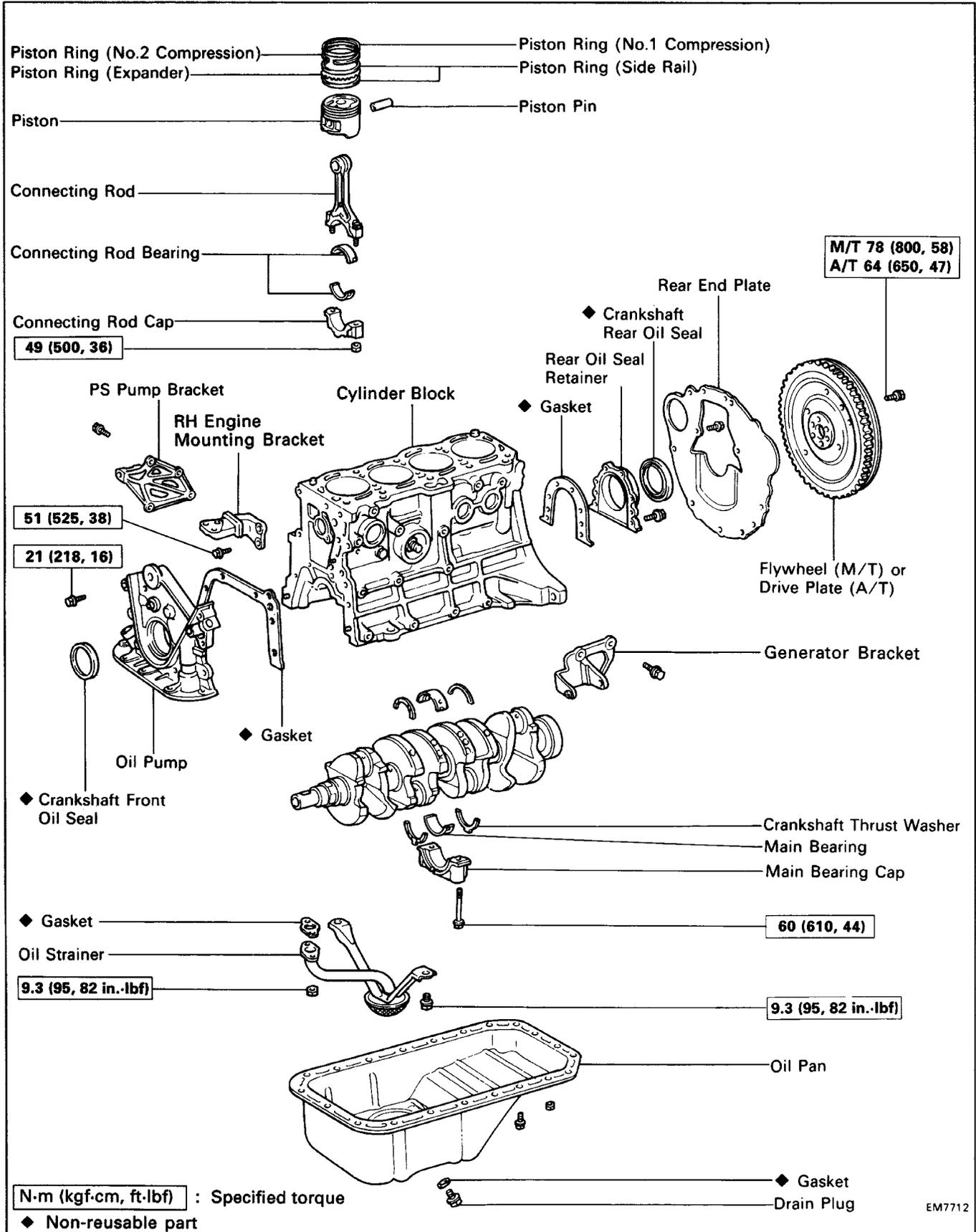


CYLINDER BLOCK (4A-FE) COMPONENTS



REMOVAL OF ENGINE

1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY

CAUTION: Work must be started after approx. 20 seconds or longer from the time the ignition switch is turned to the "LOCK" position and the negative (-) terminal cable is disconnected from the battery.

2. REMOVE HOOD

3. REMOVE ENGINE UNDER COVER

4. DRAIN ENGINE COOLANT (See page CO-6)

5. DRAIN ENGINE OIL (See page LU-7)

6. REMOVE AIR CLEANER

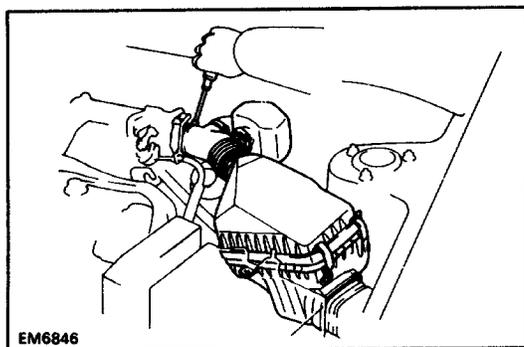
- (a) Disconnect the intake air temperature sensor connector.
- (b) Disconnect the accelerator cable from the bracket on the air cleaner cap.
- (c) Disconnect the four air cleaner cap clips.
- (d) Disconnect the air hose from the air pipe.
- (e) Disconnect the air cleaner hose from the throttle body, and remove the air cleaner cap and element.
- (f) Remove the three bolts and air cleaner case.

7. DISCONNECT ACCELERATOR CABLE FROM THROTTLE BODY

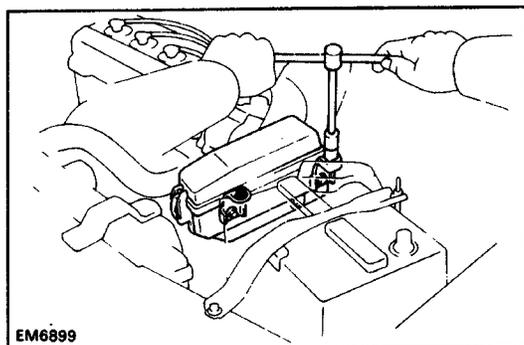
8. REMOVE ENGINE RELAY BOX, AND DISCONNECT ENGINE WIRE CONNECTORS

- (a) Remove the two nuts, and disconnect the relay box from the battery.

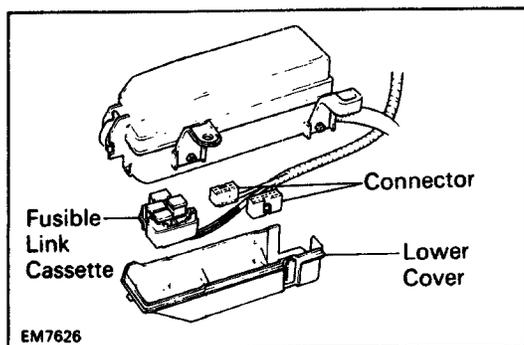
- (b) Remove the lower cover from the relay box.
- (c) Disconnect the fusible link cassette and two connectors of the engine wire from the relay box.



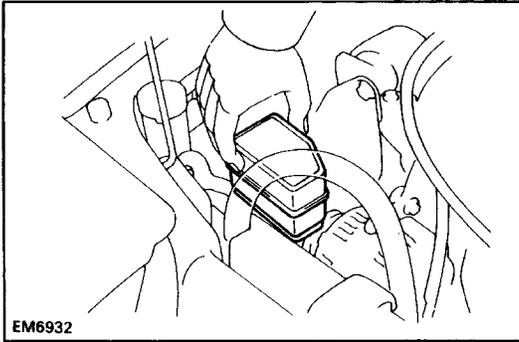
EM6846



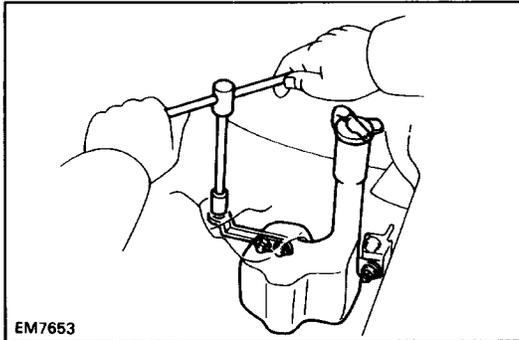
EM6899



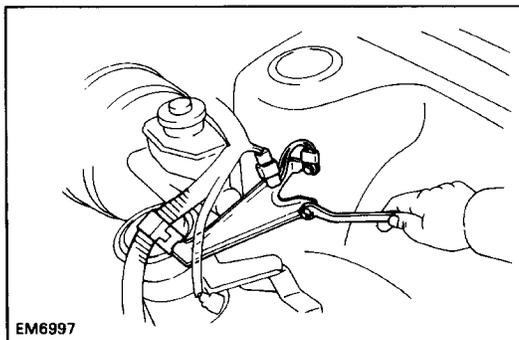
EM7626



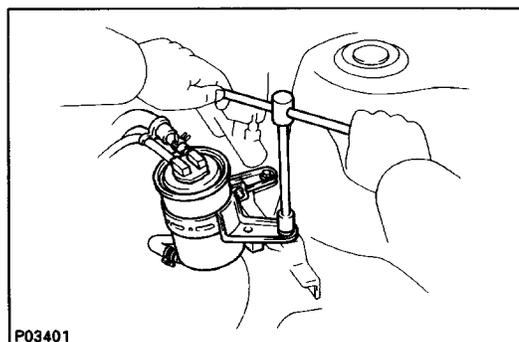
- 9. REMOVE A/C RELAY BOX FROM BRACKET**
10. REMOVE BATTERY
11. REMOVE RADIATOR (See page CO-23)



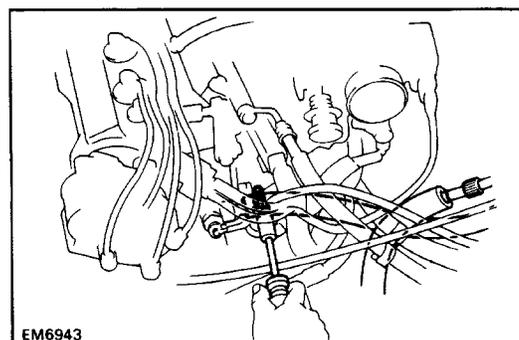
- 12. REMOVE RADIATOR RESERVOIR TANK**
 Remove the bolt, nut and reservoir tank.
13. DISCONNECT WIRES AND CONNECTORS
- (a) Data link connector 1
 - (b) Vacuum sensor connector
 - (c) Ground strap from LH fender apron



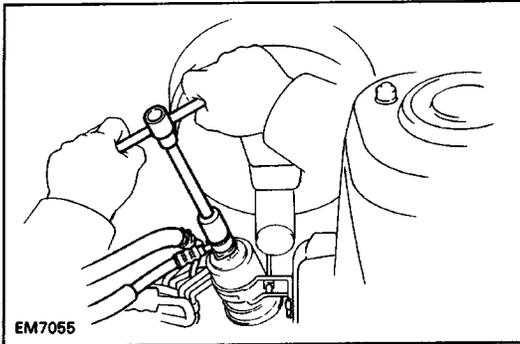
- 14. REMOVE ENGINE WIRE BRACKET**
- (a) Disconnect the wire clamp from the wire bracket.
 - (b) Remove the two bolts and wire bracket. Disconnect the noise filter.



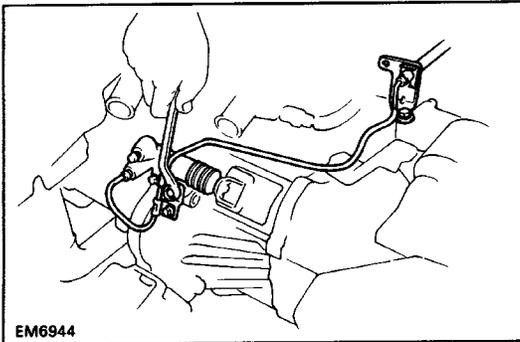
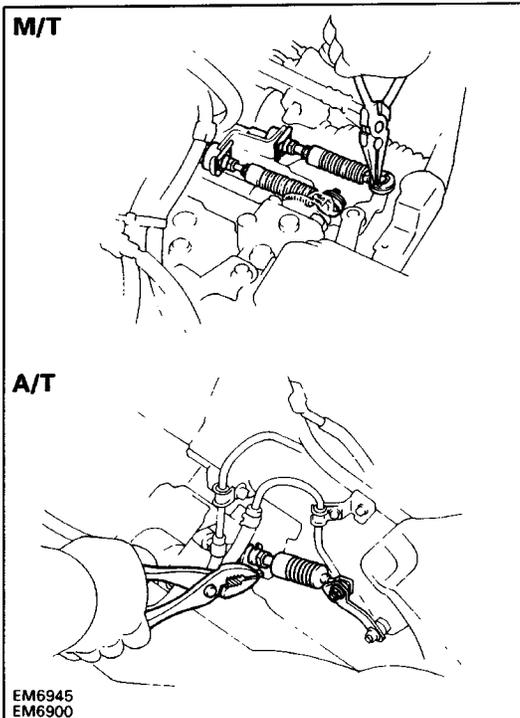
- 15. REMOVE CHARCOAL CANISTER**
- (a) Disconnect the three hoses.
 - (b) Remove the two bolts and charcoal canister.



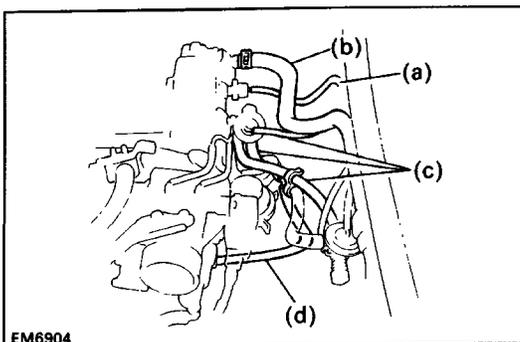
- 16. DISCONNECT HEATER HOSE FROM WATER INLET**
17. DISCONNECT SPEEDOMETER CABLE

18. DISCONNECT FUEL HOSES**CAUTION:** Catch leaking fuel in a container.**19. (M/T)****REMOVE CLUTCH RELEASE CYLINDER WITHOUT DISCONNECTING TUBE**

Remove the three bolts, release cylinder and tube from the transaxle.

**20. DISCONNECT TRANSAXLE CONTROL CABLE(S) FROM TRANSAXLE****21. DISCONNECT VACUUM HOSES**

- (a) Vacuum sensor hose from gas filter on air intake chamber
- (b) Brake booster vacuum hose from air intake chamber
- (c) Three A/C vacuum hoses from ASV on air intake chamber
- (d) A/C vacuum hose from air pipe

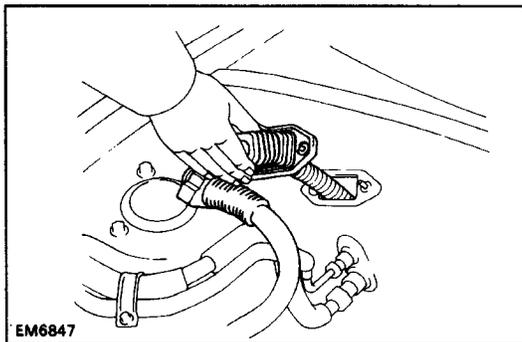
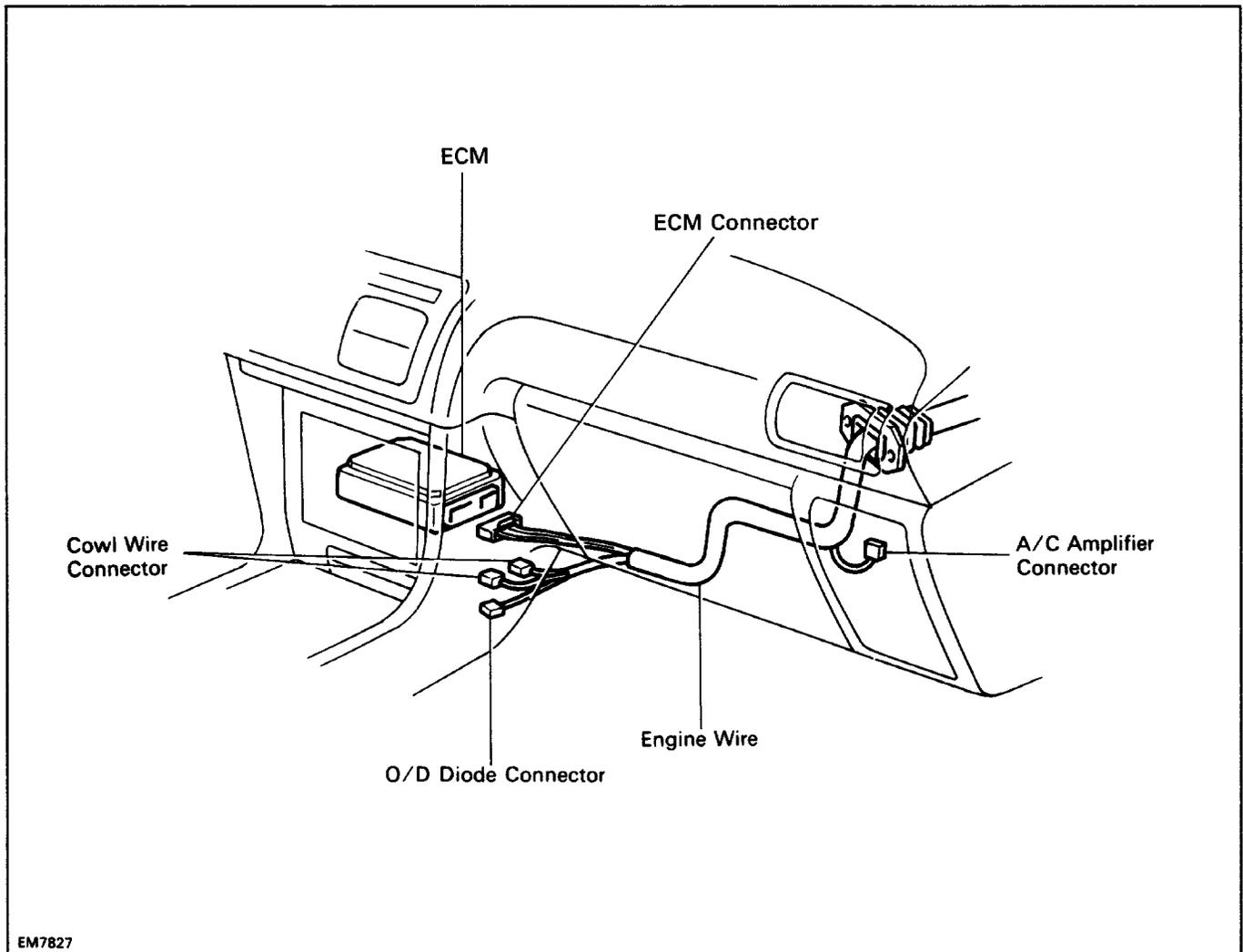


22. DISCONNECT ENGINE WIRE

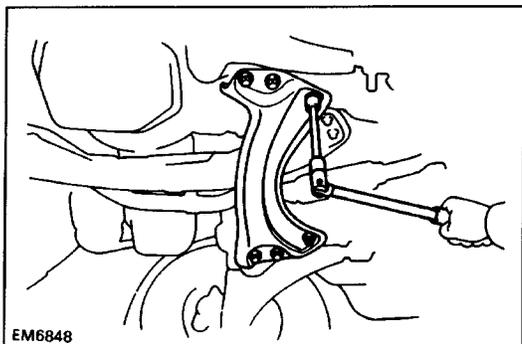
- (a) Engine wire clamp from wire bracket on RH fender apron.
- (b) Two cowl wire connectors

23. DISCONNECT ENGINE WIRE FROM CABIN

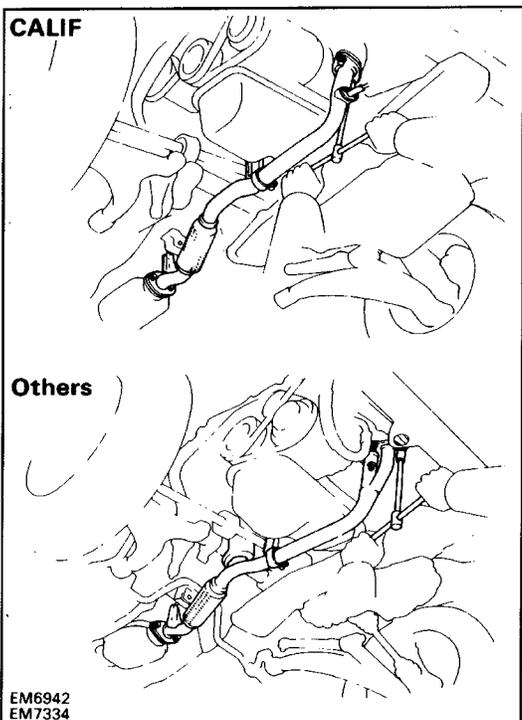
- (a) Disconnect the following connectors:
 - (1) ECM connector
 - (2) Two cowl wire connectors
 - (3) A/C amplifier connector
 - (4) O/D diode connector



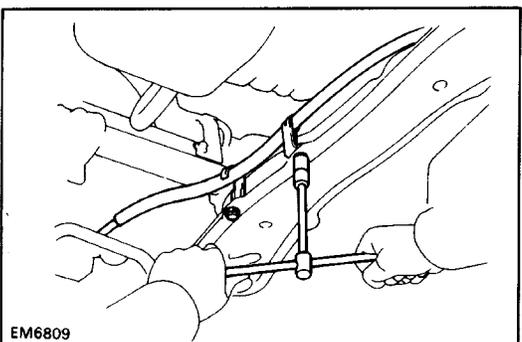
- (b) Remove the two nuts, and pull out the engine wire from the cowl panel.

**24. REMOVE SUSPENSION LOWER CROSSMEMBER**

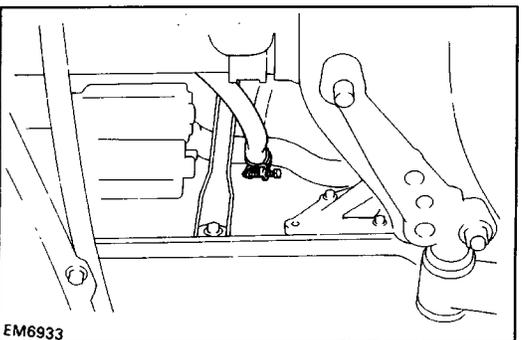
Remove the four bolts, two nuts and lower crossmember.

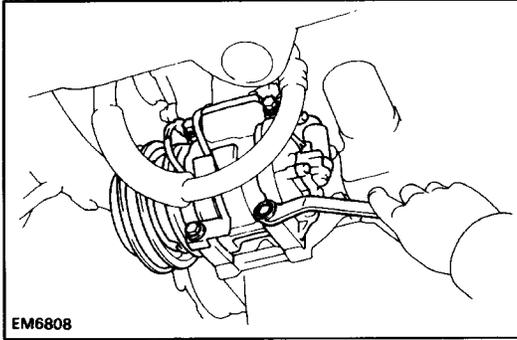
**25. REMOVE FRONT EXHAUST PIPE**

- (a) Disconnect the oxygen sensor connector.
- (b) Loosen the bolt, and disconnect the clamp from the support bracket.
- (c) Remove the two bolts and nuts holding the front exhaust pipe to the three-way catalytic converter.
- (d) Using a 14 mm deep socket wrench, remove the two nuts (CALIF.) or three nuts (others) holding the front exhaust pipe to the three-way catalytic converter.
- (e) Disconnect the support hook on the front exhaust pipe from the support bracket, and remove the front exhaust pipe and two (CALIF.) or three (others) gaskets.

**26. (A/T)**

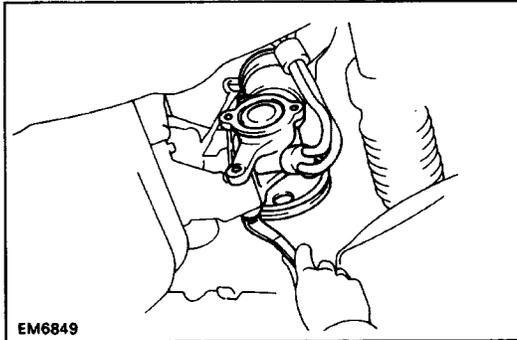
DISCONNECT TRANSAXLE CONTROL CABLE FROM ENGINE MOUNTING CENTER MEMBER

27. REMOVE DRIVE SHAFTS (See SA section)**28. DISCONNECT HEATER HOSE FROM WATER INLET PIPE**

**29. (w/ A/C)****REMOVE A/C COMPRESSOR WITHOUT DISCONNECTING HOSES**

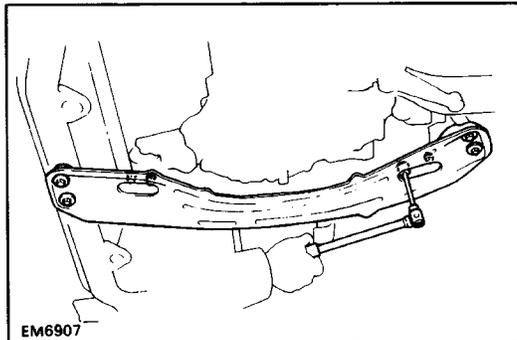
- (a) Disconnect the A/C compressor connector.
- (b) Remove the drive belt.
- (c) Remove the four bolts, and disconnect the A/C compressor.

HINT: Put aside the compressor, and suspend it to the radiator support with a string.

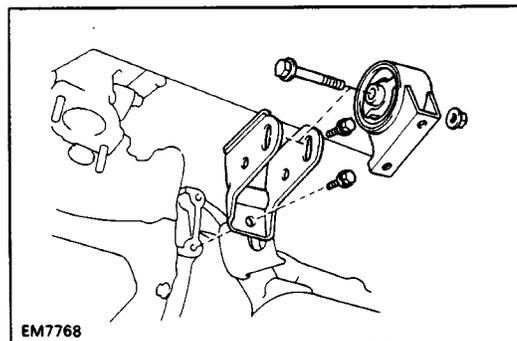
**30. REMOVE PS PUMP WITHOUT DISCONNECTING HOSES**

- (a) Disconnect the air hose from the air pipe.
- (b) Disconnect the air hose from the intake manifold.
- (c) Remove the PS drive belt.
- (d) Remove the two bolts, and disconnect the PS pump from the engine.

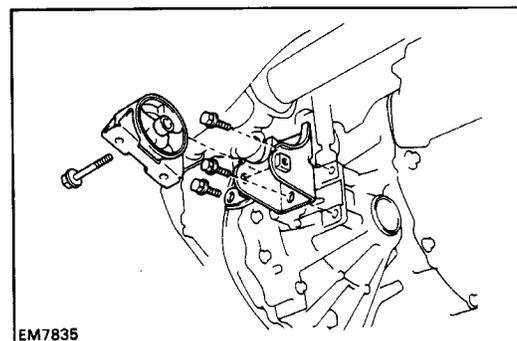
HINT: Put aside the pump and suspend it from the cowl with a string.

**31. REMOVE ENGINE MOUNTING CENTER MEMBER**

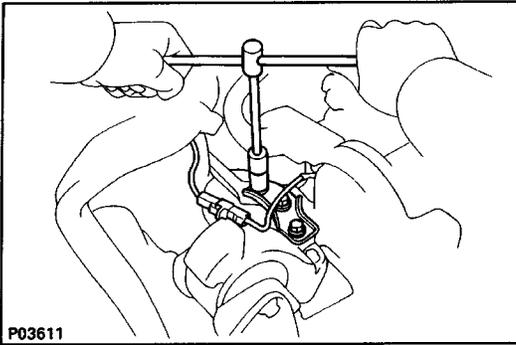
Remove the eight bolts and center member.

**32. REMOVE FRONT ENGINE MOUNTING INSULATOR AND BRACKET**

- (a) Remove the through bolt, nut and mounting insulator.
- (b) Remove the two bolts and mounting bracket.

**33. REMOVE REAR ENGINE MOUNTING INSULATOR AND BRACKET**

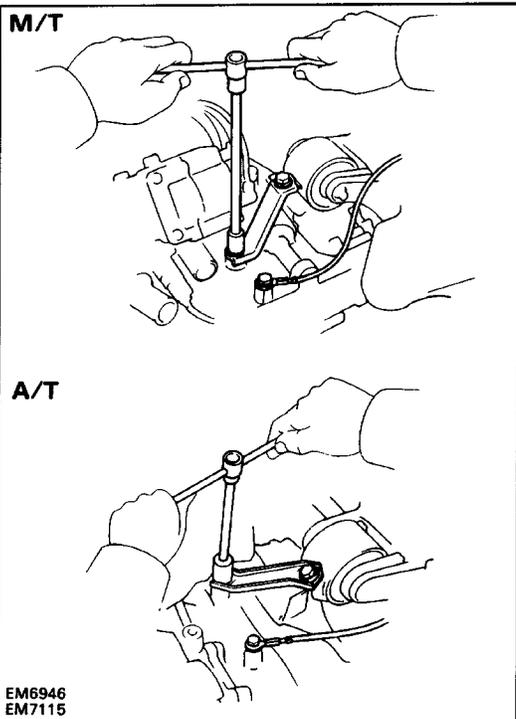
- (a) Remove the through bolt and mounting insulator.
- (b) Remove the three bolts and mounting bracket.



34. REMOVE CONNECTOR FROM GROUND WIRE ON RH FENDER APRON

35. REMOVE RH ENGINE MOUNTING STAY

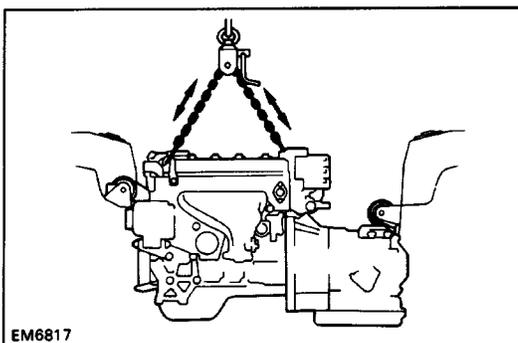
Remove the three bolts and mounting stay.



36. REMOVE LH ENGINE MOUNTING STAY

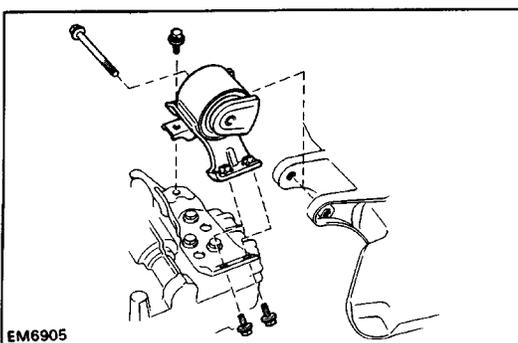
Remove the two bolts and mounting stay.

37. REMOVE GROUND STRAP FROM TRANSAXLE

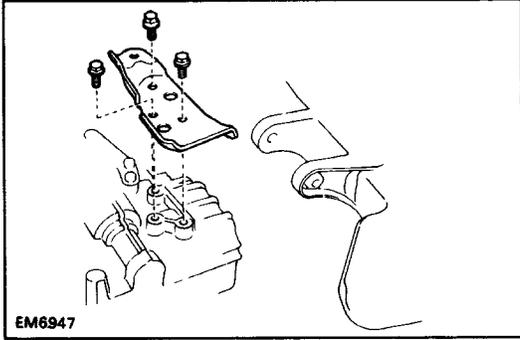


38. REMOVE ENGINE AND TRANSAXLE ASSEMBLY FROM VEHICLE

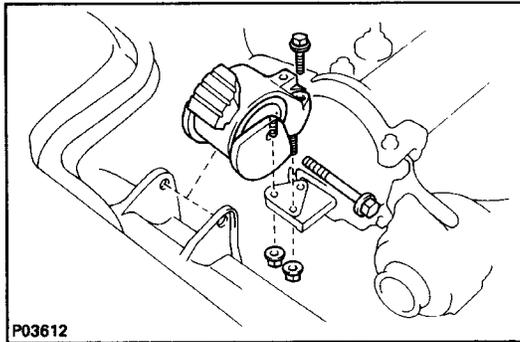
(a) Attach the engine chain hoist to the engine hangers.



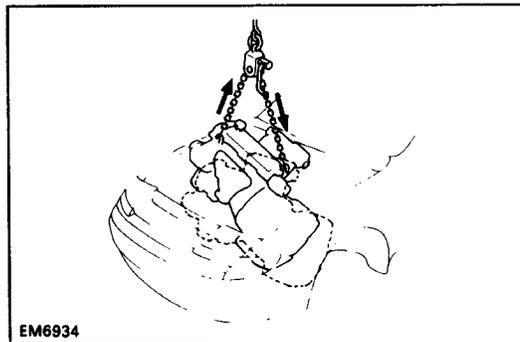
(b) Remove the through bolt, three bolts and LH mounting insulator.



(c) Remove the three bolts and LH mounting bracket.



(d) Remove the through bolt, two nuts and RH mounting insulator.



(e) Lift the engine out of the vehicle slowly and carefully.

NOTICE: Be careful not to hit the PS gear housing or neutral start switch (A/T).

(f) Make sure the engine is clear of all wiring, hoses and cables.

(g) Place the engine and transaxle assembly onto the stand.

39. REMOVE STARTER (See page [ST-3](#))

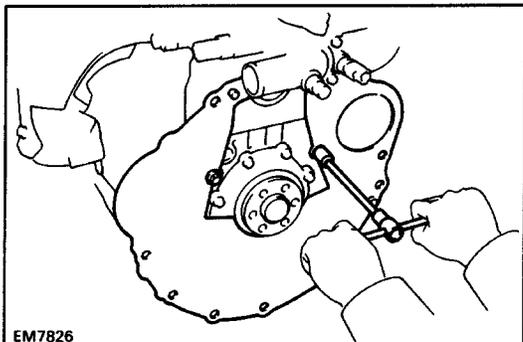
40. SEPARATE ENGINE AND TRANSAXLE

MIT (See MT section)

A/T (See AT section)

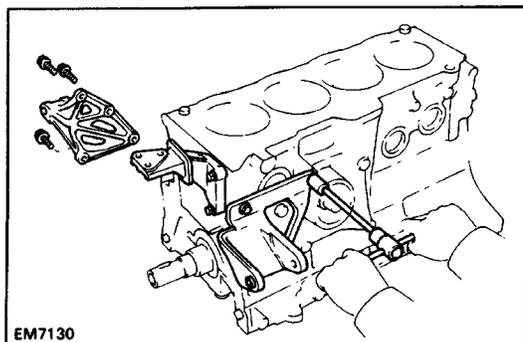
PREPARATION FOR DISASSEMBLY

1. (M/T)
REMOVE CLUTCH COVER AND DISC
2. (M/T)
REMOVE FLYWHEEL
3. (A/T)
REMOVE DRIVE PLATE

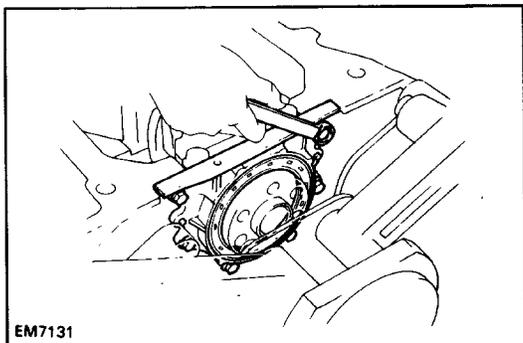


4. REMOVE REAR END PLATE
Remove the two bolts and end plate.

5. INSTALL ENGINE TO ENGINE STAND FOR DISASSEMBLY
6. REMOVE GENERATOR (See page [CH-6](#))
7. REMOVE DISTRIBUTOR (See page [IG-20](#))
8. REMOVE TIMING BELT AND PULLEYS
(See pages [EM-35](#) to 38)
9. REMOVE CYLINDER HEAD (See pages [EM-82](#) to 90)
10. REMOVE WATER PUMP (See page [CO-8](#))
11. REMOVE OIL PAN AND OIL PUMP
(See pages [LU-10](#) and 11)
12. REMOVE OIL FILTER (See page [LU-7](#))



13. REMOVE GENERATOR BRACKET
Remove the three bolts and generator bracket.
14. REMOVE RH ENGINE MOUNTING BRACKET
Remove the three bolts and mounting bracket.
15. REMOVE PS PUMP BRACKET
Remove the three bolts and PS pump bracket.



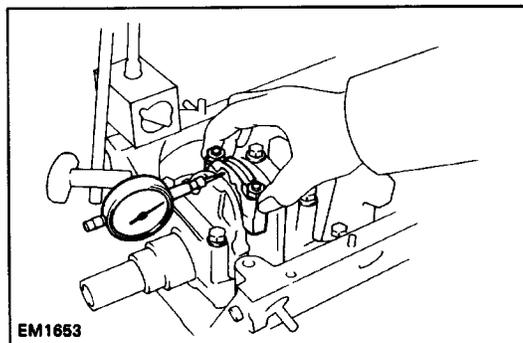
EM7131

DISASSEMBLY OF CYLINDER BLOCK

(See page [EM-184](#))

1. REMOVE REAR OIL SEAL RETAINER

Remove the six bolts, retainer and gasket.



EM1653

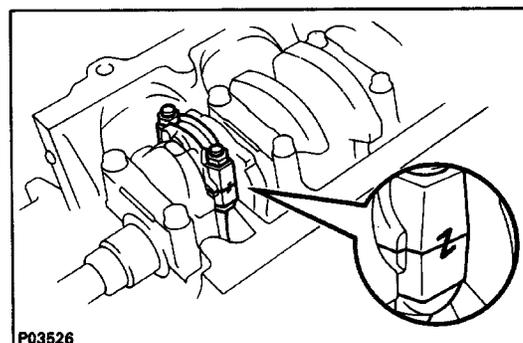
2. CHECK CONNECTING ROD THRUST CLEARANCE

Using a dial indicator, measure the thrust clearance while moving the connecting rod back and forth.

Standard thrust clearance: 0.150–0.250 mm
(0.0059–0.0098 in.)

Maximum thrust clearance: 0.30 mm (0.0118 in.)

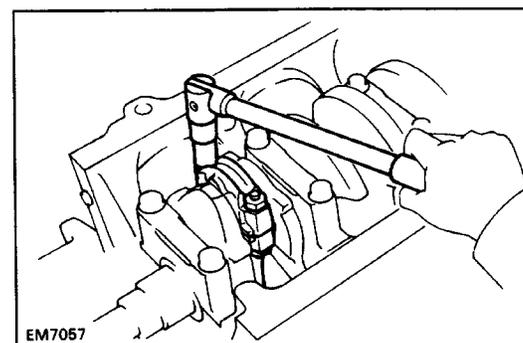
If the thrust clearance is greater than maximum, replace the connecting rod assembly. If necessary, replace the crankshaft.



P03526

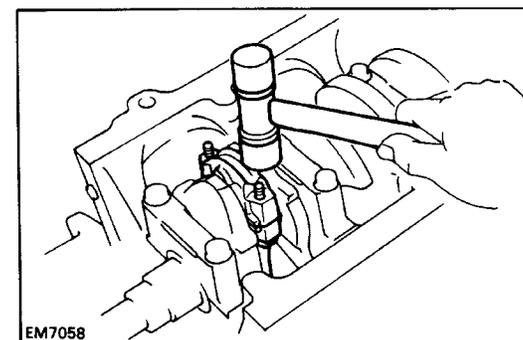
3. REMOVE CONNECTING ROD CAPS AND CHECK OIL CLEARANCE

- (a) Check the matchmarks on the connecting rod and cap to ensure correct reassembly.



EM7057

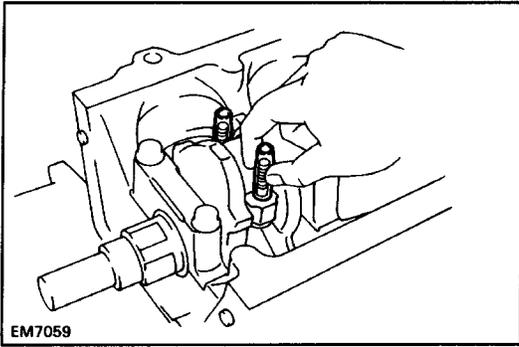
- (b) Remove the connecting rod cap nuts.



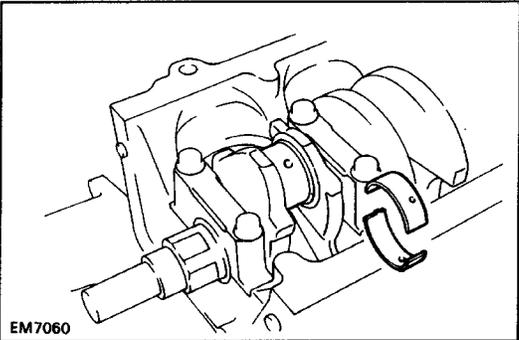
EM7058

- (c) Using a plastic-faced hammer, lightly tap the connecting rod bolts and lift off the connecting rod cap

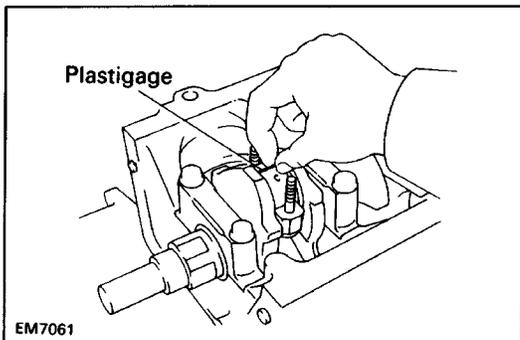
HINT: Keep the lower bearing inserted with the connecting cap.



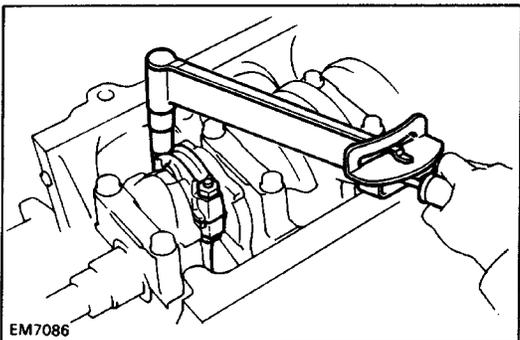
- (d) Cover the connecting rod bolts with a short piece of hose to protect the crankshaft from damage.



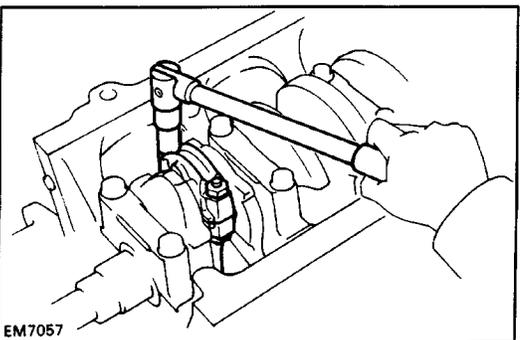
- (e) Clean the crank pin and bearing.
 (f) Check the crank pin and bearing for pitting and scratches.
 If the crank pin or bearing is damaged, replace the bearings. If necessary, grind or replace the crankshaft.



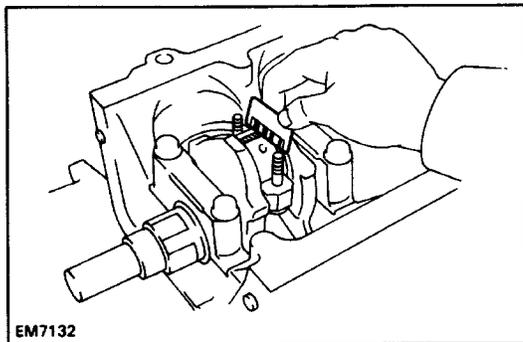
- (g) Lay a strip of Plastigage across the crank pin.



- (h) Install the connecting rod cap.
 (See step 6 on page [EM-212](#))
Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)
NOTICE: Do not turn the crankshaft.



- (i) Remove the connecting rod cap.
 (See procedure (b) and (c) above)



EM7132

(j) Measure the Plastigage at its widest point.

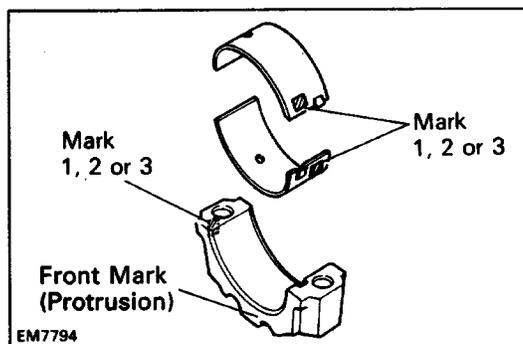
Standard oil clearance:

STD 0.020–0.051 mm
(0.0008–0.0020 in.)

U/S 0.25 0.019–0.065 mm
(0.0007–0.0026 in.)

Maximum oil clearance: 0.08 mm (0.0031 in.)

If the oil clearance is greater than maximum, replace the bearings. If necessary, grind or replace the crankshaft.



EM7794

HINT: If using a standard bearing, replace it with one having the same number marked on the connecting rod cap. There are three sizes of standard bearings, marked "1", "2" and "3" accordingly.

(Reference)

Standard sized bearing center wall thickness:

Mark "1" 1.486–1.490 mm
(0.0585–0.0587 in.)

Mark "2" 1.490–1.494 mm
(0.0587–0.0588 in.)

Mark "3" 1.494–1.498 mm
(0.0588–0.0590 in.)

(k) Completely remove the Plastigage.

4. REMOVE PISTON AND CONNECTING ROD ASSEMBLIES

(a) Using a ridge reamer, remove all the carbon from the top of the cylinder.

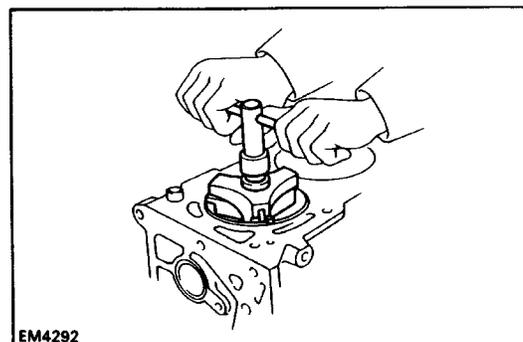
(b) Cover the connecting rod bolts.

(See page [EM-195](#))

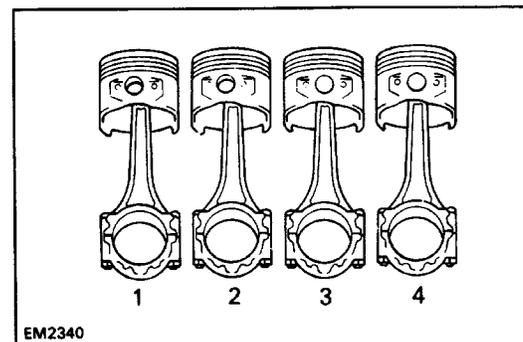
(c) Push the piston, connecting rod assembly and upper bearing through the top of the cylinder block.

HINT:

- Keep the bearings, connecting rod and cap together.
- Arrange the piston and connecting rod assemblies in correct order.



EM4292



EM2340

5. CHECK CRANKSHAFT THRUST CLEARANCE

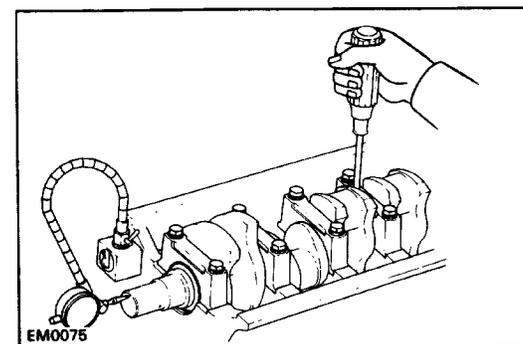
Using a dial indicator, measure the thrust clearance while prying the crankshaft back and forth with a screwdriver

Standard thrust clearance: 0.020–0.220 mm
(0.0008–0.0087 in.)

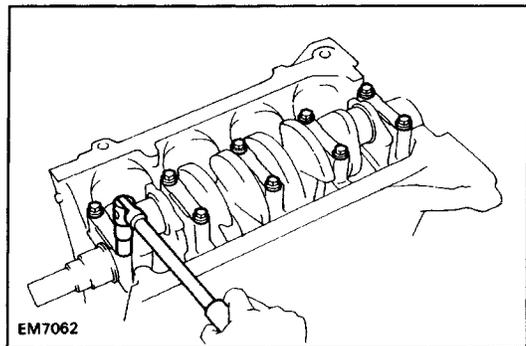
Maximum thrust clearance: 0.30 mm (0.0118 in.)

If the thrust clearance is greater than maximum, replace the thrust washers as a set.

Thrust washer thickness: 2.440–2.490 mm
(0.0961–0.0980 in.)

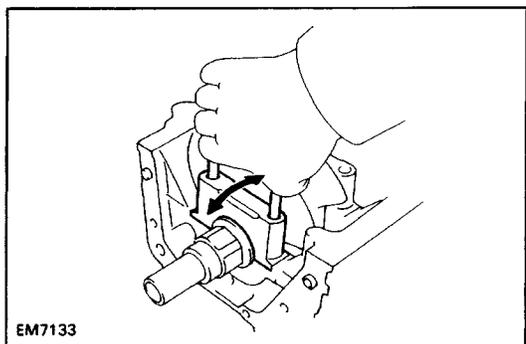


EM0075



6. REMOVE MAIN BEARING CAPS AND CHECK OIL CLEARANCE

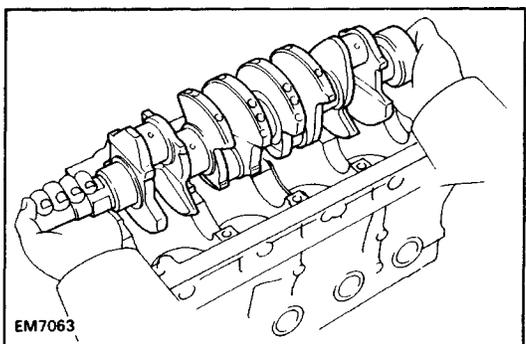
(a) Remove the main bearing cap bolts.



(b) Using the removed main bearing cap bolts, pry the main bearing cap back and forth, and remove the main bearing caps, lower bearings and lower thrust washers (No.3 main bearing cap only).

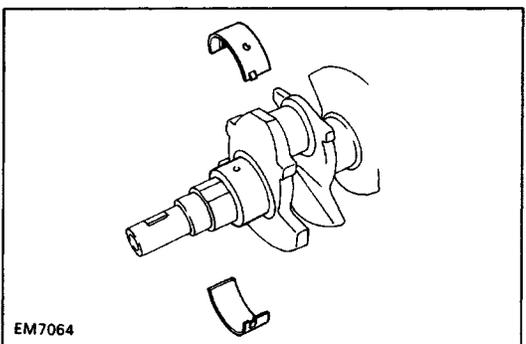
HINT:

- Keep the lower bearing and main bearing cap together.
- Arrange the main bearing caps and lower thrust washers in correct order.



(c) Lift out the crankshaft.

HINT: Keep the upper bearing and upper thrust washers together with the cylinder block.

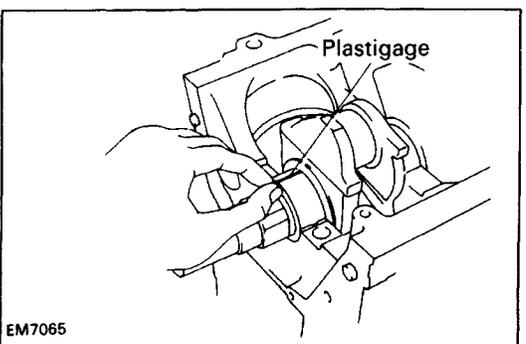


(d) Clean each main journal and bearing.

(e) Check each main journal and bearing for pitting and scratches.

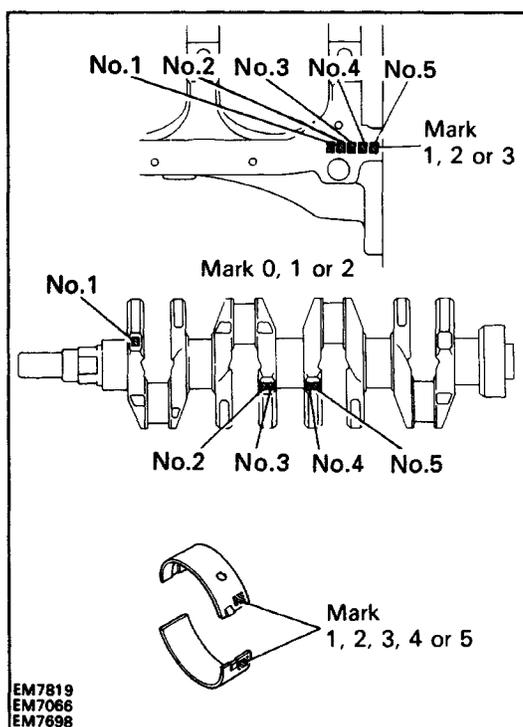
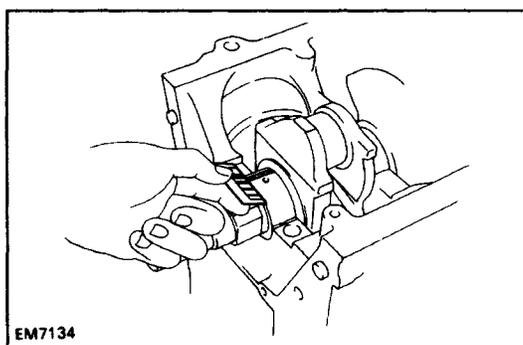
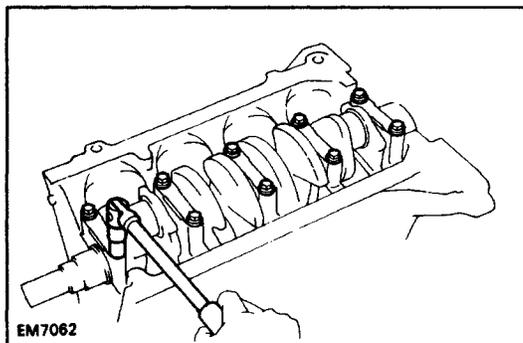
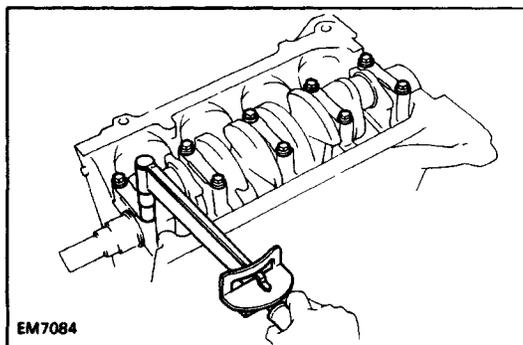
If the journal or bearing is damaged, replace the bearings.

If necessary, grind or replace the crankshaft.



(f) Place the crankshaft on the cylinder block.

(g) Lay a strip of Plastigage across each journal.



(h) Install the main bearing caps.

(See step 4 on page EM-211)

Torque: 60 N·m (610 kgf·cm, 44 ft·lbf)

NOTICE: Do not turn the crankshaft.

(i) Remove the main bearing caps.

(See procedure (a) and (b) above)

(j) Measure the Plastigage at its widest point.

Standard clearance:

STD **0.015–0.033 mm**
 (0.0006–0.0013 in.)

U/S 0.25 **0.018–0.056 mm**
 (0.0007–0.0022 in.)

Maximum clearance: 0.10 mm (0.0039 in.)

HINT: If replacing the cylinder block subassembly, the bearing standard clearance will be:

0.015–0.045 mm
(0–0006–0.0018 in.)

If the oil clearance is greater than maximum, replace the bearings. If necessary, grind or replace the crankshaft.

HINT: If using a standard bearing, replace it with one having the same number. If the number of the bearing cannot be determined, select the correct bearing by adding together the numbers imprinted on the cylinder block and crankshaft, then selecting the bearing with the same number as the total. There are five sizes of standard bearings, marked "1", "2", "3", "4" and "5" accordingly.

	Number marked								
	1			2			3		
Cylinder block									
Crankshaft	0	1	2	0	1	2	0	1	2
Bearing	1	2	3	2	3	4	3	4	5

EXAMPLE: Cylinder block "2" + Crankshaft "1"
 = Bearing "3"

(Reference)**Cylinder block main journal bore diameter:**

Mark "1" 52.025-52-031 m m
(2.0482-2.0485 in.)

Mark "2" 52.031-52-037 m m
(2.0485-2.0487 in.)

Mark "3" 52.037-52.043 m m
(2.0487-2.0489 in.)

Crankshaft journal diameter:

Mark "0" 47.994-48-000 m m
(1.8895-1.8898 in.)

Mark "1" 47.988-47.994 m m
(1.8893-1.8895 in.)

Mark "2" 47.982-47.988 m m
(1.8891-1.8893 in.)

Standard sized bearing center wall thickness:

Mark "1" 2.002-2.005 mm
(0.0788-0.0789 in.)

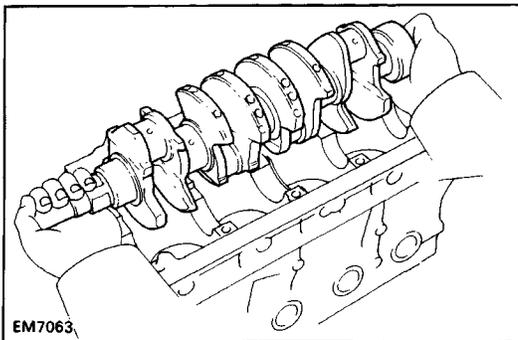
Mark "2" 2.005-2.008 m m
(0.0789-0.0791 in.)

Mark "T" 2.008-2.011 mm
(0.0791-0.0792 in.)

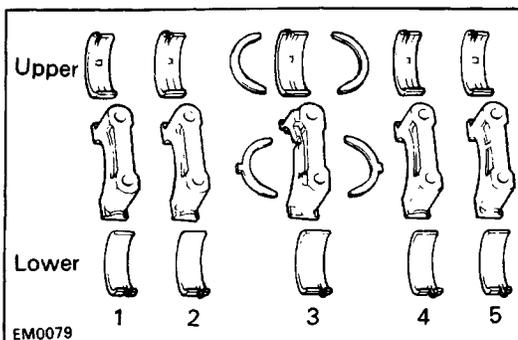
Mark "4" 2.011-2.014 mm
(0.0792-0.0793 in.)

Mark "5" 2.014-2.017 mm
(0.0793-0.0794 in.)

(k) Completely remove the Plastigage.

**7. REMOVE CRANKSHAFT**

- (a) Lift out the crankshaft.
- (b) Remove the upper bearings and upper thrust washers from cylinder block.



HINT: Arrange the main bearing caps, bearings and thrust washers in correct order.

INSPECTION OF CYLINDER BLOCK

1. CLEAN CYLINDER BLOCK

A. Remove gasket material

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

B. Clean cylinder block

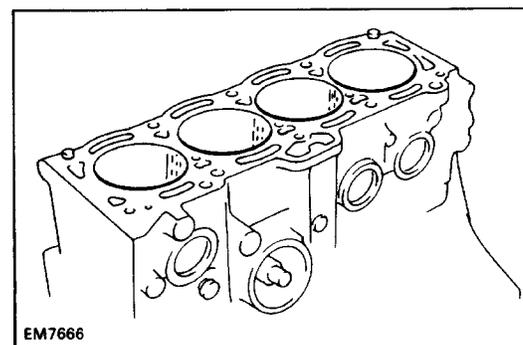
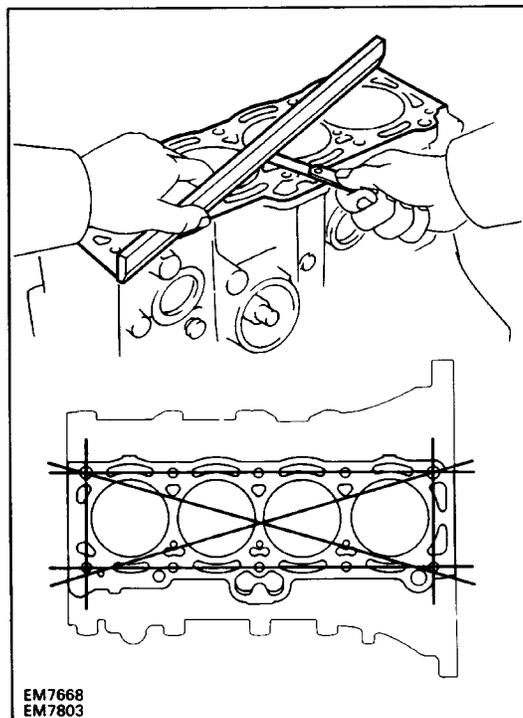
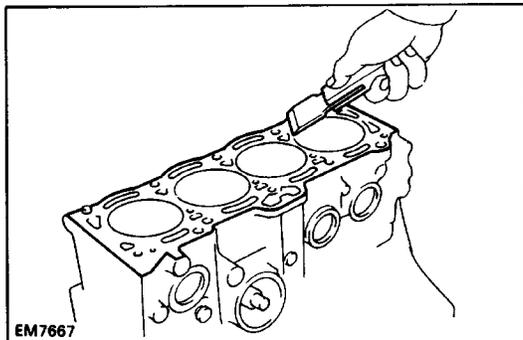
Using a soft brush and solvent, thoroughly clean the cylinder block.

2. INSPECT TOP SURFACE OF CYLINDER BLOCK FOR FLATNESS

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

Maximum warpage: 0.05 mm (0.0020 in.)

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



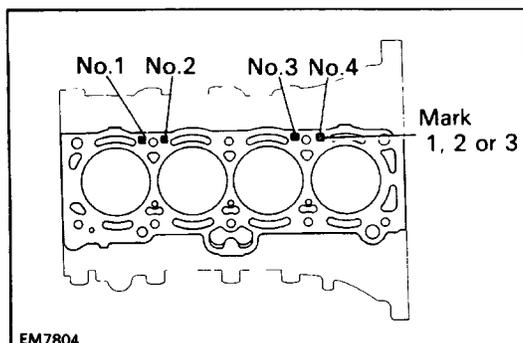
3. INSPECT CYLINDER FOR VERTICAL SCRATCHES

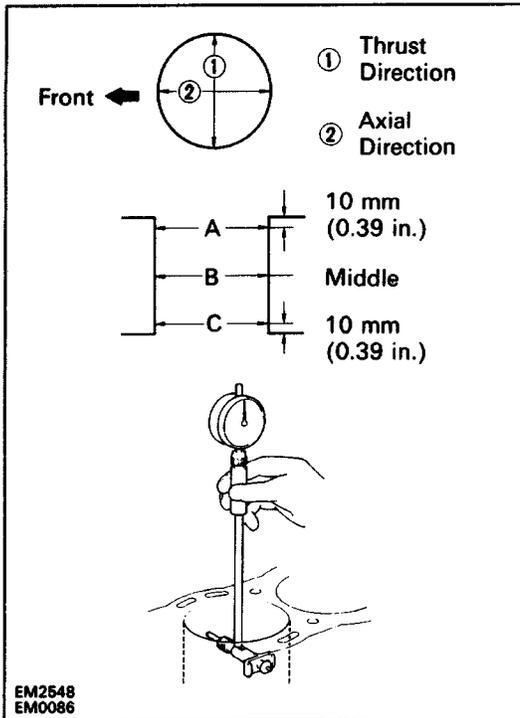
Visually check the cylinder for vertical scratches.

If deep scratches are present, rebore all the four cylinders. If necessary, replace the cylinder block.

4. INSPECT CYLINDER BORE DIAMETER

HINT: There are three sizes of the standard cylinder bore diameter, marked "1", "2" and "3" accordingly. The mark is stamped on the top of the cylinder block.





Using a cylinder gauge, measure the cylinder bore diameter at positions A, B and C in the thrust and axial directions.

Standard diameter:

STD Mark "1" 81.000–81.010 mm
(3–1890–3.1894 in.)

Mark "2" 81.010–81.020 mm
(3–1894–3.1898 in.)

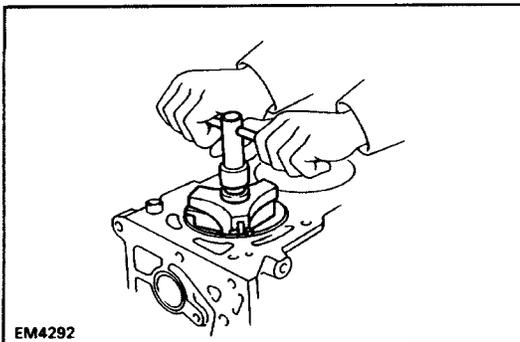
Mark "3" 81.020–81.030 mm
(3.1898–3.1902 in.)

Maximum diameter:

STD 81.23 mm (3.1980 in.)

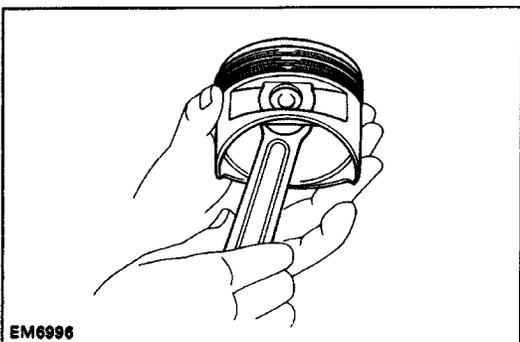
O/S 0.50 81.73 mm (3.2177 in.)

If the diameter is greater than maximum, rebore all the four cylinders. If necessary, replace the cylinder block.



5. REMOVE CYLINDER RIDGE

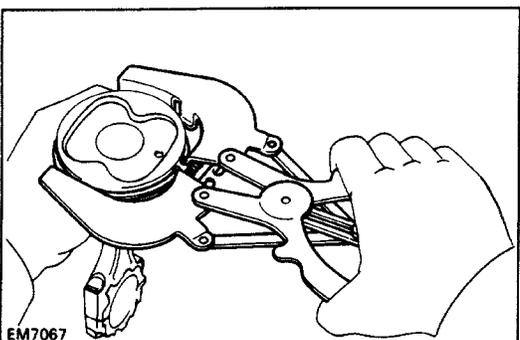
If the wear is less than 0.2 mm (0.008 in.), using a ridge reamer, grind the top of the cylinder.



DISASSEMBLY OF PISTON AND CONNECTING ROD ASSEMBLIES

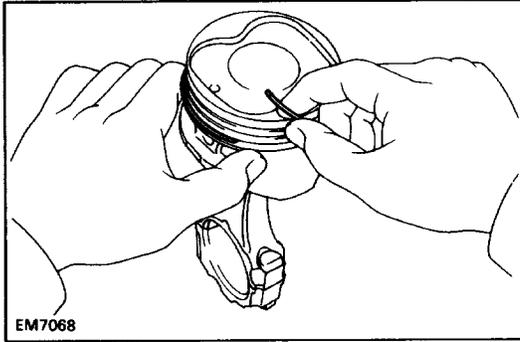
1. CHECK FIT BETWEEN PISTON AND PISTON PIN

Try to move the piston back and forth on the piston pin. If any movement is felt, replace the piston and pin as a set.



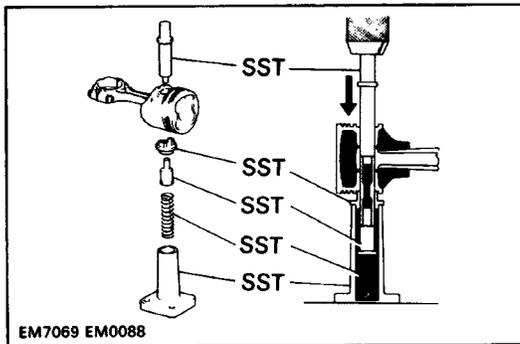
2. REMOVE PISTON RINGS

(a) Using a piston ring expander, remove the two compression rings.



(b) Remove the two side rails and oil ring expander by hand.

HINT: Arrange the rings in correct order only.

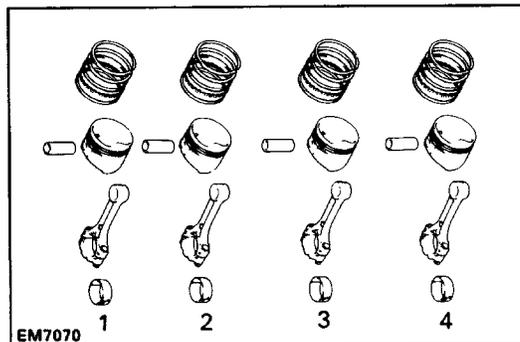


3. DISCONNECT CONNECTING ROD FROM PISTON

Using SST, press out the piston pin from the piston.

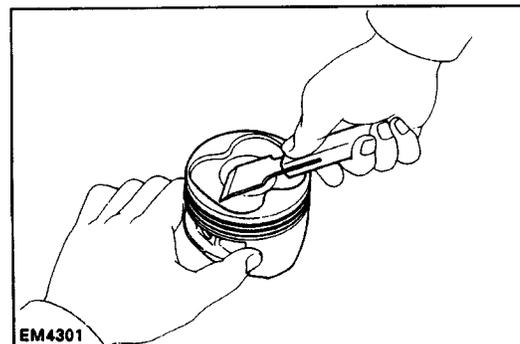
Remove the connecting rod.

SST 09221-25024 (09221-00020, 09221-00030, 09221-00050, 09221-00130, 09221-00140)



HINT:

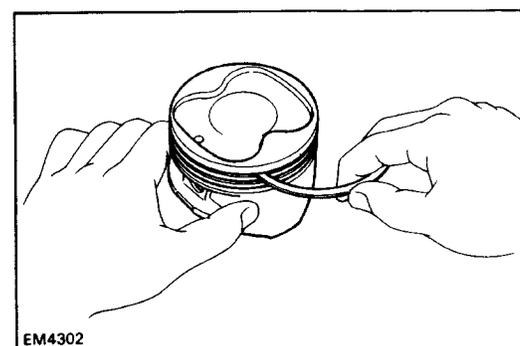
- The piston and pin are a matched set.
- Arrange the pistons, pins, rings, connecting rods and bearings in correct order.



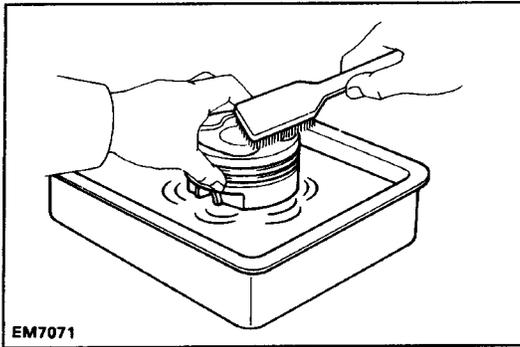
INSPECTION OF PISTON AND CONNECTING ROD ASSEMBLIES

1. CLEAN PISTON

(a) Using a gasket scraper, remove the carbon from the piston top.



(b) Using a groove cleaning tool or broken ring, clear the piston ring grooves.



(c) Using solvent and a brush, thoroughly clean the piston.

NOTICE: Do not use a wire brush.

2. INSPECT PISTON

A. Inspect piston oil clearance

HINT: There are three sizes of the standard piston diameter, marked "1", "2" and "3" accordingly. The mark is stamped on the piston top.

(a) Using a micrometer, measure the piston diameter at right angles to the piston pin center line, 22.5 mm (0.886 in.) from the piston head.

Piston diameter:

STD Mark "1"	80-930-80.940 mm (3.1862-3.1866 in.)
Mark "2"	80.940-80.950 mm (3.1866-3.1870 in.)
Mark "3"	80.950-80.960 mm (3.1870-3.1874 in.)
O / S 0.50	81.430-81.460 mm (3.2059-3.2071 in.)

(b) Measure the cylinder bore diameter in the thrust directions. (See step 4 on page [EM-201](#))

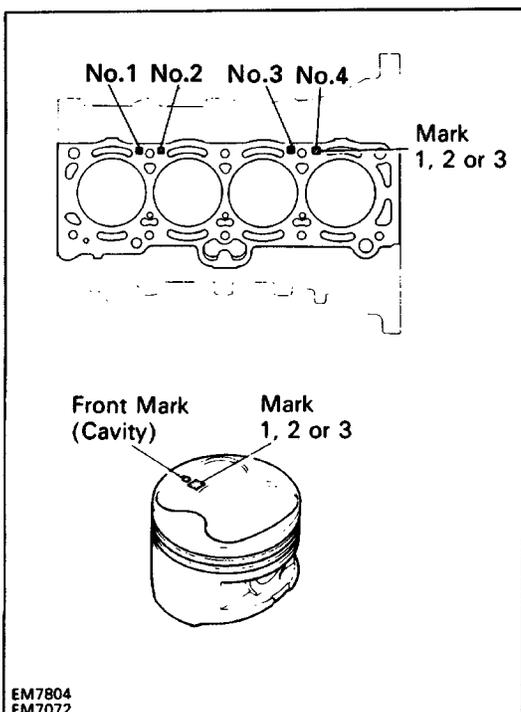
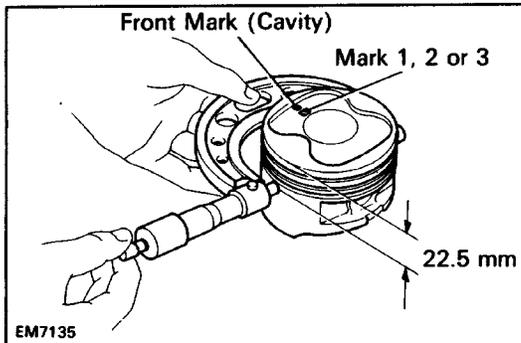
(c) Subtract the piston diameter measurement from the cylinder bore diameter measurement.

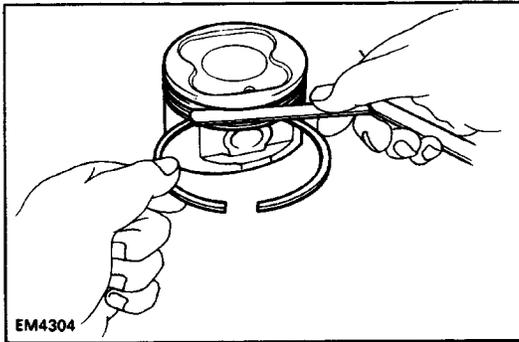
Standard oil clearance: 0.060-0.080 mm
(0.0024-0.0031 in.)

Maximum oil clearance: 0.10 mm (0.0039 in.)

If the oil clearance is greater than maximum, replace all the four pistons and rebore all the four cylinders. If necessary, replace the cylinder block.

HINT (Use new cylinder block): Use a piston with the same number mark as the cylinder bore diameter marked on the cylinder block.





B. Inspect piston ring groove clearance

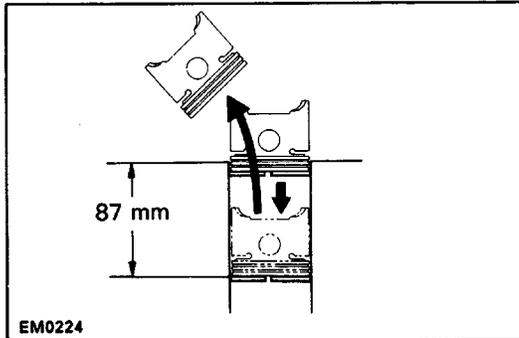
Using a feeler gauge, measure the clearance between new piston ring and the wall of the piston ring groove.

Ring groove clearance:

No.1 0.040–0.081 mm (0.0016–0.0032 in.)

No. 2 0.030–0.070 mm (0.0012–0.0028 in.)

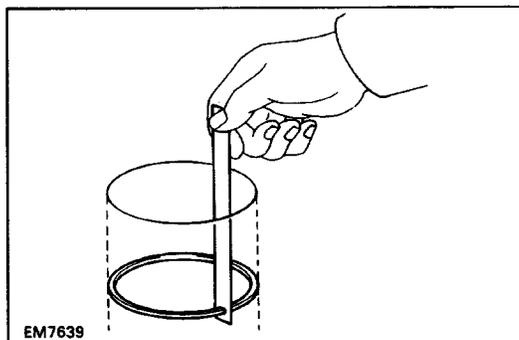
If the clearance is greater than maximum, replace the piston.



C. Inspect piston ring end gap

(a) Insert the piston ring into the cylinder bore.

(b) Using a piston, push the piston ring a little beyond the bottom of the ring travel, 87 mm (3.43 in.) from the top of the cylinder block.



(c) Using a feeler gauge, measure the end gap.

Standard end gap:

No.1 0.250–0.450 mm
0.0098–0.0177 in.)

No.2 0.150–0.400 mm
(0.0059–0.0157 in.)

Oil (Side rail) 0.100–0.700 mm
(0–0.0276 in.)

Maximum end gap:

No.1 1.05 mm (0.0413 in.)

No.2 1.00 mm (0.0394 in.)

Oil (Side rail) 1.30 mm (0.0512 in.)

If the end gap is greater than maximum, replace the piston ring. If the end gap is greater than maximum, even with a new piston ring, rebore all the four cylinders or replace the cylinder block.

3. INSPECT CONNECTING ROD

Using rod aligner and feeler gauge, check the connecting rod alignment.

- Check for bending.

Maximum bending:

0.05 mm (0.0020 in.) per 100 mm (3.94 in.)

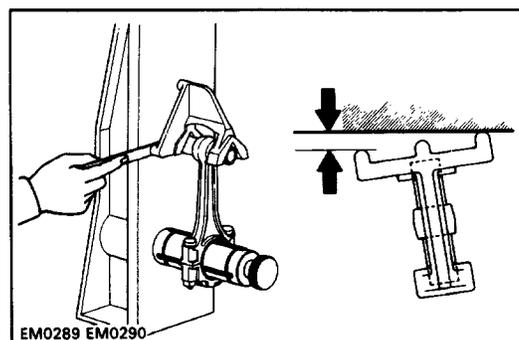
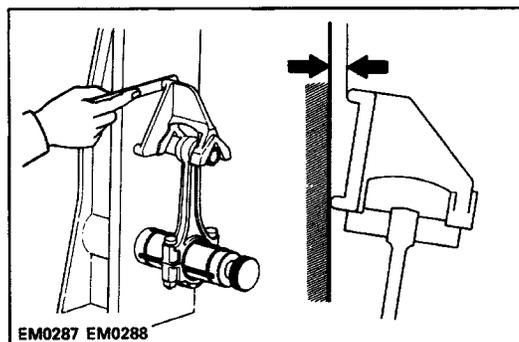
If bend is greater than maximum, replace the connecting rod and connecting rod cap as a set.

- Check for twist.

Maximum twist:

0.05 mm (0.0020 in.) per 100 mm (3.94 in.)

If twist is greater than maximum, replace the connecting rod and connecting rod cap as a set.



BORING OF CYLINDERS

HINT:

- Bore all the four cylinders for the oversized piston outside diameter.
- Replace all the piston rings with ones to match the oversized pistons.

1. KEEP OVERSIZED PISTONS

Oversized piston diameter:
O/S 0.50 81.430–81.460 mm
(3.2059–3.2071 in.)

2. CALCULATE AMOUNT TO BORE CYLINDERS

- Using a micrometer, measure the piston diameter at right angles to the piston pin center line, 22.5 mm (0.886 in.) from the piston head.
- Calculate the amount each cylinder is to be rebored as follows:

Size to be rebored = $P + C - H$

P = Piston diameter

C = Piston clearance

0 .060–0.080 mm (0.0024–0.0031 in.)

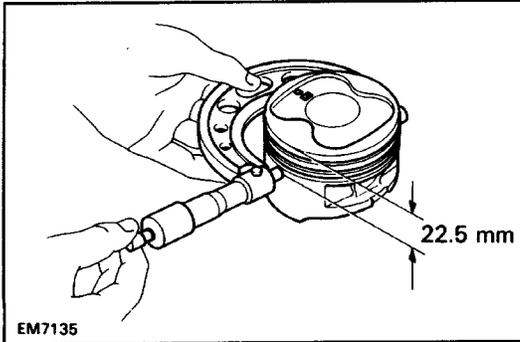
H = Allowance for honing

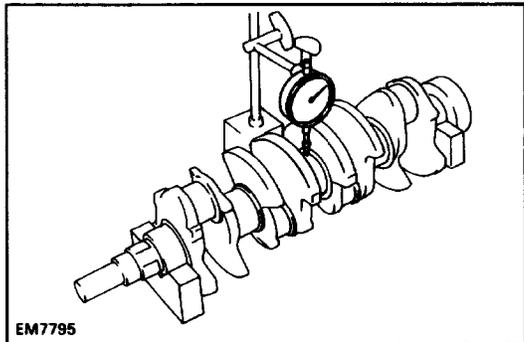
0.02 mm (0.0008 in.) or less

3. BORE AND HONE CYLINDERS TO CALCULATED DIMENSIONS

Maximum honing: 0.02 mm (0.0008 in.)

NOTICE: Excess honing will destroy the finished roundness.





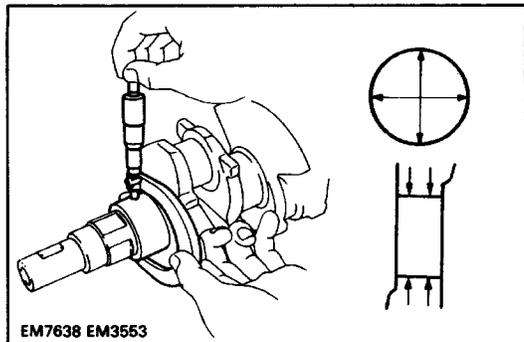
INSPECTION AND REPAIR OF CRANKSHAFT

1. INSPECT CRANKSHAFT FOR RUNOUT

- (a) Place the crankshaft on V-blocks.
- (b) Using a dial indicator, measure the circle runout at the center journal.

Maximum circle runout: 0.06 mm (0.0024 in.)

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



2. INSPECT MAIN JOURNALS AND CRANK PINS

- (a) Using a micrometer, measure the diameter of each main journal and crank pin.

Main journal diameter:

STD **47.982–48.000 mm**
 (1.8891–1.8898 in.)

U/S 0.25 **47.745–47.755 mm**
 (1.8797–1.8881 in.)

Crank pin diameter:

STD **39.985–40.000 mm**
 (1.5742–1.5748 in.)

U/S 0.25 **39.745–39.755 mm**
 (1.5648–1.5652 in.)

If the diameter is not as specified, check the oil clearance (See pages [EM-194](#) to 198). If necessary, grind or replace the crankshaft.

- (b) Check each main journal and crank pin for taper and out-of-round as shown.

Maximum taper and out-of-round: 0.02 mm
(0.0008 in.)

If the taper and out-of-round is greater than maximum, replace the crankshaft.

3. IF NECESSARY, GRIND AND HONE MAIN JOURNALS AND/OR CRANK PINS

Grind and hone the main journals and/or crank pins to the finished undersized diameter.

(See procedure step 2 above).

Install new main journal and/or crank pin undersized bearings.

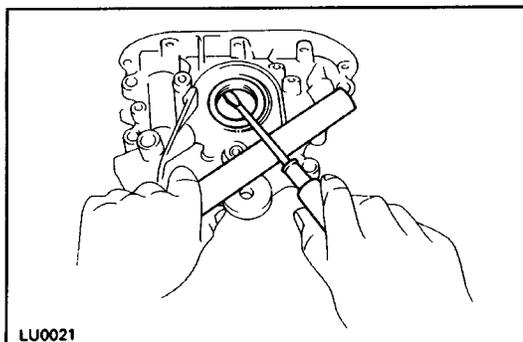
REPLACEMENT OF CRANKSHAFT OIL SEALS

HINT: There are two methods (A and B) to replace the oil seal which are as follows:

1. REPLACE CRANKSHAFT FRONT OIL SEAL

A. If oil pump is removed from cylinder block:

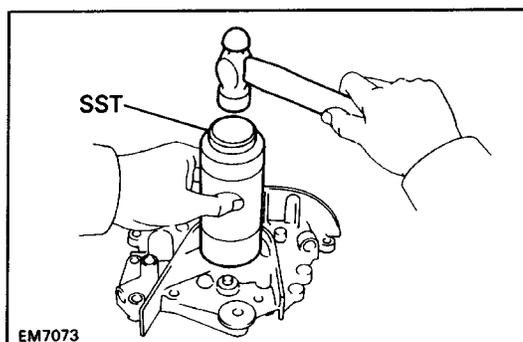
(a) Using a screwdriver, pry out the oil seal.



(b) Using SST and a hammer, tap in a new oil seal until its surface is flush with the oil pump case edge.

SST 09309-37010

(c) Apply MP grease to the oil seal lip.



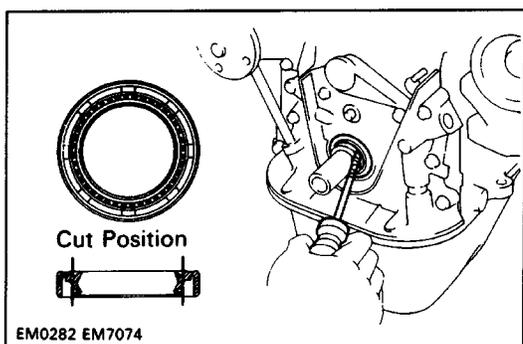
B. If oil pump is installed to the cylinder block:

(a) Using a knife, cut off the oil seal lip.

(b) Using a screwdriver, pry out the oil seal.

NOTICE: Be careful not to damage the crankshaft.

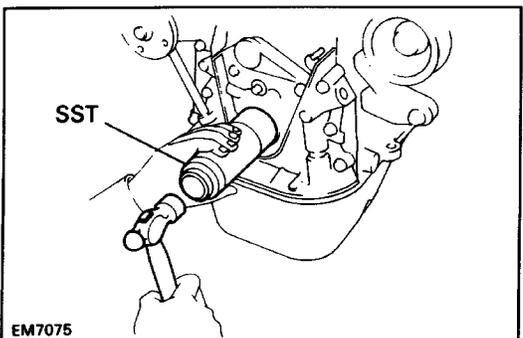
Tap the screwdriver tip.

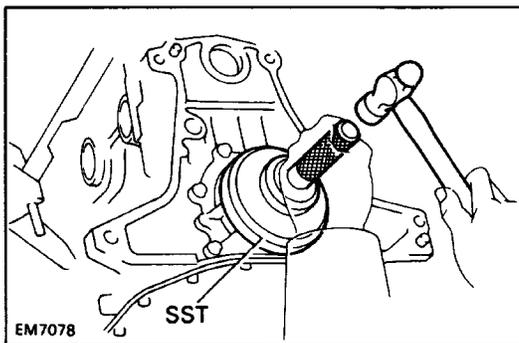
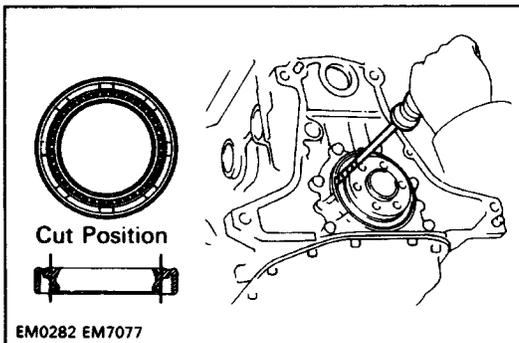
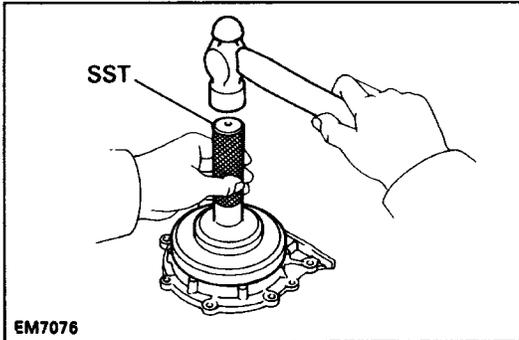
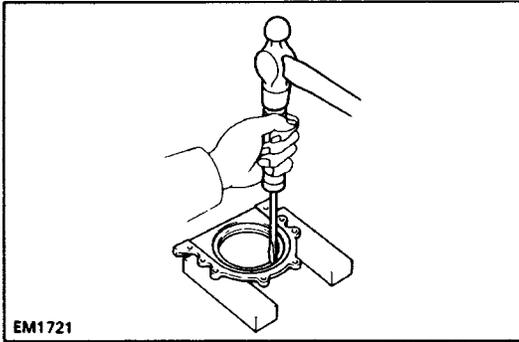


(c) Apply MP grease to a new oil seal lip.

(d) Using SST and a hammer, tap in the oil seal until its surface is flush with the oil pump case edge.

SST 09309-37010





2. REPLACE CRANKSHAFT REAR OIL SEAL

A. If rear oil seal retainer is removed from cylinder block:

(a) Using screwdriver and hammer, tap out the oil seal.

(b) Using SST and a hammer, tap in a new oil seal until its surface is flush with the rear oil seal edge.

SST 09223-41020

(c) Apply MP grease to the oil seal lip.

B. If rear oil seal retainer is installed to cylinder block:

(a) Using a knife, cut off the oil seal lip.

(b) Using a screwdriver, pry out the oil seal.

NOTICE: Be careful not to damage the crankshaft.

Tap the screwdriver tip.

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

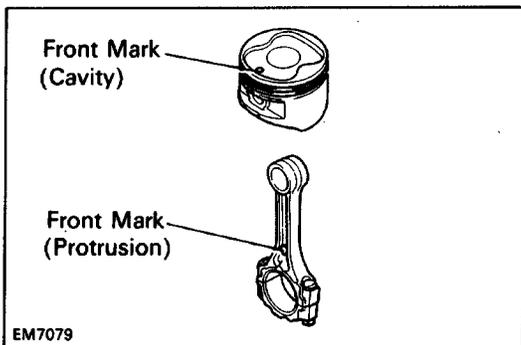
(d) Using SST and a hammer, tap in the oil seal until its surface is flush with the rear oil seal retainer edge.

SST 09223-41020

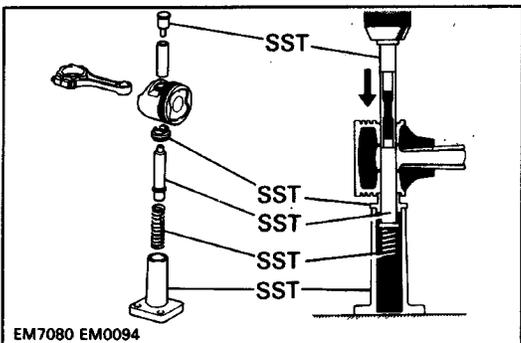
ASSEMBLY OF PISTON AND CONNECTING ROD ASSEMBLIES

1. ASSEMBLE PISTON AND CONNECTING ROD

- Coat the piston pin and pin holes of the piston with engine oil.
- Align the front marks of the piston and connecting rod.

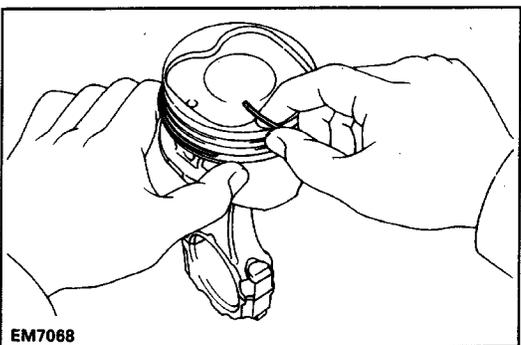


- Using SST, press in the piston pin.
SST 09221-25024 (09221-00020, 09221-00030, 09221-00050, 09221-00130, 09221-00140)



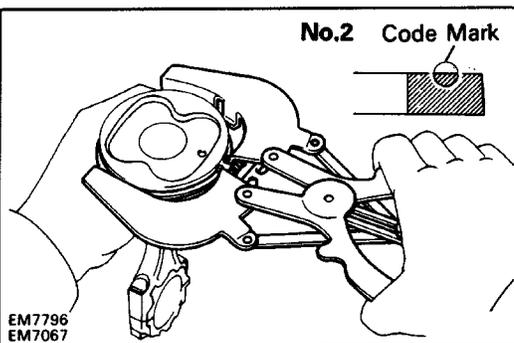
2. INSTALL PISTON RINGS

- install the oil ring expander and two side rails by hand.



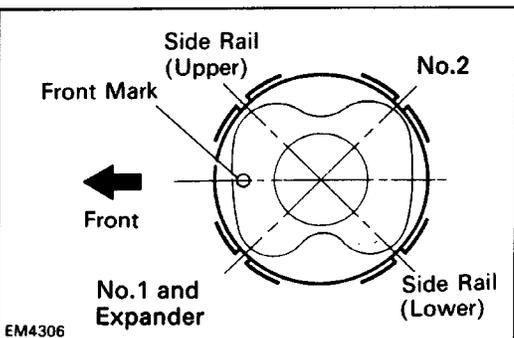
- Using a piston ring expander, install the two compression rings with the code mark facing upward (No.2 compression ring only).

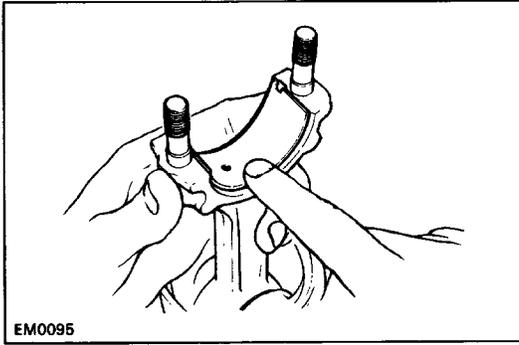
Code mark (No.2 compression ring only): R or T



- Position the piston rings so that the ring ends are as shown.

NOTICE: Do not align the ring ends.





3. INSTALL BEARINGS

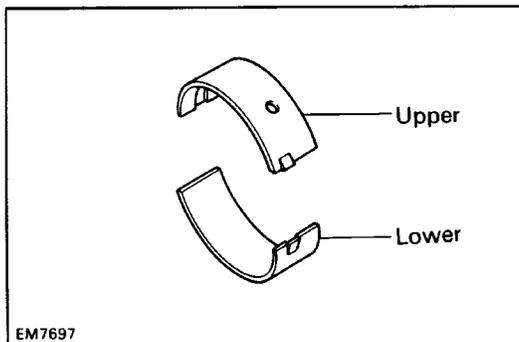
- (a) Align the bearing claw with the groove of the connecting rod or connecting cap.
- (b) Install the bearings in the connecting rod and connecting rod cap.

ASSEMBLY OF CYLINDER BLOCK

(See page [EM-184](#))

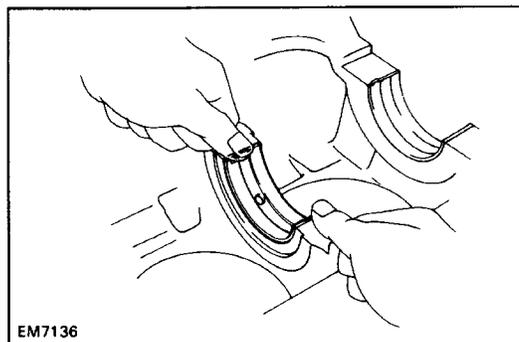
HINT:

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

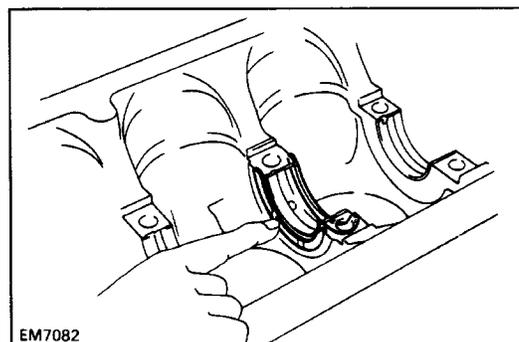


1. INSTALL MAIN BEARINGS

HINT: Upper bearings have an oil groove and oil holes; lower bearings do not.

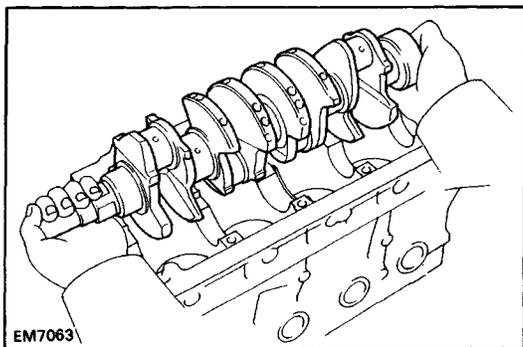


- (a) Align the bearing claw with the claw groove of the main bearing cap or cylinder block.
- (b) Install the bearings in the cylinder block and main bearing caps.

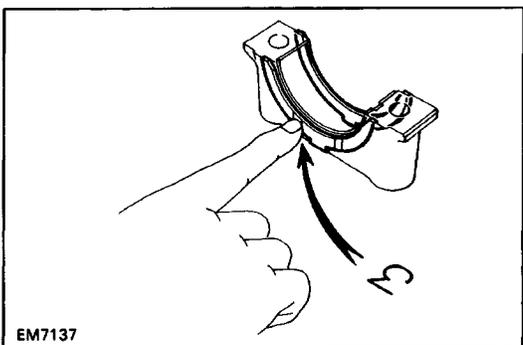


2. INSTALL UPPER THRUST WASHERS

Install the thrust washers under the No.3 main bearing cap position of the block with the oil grooves facing outward.

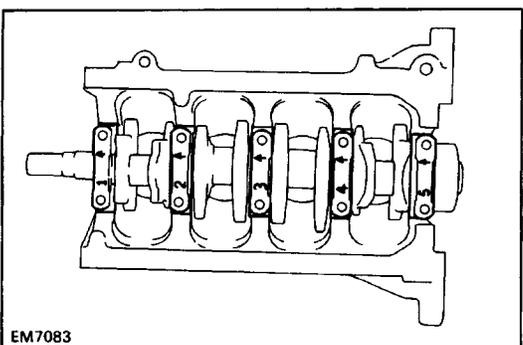


3. PLACE CRANKSHAFT ON CYLINDER BLOCK

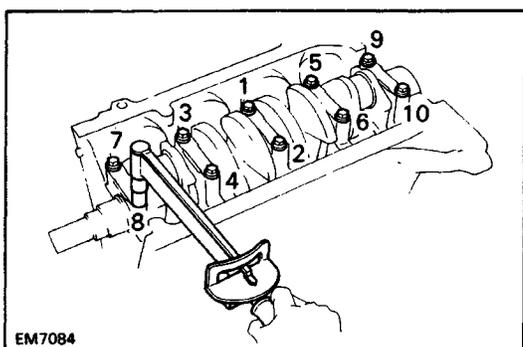


4. INSTALL MAIN BEARING CAPS AND LOWER THRUST WASHERS

- (a) Install the thrust washers on the No.3 bearing cap with the grooves facing outward.



- (b) Install the five main bearing caps in their proper locations.
 HINT: Each bearing cap has a number and front mark.

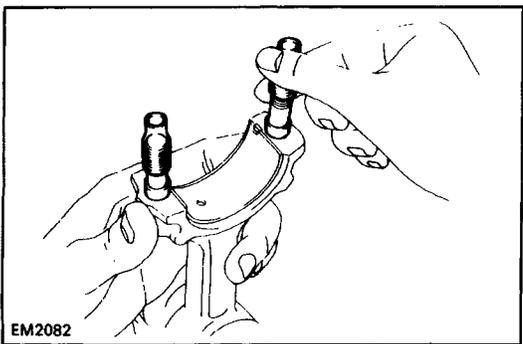


- (c) Apply a light coat of engine oil on the threads and under the heads of the main bearing caps.
 (d) Install and uniformly tighten the ten bolts of the main bearing caps in several passes in the sequence shown.

Torque: 60 N-m (610 kgf-cm, 44 ft-lbf)

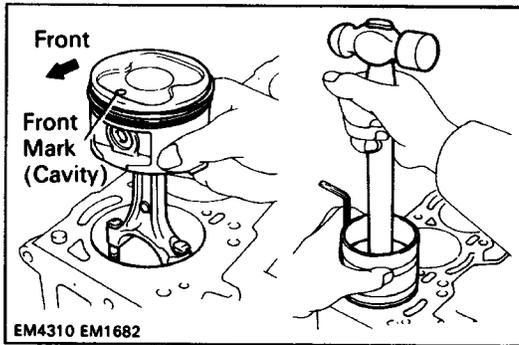
- (e) Check that the crankshaft turns smoothly.
 (f) Check the crankshaft thrust clearance.

(See step 5 on page [EM-196](#))

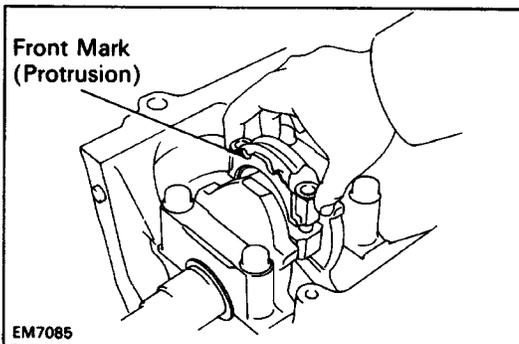


5. INSTALL PISTON AND CONNECTING ROD ASSEMBLIES

- (a) Cover the connecting rod bolts with a short piece of hose to protect the crankshaft from damage.

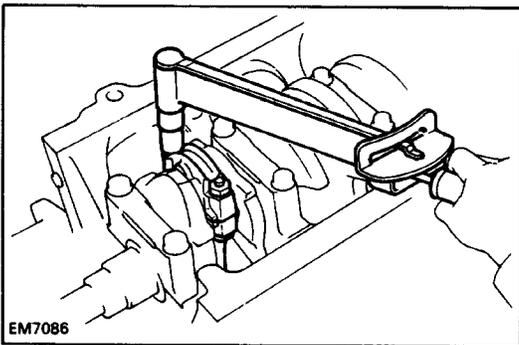


- (b) Using a piston ring compressor, push the correctly numbered piston and connecting rod assemblies into each cylinder with the front mark of the piston facing forward.



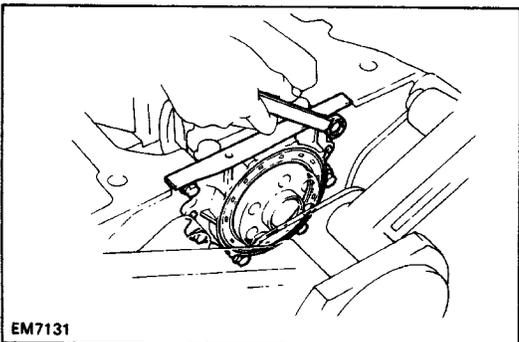
6. INSTALL CONNECTING ROD CAPS

- (a) Match the numbered connecting rod cap with the connecting rod.
 (b) Install the connecting rod cap with the front mark facing forward.



- (c) Apply a light coat of engine oil on the threads and under the cap nuts.
 (d) Install and alternately tighten the connecting rod cap nuts in several passes.
Torque: 49 N-m (500 kgf-cm, 36 ft-lbf)
 (e) Check that the crankshaft turns smoothly.
 (f) Check the connecting rod thrust clearance.

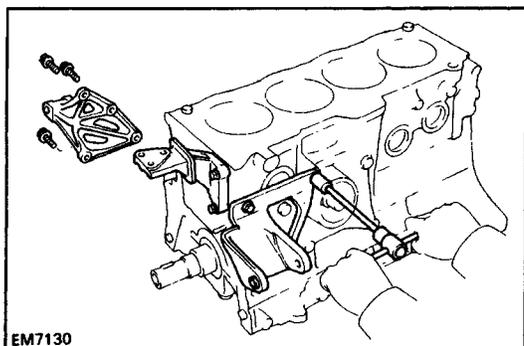
(See step 2 on page [EM-194](#))



7. INSTALL REAR OIL SEAL RETAINER

Install a new gasket and the retainer with the six bolts.

Torque: 9.3 N-m (95 kgf-cm, 82 in.-lbf)



POST ASSEMBLY

1. INSTALL PS PUMP BRACKET

Install the PS pump bracket with the three bolts.

Torque: 19 N-m (795 kgf-cm, 14 ft-lbf)

2. INSTALL RH ENGINE MOUNTING BRACKET

Install the mounting bracket with the three bolts.

Torque: 51 N-m (525 kgf-cm, 38 ft-lbf)

3. INSTALL GENERATOR BRACKET

Install the generator bracket with the three bolts.

Torque: 39 N-m (400 kgf-cm, 29 ft-lbf)

4. INSTALL OIL FILTER (See page LU-7)

5. INSTALL OIL PUMP AND OIL PAN

(See pages LU-14 and 15)

6. INSTALL WATER PUMP (See pages CO-9 and 10)

7. INSTALL CYLINDER HEAD (See pages EM-104 to 114)

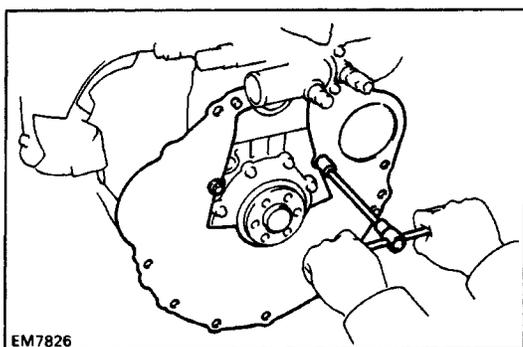
8. INSTALL PULLEYS AND TIMING BELT

(See pages EM-40 to 43)

9. INSTALL GENERATOR (See page CH-23)

10. INSTALL DISTRIBUTOR (See page IG-24)

11. REMOVE ENGINE STAND



12. INSTALL REAR END PLATE

Install the end plate with the two bolts.

Torque: 9.3 N-m (95 kgf-cm, 82 in-lbf)

13. (M/T)

INSTALL FLYWHEEL

(a) Install the flywheel on the crankshaft.

(b) Install and uniformly tighten the six mounting bolts in several passes in the sequence shown.

Torque: 78 N-m (800 kgf-cm, 58 ft-lbf)

14. (A/T)

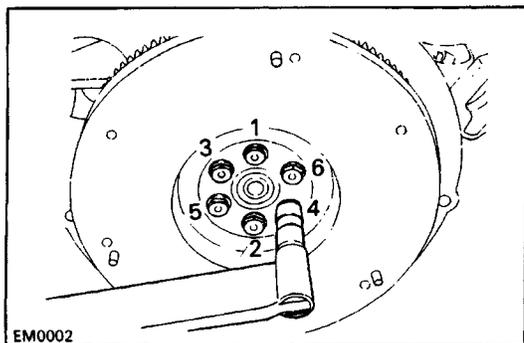
INSTALL DRIVE PLATE (See procedure in step 13)

Torque: 64 N-m (650 kgf-cm, 47 ft-lbf)

15. (M/T)

INSTALL CLUTCH DISC AND COVER

(See CL section)



INSTALLATION OF ENGINE

1. ASSEMBLE ENGINE AND TRANSAXLE

M/T (See MT section)

A/T (See AT section)

2. INSTALL STARTER (See page [ST-22](#))

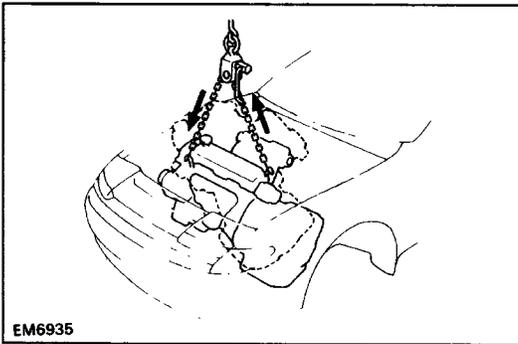
3. INSTALL ENGINE AND TRANSAXLE ASSEMBLY IN VEHICLE

(a) Attach the engine chain hoist to the engine hangers.

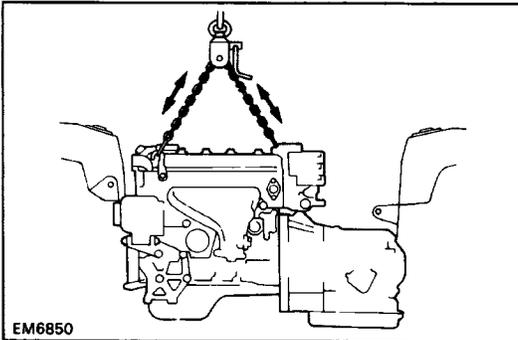
(b) Lower the engine into the engine compartment.

Tilt the transaxle downward, lower the engine and clear the LH mounting.

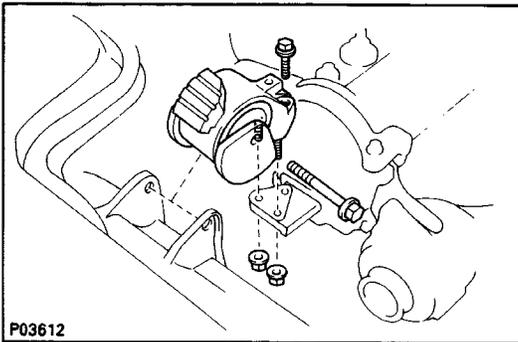
NOTICE: Be careful not to hit the PS gear housing or park/neutral position switch (A/T).



(c) Keep the engine level, and align RH and LH mountings with the body bracket.

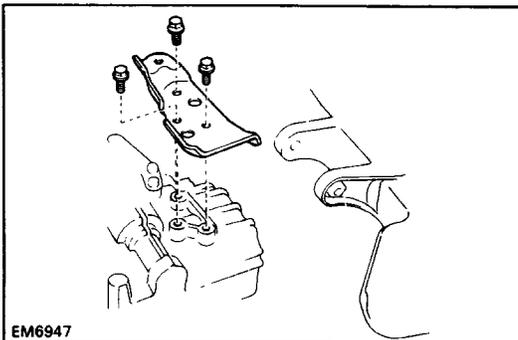


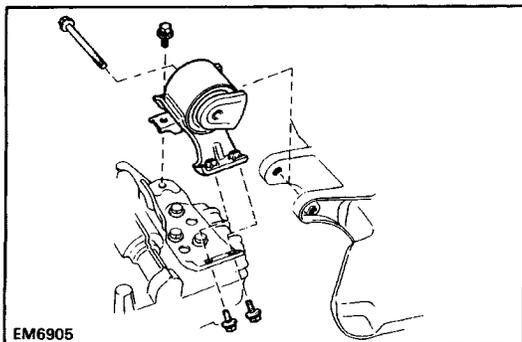
(d) Attach the RH mounting insulator to the mounting bracket and body, and temporarily install the through bolt and two nuts.



(e) Install the LH mounting bracket to the transaxle case with the three bolts.

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





- (f) Attach the LH mounting insulator to the mounting bracket and body with the through bolt and three bolts. Torque the bolts.

Torque:

Bolt 48 N-m (490 kgf-cm, 35 ft-lbf)

Through bolt 87 N-m (890 kgf-cm, 64 ft-lbf)

- (g) Torque the two nuts, bolt and through bolt of the RH mounting insulator.

Torque:

Nut 52 N-m (530 kgf-cm, 38 ft-lbf)

Bolt 64 N-m (650 kgf-cm, 47 ft-lbf)

Through bolt 87 N-m (890 kgf-cm, 64 ft-lbf)

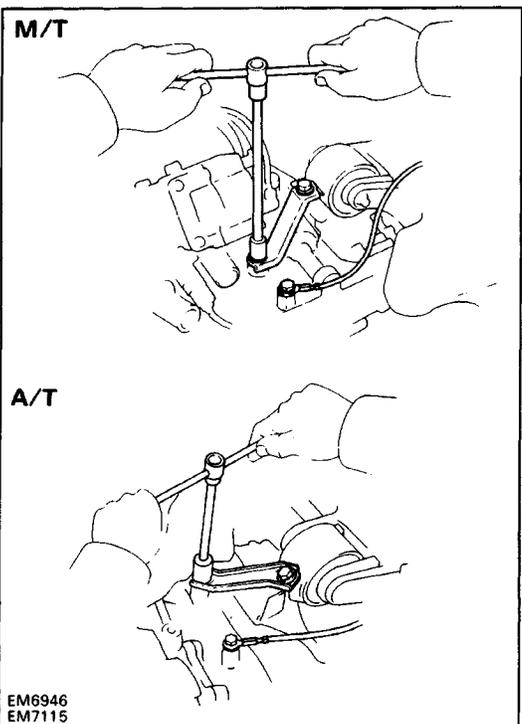
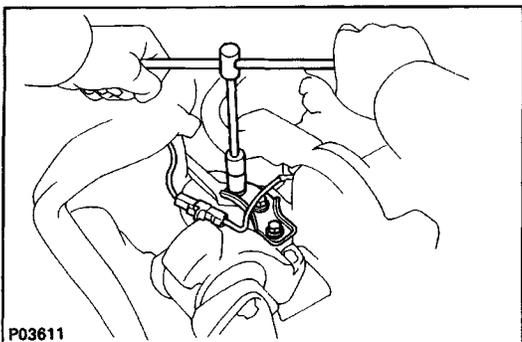
- (h) Remove the engine chain hoist from the engine.

4. INSTALL RH ENGINE MOUNTING STAY

Install the mounting stay with the three bolts.

Torque: 42 N-m (430 kgf-cm, 31 ft.lbf)

5. INSTALL CONNECTOR TO GROUND WIRE ON RH FENDER APRON

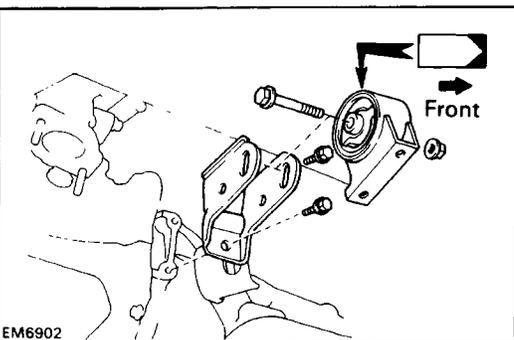


6. INSTALL LH ENGINE MOUNTING STAY

Install the mounting stay with the bolt and nut. Connect the ground strap.

Torque: 21 N-m (210 kgf-cm, 15 ft-lbf)

7. CONNECT GROUND WIRE TO TRANSAXLE

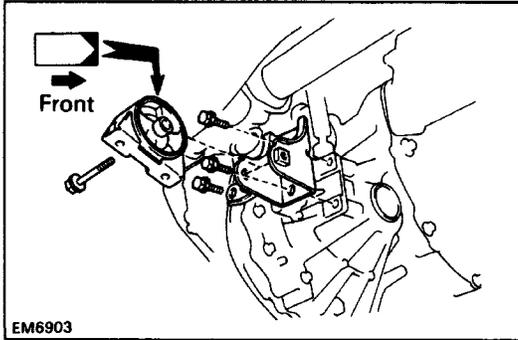


8. INSTALL FRONT ENGINE MOUNTING BRACKET AND INSULATOR

- (a) Install the mounting bracket with the two bolts.

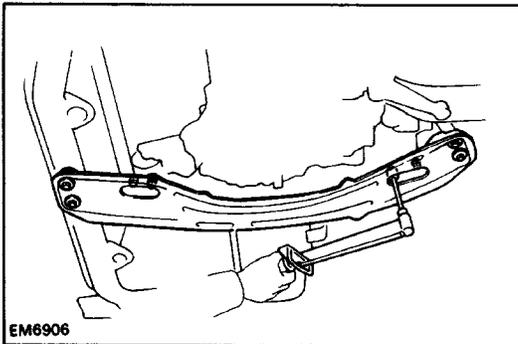
Torque: 77 N-m (790 kgf-cm, 57 ft-lbf)

- (b) Temporarily install the mounting insulator with the through bolt.



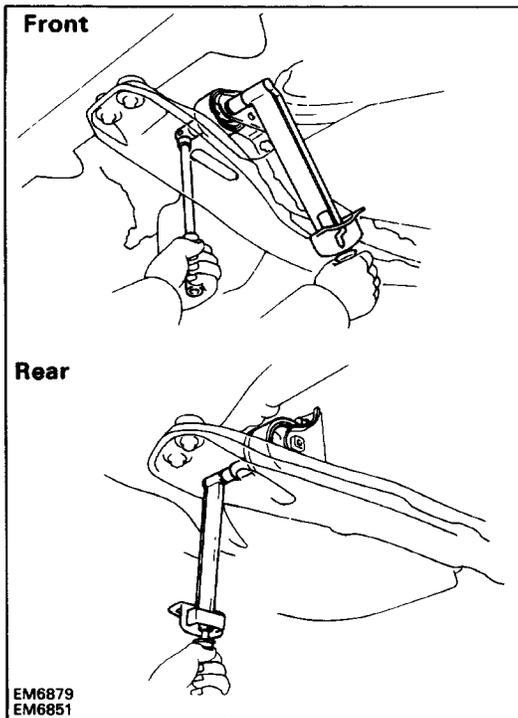
9. INSTALL REAR ENGINE MOUNTING BRACKET AND INSULATOR

- (a) Install the mounting bracket with the three bolts.
Torque: 77 N-m (790 kgf-cm, 57 ft-lbf)
- (b) Temporarily install the mounting insulator with the through bolt.



10. INSTALL ENGINE MOUNTING CENTER MEMBER

- (a) Install the engine mounting center member with the four bolts.
Torque: 52 N-m (530 kgf-cm, 38 ft-lbf)
- (b) Install and torque the four bolts holding the insulators to the center member.
Torque: 64 N-m (650 kgf-cm, 47 ft-lbf)



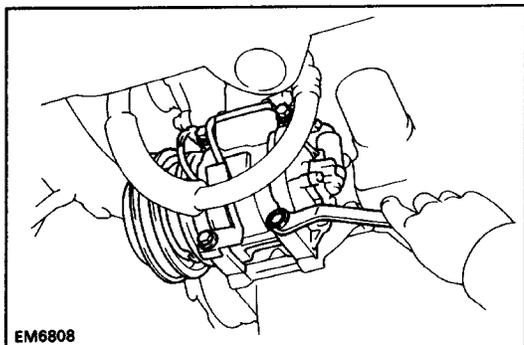
11. TIGHTEN FRONT AND REAR ENGINE MOUNTING THROUGH BOLTS

- Torque: 87 N-m (890 kgf-cm, 64 ft-lbf)**

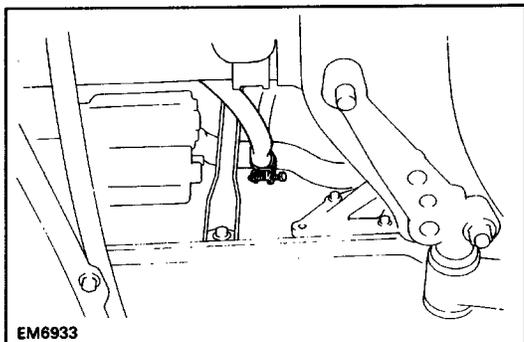
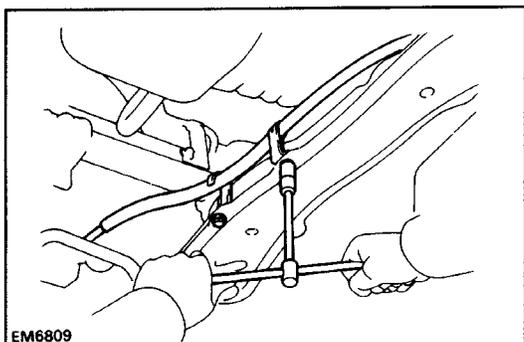


12. INSTALL PS PUMP

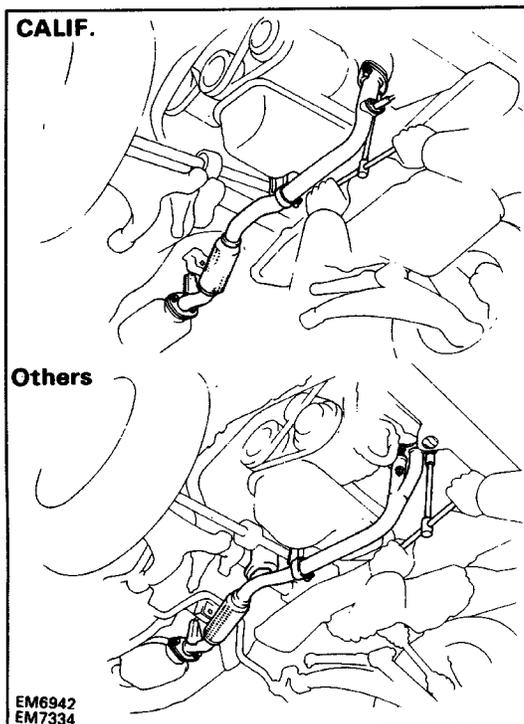
- (a) Install the PS pump with the two bolts.
Torque: 39 N-m (400 kgf-cm, 29 ft-lbf)
- (b) Install the drive belt.
- (c) Connect the air hose to the air pipe.
- (d) Connect the air hose to the air intake chamber.

**13. (w/ A/C)****INSTALL A/C COMPRESSOR**

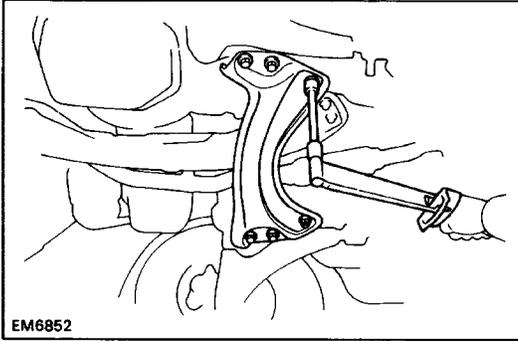
- (a) Install the compressor with the four bolts.
Torque: 25 N-m (250 kgf-cm, 18 ft-lbf)
- (b) Connect the two connectors.
- (c) Connect the A/C compressor connector.

**14. CONNECT HEATER HOSE TO WATER INLET PIPE****15. INSTALL DRIVE SHAFTS (See SA section)****16. (A/T)****INSTALL TRANSAXLE CONTROL CABLE TO ENGINE MOUNTING CENTER MEMBER**

Install the control cable with the two clamps and bolts.

**17. INSTALL FRONT EXHAUST PIPE**

- (a) Install the support hook on the front exhaust pipe to the support bracket.
- (b) Place two (CALIF.) or three (others) new gaskets on the front and rear of the front exhaust pipe.
- (c) Temporarily install the two bolts and new nuts holding the front exhaust pipe to the three-way catalytic converter.
- (d) Using a 14 mm deep socket wrench, install the two (CALIF.) or three (others) new nuts holding the front exhaust pipe to the exhaust manifold.
Torque: 62 N-m (630 kgf-cm, 46 ft.lbf)
- (e) Tighten the two bolts and nuts holding the front exhaust pipe to the three-way catalytic converter.
Torque: 43 N-m (440 kgf-cm, 32 ft-lbf)
- (f) Install the clamp with the bolt.
- (g) Connect the oxygen sensor connector.

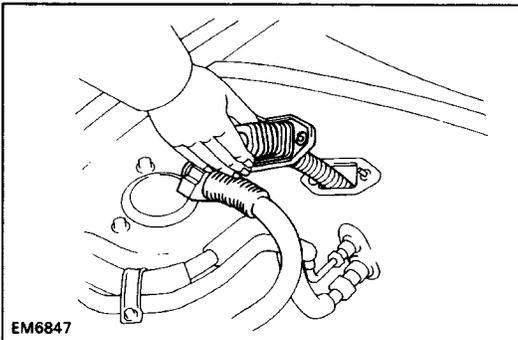


EM6852

18. INSTALL SUSPENSION LOWER CROSSMEMBER

Install the lower crossmember with the four bolts and two nuts.

Torque: 152 N-m (1,550 kgf-cm, 112 ft-lbf)



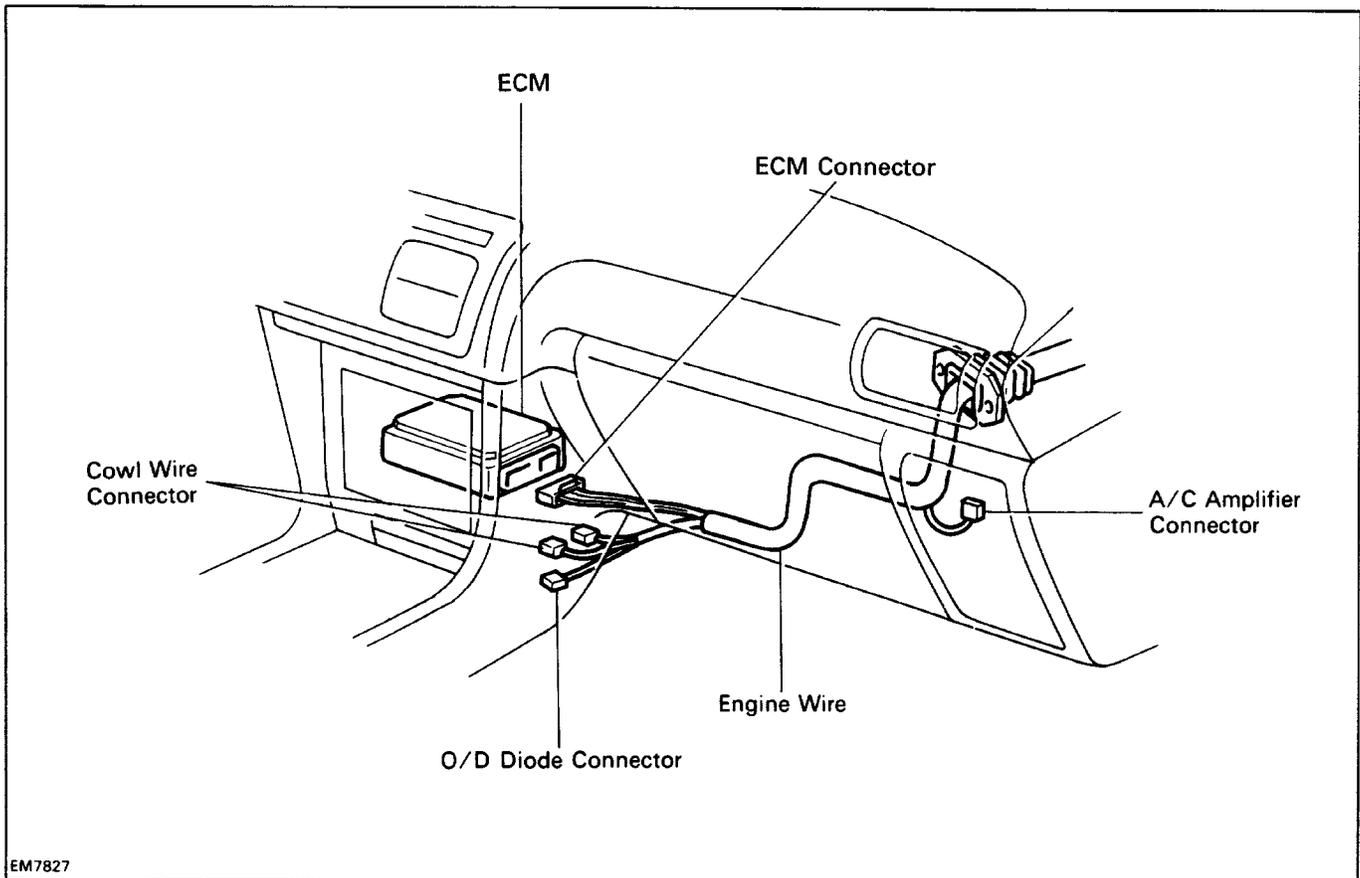
EM6847

19. CONNECT ENGINE WIRE TO CABIN

(a) Push in the engine wire through the cowl panel. Install the two nuts.

(b) Connect the following connectors:

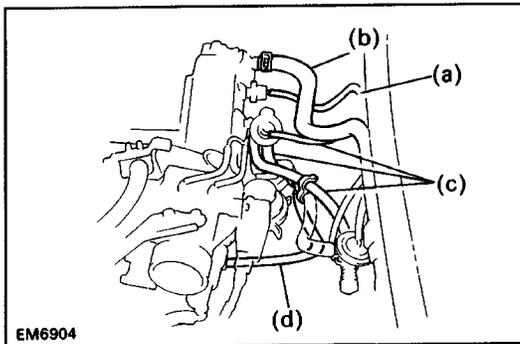
- (1) ECM connector
- (2) Two cowl wire connectors
- (3) A/C amplifier connector
- (4) O/D diode connector



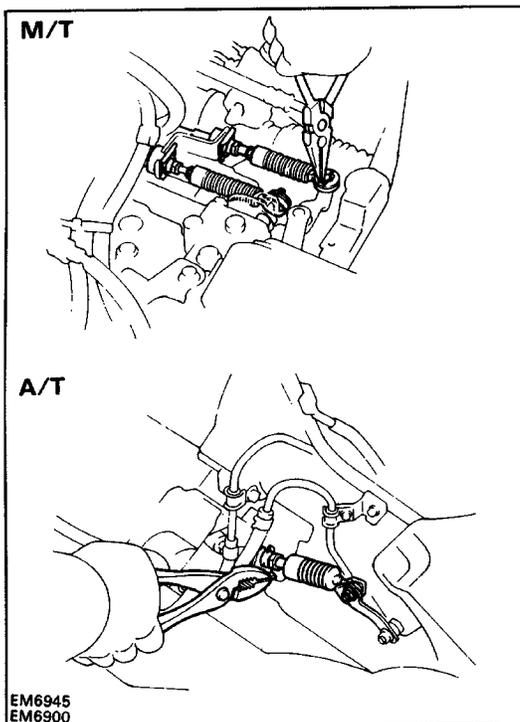
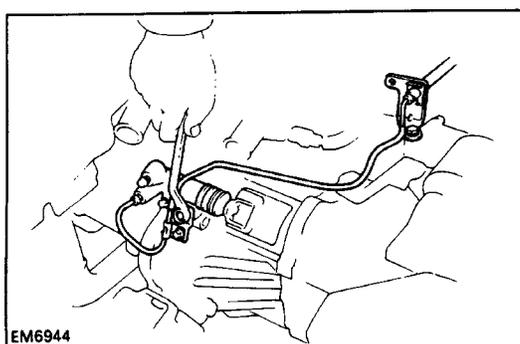
EM7827

20. CONNECT ENGINE WIRE

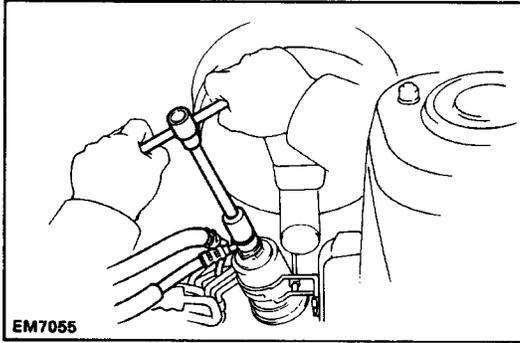
- (a) Engine wire clamp to wire bracket on RH fender apron
- (b) Two cowl wire connectors

**21. CONNECT VACUUM HOSES**

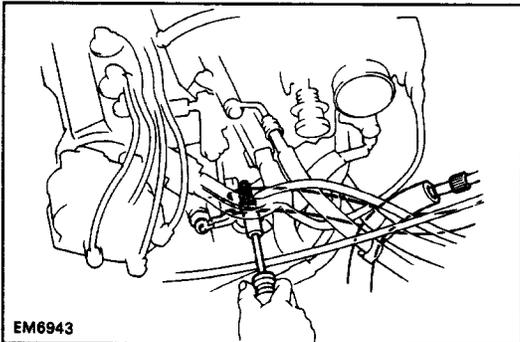
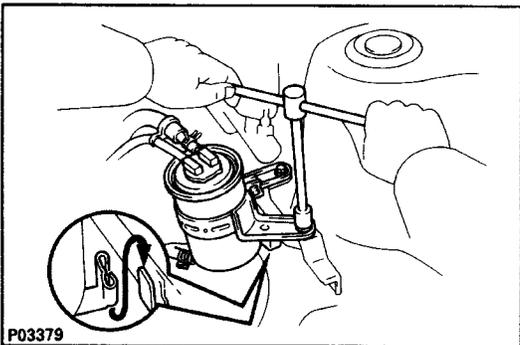
- (a) Vacuum sensor hose to gas filter on air intake chamber
- (b) Brake booster vacuum hose to air intake chamber
- (c) Three A/C idle-up vacuum hoses to ASV on air intake chamber
- (d) A/C vacuum hose to air pipe

**22. CONNECT TRANSAXLE CONTROL CABLE (S) TO TRANSAXLE****23. (M/T)****INSTALL CLUTCH RELEASE CYLINDER**

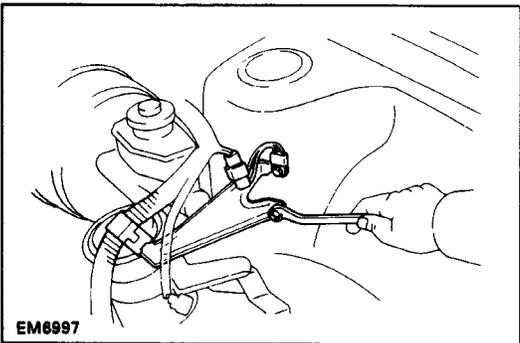
Install the release cylinder and tube with the four bolts.

**24. CONNECT FUEL HOSES**

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

**25. CONNECT SPEEDOMETER CABLE****26. CONNECT HEATER HOSE TO WATER INLET****27. INSTALL CHARCOAL CANISTER**

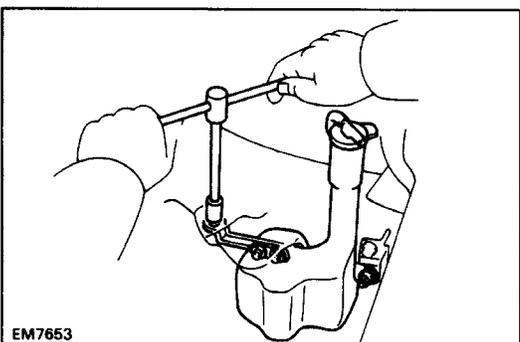
- (a) Install the charcoal canister with the two bolts.
- (b) Connect the three hoses.

**28. INSTALL ENGINE WIRE BRACKET**

- (a) Install the wire bracket with the two bolts. Install the noise filter.
- (b) Install the wire clamp to the wire bracket.

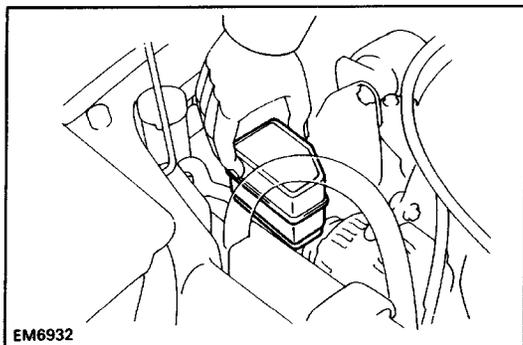
29. CONNECT WIRES AND CONNECTORS

- (a) Data link connector 1
- (b) Vacuum sensor connector
- (c) Ground straps from LH fender apron

**30. INSTALL RADIATOR RESERVOIR TANK**

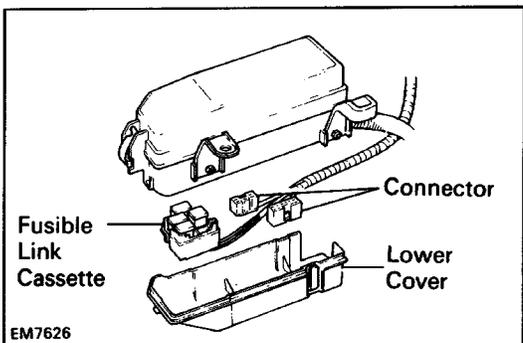
Install the reservoir tank with the two nuts.

31. INSTALL RADIATOR (See pages [CO-24](#) and [25](#))**32. INSTALL BATTERY**



EM6932

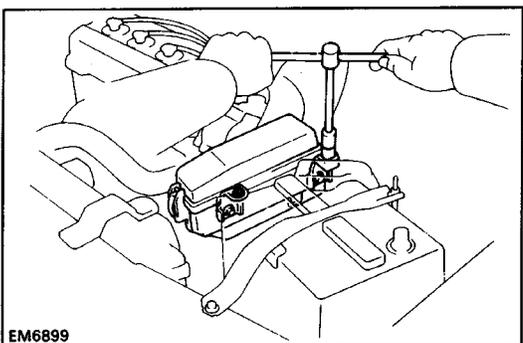
33. INSTALL A/C RELAY BOX



EM7626

34. CONNECT ENGINE WIRE, AND INSTALL ENGINE RELAY BOX

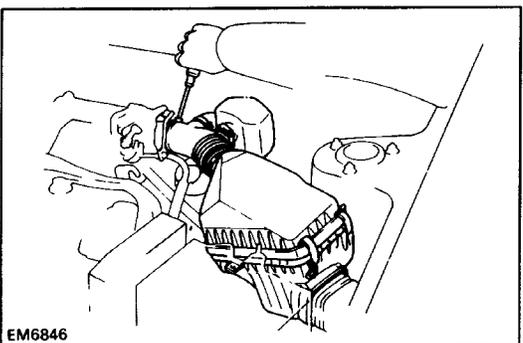
- (a) Connect the cassette and two connectors of the engine wire to the relay box.
- (b) Install the lower cover to the relay box.



EM6899

- (c) Install the relay box with the two nuts.

35. INSTALL ACCELERATOR CABLE, AND ADJUST IT



EM6846

36. INSTALL AIR CLEANER

- (a) Install the air cleaner case with the three bolts.
- (b) Install the air cleaner filter.
- (c) Connect the air cleaner hose to the throttle body.
- (d) Connect the air hose to the air pipe.
- (e) Install the air cleaner cap.
- (f) Connect the intake air temperature sensor connector

37. CONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY

38. FILL WITH ENGINE COOLANT (See page [CO-6](#))

Capacity (w/ Heater):

M/T 5.2 liters (5.5 US qts, 4.6 Imp. qts)

A/T 5.6 liters (5.9 US qts, 4.9 Imp. qts)

39. FILL WITH ENGINE OIL (See page [LU-8](#))**Capacity:****Drain and refill****w/ Oil filter change****3.2 liters (3.3 US qts, 2.8 Imp. qts)****w/o Oil filter change****3.0 liters (3.1 US qts, 2.6 Imp. qts)****Dry fill 3.7 liters (3.9 US qts, 3.3 Imp. qts)****40. START ENGINE AND CHECK FOR LEAKS****41. PERFORM ENGINE ADJUSTMENT**

(a) Adjust the generator drive belt.

Drive belt tension: New belt 160 ± 20 lbf**Used belt 130 ± 20 lbf**(b) Adjust the PS drive belt. (See page [SR-38](#))**Drive belt tension: New belt 125 ± 25 lbf****Used belt 80 ± 20 lbf**

(c) Adjust the A/C drive belt.

Drive belt tension: New belt 160 ± 25 lbf**Used belt 100 ± 20 lbf**(d) Adjust the ignition timing. (See page [IG-25](#))**Ignition timing:****10° BTDC @ idle****(w/ Terminals TE1 and E1 connected)****42. INSTALL ENGINE UNDER COVERS****43. INSTALL HOOD****44. PERFORM ROAD TEST**

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

45. RECHECK ENGINE COOLANT AND ENGINE OIL LEVELS