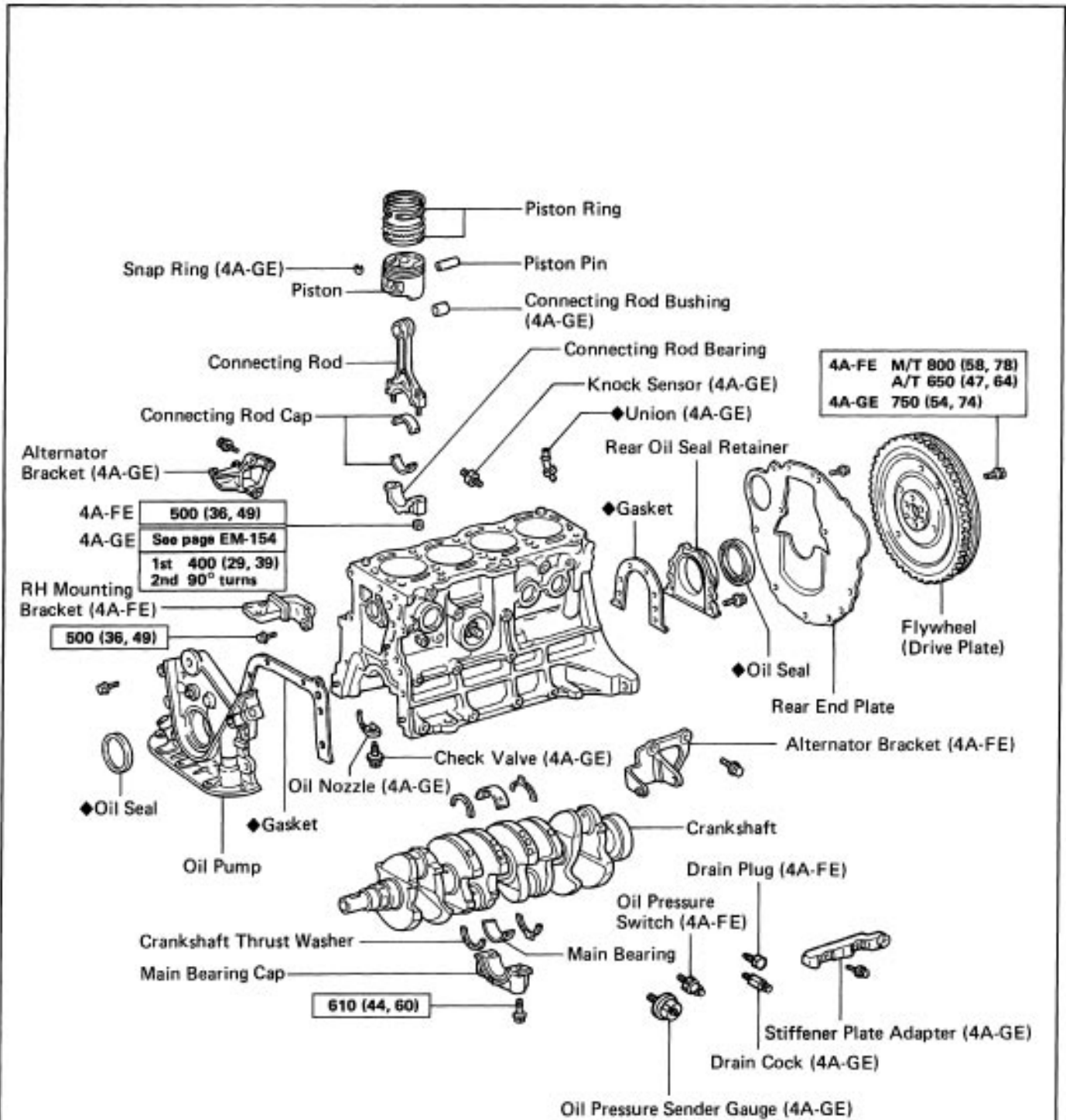


CYLINDER BLOCK COMPONENTS



kg-cm (ft-lb, N-m) : Specified torque

◆ Non-reusable part

REMOVAL OF ENGINE (4A-FE)

1. REMOVE BATTERY AND HOOD
2. REMOVE RH AND LH ENGINE UNDER COVERS
3. DRAIN ENGINE OIL
4. DRAIN ENGINE COOLANT
5. DRAIN GEAR OIL (M/T) OR FLUID (A/T)
6. REMOVE RADIATOR WITH COOLING FAN
(See page CO-13)
7. DISCONNECT ACCELERATOR WIRE FROM BRACKET
8. (A/T)

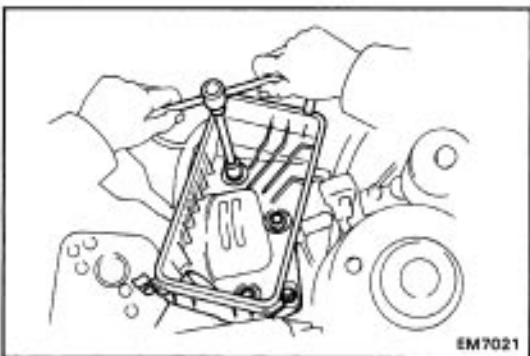
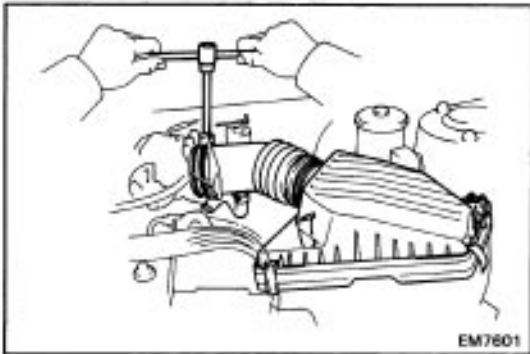
DISCONNECT THROTTLE CABLE FROM BRACKET

9. (w/ CRUISE CONTROL)

REMOVE CRUISE CONTROL ACTUATOR

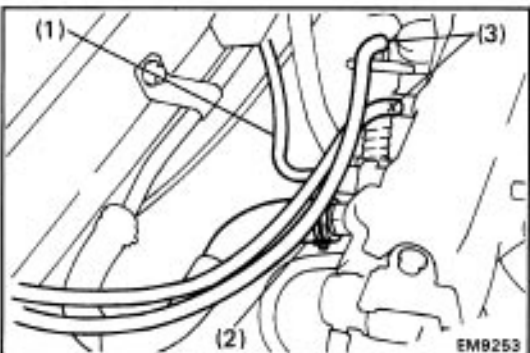
10. REMOVE AIR CLEANER ASSEMBLY

- (a) Disconnect the vacuum hose from the charcoal canister.
- (b) Disconnect the air intake temp. sensor connector from the air cleaner cap.
- (c) Disconnect the air hose from the air pipe.
- (d) Loosen the air cleaner hose clamp bolt.
- (e) Disconnect the air cleaner cap clips.
- (f) Remove the air cleaner cap with air cleaner hose.
- (g) Remove the air cleaner filter element.



- (h) Disconnect the harness clamp from the boss, and remove the three bolts and air cleaner case.
- (i) Remove the two bolts and air cleaner support bracket.

11. REMOVE WASHER TANK



12. DISCONNECT FOLLOWING HOSES:

- (a) Disconnect the following vacuum hoses from the intake chamber:
 - (1) Vacuum sensor hose from gas filter
 - (2) Brake booster vacuum hose
 - (3) (with A/C)
 - Two A/C vacuum hoses from actuator
- (b) (w/ PS and/or with A/C)
 - Disconnect the air hose from the air pipe.
- (e) Disconnect the fuel return hose from the air pipe.

13. DISCONNECT ENGINE WIRE

(a) Remove the three nuts, No.2 junction block and No.5 relay block.

(b) Disconnect the following connectors:

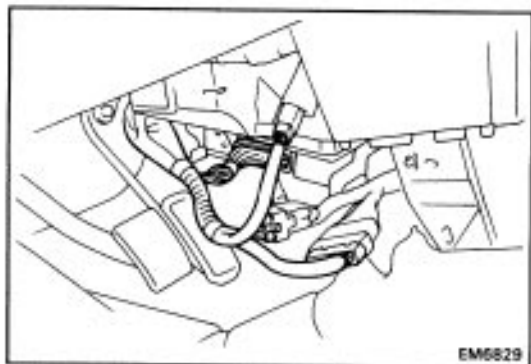
- Ground strap connector and bolt
- Check connector
- Vacuum sensor connector
- (with A/C)

A/C wire connector

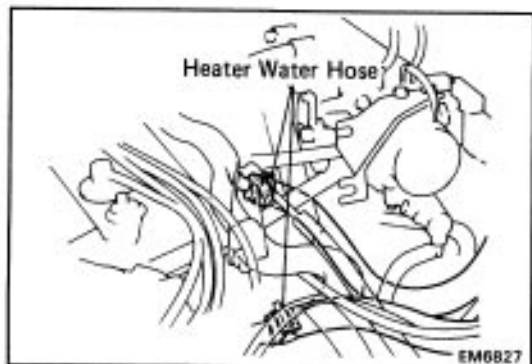
(c) Remove the front and rear console boxes.

(d) Remove the center cover in front of the console box.

(e) Disconnect the four connectors from the cowl wire and ECU.

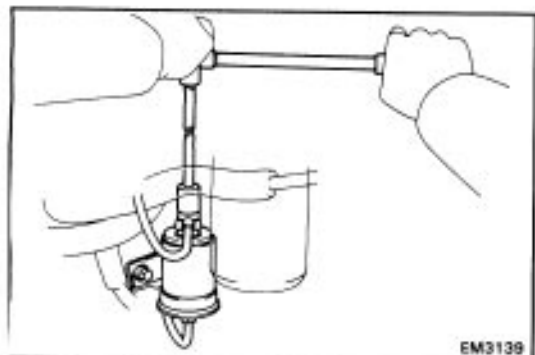


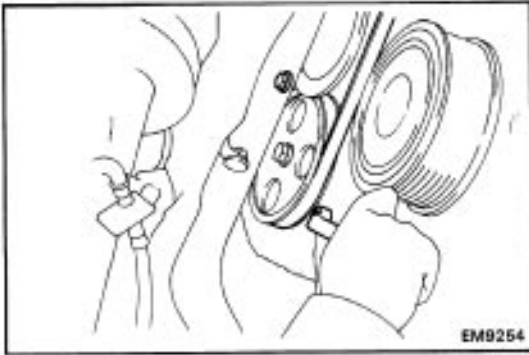
(f) Pull out the engine wire from the cowl panel.

**14. DISCONNECT HEATER WATER HOSES**

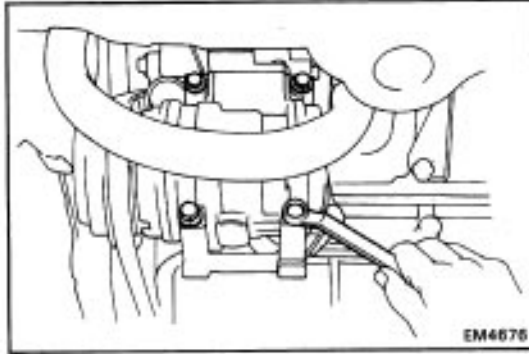
(a) Disconnect the heater hose from the water inlet housing.

(b) Disconnect the hose from the water inlet pipe.

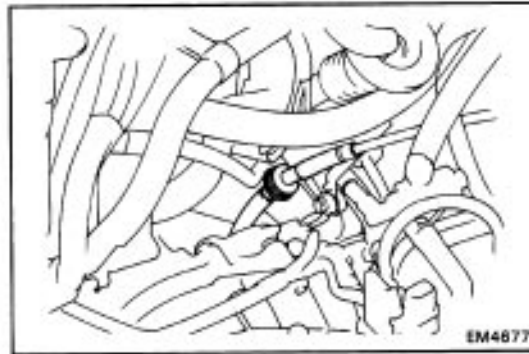
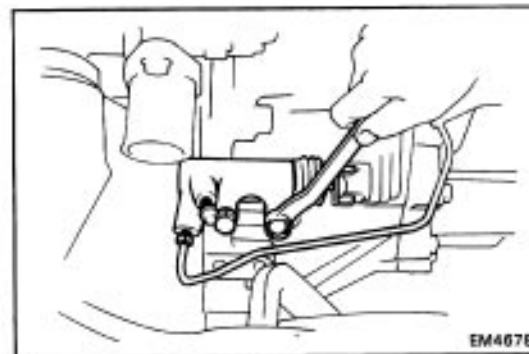
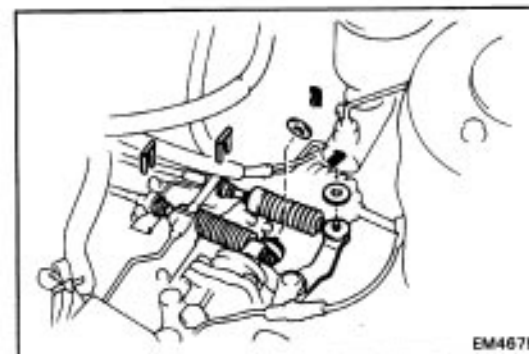
**15. DISCONNECT INLET FUEL HOSE FROM FUEL FILTER****16. DISCONNECT FUEL RETURN HOSE FROM AIR PIPE**

**17. (w/ PS)****DISCONNECT PS PUMP**

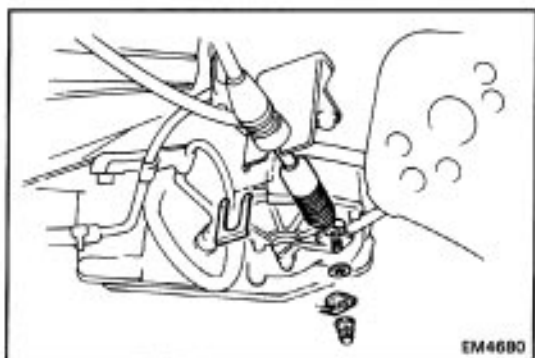
- (a) Loosen the adjusting bolt, pivot bolt, and remove the drive belt.
- (b) Remove the adjusting bolt, pivot bolt and PS pump.
- (c) Suspend the PS pump.

**18. (with A/C)****DISCONNECT A/C COMPRESSOR**

- (a) Loosen the adjusting bolt and remove the drive belt.
- (b) Remove the four compressor mounting bolts.
- (c) Move the compressor aside and suspend it.

**19. DISCONNECT SPEEDOMETER CABLE FROM TRANS-AXLE****20. (M/T)****REMOVE CLUTCH RELEASE CYLINDER WITHOUT DISCONNECTING PIPE AND HOSE****21. (M/T)****DISCONNECT CONTROL CABLES**

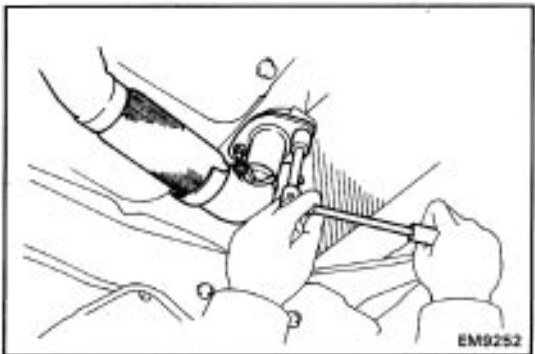
- (a) Remove the two clips, washers and retainers.
- (b) Disconnect the control cables from the shift outer lever and select outer lever.

**22. (A/T)****DISCONNECT CONTROL CABLE**

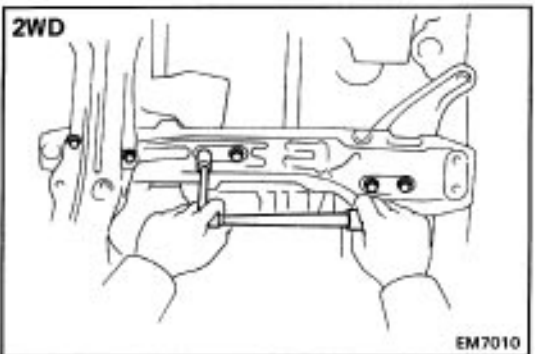
- (a) Remove the clip and retainer.
- (b) Disconnect the control cable from the shift lever.

23. RAISE VEHICLE

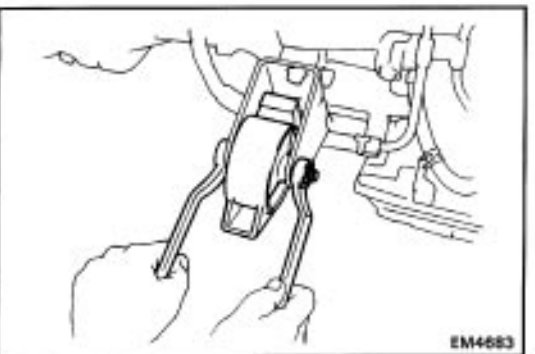
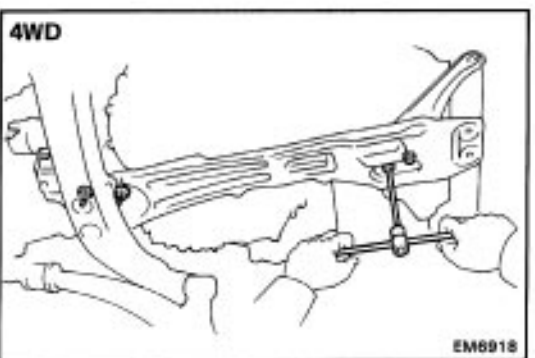
NOTICE: Be sure the vehicle is securely supported.

24. (4WD)**DISCONNECT OIL COOLER HOSES****25. REMOVE FRONT EXHAUST PIPE**

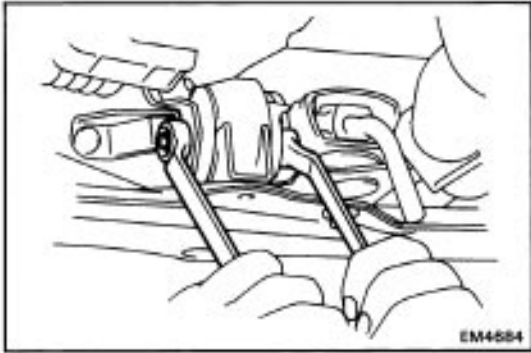
- (a) Disconnect the oxygen sensor connector.
- (b) Remove the two bolts and disconnect pipe from the catalytic converter.
- (c) Remove the two nuts and exhaust pipe.

26. DISCONNECT DRIVE SHAFTS FROM TRANSAXLE**27. (4WD)****DISCONNECT PROPELLER SHAFT****28. DISCONNECT FRONT, CENTER (2WD) AND REAR MOUNTINGS FROM CENTER MEMBER**

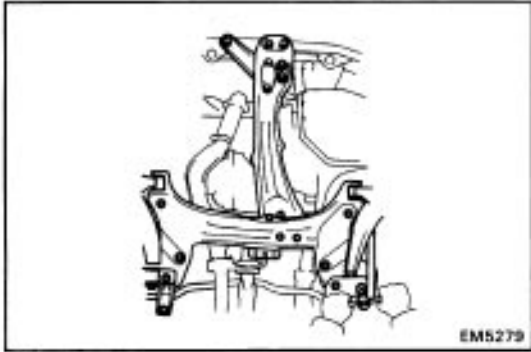
- (a) Remove the two hole covers.
- (b) Remove the six bolts (2WD) or two bolts and two nuts (4WD) from each mounting. '



- (c) Remove the front mounting bolt and mounting.



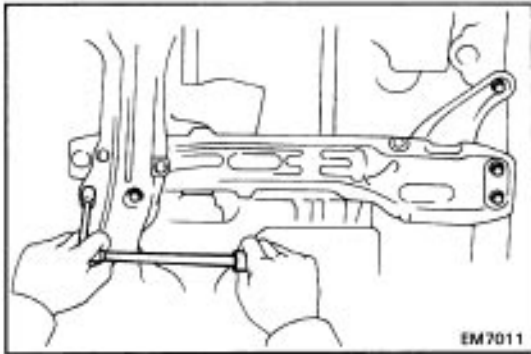
(d) Remove the rear mounting bolt and mounting.



29. (4WD)

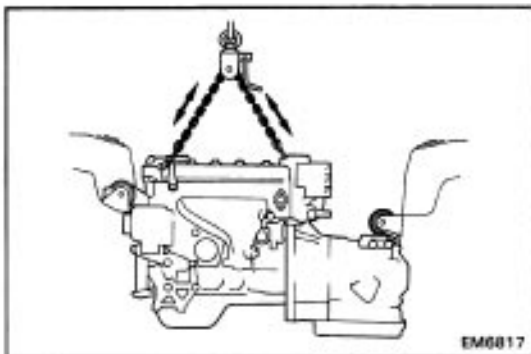
REMOVE FRONT SUSPENSION CROSSMEMBER

Remove the eight bolts from the front suspension crossmember.



30. REMOVE ENGINE MOUNTING CENTER MEMBER

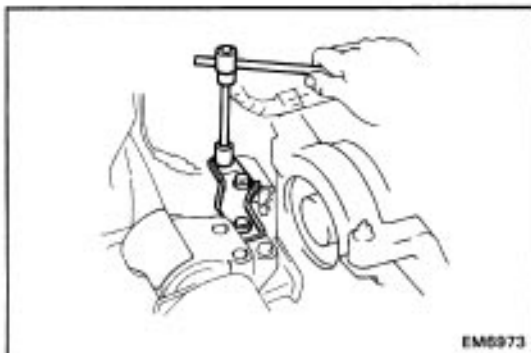
Remove the five bolts (2WD) or four bolts (4WD), insulators and member.



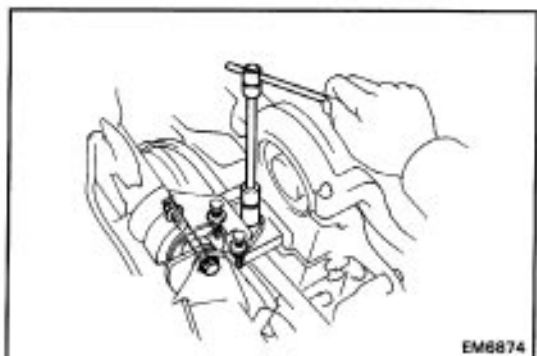
31. REMOVE ENGINE WITH TRANSAXLE FROM VEHICLE

(a) Attach the engine chain hoist to the lifting bracket on the engine.

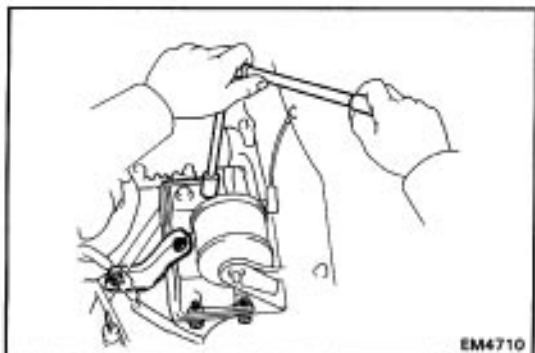
HINT: Hang the engine wires and hoses on the chain.



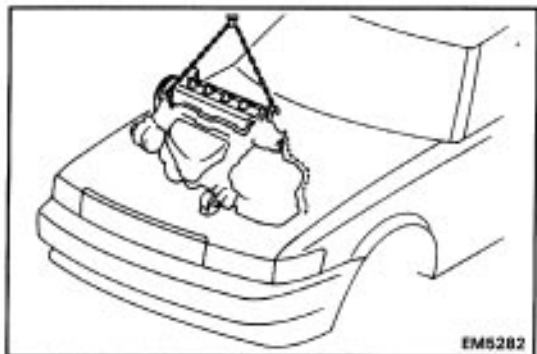
(b) Remove the three bolts and mounting stay.



- (c) Remove the bolt, two nuts, through bolt and RH mounting.



- (d) Remove the two bolts and mounting stay.
 (e) Remove the three bolts and disconnect the LH mounting bracket from the transaxle bracket.



- (f) Lift the engine out of the vehicle slowly and carefully.
- Clear the LH mounting while lowering the transaxle.
- NOTICE: Be careful not to hit the power steering gear housing and throttle position sensor.**
- (g) Make sure the engine is clear of all wiring, hoses and cables.
 (h) Place the engine with the transaxle onto the stand.

32. DISCONNECT FOLLOWING CONNECTORS:

- (a) Back-up lamp switch connector (M/T)
 (b) Neutral start switch connector (A/T)

33. REMOVE HOLE PLUG FROM REAR END PLATE

34. (A/T)

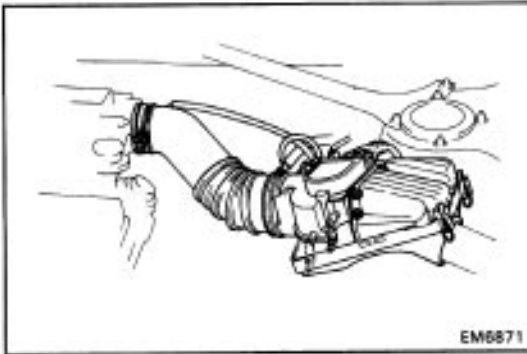
REMOVE SIX TORQUE CONVERTER MOUNTING BOLTS

35. REMOVE STARTER (See page [ST-5](#))

36. REMOVE TRANSAXLE FROM ENGINE

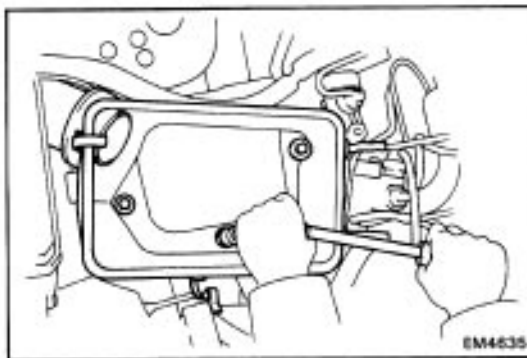
REMOVAL OF ENGINE (4A-GE)

1. REMOVE BATTERY AND HOOD
2. REMOVE RH AND LH ENGINE UNDER COVERS
3. DRAIN ENGINE OIL
4. DRAIN ENGINE COOLANT
5. DRAIN GEAR OIL
6. REMOVE RADIATOR WITH COOLING FAN
- (See page [CO-13](#))
7. DISCONNECT ACCELERATOR WIRE FROM BRACKET
8. (w/ CRUISE CONTROL)
REMOVE CRUISE CONTROL ACTUATOR



9. REMOVE AIR CLEANER ASSEMBLY

- (a) Disconnect the air flow meter connector.
- (b) Disconnect the VSV connector.
- (c) Disconnect the vacuum hoses from VSV.
- (d) (with A/C)
Disconnect the air hose.
- (e) Loosen the air cleaner hose clamp bolt.
- (f) Disconnect the air cleaner cap clips.
- (g) Remove the air cleaner cap and air flow meter with air cleaner hose.
- (h) Remove the air cleaner filter element.
- (i) Disconnect the harness clamp from the boss, and remove the three bolts and air cleaner case.
Remove the two bolts and air cleaner support bracket,



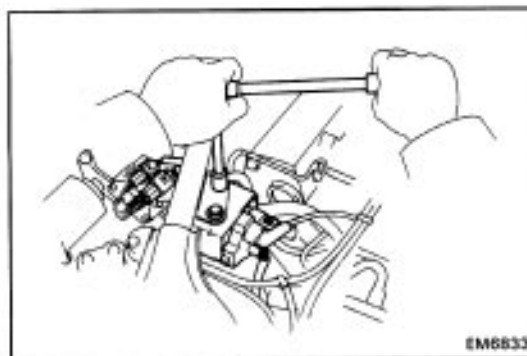
10. REMOVE WASHER TANK

11. DISCONNECT FOLLOWING HOSES:

- (a) Brake booster vacuum hose
- (b) Charcoal canister vacuum hose

12. REMOVE IGNITION COIL

- (a) Disconnect the ignition coil connectors.
- (b) Disconnect the high-tension cord.
- (c) Remove the two bolts and the ignition coil with bracket.



13. DISCONNECT ENGINE WIRE

(a) Remove the three nuts, No.2 junction block and No.5 relay block.

(b) Disconnect the following connectors:

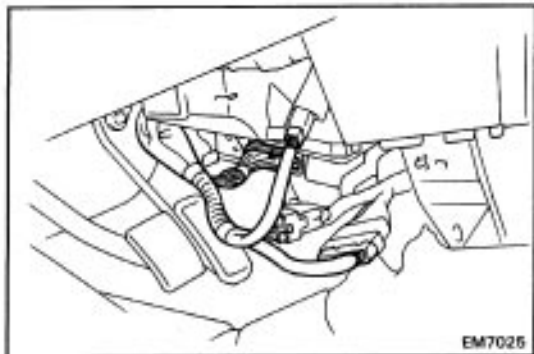
- Noise filter connector
- Ground strap connector and bolt
- Check connector
- (with A/C)

A/C wire connector

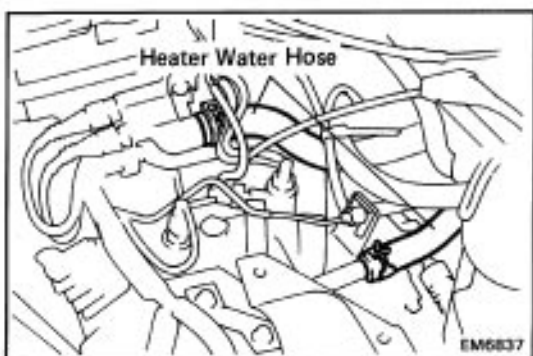
(c) Remove the front and rear console boxes.

(d) Remove the center cover in front of the console box.

(e) Disconnect the five connectors from the cowl wire and ECU.

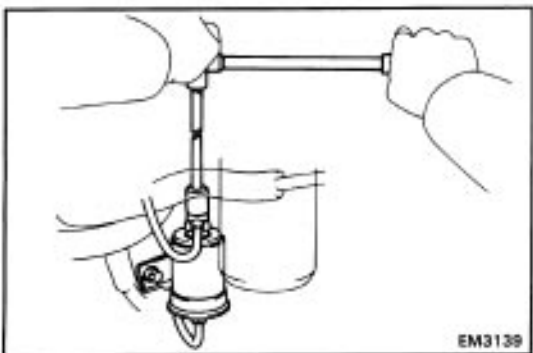


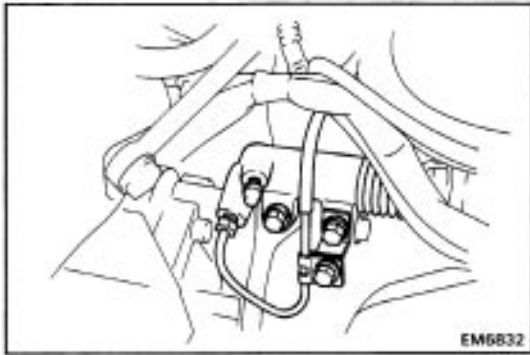
(f) Pull out the engine wire from the cowl panel.

**14. DISCONNECT HEATER WATER HOSES**

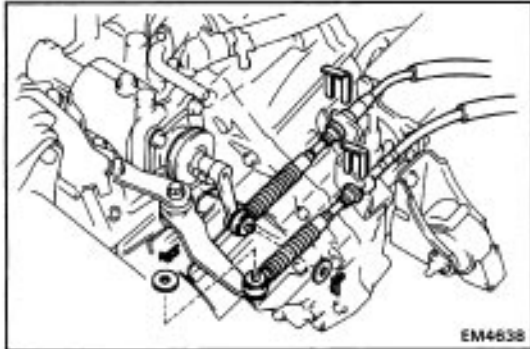
(a) Disconnect the heater hose from the water inlet housing.

(b) Disconnect the heater hose from the cylinder head rear cover.

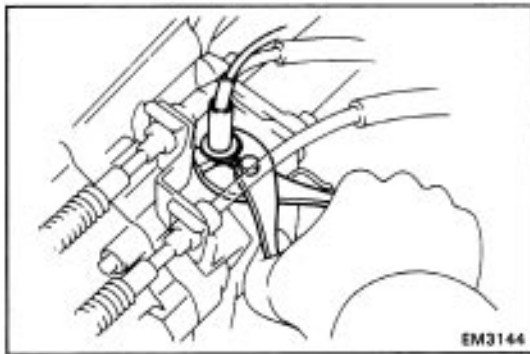
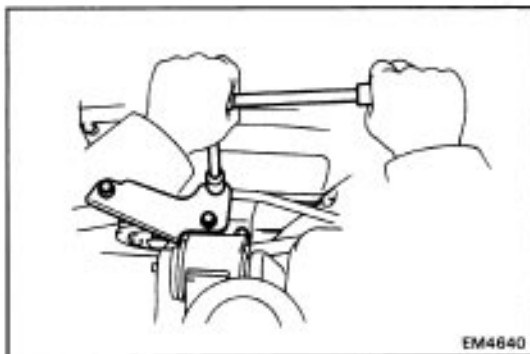
**15. DISCONNECT INLET FUEL HOSE FROM FUEL FILTER****16. DISCONNECT RETURN FUEL HOSE FROM PRESSURE REGULATOR****17. DISCONNECT HEATER AND AIR HOSES FROM AIR VALVE**

**18. REMOVE RELEASE CYLINDER**

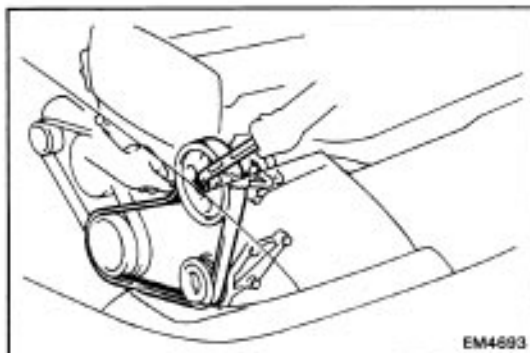
- (a) Remove the three bolts and release tube clamp bolt.
- (b) Move the release cylinder aside and suspend it.

**19. DISCONNECT CONTROL CABLES**

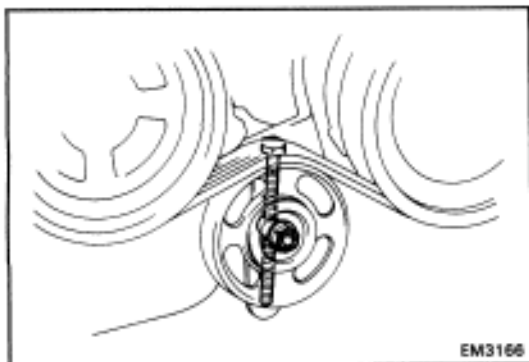
- (a) Remove the two clips, washers and retainers.
- (b) Disconnect the control cables from the shift outer lever and select lever.

**20. DISCONNECT SPEEDOMETER CABLE****21. (with A/C AND/OR PS)****DISCONNECT A/C COMPRESSOR AND PS PUMP**

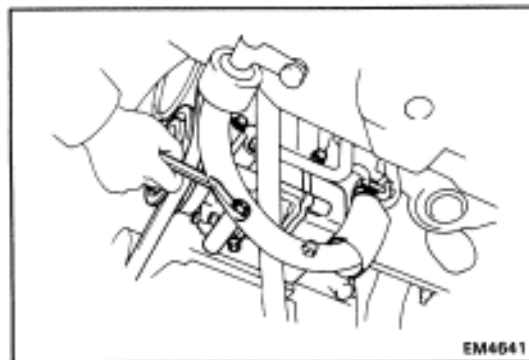
- (a) Remove the three bolts and RH mounting stay.
- (b) Remove the PS pump pipe clamp bolt.
- (c) Disconnect the two A/C connectors.



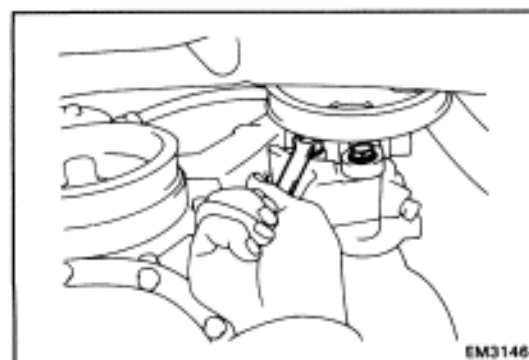
- (d) Remove the PS pump pulley nut.



- (e) Loosen the idler pulley adjusting bolt and pulley bolt.
- (f) Remove the drive belt.



- (g) Remove the four compressor mounting bolts.
- (h) Move the compressor aside and suspend it.
- (i) Loosen the bolts and nut of compressor bracket.
- (j) Disconnect oil pressure connector.



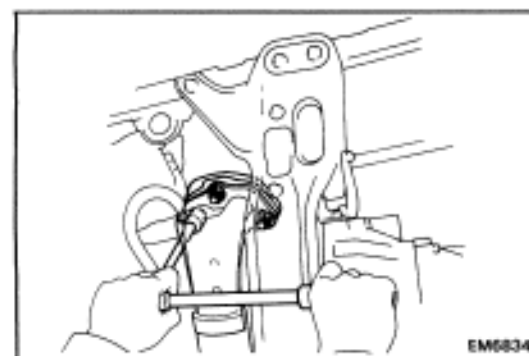
- (k) Loosen the PS pump lock bolt and pivot bolts.
- (l) Remove the PS pump with the bracket aside and suspend it.



22. DISCONNECT OIL COOLER HOSES

23. RAISE VEHICLE

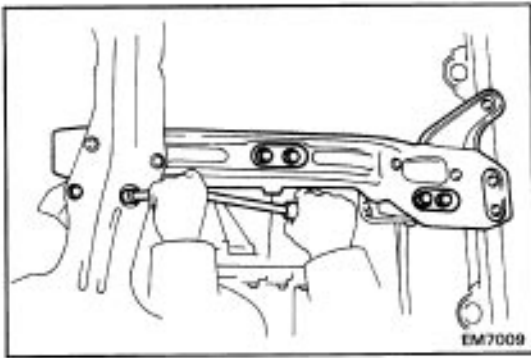
NOTICE: Be sure the vehicle is securely supported.



24. REMOVE EXHAUST FRONT PIPE

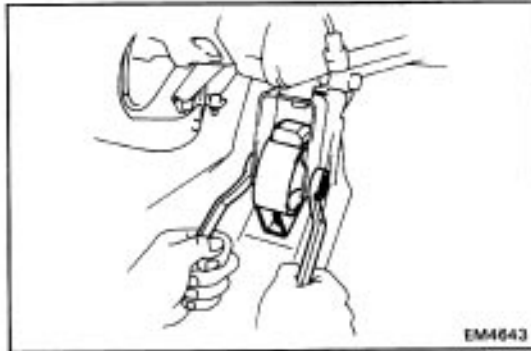
- (a) Disconnect the oxygen sensor connector.
- (b) Remove the two bolts from the pipe clamp.
- (c) Remove the two bolts, and disconnect the exhaust pipe from the catalytic converter.
- (d) Remove the three nuts and exhaust pipe.

25. DISCONNECT RH AND LH DRIVE SHAFTS FROM TRANSAXLE

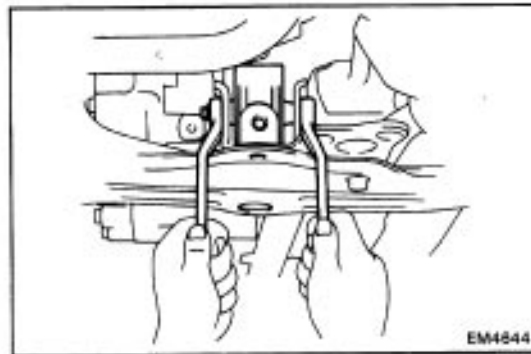


26. DISCONNECT FRONT, CENTER AND REAR MOUNTINGS FROM MEMBER

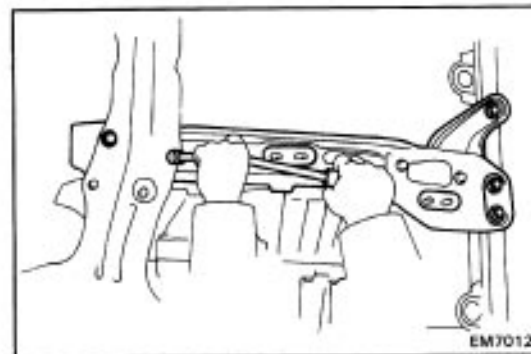
- (a) Remove the two hole covers.
- (b) Remove the six bolts from each mounting.



- (c) Remove the front mounting bolt and mounting.



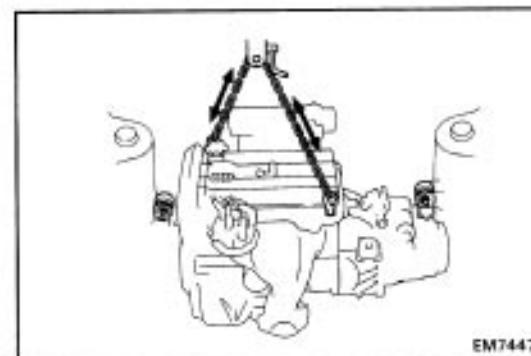
- (d) Remove the rear mounting bolt and mounting.



27. REMOVE ENGINE MOUNTING CENTER MEMBER

Remove the five bolts, insulators and center member.

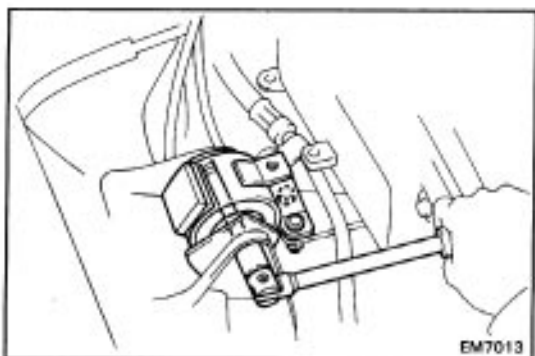
28. LOWER VEHICLE



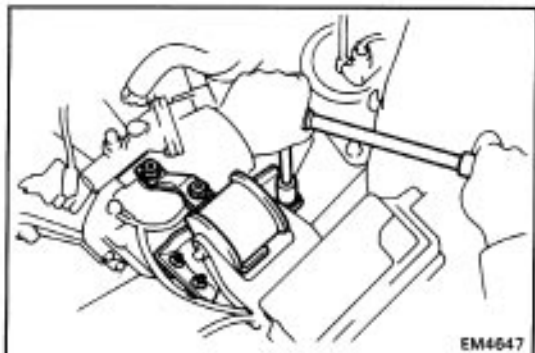
29. REMOVE ENGINE WITH TRANSAXLE FROM VEHICLE

- (a) Attach the engine hoist chain to the lifting bracket or the engine.

HINT: Hang the engine wires and hoses on the chain.

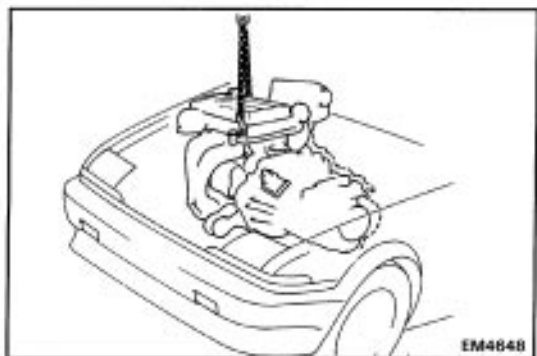


(b) Remove the two nuts, through bolt and RH mounting.



(c) Remove the two bolts and mounting stay.

(d) Remove the three bolts and disconnect the LH mounting bracket from transaxle bracket.



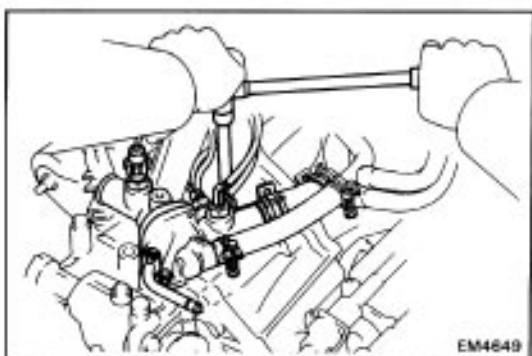
(e) Lift the engine out of the vehicle slowly and carefully.

- Clear the RH mounting while lowering the transaxle.

NOTICE: Be careful not to hit the power steering gear housing and throttle position sensor.

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

(g) Place the engine with the transaxle onto the stand.



30. REMOVE WATER INLET HOUSING

(a) Disconnect the radiator fan temperature switch connector and start injector time switch connector.

(b) Disconnect the vacuum hose from BVSV.

(c) Remove the water inlet housing mounting bolts and nut.

(d) Disconnect the two hoses from the No. 1 and No. 2 water by-pass pipes, and remove the water inlet housing.

31. DISCONNECT FOLLOWING CONNECTORS:

(a) Back-up lamp switch connector

(b) Water temperature sensor connector

32. REMOVE FLYWHEEL HOUSING UNDER COVER

33. REMOVE STARTER (See page [ST-5](#))

34. REMOVE TRANSAXLE FROM ENGINE

PREPARATION FOR DISASSEMBLY (4A-FE)

1. (M/T)
REMOVE CLUTCH COVER AND DISC
2. REMOVE FLYWHEEL OR DRIVE PLATE
3. REMOVE REAR END PLATE
4. INSTALL ENGINE ASSEMBLY TO ENGINE STAND FOR DISASSEMBLY
5. (w/ PS)
REMOVE PS PUMP BRACKET
6. (with A/C)
REMOVE A/C COMPRESSOR BRACKET
7. REMOVE ALTERNATOR AND BRACKET
8. REMOVE TIMING BELT AND TIMING PULLEY
(See page [EM-30](#))
9. REMOVE RH MOUNTING BRACKET
10. REMOVE CYLINDER HEAD
(See page [EM-54](#))
11. REMOVE WATER PUMP
(See page [CO-6](#))
12. REMOVE OIL PAN, OIL STRAINER AND OIL PUMP
(See page [LU-9](#))
13. REMOVE OIL FILTER
(See page [LU-7](#))
14. REMOVE OIL PRESSURE SWITCH

PREPARATION FOR DISASSEMBLY (4A-GE)

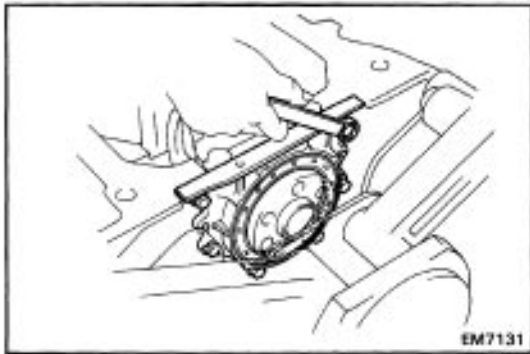
- 1. REMOVE CLUTCH COVER AND DISC**
- 2. REMOVE FLYWHEEL**
- 3. REMOVE REAR END PLATE**
- 4. INSTALL ENGINE ASSEMBLY TO ENGINE STAND FOR DISASSEMBLY**
- 5. REMOVE OIL COOLER HOSES AND UNION PIPES**
- 6. REMOVE TIMING BELT AND TIMING PULLEYS**
(See page [EM-41](#))
- 7. REMOVE ALTERNATOR AND BRACKET**
- 8. REMOVE CYLINDER HEAD**
(See page [EM-89](#))
- 9. REMOVE WATER PUMP**
(See page [CO-6](#))
- 10. REMOVE OIL PAN, STRAINER, BAFFLE PLATE AND OIL PUMP**
(See page [LU-9](#))
- 11. REMOVE OIL FILTER BRACKET**
(See page [LU-7](#))
- 12. REMOVE OIL PRESSURE SENDER GAUGE**
(See page [LU-5](#))
- 13. REMOVE KNOCK SENSOR**
- 14. REMOVE STIFFENER PLATE ADAPTER**

DISASSEMBLY OF CYLINDER BLOCK

(See page [EM-117](#))

1. REMOVE REAR OIL SEAL RETAINER

Remove the six bolts, retainer and gasket.



2. CHECK CONNECTING ROD THRUST CLEARANCE

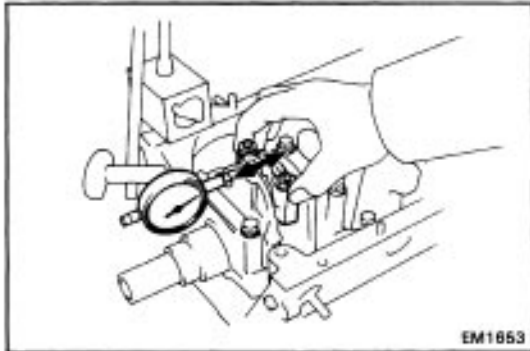
Using a dial indicator, measure the thrust clearance while moving the connecting rod back and forth.

Standard thrust clearance: 0.150 – 0.250 mm

(0.0059 – 0.0098 in.)

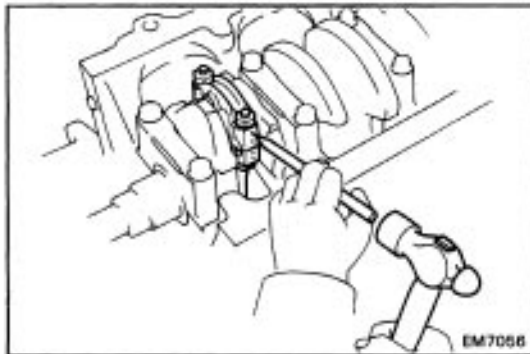
Maximum thrust clearance: 0.30 mm (0.0118 in.)

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

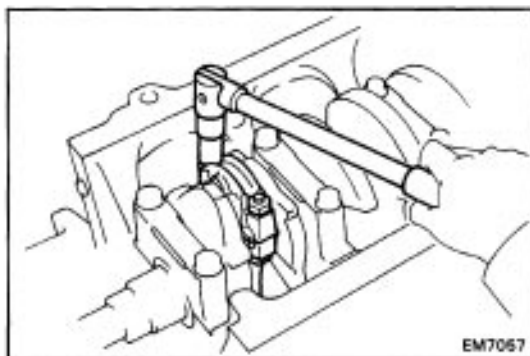


3. REMOVE CONNECTING ROD CAPS AND CHECK OIL CLEARANCE

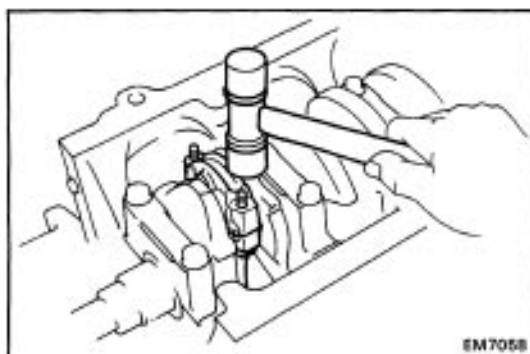
(a) Using a punch or numbering stamp, place the matchmarks on the connecting rod and cap to ensure correct reassembly.

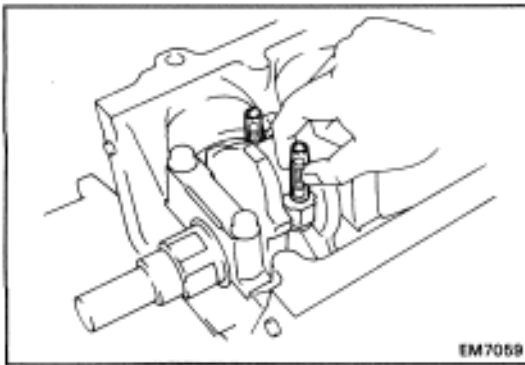


(b) Remove the connecting rod cap nuts.

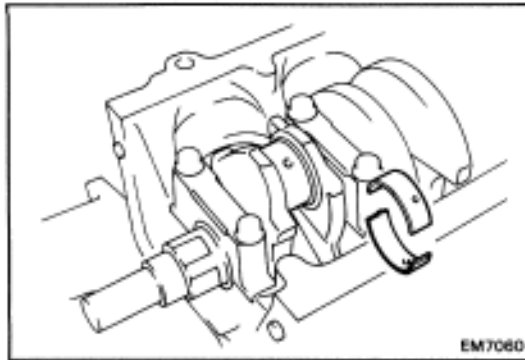


(c) Using a plastic-faced hammer, lightly tap the connecting rod bolts and lift off the connecting rod cap.
HINT: Keep the lower bearing inserted with the connecting cap.





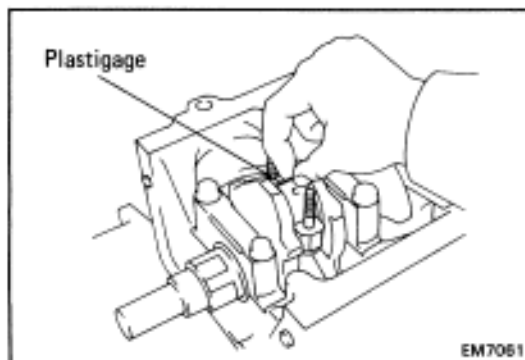
- (d) Cover the connecting rod bolts with a short piece of hose to protect the crankshaft from damage.



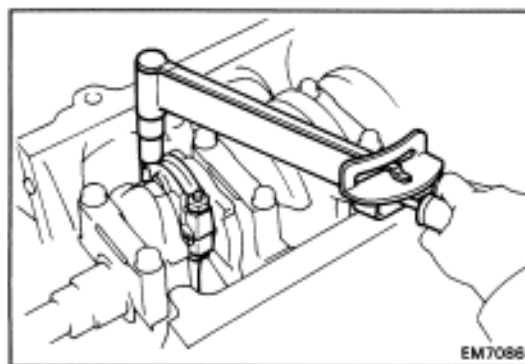
- (e) Clean the crank pin and bearing.

- (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.



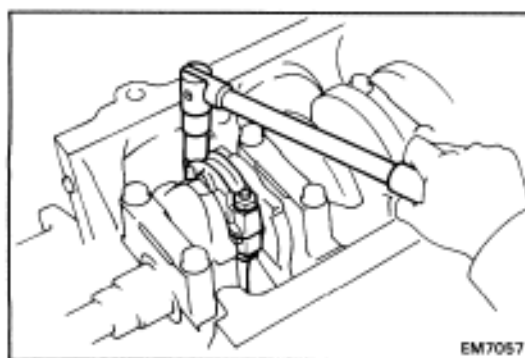
- (g) Lay a strip of Plastigage across the crank pin.



- (h) Install the connecting rod cap.

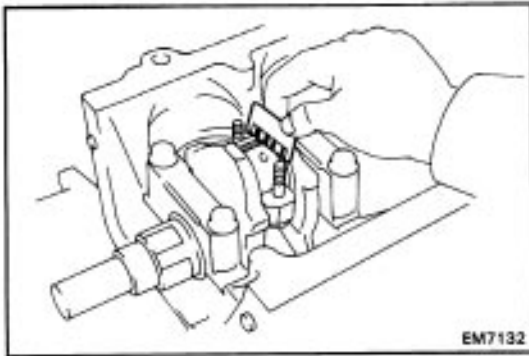
(See step 7 on page [EM-154](#))

NOTICE: Do not turn the crankshaft.



- (i) Remove the connecting rod cap.

(See procedure (b) and (c) on page [EM-132](#).)



(j) Measure the Plastigage at its widest point.

Standard oil clearance:

STD 0.020 – 0.051 mm

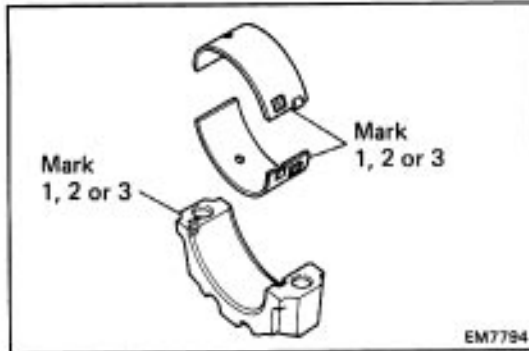
(0.0008 – 0.0020 in.)

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.



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.

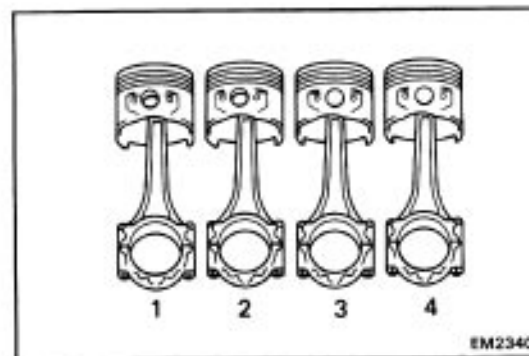
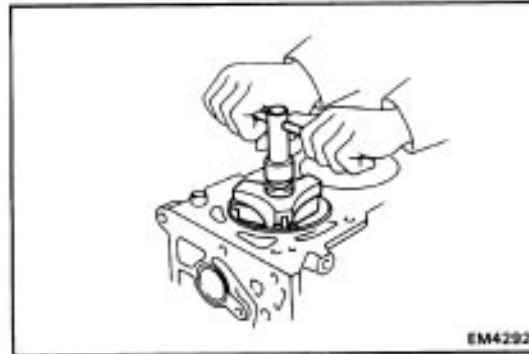
4. REMOVE PISTON AND CONNECTING ROD ASSEMBLIES

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

(b) Cover the connecting rod bolts.

(See page [EM-133](#))

(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.

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

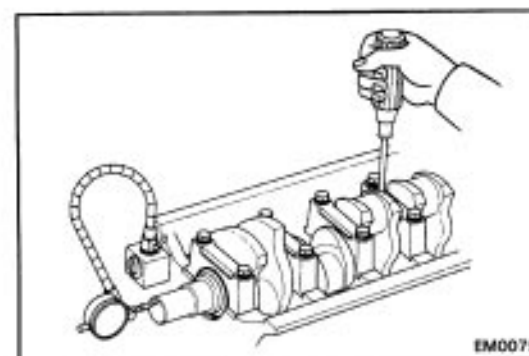
(0.0008 – 0.0087 in.)

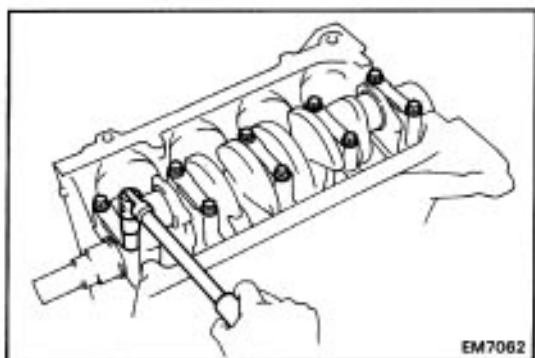
Maximum thrust clearance: 0.30 mm (0.0118 in.)

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

Thrust washer thickness: 2.440 – 2.490 mm

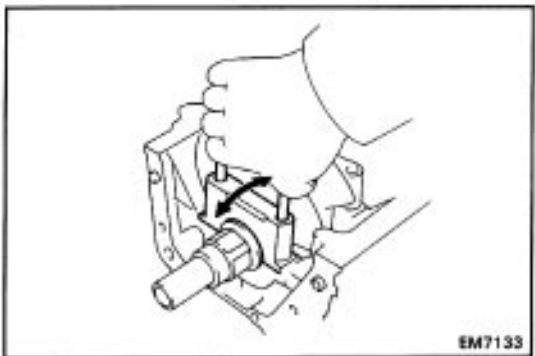
(0.0961 – 0.0980 in.)





6. REMOVE MAIN BEARING CAPS AND CHECK OIL CLEARANCE

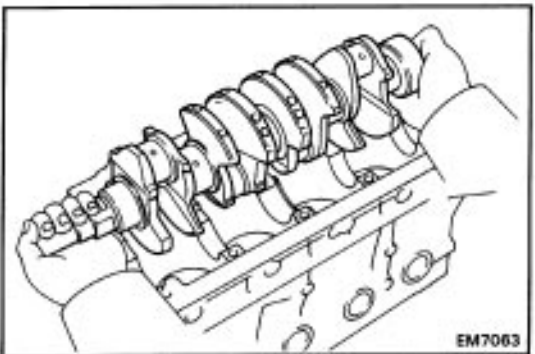
(a) Remove the main bearing cap bolts.



(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).

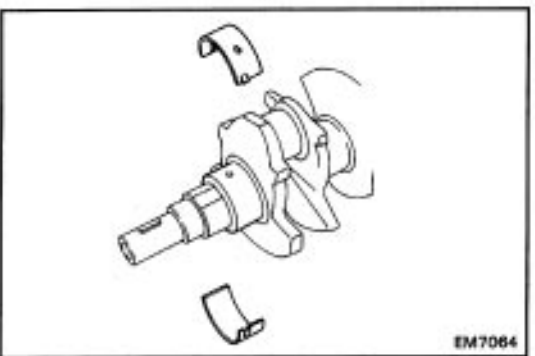
HINT:

- 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.

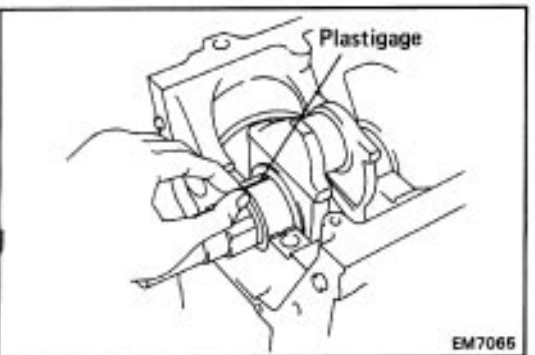
HINT: Keep the upper bearing and upper thrust washers together with the cylinder block.



(d) Clean each main journal and bearing.

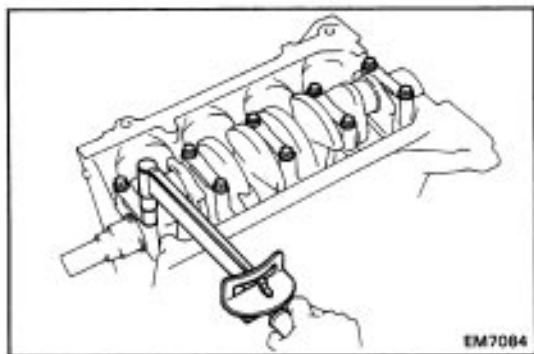
(e) Check each main journal and bearing for pitting and scratches.

If the journal or bearing is damaged, replace the bearings. If necessary, grind or replace the crankshaft.

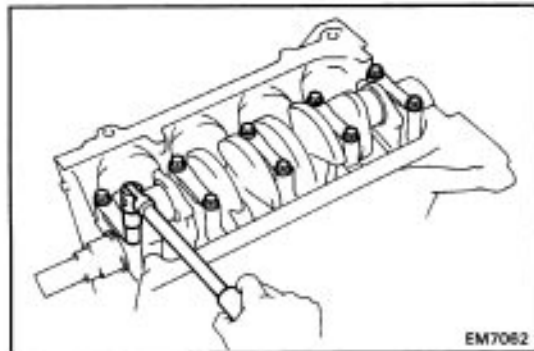


(f) Place the crankshaft on the cylinder block.

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



- (h) Install the main bearing caps.
 (See step 5 on page [EM-153](#))
Torque: 610 kg-cm (44 ft-lb, 60 N-m)
NOTICE: Do not turn the crankshaft.



- (i) Remove the main bearing caps.
 (See procedure (a) and (b) on page [EM-135](#).)



- (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.)

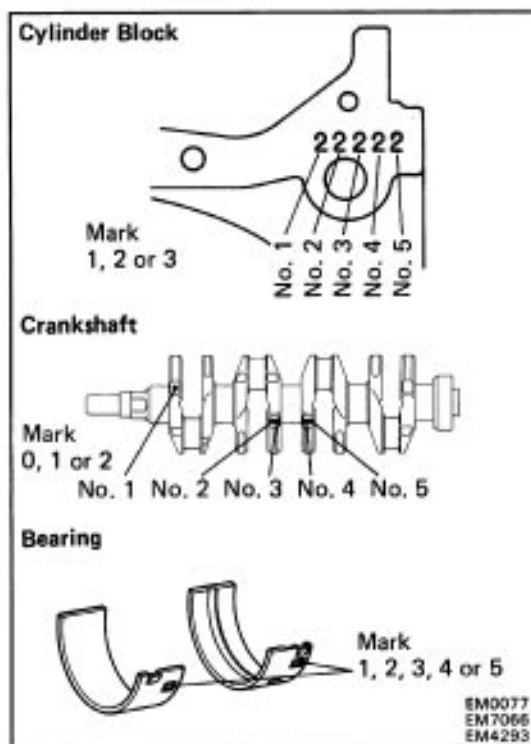
Maximum clearance: 0.10 mm (0.0039 in.)

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 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 select 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								
	Cylinder block			Crankshaft			Bearing		
Cylinder block	1			2			3		
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 mm (2.0482 – 2.0485 in.)
Mark "2"	52.031 – 52.037 mm (2.0485 – 2.0487 in.)
Mark "3"	52.037 – 52.043 mm (2.0487 – 2.0489 in.)

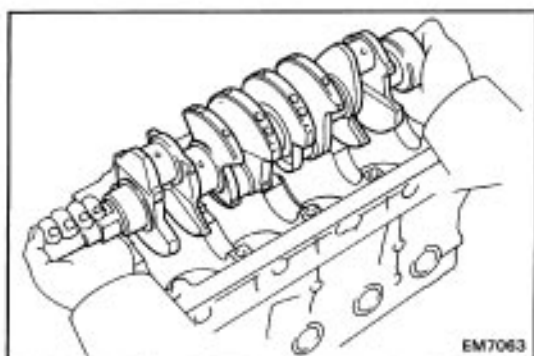
Crankshaft journal diameter:

Mark "0"	47.994 – 48.000 mm (1.8895 – 1.8898 in.)
Mark "1"	47.988 – 47.994 mm (1.8893 – 1.8895 in.)
Mark "2"	47.982 – 47.988 mm (1.8891 – 1.8893 in.)

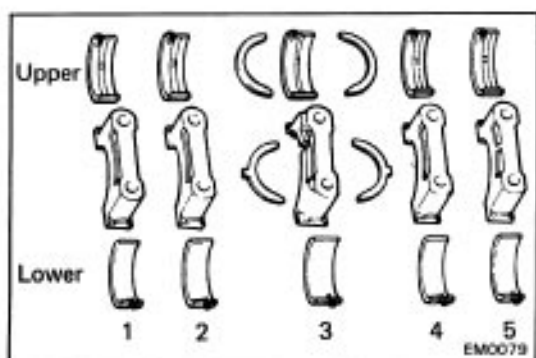
Standard sized bearing center wall thickness:

Mark "1"	2.002 – 2.005 mm (0.0788 – 0.0789 in.)
Mark "2"	2.005 – 2.008 mm (0.0789 – 0.0791 in.)
Mark "3"	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.)

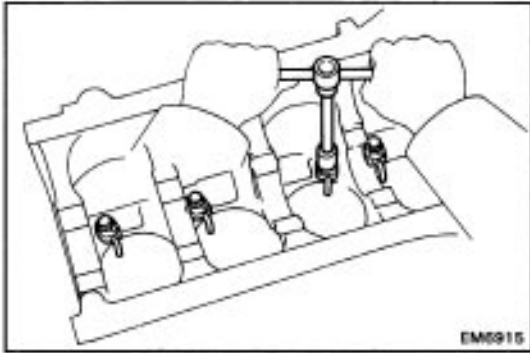
(k) Completely remove the Plastigage.

**7. REMOVE CRANKSHAFT**

- Lift out the crankshaft.
- Remove the upper bearings and upper thrust washers from cylinder block.



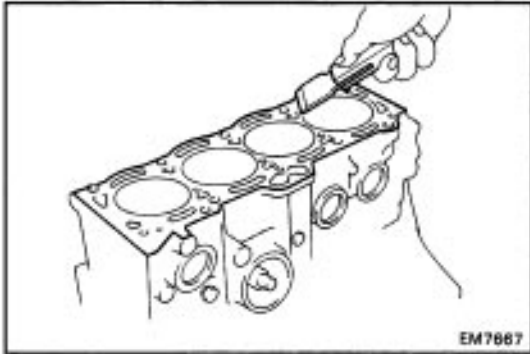
HINT: Arrange the main bearing caps, bearings and thrust washers in correct order.



8. (4A-GE)

REMOVE CHECK VALVE AND OIL NOZZLES

Remove the four check valves and oil nozzles.



INSPECTION OF CYLINDER BLOCK

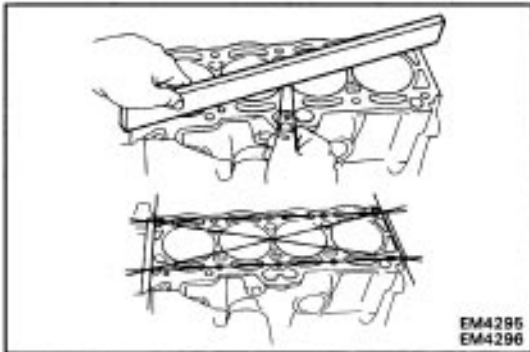
1. CLEAN CYLINDER BLOCK

A. Remove gasket material

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

B. Clean cylinder block

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

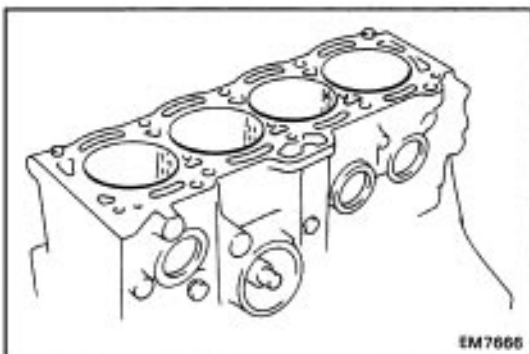


2. INSPECT TOP SURFACE OF CYLINDER BLOCK FOR FLATNESS

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

Maximum warpage: 0.05 mm (0.0020 in.)

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

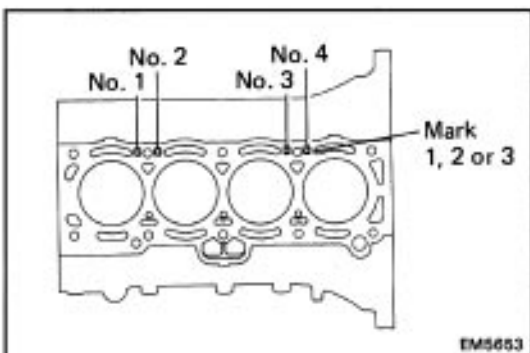


3. INSPECT CYLINDER FOR VERTICAL SCRATCHES

Visually check the cylinder for vertical scratches.

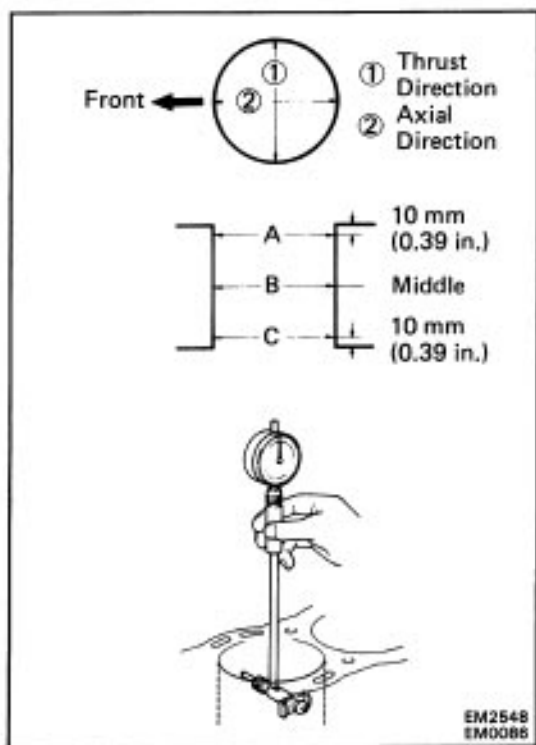
If deep scratches are present, rebore all the four cylinders.

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.

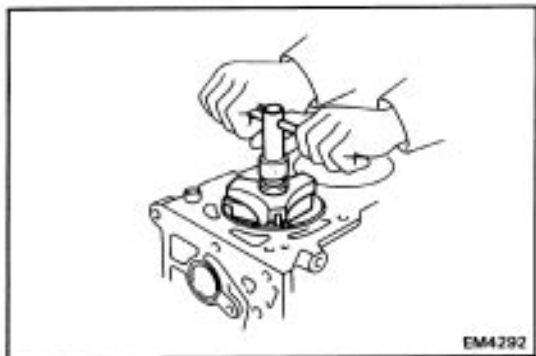
Standard diameter:

STD Mark "1"	81.000 – 81.010 mm (3.1890 – 3.1894 in.)
Mark "2"	81.010 – 81.020 mm (3.1894 – 3.1902 in.)
Mark "3"	81.020 – 81.030 mm (3.1898 – 3.1264 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.



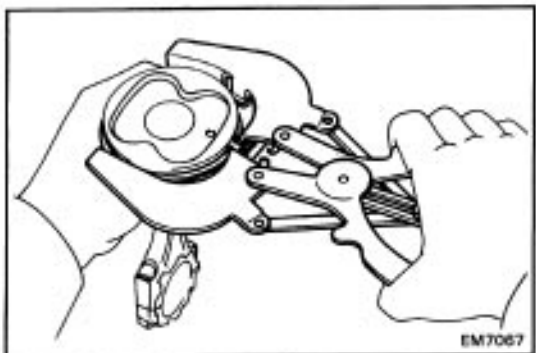
DISASSEMBLY OF PISTON AND CONNECTING ROD ASSEMBLIES

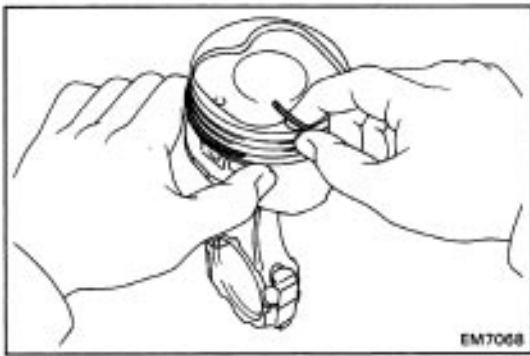
1. CHECK FIT BETWEEN PISTON AND PISTON PIN

Try to move the piston back and forth on the piston pin. If the piston does not move at all, replace the piston and pin as a set.

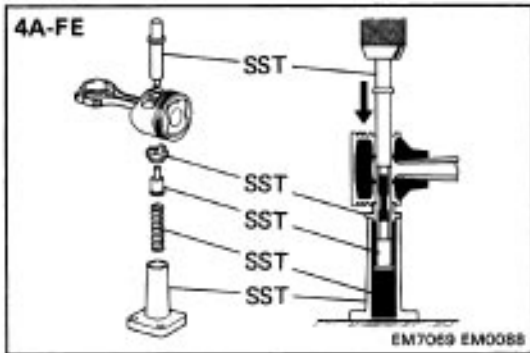
2. REMOVE PISTON RINGS

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





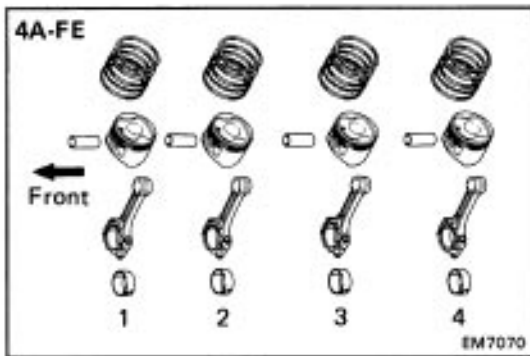
(b) Remove the two side rails and oil ring expander by hand.
HINT: Arrange the rings in correct order only.



3. DISCONNECT CONNECTING ROD FROM PISTON (4A-FE)

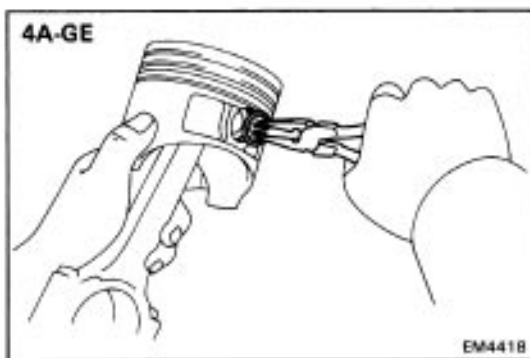
Using SST, press out the piston pin from the piston. Remove the connecting rod.

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



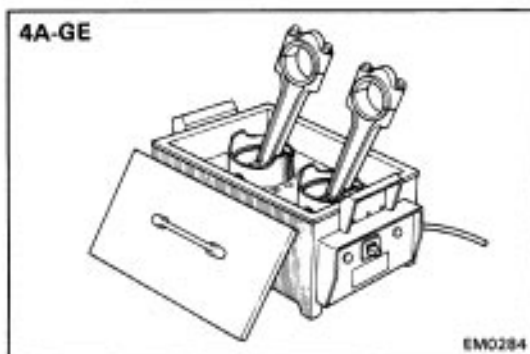
HINT:

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

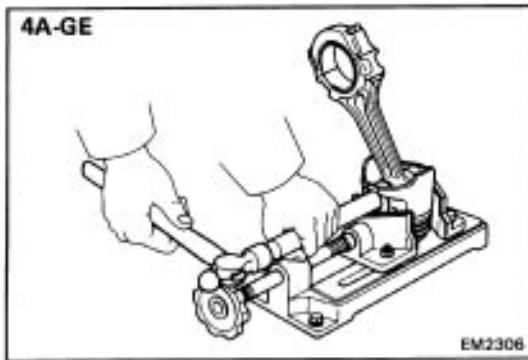


(4A-GE)

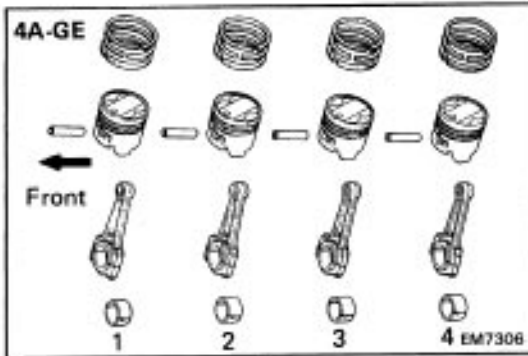
(a) Using needle-nose pliers, remove the snap rings.



(b) Gradually heat the piston to 70 – 80°C (158 – 176°F).



- (c) Using a plastic-faced hammer and brass bar, lightly tap out the piston pin and remove the connecting rod.



HINT:

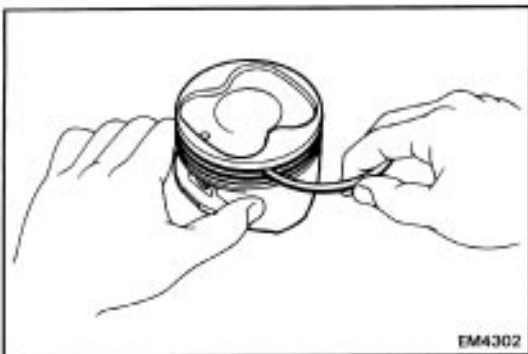
- The piston and pin are a matched set.
- Arrange the pistons, pins, rings, connecting rods and bearings in correct order.

INSPECTION OF PISTON AND CONNECTING ROD ASSEMBLIES

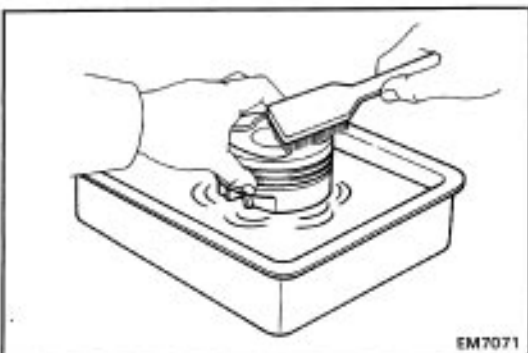
1. CLEAN PISTON



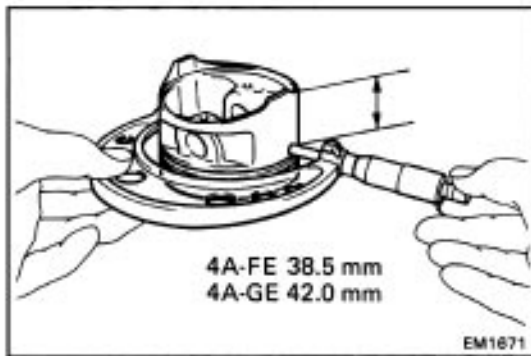
- (a) Using a gasket scraper, remove the carbon from the piston top.



- (b) Using a groove cleaning tool or broken ring, clean 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 and with the piston upside down, measure the piston diameter at a right angle to the piston pin hole center line, the indicated distance from the skirt of the bottom edge.

4A-FE 38.5 mm (1.576 in.)

4A-GE 42.0 mm (1.654 in.)

Piston diameter:

4A-FE

STD	Mark "1"	80.93 – 80.94 mm (3.1862 – 3.1866 in.)
	Mark "2"	80.94 – 80.950 mm (3.1866 – 3.187 in.)
	Mark "3"	80.95 – 80.96 mm (3.1870 – 3.1874 in.)
O/S 0.50		81.43 – 81.46 mm (3.2059 – 3.2071 in.)

4A-GE

STD	Mark "1"	80.89 – 80.90 mm (3.1846 – 3.1850 in.)
	Mark "2"	80.90 – 80.91 mm (3.1850 – 3.1854 in.)
	Mark "3"	80.91 – 80.92 mm (3.1854 – 3.1858 in.)
O/S 0.50		81.39 – 81.42 mm (3.2043 – 3.2055 in.)

- (b) Measure the cylinder bore diameter in the thrust directions.

(See step 4 on page [EM-138](#))

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

Standard oil clearance:

4A-FE 0.06 – 0.08 mm (0.0024 – 0.0031 in.)

4A-GE 0.10 – 0.12 mm (0.0039 – 0.0047 in.)

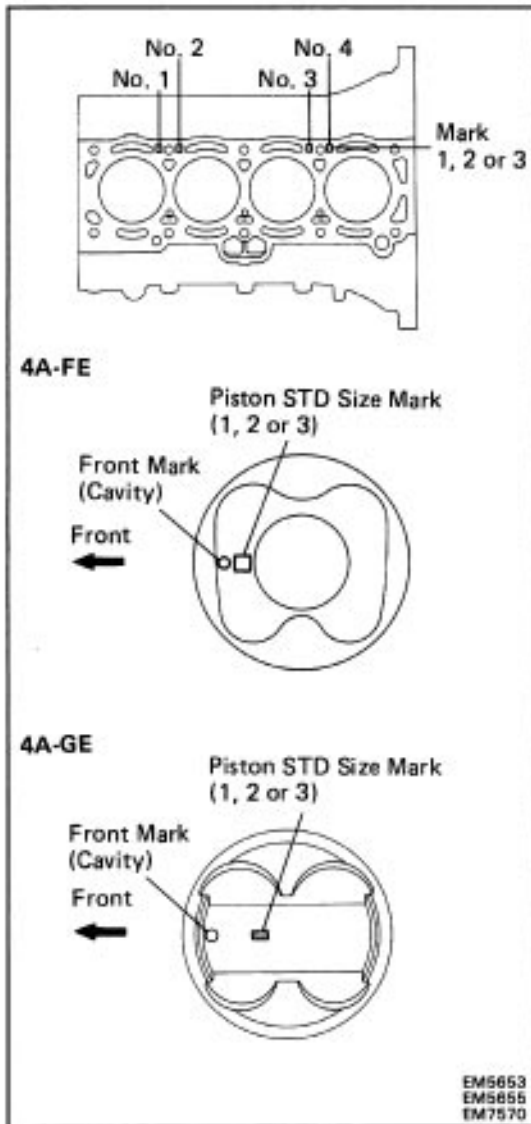
Maximum oil clearance:

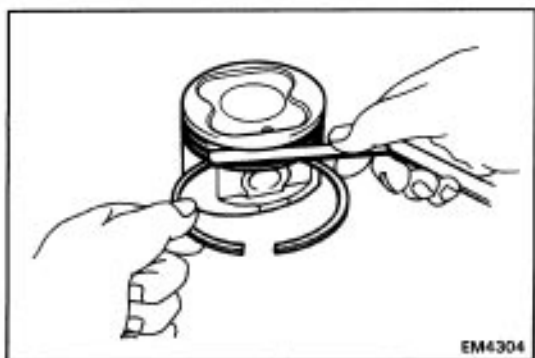
4A-FE 0.10 mm (0.0039 in.)

4A-GE 0.15 mm (0.0059 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.





EM4304

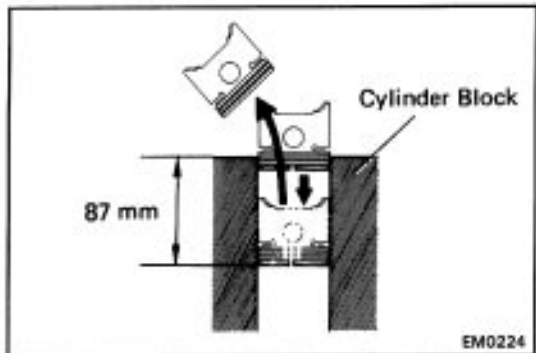
B. Inspect piston ring groove clearance

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

Ring groove clearance:

4A-FE	No.1	0.04 – 0.08 mm
		(0.0016 – 0.0031 in.)
	No.2	0.03 – 0.07 mm
		(0.0012 – 0.0028 in.)
4A-GE	No.1	0.03 – 0.08 mm
		(0.0012 – 0.0031 in.)
	No.2	0.03 – 0.07 mm
		(0.0012 – 0.0028 in.)

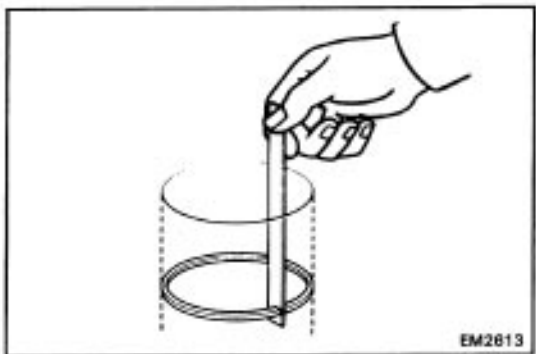
If the clearance is greater than maximum, replace the piston.



EM0224

C. Inspect piston ring end gap

- Insert the piston ring into the cylinder bore.
- 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.



EM2813

- Using a feeler gauge, measure the end gap.

Standard piston ring end gap:

4A-FE	No.1	0.25 – 0.45 mm
		(0.0098 – 0.0177 in.)
	No.2	0.15 – 0.40 mm
		(0.0059 – 0.0118 in.)
	Oil	0.10 – 0.70 mm
		(0.0039 – 0.0276 in.)
4A-GE	No.1	0.25 – 0.47 mm
		(0.0098 – 0.0185 in.)
	No.2	0.20 – 0.42 mm
		(0.0079 – 0.0165 in.)
	Oil	0.15 – 0.52 mm
		(0.0059 – 0.0205 in.)

Maximum piston ring end gap:

4A-FE	No.1	1.05 mm (0.0413 in.)
	No.2	1.00 mm (0.0394 in.)
	Oil	1.30 mm (0.0512 in.)
4A-GE	No.1	1.07 mm (0.0421 in.)
	No.2	1.02 mm (0.0402 in.)
	Oil	1.12 mm (0.0441 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.

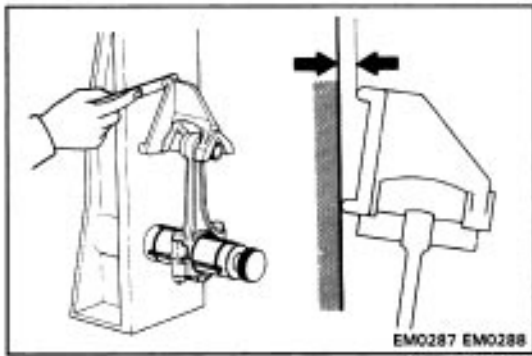
3. (4A-GE)

INSPECT PISTON PIN FIT

At 80°C (176°F) you should be able to push the piston pin into the piston pin hole with your thumb.



EM7445



4. INSPECT CONNECTING ROD

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

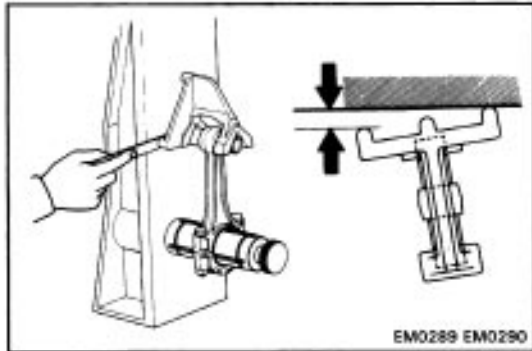
- Check for bend.

Maximum bend:

4A-FE 0.05 mm (0.0020 in.) per 100 mm (3.94 in.)

4A-GE 0.03 mm (0.0012 in.) per 100 mm (3.94 in.)

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

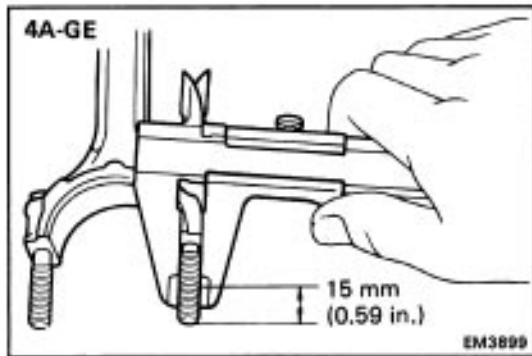


- Check for twist.

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.



(4A-GE)

(b) Inspect connecting rod bolts.

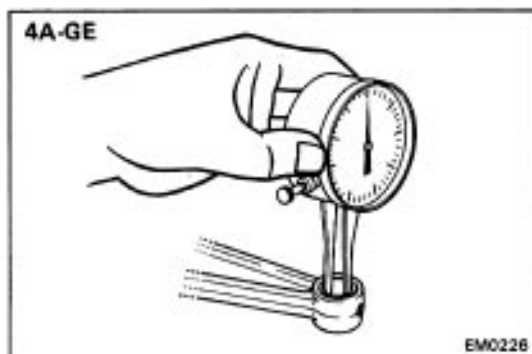
- Fix a nut to each of the connecting rod bolts and check that the nut can be turned by hand to the end of the thread.
- If a nut cannot be moved all the way down the thread, measure the compressed thread outer diameter with a measuring gauge.
- If the location of this area cannot be judged by visual inspection, use the dimension locations in the illustration and measure the outer diameter.

Standard diameter: 8.860 – 9.000 mm

(0.3488 – 0.3543 in.)

Minimum diameter: 8.600 mm (0.3386 in.)

If the diameter is not within specifications, replace the nut and connecting rod bolt.



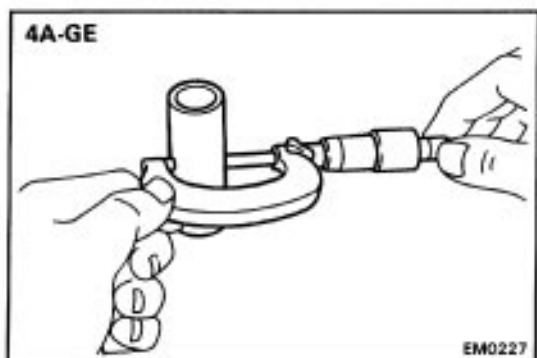
5. (4A-GE)

INSPECT PISTON PIN OIL CLEARANCE

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

Bushing inside diameter: 20.012 – 20.022 mm

(0.7879 – 0.7883 in.)



(b) Using a micrometer, measure the piston pin diameter.

Piston pin diameter: 20.006 – 20.016 mm

(0.7876 – 0.7880 in.)

(c) Subtract the piston pin diameter measurement from the bushing inside diameter measurement.

Standard oil clearance: 0.004 – 0.008 mm

(0.0002 – 0.0003 in.)

Maximum oil clearance: 0.05 mm (0.0020 in.)

If clearance is greater than maximum, replace the bushing.

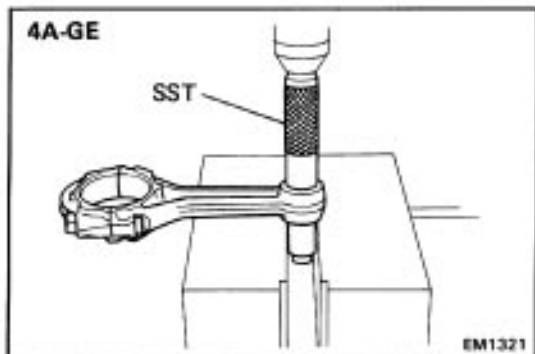
If necessary, replace the piston and piston pin assembly.

6. (4A-GE)

IF NECESSARY, REPLACE CONNECTING ROD BUSHINGS

(a) Using SST and a press, push out the bushing.

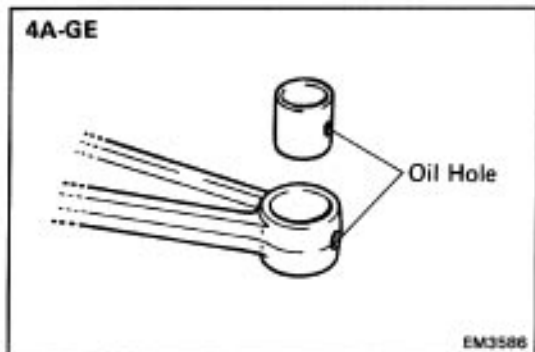
SST 09222-30010



(b) Align the oil holes of the bushing and connecting rod.

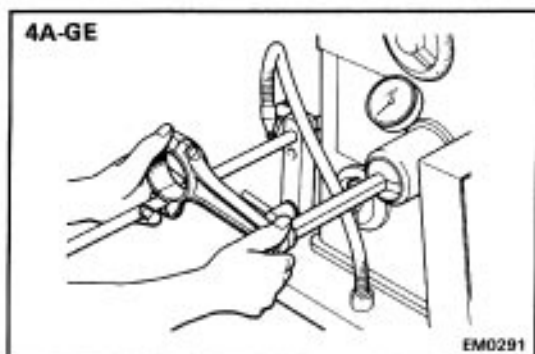
(c) Using SST and a press, press in the bushing.

SST 09222-30010



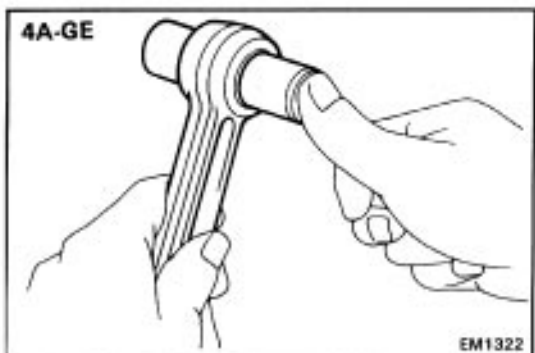
(d) Using a pin hole grinder, hone the bushing to obtain

the standard specified clearance (See step 4) between the bushing and piston pin.



(e) Check the piston pin fit at normal room temperature.

Coat the piston pin with engine oil and push it into the connecting rod with your thumb.



BORING OF CYLINDERS

HINT:

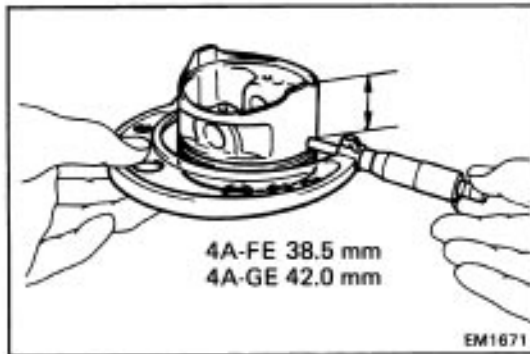
- Bore all four cylinders for the oversized piston outside diameter.
- Replace the piston rings with ones to match the oversized pistons.

1. KEEP OVERSIZED PISTON

Oversized piston diameter:

4A-FE O/S 0.50 81.43 – 81.46 mm
(3.2059 – 3.2071 in.)

4A-GE O/S 0.50 81.39 – 81.42 mm
(3.2043 – 3.2055 in.)



2. CALCULATE AMOUNT TO BORE CYLINDER

- (a) Using a micrometer and with the piston upside down, measure the piston diameter at right angles to the piston pin hole center line, the indicated distance from the skirt of the bottom edge.

4A-FE 38.5 mm (1.576 in.)

4A-GE 42.0 mm (1.654 in.)

- (b) Calculate the amount each cylinder is to be rebored as follows:

$$\text{Size to be rebored} = P + C - H$$

P = Piston diameter

C = Piston clearance

4A-FE 0.06 – 0.08 mm
(0.0024 – 0.0031 in.)

4A-GE 0.10 – 0.12 mm
(0.0039 – 0.0047 in.)

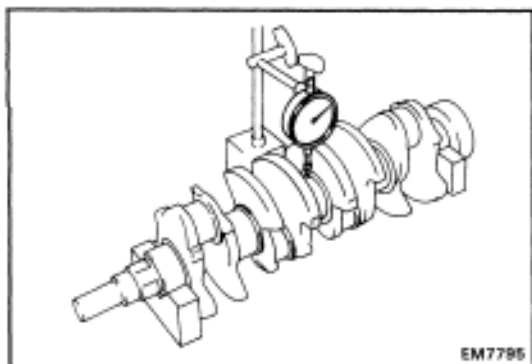
H = Allowance for honing.

Less than 0.02 mm (0.0008 in.)

3. BORE AND HONE CYLINDERS TO CALCULATED DIMENSIONS

Amount of honing: 0.02 mm (0.0008 in.) maximum

NOTICE: Excess honing will destroy the finished roundness.



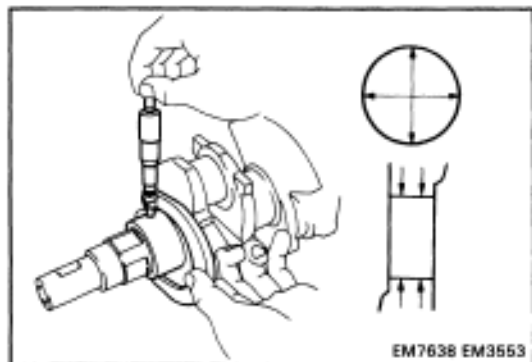
INSPECTION AND REPAIR OF CRANKSHAFT

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:

4A-FE 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.)
4A-GE STD	41.985 – 42.000 mm (1.6529 – 1.6535 in.)
U/S 0.25	41.745 – 41.755 mm (1.6435 – 1.6439 in.)

If the diameter is not as specified, check the oil clearance (See pages [EM-132](#) to [EM-136](#)). 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 CRANKPINS

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

(See procedure in step 2 above).

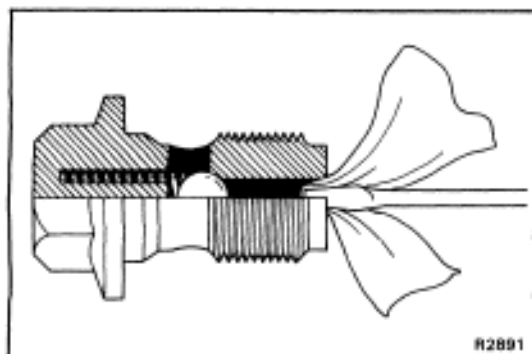
Install new main journal and/or crank pin undersized bearings.

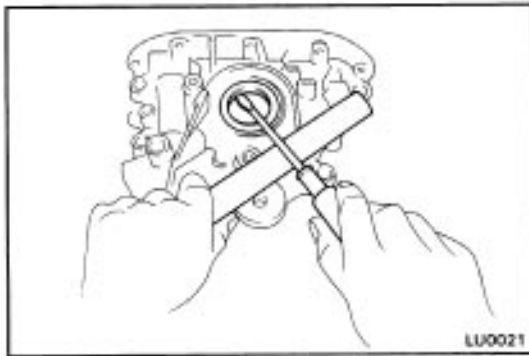
INSPECTION OF CHECK VALVES (4A-GE)

INSPECT CHECK VALVES

Push the valve with a screwdriver to check if it is stuck.

If stuck, replace the check valve.





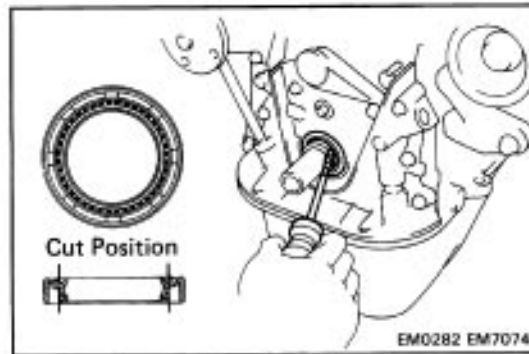
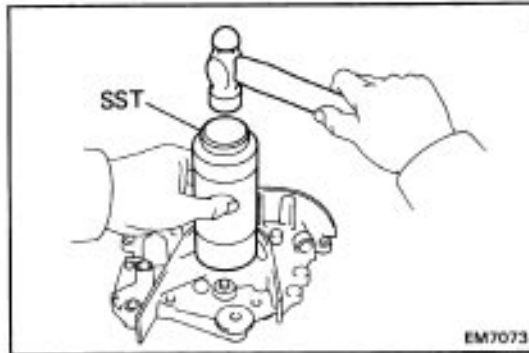
REPLACEMENT OF CRANKSHAFT OIL SEALS

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

1. REPLACE CRANKSHAFT FRONT OIL SEAL

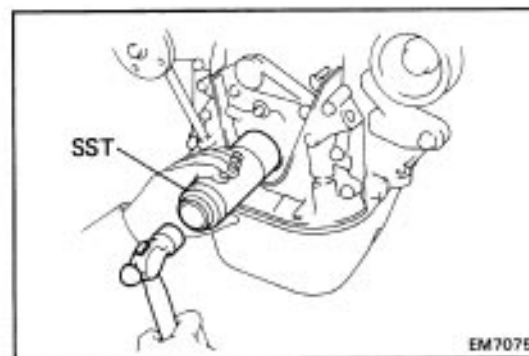
A. If oil pump is removed from cylinder block:

- (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.
Tape the screwdriver tip.



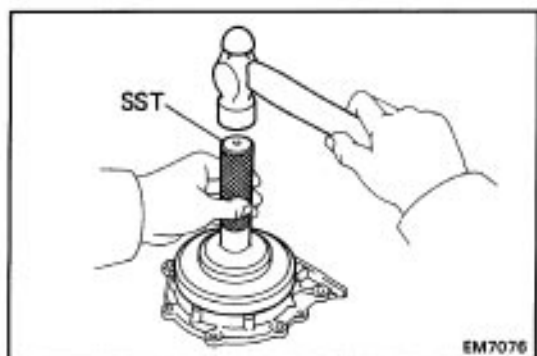
- (c) Apply MP grease to a new oil seal lip.
- (d) Using SST and a hammer, tap in the oil seal until its surface is flush with the oil pump case edge.
SST 09309-37010



2. REPLACE CRANKSHAFT REAR OIL SEAL

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

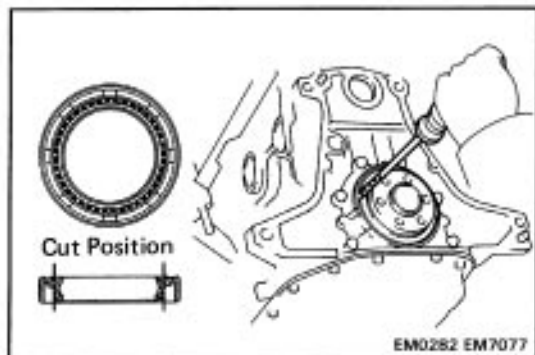
- (a) Using screwdriver and hammer, tap out the oil seal,



(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.



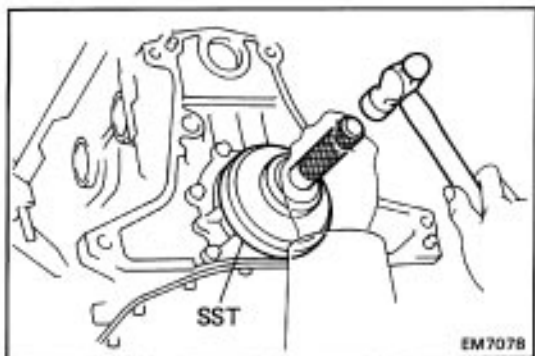
B. If rear oil seal retainer is installed to cylinder block:

(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.

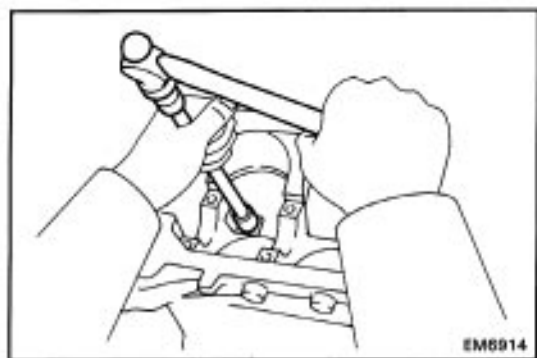
Tape the screwdriver tip.



(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.

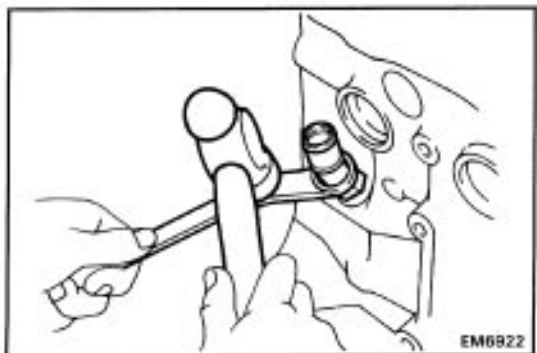
SST 09223–41020



REPLACEMENT OF UNION (4A–GE)

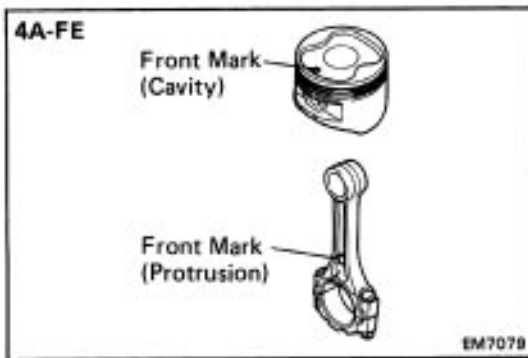
1. REMOVE UNION

Using a 12mm socket wrench and a hammer, tap out the union.



2. INSTALL UNION

Using an offset wrench and a hammer, tap in a new union.

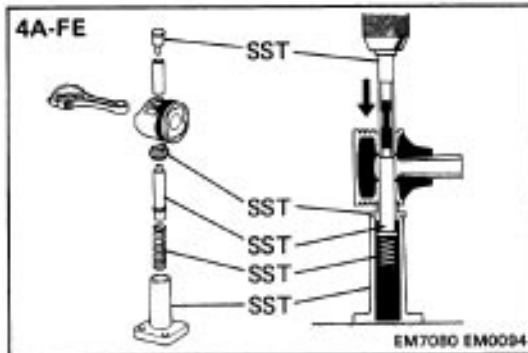


ASSEMBLY OF PISTON AND CONNECTING ROD

(See page [EM-117](#))

1. ASSEMBLE PISTON AND CONNECTING ROD

(a) Align the front marks of the piston and connecting rod.



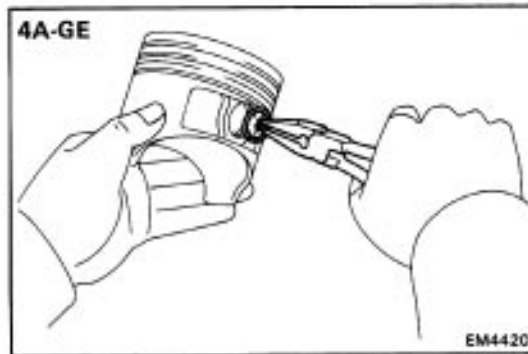
(b) Coat the piston pin and piston hole of the piston with engine oil.

(c) Using SST, press in the piston pin.

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

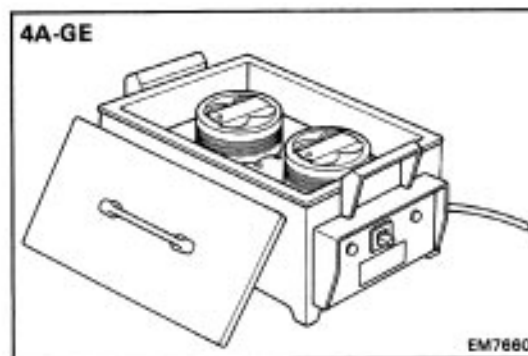
(d) Check that the piston smoothly moves back and forth on the piston pin.

(e) Check that the connecting rod and piston pin are positioned in the middle of the piston.

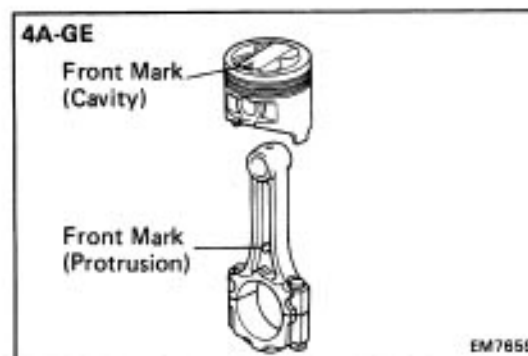


(4A-GE)

(a) Install a new snap ring on one side of the piston pin hole.



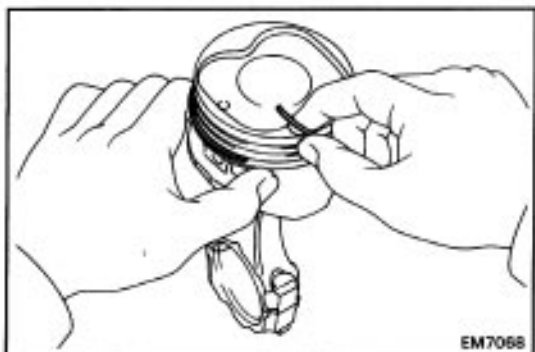
(b) Gradually heat the piston to 70 – 80°C (158 – 176°F)



(c) Coat the piston pin with engine oil.

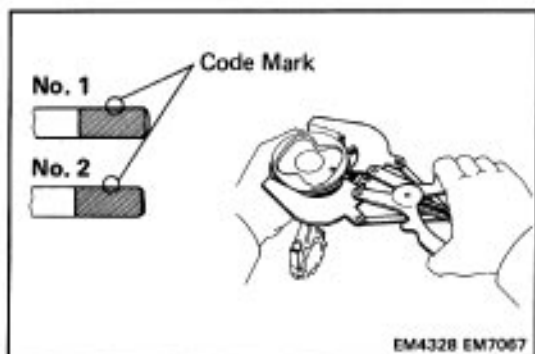
(d) Align the front marks of the piston and connecting rod, and push in the piston pin with your thumb.

(e) Install a new snap ring on the other side of the piston pin hole.



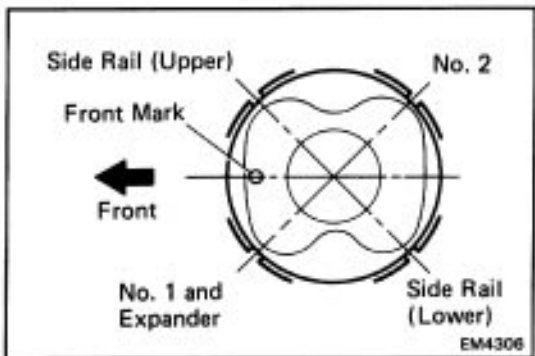
2. INSTALL PISTON RINGS

(a) Install the oil ring expander and two side rails by hand.



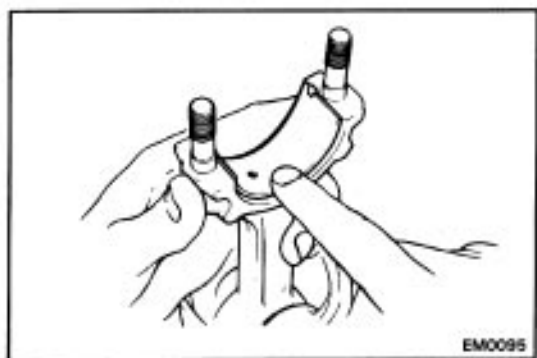
(b) Using a piston ring expander, install the two compression rings with the code mark facing upward.

**Code mark: No. 1 R or T (4A-GE only)
No. 2 R or T**



(c) Position the piston rings so that the ring end gaps are as shown.

NOTICE: Do not align the end gaps.



3. INSTALL CONNECTING ROD BEARINGS

(a) Align the bearing claw with the groove of the connecting rod or connecting rod cap.

(b) Install the bearings in the connecting rod and connecting rod cap.

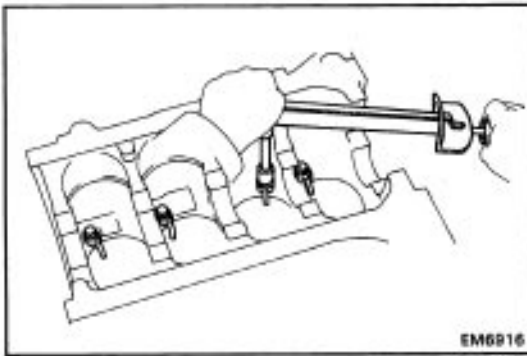
NOTICE: Install the bearing with the oil hole in the connecting rod.

ASSEMBLY OF CYLINDER BLOCK

(See page [EM-117](#))

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.

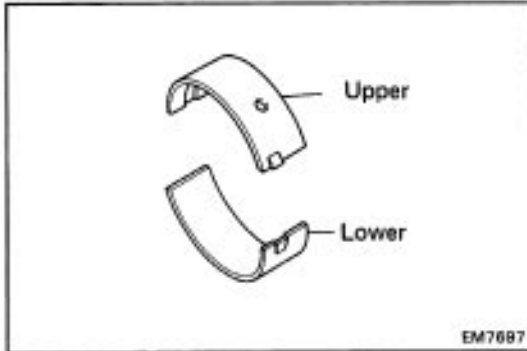


1. (4A-GE)

INSTALL OIL NOZZLE AND CHECK VALVES

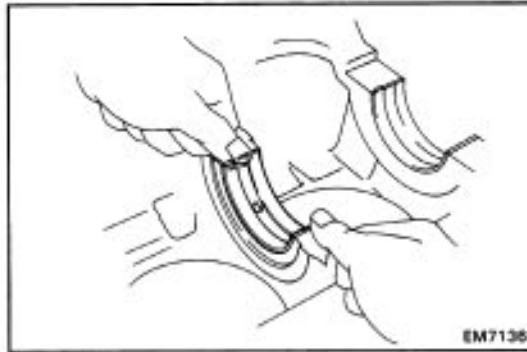
Install the nozzle with the bolt. Install the four oil nozzles. Torque the bolts.

Torque: 250 kg-cm (18 ft-lb, 25 N-m)



2. INSTALL MAIN BEARINGS

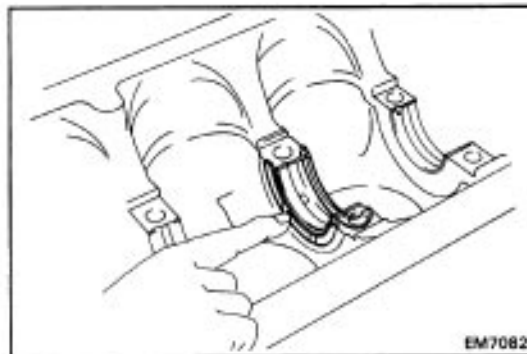
HINT: Upper bearings have an oil groove and oil holes; lower bearings do not.



(a) Align the bearing claw with the claw groove of the main bearing cap or cylinder block.

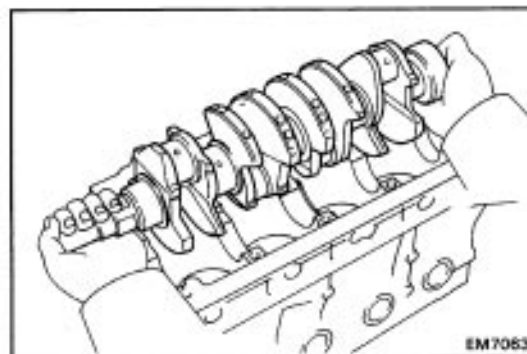
(b) Install the bearings in the cylinder block and main bearing caps.

NOTICE: Install the bearing with the oil hole in the cylinder block.

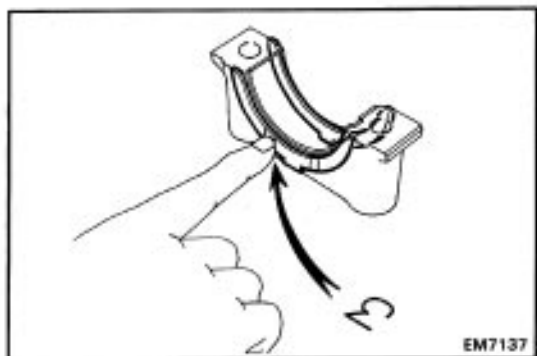


3. INSTALL UPPER THRUST WASHERS

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

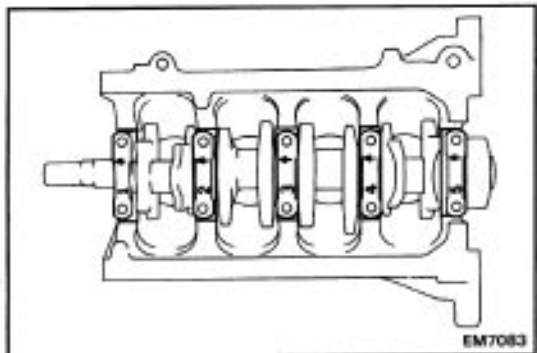


4. PLACE CRANKSHAFT ON CYLINDER BLOCK



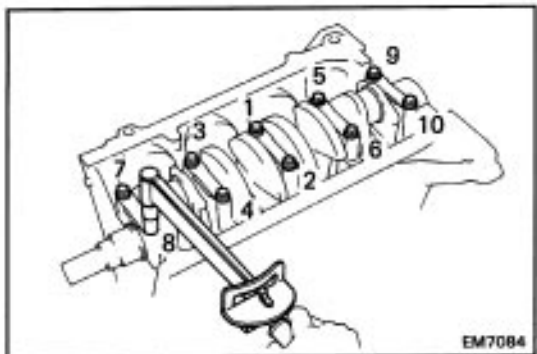
5. INSTALL MAIN BEARING CAPS AND LOWER THRUST WASHERS

- (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.

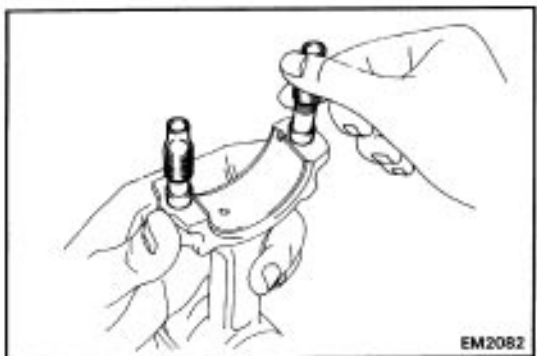
- (d) Install and uniformly tighten the ten bolts of the main bearing caps in several passes in the sequence shown.

Torque: 610 kg-cm (44 ft-lb, 60 N-m)

- (e) Check that the crankshaft turns smoothly.

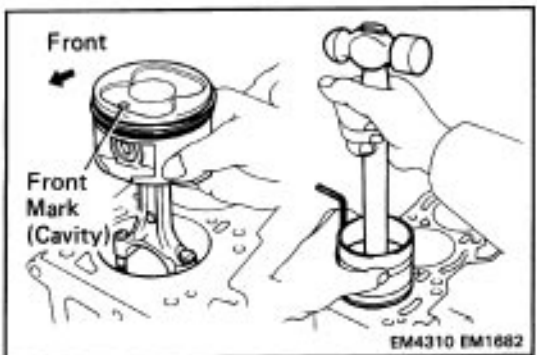
- (f) Check the crankshaft thrust clearance.

(See step 5 on page [EM-134](#))

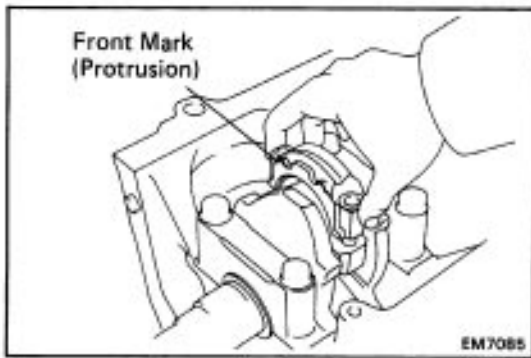


6. INSTALL PISTON AND CONNECTING ROD ASSEMBLIES

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

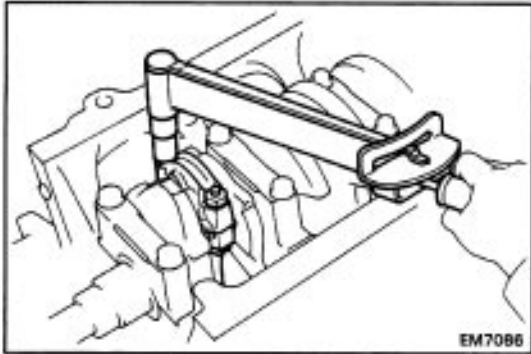


- (b) Using a piston ring compressor, push the correctly numbered piston and connecting rod assemblies into each cylinder with the front mark of the piston facing forward.



7. INSTALL CONNECTING ROD CAPS

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



(4A-FE)

- (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.

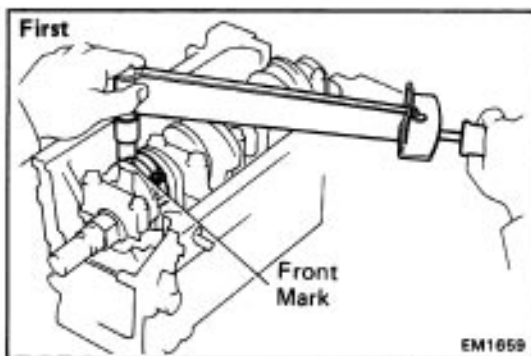
Torque: 500 kg-cm (36 ft-lb, 49 N-m)

- (e) Check that the crankshaft turns smoothly.
- (f) Check the connecting rod thrust clearance.
(See step 2 on page [EM-132](#))

(4A-GE)

HINT:

- The connecting rod cap nuts are tightened in two progressive steps.
- If any of the cap bolts break or deform, replace them.

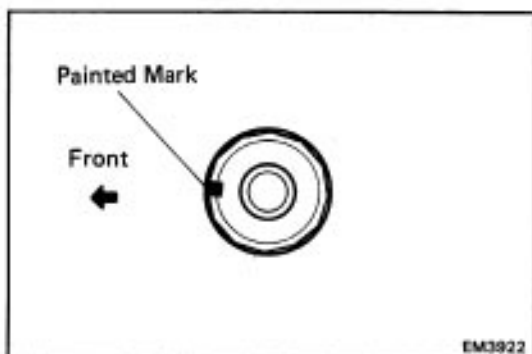


- (c) Apply a light coat of engine oil on the threads and under the nuts of the connecting rod cap.

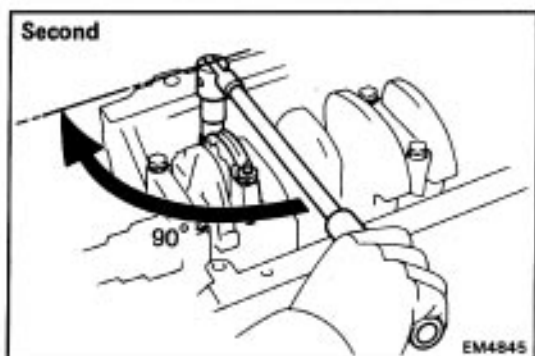
- (d) First, alternately tighten the cap nuts in several passes.

Torque: 400 kg-cm (29 ft-lb, 39 N-m)

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



- (e) Mark the front side of the top of cap nut with paint.



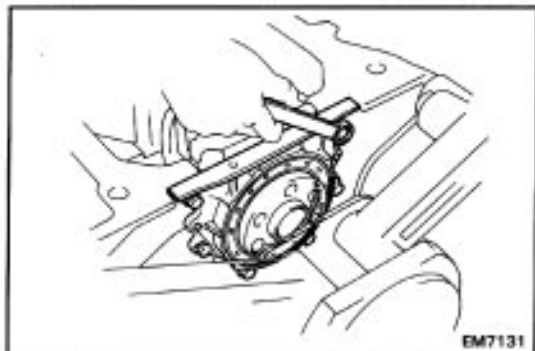
(f) Second, alternately retighten the cap nuts by an additional 90°.

(g) Check that the painted mark is turned by 90°.

(h) Check that the crankshaft turns smoothly.

(i) Check the connecting rod thrust clearance.

(See step 2 on page [EM-132](#))



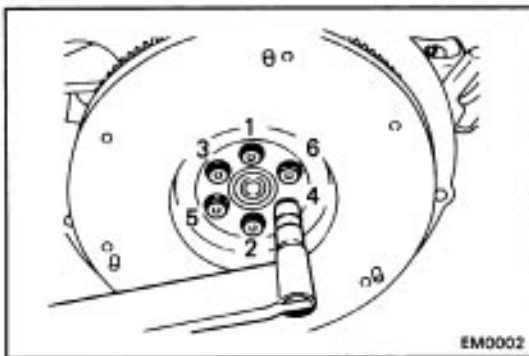
8. INSTALL REAR OIL SEAL RETAINER

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

Torque: 95 kg-cm (82 in.-lb, 9.3 N-m)

ASSEMBLY OF ENGINE (4A-FE)

1. INSTALL OIL PRESSURE SWITCH
2. INSTALL OIL FILTER
(See page [LU-7](#))
3. INSTALL OIL PUMP, OIL STRAINER AND OIL PAN
(See page [LU-9](#))
4. INSTALL WATER PUMP
(See page [CO-6](#))
5. INSTALL CYLINDER HEAD
(See page [EM-54](#))
6. INSTALL TIMING PULLEY AND TIMING BELT
(See page [EM-30](#))
7. INSTALL BRACKET AND ALTERNATOR
Torque (Bracket): 500 kg-cm (36 ft-lb, 49 N-m)
8. (with A/C)
INSTALL A/C COMPRESSOR BRACKET
Torque: 480 kg-cm (35 ft-lb, 47 N-m)
9. (w/ PS)
INSTALL PS PUMP BRACKET
Torque: 400 kg-cm (29 ft-lb, 39 N-m)
10. REMOVE ENGINE ASSEMBLY FROM ENGINE STAND
11. INSTALL REAR END PLATE



12. INSTALL FLYWHEEL (M/T) OR DRIVE PLATE (A/T)

Install the flywheel or drive plate on the crankshaft. Tighten the bolts to the specified torque in two or three passes in the sequence shown.

Torque:

Flywheel 800 kg-cm (58 ft-lb, 78 N-m)

Drive plate 650 kg-cm (47 ft-lb, 64 N-m)

13. (M/T)

INSTALL CLUTCH DISC AND COVER

HINT: If necessary, inspect the clutch unit before installation.

ASSEMBLY OF ENGINE (4A-GE)

1. INSTALL STIFFENER PLATE ADAPTER

Torque: 400 kg-cm (29 ft-lb, 39 N-m)

2. INSTALL KNOCK SENSOR

3. INSTALL OIL PRESSURE SENDER GAUGE

(See page [LU-5](#))

4. INSTALL OIL FILTER BRACKET

(See page [LU-7](#))

5. INSTALL OIL PUMP, BAFFLE PLATE, STRAINER AND OIL PUMP

(See page [LU-9](#))

6. INSTALL WATER PUMP

(See page [CO-6](#))

7. INSTALL CYLINDER HEAD

(See page [EM-89](#))

8. INSTALL BRACKET AND ALTERNATOR

Torque (Bracket): 500 kg-cm (36 ft-lb, 49 N-m)

9. INSTALL TIMING PULLEYS AND TIMING BELT

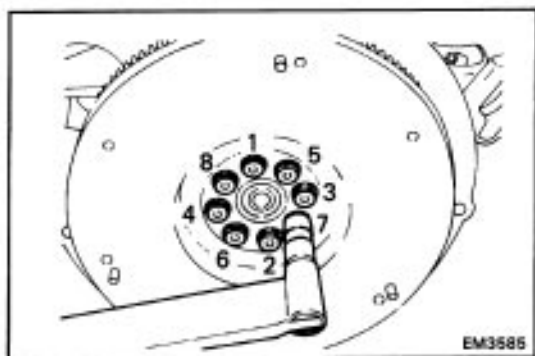
(See page [EM-41](#))

10. INSTALL UNION PIPES AND OIL COOLER HOSES

Torque: 250 kg-cm (18 ft-lb, 25 N-m)

11. REMOVE ENGINE ASSEMBLY FROM ENGINE STAND

12. INSTALL REAR END PLATE



13. INSTALL FLYWHEEL

Install the flywheel or drive plate on the crankshaft.

Tighten the bolts to the specified torque in two or three passes in the sequence shown.

Torque: 750 kg-cm (154 ft-lb, 74 N-m)

14. INSTALL CLUTCH DISC AND COVER

HINT: If necessary, inspect the clutch unit before installation.

INSTALLATION OF ENGINE (4A-FE)

1. INSTALL TRANSAXLE TO ENGINE

2. INSTALL STARTER (See page [ST-14](#))

3. (A/T)

INSTALL SIX TORQUE CONVERTER MOUNTING BOLTS

4. INSTALL HOLE PLUG TO REAR END PLATE

5. CONNECT FOLLOWING CONNECTORS:

- Back-up lamp switch (M/T)
- Neutral start switch (A/T)

6. INSTALL ENGINE WITH TRANSAXLE TO VEHICLE

- (a) Attach the engine hoist chain to the lifting bracket on the engine.

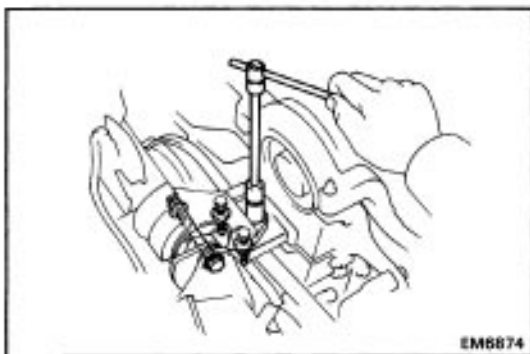
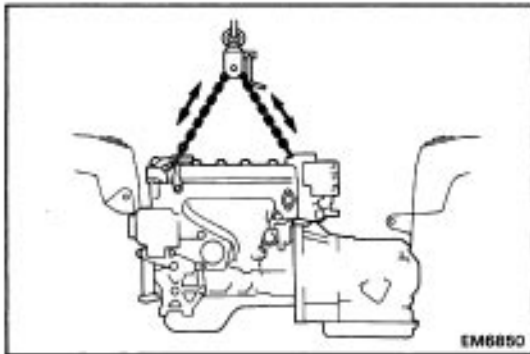
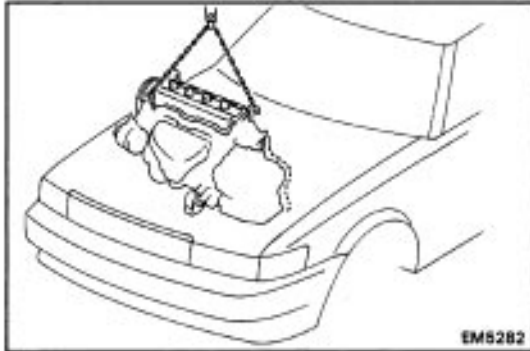
HINT: Hang the engine wires and hoses on the chain.

- (b) Lower the engine into the engine compartment.

- Tilt the transaxle downward, lower the engine and clear the left mounting.

NOTICE: Be careful not to hit the power steering gear housing and throttle position sensor.

- (c) Keep the engine level, and align each mounting with the bracket.



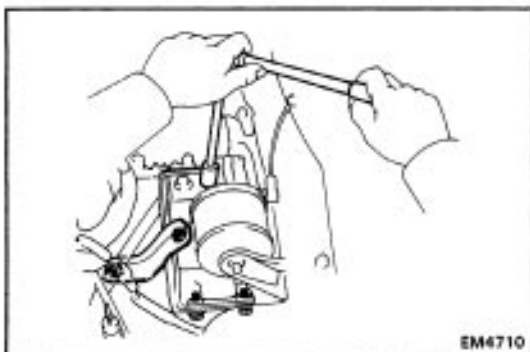
- (d) Install the RH mounting insulator to the engine mounting bracket with the two nuts and bolt.

Torque: Bolt 650 kg-cm (47 ft-lb, 64 N-m)

Nut 530 kg-cm (38 ft-lb, 52 N-m)

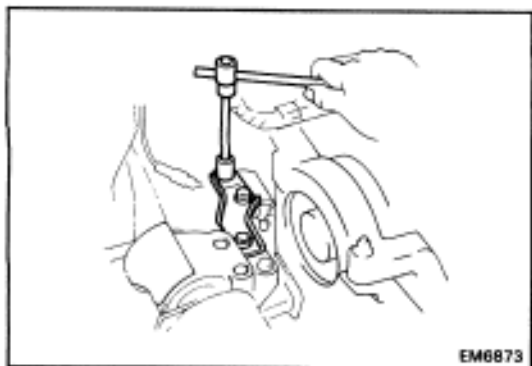
- (e) Align the RH mounting insulator with the body bracket and temporarily install the mounting through bolt and nut.

Torque: 890 kg-cm (64 ft-lb, 87 N-m)



- (f) Align the LH mounting insulator bracket with the transaxle case bracket. Temporarily install the three bracket bolts.

Torque: 490 kg-cm (35 ft-lb, 48 N-m)



(g) Install the RH mounting stay with the three bolts.

Torque: 430 kg-cm (31 ft-lb, 42 N-m)

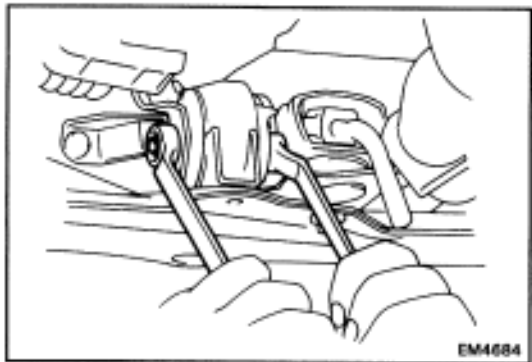
(h) Install the LH mounting stay with the two bolts.

Torque: 210 kg-cm (15 ft-lb, 21 N-m)

(i) Remove the hoist chain from the engine.

7. RAISE VEHICLE

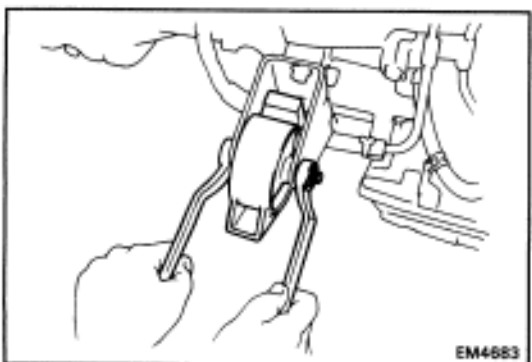
NOTICE: Be sure the vehicle is securely supported.



8. INSTALL ENGINE MOUNTING CENTER MEMBER

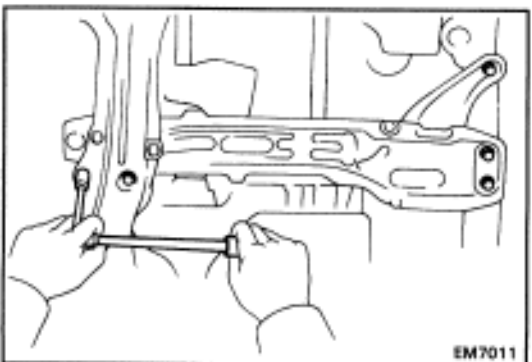
(a) Install and torque the rear mounting bolt.

Torque: 890 kg-cm (64 ft-lb, 87 N-m)



(b) Install and torque the front mounting bolt.

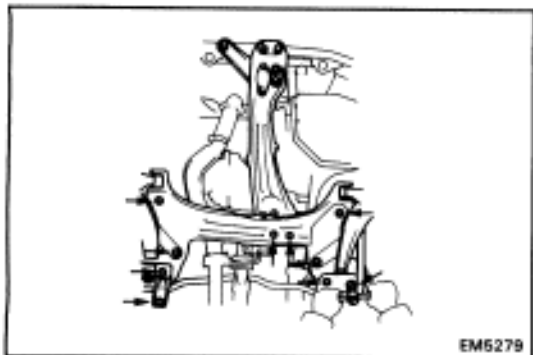
Torque: 890 kg-cm (64 ft-lb, 87 N-m)



(c) Install the engine mounting member with the five bolts.

Torque the bolts.

Torque: 620 kg-cm (45 ft-lb, 61 N-m)



9. (4WD)

INSTALL FRONT SUSPENSION CROSSMEMBER

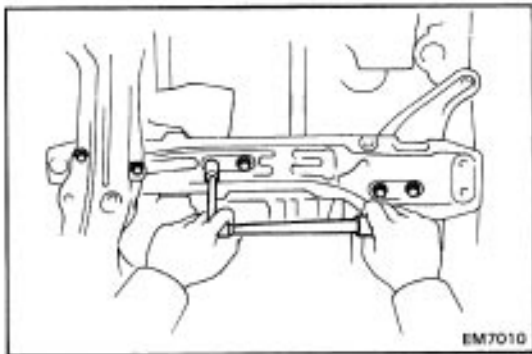
Install the suspension crossmember with the eight bolts.

Torque: 2,100 kg-cm (152 ft-lb, 206 N-m)

(Front lower arm bolt)

1,300 kg-cm (94 ft-lb, 127 N-m)

(Rear bolt)



10. INSTALL FRONT, CENTER (2WD) AND REAR MOUNTINGS ONTO MEMBER

- Temporarily install the front and rear mountings and bolts.
- Align each bolt hole at the brackets with the member.
Install and torque the bolts and nuts.

Torque:	Front	490 kg-cm (35 ft-lb, 48 N-m)
	Center (2WD)	530 kg-cm (38 ft-lb, 52 N-m)
	Rear (2WD)	530 kg-cm (38 ft-lb, 52 N-m)
	Rear (4WD)	580 kg-cm (42 ft-lb, 57 N-m)

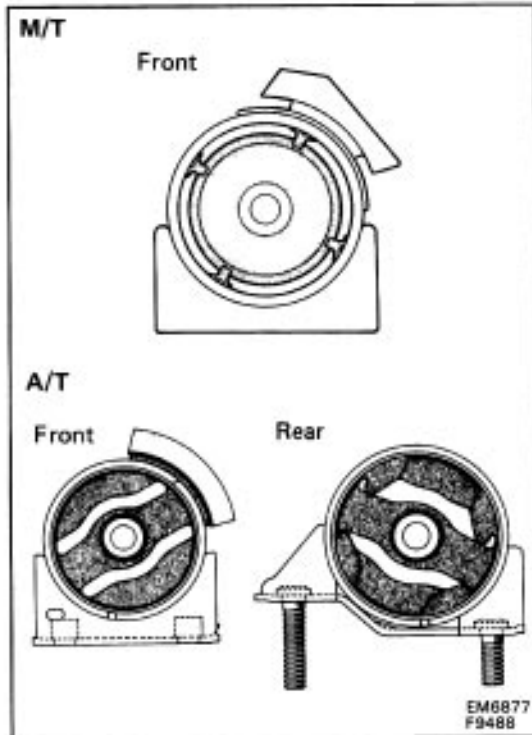
- Install the two hole covers.
- Shake the engine several times to make sure that there is no load on the front and rear (A/T only) mounting insulators.

NOTICE:

- On M/T, check that the insulator space is equal all the way around.
- On A/T, check that the space above and below the insulator is equal.

HINT:

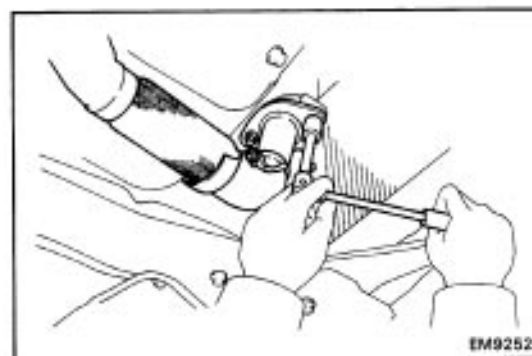
- On new insulators, the lower space is wider than the upper space.
- On M/T, it does not matter if the insulator ribs (4 places) are broken.



11. (4WD)

CONNECT PROPELLER SHAFT

12. CONNECT DRIVE SHAFTS TO TRANSAXLE



13. INSTALL FRONT EXHAUST PIPE

- Install both sets of new gaskets and the front pipe.
- Connect the exhaust pipe to the manifold.
Install and torque two new nuts.

Torque: 630 kg-cm (46 ft-lb, 62 N-m)

- Install the two bolts to the catalytic converter and bracket.
- Connect the oxygen sensor connector.

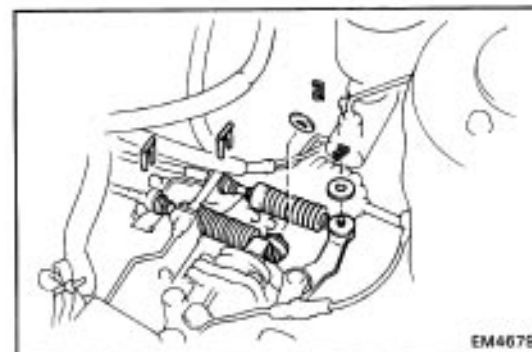
14. (4WD)

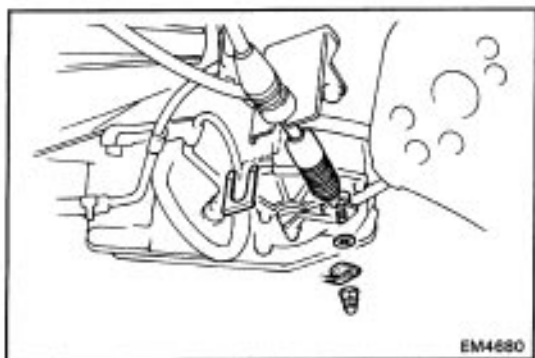
CONNECT OIL COOLER HOSES

15. LOWER VEHICLE

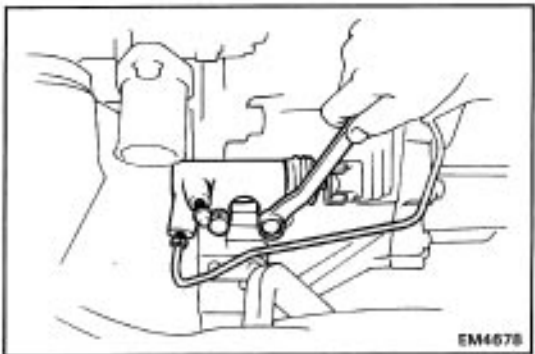
16. CONNECT CONTROL CABLES

- Connect the control cables to the shift outer lever and select lever.
- Install the retainers, washers and clips.

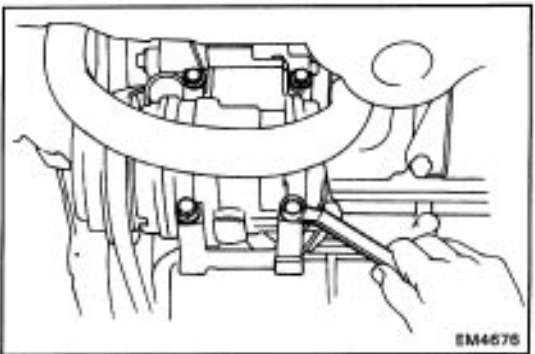


**17. (A/T)****CONNECT CONTROL CABLE**

- (a) Connect the control cable to the shift lever.
- (b) Install the retainer and clip.

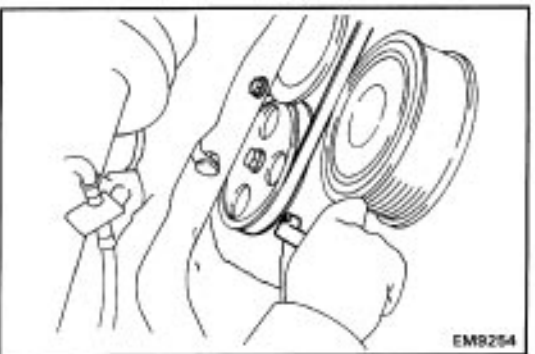
**18. (M/T)****INSTALL CLUTCH RELEASE CYLINDER**

- (a) Install the release cylinder with the two bolts.
- (b) Connect the bracket to the transaxle.
- (c) Install the clip to the clutch pipe bracket.

19. CONNECT SPEEDOMETER CABLE TO TRANSAXLE**20. (with A/C)****INSTALL A/C COMPRESSOR**

Install the four compressor mounting bolts.

Torque: 250 kg-cm (18 ft-lb, 25 N-m)

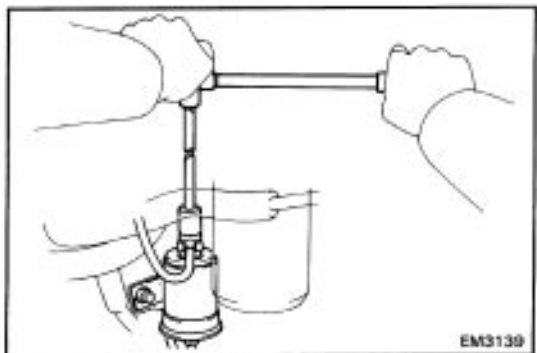
**21. (w/ PS)****INSTALL PS PUMP**

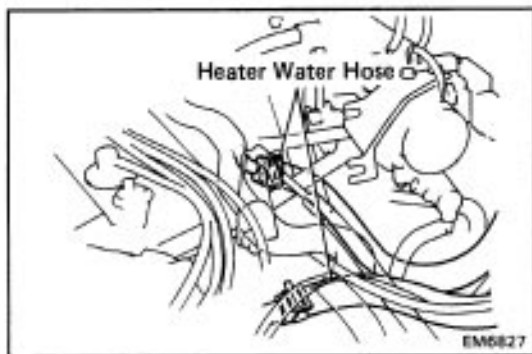
- (a) Connect the PS pump with pivot bolt and adjusting bolts.
 - (b) Install the drive belt.
- Torque the bolts.

Torque: 400 kg-cm (29 ft-lb, 39 N-m)

22. ADJUST DRIVE BELT (See step 18 on page [EM-40](#))**23. CONNECT FUEL RETURN HOSE TO AIR PIPE****24. CONNECT INLET HOSE TO FUEL FILTER**

Torque: 300 kg-cm (22 ft-lb, 29 N-m)

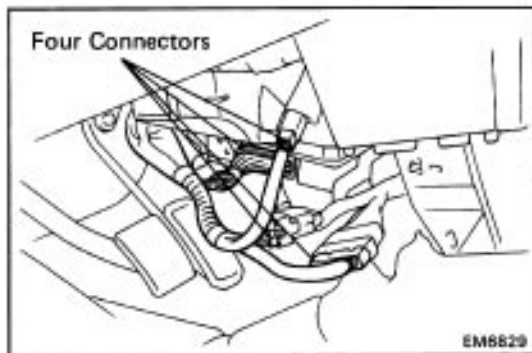


**25. CONNECT HEATER WATER HOSES**

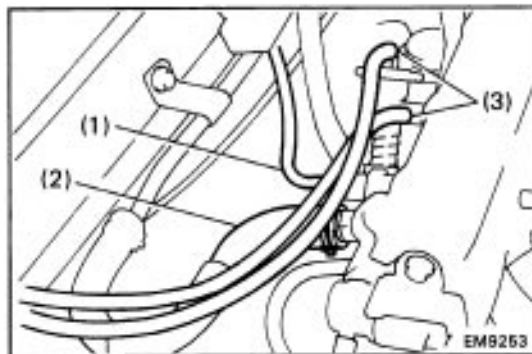
- (a) Connect the heater hose to the water inlet pipe.
- (b) Connect the heater hose to the water inlet housing.

26. CONNECT ENGINE WIRE

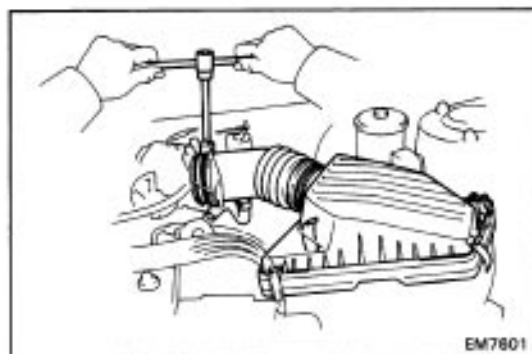
- (a) Push in the engine wire through the cowl panel.
- (b) Connect the four connectors to the cowl wire and ECU.
- (c) Install the center cover in front of the console box.
- (d) Install rear and front console boxes.
- (e) Connect the following connectors:
 - Ground strap connector and bolt
 - Check connector
 - Vacuum sensor connector
 - A/C wire connector.
- (f) Install the No.2 junction block and No.5 relay block with the three nuts.

**27. CONNECT FOLLOWING HOSES:**

- (a) Connect the fuel return hose to the air pipe.
- (b) (w/ PS and/or with A/C)
Connect the air hoses to the air pipe.
- (c) Connect the following vacuum hoses to the intake chamber:
 - (1) Vacuum sensor hose to gas filter
 - (2) Brake booster vacuum hose
 - (3) (with A/C)
Two A/C vacuum hoses to actuator

**28. INSTALL WASHER TANK****29. INSTALL AIR CLEANER ASSEMBLY**

- (a) Install the air cleaner support bracket with the two bolts.
- (b) Install the air cleaner case with the three bolts.
- (c) Connect the harness clamp to the boss of the case.
- (d) Install the air cleaner filter element.
- (e) Connect the air cleaner hose, and install the air cleaner cap with the four clips.
- (f) Tighten the air cleaner hose clamp bolt.
- (g) Connect the air hose to the air pipe.
- (h) Connect the air intake temp. sensor connector to the air cleaner cap.
- (i) Connect the vacuum hose to the charcoal canister.

**30. (w/ CRUISE CONTROL)****INSTALL CRUISE CONTROL ACTUATOR****31. (A/T)****CONNECT THROTTLE CABLE TO BRACKET****32. CONNECT ACCELERATOR WIRE TO BRACKET**

33. INSTALL RADIATOR WITH COOLING FAN

(See page [CO-19](#))

34. (M/T)

REFILL MANUAL TRANSAXLE AND TRANSFER WITH GEAR OIL

2WD (See page [MA-9](#))

4WD (See page [MA-10](#))

35. (A/T)

REFILL AUTOMATIC TRANSAXLE AND TRANSFER WITH FLUID

2WD (See page [MA-10](#))

4WD (See page [MA-11](#))

36. REFILL WITH COOLANT (See page [CO-5](#))

Close the radiator and engine drain cock and fill with coolant.

Total capacity (w/ Heater):

M/T (Ex. AE92L – ACMXKK)

5.6 liters (5.9 US qts, 4.9 Imp. qts)

M/T (AE92L – ACMXKK)

6.2 liters (6.2 US qts, 5.5 Imp. qts)

A/T 6.1 liters (6.4 US qts, 5.4 Imp. qts)

37. REFILL WITH ENGINE OIL (See page [LU-7](#))

Oil Grade: API grade SG

Capacity: Dry fill 3.7 liters (3.9 US qts, 3.3 Imp. qts)

Drain and refill (w/o Oil filter change)

3.0 liters (3.2 US qts, 2.6 Imp. qts)

Drain and refill (w/ Oil filter change)

3.2 liters (3.4 US qts, 2.8 Imp. qts)

38. INSTALL BATTERY**39. START ENGINE AND CHECK FOR LEAKS**

Warm up engine and inspect leakage.

40. RECHECK COOLANT AND ENGINE OIL LEVEL**41. INSTALL RH AND LH ENGINE UNDER COVERS****42. INSTALL HOOD**

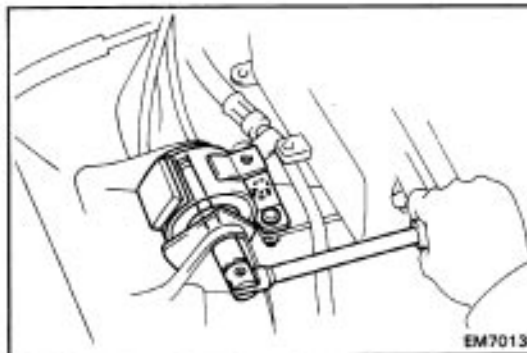
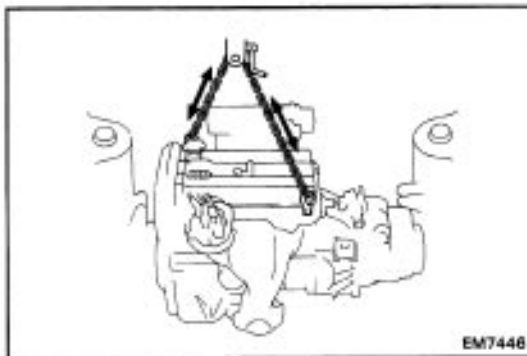
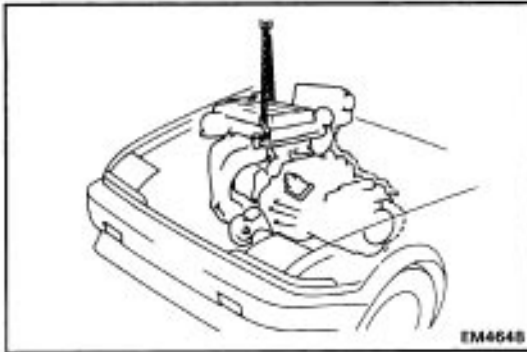
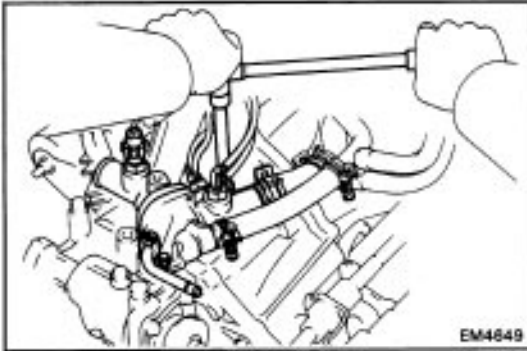
INSTALLATION OF ENGINE (4A-GE)

1. INSTALL TRANSAXLE TO ENGINE
2. INSTALL STARTER (See page [ST-14](#))
3. INSTALL FLYWHEEL HOUSING UNDER COVER
4. CONNECT FOLLOWING CONNECTORS:

- (a) Back-up light switch connector
- (b) Water temperature sensor connector

5. INSTALL WATER INLET HOUSING

- (a) Connect the two hoses to the No. 1 and No. 2 water by-pass pipes.
- (b) Install the water inlet housing with mounting bolts and nut.
- (e) Connect the vacuum hoses to BVSV.
- (d) Connect the radiator fan temperature switch connector and start injector time switch connector.



6. INSTALL ENGINE WITH TRANSAXLE TO VEHICLE

- (a) Attach the engine hoist chain to the lifting bracket on the engine.

HINT: Hang the engine wires and hoses on the chain.

- (b) Lower the engine into the engine compartment.
 - Tilt the transaxle downward, lower the engine and clear the left mounting.

NOTICE: Be careful not to hit the power steering gear housing and throttle position sensor.

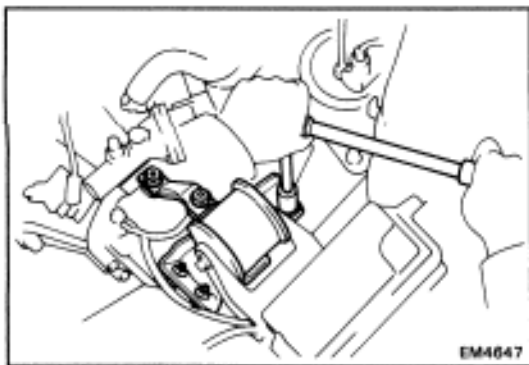
- (c) Keep the engine level, and align each mounting with the bracket.

- (d) Install the RH mounting insulator to the engine mounting bracket with the two nuts.

Torque: 530 kg-cm (38 ft-lb, 52 N-m)

- (e) Align the RH mounting insulator with the body bracket and temporarily install the mounting through bolt and nut.

Torque: 890 kg-cm (64 ft-lb, 87 N-m)



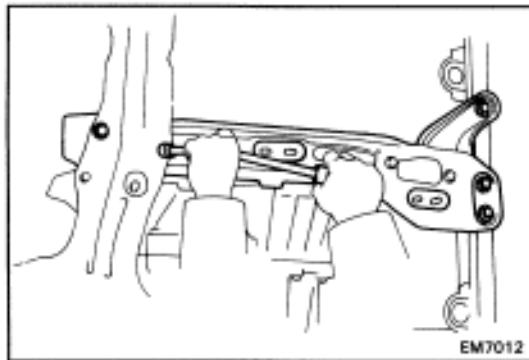
- (f) Align the LH mounting insulator bracket with the trans-axle case bracket. Temporarily install the three bracket bolts.

Torque: 490 kg-cm (35 ft-lb, 48 N-m)

- (g) Install the LH mounting stay with the two bolts.

Torque: 210 kg-cm (15 ft-lb, 21 N-m)

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



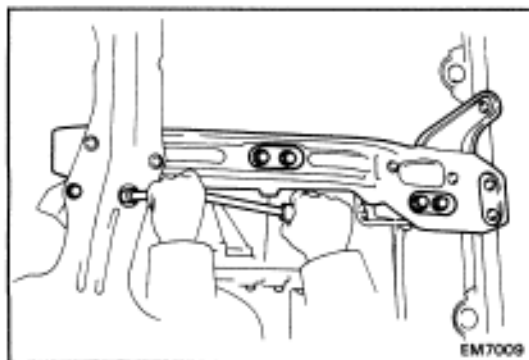
7. RAISE VEHICLE

NOTICE: Be sure the vehicle is securely supported.

8. INSTALL ENGINE MOUNTING CENTER MEMBER

Install the engine mounting center member with the five bolts. Torque the bolts.

Torque: 620 kg-cm (45 ft-lb, 61 N-m)



9. INSTALL FRONT, CENTER AND REAR MOUNTINGS ONTO MEMBER

- (a) Temporarily install the front and rear mountings and bolts.

- (b) Align each bolt hole at the brackets with the member. Install and torque the bolts.

Torque: Front 490 kg-cm (35 ft-lb, 48 N-m)

Center 530 kg-cm (38 ft-lb, 52 N-m)

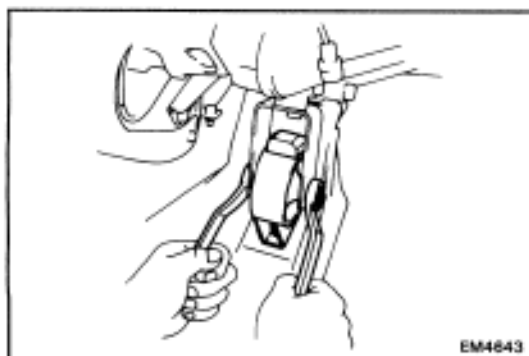
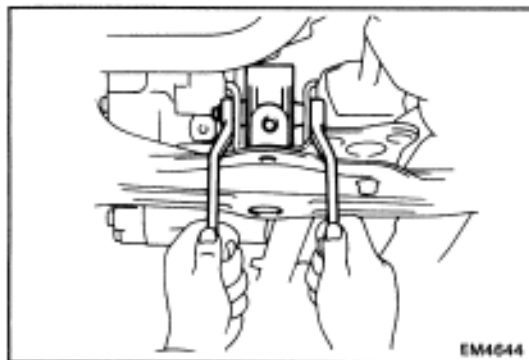
Rear 580 kg-cm (42 ft-lb, 57 N-m)

- (c) Install the two hole covers.

- (d) Shake the engine several times to make sure that there is no load on the front mounting insulators.

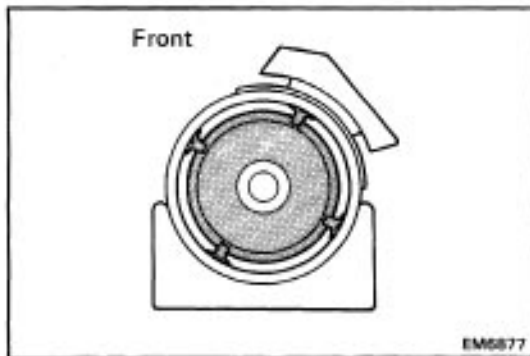
- (e) Install and torque the rear mounting bolt.

Torque: 890 kg-cm (64 ft-lb, 87 N-m)



- (f) Install and torque the front mounting bolt.

Torque: 890 kg-cm (64 ft-lb, 87 N-m)



NOTICE: Check that the insulator space is equal all the way around.

HINT:

- On new insulators, the lower space is wider than the upper space.
- It does not matter if the insulator ribs (4 places) are broken.

10. CONNECT RH AND LH DRIVE SHAFTS TO TRANSAXLE

11. INSTALL FRONT EXHAUST PIPE

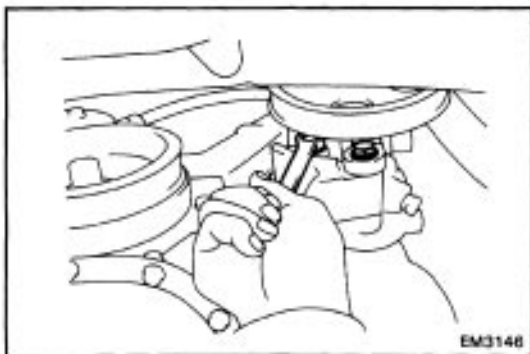
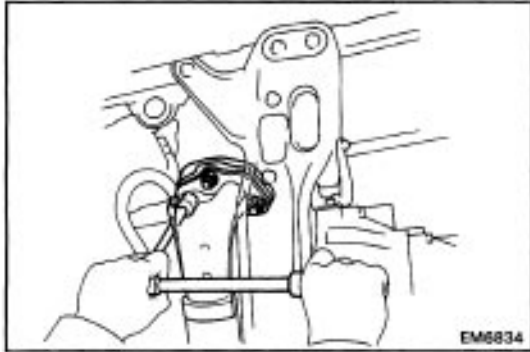
- Install three new gaskets and the front pipe.
- Connect the exhaust pipe to the manifold.
Install and torque three new nuts.

Torque: 630 kg-cm (46 ft-lb, 62 N-m)

- Install the two bolts to the pipe clamp.
- Install the two bolts and nuts to the catalytic converter and bracket.
- Connect the oxygen connector.

12. LOWER VEHICLE

13. CONNECT OIL COOLER HOSES



14. (w/ PS AND/OR with A/C)

CONNECT PS PUMP AND A/C COMPRESSOR

- Install the PS pump and pulley with the bracket.
Install and tighten the bracket bolts.

Torque: 400 kg-cm (29 ft-lb, 39 N-m)

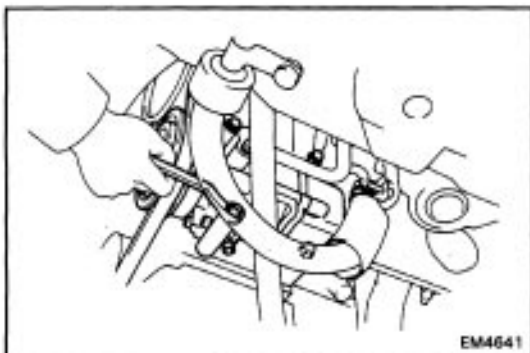
- Tighten the PS pump lock bolt and pivot bolts.
- Connect oil pressure connector.
- Install the compressor bracket and tighten the bolts and nut.

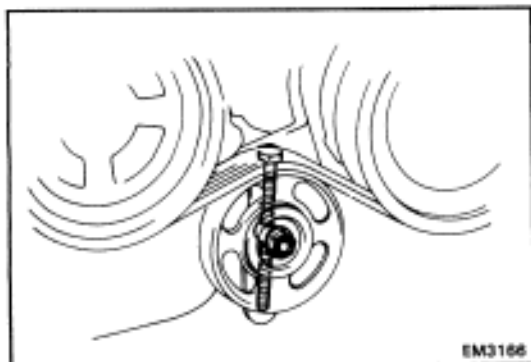
Torque: Bolt 480 kg-cm (35 ft-lb, 47 N-m)

Nut 450 kg-cm (33 ft-lb, 44 N-m)

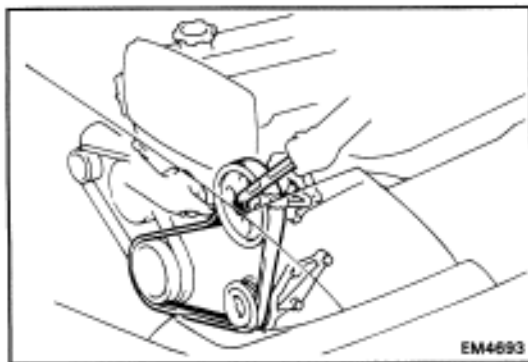
- Install the compressor and tighten the four mounting bolts.

Torque: 250 kg-cm (18 ft-lb, 25 N-m)

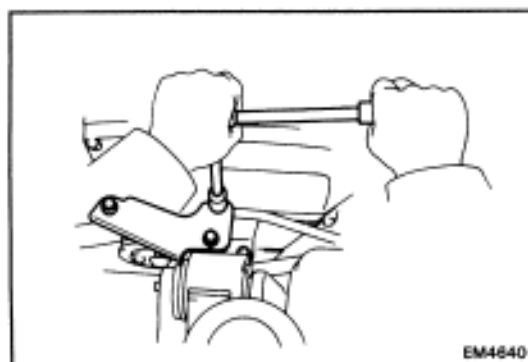




- (f) Install the drive belt, and temporarily tighten the idler pulley bolt.



- (g) Tighten the PS pump pulley nut.
Torque: 390 kg-cm (28 ft-lb, 38 N-m)
 (h) Connect the two A/C connectors.



- (i) Install the PS pump pipe clamp bolt.
 (j) Install and tighten the RH mounting stay and three bolts with PS pipe clamp.

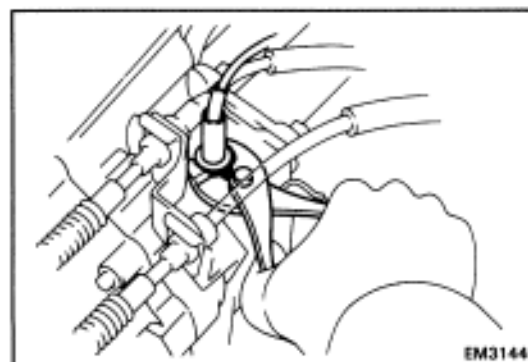
Torque: 430 kg-cm (31 ft-lb, 42 N-m)

15. ADJUST PS DRIVE BELT (See page [EM-52](#))

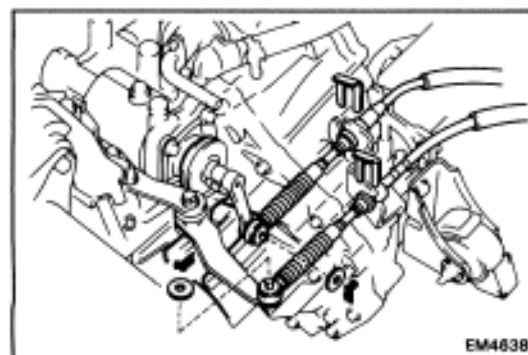
PS drive belt tension:

New belt 165 ± 25 lb

Used belt 90 ± 20 lb

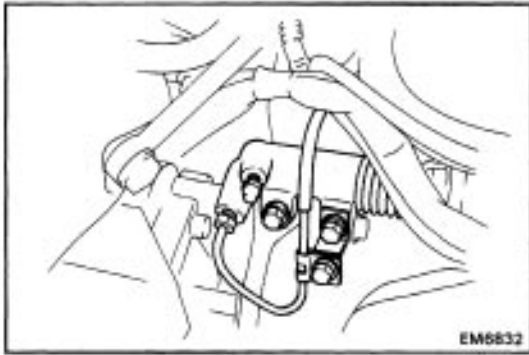


16. CONNECT SPEEDOMETER CABLE

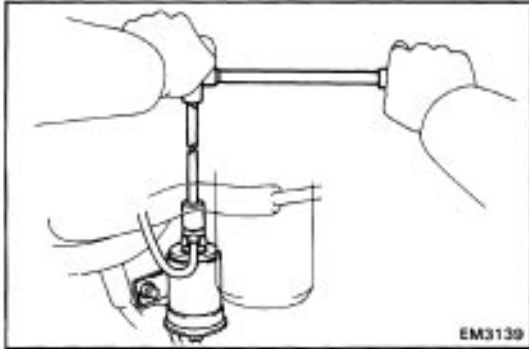


17. CONNECT CONTROL CABLES

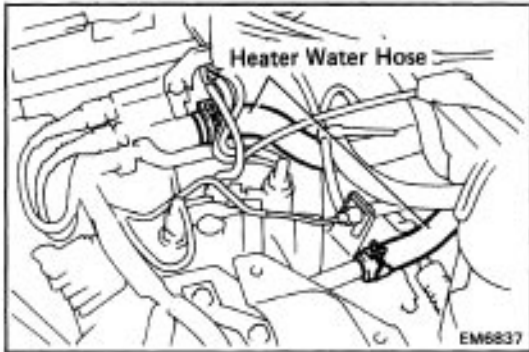
- (a) Connect the control cables to the shift outer lever and select lever.
 (b) Install the retainers, washers and clips.

**18. INSTALL RELEASE CYLINDER**

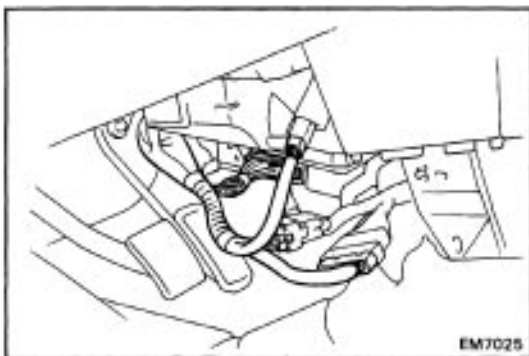
- (a) Install the release cylinder.
- (b) Tighten the three bolts.

19. CONNECT HEATER AND AIR HOSES TO AIR VALVE**20. CONNECT FUEL RETURN HOSE TO PRESSURE REGULATOR****21. CONNECT INLET FUEL HOSE TO FUEL FILTER**

Torque: 300 kg-cm (22 ft-lb, 29 N-m)

**22. CONNECT HEATER WATER HOSES**

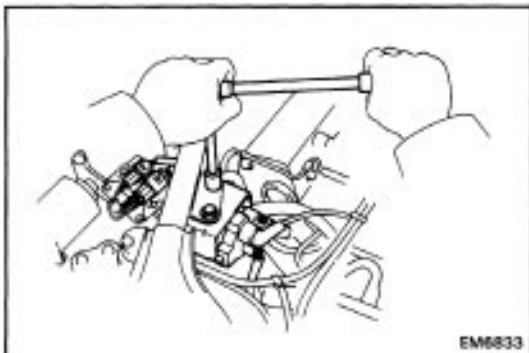
- (a) Connect the heater hose to the cylinder head rear cover.
- (b) Connect the heater hose to the water inlet housing.

**23. CONNECT ENGINE WIRE**

- (a) Push in the engine wire through the cowl panel.
- (b) Connect the four connectors to the cowl wire and ECU.
- (c) Install the center cover in front of the console box.
- (d) Install rear and front console boxes.
- (e) Connect the following connectors:
 - Noise filter connector
 - Ground strap connector and bolt
 - Check connector
 - (with A/C)
A/C wire connector
- (f) Install the No.2 junction block and No.5 relay block with the three nuts.

24. INSTALL IGNITION COIL

- (a) Install the ignition coil with the bracket and two bolts.
- (b) Connect the high-tension cord.
- (c) Connect the two ignition connectors.

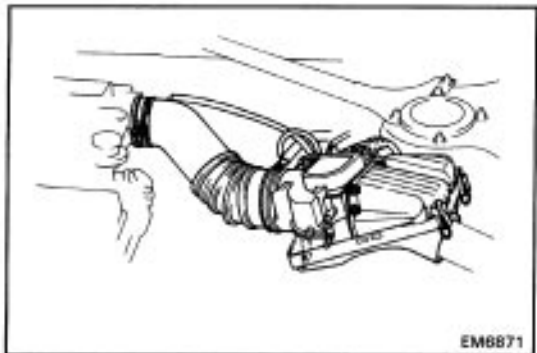


25. CONNECT FOLLOWING HOSES:

- Brake booster vacuum hose
- Charcoal canister vacuum hose

26. INSTALL WASHER TANK**27. INSTALL AIR CLEANER ASSEMBLY**

- Install the air cleaner support bracket with the two bolts.
- Install the air cleaner case with the three bolts.
- Connect the harness clamp to the boss of the case.
- Install the air cleaner filter element.
- Connect the air cleaner hose, and install the air cleaner cap and air flow meter with the four clips.
- Tighten the air cleaner hose clamp bolt.
- (with A/C)
Connect the air hoses.
- Connect the vacuum hoses to the VSV.
- Connect the VSV connector.
- Connect the air flow meter connector.

**28. (w/ CRUISE CONTROL)****INSTALL CRUISE CONTROL ACTUATOR****29. CONNECT ACCELERATOR WIRE TO BRACKET****30. INSTALL RADIATOR WITH COOLING FAN**(See page [CO-19](#))**31. REFILL WITH COOLANT (See page [CO-5](#))**

Total capacity	(w/ Heater)
6.0 liters	(6.3 US qts, 5.3 Imp. qts)

32. REFILL MANUAL TRANSAXLE OIL (See page [MA-22](#))

Oil grade :	API grade GL-4 or GL-5
Viscosity:	SAE 75W-90
Capacity :	2.6 liters (2.7 US qts, 2.3 Imp. qts)

33. REFILL WITH ENGINE OIL (See page [LU-7](#))

Oil grade:	API grade SG
Capacity:	Dry fill 4.1 liters (4.3 US qts, 3.6 Imp. qts)
	Drain and refill (w/o Oil filter change)
	3.4 liters (3.6 US qts, 3.0 Imp. qts)
	Drain and refill (w/ Oil filter change)
	3.7 liters (3.9 US qts, 3.3 Imp. qts)

34. INSTALL BATTERY**35. START ENGINE AND CHECK FOR LEAKS**

Warm up the engine and inspect leakage.

36. INSTALL RH AND LH ENGINE UNDER COVERS**37. INSTALL HOOD**