ft-lb, 19 N·m)
   (b) Connect the by-pass hose to the thermo wax of the injection pump.
   (c) Connect the water temperature switch connector.



12. INSTALL NO. 2 TIMING BELT COVER
Install the timing belt cover with the four bolts.
Torque: 185 kg-cm (13 ft-lb, 18 N·m)

13. INSTALL CAMSHAFT TIMING PULLEY

14. INSTALL INJECTION NOZZLES

15. INSTALL INJECTION PUMP
(See steps 2 to 11 on pages FU-46 and 47)

16. INSTALL TIMING BELT
(See steps 12 to 18 on page FU-48)

17. INSTALL TURBOCHARGER
(See steps 3 to 8 on pages TC-13 and 14)

18. FILL WITH ENGINE COOLANT **(See page CO-5)**

19. START ENGINE AND CHECK FOR LEAKS

20. RECHECK ENGINE COOLANT LEVEL AND OIL LEVEL