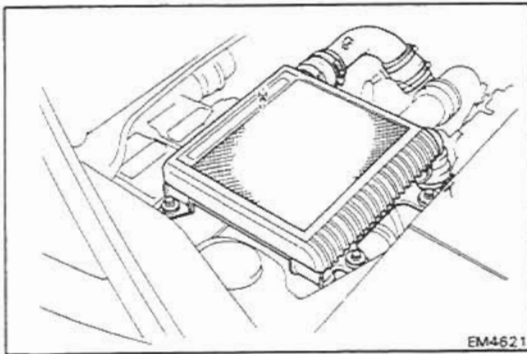


REMOVAL OF ENGINE (4A-GZE)

1. **DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY**
2. **REMOVE FUEL TANK PROTECTORS AND ENGINE UNDER COVER**
3. **DRAIN ENGINE OIL**
4. **DRAIN ENGINE COOLANT (See page CO-3)**



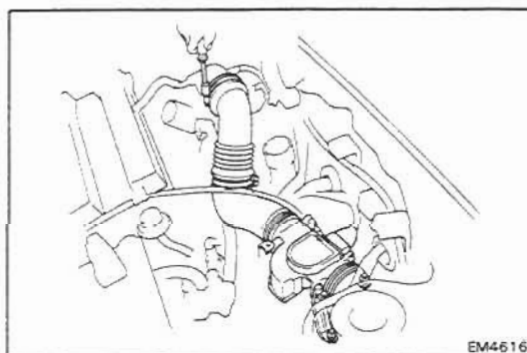
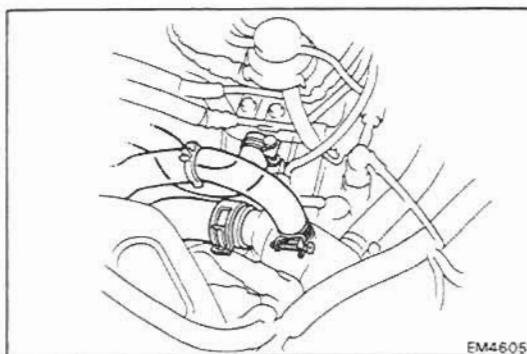
5. **REMOVE INTERCOOLER**
Disconnect the two hose clamps, and remove the four bolts and intercooler.
6. **REMOVE BATTERY**

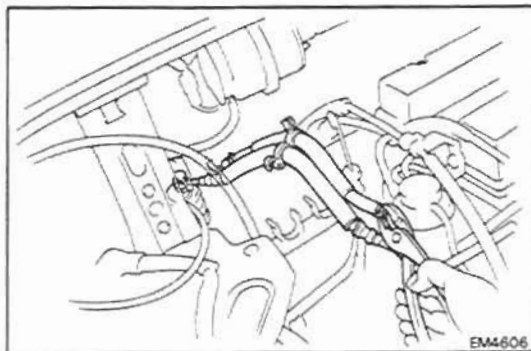
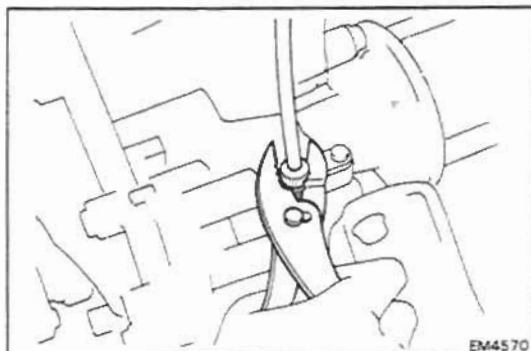
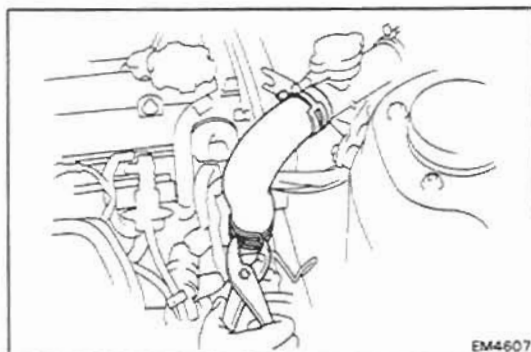
7. DISCONNECT FOLLOWING HOSES:

- (a) (w/ A/C)
A/C idle up vacuum hoses
- (b) Charcoal canister vacuum hose
- (c) (w/ Cruise control)
Cruise control vacuum hose
- (d) Air bleeder hose from water inlet housing

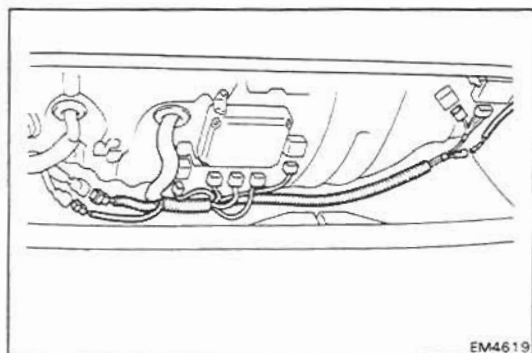
**8. (A/T vehicle)
DISCONNECT A/T THROTTLE CABLE****9. REMOVE AIR FLOW METER WITH NO. 3 AIR CLEANER HOSE**

- (a) Disconnect the EGR VSV connector.
- (b) Disconnect the air flow meter connector.
- (c) Remove the bolt and EGR VSV.
- (d) Loosen the two clamps, and remove the three bolts and air flow meter with No. 3 air cleaner hose.

**10. DISCONNECT ACCELERATOR CABLE****11. (w/ Cruise control)
DISCONNECT CRUISE CONTROL CABLE****12. DISCONNECT HEATER HOSES AND NO. 6 RADIATOR HOSE**

**13. DISCONNECT FUEL INLET AND RETURN HOSES****14. DISCONNECT SPEEDOMETER CABLE****15. DISCONNECT BRAKE BOOSTER VACUUM HOSE****16. REMOVE RADIATOR RESERVOIR TANK****17. DISCONNECT NO. 1 RADIATOR HOSE FROM WATER OUTLET HOUSING****18. DISCONNECT FOLLOWING CONNECTORS AND WIRES:**

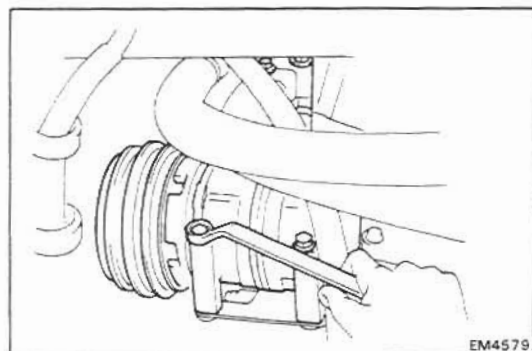
- (a) (A/T vehicle)
Two neutral start switch connectors
- (b) (A/T vehicle)
Solenoid connector
- (c) (A/T vehicle)
Speed sensor connector
- (d) Cold start injector time switch connector
- (e) (M/T vehicle)
Back-up light switch connector
- (f) Ground strap from water inlet housing
- (g) Two engine wire connectors
- (h) Check connector
- (i) High-tension cord from ignition coil
- (j) Igniter connector
- (k) Noise filter connector
- (l) Engine compartment cooling fan connector
- (m) Ground strap connector (between cylinder head and body)
- (n) (w/ A/C)
Two A/C compressor connectors
- (o) Solenoid resistor connector

**19. PULL OUT ENGINE WIRE HARNESS TO ENGINE COMPARTMENT**

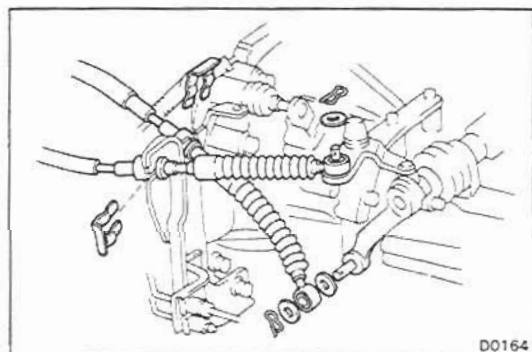
- (a) Remove the five clips and rear luggage compartment trim.
- (b) Disconnect the following connectors:
 - Circuit opening relay connector
 - ECU connectors
 - Cooling fan computer connector
 - Supercharger relay connector
 - IC regulator connector
 - Engine wire and engine main wire connectors
- (c) Pull out the wire harness to the engine compartment.

**20. (w/ A/C)
REMOVE A/C DRIVE BELT**

Loosen the idle pulley lock nut and adjusting bolt, and remove the drive belt.

**21. (w/ A/C)
DISCONNECT A/C COMPRESSOR**

- (a) Remove the four compressor mounting bolts.
- (b) Move the compressor aside and suspend it.

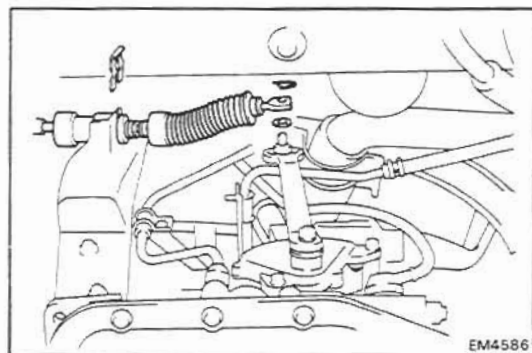
**22. DISCONNECT CONTROL CABLES**

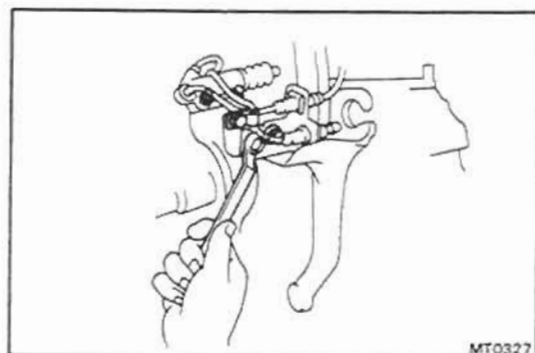
(M/T vehicle)

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

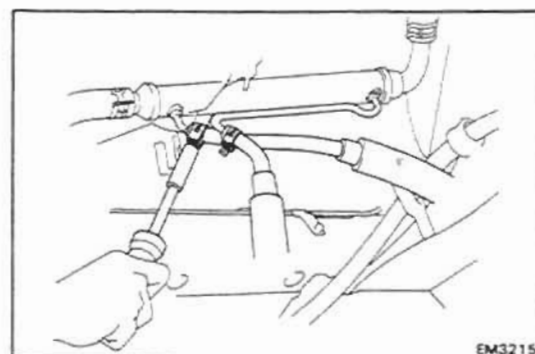
(A/T vehicle)

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

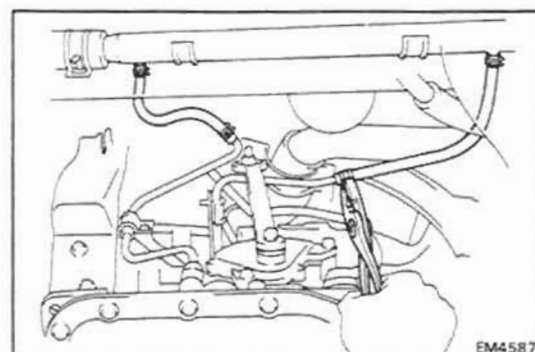




- 23. (M/T vehicle)
REMOVE CLUTCH RELEASE CYLINDER AND
CONTROL BRACKET**



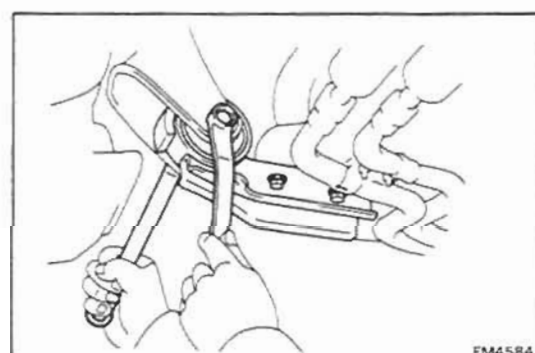
- 24. DISCONNECT ENGINE OIL COOLER HOSES**



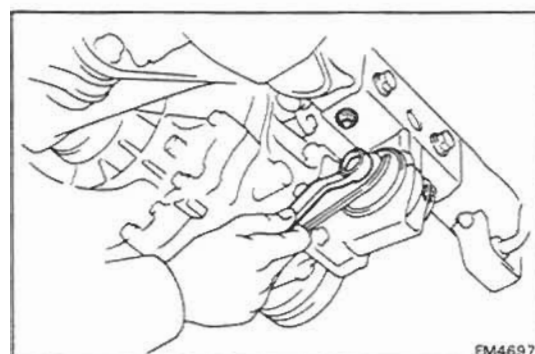
- 25. (A/T vehicle)
DISCONNECT A/T OIL COOLER HOSES**

- 26. REMOVE FRONT EXHAUST PIPE**
(See page LU-5)

- 27. REMOVE REAR DRIVE SHAFTS**
(See page RA-15)



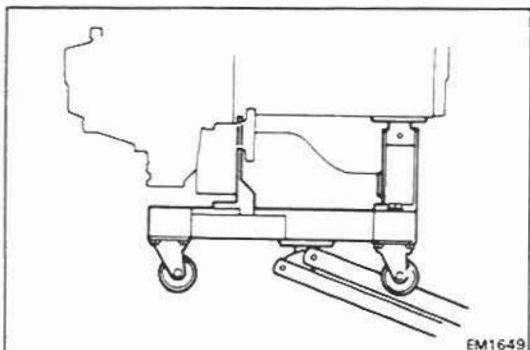
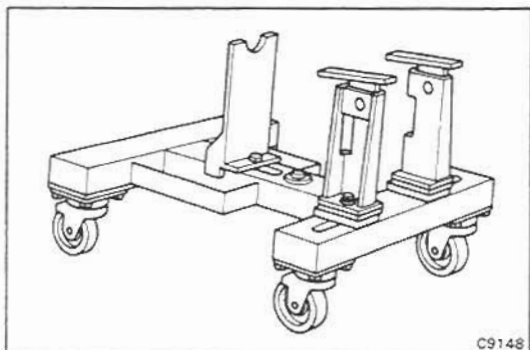
- 28. REMOVE FRONT MOUNTING INSULATOR**
- (a) Remove the mounting through bolt.
 - (b) Remove the two mount bolts and insulator.



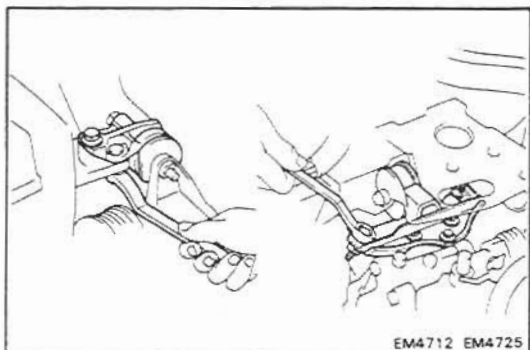
- 29. REMOVE REAR MOUNTING INSULATOR**
- (a) Remove the mounting through bolt.
 - (b) Remove the four mount bolts and insulator.

30. REMOVE ENGINE WITH TRANSAXLE

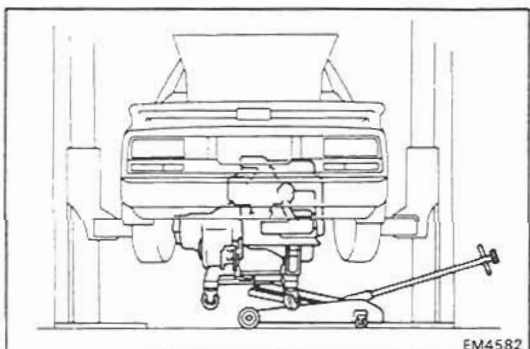
NOTE: Prepare an engine saddle in advance as shown.



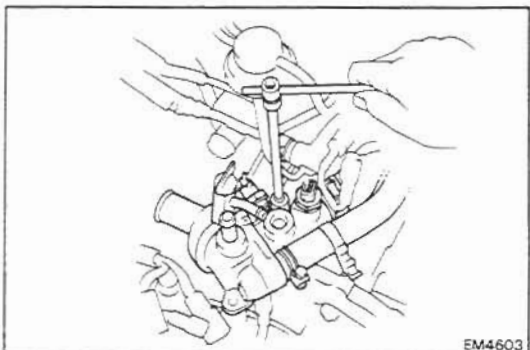
- (a) Lower the vehicle while supporting the engine with the engine saddle.



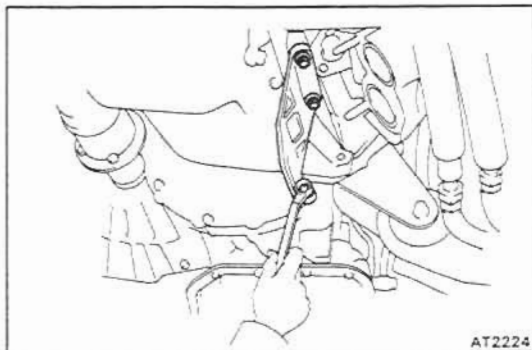
- (b) Remove the two bolts and nuts holding the RH mounting bracket and RH mounting insulator.
- (c) Remove the two (M/T) or three (A/T) bolts holding the LH mounting insulator and transaxle bracket.



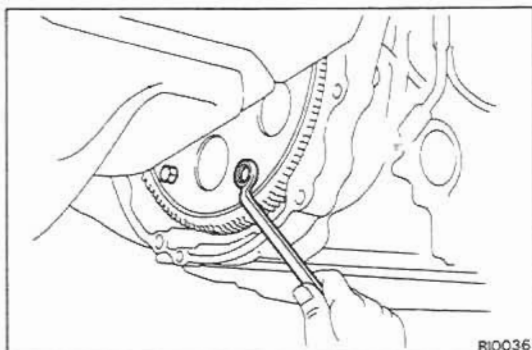
- (d) Slowly raise the vehicle.
- (e) Check that the engine is clear of all wiring, hoses and cables.

**31. REMOVE WATER INLET WITH HOUSING**

- (a) Disconnect the vacuum hoses from BVS.V.
- (b) Remove the water inlet with housing mounting nut.
- (c) Disconnect the two hoses from the No. 1 and No. 2 water by-pass pipes, and remove the water inlet housing.

**32. REMOVE FLYWHEEL HOUSING UNDER COVER**

- (a) (A/T vehicle)
Remove the three bolts and stiffener plate.
- (b) Remove the three bolts (M/T) or two bolts (A/T) and under cover.

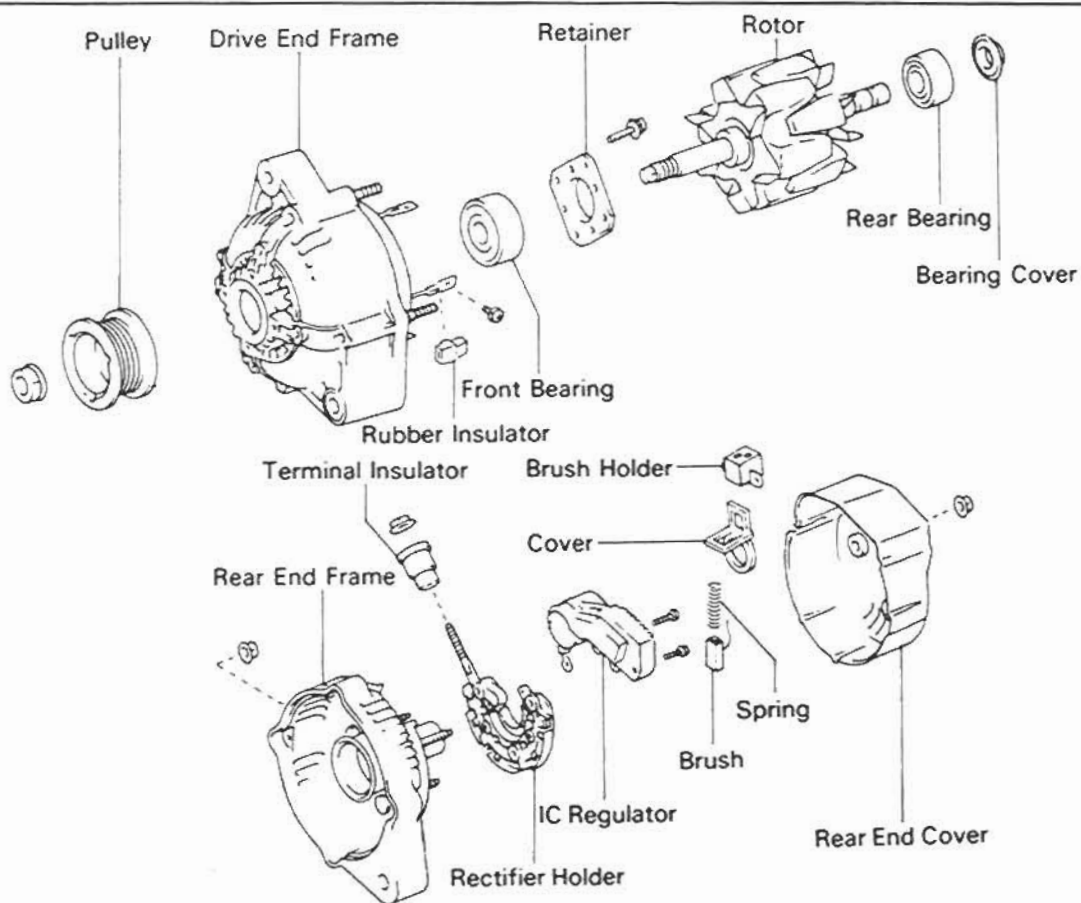
**33. (A/T vehicle)
REMOVE SIX TORQUE CONVERTER MOUNTING BOLTS**

Turn the crankshaft to gain access to each bolt. Remove the six bolts.

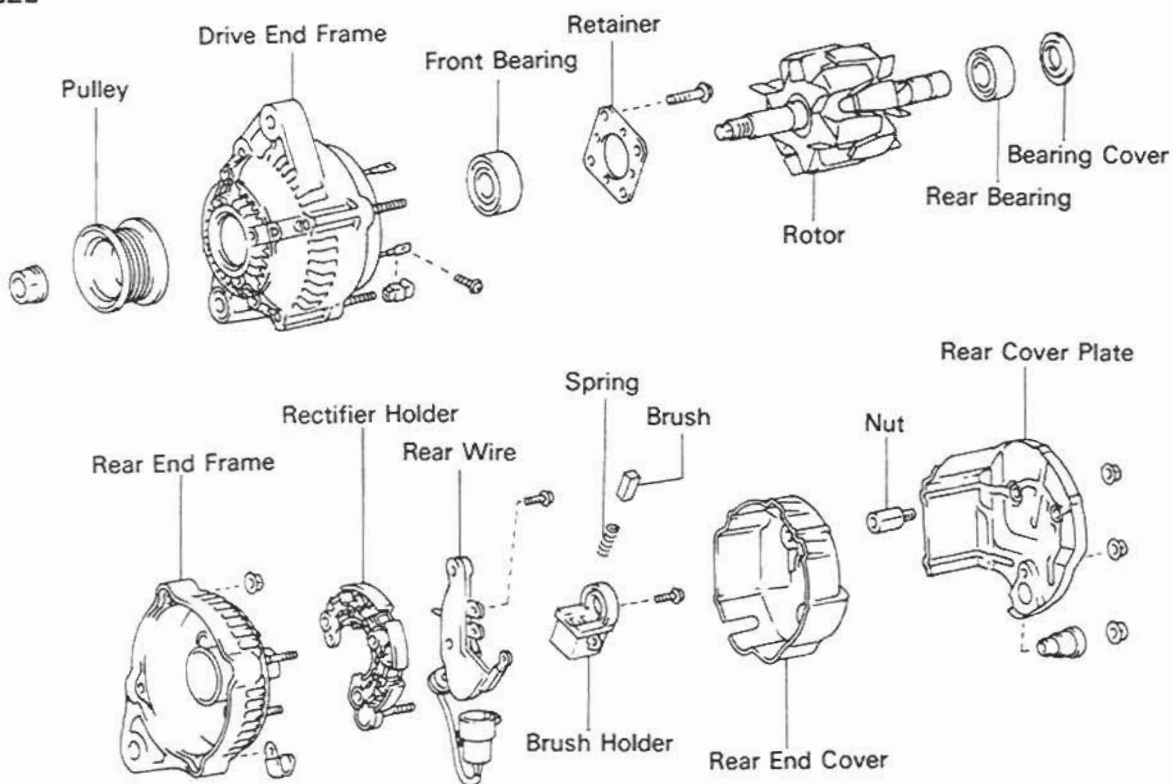
34. REMOVE STARTER (See page ST-3)**35. REMOVE TRANSAXLE FROM ENGINE**

ALTERNATOR COMPONENTS

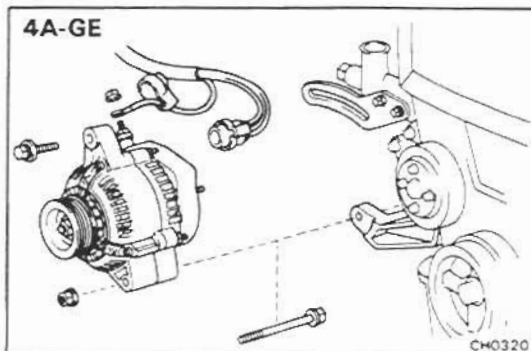
4A-GE



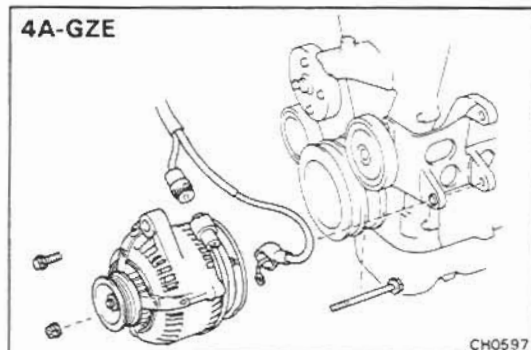
4A-GZE



4A-GE



4A-GZE



REMOVAL OF ALTERNATOR

1. **DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY**
2. **DISCONNECT WIRE FROM ALTERNATOR**
 - (a) Disconnect the connector from the alternator.
 - (b) Remove the nut and wire from the alternator.

3. REMOVE ALTERNATOR DRIVE BELT

Loosen the alternator pivot nut, bolt and adjusting lock bolts, and remove the drive belt.

4. REMOVE ALTERNATOR

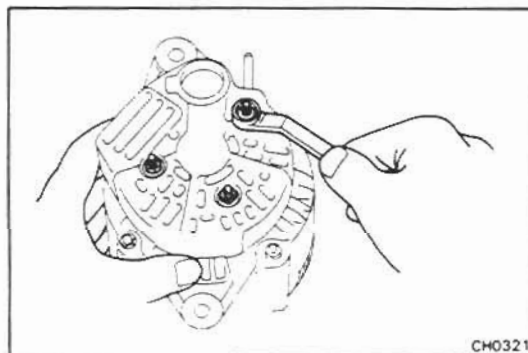
- (a) Remove the pivot nut, bolt and adjusting lock bolts.
- (b) Remove the alternator.

DISASSEMBLY OF ALTERNATOR

(See page CH-6)

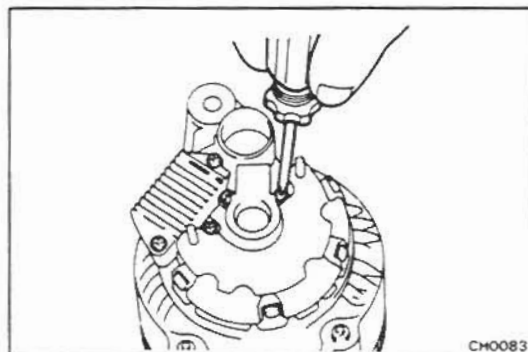
1. (4A-GZE) REAR COVER PLATE

- (a) Remove the nut and terminal insulator.
- (b) Remove the three nuts and cover plate.
- (c) Remove the two bolts.



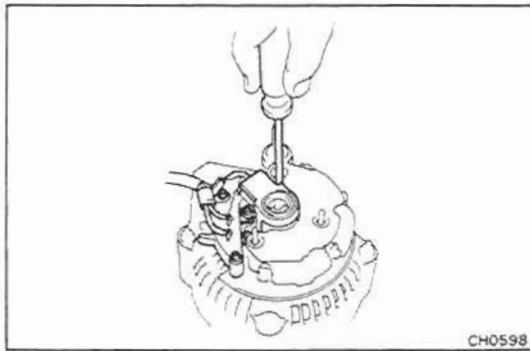
2. REMOVE REAR END COVER

- (a) (4A-GE)
Remove the nut and terminal insulator.
- (b) Remove the three nuts and end cover.



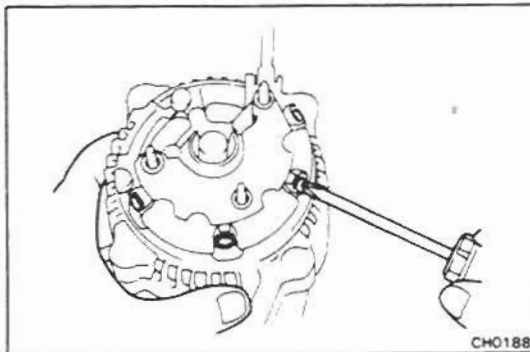
3. REMOVE BRUSH HOLDER AND IC REGULATOR (4A-GE) OR READ WIRE (4A-GZE)

- (4A-GE)
Remove the five screws, brush holder and IC regulator.

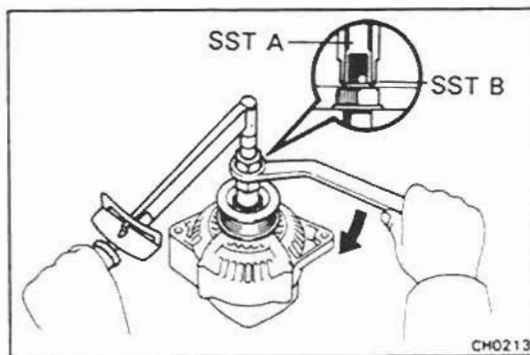


(4A-GZE)

Remove the five screws, brush holder and read wire.

**4. REMOVE RECTIFIER HOLDER**

Remove the four screws, rectifier holder and rubber insulators.

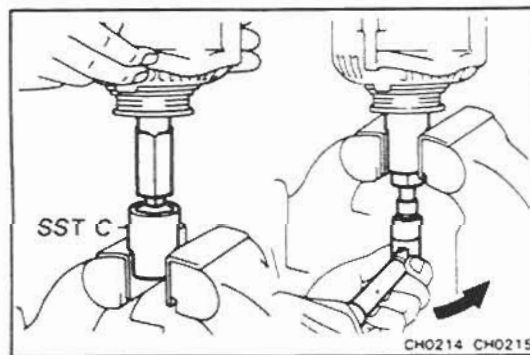
**5. REMOVE PULLEY**

- (a) Hold SST A with a torque wrench and tighten SST B clockwise to the specified torque.

SST 09820-63010

Torque: 400 kg-cm (29 ft-lb, 39 N·m)

- (b) Confirm that SST A is secured to the pulley shaft.



- (c) As shown in the figure, grip SST C in a vise and then install the alternator to SST C.

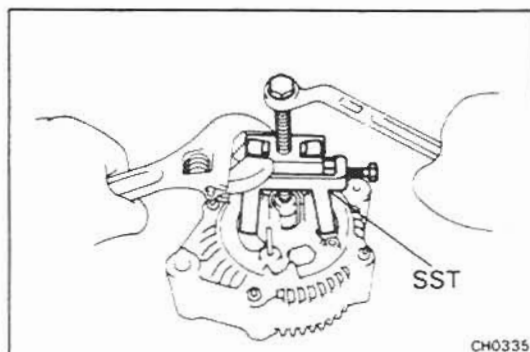
- (d) To loosen the pulley nut, turn SST A in the direction shown in the figure.

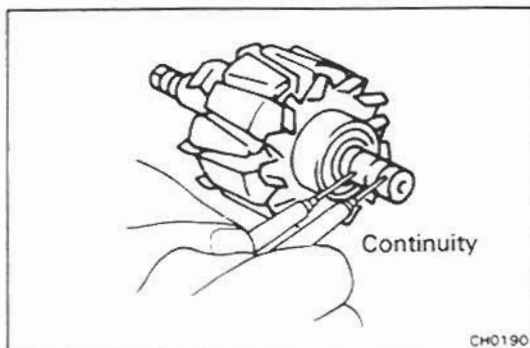
CAUTION: To prevent damage to the rotor shaft, do not loosen the pulley nut more the one-half of a turn.

- (e) Remove the alternator from SST C.
(f) Turn SST B and remove all SSTs.
(g) Remove the pulley nut and the pulley.

6. REMOVE REAR END FRAME

- (a) Remove the four nuts.
(b) Using SST, remove the rear end frame.
SST 09286-46011

7. REMOVE ROTOR FROM DRIVE END FRAME



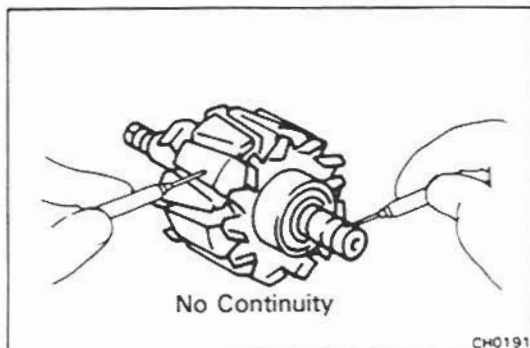
INSPECTION AND REPAIR OF ALTERNATOR Rotor

1. INSPECT ROTOR FOR OPEN CIRCUIT

Using an ohmmeter, check for continuity between the slip rings.

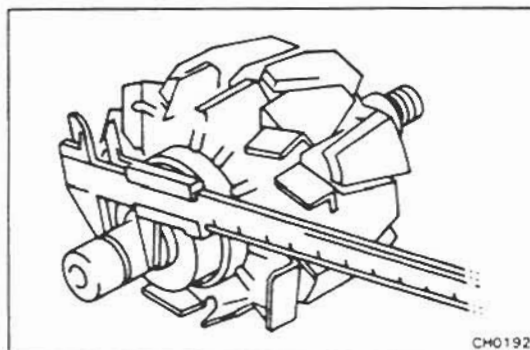
Standard resistance: Less than 3Ω

If there is no continuity, replace the rotor.



2. INSPECT ROTOR FOR GROUND

Using an ohmmeter, check that there is no continuity between the slip ring and rotor. If there is continuity, replace the rotor.



3. INSPECT SLIP RINGS

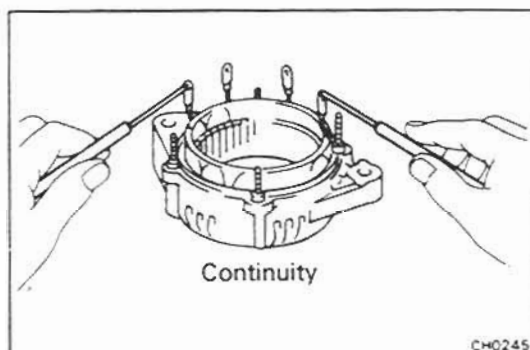
(a) Check that the slip rings are not rough or scored. If rough or scored, replace the rotor.

(b) Using calipers, measure the slip ring diameter.

Standard diameter: 14.2 – 14.4 mm
(0.559 – 0.567 in.)

Minimum diameter: 12.8 mm (0.504 in.)

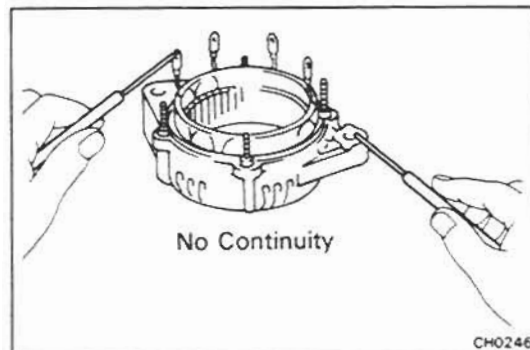
If the diameter of the slip ring is less than the minimum, replace the rotor.



Stator

1. INSPECT STATOR FOR OPEN CIRCUIT

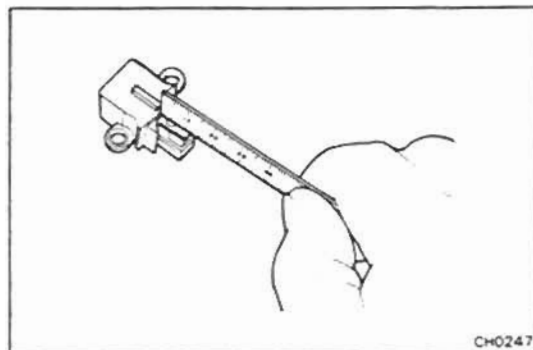
Using an ohmmeter, check all leads for continuity. If there is no continuity, replace the drive end frame assembly.



2. INSPECT THAT STATOR IS NOT GROUNDED

Using an ohmmeter, check that there is no continuity between the coil leads and drive end frame.

If there is continuity, replace the drive end frame assembly.



Brush and Brush Holder

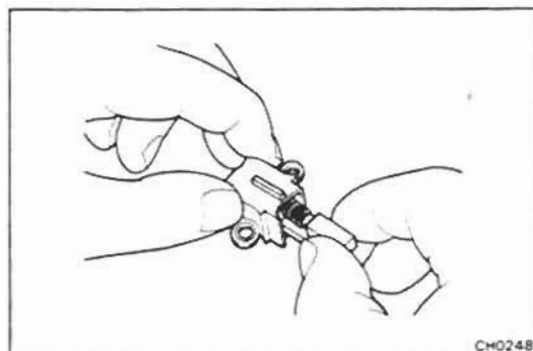
1. MEASURE EXPOSED BRUSH LENGTH

Using a scale, measure the exposed brush length.

Standard exposed length: 10.5 mm (0.413 in.)

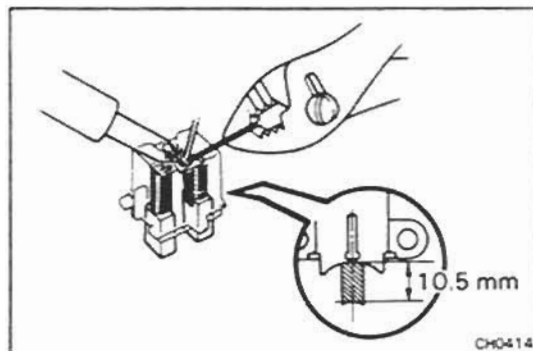
Minimum exposed length: 1.5 mm (0.059 in.)

If the brush length is less than the minimum, replace the brush.



2. IF NECESSARY, REPLACE BRUSH

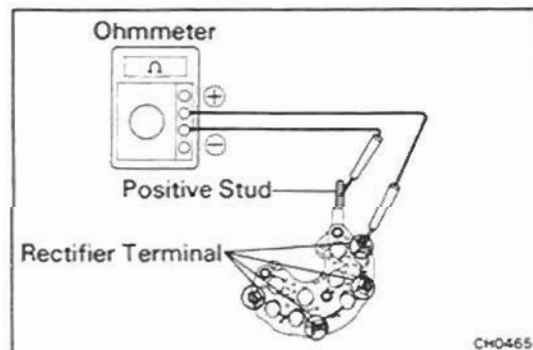
- Unsolder and remove the brush and the spring.
- Put the brush wire through the spring and insert the brush holder.



- Solder the wire to the brush holder as shown.

Standard exposed length: 10.5 mm (0.413 in.)

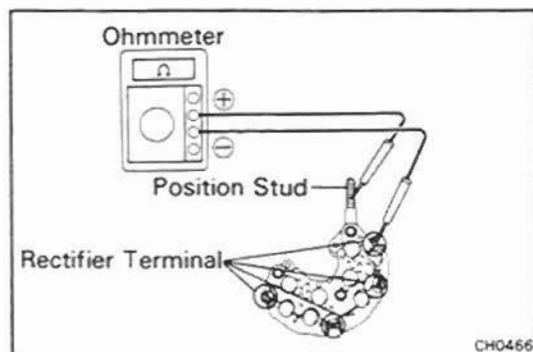
- Check that the brush moves smoothly in the brush holder.
- Cut off the excess wire.



Rectifier

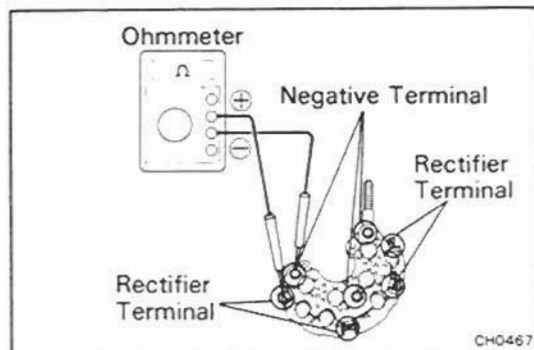
1. INSPECT POSITIVE SIDE RECTIFIER

- Using an ohmmeter, connect one tester probe to the positive stud and the other to each rectifier terminal.



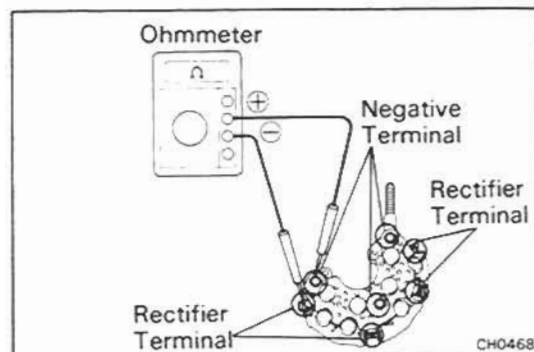
- Reverse the polarity of the tester probes and repeat step a.
- Check that one shows continuity and the other shows no continuity.

If not, replace the rectifier holder.



2. INSPECT NEGATIVE SIDE RECTIFIER

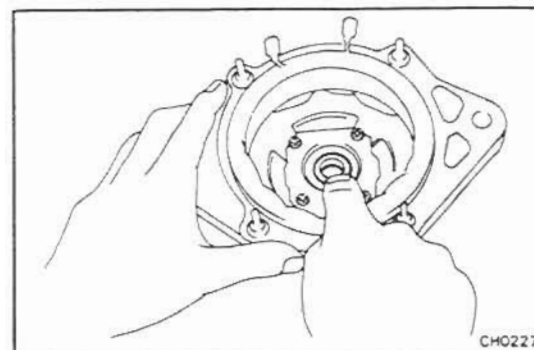
- (a) Connect one tester probe to each rectifier terminal and the other to each rectifier negative terminal.



- (b) Reverse the polarity of the tester probes.

- (c) Check that one shows continuity and the other shows no continuity.

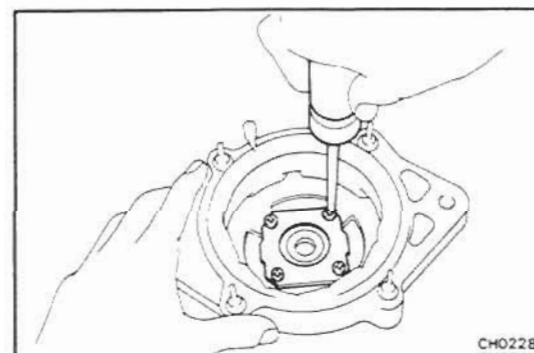
If not, replace the rectifier holder.



Bearings

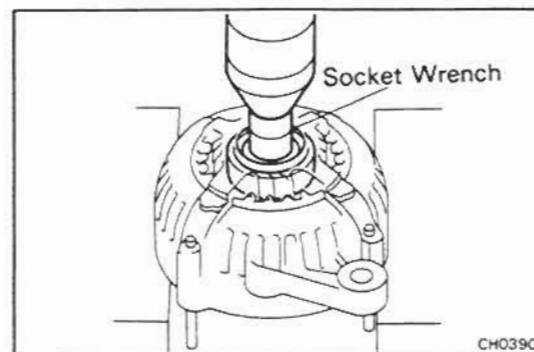
1. INSPECT FRONT BEARING

Check that the bearing is not rough or worn.

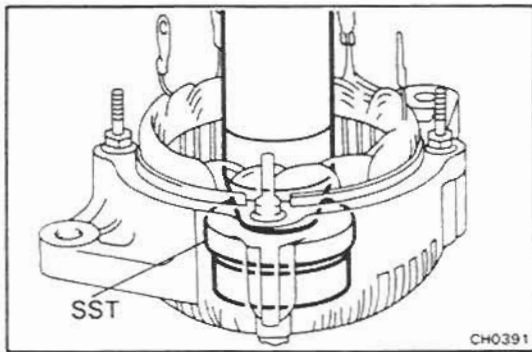


2. IF NECESSARY, REPLACE FRONT BEARING

- (a) Remove the four screws and bearing retainer.



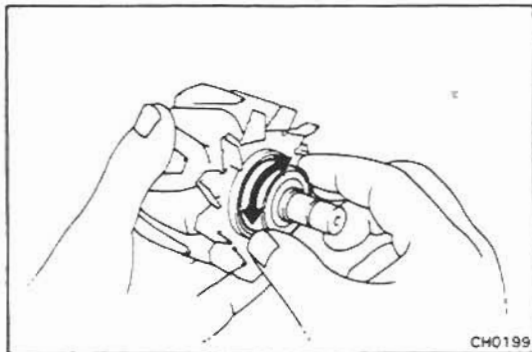
- (b) Using a press and socket wrench, press out the front bearing.



- (c) Using SST and a press, press the front bearing into the drive end frame.

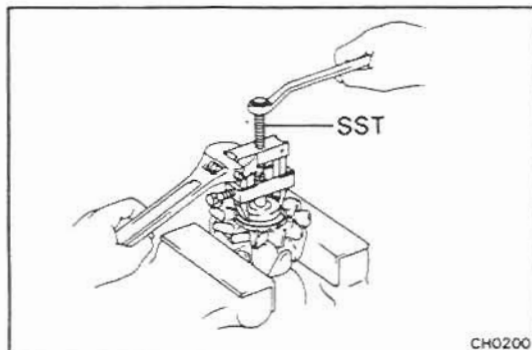
SST 09608-20012 (09608-00030)

- (d) Install the bearing retainer with the four screws.



3. INSPECT REAR BEARING

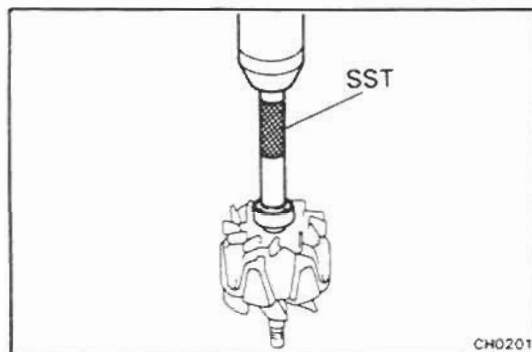
Check that the bearing is not rough or worn.



4. IN NECESSARY, REPLACE REAR BEARING

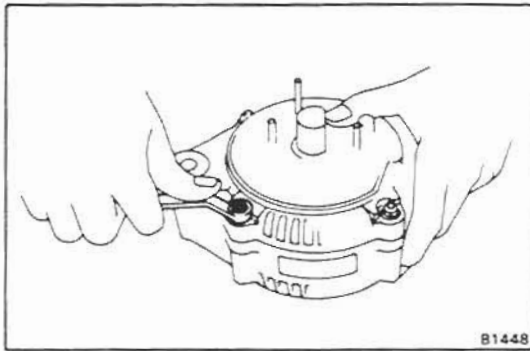
- (a) Using SST, remove the rear bearing cover and cover.
SST 09820-00021

CAUTION: Be careful not to damage the fan.



- (b) Using SST and a press, press in a new bearing and the bearing cover.

SST 09285-76010



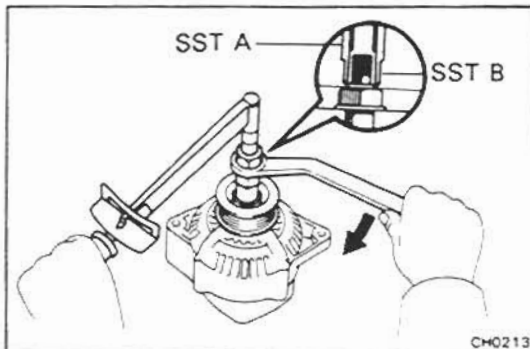
ASSEMBLY OF ALTERNATOR

(See page CH-6)

1. INSTALL ROTOR TO DRIVE END FRAME

2. INSTALL REAR END FRAME

- Using a plastic hammer, lightly tap the rear end frame on the drive end frame.
- Install the four nuts.

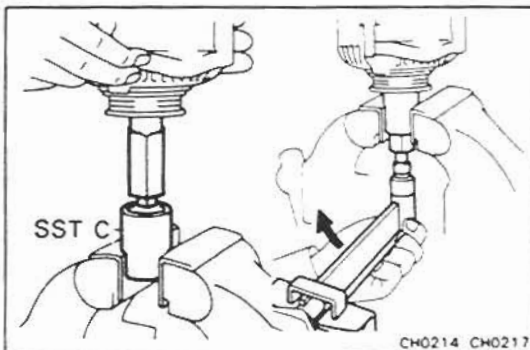


3. INSTALL PULLEY

- Install the pulley to the rotor shaft by tightening the pulley nut by hand.
- Hold SST A with a torque wrench and tighten SST B clockwise to the specified torque.

SST 09820-63010

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



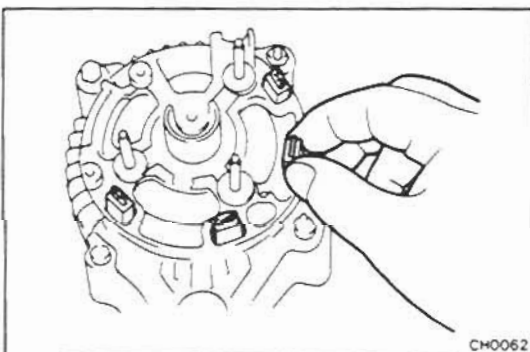
- Confirm that SST A is secured to the pulley shaft.
- As shown in the figure, grip SST C in a vise and then install the alternator to SST C.
- To torque the pulley nut turn SST A in the direction shown in the figure.

Torque: 1,125 kg-cm (81 ft-lb, 110 N-m)

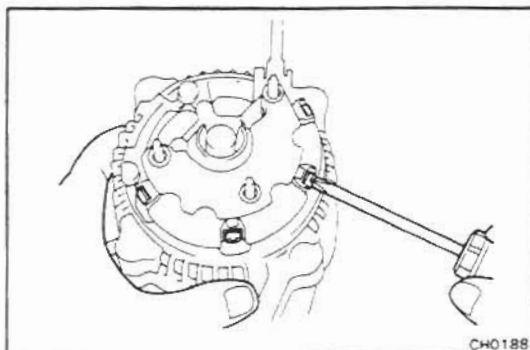
- Turn SST B and remove all SSTs.

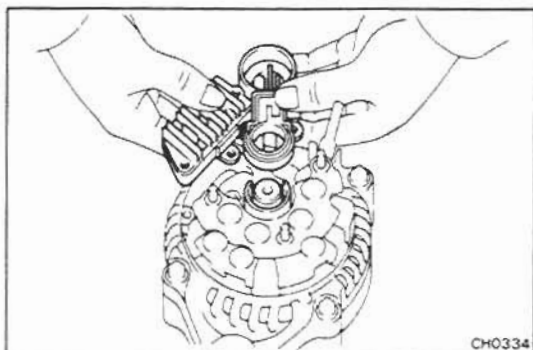
4. INSTALL RECTIFIER HOLDER

- Install the four rubber insulators on the lead wires.



- Install the rectifier with four screws.

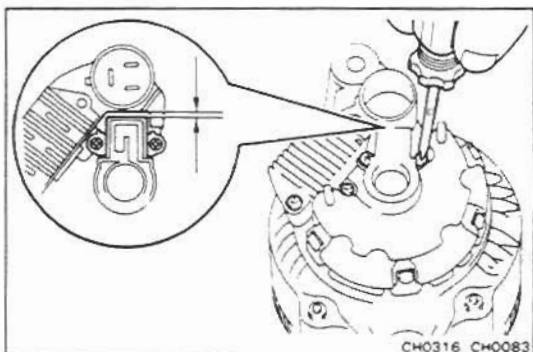




5. **(4A-GE)**
INSTALL BRUSH HOLDER AND IC REGULATOR

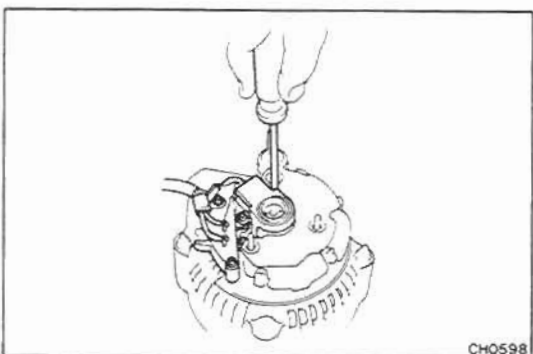
- (a) Place the brush holder cover to the brush holder.
- (b) Install the IC regulator and brush holder to the rear end frame horizontally as shown in the figure.

NOTE: Make sure the brush holder's cover doesn't slip to one side during installation.



- (c) Install and tighten the three screws.

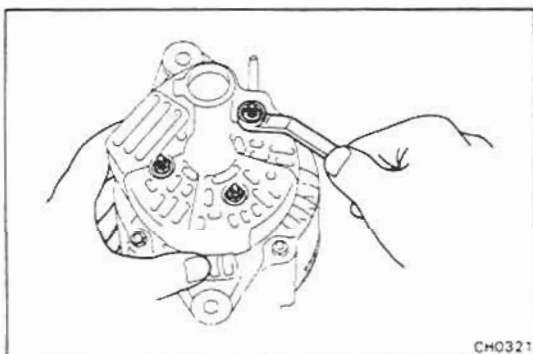
NOTE: Make sure the gap between the brush holder and connector is at least 1 mm (0.04 in.).



6. **(4A-GZE)**
INSTALL BRUSH HOLDER AND

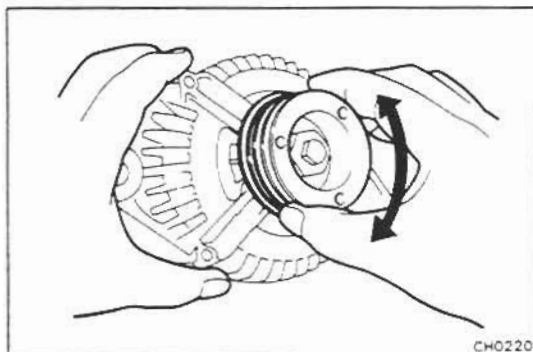
- (a) Place the brush holder cover to the brush holder.
- (b) Install the read wire and brush holder to the rear end frame horizontally as shown in the figure.

NOTE: Make sure the brush holder's cover doesn't slip to one side during installation.



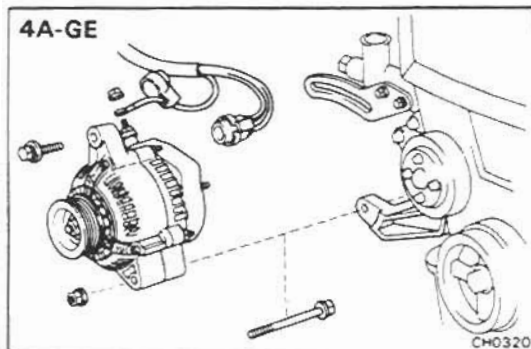
7. **INSTALL REAR END COVER**

- (a) Install the end cover with the three nuts.
- (b) Install the terminal insulator with the nut.



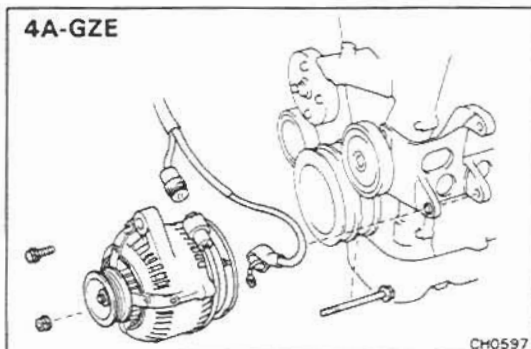
8. **MAKE SURE ROTOR ROTATES SMOOTHLY**

4A-GE



CH0320

4A-GZE



CH0597

INSTALLATION OF ALTERNATOR

1. INSTALL ALTERNATOR

Mount the alternator on the engine bracket with the pivot nut, bolt and adjusting lock bolts.

Do not tighten the bolts.

2. CONNECT WIRING TO ALTERNATOR

- Connect the wire to the alternator and install the nut.
- Connect the connector to the alternator.

3. CONNECT NEGATIVE CABLE TO BATTERY

4. INSTALL ALTERNATOR DRIVE BELT

- Install the drive belt.
- Using a belt tension gauge, check the drive belt tension.

Belt tension gauge:

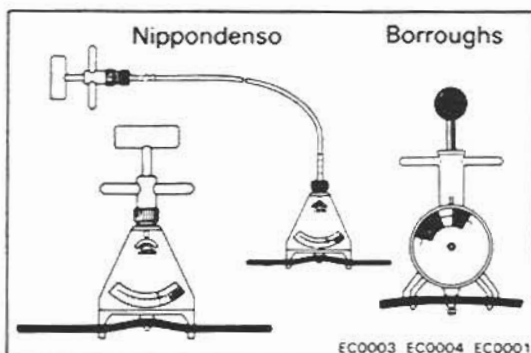
Nippondenso	BTG-20 (95506-00020) or
Borroughs	No. BT-33-73F

Drive belt tension: **New belt** 175 ± 5 lb
Used belt 115 ± 20 lb

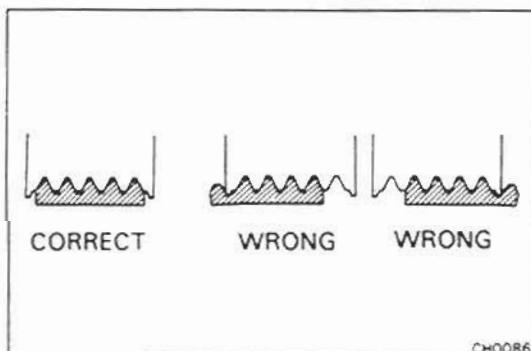
NOTE:

- “New belt” refers to a belt which has been used less than 5 minutes on a running engine.
- “Used belt” refers to a belt which has been used on a running engine for 5 minutes or more.
- After installing the drive belt, check that it fits, properly in the ribbed grooves.

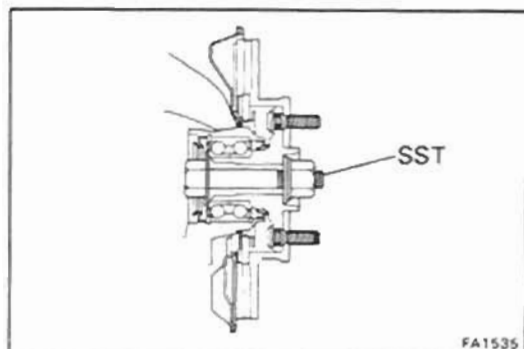
- Tighten the pivot bolt.



EC0003 EC0004 EC0001



CH0086



CAUTION: The hub bearing could be damaged if it is subjected to the vehicle weight, such as when moving the vehicle with the drive shaft removed. Therefore, if it is absolutely necessary to place the vehicle weight on the hub bearing, first support it with SST.

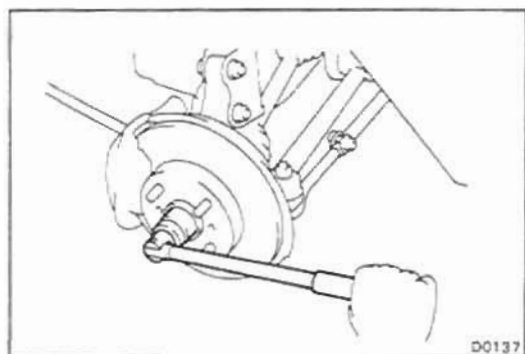
SST 09608-16041 (09608-02020, 09608-02040)

REMOVAL OF REAR DRIVE SHAFT

(See page RA-14)

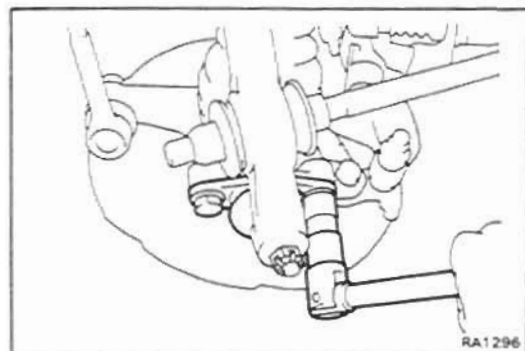
1. REMOVE COTTER PIN, BEARING LOCK NUT CAP AND BEARING LOCK NUT

- Remove the cotter pin and lock nut cap.
- Set the parking brake and remove the nut.



2. DISCONNECT LOWER ARM FROM REAR AXLE CARRIER

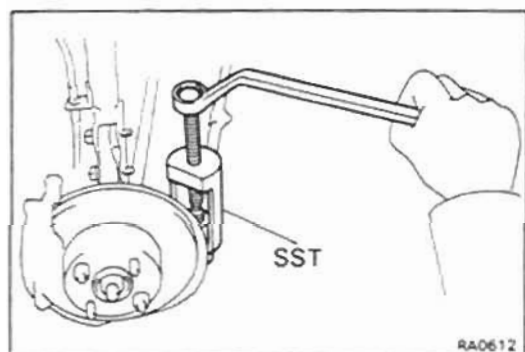
- Remove the two bolts holding the ball joint to the rear axle carrier.
- Disconnect the lower arm.



3. DISCONNECT SUSPENSION ARM

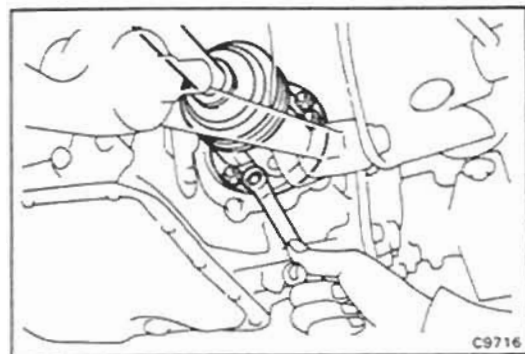
- Remove the cotter pin and nut.
- Using SST, disconnect the suspension arm from the rear axle carrier.

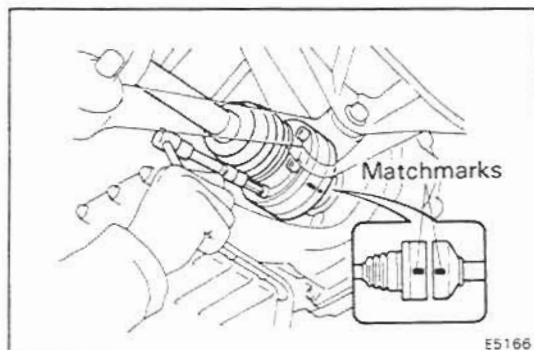
SST 09610-20012



4. DISCONNECT REAR DRIVE SHAFT FROM DIFFERENTIAL SIDE GEAR SHAFT (4A-GE)

- Remove the six nuts while depressing the brake pedal.



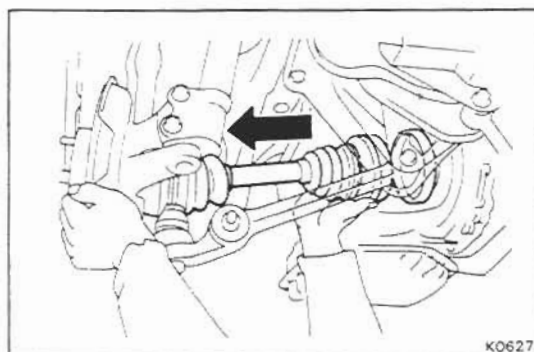
**(4A-GZE)**

- (a) Place matchmarks on the drive shaft and side gear shaft.

CAUTION: Do not punch the marks.

- (b) Using SST, remove the six hexagon bolts and the three washers while depressing the brake pedal.

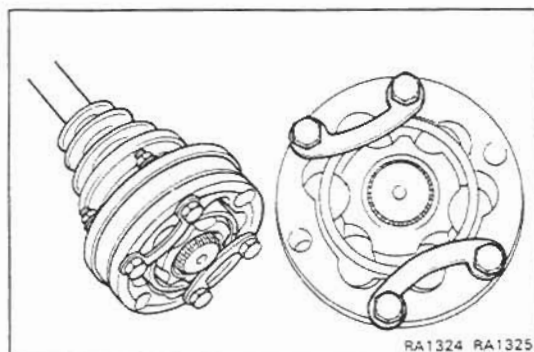
SST 09043-88010



- (c) Push the rear axle carrier towards the outside of the vehicle, and separate the drive shaft from the side gear shaft.

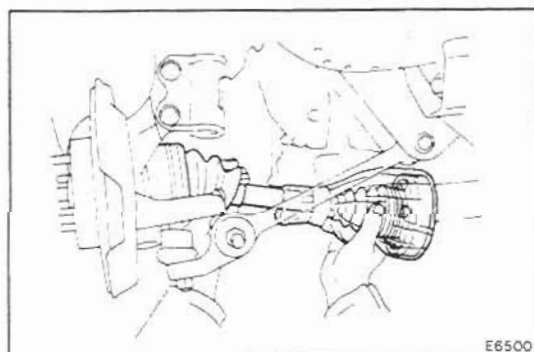
CAUTION: When moving the drive shaft, do not compress the boot.

- (d) Remove the joint end cover gasket from the drive shaft.



- (e) Use bolts, nuts and washers to keep the inboard joint together.

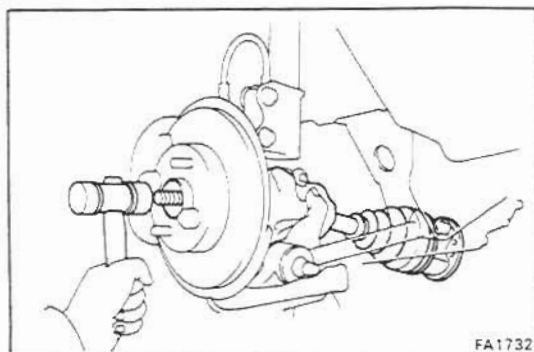
CAUTION: Tighten the bolts by hand to avoid scratching the flange surface.



- (f) Cover the inboard joint and side gear shaft vinyl bags to keep out dust and sand.

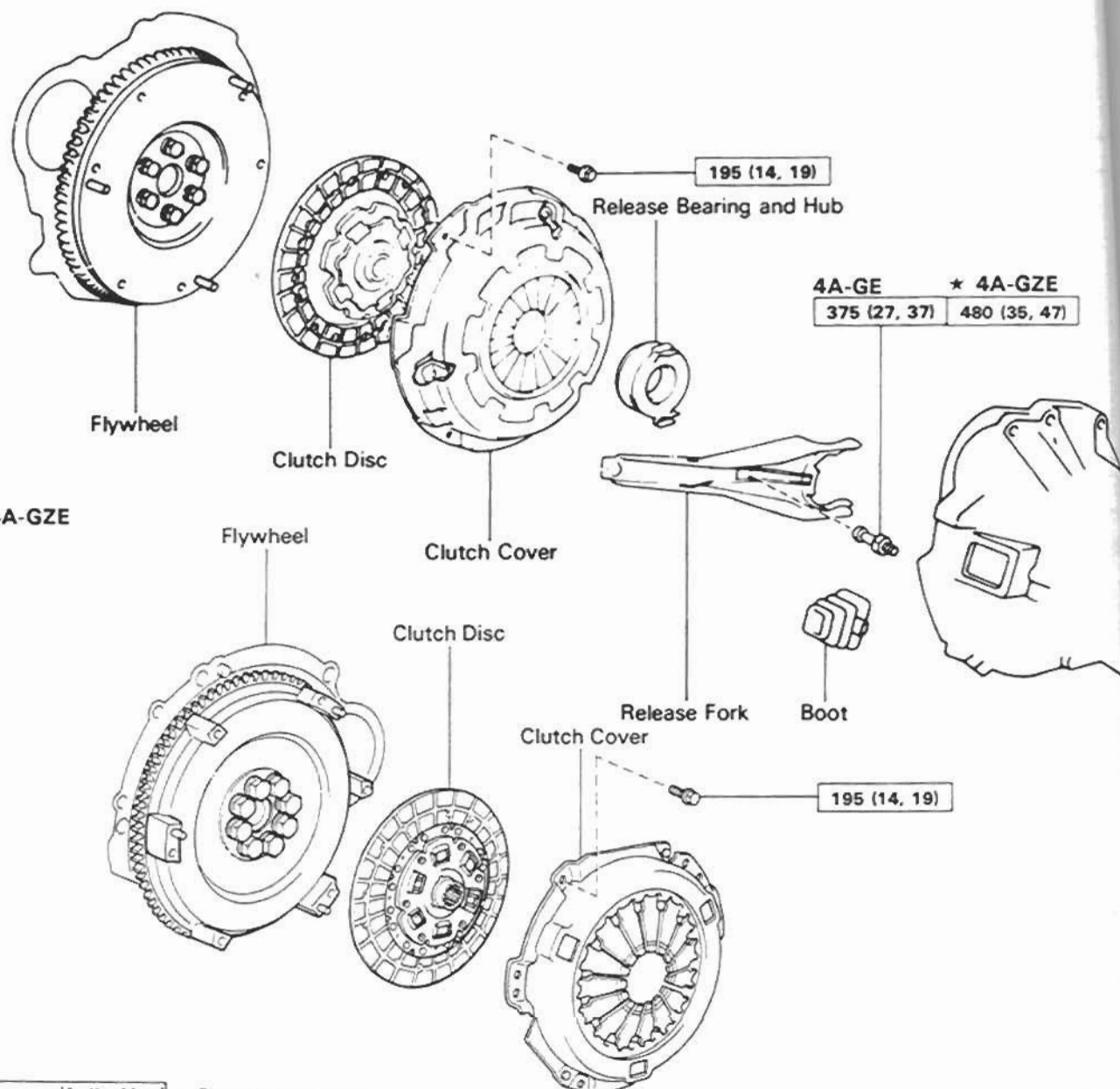
5. REMOVE REAR DRIVE SHAFT

Using a plastic hammer, tap out the drive shaft from the axle hub.



CLUTCH UNIT COMPONENTS

4A-GE



4A-GZE

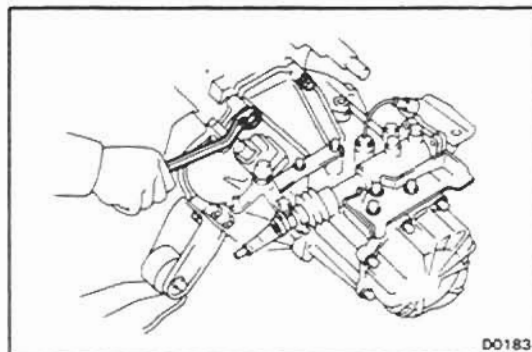
kg-cm (ft-lb, N-m) : Specified torque

★ Precoated part

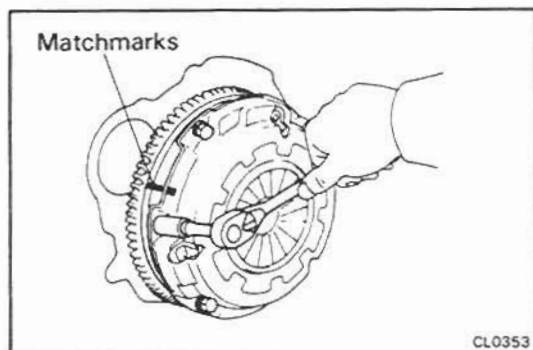
C7987
CLO378

REMOVAL OF CLUTCH UNIT

1. REMOVE TRANSAXLE FROM ENGINE
(See page MT-3)

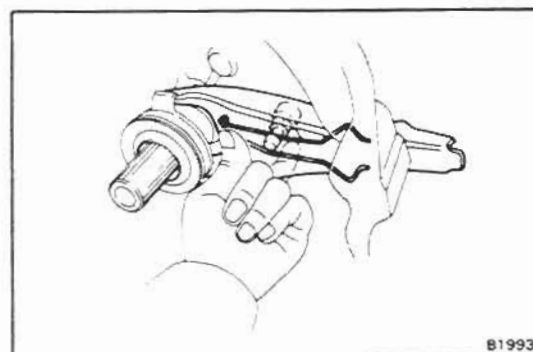


D0183



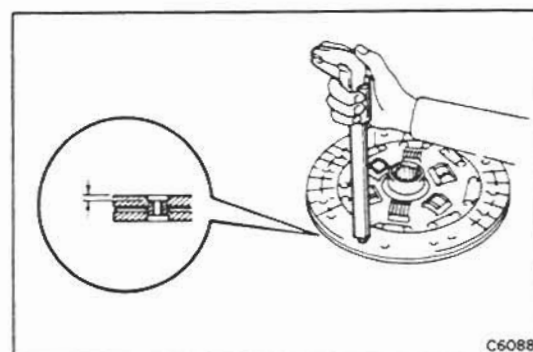
2. REMOVE CLUTCH COVER AND DISC

- Place the matchmarks on the clutch cover and flywheel.
- Loosen each set bolt one turn at a time until spring tension is released.
- Remove the set bolts, and pull off the clutch assembly.



3. REMOVE RELEASE BEARING, FORK AND BOOT FROM TRANSAXLE

- Remove the bearing assembly together with the fork, and then separate them.
- Remove the boot.



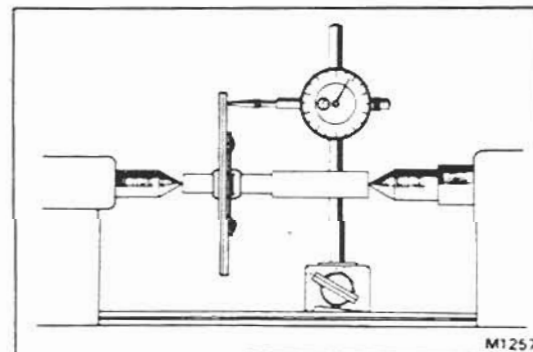
INSPECTION AND REPAIR OF CLUTCH PARTS

1. INSPECT CLUTCH DISC FOR WEAR OR DAMAGE

Using calipers, measure the rivet head depth.

Minimum rivet depth: 0.3 mm (0.012 in.)

If a problem is found, replace the clutch disc.

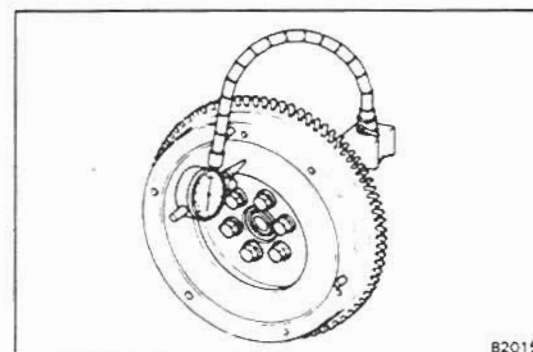


2. INSPECT CLUTCH DISC RUNOUT

Using a dial indicator, check the disc runout.

Maximum runout: 0.8 mm (0.031 in.)

If runout is excessive, replace the clutch disc.

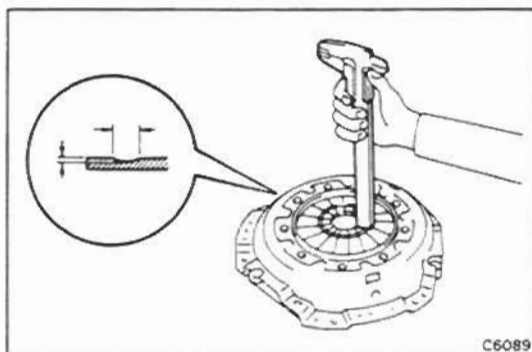


3. INSPECT FLYWHEEL RUNOUT

Using a dial indicator, check the flywheel runout.

Maximum runout: 0.1 mm (0.004 in.)

If runout is excessive, replace the flywheel.



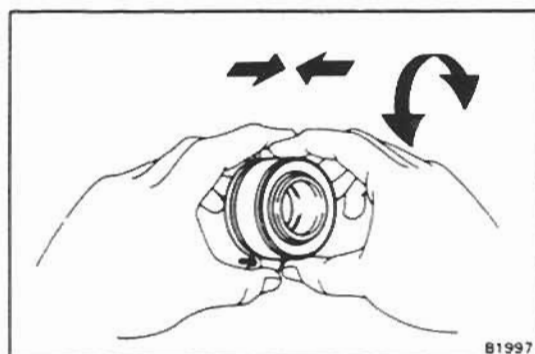
4. INSPECT DIAPHRAGM SPRING FOR WEAR

Using calipers, measure the diaphragm spring for depth and width of wear.

Maximum: Depth 0.6 mm (0.024 in.)

Width 5.0 mm (0.197 in.)

If necessary, replace the clutch cover.

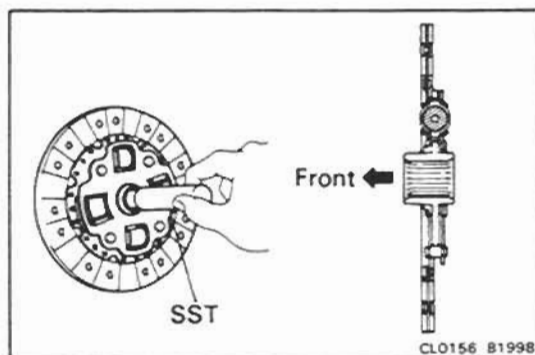


5. INSPECT RELEASE BEARING

Turn the bearing by hand while applying force in the axial direction.

If the bearing sticks or has much resistance, replace the release bearing together with the hub.

NOTE: The bearing is permanently lubricated and requires no cleaning or lubrication.



INSTALLATION OF CLUTCH UNIT

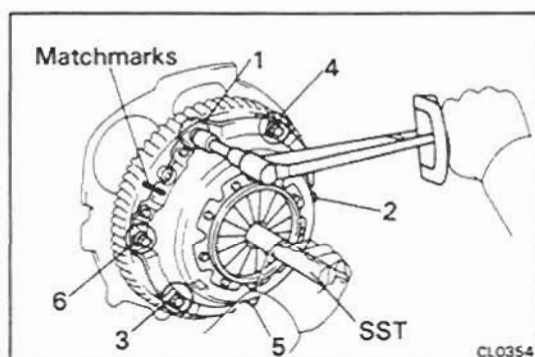
(See page CL-12)

1. INSTALL CLUTCH DISC AND COVER ON FLYWHEEL

- (a) Insert the SST in the clutch disc, and then set them and the cover in position.

SST 09301-32010 (4A-GE)

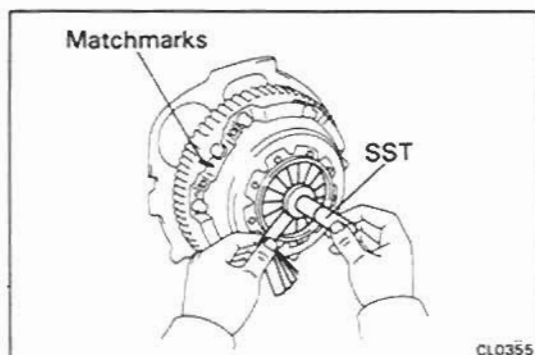
09301-17010 (4A-GZE)



- (b) Align the matchmarks and position the clutch cover in place. Tighten the bolts evenly and gradually while pushing the SST. Make several passes around the cover until it is snug. Torque the bolts.

Torque: 195 kg-cm (14 ft-lb, 19 N·m)

NOTE: Tighten the topmost bolt from the three near the knock pins first.



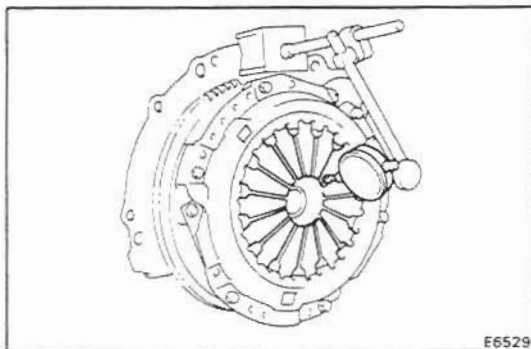
2. CHECK DIAPHRAGM SPRING TIP ALIGNMENT

(4A-GE)

Using SST, check the diaphragm spring tip alignment.

SST 09302-20021

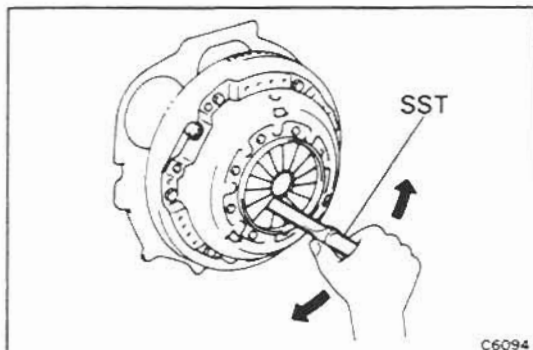
Maximum non-alignment: 0.5 mm (0.020 in.)



(4A-GZE)

Using a dial indicator and measuring point, check the diaphragm spring tip alignment.

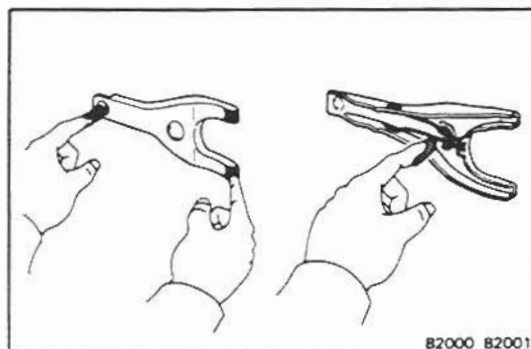
Maximum non-alignment: 0.5 mm (0.020 in.)



3. IF NECESSARY, ADJUST SPRINGS

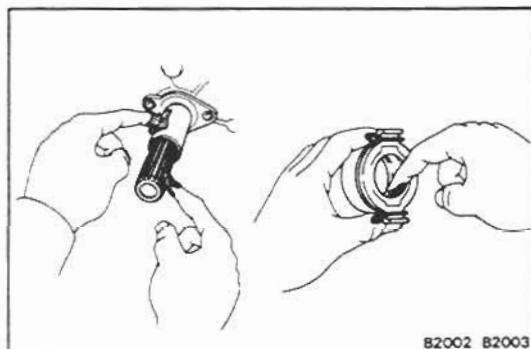
Using SST, adjust the diaphragm spring tip alignment.

SST 09333-00013

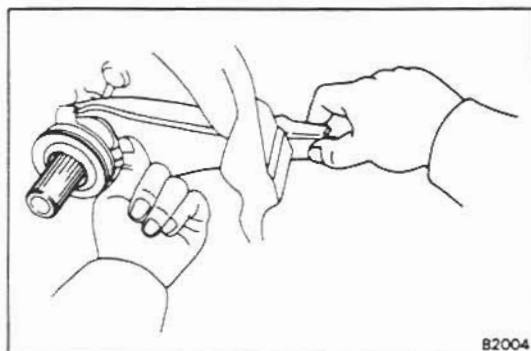


4. APPLY MOLYBDENUM DISULPHIDE LITHIUM BASE GREASE (NLGI NO. 2) TO FOLLOWING PARTS:

- (a) Release fork and hub contact point
- (b) Release fork and push contact point
- (c) Release fork pivot point



- (d) Clutch disc spline
- (e) Release bearing hub inside groove



5. INSTALL RELEASE BEARING, FORK AND BOOT FROM TRANSAXLE

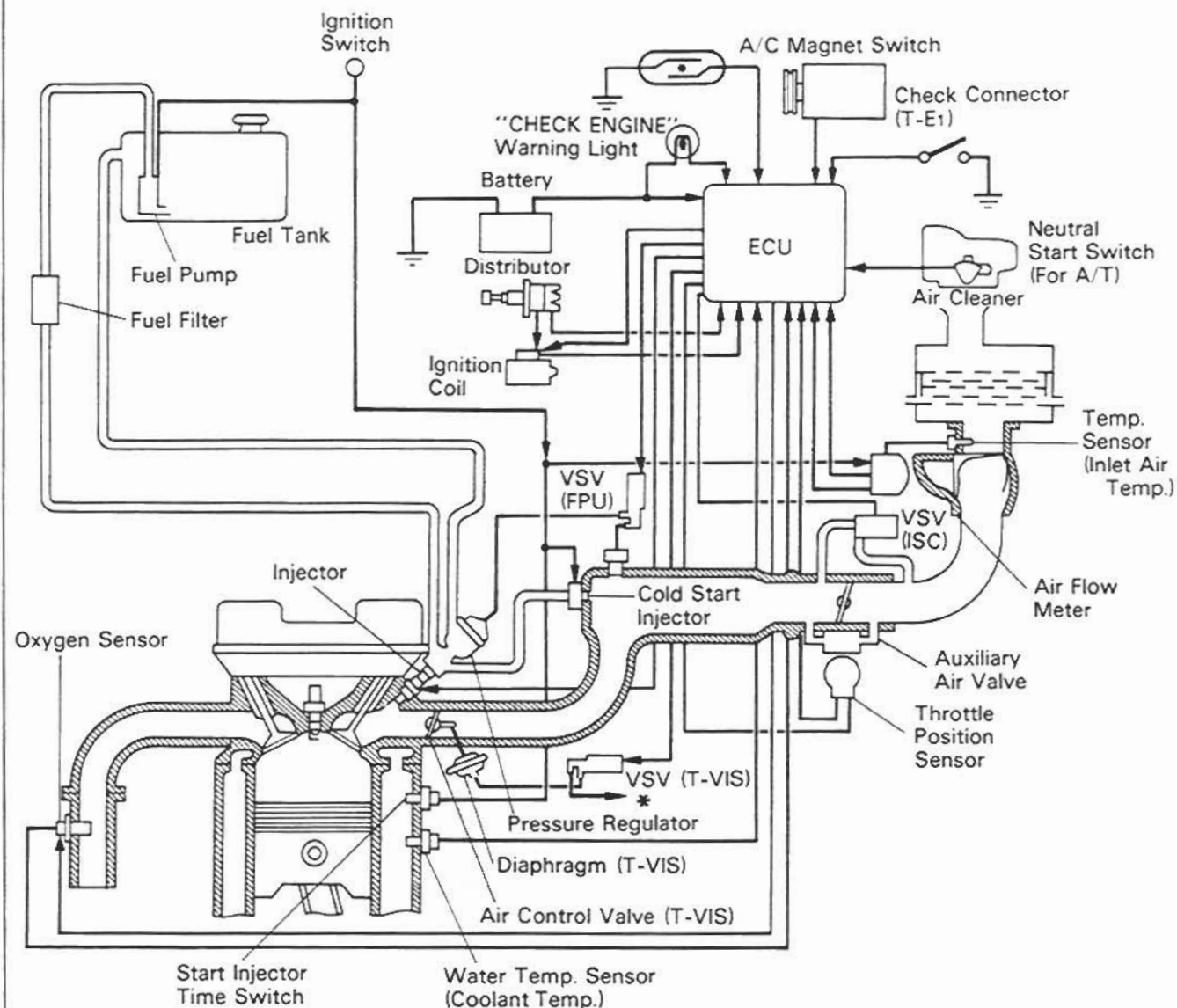
- (a) Install the bearing assembly to the fork, and then install them to the transaxle.
- (b) Install the boot.

6. INSTALL TRANSAXLE TO ENGINE

(See page MT-37)

DESCRIPTION

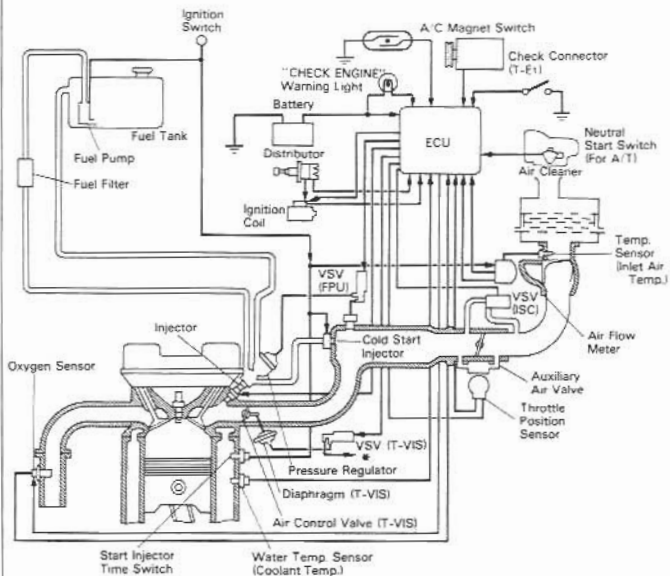
4A-GE



* : To Vacuum Reservoir Tank

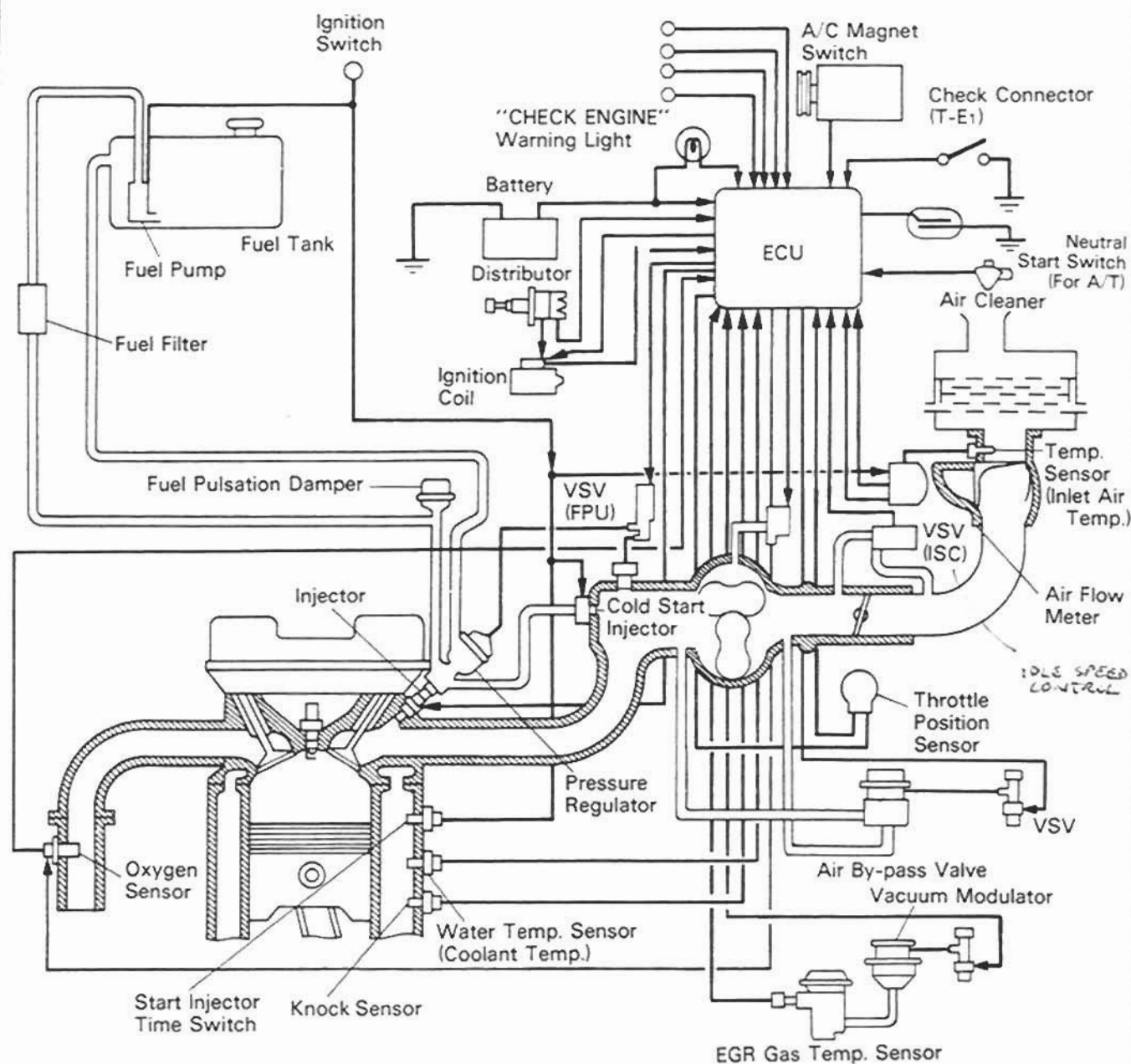
DESCRIPTION

4A-GE



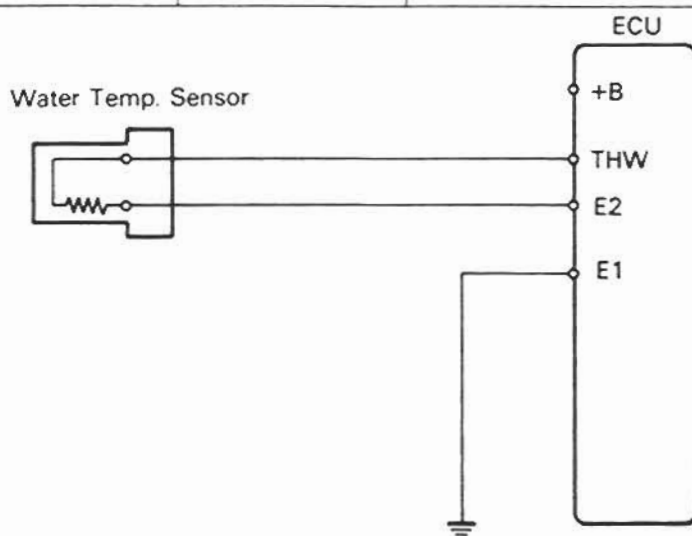
* To Vacuum Reservoir Tank

4A-GZE

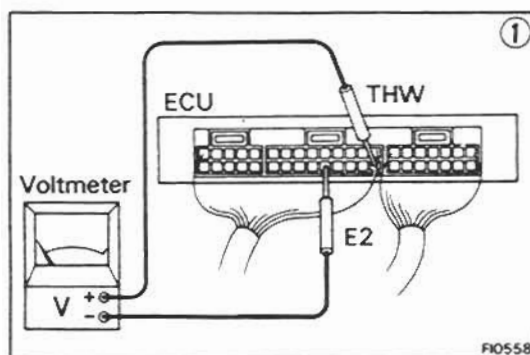


* : To Vacuum Reservoir Tank

No.	Terminals	Trouble	Condition	STD Voltage
8	THW — E2	No voltage	Ignition switch ON Coolant temperature 80°C (176°F)	0.1 — 1.0 V



FI0487



① There is no specified voltage between ECU terminals THW and E2. (IG S/W ON)

② Check that there is voltage between ECU terminal +B1 or +B and body ground. (IG S/W ON)

OK

NO

③ Check water temp. sensor.

BAD

OK

Replace water temp. sensor.

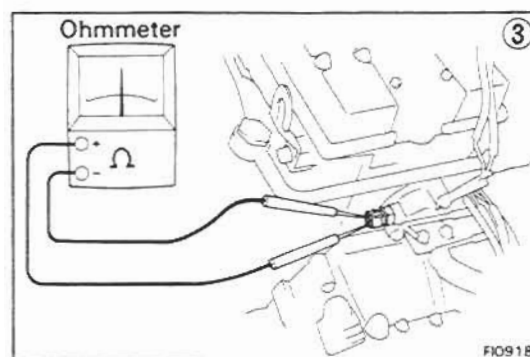
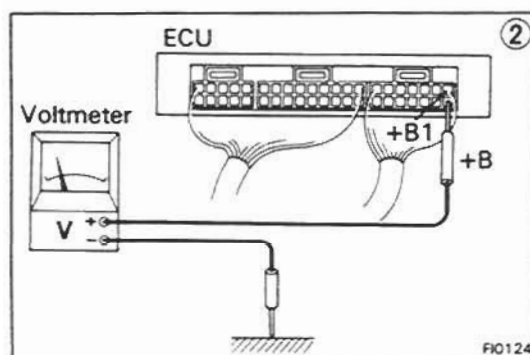
Check wiring between ECU and air temp. sensor.

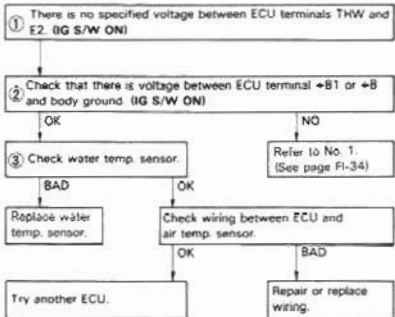
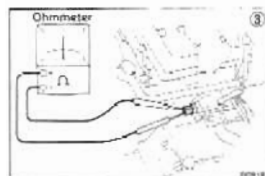
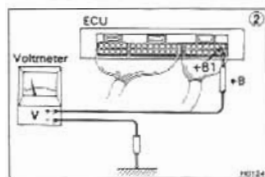
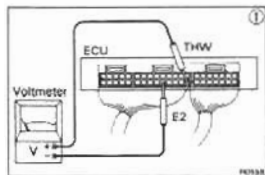
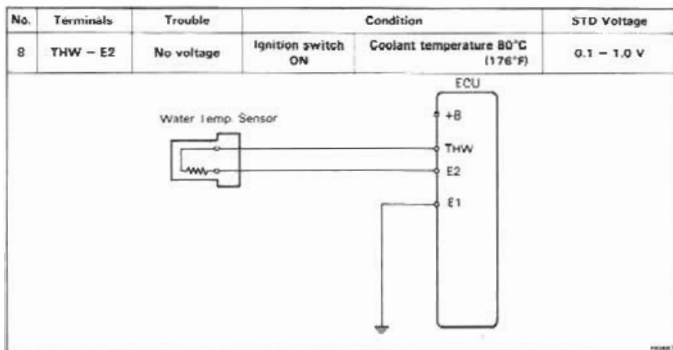
OK

BAD

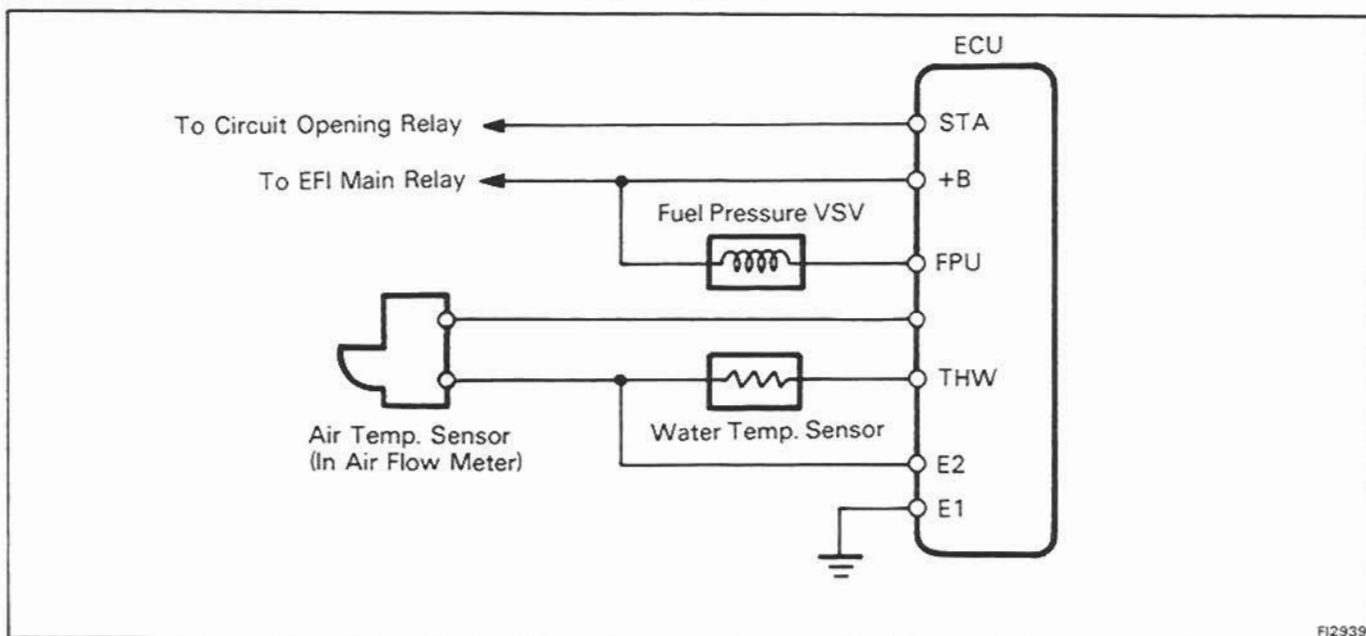
Try another ECU.

Repair or replace wiring.





High Temperature Line Pressure Up System



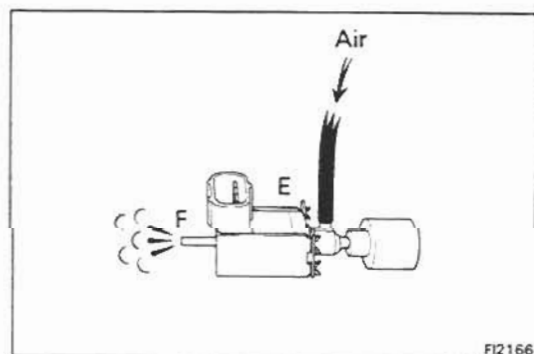
FI2939

INSPECTION OF HIGH TEMPERATURE LINE PRESSURE UP SYSTEM

1. INSPECT WATER TEMPERATURE SENSOR
(See page FI-116)
2. INSPECT AIR TEMPERATURE SENSOR
(See page FI-94)

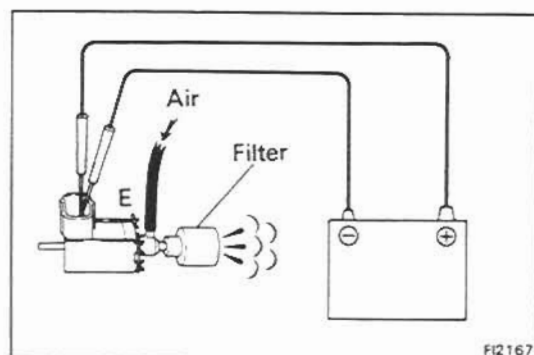
3. INSPECT FUEL PRESSURE VSV

- (a) Check that air does not flow pipe E to pipe F.



FI2166

- (b) Apply battery voltage across the terminals.
- (c) Check that air flows from pipe E to pipe F.
If operation is not as specified, replace the VSV.

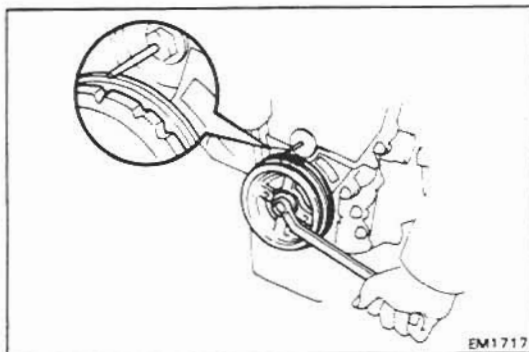


FI2167

ADJUSTMENT OF VALVE CLEARANCE

NOTE: Adjust the valve clearance while the engine is cold.

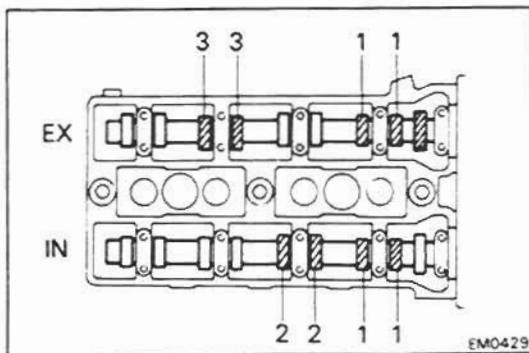
1. REMOVE CYLINDER HEAD COVERS
(See steps 19 to 22 on page EM-18)



2. SET NO.1 CYLINDER TO TDC/COMPRESSION

- (a) Turn the crankshaft pulley and align its groove with the timing mark "O" of the timing pointer.
- (b) Check that the valve lifters on the No.1 cylinder are loose and valve lifters on the No.4 are tight.

If not, turn the crankshaft one revolution (360°) and align the mark as above.



3. ADJUST VALVE CLEARANCE

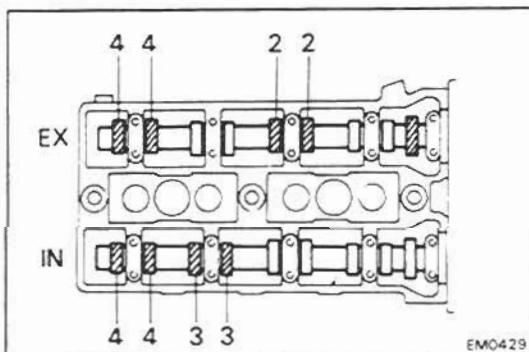
- (a) Check only those valves indicated as shown.
 - Using a feeler gauge, measure the clearance between the valve lifter and camshaft.
 - Record the valve clearance measurements which are out of specification. They will be used later to determine the required replacement adjusting shim.

Valve clearance (Cold):

Intake 0.15 – 0.25 mm (0.006 – 0.010 in.)

Exhaust 0.20 – 0.30 mm (0.008 – 0.012 in.)

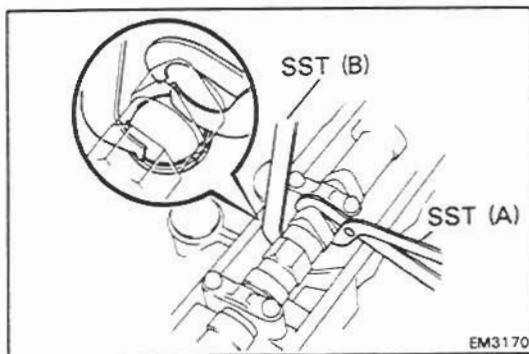
- (b) Turn the crankshaft one revolution (360°) and align the mark as above. (See procedure step 2)
- (c) Check only the valves indicated as shown. Measure the valve clearance. (See procedure step (a)).

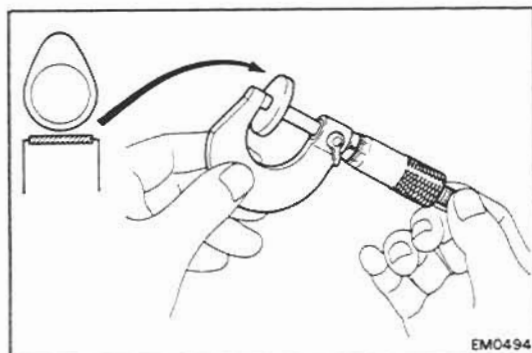
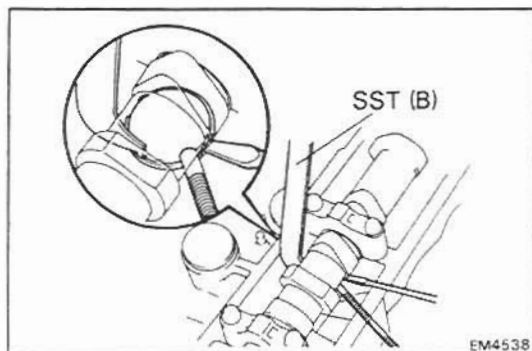


- (d) Remove the adjusting shim.
 - Turn the crankshaft to position the cam lobe of the camshaft on the adjusting valve upward.
 - Using SST (A), press down the valve lifter and place SST (B) between the camshaft and valve lifter. Remove SST (A).

SST 09248-55010

NOTE: Before pressing down the valve lifter, position the notch toward the spark plug.





- Remove the adjusting shim with a small screwdriver and magnetic finger.

(e) Determine the replacement adjusting shim size following Formula or Charts:

- Using a micrometer, measure the thickness of the shim which was removed.
- Calculate the thickness of a new shim so the valve clearance comes within specified value.

T Thickness of used shim

A Measured valve clearance

N Thickness of new shim

Intake $N = T + (A - 0.20 \text{ mm (0.008 in.)})$

Exhaust $N = T + (A - 0.25 \text{ mm (0.010 in.)})$

- Select a new shim with a thickness as close as possible to the calculated values.

NOTE: Shims are available in seventeen sizes of 0.05 mm (0.0020 in.), from 2.50 mm (0.0984 in.) to 3.30 mm (0.1299 in.).

(f) Install a new adjusting shim.

- Place a new adjusting shim on the valve lifter.
- Using SST (A), press down the valve lifter and remove SST (B).

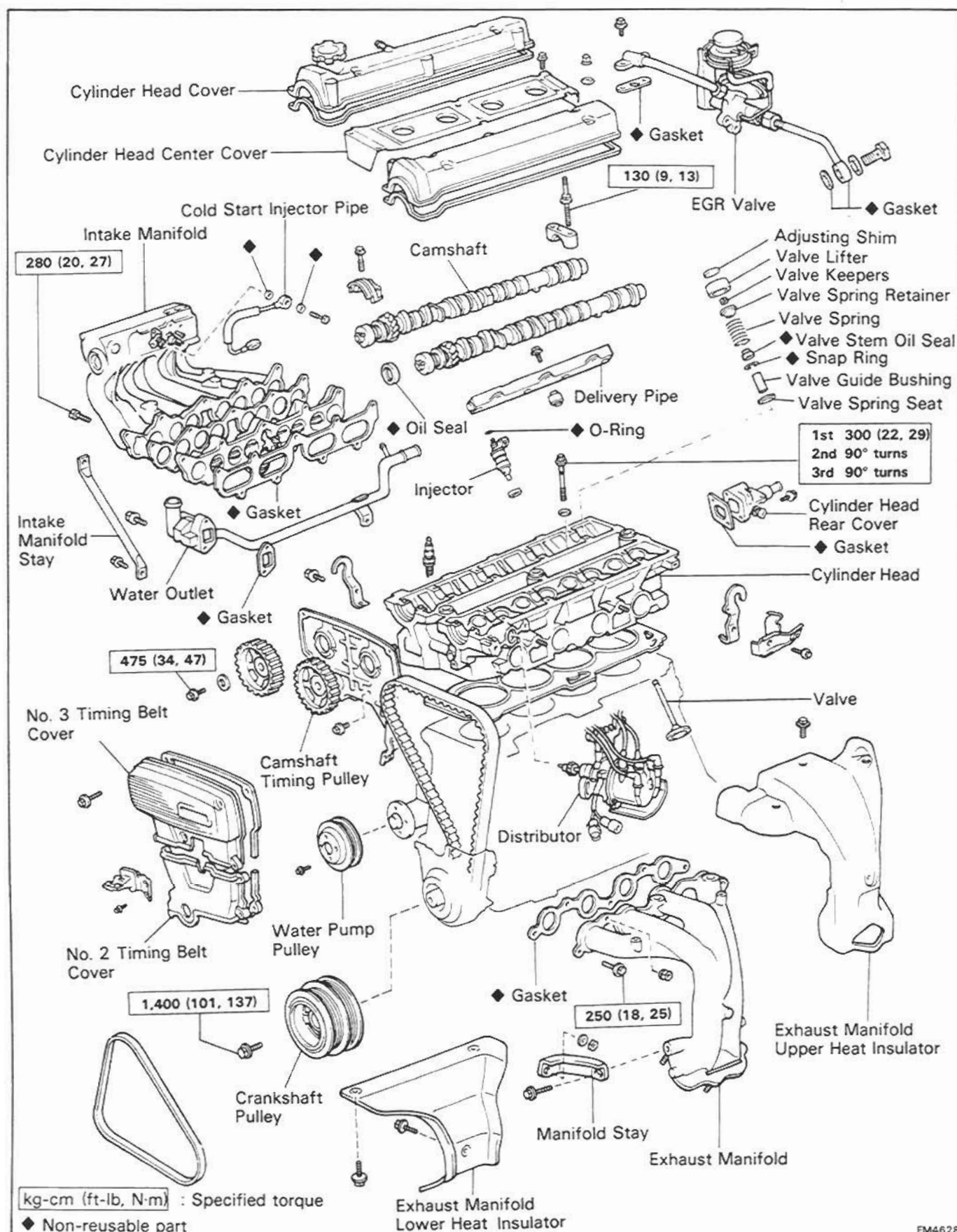
SST 09248-55010

(g) Recheck the valve clearance.

4. REINSTALL CYLINDER HEAD COVERS (See steps 2 to 5 on pages EM-21, 22)

CYLINDER HEAD (4A-GE)

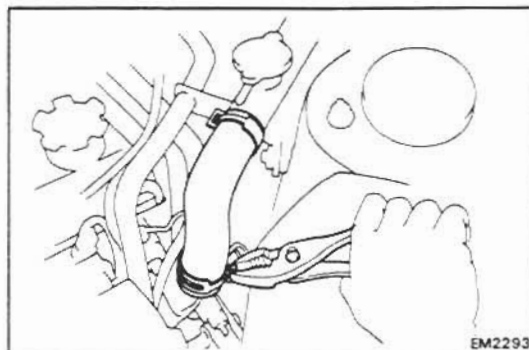
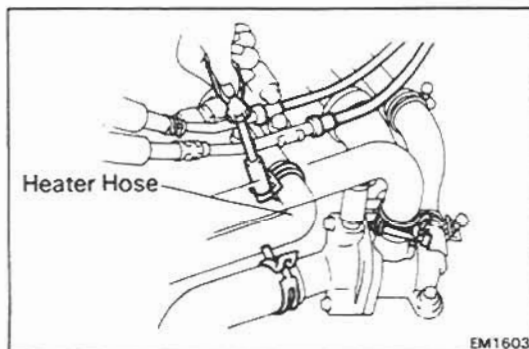
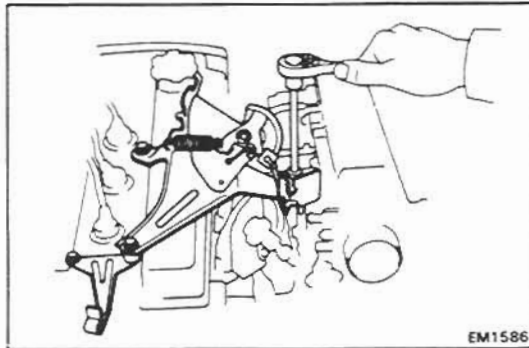
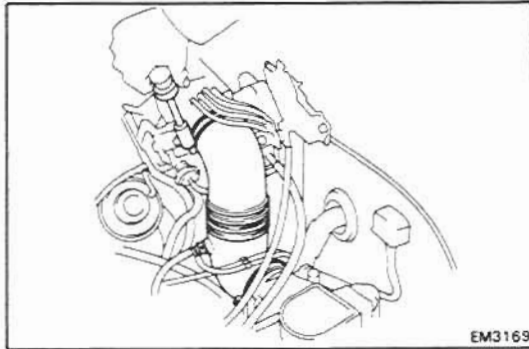
COMPONENTS

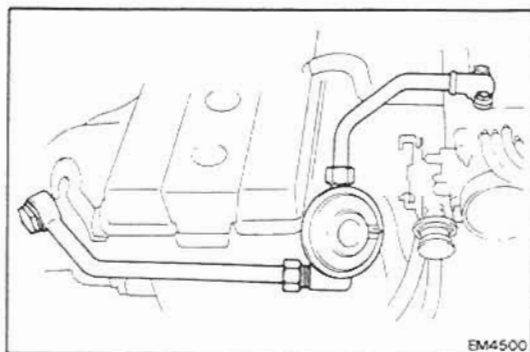


REMOVAL OF CYLINDER HEAD

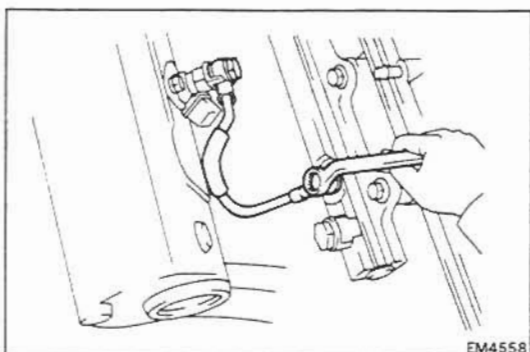
(See page EM-26)

1. **DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY**
2. **REMOVE ENGINE HOOD**
3. **REMOVE ENGINE UNDER COVER**
4. **DRAIN ENGINE COOLANT**
(See page CO-3)
5. **REMOVE AIR RESONATOR**
6. **REMOVE NO. 1 AIR CLEANER HOSE**
 - (a) Disconnect the vacuum hose from the air cleaner hose.
 - (b) Disconnect the VSV and air flow meter connector.
 - (c) Loosen the two clamp bolts and remove the air cleaner hose.
7. **REMOVE ACCELERATOR LINK AND SPEEDOMETER CABLE CLAMP**
 - (a) (w/ Cruise control)
Disconnect the cruise control cable.
 - (b) Disconnect the accelerator cable and connecting rod.
 - (c) Remove the four bolts, accelerator link and speedometer cable clamp.
8. **DISCONNECT FOLLOWING VACUUM HOSES:**
 - Brake booster hose
 - (w/ Cruise control)
Cruise control vacuum hose from intake manifold
9. **DISCONNECT HEATER HOSE FROM CYLINDER HEAD REAR COVER**
10. **DISCONNECT NO. 1 RADIATOR HOSE FROM WATER OUTLET HOUSING**
11. **REMOVE PCV HOSE**



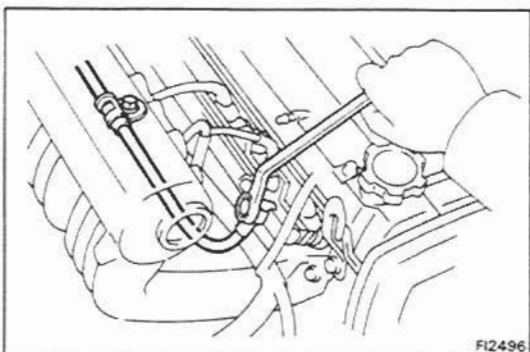
**12. REMOVE EGR VALVE WITH PIPES**

- (a) Remove the EGR vacuum modulator and bracket.
- (b) Remove the accelerator cable clamp from the engine hanger.
- (c) Remove the union bolt, four bolts and EGR valve with pipes and gaskets.

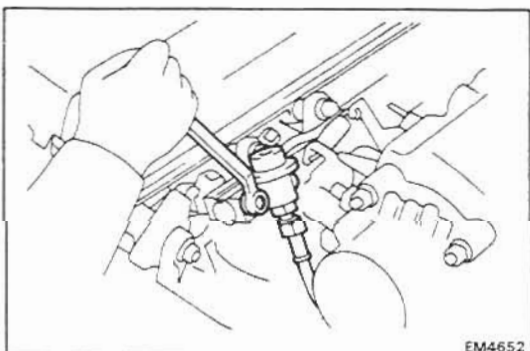
**13. REMOVE COLD START INJECTOR PIPE**

- (a) Disconnect the cold start injector connector.
- (b) Remove the two union bolts, cold start injector pipe and four gaskets.

NOTE: Slowly loosen the union bolts.

**14. REMOVE NO. 1 FUEL PIPE**

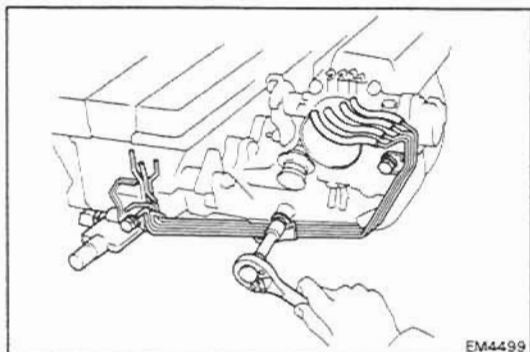
- (a) Remove the union bolt and two gaskets, and disconnect the No. 1 fuel pipe from the delivery pipe.
- (b) Remove the two bolts and disconnect the No. 1 fuel pipe from the intake manifold and cylinder head rear cover.

**15. REMOVE PRESSURE REGULATOR**

- (a) Disconnect the vacuum hose.
- (b) Disconnect the fuel hose from the No. 2 fuel pipe.
- (c) Remove the bolt, and disconnect the No. 2 fuel pipe from the cylinder head rear cover.
- (d) Remove the two bolts and pressure regulator with the No. 2 fuel pipe.

16. DISCONNECT HIGH-TENSION CORDS FROM IGNITION COIL**17. DISCONNECT NO. 2 AND NO. 3 WATER BY-PASS HOSES FROM AUXILIARY AIR VALVE****18. REMOVE VACUUM PIPE AND CYLINDER HEAD REAR COVER**

- (a) Disconnect the water temp. sensor connector.
- (b) (w/ A/C)
Disconnect the water temp. switch connector.
- (c) Remove the vacuum hoses from the vacuum pipe.
- (d) Remove the four bolts, vacuum pipe, cylinder head rear cover and wire clamp.

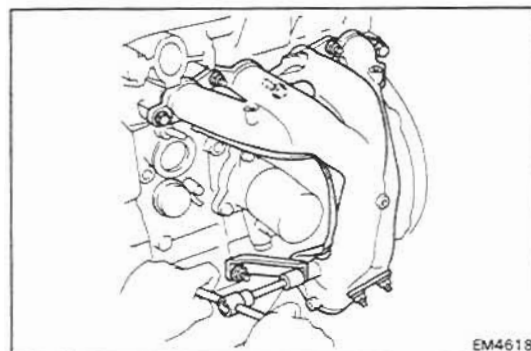
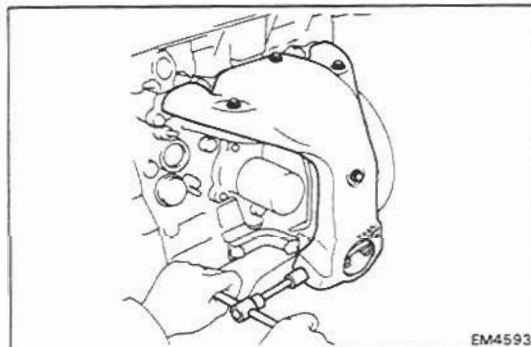


19. DISCONNECT FOLLOWING CONNECTORS AND WIRES:

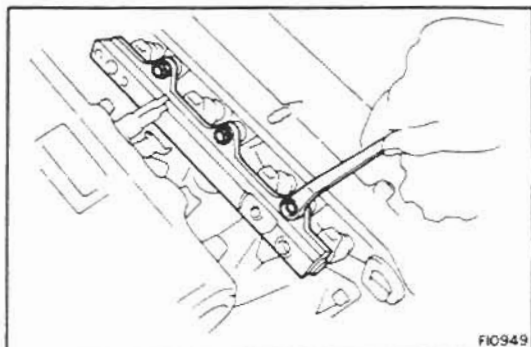
- Engine compartment wire connector from the engine compartment main wire
- Cold start injector time switch connector
- Engine compartment cooling fan temp. sensor connector
- Throttle position sensor connector
- (w/ A/C)
VSV connector (for pressure regulator)
- Injector connectors
- Ground strap from intake manifold
- Two igniter connectors
- Ground strap (between cylinder head and body)
- Noise filter connector
- Engine compartment cooling fan motor connector
- EGR gas temperature sensor connector (Calif. only)
- Water temp. sender gauge connector
- (w/ A/C)
Compressor connector
- Oil pressure sender gauge connector
- Starter wire and connector
- VSV connector (for T-VIS)
- Alternator wire and connector

20. LAY WIRE HARNESS TO ONE SIDE WITHOUT DISCONNECTING IT FROM ENGINE**21. REMOVE DISTRIBUTOR****22. (w/ A/C)
REMOVE A/C DRIVE BELT AND IDLER PULLEY****23. REMOVE DRIVE BELT AND WATER PUMP PULLEY
(See page EM-15)****24. REMOVE FRONT EXHAUST PIPE
(See page LU-5)****25. REMOVE EXHAUST MANIFOLD**

- (a) Remove the six bolts and upper heat insulator.



- (b) Remove the bolt, nut and manifold stay.
- (c) Remove the three bolts, two nuts exhaust manifold and gasket.
- (d) Remove the three bolts and lower insulator.



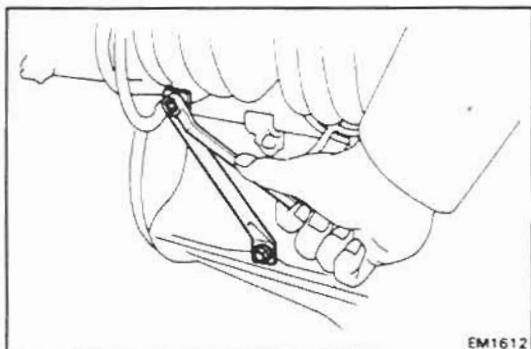
FIO949

26. REMOVE DELIVERY PIPE WITH INJECTORS

- (a) Remove the three bolts, and then remove the delivery pipe with the injectors.

NOTE: When removing the delivery pipe, be careful not to drop the injectors.

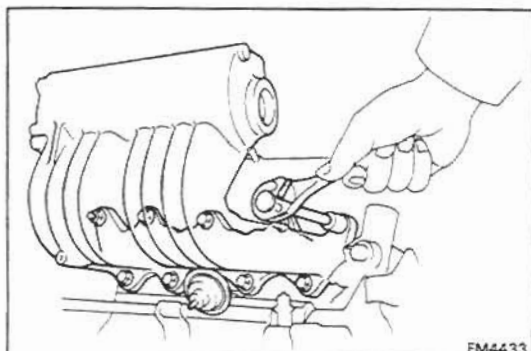
- (b) Remove the four insulators and three spacers from the cylinder head.



EM1612

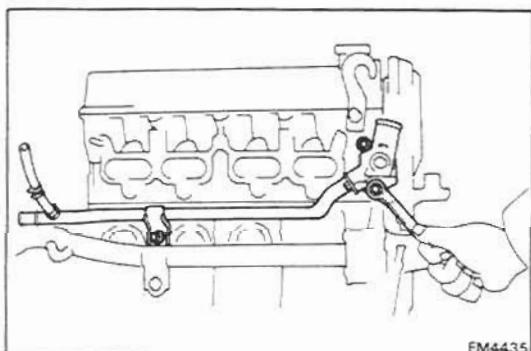
27. REMOVE INTAKE MANIFOLD AND INTAKE AIR CONTROL VALVE

- (a) Remove the manifold stay.
- (b) Disconnect the vacuum hose from the intake air control valve.
- (c) Remove the two bolts and VSV with vacuum tank.



EM4433

- (d) Remove the two nuts and seven bolts.
- (e) Remove the manifold and air control valve with the gaskets.

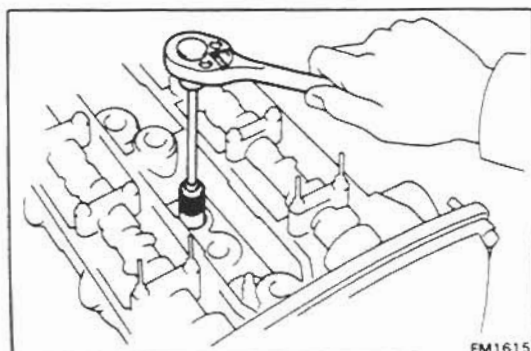


EM4435

28. REMOVE WATER OUTLET WITH NO. 1 BY-PASS PIPE AND DRIVE BELT ADJUSTING BAR

- (a) Disconnect the water by-pass hose.
- (b) Remove the three bolts, water outlet with the No. 1 by-pass pipe, drive belt adjusting bar and gasket.

29. REMOVE CYLINDER HEAD COVERS (See steps 19 to 22 on page EM-18)

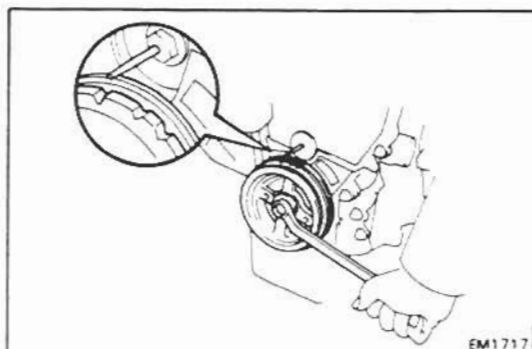


EM1615

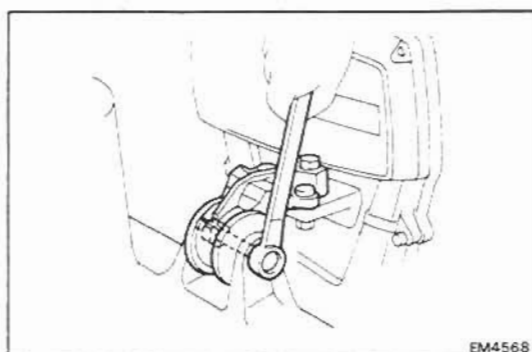
30. REMOVE SPARK PLUGS

Using plug wrench (16 mm), remove the spark plugs.

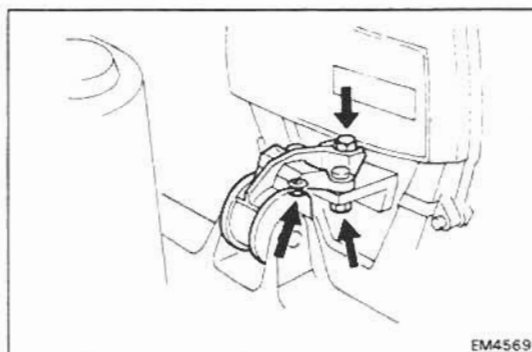
31. INSPECT VALVE CLEARANCE (See page EM-7)

**32. SET NO. 1 CYLINDER TO TDC/COMPRESSION**

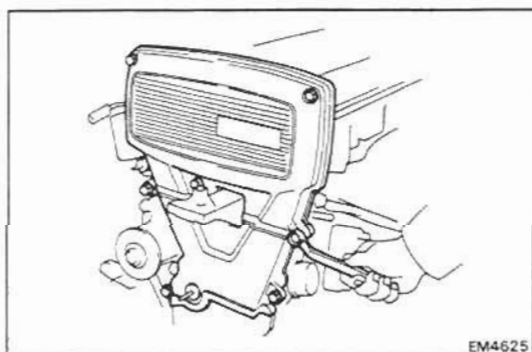
- (a) Turn the crankshaft pulley and align its groove with the idler pulley bolt.
- (b) Check that the valve lifters on the No. 1 cylinder are loose. If not, turn the crankshaft pulley one complete revolution.

**33. REMOVE RH ENGINE MOUNTING INSULATOR**

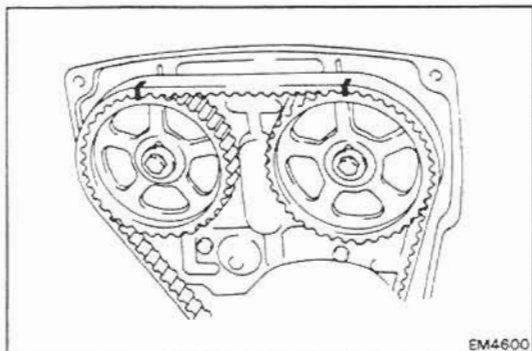
- (a) Slightly raise the engine with a jack.
NOTE: Place a wooden block between the jack and engine.
- (b) Remove the mounting through bolt.



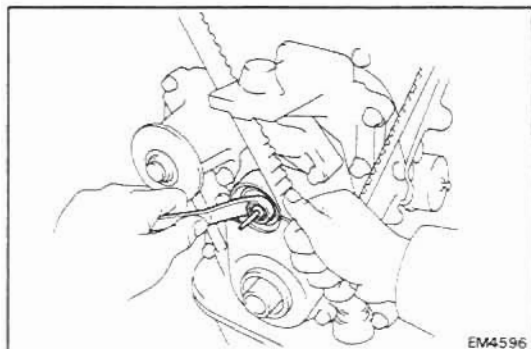
- (c) Remove the two nuts, bolt and RH engine mounting insulator.

**34. REMOVE CRANKSHAFT PULLEY
(See step 9 on page EM-16)****35. REMOVE NO. 3 AND NO. 2 TIMING BELT COVERS WITH GASKETS**

Remove the seven bolts, No. 3 and No. 2 timing belt covers.

**36. REMOVE TIMING BELT FROM CAMSHAFT TIMING PULLEYS**

Place matchmarks on the camshaft timing pulleys and belt.

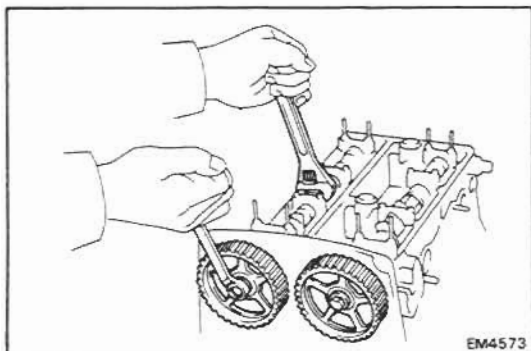
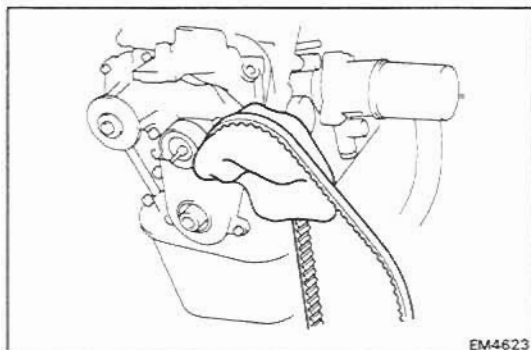


37. REMOVE TIMING BELT FROM CAMSHAFT TIMING PULLEYS

- Loosen the idler pulley bolt, push it left as far as it will go and then temporarily tighten it.
- Remove the timing belt from the camshaft timing pulleys.

NOTE:

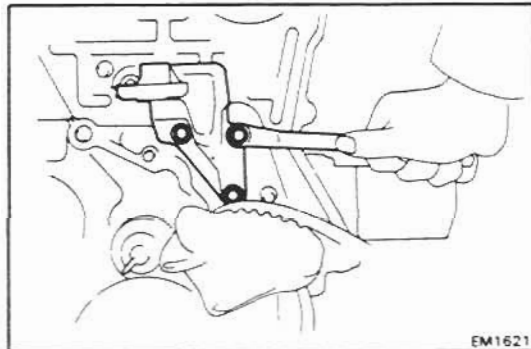
- Support the belt so the meshing of the crankshaft timing pulley and timing belt does not shift.
- Be careful not to drop anything inside the timing belt cover.
- Do not allow the belt to come into contact with oil, water or dust.



38. REMOVE CAMSHAFT TIMING PULLEYS

Secure the hexagonal portion of the camshaft, remove the bolt, plate washer and pulley. Remove the two camshaft pulleys.

CAUTION: Be careful not to damage the cylinder head with the wrench.

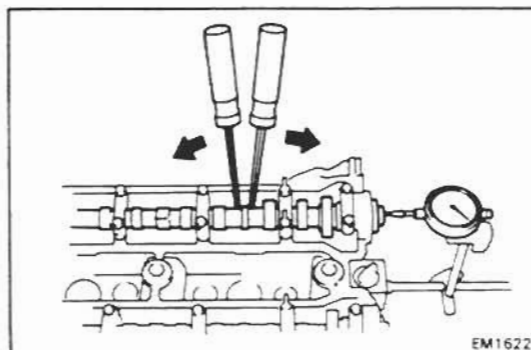


39. REMOVE RH MOUNTING BRACKET

Remove the three bolts and bracket.

40. REMOVE NO. 4 TIMING BELT COVER

Remove the seven bolts and No. 4 timing belt cover.



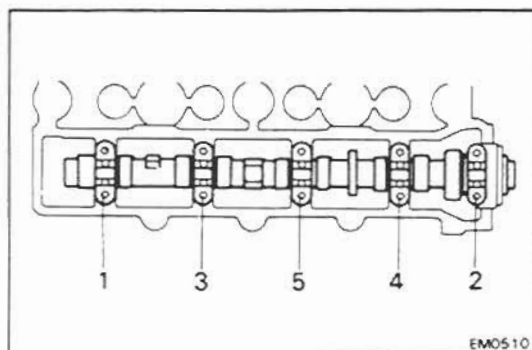
41. INSPECT CAMSHAFT THRUST CLEARANCE

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

Standard clearance: 0.08 – 0.19 mm
(0.0031 – 0.0075 in.)

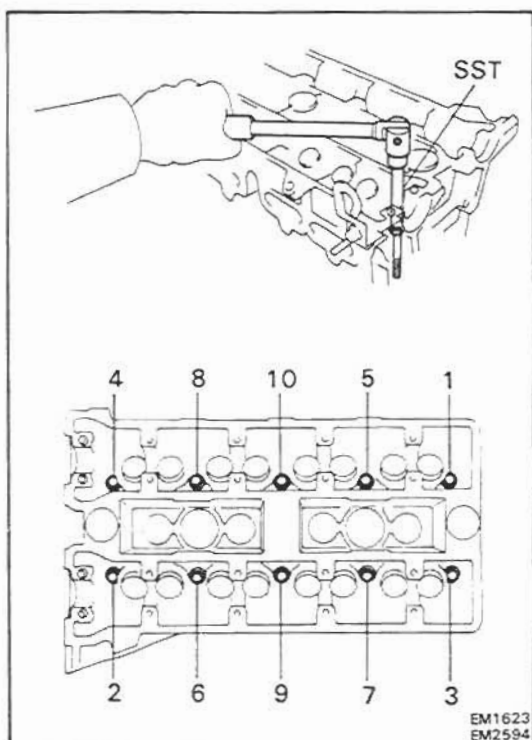
Maximum clearance: 0.30 mm (0.0118 in.)

If clearance is greater than maximum, replace the camshaft and/or cylinder head.

**42. REMOVE CAMSHAFTS**

- (a) Uniformly loosen and remove the bearing cap bolts in several passes, in the sequence shown.
- (b) Remove the bearing caps, oil seal and camshaft.

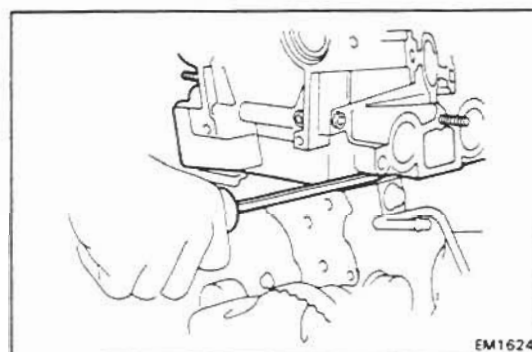
NOTE: Arrange the intake and exhaust camshafts.

**43. REMOVE CYLINDER HEAD**

- (a) Using SST, uniformly loosen and remove the ten cylinder head bolts in several passes, in the sequence shown.

SST 09205-16010

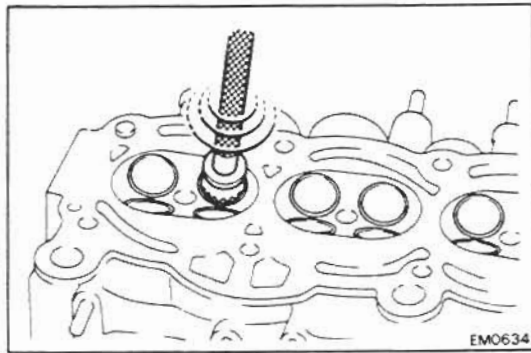
CAUTION: Head warpage or cracking could result from removing bolts in incorrect order.



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

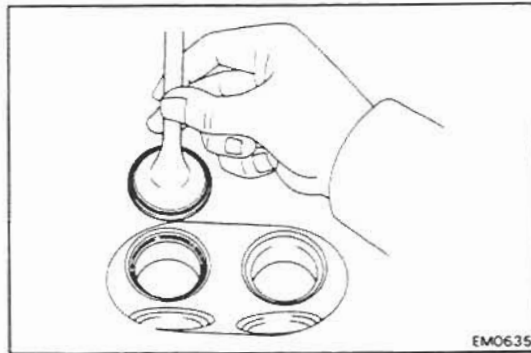
NOTE: If the cylinder head is difficult to lift off, pry with a screwdriver between the cylinder head and block saliences.

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



12. INSPECT AND CLEAN VALVE SEATS

- (a) Using a 45° carbide cutter, resurface the valve seats. Remove only enough metal to clean the seats.



- (b) Check the valve seating position.

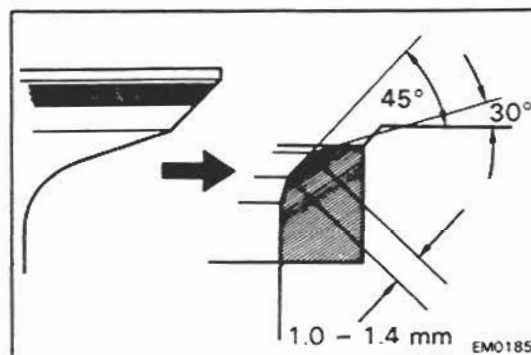
Apply a thin coat of prussian blue (or white lead) to the valve face. Install the valve. While applying light pressure to the valve, rotate the valve against the seat.

- (c) Check the valve face and seat for the following.

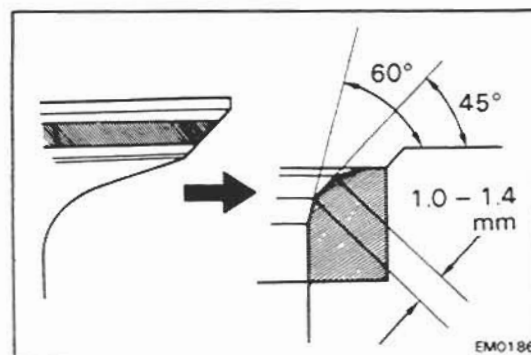
- If blue appears 360° around the face, the valve is concentric. If not, replace the valve.
- If blue appears 360° around the valve seat, the guide and seat are concentric. If not, resurface the seat.
- Check that the seat contact is on the middle of the valve face with the following width.

1.0 – 1.4 mm (0.039 – 0.055 in.)

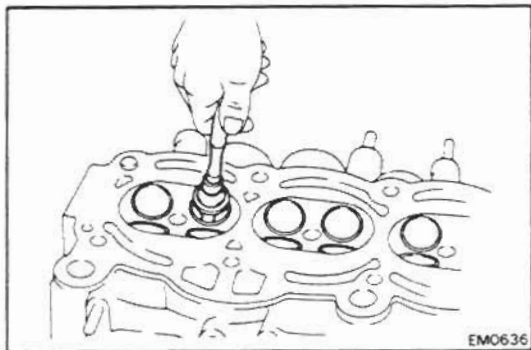
If not, correct the valve seat as follows:



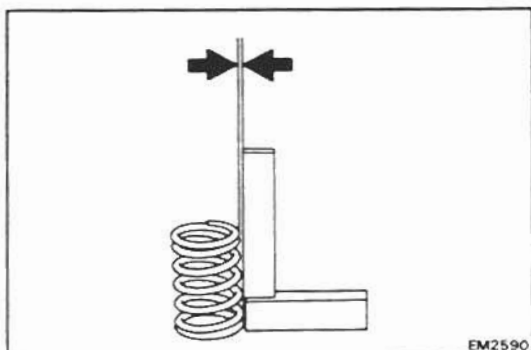
- (1) If seating is too high on the valve face use 30° and 45° cutters to correct the seat.



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



- (d) Hand-lap the valve and valve seat with an abrasive compound.
- (e) Clean the valve and valve seat after hand-lapping.

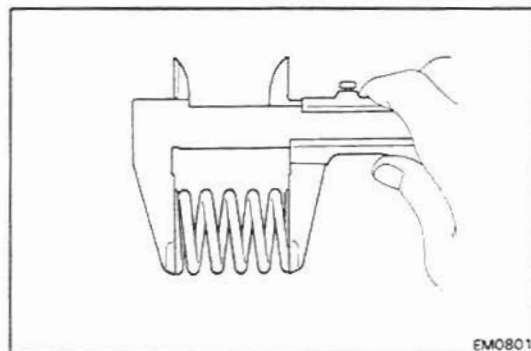


13. INSPECT VALVE SPRINGS

- (a) Using a steel square, measure the squareness of the valve springs.

Maximum squareness: 1.8 mm (0.071 in.)

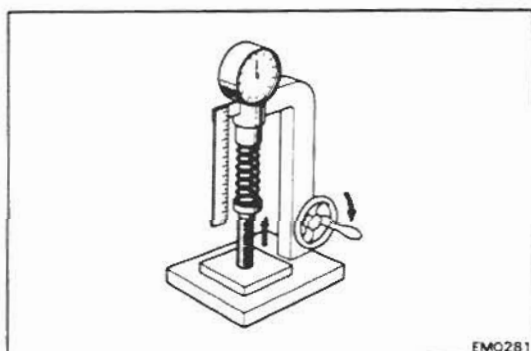
If squareness is greater than maximum, replace the valve spring.



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

Free length: 41.09 mm (1.6177 in.)

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

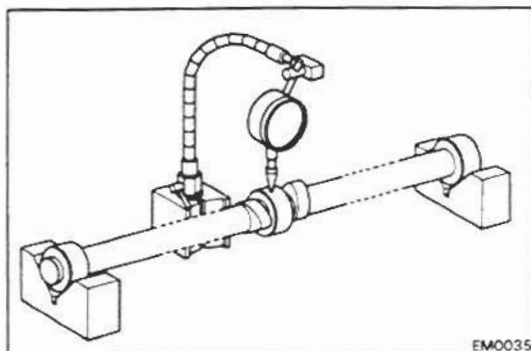


- (c) Using a spring tester, measure the tension of the valve spring at the specified installed length.

Installed tension:

**14.6 – 1.0 kg (32.2 – 37.5 lb, 143 – 167 N)
at 34.7 mm (1.366 in.)**

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



14. INSPECT CAMSHAFT AND BEARING CAPS

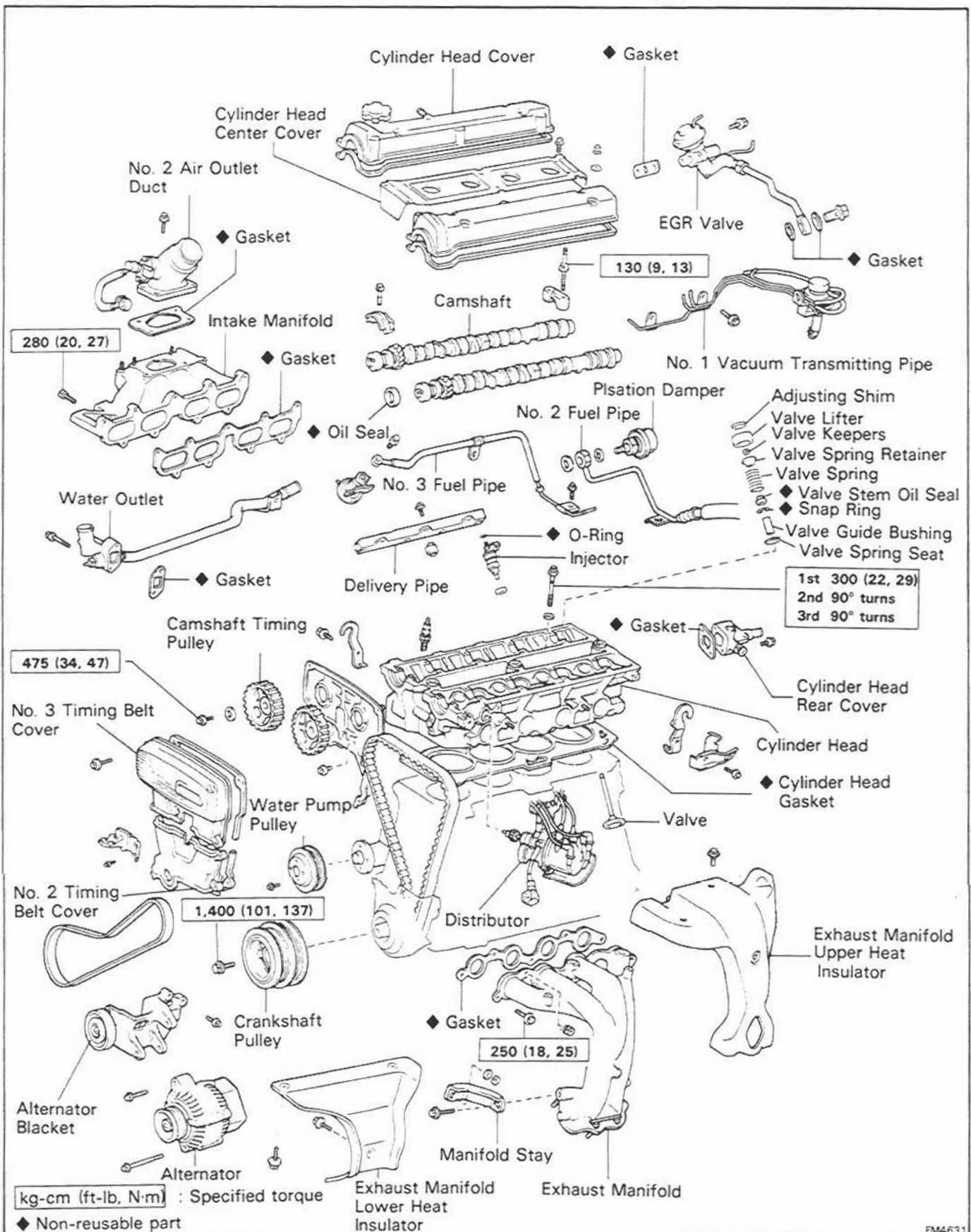
- (a) Place the camshaft on V-blocks and, using a dial indicator, measure the circle runout at the center journal.

Maximum circle runout: 0.04 mm (0.0016 in.)

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

CYLINDER HEAD (4A-GZE)

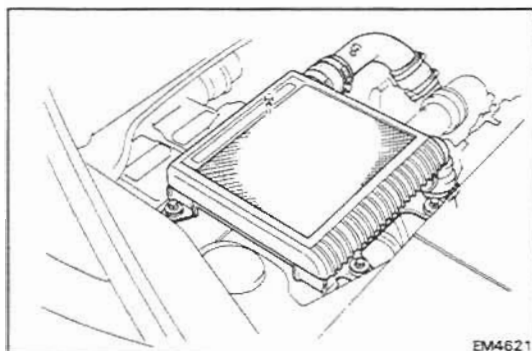
COMPONENTS



REMOVAL OF CYLINDER HEAD

(See page EM-55)

1. **DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY**
2. **REMOVE ENGINE HOOD**
3. **REMOVE ENGINE UNDER COVER**
4. **DRAIN ENGINE COOLANT** (See page CO-3)



5. **REMOVE INTERCOOLER**

Disconnect the two hose clamps, and remove the four bolts and intercooler.

6. **REMOVE BATTERY**

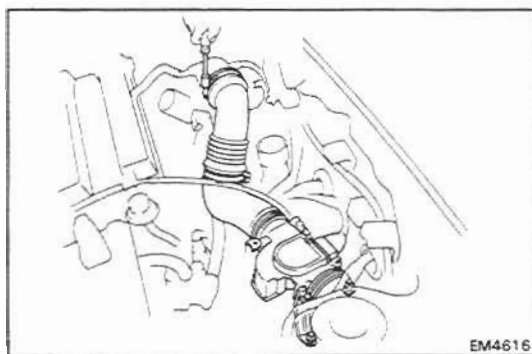
7. **DISCONNECT AIR BLEEDER HOSE FROM WATER INLET HOUSING**

8. (w/ Cruise control)
DISCONNECT CRUISE CONTROL VACUUM HOSE

9. (A/T vehicle)
DISCONNECT A/T THROTTLE CABLE

10. **REMOVE AIR FLOW METER WITH NO. 3 AIR CLEANER HOSE**

- (a) Disconnect the EGR VSV connector.
- (b) Disconnect the air flow meter connector.
- (c) Remove the bolt and EGR VSV.
- (d) Loosen the two clamps, and remove the three bolts and air flow meter with No. 3 air cleaner hose.

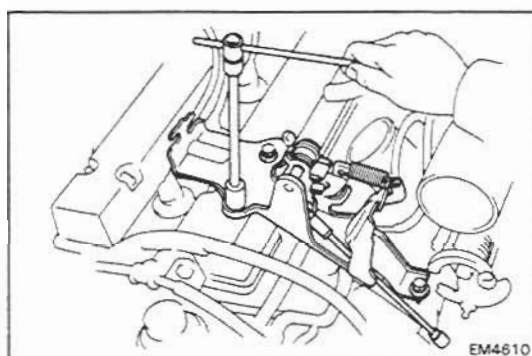


11. **DISCONNECT ACCELERATOR CABLE**

12. (w/ Cruise control)
DISCONNECT CRUISE CONTROL CABLE

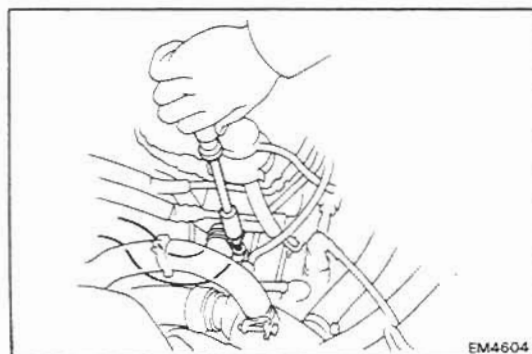
13. (w/ Cruise control)
REMOVE ACCELERATOR LINK

Disconnect accelerator rod, and remove the three bolts and accelerator link.

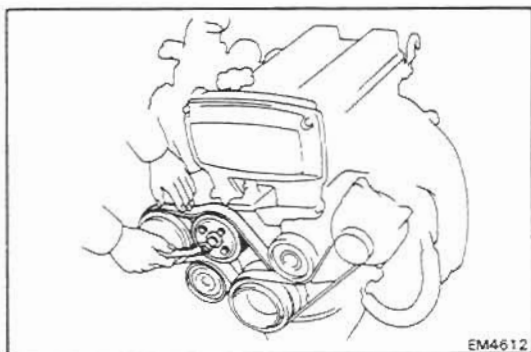


14. (w/ A/C)
DISCONNECT A/C IDLE UP VACUUM HOSES

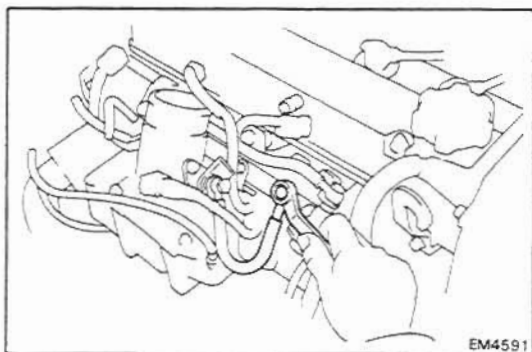
15. **DISCONNECT HEATER HOSE FROM CYLINDER HEAD REAR COVER**



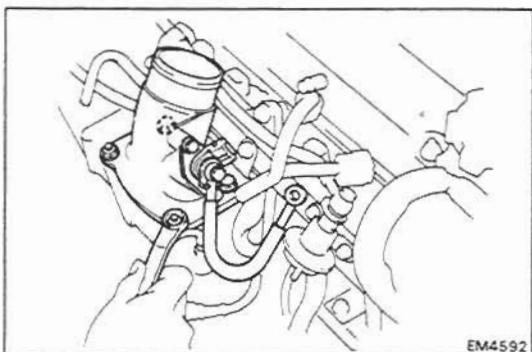
16. DISCONNECT BRAKE BOOSTER VACUUM HOSE
17. REMOVE RADIATOR RESERVOIR TANK
18. DISCONNECT NO. 1 RADIATOR HOSE FROM WATER OUTLET HOUSING
19. DISCONNECT FOLLOWING CONNECTORS AND WIRES:
 - (a) Cold start injector time switch connector
 - (b) EGR gas temp. sensor connector
 - (c) Engine compartment cooling fan sensor connector
 - (d) Water temperature sensor connector
 - (e) Water temperature sender gauge connector
 - (f) Noise filter connector
 - (g) Ground strap connector (between cylinder head and body)
 - (h) Igniter connector
 - (i) Distributor connector
 - (j) High-tension cord from ignition coil
 - (k) Solenoid resistor connector
 - (l) Engine compartment cooling fan motor connector
 - (m) (w/ A/C)
Two A/C compressor connectors
 - (n) Oil pressure sender gauge connector
 - (o) Alternator wire and connector
 - (p) Injector connectors
 - (q) Cold start injector connector
 - (r) Supercharger air control valve connector
 - (s) Supercharger ABV connector
 - (t) Throttle position sensor connector
 - (u) ISC valve connector



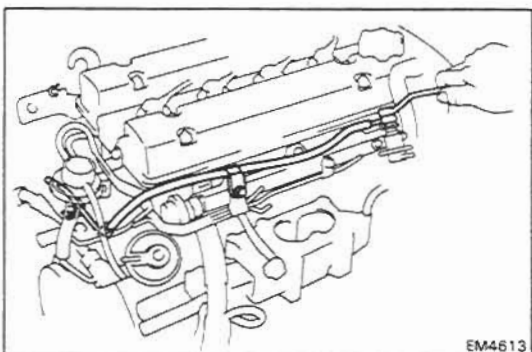
20. REMOVE DRIVE BELTS AND WATER PUMP PULLEY
 - (a) Loosen the four bolts mounting the pulley to the pulley seat of the water pump.
 - (b) Loosen the idler pulley lock nuts and adjusting bolts, and remove the drive belts.
 - (c) Remove the four bolts and water pump pulley.
21. REMOVE SUPERCHARGER (See page SC-5)

**22. REMOVE NO. 2 AIR OUTLET DUCT**

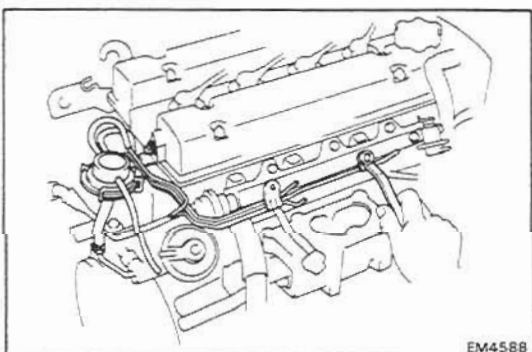
- (a) Remove the union bolt and gaskets, and disconnect the cold start injector pipe from the delivery pipe.
- (b) Remove the two bolts, nuts, No. 2 air outlet duct and gasket.

**23. DISCONNECT NO. 3 FUEL PIPE**

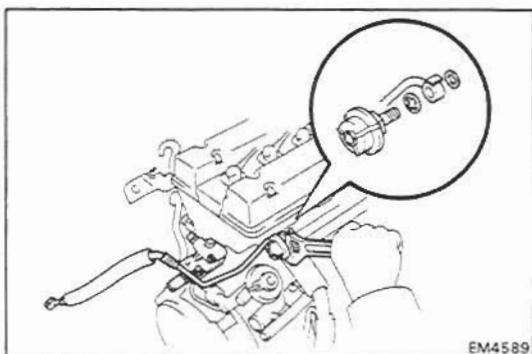
- (a) Remove the union bolt and two gaskets.
- (b) Remove the two bolts and disconnect the No. 3 fuel pipe.

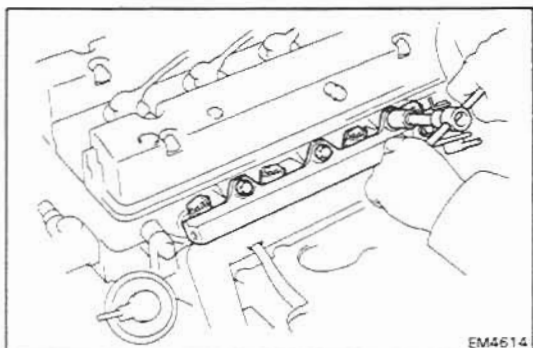
**24. REMOVE NO. 1 VACUUM TRANSMITTING PIPE**

- (a) Disconnect the vacuum hose from the EGR valve.
- (b) Disconnect the EGR modulator hose.
- (c) Remove the two bolts and No. 1 vacuum transmitting pipe with modulator.

**25. DISCONNECT NO. 2 FUEL HOSE**

- (a) Remove the pulsation damper and gaskets.
- (b) Remove the bolt and disconnect the No. 2 fuel hose.

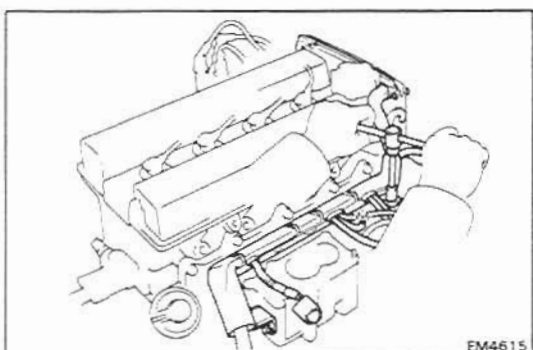
**26. REMOVE CYLINDER HEAD REAR COVER**

**27. REMOVE DELIVERY PIPE WITH INJECTORS**

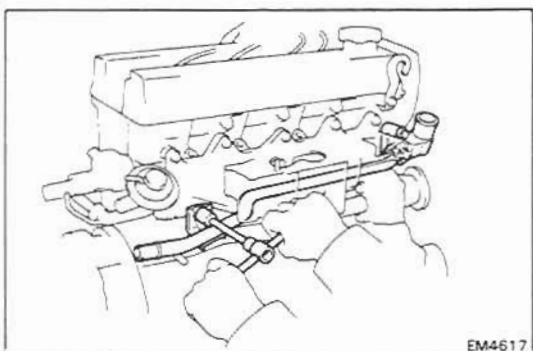
- (a) Remove the three bolts, and then remove the delivery pipe with the injectors.

CAUTION: Be careful not to drop the injectors.

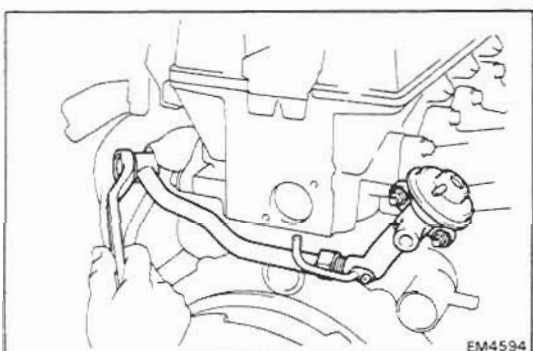
- (b) Remove the four insulators and three spacers from the cylinder head.

**28. LAY WIRE HARNESS TO ONE SIDE**

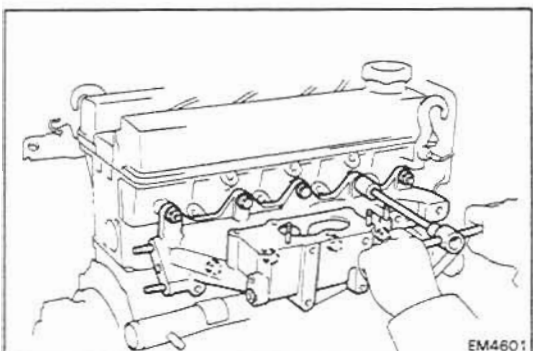
Loosen the two bolts of the No. 3 timing cover, and remove the three bolts and lay the wire harness.

**29. REMOVE WATER OUTLET WITH BY-PASS PIPE**

- (a) Disconnect water by-pass hose.
- (b) Remove the three bolts, water outlet with by-pass pipe and gasket.

**30. REMOVE EGR VALVE WITH PIPE**

Remove the union bolt, two gaskets, two nuts and EGR valve with pipe and gasket.

**31. REMOVE INTAKE MANIFOLD**

Remove the seven bolts, two nuts, intake manifold and gasket.

32. REMOVE FRONT EXHAUST PIPE

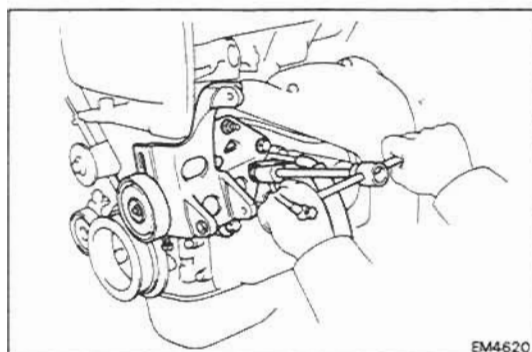
(See page LU-4)

33. (w/ A/C)**REMOVE A/C COMPRESSOR AND BRACKET****34. REMOVE DISTRIBUTOR**

(See page IG-9)

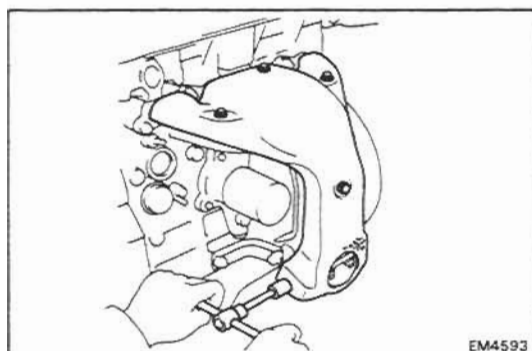
35. REMOVE ALTERNATOR

(See page CH-7)

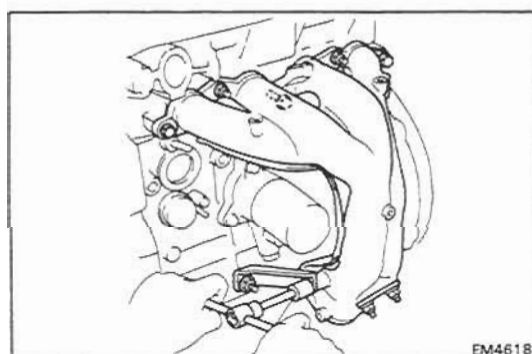
**36. REMOVE ALTERNATOR BRACKET**

(a) Disconnect the oil cooler pipe.

(b) Remove the three bolts, nut and alternator bracket.

**37. REMOVE EXHAUST MANIFOLD**

(a) Remove the six bolts and upper heat insulator.



(b) Remove the bolt, nut and manifold stay.

(c) Remove the three bolts, two nuts exhaust manifold and gasket.

38. REMOVE CAMSHAFT AND CYLINDER HEAD

(See steps 29 to 43 on pages EM-30 to 33)

DISASSEMBLY OF CYLINDER HEAD

(See pages EM-34, 55)

INSPECTION, CLEANING AND REPAIR OF CYLINDER HEAD COMPONENTS

(See page EM-35)

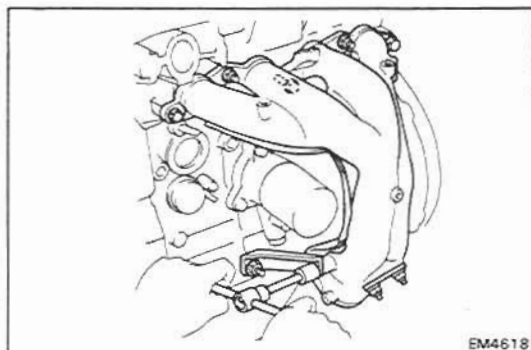
ASSEMBLY OF CYLINDER HEAD

(See pages EM-45, 55)

INSTALLATION OF CYLINDER HEAD

(See pages EM-45, 55)

1. **INSTALL CYLINDER HEAD AND CAMSHAFT**
(See steps 1 to 15 on pages EM-46 to 50)

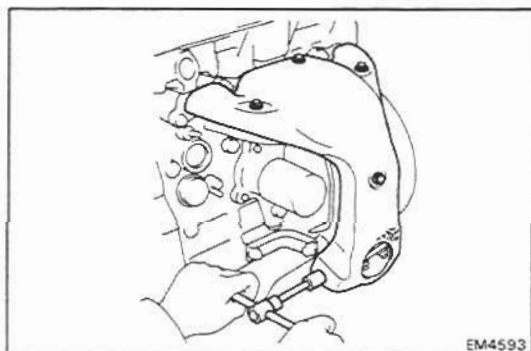


2. **INSTALL EXHAUST MANIFOLD**

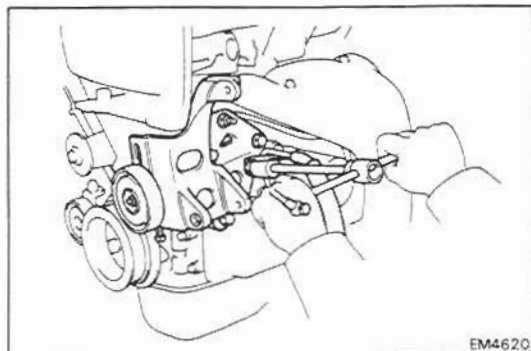
- (a) Install a new gasket, the exhaust manifold with the three bolts and two nuts.

Torque: 250 kg-cm (18 ft-lb, 25 N·m)

- (b) Install the manifold stay with the bolt and nut.



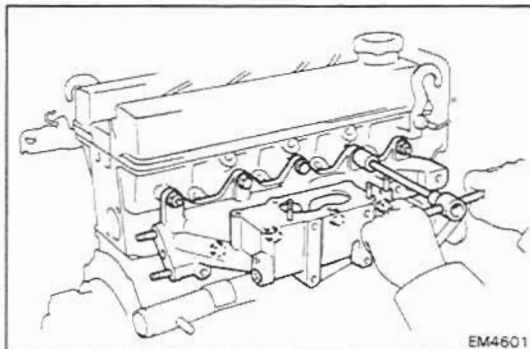
- (c) Install the upper heat insulator with the six bolts.



3. **INSTALL ALTERNATOR BRACKET**

- (a) Install the alternator bracket with the three bolts and nut.
- (b) Connect the oil cooler pipe.

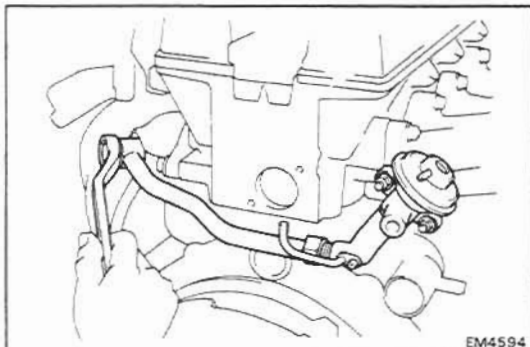
4. **INSTALL ALTERNATOR**
(See page CH-15)
5. **INSTALL DISTRIBUTOR**
(See page IG-10)
(w/ A/C)
6. **INSTALL A/C COMPRESSOR AND BRACKET**
7. **INSTALL FRONT EXHAUST PIPE**
(See page LU-12)



8. **INSTALL INTAKE MANIFOLD**

Install a new gasket, the intake manifold with the seven bolts and two nuts.

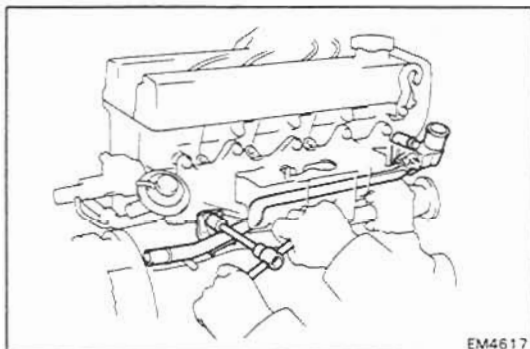
Torque: 280 kg-cm (20 ft-lb, 27 N·m)



9. **INSTALL EGR VALVE WITH PIPE**

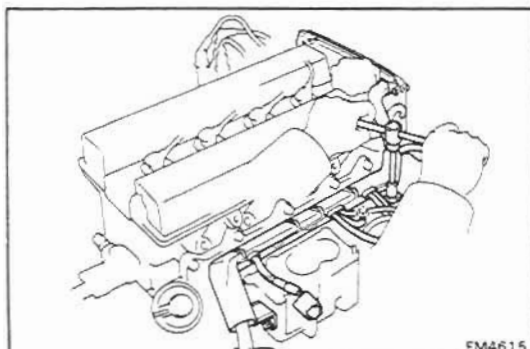
Using new gaskets, install the EGR valve with pipe. Torque the union bolt and two nuts.

Torque:	Union bolt	700 kg-cm (51 ft-lb, 69 N·m)
	Nut	190 kg-cm (14 ft-lb, 19 N·m)



10. **INSTALL WATER OUTLET WITH BY-PASS PIPE**

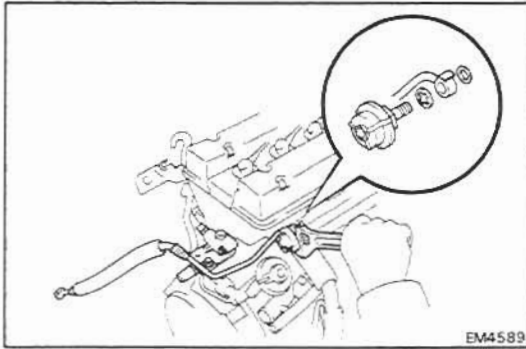
Using a new gasket, install the water outlet with by-pass pipe to the cylinder head and intake manifold with the three bolts.



11. **CLAMP WIRE HARNESS**

Clamp the wire harness with the five bolts.

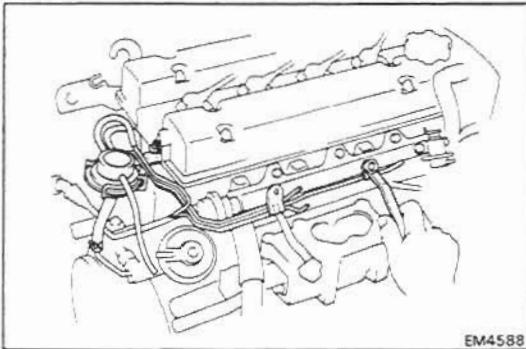
12. **INSTALL DELIVERY PIPE WITH INJECTORS**
(See page FI-90)

**13. INSTALL CYLINDER HEAD REAR COVER****14. CONNECT NO. 2 FUEL HOSE**

- (a) Install the pulsation damper with new gaskets.

Torque: 300 kg-cm (22 ft-lb, 29 N·m)

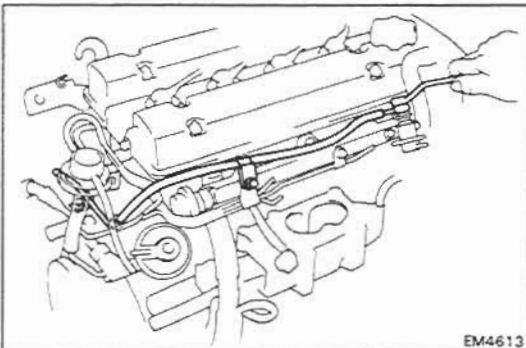
- (b) Clamp the hose to the cylinder head rear cover with the bolt.

**15. INSTALL NO. 1 VACUUM TRANSMITTING PIPE**

- (a) Install the No. 1 vacuum transmitting pipe with modulator with the two bolts.

- (b) Connect the EGR modulator hose.

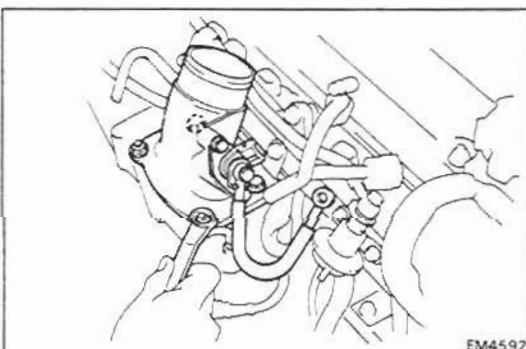
- (c) Connect the vacuum hose.

**16. CONNECT NO. 3 FUEL PIPE**

- (a) Connect the No. 3 fuel pipe with the union bolt and new gasket.

Torque: 150 kg-cm (11 ft-lb, 15 N·m)

- (b) Clamp the No. 3 fuel pipe with the two bolts.

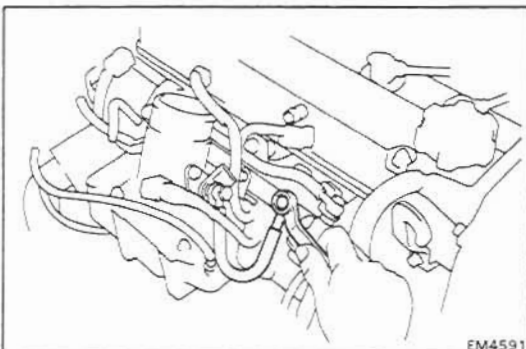
**17. INSTALL NO. 2 AIR OUTLET DUCT**

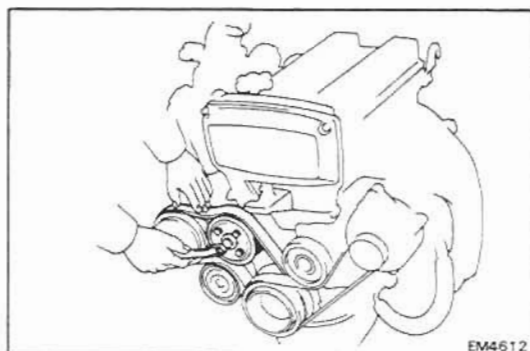
- (a) Install the No. 2 air outlet duct with a new gasket, the two bolts and two nuts.

Torque: 95 kg-cm (82 in.-lb, 9 N·m)

- (b) Connect the cold start injector pipe to the delivery pipe with new gaskets and the union bolt.

Torque: 150 kg-cm (11 ft-lb, 15 N·m)

**18. INSTALL SUPERCHARGER (See page SC-17)**



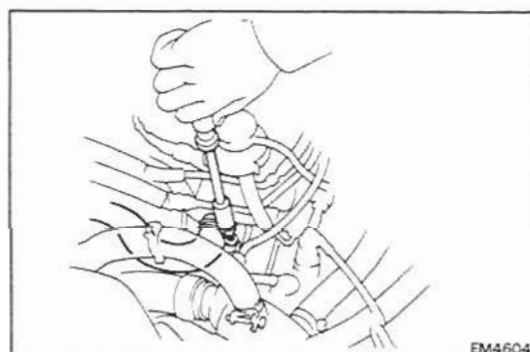
EM4612

19. INSTALL WATER PUMP PULLEY AND DRIVE BELTS

- (a) Install the water pump pulley with the four bolts.
- (b) Install and adjust drive belts.
(See page MA-4)
- (c) Stretch the belt tight and tighten the four pulley bolts.

20. CONNECT FOLLOWING CONNECTORS AND WIRES:

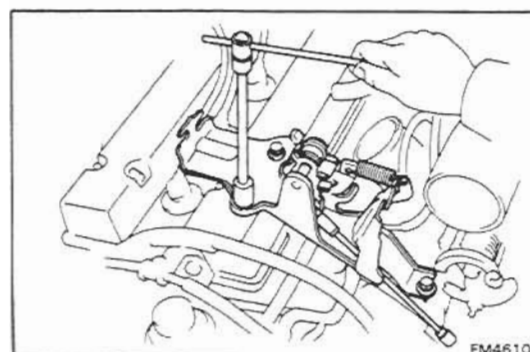
- (a) Cold start injector time switch connector
- (b) EGR gas temp. sensor connector (Calif. only)
- (c) Engine compartment cooling fan sensor connector
- (d) Water temperature sensor connector
- (e) Water temperature sender gauge connector
- (f) Noise filter connector
- (g) Ground strap connector (between cylinder head and body)
- (h) Igniter connector
- (i) Distributor connector
- (j) High-tension cord from ignition coil
- (k) Solenoid resistor connector
- (l) Engine compartment cooling fan motor connector
- (m) (w/ A/C)
Two A/C compressor connectors
- (n) Oil pressure sender gauge connector
- (o) Alternator wire and connector
- (p) Injector connectors
- (q) Cold start injector connector
- (r) Supercharger air control valve connector
- (s) Supercharger ABV connector
- (t) Throttle position sensor connector
- (u) ISC valve connector



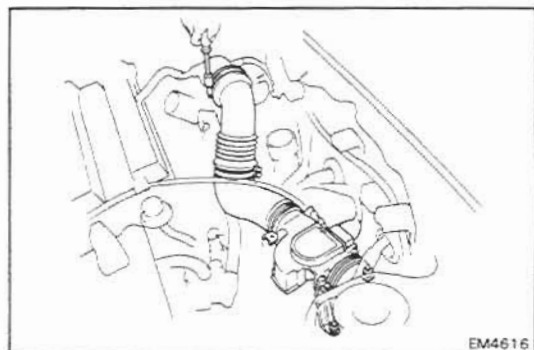
EM4604

21. CONNECT NO. 1 RADIATOR HOSE TO WATER OUTLET HOUSING**22. INSTALL RADIATOR RESERVOIR TANK****23. CONNECT BRAKE BOOSTER VACUUM HOSE****24. CONNECT HEATER HOSE TO CYLINDER HEAD REAR COVER****25. (w/ A/C)
CONNECT A/C IDLE UP VACUUM HOSES****26. (w/ Cruise control)
INSTALL ACCELERATOR LINK**

- (a) Install the accelerator link with the three bolts.
- (b) Connect the accelerator rod.



EM4610



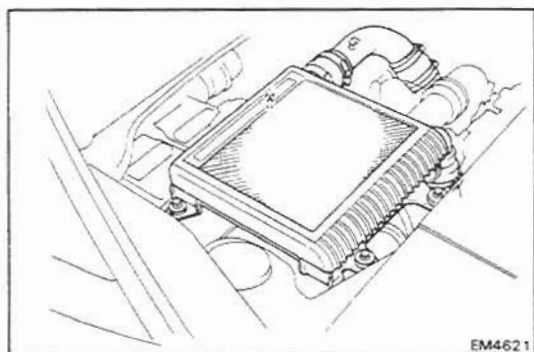
27. INSTALL AIR FLOW METER WITH NO. 3 AIR CLEANER HOSE

- (a) Install the air flow meter with No. 3 air cleaner hose with the three bolts and two clamps.
- (b) Install the EGR VSV with the bolt.
- (c) Connect the air flow meter and EGR VSV connectors.

**28. (A/T vehicle)
CONNECT A/T THROTTLE CABLE**

**29. (w/ Cruise control)
CONNECT CRUISE CONTROL VACUUM HOSE**

30. CONNECT AIR BLEEDER HOSE TO WATER INLET HOUSING INSTALL BATTERY



31. INSTALL INTERCOOLER

Install the intercooler with the four bolts and two clamps.

32. REFILL WITH COOLANT (See page CO-4)

Capacity:

M/T

w/ Heater

12.2 liters (12.9 US qts, 10.7 Imp. qts)

Others

12.4 liters (13.1 US qts, 10.9 Imp. qts)

A/T

12.9 liters (13.6 US qts, 11.4 Imp. qts)

33. CONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY

34. START ENGINE AND CHECK FOR LEAKS

35. PERFORM ENGINE ADJUSTMENT

Adjust the ignition timing.
(See steps 5 to 8 on pages IG-11, 12)

36. INSTALL ENGINE UNDER COVER

37. PERFORM ROAD TEST

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

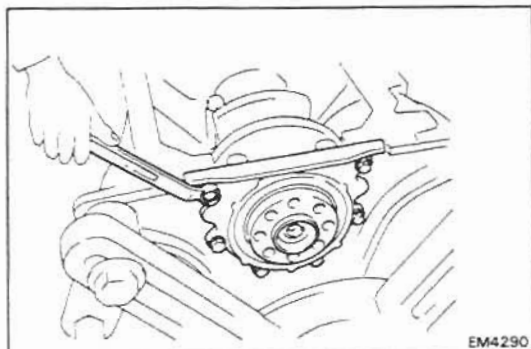
38. RECHECK ENGINE COOLANT AND ENGINE OIL LEVELS

DISASSEMBLY OF CYLINDER BLOCK

(See page EM-66)

1. REMOVE REAR OIL SEAL RETAINER

Remove the six bolts, rear oil seal retainer and gasket.



EM4290

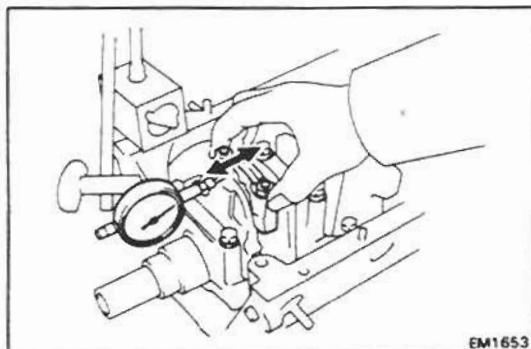
2. MEASURE CONNECTING ROD THRUST CLEARANCE

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

Standard thrust clearance: 0.15 – 0.25 mm
(0.0059 – 0.0098 in.)

Maximum thrust clearance: 0.30 mm (0.0118 in.)

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



EM1653

3. REMOVE ROD CAPS AND MEASURE OIL CLEARANCE

NOTE: If replacing the bearing, replace with one having the same number as marked on the bearing cap.

There are three sizes of standard bearings supplied, marked 1, 2 or 3 respectively.

Bearing thickness (at center wall):

STD

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

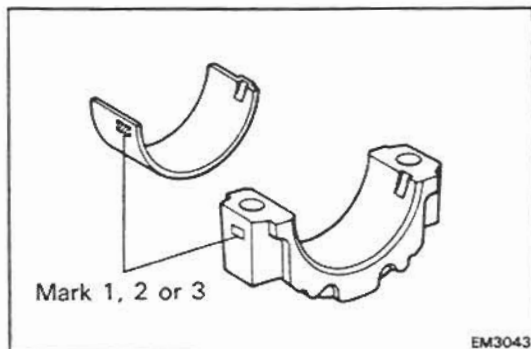
Mark 2 1.490 – 1.494 mm
(0.0587 – 0.0588 in.)

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

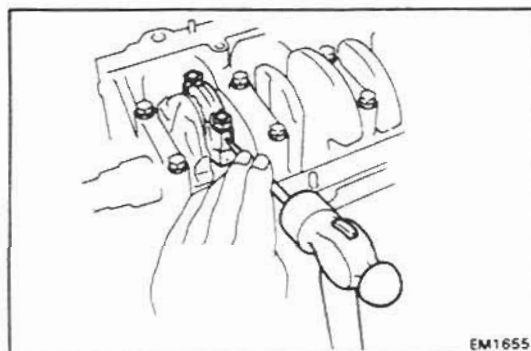
U/S

0.25 1.607 – 1.613 mm (0.0633 – 0.0635 in.)

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

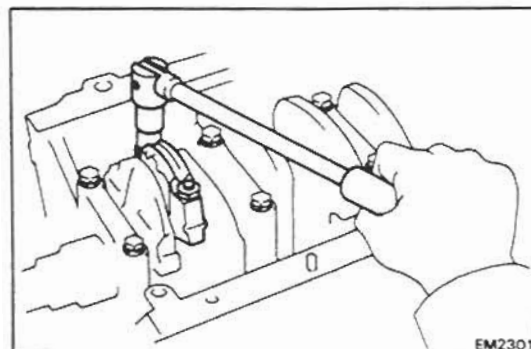


EM3043

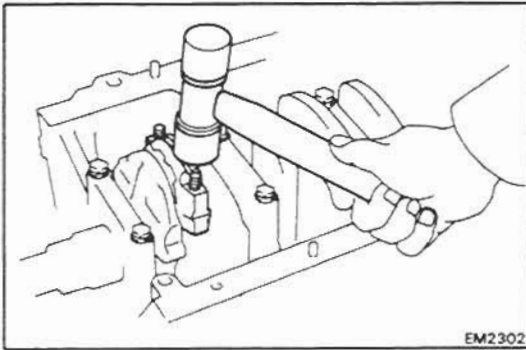


EM1655

- (b) Remove the rod cap nuts.

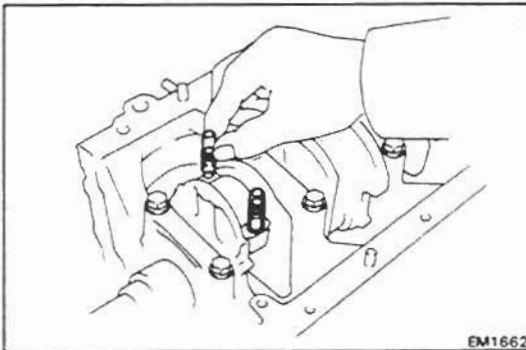


EM2301

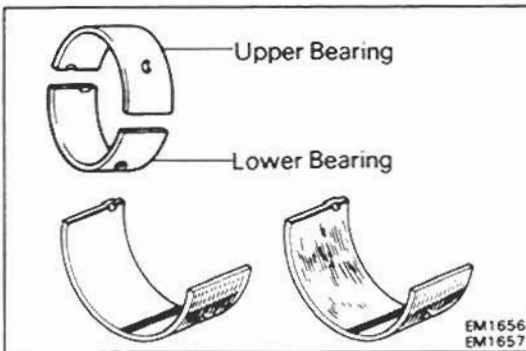


- (c) Using a plastic-faced hammer, lightly tap the connecting rod bolt and lift off the cap and lower bearing.

NOTE: Keep the lower bearing inserted with the cap.



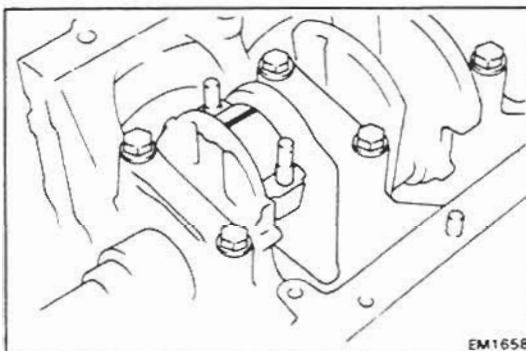
- (d) Cover the connecting rod bolts with a short piece of hose to protect the crankshaft from damage.



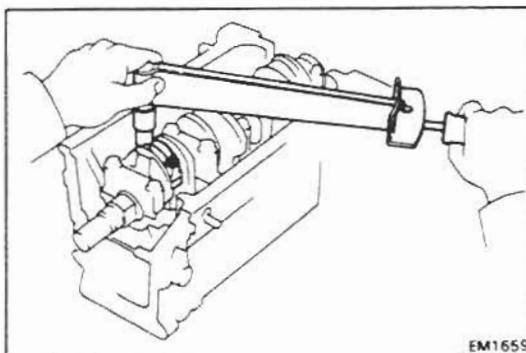
- (e) Clean the crank pin and bearing.

- (f) Check the crank pin and bearing for pitting and scratches.

If the crank pin or bearing are damaged, replace the bearing. If necessary grind or replace the crankshaft.



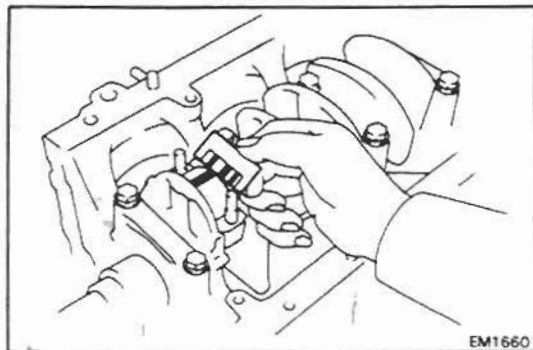
- (g) Lay a strip of Plastigage across the crankshaft pin.



- (h) Install the connecting rod cap.
(See step 6 on page EM-98)

NOTE: Do not turn the crankshaft.

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



EM1660

- (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 – 0.073 mm (0.0007 – 0.0029 in.)

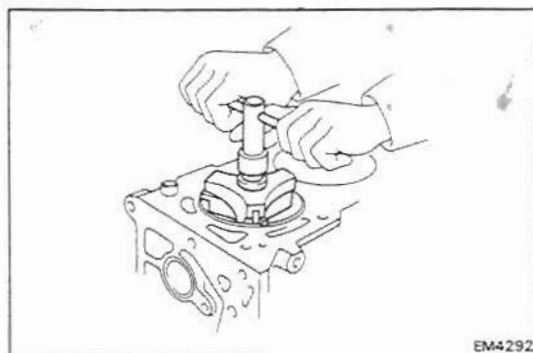
Maximum oil clearance: 0.08 mm (0.0031 in.)

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

- (k) Completely remove the Plastigage.

4. PUSH OUT PISTON AND CONNECTING ROD ASSEMBLIES

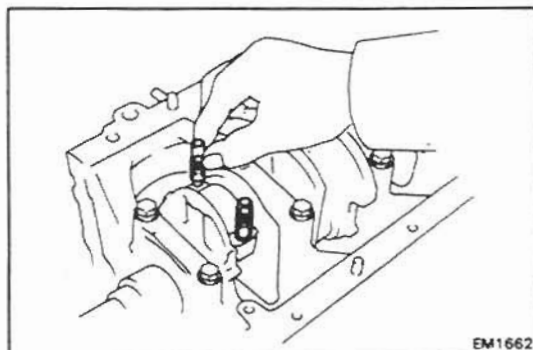
- (a) Remove all the carbon from the top of the cylinder.



EM4292

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

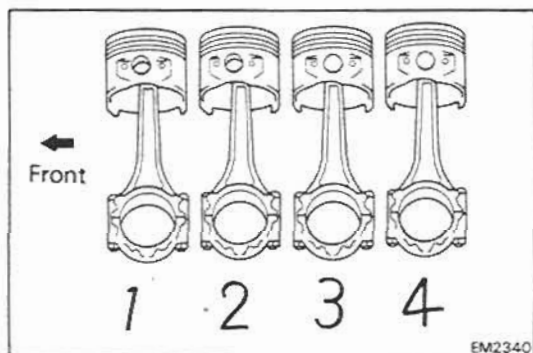
- (c) Push out the piston and connecting rod assembly and the upper bearing through the top of the cylinder block.



EM1662

NOTE:

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



EM2340

5. CHECK CRANKSHAFT THRUST CLEARANCE

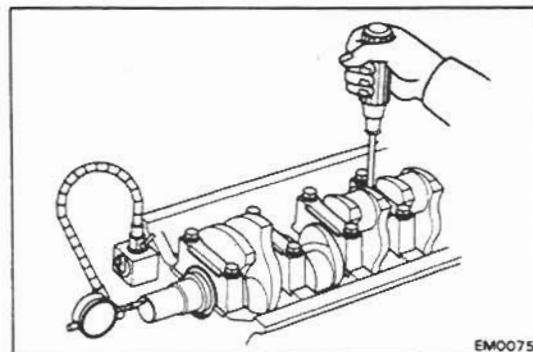
Using a dial indicator, measure the thrust clearance while prying the crankshaft back and forth with a screwdriver.

Standard thrust clearance: 0.02 – 0.22 mm
(0.0008 – 0.0087 in.)

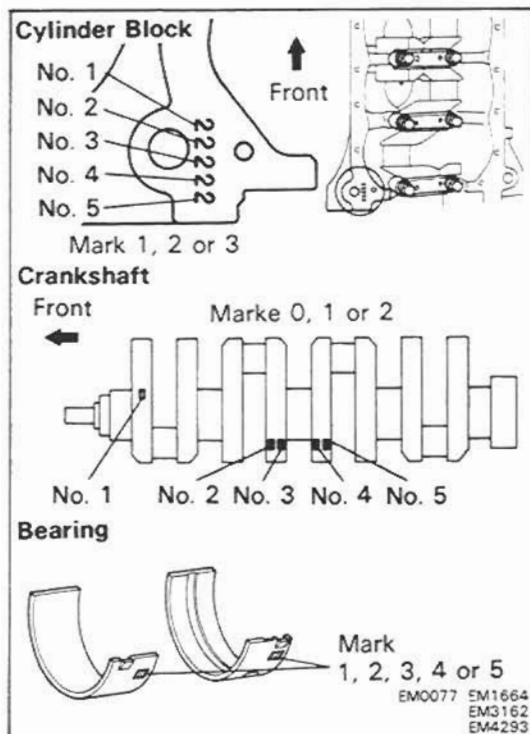
Maximum thrust clearance: 0.30 mm (0.0118 in.)

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

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



EM0075



6. REMOVE MAIN BEARING CAPS AND MEASURE OIL CLEARANCE

NOTE: If replacing a bearing, replace with one having the same number. If the number of the bearing cannot be determined, select a bearing from the table below according to the numbers imprinted on the cylinder block and crankshaft.

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

Example: Cylinder Block "2", Crankshaft "1" = Bearing "3"

(Reference)

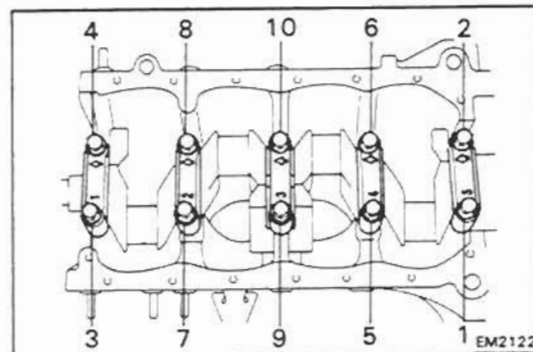
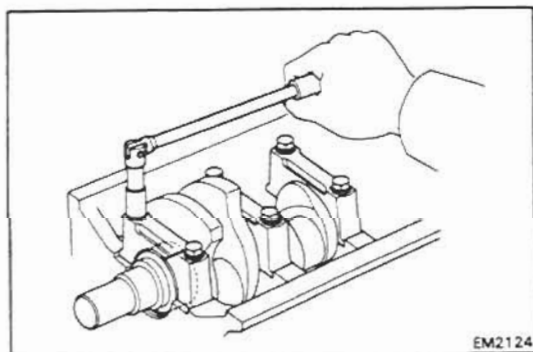
mm (in.)					
No.	Cylinder block main journal bore	No.	Crankshaft diameter	No.	★ Bearing thickness
1	52.025-52.031 (2.0482-2.0485)	0	47.994-48.000 (1.8895-1.8898)	1	2.002-2.005 (0.0788-0.0789)
				2	2.005-2.008 (0.0789-0.0791)
2	52.031-52.037 (2.0485-2.0487)	1	47.988-47.994 (1.8893-1.8895)	3	2.008-2.011 (0.0791-0.0792)
				4	2.011-2.014 (0.0792-0.0793)
3	52.037-52.043 (2.0487-2.0489)	2	47.982-47.988 (1.8891-1.8893)	5	2.014-2.017 (0.0793-0.0794)

★ Bearing thickness = Center wall thickness

Bearing thickness (at center wall):

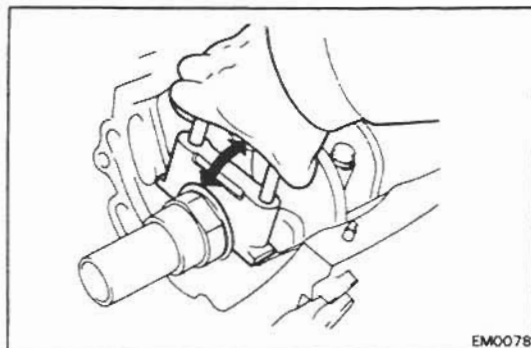
U/S 0.25

2.121 – 2.127 mm (0.0835 – 0.0837 in.)



- (a) Remove the bearing caps with the lower bearing and lower thrust washers (No. 3 cap only).

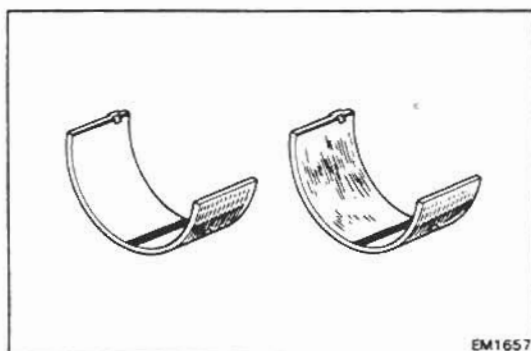
NOTE: Uniformly loosen and remove the main bearing cap bolts in several passes, in the sequence shown.



- (b) Using the removed bearing cap bolts, wiggle the bearing cap back and forth, and remove it with the lower bearing and thrust washers (No. 3 journal only).

NOTE:

- Keep the lower bearing inserted with the cap.
- Arrange the caps and lower thrust washers in correct order.

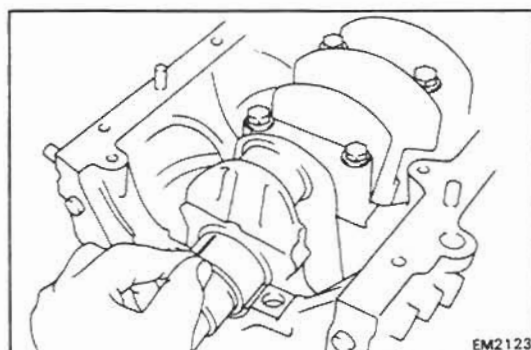


- (c) Lift off the crankshaft.

NOTE: Keep the upper bearings and upper thrust washers (No. 3 journal only) inserted in the cylinder block.

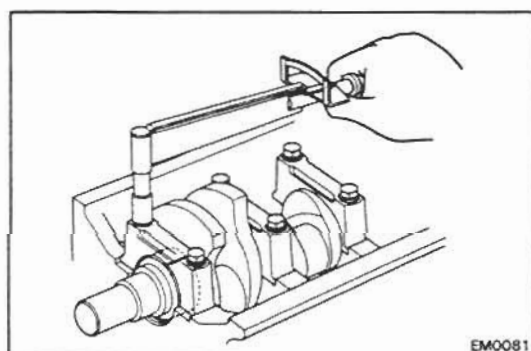
- (d) Clean the journals and bearings.
 (e) Check the journals and bearings for pitting and scratches.

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



- (f) Place the crankshaft on the cylinder block.

- (g) Lay a strip of plastigage across each journal.

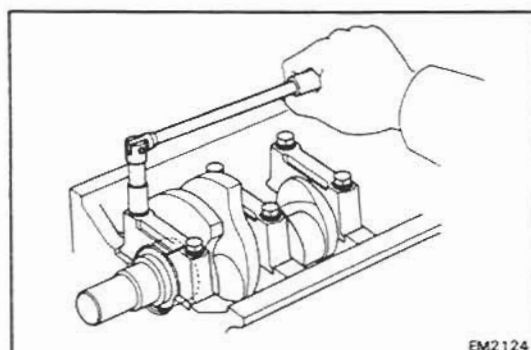


- (h) Install the bearing caps with the lower bearing and lower thrust washers (No. 3 cap only).

(See step 4 on page EM-96)

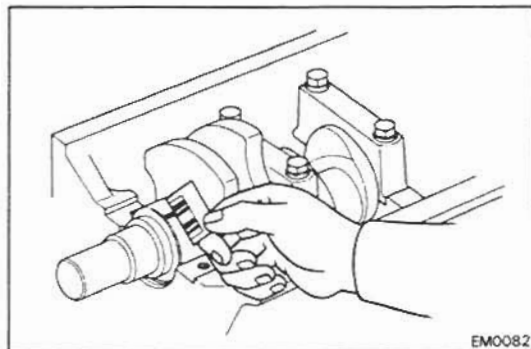
Torque: 610 kg-cm (44 ft-lb, 60 N-m)

NOTE: Do not turn the crankshaft.



- (i) Remove the bearing caps with the lower bearing and lower thrust washers.

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



- (j) Measure the Plastigage at its widest point.

Standard oil clearance:

STD	0.015 – 0.033 mm (0.0006 – 0.0013 in.)
U/S 0.25	0.013 – 0.0053 mm (0.0005 – 0.0021 in.)

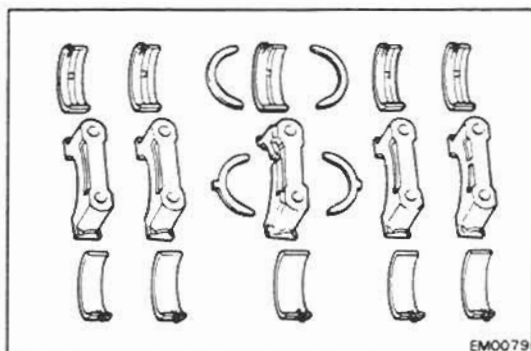
Maximum oil clearance: 0.10 mm (0.0039 in.)

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

0.015 – 0.045 mm (0.0006–0.0018 in.).

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

- (k) Completely remove the Plastigage.



7. REMOVE CRANKSHAFT

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

NOTE:

- Arrange the caps, bearings and thrust washers in correct order.
- The pilot bearing in the crankshaft rear end is permanently lubricated and requires no cleaning or lubrication.

MAINTENANCE

Engine

Drive belt tension w/ Borroughs drive belt tension gauge No. BT-33-73F or Nippondenso BTG-20 (95506-00020)						
4A-GE	Alternator	New belt	175 ± 5 lb			
		Used belt	115 ± 20 lb			
	A/C	New belt	160 ± 20 lb			
		Used belt	105 ± 10 lb			
4A-GZE	Alternator					
		w/ Air con.	New belt	165 ± 10 lb		
		Used belt	85 ± 15 lb			
	w/o Air con.	New belt	175 ± 5 lb			
		Used belt	115 ± 20 lb			
	Supercharger	New belt	175 ± 5 lb			
Used belt		115 ± 20 lb				
Coolant capacity w/ heater or air conditioner						
	M/T	w/ heater	12.2 liters	12.9 US qts	10.7 Imp. qts	
		Others	12.4 liters	13.1 US qts	10.9 Imp. qts	
	A/T		12.9 liters	13.6 US qts	11.4 Imp. qts	
Engine oil capacity	Drain and refill					
	w/ Oil cooler					
		w/ Oil filter change	3.4 liters	3.6 US qts	3.0 Imp. qts	
	w/o Oil cooler					
w/ Oil filter change		3.3 liters	3.5 US qts	2.9 Imp. qts		
Spark plug						
Type	4A-GE	ND	PQ16R			
		NGK	BCPR5EP11			
	4A-GZE	ND	PQ20R			
		NGK	BCPR6EP11			
Gap			1.1 mm	0.043 in.		
Firing order			1 - 3 - 4 - 2			
Valve clearance (cold)		Intake	0.15 - 0.25 mm	0.006 - 0.010 in.		
		Exhaust	0.20 - 0.30 mm	0.008 - 0.012 in.		
Idle speed				800 rpm		

Chassis

Front brake					
Pad thickness	Limit	3.0 mm		0.118 in.	
Disc thickness	Limit	21.0 mm		0.827 in.	
Disc runout	Limit	0.13 mm		0.0051 in.	
Rear brake					
Pad thickness	Limit	1.0 mm		0.039 in.	
Disc thickness	Limit	9.0 mm		0.354 in.	
Disc runout	Limit	0.15 mm		0.0059 in.	
Front axle and suspension					
Ball joint vertical play	Limit	0 mm		0 in.	
Steering wheel freeplay		Max. 30 mm (1.18 in.)			

Chassis (Cont'd)

Torque specifications:				
Front seat mounting bolt		375 kg-cm	27 ft-lb	37 N·m
Front strut bar bracket x Body		590 kg-cm	43 ft-lb	58 N·m
Rear suspension arm bracket x Body		590 kg-cm	43 ft-lb	58 N·m

ENGINE MECHANICAL

Specifications

Cylinder head	Warpage	Cylinder block side	Limit	0.05 mm	0.0020 in.
		Intake manifold side	Limit	0.05 mm	0.0020 in.
		Exhaust manifold side	Limit	0.10 mm	0.0039 in.
	Valve guide bushing bore		STD	11.000 – 11.027 mm	0.4331 – 0.4341 in.
			O/S 0.05	11.050 – 11.077 mm	0.4350 – 0.4361 in.
	Valve seat	Refacing angle		30°, 45°, 60°	
		Contacting angle		45°	
		Contacting width		1.0 – 1.4 mm	0.039 – 0.055 in.
Valve guide bushing	Inside diameter			6.01 – 6.03 mm	0.2366 – 0.2374 in.
	Outside diameter		STD	11.033 – 11.044 mm	0.4344 – 0.4348 in.
			O/S 0.05	11.083 – 11.094 mm	0.4363 – 0.4368 in.
	Replacing temperature (Cylinder head side)			80 – 100°C	176 – 212°F
Valve	Valve overall length	STD	Intake	99.60 mm	3.9213 in.
			Exhaust	99.75 mm	3.9272 in.
		Limit	Intake	99.10 mm	3.9016 in.
			Exhaust	99.25 mm	3.9075 in.
	Valve face angle			44.5°	
	Stem diameter		Intake	5.970 – 5.985 mm	0.2350 – 0.2356 in.
			Exhaust	5.965 – 5.980 mm	0.2348 – 0.2354 in.
	Stem oil clearance	STD	Intake	0.025 – 0.060 mm	0.0010 – 0.0024 in.
			Exhaust	0.030 – 0.065 mm	0.0012 – 0.0026 in.
		Limit	Intake	0.08 mm	0.0031 in.
			Exhaust	0.10 mm	0.0039 in.
	Margin thickness	STD		0.8 – 1.2 mm	0.031 – 0.047 in.
		Limit		0.5 mm	0.020 in.
Valve spring	Free length			41.09 mm	1.6177 in.
	Installed tension at 34.7 mm (1.366 in.)			14.6 – 17.0 kg (32.2 – 37.5 lb, 143 – 167 N)	
	Squareness		Limit	1.8 mm	0.071 in.
Valve lifter	Outer diameter		STD	27.975 – 27.985 mm	1.1014 – 1.1018 in.
	Oil clearance		STD	0.015 – 0.046 mm	0.0006 – 0.0018 in.
			Limit	0.10 mm	0.0039 in.
Manifold	Warpage	Intake manifold	Limit	0.05 mm	0.0020 in.
		Exhaust manifold	Limit	0.30 mm	0.0118 in.
Air control valve	Warpage (4A-GE only)		Limit	0.05 mm	0.0020 in.

Specifications (Cont'd)

Timing belt	Timing belt deflection			4 mm at 2 kg (0.16 in. at 4.4 lb, 20 N)		
	Tension spring		Free length	43.5 mm	1.713 in.	
			Installed load	9.97 kg at 50.2 mm (22.0 lb, 98 N at 1.976 in.)		
Camshaft	Thrust clearance		STD	0.08 – 0.19 mm	0.0031 – 0.0075 in.	
			Limit	0.30 mm	0.0118 in.	
	Journal oil clearance		STD	0.035 – 0.072 mm	0.0014 – 0.0028 in.	
			Limit	0.10 mm	0.0039 in.	
	Journal diameter		STD	26.949 – 26.965 mm	1.0610 – 1.0616 in.	
	Circle runout		Limit	0.04 mm	0.0016 in.	
	Cam lobe height		STD	35.410 – 35.510 mm	1.3823 – 1.3980 in.	
			Limit	35.11 mm	1.3823 in.	
Cylinder block	Cylinder head surface warpage		Limit	0.05 mm	0.0020 in.	
	Cylinder bore diameter	STD	STD	81.00 – 81.03 mm	3.1890 – 3.1902 in.	
		Limit	STD	81.23 mm	3.1980 in.	
			O/S 0.50	81.73 mm	3.2177 in.	
Piston and piston ring	Piston diameter	4A-GE	STD	80.890 – 80.920 mm	3.1846 – 3.1858 in.	
			U/S 0.50	81.390 – 81.420 mm	3.2043 – 3.2055 in.	
		4A-GZE	STD	80.870 – 80.900 mm	3.1839 – 3.1850 in.	
			U/S 0.50	81.370 – 81.400 mm	3.2035 – 3.2047 in.	
	Piston oil clearance	4A-GE		0.10 – 0.12 mm	0.0039 – 0.0047 in.	
			4A-GZE		0.12 – 0.14 mm	0.0047 – 0.0055 in.
	Piston ring groove clearance		No. 1	0.04 – 0.08 mm	0.0016 – 0.0031 in.	
			No. 2	0.03 – 0.07 mm	0.0012 – 0.0028 in.	
	Piston ring end gap	STD	No. 1		0.25 – 0.47 mm	0.0098 – 0.0185 in.
					0.20 – 0.42 mm	0.0079 – 0.0165 in.
			Oil	Code mark T	0.15 – 0.52 mm	0.0059 – 0.0205 in.
				Code mark R	0.30 – 1.02 mm	0.0118 – 0.0402 in.
		Limit	No. 1		1.07 mm	0.0421 in.
					1.02 mm	0.0402 in.
			Oil	Code mark T	1.12 mm	0.0441 in.
				Code mark R	1.62 mm	0.0638 in.
Connecting rod and bearing	Thrust clearance		STD	0.15 – 0.25 mm	0.0059 – 0.0098 in.	
			Limit	0.30 mm	0.0118 in.	
	Connecting rod oil clearance	STD	STD	0.020 – 0.051 mm	0.0008 – 0.0020 in.	
			U/S 0.25	0.019 – 0.073 mm	0.0007 – 0.0029 in.	
		Limit		0.08 mm	0.0031 in.	
	Connecting rod bearing center wall thickness	STD	Mark 1	1.486 – 1.490 mm	0.0585 – 0.0587 in.	
			Mark 2	1.490 – 1.494 mm	0.0587 – 0.0588 in.	
		U/S 0.25	Mark 3	1.494 – 1.498 mm	0.0588 – 0.0590 in.	
			1.607 – 1.613 mm	0.0633 – 0.0635 in.		

Specifications (Cont'd)

Connecting rod and bearing (cont'd)	Bent	Limit	per 100 mm (3.94 in.)	0.03 mm	0.0012 in.
	Twist	Limit	per 100 mm (3.94 in.)	0.05 mm	0.0020 in.
	Bushing inside diameter			20.010 – 20.022 mm	0.7878 – 0.7883 in.
	Piston pin diameter			20.004 – 20.016 mm	0.7876 – 0.7880 in.
	Piston pin oil clearance	STD		0.004 – 0.008 mm	0.0002 – 0.0003 in.
		Limit		0.05 mm	0.0020 in.
Crankshaft	Thrust clearance	STD		0.02 – 0.22 mm	0.0008 – 0.0087 in.
		Limit		0.30 mm	0.0118 in.
	Thrust washer thickness	STD		2.440 – 2.490 mm	0.0961 – 0.0980 in.
	Main journal oil clearance				
		STD	STD	0.015 – 0.033 mm	0.0006 – 0.0013 in.
			U/S 0.25	0.013 – 0.053 mm	0.0005 – 0.0021 in.
		Limit		0.10 mm	0.0039 in.
	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 – 1.8801 in.
	Main bearing center wall thickness				
		STD	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.
			U/S 0.25	2.121 – 2.127 mm	0.0835 – 0.0837 in.
	Crank pin diameter	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.
	Circle runout	Limit		0.06 mm	0.0024 in.
	Main journal taper and out-of-round				
		Limit		0.02 mm	0.0008 in.
	Crank pin taper and out-of-round	Limit		0.02 mm	0.0008 in.

Torque Specifications

Part tightened		kg-cm	ft-lb	N-m
Camshaft timing pulley x Camshaft		475	34	47
Idler pulley x Cylinder block		375	27	37
Crankshaft pulley x Crankshaft		1,400	101	137
Cylinder head x Cylinder block	1st	300	22	29
	2nd	90° turns		
	3rd	90° turns		
Camshaft bearing cap x Cylinder head		130	9	13
Intake manifold x Cylinder head		280	20	27
Intake manifold stay x Cylinder head (4A-GE)		220	16	22
Intake manifold stay x Cylinder block (4A-GE)		220	16	22
EGR pipe x Exhaust manifold		700	51	69
EGR valve x Intake manifold		190	14	19
Exhaust manifold x Cylinder head		250	29	39

Torque Specifications (Cont'd)

Part tightened	kg-cm	ft-lb	N-m
Exhaust manifold stay x Exhaust manifold	400	29	39
Exhaust manifold stay x Cylinder block	400	29	39
Main bearing cap x Cylinder block	610	44	60
Connecting rod cap x Connecting rod (Hexagon nut type)	500	36	49
(12-sided nut type)	400	29	39
1st	90° turns		
2nd			
Flywheel x Crankshaft	750	54	74
Drive plate x Crankshaft	850	61	83

SUPERCHARGER SYSTEM

Specifications

Supercharger pressure	M/T	0.25 kg/cm ²	3.6 psi	25 kPa
	A/T	0.30 kg/cm ²	4.3 psi	29 kPa
Supercharger magnet clutch resistance	at 20°C (68°F)	3.5 – 3.9 Ω		
Supercharger magnet clutch air gap		0.35 – 0.65 mm	0.0138 – 0.0256 in.	
Supercharger magnet clutch air gap adjusting shim thickness		0.1 mm	0.004 in.	
		0.3 mm	0.012 in.	
		0.5 mm	0.020 in.	
		0.7 mm	0.028 in.	
		0.9 mm	0.035 in.	
		1.1 mm	0.043 in.	

Torque Specifications

Part tightened	kg-cm	ft-lb	N-m
Rear plate x Housing (Bolt)	50	43 in.-lb	4.9
Rear plate x Housing (Nut)	500	36	49
Rear cover x Rear plate	50	43 in.-lb	4.9
Clutch flange x Housing	50	43 in.-lb	4.9
Clutch pulley ring nut	250	18	25
Clutch hub nut	200	14	20
No. 2 air inlet duct x Housing	95	82 in.-lb	9.4
Supercharger x Intake manifold	350	25	34
Supercharger x Bracket	600	47	64
No. 1 air inlet duct x Intake manifold	190	14	19
No. 1 air outlet duct x Housing	100	7	10
Air inlet duct stay (Duct side)	220	16	22
Air inlet duct stay (Block side)	400	29	39

Specifications (Cont'd)

Air flow meter (cont'd)	Resistance (cont'd)	THA - E ₂	10 - 20 k Ω (-20°C, -4°F) 4 - 7 k Ω (0°C, 32°F) 2 - 3 k Ω (20°C, 68°F) 0.9 - 1.3 k Ω (40°C, 104°F) 0.4 - 0.7 k Ω (60°C, 140°F)
Water temp. sensor and air temp. sensor	Resistance	at -20°C (-4°F) 0°C (32°F) 20°C (68°F) 40°C (104°F) 60°C (140°F) 80°C (176°F)	10 - 20 k Ω 4 - 7 k Ω 2 - 3 k Ω 0.9 - 1.3 k Ω 0.4 - 0.7 k Ω 0.2 - 0.4 k Ω
Resistor	Resistance	No. 10 or No. 20 - +B	3 Ω
ISC Valve	Resistance	ISC ₁ - +B ISC ₂ - +B	16 - 17 Ω 16 - 17 Ω
Oxygen sensor	Heater coil resistance		5.1 - 6.3 Ω
EGR gas temp. sensor	Resistance	50°C (112°F) 100°C (212°F) 150°C (302°F)	69.40 - 88.50 k Ω 11.89 - 14.37 k Ω 2.79 - 3.59 k Ω

- NOTE: 1. Perform all voltage and resistance measurements with the computer connected.
2. Verify that the battery voltage is 11 V or above when the ignition switch is ON.
3. The testing probes must not make contact with the computer Ox and V_r terminals.

Terminals	STD voltage	Condition	
BATT - E1	10 - 14	—	
+B1 - E1 +B - E1		Ignition S/W ON	
IDL - E2	M/T 4 - 5 A/T 10 - 14	Ignition S/W ON	Throttle valve open
VTA - E2	0.1 - 1.0		Throttle valve fully closed
	4 - 5		Throttle valve fully open
VC - E2	4 - 6	Ignition S/W ON	—
VC - E2	4 - 6		—
VS - E2	4 - 5		Measuring plate fully closed
	0.02 - 0.5		Measuring plate fully open
	2 - 4	Idling	—
No. 10 - E01 No. 20 - E02	9 - 14	Ignition S/W ON	
W - E1	0.5 or less	Ignition S/W ON	
	9 - 14	Engine start	
THA - E2	1 - 3	Ignition S/W ON	Intake air temperature 20°C (68°F)
THW - E2	0.1 - 1.0	Ignition S/W ON	Coolant temperature 80°C (176°F)
STA - E1	6 - 14	Ignition S/W ST position and press on the clutch pedal (M/T)	
IGT - E1	0.7 - 1.0	Idling	
RSC RSO - E1	9 - 14	Ignition S/W ON	

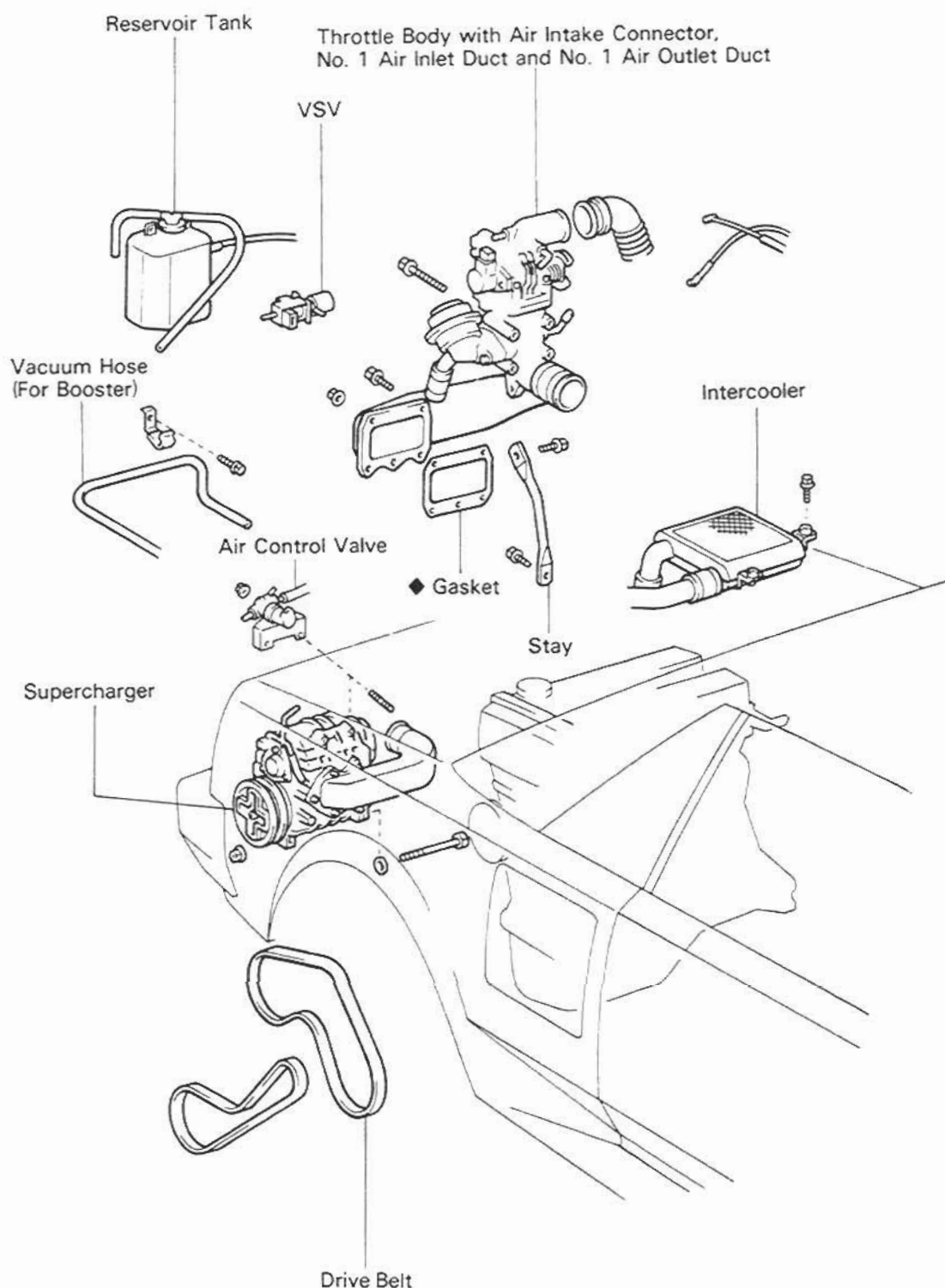
Specifications (Cont'd)

Air flow meter (cont'd)	Resistance (cont'd)	THA - E ₂	10 - 20 k Ω (-20°C, -4°F) 4 - 7 k Ω (0°C, 32°F) 2 - 3 k Ω (20°C, 68°F) 0.9 - 1.3 k Ω (40°C, 104°F) 0.4 - 0.7 k Ω (60°C, 140°F)
Water temp. sensor and air temp. sensor	Resistance	at -20°C (-4°F) 0°C (32°F) 20°C (68°F) 40°C (104°F) 60°C (140°F) 80°C (176°F)	10 - 20 k Ω 4 - 7 k Ω 2 - 3 k Ω 0.9 - 1.3 k Ω 0.4 - 0.7 k Ω 0.2 - 0.4 k Ω
Resistor	Resistance	No. 10 or No. 20 - +B	3 Ω
ISC Valve	Resistance	ISC ₁ - +B ISC ₂ - +B	16 - 17 Ω 16 - 17 Ω
Oxygen sensor	Heater coil resistance		5.1 - 6.3 Ω
EGR gas temp. sensor	Resistance	50°C (112°F) 100°C (212°F) 150°C (302°F)	69.40 - 88.50 k Ω 11.89 - 14.37 k Ω 2.79 - 3.59 k Ω

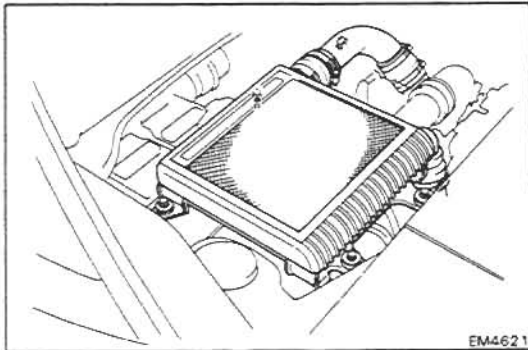
- NOTE: 1 Perform all voltage and resistance measurements with the computer connected.
2 Verify that the battery voltage is 11 V or above when the ignition switch is ON.
3 The testing probes must not make contact with the computer Ox and Vr terminals.

Terminals	STD voltage	Condition	
BATT - E1		—	
+B1 +B	10 - 14	Ignition S/W ON	
IDL - E2	M/T 4 - 5 A/T 10 - 14	Ignition S/W ON	Throttle valve open
VTA - E2	0.1 - 1.0 4 - 5		Throttle valve fully closed
			Throttle valve fully open
VC - E2	4 - 6	Ignition S/W ON	—
VC - E2	4 - 5		—
			—
VS - E2	4 - 5 0.02 - 0.5	Ignition S/W ON	Measuring plate fully closed
			Measuring plate fully open
	2 - 4	Idling	—
No. 10 - E01 No. 20 - E02	9 - 14	Ignition S/W ON	
	0.5 or less	Ignition S/W ON	
W - E1	9 - 14	Engine start	
THA - E2	1 - 3	Ignition S/W ON	Intake air temperature 20°C (68°F)
THW - E2	0.1 - 1.0	Ignition S/W ON	Coolant temperature 80°C (176°F)
STA - E1	6 - 14	Ignition S/W ST position and press on the clutch pedal (M/T)	
IGT - E1	0.7 - 1.0	Idling	
RSC RSO	9 - 14	Ignition S/W ON	

REMOVAL OF SUPERCHARGER Components

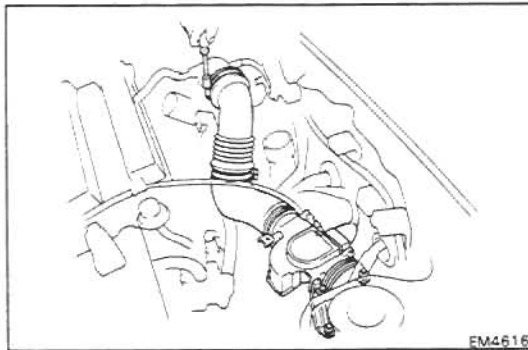


1. **DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY**
2. **DRAIN ENGINE COOLANT**
3. **REMOVE RADIATOR RESERVOIR TANK**
4. **REMOVE VSV**



5. **REMOVE INTERCOOLER**

Disconnect the two hose clamps, and remove the four bolts and intercooler.



6. **REMOVE AIR FLOW METER WITH NO.3 AIR CLEANER HOSE**

- (a) Disconnect the air flow meter connector.
- (b) Remove the bolt and EGR VSV without disconnect the connector.
- (c) Loosen the two clamps, and remove the three bolts and air flow meter with No.3 air cleaner hose.

7. **DISCONNECT ACCELERATOR CABLE (ROD) AND THROTTLE CABLE**

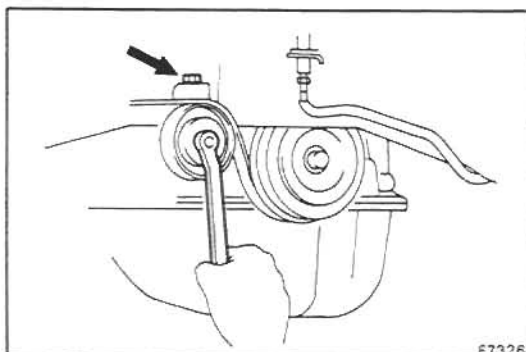
8. **DISCONNECT FOLLOWING HOSES:**

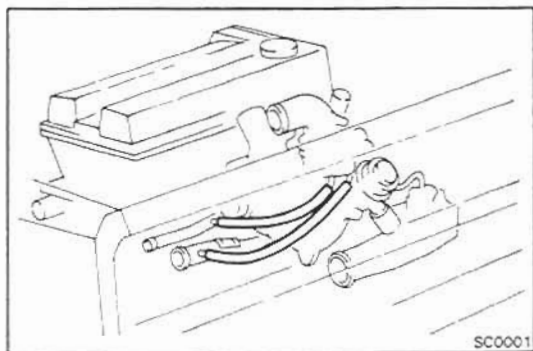
- (a) PCV hose
- (b) Brake booster hose
- (c) ACV hose
- (d) A/C idle up vacuum hose
- (e) Emission control vacuum hoses

9. **REMOVE NO.1 INTAKE AIR CONNECTOR PIPE WITH AIR HOSE**

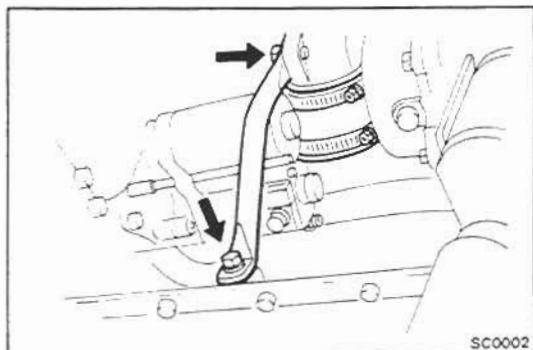
10. **REMOVE DRIVE BELT (FOR SUPERCHARGER)**

Loosen the idler pulley lock nut and adjusting bolt, and remove the drive belt.



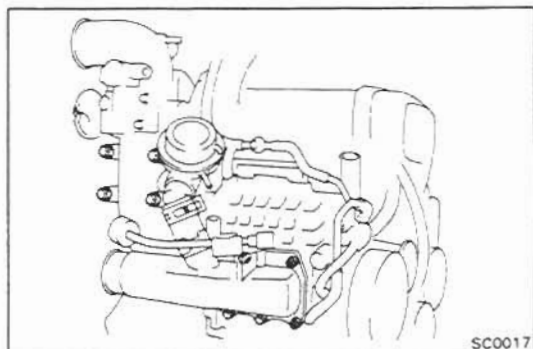


11. DISCONNECT NO.2 AND NO.3 WATER BY-PASS HOSES



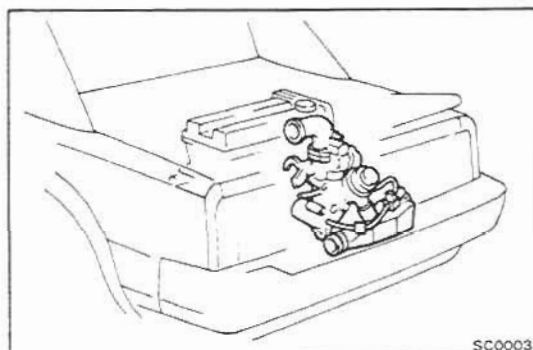
12. LOOSEN AIR HOSE CLAMP

13. REMOVE TWO BOLTS AND AIR INLET DUCT STAY



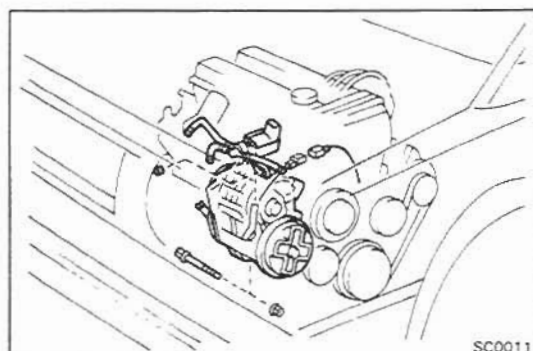
14. REMOVE THROTTLE BODY WITH AIR INTAKE CONNECTOR, NO.1 AIR INLET DUCT, AND NO.1 AIR OUTLET DUCT

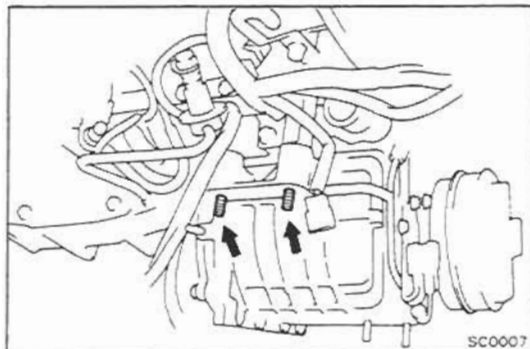
- (a) Remove the four bolt holding the No.1 inlet duct to the intake manifold.
- (b) Remove the three bolts and two nuts holding the No.1 air outlet duct to the supercharger housing.
- (c) Remove the throttle body with air intake connector, No.1 air inlet duct and No.1 air outlet duct.



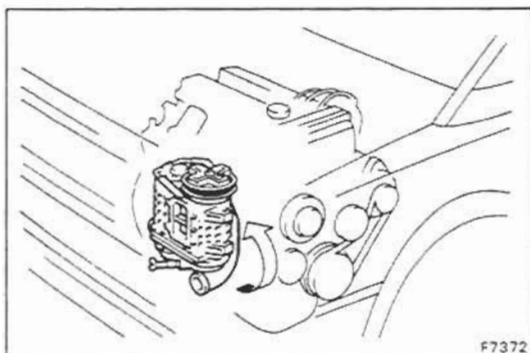
15. REMOVE SUPERCHARGER

- (a) Disconnect the ACV and supercharger connectors.
- (b) Disconnect the two ACV hoses.
- (c) Remove the two nuts and ACV.
- (d) Remove the pivot bolt and nut.



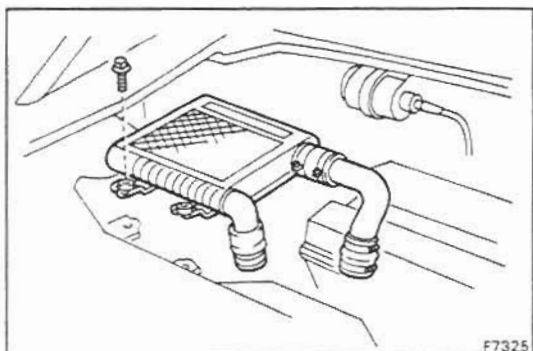


(e) Remove the two stud bolts.



(f) As shown in the illustration, rotate the supercharger assembly so that the clutch hub is uppermost, then lift it upwards.

CAUTION: The vehicle body is easily scratched, so use a cloth or rag to protect it.



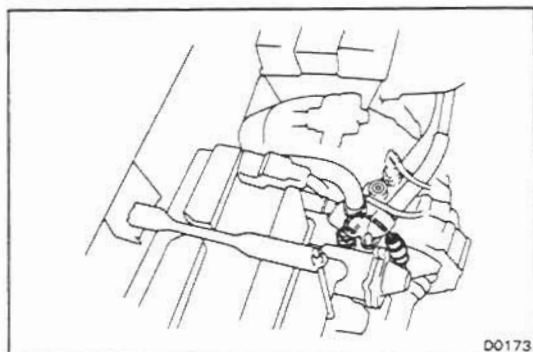
REMOVAL OF TRANSAXLE

1. REMOVE NEGATIVE BATTERY CABLE

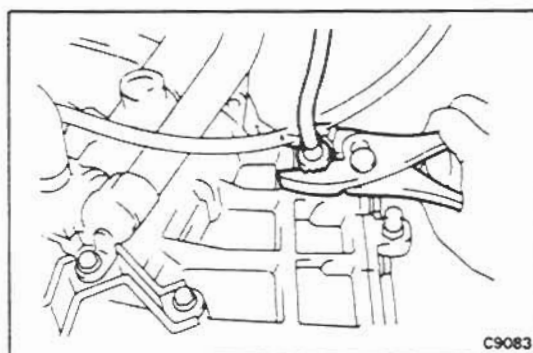
2. DRAIN OUT GEAR OIL

3. (E51 M/T) REMOVE INTERCOOLER

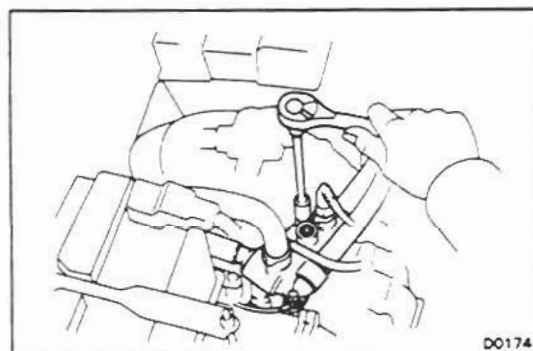
Disconnect the two hose clamps, remove the four bolts and intercooler.



4. DISCONNECT BACK-UP LIGHT SWITCH CONNECTOR



5. REMOVE SPEEDOMETER CABLE



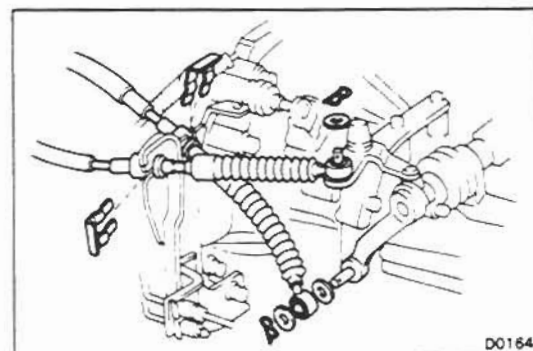
6. REMOVE WATER INLET

(a) Remove the bolts holding the water inlet to the transaxle.

(b) Remove the water inlet from the transaxle.

7. REMOVE ENGINE UNDER COVER

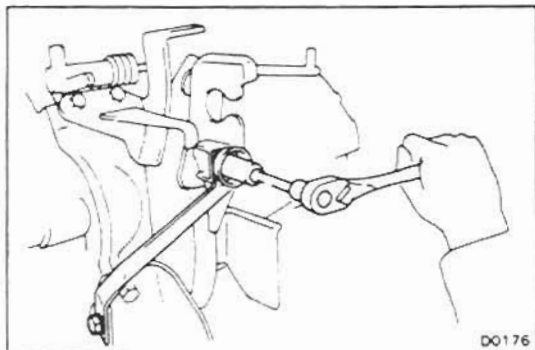
8. REMOVE FUEL TANK PROTECTOR



9. DISCONNECT CONTROL CABLES

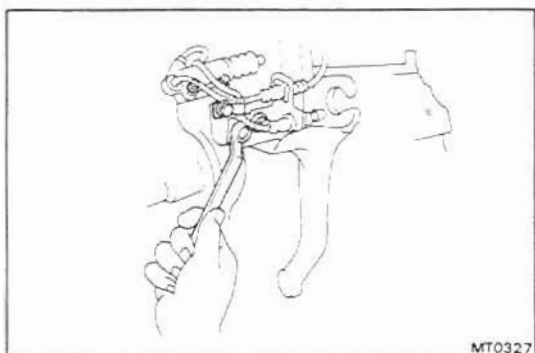
(a) Remove the two clips.

(b) Remove the two retainers and disconnect two control cables.

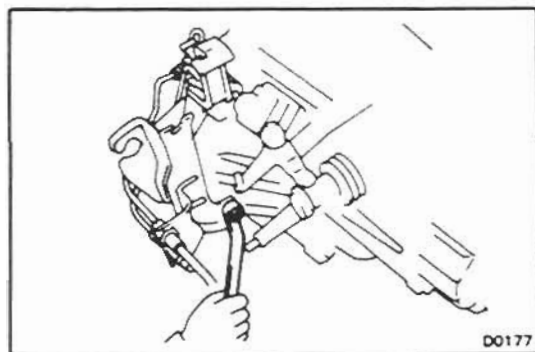


10. REMOVE CONTROL CABLE BRACKET AND CLUTCH RELEASE CYLINDER

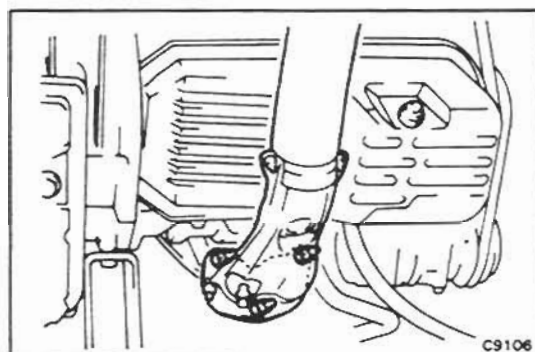
- (a) Remove the water hose clamp from control cable bracket.
- (b) (C52 M/T)
Remove the No. 2 control cable bracket.



- (c) (E51 M/T)
Remove the clutch release cylinder pipe bracket and clamp.

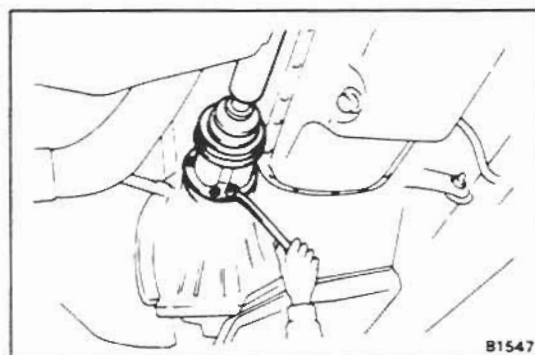


- (d) (C52 M/T)
Remove the control cable bracket and clutch release cylinder.



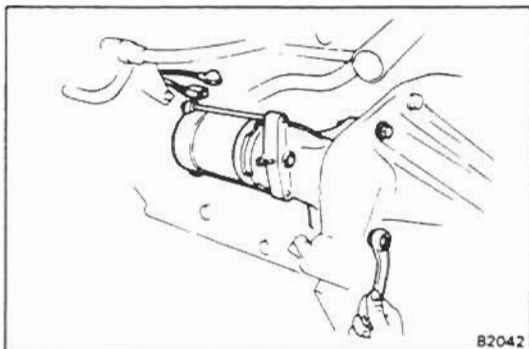
11. REMOVE EXHAUST PIPE ASSEMBLY

- (a) Disconnect the exhaust pipe from the exhaust manifold.
- (b) Remove the front bracket from the body.
- (c) Remove the exhaust pipe assembly from the rear bracket.

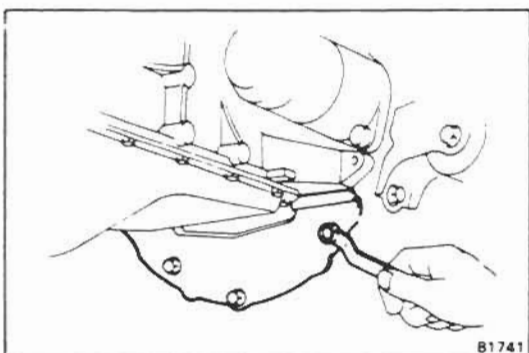
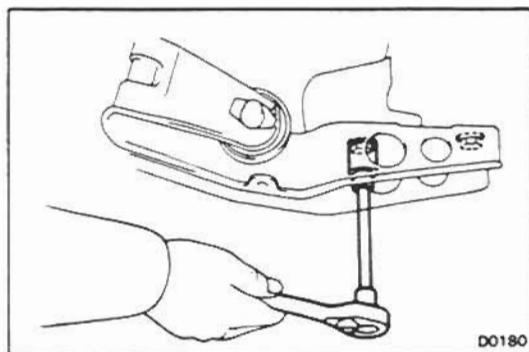


12. DISCONNECT DRIVE SHAFT FROM SIDE GEAR SHAFT

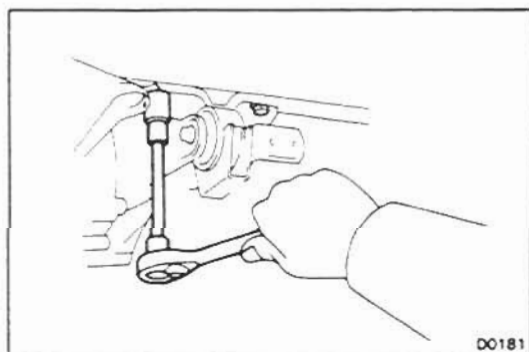
- (a) Remove the transaxle protector.
- (b) Disconnect the drive shaft from the side gear shaft.

**13. REMOVE STARTER**

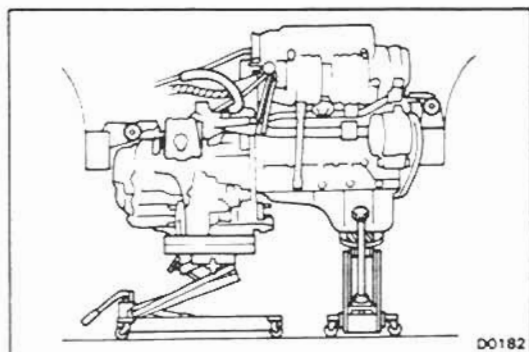
- (a) Disconnect the cable and connector.
- (b) Remove the starter with the two bolts.

**14. REMOVE NO. 2 ENGINE REAR PLATE****15. REMOVE FRONT ENGINE MOUNTING**

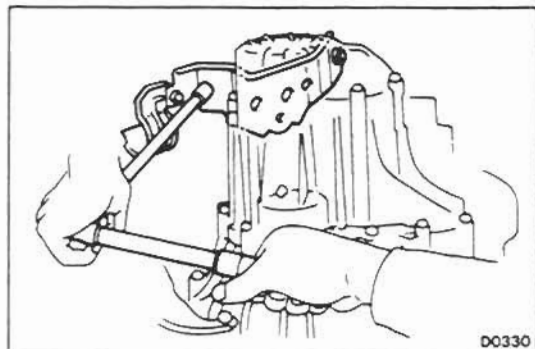
Remove the front engine mounting from the body.

**16. REMOVE REAR ENGINE MOUNTING**

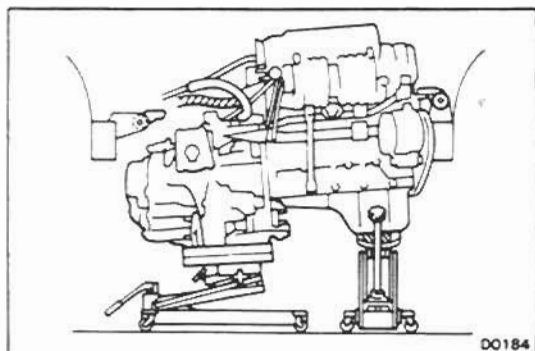
Remove the rear engine mounting from the body.

**17. REMOVE LEFT ENGINE MOUNTING**

- (a) Raise the transaxle and engine slightly, with a jack and wooden block in-between.

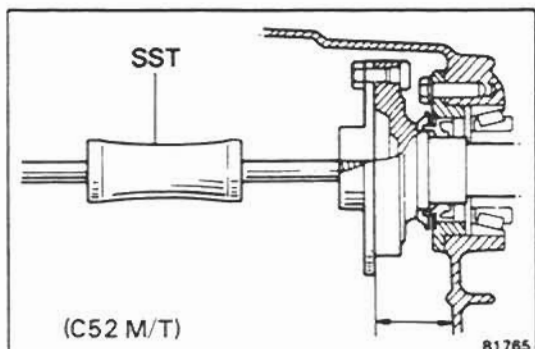


- (b) Disconnect the left engine mounting.



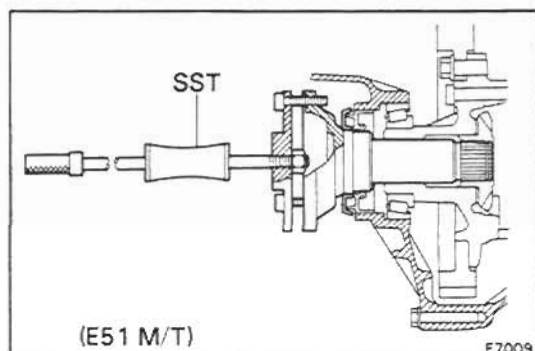
18. REMOVE TRANSAXLE

- (a) Disconnect the transaxle mounting bolts from the engine.
- (b) Lower the engine left side and remove the transaxle from the engine.



19. REMOVE SIDE GEAR SHAFT FROM TRANSAXLE

- (a) In order to install the side gear shaft, push the side gear shaft to the differential. Measure and note the distance between the transaxle case and side gear shaft.
- (b) Using SST, drive out the side gear shaft.
- SST 09520-32012



INSTALLATION OF TRANSAXLE

1. INSTALL SIDE GEAR SHAFT TO TRANSAXLE

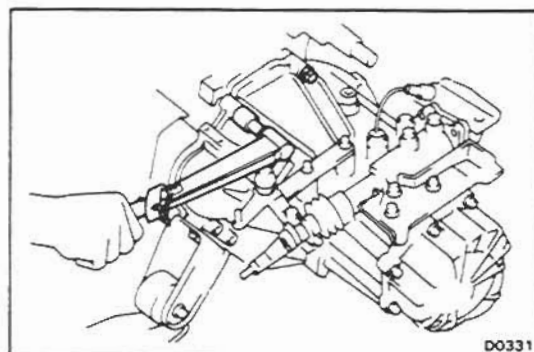
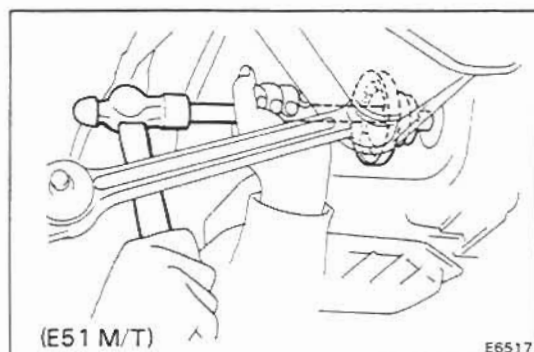
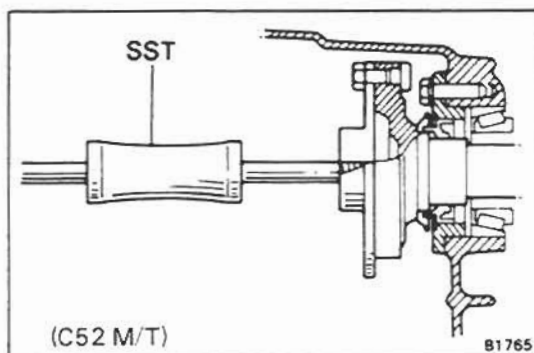
- Insure that a new snap ring is positioned securely in the groove of the side gear shaft.
- (C52 M/T)
Using SST, drive in the side gear shaft until it makes contact with the pinion shaft.

SST 09520-32012

(E51 M/T)

Using a brass bar and hammer, drive in the side gear shaft until it makes contact with the pinion shaft.

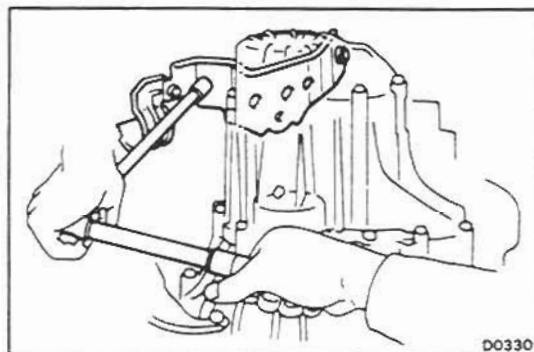
NOTE: Whether or not the side gear shaft is making contact with the pinion shaft can be known by the sound or feeling when driving it in.



2. INSTALL TRANSAXLE TO ENGINE

Align the input shaft spline with the clutch disc, and install the transaxle to the engine. Torque the bolts.

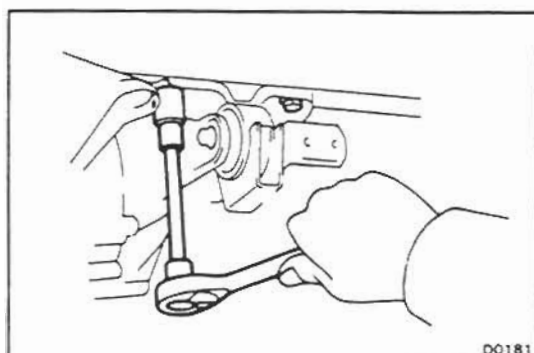
Torque: 12 mm bolt 650 kg-cm (47 ft-lb, 64 N·m)
10 mm bolt 470 kg-cm (34 ft-lb, 46 N·m)



3. INSTALL LEFT ENGINE MOUNTING

Install the left engine mounting with the bolts. Torque the bolts.

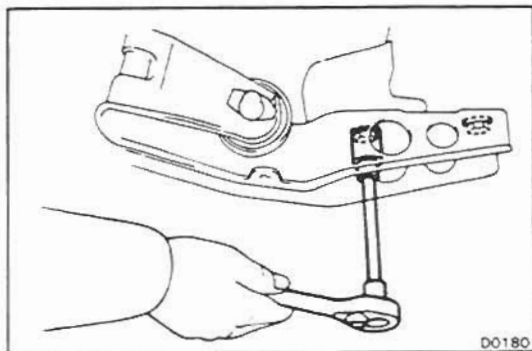
Torque: 530 kg-cm (38 ft-lb, 52 N·m)



4. INSTALL REAR ENGINE MOUNTING

Install the rear engine mounting with the bolts. Torque the bolts.

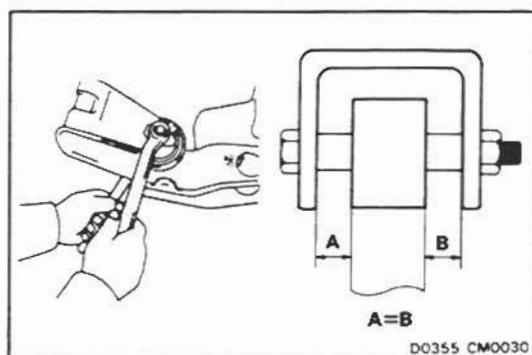
Torque: 530 kg-cm (38 ft-lb, 52 N·m)



5. INSTALL FRONT ENGINE MOUNTING

- (a) Install the front engine mounting with the bolts to the body.

Torque: 530 kg-cm (38 ft-lb, 52 N·m)

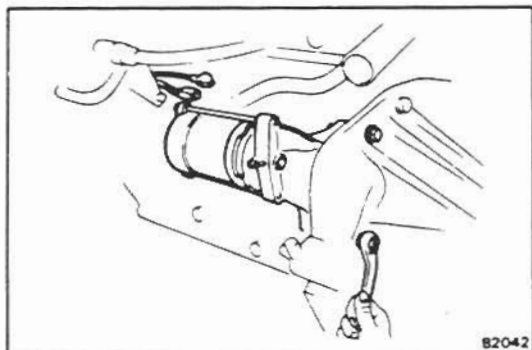


- (b) Loosen the insulator set bolt.

- (c) By bouncing the engine, confirm the front mount insulator is mounted on the middle of the insulator mount bracket.

- (d) Torque the insulator set bolt.

Torque: 800 kg-cm (58 ft-lb, 78 N·m)

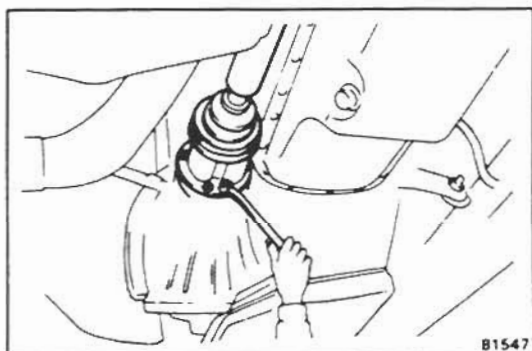


6. INSTALL STARTER

- (a) Install the starter with the two bolts. Torque the bolts.

Torque: 400 kg-cm (29 ft-lb, 39 N·m)

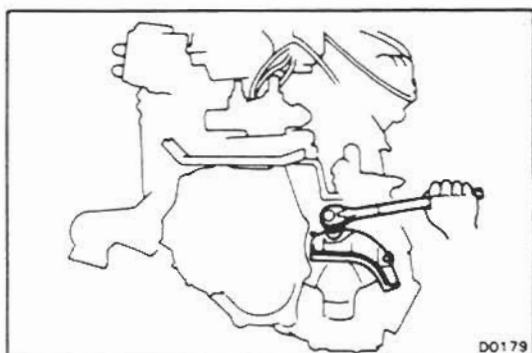
- (b) Connect the connector and cable.



7. CONNECT DRIVE SHAFT TO SIDE GEAR SHAFT

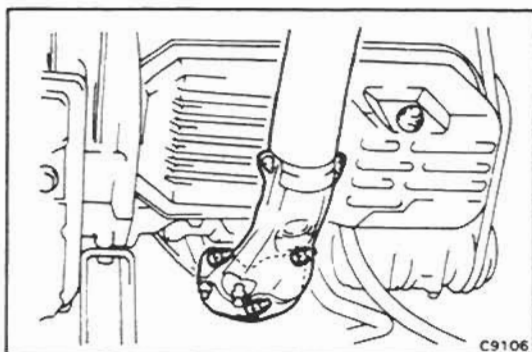
- (a) Connect the drive shaft to the side gear shaft. Torque the nuts.

Torque: 370 kg-cm (27 ft-lb, 36 N·m)



- (b) Install the transaxle protector. Torque the bolts.

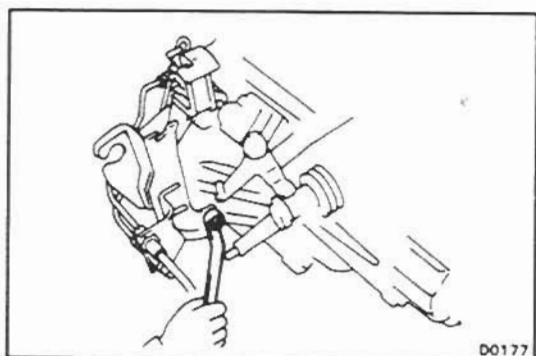
Torque: 130 kg-cm (9 ft-lb, 13 N·m)



8. INSTALL EXHAUST PIPE ASSEMBLY

- Install the exhaust pipe assembly to the rear bracket.
- Install the front bracket to the body.
- Connect the exhaust pipe to the exhaust manifold. Torque the nuts.

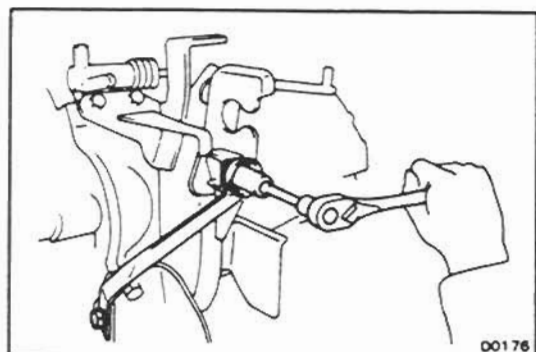
Torque: 630 kg-cm (46 ft-lb, 62 N·m)



9. INSTALL CONTROL CABLE BRACKET AND CLUTCH RELEASE CYLINDER

- Install the control cable bracket and clutch release cylinder. Torque the bolts.

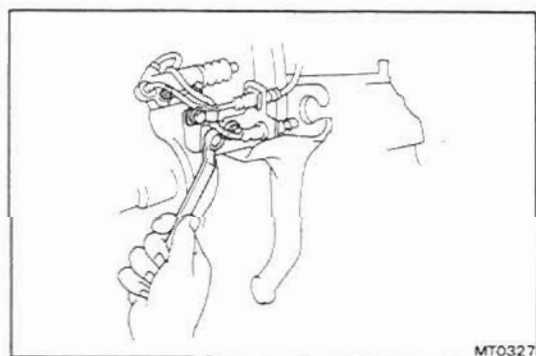
Torque: Transaxle side
 650 kg-cm (47 ft-lb, 64 N·m)
 Release cylinder side
 185 kg-cm (13 ft-lb, 18 N·m)



- Install the No. 2 control cable bracket. Torque the bolts.

Torque: 195 kg-cm (14 ft-lb, 19 N·m)

- Install the water hose clamp to the control cable bracket.

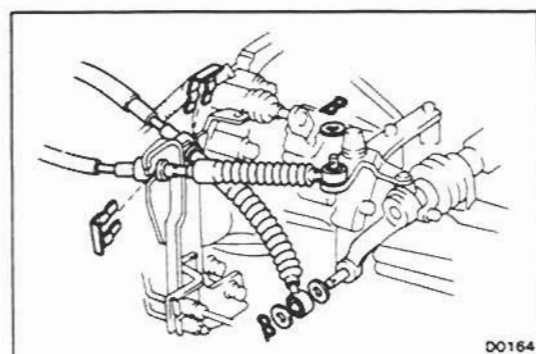


(E51 M/T)

Install the clutch release cylinder pipe bracket and clamp.

Torque the bolts.

Torque: 185 kg-cm (13 ft-lb, 18 N·m)



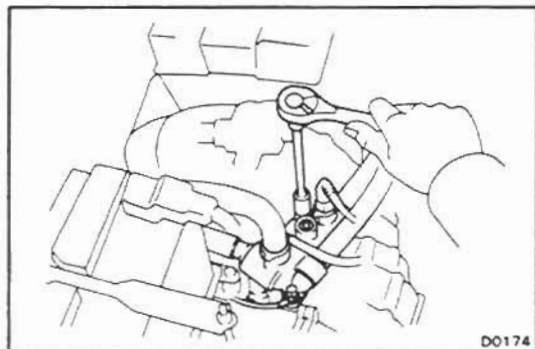
10. CONNECT CONTROL CABLES

- Install the two control cables with two retainers to the bracket.
- Connect the two control cables to the linkages and install the three washers and two clips.

11. INSTALL FUEL TANK PROTECTOR

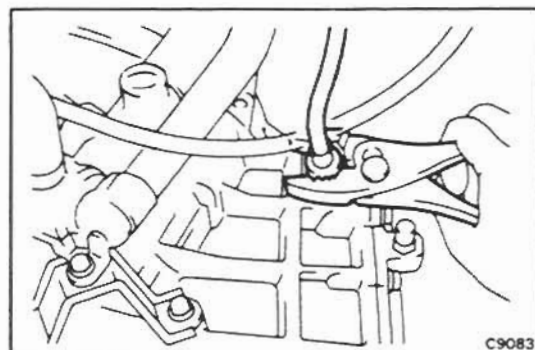
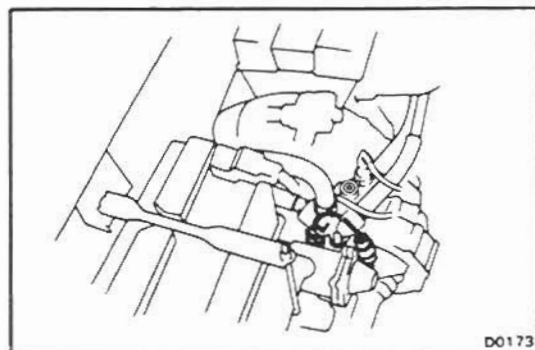
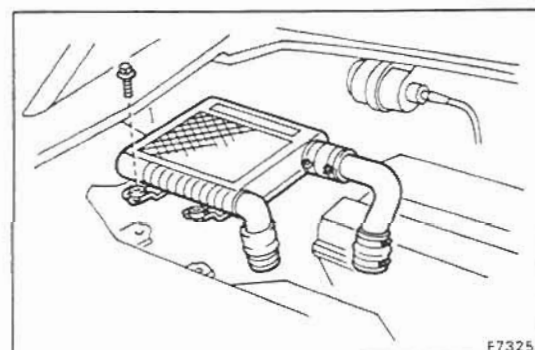
12. INSTALL ENGINE UNDER COVER

13. INSTALL NO. 2 ENGINE REAR PLATE

**14. INSTALL WATER INLET**

- (a) Set the ground strap.
- (b) Install the water inlet with the bolts.
Torque the bolts.

Torque: 200 kg-cm (14 ft-lb, 20 N·m)

**15. INSTALL SPEEDOMETER CABLE****16. CONNECT BACK-UP LIGHT SWITCH CONNECTOR****17. (E51 M/T) INSTALL INTERCOOLER**

Install the intercooler and four bolts, connect the two hose clamps.

Torque the bolts.

Torque: 175 kg-cm (13 ft-lb, 17 N·m)

18. INSTALL NEGATIVE BATTERY TERMINAL WIRE**19. FILL TRANSAXLE WITH GEAR OIL**

(C52 M/T)

Oil grade: API GL-4 or GL-5

Viscosity: SAE 75W – 90 or 80W – 90

Capacity: 2.6 liters (2.7 US qts, 2.3 Imp. qts)

(E51 M/T)

Oil grade: API GL-4 or GL-5

Viscosity: SAE 75W – 90 or 80W – 90

Capacity: 4.2 liters (4.4 US qts, 3.7 Imp. qts)

20. PERFORM ROAD TEST

Check for abnormal noise and smooth operation.