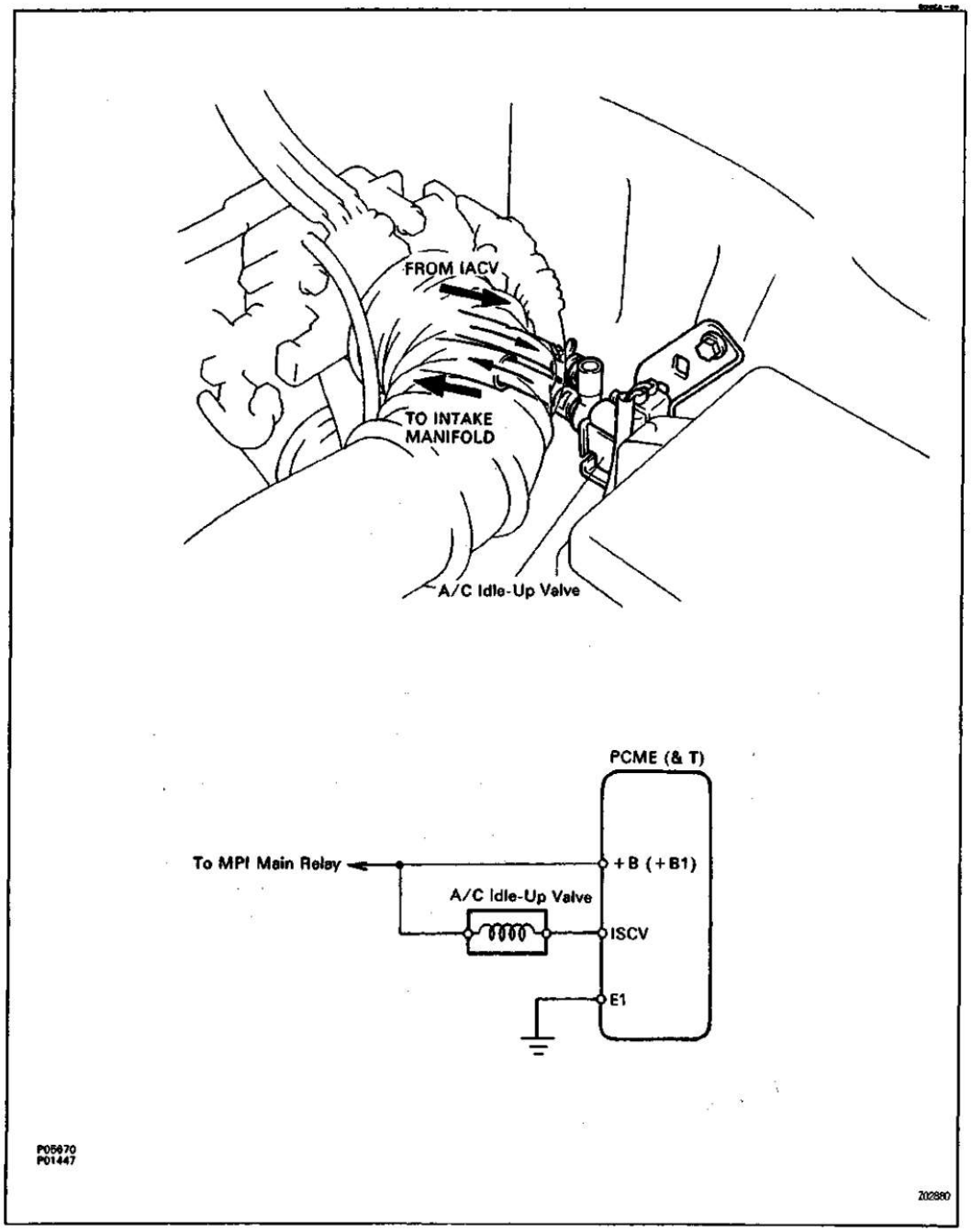
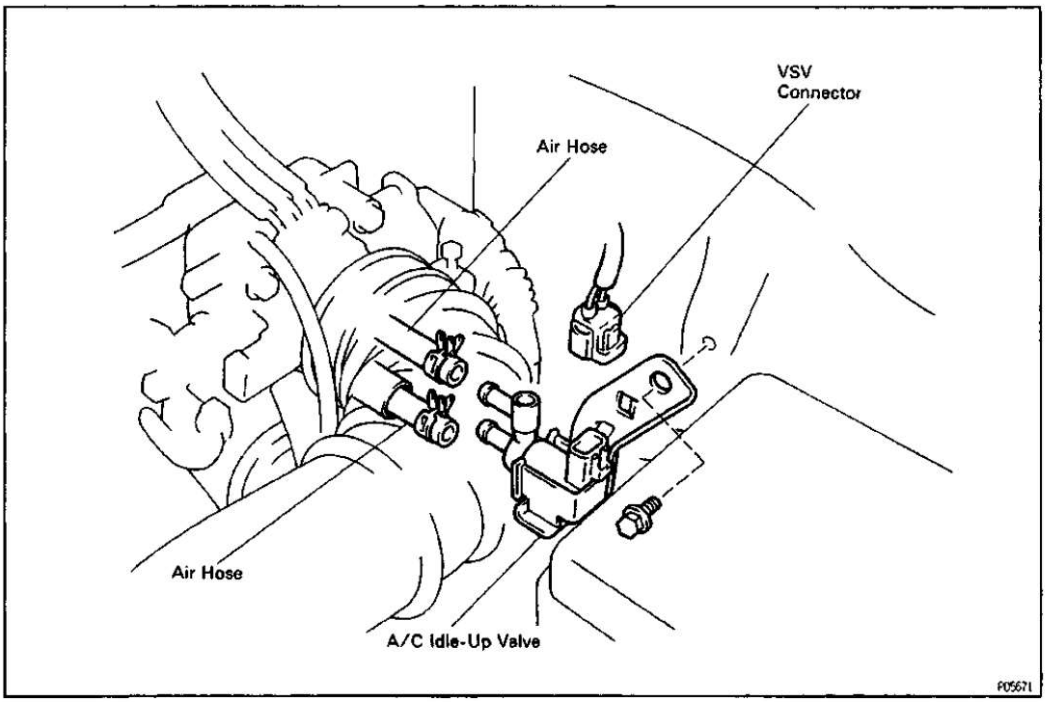
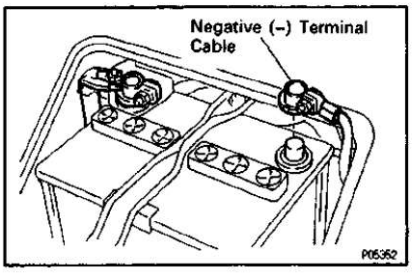
AC IDLE–UP VALVE



COMPONENTS FOR REMOVAL AND INSTALLATION



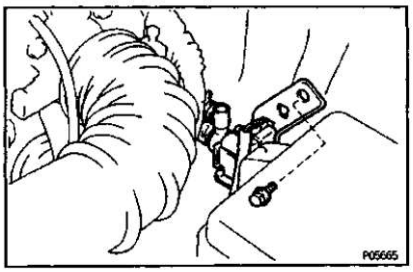


A/C IDLE–UP VALVE INSPECTION

(See Components for Removal and Installation)

1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY

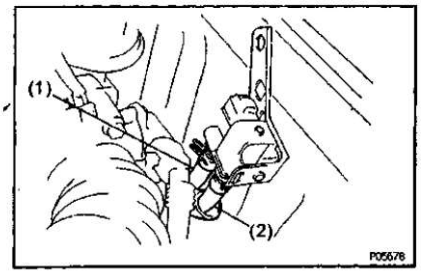
CAUTION: Turn the ignition switch to "LOCK". Disconnect the negative terminal from the battery. Wait at least 20 seconds before proceeding with work.



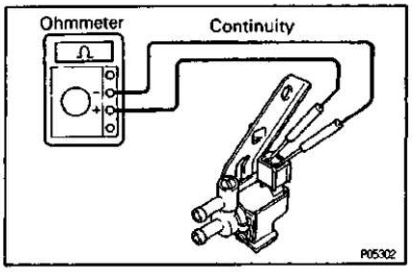
2. REMOVE IDLE–UP VALVE

(a) Disconnect the idle–up valve connector.

(b) Remove the mounting bolt.



(c) Disconnect the following and hoses, and remove the idle–up valve:
(1) Air hose (from IACV) from port E of idle–up valve
(2) Air hose (from intake manifold) from port F of idle –up valve



3. INSPECT IDLE –UP VALVE

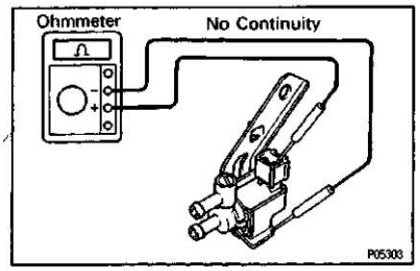
A. Inspect idle–up valve for open circuit

Using an ohmmeter, check that there is continuity between the terminals.

Resistance (Cold):

30–34Ω

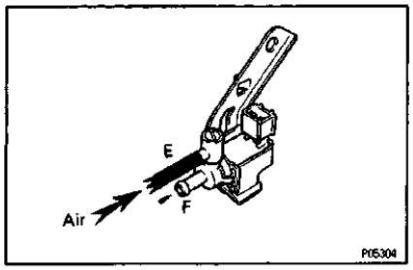
If there is no continuity, replace the idle –up valve.



B. Inspect idle–up valve for ground

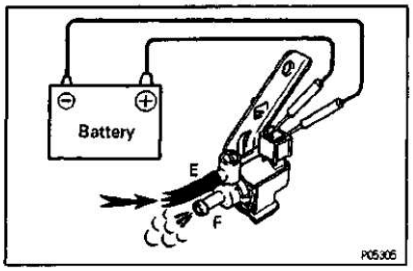
Using an ohmmeter, check that there is no continuity between each terminal and the body.

If there is continuity, replace the idle–up valve.



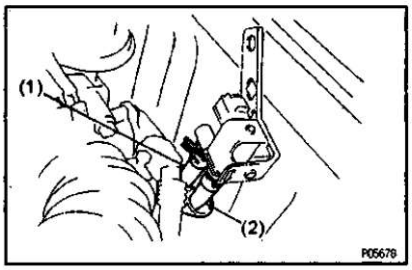
C. Inspect idle–up valve operation

(a) Check that the air does not flow from port E to port F.



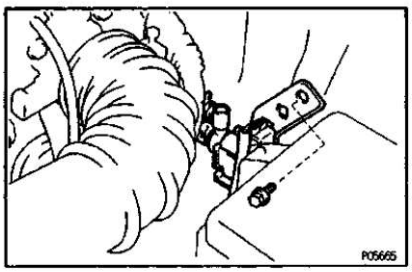
(b) Apply battery voltage across the terminals.
(c) Check that the air flows from port E to port F.

If operation is not as specified, replace the idle–up valve.



4. REINSTALL IDLE–UP VALVE

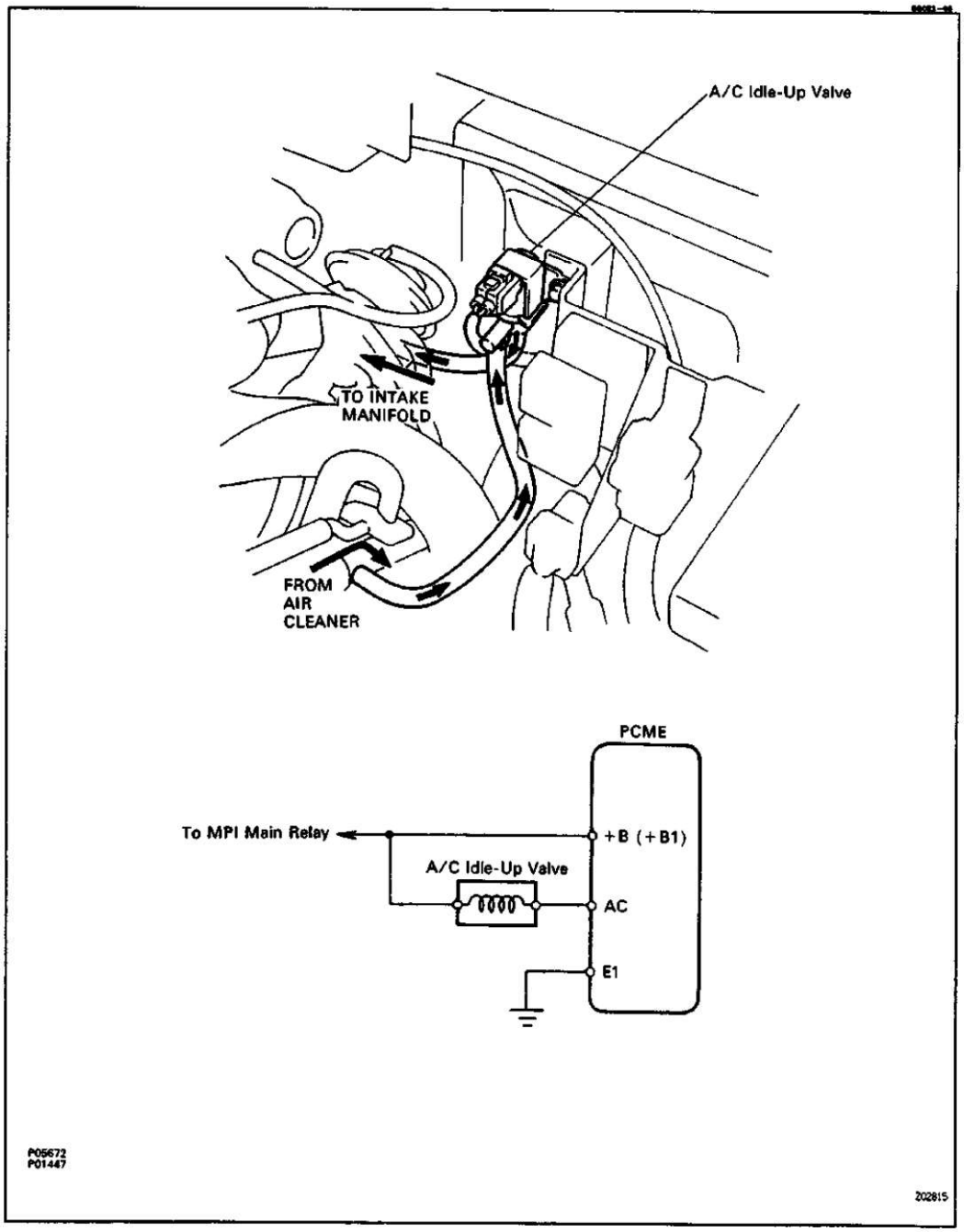
(a) Connect the following and hoses:
(1) Air hose (from IACV) from port E of idle–up valve
(2) Air hose (from intake manifold) from port F of idle –up valve



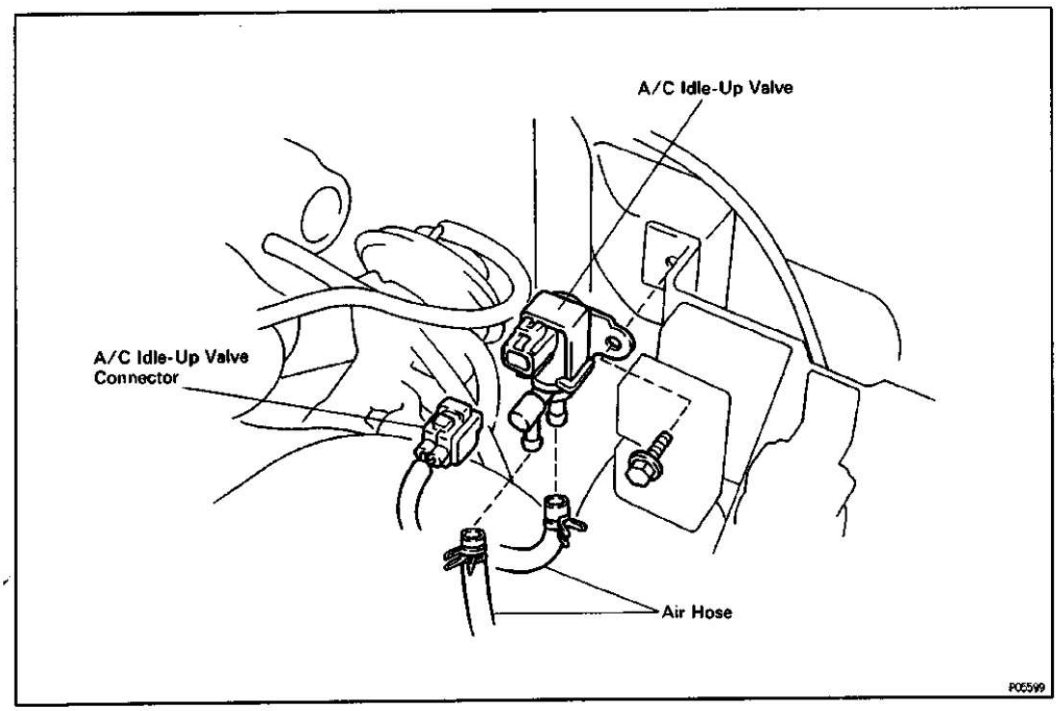
(b) Install the idle–up valve with the bolt.
(c) Connect the idle–up valve connector.

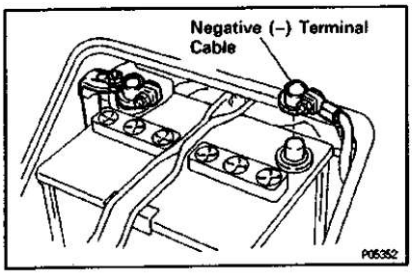
5. RECONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY

AC IDLE–UP VALVE



COMPONENTS FOR REMOVAL AND INSTALLATION



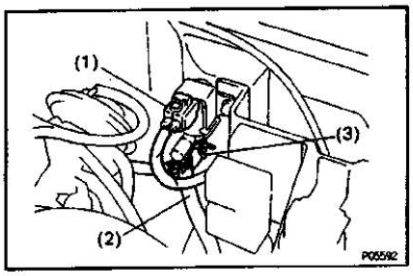


A/C IDLE–UP VALVE INSPECTION

(See Components for Removal and Installation)

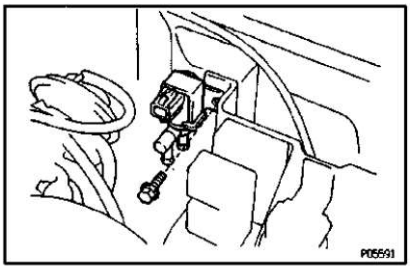
1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY

CAUTION: Turn the ignition switch to 'LOCK'. Disconnect the negative terminal from the battery. Wait at least 20 seconds before proceeding with work.

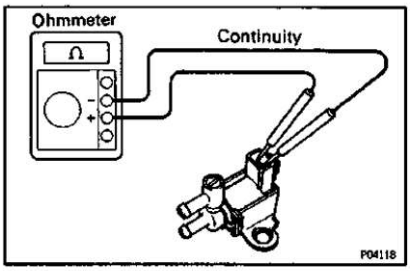


2. REMOVE IDLE–UP VALVE

(a) Disconnect the following connector and hoses:
(1) Idle–up valve connector
(2) Air hose (from No. 1 air tube) from port E of idle – up valve
(3) Air hose (from intake manifold) from port F of idle –up valve



(b) Remove the bolt and idle–up valve.



3. INSPECT IDLE–UP VALVE

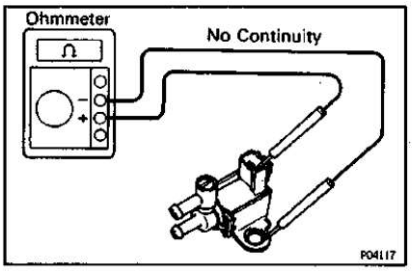
A. Inspect idle–up valve for open circuit

Using an ohmmeter, check that there is continuity between the terminals.

Resistance (Cold):

30–34Ω

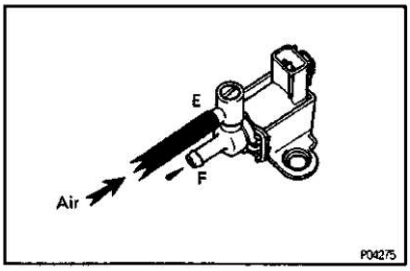
If there is no continuity, replace the idle –up valve.



B. Inspect idle–up valve for ground

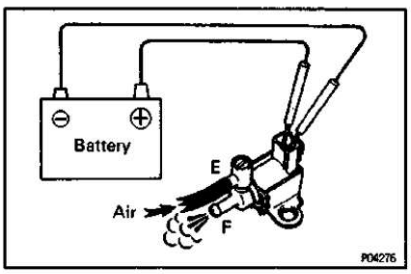
Using an ohmmeter, check that there is no continuity between each terminal and the body.

If there is continuity, replace the idle–up valve.



C. Inspect idle–up valve operation

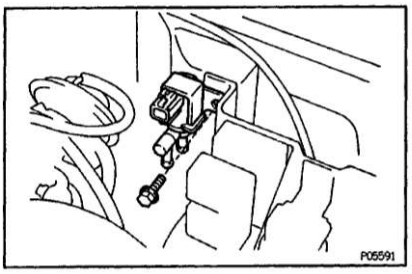
(a) Check that the air does not flow from port E to port F.



(b) Apply battery voltage across the terminals.

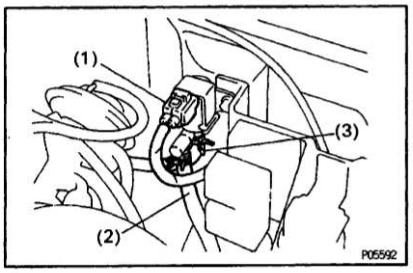
(c) Check that the air flows from port E to port F.

(f operation is nut as specified, replace the idle–up valve.



4. REINSTALL IDLE–UP VALVE

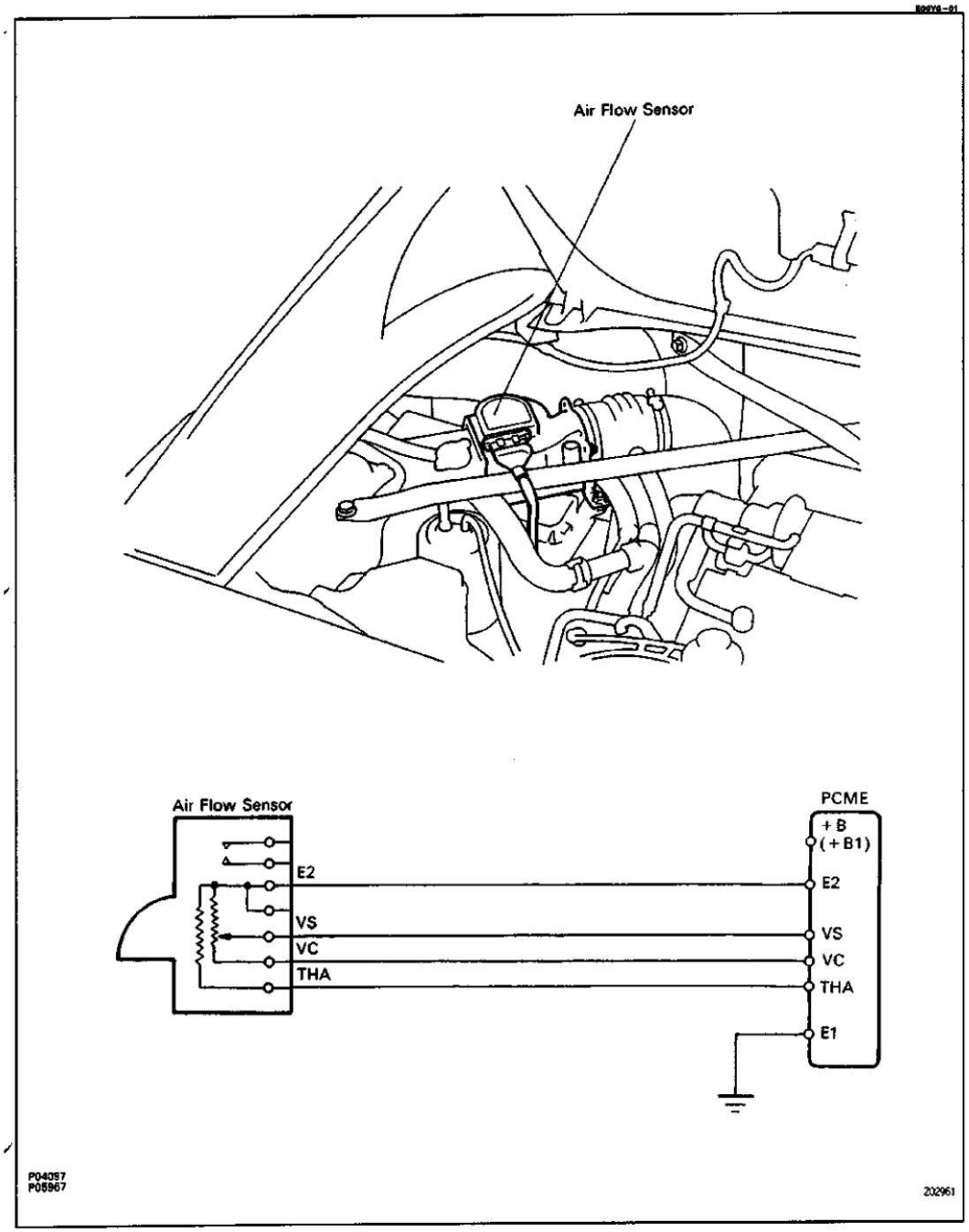
(a) Install the idle–up valve with the bolt.

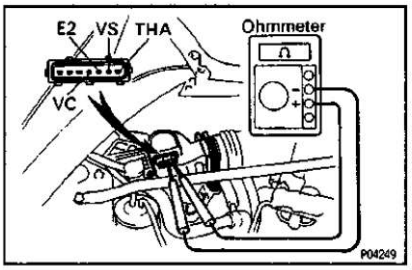


(b) Connect the following connector and hoses:
(1) Idle–up valve connector
(2) Air hose (from No. 1 air tube) to port E of idle–up valve
(3) Air hose (from intake manifold) to port F of idle – up valve

5. RECONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY

AIR FLOW SENSOR





ON–VEHICLE INSPECTION

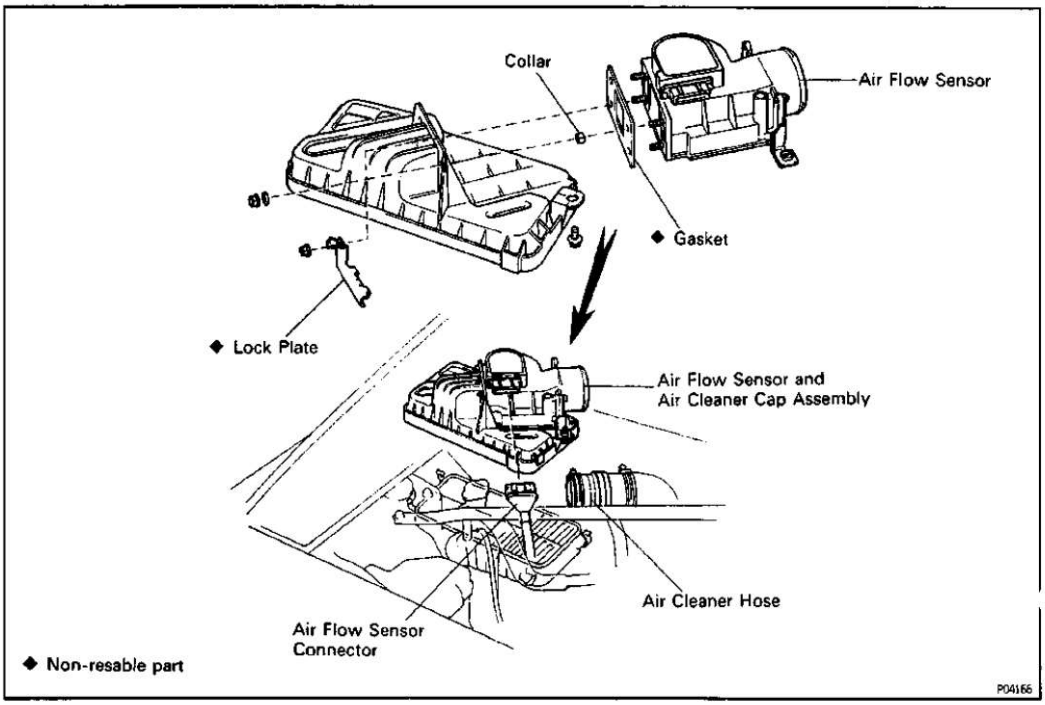
INSPECT RESISTANCE OF AIR FLOW SENSOR

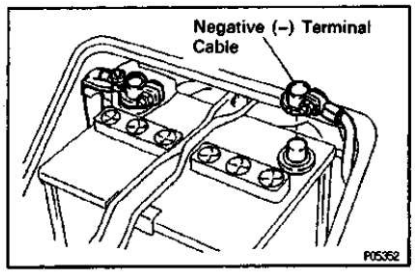
(a) Disconnect the air flow sensor connector.
(b) Using an ohmmeter, measure the resistance between each terminal.

Between terminals	Resistance	Temperature
VS –e2	200 – 6000	–
VC –E2	200 –4000	–
THA – E2	10–20kΩ	–20°C (–4°F)
THA – E2	4–7 kΩ	0°C (32°F)
THA – E2	2 – 3 kΩ	20° C (68° F)
THA – E2	0.9 – 1.3 kΩ	40° C (104° F)
THA – E2	0.4–0.7k0	60° C (140° F)

If the resistance is not as specified, replace the air flow sensor.
(c) Reconnect the air flow sensor connector.

COMPONENTS FOR REMOVAL AND INSTALLATION



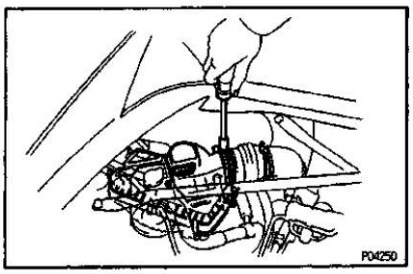


AIR FLOW SENSOR REMOVAL

(See Components for Removal and Installation)

1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY

CAUTION: Turn the ignition switch to 'LOCK'. Disconnect the negative terminal from the battery. Wait at least 20 seconds before proceeding with work.

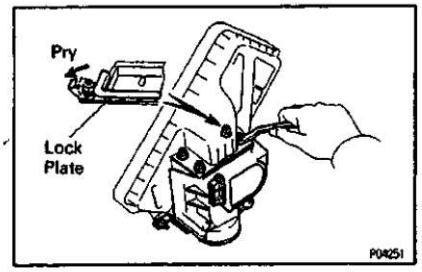


2. DISCONNECT AIR FLOW SENSOR CONNECTOR

3. REMOVE AIR CLEANER CAP AND AIR FLOW SENSOR ASSEMBLY

(a) Disconnect the air cleaner hose from the air flow sensor.

(b) Disconnect the four clamps, and remove the air cleaner cap and air flow sensor assembly.



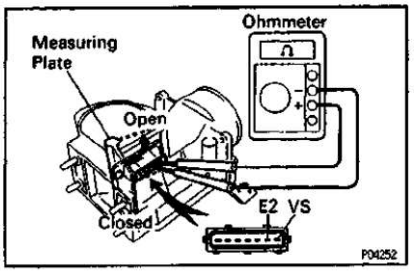
3. REMOVE AIR FLOW SENSOR FROM AIR CLEANER CAP

(a) Remove the bolt holding the bracket to air cleaner cap.

(b) Pry oft the lock plate.

(c) Remove the four nuts, three plate washers and lock plate.

(d) Remove the air flow sensor, gasket and four collar.



AIR FLOW SENSOR INSPECTION

INSPECT AIR PLOW SENSOR

Using an ohmmeter, measure the resistance between terminals VS and E2 by moving the measuring plate.

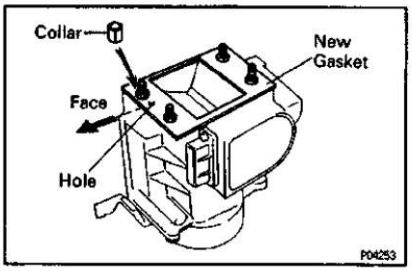
Resistance:

200 – 600Ω at fully closed

20 – 1,200Ω at fully open

HINT: Resistance will change in a wave pattern as the measuring plate slowly opens.

If the resistance is not as specified, replace the air flow sensor.

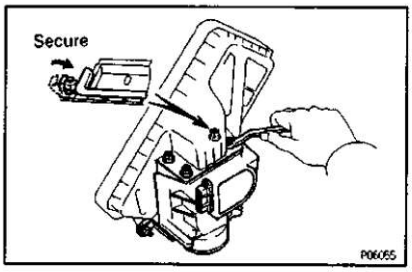


AIR FLOW SENSOR INSTALLATION

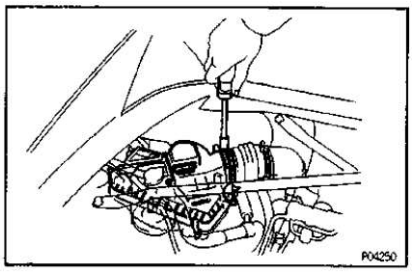
(See Components for Removal and Installation)

1. INSTALL AIR FLOW SENSOR TO AIR CLEANER CAP

(a) Place anew gasket and the four collars on the air flow sensor.



(b) Install the air flow sensor with the lock plate, three plate washers and four nuts.
(c) Secure the nut with the lock plate.
(d) Install the bolt holding the bracket and air cleaner cap.



2. INSTALL AIR CLEANER CAP AND AIR FLOW SENSOR ASSEMBLY

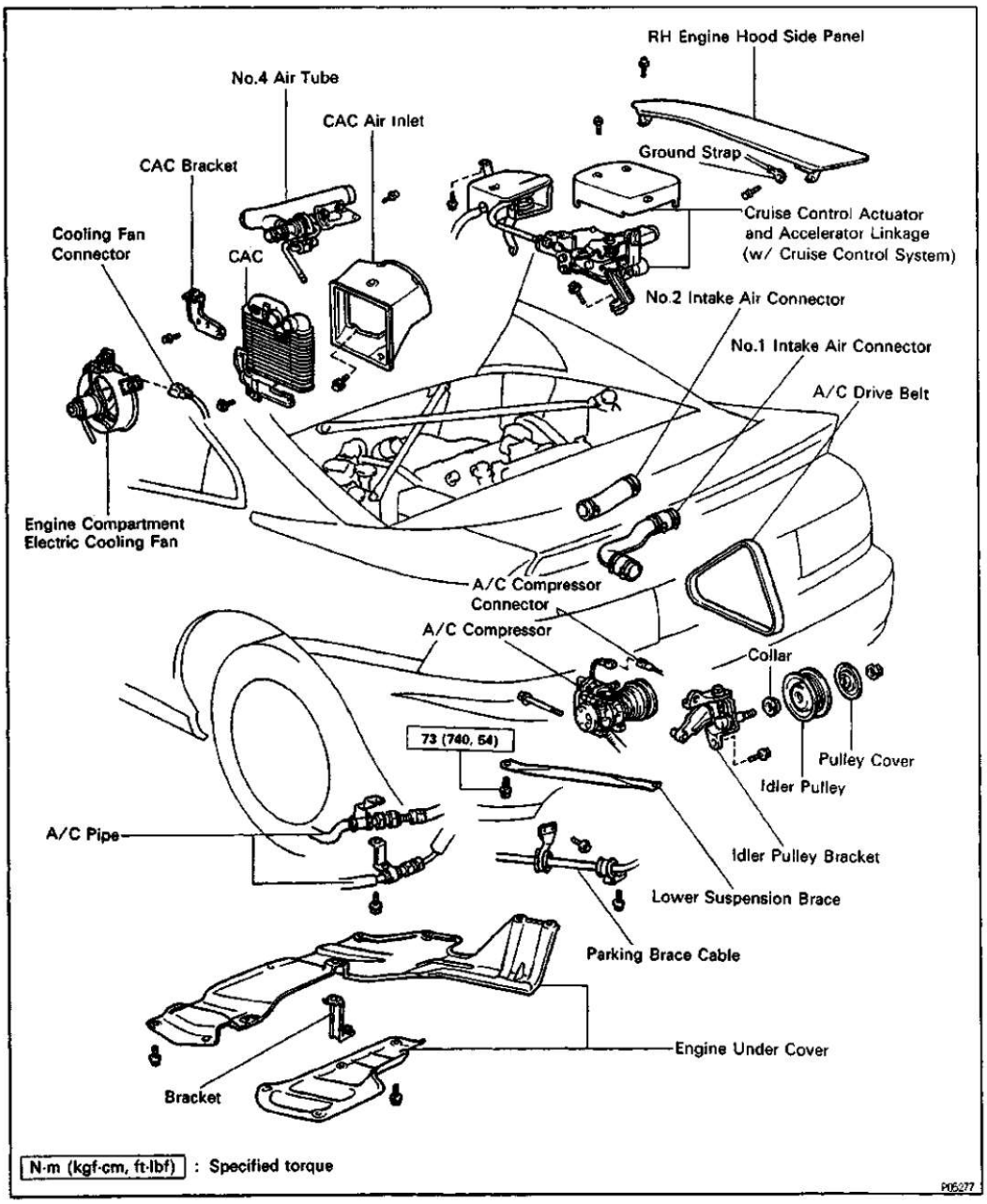
(a) Install the air cleaner cap to the air cleaner case with the four clips.
(b) Connect the air cleaner hose to the air flow sensor.

3. CONNECT AIR FLOW SENSOR CONNECTOR

4. CONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY

CHARGE AIR COOLER (CAC)

COMPONENTS FOR REMOVAL AND INSTALLATION



B00X4–01

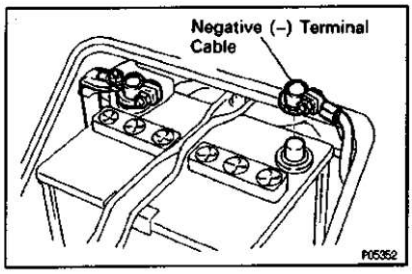
CRC REMOVAL

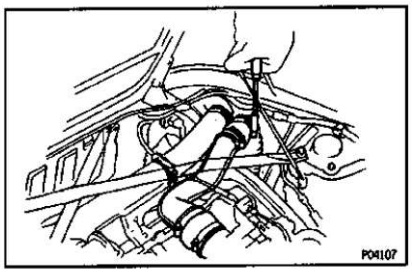
(See Components for Removal and Installation)

1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY

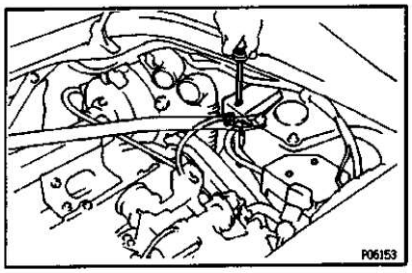
   CAUTION: Turn the ignition switch to "LOCK". Disconnect the negative terminal from the battery. Wait at least 20 seconds before proceeding with work.

2. REMOVE ENGINE UNDER COVERS
3. REMOVE RH ENGINE HOOD SIDE PANEL
4. REMOVE NO.1 AND NO.2 INTAKE AIR CONNECTORS



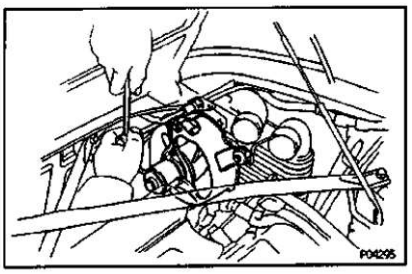


5. (w/ CRUISE CONTROL SYSTEM) REMOVE CRUISE CONTROL ACCELERATOR LINKAGE



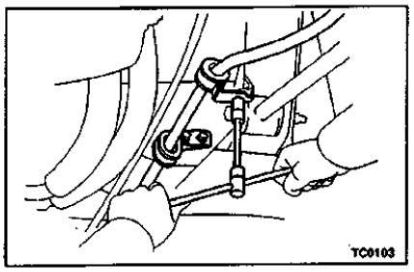
6. REMOVE ENGINE COMPARTMENT ELECTRIC COOLING FAN

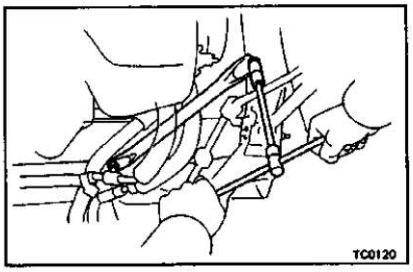
(a) Disconnect the cooling fan connector.
(b) Loosen the three bolts, and remove the cooling fan.



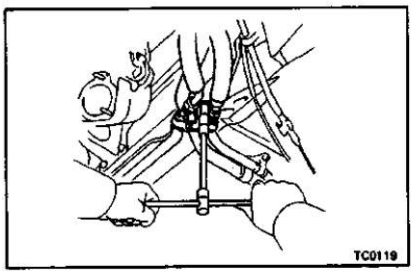
7. DISCONNECT A/C COMPRESSOR FROM ENGINE

(a) Remove the three clamp bolts, and disconnect the parking brake cable.

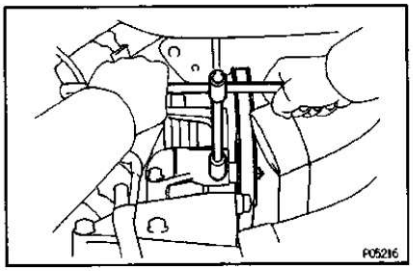




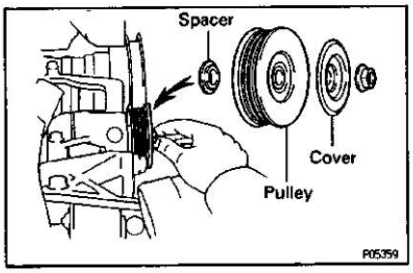
(b) Remove the two bolts and suspension brace.



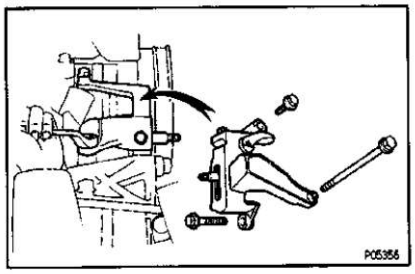
(c) Remove the clamp nut, and disconnect the two A/C pipes.



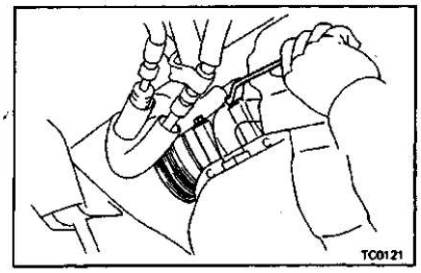
(d) Loosen the idler pulley nut.
(e) Loosen the adjusting bolt, and remove the drive belt.



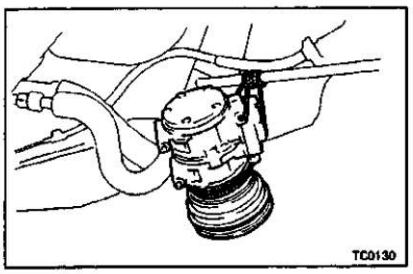
(f) Remove the nut, pulley cover, idler pulley and spacer.



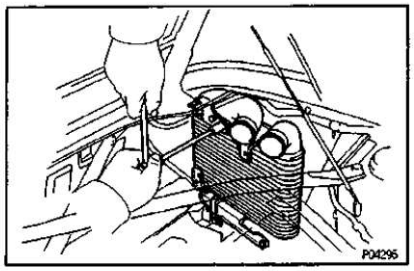
(g) Disconnect the A/C compressor connector.
(h) Remove the three bolts and idler pulley bracket.



(i) Remove the two bolts, and disconnect the A/C compressor from the engine.



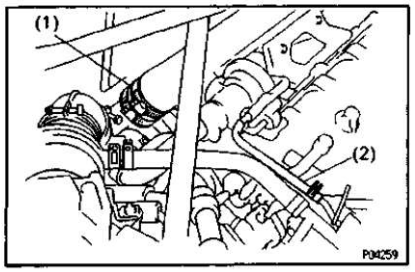
HINT: Suspend the A/C compressor to strut rod with a string.



8. REMOVE CAC

(a) Remove the two bolts holding the CAC to the upper bracket.

(b) Remove the three bolts, upper bracket and CAC.

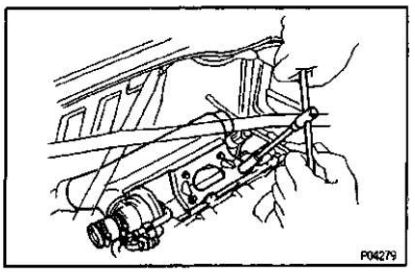


9. REMOVE NO.4 AIR TUBE

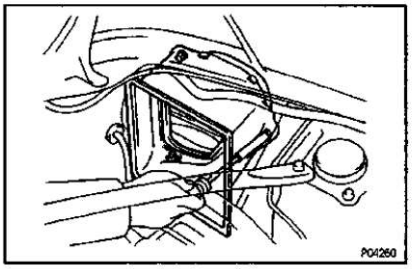
(a) Disconnect the following hoses:

(1) Air connector from No.4 air tube

(2) Air hose from No.2 air tube

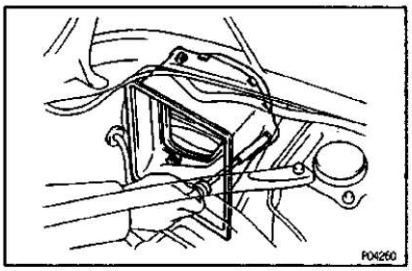


(b) Remove the two bolts and No.4 air tube.



10. REMOVE COOL AIR INLET

Remove the three bolts and air inlet.

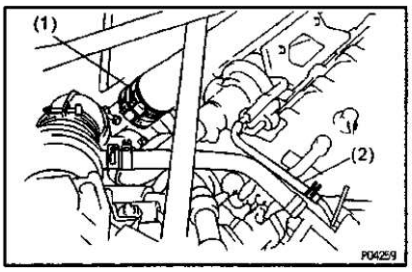


CAC INSTALLATION

(See Components for Removal and Installation)

1. INSTALL COOL AIR INLET

Install the air inlet with the three bolts.

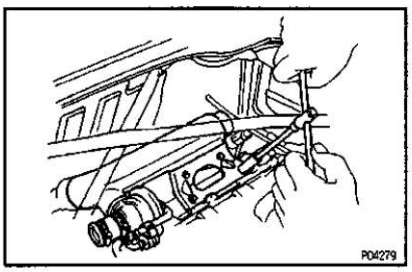


2. INSTALL NO.4 AIR TUBE

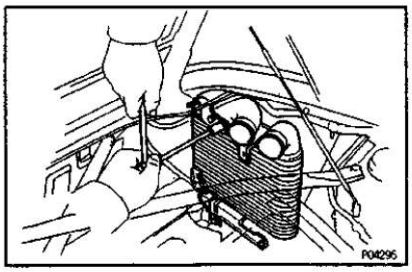
(a) Connect the following hoses:

(1) Air connector to No.4 air tube

(2) Air hose to No.2 air tube

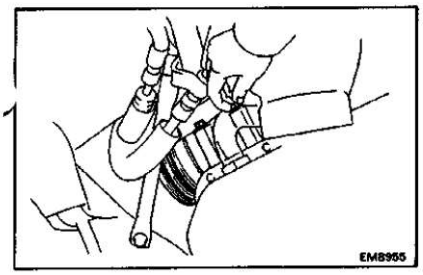


(b) Install the No.4 air tube with the two bolts.



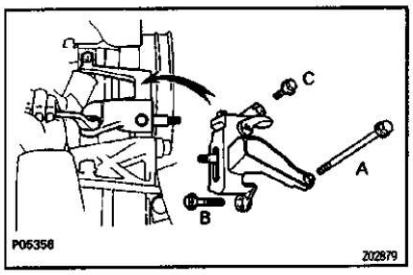
3. INSTALL CAC

Install the CAC and upper bracket with the five bolts.



4. INSTALL A/C COMPRESSOR

(a) Temporarily install the A/C compressor with the with the two bolts.



(b) Install the idler pulley bracket with the three bolts.

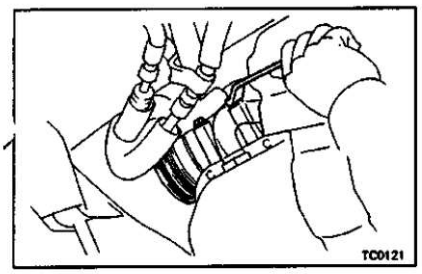
Torque:

25 N–m (250 kgf–cm, 18 ft–lbf) for A

27 N–m (275 kgf–cm, 20 ft–lbf) for B

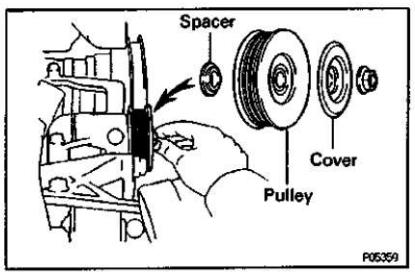
37 N–m (375 kgf–cm, 27 ft–lbf) for C

(c) Connect the A/C compressor connector.

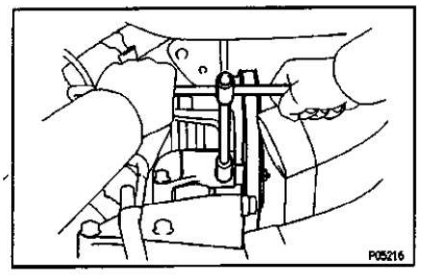


(d) Tighten the two bolts of the lower side of the A/C compressor.

Torque: 25 N–m (250 kgf–cm, 18 ft–lbf)

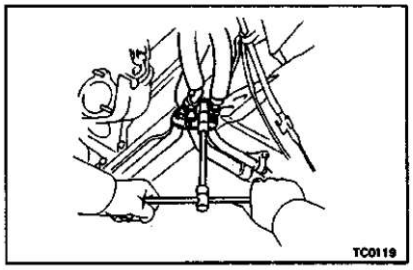


(e) Temporarily install the spacer, idler pulley and pulley cover with the nut.

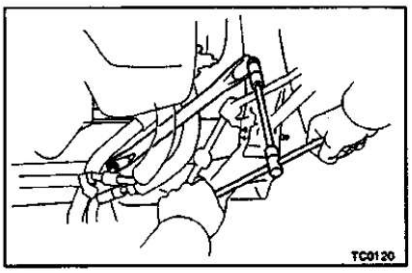


(f) Install the drive belt with the adjusting bolt.

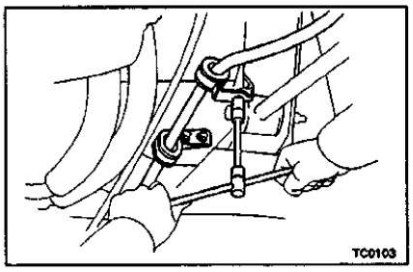
(g) Tighten the idler pulley nut.



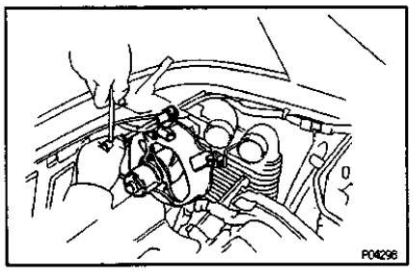
(h) Install the A/C pipes with the two clamps and nut.



(i) Install the lower suspension brace with the two bolts.
Torque: 73 N–m (740 kgf–cm, 54 ft–lbf)

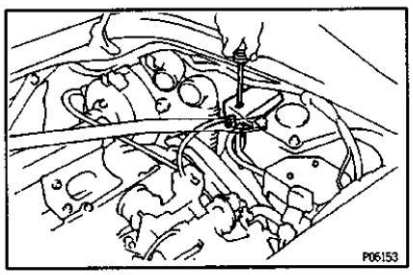


(j) Install the parking brake cable with the two clamp and three bolts.

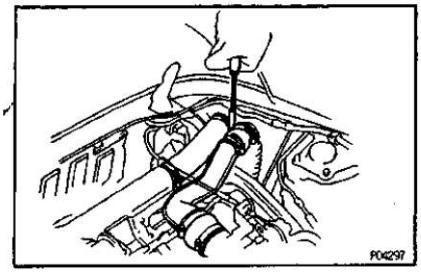


5. INSTALL ENGINE COMPARTMENT ELECTRIC COOLING FAN

(a) Install the cooling fan with the three bolts.
(b) Connect the cooling fan connector.



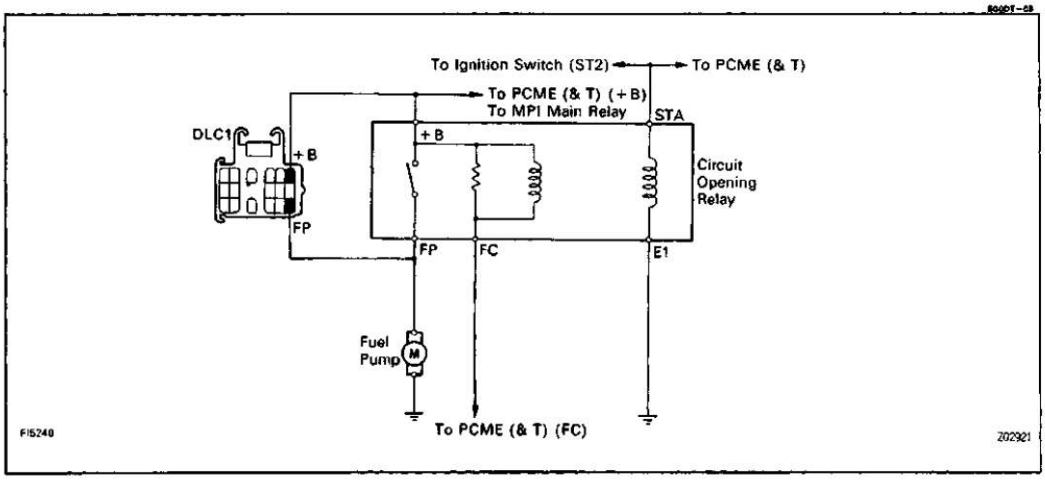
6. (w/ CRUISE CONTROL SYSTEM) INSTALL CRUISE CONTROL ACCELERATOR LINKAGE

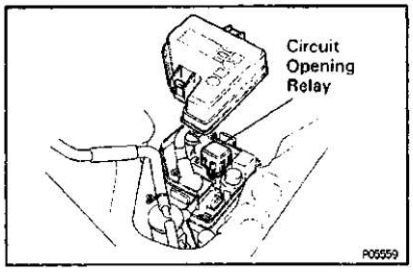


7. INSTALL NO.1 AND NO.2 INTAKE AIR CONNECTORS

8. INSTALL RH ENGINE HOOD SIDE PANEL
9. INSTALL ENGINE UNDER COVERS
10. CONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY

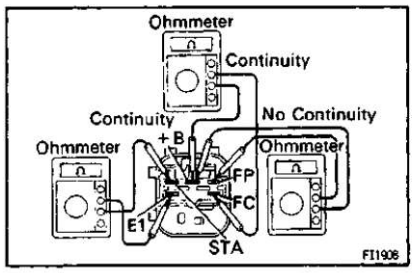
CIRCUIT OPENING RELAY





CIRCUIT OPENING RELAY ("C/OPN") INSPECTION

7. REMOVE CIRCUIT OPENING RELAY



2. INSPECT CIRCUIT OPENING RELAY

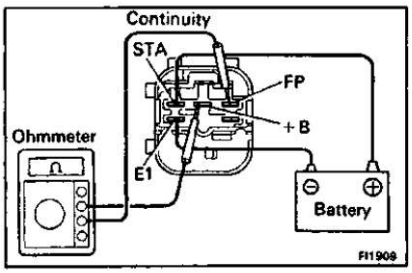
A. Inspect relay continuity

(a) Using an ohmmeter, check that there is continuity between terminals STA and E1.

(b) Check that there is continuity between terminals +B and FC.

(c) Check that there is no continuity between terminals +B and FP.

If continuity is not as specified, replace the relay.



B. Inspect relay operation

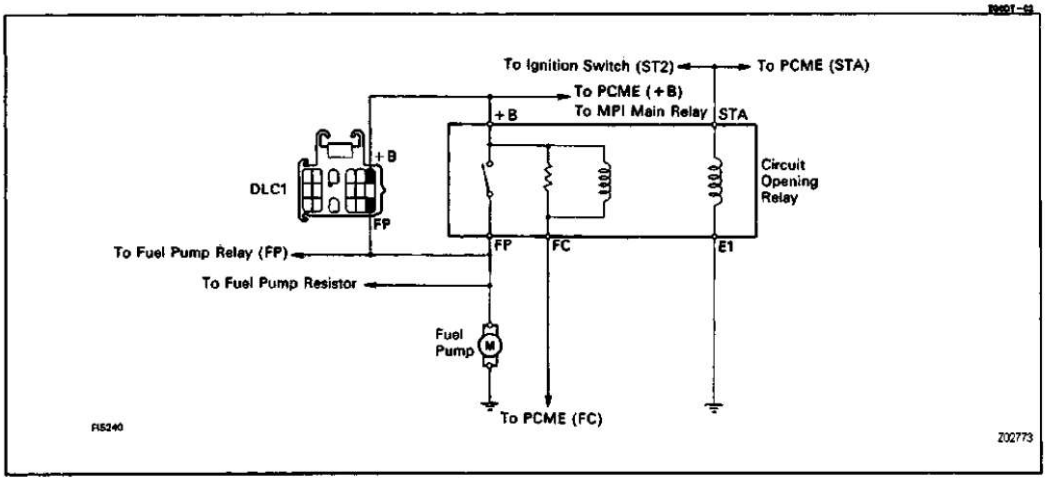
(a) Apply battery voltage across terminals STA and E1.

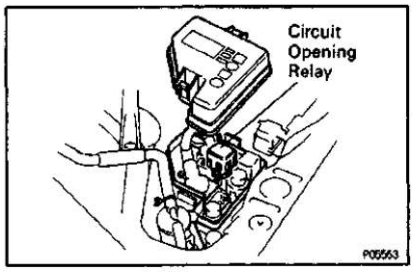
(b) Using an ohmmeter, check that there is continuity between terminals +B and FP.

If operation is not as specified, replace the relay.

3. REINSTALL CIRCUIT OPENING RELAY

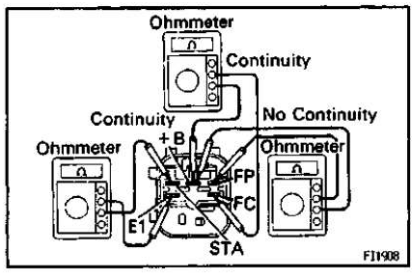
CIRCUIT OPENING RELAY





CIRCUIT OPENING RELAY ("C/OPN") INSPECTION

1. REMOVE CIRCUIT OPENING RELAY



2. INSPECT CIRCUIT OPENING RELAY

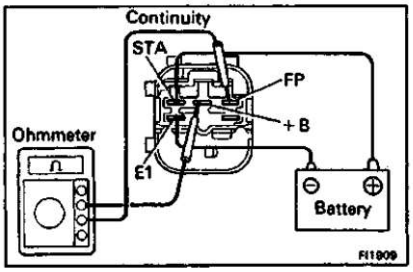
A. Inspect relay continuity

(a) Using an ohmmeter, check that there is continuity between terminals STA and E1.

(b) Check that there is continuity between terminals +B and FC.

(c) Check that there is no continuity between terminals +B and FP.

If continuity is not as specified, replace the relay.



B. Inspect relay operation

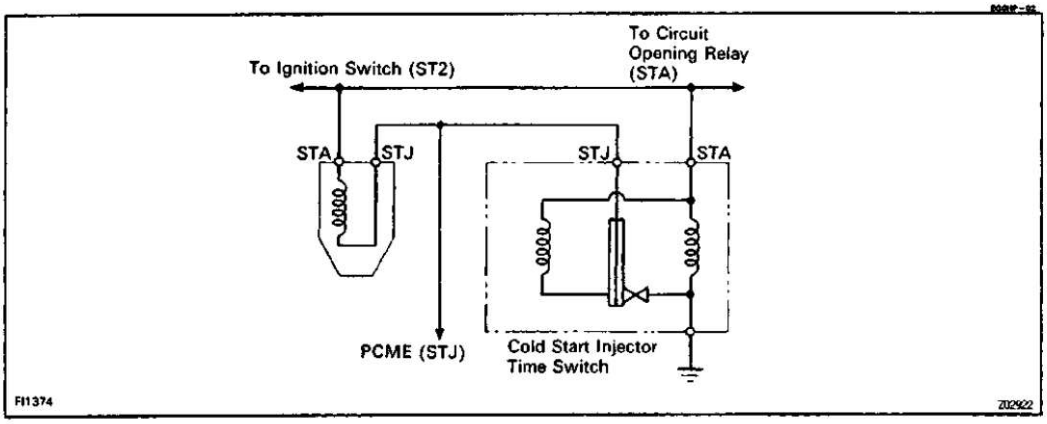
(a) Apply battery voltage across terminals STA and E1.

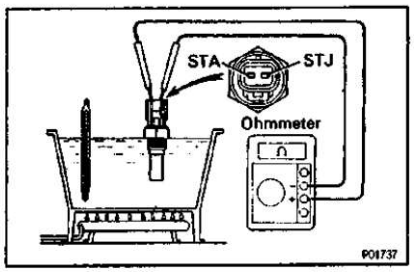
(b) Using an ohmmeter, check that there is continuity between terminals +B and FP.

If operation is not as specified, replace the relay.

3. REINSTALL CIRCUIT OPENING RELAY

COLD START INJECTOR TIME SWITCH





COLD START INJECTOR TIME SWITCH INSPECTION

1. **REMOVE COLD START INJECTOR TIME SWITCH**
2. **INSPECT COLD START INJECTOR TIME SWITCH**

   Using an ohmmeter, measure the resistance between each terminal.

   Resistance:

   STA – STJ

   30 – 50Ωbelow 15° C (59°F)

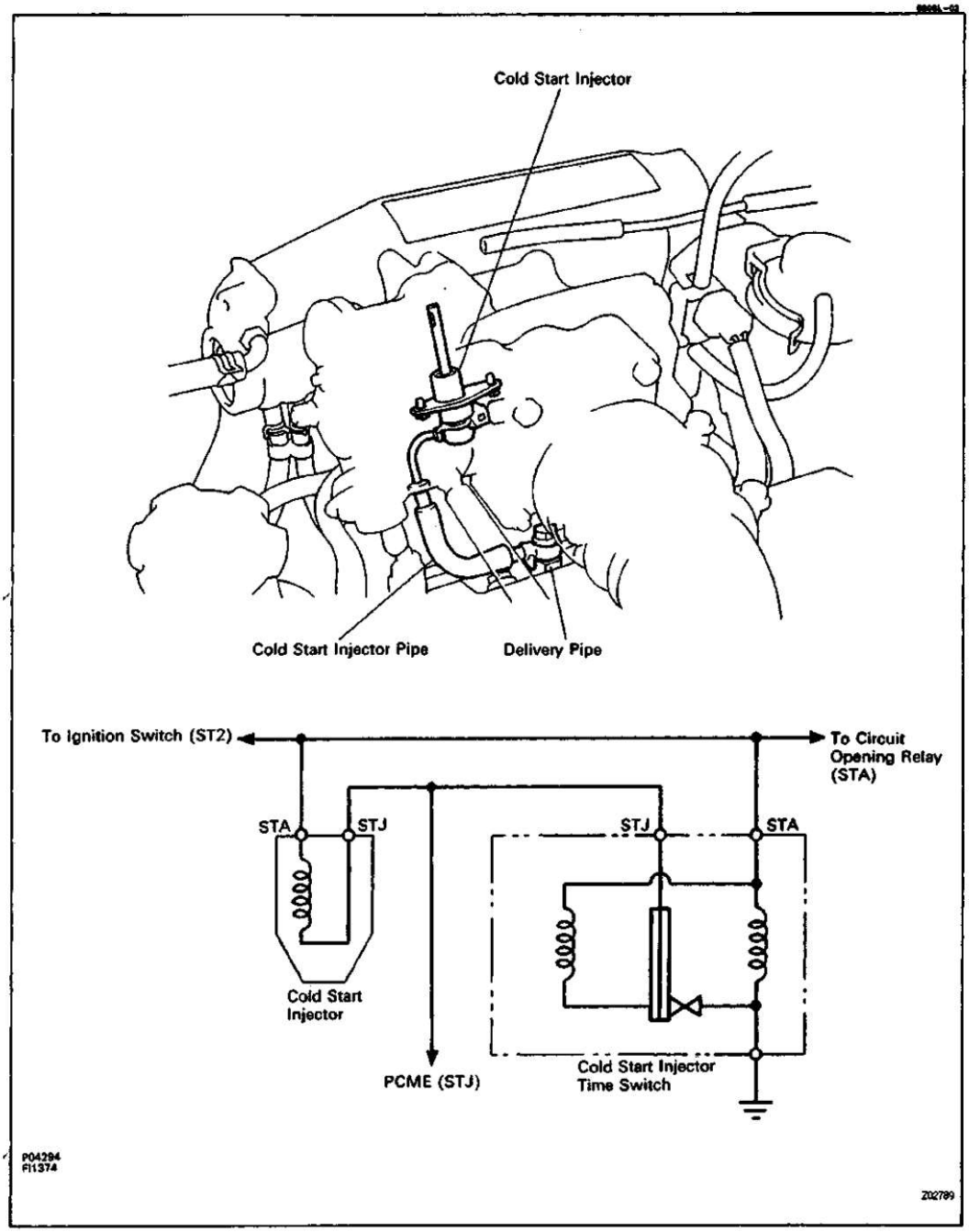
   70 – 90Ωabove 30° C (86° 9)

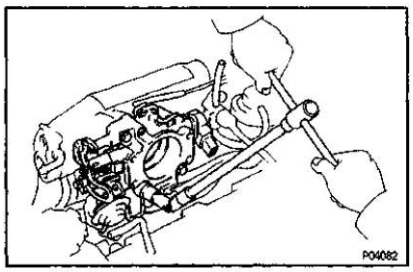
   STA – Ground

   30–90Ω

   If the resistance is not as specified, replace the switch.
3. **REINSTALL COLD START INJECTOR TIME SWITCH**

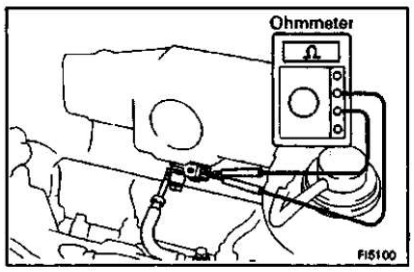
COLD START INJECTOR





ON–VEHICLE INSPECTION

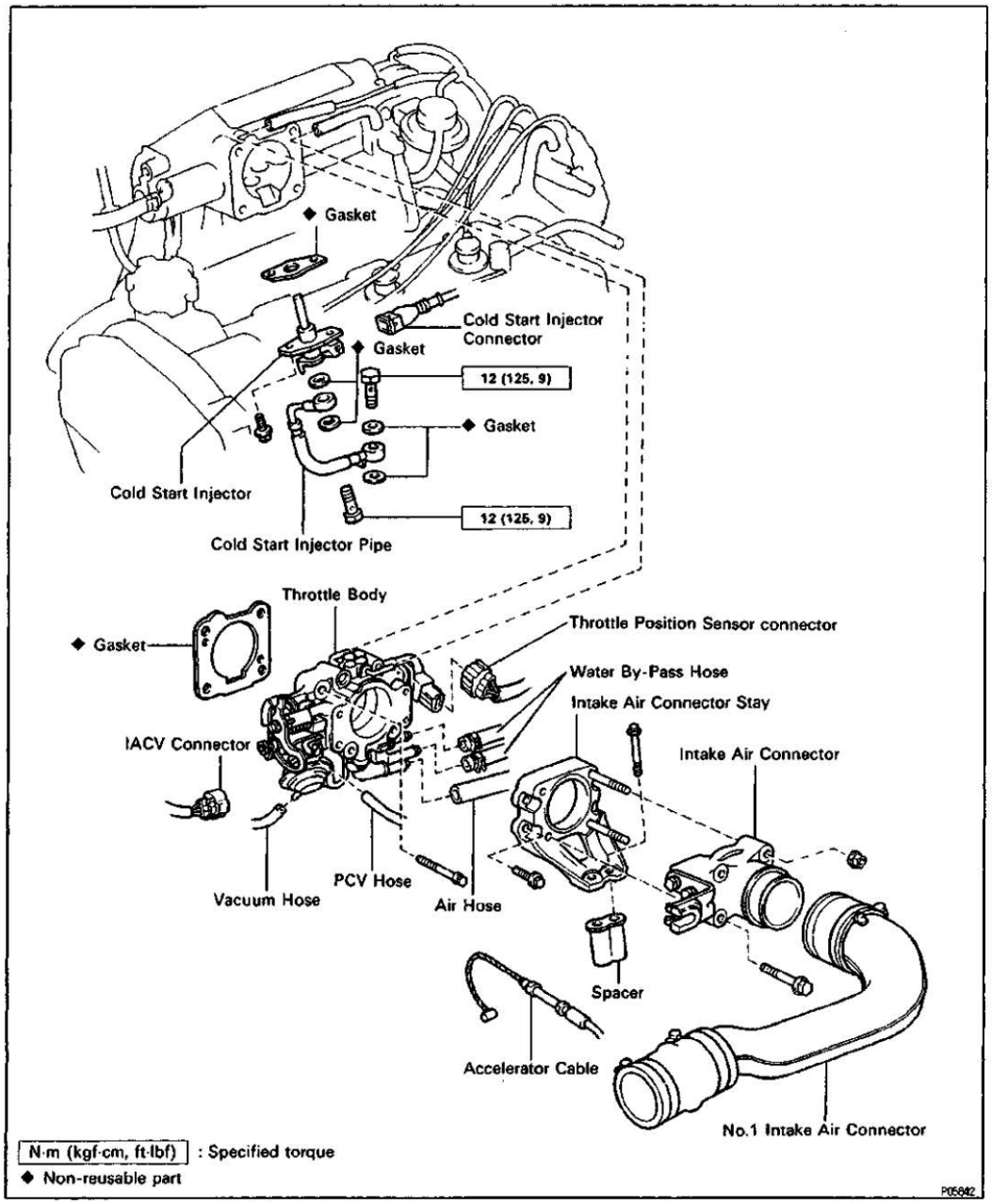
1. **REMOVE THROTTLE BODY**
   (See Throttle Body Removal)
2. **DISCONNECT COLD START INJECTOR CONNECTOR**

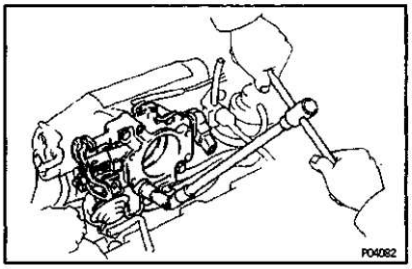


3. **INSPECT COLD START INJECTOR**
   Using an ohmmeter, measure the resistance between the terminals.
   Resistance:
   2–4Ω
   If the resistance is not as specified, replace the cold start injector.

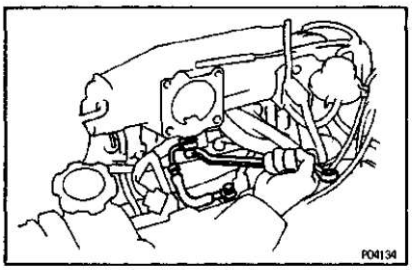
4. **RECONNECT COLD START INJECTOR CONNECTOR**
5. **REINSTALL THROTTLE BODY**
   (See Throttle Body Installation)

COMPONENTS FOR REMOVAL AND INSTALLATION

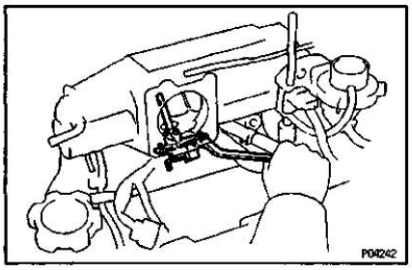




COLD START INJECTOR REMOVAL
(See Components for Removal and installation)
1. REMOVE THROTTLE BODY
(See Throttle Body Removal)

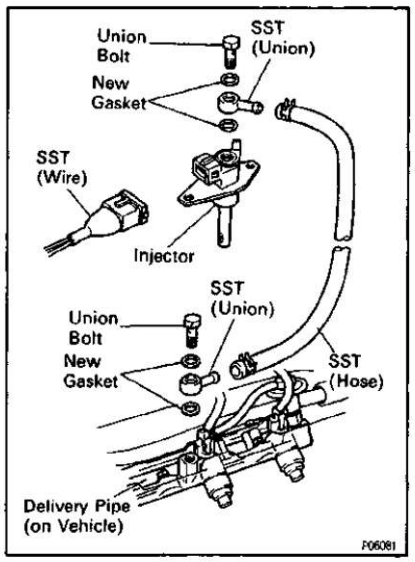


2. REMOVE COLD START INJECTOR PIPE
Remove the two union bolts, four gaskets and cold start injector pipe.
CAUTION:
- **Put a suitable container or shop towel under the injector pipe.**
- **Slowly loosen the union bolts.**

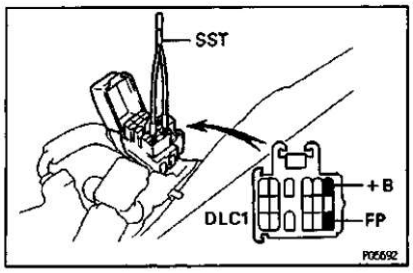


3. REMOVE COLD START INJECTOR
(a) Disconnect the cold start injector connector.
(b) Remove the two bolts, cold start injector and gasket.

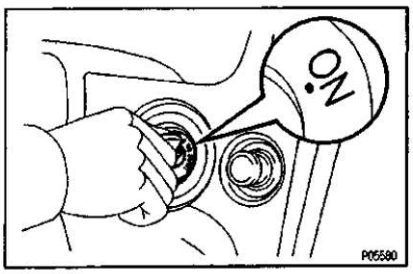
COLD START INJECTOR INSPECTION



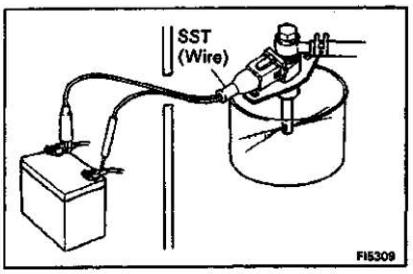
1. INSPECT INJECTION OF COLD START INJECTOR
CAUTION: Keep injector clear of sparks during the test.
(a) Install SST (two unions) to the injector and delivery pipe with four new gaskets and the union bolts.
SST 09268–41045 (09268–41080)
(b) Connect SST (hose) to the unions.
SST 09268–41045
(c) Connect SST (wire) to the injector.
SST 09842–30050
(d) Put a container under the injector.



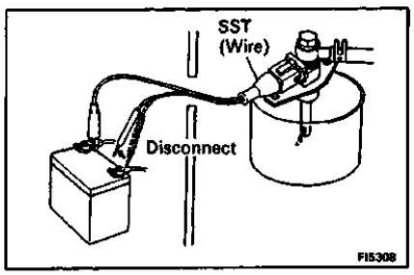
(e) Using SST, connect terminals +B and FP of the data link connector.
SST 09843–18020
(f) Reconnect the battery negative (–) cable.



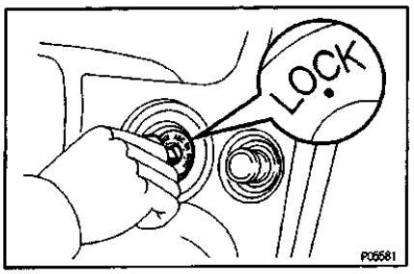
(g) Turn the ignition switch ON.
NOTICE: Do not start the engine.



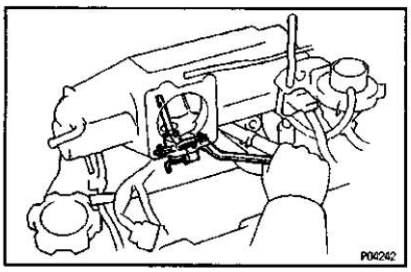
(h) Connect the test probes of the SST (wire) to the battery, and check that the fuel spray is as shown.
SST 09842–30050
NOTICE: Perform this check within the shortest possible time.



2. INSPECT LEAKAGE
(a) In the condition above, disconnect the test probes of SST (wire) from the battery and check fuel leakage from the injector.
SST 09842–30050
Fuel drop: One drop or less per minute



(b) Turn the ignition switch OFF.
(c) Disconnect the battery negative (–) cable.
(d) Remove the SST.
SST 09268–41045, 09842–30050, 09843–18020



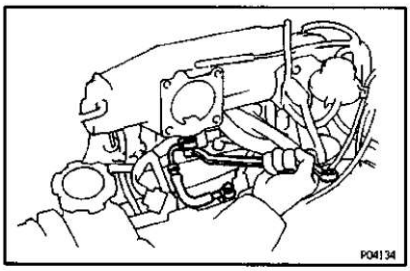
COLD START INJECTOR INSTALLATION

(See Components for Removal and Installation)

1. INSTALL COLD START INJECTOR

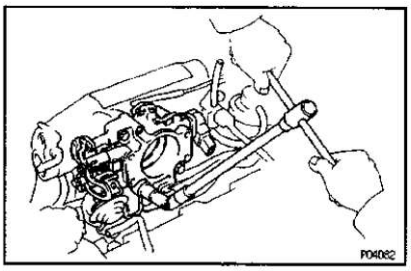
(a) Install a new gasket and the cold start injector with the two bolts.
Torque: 5.9 N–m (60 kgf–cm, 52 in.–lbf)

(b) Connect the cold start injector connector.



2. INSTALL COLD START INJECTOR PIPE

Install the cold start injector pipe with four new gaskets and two union bolts.
Torque: 12 N–m (125 kgf–cm, 9 ft–lbf)



3. INSTALL THROTTLE BODY

(See Throttle Body Installation)

4. START ENGINE AND CHECK FOR FUEL LEAKS

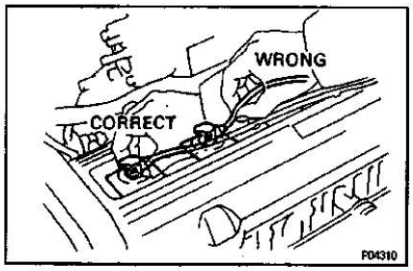
COMPRESSION CHECK

HINT: If there is lack of power, excessive oil con–sumption or poor fuel economy, measure the com–pression pressure.

1. WARM UP AND STOP ENGINE

Allow the engine to warm up to normal operating temperature.

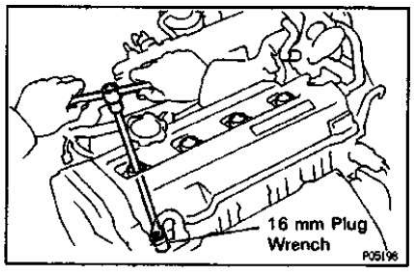
2. DISCONNECT DISTRIBUTOR CONNECTORS



3. DISCONNECT HIGH–TENSION CORDS FROM SPARK PLUGS

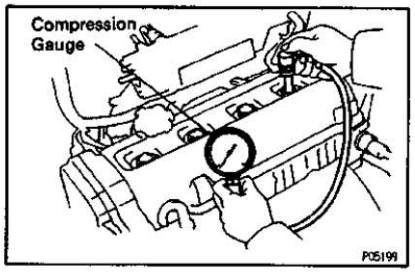
Disconnect the high – tension cords at the rubber boot. Do not pull on the cords.

NOTICE: Pulling on or bending the cords may damage the conductor inside.



4. REMOVE SPARK PLUGS

Using a 16 mm plug wrench, remove the four spark plugs.



5. CHECK CYLINDER COMPRESSION PRESSURE

(a) Insert a compression gauge into the spark plug hole.
(b) Fully open the throttle.
(c) While cranking the engine, measure the compression pressure.

HINT: Always use a fully charged battery to obtain engine speed of 250 rpm or more.

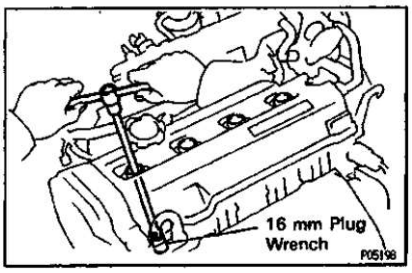
(d) Repeat steps
(a) through
(c) for each cylinder.

NOTICE: This measurement must be done in as short a time as possible.

Compression pressure:
1,226 kPa (12.5 kgf/cm^2, 178 psi) or more
Minimum pressure:
981 kPa (10.0 kgf/cm^2, 142 psi)
Difference between each cylinder:
98 kPa (1.0 kgf/cm^2, 14 psi) or less

(e) If the cylinder compression in one or more cylinders is low, pour a small amount of engine oil into the cylin–der through the spark plug hole and repeat steps (a) through (c) for cylinders with low compression.

- If adding oil helps the compression, chances are that the piston rings and/or cylinder bore are worn or damage.
- If pressure stays low, a valve may be sticking or seating is improper, or there may be leakage past the gasket.



6. REINSTALL SPARK PLUGS

Using a 16 mm plug wrench, install the four spark plugs.

Torque: 18 N–m (180 kgf–cm, 13 ft–lbf)

7. RECONNECT HIGH–TENSION CORDS TO SPARK PLUGS

8. RECONNECT DISTRIBUTOR CONNECTORS

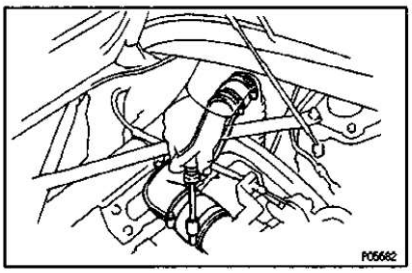
COMPRESSION CHECK

HINT: If there is lack of power, excessive oil con–sumption or poor fuel economy, measure the com–pression pressure.

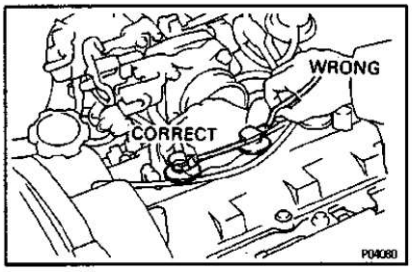
1. WARM UP AND STOP ENGINE

Allow the engine to warm up to normal operating temperature.

2. DISCONNECT DISTRIBUTOR CONNECTOR



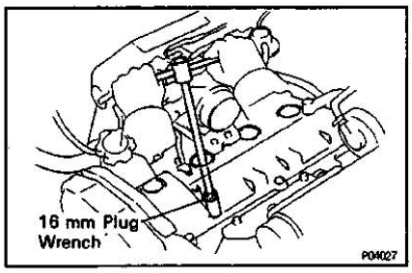
3. REMOVE NO.1 INTAKE AIR CONNECTOR



4. DISCONNECT HIGH–TENSION CORDS FROM SPARK PLUGS

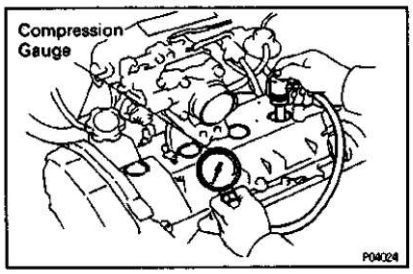
Disconnect the high – tension cords at the rubber boot. Do not pull on the cords.

NOTICE: Pulling on or bending the cords may damage the conductor inside.



5. REMOVE SPARK PLUGS

Using a 16 mm plug wrench, remove the four spark plugs.



6. CHECK CYLINDER COMPRESSION PRESSURE

(a) Insert a compression gauge into the spark plug hole.
(b) Fully open the throttle.
(c) While cranking the engine, measure the compression pressure.

HINT: Always use a fully charged battery to obtain engine speed of 250 rpm or more.

(d) Repeat steps (a) through (c) for each cylinder.

NOTICE: This measurement must be done in as short a time as possible.

Compression pressure:

1,128 kPa (11.5 kg f/cm^2, 164 psi) or more

Minimum pressure:

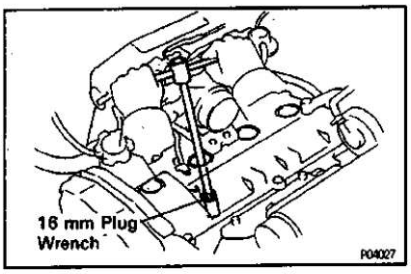
883 kPa (9.0 kgf/cm^2, 128 psi)

Difference between each cylinder:

98 kPa (1.0 kg f/cm^2, 14 psi) or less

(e) If the cylinder compression in one or more cylinders is low, pour a small amount of engine oil into the cylinder through the spark plug hole and repeat steps (a) through (c) for cylinders with low compression.

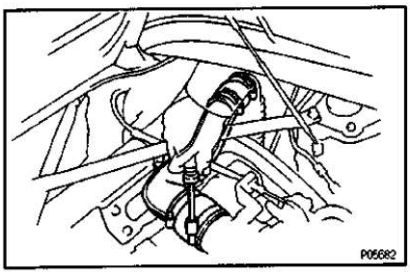
- If adding oil helps the compression, chances are that the piston rings and/or cylinder bore are worn or damage.
- If pressure stays low, a valve may be sticking or seating is improper, or there may be leakage past the gasket.



7. REINSTALL SPARK PLUGS

Using a 16 mm plug wrench, install the four spark plugs.

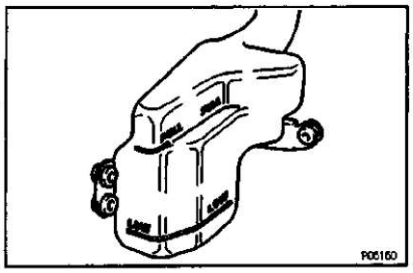
Torque: 18 N–m (180 kgf–cm, 13 ft–lbf)



8. REINSTALL NO.1 INTAKE AIR CONNECTOR

9. RECONNECT HIGH–TENSION CORDS TO SPARK PLUGS

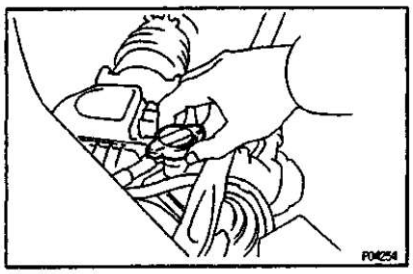
10. RECONNECT DISTRIBUTOR CONNECTOR



COOLANT CHECK

1. CHECK ENGINE COOLANT LEVEL AT RESERVOIR TANK

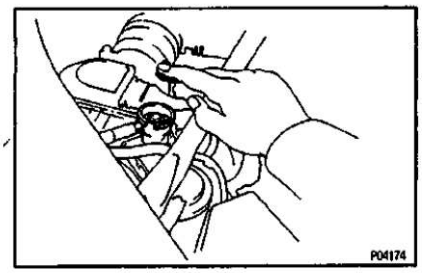
The engine coolant level should be between the " LOW" and "FULL" lines.
If low, check for leaks and add engine coolant up to the "FULL" line.



2. CHECK ENGINE COOLANT QUALITY

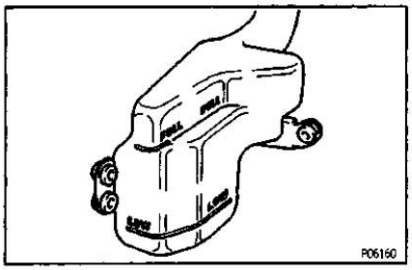
(a) Remove the radiator (water filler) cap.

CAUTION: To avoid the danger of being burned, do not remove it while the engine and radiator are still hot, as fluid and steam can be blown out under pressure.



(b) There should not be any excessive deposits of rust or scales around the radiator cap or radiator filler hole, and the coolant should be free from oil.
If excessively dirty, replace the coolant.

(c) Reinstall the radiator (water filler) cap.

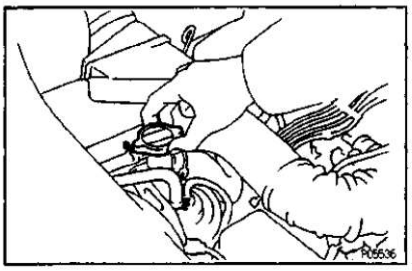


COOLANT CHECK

1. CHECK ENGINE COOLANT LEVEL AT RESERVOIR TANK

The engine coolant level should be between the " LOW" and "FULL" lines.

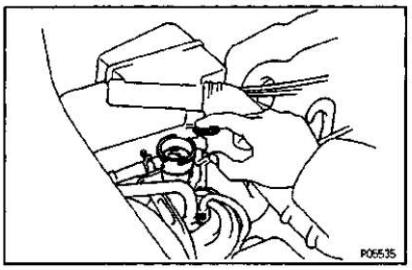
If low, check for leaks and add engine coolant up to the "FULL" line.



2. CHECK ENGINE COOLANT QUALITY

(a) Remove the radiator (water filler) cap.

CAUTION: To avoid the danger of being burned, do not remove it while the engine and radiator are still hot, as fluid and steam can be blown out under pressure.



(b) There should not be any excessive deposits of rust or scales around the radiator cap or radiator filler hole, and the coolant should be free from oil.

If excessively dirty, replace the coolant.

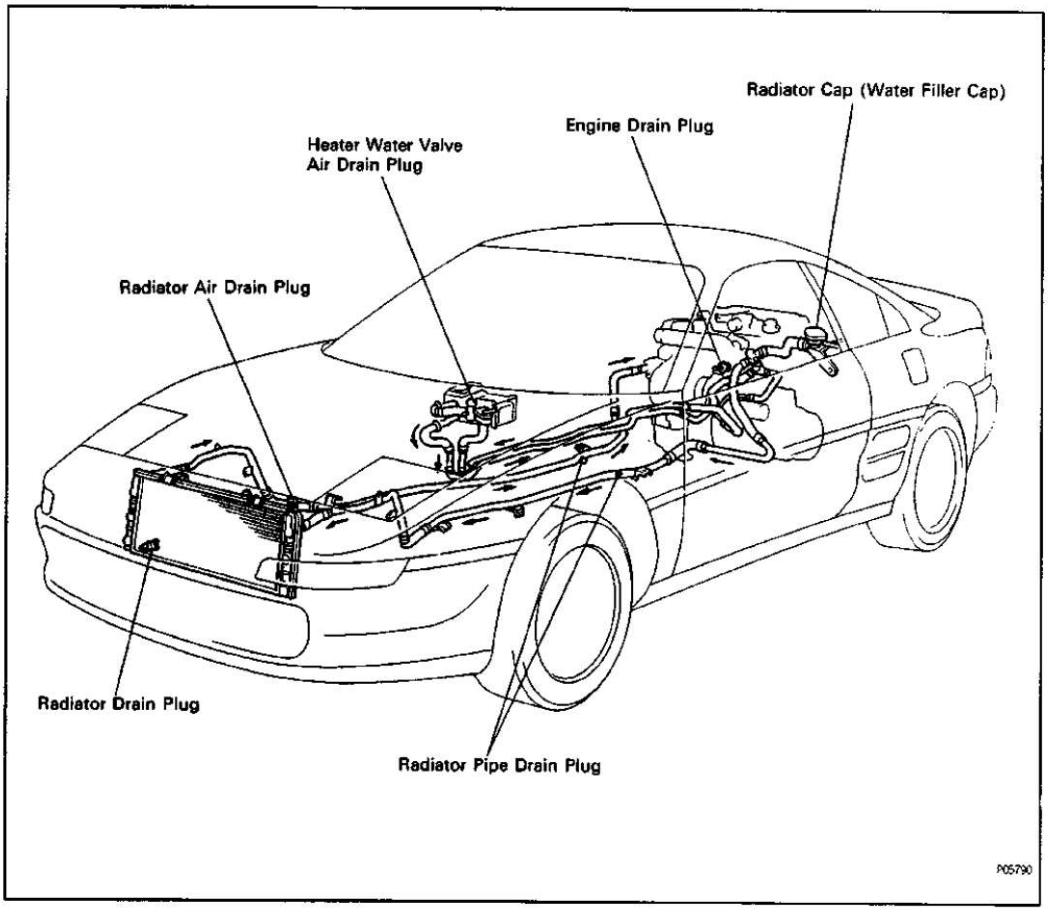
(e) Reinstall the radiator (water filler) cap.

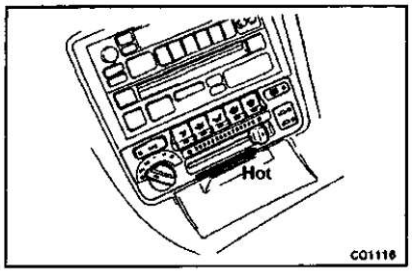
COOLANT REPLACEMENT

NOTICE:

- To avoid the danger of burns, do not begin work until the engine and coolant have properly cooled down.
- To ensure that coolant is poured in properly, perform the operation at a level area. Performing work with the vehicle inclined may cause improper removal of coolant or improper air removal when pouring coolant.
- After replacing the coolant, check the water level in the water filler and reservoir tank once or twice within 500 km (311 miles) of driving or within one week.

COOLANT CIRCUIT



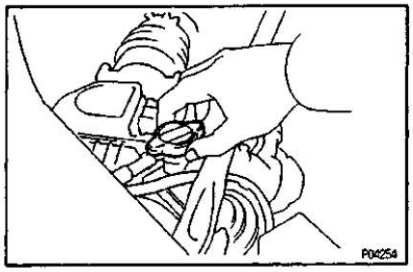


ENGINE COOLANT DRAINAGE

1. REMOVE REAR FUEL TANK PROTECTOR

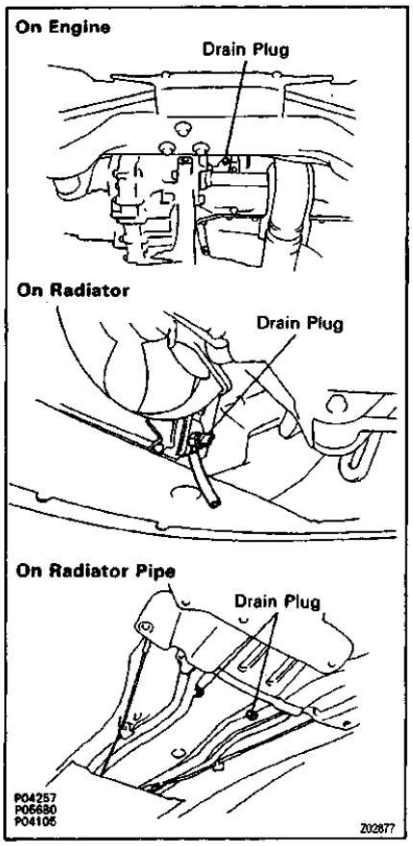
2. DRAIN ENGINE COOLANT

(a) Set the heater control lever to hot.



(b) Remove the radiator cap.

CAUTION: To avoid the danger of being burned, do not remove it while the engine and radiator are still hot, as fluid and steam can be blown out under pressure.



(c) Remove the drain cocks (engine, radiator and radiator pipes), and drain the coolant.

(d) Close the drain plugs.

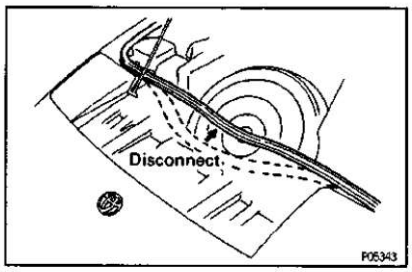
Torque:

25 N–m (250 kgf–cm, 18 ft–lbf) for engine

17 N–m (170 kgf–cm, 12 ft–lbf) for radiator pipes

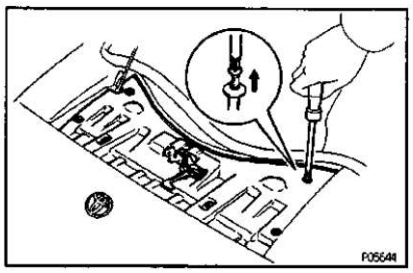
ENGINE COOLANT REFILL

1. REMOVE SPARE TIRE
2. REMOVE DASH PANEL FRONT TRIM COVER

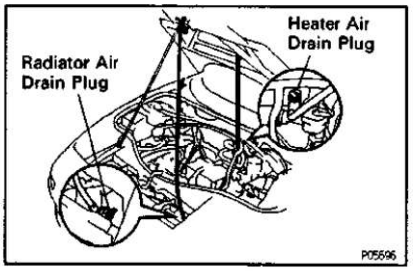


3. REMOVE UPPER RADIATOR SUPPORT SEAL

(a) Disconnect the hood weatherstrip.

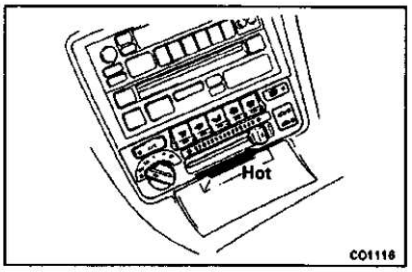


(b) Remove the seven clips.
(c) Remove the two hood lock mounting bolts, and remove the support seal.



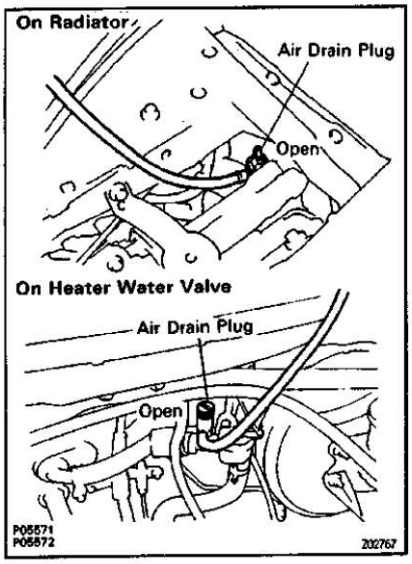
4. SET SERVICE HOSES

(a) Connect the service hoses to the air drain plugs of the radiator and heater water valve.
(b) Suspend the opposite ends the front hood as shown in the illustration.
NOTICE: Do not close–off or pinch any of the service hoses.

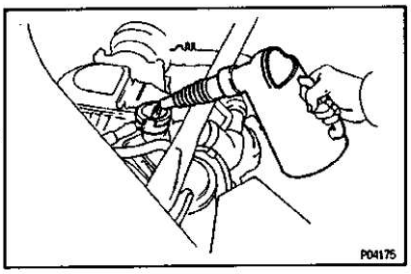


5. FILL ENGINE COOLANT

(a) Set the heater control lever to hot.



(b) Open the air drain plugs of the radiator or heater water valve above three turns.

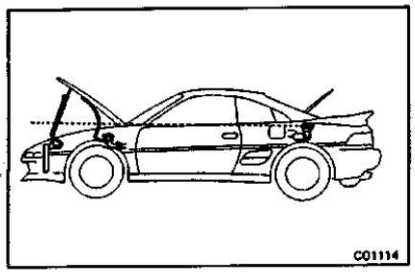


(c) Slowly fill the system with coolant.
Use a good brand of ethylene–glycol base coolant and mix it according to the manufacturer's directions.
Using coolant which includes more than 50% ethylene–glycol (but not more than 70%) is recommended.
NOTICE:

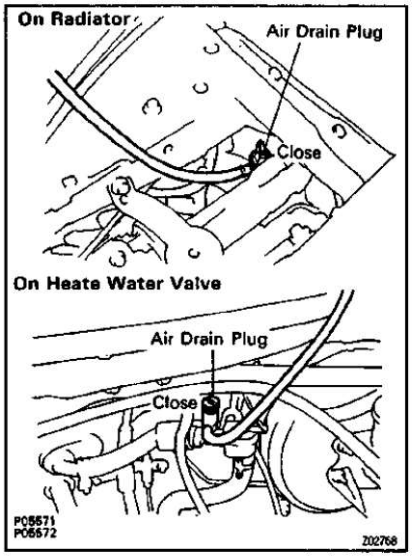
- **Do not use a alcohol type coolant.**
- **The coolant should be mixed with demineralized water or distilled water.**

Capacity (w/ Heater):
13.6 liters (14.4 US qts. 12.0 Imp.qts)

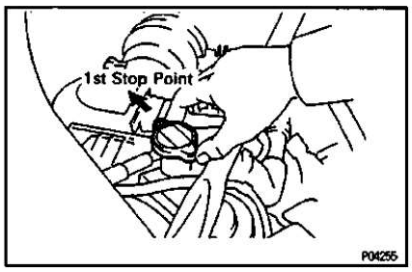
(d) Check that air is absent from the air drain plugs of the radiator and heater water valve while filling the water filler inlet to the top with coolant.



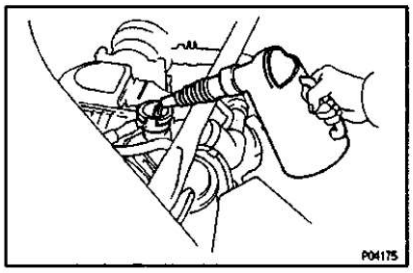
(e) Visually check that the level of coolant in the air drain service hoses of the radiator and heater water valve are the same as in the water filler.
NOTICE: If the water level of coolant in the air drain service hose is clearly, air removal has been incomplete, so check if the service hose is crushed or bent, them perform step (c).



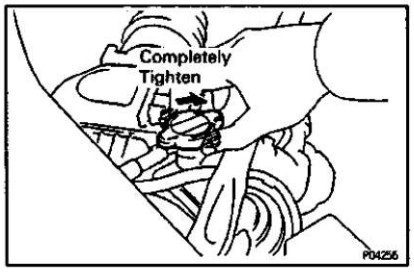
(f) When the coolant level in the air drain service hoses stops dropping, close the air drain plugs of the radi–ator and heater water valve.



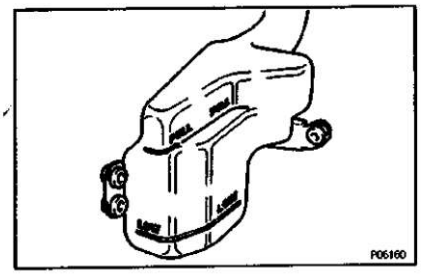
(g) Fasten the radiator (water filler) cap to the 1 st stop point.
NOTICE: Do not tighten the radiator cap completely (to the 2nd stop point).
(h) Start the engine, and run at idle for approx. 3 minutes, and stop the engine.



(i) Add more coolant, and repeat steps (h) and (i).
HINT: By performing steps (h) and (i), 0.2 – 0.5 liters (0.2 – 0.5 US qts, 0.2 – 0.4 Imp. qts) can normally be added.
(j) Check that coolant level in the water filler has not dropped.
If the coolant level has dropped, add coolant and repeat the steps from (g) onward.



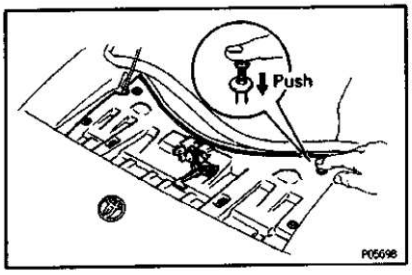
(k) Completely tighten the radiator (water filler) cap.



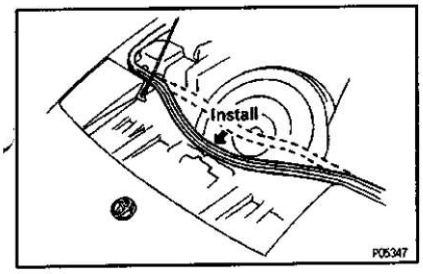
(l) Fill coolant into the reservoir tank up to the "FULL" line.
(m) Check coolant for leaks.

6. REINSTALL UPPER RADIATOR SUPPORT SEAL

(a) Temporarily install the hood lock with the RH side bolt.
(b) Place the support seal in position.
(c) Install the hood lock with the two bolts.
(d) Install the seven clips.



(e) install the hood weatherstrip.



7. REINSTALL SPARE TIRE
8. REINSTALL DASH PANEL FRONT TRIM COVER
9. REINSTALL REAR FUEL TANK PROTECTOR

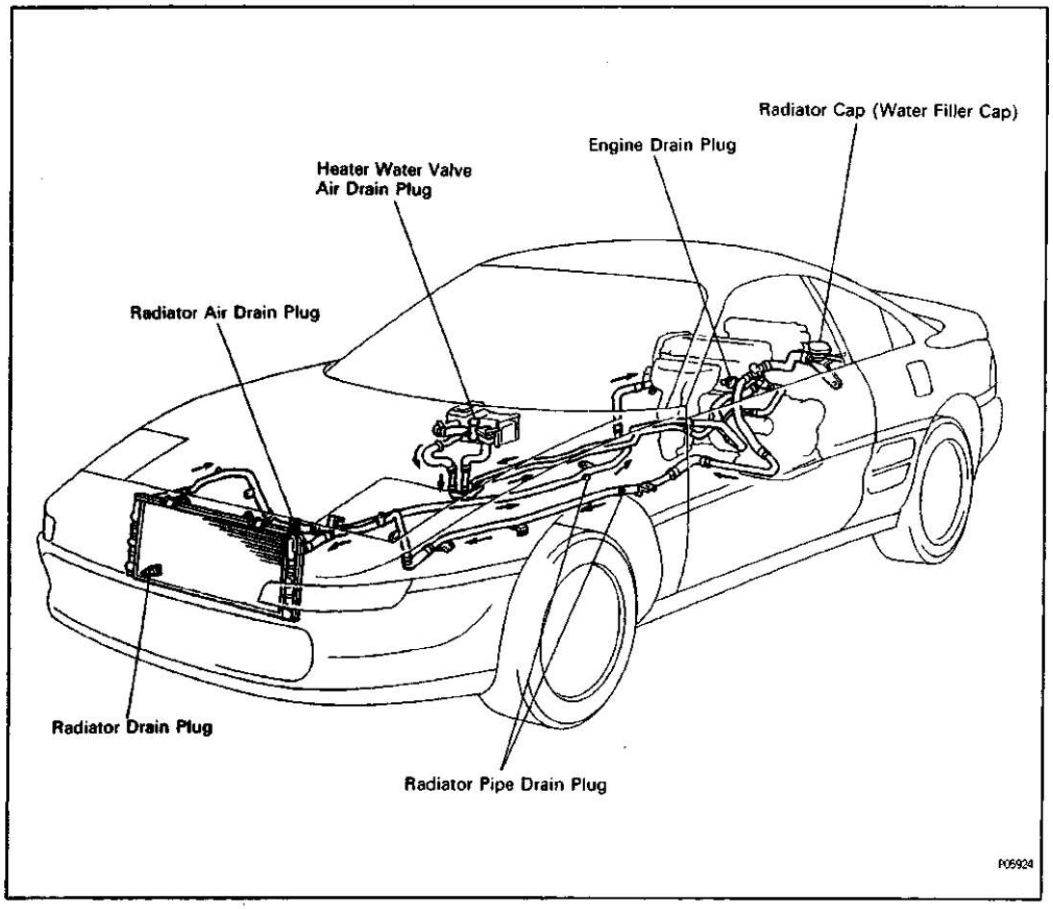
COOLANT REPLACEMENT

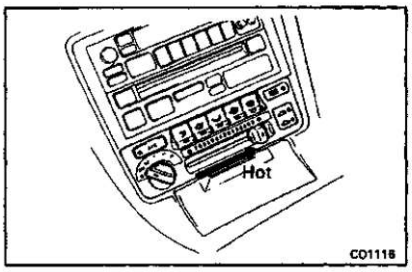
NOTICE: E0183–01

- To avoid the danger of burns, do not begin work until the engine and coolant have properly cooled down.
- To ensure that coolant is poured in,properly, per–form the operation at a level area. Performing work with the vehicle inclined may cause improper re–moval of coolant or improper air removal when pouring coolant.
- After replacing the coolant, check the water level in the water filler and reservoir tank once or twice within 500 km (311 miles) of driving or within one week.

E0134–01

COOLANT CIRCUIT





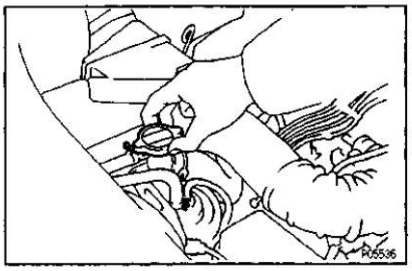
ENGINE COOLANT DRAINAGE

5G134–01

1. REMOVE REAR FUEL TANK PROTECTOR

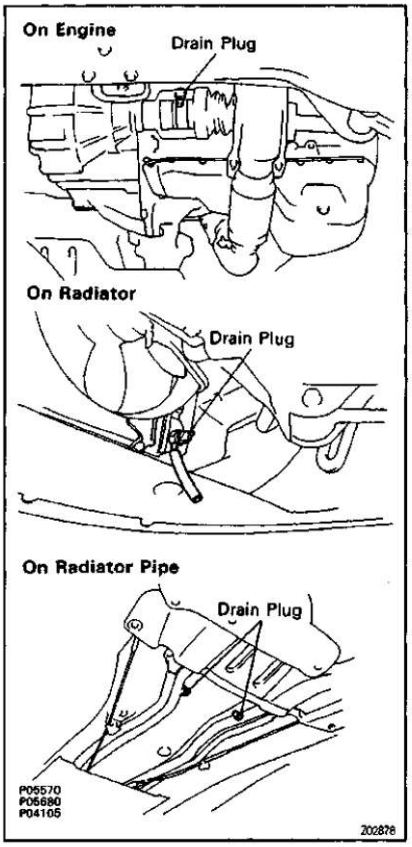
2. DRAIN ENGINE COOLANT

(a) Set the heater control lever to hot.



(b) Remove the radiator cap.

CAUTION: To avoid the danger of being burned, do not remove it while the engine and radiator are still hot, as fluid and steam can be blown out under pressure.



(c) Remove the drain cocks (engine, radiator and radiator pipes), and drain the coolant.

(d) Close the drain plugs.

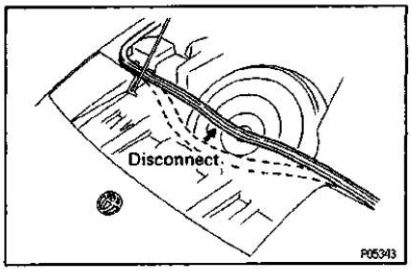
Torque:

25 N–m (250 kgf–cm, 18 ft–lbf) for engine

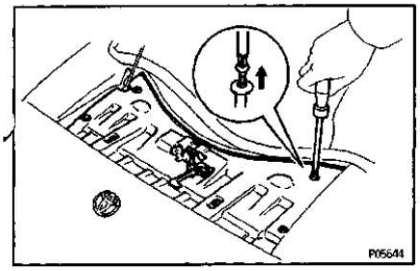
17 N–m (170 kgf–cm, 12 ft–lbf) for radiator pipes

ENGINE COOLANT REFILL

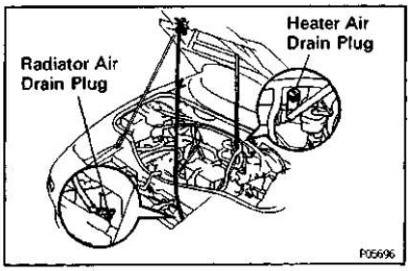
1. REMOVE SPARE TIRE
2. REMOVE DASH PANEL FRONT TRIM COVER



3. REMOVE UPPER RADIATOR SUPPORT SEAL
   (a) Disconnect the hood weatherstrip.

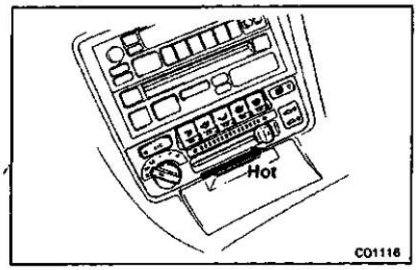


   (b) Remove the seven clips.
   (c) Remove the two hood lock mounting bolts, and remove the support seal.

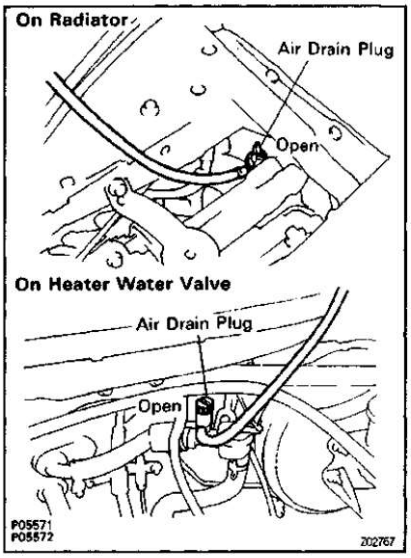


4. SET SERVICE HOSES
   (a) Connect the service hoses to the air drain plugs of the radiator and heater water valve.
   (b) Suspend the opposite ends the front hood as shown in the illustration.

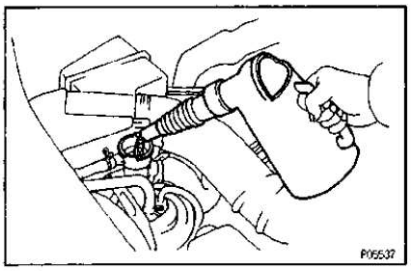
NOTICE: Do not close–off or pinch any of the service hoses.



5. FILL ENGINE COOLANT
   (a) Set the heater control lever to hot.



(b) Open the air drain plugs of the radiator or heater water valve above three turns.



(c) Slowly fill the system with coolant.

- Use a good brand of ethylene–glycol base coo–lant and mix it according to the manufacturer's directions.
- Using coolant which includes more than 50 % ethylene–glycol (but not more than 70 %) is recommended.

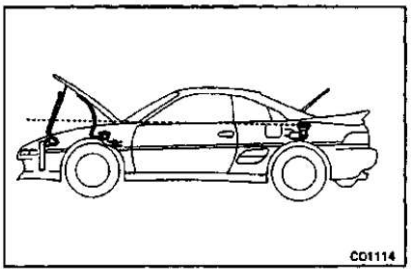
NOTICE:

- **Do not use a alcohol type coolant.**
- **The coolant should be mixed with dernineralized water or distilled water.**

Capacity (w/ Heater):

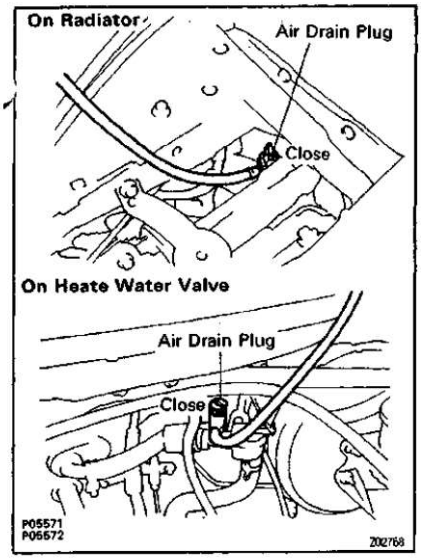
13.0 liters (13.7 US qts, 11.4 Imp.qts)

(d) Check that air is absent from the air drain plugs of the radiator and heater water valve while filling the water filler inlet to the top with coolant.

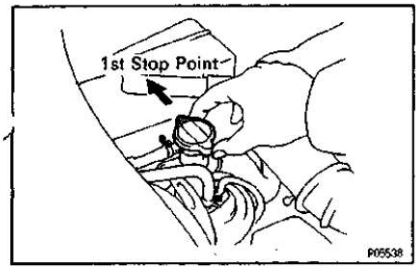


(e) Visually check that the level of coolant in the air drain service hoses of the radiator and heater water valve are the same as in the water filler.

NOTICE: If the water level of coolant in the air drain service hose is clearly, air removal has been incomplete, so check if the service hose is crushed or bent, them perform step (e).



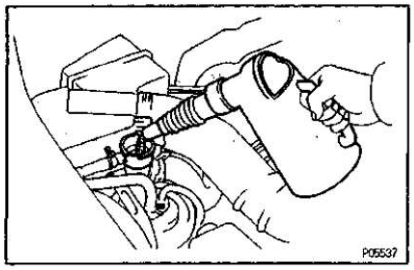
(f) When the coolant level in the air drain service hoses stops dropping, close the air drain plugs of the radi–ator and heater water valve.



(g) Fasten the radiator (water filler) cap to the 1st stop point.

NOTICE: Do not tighten the radiator cap completely (to the 2nd stop point).

(h) Start the engine, and run at idle for approx. 3 minutes, and stop the engine.

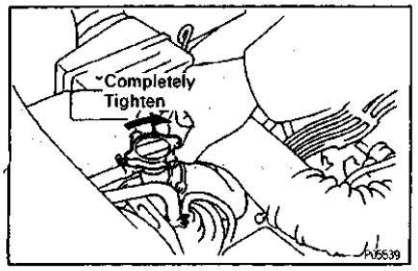


(i) Add more coolant, and repeat steps (h) and (i).

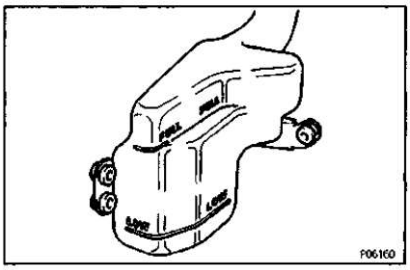
HINT: By performing steps (h) and (i), 0.2 – 0.5 liters (0.2 – 0.5 US qts, 0.2 – 0.4 Imp. qts) can normally be added.

(j) Check that coolant level in the water filler has not dropped.

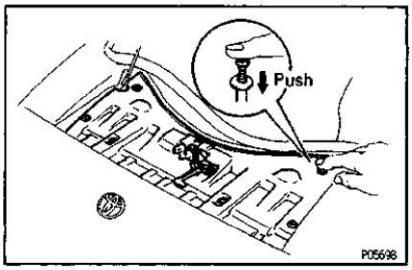
If the coolant level has dropped, add coolant and repeat the steps from (g) onward.



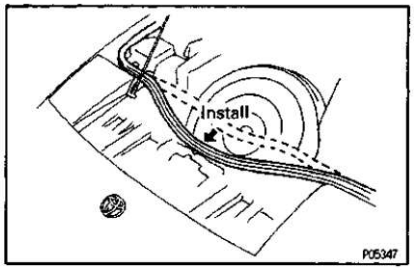
(k) Completely tighten the radiator (water filler) cap.



(l) Fill coolant into the reservoir tank up to the "FULL" line.
(m) Check coolant for leaks.



6. INSTALL UPPER RADIATOR SUPPORT SEAL
(a) Temporarily install the hood lock with the RH side bolt.
(b) Place the support seal in position.
(c) Install the hood lock with the two bolts.
(d) Install the seven clips.

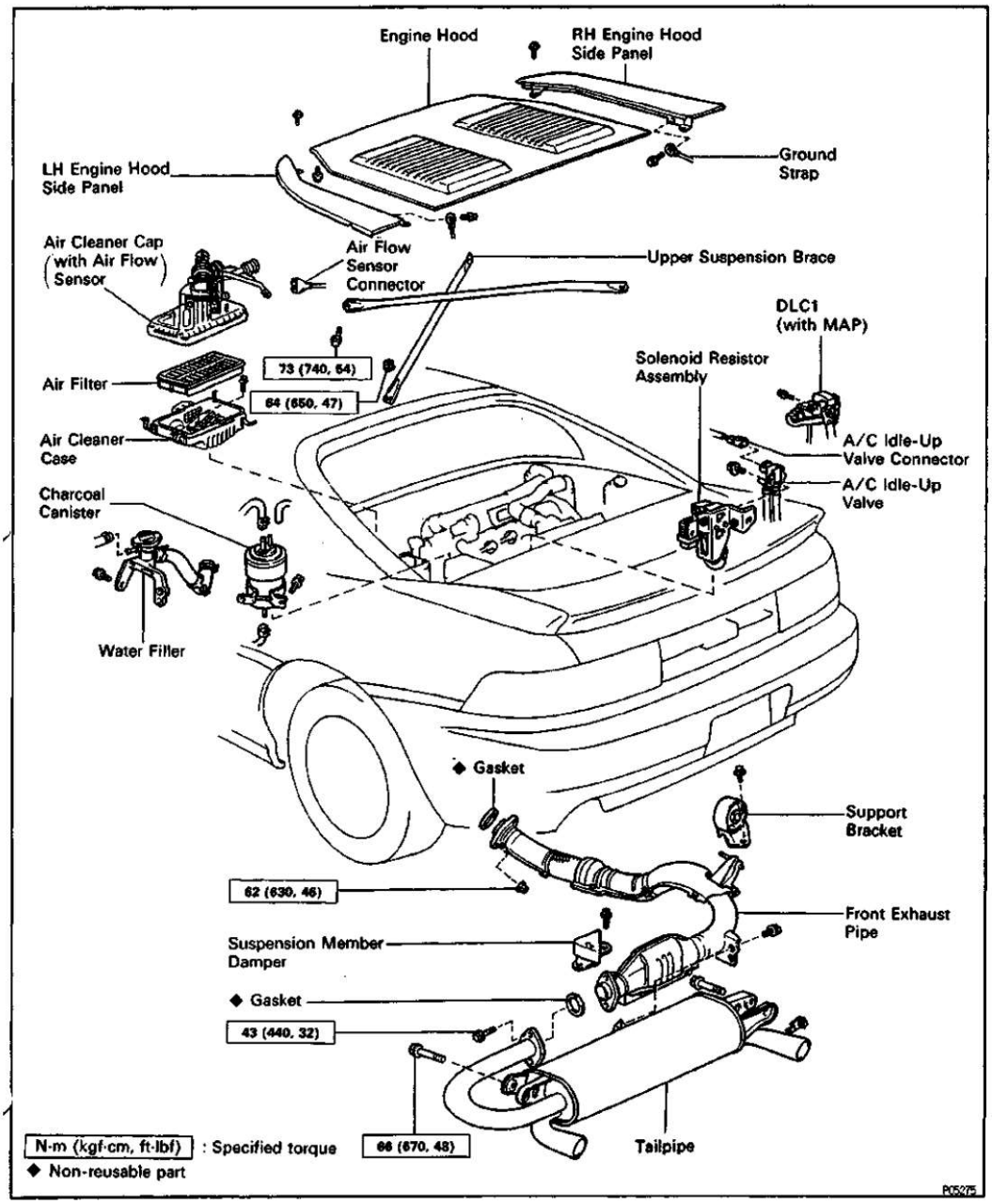


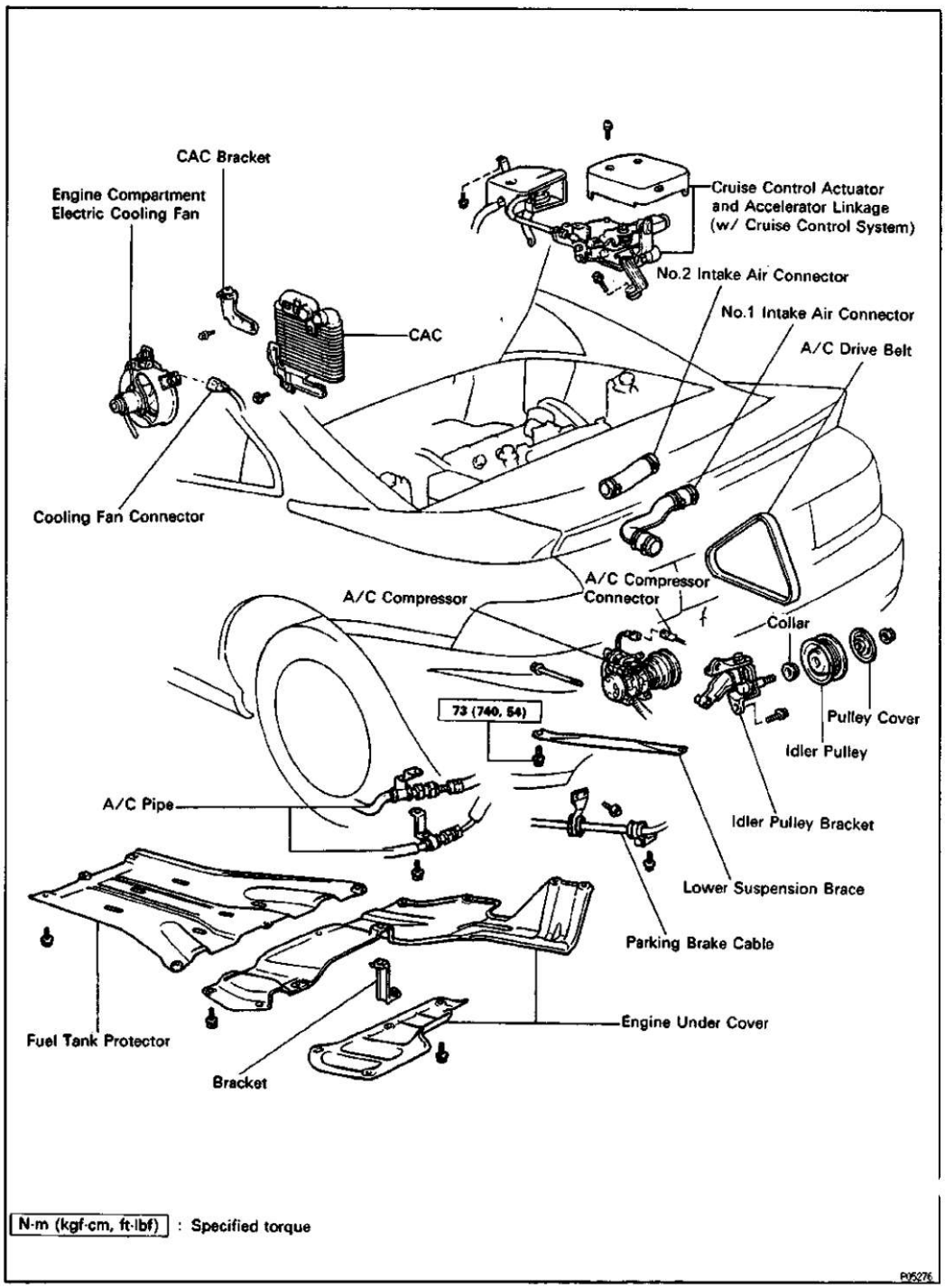
(e) Install the hood weatherstrip.

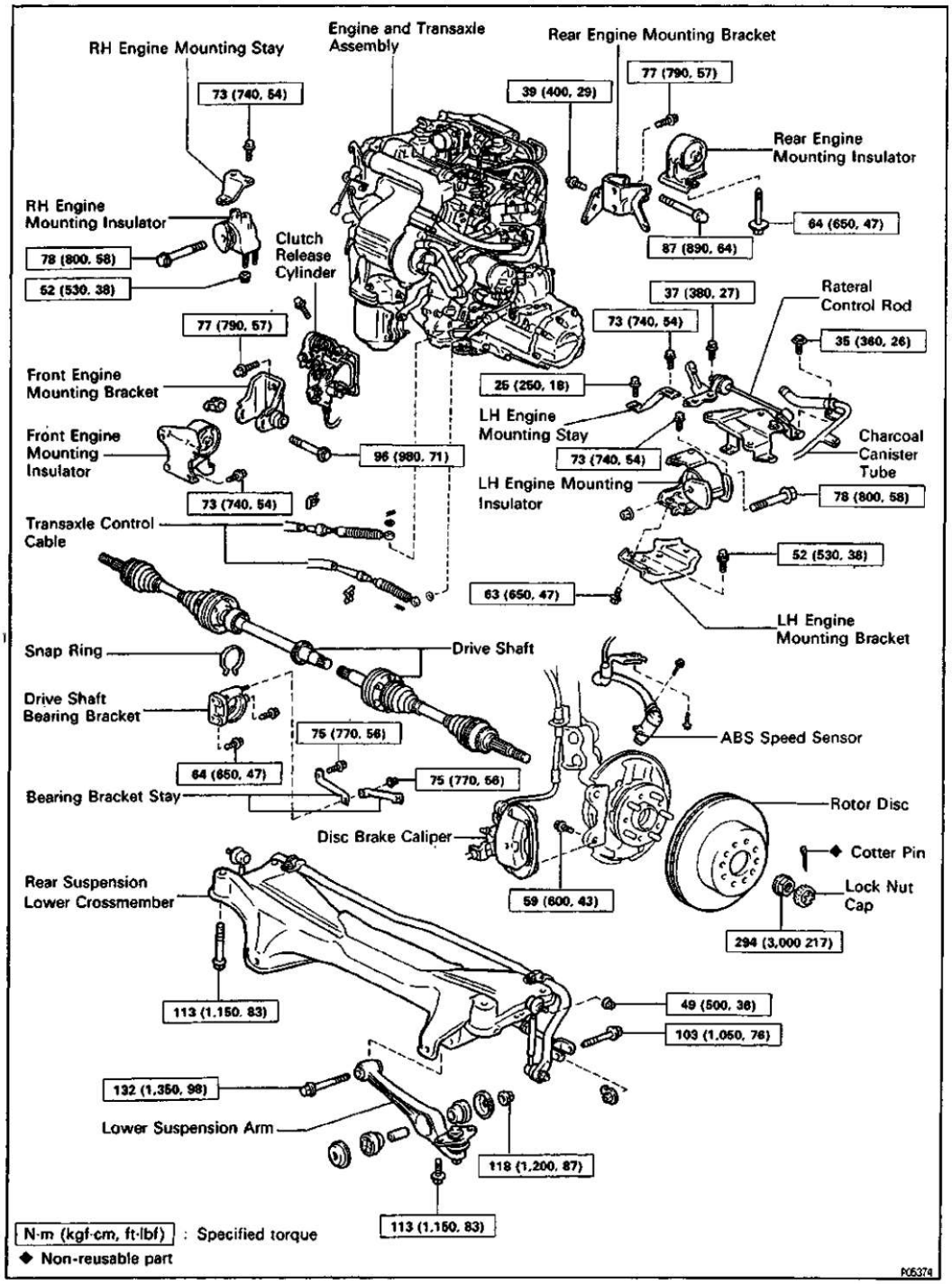
7. REINSTALL SPARE TIRE
8. REINSTALL DASH PANEL FRONT TRIM COVER
9. REINSTALL REAR FUEL TANK PROTECTOR

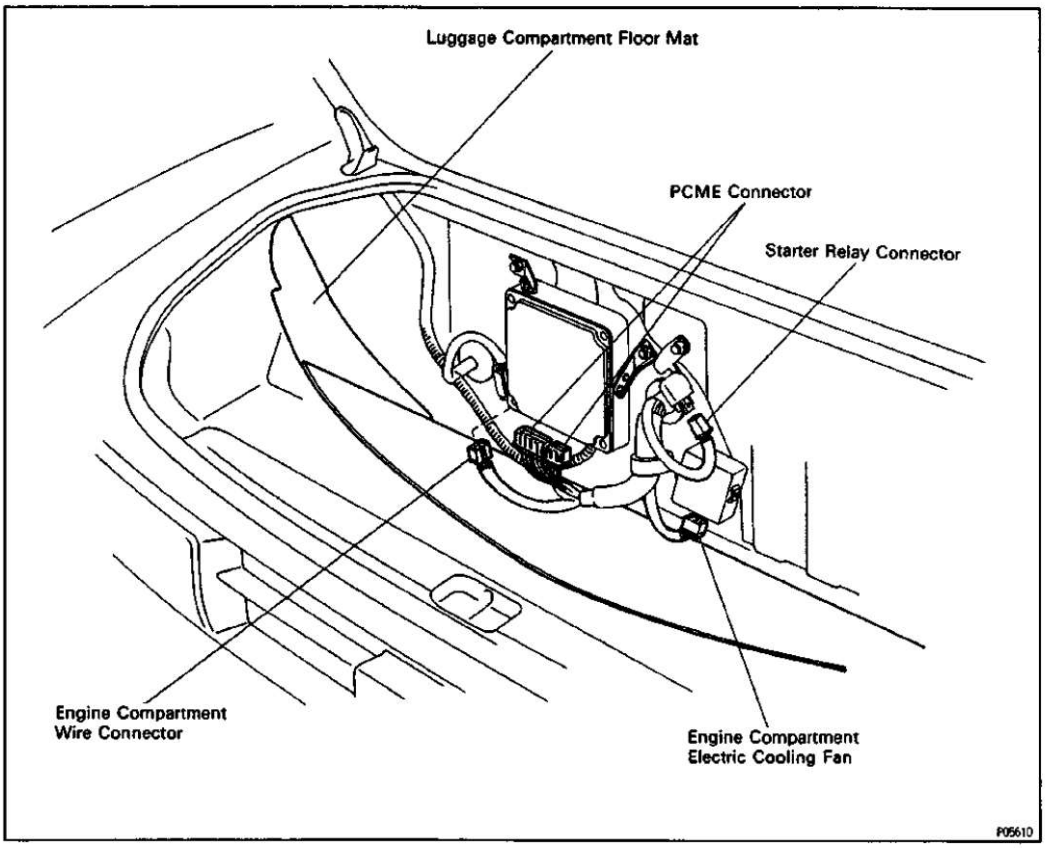
CYLINDER BLOCK

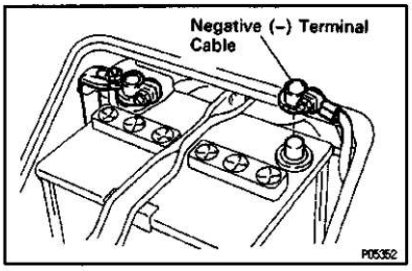
COMPONENTS FOR ENGINE REMOVAL AND INSTALLATION




CAC Bracket
Engine Compartment Electric Cooling Fan
Cruise Control Actuator and Accelerator Linkage (w/ Cruise Control System)
No.2 Intake Air Connector
No.1 Intake Air Connector
A/C Drive Belt
CAC
Cooling Fan Connector
A/C Compressor Connector
A/C Compressor
Collar
Pulley Cover
Idler Pulley
73 (740, 54)
A/C Pipe
Idler Pulley Bracket
Lower Suspension Brace
Parking Brake Cable
Engine Under Cover
Fuel Tank Protector
Bracket
N·m (kgf·cm, ft·lbf) : Specified torque
P05276


RH Engine Mounting Stay
Engine and Transaxle Assembly
Rear Engine Mounting Bracket
73 (740, 54)
39 (400, 29)
77 (790, 57)
Rear Engine Mounting Insulator
RH Engine Mounting Insulator
64 (650, 47)
78 (800, 58)
Clutch Release Cylinder
87 (890, 64)
52 (530, 38)
37 (380, 27)
Rateral Control Rod
77 (790, 57)
73 (740, 54)
35 (360, 26)
Front Engine Mounting Bracket
25 (250, 18)
LH Engine Mounting Stay
Front Engine Mounting Insulator
96 (980, 71)
73 (740, 54)
Charcoal Canister Tube
LH Engine Mounting Insulator
78 (800, 58)
73 (740, 54)
Transaxle Control Cable
52 (530, 38)
63 (650, 47)
LH Engine Mounting Bracket
Snap Ring
Drive Shaft
Drive Shaft Bearing Bracket
ABS Speed Sensor
75 (770, 56)
64 (650, 47)
75 (770, 56)
Bearing Bracket Stay
Rotor Disc
Disc Brake Caliper
◆ Cotter Pin
Rear Suspension Lower Crossmember
Lock Nut Cap
59 (600, 43)
294 (3,000 217)
113 (1,150, 83)
49 (500, 36)
103 (1,050, 76)
132 (1,350, 98)
Lower Suspension Arm
118 (1,200, 87)
113 (1,150, 83)
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part
P05374





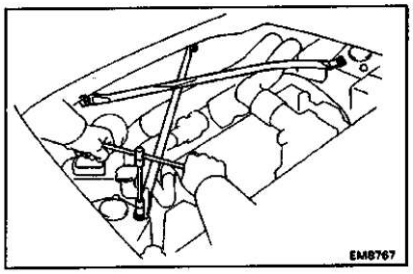
ENGINE REMOVAL

(See Components for Engine Removal and Installation)

1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY

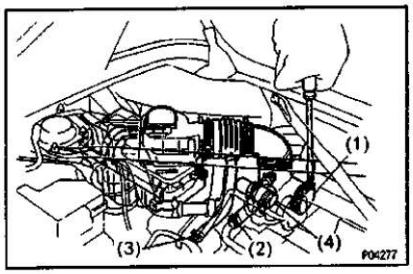
   CAUTION: Turn the ignition switch to "LOCK". Disconnect the negative terminal from the battery. Wait at least 20 seconds before proceeding with work.

2. REMOVE ENGINE HOOD
3. REMOVE ENGINE HOOD SIDE PANELS
4. REMOVE ENGINE UNDER COVERS
5. DRAIN ENGINE COOLANT
6. DRAIN ENGINE OIL
7. DRAIN TRANSAXLE OIL



8. REMOVE UPPER SUSPENSION BRACE

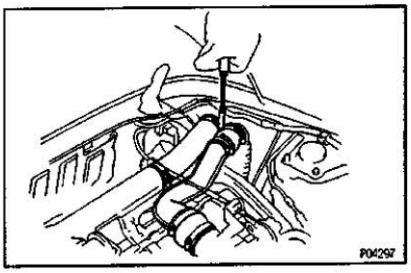
Remove the two bolts, two nuts and suspension brace.



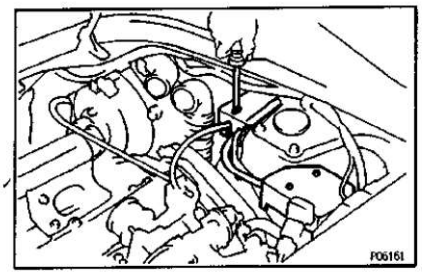
9. REMOVE AIR CLEANER HOUSING

(a) Disconnect the air flow sensor connector.
(b) Disconnect the following hoses:
(1) Air cleaner hose from turbocharger
(2) PCV hose from cylinder head cover
(3) Air hose from No.2 air hose
(4) Air hose from air by–pass valve

(c) Disconnect the four clamps, and remove the air cle–aner cap and air flow sensor assembly.
(d) Remove the air filter.
(e) Remove the three bolts and air cleaner case.

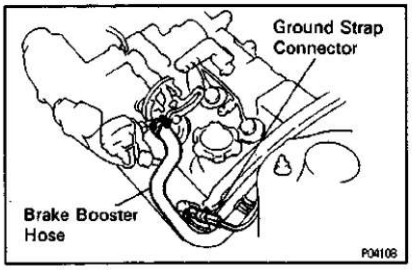


10. REMOVE N0.1 AND NO.2 INTAKE AIR CONNECTORS

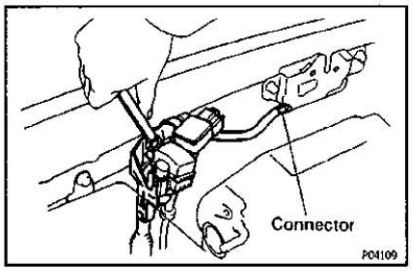


11. (w/ CRUISE CONTROL SYSTEM) REMOVE CRUISE CONTROL ACTUATOR AND ACCELERATOR LINKAGE

12. (w/o CRUISE CONTROL SYSTEM) DISCONNECT ACCELERATOR LINKAGE FROM THROTTLE BODY

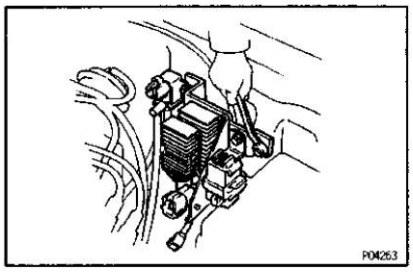


13. DISCONNECT GROUND STRAP CONNECTOR
14. DISCONNECT BRAKE BOOTER VACUUM HOSE



15. DISCONNECT DATA LINK CONNECTOR 1 AND MAP

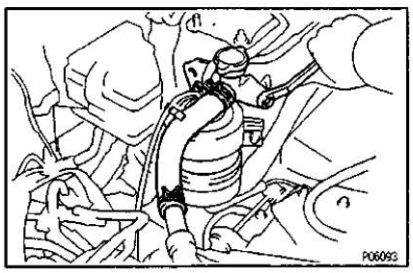
(a) Disconnect the engine hood courtesy switch connector.
(b) Remove the bolt, and disconnect the data link connector 1 and MAP from the body.



16. DISCONNECT A/C IDLE–UP VALVE, AND REMOVE SOLENOID RESISTOR ASSEMBLY

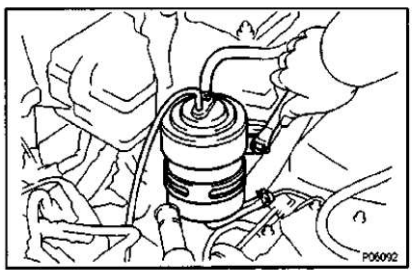
(a) Disconnect the following connectors:
- Solenoid resistor connector
- Fuel pump relay connector
- Fuel pump resistor connector

(b) Remove the two bolts, and disconnect the A/C idle – up from the body. Remove the solenoid resistor assembly.



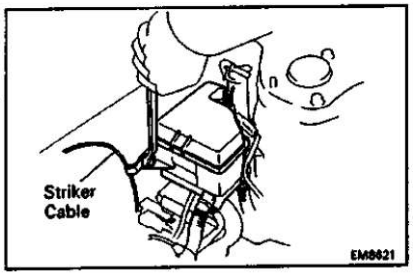
17. REMOVE WATER FILLER

(a) Disconnect the following hoses:
(1) Water filler hose
(2) Coolant reservoir hose
(b) Remove the two bolts and water filler.



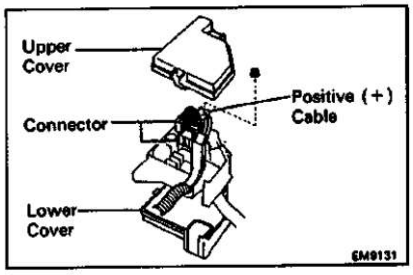
18. REMOVE CHARCOAL CANISTER

(a) Disconnect the three hoses from the charcoal canister.
(b) Remove the two bolts and charcoal canister.



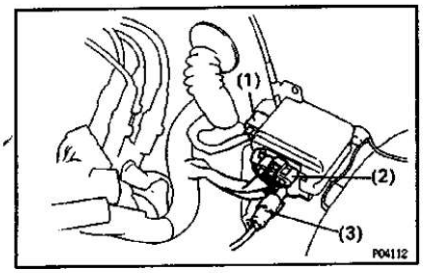
19. REMOVE ENGINE RELAY BOX, AND DISCONNECT ENGINE WIRE

(a) Remove the two bolts and relay box. Disconnect the luggage compartment striker cable.



(b) Remove the upper and lower covers from the relay box.

(c) Disconnect the positive (+) cable and two connectors of the engine wire from the relay box.



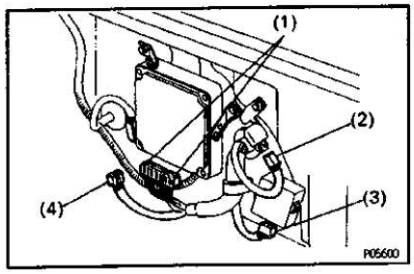
20. DISCONNECT CONNECTORS AND HIGH–TENSION CORD

Disconnect the following connectors and cord:

(1) Noise filter connector

(2) Igniter connector

(3) High–tension cord from ignition coil



21. DISCONNECT ENGINE WIRE FROM LUGGAGE COMPARTMENT

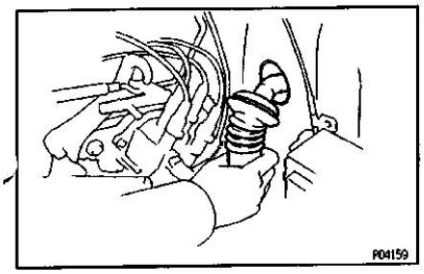
(a) Disconnect the following connectors:

(1) Two PCME connectors

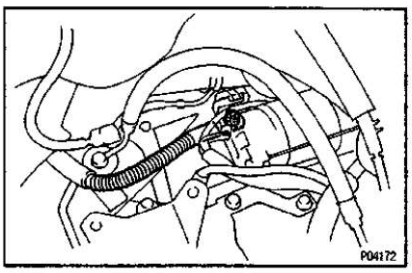
(2) Starter relay connector

(3) Engine compartment electric cooling fan con–nector

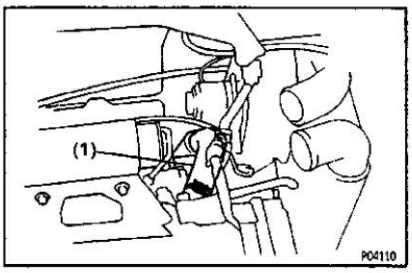
(4) Engine compartment wire connector



(b) Pull out the engine wire from the luggage compart–ment.

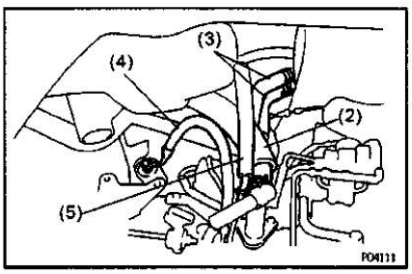


22. DISCONNECT STARTER CABLE

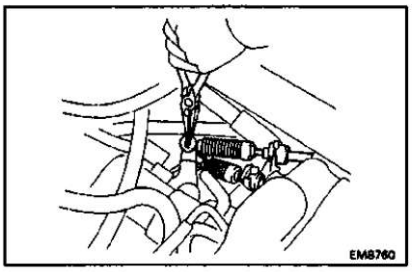


23. DISCONNECT HOSES

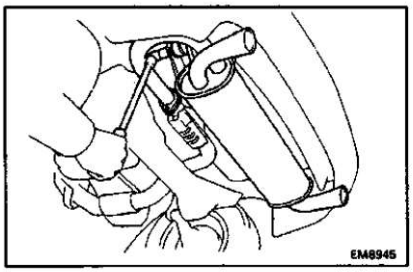
Disconnect the following connectors:
(1) Radiator hose from water inlet



(2) Radiator hose from water outlet
(3) Two heater water hoses
(4) Fuel inlet hose from fuel filter
(5) Fuel return hose
CAUTION: Catch leaking fuel in a container.

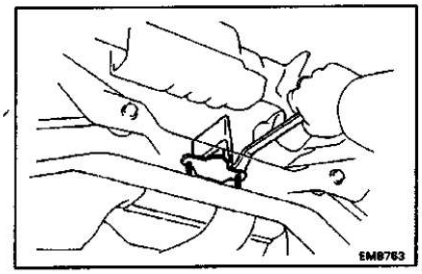


24. DISCONNECT TRANSAXLE CONTROL CABLES FROM TRANSAXLE



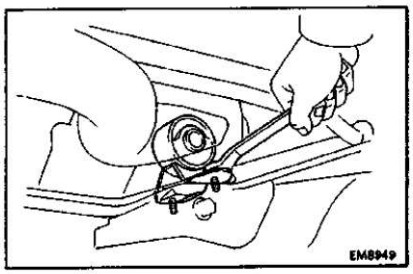
25. REMOVE TAILPIPEE

(a) Remove the two bolts holding the front exhaust pipe bracket to the tailpipe bracket.
(b) Remove the two bolts holding the front exhaust pipe to the tailpipe.
(c) Remove the two bolts, tailpipe and gasket.

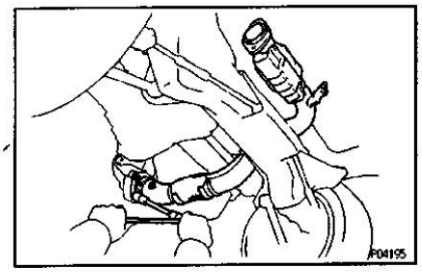


26. REMOVE FRONT EXHAUST PIPE

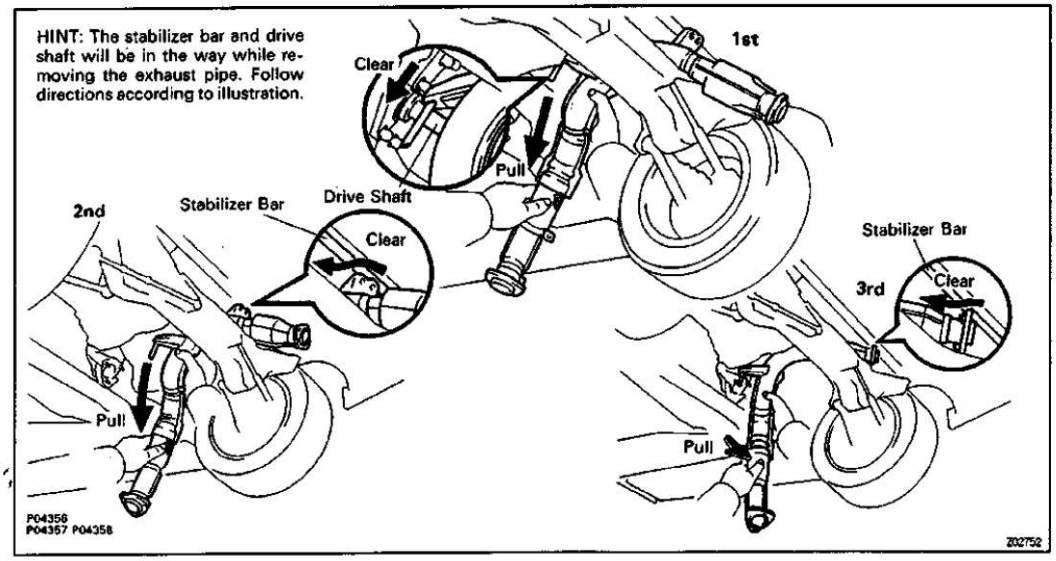
(a) Remove the two bolts and damper.

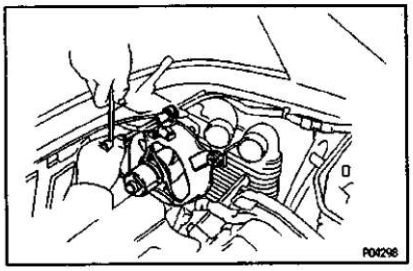


(b) Remove the two bolts and support bracket.



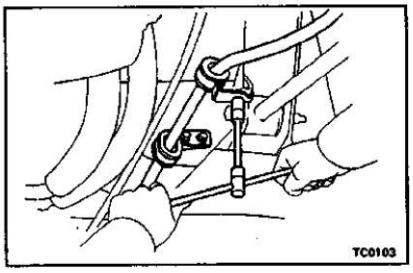
(c) Using a 14 mm deep wrench, remove the three nuts.
(d) Remove the exhaust pipe and gasket.





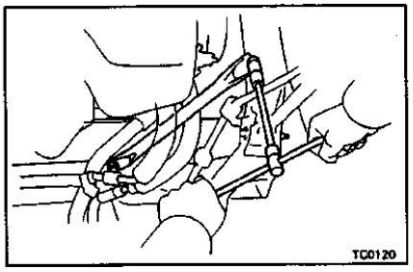
27. REMOVE ENGINE COMPARTMENT ELECTRIC COOLING FAN

(a) Disconnect the cooling fan connector.
(b) Loosen the three bolts, and remove the cooling fan.

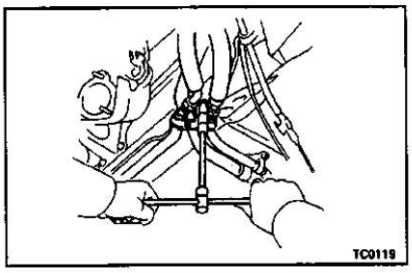


28. DISCONNECT A/C COMPRESSOR FROM ENGINE

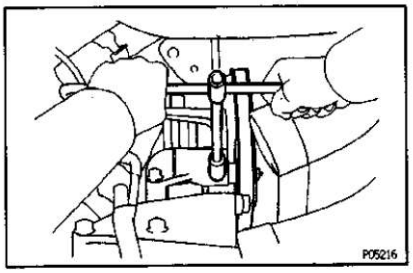
(a) Remove the three clamp bolts, and disconnect the parking brake cable.



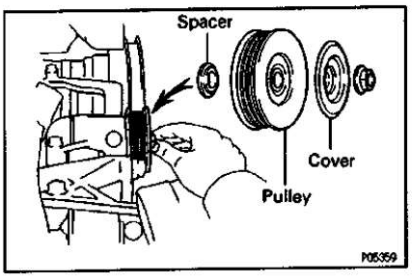
(b) Remove the two bolts and lower suspension brace.



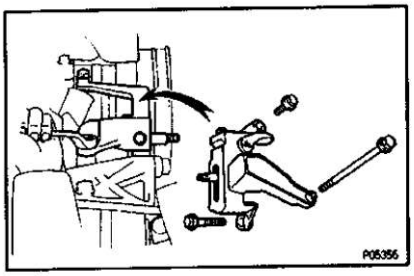
(c) Remove the clamp nut, and disconnect the two A/C pipes.



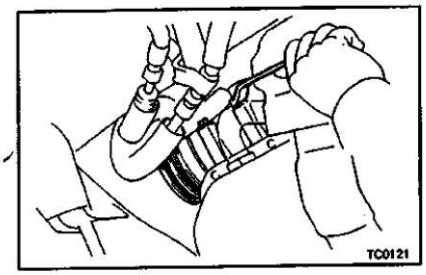
(d) Loosen the idler pulley nut.
(e) Loosen the adjusting bolt, and remove the drive belt,



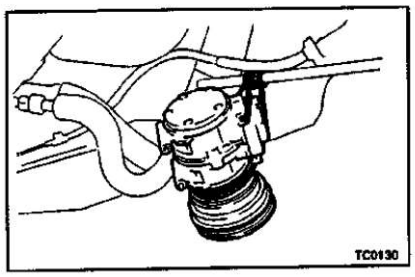
(f) Remove the nut, pulley cover, idler pulley and spacer.



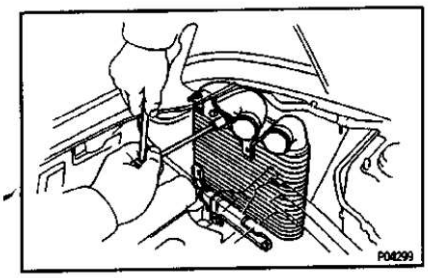
(g) Disconnect the A/C compressor connector.
(h) Remove the three bolts and idler pulley bracket.



(i) Remove the two bolts, and disconnect the A/C compressor from the engine.

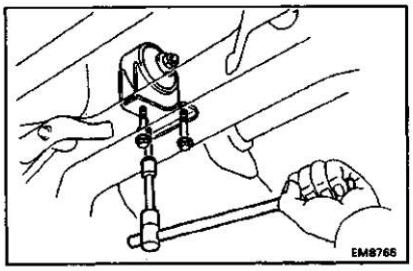


HINT: Suspend the A/C compressor to strut rod with a string.



29. REMOVE CAC

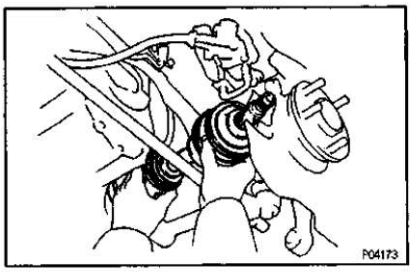
(a) Remove the two bolts holding the CAC to the upper bracket.
(b) Remove the three bolts, upper bracket and CAC.



30. REMOVE REAR ENGINE MOUNTING INSULATOR

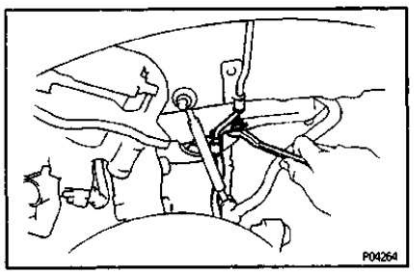
(a) Remove the through bolt holding the mounting insulator to the mounting bracket.

(b) Remove the three bolts and mounting insulator.



31. REMOVE DRIVE SHAFTS

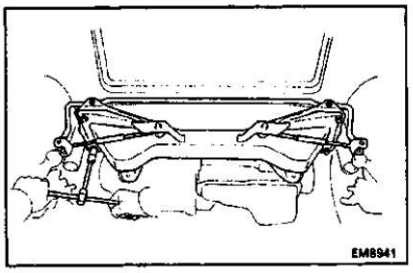
(See Drive Shaft Removal in SA section)



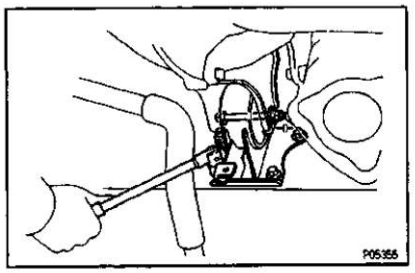
32. REMOVE REAR SUSPENSION CROSSMEMBER

(a) Remove the lower suspension arms.
(See Lower Suspension arm Removal in SA section)

(b) Remove the bolt, and disconnect the wire clamp of the ABS speed sensor from the suspension crossmember.



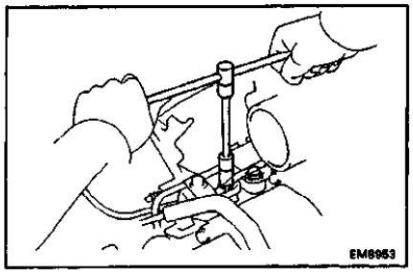
(c) Remove the four bolts and lower crossmember.



33. REMOVE FRONT ENGINE MOUNTING INSULATOR

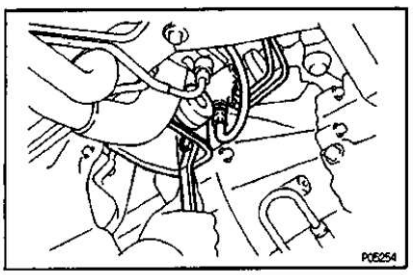
(a) Remove the through bolt and nut holding the mounting insulator to the mounting bracket.

(b) Remove the four bolts and mounting insulator.

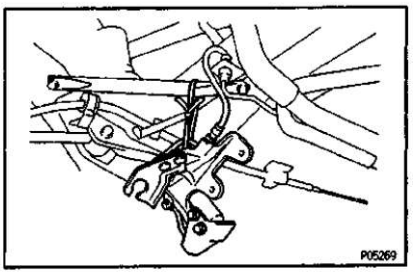


34. REMOVE FRONT ENGINE MOUNTING BRACKET

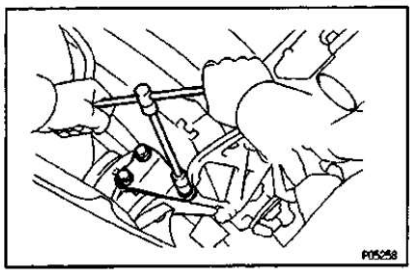
(a) Remove the two bolts holding the clutch release cyl–inder to the transaxle.



(b) Remove the two bolts and mounting bracket. Dis–connect the clutch release cylinder from the transaxle.

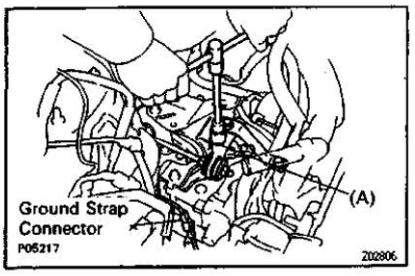


HINT: Suspend the clutch release cylinder to the suspension brace with a string.



35. REMOVE RH ENGINE MOUNTING STAY

Remove the three bolts and mounting stay.



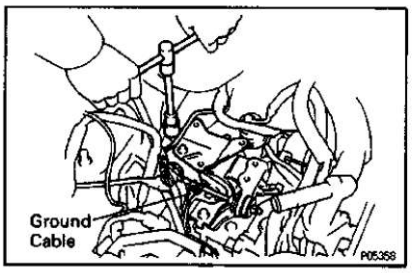
36. REMOVE LH ENGINE MOUNTING STAY

Remove the two bolts and mounting stay.

37. DISCONNECT LATERAL CONTROL ROD FROM LH ENGINE MOUNTING INSULATOR

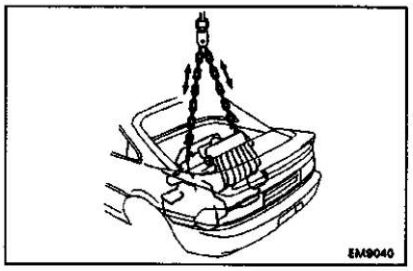
Remove the bolt (A), and disconnect the lateral con–trol rod from the mounting insulator.

38. DISCONNECT GROUND STRAP CONNECTOR



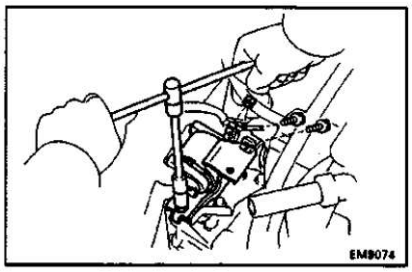
39. REMOVE LATERAL CONTROL ROD

Remove the four bolts and lateral control rod. Dis–connect the ground strap connector.

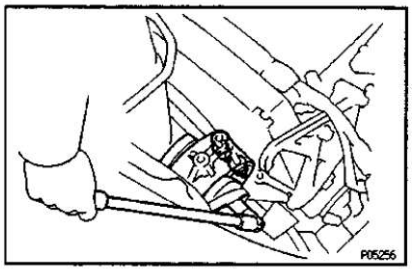


40. REMOVE ENGINE AND TRANSAXLE ASSEMBLY FROM VEHICLE

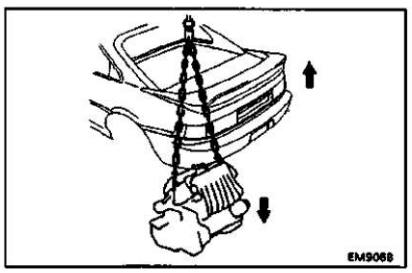
(a) Attach the engine sling device to the engine hangers.



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

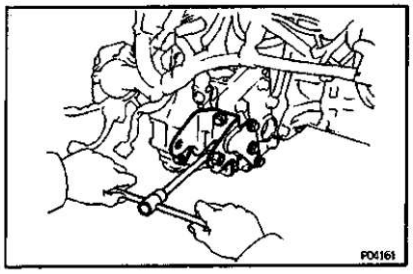


(c) Remove the through bolt, two nuts and RH mounting insulator.



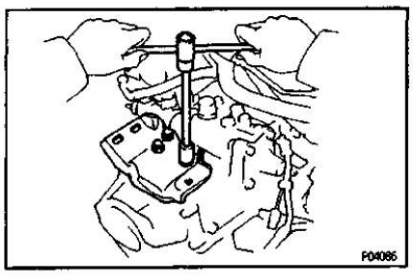
(d) Lower the engine out of the vehicle slowly and care–fully, and raise the vehicle.
HINT: Make sure the engine is clear of all wiring, hoses and cables.

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



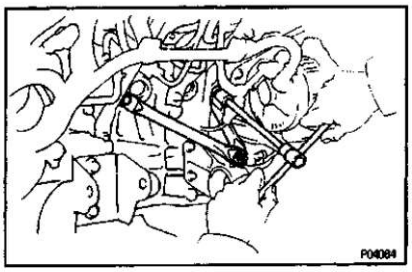
41. REMOVE REAR ENGINE MOUNTING BRACKET

Remove the six bolts and mounting bracket.



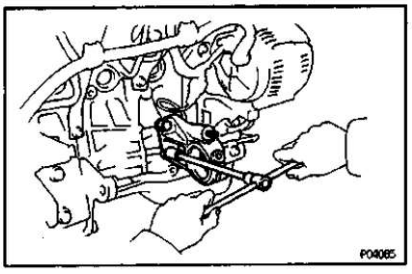
42. REMOVE LH ENGINE MOUNTING BRACKET

Remove the three bolts and mounting bracket.



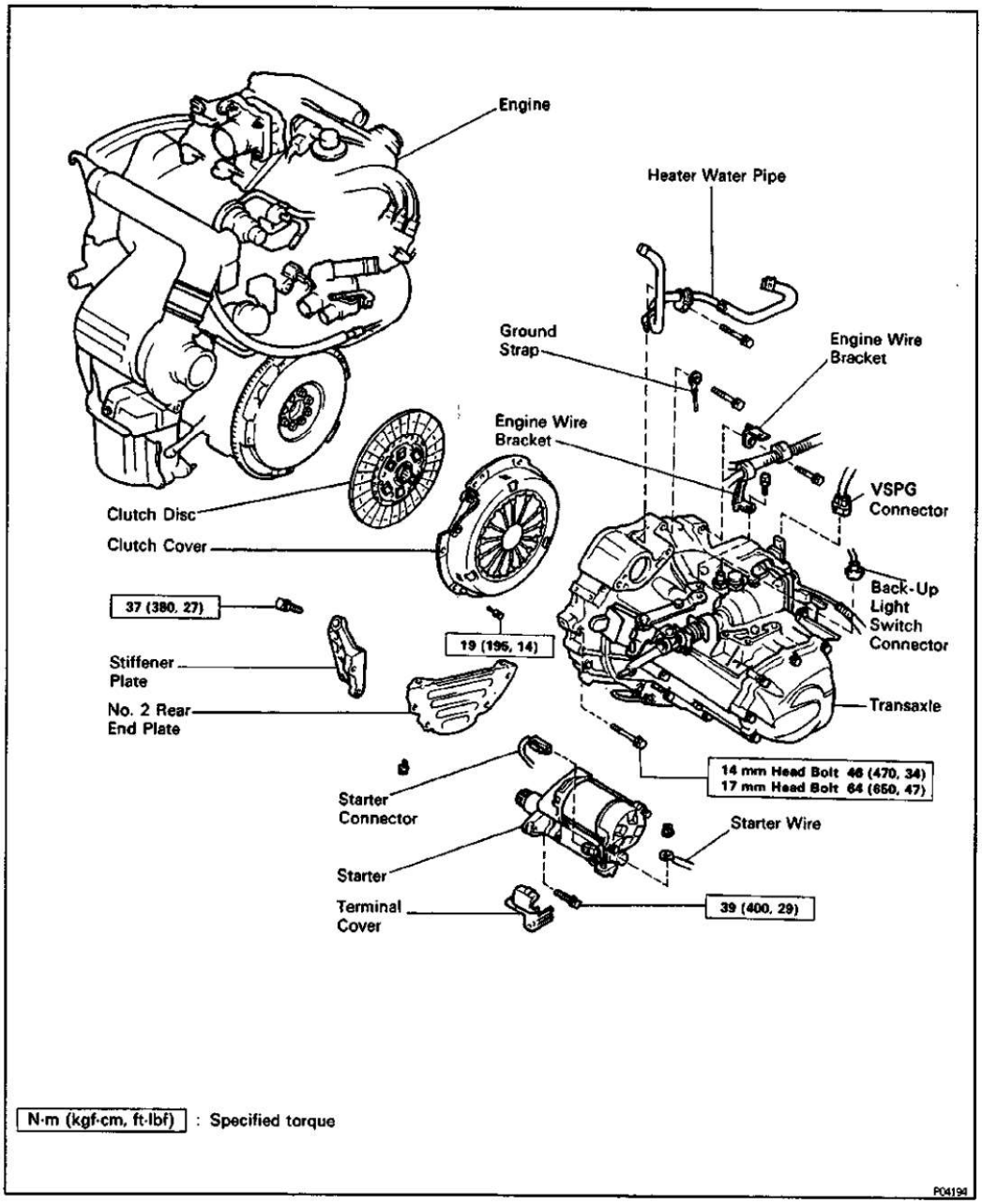
43. REMOVE DRIVE SHAFT BEARING BRACKET

(a) Remove the two bolts, nut and bearing bracket stay.



(b) Remove the two bolts and bearing bracket.

COMPONENTS FOR ENGINE & TRANSAXLE SEPARATION AND ASSEMBLY

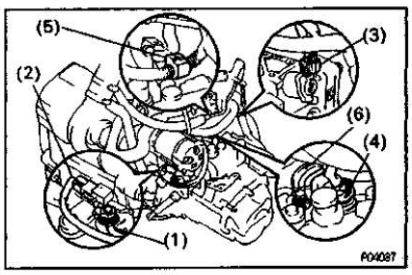


ENGINE AND TRANSAXLE SEPARATION

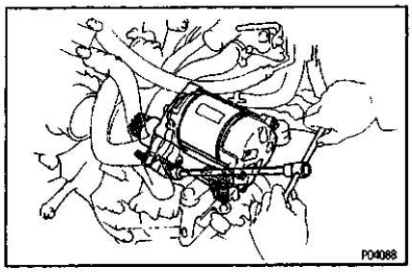
(Components for Engine & Transaxle Separation and Assembly)

1. DISCONNECT ENGINE WIRE

(a) Remove the terminal cover from the starter.

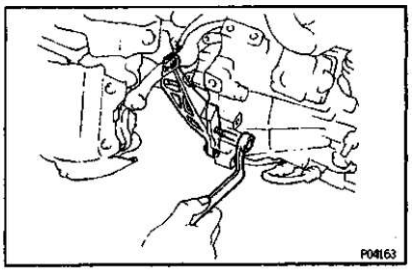


(b) Disconnect the following parts:
(1) Starter wire
(2) Starter connector
(3) Vehicle speed pulse generator connector
(4) Back–up light switch connector
(5) Engine wire clamp
(6) Engine wire bracket



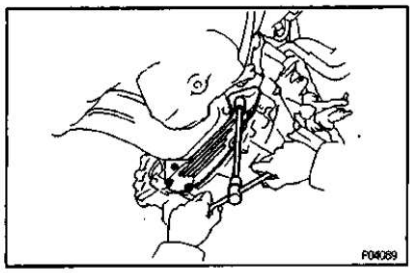
2. REMOVE STARTER

Remove the two bolts and starter.



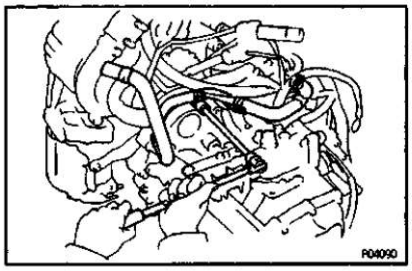
3. REMOVE STIFFENER PLATE

Remove the three bolts and stiffener plate.



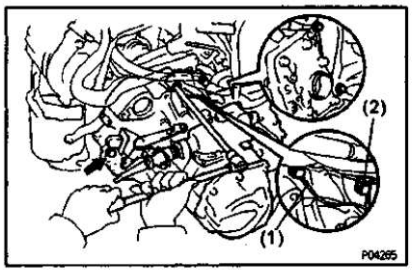
4. REMOVE N0.2 REAR END PLATE

Remove the four bolts and rear end plate.



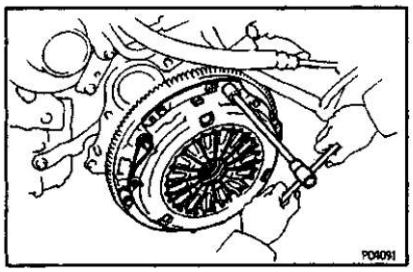
6. REMOVE HEATER WATER PIPE

(a) Disconnect the water hose from the water by–pass pipe.
(b) Remove the two bolts and heater water pipe.



6. REMOVE TRANSAXLE

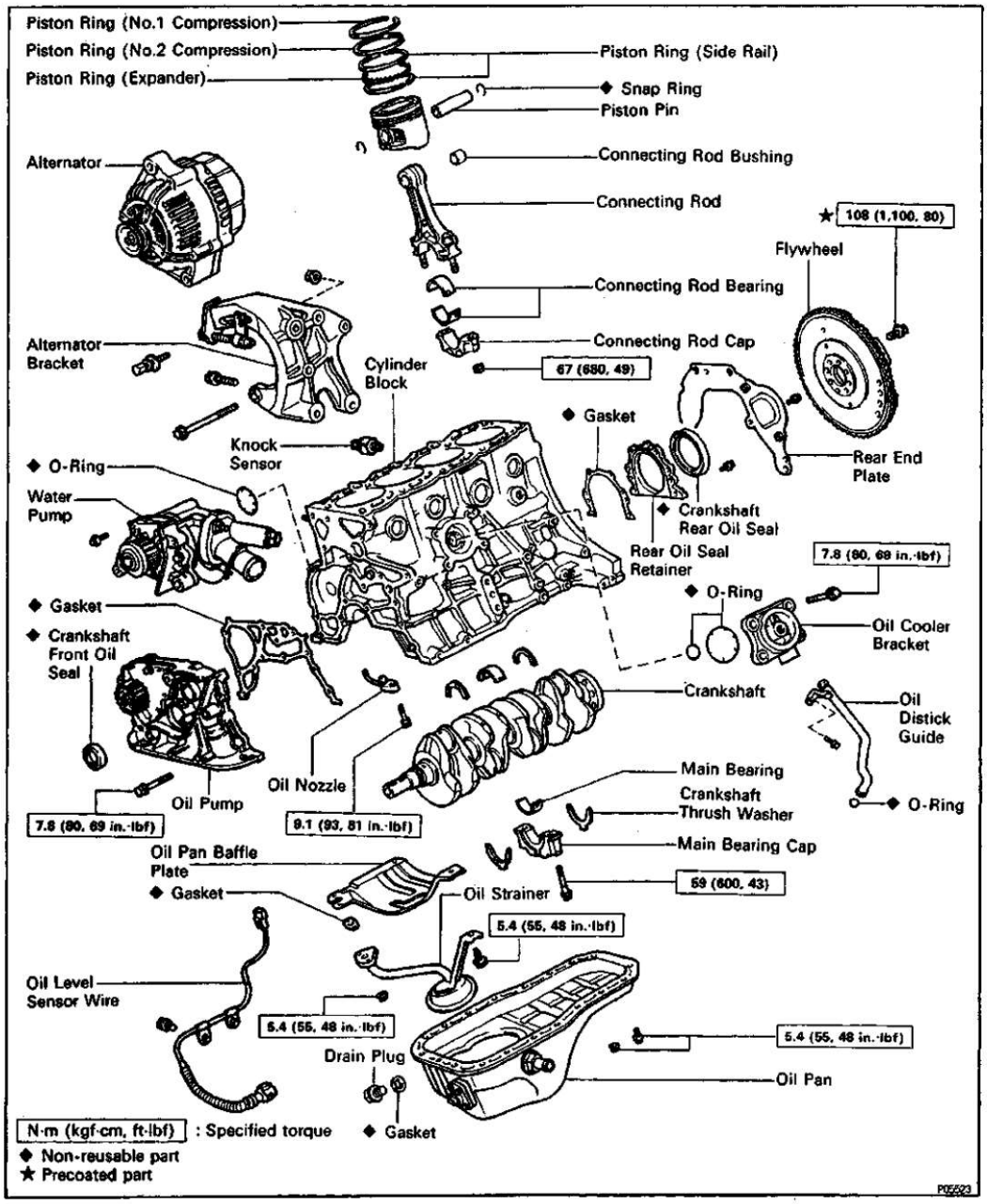
(a) Remove the five bolts and following parts:
(1) Ground strap
(2) Engine wire bracket
(b) Separate the transaxle and engine.

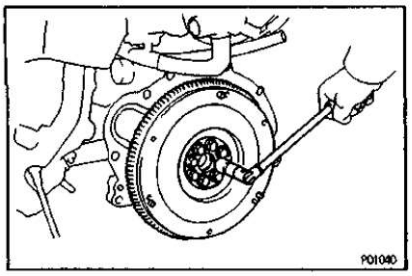


7. REMOVE CLUTCH COVER AND DISC

Remove the six bolts, clutch cover– and disc.

COMPONENTS FOR CYLINDER BLOCK DISASSEMBLY AND ASSEMBLY

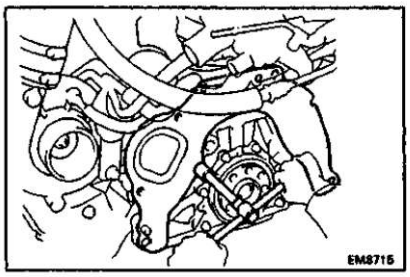




PREPARATION FOR DISASSEMBLY

1. REMOVE FLYWHEEL

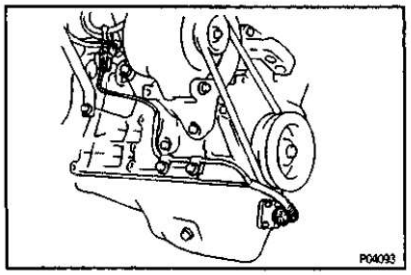
Remove the eight bolts and flywheel.



2. REMOVE REAR END PLATE

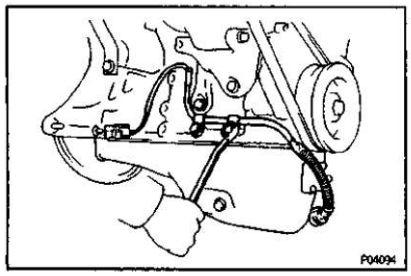
Remove the bolt and end plate.

3. INSTALL ENGINE TO ENGINE STAND FOR DISASSEMBLY

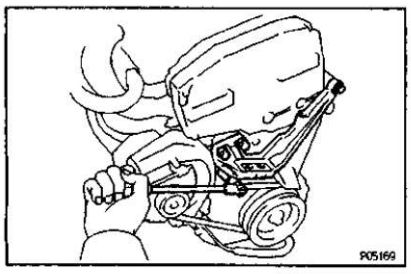


4. REMOVE OIL LEVEL SENSOR WIRE

(a) Disconnect the two connectors.

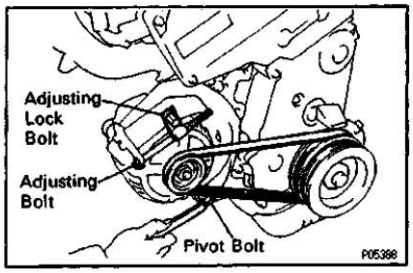


(b) Remove the two bolts and sensor wire.



5. REMOVE RH ENGINE MOUNTING BRACKET

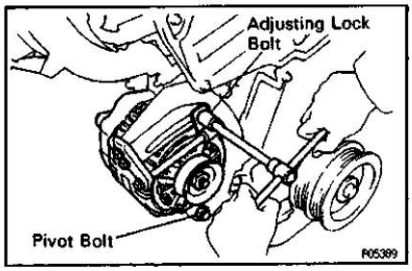
Remove the four bolts and mounting bracket.



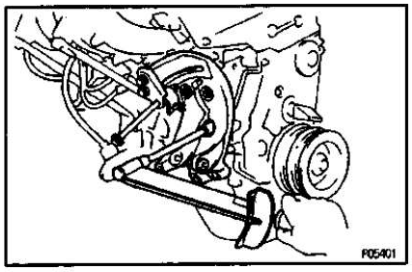
6. REMOVE ALTERNATOR

(a) Loosen the pivot bolt and adjusting lock bolt.

(b) Loosen the adjusting bolt, and disconnect the drive belt from the alternator.



(c) Remove the pivot bolt and adjusting lock bolt, and disconnect the alternator from the bracket.



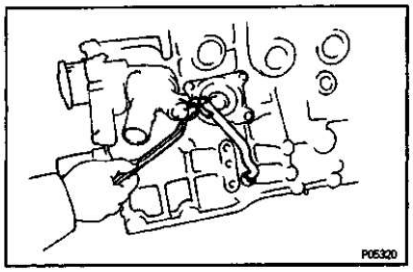
7. REMOVE ALTERNATOR BRACKET

Remove the three bolts, two nuts and alternator bracket.

8. REMOVE TIMING BELT AND PULLEYS
(See Timing Belt Removal)

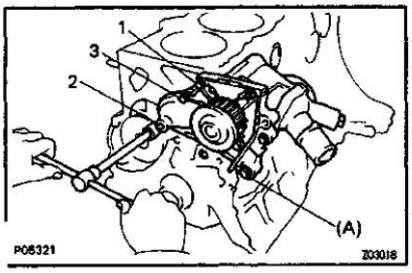
9. REMOVE CYLINDER HEAD
(See Cylinder Head Removal)

10. REMOVE OIL PAN AND OIL PUMP
(See Oil Pump Removal)



11. REMOVE OIL DIPSTICK GUIDE

Remove the bolt, and pull out the dipstick guide.

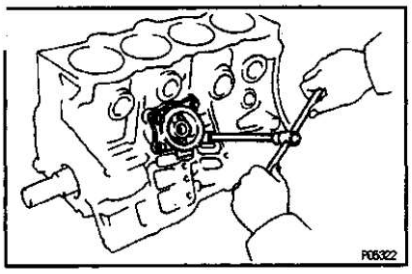


12. REMOVE WATER PUMP

(a) (w/o A/C)

Remove the bolt (A).

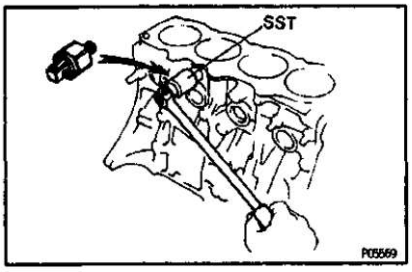
(b) Remove the three bolts in the sequence shown.



13. REMOVE OIL COOLER BRACKET

(a) Remove the four bolts and oil cooler bracket.

(b) Remove the two 0–rings from the oil cooler bracket.



14. REMOVE KNOCK SENSOR

Using SST, remove the knock sensor.

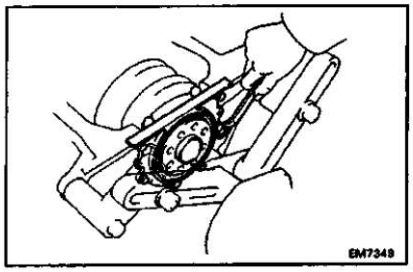
SST 09816 – 30010

CYLINDER BLOCK DISASSEMBLY

(See Components for Cylinder Block Disassembly and Assembly)

1. REMOVE REAR OIL SEAL RETAINER

Remove the six bolts, retainer and gasket.



2. CHECK CONNECTING ROD THRUST CLEARANCE

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

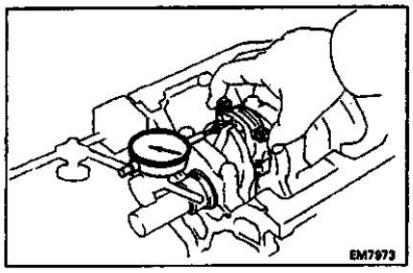
Standard thrust clearance: .

0.160 – 0.312 mm (0.0063 – 0.0123 in.)

Maximum thrust clearance:

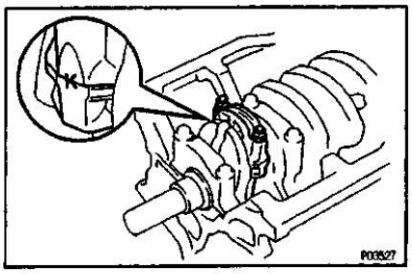
0.35 mm (0.0138 in.)

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

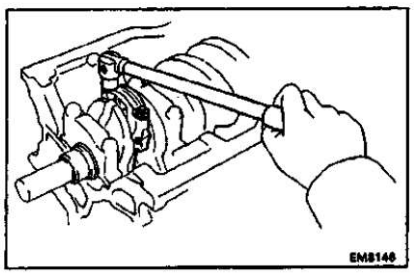


3. REMOVE CONNECTING ROD CAPS AND CHECK OIL CLEARANCE

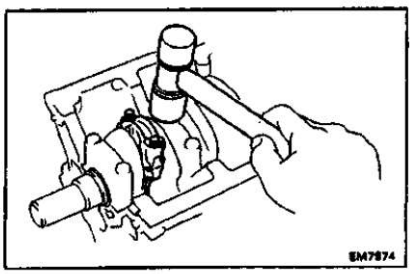
(a) Check the matchrnarks on the connecting rod and cap to ensure correct reassembly.

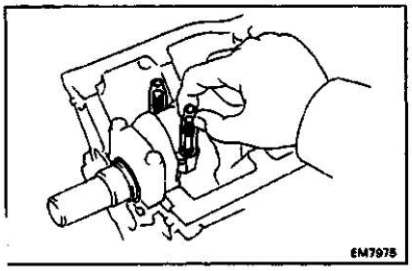


(b) Remove the connecting rod cap nuts.

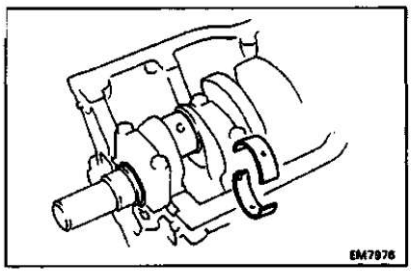


(c) Using a plastic–faced hammer, lightly tap the connecting rod bolts and lift off the connecting rod cap.
HINT: Keep the lower bearing inserted with the connecting cap.

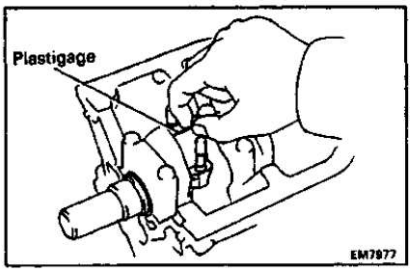




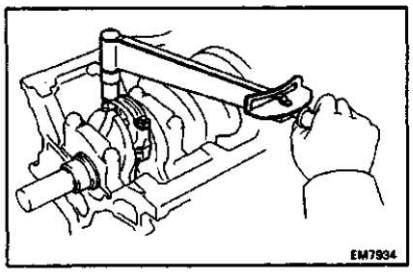
(d) Cover the connecting rod bolts with a short piece of hose to protect the crankshaft from damage.



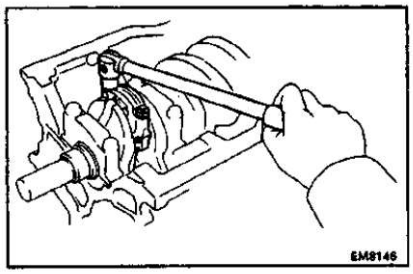
(e) Clean the crank pin and bearing.
(f) Check the crank pin and bearing for pitting and scr–atches.
If the crank pin or bearing is damaged, replace the bearings. If necessary, grind or replace the crankshaft.



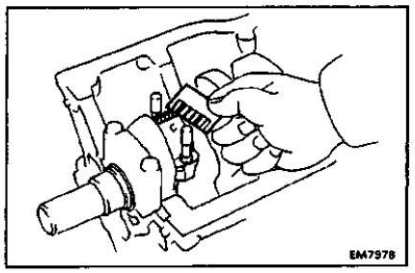
(g) Lay a strip of Plastigage across the crank pin.

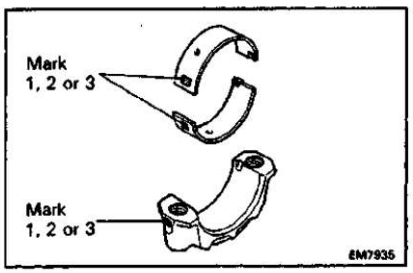


(h) Install the connecting rod cap.
(See step 6 in Cylinder Block Assembly)
Torque: 67 N–m (680 kgf–cm, 49 ft–lbf)
NOTICE: Do not turn the crankshaft.



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





(j) Measure the Plastigage at its widest point.

Standard oil clearance:

STD

0.024 – 0.055 mm (0.0009 – 0.0022 in.)

U/S 0.25

0.023 – 0.069 mm (0.0009 – 0.0027 in.)

Maximum oil clearance:

0.08 mm (0.0031 in.)

If the oil clearance is greater than maximum, replace the bearings. If necessary, grind or replace the cra–nkshaft.

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

Standard sized bearing center wall thickness:

Mark '1'

1.484 – 1.488 mm (0.0584 – 0.0586 in.)

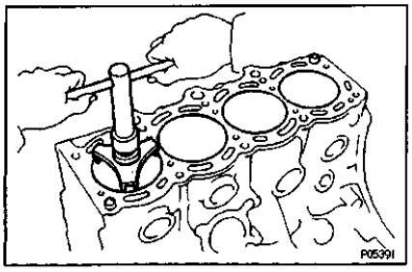
Mark '2'

1.488 – 1.492 mm (0.0586 – 0.0587 in.)

Mark '3'

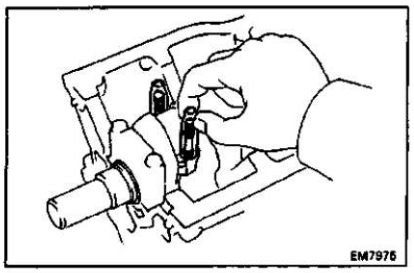
1.492 – 1.496 mm (0.0587 – 0.0589 in.)

(k) Completely remove the Plastigage.



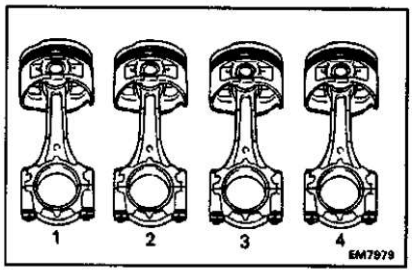
4. REMOVE PISTON AND CONNECTING ROD ASSEMBLIES

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



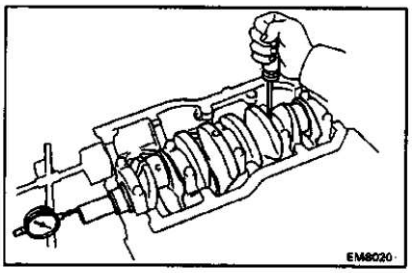
(b) Cover the connecting rod bolts with a short piece of hose to protect the crankshaft from damage.

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



HINT:

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



5. CHECK CRANKSHAFT THRUST CLEARANCE

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

Standard thrust clearance:

0.020 – 0.220 mm (0.0008 – 0.0087 in.)

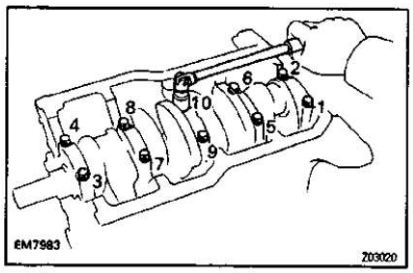
Maximum thrust clearance:

0.30 mm (0.0118 in.)

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

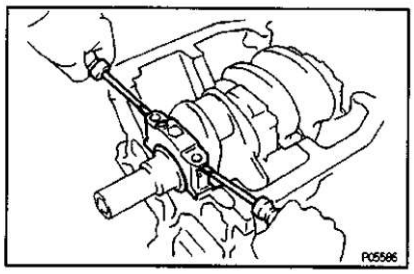
Thrust washer thickness:

2.440 – 2.490 mm (0.0961 – 0.0980 in.)



6. REMOVE MAIN BEARING CAPS AND CHECK OIL CLEARANCE

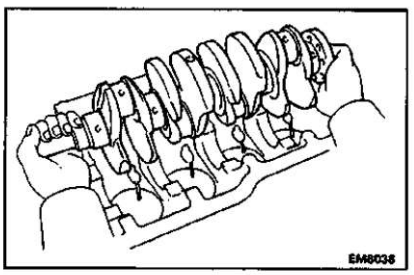
(a) Uniformly loosen and remove the main bearing cap bolts in several passes, in the sequence shown.



(b) Using two screwdrivers, pry out the main bearing cap, and remove the main bearing caps, lower bearing and remove the main bearing caps, lower bearings and lower and lower thrust washers (No.3 main bearing cap only).

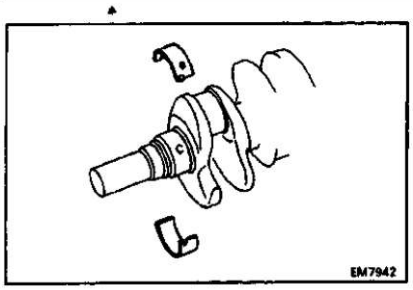
HINT:

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

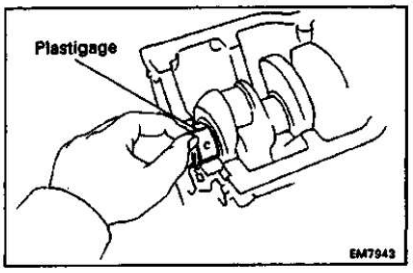


(c) Lift out the crankshaft.

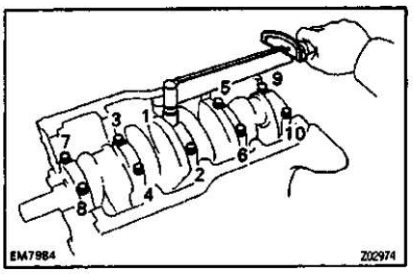
HINT: Keep the upper bearing and upper thrust washers together with the cylinder block.



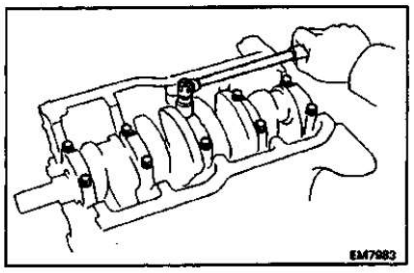
(d) Clean each main journal and bearing.
(e) Check each main journal and bearing for pitting and scratches.
If the journal or bearing is damaged, replace the bearings. If necessary, grind or replace the crankshaft.



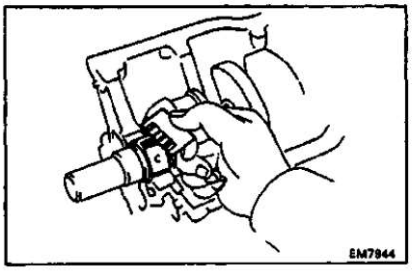
(f) Place the crankshaft on the cylinder block.
(g) lay a strip of Plastigage across each journal.



(h) Install the main bearing caps.
(See step 4 in Cylinder Block Assembly)
Torque: 59 N–m (600 kgf–cm, 43 ft–lbf)
NOTICE: Do not turn the crankshaft.



(i) Remove the main bearing caps.
(See procedure (a) and (b) above)



(j) Measure the Plastigage at its widest point.

Standard clearance:

N o.3

STD

0.025 – 0.044 mm (0.0010 – 0.0017 in.)

U/S 0.25

0.021 – 0.061 mm (0.0008 – 0.0024 in.)

Others

STD

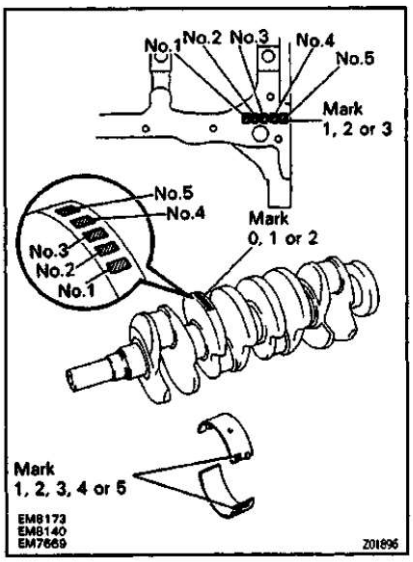
0.015 – 0.034 mm (0.0006 – 0.0013 in.)

U/S 0.25

0.029 – 0.069 mm (0.0011 – 0.0027 in.)

Maximum clearance:

0.08 mm (0.0031 in.)



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

No.3

0.027 – 0.054 mm (0.0011 – 0.0021 in.)

Others

0.017 – 0.044 mm (0.0007 – 0.0017 in.)

If the oil clearance is greater than maximum, replace the bearings. If necessary, grind or replace the cra–nkshaft.

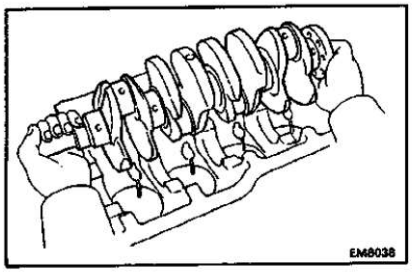
HINT: If using a standard bearing, replace it with one having the same number. If the number of the bearing cannot be determined, select the correct bearing by adding together the numbers imprinted on the cylin–der block and crankshaft, then selecting the bearing with the same number as the total. There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

	Number marked								
Cylinder block	1			2			3		
Crankshaft	0	1	2	0	1	2	0	1	2
Use bearing	1	2	3	2	3	4	3	4	5

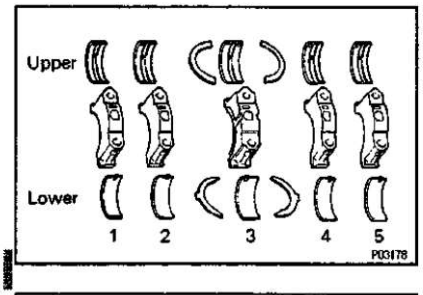
EXAMPLE: Cylinder block ”2” + Crankshaft ”1”
= Total number 3 (Use bearing ”3”)

V00240

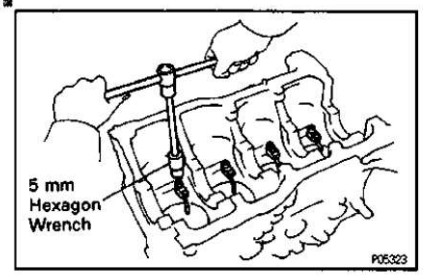
(Reference)
Cylinder block main journal bore diameter:
Mark '1'
59.020 – 59.026 mm (2.3236 – 2.3239 in.)
Mark '2'
59.026 – 59.032 mm (2.3239 – 2.3241 in.)
Mark "3"
59.032 – 59.038 mm (2.3241 – 2.3243 in.)
Crankshaft journal diameter:
Mark '0"
54.998 – 55.003 mm (2.1653 – 2.1655 in.)
Mark '1'
54.993 – 54.998 mm (2.1651 – 2.1653 in.)
Mark '2'
54.988 – 54.993 mm (2.1649 – 2.1651 in.)
Standard sized bearing center wall thickness:
N o.3
Mark "I"
1.992 – 1.995 mm (0.0784 – 0.0785 in.)
Mark "2"
1.995 – 1.998 mm (0.0785 – 0.0787 in.)
Mark '3'
1.998 – 2.001 mm (0.0787 – 0.0788 in.)
Mark '4'
2.001 – 2.004 mm (0.0788 – 0.0789 in.)
Mark "5"
2.004 – 2.007 mm (0.0789 – 0.0790 in.)
Others
Mark '1'
1.997 – 2.000 mm (0.0786 – 0.0787 in.)
Mark '2'
2.000 – 2.003 mm (0.0787 – 0.0789 in.)
Mark '3"
2.003 – 2.006 mm (0.0789 – 0.0790 in.)
Mark '4"
2.006 – 2.009 mm (0.0790 – 0.0791 in.)
Mark '5"
2.009 – 2.012 mm (0.0791 – 0.0792 in.)
(k) Completely remove the Plastigage.



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

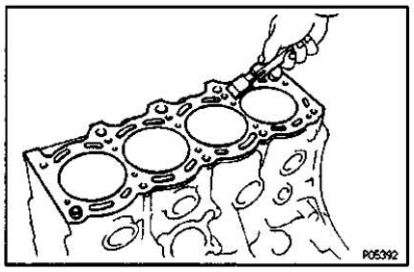


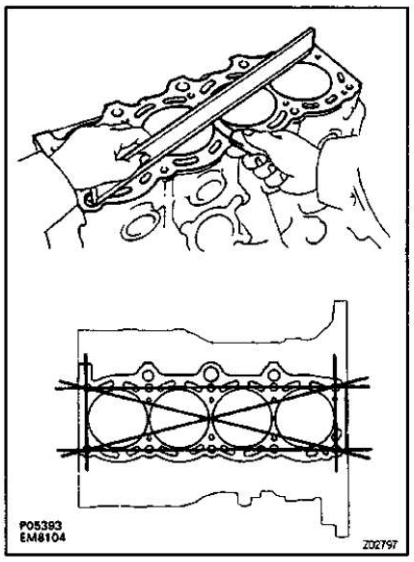
HINT: Arrange the main bearing caps, bearings and thrust washers in correct order.



8. REMOVE OIL NOZZLES

Using a 5 mm hexagon wrench, remove the bolt and oil nozzle. Remove the four oil nozzles.





CYLINDER BLOCK INSPECTION

1. CLEAN CYLINDER BLOCK

A. Remove gasket material

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

B. Clean cylinder block

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

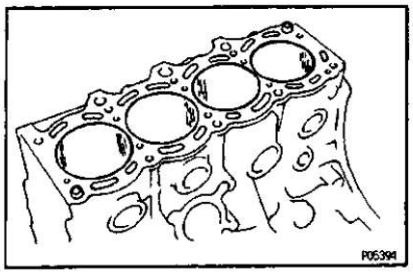
2. INSPECT TOP SURFACE OF CYLINDER BLOCK FOR FLATNESS

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

Maximum warpage:

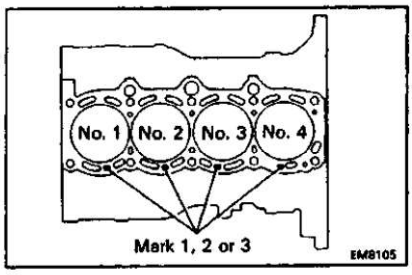
0.05 mm (0.0020 in.)

If warpage is greater than maximum, replace the cyl–inder block.



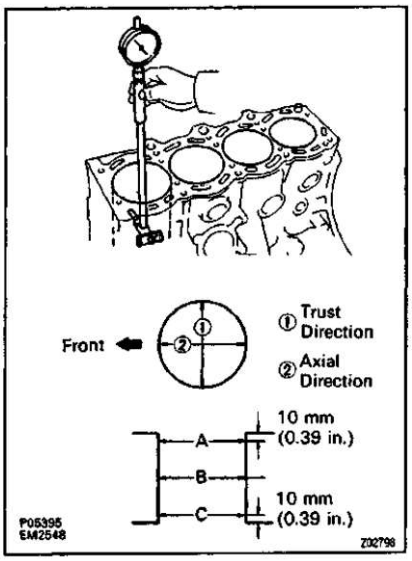
3. INSPECT CYLINDER FOR VERTICAL SCRATCHES

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



4. INSPECT CYLINDER BORE DIAMETER

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



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

Standard diameter:

Mark '1'

86.000 – 86.010 mm (3.3858 – 3.3862 in.)

Mark "2'

86.010 – 86.020 mm (3.3862 – 3.3866 in.)

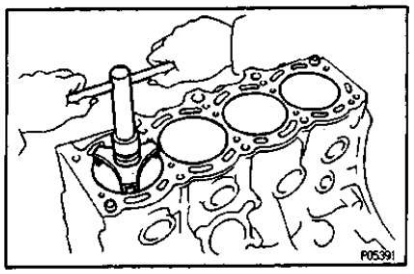
Mark "3'

86.020 – 86.030 mm (3.3866 – 3.3870 in.)

Maximum diameter:

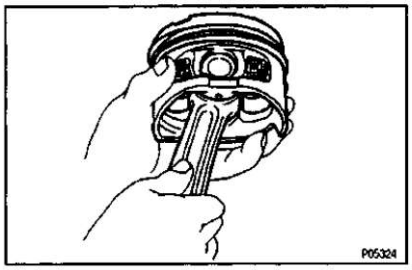
86.23 mm (3.4342 in.)

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



5. REMOVE CYLINDER RIDGE

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

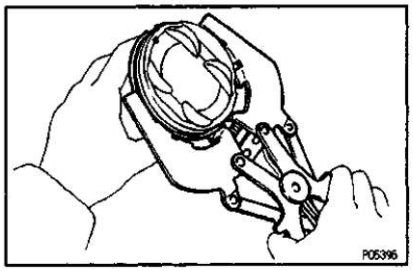


PISTON AND CONNECTING ROD DISASSEMBLY

1. CHECK FIT BETWEEN PISTON AND PISTON PIN

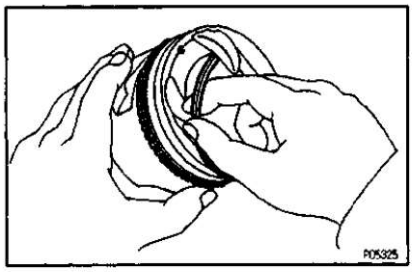
Try to move the piston back and forth on the piston pin.

If any movement is felt, replace the piston and pin as a set.



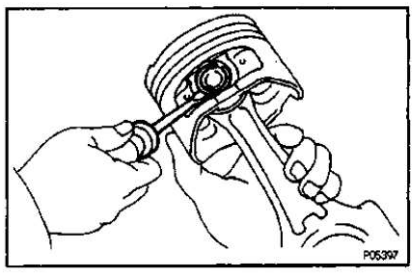
2. REMOVE PISTON RINGS

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



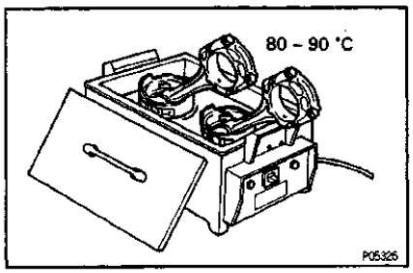
(b) Remove the two side rails and oil ring by hand.

HINT: Arrange the piston rings in correct order only.

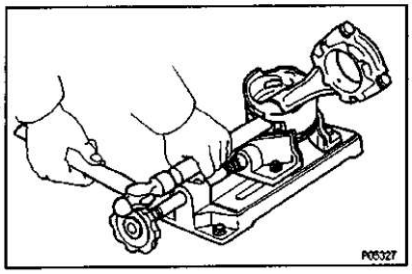


3. DISCONNECT CONNECTING ROD FROM PISTON

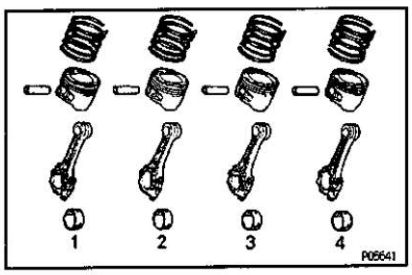
(a) Using a small screwdriver, pry out the two snap rings.



(b) Gradually heat the piston to 80 – 90°C (176 – 194°F).



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

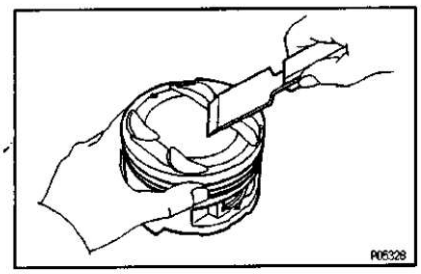


HINT:

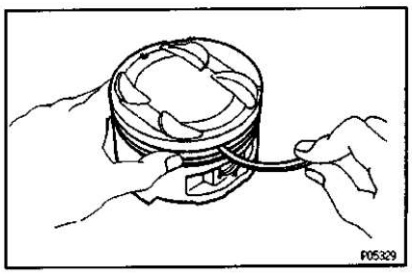
- The piston and pin are a matched set.
- Arrange the pistons, pins, rings, connecting rods and bearings in correct order.

PISTON AND CONNECTING ROD INSPECTION

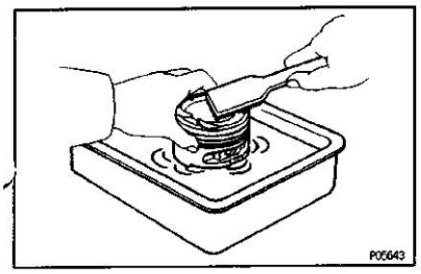
1. CLEAN PISTON



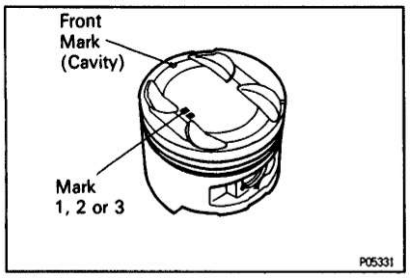
(a) Using a gasket scraper, remove the carbon from the piston top.



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



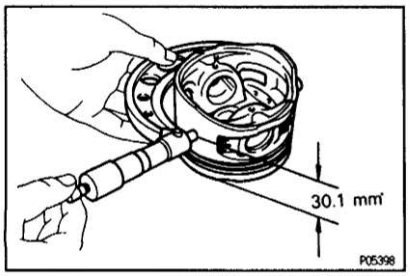
(c) Using solvent and a brush, thoroughly clean the piston.
NOTICE: Do not use a wire brush.



2. INSPECT PISTON

A. Inspect piston oil clearance

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



(a) Using a micrometer, measure the piston diameter at ring angles to the piston pin center line, 30.1 mm (1.185 in.) from the piston head.

Piston diameter:

Mark '1"

85.920 – 85.930 mm (3.3827 – 3.3831 in.)

Mark '2"

85.930 – 85.940 mm (3.3831 – 3.3835 in.)

Mark '3'

85.940 – 85.950 mm (3.3835 – 3.3839 in.)

(b) Measure the cylinder bore diameter in the thrust di–rections. (See step 4 in Cylinder Block Inspection)

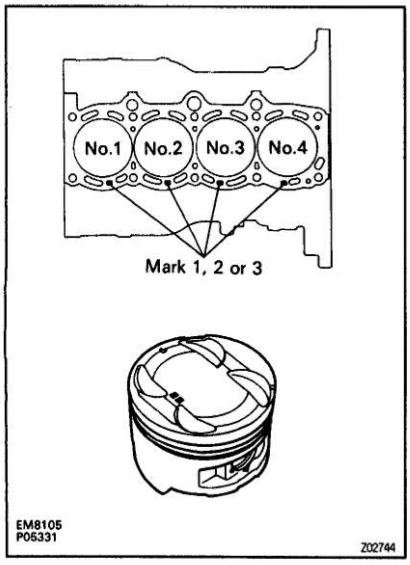
(c) Subtract the piston diameter measurement from the cylinder bore diameter measurement.

Standard oil clearance:

0.070 – 0.090 mm (0.0028 – 0.0035 in.)

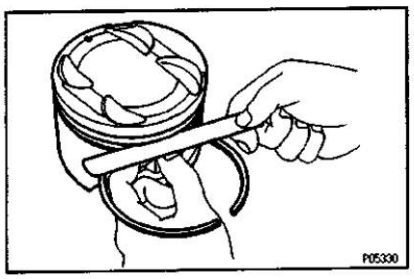
Maximum oil clearance:

0.11 mm (0.0043 in.)



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

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



B. Inspect piston ring groove clearance

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

Ring groove clearance:

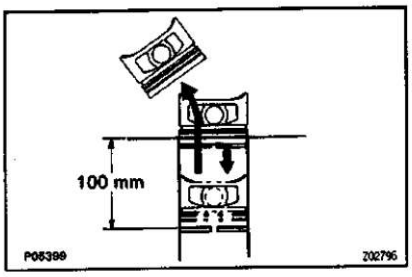
No.1

0.040 – 0.080 mm (0.0016 – 0.0031 in.)

No.2

0.030 – 0.070 mm (0.0012 – 0.0028 in.)

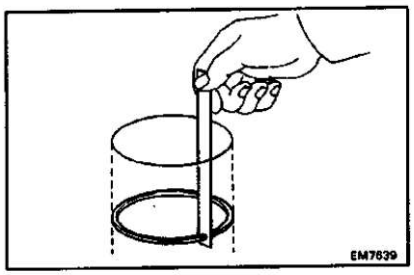
If the clearance is greater than maximum, replace the piston.



C. Inspect piston ring end gap

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

(b) Using a piston, push the piston ring a little beyond the bottom of the ring travel, 100 mm (3.94 in.) from the top of the cylinder block.



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

Standard end gap:

No.1

0.330 – 0.550 mm (0.0130 – 0.0217 in.)

N o.2

0.450 – 0.670 mm (0.0177 – 0.0264 in.)

Oil (Side rail)

0.200 – 0.600 mm (0.0079 – 0.0236 in.)

Maximum end gap:

N o.1

0.85 mm (0.0335 in.)

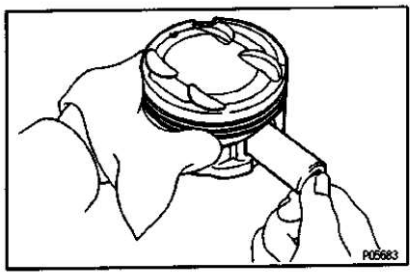
No.2

0.97 mm (0.0382 in.)

Oil (Side rail)

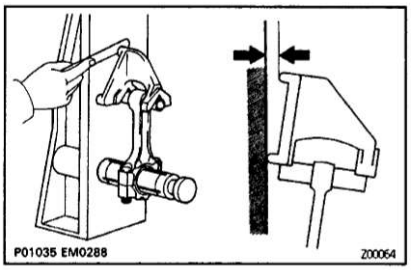
0.90 mm (0.0354 in.)

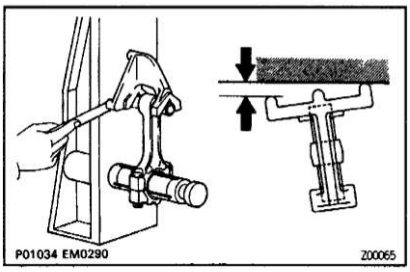
If the end gap is greater than maximum, replace the piston ring. If the end gap is greater than maximum, even with a new piston ring, rebore all the four cyl–inders or replace the cylinder block.



D. Inspect piston pin fit

At 60* C (140˚ F), you should be able to push the piston pin into the piston pin hole with your thumb.





3. INSPECT CONNECTING ROD

A. Inspect connecting rod alignment

Using a rod aligner and thickness gauge, check the connecting rod alignment.

- Check for bend.

Maximum bend:

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

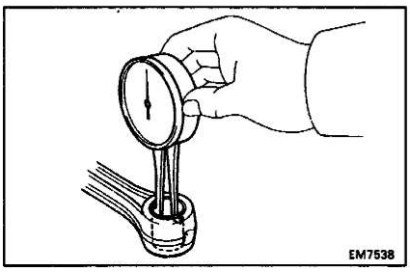
If bend is greater than maximum, replace the connecting rod assembly.

- Check for twist

Maximum twist:

0.15 mm (0.0059 in.) per 100 mm (3.94 in.)

If twist is greater than maximum, replace the connecting rod assembly.

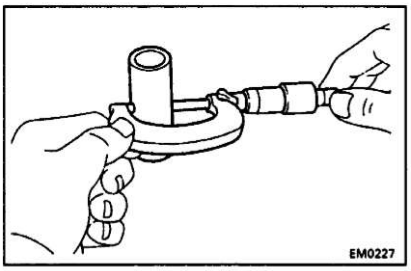


B. Inspect piston pin oil clearance

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

Bushing inside diameter:

22.005 – 22.017 mm (0.8663 – 0.8668 in.)



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

Piston pin diameter:

21.997 – 22.009 mm (0.8660 – 0.8665 in.)

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

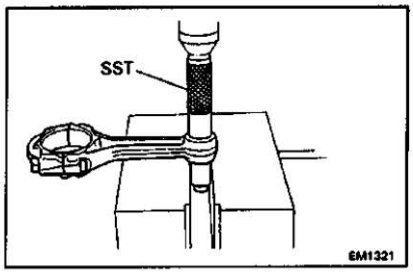
Standard oil clearance:

0.005 – 0.011 mm (0.0002 – 0.0004 in.)

Maximum oil clearance:

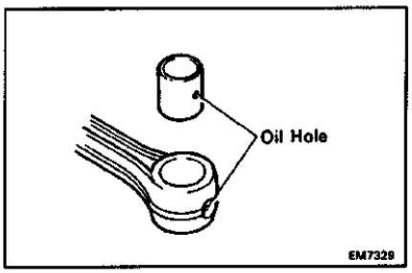
0.05 mm (0.0020 in.)

If the oil clearance is greater than maximum, replace the bushing. If necessary, replace the piston and piston pin as a set.



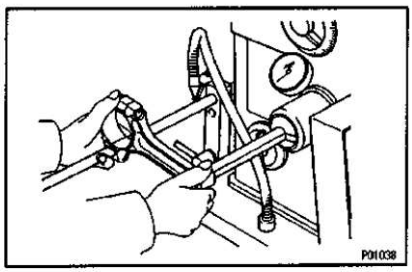
C. If necessary, replace connecting rod bushing

(a) Using SST and a press, press out the bushing.
SST 09222–30010

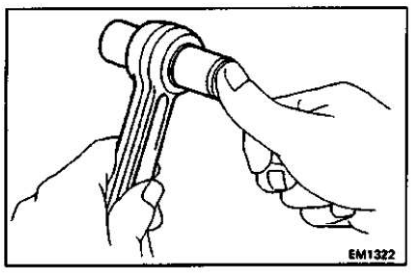


(b) Align the oil holes of a new bushing and the conne–cting rod.

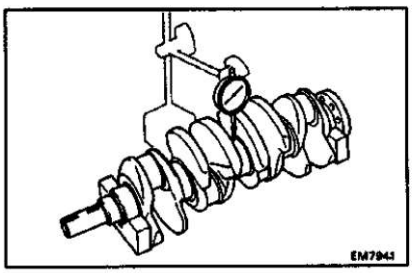
(c) Using SST and a press, press in the bushing.
SST 09222–30010

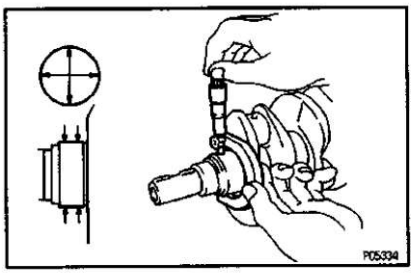


(d) Using a pin hole grinder, hone the bushing to obtain the standard specified clearance (see step B above) between the bushing and piston pin.



(e) Check the piston pin fit at normal room temperature. Coat the piston pin with engine oil, and push it into the connecting rod with your thumb.





CRANKSHAFT INSPECTION AND REPAIR

1. INSPECT CRANKSHAFT FOR CIRCLE RUNOUT

(a) Place the crankshaft on V–blocks.

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

Maximum circle runout:
0.06 mm (0.0024 in.)

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

2. INSPECT MAIN JOURNALS AND CRANK PINS

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

Main journal diameter:
STD size
54.988 – 55.003 mm (2.1653 – 2.1655 in.)
U/S 0.25
54.745 – 54.755 mm (2.1553 – 2.1557 in.)
Crank pin diameter:
STD size
47.985 – 48.000 mm (1.8892 –1.8898 in.)
U/S 0.25
47.745 – 47.755 mm (1.8797 – 1.8801 in.)

If the diameter is not as specified, check the oil cle–arance. (See steps 3 and 6 in Cylinder Block Disas–sembly) If necessary, grind or replace the crankshaft:

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

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

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

3. IF NECESSARY, GRIND AND HONE MAIN JOUR–NALS AND/OR CRANK PINS

Grind and hone the main journals and/or crank pins to the fin-ished undersized diameter (See procedure in step 2).
Install new main journal and/or crankshaft pin undersized bear-ings.

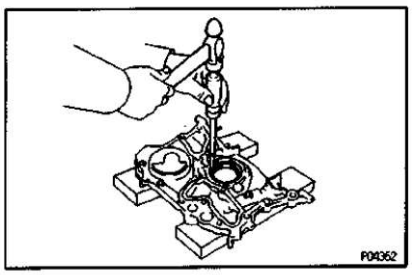
CRANKSHAFT OIL SEALS REPLACEMENT

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

1. REPLACE CRANKSHAFT FRONT OIL SEAL

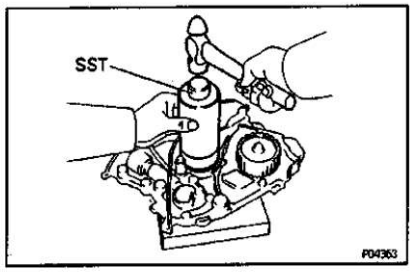
A. If oil pump is removed from cylinder block:

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



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

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

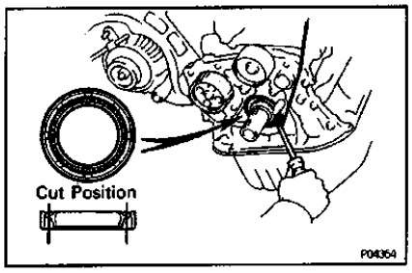


B. If oil pump is installed to the cylinder block:

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

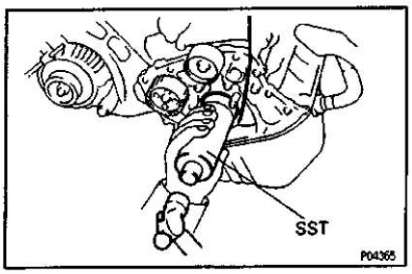
(b) Using a screwdriver, pry out the oil seal.

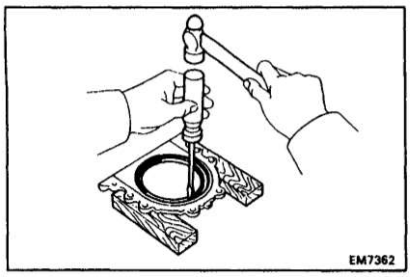
NOTICE: Be careful not to damage the crankshaft. Tape the screwdriver tip.



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

(d) Using SST and a hammer, tap in the oil seal until its surface is flush with the oil pump case edge.
SST 09226–10010

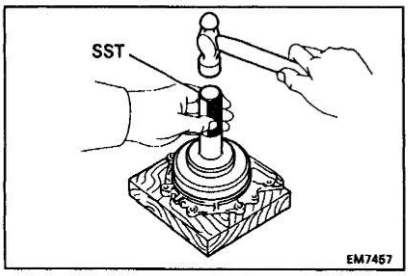




2. REPLACE CRANKSHAFT REAR OIL SEAL

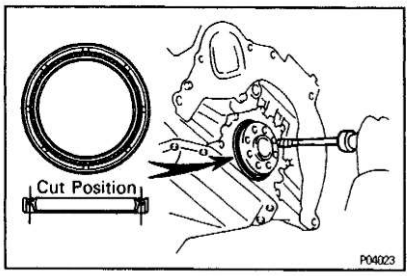
A. If rear oil seal retainer is removed from cylinder block:

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



(b) Using SST and a hammer, tap in a new oil seal until its surface is flush with the rear oil seal edge.
SST 09223–63010

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

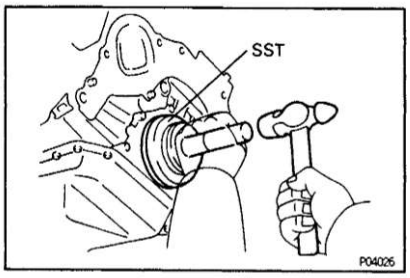


B. If rear oil seal retainer is installed to cylinder block:

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

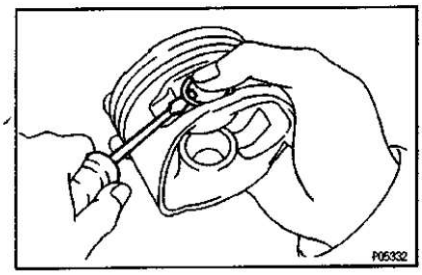
(b) Using a screwdriver, pry out the oil seal.

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



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

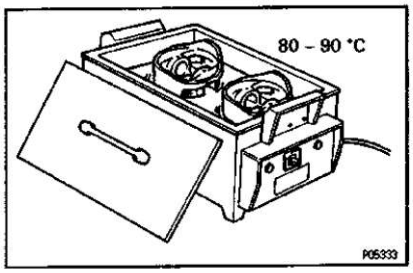
(d) Using SST and a hammer, tap in the oil seal until its surface is flush with the rear oil seal retainer edge.
SST 09223–63010



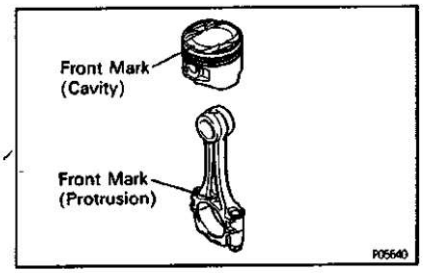
PISTON AND CONNECTING ROD ASSEMBLY

1. ASSEMBLE PISTON AND CONNECTING ROD

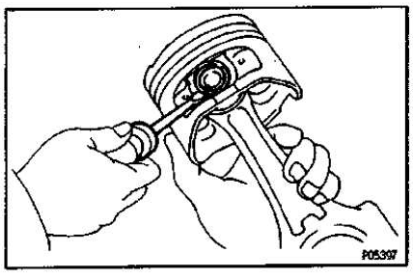
(a) Using a small screwdriver, Install a new snap ring on one side of the piston pin hole.



(b) Gradually heat the piston to 80 – 90°C (176 – 194° F).

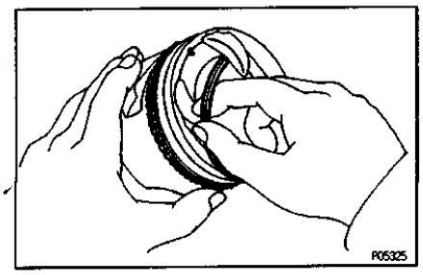


(c) Coat the piston pin with engine oil.
(d) Align the front marks of the piston and connecting rod, and push in the piston pin with your thumb.

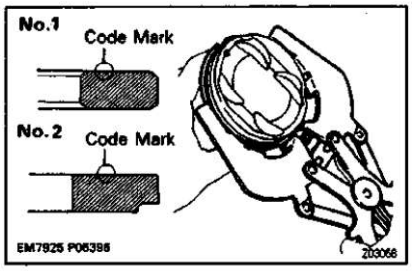


(e) Using a small screwdriver, Install a new snap ring on the other side of the piston pin hole.

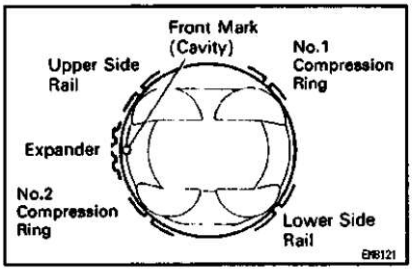
2. INSTALL PISTON RINGS



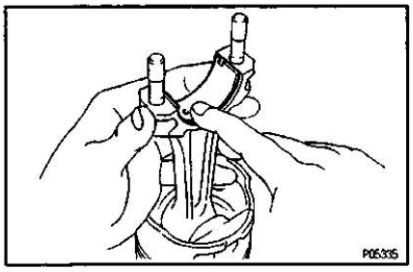
(a) Install the oil ring expander and two side rails by hand.



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



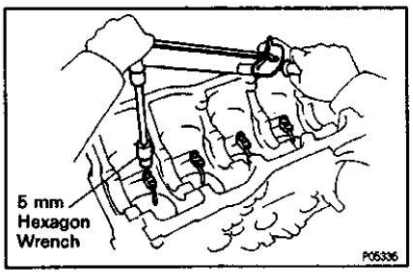
(c) Position the piston rings so that the ring ends are as shown.
NOTICE: Do not align the piston ring ends.



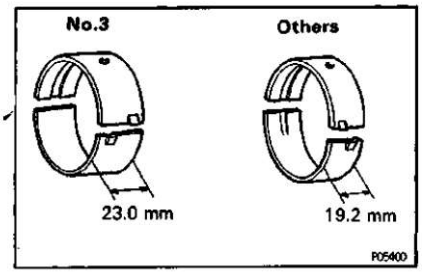
3. INSTALL BEARINGS
(a) Align the bearing claw with the groove of the connecting rod or connecting cap.
(b) Install the bearings in the connecting rod and connecting rod cap.

CYLINDER BLOCK ASSEMBLY

(See Components for Cylinder Block Disassembly and Assembly)
HINT:
- Thoroughly clean all parts to be assembled.
- Before installing the parts, apply new engine oil to all sliding and rotating surfaces.
- Replace all gaskets, 0–rings and oil seals with new parts.



1. INSTALL OIL NOZZLES
Using a 5 mm hexagon wrench, install the oil nozzle with the bolt. Install the four oil nozzles.
Torque: 9.1 N–m (93 kgf–cm, 81 in.–lbf)

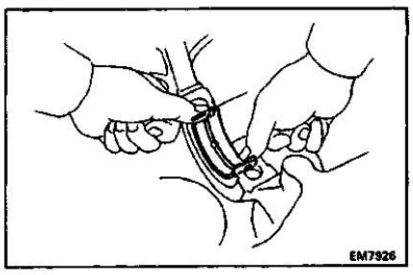


2. INSTALL MAIN BEARINGS

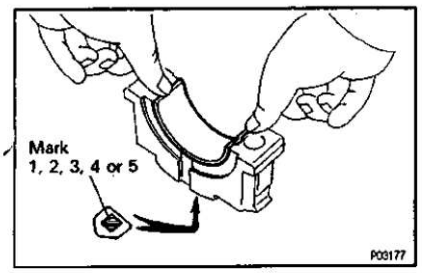
HINT:

- Main bearings come in widths of 19.2 mm (0.756 in.) and 23.0 mm (0.906 in.). Install the 23.0 mm (0.906 in.) bearings in the No.3 cylinder block journal position with the main bearing cap. Install the 19.2 mm (0.756 in.) bearings in the other positions.
- Upper bearings have an oil groove and oil holes; lower bearings do not.

(a) Align the bearing claw with the claw groove of the cylinder block, and push in the five upper bearings.

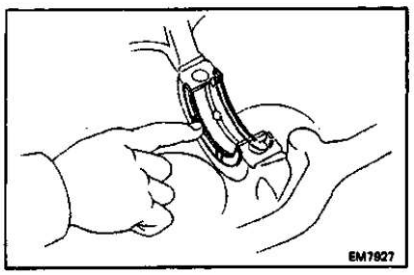


(b) Align the bearing claw with the claw groove of the main bearing cap, and push in the five lower bearings.
HINT: A number is marked on each main bearing cap to indicate the installation position.

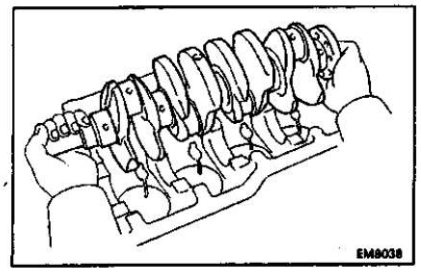


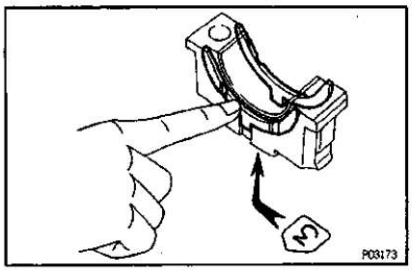
3. INSTALL UPPER THRUST WASHERS

Install the two thrust washers under the No.3 journal position of the cylinder block with the oil grooves facing outward.



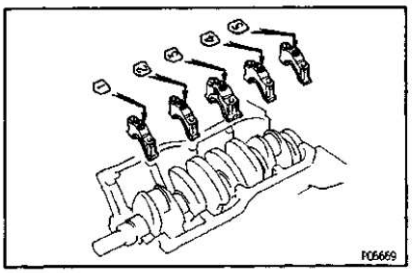
4. PLACE CRANKSHAFT ON CYLINDER BLOCK



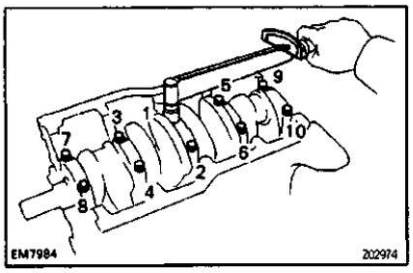


5. INSTALL MAIN BEARING CAPS AND LOWER THRUST WASHERS

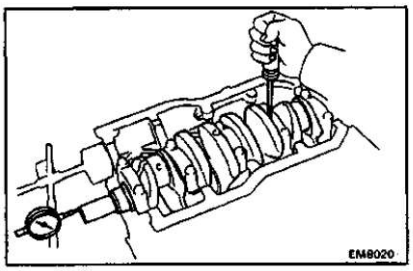
(a) install the two thrust washers on the No.3 bearing cap with the grooves facing outward.



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

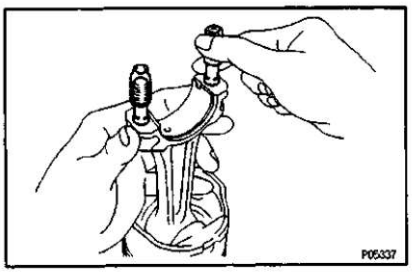


(c) Apply a light coat of engine oil on the threads and under the heads of the main bearing cap bolts.
(d) Install and uniformly tighten the ten bolts of the main bearing cap bolts in several passes, in the sequence shown.
Torque: 59 N–m (600 kgf–cm, 43 ft–lbf)
(e) Check that the crankshaft turns smoothly.



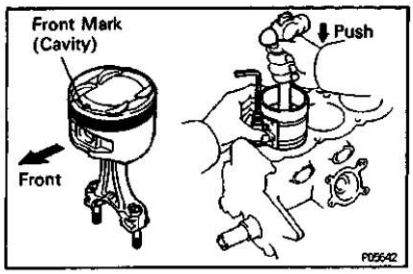
(f) Check the crankshaft thrust clearance.
- Using a dial indicator, measure the thrust clearance while prying the crankshaft back an forth with a screwdriver.

Standard thrust clearance:
0.020 – 0.220 mm (0.0008 – 0.0087 in.)
Maximum thrust clearance:
0.30 mm (0.0118 in.)
If the thrust clearance is greater than maximum, replace the thrust washers as a set.

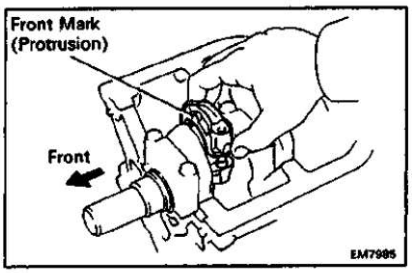


6. INSTALL PISTON AND CONNECTING ROD ASSEMBLES

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



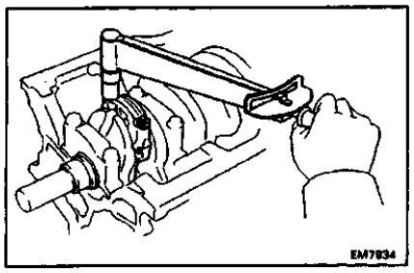
(b) Using a piston ring compressor, push the correctly numbered piston and connecting rod assemblies into each cylinder with the front mark of the piston facing forward.



7. INSTALL CONNECTING ROD CAPS

(a) Match the numbered connecting rod cap with the connecting rod.

(b) Install the connecting rod cap with the front mark facing forward.

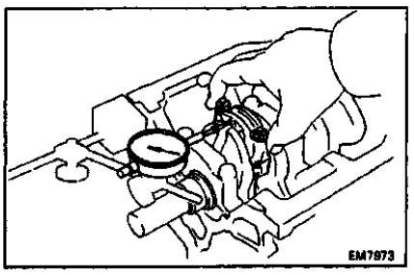


(c) Apply a light of engine oil on the threads and under the nuts of the connecting rod cap.

(d) Install and alternately tighten the cap nuts in several passes.

Torque: 67 N–m (680 kgf–cm, 49 ft–lbf)

(e) Check that the crankshaft turns smoothly.



(f) Check the connecting rod thrust clearance.

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

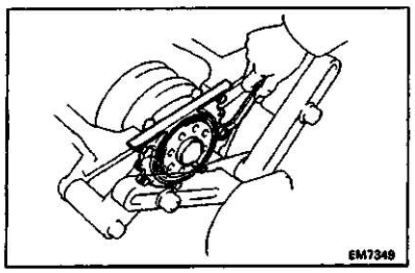
Standard thrust clearance:

0.160 – 0.312 mm (0.0063 – 0.0123 in.)

Maximum thrust clearance:

0.35 mm (0.0138 in.)

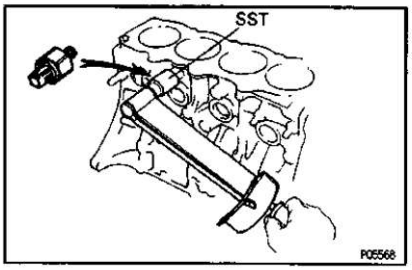
If the thrust clearance is greater than maximum, replace the connecting rod assembly. If necessary, replace the crankshaft.



8. INSTALL REAR OIL SEAL RETAINER

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

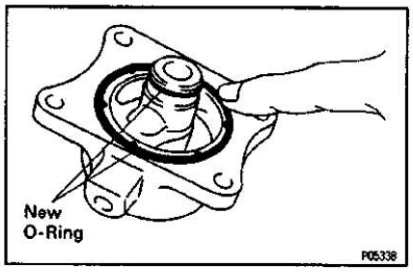
Torque: 9.3 N–m (95 kgf–cm, 82 in.–lbf)



POST ASSEMBLY

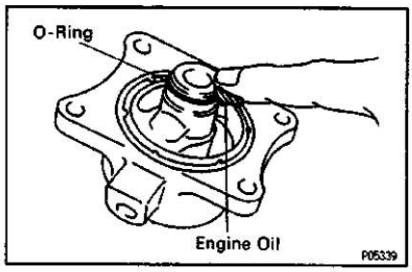
1. INSTALL KNOCK SENSOR

Using SST, install the knock sensor.
SST 09816–30010
Torque: 37 N–m (380 kgf–cm, 27 ft–lbf)

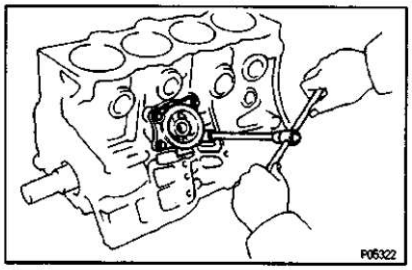


2. INSTALL OIL COOLER BRACKET

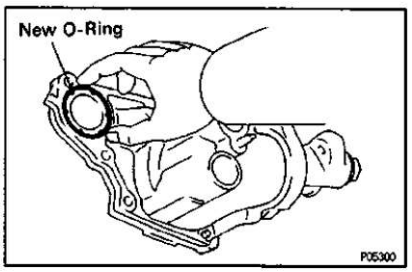
(a) Install two new 0–rings to the oil cooler bracket.



(b) Apply a light coat of engine oil on the small O–ring.

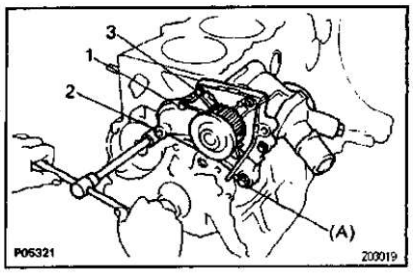


(c) Install the oil cooler bracket with the four bolts.
Torque: 7.8 N–m (80 kgf–cm, 69 in.–lbf)

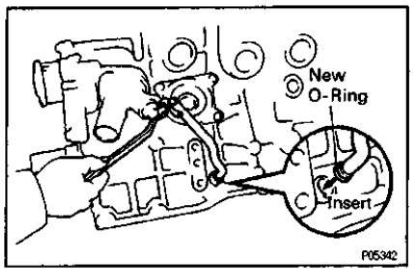


3. INSTALL WATER PUMP AND WATER PUMP COVER ASSEMBLY

(a) Install a new 0–ring to the water pump cover.

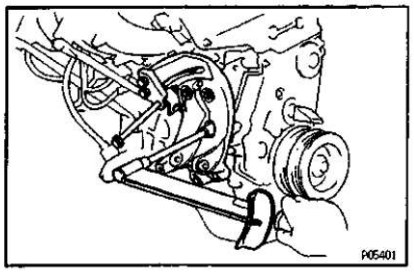


(b) Install the water pump with the three bolts. Tighten the bolts in the sequence shown.
Torque: 7.8 N–m (80 kgf–cm, 69 in.–lbf)
(c) (w/o A/C)
Install the bolt (A).
Torque: 27 N–m (275 kgf–cm, 20 ft–lbf)

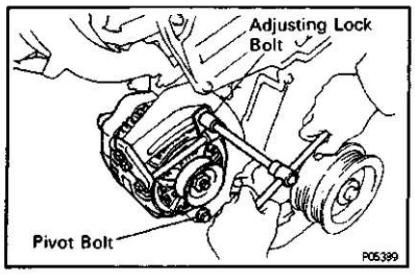


4. INSTALL OIL DIPSTICK GUIDE
(a) Install a new O–ring to the dipstick guide.
(b) Apply soapy water to the 0–ring.
(c) Insert the dipstick guide into the guide hole of the cylinder block.
(d) Install the dipstick guide with the bolt.

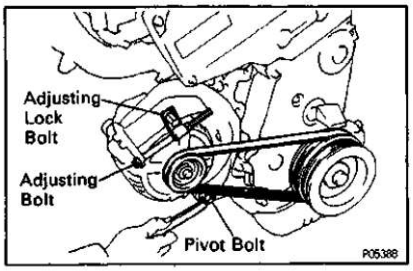
5. INSTALL OIL PUMP AND AND OIL PAN
(See Oil Pump Installation)
6. INSTALL CYLINDER HEAD
(See Cylinder Head Installation)
7. INSTALL TIMING BELT AND PULLEYS
(See Timing Belt Installation)



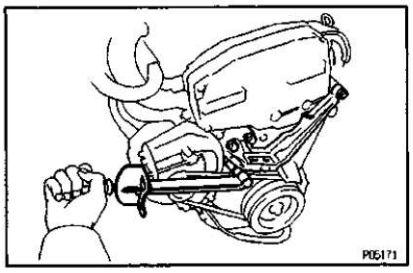
8. INSTALL ALTERNATOR BRACKET
Install the alternator bracket with the three bolts and two nuts.
Torque: 43 N–m (440 kgf–cm, 32 ft–lbf)



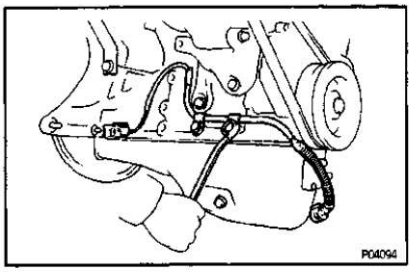
9. INSTALL ALTERNATOR
(a) Mount the alternator on the alternator bracke with the pivot bolt and adjusting lock bolt. Do not tighten the bolts yet.



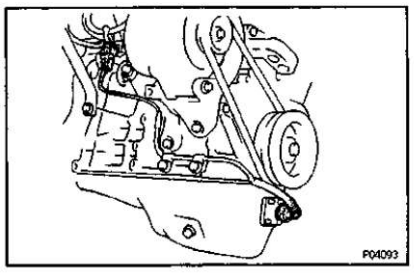
(b) Install the drive belt with the adjusting bolt.
(c) Adjust the drive belt with the adjusting bolt.



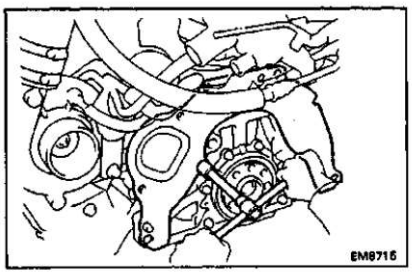
10. INSTALL RH ENGINE MOUNTING BRACKET
Install the mounting bracket with the four– bolts.
Torque: 61 N–m (620 kgf–cm, 45 ft–lbf)



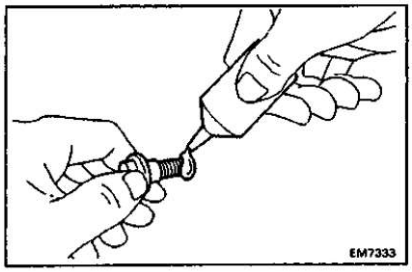
11. INSTALL OIL LEVEL SENSOR WIRE
(a) Install the sensor wire with the two bolts.



(b) Connect the two connectors.
12. DISCONNECT ENGINE FROM ENGINE STAND



13. INSTALL REAR END PLATE
Install the rear end plate with the bolt.
Torque: 9.3 N–m (95 kgf–cm, 82 in.–lbf)

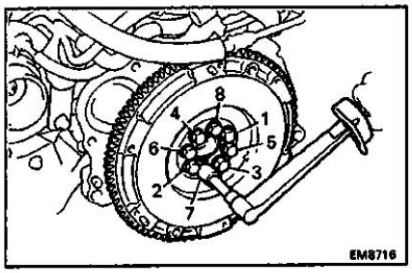


14. INSTALL FLYWHEEL

(a) Apply adhesive to two or three threads of the mou–nting bolt end.

Adhesive:

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



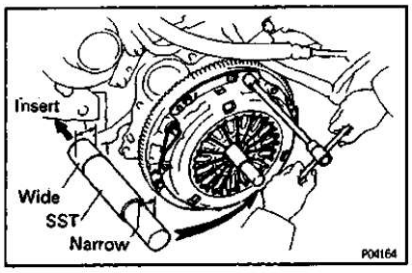
(b) Install the flywheel on the crankshaft.

(c) Install and uniformly tighten the mounting bolts in several passes, in the sequence shown.

Torque: 108 N–m (1,100 kgf–cm, 80 ft–lbf)

ENGINE AND TRANSAXLE ASSEMBLY

(See Components for Engine & Transaxle Separation and Assembly)

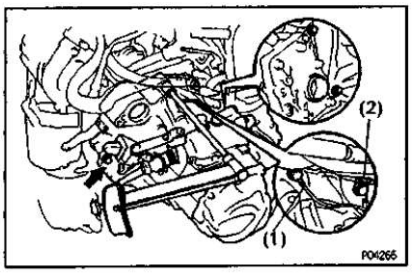


1. INSTALL CLUTCH DISC AND COVER

Using SST, install the disc and cover with the six bolts. Uniformly tighten the bolts in several passes.

SST 09301–17010

Torque: 19 N–m (195 kgf–cm, 14 ft–lbf)



2. INSTALL TRANSAXLE TO ENGINE

(a) Attach the transaxle to the engine.

(b) Install the five bolts together with the following parts:

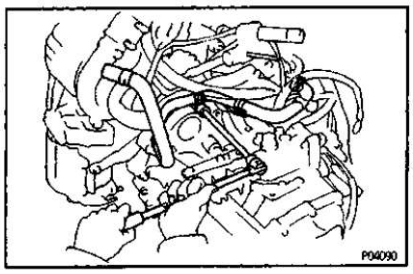
(1) Ground strap

(2) Engine wire bracket

Torque:

46 N–m (470 kgf–cm, 34 ft–lbf) for 14 mm head

64 N–m (650 kgf–cm, 47 ft–lbf) for 17 mm head

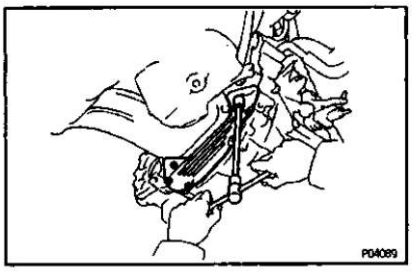


3. INSTALL HEATER WATER PIPE

(a) Install the water pipe with the two bolts.

(b) Connect the water hose to the water by–pass pipe.

Torque: 46 N–m (470 kgf–cm, 34 ft–lbf)



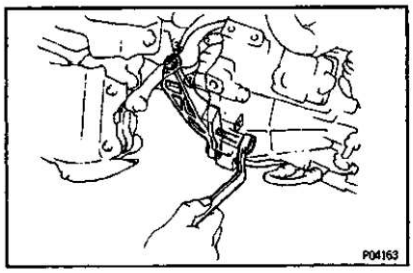
4. INSTALL N4.2 REAR END PLATE

Install the rear end plate with the four bolts.

Torque:

9.3 N–m (95 kgf–cm, 82 In.–lbf) for 10 mm head

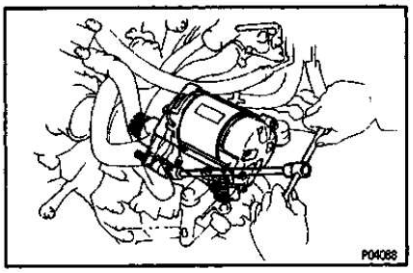
19 N–m (195 kgf–cm, 14 ft–lbf) for 12 mm head



5. INSTALL STIFFENER PLATE

Install the stiffener plate with the three bolts.

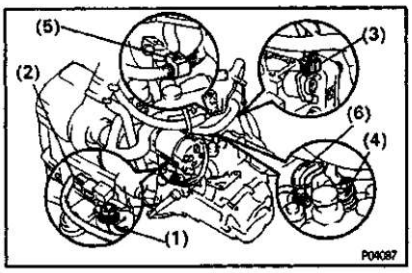
Torque: 37 N–m (380 kgf–cm, 27 ft–lbf)



6. INSTALL STARTER

Install the stater with the two bolts.

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



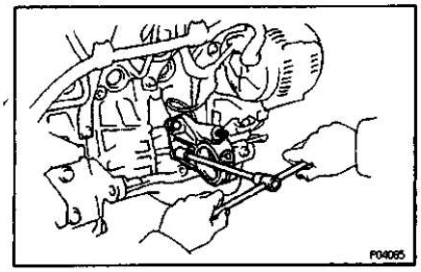
7. CONNECT ENGINE WIRE

(a) Connect the following parts:

(1) Starter wire
(2) Starter connector
(3) Vehicle speed pulse generator connector
(4) Back–up light switch connector
(5) Engine wire clamp
(6) Engine wire bracket

(b) Install the terminal cover to the starter.

ENGINE INSTALLATION

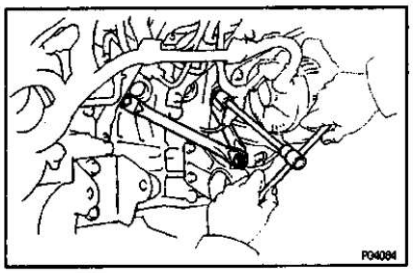


(See Components for Engine Removal and Installation)

1. INSTALL DRIVE SHAFT BEARING BRACKET

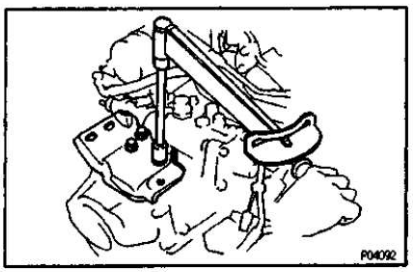
(a) Install the bearing bracket with the two bolts.

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



(b) Install the bearing bracket stay with the two bolts and nut.

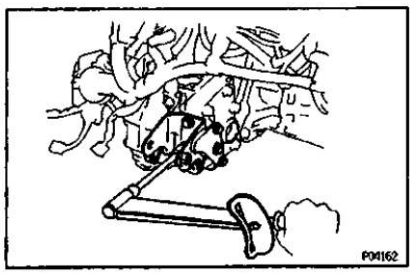
Torque: 75 N–m (770 kgf–cm, 56 ft–lbf)



2. INSTALL LH ENGINE MOUNTING BRACKET

Install the mounting bracket with the three bolts.

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



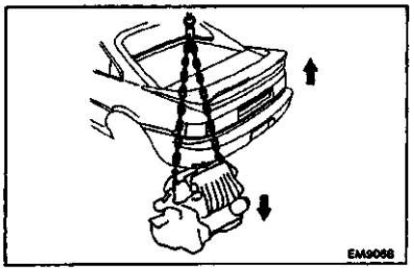
3. INSTALL REAR ENGINE MOUNTING BRACKET

Install the mounting bracket with the six bolts.

Torque:

39 N–m (400 kgf–cm, 29 ft–lbf) for RH side

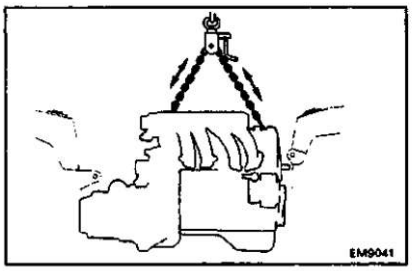
77 N–m (790 kgf–cm, 57 ft–lbf) for rear side



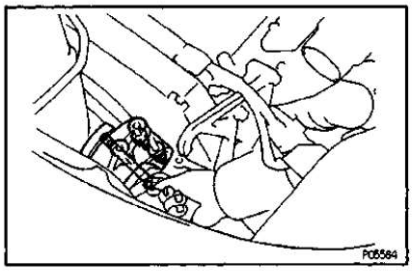
4. INSTALL ENGINE AND TRANSAXLE ASSEMBLY IN VEHICLE

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

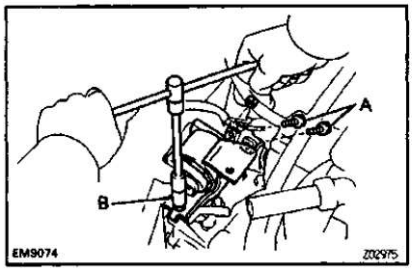
(b) Slowly lower the vehicle, and raise the engine.



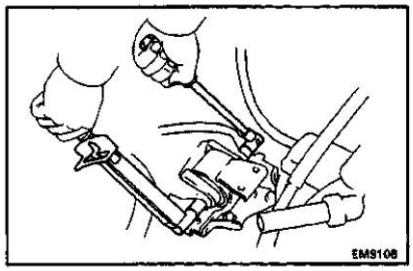
(c) Keep the engine level, and align RH and LH mounting with the body mountings.



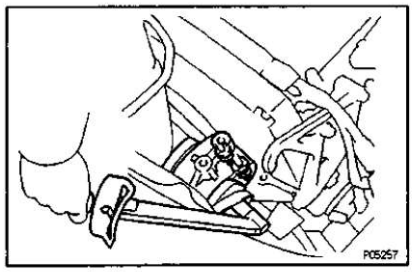
(d) Attach the RH mounting insulator to the body, and temporarily install the through bolt.
(e) Attach the RH mounting insulator to the mounting bracket, and temporarily install the two nuts.



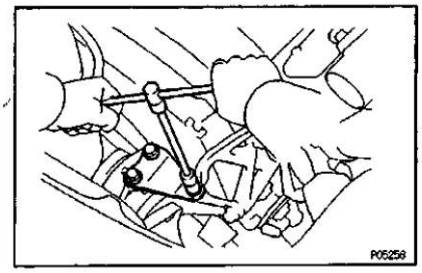
(f) Attach the LH mounting insulator to the body, and temporarily install the through bolt.
(g) Attach the LH mounting insulator to the mounting bracket, and install the three bolts.
Torque:
63 N–m (650 kgf–cm. 47 ft–lbf) for A
73 N–m (740 kgf–cm, 54 ft–lbf) for B



(h) Tighten the through bolt holding the LH mounting insulator to the body.
Torque: 78 N–m (800 kgf–cm, 58 ft–lbf)



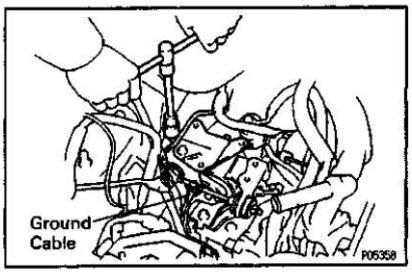
(i) Tighten the two nuts holding the RH mounting insu–lator to the mounting bracket.
Torque: 52 N–m (530 kgf–cm, 38 ft–lbf)
(j) Tighten the through bolt holding the RH mounting insulator to the body.
Torque: 78 N–m (800 kgf–cm, 58 ft–lbf)
(k) Disconnect the engine sling device from the engine.



5. INSTALL RH ENGINE MOUNTING STAY

Install the mounting stay with the three bolts.

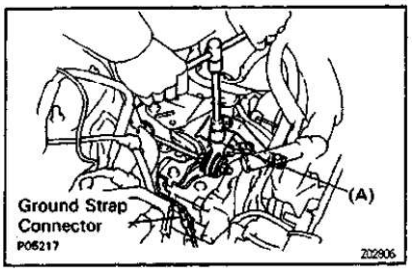
Torque: 73 N–m (740 kgf–cm, 54 ft–lbf)



6. INSTALL LATERAL CONTROL ROD TO BODY

Install the control rod and charcoal canister tube with the four bolts. Connect the ground cable.

Torque: 35 N–m (360 kgf–cm, 26 ft–lbf)



7. INSTALL LATERAL CONTROL ROD (TO LH ENGINE MOUNTING INSULATOR)AND LH ENGINE MOUNTING STAY

(a) Temporarily install the lateral control rod with the bolt (A).

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

Torque:

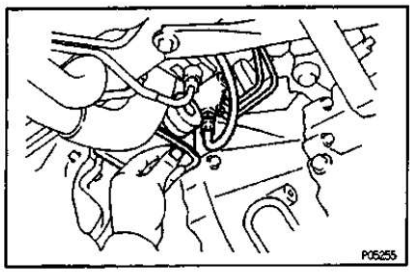
25 N–m (250 kgf–cm, 18 ft–lbf) for transaxle side

73 N–m (740 kgf–cm, 54 ft–lbf) for insulator side

(c) Tighten the bolt (A).

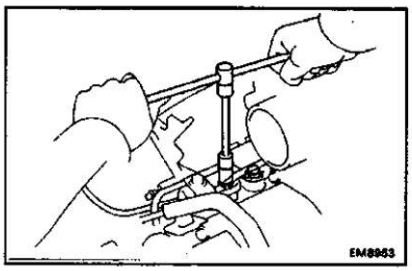
Torque: 37 N–m (380 kgf–cm, 27 ft–lbf)

8. CONNECT GROUND STRAP CONNECTOR

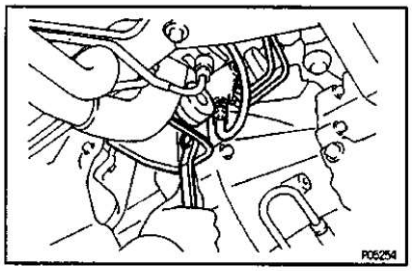


9. INSTALL FRONT ENGINE MOUNTING BRACKET

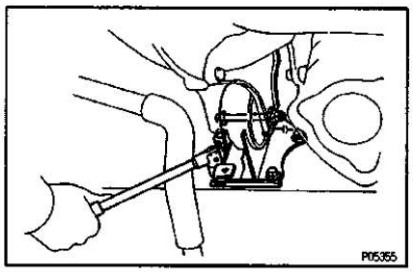
(a) Temporarily install the clutch release cylinder and mounting bracket with the two bolts.



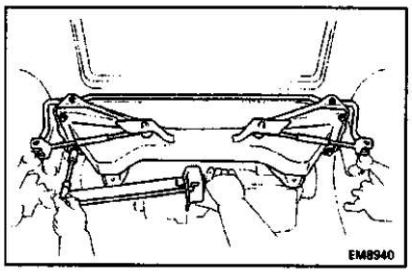
(b) Tighten the two bolts holding the clutch release cyl–inder to the transaxle.
Torque: 12 N–m (120 kgf–cm, 9 ft–lbf)



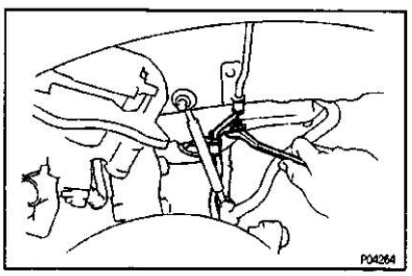
(c) Tighten the two bolts holding the mounting bracket to to the transaxle.
Torque: 77 N–m (790 kgf–cm, 57 ft–lbf)



10. INSTALL FRONT ENGINE MOUNTING INSULATOR
(a) Install the mounting insulator to the body with the four bolts.
Torque: 73 N–m (740 kgf–cm, 54 ft–lbf)
(b) Temporarily install the through bolt and nut holding the mounting insulator to the mounting bracket.



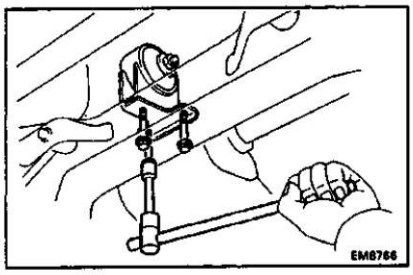
11. INSTALL REAR SUSPENSION LOWER CROSSMEMBER
(a) Install the lower crossmember with the four bolts.
Torque: 113 N–m (1,150 kgf–cm, 83 ft–lbf)



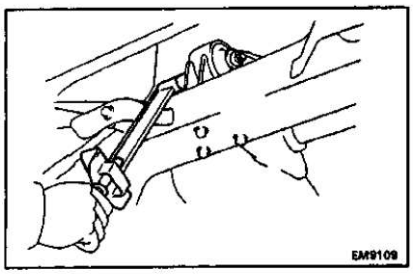
(b) Install the wire clamp of the speed sensor to the lower crossmember with the bolt. Install the two wire clamps.
(c) Install the lower suspension arm.
(See Lower Suspension Arm Installation in SA section)



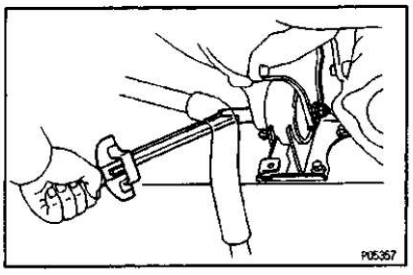
12. INSTALL DRIVE SHAFTS
(See Drive Shaft Installation in SA section)



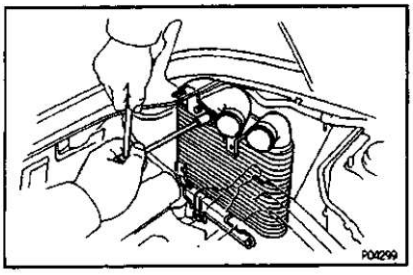
13. INSTALL REAR ENGINE MOUNTING INSULATOR
(a) Temporarily install the mounting bracket to the body with the three bolts.
(b) Temporarily install the through bolt holding the mou–nting insulator to the mounting bracket.
(c) Tighten the three bolts holding the mounting bracket to the lower crossmember.
Torque: 64 N–m (650 kgf–cm, 47 ft–lbf)



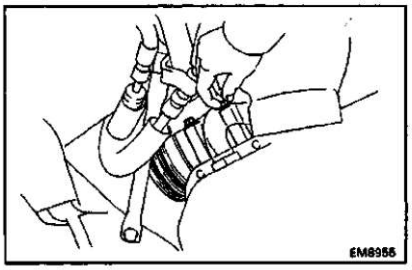
(d) Tighten the through bolt holding the mounting insu–lator to the mounting bracket.
Torque: 87 N–m (890 kgf–cm, 64 ft–lbf)



14 TIGHTEN FRONT ENGINE MOUNTING THROUGH BOLT
Torque: 96 N–m (980 kgf–cm, 71 ft–lbf)

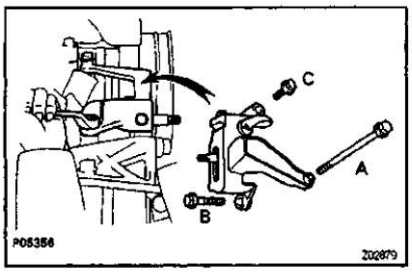


15. INSTALL CAC
Install the CAC and upper bracket with the five bolts.



16. INSTALL A/C COMPRESSOR

(a) Temporarily install the A/C compressor with the two bolts.



(b) Install the idler pulley bracket with the three bolts.

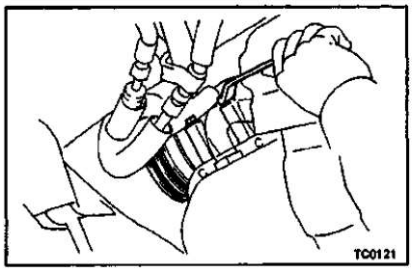
Torque:

25 N–m (250 kgf–cm, 18 ft–lbf) for A

27 N–m (275 kgf–cm. 20 ft–lbf) for B

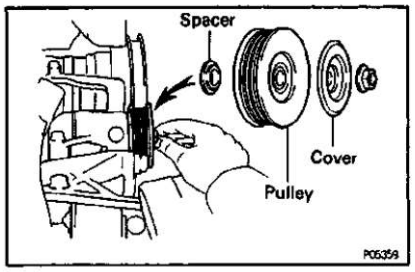
37 N–m (375 kgf–cm, 27 ft–lbf) for C

(c) Connect the A/C compressor connector.

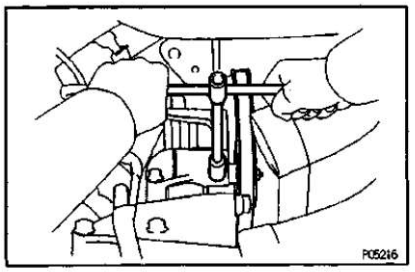


(d) Tighten the two bolts of the lower side of the A/C compressor.

Torque: 25 N–m (250 kgf–cm, 18 ft–lbf)

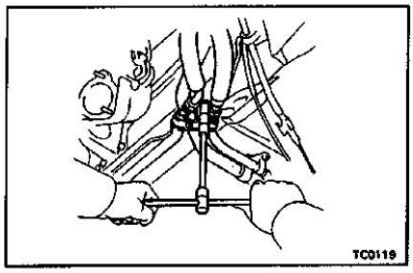


(e) Temporarily install the spacer, idler pulley and pulley cover with the nut.

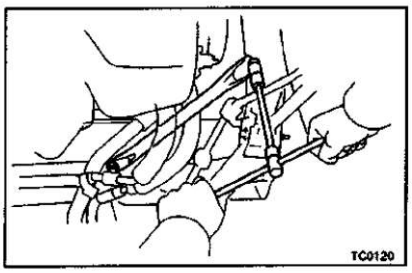


(f) Install the drive belt with the adjusting bolt.

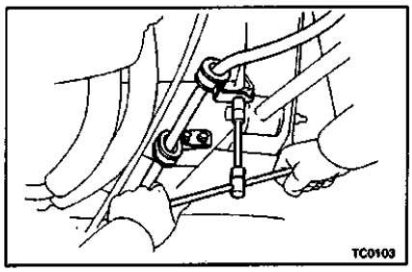
(g) Tighten the idler pulley nut.



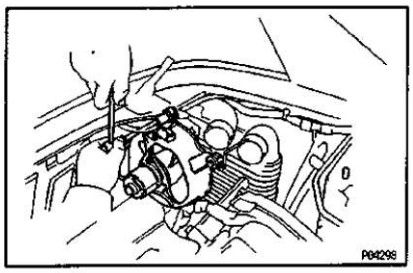
(h) Install the A/C pipes with the two clamps and nut.



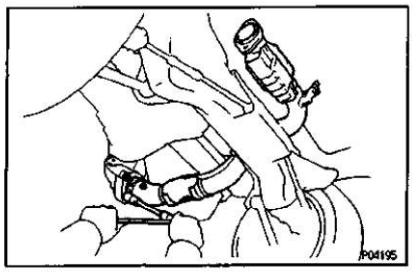
(i) Install the lower suspension brace with the two bolts.
Torque: 73 N–m (740 kgf–cm, 64 ft–lbf)



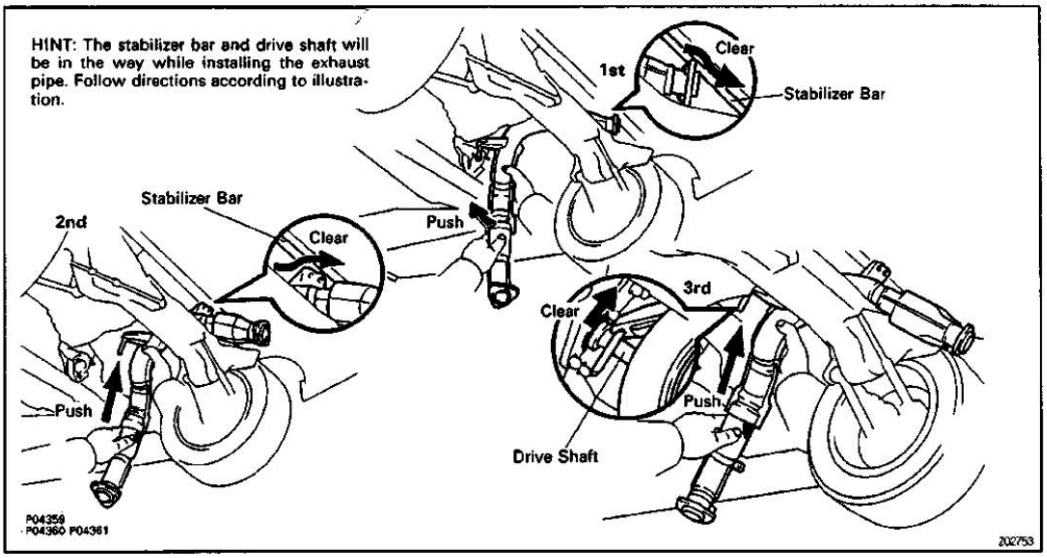
(j) Install the parking brake cable with the two clamp and three bolts.

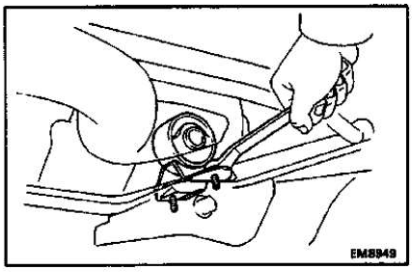


17. INSTALL ENGINE COMPARTMENT ELECTRIC COOLING FAN
(a) Install the cooling fan with the three bolts.
(b) Connect the cooling fan connector.

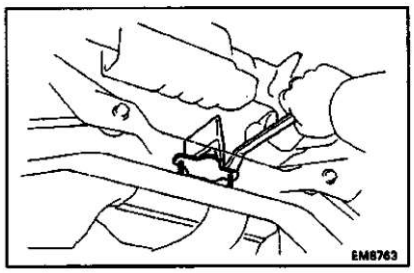


18. INSTALL FRONT EXHAUST PIPE
(a) Place a new gasket to the front of the front exhaust pipe.
(b) Using a 14 mm deep socket wrench, install the front exhaust pipe with three new nuts.
Torque: 62 N–m (630 kgf–cm, 46 ft–lbf)

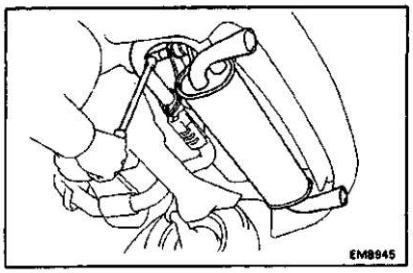




(c) Install the support bracket with the two bolts.
Torque: 21 N–m (210 kgf–cm, 15 ft–lbf)

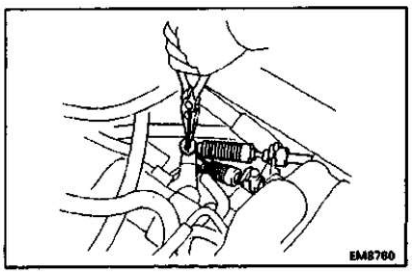


(d) Install the damper with the two bolts.
Torque: 21 N–m (210 kgf–cm, 15 ft–lbf)

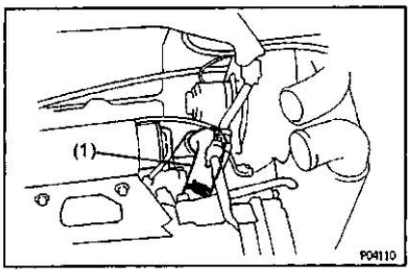


19. INSTALL TAILPIPE

(a) Place a new gasket to the rear of the front exhaust pipe.
(b) Install the tailpipe to the body bracket with the two bolts and nut.
Torque: 66 N–m (670 kgf–cm, 48 ft–lbf)
(c) Install the two bolts holding the front exhaust pipe to the tailpipe.
Torque: 43 N–m (440 kgf–cm, 32 ft–lbf)
(d) Install the two bolts holding the front exhaust pipe bracket to the tailpipe bracket.
Torque: 19 N–m (190 kgf–cm, 14 ft–lbf)

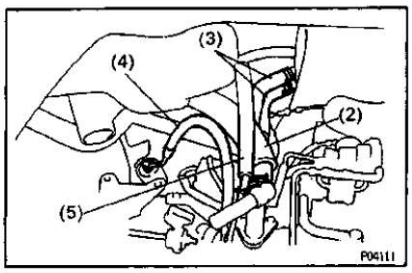


20. CONNECT TRANSAXLE CONTROL CABLES TO TRANSAXLE

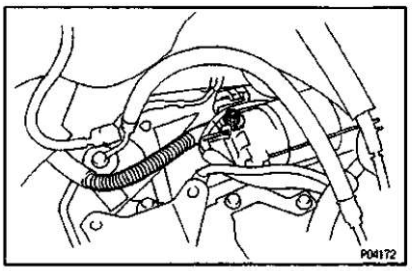


21. CONNECT HOSES

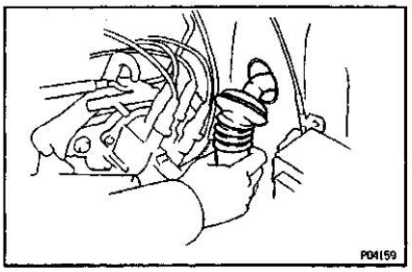
Connect the following connectors:
(1) Radiator hose to water inlet



(2) Radiator hose to water outlet
(3) Two heater water hoses
(4) Fuel inlet hose to fuel filter
(5) Fuel return hose

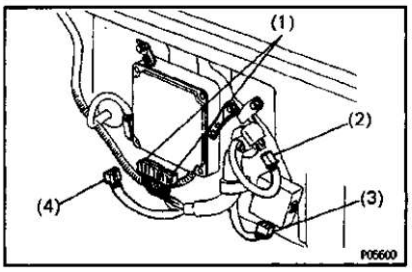


22. CONNECT STARTER CABLE

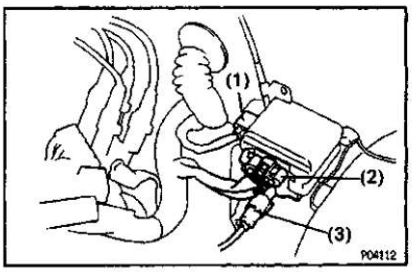


23. CONNECT ENGINE WIRE TO LUGGAGE COMPARTMENT

(a) Push in the engine wire through the luggage com–partment.

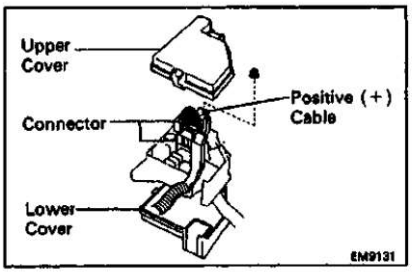


(b) Connect the following connectors:
(1) Two PCME connectors
(2) Starter relay connector
(3) Engine compartment electric cooling fan con–nector
(4) Engine compartment wire connector



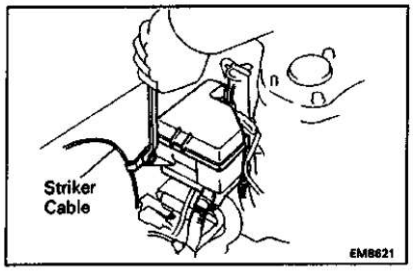
24. CONNECT CONNECTORS AND HIGH–TENSION CORD

Connect the following connectors and cord:
(1) Noise filter connector
(2) Igniter connector
(3) High–tension cord to ignition coil

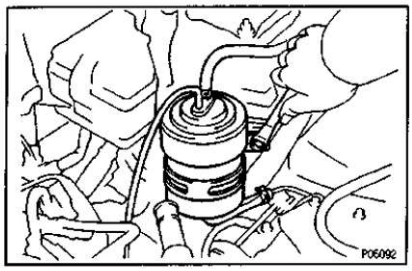


25. CONNECT ENGINE WIRE, AND INSTALL ENGINE RELAY BOX

(a) Connect the two connectors and positive (+) cable of the engine wire to the relay box.
(b) Install the upper and lower covers to the relay box.

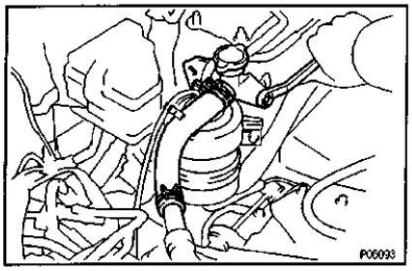


(c) Install the relay box with the two bolts. Install the luggage compartment striker cable.



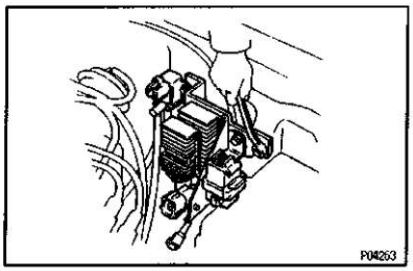
26. INSTALL CHARCOAL CANISTER

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



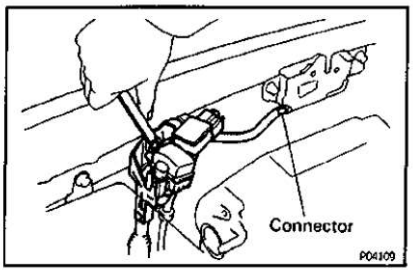
27. INSTALL WATER FILLER

(a) Install the water filler with the two bolts.
(b) Connect the following hoses:
(1) Water filler hose
(2) Coolant reservoir hose



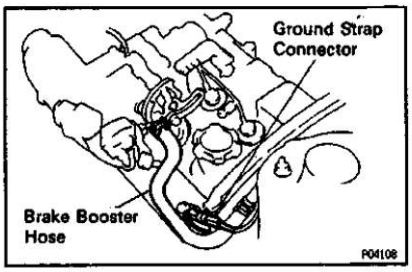
28. INSTALL SOLENOID RESISTOR ASSEMBLY AND A/C IDLE–UP VALVE

(a) Install the solenoid resistor assembly and A/C idle–up valve with the two bolts.
(b) Connect the following connectors:
- Solenoid resistor connector
- Fuel pump relay connector
- Fuel pump resistor connector

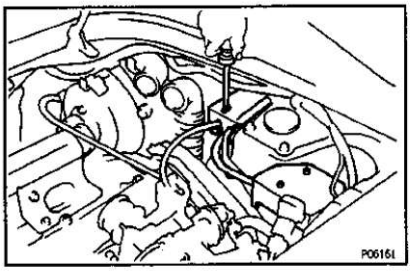


29. CONNECT DATA LINK CONNECTOR 1 AND MAP

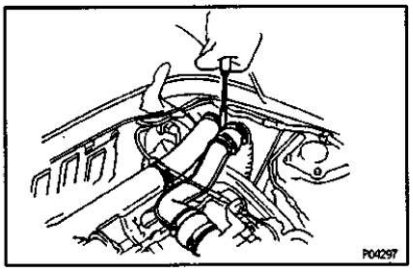
(a) Install the data link connector 1 and MAP to the body with the bolt.
(b) Connect the engine hood courtesy switch connector.



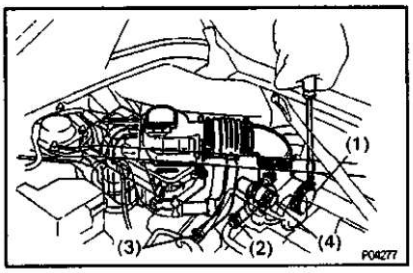
30. CONNECT BRAKE BOOSTER VACUUM HOSE
31. CONNECT GROUND STRAP CONNECTOR



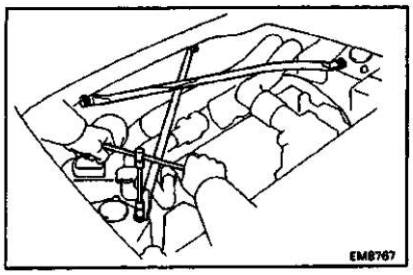
32. (w/ CRUISE CONTROL SYSTEM)
INSTALL CRUISE CONTROL ACTUATOR AND ACCELERATOR LINKAGE
33. (w/o CRUISE CONTROL SYSTEM)
CONNECT ACCELERATOR LINKAGE TO THROTTLE BODY



34. INSTALL NO.1 AND NO.2 INTAKE AIR CONNECTORS



35. INSTALL AIR CLEANER HOUSING
(a) Install the air cleaner case with the three bolts.
(b) Install the air filter.
(c) Install the air cleaner cap and air flow sensor assembly with the four clips.
(d) Connect the following hoses:
(1) Air cleaner hose to turbocharger
(2) PCV hose to cylinder head cover
(3) Air hose to No.2 air tube
(4) Air hose to air by–pass valve
(e) Connect the air flow sensor connector.



36. INSTALL UPPER SUSPENSION BRACE

Install the upper brace with the two bolts and two nuts.

Torque:
73 N–m (740 kgf–cm, 54 ft–lbf) for bolt
64 N–m (650 kgf–cm, 47 ft–lbf) for nut

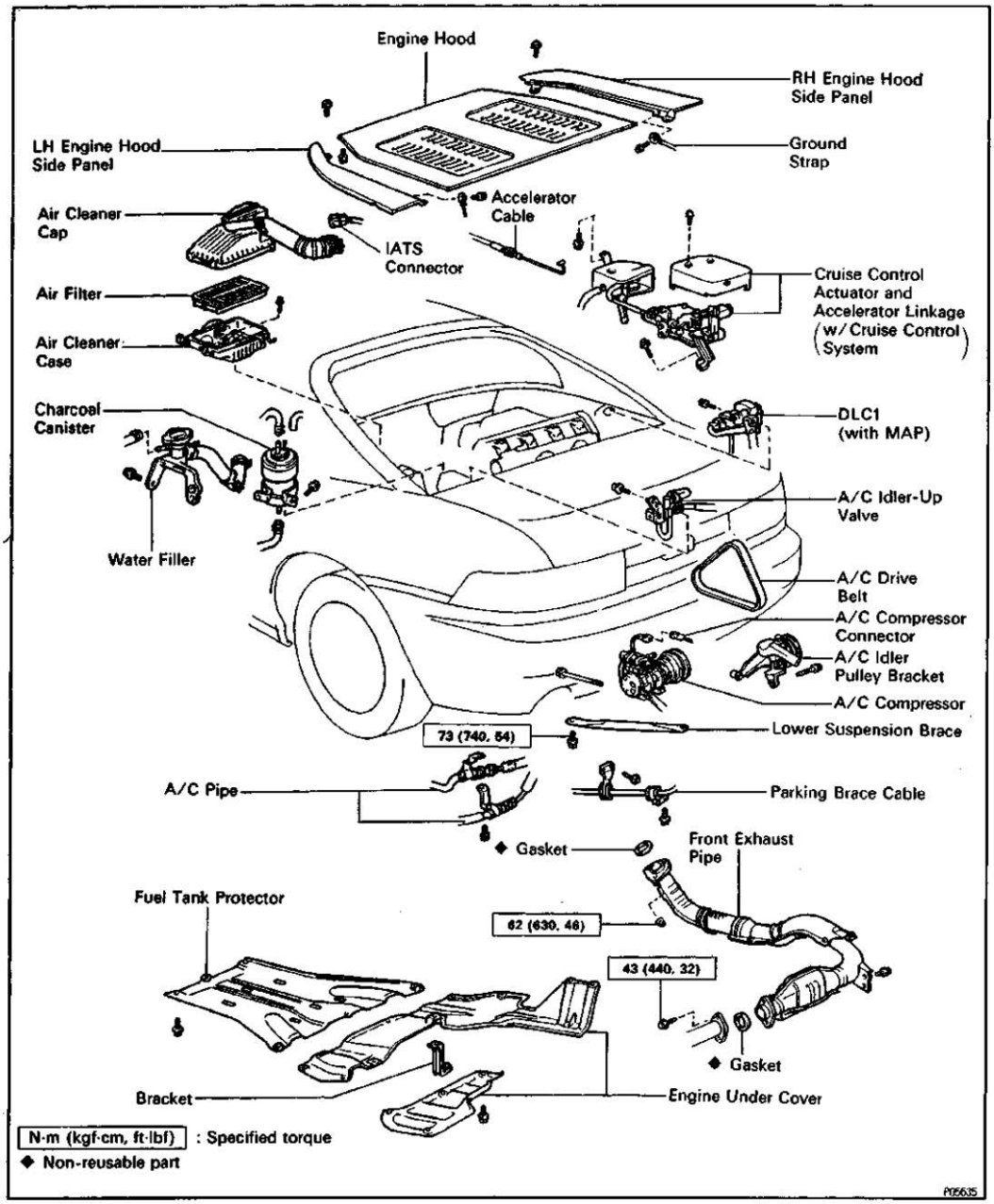
37. CONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY
38. FILL WITH ENGINE COOLANT
39. FILL WITH ENGINE OIL
40. START ENGINE AND CHECK FOR LEAKS
41. PERFORM ENGINE ADJUSTMENT
(See Tune–Up)
42. INSTALL ENGINE UNDER COVERS
43. INSTALL ENGINE HOOD
44. INSTALL ENGINE HOOD SIDE PANELS
45. PERFORM ROAD TEST

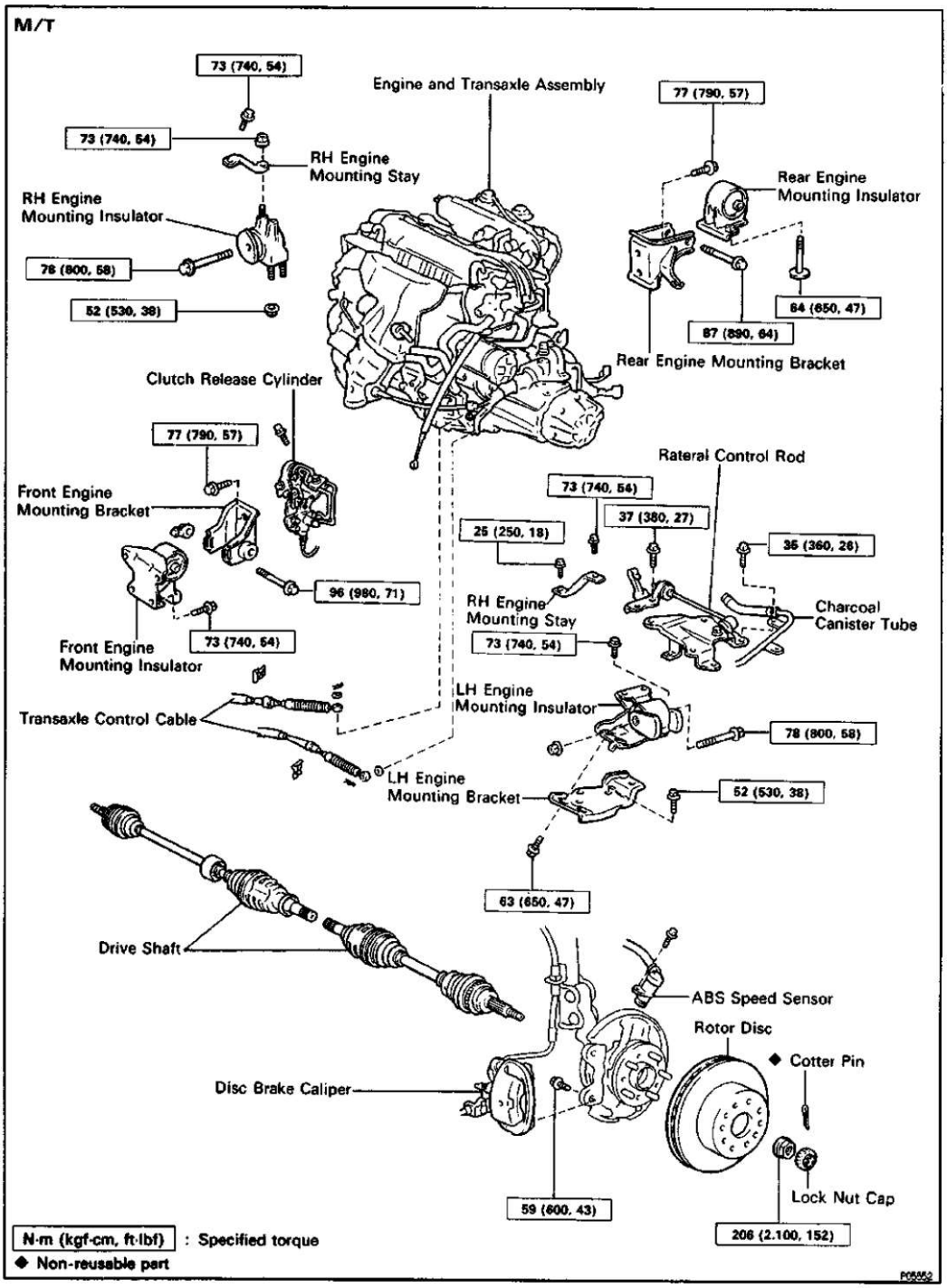
Check for abnormal noise, shock slippage, correct shift points and smooth operation.

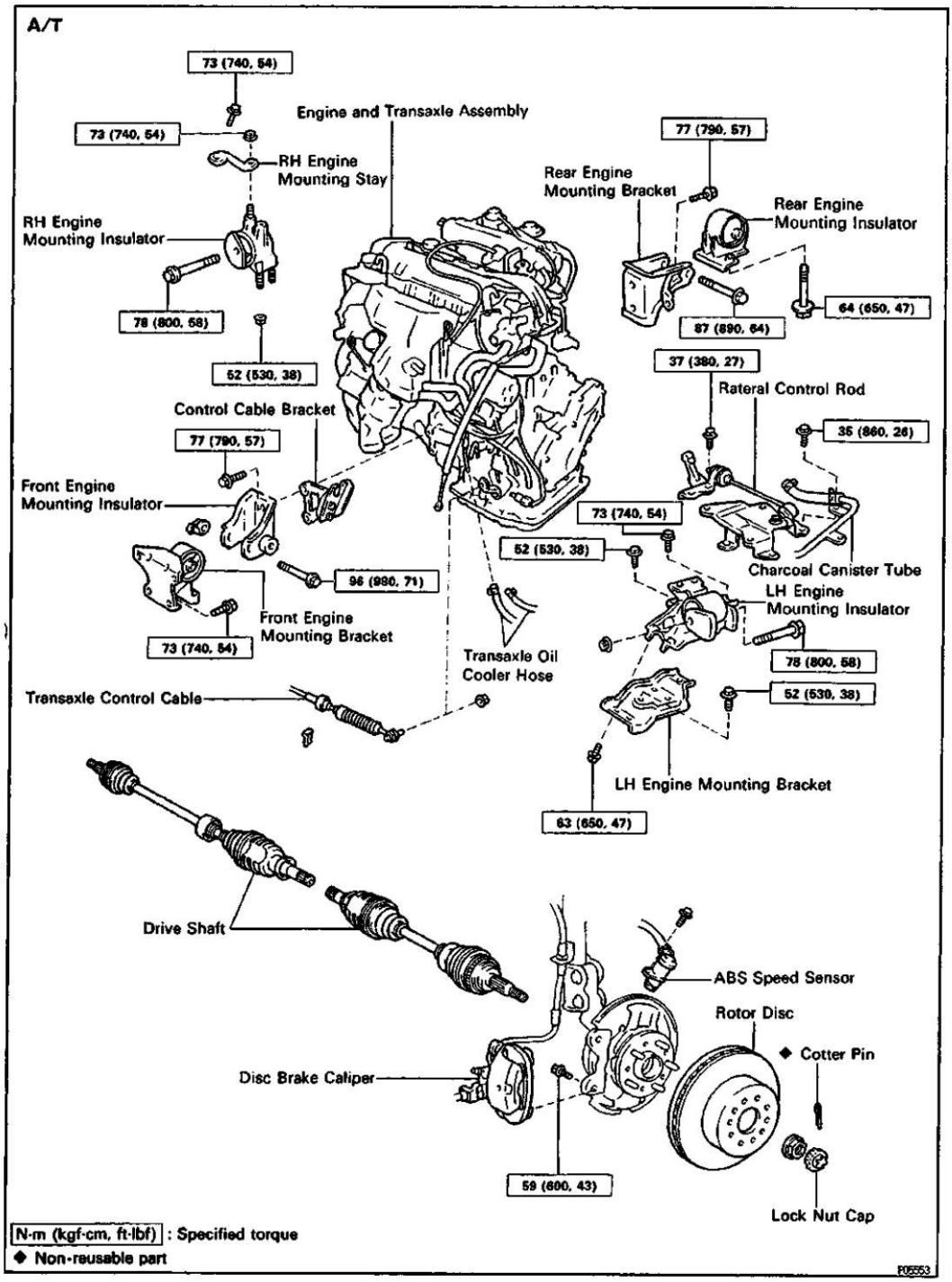
46. RECHECK ENGINE COOLANT AND OIL LEVELS

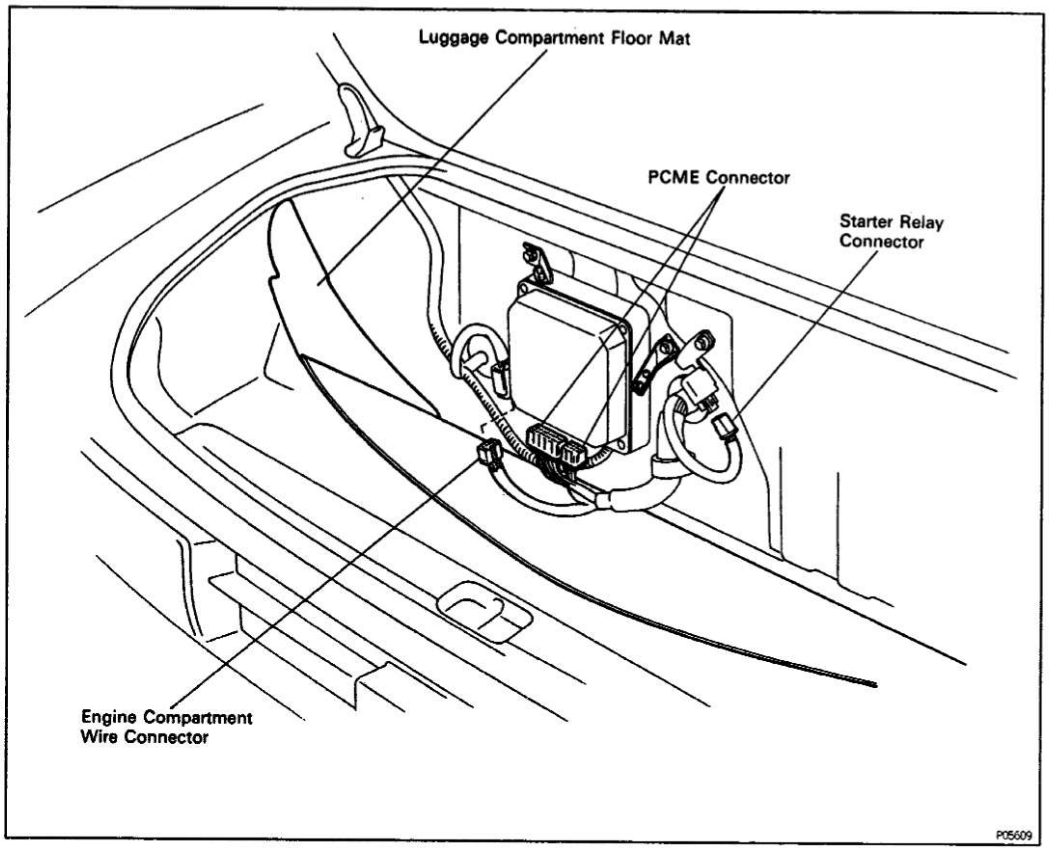
CYLINDER BLOCK

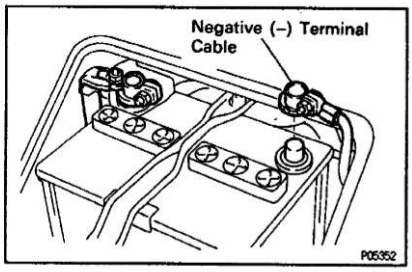
COMPONENTS FOR ENGINE REMOVAL AND INSTALLATION




M/T
73 (740, 54)
73 (740, 54)
RH Engine Mounting Stay
RH Engine Mounting Insulator
78 (800, 58)
52 (530, 38)
Engine and Transaxle Assembly
77 (790, 57)
Rear Engine Mounting Insulator
64 (650, 47)
87 (890, 64)
Rear Engine Mounting Bracket
Clutch Release Cylinder
77 (790, 57)
Front Engine Mounting Bracket
96 (980, 71)
Front Engine Mounting Insulator
73 (740, 54)
Rateral Control Rod
73 (740, 54)
37 (380, 27)
25 (250, 18)
35 (360, 26)
RH Engine Mounting Stay
73 (740, 54)
Charcoal Canister Tube
Transaxle Control Cable
LH Engine Mounting Insulator
78 (800, 58)
LH Engine Mounting Bracket
52 (530, 38)
63 (650, 47)
Drive Shaft
ABS Speed Sensor
Rotor Disc
◆ Cotter Pin
Disc Brake Caliper
59 (600, 43)
Lock Nut Cap
206 (2.100, 152)
N·m (kgf-cm, ft·lbf) : Specified torque
◆ Non-reusable part


A/T
73 (740, 54)
73 (740, 54)
Engine and Transaxle Assembly
RH Engine Mounting Stay
RH Engine Mounting Insulator
78 (800, 58)
52 (530, 38)
Control Cable Bracket
77 (790, 57)
Front Engine Mounting Insulator
96 (980, 71)
Front Engine Mounting Bracket
73 (740, 54)
Transaxle Control Cable
Transaxle Oil Cooler Hose
77 (790, 57)
Rear Engine Mounting Bracket
Rear Engine Mounting Insulator
64 (650, 47)
87 (890, 64)
37 (380, 27)
Rateral Control Rod
35 (360, 26)
73 (740, 54)
52 (530, 38)
Charcoal Canister Tube
LH Engine Mounting Insulator
78 (800, 58)
52 (530, 38)
LH Engine Mounting Bracket
63 (650, 47)
Drive Shaft
ABS Speed Sensor
Rotor Disc
◆ Cotter Pin
Disc Brake Caliper
59 (600, 43)
Lock Nut Cap
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part
P05553





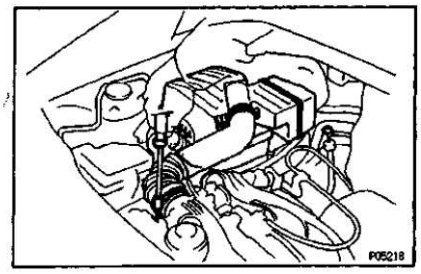
ENGINE REMOVAL

(See Components for Engine Removal and Installation)

1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY

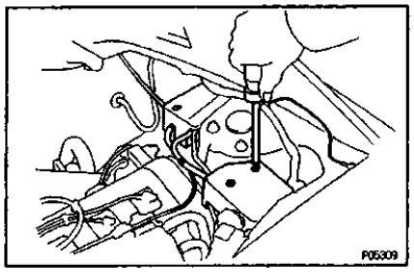
   CAUTION: Turn the ignition switch to 'LOCK' Disconnect the negative terminal from the battery. Wait at least 20 seconds before proceeding with work.

2. REMOVE ENGINE HOOD
3. REMOVE ENGINE HOOD SIDE PANELS
4. REMOVE ENGINE UNDER COVERS
5. DRAIN ENGINE COOLANT
6. DRAIN ENGINE OIL
7. DRAIN TRANSAXLE OIL



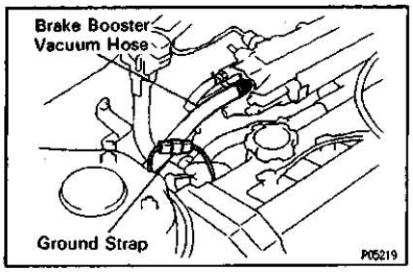
8. REMOVE AIR CLEANER HOUSING

(a) Disconnect the IATS connector.
(b) Disconnect the air cleaner hose from the throttle body.
(c) Disconnect the four clamps, and remove the air cleaner cap.
(d) Remove the air filter.
(e) Remove the three bolts and air cleaner case.



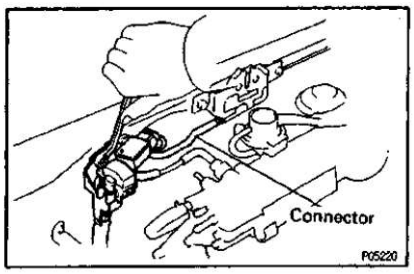
9. DISCONNECT ACCELERATOR LINKAGE FROM THROTTLE BODY

10. (w/ CRUISE CONTROL SYSTEM) REMOVE CRUISE CONTROL ACTUATOR AND ACCELERATOR LINKAGE



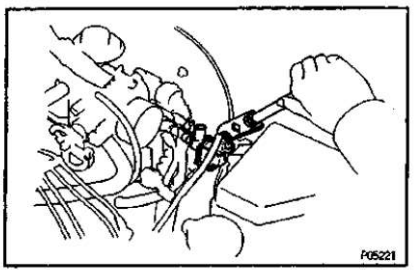
11. DISCONNECT GROUND STRAP CONNECTOR

12. DISCONNECT BRAKE BOOSTER VACUUM HOSE



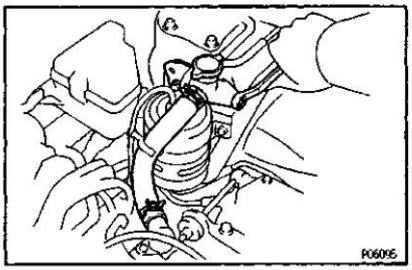
13. DISCONNECT DATA LINK CONNECTOR 1 AND MAP

(a) Disconnect the engine hood curtesy switch connector.
(b) Remove the bolt, and disconnect the data link connector and MAP from the body.



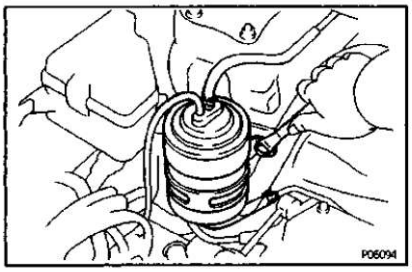
14. DISCONNECT A/C IDLE–UP VALVE FROM BODY

Remove the bolt, and disconnect the A/C idle–up from the body.



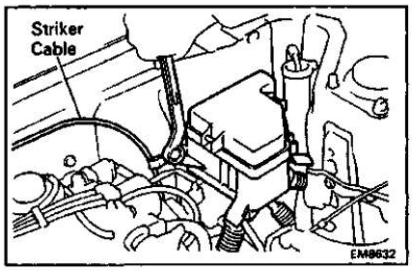
15. REMOVE WATER FILLER

(a) Disconnect the following hose:
(1) Water filler hose
(2) Coolant reservoir hose
(b) Remove the two bolts and water filler.



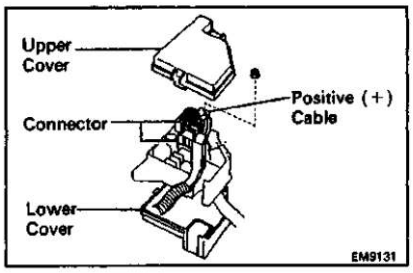
16. REMOVE CHARCOAL CANISTER

(a) Disconnect the three hoses from the charcoal canis–ter.
(b) Remove the two bolts and charcoal canister.

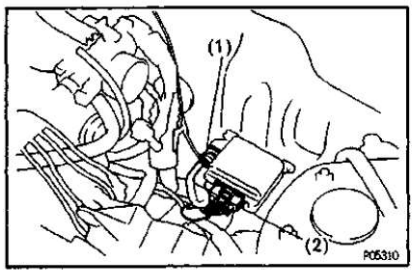


17. REMOVE ENGINE RELAY BOX, AND DISCONNECT ENGINE WIRE

(a) Remove the two bolts and relay box. Disconnect the luggage compartment striker cable.

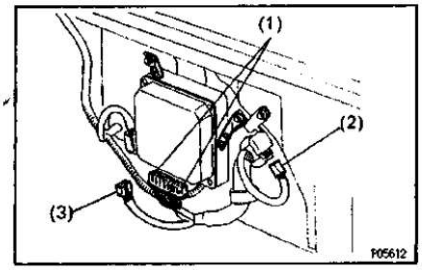


(b) Remove the upper and lower covers from the relay box.
(c) Disconnect the positive (+) cable and two connectors of the engine wire from the relay box.



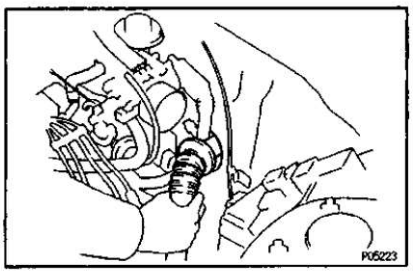
18. DISCONNECT CONNECTORS

Disconnect the following connector and cord:
(1) Noise filter connector
(2) Igniter connector

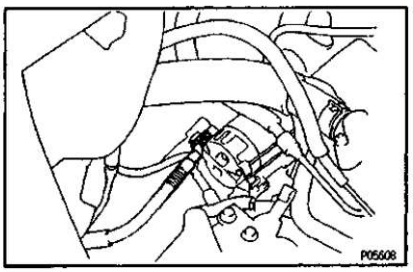


19. DISCONNECT ENGINE WIRE FROM LUGGAGE COMPARTMENT

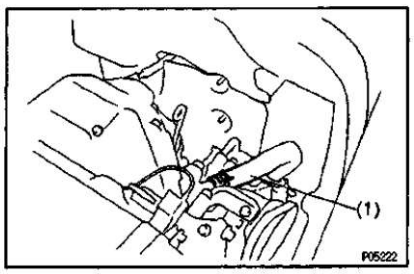
(a) Disconnect the following connectors:
(1) Two PCME (& T) connectors
(2) Starter relay connector
(3) Engine compartment wire connector



(b) Pull out the engine wire from the luggage compartment.

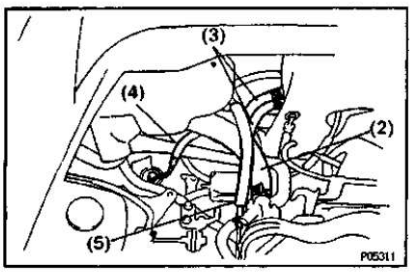


20. DISCONNECT STARTER CABLE



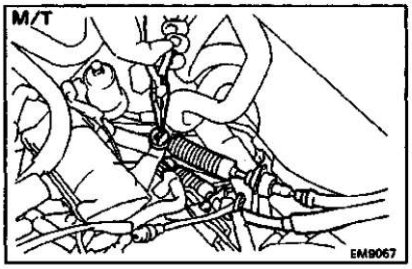
21. DISCONNECT HOSES

(a) Disconnect the following connectors:
(1) Radiator hose from water inlet

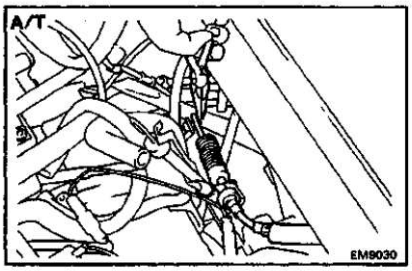


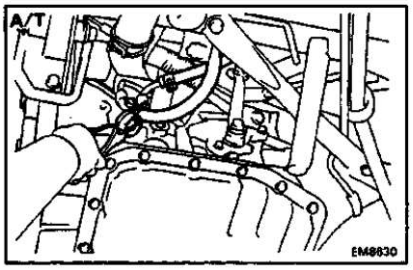
(2) Radiator hose from water outlet
(3) Two heater water hoses
(4) Fuel inlet hose from fuel filter
(5) Fuel return hose

CAUTION: Catch leaking fuel in a container.

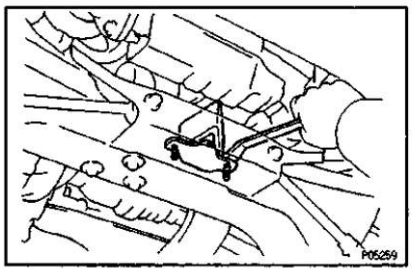


22. DISCONNECT TRANSAXLE CONTROL CABLE (S) FROM TRANSAXLE



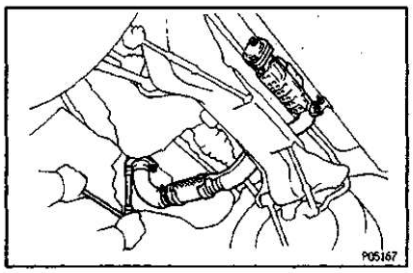


23. (A/T) DISCONNECT TRANSAXLE OIL COOLER HOSES



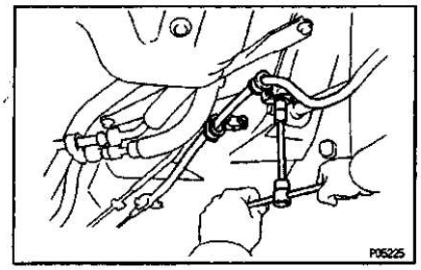
24. REMOVE EXHAUST PIPE

(a) (CALIF. only)
Remove the two bolts and damper.

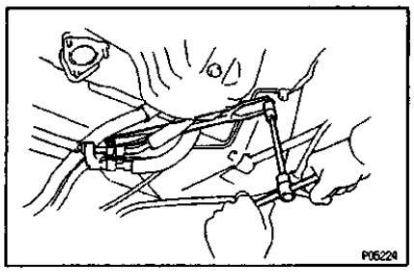


(b) Remove the two bolts holding the front exhaust pipe bracket to the tailpipe bracket.
(c) Remove the two bolts holding the front exhaust pipe to the tailpipe.
(d) Using a 14 mm deep socket wrench, remove the three nuts holding the front exhaust pipe to the TWC.
(e) Remove the front exhaust pipe.
(f) Remove the two gaskets.

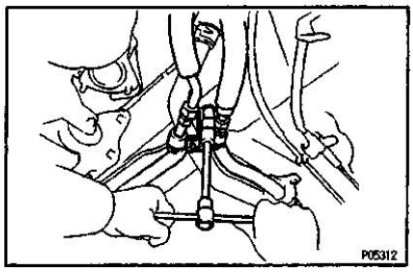
25. DISCONNECT A/C COMPRESSOR PROM ENGINE



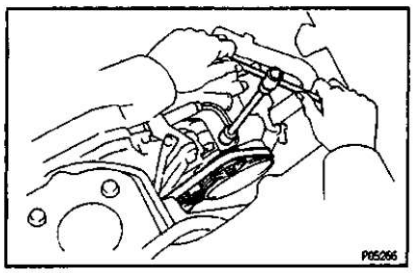
(a) Remove the three clamp bolts, and disconnect the parking brake cable.



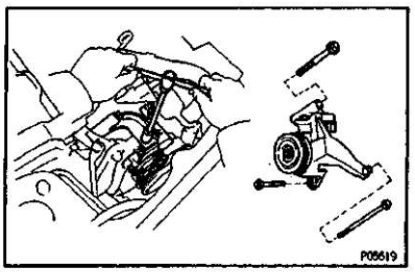
(b) Remove the two bolts and lower suspension brace.



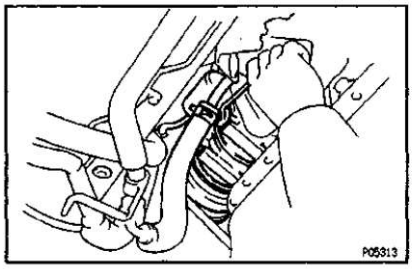
(c) Remove the clamp nut, and disconnect the two A/C pipes.



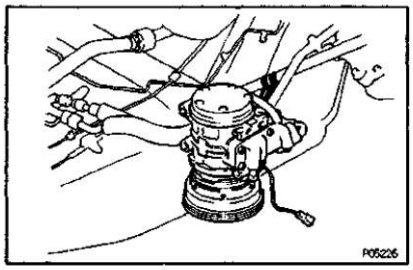
(d) Loosen the idler pulley nut.
(e) Loosen the adjusting bolt, and remove the drive belt.



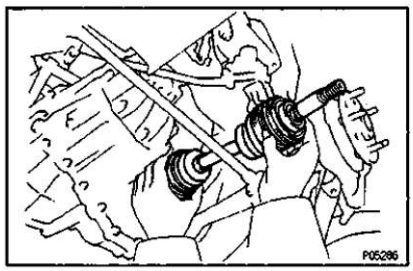
(f) Disconnect the A/C compressor connector.
(g) Remove the three bolts and idler pulley bracket.



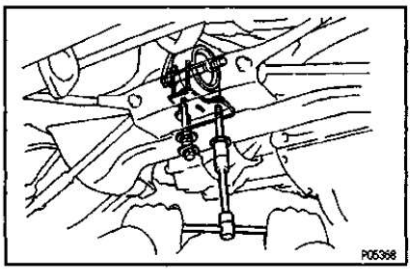
(h) Remove the two bolts, and disconnect the A/C compressor from the engine.



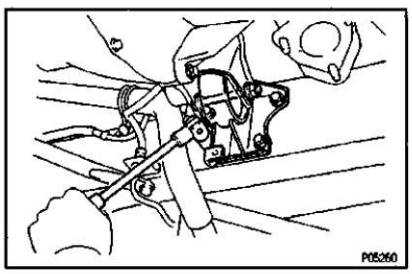
HINT: Suspend the A/C compressor to strut rod with a string.



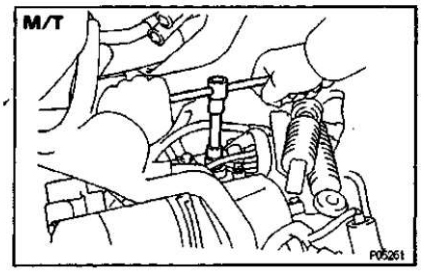
26. REMOVE DRIVE SHAFTS
(See Drive Shaft Removal in SA section)



27. REMOVE REAR ENGINE MOUNTING INSULATOR
(a) Remove the through bolt holding the mounting insulator to the mounting bracket.
(b) Remove the three bolts and mounting insulator.



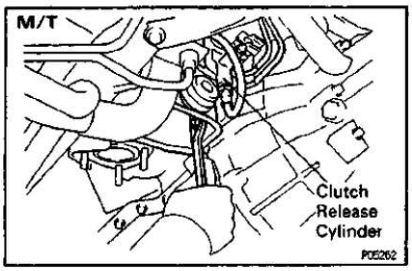
28. REMOVE FRONT ENGINE MOUNTING INSULATOR
(a) Remove the through bolt and nut holding the mounting insulator to the mounting bracket.
(b) Remove the four bolts and mounting insulator.



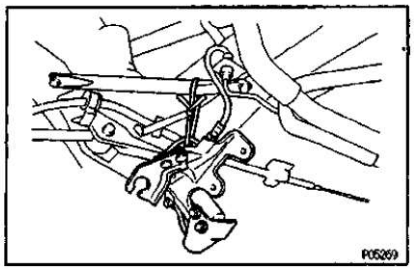
29. REMOVE FRONT ENGINE MOUNTING BRACKET

(M/T)

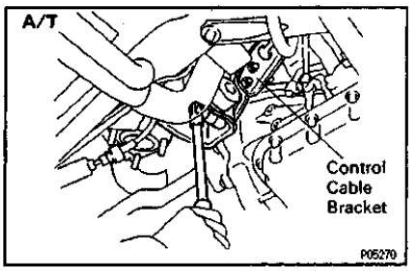
(a) Remove the bolt and nut holding the clutch release cylinder to the transaxle.



(b) Remove the two bolts and mounting bracket, and disconnect the clutch release cylinder from the tra–nsaxle.

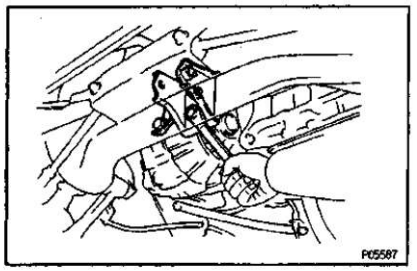


HINT: Suspend the clutch release cylinder to the suspension brace with a string.



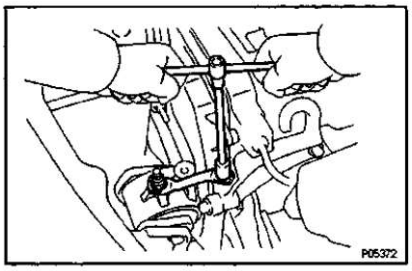
(A/T)

Remove the two bolts, mounting bracket and control cable bracket.



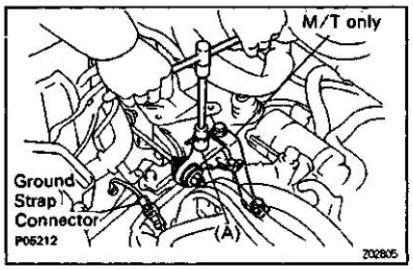
30. REMOVE REAR ENGINE MOUNTING BRACKET

Remove the three bolts and mounting bracket.



31. REMOVE RH ENGINE MOUNTING STAY

Remove the bolt, nut and mounting stay.



32. (M/T only)

REMOVE LH ENGINE MOUNTING STAY

Remove the two bolts and mounting stay.

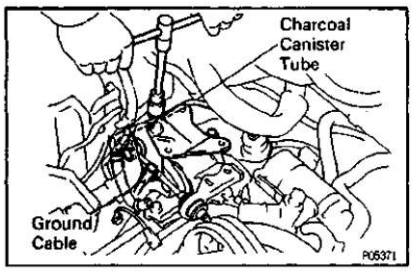
33. DISCONNECT LATERAL CONTROL ROD FROM LH ENGINE MOUNTING INSULATOR

(M/T)

Remove the bolt (A), and disconnect the rateral con– trol rod from the mounting insulator.

(A/T)

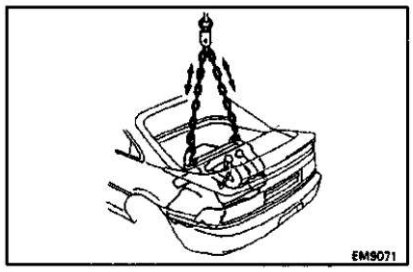
Remove the two bolts and disconnect the rateral control rod from the mounting insulator.



34. DISCONNECT GROUND STRAP CONNECTOR

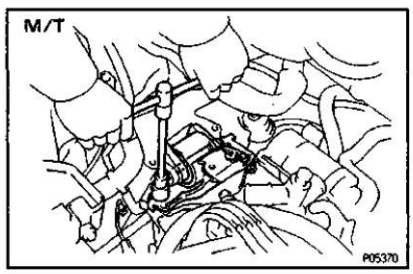
35. REMOVE RATERAL CONTROL ROD

Remove the four bolts and rateral control rod. Dis– connect the ground strap connector.



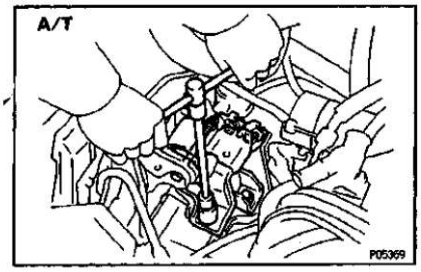
36. REMOVE ENGINE AND TRANSAXLE ASSEMBLY FROM VEHICLE

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

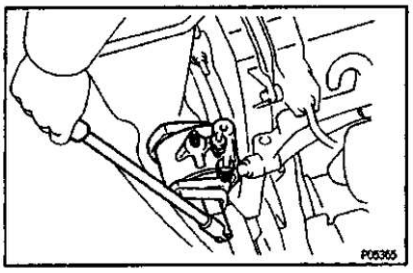


(b) (M /T)

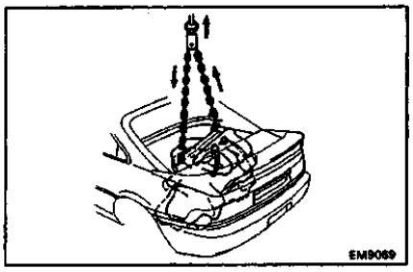
Remove the three bolts, through bolt, nut and LH mounting insulator.



(c) (A/T)
Remove the four bolts, through bolt, nut and LH mounting insulator.

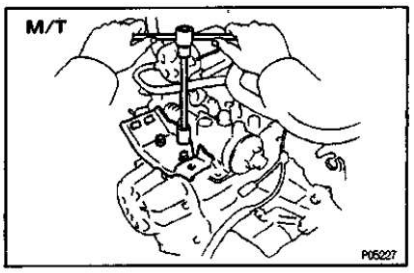


(d) Remove the through bolt, two nuts and RH mounting insulator.

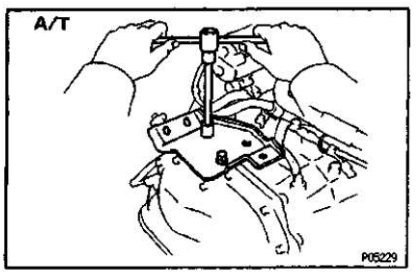


(e) Lift the engine out of the vehicle slowly and carefully.
HINT: Make sure the engine is clew of all wiring, hoses and cables.
(f) Place the engine and transaxle assembly onto the stand.

37. REMOVE LH ENGINE MOUNTING BRACKET

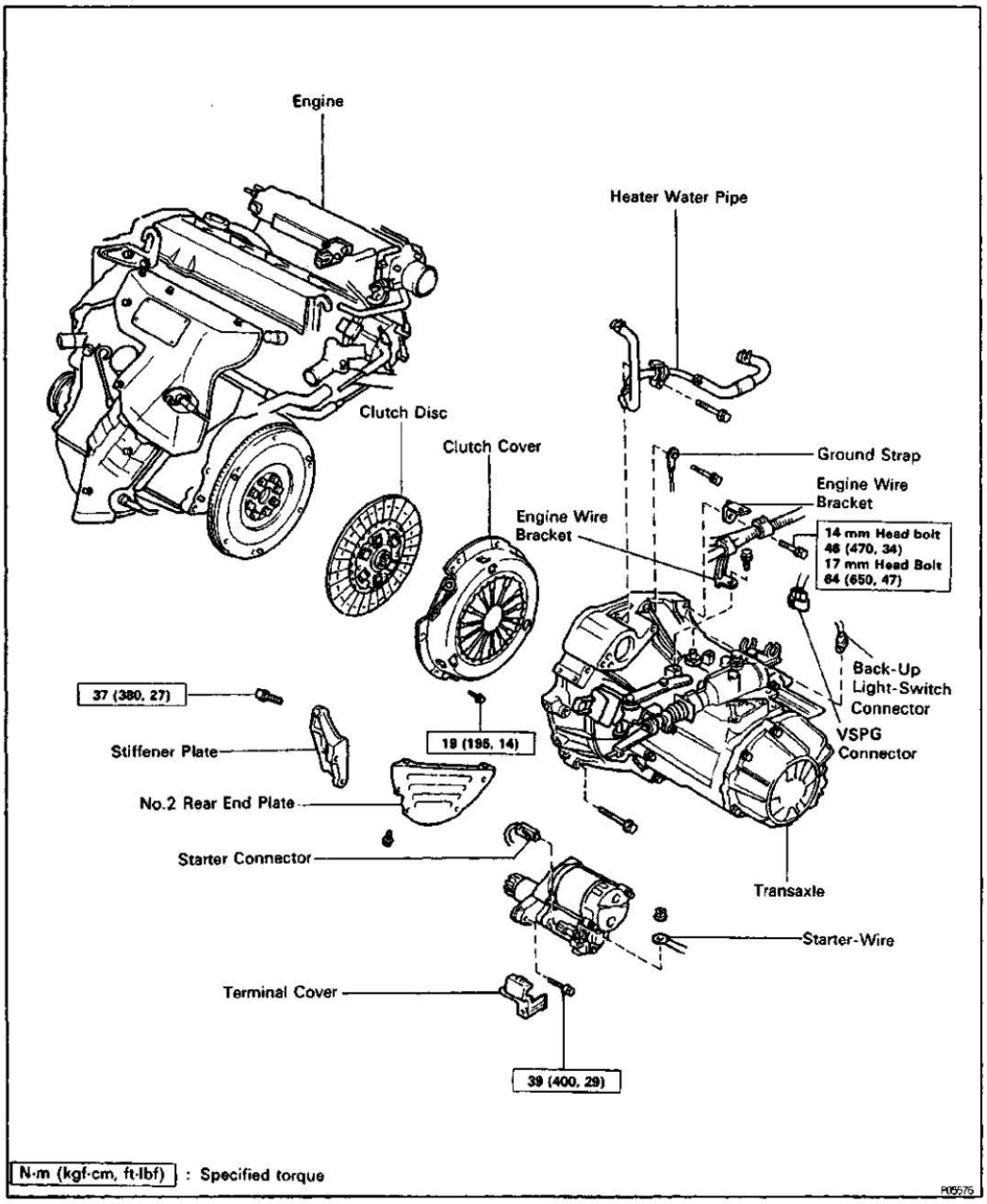


(M/T)
Remove the three bolts and mounting bracket.



(A/T)
Remove the two bolts and mounting bracket.

COMPONENTS FOR ENGINE & TRANSAXLE SEPARATION AND ASSEMBLY (M/T)

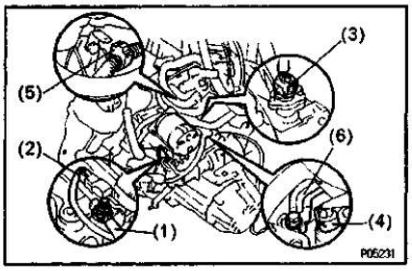


ENGINE & TRANSAXLE SEPARATION (M/T)

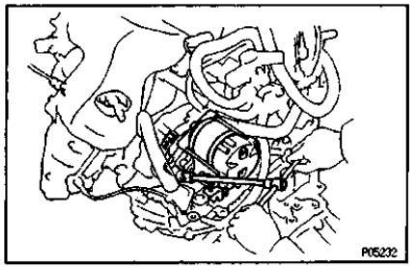
(Components for Engine & Transaxle Separation and Assembly)

1. DISCONNECT ENGINE WIRE

(a) Remove the terminal cover from the starter.

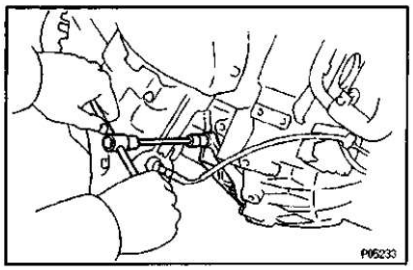


(b) Disconnect the following parts:
(1) Starter wire
(2) Starter connector
(3) Vehicle speed pulse generator connector
(4) Back–up light switch connector
(5) Engine wire clamp
(6) Engine wire bracket



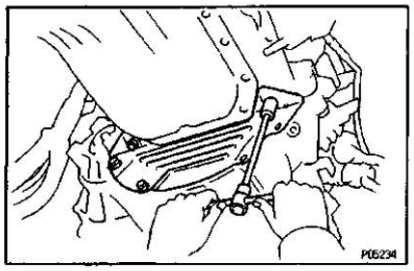
2. REMOVE STARTER

Remove the two bolts and starter.



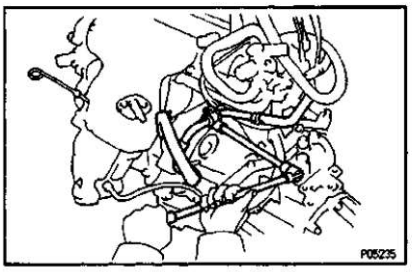
3. REMOVE STIFFENER PLATE

Remove the three bolts and stiffener plate.



4. REMOVE NO.2 REAR END PLATE

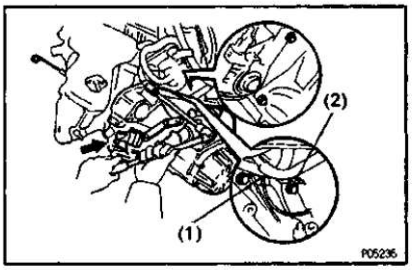
Remove the four bolts and rear end plate.



5. REMOVE HEATER WATER PIPE

(a) Disconnect the water hose from the water by–pass pipe.

(b) Remove the two bolts and heater water pipe.



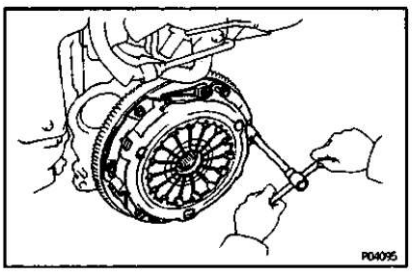
6. REMOVE TRANSAXLE

(a) Remove the five bolts and following parts:

(1) Ground strap

(2) Engine wire bracket

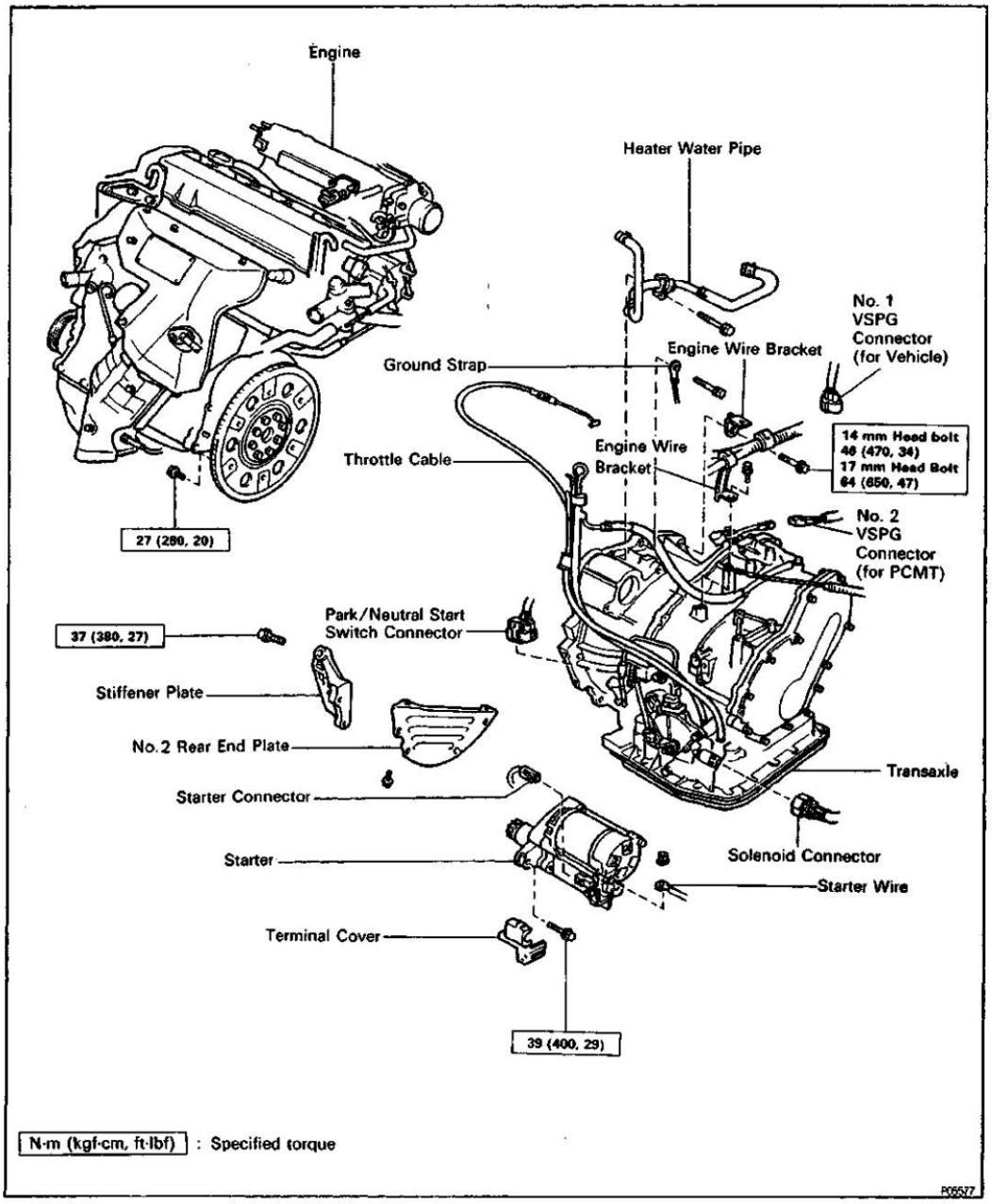
(b) Separate the transaxle and engine.

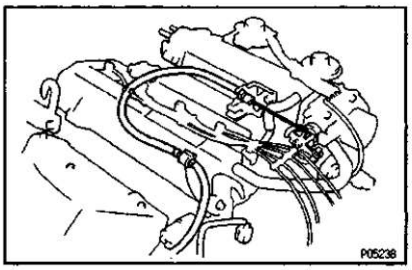


7. REMOVE CLUTCH COVER AND DISC

Remove the six bolts, clutch cover and disc.

COMPONENTS FOR ENGINE & TRANSAXLE SEPARATION AND ASSEMBLY (A/T)





ENGINE & TRANSAXLE SEPARATION. (A/T)

(Components for Engine & Transaxle Separation and Assembly (A/T))

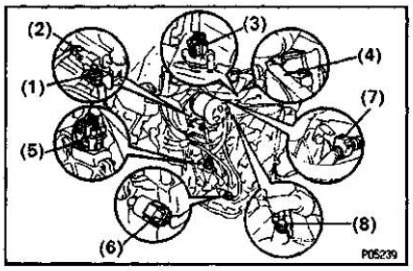
1. DISCONNECT THROTTLE CABLE FROM THROTTLE BODY

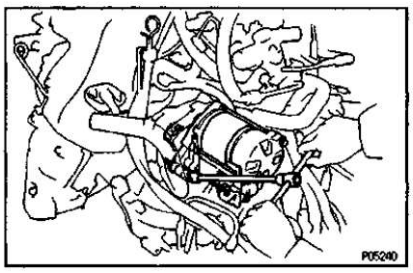
2. DISCONNECT ENGINE WIRE

(a) Remove the terminal cover from the starter.

(b) Disconnect the following parts:

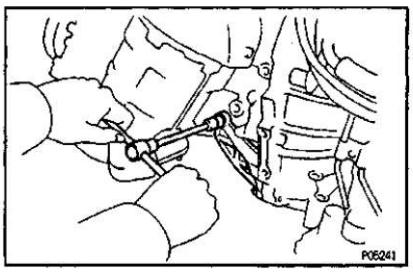
(1) Starter wire
(2) Starter connector
(3) No.1 vehicle speed pulse generator
(4) No.2 vehicle speed pulse generator
(5) Park/neutral switch connector
(6) Solenoid connector
(7) Engine wire clamp
(8) Engine wire bracket





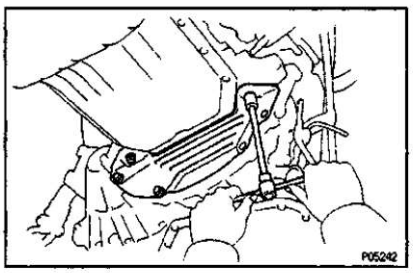
3. REMOVE STARTER

Remove the two bolts and starter.



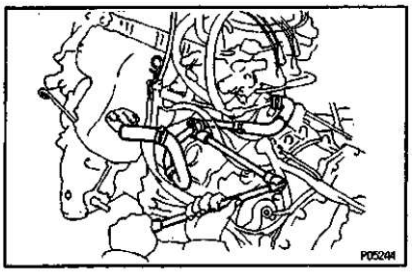
4. REMOVE STIFFENER PLATE

Remove the three bolts and stiffener plate.



5. REMOVE NO–2 REAR END PLATE

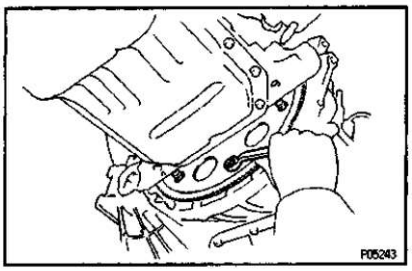
Remove the four bolts and rear end plate.



6. REMOVE HEATER WATER PIPE

(a) Disconnect the water hose from the water by–pass pipe.

(b) Remove the two bolts and heater water pipe.



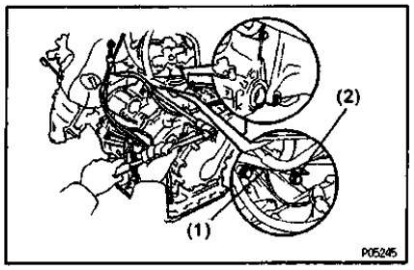
7. REMOVE TRANSAXLE

A. Remove torque converter mounting bolts

(a) Turn the crankshaft the to gain access to each bolts.

(b) Hold the crankshaft pulley bolt with a wrench, and remove the six bolts.

HINT: First remove the dark green colored bolt, and remove the other bolts.



B. Remove transaxle

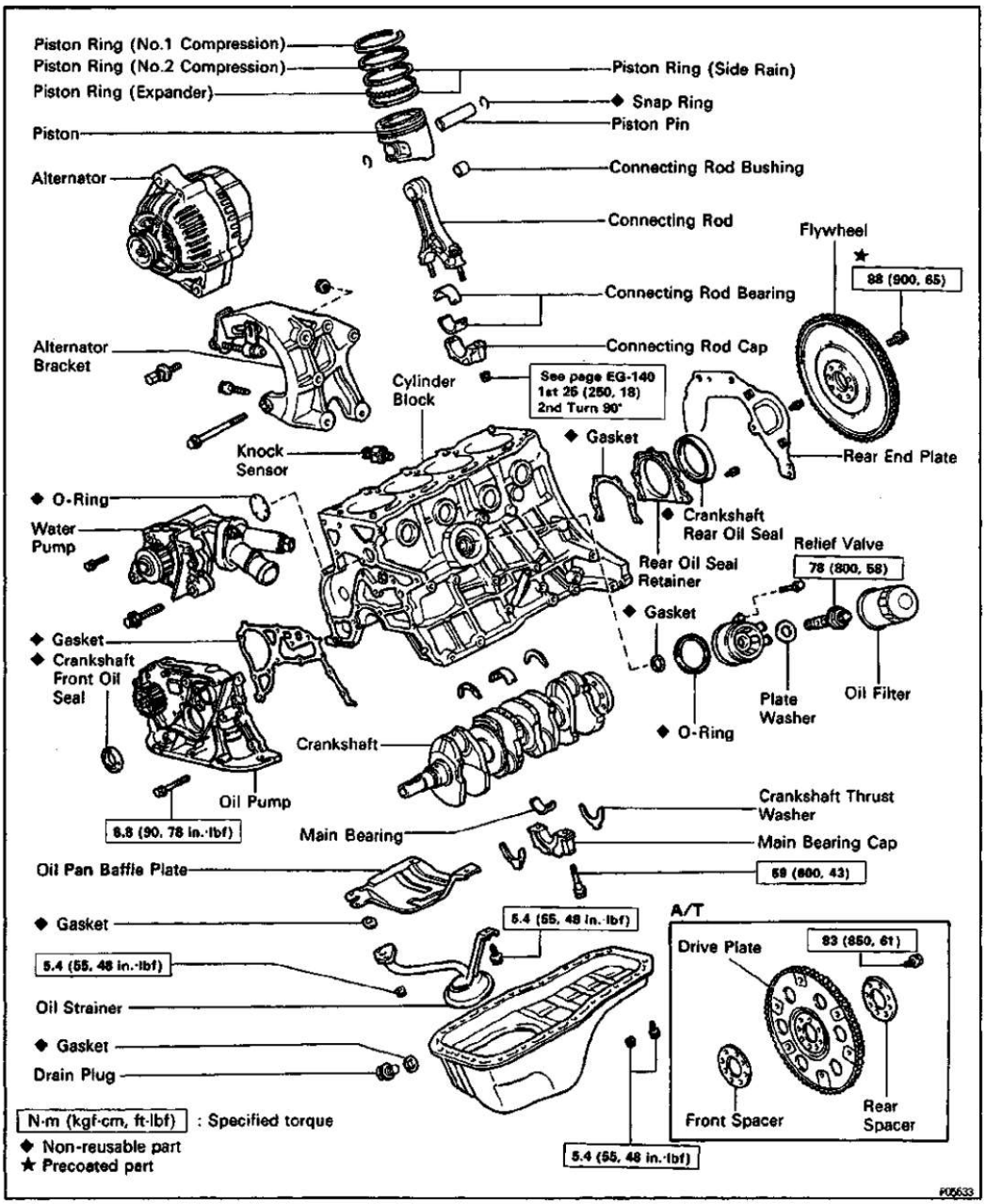
(a) Remove the five bolts and following parts:

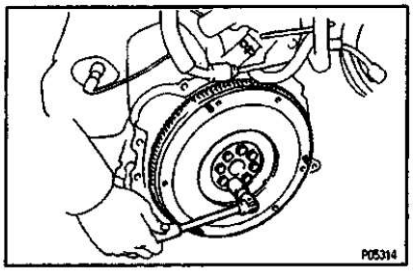
(1) Ground strap

(2) Engine wire bracket

(b) Remove the transaxle together with the torque con–verter from the engine.

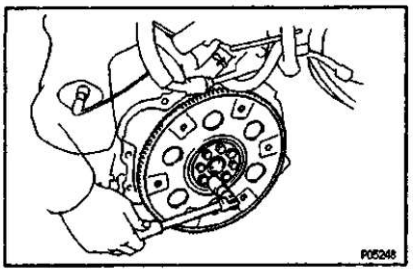
COMPONENTS FOR CYLINDER BLOCK–DISASSEMBLY AND ASSEMBLY



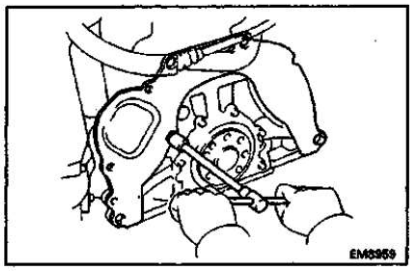


PREPARATION FOR DISASSEMBLY

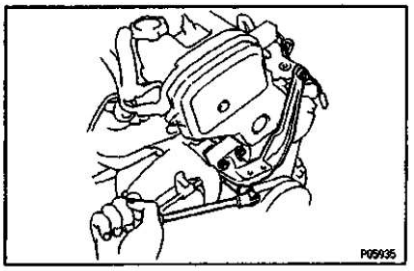
1. (M/T)
   REMOVE FLYWHEEL
   Remove the eight bolts and flywheel.



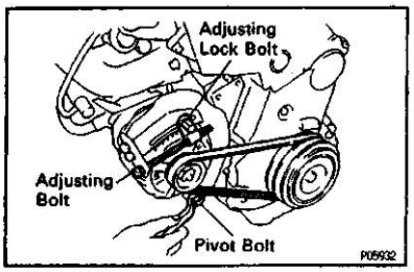
2. (A/T)
   REMOVE DRIVE PLATE
   Remove the eight bolts, front spacer, drive plate and rear spacer.



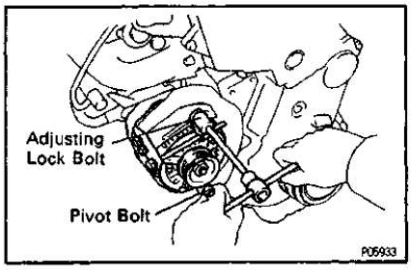
3. **REMOVE REAR END PLATE**
   Remove the bolt and end plate.
4. **INSTALL ENGINE TO ENGINE STAND FOR DISASSEMBLY**



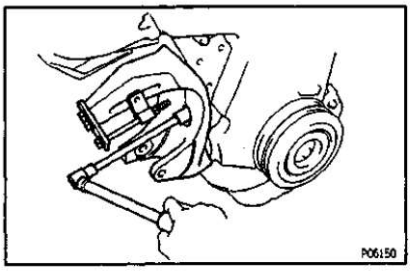
5. **REMOVE RH ENGINE MOUNTING BRACKET**
   Remove the four bolts and mounting bracket.



6. **REMOVE ALTERNATOR**
   (a) Loosen the pivot bolt and adjusting lock bolt.
   (b) Loosen the adjusting bolt, and disconnect the drive belt from the alternator.



(c) Remove the pivot bolt and adjusting lock bolt, and disconnect the alternator from the bracket.



7. REMOVE ALTERNATOR BRACKET

Remove the three bolts, two nuts and alternator bracket.

8. REMOVE TIMING BELT AND PULLEYS

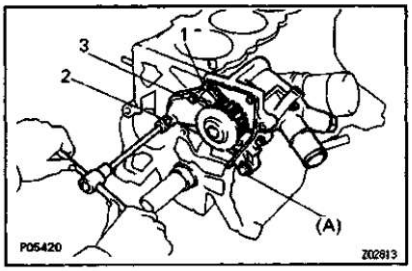
(See Timing Belt Removal)

9. REMOVE CYLINDER HEAD

(See Cylinder Head Removal)

10. REMOVE OIL PAN AND OIL PUMP

(See Oil pump Removal)

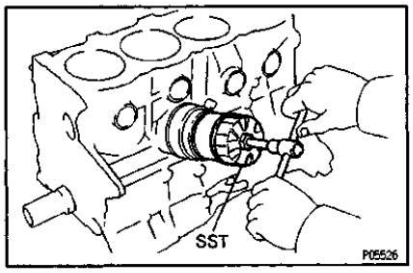


11. REMOVE WATER PUMP

(a) (w/o A/C)

Remove the bolt (A).

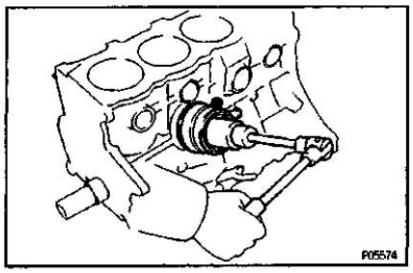
(b) Remove the three bolts in the sequence shown.



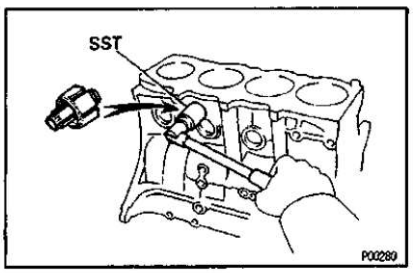
12. REMOVE OIL COOLER

(a) Using SST, remove the oil filter.

SST 09228–06500



(b) Remove the relief valve and plate washer.
(c) Remove the nut and oil cooler.
(d) Remove the O–ring and gasket from the oil cooler.

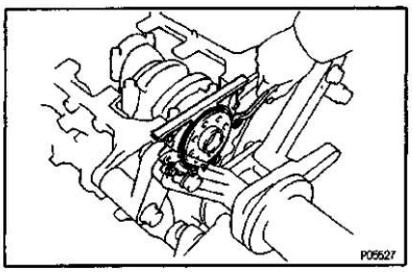


13. REMOVE KNOCK SENSOR

Using SST, remove the knock sensor.
SST 09816 – 30010

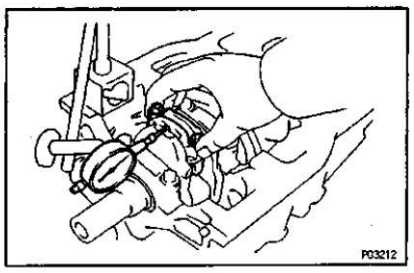
CYLINDER BLOCK DISASSEMBLY

(See Components for Cylinder Block Disassembly and Installation)



1. REMOVE REAR OIL SEAL RETAINER

Remove the six bolts, retainer and gasket.



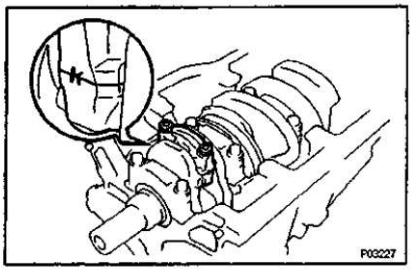
2. CHECK CONNECTING ROD OIL CLEARANCE

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

Standard thrust clearance:
0.160 – 0.312 mm (0.0063 – 0.0123 in.)

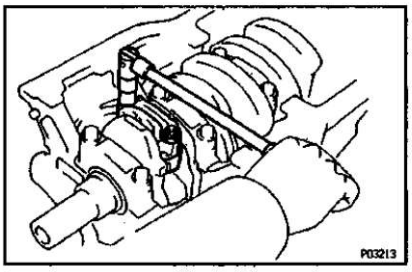
Maximum thrust clearance:
0.35 mm (0.0138 in.)

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

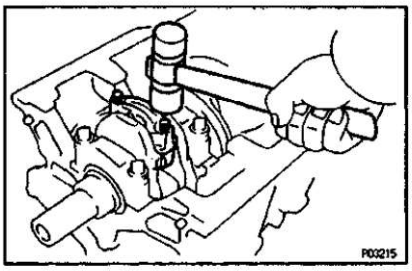


3. REMOVE CONNECTING ROD CAPS AND CHECK OIL CLEARANCE

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

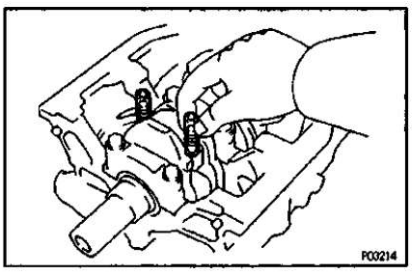


(b) Remove the connecting rod cap nuts.

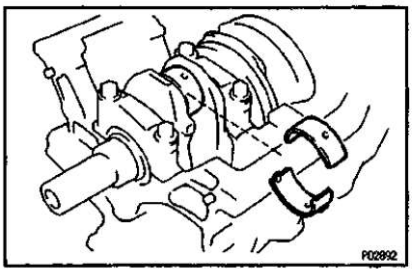


(c) Using a plastic–faced hammer, lightly tap the con–necting rod bolts and lift off the connecting rod cap.

HINT: Keep the lower bearing inserted with the con–necting rod cap.



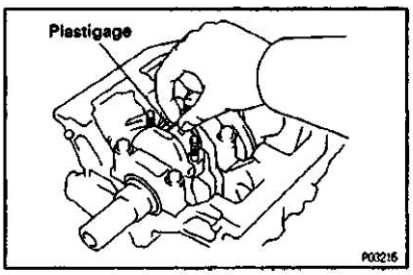
(d) Cover the connecting rod bolts with a short piece of hose to protect the crankshaft from damage.



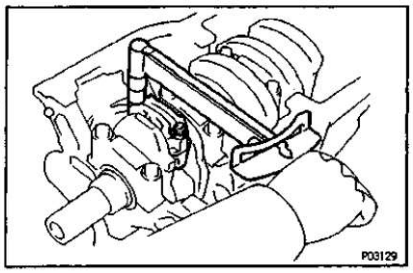
(e) Clean the crank pin and bearing.

(f) Check the crank pin and bearing for pitting and scr–atches.

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

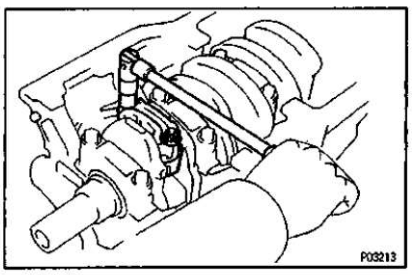


(g) Lay a strip of Plastigage across the crank pin.

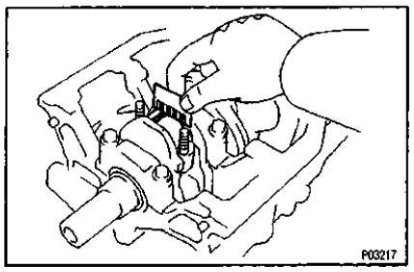


(h) Install the connecting rod cap.
(See step 6 in Cylinder Block Assembly)

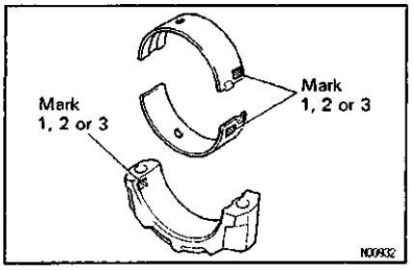
1st
Torque: 25 N–m (250 kgf–cm, 18 ft–lbf)
2nd Turn 90°
NOTICE: Do not turn the crankshaft.



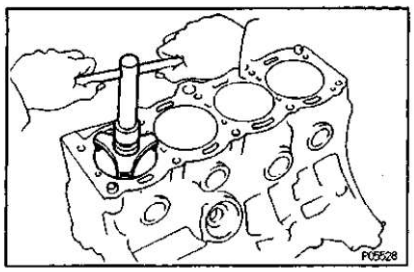
(i) Remove the connecting rod cap.
(See procedure (b) and (c) above)



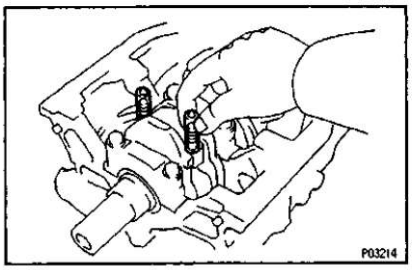
(j) Measure the Plastigage at its widest point.
Standard oil clearance:
STD
0.024 – 0.055 mm (0.0009 – 0.0022 in.)
U/S 0.25
0.023 – 0.069 mm (0.0009 – 0.0027 in.)
Maximum oil clearance:
0.08 mm (0.0031 in.)
If the oil clearance is greater than maximum, replace the bearings. If necessary, grind or replace the cra–nkshaft.
HINT: If using a standard bearing, replace it with one having the same number marked on the connecting rod cap. There are three sizes of standard bearings, marked "1", "2" and "3" accordingly.



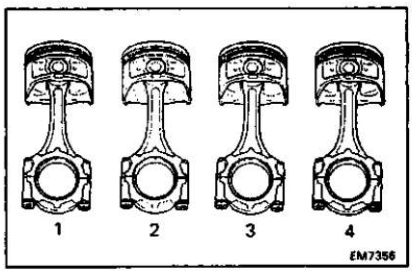
Standard sized bearing center wall thickness:
Mark "1"
1.484 – 1.488 mm (0.0584 – 0.0586 in.)
Mark "2"
1.488 – 1.492 mm (0.0586 – 0.0587 in.)
Mark "3"
1.492 – 1.496 mm (0.0587 – 0.0589 in.)
(k) Completely remove the Plastigage.



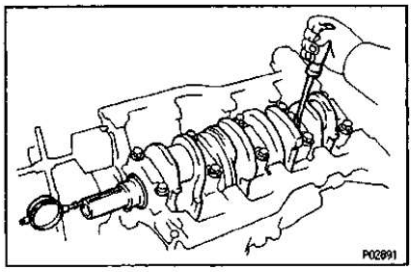
4. REMOVE PISTON AND CONNECTING ROD ASSEMBLIES
(a) Using a ridge reamer, remove all the carbon from the top of the cylinder.



(b) Cover the connecting rod bolts with a short piece of hose to protect the crankshaft from damage.
(e) Push the piston, connecting rod assembly and upper bearing through the top of the cylinder block.



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



5. CHECK CRANKSHAFT THRUST CLEARANCE

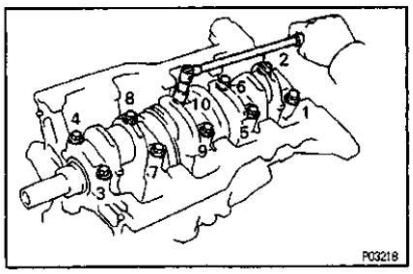
Using a dial indicator, measure the thrust clearance while prying the crankshaft back and forth with a screwdriver.

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

Maximum thrust clearance:
0.30 mm (0.0118 in.)

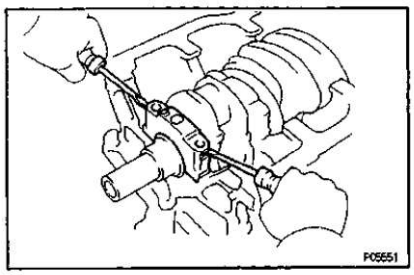
If the thrust clearance is greater than maximum, replace the thrust washers as a set.

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



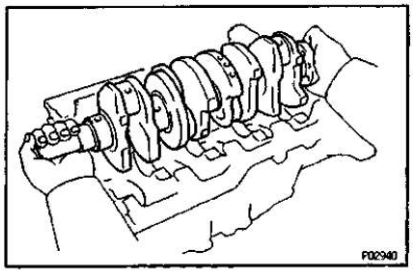
6. REMOVE MAIN BEARING CAPS AND CHECK OIL CLEARANCE

(a) Uniformly loosen and remove the main bearing cap bolts in several passes, in the sequence shown.

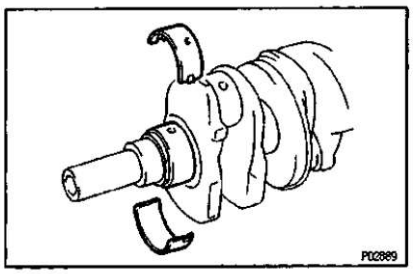


(b) Using two screwdrivers, pry out the main bearing cap, and remove the main bearing caps, lower bearings and lower thrust washers (No.3 main bearing cap only).

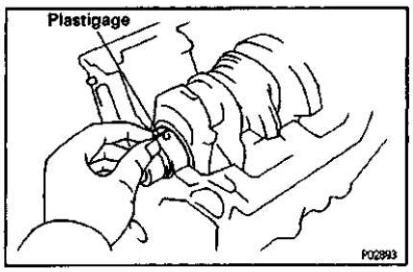
HINT:
- Keep the lower bearing and main bearing cap together.
- Arrange the main bearing caps and lower thrust washers in correct order.



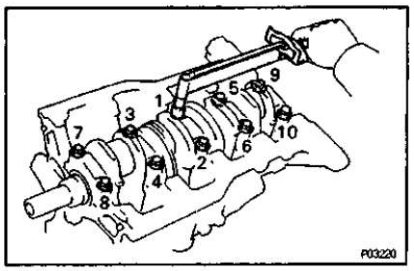
(c) Lift out the crankshaft.
HINT: Keep the upper bearing and upper thrust was–
hers together with the cylinder block.



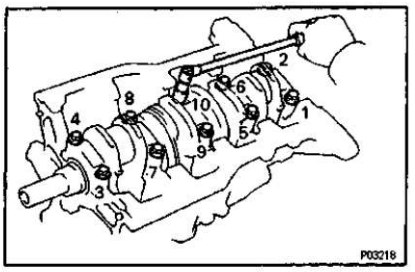
(d) Clean each main journal and bearing.
(e) Check each main journal and bearing for pitting and scratches.
If the journal or bearing is damaged, replace the bearings. If necessary, grind or replace the crankshaft.



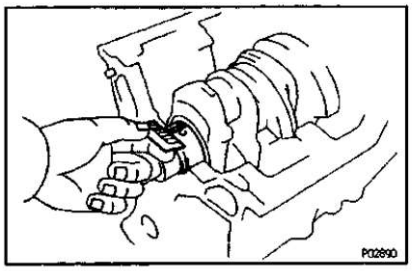
(f) Place the crankshaft on the cylinder block.
(g) Lay a strip of Plastigage across each journal.



(h) Install the main bearing caps.
(See step 4 in Cylinder Block Assembly)
Torque: 59 N–m (600 kgf–cm, 43 ft–lbf)
NOTICE: Do not turn the crankshaft.

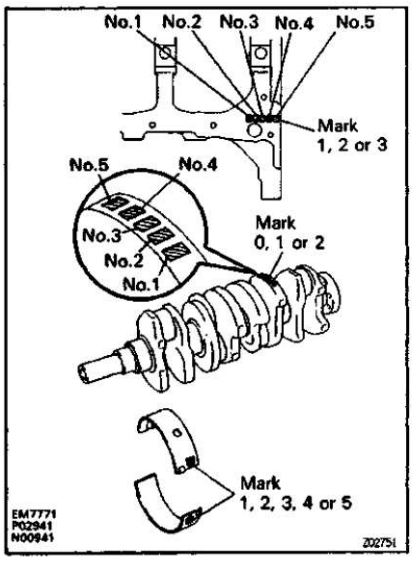


(i) Remove the main bearing caps.
(See procedure (a) and (b) above)



(j) Measure the Plastigage at its widest point.

Standard clearance:
No–3
STD
0.025 – 0.044 mm (0.0010 – 0.0017 in.)
U/S 0.25
0.027 – 0.067 mm (0.0011 – 0.0026 in.)
Others
STD
0.015 – 0.034 mm (0.0006 – 0.0013 in.)
U/S 0.25
0.019 – 0.059 mm (0.0007 – 0.0023 in.)
Maximum clearance:
0.08 mm (0.0031 in.)



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

No.3
0.027 – 0.054 mm (0.0011 – 0.0021 in.)
Others
0.017 – 0.044 mm (0.0007 – 0.0017 in.)

If the oil clearance is greater than maximum, replace the bearings. If necessary, grind or replace the cra–nkshaft.

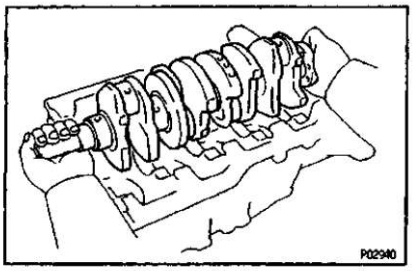
HINT: If using a standard bearing, replace it with one having the same number. If the number of the bearing cannot be determined, select the correct bearing by adding together the numbers imprinted on the cylinder block and crankshaft, then selecting the bearing with the same number as the total. There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

	Number marked								
Cylinder block	1			2			3		
Crankshaft	0	1	2	0	1	2	0	1	2
Use bearing	1	2	3	2	3	4	3	4	5

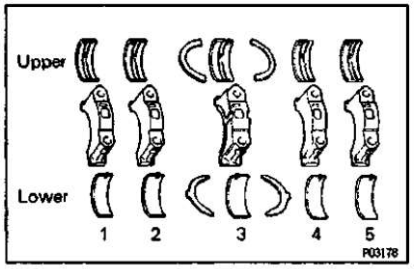
EXAMPLE: Cylinder block "2" + Crankshaft "1 "
= Total number 3 (Use bearing "3")

V00240

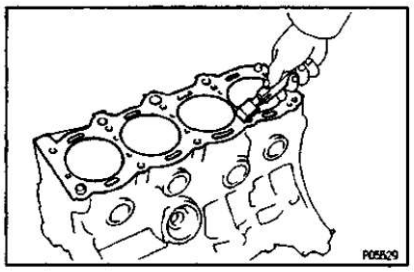
(Reference)
Cylinder block main journal bore diameter:
Mark "1"
59.020– 59.026 mm (2.3236 – 2.3239 in.)
Mark "2"
59.026 – 59.032 mm (2.3239 – 2.3241 in.)
Mark "3"
59.032 – 59.038 mm (2.3241 – 2.3243 in.)
Crankshaft journal diameter:
Mark "0"
54.998 – 55.003 mm (2.1653 – 2.1655 in.)
Mark '1'
54.993 – 54.998 mm (2.1651 – 2.1653 in.)
Mark "2"
54.988 – 54.993 mm (2.1649 – 2.1651 in.)
Standard sized bearing center wall thickness:
No.3
Mark "1"
1.992 – 1.995 mm (0.0784 – 0.0785 in.)
Mark "2"
1.995 – 1.998 mm (0.0785 – 0.0787 in.)
Mark "3"
1.998 – 2.001 mm (0.0787 – 0.0788 in.)
Mark "4"
2.001 – 2.004 mm (0.0788 – 0.0789 in.)
Mark "5"
2.004 – 2.007 mm (0.0789 – 0.0790 in.)
Others
Mark "1"
1.997 – 2.000 mm (0.0786 – 0.0787 in.)
Mark "2"
2.000 – 2.003 mm (0.0787 – 0.0789 in.)
Mark "3"
2.003 – 2.006 mm (0.0789 – 0.0790 in.)
Mark "4"
2.006 – 2.009 mm (0.0790 – 0.0791 in.)
Mark "5"
2.009 – 2.012 mm (0.0791 – 0.0792 in.)
(k) Completely remove the Plastigage.



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



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



CYLINDER BLOCK INSPECTION

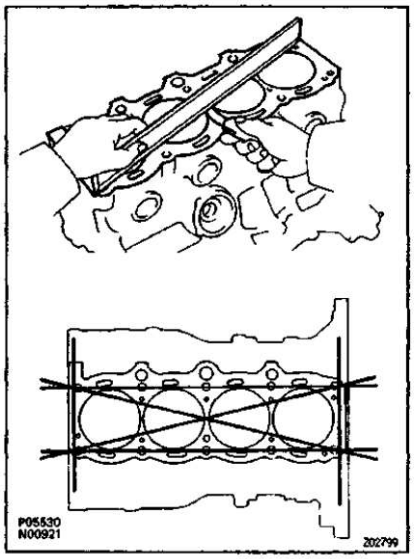
1. CLEAN CYLINDER BLOCK

A. Remove gasket material

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

B. Clean cylinder block

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

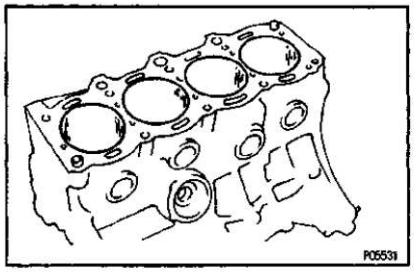


2. INSPECT TOP SURFACE OF CYLINDER BLOCK FOR FLATNESS

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

Maximum warpage:
0.05 mm (0.0020 in.)

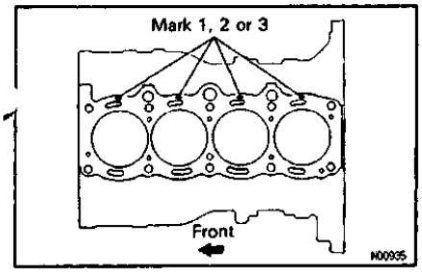
If warpage is greater than maximum, replace the cyl–inder block.



3. INSPECT CYLINDER FOR VERTICAL SCRATCHES

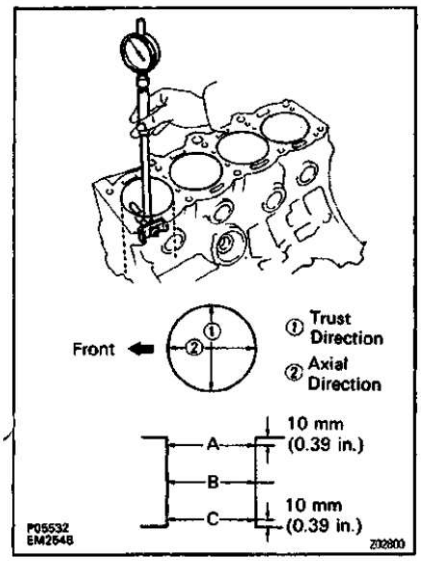
Visually check the cylinder for vertical scratches.

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



4. INSPECT CYLINDER BORE DIAMETER

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



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

Standard diameter:

STD

Mark "1"

87.000 – 87.010 mm (3.4252 – 3.4256 in.)

Mark "2"

87.010 – 87.020 mm (3.4256 – 3.4260 in.)

Mark "3"

87.020 – 87.030 mm (3.4260 – 3.4264 in.)

Maximum diameter:

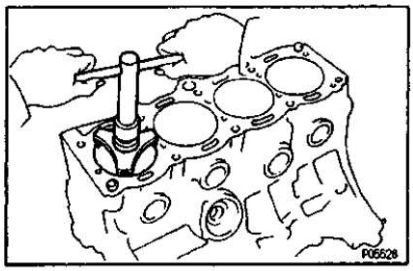
STD

87.23 mm (3.4342 in.)

O/S 0.50

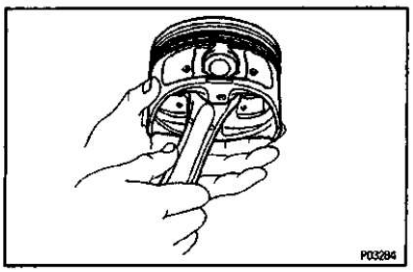
87.73 mm (3.4350 in.)

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



5. REMOVE CYLINDER RIDGE

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

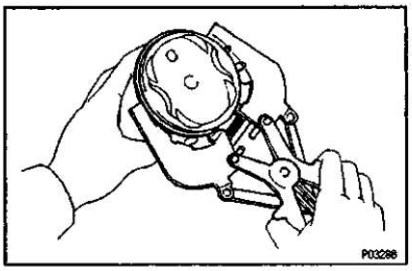


PISTON AND CONNECTING ROD ASSY DISASSEMBLY

1. CHECK FIT BETWEEN PISTON AND PISTON PIN

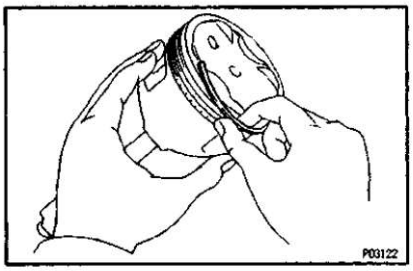
Try to move the piston back and forth on the piston pin.

If any movement is felt, replace the piston and pin as a set.

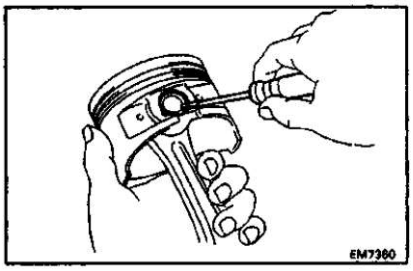


2. REMOVE PISTON RINGS

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

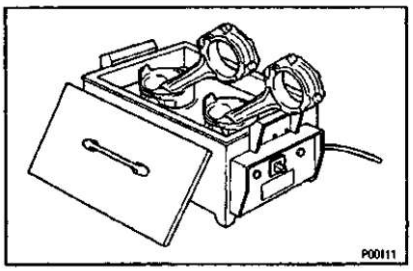


(b) Remove the two side rails and oil ring by hand.
HINT: Arrange the piston rings in correct order only.

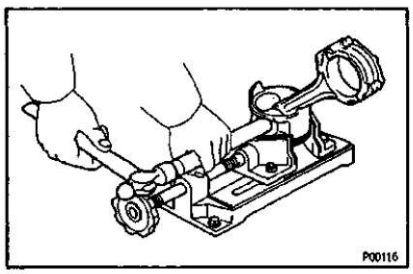


3. DISCONNECT CONNECTING ROD FROM PISTON

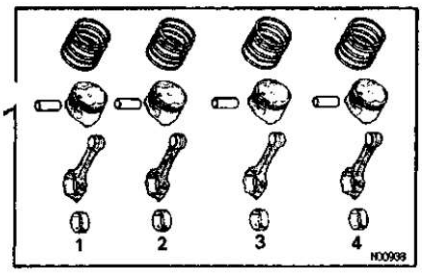
(a) Using a small screwdriver, pry out the two snap rings.



(b) Gradually heat the piston to 80 – 90°C (1176 – 194°F).



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



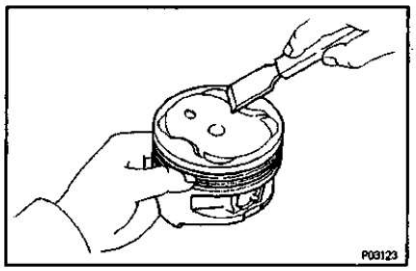
HINT:

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

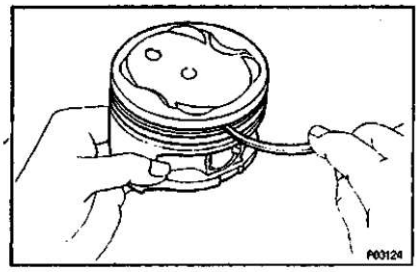
PISTON AND CONNECTING ROD INSPECTION

1. CLEAN PISTON

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

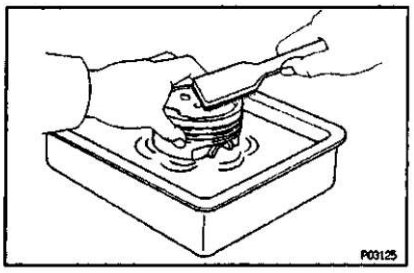


(b) Using a groove cleaning tool or broken ring, clean the piston ring grooves.



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

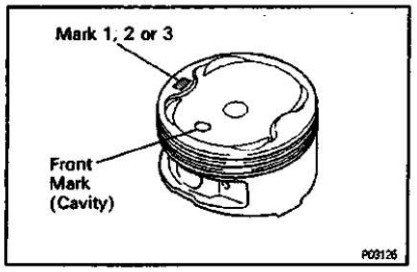
NOTICE: Do not use a wire brush.

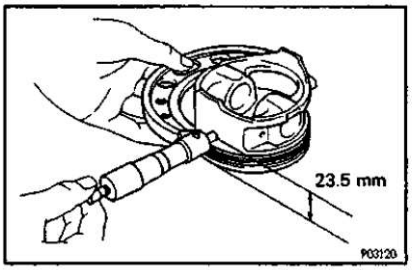


2. INSPECT PISTON

A. Inspect piston oil clearance

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





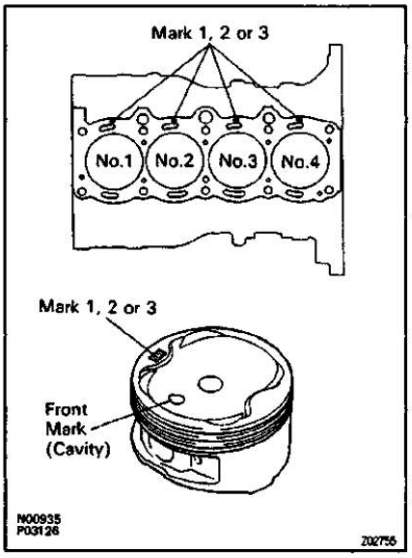
(a) Using a micrometer, measure the piston diameter at ring angles to the piston pin center line, 23.5 mm (0.925 in.) from the piston head.

Piston diameter:
STD
Mark "1"
86.850 – 86.860 mm (3.4193 – 3.4197 in.)
Mark '2'
86.860 – 86.870 mm (3.4197 – 3.4201 in.)
Mark '3"
86.870 – 86.880 mm (3.4201 – 3.4205 in.)
O/S 0.50
87.350 – 87.380 mm (3.4390 – 3.4402 in.)

(b) Measure the cylinder bore diameter in the thrust di–rections. (See step 4 in Cylinder Block Inspection)

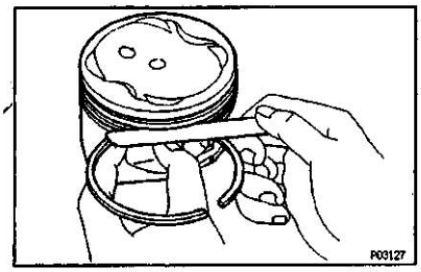
(c) Subtract the piston diameter measurement from the cylinder bore diameter measurement.

Standard oil clearance:
0.14 – 0.16 mm (0.0055 – 0.0063 in.)
Maximum oil clearance:
0.18 mm (0.0071 in.)



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

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



B. Inspect piston ring groove clearance

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

Ring groove clearance:

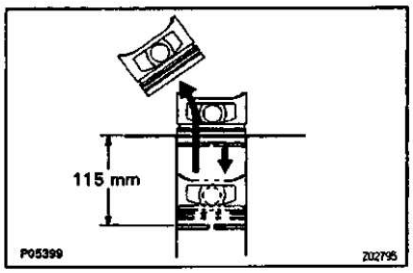
No.1

0.040 – 0.080 mm (0.0016 – 0.0031 in.)

No.2

0.030 – 0.070 mm (0.0012 – 0.0028 in.)

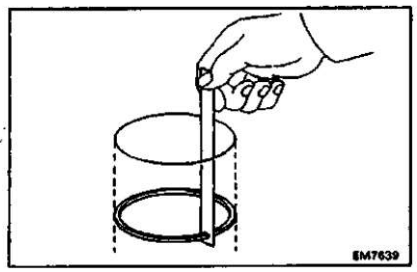
If the clearance is greater than maximum, replace the piston.



C. Inspect piston ring end gap

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

(b) Using a piston, push the piston ring a little beyond the bottom of the ring travel, 115 mm (4.53 in.) from the top of the cylinder block.



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

Standard end gap:

No.1

0.270 – 0.500 mm (0.0106 – 0.0197 in.)

No.2

0.350 – 0.600 mm (0.0138 – 0.0234 in.)

Oil (Side rail)

0.200 – 0.550 mm (0.0079 – 0.0217 in.)

Maximum end gap:

No.1

1.10 mm (0.0433 in.)

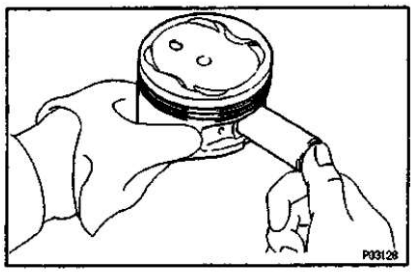
No–2

1.20 mm (0.0472 in.)

Oil (Side rail)

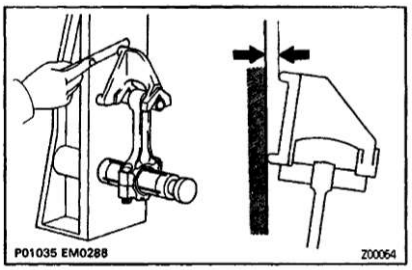
1.15 mm (0.0453 in.)

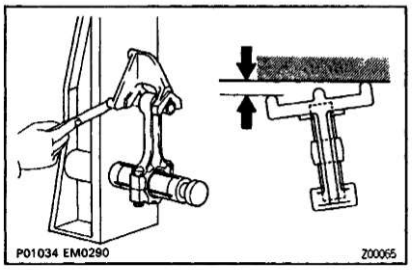
If the end gap is greater than maximum, replace the piston ring. If the end gap is greater than maximum, even with a new piston ring, rebore all the four cyl–inders or replace the cylinder block.



D. Inspect piston pin fit

At 60°C (140°F), you should be able to push the piston pin into the piston pin hole with your thumb.





3. INSPECT CONNECTING ROD

A. Inspect connecting rod alignment

Using a rod aligner and feeler gauge, check the con–necting rod alignment.

- Check for bend.

Maximum bend:

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

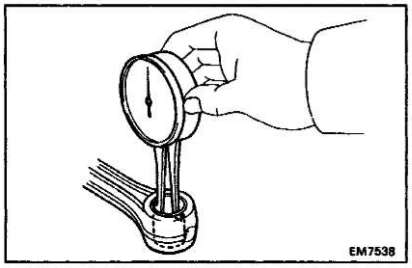
If bend is greater than maximum, replace the conne–cting rod assembly.

Check for twist

Maximum twist:

0.15 mm (0.0059 in.) per 100 mm (3.94 in.)

If twist is greater than maximum, replace the conne–cting rod assembly.

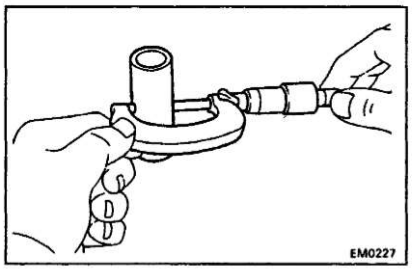


B. Inspect piston pin oil clearance

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

Bushing inside diameter:

22.005 – 22.017 mm (0.8663 – 0.8668 in.)



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

Piston pin diameter:

21.997 – 22.009 mm (0.8660 – 0.8665 in.)

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

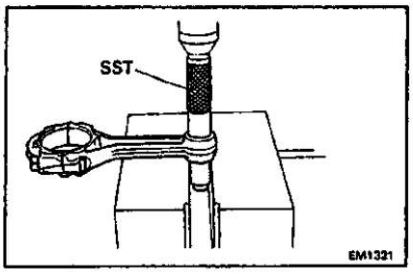
Standard oil clearance:

0.005 – 0.011 mm (0.0002 – 0.0004 in.)

Maximum oil clearance:

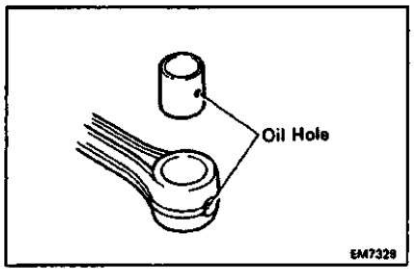
0.05 mm (0.0020 in.)

If the oil clearance is greater than maximum, replace the bushing. If necessary, replace the piston and piston pin as a set.



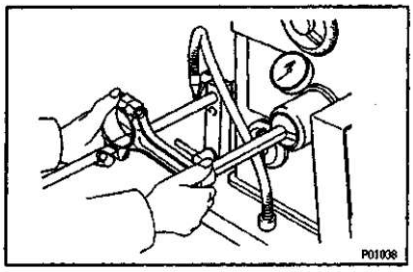
C. If necessary, replace connecting rod bushing

(a) Using SST and a press, press out the bushing.
SST 09222–30010

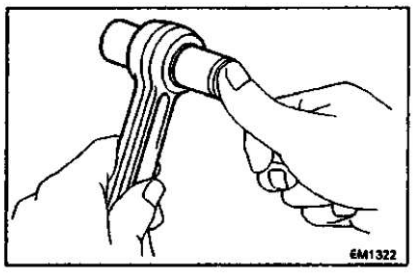


(b) Align the oil holes of a new bushing and the conne–cting rod.

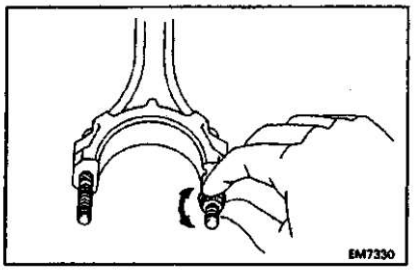
(c) Using SST and a press, press in the bushing.
SST 09222–30010



(d) Using a pin hole grinder, hone the bushing to obtain the standard specified clearance (see step B above) between the bushing and piston pin.

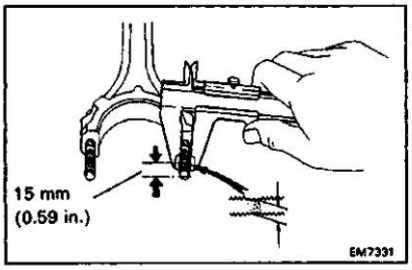


(e) Check the piston pin fit at normal room temperature. Coat the piston pin with engine oil, and push it into the connecting rod with your thumb.



D. Inspect connecting rod bolts

(a) Install the cap nut to the connecting rod bolt. Check that the cap nut can be turned easily by hand to the end of the thread.



(b) If the cap nut cannot be turned easily, measure the outside diameter– of the connecting rod bolt with a vernier caliper.

Standard diameter:
7.860 – 8.000 mm (0.3094 – 0.3150 in.)

Maximum diameter:
7.60 mm (0.2992 in.)

HINT: If the location of this area cannot be judged by visual inspection, measure the outer diameter at the location shown in the illustration.
If the outside diameter is less than minimum, replace the connecting rod bolt and nut as a set.

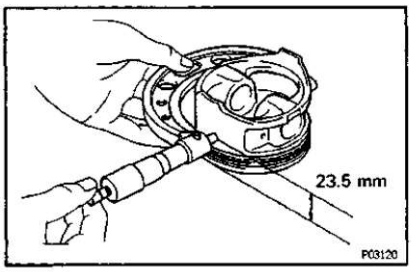
CYLINDER BORING

HINT:

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

1. KEEP OVERSIZED PISTONS

Oversized piston diameter:
O/S 0.50
87.350 – 87.380 mm (3.4390 – 3.4402 in.)



2. CALCULATE AMOUNT TO BORE CYLINDERS

(a) Using a micrometer, measure the piston diameter at right angles to the piston pin center line, 23.5 mm (0.925 in.) from the piston head.

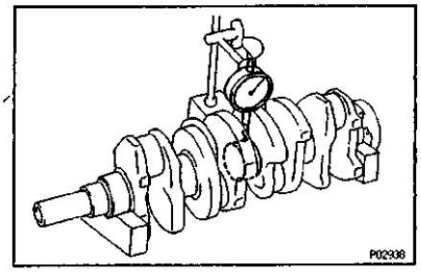
(b) Calculate the amount of each cylinder is to be rebored as follows:

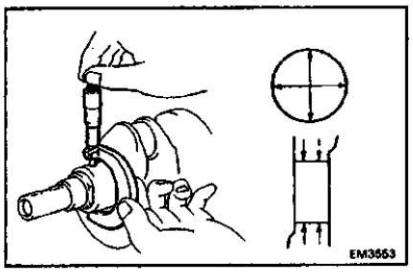
Size to be rebored = P + C – H
P = Piston diameter
C = Piston oil clearance
0.140 – 0.160 mm (0.0055 – 0.0063 in.)
H = Allowance for honing
0.20 mm (0.0008 In.) or less

3. BORE AND HONE CYLINDER TO CALCULATED DI–MENSIONS

Maximum honing:
0.02 mm (0.0008 in.)

NOTICE: Excess honing will destroy the finished round–ness.





CRANKSHAFT INSPECTION AND REPAIR

1. INSPECT CRANKSHAFT FOR CIRCLE RUNOUT

(a) Place the crankshaft on V–blocks.

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

Maximum circle runout

0.06 mm (0.0024 in.)

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

2. INSPECT MAIN JOURNALS AND CRANK PINS

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

Main journal diameter:

STD

54.988 – 55.003 mm (2.1653 – 2.1655 in.)

U/S 0.25

54.745 – 54.755 mm (2.1553 – 2.1557 in.)

Crank pin diameter:

STD

51.985 – 52.000 mm (2.0466 – 2.0472 in.)

U/S 0.25

51.745 – 51.755 mm (2.0372 – 2.0376 in.)

If the diameter is not as specified, check the oil clearance (See steps 3 and 6 in Cylinder Block Disassembly). If necessary, grind or replace the crankshaft.

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

Maximum taper and out–of–round:

0.02 mm (0.0008 In.)

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

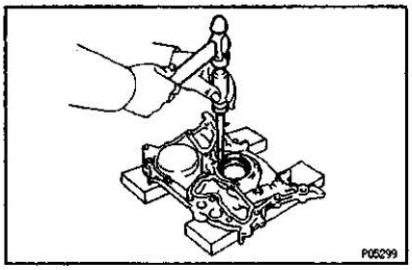
3. IF NECESSARY, GRIND AND HONE MAIN JOURNALS AND/OR CRANK PINS

Grind and hone the main journals and/or crank pins to the finished undersized diameter (See procedure in step 2).

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

CRANKSHAFT OIL SEALS REPLACEMENT

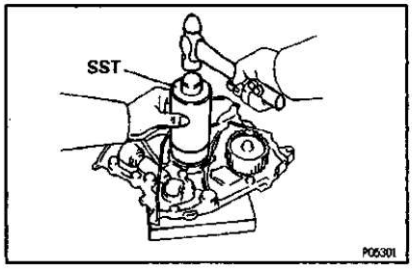
HINT: There are two methods (A and B) to replace the oil seal which are as follows:



1. REPLACE CRANKSHAFT FRONT OIL SEAL

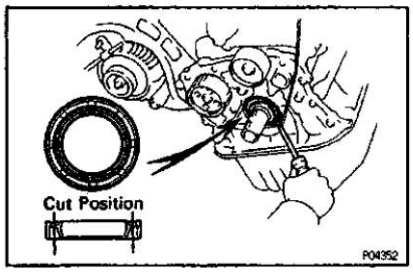
A. If oil pump is removed from cylinder block:

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



(b) Using SST and a hammer, tap in a new oil seal until its surface is flush with the oil pump case edge.
SST 09226–10010

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

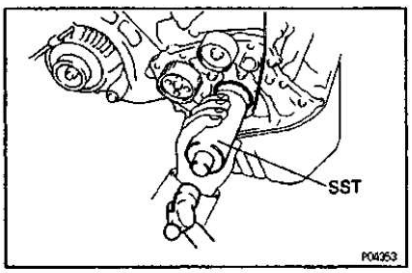


B. If oil pump is installed to the cylinder block:

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

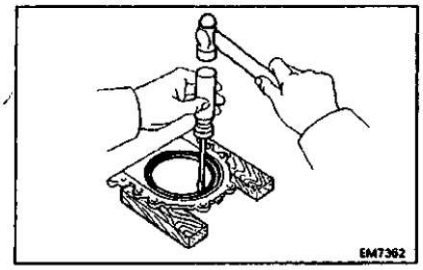
(b) Using a screwdriver, pry out the oil seal.

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



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

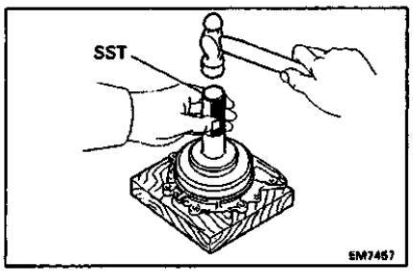
(d) Using SST and a hammer, tap in the oil seal until its surface is flush with the oil pump case edge.
SST 09226–10010



2. REPLACE CRANKSHAFT REAR OIL SEAL

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

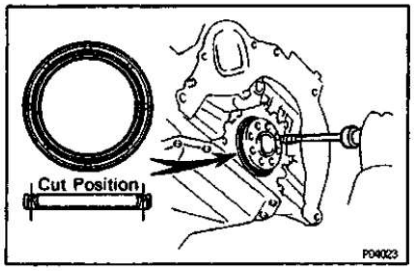
(a) Using a screwdriver and hammer, tap out the oil seal.



(b) Using SST and a hammer, tap in a new oil seal until its surface is flush with the rear oil seal edge.
SST 09223–63010

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

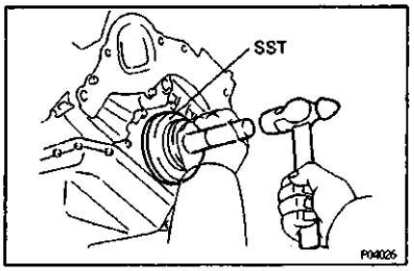
B. If rear oil seal retainer is installed to cylinder block:



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

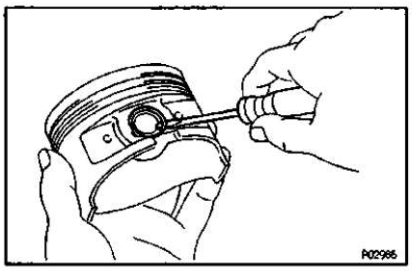
(b) Using a screwdriver, pry out the oil seal.

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



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

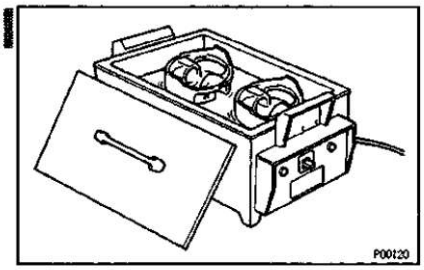
(d) Using SST and a hammer, tap in the oil seal until its surface is flush with the rear oil seal retainer edge.
SST 09223–63010



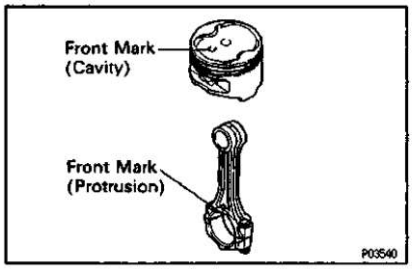
PISTON AND CONNECTING ROD ASSEMBLY

1. ASSEMBLE PISTON AND CONNECTING ROD

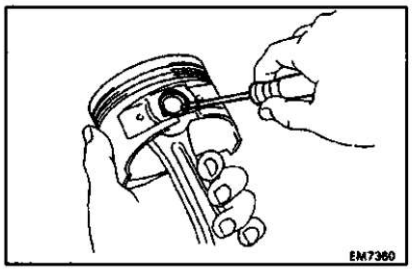
(a) Using a small screwdriver, install a new snap ring on one side of the piston pin hole.



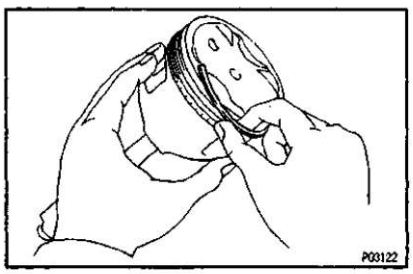
(b) Gradually heat the piston to 80 – 90°C (176 – 194°F).



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

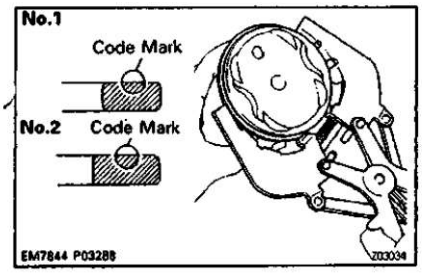


(e) Using a small screwdriver, install a new snap ring on the other side of the piston pin hole.



2. INSTALL PISTON RINGS

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



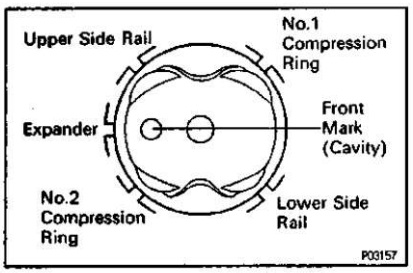
(b) Using a piston ring expander, install the two compression rings with the code mark facing upward. Code mark:

No.1

1 Nor T

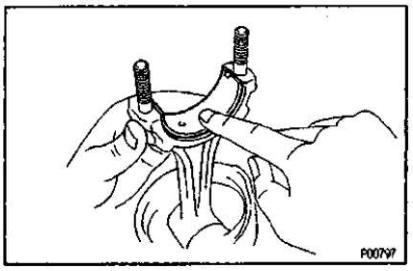
No.2

2N or 2T



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

NOTICE: Do not align the ring ends.



3. INSTALL BEARINGS

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

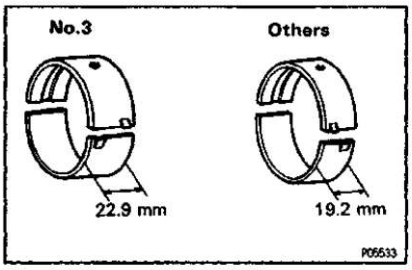
(b) Install the bearings in the connecting rod and connecting rod cap.

CYLINDER BLOCK ASSEMBLY

(See Components for Cylinder block Disassembly and Installation)

HINT:

- Thoroughly clean all parts to be assembled.
- Before installing the parts, apply new engine oil to all sliding and rotating surfaces.
- Replace all gaskets, 0–rings and oil seals with new parts.

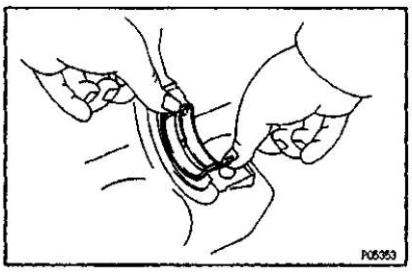


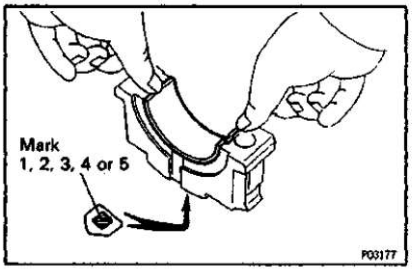
1. INSTALL MAIN BEARINGS

HINT:

- Main bearings come in widths of 19.2 mm (0.756 in.) and 22.9 mm (0.902 in.). Install the 22.9 mm (0.902 in.) bearings in the No.3 cylinder block journal position with the main bearing cap. Install the 19.2 mm (0.756 in.) bearings in the other positions.
- Upper bearings have an oil groove and oil holes; lower bearings do not.

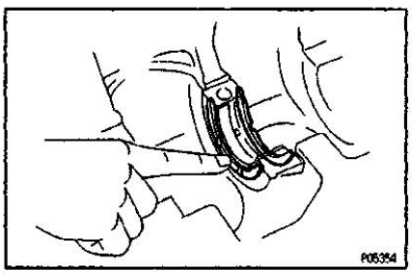
(a) Align the bearing claw with the claw groove of the cylinder block, and push in the five upper bearings.





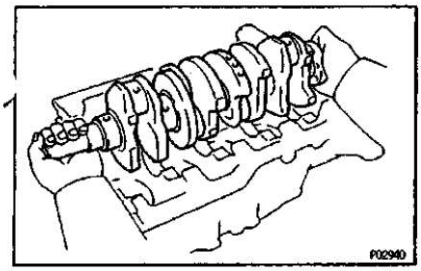
(b) Align the bearing claw with the claw groove of the main bearing cap, and push in the five lower bearings.

HINT: A number is marked on each main bearing cap to indicate the installation position.

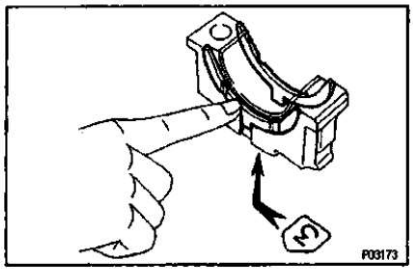


2. INSTALL UPPER THRUST WASHERS

Install the two thrust washers under the No.3 journal position of the cylinder block with the oil grooves facing outward.

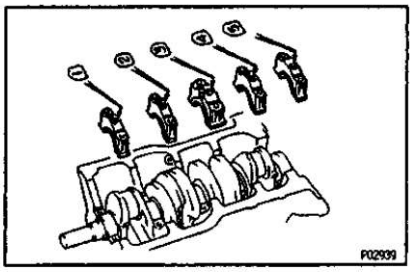


3. PLACE CRANKSHAFT ON CYLINDER BLOCK



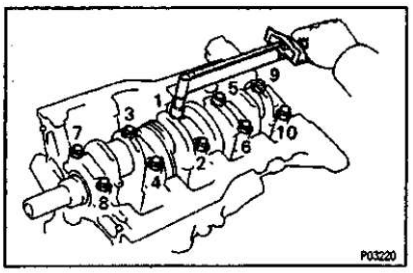
4. INSTALL MAIN BEARING CAPS AND LOWER THRUST WASHERS

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



(b) Install the five main bearing caps in their proper locations.

HINT: Each bearing cap has a number and front mark.

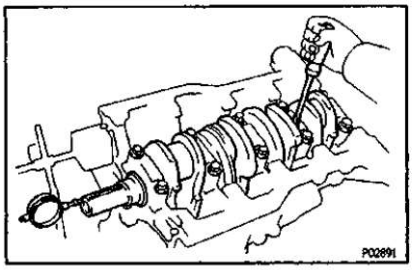


(c) Apply a light coat of engine oil on the threads and under the heads of the main bearing cap bolts.

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

Torque: 59 N–m (600 kgf–cm, 43 ft–lbf)

(e) Check that the crankshaft turns smoothly.

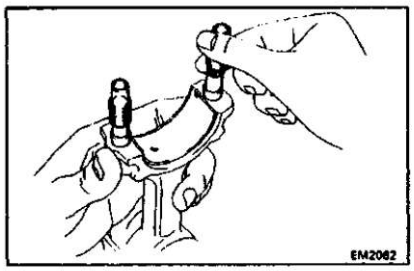


(f) Check the crankshaft thrust clearance.
Using a dial indicator, measure the thrust clearance while prying the crankshaft back an forth with a screwdriver.

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

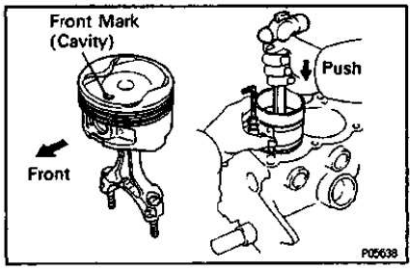
Maximum thrust clearance:
0.30 mm (0.0118 In.)

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

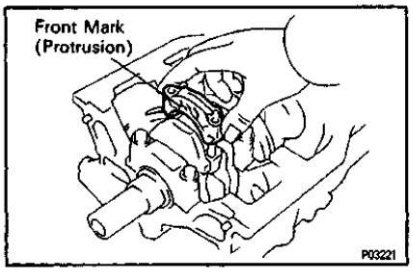


5. INSTALL PISTON AND CONNECTING ROD ASSEMBLES

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



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



6. INSTALL CONNECTING ROD CAPS

A. Place connecting rod cap on connecting rod

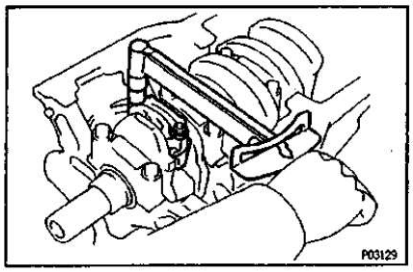
(a) Match the numbered connecting rod cap with the connecting rod.

(b) Install the connecting rod cap with the front mark facing forward.

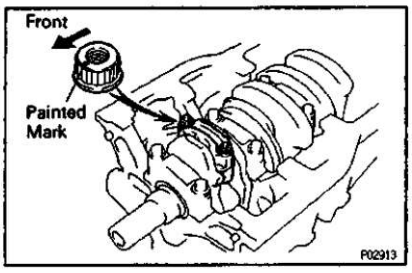
B. Install connecting rod cap nuts

HINT:

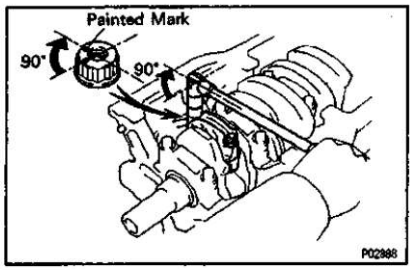
- The cap nuts are tightened in two progressive steps (steps (b) and (d)).
- If any one of the connecting rod bolts is broken or deformed, replace it.



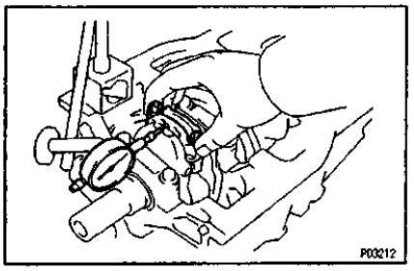
(a) Apply a light of engine oil on the threads and under the nuts of the connecting rod cap.
(b) Using SST, install and alternately tighten the cap nuts in several passes.
SST 09011–38121
Torque: 25 N–m (250 kgf–cm, 18 ft–lbf)
If any one of the cap nuts does not meet the torque specification, replace the connecting rod bolt and cap nut as a set.



(c) Mark the front of the cap nut with the paint.

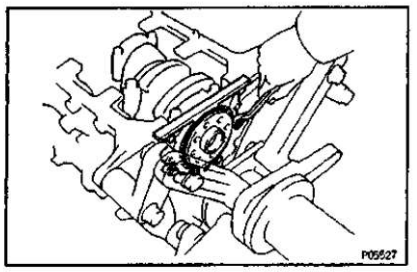


(d) Retighten the cap nuts 90° as shown.
(e) Check that the painted mark is now at a 90° angle to the front.
(f) Check that the crankshaft turns smoothly.

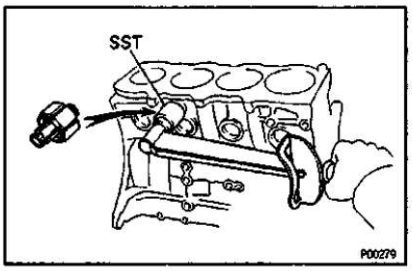


(g) Check the connecting rod thrust clearance.
- Using a dial indicator, measure the thrust clearance while moving the connecting rod back an forth.

Standard thrust clearance:
0.160 – 0.312 mm (0.0063 – 0.0123 in.)
Maximum thrust clearance:
0.35 mm (0.0138 in.)
If the thrust clearance is greater than maximum, replace the connecting rod assembly. If necessary, replace the crankshaft.



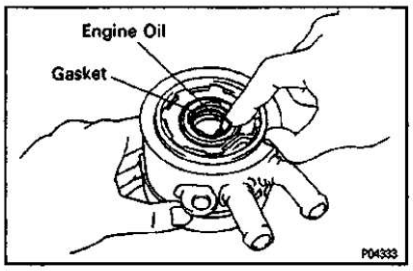
7. INSTALL REAR OIL SEAL RETAINER
Install a new gasket and the retainer with the six bolts.
Torque: 9.3 N–m (95 kgf–cm, 82 in.–lbf)



POST ASSEMBLY

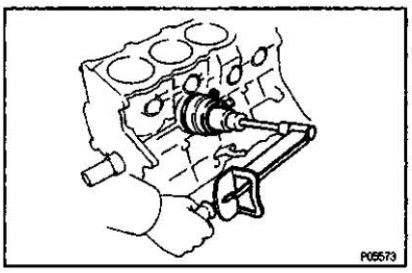
1. INSTALL KNOCK SENSOR

Using SST, install the knock sensor.
SST 09816–30010
Torque: 37 N–m (380 kgf–cm, 27 ft–lbf)

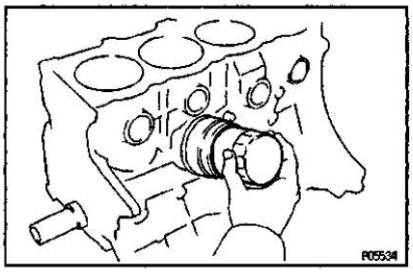


2. INSTALL OIL COOLER

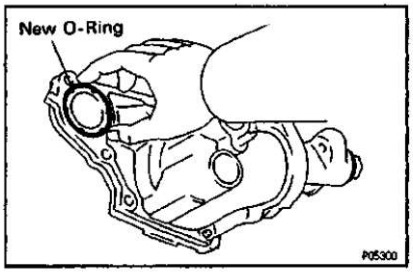
(a) Install new O–ring and gasket to the oil cooler.



(b) Apply a light coat of engine oil on the threads and under the head of the relief valve.
(c) Temporarily install the oil cooler with the nut.
(d) Install the plate washer and relief valve.
Torque: 78 N–m (800 kgf–cm, 58 ft–lbf)
(e) Tighten the nut.
Torque: 7.8 N–m (80 kgf–cm, 69 in.–lbf)

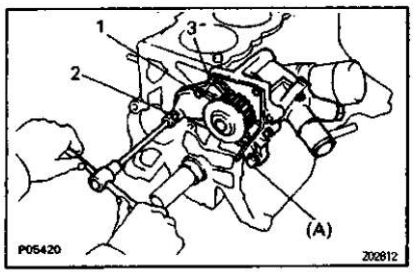


(f) Install the oil filter.
(See Replacement of Oil and Oil Filter)



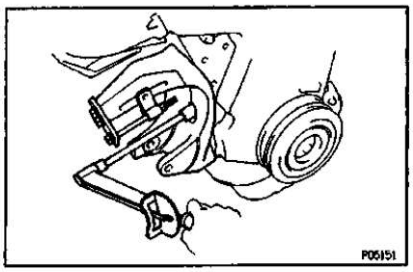
3. INSTALL WATER PUMP AND WATER PUMP COVER ASSEMBLY

(a) Install a new O–ring to the water pump cover.

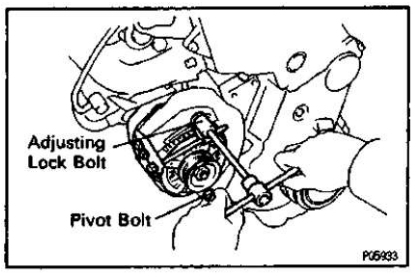


(b) Install the water pump with the three bolts. Tighten the bolts in the sequence shown.
Torque: 7.8 N–m (80 kgf–cm, 69 in–lbf)
(c) (w/o A/C)
Install the bolt (A).
Torque: 27 N–m (275 kgf–cm. 20 ft–lbf)

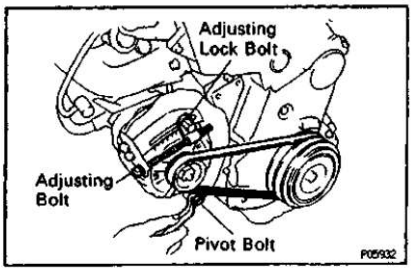
4. INSTALL OIL PUMP AND AND OIL PAN
(See Oil pump Installation)
5. INSTALL CYLINDER HEAD
(See Cylinder Head Installation)
6. INSTALL TIMING BELT AND PULLEYS
(See Timing Belt Installation)



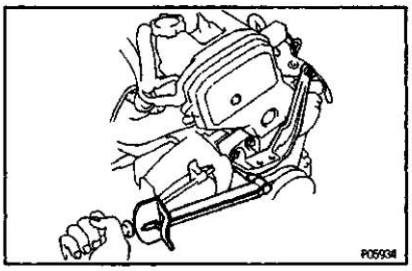
7. INSTALL ALTERNATOR BRACKET
Install the alternator bracket with the three bolts and two nuts.
Torque: 43 N–m (440 kgf–cm, 32 ft–lbf)



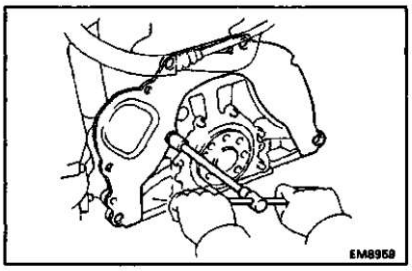
8. INSTALL ALTERNATOR
(a) Mount the alternator on the alternator bracket with the pivot bolt and adjusting lock bolt. Do not tighten the bolts yet.



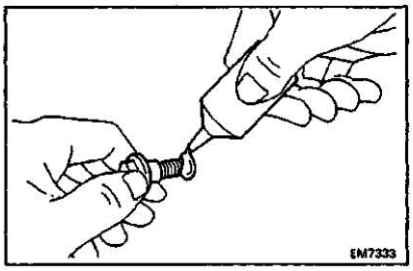
(b) Install the drive belt with the adjusting bolt.
(c) Adjust the drive belt with the adjusting bolt.



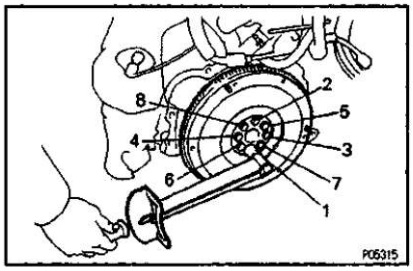
9. INSTALL RH ENGINE MOUNTING BRACKET
Install the mounting bracket with the four bolts.
Torque: 61 N–m (620 kgf–cm, 45 ft–lbf)
10. DISCONNECT ENGINE FROM ENGINE STAND



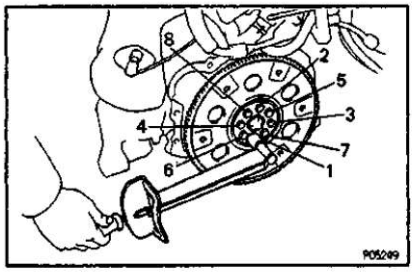
11. INSTALL REAR END PLATE
Install the rear end plate with the bolt.
Torque: 9.3 N–m (95 kgf–cm, 82in–lbf)



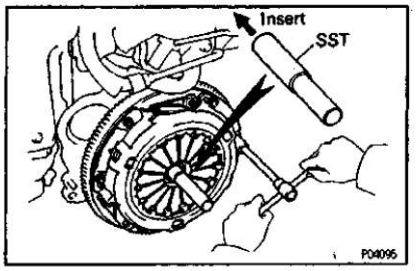
12. (M/T)
INSTALL FLYWHEEL
(a) Apply adhesive to two or three threads of the mou–nting bolt end.
Adhesive:
Part No. 08833–00070, THREE BOND 1324 or equivalent



(b) Install the flywheel on the crankshaft.
(c) Install and uniformly tighten the mounting bolts in several passes, in the sequence shown.
Torque: 88 N–m (900 kgf–cm, 65 ft–lbf)

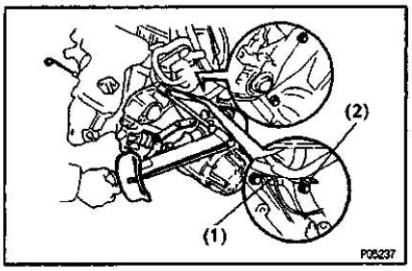


13. (A/T)
INSTALL DRIVE PLATE (See procedure in step 12)
Torque: 83 N–m (850 kgf–cm, 61 ft–lbf)



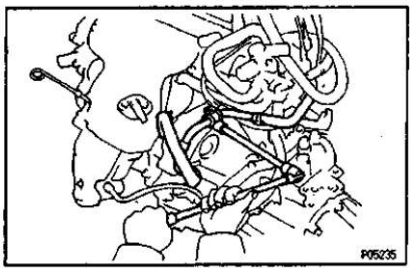
1. INSTALL CLUTCH DISC AND COVER

Using SST, install the disc and cover with the six bolts.
Uniformly tighten the bolts in several passes.
SST 09301–32010
Torque: 19 N–m (195 kgf–cm, 14 ft–lbf)



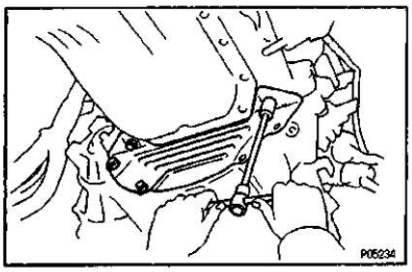
2. INSTALL TRANSAXLE TO ENGINE

(a) Attach the transaxle to the engine.
(b) Install the five bolts together with the following parts
(1) Ground strap
(2) Engine wire bracket
Torque:
46 N–m (470 kgf–cm, 34 ft–lbf) for 14 mm head
64 N–m (650 kgf–cm, 47 ft–lbf) for 17 mm head



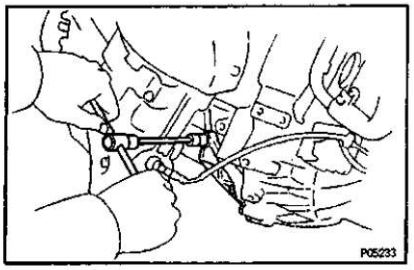
3. INSTALL HEATER WATER PIPE

(a) Install the water pipe with the two bolts.
(b) Connect the water hose to the water by–pass pipe.
Torque: 46 N–m (470 kgf–cm, 34 ft–lbf)



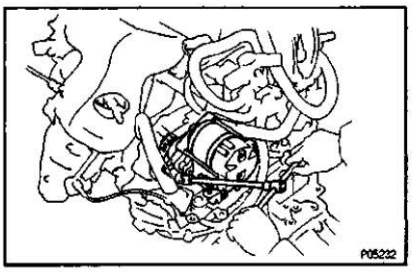
4. INSTALL NO.2 REAR END PLATE

Install the rear end plate with the four bolts.
Torque:
9.3 N–m (95 kgf–cm, 82 in.–lbf) for 10 mm head
19 N–m (195 kgf–cm, 14 ft–lbf) for 12 mm head



5. INSTALL STIFFENER PLATE

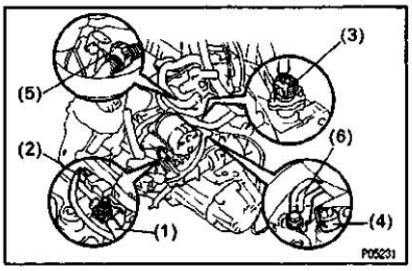
Install the stiffener plate with the three bolts.
Torque: 37N–m (380 kgf–cm, 27 ft–lbf)



6. INSTALL STARTER

Install the starter with the two bolts.

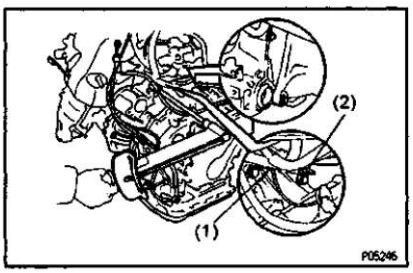
Torque: 39 N–m (400 kgf–cm, 29 ft–lbf)



7. CONNECT ENGINE WIRE

(a) Connect the following parts:
- (1) Starter wire
- (2) Starter connector
- (3) Vehicle speed pulse generator connector
- (4) Back–up light switch connector
- (5) Engine wire clamp
- (6) Engine wire bracket

(b) Install the terminal cover to the starter.



ENGINE & TRANSAXLE ASSEMBLY (A/T)

(See Components for Engine & Transaxle Separation and Assembly (A/T)

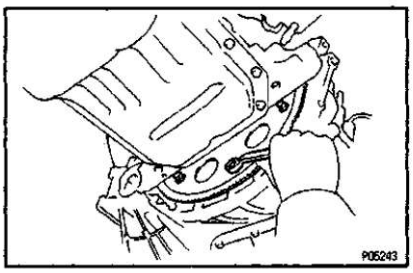
1. INSTALL TRANSAXLE TO ENGINE

A. Install transaxle

(a) Attach the transaxle to the engine.

(b) Install the five bolts together with the following parts
- (1) Ground strap
- (2) Engine wire bracket

Torque:
46 N–m (470 kgf–cm, 34 ft–lbf) for 14 mm head
64 N–m (650 kgf–cm, 47 ft–lbf) for 17 mm head



B. Install torque converter mounting bolts

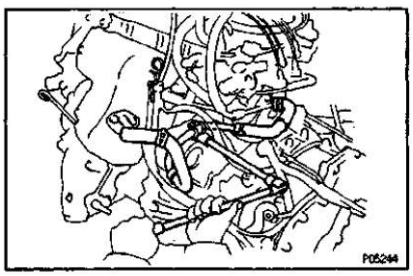
(a) Apply adhesive to two or three threads of the mou–nting bolt end.

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

(b) Hold the crankshaft pulley bolt with a wrench, and install the six bolts evenly.

Torque: 27 N–m (280 kgf–cm, 20 ft–lbf)

HINT: First install the dark green colored bolt, install the other bolts.

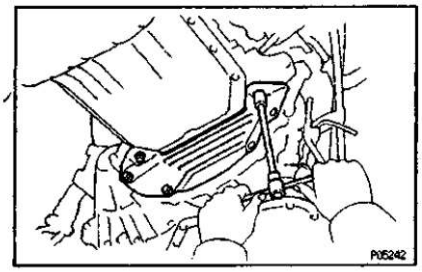


2. INSTALL HEATER WATER PIPE

(a) Install the water pipe with the two bolts.

(b) Connect the water hose to the water by–pass pipe.

Torque: 46 N–m (470 kgf–cm, 34 ft–lbf)

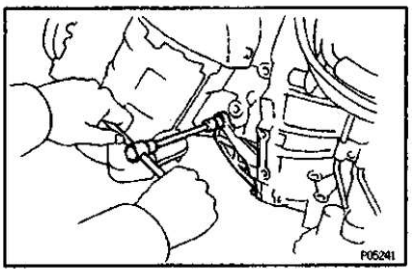


3. INSTALL No.2 REAR END PLATE

Install the rear end plate with the four bolts.

Torque:

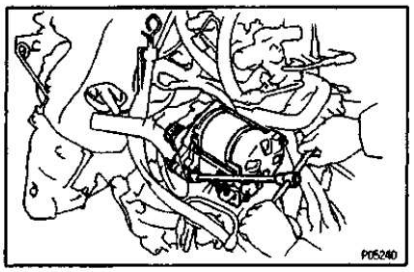
9.3 N–m (95 kgf–cm, 82 in–lbf) for 10 mm head
19 N–m (195 kgf–cm, 14 ft–lbf) for 12 mm head



4. INSTALL STIFFENER PLATE

Install the stiffener plate with the three bolts.

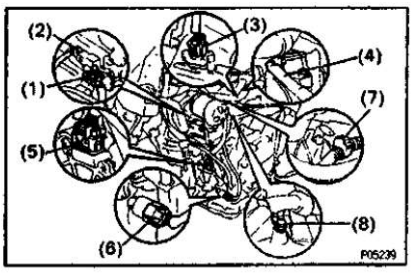
Torque: 37 N–m (380 kgf–cm. 27 ft–lbf)



5. INSTALL STARTER

Install the starter with the two bolts.

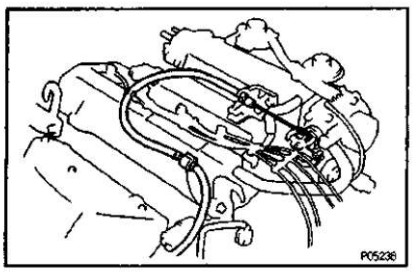
Torque: 39 N–m (400 kgf–cm, 29 ft–lbf)



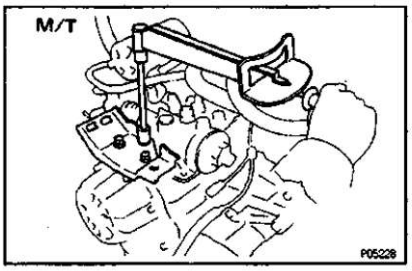
6. CONNECT ENGINE WIRE

(a) Connect the following parts:
(1) Starter wire
(2) Starter connector
(3) No.1 vehicle speed pulse generator
(4) No.2 vehicle speed pulse generator
(5) Park/neutral switch connector
(6) Solenoid connector
(7) Engine wire clamp
(8) Engine wire bracket

(b) Install the terminal cover to the starter.



7. CONNECT THROTTLE CABLE FROM THROTTLE BODY



ENGINE INSTALLATION

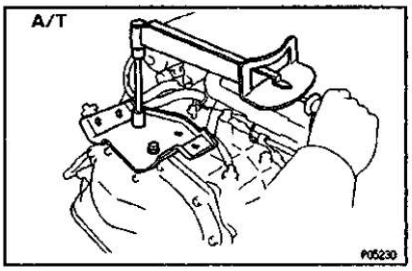
(See Components for Engine Removal and Installation)

1. INSTALL LH ENGINE MOUNTING BRACKET TO TRANSAXLE

(M/T)

install the mounting bracket with the three bolts.

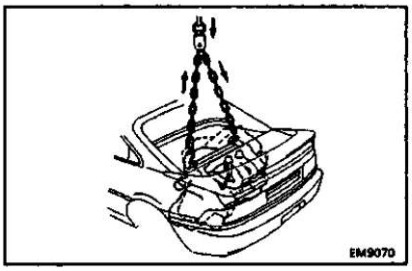
Torque 52 N–m (530 kgf–cm, 38 ft–lbf)



(A/T)

Install the mounting bracket with the two bolts.

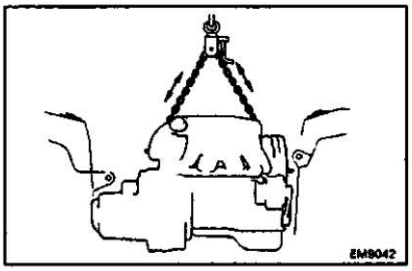
Torque: 52 N–m (530 kgf–cm, 38 ft–lbf)



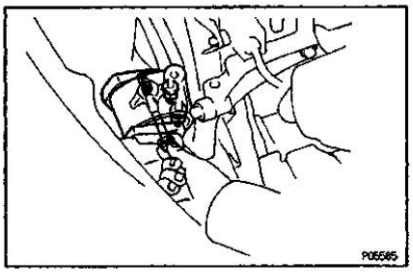
2. INSTALL ENGINE AND TRANSAXLE ASSEMBLY IN VEHICLE

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

(b) Slowly lower the engine into the engine compartment. Tilt the transaxle downward, lower the engine and clear the LH body mounting.

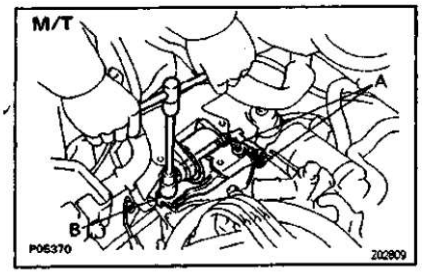


(c) Keep the engine level, and align RH and LH mountings with the body mountings.



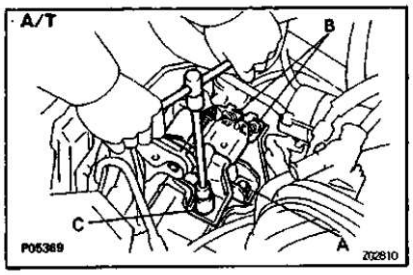
(d) Attach the RH mounting insulator to the body, and temporarily install the through bolt.

(e) Attach the RH mounting insulator to the mounting bracket, and temporarily the two nuts.



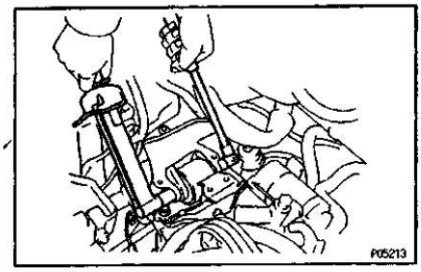
(f) Attach the LH mounting insulator to the body, and temporarily install the through bolt.
(g) (M/T)
Attach the LH mounting insulator to the mounting bracket, and install the three bolts.

Torque:
63 N–m (650 kgf–cm, 47 ft–lbf) for A
73 N–m (740 kgf–cm, 54 ft–lbf) for B



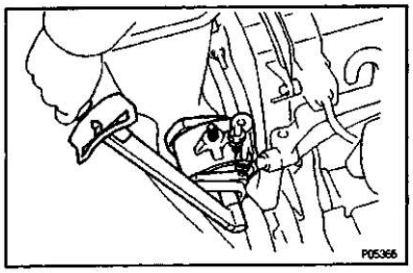
(h) (A/T)
Attach the LH mounting insulator to the mounting bracket, and install the four bolts.

Torque:
52 N–m (530 kgf–cm, 38 ft–lbf) for A
63 N–m (650 kgf–cm, 47 ft–lbf) for B
73 N–m (740 kgf–cm, 54 ft–lbf) for C



(i) Tighten the through bolt holding the LH mounting insulator to the body.

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



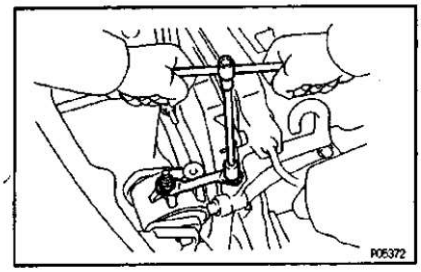
(j) Tighten the two nuts holding the RH mounting insu–lator to the mounting bracket.

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

(k) Tighten the through bolt holding the RH mounting insulator to the body.

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

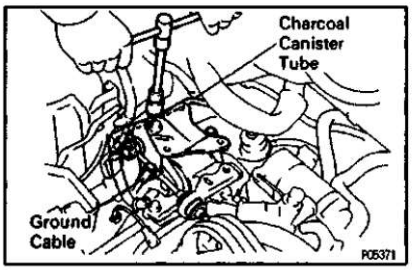
(l) Remove the engine chain hoist from the engine.



3. INSTALL RH ENGINE MOUNTING STAY

Install the mounting stay with the bolt and nut.

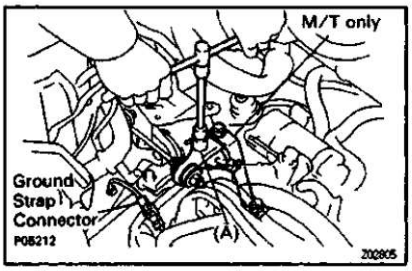
Torque: 73 N–m (740 kgf–cm, 54 ft–lbf)



4. INSTALL LATERAL CONTROL ROD TO BODY

Install the control rod and charcoal canister tube with the four bolts. Connect the ground cable.

Torque: 35 N–m (360 kgf–cm, 26 ft–lbf)



5. INSTALL LATERAL CONTROL ROD (TO LH ENGINE MOUNTING INSULATOR) AND LH ENGINE MOUNTING STAY (M/T only)

(M/T)

(a) Temporarily install the lateral control rod Temporarily install the lateral control rod with bolt (A).

(b) install the LH mounting stay with the two bolts.

Torque:

25 N–m (250 kgf–cm, 18 ft–lbf) for transaxle side

73 N–m (740 kgf–cm, 54 ft–lbf) for insulator side

(c) Tighten the bolt (A).

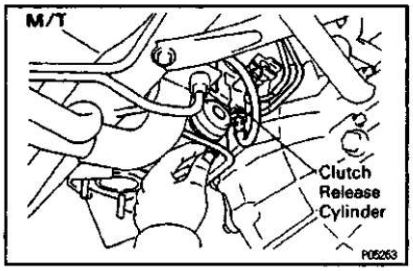
Torque: 37 N–m (380 kgf–cm, 27 ft–lbf)

(A/T)

Install the lateral control rod with two bolts.

Torque: 37 N–m (380 kgf–cm, 27 ft–lbf)

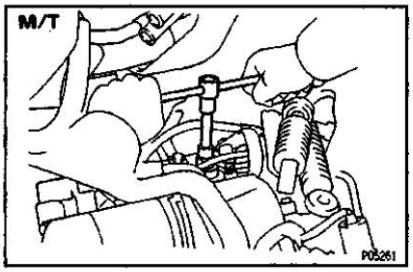
6. CONNECT GROUND STRAP CONNECTOR



7. INSTALL FRONT ENGINE MOUNTING BRACKET

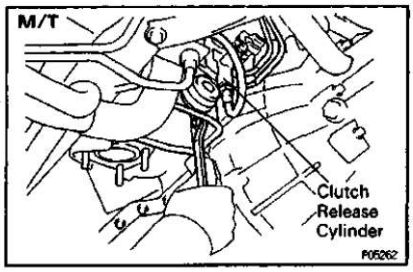
(M/T)

(a) Temporarily install the clutch release cylinder and mounting bracket with the two bolts.

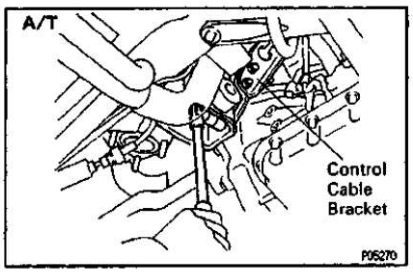


(b) Tighten the two bolts holding the clutch release cyl–inder to the transaxle.

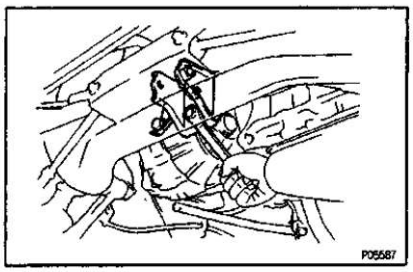
Torque: 12 N–m (120 kgf–cm. 9 ft–lbf)



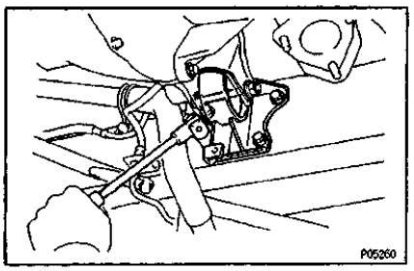
(c) Tighten the two bolts holding the mounting bracket to to the transaxle.
Torque: 77 N–m (790 kgf–cm. 57 ft–lbf)



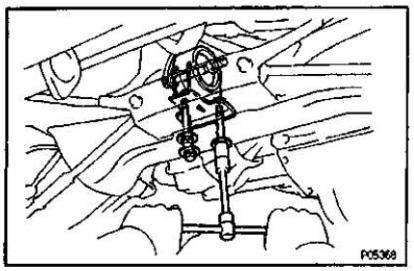
(A/T)
Install the control cable bracket and mounting bracket with the two bolts.
Torque: 77 N–m (790 kgf–cm. 57 ft–lbf)



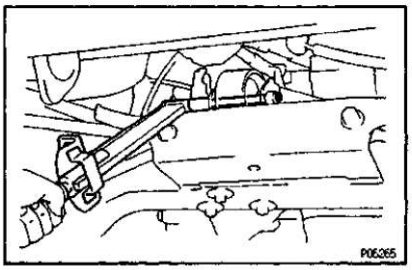
8. INSTALL REAR ENGINE MOUNTING BRACKET
Install the mounting bracket with the three bolts.
Torque: 77 N–m (790 kgf–cm, 57 ft–lbf)



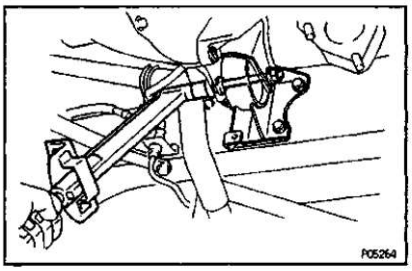
9. INSTALL FRONT ENGINE MOUNTING INSULATOR
(a) Install the mounting insulator to the body with the four bolts.
Torque: 73 N–m (740 kgf–cm, 54 ft–lbf)
(b) Temporarily install the through bolt and nut holding the mounting insulator to the mounting bracket.



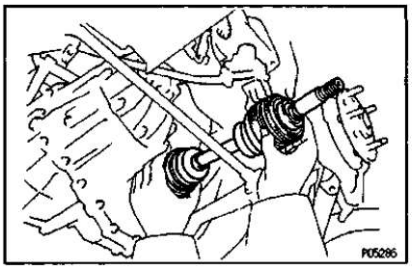
10. INSTALL REAR ENGINE MOUNTING INSULATOR
(a) Temporarily install the mounting bracket to the body with the three bolts.
(b) Temporarily install the through bolt holding the mou–nting insulator to the mounting bracket.
(c) Tighten the three bolts holding the mounting bracket to the body.
Torque: 64 N–m (650 kgf–cm, 47 ft–lbf)



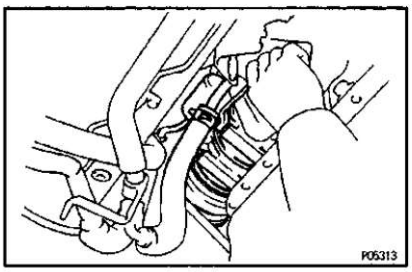
(d) Tighten the through bolt holding the mounting insu–lator to the mounting bracket.
Torque: 87 N–m (890 kgf–cm, 64 ft–lbf)



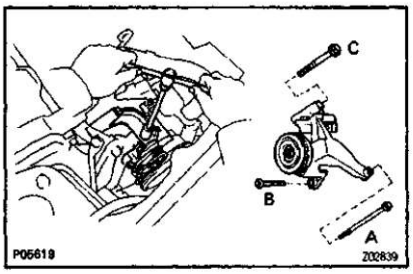
11. TIGHTEN FRONT ENGINE MOUNTING THROUGH BOLT
Torque: 96 N–m (980 kgf–cm, 70 ft–lbf)



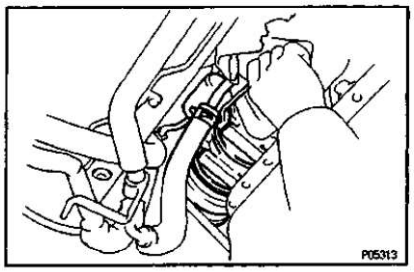
12. INSTALL DRIVE SHAFTS
(See Drive Shaft Installation in SA section)



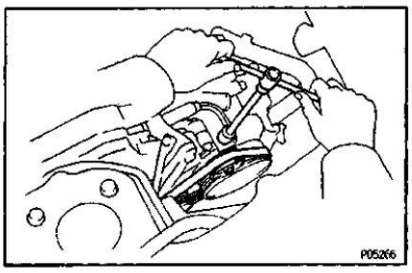
13. INSTALL A/C COMPRESSOR
(a) Temporarily install the A/C compressor with the two bolts



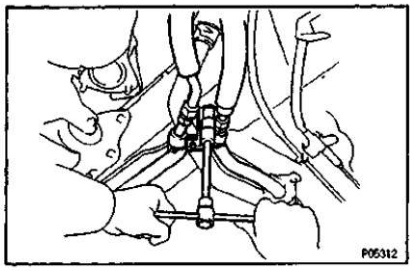
(b) Install the idler pulley bracket with the three bolts.
Torque:
25 N–m (250 kgf–cm, 18 ft–lbf) for A
27 N–m (275 kgf–cm, 20 ft–lbf) for B
37 N–m (375 kgf–cm, 27 ft–lbf) for C
(c) Connect the A/C compressor connector.



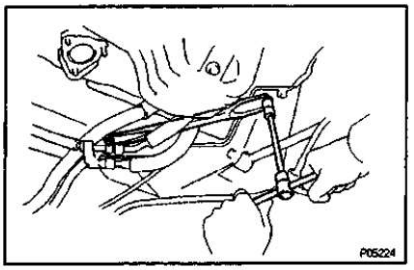
(d) Tighten the two bolts of the lower side of the A/C compressor.
Torque: 25 N–m (250 kgf–cm, 18 ft–lbf)



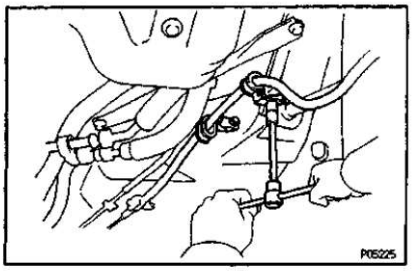
(e) Install the drive belt with the adjusting bolt.
(f) Tighten the idler pulley nut.



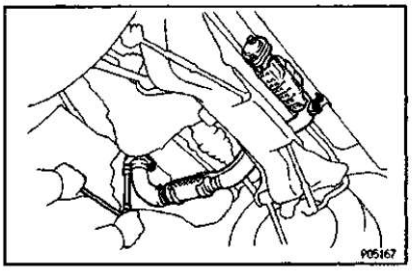
(g) Install the A/C pipes with the two clamps and nut.



(h) Install the lower suspension brace with the two bolts.
Torque: 73 N–m (740 kgf–cm, 54 ft–lbf)



(i) Install the parking brake cable with the two clamps and three bolts.



14. INSTALL FRONT EXHAUST PIPE

(a) Place two new gaskets to the front and rear of the front exhaust pipe.

(b) Using a 14 mm deep socket wrench, install the front exhaust pipe with three new nuts.

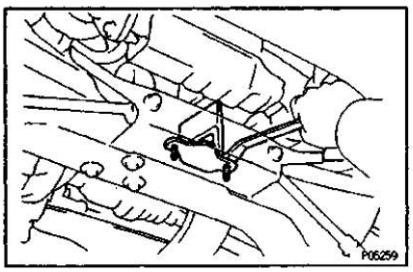
Torque: 62 N–m (630 kgf–cm, 46 ft–lbf)

(c) Install the two bolts holding the front exhaust pipe to the tailpipe.

Torque: 43 N–m (440 kgf–cm, 32 ft–lbf)

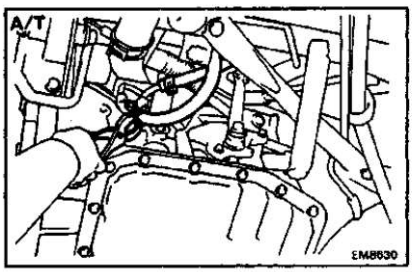
(d) Install the two bolts holding the front exhaust pipe bracket to the tailpipe bracket.

Torque: 19 N–m (190 kgf–cm, 14 ft–lbf)

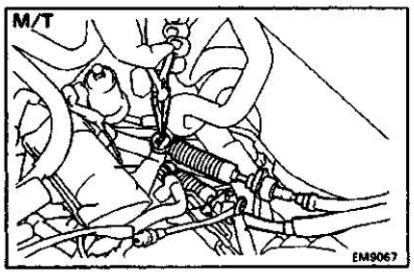


(e) Install the damper with the two bolts.

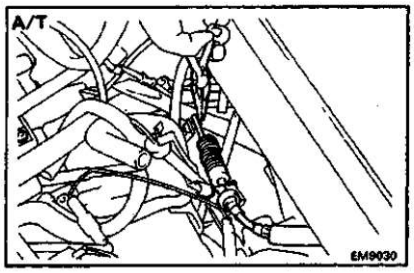
Torque: 21 N–m (210 kgf–cm, 15 ft–lbf)



15. (A/T)
CONNECT TRANSAXLE OIL COOLER HOSES



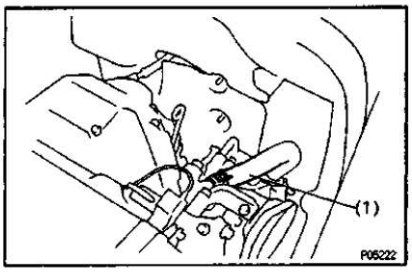
16. CONNECT TRANSAXLE CONTROL CABLE(S)



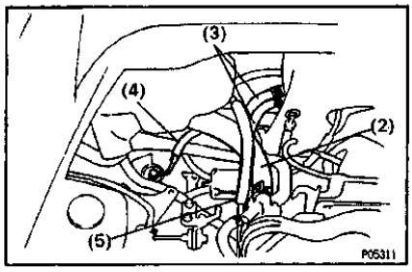
17. CONNECT HOSES

Connect the following connectors:

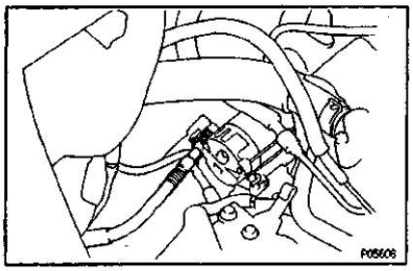
(1) Radiator hose to water inlet



(2) Radiator hose to water outlet
(3) Two heater water hoses
(4) Fuel inlet hose to fuel filter
(5) Fuel return hose

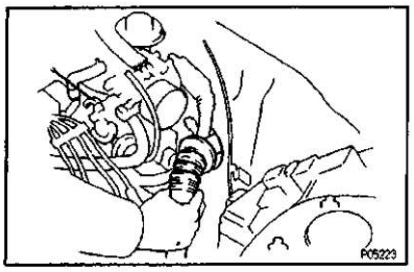


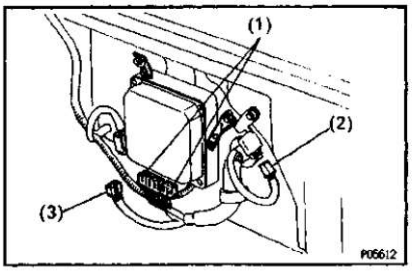
18. CONNECT STARTER CABLE



19. CONNECT ENGINE WIRE TO LUGGAGE COMPARTMENT

(a) Push in the engine wire through the luggage com–partment.



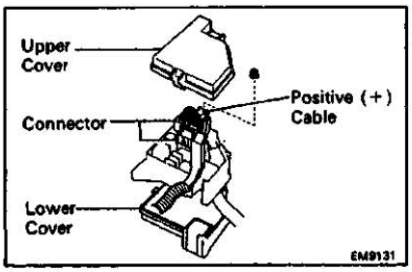


(b) Connect the following connectors:
(1) Two PCME (& T) connectors
(2) Starter relay connector
(3) Engine compartment wire connector



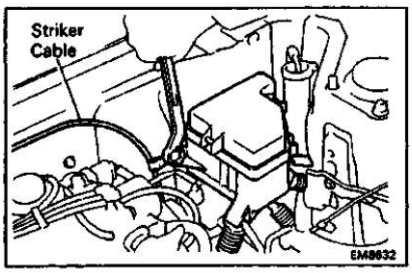
20. CONNECT CONNECTORS

Connect the following connectors:
(1) Noise filter connector
(2) Igniter connector

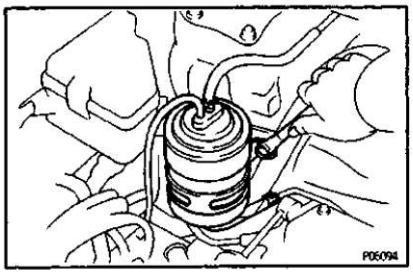


21. CONNECT ENGINE WIRE, AND INSTALL ENGINE RELAY BOX

(a) Connect the two connectors and positive (+) cable of the engine wire to relay box.
(b) Install the upper and lower covers to the relay box.

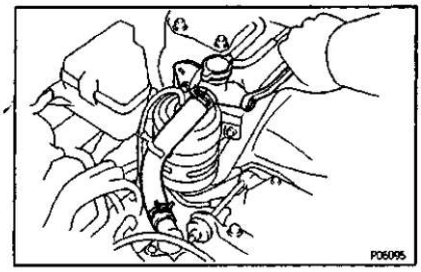


(c) Install the relay box with the two bolts. Install the luggage compartment striker cable.



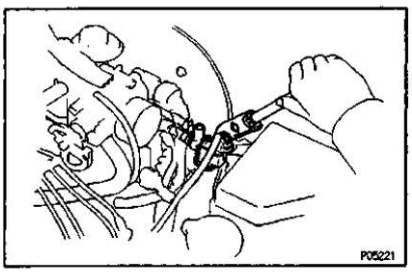
22. INSTALL CHARCOAL CANISTER

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



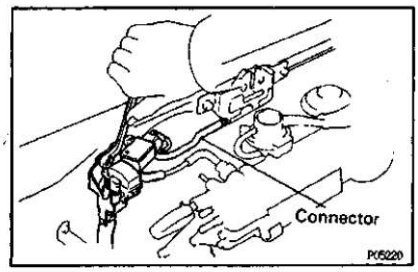
23. INSTALL WATER FILTER

(a) Install the water filler with the two bolts.
(b) Connect the following hoses:
(1) Water filler hose
(2) Coolant reservoir hose



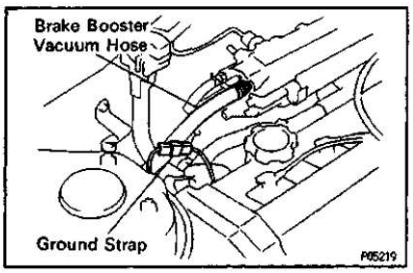
24. INSTALL A/C IDLE–UP VALVE

Install theC idle–up valve with the bolt.

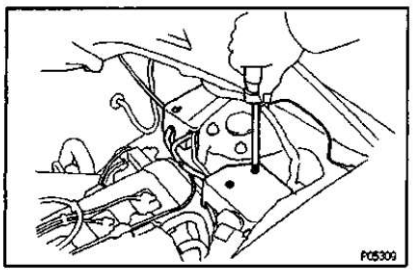


25. INSTALL DATA LINK CONNECTOR 1 AND MAP

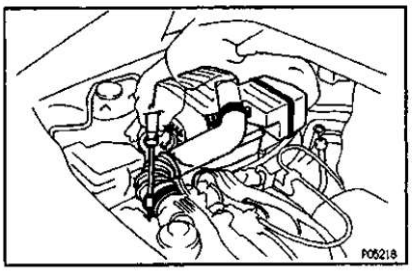
(a) Install the data link connector 1 and MAP to the body with the bolt.
(b) Connect the engine hood curtesy switch connector.



26. CONNECT BRAKE BOOSTER VACUUM HOSE
27. CONNECT GROUND STRAP CONNECTOR



28. (w/ CRUISE CONTROL SYSTEM) INSTALL CRUISE CONTROL ACTUATOR AND ACCELERATOR LINKAGE
29. CONNECT ACCELERATOR LINKAGE TO THROTTLE BODY



30. INSTALL AIR CLEANER HOUSING

(a) Install the air cleaner case with the three bolts.
(b) Install the air filter.
(c) Install the air cleaner cap with the four clamps.
(d) Connect the air cleaner hose to the throttle body.
(e) Connect the IATS connector.

31. CONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY

32. FILL WITH ENGINE COOLANT

33. FILL WITH ENGINE OIL

34. START ENGINE AND CHECK FOR LEAKS

35. PERFORM ENGINE ADJUSTMENT

(See Tune–Up)

36. INSTALL ENGINE UNDER COVERS

37. INSTALL ENGINE HOOD

38. INSTALL ENGINE HOOD SIDE PANELS

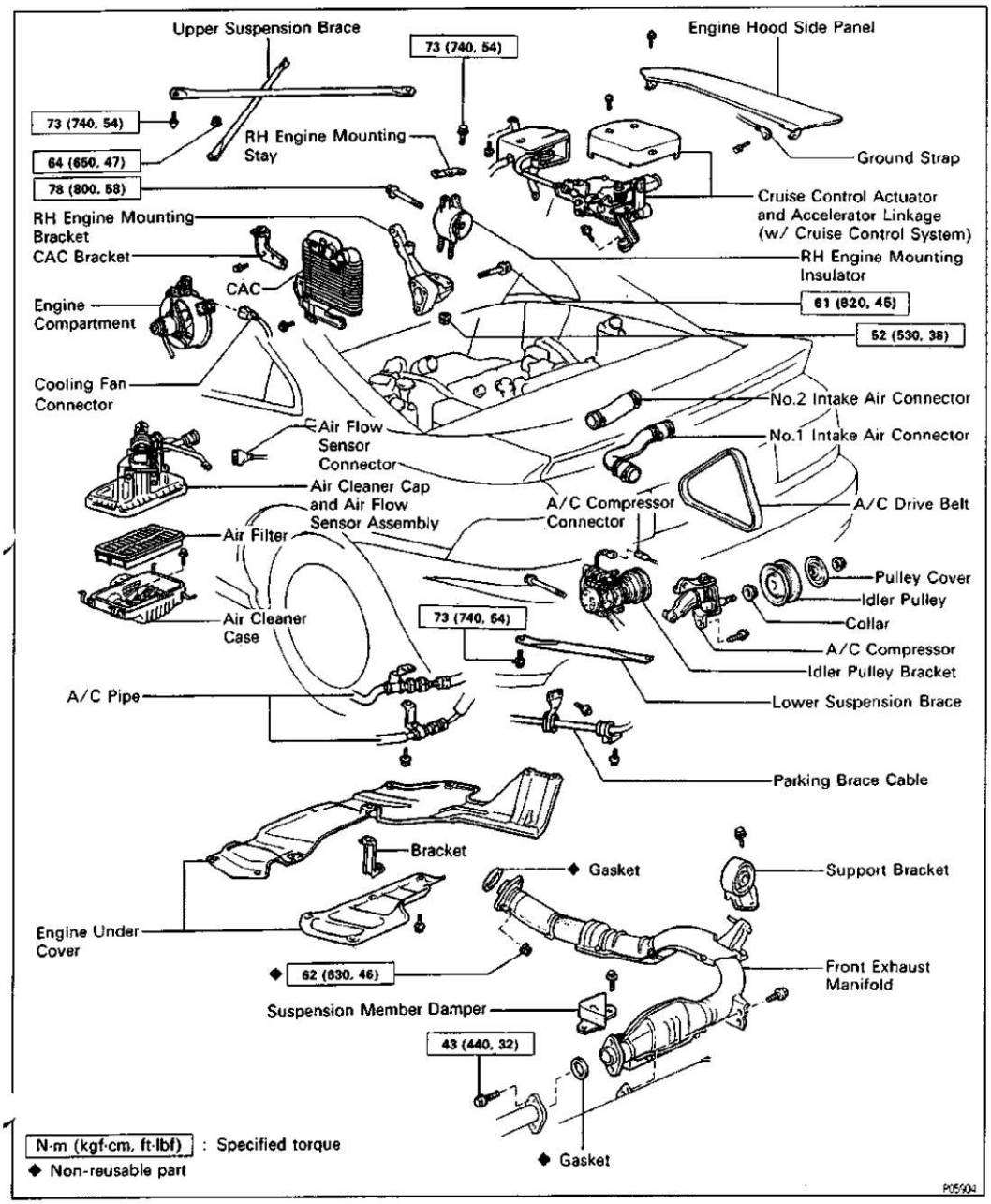
39. PERFORM ROAD TEST

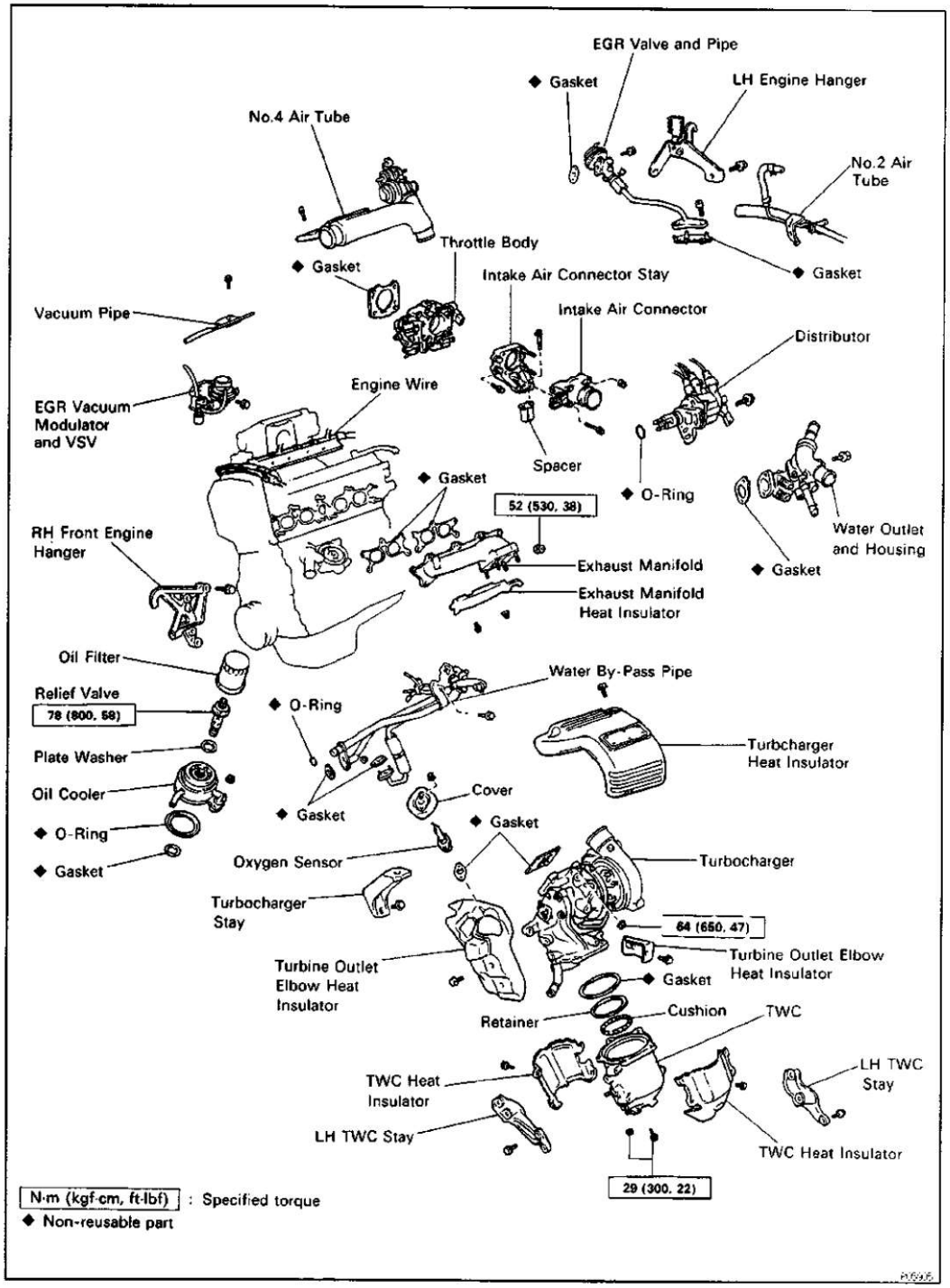
Check for abnormal noise, shock slippage, correct shift points and smooth operation.

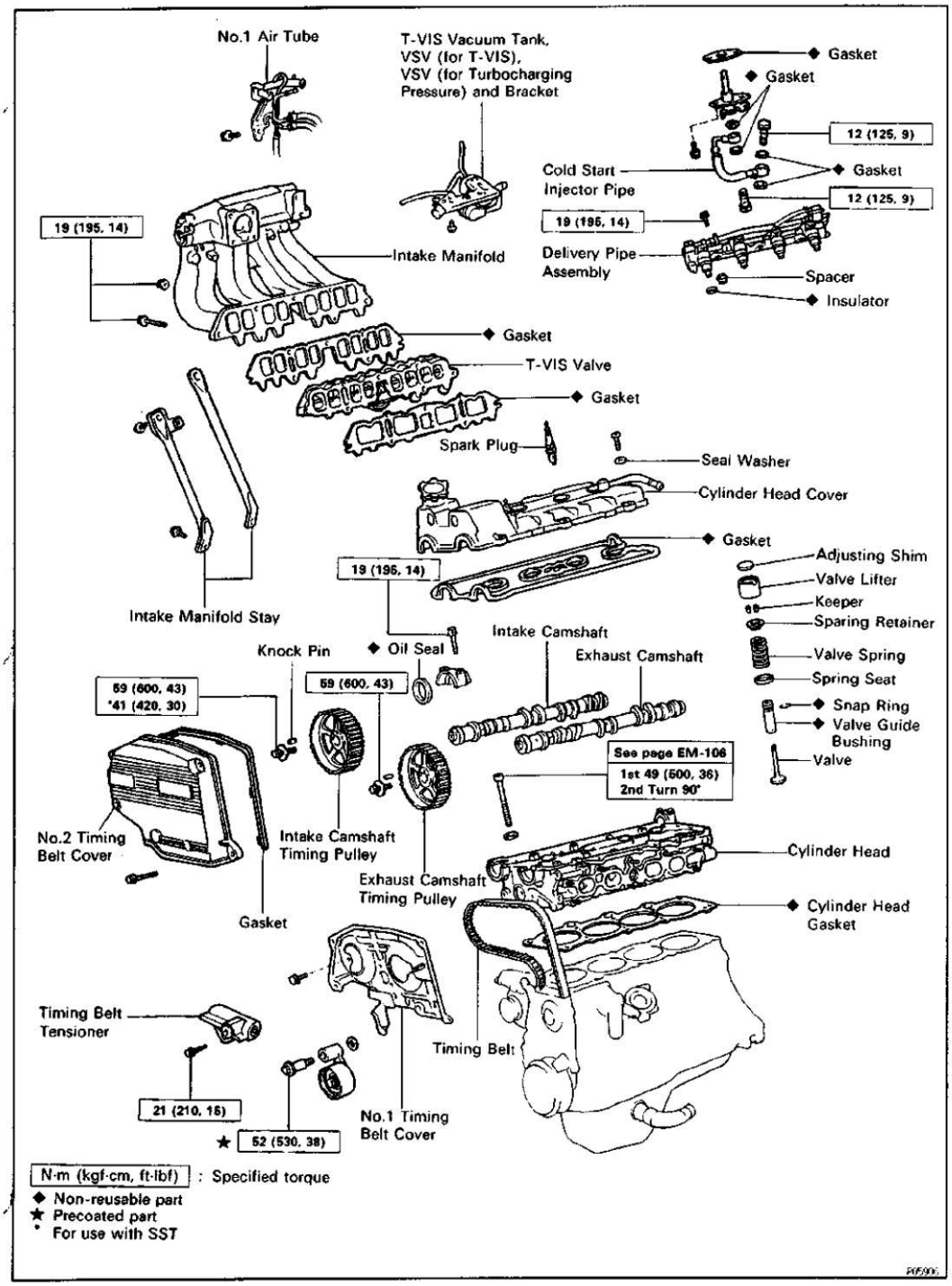
40. RECHECK ENGINE COOLANT AND OIL LEVELS

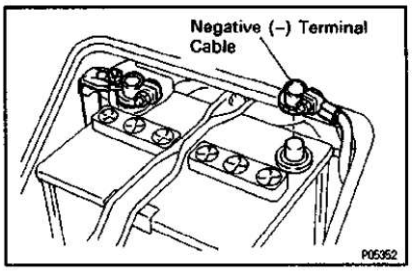
CYLINDER HEAD

COMPONENTS FOR REMOVAL AND INSTALLATION




EGR Valve and Pipe
◆ Gasket
LH Engine Hanger
No.4 Air Tube
No.2 Air Tube
Throttle Body
◆ Gasket
◆ Gasket
Intake Air Connector Stay
Vacuum Pipe
Intake Air Connector
Distributor
EGR Vacuum Modulator and VSV
Engine Wire
Spacer
◆ Gasket
52 (530, 38)
◆ O-Ring
Water Outlet and Housing
RH Front Engine Hanger
Exhaust Manifold
◆ Gasket
Exhaust Manifold Heat Insulator
Oil Filter
Water By-Pass Pipe
Relief Valve
78 (800, 58)
◆ O-Ring
Turbocharger Heat Insulator
Plate Washer
Oil Cooler
Cover
◆ Gasket
◆ Gasket
◆ O-Ring
Oxygen Sensor
Turbocharger
◆ Gasket
Turbocharger Stay
64 (650, 47)
Turbine Outlet Elbow Heat Insulator
Turbine Outlet Elbow Heat Insulator
◆ Gasket
Retainer
Cushion
TWC
LH TWC Stay
TWC Heat Insulator
LH TWC Stay
TWC Heat Insulator
29 (300, 22)
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part


No.1 Air Tube
T-VIS Vacuum Tank, VSV (for T-VIS), VSV (for Turbocharging Pressure) and Bracket
◆ Gasket
◆ Gasket
12 (125, 9)
Cold Start Injector Pipe
◆ Gasket
12 (125, 9)
19 (195, 14)
19 (195, 14)
Delivery Pipe Assembly
Intake Manifold
Spacer
◆ Insulator
◆ Gasket
T-VIS Valve
◆ Gasket
Spark Plug
Seal Washer
Cylinder Head Cover
◆ Gasket
Adjusting Shim
Valve Lifter
Keeper
Sparing Retainer
19 (195, 14)
Intake Manifold Stay
Intake Camshaft
Knock Pin
◆ Oil Seal
Exhaust Camshaft
Valve Spring
Spring Seat
59 (600, 43)
*41 (420, 30)
59 (600, 43)
◆ Snap Ring
◆ Valve Guide Bushing
Valve
See page EM-106
1st 49 (500, 36)
2nd Turn 90°
No.2 Timing Belt Cover
Intake Camshaft Timing Pulley
Cylinder Head
Exhaust Camshaft Timing Pulley
◆ Cylinder Head Gasket
Gasket
Timing Belt Tensioner
Timing Belt
21 (210, 15)
No.1 Timing Belt Cover
★ 52 (530, 38)
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part
★ Precoated part
* For use with SST



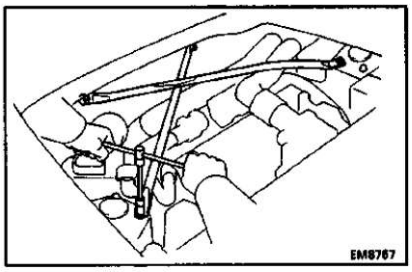
REMOVAL OF CYLINDER HEAD

(See Components for Removal and Installation)

1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY

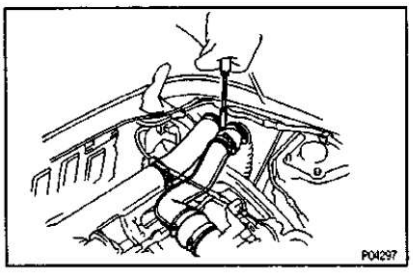
CAUTION: Turn the ignition switch to "LOCK". Disconnect the negative terminal from the battery. Wait at least 20 seconds before proceeding with work.

2. DRAIN ENGINE COOLANT
3. REMOVE ENGINE UNDER COVERS
4. REMOVE ENGINE HOOD SIDE PANELS

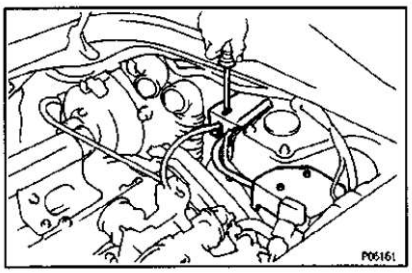


5. REMOVE UPPER SUSPENSION BRACE

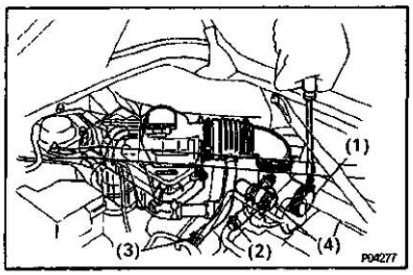
Remove the two bolts, two nuts and upper brace.



6. REMOVE N4.1 AND NO.2 INTAKE AIR CONNECTORS



7. (w/ CRUISE CONTROL SYSTEM)
REMOVE CRUISE CONTROL ACTUATOR AND ACCELERATOR LINKAGE
8. (w/o CRUISE CONTROL SYSTEM)
DISCONNECT ACCELERATOR LINKAGE FROM THROTTLE BODY

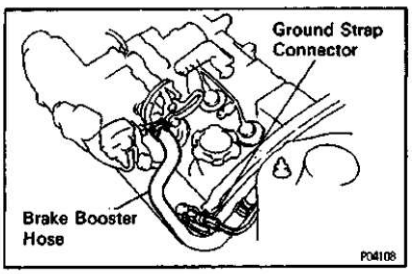


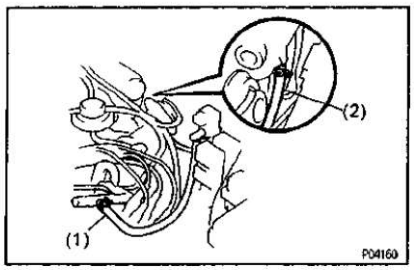
8. REMOVE AIR CLEANER HOUSING

(a) Disconnect the air flow sensor connector.
(b) Disconnect the following hoses:
(1) Air cleaner hose from turbocharger
(2) PCV hose from cylinder head cover
(3) Air hose from No.2 air hose
(4) Air hose from air by–pass valve
(c) Disconnect the four clamps, and remove the air cle–aner cap and air flow sensor assembly.
(d) Remove the air filter.
(e) Remove the three bolts and air cleaner case.

10. DISCONNECT GROUND STRAP CONNECTOR

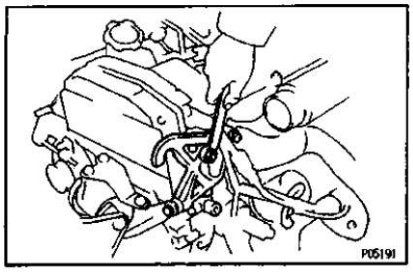
11. DISCONNECT BRAKE BOOTER VACUUM HOSE





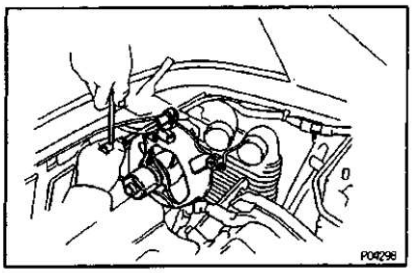
12. DISCONNECT A/C IDLE–UP AIR HOSES

Disconnect the following hose:
(1) Air hose from No.2 air tube
(2) Air hose from intake manifold



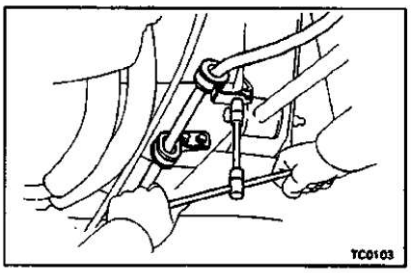
13. REMOVE RH FRONT ENGINE HANGER

Remove the four bolts and engine hanger.



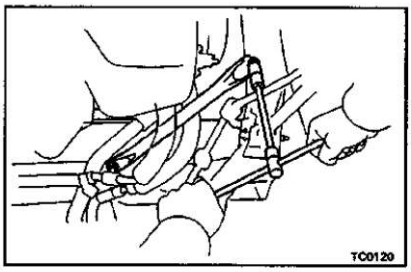
14. REMOVE ENGINE COMPARTMENT ELECTRIC COOLING FAN

(a) Disconnect the cooling fan connector.
(b) Loosen the three bolts, and remove the cooling fan.

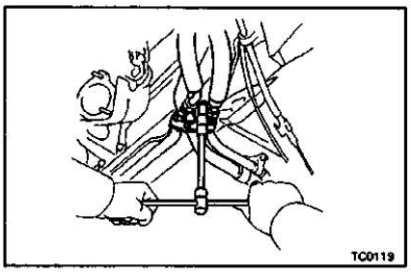


15. DISCONNECT A/C COMPRESSOR FROM ENGINE

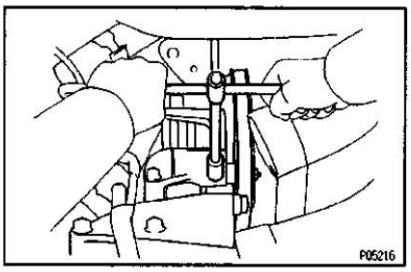
(a) Remove the three clamp bolts, and disconnect the parking brake cable.



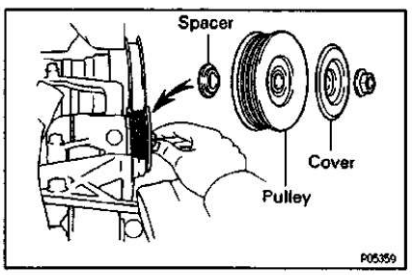
(b) Remove the two bolts and lower suspension brace.



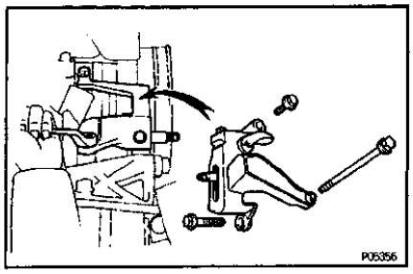
(c) Remove the clamp nut, and disconnect the two A/C pipes.



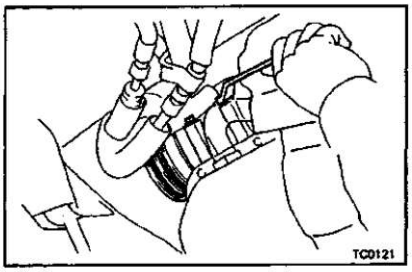
(d) Loosen the idler pulley nut.
(e) Loosen the adjusting bolt, and remove the drive belt.



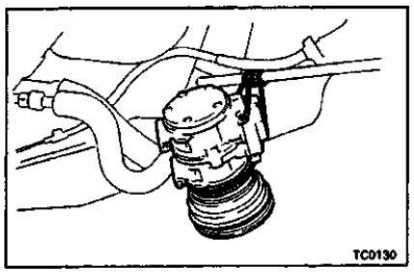
(f) Remove the nut, pulley cover, idler pulley and spacer.



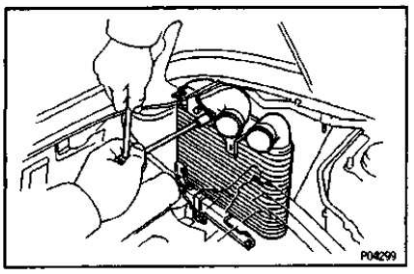
(g) Disconnect the A/C compressor connector.
(h) Remove the three bolts and idler pulley bracket.



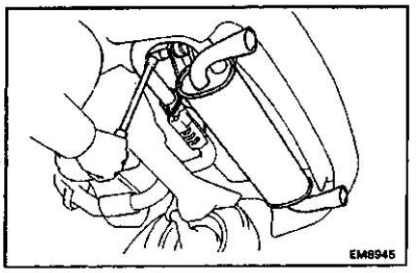
(i) Remove the two bolts, and disconnect the A/C com–pressor from the engine.



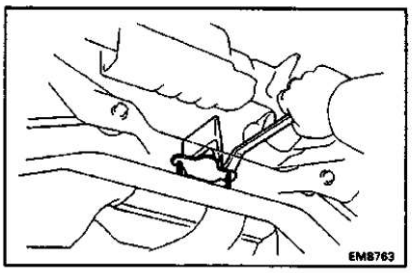
HINT: Suspend the A/C compressor to strut rod with a string.



16. REMOVE CAC
(a) Remove the two bolts holding the CAC to the upper bracket.
(b) Remove the three bolts, upper bracket and CAC.

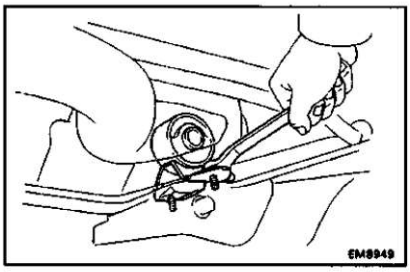


17. REMOVE TAILPIPE
(a) Remove the two bolts holding the front exhaust pipe to the tailpipe bracket.
(b) Remove the two bolts holding the front exhaust pipe to the tailpipe.
(c) Remove the two bolts, tailpipe and gasket.

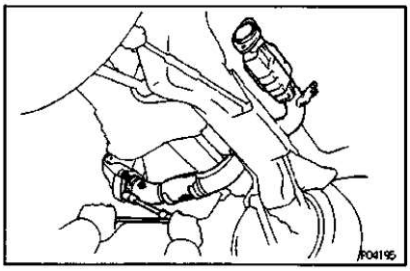


18. REMOVE FRONT EXHAUST PIPE

(a) Remove the two bolts and damper.

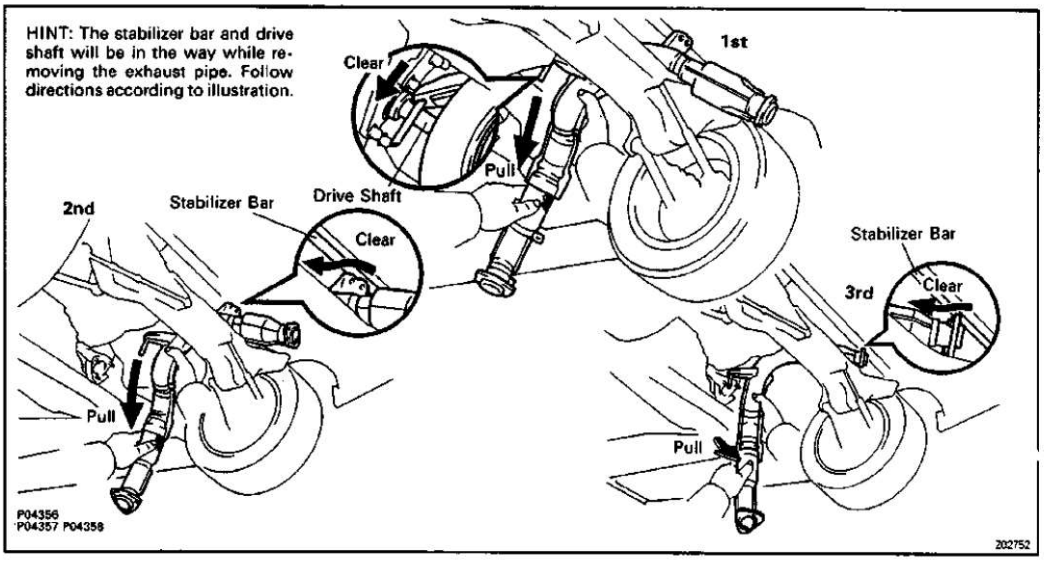


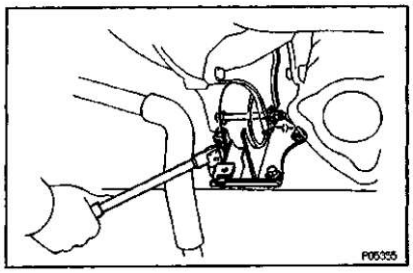
(b) Remove the two bolts and support bracket.



(c) Using a 14 mm deep socket wrench, remove the three nuts.

(d) Remove the front exhaust pipe and gasket.

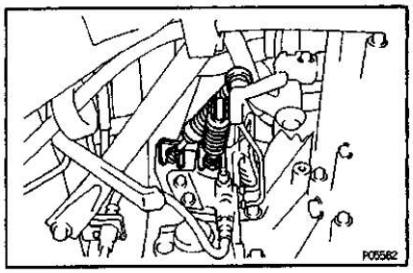




19. REMOVE FRONT ENGINE MOUNTING INSULATOR

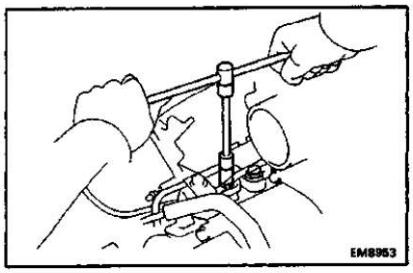
(a) Remove the through bolt and nut holding the mounting insulator to the mounting bracket.

(b) Remove the four bolts and mounting insulator.

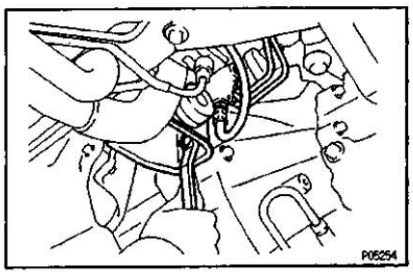


20. REMOVE FRONT ENGINE MOUNTING BRACKET AND CLUTCH RELEASE CYLINDER

(a) Disconnect the two transaxle control cables from the transaxle.

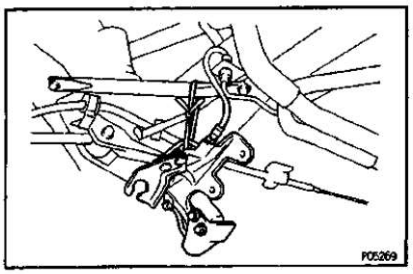


(b) Remove the two bolts holding the clutch release cylinder to the transaxle.

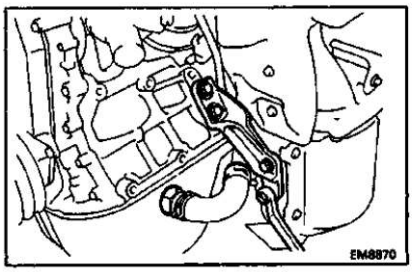


(c) Remove the two bolts and mounting bracket.

(d) Disconnect the clutch release cylinder from the transaxle.
Remove the three bolts and stiffener plate.

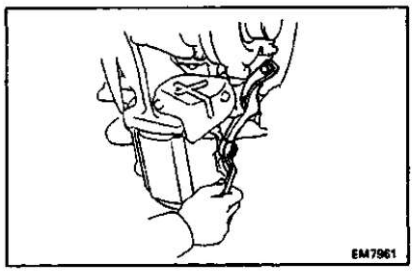


HINT: Suspend the clutch release cylinder to the suspension brace with a string.

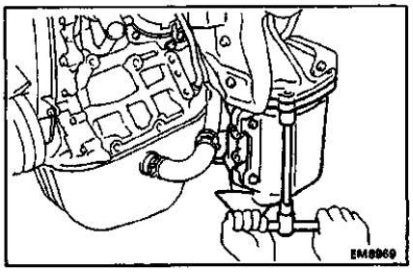


21. REMOVE MAIN TWC

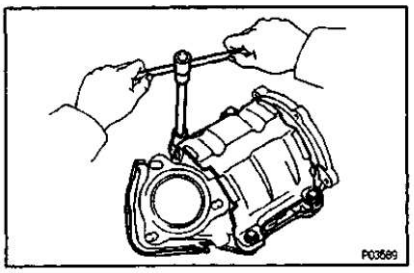
(a) Remove the four bolts and RH TWC stay.



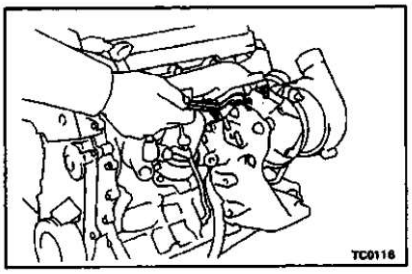
(b) Remove the three bolts and LH TWC stay.



(c) Remove the three bolts, two nuts, TWC, gasket, retainer and cushion.

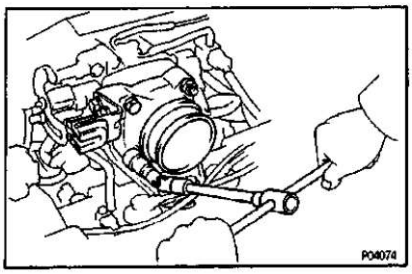


(d) Remove the nine bolts and two heat insulators from the TWC.



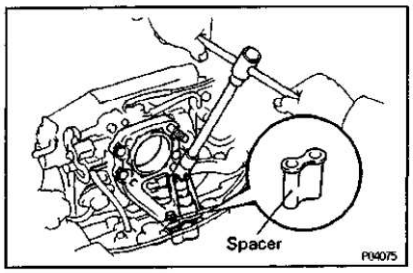
22. REMOVE TURBOCHARGER

(See Turbocharger Removal under Turbocharger System)



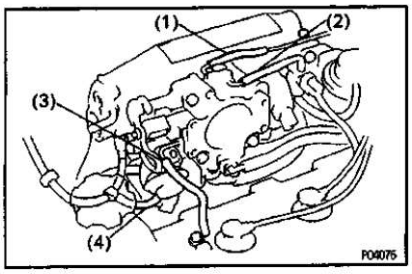
23. REMOVE INTAKE AIR CONNECTOR

Remove the two bolts, two nuts and intake air con–nector.



24. REMOVE INTAKE AIR CONNECTOR STAY

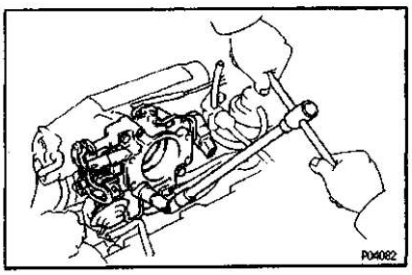
(a) Remove the six bolts and intake air connector stay.
(b) Remove the spacer.



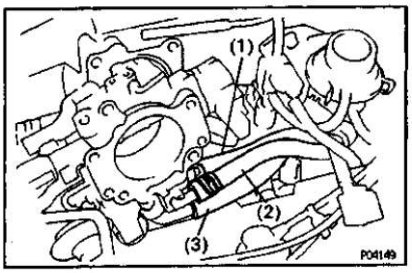
25. REMOVE THROTTLE BODY

(a) Disconnect the following connector:
- Throttle position sensor connector
- IACV connector

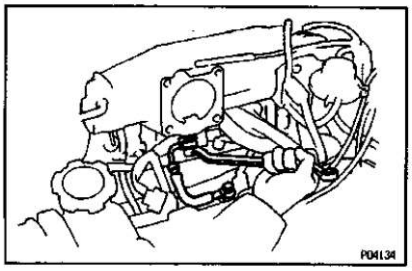
(b) Disconnect the following hoses:
(1) Vacuum hose from port ”P” of throttle body
(2) Vacuum hose from port ”E” of throttle body
(3) PCV hose from port PCV of throttle body
(4) Vacuum hose from throttle body opener



(c) Remove the four bolts, and disconnect the throttle body from the intake manifold.
(d) Remove the throttle body gasket.



(e) Disconnect the following hoses from the throttle body, and remove the throttle body:
(1) Water by–pass hose (from upper side of No.1 air tube)
(2) Water by–pass hose (from lower side of No. 1 air tube)
(3) Air hose (from No. 1 air tube)

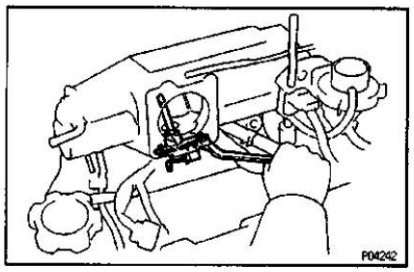


26. REMOVE COLD START INJECTOR PIPE

Remove the two union bolts, four gaskets and cold start injector pipe.

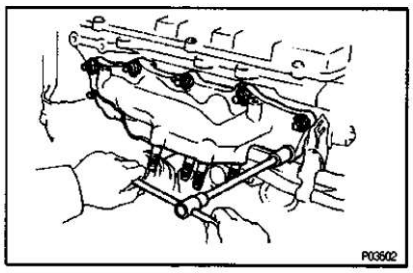
CAUTION:

- Put a suitable container or shop towel under the Injector pipe.
- Slowly loosen the union bolts.



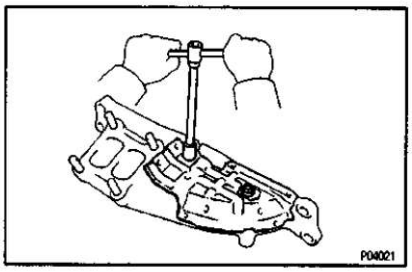
27. REMOVE COLD START INJECTOR

(a) Disconnect the cold start injector connector.
(b) Remove the two bolts, cold start injector and gasket.

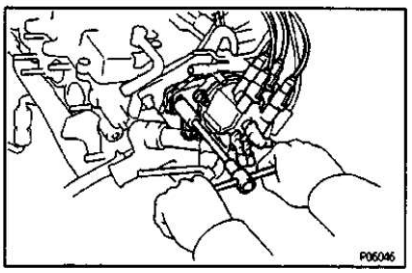


28. REMOVE EXHAUST MANIFOLD

(a) Remove the nine nuts, exhaust manifold and gasket.

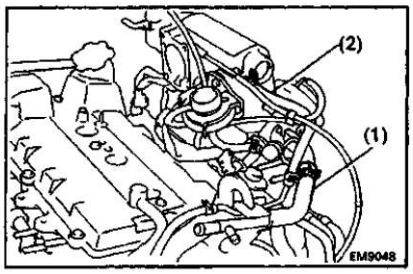


(b) Remove the bolt, nut and heat insulator.



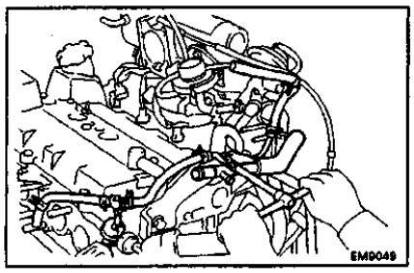
29. REMOVE DISTRIBUTOR

(a) Disconnect the high–tension cords from the spark plugs and ignition coil.
(b) Remove the two hold–down bolt, and pull out the distributor.
(c) Remove the 0–ring from the distributor housing.

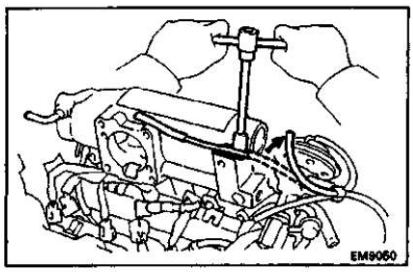


30. REMOVE NO.2 AIR TUBE

(a) Disconnect the following hoses:
(1) Air hose from No. 1 air tube
(2) Air hose from intake manifold

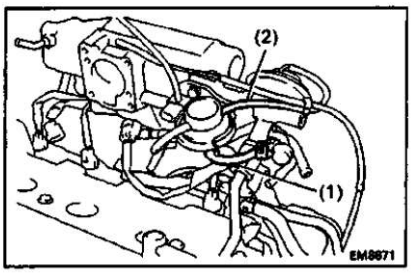


(b) Remove the bolt and No.2 air tube.



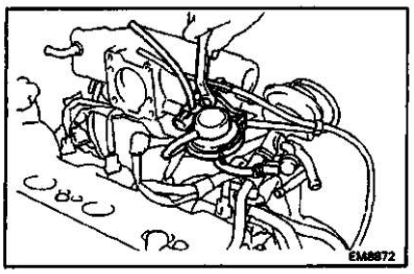
31. REMOVE LH ENGINE HANGER

Remove the two bolts and engine hanger.

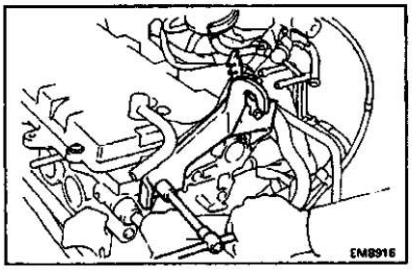


32. REMOVE EGR VACUUM MODULATOR AND VSV

(a) Disconnect the VSV connector.
(b) Disconnect the following hoses:
(1) EGR hose from EGR valve
(2) Vacuum hose from EGR vacuum modulator

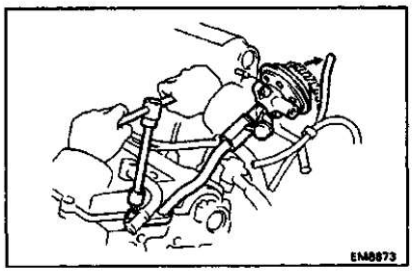


(c) Remove the bolt, the vacuum modulator and VSV assembly.



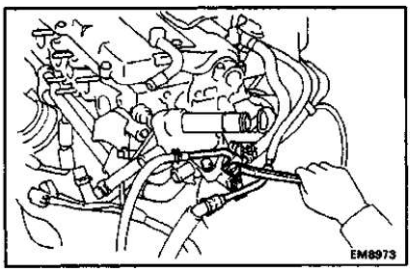
33. REMOVE VACUUM PIPE

(a) Disconnect the vacuum hose from the vacuum pipe.
(b) Remove the bolt and vacuum pipe.



34. REMOVE EGR VALVE AND PIPE

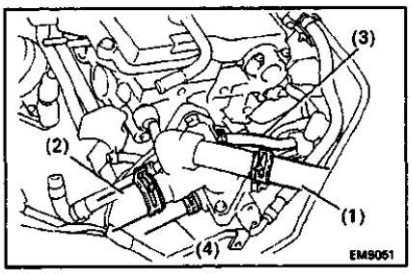
(a) Disconnect the vacuum hose from the EGR valve.
(b) Remove the four bolts, the EGR valve, pipe assembly and two gaskets.



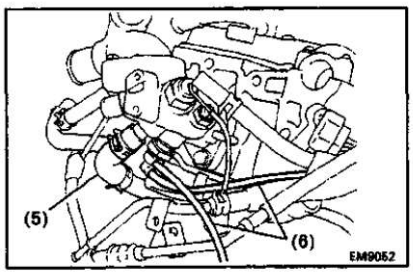
35. REMOVE WATER OUTLET AND HOUSING

(a) Disconnect the following connectors:
- Water temperature sender gauge connector
- ECTS connector
- Cold start injector time switch connector

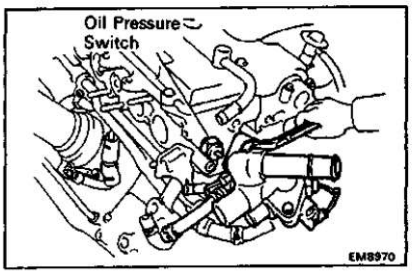
(b) Remove the bolt, and disconnect the fuel inlet hose.
(c) Remove the bolt, and disconnect the fuel return hose.



(d) Disconnect the following hoses:
(1) Water filler hose
(2) Radiator hose
(3) Water by–pass pipe hose from IACV
(4) Heater water hose

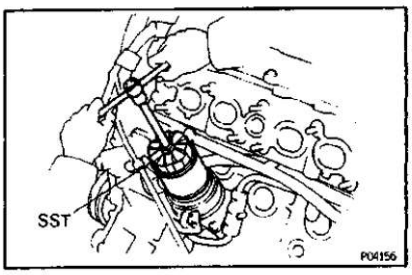


(5) Water by–pass hose from water by–pass pipe
(6) Two TVS (for EVAP) vacuum hoses



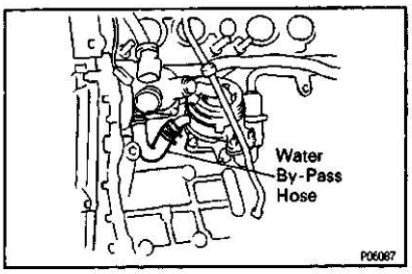
(e) Remove the two bolts, the water outlet, housing as–sembly and gasket.

36. REMOVE OIL PRESSURE SWITCH

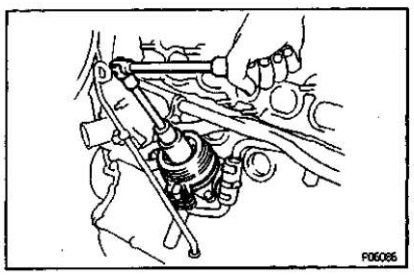


37. REMOVE OIL COOLER

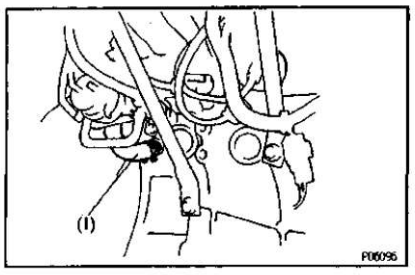
(a) Using SST, remove the oil filter.
SST 09228–06500



(b) Disconnect the water by – pass hose from the oil cooler.

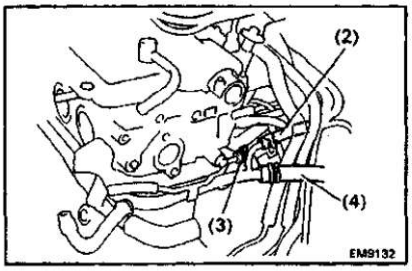


(c) Remove the relief valve and plate washer.
(d) Remove the two nuts and oil cooler.
(e) Remove the O–ring and gasket from the oil cooler.

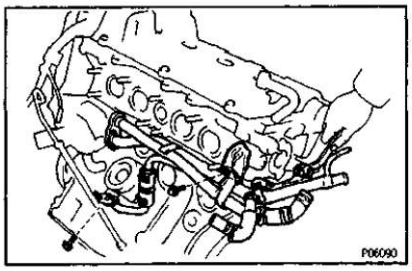


38. REMOVE WATER BY–PASS PIPE

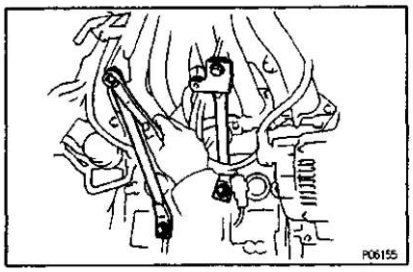
(a) Disconnect the following hoses:
(1) Water by–pass hose from cylinder block



(2) Water by–pass hoses from No.1 air tube
(3) Air hose from turbocharging pressure VSV
(4) Heater water hose

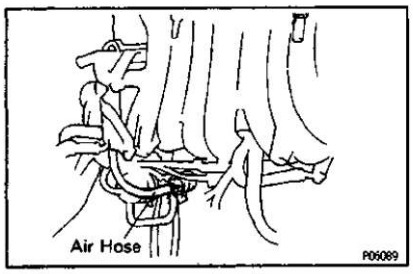


(b) Remove the three bolts, two nuts, water by–pass pipe, gasket and O–ring.



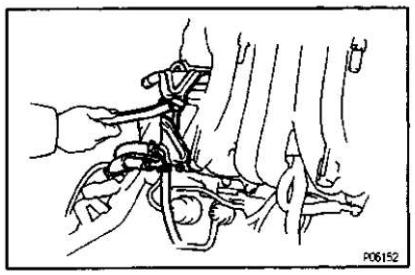
39. REMOVE INTAKE MANIFOLD STAYS

Remove the two bolts and manifold stay. Remove the two manifold stays.

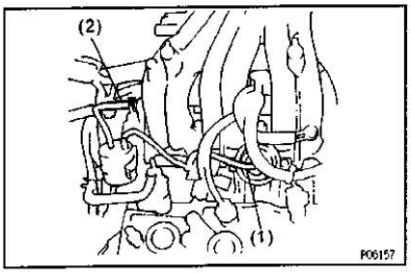


40. REMOVE NO.1 AIR TUBE

(a) Disconnect the air hose from the VSV (for turboch–arging pressure).



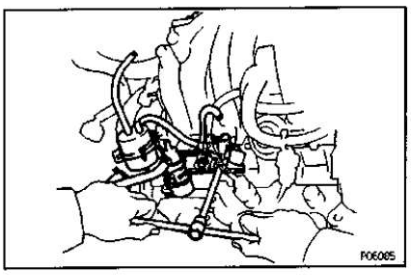
(b) Remove the two bolts and air tube.



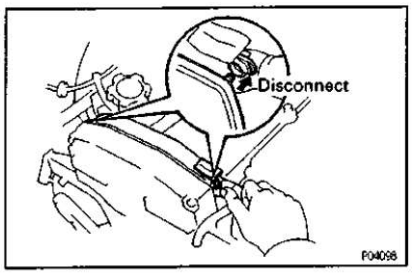
41. REMOVE T – VIS VACUUM TANK, VSV (FOR T – VIS), VSV (FOR TURBOCHARGING PRESSURE) AND BRACKET

(a) Disconnect the following connectors:
- VSV (for T–VIS) connector
- VSV (for turbocharging pressure) connector

(b) Disconnect the following hoses:
(1) Vacuum hose (from VSV for T–VIS) from T–VIS actuator
(2) Vacuum hose (from T–VIS vacuum tank) from intake manifold

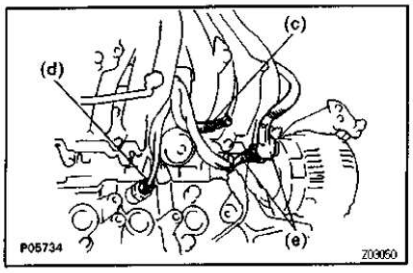


(c) Remove the two bolts, the T–VIS vacuum tank, VSV (for T–VIS), VSV (for turbocharging pressure) and bracket assembly.

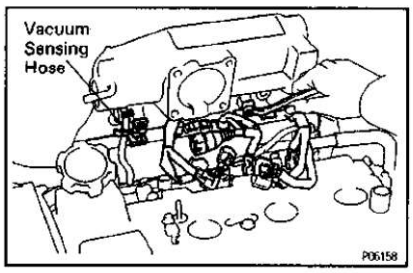


42. DISCONNECT ENGINE WIRE FROM INTAKE MANIFOLD

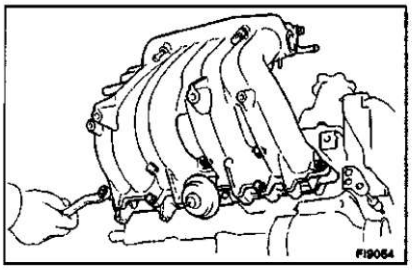
(a) Disconnect the two engine wire clamps from the mounting bolts on the No.2 timing belt covers.
(b) Disconnect the injector connector.



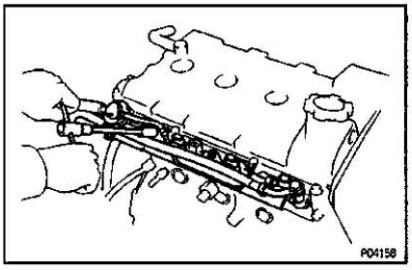
(c) Remove the bolt, and disconnect the ground strap.
(d) Disconnect the knock sensor connector.
(e) Disconnect the alternator wire and connector.



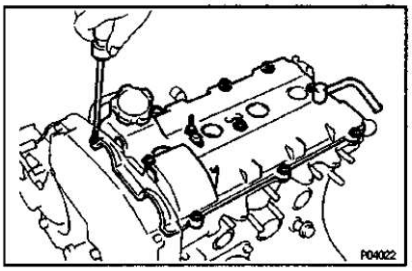
(f) Disconnect the vacuum sensing hose from the intake manifold.
(g) Remove the two bolts, and disconnect the engine wire from the intake manifold.



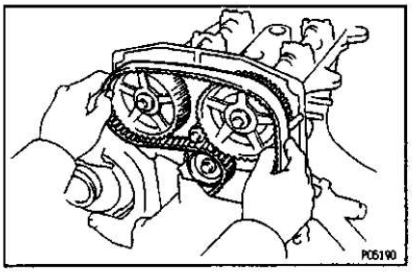
43. REMOVE INTAKE MANIFOLD AND T–VIS VALVE
Remove the four bolts, three nuts, intake manifold, T – VIS valve and two gaskets.



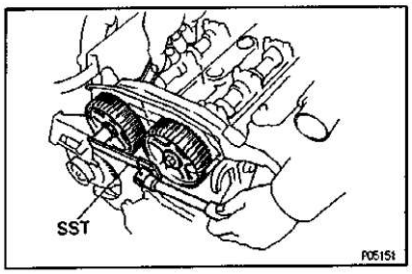
44. REMOVE DELIVERY PIPE ASSEMBLY
(a) Remove the three bolts and delivery pipe assembly.
(b) Remove the four insulators and three spacers.



45. REMOVE CYLINDER HEAD COVER
Remove the ten screws, seal washers, head cover and two gaskets.



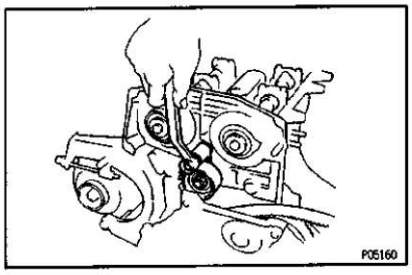
46. DISCONNECT TIMING BELT FROM CAMSHAFT TIMING PULLEYS
(See 11,13,16 to 18 and 23 to 26 under Timing Belt Removal)



47. REMOVE CAMSHAFT TIMING PULLEYS

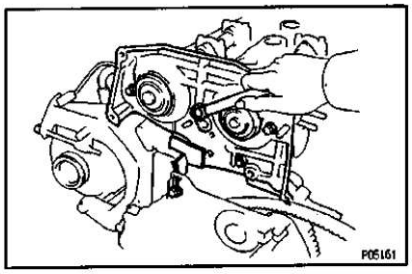
(a) Hold the hexagon wrench head portion of the cam–shaft with a wrench, and loosen the pulley bolt.
HINT (Intake camshaft timing pulley): Use SST.
SST 09249–63010

(b) Remove the bolt, timing pulley and pin. Remove the two timing pulleys.
HINT: Arrange the intake and exhaust timing pulleys.



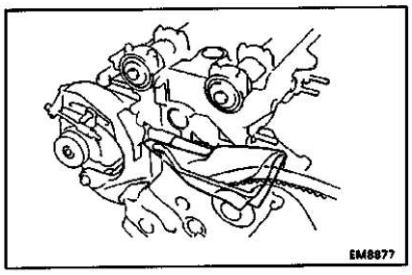
48. REMOVE NO.1 IDLER PULLEY

Remove the pivot bolt, pulley and plate washer.



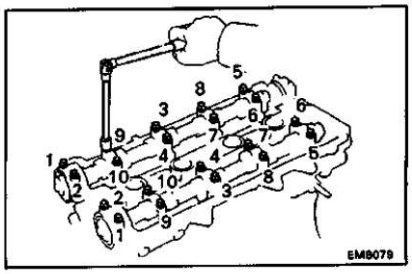
49. REMOVE NO.3 TIMING BELT COVER

Remove the five bolts and timing belt cover.



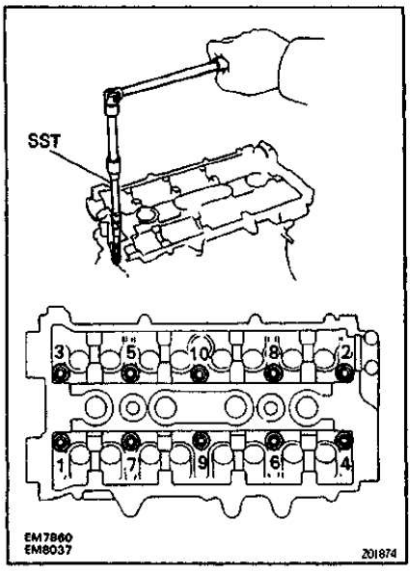
HINT:

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



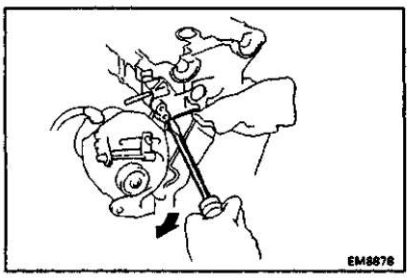
50. REMOVE CAMSHAFTS

Uniformly loosen and remove the tem bearing cap bolts in several passes, in the sequence shown, and remove the five bearing caps, oil seal and camshaft.
Remove the intake and exhaust camshafts.

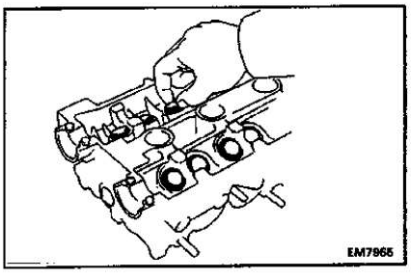


51. REMOVE CYLINDER HEAD

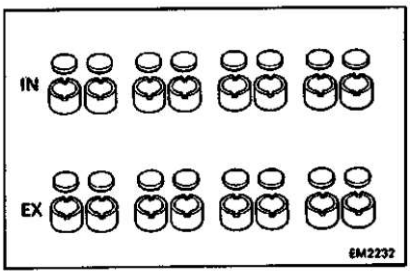
(a) Using SST, uniformly loosen and remove the ten cyl–inder head bolts in several passes, in the sequence shown.
SST 09043 – 38100
HINT: Cylinder head warpage or cracking could result from removing in the incorrect order.



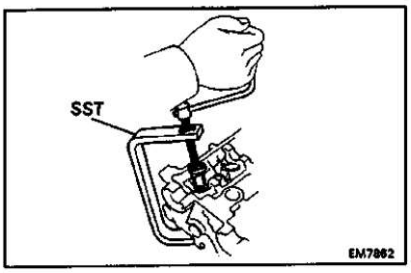
(b) Lift the cylinder head from the dowels on the cylinder block, and place the cylinder head on wooden blocks on a bench.
HINT: If the cylinder head is difficult to lift off, pry between the cylinder head and cylinder block with a screwdriver.
NOTICE: Be careful not to damage the contact surfaces of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



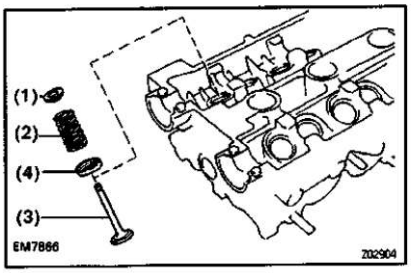
CYLINDER HEAD DISASSEMBLY
(See Components for Removal and Installation)
1. REMOVE VALVE LIFTERS AND SHIMS



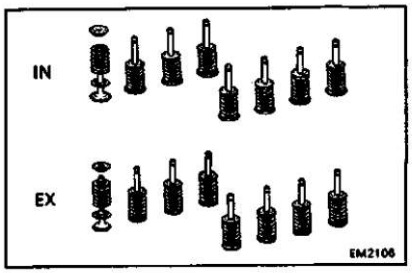
HINT: Arrange the valve lifters and shims in correct order.



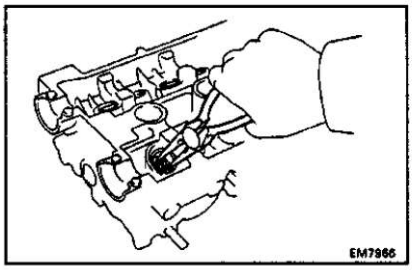
2. REMOVE VALVES
(a) Using SST, compress the valve spring and remove the two keepers.
SST 09202–70010



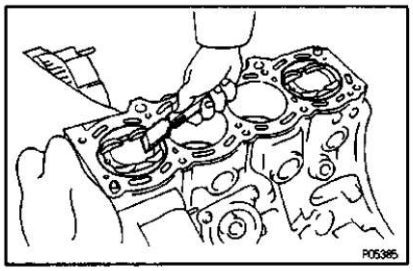
(b) Remove the following parts:
(1) Spring retainer
(2) Valve spring
(3) Valve
(4) Spring seat



HINT: Arrange the valves, valve springs, spring seats and spring retainers incorrect order.



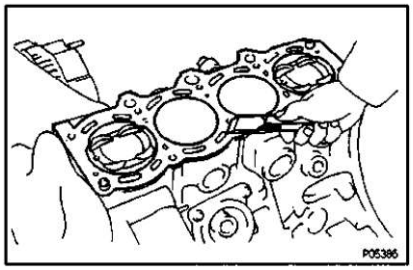
(c) Using needle –nose pliers, remove the oil seal.



CYLINDER HEAD COMPONENTS INSPECTION AND REPAIR

1. CLEAN TOP SURFACES OF PISTONS AND CYLIN– DER BLOCK

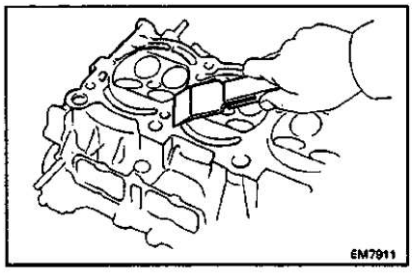
(a) Turn the crankshaft, and bring each piston to top dead center (TDC). Using a gasket scraper, remove all the carbon from the piston top surface.



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

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

CAUTION: Protect your eyes when using high – com– pressed air.

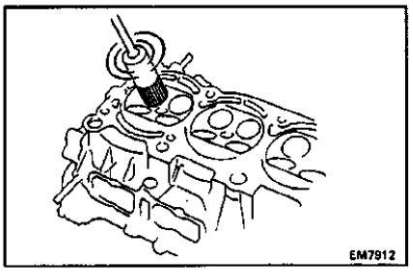


2. CLEAN CYLINDER HEAD

A. Remove gasket material

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

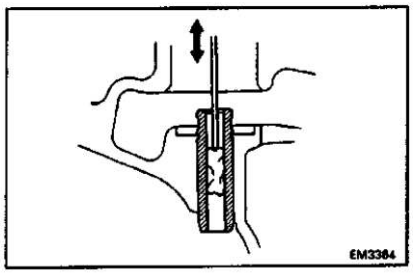
NOTICE: Be careful not to scratch the cylinder block contact surface.



B. Clean combustion chambers

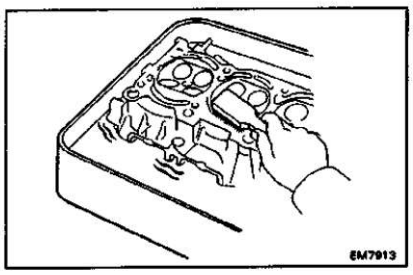
Using a wire brush, remove all the carbon from the combustion chambers.

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



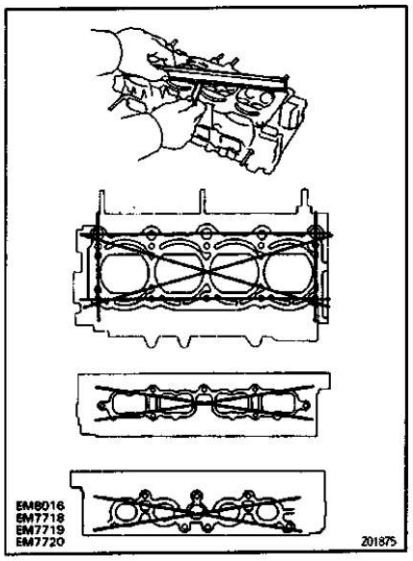
C. Clean valve guide bushings

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



D. Clean cylinder head

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



3. INSPECT CYLINDER HEAD

A. Inspect for flatness

Using precision straight edge and feeler gauge, measure the surfaces contacting the cylinder block, T–VIS valve and the manifold for warpage.

Maximum warpage:

Cylinder block side

0.20 mm (0.0079 in.)

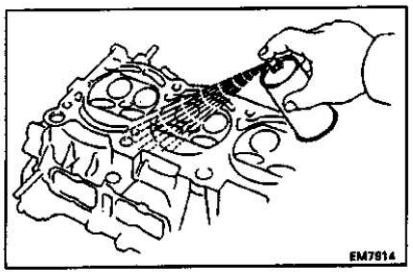
T – VIS valve side

0.20 mm (0.0079 in.)

Exhaust manifold side

0.30 mm (0.0118 in.)

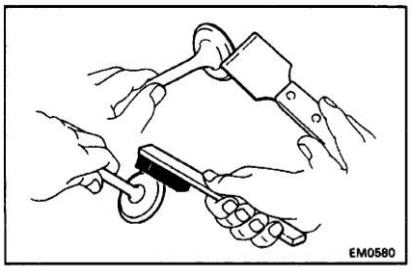
If warpage is greater than maximum, replace the cylinder head.



B. Inspect for cracks

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

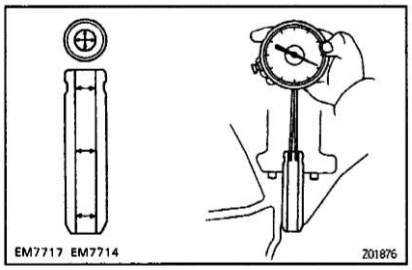
If cracked, replace the cylinder head.



4. CLEAN VALVES

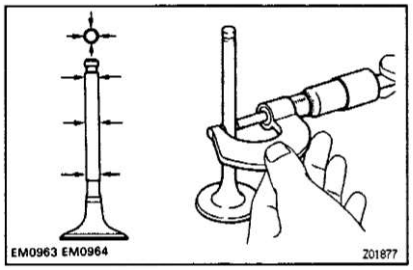
(a) Using a gasket scraper, chip off any carbon from the valve head.

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



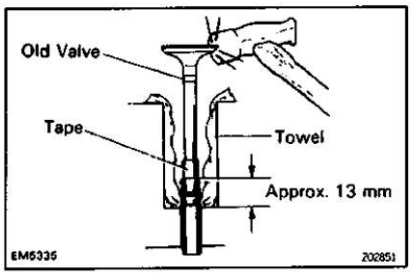
5. INSPECT VALVE STEMS AND GUIDE BUSHINGS

(a) Using a caliper gauge, measure the inside diameter of the guide bushing.
Bushing inside diameter:
6.000–6.018 mm (0.2362–0.2369 in.)



(b) Using a micrometer, measure the diameter of the valve stem.
Valve stem diameter:
Intake
5.960 – 5.975 mm (0.2346 – 0.2352 in.)
Exhaust
5.955 – 5.970 mm (0.2344 – 0.2350 in.)

(c) Subtract the valve stem diameter measurement from the guide bushing inside diameter measurement.
Standard oil clearance:
Intake
0.025 – 0.058 mm (0.0010 – 0.0023 in.)
Exhaust
0.030 – 0.063 mm (0.0012 – 0.0025 in.)
Maximum oil clearance:
Intake
0.08 mm (0.0031 in.)
Exhaust
0.10 mm (0.0039 in.)
If the clearance is greater than maximum, replace the valve and guide bushing.



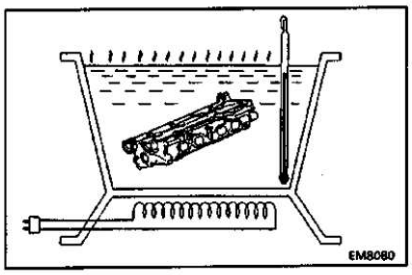
6. IF NECESSARY, REPLACE VALVE GUIDE BUSHINGS

(a) (w/ Snap Ring)

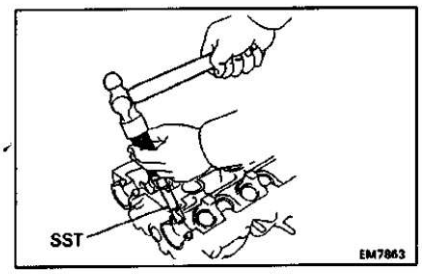
Insert an old valve wrapped with tape into the valve guide bushing, and break off the valve guide bushing by hitting it with a hammer. Remove the snap ring.

HINT: Wrap the tape approx. 13 mm (0.51 in.) from the valve stem end.

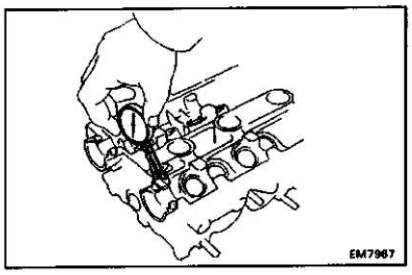
NOTICE: Be careful not to damage the valve lifter hole.



(b) Gradually heat the cylinder head to 80–100°C (176–212° F).



(c) Using SST and a hammer, tap out the guide bushing.
SST 09201 – 70010



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

Both intake and exhaust

Bushing bore diameter mm (in.)	Bushing size
10.988 – 11.006 (0.432fi – 0.4333)	Use STD
11.038 – 11.056 (0.4346 – 0.4353)	Use 0/S 0.05

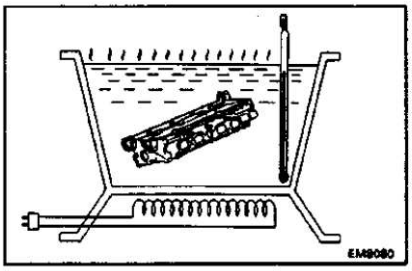
V00855

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

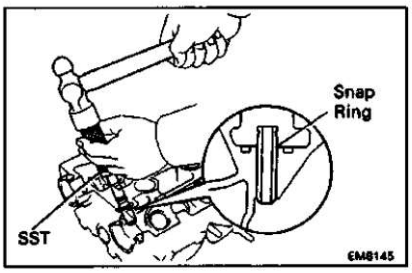
If the bushing bore diameter of the cylinder head is greater than 11.006 mm (0.4333 in.), machine the bushing bore to the following dimension:

11.038 – 11.056 mm (0.4346 – 0.4353 in.)

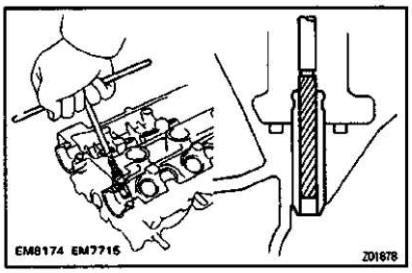
If the bushing bore diameter of the cylinder head is greater than 11.056 mm (0.4353 in.), replace the cylinder head.



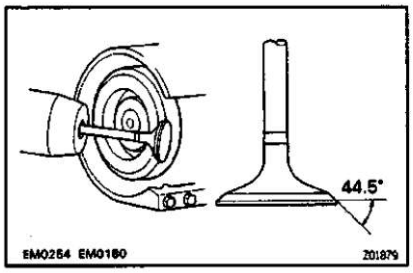
(f) Gradually heat the cylinder head to 80–100°C (176–212" F).



(g) Using SST and a hammer, tap in a new guide bushing until the snap ring makes contact with the cylinder head.
SST 09201– 70010



(h) Using a sharp 6 mm reamer, ream the guide bushing to obtain the specified clearance (see step 5 above) between the guide bushing and valve stem.



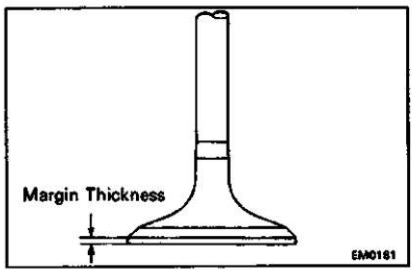
7. INSPECT AND GRIND VALVES

(a) Grind the valve enough to remove pits and carbon.

(b) Check that the valve is ground to the correct valve face angle.

Valve face angle:

44.5°



(c) Check the valve head margin thickness.

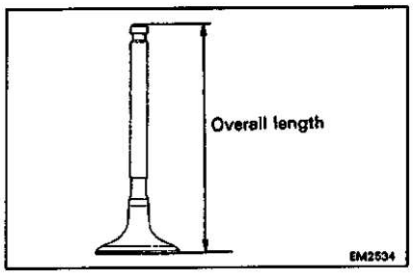
Standard margin thickness:

0.8 – 1.2 mm (0.031 – 0.047 in.)

Minimum margin thickness:

0.5 mm (0.020 in.)

If the margin thickness is less than minimum, replace the valve.



(d) Check the valve overall length.

Standard overall length:

Intake

105.50 mm (4.1535 in.)

Exhaust

99.55 mm (3.9193 in.)

Minimum overall length:

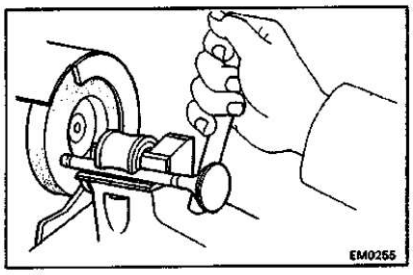
Intake

104.80 mm (4.1260 in.)

Exhaust

98.85 mm (3.8917 in.)

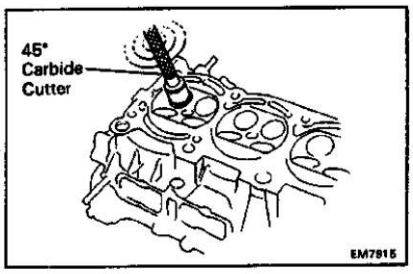
If the overall length is less than minimum, replace the valve.



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

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

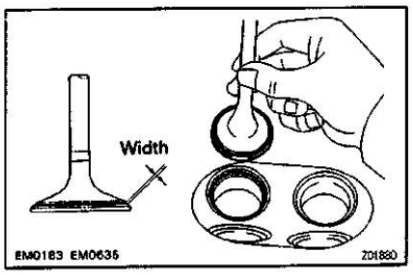
NOTICE: Do not grind off more than minimum.



8. INSPECT AND CLEAN VALVE SEATS

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

Remove only enough metal to clean the seats.



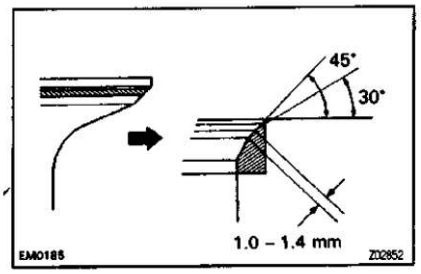
(b) Check the valve seating position.

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

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

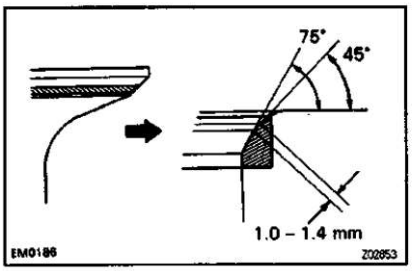
- If blue appears 360° around the face, the valve is concentric. If not, replace the valve.
- If blue appears 380° around the valve seat, the guide and face are concentric. If not, resurface the seat.
- Check that the seat contact is in the middle of the valve face with the following width:

1.0 – 1.4 mm (0.039 – 0.055 in.)

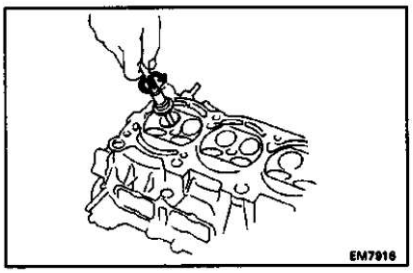


If not, correct the valve seats as follows:

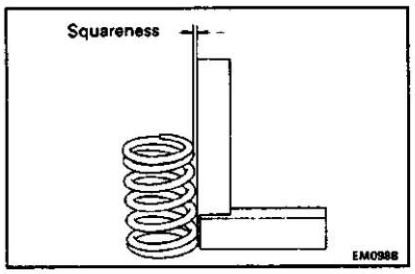
(1) If the seating is too high on the valve face, use 30° and 45° cutters to correct the seat.



(2) If the seating is too low on the valve face, use 75° and 45° cutters to correct the seat.



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



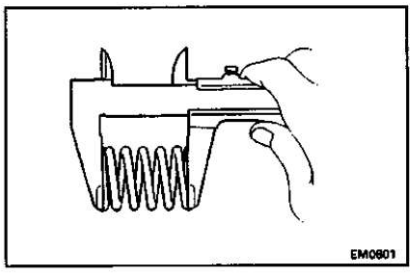
9. INSPECT VALVE SPRINGS

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

Maximum squareness:

2.0 mm (0.079 in.)

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

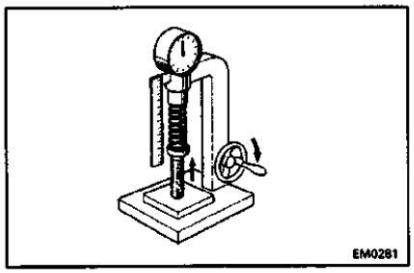


(b) Using a vernier caliper, measure the free length of the valve spring.

Free length: .

44.43 mm (1.7492 in.)

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



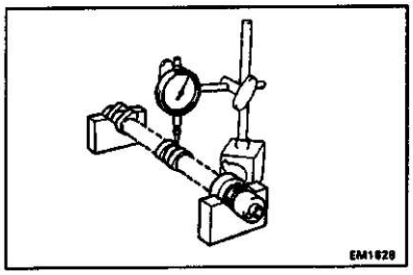
(c) Using a spring tester, measure the tension of the valve spring at the specified installed length.

Installed tension:

201 – 236 N (20.5 – 24.1 kgf, 45.2 – 53.1 lbf)

at 34.4 mm (1.354 in.)

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



10. INSPECT CAMSHAFTS AND BEARINGS

A. Inspect camshaft for runout

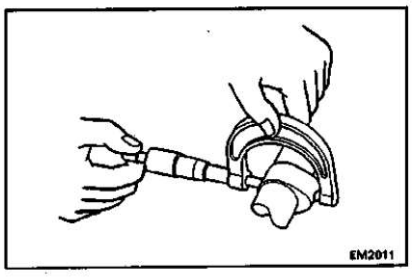
(a) Place the camshaft on V – blocks.

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

Maximum circle runout:

0.06 mm 10.0024 in.)

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



B. Inspect cam lobes

Using a micrometer, measure the cam lobe height.

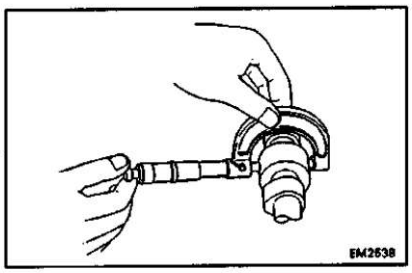
Standard cam lobe height:

41.010 – 41.110 mm (1.6146 – 1.6185 in.)

Minimum cam lobe height:

39.90 mm, (1.5709 in.)

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



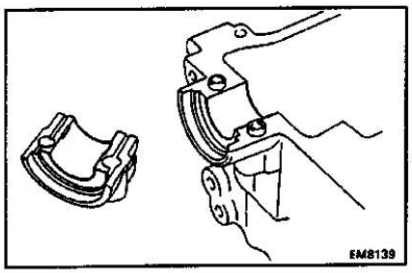
C. Inspect camshaft journals

Using a micrometer, measure the journal diameter.

Journal diameter:

26.959 – 26.975 mm (1.0614 – 1.0620 in.)

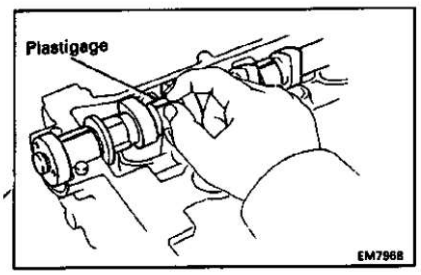
If the journal diameter is not as specified, check the oil clearance.



D. Inspect camshaft bearings

Check that bearings for flaking and scoring.

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

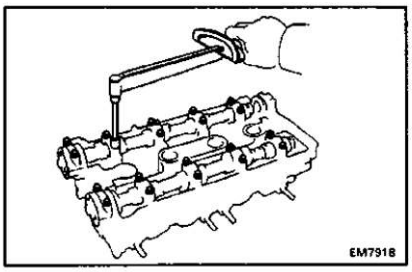


E. Inspect camshaft journal oil clearance

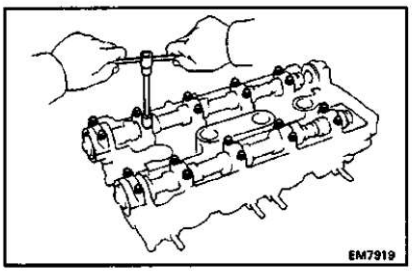
(a) Clean the bearing caps and camshaft journals.

(b) Place the camshafts on the cylinder head.

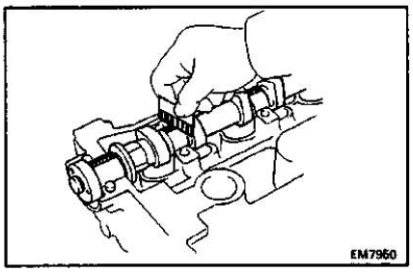
(c) Lay a strip of Plastigage across each of the camshaft journals.



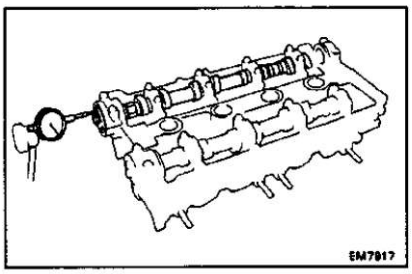
(d) Install the bearing caps.
(See step 2 in Cylinder Head Installation)
Torque: 19 N–m (190 kgf–cm, 14 ft–lbf)
NOTICE: Do not turn the camshaft.



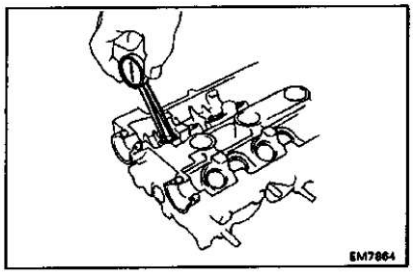
(e) Remove the bearing caps.



(f) Measure the Plastigage at its widest point.
Standard oil clearance:
0.025 – 0.062 mm (0.0010 – 0.0024 in.)
Maximum oil clearance:
0.08 mm (0.0031 in.)
If the oil clearance is greater than maximum, replace the camshaft. If necessary, replace the bearing caps and cylinder head as a set.
(g) Completely remove the Plastigage.

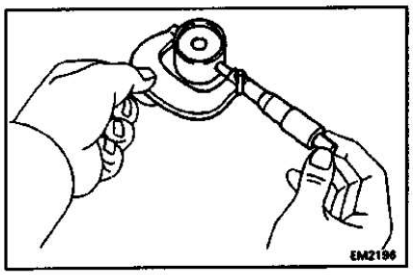


F. Inspect camshaft thrust clearance
(a) Install the camshaft.
(See step 2 in Cylinder Head Installation)
(b) Using a dial indicator, measure the thrust clearance while moving the camshaft back and forth.
Standard thrust clearance:
0.120 – 0.240 mm (0.0047 – 0.0094 in.)
Maximum thrust clearance:
0.30 mm (0.0118 in.)
If the thrust clearance is greater than maximum, re–place the camshaft. If necessary, replace the bearing caps and cylinder head as a set.



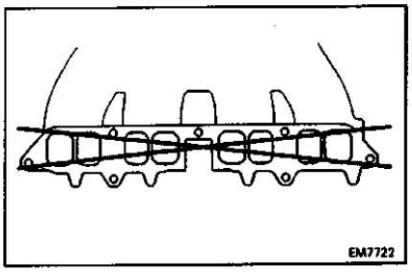
11. INSPECT VALVE LIFTERS AND LIFTER BORES

(a) Using a caliper gauge, measure the lifter bore diame–ter of the clinder head.
Lifter bore diameter:
28.000 – 28.021 mm (1.1024 – 1.1032 in.)



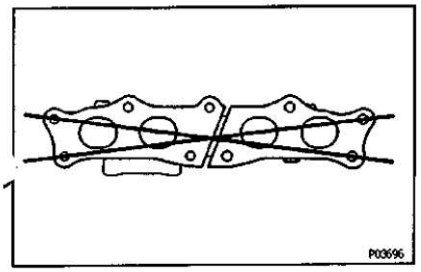
(b) Using a micrometer, measure the lifter diameter.
Lifter diameter:
27.975 – 27.985 mm (1.1014 – 1.1018 in.)

(c) Subtract the lifter diameter measurement from the lifter bore diameter measurement.
Standard oil clearance:
0.015 – 0.046 mm (0.0005 – 0.0018 in.)
Maximum oil clearance:
0.07 mm (0.0028 in.)
If the oil clearance is greater than maximum, replace the lifter. If necessary, replace the cylinder head.

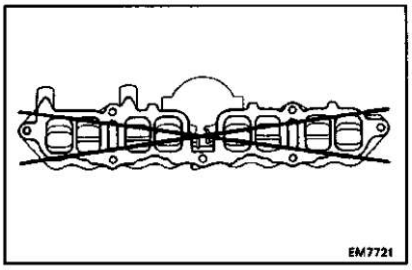


12. INSPECT MANIFOLDS

(intake manifold)
Using precision straight edge and feeler gauge, mea–sure the surface contacting the T – VIS valve for warpage.
Maximum warpage:
0.20 mm (0.0079 in.)
If warpage is greater than maximum, replace the intake manifold.



(Exhaust manifold)
Using precision straight edge and feeler– gauge, mea–sure the surface contacting the cylinder head for warpage.
Maximum warpage:
0.20 mm (0.0079 in.)
If warpage is greater than maximum, replace the ex–haust manifold.



TOYOTA–VARIABLE INDUCTION SYSTEM (T–VIS) COMPONENTS INSPECTION

1. INSPECT T–VIS VALVE

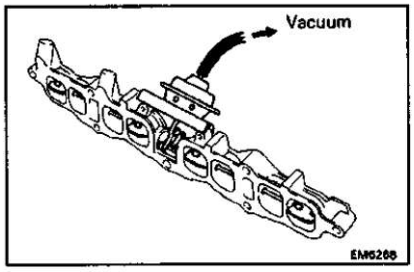
A. Inspect for flantness

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

Maximum warpage:

0.20 mm (0.0079 in.)

If warpage is greater than maximum, replace the T–VIS valve.

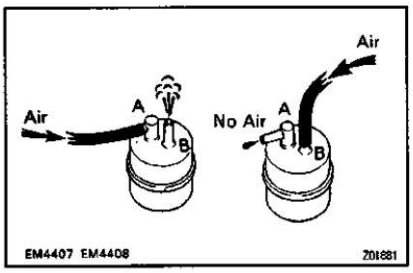


B. Inspect for operation

(a) With 53.3 kPa (400 mmHg, 15.75 in.Hg) of vacuum applied to the actuator, check that the control valve moves smoothly to the fully closed position.

(b) With the vacuum released, check that the control valve fully opens quickly.

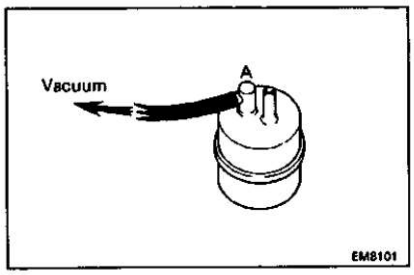
If operation is not as specified, replace the T–VIS valve.



2. INSPECT VACUUM TANK

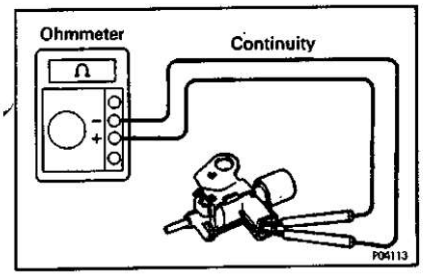
(a) Check that air flows from port A to port B.

(b) Check that air does not flow from ports B to A.



(c) Apply 67.7 kPa (500 mmHg, 19.69 in.Hg) of vacuum to port A, and check that there is no change in vacuum after one minute.

If operation is not as specified, replace the vacuum tank.



3. INSPECT VSV

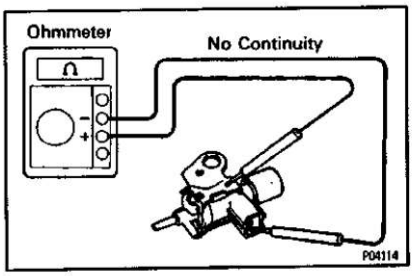
A. Inspect VSV for open circuit

Using an ohmmeter, check that there is continuity between the terminals.

Resistance (Cold):

33–39 Ω

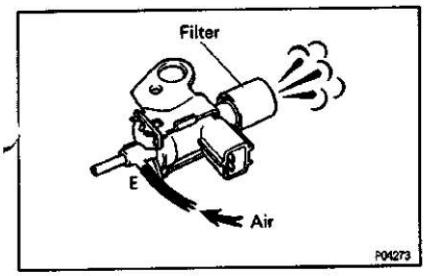
If there is no continuity, replace the VSV.



B. Inspect VSV for ground

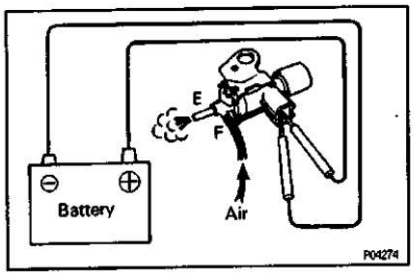
Using an ohmmeter, check that there is no continuity between each terminal and the body.

If there is continuity, replace the VSV.



C. Inspect VSV operation

(a) Check that the air flows from port E to the filter.



(b) Apply battery voltage across the terminals.

(c) Check that the air flows from port E to port F.

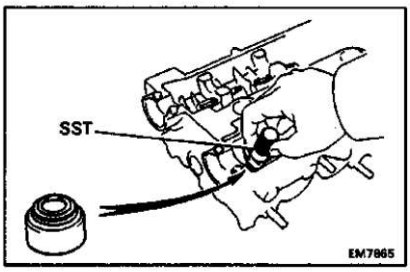
If operation is not as specified, replace the VSV.

CYLINDER HEAD ASSEMBLY

(See Components for Removal and Installation)

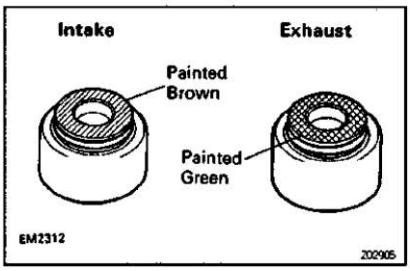
HINT:

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

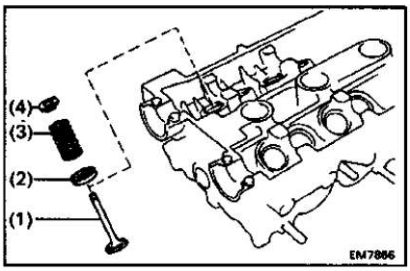


1. INSTALL VALVES

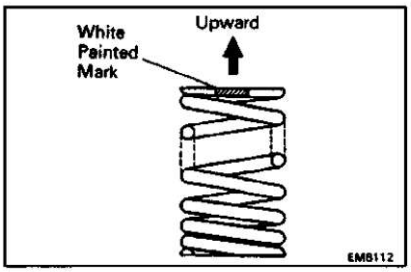
(a) Using SST, push in a new oil seal.
SST 09201–41020



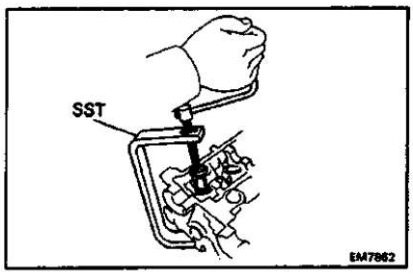
HINT: The intake valve oil seal is brown and the exhaust valve oil seal is green.



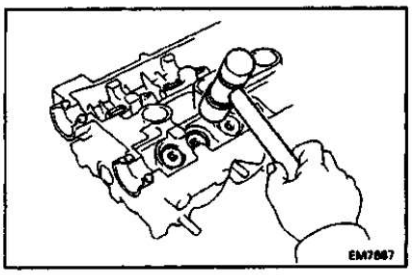
(b) Install the following parts:
(1) Valve
(2) Spring seat
(3) Valve spring
(4) Spring retainer



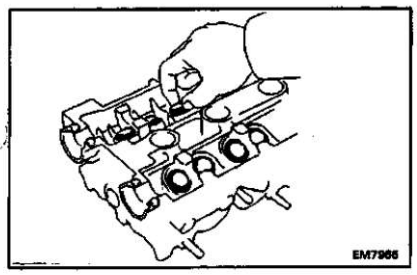
HINT: Install the valve spring, facing the white painted
mark upward.



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

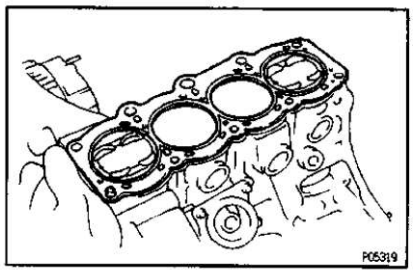


(d) Using a plastic–faced hammer, lightly tap the valve stern tip to assure proper fit.



2. INSTALL VALVE LIFTERS AND SHIMS

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



CYLINDER HEAD INSTALLATION

600WJ–01

(See Components for Removal and Installation)

1. INSTALL CYLINDER HEAD

A. Place cylinder head on cylinder block

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

NOTICE: Be careful of the installation direction.

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

B. Install cylinder head bolts

HINT:

- The cylinder head bolts are tightened in two progressive steps (steps (b) and (d)).
- If any cylinder head bolt is broken or deformed, replace it.

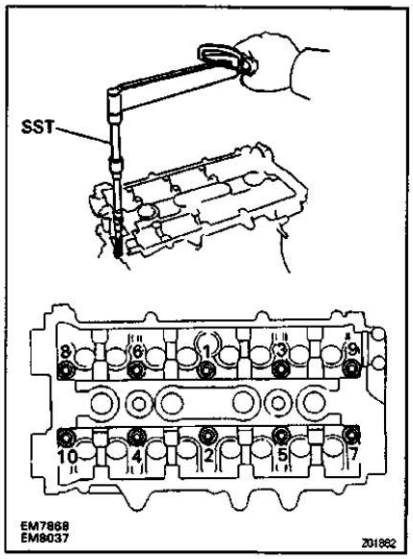
(a) Apply a light coat of engine oil on the threads and under the heads of the cylinder head bolts.

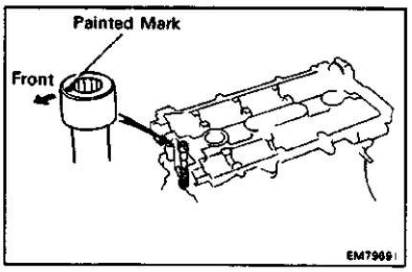
(b) Using SST, install and uniformly tighten the ten cyl–inder head bolts in several passes, in the sequence shown.

SST 09043 – 38100

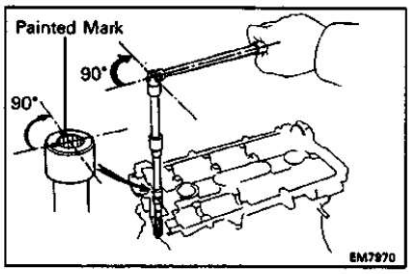
Torque: 49 N–m (500 kgf–cm, 36 ft–lbf)

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



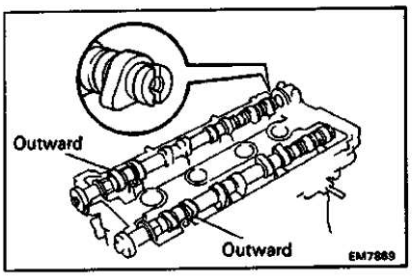


(c) Mark the front of the cylinder head bolt head with paint.



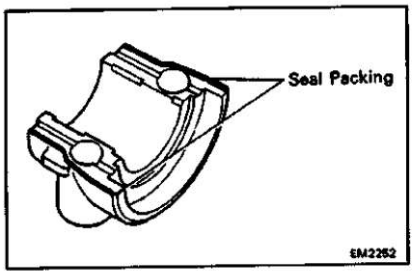
(d) Retighten the cylinder head bolts 90° in the numerical order shown.

(e) Check that the painted mark is now at a 90° angle to front.

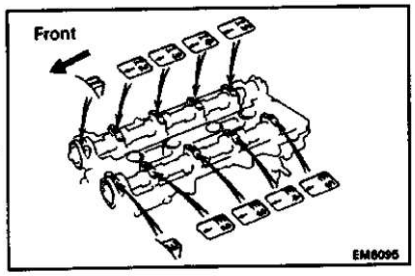


2. INSTALL CAMSHAFTS

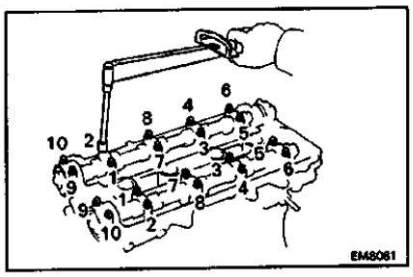
(a) Place the camshaft on the cylinder head with the No. 1 cam lobe facing outward as shown.



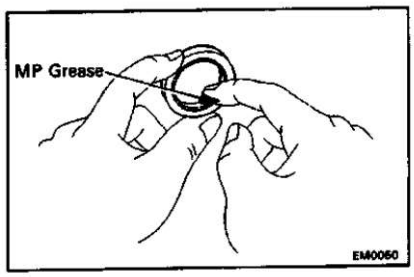
(b) Apply seal packing to the No. 1 bearing cap as shown.
Seal packing: Part No. 08826–00080 or equivalent



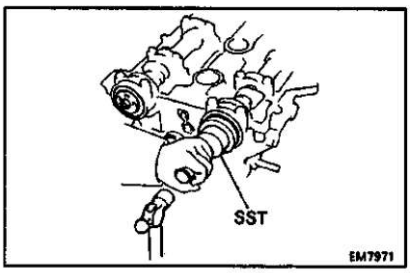
(c) Install the bearing caps in their proper locations.
HINT: Each bearing cap has a number and front mark.



(d) Apply a light coat of engine oil on the threads and under the heads of the bearing cap bolts.
(e) Install and uniformly tighten the ten bearing cap bolts on one side in several passes, in the sequence shown.
Torque: 19 N–m (190 kgf–cm, 14 ft–lbf)



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



(9) Using SST, tap in the two camshaft oil seals.
SST 09223–50010

3. ADJUST VALVE CLEARANCE (See Tune–Up)

Turn the camshaft and position the cam lobe upward, check and adjust the valve clearance.

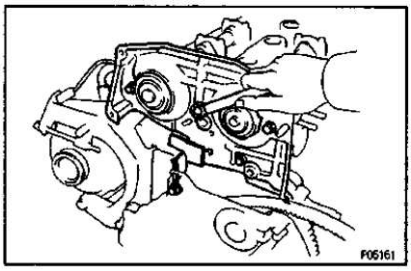
Valve clearance (Cold):

Intake

0.15 – 0.25 mm (0.006 – 0.010 in.)

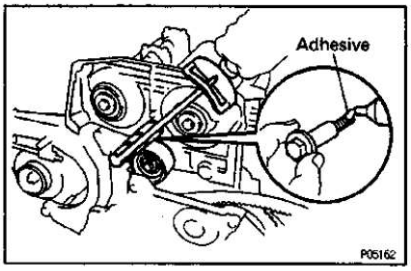
Exhaust

0.28 – 0.38 mm (0.011 – 0.015 in.)



4. INSTALL NO–3 TIMING BELT COVER

Install the No.3 belt cover with the five bolts.
Torque: 8.8 N–m (90 kgf–cm, 78 ft–lbf)



5. INSTALL NO.1 IDLER PULLEY

(a) Apply adhesive two or three threads of the pivot bolt.

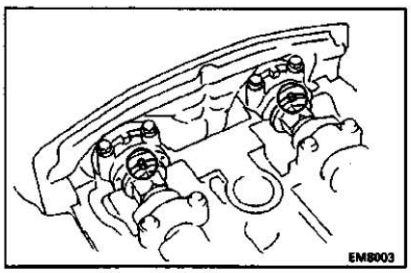
Adhesive:

Part No. 08833–00080,THREE BOND 1344, LOCTITE 242 or equivalent

(b) Install the plate washer and pulley with the pivot bolt.

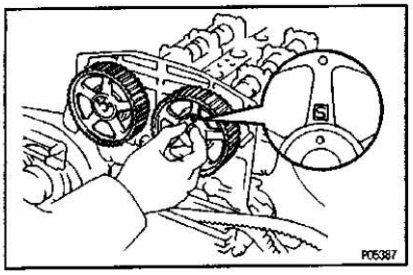
Torque: 52 N–m (530 kgf–cm, 38 ft–lbf)

(c) Check that the idler pulley moves smoothly.

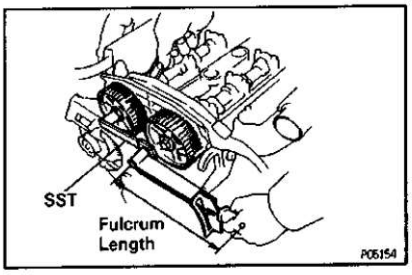


6. INSTALL CAMSHAFT TIMING PULLEY

(a) Using a wrench, turn and align the groove of the camshaft with the dot mark of the No.1 camshaft bearing cap.



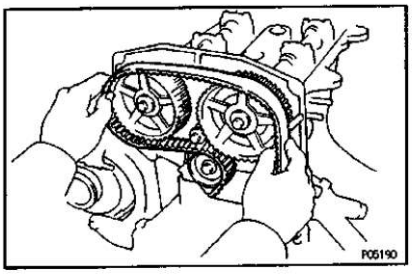
(b) Slide the timing pulley onto the camshaft facing mark "S" upward.
(c) Align the pin holes of the camshaft and timing pulley, and insert the knock pin.

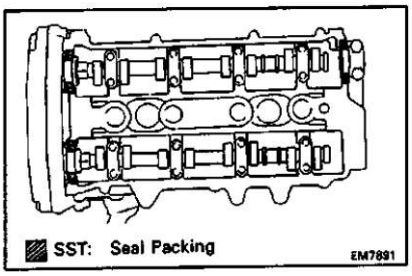


(d) Hold the hexagon wrench portion of the camshaft with a wrench and tighten the bolts.
Torque:
59 N–m (600 kgf–cm, 43 ft–lbf)
41 N–m (420 kgf–cm, 30 ft–lbf) for SST
HINT (Intake camshaft timing pulley):
- Use SST.

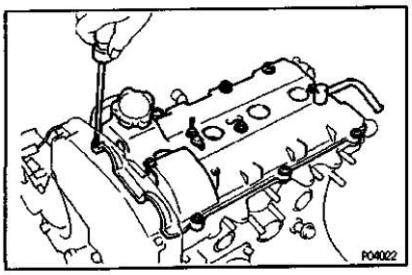
SST 09249–63010
- Use a torque wrench with a fulcrum length of 340 mm (13.39 in.).

7. CONNECT TIMING BELT TO CAMSHAFT TIMING PULLEYS (See steps 10 to 16, 21 to 23 and 27 in Timing Belt Installation)

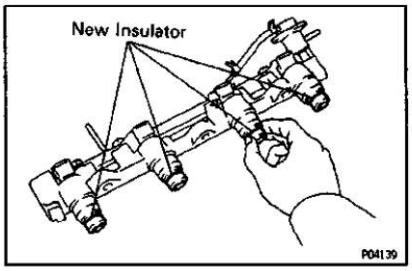




8. INSTALL CYLINDER HEAD COVER
(a) Apply seal packing to the cylinder head as shown in the illustration.
Seal packing:
Part No. 08826–00080 or equivalent

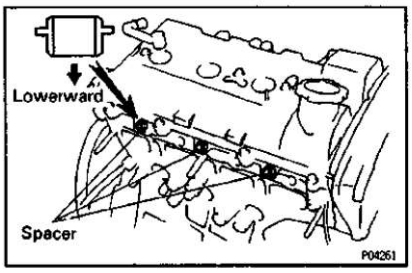


(b) Install the two gaskets to the head cover.
(c) Install the head cover with the twelve seal washers and screws. Uniformly tighten the screw in several passes.
Torque: 2.5 N–m (25 kgf–cm, 21 in.¿lbf)

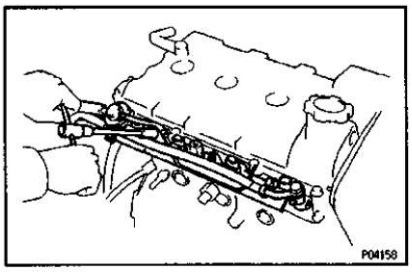


9. INSTALL DELIVERY PIPE ASSEMBLY

(a) Install four new insulators to the delivery pipe.



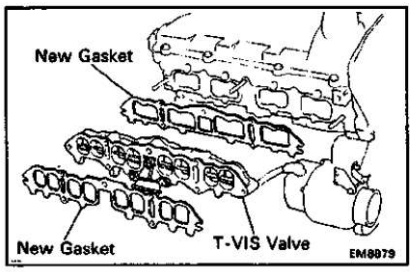
(b) Install the three spacers to the cylinder head.



(c) Attach the delivery pipe assembly to the cylinder head.

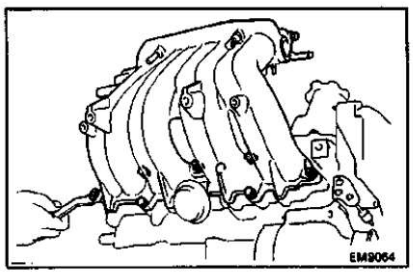
(d) Install the delivery pipe assembly with the three bolts.

Torque: 19 N–m (195 kgf–cm, 14 ft–lbf)



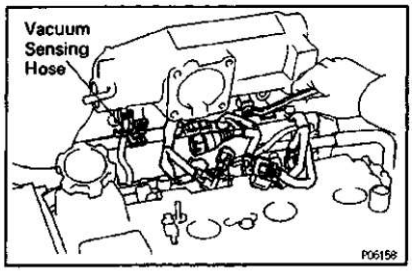
10. INSTALL T–VIS VALVE AND INTAKE MANIFOLD

(a) Place a new gasket, the T–VIS valve and the other new gasket on the cylinder head.



(b) Install the intake manifold with the four bolts and three nuts. Uniformly tighten the bolts and nuts in several passes.

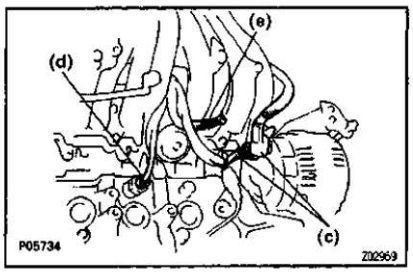
Torque: 19 N–m (195 kgf–cm, 14 ft–lbf)



11. INSTALL ENGINE WIRE TO INTAKE MANIFOLD

(a) Install the engine wire clamp to the intake manifold with the two bolts.

(b) Connect the vacuum sensing hose to the intake manifold.



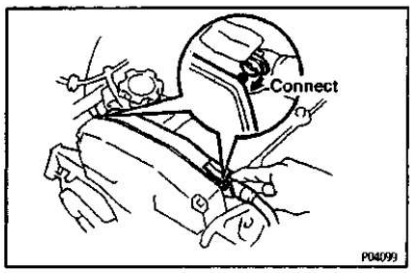
(c) Connect the alternator wire and connector.

(d) Connect the knock sensor connector.

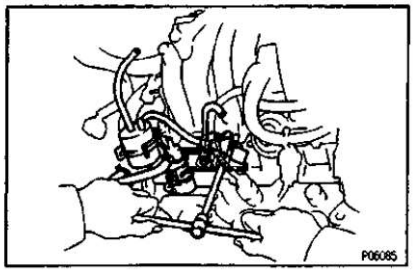
(e) Connect the ground strap with the bolt.

(f) Connect the injector connectors.

HINT: No.1 and No.3 injector connectors are brown, No.2 and No.4 injector connectors are gray.

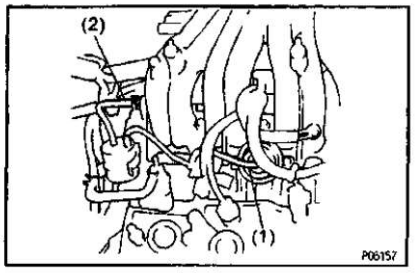


(g) Install the two clamps to the mounting bolts of the No. 2 timing belt cover.



12. INSTALL T–VIS VACUUM TANK, VSV (FOR T–VIS) AND VSV (FOR TURBOCHARGING PRESSURE) ASSEMBLY

(a) Install the T–VIS vacuum tank, VSV (for T–VIS) and VSV (for turbocharging pressure) assembly with the two bolts.



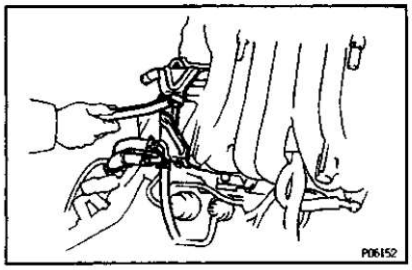
(b) Connect the following hoses:

(1) Vacuum hose (from VSV for T–VIS) to T–VIS actuator

(2) Vacuum hose (from T – VIS vacuum tank) to intake manifold

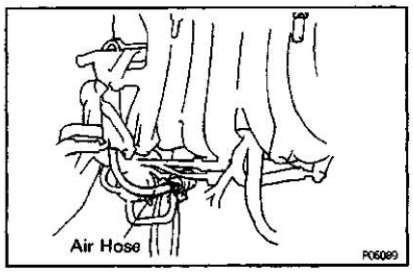
(c) Connect the following connectors:

- VSV (for T–VIS) connector
- VSV (for turbocharging pressure) connector

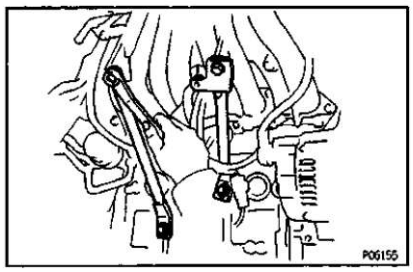


13. INSTALL NO.1 AIR TUBE

(a) Install the air tube with the two bolts.



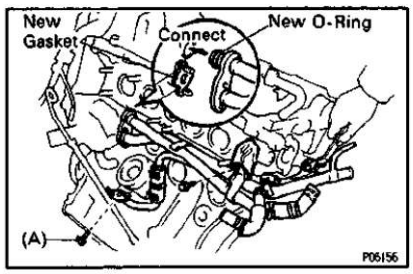
(b) Connect the air hose to the VSV (for turbocharging pressure).



14. INSTALL INTAKE MANIFOLD STAYS

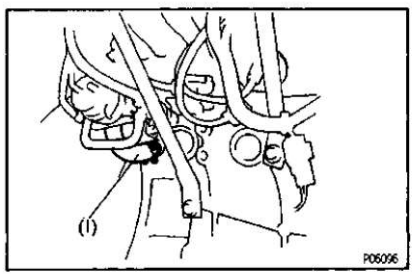
Install the manifold stay with the two bolts. Install the two manifold stays.

Torque: 25 N–m (260 kgf–cm, 19 ft–lbf)

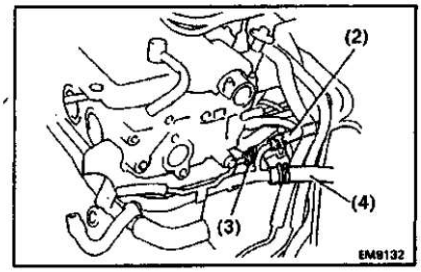


15. INSTALL WATER BY–PASS PIPE

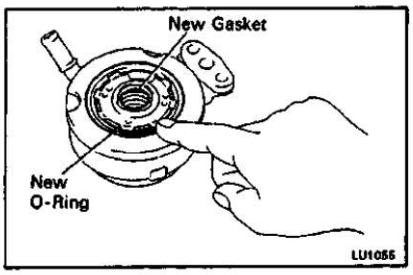
(a) Install a new 0– ring to the pipe.
(b) Apply soapy water on the 0–ring.
(c) Install a new gasket to the water pump.
(d) Install the water by–pass pipe with the two nuts and two bolts.
Torque (Nuts): 7.8 N–m (80 kgf–cm, 69 in.¿lbf)
(e) Temporarily install the bolt (A).



(f) Connect the following hoses:
(1) Water by–pass hose to cylinder block

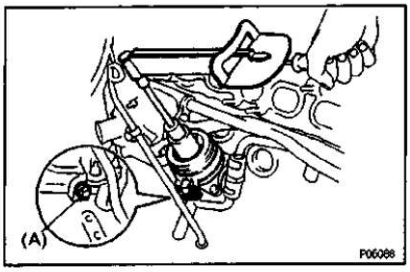


(2) Water by–pass hose to No.1 air tube
(3) Air hose to VSV (for turbocharging pressure)
(4) Heater water hose

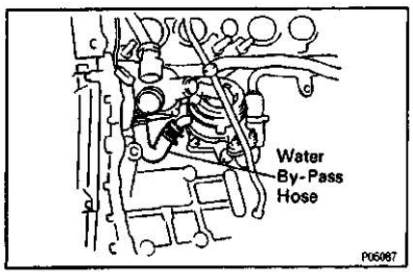


16. INSTALL OIL COOLER

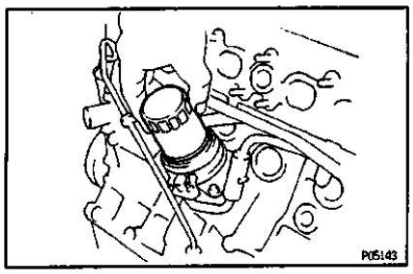
(a) Install a new O–ring and gasket to the oil cooler.
(b) Place a new gasket on the water by–pass pipe.



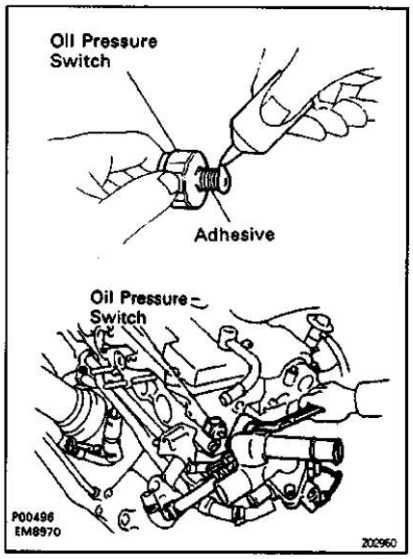
(c) Temporarily install the oil cooler with the two nuts.
(d) Apply a light coat of engine oil on the threads and under the head of the relief valve.
(e) Install the plate washer and relief valve.
Torque: 78 N–m (800 kgf–cm, 58 ft–lbf)
(f) Tighten the two nuts.
Torque: 7.8 N–m (80 kgf–cm, 69 in.¿lbf)
(g) Tighten the bolt (A).



(h) Connect the water by–pass hose to the oil cooler.



(i) Install the oil filter.
(See Replacement of Oil and Oil Filter under Lubrication System)



17. INSTALL OIL PRESSURE SWITCH

Apply adhesive to two or three threads.

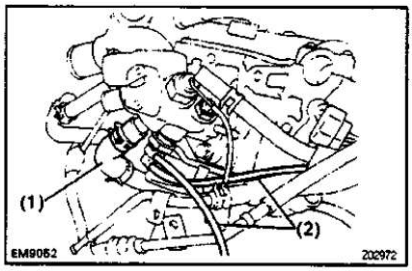
Adhesive:

Part No. 08833–00080, THREE BOND 1324, or equivalent

18. INSTALL WATER OUTLET AND HOUSING

(a) Install a new gasket and the water outlet and housing assembly with the two bolts.

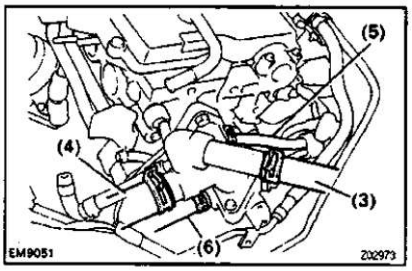
Torque: 39 N–m (400 kgf–cm, 29 ft–lbf)



(b) Connect the following hoses:

(1) Water by–pass hose to water by–pass pipe

(2) Two TVS (for EVAP) vacuum hoses

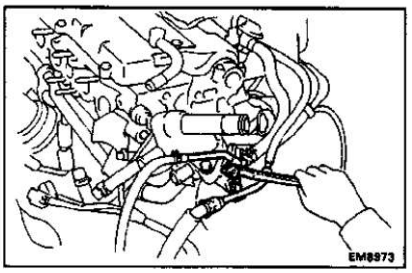


(3) Water filler hose

(4) Radiator hose

(5) Water by–pass pipe hose to IACV

(6) Heater water hose

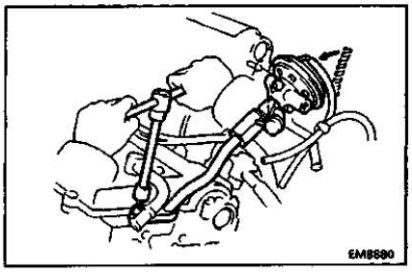


(c) Install the fuel inlet hose with the bolt.

(d) Install the fuel return hose with the bolt.

(e) Connect the following connectors:

- Water temperature sender gauge connector
- ECTS connector
- Cold start injector time switch connector



19. INSTALL EGR VALVE AND PIPE

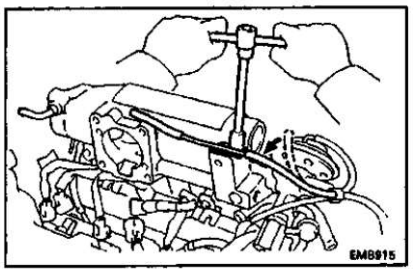
(a) Install two new gaskets, the EGR valve and pipe assembly with the four bolts.

Torque:

19 N–m (195 kgf–cm, 14 ft–lbf) for intake manifold

25 N–m (260 kgf–cm, 19 ft–lbf) for cylinder head

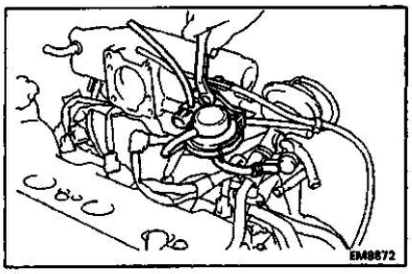
(b) Connect the vacuum hose to the EGR valve.



20. INSTALL VACUUM PIPE

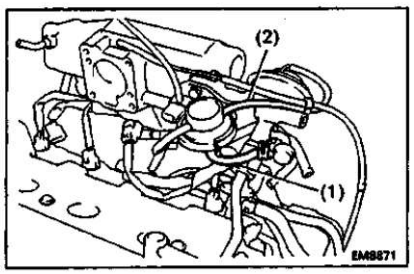
(a) Install the vacuum pipe with the bolt.

(b) Connect the vacuum hose to the vacuum pipe.



21. INSTALL EGR VACUUM MODULATOR AND VSV

(a) Install the EGR vacuum modulator and VSV assembly with the bolt.



(b) Connect the following hoses:

(1) EGR hose to EGR valve

(2) Vacuum hose to EGR vacuum modulator

(c) Connect the EGR connector.



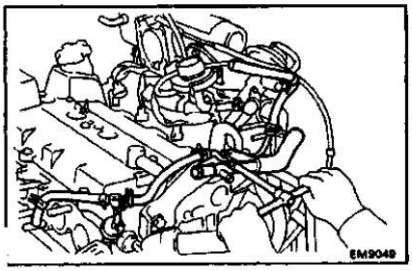
22. INSTALL LH ENGINE HANGER

Install the LH engine hanger with the two bolts.

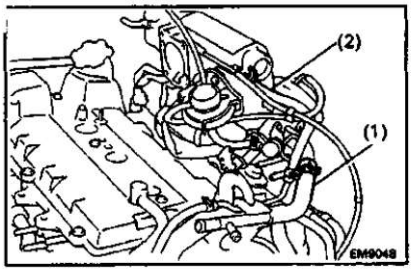
Torque:

13 N–m (13o kgf–cm, 9 ft–lbf) for 12 mm head

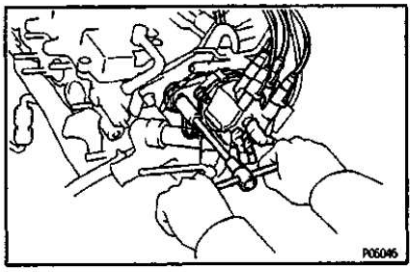
19 N–m (195 kgf–cm, 14 ft–lbf) for 14 mm head



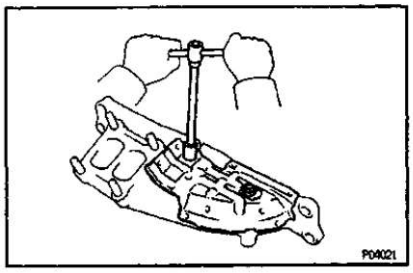
23. INSTALL NO.2 AIR TUBE
(a) Install the No.2 air tube with the bolt.



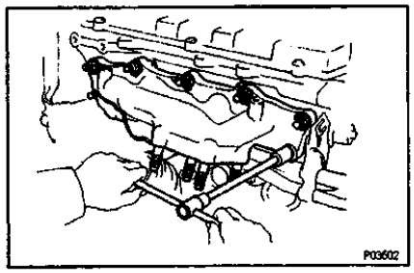
(b) Connect the following hoses:
(1) Air hose to No. 1 air tube
(2) Air hose to intake manifold



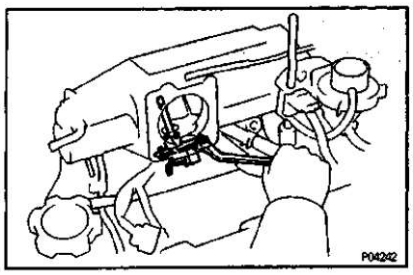
24. INSTALL DISTRIBUTOR
(See Distributor Installation in IG section)



26. INSTALL EXHAUST MANIFOLD
(a) Install the heat insulator with the bolt and nut.



(b) Install a new gasket and the exhaust manifold with the seven nuts. Uniformly tighten the nuts in several passes.
Torque: 52 N–m (530 kgf–cm, 38 ft–lbf)

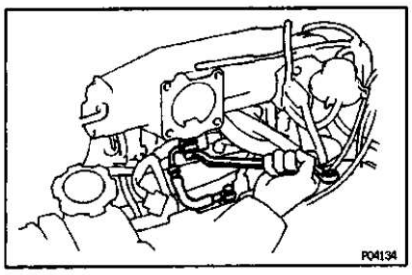


26. INSTALL COLD START INJECTOR

(a). Install a new gasket and the cold start injector with the two bolts.

Torque: 5.9 N–m (60 kgf–cm, 52 in.–lbf)

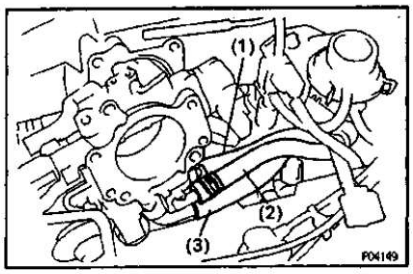
(b) Connect the cold start injector connector.



27. INSTALL. COLD START INJECTOR PIPE

Install the cold start injector pipe with four new gas–kets and two union bolts.

Torque: 12 N–m (125 kgf–cm, 9 ft–lbf)



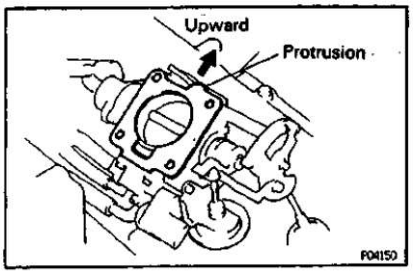
28. INSTALL THROTTLE BODY

(a) Connect the following hoses to the throttle body.

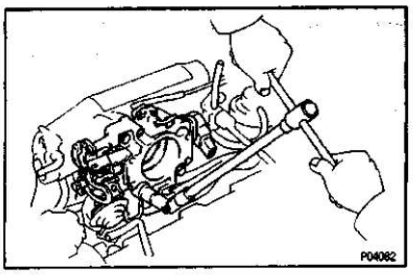
(1) Water by–pass hose (from upper side of No. 1 air tube)

(2) Water by–pass hose (from lower side of No. 1 air tube)

(3) Air hose (from No. 1 air tube)



(b) Install a new gasket to the throttle body.



(c) Install the throttle body with the four bolts.

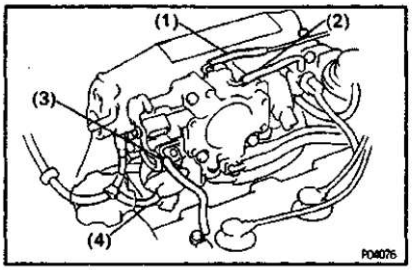
Torque: 19 N–m (195 kgf–cm, 14 ft–lbf)

HINT: Different bolt lengths are used for the upper and lower sides.

Bolt length:

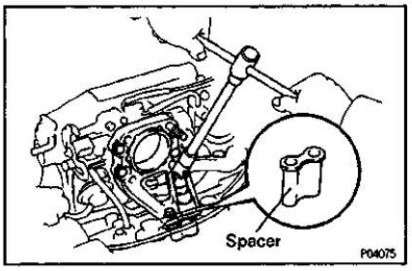
45 mm (1.77 in.) for upper bolt

70 mm (2.76 in.) for lower bolt



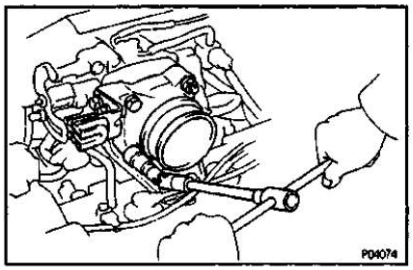
(d) Connect the following hoses:
(1) Vacuum hose to port "P" of throttle body
(2) Vacuum hose to port "E" of throttle body
(3) PCV hose to port PCV of throttle body
(4) Vacuum hose to throttle body opener

(e) Connect the following connector:
- Throttle position sensor connector
- IACV connector



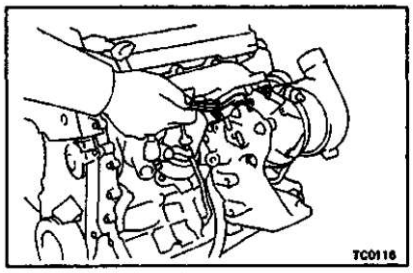
29. INSTALL INTAKE AIR CONNECTOR STAY

(a) Install the spacer.
(b) Install the intake air connector stay with the six bolts.
Torque:
7.8 N–m (80 kgf–cm, 69 in.–lbf) for 10 mm head
19 N–m (195 kgf–cm, 14 ft–lbf) for 12 mm head



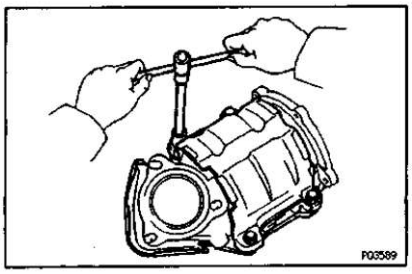
30. INSTALL INTAKE AIR CONNECTOR

Install the intake air connector with the two bolts and two nuts.
Torque: 19 N–m (195 kgf–cm, 14 ft–lbf)



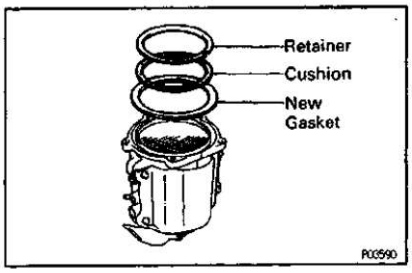
31. INSTALL TURBOCHARGER

(See Turbocharger Removal under Turbocharger System)

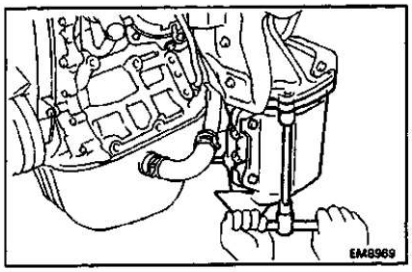


32. INSTALL MAIN TWC

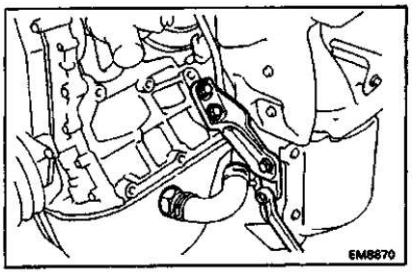
(a) Install the two heat insulator to the TWC with the nine bolts.



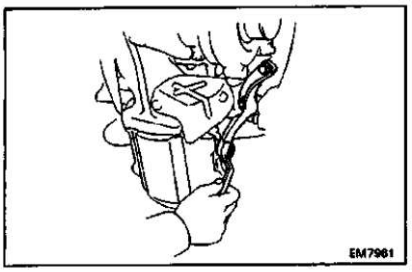
(b) Place the cushion, retainer and a new gasket on the TWC.



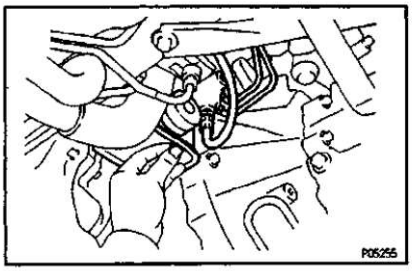
(c) Install the TWC with the three bolts and two nuts.
Torque: 29 N–m (300 kgf–cm, 22 ft–lbf)



(d) install the RH TWC stay with the four bolts.
Torque: 59 N–m (600 kgf–cm, 43 ft–lbf)

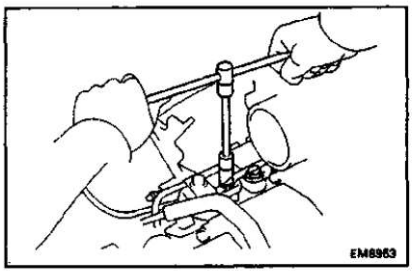


(e) Install the LH TWC stay with the three bolts.
Torque: 59 N–m (600 kgf–cm, 43 ft–lbf)

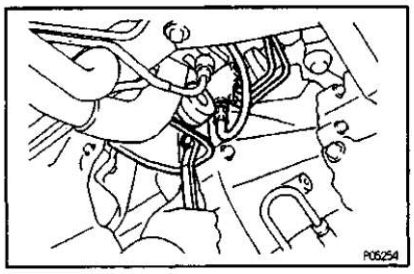


33. INSTALL CLUTCH RELEASE CYLINDER AND FRONT ENGINE MOUNTING BRACKET

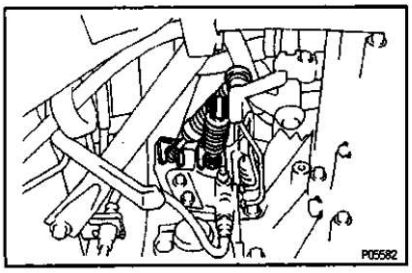
(a) Temporarily install the release cylinder and mounting bracket with the two bolts.



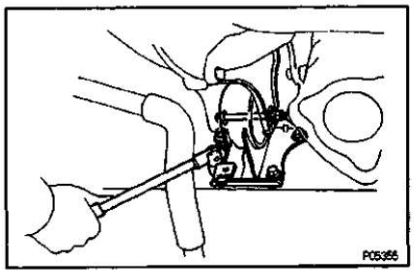
(b) Install the clutch release cylinder with the two bolts.
Torque: 12 N–m (120 kgf–cm, 9 ft–lbf)



(c) Tighten the two bolts holding the clutch release cyl–inder to the transaxle.
Torque: 77 N–m (790 kgf–cm, 57 ft–lbf)



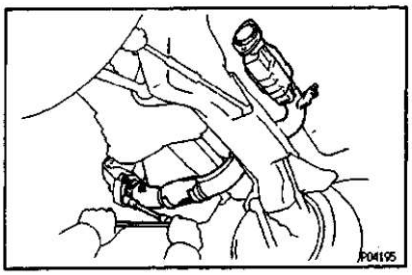
(d) Connect the two transaxle control cables to the tra–nsaxle.



34. INSTALL FRONT ENGINE MOUNTING INSULATOR

(a) Install the mounting insulator to the body with the four bolts.
Torque: 77 N–m (790 kgf–cm, 57 ft–lbf)

(b) Install the mounting insulator to the mounting bracket with the through bolt and nut.
Torque: 96 N–m (980 kgf–cm, 71 ft–lbf)

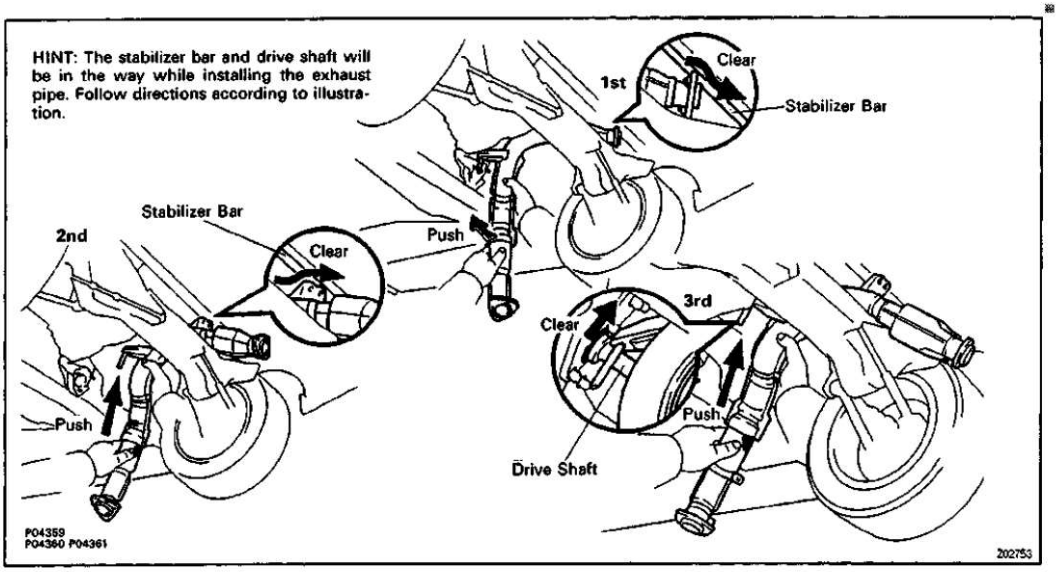


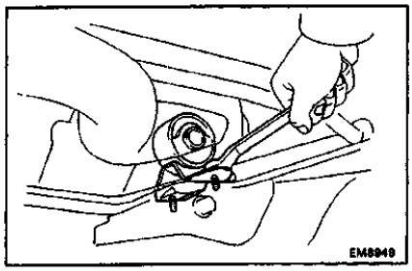
35. INSTALL FRONT EXHAUST PIPE

(a) Place a new gasket to the front of the front exhaust pipe.

(b) Using a 14 mm deep socket wrench, install the front exhaust pipe with three new nuts.

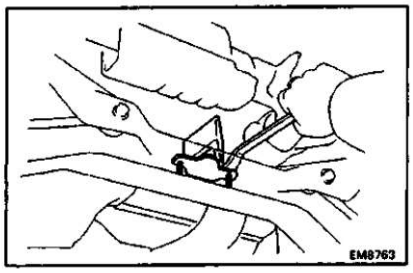
Torque: 62 N–m (630 kgf–cm, 46 ft–lbf)





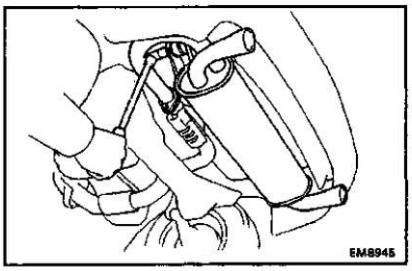
(c) Install the support bracket with the two bolts.

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



(d) Install the damper with the two bolts.

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



36. INSTALL TAILPIPEE

(a) Place a new gasket to the rear of the front exhaust pipe.

(b) Install the tailpipe to the body bracket with the two bolts and nut.

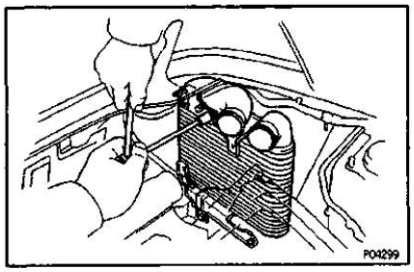
Torque:66 N–m (670 kgf–cm, 48 ft–lbf)

(c) Install the two bolts holding the front exhaust pipe to the tailpipe.

Torque: 43 N–m (440 kgf–cm, 32 ft–lbf)

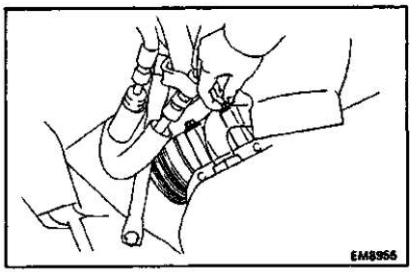
(d) Install the two bolts holding the front exhaust pipe bracket to the tailpipe bracket.

Torque: 19 N–m (190 kgf–cm, 14 ft–lbf)



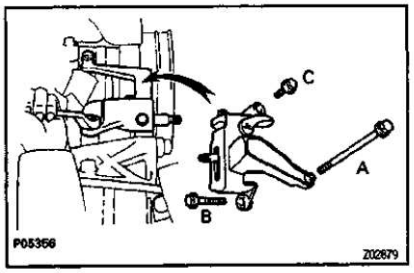
37. INSTALL CAC

Install the CAC and upper bracket with the five bolts.



38. INSTALL A/C COMPRESSOR

(a) Temporarily install the A/C compressor with the with the two bolts.



(b) Install the idler pulley bracket with the three bolts.

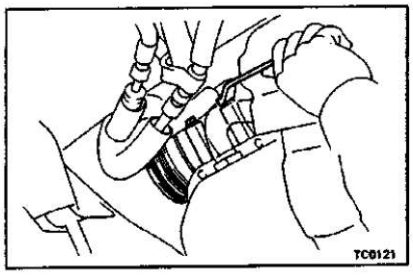
Torque:

25 N–m (250 kgf–cm, 18 ft–lbf) for A

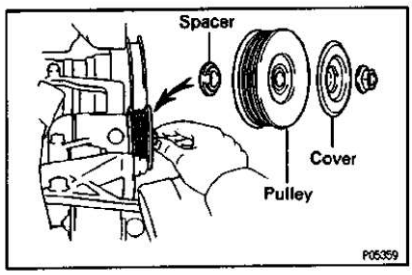
27 N–m (275 kgf–cm, 20 ft–lbf) for B

37 N–m (375 kgf–cm, 27 ft–lbf) for C

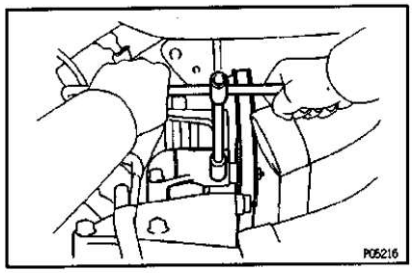
(c) Connect the A/C compressor connector.



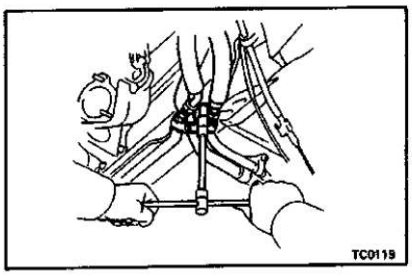
(d) Tighten the two bolts of the lower side of the A/C compressor.
Torque: 25 N–m (250 kgf–cm, 18 ft–lbf)



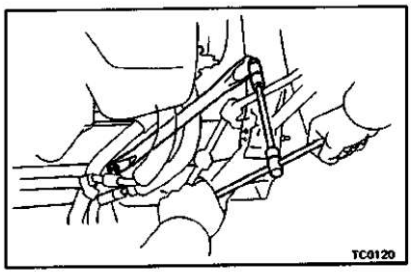
(e) Temporarily install the spacer, idler pulley and pulley cover with the nut.



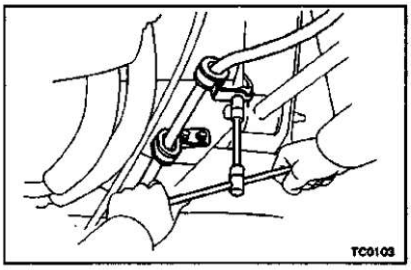
(f) Install the drive belt with the adjusting bolt.
(g) Tighten the idler pulley nut.



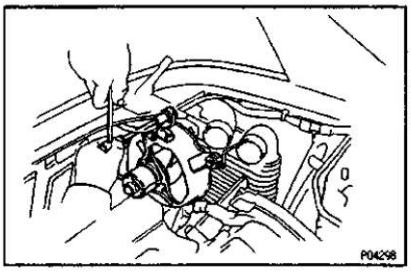
(h) Install the A/C pipes with the two clamps and nut.



(i) Install the lower suspension brace with the two bolts.
Torque: 73 N–m (740 kgf–cm, 54 ft–lbf)

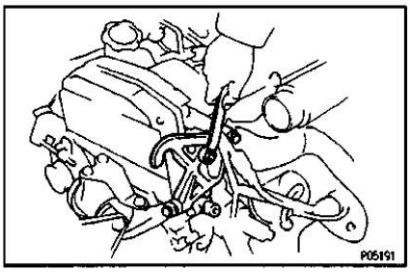


(j) Install the parking brake cable with the two clamps and three bolts.



39. INSTALL ENGINE COMPARTMENT ELECTRIC COOLING FAN

(a) Install the cooling fan with the three bolts.
(b) Connect the cooling fan connector.

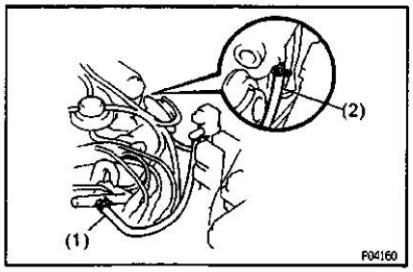


40. INSTALL RH FRONT ENGINE HANGER

Install the engine hanger with the four bolts.

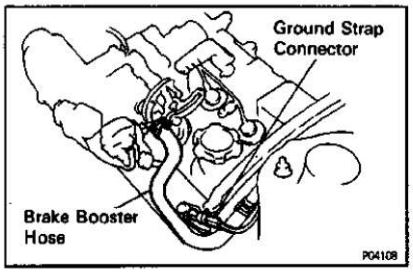
Torque:

39 N–m (400 kgf–cm, 29 ft–lbf) for cylinder head
61 N–m (620 kgf–cm, 45 ft–lbf) for mounting bracket

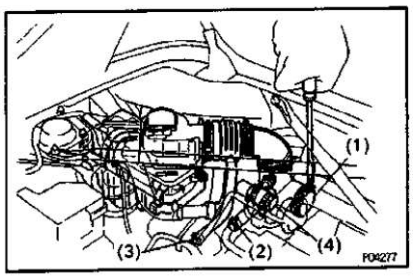


41. CONNECT A/C IDLE–UP AIR HOSES

(1) Air hose to No.2 air tube
(2) Air hose to intake manifold

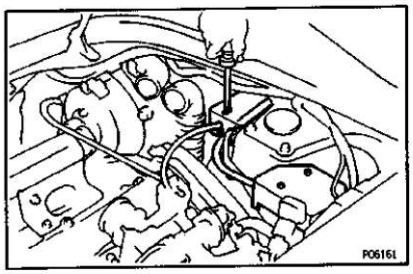


42. CONNECT BRAKE BOOTER VACUUM HOSE
43. CONNECT GROUND STRAP CONNECTOR



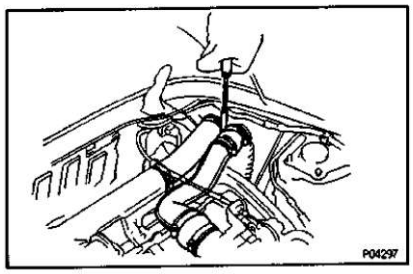
44. INSTALL AIR CLEANER HOUSING

(a) Install the air cleaner case with the three bolts.
(b) Install the air filter.
(c) Install the air cleaner cap and air flow sensor assembly with the four clips.
(d) Connect the following hoses:
(1) Air cleaner hose to turbocharger
(2) PCV hose to cylinder head cover
(3) Air hose to No.2 air tube
(4) Air hose to air by–pass valve
(e) Connect the air flow sensor connector.

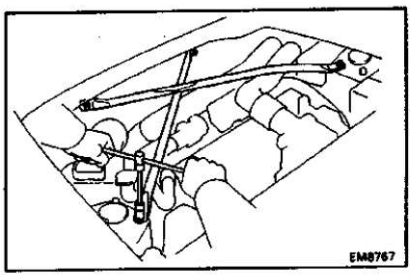


45. (w/ CRUISE CONTROL SYSTEM) INSTALL CRUISE CONTROL ACTUATOR AND ACCELERATOR LINKAGE

46. (w/o CRUISE CONTROL SYSTEM) CONNECT ACCELERATOR LINKAGE TO THROTTLE BODY



47. INSTALL NO.1 AND NO.2 INTAKE AIR CONNECTORS



48. INSTALL UPPER SUSPENSION BRACE

Install the upper brace with the two bolts and two nuts.

Torque:

73 N–m (740 kgf–cm, 54 ft–lbf) for bolt
64 N–m (650 kgf–cm, 47 ft–lbf) for nut

49. CONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY

50. FILL WITH ENGINE COOLANT

51. START ENGINE AND CHECK FOR LEAKS

52. ADJUST IGNITION TIMING

53. INSTALL ENGINE HOOD SIDE PANELS

54. INSTALL ENGINE UNDER COVERS

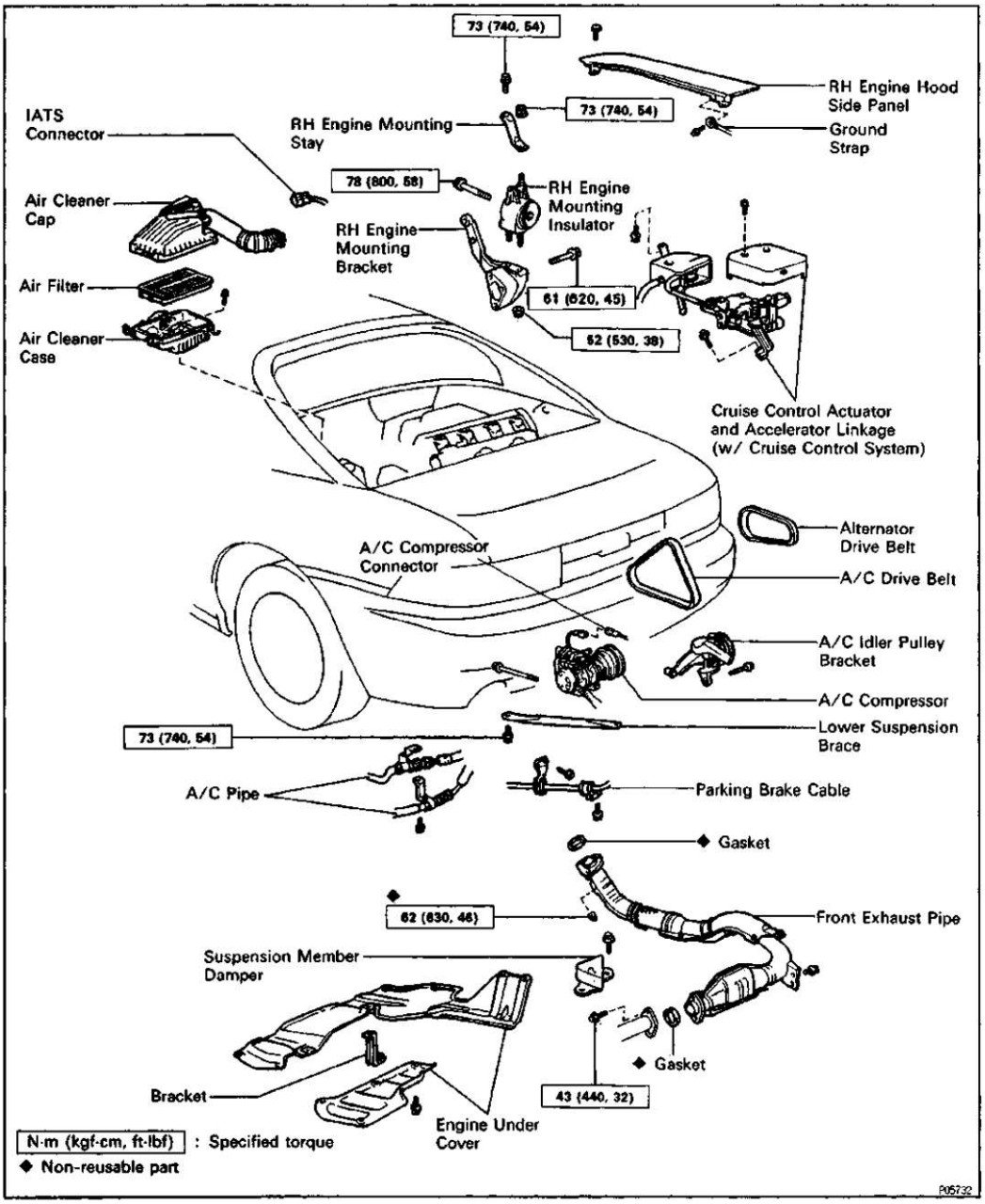
55. PERFORM ROAD TEST

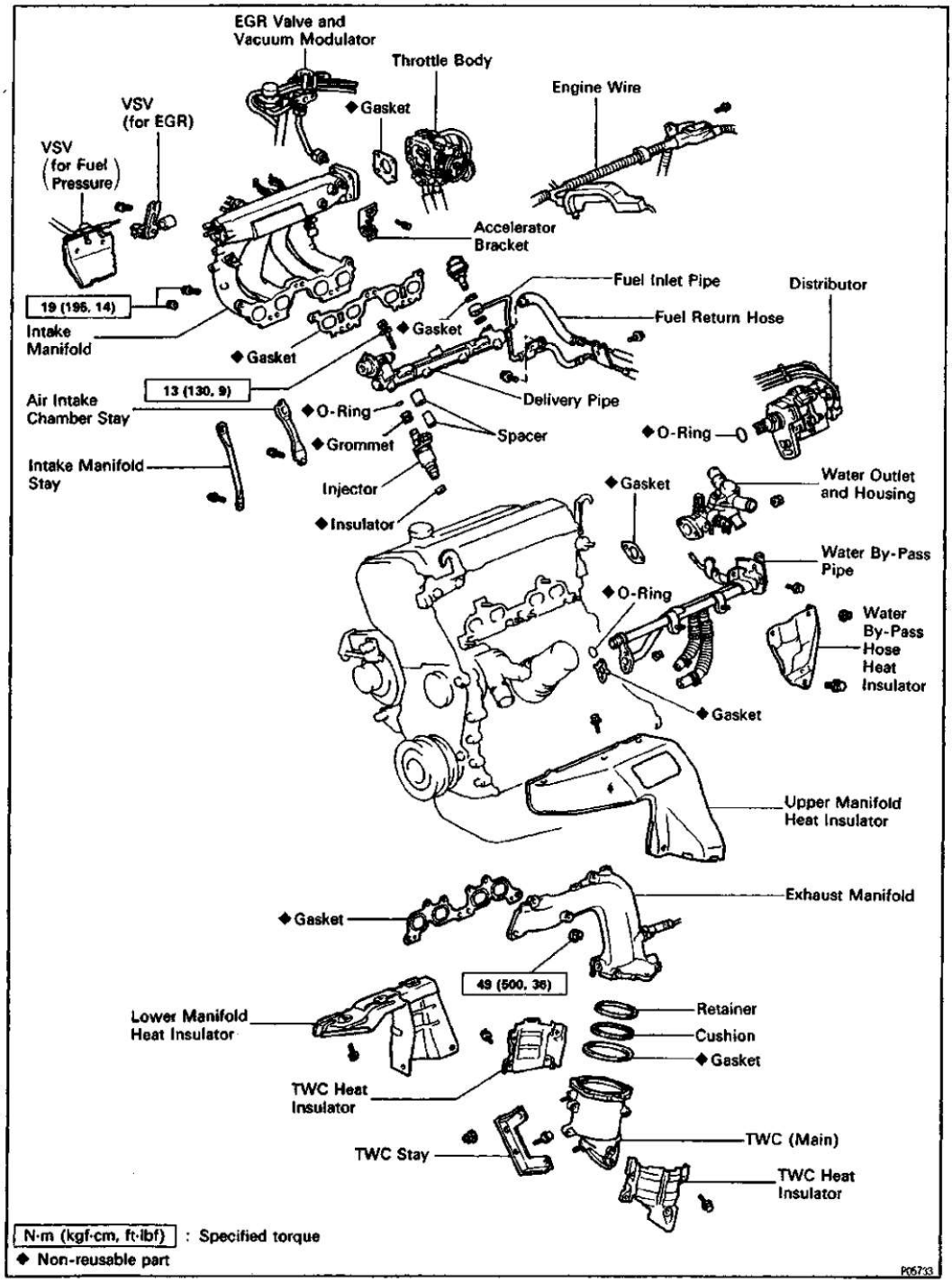
Check for abnormal noise, shock, slippage, correct shift points and smooth operation.

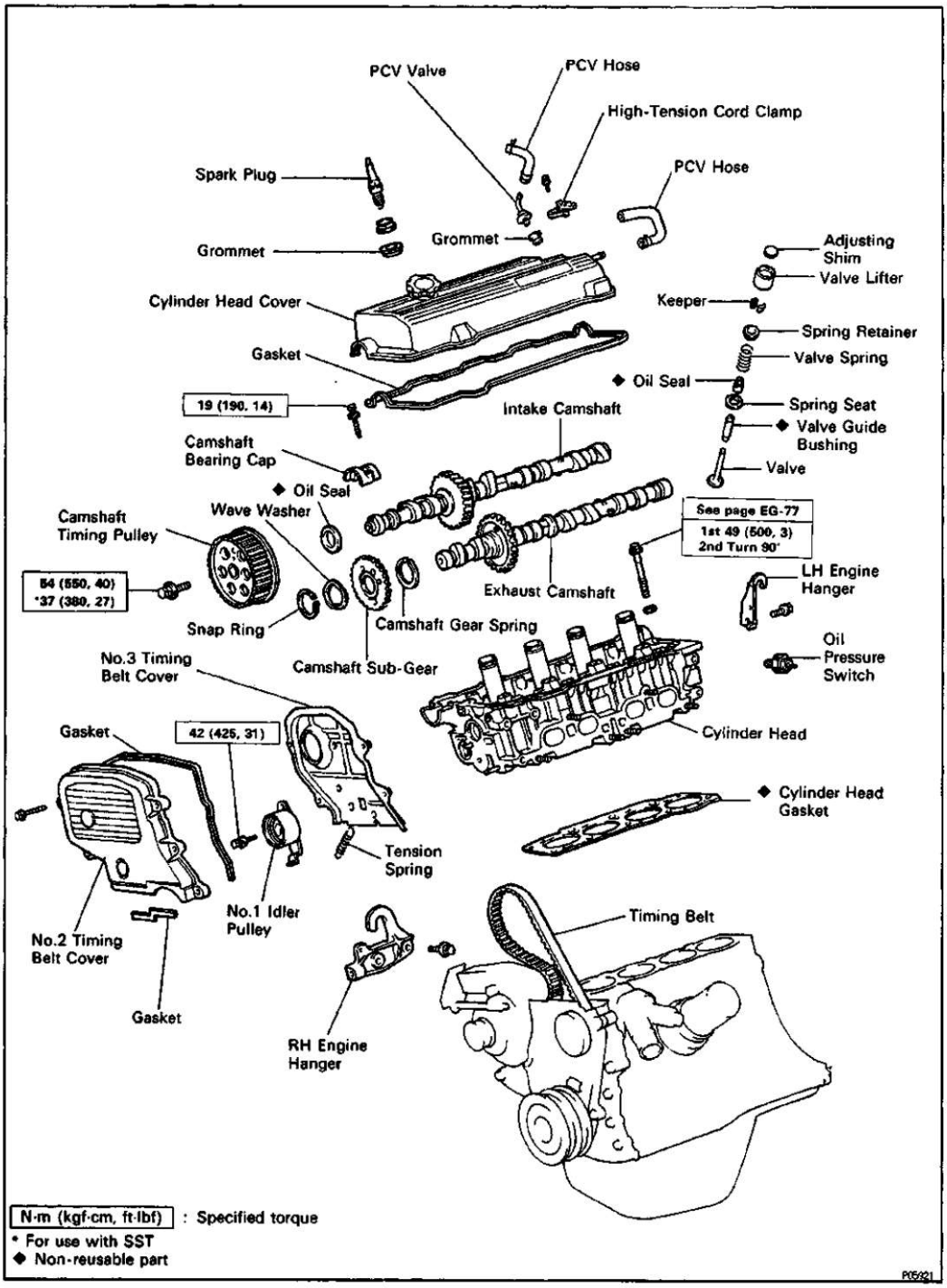
58. RECHECK ENGINE COOLANT AND OIL LEVELS

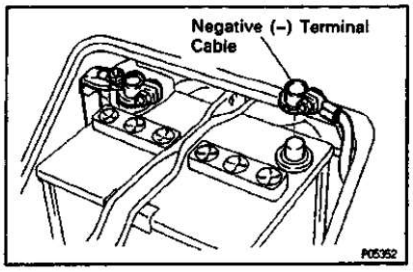
CYLINDER HEAD

COMPONENTS FOR REMOVAL AND INSTALLATION




EGR Valve and Vacuum Modulator
Throttle Body
Engine Wire
VSV (for EGR)
◆Gasket
VSV (for Fuel Pressure)
Accelerator Bracket
Fuel Inlet Pipe
Distributor
19 (195, 14)
Fuel Return Hose
Intake Manifold
◆Gasket
◆Gasket
13 (130, 9)
Delivery Pipe
Air Intake Chamber Stay
◆O-Ring
Spacer
◆O-Ring
◆Grommet
Intake Manifold Stay
Injector
◆Gasket
Water Outlet and Housing
◆Insulator
Water By-Pass Pipe
◆O-Ring
Water By-Pass Hose
Heat Insulator
◆Gasket
Upper Manifold Heat Insulator
Exhaust Manifold
◆Gasket
49 (500, 36)
Lower Manifold Heat Insulator
Retainer
Cushion
◆Gasket
TWC Heat Insulator
TWC (Main)
TWC Stay
TWC Heat Insulator
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part
P05733


PCV Valve
PCV Hose
High-Tension Cord Clamp
Spark Plug
PCV Hose
Grommet
Grommet
Adjusting Shim
Valve Lifter
Keeper
Cylinder Head Cover
Spring Retainer
Valve Spring
Gasket
◆ Oil Seal
19 (190, 14)
Intake Camshaft
Spring Seat
◆ Valve Guide Bushing
Camshaft Bearing Cap
Valve
◆ Oil Seal
Wave Washer
Camshaft Timing Pulley
See page EG-77
1st 49 (500, 3)
2nd Turn 90°
54 (550, 40)
*37 (380, 27)
LH Engine Hanger
Exhaust Camshaft
Snap Ring
Camshaft Gear Spring
Oil Pressure Switch
No.3 Timing Belt Cover
Camshaft Sub-Gear
Cylinder Head
Gasket
42 (425, 31)
◆ Cylinder Head Gasket
Tension Spring
No.1 Idler Pulley
Timing Belt
No.2 Timing Belt Cover
Gasket
RH Engine Hanger
N·m (kgf·cm, ft·lbf) : Specified torque
* For use with SST
◆ Non-reusable part
P05921



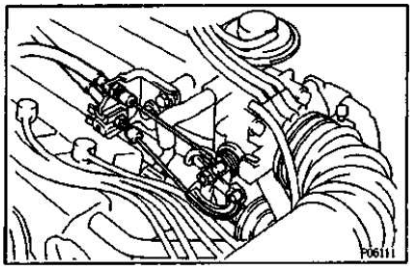
CYLINDER HEAD REMOVAL

(See Components for Removal and Installation)

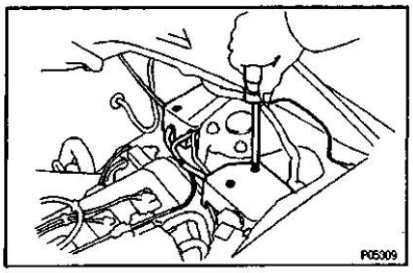
1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY

CAUTION: Turn the ignition switch to 'LOCK'. Disconnect the negative terminal from the battery. Wait at least 20 seconds before proceeding with work.

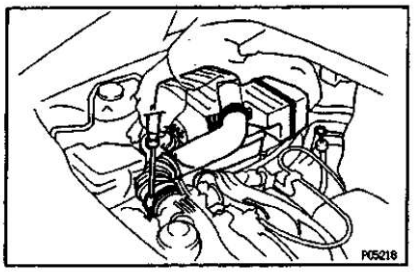
2. DRAIN ENGINE COOLANT
3. REMOVE ENGINE UNDER COVERS
4. REMOVE ENGINE HOOD SIDE PANELS



5. DISCONNECT ACCELERATOR LINKAGE FROM THROTTLE BODY
6. (A/T)
DISCONNECT THROTTLE CABLE FROM THROTTLE BODY

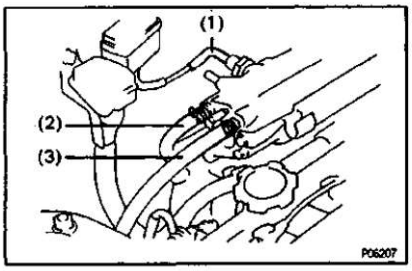


7. (w/ CRUISE CONTROL SYSTEM)
REMOVE CRUISE CONTROL ACTUATOR AND ACCELERATOR LINKAGE



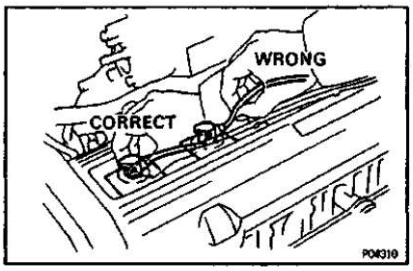
8. REMOVE AIR CLEANER HOUSING

(a) Disconnect the IATS connector.
(b) Disconnect the air cleaner hose from the throttle body.
(c) Disconnect the four clamps, and remove the air cleaner cap.
(d) Remove the air filter.
(e) Remove the three bolts and air cleaner case.



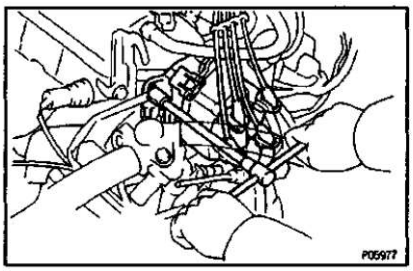
9. DISCONNECT HOSES AND GROUND STRAP

Disconnect the following hoses:
(1) MAP vacuum hose from intake manifold
(2) A/C idle–up air hose (from port F) from intake manifold
(3) Brake booster vacuum hose from intake manifold

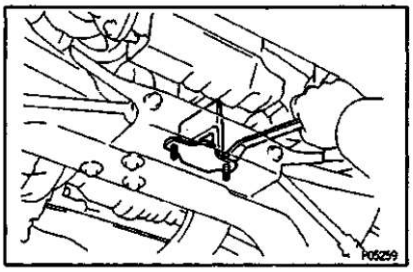


10. REMOVE DISTRIBUTOR

(a) Disconnect the four high–tension cords from the clamp on the cylinder head.
(b) Disconnect the four high–tension cords from the spark plugs.
Disconnect the high – tension cords at the rubber boot. Do not pull on the cords.
NOTICE: Pulling on or bending the cords may damage the conductor inside.

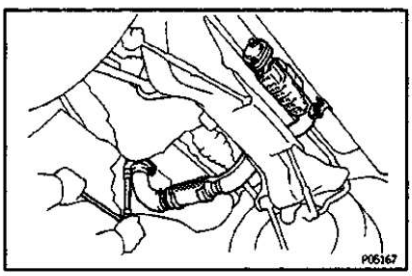


(c) Remove the two bolts, and pull out the distributor.

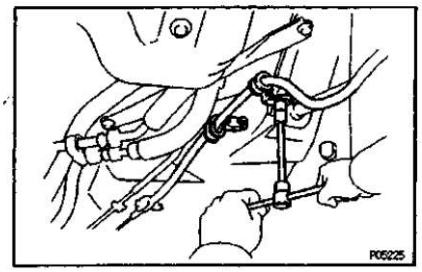


11. REMOVE FRONT EXHAUST PIPE

(a) (CALIF. only)
Remove the two bolts and damper.

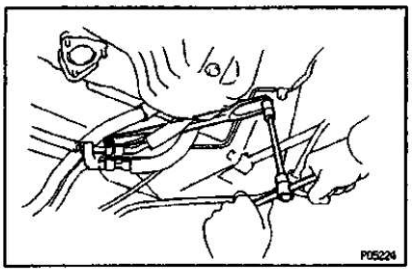


(b) Remove the two bolts holding the front exhaust pipe to the tailpipe bracket.
(c) Remove the two bolts holding the front exhaust pipe to the tailpipe.
(d) Using a 14 mm deep socket wrench, remove the three nuts.
(e) Remove the front exhaust pipe and two gaskets.

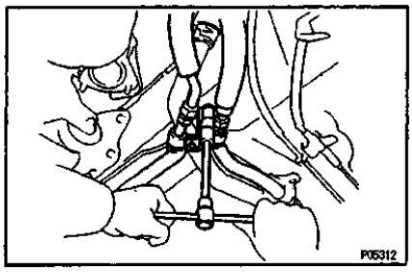


12. DISCONNECT A/C COMPRESSOR FROM ENGINE

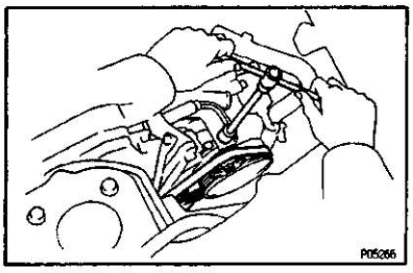
(a) Remove the three clamp bolts, and disconnect the parking brake cable.



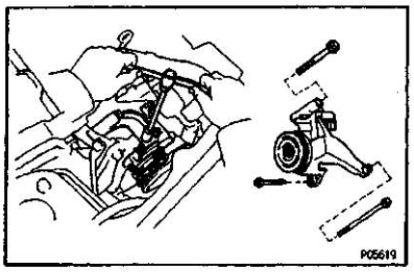
(b) Remove the two bolts and lower suspension brace.



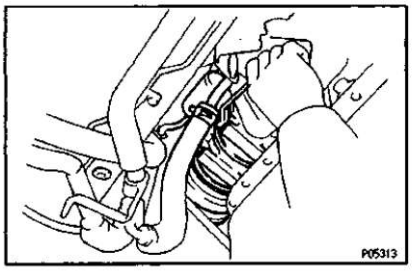
(c) Remove the clamp nut, and disconnect the two A/C pipes.



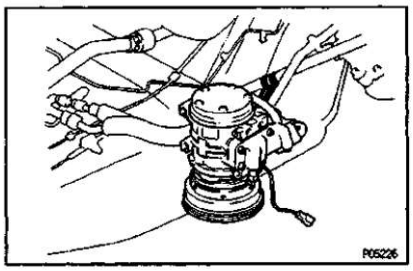
(d) Loosen the idler pulley nut.
(e) Loosen the adjusting bolt, and remove the drive belt.



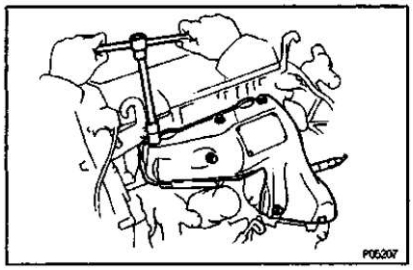
(f) Disconnect the A/C compressor connector.
(g) Remove the three bolts and idler pulley bracket.



(h) Remove the two bolts, and disconnect the A/C compressor from the engine.



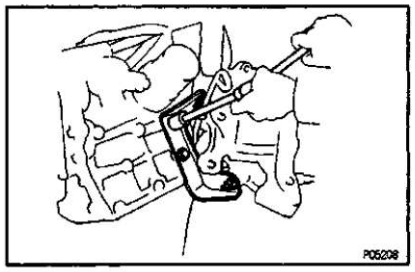
HINT: Suspend the A/C compressor to strut rod with a string.



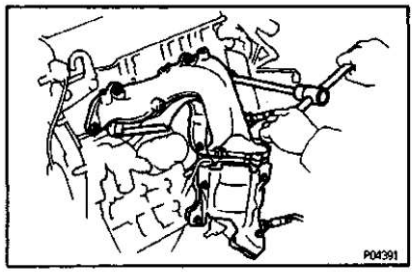
13. REMOVE EXHAUST MANIFOLD AND TWC ASSEMBLY

(a) Disconnect the following connectors:
- Oxygen sensor (main) connector (CALIF. only)
- Sub–oxygen sensor connector

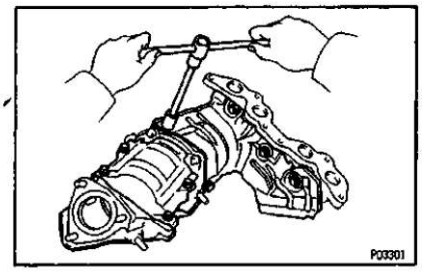
(b) Remove the six bolts and manifold upper heat insulator.



(c) Remove the two bolts, two nuts and TWC stay.



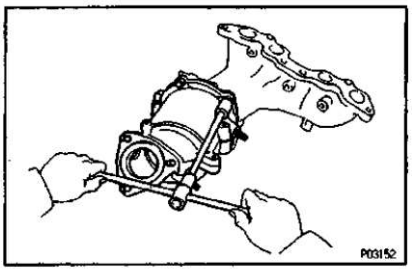
(d) Remove the six nuts, the exhaust manifold and TWC assembly.



14. SEPARATE EXHAUST MANIFOLD AND TWC

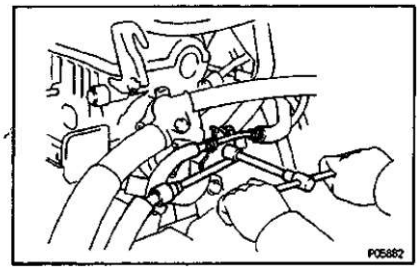
(a) Remove the five bolts and lower manifold heat insu–lator.

(b) Remove the eight bolts and two TWC heat insulator.



(c) Remove the three bolts, two nuts, catalytic converter, gasket, retainer and cushion.

15. DISCONNECT OIL PRESSURE SWITCH CONNECTOR

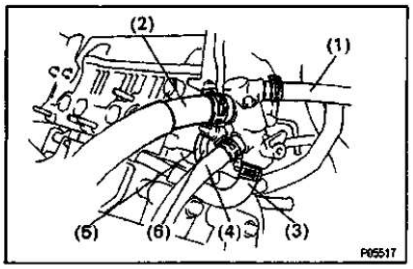


16. REMOVE WATER OUTLET AND HOUSING

(a) Remove the bolt, and disconnect the fuel inlet pipe (with the fuel return tube) from the water outlet housing.

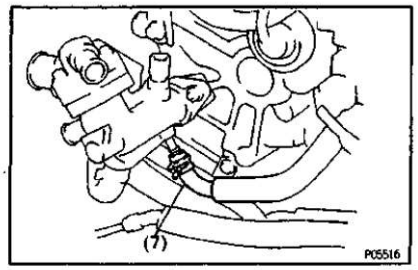
(b) Disconnect the following connectors:

- Water temperature sender gauge connector
- ECTS connector

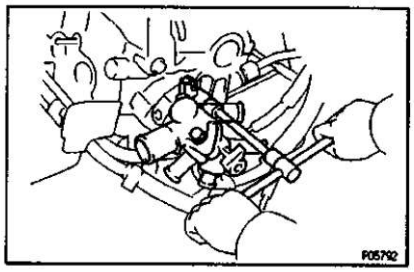


(c) Disconnect the following hoses:

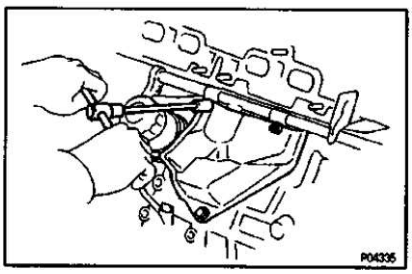
(1) Water filler hose
(2) Radiator hose
(3) Water by–pass pipe hose
(4) Heater water hose
(5) Vacuum hose (from P port of throttle body) from upper port of TVS
(6) Vacuum hose (from charcoal canister) from lower port of TVS



(7) IACV water by–pass hose

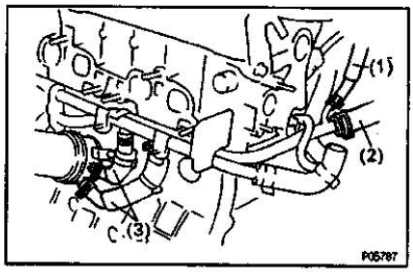


(d) Remove the two bolts, the water outlet, housing as–sembly and gasket.

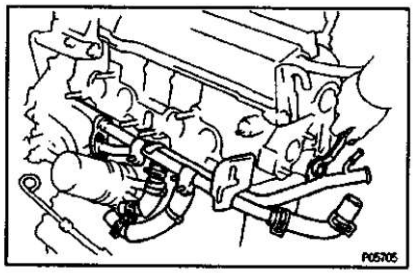


17. REMOVE WATER BY–PASS PIPE

(a) Remove the bolt, two nuts and water by–pass heat protector.



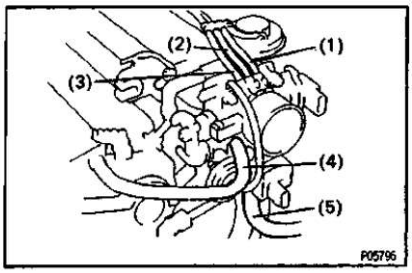
(b) Disconnect the following hoses:
(1) IACV water by–pass hose
(2) Heater water hose
(3) Two oil cooler water by–pass hoses



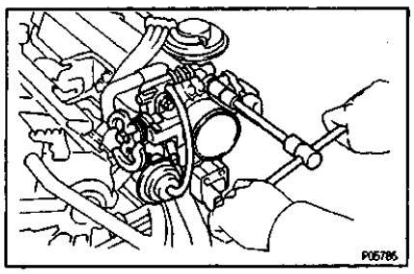
(c) Remove the two bolts, two nuts, water by– pass pipe and gasket.
(d) Remove the O–ring from the water by–pass hose.

18. REMOVE THROTTLE BODY

(a) Disconnect the following connector:
Throttle position sensor connector
IACV connector



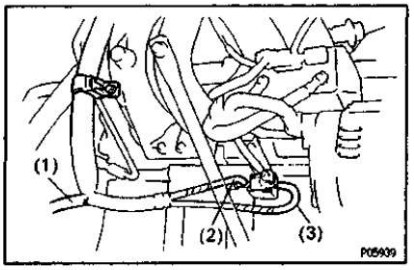
(b) Disconnect the following hoses:
(1) Vacuum hose (from upper port of TVS) from port "P" of throttle body ,
(2) Vacuum hose (from port "Q" of EGR vacuum modulator) from port "E" of throttle body
(3) Vacuum hose (from port "R" of EGR vacuum modulator) from port "R" of throttle body
(4) PCV hose (from cylinder head) from throttle body
(5) Air hose (from A/C idle–up valve)

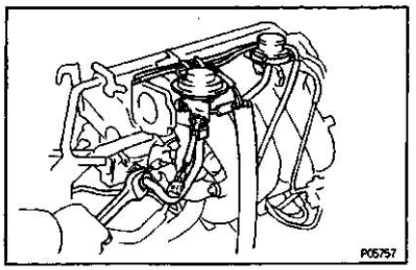


(c) Remove the four bolts, throttle body and gasket.

19. REMOVE EGR VALVE AND VACUUM MODULATOR

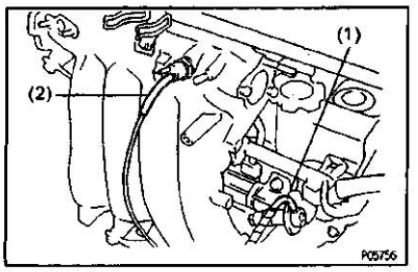
(a) (CALIF. only)
Disconnect EGR function sensor connector.
(b) Remove the bolt, and disconnect the vacuum hose clamp from the intake manifold.
(c) Remove the following hoses:
(1) Vacuum hose from charcoal canister.
(2) Vacuum hose (from EGR valve) from port E of VSV (for EGR)
(3) Vacuum hose (from "Q" port of EGR vacuum modulator) from port G of VSV (for EGR)
(d) Loosen the union nut of the EGR pipe, and remove two nuts, the EGR valve, vacuum modulator, vacuum hoses assembly and gasket.

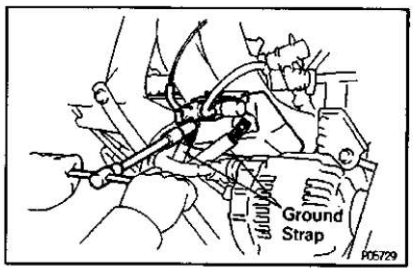




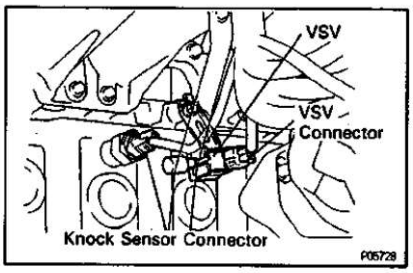
20. REMOVE VSV FOR FUEL PRESSURE

(a) Disconnect the VSV connector.
(b) Disconnect the following hoses:
(1) Vacuum hose (from port E of VSV) from fuel pressure regulator
(2) Vacuum hose (from port G of VSV) from gas filter.

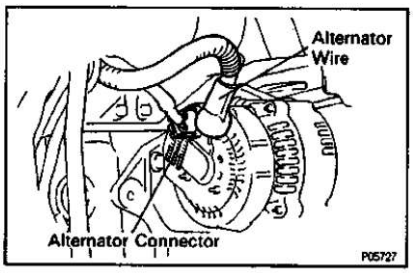




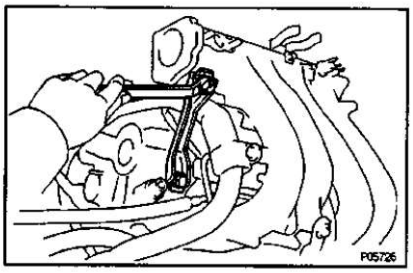
(c) Remove the two bolts, and VSV. Disconnect the two ground straps.



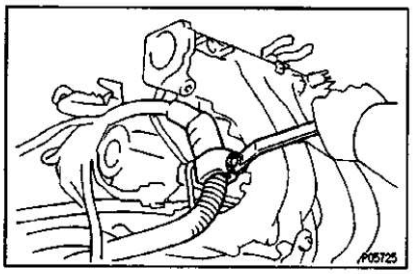
21. DISCONNECT KNOCK SENSOR CONNECTOR
22. REMOVE EGR VSV
(a) Disconnect the VSV connector.
(b) Remove the bolt and VSV.



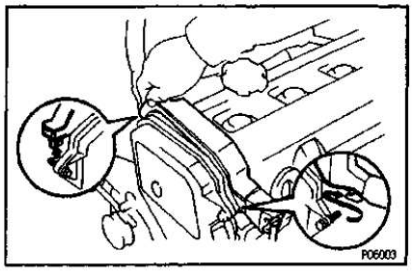
23. REMOVE INTAKE MANIFOLD
(a) Disconnect the alternator connector and wire.



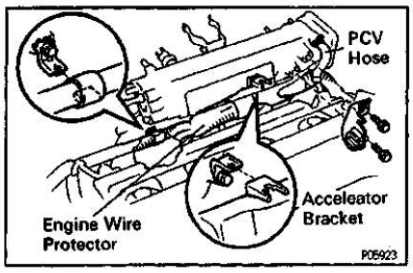
(b) Remove the two bolts and air intake chamber stay.



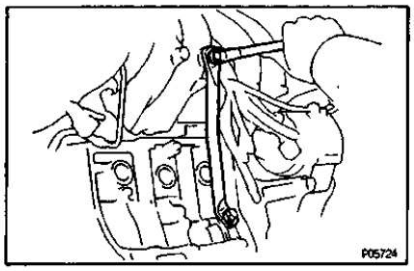
(c) Remove the bolt, and disconnect the engine wire protector from the RH side of the intake manifold.



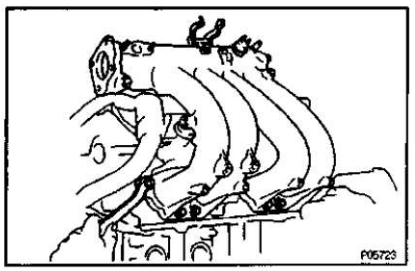
(d) Disconnect the engine wire protector between the No. 3 timing belt and cylinder head cover.



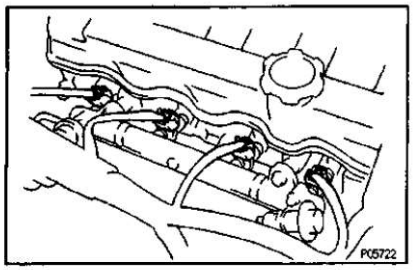
(e) Remove the two bolts and accelerator bracket.
(f) Disconnect the PCV hose from the intake manifold.
(g) Disconnect the engine wire protector from the two brackets on the front side of the intake manifold.



(h) Remove the two bolts and intake manifold stay.

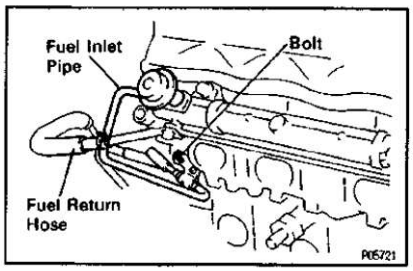


(i) Remove the six bolts, two nuts, intake manifold and gasket.

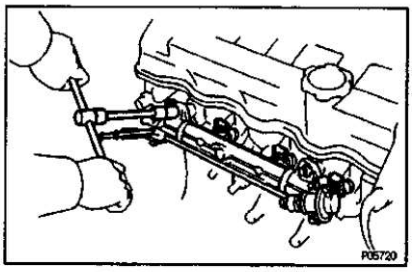


24. REMOVE DELIVERY PIPE AND INJECTORS

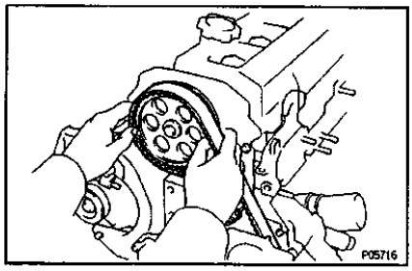
(a) Disconnect the injector connectors.



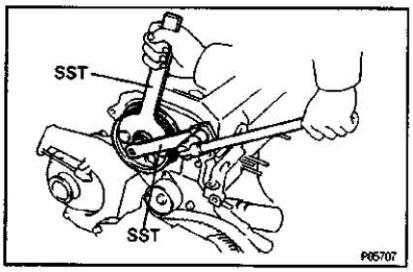
(b) Disconnect fuel return hose.
(c) Remove the bolt holding the fuel inlet pipe to the cylinder head.
(d) Remove the pulsation damper and two gaskets, and disconnect the fuel inlet pipe from the delivery pipe.



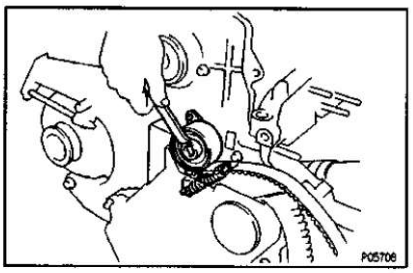
(d) Remove the two bolts and delivery pipe together with the four injectors.
NOTICE: Be careful not to drop the injectors when removing the delivery pipe.
(e) Remove the four insulators and two spacers from the cylinder head.
(f) Pull out the four injectors from the delivery pipe.
(g) Remove the O–ring and grommet from each injector.



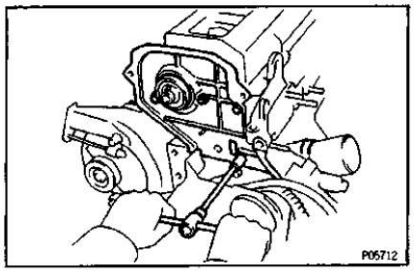
25. DISCONNECT TIMING BELT FROM CAMSHAFT TIMING PULLEY
(See steps 10 to 17 in Timing Belt Removal)



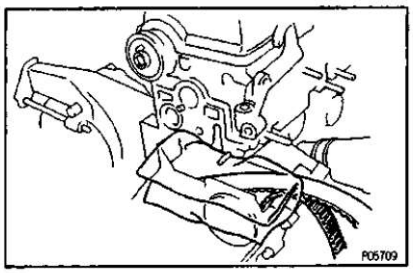
26. REMOVE CAMSHAFT TIMING PULLEY
Using SST, remove the bolt, and timing pulley.
SST 09249–63010,09278–54012



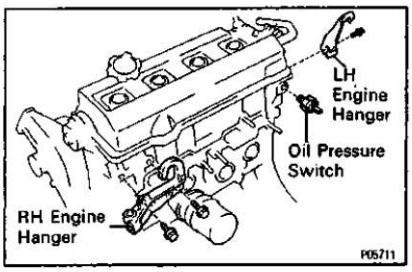
27. REMOVE NO.1 IDLER PULLEY AND TENSION SPRING
Remove the bolt, pulley and tension spring.



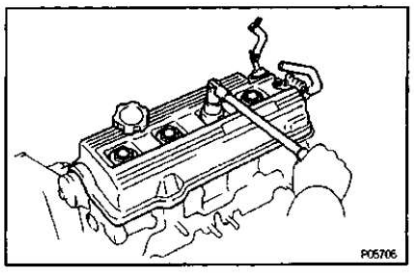
28. REMOVE No.3 TIMING BELT COVER
Remove the four bolts and timing and cover.



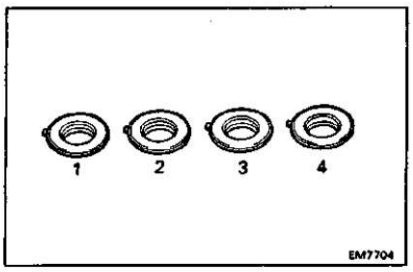
NOTICE:
- **Support the timing belt, so the meshing of crank–shaft timing pulley and timing belt does not shift.**
- **Be careful not to drop anything inside the timing belt cover.**
- **Do not allow the belt to come into correct with oil, water or dust.**



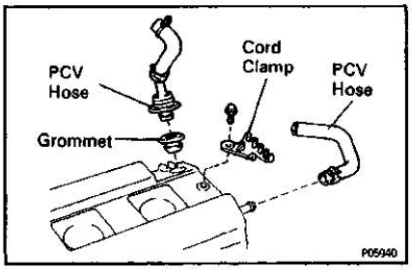
29. REMOVE ENGINE HANGERS
(a) Remove the two bolts and RH engine hanger.
(b) Remove the bolt and LH engine hanger.
30. REMOVE OIL PRESSURE SWITCH



31. REMOVE CYLINDER HEAD COVER
Remove the four nuts, grommets, head cover and gasket.



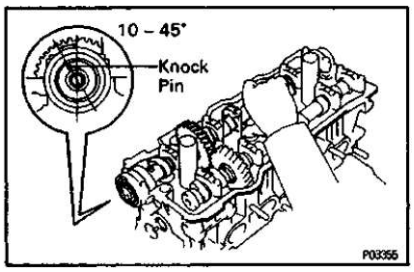
HINT: Arrange the grommets in correct order, so that they can be reinstalled into their original positions. This minimizes any possibility of oil leakage due to reuse of grommets.



32. REMOVE HIGH–TENSION CORD CLAMP, PCV VALVE AND HOSE

33. REMOVE CAMSHAFTS

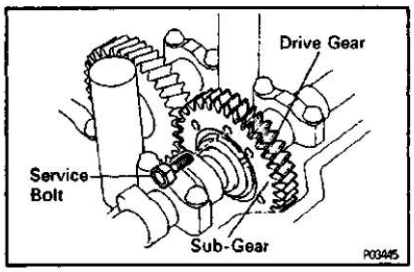
NOTICE: Since the thrust clearance of the camshaft is small, the camshaft must be kept level while it is being removed. If the camshaft is not kept level, the portion of the cylinder head receiving the shaft thrust may crack or be damaged, causing the camshaft to seize or break. To avoid this, the following steps should be carried out.



A. Remove exhaust camshaft

(a) Set the knock pin of the intake camshaft at 10 – 45° BTDC of camshaft angle.

HINT: The above angle allows No.2 and No.4 cylinder cam lobes of the exhaust camshaft to push their valve lifters evenly.



(b) Secure the exhaust camshaft sub–gear to drive gear with a service bolt.

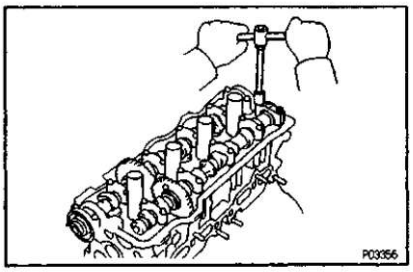
Recommended service bolt:

Thread diameter 6 mm

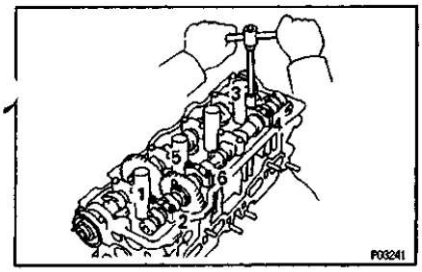
Thread pitch 1.0 rnm

Bolt length 16 – 20 mm (0.63 – 0.79 in.)

HINT: When removing the camshaft, make sure that the torsional spring force of the sub–gear has been eliminated by the above operation.



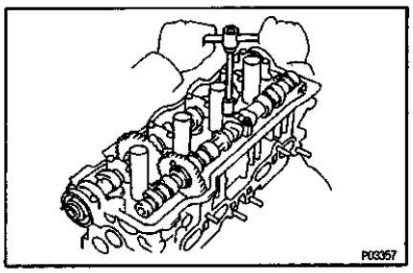
(c) Remove the two bolts and rear bearing cap.



(d) Uniformly loosen and remove the six bolts on the No. 1. No.2 and No.4 bearing caps in several passes, in the sequence shown.

NOTICE: Do not remove the No.3 bearing cap bolts at this stage.

(e) Remove the No.1, No.2 and No.4 bearing caps.



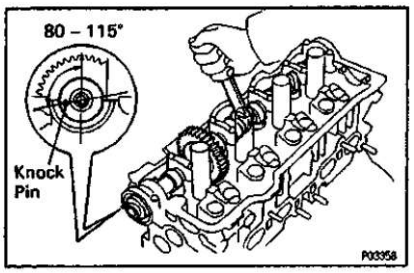
(f) Alternately loosen and remove the two bolts on the No.3 bearing cap.

HINT:

- As the two No.3 bearing cap bolts are loosened, make sure that the camshaft is lifted out straight and level.
- If the camshaft is not being lifted out straight and level, tighten the two No.3 bearing cap bolts. Then reverse the order of above steps from (f) to (a) and reset the knock pin of the intake camshaft at 10 – 45° BTDC, and repeat steps from (b) to (f) once again.

NOTICE: Do not pry on or attempt to force the camshaft with s tool or other object.

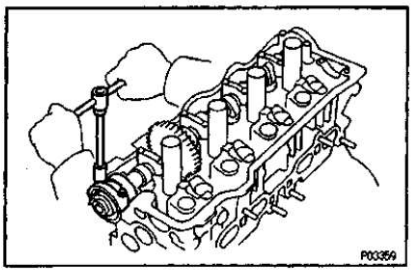
(g) Remove the No.3 bearing cap and exhaust camshaft.



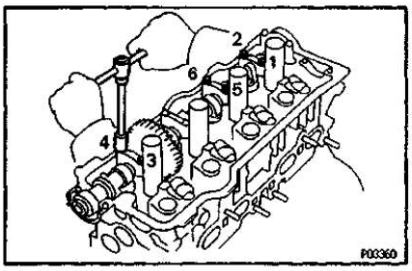
B. Remove intake camshaft

(a) Set the knock pin of the intake camshaft at 80 – 115° BTDC of camshaft angle.

HINT: The above angle allows the No.1 and No.3 cylinder cam lobes of intake camshaft to push their valve lifters evenly.



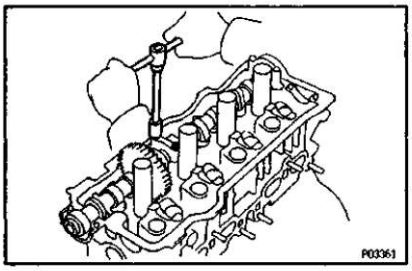
(b) Remove the two bolts, front bearing cap and oil seal.



(c) Uniformly loosen and remove the six bolts on the No. 1, No.3 and No.4 bearing caps in several passes, in the sequence shown. ,

NOTICE: Do not remove the No.2 bearing cap bolts at this stage.

(d) Remove the No.1, No.3 and No.4 bearing caps.



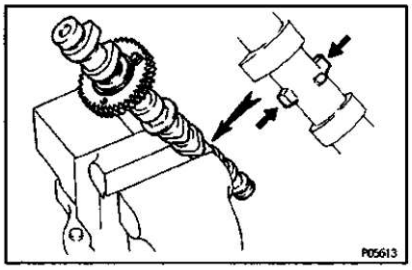
(e) Alternately loosen and remove the two bolts on the No.2 bearing cap.

HINT:

- As the two No.2 bearing cap bolts are loosened, make sure that the camshaft is lifted out straight and level, after breaking adhesion on the front bearing cap.
- If the camshaft is not being lifted out straight and level, retighten the two No.2 bearing cap bolts. Reverse the order of above steps from (e) to (a) and reset the knock pin of the intake camshaft at 80 – 115° BTDC, and repeat steps from (b) to (e) once again.

  NOTICE: Do not pry on or attempt to force the camshaft with a tool or other object.

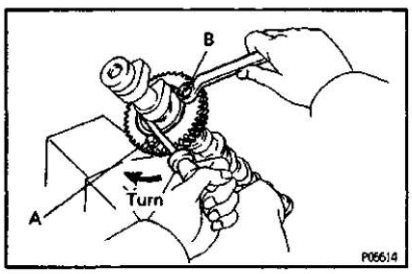
(f) Remove the No.2 bearing cap and camshaft.



34. DISASSEMBLE EXHAUST CAMSHAFT

(a) Mount the hexagon wrench head portion of the camshaft in a vise.

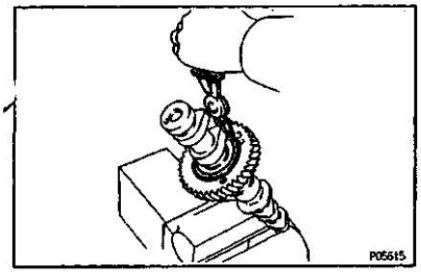
NOTICE: Be careful not to damage the camshaft.



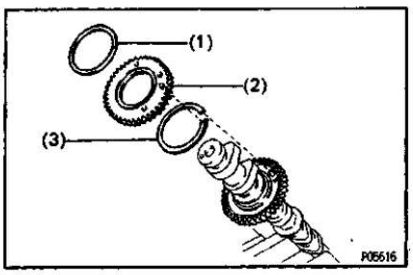
(b) insert service bolt A into the service hole of the camshaft sub–gear.

(c) Using a screwdriver, turn the sub–gear clockwise, and remove service bolt B.

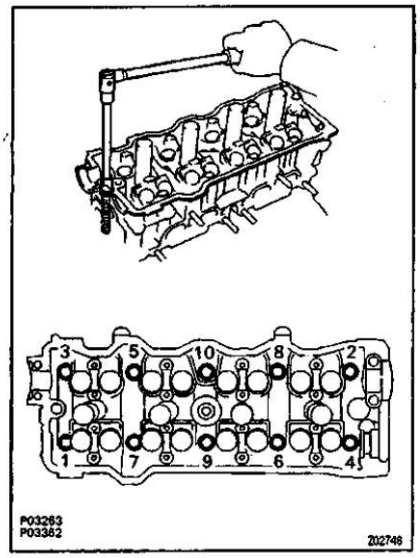
NOTICE: Be careful not to damage the camshaft.



(d) Using snap ring pliers, remove the snap ring.



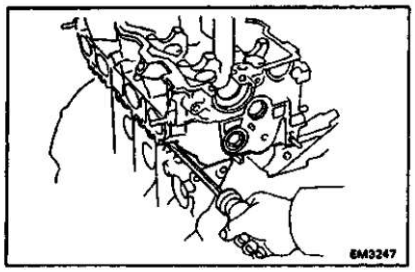
(e) Remove the following parts:
(1) Wave washer
(2) Camshaft sub–gear
(3) Camshaft gear spring



35. REMOVE CYLINDER HEAD

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

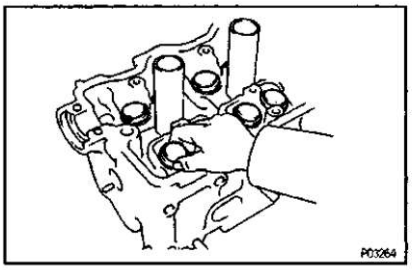
NOTICE: Cylinder head warpage or cracking could result from removing bolts in incorrect order.



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

HINT: If the cylinder head is oft, pry between the cylinder head and cylinder block with a screwdriver.

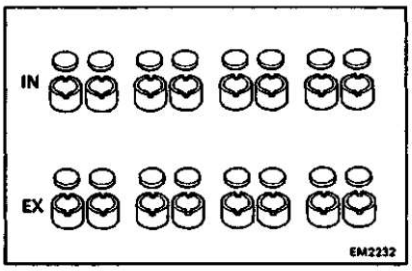
NOTICE: Be careful not to damage the contact surfaces of the cylinder head and cylinder block.



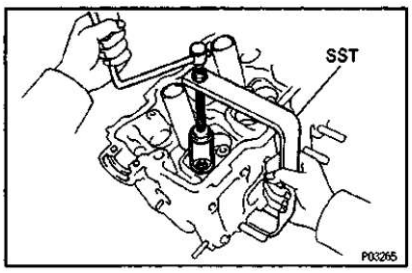
CYLINDER HEAD DISASSEMBLY

(See Components for Removal and Installation)

1. REMOVE VALVE LIFTERS AND SHIMS

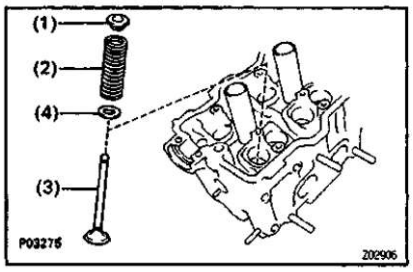


HINT: Arrange the valve lifters and shims in correct order.

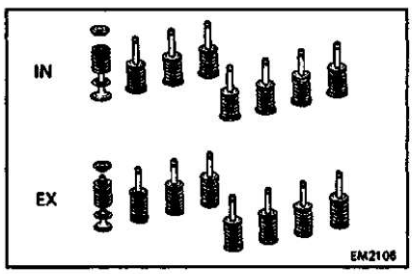


2. REMOVE VALVES

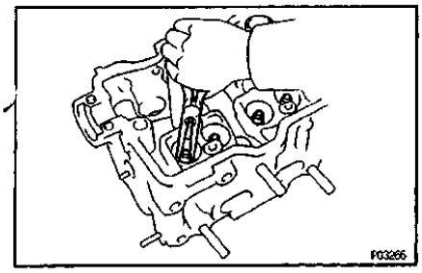
(a) Using SST, compress the valve spring and remove the two keepers.
SST 09202–70010



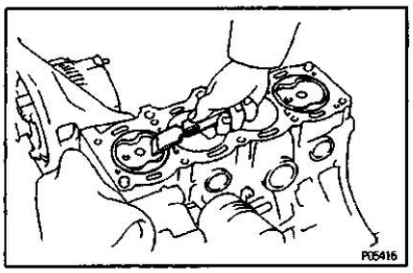
(b) Remove the following parts:
(1) Spring retainer
(2) Valve spring
(3) Valve
(4) Spring seat



HINT: Arrange the valves, valve springs, spring seats and spring retainers incorrect order.



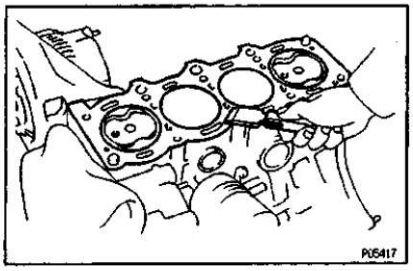
(c) Using needle–nose pliers, remove the oil seal.



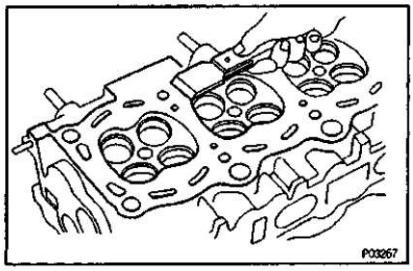
CYLINDER HEAD COMPONENTS INSPECTION AND REPAIR

1. CLEAN TOP SURFACES OF PISTONS AND CYLINDER BLOCK

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



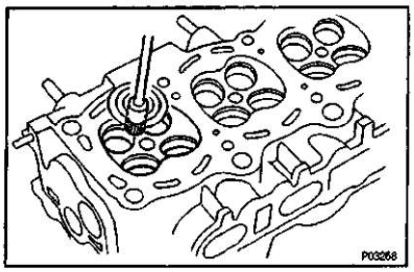
(b) Using a gasket scraper, remove all the gasket material from the cylinder block surface.
(c) Using compressed air, blow carbon and oil from the bolt holes.
CAUTION: Protect your eyes when using high – com– pressed air.



2. CLEAN CYLINDER HEAD

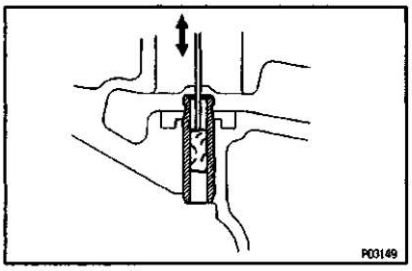
A. Remove gasket material

Using a gasket scraper, remove all the gasket material from the cylinder block contact surface.
NOTICE: Be careful not to scratch the cylinder block contact surface.

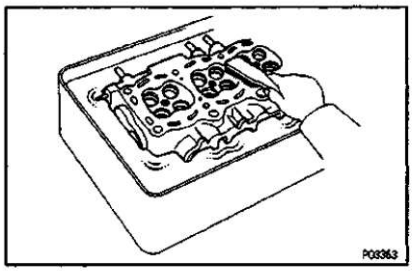


B. Clean combustion chambers

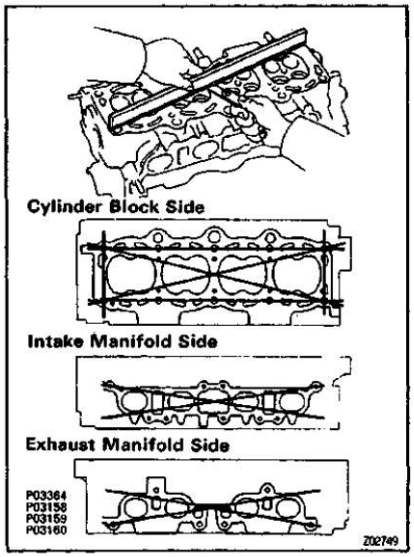
Using a wire brush, remove all the carbon from the combustion chambers.
NOTICE: Be careful not to scratch the cylinder block contact surface.



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

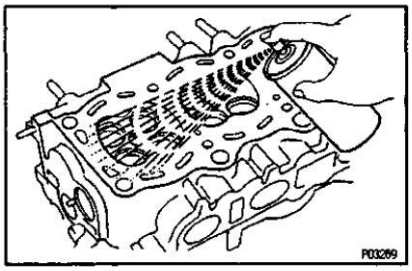


D. Clean cylinder head
Using a soft brush and solvent, thoroughly clean the cylinder head.

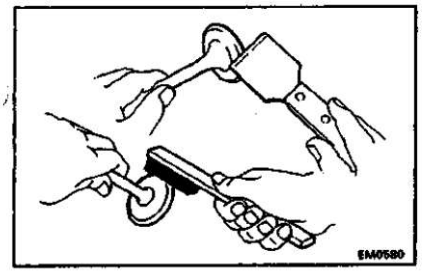


3. INSPECT CYLINDER HEAD

A. Inspect for flatness
Using a precision straight edge and feeler gauge, measure the surfaces contacting the cylinder block and the manifolds for warpage.
Maximum warpage:
Cylinder block side
0.05 mm (0.0020 in.)
Manifold side
0.08 mm (0.0031 in.)
If warpage is greater than maximum, replace the cyl–inder head.



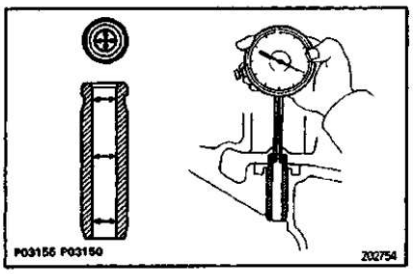
B. Inspect for cracks
Using a dye penetrant, check the combustion cham–ber, intake ports, exhaust ports and cylinder block surface for cracks.
If cracked, replace the cylinder head.



4. CLEAN VALVES

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

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

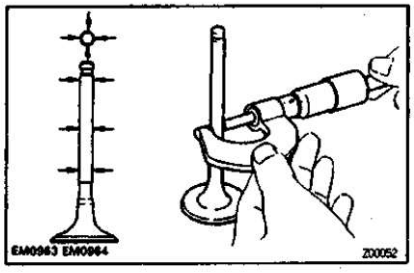


5. INSPECT VALVE STEMS AND GUIDE BUSHINGS

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

Bushing inside diameter:

6.010 –6.030 mm (0.2366 – 0.2374 in.)



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

Valve stem diameter:

Intake

5.970 – 5.985 mm (0.2350 – 0.2356 in.)

Exhaust

5.965 – 5.980 mm (0.2348 – 0.2354 in.)

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

Standard oil clearance:

Intake

0.025 – 0.060 mm (0.0010 – 0.0024 in.)

Exhaust

0.030 – 0.065 mm (0.0012 – 0.0026 in.)

Maximum oil clearance:

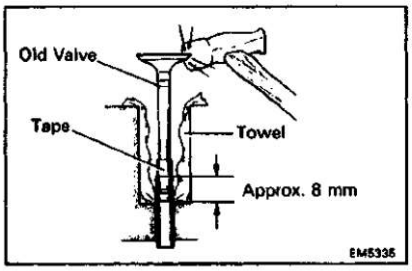
Intake

0.08 mm (0.0031 in.)

Exhaust

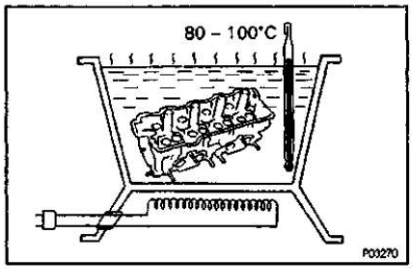
0.10 mm (0.0039 in.)

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

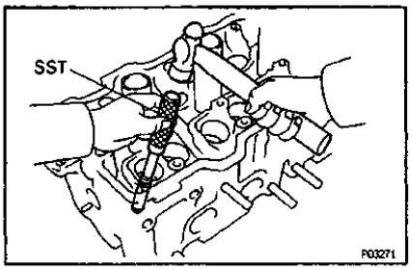


6. IF NECESSARY, REPLACE VALVE GUIDE BUSHINGS

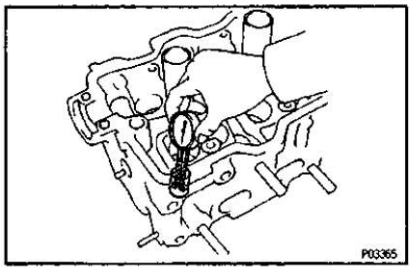
(a) (Exhaust (w/ Snap Ring))
Insert an old valve wrapped with tape into the valve guide bushing, and break off the valve guide bushing by hitting it with a hammer. Remove the snap ring.
HINT: Wrap the tape approx. 8 mm (0.31 in.) from the valve stem end.
NOTICE: Be careful not to damage the valve lifter hole.



(b) Gradually heat the cylinder head to 80 – 100˚C (176 – 212˚ F).



(c) Using SST and a hammer, tap out the guide bushing.
SST 09201–70010



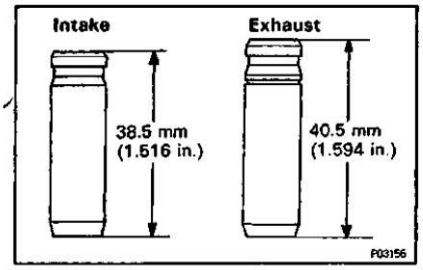
(d) Using a caliper gauge, measure the bushing bore di–ameter of the cylinder head.

Both intake and exhaust

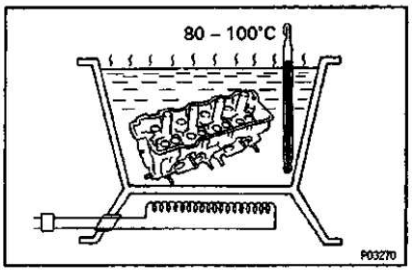
Bushing bore diameter mm (in.)	Bushing size
11.000 – 11.027 (0.4331 – 0.4342)	Use STD
11.050 – 11.077 (0.4350 – 0.4361)	Use O/S 0.05

V00228

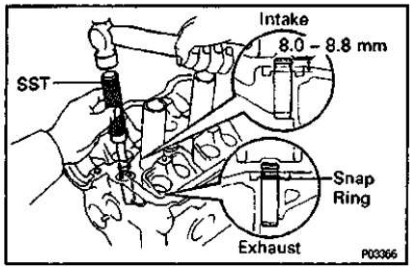
(e) Select a new guide bushing (STD or O/S 0.05).
If the bushing bore diameter of the cylinder head is greater than 11.027 mm (0.4341 in.), machine the bushing bore to the following dimension:
11.050 – 11.077 mm (0.4350 – 0.4361 in.)
If the bushing bore diameter of the cylinder head is greater than 11.077 mm (0.4361 in.), replace the cylinder head.



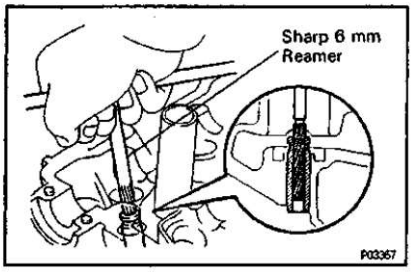
HINT: Different the bushings are used for the intake and exhaust.



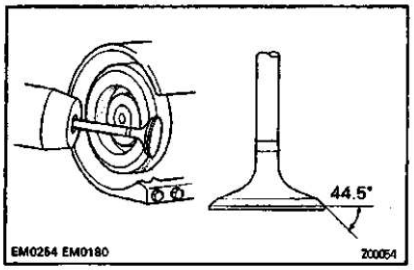
(f) Gradually heat the cylinder head to 80 – 100°C (176 – 212°F).



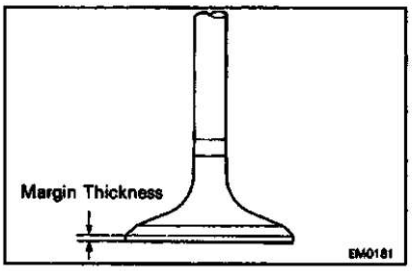
(g) (Intake)
Using SST and a hammer, tap in a new guide bushing until there is 8.0 – 8.8 mm (0.315 – 0.346 in.) protruding from the cylinder head.
SST 09201–70010
(h) (Exhaust)
Using SST and a hammer, tap in a new guide bushing until the snap ring makes contact with the cylinder head.
SST 09201–70010



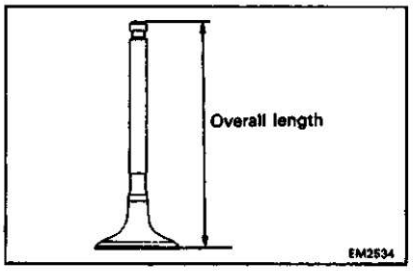
(I) Using a sharp 6 mm reamer, ream the guide bushing to obtain the standard specified clearance (See step 5 above) between the guide bushing and valve stem.



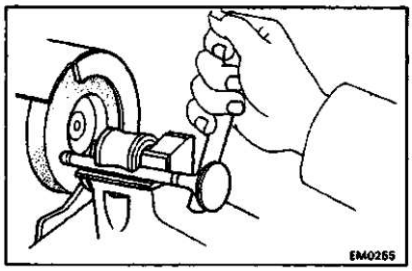
7. INSPECT AND GRIND VALVES
(a) Grind the valve enough to remove pits and carbon.
(b) Check that the valve is ground to the correct valve face angle.
Valve face angle:
44.5°



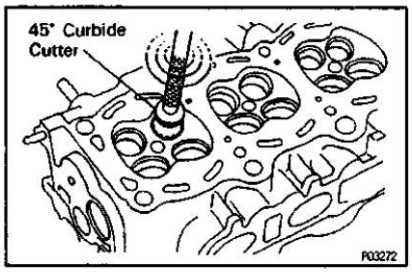
(c) Check the valve head margin thickness.
Standard margin thickness:
0.8 – 1.2 mm (0.031 – 0.047 in.)
Minimum margin thickness:
0.5 mm (0.020 in.)
If the margin thickness is less than minimum, replace the valve.



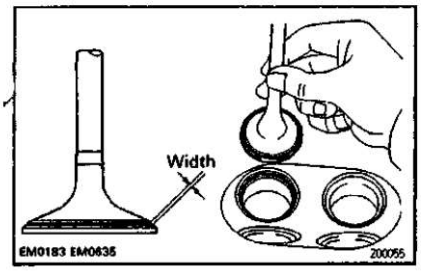
(d) Check the valve overall length.
Standard overall length:
Intake
97.60 mm (3.8425 in.)
Exhaust
98.45 mm (3.8760 in.)
Minimum overall length:
Intake
97.1 mm (3.823 in.)
Exhaust
98.0 mm (3.858 in.)
If the overall length is less than minimum, replace the valve.



(e) Check the surface of the valve stem tip for wear.
If the valve stem tip is worn, resurface the tip with a grinder or replace the valve.
NOTICE: Do not grind off more then minimum.

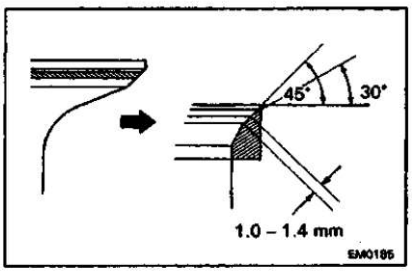


8. INSPECT AND CLEAN VALVE SEATS
(a) Using a 45° carbide cutter, resurface the valve seats. Remove only enough metal to clean the seats.

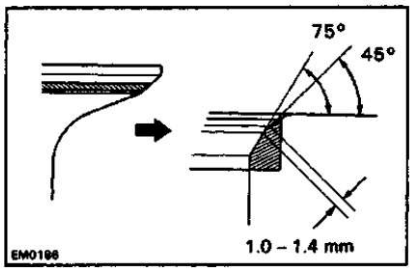


(b) Check the valve seating position.
Apply a light coat of prussian blue (or white lead) to the valve face. Lightly press the valve against the seat. Do not rotate valve.
(c) Check the valve face and seat for the following:
- If blue appears 360° around the face, the valve is concentric. If not, replace the valve.
- If blue appears 360° around the valve seat, the guide and face are concentric. If not, resurface the seat.
- Check that the seat contact is in the middle of the! valve face with the following width:
  1.0 – 1.4 mm (0.039 – 0.055 in.)
  If not, correct the valve seats as follows:

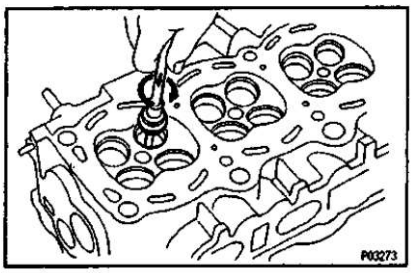
(1) If the seating is too high on the valve face, use 30° and 45° cutters to correct the seat.



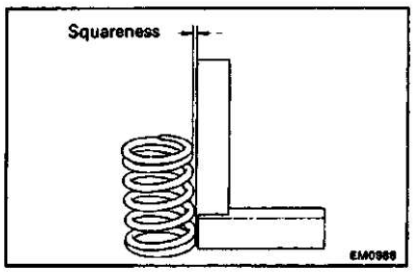
(2) If the seating is too low on the valve face, use 75° and 45° cutters to correct the seat.

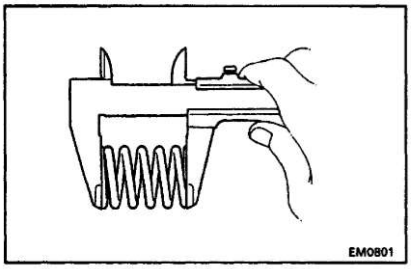


(d) Hand–lap the valve and valve seat with an abrasive compound.
(e) After hand–lapping, clean the valve and valve seat.

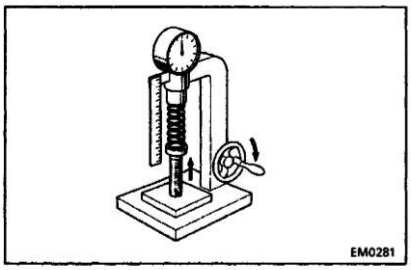


9. INSPECT VALVE SPRINGS
(a) Using a steel square, measure the squareness of the valve spring.
Maximum squareness:
2.0 mm (0.079 in.)
If the deviation is greater than maximum, replace the valve spring.

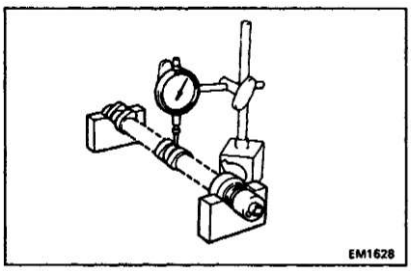




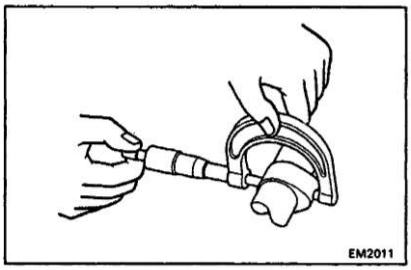
(b) Using a vernier caliper, measure the free length of the valve spring.
Free length:
41.9 mm (1.650 in.)
If the free length is not as specified, replace the valve spring.



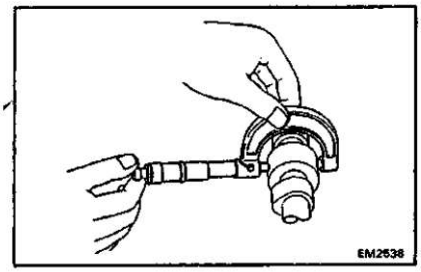
(c) Using a spring tester, measure the tension of the valve spring at the specified installed length.
Installed tension:
164 – 189 N (16.7 – 19.3 kgf, 36.8 – 42.5 lbf)
at 34.7 mm (1.366 in.)
If the installed tension is not as specified, replace the valve spring.



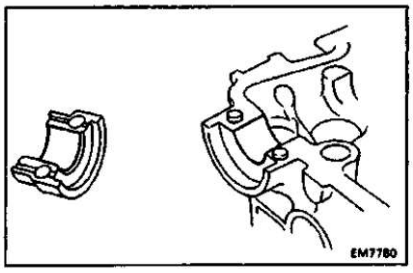
10. INSPECT CAMSHAFTS AND BEARINGS
A. Inspect camshaft for runout
(a) Place the camshaft on V–blocks.
(b) Using a dial indicator, measure the circle runout at the center journal.
Maximum circle runout:
0.04 mm (0.0016 in.)
If the circle runout is greater than maximum, replace the camshaft.



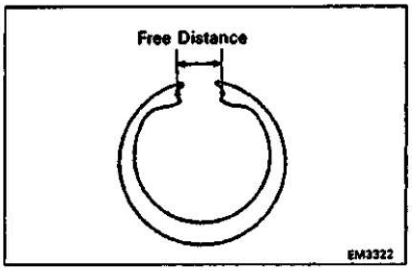
6. Inspect cam lobes
Using a micrometer, measure the cam lobe height.
Standard cam lobe height:
Intake
42.01 – 42.11 mm (1.6539 – 1.6579 in.)
Exhaust
40.06 – 40.16 mm (1.5772 – 1.5811 in.)
Minimum cam lobe height:
Intake
41.90 mm (1.6496 in.)
Exhaust
39.95 mm (1.5728 in.)
If the cam lobe height is less than minimum, replace the camshaft.



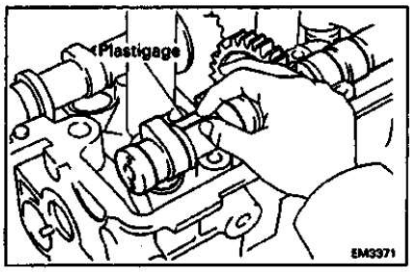
C. Inspect camshaft journals
Using a micrometer, measure the journal diameter.
Journal diameter:
26.959 – 26.975 mm (1.0614 – 1.0620 in.)
If the journal diameter is not as specified, check the oil clearance.



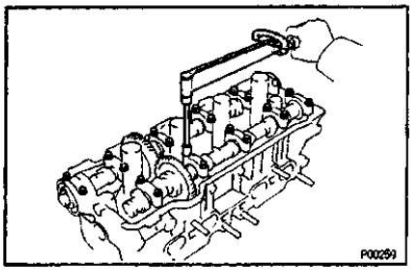
D. Inspect camshaft bearings
Check that bearings for flaking and scoring.
If the bearings are damaged, replace the bearing caps and cylinder head as a set.



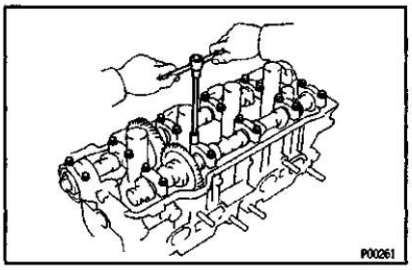
E. Inspect camshaft gear spring
Using a vernier caliper, measure the free distance between the spring ends.
Free distance:
22.5 – 22.9 mm (0.886 – 0.902 in.)
If the free distance is not as specified, replace the gear spring.



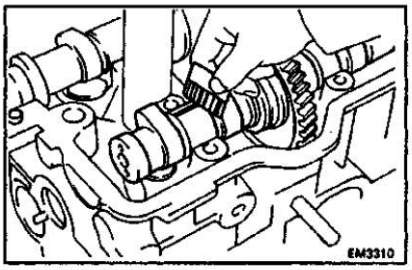
F. Inspect camshaft journal oil clearance
(a) Clean the bearing caps and camshaft journals.
(b) Place the camshafts on the cylinder head.
(c) Lay a strip of Plastigage across each of the camshaft journals.



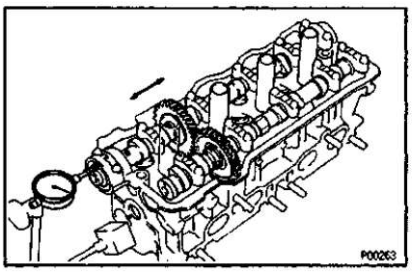
(d) Install the bearing caps.
(See step 4 in Cylinder Head Installation)
Torque: 19 N–m (190 kgf–cm, 14 ft–lbf)
NOTICE: Do not turn the camshaft.



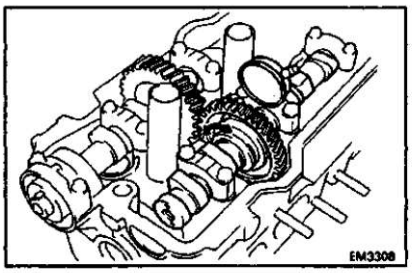
(e) Remove the bearing caps.



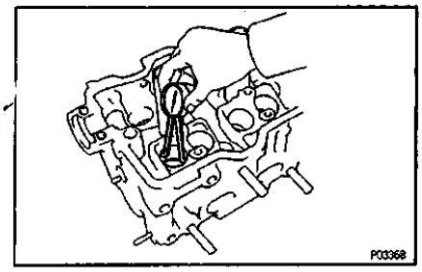
(f) Measure the Plastigage at its widest point.
Standard oil clearance:
0.025 – 0.062 mm (0.0010 – 0.0024 in.)
Maximum oil clearance:
0.10 mm (0.0039 in.)
If the oil clearance is greater than maximum, replace the camshaft. If necessary, replace the bearing caps and cylinder head as a set.
(g) Completely remove the Plastigage.



G. Inspect camshaft thrust clearance
(a) Install the camshaft.
(See step 4 in Cylinder Head Installation)
(b) Using a dial indicator, measure the thrust clearance while moving the camshaft back and forth.
Standard thrust clearance:
Intake
0.045 – 0.100 mm (0.0018 – 0.0039 in.)
Exhaust
0.030 – 0.085 mm (0.0012 – 0.0033 in.)
Maximum thrust clearance:
Intake
0.12 mm (0.0047 in.)
Exhaust
0.10 mm (0.0039 in.)
If the thrust clearance is greater than maximum, re–place the camshaft. If necessary, replace the bearing caps and cylinder head as a set.



H. Inspect camshaft gear backlash
(a) Install the camshafts without installing the exhaust cam sub–gear.
(See step 4 in Cylinder Head Installation)
(b) Using a dial indicator, measure the backlash.
Standard backlash:
0.020 – 0.200 mm (0.0008 – 0.0079 in.)
Maximum backlash:
0.30 mm (0.0188 in.)
If the backlash is greater then maximum, replace the camshafts.

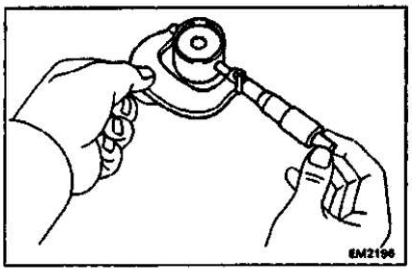


11. INSPECT VALVE LIFTERS AND LIFTER BORES

(a) Using a caliper gauge, measure the lifter bore diameter of the clinder head.

Lifter bore diameter:

31.000 – 31.018 mm (1.2205 – 1.2213 in.)



(b) Using a micrometer, measure the lifter diameter.

Lifter diameter:

30.966 – 30.976 mm (1.2191 – 1.2195 in.)

(c) Subtract the lifter diameter measurement from the lifter bore diameter measurement.

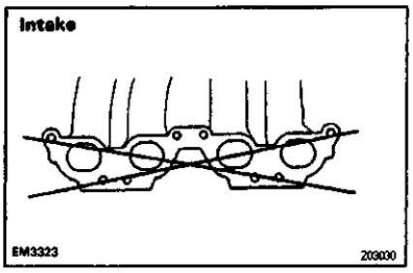
Standard oil clearance:

0.024 – 0.052 mm (0.0009 – 0.0020 in.)

Maximum oil clearance:

0.07 mm (0.0028 in.)

If the oil clearance is greater than maximum, replace the lifter. If necessary, replace the cylinder head.



12. INSPECT MANIFOLDS

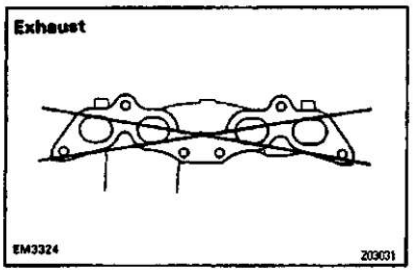
(Intake)

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

Maximum warpage:

0.30 mm (0.0118 in.)

If warpage is greater than maximum, replace the manifold.



(Exhaust)

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

Maximum warpage:

0.30 mm (0.0118 in.)

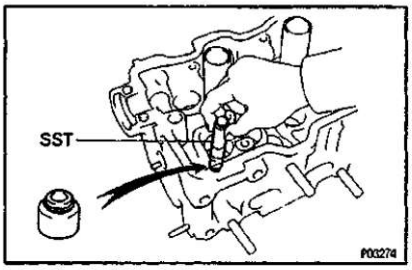
If warpage is greater than maximum, replace the manifold.

CYLINDER HEAD ASSEMBLY

(See Components for Removal and Installation)

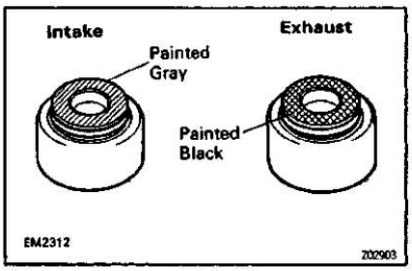
HINT:

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

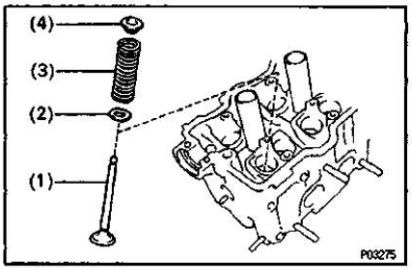


1. INSTALL VALVES

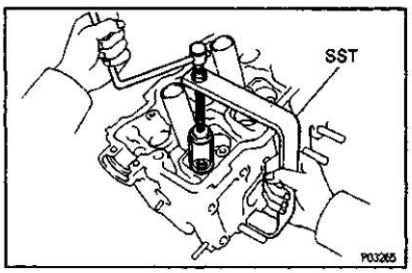
(a) Using SST, push in a new oil seal.
SST 09201–41020



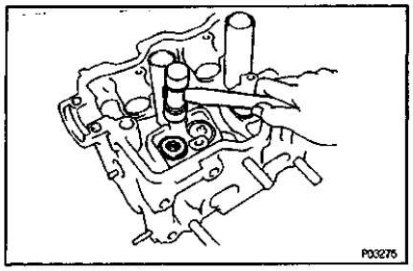
HINT: The intake valve oil seal is gray and the exhaust valve oil seal is black.



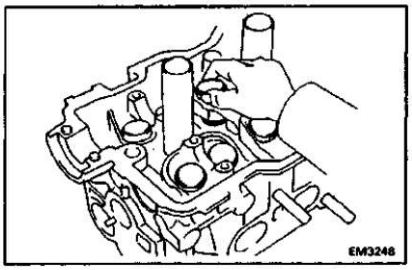
(b) Install the following parts:
(1) Valve
(2) Spring seat
(3) Valve spring
(4) Spring retainer



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



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

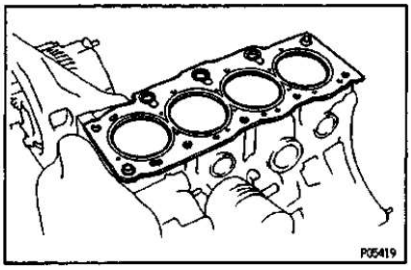


2. INSTALL VALVE LIFTERS AND SHIMS
(a) Install the valve lifter and shim.
(b) Check that the valve lifter rotates smoothly by hand.

CYLINDER HEAD INSTALLATION

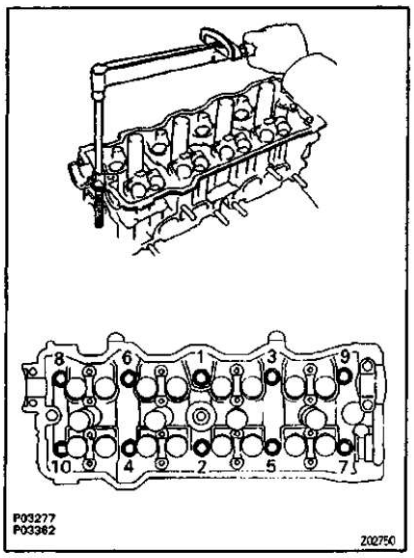
(See Components for Removal and Installation)

1. INSTALL CYLINDER HEAD



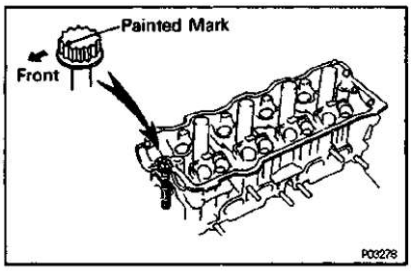
A. Place cylinder head on cylinder block
(a) Place a new cylinder head gasket in position on the cylinder block.
NOTICE: Be careful of the installation direction.
(b) Place the cylinder head in position on the cylinder head gasket.

B. Install cylinder head bolts

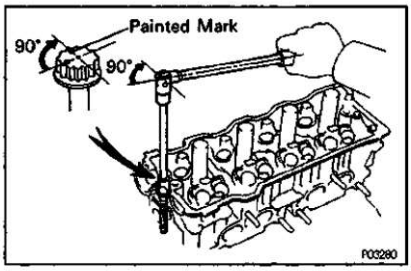


HINT:
- The cylinder head bolts are tightened in two progressive steps (steps (b) and (d)).
- If any cylinder head bolt is broken or deformed, replace it.

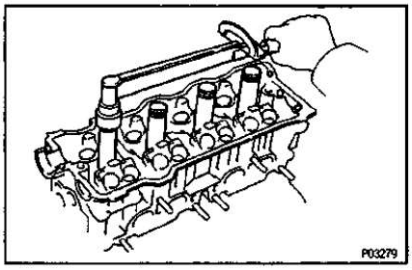
(a) Apply a light coat of engine oil on the threads and under the heads of the cylinder head bolts.
(b) Install and uniformly tighten the ten cylinder head bolts and plate washers in several passes, in the sequence shown.
Torque: 49 N–m (500 kgf–cm, 36 ft–lbf)
If any one of the cylinder head bolts does not meet the torque specification, replace the cylinder head bolt.



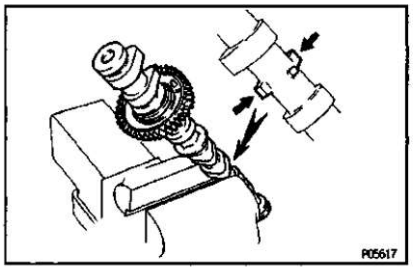
(c) Mark the front of the cylinder head bolt head with paint.



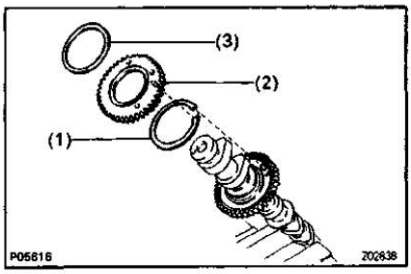
(d) Retighten the cylinder head bolts 90° in the numerical order shown.
(e) Check that the painted mark is now at a 90° angle to front.



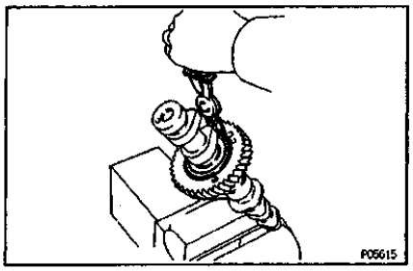
2. INSTALL SPARK PLUG TUBES
(a) Clean the cylinder head tube holes of any residual adhesive, oil or foreign particles. Remove any oil with kerosene or gasoline.
(b) Screw the threads of the spark plug tube coated with adhesive into the cylinder head.
(c) Using the spark plug tube nut and a 30 mm socket wrench, tighten the spark plug tubes.
Torque: 39 N–m (400 kgf–cm, 29 ft–lbf)



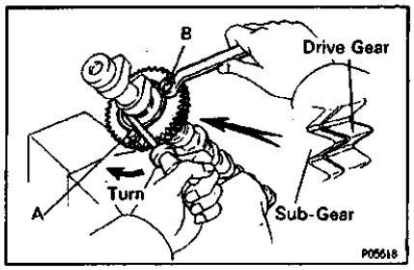
3. ASSEMBLY EXHAUST CAMSHAFT
(a) Mount the hexagon wrench head portion of the camshaft in a vise.
NOTICE: Be careful not to damage the camshaft.



(b) Install the following parts:
(1) Camshaft gear spring
(2) Camshaft sub–gear
(3) Wave washer
HINT: Align the pins on the gears with the spring ends.

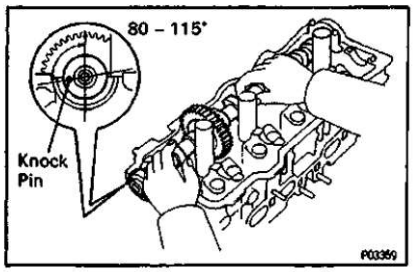


(c) Using snap ring pliers, install the snap ring.

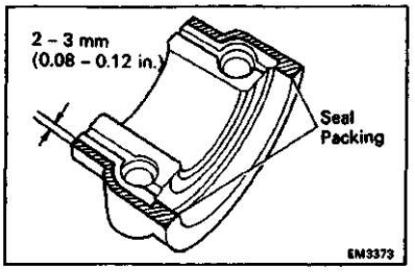


(d) Insert service bolt A into the service hole of the camshaft sub–gear.
(e) Using a screwdriver, align the holes of the camshaft drive gear and sub–gear by turning camshaft sub–gear clockwise, and install service bolt B.
NOTICE: Be careful not to damage the camshaft.
(f) Align the gear teeth of the drive gear and sub–gear, and tighten service bolt B.

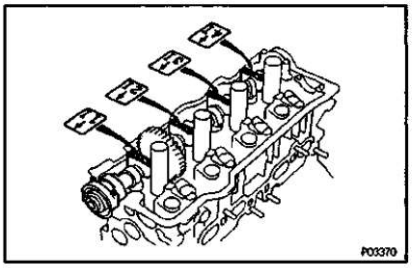
4. INSTALL CAMSHAFTS
NOTICE: Since the thrust clearance of the camshaft is small, the camshaft must be kept level while it is being installed. If the camshaft is not kept level, the portion of the cylinder head receiving the shaft thrust may crack or be damaged, causing the camshaft to seize or break. To avoid this, the following steps should be carried out.



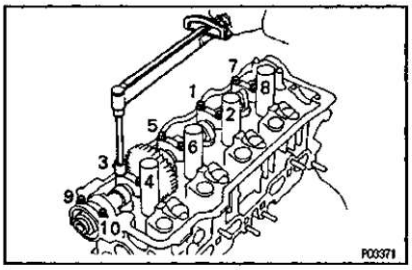
A. Install intake camshaft
(a) Apply Mp grease to the thrust portion of the cam–shaft.
(b) Place the intake camshaft at 80 – 115° BTDC of camshaft angle on the cylinder head.
HINT: The above angle arrows the No.1 and No.3 cylinder cam lobes of the intake camshaft to push their valve lifters evenly.



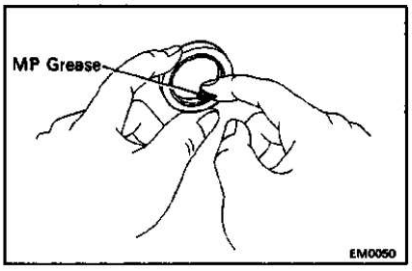
(c) Apply seal packing to the No.1 bearing cap as shown.
Seal packing:
Part No. 08826–00080 or equivalent



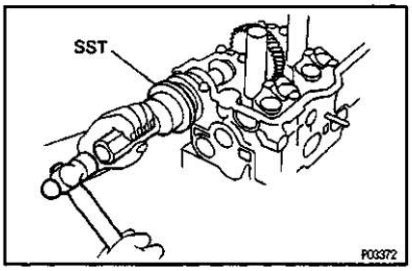
(d) Install the bearing caps in their proper locations.



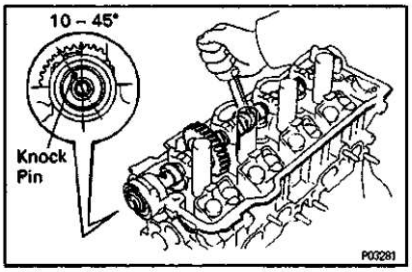
(e) Apply a light coat of engine oil on the threads and under the heads of the bearing cap bolts.
(f) Install and uniformly tighten the ten bearing cap bolts in several passes, in the sequence shown.
Torque: 19 N–m (190 kgf–cm, 14 ft–lbf)



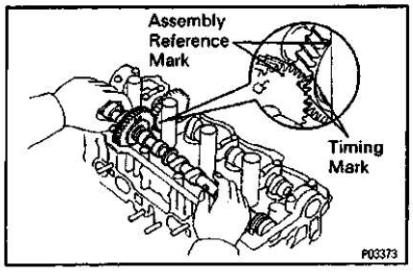
(g) Apply IMP grease to a new oil seal lip.



(h) Using SST, tap in the oil seal.
SST 09223–46011



B. Install exhaust camshaft
(a) Set the knock pin of the intake camshaft at 10 – 45° BTDC of camshaft angle.
HINT: The above angle allows the No.2 and No.4 cylinder cam lobes of the exhaust camshaft to push their valve liters evenly.

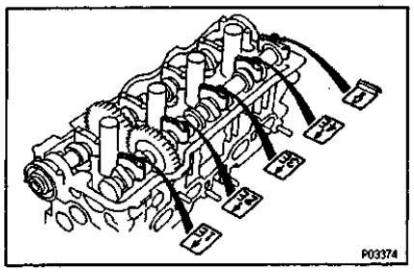


(b) Apply MP grease to the thrust portion of the cam–shaft.
(c) Engage the exhaust camshaft gear to the intake camshaft gear by matching the timing marks on each gear.
(d) Roll down the exhaust camshaft onto the bearing journals while engaging gears with each other.

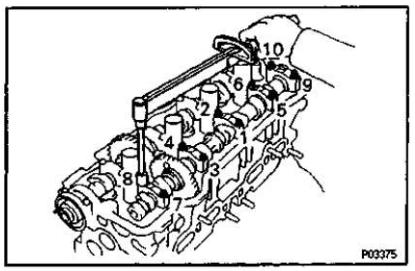
NOTICE: There are also assembly reference marks on each gear as shown in the illustration. Do not use these marks.

(e) Turn the intake camshaft clockwise or counterclock–wise little until the exhaust camshaft sits in the bea–ring journals evenly without rocking the camshaft on the bearing journals.

NOTICE: It is very important to replace the camshaft in the bearing journals evenly while tightening bear-ing caps in the subsequent steps.

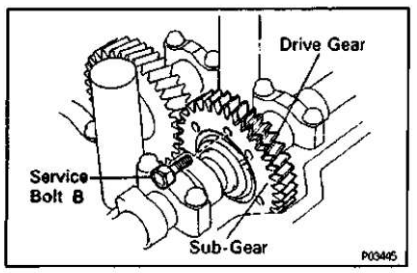


(f) Install the bearing caps in their proper locations.



(g) Apply a light coat of engine oil on the threads and under the heads of the bearing cap bolts.
(h) Install and uniformly tighten the ten bearing cap bolts in several passes, in the sequence shown.

Torque: 19 N–m (190 kgf–cm. 14 ft–lbf)



(i) Remove service bolt B.

5. CHECK AND ADJUST VALVE CLEARANCE

(See Tune–Up)

Turn the camshaft and position the cam lobe upward, and check and adjust the valve clearance.

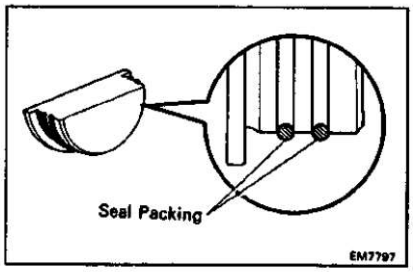
Valve clearance (Cold):

Intake

0.19 – 0.29 mm (0.007 – 0.011 in.)

Exhaust

0.28 – 0.38 mm (0.011 – 0.015 in.)



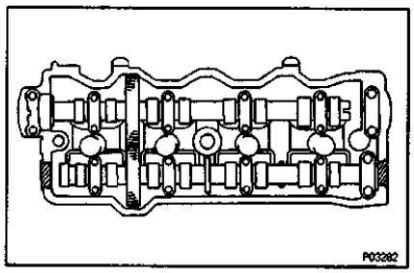
6. INSTALL SEMI–CIRCULAR PLUGS

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

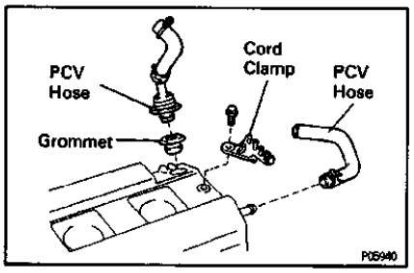
(b) Apply seal packing to the semi–circular plug grooves.

Seal packing:

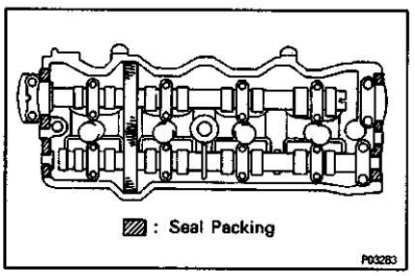
Part No. 08826–00080 or equivalent



(c) Install the two semi–circular plugs to the cylinder head.



7. INSTALL PCV VALVE, PCV HOSE AND HIGH–TENSION CORD CLAMP



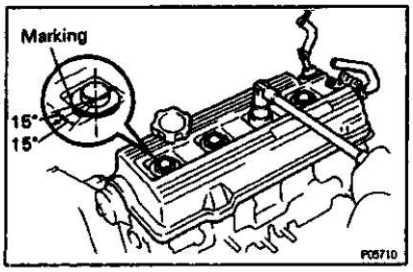
8. INSTALL CYLINDER HEAD COVER

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

(b) Apply seal packing to the cylinder head as shown in the illustration.

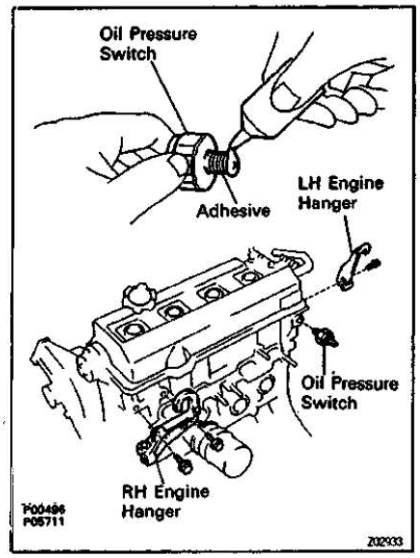
Seal packing:

Pert No. 08826–00080 or equivalent



(c) Install the gasket to the head cover.
(d) install the head cover with the four grommets and nuts. Uniformly tighten the nuts in several passes.
Torque: 23 N–m (230 kgf–cm, 17 ft–lbf)

HINT: Install the grommets so that their markings are as shown in the illustration.



9. INSTALL OIL PRESSURE SWITCH

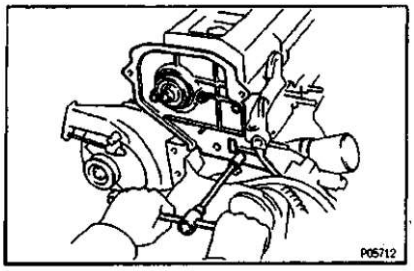
Apply adhesive to two or three threads.

Adhesive:

Part No. 08833–00080. THREE BOND 1324 or equivalent

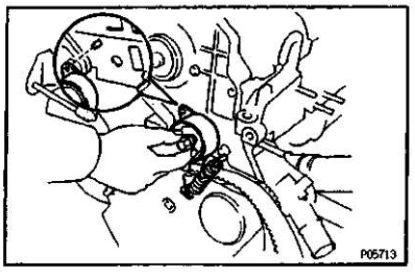
10. INSTALL ENGINE HANGERS

(a) Install the RH engine hanger with the two bolts.
Torque: 25 N–m (250 kgf–cm, 18 ft–lbf)
(b) Install the LH engine hanger with the bolt.
Torque: 25 N–m (250 kgf–cm, 18 ft–lbf)



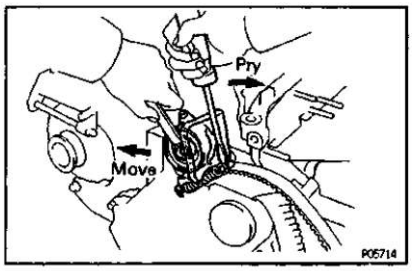
11. INSTALL NO.3 TIMING BELT COVER

install the timing belt cover with the four bolts.
Torque: 7.8 N–m (80 kgf–cm, 69 in.–lbf)

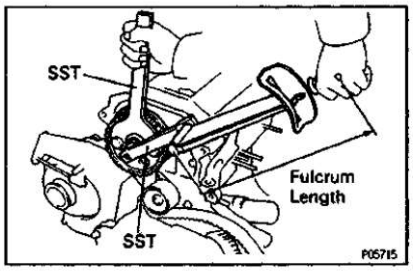


12. TEMPORARILY INSTALL NO.1 IDLER PULLEY AND TENSION SPRING

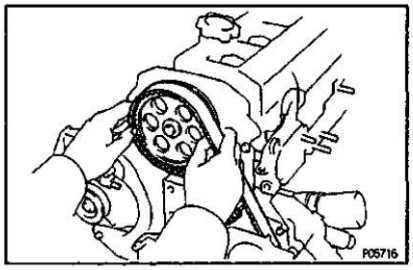
(a) Align the bracket pin hole with the pivot pin.
(b) Install the pulley with the bolt. Do not tighten the bolt yet.
(c) Install the tension spring.



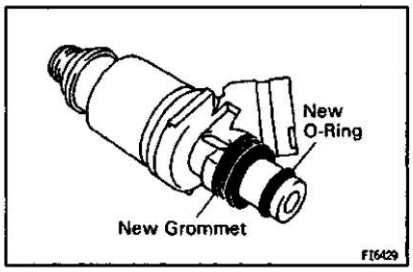
(d) Pry the pulley toward the left as far as it will go and tighten the bolt.
(e) Check that the idler pulley moves smoothly.



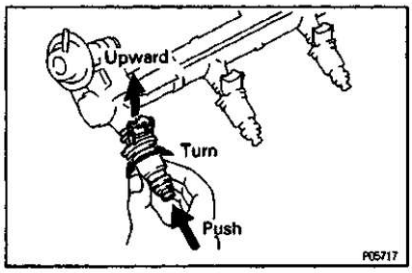
13. INSTALL CAMSHAFT TIMING PULLEY
(a) Align the camshaft knock pin with the knock pin groove of the pulley, and slide on the timing pulley.
(b) Using SST, install the pulley bolt.
SST 09249–63010,09278–54012
Torque:
54 N–m (550 kgf–cm, 40 ft–lbf)
37 N–m (380 kgf–cm, 27 ft–lbf) for SST
HINT: Use a torque wrench with a fulcrum length of 340 mm (13.39 in.)



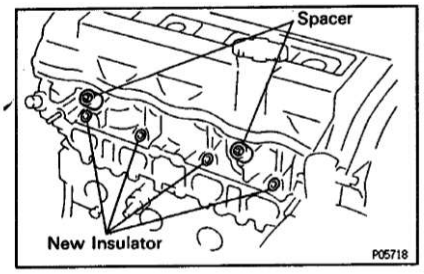
14. CONNECT TIMING BELT TO CAMSHAFT TIMING PULLEY
(See steps 10 to 22 in Timing Belt Installation)



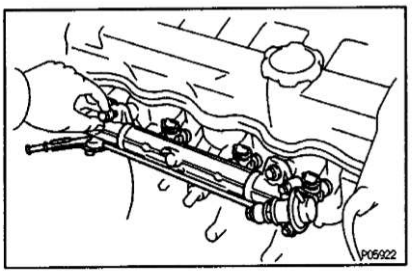
15. INSTALL INJECTORS AND DELIVERY PIPE
(a) Install a new grommet to the injector.
(b) Apply a light coat of gasoline to a new O–ring and install it to the injector.



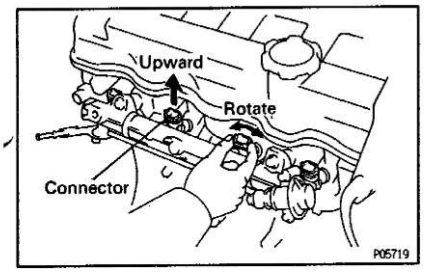
(c) While turning the injector left and right, install it to the delivery pipes. Install the four injectors.
(d) Position the injector connector upward.



(e) Place four new insulators and the two spacers in position on the cylinder head.



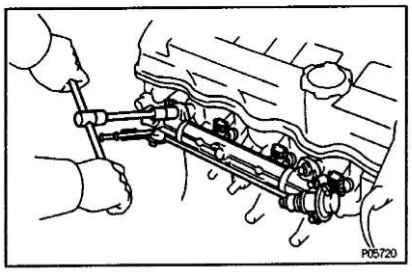
(f) Place the four injectors together with the delivery pipe in position on the cylinder head.
(g) Temporarily install the two bolts holding the delivery pipe to the cylinder head.



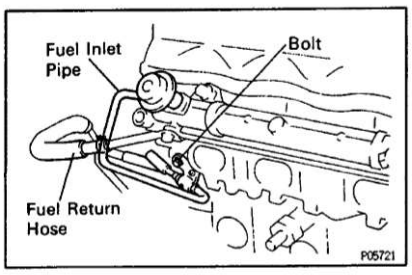
(h) Check that the injectors rotate smoothly.

HINT: If injectors do not rotate smoothly, the probable cause is incorrect installation of 0– rings. Replace the O–rings.

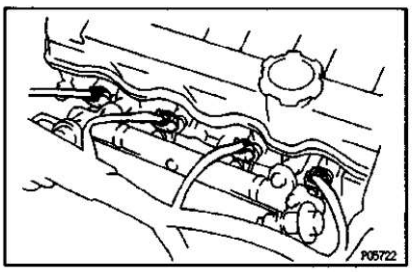
(i) Position the injector connector upward.



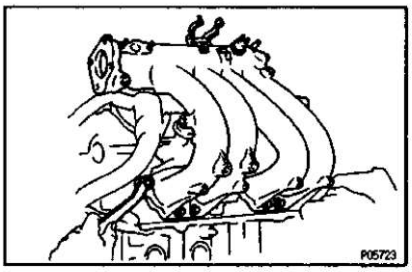
(j) Tighten the two bolts holding the delivery pipe to the cylinder head.
Torque: 13 N–m (130 kgf–cm. 9 ft–lbf)



(k) Connect the fuel inlet pipe to the delivery pipe with two new gaskets and the pulsation damper.
Torque: 34 N–m (350 kgf–cm, 25 ft–lbf)
(l) Install the fuel inlet pipe to the cylinder head with the bolt.
(m) Connect the fuel return hose.



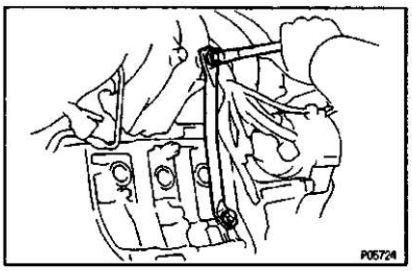
(n) Connect the four injector connectors.



16. INSTALL INTAKE MANIFOLD

(a) Install a new gasket and the intake manifold with the six bolts and two nuts. Uniformly tighten the bolts and nuts in several passes.

Torque: 19 N–m (195 kgf–cm, 14 ft–lbf)

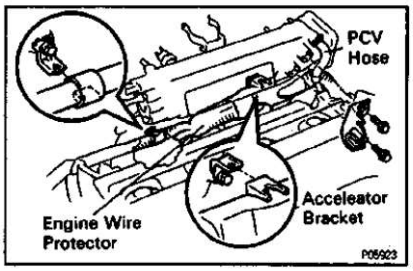


(b) Install the intake manifold stay with the two bolts.

Torque:

22 N–m (220 kgf–cm, 16 ft–lbf) for 12 mm head

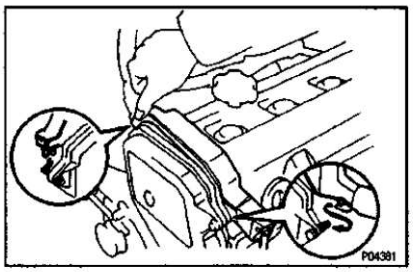
42 N–m (425 kgf–cm. 31 ft–lbf) for 14 mm head



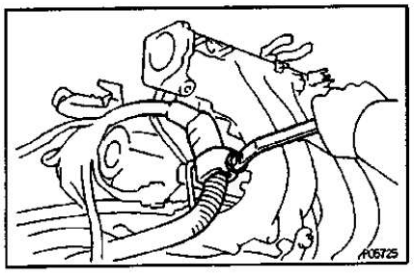
(c) Connect the the engine wire protector to the brackets on the front side of the intake manifold.

(d) Connect the PCV hose to the intake manifold.

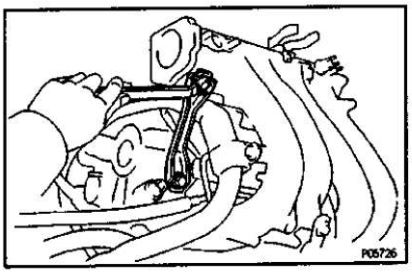
(e) Install the accelerator bracket with the two bolts.



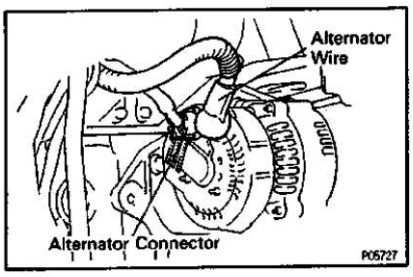
(f) Install the two clamps of the engine wire protector to each bolt.



(g) Install the engine wire protector with the bolt.



(h) Install the air intake chamber stay with the two bolts.
Torque: 42 N–m (425 kgf–cm, 31 ft–lbf)

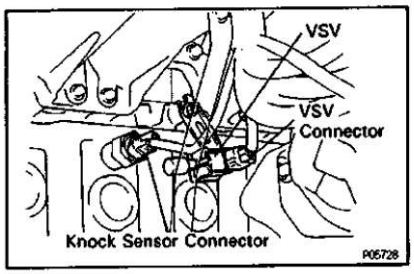


(i) Connect the alternator connector and wire.

17. INSTALL VSV FOR EGR

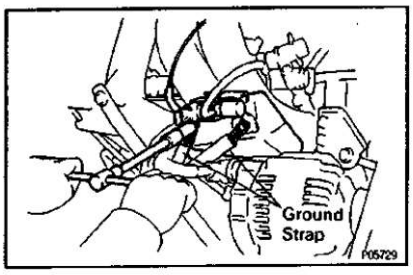
(a) Install the VSV with the bolt.
(b) Connect the VSV connector.

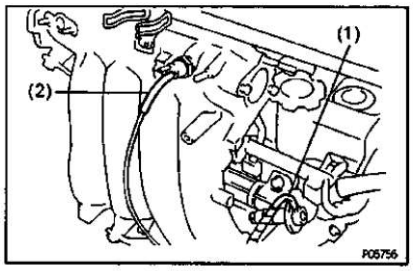
18. CONNECT KNOCK SENSOR CONNECTOR



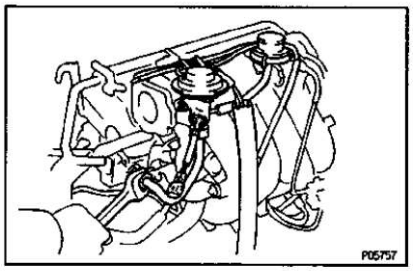
19. INSTALL VSV FOR FUEL PRESSURE

(a) Install the VSV with the two bolts. Connect the two ground straps.

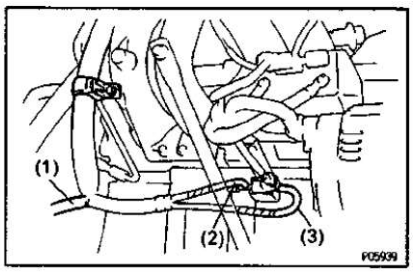




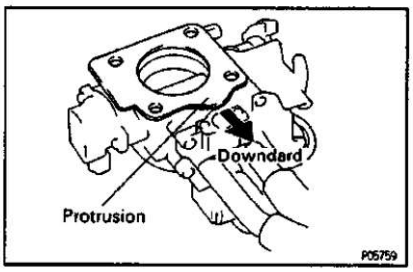
(b) Connect the following hoses:
(1) Vacuum hose (from port E of VSV) to fuel pressure regulator
(2) Vacuum hose (from port G of VSV) to gas filter.
(c) Connect the VSV connector:



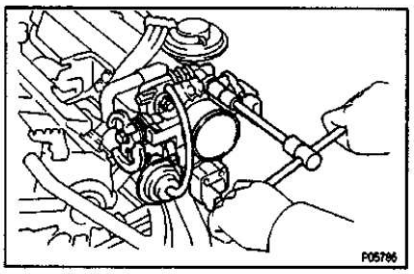
20. INSTALL EGR VALVE AND VACUUM MODULATOR
(a) Install a new gasket and the EGR valve with the union nut and two nuts.
Torque:
13 N–m (130 kgf–cm, 9 ft–lbf) for nut
59 N–m (600 kgf–cm, 43 ft–lbf) for union nut
(b) Install the vacuum modulator to the clamp.
(c) (CALIF. only)
Connect the EGR function sensor connector.



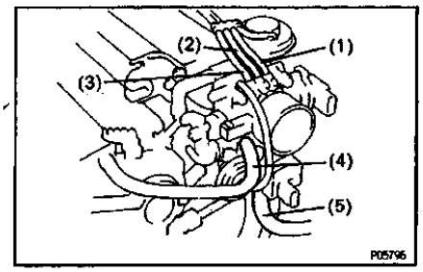
(d) Install the vacuum hose clamp to the intake manifold with the bolt.
(e) Connect the following hoses:
(1) Vacuum hose to charcoal canister
(2) Vacuum hose (from EGR valve) to port E of VSV (for EGR)
(3) Vacuum hose (from port "a" of EGR vacuum modulator) to port G of VSV (for EGR)



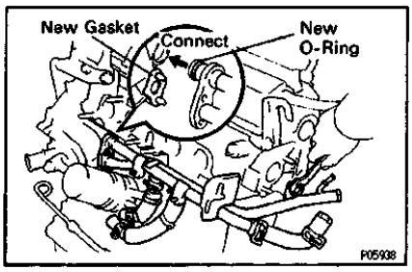
21. INSTALL THROTTLE BODY
(a) Place a new gasket on the throttle body, facing the protrusion downward.



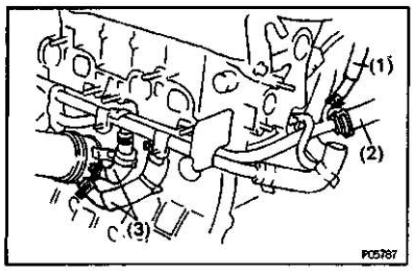
(b) Install the throttle body with the four bolts.
Torque: 19 N–m (195 kgf–cm. 14 ft–lbf)
HINT: Different the bolt lengths are used for upper side and lower side.
Bolt length:
45 mm (1.77 in.) for upper side
55 mm (2.17 in.) for lower side



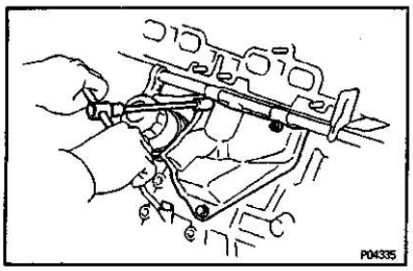
(c) Connect the following hoses:
(1) Vacuum hose (from upper port of TVS) to port "P" of throttle body
(2) Vacuum hose (from port "Q" of EGR vacuum modulator) to port "E" of throttle body
(3) Vacuum hose (from port "R" of EGR vacuum modulator) to port "R" of throttle body
(4) PCV hose (from cylinder head) to throttle body
(5) Air hose (port F of A/C idle–up valve)
(d) Connect the following connectors:
Throttle position sensor connector.
IACV connector.



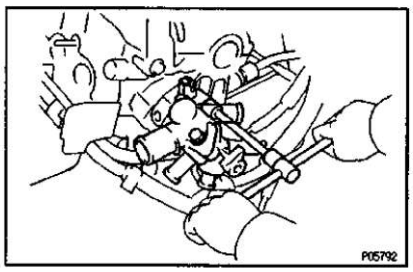
22. INSTALL WATER BY–PASS PIPE
(a) Install a new gasket to the water pump cover.
(b) Install a new O–ring to the by–pass pipe.
(c) Apply soapy water on the 0– ring.
(d) Install the by–pass pipe with the two nuts and two bolts.
Torque: 8.8N–m (90 kgf–cm, 78 in–lbf) for nut



(e) Connect the following hoses:
(1) IACV water by–pass hose
(2) Heater water hose
(3) Two oil cooler water by–pass hoses



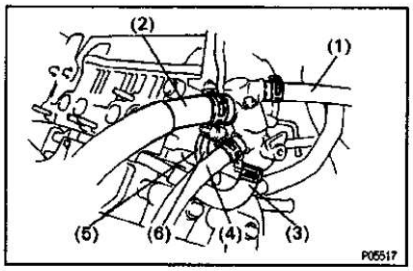
(f) Install the oil cooler heat protector with the two nuts and bolt.



23. INSTALL WATER OUTLET AND HOUSING

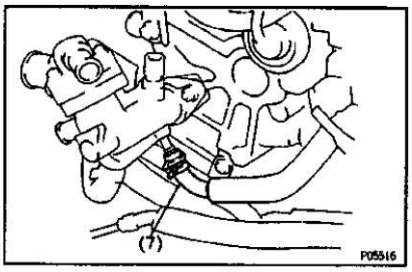
(a) Install a new gasket, the water outlet and outlet housing with the two nuts.

Torque: 15 N–m (150 kgf–cm, 11 ft–lbf)



(b) Connect the following hoses:

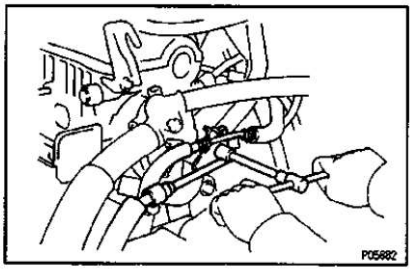
(1) Water filler hose
(2) Radiator hose
(3) Water by–pass pipe hose
(4) Heater water hose
(5) Vacuum hose (from P port of throttle body) to upper port of TVS
(6) Vacuum hose (from charcoal canister) to lower port of TVS



(7) IACV water by–pass hose

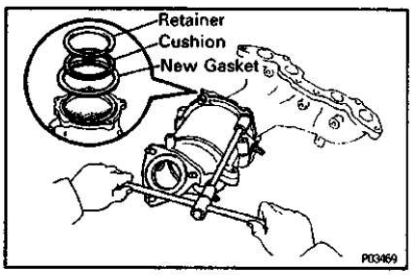
(c) Connect the following connectors:

- Water temperature sender gauge connector
- ECTS connector



(d) Install the fuel inlet pipe (with fuel return tube) with the bolt.

24. CONNECT OIL PRESSURE SWITCH CONNECTOR

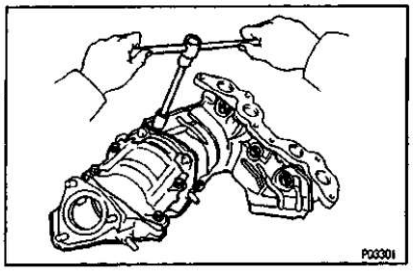


25. ASSEMBLE EXHAUST MANIFOLD AND TWC

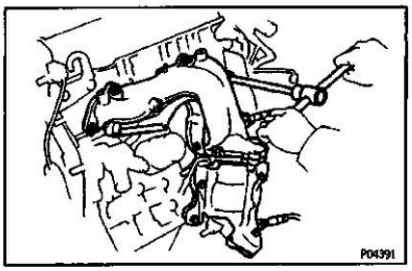
(a) Place the cushion, retainer and a new gasket on the TWC.

(b) Install the TWC to the exhaust manifold with the three bolts and two nuts.

Torque: 29 N–m (300 kgf–cm, 22 ft–lbf)

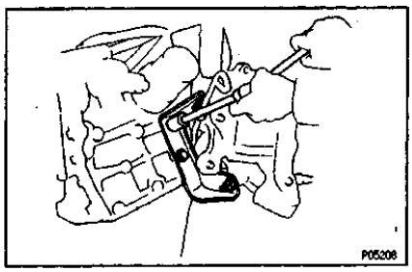


(c) Install the lower manifold heat insulator with the five bolts.
(d) Install the two TWC heat insulator with the eight bolts.

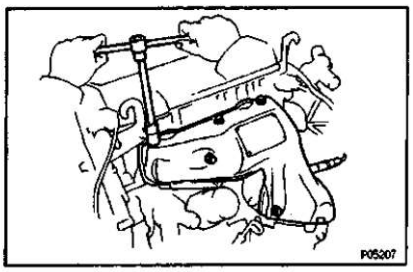


26. INSTALL EXHAUST MANIFOLD AND TWC ASSEMBLY

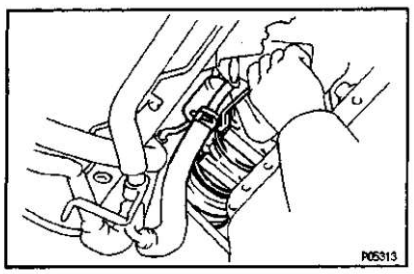
(a) Install a new gasket, the exhaust manifold and TWC assembly with the six nuts. Uniformly tighten the nuts in several passes.
Torque: 49 N–m (500 kgf–cm, 36 ft–lbf)



(b) Install the TWC stay with the two bolts and two nuts.
Torque: 42 N–m (425 kgf–cm, 31 ft–lbf)

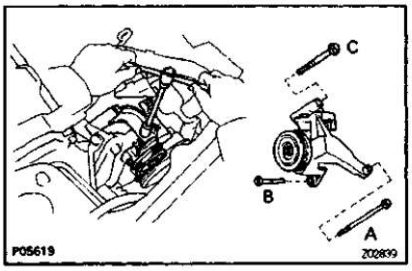


(c) Install the upper manifold heat insulator with the six bolts.
(d) Connect the following connectors:
- Oxygen sensor (main) connector
- (CALIF. only)
- Sub–oxygen sensor connector

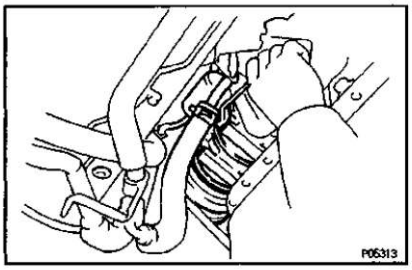


27. INSTALL A/C COMPRESSOR

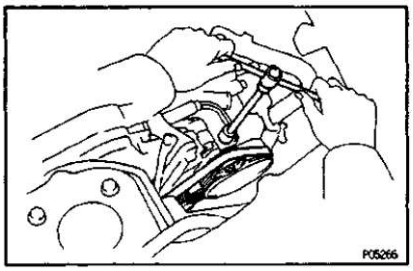
(a) Temporarily install the A/C compressor with the two bolts



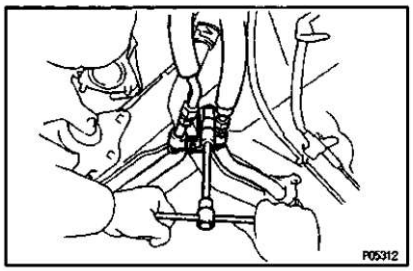
(b) Install the idler pulley bracket with the three bolts.
Torque:
25 N–m (250 kgf–cm, 18 ft–lbf) for A
27 N–m (275 kgf–cm, 20 ft–lbf) for B
37 N–m (375 kgf–cm, 27 ft–lbf) for C
(c) Connect the A/C compressor connector.



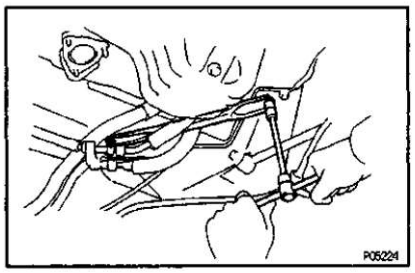
(d) Tighten the two bolts of the lower side of the A/C compressor.
Torque: 25 N–m (250 kgf–cm, 18 ft–lbf)



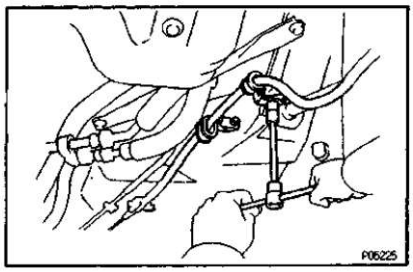
(e) Install the drive belt with the adjusting bolt.
(f) Tighten the idler pulley nut.



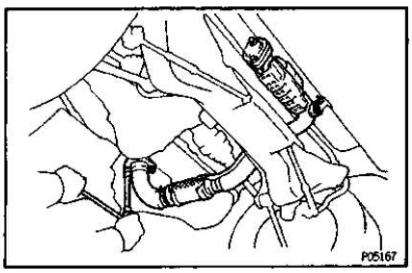
(g) Install the A/C pipes with the two clamps and nut.



(h) Install the lower suspension brace with the two bolts.
Torque: 73 N–m (740 kgf–cm, 54 ft–lbf)



(i) Install the parking brake cable with the two clamps and three bolts.



28. INSTALL FRONT EXHAUST PIPE

(a) Place two new gaskets to the front and rear of the front exhaust pipe.

(b) Using a 14 mm deep socket wrench, install the front exhaust pipe with three new nuts.

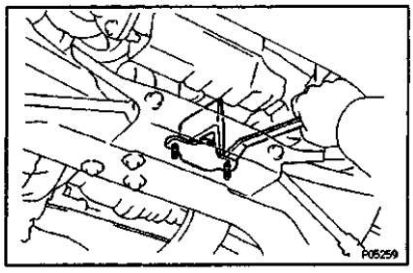
Torque: 62 N–m (630 kgf–cm, 46 ft–lbf)

(c) Install the two bolts holding the front exhaust pipe to the tailpipe.

Torque: 43 N–m (440 kgf–cm, 32 ft–lbf)

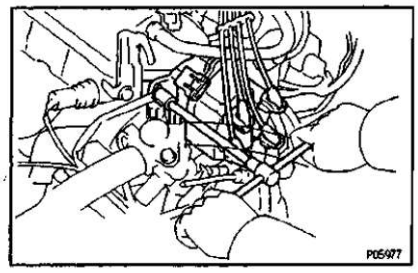
(d) Install the two bolts holding the front exhaust pipe bracket to the tailpipe bracket.

Torque: 19 N–m (190 kgf–cm, 14 ft–lbf)



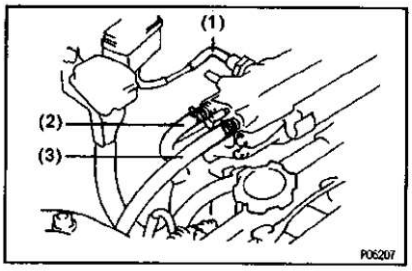
(e) Install the damper with the two bolts.

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



29. INSTALL DISTRIBUTOR

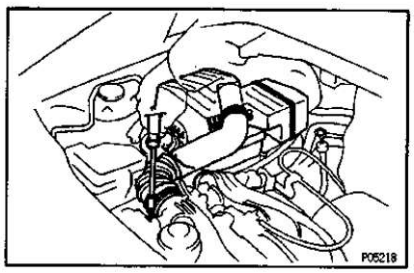
(See steps 3 to 6 Distributor Installation)



30. CONNECT HOSES AND GROUND STRAP

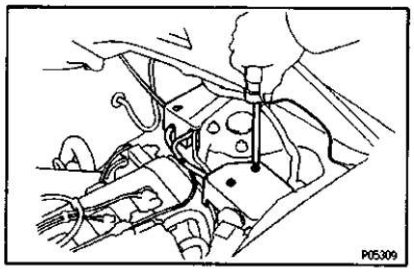
Connect the following hoses:

(1) MAP vacuum hose to intake manifold
(2) A/C idle–up air hose (from port F) to intake manifold
(3) Brake booster vacuum hose to intake manifold

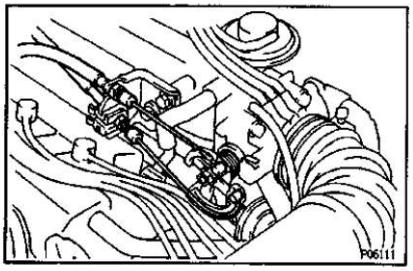


31. INSTALL AIR CLEANER CAP

(a) Install the air filter.
(b) Install the air cleaner cap with the four clamps.
(c) Connect the air cleaner hose to the throttle body.
(d) Connect the IATS connector.



32. (w/ CRUISE CONTROL SYSTEM)
INSTALL CRUISE CONTROL ACTUATOR AND ACCELERATOR LINKAGE



33. CONNECT ACCELERATOR LINKAGE TO THROTTLE BODY
34. (A/T)
CONNECT THROTTLE CABLE TO THROTTLE BODY
35. FILL WITH ENGINE COOLANT
36. CONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY
37. START ENGINE AND CHECK FOR LEAKS
38. PERFORM ENGINE ADJUSTMENT (See Tune–Up)
39. INSTALL ENGINE HOOD SIDE PANELS
40. PERFORM ROAD TEST

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

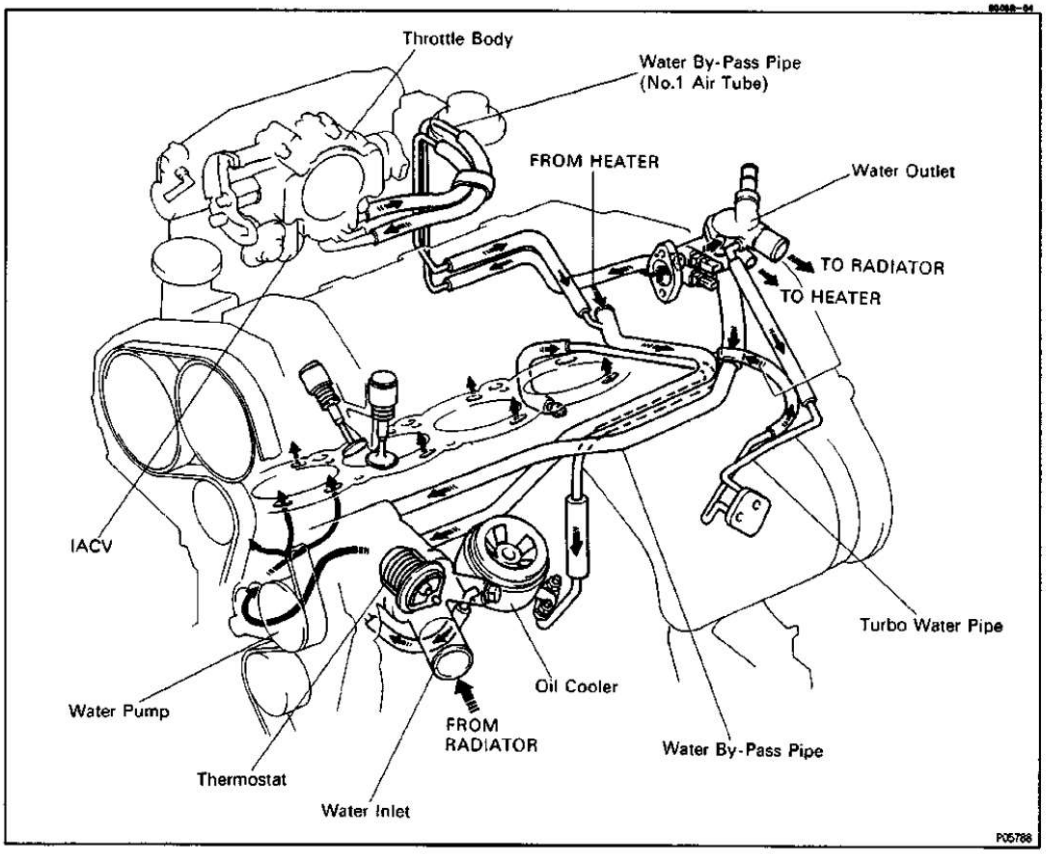
41. RECHECK ENGINE COOLANT LEVEL AND OIL LEVEL

COOLING SYSTEM

DESCRIPTION

This engine utilizes a pressurized forced circulation cooling system which includes a thermostat equipped with a by–pass valve mounted on the inlet side.

OPERATION



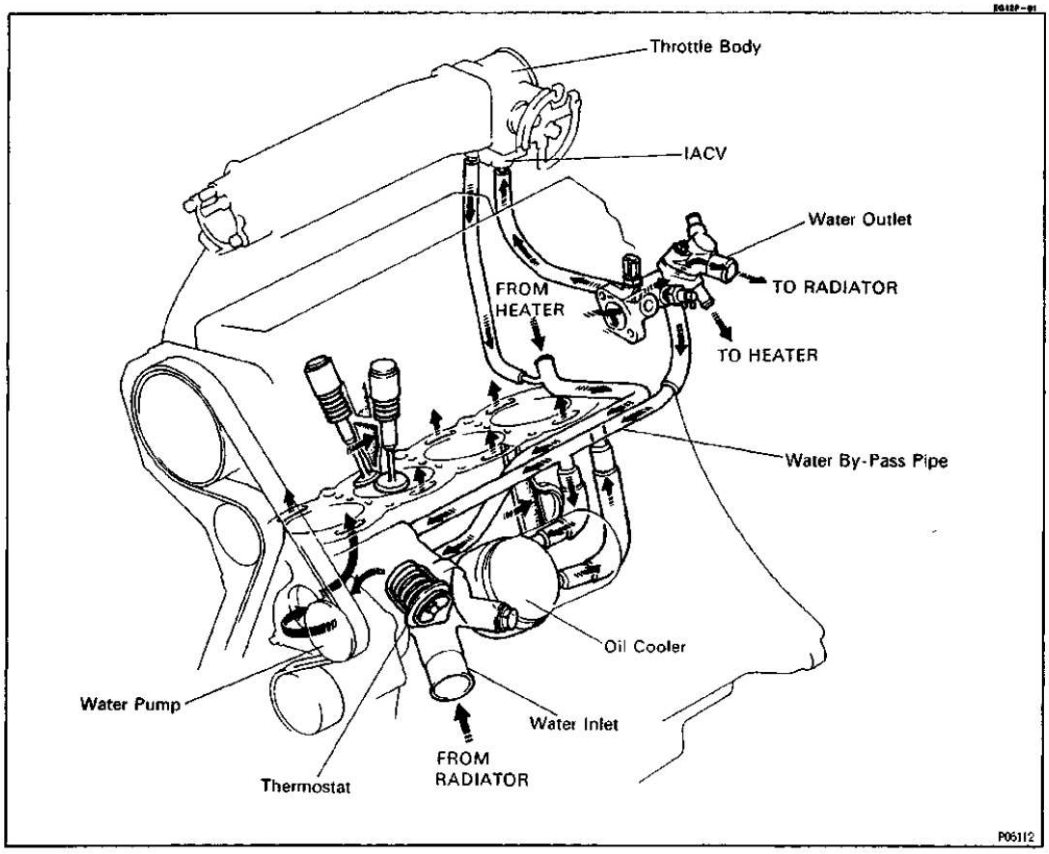
The cooling system is composed of the water jacket (inside the cylinder block and cylinder head), radiator, water pump, thermostat, electric fan, hoses and other components.
Coolant which is heated in the water jacket is pumped to the radiator, through which and electric fan blows air to cool the coolant as it passes through. Coolant which has been cooled is then sent back to the engine by the water pump, where it cools the engine.
The water jacket is a network of channels in the shell of the cylinder block and cylinder head through which coolant passes. It is designed to provide adequate cooling of the cylinders and combustion chambers which become heated during engine operation.

COOLING SYSTEM

DESCRIPTION

This engine utilizes a pressurized forced circulation cooling system which includes a thermostat equipped with a by–pass valve mounted on the inlet side.

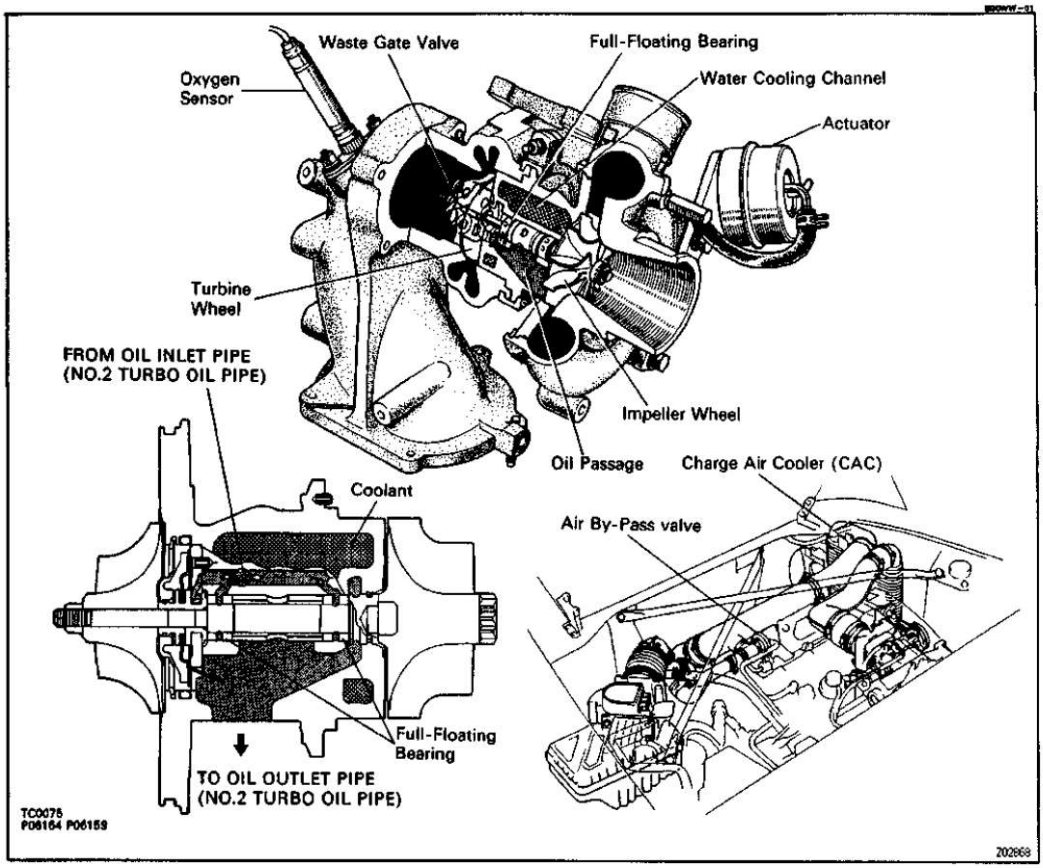
OPERATION



The cooling system is composed of the water jacket (inside the cylinder block and cylinder head), radiator, water pump, thermostat, electric fan, hoses and other components.
Coolant which is heated in the water jacket is pumped to the radiator, through which and electric fan blows air to cool the coolant as it passes through. Coolant which has been cooled is then sent back to the engine by the water pump, where it cools the engine.
The water jacket is a network of channels in the shell of the cylinder block and cylinder head through which coolant passes. It is designed to provide adequate cooling of the cylinders and combustion chambers which become heated during engine operation.

TURBOCHARGER SYSTEM

DESCRIPTION



Systems which increase the amount of air sent to the engine are either turbocharger type (using exhaust gas to turn the turbine) or supercharger type (using the engine crankshaft, etc. to mechanically turn the pump, etc.). For MR2 3S–GTE engine, the turbocharger type been adopted.

The turbocharger is a device which increases engine output by sending a greater amount of air–fuel mixture to the engine than under normal conditions.

Engine output depends upon the volume of the air–fuel mixture ignited per unit of time.

Therefore, to increase engine output, the most effective method is to send a greater amount of air–fuel mixture into the cylinder.

In other words, by installing a special turbocharger and providing a higher air–fuel mixture than usual, engine output can be increased by increasing the average combustion pressure without increasing the engine speed.

3S–GTE ENGINE

ENGINE MECHANICAL

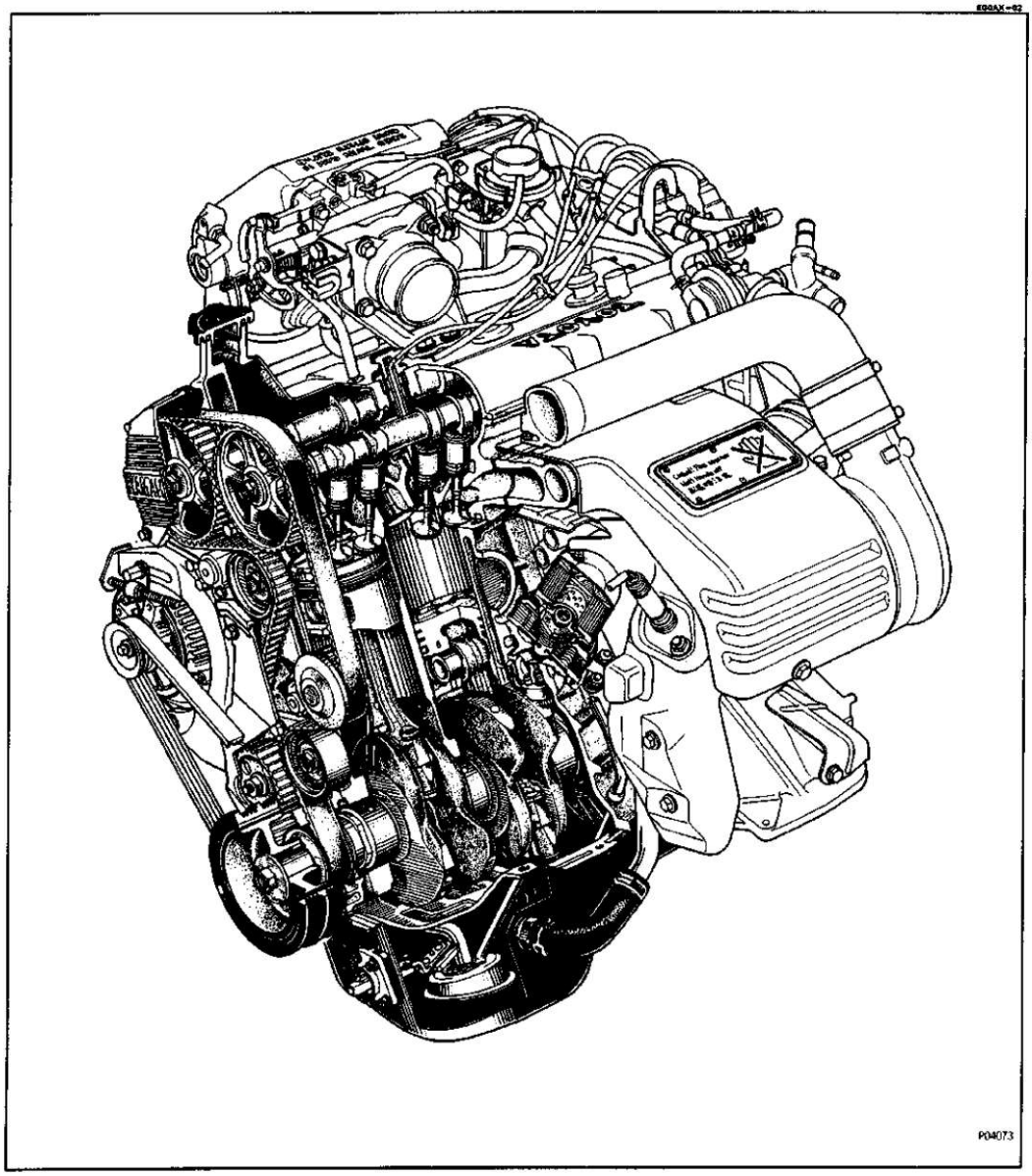
DESCRIPTION

EG0VX–01

The 3S–GTE engine is an in–line, 4–cylinder, 2.0 liter DOHC 16–valve engine.

OPERATION

EG0AX–02



P04073

SERVICE SPECIFICATIONS

SERVICE DATA

EG07L–04

Thermostat	**Valve opening temperature**	**80 – 84°C (176 – 183°F)**
	Valve lift (at 95°C (203°F))	**8 mm (0.31 in.) or more**
Radiator cap	**Relief valve opening pressure (STD)**	**74 – 103 kPa (0.75 – 1.05 kgf/cm², 10.7 – 14.9 psi)**
	Relief valve opening pressure (Limit)	**59 kPa (0.6 kgf/cm², 8.5 psi)**
Radiator electric cooling fan	**Rotating amperage (M/T)**	**5.8 – 7.4 A**
	Rotating amperage (A/T)	**8.8 – 10.8 A**
ECTS	**Resistance (at 85°C (185°F))**	**Approx. 1.35 kΩ**
	Resistance (at 90°C (194°F))	**Approx. 1.19 kΩ**
	Resistance (at 95°C (203°F))	**Approx. 1.05 kΩ**

TORQUE SPECIFICATIONS

EG07M–04

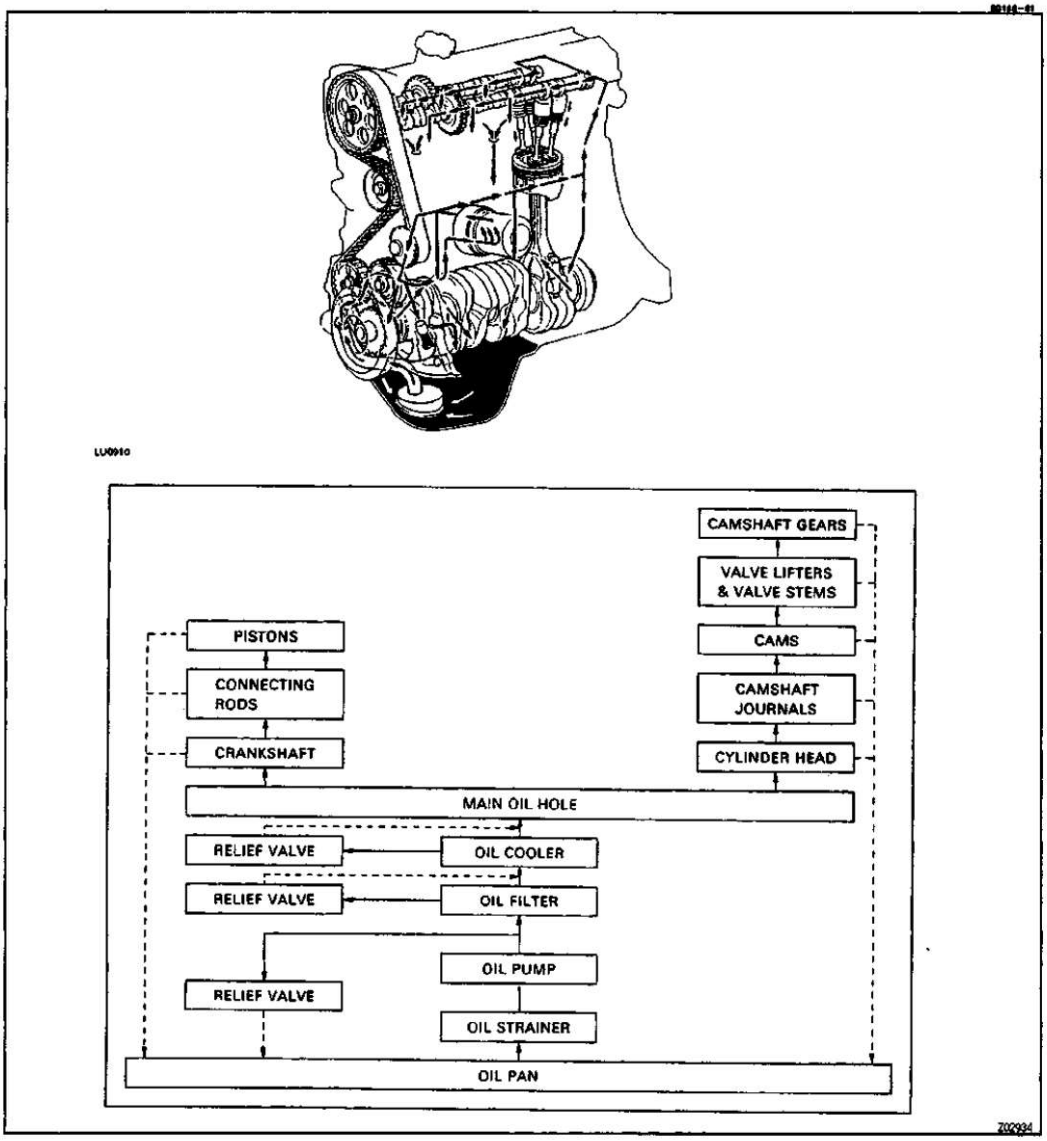
Part tightened	N·m	kgf·cm	ft·lbf
Cylinder block x Drain plug	25	250	18
Radiator pipe x Drain plug	17	170	12
Water pump x Water pump cover	8.8	90	78 in.·lbf
Water pump x Cylinder block (10 mm head)	8.8	90	78 in.·lbf
Water pump x Cylinder block (12 mm head)	27	275	20 in.·lbf
Water by–pass pipe x Water pump cover	9.3	95	82 in.·lbf
No.2 idler pulley x Cylinder block	42	425	31
Water inlet x Water pump cover	8.8	90	78 in.·lbf
Radiator support bolt	13	130	9

LUBRICATION SYSTEM

DESCRIPTION

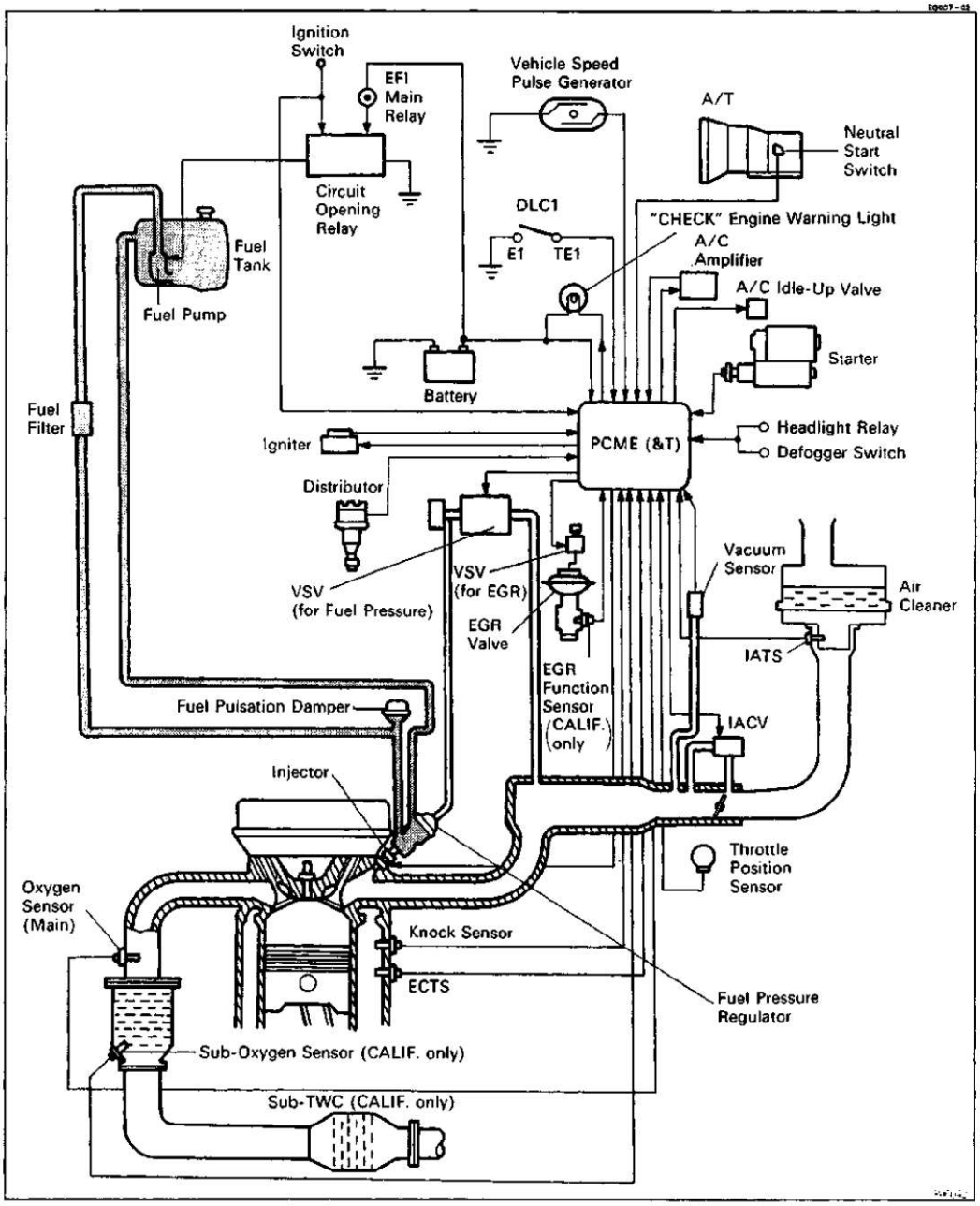
A fully pressurized, fully filtered lubrication system has been adopted for this engine.

OPERATION



MPI SYSTEM

DESCRIPTION



The MPI system is composed of three basic sub–systems: Fuel, Air Induction and Electronic Control Systems.

FUEL SYSTEM

Fuel is supplied under constant pressure to the MPI injectors by an electric fuel pump. The injectors inject a metered quantity of fuel into the intake port in accordance with signals from the PCME (& T) (Powertrain Control Module (Engine & Transmission)).

AIR INDUCTION SYSTEM

The air induction system provides sufficient air for engine operation.

ELECTRONIC CONTROL SYSTEM

The MR2 5S–FE engine is equipped with a TOYOTA Computer Controlled System (TCCS) which centrally controls the MPI, EI, IAC diagnosis systems etc. by means of a Powertrain Control Module (Engine & Transmission) (PCME (& T)–formerly MPI computer) employing a microco–mputer.

The PCME (& T) controls the following functions:

1. Electronic Fuel Injection

The PCME (& T) receives signals from various sensors indicating changing engine operation conditions such as:
Intake manifold pressure
Intake air temperature
Coolant temperature
Engine rpm
Throttle valve opening angle
Exhaust oxygen content etc.
The signals are utilized by the PCME (& T) to determine the injection duration necessary for an optimum air–fuel ratio.

2. Electronic Ignition (EI)

The PCME (& T) is programmed with data for optimum ignition timing under any and all operating conditions. Using data provided by sensors which monitor various engine functions (rpm, coolant temperature, etc.), the microcomputer (PCME (& T)) triggers the spark at precisely the right instant.

3. Idle Speed Control (IAC)

The PCME (& T) is programmed with target idling speed values to respond to different engine conditions (coolant temperature, air conditioner ON/OFF, etc.) Sensors transmit signals to the PCME (& T) which controls the flow of air through the by–pass of the throttle value and adjust idle speed to the target value.

4. Diagnosis

The PCME (& T) detects any malfunctions and abnormalities in the sensor network and lights a “CHECK” engine warning light on the combination meter. At the same time, trouble is identified and a diagnostic trouble code is recorded is recorded by the PCME (& T). The diagnostic trouble code can be read by the number of bl inks of the ”CHECK” engine warning light when terminals TE 1 and E1 are connected. The diagnostic trouble codes are referred to the later page.
(See page EG2–209)

5. Fail–Safe Function

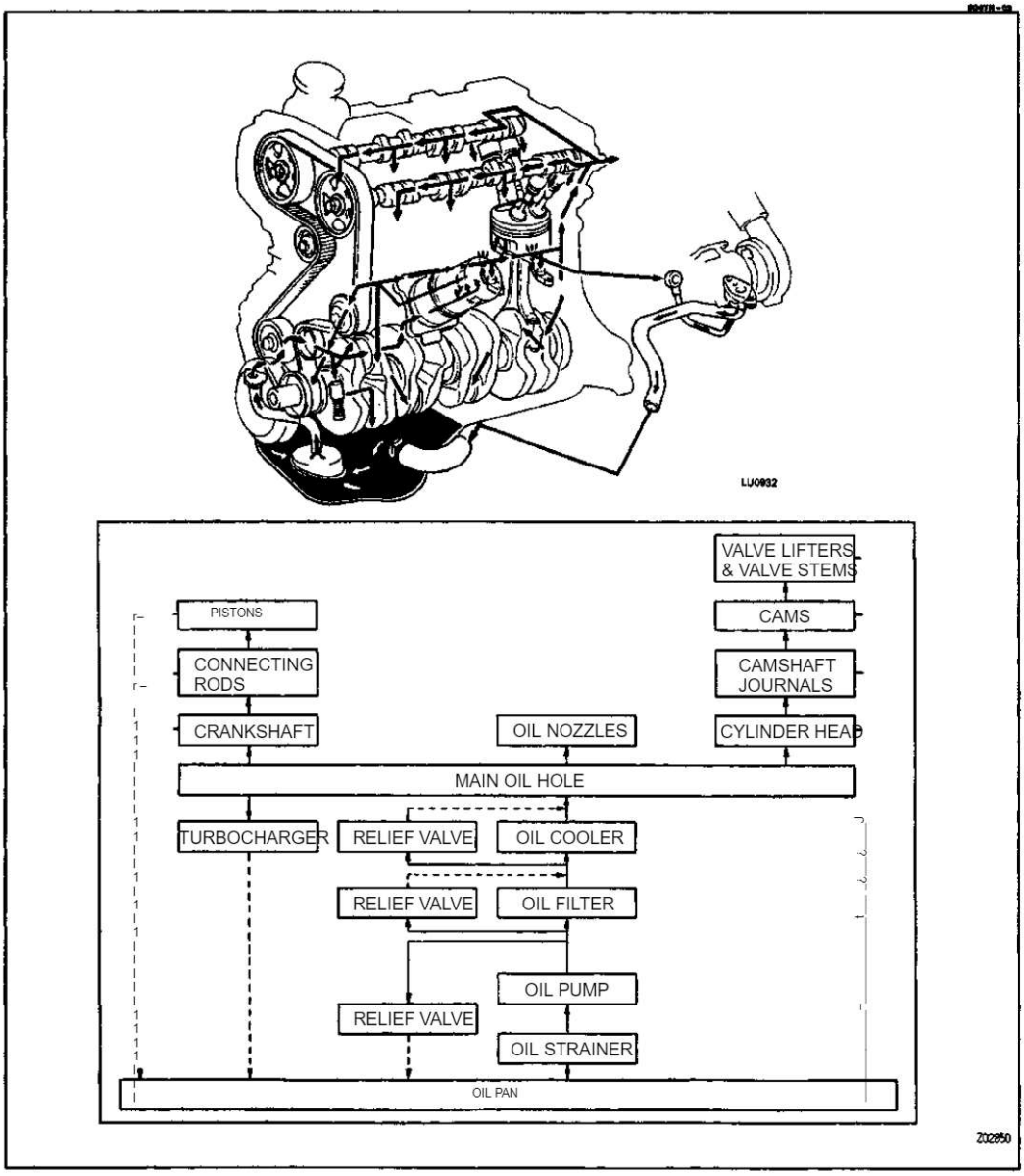
In the event of the sensor malfunction, a back–up circuit will take over to provide minimal drivability, and the ”CHECK” engine warning light will illuminate.

LUBRICATION SYSTEM

DESCRIPTION

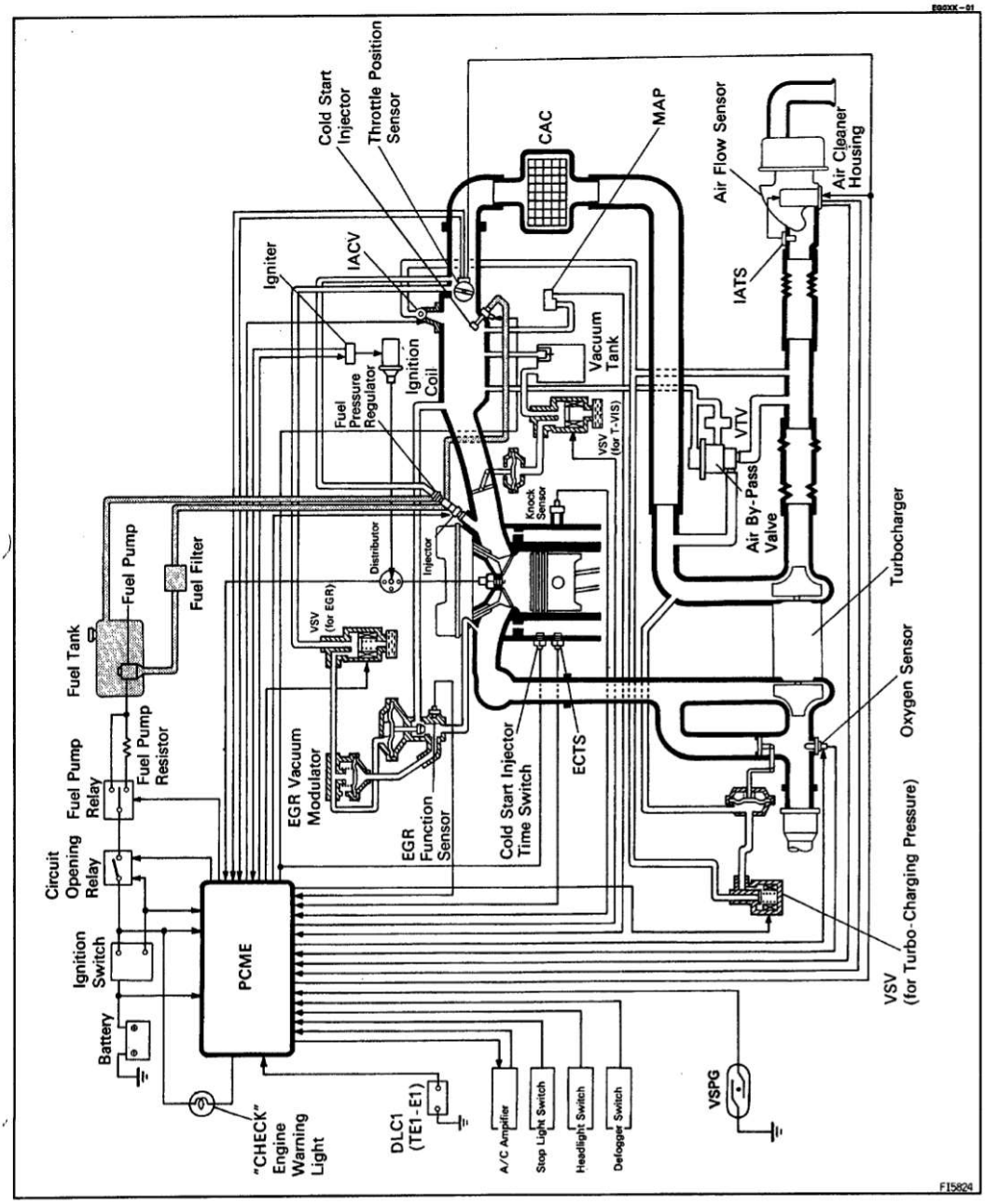
A fully pressurized, fully filtered lubrication system has been adopted for this engine.

OPERATION



SMPI SYSTEM

DESCRIPTION



The SMPI system is composed of three basic sub–systems: Fuel, Air Induction and Electronic Control Systems.

FUEL SYSTEM

Fuel is supplied under constant pressure to the SMPI injectors by an electric fuel pump. The injectors inject a metered quantity of fuel into the intake manifold in accordance with signals from the PCM E (Powertrain Control Module (Engine)).

AIR INDUCTION SYSTEM

The air induction system provides sufficient air for engine operation.

ELECTRONIC CONTROL SYSTEM

The MR2 3S–GTE engine is equipped with a TOYOTA Computer Controlled System (TCCS) which centrally controls the SMPI, EI. IAC, Diagnosis systems etc. by means of a Powertrain Control Module (PCME–formerly SMPI computer) employing a microcomputer.

By means of the PCME, the controls the following functions:

1. Multipoint Electronic Fuel Injection

The PCM receives signals from various sensors indicating changing engine operation conditions such as:

- Intake air volume
- Intake air temperature
- Coolant temperature
- Engine rpm
- Acceleration/deceleration
- Exhaust oxygen content etc.

The signals are utilized by the PCME to –determine the injection duration necessary for an optimum air–fuel ratio.

2. Electronic Ignition (EI)

The PCME is programmed with data for optimum ignition timing under any and a!! operating conditions.

Using data provided by sensors which monitor various engine functions (rpm, coolant tempera–ture, etc.), the microcomputer (PCME) triggers the spark at precisely the right instant. (See IG section)

3. Idle Air Control (IAC)

The PCME is programmed with target idling speed values to respond to different engine conditions (coolant temperature, air conditioner ON/OFF, etc.). Sensors transmit signals to the PCME which control the flow of air through the by–pass of the throttle valve and adjust idle speed to the target value.

4. Diagnosis

The PCME detects any malfunctions and abnormalities in the sensor network and lights a ” CHECK” engine warning light on the combination meter. At the same time, the trouble is identified and a diagnostic trouble code is recorded by the PCME. The diagnostic trouble code can be read by the number of blinks of the ”CHECK” engine warning light when terminals TE 1 and E 1 are connected. The diagnostic trouble codes are refer to the later page. (See page EG1–286)

5. Fail–Safe Function

In the event of the sensor malfunctioning, a back–up circuit will take over to provide minimal driveability, and the ”CHECK” engine warning light will illuminate.

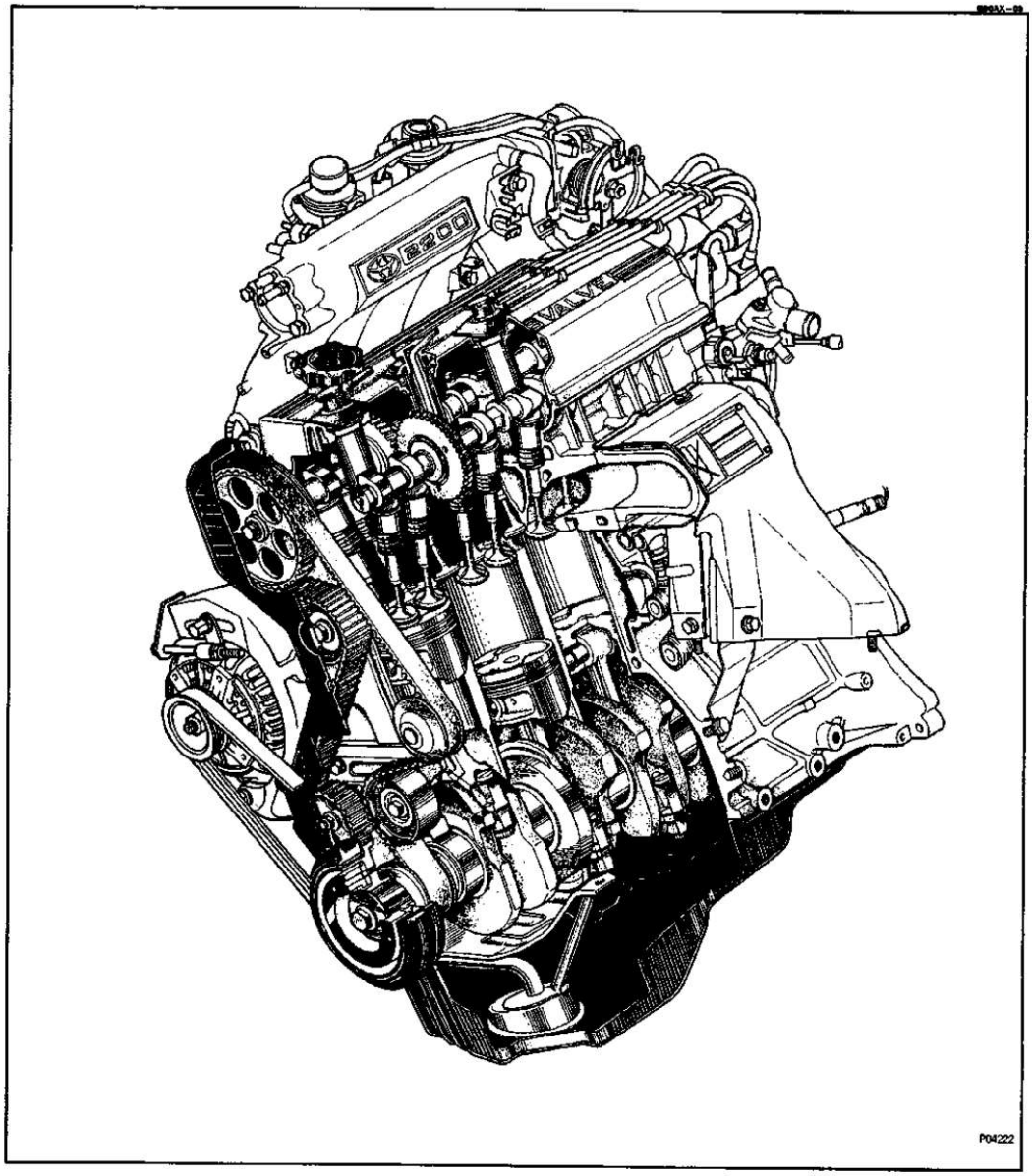
5S–FE ENGINE

ENGINE MECHANICAL

DESCRIPTION

The 5S–FE engine is an in–line, 4–cylinder, 2.2 liter DOHC 16–valve engine.

OPERATION



DIAGNOSIS SYSTEM

EG11Z–01

DESCRIPTION

The PCME (& T) contains a built–in self–diagnosis system by which troubles with the engine signal network are detected and a “CHECK” engine warning light on the combination meter lights up.

By analyzing various signals as shown in the later table (See page EG2–209) the PCME (& T) detects system malfunctions relating to the sensors or actuators.

The self–diagnosis system has two modes, a normal mode and a test mode.

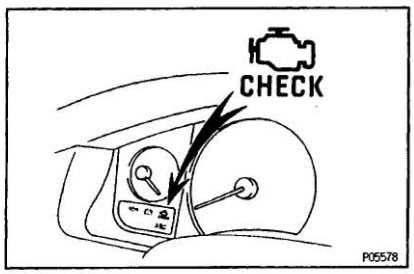
If a malfunction is detected when in the normal mode, the PCME (& T) lights up the “CHECK” engine warning light to inform the driver of the occurrence of a malfunction. (For some codes the light does not come on.) The light goes off automatically when the malfunction has been repaired. But the diagnostic trouble code(s) remains stored in the PCME (& T) memory (except for code No. 16). The PCME (& T) stores the code(s) until it is cleared by removing the EFI fuse with the ignition switch off.

The diagnostic trouble code can be read by the number of blinks of the ”CHECK” engine warning light when TE1 and E1 terminals on the data link connector 1 are connected. When 2 or more codes are indicated, the lowest number (code) will appear first.

If a malfunction is detected when in the test mode, the PCME (& T) lights up the “CHECK” engine warning light to inform the technician of the occurrence of a malfunction (except for code Nos. 42, 43 and 51). In this case, TE2 and E1 terminals on the data link connector 1 should be connected as shown later. (See page EG2–206).

In the test mode, even if the malfunction is corrected, the malfunction code is stored in the PCME (& T) memory even when the ignition switch is off (except code Nos.42, 43 and 51). This also applies in the normal mode. The diagnostic mode (normal or test) and the output of the ”CHECK” engine warning light can be selected by connecting the TE1, TE2 and E1 terminals on the data link connector 1, as shown later.

A test mode function has been added to the functions of the self–diagnosis system of the normal mode for the purpose of detecting malfunctions such as poor contact, which are difficult to detect in the normal mode. This function fills up the self–diagnosis system. The test mode can be implemented by the technician following the appropriate procedures of check terminal connection and operation described later. (See page EG2–206)



”CHECK” ENGINE WARNING LIGHT CHECK

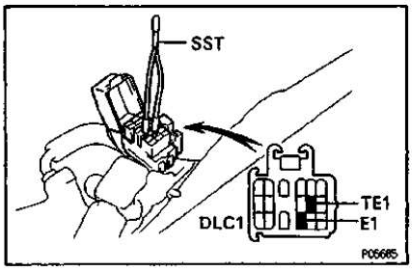
1. The “CHECK” engine warning light will come on when the ignition switch is placed at ON and the engine is not running.
2. When the engine is started, the “ CHECK” engine warning light should go off.
   If the light remains on, the diagnosis system has detected a malfunction or abnormality in the system.

DIAGNOSTIC TROUBLE CODES OUTPUT

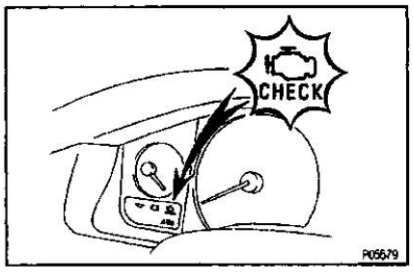
(Normal mode)

To obtain an output of diagnostic trouble codes, proceed as follows:

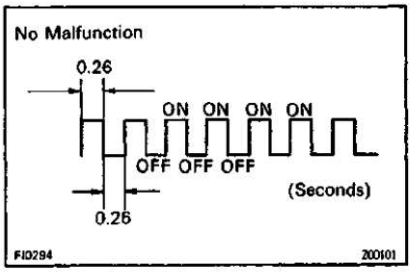
1. Initial conditions
   (a) Battery voltage 11 V or more
   (b) Throttle valve fully closed (throttle position sensor IDL points closed)
   (c) Transmission in neutral range
   (d) Accessories switched OFF
   (e) Engine at normal operating temperature
2. Turn the ignition switch ON. DO not start the engine.



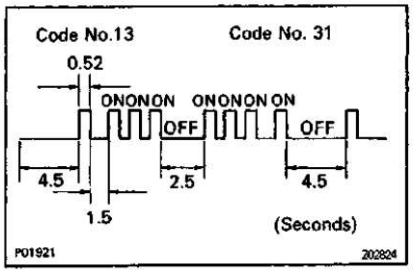
3. Using SST, connect terminals TE1 and E1 of the data link connector 1.
   SST 09843–18020



4. Read the diagnostic trouble code as indicated by the number of flashes of the “CHECK” engine warning light.



Diagnostic Trouble Codes (See page EG2–209)
   (a) Normal System Operation (no malfunction)
   - The light will alternately blink ON and OFF at 0.26–second intervals.

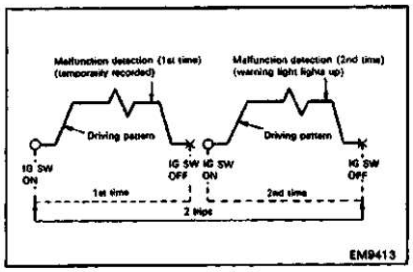


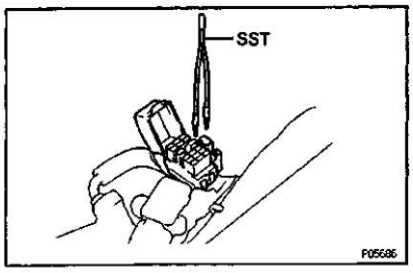
(b) Malfunction Code Indication

In the event of a malfunction, the light will blink every 0.52–seconds. The first number of blinks will equal the first digit of a 2–digit diagnostic trouble code and, after a 1.5–second pause, the 2nd number of blinks will equal the 2nd. If there are two or more codes, there will be a 2.5–second pause between each code.

After all the codes have been output, there will be a 4.5 second pause and they will all be repeated as long the terminals TE1 and E1 of the data link connector 1 are connected.

HINT: In the event of a number of trouble codes, indication will begin from the smaller value and con–tinue to the larger.





(c) (2 trip detection logic)

Diagnostic trouble codes 25, 26 27 and 71 use “2 trip detection logic”. With this logic, when a malfunction is first detected, the malfunction is temporarily stored in the PCME (& T) memory. If the same case is detected again during the second drive test, this second de–tection causes the “CHECK” engine warning light to light up.

The 2 trip repeats the same mode a 2nd time. (How–ever, the ignition switch must be turned OFF between the 1 st time and 2nd time.) In the Test Mode, the ”CHECK” engine warning light lights up the 1 st time a malfunction is detected.

5. After the diagnosis check, remove SST.

SST 09843–18020

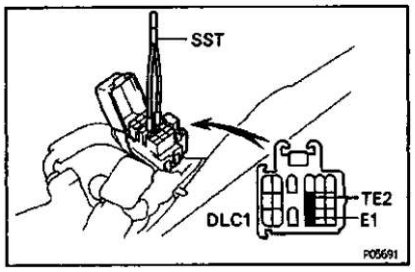
(Test mode)

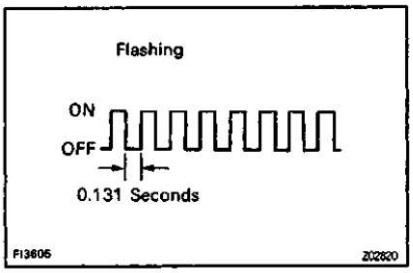
HINT:

- Compared to the normal mode, the test mode has high sensing ability to detect malfunctions.
- It can also detect malfunctions in the starter signal circuit, air conditioner signal and park/ neutral switch signal.
- Furthermore, the same diagnostic items which are detected in the normal mode can also be detected in the test mode.

To obtain an output of diagnostic trouble codes, proceed as follows:

1. Initial conditions
   (a) Battery voltage 11 volts or more
   (b) Throttle valve fully closed (throttle position sensor IDL points closed)
   (c) Transmission in neutral range
   (d) Accessories switched OFF
2. First, using SST, connect terminals TE2 and E1 of the data link connector 1.
   SST 09843–18020

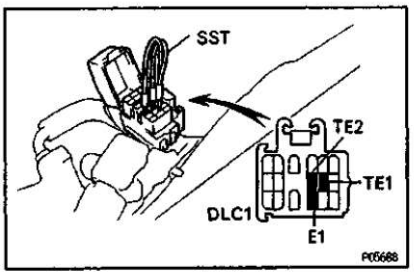




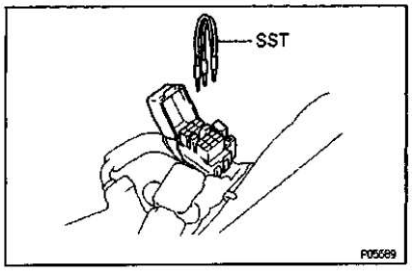
3. Turn the ignition switch ON.

HINT: To confirm that the test mode is operating, check that the “CHECK” engine warning light flashes when the ignition switch is turned ON.

4. Start the engine and drive the vehicle at a speed of 10 km/h (6 mph) or higher.
5. Simulate the conditions of the malfunction described by the customer.



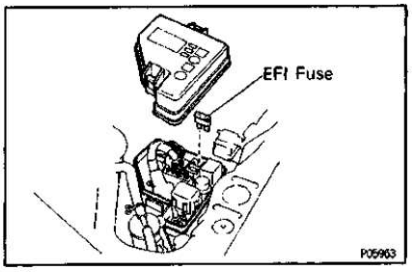
6. Using SST, connect terminals TE1 and E1 of the data link connector 1.
   SST 09843–18020
7. Read the diagnostic trouble code as indicated by the number of flashes of the “CHECK” engine warning light. (See page EG2–209)



8. After the diagnosis check, remove SST.
SST 09843–18020

HINT:

- The test mode will not start if terminals TE2 and E1 are connected after the ignition switch is turned on.
- The starter signal and vehicle speed signal will be diagnosed by the PCME (& T) as malfunctions, and code Nos. 42, and 43 will be output, if the operation in step 4 is not performed.
- When the automatic transmission shift lever is in the “D”, “2”, “L” or “R” shift position, or when the air conditioner is on or when the accelerator pedal is depressed, code “51” (Switch condition signal) is output, but this is not abnormal.



DIAGNOSTIC TROUBLE CODE CANCELLATION

1. After repair of the trouble area, the diagnostic trouble code retained in memory by the PCME (& T) must be cancelled out by removing the EFI fuse (115 A) for 10 seconds or more, depending on ambient temperature (the lower the temperature, the longer the fuse must be left out) with the ignition switch OFF.

HINT:

- Cancellation can also be done by removing the battery negative (–) terminal, but in this case, other memory systems (clock, etc.) will also cancelled out.
- If the diagnostic trouble code is not cancelled out, it will be retained by the PCME (& T) and appear along with a new code in the event of future trouble.
- If it is necessary to work on engine components requiring removal of the battery terminal, a check must first be made to see if a diagnostic trouble code has been recorded.

2. After cancellation, perform road test of the vehicle to check that a normal code is now read on the “CHECK” engine warning light.
If the same diagnostic trouble code appears, it indi–cates that the trouble area has not been repaired thoroughly.

DIAGNOSIS INDICATION

SG124–01

1. When 2 or more codes are indicated, the lowest number (code) will appear first.
2. All detected diagnostic trouble codes, except code Nos. 43 and 53 will be retained in memory by the PCME (& T) from the time of detection until cancelled out.
3. Once malfunction is cleared, the “ CHECK” engine warning light on the combination meter will go off but the diagnostic trouble code(s) remains stored in PCME (& T) memory (except for code Nos. 43 and 51).

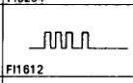
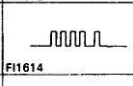
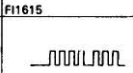
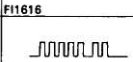
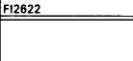
DIAGNOSTIC TROUBLE CODES

HINT:

- If a malfunction is detected during the diagnostic trouble code check, refer to the circuit indicated in the table, and turn to the corresponding page.
- Your readings may vary from the parameters listed in the table, depending on the instruments used.

Code No.	Number of blinks "CHECK" Engine Warning Light	System	"CHECK" *1 Engine Warning Light		Diagnosis	Trouble Area	*2 Memory	See Page
			Normal Mode	Test Mode				
–	 FI1401	Normal	–		No trouble code is recorded. code is recorded.	–	–	–
12	 FI1606	RPM Signal	ON	N.A.	(1) No NE signal is input to PCME (PCME & T) for 2 secs. or more after STA turns ON. (2) No G signal is input to PCME (PCME & T) for 3 secs. or more between 600 – 4,000 rpm.	• Open or short in NE, G circuit • Distributor • Open or short in STA circuit • PCME (PCME & T)	O	IG–24 EG2–228 EG2–244
13	 FI1607	RPM Signal	ON	ON	(1) NE signal is not input to PCME (PCME & T) for 0.3 secs. or more when engine speed is 1,500 rpm or more. (2) No G signal is input to PCME (PCME & T) for 4 NE signal. (Test mode only)	• Open or short in NE circuit • Distributor • PCME (PCME & T)	O	IG–24
14	FI1608	Ignition Signal	ON	N.A.	IG signal from igniter is not input to PCME (PCME & T) for 4 – 5 consecutive ignition.	• Open or short in IGF or IGT circuit from igniter to PCME (PCME & T) • Igniter • PCME (PCME & T)	O	EG2–229 EG2–245
16 (A/T only)	BE3931	ECT Control Signal	ON	N.A.	Normal signal is not output from PCME & T.	• PCME & T	X	–
21	 FI1609	Main Oxygen Sensor Signal	ON	N.A.	At normal driving speed (below 60 mph and engine speed is above 1,500 rpm), amplitude of oxygen sensor signal (OX) is reduced to between 0.35 – 0.70 V continuously for 60 secs. or more.	• Open or short in oxygen sensor circuit • Oxygen sensor • PCME (PCME & T)	O	EG2–232 EG2–249
22	 FI1610	Engine Coolant Temp. Sensor Signal	ON	ON	Open or short in engine coolant temp. sensor circuit for 0.5 sec. or more. (THW)	• Open or short in engine coolant temp. sensor circuit • Engine coolant temp. sensor • PCME (PCME & T)	O	EG2–227 EG2–243
24	 FI1611	Intake Air Temp. Sensor Signal	ON *3	ON	Open or short in intake air temp. sensor circuit for 0.5 sec. or more. (THA)	• Open or short in intake air temp. sensor circuit • Intake air temp. sensor • PCME (PCME & T)	O	EG2–226 EG2–242
25	 FI2562	Air–Fuel Ratio Lean Malfunction	ON	ON	(1) Oxygen sensor output is less than 0.45 V for at least 90 secs. when oxygen sensor is warmed up (racing at 2,000 rpm). – only for code 25 (2) When the engine speed varies by more than 20 rpm over the preceding crank angle period during a period of 20 seconds during idling with the coolant temp. 60°C (140°F) or more. (Calif. only) *5 (2 trip detection logic) (1) and (2)	• Engine ground bolt loose • Open in E1 circuit • Open in injector circuit • Fuel line pressure (Injector blockage, etc.) • Open or short in oxygen sensor circuit • Oxygen sensor • Ignition system • Engine coolant temp. sensor • MAP • PCME (PCME & T)	O	EG2–26 EG2–227 EG2–232 EG2–243 EG2–249
26 *4	 FI2563	Air–Fuel Ratio Lean Malfunction	ON	ON		• Engine ground bolt loose • Open in E1 circuit • Short in injection circuit • Fuel line pressure (Injector leakage, etc.) • Open or short in oxygen sensor circuit • Oxygen sensor • Engine coolant temp. sensor • MAP • Compression pressure • PCME (PCME & T)	O	

DIAGNOSTIC TROUBLE CODES (Cont'd)

Code No.	Number of blinks "CHECK" Engine Warning Light	System	"CHECK" *1 Engine Warning Light		Diagnosis	Trouble Area	*2 Memory	See page
			Normal Mode	Test Mode				
27*4	 FI3294	Sub–Oxygen Sensor Signal	ON	ON	When sub-oxygen sensor is Warmed up and full acceleration continued for 2 seconds, output of main oxygen sensor is 0.45 V or more (rich) and output of sub-oxygen sensor is 0.45 V or less (lean). (OX2) *5 (2 trip detection logic)	• Short or open in sub-oxygen sensor circuit • Sub-oxygen sensor • PCME (PCME & T)	O	EG2–232 EG2–249
31	 FI1612	Manifold Absolute Pressure sensor Signal	ON	ON	Open or short detected continuously for 0.5 sec. or more in MAP circuit. (PIM)	• Open or short in vacuum sensor circuit • MAP • PCME (PCME & T)	O	EG2–222 EG2–236
41	 FI1614	Throttle Position Sensor Signal	ON*3	ON	Open or short detected continuously for 0.5 sec. or more in throttle sensor (VTA) circuit.	• Open or short in throttle position sensor circuit • Throttle position sensor • PCME (PCME & T)	O	EG2–224 EG2–238
42	FI1615	Vehicle Speed Pulse Generator Signal	OFF	OFF	(M/T) SPD signal is not input to PCM for at least 8 seconds during high load driving with engine speed between 2,400 rpm and 5,000 rpm. (A/T) PNS OFF and engine speed 3,000 rpm or more.	• Open or short in vehicle speed sensor circuit • Vehicle speed pulse generator • PCME (PCME & T)	O	—
43	 FI1616	Starter Signal	N.A.	OFF	No starter signal is not input to PCM even once after ignition.	• Open or short in starter signal circuit • Open or short in IG SW or MPI main relay circuit • PCME (PCME & T)	X	EG2–228 EG2–244
52	 FI1618	Knock Sensor Signal	ON	N.A.	In area of knock control signal from knock sensor is not input to PCM for 0.65 sec. (KNK)	• Open or short in knock sensor circuit • Knock sensor (looseness, etc.) • PCME (PCME & T)	O	—
71*4	FI2622	EGR System Malfunction	ON	ON	50 seconds from start of EGR operation, EGR gas temp. is less than 70°C with coolant temp. 80°C (176°F) or more.	• Open in EGR function sensor circuit • Open in VSV circuit for EGR • EGR vacuum hose disconnected, valve stuck • Clogged in EGR gas passage • PCME (PCME & T)	O	EG2–233 EG2–249
51	 FI1617	Switch Condition signal	N.A.	OFF	Displayed when A/C is ON IDL contact OFF or shift position in "R", "D", "2", or "1" ranges with the check terminals E1 and TE1 connected.	• A/C switch circuit • Throttle position sensor IDL circuit • Park/Neutral switch circuit • Accelerator pedal, cable • PCME (PCME & T)	X	EG2–224 EG2–238

REMARKS:

*1: "ON" displayed in the diagnosis mode column indicates that the "CHECK" Engine Warning Light is lighted up when a malfunction is detected. "OFF" indicates that the "CHECK" Engine Warning Light does not,,light up during malfunction diagnosis, even if a malfunction is detected. "N.A." indicates that the item is not included in malfunction diagnosis.

*2: "O" in the memory column indicates that a diagnostic code is recorded in the PCME (PCME & T) memory when a malfunction occurs. "X" indicates that a diagnostic code is not recorded in the PCME (PCME & T) memory even if a malfunction occurs. Accordingly, output of diagnostic results in normal or test mode is performed with the ignition switch ON.

*3: The "CHECK" Engine Warning Light comes on if malfunction occurs only to California specifications.

*4: Code 26, 27 and 71 is used only for California specifications.

*5: "2 trip detection logic" (See page EG2–205)

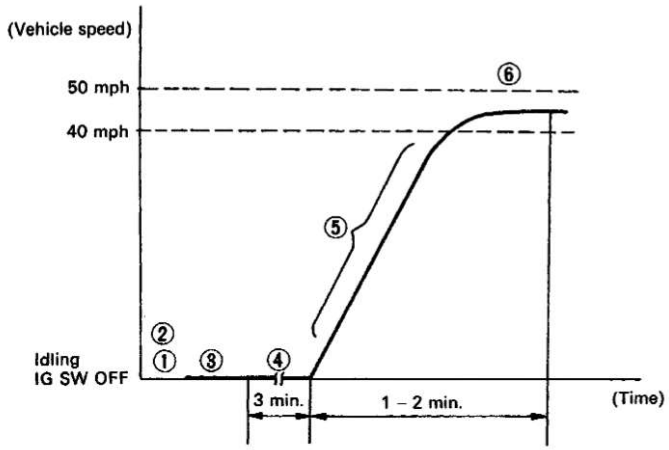
DIAGNOSTIC TROUBLE CODE DETECTION DRIVING PATTERN

Purpose of the driving pattern.

(a) To simulate diagnostic trouble code detecting condition after diagnostic trouble code is recorded.
(b) To check that the malfunction is corrected when the repair is completed, confirming that diagnostic trouble code is no longer detected.

Code No	21	Main Oxygen Sensor–Circuit

Malfunction: Deterioration of Main Oxygen Sensor



P01713

(1) Disconnect the EFI fuse (15 A) for 10 seconds or more, with ignition switch OFF.
(2) Initiate test mode: Connect terminals TE2 and E1 of DLC1 with ignition switch OFF.
(3) Start the engine and warm the engine up with all accessory switches OFF.
(4) After the engine is warmed up, let it idle for 3 minutes.
(5) Accelerate gradually and maintain at approximately 1,500 rpm, or within the 1,300 to 1,700 rpm range. Turn the A/C on, and drive in “D” for automatic, or in case of manual transmission, upshift appropriately. Shift carefully so that the engine speed would not fall below 1,200 rpm. Depress the accelerator pedal gradually and maintain a steady speed to avoid engine braking.
(6) Maintain the vehicle speed at 40 – 50 mph.
Keep the vehicle running for 1 – 2 minutes after staring acceleration.
HINT: If any malfunction is detected, the “CHECK” engine warning light will light up during step (6).
NOTICE: If this procedure is not strictly followed, you cannot detect the malfunction.

V00912

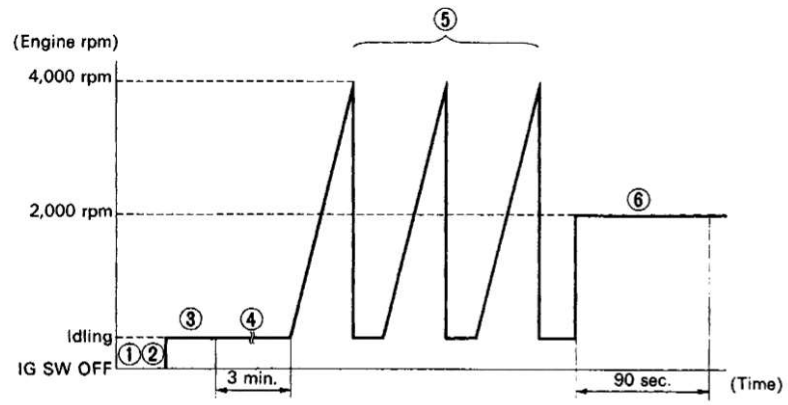
DIAGNOSTIC TROUBLE CODE DETECTION DRIVING PATTERN (Cont'd)

Purpose of the driving pattern.

(a) To simulate diagnostic trouble code detecting condition after diagnostic trouble code is recorded.
(b) To check that the malfunction is corrected when the repair is completed, confirming that diagnostic trouble code is no longer detected.

Code No	25	Air–Fuel Ratio Lean Malfunction
	26	Air–Fuel Ratio Rich Malfunction

Malfunction: Open or Short in Main Oxygen Sensor



P02491

① Disconnect the EFI fuse (15 A) for 10 seconds or more, with ignition switch OFF.
② Initial test mode: Connect terminal TE2 and E1 of DLC1 with ignition switch OFF.
③ Start the engine and warm the engine up, with all accessory switches OFF.
④ After the engine is warmed up, let it idle for 3 minutes.
⑤ Accelerate rapidly to 4,000 rpm three times.
⑥ Maintain at 2,000 rpm for 90 seconds.

HINT: If a malfunction is detected, the "CHECK" engine warning light will light up during step (6).
NOTICE: If this procedure is not strictly followed, you cannot detect the malfunction.

V00913

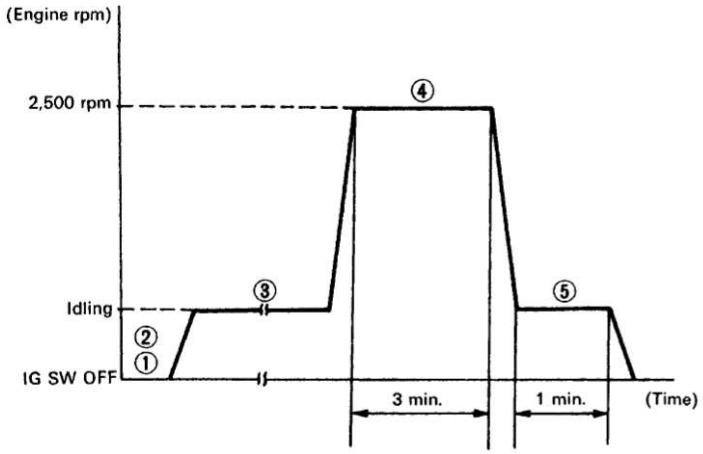
DIAGNOSTIC TROUBLE CODE DETECTION DRIVING PATTERN (Cont'd)

Purpose of the driving pattern.

(a) To simulate diagnostic trouble code detecting condition after diagnostic trouble code is recorded.
(b) To check that the malfunction is corrected when the repair is completed, confirming that diagnostic trouble code is no longer detected.

Code No		
	25	Air–Fuel Ratio Lean Malfunction (California)
	26	Air–Fuel Ratio Lean Malfunction (California)

Malfunction: Open or Short in OXygen Sensor, Open or Short in Injector Leak, Blockage, Loose Engine Ground Bolt



P01711

HINT: Before this test, check the feedback voltage for oxygen sensor.
① Disconnect the ER fuse (15 A) for 10 seconds or more, with ignition switch OFF.
② Initiate test mode: Connect terminals TE2 and E1 of DLC1 with ignition switch OFF.
③ Start the engine and warm the engine up.
④ After the engine is warmed up, maintain at 2,500 rpm for 3 minutes.
⑤ Let it idle for 1 minute.

HINT: If any malfunction is detected, the "CHECK" engine warning light will light up during step (5) .
NOTICE: If this procedure is not strictly followed, you cannot detect the malfunction.

V00914

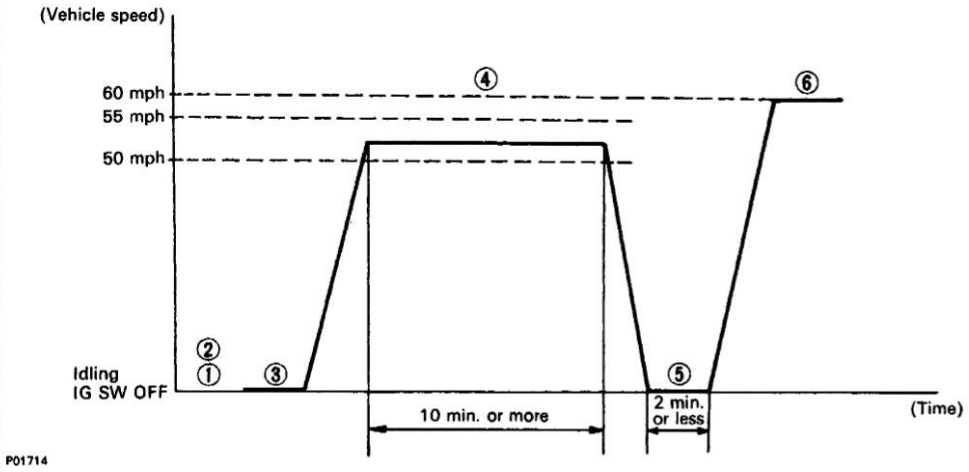
DIAGNOSTIC TROUBLE CODE DETECTION DRIVING PATTERN (Cont'd)

Purpose of the driving pattern.

(a) To simulate diagnostic trouble code detecting condition after diagnostic trouble code is recorded.
(b) To check that the malfunction is corrected when the repair is completed, confirming that diagnostic trouble code is no longer detected.

Code No	27	Sub–Oxygen Sensor Circuit (California)

Malfunction: Open or Short in Sub–Oxygen Sensor



① Disconnect the EFI fuse (15 A) for 10 seconds or more, with ignition switch OFF.
② Initiate test mode: Connect terminals TE2 and E1 of DLC1 with ignition switch OFF.
③ Start the engine and warm the engine up, with all accessory switches OFF.
④ After the engine is warmed up, let it drive at 50 – 55 mph for 10 minutes or more.
⑤ After driving, stop at a safe place and perform idling for 2 minutes or less.
⑥ After performing the idling in (5) perform acceleration to 60 mph with the throttle fully open.

HINT: If any malfunction is detected, the "CHECK" engine warning light will light up during step (6).
NOTICE: If this procedure is not strictly followed, you cannot detect the malfunction.

IY00915

DIAGNOSTIC TROUBLE CODE DETECTION DRIVING PATTERN (Cont'd)

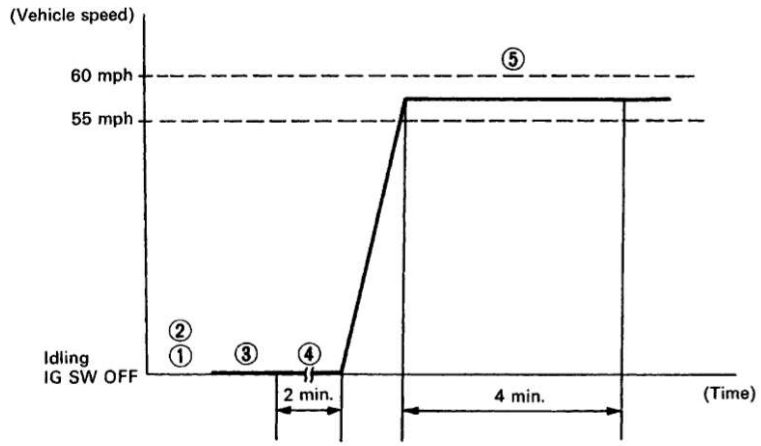
Purpose of the driving pattern.

(a) To simulate diagnostic trouble code detecting condition after diagnostic trouble code is recorded.

(b) To check that the malfunction is corrected when the repair is completed, confirming that diagnostic trouble code is no longer detected.

Code No.	71	EGR System Malfunction (California)

Malfunction: Short in VSV Circuit for EGR, Loose EGR Hose, Valve Stuck



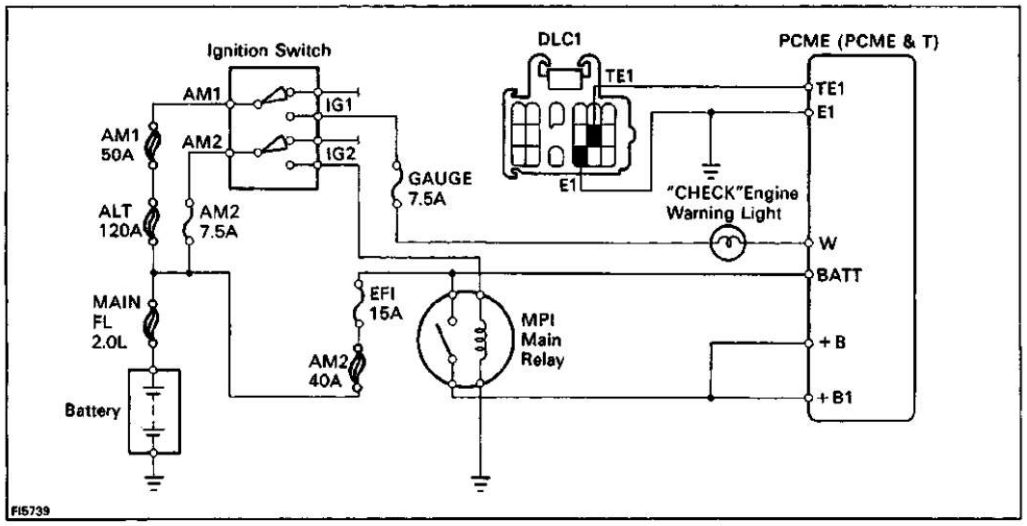
P01712

① Disconnect the fuse EFI (15 A) for 10 seconds or more, with ignition switch OFF.
② Initiate test mode: Connect terminals TE2 and E1 of DLC1 with ignition switch OFF.
③ Start engine and warm engine up.
④ After engine is warmed up, let it idle for 3 minutes.
⑤ With the A/C switch OFF and transmission in 5th gear ("D" range for A/T), drive at 55 – 60 mph for 4 minutes.

HINT: If any malfunction is detected, the "CHECK" engine warning light will light up during step (5) .
NOTICE; If this procedure is not strictly followed, you cannot detect the malfunction.

V00916

DIAGNOSIS CIRCUIT INSPECTION



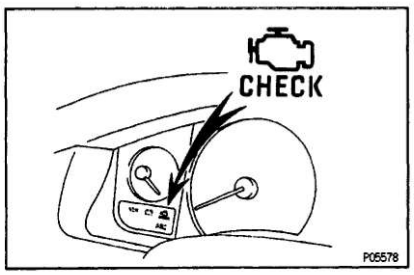
1. Does "CHECK" engine warning light come on when ignition switch is at ON ?
   - YES → System normal.
   - NO → Does "CHECK" engine warning light come on when PCME (PCME & T) terminal W is grounded to the body ?
     - YES → Check wiring between PCME (PCME & T) terminal E1 and body ground.
       - OK → Try another PCME (PCME & T).
       - BAD → Repair or replace.
     - NO → Check bulb, fuse and wiring between PCME (PCME & T) and ignition switch.
       - BAD → Repair or replace.

2. Does "CHECK" engine warning light go off when the engine is started ?
   - YES → System normal.
   - NO → Check wiring between PCME (PCME & T) and "CHECK" engine warning light.
     - BAD → Repair.
     - NO → Is there diagnostic code output when DLC1 terminals TE1 and E1 connected ?
       - NO → Check wiring between PCME (PCME & T) terminal TE1 and DLC1 terminal TE1, and PCME (PCME & T) terminal E1 and DLC1 terminal E1.
         - OK → Try another PCME (PCME & T).
       - YES → Does "CHECK" engine warning light go off after repair according to malfunction code ?
         - NO → Further repair required.
         - YES → System OK → Cancel out diagnostic trouble code.

V00917

DIAGNOSIS SYSTEM DESCRIPTION

The PCME contains a built–in self–diagnosis system by which troubles with the engine signal network are detected and a "CHECK" engine warning light on the combination meter lights up. By analyzing various signals as shown in the later table (See page EG1–288) the PCME detects system malfunctions relating to the sensors or actuators.
The self –diagnosis system has two modes, a normal mode and a test mode.
If a malfunction is detected when in the normal mode, the PCME lights up the "CHECK" engine warning light to inform the driver of the occurrence of a malfunction. (For some codes the light does not come on.) The light goes off automatically when the malfunction has been repaired. But the diagnostic trouble code(s) remains stored in the PCME memory. The PCME stores the code(s) until it is cleared by removing the EFI fuse with the ignition switch off.
The diagnostic trouble code can be read by the number of blinks of the "CHECK" engine warning light when TE1 and E1 terminals on the data link connector 1 are connected. When 2 or more codes are indicated, the lowest number (code) will appear first.
If a malfunction is detected when in the test mode, the PCME lights up the "CHECK" engine warning light to inform the technician of the occurrence of a malfunction (except for code Nos. 42, 43 and 51). In this case, TE2 and E1 terminals on the data link connector 1 should be connected as shown later. (See page EG1–283)
In the test mode, even if the malfunction is corrected, the malfunction code is stored in the PCME memory even when the ignition switch is off (except code Nos. 42, 43 and 51). This also applies in the normal mode. The diagnostic mode (normal or test) and the output of the "CHECK" engine warning light can be selected by connecting the TE1, TE2 and E 1 terminals on the data link connector 1, as shown later.
A test mode function has been added to the functions of the self–diagnosis system of the normal mode for the purpose of detecting malfunctions such as poor contact, which are difficult to detect in the normal mode. This function fills up the self–diagnosis system. The test mode can be implemented by the technician following the appropriate procedures of check terminal connection and operation described later. (See page EG1–283)



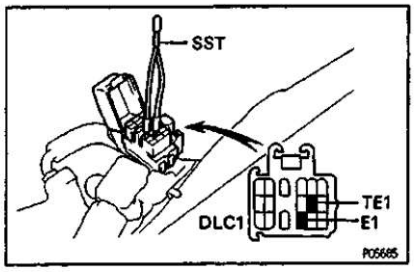
"CHECK" ENGINE WARNING LIGHT CHECK

1. The "CHECK" engine warning light will come on when the ignition switch is placed at ON and the engine is not running.
2. When the engine is started, the " CHECK" engine warning light should go off.
   If the light remains on, the diagnosis system has detected a malfunction or abnormality in the system.

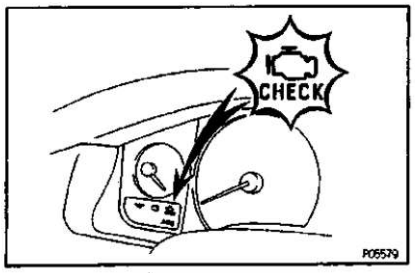
DIAGNOSTIC TROUBLE CODES OUTPUT (Normal mode)

To obtain an output of diagnostic trouble codes, proceed as follows:

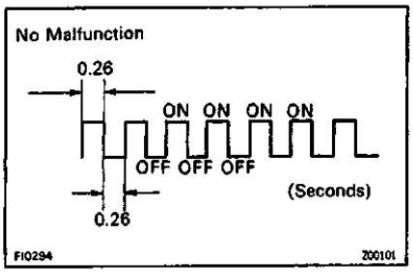
1. Initial conditions
(a) Battery voltage 11 V or more
(b) Throttle valve fully closed (throttle position sensor: IDL points closed)
(c) Transmission in neutral range
(d) Accessories switched OFF
(e) Engine at normal operating temperature
2. Turn the ignition switch ON. DO not start the engine.



3. Using SST, connect terminals TE1 and E1 of the data link connector 1.
SST 09843–18020

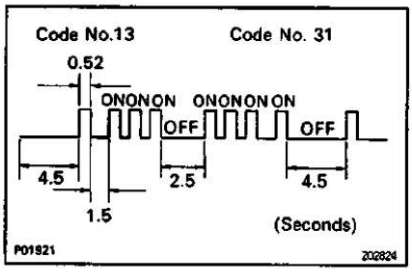


4. Read the diagnostic trouble code as indicated by the number of flashes of the "CHECK" engine warning light.



Diagnostic Trouble Codes (See page EG1–288)
(a) Normal System Operation (no malfunction)

- The light will alternately blink ON and OFF at 0.26–second intervals.

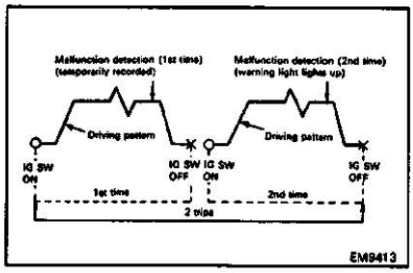


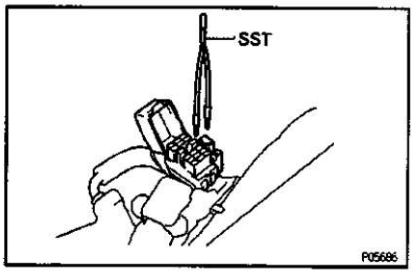
(b) Malfunction Code Indication

- In the event of a malfunction, the light will blink every 0.52–seconds. The first number of blinks will equal the first digit of a 2–digit diagnostic trouble code and, after a 1.5–second pause, the 2nd number of blinks will equal the 2nd. If there are two or more codes, there will be a 2.5–second pause between each code.

- After all the codes have been output, there will be a 4.5 second pause and they will all be repeated as long the terminals TE 1 and E 1 of the data link connector 1 are connected.

HINT: In the event of a number of trouble codes, indication will begin from the smaller value and con–tinue to the larger.





(c) (2 trip detection logic)

Diagnostic trouble codes 25, 26 and 71 use ”2 trip detection logic”. With this logic, when a malfunction is first detected, the malfunction is temporarily stored in the PCME memory. If the same case is detected again during the second drive test, this second detection causes the ”CHECK” engine warning light to light up. The 2 trip repeats the same mode a 2nd time. (How–ever, the ignition switch must be turned OFF between the 1 st time and 2nd time.) In the Test Mode, the ”CHECK” engine warning light lights up the 1 st time a malfunction is detected.

5. After the diagnosis check, remove SST.
   SST 09843–18020

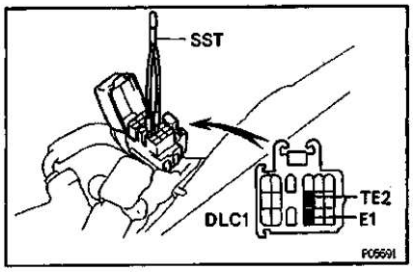
(Test mode)

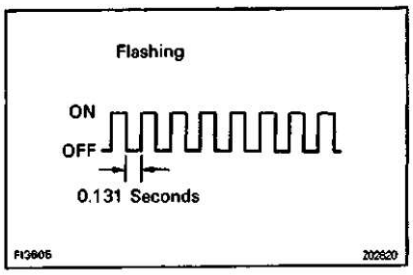
HINT:

- Compared to the normal mode, the test mode has high sensing ability to detect malfunctions.
- It can also detect malfunctions in the starter signal circuit and air conditioner signal.
- Furthermore, the same diagnostic items which are detected in the normal mode can also be detected in the test mode.

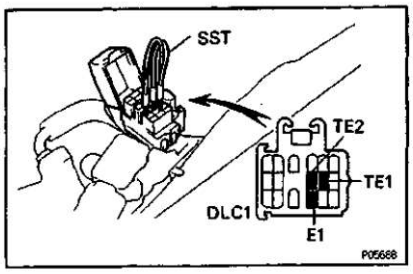
To obtain an output of diagnostic trouble codes, proceed as follows:

1. Initial conditions
(a) Battery voltage 11 volts or more
(b) Throttle valve fully closed (throttle position sensor IDL points closed)
(c) Transmission in neutral range
(d) Accessories switched OFF
2. First, using SST, connect terminals TE2 and E1 of the data link connector 1.
SST 09843–18020

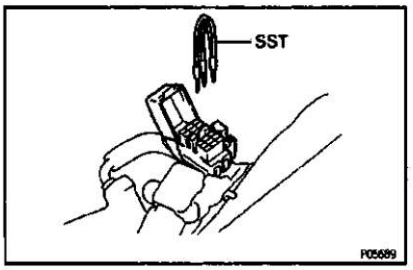




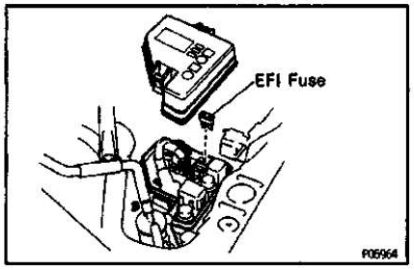
3. Turn the ignition switch ON.
HINT: To confirm that the test mode is operating, check that the "CHECK" engine warning light flashes when the ignition switch is turned ON.
4. Start the engine and drive the vehicle at a speed of 10 km/h (6 mph) or higher.
5. Simulate the conditions of the malfunction described by the customer.



6. Using SST, connect terminals TE1 and E1 of the data link connector 1.
SST 09843–18020
7. Read the diagnostic trouble code as indicated by the number of flashes of the "CHECK" engine warning light. (See page EG1–286)



8. After the diagnosis check, remove SST.
   SST 09843–18020
   HINT:
   - The test mode will not start if terminals TE2 and E1 are connected after the ignition switch is turned on.
   - The starter signal and vehicle speed signal will be diagnosed by the PCME as malfunctions, and code Nos. 42, and 43 will be output, if the oper–ation in step 4 is not performed.
   - When the air conditioner is on or when the ac–celerator pedal is depressed, code ’51” (Switch condition signal) is output, but this is not abnor–mal.



DIAGNOSTIC TROUBLE CODE CANCELLATION

1. After repair of the trouble area, the diagnostic troble code retained in memory by the PCME must be can–celled out by removing the EFI fuse (15 A) for 10 seconds or more, depending on ambient temperature (the lower the temperature, the longer the fuse must be left out) with the ignition switch OFF.
   HINT:
   - Cancellation can also be done by removing the battery negative (–) terminal, but in this case, other memory systems (clock, etc.) will also cancelled out.
   - If the diagnostic trouble code is not cancelled out, it will be retained by the PCME and appear along with a new code in the event of future trouble.
   - If it is necessary to work on engine components requiring removal of the battery terminal, a check must first be made to see if a diagnostic trouble code has been recorded.
2. After cancellation, perform road test of the vehicle to check that a normal code is now read on the ”CHECK” engine warning light.
   If the same diagnostic trouble code appears, it indi–cates that the trouble area has not been repaired thoroughly.

DIAGNOSIS INDICATION

1. When 2 or more codes are indicated, the lowest number (code) will appear first.
2. All detected diagnostic trouble codes, except code Nos. 43, 51 and 53 will be retained in memory by the PCM E from the time of detection until cancelled out.
3. Once malfunction is cleared, the ”CHECK” engine warning light on the combination meter will go off but the diagnostic trouble code(s) remains stored in PCME memory (except for code Nos. 43, 51 and 53).

DIAGNOSTIC TROUBLE CODES

HINT:

- If a malfunction is detected during the diagnostic trouble code check, refer to the circuit indicated in the table, and turn to the corresponding page,
- Your readings may vary from the parameters listed in the table, depending on the instruments used.

Code No.	Number of blinks "CHECK" Engine Warning Light	System	*1 "CHECK" Engine Warning Light		Diagnosis	Trouble Area	*2 Memory	See Page
			Normal Mode	Test Mode				
—	 FI1401	Normal	—	—	No trouble code is recorded.	—	—	—
12	 FI1606	RPM Signal	ON	N.A.	• No G1, G2 or NE signal is input to the PCM E for 2 secs. or more after STA turns ON. • Open in G – circuit	• Open or short in NE, G circuit • Distributor • Open or short in STA circuit • PCME	O	IG–4 EG1–304
13	 FI1607	RPM Signal	ON	ON	NE signal is not input to PCME for 0.05 sec. or more when engine speed is 1,000 rpm or more.	• Open or short in NE circuit • Distributor • PCME	O	IG–4
14	 FI1608	Ignition Signal	ON	N.A.	IG signal from igniter is not input to PCME for 8 consecutive ignition.	• Open or short in IG F or IGT circuit from igniter to ECU • Igniter • PCME	O	EG1–305
21	 FI1609	Oxygen Sensor Signal	ON	N.A.	Open or short in heater circuit of oxygen sensor for 0.5 sec. or more. (HT)	• Open or short in heater circuit of oxygen sensor • Oxygen sensor heater • PCME	O	EG1–403
				ON	At normal driving speed (below 60 mph and engine speed is above 1,900 rpm), amplitude of oxygen sensor signal (0X1) is reduced to between 0.35 – 0.70 V continuously for 60 secs. or more. *6 (2 trip detection logic) (Exc. Calif.)	• Open or short in oxygen sensor circuit • Oxygen sensor • Open or short in air flow sensor circuit • Air flow sensor • PCME		
22	 FI1610	Engine Coolant Temp. Sensor Signal	ON	ON	Open or short in engine coolant temp. sensor circuit for 0.5 sec. or more. (THW)	• Open or short in engine coolant temp. sensor circuit • Engine coolant temp. sensor • PCME	O	EG1–303
24	 FI1611	Intake Air Temp. Sensor Signal	*3 ON	ON	Open or short in intake air temp. sensor circuit for 0.5 sec. or more. (THA)	• Open or short in intake air temp. sensor circuit • Intake air temp. sensor • PCME	O	EG1–302
25	 FI2562	Air–Fuel Radio Lean Mal–function	ON	ON	(1) Oxygen sensor output in less than 0.45 V for at least 90 secs. when oxygen sensor is warmed up (racing at 1,500 rpm). (only for code 25) (2) When the oxygen sensor signal oscillates beyond 0.45 V more than 10 times within a 4 sec. period at idle and at coolant temperature of 60°C (140°F) or above. (3) When the air–fuel compensation value fluctuates more than 20% from the PCM E set range within an 80 sec. period at coolant temperature of 60°C (140°F) or above. *6 (2 trip detection logic) (1) – (3)	• Engine ground bolt loose • Open in E1 circuit • Open in injector circuit • Fuel line pressure (Injector blockage, etc.) • Open or short in oxygen sensor circuit • Oxygen sensor • Ignition system • Engine coolant temp. sensor • Air flow sensor (air intake) • PCM E	O	EG1–301 EG1–310
26	 FI2563	Air–Fuel Ratio Rich Mal–function	*3 ON	*3 ON		• Engine ground bolt loose • Open in E1 circuit • Short in injector circuit • Fuel line pressure (Injector leakage, etc.) • Open or short in cold start injector circuit • Cold start injector • Open or short in oxygen sensor circuit • Oxygen sensor • Air flow sensor • Compression pressure • PCIME	O	

V00885

DIAGNOSTIC TROUBLE CODES (Cont'd)

Code No.	Number of blinks "CHECK" Engine Warning Light	System	*1 "CHECK" Engine Warning Light: Normal Mode	*1 "CHECK" Engine Warning Light: Test Mode	Diagnosis	Trouble Area	*2 Memory	See Page
31	FI1612	Air Flow Sensor Signal	ON	ON	At idling, open or short detected continuously for 0.5 sec. or more in air flow sensor circuit. • Open – VC • Short – VC–E2	• Open or short in air flow sensor circuit • Air flow sensor • PCME	O	EG1–300
32	FI1613	Air Flow Sensor Signal	ON	ON	Open or short detected continuously for 0.5 sec. or more in air flow sensor circuit. • Open – E2 • Short – VS–VC		O	EG1–300
34	BE3933	Turbo–charging Pressure Signal	*3 ON	N.A.	Abnormal over charge during high load driving.	• Open or short in manifold absolute pressure sensor circuit • Manifold absolute pressure sensor • Turbocharger • PCME	O	—
35	BE3933	Manifold Absolute Pressure sensor Signal	ON	ON	Open or short detected continuously for 0.5 sec. or more in manifold absolute pressure sensor signal circuit. (PIM)		O	EG1–308
41	FI1614	Throttle Position Sensor Signal	*3 ON	ON	Open or short detected in throttle position sensor signal (VTA) for 0.5 sec. or more.	• Open or short in throttle position sensor circuit • Throttle position sensor • PCME	O	EG1–298
42	FI1615	Vehicle Speed Pulse Generator Signal	OFF	OFF	SPO signal is not input to the PCM E for at least 8 seconds during high load driving with engine speed between 2,500 rpm and 5,000 rpm.	• Open or short in vehicle speed pulse generator circuit • Vehicle speed pulse generator • PCM E	O	—
43	FI1616	Starter Signal	N.A.	OFF	Starter signal (STA) is not input to PCME until TE1 and E1 are connected.	• Open or short in starter signal circuit • Open or short in IG SW or MPI main relay circuit • PCME	X	EG1–304
52	FI1618	Knock Sensor Signal	ON	N.A.	With engine speed between 2,520 rpm and 7,200 rpm, signal from knock sensor is not input to PCME for 2 revolutions. (KNK)	• Open or short in knock sensor circuit • Knock sensor (looseness, etc.) • PCME	O	—
53	FI1619	Knock Control Signal	ON	N.A.	Engine speed is between 700 rpm and 7,200 rpm and PCME (for knock control) malfunction is detected.	• PCME	X	—
71	FI2622	EG R System Ma1–function	*3 ON	*3 ON	120 secs. from start of EGR operation, EGR gas temp. is less than 80°C (176°F) with coolant temp. 72°C (162°F) more. *6 (2 trip detection logic)	• Open in EGR function sensor circuit • Open in VSV circuit for EG R • EGR vacuum hose disconnected, valve stuck • Clogged in EGR gas passage • PCME	O	EG1–313
51	FI1617	Switch Condition Signal	N.A.	OFF	Displayed when A/C is ON or IDL contact OFF with the check terminals E1 and TE1 connected.	• A/C switch circuit • Throttle position sensor IDL circuit. • Accelerator pedal, cable • PCME	X	EG1–309

REMARKS:
*1: 'ON" displayed in the diagnosis mode column indicates that the "CHECK" Engine Warning Light is lighted up when a malfunction is detected.
"OFF" indicates that the "CHECK" does not light up during malfunction diagnosis, even if a malfunction is detected.
"N.A." indicates that the item is not included in malfunction diagnosis.
*2: "○" in the memory column indicates that a diagnostic trouble code is recorded in the PCME memory when a malfunction occurs. "X" indicates that a diagnostic
code is not recorded in the PCME memory even it a malfunction occurs.
Accordingly, output of diagnostic results is performed with the ignition switch ON.
*3: The "CHECK" Engine Warning Light comes on if malfunction occurs only for California specifications.
*4: No. (2) and (3) in the diagnostic contents of codes No. 25 and 26 apply to California specification vehicles only, while (1) applies to all models.
*5: Code 71 is used only for California specifications.
*6: "2 trip detection logic" (See page EG1–282)

V00887

DIAGNOSTIC TROUBLE CODE DETECTION DRIVING PATTERN

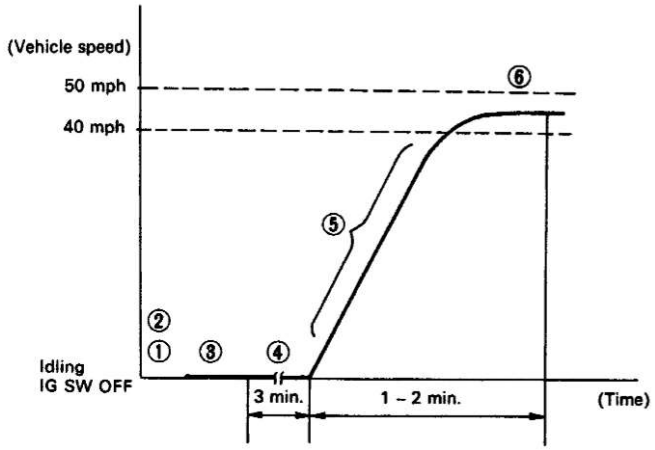
Purpose of the driving pattern.

(a) To simulate diagnostic trouble code detecting condition after diagnostic trouble code is recorded.

(b) To check that the malfunction is corrected when the repair is completed, confirming that diagnostic trouble code is no longer detected.

Code No.	21	Oxygen Sensor Circuit

Malfunction: Deterioration of Oxygen Sensor



P01713

1 Disconnect the EFI fuse (115 A) for 10 seconds or more, with ignition switch OFF.
2 Initiate test mode: Connect terminals TE2 and E1 of DLC1 with ignition switch OFF.
3 Start the engine and warm the engine up with all accessory switches OFF.
4 After the engine is warmed up, let it idle for 3 minutes.
5 Accelerate gradually and maintain at approximately 1,500 rpm, or within the 1,300 to 1,700 rpm range. Turn the A/C on, and upshift appropriately. Shift carefully so that the engine speed would not fall below 1,200 rpm. Depress the accelerator pedal gradually and maintain a steady speed to avoid engine braking:
6 Maintain the vehicle speed at 40 – 50 mph.
Keep the vehicle running for 1 – 2 minutes after staring acceleration.

HINT: If any malfunction is detected, the "CHECK" engine warning light will light up during step **6**.

NOTICE: If this procedure is not strictly followed, you cannot detect the malfunction.

V00888

DIAGNOSTIC TROUBLE CODE DETECTION DRIVING PATTERN (Cont'd)

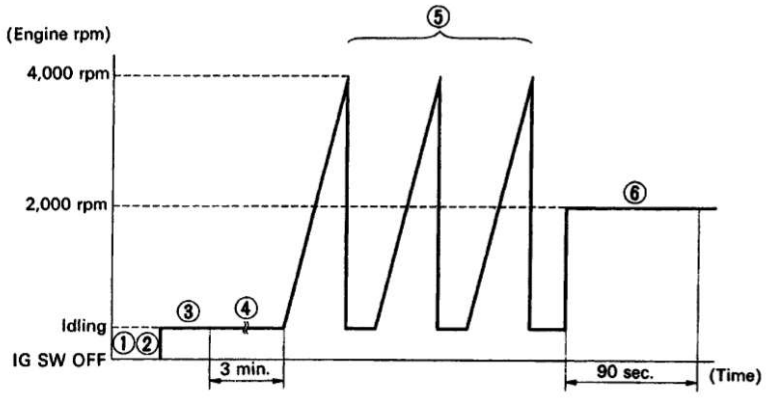
Purpose of the driving pattern.

(a) To simulate diagnostic trouble code detecting condition after diagnostic trouble code is recorded.

(b) To check that the malfunction is corrected when the repair is completed, confirming that diagnostic trouble code is no longer detected.

Code No.		
	25	Air–Fuel Ratio Lean Malfunction
	26	Air–Fuel Ratio Rich Malfunction

Malfunction: Open or Short in Oxygen Sensor



P02491

1 Disconnect the EFI fuse (15 A) for 10 seconds or more, with ignition switch OFF.
2 Initial test mode: Connect terminal TE2 and E1 of DLC1 with ignition switch OFF.
3 Start the engine and warm the engine up with all accessory switches OFF.
4 After the engine is warmed up, let it idle for 3 minutes.
5 Accelerate rapidly to 4,000 rpm three times.
6 Maintain at 2,000 rpm for 90 seconds.

HINT: If any malfunction is detected, the "CHECK" engine warning light will light up during step **6**.

NOTICE: If this procedure is not strictly followed, you cannot detect the malfunction.

V00889

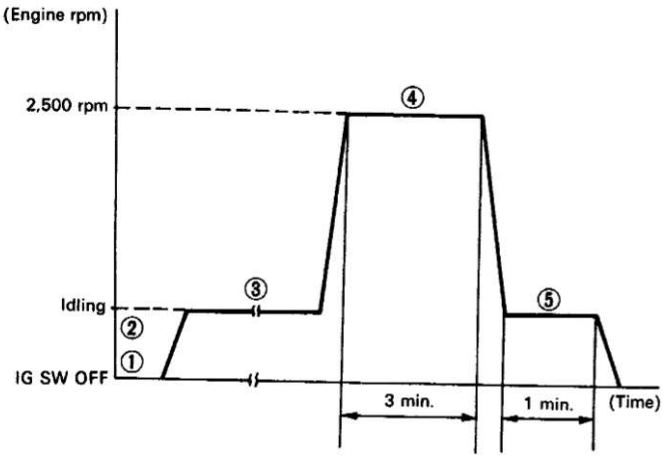
DIAGNOSTIC TROUBLE CODE DETECTION DRIVING PATTERN (Cont'd)

Purpose of the driving pattern.

(a) To simulate diagnostic trouble code detecting condition after diagnostic trouble code is recorded.
(b) To check that the malfunction is corrected when the repair is completed, confirming that diagnostic trouble code is no longer detected.

Code No.		
	25	Air–Fuel Ratio Lean Malfunction (California)
	26	Air–Fuel Ratio Rich Malfunction (California)

Malfunction: Open or Short in Injector Leak, Blockage, Loose Engine Ground Bolt



HINT: When start this test, coolant temp. is 35°C (95°F) or less and A/C switch OFF.
Before this test, check the feedback voltage for oxygen sensor.
1 Disconnect the EFI fuse (15 A) for 10 seconds or more, with ignition switch OFF.
2 Initiate test mode: Connect terminals TE2 and E1 of DLC1 with ignition switch OFF.
3 Start the engine and warm the engine up.
4 After the engine is warmed up, maintain at 2,500 rpm for 3 minutes.
5 Let it idle for 1 minute.

HINT: If any malfunction is detected, the "CHECK" engine warning light will light up during step **5**.

NOTICE: If this procedure is not strictly followed, you cannot detect the malfunction.

V00890

DIAGNOSTIC TROUBLE CODE DETECTION DRIVING PATTERN (Cont'd)

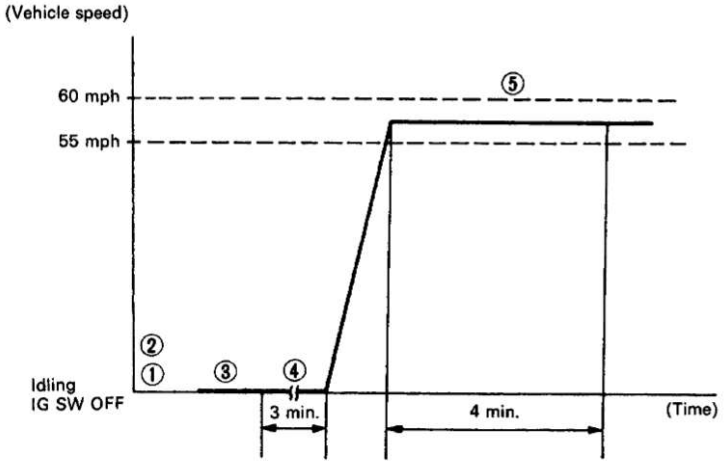
Purpose of the driving pattern,

(a) To simulate diagnostic trouble code detecting condition after diagnostic trouble code is recorded.

(b) To check that the malfunction is corrected when the repair is completed, confirming that diagnostic trouble code is no longer detected.

Code No.	71	EGR System Malfunction (California)

Malfunction: Short in VSV Circuit for EGR, Loose EGR Hose, Valve Stuck



P01712

HINT: When start this test, coolant temp. is 35°C (95°F) or less and A/C switch OFF.

1 Disconnect the fuse EFI (15 A) for 10 seconds or more, with ignition switch OFF.

2 Initiate teat mode: Connect terminals TE2 and E1 of DLC1 with ignition switch OFF.

3 Start engine and warm engine up.

4 After engine is warmed up, let it idle for 2 minutes.

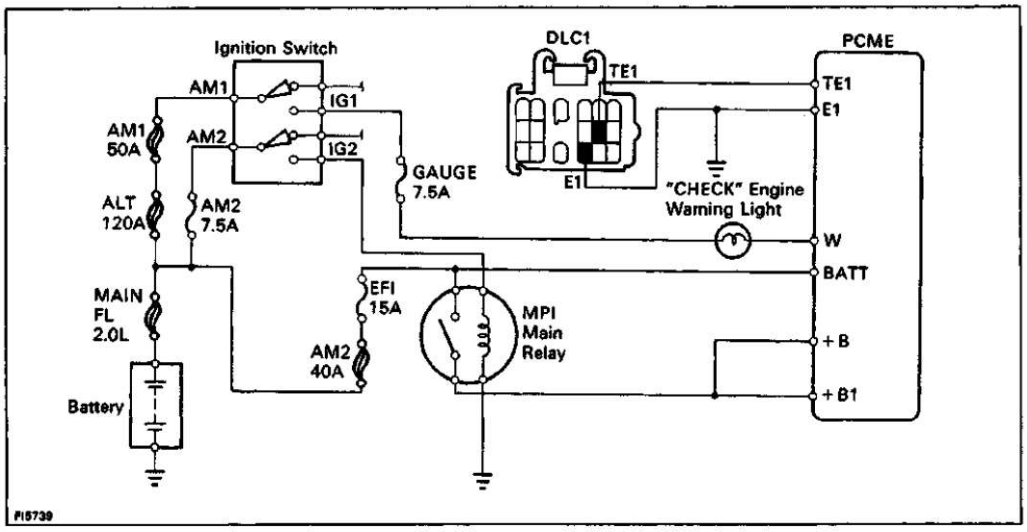
5 With the A/C switch OFF and transmission in 5th gear, drive at 55 – 00 mph for 4 minutes.

HINT: If any malfunction is detected, the "CHECK" engine warning light will light up during step **5**.

NOTICE: If this procedure is not strictly followed, you cannot detect the malfunction.

V00891

DIAGNOSIS CIRCUIT INSPECTION

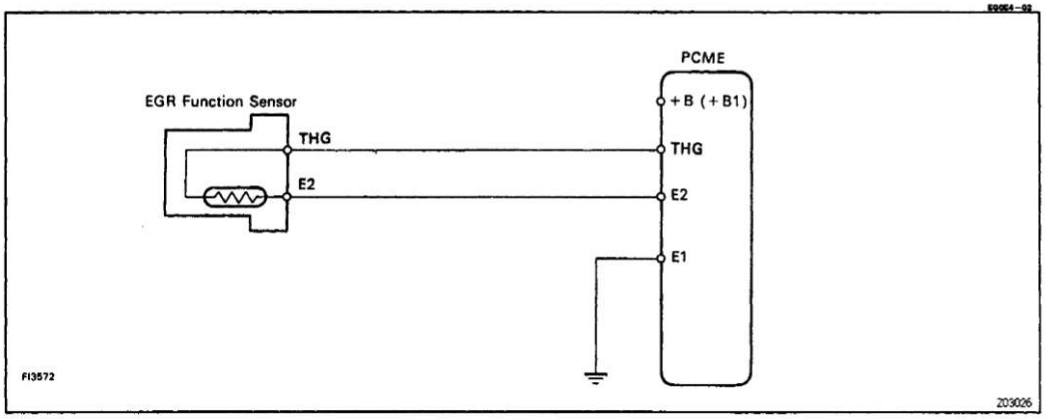


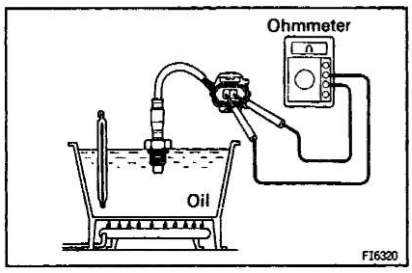
1. Does "CHECK" engine warning light come on when ignition switch is at ON?
   - YES → System normal
   - NO → Does "CHECK" engine warning light come on when PCME terminal w is grounded to the body?
     - YES → Check wiring between PCM E terminal E1 and body ground.
       - OK → Try another PCME.
       - BAD → Repair or replace.
     - NO → Check bulb, fuse and wiring between PCM E and ignition switch.
       - BAD → Repair or replace.

2. Does "CHECK" engine warning light go off when the engine is started?
   - YES → System normal
   - NO → Check wiring between PCM E and "CHECK" engine warning light.
     - BAD → Repair.
     - NO → Is there diagnostic code output when DLC1 terminals TO and E1 connected?
       - NO → Check wiring between PCME terminal TE1 and DLC1 terminal TE1, and PCME terminal E1 and DLC1 terminal E1.
         - OK → Try another PCM E.
       - YES .. → Does "CHECK" engine warning light go off after repair according to malfunction code?
         - NO → Further repair required.
         - YES → System 0 K → Cancel out diagnostic trouble code.

V00892

EGR FUNCTION SENSOR (Calif.)





EGR FUNCTION SENSOR INSPECTION

1. **REMOVE EGR FUNCTION SENSOR**
2. **INSPECT EGR FUNCTION SENSOR**

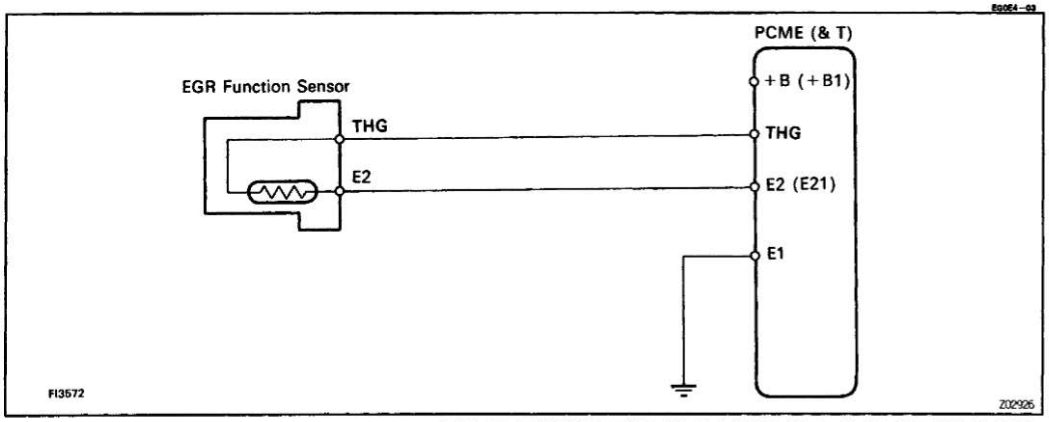
   Using an ohmmeter, measure the resistance between the terminals.

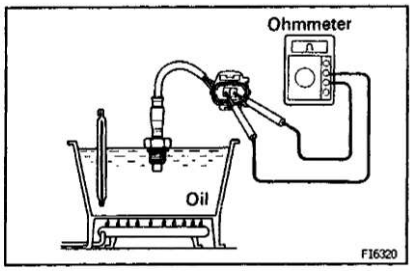
   Resistance:

   69 – 89 kΩ at 50° C (112° F)
   11 – 15 kΩ at 1000C (2120F)
   2 – 4 kΩ at 1500C (302"F)

   If the resistance is not as specified, replace the sensor.
3. **REINSTALL EGR FUNCTION SENSOR**

EGR FUNCTION SENSOR (Calif.)





EGR FUNCTION SENSOR INSPECTION

1. REMOVE EGR FUNCTION SENSOR

2. INSPECT EGR FUNCTION SENSOR

Using an ohmmeter, measure the resistance between the terminals.

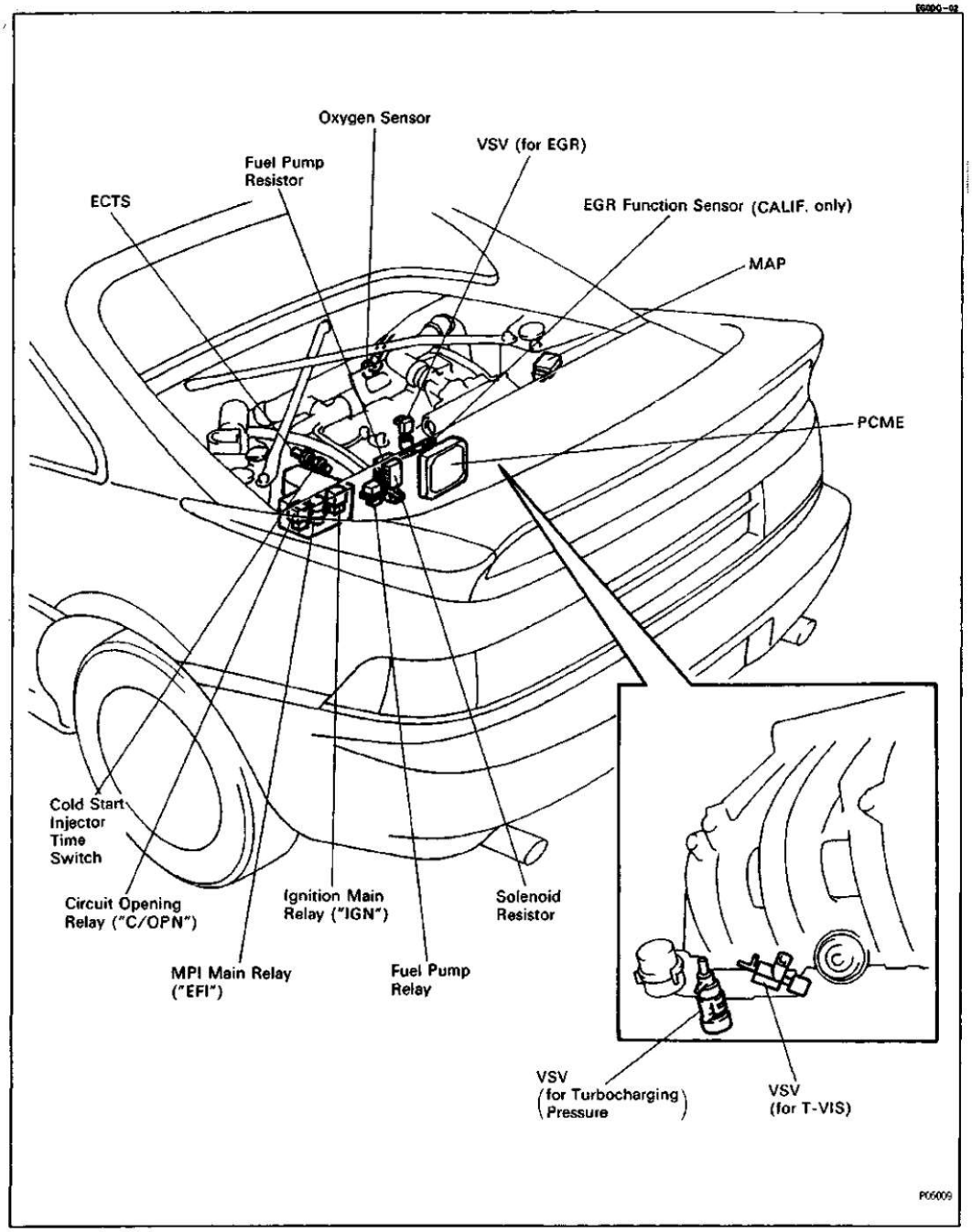
Resistance:

69 – 89 kΩat 50˚C (112˚F)
11 – 15 kΩat 100˚ C (212˚F)
2 – 4 kΩat 150˚C (302˚F)

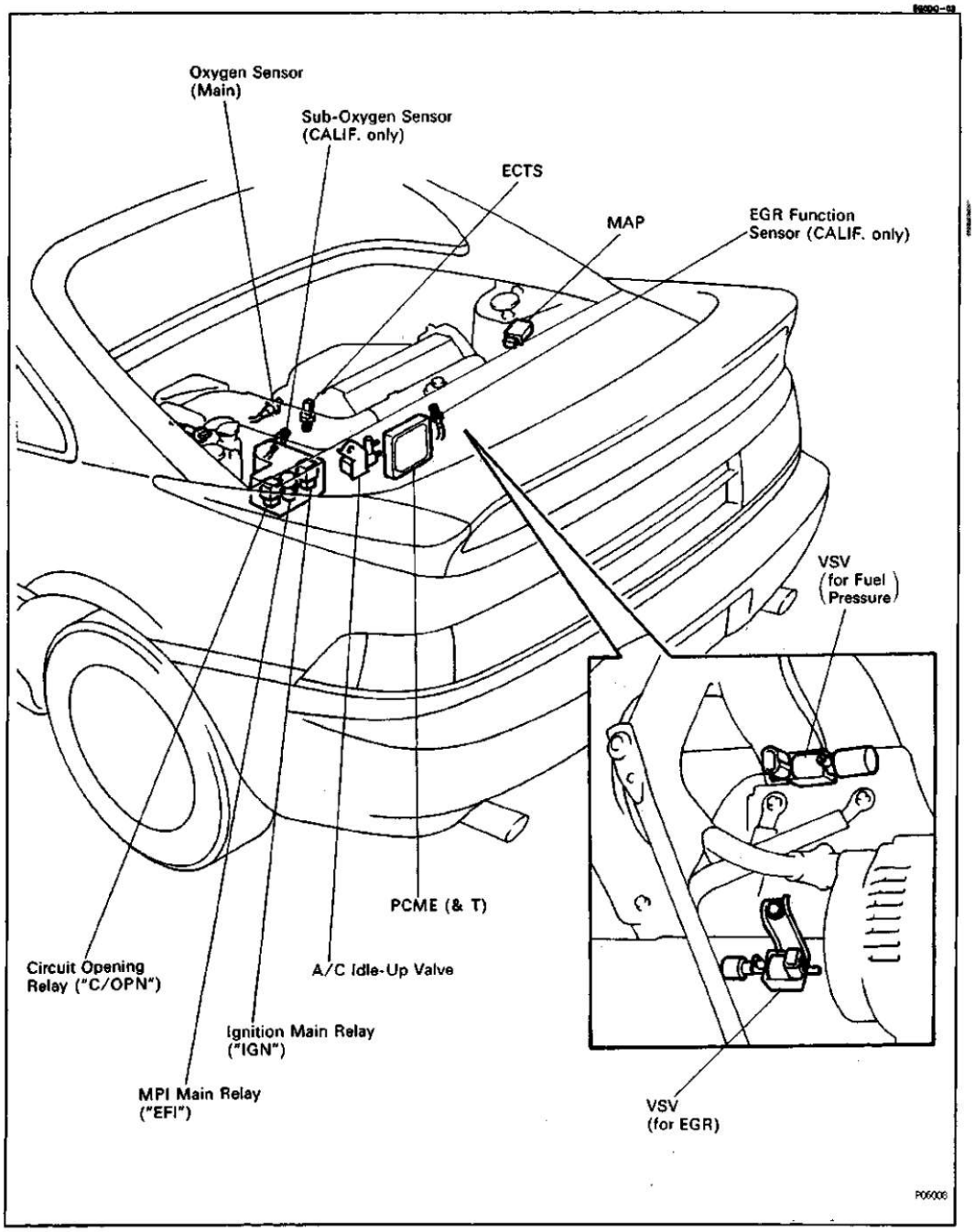
If the resistance is not as specified, replace the sensor.

3: REINSTALL EGR FUNCTION SENSOR

ELECTRONIC PARTS LOCATION

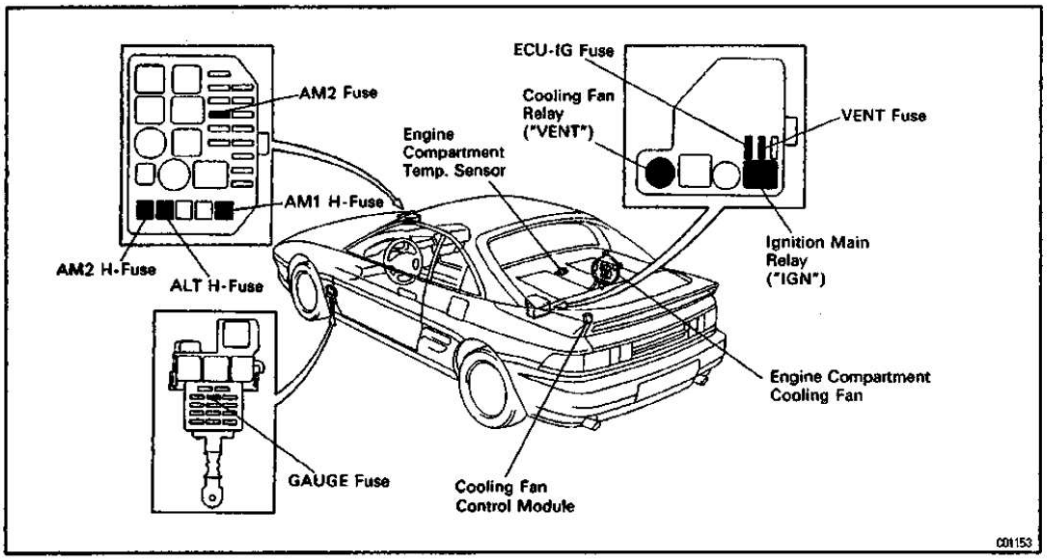


ELECTRONIC PARTS LOCATION

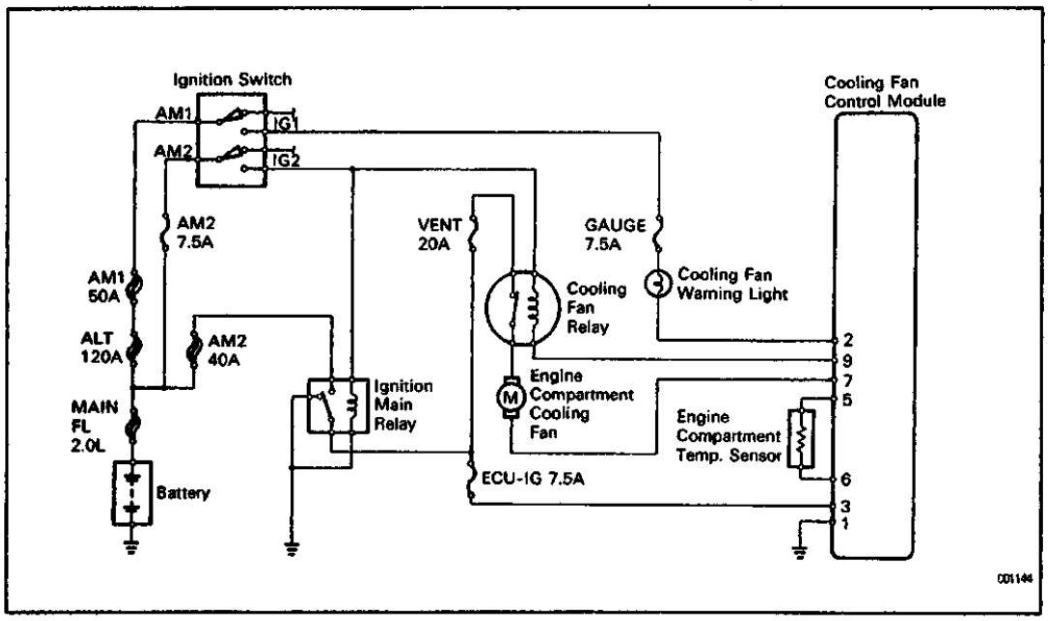


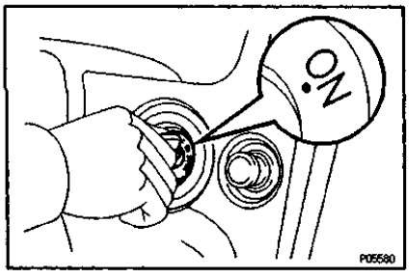
ENGINE COMPARTMENT ELECTRIC COOLING FAN

Parts Location



System Circuit

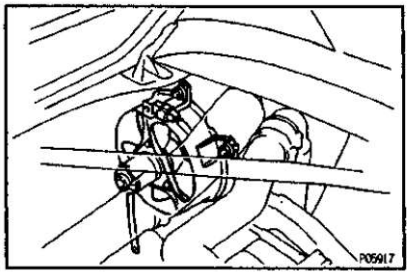




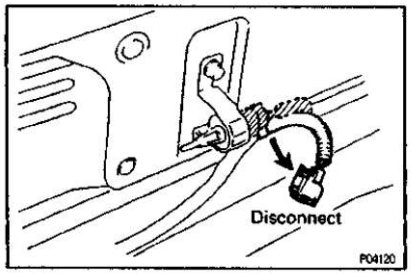
On–Vehicle Inspection

1. CHECK COOLING FAN OPERATION WITH LOW TEMPERATURE (Below 45.5°C (113.9° F))

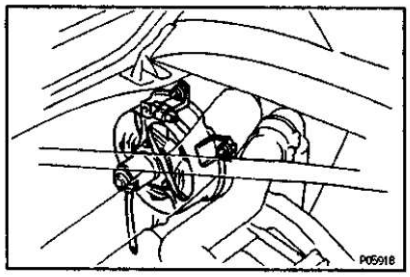
(a) Turn the ignition switch ON.



(b) Check that the cooling fan stops.
If not, check the cooling fan relay and engine coolant temperature switch, and check for a separated connector or severed wire between the cooling fan relay and engine compartment temperature sensor.

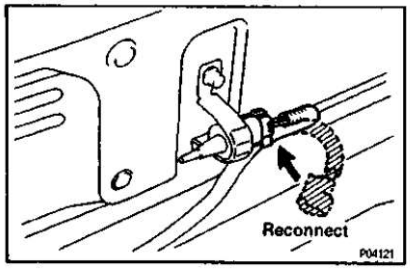


(c) Disconnect the engine compartment temperature sensor.

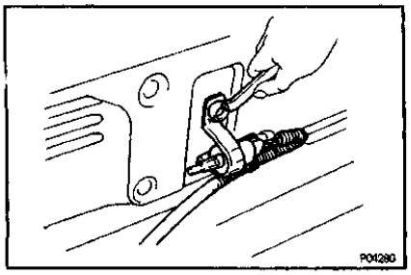


(d) Check that the cooling fan rotates.
If not, check the fan main relay, cooling fan relay, fan control module, cooling fan, fuses, and check for short circuit between the cooling fan relay and engine compartment temperature sensor.

(e) Turn the ignition switch OFF.

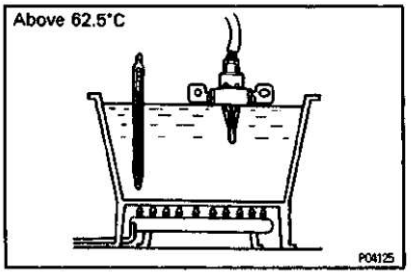


(f) Reconnect the engine compartment temperature sensor.

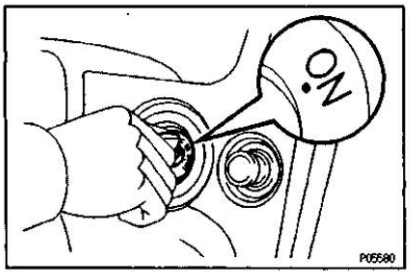


2. CHECK COOLING FAN OPERATION WITH HIGH TEMPERATURE (Above62.5˚C (144.5˚F))

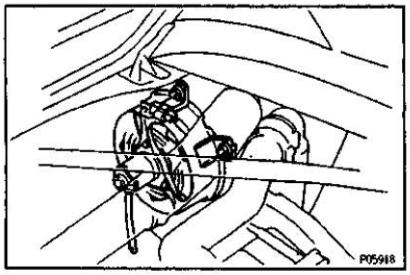
(a) Remove the two bolts, and disconnect the engine compartment temperature sensor from the engine hood.



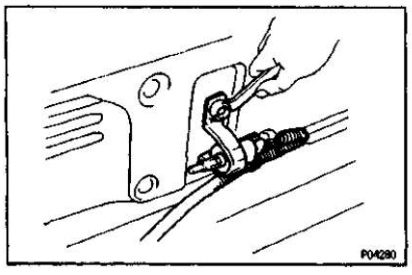
(b) Heat the engine compartment temperature sensor to above 6 2.5˚C (144.5˚F).



(c) Turn the ignition switch ON.

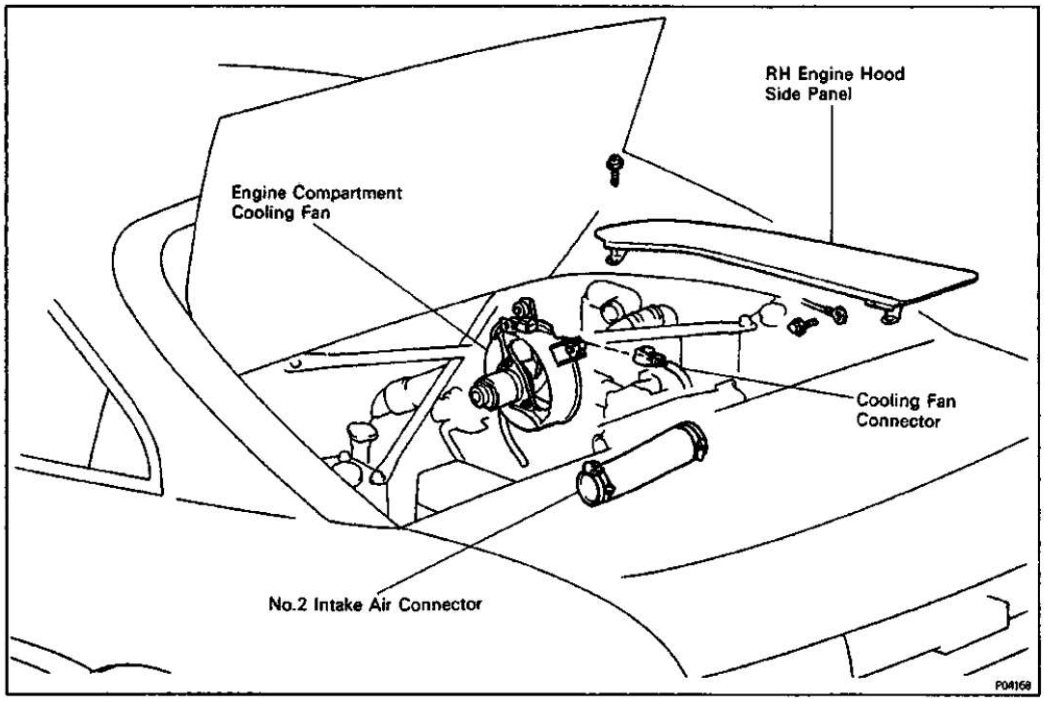


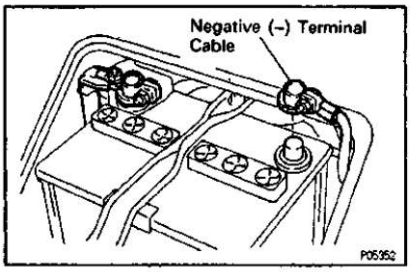
(d) Check that the cooling fan rotates.
If not, replace the engine compartment temperature switch.



(e) Reinstall the engine compartment temperature sensor with the two bolts.

Cooling Fan
COMPONENTS FOR REMOVAL AND INSTALLATION

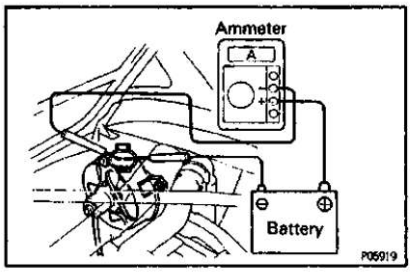




COOLING FAN INSPECTION

1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY

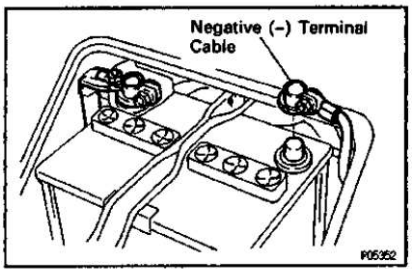
CAUTION: Turn the Ignition switch to "LOCK". Disconnect the cable from the negative terminal of the battery. Wait at least 20 seconds before proceeding with work.



2. INSPECT COOLING FAN

(a) Disconnect the cooling fan connector.
(b) Connect battery and ammeter to the cooling fan connector.
(c) Check that the cooling fan rotates smoothly, and check the reading on the ammeter.
Standard amperage:
3.1 – 4.3 A
(d) Reconnect the cooling fan connector.

3. RECONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY



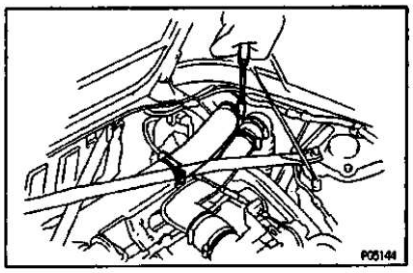
COOLING FAN REMOVAL

(See Components for Removal and Installation)

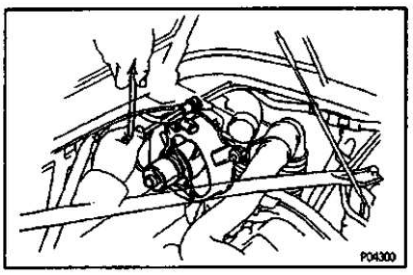
1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY

CAUTION: Turn the ignition switch to 'LOCK'. Disconnect the cable from the negative terminal of the battery. Wait at least 20 seconds before proceeding with work.

2. REMOVE RH ENGINE HOOD SIDE PANEL



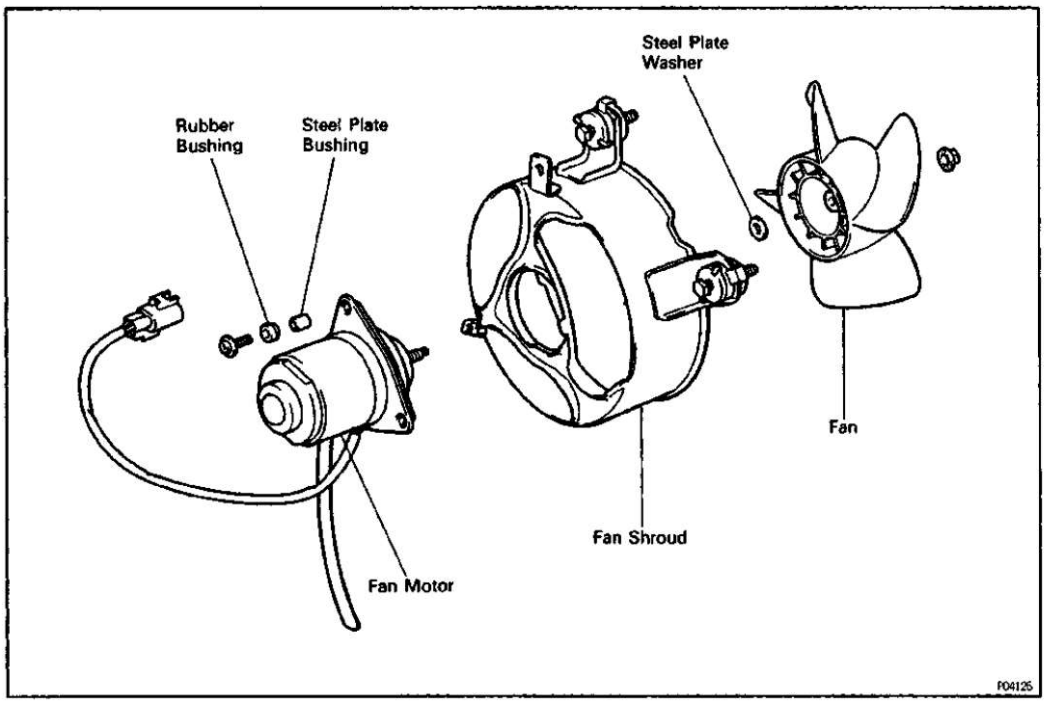
3. REMOVE NO.2 INTAKE AIR CONNECTOR

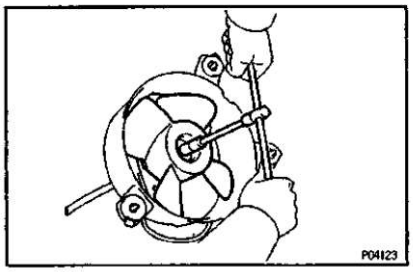


4. REMOVE COOLING FAN

(a) Disconnect the cooling fan connector.
(b) Loosen the three bolts, and remove the cooling fan.

COMPONENTS FOR DISASSEMBLY AND ASSEMBLY



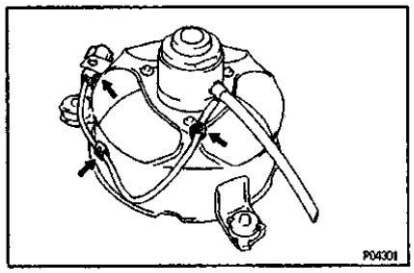


COOLING FAN DISASSEMBLY

(See Components for Disassembly and Assembly)

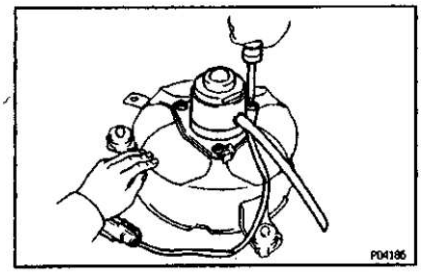
1. REMOVE FAN

Remove the nut, fan and steel plate washer.

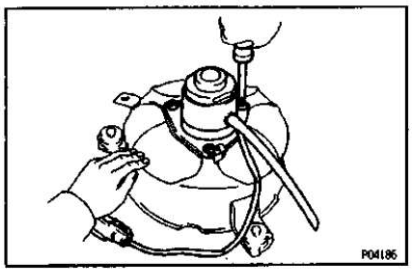


2. REMOVE FAN MOTOR

(a) Disconnect the wire and connector from the fan shroud.



(b) Remove the three screws, rubber bushings, steel plate bushings and motor.

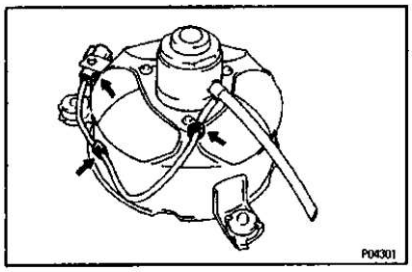


COOLING FAN ASSEMBLY

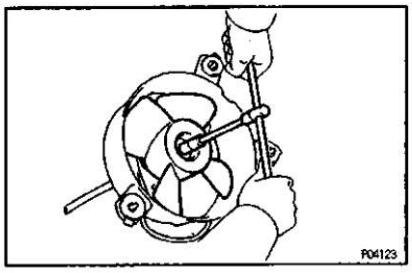
(See Components for Disassembly and Assembly)

1. INSTALL FAN MOTOR

(a) Install the fan motor with the three steel plate bushings, rubber bushings and screws.

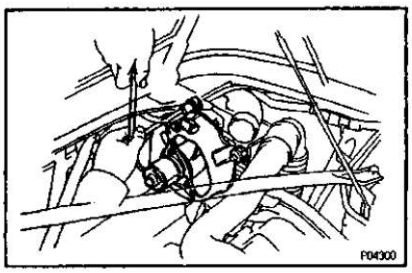


(b) Install the wire and connector to the fan shroud.



2. INSTALL FAN

Install the fan with the steel plate washer and nut.



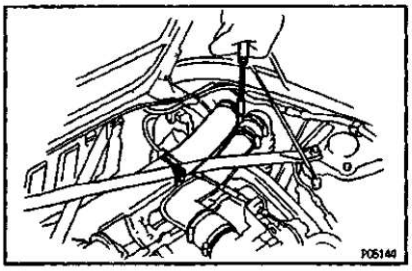
COOLING FAN INSTALLATION

(See Components for Disassembly and Assembly)

1. INSTALL COOLING FAN

(a) Install the cooling fan with the three bolts.

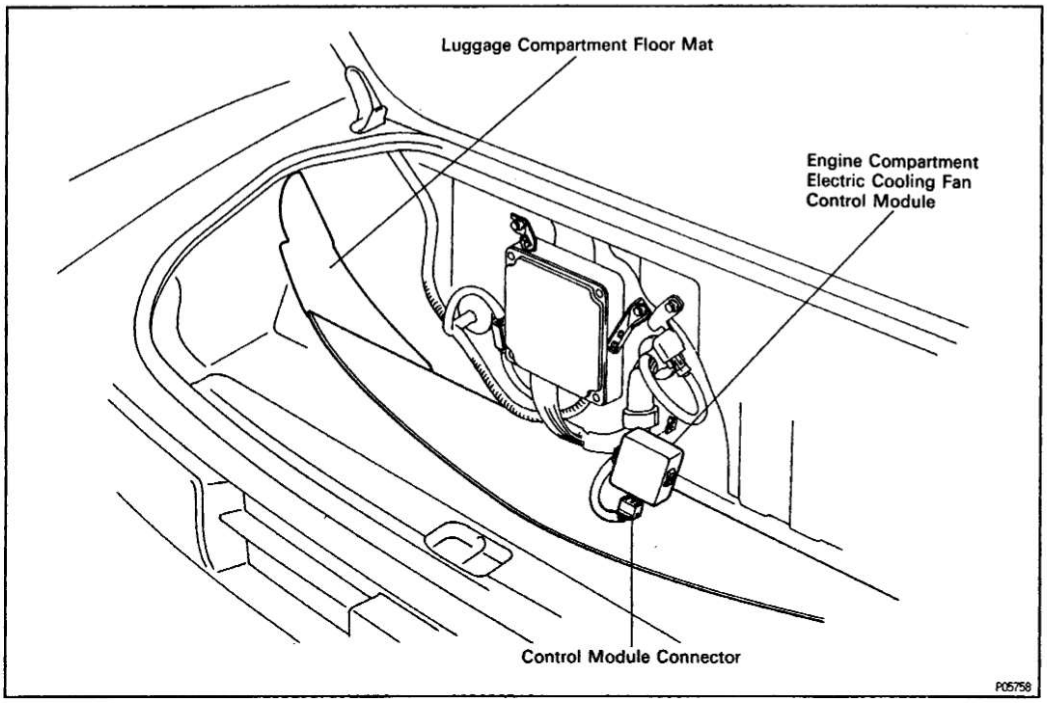
(b) Connect the cooling fan connector.

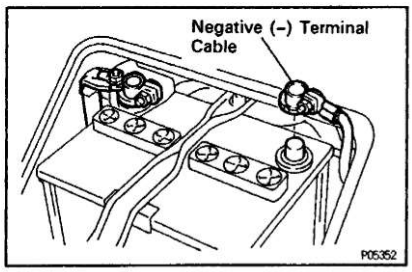


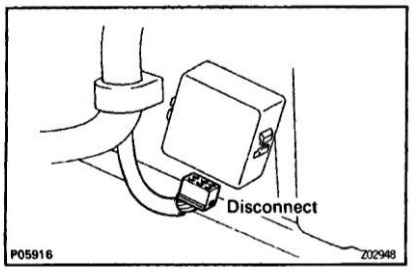
2. INSTALL NO.2 INTAKE AIR CONNECTOR

3. INSTALL RH ENGINE HOOD SIDE PANEL
4. CONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY

Cooling Fan Control Module
CONTROL MODULE FOR REMOVAL AND INSTALLATION







COOLING FAN CONTROL MODULE INSPECTION

(See Components for Removal and Installation)

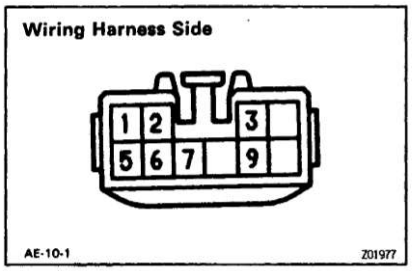
1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY

CAUTION: Turn the ignition switch to 'LOCK'. Disconnect the cable from the negative terminal of the battery. Wait at least 20 seconds before proceeding with work.

2. DISCONNECT FRONT SIDE OF LUGGAGE LUGGAGE COMPARTMENT FLOOR MAT FROM PARTITION PANEL

3. INSPECT COOLING FAN CONTROL MODULE

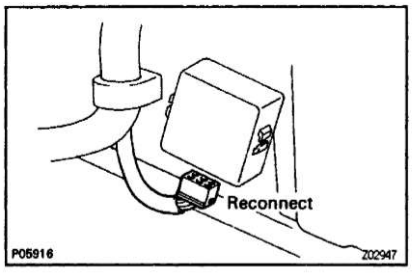
(a) Disconnect the fan control module connector.



(b) Check the connector on the wiring harness side as shown in the chart.

Check for	Tester connection	Condition		Specified valve
Continuity	1 – Ground	–		Continuity
Voltage	2 – Ground	Ignition switch ON		Battery voltage
Voltage	3 – Ground	Ignition switch ON		Battery voltage
Resistance	5–6	Coolant temp.	20°C (88°F)	Approx. 2.45 kΩ
			57.5°C (135.5°F)	Approx. 0.63 kΩ
			80°C (176°F)	Approx. 0.32 kΩ
Voltage	7 – Ground	Ignition switch ON		Battery voltage
Continuity	9 – Ground	Ignition switch ON		Battery voltage

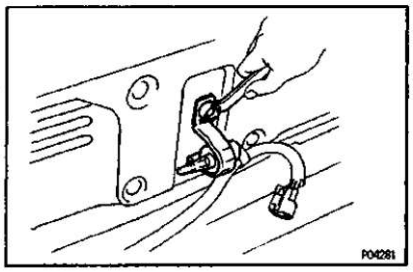
V00874



(c) Reconnect the fan control module connector.

4. REINSTALL LUGGAGE COMPARTMENT FLOOR MAT

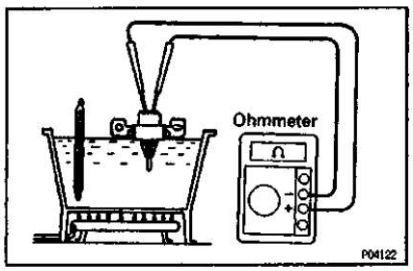
5. RECONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY



Engine Compartment Temperature Sensor
ENGINE COMPARTMENT TEMPERATURE SENSOR INSPECTION

1. REMOVE ENGINE COMPARTMENT TEMPERATURE SENSOR

(a) Disconnect the sensor connector.
(b) Remove the two bolts and sensor.



2. INSPECT ENGINE COMPARTMENT TEMPERATURE SENSOR

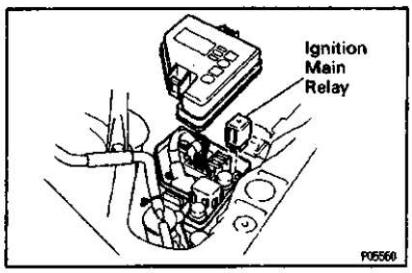
Using an ohmmeter, measure the resistance between the terminals.

Resistance:

Approx. 2.45 kΩ at 20°C (68°F)
Approx. 0.63 kΩ at 57.5°C (135.5°F)
Approx. 0.32 kΩ at 80°C (176° F)

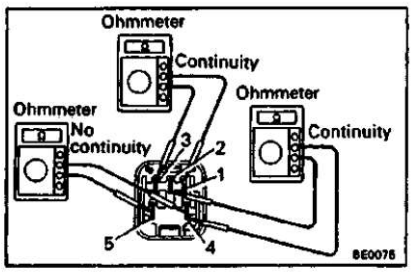
If resistance is not as specified, replace the sensor.

3. REINSTALL ENGINE COMPARTMENT TEMPERATURE SENSOR



Ignition Main Relay ('IGN')
IGNITION MAIN RELAY INSPECTION

1. REMOVE IGNITION MAIN RELAY

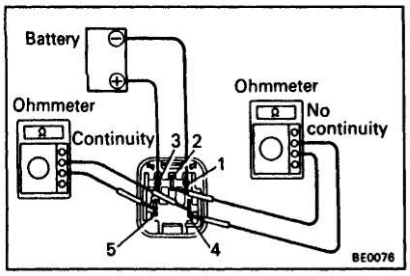


2. INSPECT IGNITION MAIN RELAY

A. Inspect relay continuity

(a) Using an ohmmeter, check that there is continuity between terminals 1 and 3.
(b) Check that there is continuity between terminals 2 and 4.
(c) Check that there is no continuity between terminals 4 and 5.

If continuity is not as specified, replace the relay.



B. Inspect relay operation

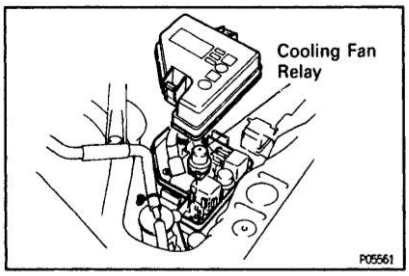
(a) Apply battery voltage across terminals 1 and 3.

(b) Using an ohmmeter, check that there is no continuity between terminals 2 and 4.

(c) Check that there is continuity between terminals 4 and 5.

If operation is not as specified, replace the relay.

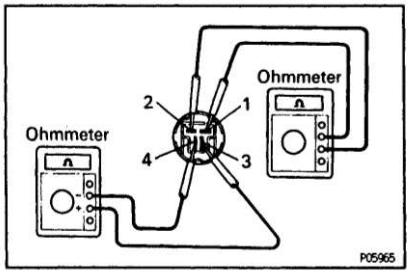
3. REINSTALL IGNITION MAIN RELAY



Cooling Fan Relay ('VENT")

COOLING FAN RELAY INSPECTION

1. REMOVE COOLING FAN RELAY



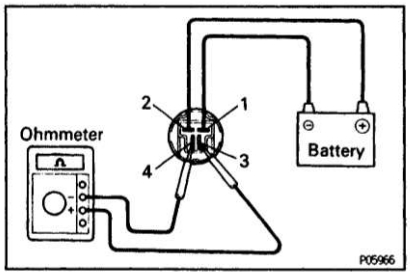
2. INSPECT COOLING FAN RELAY

A. Inspect relay continuity

(a) Using an ohmmeter, check that there is continuity between terminals 1 and 2.

(b) Check that there is continuity between terminals 3 and 4.

If continuity is not as specified, replace the relay.



B. Inspect relay operation

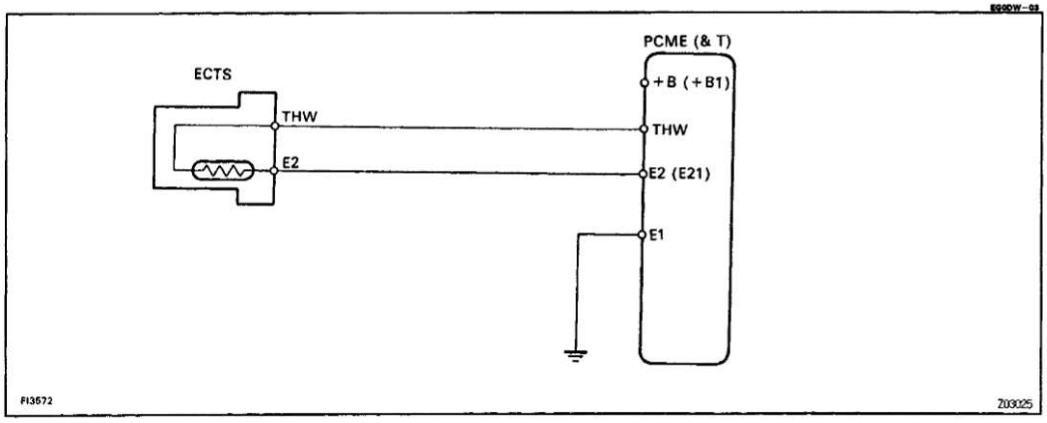
(a) Apply battery voltage across terminals 1 and 2.

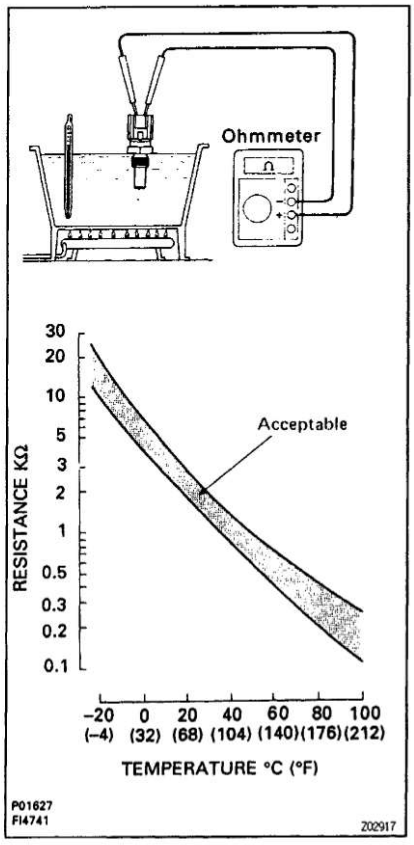
(b) Using an ohmmeter, check that there is no continuity between terminals 3 and 4.

If operation is not as specified, replace the relay.

3. REINSTALL COOLING FAN RELAY

ENGINE COOLANT TEMPERATURE SENSOR (ECTS)





ECTS INSPECTION

1. REMOVE ECTS

2. INSPECT ECTS

Using an ohmmeter, measure the resistance between the terminals.

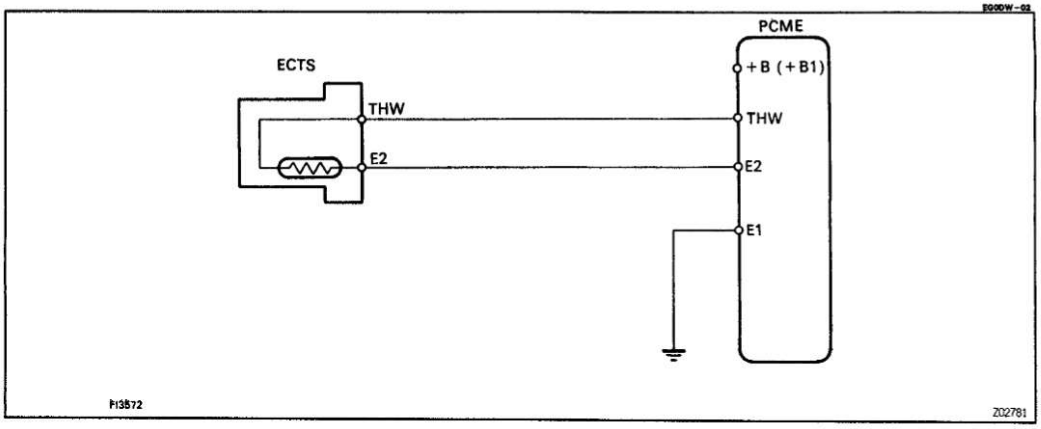
Resistance:

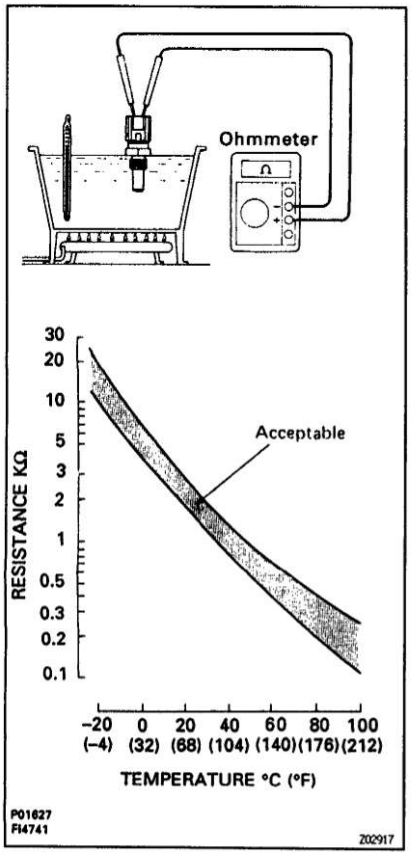
Refer to the chart graph

If the resistance is not as specified, replace the ECTS.

3. REINSTALL ECTS

ENGINE COOLANT TEMPERATURE SENSOR (ECTS)





ENGINE COOLANT TEMPERATURE SENSOR (ECTS) INSPECTION

1. **REMOVE ECTS**
2. **INSPECT ECTS**

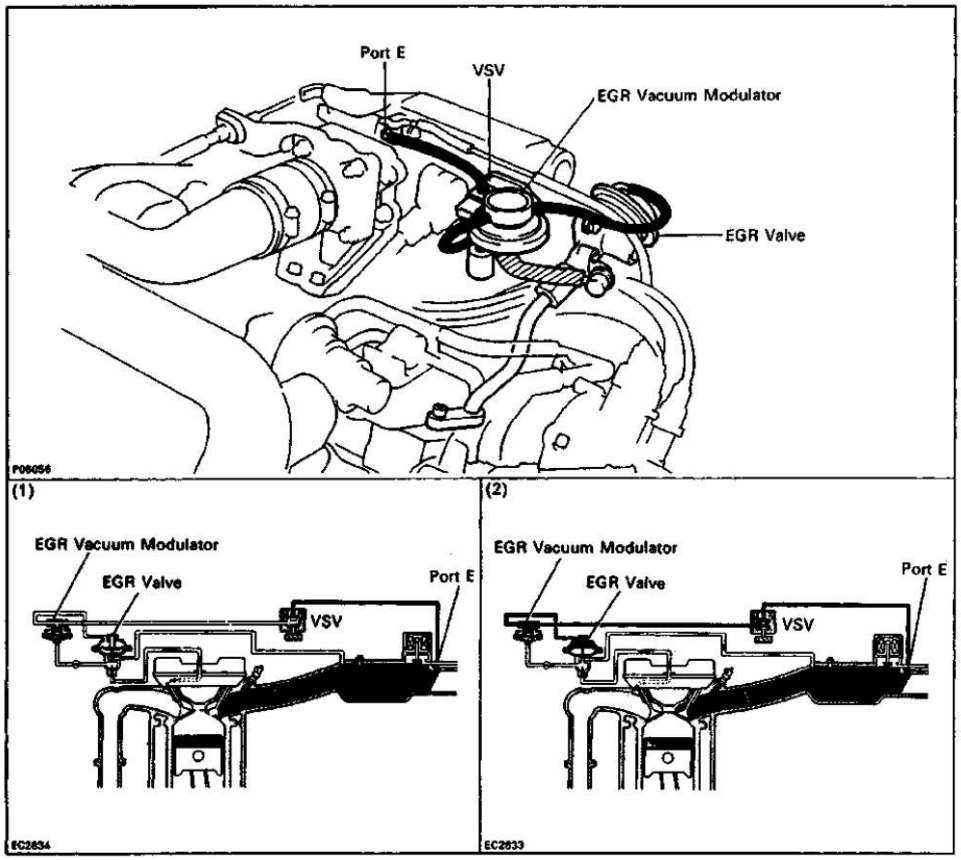
   Using an ohmmeter, measure the resistance between the terminals.

   Resistance:

   Refer to the chart graph

   If the resistance is not as specified, replace the ECTS.
3. **REINSTALL ECTS**

EXHAUST GAS RECIRCULATION (EGR) SYSTEM

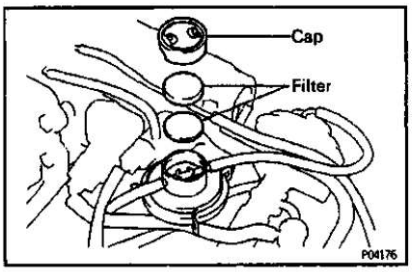


To reduce NOx emissions, part of the exhaust gases is recirculated through the EGR valve to the intake manifold to lower the maximum combustion temperature.

Coolant temp.	VSV	Throttle Valve Opening Angle	Pressure in the EG R Valve Pressure Chamber		EGR Vacuum Modulator	EG R Valve	Exhaust Gas
Below 54°C (129°F)	CLOSED	-	-		-	CLOSED	Not recirculated
Above 60°C (140° F)	OPEN	Positioned above port E	(1)	-	-	CLOSED	Not recirculated
		Positioned .below port E	(2)	-	CLOSED passage to atmosphere	OPEN	Recirculated (increase)

Remarks: When the throttle valve is positioned above the port E, the EGR vacuum modulator will close the atmosphere passage and open the EGR valve to increase the EGR gas, even if the exhaust pressure is insufficiently low.

V00969

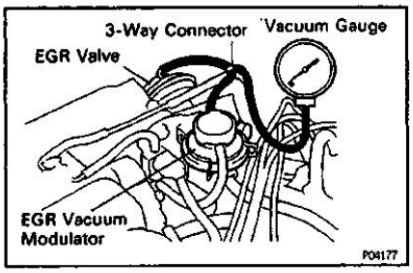


EGR SYSTEM INSPECTION

1. INSPECT AND CLEAN FILTER IN EGR VACUUM MODULATOR

(a) Remove the cap and two filters.
(b) Check the filter for contamination or damage.
(c) Using compressed air, clean the filter.
(d) Reinstall the two filters and cap.

HINT: Install the filter with the coarser surface facing the atmospheric side (outward).

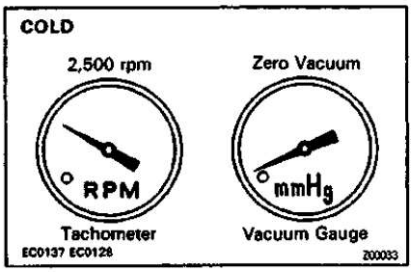


2. INSTALL VACUUM GAUGE

Using a 3–way connector, connect a vacuum gauge to the hose between the EGR valve and vacuum modulator.

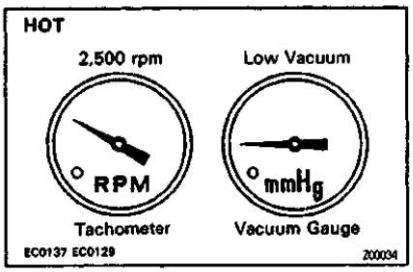
3. INSPECT SEATING OF EGR VALVE

Start the engine and check that the engine starts and runs at idle.



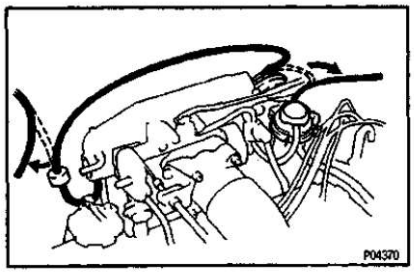
4. INSPECT VSV OPERATION WITH COLD ENGINE

(a) The coolant temperature should be below 54°C (129°F).
(b) Check that the vacuum gauge indicates zero at 2,500 rpm.



5. INSPECT VSV OPERATION WITH HOT ENGINE

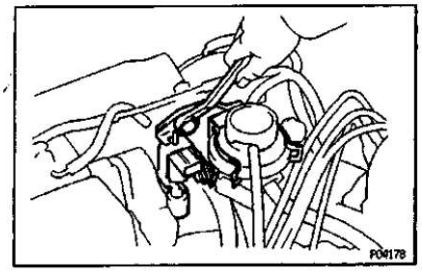
(a) Warm up the engine to above 60°C (140°F).
(b) Check that the vacuum gauge indicates low vacuum at 2,500 rpm.



6. INSPECT EGR VALVE

(a) Apply vacuum directly to the EGR valve with the engine idling.
(b) Check that the engine runs rough or dies.
(c) Reconnect the vacuum hoses to the proper locations.

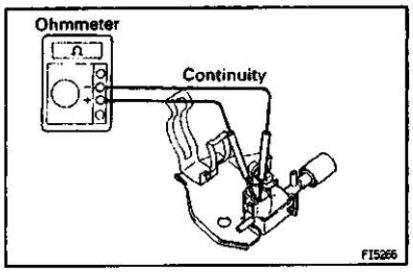
IF NO PROBLEM IS FOUND WITH THIS INSPECTION, SYSTEM IS NORMAL; OTHERWISE INSPECT EACH PART



VSV INSPECTION

1. REMOVE VSV

(See VSV Removal under SMPI System)



2. INSPECT VSV

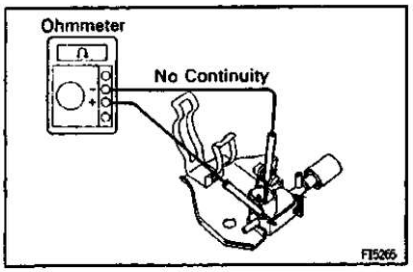
A. Inspect VSV for open circuit .

Using an ohmmeter, check that there is continuity between the terminals.

Resistance (Cold):

33–39 Ω

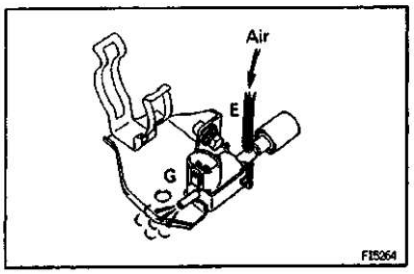
If there is no continuity, replace the VSV.



B. Inspect VSV for ground

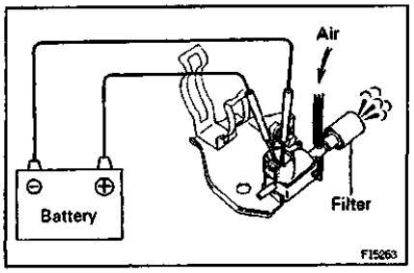
Using an ohmmeter, check that there is no continuity between each terminal and the body.

If there is continuity, replace the VSV.



C. Inspect VSV operation

(a) Check that the air flows from port E to port G.



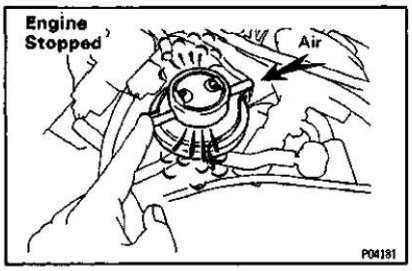
(b) Apply battery voltage across the terminals.

(c) Check that the air flows from port E to the filter.

If operation is not as specified, replace the VSV.

3. REINSTALL VSV

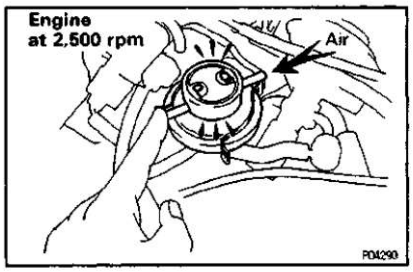
(See VSV Removal under SMPI System)



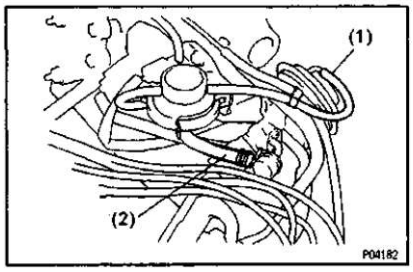
EGR VACUUM MODULATOR INSPECTION

INSPECT EGR VACUUM MODULATOR OPERATION

(a) Disconnect the vacuum hoses from ports P and Q of the EGR vacuum modulator.
(b) Block port one side with your finger.
(c) Blow air into another port, and check that the air passes through to the air filter side freely.



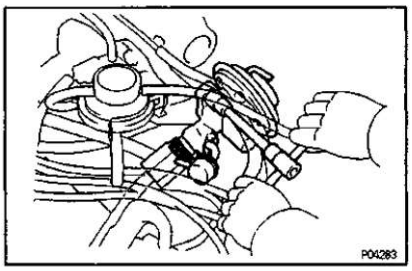
(d) Start the engine, and maintain speed at 2,500 rpm.
(e) Repeat the above test. Check that there is a strong resistance to air flow.
(f) Reconnect the vacuum hoses to the proper locations.



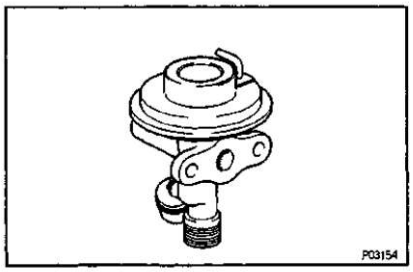
EGR VALVE INSPECTION

1. REMOVE EGR VALVE

(a) (CALIF. only)
Disconnect the EGR function sensor connector.
(b) Disconnect the following hoses from the EGR valve:
(1) Vacuum hose (from vacuum modulator)
(2) EGR hose (from vacuum modulator)

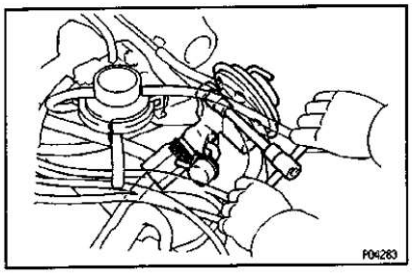


(c) Loosen the union nut, and Remove the two bolts, EGR valve and gasket.



2. INSPECT EGR VALVE

Check for sticking and heavy carbon deposits.
If a problem is found, replace the valve.



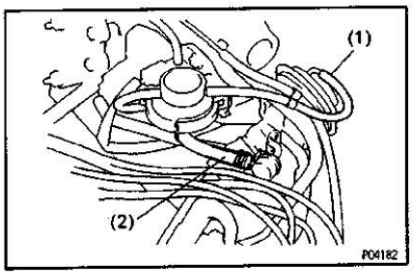
3. REINSTALL EGR VALVE

(a) Install a new gasket and the EGR valve with the union nut and two bolts.

Torque:

19 N–m (195 kgf–cm, 19 ft–lbf) for bolt

59 N–m (600 kgf–cm, 43 ft–lbf) for union nut



(b) Connect the following hoses to the EGR valve:

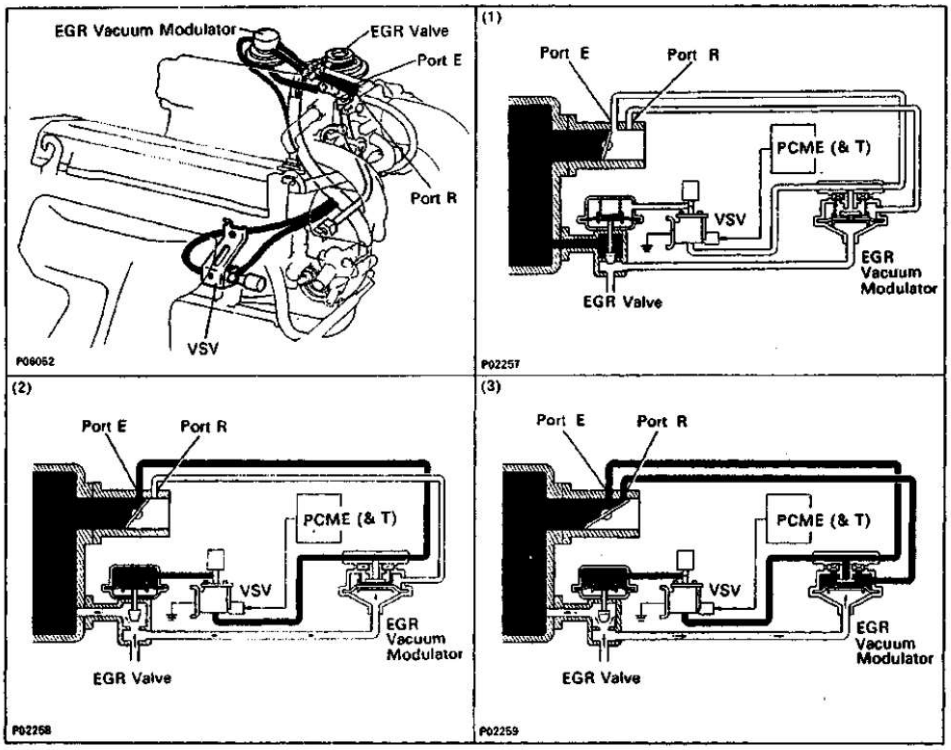
(1) Vacuum hose (from vacuum modulator)

(2) EGR hose (from vacuum modulator)

(c) (CALIF. only)

Reconnect the EGR function sensor connector.

EXHAUST GAS RECIRCULATION (EGR) SYSTEM



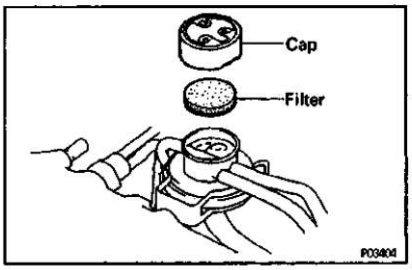
Coolant Temp.	Engine RPM	PIM (PCM)	VSV	Throttle Valve Opening Angle	Pressure in the EGR Valve Pressure Chamber		EGR Vacuum Modulator	EGR Valve	Exhaust Gas
Below 55°C (131°F)	-	-	CLOSED	-	-		-	CLOSED	Not recirculated
Above 60°C (140°F)	Below 4,000 rpm	OFF	CLOSED	Positioned below port E	-		-	CLOSED	Not recirculated
			CLOSED	Positioned below port E	(1)	-	-	CLOSED	Not recirculated
		***ON	OPEN	Positioned between port E and port R	(2) HIGH	*	CLOSES passage to atmosphere	OPEN	Recirculated
				Positioned above port R	(3) HIGH	**	CLOSES passage to atmosphere	OPEN	Recirculated (increase)
	Above 4,000 rpm	OFF	CLOSED	-	-		-	CLOSED	Not Recirculated

* Pressure increases → Modulator closes → EGR valve opens → Pressure drops
EGR valve closes ← Modulator opens ←

** When the throttle valve is positioned above port R, the EGR vacuum modulator will close the atmosphere passage and open the EGR valve to increase the exhaust gas, even if the exhaust pressure is insufficiently low.

*** If terminals TE1 and E1 of DLC1 connector are connected, the VSV switches ON.

V01008

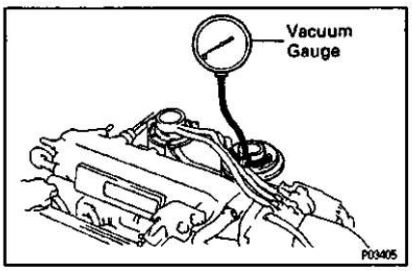


EGR SYSTEM INSPECTION

1. INSPECT AND CLEAN FILTER IN EGR VACUUM MODULATOR

(a) Remove the cap and filter.
(b) Check the filter for contamination or damage.
(c) Using compressed air, clean the filter.
(d) Reinstall the filter and cap.

HINT: Install the filter with the coarser surface facing the atmospheric side (outward).

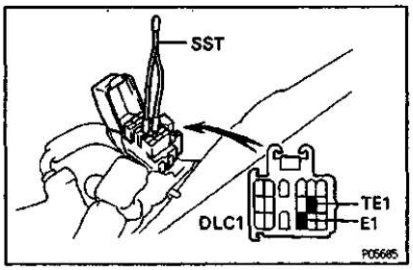


2. INSTALL VACUUM GAUGE

Using a 3–way connector, connect a vacuum gauge to the hose between the EGR valve and VSV.

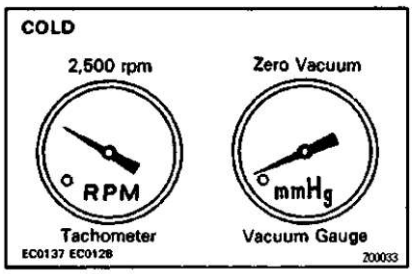
3. INSPECT SEATING OF EGR VALVE

Start the engine and check that the engine starts and runs at idle.



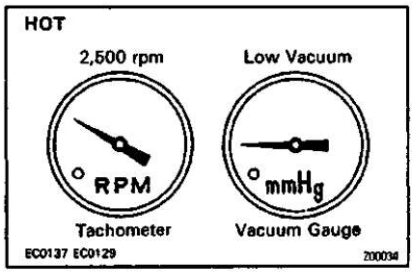
4. CONNECT TERMINALS TE1 AND E1 OF DATA LINK CONNECTOR 1

Using SST, connect terminals TE1 and E1 of the data link connector 1.
SST 09843–18020



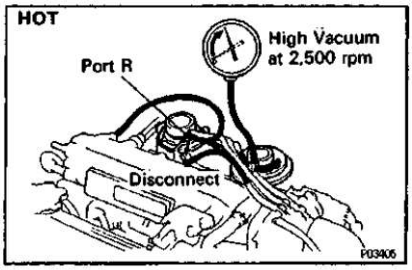
5. INSPECT VSV OPERATION WITH COLD ENGINE

(a) The engine coolant temperature should be below 55° C (131°F).
(b) Check that the vacuum gauge indicates zero at 2,500 rpm.



6. INSPECT OPERATION OF VSV AND EGR VACUUM MODULATOR WITH HOT ENGINE

(a) Warm up the engine to above 60°C (140°F).
(b) Check that the vacuum gauge indicates low vacuum at 2,500 rpm.



(c) Disconnect the vacuum hose port R of the EGR vacuum modulator and connect port R directly to the intake manifold with another hose.
(d) Check that the vacuum gauge indicates high vacuum at 2,500 rpm.

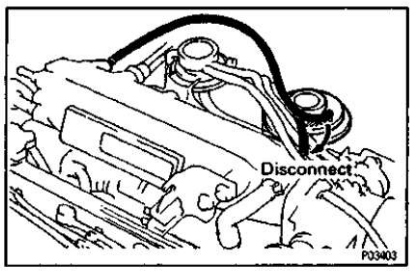
HINT: As a large amount of exhaust gas enters, the engine will misfire slightly.

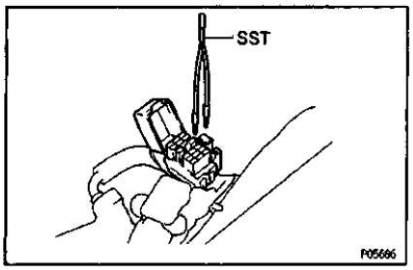
7. REMOVE VACUUM GAUGE

Remove the vacuum gauge, and reconnect the vacuum hoses to the proper locations.

8. INSPECT EGR VALVE

(a) Apply vacuum directly to the EGR valve with the¿engine idling.
(b) Check that the engine runs rough or dies.
(c) Reconnect the vacuum hoses to the proper locations.

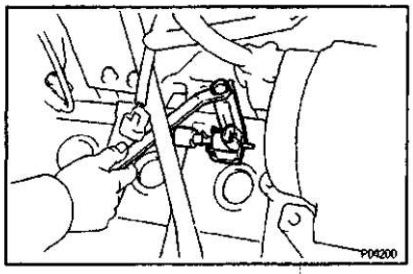




9. REMOVE SST FROM DATA LINK CONNECTOR 1

SST 09843–18020

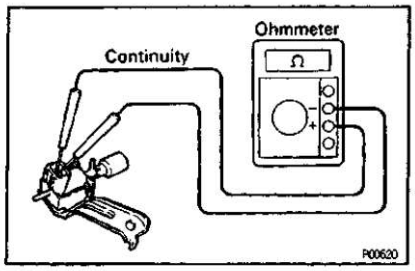
IF NO PROBLEM IS FOUND WITH THIS INSPECTION, SYSTEM IS NORMAL; OTHERWISE INSPECT EACH PART



VSV INSPECTION

1. REMOVE VSV

(See VSV Removal under MPI System)



2. Inspect VSV for open circuit

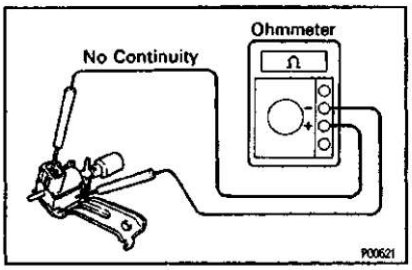
A. Inspect VSV for open circuit

Using an ohmmeter, check that there is continuity between the terminals.

Resistance (Cold):

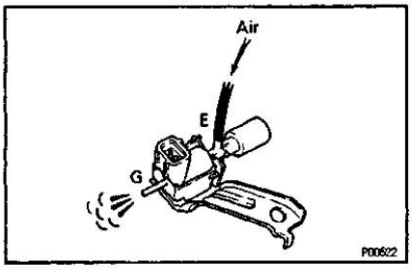
33–39Ω

If there is no continuity, replace the VSV.



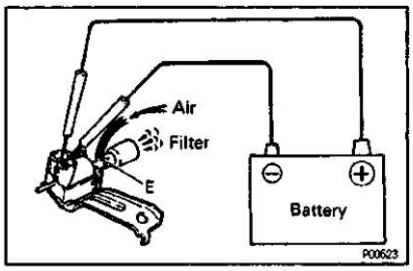
B. Inspect VSV for ground

Using an ohmmeter, check that there is no continuity between each terminal and the body.
If there is continuity, replace the VSV.



C. Inspect VSV operation

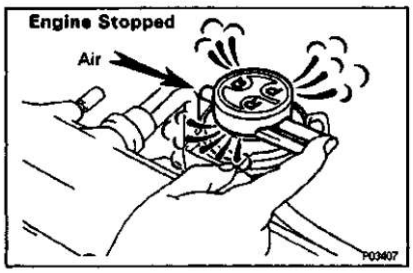
(a) Check that the air flows from port E to port G.



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

3. REINSTALL VSV

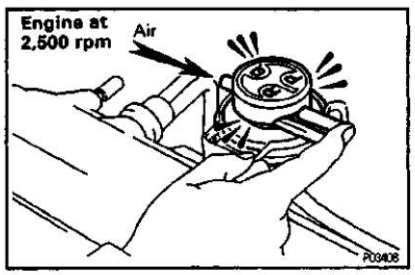
(See VSV Removal under MPI System)



EGR VACUUM MODULATOR INSPECTION

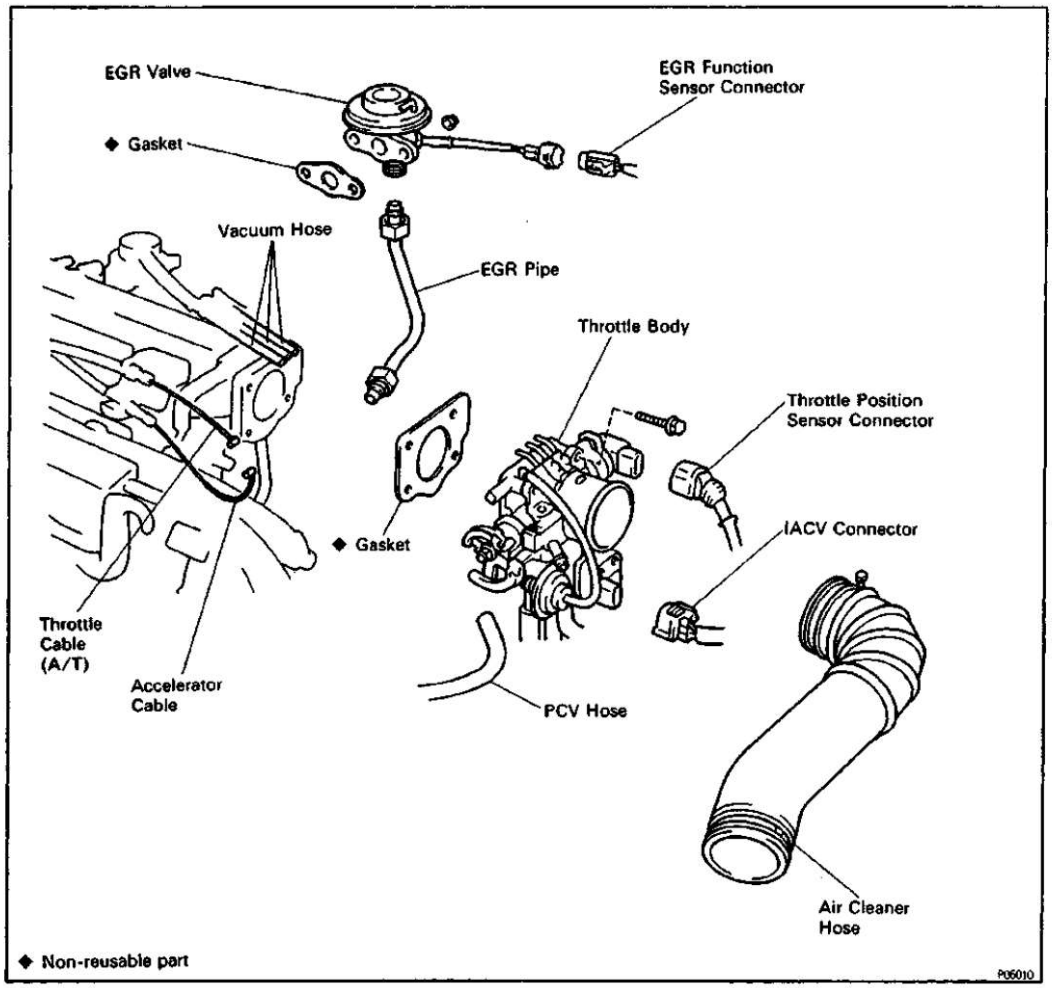
INSPECT EGR VACUUM MODULATOR OPERATION

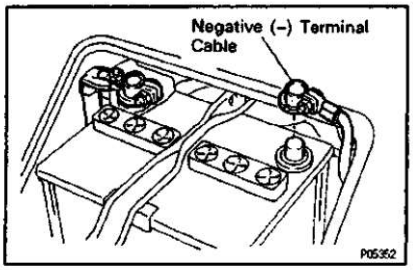
(a) Disconnect the vacuum hoses from ports P, Q and R of the EGR vacuum modulator.
(b) Block ports P and R with your finger.
(c) Blow air into port Q, and check that the air passes through to the air filter side freely.



(d) Start the engine, and maintain speed at 2,500 rpm.
(e) Repeat the above test. Check that there is a strong resistance to air flow.
(f) Reconnect the vacuum hoses to the proper locations.

COMPONENTS FOR EGR VALVE REMOVAL AND INSTALLATION



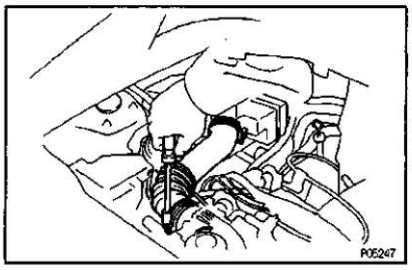


EGR VALVE INSPECTION

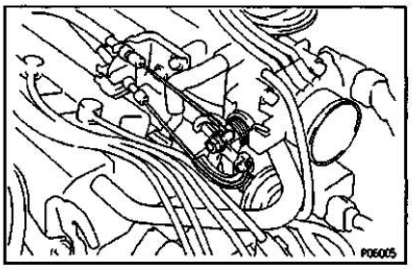
(See Components for EGR Valve Removal and Installation)

1. DISCONNECT CAGE FROM NEGATIVE TERMINAL OF BATTERY

CAUTION: Turn the ignition switch to 'LOCK'. Disconnect the negative terminal from the battery. Wait at least 20 seconds before proceeding with work.



2. REMOVE AIR CLEANER HOSE

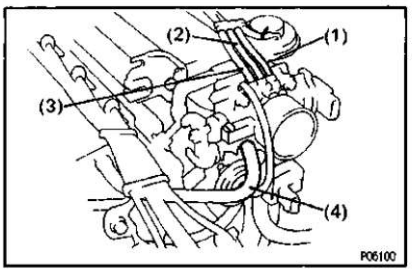


3. DISCONNECT ACCELERATOR CABLE FROM THROTTLE BODY

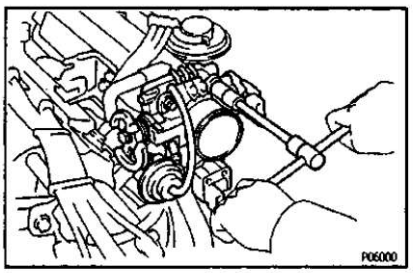
4. (A/T)
DISCONNECT THROTTLE CABLE FROM THROTTLE BODY

6. DISCONNECT THROTTLE BODY FROM INTAKE MANIFOLD

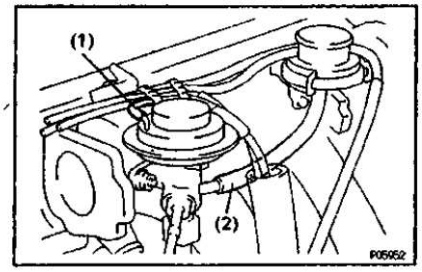
(a) Disconnect the following connector:
- Throttle position sensor connector
- IACV connector



(b) Disconnect the following hoses:
(1) Vacuum hose (from upper port of TVS) from port "P" of throttle body
(2) Vacuum hose (from port "a" of EGR vacuum modulator) from port "E" of throttle body
(3) Vacuum hose (from port "R" of EGR vacuum modulator) from port "R" of throttle body
(4) PCV hose (from cylinder head) from throttle body

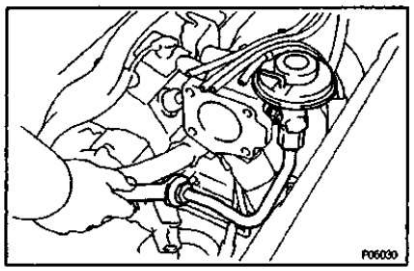


(c) Remove the four bolts, and disconnect the throttle body from the intake manifold.
(d) Remove the throttle body gasket.

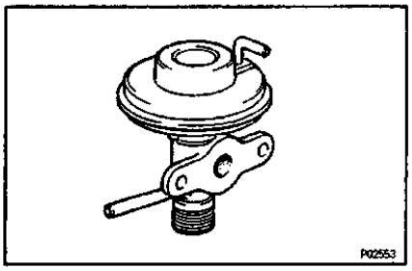


6. REMOVE EGR VALVE

(a) (CALIF. only)
Disconnect the EGR function sensor connector.
(b) Disconnect the following hoses from the EGR valve:
(1) Vacuum hose (from port E of VSV)
(2) EGR hose (from vacuum modulator)

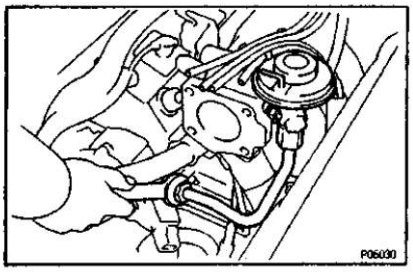


(c) Loosen the two union nuts.
(d) Remove the two nuts, EGR valve and gasket.



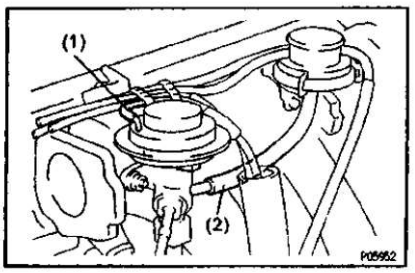
7. INSPECT EGR VALVE

Check for sticking and heavy carbon deposits.
If a problem is found, replace the valve.

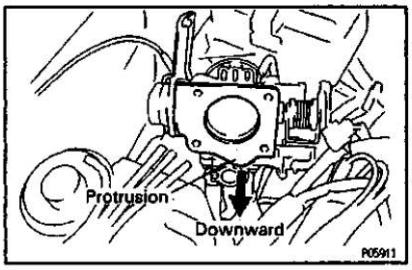


8. REINSTALL EGR VALVE

(a) Install a new gasket and the EGR valve with the two nuts.
Torque: 13 N–m (130 kgf–cm, 9 ft–lbf)
(b) Install the EGR pipe with the two union nuts.
Torque: 59 N–m (600 kgf–cm, 43 ft–lbf)

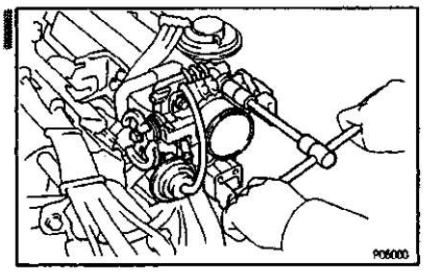


(c) Connect the following hoses to the EGR valve:
(1) Vacuum hose (from port E of VSV)
(2) EGR hose (from vacuum modulator)
(d) (CALIF. only)
Reconnect the EGR function sensor connector.



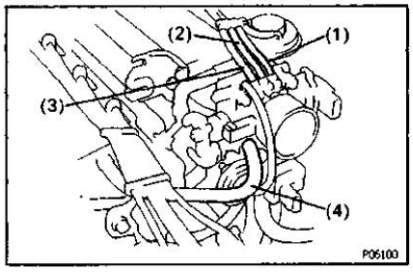
9. INSTALL THROTTLE BODY

(a) Install a new gasket on the throttle body, facing the protrusion downward.



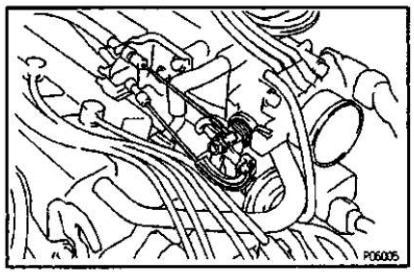
(b) Install the throttle body with the four bolts.
Torque: 19 N–m (195 kgf–cm, 14 ft–lbf)

HINT: Different bolt lengths are used for the upper and lower sides.
Bolt length:
45 mm (1.77 in.) for upper side
55 mm (2.17 in.) for lower side



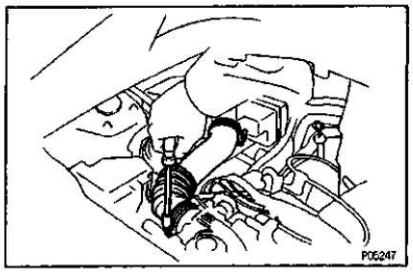
(c) Connect the following hoses:
(1) Vacuum hose (from upper port of TVS) to port "P" of throttle body
(2) Vacuum hose (from port "Q" of EGR vacuum modulator) to port "E" of throttle body
(3) Vacuum hose (from port "R" of EGR vacuum modulator) to port "R" of throttle body
(4) PCV hose (from cylinder head) to throttle body

(d) Reconnect the following connector:
- Throttle position sensor connector
- IACV connector



10. CONNECT ACCELERATOR CABLE TO THROTTLE BODY

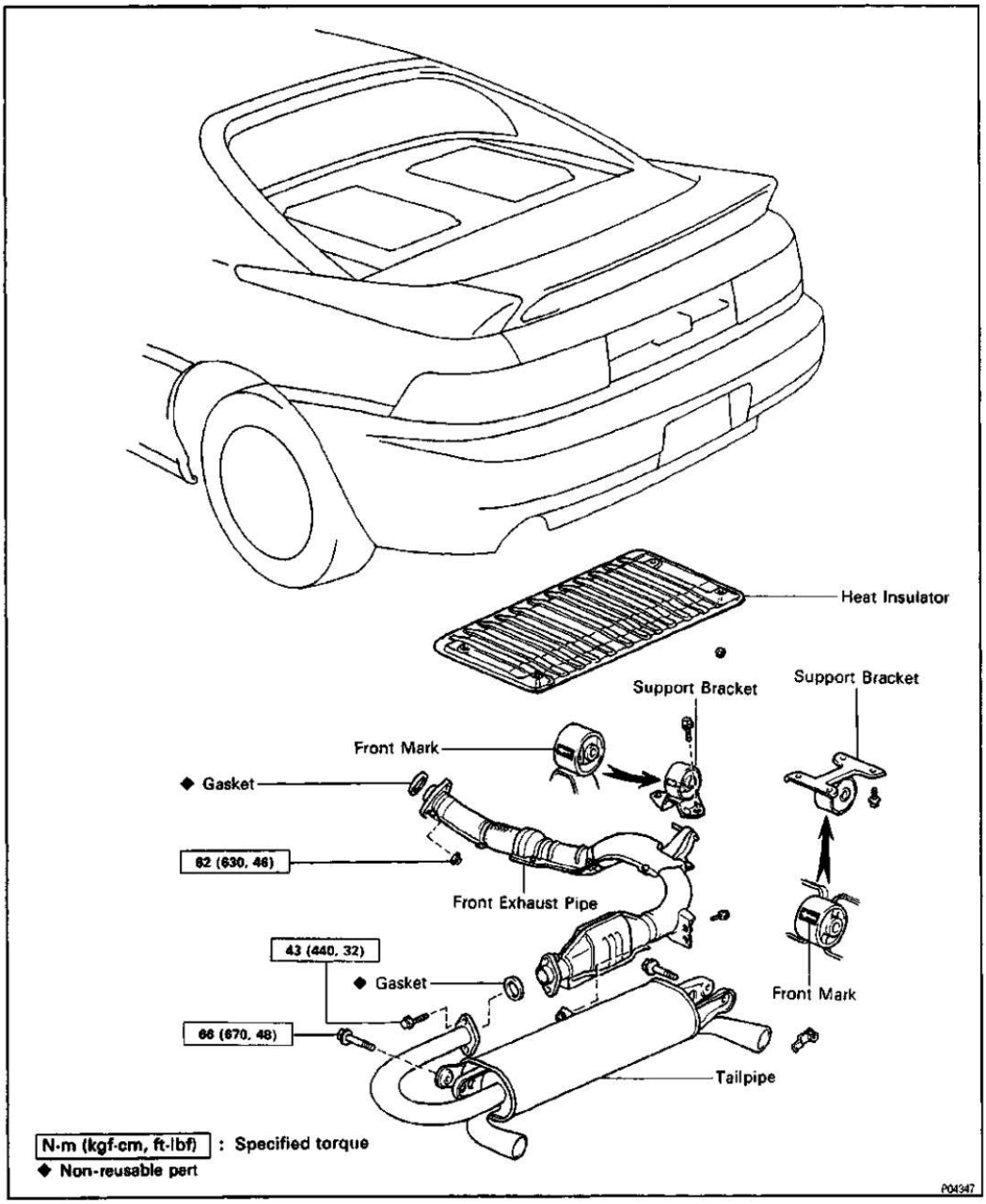
11. (A/T)
CONNECT THROTTLE CABLE TO THROTTLE BODY



12. REINSTALL AIR CLEANER HOSE

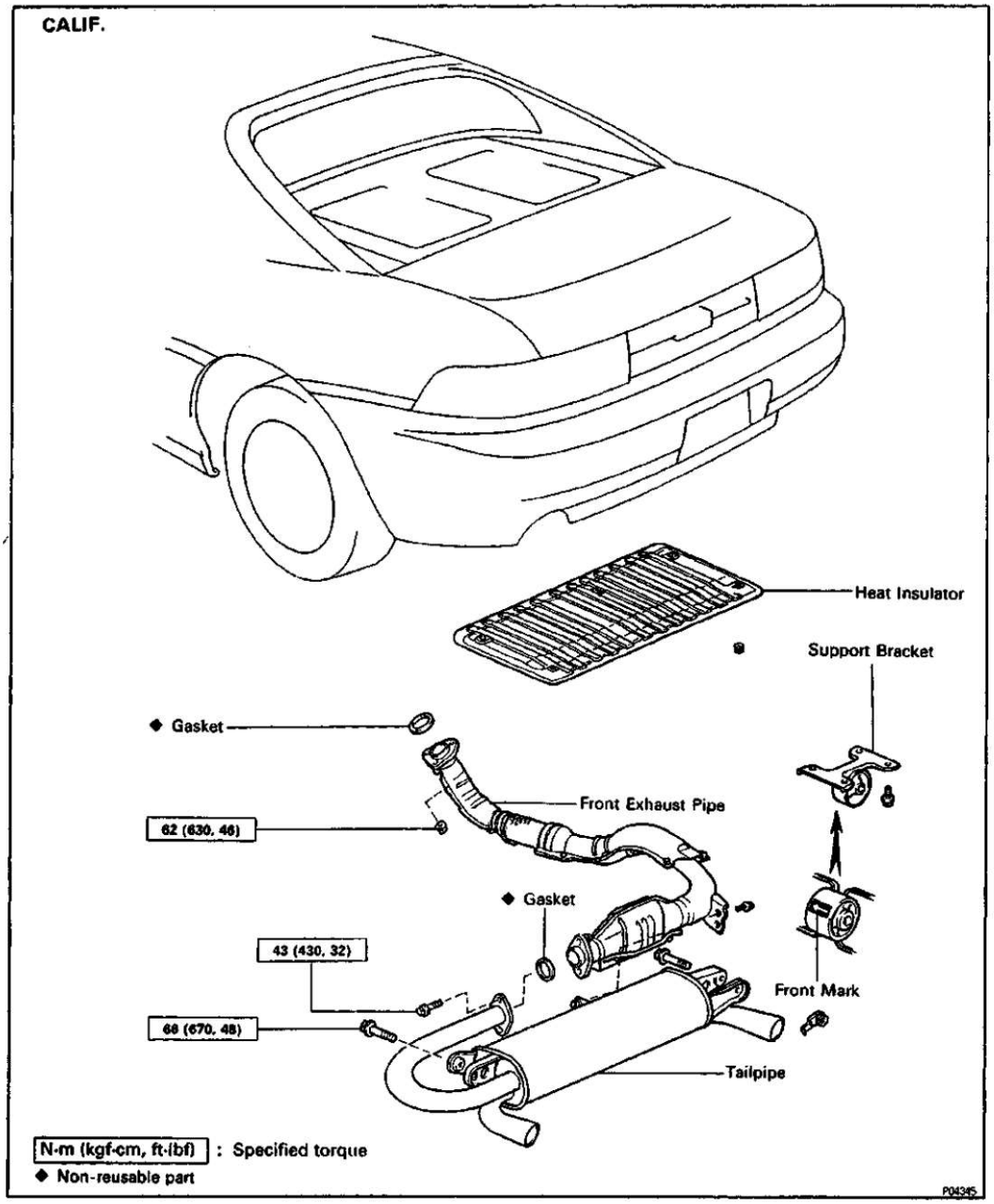
13. RECONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY

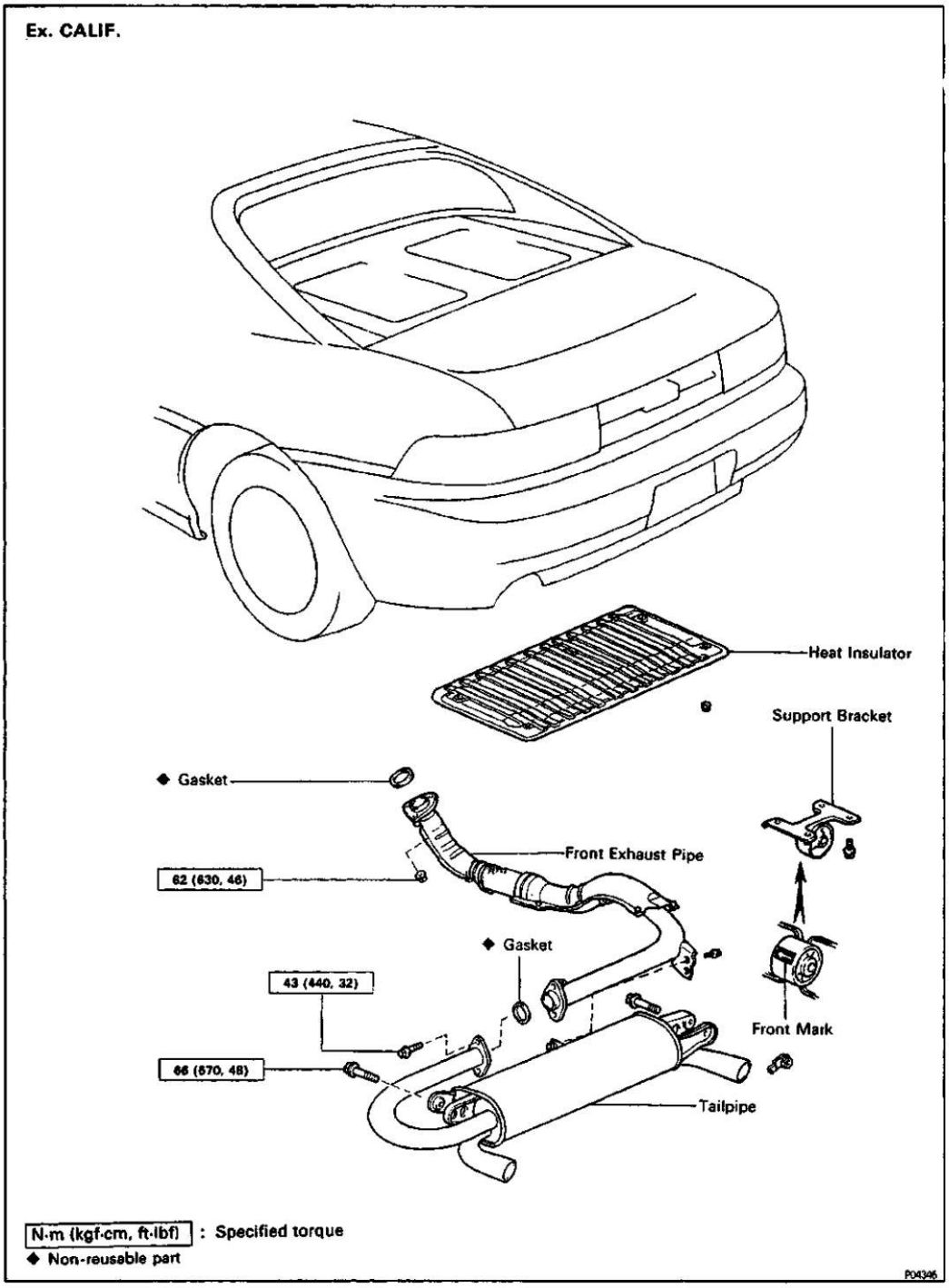
EXHAUST SYSTEM COMPONENTS



EXHAUST SYSTEM

COMPONENTS



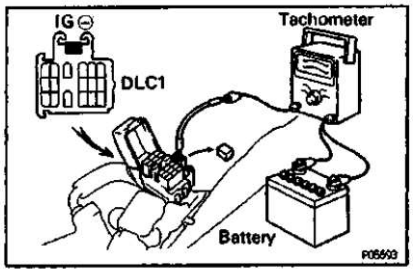

Ex. CALIF.
Heat Insulator
Support Bracket
◆ Gasket
Front Exhaust Pipe
62 (630, 46)
◆ Gasket
43 (440, 32)
66 (670, 48)
Front Mark
Tailpipe
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part
P04346

FUEL CUT RPM

FUEL CUT PRM INSPECTION

1. WARM UP ENGINE

Allow the engine to warm up to normal operating temperature.

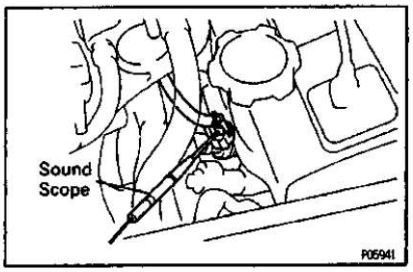


2. CONNECT TACHOMETER TO ENGINE

Connect the test probe of a tachometer to terminal IG (–) of the data link connector 1.

NOTICE:

- **Never allow the tachometer terminal to touch ground as it could result in damage to the igniter and/or ignition coil.**
- **As some tachometers are not compatible with this ignition system, we recommend that you confirm the compatibility of your before use.**



3. INSPECT FUEL CUT PRM

(a) Increase the engine speed to at least 2,500 rpm.

(b) Using a sound scope, check for injector operating noise.

(c) Check that when the throttle lever is released, injector operation noise stops momentarily and then resumes.

HINT: Measure with the A/C OFF.

Fuel return rpm:

1,500 rpm

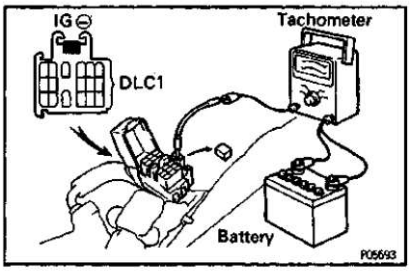
4. DISCONNECT TACHOMETER

FUEL CUT RPM

FUEL CUT PRM INSPECTION

1. WARM UP ENGINE

Allow the engine to warm up to normal operating temperature.

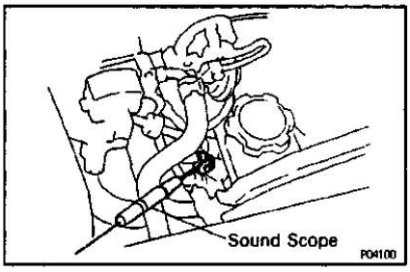


2. CONNECT TACHOMETER TO ENGINE

Connect the test probe of a tachometer to terminal IG – of the data link connector 1.

NOTICE:

- Never allow the tachometer terminal to touch ground as it could result in damage to the igniter and/or ignition coil.
- As some tachometers are not compatible with this ignition system, we recommend that you confirm the compatibility of your before use.



3. INSPECT FUEL CUT PRM

(a) Increase the engine speed to at least 2,500 rpm.

(b) Using a sound scope, check for injector operating noise.

(c) Check that when the throttle lever is released, injector operation noise stops momentarily and then resumes.

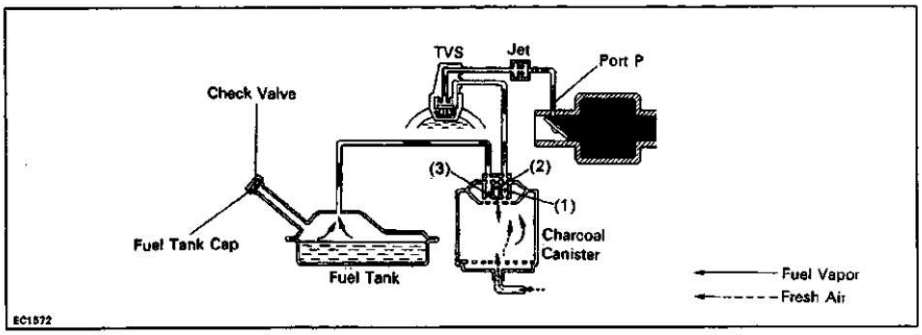
HINT: Measure with the A/C OFF.

Fuel return rpm:

1,600 rpm

4. DISCONNECT TACHOMETER

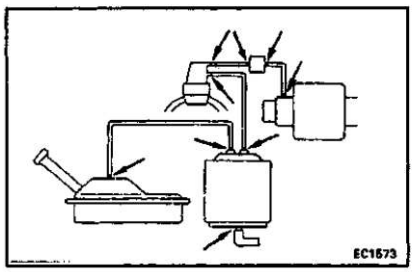
FUEL EVAPORATIVE SYSTEM (EVAP)



To reduce HC emission, evaporated fuel from the fuel tank is routed through the charcoal canister to the intake manifold for combustion in the cylinders.

Coolant Temp.	TVS	Throttle Valve Opening	Canister Check Valve (1)	Canister Check Valve (2)	Canister Check Valve (3)	Check valve in Cap	Evaporated Fuel (HC)
Below 35°C (95°F)	CLOSED	-	-	-	-	-	HC from tank is absorbed into the canister.
Above 54°C (129°F)	OPEN	Positioned below port P	CLOSED	-	-	-	
		Positioned above port P	OPEN	-	-	-	HC from canister is led into air intake chamber.
High pressure in tank	-	-	-	OPEN	CLOSED	CLOSED	HC from tank is absorbed into the canister.
High vacuum in take	-	-	-	CLOSED	OPEN	OPEN	Air is led into the fuel tank.

V00968



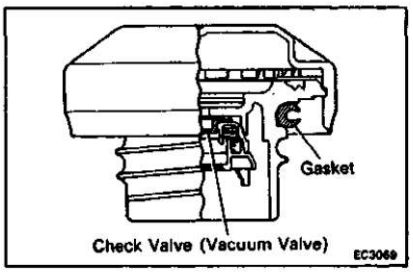
FUEL VAPOR LINES, FUEL TANK AND TANK CAP INSPECTION

1. VISUALLY INSPECT LINES AND CONNECTIONS

Look for loosen connections, sharp bends or damage.

2. VISUALLY INSPECT FUEL TANK

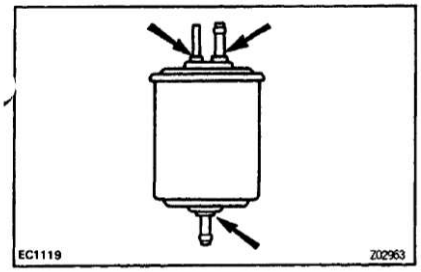
Look for deformation, cracks or fuel leakage.



3. VISUALLY INSPECT FUEL TANK CAP

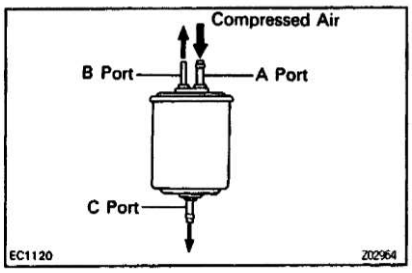
Check if the cap and /or gasket are deformed or damaged.

If necessary, repair or replace the cap.



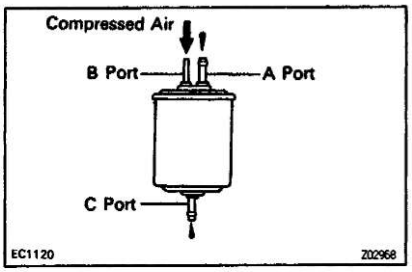
CHARCOAL CANISTER INSPECTION

1. REMOVE CHARCOAL CANISTER
2. REMOVE CAP FROM CHARCOAL CANISTER
3. VISUALLY INSPECT CHARCOAL CANISTER
   Lock for cranks or damage.

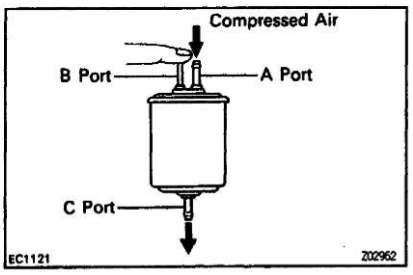


4. CHECK FOR CLOGGED FILTER AND STUCK CHECK VALVE

(a) Using low pressure compressed air, blow into port A and check that air flows without resistance from the other ports.



(b) Blow into port Band check that air does not flow from the other ports.
If operation is not as specified, replace the charcoal canister.



5. CLEAN FILTER IN CANISTER
   Clean the filter by blowing 294 kPa (3 kgf/cm2, 43 psi) of compressed air into port A while holding port B closed.
   NOTICE:
   - **Do not attempt to wash the canister.**
   - **No activated carbon should come out.**

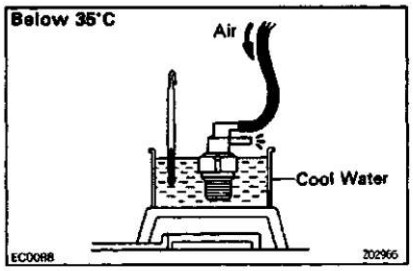
6. REINSTALL CAP TO CHARCOAL CANISTER
7. REINSTALL CHARCOAL CANISTER

EG4XO–04

TVS INSPECTION

1. DRAIN ENGINE COOLANT

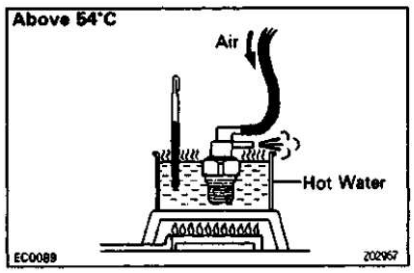
2. REMOVE TVS FROM WATER OUTLET



3. INSPECT TVS OPERATION

(a) Cool the TVS to below 35° C (95° F) with cool water.

(b) Check that air does not flow from the upper port to lower port.



(c) Heat the TVS to above 54°C (129°F) with hot water.

(d) Check that air flows from the upper port to lower port.

If operation is not as specified, replace the TVS.

4. REINSTALL TVS

Apply adhesive to two or three threads of the TVS, and install it.

Adhesive:

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

Torque: 29 N–m (300 kgf–cm, 22 ft–lbf)

5. REFILL WITH ENGINE COOLANT

EG087–02

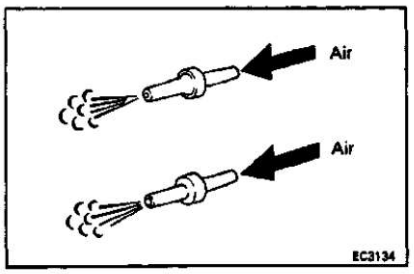
JET INSPECTION

1. REMOVE JET

2. INSPECT JET

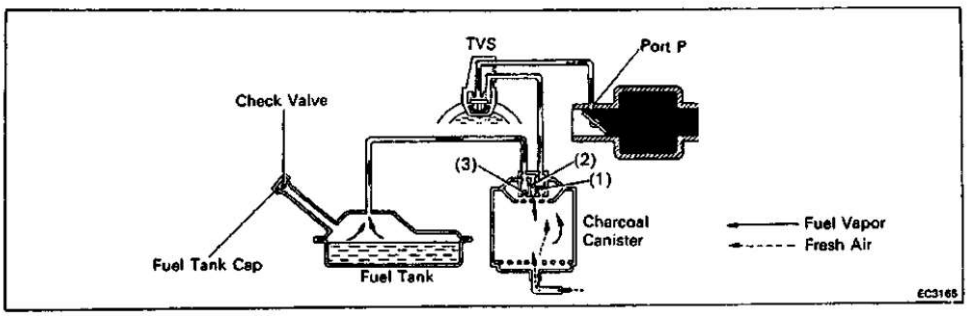
Blow air from each side of the jet, and check for stoppage.

If operation is not as specified, replace the jet.



3. REINSTALL JET

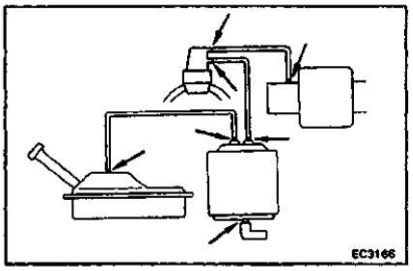
FUEL EVAPORATIVE SYSTEM (EVAP)



To reduce HC emission, evaporated fuel from the fuel tank is routed through the charcoal canister to the intake manifold for combustion in the cylinders.

Coolant Temp.	TVS	Throttle Valve Opening	Canister Check Valve (1)	Canister Check Valve (2)	Canister Check Valve (3)	Check Valve in Cap	Evaporated Fuel (HC)
Below 35°C (95°F)	CLOSED	–	–	–	–	–	HC from tank is absorbed into the canister.
Above 54°C (129°F)	OPEN	Positioned below port P	CLOSED	–	–	–	
		Positioned above port P	OPEN	–	–	–	HC from canister is led into air intake manifold.
High pressure in tank	–	–	–	OPEN	CLOSED	CLOSED	HC from tank is absorbed into the canister.
High vacuum in tank	–	–	–	CLOSED	OPEN	OPEN	Air is led into the fuel tank.

V01044



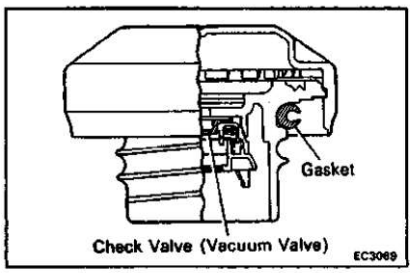
FUEL VAPOR LINES, FUEL TANK AND TANK CAP INSPECTION

1. VISUALLY INSPECT LINES AND CONNECTIONS

Look for loosen connections, sharp bends or damage.

2. VISUALLY INSPECT FUEL TANK

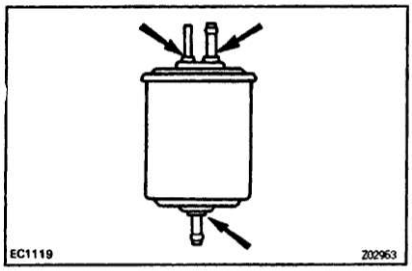
Look for deformation, cracks or fuel leakage.



3. VISUALLY INSPECT FUEL TANK CAP

Check if the cap and/or gasket are deformed or damaged.

If necessary, repair or replace the cap.



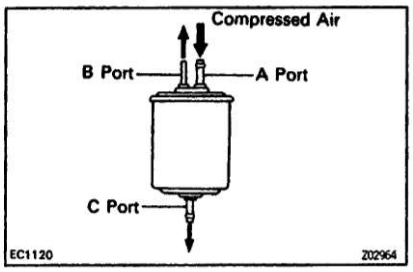
CHARCOAL CANISTER INSPECTION

1. REMOVE CHARCOAL CANISTER

2. REMOVE CAP FROM CHARCOAL CANISTER

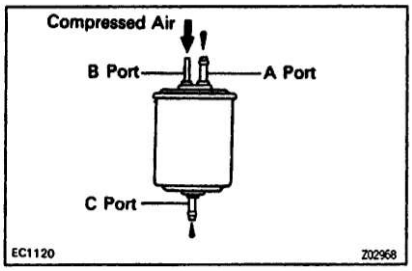
3. VISUALLY INSPECT CHARCOAL CANISTER

Lock for cranks or damage.

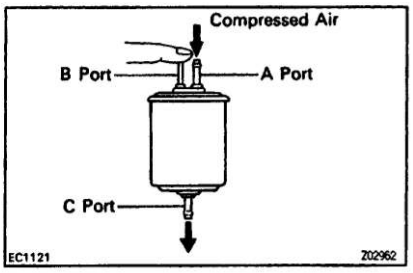


4. INSPECT FOR CLOGGED FILTER AND STUCK CHECK VALVE

(a) Using low pressure compressed air, blow into port A and check that air flows without resistance from the other ports.



(b) Blow into port Band check that air does not flow from the other ports.
If operation is not as specified, replace the charcoal canister.



5. CLEAN FILTER IN CANISTER

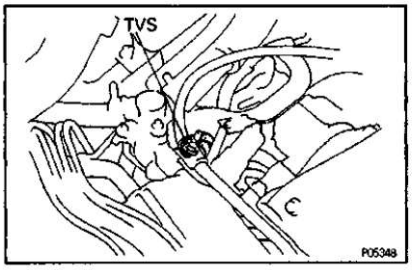
Clean the filter by blowing 294 kPa (3 kgf/cm2, 43 psi) of compressed air into port A while holding port B closed.

NOTICE:

- **Do not attempt to wash the canister.**
- **No activated carbon should some out.**

6. REINSTALL CAP TO CHARCOAL CANISTER

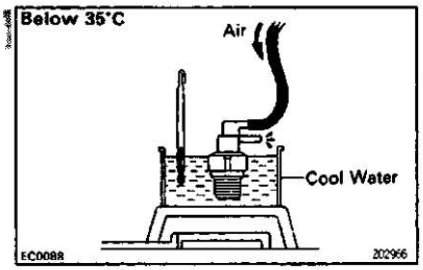
7. REINSTALL CHARCOAL CANISTER



TVS INSPECTION

1. DRAIN ENGINE COOLANT

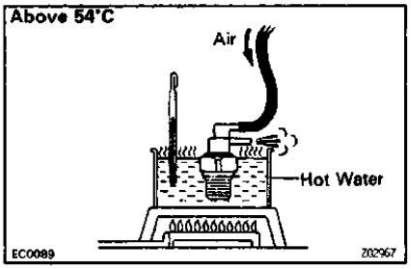
2. REMOVE TVS FROM WATER OUTLET



3. INSPECT TVS OPERATION

(a) Cool the TVS to below 35°C (95°F) with cool water.

(b) Check that air does not flow from the upper port to lower port.



(c) Heat the TVS to above 54°C (129°F) with hot water.

(d) Check that air flows from the upper port to lower port.

If operation is not as specified, replace the TVS.

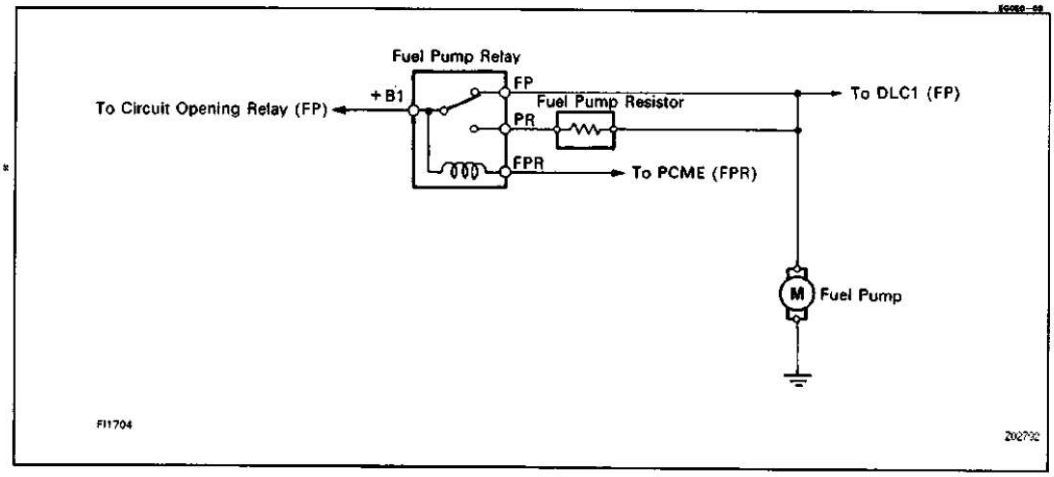
4. REINSTALL TVS

Apply adhesive to two or three threads of the TVS, and install it.

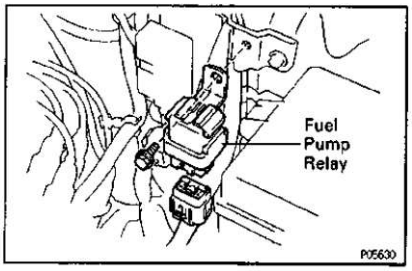
Adhesive:
Part No. 08833–00070, THREE BOND 1324 or equivalent
Torque: 29 N–m (300 kgf–cm, 22 ft–lbf)

5. REFILL WITH ENGINE COOLANT

FUEL PUMP RELAY AND RESISTOR

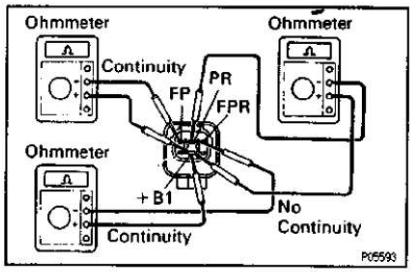


FUEL PUMP RELAY INSPECTION



1. REMOVE FUEL PUMP RELAY

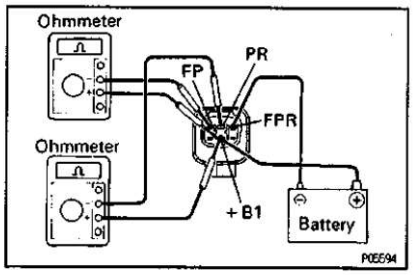
(a) Disconnect the fuel pump relay connector.
(b) Remove the bolt and fuel pump relay.



2. INSPECT FUEL PUMP RELAY

A. Inspect relay continuity

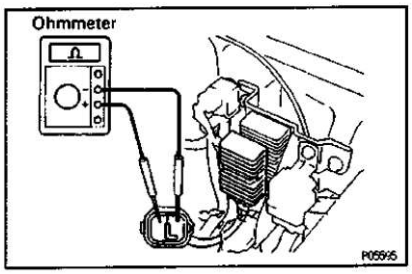
(a) Using an ohmmeter, check that there is continuity between terminals +1311 and FPR.
(b) Check that there is continuity between terminals +B1 and FP.
(c) Check that there is no continuity between terminals + 131 and PR.
(f continuity is not as specified, replace the relay.



B. Inspect relay operation

(a) Apply battery voltage across terminals +B1 and FPR.
(b) Using an ohmmeter, check that there is no continuity between the +131 and FP.
(c) Check that there is continuity between terminals +B1 and PR.
If operation is not as specified, replace the relay.

3. REINSTALL FUEL PUMP RELAY



FUEL PUMP RESISTOR INSPECTION

B00VX–01

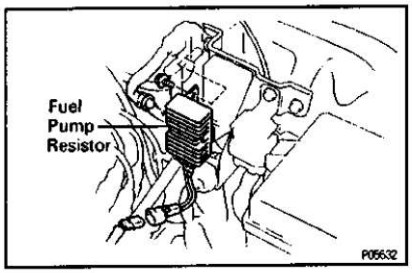
1. DISCONNECT FUEL PUMP RESISTOR CONNECTOR

2. INSPECT FUEL PUMP RESISTOR

Using an ohmmeter, measure the resistance between the terminal.

Resistance (Cold):

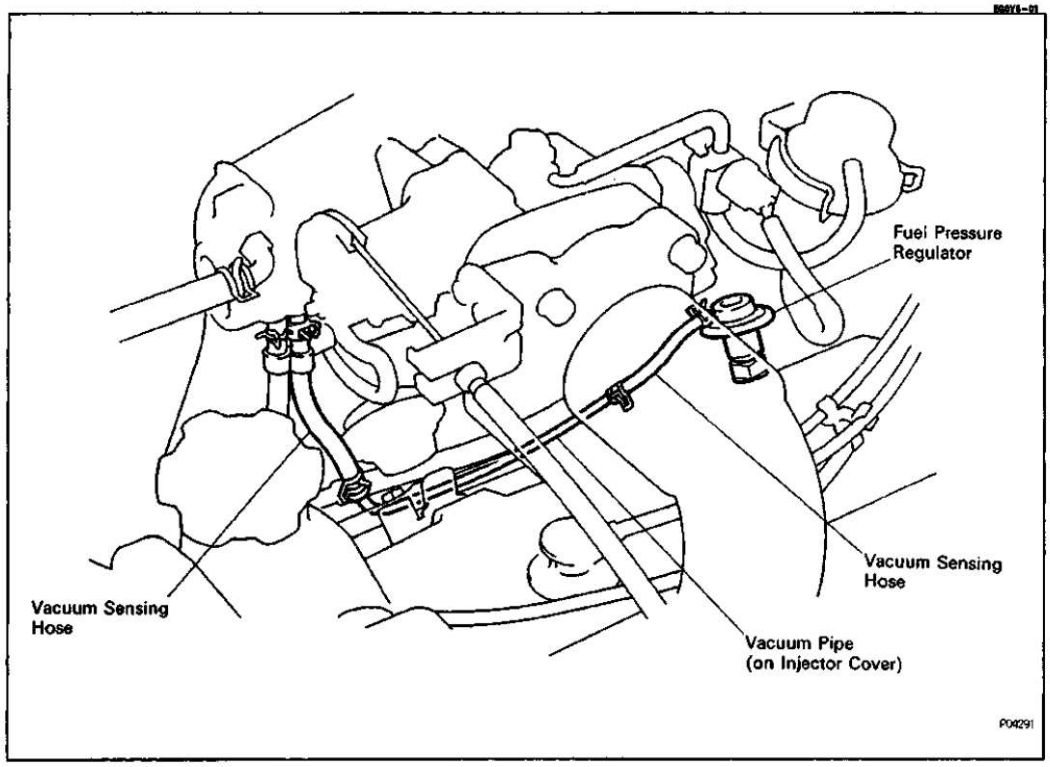
Approx. 0.73 0



If the resistance is not as specified, replace the re–sistor.

3. RECONNECT FUEL PUMP RESISTOR CONNECTOR

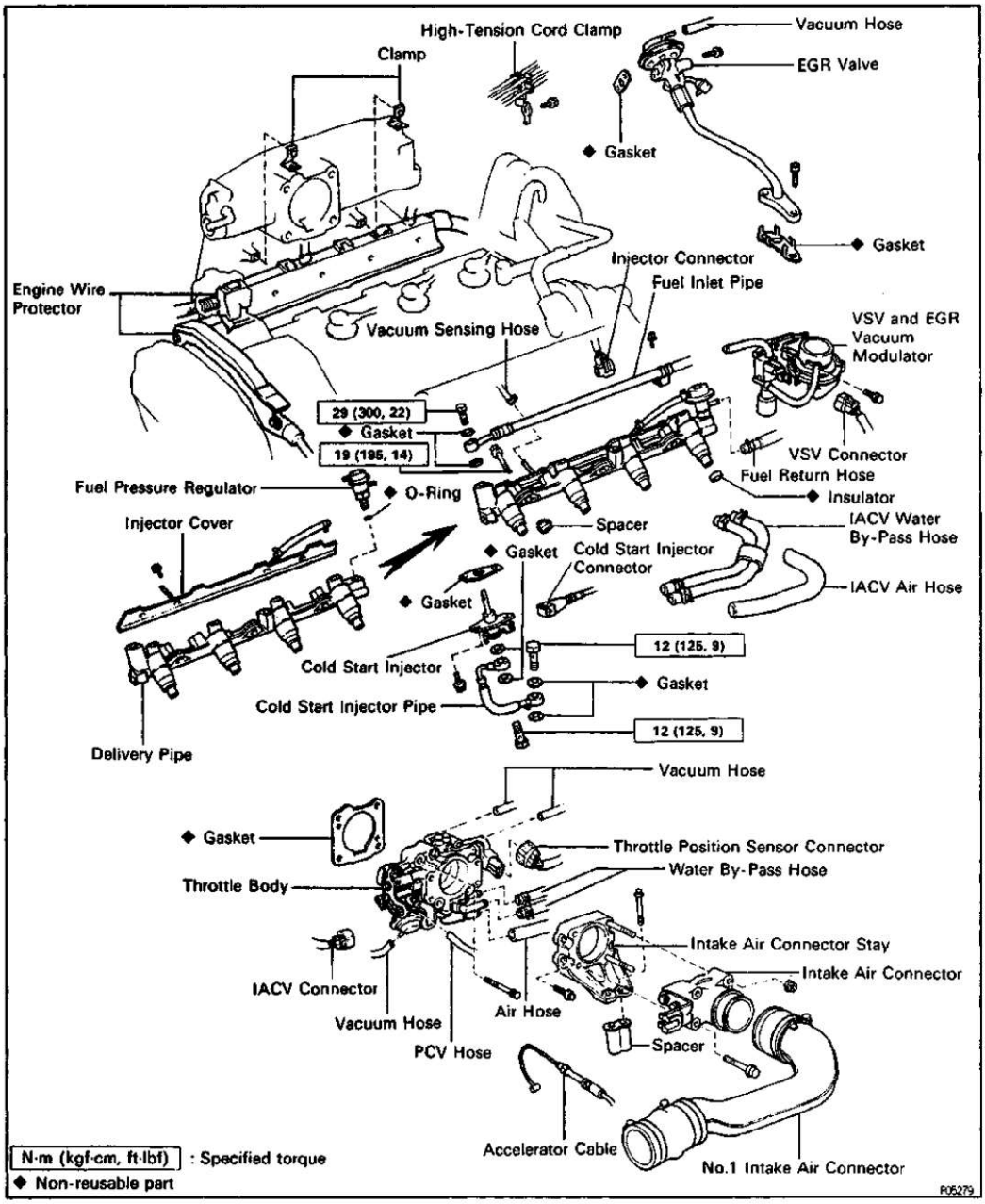
FUEL PRESSURE REGULATOR



ON–VEHICLE INSPECTION

INSPECT FUEL PRESSURE
(See On–Vehicle Inspection in Fuel Pump)

COMPONENTS FOR REMOVAL AND INSTALLATION

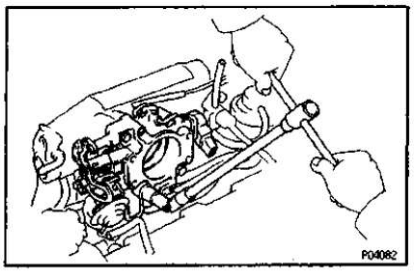


FUEL PRESSURE REGULATOR REMOVAL

(See Components for Removal and Installation)

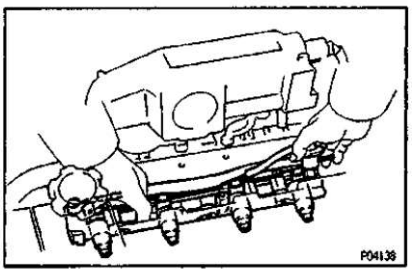
1. REMOVE THROTTLE BODY

(See Throttle Body Removal)



2. REMOVE DELIVERY PIPE ASSEMBLY

(See step 2 to 9 in Injectors Removal)

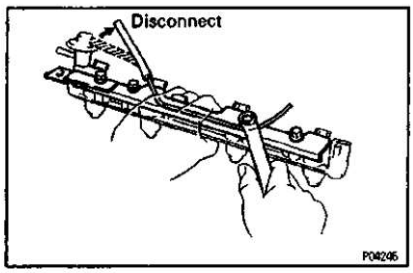


3. REMOVE INJECTOR COVER FROM DELIVERY PIPE

(a) Disconnect the vacuum sensing hose from the fuel pressure regulator.

(b) Remove the four bolts and injector cover.

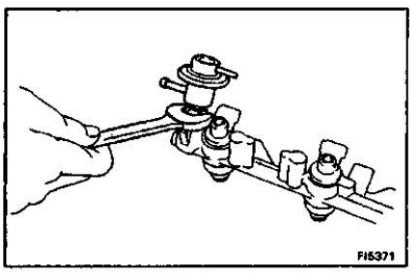
(c) Remove the four insulators from the injectors.

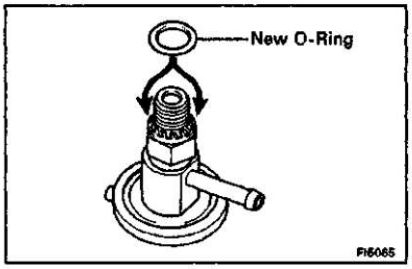


4. REMOVE FUEL PRESSURE REGULATOR

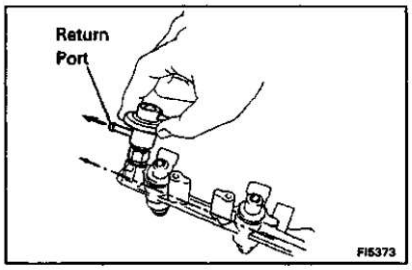
(a) Loosen the the lock nut, and remove the pressure regulator.

(b) Remove the O–ring from the pressure regulator.

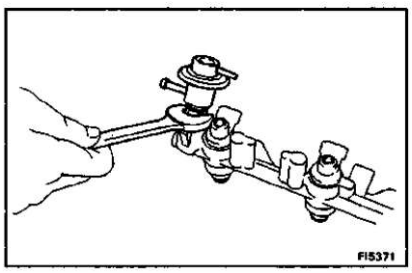




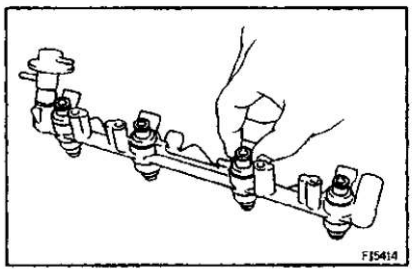
FUEL PRESSURE REGULATOR
INSTALLATION
(See Components for Removal and Installation)
1. INSTALL FUEL PRESSURE REGULATOR
(a) Fully loosen the lock nut on the pressure regulator.
(b) Apply a light coat of gasoline to a new O–ring, and install it to the pressure regulator.



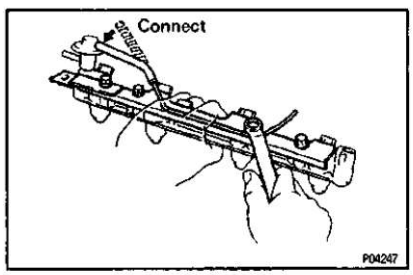
(c) Completely thrust the pressure regulator into the delivery pipe by hand.
(d) Turn the pressure regulator counterclockwise until the fuel return port faces in the direction indicated in the illustration.



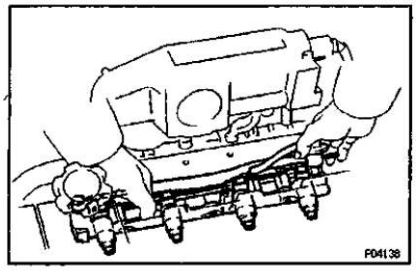
(e) Tighten the lock nut.
Torque: 29 N–m (300 kgf–cm, 22 ft–lbf)



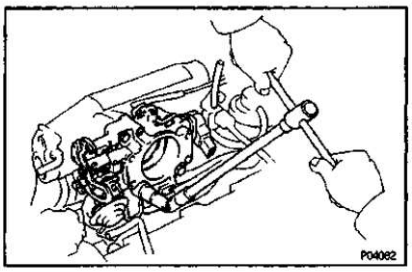
2. INSTALL INJECTOR COVER TO DELIVERY PIPE
(a) Install a new insulator to each injector.



(b) Install the injector cover with the four bolts.
Torque: 7.8 N–m (80 kgf–cm, 69 in.–lbf)
(c) Connect the vacuum sensing hose to the fuel pressure regulator.



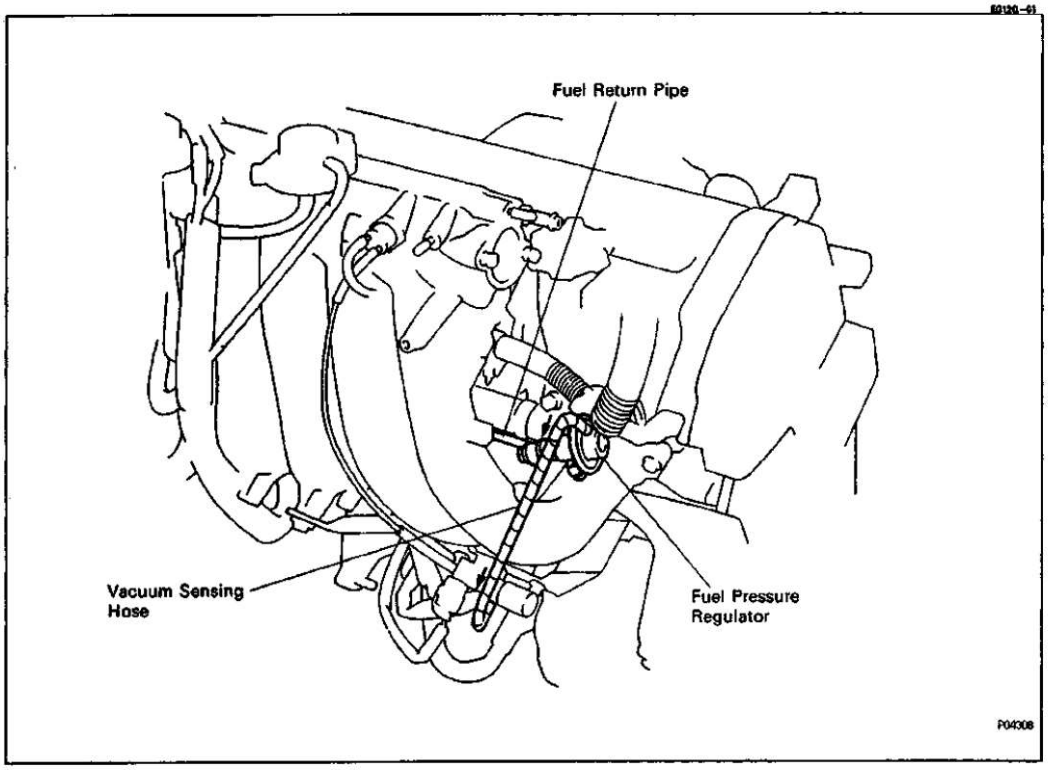
3. INSTALL DELIVERY PIPE ASSEMBLY
(See steps 1 to 8 in Injector Installation)



4. INSTALL THROTTLE BODY
(See Throttle Body Installation)

5. START ENGINE AND CHECK FOR FUEL LEAKS

FUEL PRESSURE REGULATOR

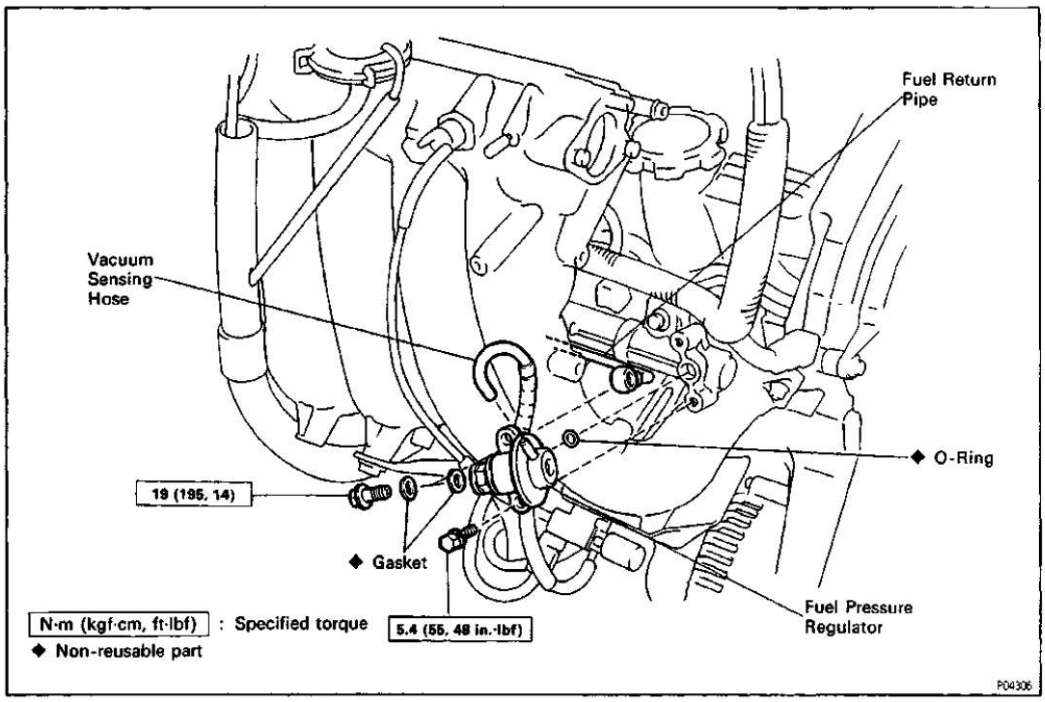


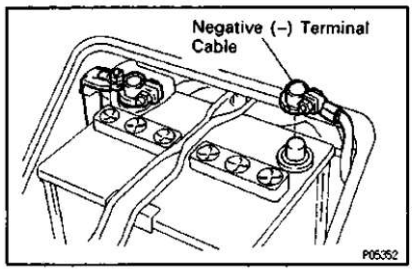
ON–VEHICLE INSPECTION

INSPECT FUEL PRESSURE

(See On–Vehicle Inspection in Fuel Pump)

COMPONENTS FOR REMOVAL AND INSTALLATION



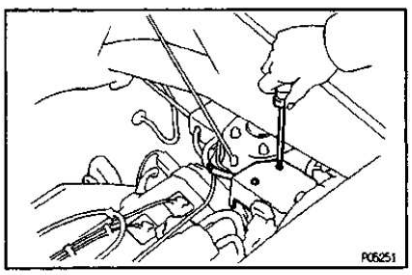


FUEL PRESSURE REGULATOR REMOVAL

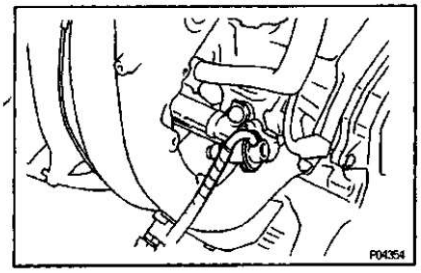
(See Components for Removal and Installation)

1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY

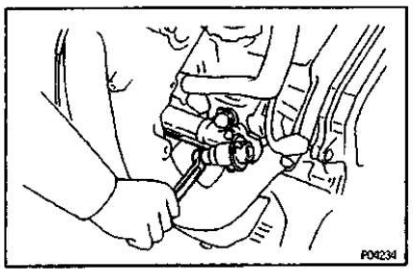
CAUTION: Turn the ignition switch to 'LOCK'. Disconnect the cable from the negative terminal of the battery. Wait at least 20 seconds before proceeding with work.



2. (w/ CRUISE CONTROL SYSTEM) REMOVE CRUISE CONTROL ACTUATOR



3. DISCONNECT VACUUM SENSING HOSE FROM FUEL PRESSURE REGULATOR

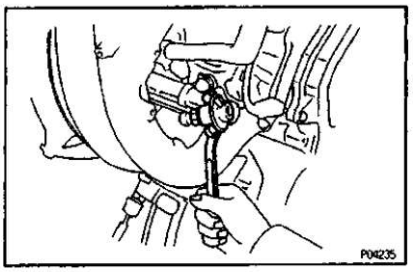


4. DISCONNECT FUEL RETURN PIPE FROM FUEL PRESSURE REGULATOR

Remove the union bolt and two gaskets, and disconnect the return pipe from the pressure regulator.

HINT:

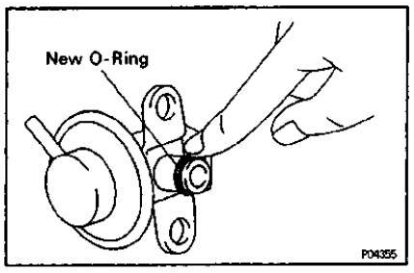
- Put a suitable container or shop towel under the pressure regulator.
- Slowly loosen the union bolt.



5. REMOVE FUEL PRESSURE REGULATOR

(a) Remove the two bolts, and pull out the pressure regulator.

(b) Remove the O–ring from the pressure regulator.

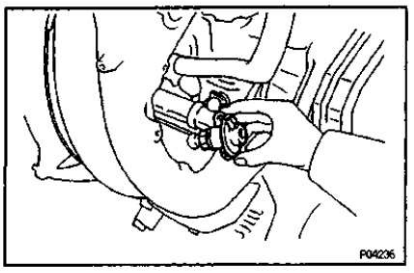


FUEL PRESSURE REGULATOR INSTALLATION

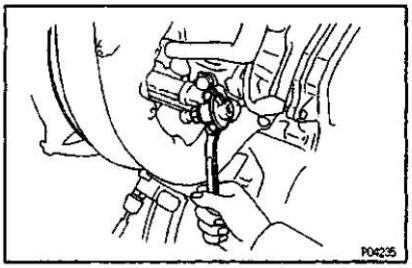
(See Components for Removal and Installation)

1. INSTALL FUEL PRESSURE REGULATOR

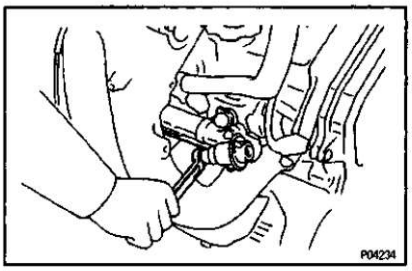
(a) Apply a light coat of gasoline to a new O–ring, and install it to the pressure regulator.



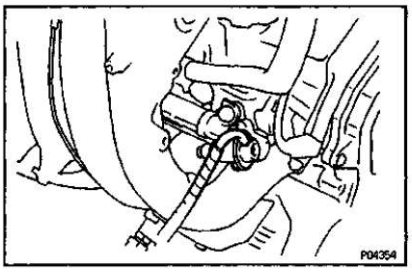
(b) Attach the pressure regulator to the delivery pipe.



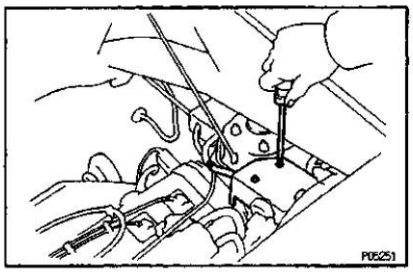
(c) Install the pressure regulator with the two bolts.
Torque: 5.4 N–m (55 kgf–cm, 48 in–lbf)



2. CONNECT FUEL RETURN PIPE TO FUEL PRESSURE REGULATOR
Install the return pipe with new two gaskets and the union bolt.
Torque: 19 N–m (195 kgf–cm, 14 ft–lbf)



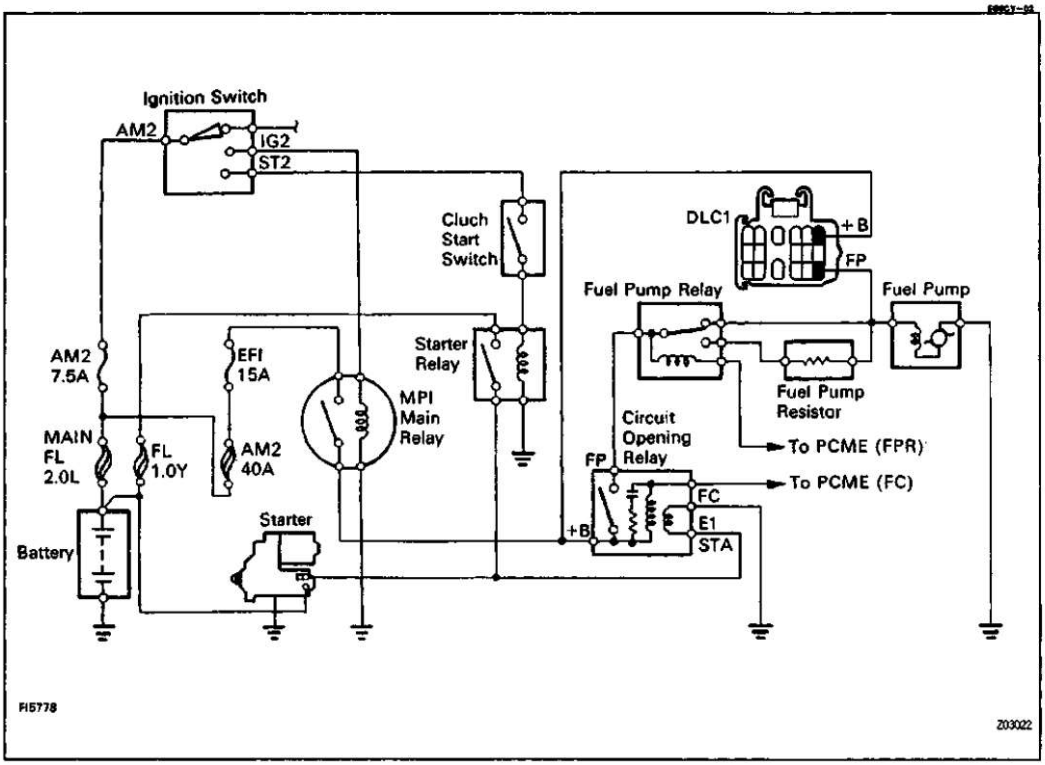
3. CONNECT VACUUM SENSING HOSE TO FUEL PRESSURE REGULATOR

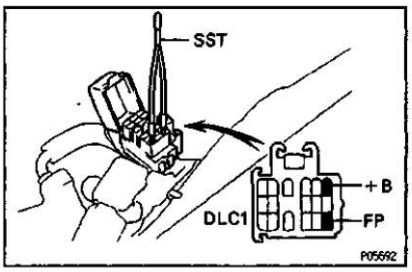


4. (w/ CRUISE CONTROL SYSTEM) INSTALL CRUISE CONTROL ACTUATOR

5. CONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY
6. START ENGINE AND CHECK FOR FUEL LEAKS

FUEL PUMP

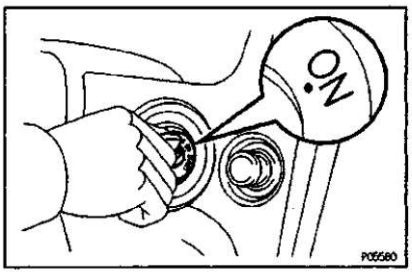




ON–VEHICLE INSPECTION

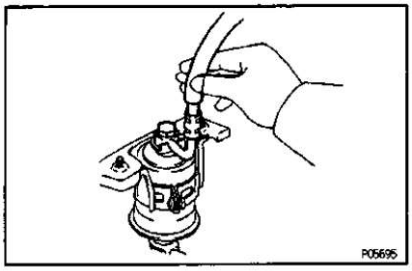
1. CHECK FUEL PUMP OPERATION

(a) Using SST, connect terminals +B and FP of the data link connector 1.
SST 09843–18020



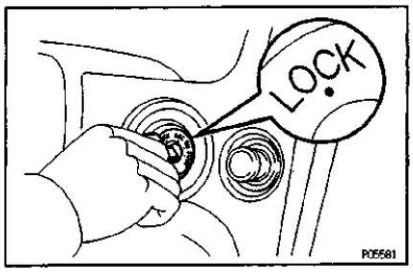
(b) Turn the ignition switch ON.

NOTICE: Do not start the engine.

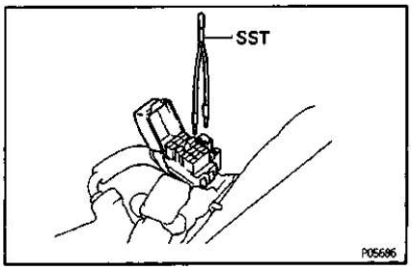


(c) Check that there is pressure in the hose from the fuel filter.

HINT: At this time, you will hear fuel return noise.

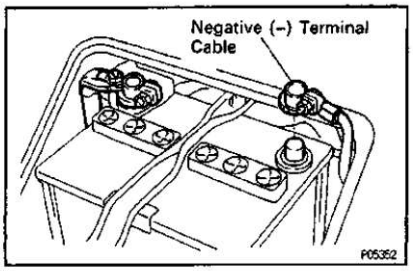


(d) Turn the ignition switch OFF.



(e) Remove the SST from the data link connector 1.
SST 09843–18020

If there is no pressure, check the following parts:
- Fusible links (2.OL, 1.OY)
- H –fuse (AM2 40A)
- Fuses (EFI 15A, AM2 7.5A)
- MPI main relay
- Fuel pump
- Fuel pump relay
- Fuel pump resistor
- Wiring connections

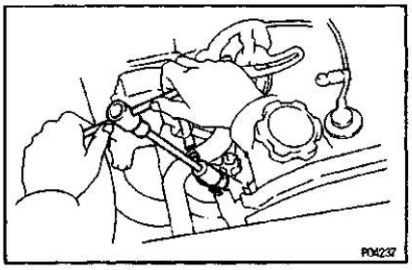


2. CHECK FUEL PRESSURE

(a) Check that the battery voltages is above 12 volts.

(b) Disconnect the cable from the negative (–) terminal of the battery.

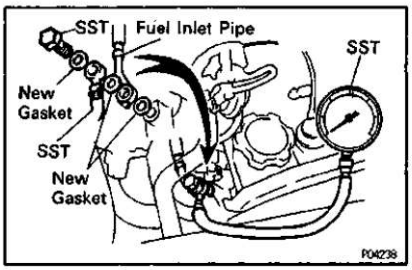
CAUTION: Turn the ignition switch to "LOCK". Disconnect the negative terminal from the battery. Wait at least 20 seconds before proceeding with work.



(c) Remove the union bolt and two gaskets, and disconnect the fuel inlet hose from the delivery pipe.

HINT:
Put a suitable container or shop towel under the delivery pipe.

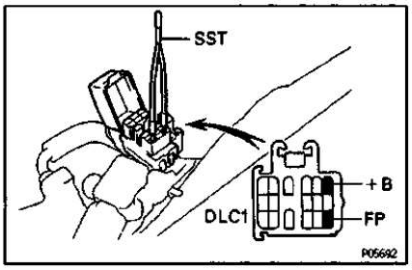
- Slowly loosen the union bolt.



(d) Install the fuel inlet hose and SST (pressure gauge) to the delivery pipe with three new gaskets and SST (union bolt).
SST 09268–45012

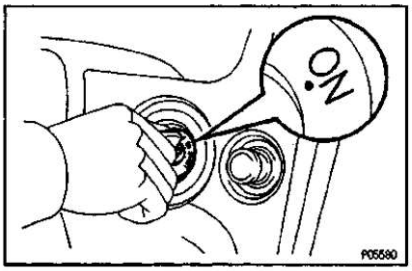
Torque: 29 N–m (300 kgf–cm, 22 ft–lbf)

(e) Wipe off any splattered gasoline.

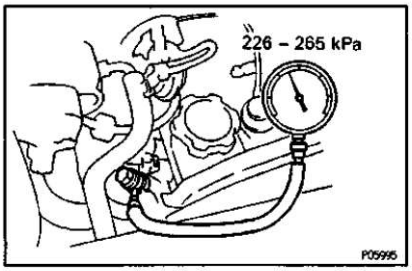


(f) Using SST, connect terminals +B and FP of the data link connector 1.
SST 09843–18020

(g) Reconnect the battery negative (–) cable.



(h) Turn the ignition switch ON.



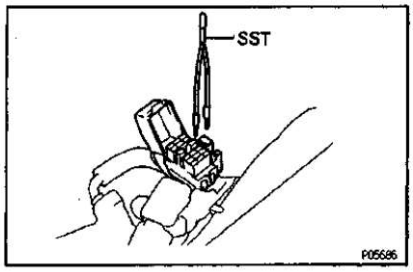
(i) Measure the fuel pressure.

Fuel pressure:

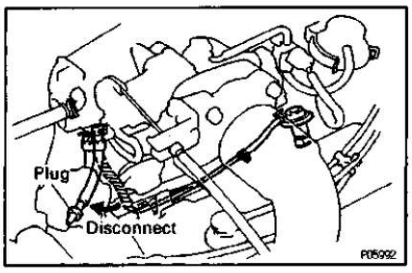
226 – 265 kPa (2.3 – 2.7 kgf/cm^2, 33 – 38 psi)

If pressure is high, replace the fuel pressure regulator.
If pressure is low, check the following parts:

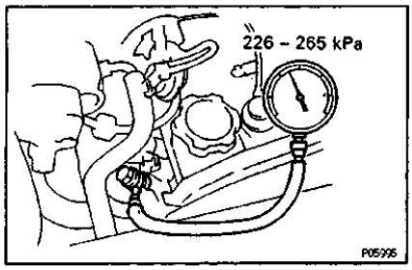
- Fuel hoses and connections
- Fuel pump
- Fuel filter
- Fuel pressure regulator



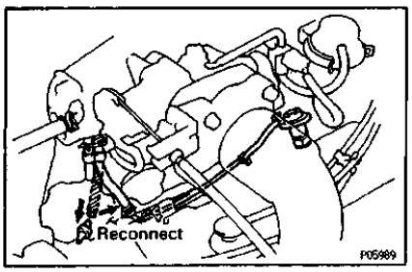
(j) Remove the SST from the data link connector 1.
SST 09483–18020



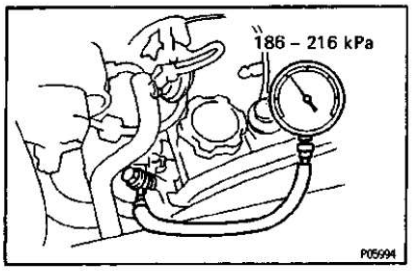
(k) Start the engine.
(1) Disconnect the vacuum sensing hose from the air intake chamber and plug the air intake chamber outlet.



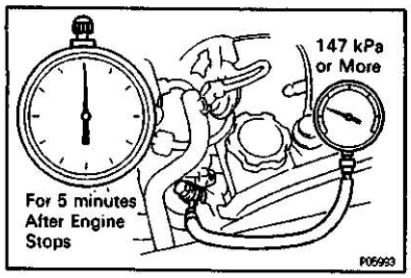
(m) Measure the fuel pressure at idle.
Fuel pressure:
226 – 265 kPa (2.3 – 2.7 kgf/cm^2, 33 – 38 psi)



(n) Reconnect the vacuum sensing hose to the air intake chamber.

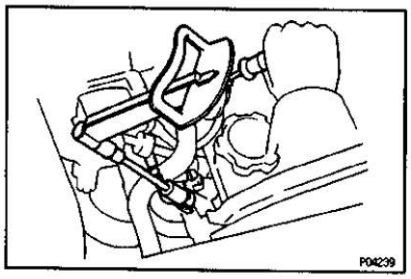


(o) Measure the fuel pressure at idle.
Fuel pressure:
186 – 216 kPa (1.9 – 2.2 kgf/cm^2, 27 – 31 psi)
If pressure is not as specified, check the vacuum sensing hose and fuel pressure regulator.



(P) Stop the engine.
(q) Check that the fuel pressure remains as specified for 5 minutes after the engine stops.
Fuel pressure:
147 kPa (1.5 kgf/cm^2, 21 psi) or more
If pressure is not as specified, check the fuel pump, pressure regulator and/or injector.

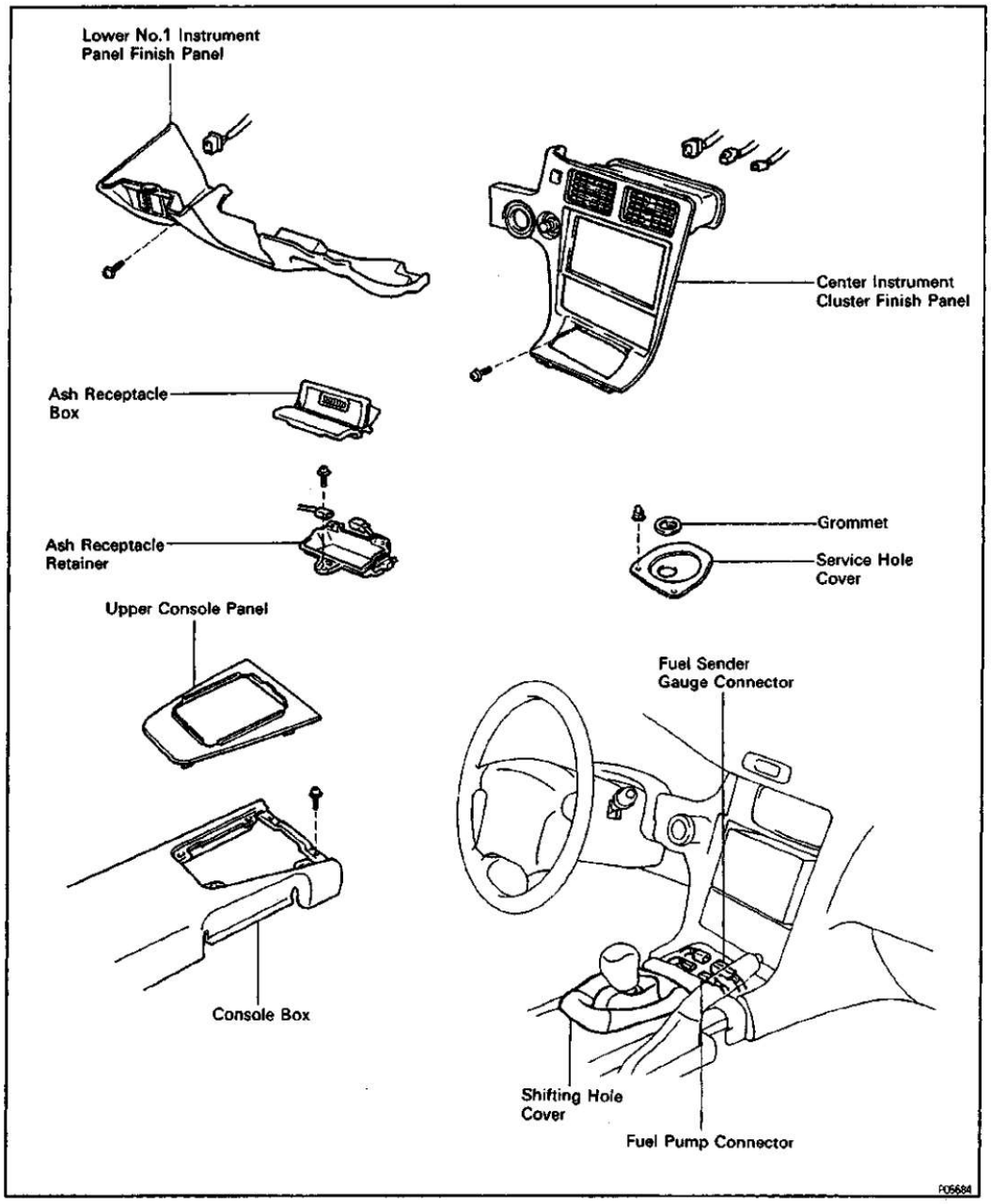
(r) After checking fuel pressure, disconnect the battery negative (–) cable and carefully remove the SST to prevent gasoline from splashing.
SST 09268–45012

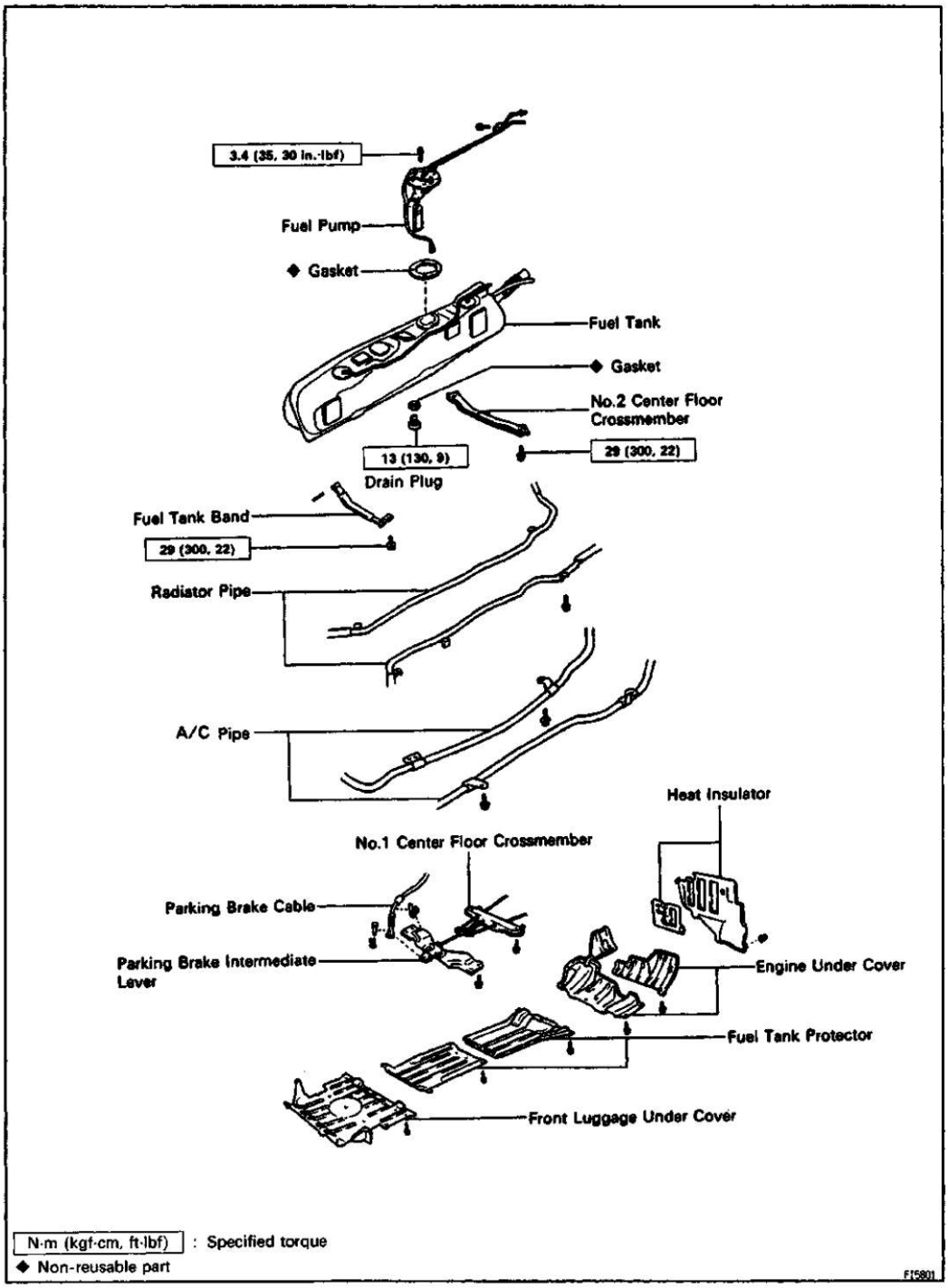


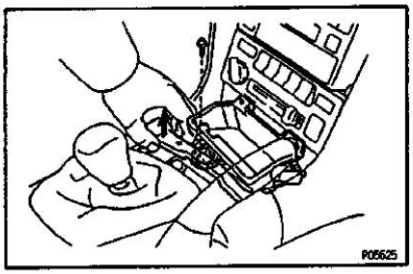
(s) Connect the fuel inlet hose to the delivery pipe with two new gaskets and the union bolt.
Torque: 29 N–m (300 kgf–cm, 22 ft–lbf)

(t) Reconnect the cable to the negative (–) terminal of the battery.
(u) Check for fuel leaks.

COMPONENTS FOR REMOVAL AND INSTALLATION



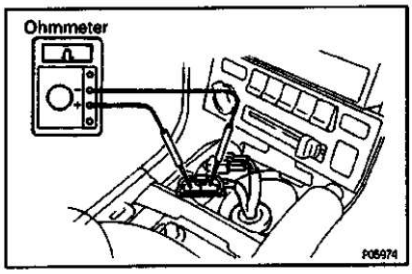

3.4 (35, 30 in.-lbf)
Fuel Pump
◆ Gasket
Fuel Tank
◆ Gasket
No.2 Center Floor Crossmember
13 (130, 9)
Drain Plug
29 (300, 22)
Fuel Tank Band
29 (300, 22)
Radiator Pipe
A/C Pipe
Heat Insulator
No.1 Center Floor Crossmember
Parking Brake Cable
Parking Brake Intermediate Lever
Engine Under Cover
Fuel Tank Protector
Front Luggage Under Cover
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part
F15801



FUEL PUMP INSPECTION

(See Components for Removal and Installation)

1. REMOVE ASH RECEPTACLE RETAINER
   (See steps 1 and 2 in Fuel Pump Removal)
2. DISCONNECT FUEL PUMP CONNECTOR



3. INSPECT FUEL PUMP

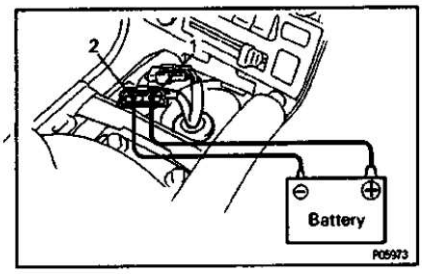
A. Inspect fuel pump resistance

Using an ohmmeter, measure the resistance between the terminals.

Resistance (Cold):

0.2–3.00

If the resistance is not as specified, replace the fuel pump.



B. Inspect fuel pump operation

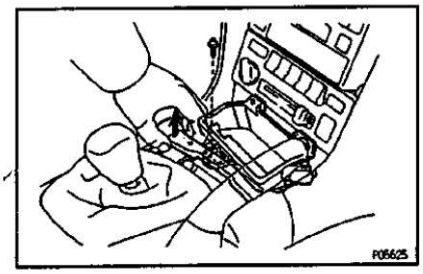
Connect the positive (+) lead from the battery to terminal 1 of the connector, and the negative (–) lead to terminal

2. Check that the fuel pump operates.
   If operation is not as specified, replace the fuel pump.

NOTICE:

- **These tests must be performed quickly (within 10 seconds) to prevent the coil from burning out.**
- **Keep the fuel pump as far away from the battery as possible. .**
- **Always perform switching at the battery side.**

4. RECONNECT FUEL PUMP CONNECTOR

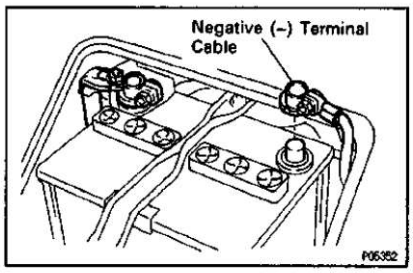


6. REINSTALL ASH RECEPTACLE RETAINER
   (See steps 7 and 9 in Fuel Pump Installation)

FUEL PUMP REMOVAL

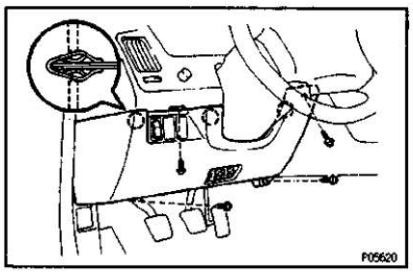
(See Components for Removal and Installation)

CAUTION: Do not smoke or work near an open flame when working on the fuel pump.



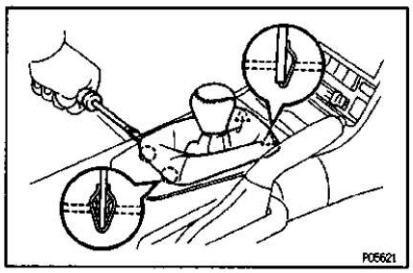
1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY

CAUTION: Turn the ignition switch to 'LOCK'. Disconnect the negative terminal from the battery. Wait at least 20 seconds before proceeding with work.

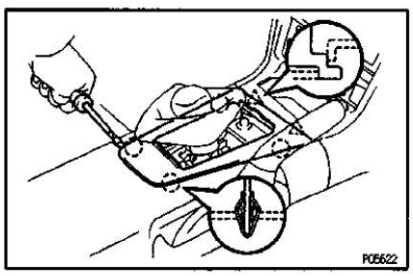


2. DISCONNECT FUEL PUMP CONNECTOR AND FUEL SENDER GAUGE CONNECTOR

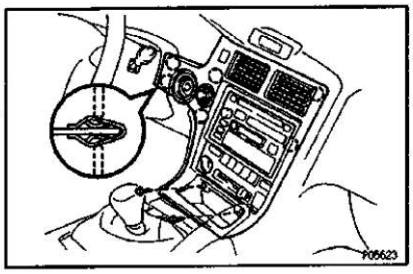
(a) Remove the four screws, and disconnect the lower No.1 instrument panel finish panel by pulling it.
(b) Disconnect the connector, and remove the lower No. 1 instrument panel finish panel.
(c) Remove the ash receptacle box.



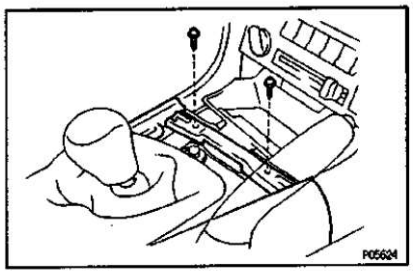
(d) Using a screwdriver, pry out the shifting hole cover.



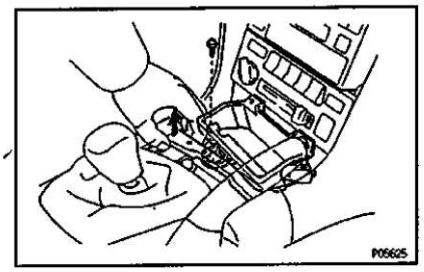
(e) Using a screwdriver, pry out the upper console panel.



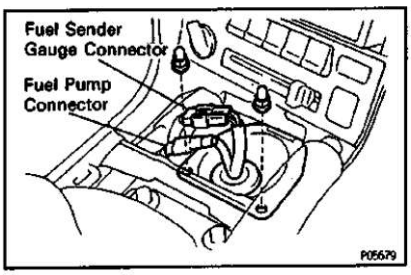
(f) Remove the two screws, and disconnect the center instrument cluster finish panel by pulling it.
(g) Disconnect the connectors, and remove the center instrument cluster finish panel.



(h) Remove the two screws holding the console box to the instrument panel safety pad.

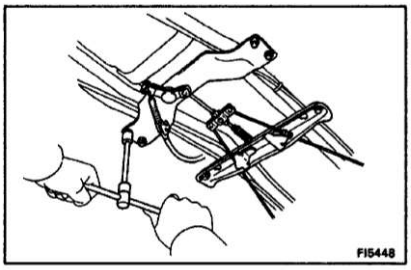


(i) Remove the ash receptacle retainer mounting screw by lifting the front side of the console box.
(j) Disconnect the connector, and remove the ash re–ceptacle retainer.



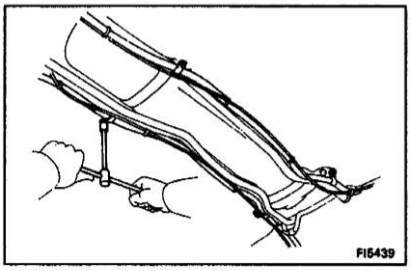
(k) Disconnect the fuel pump connector and fuel sender gauge connector.
(1) Remove the grommet from the service hole cover.
(m) Remove the two nuts and service hole cover.

3. REMOVE ENGINE UNDER COVERS
4. REMOVE FRONT LUGGAGE UNDER COVER
5. REMOVE FUEL TANK PROTECTORS
6. DRAIN FUEL



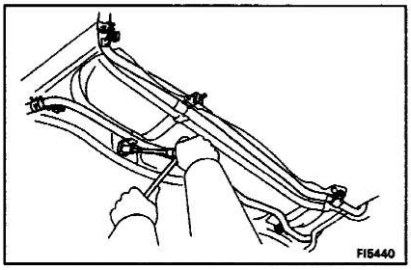
7. REMOVE PARKING BRAKE INTERMEDIATE LEVER AND NO.1 CENTER FLOOR CROSSMEMBER

(a) Remove the four bolts and intermediate lever.
(b) Remove the two bolts and crossmember.
(c) Disconnect the parking brake cable from the intermediate lever.



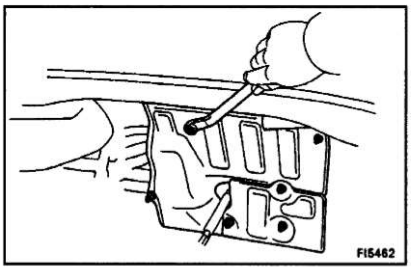
8. REMOVE A/C PIPES FROM BODY

Remove the four bolts, and disconnect the two A/C pipes from the body.



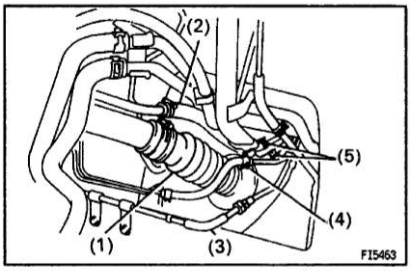
9. DISCONNECT RADIATOR PIPES FROM BODY

Remove the six bolts, and disconnect the two radiator pipes from the body.



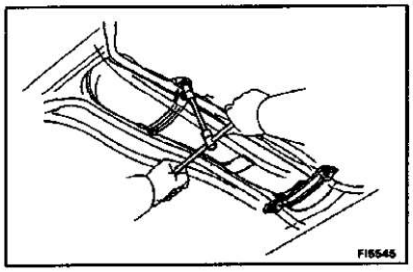
10. REMOVE FUEL TANK HEAT INSULATORS

Remove the six nuts and two heat insulators.



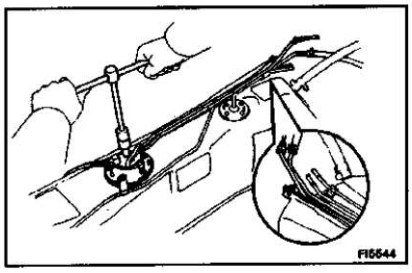
11. DISCONNECT HOSES AND TUBE

CAUTION: Remove the fuel filter cap to prevent the fuel from flowing out.
Disconnect the following hoses and tube:
(1) Fuel inlet hose
(2) Fuel breather hose
(3) Fuel pump hose
(4) Fuel return hose
(5) Two fuel evaporative bent hose



12. REMOVE FUEL TANK

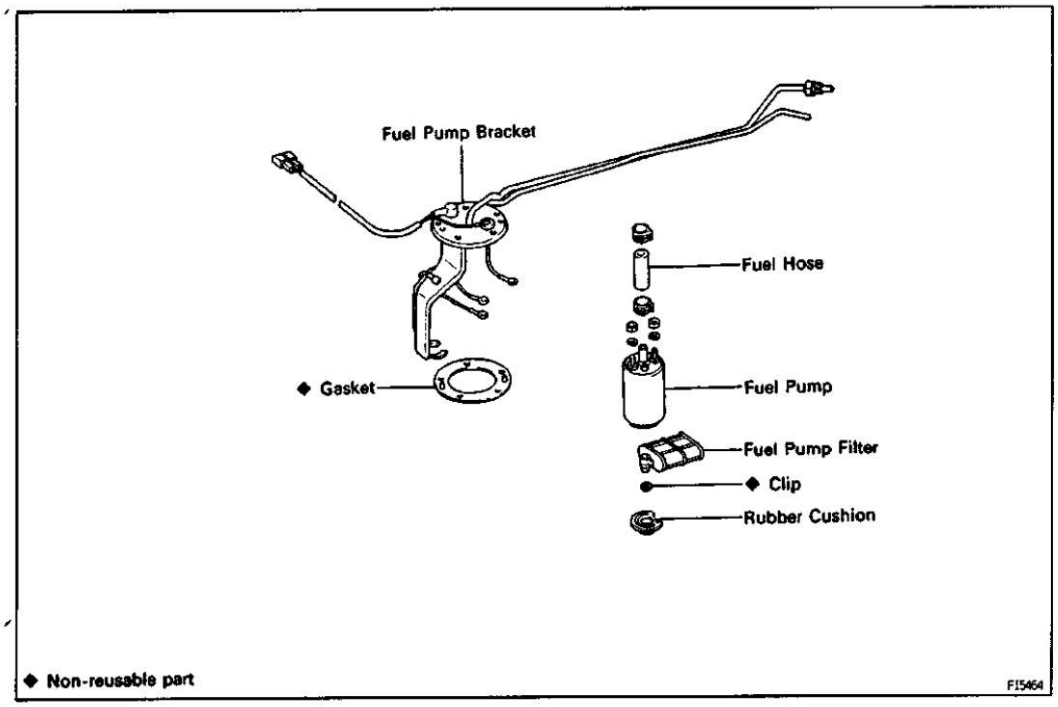
(a) Remove the bolt, pin and tank band.
(b) Remove the two bolts and No.2 center floor cross–member.
(c) Remove the fuel tank.

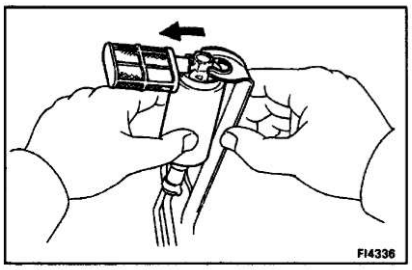


13. REMOVE FUEL PUMP ASSEMBLY FROM FUEL TANK

(a) Remove the bolt holding the fuel pump tube to the fuel tank.
(b) Remove the five bolts, and pull out the fuel pump assembly.
(c) Remove the gasket from the pump bracket.

COMPONENTS FOR DISASSEMBLY AND ASSEMBLY





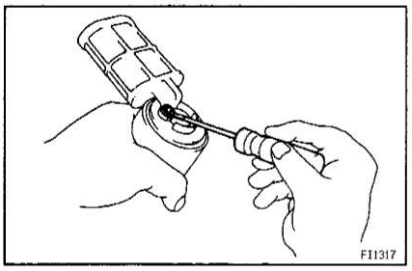
FUEL PUMP DISASSEMBLY

EG0Y0-01

(See Components for Disassembly and Assembly)

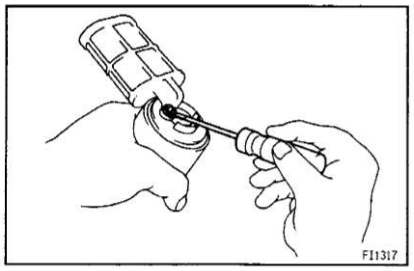
1. REMOVE FUEL PUMP FROM FUEL PUMP BRACKET

(a) Pull out the lower side of the fuel pump from the pump bracket.
(b) Remove the rubber cushion from the fuel pump.
(c) Remove the nut and spring washer, and disconnect the lead wire from the fuel pump. Disconnect the three lead wires.
(d) Disconnect the fuel hose from the fuel pump, and remove the fuel pump.



2. REMOVE FUEL PUMP FILTER FROM FUEL PUMP

(a) Using a small screwdriver, pry out the clip.
(b) Pull out the pump filter.



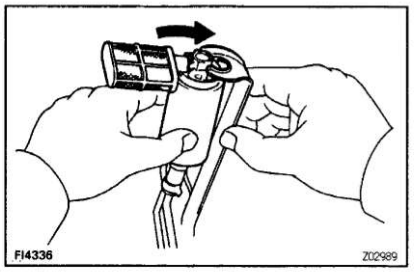
FUEL PUMP ASSEMBLY

EG0Y1-01

(See Components for Disassembly and Assembly)

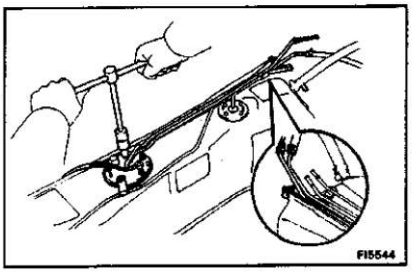
1. INSTALL FUEL PUMP FILTER TO FUEL PUMP

Install the pump filter with a new clip.



2. INSTALL FUEL PUMP TO FUEL PUMP BRACKET

(a) Connect the fuel hose to the outlet port of the fuel pump.
(b) Connect the lead wire to the fuel pump with the spring washer and nut. Connect the three lead wires.
(c) Install the rubber cushion to the fuel pump.
(d) Install the fuel pump by pushing the lower side of the fuel pump.



FUEL PUMP INSTALLATION

(See Components for Removal and Installation)

1. INSTALL FUEL PUMP ASSEMBLY TO FUEL TANK

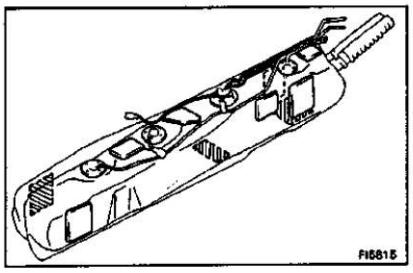
(a) Install a new gasket to the pump bracket.

(b) Insert the fuel pump assembly into the fuel tank.

(c) Install the five bolts holding the fuel pump bracket to the fuel tank.

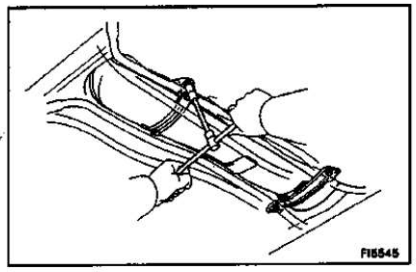
Torque: 3.4 N–m (35 kgf–cm, 30in.–lbf)

(d) Install the five bolts holding the fuel pump tube to the fuel tank.



2. INSTALL FUEL TANK

(a) Apply soapy water to the cushions on the fuel tank.



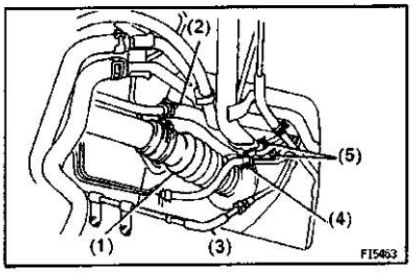
(b) Attach the fuel tank to the body.

(c) Install the fuel tank band with the pin and bolt.

Torque: 29 N–m (300 kgf–cm, 22 ft–lbf)

(d) Install the No.2 center floor crossmember with the two bolts.

Torque: 29 N–m (300 kgf–cm, 22 ft–lbf)



3. CONNECT HOSES AND TUBE

Connect the following hoses and tube:

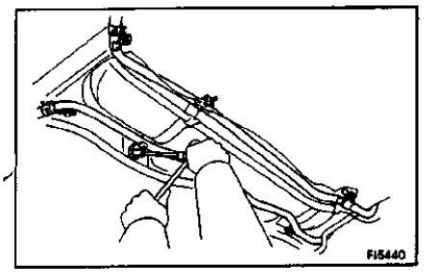
(1) Fuel inlet hose

(2) Fuel breather hose

(3) Fuel pump hose

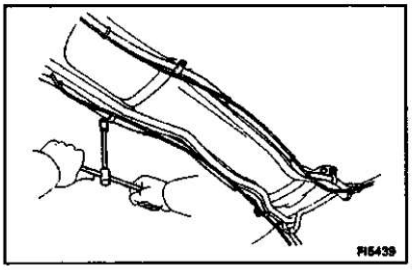
(4) Fuel return hose

(5) Two fuel evaporative bent hose



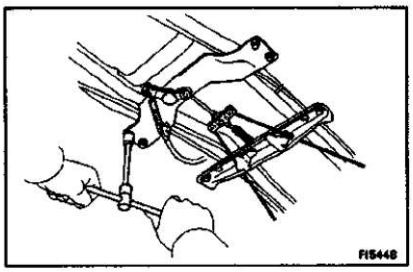
4. INSTALL RADIATOR PIPES TO BODY

Install the two radiator pipes with the six bolts.



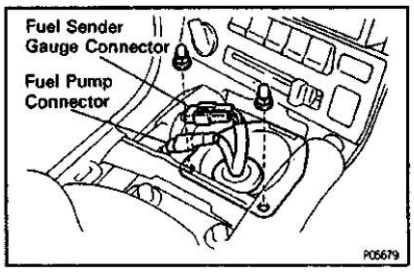
5. INSTALL A/C PIPES TO BODY

Install the two A/C pipes with the four bolts



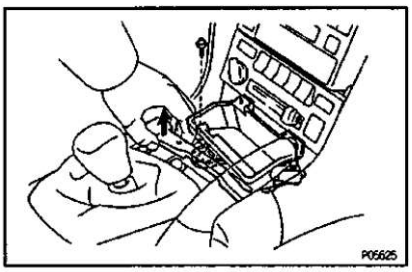
6. INSTALL PARKING BRAKE INTERMEDIATE LEVER AND NO.1 CENTER FLOOR CROSSMEMBER

(a) Connect the parking brake cable to the intermediate lever.
(b) Install the intermediate lever with the four bolts.
(c) Install the crossmember with the two bolts.

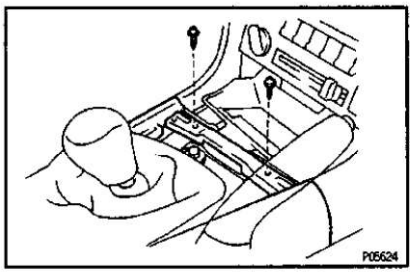


7. CONNECT FUEL PUMP CONNECTOR AND FUEL SENDER GAUGE CONNECTOR

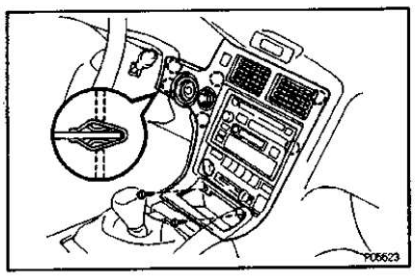
(a) Install the service hole cover with the two nuts.
(b) Connect the fuel pump connector and fuel sender gauge connector.
(c) Install the grommet to the service hole cover.



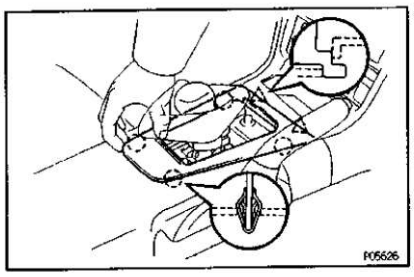
(d) Connect the connector, and install the ash receptacle retainer with the screw by lifting the front side of the console box.



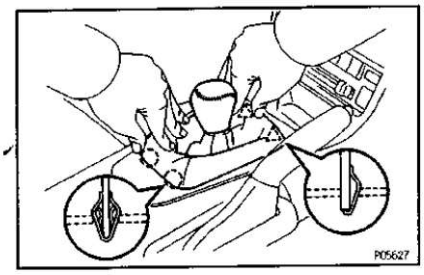
(e) Install the console box to the instrument panel safety pad with the two screws.



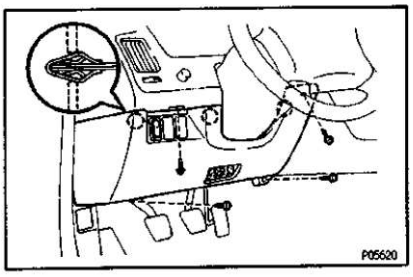
(f) Connect the connectors, and attach the center instrument cluster finish panel to the instrument panel safety pad with the clips.
(g) Install the two screws.



(h) Connect the connector, and attach the upper console panel to the console panel with the two claws and two clips.

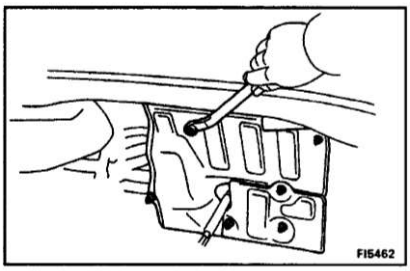


(i) Attach the shifting hole cover with the four clips.
(j) Install the ash receptacle box.



(k) Connect the connector, and attach the lower No.1 instrument panel finish panel with the three clips.
(l) Install the four screws.

8. FILL WITH FUEL
9. CONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY
10. CHECK FOR FUEL LEAKS



11. INSTALL FUEL TANK HEAT INSULATORS

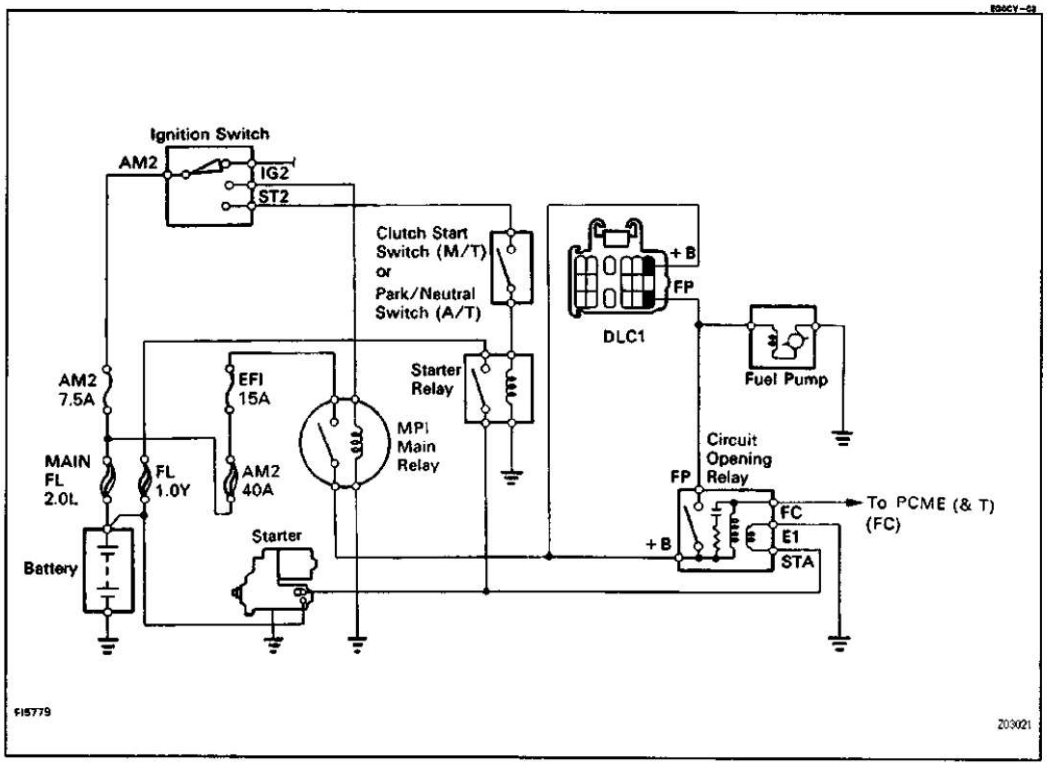
Install the two heat insulators with the six nuts.

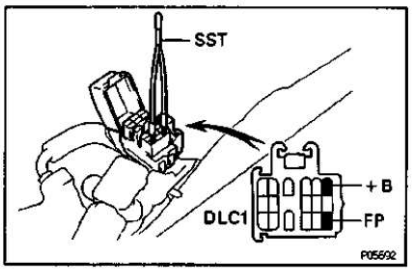
12. INSTALL FUEL TANK PROTECTORS

13. INSTALL FRONT LUGGAGE UNDER COVER

14. INSTALL ENGINE UNDER COVERS

FUEL PUMP

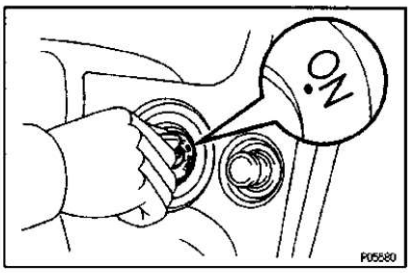




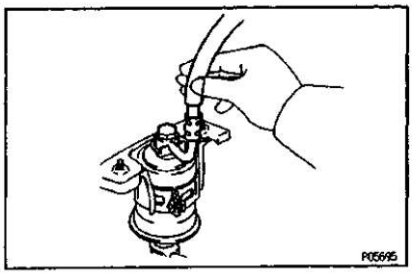
ON–VEHICLE INSPECTION

1. CHECK FUEL PUMP OPERATION

(a) Using SST, connect terminals +B and FP of the data link connector 1.
SST 09843–18020

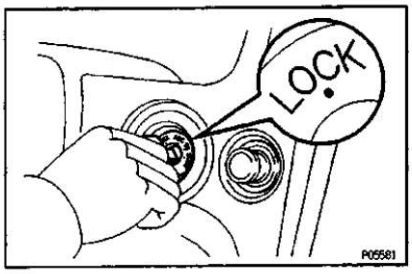


(b) Turn the ignition switch ON.
NOTICE: Do not start the engine.

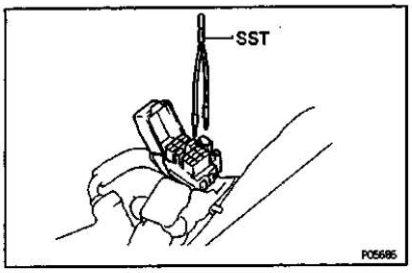


(c) Check that there is pressure in the hose from the fuel filter.

HINT: At this time, you will hear fuel return noise.



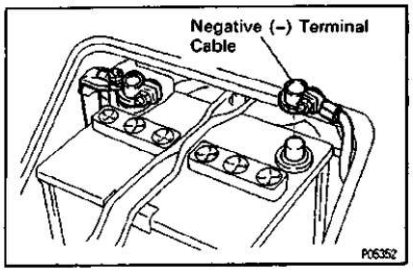
(d) Turn the ignition switch OFF.



(e) Remove the SST from the data link connector 1.
SST 09843–18020

If there is no pressure, check the following parts:

- Fusible links (2.01, 1.0Y)
- H–fuse (AM2 40A)
- Fuses (EFI 15A, AM2 7.5A)
- MPI main relay
- Fuel pump
- Wiring connections

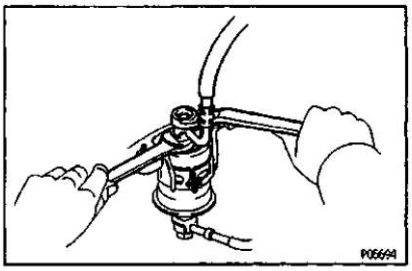


2. CHECK FUEL PRESSURE

(a) Check that the battery voltages is above 12 volts.

(b) Disconnect the cable from the negative (–) terminal of the battery.

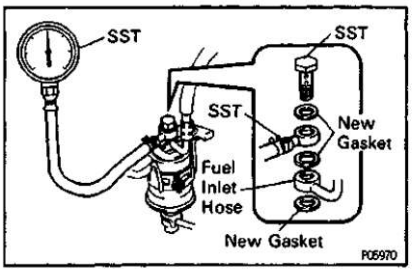
CAUTION: Turn the ignition switch to ”LOCK”. Discon–nect the negative terminal from the battery. Wait at least 20 seconds before proceeding with work.



(c) Remove the union bolt and two gaskets, and disconnect the fuel inlet hose from the fuel filter outlet.

HINT:

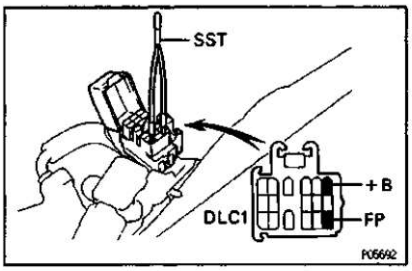
- Put a suitable container or shop towel under the fuel filter.
- Slowly loosen the union bolt.



(d) install the fuel inlet hose and SST (pressure gauge) to the fuel filter with three new gaskets and SST (union bolt).
SST 09268–45012

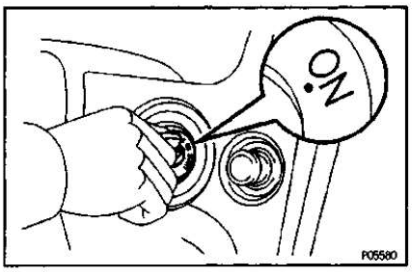
Torque: 29 N–m (300 kgf–cm, 22 ft–lbf)

(e) Wipe off any splattered gasoline.

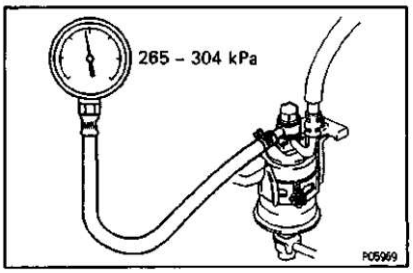


(f) Using SST, connect terminals +B and FP of the data link connector 1.
SST 09843–18020

(g) Reconnect the battery negative (–) cable.



(h) Turn the ignition switch ON.



(i) Measure the fuel pressure.

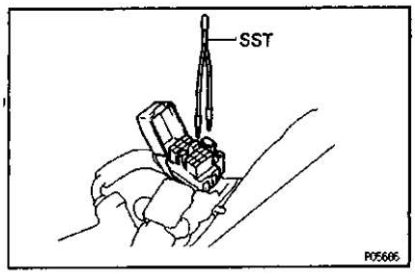
Fuel pressure:

265 – 304 kPa (2.7 – 3.1 kg f/cm^2, 38 – 44 psi)

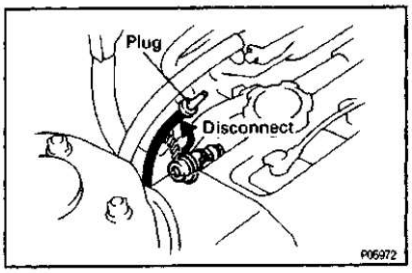
If pressure is high, replace the fuel pressure regulator.

If pressure is low, check the following parts:

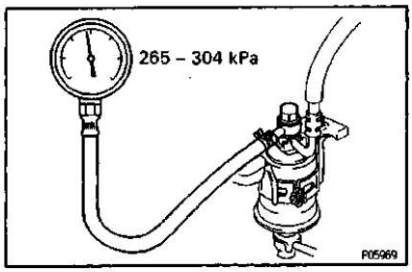
- Fuel hoses and connections
- Fuel pump
- Fuel filter
- Fuel pressure regulator



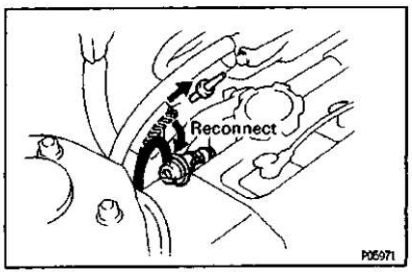
(j) Remove the SST from the data link connector 1.
SST 09483–18020



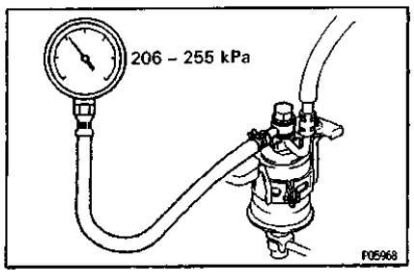
(k) Start the engine.
(l) Disconnect the vacuum sensing hose from the air intake chamber and plug the air intake chamber outlet.



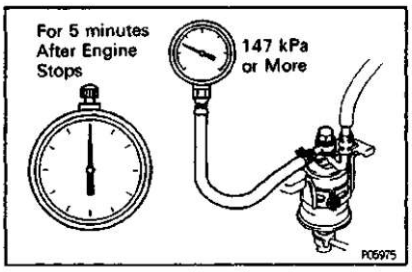
(m) Measure the fuel pressure at idle.
Fuel pressure:
265 – 304 kPa (2.7 – 3.1 kgf/cm^2, 38 – 44 psi)



(n) Reconnect the vacuum sensing hose to the air intake chamber.

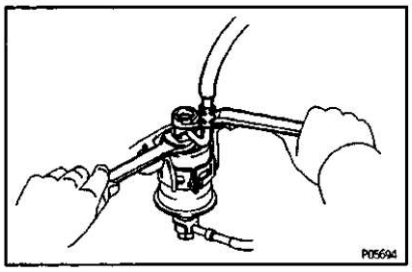


(o) Measure the fuel pressure at idling.
Fuel pressure:
206 – 255 kPa (2.1 – 2.6 kgf/cm^2, 31 – 37 psi)
If pressure is not as specified, check the vacuum sensing hose and fuel pressure regulator.



(P) Stop the engine.
(q) Check that the fuel pressure remains as specified for 5 minutes after the engine stops.
Fuel pressure:
147 kPa (1.5 kgf/cm^2, 21 psi) or more
If pressure is not as specified, check the fuel pump, pressure regulator and/or injector.

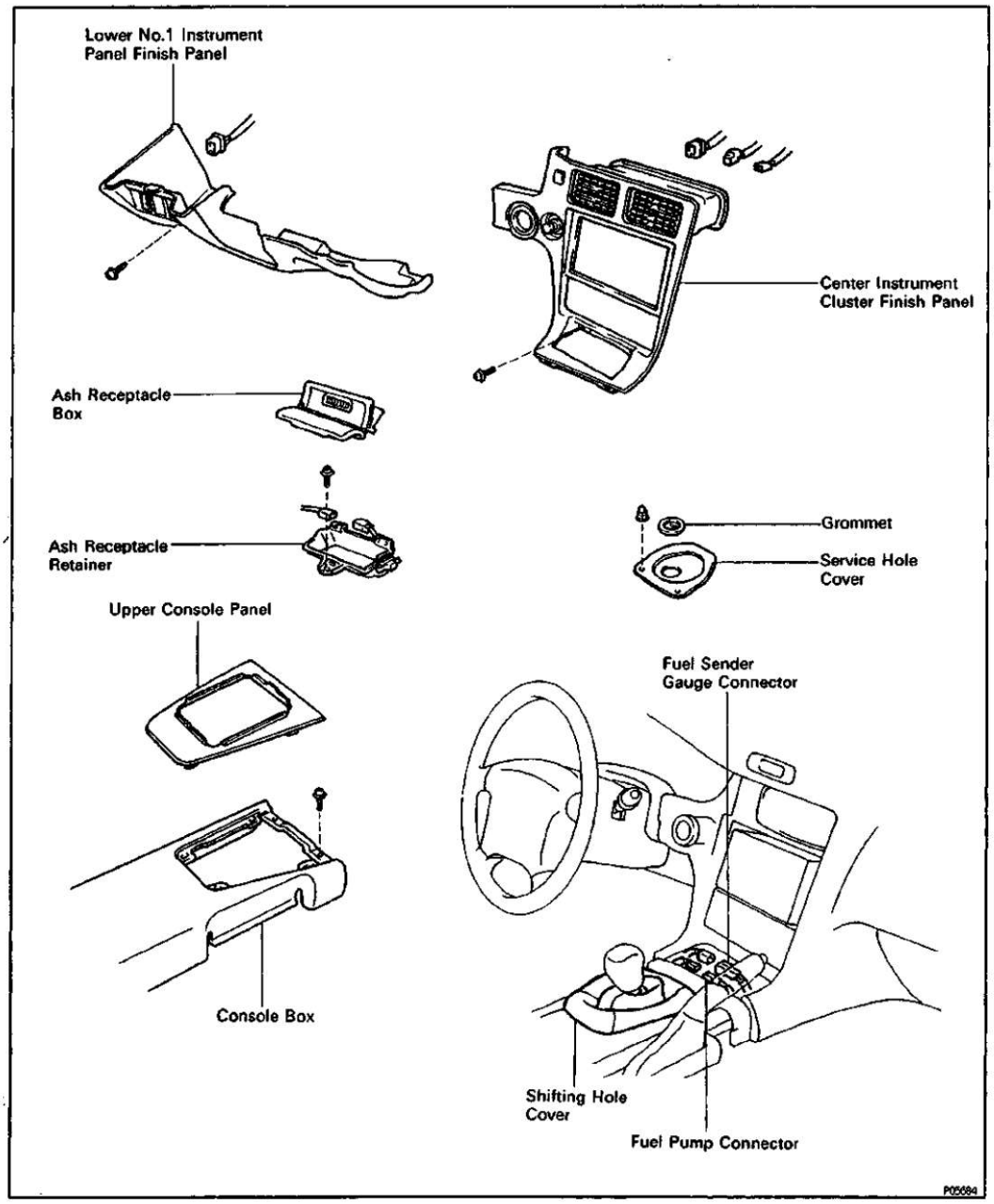
(r) After checking fuel pressure, disconnect the battery negative (–) cable and carefully remove the SST to prevent gasoline from splashing.
SST 09268–45012

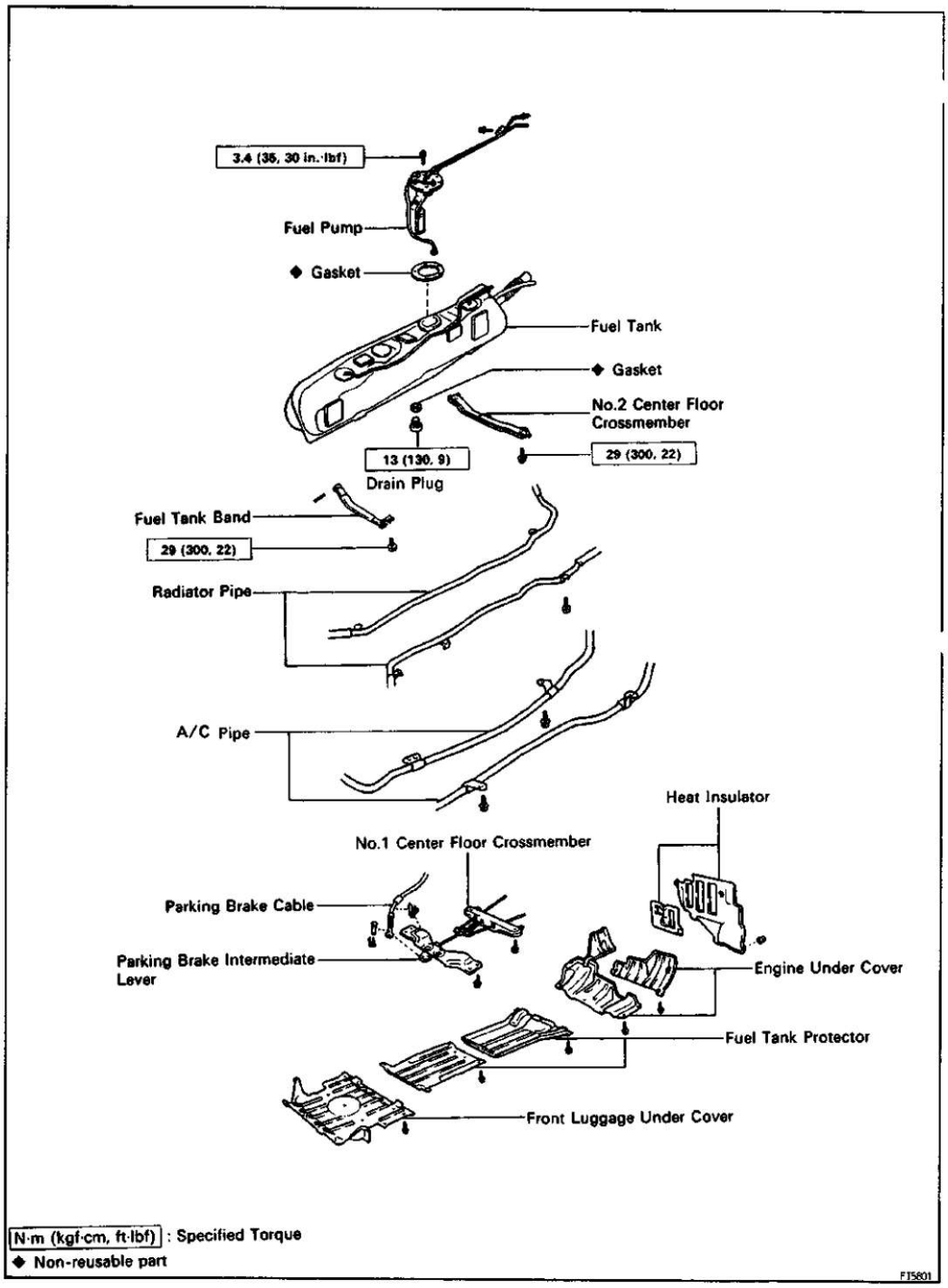


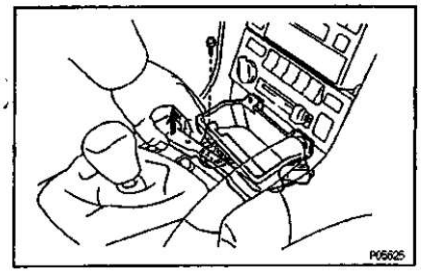
(s) Connect the fuel inlet hose to the fuel filter with with two new gaskets and the union bolt.
Torque: 29 N–m (300 kgf–cm, 22 ft–lbf)

(t) Reconnect the cable to the negative (–) terminal of the battery.
(u) Check for fuel leaks.

COMPONENTS FOR REMOVAL AND INSTALLATION




3.4 (35, 30 in.·lbf)
Fuel Pump
◆ Gasket
Fuel Tank
◆ Gasket
No.2 Center Floor Crossmember
13 (130, 9)
Drain Plug
29 (300, 22)
Fuel Tank Band
29 (300, 22)
Radiator Pipe
A/C Pipe
Heat Insulator
No.1 Center Floor Crossmember
Parking Brake Cable
Parking Brake Intermediate Lever
Engine Under Cover
Fuel Tank Protector
Front Luggage Under Cover
N·m (kgf·cm, ft·lbf) : Specified Torque
◆ Non-reusable part
FI5801



FUEL PUMP INSPECTION

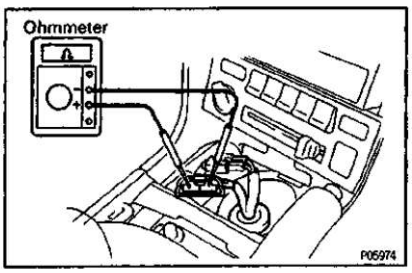
EG12H–01

(See Components for Removal and Installation)

1. REMOVE ASH RECEPTACLE RETAINER

(See steps 1 and 2 in Fuel Pump Removal)

2. DISCONNECT FUEL PUMP CONNECTOR



3. INSPECT FUEL PUMP

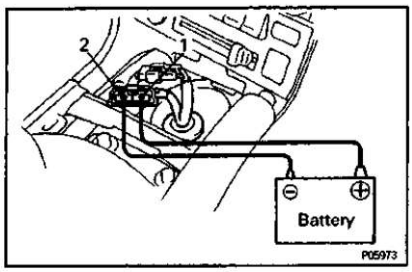
A. Inspect fuel pump resistance

Using an ohmmeter, measure the resistance between the terminals.

Resistance (Cold):

0.2–3.0Ω

If the resistance is not as specified, replace the fuel pump.



B. Inspect fuel pump operation

Connect the positive (+) lead from the battery to terminal 1 of the connector, and the negative (–) lead to terminal

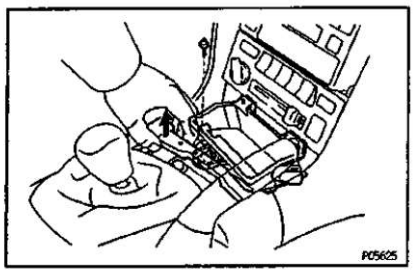
2. Check that the fuel pump operates.

If operation is not as specified, replace the fuel pump.

NOTICE:

- **These tests must be performed quickly (within 10 seconds) to prevent the coil from burning out.**
- **Keep the fuel pump as far away from the battery as possible.**
- **Always perform switching at the battery side.**

4. RECONNECT FUEL PUMP CONNECTOR



5. REINSTALL ASH RECEPTACLE RETAINER

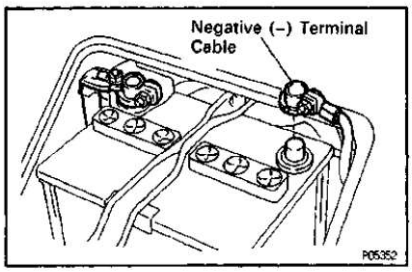
(See steps 7 and 9 in Fuel Pump Installation)

FUEL PUMP REMOVAL

E612J–01

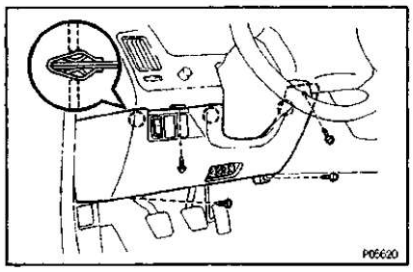
(See Components for Removal and Installation)

CAUTION: Do not smoke or work near an open flame when working on the fuel pump.



1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY

CAUTION: Turn the ignition switch to "LOCK". Disconnect the negative terminal from the battery. Wait at least 20 seconds before proceeding with work.

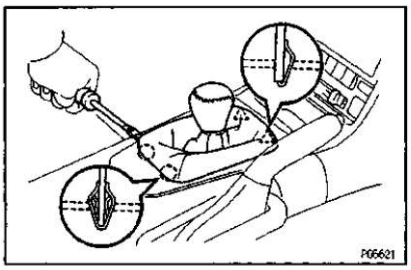


2. DISCONNECT FUEL PUMP CONNECTOR AND FUEL SENDER GAUGE CONNECTOR

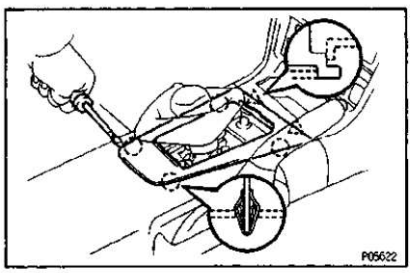
(a) Remove the tour screws, and disconnect the lower No.1 instrument panel finish panel by pulling it.

(b) Disconnect the connector, and remove the lower No. 1 instrument panel finish panel.

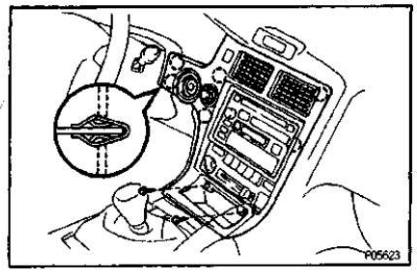
(c) Remove the ash receptacle box.



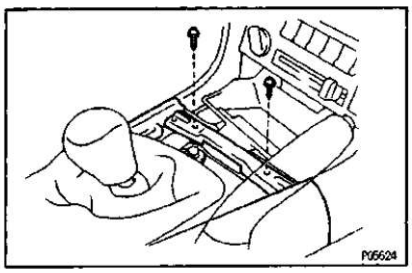
(d) Using a screwdriver, pry out the shifting hole cover.



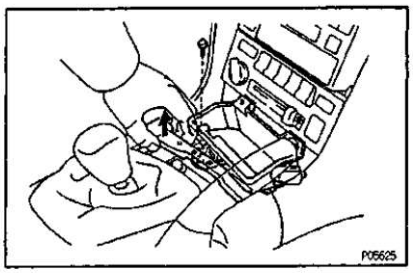
(e) Using a screwdriver, pry out the upper console panel.



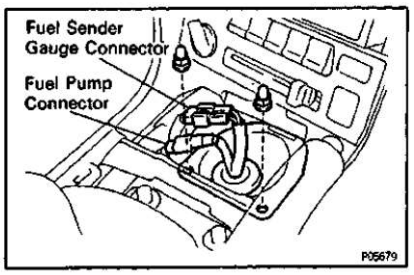
(f) Remove the two screws, and disconnect the center instrument cluster finish panel by pulling it.
(g) Disconnect the connectors, and remove the center instrument cluster finish panel.



(h) Remove the two screws holding the console box to the instrument panel safety pad.

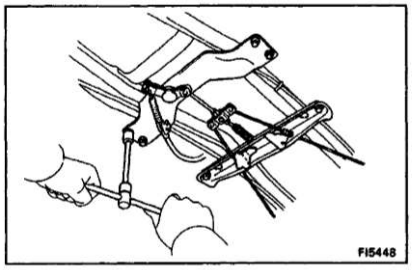


(i) Remove the ash receptacle retainer mounting screw by lifting the front side of the console box.
(j) Disconnect the connector, and remove the ash re–ceptacle retainer.



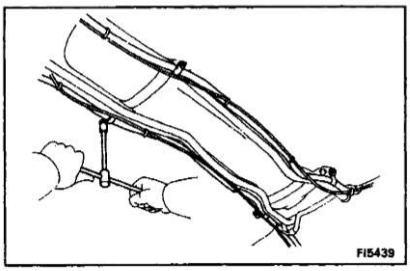
(k) Disconnect the fuel pump connector and fuel sander gauge connector.
(l) Remove the grommet from the service hole cover.
(m) Remove the two nuts and service hole cover.

3. REMOVE ENGINE UNDER COVERS
4. REMOVE FRONT LUGGAGE UNDER COVER
5. REMOVE FUEL TANK PROTECTORS
6. DRAIN FUEL



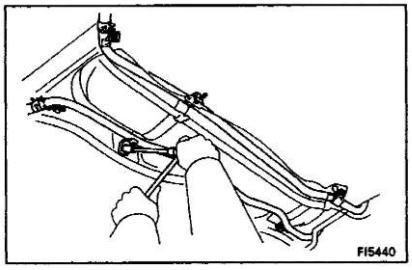
7. REMOVE PARKING BRAKE INTERMEDIATE LEVER AND NO.1 CENTER FLOOR CROSSMEMBER

(a) Remove the four bolts and intermediate lever.
(b) Remove the two bolts and crossmember.
(c) Disconnect the parking brake cable from the intermediate lever.



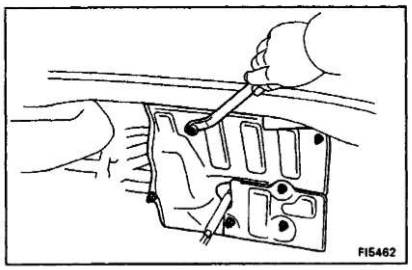
8. REMOVE A/C PIPES FROM BODY

Remove the four bolts, and disconnect the two A/C pipe from the body.



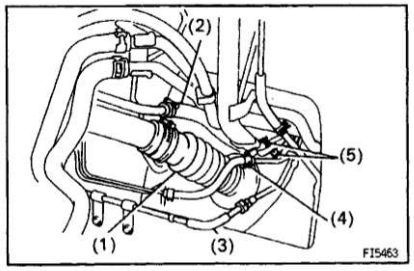
9. DISCONNECT RADIATOR PIPES FROM BODY

Remove the six bolts, and disconnect the two radiator pipe from the body.



10. REMOVE FUEL TANK HEAT INSULATORS

Remove the six nuts and two heat insulator.

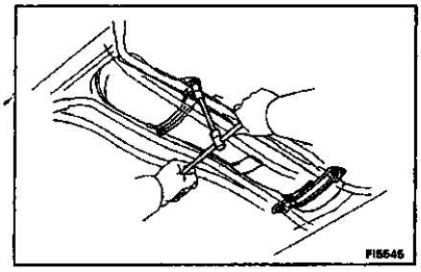


11. DISCONNECT HOSES AND TUBE

CAUTION: Remove the fuel filter cap to prevent the fuel from flowing out.

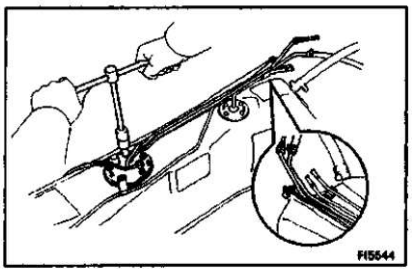
Disconnect the following hoses and tube:

(1) Fuel inlet hose
(2) Fuel breather hose
(3) Fuel pump hose
(4) Fuel return hose
(5) Two fuel evaporative bent hose



12. REMOVE FUEL TANK

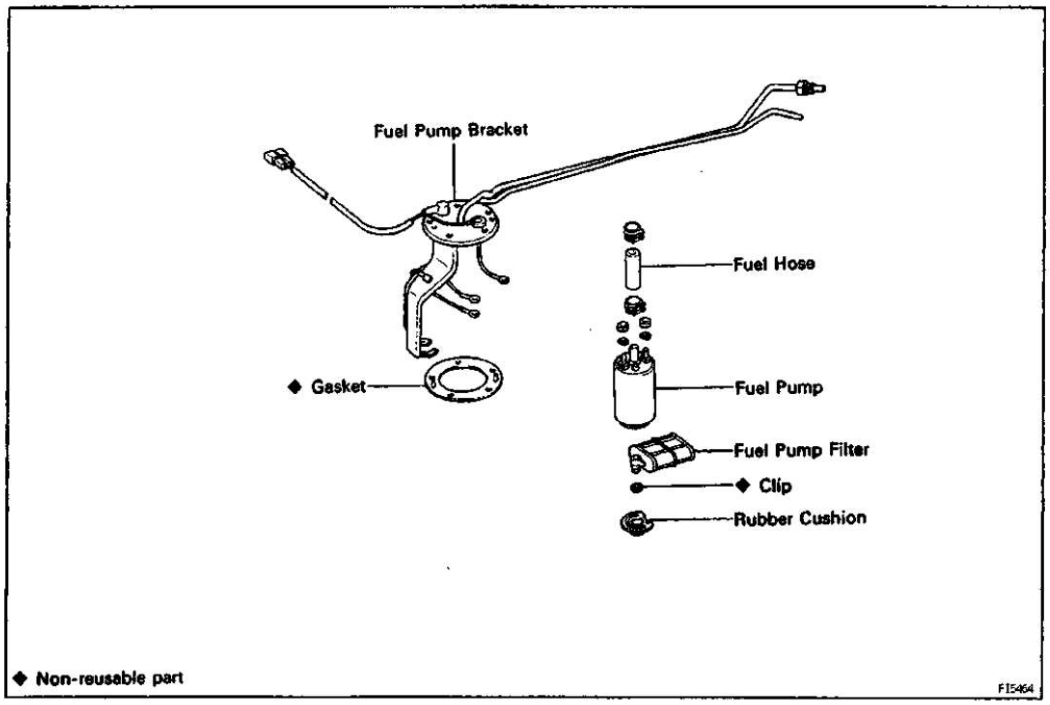
(a) Remove the bolt, pin and tank band.
(b) Remove the two bolts and No.2 center floor cross–member.
(c) Remove the fuel tank.

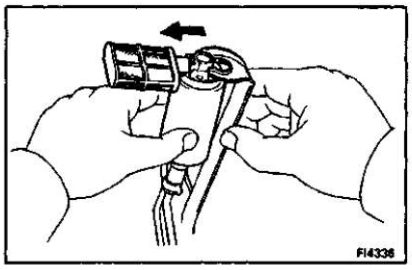


13. REMOVE FUEL PUMP ASSEMBLY FROM FUEL TANK

(a) Remove the bolt holding the fuel pump tube to the fuel tank.
(b) Remove the five bolts, and pull out the fuel pump assembly.
(c) Remove the gasket from the pump bracket.

COMPONENTS FOR DISASSEMBLY AND ASSEMBLY



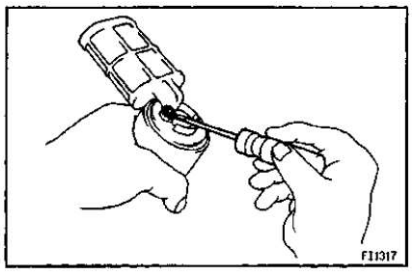


FUEL PUMP DISASSEMBLY

(See Components for Disassembly and Assembly)

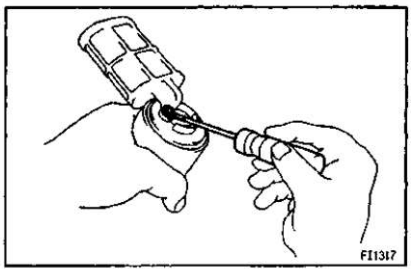
1. REMOVE FUEL PUMP FROM FUEL PUMP BRACKET

(a) Pull out the lower side of the fuel pump from the pump bracket.
(b) Remove the rubber cushion from the fuel pump.
(c) Remove the nut and spring washer, and disconnect the lead wire from the fuel pump. Disconnect the three lead wires.
(d) Disconnect the fuel hose from the fuel pump, and remove the fuel pump.



2. REMOVE FUEL PUMP FILTER FROM FUEL PUMP

(a) Using a small screwdriver, pry out the clip.
(b) Pull out the pump filter.

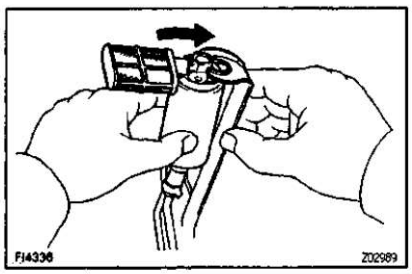


FUEL PUMP ASSEMBLY

(See Components for Disassembly and Assembly)

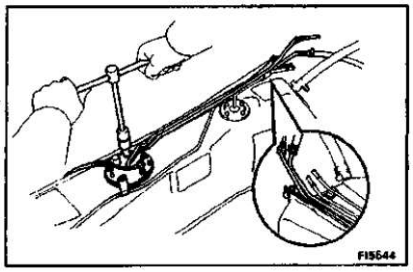
1. INSTALL FUEL PUMP FILTER TO FUEL PUMP

Install the pump filter with a new clip.



2. INSTALL FUEL PUMP TO FUEL PUMP BRACKET

(a) Connect the fuel hose to the outlet port of the fuel pump.
(b) Connect the lead wire to the fuel pump with the spring washer and nut. Connect the three lead wires.
(c) Install the rubber cushion to the fuel pump.
(d) Install the fuel pump by pushing the lower side of the fuel pump.

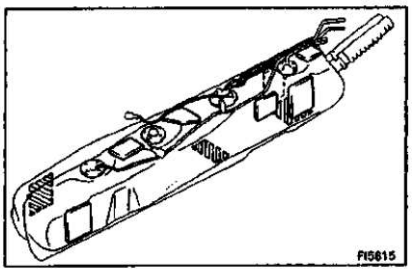


FUEL PUMP INSTALLATION

(See Components for Removal and Installation)

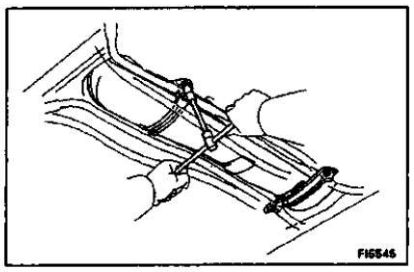
1. INSTALL FUEL PUMP ASSEMBLY TO FUEL TANK

(a) Install a new gasket to the pump bracket.
(b) Insert the fuel pump assembly into the fuel tank.
(c) Install the five bolts holding the fuel pump bracket to the fuel tank.
Torque: 3.4 N–m (35 kgf–cm, 30 in.–lbf)
(d) Install the five bolts holding the fuel pump tube to the fuel tank.

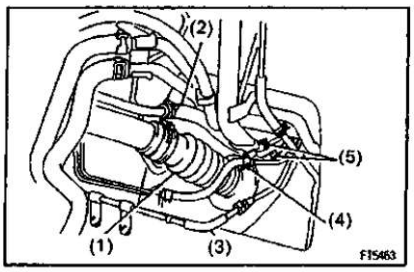


2. INSTALL FUEL TANK

(a) Apply soapy water–to the cushions on the fuel tank.

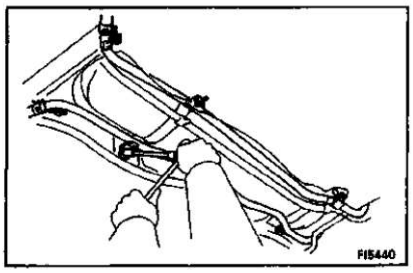


(b) Attach the fuel tank to the body.
(c) Install the fuel tank band with the pin and bolt.
Torque: 29 N–m (300 kgf–cm, 22 ft–lbf)
(d) Install the No.2 center floor crossmember with the two bolts.
Torque: 29 N–m (300 kgf–cm, 22 ft–lbf)



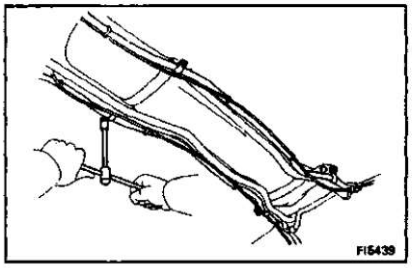
3. CONNECT HOSES AND TUBE

Connect the following hoses and tube:
(1) Fuel inlet hose
(2) Fuel breather hose
(3) Fuel pump hose
(4) Fuel return hose
(5) Two fuel evaporative bent hose



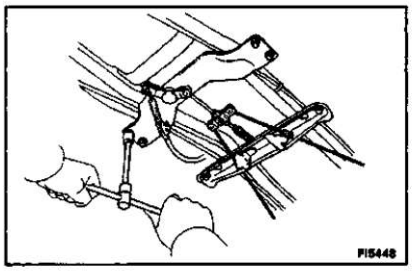
4. INSTALL RADIATOR PIPES TO BODY

Install the two radiator pipes with the six bolts.



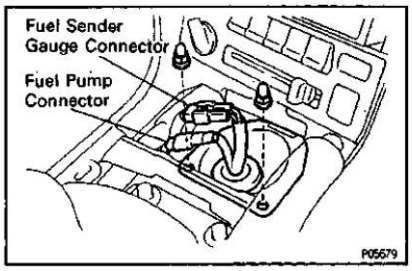
5. INSTALL A/C PIPES TO BODY

Install the two A/C pipes with the four bolts



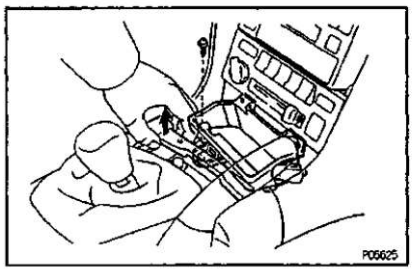
6. INSTALL PARKING BRAKE INTERMEDIATE LEVER AND NO.1 CENTER FLOOR CROSSMEMBER

(a) Connect the parking brake cable to the intermediate lever.
(b) Install the intermediate lever with the four bolt.
(c) Install the crossmember with the two bolts.

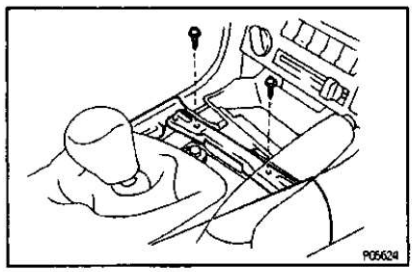


7. CONNECT FUEL PUMP CONNECTOR AND FUEL SENDER GAUGE CONNECTOR

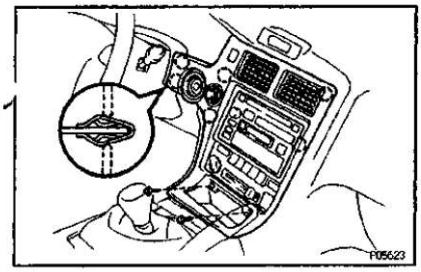
(a) Install the service hole cover with the two nuts.
(b) Connect the fuel pump connector and fuel sender gauge connector.
(c) Install the grommet to the service hole cover.



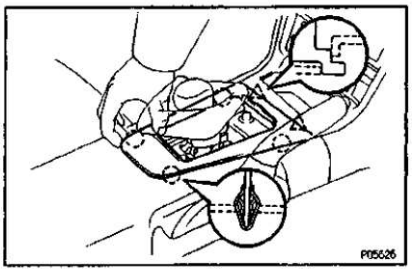
(d) Connect the connector, and install the ash receptacle retainer with the screw by lifting the front side of the console box.



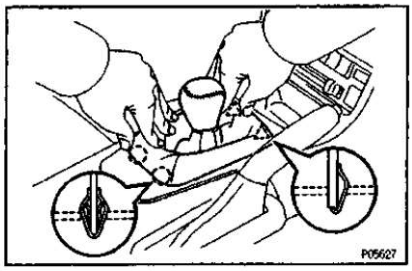
(e) Install the console box to the instrument panel safety pad with the two screws



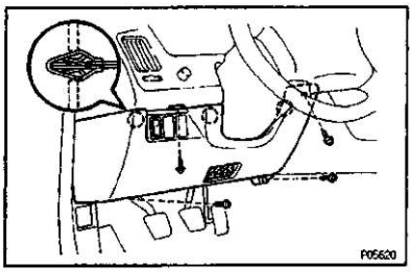
(f) Connect the connectors, and attach the center instrument cluster finish panel to the instrument panel safety pad with the clips.
(g) Install the two screws.



(h) Connect the connector, and attach the upper console panel to the console panel with the two claws and two clips.

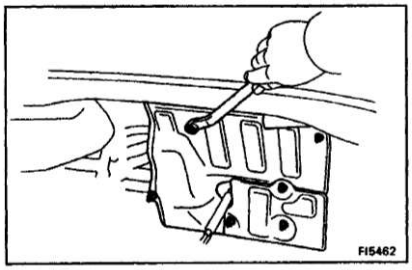


(i) Attach the shifting hole cover with the four clips.
(j) Install the ash receptacle box.



(k) Connect the connector, and attach the lower No.1 instrument panel finish panel with the three clips.
(l) Install the four screws.

8. FILL WITH FUEL
9. CONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY
10. CHECK FOR FUEL LEAKS

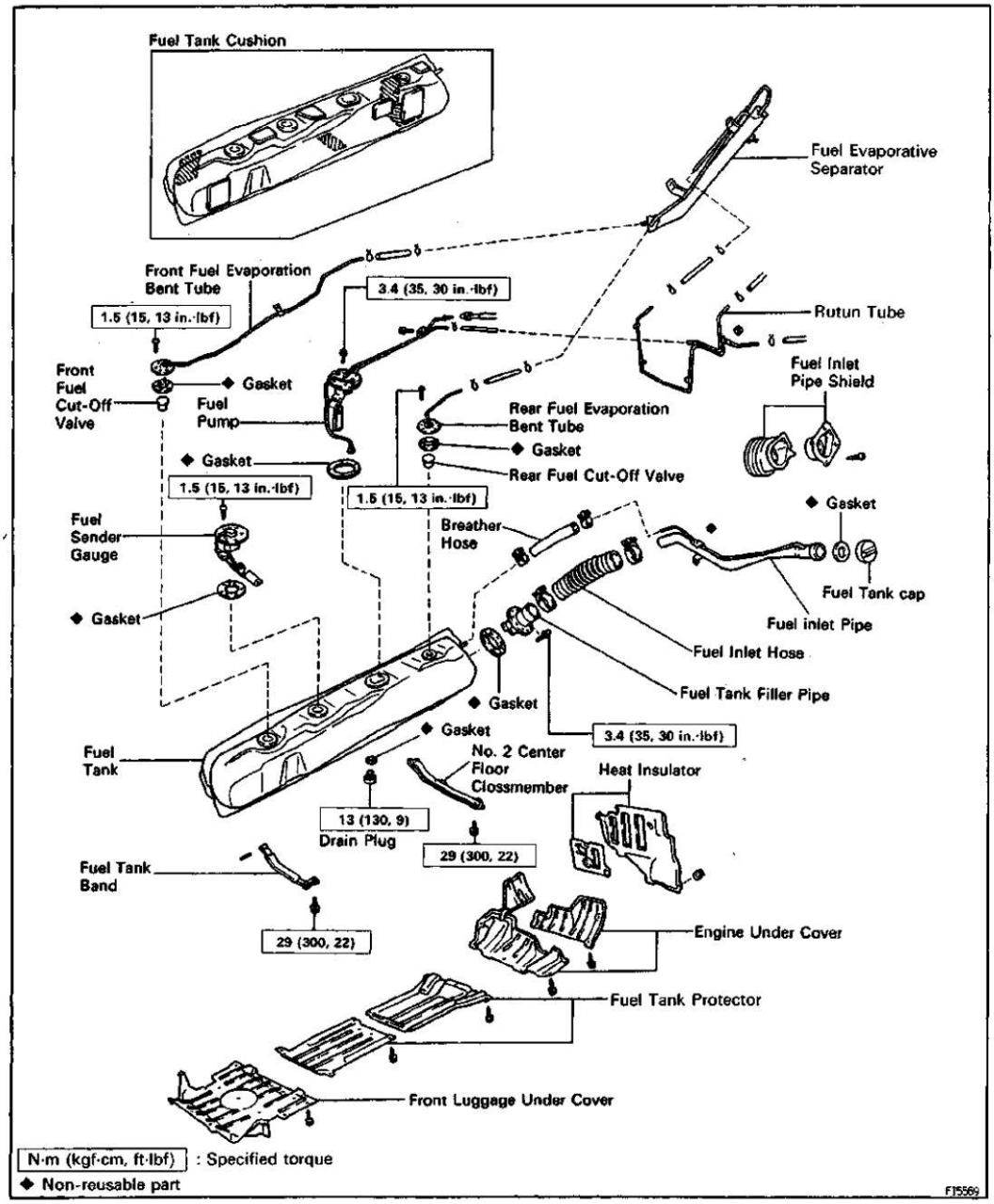


11. INSTALL FUEL TANK HEAT INSULATORS
Install the two heat insulators with the six nuts.

12. INSTALL FUEL TANK PROTECTORS
13. INSTALL FRONT LUGGAGE UNDER COVER
14. INSTALL ENGINE UNDER COVERS

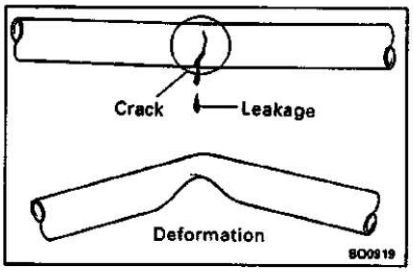
FUEL TANK AND LINE

COMPONENTS



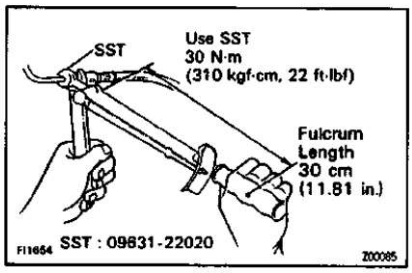
PRECAUTIONS

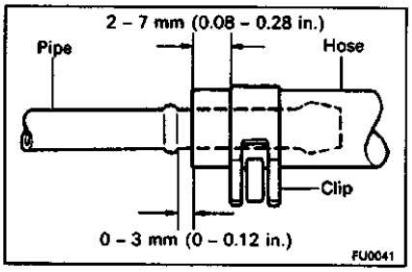
1. Always use new gaskets when replacing the fuel tank or component parts.
2. Apply the proper torque to all parts tightened.



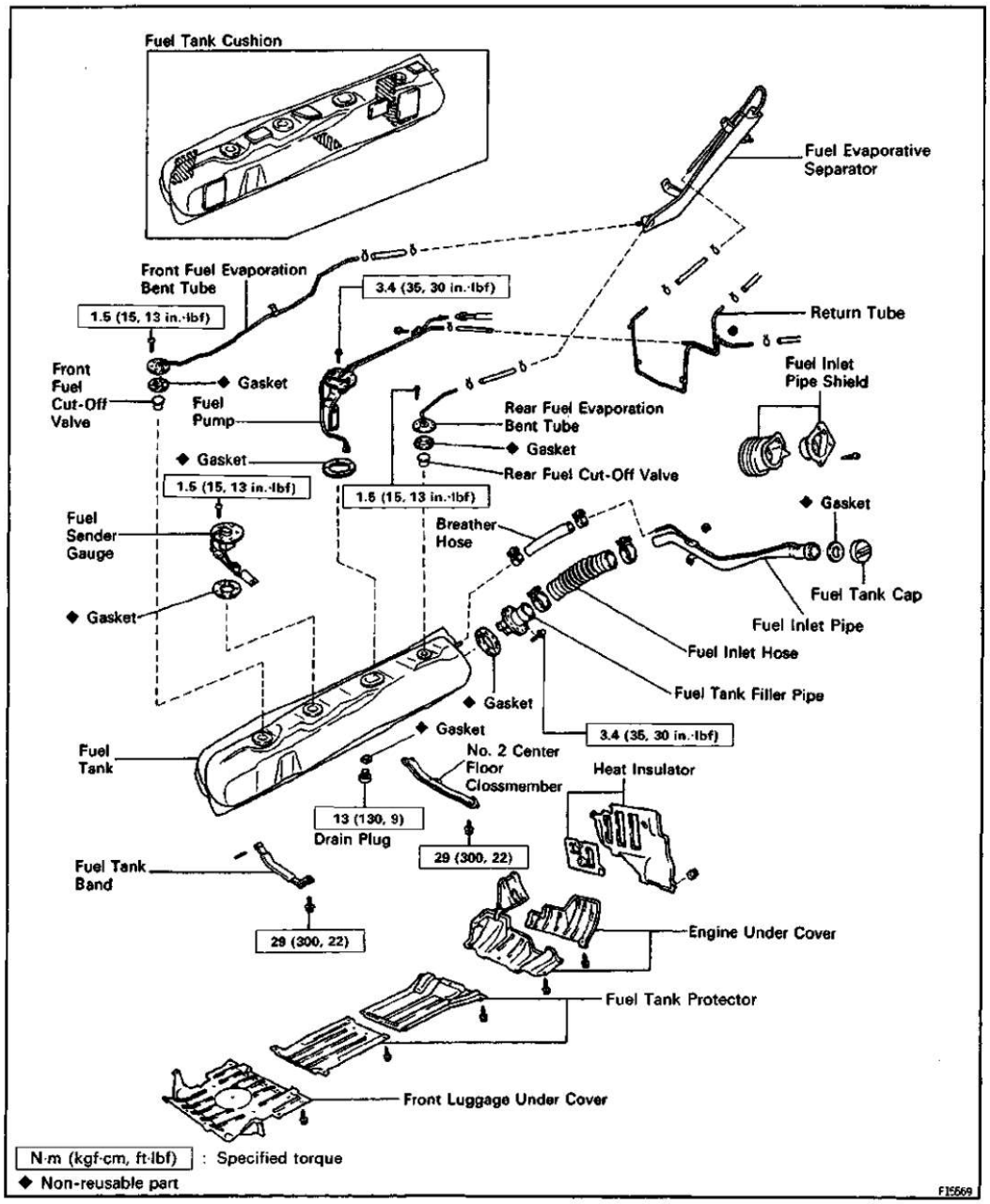
FUEL LINES AND CONNECTIONS INSPECTION

(a) Check the fuel lines for cracks or leakage, and all connections for deformation.
(b) Check the fuel tank vapor vent system hoses and connections for looseness, sharp bends or damage.
(c) Check the fuel tank for deformation, cracks fuel lea–kage or tank band looseness.
(d) Check the filler neck for damage or fuel leakage.
(e) Hose and tube connections are as shown in the il–lustration.
If a problem is found, repair or replace the part as necessary.





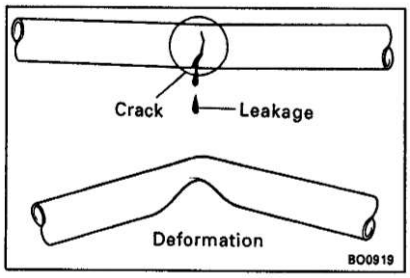
FUEL TANK AND LINE
COMPONENTS

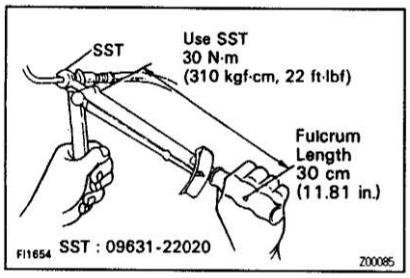


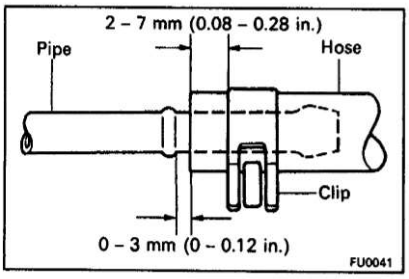
PRECAUTIONS

EG0DD–01

1. Always use new gaskets when replacing the fuel tank or component parts.
2. Apply the proper torque to all parts tightened.





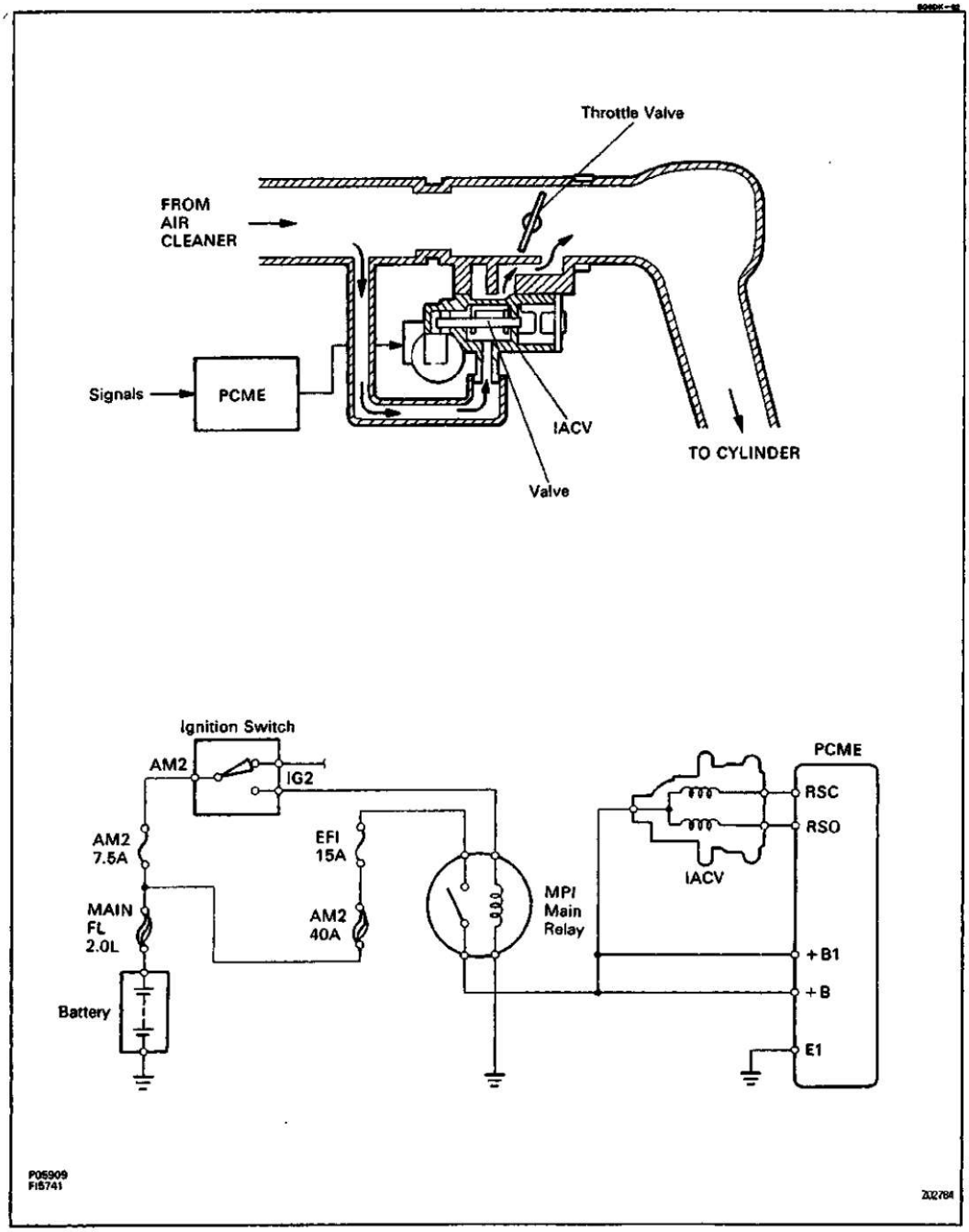


FUEL LINES AND CONNECTIONS INSPECTION

EG0DE–01

(a) Check the fuel lines for cracks or leakage, and all connections for deformation.
(b) Check the fuel tank vapor vent system hoses and connections for looseness, sharp bends or damage.
(c) Check the fuel tank for deformation, cracks fuel lea– kage or tank band looseness.
(d) Check the filler neck for damage or fuel leakage.
(e) Hose and tube connections are as shown in the il– lustration.
If a problem is found, repair or replace the part as necessary.

IDLE AIR CONTROL VALVE (IACV)

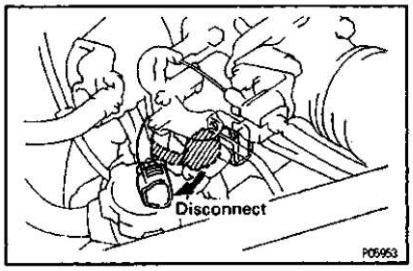


ON–VEHICLE INSPECTION

1. INSPECT IACV OPERATION

(a) Initial conditions:

- Engine at normal operating temperature
- Idle speed set correctly
- Transmission in neutral position

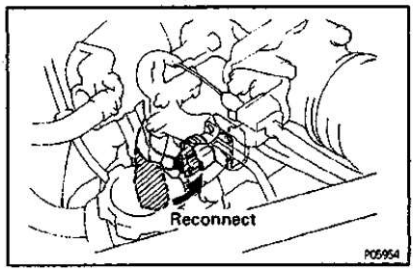


(b) Disconnect the IACV connector.

(c) Check the engine rpm.

Engine rpm:

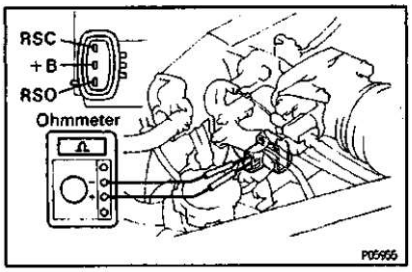
1,000 rpm or more



(d) Reconnect the IACV connector.

If the rpm operation is not as specified, check the IACV, wiring and PCME.

2. INSPECT IACV RESISTANCE



(a) Disconnect the IACV connector.

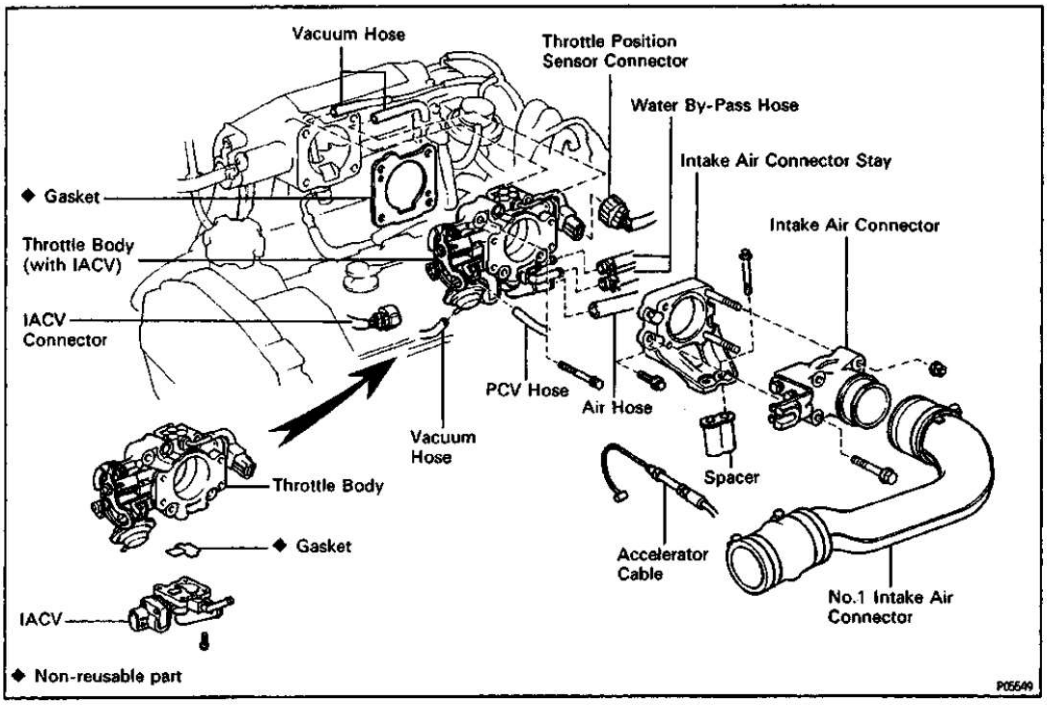
(b) Using an ohmmeter, measure the resistance between terminal +B and other terminals (RSC, RSO).

Resistance: Ω17.7–23.90

If resistance is not as specified, replace the IACV.

(c) Reconnect the IACV connector.

COMPONENTS FOR REMOVAL AND INSTALLATION

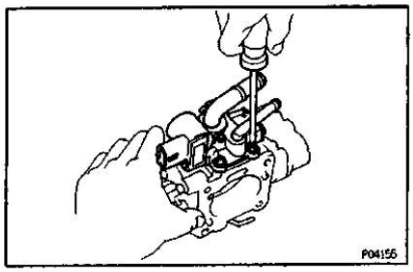


IACV REMOVAL

(See Components for Removal and Installation)

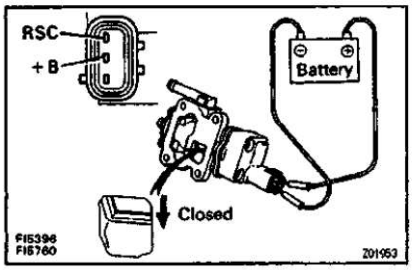
1. REMOVE THROTTLE BODY

(See Throttle Body Removal)



2. REMOVE IACV

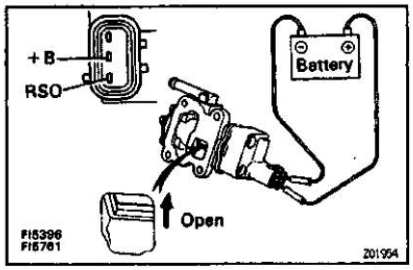
Remove the four screws, IACV and gasket.



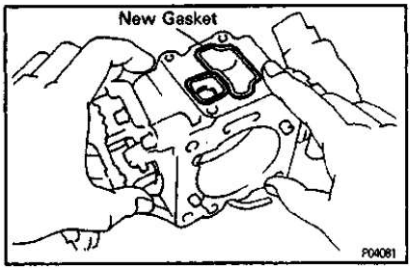
IACV INSPECTION

INSPECT IACV

(a) Connect the position (+) lead from the battery to terminal +B and negative (–) lead to terminal RSC, and check that the valve is closed.



(b) Connect the positive (+) lead from the battery to terminal +B and negative (–) lead to terminal RSO, and check that the valve is open.
If operation is not as specified, replace the IACV.

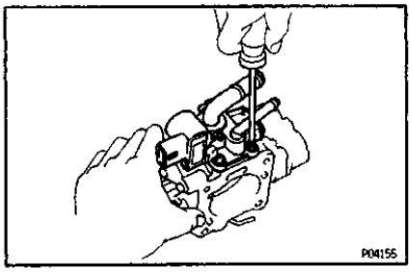


IACV INSTALLATION

(See Components for Removal and Installation)

1. INSTALL IACV

(a) Place a new gasket on the throttle body.

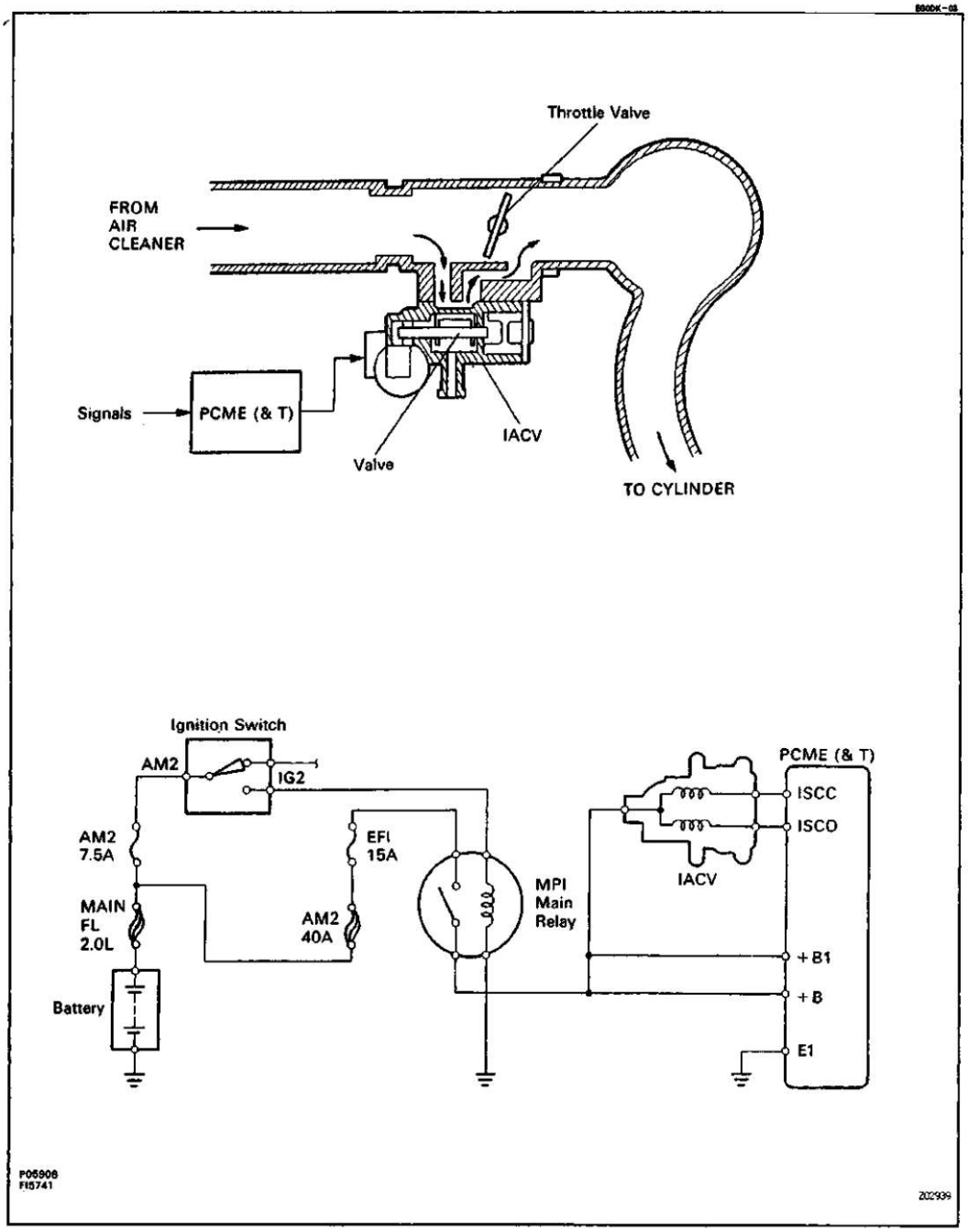


(b) Install the IACV with the four screws.

2. INSTALL THROTTLE BODY

(See Throttle Body Installation)

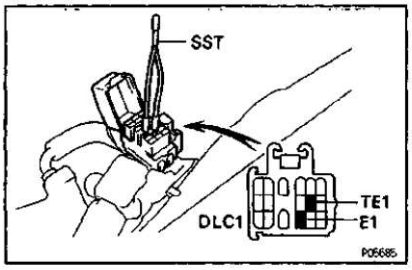
IDLE AIR CONTROL VALVE (IACV)



ON–VEHICLE INSPECTION

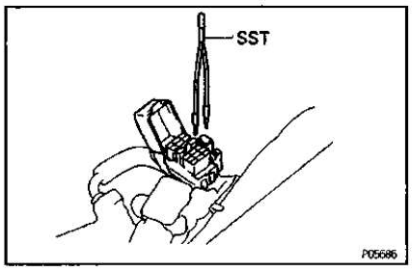
1. INSPECT IACV OPERATION

(a) Initial conditions:
- Engine at normal operating temperature
- Idle speed set correctly
- Transmission in neutral position

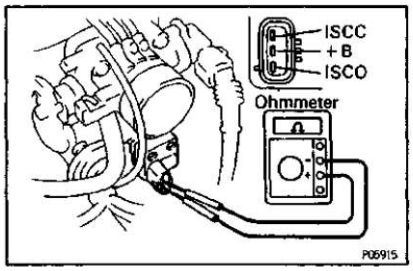


(b) Using SST, connect terminals TE1 and E1 of the data link connector 1.
SST 09843–18020

(c) After engine rpm are kept at 900 – 1,300 rpm for 5 seconds, check that they return to idle speed.
If the rpm operation is not as specified, check the IACV, wiring and PCME (& T).



(d) Remove the SST form the data link connector 1.
SST 09843–18020



2. INSPECT IACV RESISTANCE

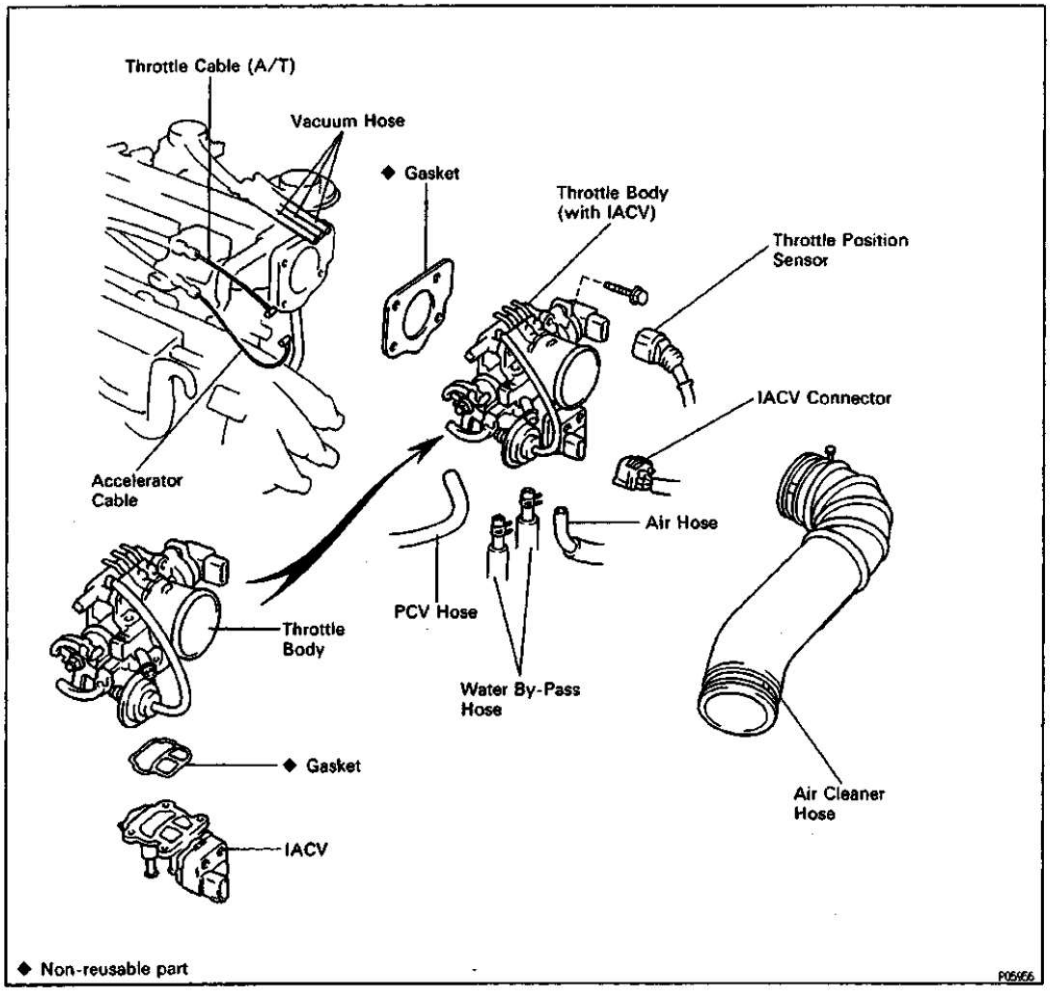
(a) Disconnect the IACV connector.

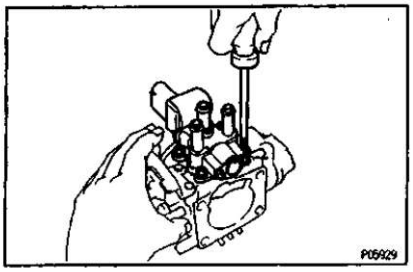
(b) Using an ohmmeter, measure the resistance between terminal +B and other terminals (ISCC, ISCO).
Resistance:
19.3–22–30

If resistance is not as specified, replace the IACV.

(c) Reconnect the IACV connector.

COMPONENTS FOR REMOVAL AND INSTALLATION

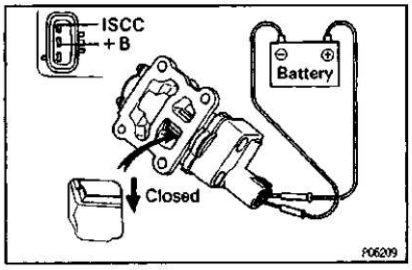




IACV REMOVAL

(See Components for Removal and Installation)

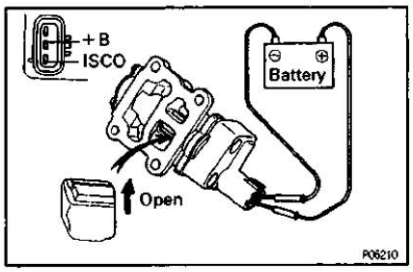
1. REMOVE THROTTLE BODY
   (See Throttle Body Removal)
2. REMOVE IACV
   Remove the four screws, IACV and gasket.



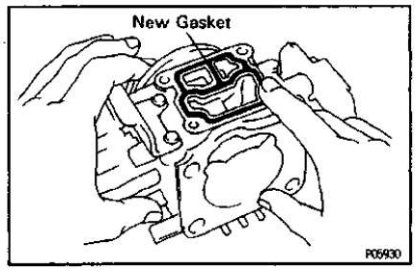
IACV INSPECTION

INSPECT IACV OPERATION

(a) Connect the position (+) lead from the battery to terminal +B and negative (–) lead to terminal ISCC, and check that the valve is closed.



(b) Connect the positive (+) lead from the battery to terminal +B and negative (–) lead to terminal ISCO, and check that the valve is open.
If operation is not as specified, replace the IACV.

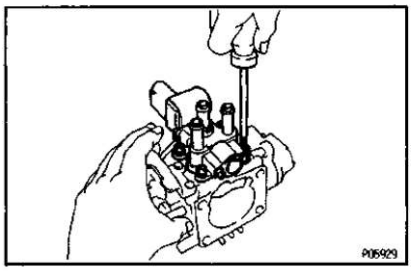


IACV INSTALLATION

(See Components for Removal and Installation)

1. INSTALL IACV

(a) Place a new gasket on the throttle body.



(b) Install the IACV with the four screws.

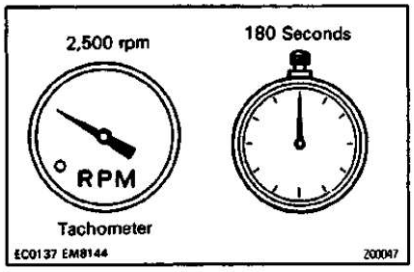
2. INSTALL THROTTLE BODY
(See Throttle Body Installation)

IDLE AND OR 2500 RPM CO HC CHECK

HINT: This check is used only to determine whether or not the idle CO/HC complies with regulations.

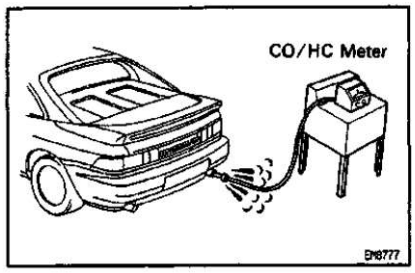
1. INITIAL CONDITIONS

(a) Engine at normal operating temperature
(b) Air cleaner installed
(c) All pipes and hoses of air induction system connected
(d) All accessories switched OFF
(e) All vacuum lines properly connected
HINT: All vacuum hoses for EGR systems, etc. should be properly connected.
(f) SMPI system wiring connectors fully plugged
(g) Ignition timing set correctly
(h) Transmission in neutral range
(i) Tachometer and CO/HC meter calibrated by hand



2. START ENGINE

3. RACE ENGINE AT 2,500 RPM FOR APPROX. 180 SECONDS



4. INSERT CO/HC METER TESTING PROBE INTO TAILPIPE AT LEAST 40 cm (1.3 ft) DURING IDLING

5. IMMEDIATELY CHECK CO/HC CONCENTRATION AT IDLE AND/OR 2,500 RPM

HINT: When performing the 2 mode (2,500 rpm and idle) test, follow the measurement order prescribed by the applicable local regulations.

Troubleshooting

If the CO/HC concentration does not comply with regulations, perform troubleshooting in the order given below.

(a) Check oxygen sensor operation.
(See Main Oxygen Sensor Inspection under SMPI System)

(b) See the table below for possible causes, and then inspect and correct the applicable causes if neces–sary.

HC	CO	Problems	Causes
High	Normal	Rough idle	1. Faulty ignitions: • Incorrect timing • Fouled, shorted or improperly gapped plugs • Open or crossed high–tension cords • Cracked distributor cap 2. Incorrect valve clearance 3. Leaky EGR valve 4. Leaky intake and exhaust valves 5. Leaky cylinder
High	Low	Rough idle (Fluctuating HC reading)	1. Vacuum leaks: • PCV hose • EGR valve • Intake manifold • T–VIS valve • Throttle body • IACV • Brake booster line 2. Lean mixture causing misfire
High	High	Rough idle (Black smoke from exhaust)	1. Restricted air filter 2. Faulty SMPI systems: • Faulty pressure regulator • Clogged fuel return line • Defective ECTS • Defective MAP • Faulty PCME • Faulty injector • Faulty cold start injector • Faulty throttle position sensor • Faulty air flow sensor

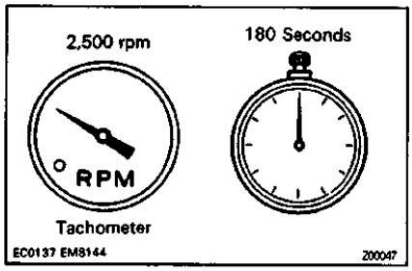
V00995

IDLE AND OR 2500 RPM CO HC CHECK

HINT: This check is used only to determine whether or not the idle CO/HC complies with regulations.

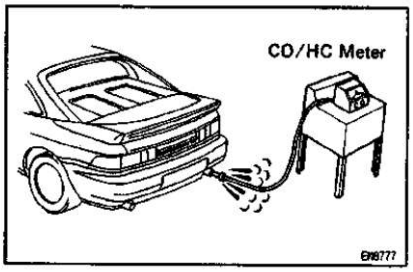
1. INITIAL CONDITIONS

(a) Engine at normal operating temperature
(b) Air cleaner installed
(c) All pipes and hoses of air induction system connected
(d) All accessories switched OFF
(e) All vacuum lines properly connected
HINT: All vacuum hoses for EGR systems, etc. should be properly connected.
(f) SMPI system wiring connectors fully plugged
(g) Ignition timing set correctly
(h) Transmission in neutral range
(i) Tachometer and CO/HC meter calibrated by hand



2. START ENGINE

3. RACE ENGINE AT 2,500 RPM FOR APPROX. 180 SECONDS



4. INSERT CO/HC METER TESTING PROBE INTO TAILPIPE AT LEAST 40 cm (1.3 ft) DURING IDLING

5. IMMEDIATELY CHECK CO/HC CONCENTRATION AT IDLE AND/OR 2,500 RPM

HINT: When performing the 2 mode (2,500 rpm and idle) test, follow the measurement order prescribed by the applicable local regulations.

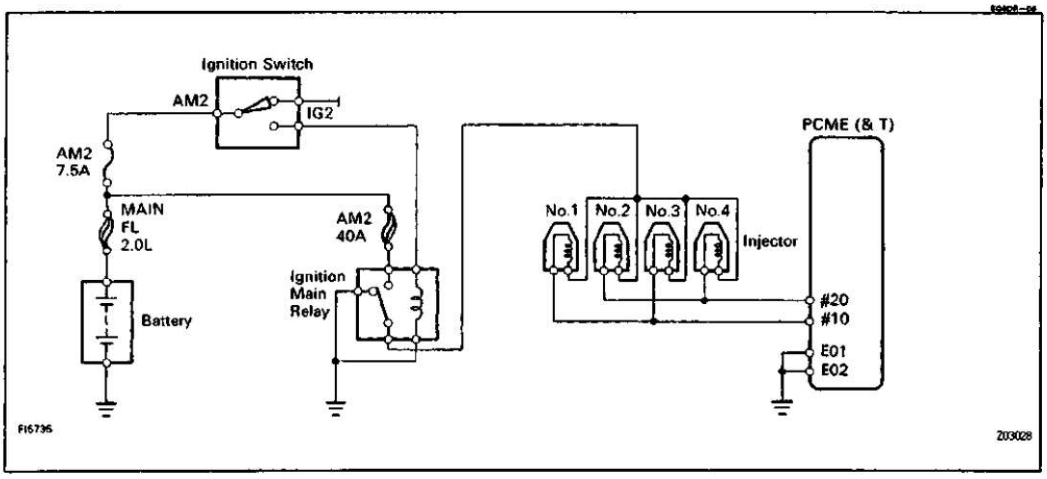
Troubleshooting

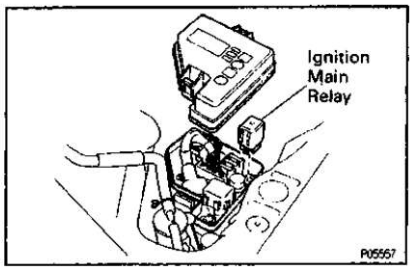
If the CO/HC concentration does not comply with regulations, perform troubleshooting in the order given below.
(a) Check oxygen sensor operation.
(See Oxygen Sensor Inspection under MPI System)
(b) See the table below for possible causes, and then inspect and correct the applicable causes if neces–sary.

HC	CO	Problems	Causes
High	Normal	Rough idle	1. Faulty ignitions: • Incorrect timing • Fouled, shorted or improperly gapped plugs • Open or crossed high–tension cords • Cracked distributor cap 2. Incorrect valve clearance 3. Leaky EGR valve 4. Leaky intake and exhaust valves 5. Leaky cylinder
High	Low	Rough idle (Fluctuating HC reading)	1. Vacuum leaks: • PCV hose • EGR valve • Intake manifold • Throttle body • IACV • Brake booster line 2. Lean mixture causing misfire
High	High	Rough idle (Black smoke from exhaust)	1. Restricted air filter . Faulty MPI systems: • Faulty pressure regulator • Clogged fuel return line • Defective ECTS • Defective IATS • Defective MAP • Faulty PCM E (& T) • Faulty injector • Faulty throttle position sensor

V01054

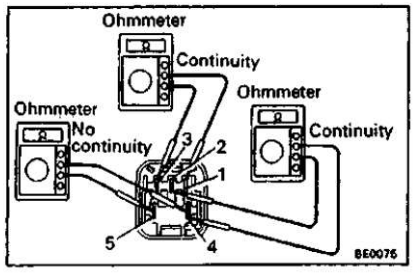
IGNITION MAIN RELAY





IGNITION MAIN RELAY ("IGN") INSPECTION

1. REMOVE IGNITION MAIN RELAY



2. INSPECT IGNITION MAIN RELAY

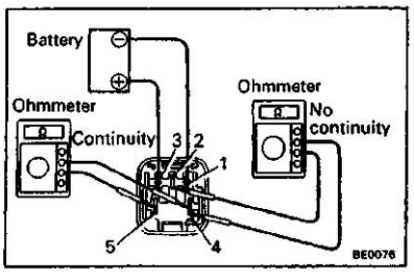
A. Inspect relay continuity

(a) Using an ohmmeter, check that there is continuity between terminals 1 and 3.

(b) Check that there is continuity between terminals 2 and 4.

(c) Check that there is no continuity between terminals 4 and 5.

If continuity is not as specified, replace the relay.



B. Inspect relay operation

(a) Apply battery voltage across terminals 1 and 3.

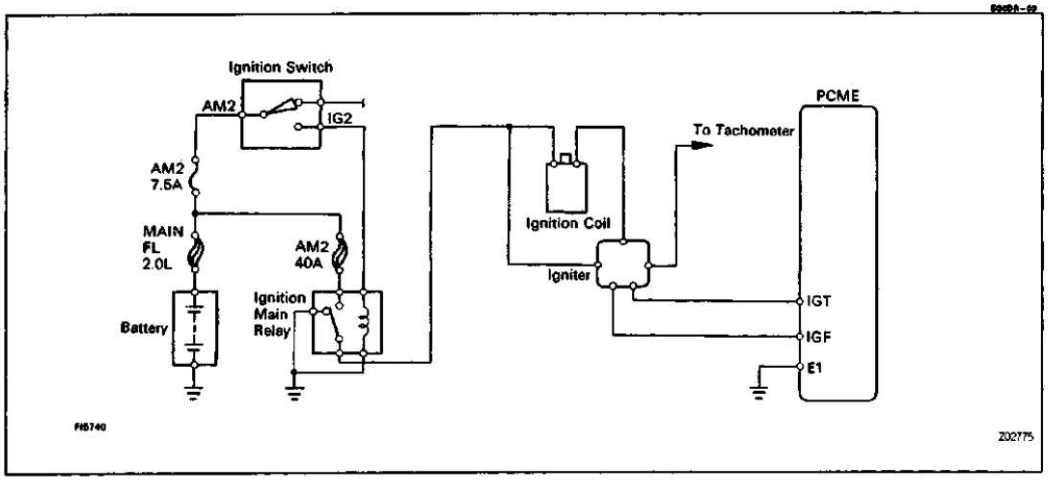
(b) Using an ohmmeter, check that there is continuity between the 2 and 4.

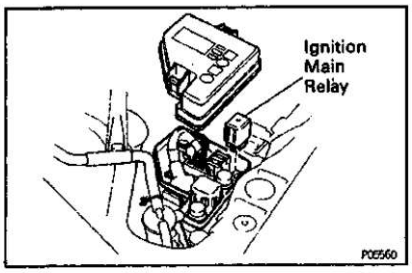
(c) Check that there is continuity between terminals 4 and 5.

If operation is not as specified, replace the relay.

3. REINSTALL IGNITION MAIN RELAY

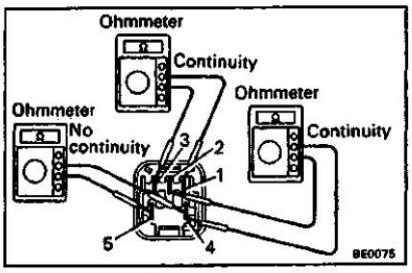
IGNITION MAIN RELAY





IGNITION MAIN RELAY ("IGN") INSPECTION

1. REMOVE IGNITION MAIN RELAY



2. INSPECT IGNITION MAIN RELAY

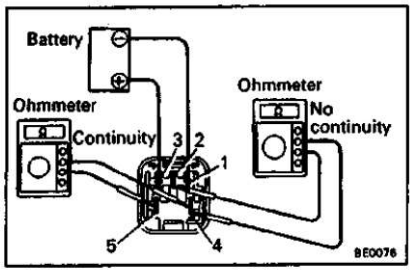
A. Inspect relay continuity

(a) Using an ohmmeter, check that there is continuity between terminals 1 and 3.

(b) Check that there is continuity between terminals 2 and 4.

(c) Check that there is no continuity between terminals 4 and 5.

If continuity is not as specified, replace the relay.



B. Inspect relay operation

(a) Apply battery voltage across terminals 1 and 3.

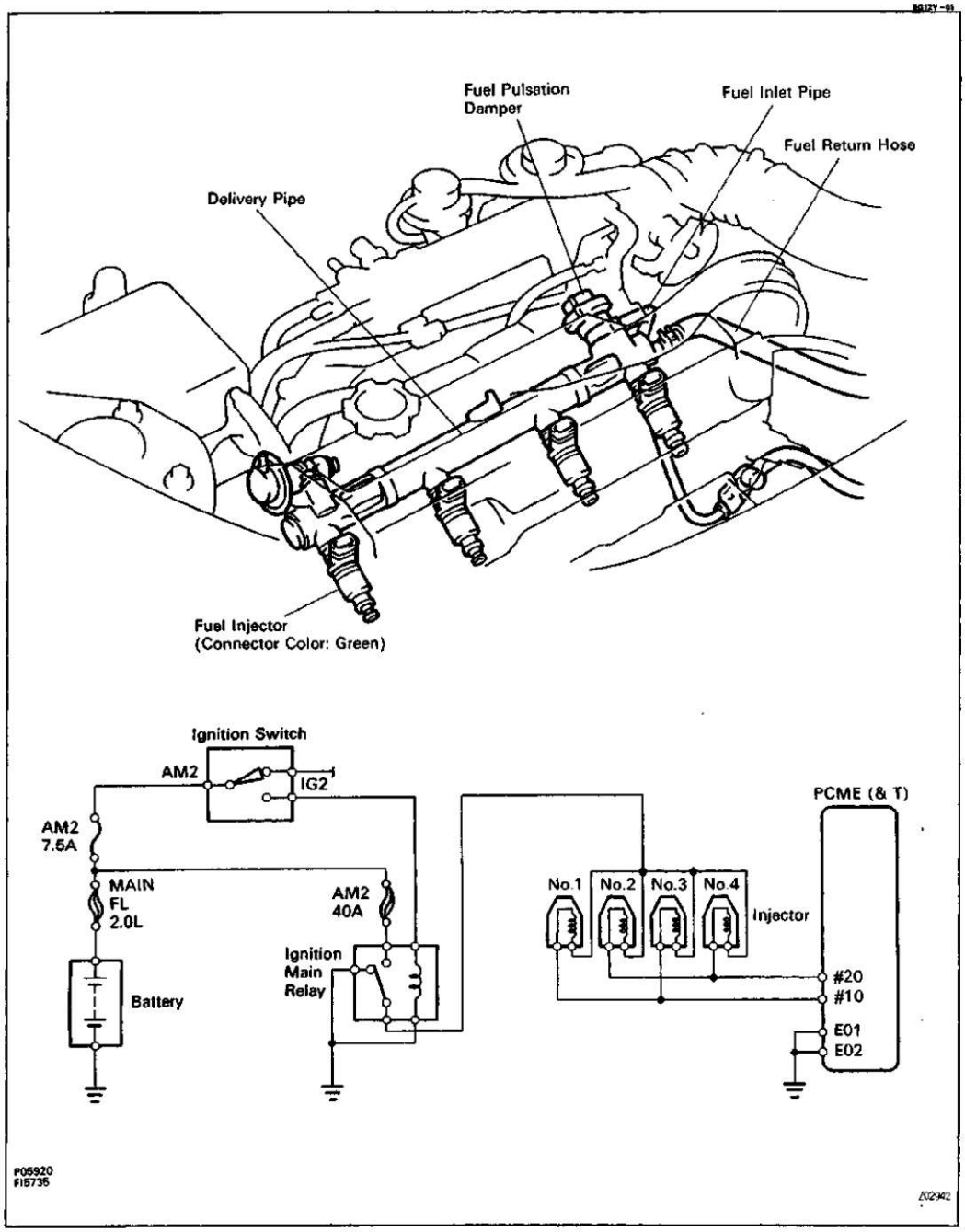
(b) Using an ohmmeter, check that there is continuity between the 2 and 4.

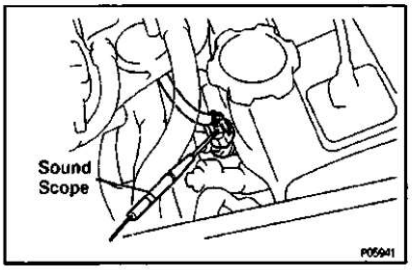
(c) Check that there is continuity between terminals 4 and 5.

If operation is not as specified, replace the relay.

3. REINSTALL IGNITION MAIN RELAY

INJECTOR


Fuel Pulsation Damper
Fuel Inlet Pipe
Fuel Return Hose
Delivery Pipe
Fuel Injector
(Connector Color: Green)
Ignition Switch
AM2
IG2
AM2
7.5A
MAIN
FL
2.0L
AM2
40A
Ignition
Main
Relay
Battery
No.1
No.2
No.3
No.4
Injector
PCME (& T)
#20
#10
E01
E02
P05920
F15735
A02942

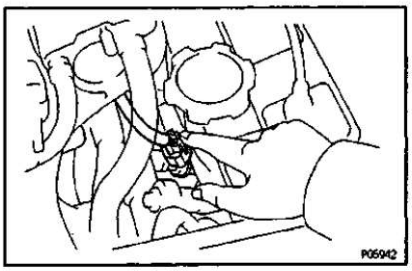


ON–VEHICLE INSPECTION

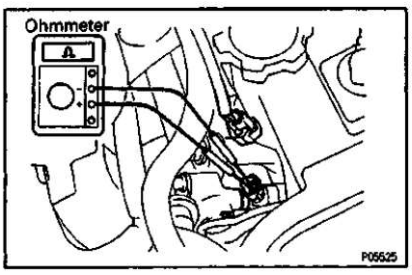
1. INSPECT INJECTOR OPERATION

Check operation sound from each injector.

(a) With the engine running or cranking, use a sound scope to check that there is normal operating noise in proportion to engine rpm.



(b) If you have no sound scope, you can check the injector transmission operation with your finger.
If no sound or unusual sound is heard, check the wiring connector, injector or injection signal from the PCME (& T).



2. INSPECT INJECTOR RESISTANCE

(a) Disconnect the injector connector.

(b) Using an ohmmeter, measure the resistance between the terminals.

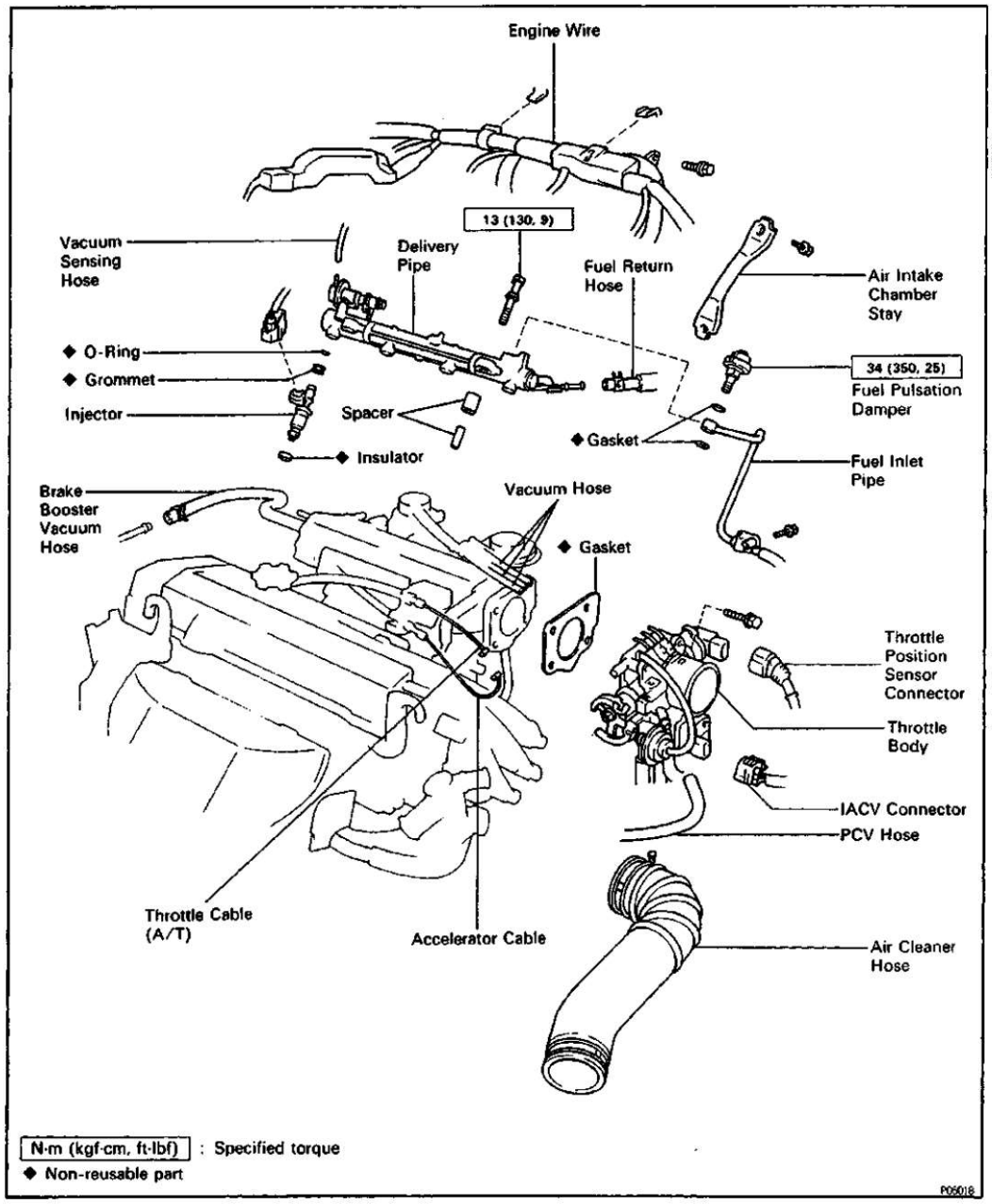
Resistance:

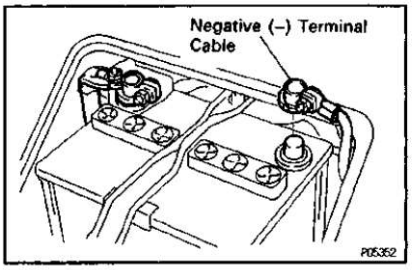
Approx. 13.8Ω

If the resistance is not as specified, replace the injector.

(c) Reconnect the injector connector.

COMPONENTS FOR REMOVAL AND INSTALLATION

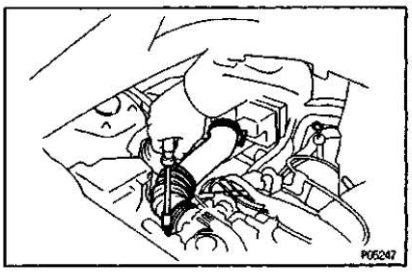




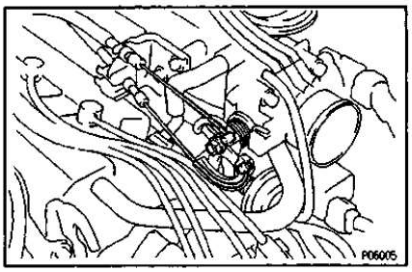
INJECTORS REMOVAL

(See Components for Removal and Installation)

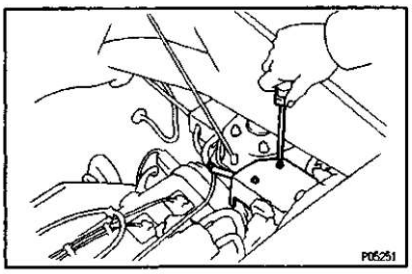
1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY
   CAUTION: Turn the ignition switch to "LOCK". Disconnect the negative terminal from the battery. Wait at least 20 seconds before proceeding with work.
2. REMOVE RH ENGINE HOOD SIDE PANEL



3. REMOVE AIR CLEANER HOSE

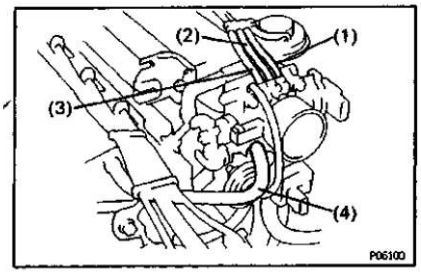


4. DISCONNECT ACCELERATOR CABLE FROM THROTTLE BODY
5. (A/T)
   DISCONNECT THROTTLE CABLE FROM THROTTLE BODY

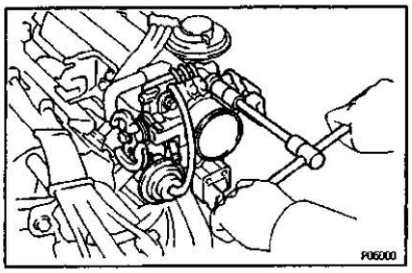


6. (w/ CRUISE CONTROL SYSTEM)
   REMOVE CRUISE CONTROL ACTUATOR

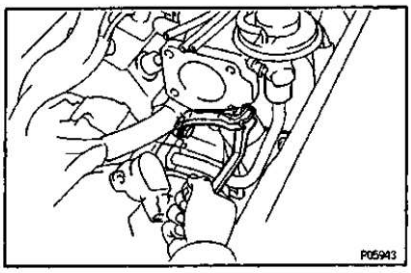
7. DISCONNECT THROTTLE BODY FROM INTAKE MANIFOLD
   (a) Disconnect the following connector:
   - Throttle position sensor connector
   - IACV connector



(b) Disconnect the following hoses:
(1) Vacuum hose (from upper port of TVS) from port "P" of throttle body
(2) Vacuum hose (from port "Q" of EGR vacuum modulator) from port "E" of throttle body
(3) Vacuum hose (from port "R" of EGR vacuum modulator) from port "R" of throttle body
(4) PCV hose (from cylinder head) from throttle body

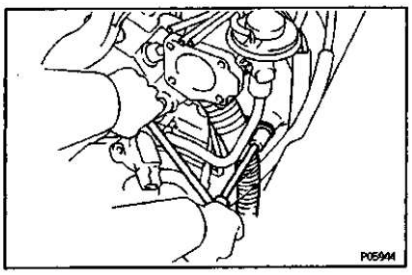


(c) Remove the four bolts, and disconnect the throttle body from the intake manifold.
(d) Remove the throttle body gasket.

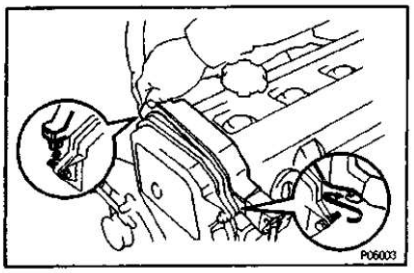


8. DISCONNECT ENGINE WIRE PROTECTOR

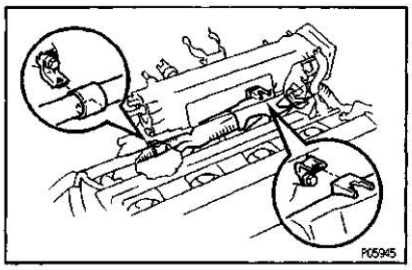
(a) Remove the two bolts and air intake chamber stay.



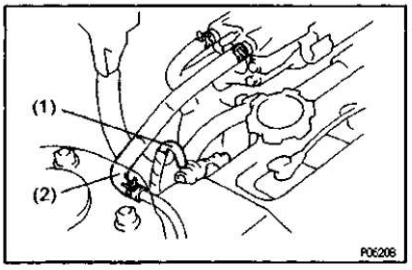
(b) Remove the bolt, and disconnect the engine wire protector from the RH side of the intake manifold.



(c) Disconnect the engine wire protector between the No. 3 timing belt and cylinder head cover.



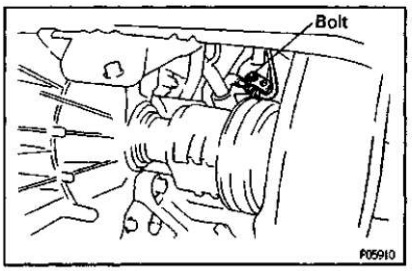
(d) Disconnect the engine wire protector from the two brackets on the front side of the intake manifold.



9. DISCONNECT VACUUM HOSE

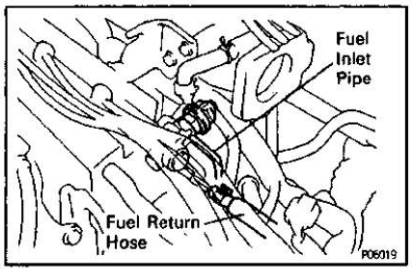
Disconnect the following hoses:

(1) Vacuum sensing hose from the fuel pressure regulator.
(2) Brake booster vacuum hose from intake manifold

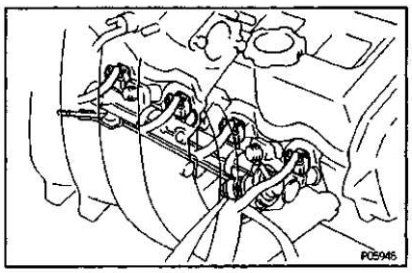


10. DISCONNECT FUEL INLET PIPE AND RETURN HOSE

(a) Remove the bolt holding the fuel inlet pipe to the cylinder head.

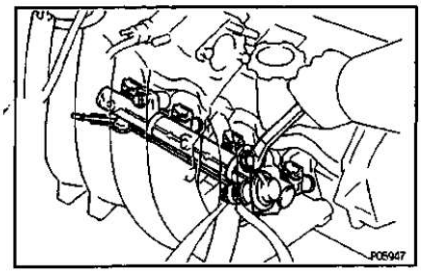


(b) Remove the pulsation damper and two gasket, and disconnect the fuel inlet pipe from the delivery pipe.
(c) Disconnect the fuel return' hose from the return pipe.

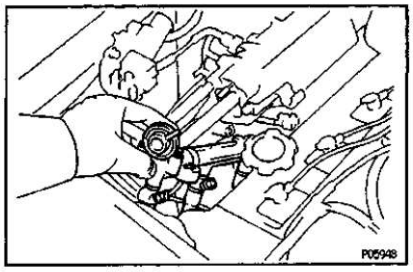


11. REMOVE DELIVERY PIPE AND INJECTORS

(a) Disconnect the four injector connectors.



(b) Remove the two bolts, the delivery pipe and four injectors assembly.



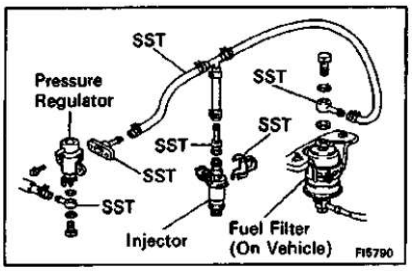
HINT: Remove the delivery pipe and four injectors assembly from the RH side of the engine.

NOTICE: Be careful not to drop the injectors when removing the delivery pipe.

(c) Remove the four insulators and two spacers from the cylinder head.

(d) Pull out the four injectors from the delivery pipe.

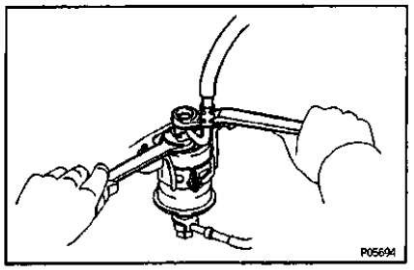
(e) Remove the O–ring and grommet from each injector.



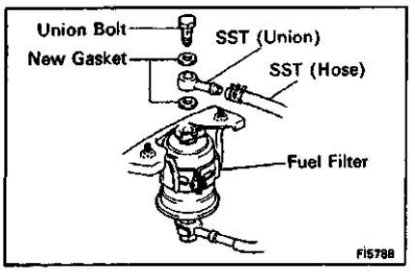
INJECTORS INSPECTION

1. INSPECT INJECTOR INJECTION

CAUTION: Keep injector clean of sparks during the test.

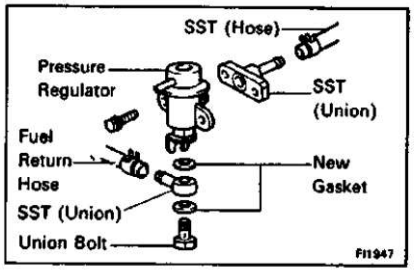


(a) Remove the union bolt and two gaskets, and disconnect the fuel inlet hose from the fuel filter outlet.

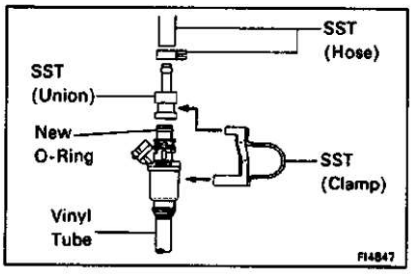


(b) Connect SST (union and hose) to the fuel filter outlet with two new gaskets and union bolts.
SST 09268–41045 (90405–09015)

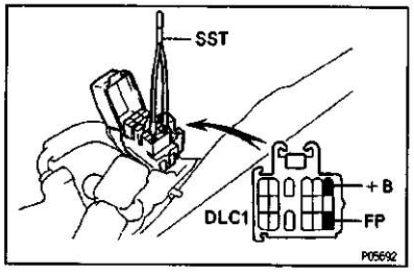
Torque: 29 N–m (300 kgf–cm, 22 ft–lbf)



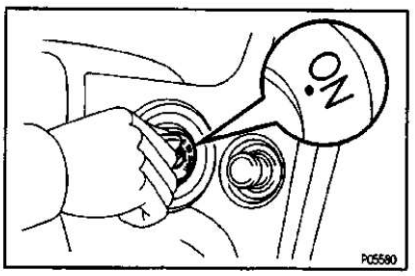
(c) Remove the pressure regulator from the delivery pipe.
(d) Install a new 0–ring to the fuel inlet of pressure regulator.
(e) Connect SST (hose) to the fuel inlet of the pressure regulator with SST (union) and the two bolts.
SST 09268–41045 (09268–41090)
Torque: 5.4 N–m (55 kgf–cm, 48 ft–lbf)
(f) Connect the fuel return hose to the fuel outlet of the pressure regulator with SST (union), two new gaskets and union bolts.
SST 09268–41045 (09268–41080)
Torque: 18 N–m (180 kgf–cm, 13 ft–lbf)



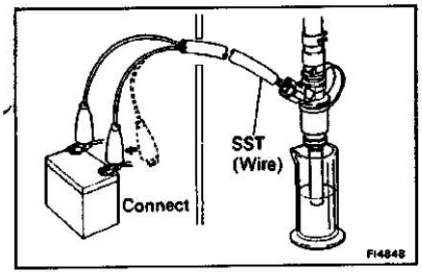
(g) Install the grommet and anew 0–ring to the injector.
(h) Connect SST (union and hose) to the injector, and hold the injector and union with SST (clamp).
SST 09268–41045
(i) Put the injector into the graduated cylinder.
HINT: Install a suitable vinyl hose onto the injector to prevent gasoline from splashing out.



(j) Using SST, connect terminals +B and FP of the data link connector 1.
SST 09843–18020
(k) Reconnect the battery negative (–) cable.



(l) Turn the ignition switch ON.
NOTICE: Do not start the engine.

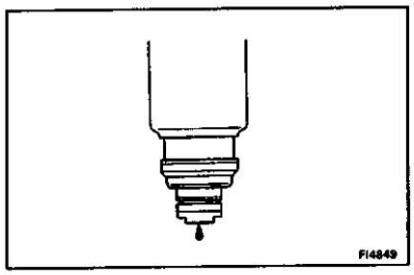


(m) Connect SST (wire) to the injector and battery for 15 seconds, and measure the injection volume with a graduated cylinder. Test each injector two or three times.
SST 09842–30070

Volume:
49 – 59 cm^2 (3.0 – 3.6 cu in.) per 15 sec.

Difference between each injector:
5 cm^2 (0.3 cu in.) or less

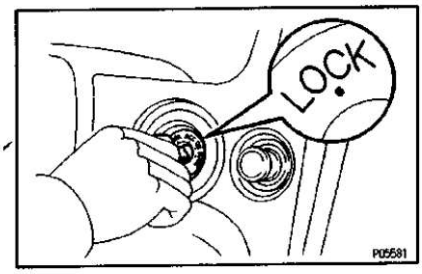
If the injection volume is not as specified, replace the injector.



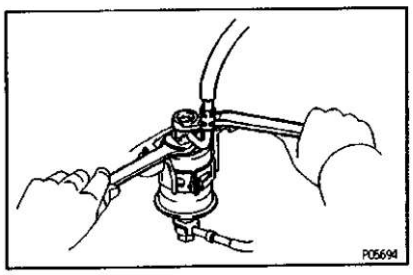
2. INSPECT LEAKAGE

(a) In the condition above, disconnect he test probes of SST (wire) from the battery and check and check the fuel leakage from the injector.
SST 09842–30070

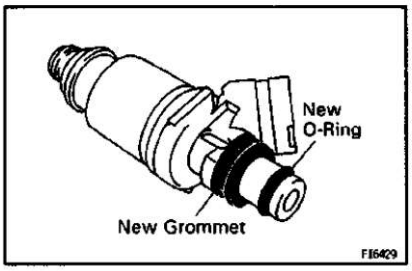
Fuel drop:
One drop or less per minute



(b) Turn the ignition switch OFF.
(c) Disconnect the battery negative (–) cable.
(d) Remove the SST.
SST 09268–41045, 09843–18020



(e) Reinstall the fuel inlet hose to the fuel filter outlet with the two new gaskets and the union bolt.
Torque: 29 N–m (300 kgf–cm, 22 ft–lbf)



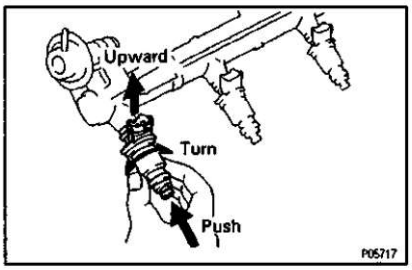
INJECTORS INSTALLATION

(See Components for Removal and Installation)

1. INSTALL INJECTORS AND DELIVERY PIPE

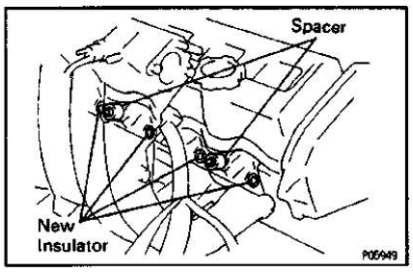
(a) Install a new grommet to the injector.

(b) Apply a light coat of gasoline to a new 0–ring and install it to the injector.

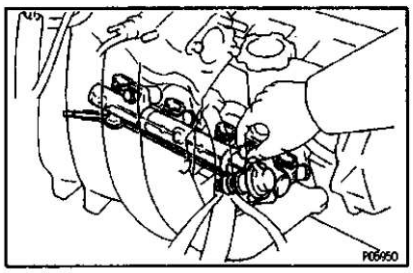


(c) While turning the injector left and right, install it to the delivery pipes. Install the four injectors.

(d) Position the injector connector upward.

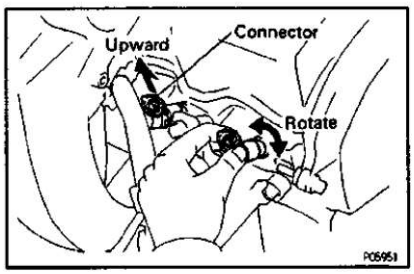


(e) Place four new insulators and the two spacers in position on the cylinder head.



(f) Place the four injectors and delivery pipe assembly in position on the cylinder head.

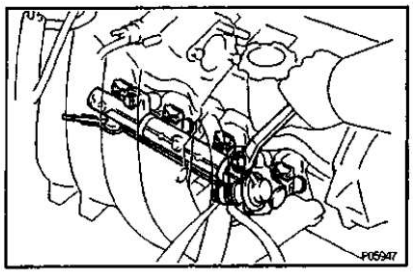
(g) Temporarily install the two bolts holding the delivery pipe to the cylinder head.



(h) Check that the injectors rotate smoothly.

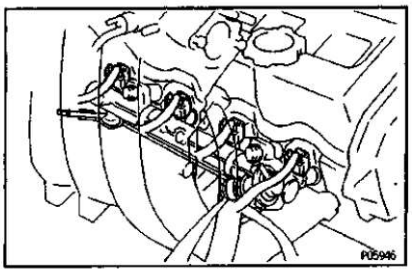
HINT: If injectors do not rotate smoothly, the probable cause is incorrect installation of O –rings. Replace the O–rings.

(i) Position the injector connector upward.

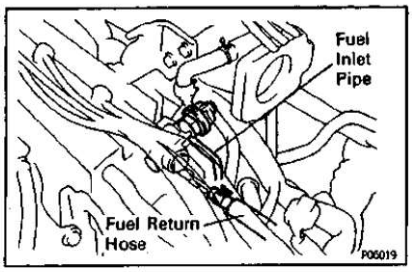


(j) Tighten the two bolts holding the delivery pipe to the cylinder head.

Torque: 13 N–m (130 kgf–cm, 9 ft–lbf)



(k) Connect the four injector connectors.

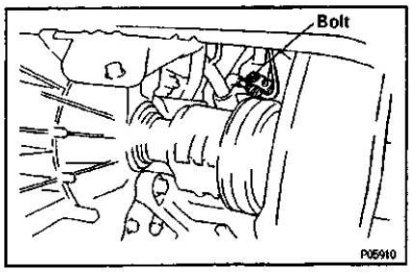


2. CONNECT FUEL INLET PIPE AND RETURN HOSE

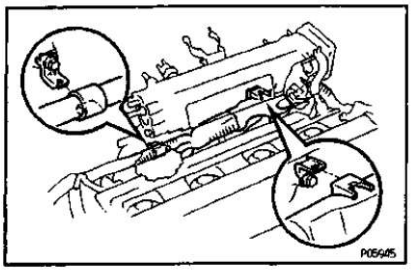
(a) Connect the fuel inlet pipe to the delivery pipe with two new gaskets and the pulsation damper.

Torque: 34 N–m (350 kgf–cm, 25 ft–lbf)

(b) Connect the fuel return hose.

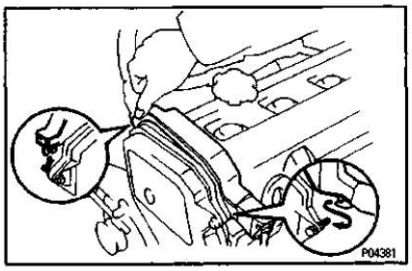


(c) Install the fuel inlet pipe to the cylinder head with the bolt.



3. INSTALL ENGINE WIRE PROTECTOR

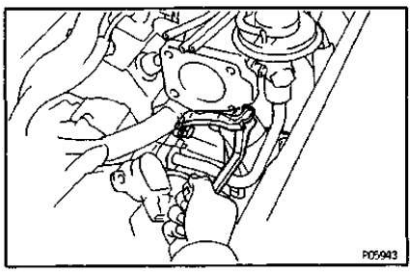
(a) Connect the the engine wire protector to the brackets on the front side of the intake manifold.



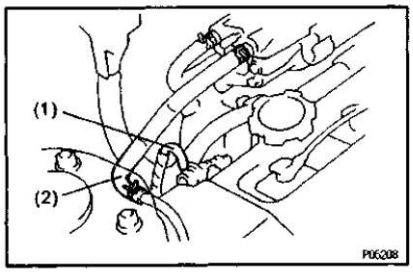
(b) Install the two clamps of the engine wire protector to each bolt.



(c) Install the engine wire protector with the bolt.



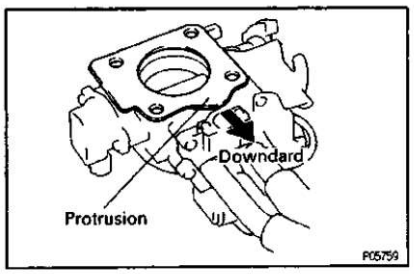
(d) Install the air intake chamber stay with the two bolts.
Torque: 42 N–m (425 kgf–cm, 31 ft–lbf)



4. CONNECT VACUUM HOSES

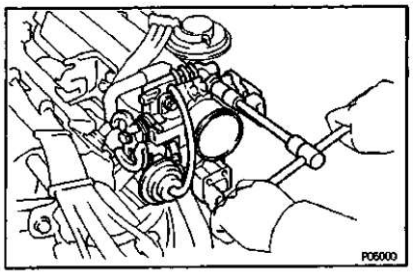
Connect the following hoses:

- Vacuum sensing hose to fuel pressure regulator
- Brake booster vacuum hose to intake manifold

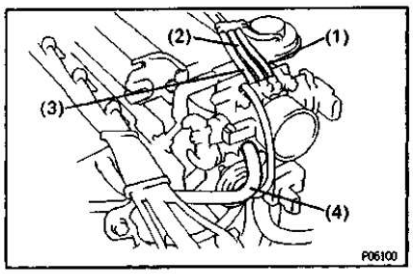


5. INSTALL THROTTLE BODY

(a) Place a new gasket on the throttle body, facing the protrusion downward.

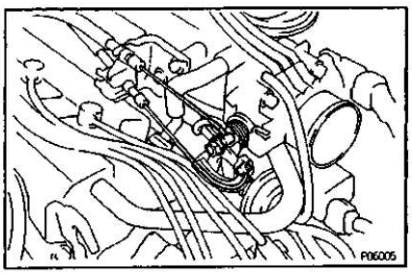


(b) Install the throttle body with the four bolts.
Torque: 19 N–m (195 kgf–cm, 14 ft–lbf)
HINT: Different bolt lengths are used for the upper and lower sides.
Bolt length:
45 mm (1.77 in.) for upper side
55 mm (2.17 in.) for lower side



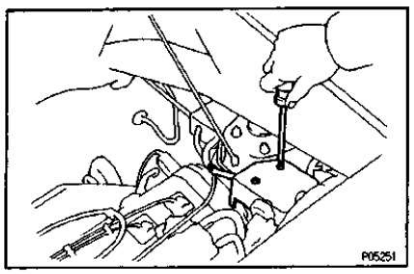
(c) Connect the following hoses:
(1) Vacuum hose (from upper port of TVS) to port "P" of throttle body
(2) Vacuum hose (from port "Q" of EGR vacuum modulator) to port "E" of throttle body
(3) Vacuum hose (from port "R" of EGR vacuum modulator) to port "R" of throttle body
(4) PCV hose (from cylinder head) to throttle body

(d) Connect the following connectors:
Throttle position sensor connector
IACV connector

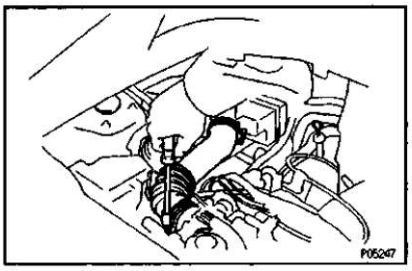


6. CONNECT ACCELERATOR CABLE TO THROTTLE BODY

7. (A/T)
CONNECT THROTTLE CABLE TO THROTTLE BODY



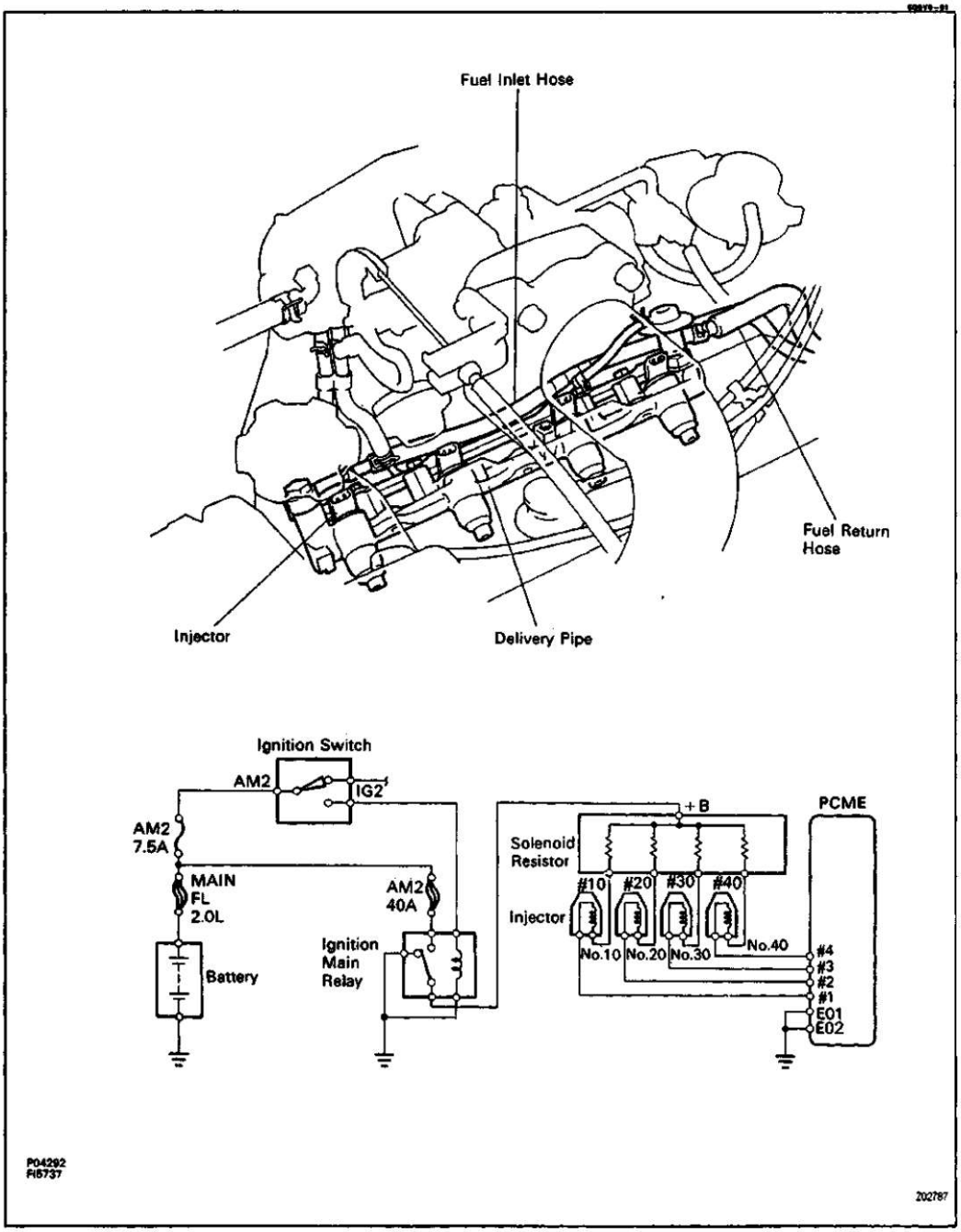
8. (w/ CRUISE CONTROL SYSTEM)
INSTALL CRUISE CONTROL ACTUATOR



9. INSTALL AIR CLEANER HOSE

10. CONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY
11. START ENGINE AND CHECK FOR FUEL LEAKS
12. INSTALL ENGINE HOOD SIDE PANELS

INJECTOR


Fuel Inlet Hose
Fuel Return Hose
Injector
Delivery Pipe
Ignition Switch
AM2
IG2
AM2 7.5A
MAIN FL 2.0L
AM2 40A
Battery
Ignition Main Relay
+B
PCME
Solenoid Resistor
#10
#20
#30
#40
Injector
No.10
No.20
No.30
No.40
#4
#3
#2
#1
E01
E02
P04292
FI5737
202787

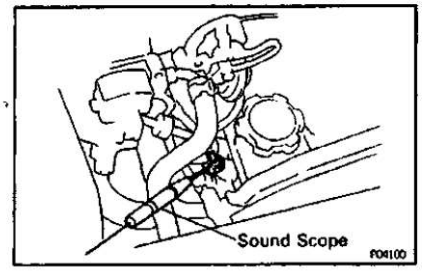
B60YA–01

ON–VEHICLE INSPECTION

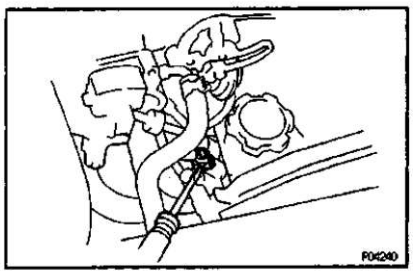
1. INSPECT INJECTOR OPERATION

Check operation sound from each injector.

(a) With the engine running or cranking, use a sound scope to check that there is normal operating noise in proportion to engine rpm.



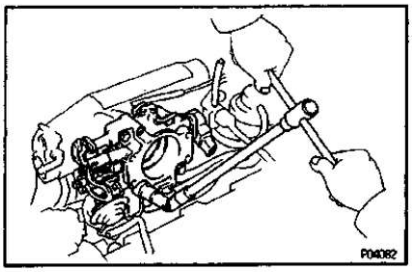
(b) If you have no sound scope, you can check the injector transmission operation with a screwdriver.
If no sound or unusual sound is heard, check the wiring connector, injector or injection signal from the PCME.



2. INSPECT INJECTOR RESISTANCE

(a) Remove the throttle body.
(See Throttle Body Removal)

(b) Disconnect the four injector connectors.

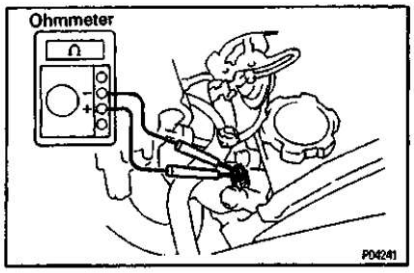


(c) Using an ohmmeter, measure the resistance between the terminals.

Resistance:

Approx. 2 – 4Ω

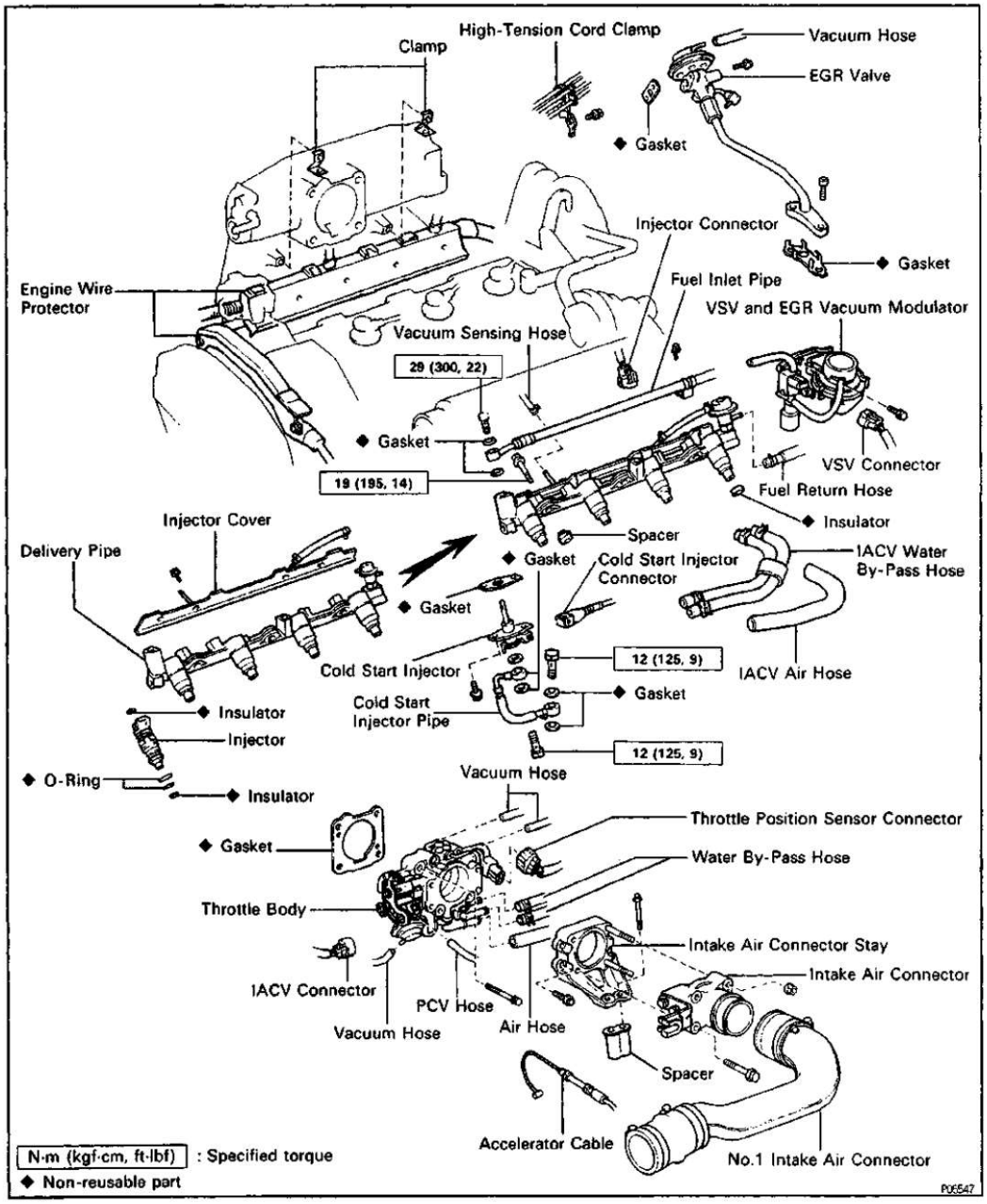
If the resistance is not as specified, replace the injector.

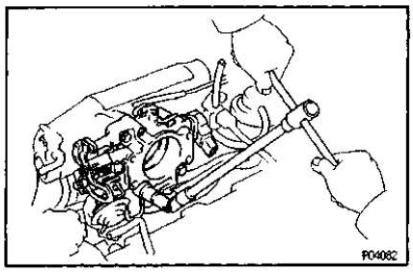


(d) Reconnect the four injector connectors.

(e) Reinstall the throttle body.
(See Throttle Body Installation)

COMPONENTS FOR REMOVAL AND INSTALLATION



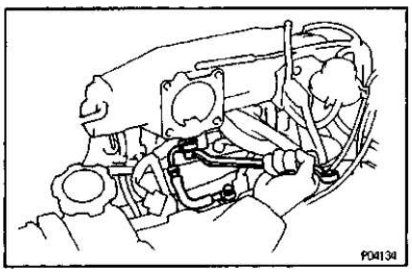


INJECTORS REMOVAL

(See Components for Removal and Installation)

1. REMOVE THROTTLE BODY

(See Throttle Body Removal)

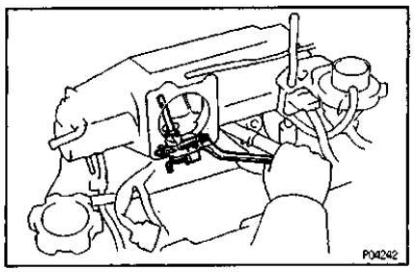


2. REMOVE COLD START INJECTOR PIPE

Remove the two union bolts, four gaskets and cold start injector pipe.

CAUTION:

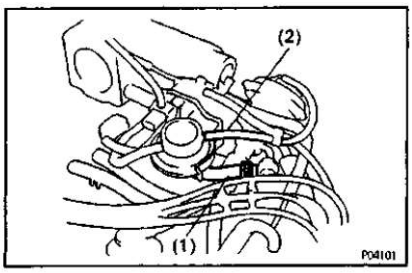
- Put a suitable container or shop towel under the injector pipe.
- Slowly loosen the union bolts.



3. REMOVE COLD START INJECTOR

(a) Disconnect the cold start injector connector.

(b) Remove the two bolts, cold start injector and gasket.



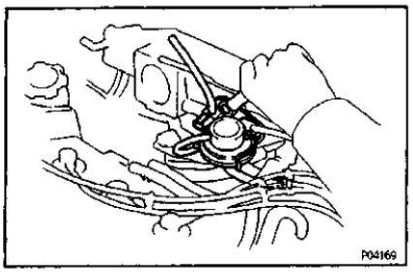
4. REMOVE VSV AND EGR VACUUM MODULATOR

(a) Disconnect the VSV connector.

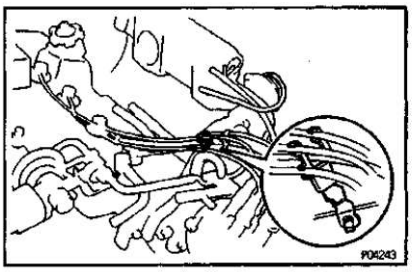
(b) Remove the following hoses from the vacuum modulator:

(1) EGR hose (from EGR valve)

(2) Vacuum hose (from EGR valve)



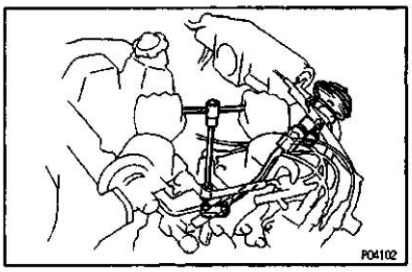
(c) Remove the bolt, the VSV and vacuum modulator assembly.



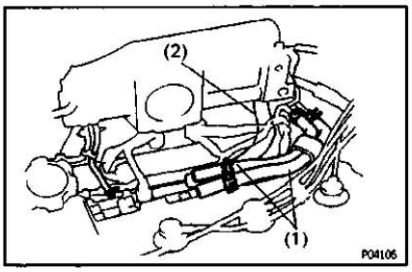
5. REMOVE EGR VALVE

(a) Disconnect the vacuum hose from the EGR valve.

(b) Remove the bolt, and disconnect the high–tension cord clamp from the LH engine hanger.



(c) Remove the four bolts, EGR valve and two gaskets.



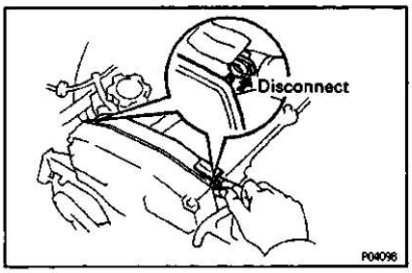
6. REMOVE WATER BY–PASS HOSE AND AIR HOSE

Remove the following hoses:

(1) Two IACV water by–pass hoses from No.1 air tube

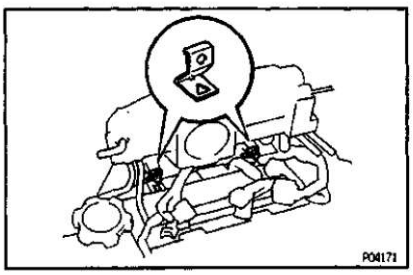
(2) IACV air hose from No.1 air tube

7. DISCONNECT VACUUM SENSING HOSE FROM VACUUM PIPE (ON INJECTOR COVER)

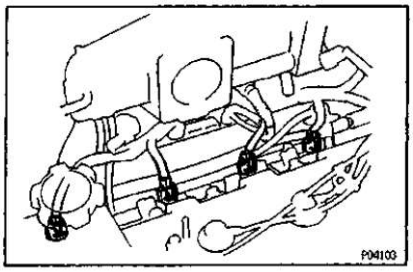


8. DISCONNECT ENGINE WIRE PROTECTORS

(a) Disconnect the engine wire protector between the No. 3 timing belt cover and cylinder head cover.

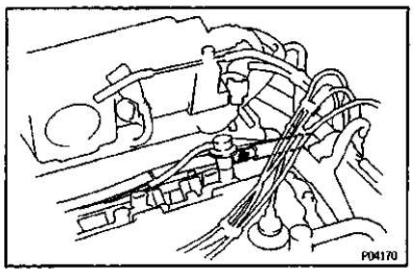


(b) Disconnect the engine wire protector from the clamp, and remove the bolt and clamp. Remove the two clamps.

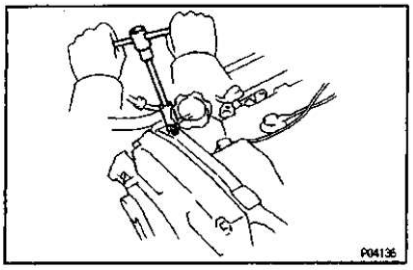


9. REMOVE DELIVERY PIPE ASSEMBLY

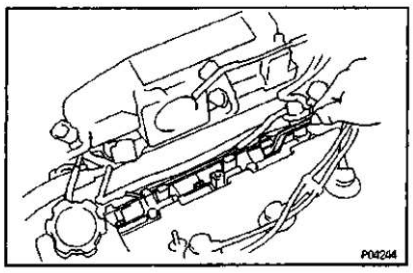
(a) Disconnect the four injector connectors.



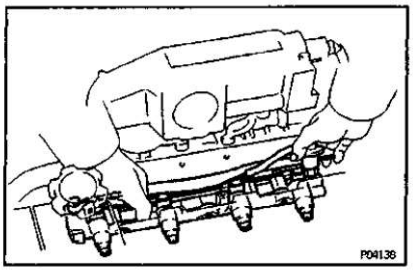
(b) Disconnect the fuel return hose from the fuel pressure regulator.



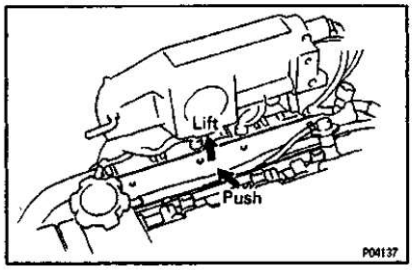
(c) Loosen the union bolt holding the fuel inlet hose to the delivery pipe.



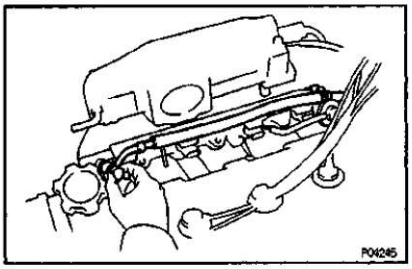
(d) Loosen the three bolts holding the delivery pipe to the cylinder head.



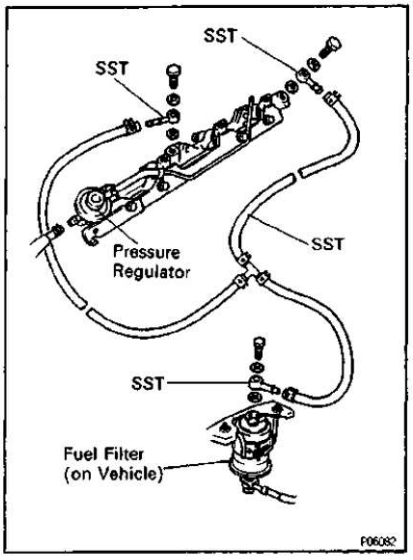
(e) Disconnect the delivery pipe assembly from the cyl–inder head.



HINT: Move the engine wire protector toward the direction shown, in the illustration.



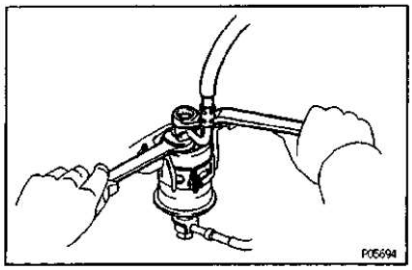
(f) Remove the union bolt, two gaskets and bolt, and disconnect the fuel inlet hose from the delivery pipe. Remove the delivery pipe assembly.
(g) Remove the four insulators and three spacers.



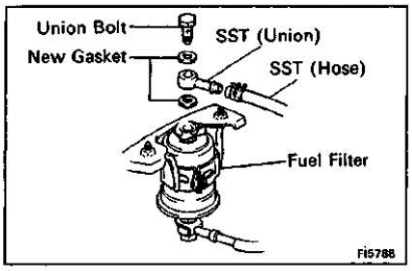
INJECTORS INSPECTION

1. INSPECT INJECTOR INJECTION

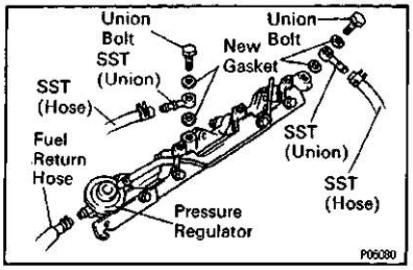
CAUTION: Keep injector clean of sparks during the test.



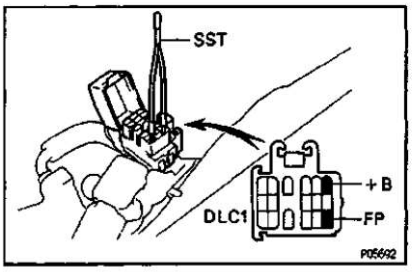
(a) Remove the union bolt and two gaskets, and disconnect the fuel inlet hose from the fuel filter outlet.



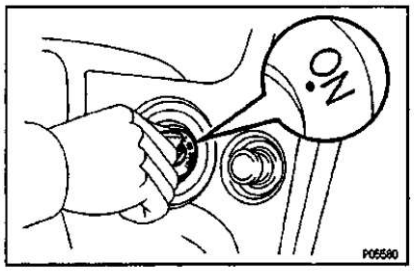
(b) Connect SST (union and hose) to the fuel filter outlet with two new gaskets and union bolts.
SST 09268–41045 (90405–09015)
Torque: 29 N–m (300 kgf–cm, 22 ft–lbf)



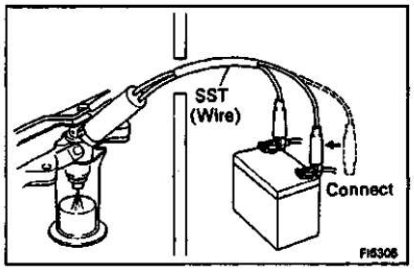
(c) Connect the fuel return hose to the fuel outlet of the pressure regulator on the delivery pipe.
(d) Connect SST (union and hose) to the delivery pipe with four new gaskets and the two union bolts.
SST 09268–41045 (09268–41080, 90405–09015)
Torque:
12 N–m (125 kgf–cm, 9 ft–lbf) for 12 mm head
29 N–m (300 kgf–cm, 22 ft–lbf) for 17 mm head
(e) Put the injector into the graduated cylinder.



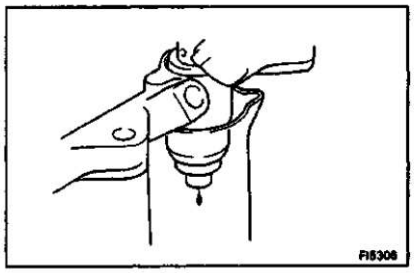
(f) Using SST, connect terminals +B and FP of the data link connector.
SST 09843–18020
(g) Reconnect the battery negative (–) cable.



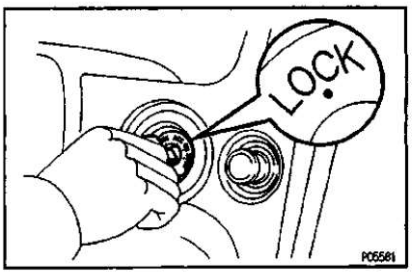
(h) Turn the ignition switch ON.
NOTICE: Do not start the engine.



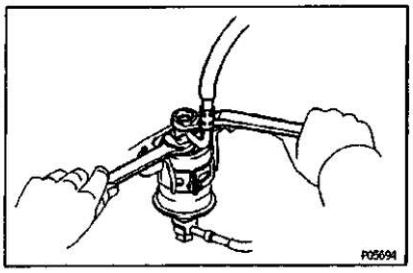
(i) Connect SST (wire) to the injector and battery for 15 seconds, and measure the injection volume with a graduated cylinder. Test each injector two or three times.
SST 09842–30060
Volume:
95 – 120 cm^2 (5.8 – 7.3 cu in.) per 15 second
Difference between each injector:
5 cm^2 (0.3 cu in.) or less
If the injection volume is not as specified, replace the injector.



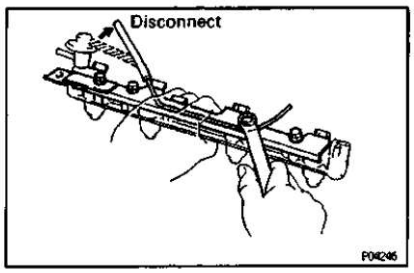
2. INSPECT LEAKAGE
(a) In the condition above, disconnect the test probes of SST (wire) from the battery and check and check for fuel leakage from the injector.
SST 09842–30060
Fuel drop:
One drop or less per minute



(b) Turn the ignition switch OFF.
(c) Disconnect the battery negative (–) cable.
(d) Remove the SST.
SST 09268–41045, 09843–18020



(e) Reinstall the fuel inlet hose to the fuel filter outlet with the two new gaskets and the union bolt.
Torque: 29 N–m (300 kgf–cm, 22 ft–lbf)

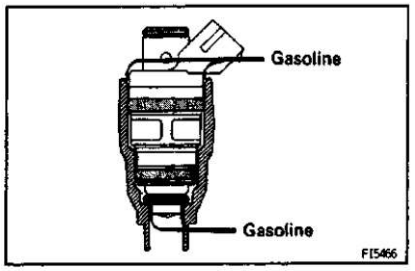


INJECTORS REPLACEMENT

(See Components for Removal and Installation)

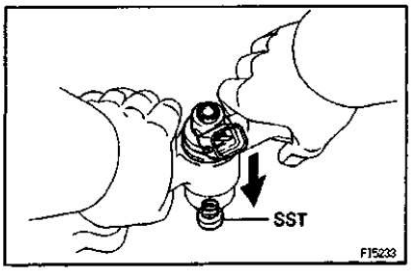
1. REMOVE INJECTOR COVER

(a) Disconnect the vacuum sensing hose from the fuel pressure regulator.
(b) Remove the four bolts and injector cover.
(c) Remove the four insulators from the injectors.

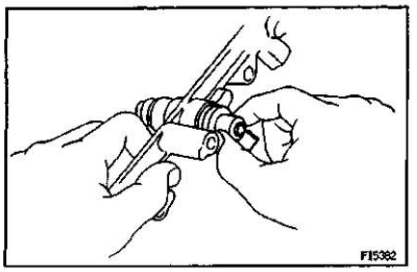


2. REMOVE INJECTORS

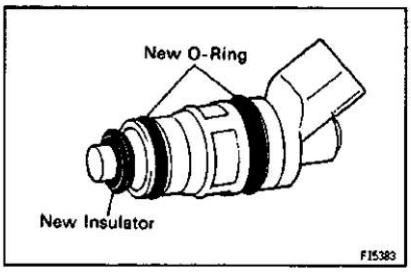
(a) Apply gasoline between the delivery pipe and injec–tors.



(b) Using SST, lift up the four injectors.
SST 09268–74010



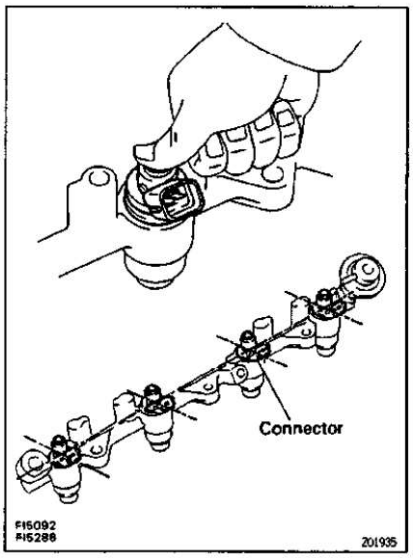
(c) Pull out the four injectors from the delivery pipe.
(d) Remove the insulator and two O–rings from each injector.



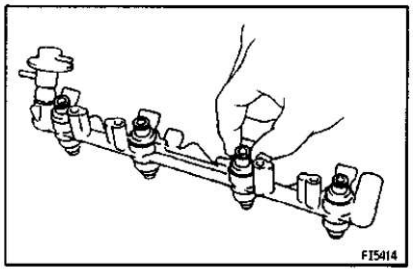
3. INSTALL INJECTORS

(a) Apply a light coat of gasoline to two new O –rings.

(b) Install the two 0–rings and new insulator to each injector.

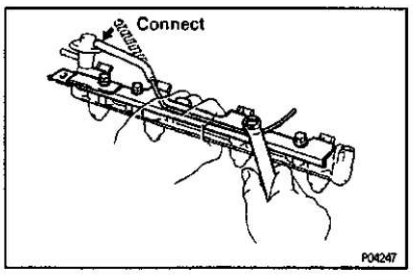


(c) Push in the four injectors so that the injector con–nectors are positioned as shown in the illustration.



4. INSTALL INJECTOR COVER

(a) Install a new insulator on each injector.



(b) Install the injector cover with the four bolts.
Torque: 7.8 N–m (80 kgf–cm, 69 in.–lbf)

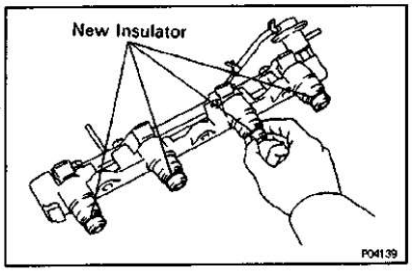
(c) Connect the vacuum sensing hose to the fuel pressure regulator.

INJECTORS INSTALLATION

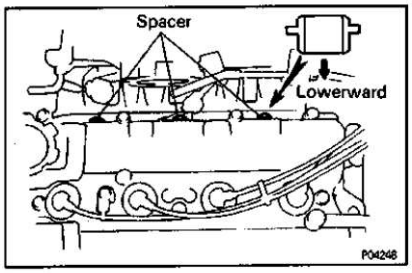
(See Components for Removal and Installation)

1. INSTALL DELIVERY PIPE ASSEMBLY

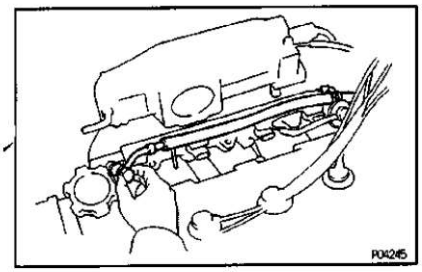
(a) Install four new insulators to the delivery pipe.



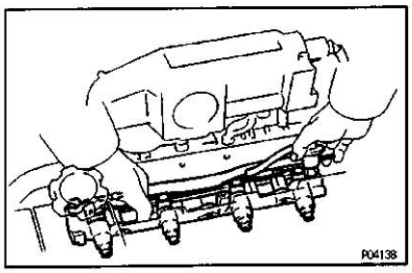
(b) Install the three spacers to the cylinder head.



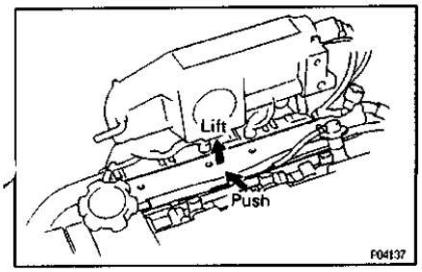
(c) Connect the fuel inlet pipe to the delivery pipe with the two gaskets, union bolt and bolt. Do not tighten the union bolt yet.

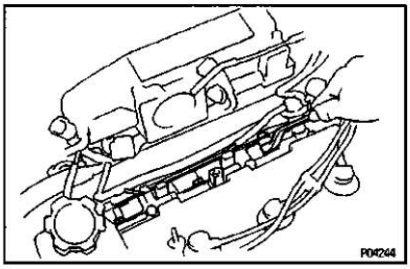


(d) Attach the delivery pipe assembly to the cylinder head.

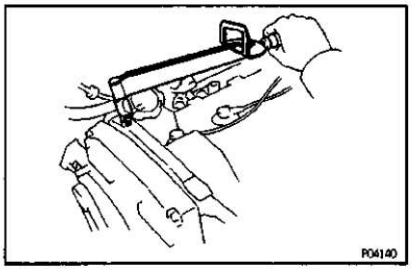


HINT: Move the engine wire protector toward the direction shown, in the illustration.

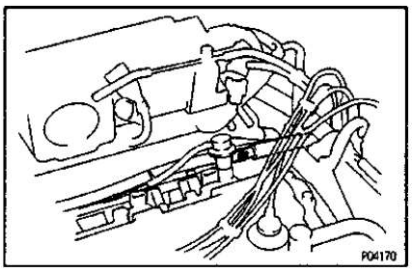




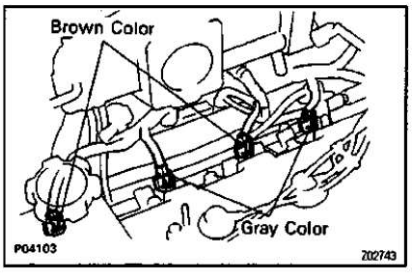
(e) Install the delivery pipe assembly with the three bolts.
Torque: 19 N–m (195 kgf–cm, 14 ft–lbf)



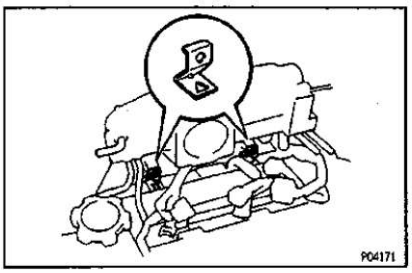
(f) Tighten the union bolt holding the fuel inlet pipe to delivery pipe.
Torque: 29 N–m (300 kgf–cm. 22 ft–lbf)



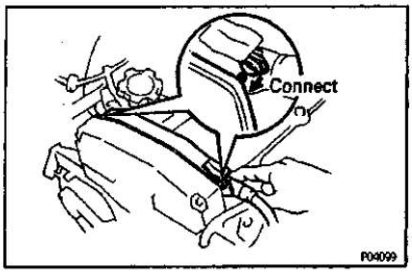
(g) Connect the fuel return hose to the fuel pressure regulator.



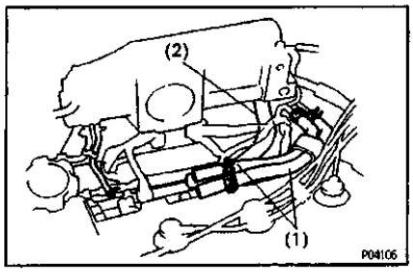
(h) Connect the four injector connectors.
HINT: No.1 and No.3 injector connectors are brown, No.2 and No.4 injector connectors are gray.



2. INSTALL ENGINE WIRE PROTECTOR
(a) Install the clamp to the intake manifold with the bolt.
Install the two clamps.
(b) Install the engine wire protector to the two clamps.



(c) Install two clamps of the engine wire protector to each bolt.



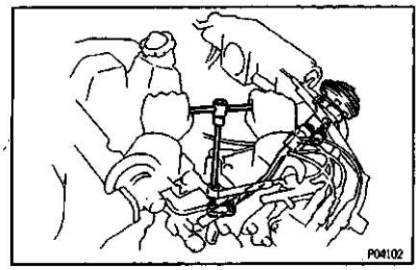
3. INSTALL WATER BY–PASS HOSE AND AIR HOSE

Install the following hoses:

(1) Two IACV water by–pass hoses to No. 1 air tube

(2) IACV air hose to No. 1 air tube

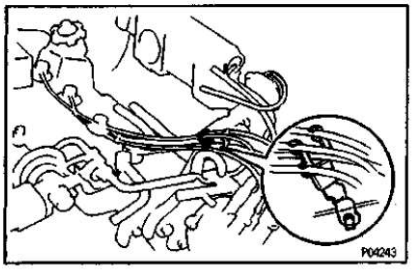
4. CONNECT VACUUM SENSING HOSE TO VACUUM PIPE (ON INJECTOR COVER)



5. INSTALL EGR VALVE

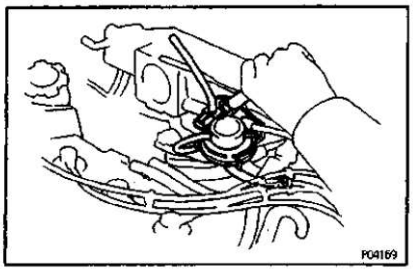
(a) Install two new gaskets and the EGR valve with the four bolts.

Torque:
19 N–m (195 kgf–cm, 14 ft–lbf) for intake manifold
25 N–m (260 kgf–cm, 19 ft–lbf) for cylinder head



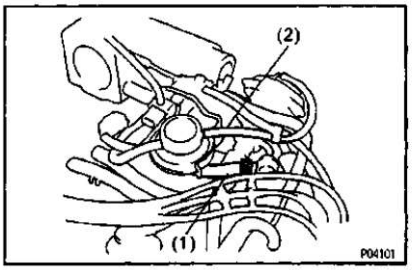
(b) Install the high–tension cord clamp to the LH engine hanger with the bolt.

(c) Connect the vacuum hose to the EGR valve.

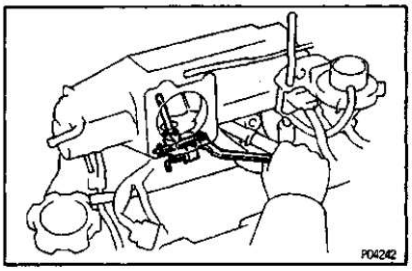


6. INSTALL VSV AND EGR VACUUM MODULATOR

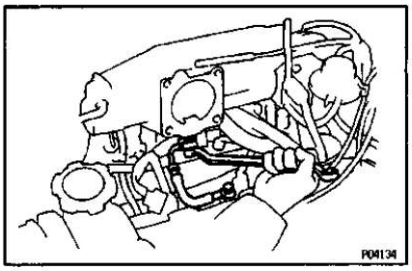
(a) Install the VSV and vacuum modulator assembly with the bolt.



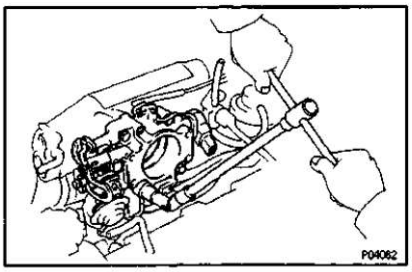
(b) Install the following hoses to the vacuum modulator:
(1) EGR hose (from EGR valve)
(2) Vacuum hose (from EGR valve)
(c) Connect the VSV connector.



7. INSTALL COLD START INJECTOR
(a) Install a new gasket and the cold start injector with the two bolts.
Torque: 5.9 N–m (60 kgf–cm, 52 in.–lbf)
(b) Connect the cold start injector connector.



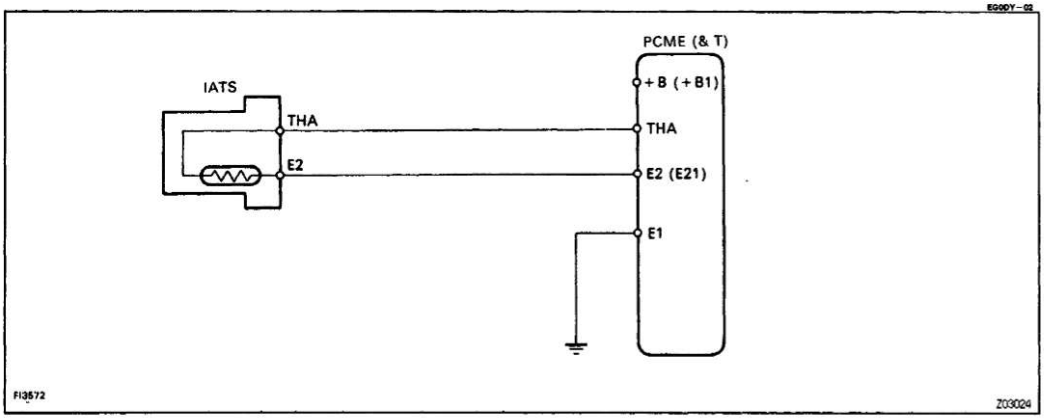
8. INSTALL COLD START INJECTOR PIPE
Install the cold start injector pipe with four new gaskets and two union bolts.
Torque: 12 N–m (125 kgf–cm, 9 ft–lbf)

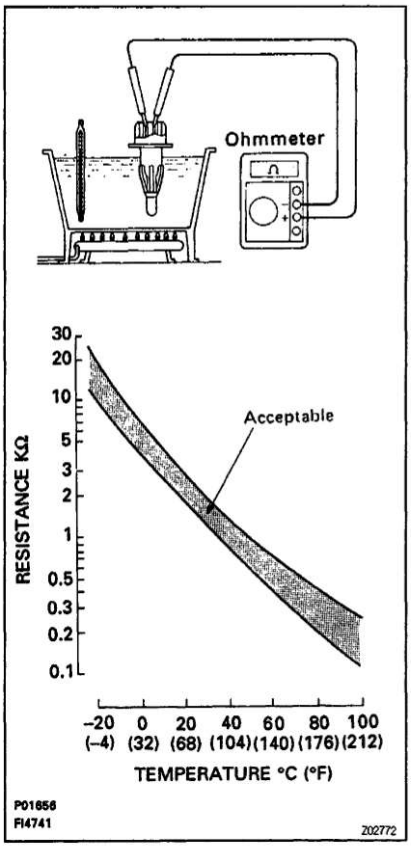


9. INSTALL THROTTLE BODY
(See Throttle Body Installation)

10. START ENGINE AND CHECK FOR FUEL LEAKS

INTAKE AIR TEMPERATURE SENSOR (IATS)





IATS INSPECTION

1. REMOVE IATS

2. INSPECT IATS

Using an ohmmeter, measure the resistance between the terminals.

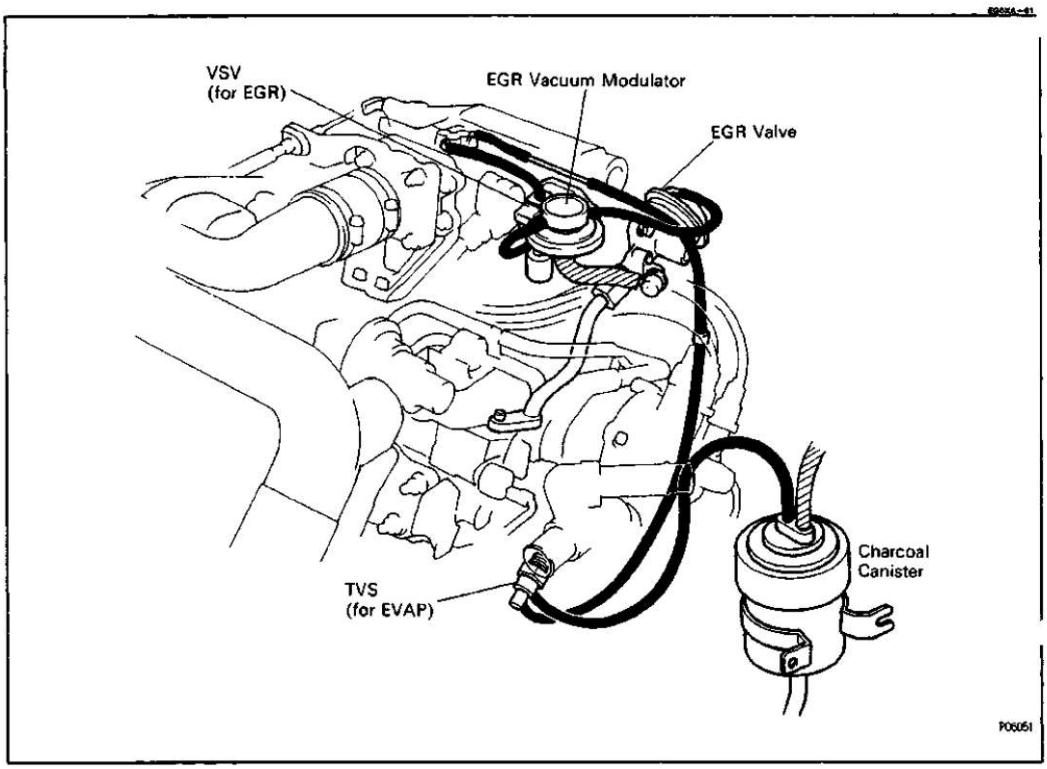
Resistance:

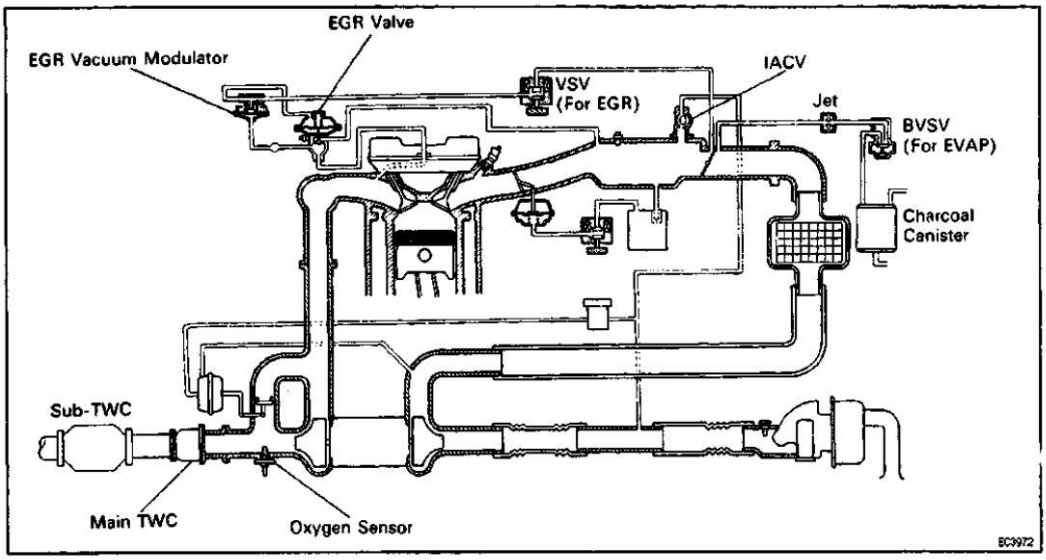
Refer to the chart graph

If the resistance is not as specified, replace the IATS.

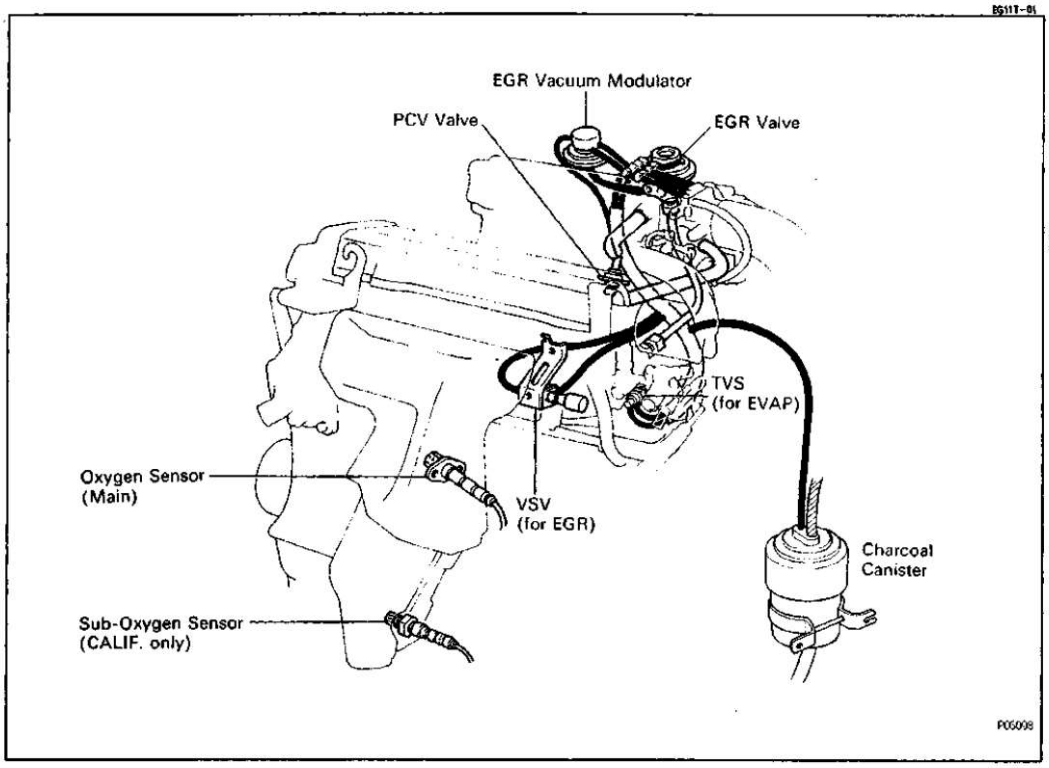
3. REINSTALL IATS

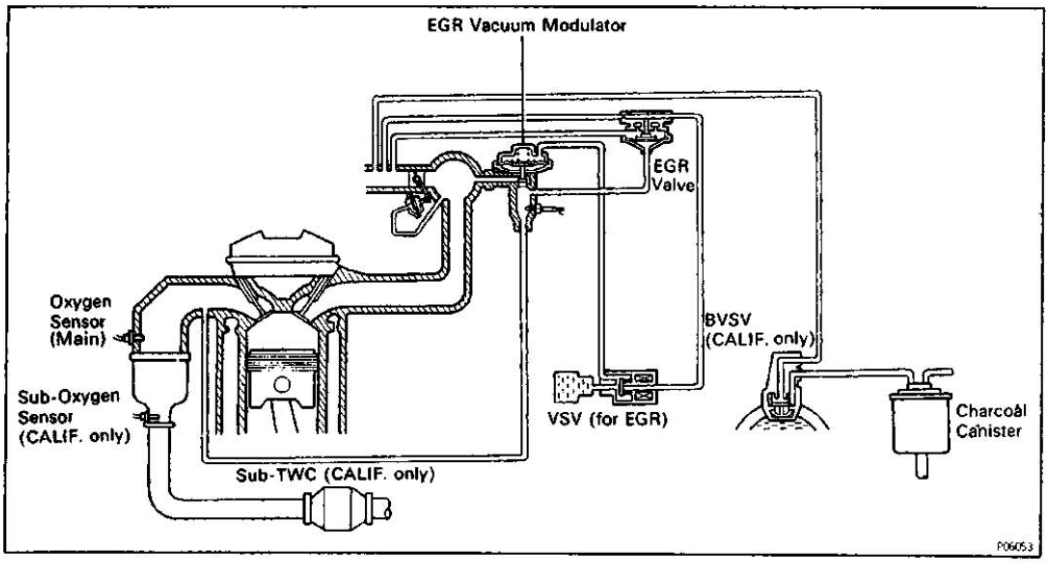
LAYOUT AND SCHEMATIC DRAWING



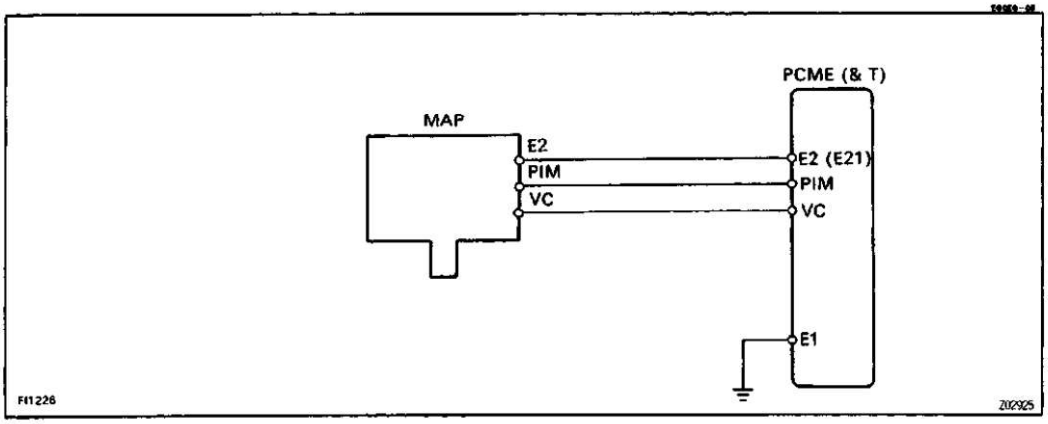


LAYOUT AND SCHEMATIC DRAWING





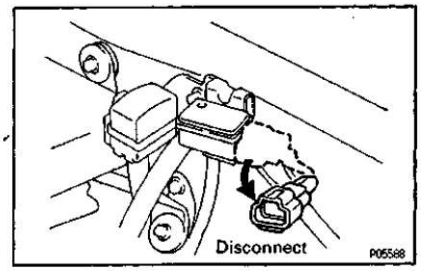
MANIFOLD ABSOLUTE PRESSURE SENSOR (MAP)



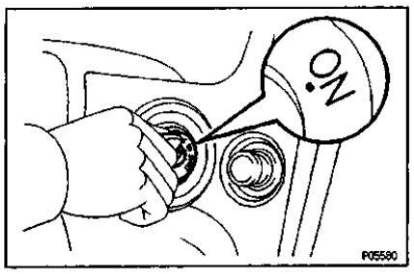
MAP INSPECTION

1. INSPECT POWER SOURCE VOLTAGE OF MAP

(a) Disconnect the MAP connector.



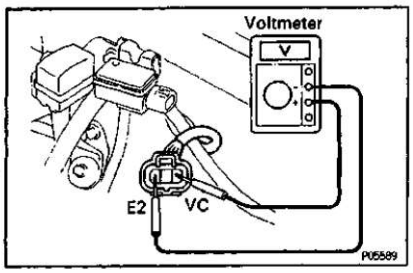
(b) Turn the ignition switch ON.

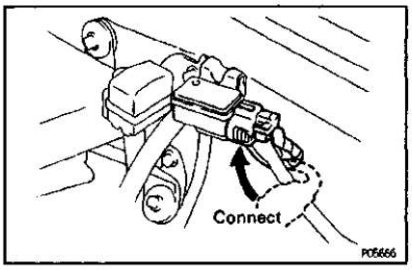


(c) Using a voltmeter, measure the voltage between connector terminals VC and E2 of the wiring harness side.

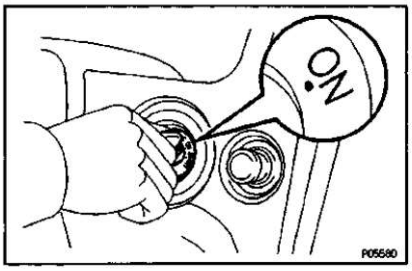
Voltage:

4.5 – 5.5 V



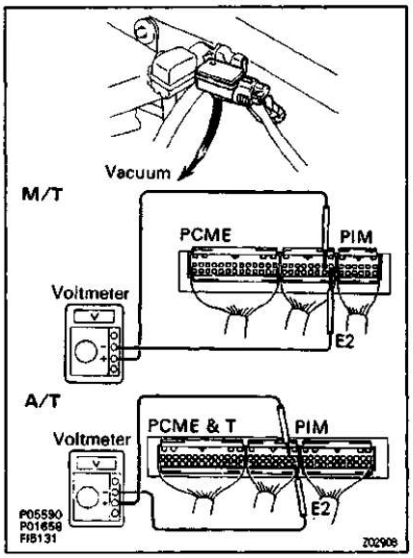


(d) Turn the ignition switch OFF.
(e) Reconnect the MAP connector.



2. INSPECT POWER OUTPUT OF MAP

(a) Turn the ignition switch ON.



(b) Disconnect the vacuum hose on the air intake manifold side.
(c) Connect a voltameter to terminals PIM and E2 of the PCM, and measure the output voltage under ambient atmospheric pressure.
(d) Apply vacuum to the MAP in 13.3 kPa (100 mmHg, 3.94 in.Hg) segments to 66.7 kPa (500 mmHg, 19.69 in.Hg).
(e) Measure the voltage drop from step (c) above for each segment.

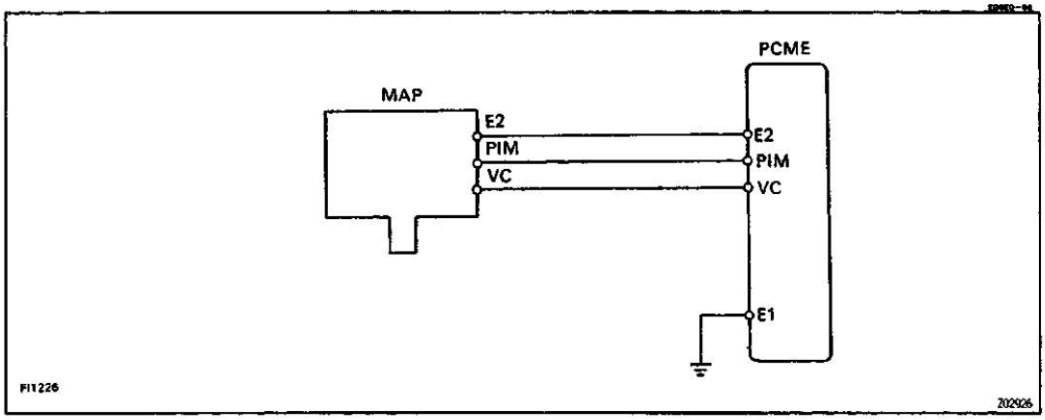
Voltage drop:

Applied Vacuum kPa (mmHg, in.Hg)	13.3 (100, 3.94)	26.7 (200, 7.87)	40.0 (300, 11.81)	53.5 (400, 15.75)	66.7 (500, 19.69)
Voltage drop V	0.3 – 0.5	0.7 – 0.9	1.1 – 1.3	1.5 – 1.7	1.9 – 2.1

V00494

(f) Reconnect the vacuum hose to the intake manifold.

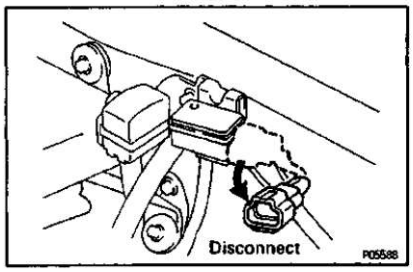
MANIFOLD ABSOLUTE PRESSURE SENSOR (MAP)



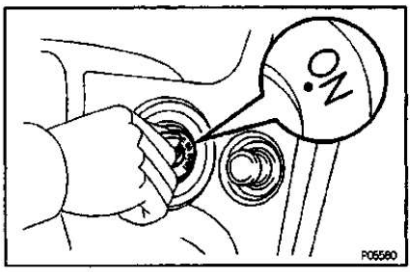
MAP INSPECTION

1. INSPECT POWER SOURCE VOLTAGE OF MAP

(a) Disconnect the MAP connector.



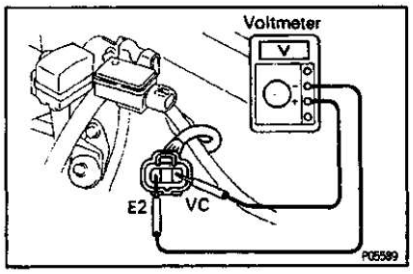
(b) Turn the ignition switch ON.

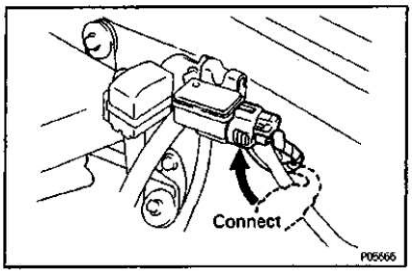


(c) Using a voltmeter, measure the voltage between connector terminals VC and E2 of the wiring harness side.

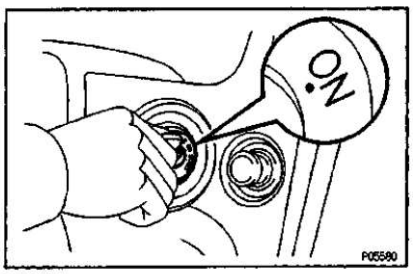
Voltage:

4.5 – 5.5 V

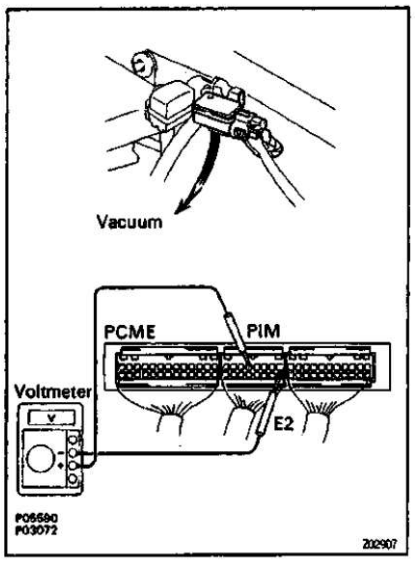




(d) Turn the ignition switch OFF.
(e) Reconnect the MAP connector.



2. INSPECT SUPPLY POWER OF MAP
(a) Turn the ignition switch ON.



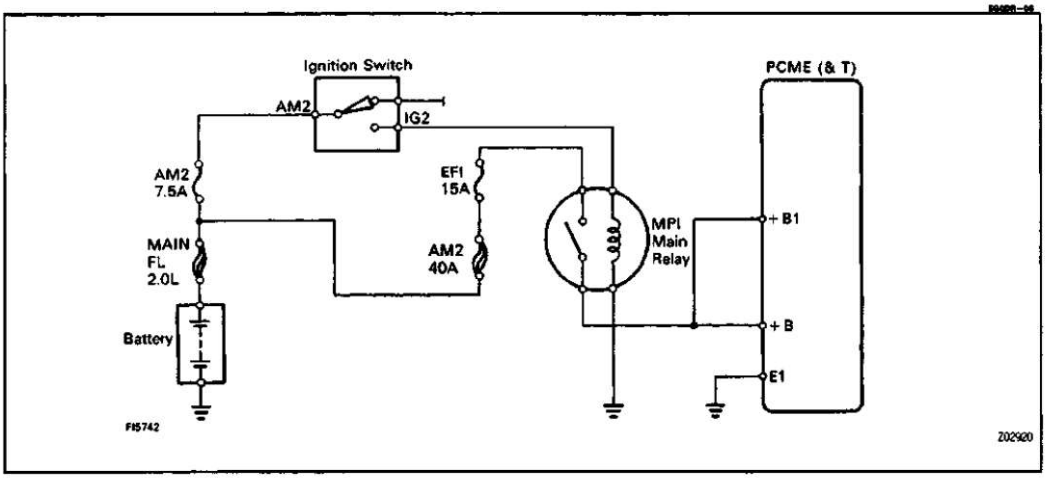
(b) Disconnect the vacuum hose on the intake manifold side.
(c) Connect a voltmeter to terminals PIM and E2 of the PCME, and measure the output voltage under ambient atmospheric pressure.
(d) Apply vacuum to the MAP in 13.3 kPa (100 mmHg, 3.94 in.Hg) segments to 66.7 kPa (500 mmHg, 19.69 in.Hg).
(e) Measure the voltage drop from step
(c) above for each segment.

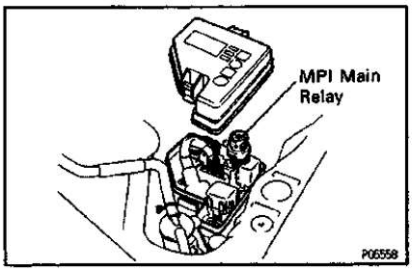
Voltage drop:

Applied Vacuum kPa (mmHg) (in.Hg.)	13.3 (100) (3.94)	26.7 (200) (7.87)	40.0 (3001) (11.81)	53.3 (400) (15.75)	66.7 (500) (19.69)
Voltage drop V	0.15–0.36	0.4–0.6	0.65–0.85	0.9–1.1	1.15–1.35

V01045

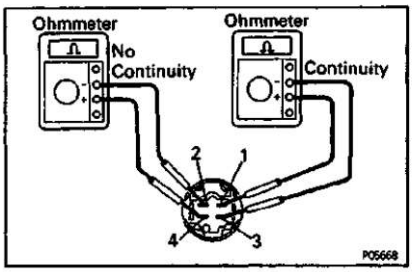
MPI MAIN RELAY





MPI MAIN RELAY (”EFI”) INSPECTION

1. REMOVE MPI MAIN RELAY



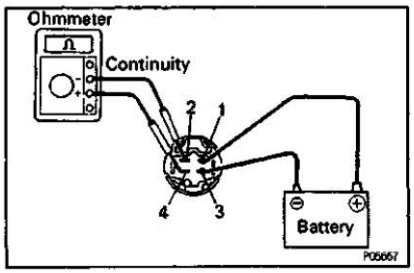
2. INSPECT MPI MAIN RELAY

A. Inspect relay continuity

(a) Using an ohmmeter, check that there is continuity between terminals 1 and 3.

(b) Check that there is no continuity between terminals 2 and 4.

If continuity is not as specified, replace the relay.



B. Inspect relay operation

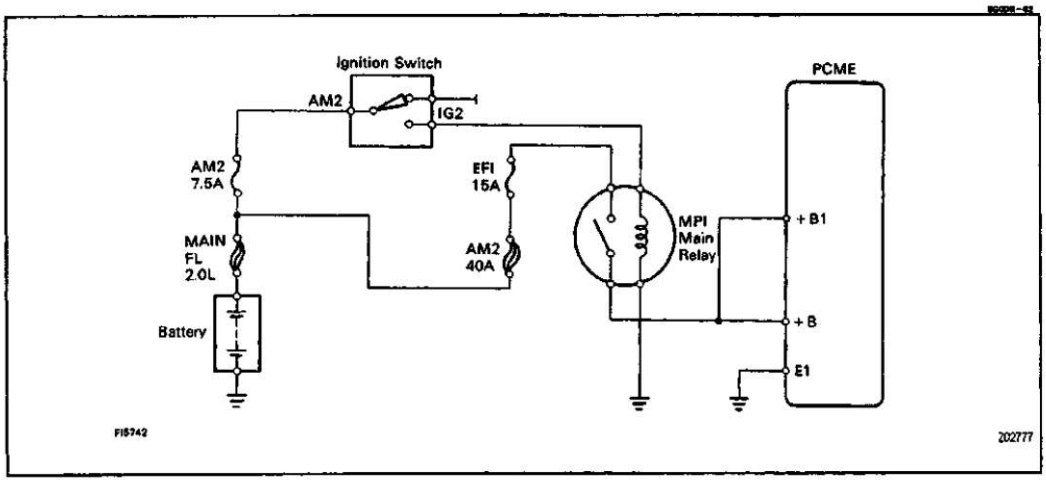
(a) Apply battery voltage across terminals 1 and 3.

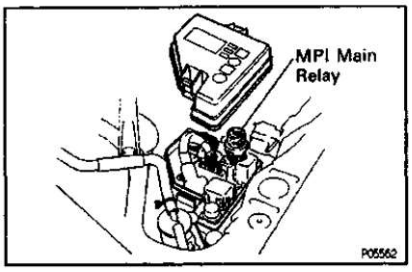
(b) Using an ohmmeter, check that there is continuity between the 2 and 4.

If operation is not as specified, replace the relay.

3. REINSTALL MPI MAIN RELAY

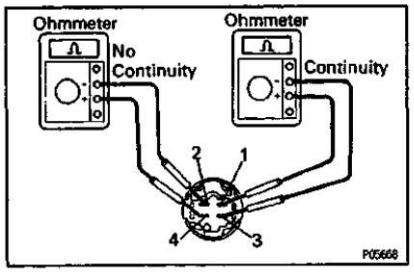
MPI MAIN RELAY





MPI MAIN RELAY ("EFI") INSPECTION

1. REMOVE MPI MAIN RELAY



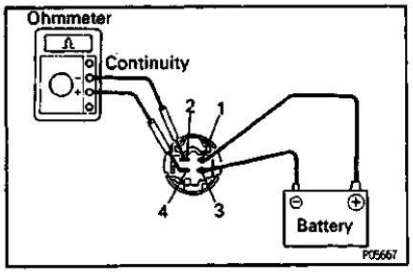
2. INSPECT MPI MAIN RELAY

A. Inspect relay continuity

(a) Using an ohmmeter, check that there is continuity between terminals 1 and 3.

(b) Check that there is no continuity between terminals 2 and 4.

If continuity is not as specified, replace the relay.



B. Inspect relay operation

(a) Apply battery voltage across terminals 1 and 3.

(b) Using an ohmmeter, check that there is continuity between the 2 and 4.

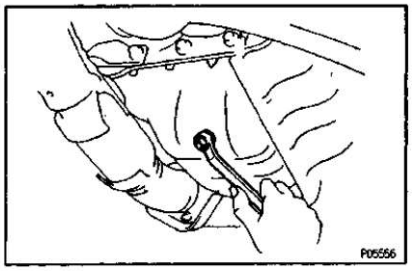
If operation is not as specified, replace the relay.

3. REINSTALL MPI MAIN RELAY

OIL AND FILTER REPLACEMENT

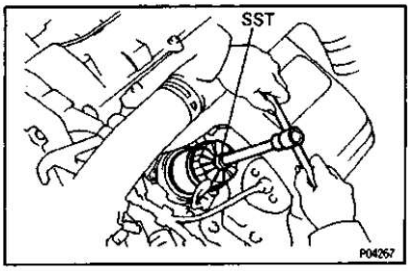
CAUTION:

- Prolonged and repeated contact with mineral oil will result in the removal of natural fats from the skin, leading to dryness, irritation and dermatitis. In ad–dition, used engine oil contains potentially harmful contaminants which may cause skin cancer.
- Care should be taken, therefore, when changing engine, oil to minimize the frequency and length of time your skin is exposed to used engine oil. Pro–tective clothing and gloves that cannot be penet–rated by oil should be worn. The skin should be thoroughly washed with soap and water, or use water – less hand cleaner, to remove any used engine oil. Do not use gasoline. thinners, or solvents.
- In order to preserve the environment, used oil and used oil filter must be disposed of only at designated disposal sites.



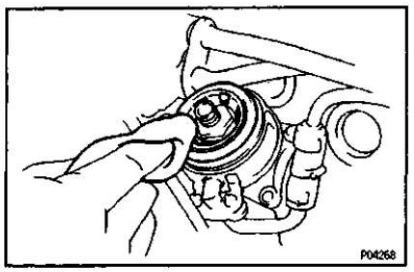
1. DRAIN ENGINE OIL

(a) Remove the oil filler cap.
(b) Remove the oil drain plug, and drain the oil into a container.

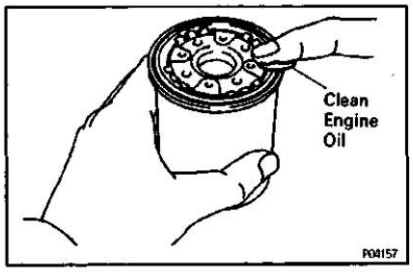


2. REPLACE OIL FILTER

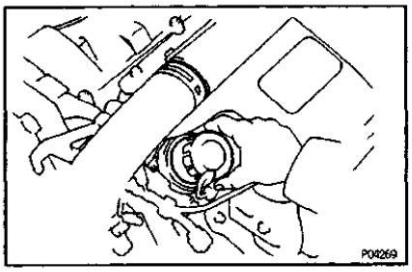
(a) Using SST, remove the oil filter.
SST 09228–06500



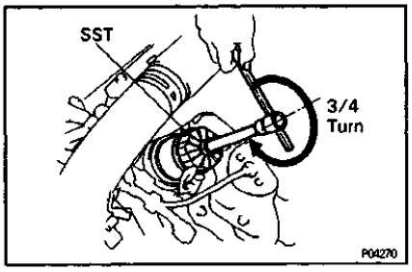
(b) Clean the oil filter contact surface on the oil filter mounting.



(c) Lubricate the filter rubber gasket with clean engine oil.



(d) Tighten the oil filter by hand until the rubber gasket contacts the seat of the filter mounting.



(e) Using SST, give it an additional 3/4 turn to seat the filter.
SST 09228–06500

3. FILL WITH ENGINE OIL

(a) Clean and install the oil drain plug with a new gasket.
Torque: 39 N–m (400 kgf–cm, 29 ft–lbf)

(b) Fill with new engine oil.
Oil grade: See step 1 Oil Pressure Check
Capacity:
Drain and refill
w/ Oil filter change
3.9 liters (4.1 US qts, 3.4 lmp. qts)
w/o Oil filter change
3.6 liters (3.8 US qts, 3.2 lmp. qts)
Dry fill
4.3 liters (4.5 US qts. 3.8 lmp. qts)

(c) Reinstall the oil filler cap.

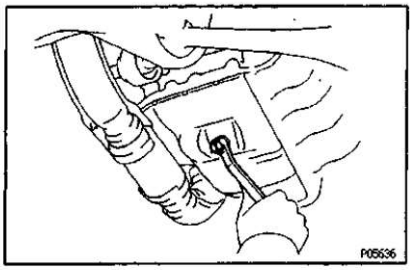
4. START ENGINE AND CHECK FOR OIL LEAKS

5. RECHECK ENGINE OIL LEVEL

OIL AND FILTER REPLACEMENT

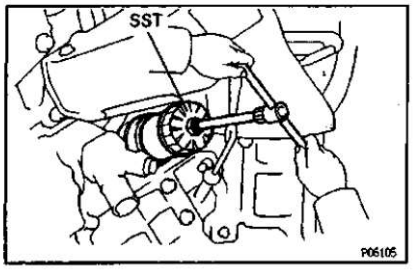
CAUTION:

Prolonged and repeated contact with mineral oil will result in the removal of natural fats from the skin, leading to dryness, irritation and dermatitis. In addition, used engine oil contains potentially harmful contaminants which may cause skin cancer.
Care should be taken, therefore, when changing engine, oil to minimize the frequency and length of time your skin is exposed to used engine oil. Protective clothing and gloves that cannot be penetrated by oil should be worn. The skin should be thoroughly washed with soap and water, or use water – less hand cleaner, to remove any used engine oil. Do not use gasoline, thinners, or solvents.
In order to preserve the environment, used oil and used oil filter must be disposed of only at designated disposal sites.



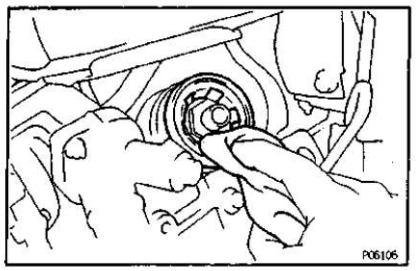
1. DRAIN ENGINE OIL

(a) Remove the oil filler cap.
(b) Remove the oil drain plug, and drain the oil into a container.

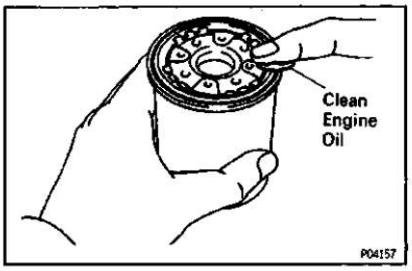


2. REPLACE OIL FILTER

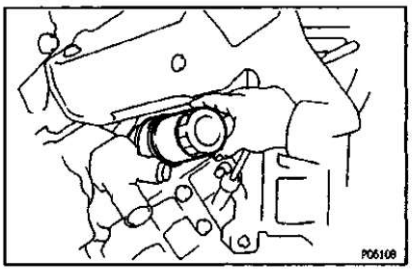
(a) Using SST, remove the oil filter.
SST 09228–06500



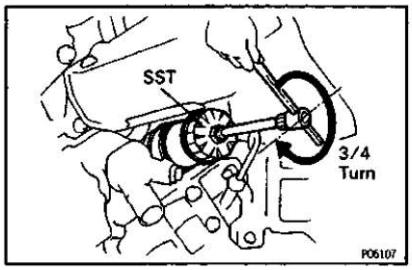
(b) Clean the oil filter contact surface on the oil filter mounting.



(c) Lubricate the filter rubber gasket with clean engine oil.



(d) Tighten the oil filter by hand until the rubber gasket contacts the seat of the filter mounting.



(e) Using SST, give it an additional 3/4 turn to seat the filer.
SST 09228–06500

3. FILL WITH ENGINE OIL

(a) Clean and install the oil drain plug with a new gasket.
Torque: 39 N–m (400 kgf–cm, 29 ft–lbf)

(b) Fill with new engine oil.
Oil grade: (See step 1 Oil Pressure Check)
Capacity:
Drain and refill
w/ Oil filter change
4.2 liters (4.4 US qts. 3.7 Imp. qts)
w/o Oil filter change
3.8 liters (4.0 US qts, 3.3 Imp. qts)
Dry fill
4.6 liters (4.9 US qts, 4.0 Imp. qts)

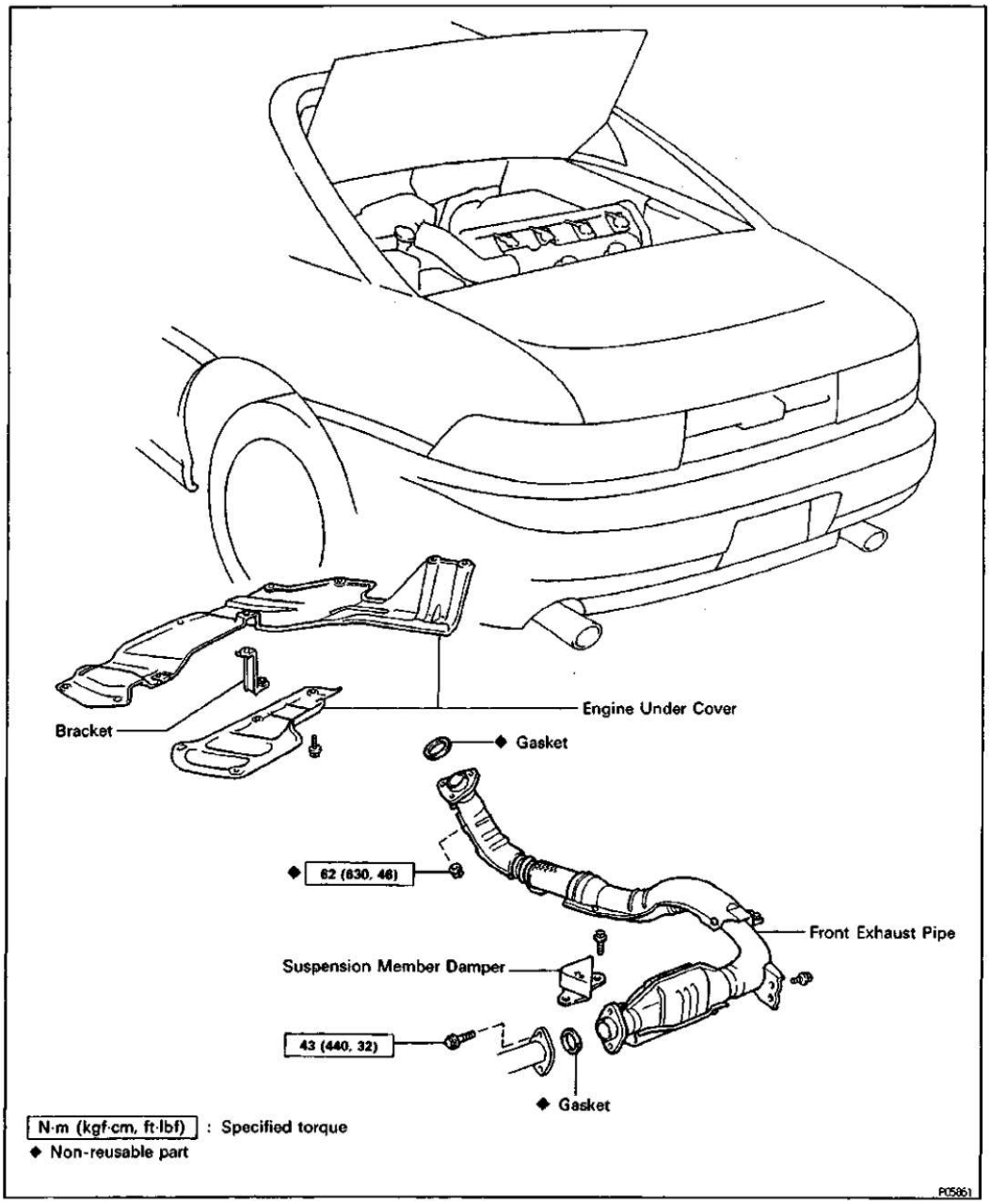
(c) Reinstall the oil filler cap.

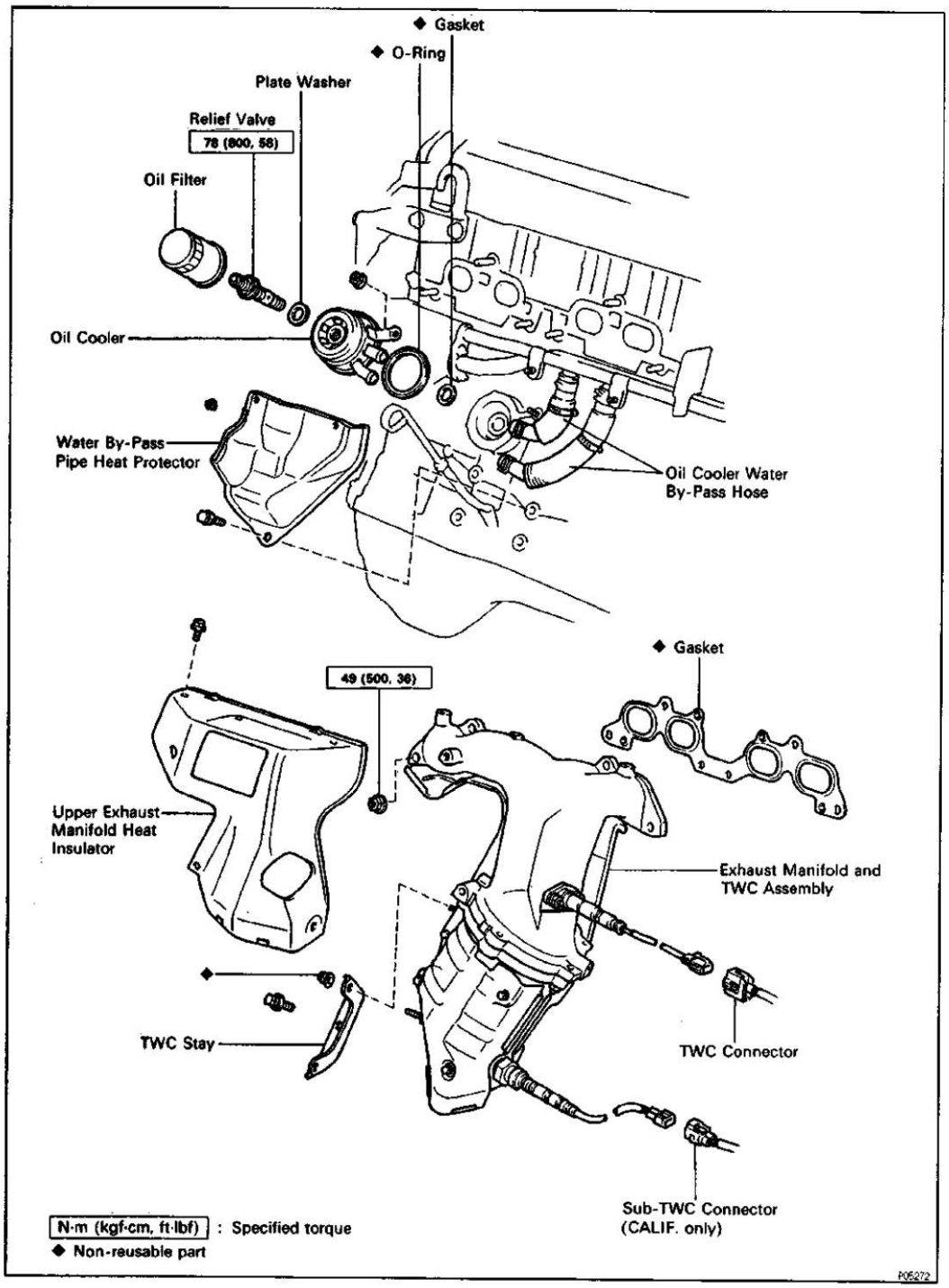
4. START ENGINE AND CHECK FOR OIL LEAKS

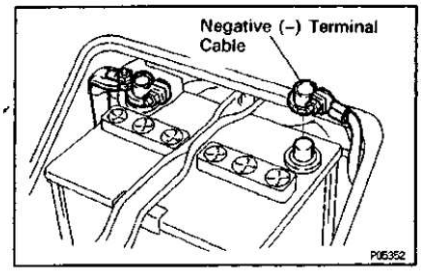
5. RECHECK ENGINE OIL LEVEL

OIL COOLER

COMPONENTS FOR REMOVAL AND INSTALLATION




◆ Gasket
◆ O-Ring
Plate Washer
Relief Valve
78 (800, 58)
Oil Filter
Oil Cooler
Water By-Pass Pipe Heat Protector
Oil Cooler Water By-Pass Hose
◆ Gasket
49 (500, 36)
Upper Exhaust Manifold Heat Insulator
Exhaust Manifold and TWC Assembly
TWC Stay
TWC Connector
Sub-TWC Connector (CALIF. only)
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part
P05272



OIL COOLER REMOVAL

(See Components for Removal and Installation)

1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY

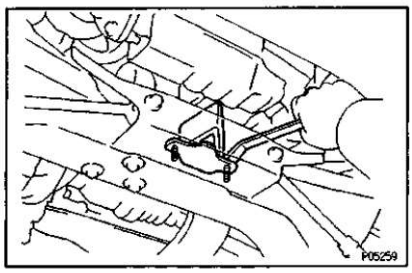
CAUTION: Turn the ignition switch to "LOCK". Disconnect the negative terminal from the battery. Wait at least 20 seconds before proceeding with work.

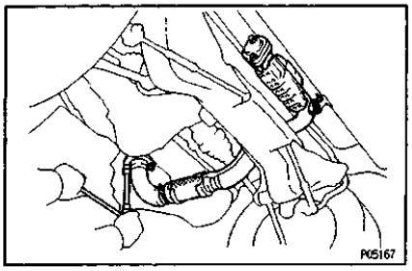
2. REMOVE ENGINE UNDER COVERS

3. DRAIN ENGINE COOLANT

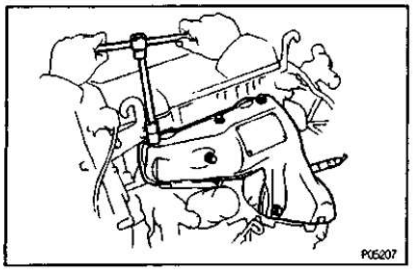
4. REMOVE FRONT EXHAUST PIPE

(a) (CALIF. only)
Remove the two bolts and damper.



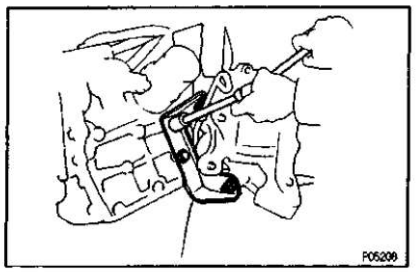


(b) Remove the two bolts holding the front exhaust pipe bracket to the tailpipe bracket.
(c) Remove the two bolts holding the front exhaust pipe to the tailpipe.
(d) Using a 14 mm deep socket wrench, remove the three nuts holding the front exhaust pipe to the TWC.
(e) Remove the front exhaust pipe.
(f) Remove the two gaskets.

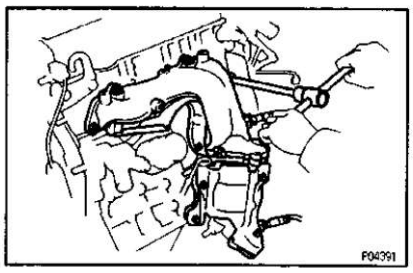


5. REMOVE EXHAUST MANIFOLD AND TWC ASSEMBLY

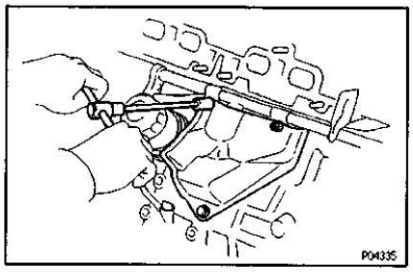
(a) Disconnect the following connectors:
Oxygen sensor (main) connector
(CALIF. only)
Sub–oxygen sensor connector
(b) Remove the six bolts and manifold upper heat insulator.



(c) Remove the two bolts, two nuts and TWC stay.

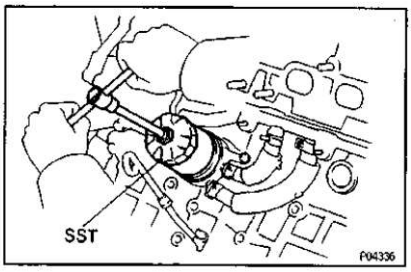


(d) Remove the six nuts, the exhaust manifold and TWC assembly.



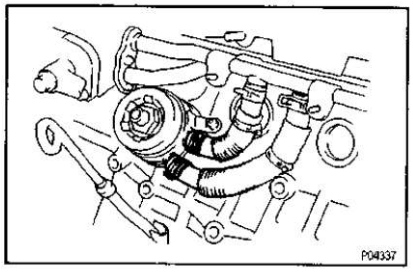
6. REMOVE WATER BY–PASS PIPE HEAT PROTECTOR

Remove the bolt, two nut and heat protector.



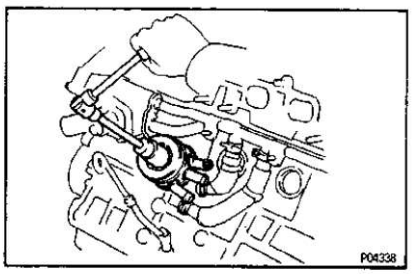
7. REMOVE OIL FILTER

Using SST, remove the oil filter.
SST 09228–06500

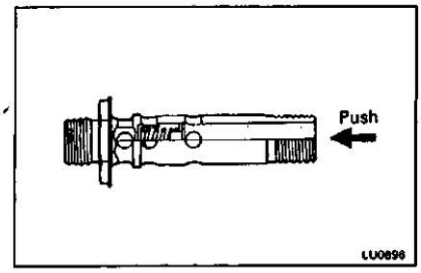


8. REMOVE OIL COOLER

(a) Disconnect the two water by–pass hoses from the oil cooler.



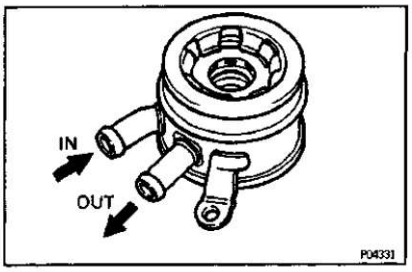
(b) Remove the relief valve and plate washer.
(c) Remove the nut and oil cooler.
(d) Remove the O–ring and gasket from the oil cooler.



OIL COOLER INSPECTION

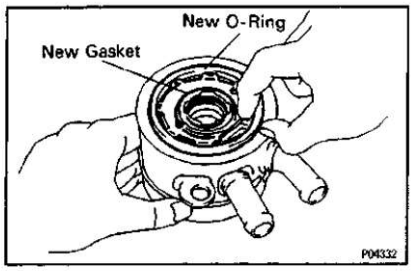
1. INSPECT RELIEF VALVE

Push the valve with a wooden stick to check if it is stuck.
If stuck, replace the relief valve.



2. INSPECT OIL COOLER

Check the oil cooler for damage or clogging.
If necessary, replace the oil cooler.

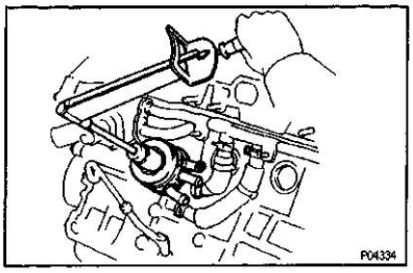


OIL COOLER INSTALLATION

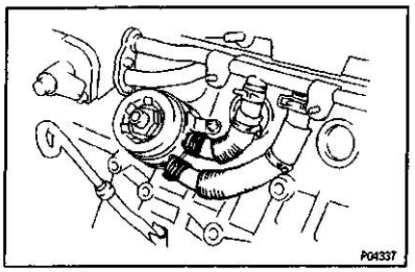
(See Components for Removal and installation)

1. INSTALL OIL COOLER

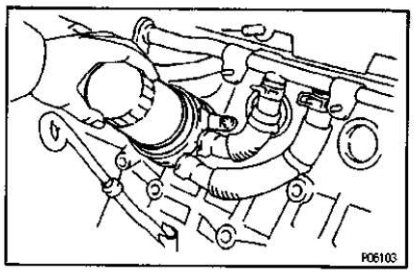
(a) Install new O–ring and gasket to the oil cooler.



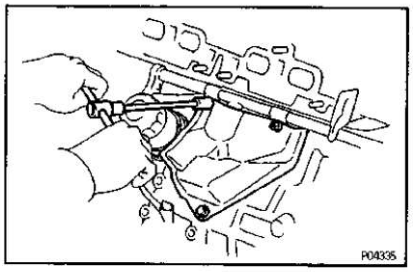
(b) Temporarily install the oil cooler with the nut.
(c) Apply a light coat of engine oil on the threads and under the head of the relief valve.
(d) Install the plate washer and relief valve.
Torque: 78 N–m (800 kgf–cm, 58 ft–lbf)
(e) Tighten the nut.
Torque: 7.8 N–m (80 kgf–cm, 69 in–lbf)



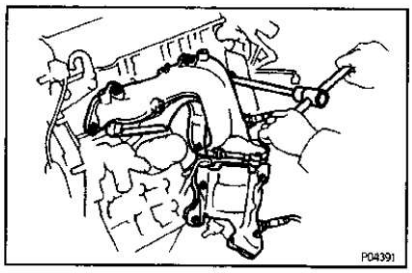
(f) Connect the two water by–pass hoses to the oil cooler.



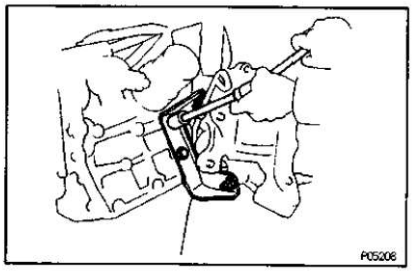
2. INSTALL OIL FILTER
(See Replacement of Oil and Oil Filter)



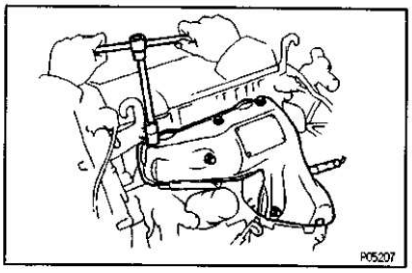
3. INSTALL WATER BY–PASS HOSE HEAT PROTECTOR
Install the heat protector with the bolt and two nuts.



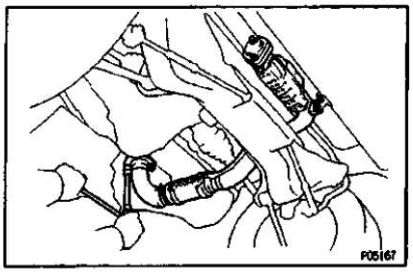
4. INSTALL EXHAUST MANIFOLD AND TWC ASSEMBLY
(a) Install a new gasket, the exhaust manifold and TWC assembly with the six nuts. Uniformly tighten the nuts in several passes.
Torque: 49 N–m (500 kgf–cm, 36 ft–lbf)



(b) Install the TWC stay with the two bolts and two nuts.
Torque: 42 N–m (425 kgf–cm, 31 ft–lbf)



(c) Install the upper manifold heat insulator with–the six bolts.
(d) Connect the following connectors:
- Oxygen sensor (main) connector
- (CALIF. only)
- Sub–oxygen sensor connector



5. INSTALL FRONT EXHAUST PIPE

(a) Place two new gaskets to the front and rear of the front exhaust pipe.

(b) Using a 14 mm deep socket wrench, install the front exhaust pipe with three new nuts.

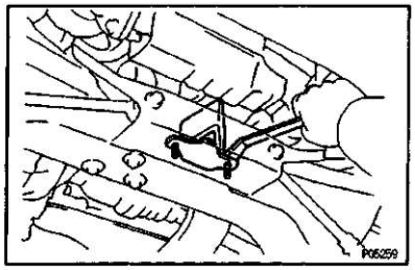
Torque: 62 N–m (630 kgf–cm, 46 ft–lbf)

(c) Install the two bolts holding the front exhaust pipe to the tailpipe.

Torque: 43 N–m (440 kgf–cm, 32 ft–lbf)

(d) Install the two bolts holding the front exhaust pipe bracket to the tailpipe bracket.

Torque: 19 N–m (190 kgf–cm, 14 ft–lbf)



(e) Install the damper with the two bolts.

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

6. CONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY

7. FILL WITH ENGINE COOLANT

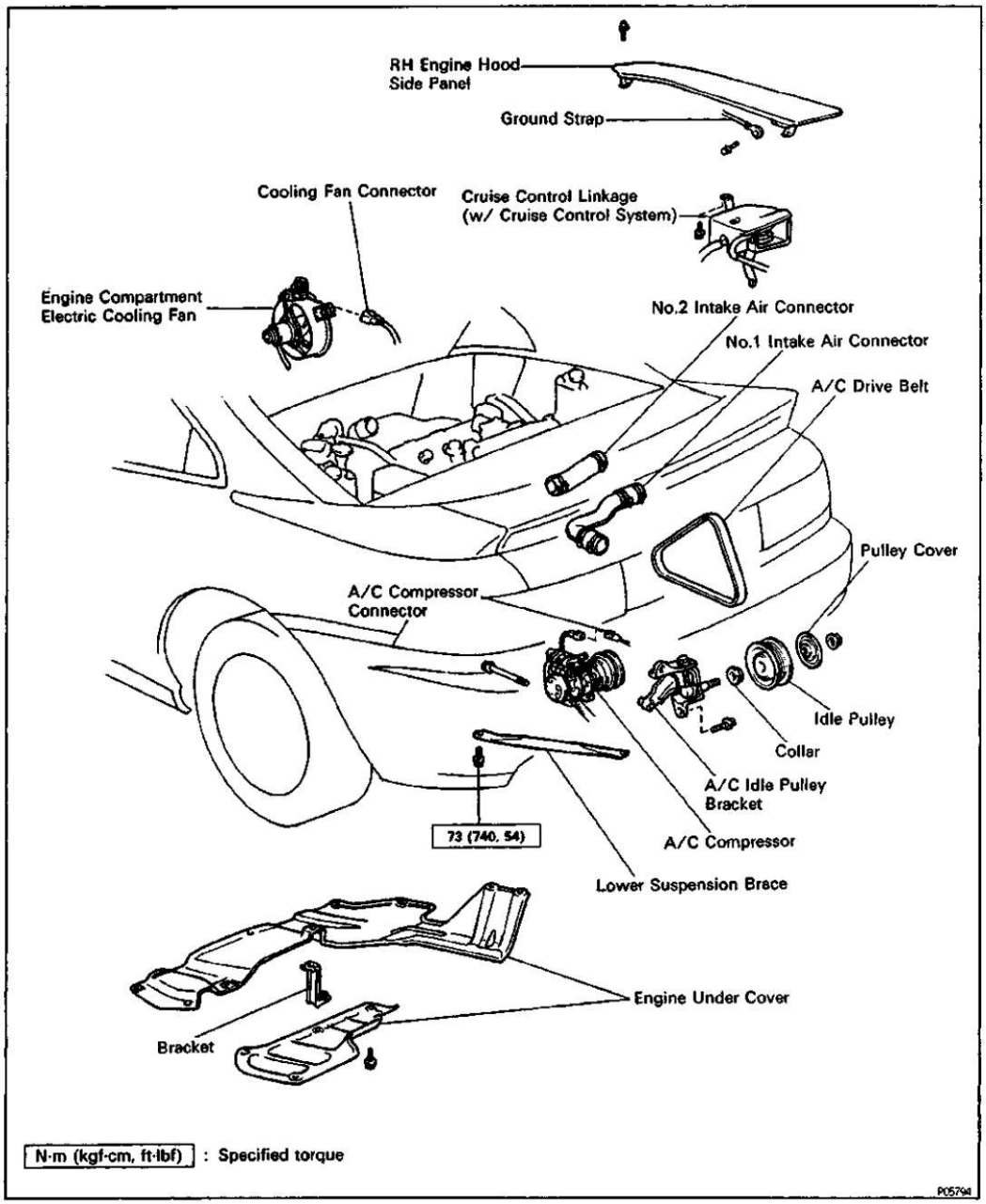
8. START ENGINE AND CHECK FOR LEAKS

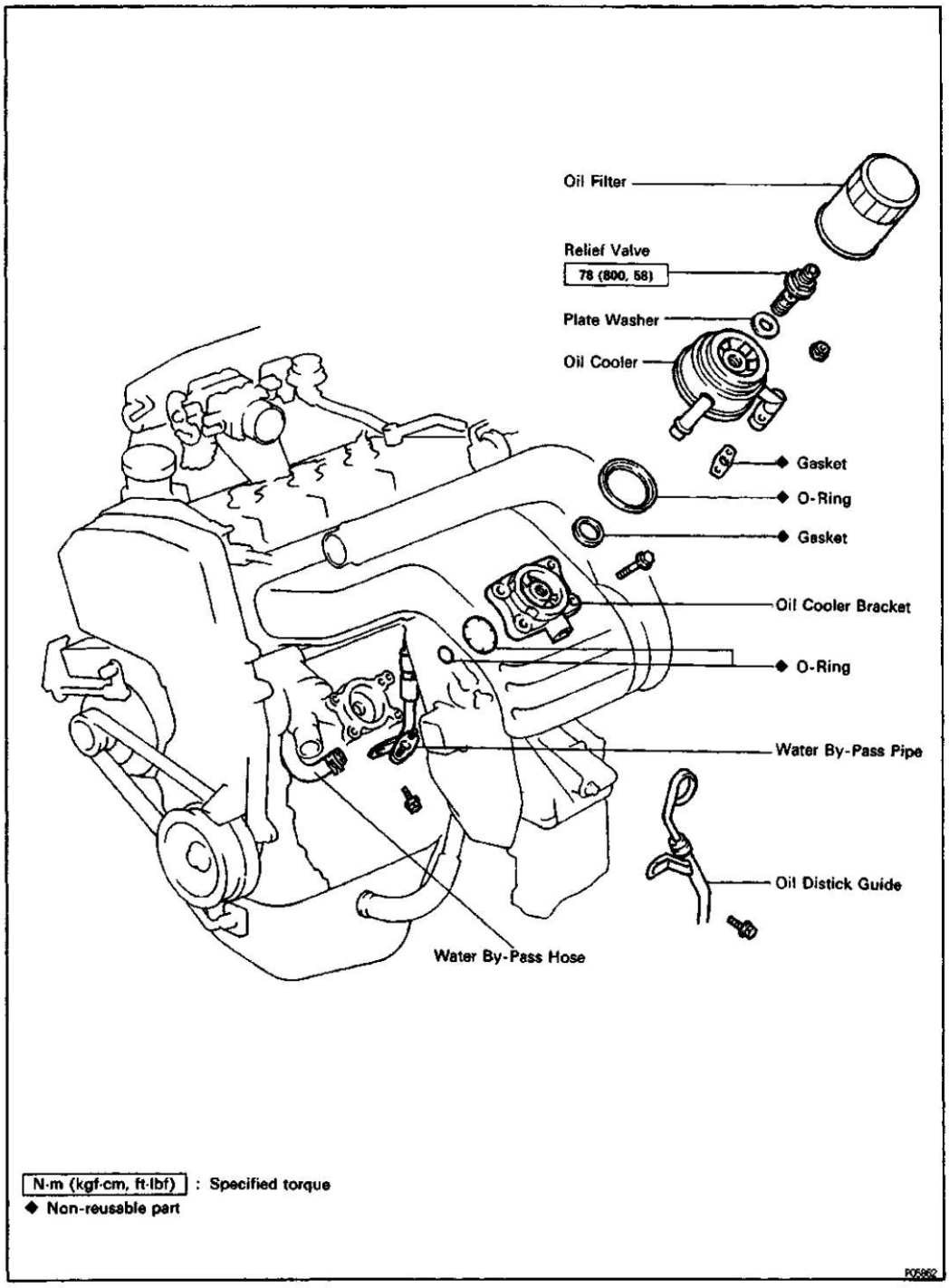
9. CHECK ENGINE OIL LEVEL

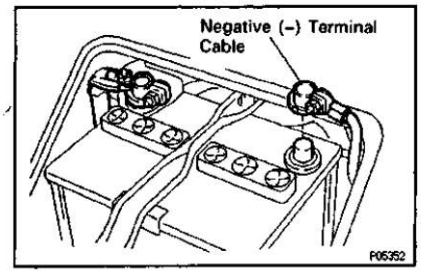
10. INSTALL ENGINE UNDER COVERS

OIL COOLER

COMPONENTS FOR REMOVAL AND INSTALLATION




Oil Filter
Relief Valve
78 (800, 58)
Plate Washer
Oil Cooler
◆ Gasket
◆ O-Ring
◆ Gasket
Oil Cooler Bracket
◆ O-Ring
Water By-Pass Pipe
Oil Distick Guide
Water By-Pass Hose
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part



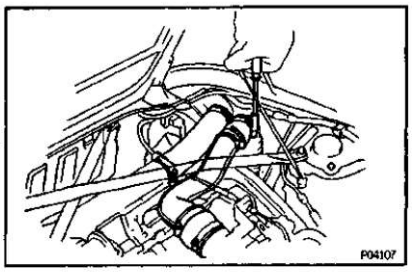
OIL COOLER REMOVAL

(See Components for Removal and Installation)

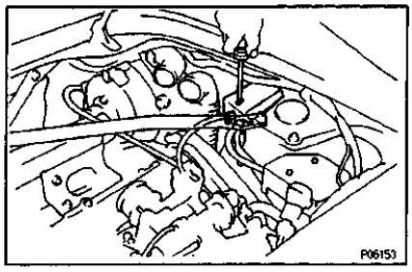
1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY

CAUTION: Turn the Ignition switch to "LOCK". Disconnect the negative terminal from the battery. Wait et least 20 seconds before proceeding with work.

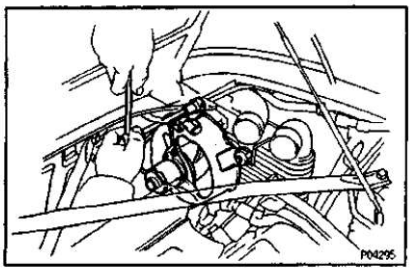
2. DRAIN ENGINE COOLANT
3. REMOVE ENGINE UNDER COVERS
4. REMOVE RH ENGINE HOOD SIDE PANEL



5. REMOVE NO.1 AND NO.2 INTAKE AIR CONNECTORS

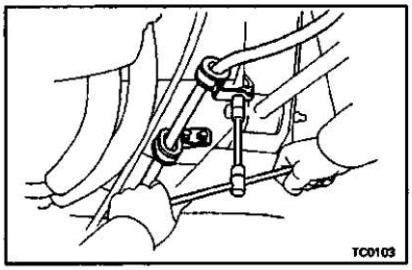


6. (w/ CRUISE CONTROL SYSTEM) DISCONNECT CRUISE CONTROL ACCELERATOR LINKAGE



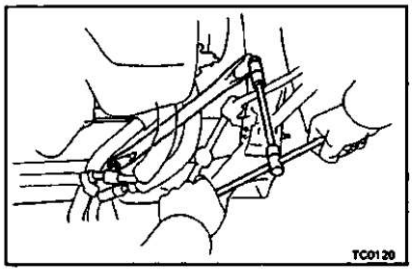
7. REMOVE ENGINE COMPARTMENT ELECTRIC COOLING FAN

(a) Disconnect the cooling fan connector.
(b) Loosen the three bolts, and remove the cooling fan.

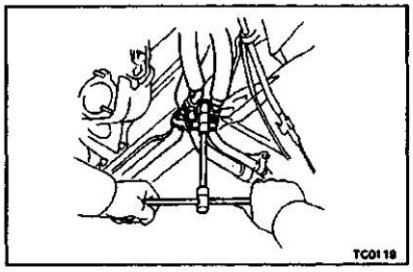


8. DISCONNECT A/C COMPRESSOR FROM ENGINE

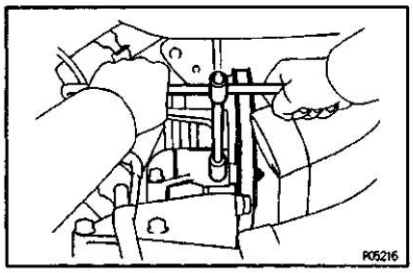
(a) Remove the three clamp bolts, and disconnect the parking brake cable.



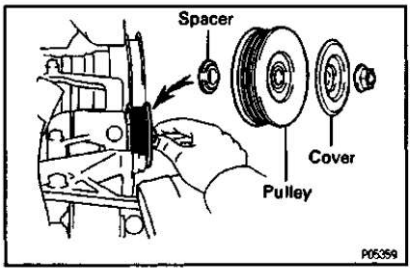
(b) Remove the two bolts and lower suspension brace.



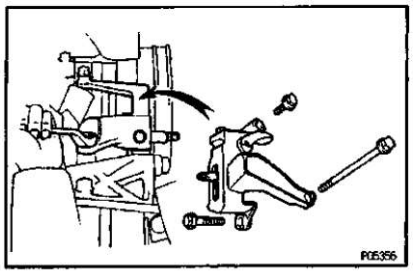
(c) Remove the clamp nut, and disconnect the two A/C pipes.



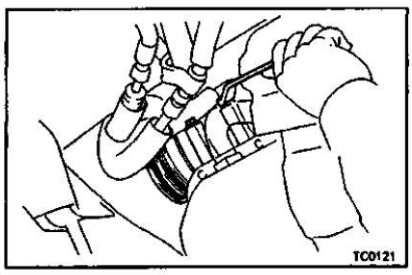
(d) Loosen the idler pulley nut.
(e) Loosen the adjusting bolt, and remove the drive belt.



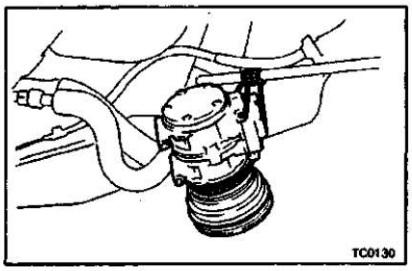
(f) Remove the nut, pulley cover, idler pulley and spacer.



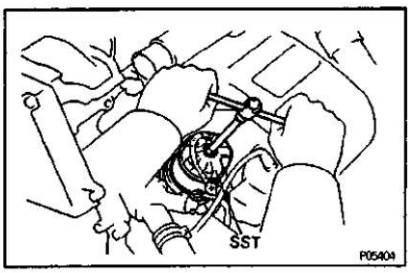
(g) Disconnect the A/C compressor connector.
(h) Remove the three bolts and idler pulley bracket.



(i) Remove the two bolts, and disconnect the A/C com–pressor from the engine.

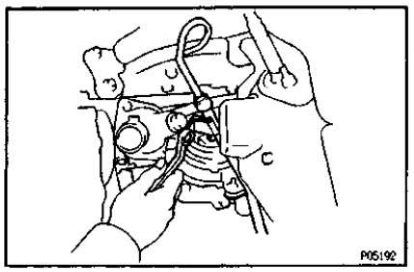


HINT: Suspend the A/C compressor to strut rod with a string.



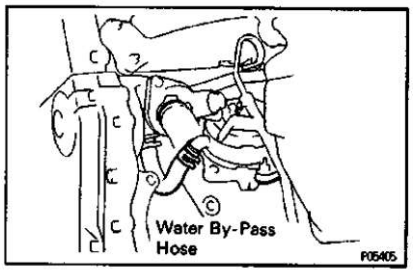
9. REMOVE OIL FILTER

Using SST, remove the oil filter.
SST 09228–06500



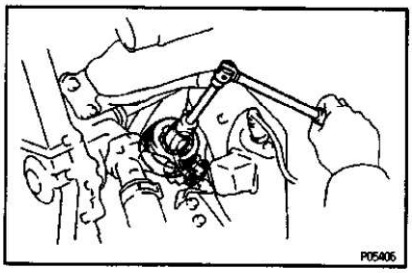
10. DISCONNECT OIL DIPSTICK GUIDE FROM OIL COOLER

Remove the bolt, and disconnect the dipstick guide from the water inlet.

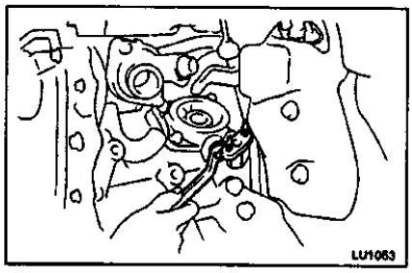


11. REMOVE OIL COOLER

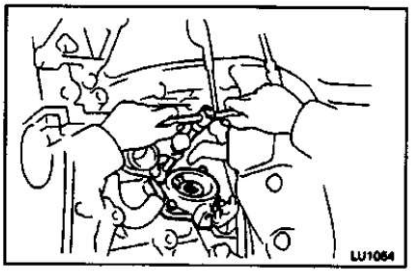
(a) Disconnect the water by–pass hose from oil cooler.



(b) Remove the relief valve and plate washer.
(c) Remove the two nuts and oil cooler.
(d) Remove the O–ring and gasket from the oil cooler.

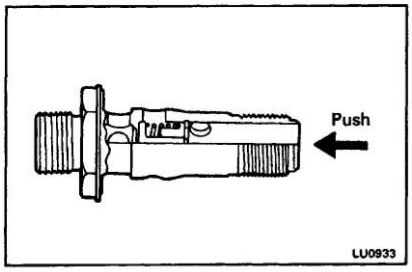


(e) Remove the bolt, and disconnect the water by–pass pipe from the oil cooler bracket.



12. REMOVE OIL COOLER BRACKET

(a) Remove the relief valve and plate washer.
(b) Remove the four bolts and oil cooler bracket.
(c) Remove the two 0– rings from the oil cooler bracket.

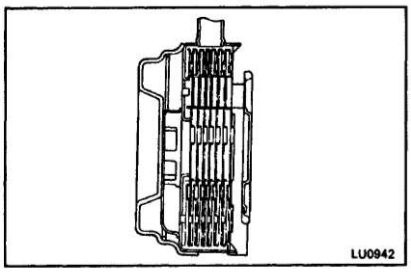


OIL COOLER INSPECTION

1. INSPECT RELIEF VALVE

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

If stuck, replace the relief valve.



2. INSPECT OIL COOLER

Check the oil cooler for damage or clogging.

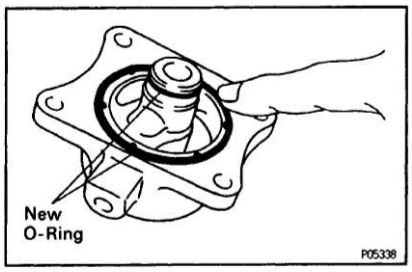
If necessary, replace the oil cooler.

OIL COOLER INSTALLATION

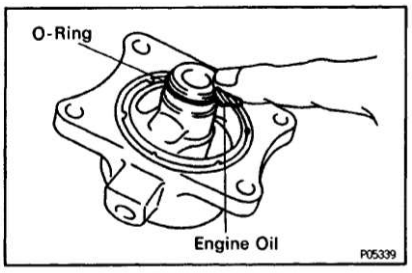
(See Components for Removal and Installation)

1: INSTALL OIL COOLER BRACKET

(a) Install two new 0–rings to the oil cooler bracket.

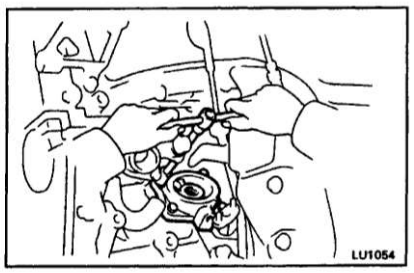


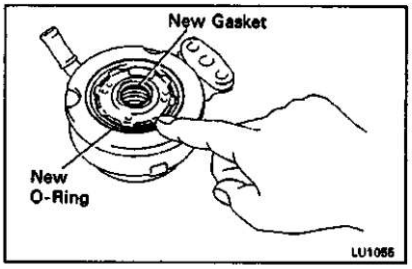
(b) Apply a light coat of engine oil on the small 0– ring.



(c) Install the oil cooler bracket with the four bolts.

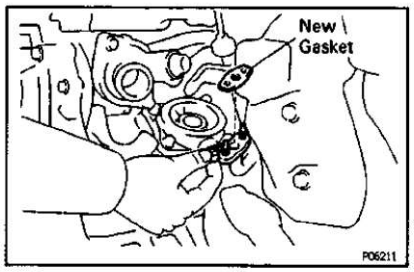
Torque: 78 N–m (800 kgf–cm, 58 ft–lbf)





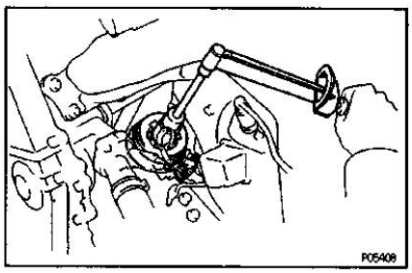
2. INSTALL OIL COOLER

(a) Install new 0–ring and gasket to the oil cooler.



(b) Temporarily install the water by–pass pipe with the bolt.

(c) Place a new gasket on the water by–pass pipe.



(d) Temporarily install the oil cooler with the two nuts.

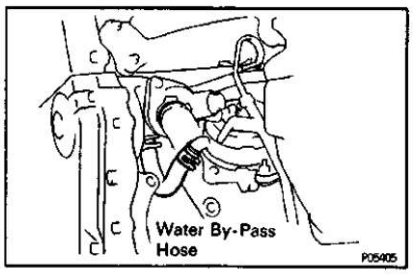
(e) Apply a light coat of engine oil on the threads and under the head of the relief valve.

(f) Install the plate washer and relief valve.

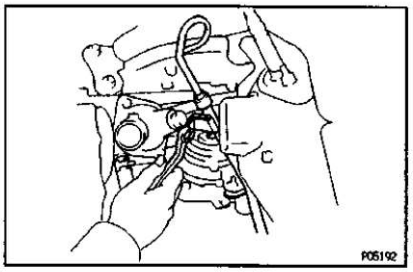
Torque: 78 N–m (800 kgf–cm, 58 ft–lbf)

(g) Tighten the two nuts.

Torque: 7.8 N–m (80 kgf–cm, 69 in.–lbf)

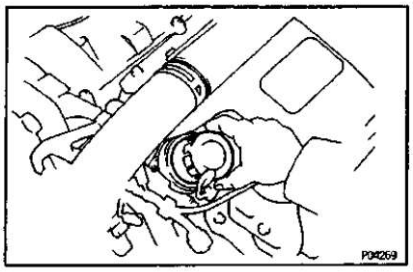


(h) Connect the water by–pass hose to the oil cooler.



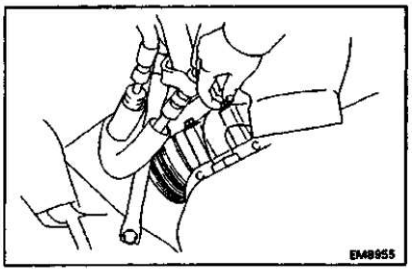
3. INSTALL OIL DIPSTICK GUIDE TO WATER INLET

Install the dipstick guide with the bolt.



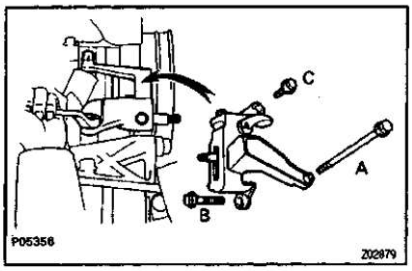
4. INSTALL OIL FILTER

(See Replacement of Oil and Oil Filter)



5. INSTALL A/C COMPRESSOR

(a) Temporarily install the A/C compressor with the two bolts.



(b) Install the idler pulley bracket with the three bolts.

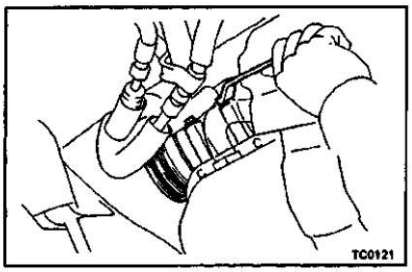
Torque:

25 N–m (250 kgf–cm, 18 ft–lbf) for A

27 N–m (275 kgf–cm, 20 ft–lbf) for B

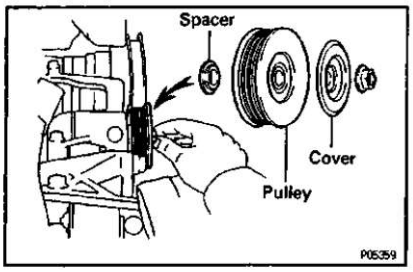
37 N–m (375 kgf–cm. 27 ft–lbf) for C

(c) Connect the A/C compressor connector.

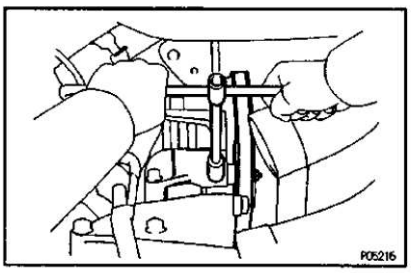


(d) Tighten the two bolts of the lower side of the A/C compressor.

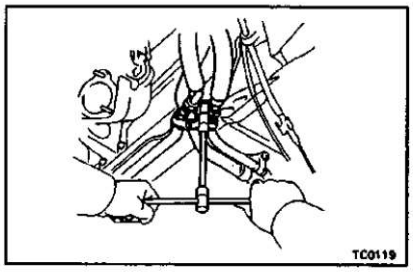
Torque: 25 N–m (250 kgf–cm. 18 ft–lbf)



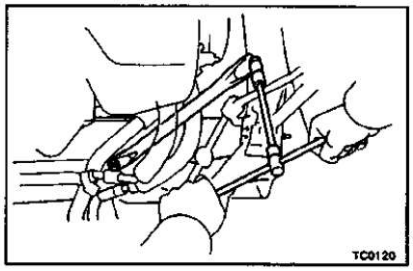
(e) Temporarily install the spacer, pulley and pulley cover with the nut.



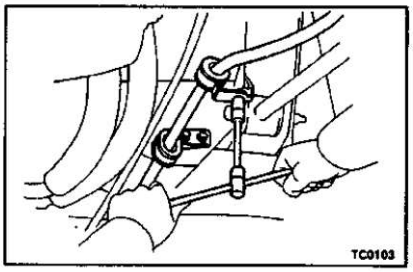
(f) Install the drive belt with the adjusting bolt.
(g) Tighten the idler pulley nut.



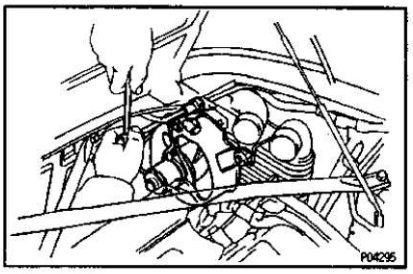
(h) Install the two A/C pipes with the two clamps and nut.



(i) Install the lower suspension brace with the two bolts.
Torque: 73 N–m (740 kgf–cm, 54 ft–lbf)

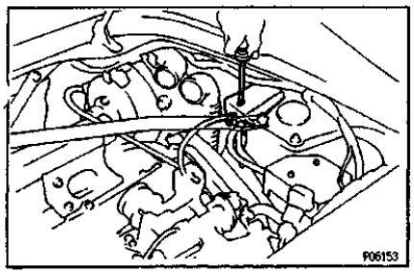


(j) Install the parking brake cable with the two clamp and three bolts.

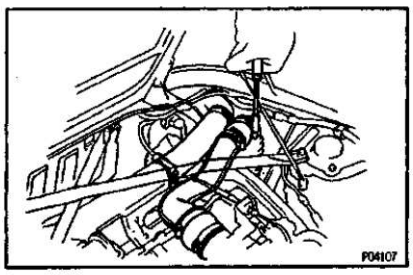


6. INSTALL ENGINE COMPARTMENT ELECTRIC COOLING FAN

(a) Install the cooling fan with the three bolts.
(b) Connect the cooling fan connector.



7. (w/ CRUISE CONTROL SYSTEM)
INSTALL CRUISE CONTROL ACCELERATOR LINKAGE

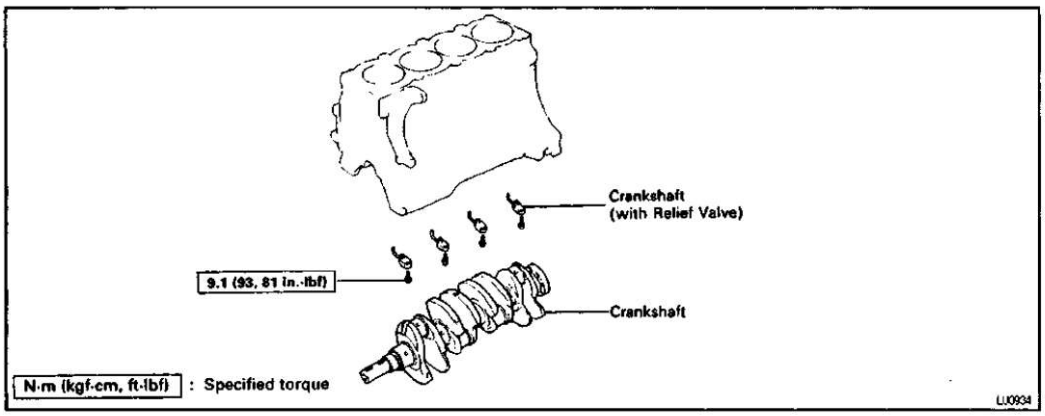


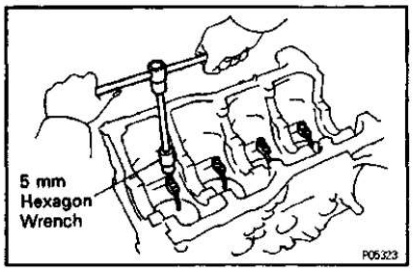
8. INSTALL NO.1 AND NO.2 INTAKE AIR CONNECTORS

9. INSTALL RH ENGINE HOOD SIDE PANEL
10. CONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY
11. FILL WITH ENGINE COOLANT
12. START ENGINE AND CHECK FOR LEAKS
13. CHECK ENGINE OIL LEVEL
14. INSTALL ENGINE UNDER COVERS

OIL NOZZLE

COMPONENTS FOR REMOVAL AND INSTALLATION





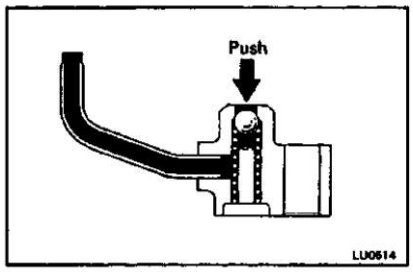
OIL NOZZLES REMOVAL

1. REMOVE OIL CRANKSHAFT

(See Cylinder Block under Engine Mechanical)

2. REMOVE OIL NOZZLES

Using a 5 mm hexagon wrench, remove the bolt and oil nozzle. Remove the four nozzles.

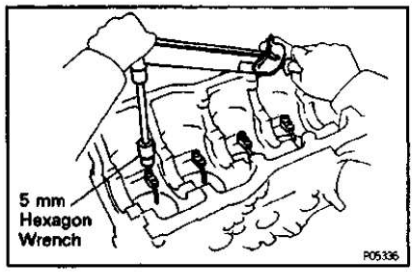


OIL NOZZLES INSPECTION

INSPECT RELIEF VALVE

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

If stuck, replace the relief valve.



OIL NOZZLES INSTALLATION

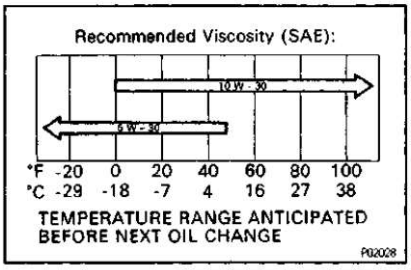
1. INSTALL OIL NOZZLES

Using a 5 mm hexagon wrench, install the oil nozzle with the bolt. Install the four nozzles.

Torque: 9.1 N–m (93 kgf–cm, 81in.–lbf)

2. INSTALL CRANKSHAFT

(See Cylinder Block under Engine Mechanical)



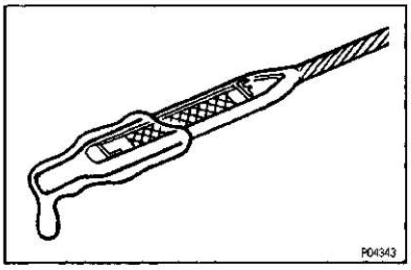
OIL PRESSURE CHECK

1. CHECK ENGINE OIL QUALITY

Check the oil for deterioration, entry of water, disco–loring or thinning.
If the quality is poor, replace the oil.

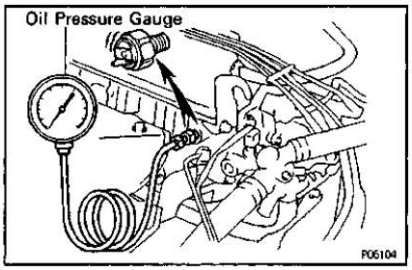
Oil grade:

API grade SG Energy–Conserving II multigrade engine oil. Recommended viscosity is as shown.



2. CHECK ENGINE OIL LEVEL

The oil level should be between the ”L” and ”F” marks on the dipstick.
If low, check for leakage and add oil up to ”F” mark.



3. REMOVE OIL PRESSURE SWITCH, AND INSTALL OIL PRESSURE GAUGE

4. WARM UP ENGINE

Allow the engine to warm up to normal operating temperature.

5. CHECK OIL PRESSURE

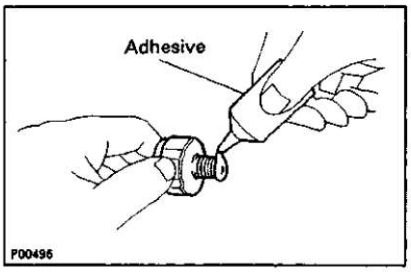
Oil pressure:

At idle

29 kPa (0.3 kgf/cm^2, 4.3 psi) or more

At 3,000 rpm

245 – 490 kPa (2.5 – 5.0 kgf/cm^2, 36 – 71 psi)



6. REMOVE OIL PRESSURE GAUGE, AND REINSTALL OIL PRESSURE SWITCH

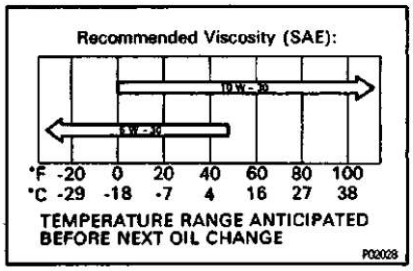
(a) Remove the oil pressure gauge.
(b) Apply adhesive to two or three threads of the oil pressure switch.

Adhesive:

Part No. 08833–00080, THREE BOND 1344, LOCTITE 242 or equivalent

(c) Reinstall the oil pressure switch.

7. START ENGINE, AND CHECK FOR OIL LEAKS



OIL PRESSURE CHECK

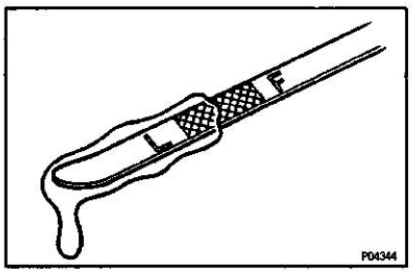
1. CHECK ENGINE OIL QUALITY

Check the oil for deterioration, entry of water, disco–oring or thinning.

If the quality is poor, replace the oil.

Oil grade:

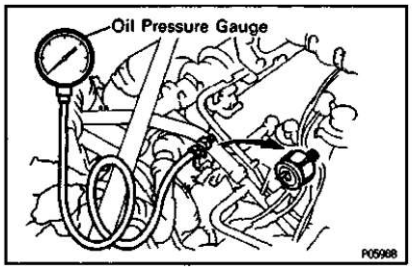
API grade SG Energy–Conserving II multigrade engine oil. Recommended viscosity is as shown.



2. CHECK ENGINE OIL LEVEL

The oil level should be between the “L” and ’F’ marks on the dipstick.

If low, check for leakage and add oil up to ”F” mark.



3. REMOVE OIL PRESSURE SWITCH, AND INSTALL OIL PRESSURE GAUGE

4. WARM UP ENGINE

Allow the engine to warm up to normal operating temperature.

5. CHECK OIL PRESSURE

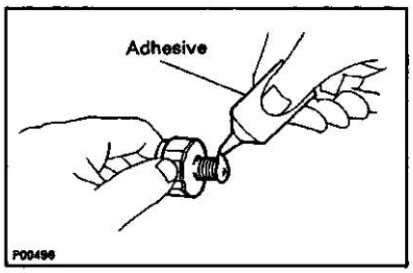
Oil pressure:

At idle

29 kPa (0.3 kgf/cm^2, 4.3 psi) or more

At 3,000 rpm

245 – 490 kPa (2.5 – 5.0 kgf/cm^2, 36 – 71 psi)



6. REMOVE OIL PRESSURE GAUGE AND REINSTALL OIL PRESSURE SWITCH

(a) Remove the oil pressure gauge.

(b) Apply adhesive to two or three threads of the oil pressure switch.

Adhesive:

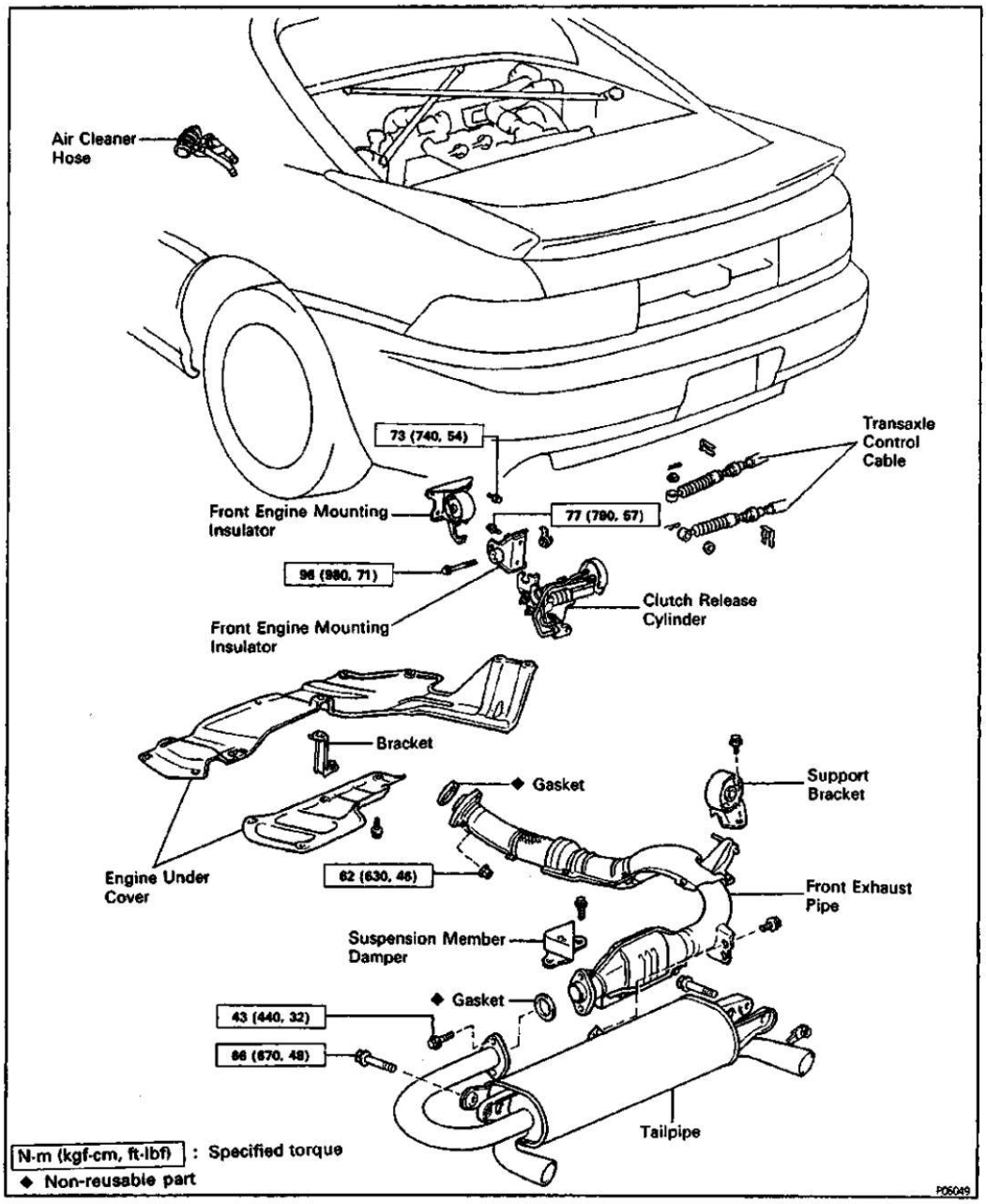
Part No. 08833–00080. THREE BOND 1344, LOCTITE 242 or equivalent

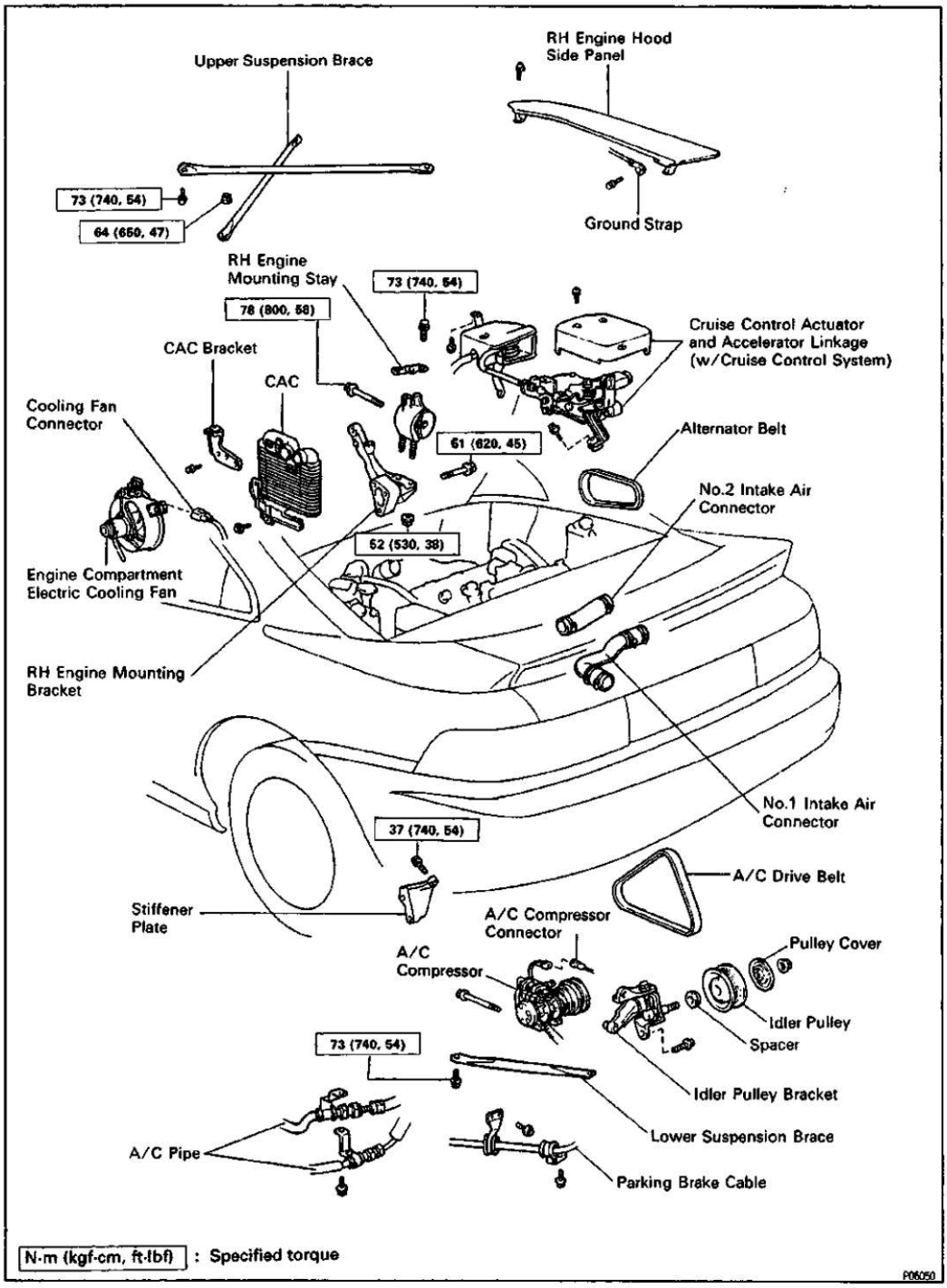
(c) Reinstall the oil pressure switch.

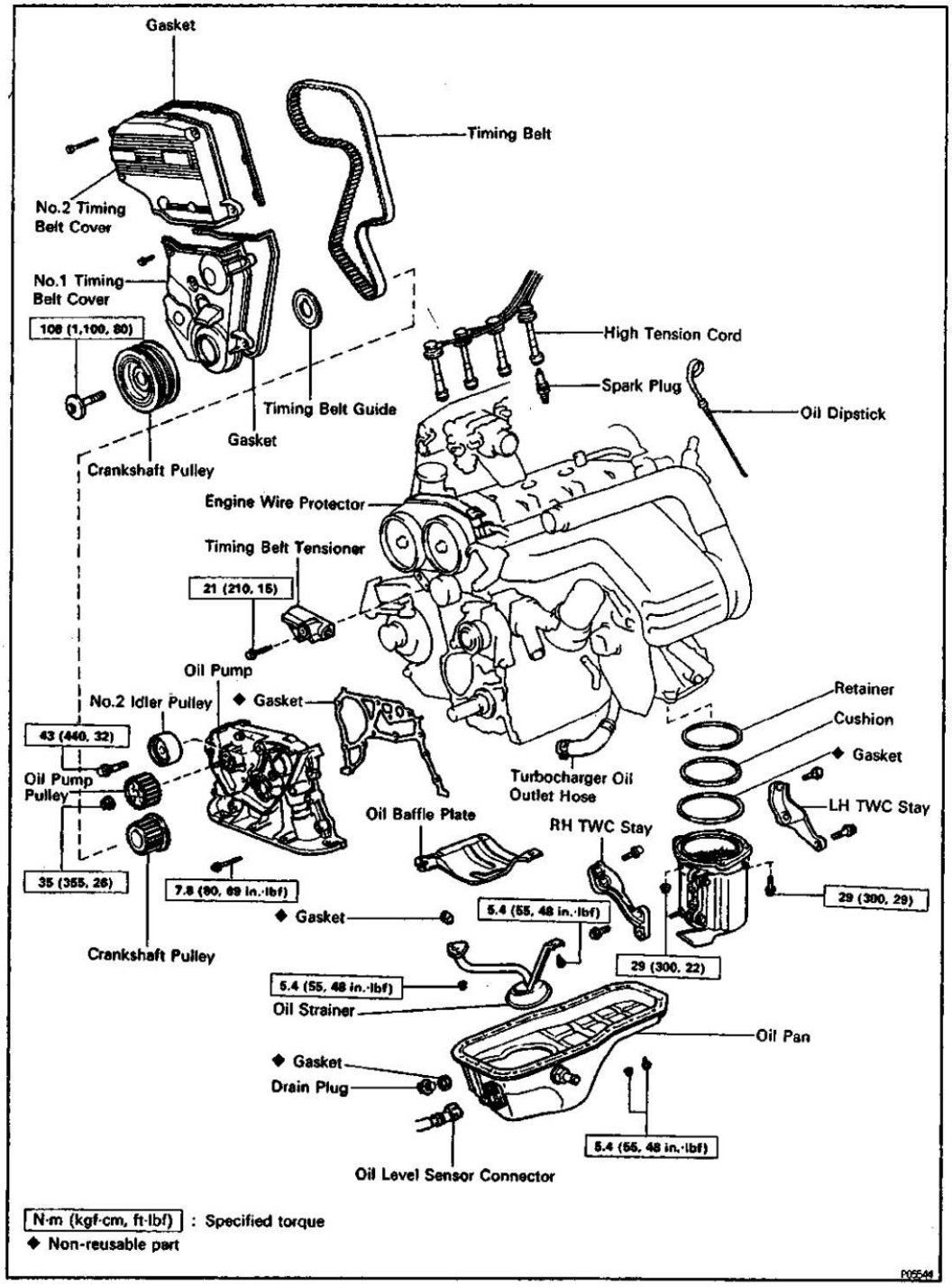
7. START ENGINE AND CHECK FOR OIL LEAKS

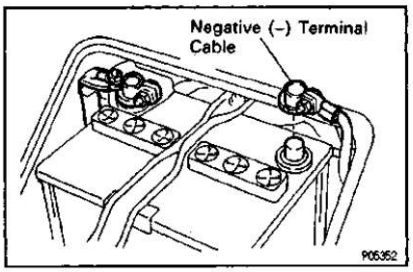
OIL PUMP

COMPONENTS FOR REMOVAL AND INSTALLATION




Upper Suspension Brace
RH Engine Hood Side Panel
73 (740, 54)
64 (650, 47)
Ground Strap
RH Engine Mounting Stay
73 (740, 54)
78 (800, 58)
Cruise Control Actuator and Accelerator Linkage (w/Cruise Control System)
CAC Bracket
CAC
Cooling Fan Connector
61 (620, 45)
Alternator Belt
No.2 Intake Air Connector
52 (530, 38)
Engine Compartment Electric Cooling Fan
RH Engine Mounting Bracket
No.1 Intake Air Connector
37 (740, 54)
A/C Drive Belt
Stiffener Plate
A/C Compressor Connector
Pulley Cover
A/C Compressor
Idler Pulley
Spacer
73 (740, 54)
Idler Pulley Bracket
Lower Suspension Brace
A/C Pipe
Parking Brake Cable
N·m (kgf-cm, ft·lbf) : Specified torque
P06050


Gasket
Timing Belt
No.2 Timing Belt Cover
No.1 Timing Belt Cover
108 (1,100, 80)
Timing Belt Guide
Gasket
Crankshaft Pulley
High Tension Cord
Spark Plug
Oil Dipstick
Engine Wire Protector
Timing Belt Tensioner
21 (210, 15)
Oil Pump
No.2 Idler Pulley
◆ Gasket
43 (440, 32)
Oil Pump Pulley
35 (355, 26)
7.8 (80, 69 in.·lbf)
Crankshaft Pulley
Oil Baffle Plate
Turbocharger Oil Outlet Hose
Retainer
Cushion
◆ Gasket
LH TWC Stay
RH TWC Stay
29 (300, 29)
◆ Gasket
5.4 (55, 48 in.·lbf)
29 (300, 22)
5.4 (55, 48 in.·lbf)
Oil Strainer
Oil Pan
◆ Gasket
Drain Plug
5.4 (55, 48 in.·lbf)
Oil Level Sensor Connector
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part
P05544



OIL PUMP REMOVAL

(See Components for Removal and Installation)

HINT: When repairing the oil pump, the oil pan an^ strainer should be removed and cleaned.

1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY

CAUTION: Turn the ignition switch to "LOCK". Disconnect the negative terminal from the battery. Wait at least 20 seconds before proceeding with work.

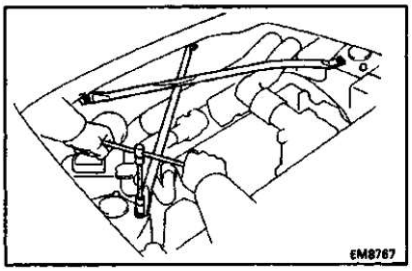
2. DRAIN ENGINE OIL

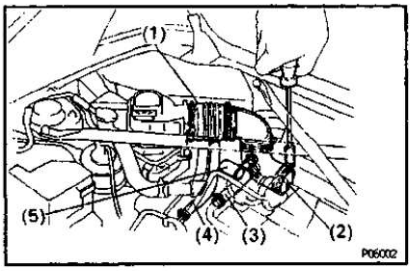
3. REMOVE ENGINE UNDER COVERS

4. REMOVE RH ENGINE HOOD SIDE PANEL

5. REMOVE UPPER SUSPENSION BRACE

Remove the two bolts, two nuts and upper brace.

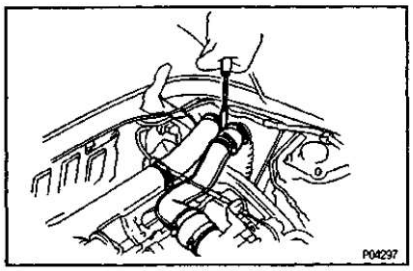




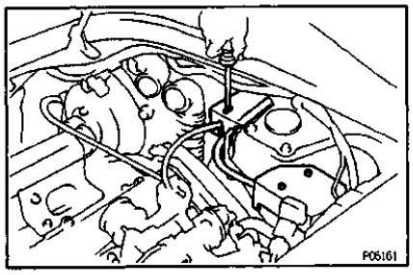
6. REMOVE AIR CLEANER HOSE

Disconnect the following hoses, and remove the air cleaner hose:

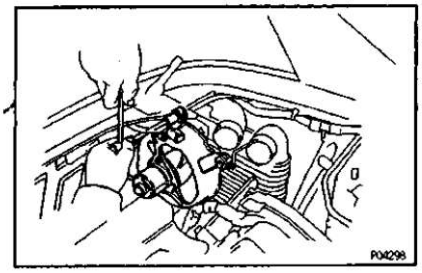
(1) Air cleaner hose from air flow sensor
(2) Air cleaner hose from turbocharger
(3) PCV hose from cylinder head cover
(4) Air hose from No.2 air hose
(5) Air hose from air by–pass valve



7. REMOVE NO.1 AND NO.2 INTAKE AIR CONNECTORS

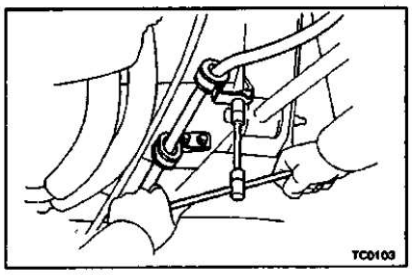


8. (w/ CRUISE CONTROL SYSTEM) REMOVE CRUISE CONTROL ACTUATOR AND ACCELERATOR LINKAGE



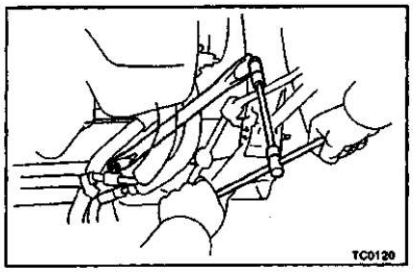
9. REMOVE ENGINE COMPARTMENT ELECTRIC COOLING FAN

(a) Disconnect the cooling fan connector.
(b) Loosen the three bolts, and remove the cooling fan.

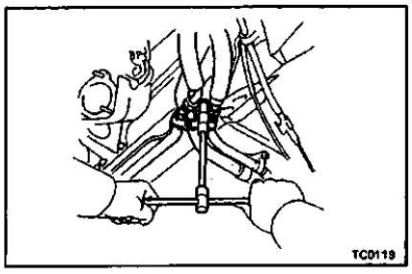


10. DISCONNECT A/C COMPRESSOR FROM ENGINE

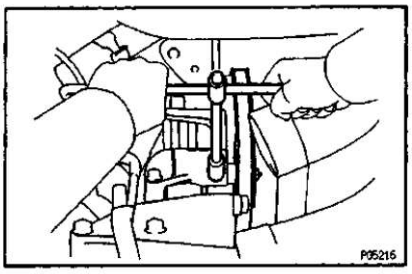
(a) Remove the three clamp bolts, and disconnect the parking brake cable.



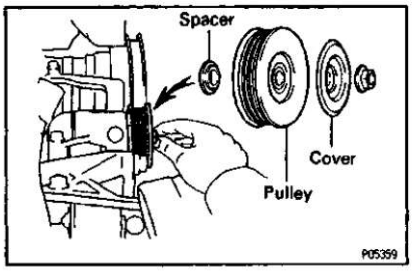
(b) Remove the two bolts and lower suspension brace.



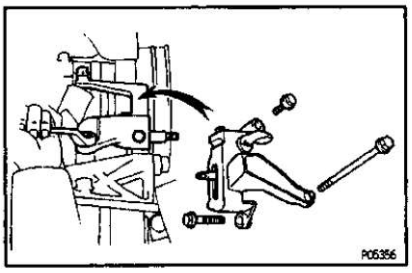
(c) Remove the clamp nut, and disconnect the two A/C pipes.



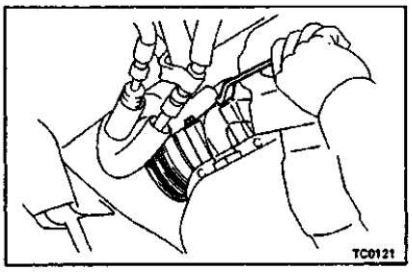
(d) Loosen the idler pulley nut.
(e) Loosen the adjusting bolt, and remove the drive belt.



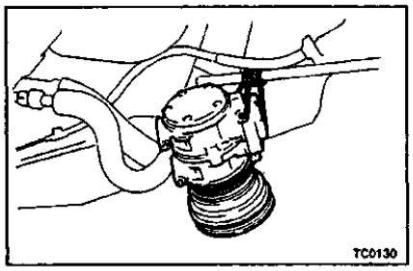
(f) Remove the nut, pulley cover, idler pulley and spacer.



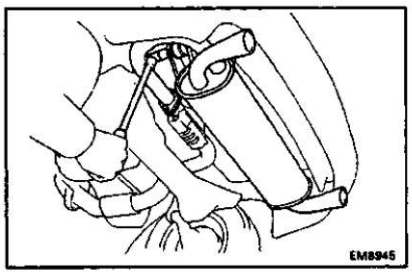
(g) Disconnect the A/C compressor connector.
(h) Remove the three bolts and idler pulley bracket.



(i) Remove the two bolts, and disconnect the A/C compressor from the engine.

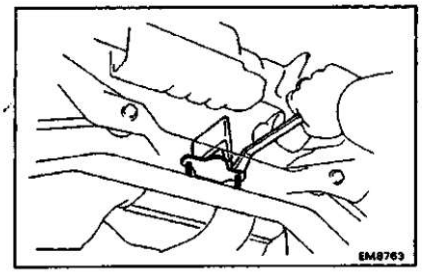


HINT: Suspend the A/C compressor to strut rod with a string.



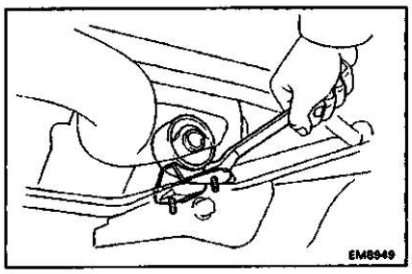
11. REMOVE TAILPIPE

(a) Remove the two bolts holding the front exhaust pipe to the tailpipe bracket.
(b) Remove the two bolts holding the front exhaust pipe to the tailpipe.
(c) Remove the two bolts, tailpipe and gasket.

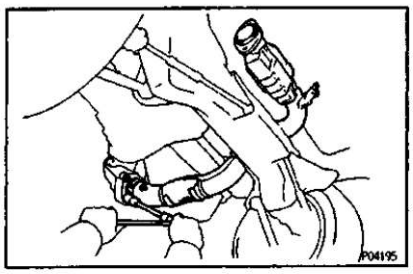


12. REMOVE FRONT EXHAUST PIPE

(a) Remove the two bolts and damper.

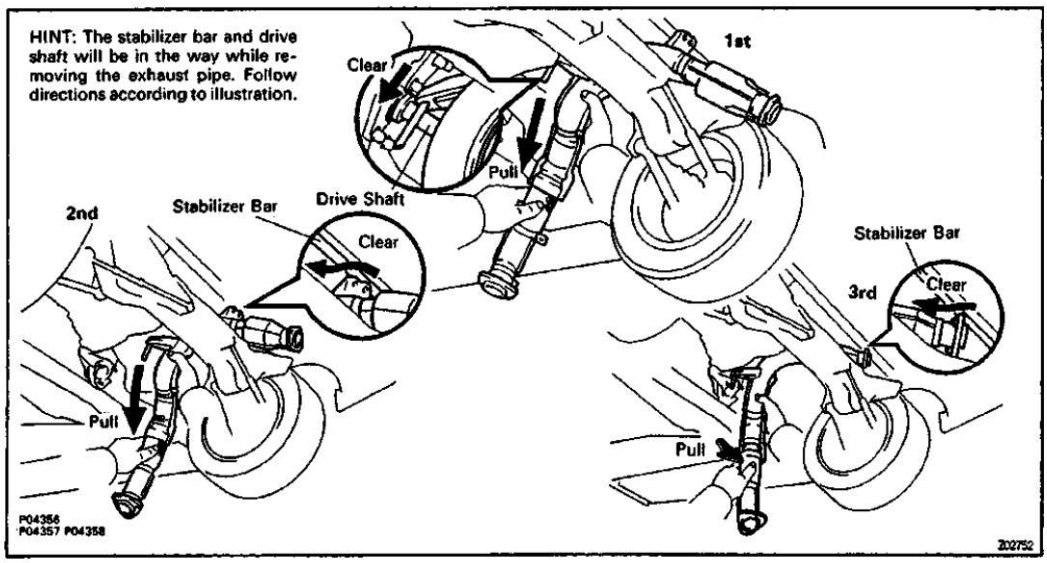


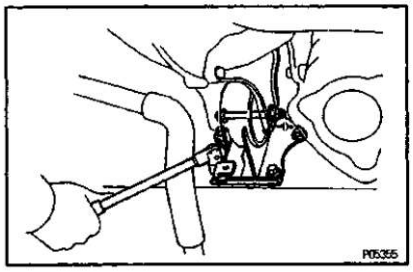
(b) Remove the two bolts and support bracket.



(c) Using a 14 mm deep socket wrench, remove the three nuts.

(d) Remove the front exhaust pipe and gasket.

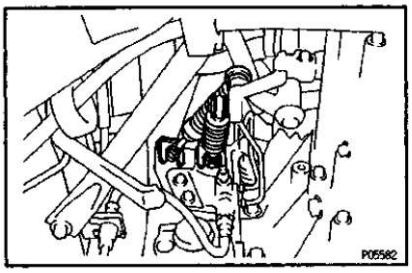




13. REMOVE FRONT ENGINE MOUNTING INSULATOR

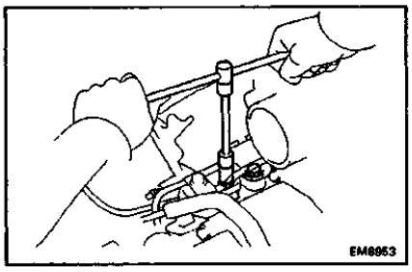
(a) Remove the through bolt and nut holding the mount–ing insulator to the mounting bracket.

(b) Remove the four bolts and mounting insulator.

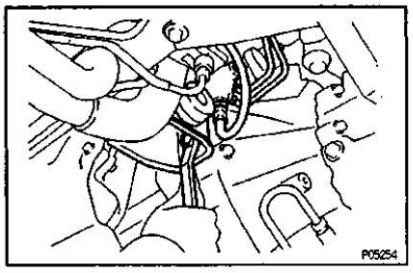


14. REMOVE FRONT ENGINE MOUNTING BRACKET AND CLUTCH RELEASE CYLINDER

(a) Disconnect the two transaxle control cables from the transaxle.

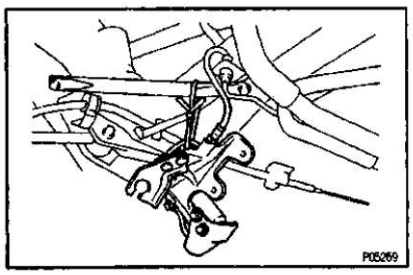


(b) Remove the two bolts holding the clutch release cyl–inder to the transaxle.

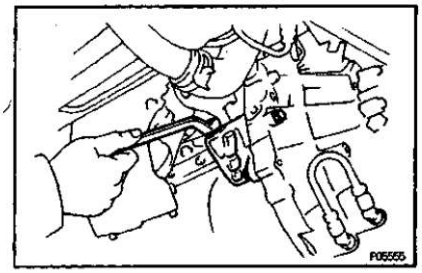


(c) Remove the two bolts and mounting bracket.

(d) Disconnect the clutch release cylinder from the tra–nsaxle.
Remove the three bolts and stiffener plate.

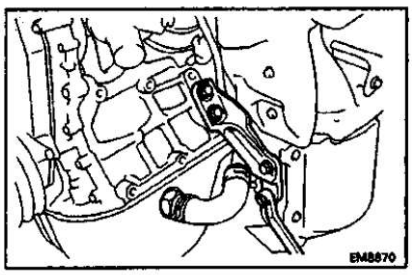


HINT: Suspend the clutch release cylinder to the suspension brace with a string.



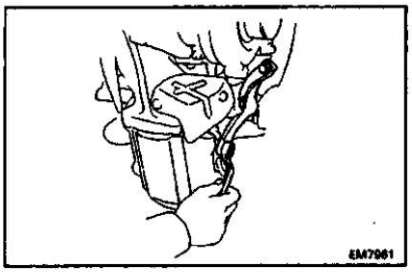
15. REMOVE STIFFENER PLATE

Remove the three bolts and stiffener plate.

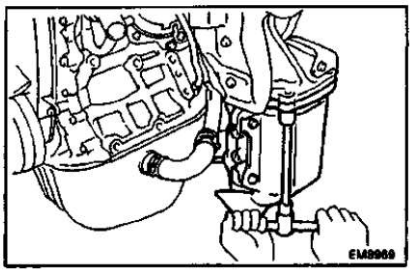


16. REMOVE MAIN TWC

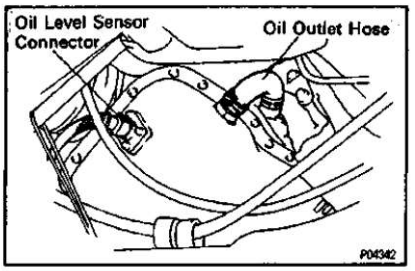
(a) Remove the four bolts and RH TWC stay.



(b) Remove the three bolts and LH TWC stay.

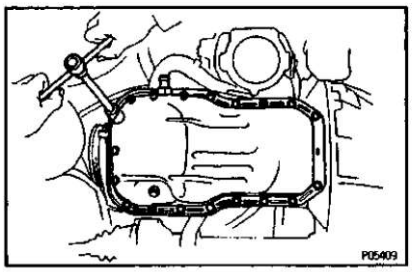


(c) Remove the three bolts, two nuts, TWC, gasket, retainer and cushion.

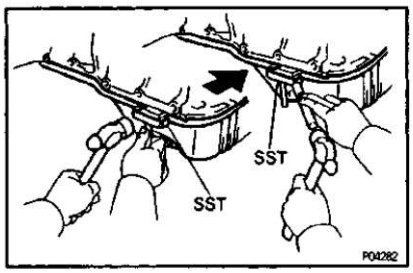


17. REMOVE OIL PAN

(a) Disconnect the oil level sensor connector.
(b) Disconnect the turbocharger oil outlet hose from the oil pan.
(c) Remove the oil dipstick.

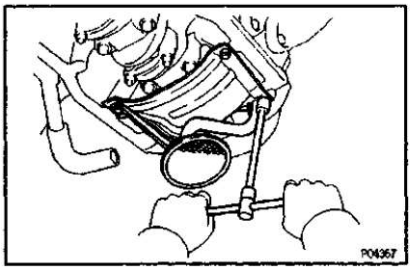


(d) Remove the seventeen bolts and two nuts.

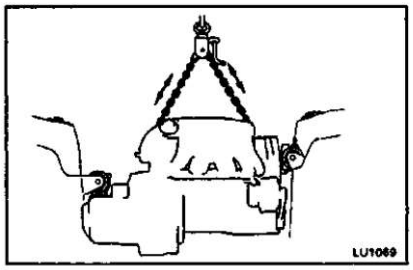


(e) Insert the blade of SST between the cylinder block and oil pan, and cut off applied sealer and remove the oil pan.
SST 09032–00100
NOTICE:

- **Do not use SST for the oil pump body side and rear oil seal retainer.**
- **Be careful not to damage the oil pan flange.**

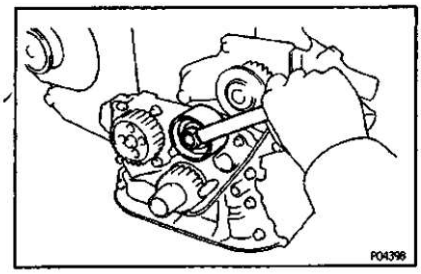


18. REMOVE OIL STRAINER
Remove the two bolts, nuts, oil strainer and gasket.

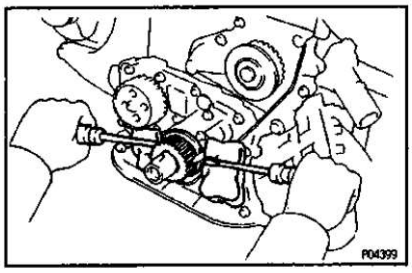


19. SUSPEND ENGINE WITH ENGINE SLING DEVICE

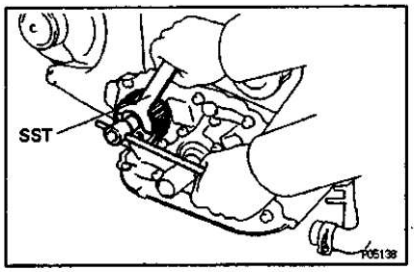
20. REMOVE TIMING BELT
(See steps 11, 12, 14 to 18, 23 to 26, 28 to 29 in Timing belt Removal under Engine Mechanical)



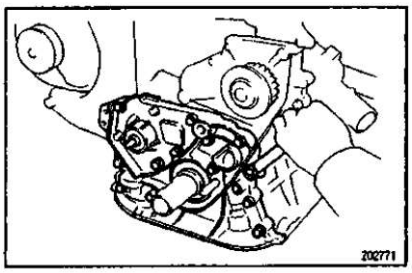
21. REMOVE No.2 IDLER PULLEY
Remove the bolt and pulley.



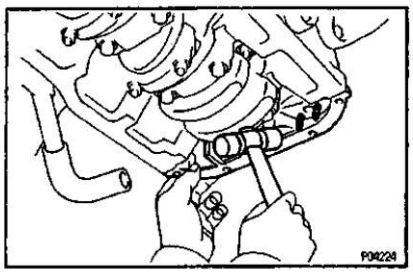
22. REMOVE CRANKSHAFT TIMING PULLEY
If the pulley cannot be removed by hand, use two screwdrivers.
HINT: Position shop rags as shown to prevent damage.



23. REMOVE OIL PUMP PULLEY
Using SST, remove the nut and pulley.
SST 09616–30011

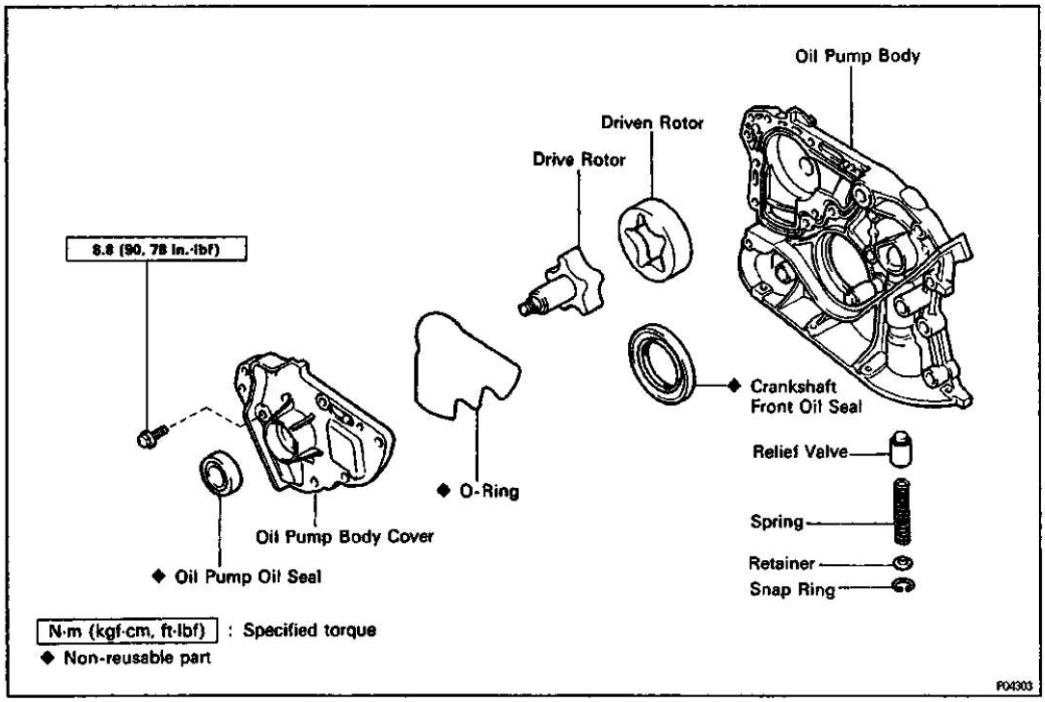


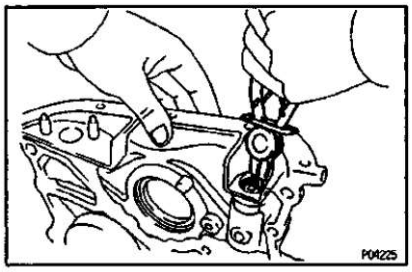
24. REMOVE OIL PUMP
(a) Remove the twelve bolts.



(b) Using a plastic–faced hammer, remove the oil pump by carefully tapping the oil pump body.
(c) Remove the gasket.

COMPONENTS FOR DISASSEMBLY AND ASSEMBLY





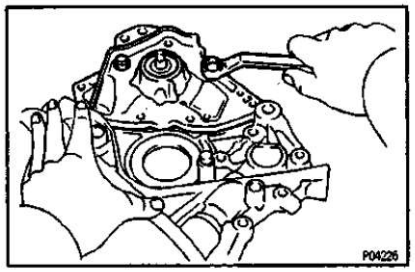
OIL PUMP DISASSEMBLY

(See Components for Disassembly and Assembly)

1. REMOVE RELIEF VALVE

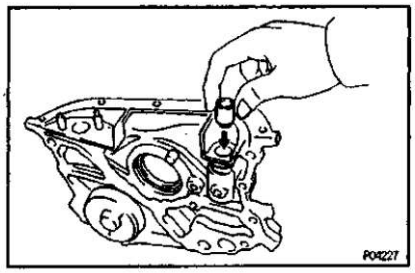
(a) Using snap ring pliers, remove the snap ring.

(b) Remove the retainer, spring and relief valve.



2. REMOVE DRIVE AND DRIVEN ROTORS

Remove the two bolts, pump body cover, 4 –ring, the drive and driven rotors.



OIL PUMP INSPECTION

1. INSPECT RELIEF VALVE

Coat the valve with engine oil and check that it falls smoothly into the valve hole by its own weight.
If it doesn't, replace the relief valve. If necessary, replace the oil pump assembly.

2. INSPECT DRIVE AND DRIVEN ROTORS

A. Inspect rotor body clearance

Using a feeler gauge, measure the clearance between the driven rotor and body.

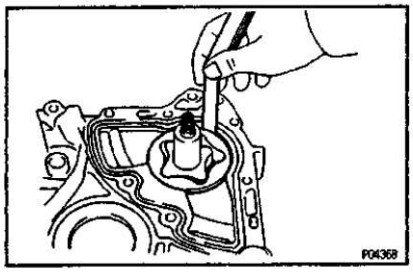
Standard body clearance:

0.10 – 0.16 mm (0.0039 – 0.0063 in.)

Maximum body clearance:

0.20 mm (0.0079 in.)

If the body clearance is greater than maximum, replace the rotors as a set. If necessary, replace the oil pump assembly.



B. Inspect rotor tip clearance

Using a feeler gauge, measure the clearance between the drive and driven rotor tips.

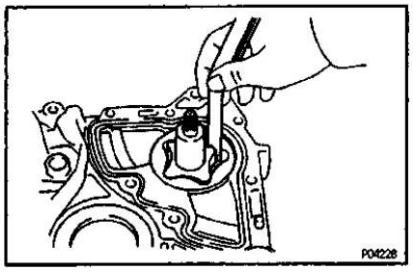
Standard tip clearance:

0.04 – 0.16 mm (0.0016 – 0.0063 in.)

Maximum tip clearance:

0.20 mm (0.0079 in.)

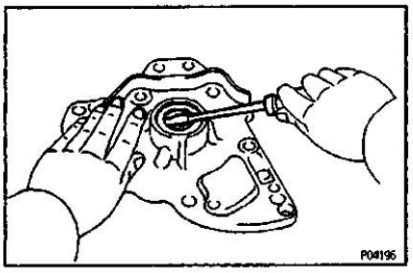
If the tip clearance is greater than maximum, replace the rotors as a set.



OIL PUMP OIL SEAL REPLACEMENT

1. REMOVE OIL SEAL

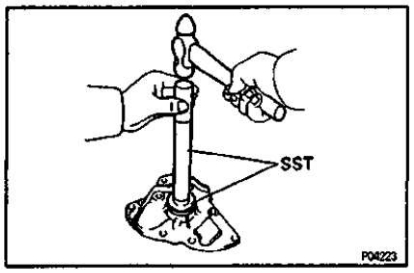
Using a screwdriver, pry out the oil seal.



2. INSTALL OIL SEAL

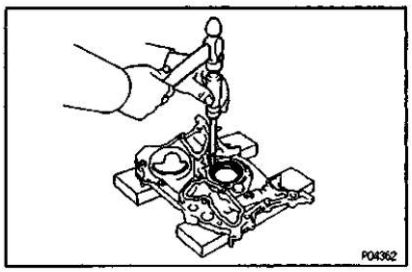
(a) Using SST and a hammer, tap in a new oil seal until its surface is flush with the oil pump cover edge.
SST 09620–30010 (09627–30010, 09631–00020)

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



CRANKSHAFT FRONT OIL SEAL REPLACEMENT

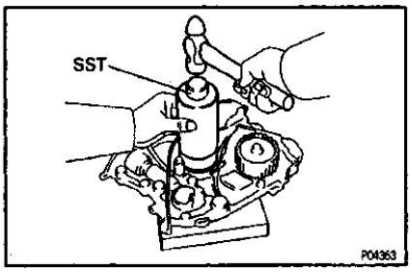
HINT: There are two methods (A and B) to replace the oil seal which are as follows:



REPLACE CRANKSHAFT FRONT OIL SEAL

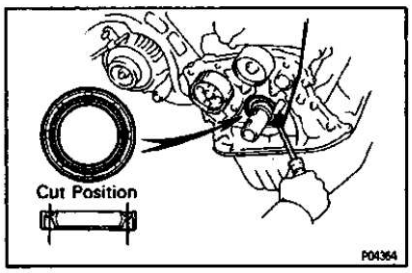
A. If oil pump is removed from cylinder block:

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



(b) Using SST and a hammer, tap in a new oil seal until its surface is flush with the oil pump body edge.
SST 09226–10010

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

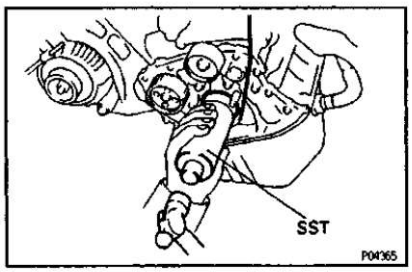


B. If oil pump is installed to the cylinder block:

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

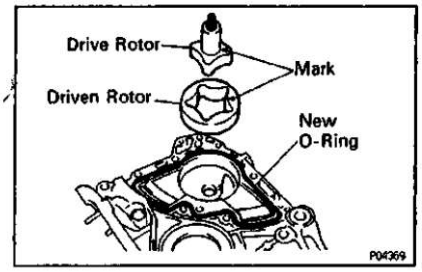
(b) Using a screwdriver, pry out the oil seat.

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



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

(d) Using SST and a hammer, tap in the oil seal until its surface is flush with the oil pump body edge.
SST 09226–10010



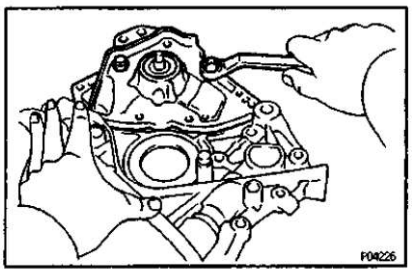
OIL PUMP ASSEMBLY

(See Components for Disassembly and Assembly)

1. INSTALL DRIVE AND DRIVEN ROTORS

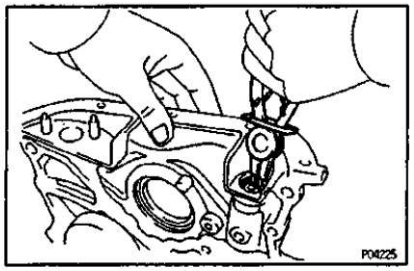
(a) Place the drive and driven rotors into pump body with the marks facing the pump body cover side.

(b) Install a new 0–ring to the oil pump body.



(c) Install the oil pump body cover with the two bolts.

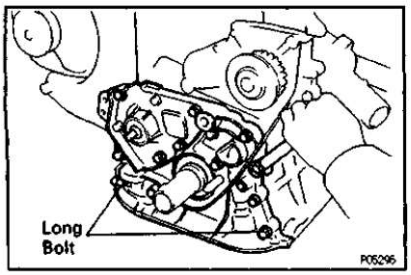
Torque: 8.8 N–m (90 kgf–cm, 78 in.–lbf)



2. INSTALL RELIEF VALVE

(a) Insert the relief valve, spring and retainer into the oil pump body hole. ,

(b) Using snap ring pliers, install the snap ring.



OIL PUMP INSTALLATION

(See Components for Removal and Installation)

1. INSTALL OIL PUMP

Install a new gasket and the oil pump with the twelve bolts.

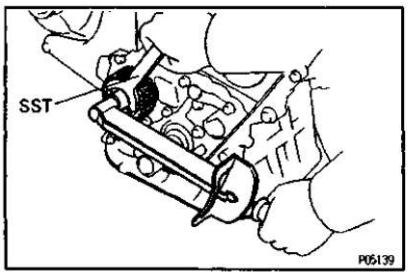
Torque: 7.8 N–m (80 kgf–cm, 69 in.–lbf)

HINT: Long bolt are indicated in the illustration.

Bolt length:

35 mm (1.38 in.) for long bolt

25 mm (0.98 in.) for other bolts



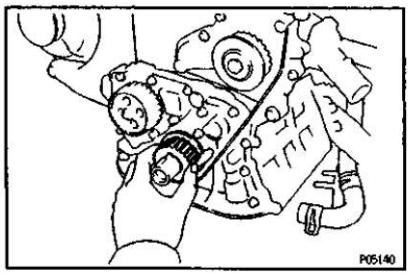
2. INSTALL OIL PUMP PULLEY

(a) Align the cutouts of the pulley and shaft, and slide on the pulley.

(b) Using SST, install the pulley nut.

SST 09616–30011

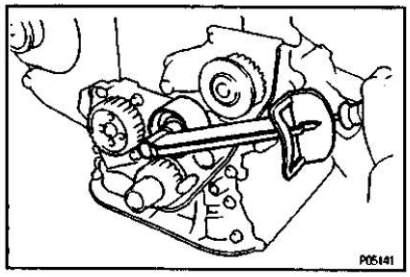
Torque: 35 N–m (355 kgf–cm, 26 ft–lbf)



3. INSTALL CRANKSHAFT TIMING PULLEY

(a) Align the timing pulley set key with the key groove of the pulley.

(b) Slide on the timing pulley, facing the flange side inward.



4. INSTALL NO.2 IDLER PULLEY

(a) Install the pulley with the bolt.

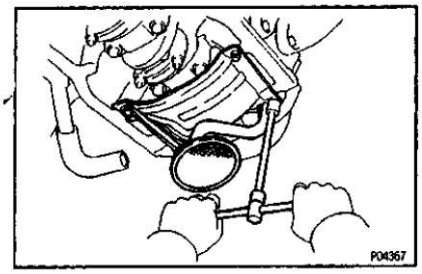
Torque: 43 N–m (440 kgf–cm, 32 ft–lbf)

(b) Check that the idler pulley moves smoothly.

5. INSTALL TIMING BELT

(See steps 5 to 8, 10 to 11, 22 to 28 in Timing Belt Installation under Engine Mechanical)

6. REMOVE ENGINE SLING DEVICE



7. INSTALL OIL STRAINER

Install a new gasket and the oil strainer with the two bolts and nuts.

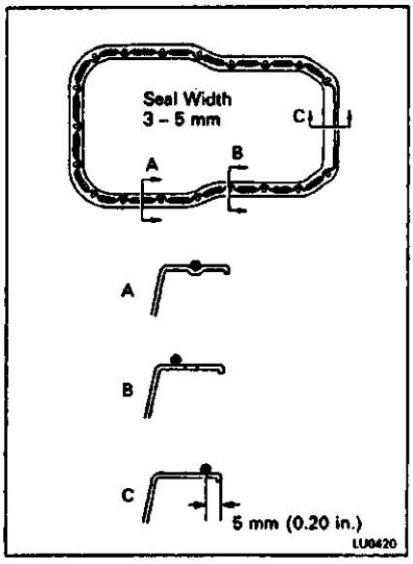
Torque: 5.4 N–m (55 kgf–cm, 48 in.–lbf)

8. INSTALL OIL PAN

(a) Remove any old packing (FIPG) material and be careful not to drop any oil on the contact surfaces of the oil pan and cylinder block.

- Using a razor blade and gasket scraper, remove all the old packing (FIPG) material from the gasket surfaces and sealing groove.
- Thoroughly clean all components to remove all the loose material.
- Using a non–residue solvent, clean both sealing surfaces.

NOTICE: Do not use a solvent which will affect the painted surfaces.

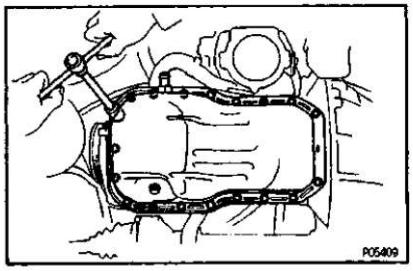


(b) Apply seal packing to the oil pan as shown in the illustration.

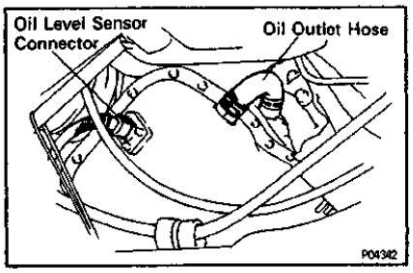
Seal packing:

Part No. 08826–00080 or equivalent

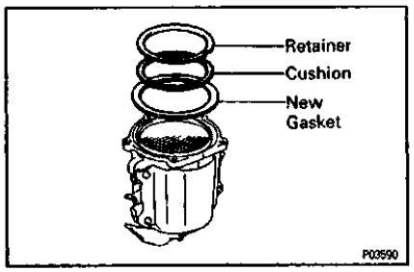
- **Install a nozzle that has been cut to a 3 – 5 mm (0.12 – 0.20 in.) opening.**
- **Parts must be assembled within 5 minutes of application. Otherwise the material must be removed and reapplied.**
- **Immediately remove nozzle from the tube and reinstall cap.**



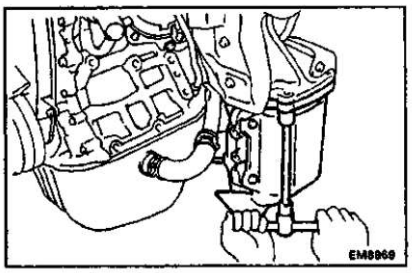
(c) Install the oil pan with seventeen bolts and two nuts.
Torque: 5.4 N–m (55 kgf–cm, 48 in.–lbf)
(d) Install the dipstick.



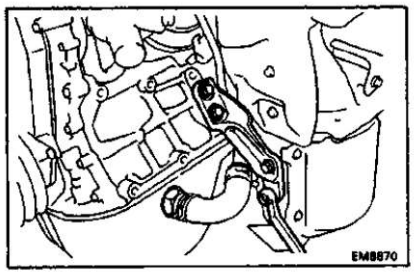
(e) Connect the turbocharger oil outlet hose to the oil pan.
(f) Connect the oil level sensor connector.



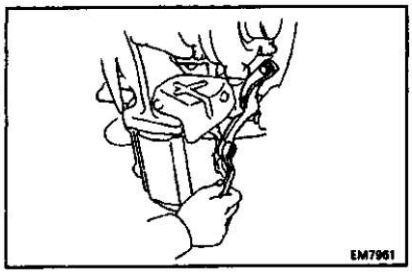
9. INSTALL MAIN TWC
(a) Place the cushion, retainer and a new gasket on the TWC.



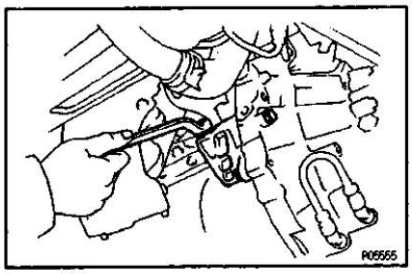
(b) Install the TWC with the three bolts and two nuts.
Torque: 29 N–m (300 kgf–cm, 22 ft–lbf)



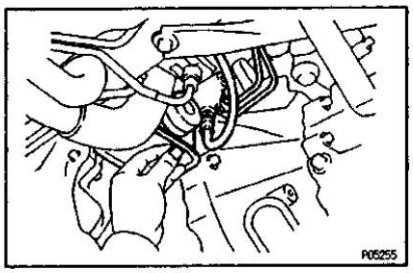
(c) Install the RH TWC stay with the four bolts.
Torque: 59 N–m (600 kgf–cm, 43 ft–lbf)



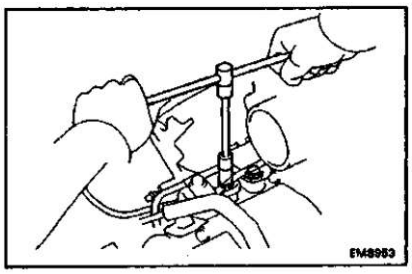
(d) Install the LH TWC stay with the three bolts.
Torque: 59 N–m (600 kgf–cm, 43 ft–lbf)



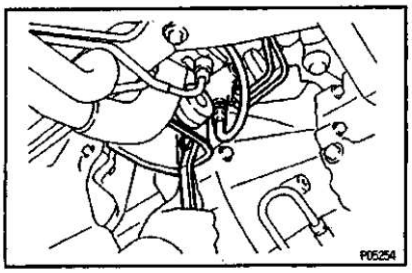
10. INSTALL STIFFENER PLATE
Install the stiffener plate with the three bolts.
Torque: 37 N–m (380 kgf–cm, 27 ft–lbf)



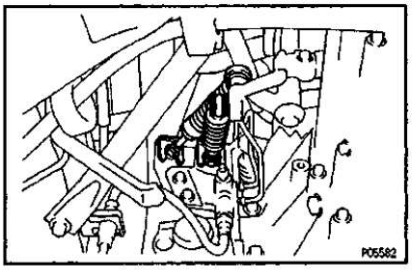
11. INSTALL CLUTCH RELEASE CYLINDER AND FRONT ENGINE MOUNTING BRACKET
(a) Temporarily install the release cylinder and mounting bracket with the two bolts.



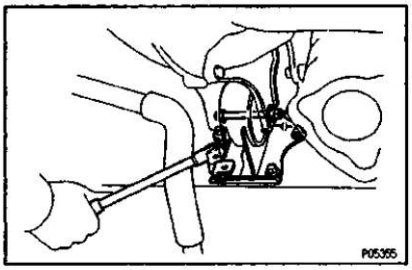
(b) Install the clutch release cylinder with the two bolts.
Torque: 12 N–m (120 kgf–cm. 9 ft–lbf)



(c) Tighten the two bolts holding the clutch release cyl–inder to the transaxle.
Torque: 77 N–m (790 kgf–cm, 57 ft–lbf)



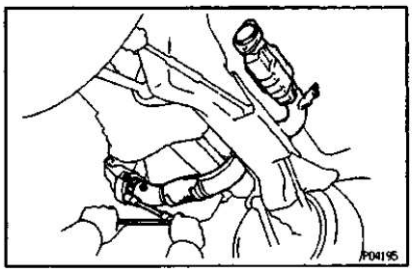
(d) Connect the two transaxle control cables to the tra–nsaxle.



12. INSTALL FRONT ENGINE MOUNTING INSULATOR

(a) Install the mounting insulator to the body with the four bolts.
Torque: 77 N–m (790 kgf–cm, 57 ft–lbf)

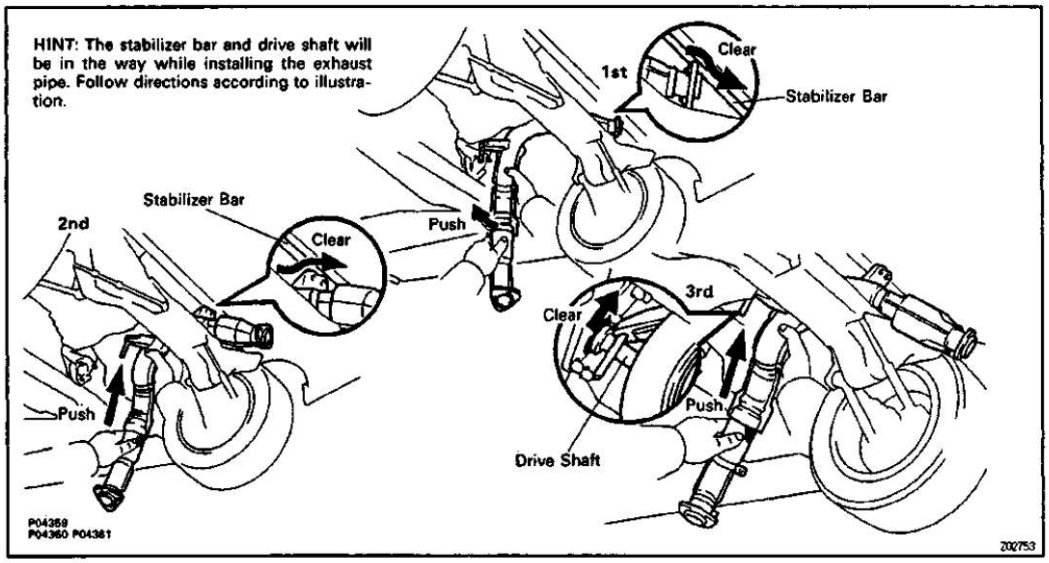
(b) Install the mounting insulator to the mounting bracket with the through bolt and nut.
Torque: 96 N–m (980 kgf–cm, 71 ft–lbf)

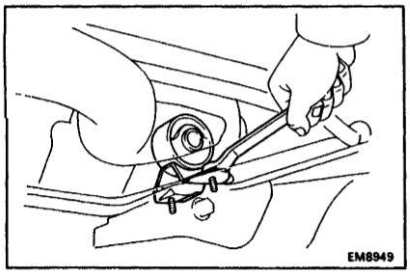


13. INSTALL FRONT EXHAUST PIPE

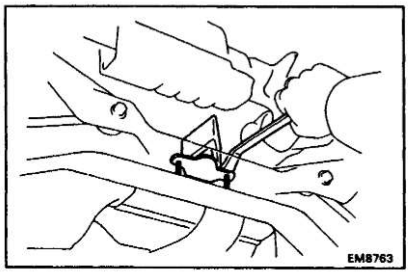
(a) Place a new gasket to the front of the front exhaust pipe.

(b) Using a 14 mm deep socket wrench, install the front exhaust pipe with three new nuts.
Torque: 62 N–m (630 kgf–cm, 46 ft–lbf)

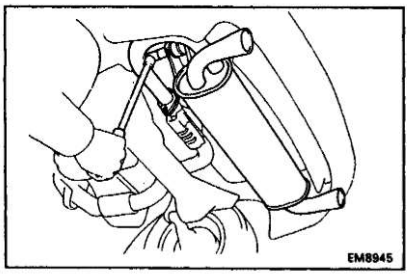




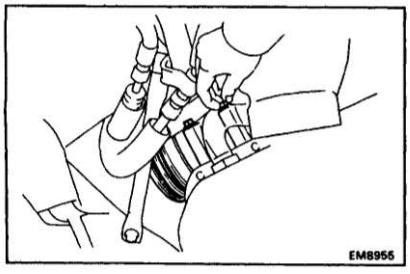
(c) Install the support bracket with the two bolts.
Torque: 21 N–m (210 kgf–cm, 15 ft–lbf)



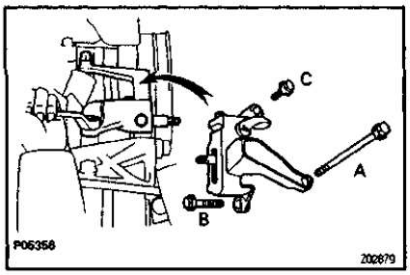
(d) Install the damper with the two bolts.
Torque: 21 N–m (210 kgf–cm, 15 ft–lbf)



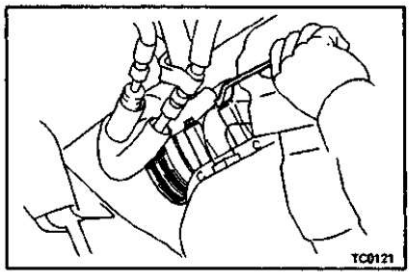
14. INSTALL TAILPIPE
(a) Place a new gasket to the rear of the front exhaust pipe.
(b) Install the tailpipe to the body bracket with the two bolts and nut.
Torque: 66 N–m (670 kgf–cm, 48 ft–lbf)
(c) Install the two bolts holding the front exhaust pipe to the tailpipe.
Torque: 43 N–m (440 kgf–cm, 32 ft–lbf)
(d) Install the two bolts holding the front exhaust pipe bracket to the tailpipe bracket.
Torque: 19 N–m (190 kgf–cm, 14 ft–lbf)



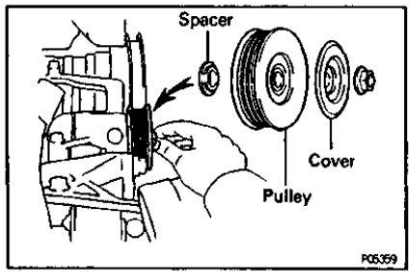
15. INSTALL A/C COMPRESSOR
(a) Temporarily install the A/C compressor with the two bolts.



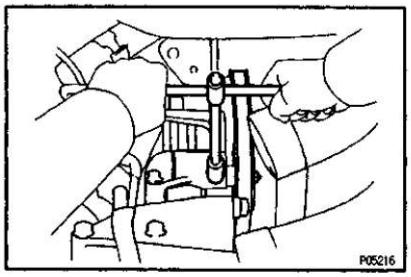
(b) Install the idler pulley bracket with the three bolts.
Torque:
25 N–m (250 kgf–cm, 18 ft–lbf) for A
27 N–m (275 kgf–cm, 20 ft–lbf) for B
37 N–m (375 kgf–cm, 27 ft–lbf) for C
(c) Connect the A/C compressor connector.



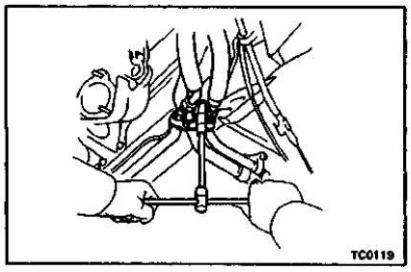
(d) Tighten the two bolts of the lower side of the A/C compressor.
Torque: 25 N–m (250 kgf–cm, 18 ft–lbf)



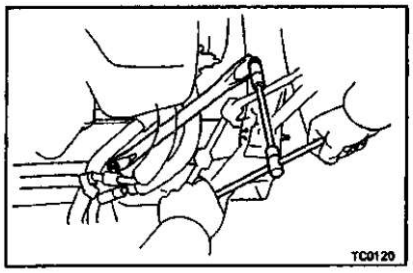
(e) Temporarily install the spacer, pulley and pulley cover with the nut.



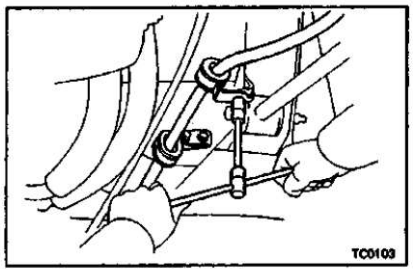
(f) Install the drive belt with the adjusting bolt.
(g) Tighten the idler pulley nut.



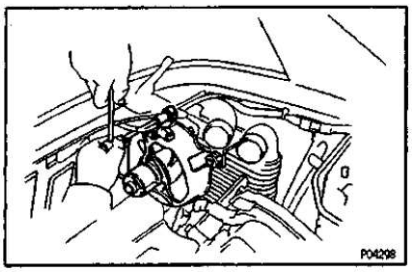
(h) Install the two A/C pipes with the two clamps and nut.



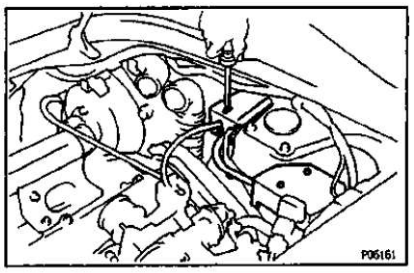
(i) Install the lower suspension brace with the two bolts.
Torque: 73 N–m (740 kgf–cm, 54 ft–lbf)



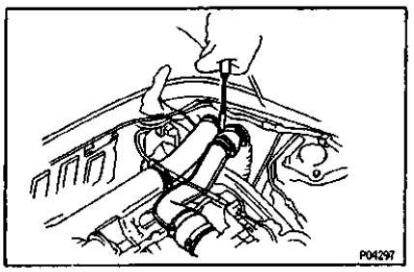
(j) Install the parking brake cable with the two clamps and three bolts.



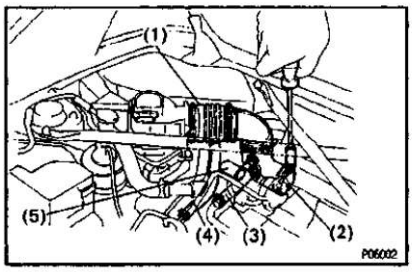
16. INSTALL ENGINE COMPARTMENT ELECTRIC COOLING FAN
(a) Install the cooling fan with the three bolts.
(b) Connect the cooling fan connector.



17. (w/ CRUISE CONTROL SYSTEM) INSTALL CRUISE CONTROL ACTUATOR AND ACCELERATOR LINKAGE



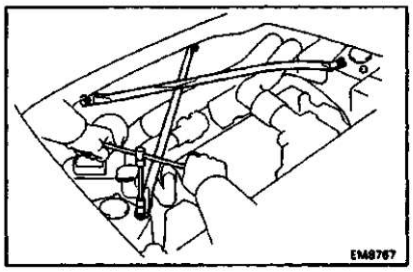
18. INSTALL NO.1 AND NO.2 INTAKE AIR CONNECTORS



19. INSTALL AIR CLEANER HOSE

Reconnect the following hoses, and install the air cleaner hose:

(1) Air cleaner hose to air flow sensor
(2) Air cleaner hose to turbocharger
(3) PCV hose to cylinder head cover
(4) Air hose to No.2 air hose
(5) Air hose to air by–pass valve



20. INSTALL UPPER SUSPENSION BRACE

Install the upper brace with the two bolts and two nuts.

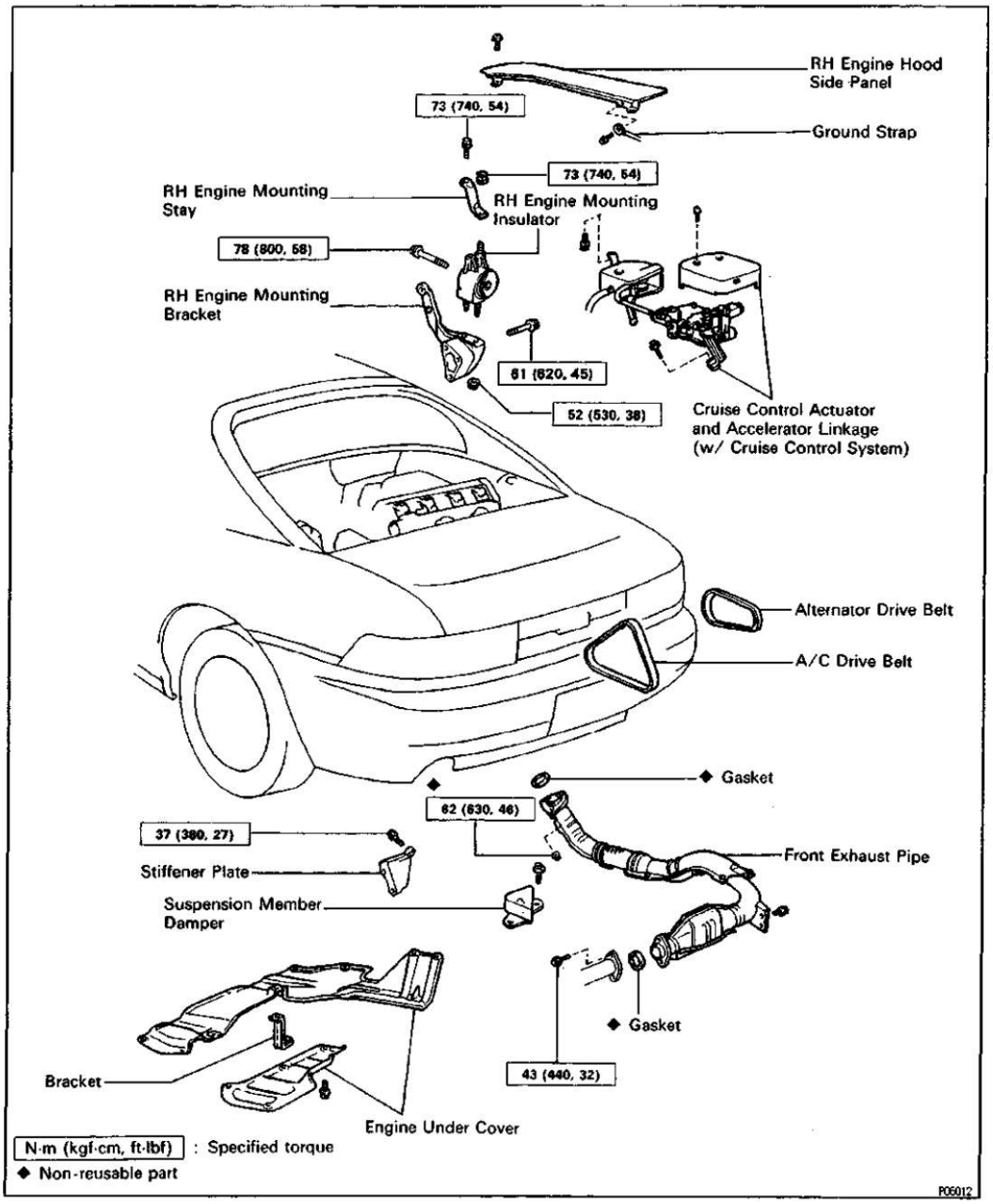
Torque:

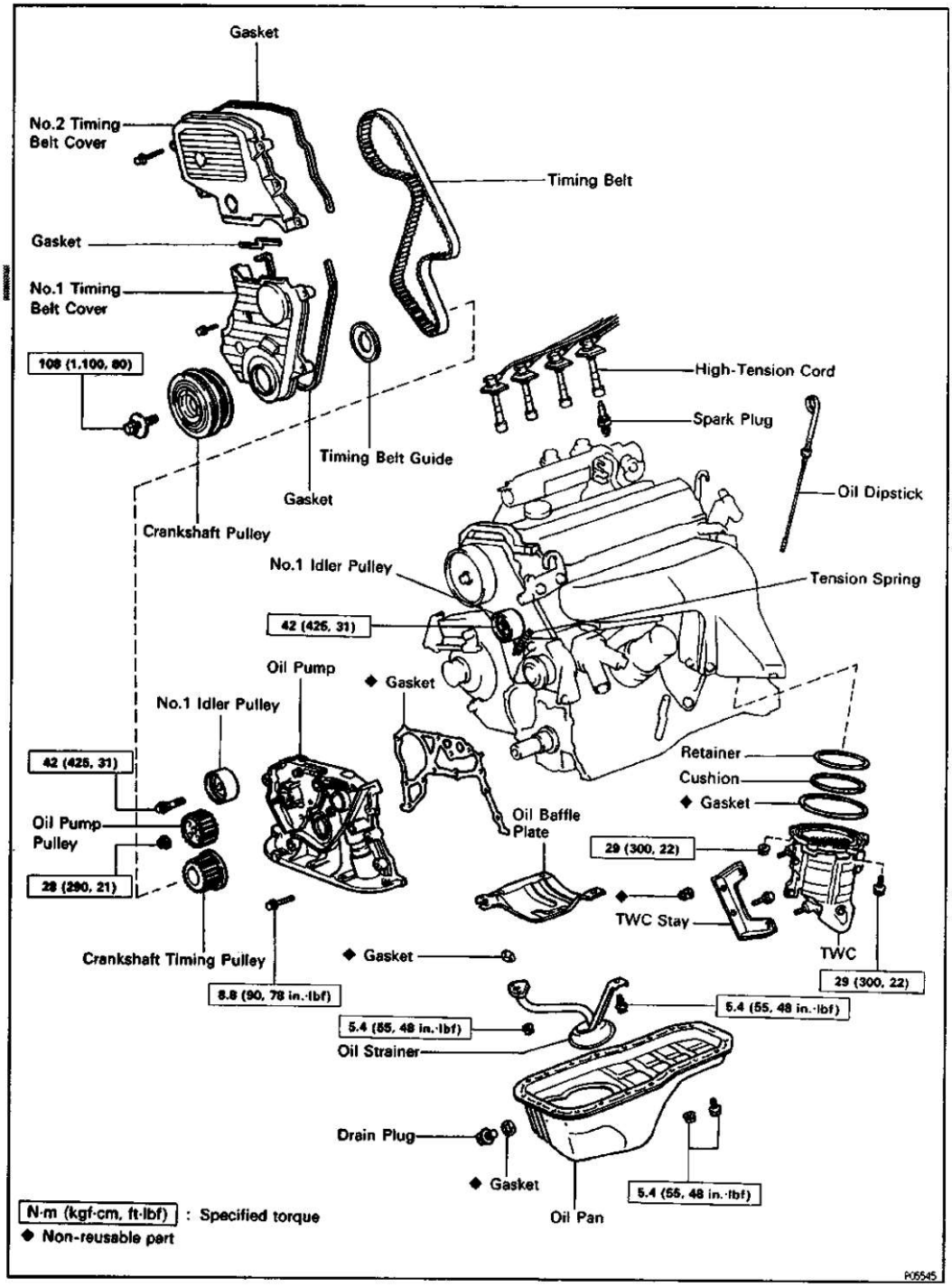
73 N–m (740 kgf–cm, 54 ft–lbf) for bolt
64 N–m (650 kgf–cm, 47 ft–lbf) for nut

21. INSTALL RH ENGINE HOOD SIDE PANEL
22. CONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY
23. FILL WITH ENGINE OIL
24. START ENGINE AND CHECK FOR OIL LEAKS
25. RECHECK ENGINE OIL LEVEL
26. INSTALL ENGINE UNDER COVERS

OIL PUMP

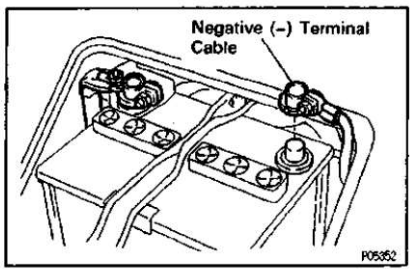
COMPONENTS FOR REMOVAL AND INSTALLATION




Gasket
No.2 Timing Belt Cover
Timing Belt
Gasket
No.1 Timing Belt Cover
108 (1,100, 80)
High-Tension Cord
Spark Plug
Timing Belt Guide
Gasket
Oil Dipstick
Crankshaft Pulley
No.1 Idler Pulley
Tension Spring
42 (425, 31)
Oil Pump
◆ Gasket
No.1 Idler Pulley
Retainer
Cushion
◆ Gasket
42 (425, 31)
Oil Pump Pulley
Oil Baffle Plate
29 (300, 22)
28 (290, 21)
◆ TWC Stay
TWC
Crankshaft Timing Pulley
◆ Gasket
29 (300, 22)
8.8 (90, 78 in.·lbf)
5.4 (55, 48 in.·lbf)
5.4 (55, 48 in.·lbf)
Oil Strainer
Drain Plug
◆ Gasket
5.4 (55, 48 in.·lbf)
Oil Pan
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part
P05545

OIL PUMP REMOVAL

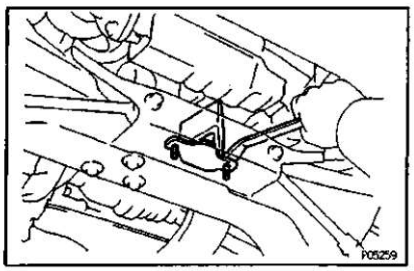
(See Components for Removal and Installation)
HINT: When repairing the oil pump, the oil pan and strainer should be removed and cleaned:



1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY

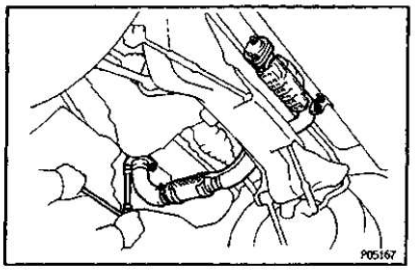
CAUTION: Turn the ignition switch to "LOCK". Disconnect the negative terminal from the battery. Wait at least 20 seconds before proceeding with work.

2. DRAIN ENGINE OIL
3. REMOVE ENGINE UNDER COVERS
4. REMOVE RH ENGINE HOOD SIDE PANEL

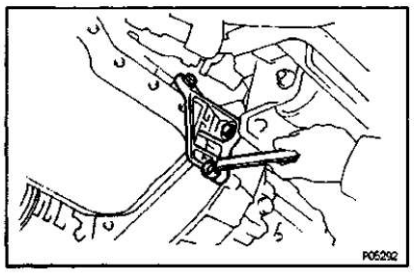


5. REMOVE EXHAUST PIPE

(a) (CALIF. only)
Remove the two bolts and damper.

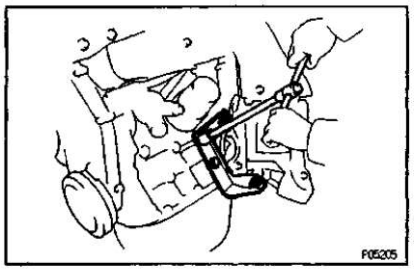


(b) Remove the two bolts holding the front exhaust pipe bracket to the tailpipe bracket.
(c) Remove the two bolts holding the front exhaust pipe to the tailpipe.
(d) Using a 14 mm deep socket wrench, remove the three nuts holding the front exhaust pipe to the TWC.
(e) Remove the front exhaust pipe.
(f) Remove the two gaskets.



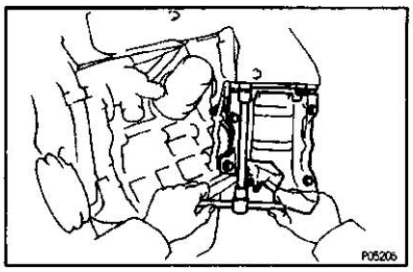
6. REMOVE STIFFENER PLATE

Remove the three bolts and stiffener plate.

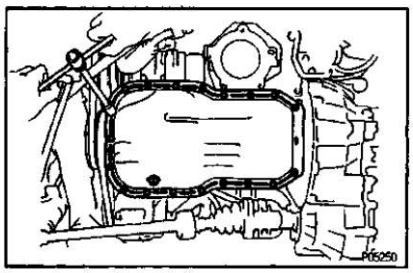


7. REMOVE TWC

(a) (CALIF. only)
Disconnect the sub–oxygen sensor connector.
(b) Remove the two bolts and TWC stay.

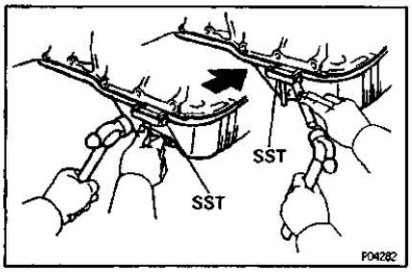


(c) Remove the three bolts, two nuts, TWC, gasket, retainer and cushion.



8. REMOVE OIL PAN

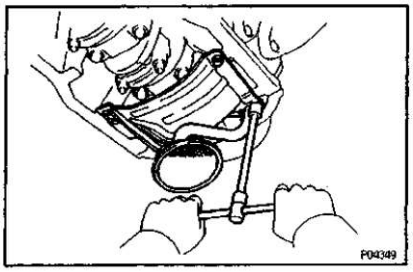
(a) Remove the oil dipstick.
(b) Remove the seventeen bolts and two nuts.



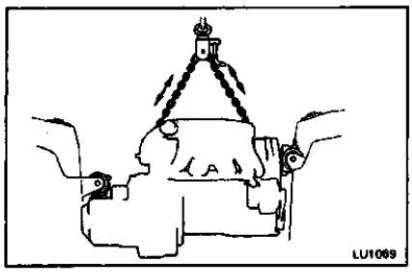
(c) Insert the blade of SST between the cylinder block and oil pan, and cut off applied sealer and remove the oil pan.
SST 09032–00100

NOTICE:

- **Do not use SST for the oil pump body side and rear oil seal retainer.**
- **Be careful not to damage the 'oil pan flange.**

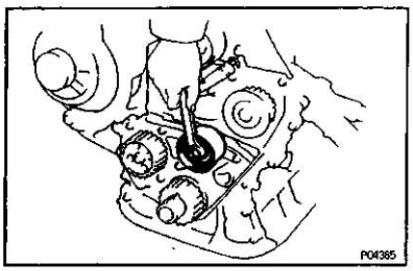


9. REMOVE OIL STRAINER
Remove the two bolts, nuts, oil strainer and gasket.

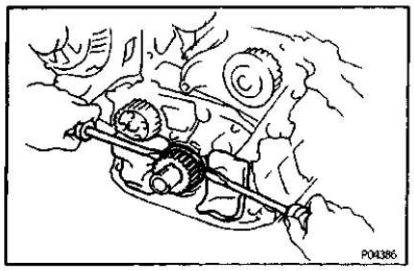


10. SUSPEND ENGINE WITH ENGINE SLING DEVICE

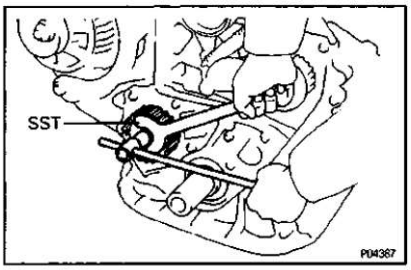
11. REMOVE TIMING BELT
(See steps 4 to 6 and 8 to 22 in Timing belt Removal under Engine Mechanical)



12. REMOVE N0.2 IDLER PULLEY
Remove the bolt and pulley.

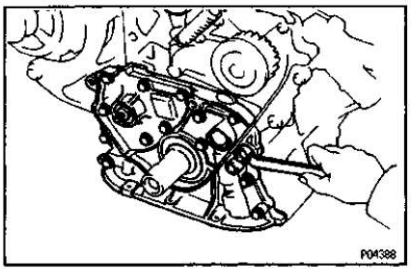


13. REMOVE CRANKSHAFT TIMING PULLEY
If the pulley cannot be removed by hand, use two screwdrivers.
HINT: Position shop rags as shown to prevent damage.



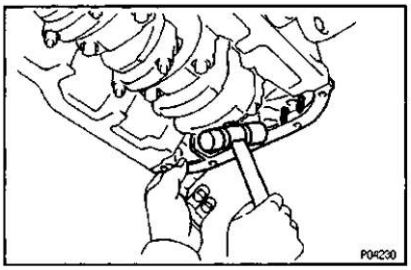
14. REMOVE OIL PUMP PULLEY

Using SST, remove the nut and pulley.
SST 09616–30011



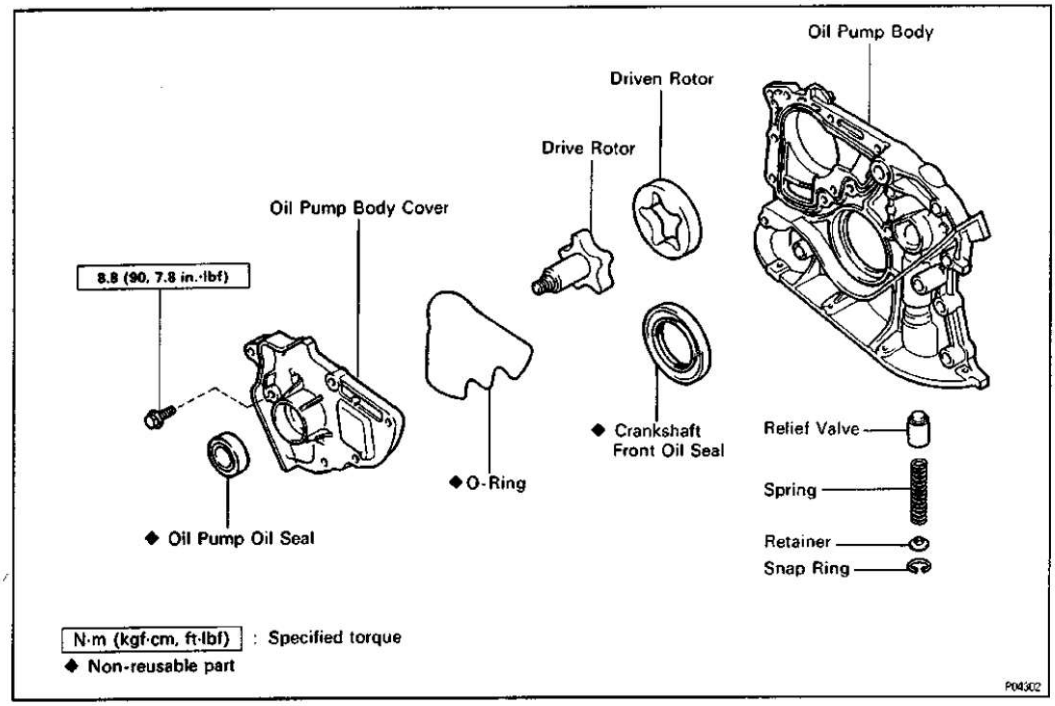
15. REMOVE OIL PUMP

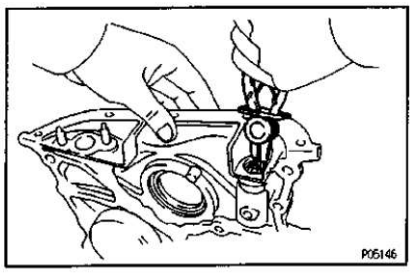
(a) Remove the twelve bolts.



(b) Using a plastic–faced hammer, remove the oil pump by carefully tapping the oil pump body.
(c) Remove the gasket.

COMPONENTS FOR DISASSEMBLY AND ASSEMBLY





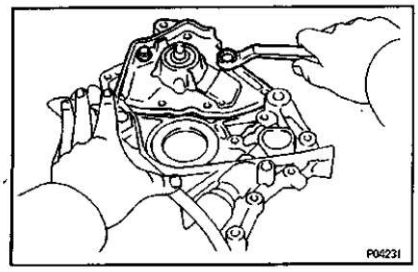
OIL PUMP DISASSEMBLY

(See Components for Disassembly and Assembly)

1. REMOVE RELIEF VALVE

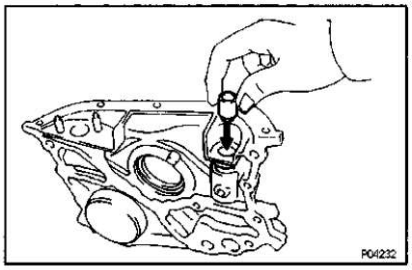
(a) Using snap ring pliers, remove the snap ring.

(b) Remove the retainer, spring and relief valve.



2. REMOVE DRIVE AND DRIVEN ROTORS

Remove the two bolts, pump body cover, O–ring, the drive and driven rotors.



OIL PUMP INSPECTION

1. INSPECT RELIEF VALVE

Coat the valve with engine oil and check that it falls smoothly into the valve hole by its own weight.
If it doesn't, replace the relief valve. If necessary, replace the oil pump assembly.

2. INSPECT DRIVE AND DRIVEN ROTORS

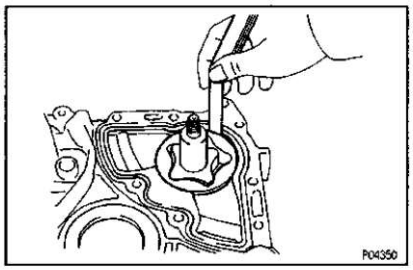
A. Inspect rotor body clearance

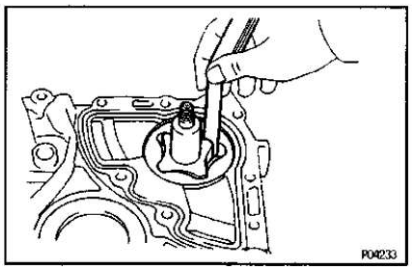
Using a feeler gauge, measure the clearance between the driven rotor and body.

Standard body clearance:
0.10 – 0.16 mm (0.0039 – 0.0063 in.)

Maximum body clearance:
0.20 mm (0.0079 in.)

If the body clearance is greater than maximum, replace the rotors as a set. If necessary, replace the oil pump assembly.





B. Inspect rotor tip clearance

Using a feeler gauge, measure the clearance between the drive and driven rotor tips.

Standard tip clearance:
0.04 – 0.16 mm (0.0016 – 0.0063 in.)

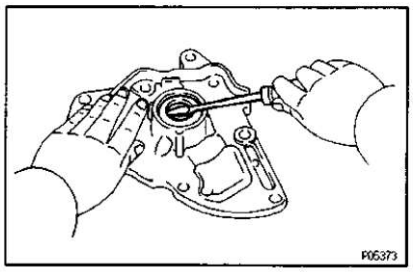
Maximum tip clearance:
0.20 mm (0.0079 in.)

If the tip clearance is greater than maximum, replace the rotors as a set.

OIL PUMP OIL SEAL REPLACEMENT

1. REMOVE OIL SEAL

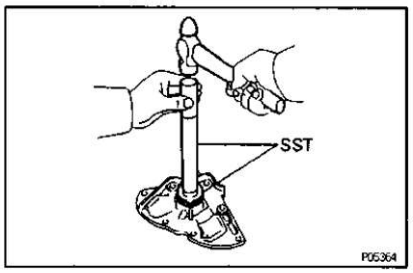
Using a screwdriver, pry out the oil seal.



2. INSTALL OIL SEAL

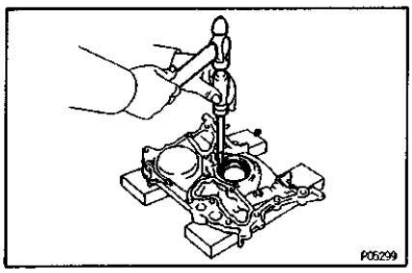
(a) Using SST and a hammer, tap in a new oil seal until its surface is flush with the oil pump cover edge.
SST 09620–30010 (09627–30010, 09631–00020)

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



CRANKSHAFT FRONT OIL SEAL REPLACEMENT

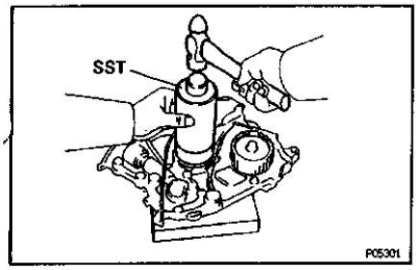
HINT: There are two methods (A and B) to replace the oil seal which are as follows:



REPLACE CRANKSHAFT FRONT OIL SEAL

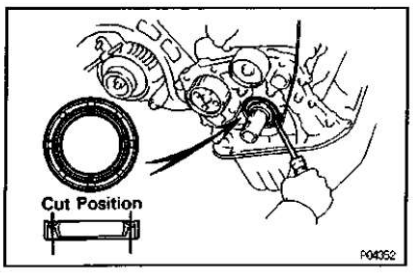
A. If oil pump is removed from cylinder block:

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



(b) Using SST and a hammer, tap in a new oil seal until its surface is flush with the oil pump body edge.
SST 09226–10010

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

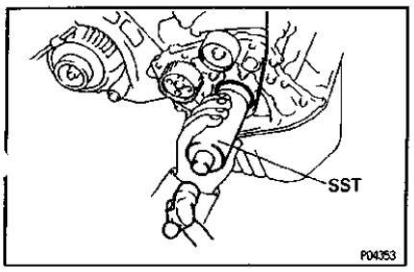


B. If oil pump is installed to the cylinder block:

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

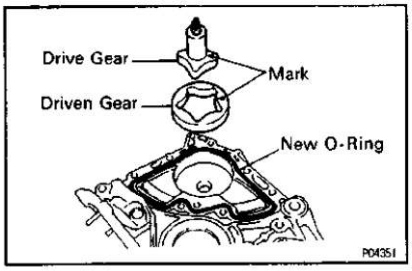
(b) Using a screwdriver, pry out the oil seal.

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



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

(d) Using SST and a hammer, tap in the oil seal until its surface is flush with the oil pump body edge.
SST 09226–10010



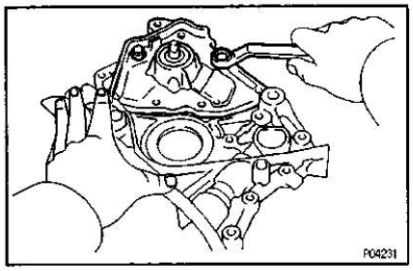
OIL PUMP ASSEMBLY

(See Components for Disassembly and Assembly)

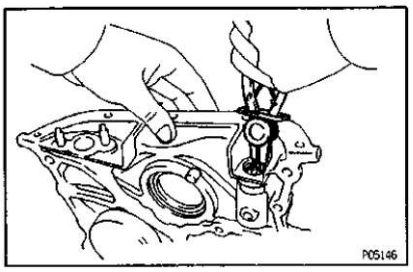
1. INSTALL DRIVE AND DRIVEN ROTORS

(a) Place the drive and driven rotors into pump body with the marks facing the pump body cover side.

(b) Install a new O–ring to the oil pump body.



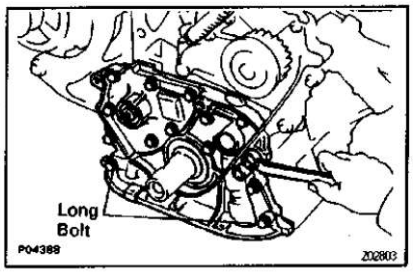
(c) Install the oil pump body cover with the two bolts.
Torque: 8.8 N–m (90 kgf–cm, 78 in–lbf)



2. INSTALL RELIEF VALVE

(a) Insert the relief valve, spring and retainer into the oil pump body hole.

(b) Using snap ring pliers, install the snap ring.



OIL PUMP INSTALLATION

(See Components for Removal and Installation)

1. INSTALL OIL PUMP

Install a new gasket and the oil pump with the twelve bolts.

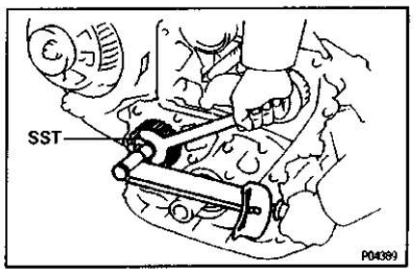
Torque: 8.8 N–m (90 kgf–cm, 78 in.–lbf)

HINT: Long bolt are indicated in the illustration.

Bolt length:

35 mm (1.38 in.) for long bolt

25 mm (0.98 in.) for other bolts



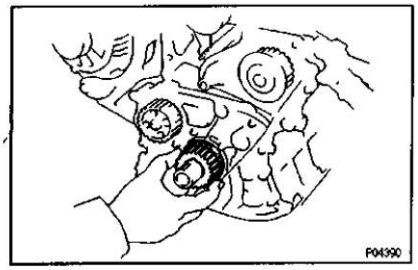
2. INSTALL OIL PUMP PULLEY

(a) Align the cutouts of the pulley and shaft, and slide on the pulley.

(b) Using SST, install the pulley nut.

SST 09616–30011

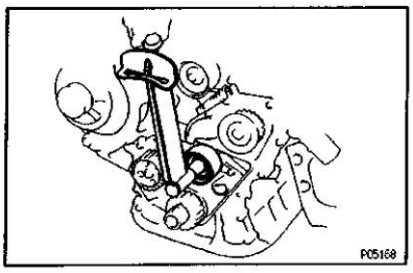
Torque: 28 N–m (290 kgf–cm, 21 ft–lbf)



3. INSTALL CRANKSHAFT TIMING PULLEY

(a) Align the timing pulley set key with the key groove of the pulley.

(b) Slide on the timing pulley, facing the flange side inward.



4. INSTALL NO.2 IDLER PULLEY

(a) Install the pulley with the bolt.

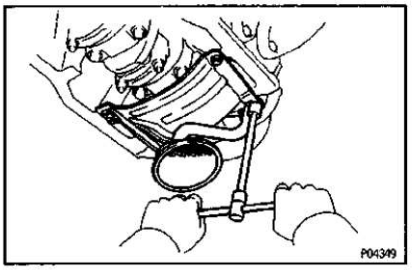
Torque: 42 N–m (425 kgf–cm. 31 ft–lbf)

(b) Check that the idler pulley moves smoothly.

5. INSTALL TIMING BELT

(See steps 5 to 19 and 21 to 23 in Timing Belt Installation under Engine Mechanical)

6. REMOVE ENGINE SLING DEVICE



7. INSTALL OIL STRAINER

Install a new gasket and the oil strainer with the two bolts and nuts.

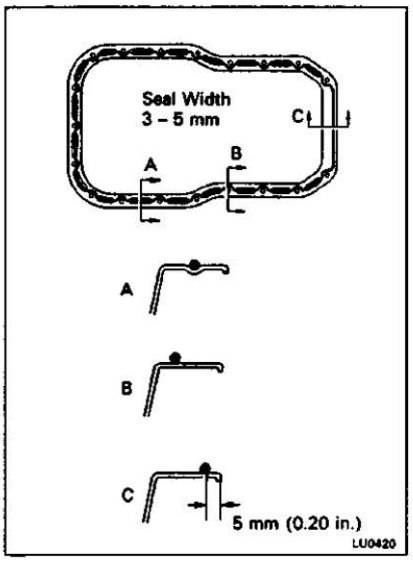
Torque: 5.4 N–m (55 kgf–cm, 48 in.–lbf)

8. INSTALL OIL PAN

(a) Remove any old packing (FIPG) material and be careful not to drop any oil on the contact surfaces of the oil pan and cylinder block.

- Using a razor blade and gasket scraper, remove all the old packing (FIPG) material from the gasket surfaces and sealing groove.
- Thoroughly clean all components to remove all the loose material.
- Using a non–residue solvent, clean both sealing surfaces.

NOTICE: Do not use a solvent which will affect the painted surfaces.

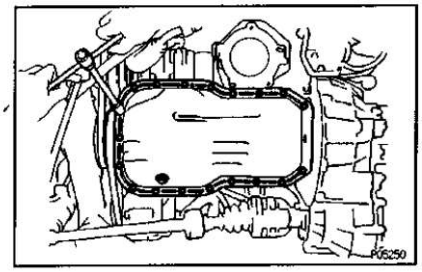


(b) Apply seal packing to the oil pan as shown in the illustration.

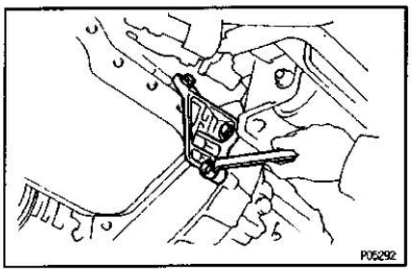
Seal packing:

Part No. 08826–00080 or equivalent

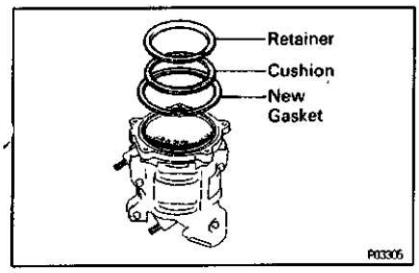
- Install a nozzle that has been cut to a 3 – 5 mm (0.12 – 0.20 in.) opening.
- Parts must be assembled within 5 minutes of application. Otherwise the material must be removed and reapplied.
- Immediately remove nozzle from the tube and reinstall cap.



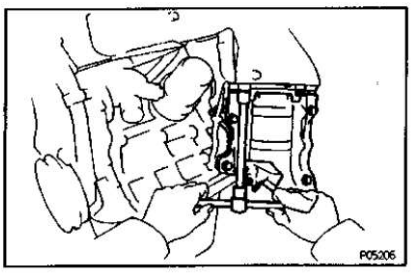
(c) Install the oil pan with the seventeen bolts and two nuts.
Torque: 5.4 N–m (55 kgf–cm, 48in–lbf)
(d) Install the dipstick.



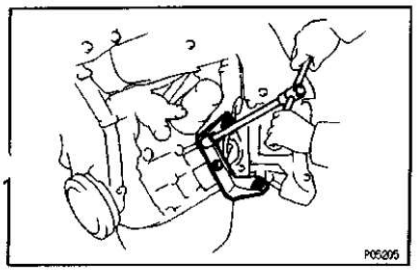
9. INSTALL STIFFENER PLATE
Install the stiffener plate with the three bolts.
Torque: 37 N–m (380 kgf–cm, 27 ft–lbf)



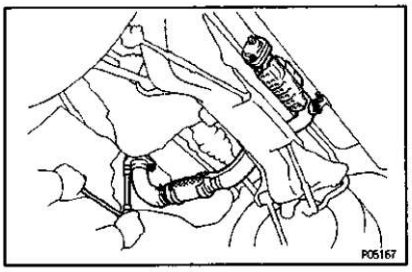
10. INSTALL TWC
(a) Place the cushion, retainer and a new gasket on the TWC.



(b) Install the TWC with the three bolts and two nuts.
Torque: 29 N–m (300 kgf–cm, 21 ft–lbf)



(c) Install the TWC stay with the two bolts.
Torque: 42 N–m (425 kgf–cm, 31 ft–lbf)
(d) (CALIF.only)
Connect the sub–oxygen sensor.



11. INSTALL FRONT EXHAUST PIPE

(a) Place two new gaskets to the front and rear of the front exhaust pipe.

(b) Using a 14 mm deep socket wrench, install the front exhaust pipe with three new nuts.

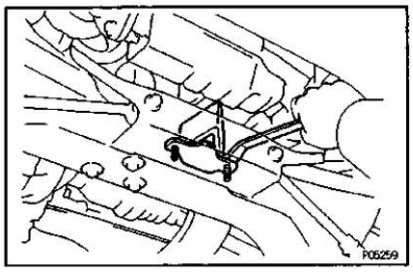
Torque: 62 N–m (630 kgf–cm, 46 ft–lbf)

(c) Install the two bolts holding the front exhaust pipe to the tailpipe.

Torque: 43 N–m (440 kgf–cm, 32 ft–lbf)

(d) Install the two bolts holding the front exhaust pipe bracket to the tailpipe bracket.

Torque: 19 N–m (190 kgf–cm, 14 ft–lbf)



(e) Install the damper with the two bolts.

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

12 INSTALL RH ENGINE HOOD SIDE PANEL

13. CONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY

14. FILL WITH ENGINE OIL

15. START ENGINE AND CHECK FOR OIL LEAKS

16. RECHECK ENGINE OIL LEVEL

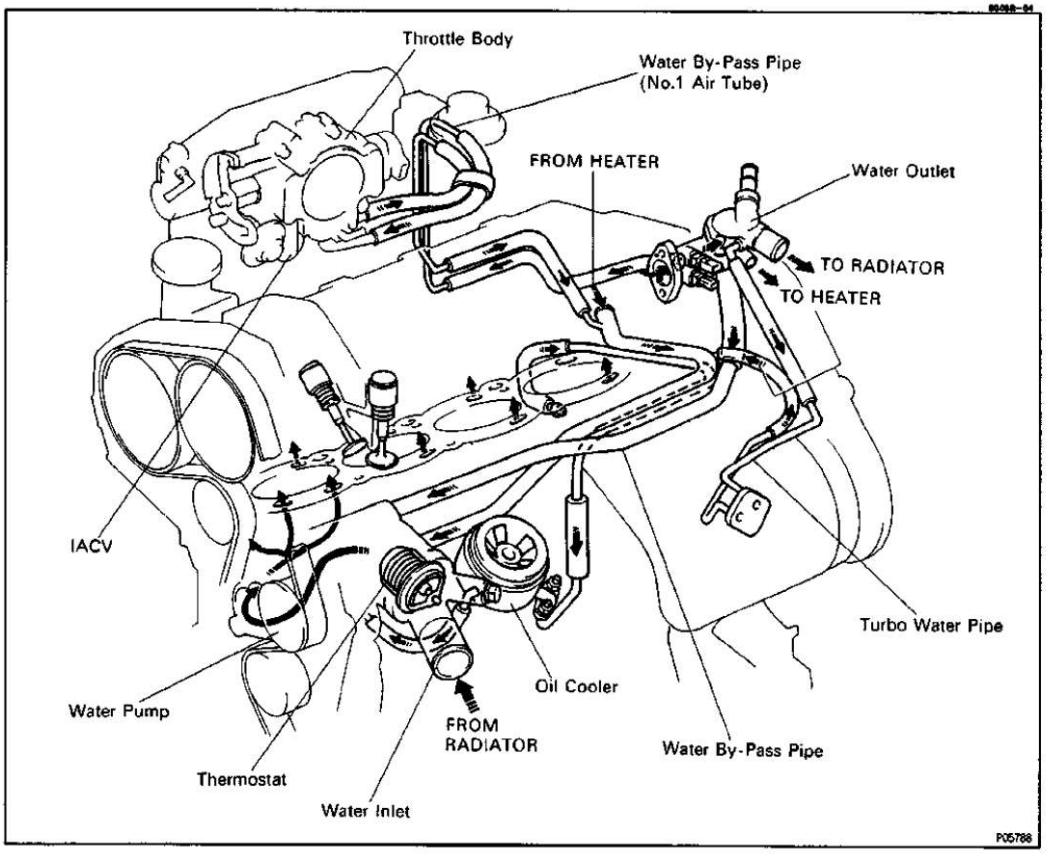
17. INSTALL ENGINE UNDER COVERS

COOLING SYSTEM

DESCRIPTION

This engine utilizes a pressurized forced circulation cooling system which includes a thermostat equipped with a by–pass valve mounted on the inlet side.

OPERATION



The cooling system is composed of the water jacket (inside the cylinder block and cylinder head), radiator, water pump, thermostat, electric fan, hoses and other components.
Coolant which is heated in the water jacket is pumped to the radiator, through which and electric fan blows air to cool the coolant as it passes through. Coolant which has been cooled is then sent back to the engine by the water pump, where it cools the engine.
The water jacket is a network of channels in the shell of the cylinder block and cylinder head through which coolant passes. It is designed to provide adequate cooling of the cylinders and combustion chambers which become heated during engine operation.

RADIATOR

The radiator cools the coolant which has passed through the water jacket and become hot, and it is mounted in the front of the vehicle. The MR2 radiator is different from that in other models, in that it is a cross flow type in which the coolant flows horizontally. It includes side tanks and a core which connects them. The inlet for coolant from the water jacket and the drain cock for draining out coolant are located in the left tank. The outlet coolant and an air drain, which facilitates the supply of coolant to the engine are located in the right tank. The core contains many tubes through which coolant flows from left tank to the right tank as well as cooling fins which radiate heat away from the coolant in the tubes. Air sucked in by the electric cooling fan, as well as the wind generated by the vehicle's travel, passes through the radiator, cooling the coolant heated by the water jacket as it passes through the tubes in the core. Models with automatic transmission include an automatic transmission. fluid cooler incorporated into the cooling pipes. A fan with an electric motor is mounted behind the radiator to assist the flow of air through the radiator. The fan operates when the coolant temperature becomes high in order to prevent it from becoming too high.

RADIATOR CAP

The radiator cap is a pressure type cap which seals the radiator, resulting in pressurization of the radiator as the coolant expands. The pressurization prevents the coolant from boiling even when the coolant temperature exceeds 100˚C (212˚F). A relief valve (pressurization valve) and a vacuum valve (negative pressure valve) are built into the radiator cap. The relief valve opens and lets steam escape through the overflow pipe when the pressure generated inside the cooling system exceeds the limit (coolant temperature: 110 – 120˚C (230 – 248˚F), pressure; 59 – 103 kPa (0.60 – 1.05 kgf/cm^2, 8.5 – 14.9 psi). The vacuum valve opens to alleviate the vacuum which develops in the coolant system after the engine is stopped and the coolant temperature drops. The valve's opening allows the coolant in the reservoir tank to return to the cooling system.

RESERVOIR TANK

The reservoir tank is used to catch coolant which overflows the cooling system as a result of volumetric expansion when the coolant is heated. The coolant in the reservoir tank returns to the radiator when the coolant temperature drops, thus keeping the radiator full at all times and avoiding needless coolant loss.

Check the reservoir tank level to learn if the coolant needs to be replenished.

WATER PUMP

The water pump is used for forced circulation of coolant through the cooling system. It is mounted on the front of the cylinder block and driven by a timing belt.

THERMOSTAT

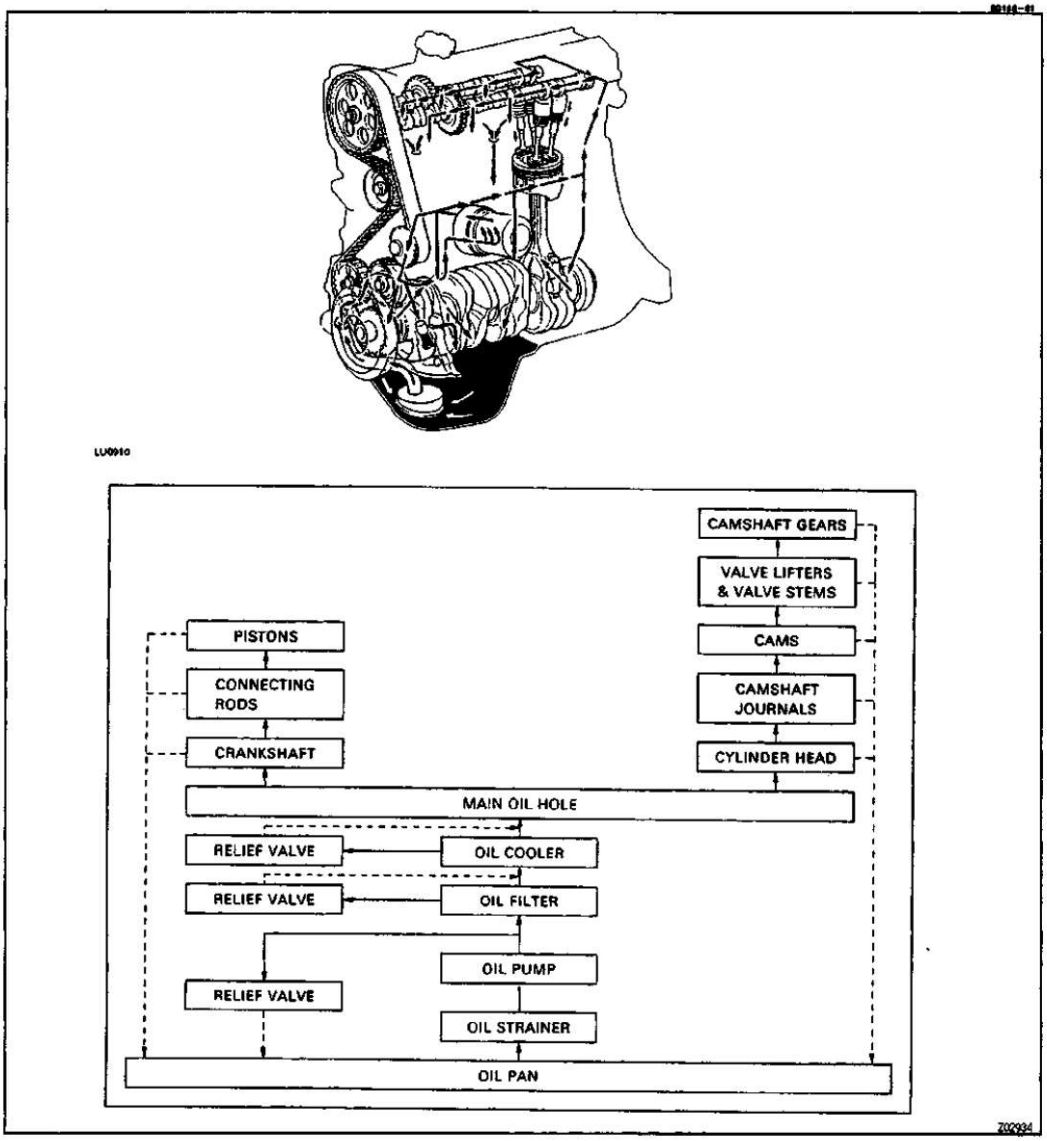
The thermostat has a wax type by–pass valve and is mounted in the water inlet housing. The thermostat includes a type of automatic valve operated by fluctuations in the coolant tempera–ture. This valve closes when the coolant temperature drops, preventing the circulation of coolant through the engine and thus permitting the engine to warm up rapidly. The valve opens when the coolant temperature has risen, allowing the circulation of coolant. Wax inside the thermostat. expands when heated and contracts when cooled. Heating the wax thus generates pressure which overpowers the force of the spring which keeps the valve closed, thus opening the valve. When the wax cools, its contraction causes the force of the spring to take effect once more, closing the valve. The thermostat in this engine operates at a temperature of 82˚C (180˚F).

LUBRICATION SYSTEM

DESCRIPTION

A fully pressurized, fully filtered lubrication system has been adopted for this engine.

OPERATION



A pressure feeding lubrication system has been adopted to supply oil to the moving parts of this engine. The lubrication system consists of an oil pan, oil pump, oil filter and other external parts which supply oil to the moving parts in the engine block. The oil circuit is shown in the illustration at the top of the previous page. Oil from the oil pan is pumped up by the oil pump. After it passes through the oil filter, it is through the various oil holes in the crankshaft and cylinder block. After passing through the cylinder block and performing its lubricating function, the oil is returned by gravity to the oil pan. A dipstick on the center left side of the cylinder block is provided to check the oil level.

OIL PUMP

The oil pump pumps up oil from the oil pan and feeds it under pressure to the various parts of the engine. An oil strainer is mounted in front of the inlet to the oil pump to remove impurities. The oil pump itself is a trochoid type pump, inside of which is a drive rotor and a driven rotor. When the drive rotor rotates, the driven rotor rotates in the same direction, and since the axis of the drive rotor shaft is different from the center of the driven rotor, the space between the two rotors is changed as they rotate. Oil is drawn in when the space widens and is discharged when the space becomes narrow.

OIL PRESSURE REGULATOR (RELIEF VALVE)

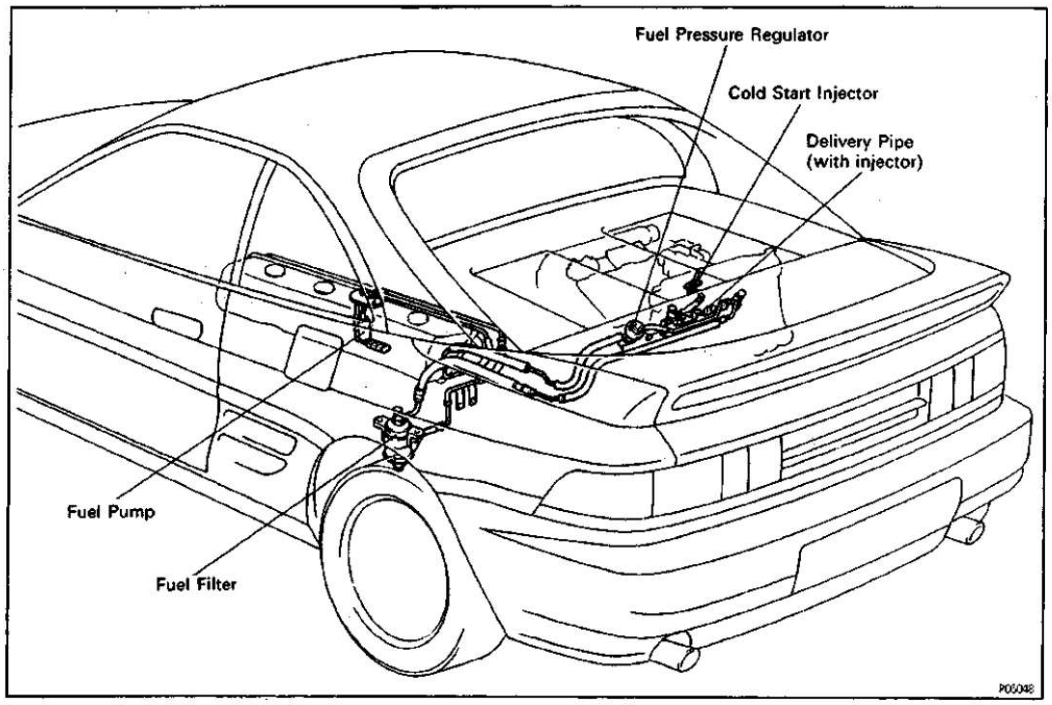
At high engine speeds, the engine oil supplied by the oil pump exceeds the capacity of the engine to utilize it. For that reason, the oil pressure regulator works to prevent an oversupply of oil. During normal oil supply, a coil spring and valve keep the by–pass closed, but when too much oil is being fed, the pressure becomes extremely high, overpowering the force of the spring and opening the valves. This allows the excess oil to flow through the valve and return to the oil pan.

OIL FILTER

The oil filter is a full flow type filter with a relief valve built into the paper filter element. Particles of metal from wear, airborne dirt, carbon and other impurities can get into the oil during use and could cause accelerated wear or seizing it allowed to circulate through the engine. The oil filter, integrated into the oil line, removes these impurities as the oil passes through it. The filter is mounted outside the engine to simplify replacement of the filter element. A relief valve is also included ahead of the filter element to relieve the high oil pressure in case the filter element becomes clogged with impurities. The relief valve opens when the oil pressure overpowers the force of the spring. Oil passing through the relief valve by–passes the oil filter and flows directly into the main oil hole in the engine.

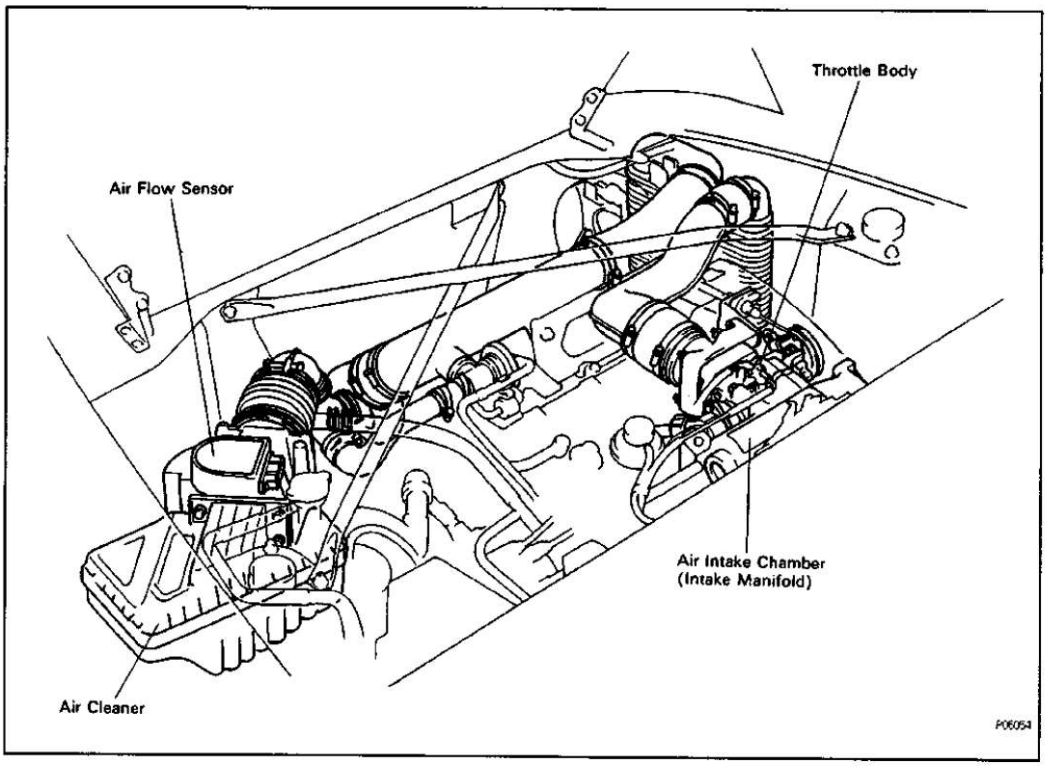
OPERATION

FUEL SYSTEM



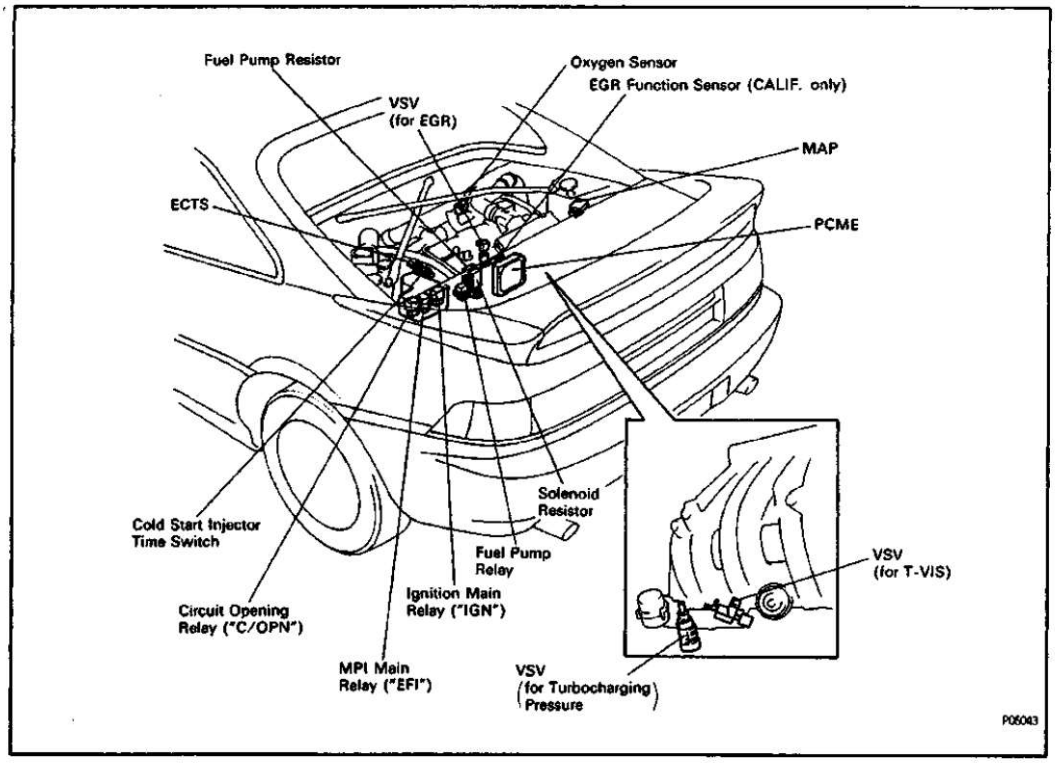
Fuel is pumped up by the fuel pump, flows through the fuel filter and is distributed to each injector and cold start injector at a set pressure maintained by the pressure regulator.
The fuel pressure regulator adjusts the pressure of the fuel from the fuel line (high pressure side) to a pressure 284 kPa (2.9 kgf/cm_2, 41 psi) higher than the pressure inside the intake manifold, and excess fuel is returned to the fuel tank through the return pipe. When the engine is hot, the fuel pressure is increased to control percolation in the fuel system and improve restartability and idling stability.
The pulsation damper absorbs the slight fluctuations in fuel pressure caused by fuel injector from the injector.
The injectors operate on input of injection signals from the PCME and inject fuel into the intake manifold.
The cold start injector operates when starting at low coolant temperature or at normal temper–ature ranges, injecting fuel into the air intake chamber to improve startability.

AIR INDUCTION SYSTEM



Air filtered through the air cleaner passes through the air flow sensor and the amount flowing to the air intake chamber is determined according to the throttle valve opening in the throttle body and the engine rpm.
The air flow sensor measures the intake air flow by the opening of the measuring plate in response to the volume of intake air to the engine.
Located in the throttle body is the throttle valve, which regulates the volume of intake air to the engine. Intake air controlled by the throttle valve opening is distributed from the air intake chamber to the manifold of each cylinder and is drawn into the combustion chamber.
At low temperatures the IACV opens and the air flows through the IACV and the throttle body, into the air intake chamber. During enginewarning up, even if the throttle valve is completely closed, air flows to the air intake chamber, thereby increasing the idle speed (first idle operation).
The air intake chamber prevents pulsation of the intake air, reduces the influence on the air flow sensor and increases the accuracy of the measurement of the intake air volume. It also prevents intake air interference in each cylinder.

ELECTRONIC CONTROL SYSTEM



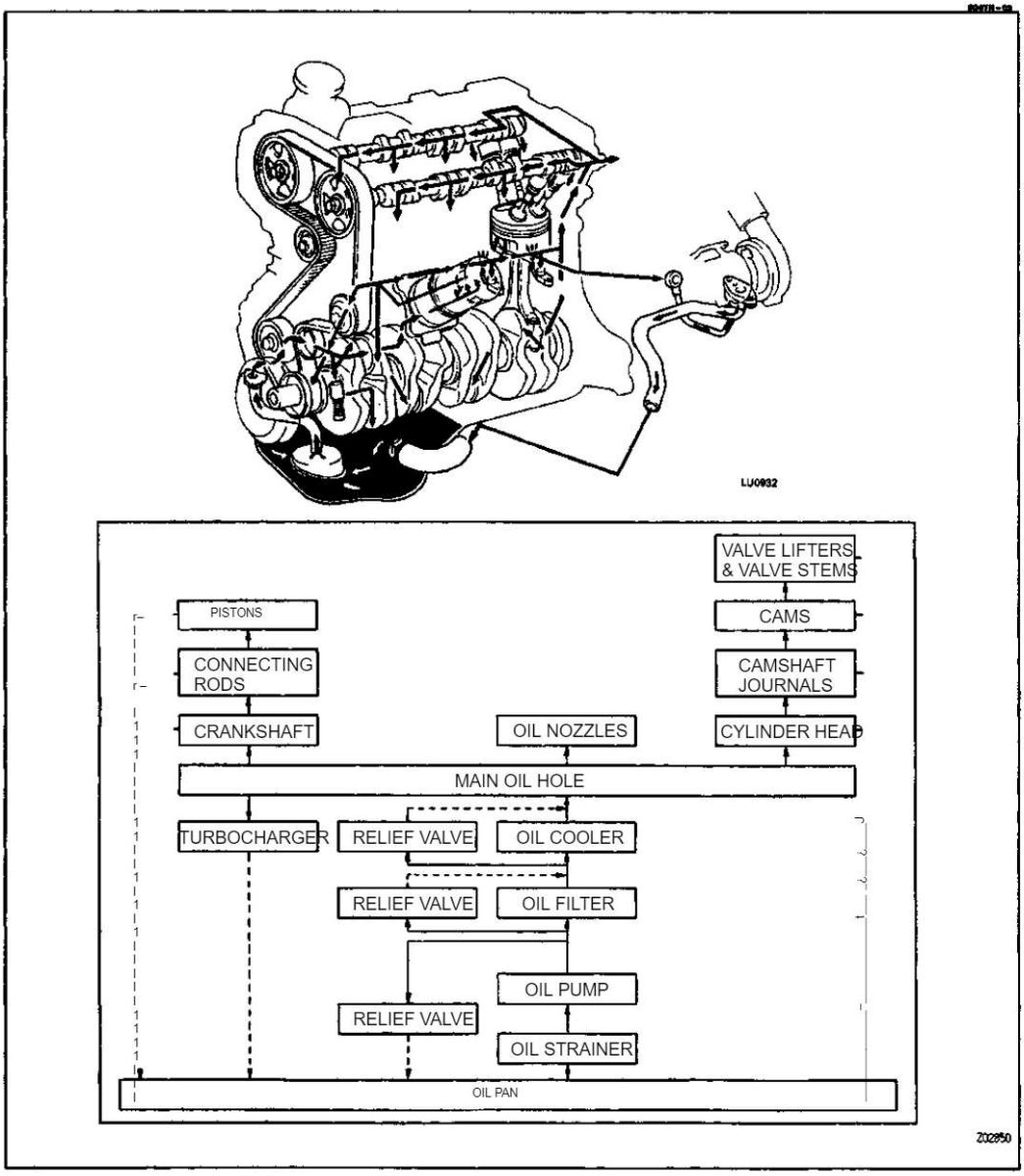
The control system consists of sensors which detect various engine conditions, and a PCME which determines the injection volume (timing) based on the signals from the sensors.
The various sensors detect the intake air volume, engine rpm, oxygen density in the exhaust gas, coolant temperature, intake air temperature and atmospheric pressure etc. and convert the information into an electrical signal which is sent to the PCME. Based on these signals, the PCME calculates the optimum ignition timing for the current conditions and operates the injectors.
The PCME not only controls the fuel injection timing, but also the self diagnostic function which records the occurrence of a malfunction, ignition timing control, idle rpm control, fuel pressure control and fuel pump control.

LUBRICATION SYSTEM

DESCRIPTION

A fully pressurized, fully filtered lubrication system has been adopted for this engine.

OPERATION



A pressure feeding lubrication system has been adopted to supply oil to the moving parts of this engine. The lubrication system consists of an oil pan, oil pump, oil filter and other external parts which supply oil to the moving parts in the engine block. The oil circuit is shown in the illustration at the top of the previous page. Oil from the oil pan is pumped up by the oil pump. After it passes through the oil filter, it is through the various oil holes in the crankshaft and cylinder block. After passing through the cylinder block and performing its lubricating function, the oil is returned by gravity to the oil pan. A dipstick on the center left side of the cylinder block is provided to check the oil level.

OIL PUMP

The oil pump pumps up oil from the oil pan and feeds it under pressure to the various parts of the engine. An oil strainer is mounted in front of the inlet to the oil pump to remove impurities. The oil pump itself is a trochoid type pump, inside of which is a drive rotor and a driven rotor. When the drive rotor rotates, the driven rotor rotates in the same direction, and since the axis of the drive rotor shaft is different from the center of the driven rotor, the space between the two rotors is changed as they rotate. Oil is drawn in when the space widens and is discharged when the space becomes narrow.

OIL PRESSURE REGULATOR (RELIEF VALVE)

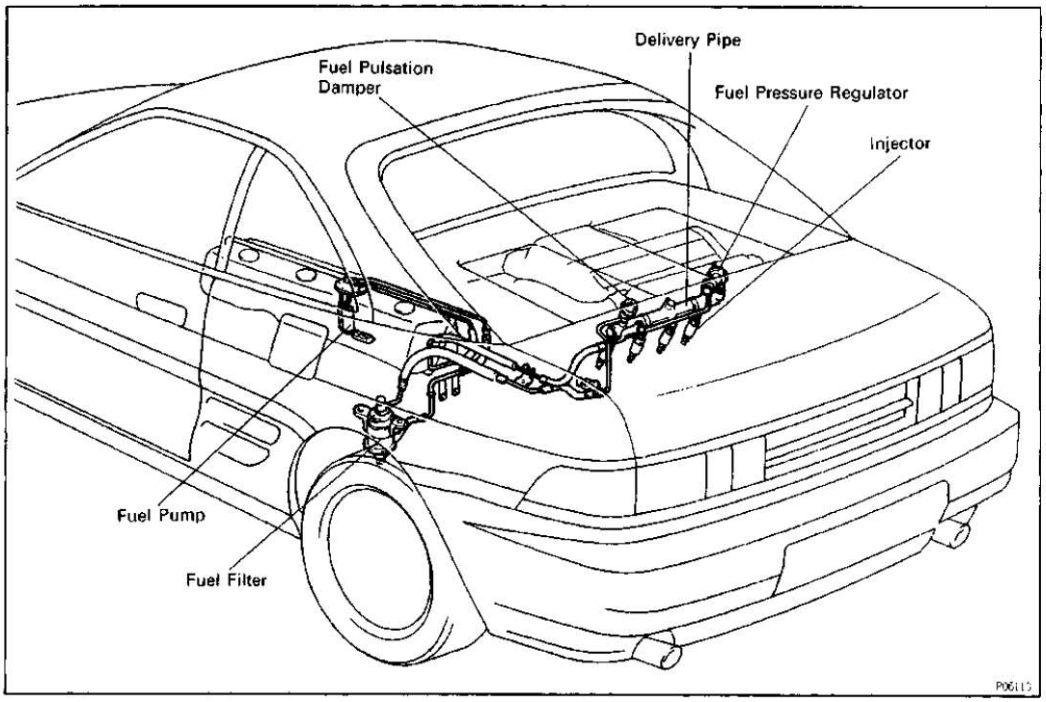
At high engine speeds, the engine oil supplied by the oil pump exceeds the capacity of the engine to utilize it. For that reason, the oil pressure regulator works to prevent an oversupply of oil. During normal oil supply, a coil spring and valve keep the by–pass closed, but when too much oil is being fed, the pressure becomes extremely high, overpowering the force of the spring and opening the valves. This allows the excess oil to flow through the valve and return to the oil pan.

OIL FILTER

The oil filter is a full flow type filter with a relief valve built into the paper filter element. Particles of metal from wear, airborne dirt, carbon and other impurities can get into the oil during use and could cause accelerated wear or seizing it allowed to circulate through the engine. The oil filter, integrated into the oil line, removes these impurities as the oil passes through it. The filter is mounted outside the engine to simplify replacement of the filter element. A relief valve is also included ahead of the filter element to relieve the high oil pressure in case the filter element becomes clogged with impurities. The relief valve opens when the oil pressure overpowers the force of the spring. Oil passing through the relief valve by–passes the oil filter and flows directly into the main oil hole in the engine.

OPERATION

FUEL SYSTEM



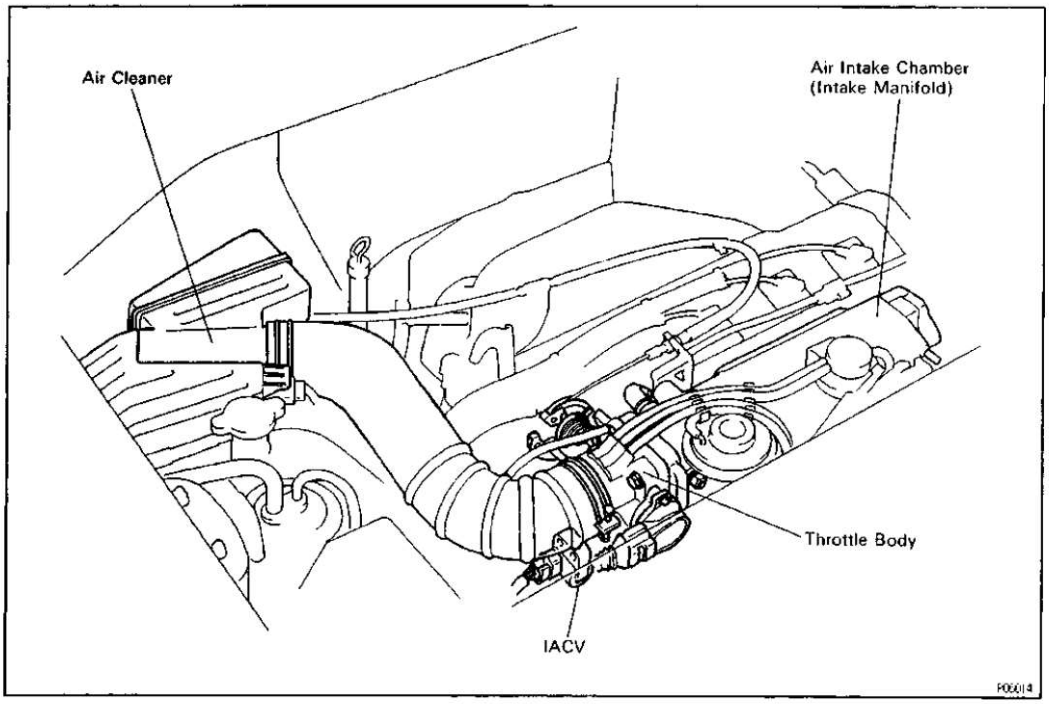
Fuel pumped up by the fuel pump, flows through the fuel filter and is distributed to each injector at a set pressure maintained by the pressure regulator.

The fuel pressure regulator adjusts the pressure of the fuel from the fuel line (high pressure side) to a pressure 284 kPa (2.9 kgf/cm^2, 41 psi) higher than the pressure inside the intake manifold, and excess fuel is returned to the fuel tank through the return pipe.

The pulsation damper absorbs the slight fluctuations in fuel pressure caused by fuel injector from the injector.

The injectors operate on input of injection slights from the PCME (& T) and inject fuel into the intake manifold.

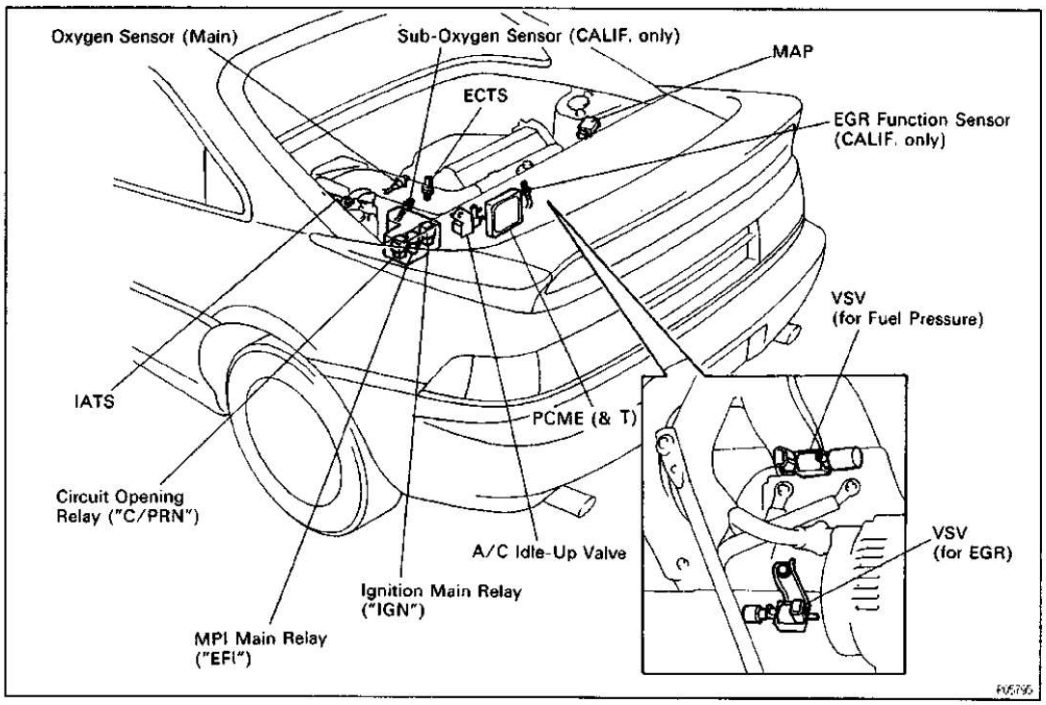
AIR INDUCTION SYSTEM



Air is filtered through the air cleaner and the amount flowing to the air intake chamber is determined according to the throttle valve opening in the throttle body and the engine rpm. Intake air controlled by the throttle valve opening is distributed from the air intake chamber to the manifold of each cylinder and is drawn into the combination chamber.

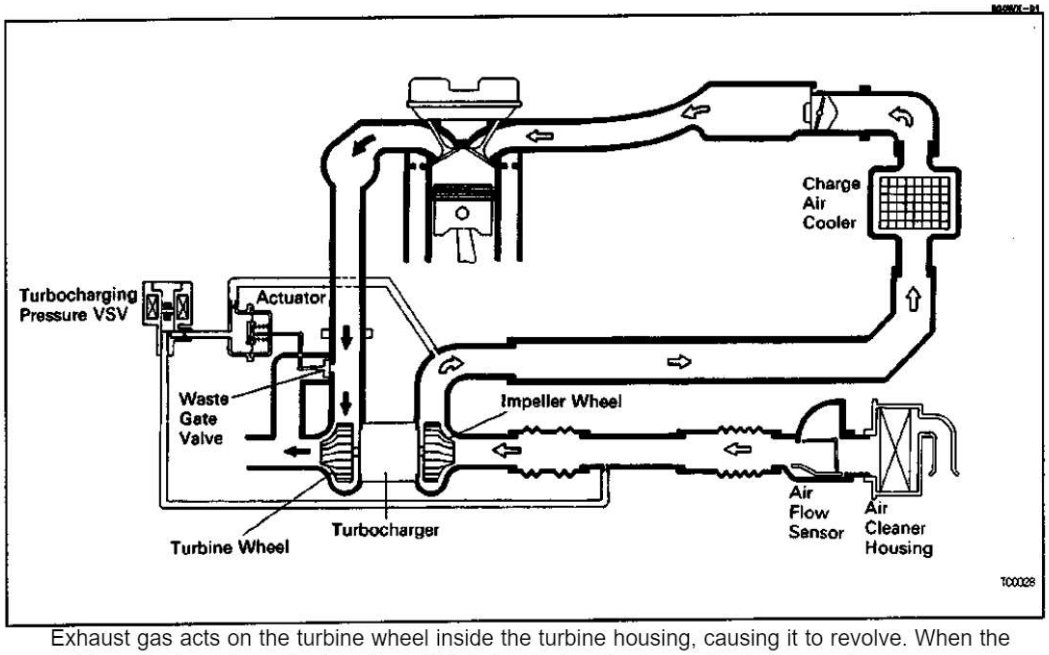
At low temperatures the IACV opens and the air flows through the IACV and the throttle body, into the air intake chamber, During engine warming up, even if the throttle valve is completely closed, air flows to the air intake chamber, thereby increasing the idle speed (first idle operation). The air intake chamber prevents pulsation of the intake air. It also prevents intake air interference in each cylinder.

ELECTRONIC CONTROL SYSTEM



The control system consists of sensors which detect various engine conditions, and a PCME (& T) which determines the injection volume (timing) based on the signals from the sensors.
The various sensors detect the intake air pressure, engine rpm, oxygen density in the exhaust gas,
coolant temperature, intake air temperature and atmospheric etc. and convert the information into an electrical signal which is sent to the PCME (& T). Based on these signals, the PCME (& T)
calculates the optimum ignition timing for the current conditions and operates the injectors.
The PCME (& T) not only controls the fuel injection timing, but also the self diagnostic function which records the occurrence of a malfunction, ignition timing control, idle rpm control and EGR control.

OPERATION



Exhaust gas acts on the turbine wheel inside the turbine housing, causing it to revolve. When the turbine wheel revolves, the impeller which is located on the same shaft also revolves, compr– essing the intake air which has passed through the air flow sensor from the air cleaner housing. When expelled from the compressor housing the compressed air is suppressed air is supplied to the cylinders. When the engine speed increases, the exhaust gas volume increases and the turbine wheel revolutions increase (approx. 20,000–110,000 rpm), thus the turbocharged air pressure grows greater and engine output increases.

Waste Gate Valve

Although on the one hand high output is achieved by turbocharging, if the turbocharged air pressure becomes too high, knocking occurs and, on the contrary, a reduction in engine output is caused. If the turbocharged air pressure exceeds the prescribed air pressure, the flow of exhaust gas by– passes the turbine, controlling turbine wheel revolutions and turbocharged air pressure. This by–pass valve which controls the quantity of exhaust gas flowing to the turbine is called the waste gate valve. When the turbocharged air pressure exceeds the prescribed pressure, the actuator operates, the waste gate valve opens and part of the exhaust gas by–passes the turbine. This causes a drop in the turbine revolution rate and controls the turbocharged air within the prescribed limits.

Charge Air Cooler (CAC)

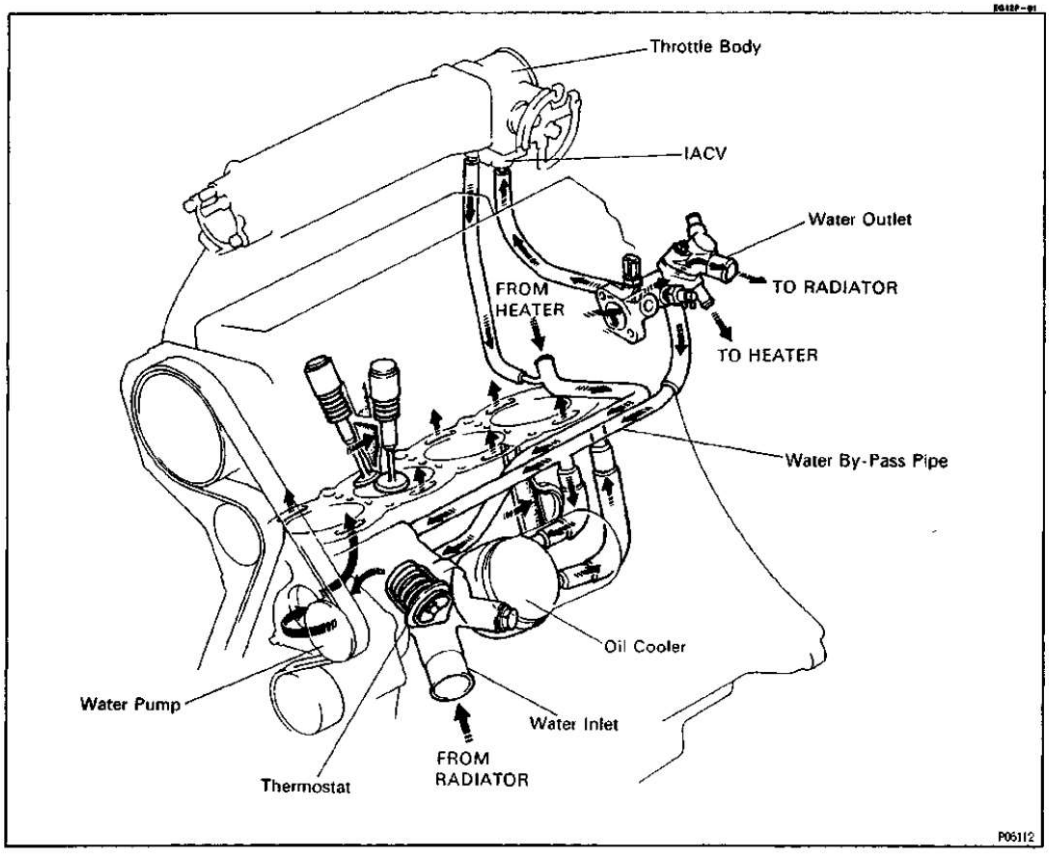
The CAC cools the turbocharged air (intake air) put out by the turbocharger, thereby increasing the air density. As the intake air temperature decreases, the gas temperature in the combustion chamber falls and the occurrence of knocking is suppressed, giving an increase in engine output. The MR2 CAC is an air cooling type located at the top of the engine, utilizing the vehicle windstream the cool the turbocharged air.

COOLING SYSTEM

DESCRIPTION

This engine utilizes a pressurized forced circulation cooling system which includes a thermostat equipped with a by–pass valve mounted on the inlet side.

OPERATION



The cooling system is composed of the water jacket (inside the cylinder block and cylinder head), radiator, water pump, thermostat, electric fan, hoses and other components.
Coolant which is heated in the water jacket is pumped to the radiator, through which and electric fan blows air to cool the coolant as it passes through. Coolant which has been cooled is then sent back to the engine by the water pump, where it cools the engine.
The water jacket is a network of channels in the shell of the cylinder block and cylinder head through which coolant passes. It is designed to provide adequate cooling of the cylinders and combustion chambers which become heated during engine operation.

RADIATOR

The radiator cools the coolant which has passed through the water jacket and become hot, and it is mounted in the front of the vehicle. The MR2 radiator is different from that in other models, in that it is a cross flow type in which the coolant flows horizontally. It includes side tanks and a core which connects them. The inlet for coolant from the water jacket and the drain cock for draining out coolant are located in the left tank. The outlet coolant and an air drain, which facilitates the supply of coolant to the engine are located in the right tank. The core contains many tubes through which coolant flows from left tank to the right tank as well as cooling fins which radiate heat away from the coolant in the tubes. Air sucked in by the electric cooling fan, as well as the wind generated by the vehicle's travel, passes through the radiator, cooling the coolant heated by the water jacket as it passes through the tubes in the core. Models with automatic transmission include an automatic transmission. fluid cooler incorporated into the cooling pipes. A fan with an electric motor is mounted behind the radiator to assist the flow of air through the radiator. The fan operates when the coolant temperature becomes high in order to prevent it from becoming too high.

RADIATOR CAP

The radiator cap is a pressure type cap which seals the radiator, resulting in pressurization of the radiator as the coolant expands. The pressurization prevents the coolant from boiling even when the coolant temperature exceeds 100˚C (212˚F). A relief valve (pressurization valve) and a vacuum valve (negative pressure valve) are built into the radiator cap. The relief valve opens and lets steam escape through the overflow pipe when the pressure generated inside the cooling system exceeds the limit (coolant temperature: 110 – 120˚C (230 – 248˚ F), pressure; 59 – 103 kPa (0.60 – 1.05 kgf/cm^2, 8.5 – 14.9 psi). The vacuum valve opens to alleviate the vacuum which develops in the coolant system after the engine is stopped and the coolant temperature drops. The valve's opening allows the coolant in the reservoir tank to return to the cooling system.

RESERVOIR TANK

The reservoir tank is used to catch coolant which overflows the cooling system as a result of volumetric expansion when the coolant is heated. The coolant in the reservoir tank returns to the radiator when the coolant temperature drops, thus keeping the radiator full at all times and avoiding needless coolant loss.

Check the reservoir tank level to learn if the coolant needs to be replenished.

WATER PUMP

The water pump is used for forced circulation of coolant through the cooling system. It is mounted on the front of the cylinder block and driven by a timing belt.

THERMOSTAT

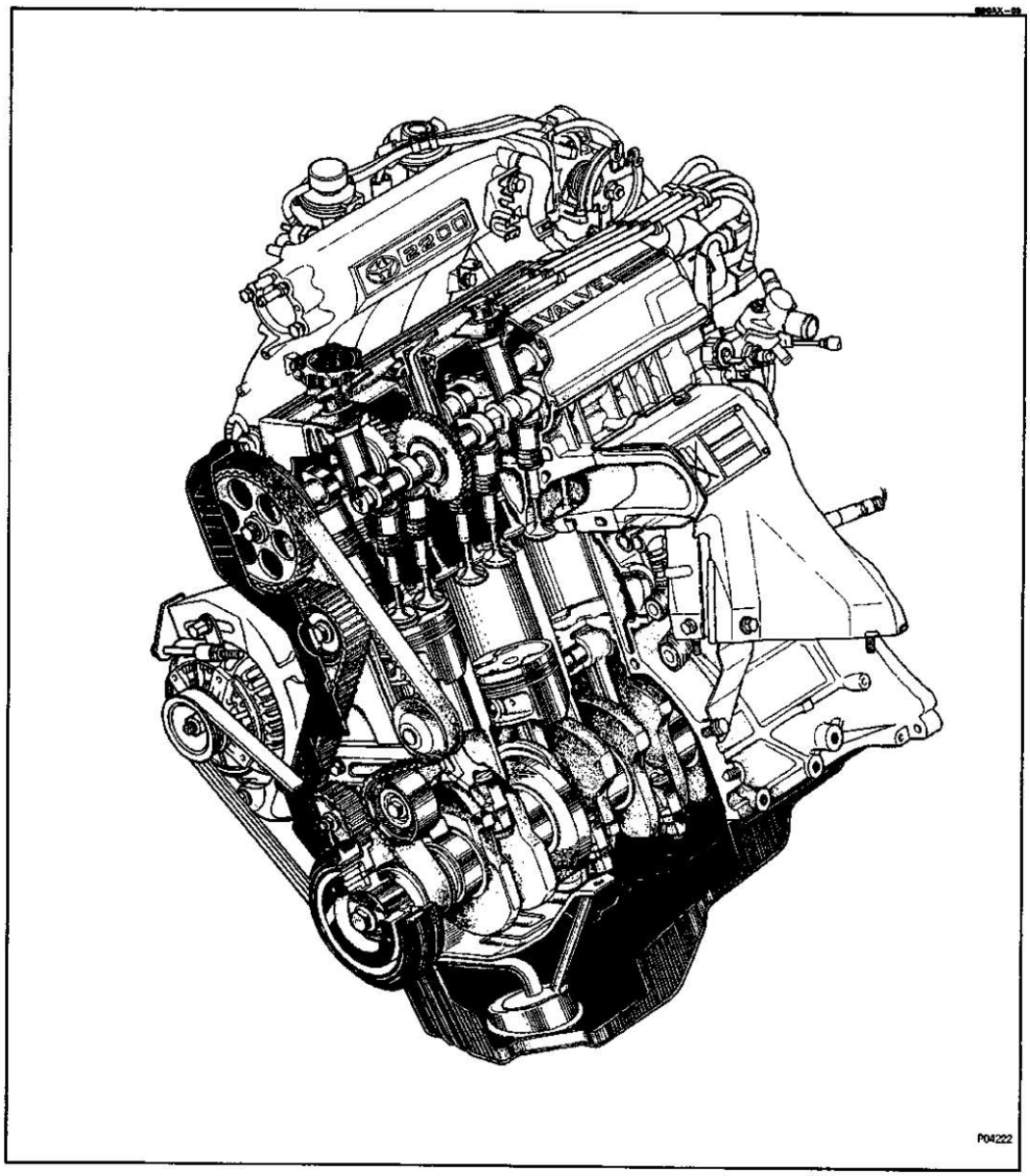
The thermostat has a wax type by–pass valve and is mounted in the water inlet housing. The thermostat includes a type of automatic valve operated by fluctuations in the coolant tempera–ture. This valve closes when the coolant temperature drops, preventing the circulation of coolant through the engine and thus permitting the engine to warm up rapidly. The valve opens when the coolant temperature has risen, allowing the circulation of coolant. Wax inside the thermostat expands when heated and contracts when cooled. Heating the wax thus generates pressure which overpowers the force of the spring which keeps the valve closed, thus opening the valve. When the wax cools, its contraction causes the force of the spring to take effect once more, closing the valve. The thermostat in this engine operates at a temperature of 82˚C (180˚ F).

ENGINE MECHANICAL

DESCRIPTION

The 5S–FE engine is an in–line, 4–cylinder, 2.2 liter DOHC 16–valve engine.

OPERATION



The 5S–FE engine is an in–line, 4–cylinder engine with the cylinders numbered 1 – 2 – 3 – 4 from the front. The crankshaft is supported by 5 bearings inside the crankcase. These bearings are made of aluminum alloy.

The crankshaft is integrated with 8 weights for balance. Oil holes are placed in the center of the crankshaft to supply oil to the connecting rods, bearing, pistons and other components.

The ignition order is 1 – 3 – 4 – 2. The cylinder head is made of aluminum alloy, with a cross flow type intake and exhaust layout and with pent–roof type combustion chambers. The spark plugs are located in the center of the combustion chambers.

The intake manifold has 4 independent long ports and utilizes the inertial supercharging effect to improve engine torque at low and medium speeds.

Exhaust and intake valves are equipped with irregular pitch springs made of special valve spring carbon steel which are capable of functioning no matter what the engine speed.

The intake camshaft is driven by a timing belt, and a gear on the intake camshaft engages with a gear on the exhaust camshaft to drive it. The cam journal is supported at 5 places between the valve lifters of each cylinder and on the front end of the cylinder head. Lubrication of the cam journals and gears is accomplished by oil being supplied through the oiler port in the center of the camshaft.

Adjustment of the valve clearance is done by means of an outer shim type system, in which valve adjusting shims are located above the valve lifters. This permits replacement of the shims without removal of the camshafts.

Pistons are made of high temperature–resistant aluminum alloy, and a depression is built into the piston head to prevent interference with the valves.

Piston pins are the full–floating type, with the pins fastened to neither the piston boss nor the connecting rods. Instead, snap rings are fitted on both ends of the pins, preventing the pins from falling out.

The No.1 compression ring is made of steel and the No.2 compression ring is made of cast iron. The oil ring is made of a combination of steel and stainless steel. The outer diameter of each piston ring is slightly larger than the diameter of the piston and the flexibility of the rings allows them to hug the cylinder walls when they are mounted on the piston. Compression rings No. 1 and No.2 work to prevent gas leakage from the cylinder and the oil ring works to scrape oil off the cylinder walls to prevent it from entering the combustion' chambers.

The cylinder block is made of cast iron. It has 4 cylinders which are approximately twice the length of the piston stroke. The top of each cylinder is closed off by the cylinder head and the lower end of the cylinders becomes the crankcase, in which the crankshaft is installed. In addition, the cylinder block contains a water jacket, through which coolant is pumped to cool the cylinders.

The oil pan is bolted onto the bottom of the cylinder block. The oil pan is an oil reservoir made of pressed steel sheet. A dividing plate is included inside the oil pan to keep sufficient oil in the bottom of the pan even when the vehicle is tilted. This dividing plate also prevents the oil from making waves when the vehicle is stopped suddenly and the oil shifts away from the oil pump suction pipe.

ENGINE MECHANICAL

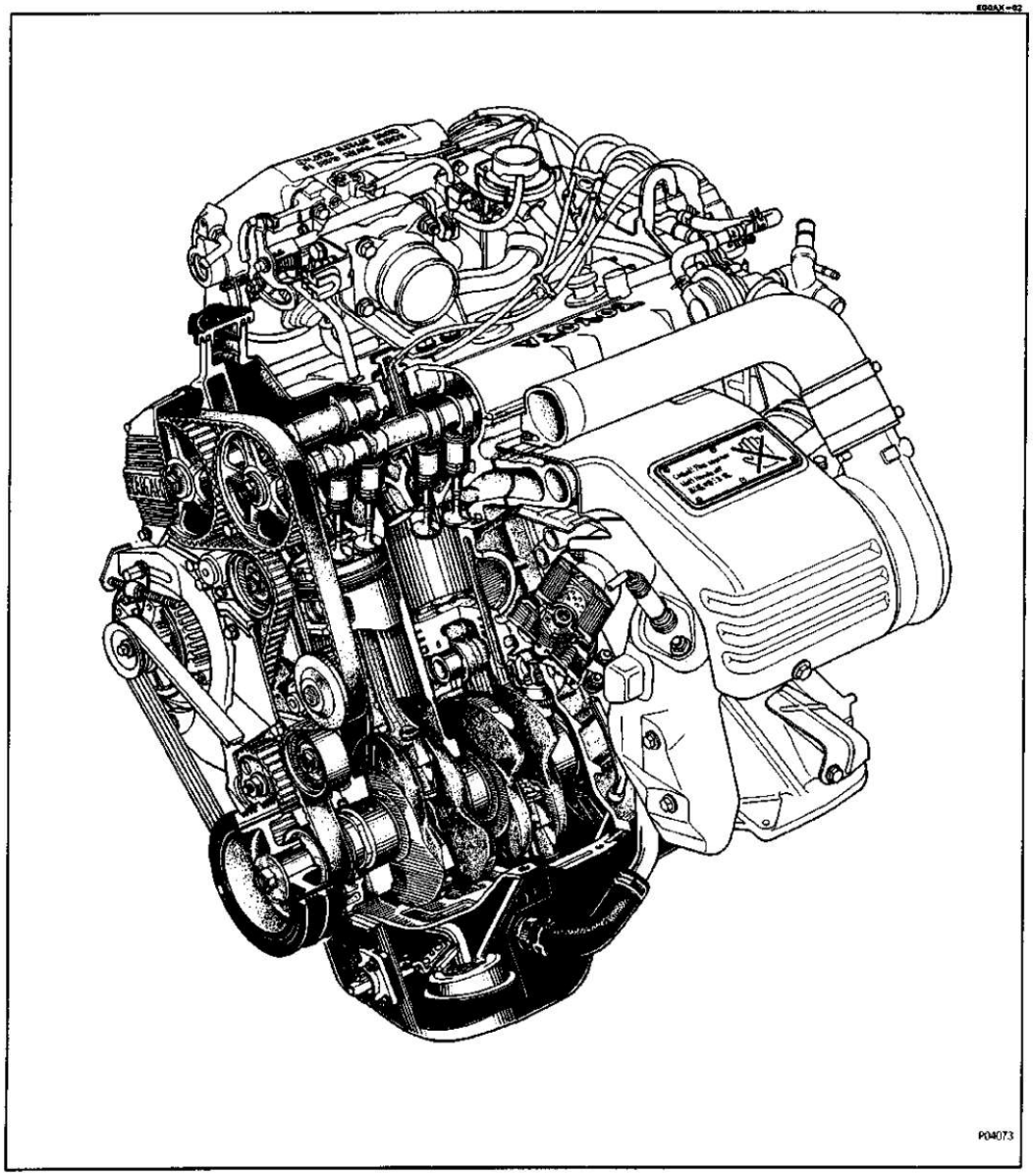
DESCRIPTION

EG0VX–01

The 3S–GTE engine is an in–line, 4–cylinder, 2.0 liter DOHC 16–valve engine.

OPERATION

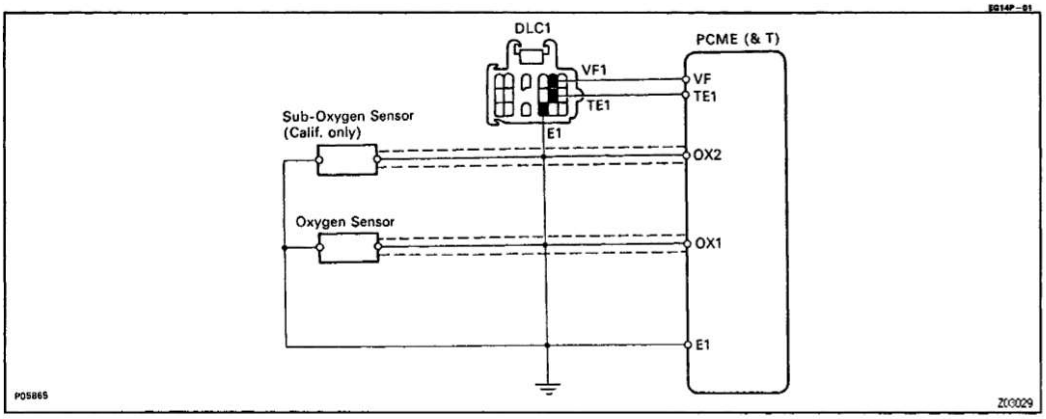
EG0AX–02

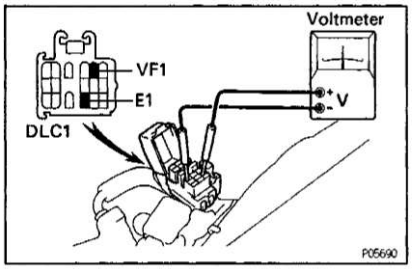


P04073

The 3S–GTE engine is an in–line, 4–cylinder engine with the cylinders numbered 1 – 2 – 3 – 4 from the front. The crankshaft is supported by 5 bearings inside the crankcase. These bearings are made of aluminum alloy.
The crankshaft is integrated with 8 weights for balance. Oil holes are placed in the center of the crankshaft to supply oil to the connecting rods, bearing, pistons and other components.
The ignition order is 1 – 3 – 4 –
2. The cylinder head is made of aluminum alloy, with a cross
flow type intake and exhaust layout and with pent–roof type combustion chambers. The spark plugs are located in the center of the combustion chambers.
The intake manifold has 8 independent long ports and utilizes the inertial supercharging effect to improve engine torque at low and meduim speeds. Both the intake camshaft and the exhaust camshaft are driven by a single timing belt. The cam journal is supported at 5 places between the valve lifters of each cylinder and on the front end of the cylinder head. Lubrication of the cam journals and cams is accomplished by oil being supplied through the oiler port in the center of the camshaft.
Adjustment of the valve clearance is done by means of an outer shim type system, in which valve adjusting shims are located above the valve lifters. This permits replacement of the shims without removal of the camshafts.
Pistons are made of high temperature–resistant aluminum alloy, and a depression is built into the piston head to prevent interference with the valves.
Piston pins are the full–floating type, with the pins fastened to neither the piston boss nor the connecting rods. Instead, snap rings are fitted on both ends of the pins, preventing the pins from falling out.
The No.1 compression ring is made of steel and the No.2 compression ring is made of cast iron.
The oil ring is made of a combination of steel and stainless steel. The outer diameter of each piston ring is slightly larger than the diameter of the piston and the flexibility of the rings allows them to hug the cylinder walls when they are mounted on the piston. Compression rings No. 1 and
No.2 work to prevent gas leakage from the cylinder and the oil ring works to scrape oil off the cylinder walls to prevent it from entering the combustion chambers.
The cylinder block is made of cast iron. It has 4 cylinders which are approximately twice the length of the piston stroke. The top of each cylinder is closed off by the cylinder head and the lower end of the cylinders becomes the crankcase, in which the crankshaft is installed. In addition, the cylinder block contains a water jacket, through which coolant is pumped to cool the cylinders.
The oil pan is bolted onto the bottom of the cylinder block. The oil pan is an oil reservoir made of pressed steel sheet. A dividing plate is included inside the oil pan to keep sufficient oil in the bottom of the pan even when the vehicle is tilted. This dividing plate also prevents the oil from making waves when the vehicle is stopped suddenly and the oil shifts away from the oil pump suction pipe.

OXYGEN SENSOR (Main)





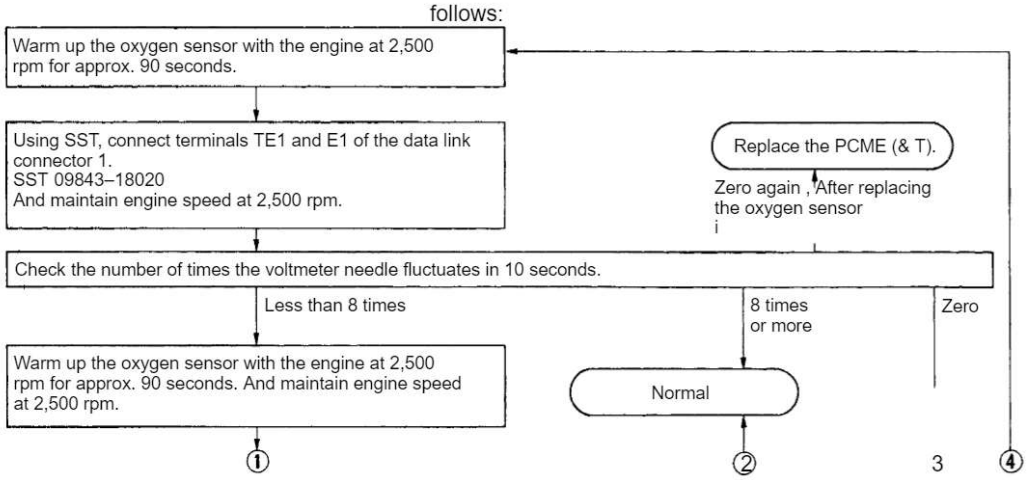
OXYGEN SENSOR INSPECTION

1. WARM UP ENGINE

Allow the engine to warm up to normal operating temperature.

2. INSPECT FEEDBACK VOLTAGE

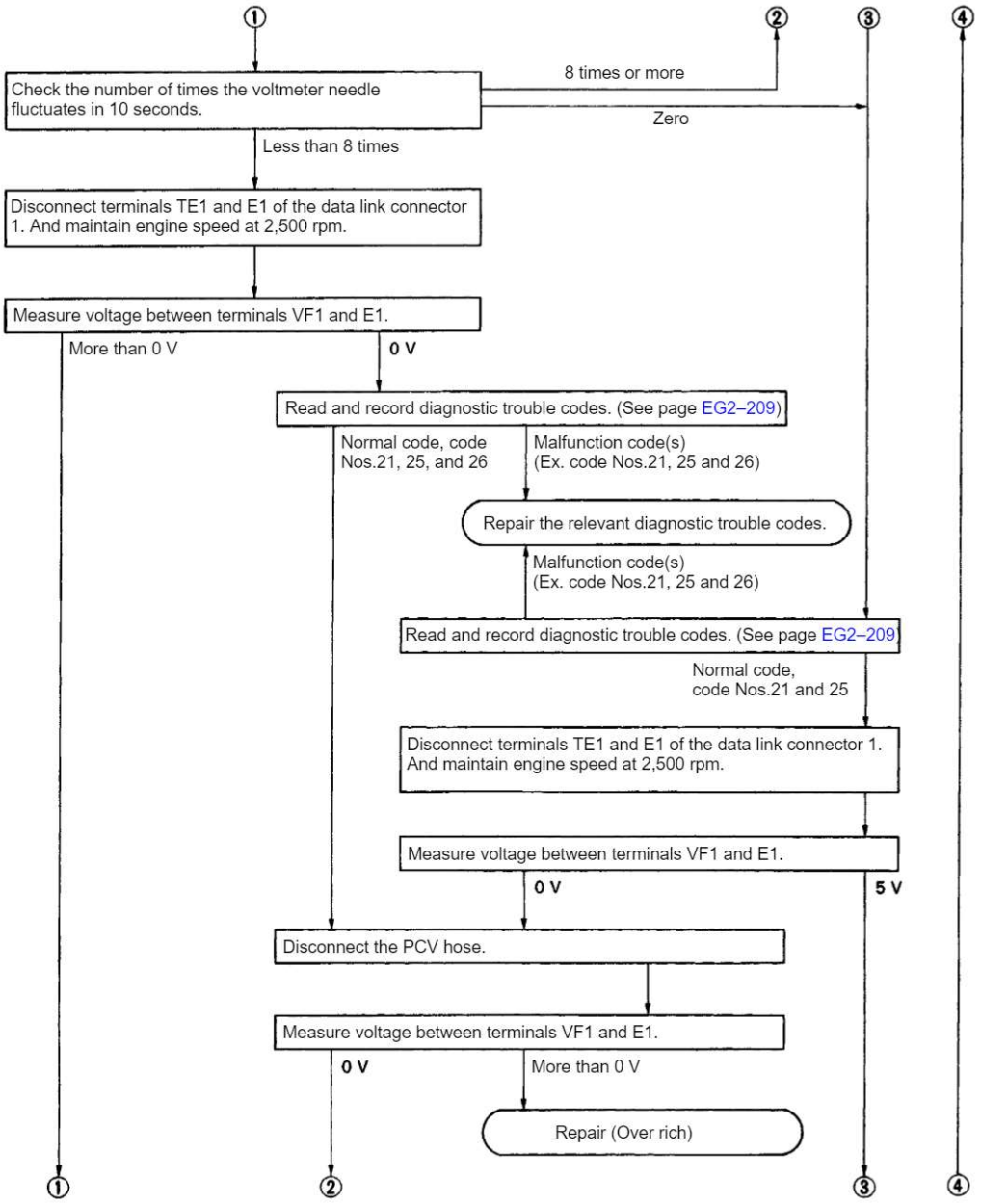
Connect the positive (+) probe of a voltmeter to terminal VF1 of the data link connector 1, and negative (–) probe to terminal E1. Perform the test as follows:



CONTINUED ON PAGE EG2–323

V01051

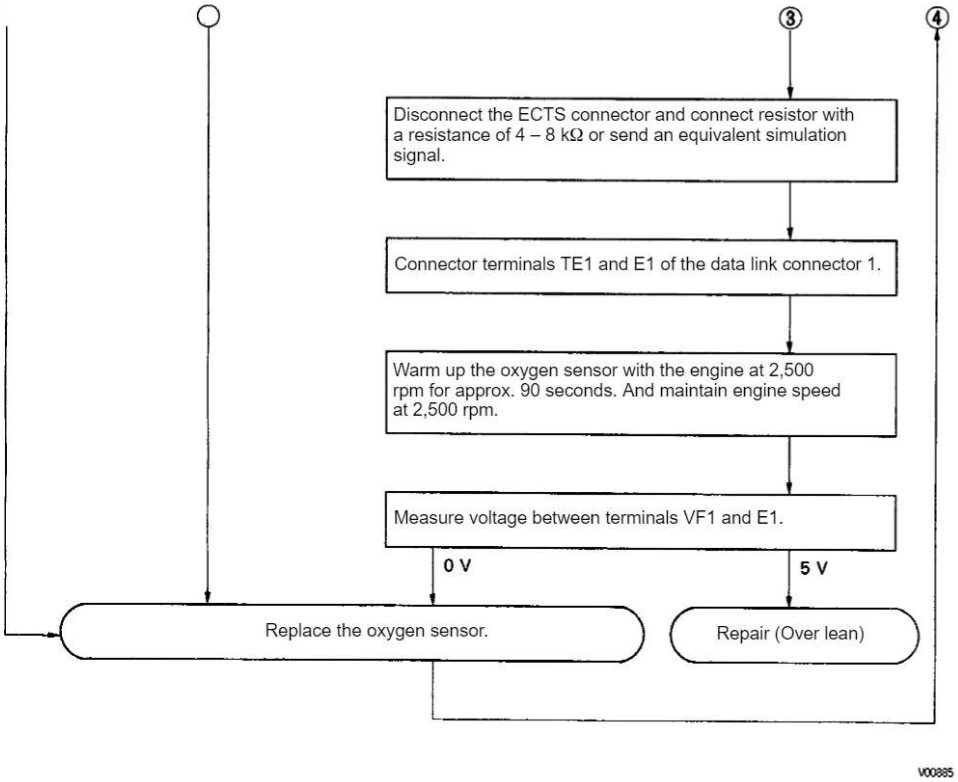
CONTINUED FROM PAGE EG2–322



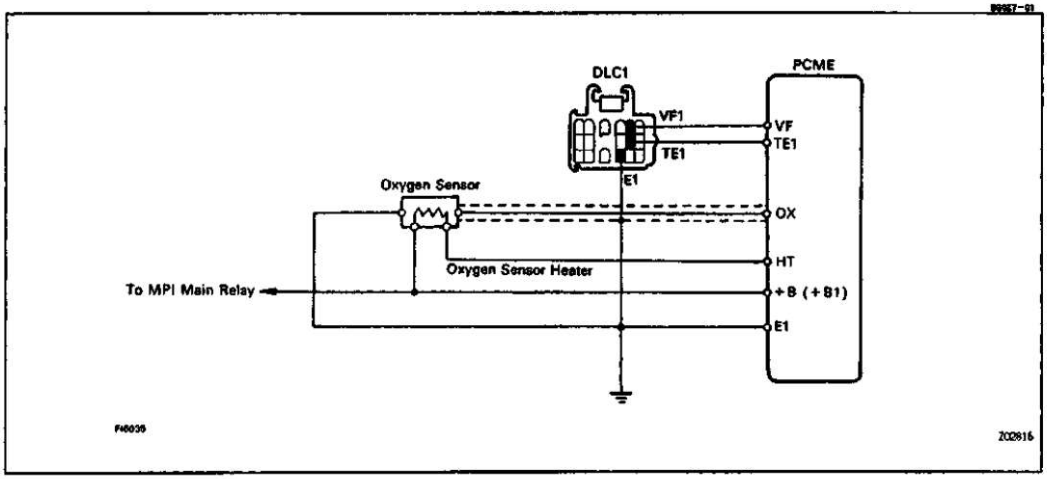
CONTINUED ON PAGE EG2–324

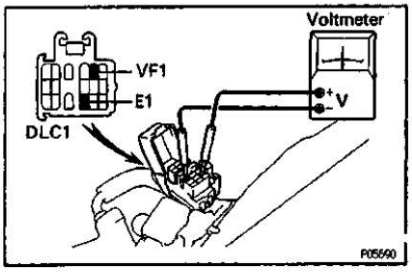
V00884

CONTINUED FROM PAGE EG2–323



OXYGEN SENSOR





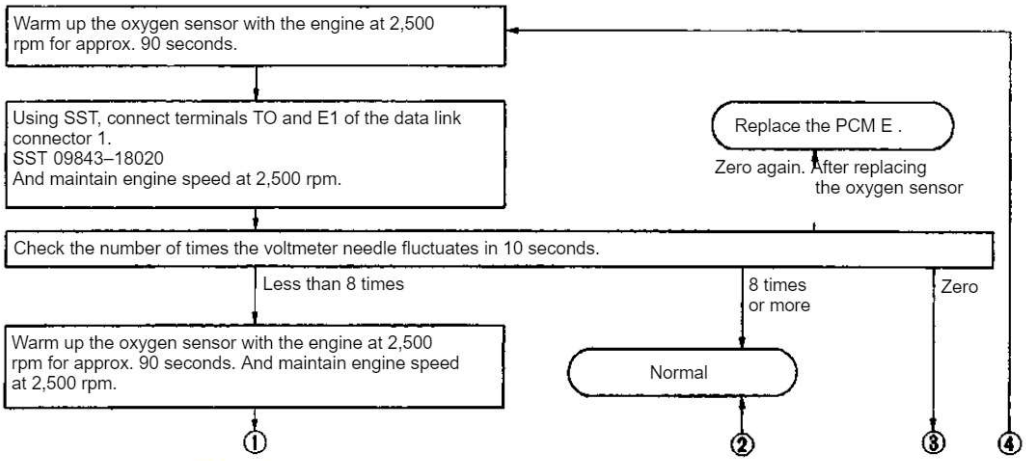
OXYGEN SENSOR INSPECTION

1. WARM UP ENGINE

Allow the engine to warm up to normal operating temperature.

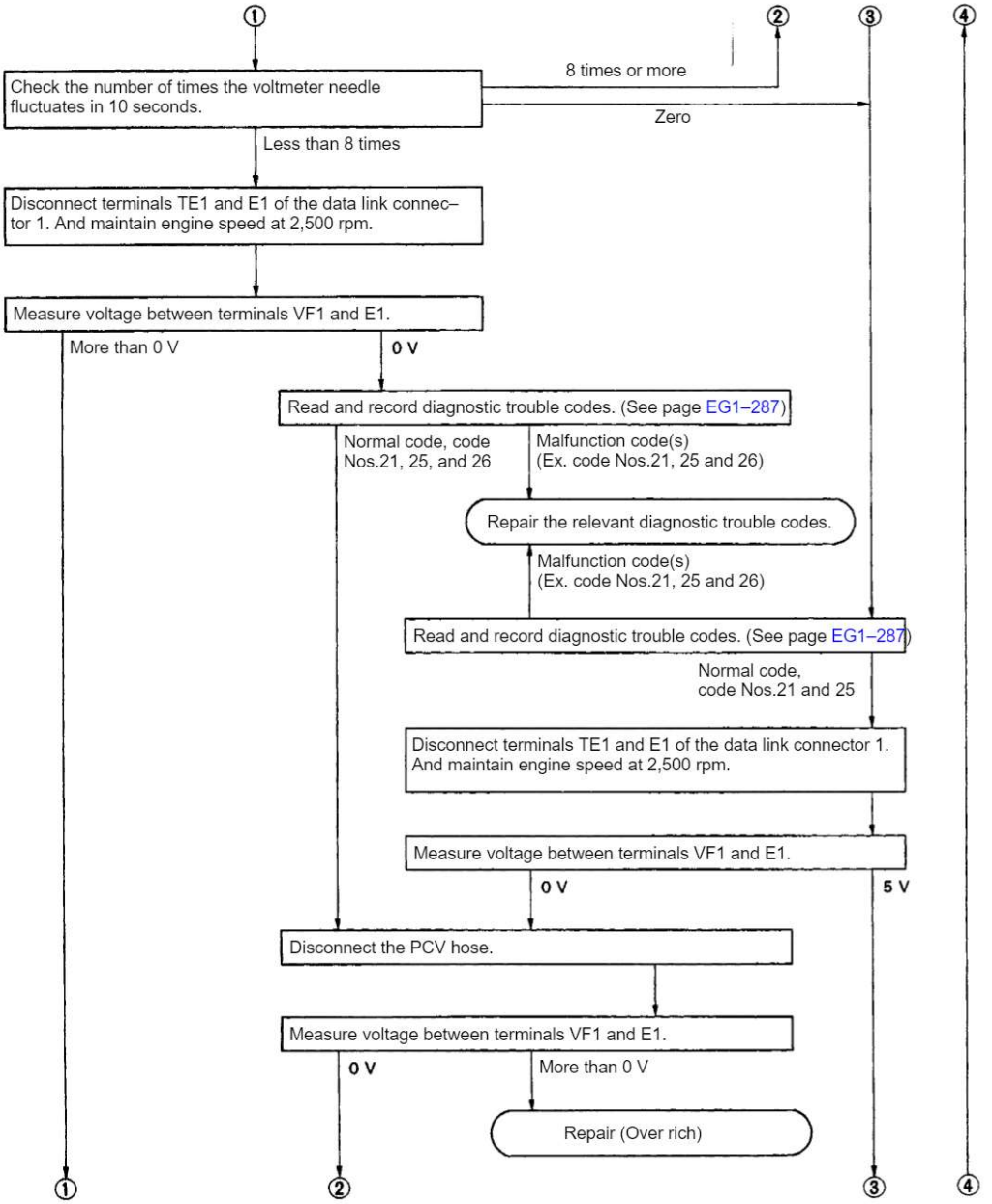
2. INSPECT FEEDBACK VOLTAGE

Connect the positive (+) probe of a voltmeter to terminal VF1 of the data link connector 1, and negative (–) probe to terminal E1. Perform the test as follows:



CONTINUED ON PAGE EG1–404

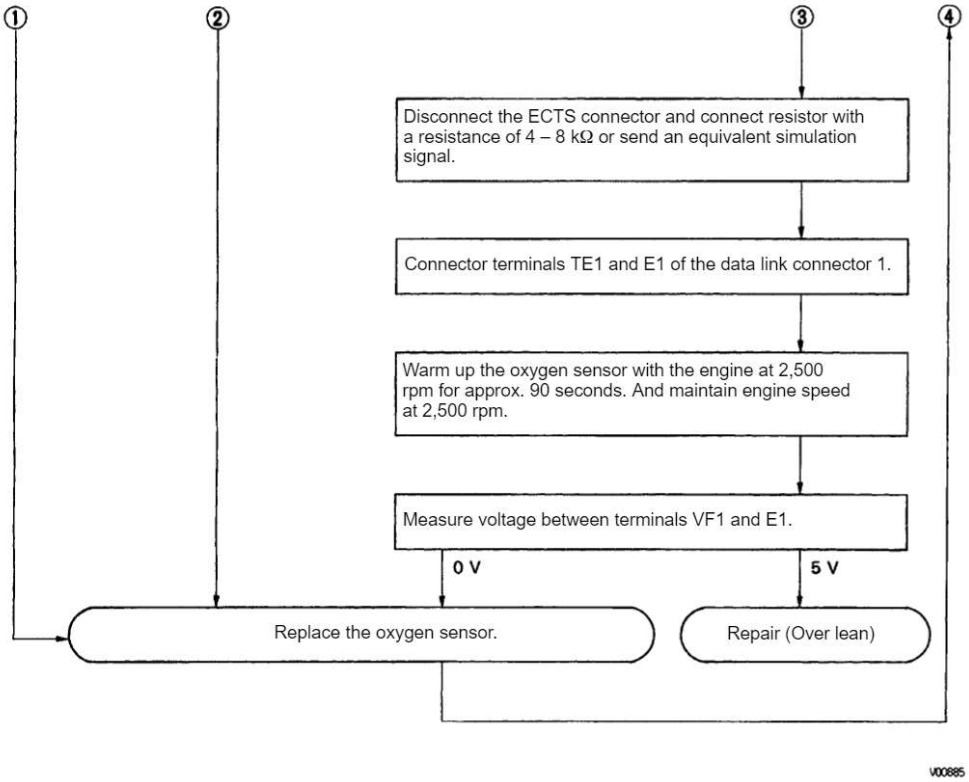
CONTINUED FROM PAGE EG1–403

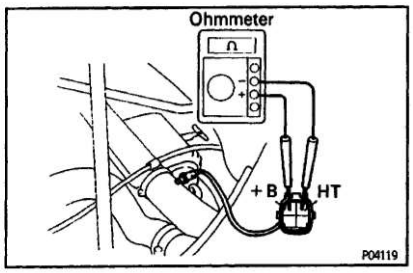


CONTINUED ON PAGE EG1–405

V00884

CONTINUED FROM PAGE EG1–404





3. INSPECT HEATER RESISTANCE OF OXYGEN SENSOR

(a) Disconnect the oxygen sensor connector.

(b) Using an ohmmeter, measure the resistance between terminals +B and HT.

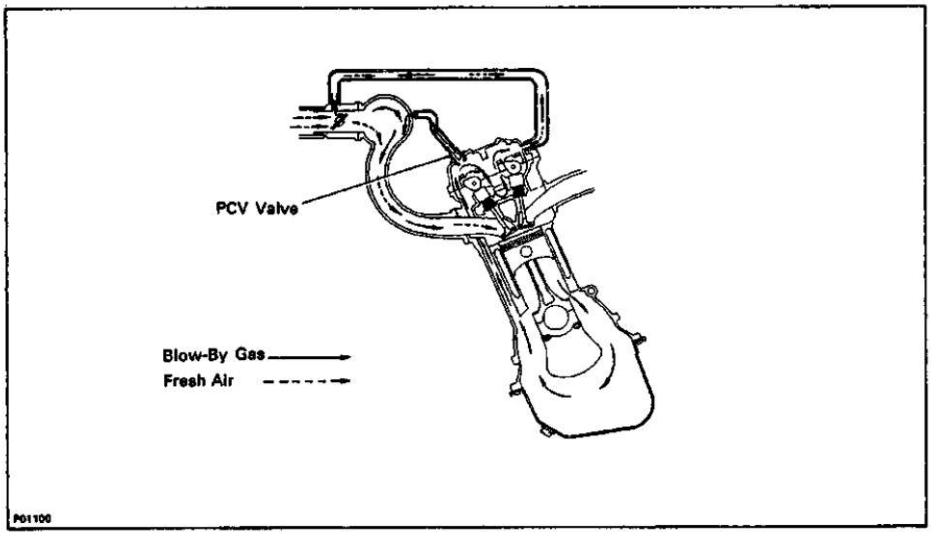
Resistance:

5.1 – 6.3 0 at 20° C (68° F)

If resistance is not as specified, replace the oxygen sensor.

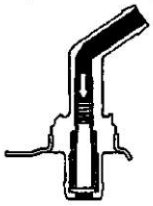
(c) Reconnect the oxygen sensor connector.

POSITIVE CRANKCASE VENTILATION (PCV) SYSTEM



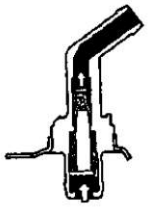
To reduce HC emissions, crankcase blow-by gas (HC) is routed through the PCV valve to the intake manifold for combustion in the cylinders.

Engine not Running or If Backfiring



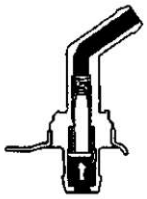
- PCV VALVE IS CLOSED.

Normal Operation



- PCV VALVE IS OPEN.
- VACUUM PASSAGE IS LARGE.

Idling or Decelerating



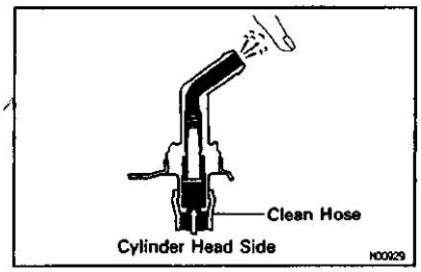
- PCV VALVE IS OPEN.
- VACUUM PASSAGE IS SMALL.

Acceleration or High Load



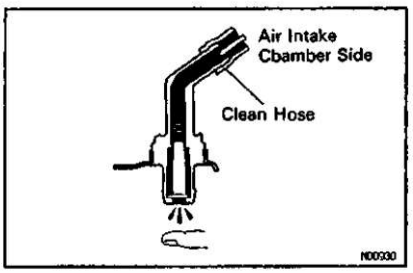
- PCV VALVE IS FULLY OPEN.

V01007

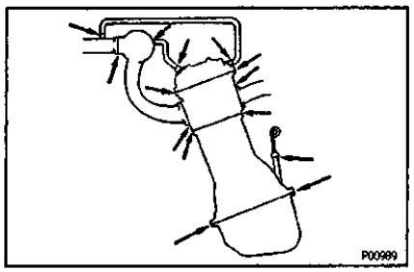


PCV VALVE INSPECTION

1. REMOVE PCV VALVE
2. INSTALL CLEAN HOSE TO PCV VALVE
3. INSPECT PCV VALVE OPERATION
   (a) Blow into the cylinder head side, and check that air passes through easily.
   CAUTION: Do not suck air through the valve. Petroleum substances inside the valve are harmful.



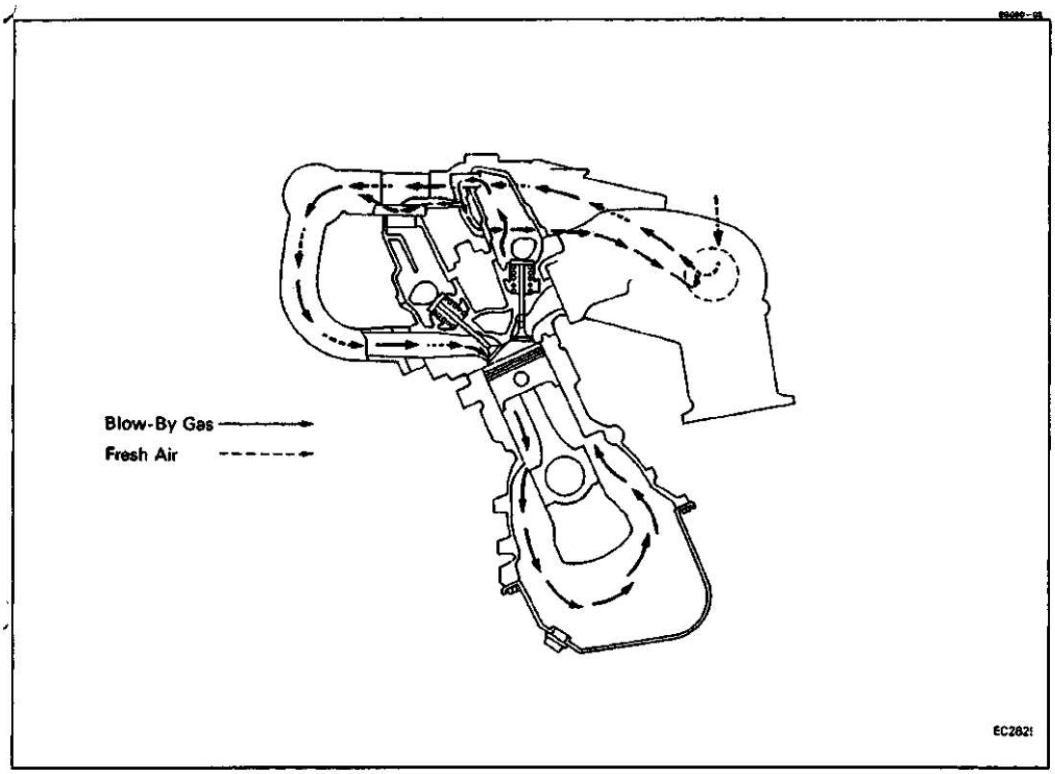
   (b) Blow air into the intake manifold side, and check that air passes through with difficulty.
   If operation is not as specified, replace the PCV valve.
4. REMOVE CLEAN HOSE FROM PCV VALVE
5. REINSTALL PCV VALVE

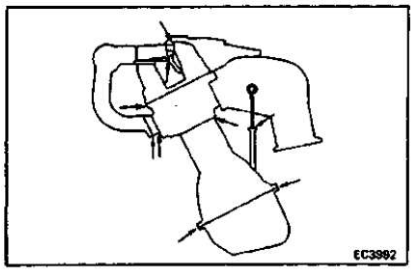


PCV HOSES AND CONNECTIONS INSPECTION

VISUALLY INSPECT HOSES AND CONNECTIONS
Check for cracks, leaks or damage.

POSITIVE CRANKCASE VENTILATION (PCV) SYSTEM





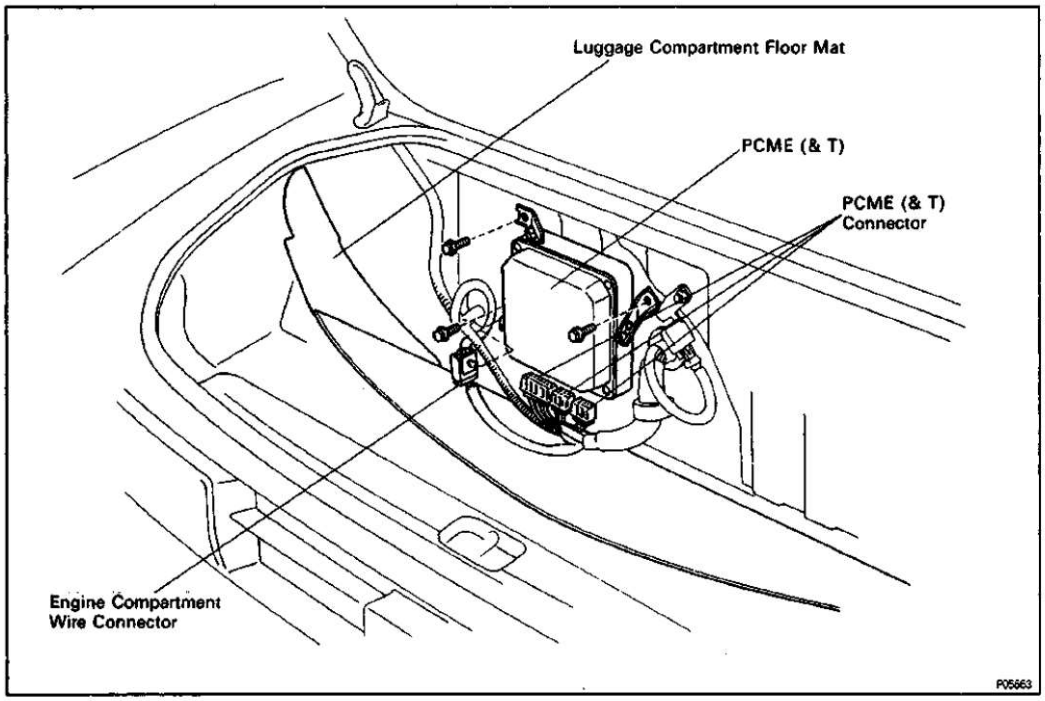
PCV HOSES AND CONNECTIONS INSPECTION

VISUALLY INSPECT HOSES, CONNECTIONS AND GASKETS

Check for cracks, leaks or damage.

POWERTRAIN CONTROL MODULE ENGINE (& ECT) (PCME (& T))

PCME (& T) FOR REMOVAL AND INSTALLATION

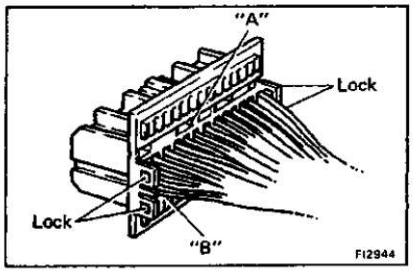


PCME INSPECTION

(See Components for Removal and Installation)

HINT: The MPI circuit can be checked by measuring the resistance and voltage at the wiring connectors of the PCME (& T).

1. DISCONNECT FRONT SIDE OF LUGGAGE COMPARTMENT FLOOR MAT FROM PARTITION PANEL



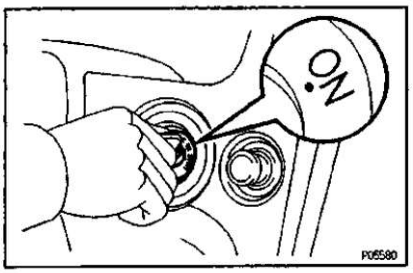
2. PREPARATION

(a) Disconnect the three connectors from the PCME (&T).

(b) Remove the locks as shown in the illustration so that the tester probe(s) can easily come in.

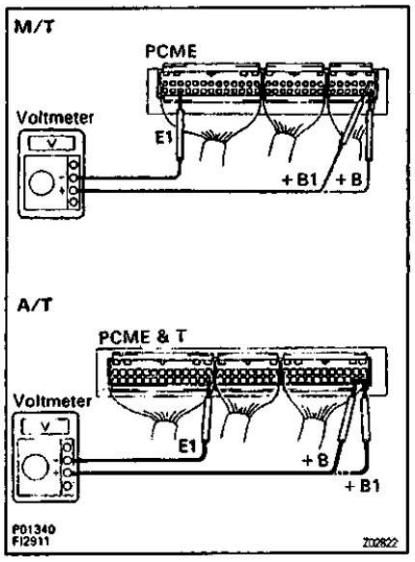
NOTICE: Pay attention to sections A and B in the illus–tration which can easily broken.

(c) Reconnect the three connectors to the PCME (& T).



3. INSPECT VOLTAGE OF PCME (& T)

(a) Turn the ignition switch ON.



(b) Measure the voltage between each terminal of the wiring connectors.

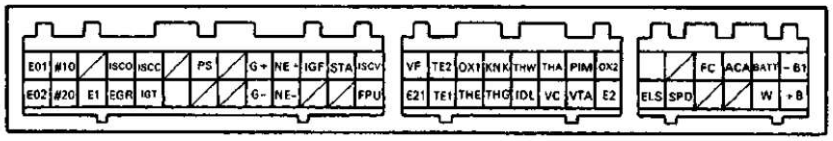
HINT:

- Perform all voltage measurements with the con–nectors connected.
- Verify that the battery voltage is 11 V or more when the ignition switch is ON.

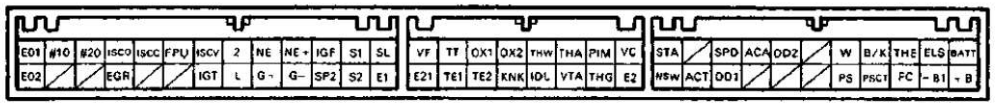
Voltage at PCME (& T) Wiring Connectors

Terminals	Condition		STD voltage (V)
+B +B1 – E1	IG SW ON		9 – 14
BATT – E1	–		9 – 14
IDL – E2	IG SW ON	Throttle valve open	9 – 14
VTA – E2		Throttle valve fully closed (Throttle opener must be cancelled first)	0.3 – 0.8
		Throttle valve fully open	3.2 – 4.9
PIM – E2	IG SW ON		3.3 – 3.9
VC – E2			4.5 – 5.5
#10 – E01 #20 – E02			9 – 14
THA – E2	IG SW ON	Intake air temp. 20°C (68°F)	0.5 – 3.4
THW – E2		Coolant temp. 80°C (176°F)	0.2 – 1.0
STA – E1	Cranking		6 or more
IGT – E1	Idling		Pluse generation
ISCO – E1	IG SW ON		9 – 14
W – E1	No trouble ("CHECK" engine warning light off) and engine running		9 – 14
ACA – E1	IG SW ON	Air conditioning ON	0 – 3
ACT – E1		Air conditioning ON	4.5 – 5.5
T – E1		DLC1 TE1 – E1 not connected	9 – 14
		DLC1 TE1 – E1 connected	0 – 3
NSW – E1 (A/T only)		Park/neutral switch P or N range	0 – 3
		Ex. Park/neutral switch P or N range	9 – 14
B/K – E1	Stop light SW ON (Brake pedal depressed)		7.5 – 14

PCME Terminals (M/T)

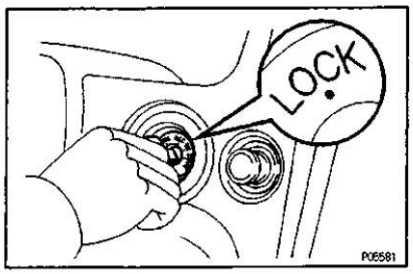


PCM E & T Terminals (A/T)



P01821
FI2796

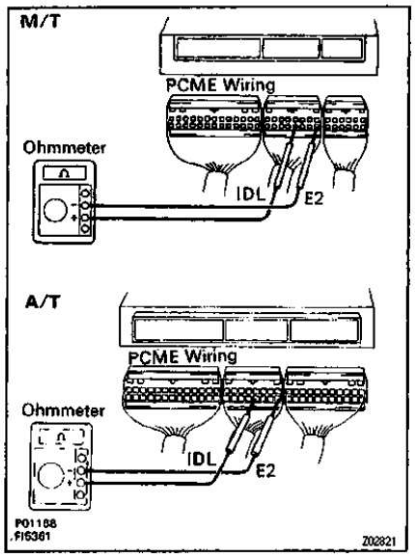
V00959



4. INSPECT RESISTANCE OF PCME (& T)

(a) Turn the ignition switch OFF.

(b) Disconnect the three connectors from the PCME (&T).



(c) Measure the resistance between each terminal of the wiring connectors.

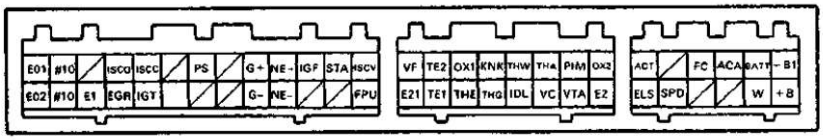
NOTICE:

- **Do not touch the PCME (& T) terminals.**
- **The tester probe should be inserted in the wiring connector from the wiring side.**

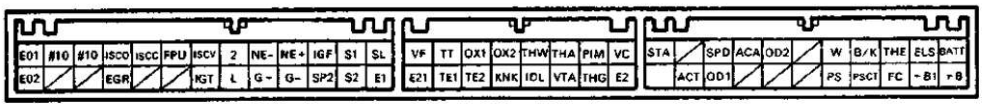
Resistance of PCME (& T) Wiring Connectors

Terminals	Condition	STD resistance (Ω)
IDL – E2	Throttle valve open	Infinity
	Throttle valve fully closed (Throttle opener must be cancelled first)	2,300 or less
VTA – E2	Throttle valve fully open	2,000 – 10,200
	Throttle valve fully closed (Throttle opener must be cancelled first)	200 – 5,700
VC – E2	–	2,500 – 5,900
THA – E2	Intake air temp. 20°C (68°F)	2,000 – 3,000
THW – E2	Coolant temp. 80°C (176° F)	200 – 400
G+ – G–	Cold (–10°C (14°F) to 50°C (104°F))	185 – 275
	Hot (50°C (104°F) to 100°C (212°F))	240 – 325
NE+ – NE–	Cold (–10°C (14°F) to 50°C (104°F))	370 – 550
	Hot (50°C (104°F) to 100°C (212°F))	475 – 650
ISCC – +B ISCO – +B1	–	19.3 – 22.3

PCM E Terminals (M/T)



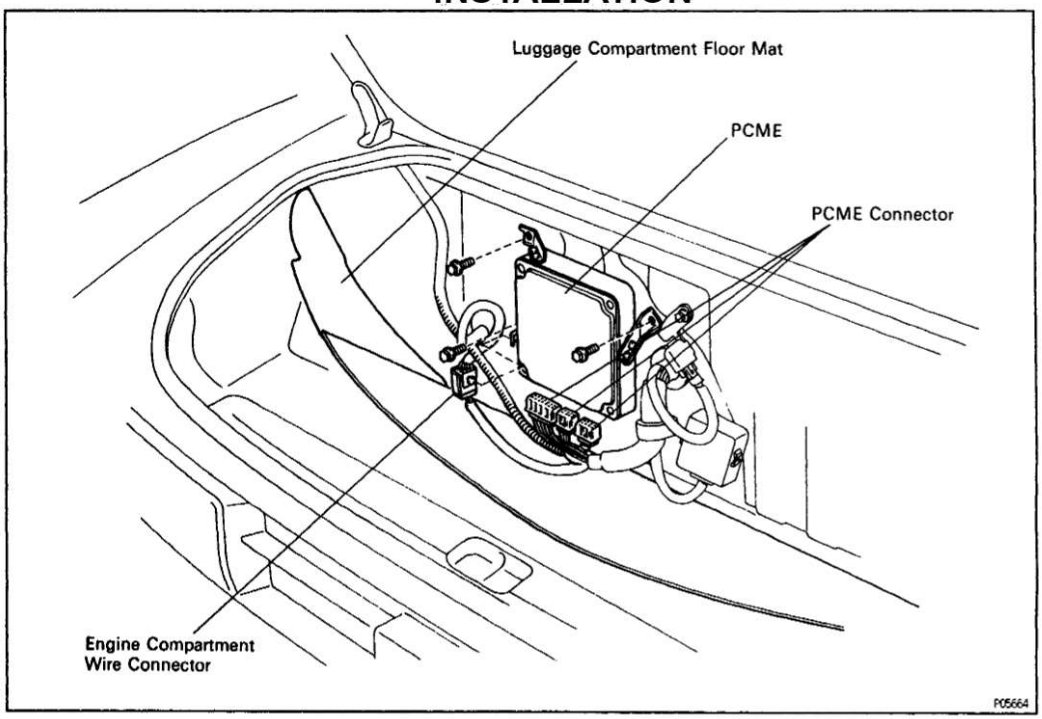
PCM E & T Terminals (A/T)



P01821
FI2796

V01040

POWERTRAIN CONTROL MODULE ENGINE (PCME) PCME FOR REMOVAL AND INSTALLATION

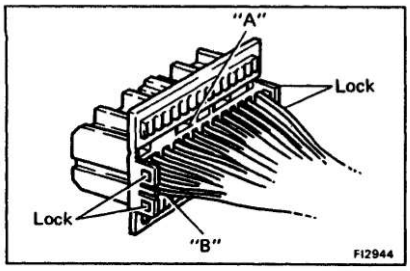


PCME INSPECTION

(See Components for Removal and Installation)

HINT: The SMPI circuit can be checked by measuring the resistance and voltage at the wiring connectors of the PCM E.

1. DISCONNECT FRONT SIDE OF LUGGAGE COMPARTMENT FLOOR MAT FROM PARTITION PANEL



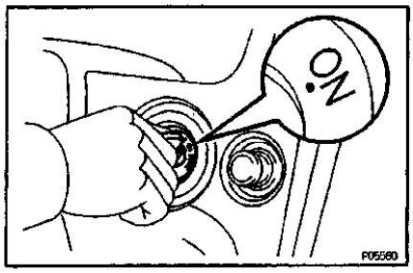
2. PREPARATION

(a) Disconnect the three connectors from the PCME.

(b) Remove the locks as shown in the illustration so that the tester probe(s) can easily come in.

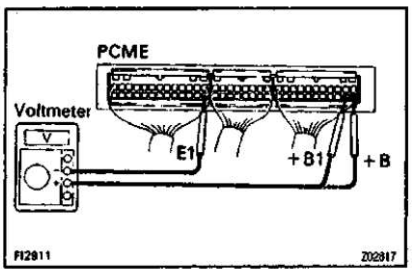
NOTICE: Pay attention to sections A and B in the illus–tration which can easily broken.

(c) Reconnect the three connectors to the PCME.



3. INSPECT VOLTAGE OF PCME

(a) Turn the ignition switch ON.



(b) Measure the voltage between each terminal of the wiring connectors.
HINT:

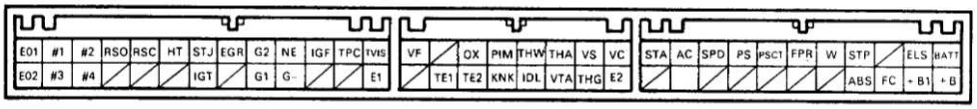
- Perform all voltage measurements with the con–nectors connected.
- Verify that the battery voltage is 1 1 V or more when the ignition switch is ON.

Voltage at PCME Wiring Connectors

Terminals	Condition		STD voltage (V)
+B, +B1 – E1	IG SW ON		9 – 14
BATT – E1			9 – 14
IDL – E2	IG SW ON	Throttle valve open	9 – 14
VTA – E2	IG SW ON	Throttle valve fully closed (Throttle opener must be cancelled first)	0.3 – 0.8
	IG SW ON		3.2 – 4.9
VC – E2	IG SW ON	Throttle valve fully open	4.5 – 5.5
VS – E2	IG SW ON	Measuring plate fully closed	4.0 – 5.5
	IG SW ON	Measuring plate fully open	0.2 – 0.5
	Idling		1.6 – 4.1
	3,000 rpm		1.0 – 2.0
#1, #2, #3, #4 – E01, E02	IG SW ON	Throttle valve fully closed (Throttle opener must be cancelled first)	9 – 14
THA – E2	IG SW ON	Intake air temp. 20°C (68°F)	0.5 – 3.4
THW – E2	IG SW ON	Coolant temp. 80°C (176°F)	0.2 – 1.0
STA – E1	Cranking		6 V or more
IGT – E1	Idling		Pulse generation
RSC, RSO – E1	IG SW ON	PCME connectors disconnected	9 – 14
W – E1	No trouble ("CHECK" engine warning light off) and engine running		9 – 14
PIM – E2	IG SW ON		2.5 – 4.5
AC – E1	IG SW ON	Air conditioning ON	9 – 14
*1TVIS – E1	IG SW ON	Throttle valve fully closed (Throttle opener must be cancelled first)	2.0 or less
	IG SW ON	Throttle valve open	9 – 14
*2TVIS – E1	Idling		2.0 or less
	4,200 rpm or more		9 – 14
TE1 – E1	IG SW ON	DLC1 TE1–E1 Not connected	9 – 14
	IG SW ON	DLC1 TE1–E1 connected	0.5 or less

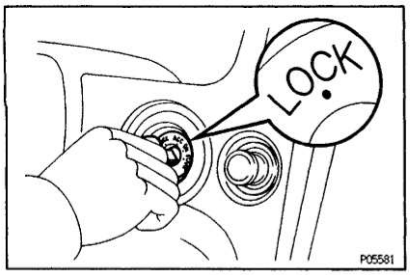
PCME Terminals

*1 w/ Regulator Gasoline
*2 w/ Premium Gasoline



FI2796

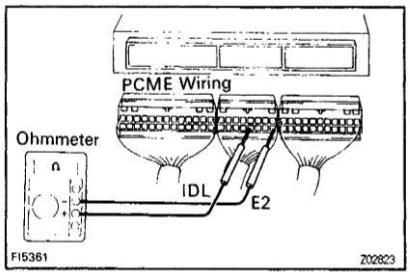
V00998



4. INSPECT RESISTANCE OF PCME

(a) Turn the ignition switch OFF.

(b) Disconnect the three connectors from the PCME.



(c) Measure the resistance between each terminal of the wiring connectors.

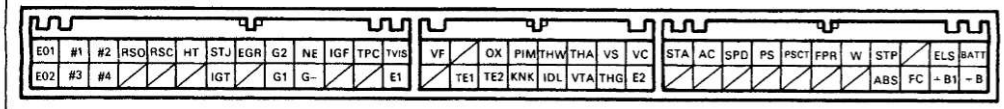
NOTICE:

- **Do not touch the PCME terminals.**
- **The tester probe should be inserted in the wiring connector from the wiring side.**

Resistance of PCME Wiring Connectors

Terminals	Condition	STD resistance (Ω)
IDL – E2	Throttle valve open	Infinity
	Throttle valve fully closed (Throttle opener must be cancelled first)	2,300 or less
VTA – E2	Throttle valve fully open	2,000 – 10,200
	Throttle valve fully closed (Throttle opener must be cancelled first)	200 – 5,700
VC – E2	Measuring plate fully closed	2,500 – 5,900
VS – E2		200 – 600
	Measuring plate fully open	20 – 1,200
THA – E2	Intake air temp. 20°C (68°F)	2,000 – 3,000
THW – E2	Coolant temp. 80°C (176°F)	200 – 400
G1 – G– G2	Cold (–10°C (14°F) to 50°C (104°F))	125 – 200
	Hot (50°C (104°F) to 1 00°C (2127))	160 – 235
NE – G–	Cold (–10°C (14°F) to 50°C (104°F)N	155 – 250
	Hot (50°C (104°F) to 100°C (212°F))	190 – 290
RSC – +B RSO – +B1		17.7 – 23.9

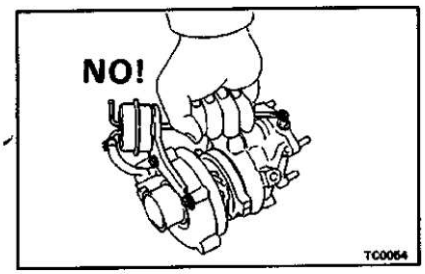
PCM E Terminals



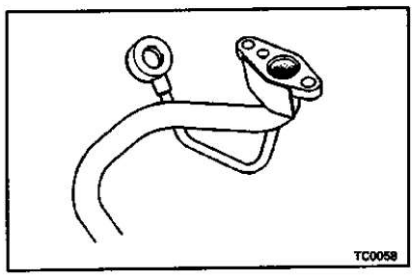
V00999

PRECAUTION

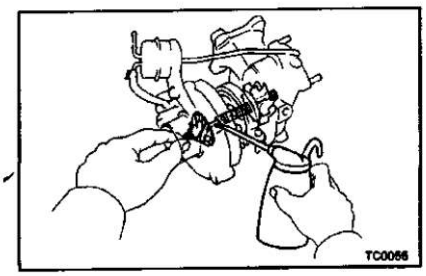
1. Do not stop the engine immediately after pulling a trailer or after high speed or uphill driving. Idle the engine for 20 – 120 seconds, depending on how hard the vehicle has been driven.
2. Avoid sudden acceleration or racing immediately after starting a cold engine.
3. Do not run the engine with air cleaner, removed, as this may cause foreign material to enter and damage the impeller wheel operating at high speed.
4. If a turbocharger is found to be defective and must be replaced, check for the cause, and repair or re–place the following items as necessary:
   - Engine oil level and quality
   - Conditions under which the turbocharger was used
   - Oil lines leading to the turbocharger



5. Use caution when removing and reinstalling the turbocharger assembly. Do not drop it or bang it against anything or grasp it by easily–deformed parts, such as the actuator or rod, when moving it.
6. Before removing the turbocharger, plug the intake and exhaust ports and oil inlet to prevent entry of dirt or other foreign material.



7. If replacing the turbocharger, check for accumula–tion of sludge particles in the oil pipes, and if nec–essary, replace the oil pipes.
8. Completely remove the gasket adhered to the lub–rication oil pipe flange and turbocharger oil flange.
9. When replacing bolt or nuts, use only authorized replacement parts to prevent breakage or defor–mation.



10. If replacing the turbocharger, put 20 cm^3 (1.2 cu in.) of oil into the turbocharger oil inlet and turn the impeller wheel by hand to spread oil to the bearing.
11. If overhauling or replacing the engine, cut the fuel supply after reassembly and crank the engine for 30 seconds to distribute oil throughout the engine. Then allow the engine to idle for 60 seconds.

PRECAUTION

1. Before working on the fuel system, disconnect the cable from negative (–) terminal of the battery.

HINT: Any diagnostic trouble code retained by the computer will be erased when the battery terminal is removed.

Therefore, if necessary, read the diagnosis before removing the terminal.

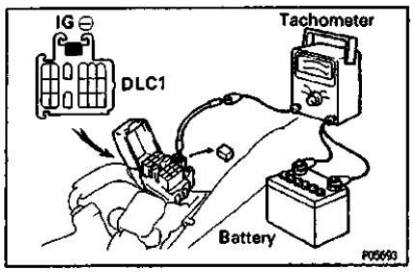
2. Do not smoke or work near an open flame when working on the fuel system.

3. Keep gasoline away from rubber or leather parts.

MAINTENANCE PRECAUTIONS

1. CHECK CORRECT ENGINE TUNE–UP

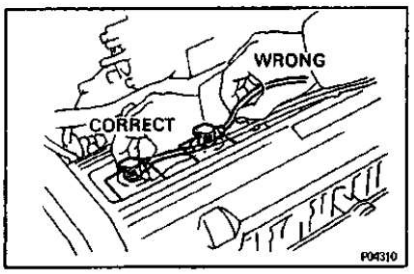
(See Tune–Up under Engine Mechanical)



2. PRECAUTION WHEN CONNECTING GAUGE

(a) Use battery as the power source for the timing light, tachometer, etc.

(b) Connect the tester probe of a tachometer to the terminal IG(–) of the data link connector 1.



3. IN EVENT OF ENGINE MISFIRE, FOLLOWING PRECAUTIONS SHOULD BE TAKEN

(a) Check proper connection of battery terminals, etc.

(b) Handle high–tension cords carefully.

(c) After repair work, check that the ignition coil terminals and all other ignition system lines are reconnected securely.

(d) When cleaning the engine compartment, be especially careful to protect the electrical system from water.

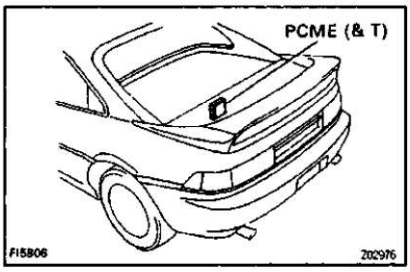
4. PRECAUTIONS WHEN HANDLING OXYGEN SENSOR

(a) Do not allow oxygen sensor to drop or hit against an object.

(b) Do not allow the sensor to come into contact with water.

IF VEHICLE IS EQUIPPED WITH MOBILE RADIO SYSTEM (HAM, CB, ETC.)

The PCME (& T) has been designed so that it will not be affected by outside interference.
However, if your vehicle is equipped with a CB radio transceiver, etc. (even one with about 10 W output), it may, at times, have an affect upon PCME (& T) operation, especially if the antenna and feeder are installed nearby.
Therefore, observe the following precautions:

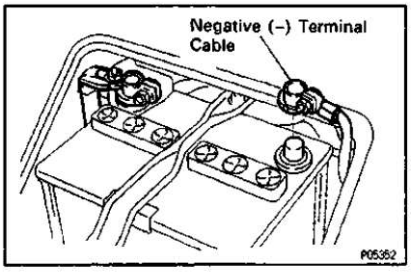


1. Install the antenna as far away as possible from the PCME (& T). The PCME (& T) is located on the partition panel into rear luggage compartment so the antenna should be installed at the rear side of the vehicle.
2. Keep the antenna feeder as far away as possible from the PCME (& T) wires–at lease 20 cm (7.87 in.)–and, especially, do not wind them together.
3. Check that the feeder and antenna are properly adjusted.
4. Do not equip your vehicle with a powerful mobile radio system.
5. Do not open the cover or the case of the PCME (& T) unless absolutely necessary. (If the IC terminals are touched, the IC may be destroyed by static electricity.)

AIR INDUCTION SYSTEM

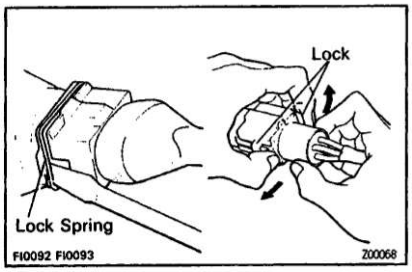
1. Separation of the engine oil dipstick, oil filler cap, PCV hose, etc. may cause the engine to run out of turn.
2. Disconnection, looseness or cracks in the parts of the air induction system between the throttle body and cylinder head will allow air suction and cause the engine to run out of tune.

ELECTRONIC CONTROL SYSTEM

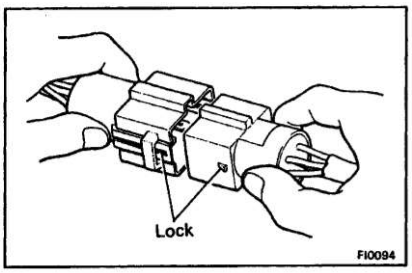


1. Before removing MPI wiring connectors, terminals, etc., first disconnect the power by either turning the ignition switch OFF or disconnecting the battery terminals.
HINT: Always check the diagnostic trouble code before disconnecting the battery terminal.

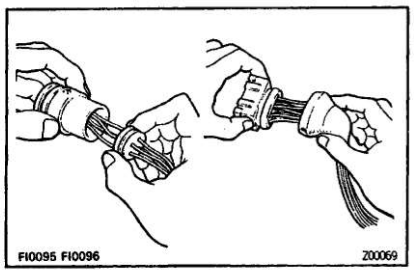
2. When installing the battery, be especially careful not to incorrectly connect the positive (+) and negative (–) cables.
3. Do not permit parts to receive a severe impact during removal or installation. Handle all MPI parts carefully, especially the PCME (& T).
4. Do not be careless during troubleshooting as there are numerous transistor circuits and even slight terminal contact can further troubles.
5. Do not open the PCME (& T) cover.
6. When inspecting during rainy weather, take care to prevent entry of water. Also, when washing they engine compartment, prevent water from getting on the MPI parts and wiring connectors.
7. Parts should be replaced as an assembly.



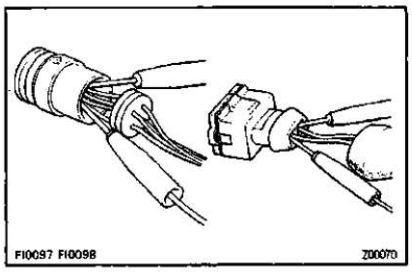
8. Care is required when pulling out and inserting wiring connectors.
   (a) Release the lock and pull out the connector, pulling on the connectors.



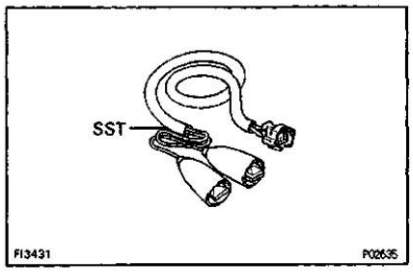
(b) Fully insert the connector and check that it is locked.



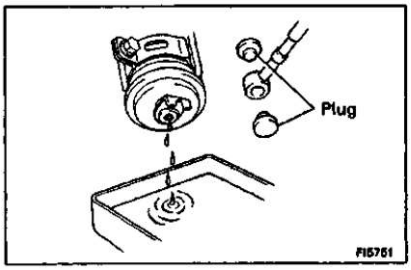
9. When inspecting a connector with a volt/ohmmeter.
   (a) Carefully take out the water–proofing rubber if it is a water–proof type connector.



(b) Insert the test probe into the connector from wiring side when checking the continuity, amperage or vol–tage.
(c) Do not apply unnecessary force to the terminal.
(d) After checking, install the water–proofing rubber on the connector securely.

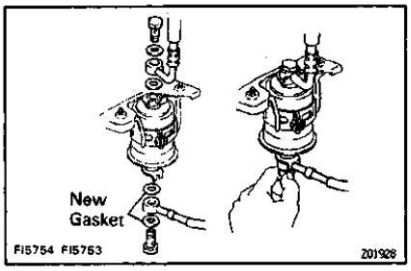


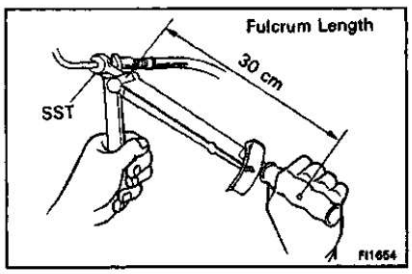
10. Use SST for inspection or test of the injector or its wiring connector.
SST 09842–30070



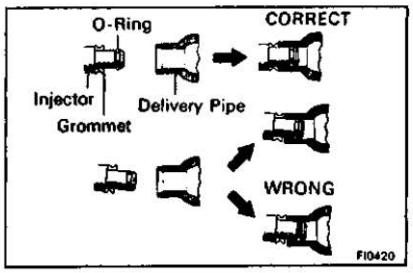
FUEL SYSTEM

1. When disconnecting the high fuel pressure line, a large amount of gasoline will spill out, so observe the following procedures:
(a) Put a container under the connection.
(b) Slowly loosen the connection.
(c) Disconnect the connection.
(d) Plug the connection with a rubber plug.
2. When connecting the flare nut or union bolt on the high pressure pipe union, observe the following pro–cedures:
(Union Bolt Type)
(a) Always use a new gasket.
(b) Tighten the union bolt by hand.
(c) Tighten the union bolt to the specified torque.
Torque: 29 N–m (300 kgf–cm, 22 ft–lbf)

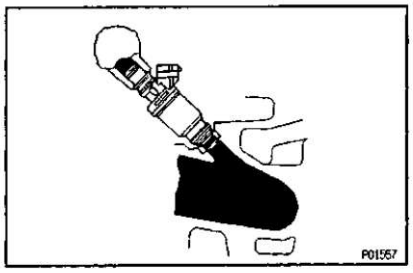




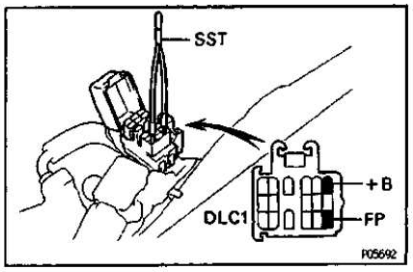
(Flare Nut Type)
(a) Apply a light coat of engine oil to the flare and tighten the flare nut by hand.
(b) Using SST, tighten the flare nut to the specified torque.
SST 09631 –22020
Torque: 30 N–m (310 kgf–cm, 22 ft–lbf)
HINT: Use a torque wrench with a fulcrum length of 30 cm (111.81 in.).



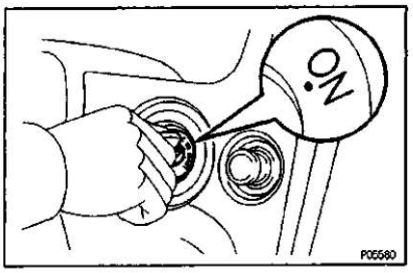
3. Observe the following precautions when removing and installing the injectors.
   (a) Never reuse the O–ring.
   (b) When placing a new O–ring on the injector, take care not to damage it in any way.
   (c) Coat a new O–ring with spindle oil or gasoline before installing –never use engine, gear or brake oil.



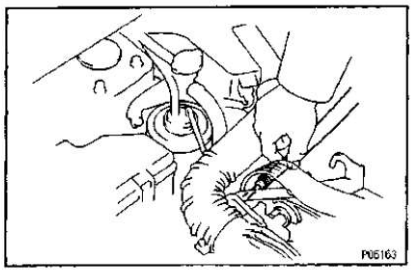
4. Install the injector– to delivery pipe and cylinder head as shown in the illustration.



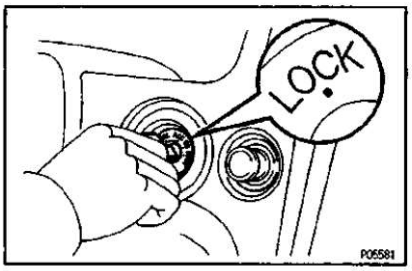
5. Check that there are no fuel leaks after performing any maintenance on the fuel system.
   (a) Using SST, connect terminals +B and FP of the data link connector 1.
   SST 09843–18020



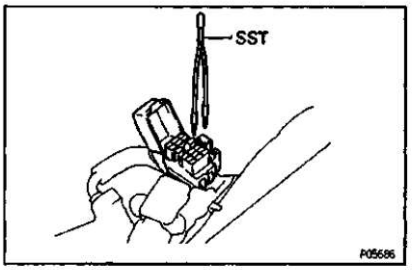
(b) Turn the ignition switch ON.
NOTICE: Do not start the engine.



(c) When the fuel return hose is pinched, the pressure within high pressure line will rise to approx. 392 kPa (4kgf/cm^2, 57 psi). In this state, check to see that there are no leaks from any part of the fuel system.
NOTICE: Always pinch the hose, avoid bending as it may cause the hose to crack.



(d) Turn the ignition switch OFF.



(e) Remove the SST from the data link connector 1.
SST 09843–18020

PRECAUTION

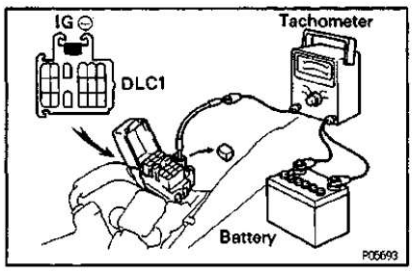
1. Before working on the fuel system, disconnect the cable from negative (–) terminal of the battery.
HINT: Any diagnostic trouble code retained by the computer will be erased when the battery terminal is removed.
Therefore, if necessary, read the diagnosis before removing the terminal.

2. Do not smoke or work near an open flame when working on the fuel system.

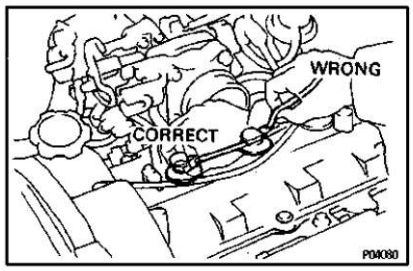
3. Keep gasoline away from rubber or leather parts.

MAINTENANCE PRECAUTIONS

1. CHECK CORRECT ENGINE TUNE–UP
(See Tune–Up under Engine Mechanical)



2. PRECAUTION WHEN CONNECTING GAUGE
(a) Use battery as the power source for the timing light, tachometer, etc.
(b) Connect the tester probe of a tachometer to the ter–minal IG– of the data link connector 1.

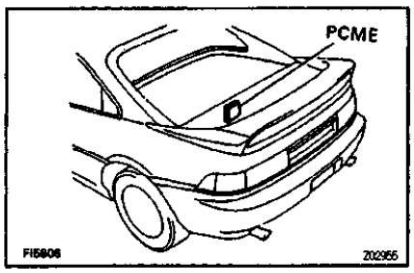


3. IN EVENT OF ENGINE MISFIRE, FOLLOWING PRECAUTIONS SHOULD BE TAKEN
(a) Check proper connection of battery terminals, etc.
(b) Handle high–tension cords carefully.
(c) After repair work, check that the ignition coil termi–nals and all other ignition system lines are reconne–cted securely.
(d) When cleaning the engine compartment, be especially careful to protect the electrical system from water.

4. PRECAUTIONS WHEN HANDLING OXYGEN SENSOR
(a) Do not allow oxygen sensor to drop or hit against an object.
(b) Do not allow the sensor to come into contact with water.

IF VEHICLE IS EQUIPPED WITH MOBILE RADIO SYSTEM (HAM, CB, ETC.)

The PCME has been designed so that it will not be affected by outside interference.
However, if your vehicle is equipped with a CB radio transceiver, etc. (even one with about 10 W output), it may, at times, have an affect upon PCME operation, especially if the antenna and feeder are installed nearby.
Therefore, observe the following precautions:

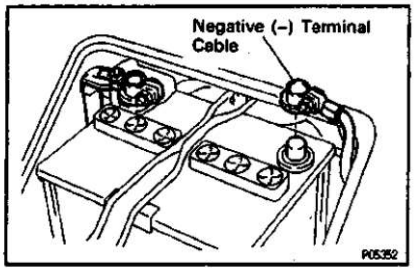


1. Install the antenna as far away as possible from the PCME. The PCME is located on the partition panel into rear luggage compartment so the antenna should be installed at the rear side of the vehicle.
2. Keep the antenna feeder as far away as possible from the PCME wires–at lease 20 cm (7.87 in.)–and, es–pecially, do not wind them together.
3. Check that the feeder and antenna are properly adj–usted.
4. Do not equip your vehicle with a powerful mobile radio system.
5. Do not open the cover or the case of the PCME unless absolutely necessary. (If the IC terminals are touched, the IC may be destroyed by static electricity.)

AIR INDUCTION SYSTEM

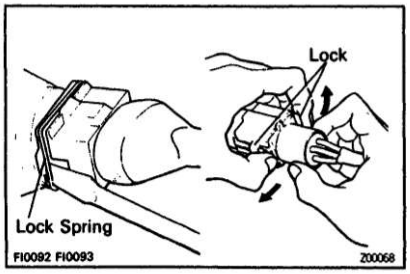
1. Separation of the engine oil dipstick, oil filler cap, PCV hose, etc. may cause the engine to run out of turn.
2. Disconnection, looseness or cracks in the parts of the air induction system between the throttle body and cylinder head will allow air suction and cause the engine to run out of tune.

ELECTRONIC CONTROL SYSTEM

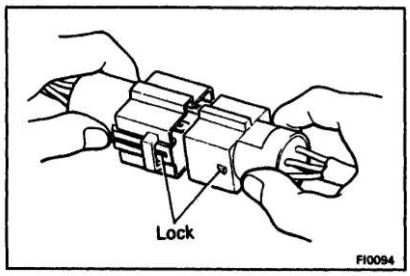


1. Before removing SMPI wiring connectors, terminals, etc., first disconnect the power by either turning the ignition switch OFF or disconnecting the battery ter–minals.
HINT: Always check the diagnostic trouble code before disconnecting the battery terminal.

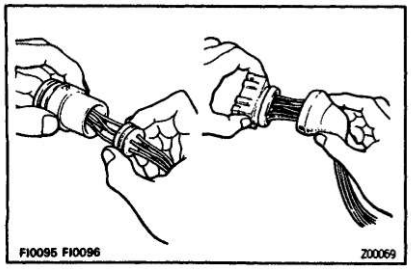
2. When installing the battery, be especially careful not to incorrectly connect the positive (+) and negative (–) cables.
3. Do not permit parts to receive a severe impact during removal or installation. Handle all SMPI parts carefully, especially the PCME.
4. Do not be careless during troubleshooting as there are numerous transistor circuits and even slight terminal contact can further troubles.
5. Do not open the PCME cover.
6. When inspecting during rainy weather, take care to prevent entry of water. Also, when washing the engine compartment, prevent water from getting on the SMPI parts and wiring connectors.
7. Parts should be replaced as an assembly.



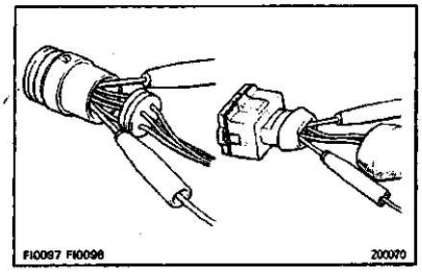
8. Care is required when pulling out and inserting wiring connectors.
(a) Release the lock and pull out the connector, pulling on the connectors.



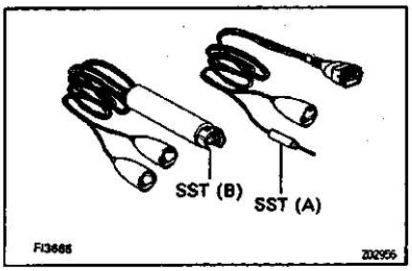
(b) Fully insert the connector and check that it is locked.



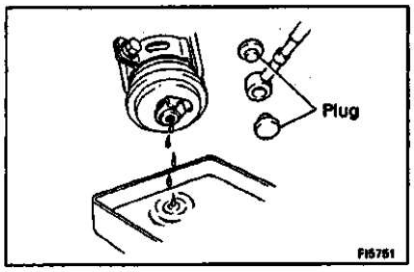
9. When inspecting a connector with a volt/ohmmeter.
(a) Carefully take out the water–proofing rubber if it is a water–proof type connector.



(b) Insert the test probe into the connector from wiring side when checking the continuity, amperage or voltage.
(c) Do not apply unnecessary force to the terminal.
(d) After checking, install the water–proofing rubber on the connector securely.

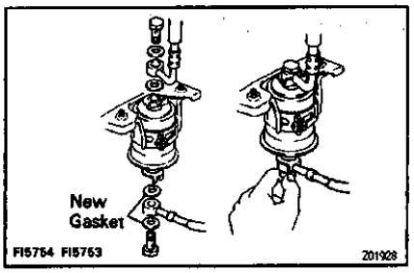


10. Use SST for inspection or test of the injector, cold start injector or its wiring connector.
SST 09842–30050 (A) for cold start injector
SST 09842–30060 (B) for injector

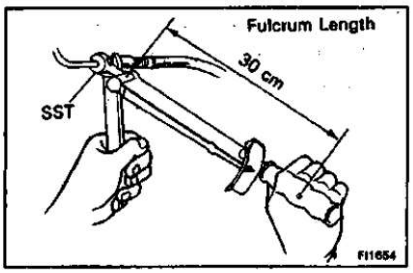


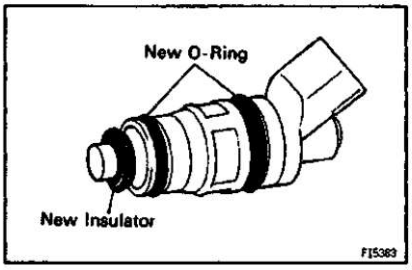
FUEL SYSTEM

1. When disconnecting the high fuel pressure line, a large amount of gasoline will spill out, –so observe the following procedures:
(a) Put a container under the connection.
(b) Slowly loosen the connection.
(c) Disconnect the connection.
(d) Plug the connection with a rubber plug.

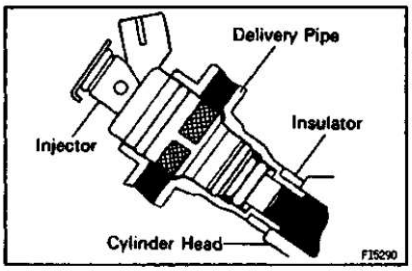


2. When connecting the flare nut or union bolt on the high pressure pipe union, observe the following procedures:
(Union Bolt Type)
(a) Always use a new gasket.
(b) Tighten the union bolt by hand.
(c) Tighten the union bolt to the specified torque.
Torque: 29 N–m (300 kgf–cm, 22 ft–lbf)
(Flare Nut Type)
(a). Apply a light coat of engine oil to the flare and tighten the flare nut by hand.
(b) Using SST, tighten the flare nut to the specified torque.
SST 09631–22020
Torque: 30 N–m (310 kgf–cm, 22 ft–lbf)
HINT: Use a torque wrench with a fulcrum length of 30 cm (111.81 in.).

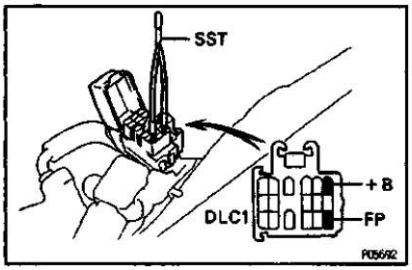




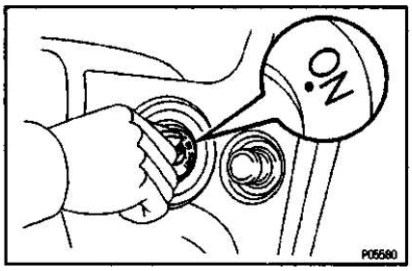
3. Observe the following precautions when removing and installing the injectors.
(a) Never reuse the 0–ring.
(b) When placing a new O –ring on the injector, take care not to damage it in any way.
(c) Coat a new O–ring with spindle oil or gasoline before installing–never use engine, gear or brake oil.



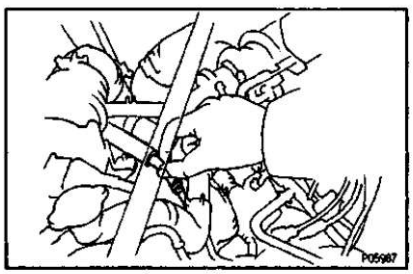
4. Install the injector to delivery pipe and cylinder head as shown in the illustration.



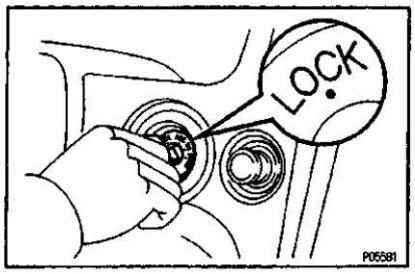
5. Check that there are no fuel leaks after performing any maintenance on the fuel system.
(a) Using SST, connect terminals +B and FP of the data link connector 1.
SST 09843–18020



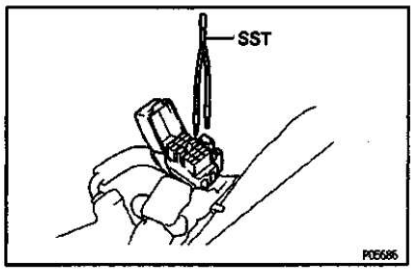
(b) Turn the ignition switch ON.
NOTICE: Do not start the engine.



(c) When the fuel return hose is pinched, the pressure within high pressure line will rise to approx. 392 kPa (4kgf/cm_2, 57 psi). In this state, check to see that there are no leaks from any part of the fuel system.
NOTICE: Always pinch the hose. avoid bending as it may cause the hose to crack.



(d) Turn the ignition switch OFF.



(e) Remove the SST from the data link connector 1.
SST 09843–18020

PREPARATION

SST (SPECIAL SERVICE TOOLS)

 09228–06500 Oil Filter Wrench	

RECOMMENDED TOOLS

 09082–00015 TOYOTA Electrical Tester	

EQUIPMENT

Heater	
Radiator cap tester	
Thermometer	
Torque wrench	

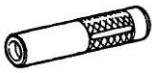
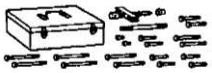
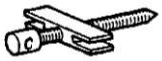
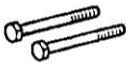
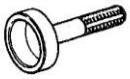
COOLANT

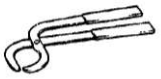
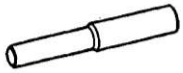
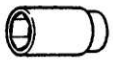
Item	Capacity	Classification
Engine coolant (w/ Heater)	13.6 liters (14.4 US qts, 12.0 Imp. qts)	Ethylene–glycol base

PREPARATION

SST (SPECIAL SERVICE TOOLS)

E00AY–04

	09201–41020 Valve Stem Oil Seal Replace	
	09201–70010 Valve Guide Bushing Remover & Replacer	
	09202–70010 Valve Spring Compressor	
	09213–54015 Crankshaft Pulley Holding Tool	
	(09214–00030) Bolt	
	09213–60017 Crankshaft Pulley & Gear Puller Set	
	(09213–00020) Body With Bolt	
	(09213–00030) Handle	
	(09213–00050) Bolt Set	
	09222–30010 Connecting Rod Bushing Remover & Replacer	
	09223–46011 Crankshaft Front Oil Seal Replacer	Camshaft oil seal
	09223–63010 Crankshaft Rear Oil Seal Replacer	
	09228–06500 Oil Filter Wrench	

	09248–55020 Valve Clearance Adjust Tool Set	
	(09248–05011) Valve Lifter Press	
	(09248–05021) valve Lifter stopper	
	09249–63010 Torque Wrench Adaptor	
	09226–10010 Crankshaft Front & Rear Bearing Replacer	
	09278–54012 Drive Shaft Holding Tool	Camshaft timing pulley
	09301–32010 Clutch Guide Tool	
	09330–00021 Companion Flange Holding Tool	Crankshaft pulley
	09616–30011 Steering Worm Bearing Adjusting Screw Wrench	Oil pump pulley
	09816–30010 Oil Pressure Switch Socket	Knock sensor
	09843–18020 Diagnosis Check Wire	

RECOMMENDED TOOLS

S90AZ–01

	09090–04010 Engine Sling Device	For suspension engine
	09200–00010 Engine Adjust Kit	

 09258–00030 Hose Plug set	Plug for the vacuum hose, fuel hose etc.
 09904–00010 Expander set	

EQUIPMENT

Battery specific gravity gauge	
Belt tension gauge	
Caliper gauge	
CO/HC meter	
Compression gauge	
Connecting rod aligner	
Cylinder gauge	
Dial indicator	
Dye penetrant	
Engine Tune–up tester	
Heater	
Magnetic finger	
Micrometer	
Piston ring compressor	
Piston ring expander	
Plastigage	
Precision straight edge	
Soft brush	
Spring tester	Valve spring
Steel square	Valve spring
Thermometer	

Torque wrench	
Valve seat cutter	
Vernier calipers	

80081–04

SSM (SERVICE SPECIAL MATERIALS)

08826–00080 Seal packing or equivalent	Camshaft bearing cap Cylinder head cover Rear oil sear retainer
08833–00070 Adhesive 1324, THREE BOND 1324 or equivalent	Flywheel or drive plate mounting bolt
08833–00080 Adhesive 1344, THREE BOND 1344, LOCTITE 242 or equivalent	Oil pressure switch

PREPARATION

SST (SPECIAL SERVICE TOOLS)

	09992–00241 Turbocharger Pressure Gauge	

EQUIPMENT

Dial indicator	Inpeller wheel
Torque wrench	

PREPARATION

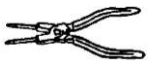
S0077–01

SST (SPECIAL SERVICE TOOLS)

	09032–00100 Oil Pan Seal Cutter	
	09226–10010 Crankshaft Front & Rear Bearing Replacer	Crankshaft front oil seal
	09228–06500 Oil Filter Wrench	
	09616–30011 Steering Worm Bearing Adjusting Screw Wrench	Oil pump pulley
	09620–30010 Steering Gear Box Replacer Set	
	(09627–30010) Steering Sector Shaft Bushing . . Replacer	Oil pump oil seal
	(09631–00020) Handle	Oil pump oil seal

S0078–01

RECOMMENDED TOOLS

	09090–04000 Engine Sling Device	For suspending engine
	09200–00010 Engine Adjust Kit	
	09905–00013 Snap Ring Pliers	

S0078–02

EQUIPMENT

Oil pressure gauge	
Torque wrench	

LUBRICANT

Item	Capacity	Classification
Engine oil Dry fill Drain and refill w/ Oil filter change w/o Oil filter change	4.3 liters (4.5 US qts, 3.8 Imp. qts) 3.9 liters (4.1 US qts, 3.4 Imp. qts) 3.6 liters (3.8 US qts, 3.2 Imp. qts)	API grade SG, Energy–Conserving II multigrade and recommended viscosity oil

SSM (SPECIAL SERVICE MATERIALS)

08826–00080 Seal packing or equivalent	Oil pan
08833–00080 Adhesive 1344, THREE BOND 1344. LOCTITE 242 or equivalent	Oil pressure switch

PREPARATION

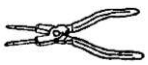
EG14U–01

SST (SPECIAL SERVICE TOOLS)

	09032–00100 Oil Pan Seal Cutter	
	09226–10010 Crankshaft Front & Rear Bearing Replacer	Crankshaft front oil seal
	09228–06500 Oil Filter Wrench	
	09616–30011 Steering Worm Bearing Adjusting Screw Wrench	Oil pump pulley
	09620–30010 Steering Gear Box Replacer Set	
	(09627–30010) Steering Sector Shaft Bushing Replacer	Oil pump oil seal
	(09631 –00020) Handle	Oil pump oil seal

EG14V–01

RECOMMENDED TOOLS

	09090–04000 Engine Sling Device	For suspending engine
	09200–00010 Engine Adjust Kit	
	09905–00013 Snap Ring Pliers	

EG14W–01

EQUIPMENT

Oil pressure gauge	
Torque wrench	

B014X-01

LUBRICANT

Item	Capacity	Classification
Engine oil Dry fill Drain and refill w/ Oil filter change w/o Oil filter change	 4.6 liters (4.9 US qts, 4.0 Imp. qts) 4.2 liters (4.4 US qts, 3.7 Imp. qts) 3.8 liters (4.0 US qts, 3.3 Imp. qts)	API grade SG, Energy–Conserving II muitigrade and recommended viscosity oil

B014Y-01

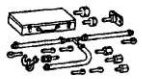
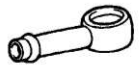
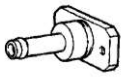
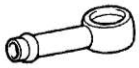
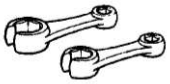
SSM (SPECIAL SERVICE MATERIALS)

08826–00080 Seal packing or equivalent	Oil pan
08833–00080 Adhesive 1344, THREE BOND 1344, LOCTITE 242 or equivalent	Oil pressure switch

PREPARATION

SST (SPECIAL SERVICE TOOLS)

E00CF–08

	09266–41045 Injection Measuring Tool Set	
	(09268–41080) No.6 Union	
	(09268–41090) No.7 Union	
	(90405–09015) No.1 Union	
	09268–45012 EFI Fuel Pressure Gauge	
	09631–22020 Power Steering Hose Nut 14 x 17 mm Wrench Set	Fuel line flare nut
	09842–30070 Wiring 'F' EFI Inspection	
	09843–18020 Diagnosis Check Wire	

RECOMMENDED TOOLS

E00CG–01

	09082–00015 TOYOTA Electrical Tester	
	09200–00010 Engine Adjust Kit	
	09258–00030 Hose Plug set	Plug for the vacuum hose, fuel hose etc.

EQUIPMENT

E00CH–01

Graduated cylinder	Injector
Carburetor cleaner	Throttle body
Sound scope	Injector
Tachometer	
Torque wrench	
Vacuum gauge	
Soft brush	Throttle body

EMISSION CONTROL SYSTEMS

SYSTEM PURPOSE

System	Abbreviation	Purpose
Positive crankcase ventilation	PCV	Reduces blow–by gas (HC)
Fuel evaporative emission control	EVAP	Reduces evaporative HC
Exhaust gas recirculation	EGR	Reduces NOx
Three–way catalyst	TWC	Reduces HC, CO and NOx
Electronic fuel injection*	MPI	Regulates all engine conditions for reduction of exhaust emissions.

* For inspection and repair of the MPI system, refer to MPI Section.

V01052

PREPARATION

SST (SPECIAL SERVICE TOOLS)

 09843–18020 Diagnosis Check Wire	

RECOMMENDED TOOLS

 09082–00015 TOYOTA Electrical Tester	

EQUIPMENT

Heater	TVS
Thermometer	TVS
Tachometer	
Torque wrench	
Vacuum gauge	

SSM (SPECIAL SERVICE MATERIALS)

08833–00070 Adhesive 1324, THREE BOND 1324 or equivalent	**TVS**

PREPARATION

EG12S–01

SST (SPECIAL SERVICE TOOLS)

 09228–06500 Oil Filter Wrench	

EG12V–01

RECOMMENDED TOOLS

 09082–00015 TOYOTA Electrical Tester	

EG12W–01

EQUIPMENT

Heater	
Radiator cap tester	
Thermometer	
Torque wrench	

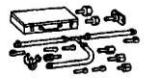
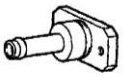
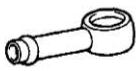
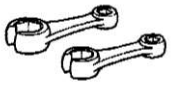
EG12X–01

COOLANT

Item	Capacity	Classification
Engine coolant (w/ Heater)	13.0 liters (13.7 US qts, 11.4 Imp. qts)	Ethylene–glycol base

PREPARATION

SST (SPECIAL SERVICE TOOLS)

	09268–41045 Injection Measuring Tool Set	
	(09268–41080) No.6 union	
	(09266–41090) No.7 union	
	(90405–09015) No.1 union	
	09266–45012 EFI Fuel Pressure Gauge	
	09631–22020 Power Steering Hose Nut 14 x 17 mm Wrench Set	Fuel line flare nut
	09842–30050 Wire 'A' EFI Inspection	Cold start injector
	09842–30060 Wire "E" EFI Inspection	Injector
	09843–18020 Diagnosis Check Wire	

RECOMMENDED TOOLS

	09082–00015 TOYOTA Electrical Tester	
	09200–00010 Engine Adjust Kit	
	09258–00030 Hose Plug Set	Plug for the vacuum hose, fuel hose etc.

EG0CH–01

EQUIPMENT

Graduated cylinder	Injector
Carburetor cleaner	Throttle body
Sound scope	Injector
Tachometer	
Torque wrench	
Vacuum gauge	
Soft brush	Throttle body

EMISSION CONTROL SYSTEMS

SYSTEM PURPOSE

E0067–02

System	Abbreviation	Purpose
Positive crankcase ventilation	PCV	Reduces blow–by gas (HC)
Fuel evaporative emission control	EVAP	Reduces evaporative HC
Exhaust gas recirculation	EG R	Reduces NOx
Three–way catalyst	TWC	Reduces HC, CO and NOx
Electronic fuel injection"	SMPI	Regulates all engine conditions for reduction of exhaust emissions.

* For inspection and repair of the SMPI system, refer to SMPI Section.

V00997

PREPARATION

RECOMMENDED TOOLS

E0065–01

 09082–00015 TOYOTA Electrical Tester	

E0065–02

EQUIPMENT

Heater	TVS
Thermometer	TVS
Tachometer	
Torque wrench	
Vacuum gauge	

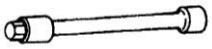
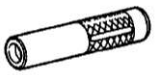
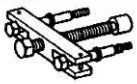
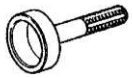
E0066–02

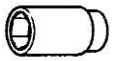
SSM (SPECIAL SERVICE MATERIALS)

08833–00070 Adhesive 1324, THREE BOND 1324 or equivalent	TVS

PREPARATION

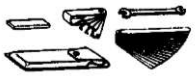
SST (SPECIAL SERVICE TOOLS)

	09043–38100 Hexagon 10 mm Wrench	Cylinder head bolt
	09201–41020 Valve Stem Oil Seal Replacer	
	09201–70010 Valve Guide Bushing Remover & Replacer	
	09202–70010 Valve Spring Compressor	
	09213–54015 Crankshaft Pulley Holding Tool	
	(90119–08216) Bolt	
	09213–31021 Crankshaft Pulley Pulier	
	09222–30010 Connecting Rod Bushing Remover & Replacer	
	09223–50010 Crankshaft Front oil Seal Replacer	Camshaft oil seal
	09223–63010 Crankshaft Rear Oil Seal Replacer	
	09228–06500 Oil Filter Wrench	
	09248–55020 Valve Clearance Adjust Tool Set	
	(09248 –05011) Valve Lifter Press	

	(09248–05021) valve Lifter Stopper	
	09249–63010 Torque Wrench Adaptor	
	09226–10010 Crankshaft Front & Rear Bearing Replacer	
	09301–17010 Clutch Guide Tool	
	09330–00021 Companion Flange Holding Tool	Crankshaft pulley
	09616–30011 Steering Worm Bearing Adjusting Screw Wrench	Oil pump pulley
	09816–30010 Oil Pressure Switch Socket	Knock sensor
	09843–18020 Diagnosis Check Wire	

B06AZ–01

RECOMMENDED TOOLS

	09090–04010 Engine Sling Device	For suspension engine
	09200–00010 Engine Adjust Kit	
	09258–00030 Hose Plug set	Plug for the vacuum hose, fuel hose etc.
	09904–00010 Expander set	

EQUIPMENT

Battery specific gravity gauge

EG0B0–02

Belt tension gauge

Caliper gauge

CO/HC meter Compression gauge	
Connecting rod aligner Cylinder gauge	
Dial indicator Dye penetr–ant	
Engine Tune–up tester Heater	
Magnetic finger Micrometer	
Piston ring compressor Piston ring expander	
Plastigage Precision straight edge	
Soft brush Spring tester	Valve spring
Steel square Thermometer	Valve spring
Torque wrench Valve seat cutter	
Vernier calipers	

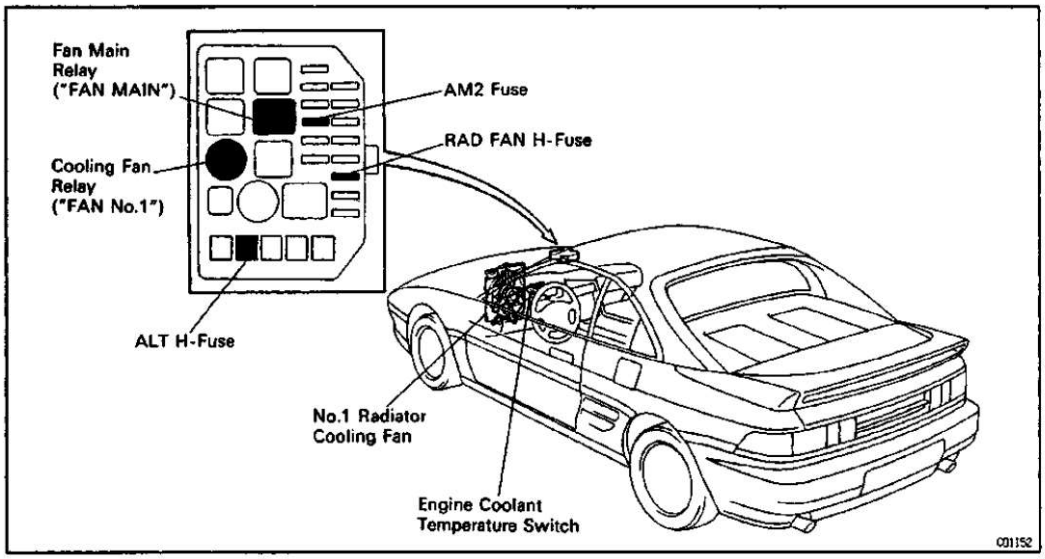
SSM (SERVICE SPECIAL MATERIALS)

EG081–03

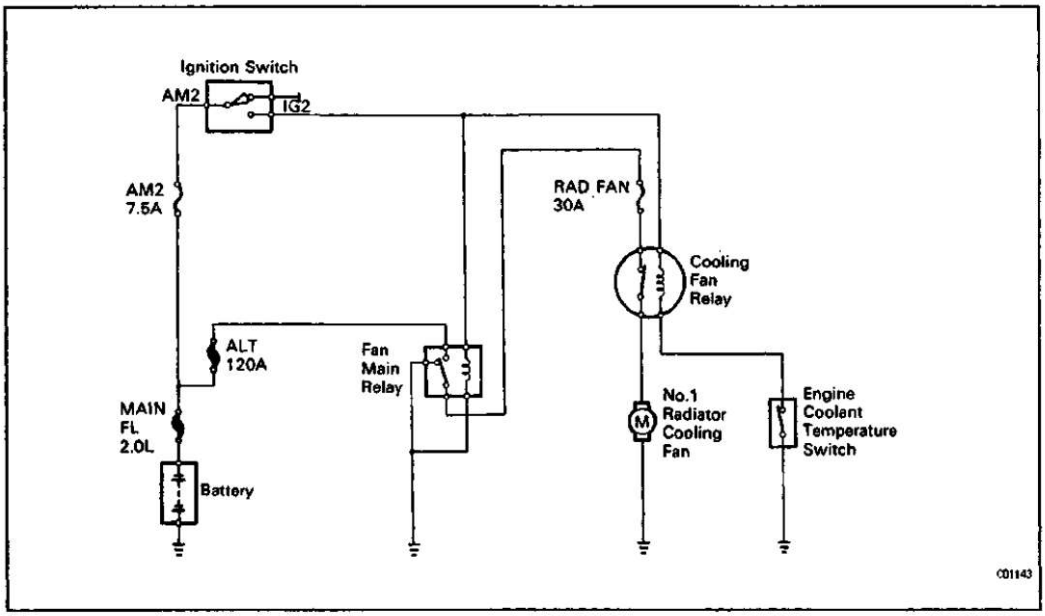
08826–00080 Seal packing or equivalent	Camshaft bearing cap Cylinder head cover Rear oil sear retainer
08833–00070 Adhesive 1324, THREE BOND 1324 or equivalent	Flywheel mounting bolt
08833–00080 Adhesive 1344, THREE BOND 1344, LOCTITE 242 or equivalent	Oil pressure switch

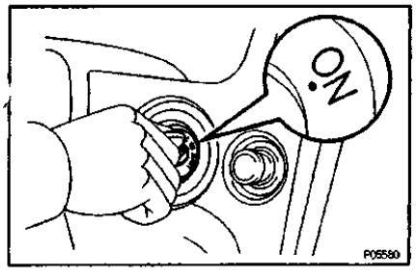
RADIATOR ELECTRIC COOLING FAN (WITHOUT AC)

Part Location



System Circuit

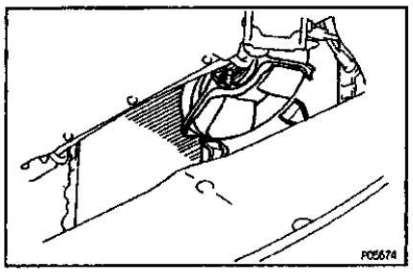




On–Vehicle Inspection

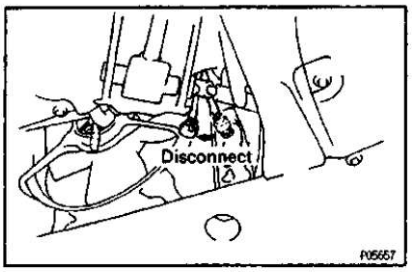
1. CHECK COOLING FAN OPERATION WITH LOW TEMPERATURE (Below 83°C (181°F))

(a) Turn the ignition switch ON.

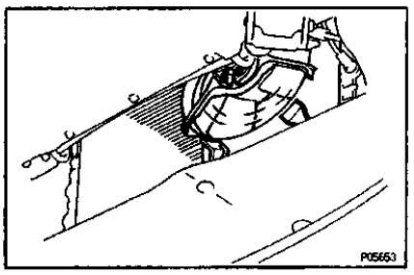


(b) Check that the cooling fan stops.

If not, check the cooling fan relay and engine coolant temperature switch, and check for a separated con–nector or severed wire between the cooling fan relay and engine coolant temperature switch.

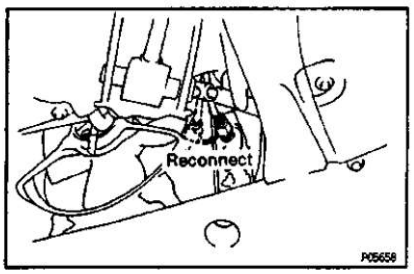


(c) Disconnect the engine coolant temperature switch.

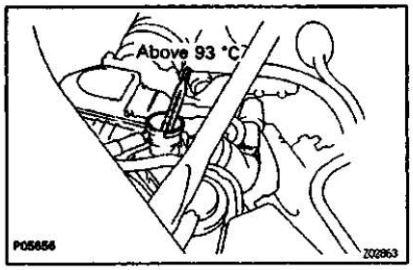


(d) Check that the cooling fan rotates.

If not, check the fan main relay, cooling fan relay, cooling fan, fuses, and check for short circuit between the cooling fan relay and engine coolant temperature switch.

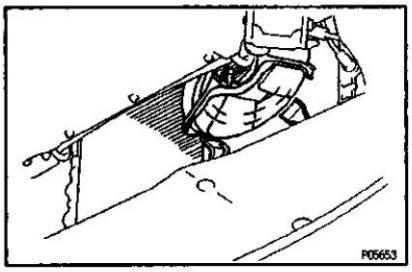


(e) Reconnect the engine coolant temperature sensor.



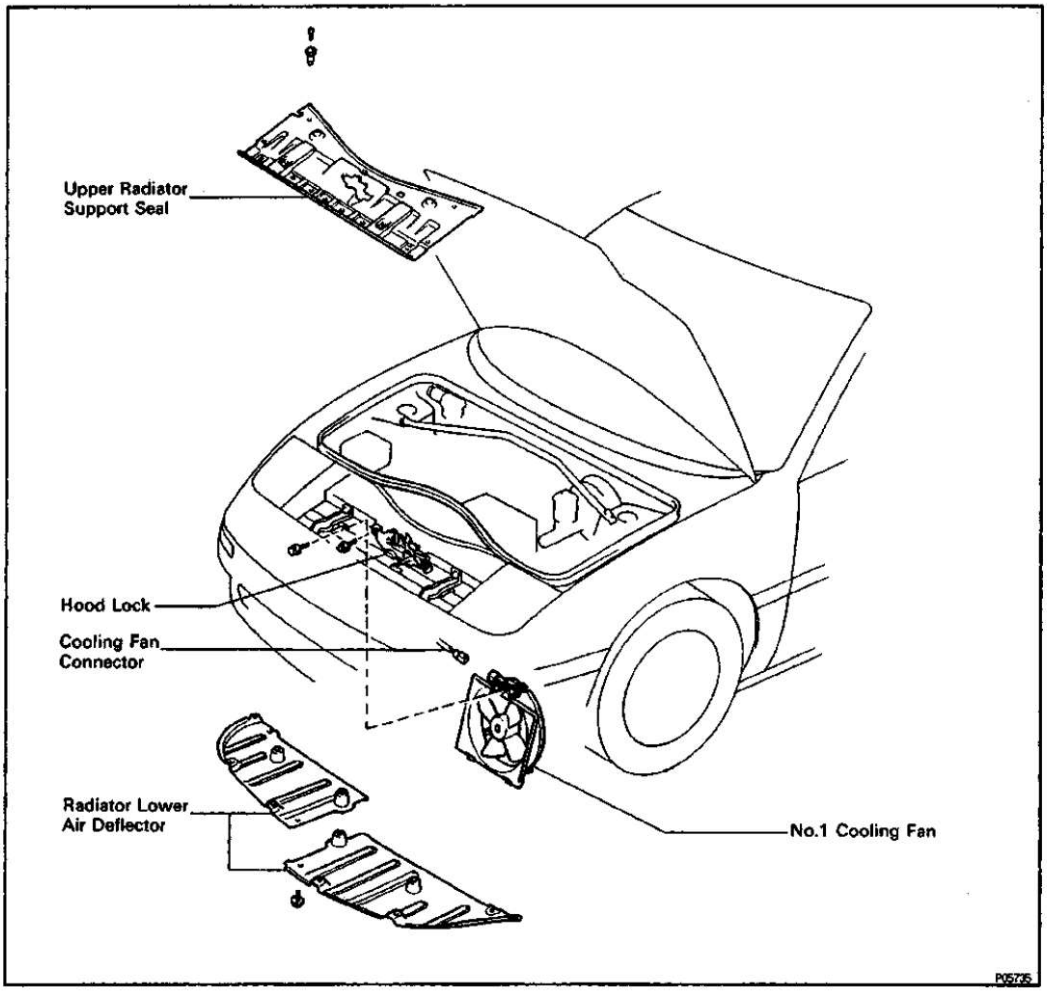
2. CHECK COOLING FAN OPERATION WITH HIGH TEMPERATURE (Above 93˚ C (199˚F))

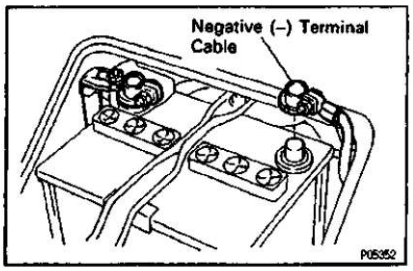
(a) Start the engine, and raise coolant temperature to above 93˚ C (199˚ F).



(b) Check that the cooling fan rotates.
If not, replace the engine coolant temperature switch.

NO.1 Cooling Fan
COMPONENTS FOR REMOVAL AND INSTALLATION



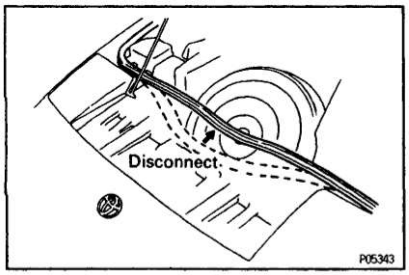


NO.1 COOLING FAN INSPECTION

(See Components for Removal and Installation)

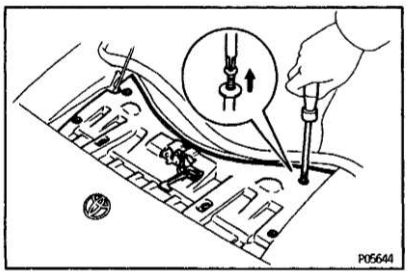
1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY

CAUTION: Turn the ignition switch to 'LOCK'. Disconnect the cable from the negative terminal of the battery. Wait at least 20 seconds before proceeding with work.

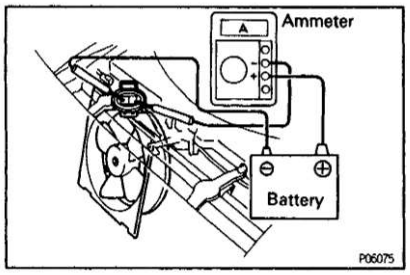


2. REMOVE UPPER RADIATOR SUPPORT SEAL

(a) Disconnect the hood weatherstrip.

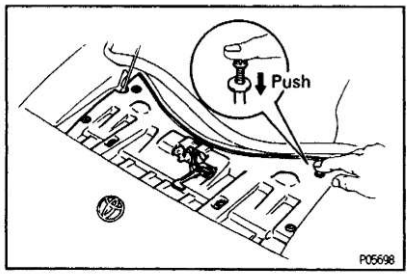


(b) Remove the seven clips.
(c) Remove the two hood lock mounting bolts, and remove the support seal.



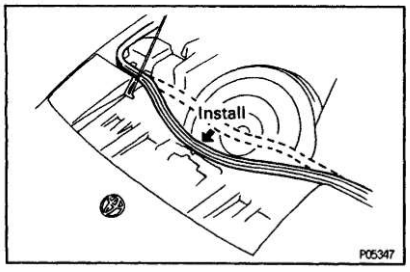
3. INSPECT NO.1 COOLING FAN

(a) Disconnect the tan connector.
(b) Connect battery and ammeter to the cooling fan connector.
(c) Check that the cooling fan rotates smoothly, and check the reading on the ammeter.
Standard amperage:
5.8 – 7.4 A
(d) Reconnect the fan connector.



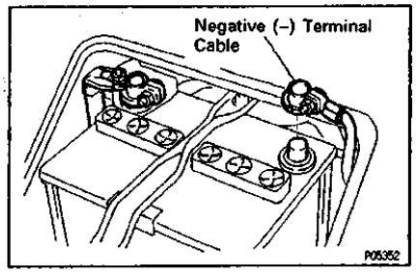
4. REINSTALL UPPER RADIATOR SUPPORT SEAL

(a) Temporarily install the hood lock with the RH side bolt.
(b) Place the support seal in position.
(c) Install the hood lock with the two bolts.



(d) Install the hood weatherstrip.

5. RECONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY



NO.1 COOLING FAN REMOVAL

(See Components for Removal and Installation)

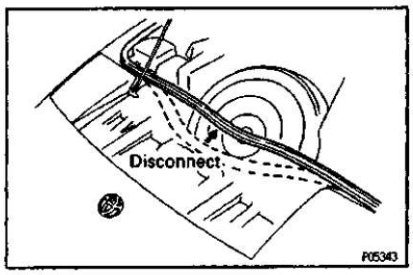
1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY

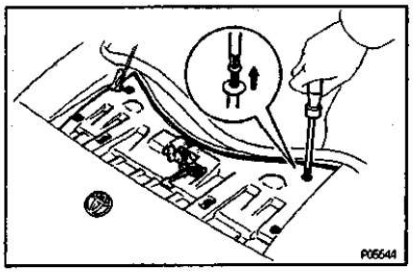
CAUTION: Turn the ignition switch to 'LOCK'. Disconnect the negative terminal from the battery. Wait at least 20 seconds before proceeding with work.

2. REMOVE RADIATOR LOWER AIR DEFLECTOR

3. REMOVE UPPER RADIATOR SUPPORT SEAL

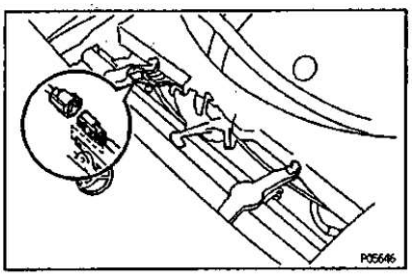
(a) Disconnect the hood weatherstrip.





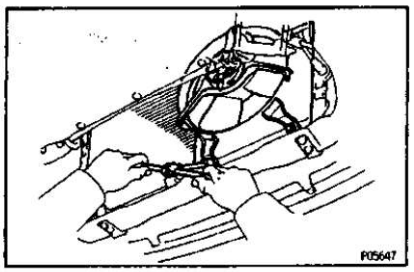
(b) Remove the seven clips.

(c) Remove the two hood lock mounting bolts, and remove the support seal.



4. REMOVE NO.1 COOLING FAN

(a) Disconnect the cooling fan connector.



(b) Remove the three bolts and cooling fan.

COMPONENTS FOR DISASSEMBLY AND ASSEMBLY

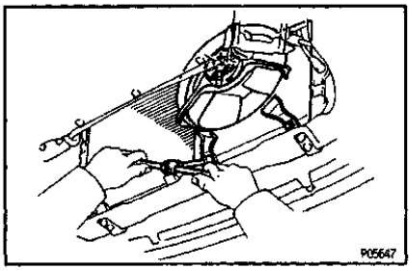
(See Radiator Cooling Fans (w/ A/C))

NO.1 COOLING FAN DISASSEMBLY

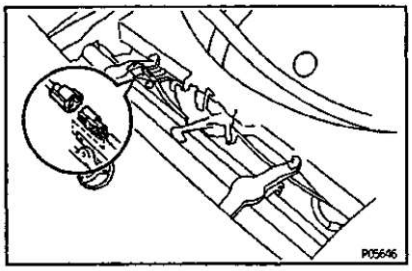
(See Radiator Cooling Fans (w/ A/C))

NO.1 COOLING FAN ASSEMBLY

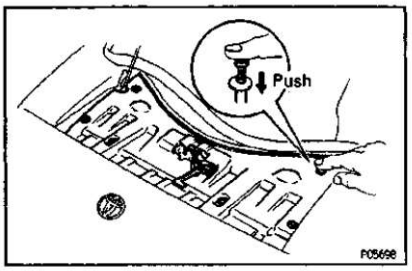
(See Radiator Cooling Fens (w/ A/C))



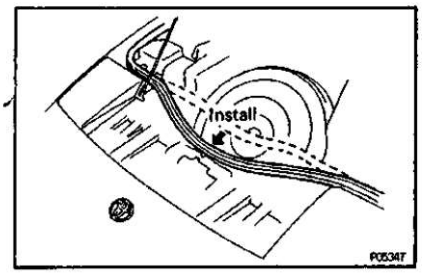
NO.1 COOLING FAN INSTALLATION
(See Components for Removal and Installation)
1. INSTALL NO.1 COOLING FAN
(a) Install the cooling fan with the three bolts.



(b) Connect the cooling fan connector.

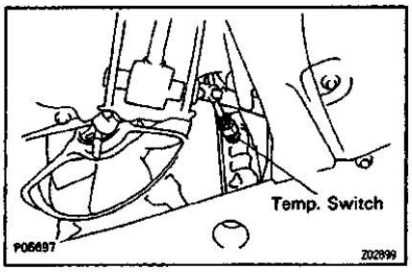


2. INSTALL UPPER RADIATOR SUPPORT SEAL
(a) Temporarily install the hood lock with the RH side bolt.
(b) Place the support seal in position.
(c) Install the hood lock with the two bolts.
(d) Install the seven clips.



(e) Install the hood weatherstrip.

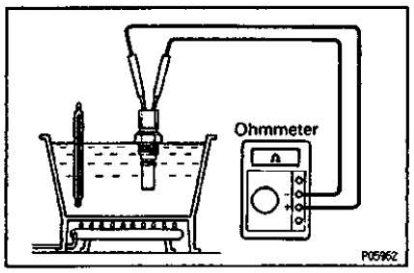
3. INSTALL RADIATOR LOWER AIR DEFLECTOR
4. CONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY



Engine Coolant Temperature Switch

ENGINE COOLANT TEMPERATURE SWITCH INSPECTION

1. DRAIN ENGINE COOLANT
2. REMOVE ENGINE COOLANT TEMPERATURE SWITCH

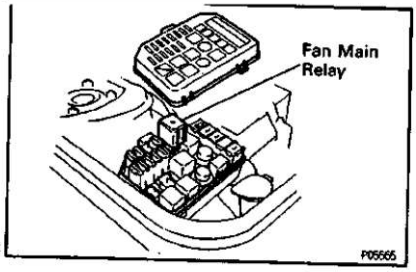


3. INSPECT ENGINE COOLANT TEMPERATURE SWITCH

(a) Using an ohmmeter, check that there is no continuity between the terminals when the coolant temperature is above 93°C (199°F).

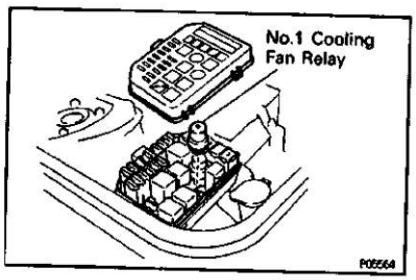
(b) Using an ohmmeter, check that there is continuity between the terminals when the coolant temperature is below 83°C (181°F).
If continuity is not as specified, replace the switch.

4. REINSTALL ENGINE COOLANT TEMPERATURE SWITCH
5. REFILL WITH ENGINE COOLANT



Fan Main Relay ('FAN MAIN")
FAN MAIN RELAY INSPECTION

(See Radiator Cooling Fens (w/ A/C))

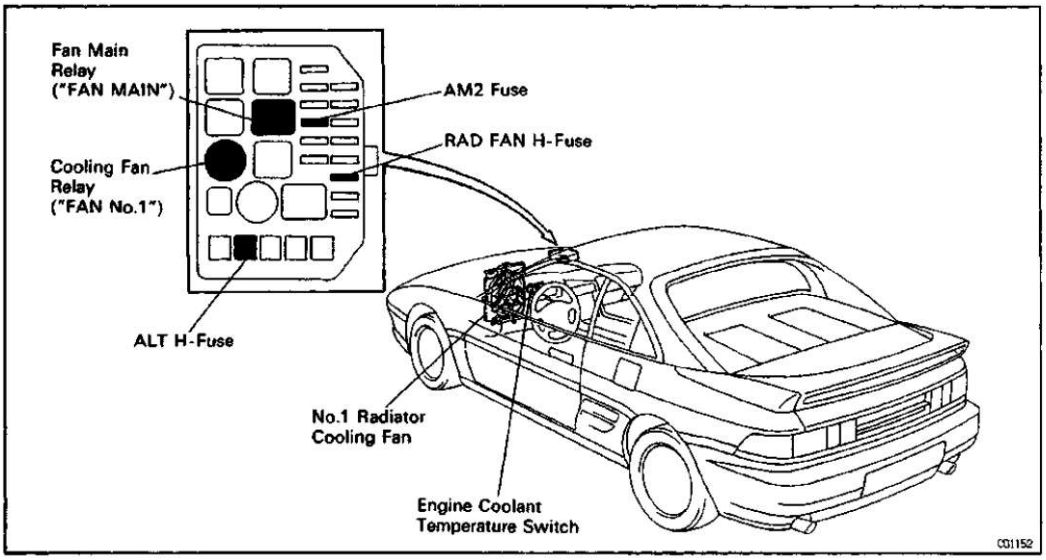


No–1 Cooling Fan Relay ('FAN NO.1")
NO–1 COOLING FAN RELAY INSPECTION

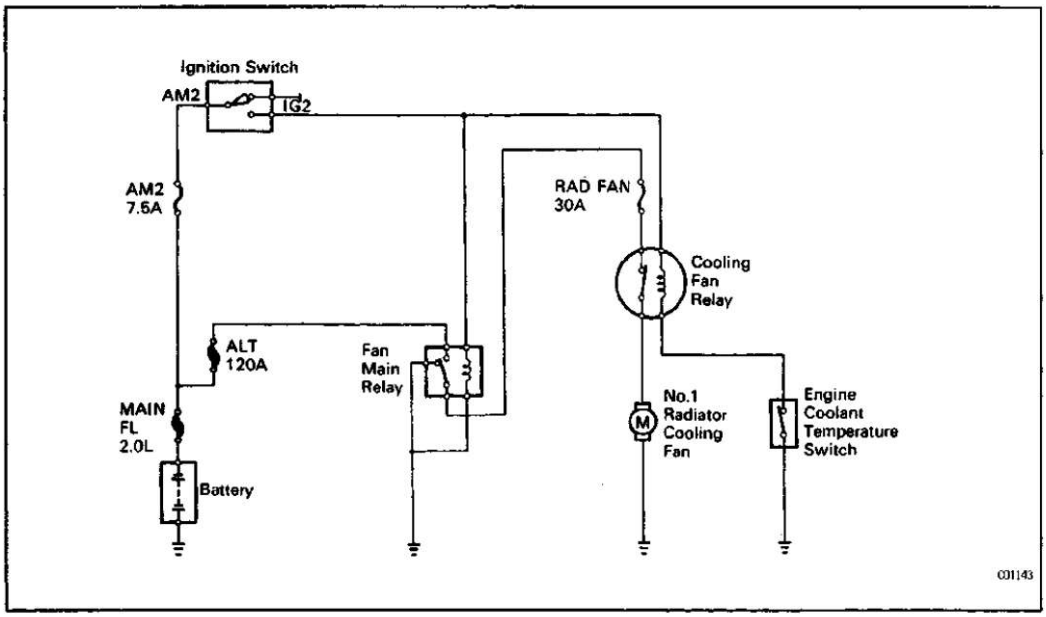
(See Radiator Cooling Fans (w/ A/C))

RADIATOR ELECTRIC COOLING FAN (Without AC)

Part Location



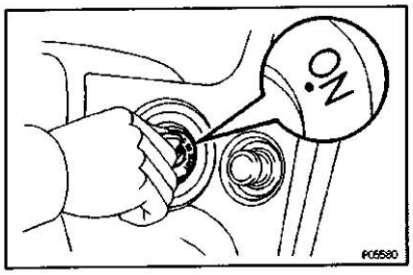
System Circuit



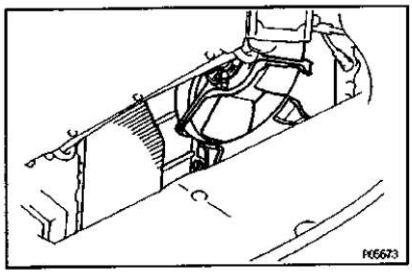
On–Vehicle Inspection

1. CHECK COOLING FAN OPERATION WITH LOW TEMPERATURE (Below 83°C (181°F))

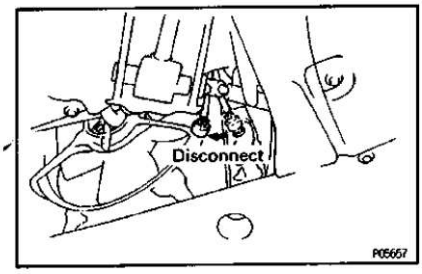
(a) Turn the ignition switch ON.



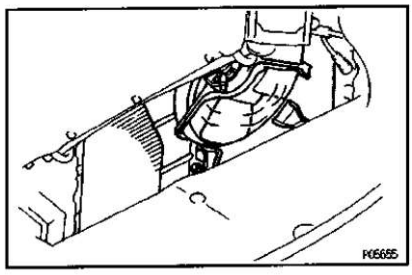
(b) Check that the cooling fan stops.
If not, check the cooling fan relay and engine coolant temperature switch, and check for a separated con–nector or severed wire between the cooling fan relay and engine coolant temperature switch.



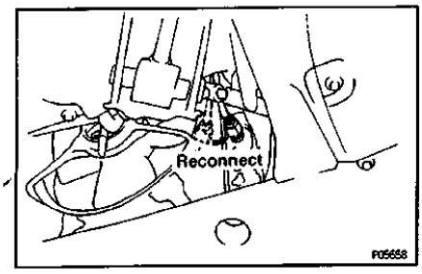
(c) Disconnect the engine coolant temperature switch.

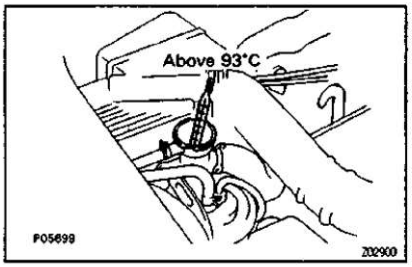


(d) Check that the cooling fan rotates.
If not, check the fan main relay, cooling fan relay, cooling fan, fuses, and check for short circuit between the cooling fan relay and engine coolant temperature switch.



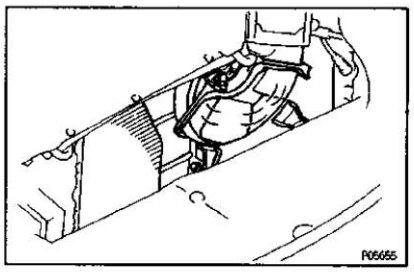
(e) Reconnect the engine coolant temperature switch.





2. CHECK COOLING FAN OPERATION WITH HIGH TEMPERATURE (Above 93˚C (199˚F))

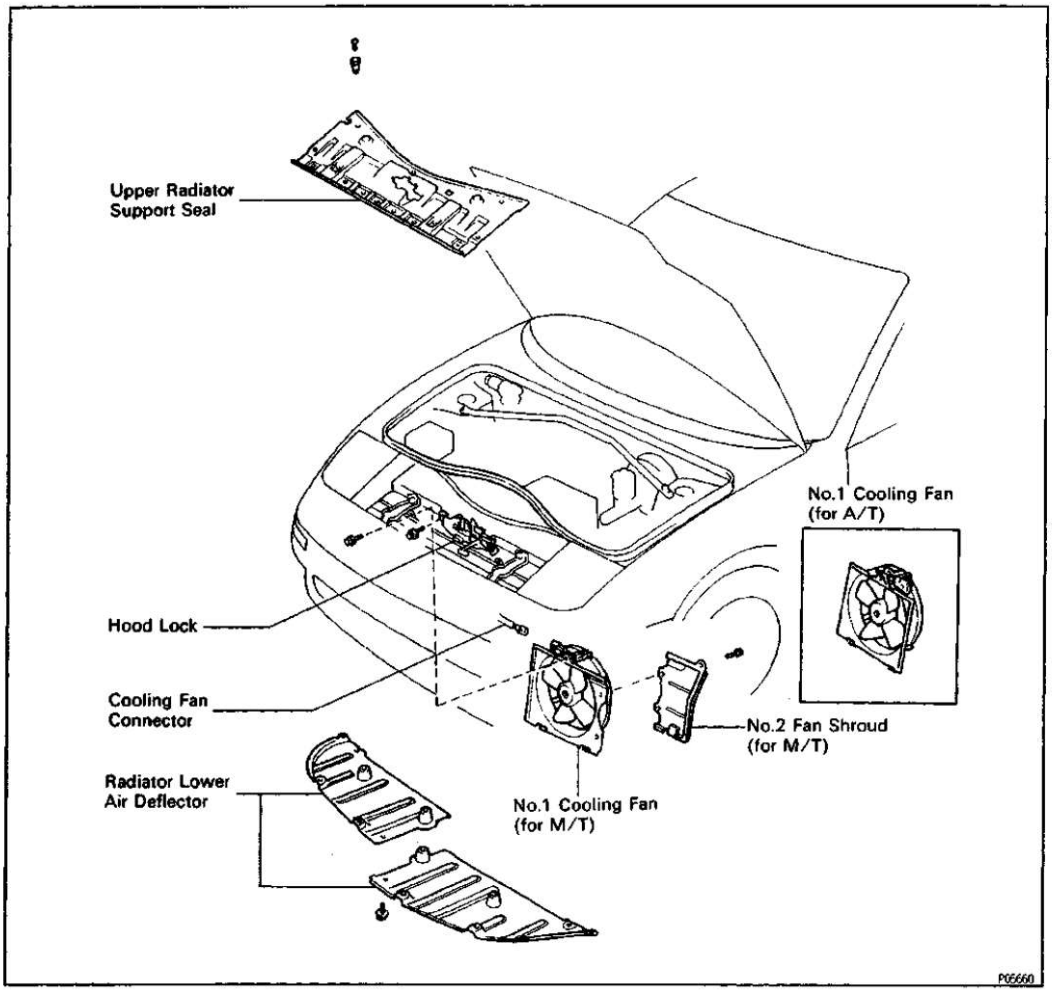
(a) Start the engine, and raise coolant temperature to above 93˚ C (199˚ F).



(b) Check that the cooling fan rotates.
If not, replace the engine coolant temperature switch.

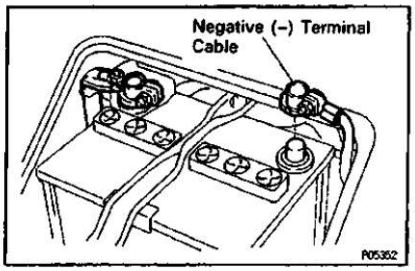
EG149–01

NO.1 Cooling Fan
COMPONENTS FOR REMOVAL AND INSTALLATION



EG14A–01

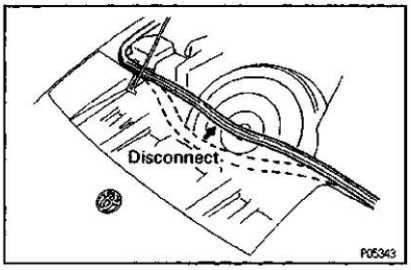
NO.1 COOLING FAN INSPECTION



(See Components for Removal and Installation)

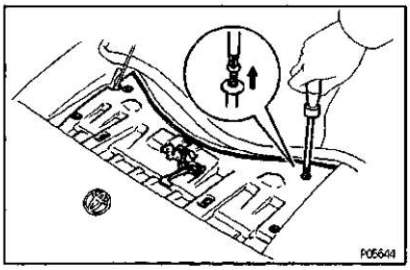
1. DISCONNECT CABE FROM NEGATIVE TERMINAL OF BATTERY

   CAUTION: Turn the ignition switch to "LOCK". Disconnect the negative terminal from the battery. Wait at least 20 seconds before proceeding with work.



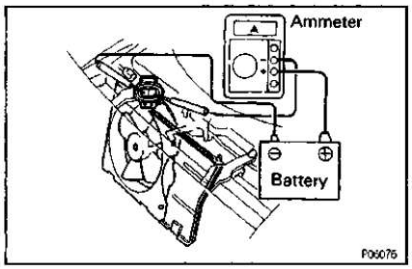
2. REMOVE UPPER RADIATOR SUPPORT SEAL

(a) Disconnect the hood weatherstrip.



(b) Remove the clips.

(c) Remove the two hood lock mounting bolts, and remove the support seal.



3. INSPECT NO.1 COOLING FAN

(a) Disconnect the fan connector.

(b) Connect battery and ammeter to the cooling fan connector.

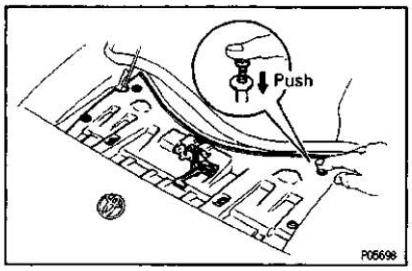
(c) Check that the cooling fan rotates smoothly, and check the reading on the ammeter.

Standard amperage:

5.8 – 7.4 A for M/T

8.8 – 10.8 A for A/T

(d) Reconnect the fan connector.

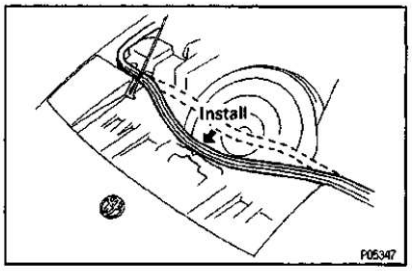


4. REINSTALL UPPER RADIATOR SUPPORT SEAL

(a) Temporarily install the hood lock with the RH side bolt.

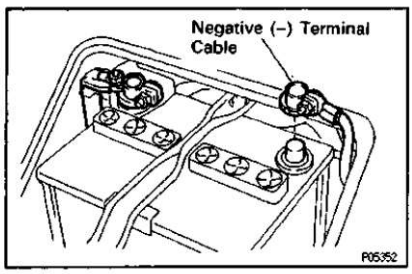
(b) Place the support seal in position.

(c) Install the hood lock with the two bolts.



(d) Install the hood weatherstrip.

5. RECONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY



NO.1 COOLING FAN REMOVAL

(See Components for Removal and Installation)

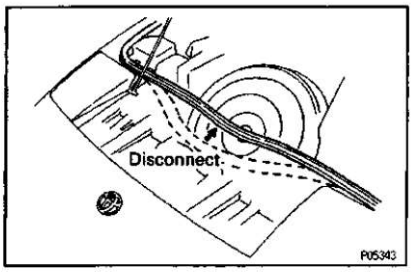
1. DISCONNECT CABE FROM NEGATIVE TERMINAL OF BATTERY

CAUTION: Turn the ignition switch to 'LOCK'. Disconnect the negative terminal from the battery. Wait at least 20 seconds before proceeding with work.

2. REMOVE RADIATOR LOWER AIR DEFLECTOR

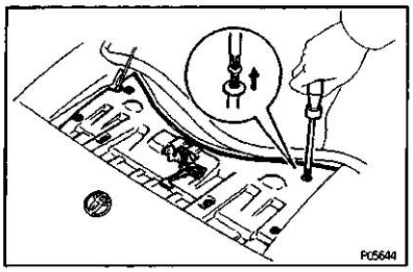
3. REMOVE UPPER RADIATOR SUPPORT SEAL

(a) Disconnect the hood weatherstrip.



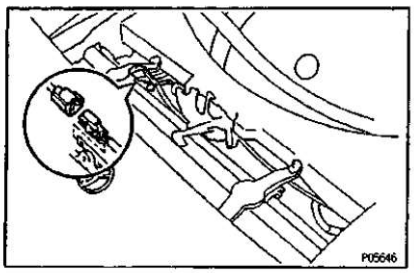
(b) Remove the clips.

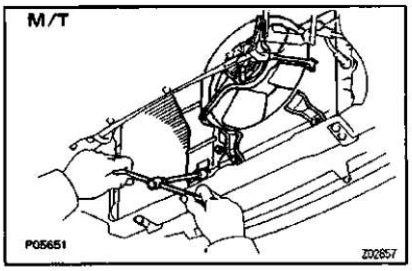
(c) Remove the two hood lock mounting bolts, and remove the support seal.



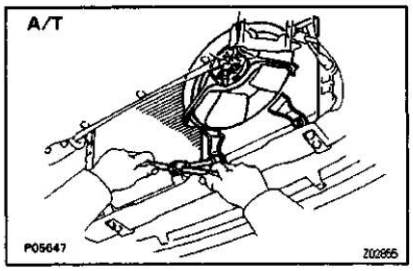
4. REMOVE NO.1 COOLING FAN

(a) Disconnect the cooling fan connector.





(b) (M/T)
Remove the five bolts and No.2 fan shroud. Remove the three bolts and No.1 cooling fan.



(c) (A/T)
Remove the three bolts and cooling fan.

COMPONENTS FOR DISASSEMBLY AND ASSEMBLY

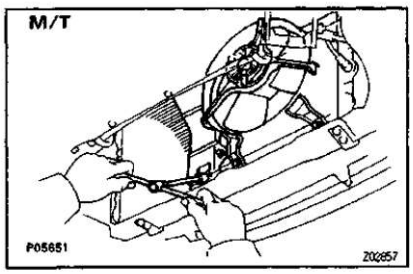
(See Radiator Cooling Fens (w/ A/C))

NO.1 COOLING FAN DISASSEMBLY

(See Radiator Cooling Fans (w/ A/C))

NO.1 COOLING FAN ASSEMBLY

(See Radiator Cooling Fans (w/ A/C))

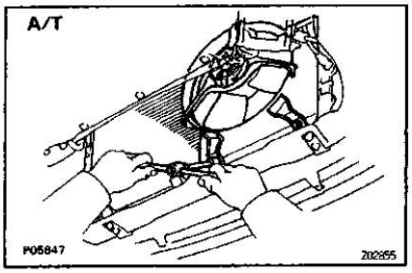


NO.1 COOLING FAN INSTALLATION

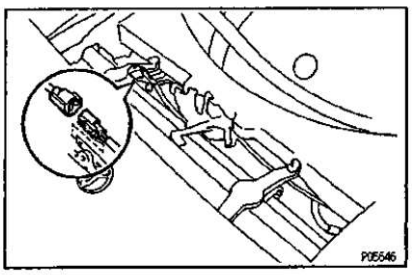
(See Components for Removal and Installation)

1. INSTALL NO.1 COOLING FAN

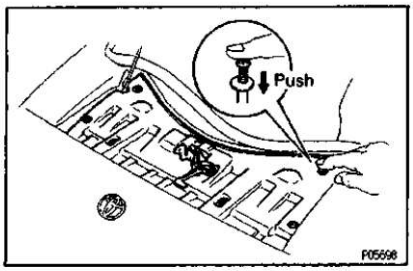
(a) (M /T)
Install the No. 1 cooling fan with the three bolts. Install the No.2 fan shroud with the five bolts.



(b) (A/T)
Install the cooling fan with the three bolts.

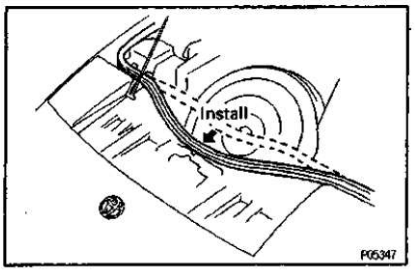


(c) Connect the cooling fan connector.



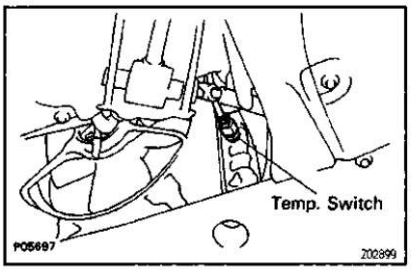
2. INSTALL UPPER RADIATOR SUPPORT SEAL

(a) Temporarily install the hood lock with the RH side bolt.
(b) Place the support seal in position.
(c) Install the hood lock with the two bolts.



(d) Install the hood weatherstrip.

3. INSTALL RADIATOR LOWER AIR DEFLECTOR
4. CONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY

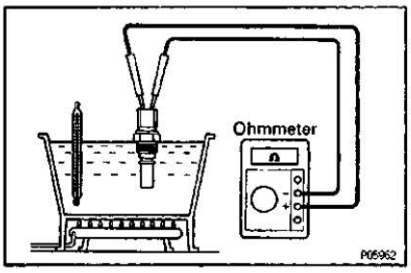


Engine Coolant Temperature Switch

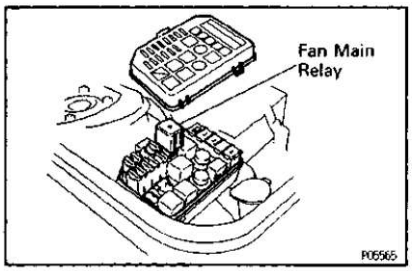
EG14J–01

ENGINE COOLANT TEMPERATURE SWITCH INSPECTION

1. DRAIN ENGINE COOLANT
2. REMOVE ENGINE COOLANT TEMPERATURE SWITCH



3. INSPECT ENGINE COOLANT TEMPERATURE SWITCH
   (a) Using an ohmmeter, check that there is no continuity between the terminals when the coolant temperature is above 93°C (199°F).
   (b) Using an ohmmeter, check that there is continuity between the terminals when the coolant temperature is below 83°C (181°F).
   If continuity is not as specified, replace the switch.
4. REINSTALL ENGINE COOLANT TEMPERATURE SWITCH
5. REFILL WITH ENGINE COOLANT

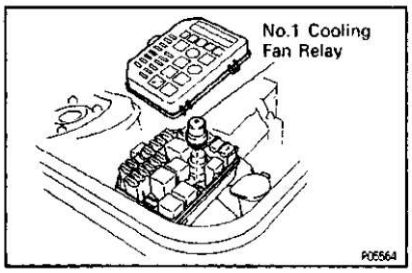


Fan Main Relay (”FAN MAIN”)

EG14K–01

FAN MAIN RELAY INSPECTION

(See Radiator Cooling Fans (w/ A/C))



No.1 Cooling Fan Relay (”FAN N0.1”)

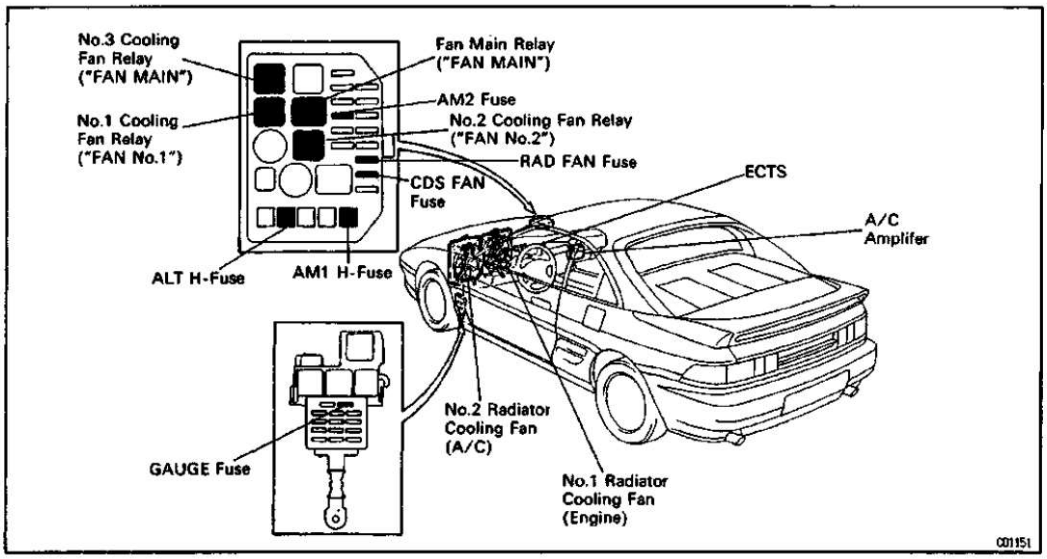
EG14L–01

No.7 COOLING FAN RELAY INSPECTION

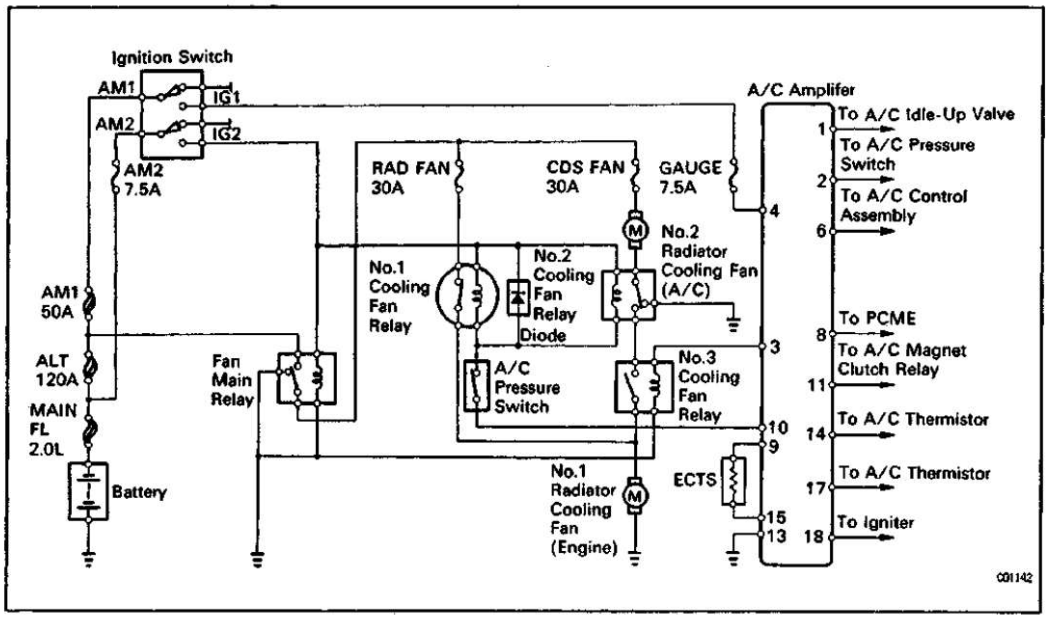
(See Radiator Cooling Fans (w/ A/C))

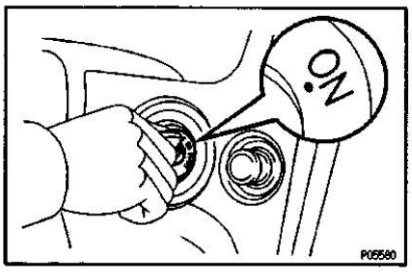
RADIATOR ELECTRIC COOLING FAN (WITH AC)

Parts Location



System Circuit

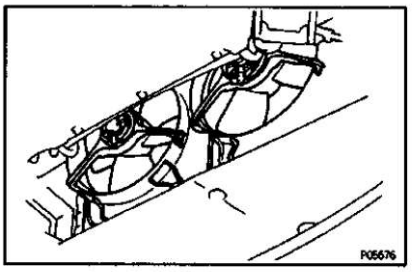




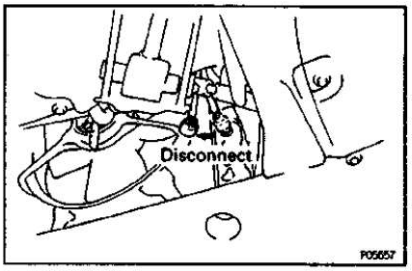
On–Vehicle Inspection

1. INSPECT COOLING FAN OPERATION AT LOW TEMPERATURE (Below 85°C (185°F))

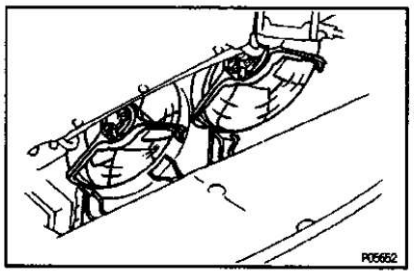
(a) Turn the ignition switch ON.



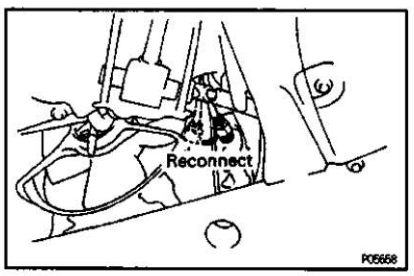
(b) Check that the cooling fans stops.
If not, check the cooling fan relays and ECTS, and check for a separated connector or severed wire between the cooling fan relay and ECTS.



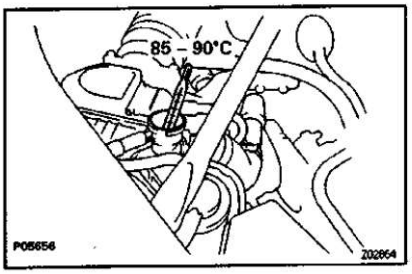
(c) Disconnect the ECTS connector.



(d) Check that the cooling fans rotates.
If not, check the fuses, fan main relay, cooling fan relays, A/C amplifier, cooling fan, and check for a short circuit between the cooling fan relay and ECTS.

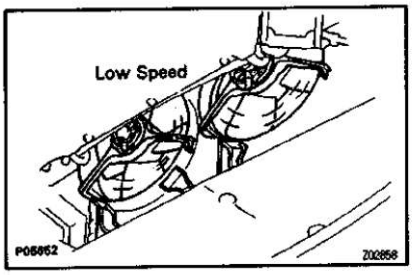


(e) Reconnect the ECTS connector.

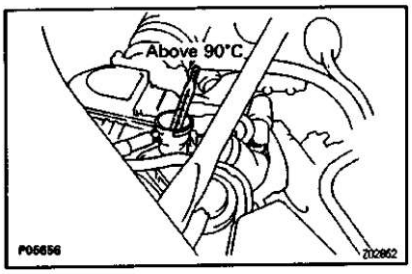


2. INSPECT COOLING FAN OPERATION AT HIGH TEMPERATURE (85 – 90˚C (185 – 194˚F))

(a) Start the engine, and raise coolant temperature to 85 – 90˚C (185 – 194˚ F).

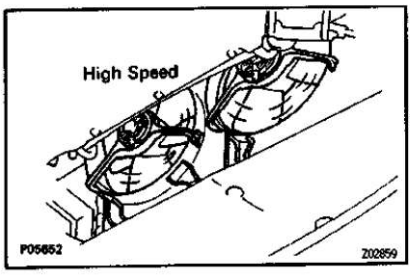


(b) Check that the cooling fans rotates at low speed. If not, replace the ECTS.



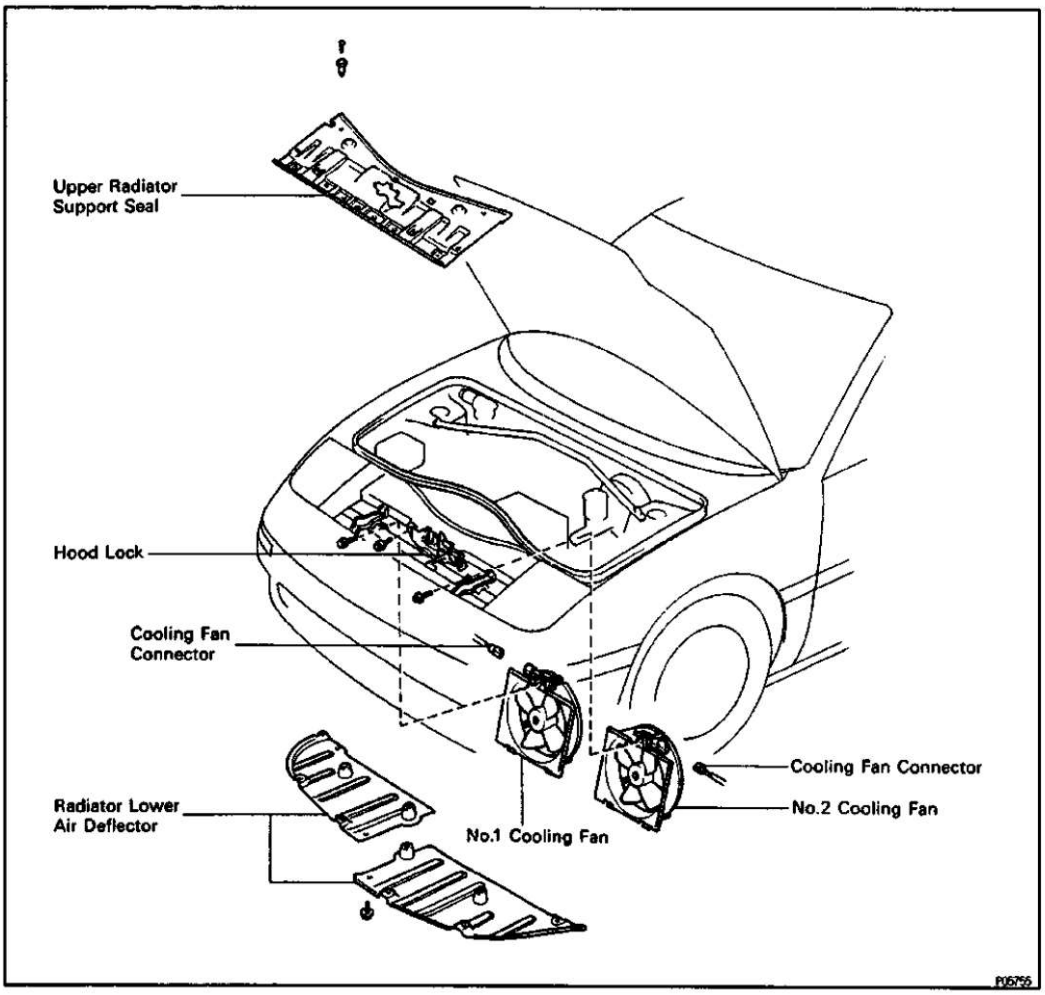
3. INSPECT COOLING FAN OPERATION AT HIGH TEMPERATURE (Above 90˚C (194˚F))

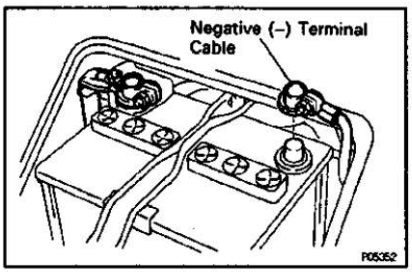
(a) Start the engine, and raise coolant temperature to above 90˚ C (194˚ F).



(b) Check that the cooling fans rotates at high speed. If not, replace the ECTS.

Cooling Fans
COMPONENTS FOR REMOVAL AND INSTALLATION



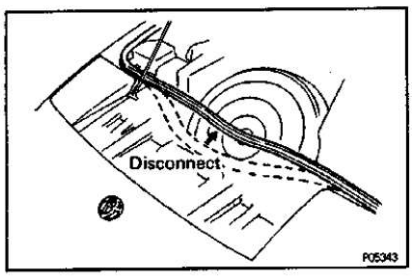


COOLING FANS INSPECTION

(See Components for Removal and Installation)

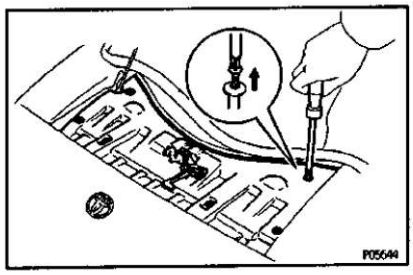
1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY

CAUTION: Turn the ignition switch to 'LOCK'. Disconnect the negative terminal from the battery. Wait at least 20 seconds before proceeding with work.

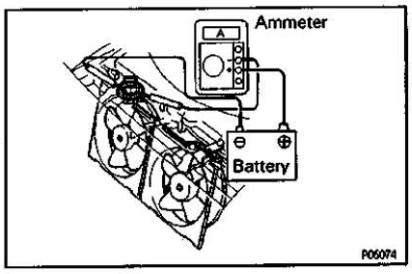


2. REMOVE UPPER RADIATOR SUPPORT SEAL

(a) Disconnect the hood weatherstrip.

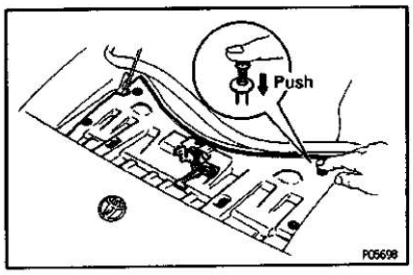


(b) Remove the seven clips.
(c) Remove the two hood lock mounting bolts, and remove the support seal.



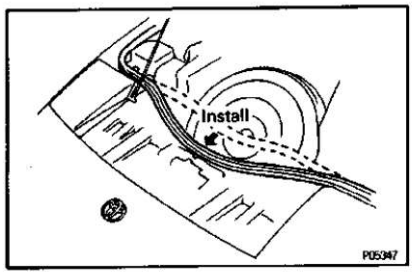
3. INSPECT COOLING FANS

(a) Disconnect the two cooling fan connectors.
(b) Connect battery and ammeter to the cooling fan connector.
(c) Check that the cooling fan rotates smoothly, and check the reading on the ammeter.
Standard amperage:
5.8 – 7.4 A
(d) Reconnect the two cooling fan connectors.



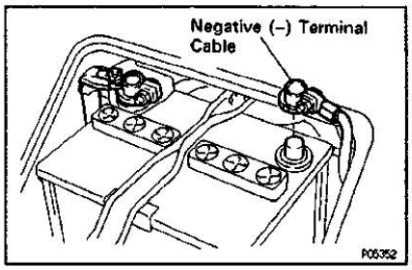
4. REINSTALL UPPER RADIATOR SUPPORT SEAL

(a) Temporarily install the hood lock with the RH side bolt.
(b) Place the support seal in position.
(c) Install the hood lock with the two bolts.
(d) Install the seven clips.



(e) Install the hood weatherstrip.

5. RECONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY



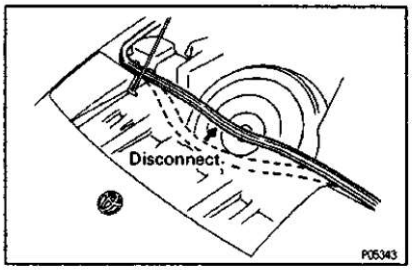
COOLING FANS REMOVAL

(See Components for Removal and Installation)

1. DISCONNECT CAGE FROM NEGATIVE TERMINAL OF BATTERY

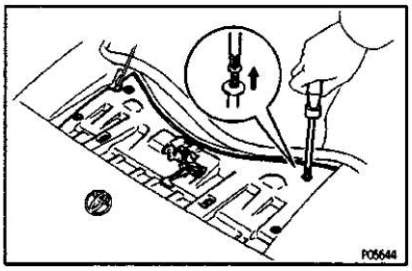
CAUTION: Turn the ignition switch to "LOCK". Disconnect the negative terminal from the battery. Wait at least 20 seconds before proceeding with work.

2. REMOVE RADIATOR LOWER AIR DEFLECTOR



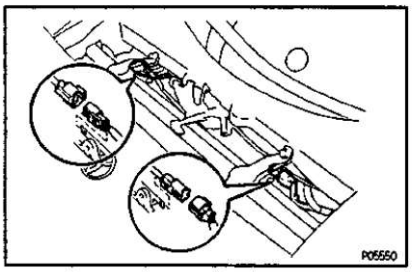
3. REMOVE UPPER RADIATOR SUPPORT SEAL

(a) Disconnect the hood weatherstrip.



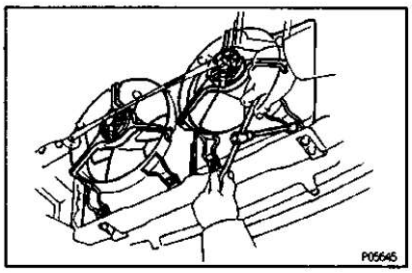
(b) Remove the seven clips.

(c) Remove the two hood lock mounting bolts, and remove the support seal.



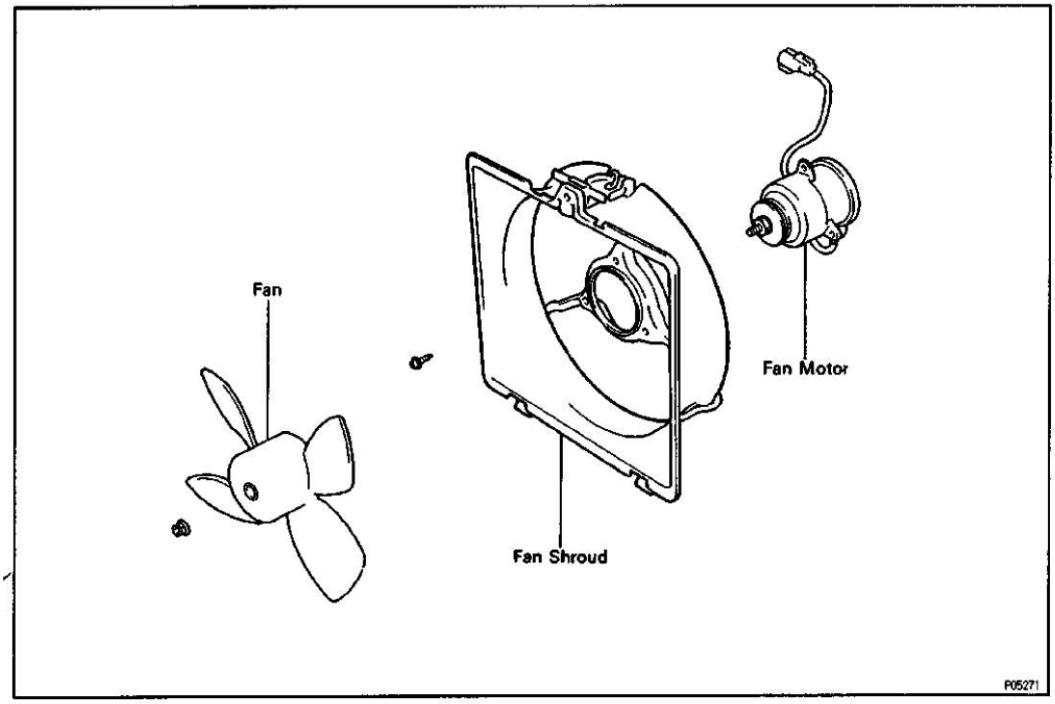
4. REMOVE COOLING FANS

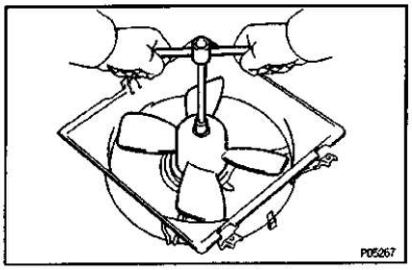
(a) Disconnect the two cooling fan connectors.



(b) Remove the three bolts and cooling fan. Remove the two cooling fans.

COMPONENTS FOR DISASSEMBLY AND ASSEMBLY



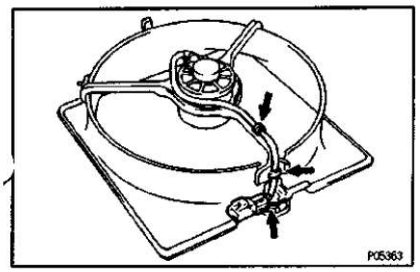


COOLING FAN DISASSEMBLY

(See Components for Disassembly and Assembly)

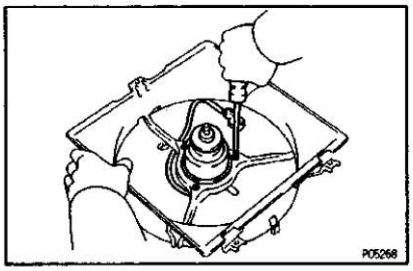
1. REMOVE FAN

Remove the nut and fan.

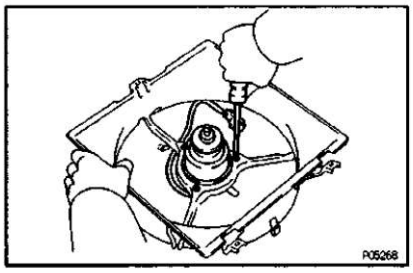


2. REMOVE FAN MOTOR

(a) Disconnect the wire and connector from the fan shroud.



(b) Remove the three screws and fan motor.

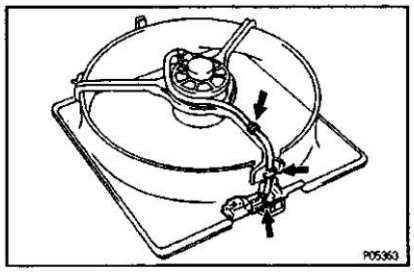


COOLING FAN ASSEMBLY

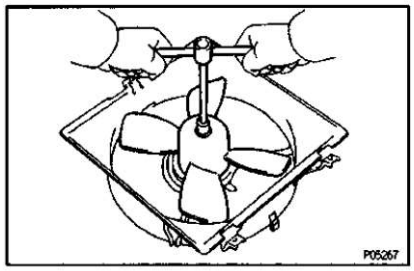
(See Components for Disassembly and Assembly)

1. INSTALL FAN MOTOR

(a) Install the fan motor with the nut.

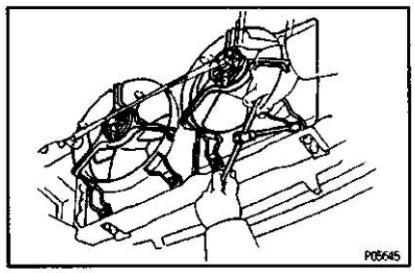


(b) Install the wire and connector to the fan shroud.



2. INSTALL FAN

Install the fan with the nut.

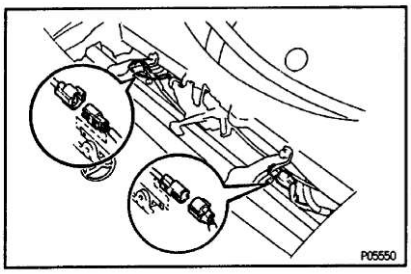


COOLING FANS INSTALLATION

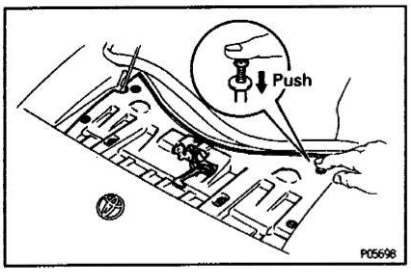
(See Components for Disassembly and Assembly)

1. INSTALL COOLING FANS

(a) Install the cooling fan with the three bolts. Install the two cooling fans.

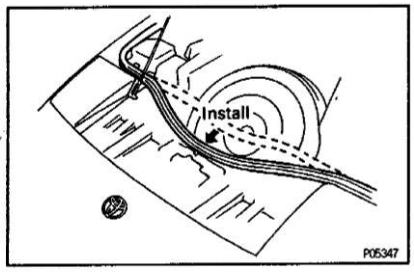


(b) Connect the two cooling fan connectors.



2. INSTALL UPPER RADIATOR SUPPORT SEAL

(a) Temporarily install the hood lock with the RH side bolt.
(b) Place the support seal in position.
(c) Install the hood lock with the two bolts.
(d) Install the seven clips.

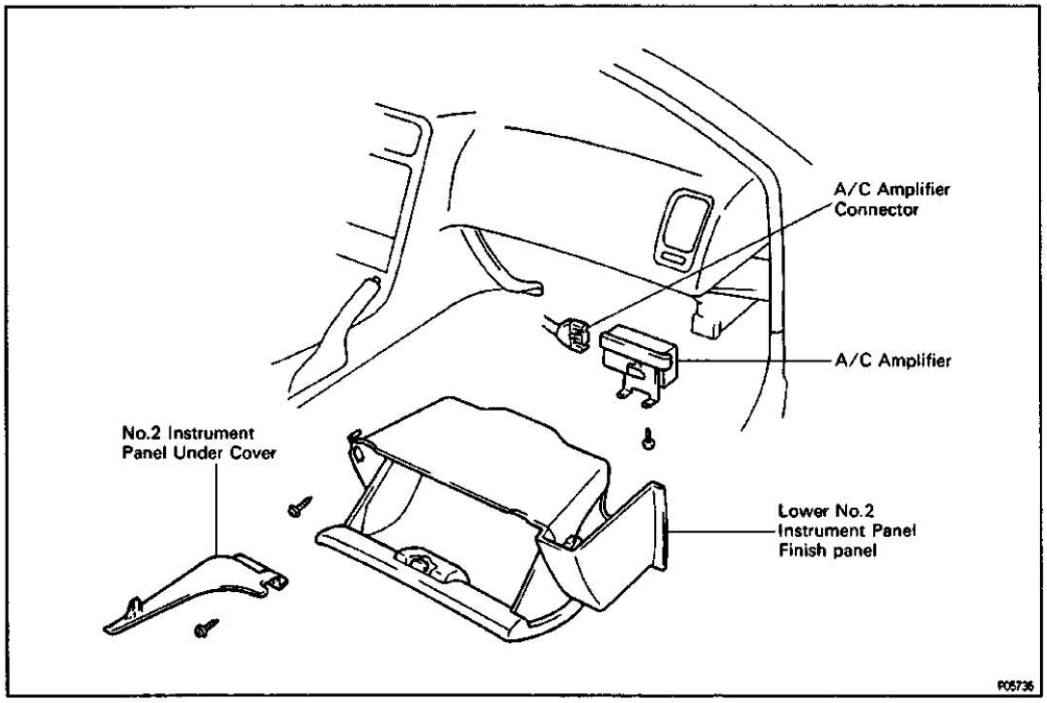


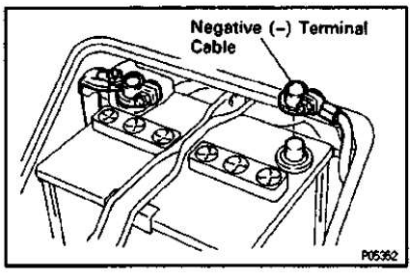
(e) Install the hood weatherstrip.

3. INSTALL RADIATOR LOWER AIR DEFLECTOR

4. CONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY

A/C Amplifier
COMPONENTS FOR REMOVAL AND INSTALLATION



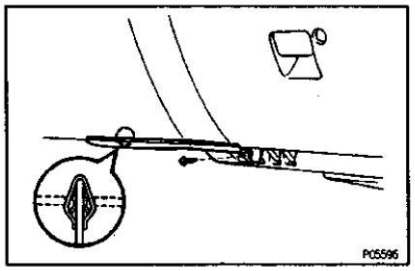


A/C AMPLIFIER INSPECTION

(See Components for Removal and Installation)

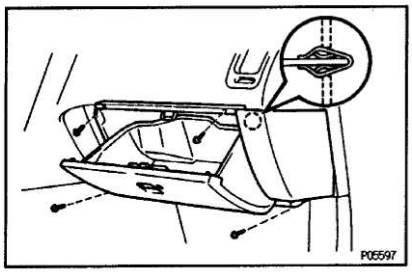
1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY

CAUTION: Turn the ignition switch to 'LOCK'. Disconnect the negative terminal from the battery. Wait at least 20 seconds before proceeding with work.



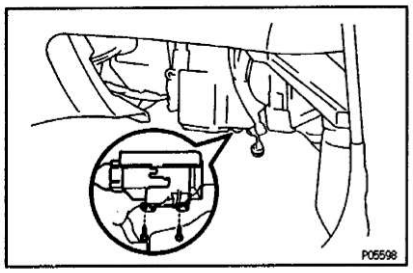
2. REMOVE NO.2 INSTRUMENT PANEL UNDER COVER

(a) Remove the screw.
(b) Remove the under cover by pulling it.



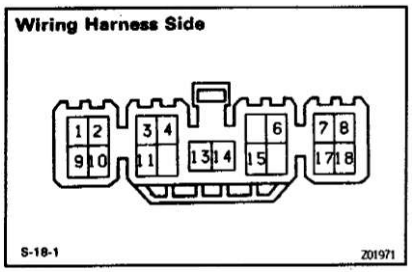
3. REMOVE LOWER NO.2 INSTRUMENT FINISH PANEL

(a) Remove the four screws.
(b) Remove the finish panel by pulling it.



4. INSPECT A/C AMPLIFIER

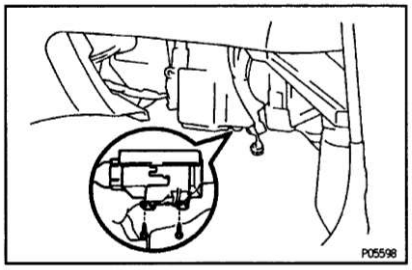
(a) Remove the two screw, and disconnect the A/C amplifier from the cooler unit.
(b) Disconnect the A/C amplifier connector.



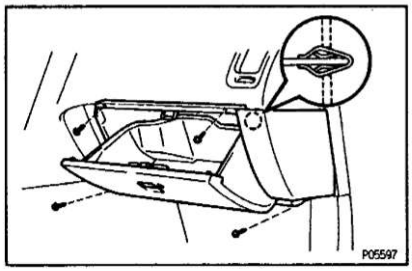
(c) Check the connector on the wiring harness side as shown in the chart.

Check for	Tester connection	Condition		Specified valve
Continuity	3 – Ground	–		Continuity
Voltage	4 – Ground	Ignition switch ON		Battery voltage
Resistance	9–15	Coolant temp.	85°C (185°F)	Approx. 1.35 kΩ
			90°C (194°F)	Approx. 1.19 kΩ
			95°C (203°F)	Approx. 1.05 kΩ
Voltage	10 – Ground	Ignition switch ON		Battery voltage
Continuity	13 – Ground	–		Continuity

V00873

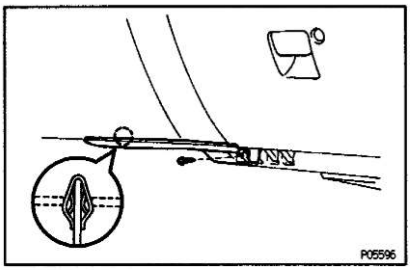


(d) Reconnect the A/C amplifier connector.
(e) Reinstall the A/C amplifier with the two screws.



5. REINSTALL LOWER NO.2 INSTRUMENT FINISH PANEL

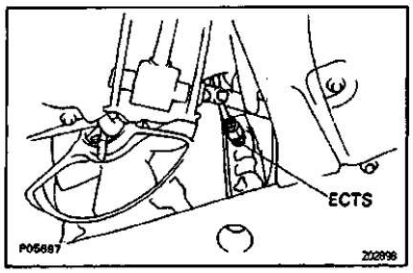
(a) Attach the finish panel to the instrument panel with the clips.
(b) Install the four screws.



6. REINSTALL NO.2 INSTRUMENT PANEL UNDER COVER

(a) Attach the finish panel to the instrument panel with the clips.
(b) Install the screw.

7. RECONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY



Engine Coolant Temperature Sensor (ECTS)

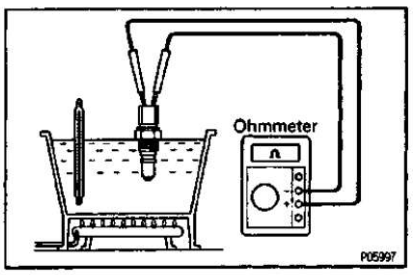
ECTS INSPECTION

1. DRAIN ENGINE COOLANT FROM RADIATOR

2. REMOVE ECTS

(a) Disconnect the sensor connector.

(b) Remove the ECTS.



3. INSPECT ECTS

Using an ohmmeter, measure the resistance between the terminals.

Resistance:

Approx. 1.35 kΩ at 85° C (185° F)

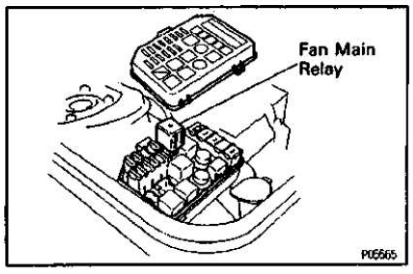
Approx. 1.19 kΩ at 90° C (194° F)

Approx. 1.05 kΩ at 95°C (203°F)

If resistance is not as specified, replace the ECTS.

4. REINSTALL ECTS

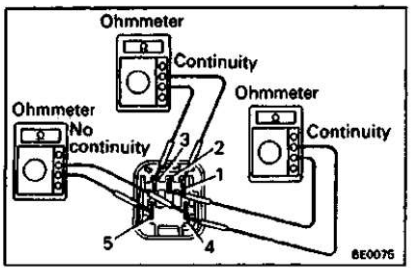
5. REFILL WITH ENGINE COOLANT



Fan Main Relay ("FAN MAIN')

FAN MAIN RELAY INSPECTION

1. REMOVE FAN MAIN RELAY



2. INSPECT FAN MAIN RELAY

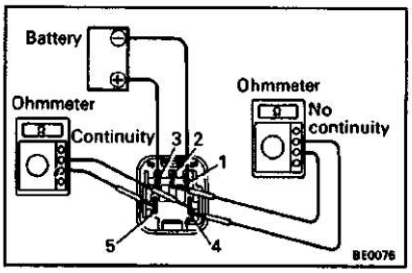
A. Inspect relay continuity

(a) Using an ohmmeter, check that there is continuity between terminals 1 and 3.

(b) Check that there is continuity between terminals 2 and 4.

(c) Check that there is no continuity between terminals 4 and 5.

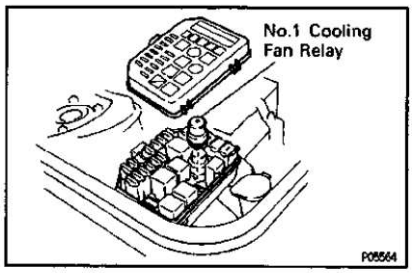
If continuity is not as specified, replace the relay.



B. Inspect relay operation

(a) Apply battery voltage across terminals 1 and 3.
(b) Using an ohmmeter, check that there is no continuity between terminals 2 and 4.
(c) Check that there is continuity between terminals 4 and 5.
If operation is not as specified, replace the relay.

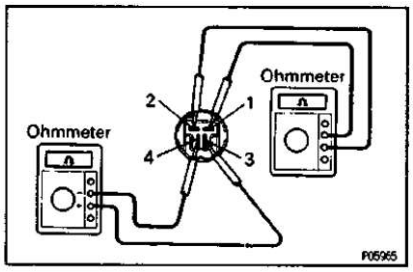
3. REINSTALL FAN MAIN RELAY



No.1 Cooling Fan Relay (”FAN NO.1”)

NO.1 COOLING FAN RELAY INSPECTION

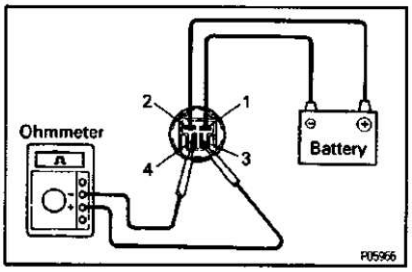
7. REMOVE N0.7 COOLING FAN RELAY



2. INSPECT NO.1 COOLING FAN RELAY

A. Inspect relay continuity

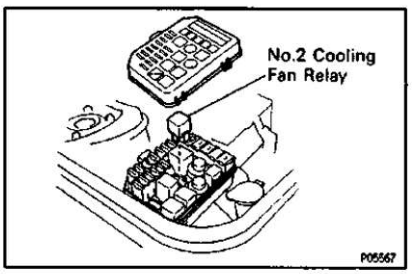
(a) Using an ohmmeter, check that there is continuity between terminals 1 and 2.
(b) Check that there is continuity between terminals 3 and 4.
If continuity is not as specified, replace the relay.



B. Inspect relay operation

(a) Apply battery voltage across terminals 1 and 2.
(b) Using an ohmmeter, check that there is no continuity between terminals 3 and 4.
If operation is not as specified, replace the relay.

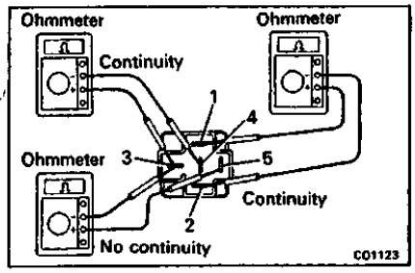
3. REINSTALL NO.1 COOLING FAN RELAY



No.2 Cooling Fan Relay (’FAN NO.2’)

NO.2 COOLING FAN RELAY INSPECTION

1. REMOVE NO.2 COOLING FAN RELAY



2. INSPECT NO.2 COOLING FAN RELAY

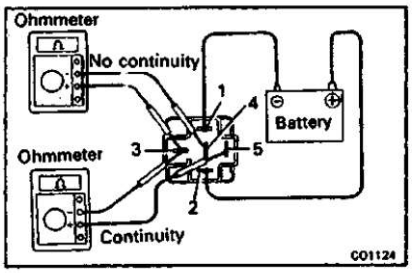
A. Inspect relay continuity

(a) Using an ohmmeter, check that there is continuity between terminals 1 and 2.

(b) Check that there is continuity between terminals 3 and 4.

(c) Check that there is no continuity between terminals 3 and 5.

If continuity is not as specified, replace the relay.



B. Inspect relay operation

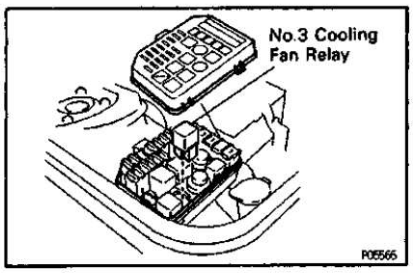
(a) Apply battery voltage across terminals 1 and 2.

(b) Using an ohmmeter, check that there is no continuity between terminals 3 and 4.

(c) Using an ohmmeter, check that there is continuity between terminals 3 and 5.

If operation is not as specified, replace the relay.

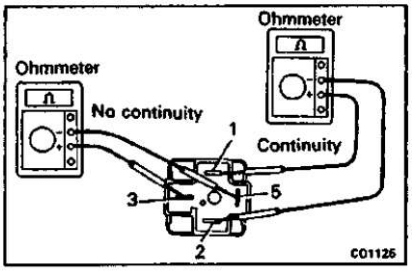
3. REINSTALL NO.2 COOLING FAN RELAY



No.3 Cooling Fan Relay ("FAN NO.3")

NO.3 COOLING FAN RELAY INSPECTION

1. REMOVE NO.3 COOLING FAN RELAY



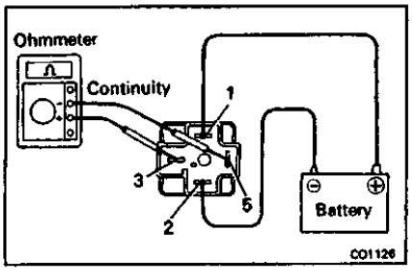
2. INSPECT NO–3 COOLING FAN RELAY

A. Inspect relay continuity

(a) Using an ohmmeter, check that there is continuity between terminals 1 and 2.

(b) Check that there is no continuity between terminals 3 and 5.

If continuity is not as specified, replace the relay.



B. Inspect relay operation

(a) Apply battery voltage across terminals 1 and 2.

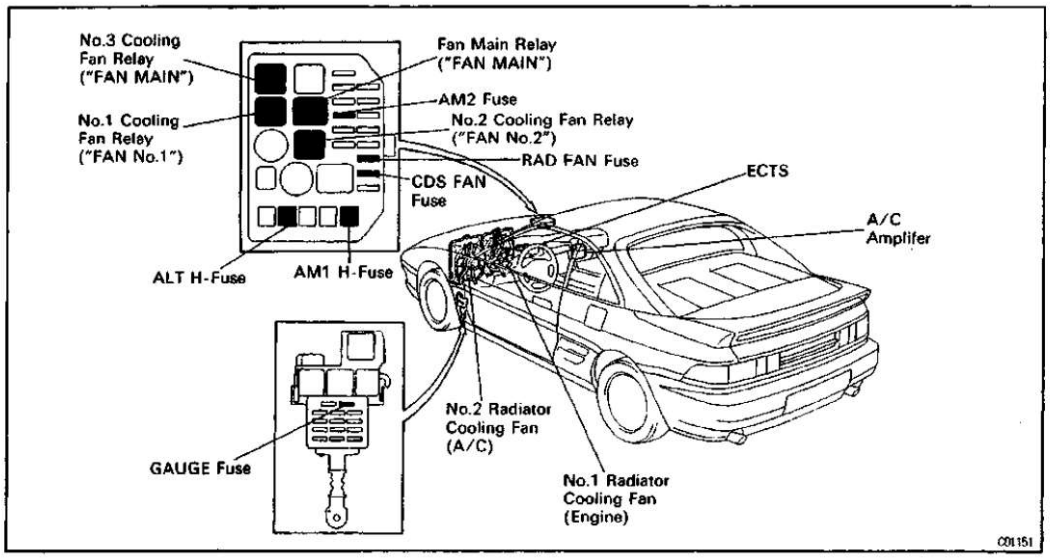
(b) Using an ohmmeter, check that there is continuity between terminals 3 and 5.

If operation is not as specified, replace the relay.

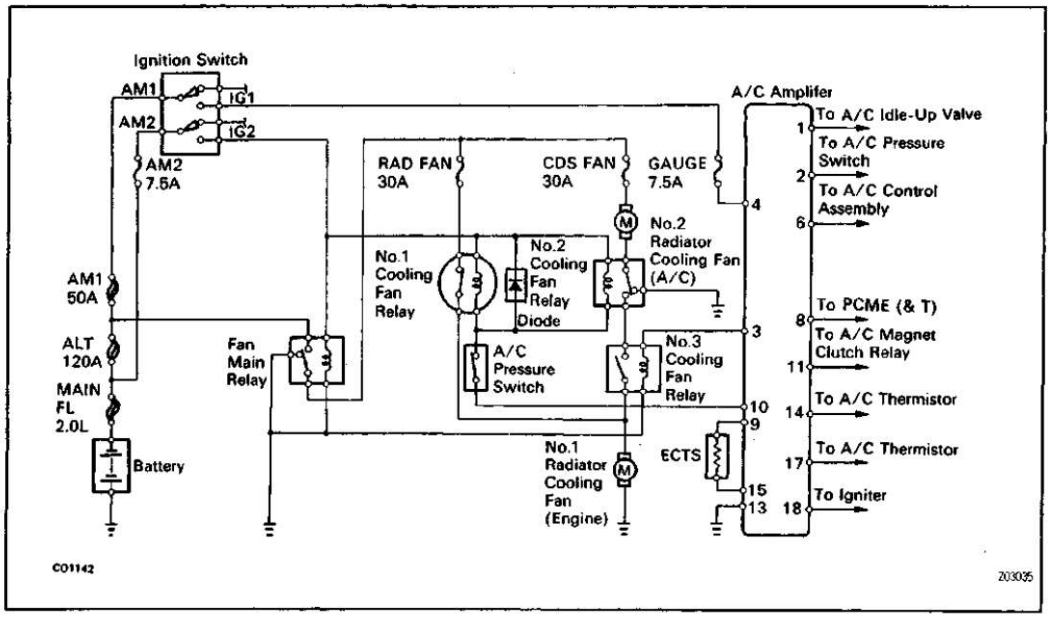
3. REINSTALL NO.3 COOLING FAN RELAY

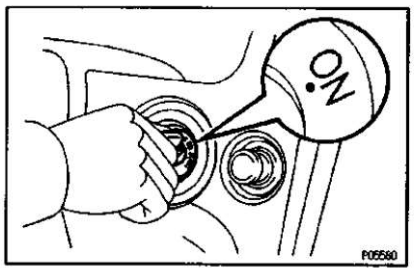
RADIATOR ELECTRIC COOLING FAN (With AC)

Parts Location



System Circuit

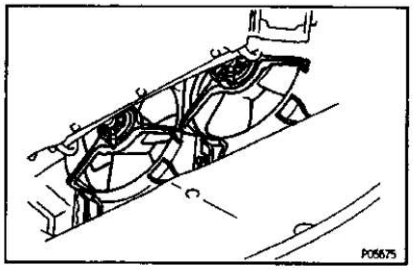




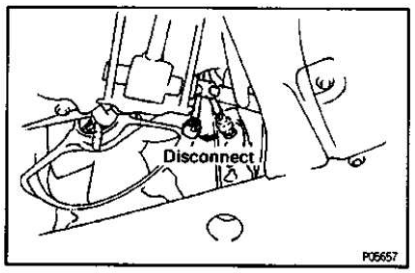
On–Vehicle Inspection

1. INSPECT COOLING FAN OPERATION AT LOW TEMPERATURE (Below 85°C (185°F))

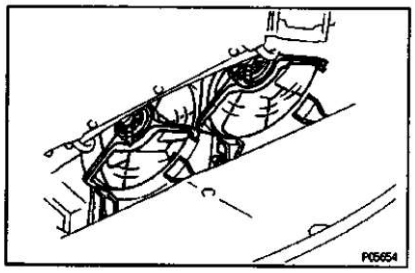
(a) Turn the ignition switch ON.



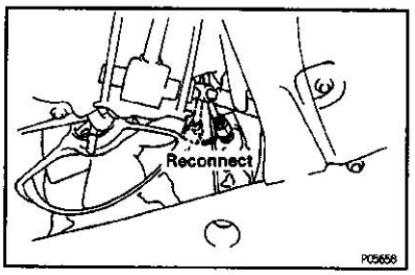
(b) Check that the cooling fans stops.
If not, check the cooling fan relays and ECTS, and check for a separated connector or severed wire between the cooling fan relay and ECTS.



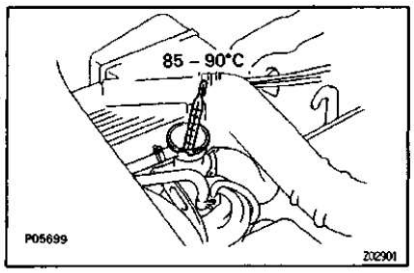
(c) Disconnect the ECTS connector.



(d) Check that the cooling fans rotates.
If not, check the fuses, fan main relay, cooling fan relays, A/C amplifier, cooling fan, and check for a short circuit between the cooling fan relay and ECTS.

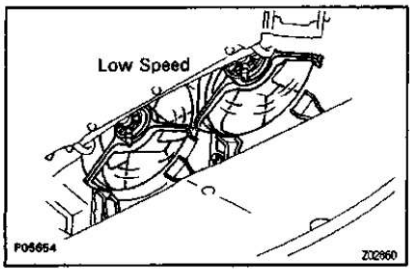


(e) Reconnect the ECTS connector.

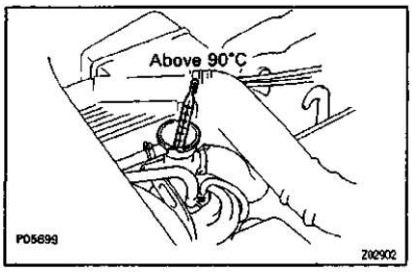


2. INSPECT COOLING FAN OPERATION AT HIGH TEMPERATURE (85 – 90˚C (185 – 194˚F))

(a) Start the engine, and raise coolant temperature to 85 – 90˚ C (185 – 194˚ F).

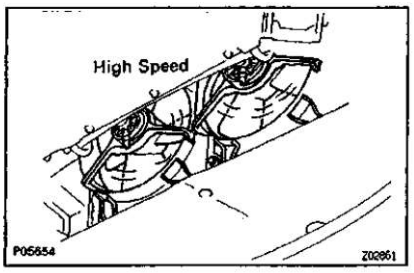


(b) Check that the cooling fans rotates at low speed.
If not, replace the ECTS.



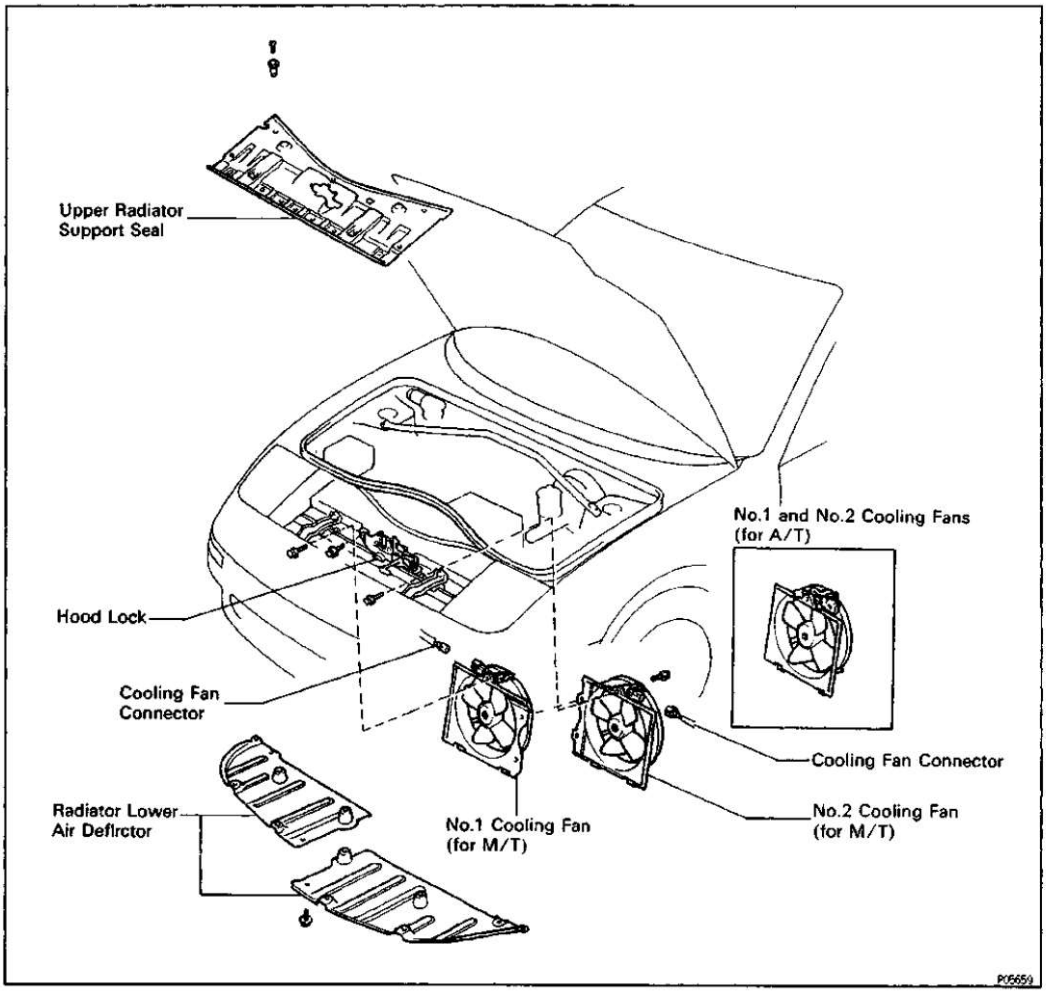
3. INSPECT COOLING FAN OPERATION AT HIGH TEMPERATURE (Above 90˚C (194˚F))

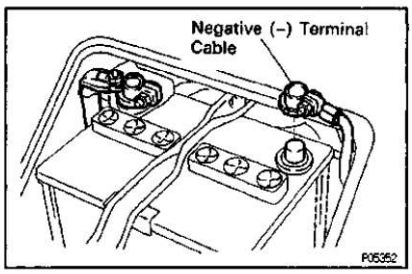
(a) Start the engine, and raise coolant temperature to above 90˚C (194˚ F).



(b) Check that the cooling fans rotates at high speed.
If not, replace the ECTS.

Cooling Fans
COMPONENTS FOR REMOVAL AND INSTALLATION



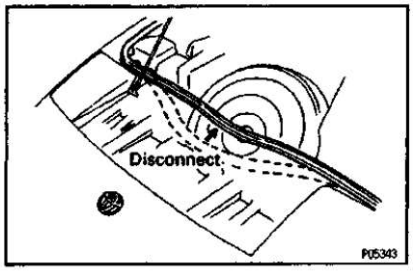


COOLING FANS INSPECTION

(See Components for Removal and Installation)

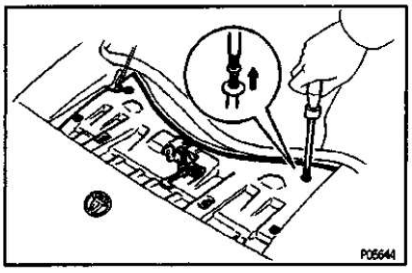
1. DISCONNECT CABE FROM NEGATIVE TERMINAL OF BATTERY

CAUTION: Turn the ignition switch to "LOCK". Disconnect the negative terminal from the battery. Wait at least 20 seconds before proceeding with work.



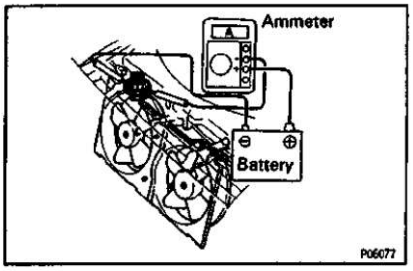
2. REMOVE UPPER RADIATOR SUPPORT SEAL

(a) Disconnect the hood weatherstrip.



(b) Remove the clips.

(c) Remove the two hood lock mounting bolts, and remove the support seal.



3. INSPECT COOLING FANS

(a) Disconnect the two cooling fan connectors.

(b) Connect battery and ammeter to the cooling fan connector.

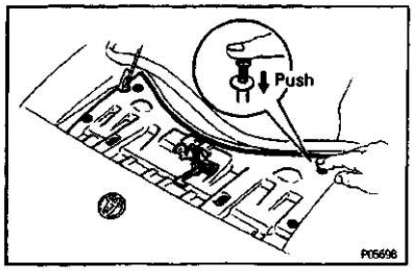
(c) Check that the cooling fan rotates smoothly, and check the reading on the ammeter.

Standard amperage:

5.8 – 7.4 A for M/T

8.8 – 10.8 A for A/T

(d) Reconnect the two cooling fan connectors.

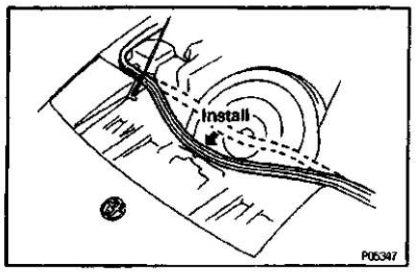


4. REINSTALL UPPER RADIATOR SUPPORT SEAL

(a) Temporarily install the hood lock with the RH side bolt.

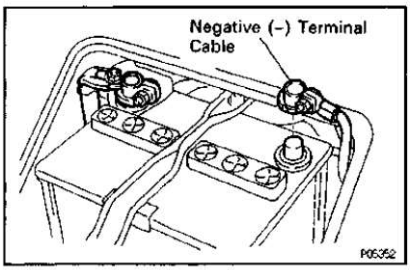
(b) Place the support seal in position.

(c) Install the hood lock with the two bolts.



(d) Install the hood weatherstrip.

5. RECONNECT CABE TO NEGATIVE TERMINAL OF BATTERY



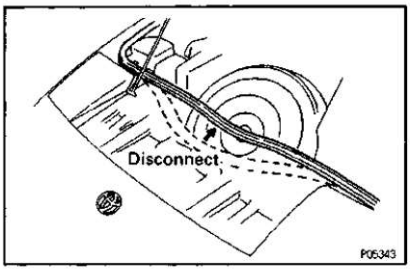
COOLING FANS REMOVAL

(See Components for Removal and Installation)

1. DISCONNECT CABE FROM NEGATIVE TERMINAL OF BATTERY

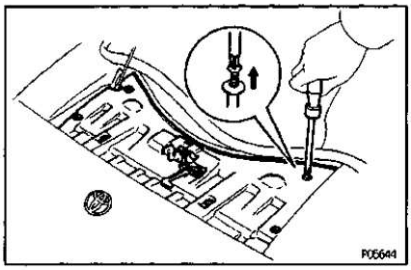
CAUTION: Turn the ignition switch to "LOCK". Disconnect the negative terminal from the battery. Wait at least 20 seconds before proceeding with work.

2. REMOVE RADIATOR LOWER AIR DEFLECTOR



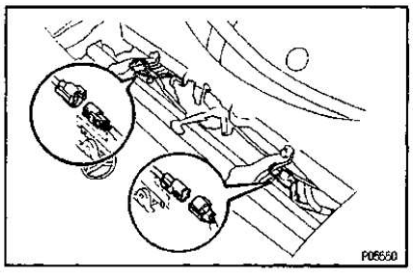
3. REMOVE UPPER RADIATOR SUPPORT SEAL

(a) Disconnect the hood weatherstrip.



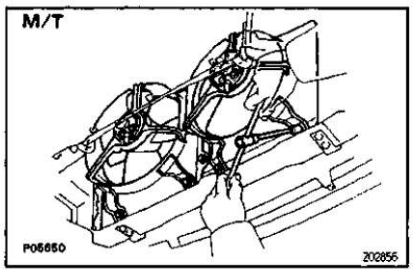
(b) Remove the seven clips.

(c) Remove the two hood lock mounting bolts, and remove the support seal.



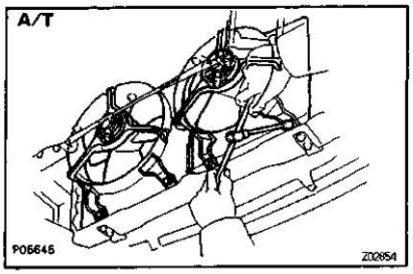
4. REMOVE COOLING FANS

(a) Disconnect the two cooling fan connectors.



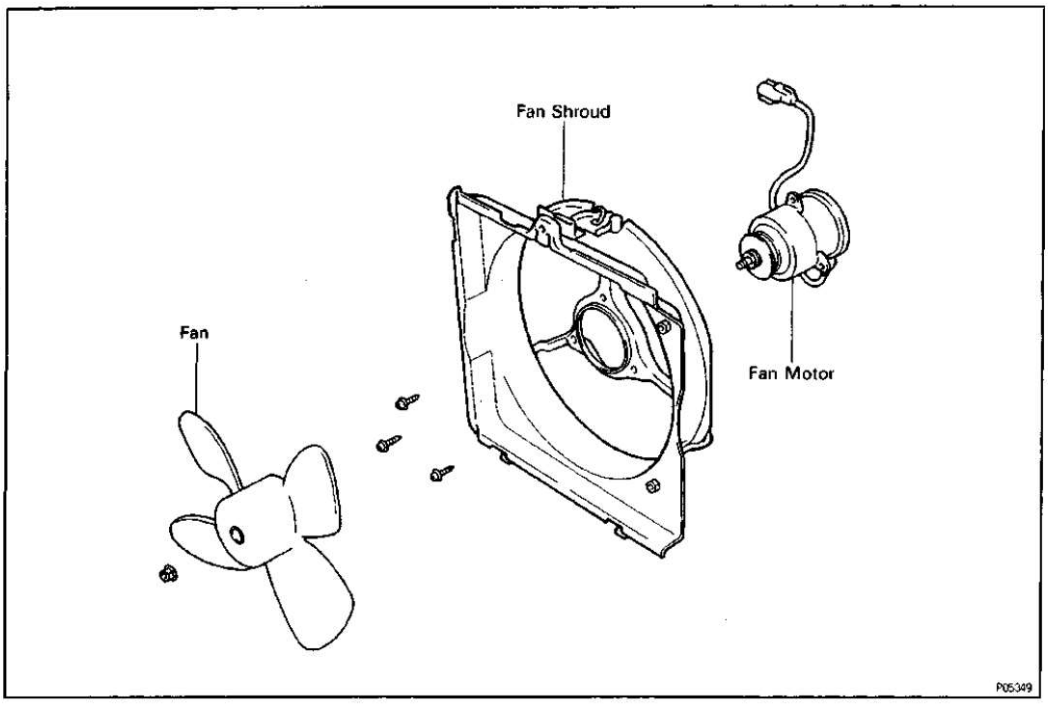
(b) (M /T)

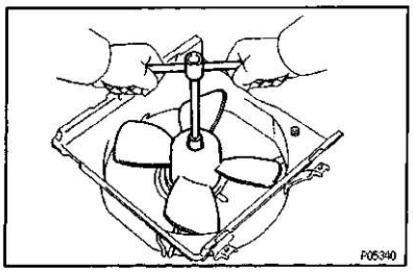
Remove the five bolts and No.2 cooling fan. Remove the three bolts and No.1 cooling fan.



(c) (A/T)
Remove the three bolts and cooling fan. Remove the two cooling fans.

COMPONENTS FOR DISASSEMBLY AND ASSEMBLY



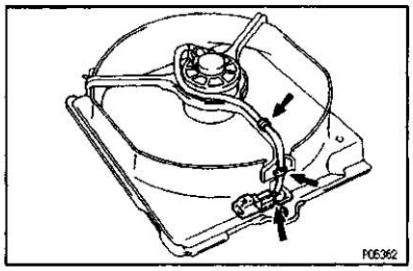


COOLING FAN DISASSEMBLY

(See Components for Disassembly and Assembly)

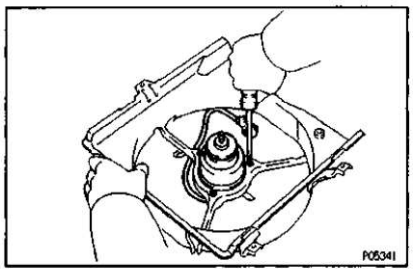
1. REMOVE FAN

Remove the nut and fan.

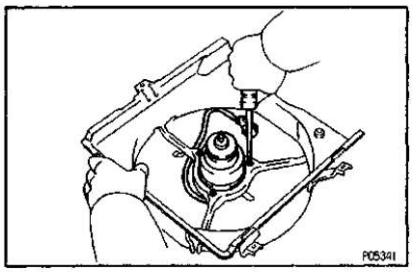


2. REMOVE FAN MOTOR

(a) Disconnect the wire and connector from the fan shroud.



(b) Remove the three screws and fan motor.

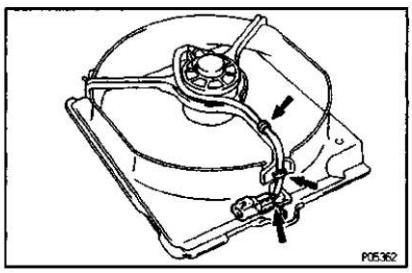


COOLING FAN ASSEMBLY

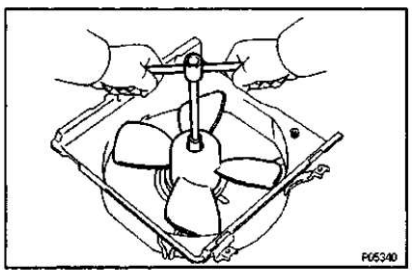
(See Components for Disassembly and Assembly)

1. INSTALL FAN MOTOR

(a) Install the fan motor with the nut.



(b) Install the wire and connector to the fan shroud.



2. INSTALL FAN

Install the fan with the nut.

EG132–01

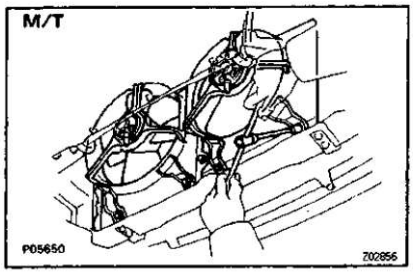
COOLING FANS INSTALLATION

(See Components for Disassembly and Assembly)

1. INSTALL COOLING FANS

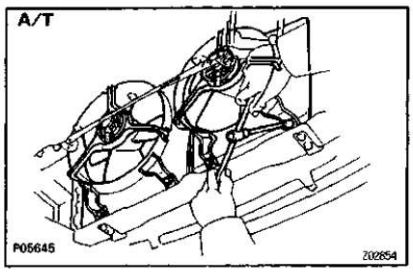
(a) (M /T)

Install the No. 1 cooling fan with the three bolts. Install the No.2 cooling fan with the five bolts.

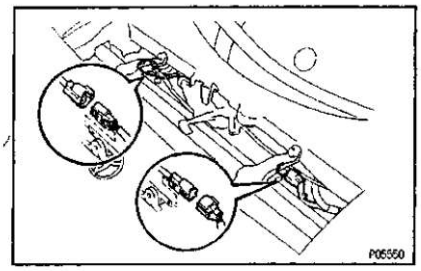


(b) (A/T)

Install the cooling fan with the three bolts. Install the two cooling fans.



(c) Connect the two cooling fan connectors.

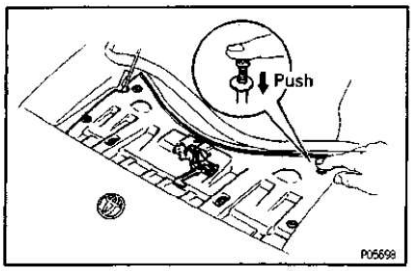


2. INSTALL UPPER RADIATOR SUPPORT SEAL

(a) Temporarily install the hood lock with the RH side bolt.

(b) Place the support seal in position.

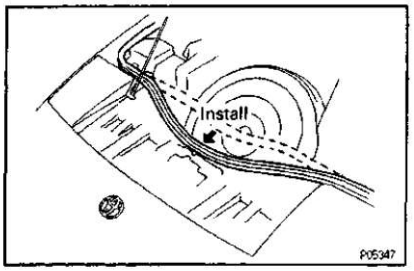
(c) Install the hood lock with the two bolts.



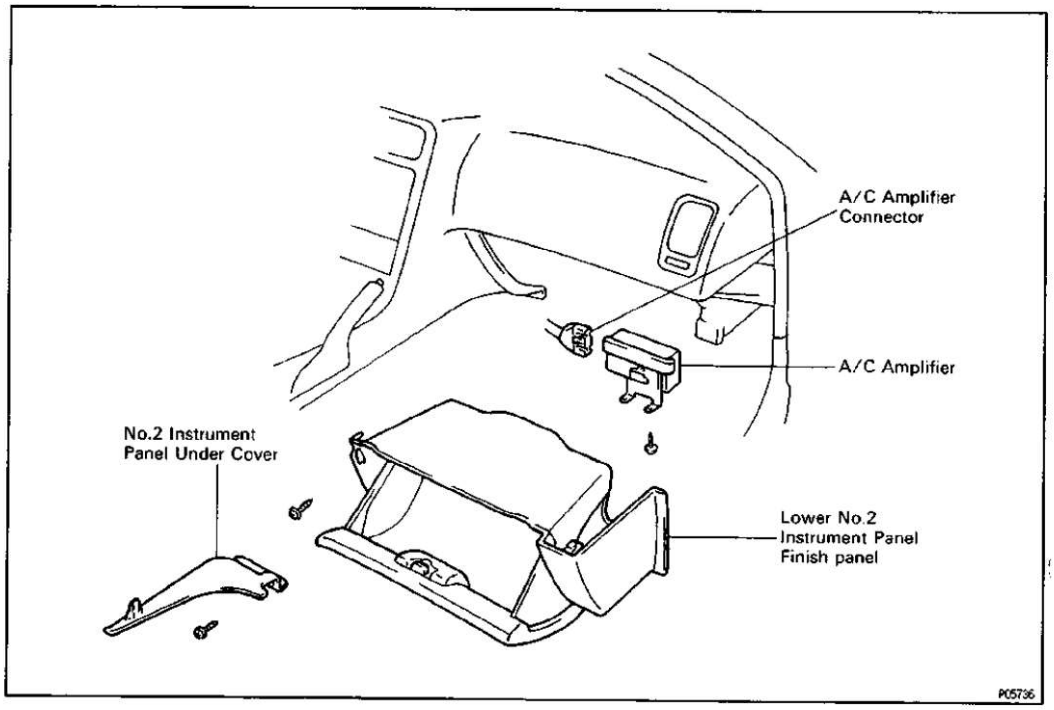
(d) Install the hood weatherstrip.

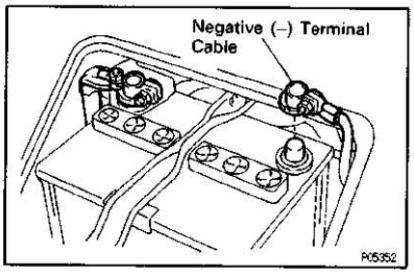
3. INSTALL RADIATOR LOWER AIR DEFLECTOR

4. CONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY



A/C Amplifier
COMPONENTS FOR REMOVAL AND INSTALLATION



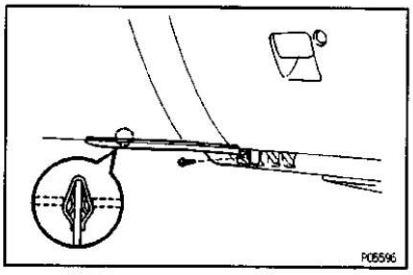


A/C AMPLIFIER INSPECTION

(See Components for Removal and Installation)

1. DISCONNECT CABE FROM NEGATIVE TERMINAL OF BATTERY

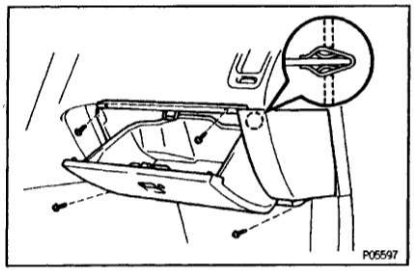
CAUTION: Turn the ignition switch to 'LOCK'. Disconnect the negative terminal from the battery. Wait at least 20 seconds before proceeding with work.



2. REMOVE NO.2 INSTRUMENT PANEL UNDER COVER

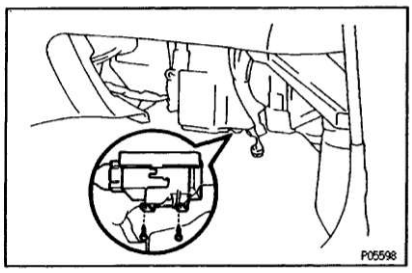
(a) Remove the screw.

(b) Remove the under cover by pulling it.



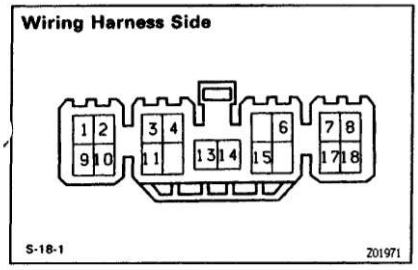
3. REMOVE LOWER NO.2 INSTRUMENT FINISH PANEL

(a) Remove the four screws.
(b) Remove the finish panel by pulling it.



4. INSPECT A/C AMPLIFIER

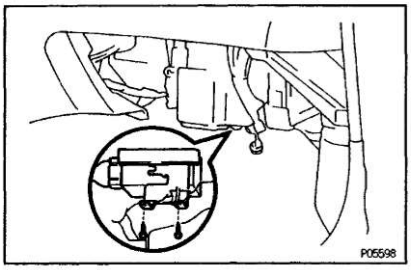
(a) Remove the two screws, and disconnect the A/C amplifier from the cooler unit.
(b) Disconnect the A/C amplifier connector.



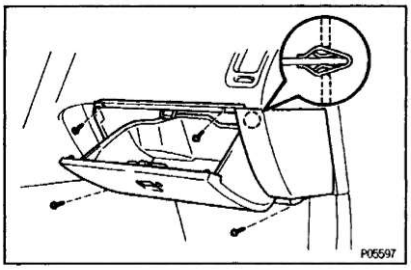
(c) Check the connector on the wiring harness side as shown in the chart.

Check for	Tester connection	Condition		Specified valve
Continuity	3 – Ground	–		Continuity
Voltage	4 – Ground	Ignition switch ON		Battery voltage
Resistance	9–15	Coolant temp.	85°C (185°F)	Approx. 1.35 kΩ
			90°C (194°F)	Approx. 1.19 kΩ
			95°C (203°F)	Approx. 1.05 kΩ
Voltage	10 – Ground	Ignition switch ON		Battery voltage
Continuity	13 – Ground	–		Continuity

V00873

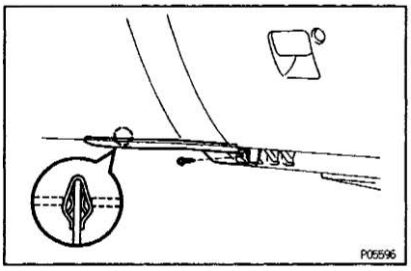


(d) Reconnect the A/C amplifier connector.
(e) Reinstall the A/C amplifier with the two screws.



5. REINSTALL LOWER NO. 2 INSTRUMENT FINISH PANEL

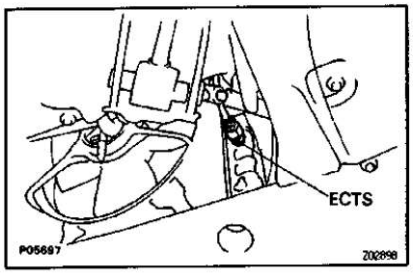
(a) Attach the finish panel to the instrument panel with the clips.
(b) Install the four screws.



6. REINSTALL NO. 2 INSTRUMENT PANEL UNDER COVER

(a) Attach the finish panel to the instrument panel with the clips.
(b) Install the screw.

7. RECONNECT CABE TO NEGATIVE TERMINAL OF BATTERY



Engine Coolant Temperature Sensor (ECTS)

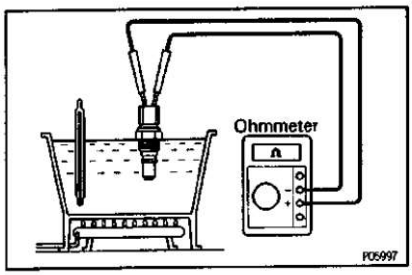
ECTS INSPECTION

1. DRAIN ENGINE COOLANT FROM RADIATOR

2. REMOVE ECTS

(a) Disconnect the sensor connector.

(b) Remove the ECTS.



3. INSPECT ECTS

Using an ohmmeter, measure the resistance between the terminals.

Resistance:

Approx. 1.35 kΩ at 85° C (185° F)

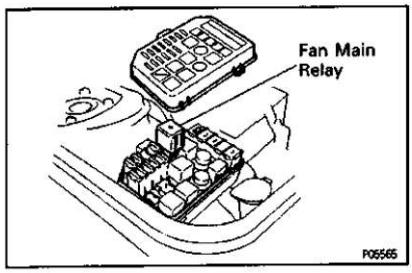
Approx. 1.19 kΩ at 90° C (194° F)

Approx. 1.05 kΩ at 95° C (203° F)

If resistance is not as specified, replace the ECTS.

4. REINSTALL ECTS

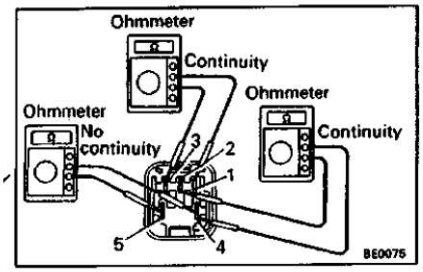
5. REFILL WITH ENGINE COOLANT



Fan Main Relay (”FAN MAIN”)

FAN MAIN RELAY INSPECTION

1. REMOVE FAN MAIN RELAY



2. INSPECT FAN MAIN RELAY

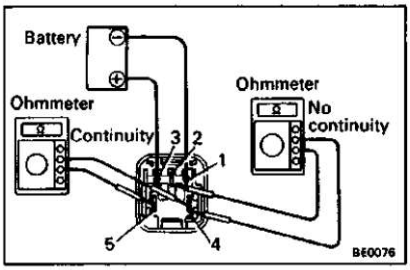
A. Inspect relay continuity

(a) Using an ohmmeter, check that there is continuity between terminals 1 and 3.

(b) Check that there is continuity between terminals 2 and 4.

(c) Check that there is no continuity between terminals 4 and 5.

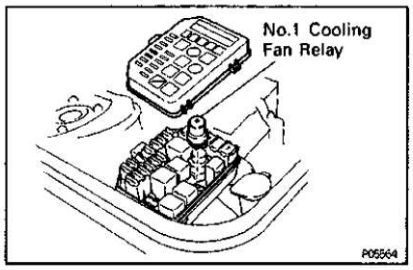
If continuity is not as specified, replace the relay.



B. Inspect relay operation

(a) Apply battery voltage across terminals 1 and 3.
(b) Using an ohmmeter, check that there is no continuity between terminals 2 and 4.
(c) Check that there is continuity between terminals 4 and 5.
If operation is not as specified, replace the relay.

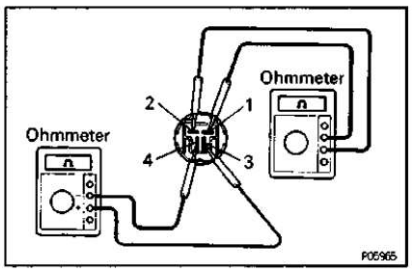
3. REINSTALL FAN MAIN RELAY



No.1 Cooling Fan Relay (”FAN NO.1”)

NO.1 COOLING FAN RELAY INSPECTION

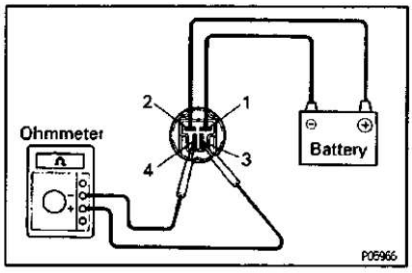
7. REMOVE NO.1 COOLING FAN RELAY



2. INSPECT NO.1 COOLING FAN RELAY

A. Inspect relay continuity

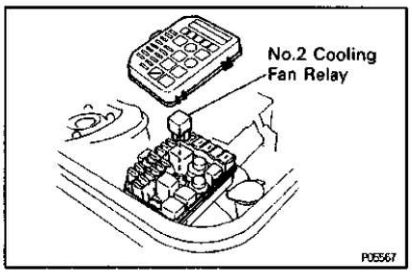
(a) Using an ohmmeter, check that there is continuity between terminals 1 and 2.
(b) Check that there is continuity between terminals and 4.
If continuity is not as specified, replace the relay.



B. Inspect relay operation

(a) Apply battery voltage across terminals 1 and 2.
(b) Using an ohmmeter, check that there is no continuity between terminals 3 and 4.
If operation is not as specified, replace the relay.

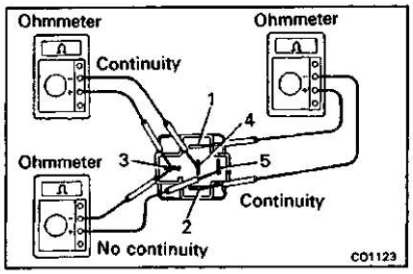
3. REINSTALL NO.1 COOLING FAN RELAY



No.2 Cooling Fan Relay (”FAN NO.2”)

NO.2 COOLING FAN RELAY INSPECTION

1. REMOVE NO.2 COOLING FAN RELAY



2. INSPECT NO.2 COOLING FAN RELAY

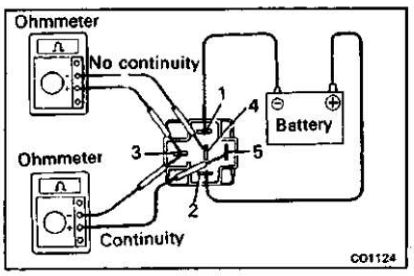
A. Inspect relay continuity

(a) Using an ohmmeter, check that there is continuity between terminals 1 and 2.

(b) Check that there is continuity between terminals 3 and 4.

(c) Check that there is no continuity between terminals 3 and 5.

If continuity is not as specified, replace the relay.



B. Inspect relay operation

(a) Apply battery voltage across terminals 1 and 2.

(b) Using an ohmmeter, check that there is no continuity between terminals 3 and 4.

(c) Using an ohmmeter, check that there is continuity between terminals 3 and 5.

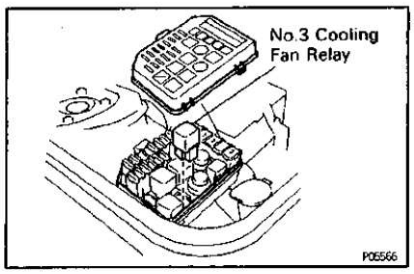
If operation is not as specified, replace the relay.

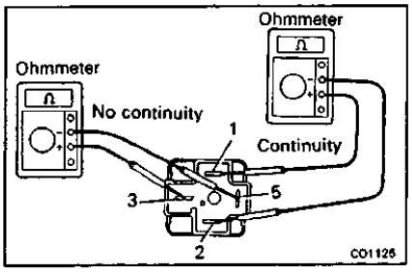
3. REINSTALL NO.2 COOLING FAN RELAY

No.3 Cooling Fan Relay (”FAN NO.3”)

NO.3 COOLING FAN RELAY INSPECTION

1. REMOVE NO.3 COOLING FAN RELAY





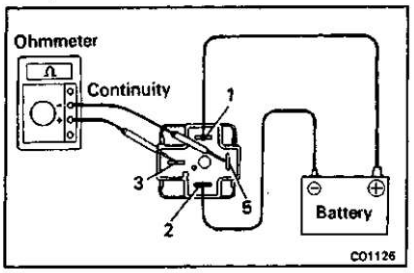
2. INSPECT NO.3 COOLING FAN RELAY

A. Inspect relay continuity

(a) Using an ohmmeter, check that there is continuity between terminals 1 and 2.

(b) Check that there is no continuity between terminals 3 and 5.

If continuity is not as specified, replace the relay.



B. Inspect relay operation

(a) Apply battery voltage across terminals 1 and 2.

(b) Using an ohmmeter, check that there is continuity between terminals 3 and 5.

If operation is not as specified, replace the relay.

3. REINSTALL NO.3 COOLING FAN RELAY

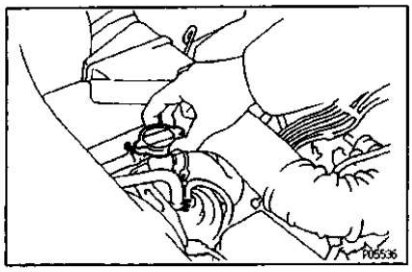
RADIATOR

EG19L–01

RADIATOR CLEANING

Using water or a steam cleaner, remove any mud and dirt from the radiator core.

NOTICE: If using a high pressure type cleaner, be careful not to deform the fins of the radiator core. If the cleaner nozzle pressure is 2,942 – 3.432 kPa (30 – 35 kgf/cm^2, 427 – 498 psi), keep a distance of at least 40 – 50 cm (15.75 – 19.69 in.) between the radiator core and cleaner nozzle.

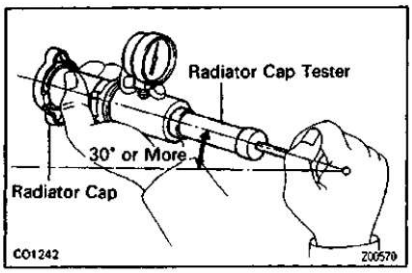


RADIATOR INSPECTION

EG19M–01

1. REMOVE RADIATOR (WATER FILLER) CAP

CAUTION: To avoid the danger of being burned, do not remove it while the engine and radiator are still hot, as fluid and steam can be blown out under pressure.



2. INSPECT RADIATOR (WATER FILLER) CAP

NOTICE: When performing steps (a) and (b) below, keep the radiator pump tester at an angle of over 30° above the horizontal.

(a) Using a radiator cap tester, slowly pump the tester and check that air is coming from the relief valve.

Pump speed:

1 push/3 seconds or more

NOTICE: Push the pump at a constant speed.

If air is not coming from the relief valve, replace the radiator cap.

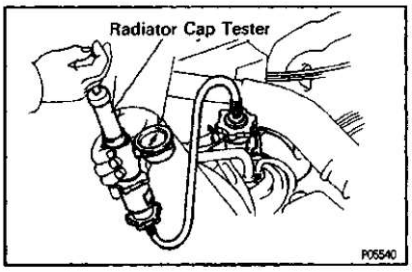
(b) Pump the tester several times and measure the relief valve opening pressure.

Pump speed:

1st time

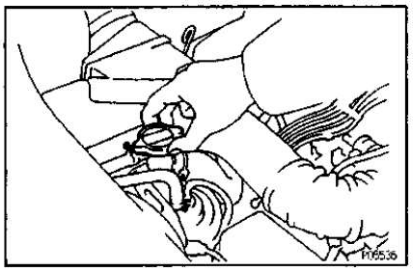
1 push/1 second or less

2nd time or more
Any speed
Standard opening pressure:
74 – 103 kPa
(0.75 – 1.05 kgf/cm^2, 10.7 – 14.9 psi)
Minimum opening pressure:
59 kPa (0.6 kgf/cm^2, 8.5 psi)
If the opening pressure is less than minimum, r
place the radiator cap.



3. INSPECT COOLING SYSTEM FOR LEAKS

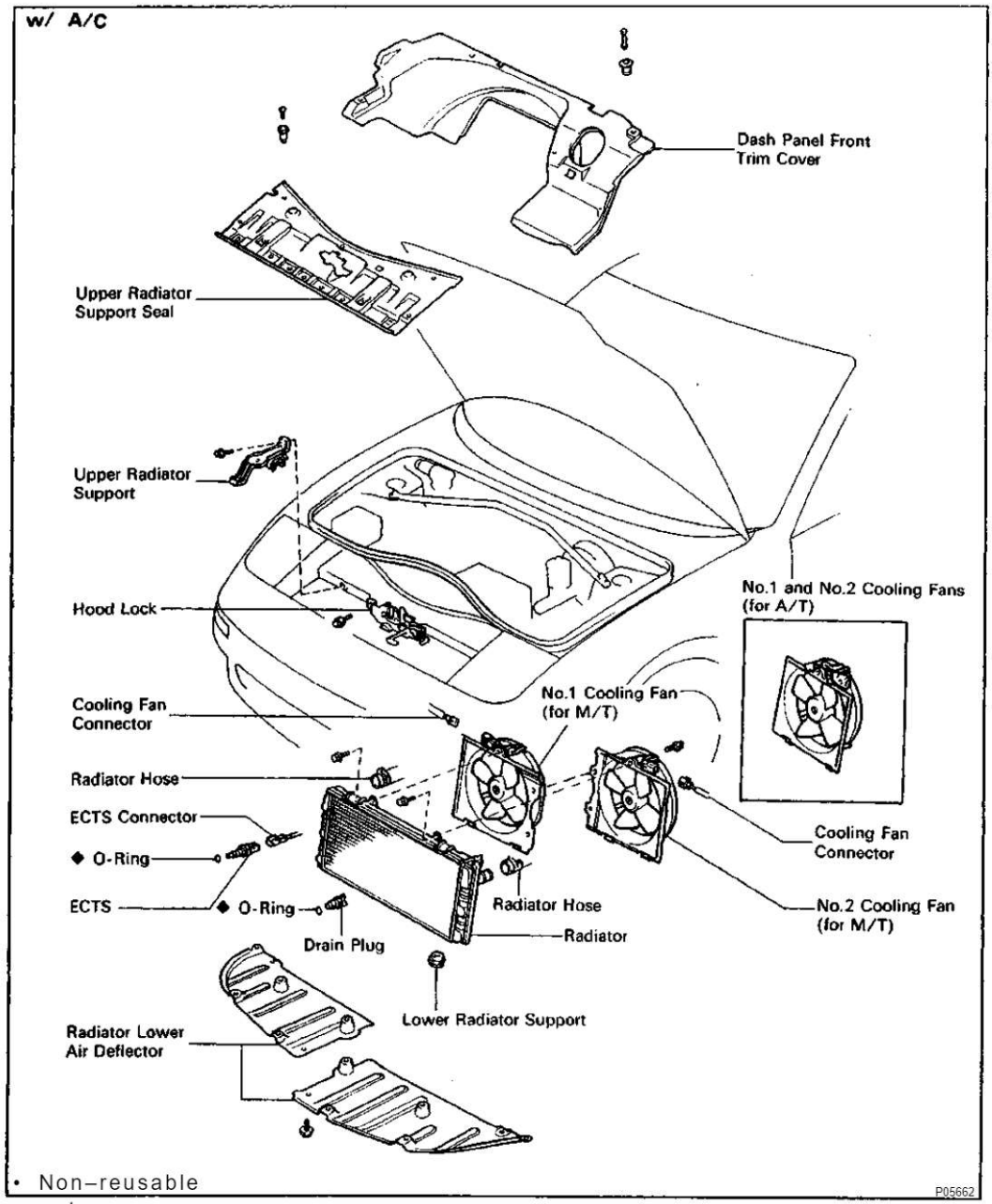
(a) Fill the radiator with coolant and attach a radiator cap tester to the water filler.
(b) Warm up the engine.
(c) Pump it to 118 kPa (1.2 kgf/cm^2, 17.1 psi), and check that the pressure does not drop.
If the pressure drops, check the hoses, radiator or water pump for leaks. If no external leaks are found, check the heater core, cylinder block and head.



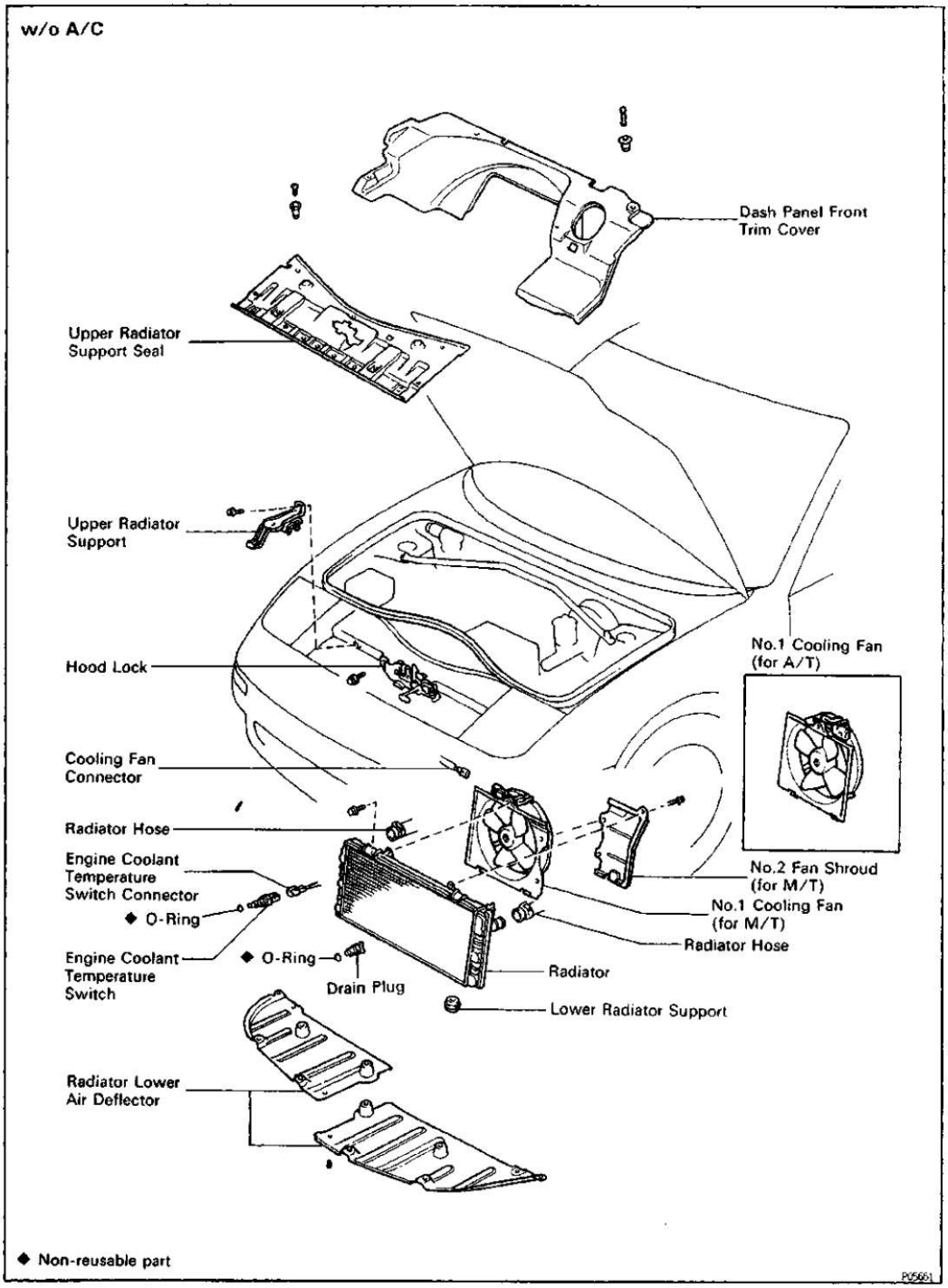
4. REINSTALL RADIATOR (WATER FILLER) CAP

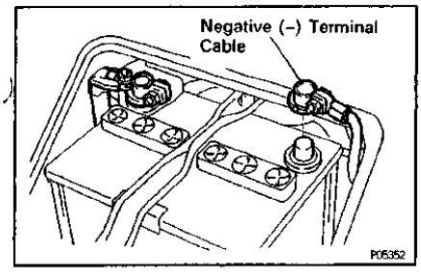
COMPONENTS FOR REMOVAL AND INSTALLATION

EG13N–05



• Non–reusable part


w/o A/C
Dash Panel Front Trim Cover
Upper Radiator Support Seal
Upper Radiator Support
Hood Lock
Cooling Fan Connector
Radiator Hose
Engine Coolant Temperature Switch Connector
◆ O-Ring
Engine Coolant Temperature Switch
◆ O-Ring
Drain Plug
Radiator
Lower Radiator Support
Radiator Lower Air Deflector
No.1 Cooling Fan (for A/T)
No.2 Fan Shroud (for M/T)
No.1 Cooling Fan (for M/T)
Radiator Hose
◆ Non-reusable part
P05691

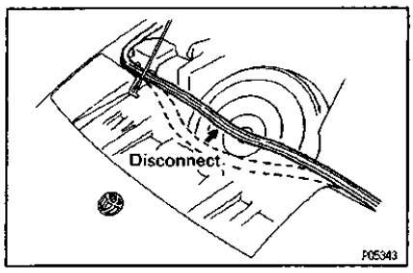


RADIATOR REMOVAL

(See Components for Removal and Installation)

1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY

CAUTION: Turn the ignition switch to "LOCK". Disconnect the negative terminal from the battery. Wait at least 20 seconds before proceeding with work.

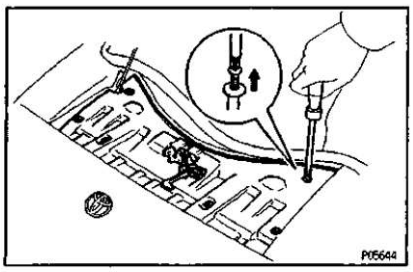


2. REMOVE RADIATOR LOWER AIR DEFLECTOR

3. DRAIN ENGINE COOLANT

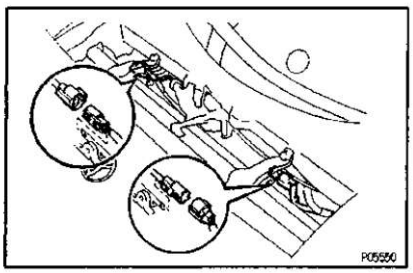
4. REMOVE UPPER RADIATOR SUPPORT SEAL

(a) Disconnect the hood weatherstrip.



(b) Remove the seven clips.

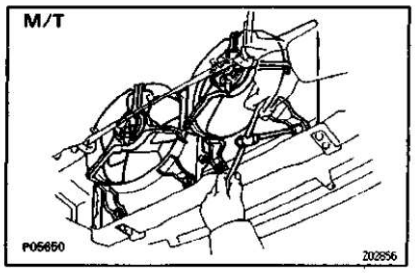
(c) Remove the two hood lock mounting bolts, and remove the support seal.



5. (w/ A/C)

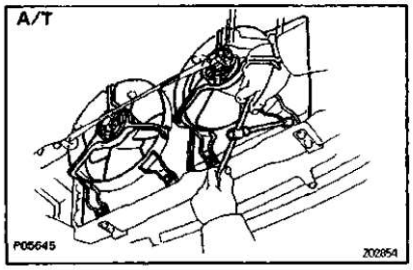
REMOVE NO.1 AND NO.2 COOLING FANS

(a) Disconnect the two cooling fan connectors.

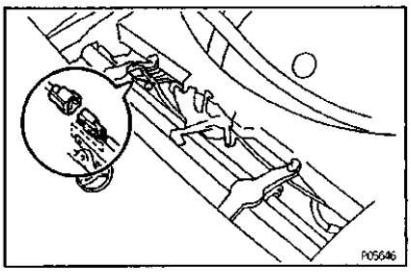


(b) (M /T)

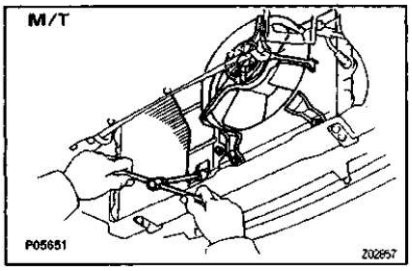
Remove the five bolts and No.2 cooling fan. Remove the three bolt and No.1 cooling fan.



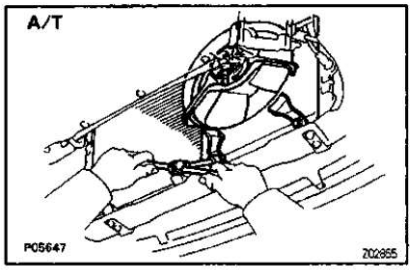
(c) (A/T)
Remove the three bolts and cooling fan. Remove the two cooling fans.



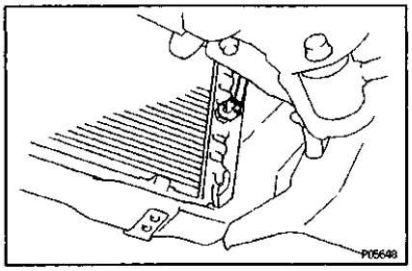
6. (w/o A/C)
REMOVE N0.1 COOLING FAN
(a) Disconnect the cooling fan connector.



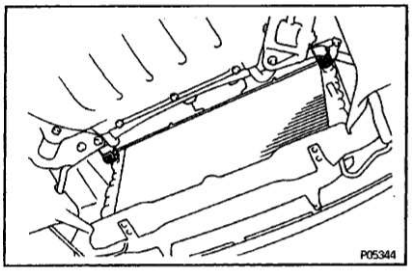
(b) (M /T)
Remove the four bolts and No.2 fan shroud. Remove the three bolts and No.1 cooling fan.



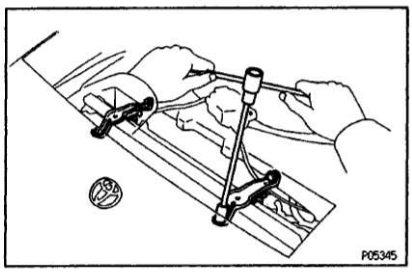
(c) (A/T)
Remove the three bolts and cooling fan.



7. (w/ A/C)
DISCONNECT ECTS CONNECTOR
8. (w/o A/C)
DISCONNECT ENGINE COOLANT TEMPERATURE SWITCH CONNECTOR

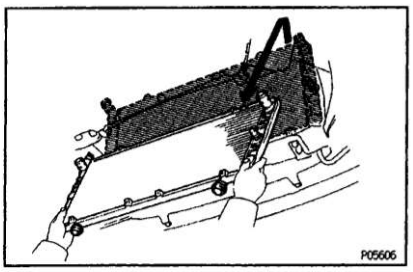


9. DISCONNECT RADIATOR HOSES

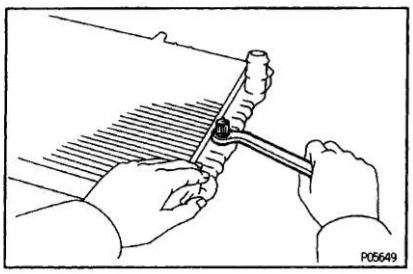


10. REMOVE RADIATOR

(a) Remove the two bolts and upper support. Remove the two upper supports.

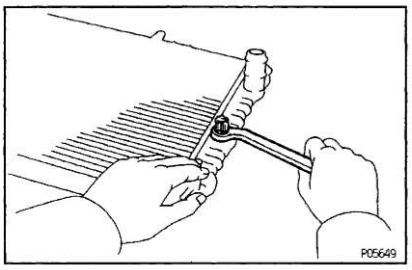


(b) Remove the radiator.
(c) Remove the two lower radiator supports.



11. (w/ A/C)
REMOVE ECTS FROM RADIATOR
(a) Remove the ECTS.
(b) Remove the O–ring from the ECTS.

12. (w/o A/C)
REMOVE ENGINE COOLANT TEMPERATURE
SWITCH FROM RADIATOR
(a) Remove the temperature switch.
(b) Remove the O–ring from the temperature switch.



RADIATOR INSTALLATION

EG13C–01

(See Components for Disassembly and Assembly)

1. (w/ A/C)

INSTALL ECTS TO RADIATOR

(a) Install a new O–ring to the ECTS.

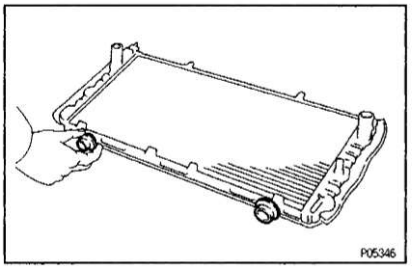
(b) Install the ECTS.

2. (w/o A/C)

INSTALL ENGINE COOLANT TEMPERATURE SWITCH TO RADIATOR

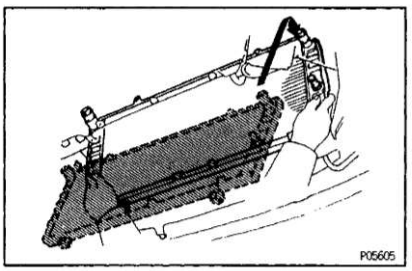
(a) Install a O–ring to the temperature switch.

(b) Install the temperature switch.

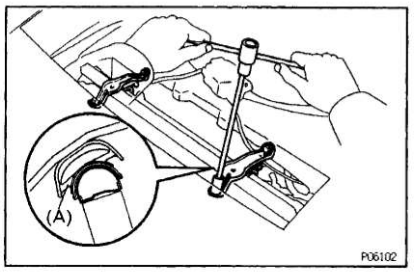


3. INSTALL RADIATOR

(a) Install the two lower radiator supports to the radiator.



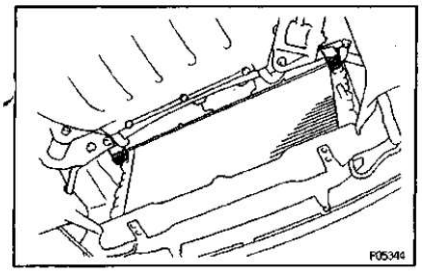
(b) Place the radiator in position on the body.



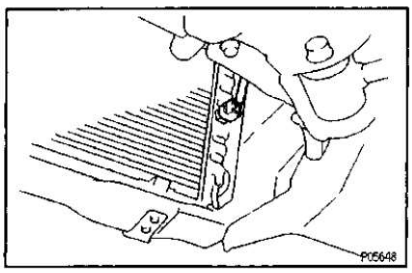
(c) Install the upper radiator support. Install the two upper supports.

Torque: 13 N–m (130 kgf–cm, 9 ft–lbf)

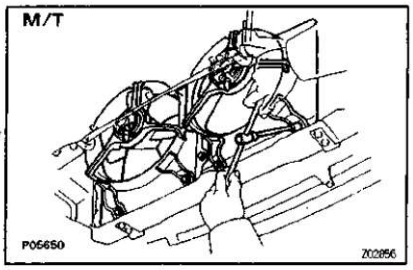
HINT: After installation, check that the rubber cushion (A) of the support is not depressed.



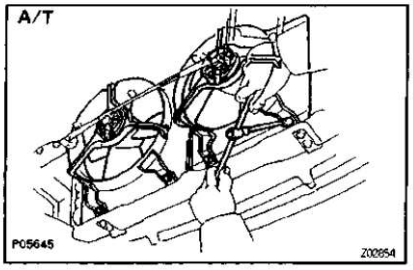
4. CONNECT RADIATOR HOSES



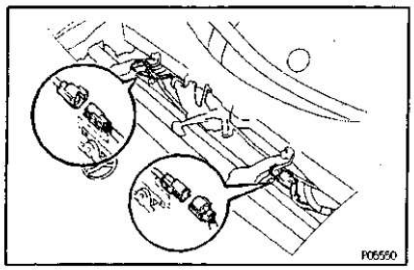
5. (w/ A/C)
CONNECT ECTS CONNECTOR
6. (w/o A/C)
CONNECT ENGINE COOLANT TEMPERATURE SWITCH CONNECTOR



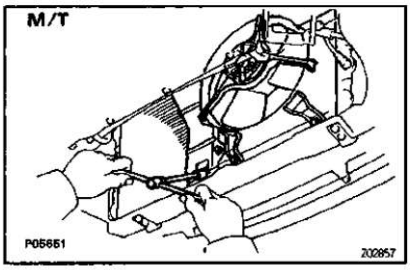
7. (w/ A/C)
INSTALL NO.1 AND NO.2 COOLING FANS
(a) (M/T)
Install the No. 1 cooling fan with the three bolts. Install the No.2 cooling fan with the five bolts.



(b) (A/T)
Install the cooling fan with the three bolts. Install the two cooling fans.



(c) Connect the two cooling fan connectors.

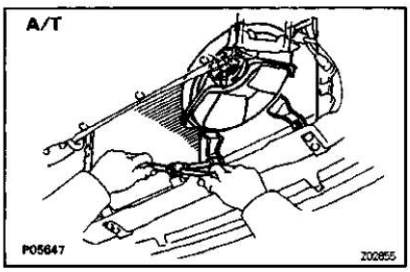


8. (w/o A/C)

INSTALL N0.1 COOLING FAN

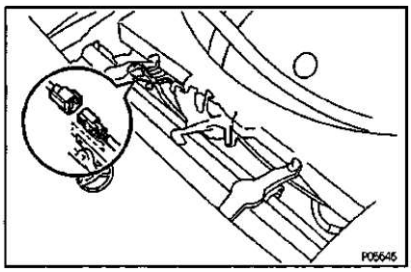
(a) (M/T)

Install the No. 1 cooling fan with the three bolts. Install the No.2 fan shroud with the five bolts.

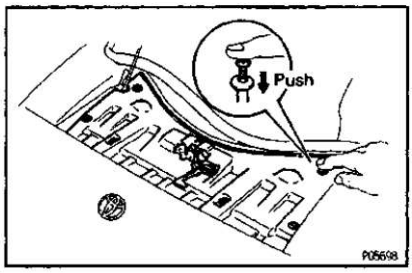


(b) (A/T)

Install the cooling fan with the three bolts.



(c) Connect the cooling fan connector.



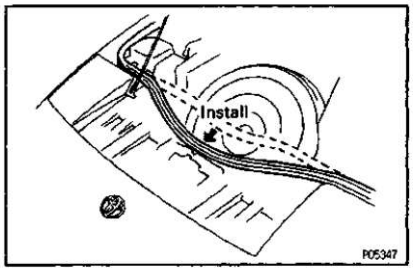
9. INSTALL UPPER RADIATOR SUPPORT SEAL

(a) Temporarily install the hood lock with the RH side bolt.

(b) Place the support seal in position.

(c) Install the hood lock with the two bolts.

(d) Install the seven clips.



(e) Install the hood weatherstrip.

10. INSTALL RADIATOR LOWER AIR DEFLECTOR

11. FILL WITH ENGINE COOLANT

12. CONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY

13. START ENGINE AND CHECK FOR COOLANT LEAKS

RADIATOR

RADIATOR CLEANING

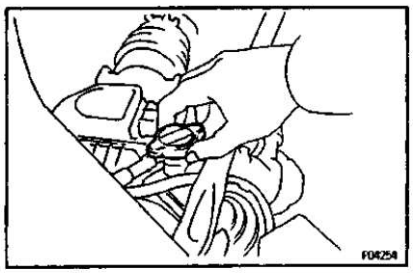
Using water or a steam cleaner, remove any mud and dirt from the radiator core.

NOTICE: If using a high pressure type cleaner, be careful not to deform the fins of the radiator core. If the cleaner nozzle pressure is 2,942 – 3,432 kPs (30 – 35 kgf/cm^2, 427 – 498 psi), keep a distance of at least 40 – 50 cm (15.75 – 19.69 in.) between the radiator core and cleaner nozzle.

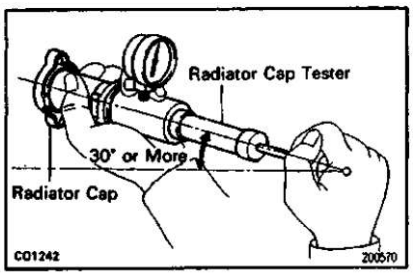
RADIATOR INSPECTION

1. REMOVE RADIATOR (WATER FILLER) CAP

CAUTION: To avoid the danger of being burned, do not remove it while the engine and radiator are still hot, as fluid and steam can be blown out under pressure.



2. INSPECT RADIATOR (WATER FILLER) CAP



NOTICE: When performing steps (a) and (b) below, keep the radiator pump tester at an angle of over 30° above the horizontal.

(a) Using a radiator cap tester, slowly pump the tester and check that air is coming from the relief valve.

Pump speed:

1 push/3 seconds or more

NOTICE: Push the pump at a constant speed.

If air is not coming from the relief valve, replace the radiator cap.

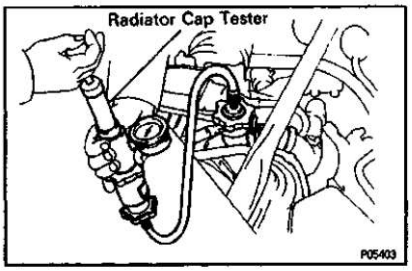
(b) Pump the tester several times and measure the relief valve opening pressure.

Pump speed:

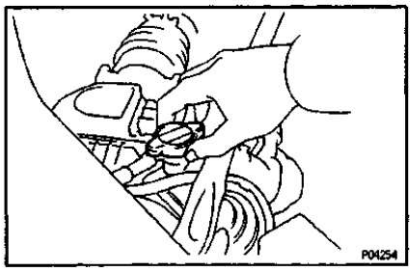
1 st time

1 push/1 second or less

2nd time or more
Any speed
Standard opening pressure:
74 – 103 kPa
(0.75 – 1.05 kgf/cm^2, 10.7 – 14.9 psi)
Minimum opening pressure:
59 kPa (o.6 kgf/cm^2, 8.5 psi)
If the opening pressure is less than minimum, replace the radiator cap.

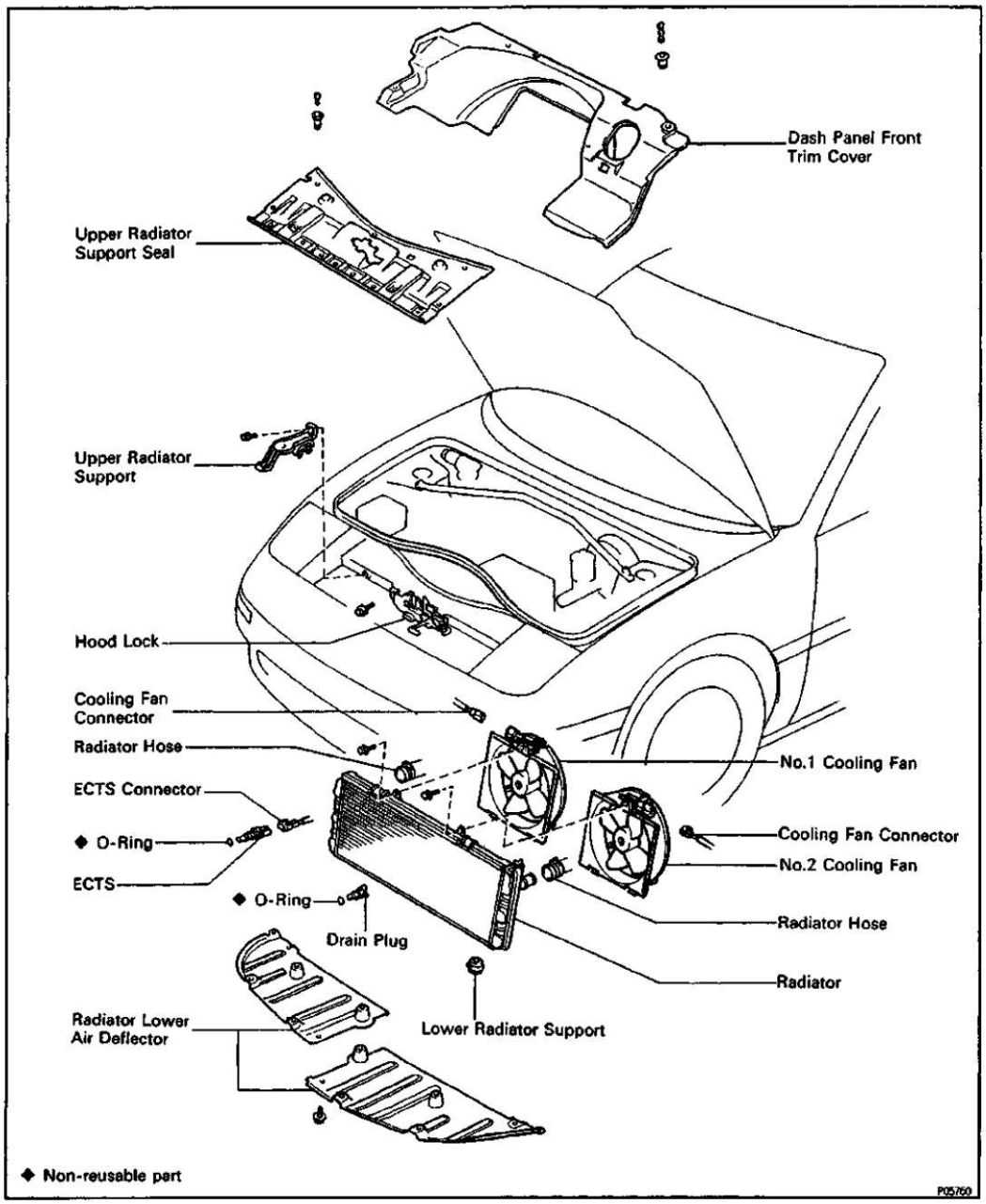


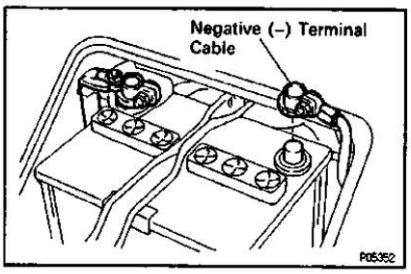
3. INSPECT COOLING SYSTEM FOR LEAKS
(a) Fill the radiator with coolant and attach a radiator cap tester to the water filler.
(b) Warm up the engine.
(c) Pump it to 118 kPa (1.2 kgf/cm^2, 17.1 psi), and check that the pressure does not drop.
If the pressure drops, check the hoses, radiator or water pump for leaks. If no external leaks are found, check the heater core, cylinder block and head.



4. REINSTALL RADIATOR (WATER FILLER) CAP

COMPONENTS FOR REMOVAL AND INSTALLATION





RADIATOR REMOVAL

(See Components for Removal and Installation)

1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY

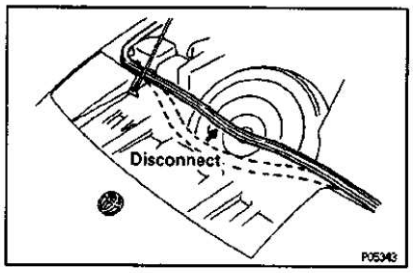
CAUTION: Turn the ignition switch to 'LOCK'. Disconnect the negative terminal from the battery. Wait at least 20 seconds before proceeding with work.

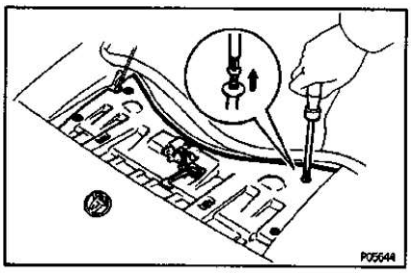
2. REMOVE RADIATOR LOWER AIR DEFLECTOR

3. DRAIN ENGINE COOLANT

4. REMOVE UPPER RADIATOR SUPPORT SEAL

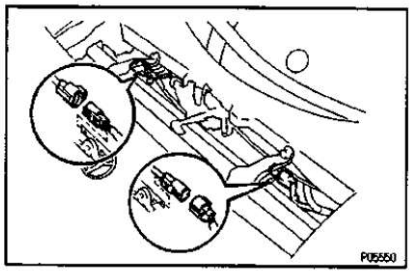
(a) Disconnect the hood weatherstrip.





(b) Remove the seven clips.

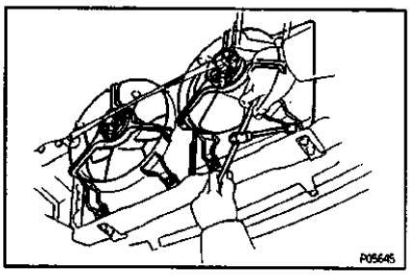
(c) Remove the two hood lock mounting bolts, and remove the support seal.



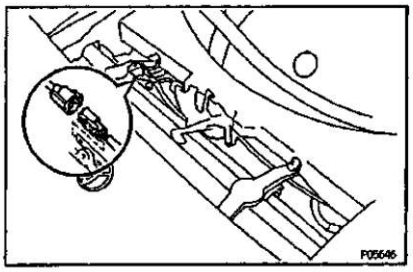
5. (w/ A/C)

REMOVE NO.1 AND NO.2 COOLING FANS

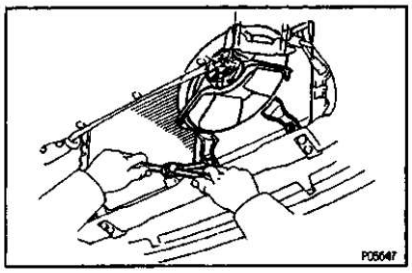
(a) Disconnect the two cooling fan connectors.



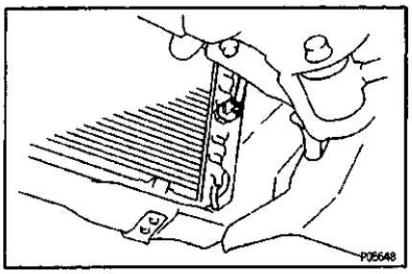
(b) Remove the three bolts and cooling fan. Remove the two cooling fans.



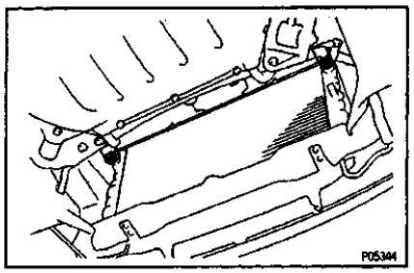
6. (w/o A/C)
REMOVE NO.1 COOLING FAN
(a) Disconnect the cooling fan connector.



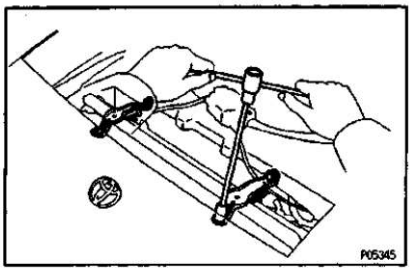
(b) Remove the three bolts and cooling fan.



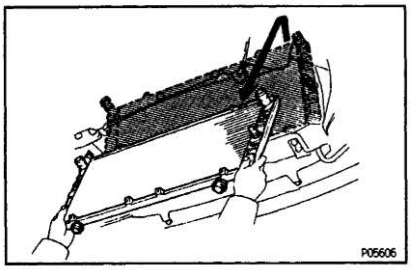
7. (w/ A/C)
DISCONNECT ECTS CONNECTOR
8. (w/o A/C)
DISCONNECT ENGINE COOLANT TEMPERATURE SWITCH CONNECTOR



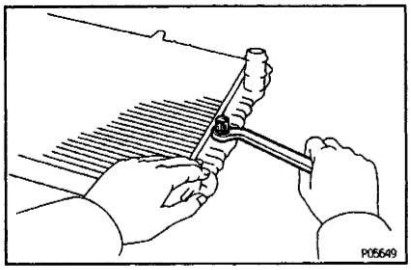
9. DISCONNECT RADIATOR HOSES



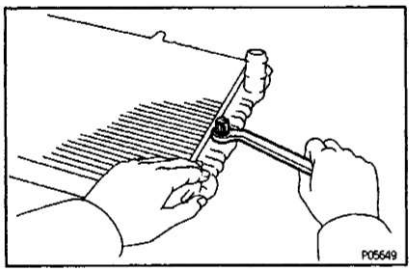
10. REMOVE RADIATOR
(a) Remove the two upper support bolts. Remove the two upper supports.



(b) Remove the radiator.
(c) Remove the two lower radiator supports.

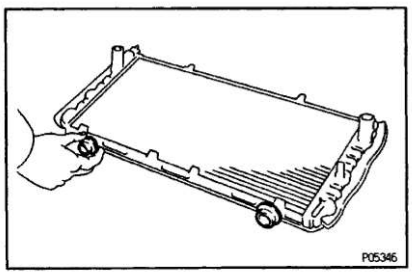


11. (w/ A/C)
REMOVE ECTS FROM RADIATOR
(a) Remove the ECTS.
(b) Remove the 0–ring from the ECTS.
12. (w/o A/C)
REMOVE ENGINE COOLANT TEMPERATURE SWITCH FROM RADIATOR
(a) Remove the temperature switch.
(b) Remove the 0–ring from the temperature switch.

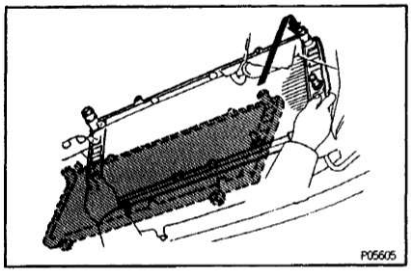


RADIATOR INSTALLATION

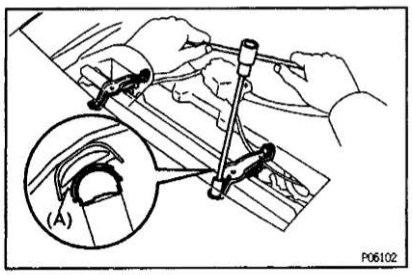
(See Components for Disassembly and Assembly)
1. (w/ A/C)
INSTALL ECTS TO RADIATOR
(a) Install a new O–ring to the ECTS.
(b) Install the ECTS.
2. (w/o A/C)
INSTALL ENGINE COOLANT TEMPERATURE SWITCH TO RADIATOR
(a) Install a O–ring to the temperature switch.
(b) Install the temperature switch.



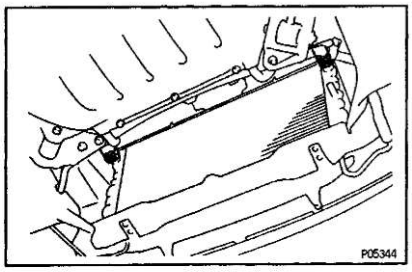
3. INSTALL RADIATOR
(a) Install the two lower radiator supports to the radiator.



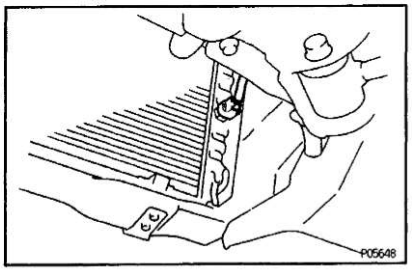
(b) Place the radiator in position on the body.



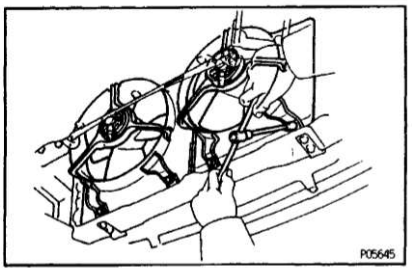
(c) Install the upper radiator support. Install the two upper supports.
Torque: 13 N–m (130 kgf–cm, 9 ft–lbf)
HINT: After installation, check that the rubber cushion (A) of the support is not depressed.



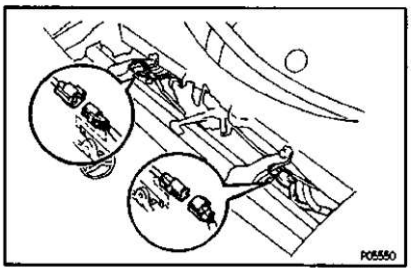
4. CONNECT RADIATOR HOSES



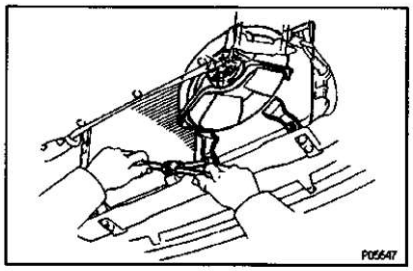
5. (w/ A/C)
CONNECT ECTS CONNECTOR
6. (w/o A/C)
CONNECT ENGINE COOLANT TEMPERATURE SWITCH CONNECTOR



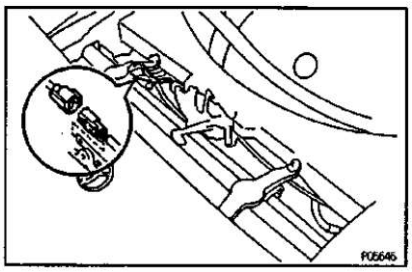
7. (w/ A/C)
INSTALL NO.1 AND NO.2 COOLING FANS
(a) Install the cooling fan with the three bolts. Install the two cooling fans.



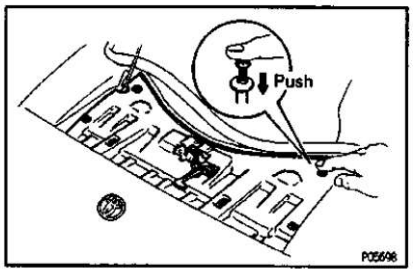
(b) Connect the two cooling fan connectors.



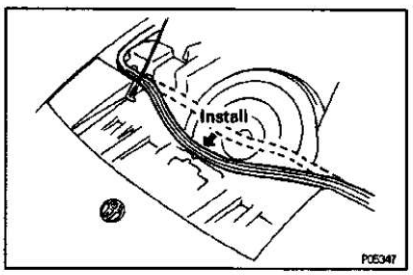
8. (w/o A/C)
INSTALL NO.1 COOLING FAN
(a) Install the cooling fan with the three bolts.



(b) Connect the cooling fan connector.



9. INSTALL UPPER RADIATOR SUPPORT SEAL
(a) Temporarily install the hood lock with the RH side bolt.
(b) Place the support seal in position.
(c) Install the hood lock with the two bolts.
(d) Install the seven clips.



(e) Install the hood weatherstrip.
10. INSTALL RADIATOR LOWER AIR DEFLECTOR
11. FILL WITH ENGINE COOLANT
12. CONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY
13. START ENGINE AND CHECK FOR COOLANT LEAKS

SERVICE SPECIFICATIONS
SERVICE DATA

Turbocharger	Turbocharging pressure	49 – 81 kPa (0.50 – 0.83 kgf/cm^2, 7.1 –11.8 psi)
	Impeller wheel axial play	0.13 mm (0.0051 in.) or less
	Impeller wheel radial play	0.18 mm (0.0071 in.) or less

TORQUE SPECIFICATIONS

Part tightened	N–m	kgf–cm	ft–lbf
Turbine outlet elbow x Turbocharger	64	650	47
Side bearing housing plate x Turbocharger	11	120	9
Turbo water pipe x Turbocharger	11	120	9
Turbocharger x Exhaust manifold	64	650	47
Oil pipe x Turbocharger	17	175	13
Oil pipe x Cylinder block (Bolt)	43	440	32
Oil pipe x Cylinder block (Union bolt)	51	525	38
Turbocharger stay x Turbocharger	69	705	51
Turbocharger stay x Cylinder block	59	600	43
Oxygen sensor x Turbine outlet elbow	44	450	33
No.4 air tube stay x Cylinder head	19	195	14
No.4 air tube stay x No.4 air tube	19	195	14
Air by–pass valve x No.4 air tube	19	195	14
Main TWC x Turbine outlet elbow	29	300	22
TWC stay x Main TWC	59	600	43
TWC stay x Cylinder block	59	600	43
Clutch release cylinder x Transaxle	12	120	9
Front engine mounting bracket x Transaxle	77	790	57
Front engine mounting insulator x Body	77	790	57
Front engine mounting insulator x Bracket	96	980	71
Front exhaust pipe x Main TWC	62	630	46
Front exhaust pipe support bracket x Suspension crossmember	21	210	15
Suspension member damper x Suspension crossmember	21	210	15
Tailpipe x Body bracket	66	670	48
Tailpipe x Front exhaust pipe	43	440	32
Tailpipe bracket x Front exhaust pipe bracket	19	190	14
A/C idler pulley bracket x Cylinder block (12 mm head)	25	250	18
A/C idler pulley bracket x Cylinder block (14 mm head)	27	275	20
A/C idler pulley bracket x RH engine hanger	37	375	27
A/C compressor x Cylinder block	25	250	18
Lower suspension brace x Body	73	740	54

SERVICE SPECIFICATIONS

SERVICE DATA

Tune – up	Engine oil API grade	SG Energy–Conserving II multigrade
	Battery specific gravity	1.25 – 1.27 (when fully charged at 20°C (68°F))
	High–tension cord resistance – Limit	25 kΩ per cord
	Alternator drive belt tension	
	New belt	120 ± 20 lbf
	Uesd belt	104 ± 20 lbf
	Valve clearance (Cold) – Intake	0.19 – 0.29 mm (0.007 – 0.011 in.)
	Valve clearance (Cold) – Exhaust	0.28 – 0.38 mm (0.011 – 0.015 in.)
	Ignition timing	10° BTDC @ idle
	Idle speed (for USA M/T)	750 ± 50 rpm
	Idle speed (for USA A/T)	700 ± 50 rpm
	Idle speed (for CANADA M/T)	850 ± 50 rpm
Intake manifold vacuum	at idle speed	60 kPa (450 mmHg, 17.7 in.Hg)
Compression pressure	at 250 rpm – STD	1,226 kPa (12.5 kgf/cm², 178 psi) or more
	at 250 rpm – Limit	981 kPa (10.0 kgf/cm², 142 psi)
	Difference of pressure between each cylinder	98 kPa (1.0 kgf/cm², 14 psi) or less
Idler pulley tension spring	Free length	46.0 mm (1.811 in.)
	Installed load at 50.5 mm (1.988 in.)	32 – 37 N (3.25 – 3.75 kgf, 7.2 – 8.3 lbf)
Cylinder head	Warpage – Cylinder block side (Limit)	0.05 mm (0.020 in.)
	Warpage – Manifold side (Limit)	0.08 mm (0.031 in.)
	Valve seat – Refacing angle	30°, 45°, 75°
	Valve seat – Contacting angle	45°
	Valve seat – Contacting width	1.0 – 1.4 mm (0.039 – 0.055 in.)
Valve guide bushing	Inside diameter	6.010 – 6.030 mm (0.2366 – 0.2374 in.)
	Outside diameter (for repair part) – STD	11.000 – 11.027 mm (0.4331 – 0.4342 in.)
	Outside diameter (for repair part) – O/S 0.05	11.050 – 11.077 mm (0.4350 – 0.4361 in.)
Valve	Valve overall length – STD (Intake)	97.60 mm (3.8425 in.)
	Valve overall length – STD (Exhaust)	98.45 mm (3.8760 in.)
	Valve overall length – Limit (Intake)	97.1 mm (3.823 in.)
	Valve overall length – Limit (Exhaust)	98.0 mm (3.853 in.)
	Vale face angle	44.5°
	Stem diameter (Intake)	5.970 – 5.985 mm (0.2350 – 0.2356 in.)
	Stem diameter (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.)
	Stem oil clearance – STD (Exhaust)	0.030 – 0.065 mm (0.0012 – 0.0026 in.)
	Stem oil clearance – Limit (Intake)	0.08 mm (0.0031 in.)
	Stem oil clearance – Limit (Exhaust)	0.10 mm (0.0039 in.)
	Margin thickness – STD	0.8 – 1.2 mm (0.031 – 0.047 in.)
	Margin thickness – Limit	0.5 mm (0.020 in.)
Valve spring	Squareness – Limit	2.0 mm (0.079 in.)
	Free length	41.9 mm (1.650 in.)
	Installed tension at 34.7 mm (1.366 in.)	164 – 189 N (16.7 – 19.3 kgf, 36.8 – 42.5 lbf)

Valve lifter	Lifter diameter	30.966 – 30.976 mm (1.2191 – 1.2195 in.)
	Lifter bore diameter	31.000 – 31.018 mm (1.2205 – 1.2213 in.)
	Oil clearance – STD	0.024 – 0.052 mm (0.0009 – 0.0020 in.)
	Oil clearance – Limit	0.07 mm (0.0028 in.)
Manifold	Warpage – Limit	0.30 mm (0.0118 in.)
Camshaft	Thrust clearance – STD (Intake)	0.045 – 0.100 mm (0.0018 – 0.0039 in.)
	Thrust clearance – STD (Exhaust)	0.030 – 0.085 mm (0.0012 – 0.0033 in.)
	Thrust clearance – Limit (Intake)	0.12 mm (0.0047 in.)
	Thrust clearance – Limit (Exhaust)	0.10 mm (0.0039 in.)
	Journal oil clearance – STD	0.025 – 0.062 mm (0.0010 – 0.0024 in.)
	Journal oil clearance – Limit	0.10 mm (0.0039 in.)
	Journal diameter	26.959 – 26.975 mm (1.0614 – 1.0620 in.)
	Circle rounout – Limit	0.04 mm (0.0016 in.)
	Cam lobe height – STD (Intake)	42.01 – 42.11 mm (1.6539 – 1.6579 in.)
	Cam lobe height – STD (Exhaust)	40.06 – 40.16 mm (1.5772 – 1.5811 in.)
	Cam lobe height – Limit (Intake)	41.90 mm (1.6496 in.)
	Cam lobe height – Limit (Exhaust)	39.95 mm (1.5728 in.)
	Camshaft gear backlash – STD	0.020 – 0.200 mm (0.0008 – 0.0079 in.)
	Camshaft gear backlash – Limit	0.30 mm (0.0188 in.)
	Camshaft gear spring end free distance	22.5 – 22.9 mm (0.886 – 0.902 in.)
Cylinder block	Cylinder head surface warpage – Limit	0.05 mm (0.0020 in.)
	Cylinder bore diameter – STD (Mark 1)	87.000 – 87.010 mm (3.4252 – 3.4256 in.)
	Cylinder bore diameter – STD (Mark 2)	87.010 – 87.020 mm (3.4256 – 3.4260 in.)
	Cylinder bore diameter – STD (Mark 3)	87.020 – 87.030 mm (3.4260 – 3.4264 in.)
	Cylinder bore diameter – Limit (STD)	87.23 mm (3.4342 in.)
	Cylinder bore diameter – Limit (O/S 0.50)	87.73 mm (3.4350 in.)
Piston and piston ring	Piston diameter – STD (Mark 1)	86.850 – 86.860 mm (3.4193 – 3.4197 in.)
	Piston diameter – STD (Mark 2)	86.860 – 86.870 mm (3.4197 – 3.4201 in.)
	Piston diameter – STD (Mark 3)	86.870 – 86.880 mm (3.4201 – 3.4205 in.)
	Piston diameter – O/S 0.50	87.350 – 87.380 mm (3.4390 – 3.4402 in.)
	Piston oil clearance – STD	0.14 – 0.016mm (0.0055 – 0.0063 in.)
	Piston oil clearance – Limit	0.18 mm (0.0071 in.)
	Piston ring groove clearance – No.1	0.040 – 0.080 mm (0.0016 – 0.0031 in.)
	Piston ring groove clearance – No.2	0.030 – 0.070 mm (0.0012 – 0.0028 in.)
	Piston ring end gap – STD (No.1)	0.270 – 0.500 mm (0.0106 – 0.0197 in.)
	Piston ring end gap – STD (No.2)	0.350 – 0.600 mm (0.0138 – 0.0234 in.)
	Piston ring end gap – STD (Oil)	0.200 – 0.550 mm (0.0079 – 0.0217 in.)
	Piston ring end gap – Limit (No.1)	1.10 mm (0.0433 in.)
	Piston ring end gap – Limit (No.2)	1.20 mm (0.0472 in.)
	Piston ring end gap – Limit (Oil)	1.15 mm (0.0453 in.)

Connecting rod	Thrust clearance – STD	0.160 – 0.312 mm (0.0063 – 0.0123 in.)
	T ·ist clearance – Limit	0.35 mm (0.0138 in.)
	Connecting rod bearing center wall thickness	
	– STD (Mark 1)	1.484 – 1.488 mm (0.0584 – 0.0586 in.)
	– STD (Mark 2)	1.488 – 1.492 mm (0.0586 – 0.0587 in.)
	– STD (Mark 3)	1.492 – 1.496 mm (0.0587 – 0.0589 in.)
	Connecting rod oil clearance	
	– STD (STD)	0.024 – 0.055 mm (0.0009 – 0.0022 in.)
	– STD (U/S 0.25)	0.023 – 0.069 mm (0.0009 – 0.0027 in.)
	– Limit	0.08 mm (0.0031 in.)
	Rod bending – Limit per 100mm (3.94 in.)	0.05 mm (0.0020 in.)
	Rod twist – Limit per 100 mm (3.94 in.)	0.15 mm (0.0059 in.)
	Bushing inside diameter	22.005 – 22.017 mm (0.8663 – 0.8668 in.)
	Piston pin diameter	21.997 – 22.009 mm (0.8660 – 0.8665 in.)
	Piston pin oil clearance – STD	0.005 – 0.011 mm (0.0002 – 0.0004 in.)
	Piston pin oil clearance – Limit	0.05 mm (0.0020 in.)
	Connecting rod bolt outside diameter – STD	7.860 – 8.000 mm (0.3094 – 0.3150 in.)
	Connecting rod bolt outside diameter – Limit	7.60 mm (0.2992 in.)
Crankshaft	Thrust clearance – STD	0.020 – 0.220 mm (0.0008 – 0.0087 in.)
	Thrust clearance – Limit	0.30 mm (0.0118 in.)
	Thrust washer thickness	2.440 – 2.490 mm (0.0961 – 0.0980 in.)
	Main journal oil clearance	
	– STD (No.3 – STD)	0.025 – 0.044 mm (0.0010 – 0.0017 in.)
	– STD (No.3 – U/S 0.25)	0.027 – 0.067 mm (0.0011 – 0.0026 in.)
	– STD (Others – STD)	0.015 – 0.034 mm (0.0006 – 0.0013 in.)
	– STD (Others – U/S 0.25)	0.019 – 0.059 mm (0.0007 – 0.0023 in.)
	– Limit	0.08 mm (0.0031 in.)
	Main journal diameter – STD	54.988 – 55.003 mm (2.1653 – 2.1655 in.)
	Main journal diameter – U/S 0.25	54.745 – 54.755 mm (2.1553 – 2.1557 in.)
	Main bearing center wall thickness	
	– STD (No.3 – Mark 1)	1.992 – 1.995 mm (0.0784 – 0.0785 in.)
	– STD (No.3 – Mark 2)	1.995 – 1.998 mm (0.0785 – 0.0787 in.)
	– STD (No.3 – Mark 3)	1.998 – 2.001 mm (0.0787 – 0.0788 in.)
	– STD (No.3 – Mark 4)	2.001 – 2.004 mm (0.0788 – 0.0789 in.)
	– STD (No.3 – Mark 5)	2.004 – 2.007 mm (0.0789 – 0.0790 in.)
	– STD (Others – Mark 1)	1.997 – 2.000 mm (0.0786 – 0.0787 in.)
	– STD (Others – Mark 2)	2.000 – 2.003 mm (0.0787 – 0.0789 in.)
	– STD (Others – Mark 3)	2.003 – 2.006 mm (0.0789 – 0.0790 in.)
	– STD (Others – Mark 4)	2.006 – 2.009 mm (0.0790 – 0.0791 in.)
	– STD (Others – Mark 5)	2.009 – 2.012 mm (0.0791 – 0.0792 in.)
	Crank pin diameter – STD	51.985 – 52.000 mm (2.0466 – 2.0472 in.)
	Crank pin diameter – U/S 0.25	51.745 – 51.755 mm (2.0372 – 2.0376 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 SPECIFICATION

EG0C6–03

Part tightened	N·m	kgf·cm	ft·lbf
Oil pump pulley x Oil pump drive shaft	28	290	21
No.2 idler pulley x Cylinder block	42	425	31
Crankshaft pulley x Crankshaft	108	1,100	80
Camshaft timing pulley x Camshaft	54	550	40
Camshaft timing pulley x Camshaft (for use with SST)	37	380	27
No.1 idler pulley x Cylinder head	42	425	31
Spark plug x Cylinder head	18	180	13
Cylinder head x Cylinder block (1st)	49	500	36
Cylinder head x Cylinder block (2nd)	Turn 90°		
Spark plug tube x Cylinder head	39	400	29
Camshaft bearing cap x Cylinder head	19	190	14
Cylinder head cover x Cylinder head	23	230	17
Engine hanger x Cylinder head	25	250	18
No.3 timing belt cover x Cylinder head	7.8	80	69 in.·lbf
Delivery pipe x Cylinder head	13	130	9
Fuel inlet pipe x Delivery pipe	34	350	25
Intake manifold x Cylinder head	19	195	14
Intake manifold stay x Intake manifold	22	220	16
Intake manifold stay x Cylinder block	42	425	31
Air intake chamber stay x Intake manifold	42	425	31
Air intake chamber stay x Cylinder head	42	425	31
EGR valve x intake manifold	13	130	9
EGR pipe x Cylinder head	59	600	43
Throttle body x Intake manifold	19	195	14
Water by–pass pipe x Water pump cover	8.8	90	78 in.·lbf
Water outlet housing x Cylinder head	15	150	11
TWC (main) x Exhaust manifold	29	300	22
Exhaust manifold x Cylinder head	49	500	36
TWC stay x TWC (main)	42	425	31
TWC stay x Cylinder block	42	425	31
Main bearing cap x Cylinder block	59	600	43
Connecting rod cap x Connecting rod (1 st)	25	250	18
Connecting rod cap x Connecting rod (2nd)	Turn 90°		
Rear oil seal retainer x Cylinder block	9.3	95	82 in.·lbf
Knock sensor x Cylinder block	37	380	27
Oil cooler x Cylinder block (relief valve)	78	800	58
Oil cooler x Cylinder block (nut)	7.8	80	69 in.·lbf
Water pump x Cylinder block (10 mm head)	7.8	80	69 in.·lbf
Water pump x Cylinder block (12 mm head for w/o A/C)	27	275	20
Alternator bracket x Cylinder block	43	440	32
Rear end plate x Cylinder block	9.3	95	82 in.·lbf
Flywheel x Crankshaft (M/T)	88	900	65
Drive plate x Crankshaft (A/T)	83	850	61
Clutch cover x Flywheel (M/T)	19	195	14
Transaxle x Cylinder block	64	650	47
Transaxle x Rear end plate	46	470	34
Heater water pipe x Cylinder block	46	470	34

No.2 rear end plate x Cylinder block	9.3	95	82 in.-lbf
No.2 rear end plate x Transaxle	19	195	14
Stiffener plate x Cylinder block	37	380	27
Stiffener plate x Transaxle	37	380	27
Starter x Rear end plate	39	400	29
Drive plate x Torque converter (A/T)	27	280	20
RN engine mounting bracket x Cylinder block	61	620	45
RH engine mounting insulator x Body	78	800	58
RH engine mounting insulator x Mounting bracket	52	530	38
RH engine mounting stay x Mounting insulator	73	740	54
RH engine mounting stay x Engine hanger	73	740	54
LH engine mounting bracket x Transaxle	52	530	38
LH engine mounting insulator x Mounting bracket (upper side)	73	740	54
LH engine mounting insulator x Transaxle (A/T)	52	530	38
LH engine mounting insulator x Body	78	800	58
LH engine mounting stay x Mounting insulator (M/T)	73	740	54
LH engine mounting stay x Transaxle (M/T)	25	250	18
Front engine mounting bracket x Transaxle	77	790	57
Front engine mounting insulator x Mounting bracket	96	980	70
Front engine mounting insulator x Body	73	740	54
Clutch release cylinder x Transaxle (M/T)	12	120	9
Rear engine mounting Bracket x Transaxle	77	790	57
Rear engine mounting insulator x Mounting bracket	87	890	64
Rear engine mounting insulator x Body	64	650	47
Lateral control rod x Body	35	360	26
Lateral control rod x LH engine mounting insulator	37	380	27
A/C idler pulley bracket x Cylinder block (12 mm head)	27	275	20
A/C idler pulley bracket x Cylinder block (14 mm head)	37	375	27
A/C compressor x Cylinder block	25	250	18
Front exhaust pipe x TWC (main)	62	630	46
Front exhaust pipe x Tailpipe	43	440	32
Front exhaust pipe bracket x Tailpipe bracket	19	190	14
Lower suspension brace x Body	73	740	54
Suspension member damper x Rear suspension lower crossmember	21	210	15
Tailpipe x Body bracket	66	670	48

SERVICE SPECIFICATIONS

SERVICE DATA

Oil pressure	At idle speed (normal operating temperature) At 3,000 rpm (normal operating temperature)	**29 kPa (0.3 kgf/cm², 43 psi) or more** **245 – 490 kPa (2.5 – 5.0 kgf/cm², 36 – 71 psi)**
Oil pump	Body clearance (STD) Body clearance (Maximum) Tip clearance (STD) Tip clearance (Maximum)	**0.10 – 0.16 mm (0.0039 – 0.0063 in.)** **0.20 mm (0.0079 in.)** **0.04 – 0.16 mm (0.0016 – 0.0063 in.)** **0.20 mm (0.0079 in.)**

TORQUE SPECIFICATIONS

Part tightened	N·m	kgf·cm	ft·lbf
Oil pan x Drain plug	**39**	**400**	**29**
Oil pump body cover x Oil pump body	**8.8**	**90**	**78 in.·lbf**
Oil pump x Cylinder block	**7.8**	**80**	**69 in.·lbf**
Oil pump pulley x Oil pump drive rotor	**35**	**355**	**26**
No.2 idler pulley x Cylinder block	**43**	**440**	**32**
Oil strainer x Cylinder block	**5.4**	**55**	**48 in.·lbf**
Oil strainer x Oil pump	**5.4**	**55**	**48 in.·lbf**
Oil pan x Cylinder block	**5.4**	**55**	**48 in.·lbf**
Oil pan x Oil pump	**5.4**	**55**	**48 in.·lbf**
Main TWC x Turbine outlet elbow	**29**	**300**	**22**
TWC stay x Main TWC	**59**	**600**	**43**
two stay x Cylinder block	**59**	**600**	**43**
Stiffener plate x Cylinder block	**37**	**380**	**27**
Stiffener plate x Transaxle case	**37**	**380**	**27**
Clutch release cylinder x Transaxle	**12**	**120**	**9**
Front engine mounting bracket x Transaxle	**77**	**790**	**57**
Front engine mounting insulator x Body	**77**	**790**	**57**
Front engine mounting insulator x Bracket	**96**	**980**	**71**
Front exhaust pipe x Main TWC	**62**	**630**	**46**
Front exhaust pipe support bracket x Suspension crossmember	**21**	**210**	**15**
Suspension member damper x Suspension crossmember	**21**	**210**	**15**
Tailpipe x Body bracket	**66**	**670**	**48**
Tailpipe x Front exhaust pipe	**43**	**440**	**32**
Tailpipe bracket x Front exhaust pipe bracket	**19**	**190**	**14**
A/C idler pulley bracket x Cylinder block (12 mm head)	**25**	**250**	**18**
A/C idler pulley bracket x Cylinder block (14 mm head)	**27**	**275**	**20**
A/C idler pulley bracket x RH engine hanger	**37**	**375**	**27**
Upper suspension brace x Body (Bolt)	**73**	**740**	**54**
Upper suspension brace x Body (Nut)	**64**	**650**	**47**
Lower suspension brace x Body	**73**	**740**	**54**
Oil cooler x Cylinder block (Bolt)	**78**	**800**	**58**
Oil cooler x Cylinder block (Relief valve)	**78**	**800**	**58**
Oil cooler x Cylinder block (Nut)	**7.8**	**80**	**69 in.·lbf**
Oil nozzle x Cylinder block	**9.1**	**93**	**81 in.·lbf**

SERVICE SPECIFICATIONS

SERVICE DATA

EG09P–02

VSV (for EGR)	**Resistance (at 20°C (68°F))**	**33 – 39 Ω**

TORQUE SPECIFICATIONS

EG09Q–02

Part tightened	N·m	kgf·cm	ft·lbf
TVS x Water outlet housing	29	300	22
EGR valve x Intake manifold	13	130	9
EGR valve x EGR pipe	13	130	9
EGR pipe x Cylinder head	59	600	43
Throttle body x Intake manifold	19	195	14
TWC (main) x Exhaust manifold	29	300	22
TW C stay x TW C (main)	42	425	31
TWC stay x Cylinder block	42	425	31
Suspension member damper x Suspension crossmember	21	210	15
Tailpipe x Front exhaust pipe	43	440	32
Tailpipe bracket x Front exhaust pipe bracket	19	190	14

SERVICE SPECIFICATIONS

SERVICE DATA

Fuel pressure regulator	Fuel pressure	at no vacuum	**226 – 265 kPa (2.3 – 2.7 kgf/cm², 33 – 38 psi)**
Fuel pump	Resistance		**0.2 – 3.0 Ω**
Cold start injector	Resistance Fuel leakage		**2 – 4 Ω** **One drop or less per minute**
Injector	Resistance Injection volume Difference between each cylinder Fuel leakage		**Approx. 2 – 4 Ω** **95 – 120 cm³ (5.8 – 7.3 cu in.) per 15 sec.** **5 cm³ (0.3 cu in.) or less** **One drop or less per minute**
Air flow sensor	Resistance	Terminals VS – E2 VS – E2 VC – E2 THA – E2 THA – E2 THA – E2 THA – E2 THA – E2	**Resistance** **200 – 600 Ω (Measuring plate fully closed)** **20 – 1,200 Ω (Measuring plate fully open)** **200 – 400 Ω** **10 – 20 kΩ at −20°C (−4°F)** **4 – 7 kΩ at 0°C (32°F)** **2 – 3 kΩ at −20°C (68°F)** **0.9 – 1.3 kΩ at 40°C (104°F)** **0.4 – 0.7 kΩ at 60°C (140°F)**
Throttle body	Throttle body fully closed angle, Throttle opener setting speed		**6°** **900 – 1,900 rpm (w/ Cooling fan OFF)**
Throttle position sensor	Clearance between stop screw and lever Terminal		**Resistance**
	0 mm (0 in.) 0.50 mm (0.020 in.) 0.70 mm (0.028 in.) Throttle valve fully open	VTA – E2 IDL–E2 IDL – E2 VTA – E2 VC – E2	**0.2 – 5.7 kΩ** **2.3 kΩ or less** **Infinity** **2.0 – 10.2 kΩ** **2.5 – 5.9 kΩ**
IACV	Resistance	+ B – RSC or RSO	**17.7 – 23.9 Ω**
Cold start injector time switch	Resistance	STA – STJ STA – STJ STA – Ground	**30 – 50 Ω below 15°C (59°F)** **70 – 90 Ω above 30°C (86°F)** **30 – 90 Ω**
ECTS	Resistance		**10 – 20 kΩ at 20°C (−4°F)** **4 – 7 kΩ at 0°C (32°F)** **2 – 3 kΩ at 20°C (68°F)** **0.9 – 1.3 kΩ at 40°C (104°F)** **0.4 – 0.7 kΩ at 60°C (140°F)** **0.2 – 0.4 kΩ at 80°C (176°F)**
Solenoid resistor	Resistance	–+B – #10, #20, #30 or #40	**4 – 6 Ω**
Fuel pump resistor	Resistance (Cold)		**Approx. 0.73 Ω**
VSV (for T – VIS)	Resistance (Cold)		**33 – 39 Ω**
VSV (for Turbocharging pressure)	Resistance (Cold)		**24 – 30 Ω**

VSV (for EGR)	Resistance (Cold)		**33 – 39 Ω**
A/C idle–up valve	Resistance (Cold)		**30 – 34 Ω**
EGR function sensor (Calif. only)	Resistance		**69 – 89 kΩ at 50°C (122°F)** **11 – 15 kΩ at 100°C (212°F)** **2 – 4 kΩ at 150°C (302°F)**
Oxygen sensor	Heater coil resistance		**5.1 – 6.3 Ω at 20°C (68°F)**
PCME	Condition	Terminals	**Voltage**
	IG SW ON	+B–E1	**9 – 14 V**
	IG SW ON	+B1 – E1	**9 – 14 V**
	–	BATT – E1	**9 – 14 V**
	IG SW ON – Throttle valve open	IDL – E2	**9 – 14 V**
	IG SW ON – Throttle valve fully closed (Throttle opener must be cancelled first)	VTA – E2	**0.3 – 0.8 V**
	IG SW ON – Throttle valve fully open	VTA – E2	**3.2 – 4.9 V**
	IG SW ON	VC – E2	**4.5 – 5.5 V**
	IG SW ON – Measuring plate fully closed	VS – E2	**4.0 – 5.5 V**
	IG SW ON – Measuring plate fully open	VS – E2	**0.2 – 0.5 V**
	Idling	VS – E2	**1.6 – 4.1 V**
	3,000 rpm	VS – E2	**1.0 – 2.0 V**
	IG SW ON	#1, #2, #3 or #4 – E01	**9 – 14 V**
	IG SW ON	#1, #2, #3 or #4 – E02	**9 – 14 V**
	IG SW ON – Intake air temp. 20°C (68°F)	THA – E2	**0.5 – 3.4 V**
	IG SW ON – Coolant temp. 80° C (176° F)	THW – E2	**0.2 – 1.0 V**
	Cranking	STA – E1	**6 V or more**
	Idling	IGT – E1	**Pulse generation**
	IG SW ON – PCM E connectors disconnected	RSC – E1	**9 – 14 V**
	IG SW ON – PCM E connectors disconnected	RSO – E1	**9 – 14 V**
	No trouble ("CHECK" engine warning light off) and engine running	W – E1	**9 – 14 V**
	IG SW ON	PIM – E2	**2.5 – 4.5 V**
	IG SW ON – Air conditioning ON	AC – E1	**9 – 14 V**
	IG SW ON– Throttle valve fully closed (Throttle opener must be cancelled first)	*1TVIS – E1	**2.0 V or less**
	IG SW ON – Throttle valve open "	*1TVIS – E1	**9 – 14 V**
	Idling	*2TVIS – E1	**2.0 V or less**
	4,200 rpm or more	*2TVIS – E1	**9 – 14 V**
	IG SW ON – DLC1 TE1 – E1 not connected	TE1 – E1	**9 – 14 V**
	IG SW ON – DLC1 TE1 – E1 connected	TE1 – E1	**0.5 V or less**

Remarks: '*1 w/ Regular Gasoline *2 'w/ Premium Gasoline

	Condition	Terminals	Resistance
PCME	Throttle valve open	IDL – E2	Infinity
	Throttle valve fully closed	IDL – E2	2,300 Ω or less
	(Throttle opener must be cancelled first)		
	Throttle valve fully open	VTA – E2	2,000 – 10,200 Ω
	Throttle valve fully closed	VTA – E2	200 – 5,700 Ω
	(Throttle opener must be cancelled first)		
	–	VC – E2	2,500 – 5,900 Ω
	Measuring plate fully closed	VS – E2	200 – 600 Ω
	Measuring plate fully open	VS – E2	20 – 1,200 Ω
	Intake air temp. 20* C (68° F)	THA – E2	2,000 – 3,000 Ω
	Coolant temp. 80°C (176°F)	THW – E2	200 – 400 Ω
	Cold (–10°C (14°F) to 50°C (104°F))		
		G1 or G2–G–	125 – 200 Ω
	Hot (50°C (104°F) to 100°C (212°F))		
		G1 or G2–G–	160 – 235 Ω
	Cold (–10° C (14° F) to 50°C (104° F)) N E – G –		155 – 250 Ω
	Hot (50°C (104°F) to 100°C (212°F)) N E – G–		190 – 290 Ω
		+1B or+B1–RSCor RSO	17.7 – 23.9 Ω
Fuel cut rpm	Fuel return rpm		1,600 rpm

S00EE–02

TORQUE SPECIFICATIONS

Part tightened	N·m	kgf·cm	ft·lbf
Fuel line (Union bolt type)	29	300	22
Fuel line (Flare nut type)	30	310	22
Drain plug x Fuel tank	13	130	9
Fuel pump x Fuel tank	3.4	35	30 in.·lbf
Fuel sender gauge x Fuel tank	1.5	15	13 in.·lbf
Fuel evaporation vent tube x Fuel tank	1.5	15	13 in.·lbf
Fuel tank filler pipe x Fuel tank	3.4	35	30 in.·lbf
Fuel tank band x Body	29	300	22
No.2 center floor crossmember x Body	29	300	22
Cold start injector x Intake manifold	5.9	60	52 in.·lbf
Cold start injector pipe x Cold start injector	12	125	9
Fuel pressure regulator x Delivery pipe	29	300	22
Injector cover x Delivery pipe	7.8	80	69 in.·lbf
Delivery pipe x Cylinder head	19	195	14
Fuel inlet pipe x Delivery pipe	29	300	22
EGR valve x Intake manifold	19	195	14
EGR pipe x Cylinder head	25	260	19
Throttle body x Intake manifold	19	195	14
Intake air connector stay x Throttle body	19	195	14
Intake air connector stay x Cylinder head	7.8	80	69 in.·lbf
Intake air connector x Intake air connector	19	195	14
No.1 intake manifold stay x Intake manifold	25	260	19
No.1 intake manifold stay x Cylinder block	25	260	19

SERVICE SPECIFICATIONS

SERVICE DATA

Thermostat	Valve opening temperature Valve lift (at 95° C (203° F))	80 – 84 C (176 – 183° F) 8 mm (0.31 in.) or more
Radiator cap	Relief valve opening pressure (STD) Relief valve opening pressure (Limit)	74 – 103 kPa (0.75 – 1.05 kgf/cm^2, 10.7 – 14.9 psi) 59 kPa (0.6 kgf/cm^2, 8.5 psi)
Radiator electric cooling fan	Rotating amperage	5.8 – 7.4 A
Engine compartment cooling fan	Rotating amperage	3.1 – 4.3 A
ECTS	Resistance (at 85° C (185° F)) Resistance (at 90° C (194° F)) Resistance (at 95° C (203° F))	Approx. 1.35 kΩ Approx. 1.19 kΩ Approx. 1.05 kΩ
Engine compartment temp.sensor	Resistance (at 20° C (68° F)) Resistance (at 57.5° C (135.5° F)) Resistance (at 80°C (176°F))	Approx. 2.45 kΩ Approx. 0.63 kΩ Approx. 0.32 kΩ

TORQUE SPECIFICATIONS

Part tightened	N–m	kgf .cm	ft–lbf
Cylinder block x Drain plug	**25**	250	**18**
Radiator pipe x Drain plug	**17**	170	**12**
Water inlet x Water pump cover	7.8	**80**	69 in.–lbf
Water pump x Water pump cover	9.3	**95**	82 in.–lbf
Water pump x Cylinder block (10 mm head)	7.8	**80**	69 in.–lbf
Water pump x Cylinder block (12 mm head)	**27**	275	20 in.–lbf
Water by–pass pipe x Water pump cover	**12**	120	9 ft–lbf
No.2 idler pulley x Cylinder block	**43**	440	**32**
Water inlet x Water pump	7.8	**80**	69 in.–lbf
Upper radiator support x Body	**13**	130	**9**

SERVICE SPECIFICATIONS

SERVICE DATA

EG15A–01

Oil pressure	At idle speed (normal operating temperature)	29 kPa (0.3 kgf/cm², 43 psi) or more
	At 3,000 rpm (normal operating temperature)	245 – 490 kPa (2.5 – 5.0 kgf/cm², 36 – 71 psi)
Oil pump	Body clearance (STD)	0.10 – 0.16 mm (0.0039 – 0.0063 in.)
	Body clearance (Maximum)	0.20 mm (0.0079 in.)
	Tip clearance (STD)	0.04 – 0.16 mm (0.0016 – 0.0063 in.)
	Tip clearance (Maximum)	0.20 mm (0.0079 in.)

TORQUE SPECIFICATIONS

EG15C–01

Part tightened	N·m	kgf·cm	ft·lbf
Oil pan x Drain plug	39	400	29
Oil pump body cover x Oil pump body	8.8	90	78 in.·lbf
Oil pump x Cylinder block	8.8	90	78 in.·lbf
Oil pump pulley x Oil pump drive rotor	28	290	21
No.2 idler pulley x Cylinder block	42	425	31
Oil strainer x Cylinder block	5.4	55	48 in.·lbf
Oil strainer x Oil pump	5.4	55	48 in.·lbf
Oil pan x Cylinder block	5.4	55	48 in.·lbf
Oil pan x Oil pump	5.4	55	48 in.·lbf
TWC (main) x Exhaust manifold	29	300	22
TWC stay x TWC (main)	42	425	31
TWC stay x Cylinder block	42	425	31
Stiffener plate x Cylinder block	37	380	27
Stiffener plate x Transaxle case	37	380	27
Front exhaust pipe x TWC (main)	62	630	46
Suspension member damper x Suspension crossmember	21	210	15
Tailpipe x Front exhaust pipe	43	440	32
Tailpipe bracket x Front exhaust pipe bracket	19	190	14
Oil cooler x Cylinder block (Relief valve)	78	800	58
Oil cooler x Cylinder block (Nut)	7.8	80	69 in.·lbf
Exhaust manifold x Cylinder head	49	500	36

SERVICE SPECIFICATIONS

SERVICE DATA

EG07L–04

Thermostat	**Valve opening temperature**	**80 – 84°C (176 – 183°F)**
	Valve lift (at 95°C (203°F))	**8 mm (0.31 in.) or more**
Radiator cap	**Relief valve opening pressure (STD)**	**74 – 103 kPa (0.75 – 1.05 kgf/cm², 10.7 – 14.9 psi)**
	Relief valve opening pressure (Limit)	**59 kPa (0.6 kgf/cm², 8.5 psi)**
Radiator electric cooling fan	**Rotating amperage (M/T)**	**5.8 – 7.4 A**
	Rotating amperage (A/T)	**8.8 – 10.8 A**
ECTS	**Resistance (at 85°C (185°F))**	**Approx. 1.35 kΩ**
	Resistance (at 90°C (194°F))	**Approx. 1.19 kΩ**
	Resistance (at 95°C (203°F))	**Approx. 1.05 kΩ**

TORQUE SPECIFICATIONS

EG07M–04

Part tightened	N·m	kgf·cm	ft·lbf
Cylinder block x Drain plug	25	250	18
Radiator pipe x Drain plug	17	170	12
Water pump x Water pump cover	8.8	90	78 in.·lbf
Water pump x Cylinder block (10 mm head)	8.8	90	78 in.·lbf
Water pump x Cylinder block (12 mm head)	27	275	20 in.·lbf
Water by–pass pipe x Water pump cover	9.3	95	82 in.·lbf
No.2 idler pulley x Cylinder block	42	425	31
Water inlet x Water pump cover	8.8	90	78 in.·lbf
Radiator support bolt	13	130	9

SERVICE SPECIFICATIONS

SERVICE DATA

vsv (for EGR)	Resistance (at 20° C (68° F))	33 –39Ω

TORQUE SPECIFICATIONS

Part tightened	N–m	kgf–cm	ft–lbf
TVS x Water outlet housing	**29**	300	**22**
EGR valve x Intake manifold	**19**	195	**19**
EGR valve x EGR pipe	**59**	600	**43**
Main TWC x Turbine outlet elbow	**29**	300	**22**
TWC stay x Main TWC	**59**	600	**43**
TWC stay x Cylinder block	**59**	600	**43**
Clutch release cylinder x Transaxle	**12**	120	**9**
Front engine mounting bracket x Transaxle	**77**	790	**57**
Front engine mounting insulator x Body	**77**	790	**57**
Front engine mounting insulator x Bracket	**96**	980	**71**
Front exhaust pipe x Main TWC	**62**	630	**46**
Front exhaust pipe support bracket x Suspension crossmember	**21**	210	**15**
Suspension member damper x Suspension crossmember	**21**	210	**15**
Tailpipe x Body bracket	**66**	670	**48**
Tailpipe x Front exhaust pipe	**43**	**440**	**32**
Tailpipe bracket x Front exhaust pipe bracket	**19**	190	**14**
A/C idler pulley bracket x Cylinder block (12 mm head)	**25**	250	**18**
A/C idler pulley bracket x Cylinder block (14 mm head)	**27**	275	**20**
A/C idler pulley bracket x RH engine hanger	**37**	375	**27**
A/C compressor x Cylinder block	**25**	250	**18**
Lower suspension brace x Body	**73**	740	**54**

SERVICE SPECIFICATIONS
SERVICE DATA

E00CS–08

Tune – up	Battery specific gravity	1.25 – 1.27 (when fully charged at 20°C (68°F))
	High–tension cord resistance – Limit	25 kΩ per cord
	Alternator drive belt tension	
	New belt	120 ± 20 lbf
	Uesd belt	104 ± 20 lbf
	Valve clearance (Cold) – Intake	0.15 – 0.25 mm (0.006 – 0.010 in.)
	Valve clearance (Cold) – Exhaust	0.28 – 0.38 mm (0.011 – 0.015 in.)
	Ignition timing	10° BTDC @ idle
	Idle speed	800 ± 50 rpm
Intake manifold vacuum	at idle speed	60 kPa (450 mmHg, 17.7 in.Hg)
Compression pressure	at 250 rpm – STD	1,128 kPa (11.5 kgf/cm², 164 psi) or more
	at 250 rpm – Limit	883 kPa (9.0 kgf/cm², 128 psi)
	Difference of pressure between each cylinder	98 kPa (1.0 kgf/cm², 14 psi) or less
Timing belt tensioner	Protrusion	8.5 – 9.5 mm (0.335 – 0.374 in.)
Cylinder head	Warpage – Cylinder block side (Limit)	0.20 mm (0.0079 in.)
	Warpage – Intake manifold side (Limit)	0.20 mm (0.0079 in.)
	Warpage – Exhaust manifold side (Limit)	0.30 mm (0.0118 in.)
	Valve seat – Refacing angle	30°, 45°, 75°
	Valve seat – Contacting angle	45°
	Valve seat – Contacting width	1.0 – 1.4 mm (0.039 – 0.055 in.)
Valve guide bushing	Inside diameter	6.000 – 6.018 mm (0.2362 – 0.2369 in.)
	Outside diameter (for replacement part) – STD	10.988 – 11.006 mm (0.4326 – 0.4333 in.)
	Outside diameter (for replacement part) – O/S 0.05	11.038 – 11.056 mm (0.4346 – 0.4353 in.)
Valve	Valve overall length – STD (Intake)	105.50 mm (4.1535 in.)
	Valve overall length – STD (Exhaust)	99.55 mm (3.9193 in.)
	Valve overall length – Limit (Intake)	104.80 mm (4.1260 in.)
	Valve overall length – Limit (Exhaust)	98.85 mm (3.8917 in.)
	Vale face angle	44.5°
	Stem diameter (Intake)	5.960 – 5.975 mm (0.2346 – 0.2352 in.)
	Stem diameter (Exhaust)	5.955 – 5.970 mm (0.2344 – 0.2350 in.)
	Stem oil clearance – STD (Intake)	0.025 – 0.058 mm (0.0010 – 0.0023 in.)
	Stem oil clearance – STD (Exhaust)	0.030 – 0.063 mm (0.0012 – 0.0025 in.)
	Stem oil clearance – Limit (Intake)	0.08 mm (0.0031 in.)
	Stem oil clearance – Limit (Exhaust)	0.10 mm (0.0039 in.)
	Margin thickness – STD	0.8 – 1.2 mm (0.031 – 0.047 in.)
	Margin thickness – Limit	0.5 mm (0.020 in.)
Valve spring	Squareness – Limit	2.0 mm (0.079 in.)
	Free length	44.43 mm (1.7492 in.)
	Installed tension at 34.4 mm (1.354 in.)	201 – 236 N (20.5 – 24.1 kgf, 45.2 – 53.1 lbf)

Valve lifter	Lifter diameter	27.975 – 27.985 mm (1.1014 – 1.1018 in.)
	Lifter bore diameter	28.000 – 28.021 mm (1.1024 – 1.1032 in.)
	Oil clearance – STD	0.015 – 0.046 mm (0.0006 – 0.0018 in.)
	Oil clearance – Limit	0.07 mm (0.0028 in.)
Manifold	Warpage – Limit	0.20 mm (0.0079 in.)
T–VIS valve	Warpage – Limit	0.20 mm (0.0079 in.)
VSV (for T–VIS)	Resistance (Cold)	33 – 39 Ω
Camshaft	Thrust clearance – STD	0.120 – 0.240 mm (0.0047 – 0.0094 in.)
	Thrust clearance – Limit	0.30 mm (0.0118 in.)
	Journal oil clearance – STD	0.0025 – 0.062 mm (0.0010 – 0.0024 in.)
	Journal oil clearance – Limit	0.08 mm (0.0031 in.)
	Journal diameter	26.959 – 26.975 mm (1.0614 – 1.0620 in.)
	Circle rounout – Limit	0.06 mm (0.0024 in.)
	Cam lobe height – STD	41.010 – 41.110 mm (1.6146 – 1.6185 in.)
	Cam lobe height – Limit	39.90 mm (1.5709 in.)
Cylinder block	Cylinder head surface warpage – Limit	0.05 mm (0.0020 in.)
	Cylinder bore diameter – STD (Mark 1)	86.000 – 86.010 mm (3.3858 – 3.3862 in.)
	Cylinder bore diameter – STD (Mark 2)	86.010 – 86.020 mm (3.3862 – 3.3866 in.)
	Cylinder bore diameter – STD (Mark 3)	86.020 – 86.030 mm (3.3866 – 3.3870 in.)
	Cylinder bore diameter – Limit	86.23 mm (3.3949 in.)
Piston and piston ring	Piston diameter – STD (Mark 1)	85.920 – 85.930 mm (3.3827 – 3.3831 in.)
	Piston diameter – STD (Mark 2)	85.930 – 85.940 mm (3.3831 – 3.3835 in.)
	Piston diameter – STD (Mark 3)	85.840 – 85.950 mm (3.3835 – 3.3839 in.)
	Piston oil clearance – STD	0.070 – 0.090 mm (0.0028 – 0.0035 in.)
	Piston oil clearance – Limit	0.11 mm (0.0043 in.)
	Piston ring groove clearance – No.1	0.040 – 0.080 mm (0.0016 – 0.00031 in.)
	Piston ring groove clearance – No.2	0.030 – 0.070 mm (0.0012 – 0.0028 in.)
	Piston ring end gap – STD (No.1)	0.330 – 0.550 mm (0.0130 – 0.0217 in.)
	Piston ring end gap – STD (No.2)	0.450 – 0.670 mm (0.0177 – 0.0264 in.)
	Piston ring end gap – STD (Oil)	0.200 – 0.600 mm (0.0079 – 0.0236 in.)
	Piston ring end gap – Limit (No.1)	0.85 mm (0.0335 in.)
	Piston ring end gap – Limit (No.2)	0.97 mm (0.0382 in.)
	Piston ring end gap – Limit (Oil)	0.90 mm (0.0354 in.)
Connecting rod	Thrust clearance – STD	0.160 – 0.312 mm (0.0063 – 0.0123 in.)
	Thrust clearance – Limit	0.35 mm (0.0138 in.)
	Connecting rod bearing center wall thickness	
	– STD (Mark 1)	1.484 – 1.488 mm (0.0584 – 0.0586 in.)
	– STD (Mark 2)	1.488 – 1.492 mm (0.0586 – 0.0587 in.)
	– STD (Mark 3)	1.492 – 1.496 mm (0.0587 – 0.0589 in.)
	Connecting rod oil clearance	
	– STD (STD)	0.024 – 0.055 mm (0.0009 – 0.0022 in.)
	– STD (U/S 0.25)	0.023 – 0.069 mm (0.0009 – 0.0027 in.)
	– Limit	0.08 mm (0.0031 in.)
	Rod bend – Limit per 100 mm (3.94 in.)	0.05 mm (0.0020 in.)
	Rod twist – Limit per 100 mm (3.94 in.)	0.15 mm (0.0059 in.)

Connecting rod (cont'd)	Bushing inside diameter	22.005 – 22.017 mm (0.8663 – 0.8668 in.)
	Piston pin diameter	21.997 – 22.009 mm (0.8660 – 0.8665 in.)
	Piston pin oil clearance – STD	0.005 – 0.011 mm (0.0002 – 0.0004 in.)
	Piston pin oil clearance – Limit	0.05 mm (0.0020 in.)
Crankshaft	Thrust clearance – STD	0.020 – 0.220 mm (0.0008 – 0.0087 in.)
	Thrust clearance – Limit	0.30 mm (0.0118 in.)
	Thrust washer thickness	2.440 – 2.490 mm (0.0961 – 0.0980 in.)
	Main journal oil clearance	
	– STD (No.3 – STD)	0.025 – 0.044 mm (0.0010 – 0.0017 in.)
	– STD (No.3 – U/S 0.25)	0.021 – 0.061 mm (0.0008 – 0.0024 in.)
	– STD (Others – STD)	0.015 – 0.034 mm (0.0006 – 0.0013 in.)
	– STD (Others – U/S 0.25)	0.029 – 0.069 mm (0.0011 – 0.0027 in.)
	– Limit	0.08 mm (0.0031 in.)
	Main journal diameter – STD	54.988 – 55.003 mm (2.1653 – 2.1655 in.)
	Main journal diameter – U/S 0.25	54.745 – 54.755 mm (2.1553 – 2.1557 in.)
	Main bearing center wall thickness	
	– STD (No.3 – Mark 1)	1.992 – 1.995 mm (0.0784 – 0.0785 in.)
	– STD (No.3 – Mark 2)	1.995 – 1.998 mm (0.0785 – 0.0787 in.)
	– STD (No.3 – Mark 3)	1.998 – 2.001 mm (0.0787 – 0.0788 in.)
	– STD (No.3 – Mark 4)	2.001 – 2.004 mm (0.0788 – 0.0789 in.)
	– STD (No.3 – Mark 5)	2.004 – 2.007 mm (0.0789 – 0.0790 in.)
	– STD (Others – Mark 1)	1.997 – 2.000 mm (0.0786 – 0.0787 in.)
	– STD (Others – Mark 2)	2.000 – 2.003 mm (0.0787 – 0.0789 in.)
	– STD (Others – Mark 3)	2.003 – 2.006 mm (0.0789 – 0.0790 in.)
	– STD (Others – Mark 4)	2.006 – 2.009 mm (0.0790 – 0.0791 in.)
	– STD (Others – Mark 5)	2.009 – 2.012 mm (0.0791 – 0.0792 in.)
	Crank pin diameter – STD	47.985 – 48.000 mm (1.8892 – 1.8898 in.)
	Crank pin diameter – U/S 0.25	47.745 – 47.755 mm (1.8797 – 1.8801 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.)

E0GC8–02

TORQUE SPECIFICATION

Part tightened	N–m	kgf–cm	ft–lbf
Cylinder head cover x Cylinder head	2.5	25	21 in.·lbf
Throttle body x Intake manifold	19	195	14
Intake air connector stay x Intake manifold	19	195	14
Intake air connector stay x Cylinder head	7.8	80	69 in.·lbf
Intake air connector x Intake air connector stay	19	195	14
Distributor x Cylinder head	39	400	29
Spark plug x Cylinder head	18	180	13
Oil pump pulley x Oil pump drive shaft	35	355	26
No.2 idler pulley x Cylinder block	43	440	32
No.1 idler pulley x Cylinder head	52	530	38
Crankshaft pulley x Crankshaft	108	1,100	80
Camshaft timing pulley x Camshaft	59	600	43
Camshaft timing pulley x Camshaft (For use with SST)	41	420	30
Timing belt tensioner x Cylinder head	21	210	15

Cylinder head x Cylinder block (1 st)	49	500	36
Cylinder head x Cylinder block (2nd)	Turn 90°		
Camshaft bearing cap x Cylinder head	19	190	14
No.3 timing belt cover x Cylinder head	8.8	90	78 in.·lbf
Delivery pipe x Cylinder head	19	195	14
Intake manifold x Cylinder head	19	195	14
Intake manifold stay x Intake manifold	25	260	19
Intake manifold stay x Cylinder block	25	260	19
Water by–pass pipe x Water pump cover	7.8	80	69 in.·lbf
Oil cooler x Oil cooler bracket (Relief valve)	78	800	58
Oil cooler x Cylinder block (Nut)	7.8	80	69 in.·lbf
Water outlet housing x Cylinder head	39	400	29
EGR valve x Intake manifold	19	195	14
EGR pipe x Cylinder head	25	260	19
RH front engine hanger x Cylinder head	39	400	29
RH front engine hanger x Mounting bracket	61	620	45
LH engine hanger x Cylinder head (12 mm head)	13	130	9
LH engine hanger x Cylinder head (14 mm head)	19	195	14
Exhaust manifold x Cylinder head	52	530	38
Cold start injector x Intake manifold	5.9	60	52 in.·lbf
Cold start injector pipe x Cold start injector	12	125	9
Cold start injector pipe x Delivery pipe	12	125	9
Main TWC x Turbine outlet elbow	29	300	22
TWC stay x Main TWC	59	600	43
TWC stay x Cylinder block	59	600	43
Oil nozzle x Cylinder block	9.1	93	81 in.·lbf
Main bearing cap x Cylinder block	59	600	43
Connecting rod cap x Connecting rod	67	680	49
Rear oil seal retainer x Cylinder block	9.3	95	82 in.·lbf
Knock sensor x Cylinder block	37	380	27
Oil cooler bracket x Cylinder block	7.8	80	69 in.·lbf
Water pump x Cylinder block (10 mm heady	7.8	80	69 in.·lbf
Water pump x Cylinder block (12 mm head)	27	275	20 in.·lbf
Alternator bracket x Cylinder block	43	440	32
Rear end plate x Cylinder block	9.3	95	82 in.·lbf
Flywheel x Crankshaft	108	1,100	80
Clutch cover x Flywheel	19	195	14
Transaxle x Cylinder block	64	650	47
Transaxle x Rear end plate	46	470	34
Heater water pipe x Cylinder block	46	470	34
No.2 rear end plate x Cylinder block	9.3	95	82 in.·lbf
No.2 rear end plate x Transaxle	19	195	14
Stiffener plate x Cylinder block	37	380	27
Stiffener plate x Transaxle	37	380	27
Starter x Rear end plate	39	400	29
Drive shaft bearing bracket x Cylinder block	64	650	47
Drive shaft bearing stay x Bearing stay	75	770	56
RH engine mounting bracket x Cylinder block	61	620	45
RH engine mounting Insulator x Mounting Bracket	52	530	38

RH engine mounting Insulator x Body	78	800	58
RH engine mounting stay x RH engine hanger	73	740	54
RH engine mounting stay x Mounting insulator	73	740	54
LH engine mounting bracket x Transaxle	52	530	38
LH engine mounting insulator x Transaxle	52	530	38
LH engine mounting insulator x Mounting bracket (upper side)	73	740	54
LH engine mounting insulator x Mounting bracket (lower side)	63	650	47
LH engine mounting insulator x Body	78	800	58
LH engine mounting stay x Mounting insulator	73	740	54
LH engine mounting stay x Transaxle	25	250	47
Front engine mounting bracket x Transaxle	77	790	57
Front engine mounting insulator x Body	73	740	54
Front engine mounting insulator x Mounting bracket	96	980	70
Rear engine mounting bracket x Transaxle (rear side)	77	790	57
Rear engine mounting bracket x Transaxle (RH side)	39	400	29
Rear engine mounting insulator x Body	64	650	47
Rear engine mounting insulator x Mounting bracket	87	890	64
Rear suspension lower crossmember x Body	113	1,150	83
Lateral control rod x Body	35	360	26
Lateral control rod x LH engine mounting insulator	37	380	27
A/C idler pulley bracket x Cylinder block (12 mm heady	25	250	18
A/C idler pulley bracket x Cylinder block 0 4 mm head)	27	275	20
A/C idler pulley bracket x RH engine hanger	37	375	27
A/C compressor x Cylinder block	25	250	18
Clutch release cylinder x Transaxle	12	120	9
Front exhaust pipe x Main TWC	62	630	46
Front exhaust pipe support bracket x Suspension crossmember	21	210	15
Suspension member damper x Suspension crossmember	21	210	15
Tailpipe x Body bracket	66	670	48
Tailpipe x Front exhaust pipe	43	440	32
Tailpipe bracket x Front exhaust pipe bracket	19	190	14
Tailpipe x Body bracket	66	670	48
Lower suspension brace x Body	73	740	54
Upper suspension brace x Body (Bolt)	73	740	54
Upper suspension brace x Body (Nut)	64	650	47

SERVICE SPECIFICATIONS

SERVICE DATA

Fuel pressure regulator	Fuel pressure	at no vacuum	265 – 304 kPa (2.7 – 3.1 kgf/cm², 38 – 44 psi)
Fuel pump	Resistance		0.2 – 3.0 Ω
Injector	Resistance		Approx. 13.8 Ω
	Injection volume		49 – 59 cm³ (3.0 – 3.6 cu in.) per 15 sec.
	Difference between each cylinder		5 cm³ (0.3 cu in.) or less
	Fuel leakage		One drop or less per minute
Throttle body	Throttle body fully closed angle		6°
	Throttle opener setting speed		1,300 – 1,500 rpm (w/ Cooling fan OFF)
Throttle position sensor	Clearance between stop screw and lever	Terminal	Resistance
	0 mm (0 in.)	VTA – E2	0.2 – 5.7 kΩ
	0.50 mm (0.020 in.)	IDL – E2	2.3 kΩ or less
	0.70 mm (0.028 in.)	IDL – E2	Infinity
	Throttle valve fully open	VTA – E2	2.0 – 10.2 kΩ
	–	VC – E2	2.5 – 5.9 kΩ
IACV	Resistance	+B – ISCC or ISCO	19.3 – 22.3 Ω
ECTS	Resistance		10 – 20 kΩ at 20°C (–4°F) 4 – 7 kΩ at 0°C (32°F) 2 – 3 kΩ at 20°C (68°F) 0.9 – 1.3 kΩ at 40°C (104°F) 0.4 – 0.7 kΩ at 60°C (140°F) 0.2 – 0.4 kΩ at 80°C (176°F)
TATS	Resistance		10 – 20 kΩ at 20°C (–4°F) 4 – 7 kΩ at 0°C (32°F) 2 – 3 kΩ at 20°C (68°F) 0.9 – 1.3 kΩ at 40°C (104°F) 0.4 – 0.7 kΩ at 60°C (140°F) 0.2 – 0.4 kΩ at 80°C (176°F)
VSV (for Fuel pressure)	Resistance (Cold)		37 – 44 Ω
VSV (for EGR)	Resistance (Cold)		33 – 39 Ω
A/C idle–up valve	Resistance (Cold)		30 – 34 Ω
EGR function sensor (Calif. only)	Resistance		69 – 89 kΩ at 50°C (122°F) 11 – 15 kΩ at 100°C (212°F) 2 – 4 kΩ at 150°C (302°F)
Oxygen sensor	Heater coil resistance		5.1 – 6.3 Ω at 20°C (68°F)

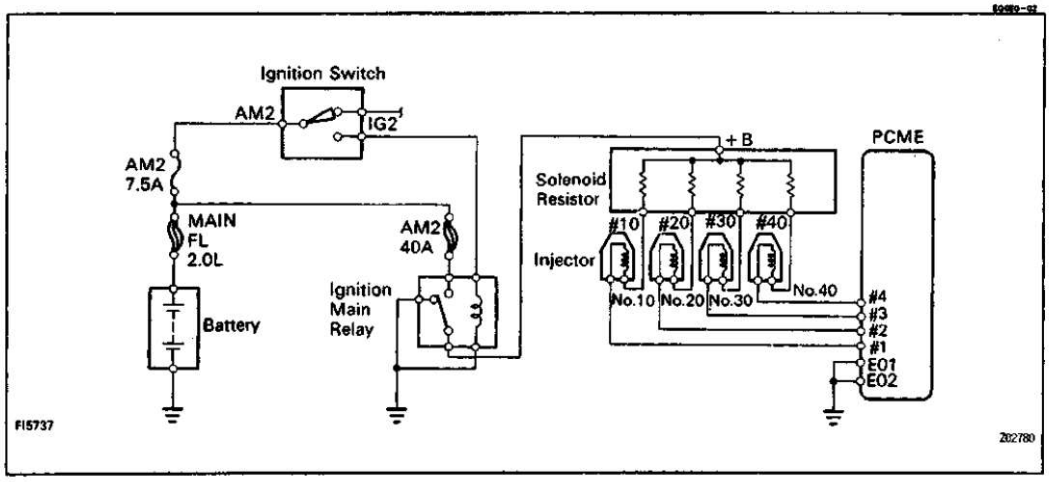
	Condition	Terminals	Voltage
PCME (& T)	IG SW ON	+B–E1	9 – 14 V
	IG SW ON	+B1 – E1	9 – 14 V
	–	BATT – E1	9 – 14 V
	IG SW ON – Throttle valve open	IDL – E2	9 – 14 V
	IG SW ON – Throttle valve fully closed (Throttle opener must be cancelled first)	VTA – E2	0.3 – 0.8 V
	IG SW ON – Throttle valve fully open	VTA – E2	3.2 – 4.9 V
	IG SW ON	PIM – E2	3.3 – 3.9 V
	IG SW ON	VC – E2	4.5 – 5.5 V
	IG SW ON	#10 or #20 – E01	9 – 14 V
	IG SW ON	#10 or #20 – E02	9 – 14 V
	IG SW ON – Intake air temp. 20°C (68°F)	THA – E2	0.5 – 3.4 V
	IG SW ON – Coolant temp. 80°C (176°F)	THW – E2	0.2 – 1.0 V
	Cranking	STA – E1	6 V or more
	Idling	IGT – E1	Pulse generation
	IG SW ON	ISCO – E1	9 – 14 V
	No trouble ("CHECK" engine warning light off) and engine running	W – E1	9 – 14 V
	IG SW ON – Air conditioning ON	ACA – E2	0 – 3 V
	IG SW ON – Air conditioning ON	ACT – E2	4.5 – 5.5 V
	IG SW ON – DLC1 TE1 – E1 not connected	TE1 – E1	9 – 14 V
	IG SW ON – DLC1 TE1 – E1 connected	TE1 – E1	0 – 3 V
	IG SW ON – Park/neutral switch P or N range	NSW – E1 (A/T only)	0 – 3 V
	IG SW ON – EX. Park/neutral switch P or N range	NSW – E1 (A/T only)	9 – 14 V
	Stop light SW ON (Brake pedal depressed)	B/K – E1	7.5 – 14 V

PCM E (& T)	Condition	Terminals	Resistance
	Throttle valve open	IDL – E2	Infinity
	Throttle valve fully closed	IDL – E2	2,300 Ω or less
	(Throttle opener must be cancelled first)		
	Throttle valve fully open	VTA – E2	2,000 – 10,200 Ω
	Throttle valve fully closed	VTA – E2	200 – 5,700 Ω
	(Throttle opener must be cancelled first)		
	–	VC – E2	2,500 – 5,900 Ω
	Intake air temp. 20°C (68°F)	THA – E2	2,000 – 3,000 Ω
	Coolant temp. 80°C (176°F)	THW – E2	200 – 400 Ω
	Cold (–10°C (14°F) to 50°C (104°F))	G+ – G–	185 – 275 Ω
	Hot (50°C (104°F) to 100°C (212°F))	G+ – G–	240 – 325 Ω
	Cold (–10°C (14°F) to 50°C (104°F))	NE+ – NE–	370 – 550 Ω
	Hot (50°C (104°F) to 100°C (212°F))	NE+ – NE–	475 – 650 Ω
	–	+B or +B1 – ISCC or ISCO	19.3 – 22.3 Ω
Fuel cut rpm	Fuel return rpm		1,500 rpm

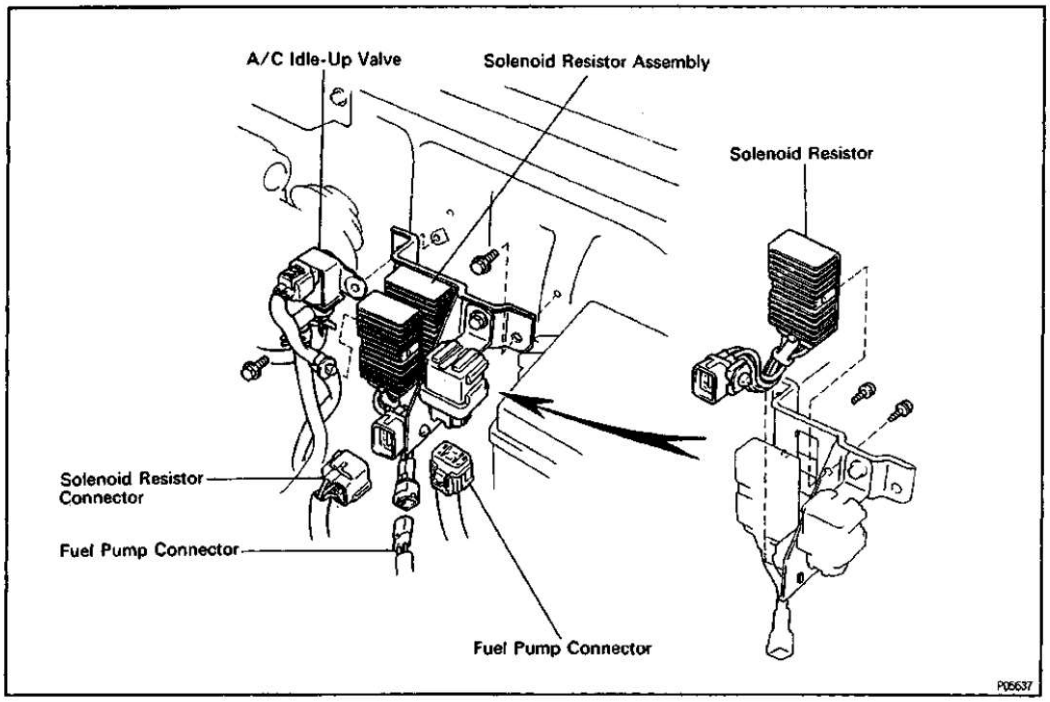
TORQUE SPECIFICATIONS

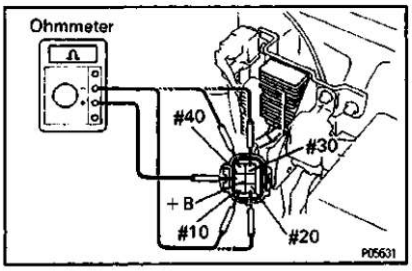
Part tightened	N·m	kgf·cm	ft·lbf
Fuel line (Union bolt type)	29	300	22
Fuel line (Flare nut type)	30	310	22
Drain plug x Fuel tank	13	130	9
Fuel pump x Fuel tank	3.4	35	30 in.·lbf
Fuel sender gauge x Fuel tank	1.5	15	13 in.·lbf
Fuel evaporation vent tube x Fuel tank	1.5	15	13 in.·lbf
Fuel tank filler pipe x Fuel tank	3.4	35	30 in.·lbf
Fuel tank band x Body	29	300	22
No.2 center floor crossmember x Body	29	300	22
Fuel pressure regulator x Delivery pipe	5.4	55	48 in.·lbf
Fuel return pipe x Fuel pressure regulator	19	195	14
Delivery pipe x Cylinder head	13	130	9
Fuel inlet pipe x Delivery pipe	34	350	25
Air intake chamber stay x Intake manifold	42	425	31
Air intake chamber stay x Cylinder head	42	425	31
Throttle body x Intake manifold	19	195	14

SOLENOID RESISTOR



COMPONENTS FOR REMOVAL AND INSTALLATION





SOLENOID RESISTOR INSPECTION

1. DISCONNECT SOLENOID RESISTOR CONNECTOR

2. INSPECT SOLENOID RESISTOR

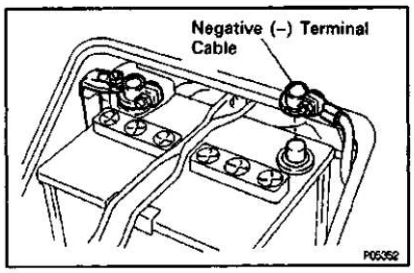
Using an ohmmeter, measure the resistance between each terminal.

Resistance (Cold):

4–6Ω

If the resistance is not as specified, replace the re–sistor.

3. RECONNECT SOLENOID RESISTOR CONNECTOR

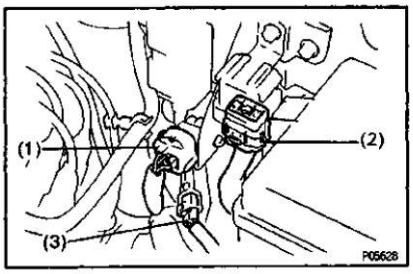


SOLENOID RESISTOR REPLACEMENT

(See Components for Removal and Installation)

1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY

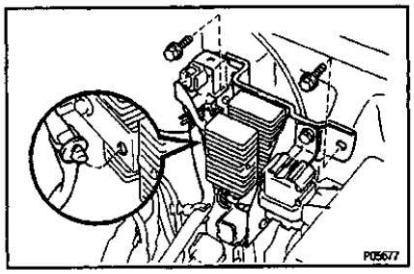
CAUTION: Turn the ignition switch to 'LOCK'. Discon–nect the negative terminal from the battery. Wait at least 20 seconds before proceeding with work.



2. DISCONNECT CONNECTORS

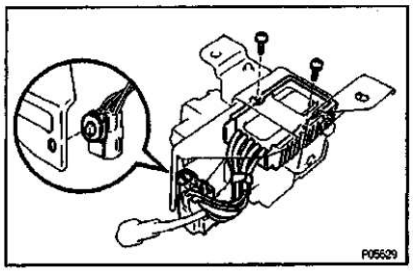
Disconnect the following connector:

(1) Solenoid resistor connector
(2) Fuel pump relay connector
(3) Fuel pump resistor connector



3. REMOVE SOLENOID RESISTOR ASSEMBLY

(a) Remove the mounting bolt.
(b) Disconnect the wire clamp from the bracket, and remove the solenoid resistor assembly.

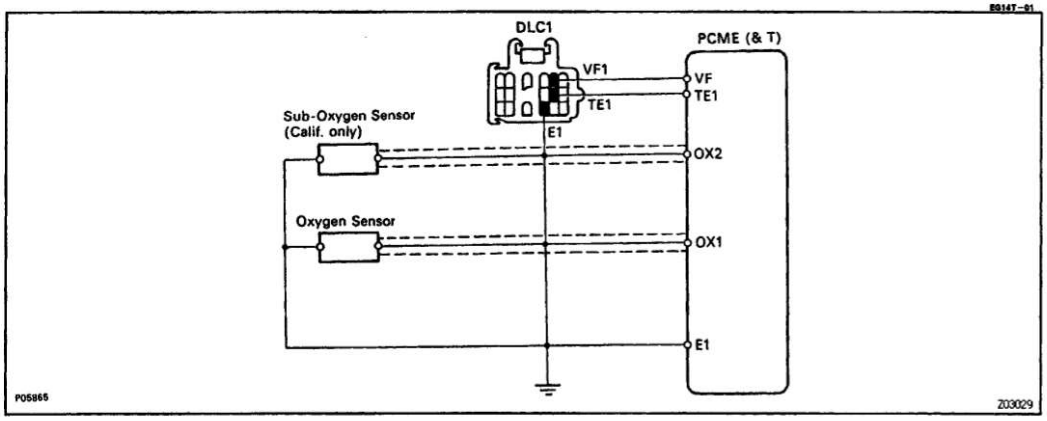


4. REMOVE SOLENOID RESISTOR FROM BRACKET

(a) Disconnect the wire clamp from the bracket.
(b) Remove the two screws and solenoid resistor.

5. REINSTALL SOLENOID RESISTOR TO BRACKET
6. REINSTALL SOLENOID RESISTOR ASSEMBLY
7. RECONNECT CONNECTORS
8. RECONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY

SUB–OXYGEN SENSOR (Calif.)



SUB–OXYGEN SENSOR INSPECTION

INSPECT SUB–OXYGEN SENSOR

HINT: Inspect only when code No.27 is displayed.

(a) Cancel the diagnostic code. (See Diagnosis System)

(b) Warm up the engine until it reaches normal operating temperature.

(c) (M/T)

Drive for 5 minutes or more at a speed less than 80 km/h (50 mph) in 4th or 5th gear.

(A/T)

Drive for 5 minutes or more at a speed less than 80 km/h (50 mph) in D range.

(d) Following the conditions in step (c), fully depress on the accelerator pedal for 2 seconds or more.

(e) Stop the vehicle and turn the ignition switch OFF.

(f) Carry out steps (b), (c) and (d) again to test acceleration.

If code No.27 appears again, check the sub–oxygen sensor circuit. If the circuit is normal, replace the sub –oxygen sensor.

EMISSION CONTROL SYSTEMS

SYSTEM PURPOSE

System	Abbreviation	Purpose
Positive crankcase ventilation	PCV	Reduces blow–by gas (HC)
Fuel evaporative emission control	EVAP	Reduces evaporative HC
Exhaust gas recirculation	EGR	Reduces NOx
Three–way catalyst	TWC	Reduces HC, CO and NOx
Electronic fuel injection*	MPI	Regulates all engine conditions for reduction of exhaust emissions.

* For inspection and repair of the MPI system, refer to MPI Section.

V01052

PREPARATION

SST (SPECIAL SERVICE TOOLS)

 09843–18020 Diagnosis Check Wire	

RECOMMENDED TOOLS

 09082–00015 TOYOTA Electrical Tester	

EQUIPMENT

Heater	TVS
Thermometer	TVS
Tachometer	
Torque wrench	
Vacuum gauge	

SSM (SPECIAL SERVICE MATERIALS)

08833–00070 Adhesive 1324, THREE BOND 1324 or equivalent	**TVS**

EMISSION CONTROL SYSTEMS

SYSTEM PURPOSE

E0057–02

System	Abbreviation	Purpose
Positive crankcase ventilation	PCV	Reduces blow–by gas (HC)
Fuel evaporative emission control	EVAP	Reduces evaporative HC
Exhaust gas recirculation	EG R	Reduces NOx
Three–way catalyst	TWC	Reduces HC, CO and NOx
Electronic fuel injection"	SMPI	Regulates all engine conditions for reduction of exhaust emissions.

* For inspection and repair of the SMPI system, refer to SMPI Section.

V00997

PREPARATION

RECOMMENDED TOOLS

E0058–01

 09082–00015 TOYOTA Electrical Tester	

E0059–02

EQUIPMENT

Heater	TVS
Thermometer	TVS
Tachometer	
Torque wrench	
Vacuum gauge	

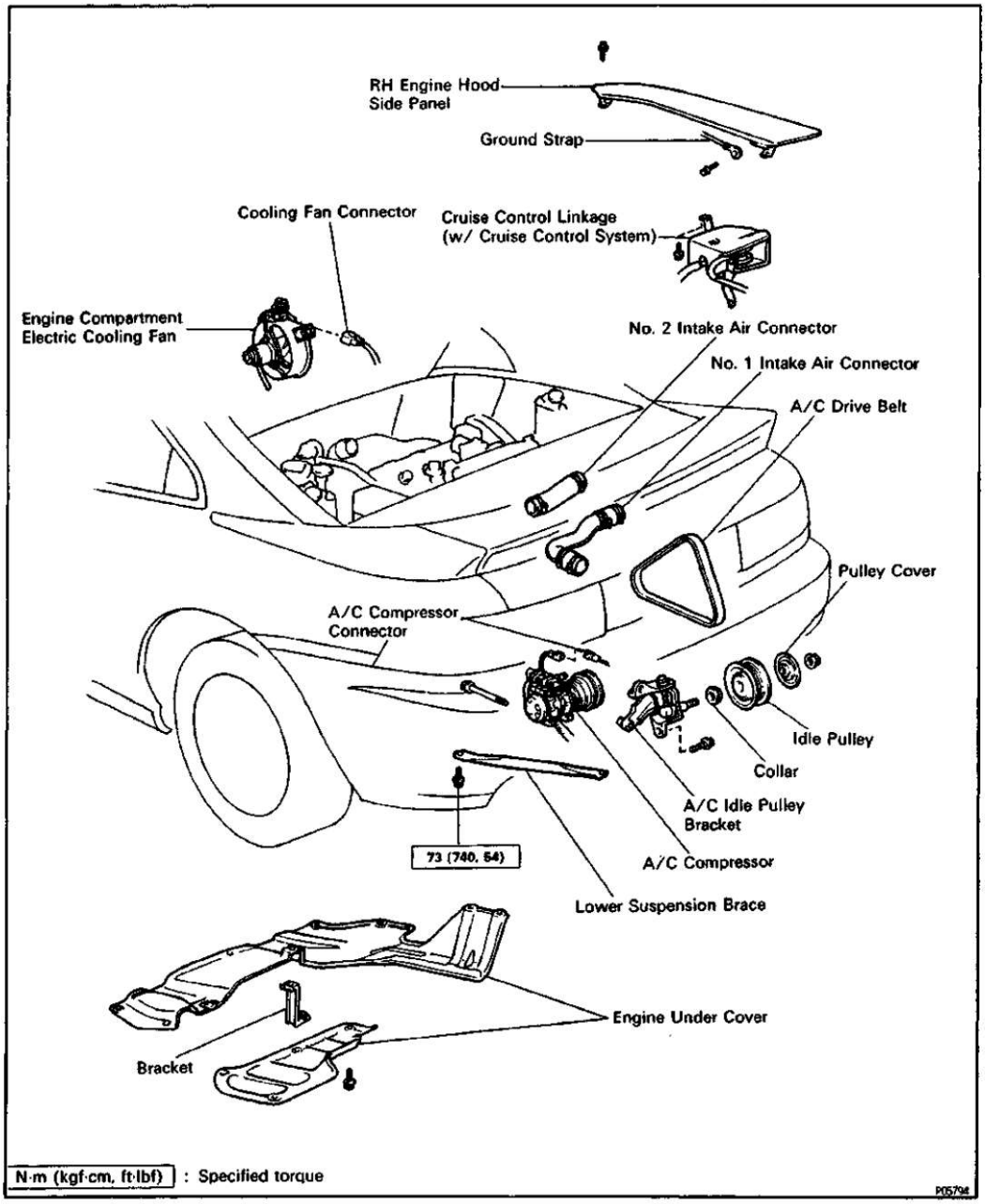
E0060–02

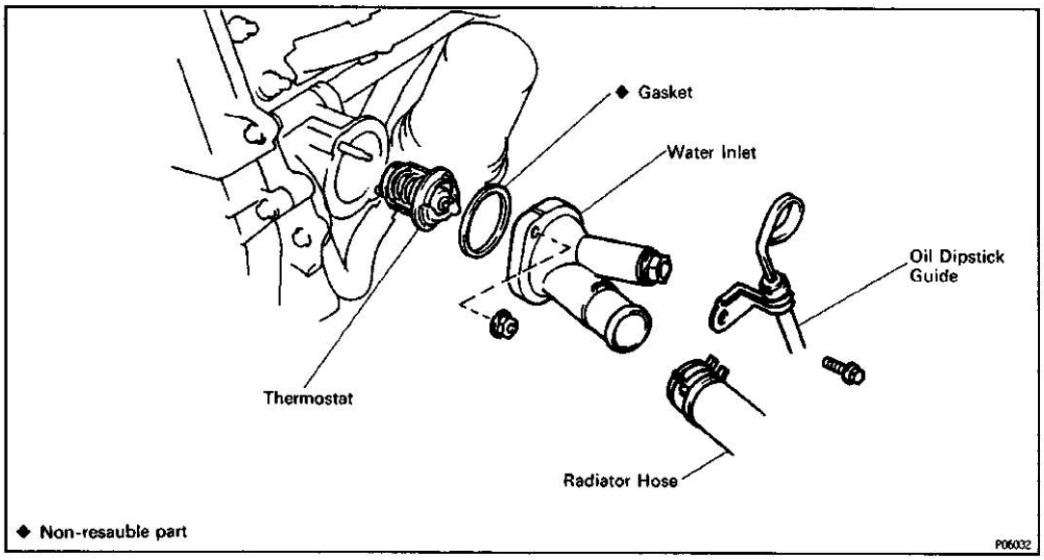
SSM (SPECIAL SERVICE MATERIALS)

08833–00070 Adhesive 1324, THREE BOND 1324 or equivalent	TVS

THERMOSTAT

COMPONENTS FOR REMOVAL AND INSTALLATION





THERMOSTAT REMOVAL

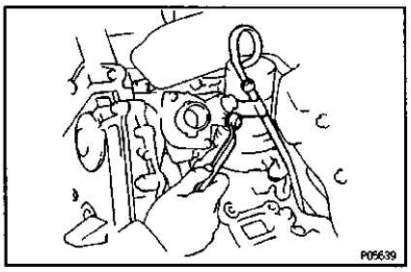
(See Components for Removal and Installation)

HINT: Removal of the thermostat would have an adverse effect, causing a lowering of cooling efficiency. Do not remove the thermostat, even if the engine tends to overheat.

1. DISCONNECT A/C COMPRESSOR FROM ENGINE (See steps 1, 2, 4, 7, 9 and 10 in Timing Belt Removal under Engine Mechanical)

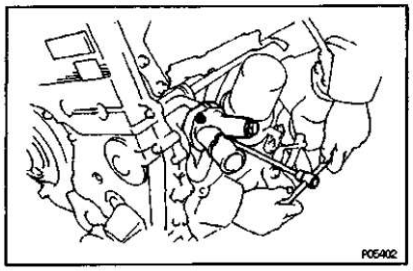
2. DRAIN ENGINE COOLANT

3. DISCONNECT RADIATOR HOSE FROM WATER INLET



4. DISCONNECT OIL DIPSTICK GUIDE FROM WATER INLET

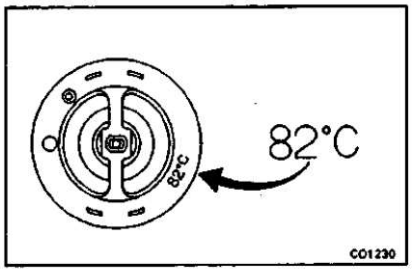
Remove the bolt, and disconnect the dipstick guide from the water inlet.



5. REMOVE WATER INLET AND THERMOSTAT

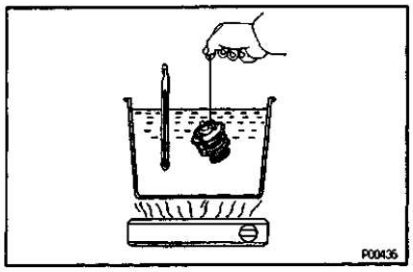
(a) Remove the two nuts and water inlet from the water pump cover.
(b) Remove the thermostat.
(c) Remove the gasket from the thermostat.

THERMOSTAT INSPECTION



INSPECT THERMOSTAT

HINT: The thermostat is numbered with the valve opening temperature.

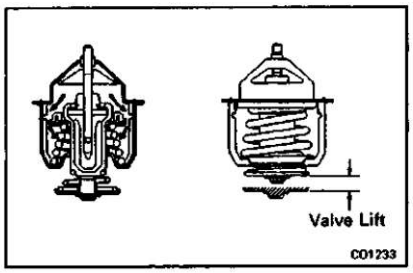


(a) Immerse the thermostat in water and gradually heat the water.
(b) Check the valve opening temperature.

Valve opening temperature:

80–84°C (176–183°F)

If the valve opening temperature is not as specified, replace the thermostat.

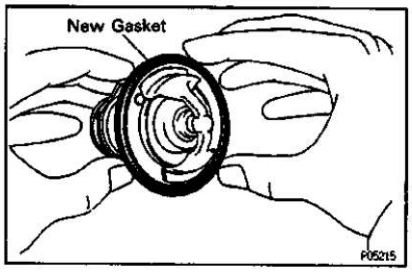


(c) Check the valve lift.

Valve lift:

8 mm (0.31 in.) or more at 95° C (203° F)

If the valve lift is not as specified, replace the thermostat.
(d) Check that the valve spring is tight when the thermostat is fully closed.
If not closed, replace the thermostat.

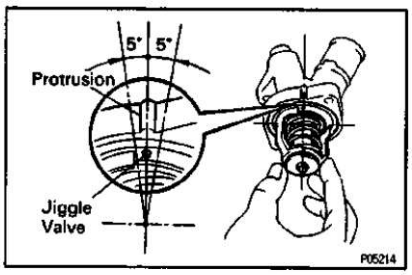


THERMOSTAT INSTALLATION

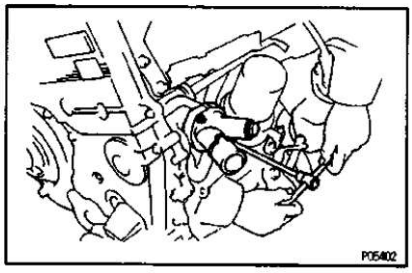
(See Components for Removal and Installation)

1. PLACE THERMOSTAT IN WATER PUMP

(a) Install a new gasket to the thermostat.



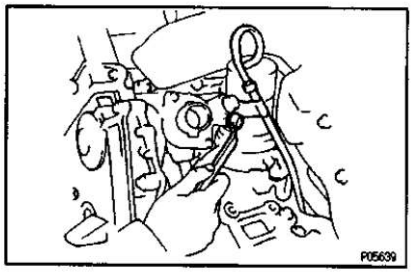
(b) Align the jiggle valve of the thermostat with the protrusion of the water inlet, and insert the thermostat in the water inlet.
HINT: The jiggle valve may be set within 5° of either side of the prescribed position.



2. INSTALL WATER INLET AND THERMOSTAT

Install the water inlet and thermostat with the two nuts.

Torque: 7.8 N–m (80 kgf–cm, 69 in.–lbf)



3. INSTALL OIL DIPSTICK GUIDE TO WATER INLET

Install the dipstick guide with the bolt.

4. CONNECT RADIATOR HOSE TO WATER INLET

5. INSTALL A/C COMPRESSOR

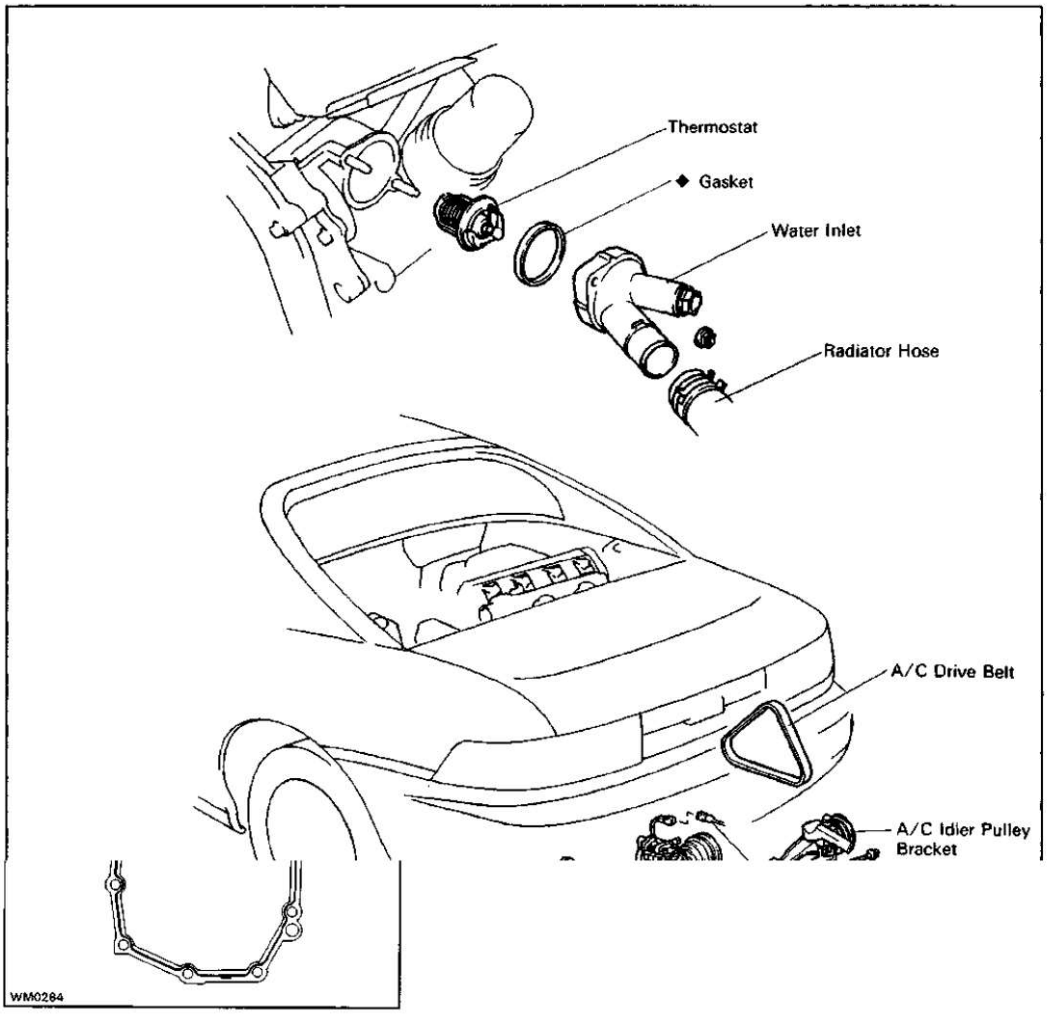
(See steps 27, 28, 30, 33, 35 and 36 in Timing Belt Installation under Engine Mechanical)

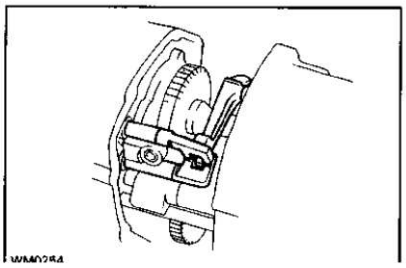
6. FILL WITH ENGINE COOLANT

7. START ENGINE AND CHECK FOR COOLANT LEAKS

THERMOSTAT

COMPONENTS FOR REMOVAL AND INSTALLATION



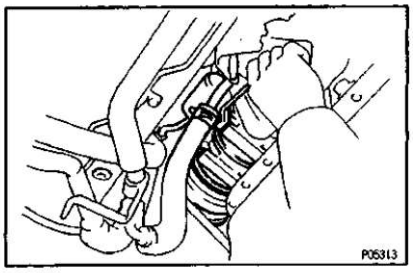


THERMOSTAT REMOVAL

(See Components for Removal and Installation)

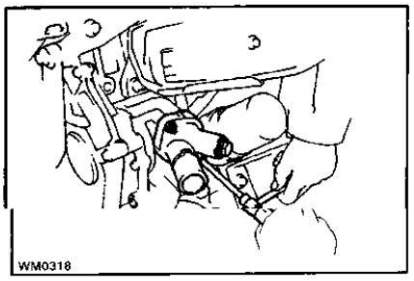
HINT: Removal of the thermostat would have an adverse effect, causing a lowering of cooling efficiency. Do not remove the thermostat, even if the engine tends to overheat.

1. DRAIN ENGINE COOLANT



2. DISCONNECT A/C COMPRESSOR FROM ENGINE
(See steps 1, 2 and 5 in Water Pump Removal)

3. DISCONNECT RADIATOR HOSE FROM WATER INLET



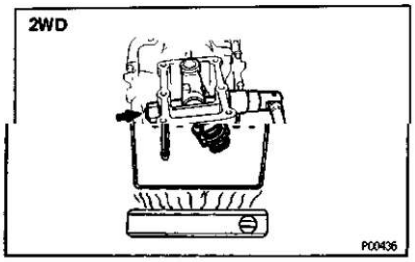
4. REMOVE WATER INLET AND THERMOSTAT

(a) Remove the two nuts and water inlet from the water pump cover.
(b) Remove the thermostat.
(e) Remove the gasket from the thermostat.

THERMOSTAT INSPECTION

INSPECT THERMOSTAT

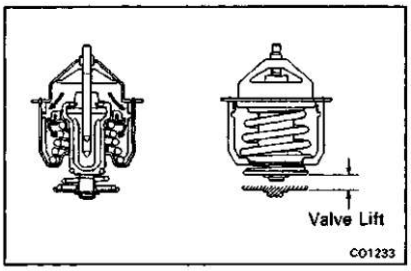
HINT: The thermostat is numbered with the valve opening temperature.



(a) Immerse the thermostat in water and gradually heat the water.
(b) Check the valve opening temperature.

Valve opening temperature:
80 – 84°C (176 – 183°F)

If the valve opening temperature is not as specified, replace the thermostat.



(c) Check the valve lift.

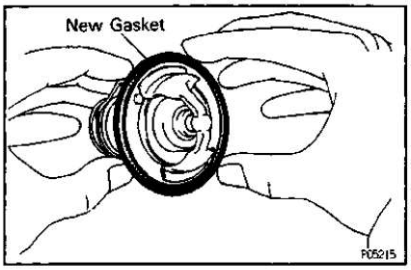
Valve lift:

8 mm (0.31 in.) or more at 95°C (203° F)

If the valve lift is not as specified, replace the thermostat.

(d) Check that the valve spring is tight when the thermostat is fully closed.

If not closed, replace the thermostat.

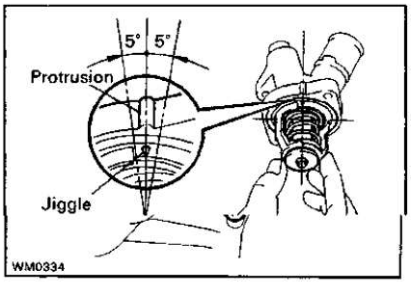


THERMOSTAT INSTALLATION

(See Components for Removal and Installation)

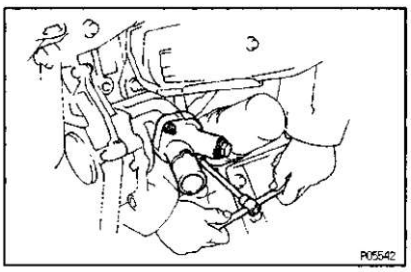
1. PLACE THERMOSTAT IN WATER PUMP

(a) Install a new gasket to the thermostat.



(b) Align the jiggle valve of the thermostat with the protrusion of the water inlet, and insert the thermostat in the water inlet.

HINT: The jiggle valve may be set within 5° of either side of the prescribed position.

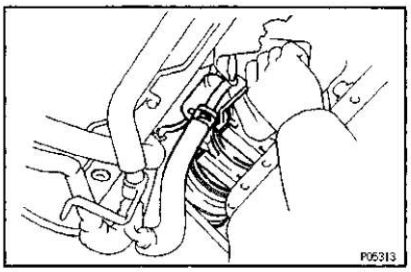


2. INSTALL WATER INLET AND THERMOSTAT

Install the water inlet and thermostat with the two nuts.

Torque: 8.8 N–m (90 kgf–cm, 78 in–lbf)

3. CONNECT RADIATOR HOSE TO WATER INLET



4. INSTALL A/C COMPRESSOR

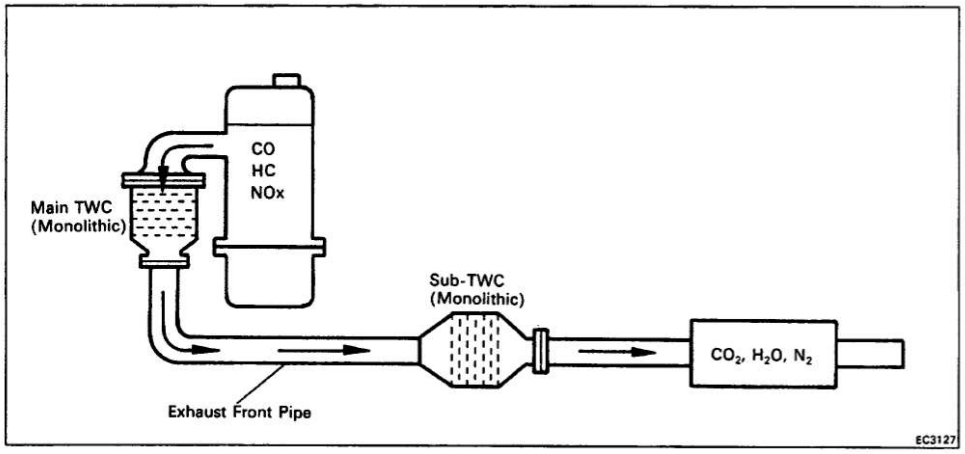
(See steps 7, 8 and 12 in Water Pump Removal)

5. FILL WITH ENGINE COOLANT

6. START ENGINE AND CHECK FOR COOLANT LEAKS

THREE–WAY CATALYST (TWC) SYSTEM

EG06J–02



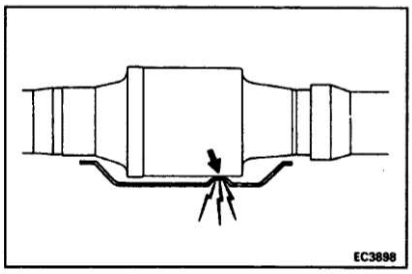
To reduce C0, HC and NOx emissions, they are oxidized, reduced and converted to carbon dioxide ($C0_2$), water (H_20) and nitrogen (N_2) by the catalyst.

Exhaust Port		Main TWC		Sub–TWC		Exhaust Gas
CO HC NOx	⇒	OXIDATION AND REDUCTION	⇒	OXIDATION AND REDUCTION	⇒	CO_2 H_20 N_2

V00328

EXHAUST PIPE ASSEMBLY INSPECTION

1. INSPECT CONNECTIONS FOR LOOSENESS OR DAMAGE
2. INSPECT CLAMPS FOR WEAKNESS, CRACKS OR DAMAGE

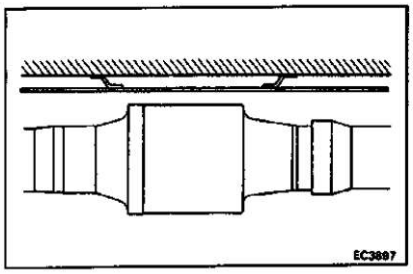


EG06L–02

SUB–TWC INSPECTION

INSPECT FOR DENTS OR DAMAGE

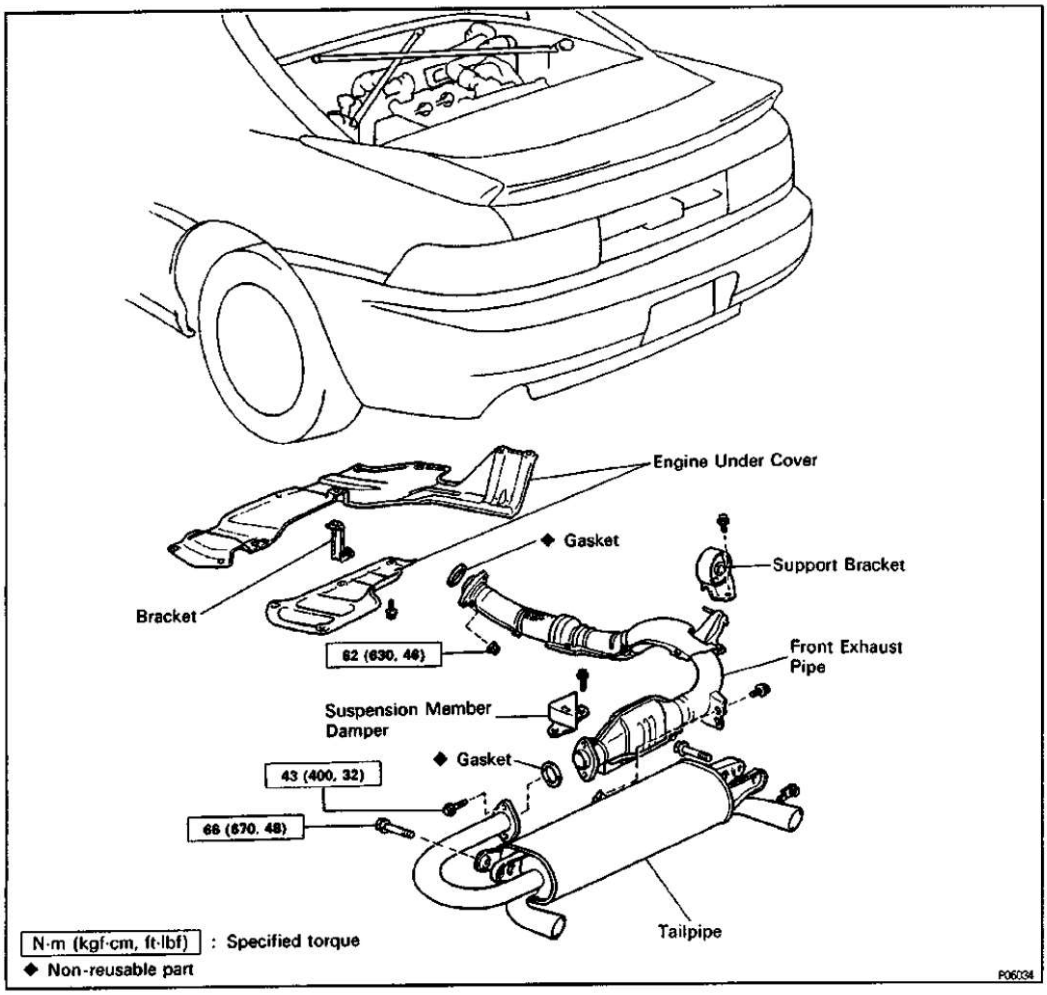
If any part of protector is damaged or dented to the extent that it contacts the sub–TWC, repair or re–place it.

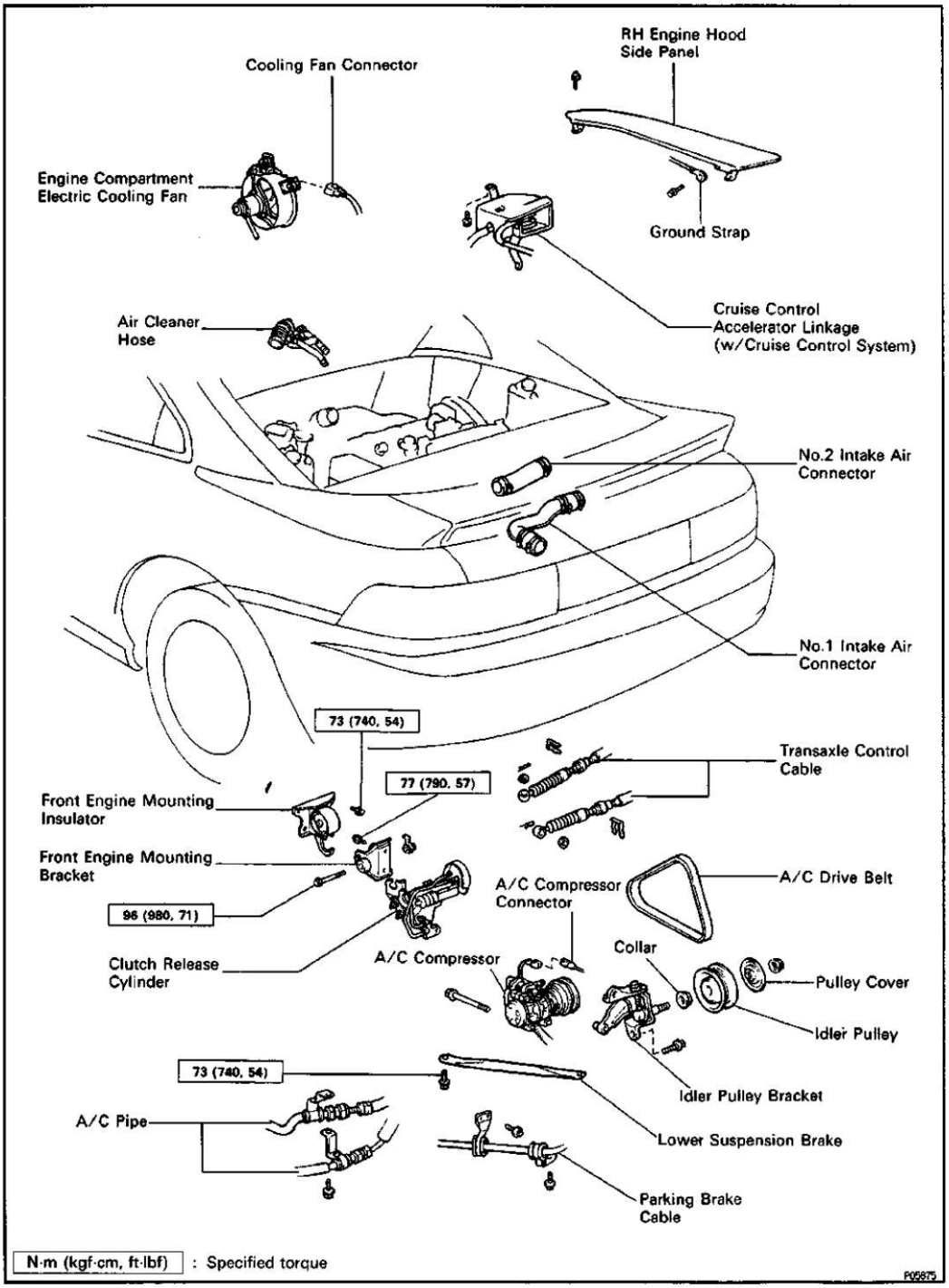


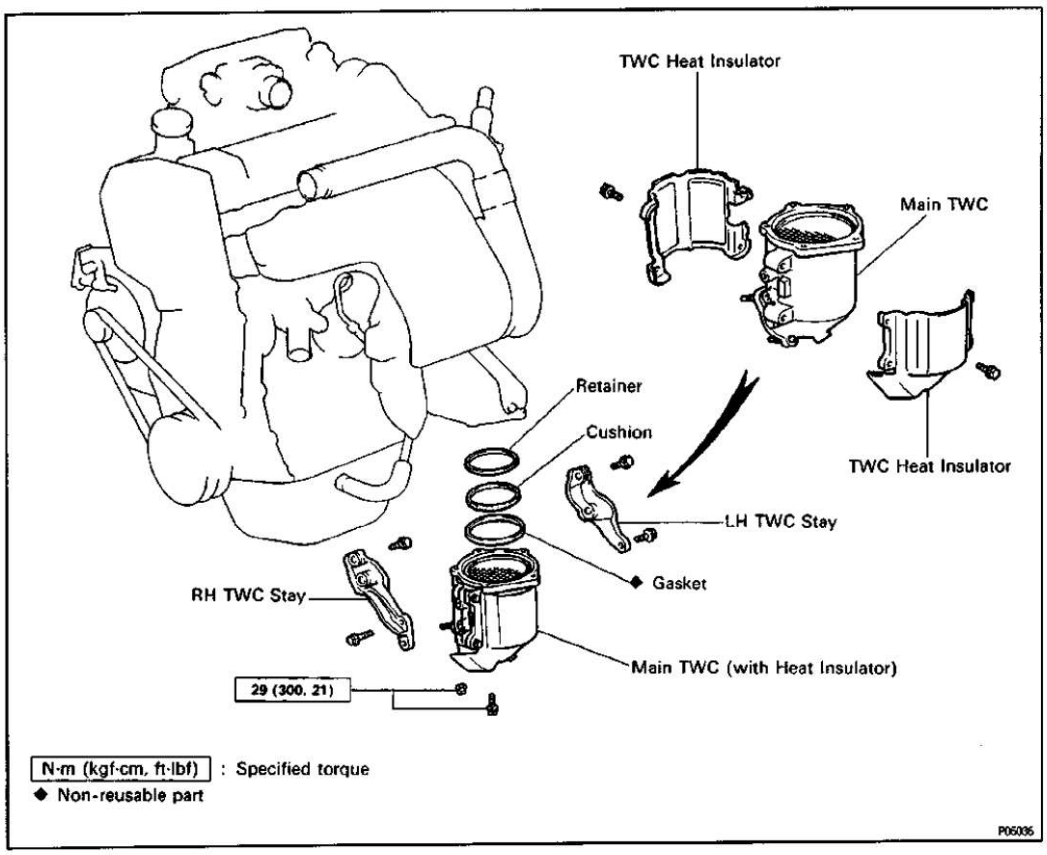
SUB–TWC HEAT INSULATOR INSPECTION

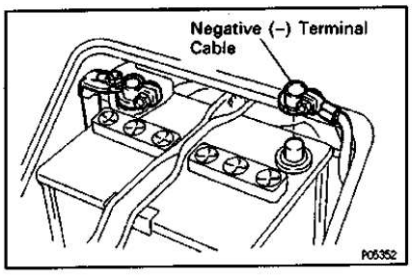
1. INSPECT HEAT INSULATOR FOR DAMAGE
2. INSPECT FOR ADEQUATE CLEARANCE BETWEEN CATALYTIC CONVERTER AND HEAT INSULATOR

COMPONENTS FOR REMOVAL AND INSTALLATION




RH Engine Hood Side Panel
Cooling Fan Connector
Engine Compartment Electric Cooling Fan
Ground Strap
Cruise Control Accelerator Linkage (w/Cruise Control System)
Air Cleaner Hose
No.2 Intake Air Connector
No.1 Intake Air Connector
73 (740, 54)
77 (790, 57)
Transaxle Control Cable
Front Engine Mounting Insulator
Front Engine Mounting Bracket
96 (980, 71)
A/C Compressor Connector
A/C Drive Belt
Clutch Release Cylinder
A/C Compressor
Collar
Pulley Cover
Idler Pulley
73 (740, 54)
Idler Pulley Bracket
A/C Pipe
Lower Suspension Brake
Parking Brake Cable
N·m (kgf·cm, ft·lbf) : Specified torque
P05875





MAIN TWC REPLACEMENT

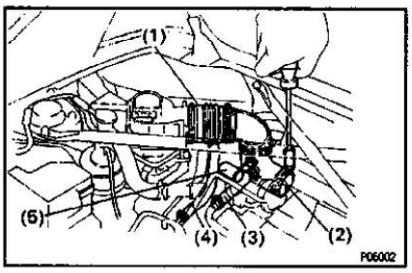
(See Components for Removal and Installation)

CAUTION: Check that the TWC is cool.

1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY

CAUTION: Turn the ignition switch to "LOCK". Disconnect the negative terminal from the battery. Wait at least 20 seconds before proceeding with work.

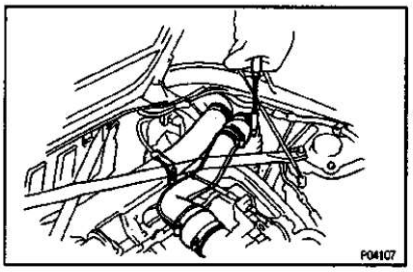
2. REMOVE ENGINE UNDER COVERS
3. REMOVE RH ENGINE HOOD SIDE PANEL



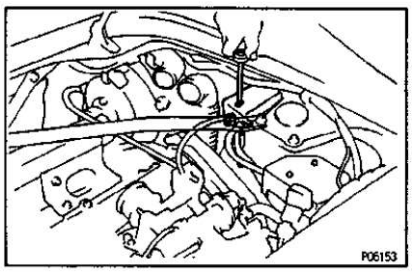
4. REMOVE AIR CLEANER HOSE

Disconnect the following hoses, and remove the air cleaner hose:

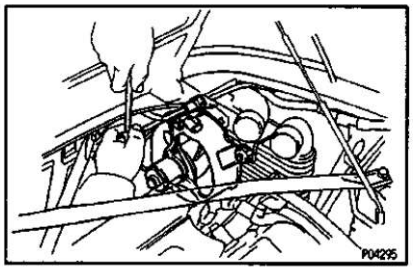
(1) Air cleaner hose from air flow sensor
(2) Air cleaner hose from turbocharger
(3) PCV hose from cylinder head cover
(4) Air hose from No.2 air hose
(5) Air hose from air by–pass valve



5. REMOVE NO.1 AND NO.2 INTAKE AIR CONNECTORS

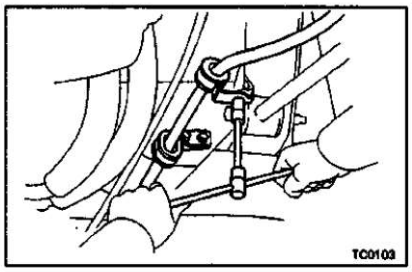


6. (w/ CRUISE CONTROL SYSTEM) REMOVE CRUISE CONTROL ACCELERATOR LINKAGE



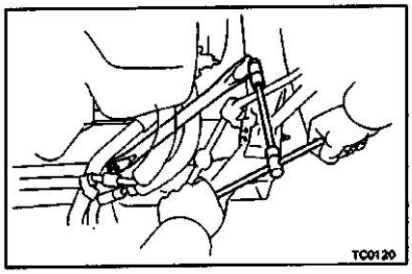
7. REMOVE ENGINE COMPARTMENT ELECTRIC COOLING FAN

(a) Disconnect the cooling fan connector.
(b) Loosen the three bolts, and remove the cooling fan.

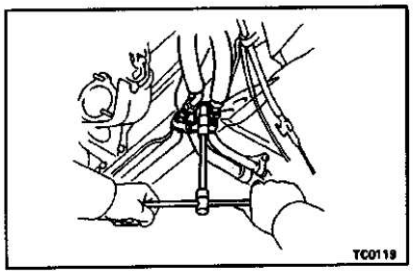


8. DISCONNECT A/C COMPRESSOR FROM ENGINE

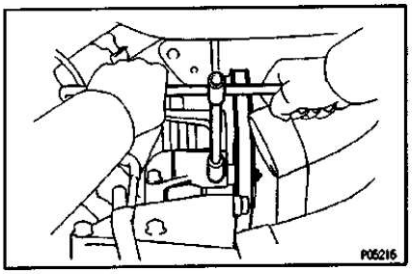
(a) Remove the three clamp bolts, and disconnect the parking brake cable.



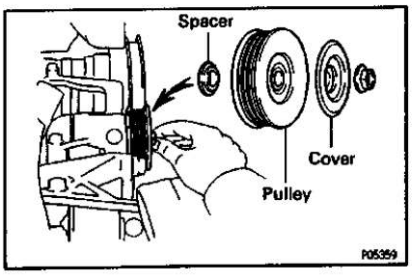
(b) Remove the two bolts and suspension brace.



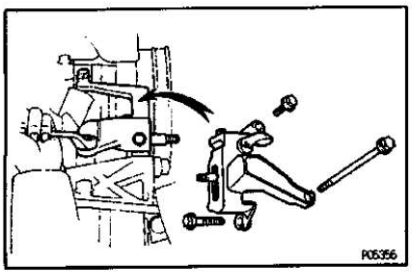
(c) Remove the clamp nut, and disconnect the two A/C pipes.



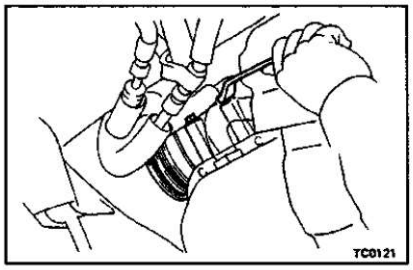
(d) Loosen the idler pulley nut.
(e) Loosen the adjusting bolt, and remove the drive belt.



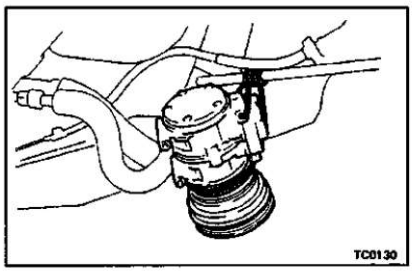
(f) Remove the nut, pulley cover, idler pulley and spacer.



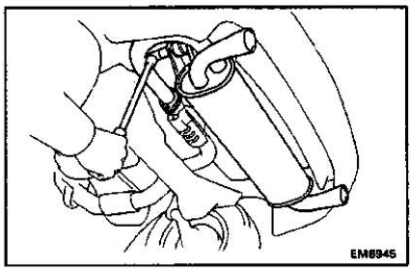
(g) Disconnect the A/C compressor connector.
(h) Remove the three bolts and idler pulley bracket.



(i) Remove the two bolts, and disconnect the A/C compressor from the engine.

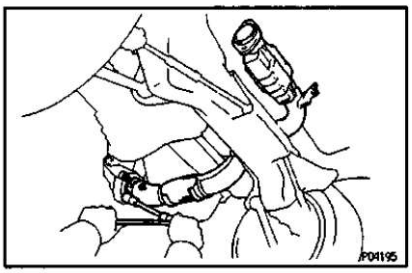


HINT: Suspend the A/C compressor to strut rod with a string.

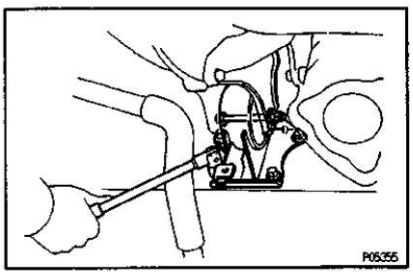


9. REMOVE TAILPIPE

(a) Remove the two bolts holding the front exhaust pipe to the tailpipe bracket.
(b) Remove the two bolts holding the front exhaust pipe to the tailpipe.
(c) Remove the two bolts, tailpipe and gasket.

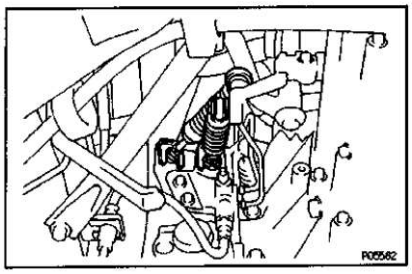


10. REMOVE FRONT EXHAUST PIPE
(See step 2 in Main TWC Replacement)



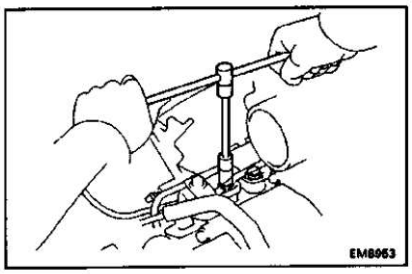
11. REMOVE FRONT ENGINE MOUNTING INSULATOR

(a) Remove the through bolt and nut holding the mounting insulator to the mounting bracket.
(b) Remove the four bolts and mounting insulator.

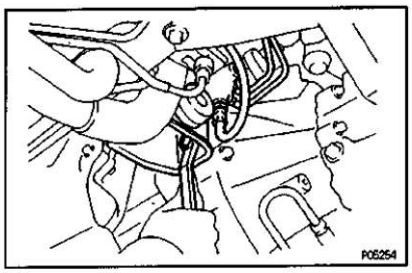


12. REMOVE FRONT ENGINE MOUNTING BRACKET AND CLUTCH RELEASE CYLINDER

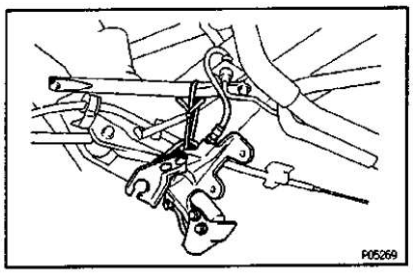
(a) Disconnect the two transaxle control cables from the transaxle.



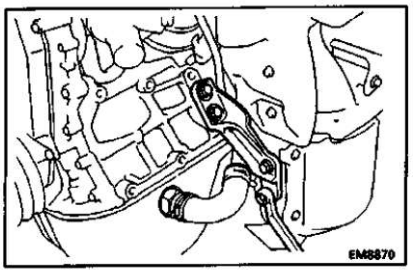
(b) Remove the two bolts holding the clutch release cylinder to the transaxle.



(c) Remove the two bolts and mounting bracket.
(d) Disconnect the clutch release cylinder from the transaxle.
Remove the three bolts and stiffener plate.

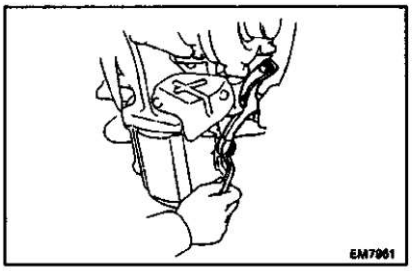


HINT: Suspend the clutch release cylinder to the suspension brace with a string.

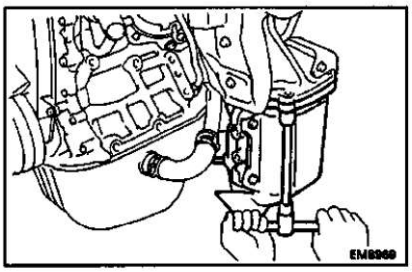


13. REMOVE MAIN TWC

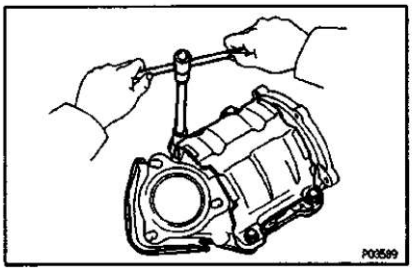
(a) Remove the four bolts and RH TWC stay.



(b) Remove the three bolts and LH TWC stay.



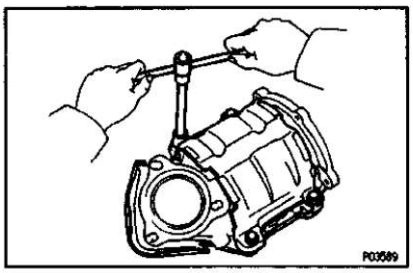
(c) Remove the three bolts, two nuts, TWC, gasket, retainer and cushion.

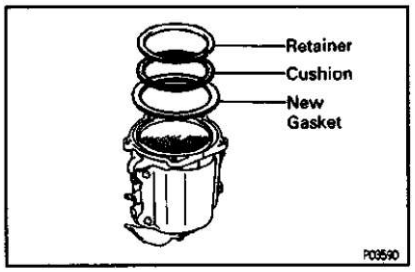


(d) Remove the nine bolts and two heat insulators from the TWC.

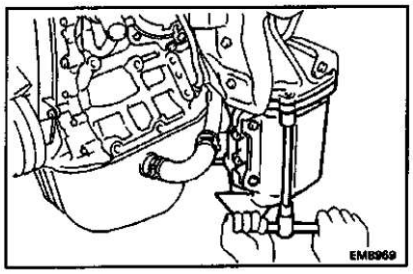
14. REINSTALL MAIN TWC

(a) Remove the two heat insulators to a new TWC with the nine bolts.

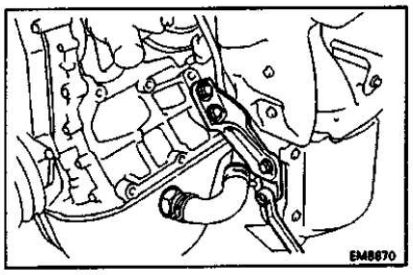




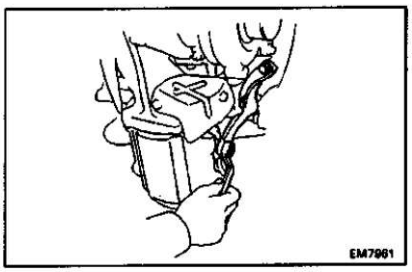
(b) Place the cushion, retainer and a new gasket on the TWC.



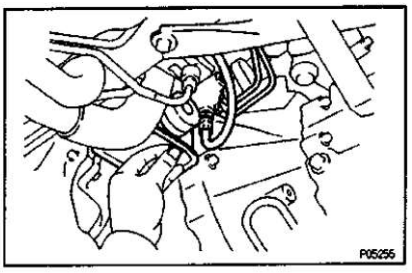
(c) Install the TWC with the three bolts and two nuts.
Torque: 29 N–m (300 kgf–cm, 21 ft–lbf)



(d) Install the RH TWC stay with the four bolts.
Torque: 59 N–m (600 kgf–cm, 43 ft–lbf)

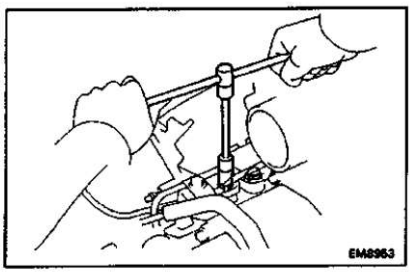


(e) Install the LH TWC stay with the three bolts.
Torque: 59 N–m (600 kgf–cm, 43 ft–lbf)

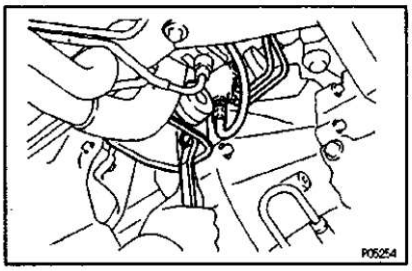


15. REINSTALL CLUTCH RELEASE CYLINDER AND FRONT ENGINE MOUNTING BRACKET

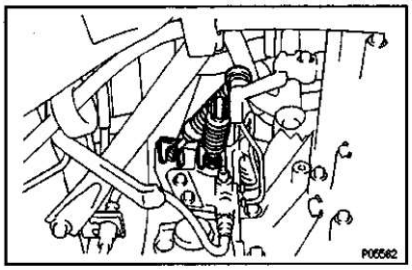
(a) Temporarily install the release cylinder and mounting bracket with the two bolts.



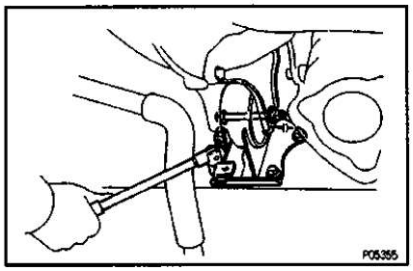
(b) Install the clutch release cylinder with the two bolts.
Torque: 12 N–m (120 kgf–cm. 9 ft–lbf)



(c) Tighten the two bolts holding the clutch release cyl–inder to the transaxle.
Torque: 77 N–m (790 kgf–cm, 57 ft–lbf)



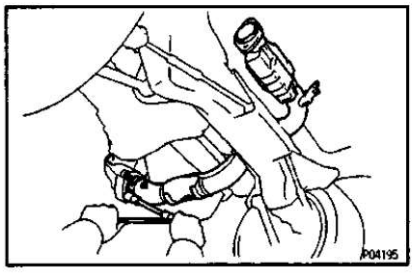
(d) Connect the two transaxle control cables to the tra–nsaxle.



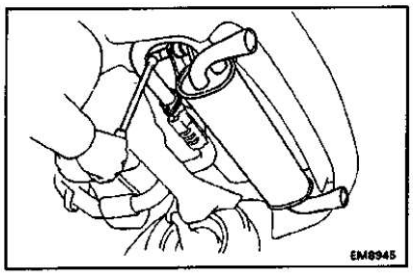
16. REINSTALL FRONT ENGINE MOUNTING INSULATOR

(a) Install the mounting insulator to the body with the four bolts.
Torque: 77 N–m (790 kgf–cm, 57 ft–lbf)

(b) Install the mounting insulator to the mounting bracket with the through bolt and nut.
Torque: 96 N–m (980 kgf–cm, 71 ft–lbf)



17. REINSTALL FRONT EXHAUST PIPE
(See step 3 in Main TWC Replacement)



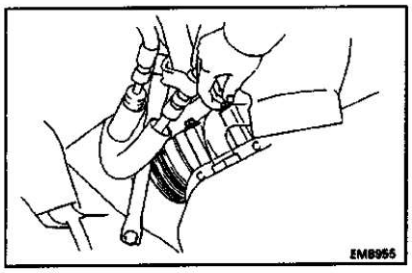
18. REINSTALL TAILPIPE

(a) Place a new gasket to the rear of the front exhaust pipe.

(b) Install the tailpipe to the body bracket with the two bolts and nut.
Torque:66 N–m (670 kgf–cm, 48 ft–lbf)

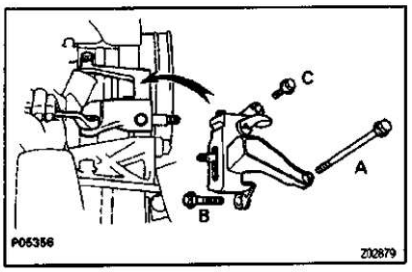
(c) Install the two bolts holding the front exhaust pipe to the tailpipe.
Torque: 43 N–m (440 kgf–cm, 32 ft–lbf)

(d) Install the two bolts holding the front exhaust pipe to the tailpipe bracket.
Torque: 19 N–m (190 kgf–cm, 14 ft–lbf)



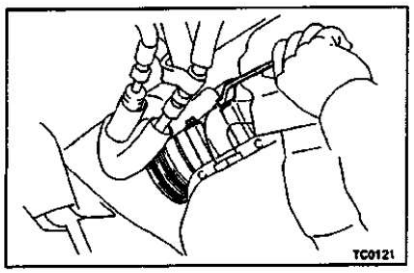
19. REINSTALL A/C COMPRESSOR

(a) Temporarily install the A/C compressor with the two bolts.

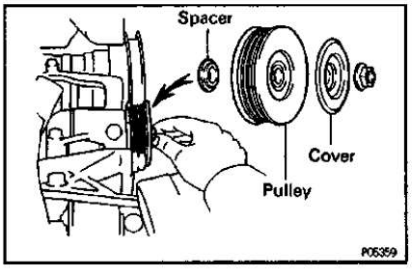


(b) Install the idler pulley bracket with the three bolts.
Torque:
25 N–m (250 kgf–cm, 18 ft–lbf) for A
27 N–m (275 kgf–cm, 20 ft–lbf) for B
37 N–m (375 kgf–cm, 27 ft–lbf) for C

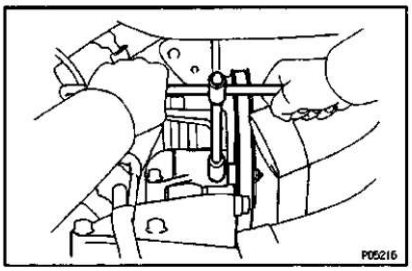
(c) Connect the A/C compressor connector.



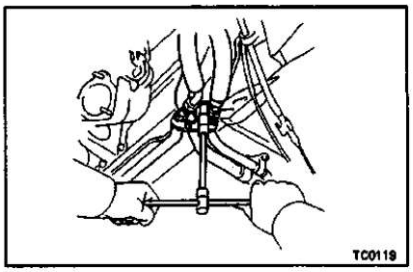
(d) Tighten the two bolts of the lower side of the A/C compressor.
Torque: 25 N–m (250 kgf–cm, 18 ft–lbf)



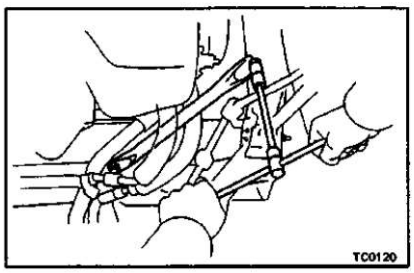
(e) Temporarily install the spacer, pulley and pulley cover with the nut.



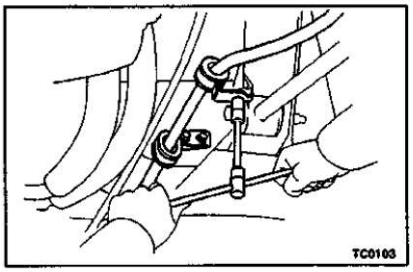
(f) Install the drive belt with the adjusting bolt.
(g) Tighten the idler pulley nut.



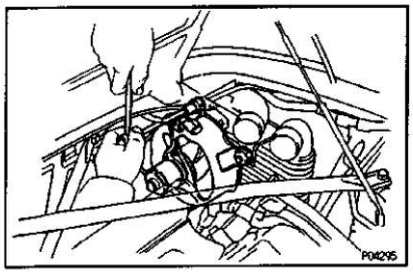
(h) Install the two A/C pipes with the nut.



(i) Install the suspension brace with the two bolts.
Torque: 73 N–m (740 kgf–cm, 54 ft–lbf)

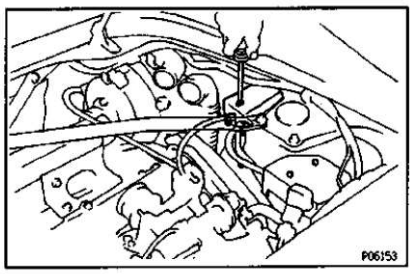


(j) Install the parking brake cable with the two clamp and three bolts.

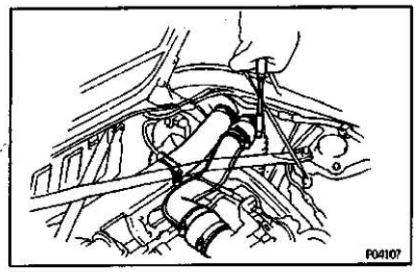


20. REINSTALL ENGINE COMPARTMENT ELECTRIC COOLING FAN

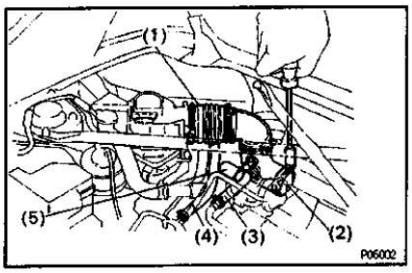
(a) Install the cooling fan with the three bolts.
(b) Connect the cooling fan connector.



21. (w/ CRUISE CONTROL SYSTEM) REINSTALL CRUISE CONTROL ACCELERATOR LINKAGE



22. REINSTALL NO.1 AND NO.2 INTAKE AIR CONNECTORS

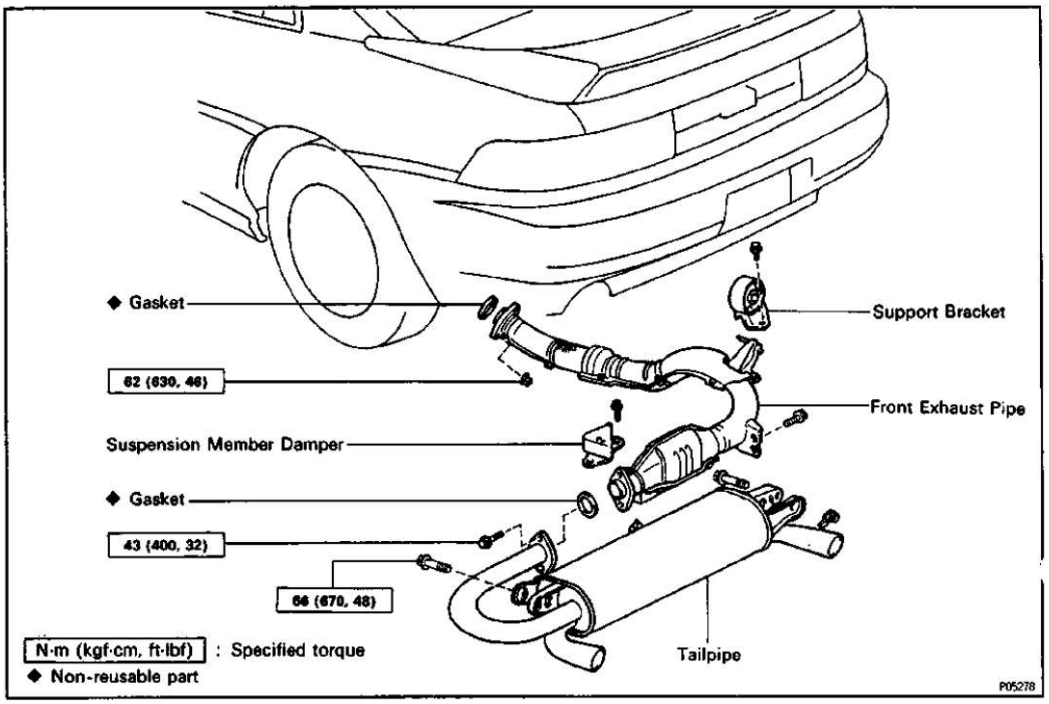


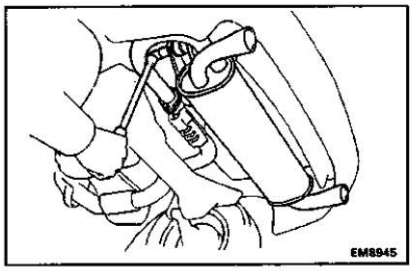
23. REINSTALL AIR CLEANER HOSE

Reconnect the following hoses, and install the air cleaner hose:
(1) Air cleaner hose to air flow sensor
(2) Air cleaner hose to turbocharger
(3) PCV hose to cylinder head cover
(4) Air hose to No.2 air hose
(5) Air hose to air by–pass valve

24. REINSTALL RH ENGINE HOOD SIDE PANEL
25. REINSTALL ENGINE UNDER COVERS
26. RECONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY

COMPONENTS FOR REMOVAL AND INSTALLATION





SUB–TWC REPLACEMENT

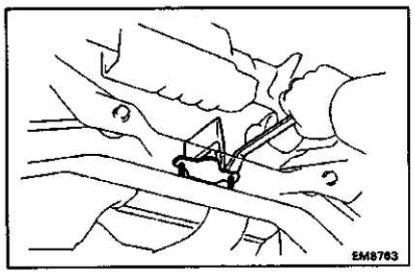
(See Components for Removal and Installation)

1. REMOVE TAILPIPE

(a) Remove the two bolts holding the front exhaust pipe to the tailpipe bracket.

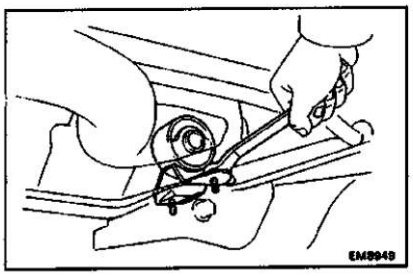
(b) Remove the two bolts holding the front exhaust pipe to the tailpipe.

(c) Remove the two bolts, tailpipe and gasket.

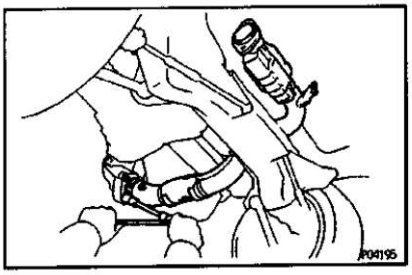


2. REMOVE FRONT EXHAUST PIPE (SUB–TWC)

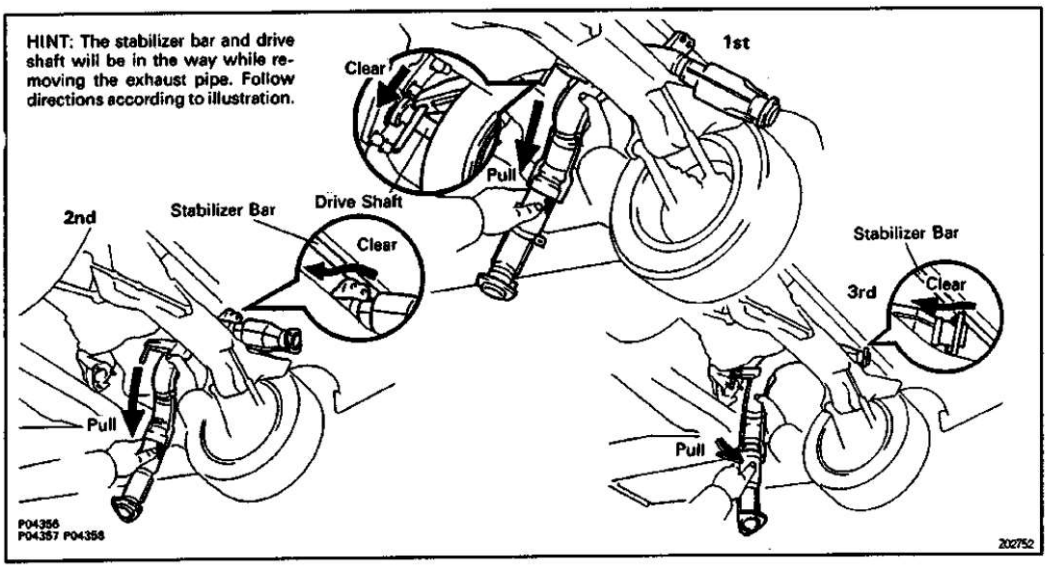
(a) Remove the two bolts and damper.

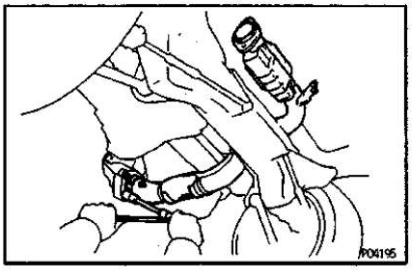


(b) Remove the two bolts and support bracket.



(c) Using a 14 mm deep socket wrench, remove the three nuts.
(d) Remove the front exhaust pipe and two gaskets.



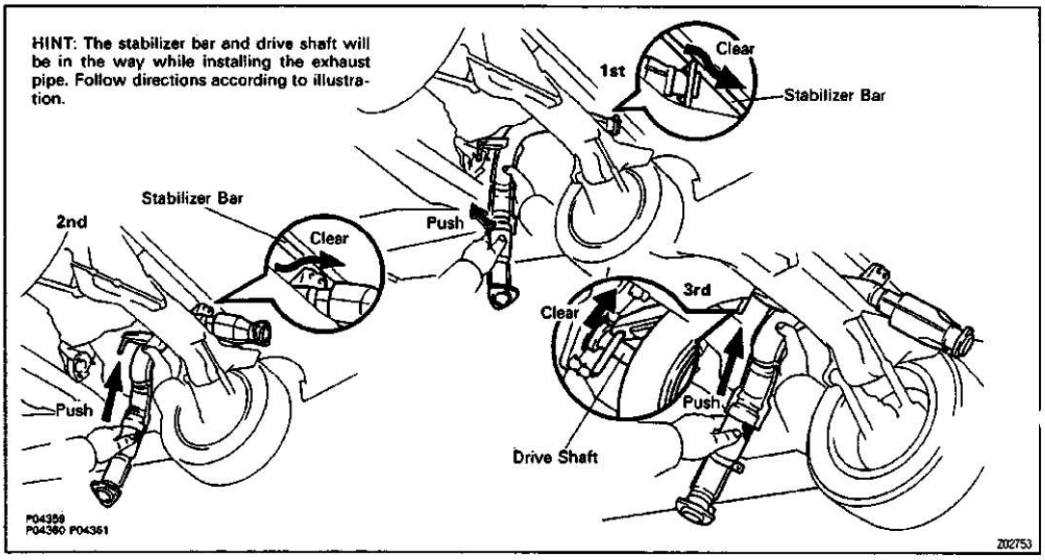


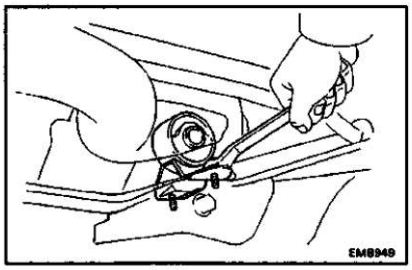
3. REINSTALL FRONT EXHAUST PIPE

(a) Place a new gasket to the front of the front exhaust pipe.

(b) Using a 14 mm deep socket wrench, install the front exhaust pipe with three new nuts.

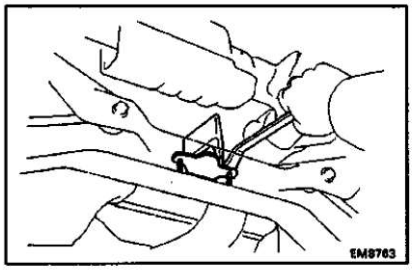
Torque: 62 N–m (630 kgf–cm, 46 ft–lbf)





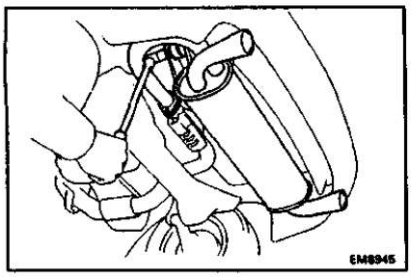
(c) Install the support bracket with the two bolts.

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



(d) Install the damper with the two bolts.

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



4. REINSTALL TAILPIPE

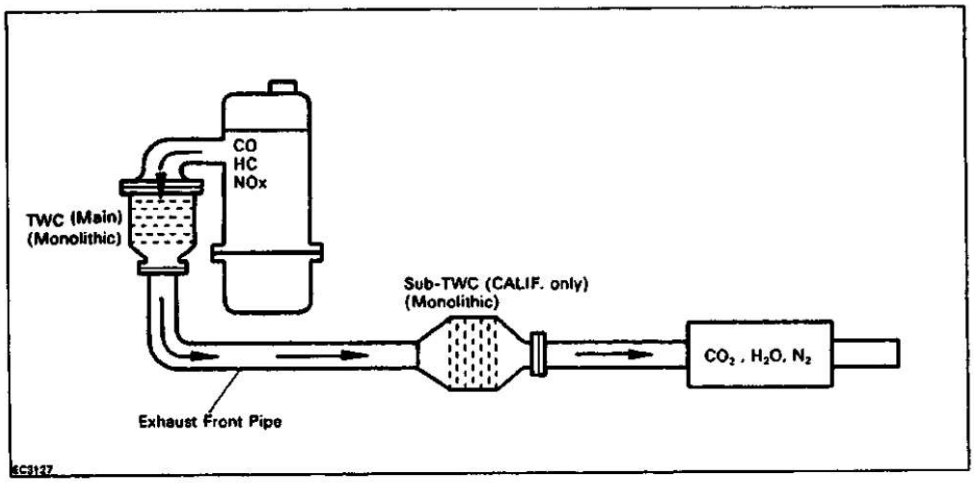
(a) Place a new gasket to the rear of the front exhaust pipe.

(b) Install the tailpipe to the body bracket with the two bolts and nut.
Torque:66 N–m (670 kgf–cm, 48 ft–lbf)

(c) Install the two bolts holding the front exhaust pipe to the tailpipe.
Torque: 43 N–m (440 kgf–cm, 32 ft–lbf)

(d) Install the two bolts holding the front exhaust pipe bracket to the tailpipe bracket.
Torque: 19 N–m (190 kgf–cm. 14 ft–lbf)

THREE–WAY CATALYST (TWC) SYSTEM



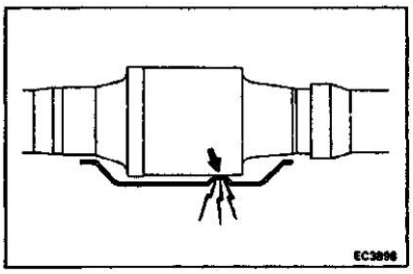
To reduce CO, HC and NOx emissions, they are oxidized, reduced and converted to carbon dioxide (CO_2), water (H_2O) and nitrogen (N_2) by the catalyst.

Exhaust Port		TWC (Main)		Sub-TWC (CALIF. only)		Exhaust Gas
CO HC NOx	→	OXIDATION AND REDUCTION	→	OXIDATION AND REDUCTION	→	CO_2 H_2O N_2

V01006

EXHAUST PIPE ASSEMBLY INSPECTION

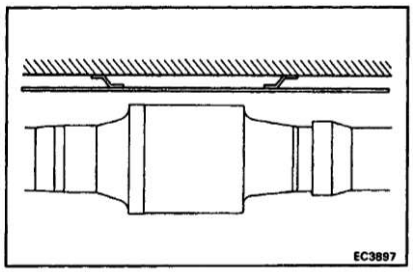
1. CHECK CONNECTIONS FOR LOOSENESS OR DAMAGE
2. CHECK CLAMPS FOR WEAKNESS, CRACKS OR DAMAGE



SUB–TWC INSPECTION (CALIF. only)

INSPECT FOR DENTS OR DAMAGE

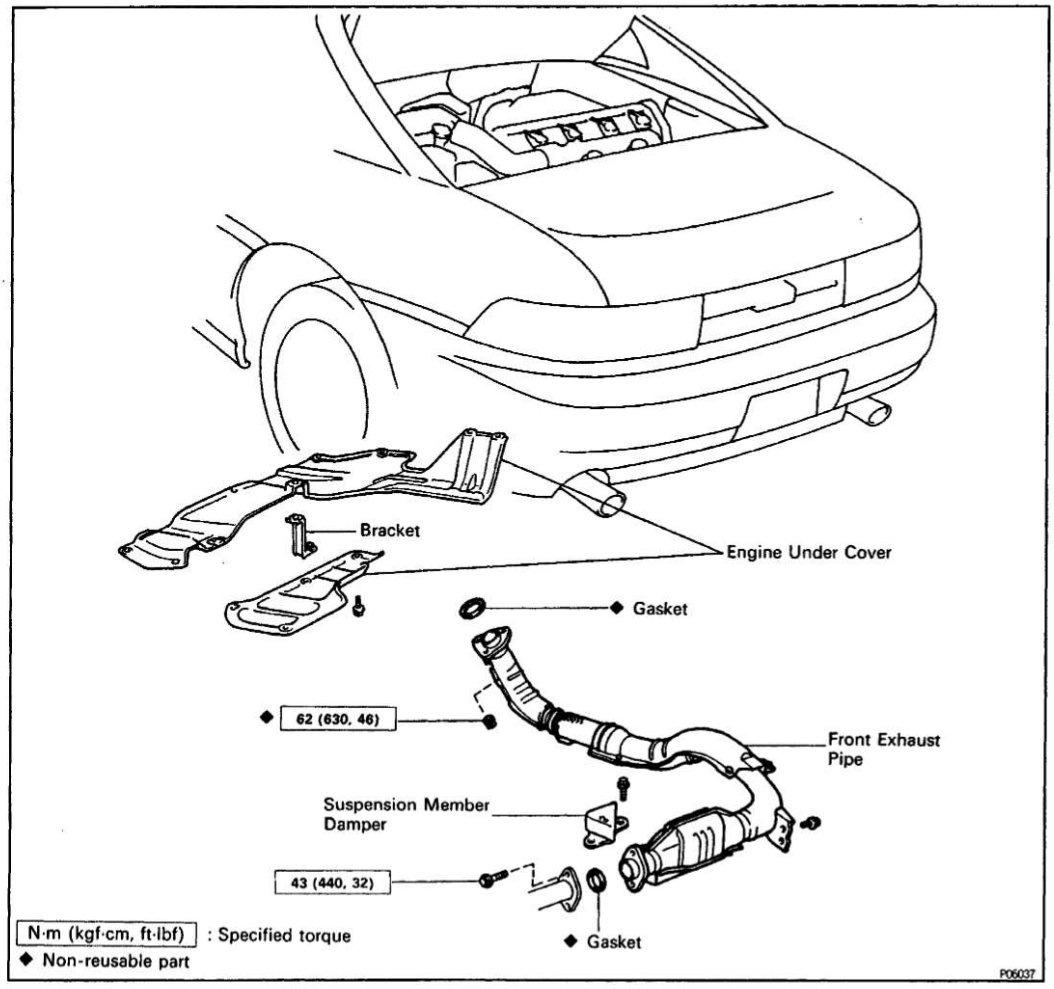
If any part of protector is damaged or dented to the extent that it contacts the sub–TWC, repair or replace it.

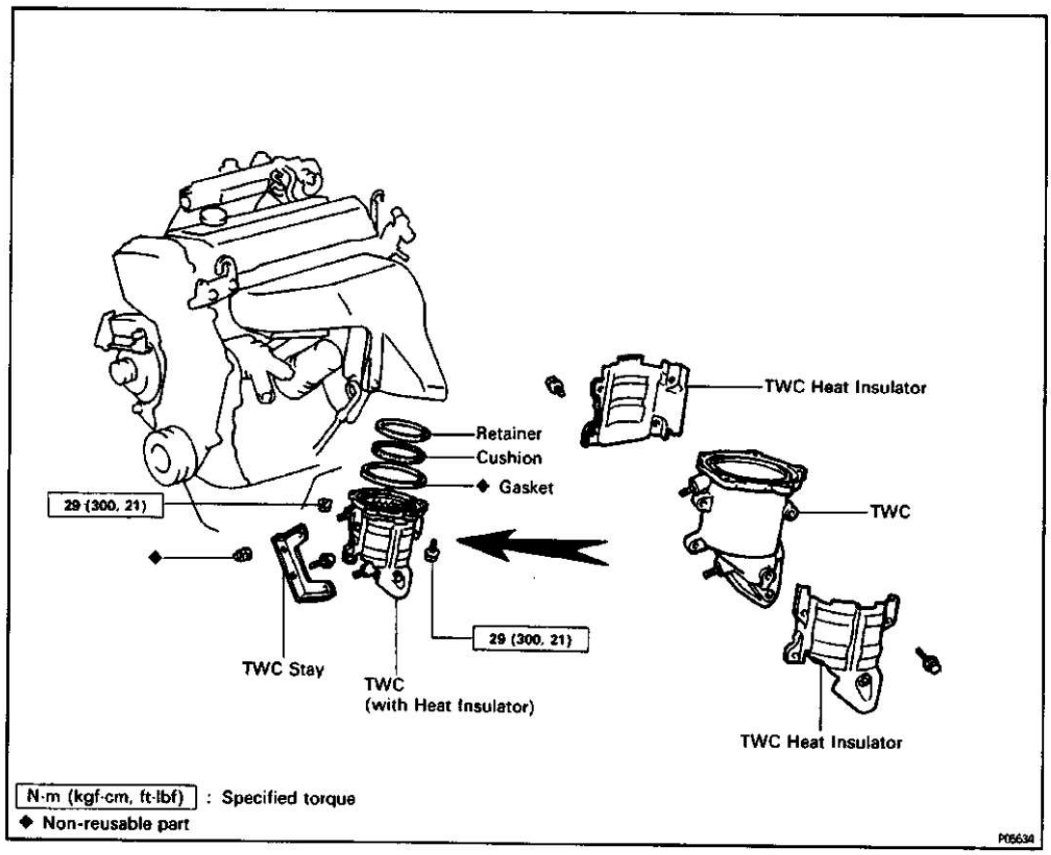


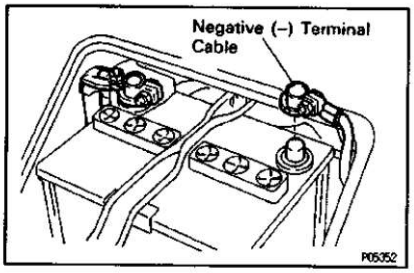
SUB–TWC HEAT INSULATOR INSPECTION (CALIF. only)

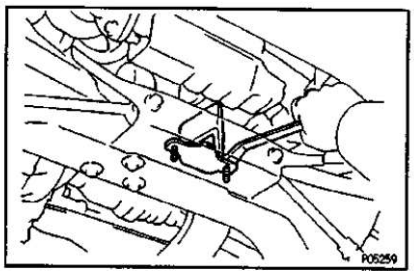
1. INSPECT HEAT INSULATOR FOR DAMAGE
2. INSPECT FOR ADEQUATE CLEARANCE BETWEEN CATALYTIC CONVERTER AND HEAT INSULATOR

COMPONENTS FOR TWC (MAIN) REMOVAL AND INSTALLATION









TWC (MAIN) REPLACEMENT

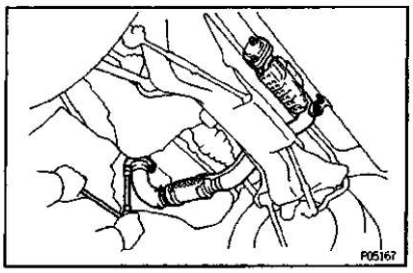
(See Components for Main (TWC) Removal and Installation)

CAUTION: Check that the TWC Is cool.

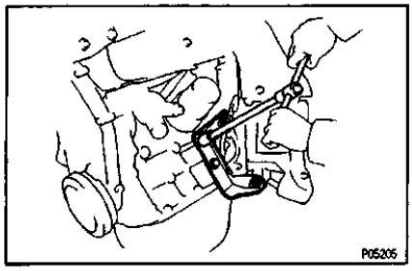
1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY

CAUTION: Turn the ignition switch to "LOCK". Discon–nect the negative terminal from the battery. Wait at least 20 seconds before proceeding with work.

2. REMOVE ENGINE UNDER COVERS
3. REMOVE FRONT EXHAUST PIPE
   (a) (CALIF. only)
   Remove the two bolts and damper.

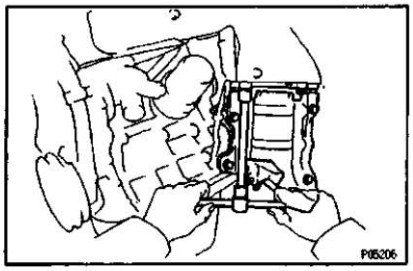


(b) Remove the two bolts holding the front exhaust pipe to the tailpipe bracket.
(c) Remove the two bolts holding the front exhaust pipe to the tailpipe.
(d) Using a 14 mm deep socket wrench, remove the three nuts.
(e) Remove the front exhaust pipe and two gaskets.

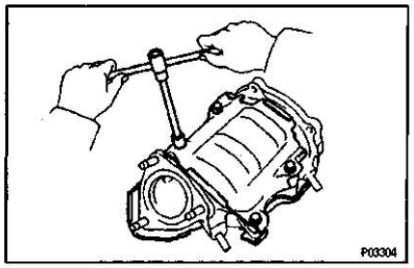


4. REMOVE TWC

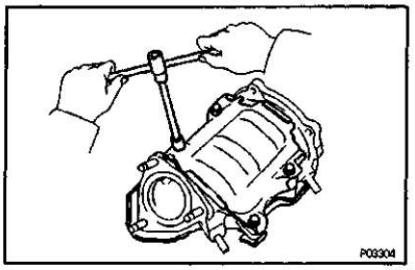
(a) Remove the oxygen sensor and sub–oxygen sensor (CALIF. only) from the TWC.
(b) Remove the two bolts, two nuts and TWC stay.



(c) Remove the three bolts, two nuts, TWC, gasket, retainer and cushion.

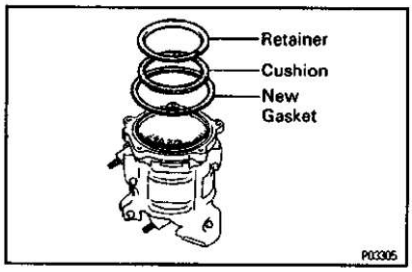


(d) Remove the eight bolts and two heat insulators from the TWC.

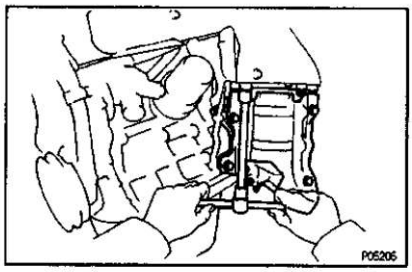


5. REINSTALL TWC

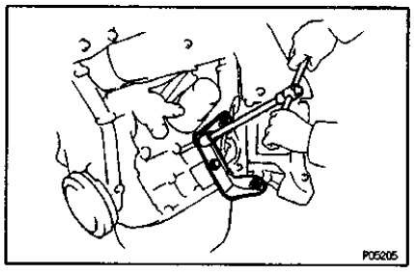
(a) Install the two heat insulators to a new TWC with the eight bolts.



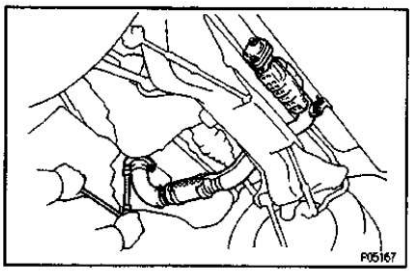
(b) Place the cushion, retainer and a new gasket on the TWC.

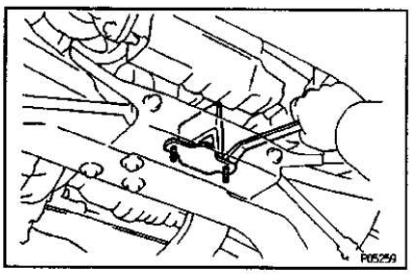


(c) Install the TWC with the three bolts and two nuts.
Torque: 29 N–m (300 kgf–cm. 21 ft–lbf)



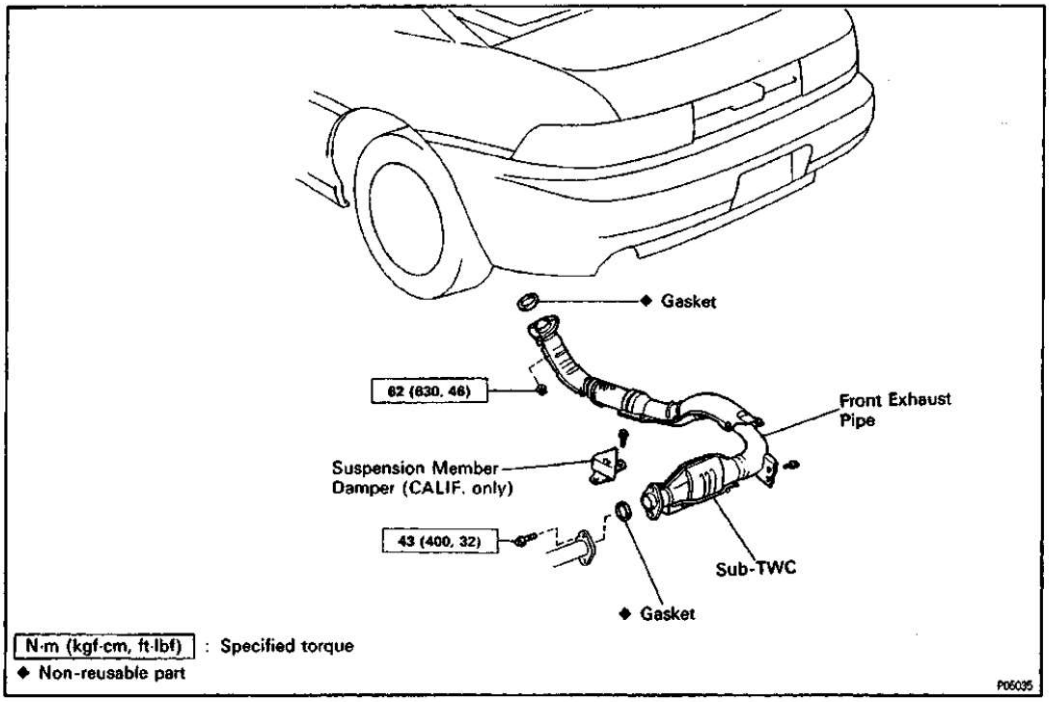
(d) Install the TWC stay with the two bolts and two new nuts.
Torque: 42 N–m (425 kgf–cm, 31 ft–lbf)
(e) Install the oxygen sensor and sub–oxygen sensor (CALIF. only) to the TWC.

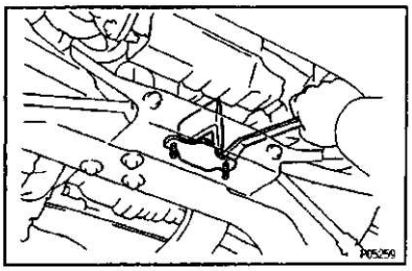




6. REINSTALL FRONT EXHAUST PIPE
(a) Place two new gaskets to the front and rear of the front exhaust pipe.
(b) Using a 14 mm deep socket wrench, install the front exhaust pipe with three new nuts.
Torque: 62 N–m (630 kgf–cm, 46 ft–lbf)
(c) Install the two bolts holding the front exhaust pipe to the tailpipe.
Torque: 43 N–m (440 kgf–cm, 32 ft–lbf)
(d) Install the two bolts holding the front exhaust pipe bracket to the tailpipe bracket.
Torque: 19 N–m (190 kgf–cm, 14 ft–lbf)
(e) Install the damper with the two bolts.
Torque: 21 N–m (210 kgf–cm, 15 ft–lbf)
7. REINSTALL ENGINE UNDER COVERS
8. RECONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY

COMPONENTS FOR SUB–TWC REMOVAL AND INSTALLATION (CALIF. only)





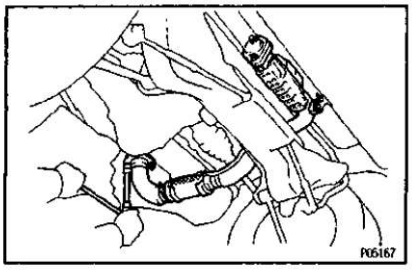
SUB–TWC REPLACEMENT (CALIF. only)

(See Components for Sub–TWC Removal and Installation (CALIF. only))

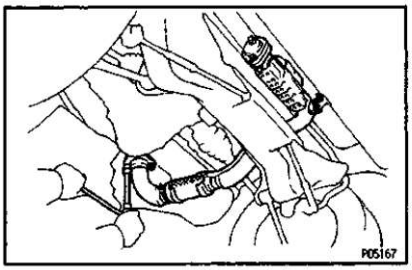
CAUTION: Check that the sub–TWC is cool.

1. REMOVE FRONT EXHAUST PIPE (SUB–TWC)

(a) (CALIF. only)
Remove the two bolts and damper.



(b) Remove the two bolts holding the front exhaust pipe to the tailpipe bracket.
(c) Remove the two bolts holding the front exhaust pipe to the tailpipe.
(d) Using a 14 mm deep socket wrench, remove the three nuts.
(e) Remove the front exhaust pipe and two gaskets.



2. REINSTALL FRONT EXHAUST PIPE (SUB–TWC)

(a) Place two new gaskets to the front and rear of the front exhaust pipe.

(b) Using a 14 mm deep socket wrench, install the front exhaust pipe with three new nuts.

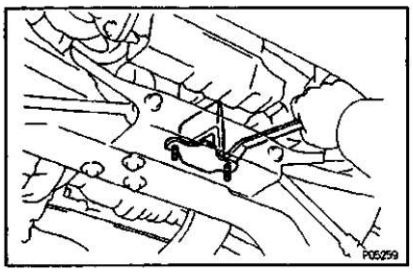
Torque: 62 N–m (630 kgf–cm, 46 ft–lbf)

(c) Install the two bolts holding the front exhaust pipe to the tailpipe.

Torque: 43 N–m (440 kgf–cm, 32 ft–lbf)

(d) Install the two bolts holding the front exhaust pipe bracket to the tailpipe bracket.

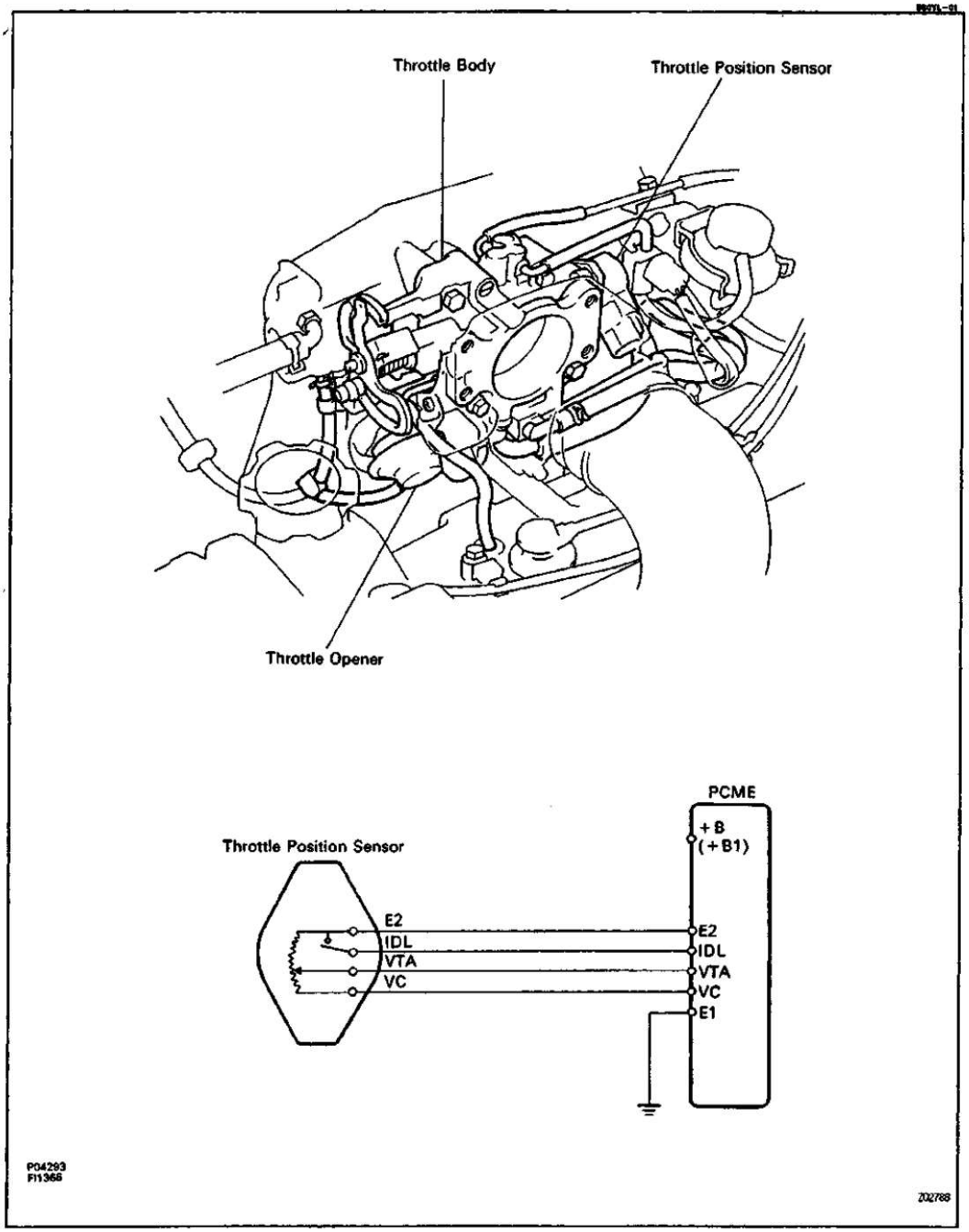
Torque: 19 N–m (190 kgf–cm, 14 ft–lbf)

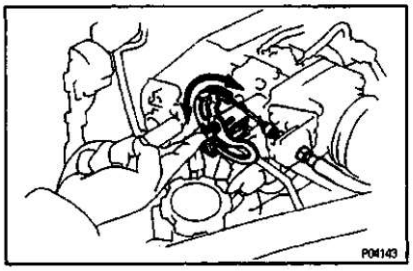


(e) (CALIF. only)
Install the damper with the two bolts.

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

THROTTLE BODY

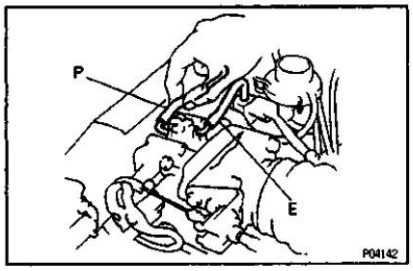




ON–VEHICLE INSPECTION

1. INSPECT THROTTLE BODY

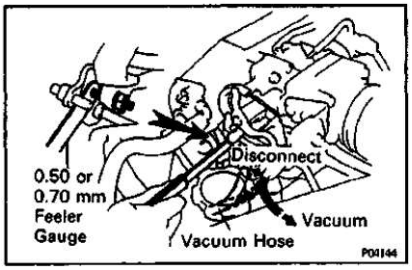
(a) Check that the throttle linkage moves smoothly.



(b) Check the vacuum at each port.

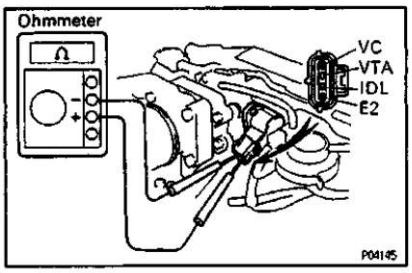
- Start the engine.
- Check the vacuum with your finger.

Port name	At idle	Other than idle
P	No vacuum	Vacuum
E	No vacuum	Vacuum



2. INSPECT THROTTLE POSITION SENSOR

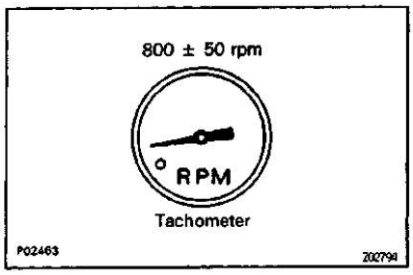
(a) Disconnect the sensor connector.
(b) Disconnect the vacuum hose from the throttle opener.
(c) Apply vacuum to the throttle opener.
(d) Insert a feeler gauge between the throttle stop screw and stop lever.



(e) Using an ohmmeter, measure the resistance between each terminal.

Clearance between lever and stop screw	Between terminals	Resistance
0 mm (0 in.)	VTA – E2	0.2 – 5.7 kΩ
0.50 mm (0.020 in.)	IDL – E2	2.3 kΩ or less
0.70 mm (0.028 in.)	IDL – E2	Infinity
Throttle valve fully open	VTA – E2	2.0 – 10.2 kΩ
–	VC – E2	2.5 – 5.9 kΩ

(f) Reconnect the vacuum hose to the throttle opener.
(g) Reconnect the sensor connector.



3. INSPECT THROTTLE OPENER

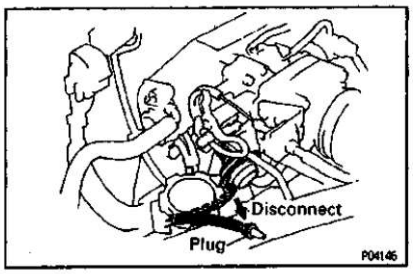
A. Warm up engine

Allow the engine to warm up to normal operating temperature.

B. Check idle speed

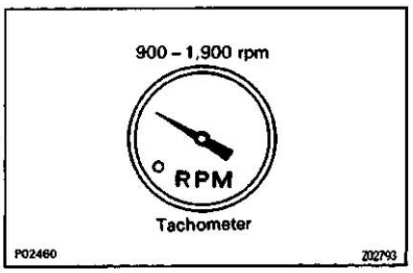
Idle speed:

800 ± 50 rpm



C. Check and adjust throttle opener setting speed

(a) Disconnect the vacuum hose from the throttle opener, and plug the hose end.



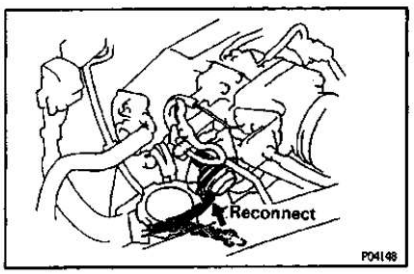
(b) Check the throttle opener setting speed.

Throttle opener setting speed:

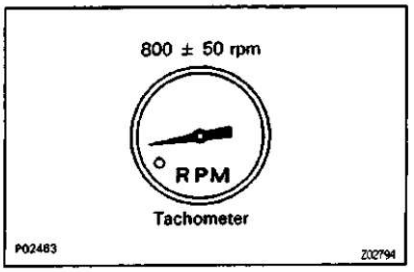
900 – 1.900 rpm (w/ Cooling fan OFF)

If the throttle opener setting is not as specified, replace the throttle body assembly.

(c) Stop the engine.



(d) Reconnect the vacuum hose to the throttle opener.

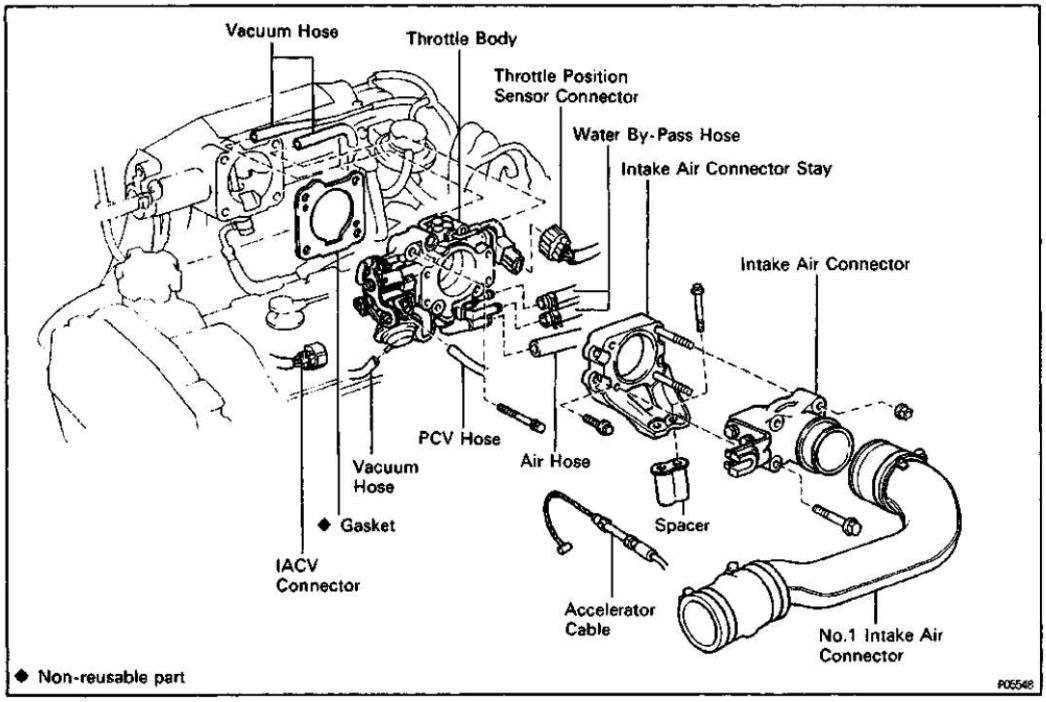


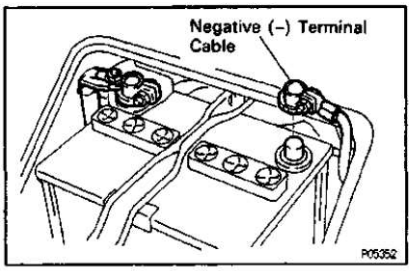
(e) Start the engine, and check that the idle rpm returns to the correct speed.

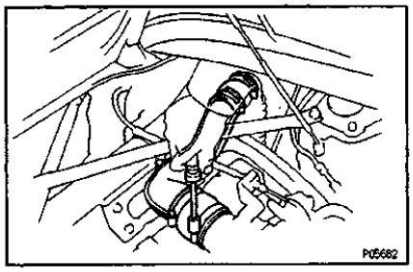
Idle speed:

800 ± 50 rpm

COMPONENTS FOR REMOVAL AND INSTALLATION



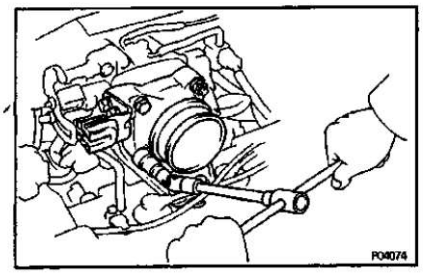




THROTTLE BODY REMOVAL

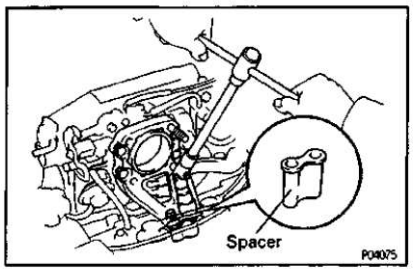
(See Components for Removal Installation)

1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY
   CAUTION: Turn the ignition switch to 'LOCK'. Disconnect the negative terminal from the battery. Wait at least 20 seconds before proceeding with work.
2. DRAIN ENGINE COOLANT
3. DISCONNECT ACCELERATOR CABLE FROM THROTTLE BODY
4. REMOVE NO.1 INTAKE AIR CONNECTOR



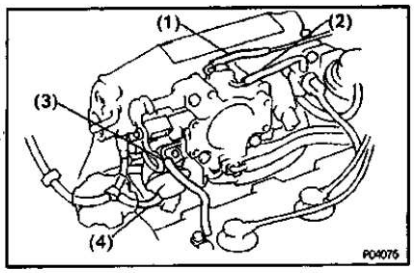
5. REMOVE INTAKE AIR CONNECTOR

Remove the two bolts, two nuts and intake air con–nector.



6. REMOVE INTAKE AIR CONNECTOR STAY

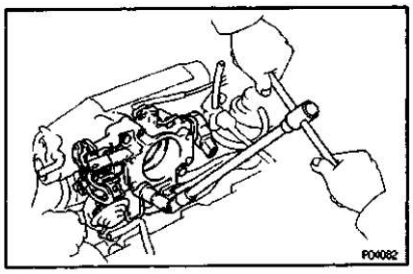
(a) Remove the six bolts and intake air connector stay.
(b) Remove the spacer.



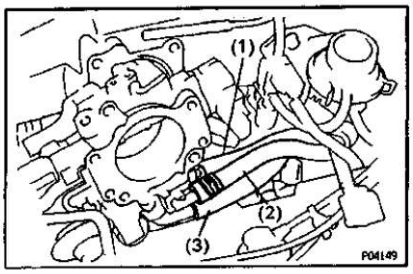
7. REMOVE THROTTLE BODY

(a) Disconnect the following connector:
- Throttle position sensor connector
- IACV connector

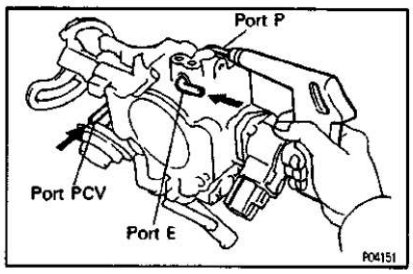
(b) Disconnect the following hoses:
(1) Vacuum hose from port ”P” of throttle body
(2) Vacuum hose from port ”E” of throttle body
(3) PCV hose from port PCV of throttle body
(4) Vacuum hose from throttle opener.



(c) Remove the four bolts, and disconnect the throttle body from the intake manifold.
(d) Remove the throttle body gasket.



(e) Disconnect the following hoses from the throttle body, and remove the throttle body:
(1) Water by–pass hose (from upper side of No. 1 air tube)
(2) Water by–pass hose (from lower side of No. 1 air tube)
(3) Air hose (from No. 1 air tube)



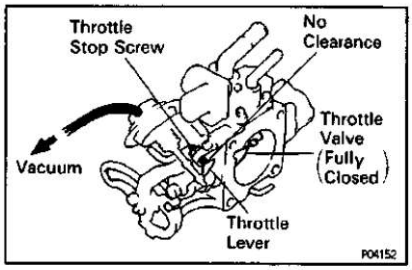
THROTTLE BODY INSPECTION

1. CLEAN THROTTLE BODY

(a) Using a soft brush and carburetor cleaner, clean the cast parts.

(b) Using compressed air, clean all the passages and apertures.

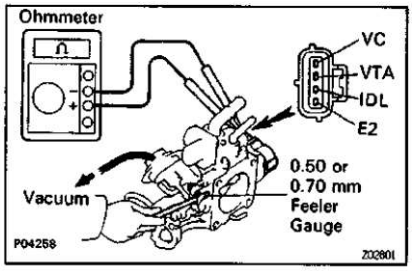
NOTICE: To prevent deterioration, do not clean the throttle position sensor.



2. INSPECT THROTTLE VALVE

(a) Apply vacuum to the throttle opener.

(b) Check that there is no clearance between the throttle stop screw and throttle lever when the throttle valve is fully closed.



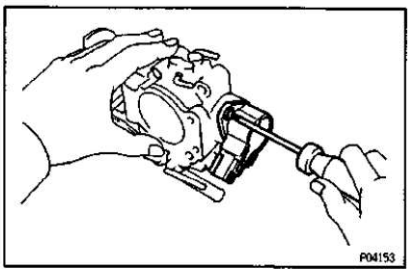
3. INSPECT THROTTLE POSITION SENSOR

(a) Apply vacuum to the throttle opener.

(b) Insert a feeler gauge between the throttle stop screw and stop lever.

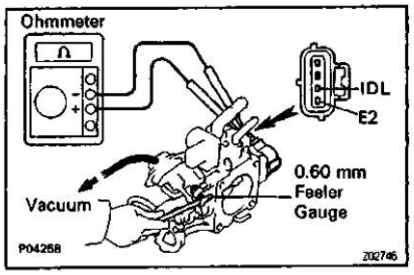
(c) Using an ohmmeter, measure the resistance between each terminal.

Clearance between lever and stop screw	Between terminals	Resistance
0 mm (0 in.)	VTA – E2	0.2 – 5.7 kΩ
0.50 mm (0.020 in.)	IDL – E2	2.3 kΩ or less
0.70 mm (0.028 in.)	IDL – E2	Infinity
Throttle valve fully open	VTA – E2	2.0 – 10.2 kΩ
–	VC – E2	2.5 – 5.9 kΩ

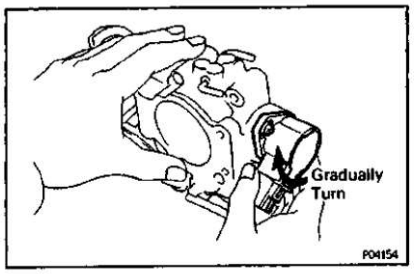


4. IF NECESSARY, ADJUST THROTTLE POSITION SENSOR

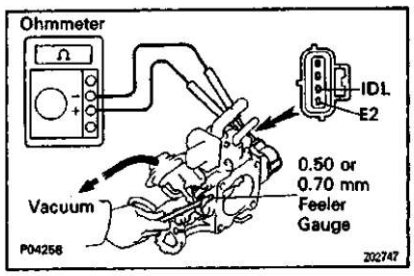
(a) Loosen the two set screws of the sensor.



(b) Apply vacuum to the throttle opener.
(c) Insert a 0.60 mm (0.024 in.) feeler gauge between the throttle stop screw and stop lever.
(d) Connect the test probe of an ohmmeter to the terminals IDL and E2 of the sensor.

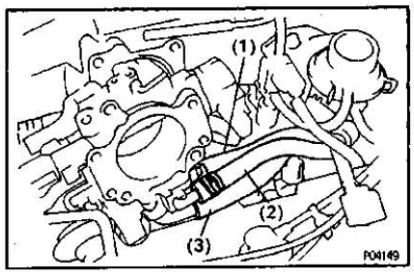


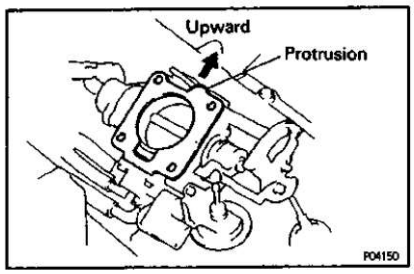
(e) Gradually turn the sensor clockwise until the ohmmeter deflects, and secure it with the two set screws.



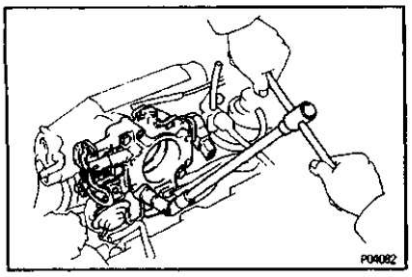
(f) Recheck the continuity between terminals IDL and E2.

Clearance between lever and stop screw	Continuity (IDL – E2)
0.50 mm (0.020 in.)	Continuity
0.70 mm (0.028 in.)	No continuity

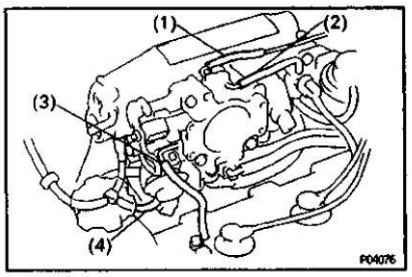




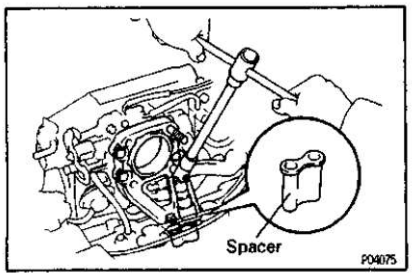
THROTTLE BODY INSTALLATION
(See Components for Removal and Installation)
1. INSTALL THROTTLE BODY
(a) Connect the following hoses to the throttle body:
(1) Water by–pass hose (from upper side of No. 1 air tube)
(2) Water by–pass hose (from lower side of No. 1 air tube)
(3) Air hose (from No. 1 air tube)
(b) Install a new gasket on the throttle body, facing the protrusion upward.



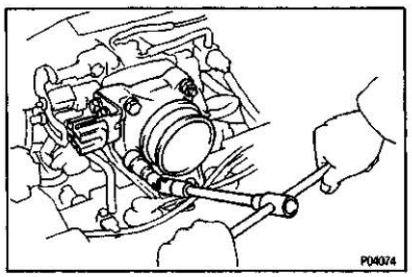
(c) Install the throttle body with the four bolts.
Torque: 19 N–m (195 kgf–cm, 14 ft–lbf)
Different bolt lengths are used for the upper and lower sides.
Bolt length:
45 mm (1.77 in.) for upper side
70 mm (2.76 in.) for lower side



(d) Connect the following hoses:
(1) Vacuum hose to port "P" of throttle body
(2) Vacuum hose to port "E" of throttle body
(3) PCV hose to port PCV of throttle body
(4) Vacuum hose to throttle opener
(e) Connect the following connector:
- Throttle position sensor connector
- IACV connector

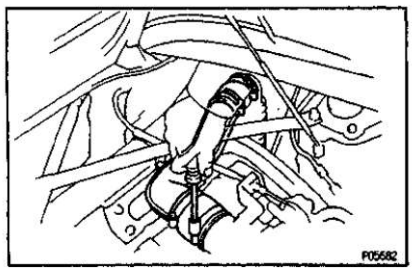


2. INSTALL INTAKE AIR CONNECTOR STAY
(a) Install the spacer.
(b) Install the intake air connector stay with the six bolts.
Torque:
7.8 N–m (80 kgf–cm, 69 in.–lbf) for 10 mm head
19 N–m (195 kgf–cm, 14 ft–lbf) for 12 mm head



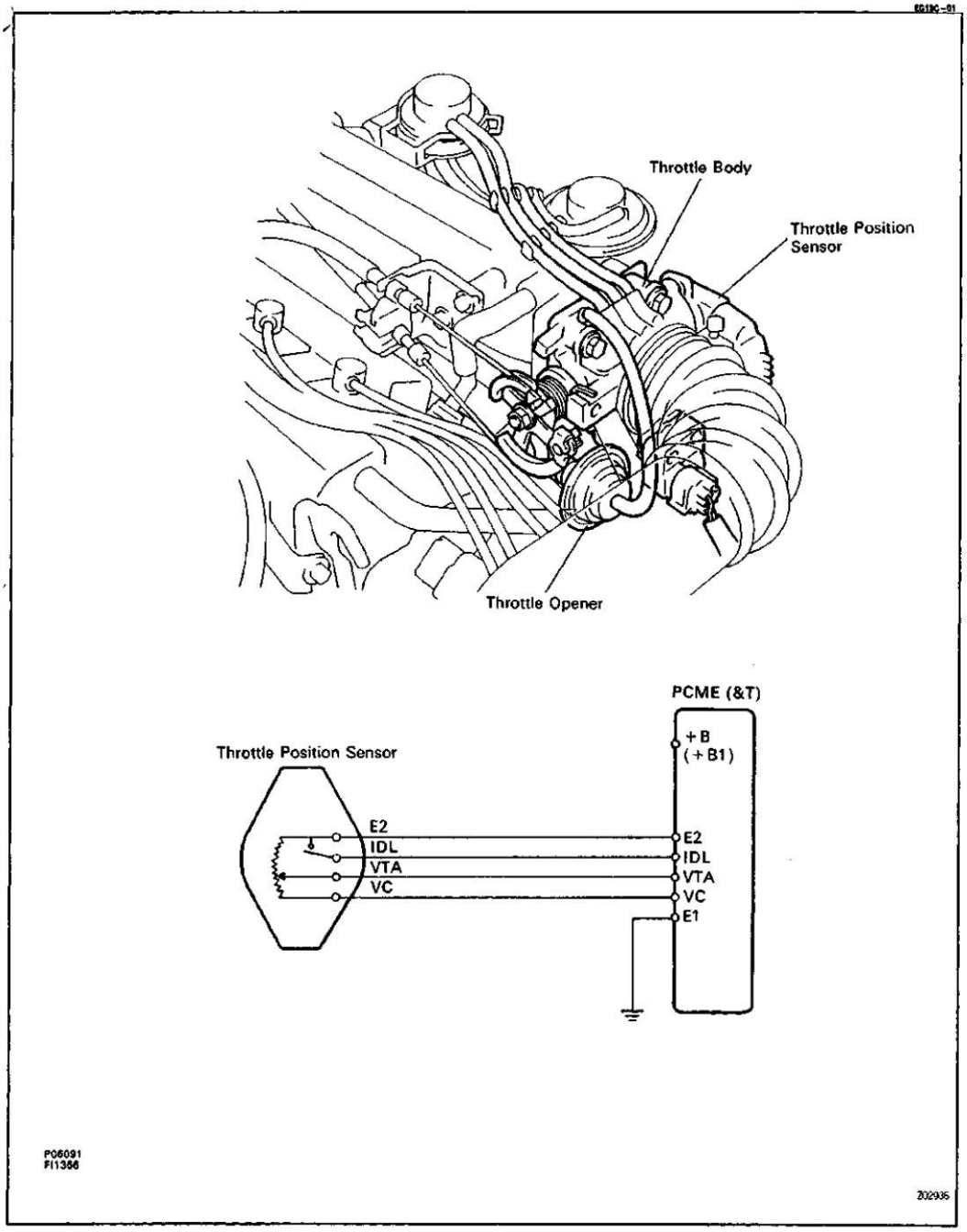
3. INSTALL INTAKE AIR CONNECTOR
Install the intake air connector with the two bolts and two nuts.
Torque: 19 N–m (195 kgf–cm, 14 ft–lbf)

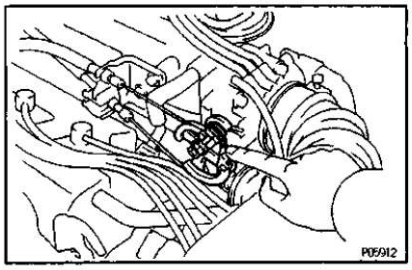
4. CONNECT ACCELERATOR CABLE TO THROTTLE BODY



5. INSTALL NO.1 INTAKE AIR CONNECTOR
6. CONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY
7. REFILL WITH ENGINE COOLANT
8. START ENGINE AND CHECK FOR ENGINE COOLANT

THROTTLE BODY

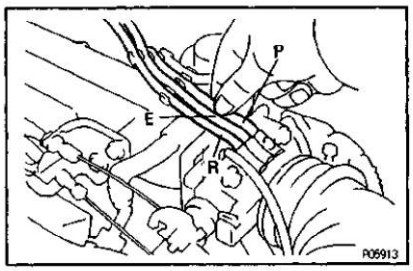




ON–VEHICLE INPSECTION

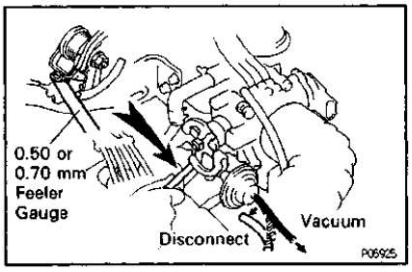
1. INSPECT THROTTLE BODY

(a) Check that the throttle linkage moves smoothly.



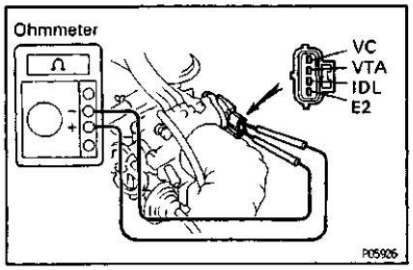
(b) Check the vacuum at each port.
Start the engine.
Check the vacuum with your finger.

Port name	At idle	Other than idle
P	No vacuum	Vacuum
E	No vacuum	Vacuum
R	No vacuum	No vacuum



2. INSPECT THROTTLE POSITION SENSOR

(a) Disconnect the sensor connector.
(b) Disconnect the vacuum hose from the throttle opener.
(c) Apply vacuum to the throttle opener.
(d) Insert a feeler gauge between the throttle stop screw and stop lever.



(e) Using an ohmmeter, measure the resistance between each terminal.

Clearance between lever and stop screw	Between terminals	Resistance
0 mm (0 in.)	VTA – E2	0.2 – 5.7 kΩ
0.50 mm (0.020 in.)	1DL – E2	2.3 kΩ or less
0.70 mm (0.028 in.)	IDL – E2	Infinity
Throttle valve fully open	VTA – E2	2.0 – 10.2 kΩ
–	VC – E2	2.5 – 5.9 kΩ

(f) Reconnect the vacuum hose to the throttle opener.
(g) Reconnect the sensor connector.

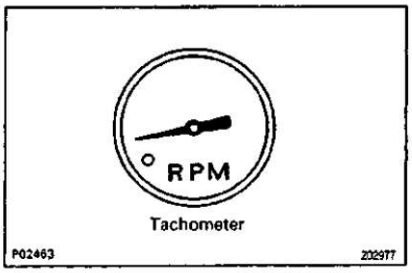
3. INSPECT AND ADJUST THROTTLE OPENER

A. Warm up engine

Allow the engine to warm up to normal operating temperature.

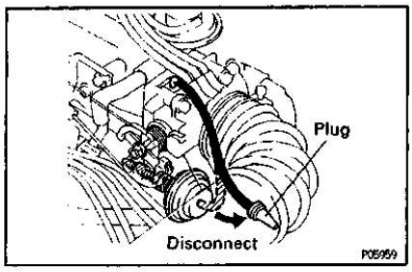
B. Connect tachometer

(See step 2 in Ignition Timing Inspection and Adjustment)



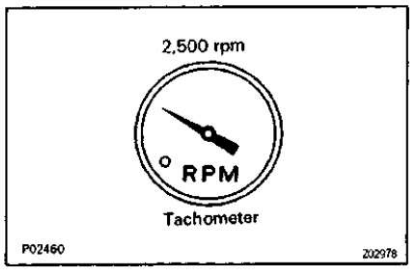
C. Check idle speed

Idle speed:
750 ± 50 rpm for USA M/T
700 ± 50 rpm for USA A/T
850 ± 50 rpm for CANADA M/T

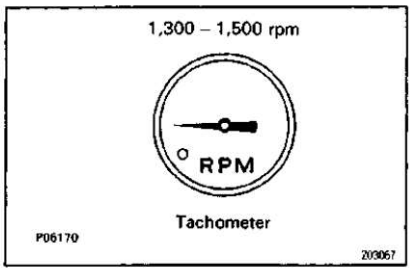


D. Check and adjust throttle opener setting speed

(a) Disconnect the vacuum hose from the throttle opener, and plug the hose end.



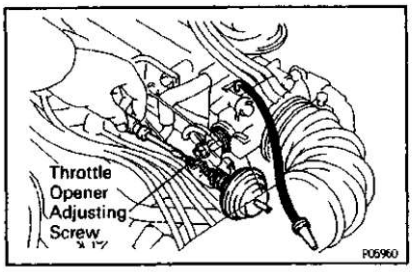
(b) Maintain the engine at 2,500 rpm.



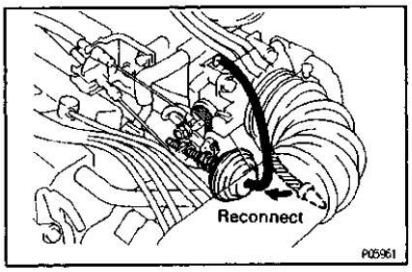
(c) Release the throttle valve.

(d) Check that the throttle opener is set.

Throttle opener setting speed:
1,300 – 1,500 rpm (w/ Cooling fan OFF)



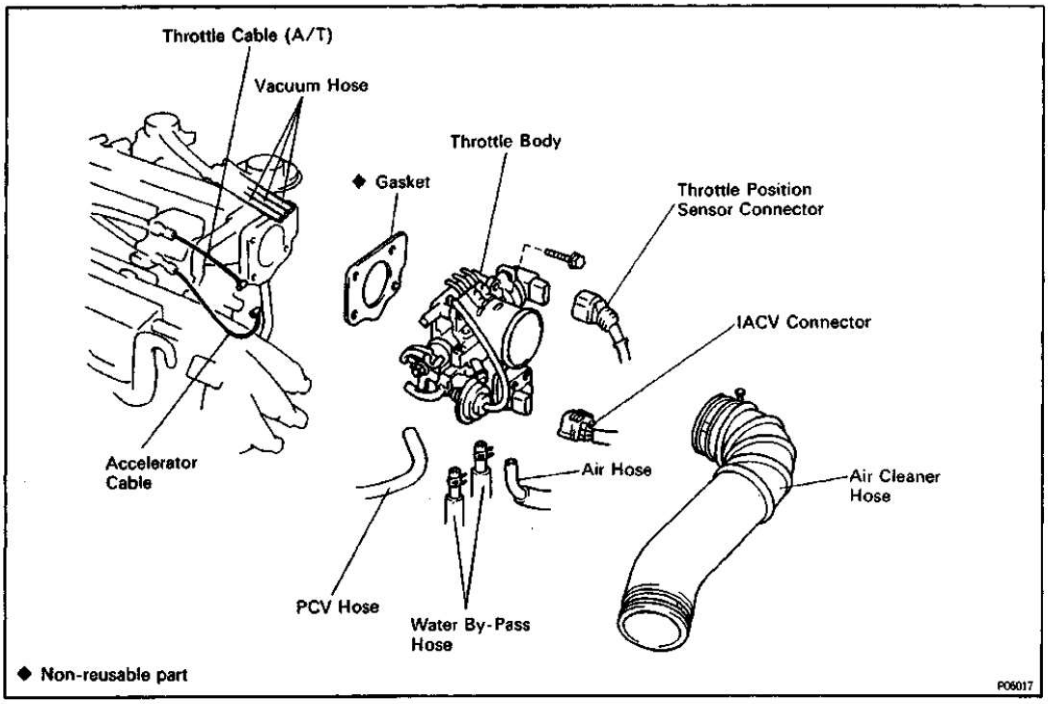
(e) Adjust the throttle opener setting speed by turning the throttle opener adjusting screw.



(f) Reconnect the vacuum hose to the throttle opener.

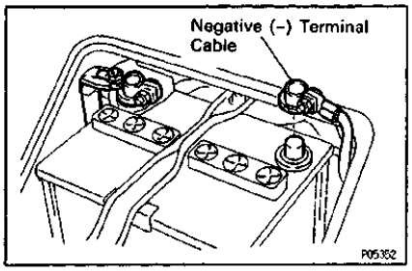
E. Disconnect tachometer

COMPONENTS FOR REMOVAL AND INSTALLATION



THROTTLE BODY REMOVAL

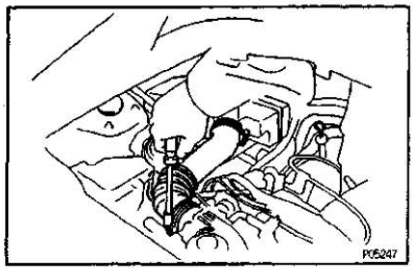
(See Components for Removal and Installation)



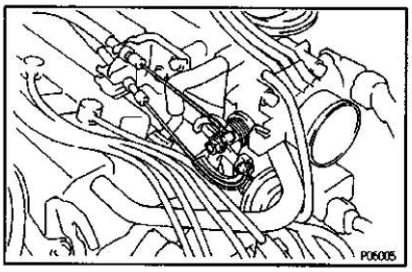
1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY

CAUTION: Turn the ignition switch to 'LOCK'. Disconnect the negative terminal from the battery. Wait at least 20 seconds before proceeding with work.

2. DRAIN ENGINE COOLANT



3. REMOVE AIR CLEANER HOSE

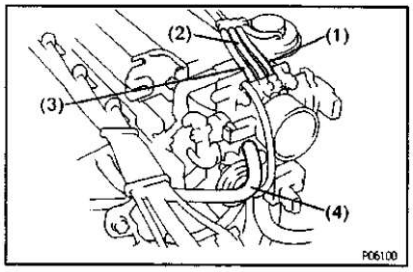


4. DISCONNECT ACCELERATOR CABLE FROM THROTTLE BODY

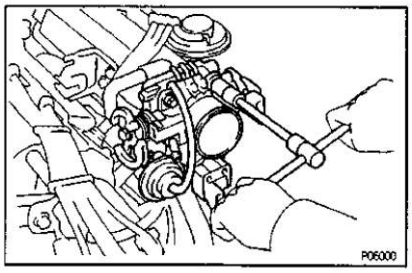
5. (A/T)
DISCONNECT THROTTLE CABLE FROM THROTTLE BODY

6. REMOVE THROTTLE BODY

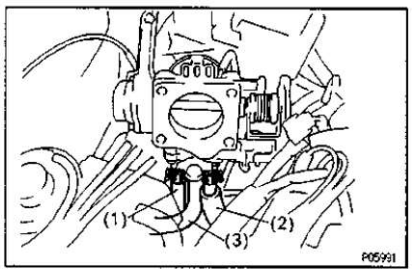
(a) Disconnect the following connector:
- Throttle position sensor connector
- IACV connector



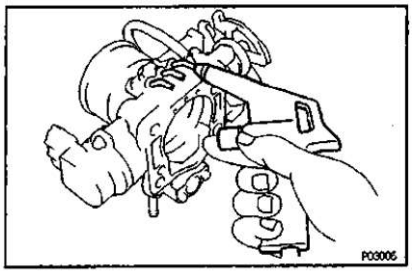
(b) Disconnect the following hoses:
(1) Vacuum hose (from upper port of TVS) from port "P" of throttle body
(2) Vacuum hose (from port "Q" of EGR vacuum modulator) from port "E" of throttle body
(3) Vacuum hose (from port "R" of EGR vacuum modulator) from port "R" of throttle body
(4) PCV hose (from cylinder head) from throttle body



(c) Remove the four bolts, and disconnect the throttle body from the intake manifold.
(d) Remove the throttle body gasket.



(e) Disconnect the following hoses from the throttle body, and remove the throttle body:
(1) Water by–pass hose (from water outlet)
(2) Water by–pass hose (from water by–pass pipe)
(3) Air hose (from A/C idle–up valve)



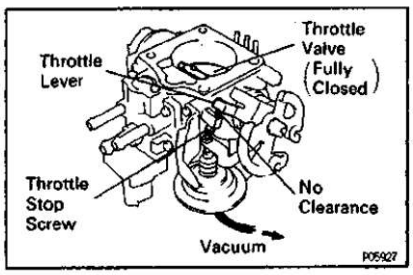
THROTTLE BODY INSPECTION

EG0DH–02

1. CLEAN THROTTLE BODY

(a) Using a soft brush and carburetor cleaner, clean the cast parts.
(b) Using compressed air, clean ail the passanges and apertures.

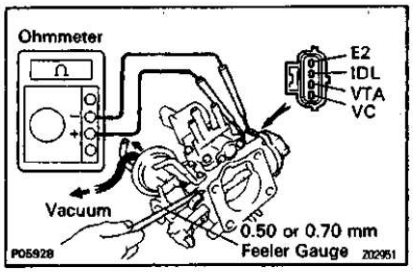
NOTICE: To prevent deterioration, do not clean the thr–ottle position sensor.



2. DISCONNECT VACUUM HOSE FROM THROTTLE OPENER

3. INSPECT THROTTLE VALVE

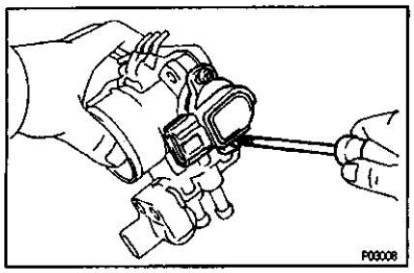
(a) Apply vacuum to the throttle opener.
(b) Check that there is no clearance between the throttle stop screw and throttle lever when the throttle valve is fully closed.



4. INSPECT THROTTLE POSITION SENSOR

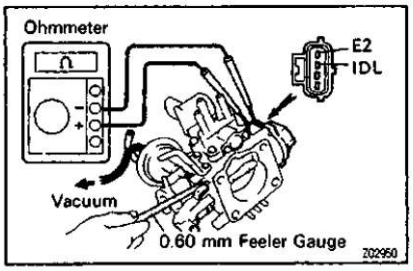
(a) Apply vacuum to the throttle opener.
(b) Insert a feeler gauge between the throttle stop screw and stop levee.
(c) Using an ohmmeter, measure the resistance between each terminal.

Clearance between lever and stop screw	Between terminals	Resistance
0 mm (0 in.)	VTA – E2	0.2 – 5.7 kΩ
0.50 mm (0.020 in.)	IDL – E2	2.3 kΩ or less
0.70 mm (0.028 in.)	IDL – E2	Infinity
Throttle valve fully open	VTA – E2	2.0 – 10.2 kΩ
–	VC – E2	2.5 – 5.9 kΩ

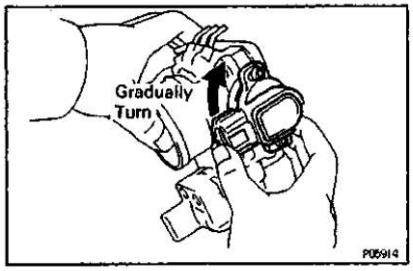


5. IF NECESSARY, ADJUST THROTTLE POSITION SENSOR

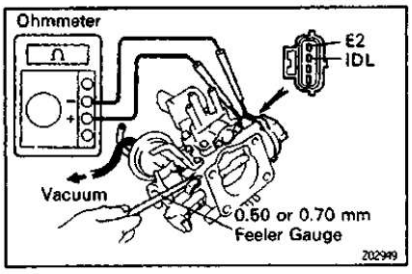
(a) Loosen the two set screws of the sensor.



(b) Apply vacuum to the throttle opener.
(c) Insert a 0.60 mm (0.024 in.) feeler gauge between the throttle stop screw and stop lever.
(d) Connect the test probe of an ohmmeter to the terminals IDL and E2 of the sensor.

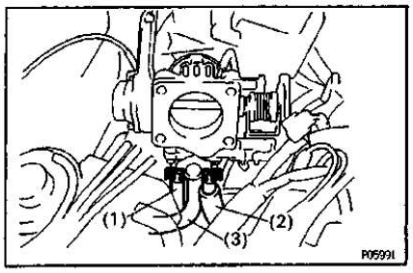


(e) Gradually turn the sensor clockwise until the ohmmeter deflects, and secure it with the two set screws.



(f) Recheck the continuity between terminals IDL and E2.

Clearance between fever and stop screw	Continuity (IDL – E2)
0.50 mm (0.020 in.)	**Continuity**
0.70 mm (0.028 in.)	**No continuity**



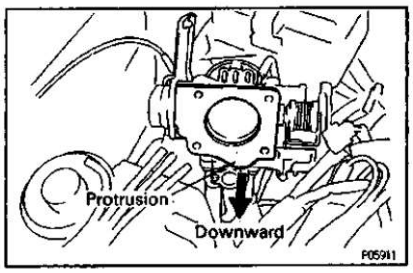
THROTTLE BODY INSTALLATION

EG13K–01

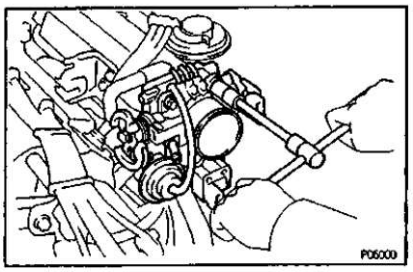
(See Components for Removal and Installation)

1. INSTALL THROTTLE BODY

(a) Connect the following hoses to the throttle body:
- (1) Water by–pass hose (from water outlet)
- (2) Water by–pass hose (from water by–pass pipe)
- (3) Air hose (from A/C idle–up valve)



(b) Install a new gasket on the throttle body, facing thel protrusion downward.



(c) Install the throttle body with the four bolts.

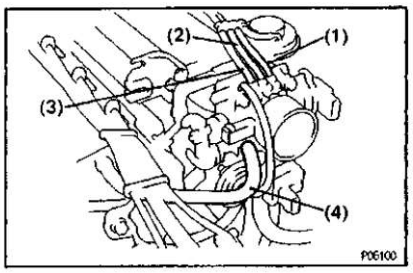
Torque: 19 N–m (195 kgf–cm, 14 ft–lbf)

HINT: Different bolt lengths are used for the upper and lower sides.

Bolt length:

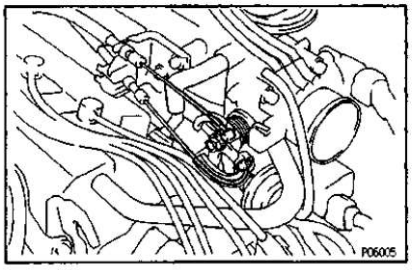
45 mm (1.77 in.) for upper side

55 mm (2.17 in.) for lower side

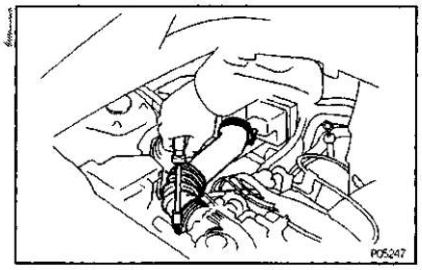


(d) Connect the following hoses:
- (1) Vacuum hose (from upper port of TVS) to port ”P” of throttle body
- (2) Vacuum hose (from port ”Q” of EGR vacuum modulator) to port ”E” of throttle body
- (3) Vacuum hose (from port ”R” of EGR vacuum modulator) to port ”R” of throttle body
- (4) PCV hose (from cylinder head) to throttle body

(e) Reconnect the following connector:
- Throttle position sensor connector
- IACV connector



2. CONNECT ACCELERATOR CABLE TO THROTTLE BODY
3. (A/T)
CONNECT THROTTLE CABLE TO THROTTLE BODY

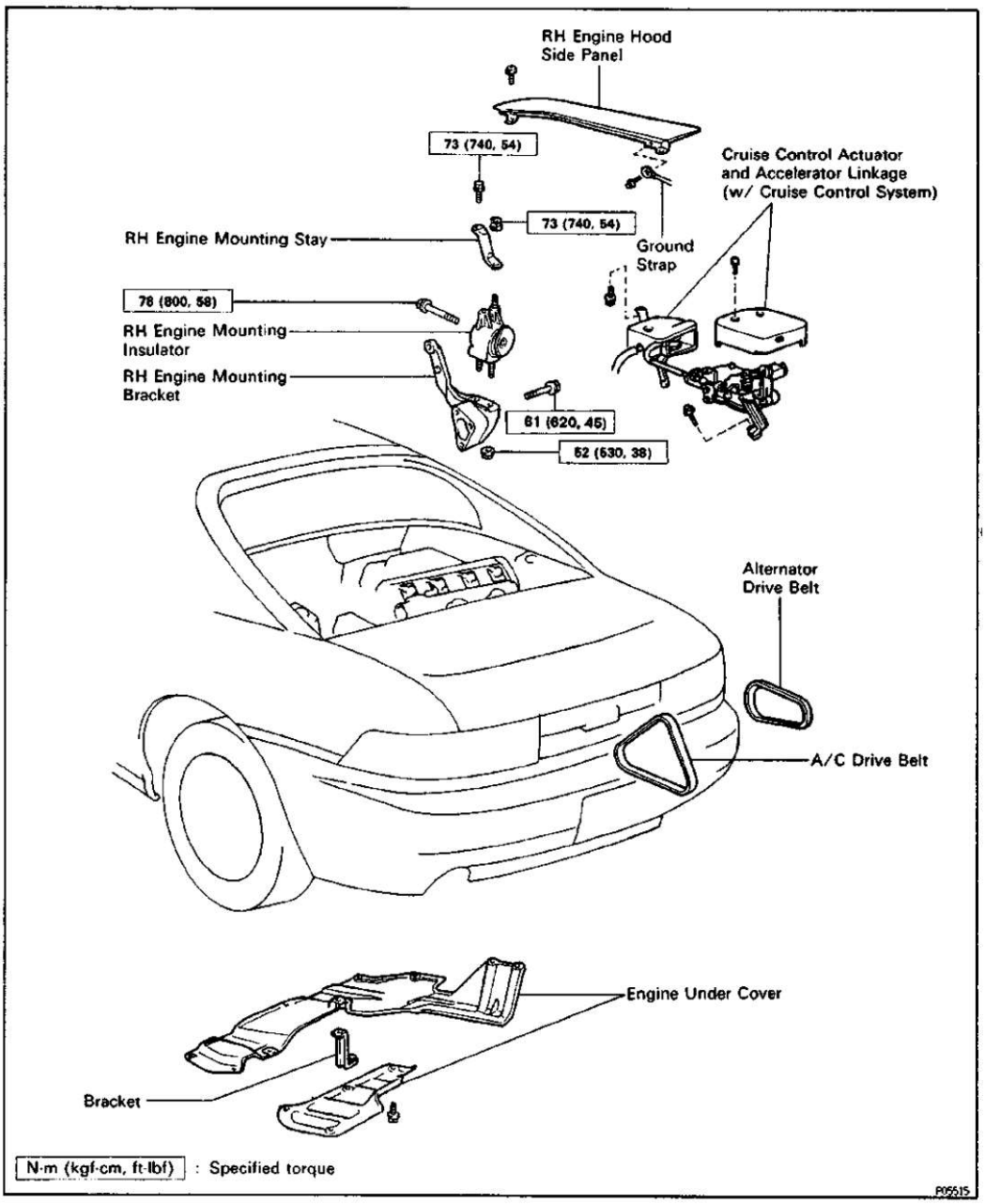


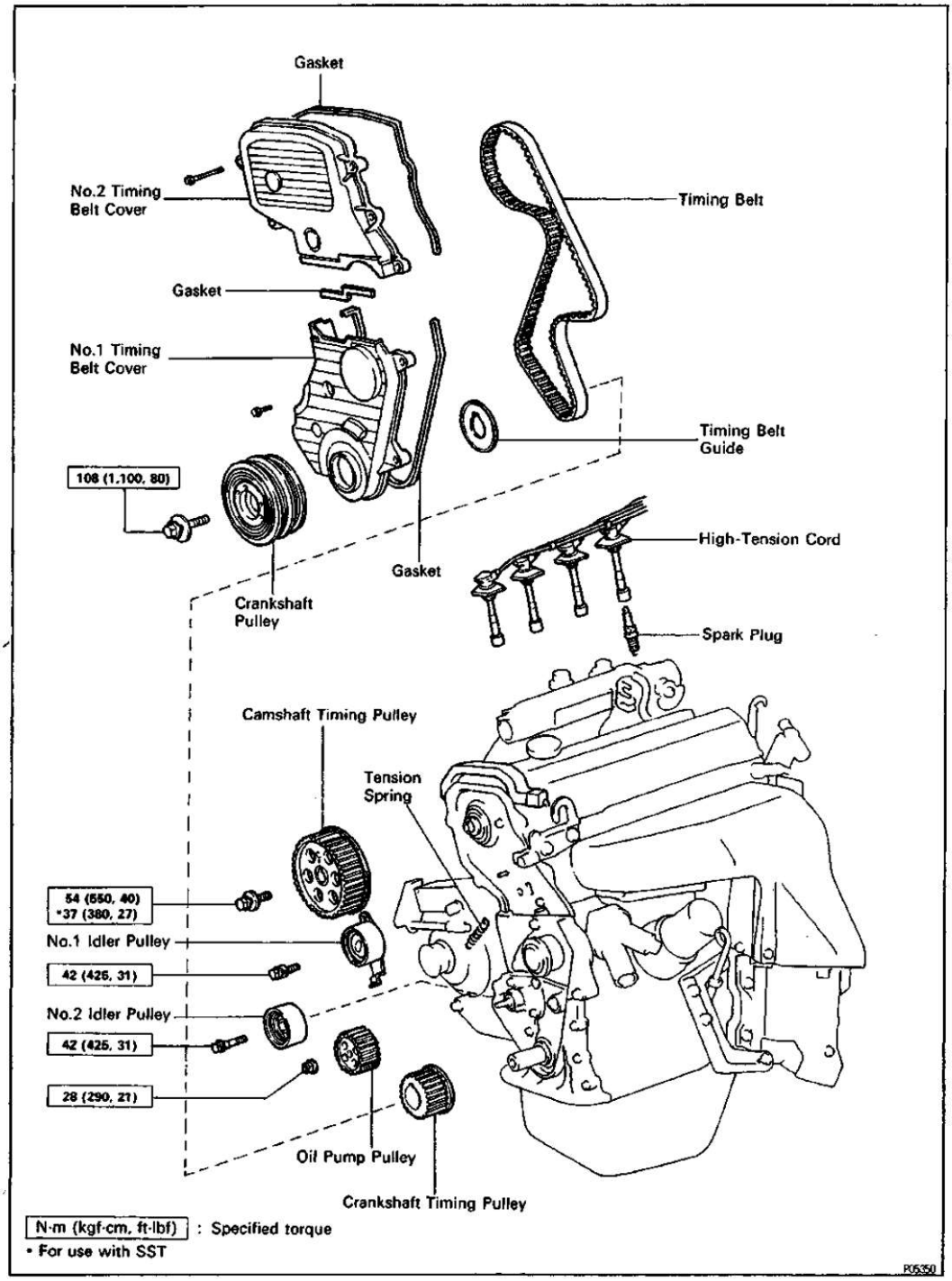
4. INSTALL AIR CLEANER HOSE

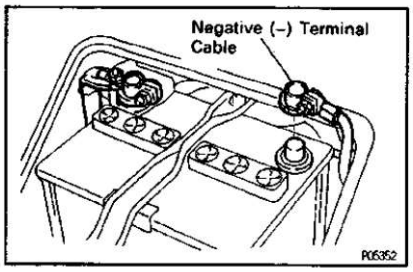
5. FILL WITH ENGINE COOLANT
6. CONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY

TIMING BELT

COMPONENTS FOR REMOVAL AND INSTALLATION




Gasket
No.2 Timing Belt Cover
Timing Belt
Gasket
No.1 Timing Belt Cover
Timing Belt Guide
108 (1,100, 80)
High-Tension Cord
Gasket
Crankshaft Pulley
Spark Plug
Camshaft Timing Pulley
Tension Spring
54 (550, 40)
*37 (380, 27)
No.1 Idler Pulley
42 (425, 31)
No.2 Idler Pulley
42 (425, 31)
28 (290, 21)
Oil Pump Pulley
Crankshaft Timing Pulley
N·m (kgf·cm, ft·lbf) : Specified torque
* For use with SST
P05350



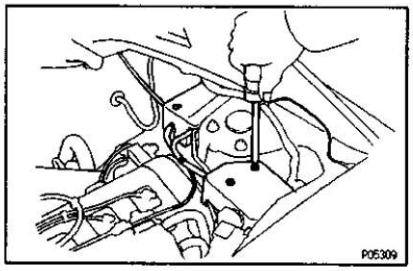
TIMING BELT REMOVAL

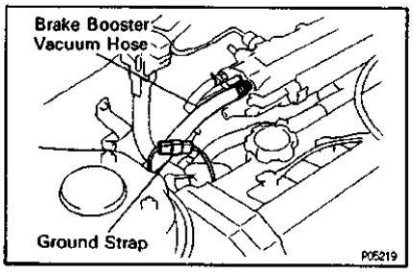
(See Components for Removal and installation)

1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY

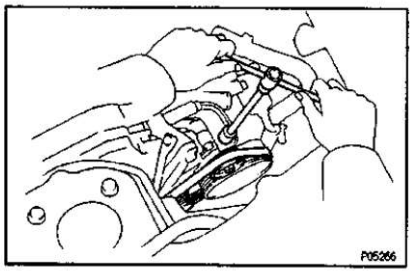
CAUTION: Turn the ignition switch to 'LOCK'. Disconnect the negative terminal from the battery. Wait at least 20 seconds before proceeding with work.

2. REMOVE ENGINE UNDER COVERS
3. REMOVE RH ENGINE HOOD SIDE PANEL
4. (w/ CRUISE CONTROL SYSTEM)
REMOVE CRUISE CONTROL ACTUATOR AND ACCELERATOR LINKAGE



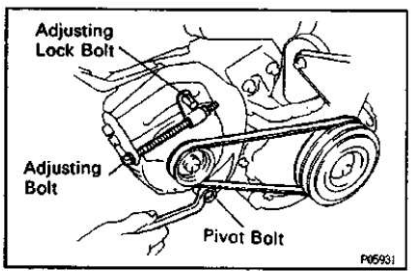


5. DISCONNECT GROUND STRAP CONNECTOR
6. DISCONNECT BRAKE BOOSTER VACUUM HOSE



7. REMOVE A/C DRIVE BELT

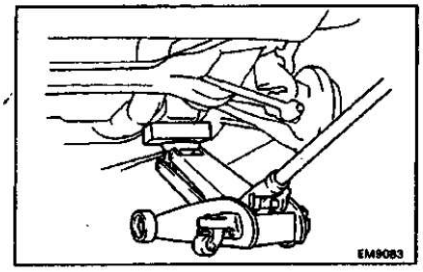
Loosen the pully nut and adjusting bolt, and remove the drive belt.



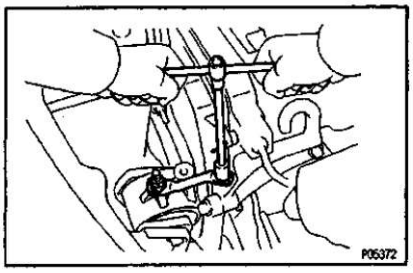
8. REMOVE ALTERNATOR DRIVE BELT

(a) Loosen the pivot bolt and adjusting lock bolt.
(b) Loosen the adjusting bolt, and remove the drive belt, pivot bolt and adjusting lock bolt.

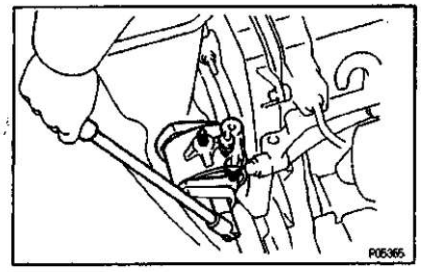
9. REMOVE RH REAR WHEEL



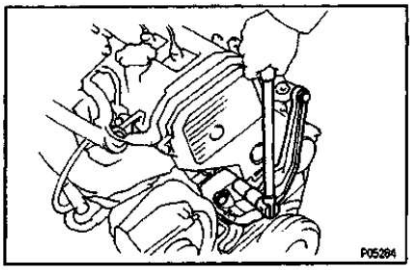
14. SLIGHTLY JACK UP ENGINE
Raise the engine enough to remove the weight from the engine mounting on the right side.



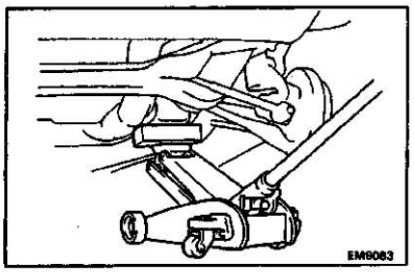
11. REMOVE RH ENGINE MOUNTING STAY
Remove the bolt, nut and mounting stay.



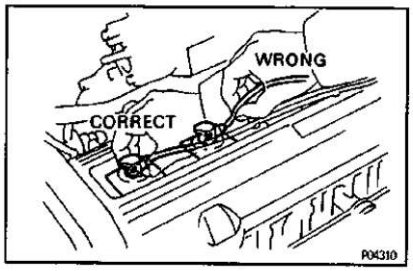
12. REMOVE RH ENGINE MOUNTING INSULATOR
Remove the through bolt, two nuts and mounting insulator.



13. REMOVE RH ENGINE MOUNTING BRACKET
(a) Remove the four bolts.



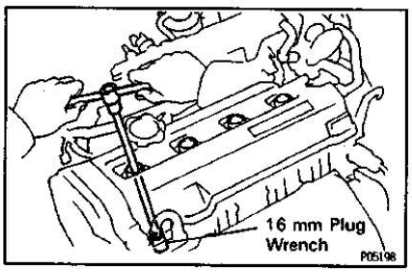
(b) Remove the mounting bracket.
HINT: Raise the engine as far as it will go, and remove the mounting bracket.



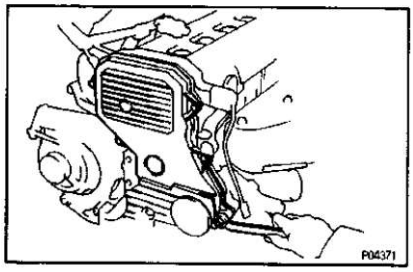
14. REMOVE SPARK PLUGS

(a) Disconnect the four high–tension cords at the rubber boot. Do not pull the cords.

NOTICE: Pulling on or bending the cords may damage the conductor inside.

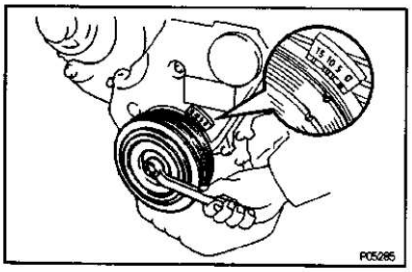


(b) Using a 16 mm plug wrench, remove the four spark plugs.



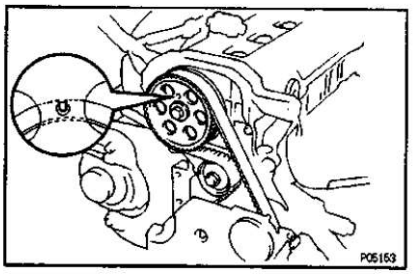
15. REMOVE NO.2 TIMING BELT COVER

Remove the five bolts, timing belt cover and two gaskets.

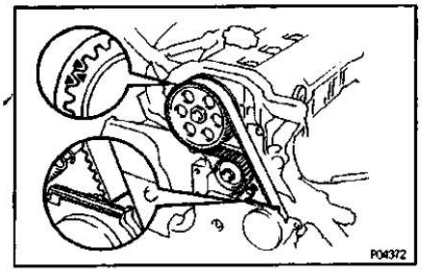


16. SET NO.1 CYLINDER TO TDC/COMPRESSION

(a) Turn the crankshaft pulley and align its groove with timing mark "0" of the No.1 timing belt cover.

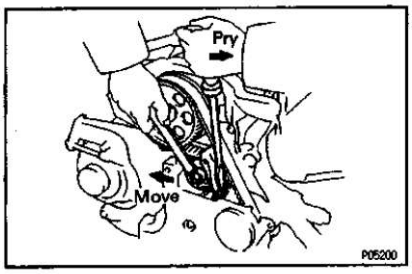


(b) Check that the hole of the camshaft timing pulley is aligned with the timing mark of the bearing cap.
If not, turn the crankshaft one revolution (360°).

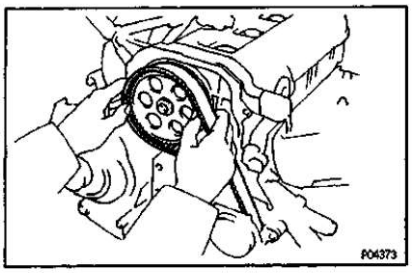


17. REMOVE TIMING BELT FROM CAMSHAFT TIMING PULLEY

HINT (When re–using timing belt): Place the match–marks on the timing belt and camshaft timing pulley, and place rnatchmark on timing belt to match the end of the No.1 timing belt cover.



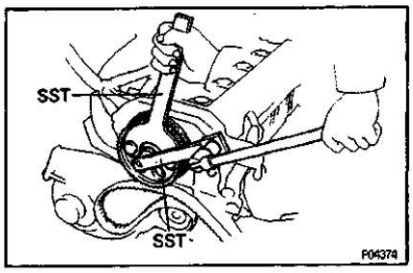
(a) Loosen the Mounting bolt of the No. 1 idler pulley and shift the pulley toward the left as far as it will go, and temporarily tighten it.



(b) Remove the timing belt from the camshaft timing pulley.

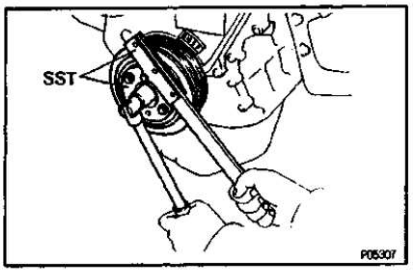
18. REMOVE CAMSHAFT TIMING PULLEY

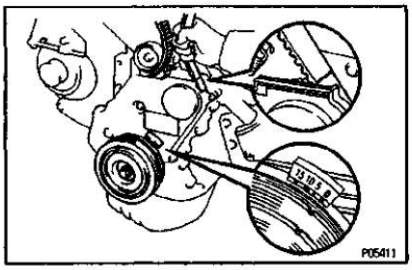
Using SST, remove the bolt and timing pulley.
SST 09249–63010, 09278–54012



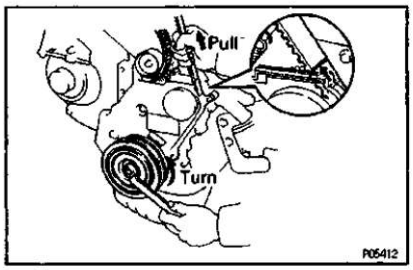
19. REMOVE CRANKSHAFT PULLEY

(a) Using SST, remove the pulley bolt.
SST 09213–54015 (09214–00030), 09330–00021



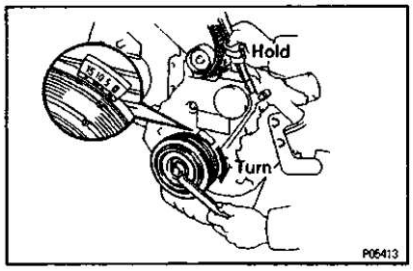


HINT (When re–using timing belt): After loosening the crankshaft pulley bolt, check that the timing belt matchmark aligns with the end of the No. 1 timing belt cover when the crankshaft pulley groove is aligned with the timing mark ”0” of the No. 1 timing belt cover. If the matchmark does not align, align as follows:

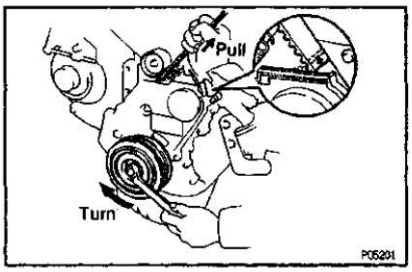


(When matchmark is out of alignment on clockwise)

- Align the matchmark by pulling the timing belt up on the water pump pulley side while turning the crankshaft pulley counterclockwise.

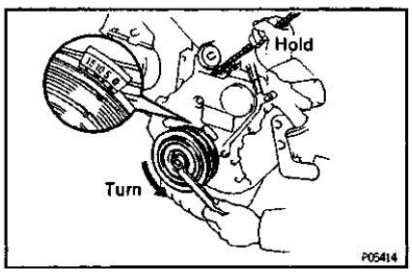


- After aligning the matchmark, hold the timing belt. And turn the crankshaft pulley clockwise, and align its groove with timing mark ”0” of the No.1 timing belt cover.

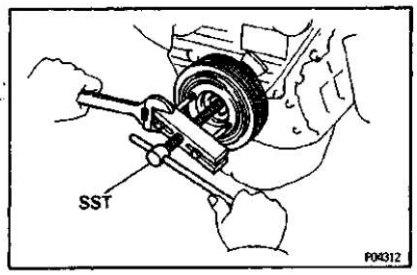


(When matchmark is out of alignment on counter–clockwise)

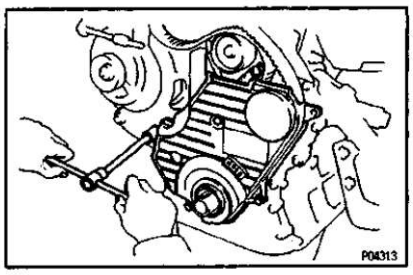
- Align the matchmark by pulling the timing belt up on the No.1 idler pulley side while turning the crankshaft pulley clockwise.



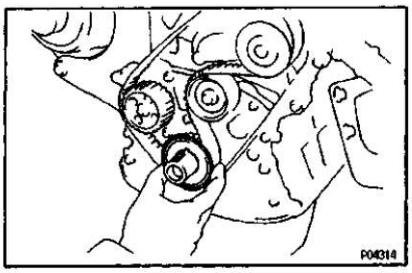
- After aligning the matchmark, hold the timing belt. And turn the crankshaft pulley counter–clockwise, and align its groove with timing mark ”0” of the No.1 timing belt cover.



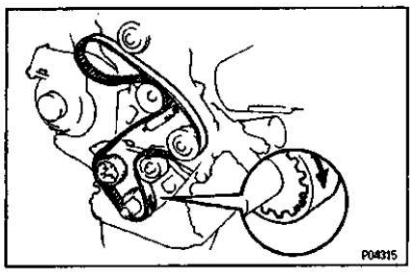
(b) Using SST, remove the pulley.
SST 0921360017 (09213–00020, 09213–00030, 09213–00050)
HINT (When re–using timing belt): Remove the pulley without turning it.



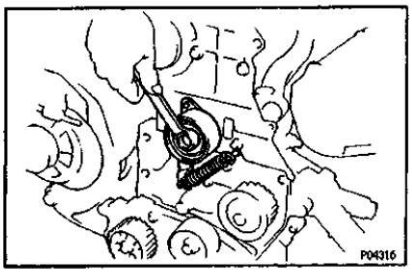
20. REMOVE NO.1 TIMING BELT COVER
Remove the four bolts, timing belt cover and gasket.



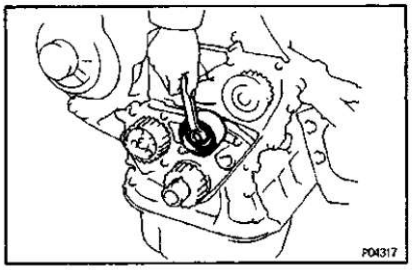
21. REMOVE TIMING BELT GUIDE



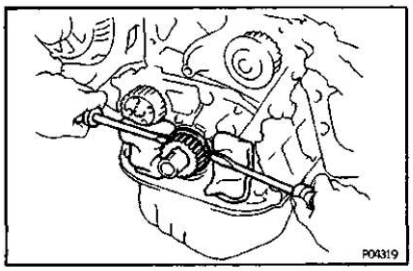
22. REMOVE TIMING BELT
HINT (When re–using timing belt): Draw a direction arrow on the timing belt (in the direction of engine revolution), and place matchmarks on the timing belt and crankshaft timing pulley.



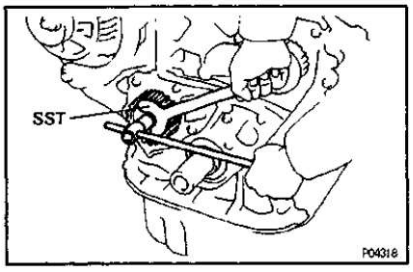
23. REMOVE No.1 IDLER PULLEY AND TENSION SPRING
Remove the bolt, pulley and tension spring.



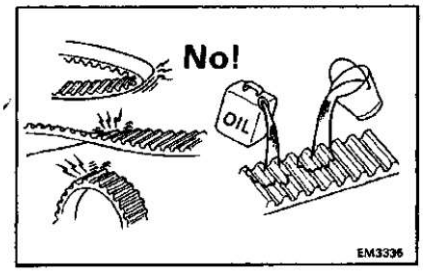
24. REMOVE NO.2 IDLER PULLEY
Remove the bolt and pulley.



25. REMOVE CRANKSHAFT TIMING PULLEY
If the pulley cannot be removed by hand, use two screwdrivers.
HINT: Position shop rags as shown to prevent damage.



26. REMOVE OIL PUMP PULLEY
Using SST, remove the nut and pulley.
SST 09616–30011

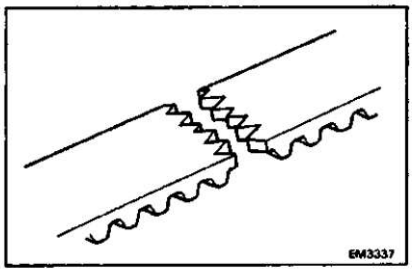


TIMING BELT COMPONENTS INSPECTION

1. INSPECT TIMING BELT

NOTICE:

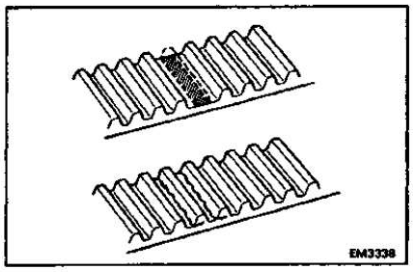
- **Do not bend, twist or turn the timing belt inside out.**
- **Do not allow the timing belt to come into contact with oil, water or steam.**
- **Do not utilize timing belt tension when installing or removing the mounting bolt of the camshaft timing pulley.**



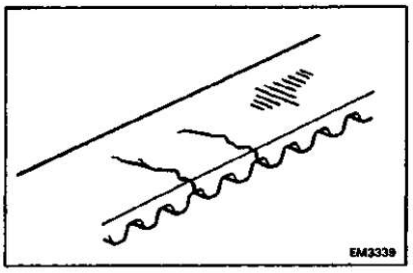
If there are any defects as shown in the illustration, check the following points:

(a) Premature parting

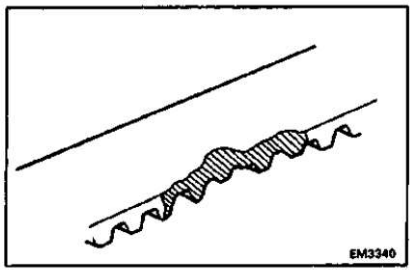
- Check the proper installation.
- Check the timing cover gasket for damage and proper installation.



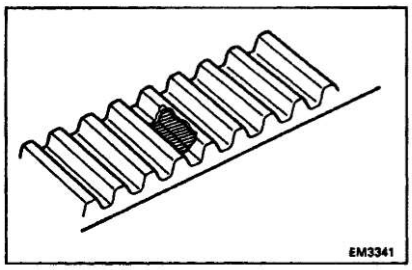
(b) If the belt teeth are cracked or damaged, check to see if either camshaft or water pump is locked.



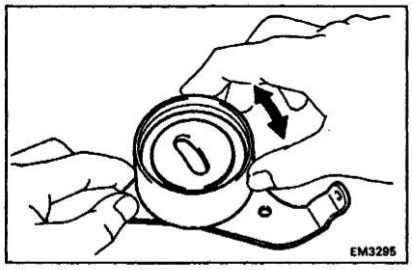
(c) If there is noticeable wear or cracks on the belt face, check to see if there are nicks on the side of the idler pulley lock.



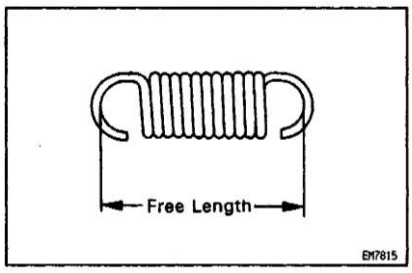
(d) If there is wear or damage on only one side of the belt, check the belt guide and the alignment of each pulley.



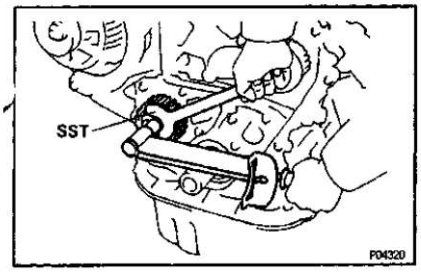
(e) If there is noticeable wear on the belt teeth, check the timing cover for damage, correct gasket installation, and the foreign material on the pulley teeth.
If necessary, replace the timing belt.



2. INSPECT IDLER PULLEYS
Check that the idler pulley turns smoothly.
If necessary, replace the idler pulley.



3. INSPECT TENSION SPRING
(a) Measure the free length of tension spring.
Free length:
46.0 mm (1.811 in.)
If the free length is not as specified, replace the tension spring.
(b) Measure the tension or the tension spring at the specified installed length.
Installed tension (at 50.5 mm (1.988 in.)):
32 – 37 N (3.25 – 3.75 kgf, 7.2 – 8.3 lbf)
If the installed tension is not as specified, replace the tension spring.



TIMING BELT INSTALLATION

(See Components for Removal and Installation)

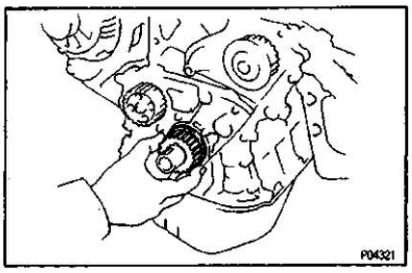
1. INSTALL OIL PUMP PULLEY

(a) Align the cutouts of the pulley and shaft, and slide on the pulley.

(b) Using SST, install the pulley nut.

SST 09616–30011

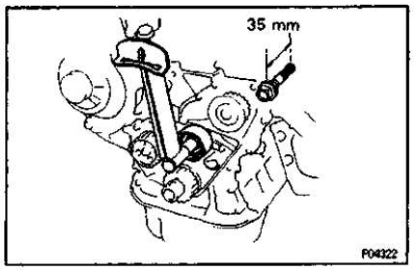
Torque: 28 N–m (290 kgf–cm, 21 ft–lbf)



2. INSTALL CRANKSHAFT TIMING PULLEY

(a) Align the timing pulley set key with the key groove of the pulley.

(b) Slide on the timing pulley, facing the flange side inward.



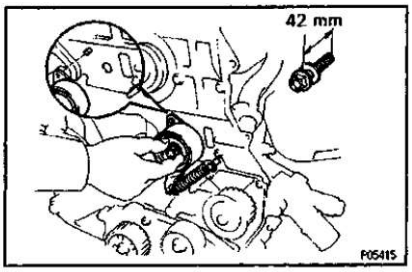
3. INSTALL N0.2 IDLER PULLEY

(a) Install the pulley with the bolt.

Torque: 42 N–m (425 kgf–cm, 31 ft–lbf)

HINT: Use bolt 35 mm (1.38 in.) in length.

(b) Check that the idles pulley moves smoothly.



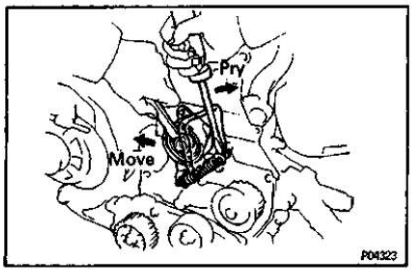
4. TEMPORARILY INSTALL N0.1 IDLER PULLEY AND TENSION SPRING

(a) Align the bracket pin hole with the pivot pin.

(b) Install the pulley with the bolt. Do not tighten the bolt yet.

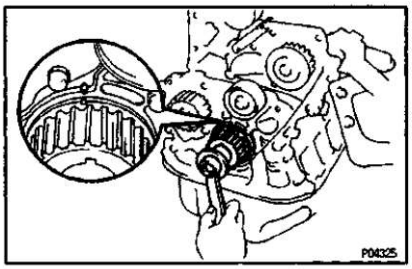
HINT: Use bolt 42 mm (1.65 in.) in length.

(c) Install the tension spring.



(d) Pry the pulley toward the left as far as it will go and tighten the bolt.

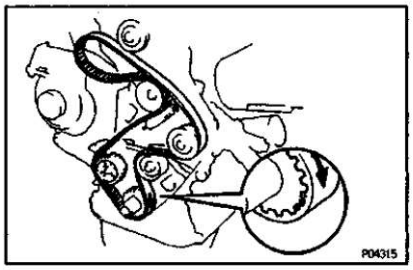
(e) Check that the idler pulley moves smoothly.



5. TEMPORARILY INSTALL TIMING BELT

NOTICE: The engine should be cold.

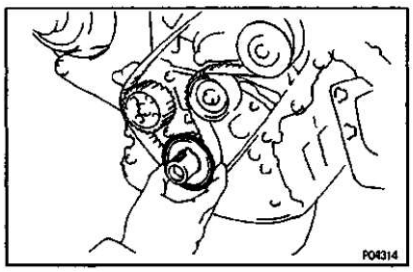
(a) Using the crankshaft pulley bolt, turn the crankshaft and align the timing marks of the crankshaft timing pulley and oil pump body.



(b) Remove any oil or water on the crankshaft pulley, oil pump pulley, water pump pulley, No. 1 idler pulley, No. 2 idler pulley and keep them clean.

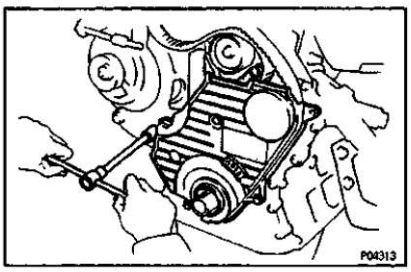
(c) Install the timing belt on the crankshaft timing pulley, oil pump pulley, No.1 idler pulley, water pump pulley and No.2 idler pulley.

HINT (When re–using timing belt): Align the points marked during removal, and install the belt with the arrow pointing in the direction of engine revolution.



6. INSTALL TIMING BELT GUIDE

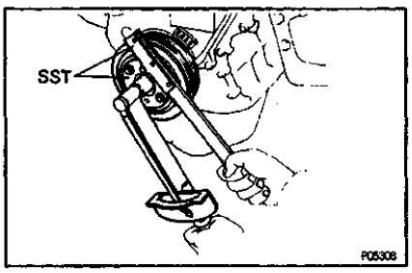
Install the guide, facing the cup side outward.



7. INSTALL NO.1 TIMING BELT COVER

(a) Install the gasket to the timing belt cover.

(b) Install the timing belt cover with the four bolts.



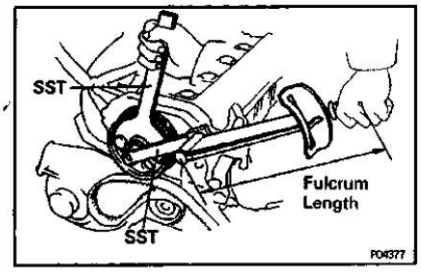
8. INSTALL CRANKSHAFT PULLEY

(a) Align the pulley set key with the key groove of the pulley, and slide on the pulley.

(b) Using SST, install the pulley bolt.

SST 09213–54015 (09214–00030), 09330–00021

Torque: 108 N–m (1,100 kgf–cm, 80 ft–lbf)



9. INSTALL CAMSHAFT TIMING PULLEY

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

(b) Using SST, install the pulley bolt.

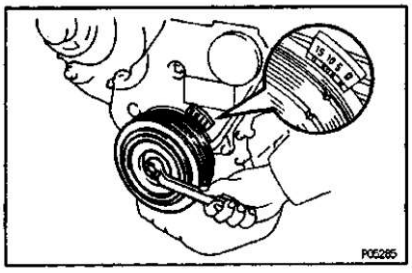
SST 09249–63010, 09278–54012

Torque:

54 N–m (550 kgf–cm, 40 ft–lbf)

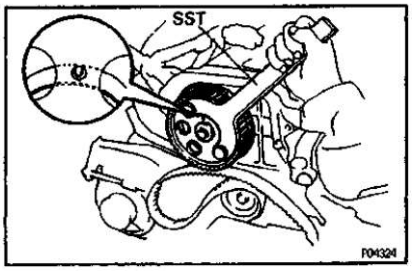
37 N–m (380 kgf–cm, 27 ft–lbf) for SST

HINT: Use a torque wrench with a fulcrum length of 340 mm (13.39 in.)



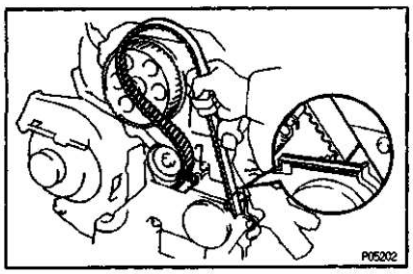
10. SET NO.1 CYLINDER TO TDC/COMPRESSION

(a) Turn the crankshaft pulley, and align its groove with timing mark ”0” of the No.1 timing belt cover.



(b) Using SST, turn the camshaft, and align the hole of the camshaft timing pulley with the timing mark of the bearing cap.

SST 09278–54012

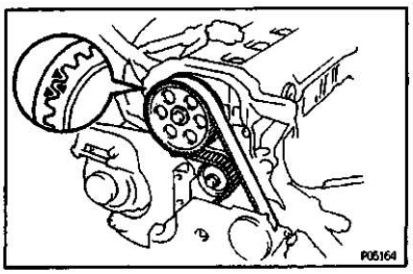


11. INSTALL TIMING BELT

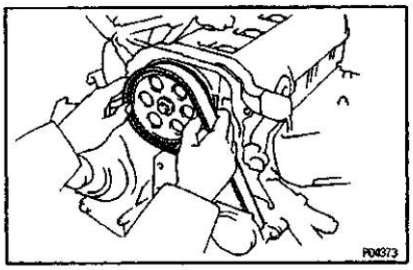
HINT (When re–using timing belt):

- Check that the matchmark on the timing belt matches the en d of the No.1 timing belt cover.

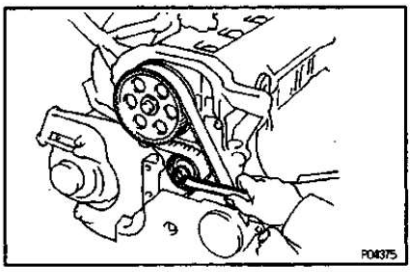
If the matchmark does not align, shift the meshing of the timing belt and crankshaft timing pulley until they align. (See step 19 in Timing Belt Removal)



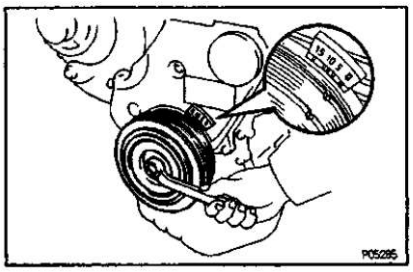
- Align the matchmarks of the timing belt and camshaft timing pulley.



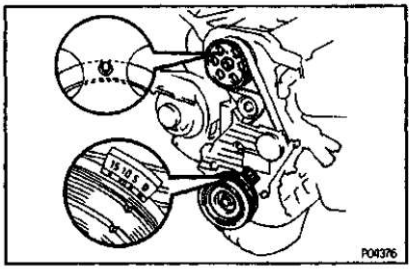
(a) Remove any oil or water on the camshaft timing pulley, and keep it clean.
(b) Install the timing belt, and checking the tension be–tween the crankshaft timing pulley and camshaft timing pulley.



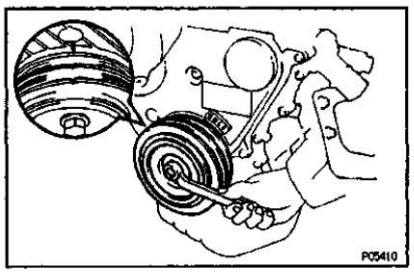
12. CHECK VALVE TIMING
(a) Loosen the No.1 idler pulley bolt 1/2 turn.



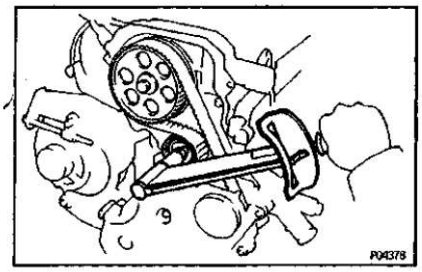
(b) Slowly turn the crankshaft pulley two revolutions TDC to TDC.
NOTICE: Always turn the crankshaft pulley clockwise.



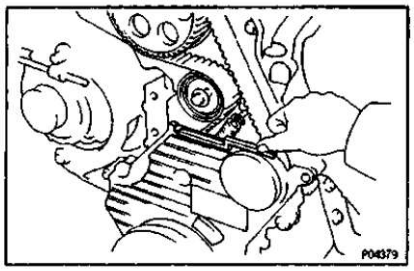
(c) Check that each pulley aligns with the timing marks as shown in the illustration.
If the timing marks do not align, remove the timing belt and reinstall it.



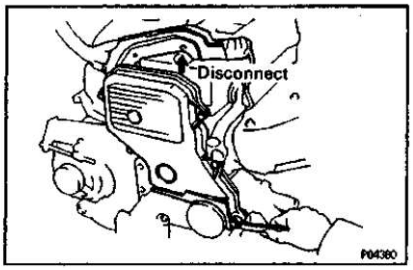
(d) Slowly turn the crankshaft pully 1 and 7/8 revolu–tions, and align its groove with the mark at 45° BTDC (for No.1 cylinder) of the No.1 timing belt cover.
NOTICE: Always turn the crankshaft pulley clockwise.



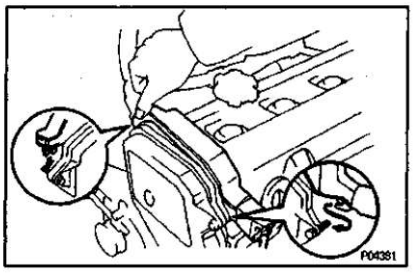
(e) Torque the mounting bolt of the No.1 idler pulley.
Torque: 42 N–m (425 kgf–cm, 31 ft–lbf)



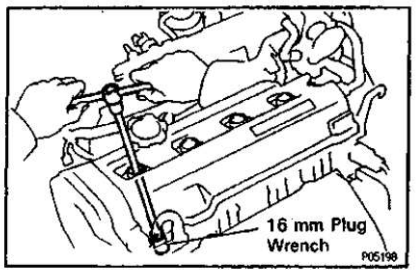
13. INSTALL NO.2 TIMING BELT COVER
(a) Install the gasket to the No.1 timing belt cover.



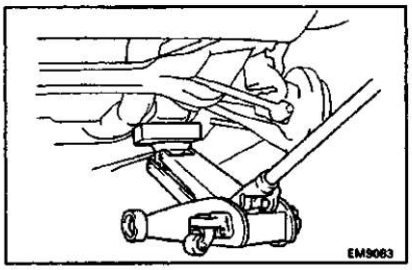
(b) Disconnect the engine wire protector between the No. 3 timing belt cover and cylinder head cover.
(c) Install the belt cover with the five bolts.



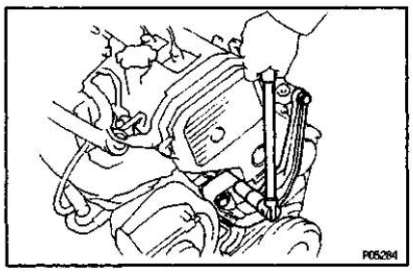
(d) Install the two clamps of the engine wire protector to each bolt.



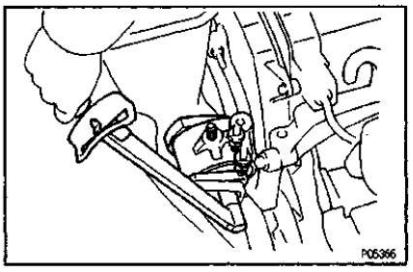
14. INSTALL SPARK PLUGS
(a) Using a 16 mm plug wrench, install the four spark plugs.
(b) Connect the four high–tension cords to the spark plugs.



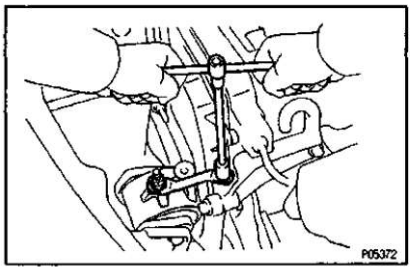
15. INSTALL RH ENGINE MOUNTING BRACKET
(a) Place the mounting bracket in position.
HINT: Raise the engine as far as it will go, and place the mounting bracket in position.



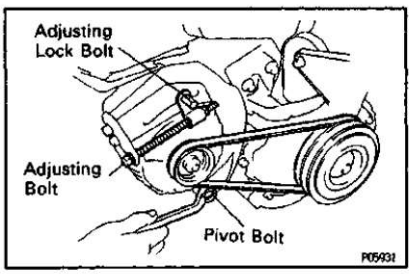
(b) Install the mounting bracket with the four bolts.
Torque: 61 N–m (620 kgf–cm, 45 ft–lbf)



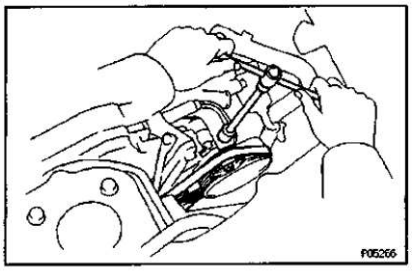
16. INSTALL RH ENGINE MOUNTING INSULATOR
Install the mounting insulator with the through bolt and two nuts.
Torque:
52 N–m (530 kgf–cm, 38 ft–lbf) for nut
78 N–m (800 kgf–cm, 58 ft–lbf) for through bolt



17. INSTALL RH ENGINE MOUNTING STAY
Install the mounting stay with the bolt and nut.
Torque: 73 N–m (740 kgf–cm, 54 ft–lbf)
18. INSTALL RH REAR WHEEL

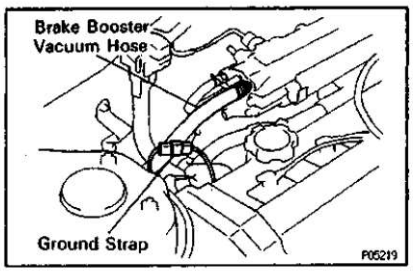


19. INSTALL ALTERNATOR DRIVE BELT
(a) Install the drive belt with the adjusting bolt.
(b) Adjust the drive belt with the adjusting bolt.
(c) Tighten the pivot bolt and adjusting lock bolt.

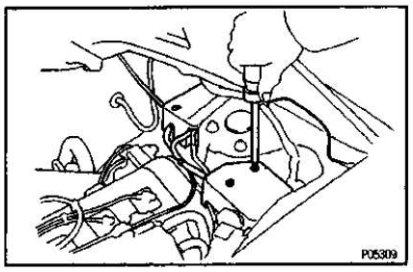


20. INSTALL A/C DRIVE BELT

(a) Install the drive belt with the adjusting bolt.
(b) Tighten the idler pulley bolt.



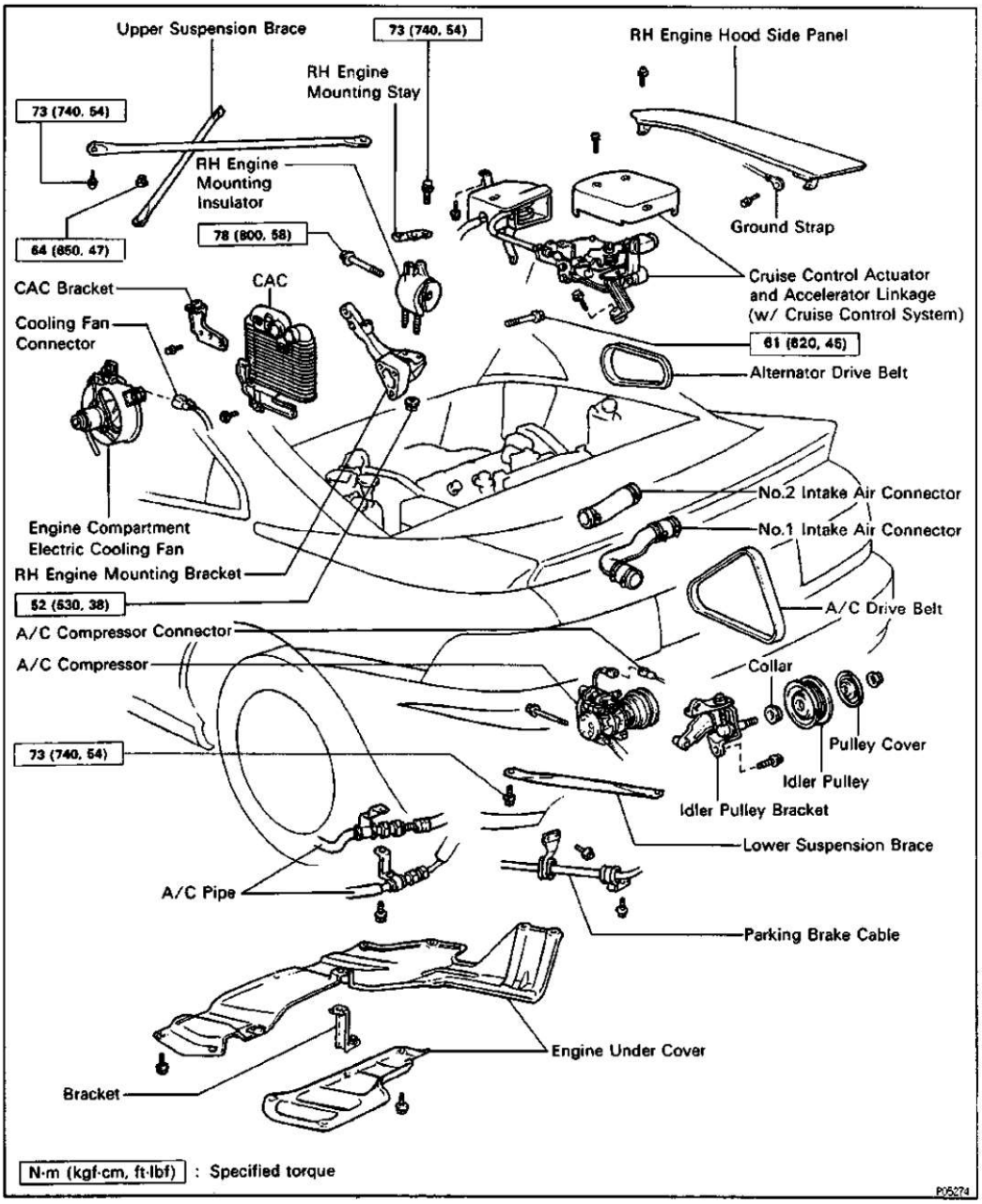
21. CONNECT GROUND STRAP CONNECTOR
22. CONNECT BRAKE BOOSTER HOSE

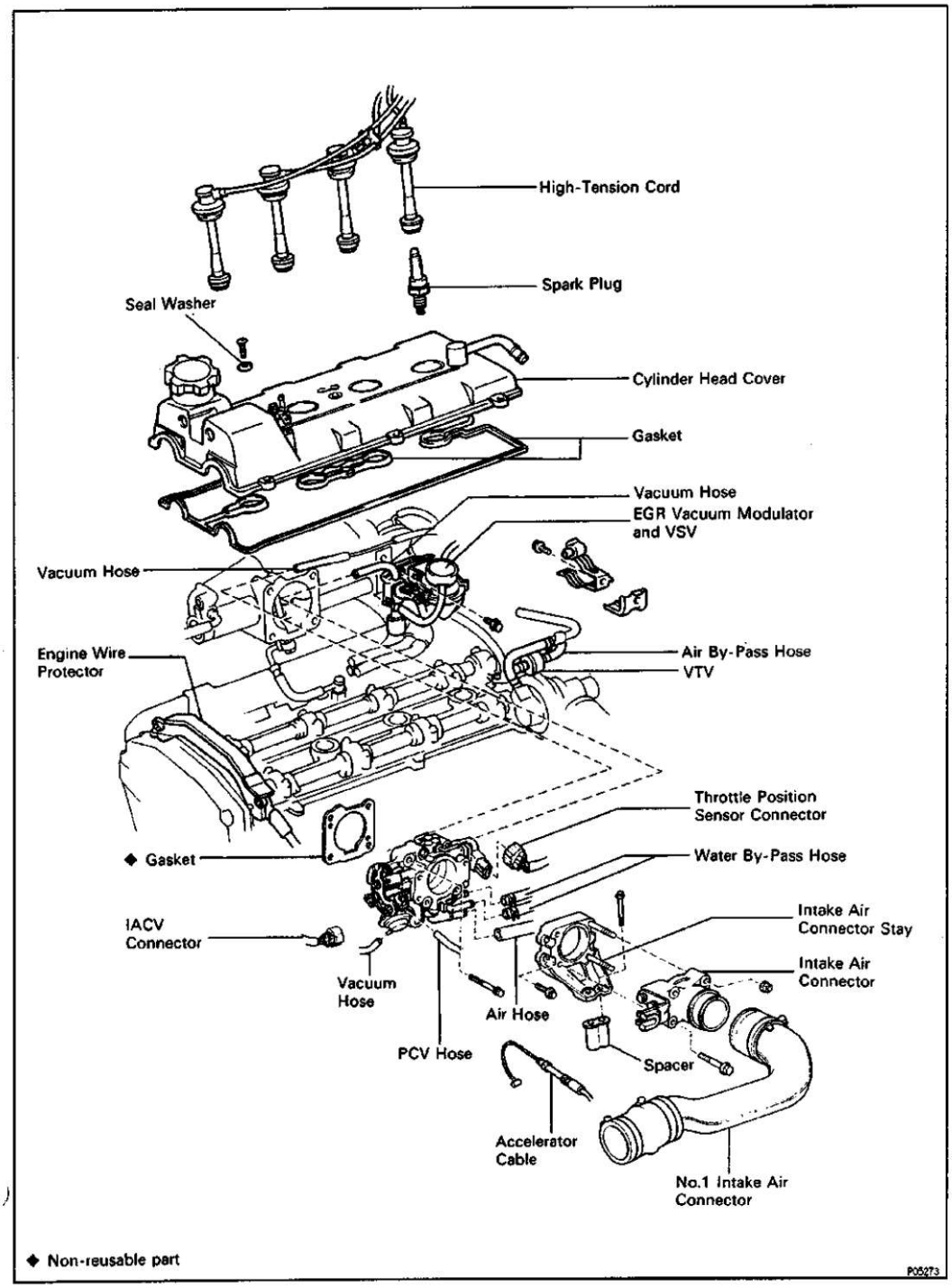


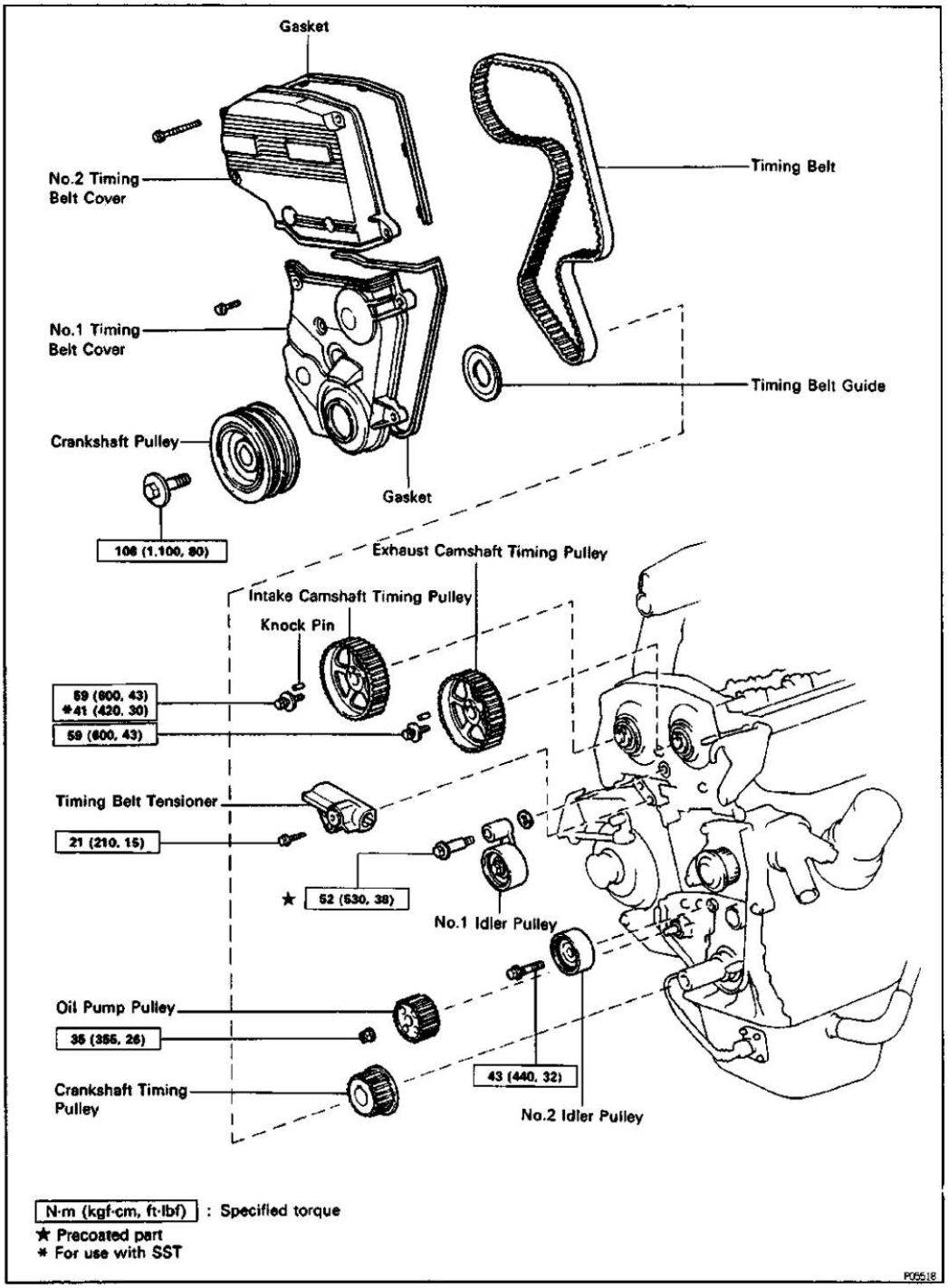
23. (w/ CRUISE CONTROL SYSTEM)
INSTALL CRUISE CONTROL ACTUATOR AND ACCELERATOR LINKAGE

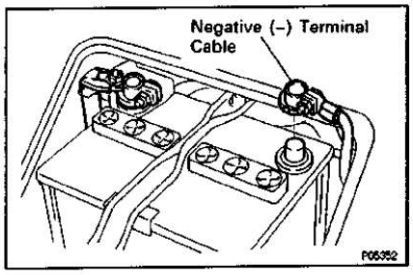
24. INSTALL RH ENGINE HOOD SIDE PANEL
25. INSTALL ENGINE UNDER COVERS
26. CONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY

TIMING BELT
COMPONENTS




High-Tension Cord
Spark Plug
Seal Washer
Cylinder Head Cover
Gasket
Vacuum Hose
EGR Vacuum Modulator and VSV
Vacuum Hose
Engine Wire Protector
Air By-Pass Hose
VTV
Throttle Position Sensor Connector
◆ Gasket
Water By-Pass Hose
IACV Connector
Intake Air Connector Stay
Intake Air Connector
Vacuum Hose
Air Hose
PCV Hose
Spacer
Accelerator Cable
No.1 Intake Air Connector
◆ Non-reusable part
P05273


Gasket
No.2 Timing Belt Cover
Timing Belt
No.1 Timing Belt Cover
Timing Belt Guide
Crankshaft Pulley
Gasket
108 (1.100, 80)
Exhaust Camshaft Timing Pulley
Intake Camshaft Timing Pulley
Knock Pin
59 (600, 43)
*41 (420, 30)
59 (600, 43)
Timing Belt Tensioner
21 (210, 15)
★ 52 (530, 38)
No.1 Idler Pulley
Oil Pump Pulley
35 (355, 26)
43 (440, 32)
Crankshaft Timing Pulley
No.2 Idler Pulley
N·m (kgf-cm, ft·lbf) : Specified torque
★ Precoated part
* For use with SST
P05518



TIMING BELT REMOVAL

(See Components for Removal and Installation)

1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY

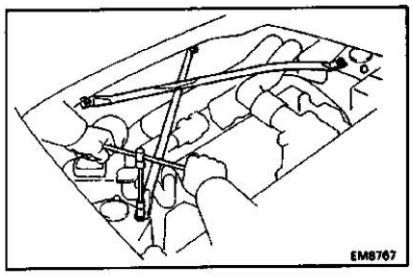
CAUTION: Turn the ignition switch to "LOCK". Disconnect the negative terminal from the battery. Wait at least 20 seconds before proceeding with work.

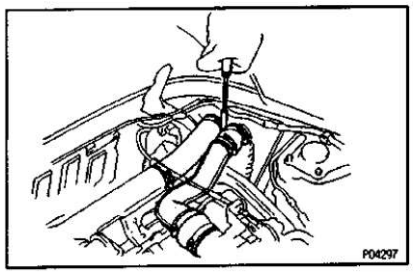
2. REMOVE ENGINE UNDER COVERS

3. REMOVE RH ENGINE HOOD SIDE PANEL

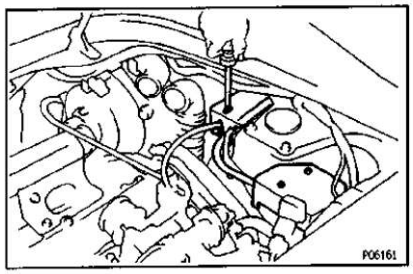
4. REMOVE UPPER SUSPENSION BRACE

Remove the two bolts, two nuts and upper brace.



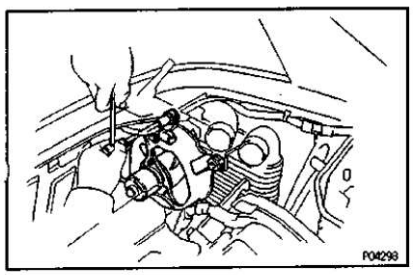


5. REMOVE NO.1 AND NO.2 INTAKE AIR CONNECTORS



6. (w/ CRUISE CONTROL SYSTEM) REMOVE CRUISE CONTROL ACTUATOR AND ACCELERATOR LINKAGE

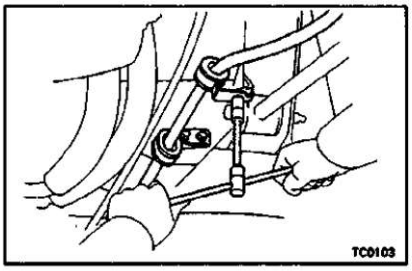
7. (w/o CRUISE CONTROL SYSTEM) DISCONNECT ACCELERATOR LINKAGE FROM THROTTLE BODY



8. REMOVE ENGINE COMPARTMENT ELECTRIC COOLING FAN

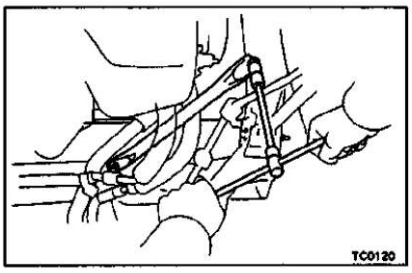
(a) Disconnect the cooling fan connector.

(b) Loosen the three bolts, and remove the cooling fan.

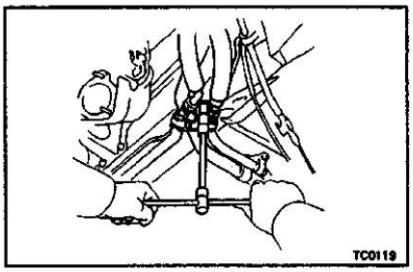


9. DISCONNECT A/C COMPRESSOR FROM ENGINE

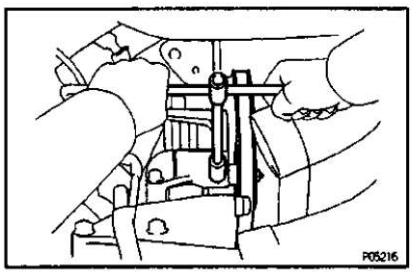
(a) Remove the three clamp bolts, and disconnect the parking brake cable.



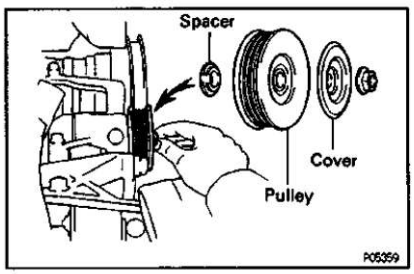
(b) Remove the two bolts and lower suspension brace.



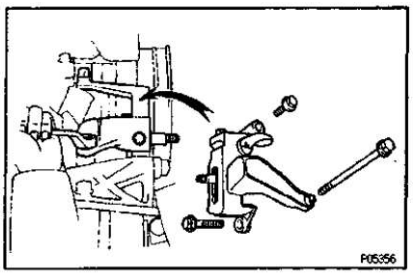
(c) Remove the clamp nut, and disconnect the two A/C pipes.



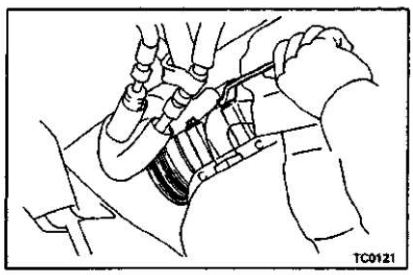
(d) Loosen the idler pulley nut.
(e) Loosen the adjusting bolt, and remove the drive belt.



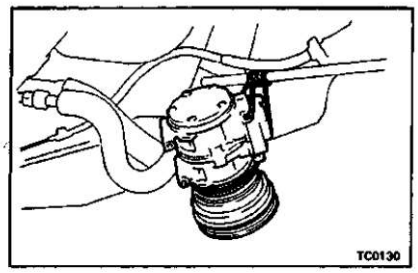
(f) Remove the nut, pulley cover, idler pulley and spacer.



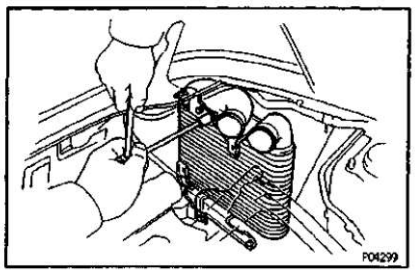
(g) Disconnect the A/C compressor connector.
(h) Remove the three bolts and idler pulley bracket.



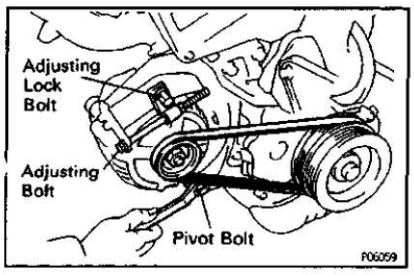
(i) Remove the two bolts, and disconnect the A/C compressor from the engine.



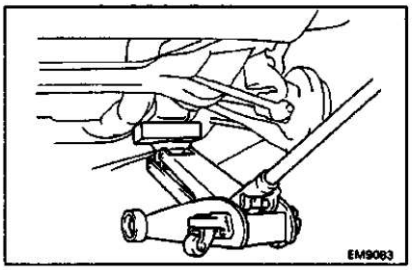
HINT: Suspend the A/C compressor to strut rod with a string.



10. REMOVE CAC
(a) Remove the two bolts holding the CAC to the upper bracket.
(b) Remove the three bolts, upper bracket and CAC.
11. REMOVE RH REAR WHEEL

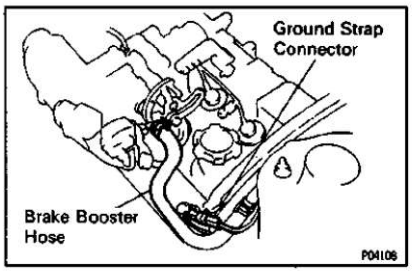


12. REMOVE ALTERNATOR DRIVE BELT
(a) Loosen the pivot bolt and adjusting lock bolt.
(b) Loosen the adjusting bolt, and remove the drive belt.



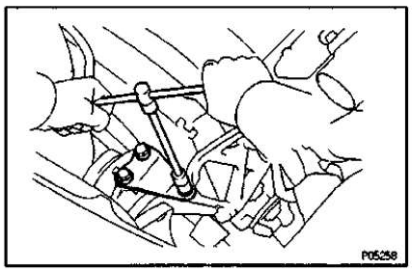
13. SLIGHTLY JACK UP ENGINE

Raise the engine enough to remove the weight from the engine mounting on the right side.



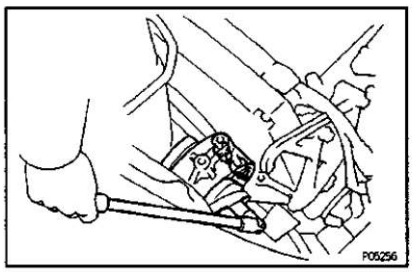
14. DISCONNECT GROUND STRAP CONNECTOR

15. DISCONNECT BRAKE BOOTER VACUUM HOSE



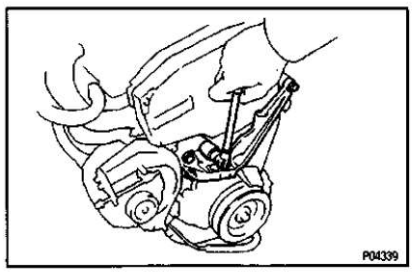
16. REMOVE RH ENGINE MOUNTING STAY

Remove the three bolts and mounting stay.



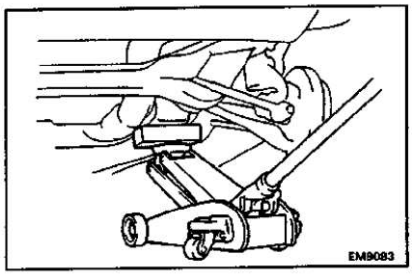
17. REMOVE RH ENGINE MOUNTING INSULATOR

Remove the two nuts, through bolt and mounting insulator.

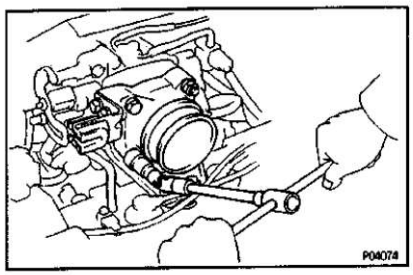


18. REMOVE RH ENGINE MOUNTING BRACKET

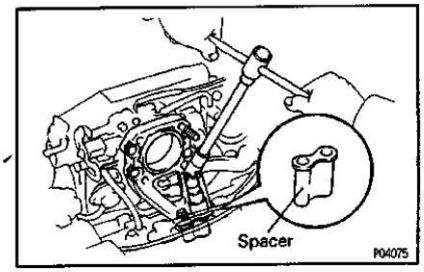
(a) Remove the four bolts.



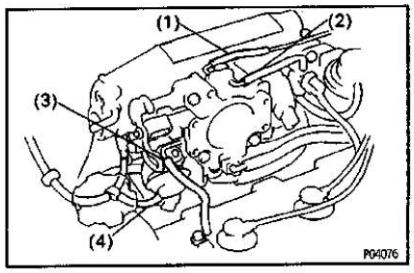
(b) Remove the mounting bracket.
HINT: Raise the engine as far as it will go, and remove the mounting bracket.



19. REMOVE INTAKE AIR CONNECTOR
Remove the two bolts, and two nuts and intake air connector.



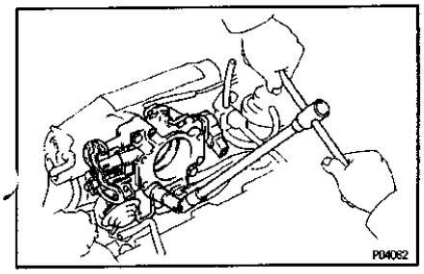
20. REMOVE INTAKE AIR CONNECTOR STAY
(a) Remove the six bolts and intake air connector stay.
(b) Remove the spacer.

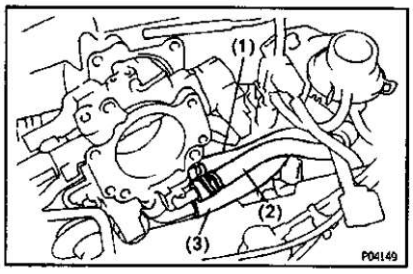


21. REMOVE THROTTLE BODY
(a) Disconnect the following connector:
- Throttle position sensor connector
- IACV connector

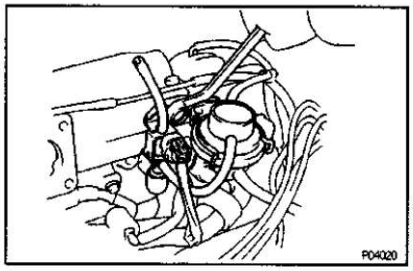
(b) Disconnect the following hoses:
(1) Vacuum hose from port "P" of throttle body
(2) Vacuum hose from port "E" of throttle body
(3) PCV hose from port PCV of throttle body
(4) Vacuum hose from throttle body opener

(c) Remove the four bolts, and disconnect the throttle body from the intake manifold.
(d) Remove the throttle body gasket.



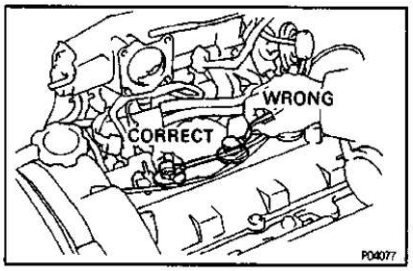


(e) Disconnect the following hoses from the throttle body, and remove the throttle body:
(1) Water by–pass hose (f r–om upper side of No. 1 air tube)
(2) Water by–pass hose (from lower side of No. 1 air tube)
(3) Air hose (from No. 1 air tube)

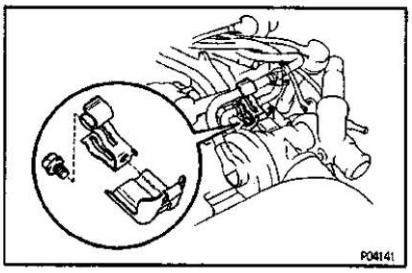


22. REMOVE CYLINDER HEAD COVER

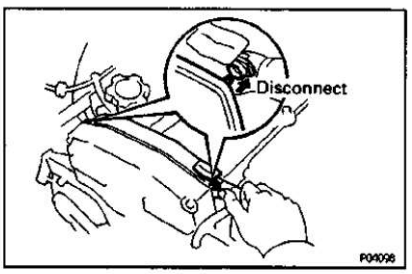
(a) Remove the bolt, and disconnect the VSV and EGR vacuum modulator assembly from the intake mani–fold.



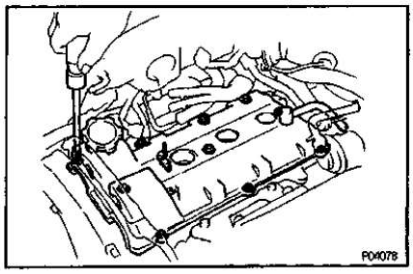
(b) Disconnect the high – tension cords at the rubber boot. Do not pull on the high–tension cords.
NOTICE: Pulling on or bending the cords may damage the conductor inside.



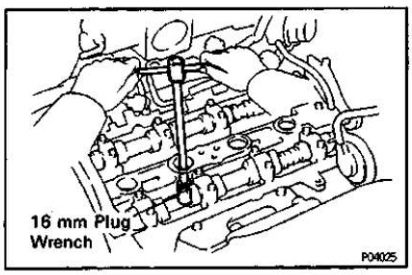
(c) Disconnect the hose and VTV from the clamps.
(d) Remove the bolt and two clamps.



(e) Disconnect the engine wire protector between the No. 3 timing belt cover and cylinder head cover.

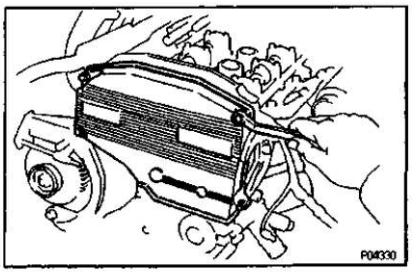


(f) Remove the ten screws, seal washers, bolts, head cover and two gaskets.



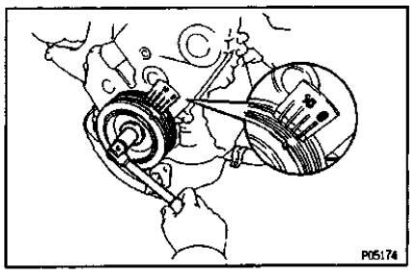
23. REMOVE SPARK PLUGS

Using a 16 mm plug wrench, remove the four spark plugs.



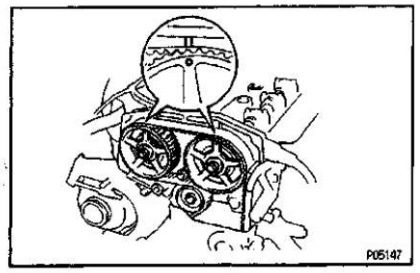
24. REMOVE No.2 TIMING BELT COVER

Remove the five bolts, timing belt cover and gasket.

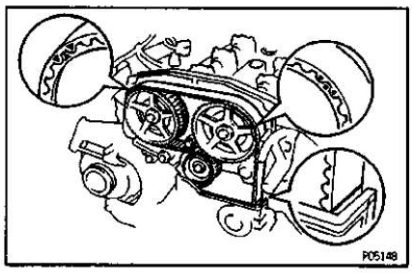


25. SET NO.1 CYLINDER TO TDC/COMPRESSION

(a) Turn the crankshaft pulley and align its groove with timing mark ”0” of the No.1 timing belt cover.



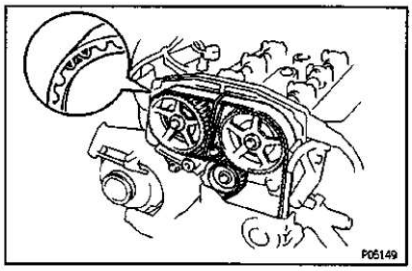
(b) Check that the timing marks of the camshaft timing pulleys are aligned with the timing marks of the No.3 timing belt cover.
If not, turn the crankshaft one revolution (360˚).



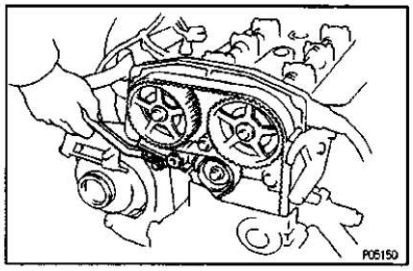
26. DISCONNECT TIMING BELT FROM CAMSHAFT TIMING PULLEYS

HINT:

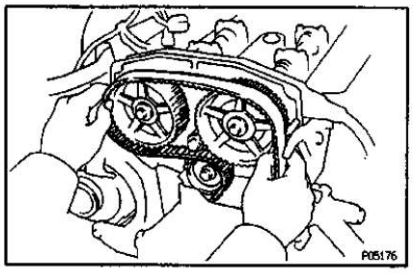
- (Re–using timing belt)
  Place matchmarks on the timing belt and cam–shaft timing pulleys, and place a matchmark on the timing belt to match the end of the No.1 timing belt cover.



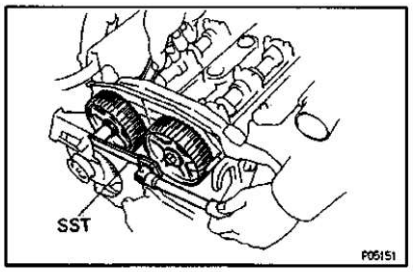
- (When replacing timing belt tensioner only)
  To avoid meshing of the timing belt and timing pulley, secure one with a string. And place the matchmarks on the timing belt and RH camshaft timing pulley.



(a) Remove the two bolts and timing belt tensioner.



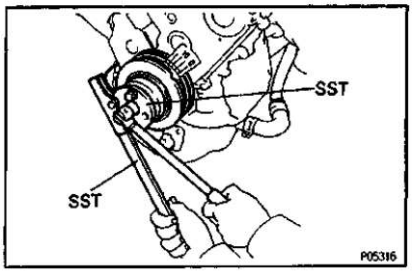
(b) Disconnect the timing belt from the camshaft timing pulleys.



27. REMOVE CAMSHAFT TIMING PULLEYS

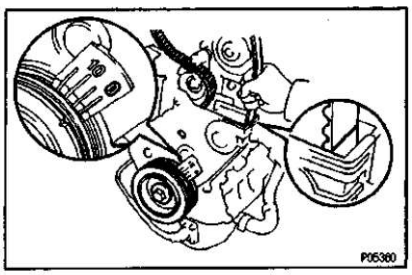
(a) Hold the hexagon wrench head portion of the cam–shaft with a wrench, and loosen the pulley bolt.
HINT (Intake camshaft timing pulley): Use SST.
, SST 09249–63010

(b) Remove the bolt, timing pulley and pin. Remove the two timing pulleys.
HINT: Arrange the intake and exhaust timing pulleys.

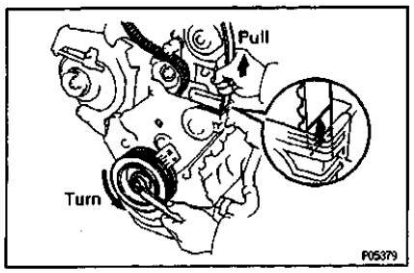


28. REMOVE CRANKSHAFT PULLEY

(a) Using SST, remove the pulley bolt.
SST 09213–54015 (90119–08216), 09330–00021

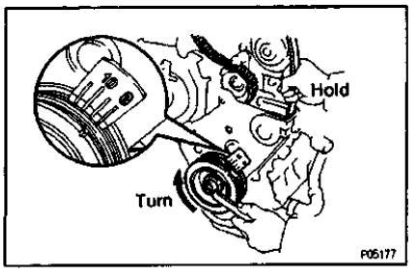


HINT (When re–using timing belt): After loosening the crankshaft pulley bolt, check that the timing belt rnatchmark aligns with the end of the No. 1 timing belt
cover when the crankshaft pulley groove is aligned with the timing mark ”0” of the No. 1 timing belt cover. If the matchmark does not align, align as follows:

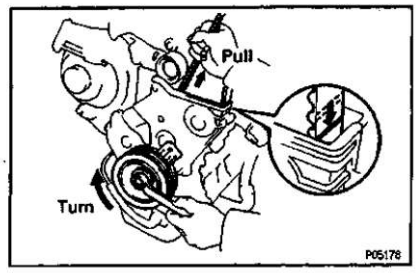


(When matchmark is out of alignment on clockwise)

- Align the matchmark by pulling the timing belt up on the water pump pulley side while turning the crankshaft pulley counterclockwise.

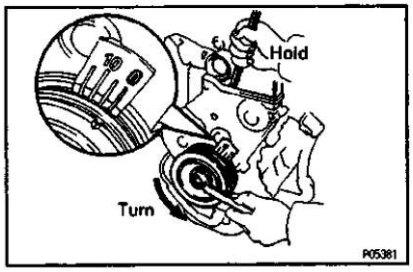


- After aligning the matchmark, hold the timing belt. And turn the crankshaft pulley clockwise, and align its groove with timing mark ”0” of the No.1 timing belt cover.

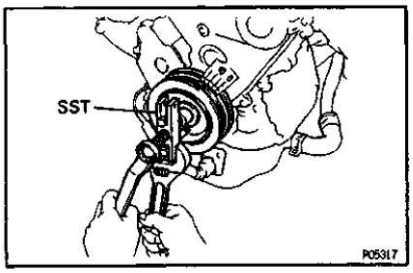


(When matchmark is out of alignment on counter–clockwise)

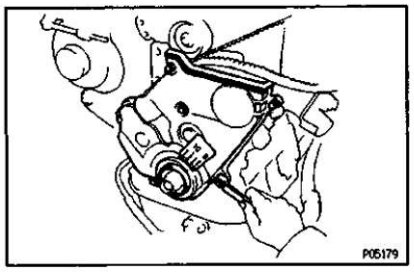
- Align the matchmark by pulling the timing belt up on the No.1 idler pulley side while turning the crankshaft pulley clockwise.



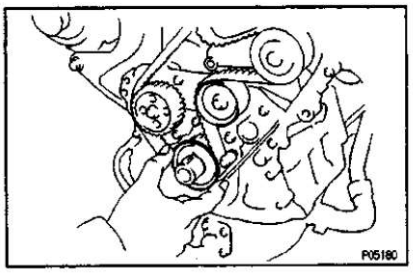
- After aligning the matchmark, hold the timing belt. And turn the crankshaft pulley counter–clockwise, and align its groove with timing mark' 0" of the No.1 timing belt cover.



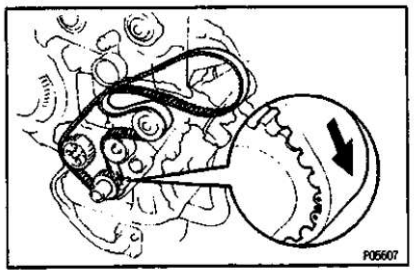
(b) Using SST, remove the pulley.
SST 09213–31021
HINT (When re–using timing belt): Remove the pulley without turning it.



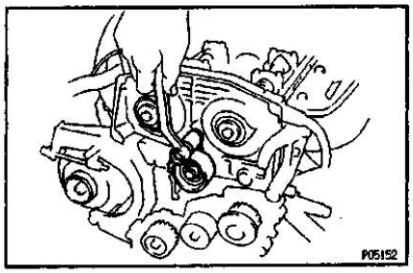
29. REMOVE NO.1 TIMING BELT COVER
Remove the six bolts, timing belt cover and gasket.



30. REMOVE TIMING BELT GUIDE

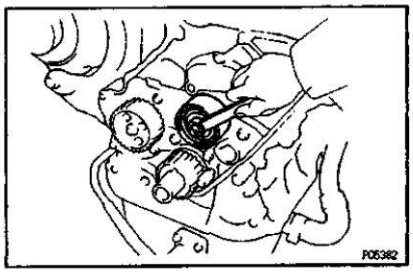


31. REMOVE TIMING BELT
HINT (When re–using timing belt): Draw a direction arrow on the timing belt (in the direction of engine revolution), and place matchmarks on the timing bell and crankshaft timing pulley.



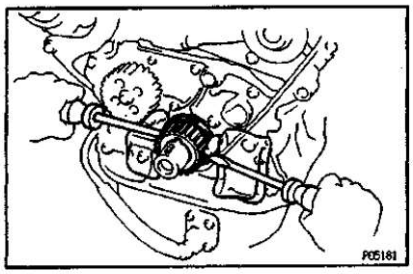
32. REMOVE N0.1 IDLER PULLEY

Remove the pivot bolt, pulley and plate washer.



33. REMOVE No.2 IDLER PULLEY

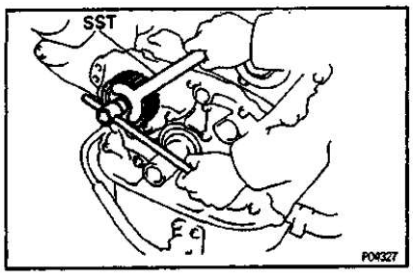
Remove the bolt and pulley.



34. REMOVE CRANKSHAFT TIMING PULLEY

If the pulley cannot be removed by hand, use two screwdrivers.

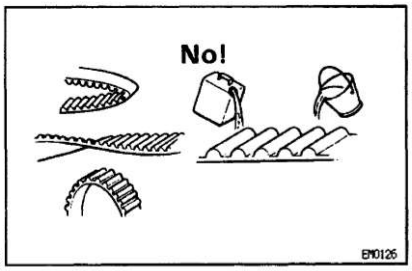
HINT: Position shop rags as shown to prevent damage.



35. REMOVE OIL PUMP PULLEY

Using SST, remove the nut and pulley.

SST 09616–30011



TIMING BELT COMPONENTS INSPECTION

1. INSPECT TIMING BELT

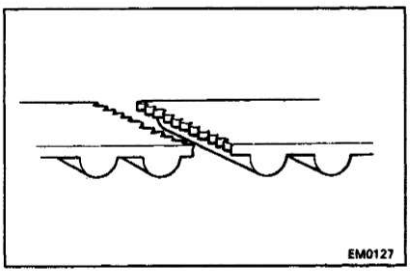
NOTICE:

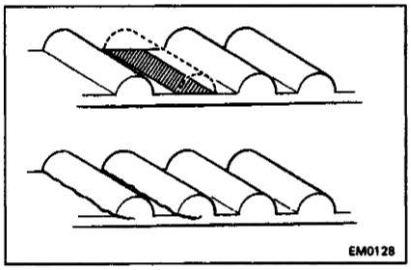
- Do not bend, twist or turn the timing belt inside out.
- Do not allow the timing belt to come into contact with oil, water or steam.
- Do not utilize timing belt tension when installing or removing the mounting bolt of the camshaft timing pulley.

If there are any defects as shown in the illustration, check the following points:

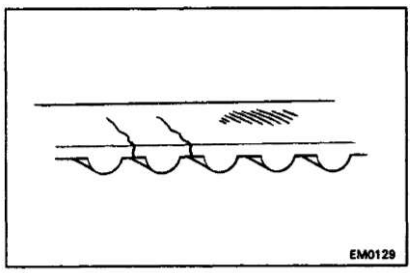
(a) Premature parting

- Check the proper installation.
- Check the timing cover gasket for damage and proper installation.

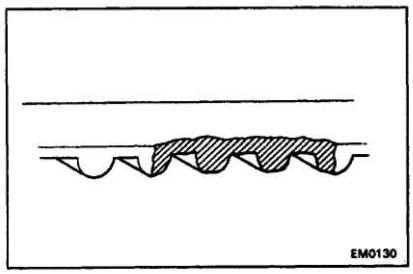




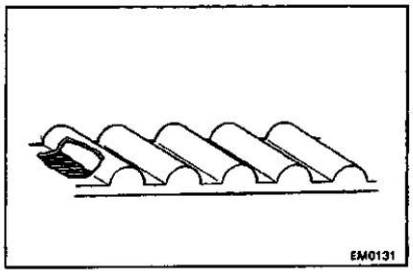
(b) If the belt teeth are cracked or damaged, check to see if either camshaft or water pump is locked.



(c) If there is noticeable wear or cracks on the belt face, check to see if there are nicks on the side of the idler pulley lock.



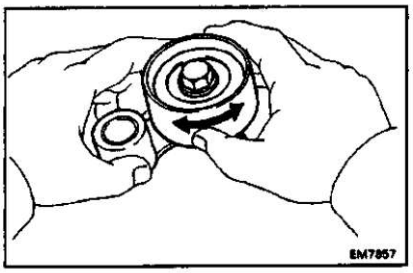
(d) If there is wear or damage on only one side of the belt, check the belt guide and the alignment of each pulley.



(e) If there is noticeable wear on the belt teeth, check the timing cover for damage, correct gasket installation, and the foreign material on the pulley teeth.
If necessary, replace the timing belt.

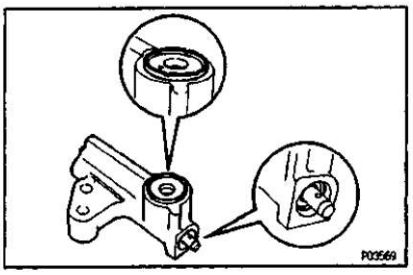
2. INSPECT IDLER PULLEYS

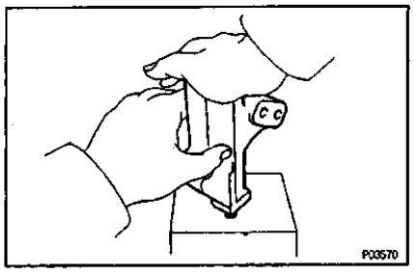
Check that the idler pulley turns smoothly.
If necessary, replace the idler pulley.



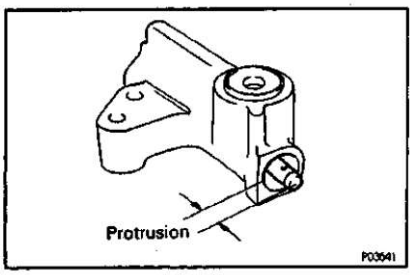
3. INSPECT TIMING BELT TENSIONER

(a) Visually check tensioner for leakage.
HINT: A small trace of oil on the push rod seal is permissible.
If leakage is found, replace the tensioner.

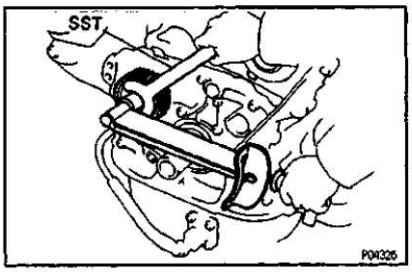




(b) Hold the tensioner with both hands, and push the push rod firmly against the floor or wall to check that it doesn't move.
If push rod moves, replace the tensioner.



(c) Measure the protrusion of the push rod from the housing end.
Protrusion:
8.5 – 9.5 mm (0.335 – 0.374 in.)
If the protrusion is not as specified, replace the tensioner.



TIMING BELT INSTALLATION

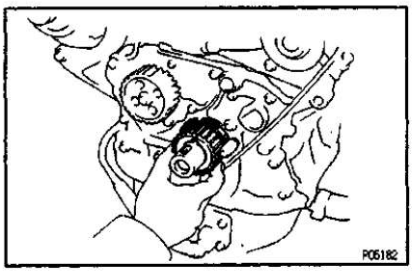
EG4WA–01

(See Components for Removal and Installation)

1. INSTALL OIL PUMP PULLEY

(a) Align the cutouts of the pulley and shaft, and slide on the pulley.

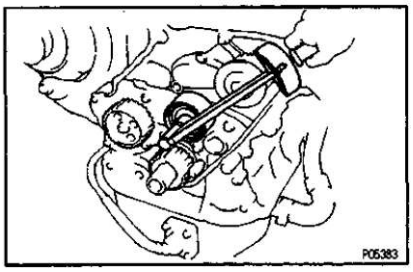
(b) Using SST, install the pulley nut.
SST 09616–30011
Torque: 35 N–m (355 kgf–cm, 26 ft–lbf)



2. INSTALL CRANKSHAFT TIMING PULLEY

(a) Align the timing pulley set key with the key groove of the pulley.

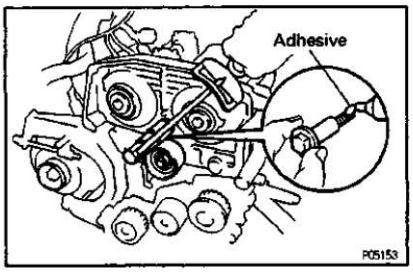
(b) Slide on the timing pulley, facing the flange side inward.



3. INSTALL NO.2 IDLER PULLEY

(a) Install the pulley with the bolt.
Torque: 43 N–m (440 kgf–cm, 32 ft–lbf)

(b) Check that the idler pulley moves smoothly.

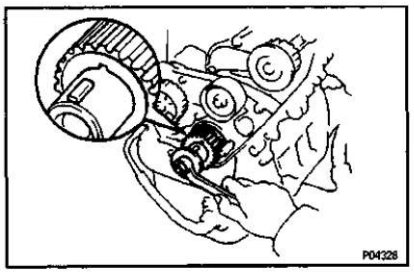


4. INSTALL NO.1 IDLER PULLEY

(a) Apply adhesive two or three threads of the pivot bolt.
Adhesive:
Part No. 08833–00080. THREE BOND 1344, LOCTITE 242 or equivalent

(b) Install the plate washer and pulley with the pivot bolt.
Torque: 52 N–m (530 kgf–cm, 38 ft–lbf)

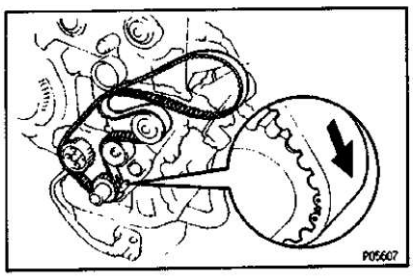
(c) Check that the idler pulley moves smoothly.



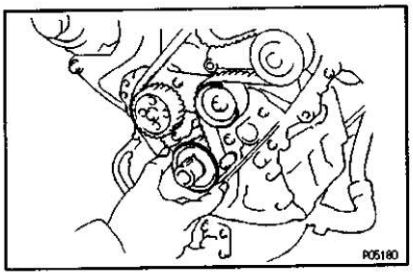
5. TEMPORARILY INSTALL TIMING BELT

NOTICE: The engine should be cold.

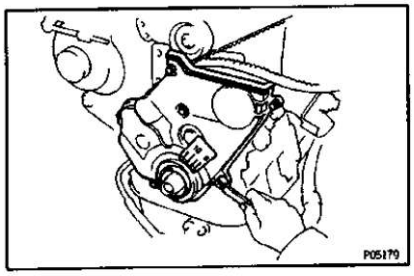
(a) Using the crankshaft pulley bolt, turn the crankshaft and position the key groove of the crankshaft timing pulley upward.



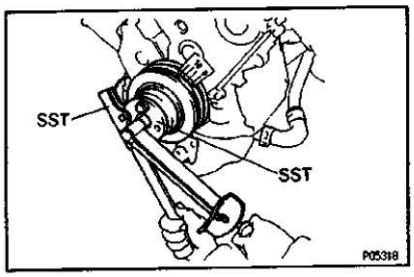
(b) Remove any oil or water on the crankshaft pulley, oil pump pulley, water pump pulley, No.1 idler pulley, No. 2 idler pulley and keep them clean.
(c) Install the timing belt on the crankshaft timing pulley, oil pump pulley, No.1 idler pulley, water pump pulley and No.2 idler pulley.
HINT (When re–using timing belt): Align the points marked during removal, and install the belt with the arrow pointing in the direction of engine revolution.



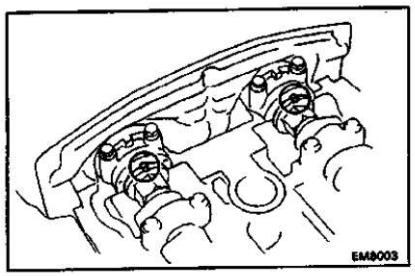
6. INSTALL TIMING BELT GUIDE
Install the guide, facing the cup side outward.



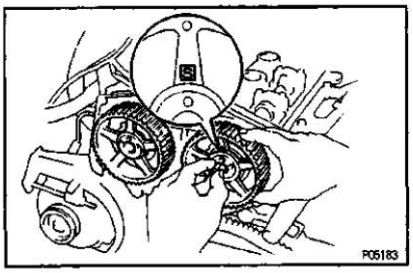
7. INSTALL NO.1 TIMING BELT COVER
(a) Install the gasket to the timing belt cover.
(b) Install the timing belt cover with the six bolts.



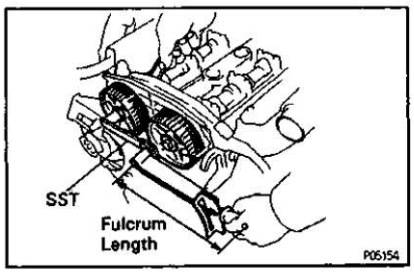
8. INSTALL CRANKSHAFT PULLEY
(a) Align the pulley set key with the key groove of the pulley, and slide on the pulley.
(b) Using SST, install the pulley bolt.
SST 09213–54015 (90119–08216), 09330–00021
Torque: 108 N–m (1,100 kgf–cm, 80 ft–lbf)



9. INSTALL CAMSHAFT TIMING PULLEY
(a) Using a wrench, turn and align the groove of the camshaft with the dot mark of the No.1 camshaft bearing cap.

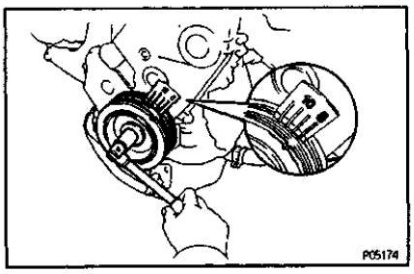


(b) Slide the timing pulley onto the camshaft facing mark "S" upward.
(c) Align the pin holes of the camshaft and timing pulley, and insert the knock pin.

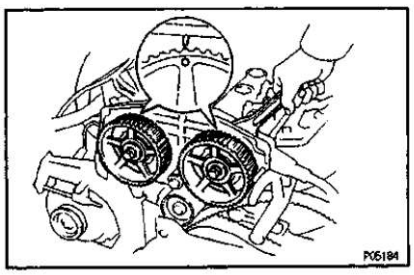


(d) Hold the hexagon wrench portion of the camshaft with a wrench and tighten the bolts.
Torque:
59 N–m (600 kgf–cm. 43 ft–lbf)
41 N–m (420 kgf–cm, 30 ft–lbf) for SST
HINT (Intake camshaft timing pulley):
- Use SST.

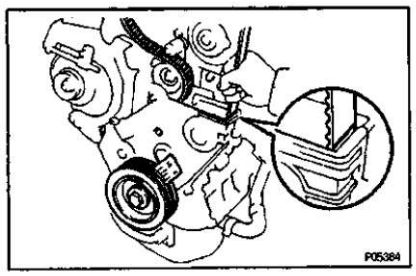
SST 09249–63010
- Use a torque wrench with a fulcrum length of 340 mm (13.39 in.).



10. SET NO.1 CYLINDER TO TDC/COMPRESSION
(a) Turn the crankshaft pulley, and align its groove with timing mark "0" of the No.1 timing belt cover.

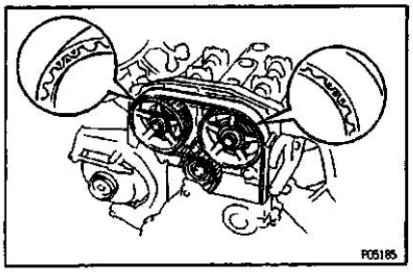


(b) Turn the camshaft, and align the timing marks of the camshaft timing pulleys and No.3 timing belt cover.

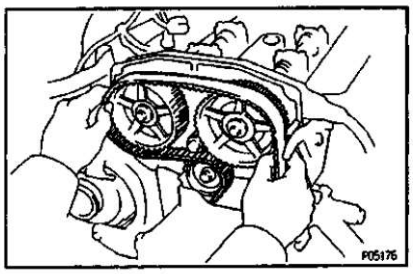


11. CONNECT TIMING BELT TO CAMSHAFT TIMING PULLEYS
HINT (When re–using timing belt):
- Check that the matchmark on the timing belt matches the end of the No.1 timing belt cover.

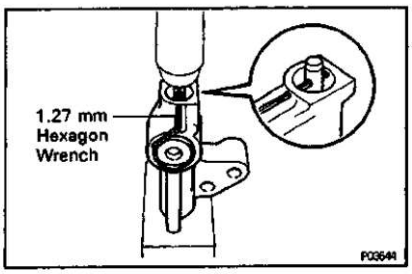
If the matchmark does not align, shift the meshing o1 the timing belt and crankshaft timing pulley until they align. (See step 28 in Timing Belt Removal)



- Align the matchmarks of the timing belt and camshaft timing pulleys.

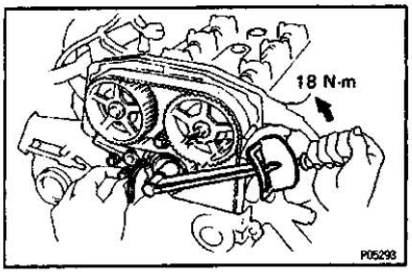


(a) Remove any oil or water on the camshaft timing pul–leys, and keep it clean.
(b) Install the timing belt, and checking the tension be–tween the crankshaft timing pulley and intake cam–shaft timing pulley.



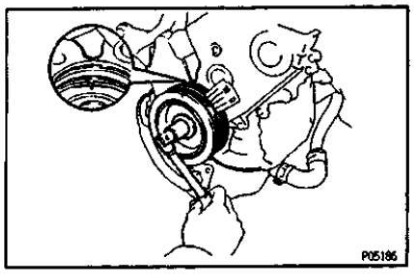
12. SET TIMING BELT TENSIONER

(a) Using a press, slowly press in the push rod using 981 – 9,807 N (100 – 1,000 kgf, 220 – 2,205 lbf) of pressure.
(b) Align the holes of the push rod and housing, pass a 1.27 mm hexagon wrench through the holes to keep the setting position of the push rod.
(c) Release the press.

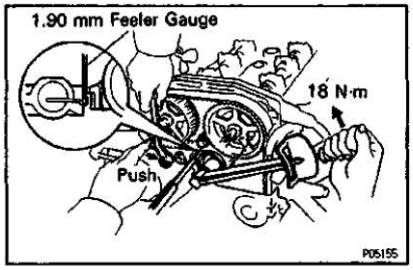


13. INSTALL TIMING BELT TENSIONER

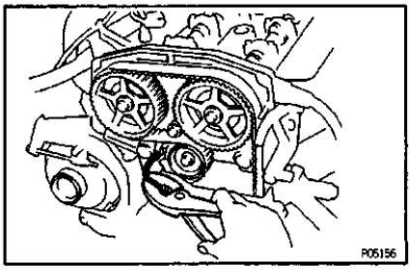
(a) Turn the No.1 idler pulley bolt counterclockwise to obtain the specified torque toward the left as far as the No. 1 idler pulley will go, and temporarily install the tensioner with the two bolts.
Torque: 18 N–m (180 kgf–cm, 13 ft–lbf)
NOTICE: To apply the correct torque, apply the torque wrench along the axis through the bolts of the No.1 idler pulley and exhaust camshaft timing pulley.

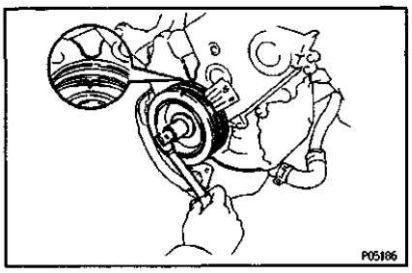


(b) Slowly turn the crankshaft pulley 5/6 revolution, and align its groove with the ATDC 60˚ mark of the No. 1 timing belt cover.
NOTICE: Always turn the crankshaft clockwise.

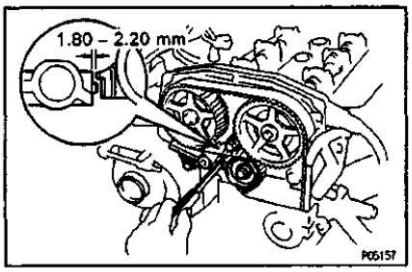


(c) Insert the 1.90 mm (0.075 in.) feeler gauge between the tensioner body and No.1 idler pulley stopper.
(d) Turn the No.1 idler pulley bolt counterclockwise to obtain the specified torque.
Torque: 18 N–m (180 kgf–cm, 13 ft–lbf)
NOTICE: To apply the correct torque, apply the torque wrench along the axis through the bolts of the No.1 idler pulley and exhaust camshaft timing pulley.
(e) While pushing the tensioner, alternately tighten the two bolts.
Torque: 21 N–m (210 kgf–cm, 15 ft–lbf)
(f) Remove the 1.90 mm (0.075 in.) feeler gauge.
(g) Remove the 1.27 mm hexagon wrench from the tensioner

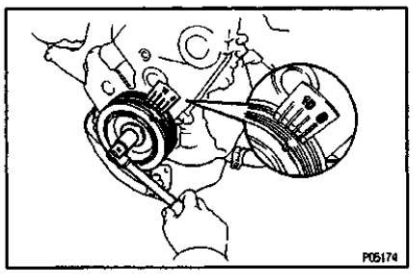




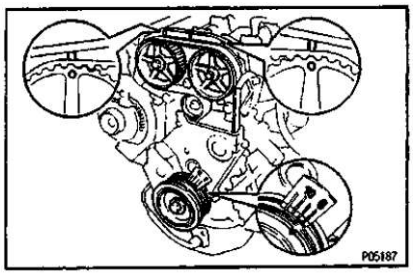
(h) Slowly turn the crankshaft pulley one revolution, and align its groove with the ATDC 60° mark of the No. 1 timing belt cover.
NOTICE: Always turn the crankshaft clockwise.



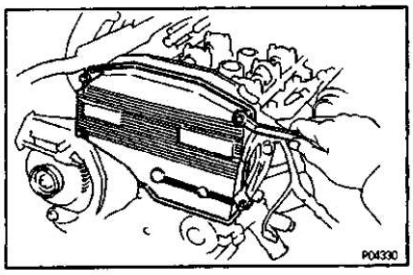
(i) Using a feeler gauge, check the specified clearance between the tensioner body and No.1 idler pulley stopper.
Clearance:
1.80 – 2.20 mm (0.071 – 0.087 in)
If the clearance is not as specified, remove the tensioner and reinstall it.



14. CHECK VALVE TIMING
(a) Slowly turn the crankshaft pulley two revolutions from TDC to TDC.
NOTICE: Always turn the crankshaft clockwise.

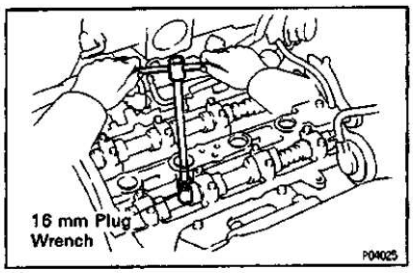


(b) Check that each pulley aligns with the timing marks as shown in the illustration.
If the timing marks do not align, remove the timing belt and reinstall it.



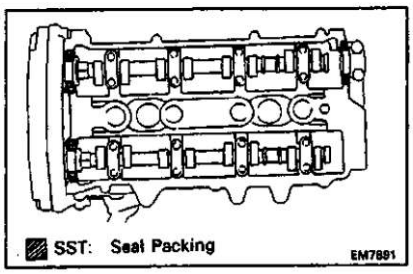
15. INSTALL NO.2 TIMING BELT COVER

(a) Install the gasket to the timing belt cover.
(b) Install the timing belt cover with the five bolts.



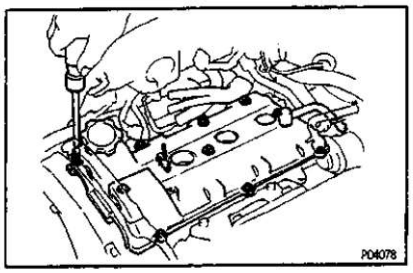
16. INSTALL SPARK PLUGS

Using a 16 mm plug wrench, install the four spark plugs.
Torque: 18 N–m (180 kgf–cm, 13 ft–lbf)

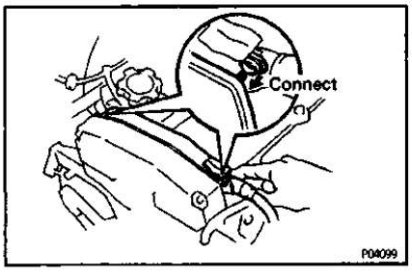


17. REINSTALL CYLINDER HEAD COVER

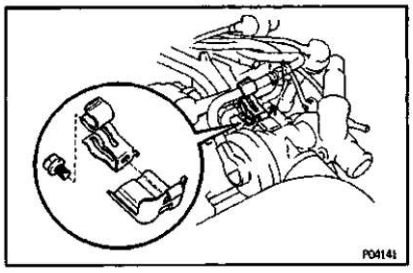
(a) Remove any old packing (FIPG) material.
(b) Apply seal packing to the cylinder head as shown in the illustration.
Seal packing:
Part No. 08826–00080 or equivalent



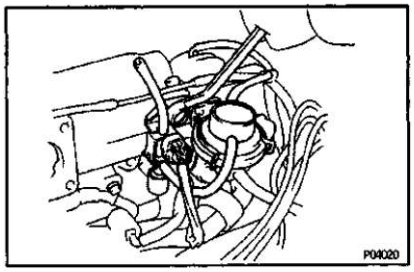
(c) Install the two gaskets to the cylinder head cover.
(d) Install the cylinder head cover with the ten seal washers and screws.
Torque: 2.5 N–m (25 kgf–cm, 21 in.–lbf)



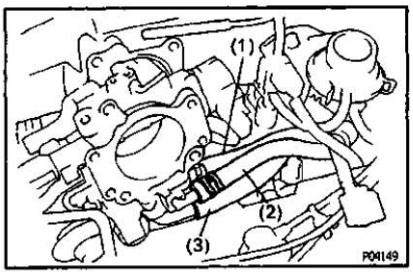
(e) install the two clamps of the engine wire protector to each bolt.



(f) install the two clamps.
(g) Connect the VTV and hose to the clamp.
(h) Connect the high–tension cords.

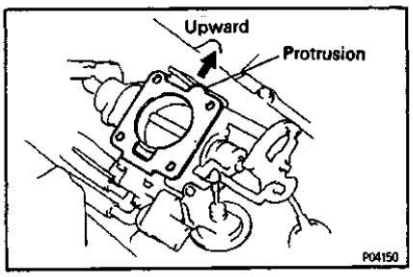


(i) Install the VSV and EGR vacuum modulator assembly with the bolt.

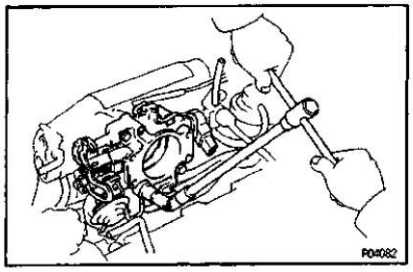


18. INSTALL THROTTLE BODY

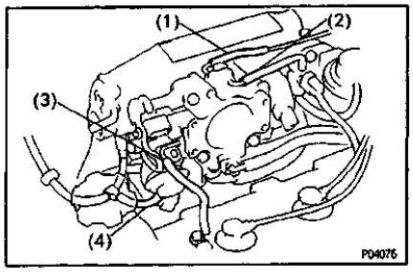
(a) Connect the following hoses to the throttle body:
(1) Water by–pass hose (from upper side of No. 1 air tube)
(2) Water by–pass hose (from lower side of No.1 air tube)
(3) Air hose (from No. 1 air tube)



(b) Install a new gasket to the throttle body.

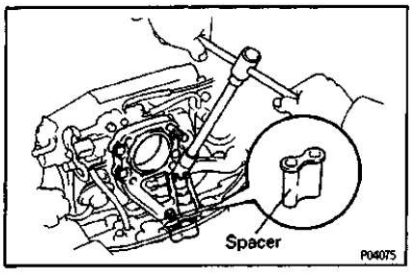


(c) Install the throttle body with the four bolts.
Torque: 19 N–m (195 kgf–cm, 14 ft–lbf)
HINT: Deferment bolt lengths are used for the upper and lower sides.
Bolt length:
45 mm (1.77 in.) for upper side
70 mm (2.76 in.) for lower side

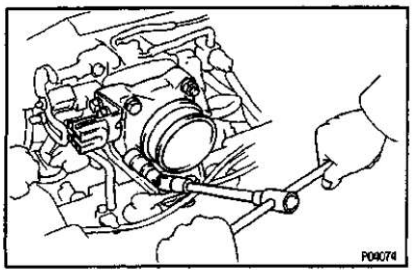


(d) Connect the following hoses:
(1) Vacuum hose to port "P" of throttle body
(2) Vacuum hose to port "E" of throttle body
(3) PCV hose to port PCV of throttle body
(4) Vacuum hose to throttle body opener

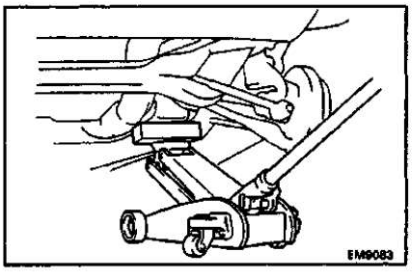
(e) Connect the following connector:
- Throttle position sensor connector
- IACV connector



19. INSTALL INTAKE AIR CONNECTOR STAY
(a) Install the spacer.
(b) Install the intake air connector stay with the six bolts.
Torque:
7.8 N–m (80 kgf–cm. 69 in–lbf) for 10 mm head
19 N–m (195 kgf–cm, 14 ft–lbf) for 12 mm head



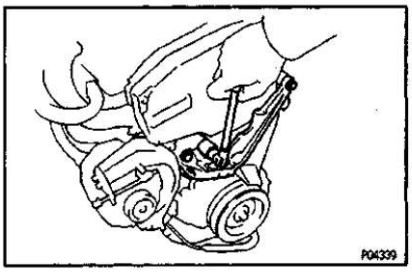
20. INSTALL INTAKE AIR CONNECTOR
Install the intake air connector with the two bolts and two nuts.
Torque: 19 N–m (195 kgf–cm, 14 ft–lbf)



21. INSTALL RH ENGINE MOUNTING BRACKET

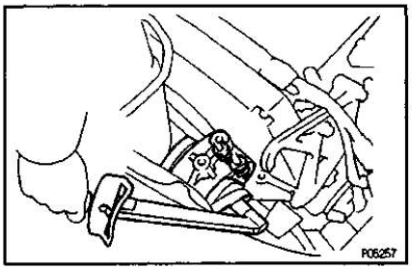
(a) Place the mounting bracket in position.

HINT: Raise the engine as far as it will go, and place the mounting bracket in position.



(b) Install the mounting bracket with the four bolts.

Torque: 61 N–m (620 kgf–cm, 45 ft–lbf)



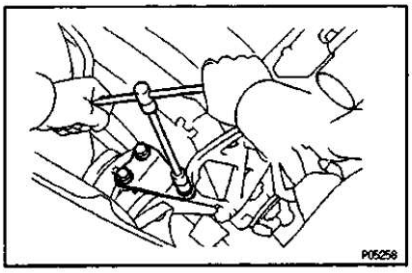
22. INSTALL RH ENGINE MOUNTING INSULATOR

Install the mounting insulator with the throught bolt and two nuts.

Torque:

52 N–m (530 kgf–cm, 38 ft–lbf) for nut

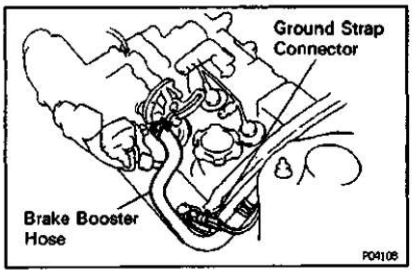
78 N–m (800 kgf–cm, 58 ft–lbf) for through bolt



23. INSTALL RH ENGINE MOUNTING STAY

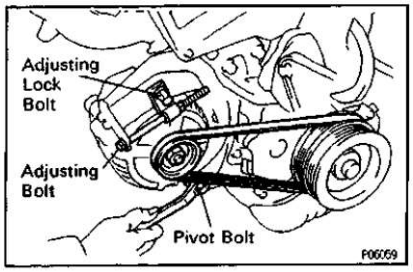
Install the mounting stay with the three bolts.

Torque: 73 N–m (740 kgf–cm, 54 ft–lbf)



24. CONNECT BRAKE BOOTER VACUUM HOSE

25. CONNECT GROUND STRAP CONNECTOR



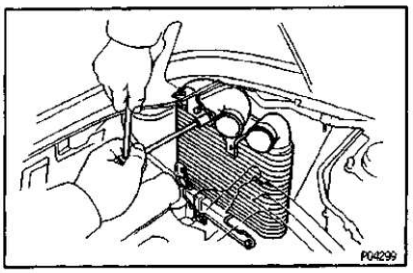
26. INSTALL ALTERNATOR DRIVE BELT

(a) Install the drive belt with the adjusting bolt.

(b) Adjust the drive belt with the adjusting bolt.

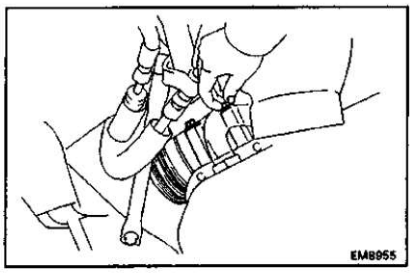
(c) Tighten the adjusting lock bolt and pivot bolt.

27. INSTALL RH REAR WHEEL



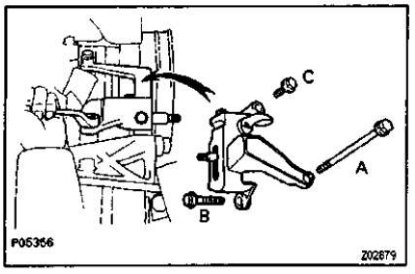
28. INSTALL CAC

Install the CAC and upper bracket with the five bolts.



29. INSTALL A/C COMPRESSOR

(a) Temporarily install the A/C compressor with the two bolts.



(b) Install the idler pulley bracket with the three bolts.

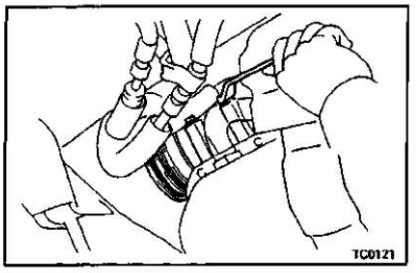
Torque:

25 N–m (250 kgf–cm, 18 ft–lbf) for A

27 N–m (275 kgf–cm, 20 ft–lbf) for B

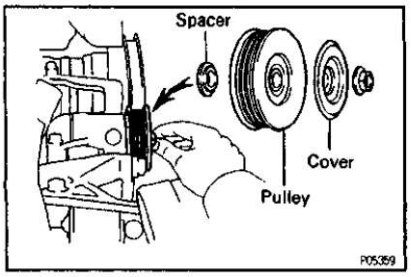
37 N–m (375 kgf–cm, 27 ft–lbf) for C

(c) Connect the A/C compressor connector.

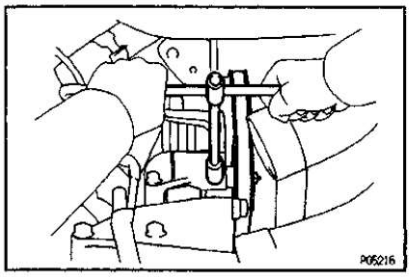


(d) Tighten the two bolts of the lower side of the A/C compressor.

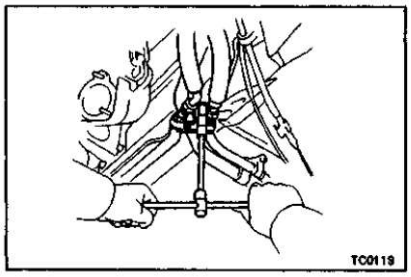
Torque: 25 N–m (250 kgf–cm, 18 ft–lbf)



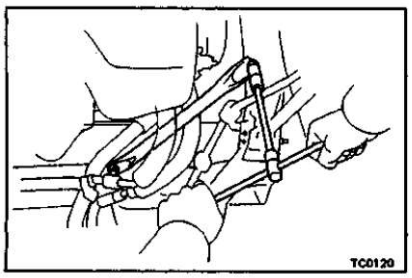
(e) Temporarily install the spacer, idler pulley and pulley cover with the nut.



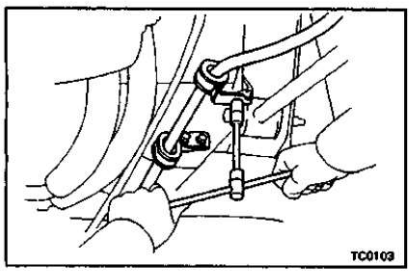
(f) Install the drive belt with the adjusting bolt.
(g) Tighten the idler pulley nut.



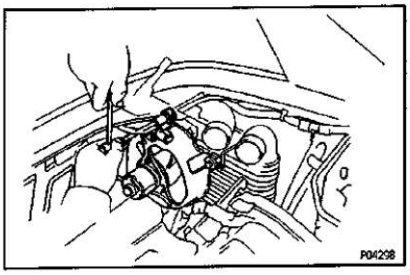
(h) Install the A/C pipes with the two clamps and nut.



(i) Install the lower suspension brace with the two bolts.
Torque: 73 N–m (740 kgf–cm, 54 ft–lbf)

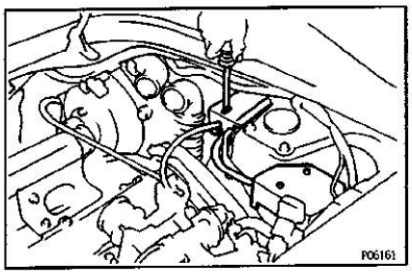


(j) Install the parking brake cable with the two clamp and three bolts.



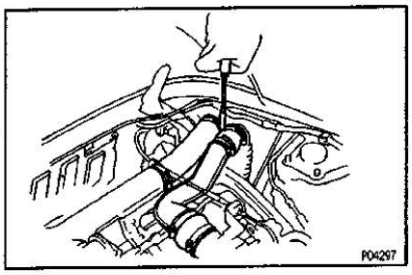
30. INSTALL ENGINE COMPARTMENT ELECTRIC COOLING FAN

(a) Install the cooling fan with the three bolts.
(b) Connect the cooling fan connector.

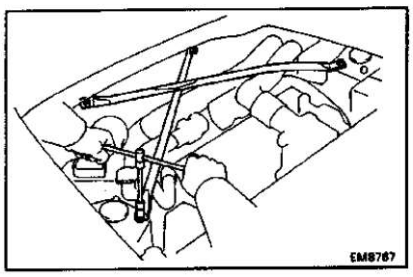


31. (w/ CRUISE CONTROL SYSTEM) INSTALL CRUISE CONTROL ACTUATOR AND ACCELERATOR LINKAGE

32. (w/o CRUISE CONTROL SYSTEM) CONNECT ACCELERATOR LINKAGE TO THROTTLE BODY



33. INSTALL NO.1 AND NO.2 INTAKE AIR CONNECTORS



34. INSTALL UPPER SUSPENSION BRACE

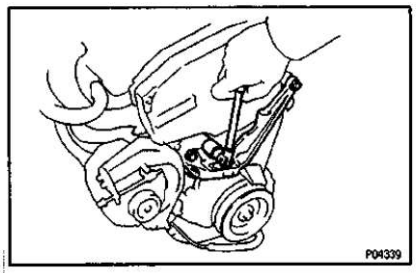
Install the upper– brace with the two bolts and two nuts.

Torque:
73 N–m (740 kgf–cm, 54 ft–lbf) for–bolt
64 N–m (650 kgf–cm, 47 ft–lbf) for nut

35. INSTALL RH ENGINE HOOD SIDE PANEL

36. INSTALL ENGINE UNDER COVERS

37. CONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY

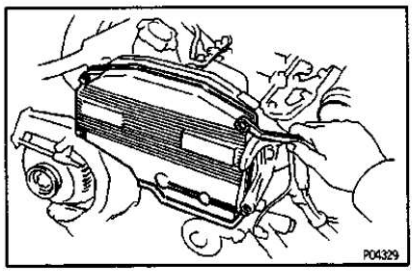


VALVE TIMING ADJUSTMENT

(See Components for Removal and Installation)

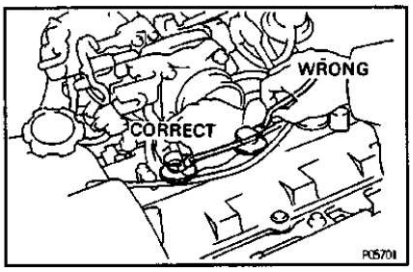
1. REMOVE RH ENGINE MOUNTING BRACKET

(See steps 1 to 11 and 13 to 18 in Timing Belt Removal)



2. REMOVE No.2 TIMING BELT COVER

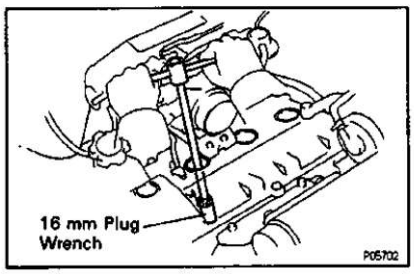
Remove the five bolts, timing belt cover and gasket.



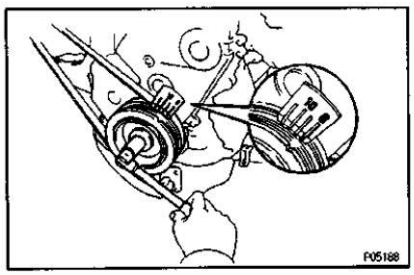
3. REMOVE SPARK PLUGS

(a) Disconnect the high – tension cords at the rubber boot. Do not pull on the high–tension cords.

NOTICE: Pulling on or bending the cords may damage the conductor inside.

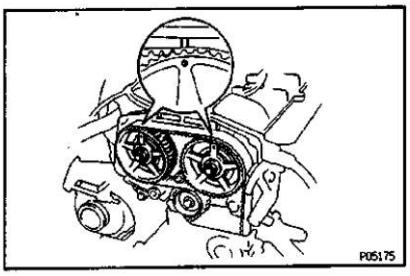


(b) Using a 16 mm plug wrench, remove the four spark plugs.

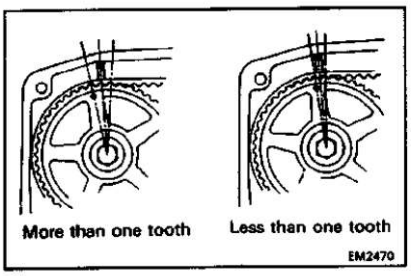


4. CHECK CAMSHAFT TIMING PULLEY MARKS

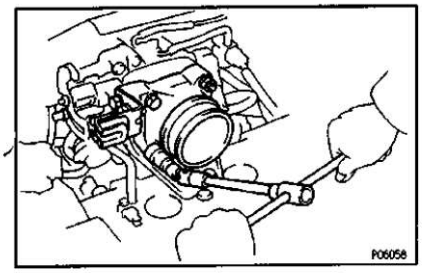
(a) Turn the crankshaft pulley and align its groove with timing mark ”0” of the No.1 timing belt cover.



(b) Check that the timing marks of the camshaft timing pulleys are aligned with the timing marks of the No.3 timing belt cover.

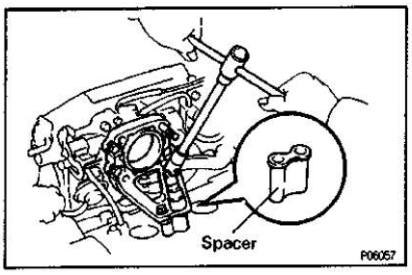


- If there is more one timing pulley tooth between the timing marks, realign the timing marks in accordance with step 9.
- If the timing marks are aligned or the difference is less than one timing pulley tooth, proceed to step 10.



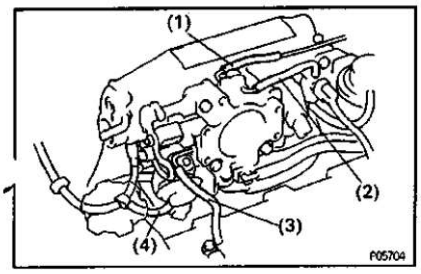
5. REMOVE INTAKE AIR CONNECTOR

Remove the two bolts, two nuts and intake air connector.



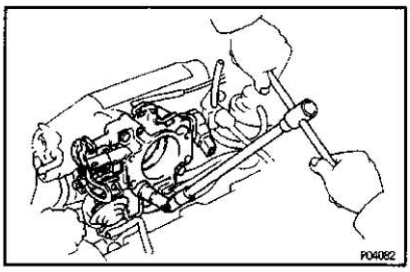
6. REMOVE INTAKE AIR CONNECTOR STAY

(a) Remove the six bolts and intake air connector stay.
(b) Remove the spacer.

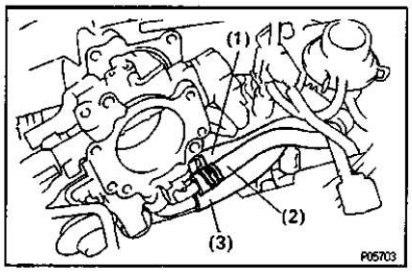


7. REMOVE THROTTLE BODY

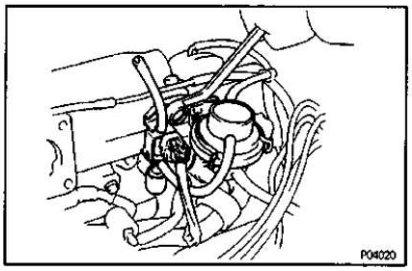
(a) Disconnect the following connector:
Throttle position sensor connector
IACV connector
(b) Disconnect the following hoses:
(1) Vacuum hose from port "P" of throttle body
(2) Vacuum hose from port "E" of throttle body
(3) PCV hose from port PCV of throttle body
(4) Vacuum hose from throttle body opener



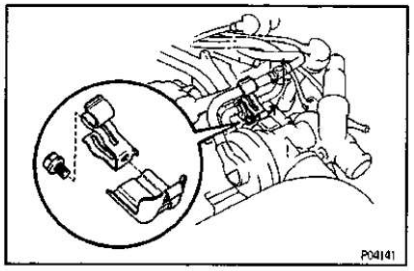
(c) Remove the four bolts, and disconnect the throttle body from the intake manifold.
(d) Remove the throttle body gasket.



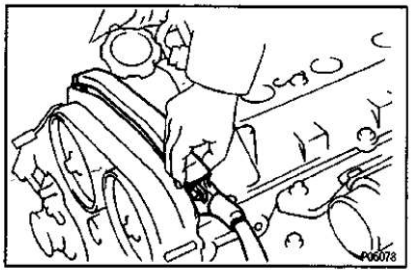
(e) Disconnect the following hoses from the throttle body, and remove the throttle body:
(1) Water by–pass hose (from upper side of No. 1 air tube)
(2) Water by–pass hose (from lower side of No.1 air tube)
(3) Air hose (from No. 1 air tube)



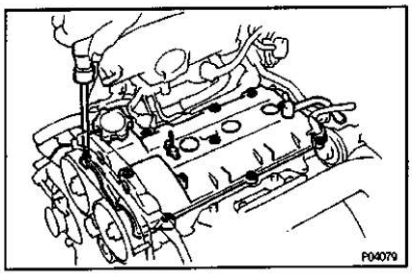
8. REMOVE CYLINDER HEAD COVER
(a) Remove the bolt, and disconnect the VSV and EGR vacuum modulator assembly from the intake mani–fold.



(b) Disconnect the hose and VTV from the clamps.
(c) Remove the bolt and two clamps.

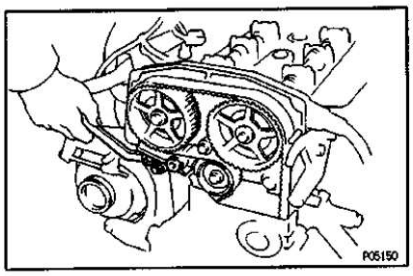


(d) Disconnect the engine wire protector between the No. 3 timing belt cover and cylinder head cover.

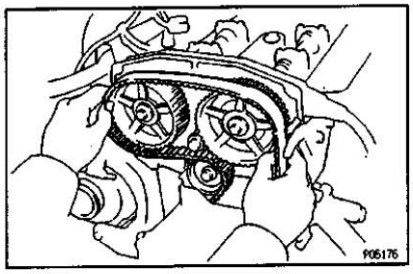


(e) Remove the ten screws, seal washers bolts, head cover and two gaskets.

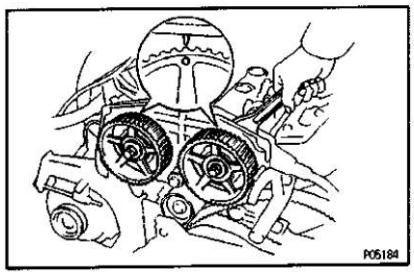
9. ADJUST CAMSHAFT TIMING PULLEY MARKS



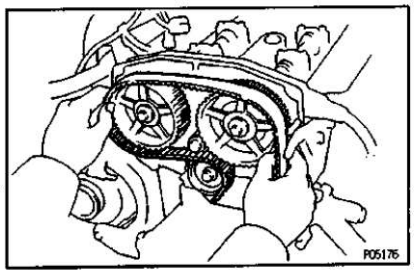
(a) Remove the two bolts and timing belt tensioner.



(b) Disconnect the timing belt from the camshaft timing pulleys.

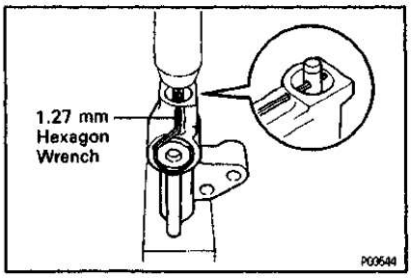


(c) Rotate the camshaft with a wrench, and align the alignment marks of the camshaft timing pulley and No.3 timing belt cover.

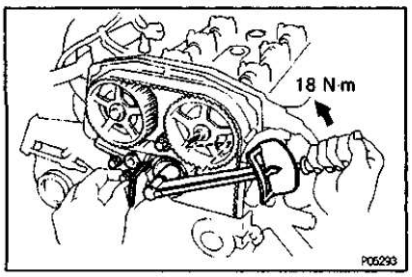


(d) Reinstall the timing belt, checking the tension be–tween the the crankshaft timing pulley and intake camshaft timing pulley.

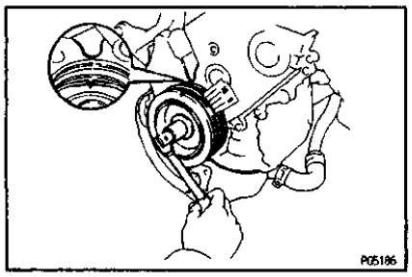
NOTICE: Install the timing belt when the engine is cold.



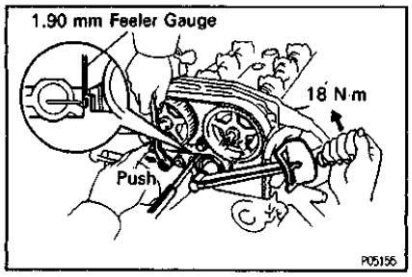
(e) Set the timing belt tensioner.
- Using a press, slowly press in the push rod using 981 – 9,807 N (100 – 1,000 kgf, 220 – 2,205 lbf) of pressure.
- Align the holes of the push rod and housing, pass a 1.27 mm hexagon wrench through the holes to keep the setting position of the push rod.
- Release the press.



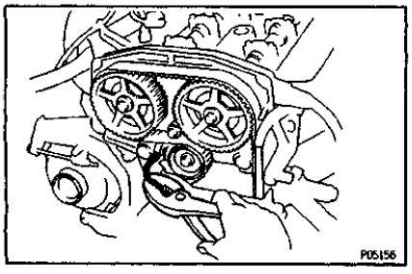
(f) Turn the No.1 idler pulley bolt counterclockwise to obtain the specified torque toward the left as far as the No. 1 idler pulley will go, and temporarily install the tensioner with the two bolts.
Torque: 18 N–m (180 kgf–cm, 13 ft–lbf)
NOTICE: To apply the correct torque, apply the torque wrench along the axis through the bolts of the No.1 idler pulley and exhaust camshaft timing pulley.

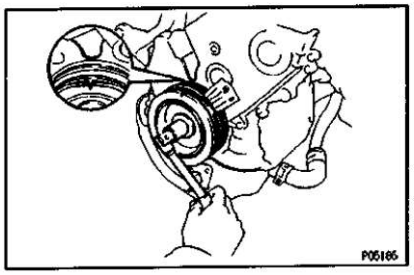


(g) Slowly turn the crankshaft pulley 5/6 revolution, and align its groove with the ATDC 60° mark of the No. 1 timing belt cover.
NOTICE: Always turn the crankshaft clockwise.

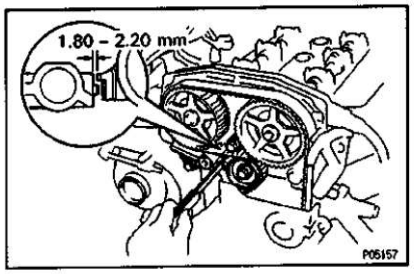


(h) Insert the 1.90 mm (0.075 in.) feeler gauge between the tensioner body and No.1 idler pulley stopper.
(i) Turn the No.1 idler pulley bolt counterclockwise to obtain the specified torque.
Torque: 18 N–m (180 kgf–cm, 13 ft–lbf)
NOTICE: To apply the correct torque, apply the torque wrench along the axis through the bolts of the No.1 idler pulley and exhaust camshaft timing pulley.
(j) While pushing the tensioner, alternately tighten the two bolts.
Torque: 21 N–m (210 kgf–cm, 15 ft–lbf)
(k) Remove the 1.90 mm (0.075 in.) feeler gauge.
(1) Remove the 1.27 mm hexagon wrench from the tensioner.

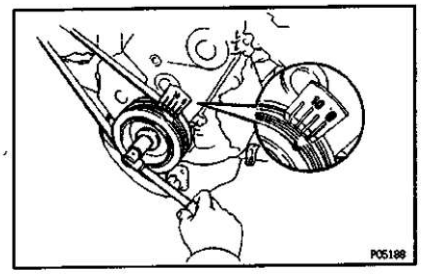




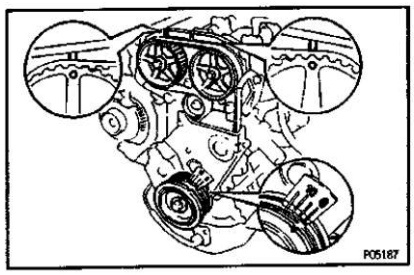
(m) Slowly turn the crankshaft pulley one revolution, and align its groove with the ATDC ^0˚ mark of the No. 1 timing belt cover.
NOTICE: Always turn the crankshaft clockwise.



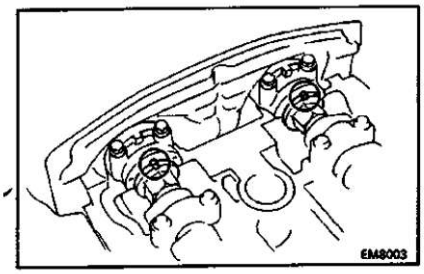
(n) Using a feeler gauge, check the specified clearance between the tensioner body and No.1 idler pulley stopper.
Clearance:
1.80 – 2.20 mm (0.071 – 0.087 in)
If the clearance is not as specified, remove the ten–sioner and reinstall it.



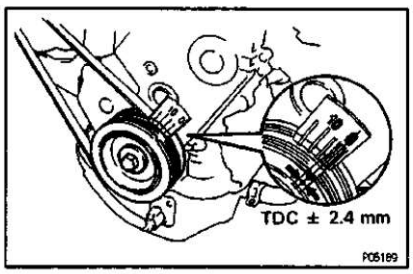
(o) Slowly turn the crankshaft pulley two revolutions from TDC to TDC.
NOTICE: Always turn the crankshaft clockwise.



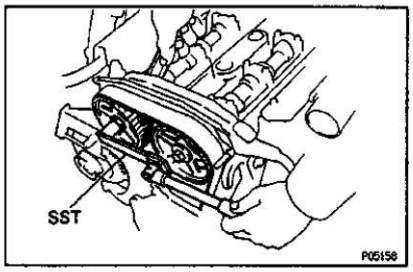
(p) Check that each pulley aligns with the timing marks as shown in the illustration.



10. CHECK VALVE TIMING
(a) Using a wrench, turn and align the groove of the camshaft with the dot mark of the No.1 camshaft bearing cap.

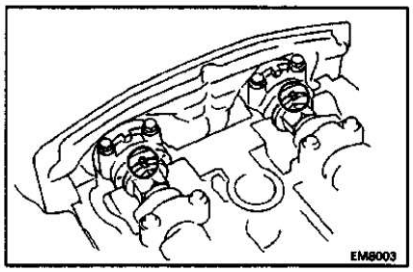


(b) Next mark a note of the crankshaft pulley angle on the No.1 timing belt cover.
HINT: Perform this check separately for the intake and exhaust sides.
If the crankshaft pulley movement is within ± 2.4 mm (0.094 in.) of TDC, it is correct.
If it is greater than 2.4 mm (0.094 in.), go back to step 9.

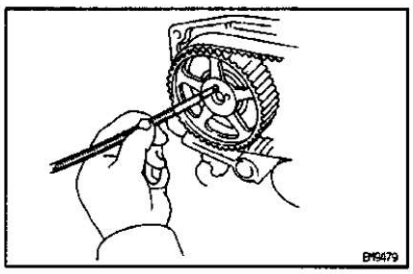


11. ADJUST VALVE TIMING

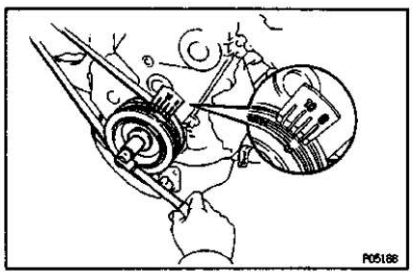
(a) Hold the hexagon wrench head portion of the cam–shaft with a wrench, and remove the two camshaft timing pulley bolts.
HINT (Intake camshaft timing pulley): Use SST.
SST 09249 – 63010
NOTICE: Do not make use of the timing belt tension when loosening the pulley bolts.



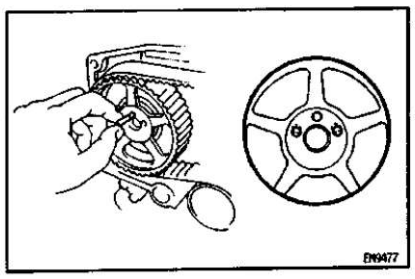
(b) Using a wrench, turn and align the groove of the camshaft with the dot mark of the No.1 camshaft bearing cap.



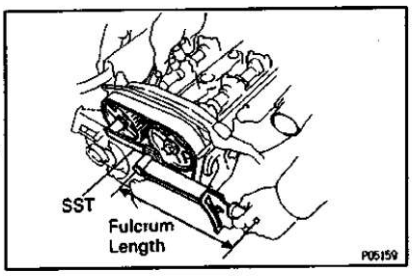
(c) Using a magnetic finger, remove the knock pin from the pin hole of the camshaft timing pulley.



(d) Slowly turn the crankshaft pulley two revolutions from TDC to TDC.
NOTICE: Always turn the crankshaft clockwise.



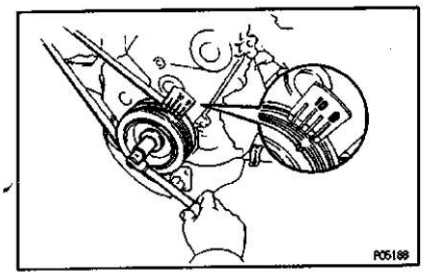
(e) Select one overlapped hole of the camshaft and timing pulley, and insert the knock pin into it.
HINT:
- If there is not an overlapped hole, rotate the crankshaft a little and insert the pin knock pin into the nearly overlapped hole.
- By changing the pin hole to the next one, the crankshaft pulley angle can be adjusted by approx. 2°.
- By changing the pin hole to the next two, the crankshaft pulley angle can be adjusted by approx. 5°.



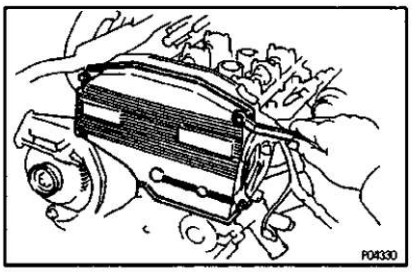
(f) Hold the hexagon wrench portion of the camshaft with a wrench, and tighten the two camshaft timing pulley bolts.
Torque:
59 N–m (600 kgf–cm. 43 ft–lbf)
41 N–m (420 kgf–cm, 30 ft–lbf) for SST
HINT(Intake camshaft timing pulley):
- Use SST.

SST 09249–63010
- Use a torque wrench with a fulcrum length of 340 mm (13.39 in.).

NOTICE: Do not make use of the timing belt tension when tightening the pulley bolts.

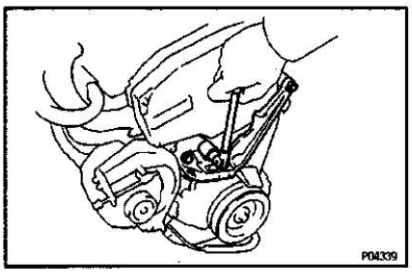


(g) Slowly turn the crankshaft pulley two revolutions from TDC to TDC.
NOTICE: Always turn the crankshaft clockwise.
(h) Recheck the valve timing. (See step 10 above)



12. INSTALL NO.2 TIMING BELT COVER

(a) Install the gasket to the timing belt cover.
(b) Install the timing belt cover with the five bolts.



13. INSTALL RH ENGINE MOUNTING BRACKET

(See steps 16 to 25 and 27 to 37 in Timing Belt Installation)

TOYOTA–VARIABLE INDUCTION SYSTEM (T–VIS)

T–VIS INSPECTION

1. WARM UP AND STOP ENGINE

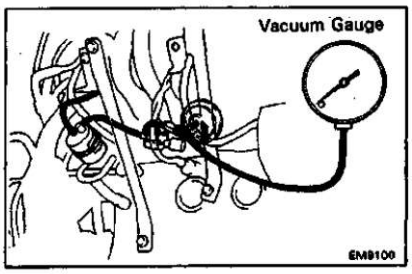
Allow the engine to warm up to normal operating temperature.

2. CONNECT TACHOMETER

(See step 2 in Ignition Timing Inspection and Adjustment)

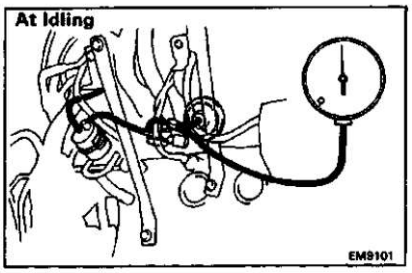
3. CONNECT VACUUM GAUGE

Using a 3 – way connector, connect the vacuum gauge to the hose between the VSV and actuator.



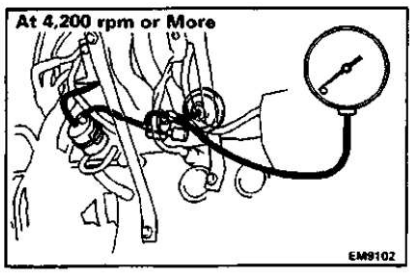
4. CONNECT VACUUM GAUGE

(a) Check that the vacuum gauge indicates vacuum at idling.



(b) Check that the vacuum gauge indicates zero at 4,200 rpm or more.

HINT: If regular unleaded gasoline is used, the vacuum gauge also indicates zero below 4,200 rpm.



5. DISCONNECT TACHOMETER

TROUBLESHOOTING

HINT: Before troubleshooting the turbocharger, first check the engine itself. (Valve clearance, engine compression, ignition timing etc.)

INSUFFICIENT ACCELERATION, LACK OF POWER OR EXCESSIVE FUEL CONSUMPTION

(Possible Cause)	(Check Procedure and Correction Method)
1. TURBOCHARGING PRESSURE TOO LOW	Check turbocharging pressure. (See page EG1–202) **Turbocharging pressure:** **49 – 81 kPa** **(0.50 – 0.83 kgf/cm^2, 7.1 – 11.8 psi)** If the pressure is below specifications, begin diagnosis from item 2.
2. RESTRICTED INTAKE SYSTEM	Check intake air system, and repair or replace parts as necessary. (See page EG1–202)
3. LEAK IN INTAKE AIR SYSTEM	Check intake air system, and repair or replace parts as necessary. (See page EG1–202)
4. RESTRICTED EXHAUST SYSTEM	Check exhaust system, and repair or replace parts as necessary. (See page EG1–202)
5. LEAK IN EXHAUST SYSTEM	Check exhaust system, and repair or replace parts as necessary. (See page EG1–202)
6. ERRATIC TURBOCHARGER OPERATION	Check rotation of impeller wheel. If it does not turn or turns with a heavy drag, replace the turbocharger assembly. Check axial and radial plays of impeller wheel. (See page EG1–215) **Axial play: 0.13 mm (0.0051 in.) or less** **Radial play: 0.18 mm (0.0071 in.) or less** If not within specification, replace the turbocharger assembly.

V00992

ABNORMAL NOISE

(Possible Cause)	(Check Procedure and Correction Method)
1. TURBOCHARGING HEAT INSULATOR RESONANCE	Check for loose, improperly installed or deformed insulator mount bolts, and repair or replace as necessary.
2. EXHAUST PIPE LEAKING OR VIBRATING	Check for deformed exhaust pipe, loose mount bolts or damaged gasket, and repair or replace as necessary.
3. ERRATIC TURBOCHARGER OPERATION	Refer to Item 6 of INSUFFICIENT ACCELERATION, LACK OF POWER OR EXCESSIVE FUEL CONSUMPTION.

EXCESSIVE OIL CONSUMPTION OR WHITE EXHAUST

(Possible Cause)	(Check Procedure and Correction Method)
FAULTY TURBOCHARGER SEAL	Check for oil leakage in exhaust system. • Remove the turbine elbow from the turbocharger and check for excessive carbon deposits on the turbine wheel. Excessive carbon deposits indicate a faulty turbocharger. Check for oil leakage in intake air system. • Check for axial and radial plays in impeller wheel, and replace the turbocharger if necessary. (See page EG1–215) **Axial play: 0.13 mm (0.0051 in.) or less** **Radial play: 0.18 mm (0.0071 in.) or less** **NOTICE: Some oil mist in the blowby from the PCV is normal.** **Do not mistake it for an oil leak from the turbocharger.**

V00993

TROUBLESHOOTING

You will find the source of the trouble more easily by correctly using the table shown below. In this table, each number shows the order of priority of the causes of the trouble. Check each part in the order shown. If necessary, replace the part.

	See page	IG–24	IG–24	EG2–232 EG2–245	EG2–227 EG2–243	EG2–226 EG2–242	EG2–232 EG2–245	EG2–224 EG2–238	EG2–222 EG2–238	EG2–228 EG2–244	–	–	–	EG2–250	EG2–267	EG2–201	EG2–271	EG2–307
	Suspect area	RPM Signal Circuit	Ignition Circuit	Main Oxygen Sensor Circuit	ECTS Circuit	Intake Air Temp. Sensor Circuit	Sub–Oxygen Sensor Circuit	MAP Circuit	Throttle Position Sensor Circuit	STA Signal Circuit	Knock Sensor Circuit	PNS Signal Circuit	A/C Signal Circuit	Fuel Pump	Fuel Pressure Regulator	Fuel Lines	Injectors	Fuel Pressure Control VSV Circuit
	Symptom																	
Dose not start	Engine does not crank																	
	Starter runs – engine does not crank																	
	No initial combusion	12	2					5						6				
	No complete combustion				5			2							4		10	
Difficult to start	Engine cranks slowly												2					
	Difficult to start normally	13	14		5	15								8	7	9	17	
	Difficult to start in cold				1	6				2				8	7	9	10	
	Difficult to start in hot				1	6								8	7	9	10	5
Poor idling	Incorrect first idle				2													
	High engine idle speed				2	4			5			7	6				8	
	Low engine idle speed				1			4									5	
	Rough idling		18		3			13						8	7	9	17	
	Misfire		5		7			9									10	
Poor drivability	Hesitation Poor acceleration			13	11	12		10	9					15	14	16	19	
	Backfire			7	4	8		6	5					10	9	11	12	
	Muffler explosion (after fire)			8	3	7		5	6						4		9	
	Surging														2		5	
	Knocking										1							
	Engine stall soon after starting				9			8						4	3	5	10	
	After acceleration pedal depressed							1	3						5	6	7	
	After acceleration pedal released							3										
	During A/C operation												1					
	When N to D shift											1						
Others	Poor fuel economy			20	15	21	22	17	16			18	19				13	14
	Engine overheat										9							
	Engine overcool																	
	Excessive oil consumption																	
	Low oil pressure																	
	High oil pressure																	
	Starter keeps running																	
	Battery often discharge																	

HINT; When inspecting a wire harness or circuit, the electrical wiring diagrams at the end of volume 2 of repair manual should be referred to and the circuits of related systems also should be checked.

V00974

								2	2	1		7							10	2	3	3	4	5	4		3	8			IACV	EG2–297
																												3			MPI Main Relay	EG2–302
																												4			Circuit Opening Relay	EG2–304
							7								1																Fuel Cut System	EG2–331
																														4	Theft Deterrent Control Module	BE–1
							23	3	3	4	8	11	10	6	10	13	20	11	19	6	9	4	11	11	18			13			PC M E (PCME & T)	EG2–326
							2					2	2				4	2	2				3	4	2			7			Fuel Quality	–
							1																								Fuel Leakage	–
						1																									Coolant Leakage	–
			1	1																											Vacuum Leakage	–
												1		1		1	1	1	1				2	3	1		1				Oil Leakage	–
	1																													1	Starter Relay	ST–25
																														3	PNS or Clutch Start SW	AX–1 CL–1
	2																									1			1	2	Starter	ST–5
						8	8				4		3	3			6	4	5						3						Spark Plug	IG–28
							9							4			7	6	6						16			1			Distributor with Ignition Coil	IG–30
							6			2	2	6	4			2	5	3	4	3					6						EG R System	EG2–173
							3														1	1									Accelerator Pedal Link	–
							5										3														Brakes Drag Even when Released	–
					1	2							7																		Cooling Fan System	EG2–367
							4										2														Clutch	CL–1
				3			10										8	8	11						10		6	9			Compression	EG2–26
																	17		14												Valve Clearance	EG2–15

V00975

5S–FE ENGINE – ENGINE MECHANICAL

EG2–9

	See page	EG2–42	EG2–37	EG2–345	EG2–67	EG2–399	EG2–117	EG2–120	EG2–66	EG2–129	–	EG2–357	EG2–354	CH–6	EG2–338	BE–1	CH–10	EG2–124
	Suspect area	Valve Timing	Timing Belt	Water Pump	Valve Stem Guide Bushing	Oil Pump	Connecting Rod Bearing	Crankshaft Bearing	Cylinder Head	Piston Ring	Flywheel or Drive Plate	Radiator and Radiator Cap	Thermostat	Drive Belt	Engine Coolant and Sender Gauge	Oil Pressure Switch	Alternator	Cylinder Block
	Symptom																	
Dose not start	Engine does not crank																	
	Starter runs – engine does not crank										2							
	No initial combusion	10	11															
	No complete combusion	8	9							7								
Difficult to start	Engine cranks slowly						3	4										
	Difficult to start normally	12								11								
	Difficult to start in cold																	
	Difficult to start in hot																	
Poor idling	Incorrect first idle																	
	High engine idle speed																	
	Low engine idle speed																	
	Rough idling	15	16						20	12								
	Misfire																	
Poor divability	Hesitation Poor acceleration	18																
	Backfire	3																
	Muffler explosion (after fire	2																
	Surging																	
	Knocking	5		9								6	8					
Engine stall	Engine stall soon after starting																	
	After acceleration pedal depressed																	
	After acceleration pedal released																	
	During A/C operation																	
	When N to D shift																	
Others	Poor fuel economy	12								11								
	Engine overheat	7	5	6		10			11			3	4		13			12
	Engine overcool												2		3			
	Excessive oil consumption				2				5	4								6
	Low oil pressure					2	3	4								5		
	High oil pressure					1										2		
	Starter keeps running																	
	Battery often discharge													1			2	

V00976

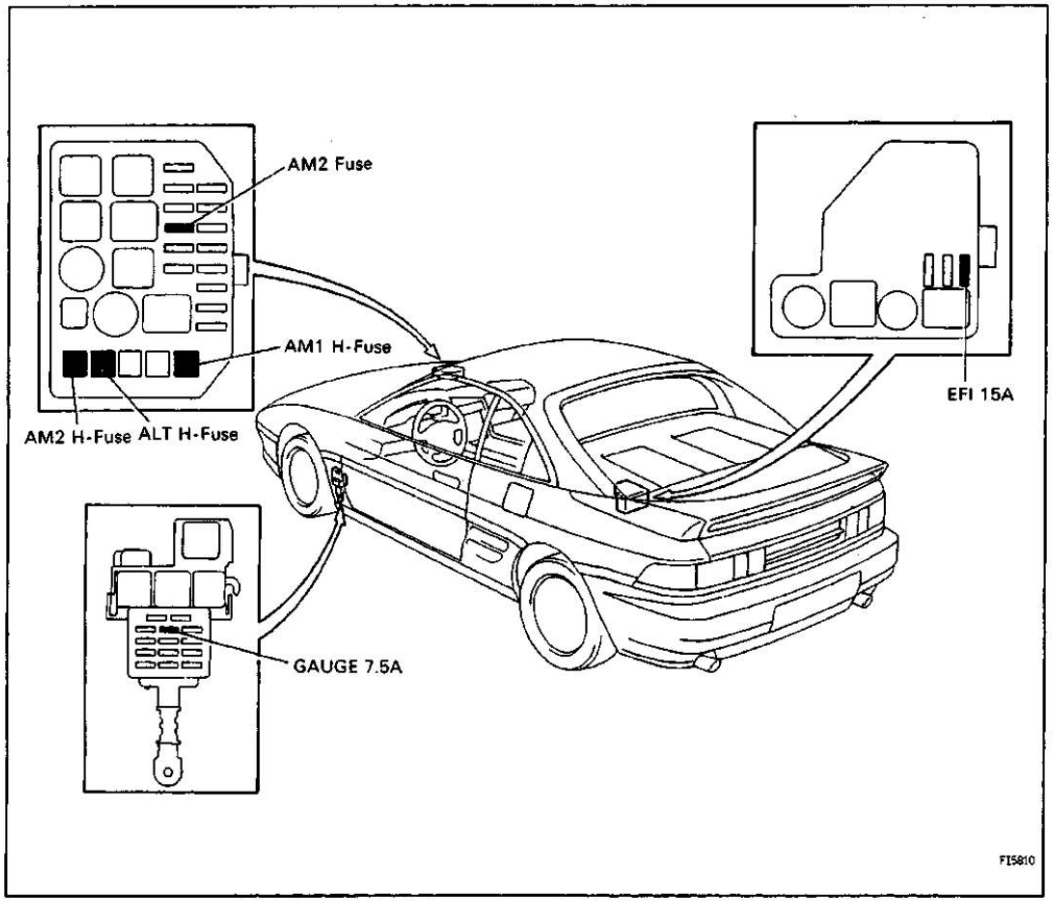
TROUBLESHOOTING WITH VOLT OHMMETER

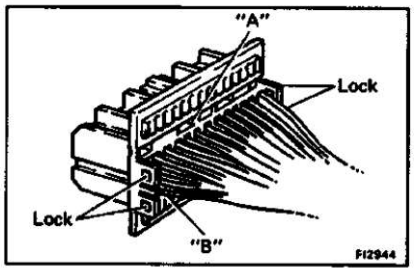
HINT: 5G0XT-01

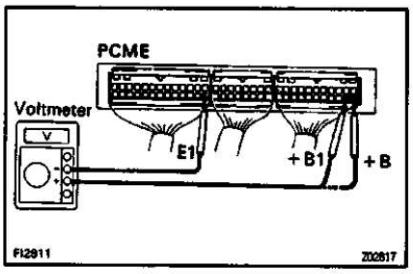
- The following troubleshooting procedures are designed for inspection of each separate system, and therefore the actual procedure may vary somewhat. However, troubleshooting should be performed while referring to the inspection methods described in this manual.
- Before beginning inspection, it is best to first make a simple check of the fuses, H–fuses, fusible link and the condition of the connectors.
- The following troubleshooting procedures are based on the supposition that the trouble lies in either a short or open circuit within the computer.
- If engine trouble occurs even though proper operating voltage is detected in the computer connector, then it can be assumed that the PCME is faulty and should be replaced.

FUSES, H– FUSES AND FUSIBLE LINK LOCATION

5G0XU-01







SMPI SYSTEM CHECK PROCEDURE

PREPARATION

(a) Disconnect the connectors from the PCME.
(b) Remove the locks as shown in the illustration so that the tester probe(s) can easily come in.
NOTICE: Pay attention to sections 'A' and 'B' in the Illustration which can be easily broken.
(c) Reconnect the connectors to the PCME.
HINT:

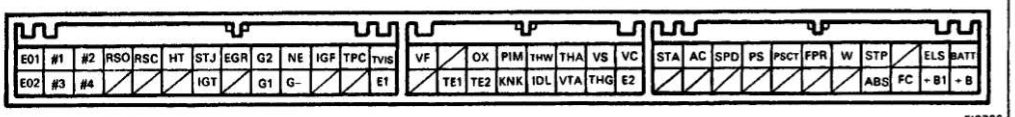
- Perform all voltage measurements with the con–nectors connected.
- Verify that the battery voltage is 11 V or more when the ignition switch is in the "ON" position.

Using a voltmeter with high impedance (10 kΩ/V minimum), measure the voltage at each terminal of the wiring connectors.

PCME Wiring Connectors Voltage

No.	Terminals	Condition		STD voltage (V)	See page
1	+B, +B1 – E1	IGS WON		9–14	EG1–296
2	BATT – E1	–		9–14	EG1–297
3	IDL – E2	IG SW ON	Throttle valve open	9–14	EG1–298
	VC – E2		–	4.5–5.5	
	VTA – E2		Throttle valve fully closed (Throttle opener must be cancelled first)	0.3–0.8	
			Throttle valve fully open	3.2–4.9	
4	VC – E2		–	4.5–5.5	EG1–300
	VS – E2		Measuring plate fully closed	4.0–5.5	
			Measuring plate fully open	0.2–0.5	
		Idling		1.6–4.1	
		3,000 rpm		1.0–2.0	
5	#1, #2, #3, #4 – E01, E02	IG SW ON		9–14	EG1–301
6	THA – E2	IG SW ON	Intake air temp. 20°C (68°F)	0.5–3.4	EG1–302
7	THW – E2		Coolant temp. 80°C (176°F)	0.2–1.0	EG1–303
8	STA – E1	Cranking		6 or more	EG1–304
9	IGT – E1	Idling		Pulse generation	EG1–305
10	RSC, RSO – E1	IG SW ON	PCME connectors disconnected	9–14	EG1–306
11	W – E1	No trouble ("CHECK" engine warning light off) and engine running		9–14	EG1 –307
12	PIM – E2	IG SW ON		2.5–4.5	EG1–308
	VC – E2			4.5–5.5	
13	AC – E1	IG SW ON	Air conditioning ON	9–14	EG1–309

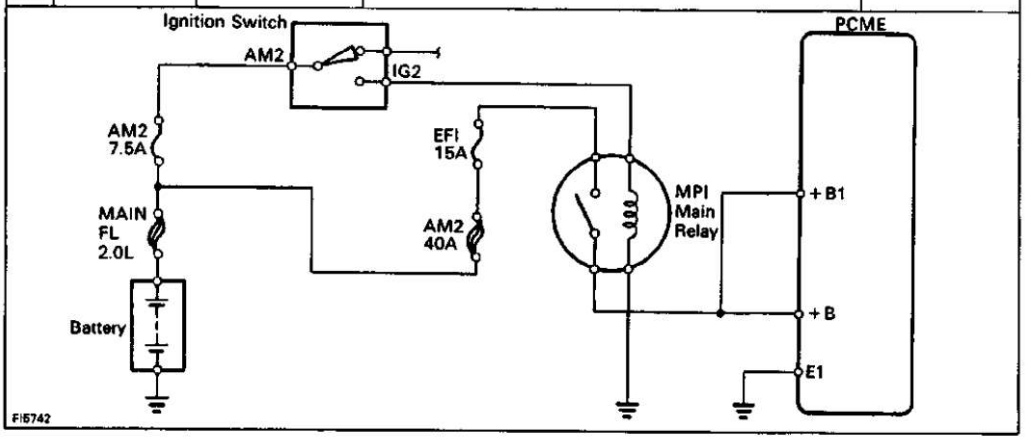
PCM E Terminals

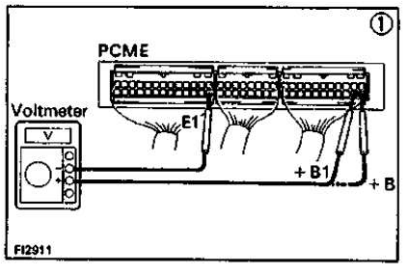


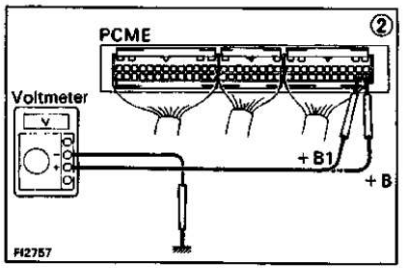
FI2796

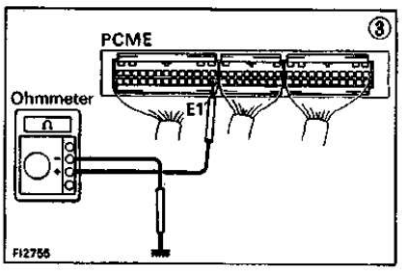
V00894

No.	Terminals	Trouble	Condition	STD voltage
1	+B, +B1 – E1	No voltage	IG SW ON	9–14V









1 There is no voltage between PCME terminals + B or + B1 and E1. (IG SW ON)

2 Check that there is voltage between PCME terminal + B or + B1 and body ground. (IG SW ON)

NO

OK

3 Check wiring between PCME terminal E1 and body ground.

OK

Try another PCM E.

BAD

Repair or replace.

Check fuses, N–fuse, fusible link and ignition switch.

BAD

Repair or replace.

OK

Check M PI main relay. (See page EG1–374)

BAD

Replace.

OK

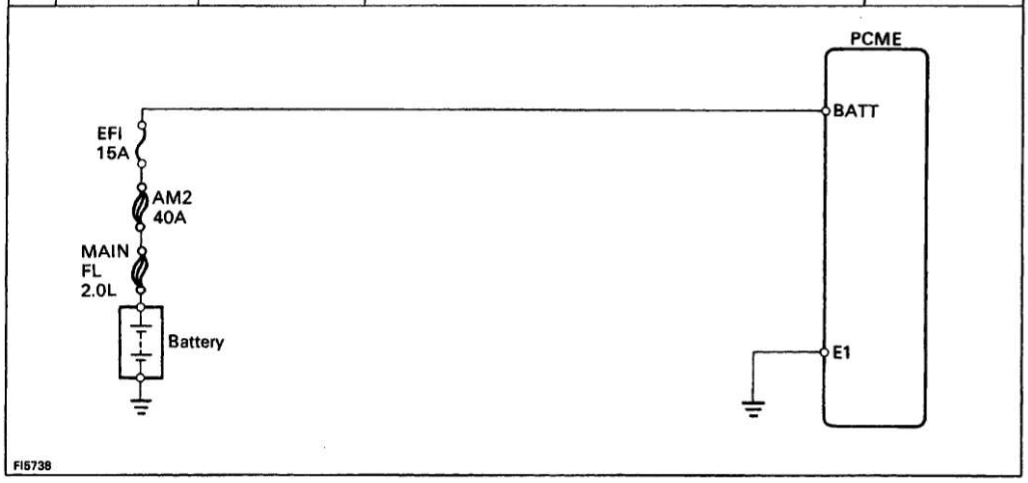
Check wiring between MPI main relay and battery.

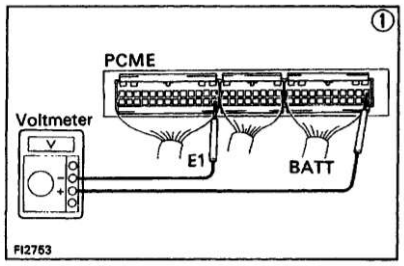
BAD

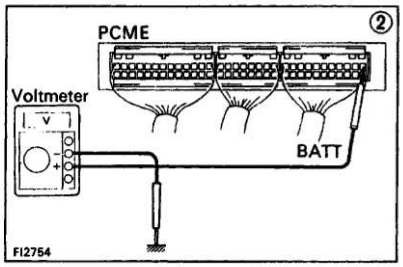
Repair or replace.

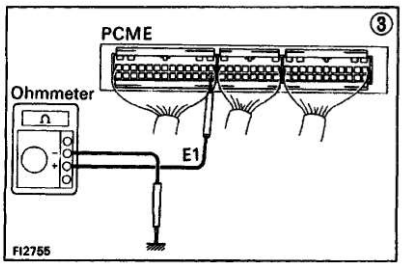
V00895

No.	Terminals	Trouble	Condition	STD voltage
2	BATT – E1	No voltage	–	9–14V









1 There is no voltage between PCME terminals BATT and E1.

2 Check that there is voltage between PCME terminal BATT and body ground.

NO

OK

3 Check wiring between PCME terminal E1 and body ground.

OK

BAD

Try another PCME.

Repair or replace.

Check fuse, H–fuse and fusible link.

BAD

Replace.

OK

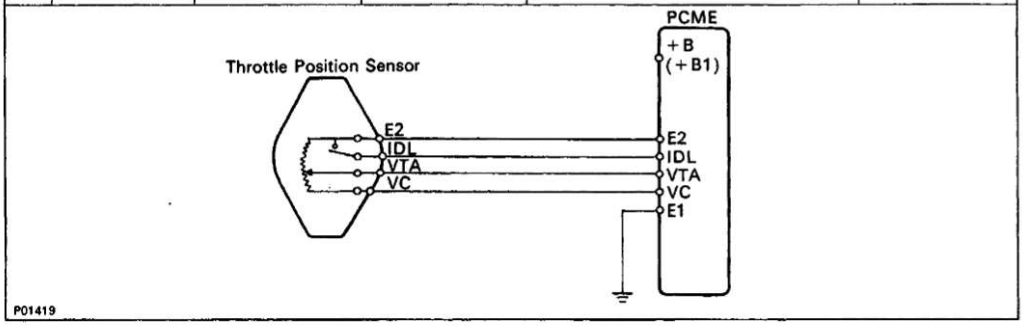
Check wiring between PCME terminal and battery.

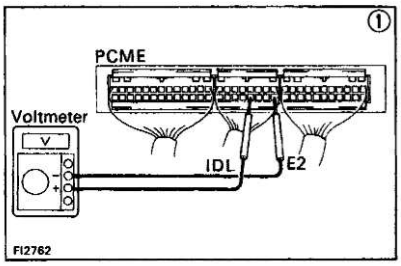
BAD

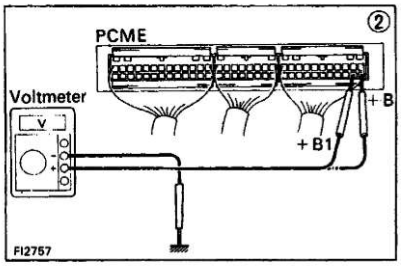
Repair or replace.

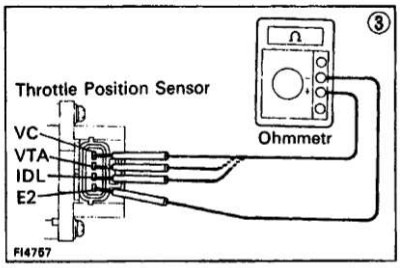
V00896

No.	Terminals	Trouble	Condition		STD voltage
3	IDL – E2	No voltage	IG SW ON	Throttle valve open	9 – 14 V
	VC – E2				4.5 – 5.5 V
	VTA – E2			Throttle valve fully closed Throttle opener must be cancelled first	0.3 – 0.8 V
				Throttle valve fully open	3.2 – 4.9 V

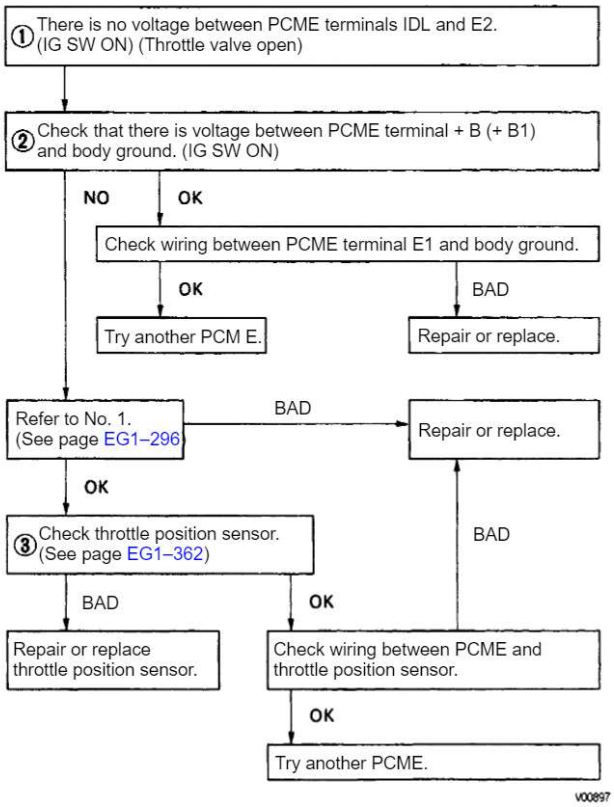


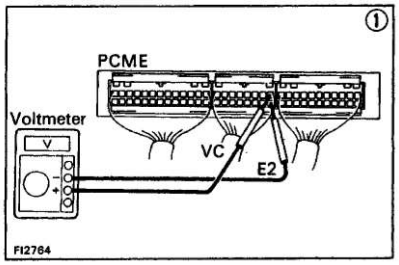


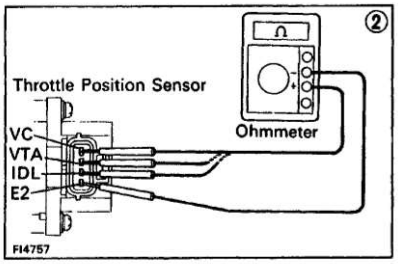


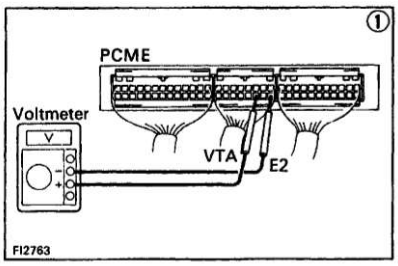


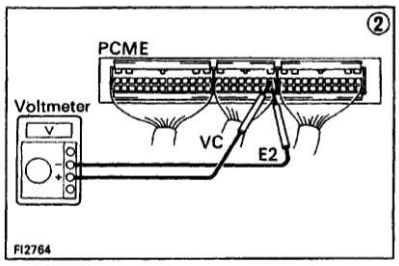
• IDL – E2

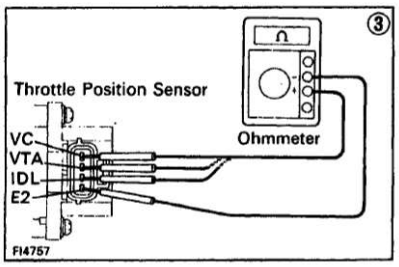












- **VC–E2**

① There is no voltage between PCME terminals VC and E2. (IG SW ON)

Check that there is voltage between PCME terminal + B (+ B1) and body ground. (IG SW ON)

OK → ② Check throttle position sensor. (See page EG1–362)

NO → Refer to No. 1. (See page EG1–296)

② BAD → Repair or replace.

② OK → Check wiring between PCM E and throttle position sensor.

OK → Try another PCM E.

BAD → Repair or replace wiring.

- **VTA – et**

① There is no specified voltage at PCME terminals VTA and E2. (IG SW ON)

② Check that there is voltage between PCME terminals VC and E2. (IG SW ON)

NO → Refer to VC – E2 trouble section.

OK

OK → ③ Check throttle position sensor. (See page EG1–362)

③ BAD → Repair or replace.

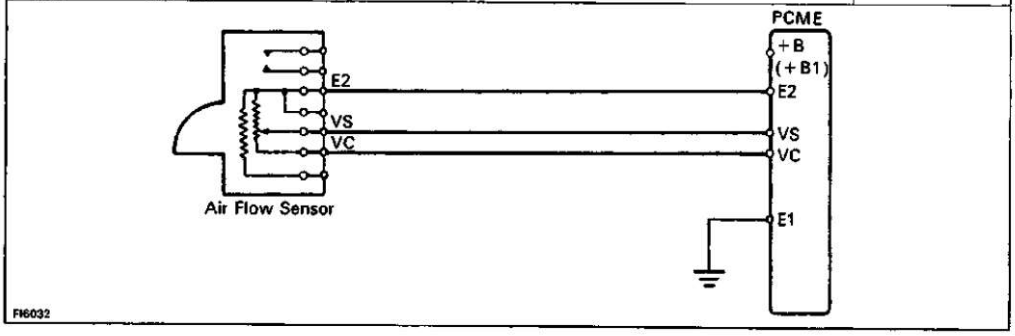
OK → Check wiring between PCME and throttle position sensor.

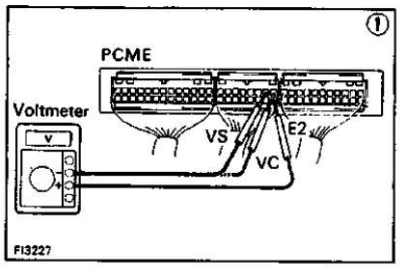
BAD → Repair or replace.

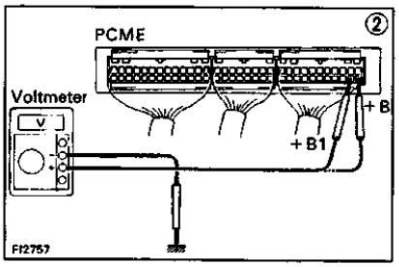
OK → Try another PCME.

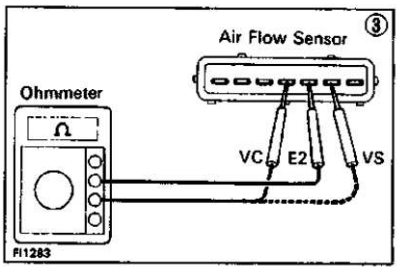
V00898

No.	Terminals	Trouble	Condition		STD voltage
4	VC – E2	No voltage	IG SW ON	–	4.5 – 5.5 V
	VS – E2			Measuring plate fully closed	4.0 – 5.5 V
				Measuring plate fully open	0.2 – 0.5 V
			Idle		1.6 – 4.1 V
			3,000 rpm		1.0 – 2.0 V









1 There is no specified voltage at PCM E terminals VC or VS and E2. (IG SW ON)

2 Check that there is voltage between PCM E terminal + B (+ 131) and body ground. (IG SW ON)

OK → Check wiring between PCME terminal E1 and body ground.

NO → Refer to No. 1. (See page EG1–296)

Check wiring between PCME terminal E1 and body ground.

OK → 3 Check air flow sensor. (See page EG1–358)

BAD → Repair or replace.

3 Check air flow sensor. (See page EG1–358)

BAD → Repair or replace air flow sensor.

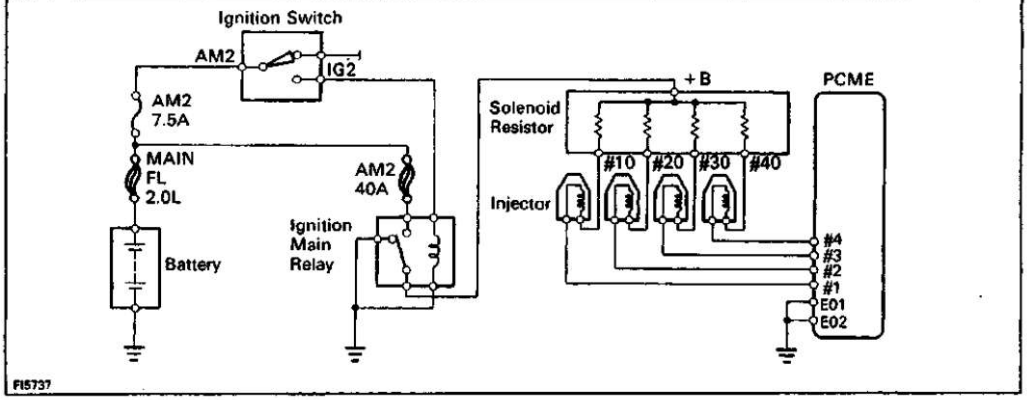
OK → Check wiring between PCM E and air flow sensor.

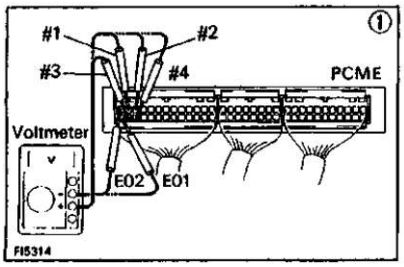
OK → Try another PCM E.

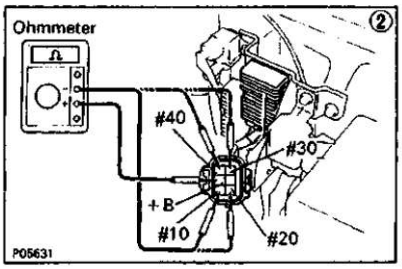
BAD → Repair or replace.

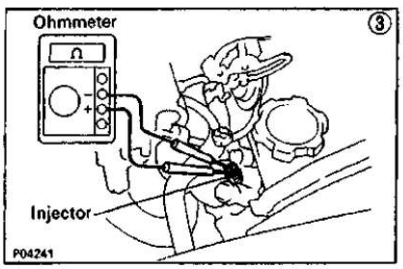
V00899

No.	Terminals	Trouble	Condition	STD voltage
5	#1 #2 _ E01 #3 E02 #4	No voltage	IG SW ON	9 – 14 V









There is no voltage between PCME terminals #1, #2, #3 and/or #4 and E01 and/or E02. IG SW ON)

↓

Check that there is specified voltage between solenoid resistor terminal + B and body ground. STD voltage: 9 –14 V

↓ OK / NO → Check fuse, H–fuse, fusible link, wiring, ignition switch and ignition main relay. → BAD → Repair or replace.

↓

Check resistance between +B of solenoid resistor and each other terminal. STD resistance: 4 – 6Ω

↓ OK / NO → Replace resistor.

↓

Check resistance of each injector. STD resistance: 2 – 4Ω

↓ OK / BAD → Replace injector.

↓

Check wiring between PCME and resistor → BAD → Repair or replace wiring.

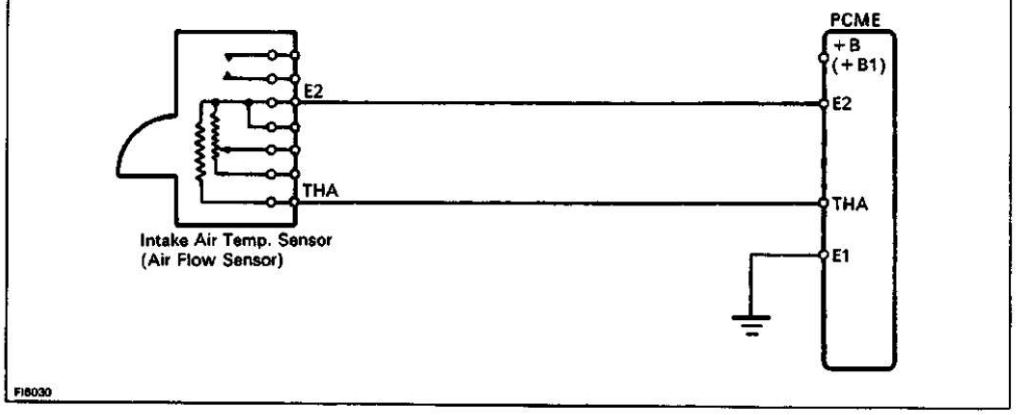
↓ OK

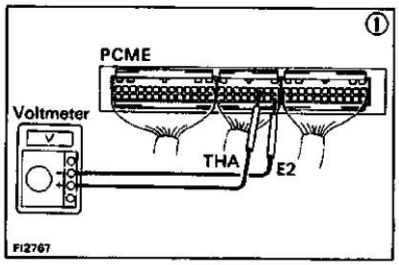
↓

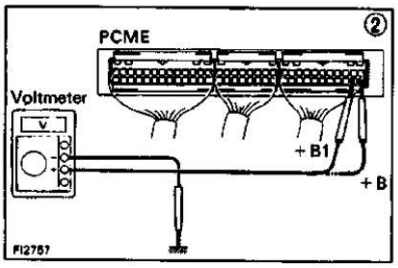
Try another PCME.

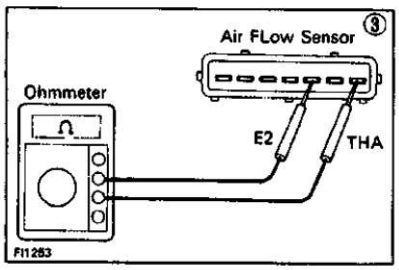
V00900

No.	Terminals		Trouble	Condition	STD voltage
6	THA – E2	No voltage	IG SW ON	Intake air temperature 20°C	0.5 – 3.4 V









① There is no voltage between PCME terminals THA and E2. (IG SW ON)

② Check that there is voltage between PCME terminal + B (+ 131) and body ground. (IG SW ON)

OK → Check wiring between PCME terminal E1 and body ground.

NO → Refer to No.1. (See page EG1–296)

Check wiring between PCME terminal E1 and body ground.

OK → ③ Check intake air temp. sensor (See page EG1–358)

BAD → Repair or replace.

③ Check intake air temp. sensor (See page EG1–358)

BAD → Replace air flow sensor.

OK → Check wiring between PCME and intake air temp. sensor

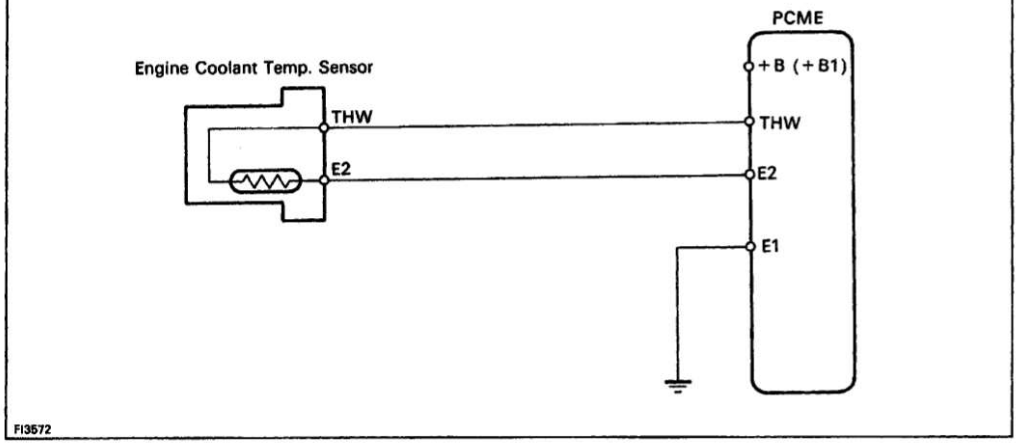
Check wiring between PCME and intake air temp. sensor

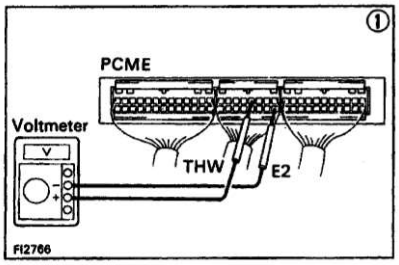
OK → Try another PCME.

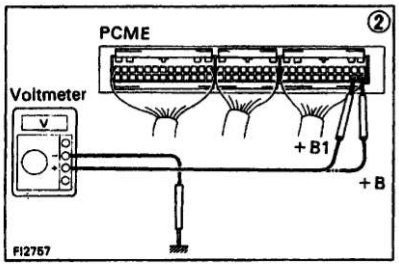
BAD → Repair or replace.

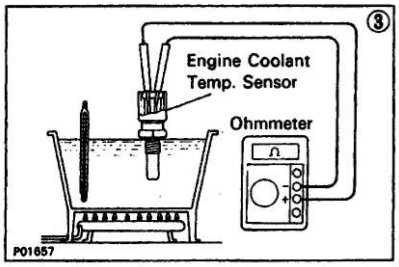
V00901

No.	Terminals	Trouble	Condition		STD voltage
7	THW – E2	No voltage	IG SW ON	Coolant temperature 80°C (176°F)	0.2 – 1.0 V









① There is no voltage between PCME terminals THW and E2. (IG SW ON)

② Check that there is voltage between PCME terminal + B (+ B1) and body ground. (IG SW ON)

OK → Check wiring between PCME terminal E1 and body ground.

NO → Refer to No.1. (See page EG1–296)

Check wiring between PCME terminal E1 and body ground.

OK → ③ Check engine coolant temp. sensor. (See page EG1–378)

BAD → Repair or replace.

③ Check engine coolant temp. sensor. (See page EG1–378)

BAD → Replace engine coolant temp. sensor.

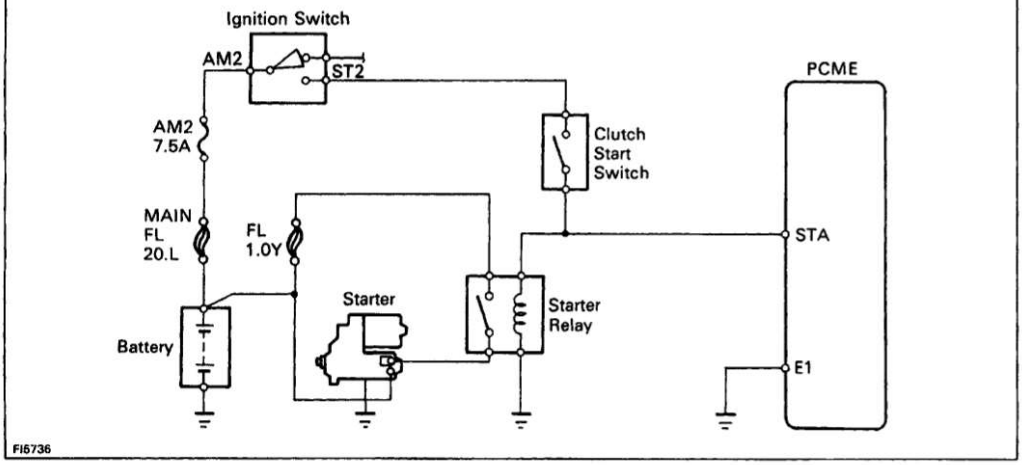
OK → Check wiring between PCME and engine coolant temp. sensor.

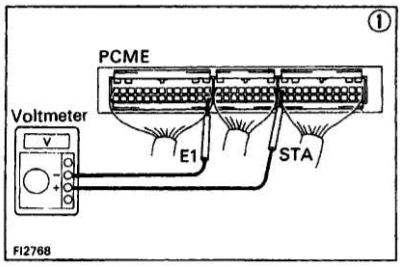
OK → Try another PCME.

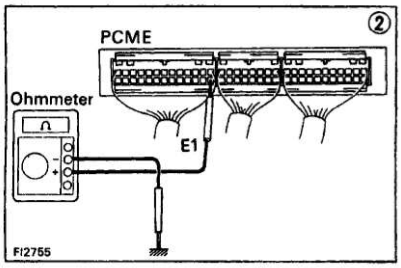
BAD → Repair or replace.

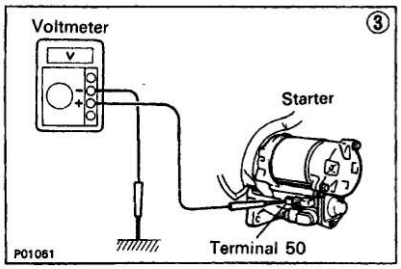
V00902

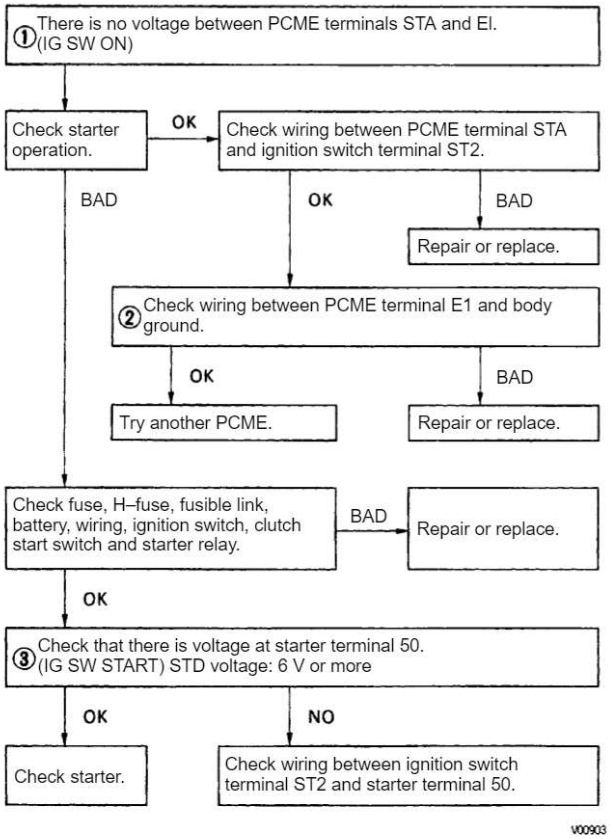
No.	Terminals	Trouble	Condition	STD voltage
8	**STA – E1**	No voltage	Cranking	**6 V or more**



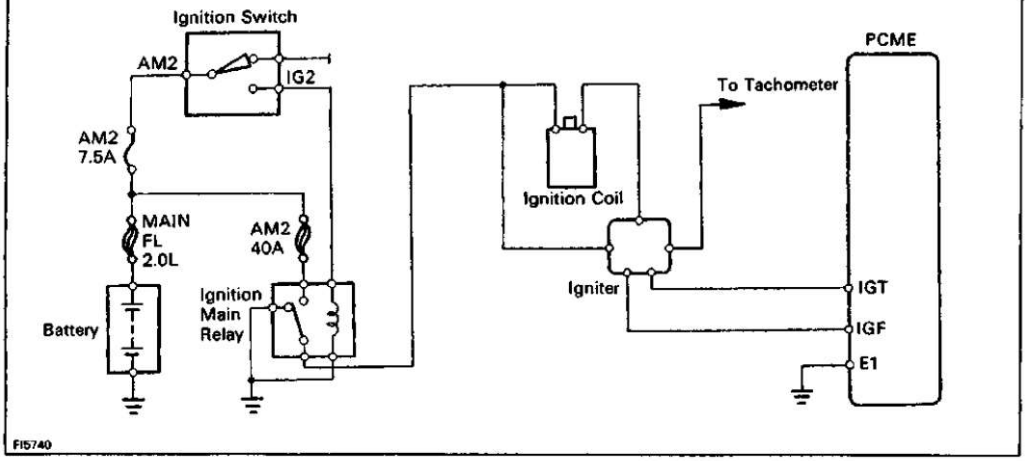


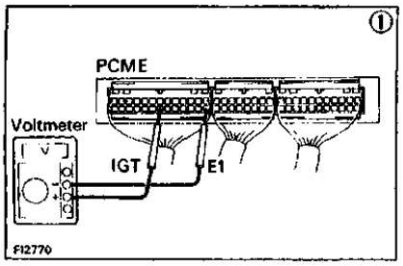


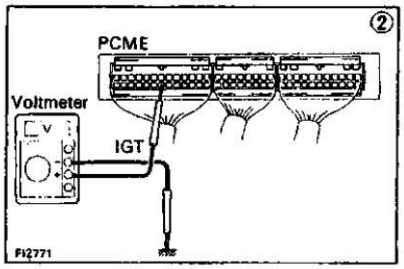


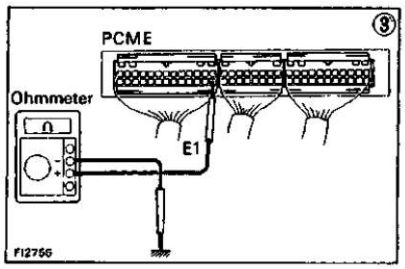


No.	Terminals	Trouble	Condition	STD voltage
9	IGT – E1	No voltage	Idling	Pulse generation









1 There is no voltage between PCME terminals IGT and E1. (Idling)

↓

2 Check that there is voltage between PCME terminal IGT and body ground. (idling)

NO → Check wiring between PCME terminal E1 and body ground. → BAD → Repair or Replace.

OK → Try another PCME.

OK →

Check fuse, H–fuse, fusible link, ignition switch and ignition main relay. → BAD → Repair or replace.

OK →

Check distributor. (See IG section) → BAD → Repair or replace.

OK →

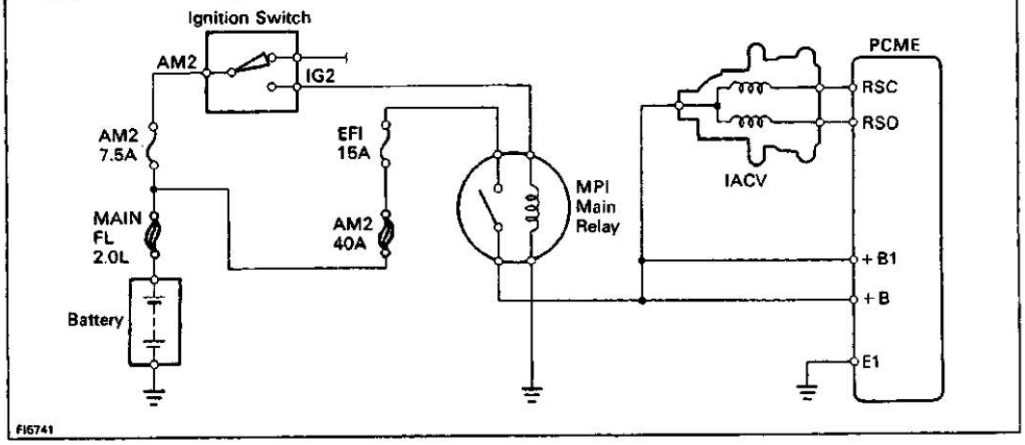
Check wiring between PCME and battery. → BAD → Repair or replace.

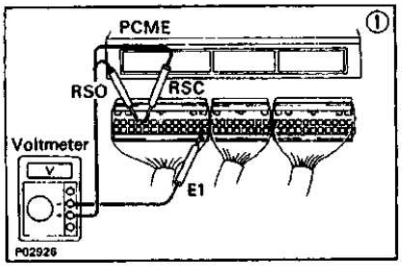
OK →

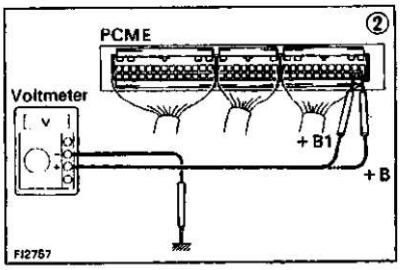
Check igniter. (See IG section) → BAD → Repair or replace.

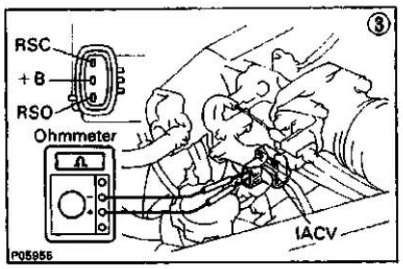
V00904

No.	Terminals	Trouble	Condition		STD voltage
10	RSC RSO – E1	No voltage	IG SW O N	PCME connecters disconnected	9 – 14 V









① There is no voltage between PCME terminals RSC or RSO and E1. (IG SW ON)

↓

② Check that there is voltage between PCME terminal + B (+ B1) and body ground. (IG SW ON)

OK ↓

NO → Refer to No–1 . (See page EG1–296)

↓

③ Check resistance between IACV terminals + B and RSC or RSO. STD resistance: 17.7 – 23.9 0

BAD → Replace IACV.

OK ↓

Check wiring between PCME and IACV.

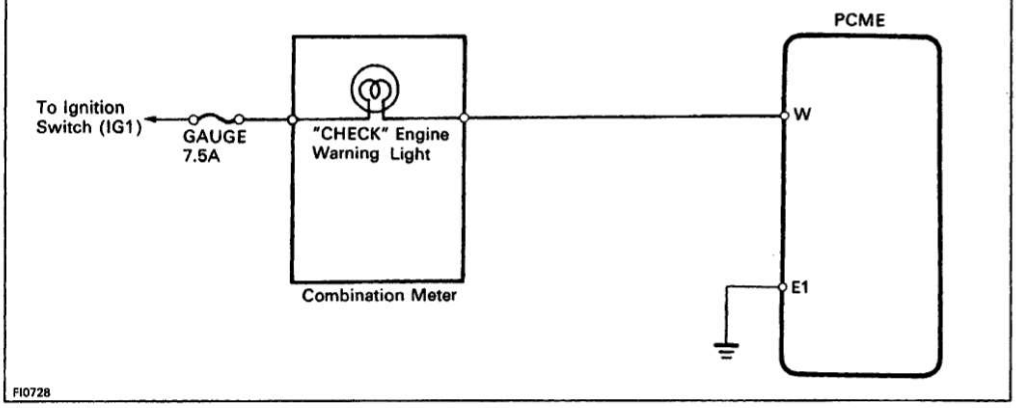
BAD → Repair or replace wiring.

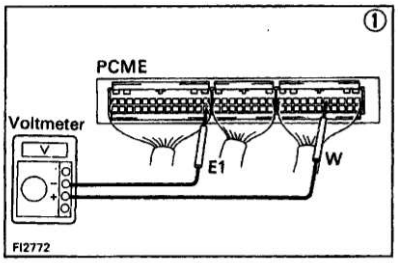
OK ↓

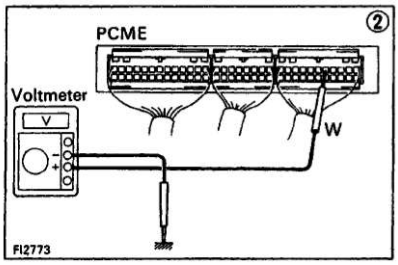
Try another PCME.

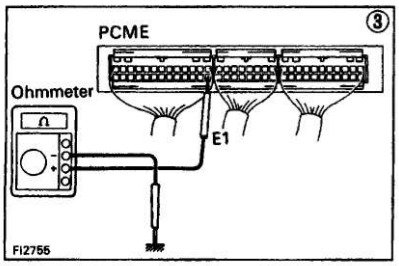
V00905

No.	Terminals	Trouble	Condition	STD voltage
11	W – E1	No voltage	No trouble ("CHECK" engine warning light off) and engine running.	9 – 14 V









① There is no voltage between PCME terminals W and E1. (Idling)

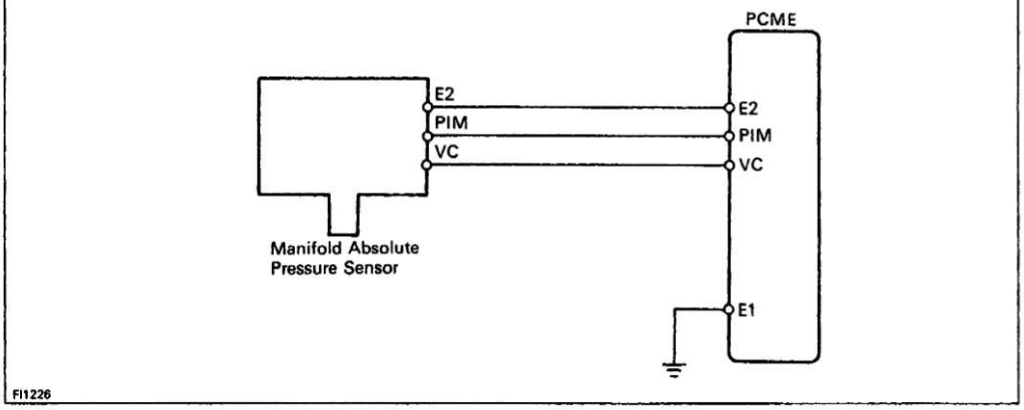
② Check that there is voltage between PCME terminal w and body ground.

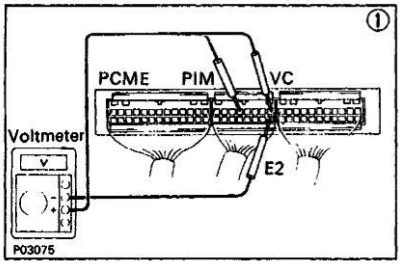
NO → Check wiring between PCME terminal E1 and body ground.
- OK → Try another PCME.
- BAD → Repair or replace.

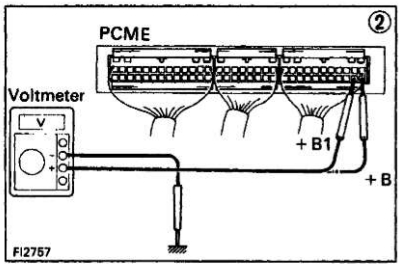
OK → Check fuse GAUGE (7.5 A) and check engine warning light.
- OK → Check wiring between PCME terminal W and fuse.
  - BAD → Repair or replace.
- BAD → Repair or replace.
- Fuse blows again → Check wiring between PCME terminal W and fuse.
  - BAD → Repair or replace.

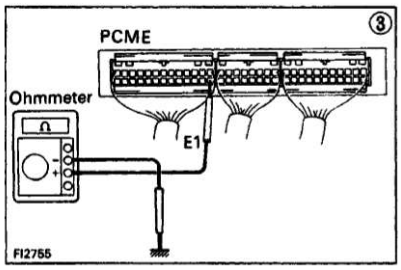
V00906

No.	Terminals	Trouble	Condition	STD voltage
12	PIM – E2	No voltage	IG SW ON	2.5 – 4.5 V
	VC – E2			4.5 – 5.5 V









① There is no voltage between PCME terminals PIM or VC and E2. (IG SW ON)

↓

② Check that there is voltage between PCME terminal + B or + 131 and body ground. OG SW ON)

OK → ↓

NO → Refer to No.1. (See page EG1–296)

↓

③ Check wiring between PCME terminal E1 and body ground.

OK → ↓

BAD → Repair or replace.

↓

Check manifold absolute pressure sensor. (See page EG1–400)

BAD → Replace manifold absolute pressure sensor.

OK → ↓

Check wiring between PCME and manifold absolute pressure sensor.

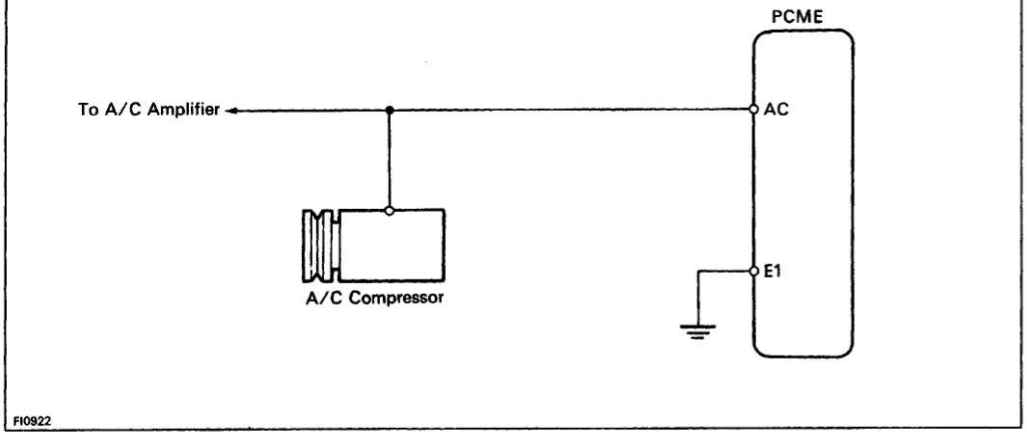
OK → ↓

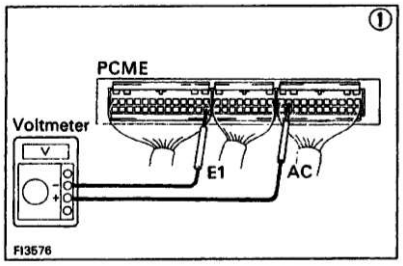
BAD → Repair or replace.

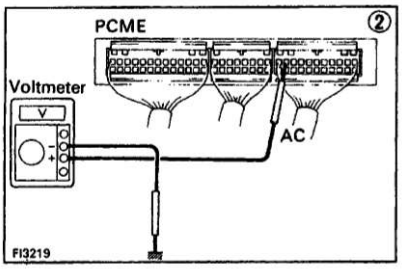
Try another PCME.

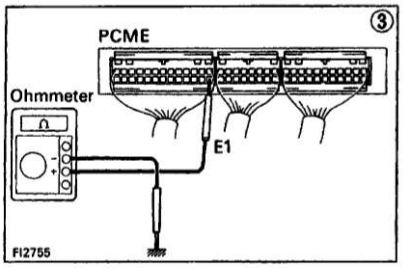
V00907

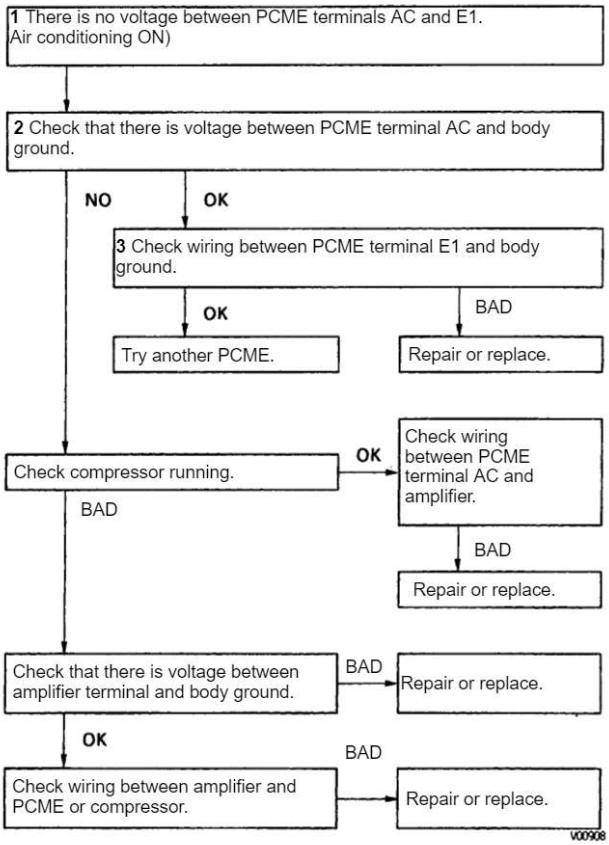
No.	Terminals	Trouble	Condition	STD voltage
13	**AC – E1**	No voltage	Air conditioning ON	**9 – 14 V**

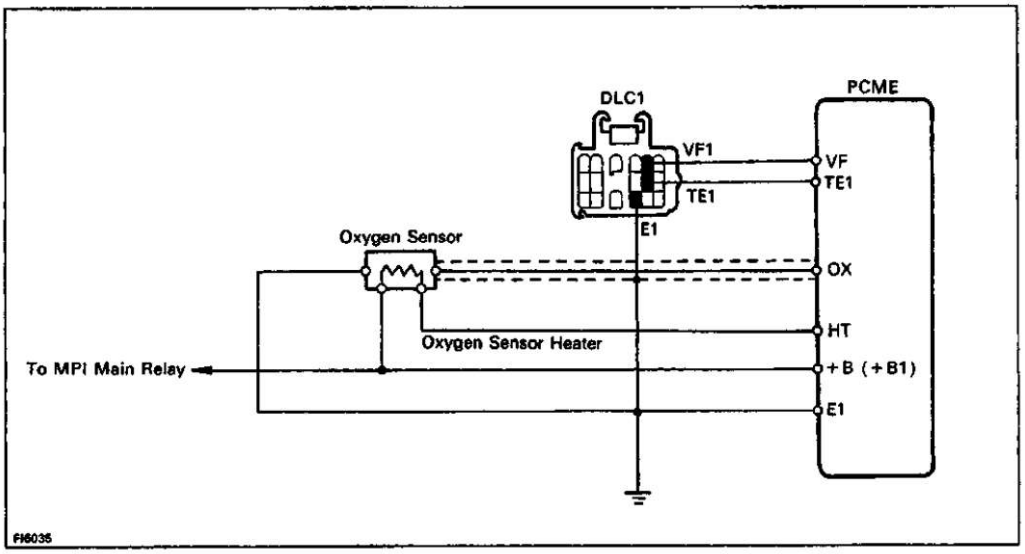


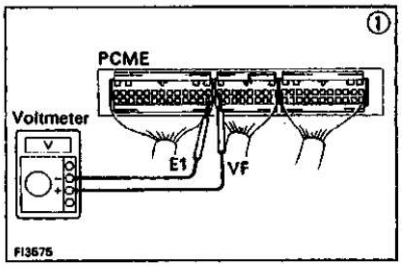


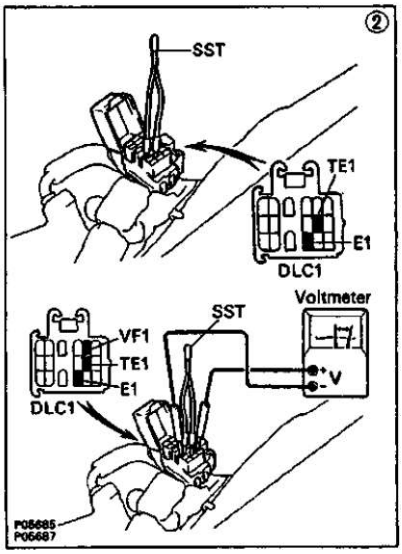












There is no voltage between PCME terminals VF and E1.

Check that there is specified voltage between PCME terminals VF and body ground.

NO → OK: Check wiring between PCME terminal E1 and body ground.
- BAD → Repair or replace.
- OK → Try another PCME.

Check for air suction into exhaust system.
- BAD → Repair air suction.
- OK

Check for air leak from air intake system.
- BAD → Repair air leak.
- BAD
- BAD
- OK

Check spark plugs.
- BAD → Repair or replace.
- OK

Check distributor and ignition system.
- BAD → Repair or replace.
- OK

Check fuel pressure.
- BAD
- BAD → Repair or replace.
- OK

Check injectors.
- BAD
- BAD → Repair or replace.
- OK

Check cold start injector.
- OK → Repair or replace.

Check air flow sensor.
- OK → Repair or replace.

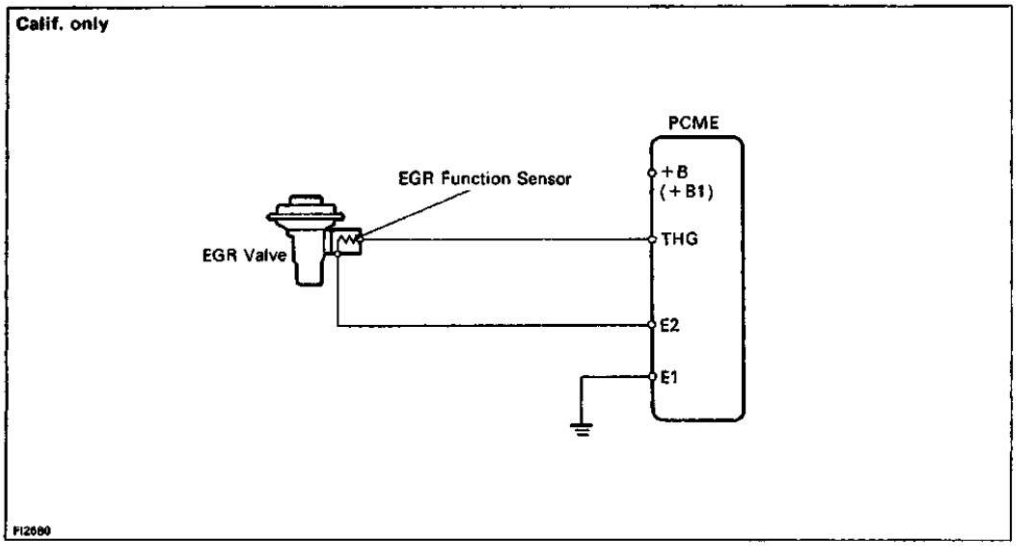
Check operation of oxygen sensor.
- OK → System normal
- BAD

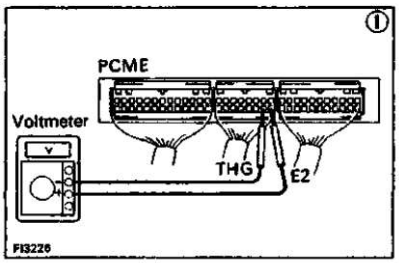
Check wiring between oxygen sensor and PCME connectors.
- BAD → Repair wiring.
- OK

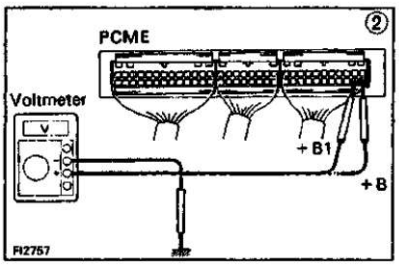
Replace oxygen sensor.

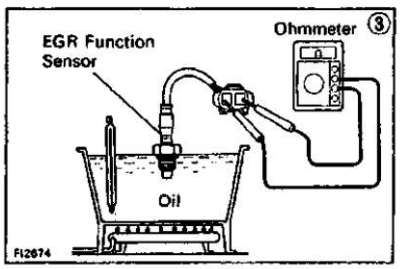
* Rich malfunction only

V00909









① There is no voltage between PCME terminals THG and E2. (IG SW ON)

② Check that there is voltage between PCME terminal + B or + 81 and body ground. (IG SW ON)

OK → Check wiring between PCME terminal E1 and body ground.

NO → Refer to No.1. (See page EG1–296)

OK → Check EGR system (See page EG1–243)

BAD → Repair or replace.

OK → ③ Check EGR function sensor. (See page EG1–402)

BAD → Replace EGR function sensor.

OK → Check wiring between PCME and EG R function sensor.

OK → Try another PCME.

BAD → Repair or replace.

V00910

TROUBLESHOOTING

You will find the source of the trouble more easily by correctly using the table shown below. In this table, each number shows the order of priority of the causes of the trouble. Check each part in the order shown. If nesessary, replace the part.

	See page	IG–4	IG–4	EG1–310 EG1–403	EG1–303	EG1–302	EG1–300	EG1–298	EG1–304	–	–	EG1–312 EG1–382	EG1–335	EG1–355	EG1–340	EG1–329	EG1–369	EG1–374
	Suspect area	RPM Signal Circuit	Ignition Circuit	Oxygen Sensor Circuit	ECTS Circuit	Intake Air Temp. Sensor Circuit	Air Flow Sensor Circuit	Throttle Position Sensor Circuit	STA Signal Circuit	Knock Sensor Circuit	A/C Signal Circuit	Fuel Pump and Relay	Fuel Pressure Regulator	Fuel Lines	Injectors	Cold Start Injector System	IACV	MPI Main Relay
Symptom																		
Dose not Start	Engine does not crank																	
	Starter runs – engine does not crank																	
	No initial combusion	13	3				6					7				14	9	4
	No complete combusion				5		2						4		10	11	3	
Difficult to start	Engine cranks slowly										2							
	Difficult to start normally	13	14		5	15						8	7	9	18	19	4	
	Difficult to start in clod				1	7			2			9	8	10	11	6	5	
	Difficult to start in hot				1	5						8	7	9	10	6	4	
Poor idling	Incorrect first idle				2												3	
	High engine idle speed				2	4		5			6				7	8	3	
	Low engine idle speed				1		4								5		2	
	Rough idling		20		3		14					9	8	10	18	19	11	
	Misfire		5		8		10								11	12		
Poor drivability	Hesitation Poor acceleration			14	12	13	11	10				16	15	17	20	21		
	Backfire			7	4	8	6	5				10	9	11	12			
	Muffler explosion (after fire)			8	3	7	5	6					4		9	10		
	Surging												2		6			
	Knocking									1								
Engine stall	Engine stall soon after starting				9		8					4	3	5	10	11	7	
	After acceleration pedal depressed						1	3					5	6	7			
	After acceleration pedal released						3										1	
	During A/C operation										1						2	
Others	Poor fuel economy			20	16	21	18	17			19				14	15		
	Engine overheat									9								
	Engine overcool																	
	Excessive oil consumption																	
	Low oil pressure																	
	High oil pressure																	
	Starter keeps running																	
	Battery often discharge																	

HINT; When inspecting a wire harness or circuit, the electrical wiring diagrams at the end of volume 2 of repair manual should be referred to and the circuits of related systems also should be checked.

V00971

	See page	EG1–62	EG1–48	EG1–437	EG1–94	EG1–485	EG1–149	EG1–152	EG1–93	EG1–161	–	EG1–433	EG1–431	CH–6	EG1–417	BE–1	CH–10	EG1–156
	Suspect area	Valve Timing	Timing Belt	Water Pump	Valve Stem Guide Bushing	Oil Pump	Connecting Rod Bearing	Crankshaft Bearing	Cylinder Head	Piston Ring	Flywheel	Radiator and Radiator Cap	Thermostat	Drive Belt	Engine Coolant and Sender Gauge	Oil Pressure Switch	Alternator	Cylinder Block
	Symptom																	
Dose not sta rt	Engine does not crank																	
	Starter runs – engine does not crank										2							
	No initial combusion	11	12															
	No complete combusion	8	9							7								
Difficult to start	Engine cranks slowly						3	4										
	Difficult to start normally	12								11								
	Difficult to start in clod																	
	Difficult to start in hot																	
Poor idling	Incorrect first idle																	
	High engine idle speed																	
	Low engine idle speed																	
	Rough idling	16	17						22	13								
	Misfire																	
Poor drivability	Hesitation Poor acceleration	19																
	Backfire	3																
	Muffler explosion (after fire)	2																
	Surging																	
	Knocking	5		9								6	8					
Engine stall	Engine stall soon after starting																	
	After acceleration pedal depressed																	
	After acceleration pedal released																	
	During A/C operation																	
Others	Poor fuel economy	13								12								
	Engine overheat	7	5	6		10			11			3	4		13			12
	Engine overcool												2		3			
	Excessive oil consumption				3				6	5								7
	Low oil pressure					2	3	4								5		
	High oil pressure					1										2		
	Starter keeps running																	
	Battery often discharge													1			2	

V00973

																											5			Circuit Opening Relay	EG1–376
							7							1																Fuel Cut System	EG1–411
																													4	Theft Deterrent Control Modele	BE–1
							22	3	4	8	12	10	7	11	13	22	13	21	6	9	4	11	12	20		12	15			PCME	EG1–406
							2				2	2				4	2	2				3	4	2			8			Fuel Quality	–
							1																							Fuel Leakage	–
						1																								Coolant Leakage	–
			1	1																										Oil Leakage	–
	1										1		1		1	1	1	1				2	3	1		1				Vacuum Leakage	–
																													1	Starter Relay.	ST–25
	2																												3	Clutch Start SW	CL–1
																									1			1	2	Starter	ST–5
						8	8			4		3	3			6	4	5						3						Spark Plug	IG–8
							9						4			7	6	6						16			1			Distributor	IG–11
							10						5			8	7	7						17			2			Ignition Coil	IG–11
							6		2	2	6	4			2	5	3	4	3					6						EG R System	EG1–243
				2												23														Turbocharger	EG1–196
							3													1	1									Accelerator Pedal Link	–
							5									3														Brakes Drag Even When Released	–
					1	2						7																		Cooling Fan System	EG1–441
							4									2														Clutch	CL–1
				4			11									9	9	12						10		6	10			Compression	EG1–32
																18		15												Valve Clearance	EG1–16

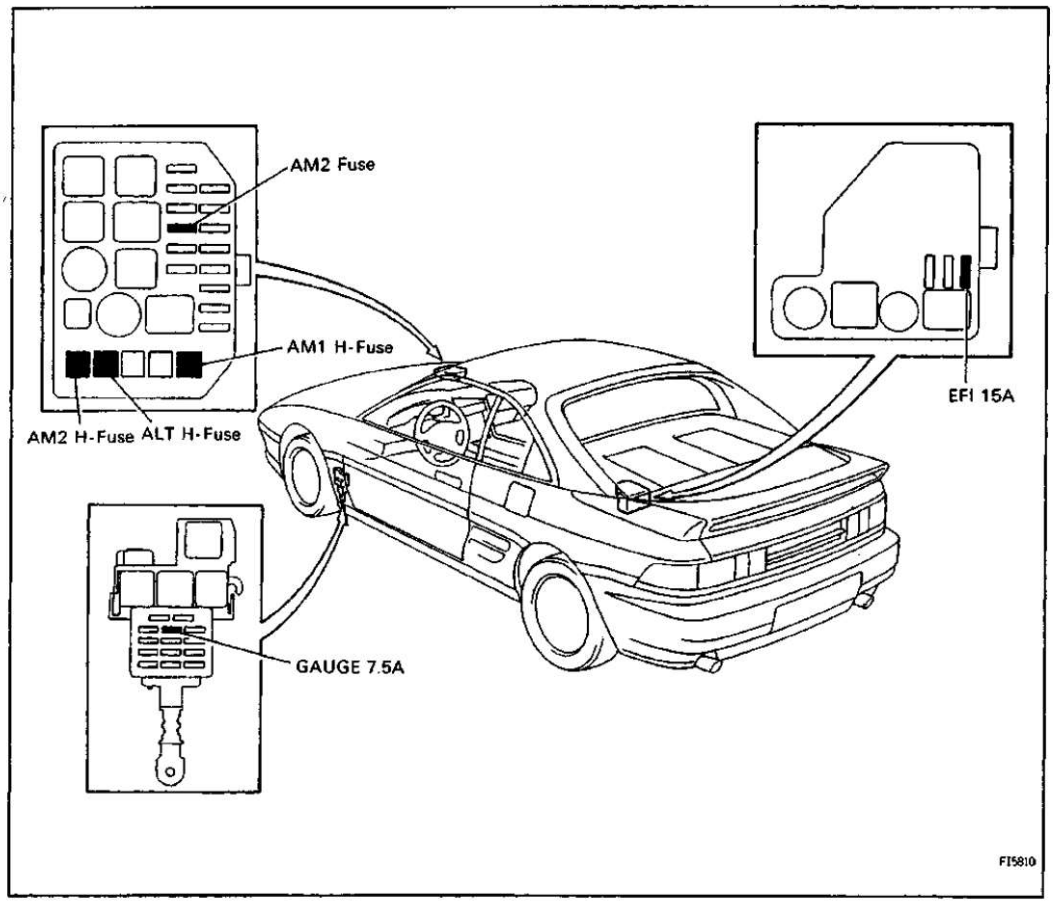
V00972

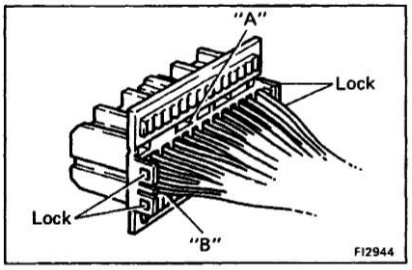
TROUBLESHOOTING WITH VOLT OHMMETER

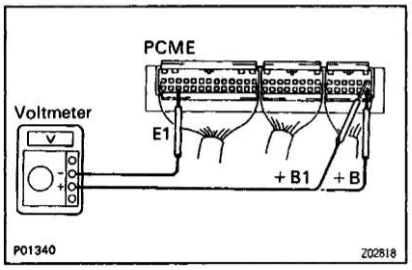
HINT:

- The following troubleshooting procedures are designed for inspection of each separate system, and therefore the actual procedure may vary somewhat. However, troubleshooting should be performed while referring to the inspection methods described in this manual.
- Before beginning inspection, it is best to first make a simple check of the fuses, H–fuses, fusible link and the condition of the connectors.
- The following troubleshooting procedures are based on the supposition that the trouble lies in either a short or open circuit within the computer.
- If engine trouble occurs even though proper operating voltage is detected in the computer connector, then it can be assumed that the PCME(& T) is faulty and should be replaced.

FUSES, H– FUSES AND FUSIBLE LINK LOCATION







MPI SYSTEM CHECK PROCEDURE (M/T)

PREPARATION

(a) Disconnect the connectors from the PCME.

(b) Remove the locks as shown in the illustration so that the tester probe(s) can easily come in.

NOTICE: Pay attention to sections "A' and 'B' in the illustration which can be easily broken.

(c) Reconnect the connectors to the PCME.

HINT:

- Perform all voltage measurements with the con–nectors connected.
- Verify that the battery voltage is 11 V or more when the ignition switch is in the "ON" position.

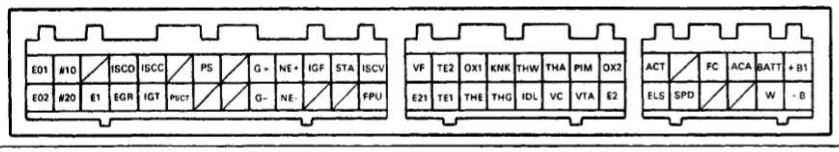
Using a voltmeter with high impedance (10 kΩ/V minimum), measure the voltage at each terminal of the wiring connectors.

PCME Terminals (M/T)

Symbol	Terminal Name	Symbol	Terminal Name	Symbol	Terminal Name
E01	POWER GROUND	NE +	DISTRIBUTOR	THA	INTAKE AIR TEMP. SENSOR
E02	POWER GROUND	NE –	DISTRIBUTOR	VC	MAP THROTTLE POSITION SENSOR
#10	INJECTOR	IGF	IGNITER	PIM	MAP
#20	INJECTOR		–	VTA	THROTTLE POSITION SENSOR
	–	STA	STARTER RELAY	*OX2	SUB–OXYGEN SENSOR
E1	ENGINE GROUND		–	E2	SENSOR GROUND
ISCO	IDLE AIR CONTROL VALVE	ISCV	A/C IDLE–UP VSV	ACT	A/C AMPLIFIER
EGR	EG R VSV	FPU	FUEL PRESSURE VSV	ELS	TAILLIGHT RELAY DEFOGGER SWITCH
ISCC	IDLE AIR CONTROL VALVE	VF	DLC1		
IGT	IGNITER	E21	SENSOR GROUND	SPD	VSPG
	–	TE2	DLC1	FC	CIRCUIT OPENING RELAY
	–	TE1	DLC1		–
PSCT	PS CONTROL MODULE	OX1	MAIN OXYGEN SENSOR	ACA	A/C AMPLIFIER
PS	PS CONTROL MODULE	THE	EVAPORATOR TEMP. SENSOR		–
	–	KNK	KNOCK SENSOR	BATT	BATTERY
	DISTRIBUTOR	*THG	EGR FUNCTION SENSOR	W	WARNING LIGHT
G +		THW	ECTS	+B1	MPI MAIN RELAY
G –	DISTRIBUTOR	IDL	THROTTLE POSITION SENSOR	+B	MPI MAIN RELAY

PCME Terminals

*Calif. only

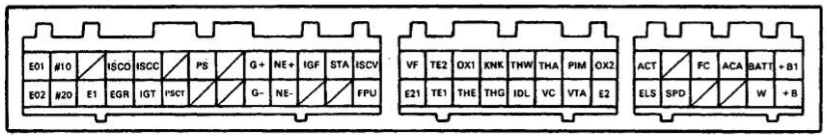


V00947

PCME Wiring Connectors Voltage (M/T)

No.	Terminals	Condition		STD voltage (V)	See page
1	+B + B1 – E1	IG SW ON		9 – 14	EG2–220
2	BATT – E1	–		9 – 14	EG2–221
3	IDL – E2	IG SW ON	Throttle valve open	9 – 14	EG2–222
	VC – E2		–	4.5 – 5.5	
	VTA – E2		Throttle valve fully closed (Throttle opener must be cancelled first)	0.3 – 0.8	
			Throttle valve fully open	3.2 – 4.9	
4	PIM – E2	IG SW ON		3.3 – 3.9	EG2–224
	VC – E2			4.5 – 5.5	
5	#10 – E01 #20 – E02			9 – 14	EG2–225
6	THA – E2	IG SW ON	Intake air temp. 20°C (68°F)	0.5 – 3.4	EG2–226
7	THW – E2		Coolant temp. 80°C (176°F)	0.2 – 1.0	EG2–227
8	STA – E1	Cranking		6 or more	EG2–228
9	IGT – E1	Idling		Pulse generation	EG2–229
10	ISCO – E1	IG SW ON		8 – 14	EG2–230
11	W – E1	No trouble ("CHECK" engine warning light off) and engine running		9 – 14	EG2–231

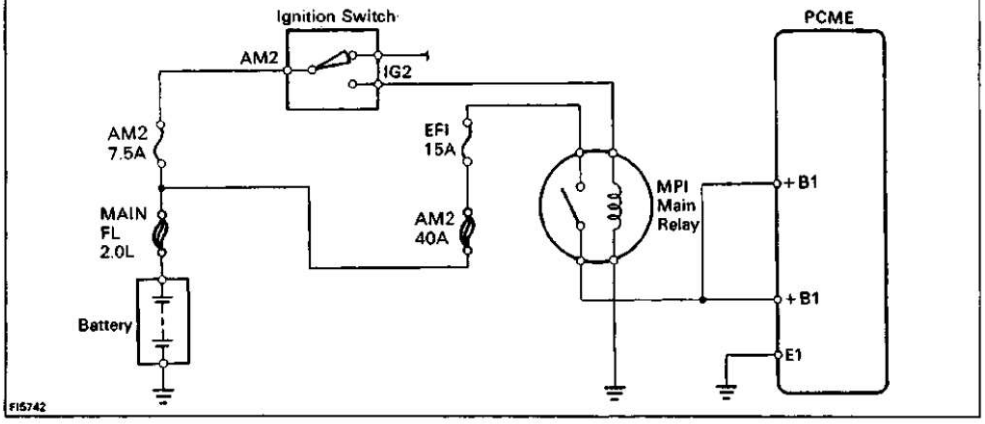
PCME Terminals

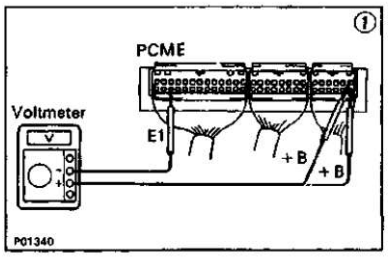


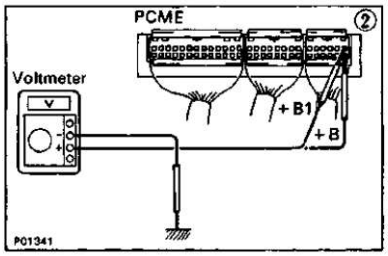
P01821

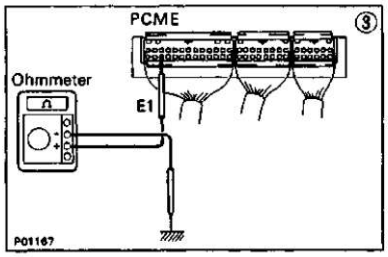
V00918

No.	Terminals	Trouble	Condition	STD voltage
1	+B + B1 –E1	No voltage	IG SW ON	9–14V









(1) There is no voltage between PCME terminals +B or +B1 and E1 **(IG SW ON)**

↓

(2) Check that there is voltage between PCME terminal +B or +B1 and body ground. **(IG SW ON)**

NO → Check wiring between PCME terminal E1 and body ground.

OK → Try another PCME.

BAD → Repair or replace.

OK → Check fuses, H–fuse, fusible link and ignition switch

BAD → Repair or replace.

OK → Check M PI main relay. (See page EG2–302)

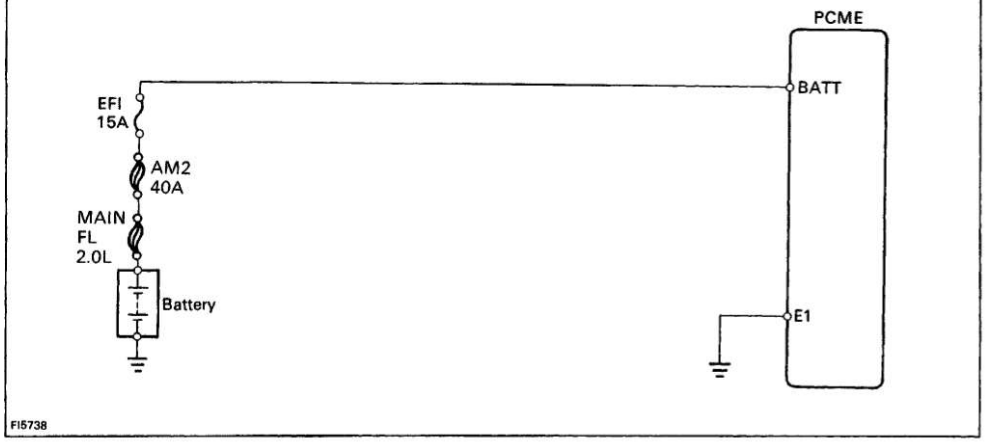
BAD → Replace.

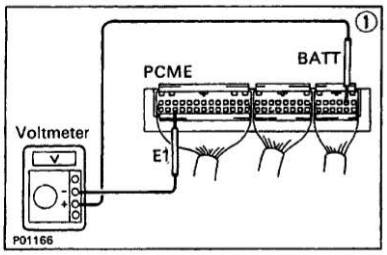
OK → Check wiring between MPI main relay and battery.

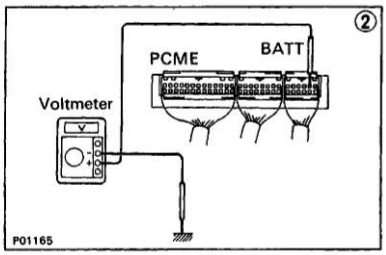
BAD → Repair or replace.

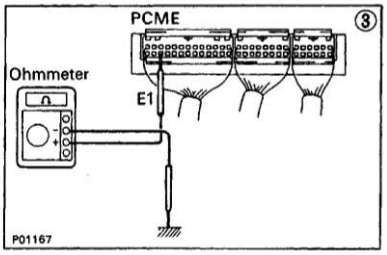
V00919

No.	Terminals	Trouble	Condition	STD voltage
2	BATT – E1	No voltage	–	9 – 14 V









(1) There is no voltage between PCME terminals BATT and E1.

↓

(2) Check that there is voltage between PCME terminal BATT and body ground.

NO → OK

(3) Check wiring between PCME terminal E1 and bodground.

OK → Try another PCME.

BAD → Repair or replace.

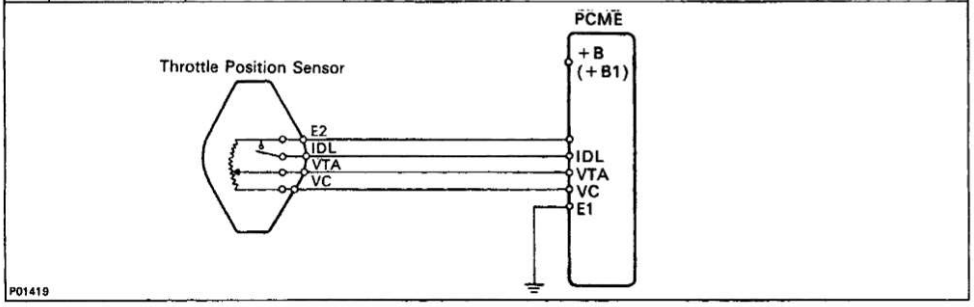
Check fuse, H–fuse and fusible link. BAD → Replace.

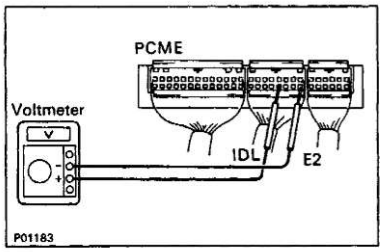
OK

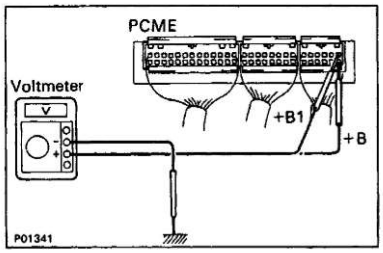
Check wiring between PCME terminal and battery. BAD → Repair or replace.

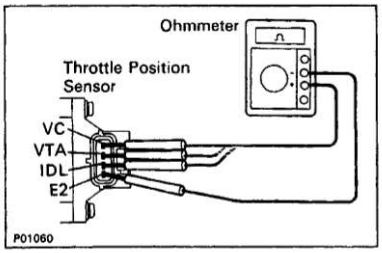
V00920

No.	Terminals	Trouble	Condition		STD voltage
3	ID – E2	No voltage	IG SW ON	Throttle valve open	9 – 14 V
	VC – E2			–	4.5 – 5.5 V
	VTA – E2			Throttle valve fully closed Throttle opener must be cancelled first	0.3 – 0.8 V
				Throttle valve fully open	3.2 – 4.9 V









- **IDL – E2**

(1) There is no voltage between PCME terminals IDL and E2 **(IG SW ON)** (Throttle valve open)

(2) Check that there is voltage between PCME terminal + B (+B1) and body ground. **(IG SW ON)**

NO / OK

Check wiring between PCME terminal E1 and body ground.

OK / BAD

Try another PCME. / Repair or replace.

Refer to No.1. (See page EG2–222) — BAD → Repair or replace.

OK

(3) Check throttle position sensor. (See page EG2–288)

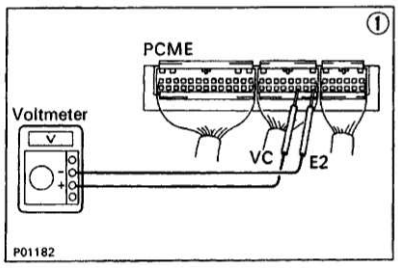
BAD / OK

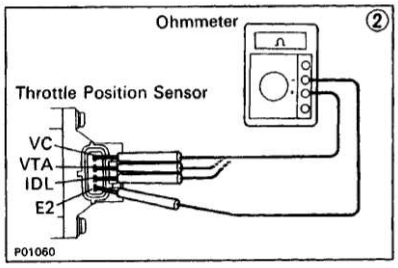
Repair or replace throttle position sensor. / Check wiring between PCME and throttle position sensor.

OK

Try another PCME.

V00921





• **VC–E2**

(1) There is no voltage between PCME terminals VC and E2. **(IG SW ON)**

↓

Check that there is voltage between PCME terminal + B (+B1) and body ground. **(IG SW ON)**

↓ **OK** / **NO** → Refer to No.1. (See page EG2–220)

↓

(2) Check throttle position sensor. (See page EG2–288)

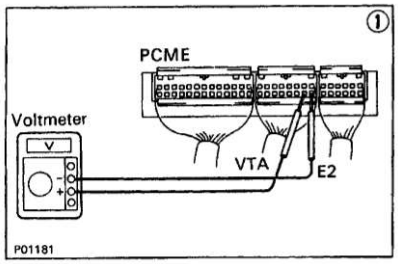
↓ **BAD** → Repair or replace.

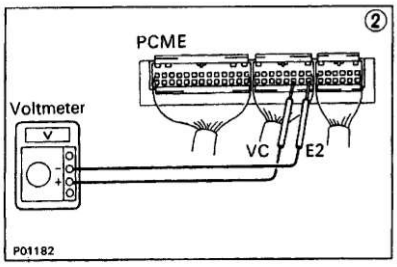
↓ **OK**

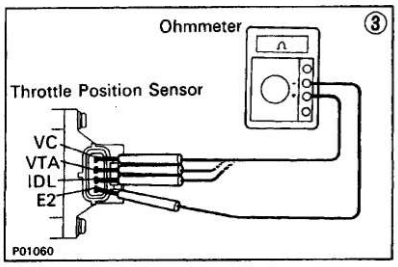
Check wiring between PCME and throttle position sensor.

↓ **OK** → Try another PCME.

↓ **BAD** → Repair or replace wiring.







• **VTA–E2**

(1) There is no specified voltage at PCME terminals VTA and E2. **(IG SW ON)**

↓

(2) Check that there is voltage between PCME terminals VC and E2. **(IG SW ON)**

↓ **NO** → Refer to VC–E2 trouble Section.

↓ **OK**

↓ **OK**

Check throttle position sensor. (See page EG2–288)

↓ **BAD** → Repair or replace.

↓ **OK**

Check wiring between PCME and throttle position sensor.

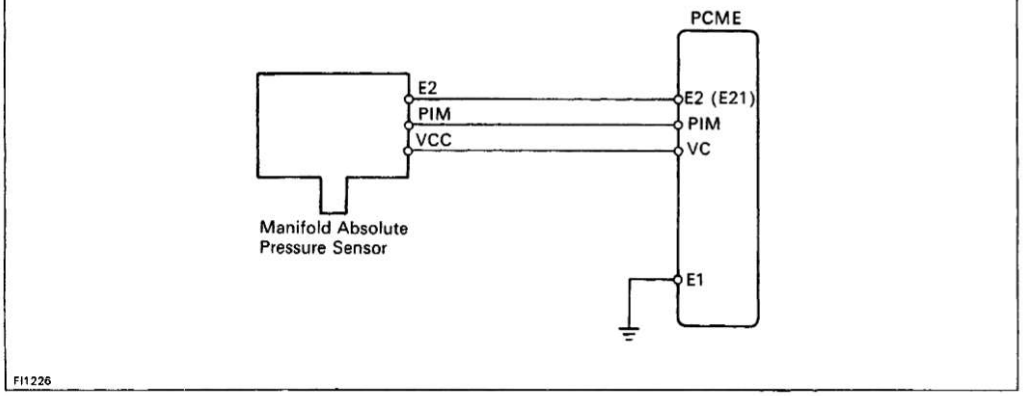
↓ **BAD** → Repair or replace.

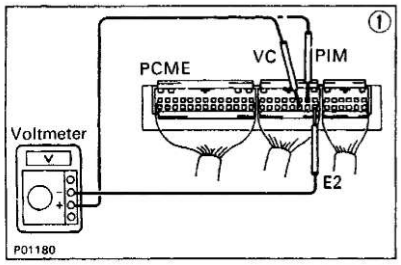
↓ **OK**

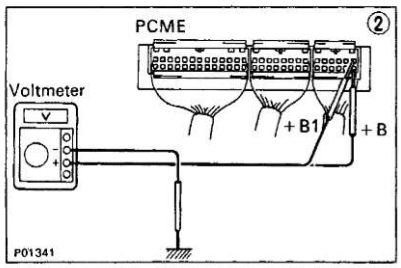
Try another PCME.

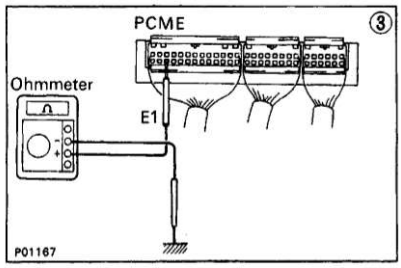
V00922

No.	Terminals	Trouble	Condition	STD voltage
4	PIM – E2	No voltage	IG SW ON	3.3 – 3.9 V
	VC – E2			4.5 – 5.5 V









(1) There is no voltage between PCME terminals PIM or VC and E2. **(IG SW ON)**

↓

(2) Check that there is voltage between PCME terminal + B (+B1) and body ground. **(IG SW ON)**

OK → ↓

NO → Refer to No.1. (See page EG2–220)

↓

(3) Check wiring between PCME terminal E1 and body ground.

OK → ↓

BAD → Repair or replace.

Check manifold absolute pressure sensor. (See page EG2–319)

BAD → Replace manifold absolute pressure sensor.

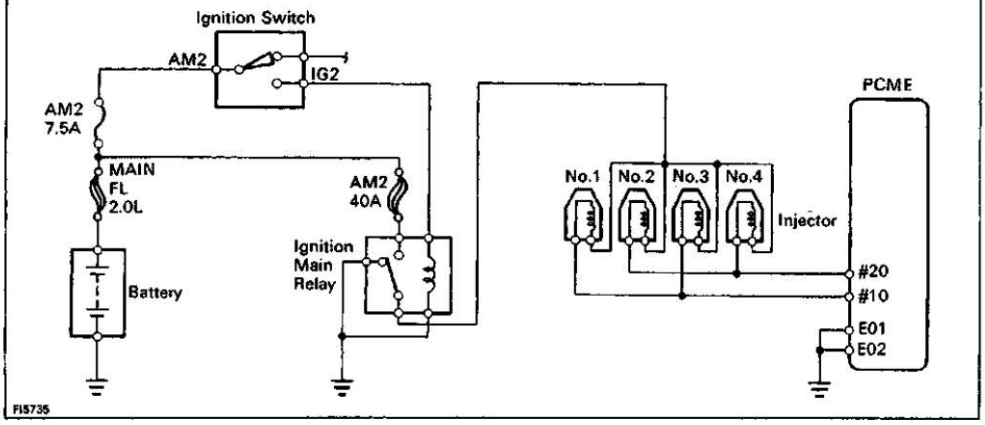
OK → Check wiring between PCME and manifold absolute pressure sensor.

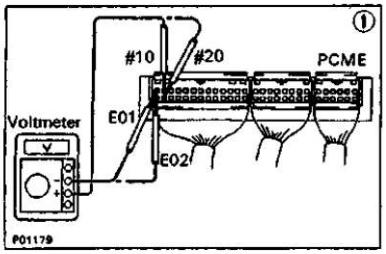
OK → Try another PCME.

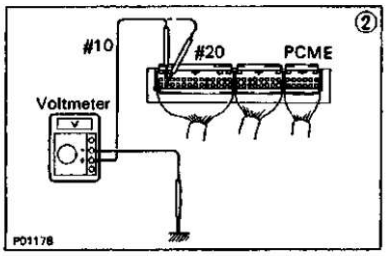
BAD → Repair or replace.

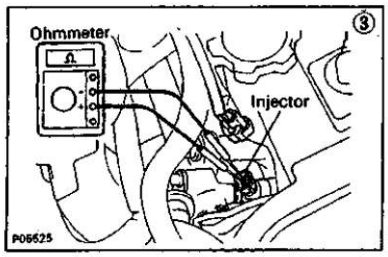
V00923

No.	Terminals	Trouble	Condition	STD voltage
5	#10 – E01 #20 – E02	No voltage	IG SW ON	9 – 14 V









(1) There is no voltage between PCME terminals #10 and/or #20 and E01 and/or E02. **(IG SW ON)**

↓

(2) Check that there is voltage between PCME terminal #10 and/or #20 and body ground.

NO → Check wiring between PCME terminal E01 and/or E02 and body ground.
- OK → Try another PCME.
- BAD → Repair or replace.

OK ↓

Check fuse, H–fuse, fusible link, ignition switch and ignition main relay. BAD → Repair or Replace.

OK ↓

(3) Check resistance of each injector.
STD resistance: Approx. 13.8Ω

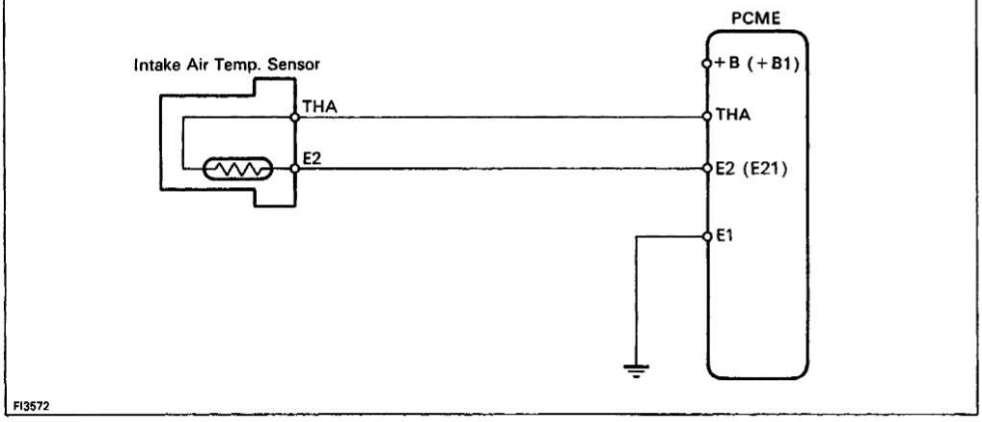
OK ↓

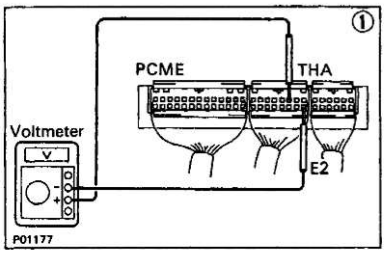
BAD → Replace injector.

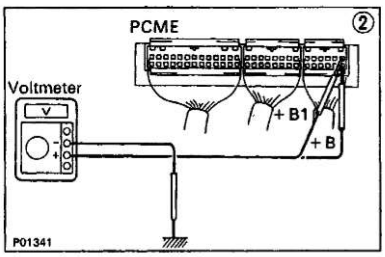
Check wiring between PCME terminal No.10 and/or No.20 and battery. BAD → Repair or replace.

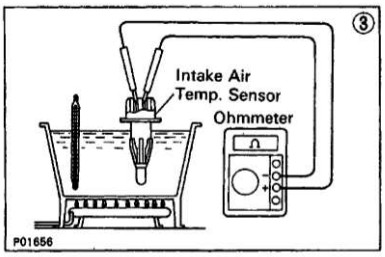
V00924

No.	Terminals	Trouble	Condition		STD voltage
6	THA – E2	No voltage	IG SW ON	Intake air temperature 20°C (68°F)	0.5 – 3.4 V









(1) There is no voltage between PCME terminals THA and E2 **(IG SW ON)**

↓

(2) Check that there is voltage between PCME terminal + B or + B1 and body ground. **(IG SW ON)**

OK ↓ / NO → Refer to No.1. (See page EG2–220)

↓

Check wiring between PCME terminal E1 and body ground.

OK ↓ / BAD → Repair or replace.

↓

(3) Check intake air temp. sensor. (See page EG2–306)

BAD → Replace intake air temp. sensor.

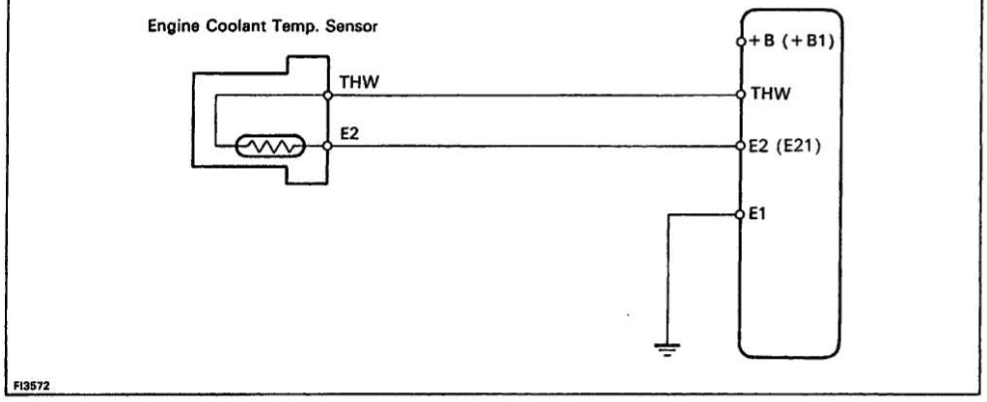
OK → Check wiring between PCME and air temp. sensor.

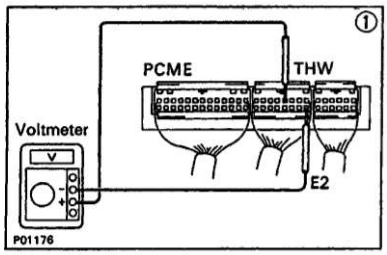
OK ↓ → Try another PCME.

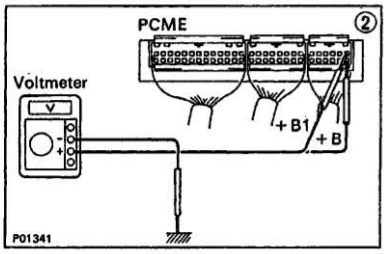
BAD → Repair or replace.

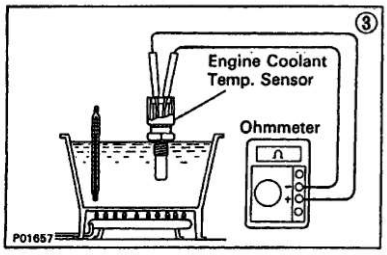
V00925

No.	Terminals	Trouble	Condition		STD voltage
7	THW – E2	No voltage	IG SW ON	Coolant temperature 80°C (176°F)	0.2 – 1.0 V









(1) There is no voltage between PCME terminals THW and E2. **(IG SW ON)**

↓

(2) Check that there is voltage between PCME terminal + B (+B1) and body ground. **(IG SW ON)**

OK → ↓ | **NO** → Refer to No.1. (See page EG2–220)

↓

Check wiring between PCME terminal E1 and body ground.

OK → ↓ | BAD → Repair or replace.

↓

(3)Check engine coolant temp. sensor. (See page EG2–305)

BAD → Repair engine coolant temp. sensor.

OK → ↓

Check wiring between PCME and engine coolant temp. sensor.

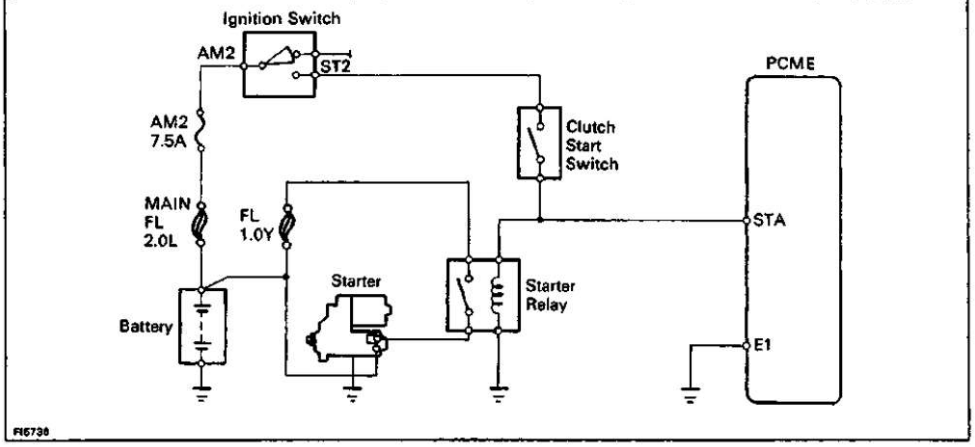
OK → ↓ | BAD → Repair or replace.

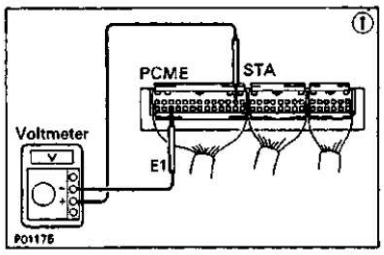
↓

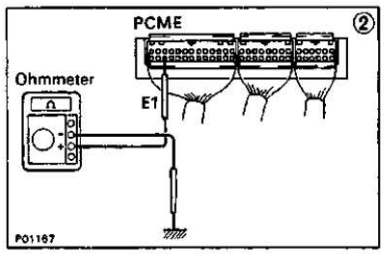
Try another PCME.

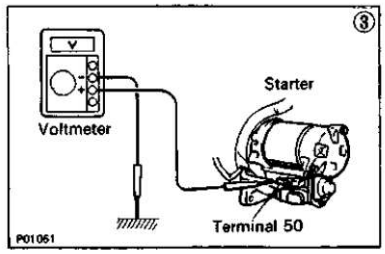
V00926

No.	Terminal	Trouble	Condition	STD voltage
8	STA – E1	No voltage	Cranking	6 V or more









(1) There is no voltage between PCME terminals STA and E1.
(IG SW ON)

Check starter operation. — OK → Check wiring between PCME terminal STA and ignition switch terminal ST2.

Check starter operation. — BAD → Check fuse, H–fuse, fusible link, battery wiring, ignition switch, clutch start switch and starter relay.

Check wiring between PCME terminal STA and ignition switch terminal ST2. — OK → (3) Check wiring between PCME terminal E1 and body ground.

Check wiring between PCME terminal STA and ignition switch terminal ST2. — BAD → Repair or replace.

(3) Check wiring between PCME terminal E1 and body ground. — OK → Try another PCME.

(3) Check wiring between PCME terminal E1 and body ground. — BAD → Repair or replace.

Check fuse, H–fuse, fusible link, battery wiring, ignition switch, clutch start switch and starter relay. — BAD → Repair or replace.

Check fuse, H–fuse, fusible link, battery wiring, ignition switch, clutch start switch and starter relay. — OK →

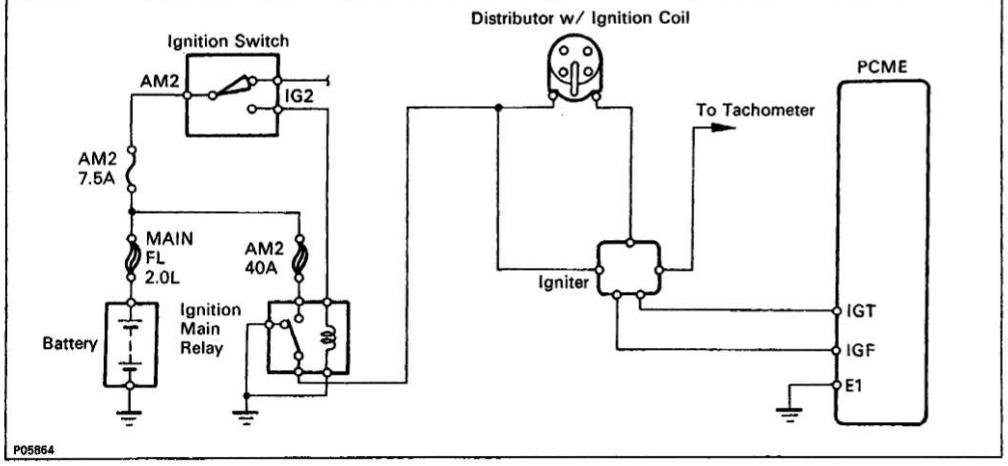
(3) Check that there is voltage at starter terminal 50.
(IG SW START) STD voltage: 6 V or more

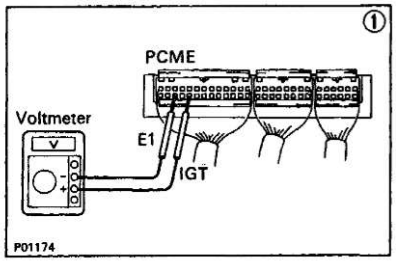
OK → Check starter.

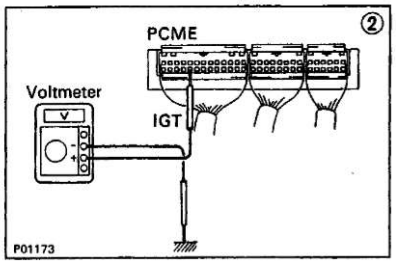
NO → Check wiring between ignition switch terminal ST2 and starter terminal 50.

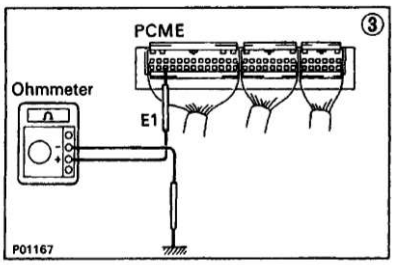
V00927

No.	Terminals	Trouble	Condition	STD voltage
9	IGT – E1	No voltage	Idling	Pulse generation









(1) There is no voltage between PCME terminals IGT and E1. **(Idling)**

↓

(2) Check that there is voltage between PCME terminal IGT and body ground. **(Idling)**

NO → **OK**

(3) Check wiring between PCME terminal E1 and body ground. — **BAD** → Repair or Replace.

OK →

Try another PCME.

Check fuse, H–fuse, fusible link, ignition switch and ignition main relay. — **BAD** → Repair or replace.

OK →

Check distributor. (See IG section) — **BAD** → Repair or replace.

OK →

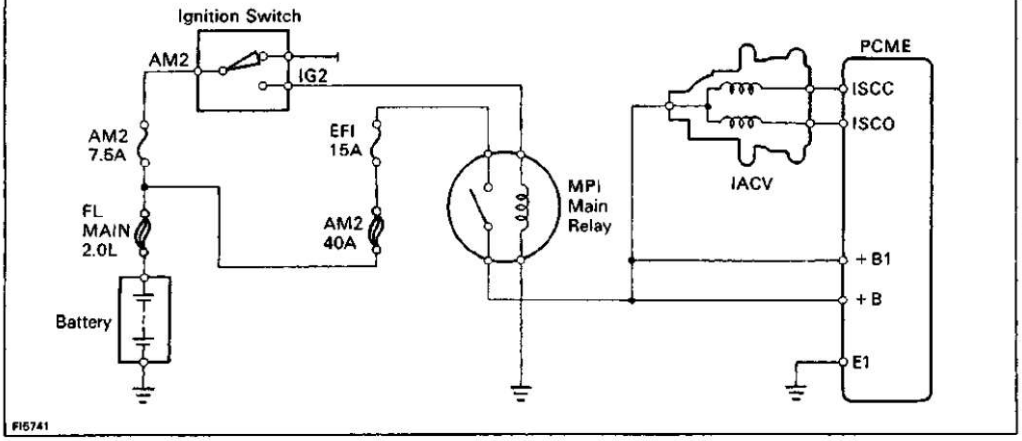
Check wiring between PCME and battery — **BAD** → Repair or replace.

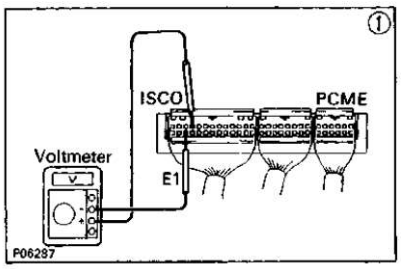
OK →

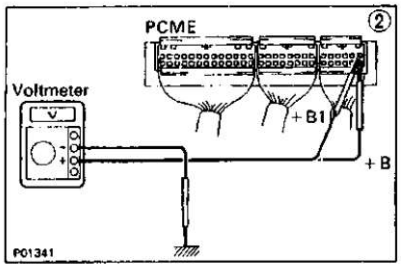
Check igniter. (See IG section) — **BAD** → Repair or replace.

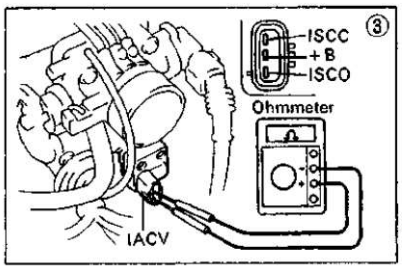
V00928

No.	Terminals	Trouble	Condition	STD voltage
10	ISCO – E1	No voltage	IG SW ON	9 – 14 V









(1) There is no voltage between PCME terminals ISCO and E1. **(IG SW ON)**

↓

(2) Check that there is voltage between PCME terminal + B or + B1 and body ground. **(IG SW ON)**

OK ↓

NO → Refer to No.1. (See page EG2–220)

↓

(3) Check resistance between IACV terminals + B and ISCC or ISCO. **STD resistance: 19.3 – 22.3Ω** — BAD → Replace IACV.

OK ↓

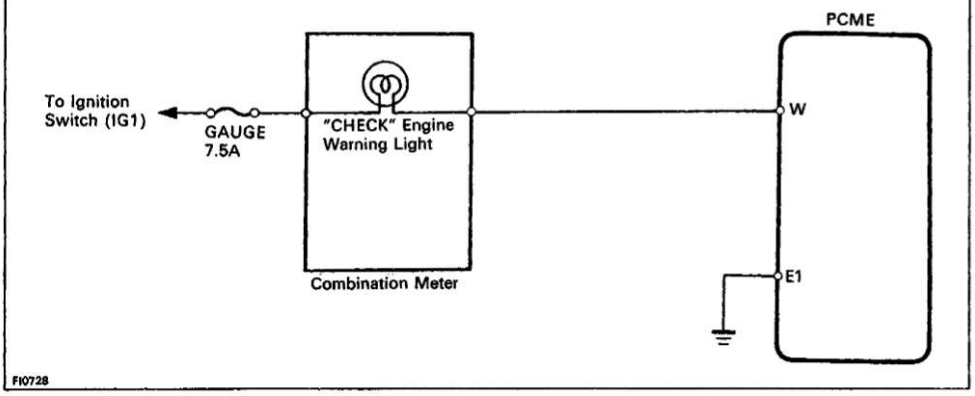
Check wiring between PCME and IACV. — BAD → Repair or replace wiring.

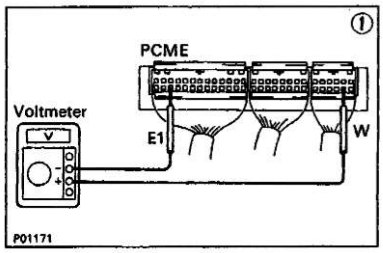
OK ↓

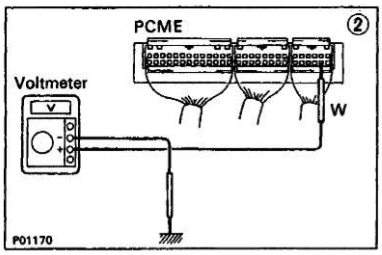
Try another PCME.

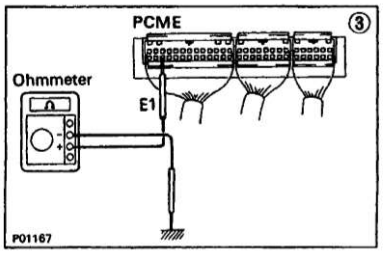
V00929

No.	Terminals	Trouble	Condition	STD voltage
11	W – E1	No voltage	No trouble ("CHECK" engine warning light off) and engine running.	9–14V









(1) There is no voltage between PCME terminals W and E1. (Idling)

(2) Check that there is voltage between PCME terminal W and body ground.

NO

OK

(3) Check wiring between PCME terminal E1 and body ground.

OK

BAD

Try another PCME.

Repair or replace.

Check fuse GAUGE (7.5A) and check engine warning light.

OK

BAD

Repair or replace.

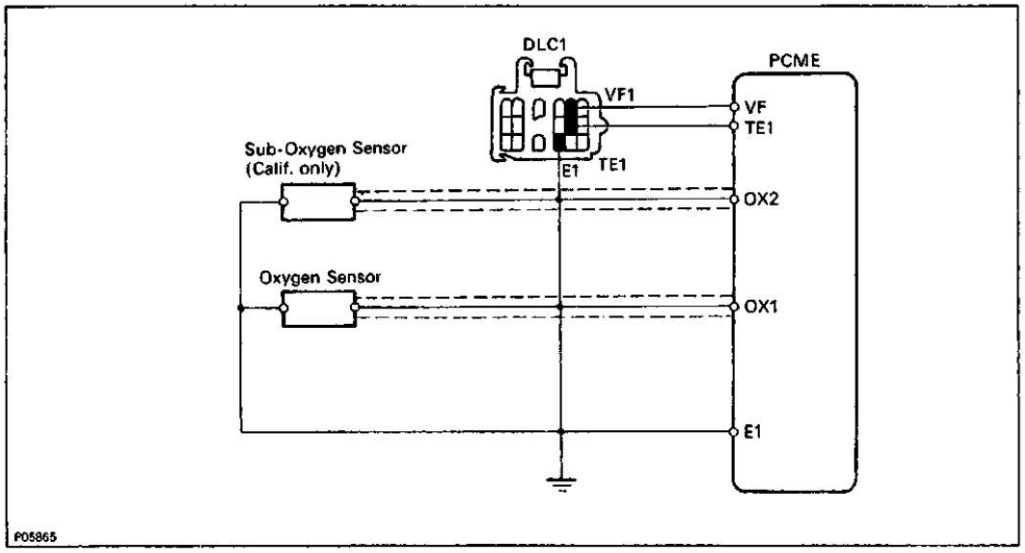
Fuse blows again

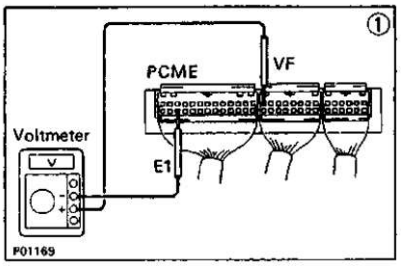
Check wiring between PCME terminal W and fuse.

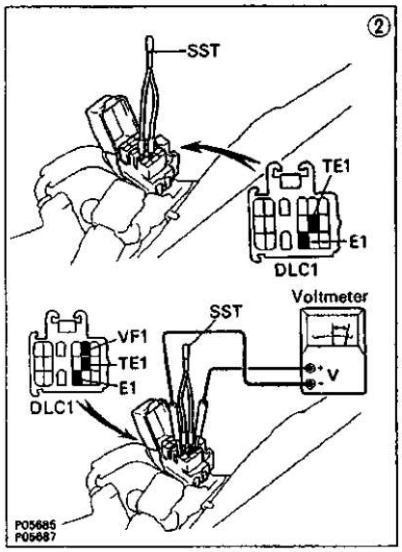
BAD

Repair or replace.

V00930







(1) There is no voltage between PCME terminals VF and E1.

Check that there is specified between PCME terminal VF and body ground.

NO → Check wiring between PCME terminal E1 and body ground.
- OK → Try another PCME.
- BAD → Repair or replace.

Check for suction of air into exhaust system.
- BAD → Repair air suction.
- OK ↓

Check for air leak from air intake system.
- BAD → Repair air leak.
- OK ↓

Check spark plugs.
- BAD → Repair or replace.
- OK ↓

Check distributor w/ ignition coil and ignition system.
- BAD → Repair or replace.
- OK ↓

Check fuel pressure.
- BAD → Repair or replace.
- OK ↓

Check injectors.
- BAD → Repair or replace.
- OK ↓

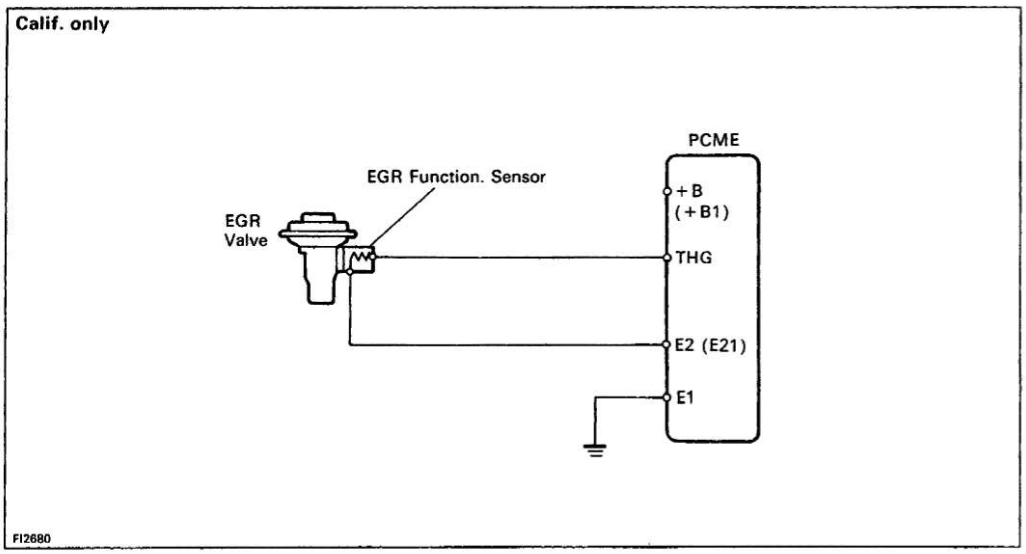
Check manifold absolute pressure sensor.
- BAD → Repair or replace.
- OK ↓

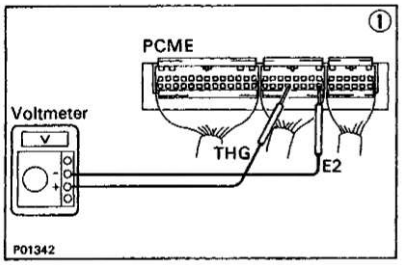
Check operation of oxygen sensors.
- OK → System normal.
- BAD ↓

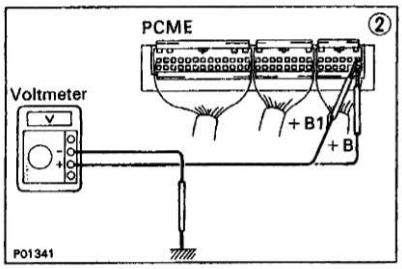
Check wiring between oxygen sensors and PCME connectors.
- BAD → Repair wiring.
- OK ↓

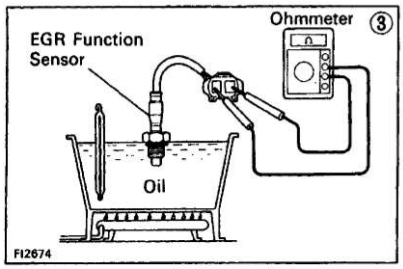
Repair oxygen sensors.

V00931









(1) There is no voltage between PCME terminals THG and E2. **(IG SW ON)**

(2) Check that there is voltage between PCME terminal + B or + B1 and body ground. **(IG SW ON)**

OK → (3) Check EGR function sensor. (See page EG2–321)

NO → Refer to No.1 (See page EG2–220)

Check wiring between PCME terminal E1 and body ground.

OK → Check EGR system. (See page EG2–173)

BAD → Repair or replace

BAD → Repair or replace

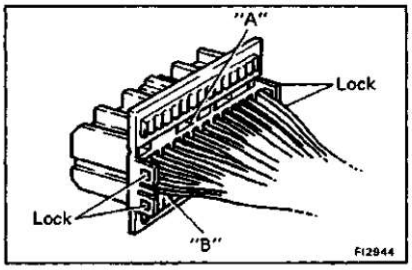
OK → Check wiring between PCME and EGR function sensor.

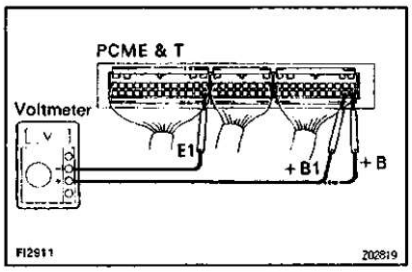
BAD → Repair or replace.

OK → Try another PCME.

BAD → Replace EGR function sensor.

V00932





SYSTEM CHECK PROCEDURE (A/T)

PREPARATION

(a) Disconnect the connectors from the PCME&T.

(b) Remove the locks as shown in the illustration so that the tester probe(s) can easily come in.

NOTICE: Pay attention to sections 'A' and 'B' in the illustration which can be easily broken.

(e) Reconnect the connectors to the PCME&T.

HINT:

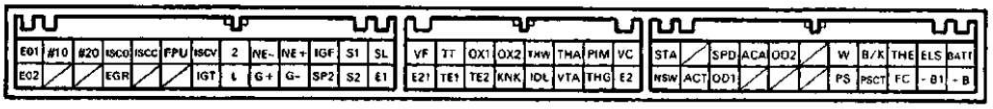
- Perform all voltage measurements with the con–nectors connected.
- Verify that the battery voltage is 1 1 V or more when the ignition switch is in the "ON" position.

Using a voltmeter with high impedance (10 kΩ/V minimum), measure the voltage at each terminal of the wiring connectors.

PCME & T Terminals (A/T)

Symbol	Terminal Name	Symbol	Terminal Name	Symbol	Terminal Name
E01	POWER GROUND	S1	ECT SOLENOID		–
E02	POWER GROUND	S2	ECT SOLENOID	ACT	A/C AMPLIFIER
#10	INJECTOR	SL	ECT SOLENOID	SP1	VSPG
	–	E1	ENGINE GROUND	OD1	OD OFF SWITCH
#20	INJECTOR	VF	DLC1	ACA	A/C AMPLIFIER
	–	E21	SENSOR GROUND		
ISCO	IDLE AIR CONTROL VALVE	TT	DLC1	OD2	OD MAIN SWITCH
EGR	EG R VSV	TE1	DLC1		–
ISCC	IDLE AIR CONTROL VALVE	OX1	OXYGEN SENSOR		
	–	TE2	DLC1		–
FPU	FUEL PRESSURE VSV	*OX2	SUB–OXYGEN SENSOR	W	WARNING LIGHT
	–	KNK	KNOCK SENSOR	PS	PS CONTROL MODULE
ISCV	A/C IDLE–UP VSV	THW	ECTS	B/K	STOP LIGHT SWITCH
IGT	IGNITER	IDL	THROTTLE POSITION SENSOR	PSCT	PS CONTROL MODULE
2	PARK/NEUTRAL SWITCH	THA	INTAKE AIR TEMP.SENSOR	THE	EVAPORATOR TEMP. SENSOR
L	PARK/NEUTRAL SWITCH	VTA	THROTTLE POSITION SENSOR	FC	CIRCUIT OPENING RELAY
NE–	DISTRIBUTOR	PIM	MAP	ELS	TAILLIGHT RELAY DEFOGGER SWITCH
G+	DISTRIBUTOR	*THG	EGR FUNCTION SENSOR	+B	MPI MAIN RELAY
NE+	DISTRIBUTOR	VC	MAP THROTTLE POSITION SENSOR	BATT	BATTERY
G–	DISTRIBUTOR	E2	SENSOR GROUND	+B1	MPI MAIN RELAY
IGF	IGNITER	STA	STARTER SWITCH	* Calif. only	
SP2	VSPG	NSW	PARK/NEUTRAL SWITCH		

PCME & T Terminals



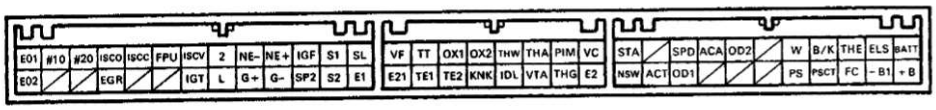
FI2796

V00945

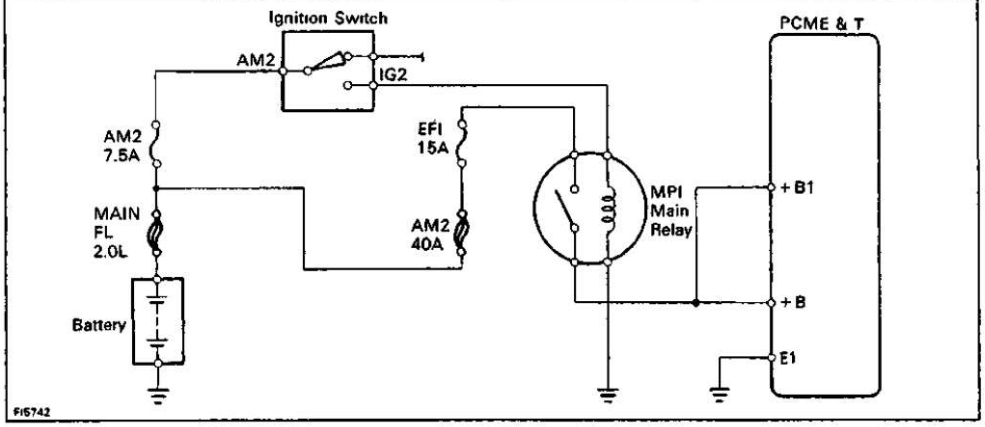
PCME & T Wiring Connectors Voltage (A/T)

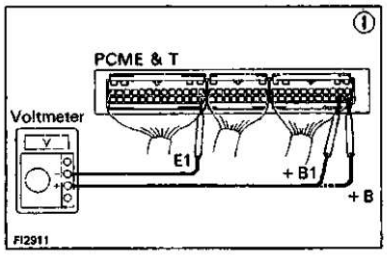
No.	Terminals	Condition		STD voltage (V)	See page
1	+B, +B1 – E1	IG SW ON		9 – 14	EG2–236
2	BATT – E1	—		9 – 14	EG2–237
3	IDL – E2	IG SW ON	Throttle valve open	9 – 14	EG2–238
	VC – E2		—	4.5 – 5.5	
	VTA – E2		Throttle valve fully closed (Throttle opener must be cancelled first)	0.3 – 0.8	
			Throttle valve fully open	3.2 – 4.9	
4	PIM – E2	IG SW ON		3.3 – 3.9	EG2–240
	VC – E2			4.5 – 5.5	
5	#10, #20 – E01, E02			9 – 14	EG2–241
6	THA – E2	IG SW ON	Intake air temp. 20°C (68°F)	0.5 – 3.4	EG2–242
7	THW – E2		Coolant temp. 80°C (176°F)	0.2 – 1.0	EG2–243
8	STA – E1	Cranking		6 or more	EG2–244
9	IGT – E1	Idling		Pulse generation	EG2–245
10	ISCO – E1	IG SW ON		9 – 14	EG2–246
11	W – E1	No trouble ("CHECK" engine warning light off) and engine running		9 – 14	EG2–247

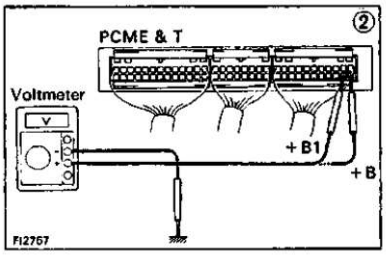
PCME & T Terminals

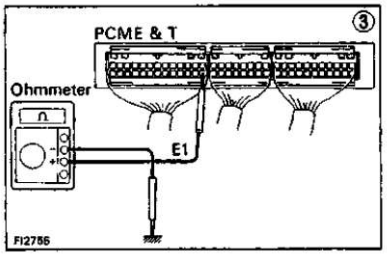


No.	Terminals	Trouble	Condition	STD voltage
1	+B +B1 – E1	No voltage	IG SW ON	9 – 14 V









(1) There is no voltage between PCME & T terminals +B or +B1 and E1. **(IG SW ON)**

(2) Check that there is voltage between PCME & T terminal + B or +B1 and body ground. **(IG SW ON)**

NO → OK

(3) Check wiring between PCME & T terminal E1 and body ground.

OK → Try another PCME & T.

BAD → Repair or replace.

Check fuses, H–fuse, fusible link and ignition switch. BAD → Repair or replace.

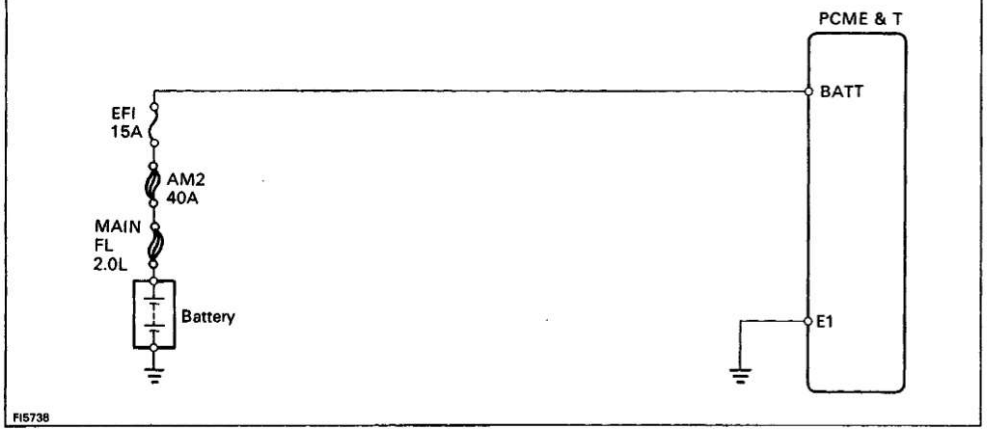
OK

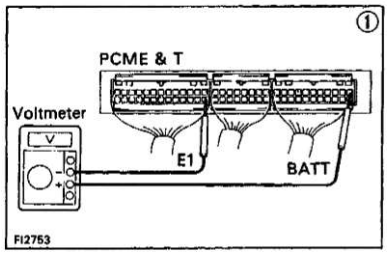
Check MPI main relay. (See page EG2–302) BAD → Replace.

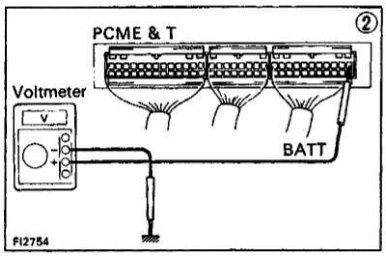
OK

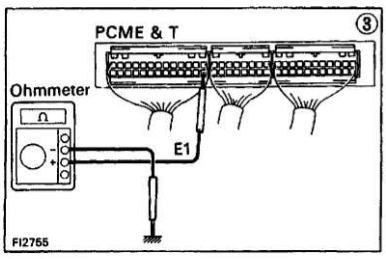
Check wiring between MPI main relay and battery. BAD → Repair or replace.

No.	Terminals	Trouble	Condition	STD voltage
2	BATT – E1	No voltage	–	9 – 14 V









(1) There is no voltage between PCME & T terminals BATT and E1.

↓

(2) Check that there is voltage between PCME & T terminal BATT and body ground.

NO → ↓ OK

(3) Check wiring between PCME & T terminal E1 and body ground.

↓ OK → Try another PCME & T.

↓ BAD → Repair or replace.

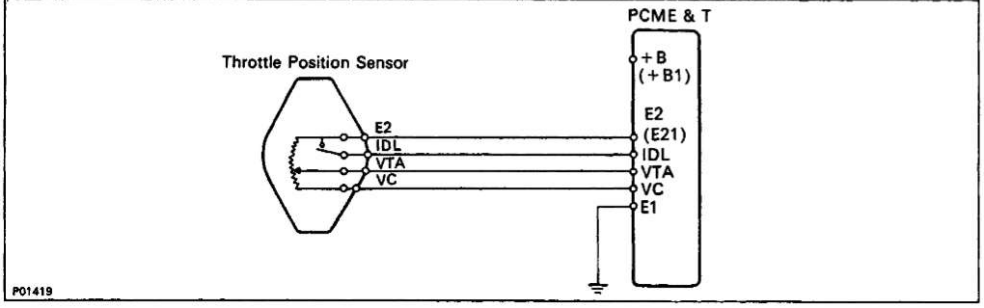
Check fuse, H–fuse and fusible link. → BAD → Replace.

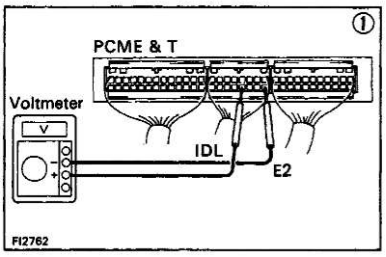
↓ OK

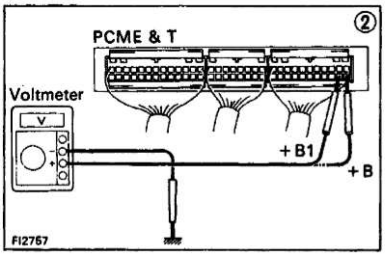
Check wiring between PCME & T terminal and battery. → BAD → Repair or replace.

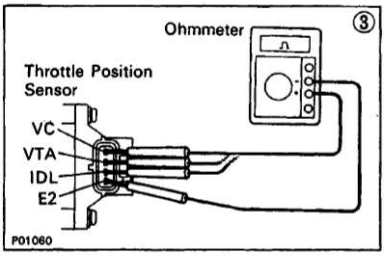
V00950

No.	Terminals	Trouble	Condition		STD voltage
3	IDL – E2	No voltage	IG SW ON	Throttle valve open	9 – 14 V
	VC – E2			–	4.5 – 5.5 V
	VTA – E2			Throttle valve fully closed Throttle opener must be .(cancelled first	0.3 – 0.8 V
				Throttle valve fully open	3.2 – 4.9 V









- **IDL– E2**

(1) There is no voltage between PCME & T terminals IDL and E2. **(IG SW ON)** (Throttle valve open)

(2) Check that there is voltage between PCME & T terminal + B (+B1) and body ground. **(IG SW ON)**

NO → OK

Check wiring between PCME & T terminal E1 and body ground.

OK → Try another PCME & T.

BAD → Repair or replace.

Refer to No.1. (See page EG2–236) → BAD → Repair or replace.

OK

(3) Check throttle position sensor. (See page EG2–288)

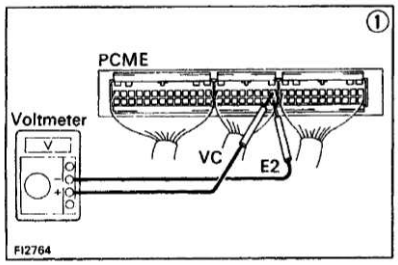
BAD → Repair or replace throttle position sensor.

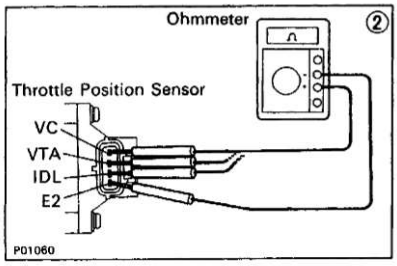
OK → Check wiring between PCME & T and throttle position sensor.

OK → Try another PCME & T.

BAD → Repair or replace.

V00935





- **VC–E2**

(1) There is no voltage between PCME & T terminals VC and E2. **(IG SW ON)**

↓

Check that there is voltage between PCME & T terminal + B (+ B1) and body ground. **(IG SW ON)**

↓ **OK** / **NO** → Refer to No–1 (See page EG2–236)

↓

(2) Check throttle position sensor. (See page EG2–288)

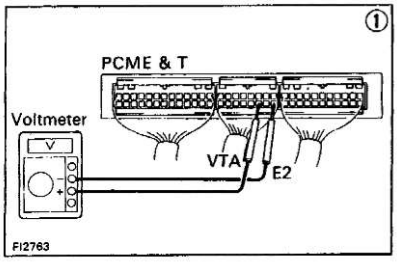
↓ BAD → Repair or replace.

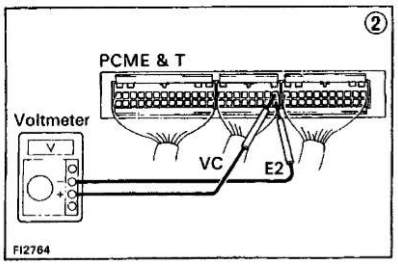
↓ **OK**

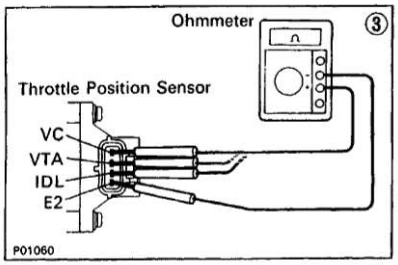
Check wiring between PCME & T and throttle position sensor.

↓ **OK** → Try another PCME & T.

↓ BAD → Repair or replace wiring







- **VTA – E2**

(1) There is no specified voltage at PCME & T terminals VTA and E2. **(IG SW ON)**

↓

(2) Check that there is voltage between PCME & T terminals VC and E2. **(IG SW ON)**

↓ **NO** → Refer to VC–E2 trouble section.

↓ **OK**

↓ **OK**

(3) Check throttle position sensor. (See page EG2–288)

↓ BAD → Repair or replace.

↓ **OK**

Check wiring between PCME & T and throttle position sensor.

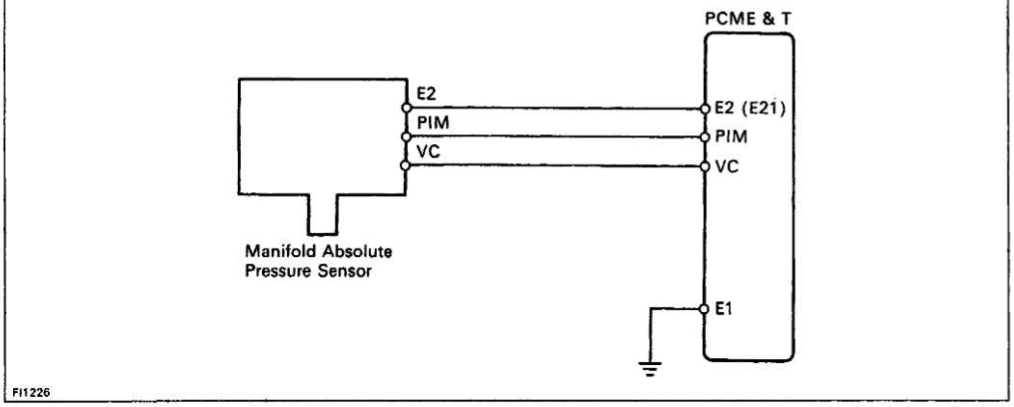
↓ BAD → Repair or replace.

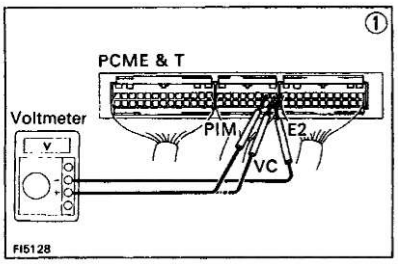
↓ **OK**

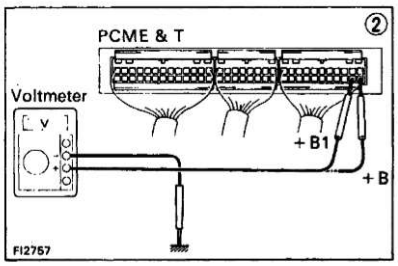
Try another PCME & T.

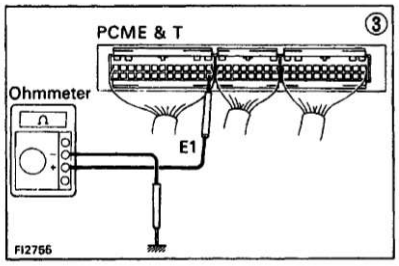
V00936

No.	Terminals	Trouble	Condition	STD voltage
4	PIM – E2	No voltage	IG SW ON	3.3 – 3.9 V
	VC – E2			4.5 – 5.5 V









(1) There is no voltage between PCME & T terminals PIM or VC and E2. **(IG SW ON)**

↓

(2) Check that there is voltage between PCME & T terminal + B (+ B1) and body ground. **(IG SW ON)**

OK → ↓

NO → Refer to No.1 (See page EG2–236)

↓

(3) Check wiring between PCME & T terminal E1 and body ground.

OK → ↓

BAD → Repair or replace.

Check manifold absolute pressure (See page EG2–319)

BAD → Replace manifold absolute pressure sensor.

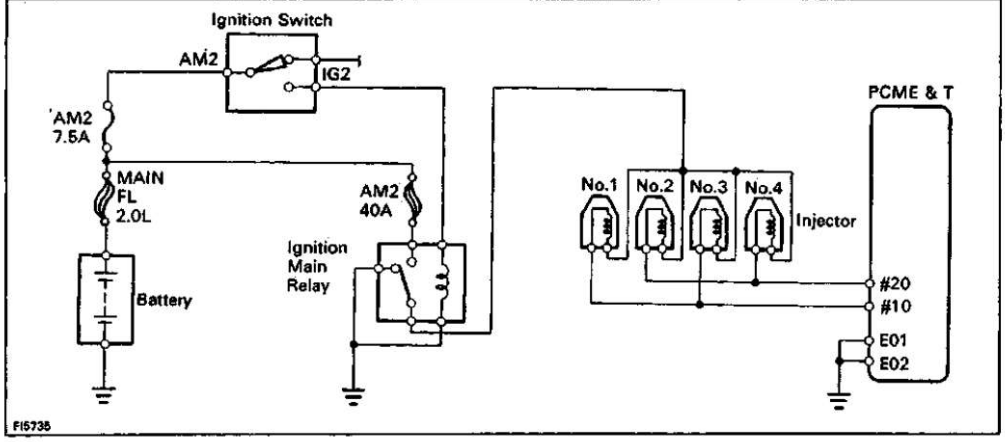
OK → Check wiring between PCME & T and manifold absolute pressure sensor.

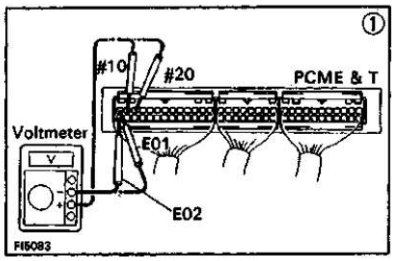
OK → Try another PCME & T.

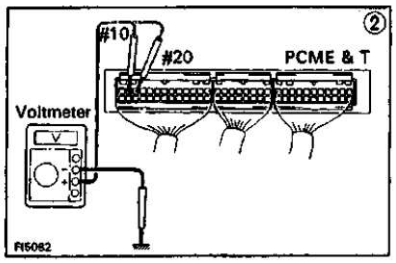
BAD → Repair or replace.

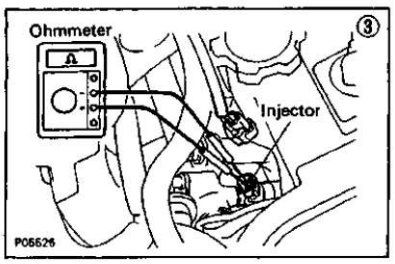
V00937

No.	Terminals	Trouble	Condition	STD voltage
6	#10 – E01 #20 – E02	No voltage	IG SW ON	9 – 14 V









(1) There is no voltage between PCME & T terminals #10 and/or # 20 and E01 and/or E02. **(IG SW ON)**

(2) Check that there is voltage between PCME & T terminal #10 and/or #20 and body ground.

NO **OK**

Check wiring between PCME & T terminal E01 and/or E02 and body ground.

OK BAD

Try another PCME & T. Repair or replace.

Check fuse, H–fuse, fusible link and ignition switch and ignition main relay. BAD Repair or replace.

OK

(3) Check resistance of each injector.
STD resistance: Approx. 13.8Ω

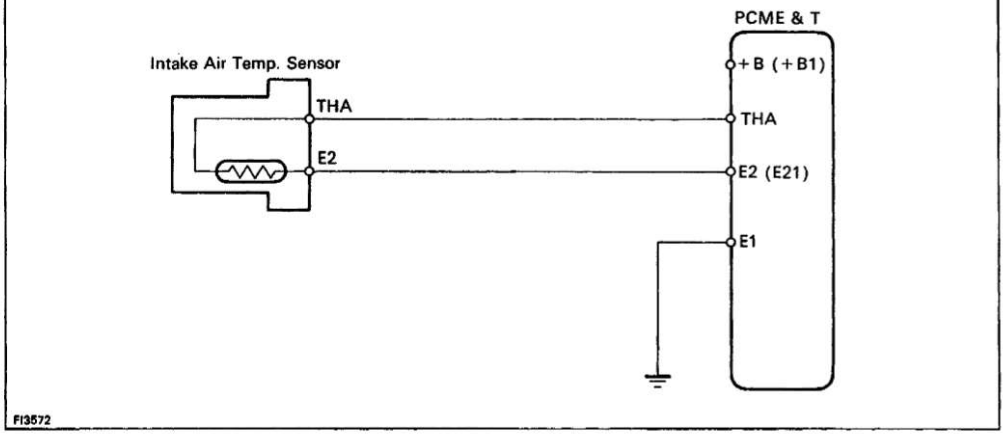
OK **OK**

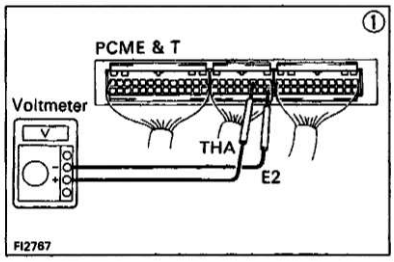
Repair injector.

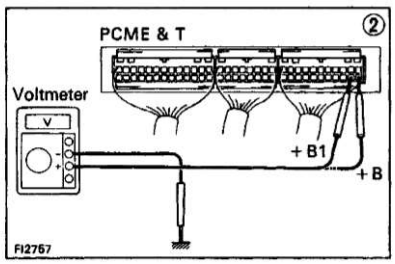
Check wiring between PCME & T terminal No.10 and/or No.20 and battery. BAD Repair or replace.

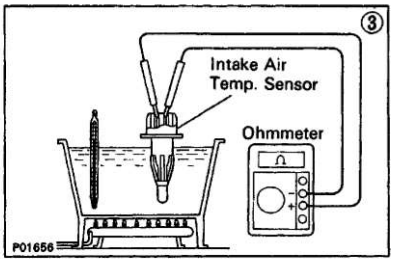
V00938

No.	Terminals	Trouble	Condition		STD voltage
6	THA – E2	No voltage	IG SW ON	Intake air temperature 20°C (68°F)	0.5 – 3.4 V









(1) There is no voltage between PCME & T terminals THA and E2. **(IG SW ON)**

(2) Check that there is voltage between PCME & T terminal + B or +B and body ground. **(IG SW ON)**

OK → Check wiring between PCME & T terminal E1 and body ground.

NO → Refer to No.1 (See page EG2–236)

OK → (3) Check intake air temp. sensor. (See page EG2–306)

BAD → Repair or replace.

BAD → Replace intake air temp. sensor.

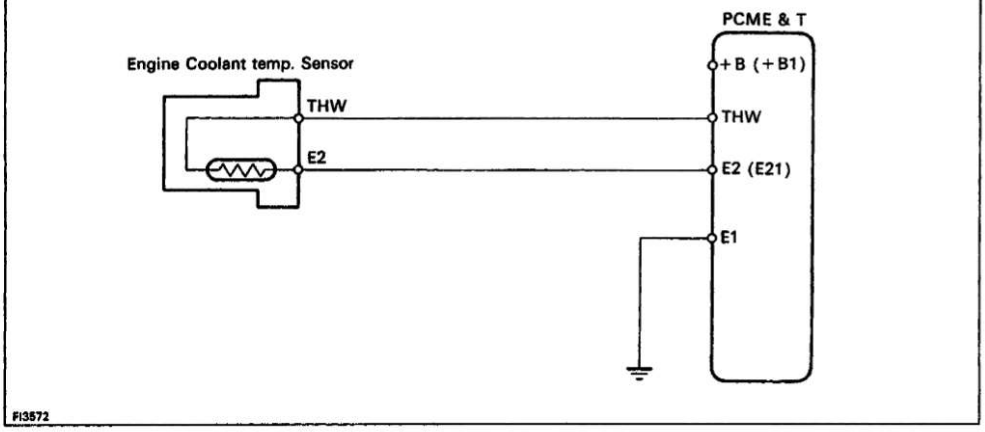
OK → Check wiring between PCME & T and air temp. sensor.

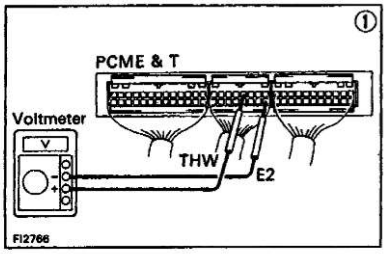
OK → Try another PCME & T.

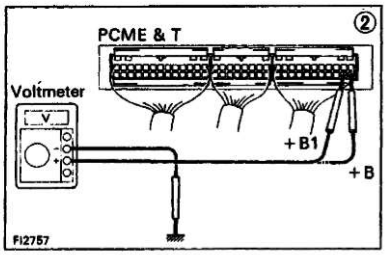
BAD → Repair or replace.

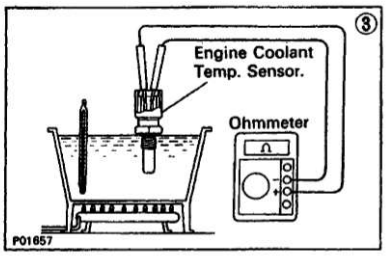
V00939

No.	Terminals	Trouble	Condition		STD voltage
7	THW – E2	No voltage	IG SW ON	Coolant temperature 80°C (176°F)	0.2 – 1.0 V









(1) There is no voltage between PCME & T terminals THW and E2. **(IG SW ON)**

(2) Check that there is voltage between PCME & T terminal +B or +B and body ground. (IG SW ON)

OK — **NO** → Refer to No.1 (See page EG2–236)

Check wiring between PCME & T terminal E1 and body ground.

OK — BAD → Repair or replace.

(3) Check engine coolant temp. sensor. (See page EG2–305)

BAD → Replace engine coolant temp. sensor.

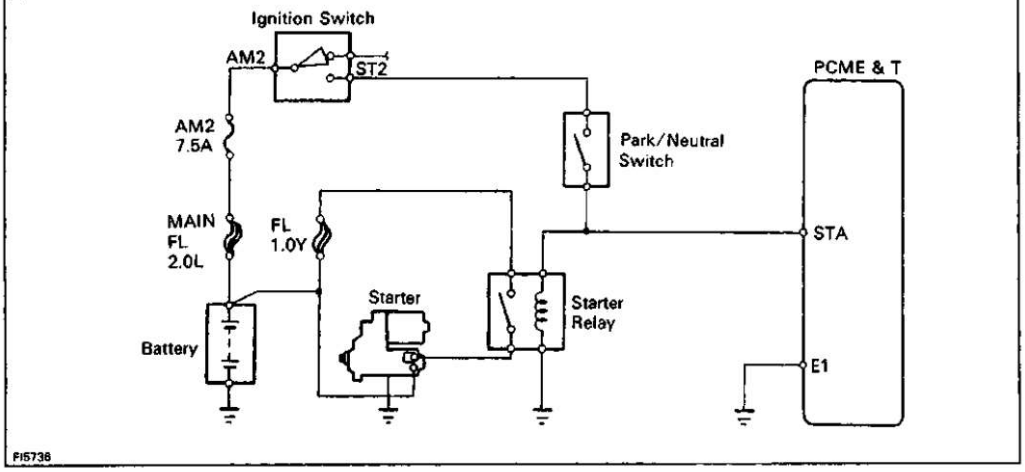
OK → Check wiring between PCME & T and engine coolant temp. sensor.

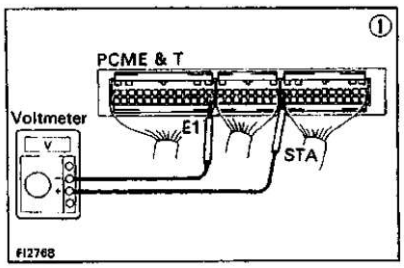
OK → Try another PCME & T.

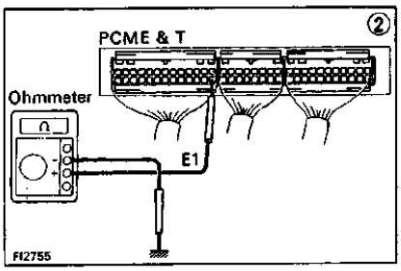
BAD → Repair or replace.

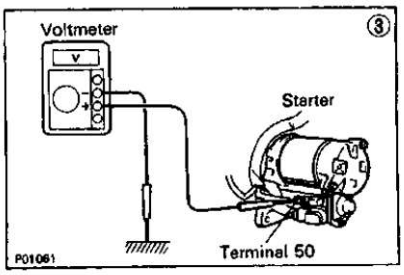
V00940

No.	Terminals	Trouble	Condition	STD voltage
8	STA – E1	No voltage	Cranking	6 V or more









(1) There is no voltage between PCME & T terminals STA and E1. **(IG SW START)**

Check starter operation. — OK → Check wiring between PCME & T terminal STA and ignition switch terminal ST2.

Check starter operation. — BAD → (2) Check wiring between PCME & T terminal E1 and body ground.

Check wiring between PCME & T terminal STA and ignition switch terminal ST2. — BAD → Repair or replace.

Check wiring between PCME & T terminal STA and ignition switch terminal ST2. — OK → (2) Check wiring between PCME & T terminal E1 and body ground.

(2) Check wiring between PCME & T terminal E1 and body ground. — OK → Try another PCME & T.

(2) Check wiring between PCME & T terminal E1 and body ground. — BAD → Repair or replace.

Check fuse, H–fuse, fusible link, battery, wiring ignition switch and park/neutral switch. — BAD → Repair or replace.

Check fuse, H–fuse, fusible link, battery, wiring ignition switch and park/neutral switch. — OK →

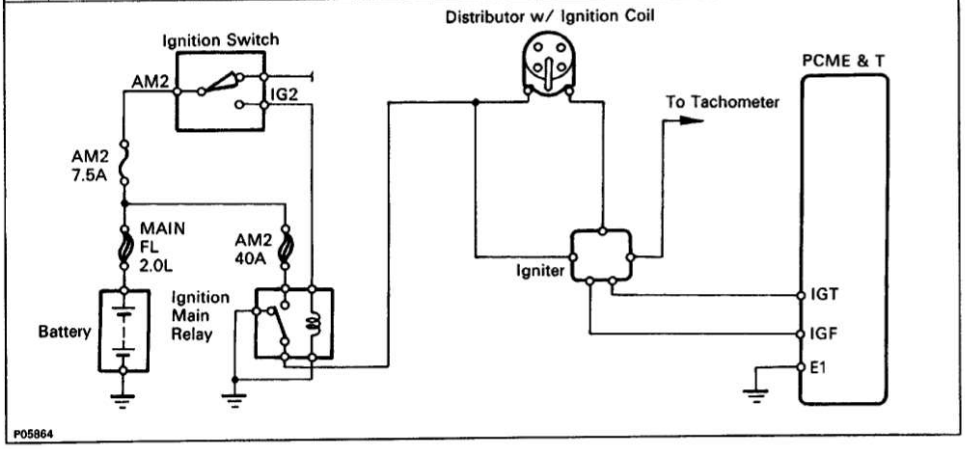
(3) Check that there is voltage at starter terminal 50. **(IG SW ON) STD voltage: 6 V or more**

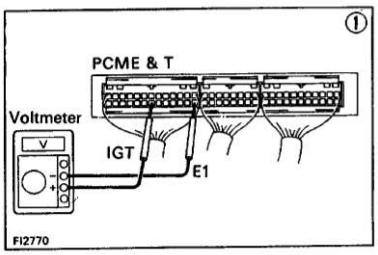
(3) Check that there is voltage at starter terminal 50. — OK → Check starter.

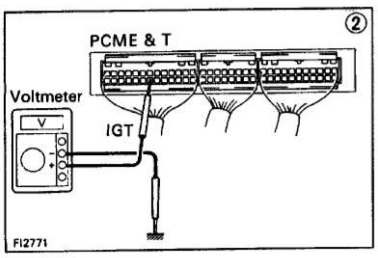
(3) Check that there is voltage at starter terminal 50. — NO → Check wiring between ignition switch terminal ST2 and starter and starter terminal 50.

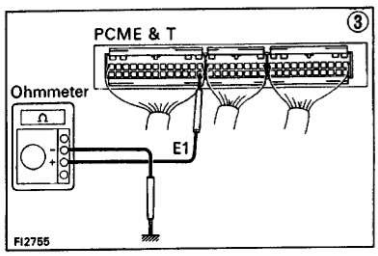
V00941

No.	Terminals	Trouble	Condition	STD voltage
9	IGT – E1	No voltage	Idling	Pulse generation









(1) There is no voltage between PCME & T terminals IGT and E1. **(Idling)**

↓

(2) Check that thee is voltage between PCME & T terminal IGT and body ground. **(Idling)**

NO → OK

(3) Check wiring between PCME & T terminal E1 and body ground. → BAD → Repair or Replace.

OK → Try another PCME & T.

Check fuse, H–fuse, fusible link, ignition switch and ignition main relay. → BAD → Repair or replace.

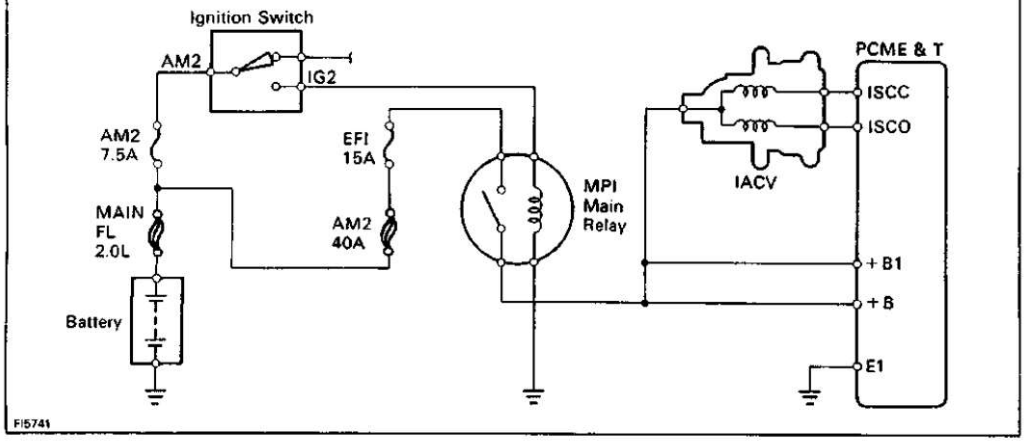
OK → Check distributor. (See IG section) → BAD → Repair or replace.

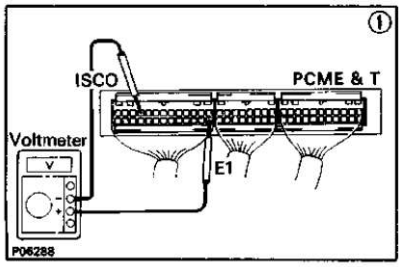
OK → Check wiring between PCME & T and battery. → BAD → Repair or replace.

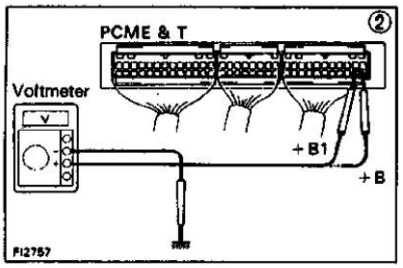
OK → Check igniter. (See IG section) → BAD → Repair or replace.

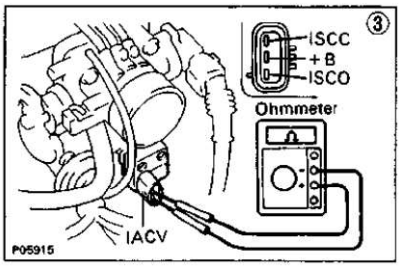
V00942

No.	Terminals	Trouble	Condition	STD voltage
10	ISCO – E1	No voltage	IG SW ON	9 – 14 V









(1) There is no voltage between PCME & T terminals ISCO and E1. **(IG SW ON)**

↓

(2) Check that there is voltage between PCME & T terminal +B or +B and body ground. **(IG SW ON)**

OK ↓

NO → Refer to No.1. (See page EG2–236)

↓

(3) Check resistance between IACV terminals +B and ISCC or ISCO. **STD resistance: 19.3 – 22.3Ω**

BAD → Replace IACV.

OK ↓

Check wiring between PCME & T and IACV.

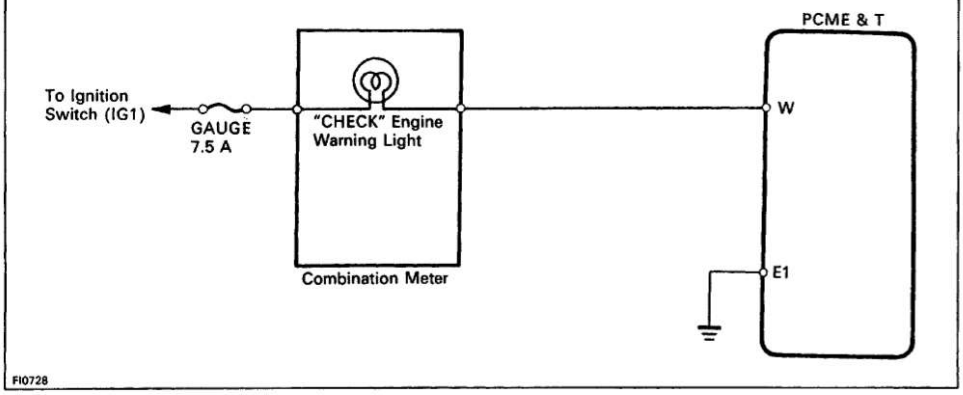
BAD → Repair or replace wiring.

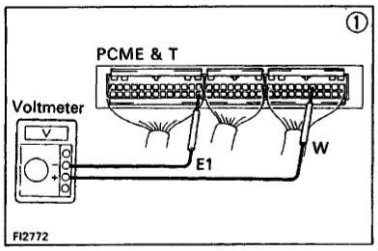
OK ↓

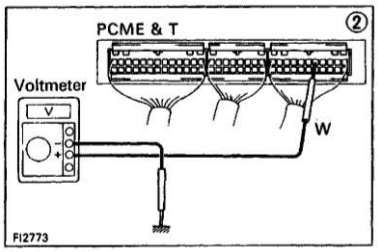
Try another PCME & T.

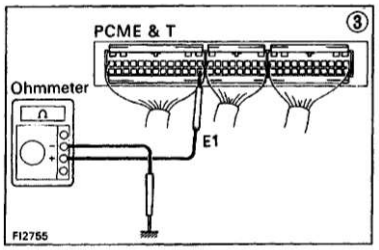
V00943

No.	Terminals	Trouble	Condition	STD voltage
11	W – E1	No voltage	No trouble ("CHECK" engine warning light off) and engine running.	9 – 14 V









(1) There is no voltage between PCME & T terminals W and E1. **(Idling)**

(2) Check that there is voltage between PCME & T terminal W and body ground.

NO — OK

(3) Check wiring between PCME & T terminal E1 and body ground.

OK — BAD

Try another PCME & T. — Repair or replace.

Check GAUGE fuse (7.5 A) and check engine warning light.

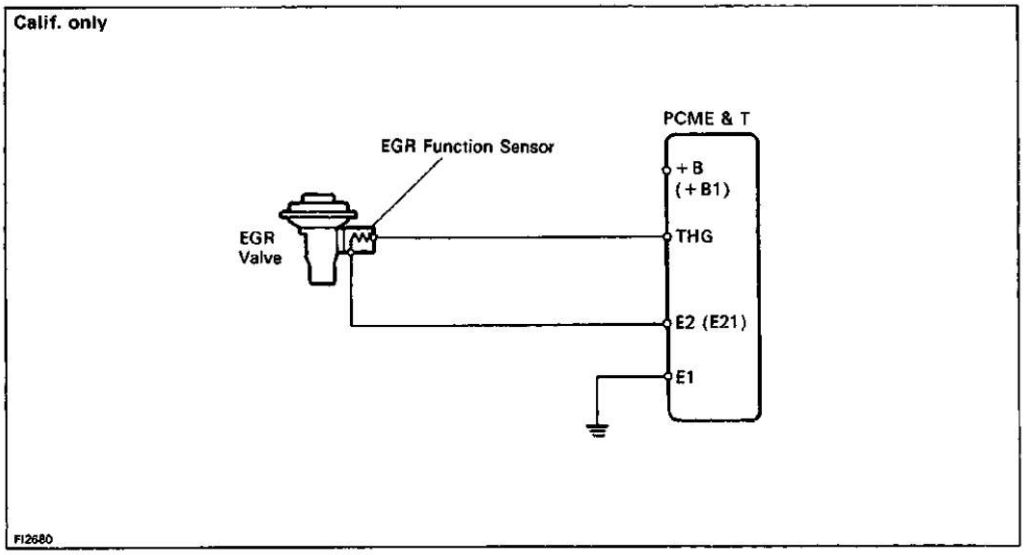
OK — BAD

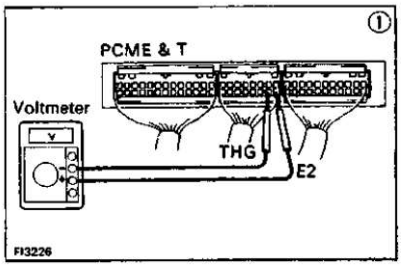
Repair or replace.

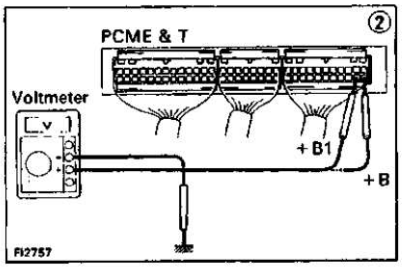
Fuse blows again

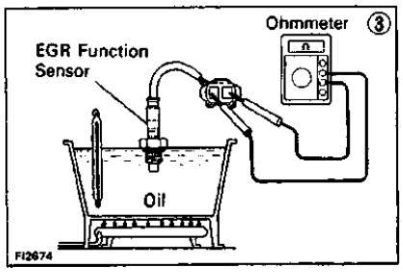
Check wiring between PCME & T terminal W and fuse. — BAD — Repair or replace.

V00944









(1)There is no voltage between PCME & T terminals THG and E2. **(IG SW ON)**

(2) Check that there is voltage between PCME & T terminal + B or +B and body ground. **(IG SW ON)**

OK → Check wiring between PCME & T terminal E1 and body ground.

NO → Refer to No.1 (See page EG2–236)

Check wiring between PCME & T terminal E1 and body ground.

OK → Check EGR system. (See page EG2–173)

BAD → Repair or replace.

Check EGR system. (See page EG2–173)

OK → Check EGR function sensor. (See page EG2–321)

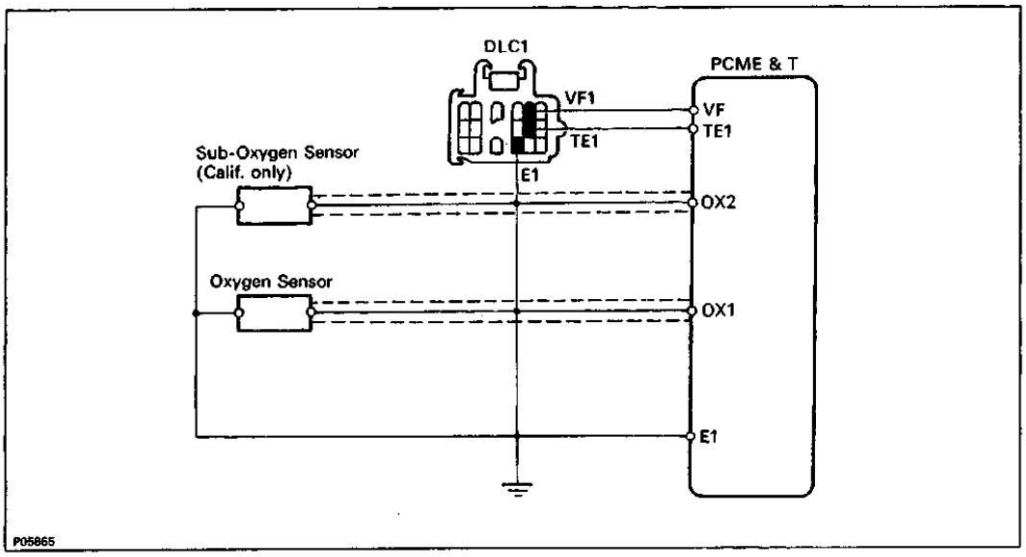
BAD → Replace EGR function sensor.

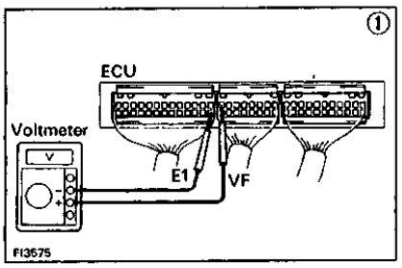
OK → Check wiring between PCME & T and EGR sensor.

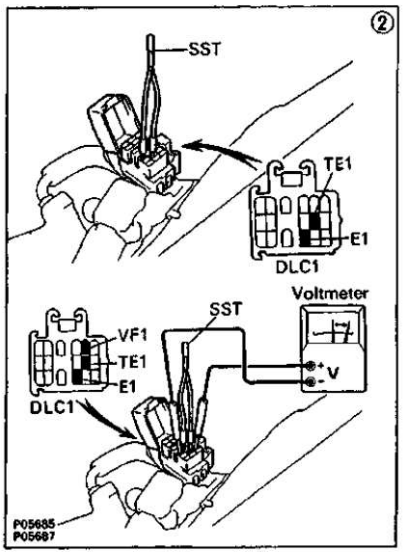
OK → Try another PCME & T.

BAD → Repair or replace.

W0948







(1) There is no voltage between PCME & T terminals VF and E1.

Check that there is specified voltage between PCME & T terminal VF and body ground.

NO → OK: Check wiring between PCME & T terminal E1 and body ground.

OK → Try another PCME & T.

BAD → Repair or replace.

Check for suction of air into exhaust system. BAD → Repair air suction.

OK

Check for air leak from air intake system. BAD → Repair air leak.

OK

Check spark plugs. BAD → Repair or replace.

OK

Check distributor w/ ignition coil and ignition system. BAD → Repair or replace.

OK

Check fuel pressure. BAD → Repair or replace.

OK

Check injectors. BAD → Repair or replace.

OK

Check manifold absolute pressure sensor. BAD → Repair or replace.

OK

Check operation of oxygen sensors. OK → System normal.

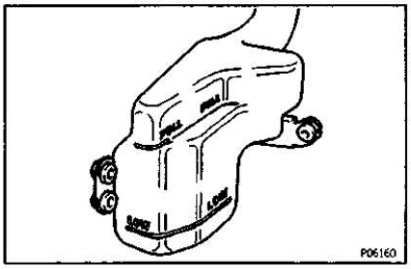
BAD

Check wiring between oxygen sensors and PCME & T connectors. BAD → Repair wiring

OK

Repair oxygen sensors.

V00949

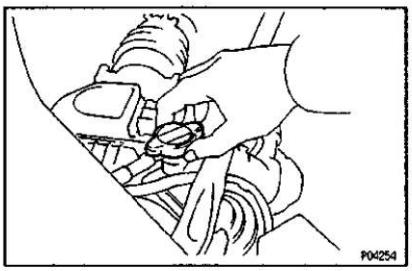


TUNE–UP

ENGINE COOLANT INSPECTION

1. CHECK ENGINE COOLANT LEVEL AT RESERVOIR TANK

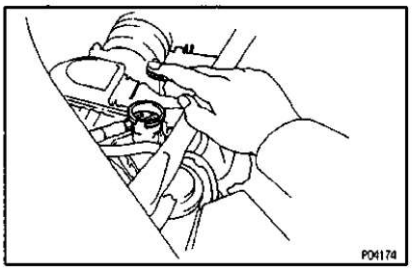
The engine coolant level should be between the " LOW" and "FULL" lines at low temperature.
If low, check for leaks and add engine coolant up to the "FULL" line.



2. CHECK ENGINE COOLANT QUALITY

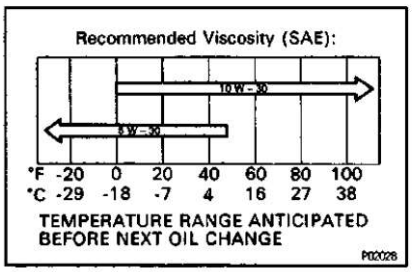
(a) Remove the radiator (water filler) cap.

CAUTION: To avoid the danger of being burned, do not remove it while the engine and radiator are still hot, as fluid and steam can be blown out under pressure.



(b) There should not be any excessive deposits of rust or scales around the radiator cap or radiator filler hole, and the coolant should be free from oil.
If excessively dirty, replace the coolant.

(c) Reinstall the radiator (water filler) cap.



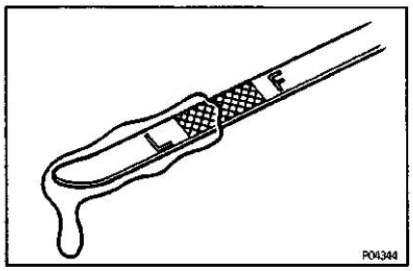
ENGINE OIL INSPECTION

1. CHECK OIL QUALITY

Check the oil for deterioration, entry of water, disco–oring or thinning.
If oil quality is poor, replace it.

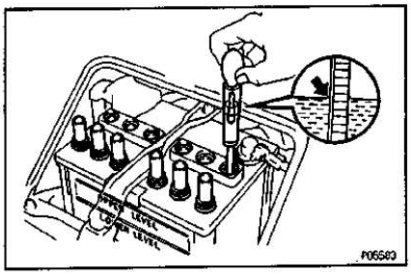
Oil grade:

API grade SG Energy–Conserving II multigrade engine oil. Recommended viscosity is as shown.



2. CHECK ENGINE OIL LEVEL

The oil level should be between the "L" and "F" marks on the dipstick.
If low, check for leakage and add oil up to the "F" mark.

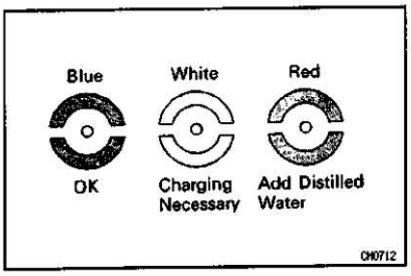


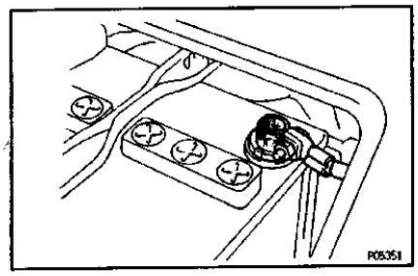
BATTERY INSPECTION

1. CHECK BATTERY SPECIFIC GRAVITY AND ELECTROLYTE LEVEL

(a) Check the electrolyte quantity of each cell.
If insufficient, refill with distilled (or purified) water.

(b) Check the specific gravity of each cell.
Standard specific gravity at 20°C (68°F):
1.25– 1.27
If not within specifications, charge the battery.
HINT: Check the indicator as shown in the illustration.

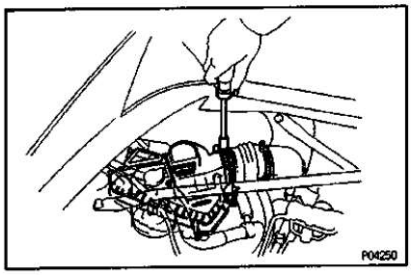




2. CHECK BATTERY TERMINALS, FUSIBLE LINK AND FUSES

(a) Check that the battery terminals are not loose or corroded.

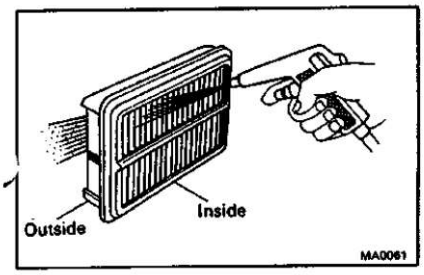
(b) Check the fusible link and fuses for continuity.



AIR FILTER INSPECTION AND CLEANING

1. REMOVE AIR FILTER

Remove the air cleaner cap and air filter.

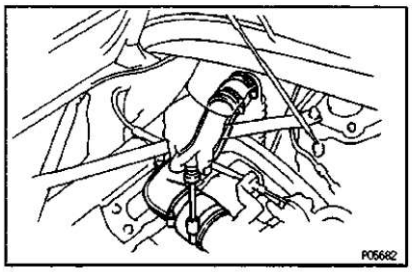


2. INSPECT AND CLEAN AIR FILTER

(a) Visually check that the air filter is not excessively damaged or only.
If necessary, replace the air filter.

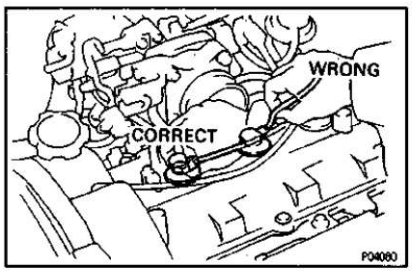
(b) Clean the air filter with compressed air.
First blow from the inside thoroughly, then blow off the outside of the air filter.

3. REINSTALL AIR FILTER



HIGH–TENSION CORDS INSPECTION

1. REMOVE NO.1 INTAKE AIR CONNECTOR FROM THROTTLE BODY

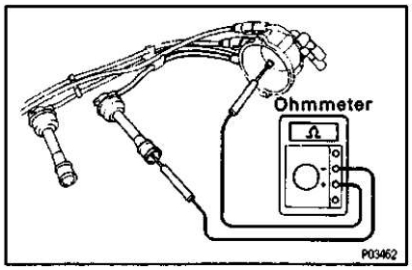


2. DISCONNECT HIGH–TENSION CORDS FROM SPARK PLUGS

Disconnect the high – tension cords at the rubber boot. Do not pull on the cords.

NOTICE: Pulling on or bending the cords may damage the conductor inside.

3. REMOVE DISTRIBUTOR CAP WITHOUT DISCONNECTING HIGH–TENSION CORDS



4. INSPECT HIGH–TENSION CORD RESISTANCE

Using an ohmmeter, measure the resistance without disconnecting the distributor cap.

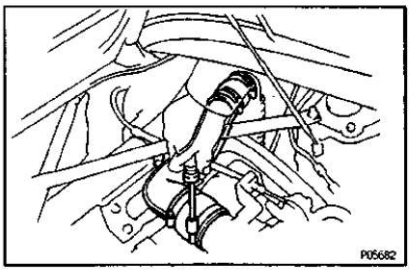
Maximum resistance:

25 kΩ per cord

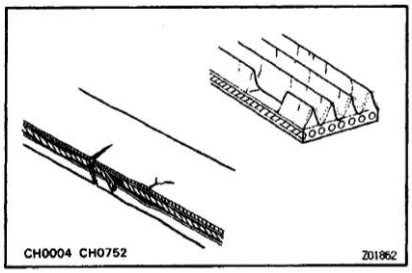
If the resistance is greater than maximum, check the terminals. If necessary, replace the high–tension cord and/or distributor cap.

5. REINSTALL DISTRIBUTOR CAP AND HIGH–TENSION CORDS

6. RECONNECT HIGH –TENSION CORDS TO SPARK PLUGS



7. REINSTALL NO.1 INTAKE AIR CONNECTOR



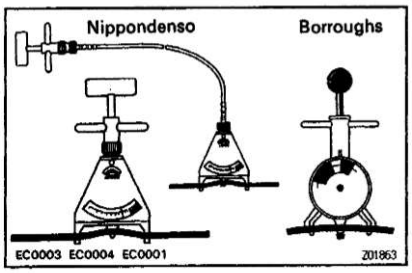
ALTERNATOR DRIVE BELT INSPECTION

INSPECT DRIVE BELTS

(a) Visually check the belt for excessive wear, frayed cords etc.

If necessary, replace the drive belt.

HINT: Cranks on the rib side of a belt are considered acceptable. If the belt has chunks missing from the ribs, it should be replaced.



(b) Using a belt tension gauge, measure the belt tension.

Belt tension gauge:

Nippondenso BTG–20 (95506–00020)

Boroughs No. BT–33–73F

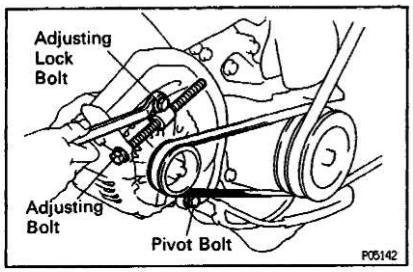
Drive belt tension:

New belt

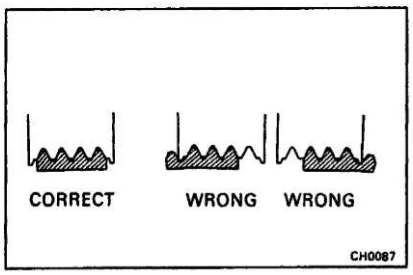
120 t 20 lbf

Used belt

104 ± 20 lbf



If necessary, adjust the belt tension.

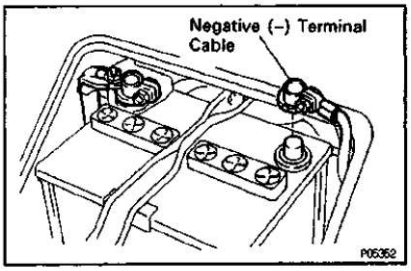


HINT:

- "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 belt, check that it fits properly in the ribbed grooves.
- Check by hand to confirm that the belt has not slipped out of the groove on the bottom of the pulley.
- After installing a new belt, run the engine for about 5 minutes and recheck the belt tension.

VALVE CLEARANCE INSPECTION AND ADJUSTMENT

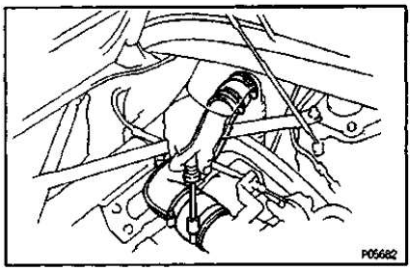
HINT: Inspect and adjust the valve clearance when the engine is cold.



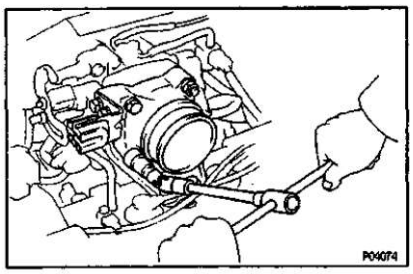
1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY

CAUTION: Turn the ignition switch to "LOCK". Disconnect the negative terminal from the battery. Wait at least 20 seconds before proceeding with work.

2. DISCONNECT ACCELERATOR LINKAGE FROM THROTTLE BODY

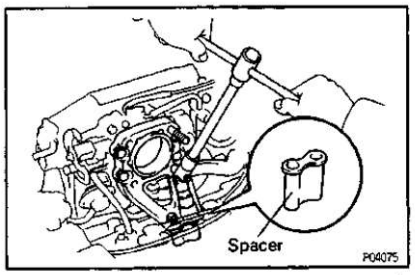


3. REMOVE N0.1 INTAKE AIR CONNECTOR



4. REMOVE INTAKE AIR CONNECTOR

Remove the two bolts, two nuts and intake air connector.

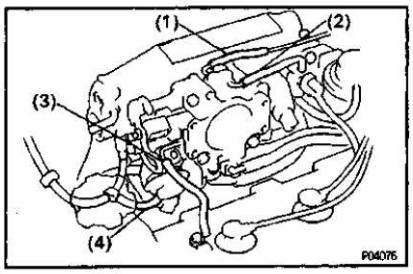


5. REMOVE INTAKE AIR CONNECTOR STAY

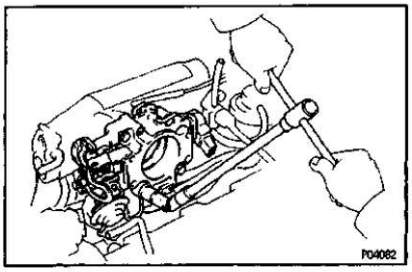
(a) Remove the six bolts and intake air connector stay.
(b) Remove the spacer.

6. REMOVE THROTTLE BODY

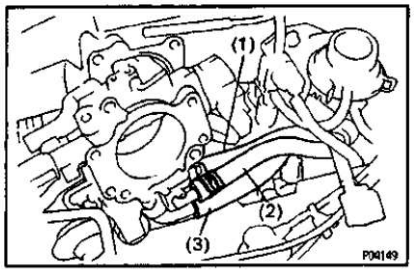
(a) Disconnect the following connector:
Throttle position sensor connector
IACV connector



(b) Disconnect the following hoses:
(1) Vacuum hose from port "P" of throttle body
(2) Vacuum hose from port "E" of throttle body
(3) PCV hose from port PCV of throttle body
(4) Vacuum hose from throttle body opener

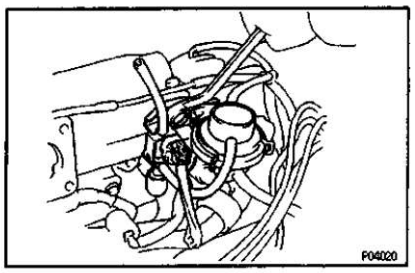


(c) Remove the four bolts, and disconnect the throttle body from the intake manifold.
(d) Remove the throttle body gasket.

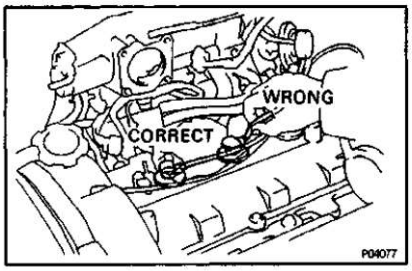


(e) Disconnect the following hoses from the throttle body, and remove the throttle body:
(1) Water by–pass hose (from upper side of No. 1 air tube)
(2) Water by–pass hose (from lower side of No. 1 air tube)
(3) Air hose (from No. 1 air tube)

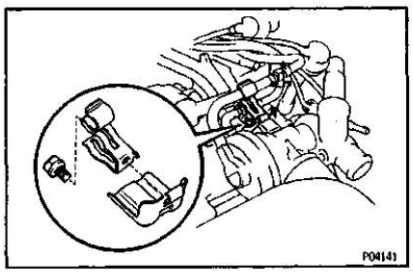
7. REMOVE CYLINDER HEAD COVER



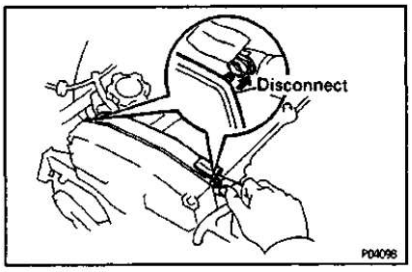
(a) Remove the bolt, and disconnect the VSV and EGR vacuum modulator assembly from the intake mani–fold.



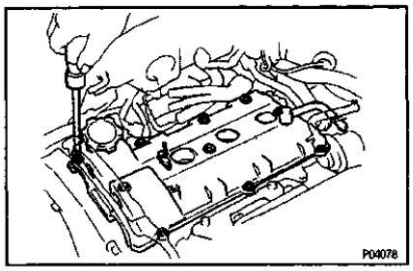
(b) Disconnect the high – tension cords at the rubber boot. Do not pull on the high–tension cords.
NOTICE: Pulling on or bending the cords may damage the conductor inside.



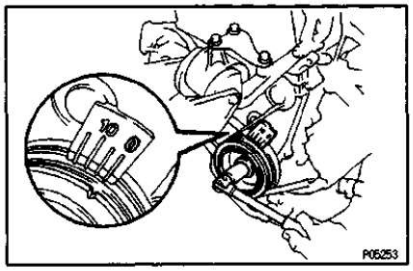
(c) Disconnect the hose and VTV from the clamps.
(d) Remove the bolt and two clamps.



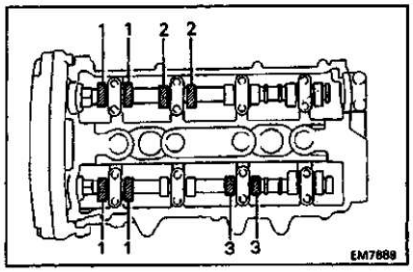
(e) Disconnect the engine wire protector between the No. 3 timing belt cover and cylinder head cover.



(f) Remove the ten screws, seal washers bolts, head cover and two gaskets.



8. SET NO.1 CYLINDER TO TDC/COMPRESSION
(a) Turn the crankshaft pulley and align its groove with timing mark "0" of the No.1 timing belt cover.
(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.



9. INSPECT VALVE CLEARANCE

(a) Check only the valves indicated.

- Using a feeler gauge, measure the clearance be–tween the valve lifter and camshaft.
- Record the out– of –specification valve clear–ance measurements. They will be used later to determine the required replacement adjusting shim.

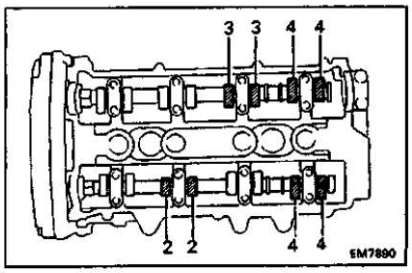
Valve clearance (Cold):

Intake

0.15 – 0.25 mm (0.006 – 0.010 in.)

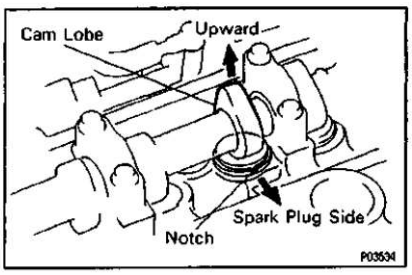
Exhaust

0.28 – 0.38 mm (0.011 – 0.015 in.)



(b) Turn the crankshaft one revolution (360°) and align the mark as above. (See procedure in step 8)

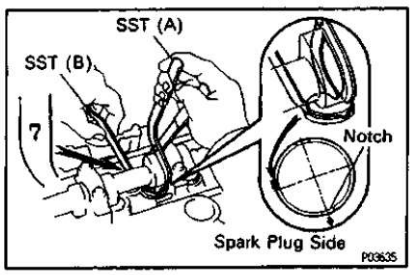
(c) Check only the valves indicated as shown. Measure the valve clearance. (See procedure in step (a))



10. ADJUST VALVE CLEARANCE

(a) Remove the adjusting shim.

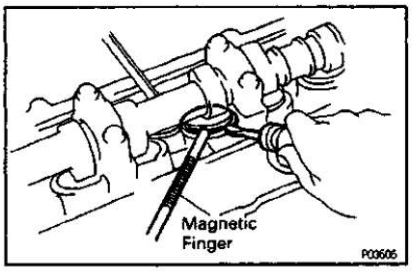
- Turn the crankshaft so that the cam lobe of the camshaft on the adjusting valve upward.
- Position the notch of the valve lifter facing the spark plug side.



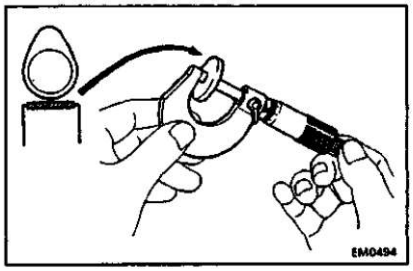
- Using SST (A), press down the valve lifter and place SST (B) between the camshaft and valve lifter. Remove SST (A).

SST 09248–55020 (09248–05011, 09248–05021)

HINT: Apply SST (B) at slight angle on the side marked with ”7”, at the position shown in the illustration.



- Remove the adjusting shim with a small screw–driver and magnetic finger.



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

- Using a micrometer, measure the thickness of the removed shim.
- Calculate the thickness of a new shim so that the valve clearance comes within specified value.
  T ..... Thickness of removed shim
  A ..... Measured valve clearance
  N ..... Thickness of new shim

Intake:

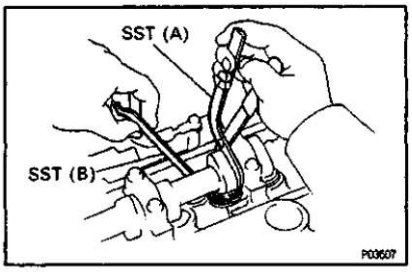
N = T + (A – 0.20 mm (0.008 in.))

Exhaust:

N = T + (A – 0.33 mm (0.013 in.))

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

HINT: Shims are available in seventeen sized in in–crements of 0.05 mm (0.0020 in.), from 2.50 mm (0.0984 in.) to 3.30 mm (0.1299 in.).

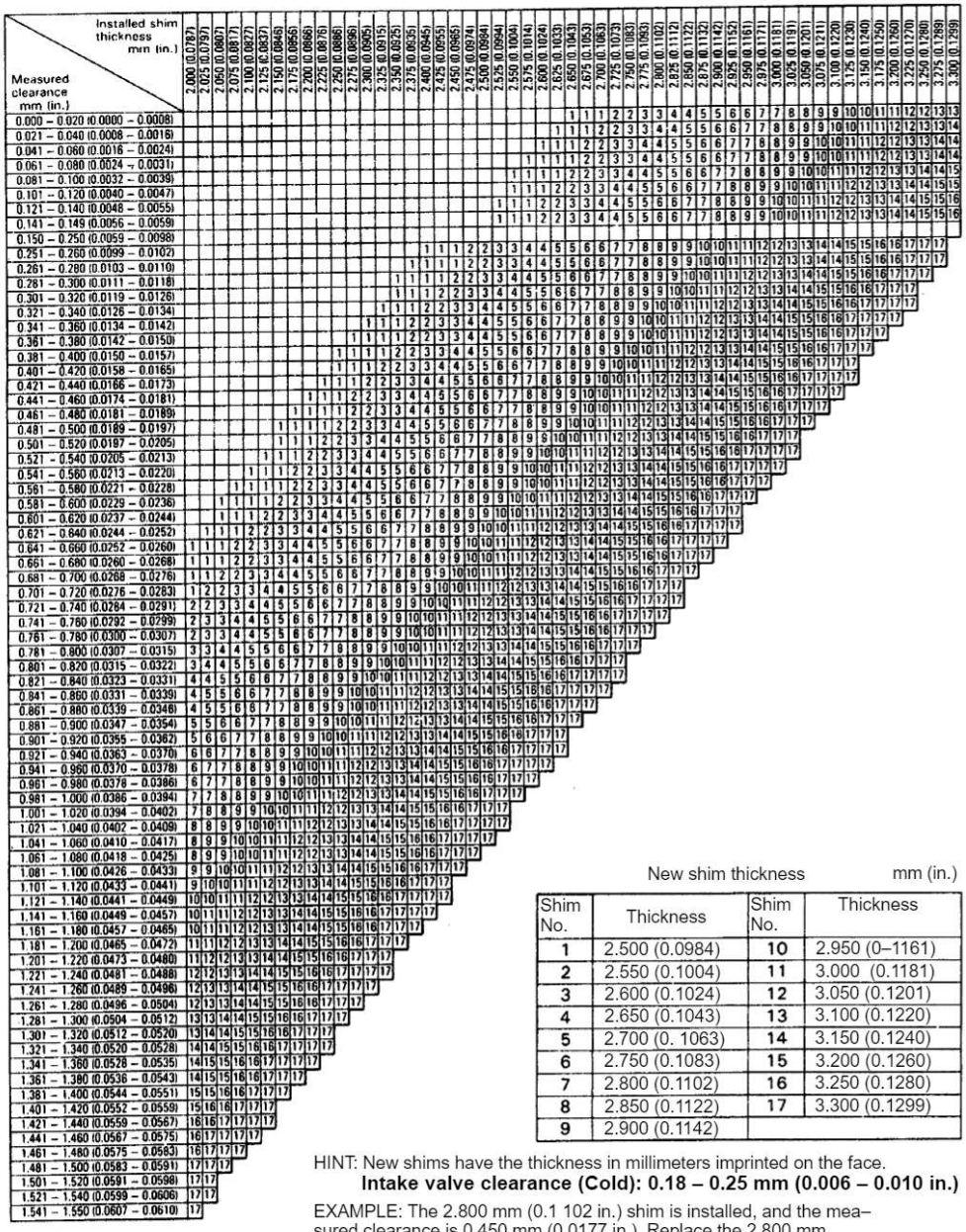


(c) Install a new adjusting shim.

- Place a new adjusting shim on the valve lifter. Using SST (A), press down the valve lifter and remove SST (B).
- SST 09248 – 55020 (09248 – 05011, 09248 – 05021)

(d) Recheck the valve clearance.

Adjusting Shim Selection Chart (Intake)



New shim thickness mm (in.)

Shim No.	Thickness	Shim No.	Thickness
1	2.500 (0.0984)	10	2.950 (0–1161)
2	2.550 (0.1004)	11	3.000 (0.1181)
3	2.600 (0.1024)	12	3.050 (0.1201)
4	2.650 (0.1043)	13	3.100 (0.1220)
5	2.700 (0. 1063)	14	3.150 (0.1240)
6	2.750 (0.1083)	15	3.200 (0.1260)
7	2.800 (0.1102)	16	3.250 (0.1280)
8	2.850 (0.1122)	17	3.300 (0.1299)
9	2.900 (0.1142)		

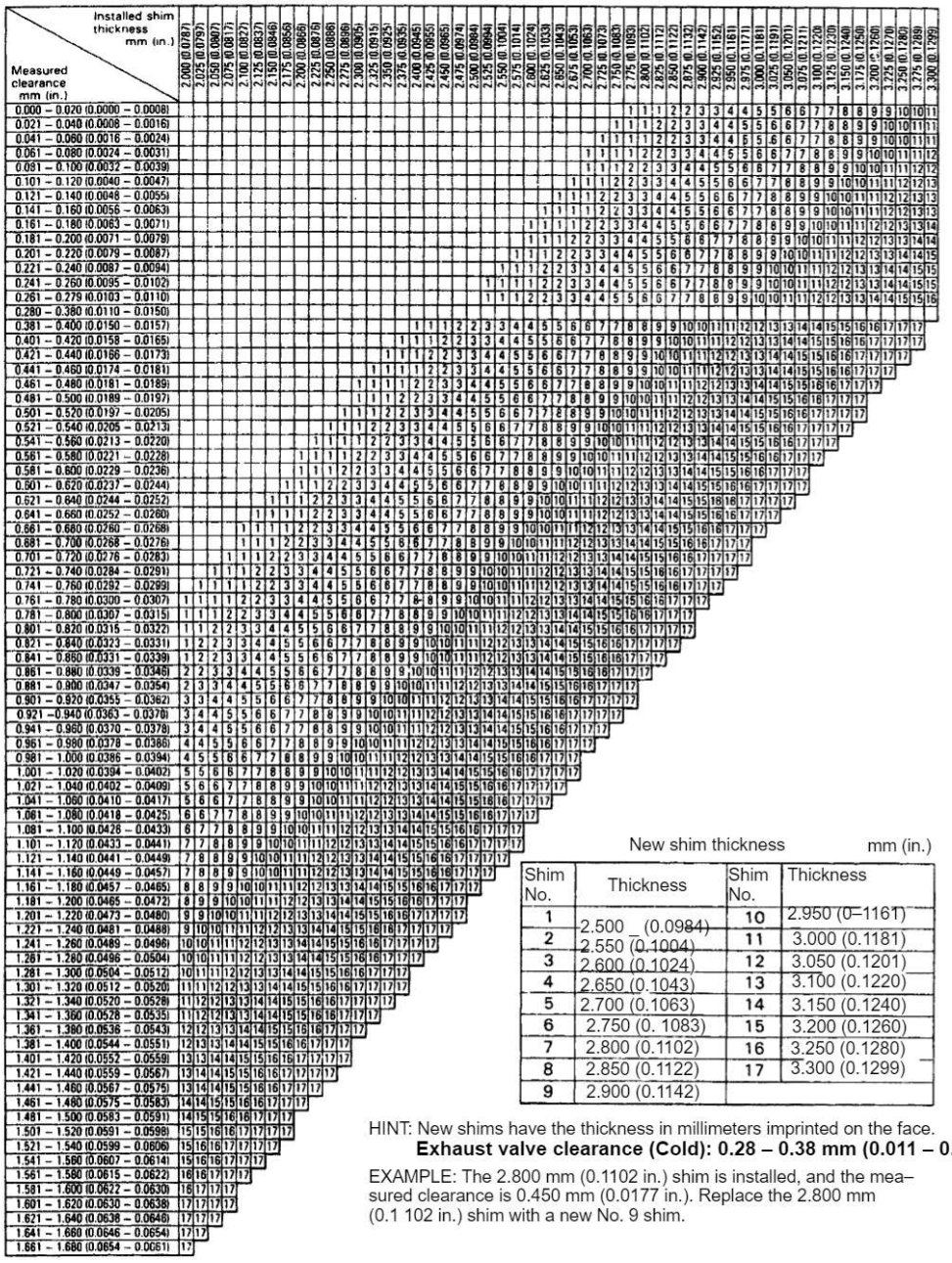
HINT: New shims have the thickness in millimeters imprinted on the face.

Intake valve clearance (Cold): 0.18 – 0.25 mm (0.006 – 0.010 in.)

EXAMPLE: The 2.800 mm (0.1 102 in.) shim is installed, and the mea–sured clearance is 0.450 mm (0.0177 in.). Replace the 2.800 mm (0.1 102 in.) shim with a new No. 12 shim.

V00846

Adjusting Shim Selection Chart (Exhaust)



P03532

New shim thickness mm (in.)

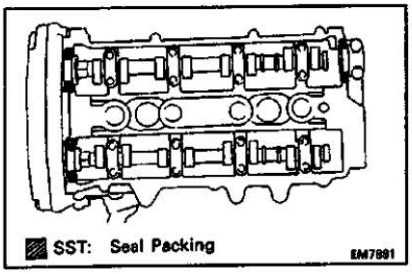
Shim No.	Thickness	Shim No.	Thickness
1	2.500 (0.0984)	10	2.950 (0.1161)
2	2.550 (0.1004)	11	3.000 (0.1181)
3	2.600 (0.1024)	12	3.050 (0.1201)
4	2.650 (0.1043)	13	3.100 (0.1220)
5	2.700 (0.1063)	14	3.150 (0.1240)
6	2.750 (0. 1083)	15	3.200 (0.1260)
7	2.800 (0.1102)	16	3.250 (0.1280)
8	2.850 (0.1122)	17	3.300 (0.1299)
9	2.900 (0.1142)		

HINT: New shims have the thickness in millimeters imprinted on the face.

Exhaust valve clearance (Cold): 0.28 – 0.38 mm (0.011 – 0.015 in.)

EXAMPLE: The 2.800 mm (0.1102 in.) shim is installed, and the measured clearance is 0.450 mm (0.0177 in.). Replace the 2.800 mm (0.1 102 in.) shim with a new No. 9 shim.

V00847



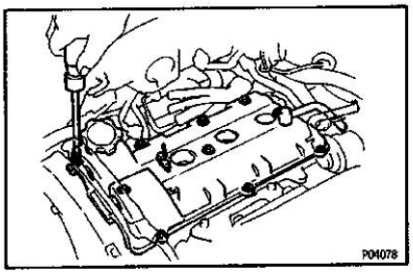
11. REINSTALL CYLINDER HEAD COVER

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

(b) Apply seal packing to the cylinder head as shown in the illustration.

Seal packing:

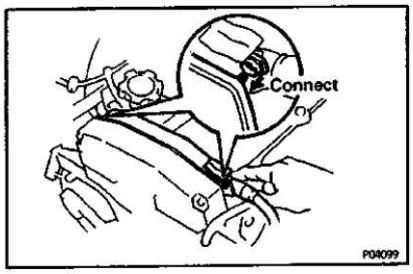
Part No. 08826–00080 or equivalent



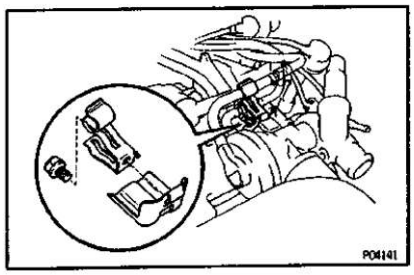
(c) Install the two gaskets to the cylinder head cover.

(d) Install the cylinder head cover with the ten seal washers and screws.

Torque: 2.5 N–m (25 kgf–cm, 21 in–lbf)



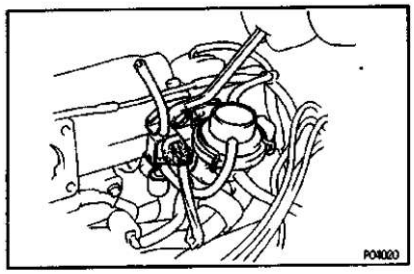
(e) Install the two clamps of the engine wire protector to each bolt.



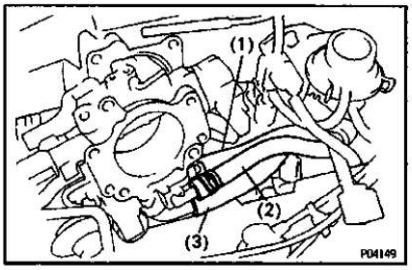
(f) Install the two clamps.

(g) Connect the VTV and hose to the clamp.

(h) Connect the high–tension cords.

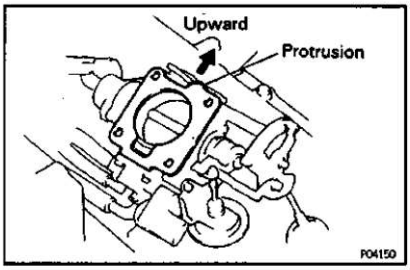


(i) Install the VSV and EGR vacuum modulator assembly with the bolt.

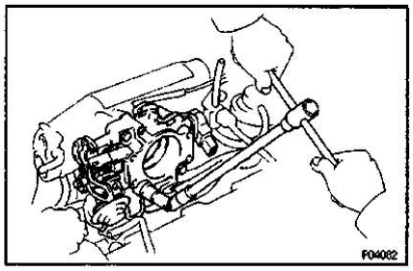


12. REINSTALL THROTTLE BODY

(a) Connect the following hoses to the throttle body:
- (1) Water by–pass hose (from upper side of No. 1 air tube)
- (2) Water by–pass hose (from lower side of No. 1 air tube)
- (3) Air hose (from No. 1 air tube)



(b) Install a new gasket to the throttle body.

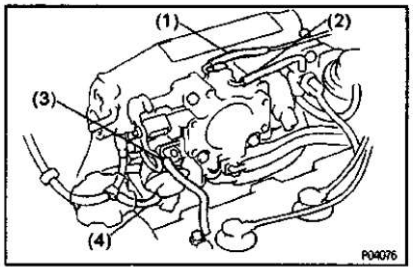


(c) Install the throttle body with the four bolts.

Torque: 19 N–m (195 kgf–cm, 14 ft–lbf)

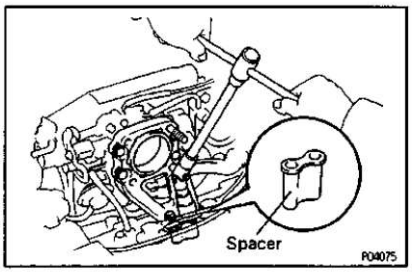
HINT: Different bolt lengths are used for the upper and lower sides.

Bolt length:
- 45 mm (1.77 in.) for upper side
- 70 mm (2.76 in.) for lower side



(d) Connect the following hoses:
- (1) Vacuum hose to port "P" of throttle body
- (2) Vacuum hose to port "E" of throttle body
- (3) PCV hose to port PCV of throttle body
- (4) Vacuum hose to throttle body opener

(e) Connect the following connector:
- Throttle position sensor connector
- IACV connector



13. REINSTALL INTAKE AIR CONNECTOR STAY

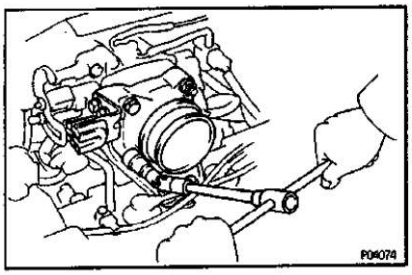
(a) Install the spacer.

(b) Install the intake air connector stay with the six bolts.

Torque:

7.8 N–m (80 kgf–cm, 69 in.–lbf) for 10 mm head

19 N–m (195 kgf–cm, 14 ft–lbf) for 12 mm head

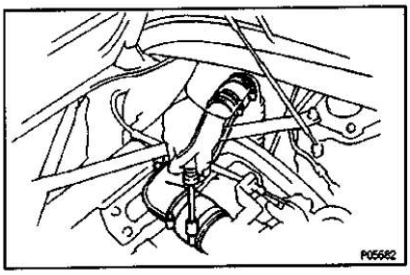


14. REINSTALL INTAKE AIR CONNECTOR

Install the intake air connector with the two bolts and two nuts.

Torque: 19 N–m(195 kgf–cm, 14 ft–lbf)

15. RECONNECT ACCELERATOR LINKAGE TO THROTTLE BODY



16. REINSTALL NO.1 INTAKE AIR CONNECTOR

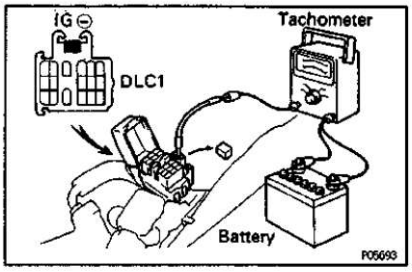
17. RECONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY

IGNITION TIMING INSPECTION AND ADJUSTMENT

1. REMOVE RH ENGINE HOOD SIDE PANEL

2. WARM UP ENGINE

Allow the engine to warm up to normal operating temperature.



3. CONNECT TACHOMETER AND TIMING LIGHT TO ENGINE

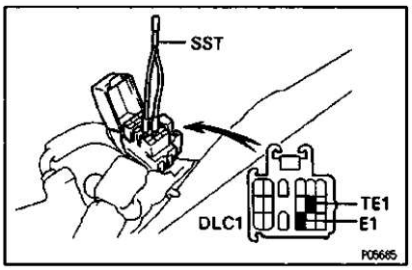
Connect the test probe of a tachometer to terminal IG – of the data link connector 1.

NOTICE:

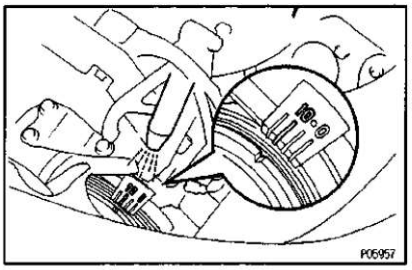
- **Never allow the tachometer terminal to touch ground as it could result in damage to the igniter and/or ignition coil.**
- **As some tachometers are not compatible with this ignition system, we recommend that you confirm the compatibility of your unit before use.**

4. ADJUST IGNITION TIMING

(a) Using SST, connect terminals TE1 and E1 of the the data link connector 1.
SST 09843–18020

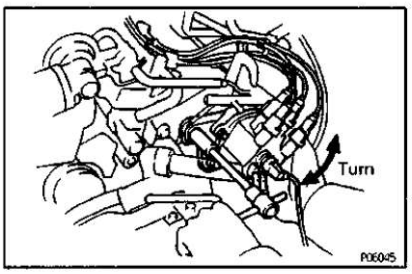


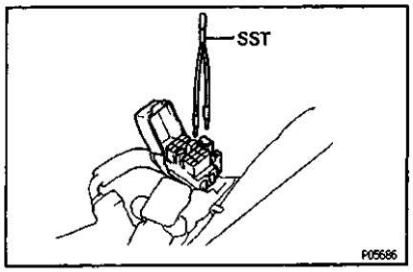
(b) Using a timing light, check the ignition timing.
Ignition timing:
10° BTDC @ idle
(Transmission in neutral position)



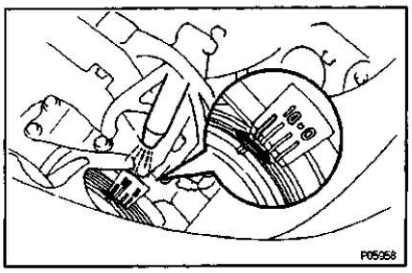
(c) Loosen the two mounting bolts, and adjust the ignition timing by turning the distributor.

(d) Tighten the two mounting bolts, and recheck the ignition timing.
Torque: 39 N–m (400 kgf–cm, 29 ft–lbf)





(e) Remove the SST from the data link connector 1.
SST 09843–18020



5. FURTHER CHECK IGNITION TIMING

Ignition timing:
12 – 21°BTDC @ idle
(Transmission in neutral position)
HINT: The timing mark moves in a range between 12° and 21°.

6. DISCONNECT TACHOMETER AND TIMING LIGHT FROM ENGINE

7. REINSTALL RH ENGINE HOOD SIDE PANEL

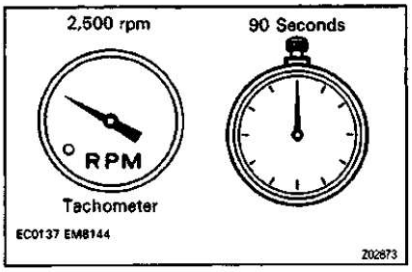
IDLE SPEED INSPECTION

1. INITIAL CONDITIONS

(a) Engine at normal operating temperature
(b) Air cleaner installed
(c) All pipes and hoses of air induction system connected
(d) All accessories switched OFF
(e) All vacuum lines properly connected
HINT: All vacuum hoses for EGR systems, etc. should be properly connected.
(f) SMPI system wiring connectors fully plugged
(g) Ignition timing set correctly
(h) Transmission in neutral position

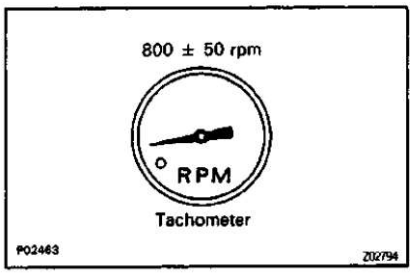
2. CONNECT TACHOMETER

(See step 2 in Ignition Timing Inspection and Adjustment)



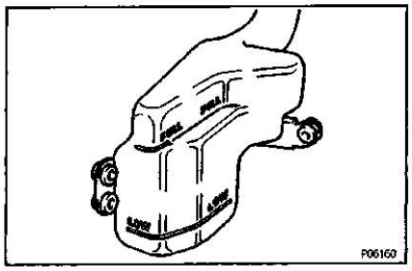
3. INSPECT IDLE SPEED

(a) Race the engine speed at 2,500 rpm for approx. 90 seconds.



(b) Check the idle speed.
Idle speed:
800 ± 50 rpm
If the idle speed is not as specified, check the IACV.

4. DISCONNECT TACHOMETER

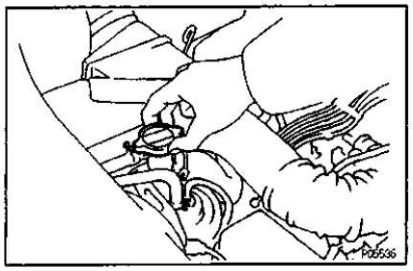


TUNE–UP

ENGINE COOLANT INSPECTION

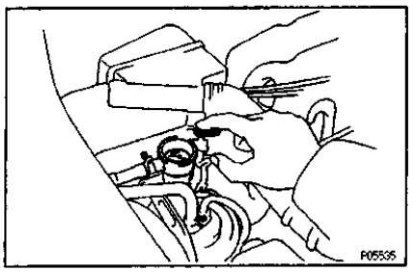
1. CHECK ENGINE COOLANT LEVEL AT RESERVOIR TANK

The engine coolant level should be between the ” LOW” and ”FULL” lines.
If low, check for leaks and add engine coolant up to the ”FULL” line.

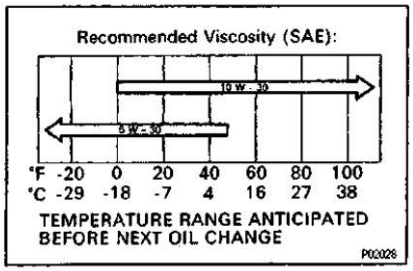


2. CHECK ENGINE COOLANT QUALITY

(a) Remove the radiator (water filler) cap.
CAUTION: To avoid the danger of being burned, do not remove it while the engine and radiator are still hot, as fluid and steam can be blown out under pressure.



(b) There should not be any excessive deposits of rust or scales around the radiator cap or radiator filler hole, and the coolant should be free from oil.
If excessively dirty, replace the coolant.
(c) Reinstall the radiator (water filler) cap.

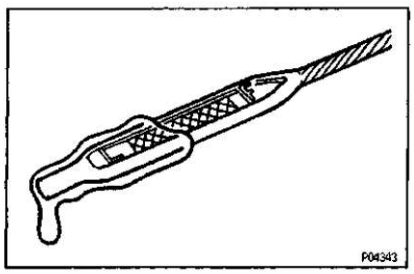


ENGINE OIL INSPECTION

1. CHECK OIL QUALITY

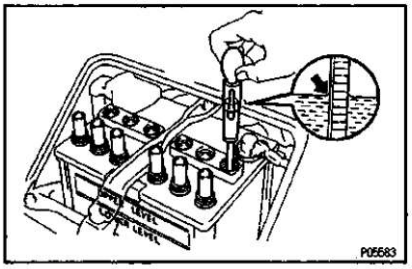
Check the oil for deterioration, entry of water, disco–loring or thinning.
If oil quality is poor, replace the oil.
Oil grade:

API grade SG Energy–Conserving II multigrade engine oil. Recommended viscosity is as shown.



2. CHECK ENGINE OIL LEVEL

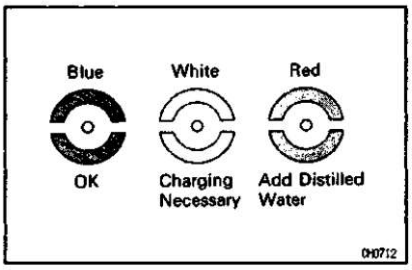
The oil level– should be between the ”L” and ”F” marks on the dipstick.
If low, check for leakage and add oil up to the ”F” mark.

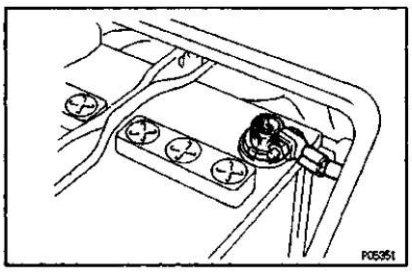


BATTERY INSPECTION

1. CHECK BATTERY SPECIFIC GRAVITY AND ELECTROLYTE LEVEL

(a) Check the electrolyte quantity of each cell.
If insufficient, refill with distilled (or purified) water.
(b) Check the specific gravity of each cell.
Standard specific gravity at 20˚C (68˚F):
1.25 – 1.27
If not within specifications, charge the battery.
HINT: Check the indicator as shown in the illustration.





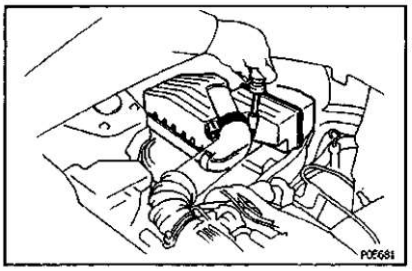
2. CHECK BATTERY TERMINALS, FUSIBLE LINK AND FUSES

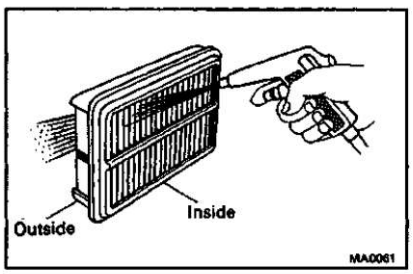
(a) Check that the battery terminals are not loose or corroded.
(b) Check the fusible link and fuses for continuity.

AIR FILTER INSPECTION AND CLEANING

1. REMOVE AIR FILTER

Remove the air cleaner cap and air filter.

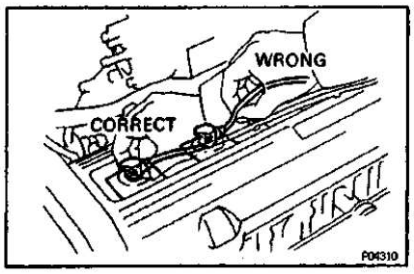


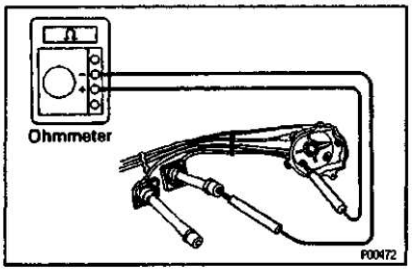


2. INSPECT AND CLEAN AIR FILTER

(a) Visually check that the air filter is not excessively damaged or only.
If necessary, replace the air filter.
(b) Clean the air filter with compressed air.
First blow from the insidethoroughly, then blow off the outside of the air filter.

3. REINSTALL AIR FILTER





HIGH–TENSION CORDS INSPECTION

1. DISCONNECT HIGH–TENSION CORDS FROM SPARK PLUGS

Disconnect the high – tension cords at the rubber boot. Do not pull on the cords.

NOTICE: Pulling on or bending the cords may damage the conductor inside.

2. REMOVE DISTRIBUTOR CAP WITHOUT DISCONNECTING HIGH–TENSION CORDS

3. INSPECT HIGH–TENSION CORD RESISTANCE

Using an ohmmeter, measure the resistance without disconnecting the distributor cap.

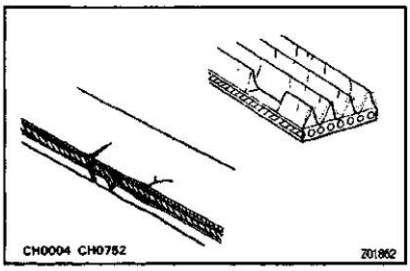
Maximum resistance:

25 k Ω per cord

If the resistance is greater than maximum, check the terminals. If necessary, replace the high–tension cord and/or distributor cap.

4. REINSTALL DISTRIBUTOR CAP AND HIGH–TENSION CORDS

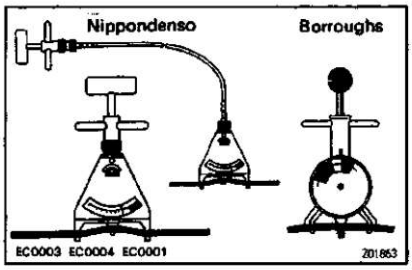
5. RECONNECT HIGH–TENSION CORDS TO SPARK PLUGS



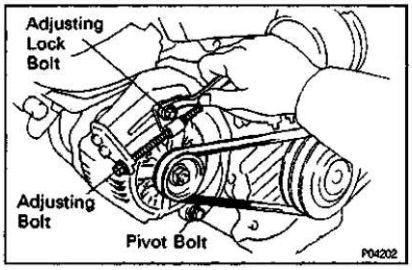
ALTERNATOR DRIVE BELT INSPECTION

INSPECT DRIVE BELTS

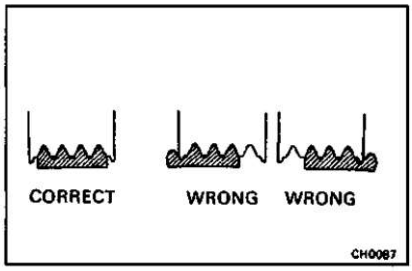
(a) Visually check the belt for excessive wear, frayed cords etc.
If necessary, replace the drive belt.
HINT: Cranks on the rib side of a belt are considered acceptable. If the belt has chunks missing from the ribs, it should be replaced.



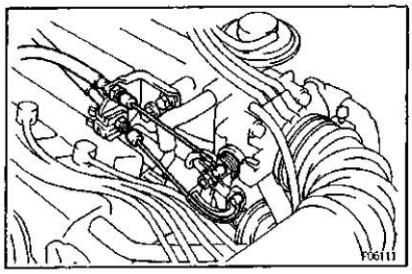
(b) Using a belt tension gauge, measure the belt tension.
Belt tension gauge:
Nippondenso BTG–20 (95506–00020)
Borroughs No. BT–33–73F
Drive belt tension:
New belt
120 ± 20 lbf
Used belt
104 ± 20 lbf



If necessary, adjust the belt tension.



HINT:
- ”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 belt, check that it fits properly in the ribbed grooves.
  Check by hand to confirm that the belt has not slipped out of the groove on the bottom of the pulley.
- After installing a new belt, run the engine for about 5 minutes and recheck the belt tension.



VALVE CLEARANCE INSPECTION AND ADJUSTMENT

HINT: Inspect and adjust the valve clearance when the engine is cold.

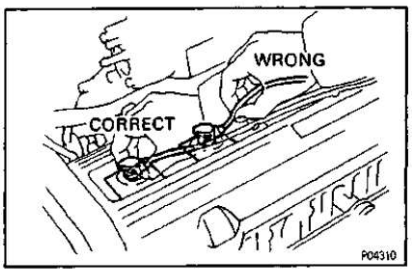
1. DISCONNECT ACCELERATOR CABLE FROM ACCELERATOR BRACKET

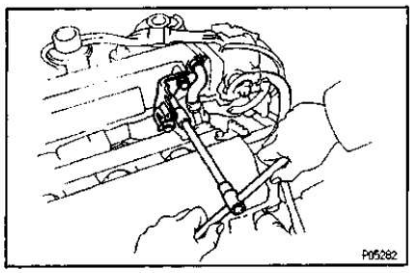
2. (A/T)
DISCONNECT THROTTLE CABLE FROM ACCELERATOR BRACKET

3. REMOVE CYLINDER HEAD COVER

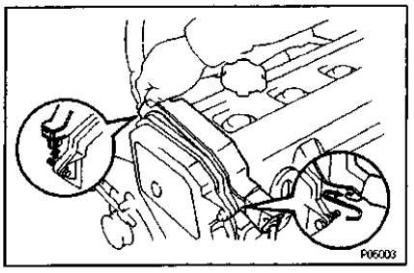
(a) Disconnect the high – tension cords at the rubberboot. Do not pull on the high–tension cords.

NOTICE: Pulling on or bending the cords may damage the conductor inside.

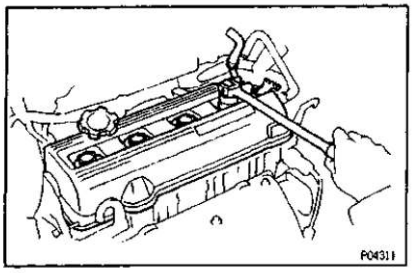




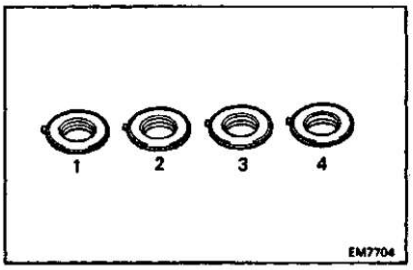
(b) Remove the two bolts and accelerator bracket.
(c) Disconnect the PCV hose from the intake manifold.



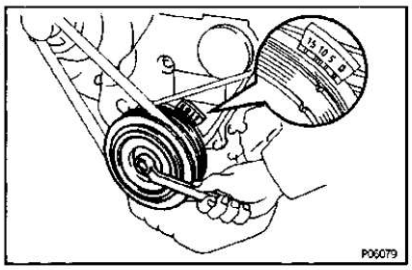
(d) Disconnect the engine wire protector between the No. 3 timing belt cover and cylinder head cover.



(e) Remove the four nuts, grommets, cylinder head cover and gasket.

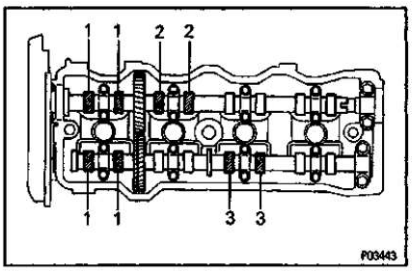


HINT: Arrange the grommets in correct order, so that they can be reinstalled into their original positions. This minimizes any possibility of oil leakage due to reuse of grommets.



4. SET NO.1 CYLINDER TO TDC/COMPRESSION

(a) Turn the crankshaft pulley and align its groove with timing mark "0" of the No.1 timing belt cover.
(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.



5. INSPECT VALVE CLEARANCE

(a) Check only the valves indicated.
Using a feeler gauge, measure the clearance be– tween the valve lifter and camshaft.
Record the out – of – specification valve clear– ance measurements. They will be used later to determine the required replacement adjusting shim.

Valve clearance (Cold):

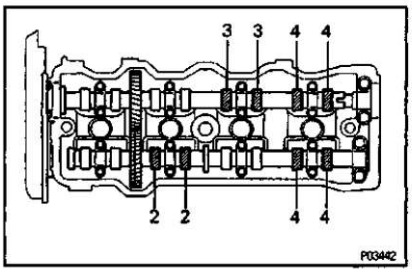
Intake

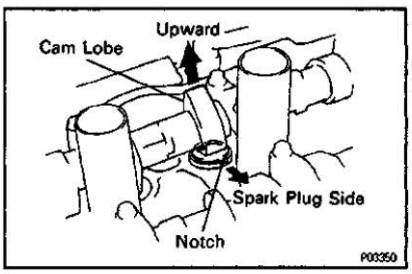
0.19 – 0.29 mm (0.007 – 0.011 in.)

Exhaust

0.28 – 0.38 mm (0.011 – 0.015 in.)

(b) Turn the crankshaft one revolution (360°) and align the mark as above. (See procedure in step 8)
(c) Check only the valves indicated as shown. Measure the valve clearance. (See procedure in step (a))

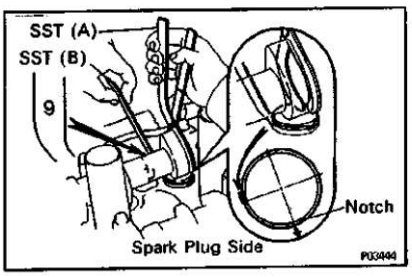




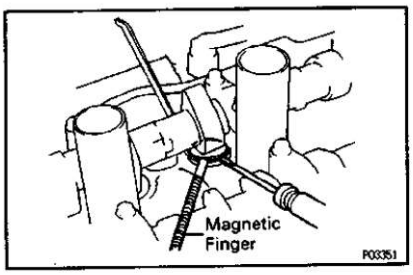
6. ADJUST VALVE CLEARANCE

(a) Remove the adjusting shim.

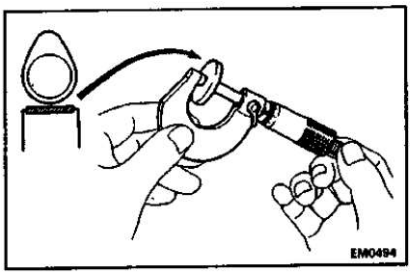
- Turn the crankshaft so that the cam lobe of the camshaft on the adjusting valve upward.
- Position the notch of the valve lifter facing the spark plug side.



Using SST (A), press down the valve lifter and place SST (B) between the camshaft and valve lifter. Remove SST (A).
SST 09248–55020 (09248–05011, 09248–05021)
HINT: Apply SST (B) at slight angle on the side marked with ”9”, at the position shown in the illustration.



Remove the adjusting shim with a small screw–driver and magnetic finger.



(b) Determine the replacement adjusting shim size by following the Formula or Charts:
- Using a micrometer, measure the thickness of the removed shim.
- Calculate the thickness of a new shim so that the valve clearance comes within specified value.
  T ..... Thickness of removed shim
  A ..... Measured valve clearance
  N ..... Thickness of new shim

Intake:

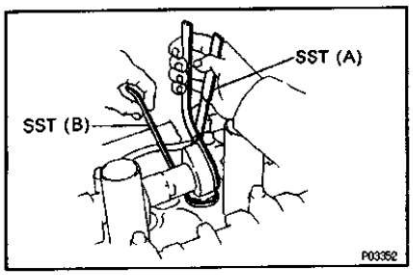
N = T + E (A – 0.24 mm (0.009 in.))

Exhaust:

N = T + (A – 0.33 mm (0.013 in.))

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

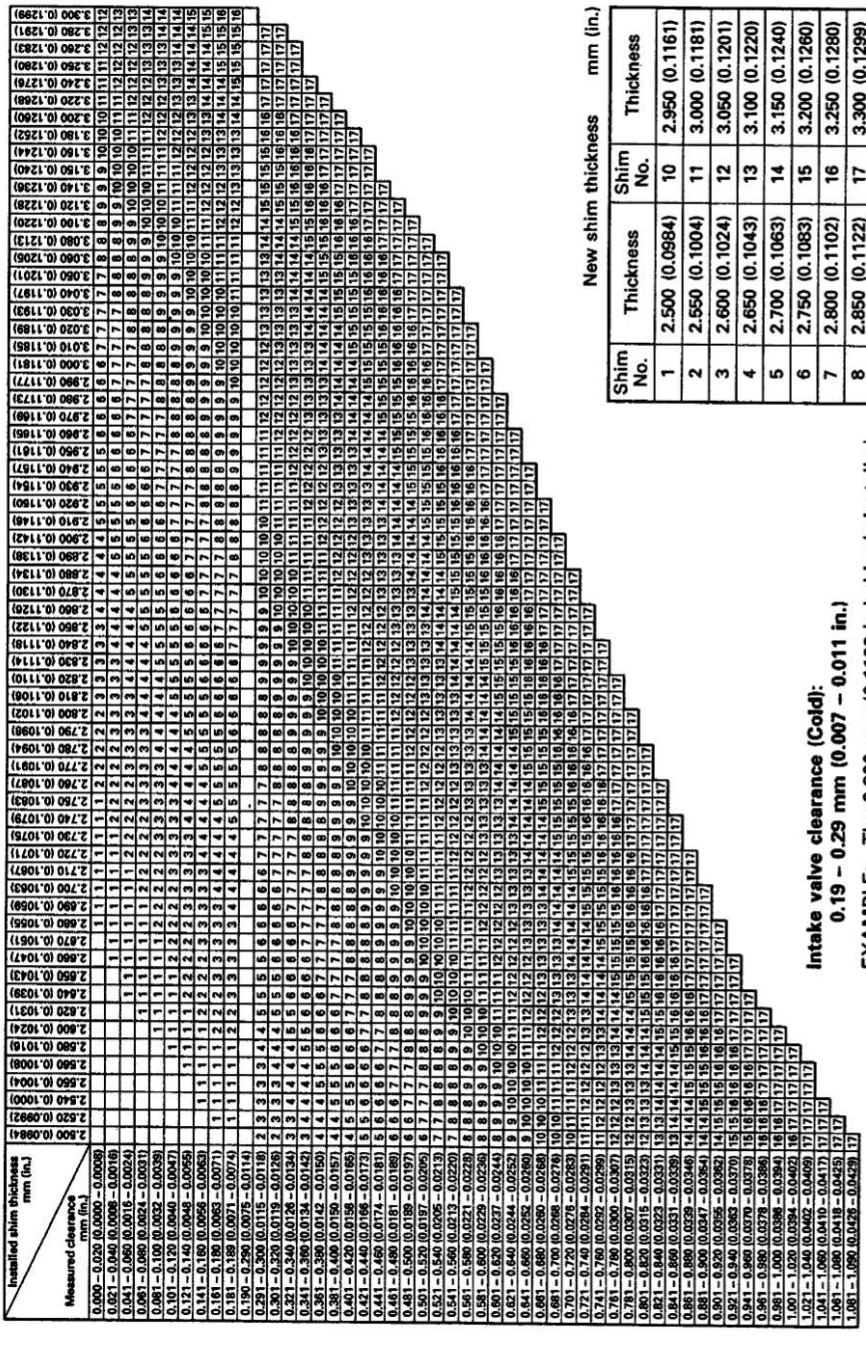
HINT: Shims are available in seventeen sized in in–crements of 0.05 mm (0.0020 in.), from 2.50 mm (0.0984 in.) to 3.30 mm (0.1299 in.).



(c) 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 09248–55020 (09248–05011, 09248–05021)

(d) Recheck the valve clearance.

Adjusting Shim Selection Chart (Intake)



New shim thickness mm (in.)

Shim No.	Thickness	Shim No.	Thickness
1	2.500 (0.0984)	10	2.950 (0.1161)
2	2.550 (0.1004)	11	3.000 (0.1181)
3	2.600 (0.1024)	12	3.050 (0.1201)
4	2.650 (0.1043)	13	3.100 (0.1220)
5	2.700 (0.1063)	14	3.150 (0.1240)
6	2.750 (0.1083)	15	3.200 (0.1260)
7	2.800 (0.1102)	16	3.250 (0.1280)
8	2.850 (0.1122)	17	3.300 (0.1299)
9	2.900 (0.1142)		

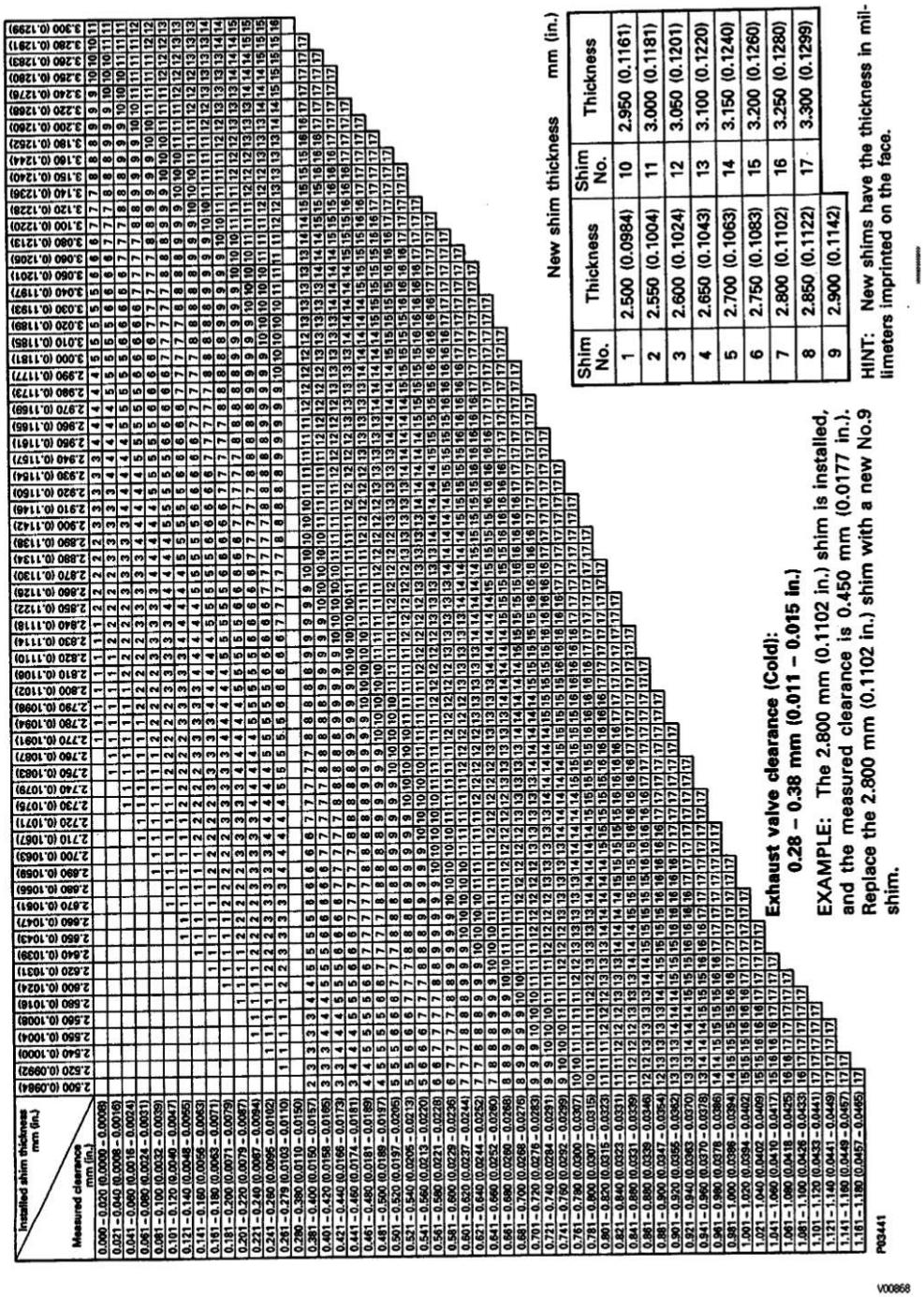
Intake valve clearance (Cold):
0.19 – 0.29 mm (0.007 – 0.011 in.)

EXAMPLE: The 2.800 mm (0.1102 in.) shim is installed, and the measured clearance is 0.450 mm (0.0177 in.). Replace the 2.800 mm (0.1102 in.) shim with a new No.11 shim.

HINT: New shims have the thickness in millimeters imprinted on the face.

V00857

Adjusting Shim Selection Chart (Exhaust)



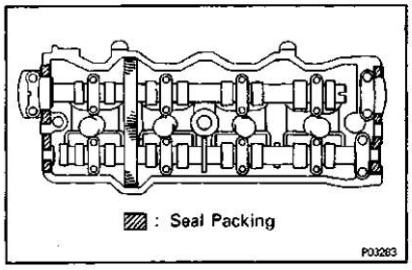
New shim thickness mm (in.)

Shim No.	Thickness	Shim No.	Thickness
1	2.500 (0.0984)	10	2.950 (0.1161)
2	2.550 (0.1004)	11	3.000 (0.1181)
3	2.600 (0.1024)	12	3.050 (0.1201)
4	2.650 (0.1043)	13	3.100 (0.1220)
5	2.700 (0.1063)	14	3.150 (0.1240)
6	2.750 (0.1083)	15	3.200 (0.1260)
7	2.800 (0.1102)	16	3.250 (0.1280)
8	2.850 (0.1122)	17	3.300 (0.1299)
9	2.900 (0.1142)		

Exhaust valve clearance (Cold):
0.28 – 0.38 mm (0.011 – 0.015 in.)

EXAMPLE: The 2.800 mm (0.1102 in.) shim is installed, and the measured clearance is 0.450 mm (0.0177 in.). Replace the 2.800 mm (0.1102 in.) shim with a new No.9 shim.

HINT: New shims have the thickness in millimeters imprinted on the face.



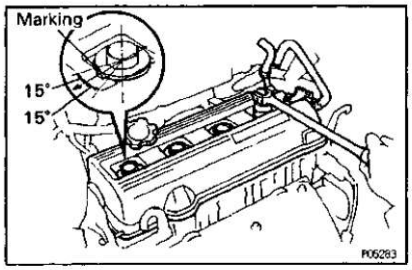
7. INSTALL CYLINDER HEAD COVER

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

(b) Apply seal packing to the cylinder head as shown in the illustration.

Seal packing:

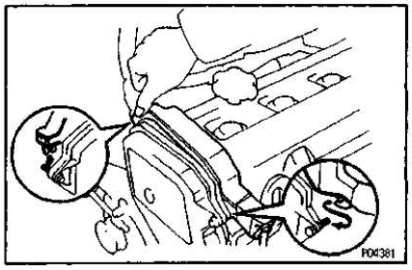
Part No. 08826–00080 or equivalent



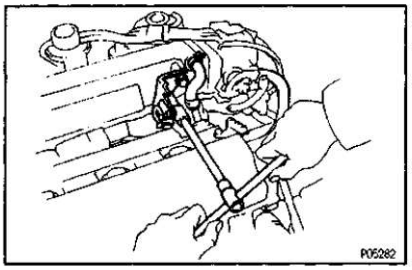
(c) Install the gasket to the cylinder head cover.

(d) Install the cylinder head cover with the four grommets and nuts.

Torque: 23 N–m (230 kgf–cm, 17 ft–lbf)



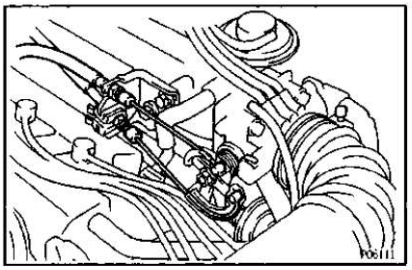
(e) Install the two clamps of the engine wire protector to the each bolts.



(f) Connect the PCV hose to the intake manifold.

(g) Install the accelerator bracket with the two bolts.

(h) Connect the four high–tension cords to the spark plugs.



8. INSTALL ACCELERATOR CABLE TO ACCELERATOR BRACKET

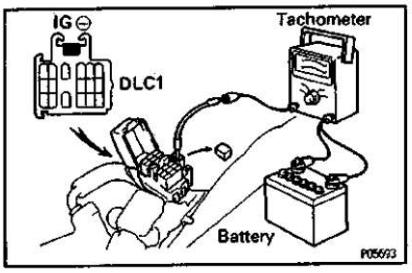
9. INSTALL THROTTLE CABLE TO ACCELERATOR BRACKET

IGNITION TIMING INSPECTION AND ADJUSTMENT

1. REMOVE RH ENGINE HOOD SIDE PANEL

2. WARM UP ENGINE

Allow the engine to warm up to normal operating temperature.



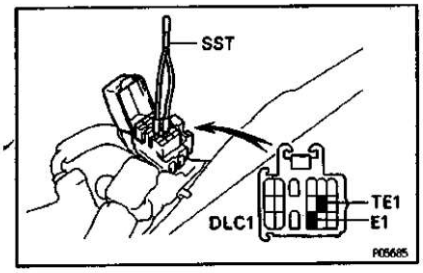
3. CONNECT TACHOMETER AND TIMING. LIGHT TO ENGINE

Connect the test probe of a tachometer to terminal IG (–) of the data link connector 1.

NOTICE:

Never allow the tachometer terminal to touch ground as it could result in damage to the igniter and/or ignition coil.

- As some tachometers are not compatible with this ignition system, we recommend that you confirm the compatibility of your unit before use.

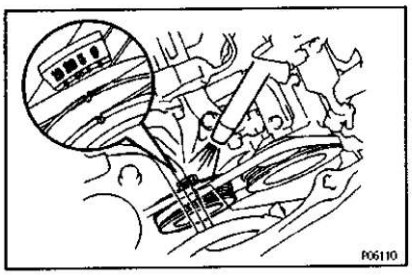


4. ADJUST IGNITION TIMING

(a) Using SST, connect terminals TE1 and E1 of the the data link connector 1.

SST 09843–18020

HINT: After engine rpm is kept at 1,000 – 1,300 rpm for 5 seconds, check that it returns to idle speed.

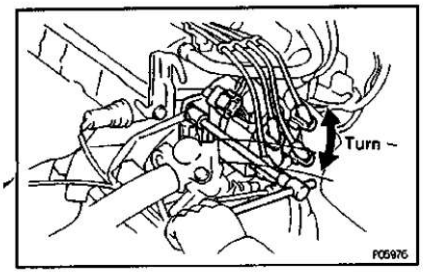


(b) Using a timing light, check the ignition timing.

Ignition timing:

10° BTDC @ idle

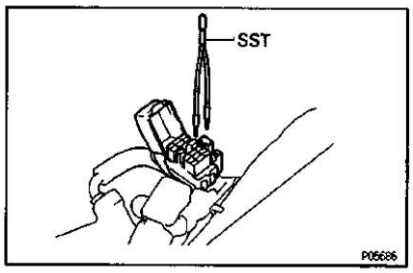
(Transmission in neutral position)



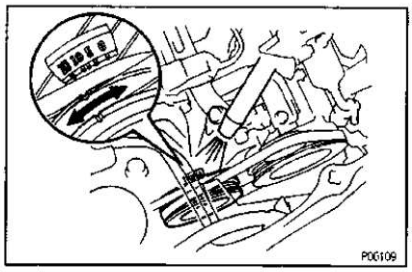
(c) Loosen the two hold–down bolts, and adjust by turning the distributor.

(d) Tighten the two hold–down bolts, and recheck the ignition timing.

Torque: 19 N–m (195 kgf–cm, 14 ft–lbf)



(e) Remove the SST from the data link connector 1.
SST 09843–18020



5. FURTHER CHECK IGNITION TIMING
Ignition timing:
13 – 22° BTDC @ idle
(Transmission in neutral position)
HINT: The timing mark moves in a range between 13° and 22°.

6. DISCONNECT TACHOMETER AND TIMING LIGHT FROM ENGINE
7. REINSTALL RH ENGINE HOOD SIDE PANEL

IDLE SPEED INSPECTION

1. INITIAL CONDITIONS

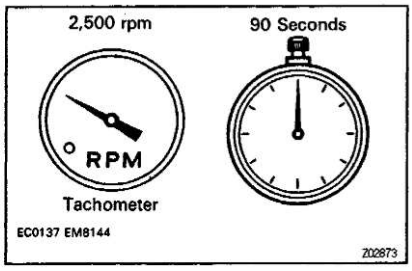
(a) Engine at normal operating temperature
(b) Air cleaner installed
(c) All pipes and hoses of air induction system connected
(d) All accessories switched OFF
(e) All vacuum lines properly connected

HINT: All vacuum hoses for EGR systems, etc. should be properly connected.

(f) MPI system wiring connectors fully plugged
(g) Ignition timing set correctly
(h) Transmission in neutral position

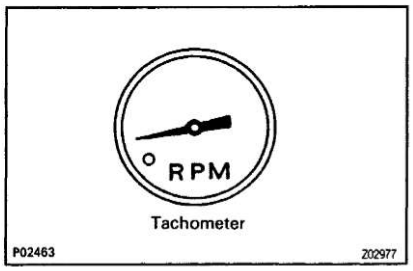
2. CONNECT TACHOMETER

(See step 2 in Ignition Timing Inspection and Adjustment)



3. INSPECT IDLE SPEED

(a) Race the engine speed at 2,500 rpm for approx. 90 seconds.



(b) Check the idle speed.

Idle speed:

750 ± 50 rpm for USA M/T
700 ± 50 rpm for USA A/T
850 ± 50 rpm for CANADA M/T

If the idle speed is not as specified, check the IACV.

4. DISCONNECT TACHOMETER

TURBOCHARGER

ON–VEHICLE INSPECTION

1. INSPECT INTAKE AIR SYSTEM

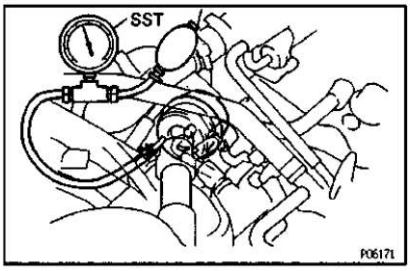
Check for leakage or clogging between the air cleaner housing and turbocharger inlet and between the tur–bocharger outlet and cylinder head.

- Clogged air cleaner .... Clean or replace element
- Hoses collapsed or deformed .... Repair or replace
- Leakage from connections .... Check each con–nection and repair
- Cracks in components .... Check and replace

2. INSPECT EXHAUST SYSTEM

Check for leakage or clogging between the cylinder head and turbocharger inlet and between the turbo–charger outlet and exhaust pipe.

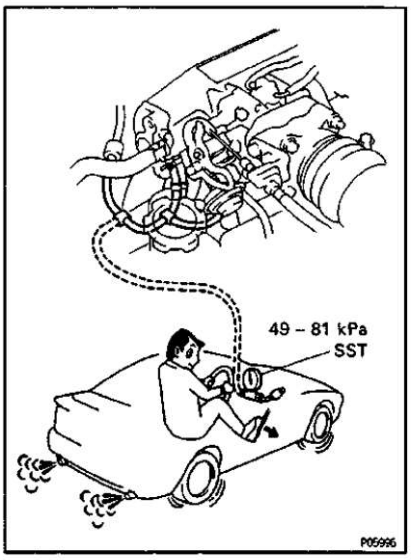
- Deformed components .... Repair or replace
- Foreign material in passages .... Remove
- Leakage from components .... Repair or replace
- Cracks in components .... Check and replace



3. INSPECT ACTUATOR OPERATION

(a) Disconnect the actuator hose.

(b) Using SST, a turbocharger pressure gauge, apply approx. 65 kPa (0.66 kgf/cm^2, 9.4 psi) of pressure to the actuator and check that the rod moves.
If the rod does not move, replace the turbocharger assembly.
SST 09992 – 00241
NOTICE: Never apply more than 81 kPa (0.83 kgf/cm^2, 11.8 psi) of pressure to the actuator.



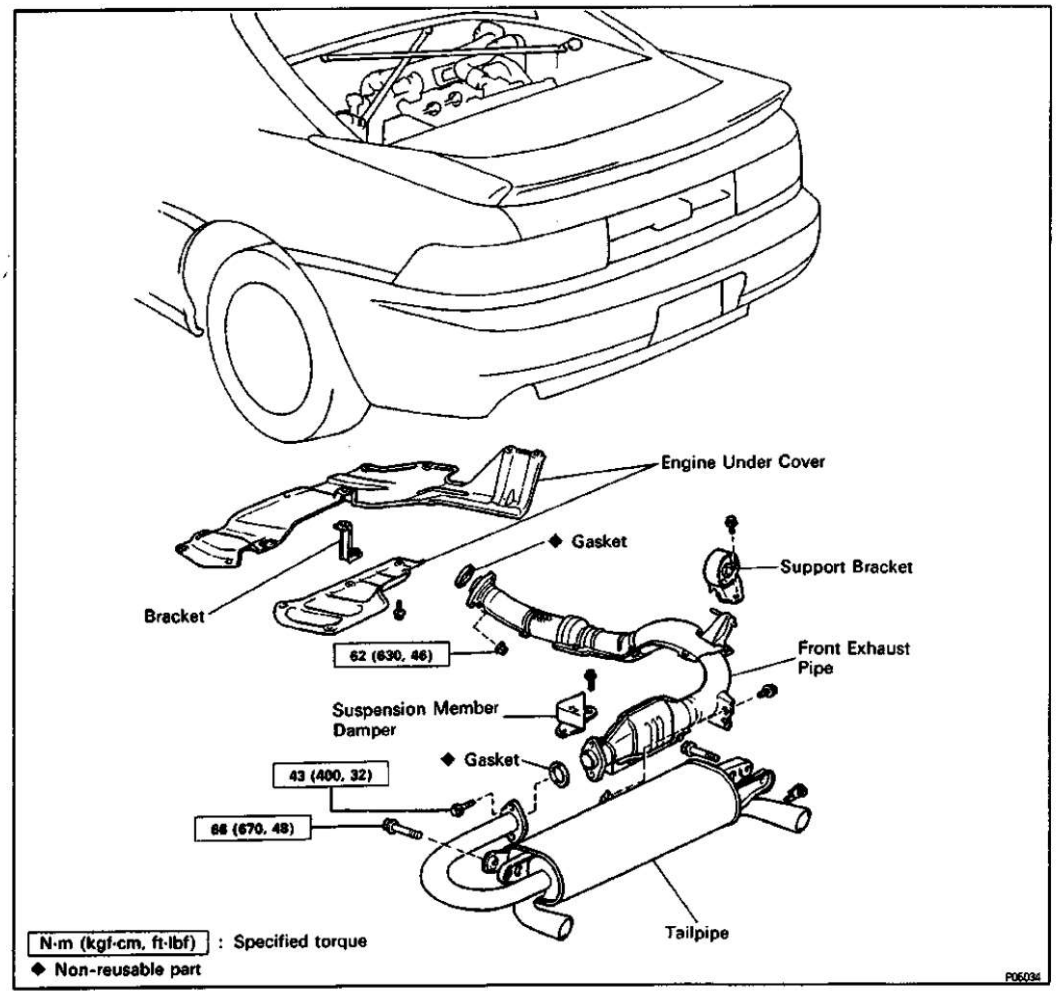
4. CHECK TURBOCHARGING PRESSURE

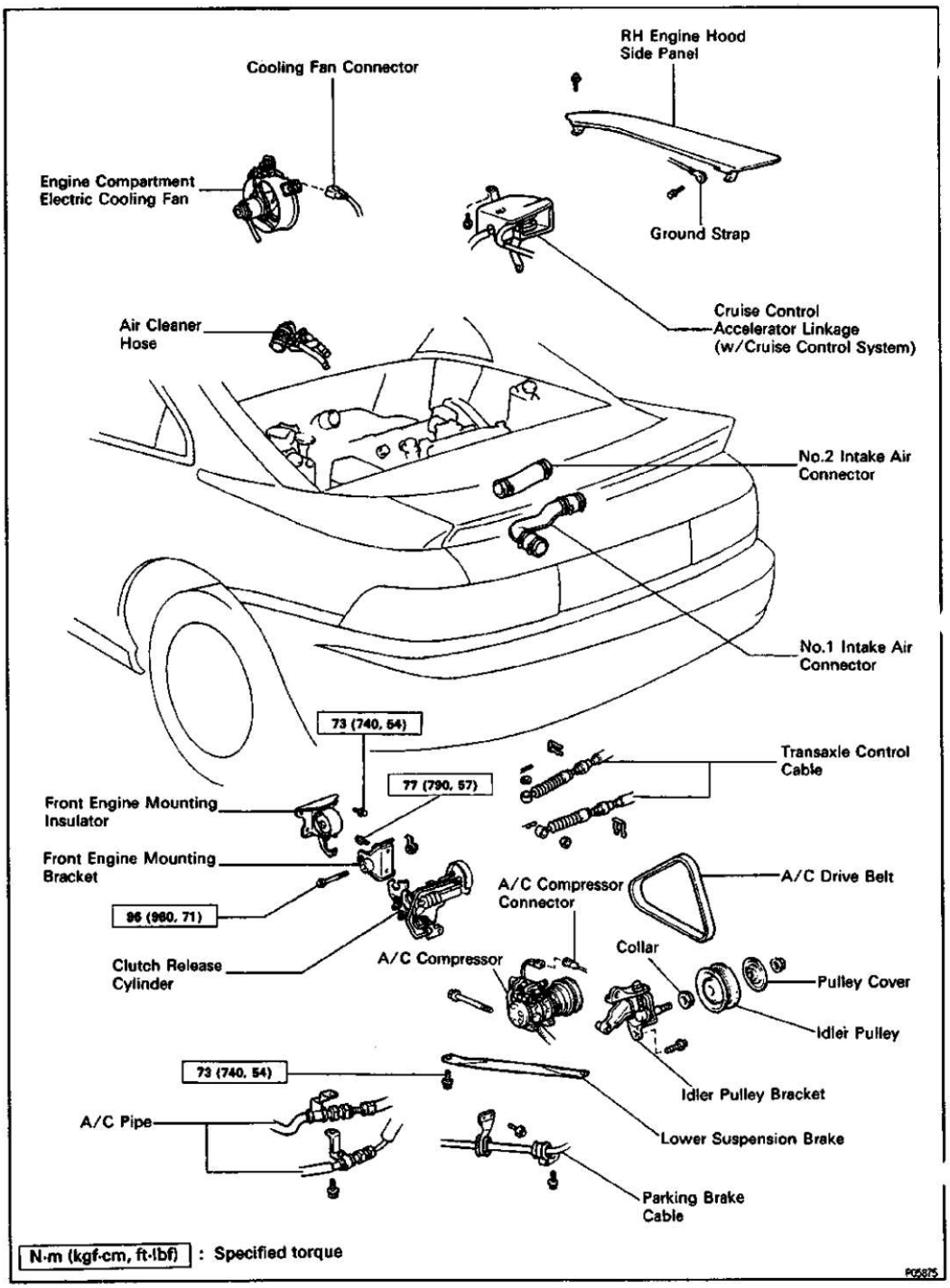
(a) Using a 3–way connector, connect SST, a turboch–arger pressure gauge, to the hose between the intake manifold and manifold absolute pressure sensor.
SST 09992 – 00241

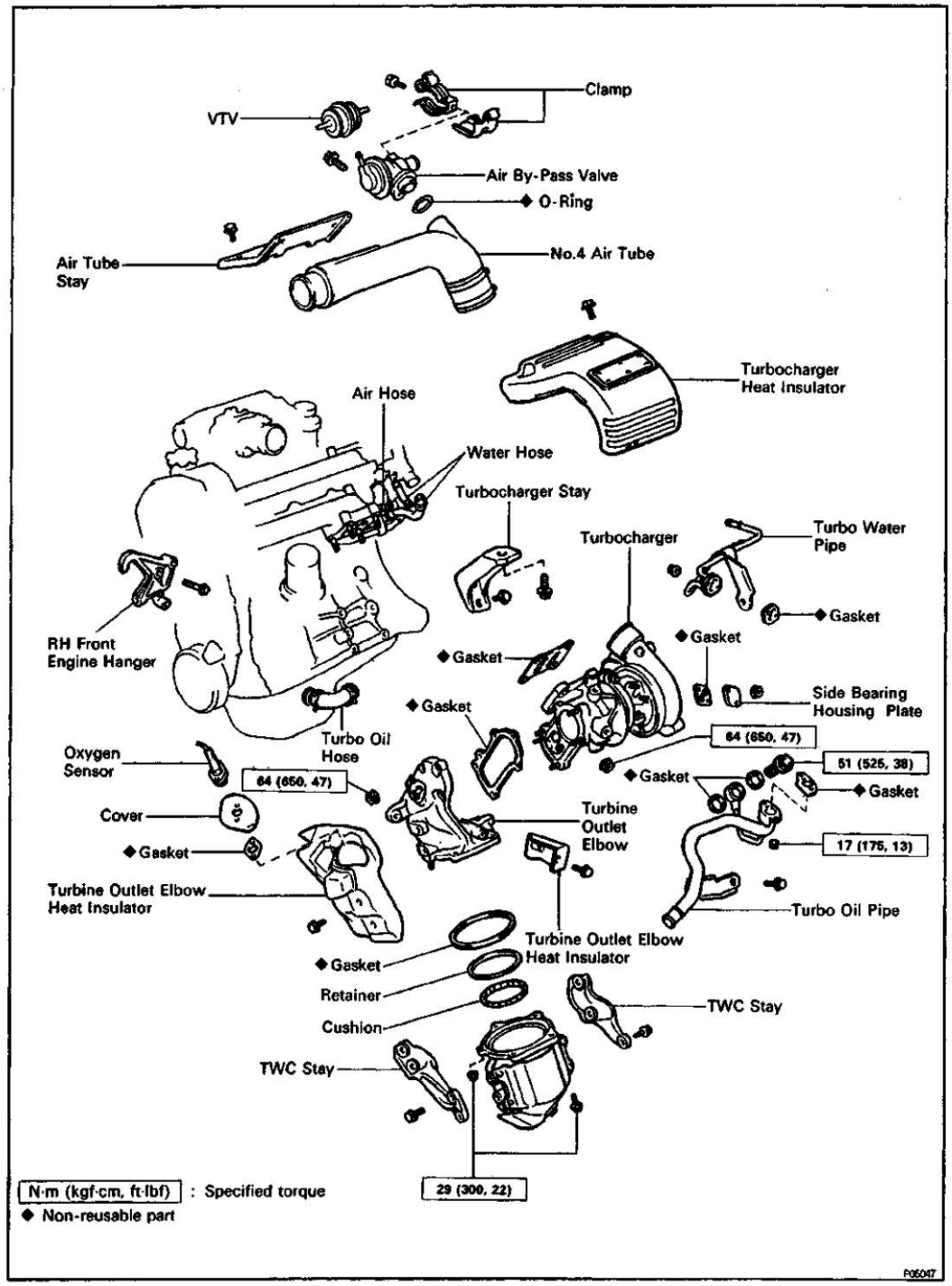
(b) While driving with the engine running at 2,800 rpm or more with the throttle valve fully open in the 3rd gear, check the turbocharging pressure.
Standard pressure:
49 – 81 kPa (0.50 – 0.83 kgf/cm', 7.1 – 11.8 psi)
If the pressure is less than that specified, check the intake air and exhaust systems for leakage. If there is no leakage, replace the turbocharger assembly.
If the pressure is above specification, check if the actuator hose is disconnected or cracked. If not, re–place the turbocharger assembly.

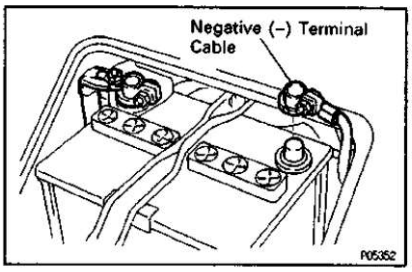
5. INSPECT IMPELLER WHEEL ROTATION
(See step 1 in Turbocharger Inspection)
6. INSPECT VSV FOR TURBOCHARGING PRESSURE
(See VSV Inspection under SMPI System)
7. INSPECT MAP
(See MAP Inspection under SMPI System)

COMPONENTS FOR REMOVAL AND INSTALLATION




RH Engine Hood Side Panel
Cooling Fan Connector
Engine Compartment Electric Cooling Fan
Ground Strap
Cruise Control Accelerator Linkage (w/Cruise Control System)
Air Cleaner Hose
No.2 Intake Air Connector
No.1 Intake Air Connector
73 (740, 54)
Transaxle Control Cable
77 (790, 57)
Front Engine Mounting Insulator
Front Engine Mounting Bracket
A/C Compressor Connector
A/C Drive Belt
96 (980, 71)
Clutch Release Cylinder
A/C Compressor
Collar
Pulley Cover
Idler Pulley
73 (740, 54)
Idler Pulley Bracket
A/C Pipe
Lower Suspension Brake
Parking Brake Cable
N·m (kgf·cm, ft·lbf) : Specified torque
P05875


Clamp
VTV
Air By-Pass Valve
◆ O-Ring
Air Tube Stay
No.4 Air Tube
Turbocharger Heat Insulator
Air Hose
Water Hose
Turbocharger Stay
Turbocharger
Turbo Water Pipe
◆ Gasket
RH Front Engine Hanger
◆ Gasket
◆ Gasket
Side Bearing Housing Plate
Turbo Oil Hose
64 (650, 47)
Oxygen Sensor
64 (650, 47)
◆ Gasket
51 (525, 38)
◆ Gasket
Cover
Turbine Outlet Elbow
◆ Gasket
17 (175, 13)
Turbine Outlet Elbow Heat Insulator
Turbo Oil Pipe
Turbine Outlet Elbow Heat Insulator
◆ Gasket
Retainer
TWC Stay
Cushion
TWC Stay
29 (300, 22)
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part
P05047



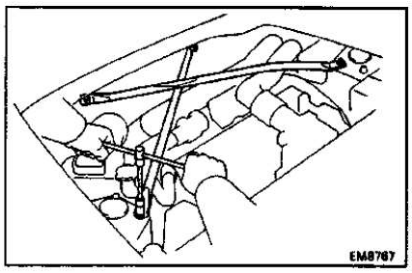
TURBOCHARGER REMOVAL

(See Components for Removal and Installation)

1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY

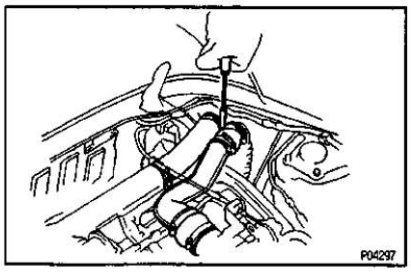
   CAUTION: Turn the ignition switch to "LOCK". Disconnect the negative terminal from the battery. Wait at least 20 seconds before proceeding with work.

2. DRAIN ENGINE OIL
3. REMOVE ENGINE UNDER COVERS
4. REMOVE RH ENGINE HOOD SIDE PANEL

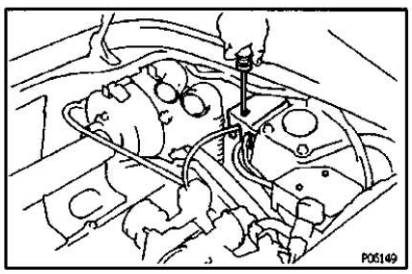


5. REMOVE UPPER SUSPENSION BRACE

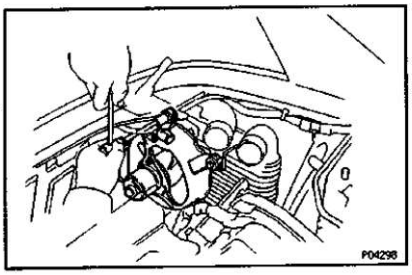
   Remove the two bolts, two nuts and upper brace.



6. REMOVE NO.1 AND NO.2 INTAKE AIR CONNECTORS

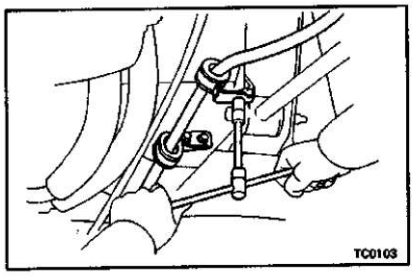


7. (w/ CRUISE CONTROL SYSTEM)
   REMOVE CRUISE CONTROL ACCELERATOR LINKAGE



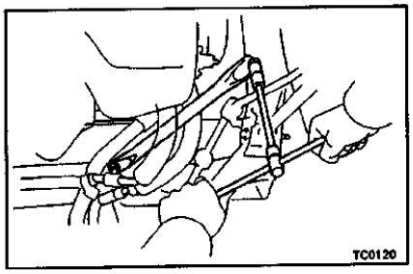
8. REMOVE ENGINE COMPARTMENT ELECTRIC COOLING FAN

(a) Disconnect the cooling fan connector.
(b) Loosen the three bolts, and remove the cooling fan.

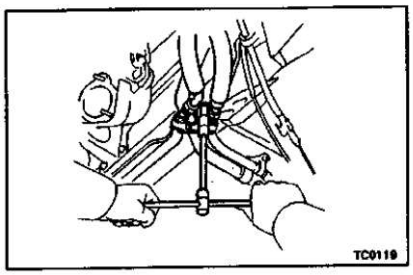


9. DISCONNECT A/C COMPRESSOR FROM ENGINE

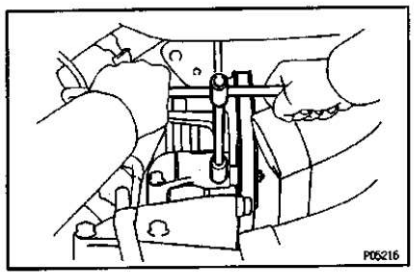
(a) Remove the three clamp bolts, and disconnect the parking brake cable.



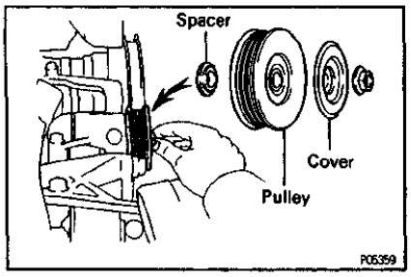
(b) Remove the two bolts and lower suspension brace.



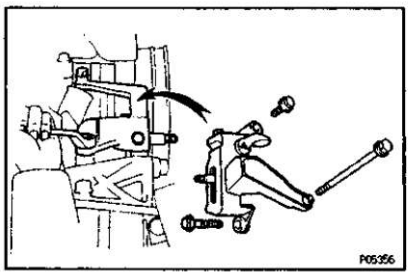
(c) Remove the clamp nut, and disconnect the two A/C pipes.



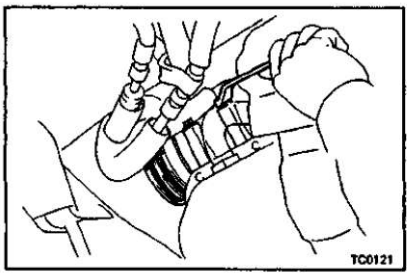
(d) Loosen the idler pulley nut.
(e) Loosen the adjusting bolt, and remove the drive belt.



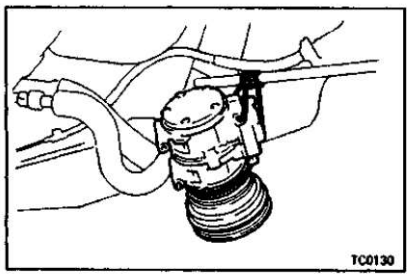
(f) Remove the nut, pulley cover, idler pulley and spacer.



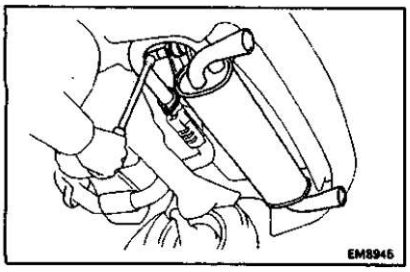
(g) Disconnect the A/C compressor connector.
(h) Remove the three bolts and idler pulley bracket.



(i) Remove the two bolts, and disconnect the A/C com–pressor from the engine.

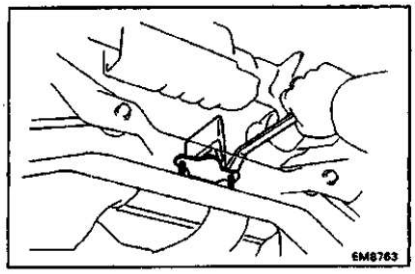


HINT: Suspend the A/C compressor to strut rod with a string.



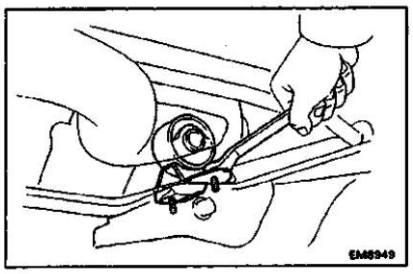
10. REMOVE TAILPIPE

(a) Remove the two bolts holding the front exhaust pipe to the tailpipe bracket.
(b) Remove the two bolts holding the front exhaust pipe to the tailpipe.
(c) Remove the two bolts, tailpipe and gasket.

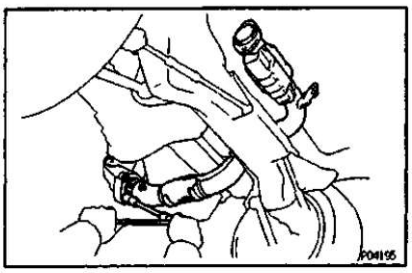


11. REMOVE FRONT EXHAUST PIPE

(a) Remove the two bolts and damper.

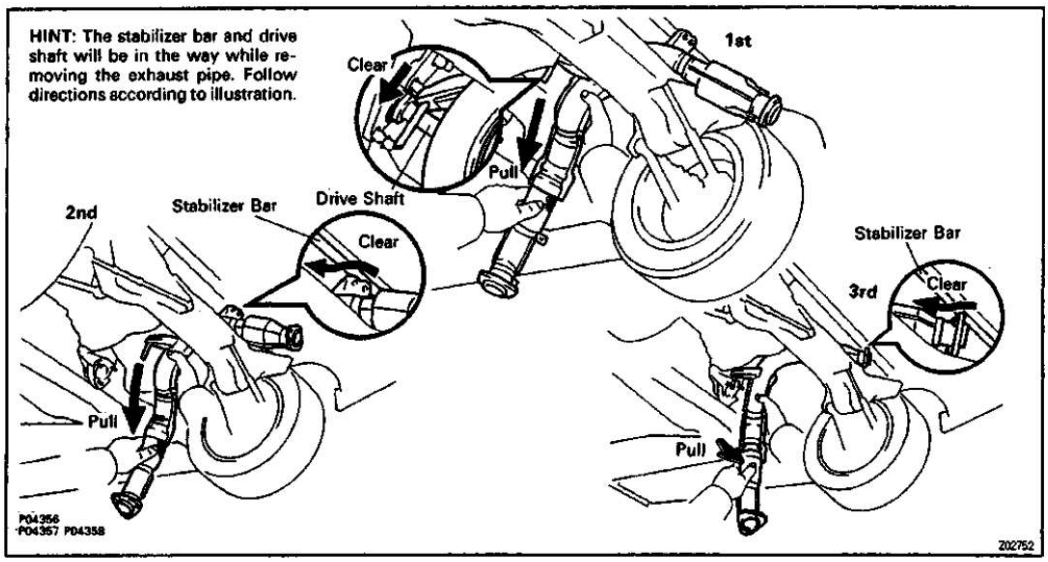


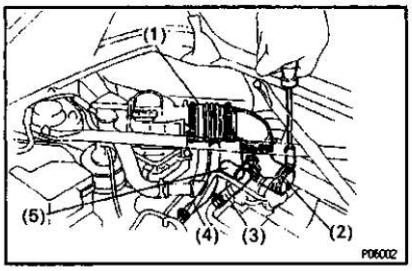
(b) Remove the two bolts and support bracket.



(c) Using a 14 mm deep socket wrench, remove the three nuts.

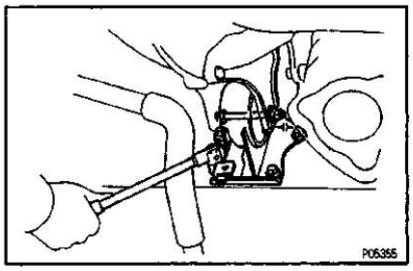
(d) Remove the front exhaust pipe and gasket.





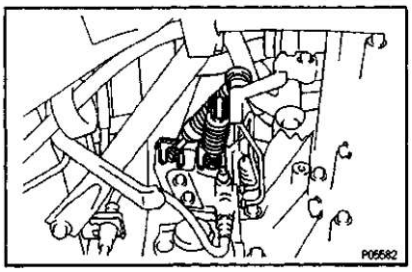
12. REMOVE AIR CLEANER HOSE

Disconnect the following hoses, and remove the air cleaner hose:
(1) Air cleaner hose from air flow sensor
(2) Air cleaner hose from turbocharger
(3) PCV hose from cylinder head cover
(4) Air hose from No.2 air hose
(5) Air hose from air by–pass valve



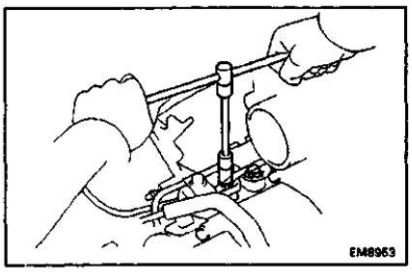
13. REMOVE FRONT ENGINE MOUNTING INSULATOR

(a) Remove the through bolt and nut holding the mounting insulator to the mounting bracket.
(b) Remove the four bolts and mounting insulator.

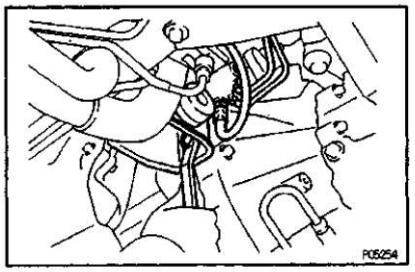


14. REMOVE FRONT ENGINE MOUNTING BRACKET AND CLUTCH RELEASE CYLINDER

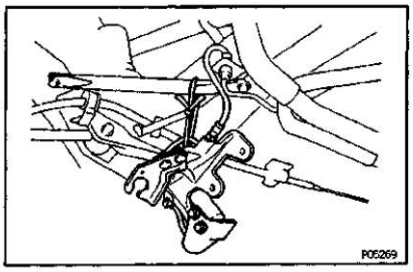
(a) Disconnect the two transaxle control cables from the transaxle.



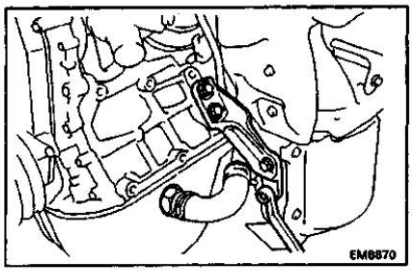
(b) Remove the two bolts holding the clutch release cylinder to the transaxle.



(c) Remove the two bolts and mounting bracket.
(d) Disconnect the clutch release cylinder from the transaxle.
Remove the three bolts and stiffener plate.

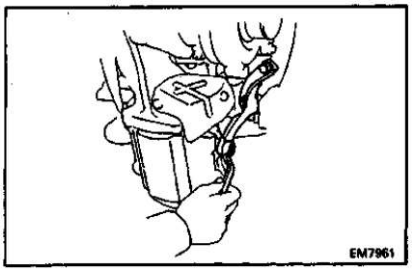


HINT: Suspend the clutch release cylinder to the suspension brace with a string.

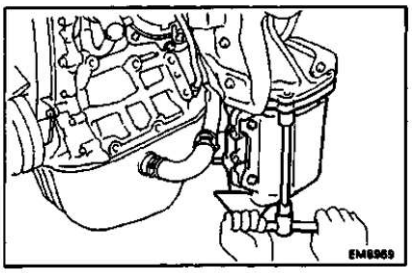


15. REMOVE MAIN TWC

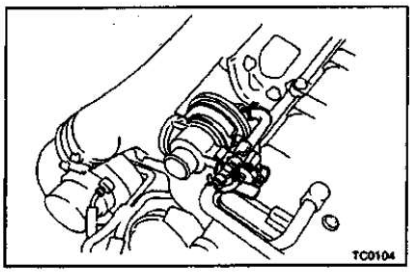
(a) Remove the four bolts and RH TWC stay.



(b) Remove the three bolts and LH TWC stay.



(c) Remove the three bolts, two nuts, TWC, gasket, retainer and cushion.



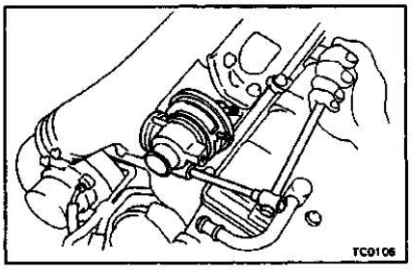
16. DISCONNECT AIR BY–PASS HOSES

(a) Disconnect the hose and VTV from the clamp.

(b) Disconnect the two air by–pass hoses.

17. REMOVE CLAMPS OF AIR BY–PASS HOSE AND VTV

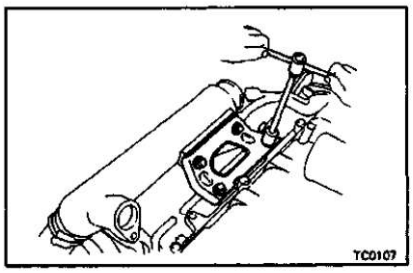
Remove the bolt and two clamps.



18. REMOVE AIR BY–PASS VALVE

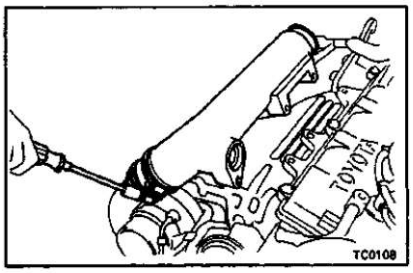
(a) Remove the bolt and air by–pass valve.

(b) Remove the O–ring from the air by–pass valve.

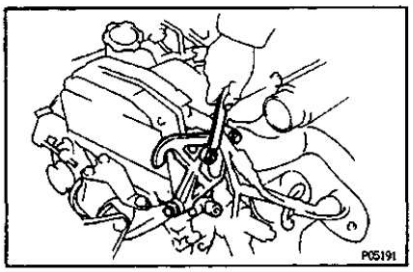


19. REMOVE NO.4 AIR TUBE

(a) Remove the four bolts and air tube stay.

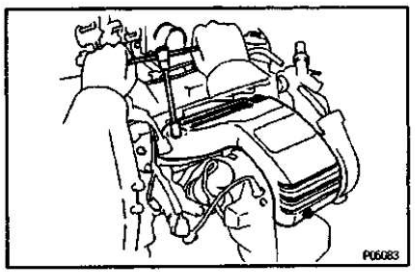


(b) Loosen the hose clamp, and remove the air tube.



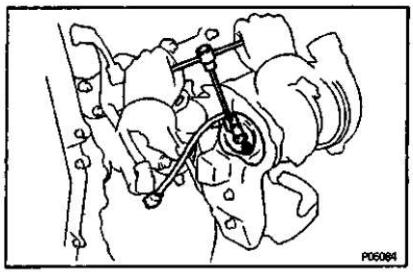
20. REMOVE RH FRONT ENGINE HANGER

Remove the four bolts and engine hanger.



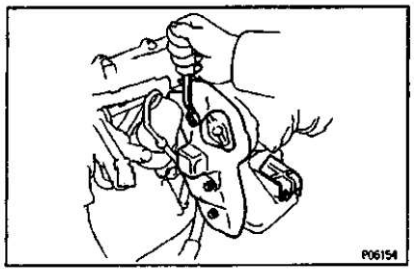
21. REMOVE TURBOCHARGER 'HEAT INSULATOR

Remove the three bolts and heat insulator.



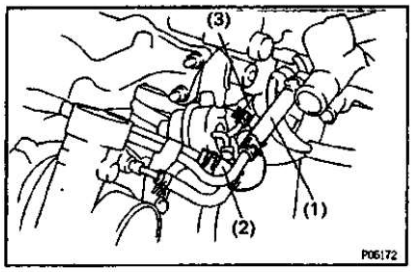
22. REMOVE OXYGEN SENSOR

(a) Disconnect the oxygen sensor connector.
(b) Remove the two nuts, cover, oxygen sensor and gasket.



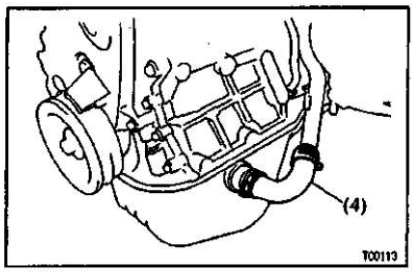
23. REMOVE HEAT INSULATORS OF TURBINE OUTLET ELBOW

(a) Remove the oil dipstick.
(b) Remove the three bolts and RH heat insulator.
(c) Remove the two bolts and LH heat insulator.

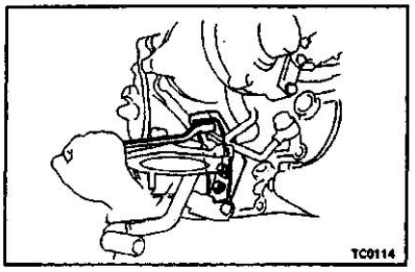


24. DISCONNECT HOSES

Disconnect the following hoses:
(1) Water hose from water inlet housing
(2) Water hose from water by–pass pipe
(3) Air hose from actuator

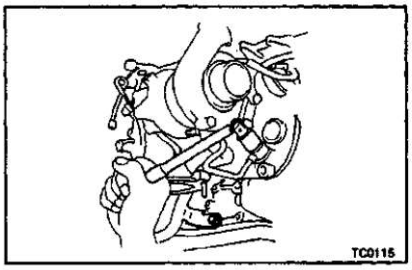


(4) Oil hose from turbo oil pipe



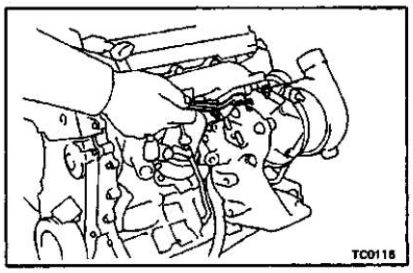
25. REMOVE TURBOCHARGER STAY

Remove the three bolts and turbocharger stay.

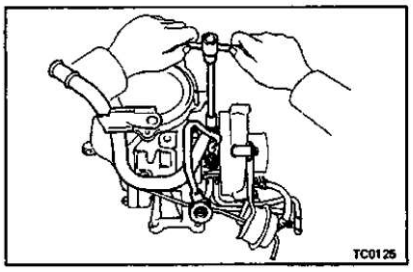


26. REMOVE TURBOCHARGER

(a) Remove the bolt and union bolt holding the No. 1 turbo oil pipe to the cylinder block. Remove the two union bolt gaskets.

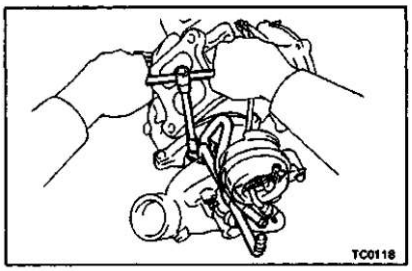


(b) Remove the four nuts, turbocharger and gasket.



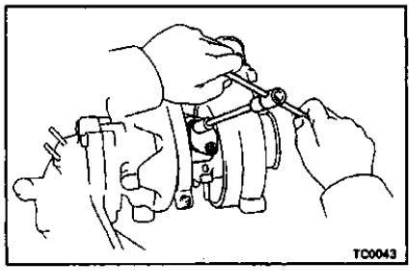
27. REMOVE TURBO OIL PIPE

Remove the two nuts, oil pipe and gasket.



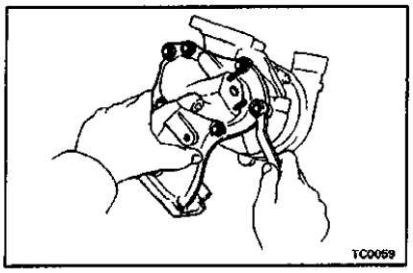
28. REMOVE TURBO WATER PIPE

Remove the two nuts, two bolts, water pipe and gasket.



29. REMOVE SIDE BEARING HOUSING PLATE

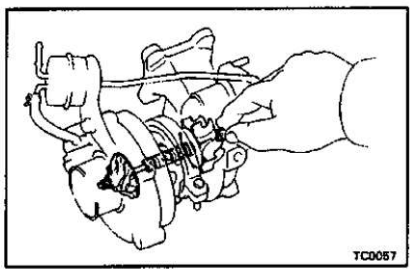
Remove the two nuts, housing plate and gasket.



30. REMOVE TURBING OUTLET ELBOW

Remove the six nuts, outlet elbow and gasket.

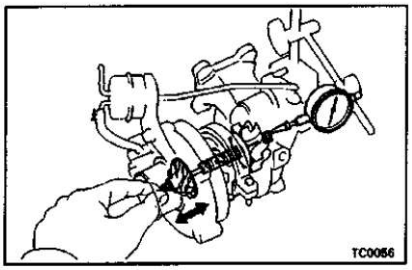
TURBOCHARGER INSPECTION



1. INSPECT IMPELLER WHEEL ROTATION

Grasp the edge of the turbine wheel and turn it. Check that the impeller wheel turns smoothly.

If the impeller wheel does not turn or if it turns with a drag, replace the turbocharger assembly.



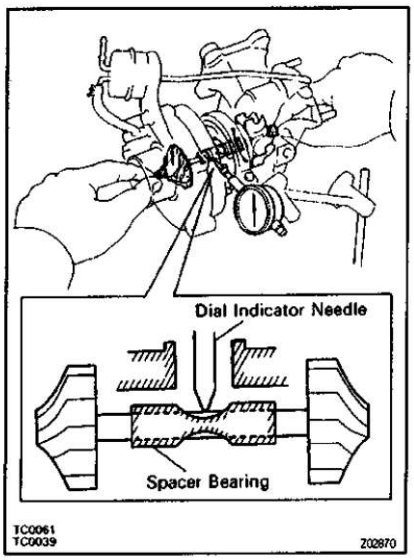
2. INSPECT AXIAL PLAY OF IMPELLER WHEEL

Insert a dial indicator into the intake side hold the turbine wheel edge by hand, and check the axial play.

Standard clearance:

0.13 mm (0.0051 in.) or less

If the axial play is not as specified, replace the tur–bocharger assembly.



3. INSPECT RADIAL PLAY OF IMPELLER WHEEL

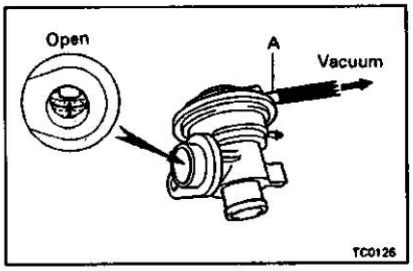
(a) From oil outlet hole, insert a dial indicator through the hole in the spacer bearing and set it in the center of the impeller shaft.

(b) Move the impeller shaft in a radial direction, measure the radial play of the impeller shaft.

Standard clearance:

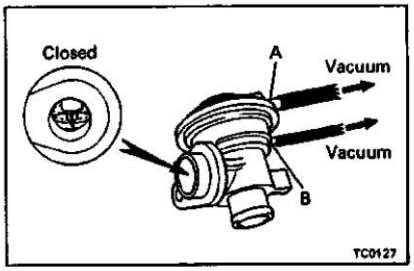
0.18 mm (0.0071 in.) or less

If the radial play is not as specified, replace the tur–bocharger assembly.

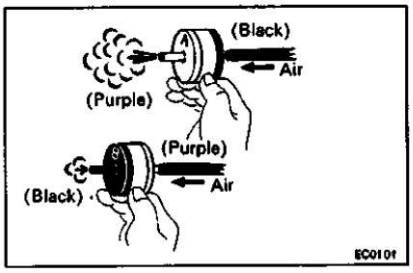


4. INSPECT AIR BY–PASS VALVE

(a) Apply vacuum to port A, and check that the valve is open.



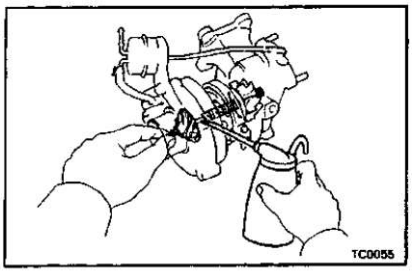
(b) In the preceding condition, apply vacuum to port B, and check that the valve is closed.
If operation is not as specified, replace the valve.



5. INSPECT VTV (FOR AIR BY–PASS VALVE)

(a) Check that air flows without resistance from ports ”B” to “A“.

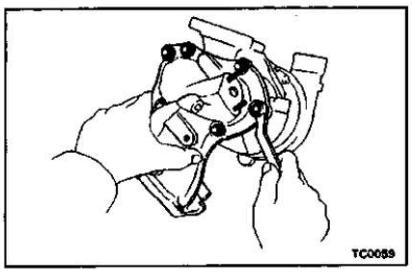
(b) Check that air flows without difficulty from ports ”A” to “13“.
If operation is not as specified, replace the VTV.



TURBOCHARGER INSTALLATION

(See Components for Removal and Installation)

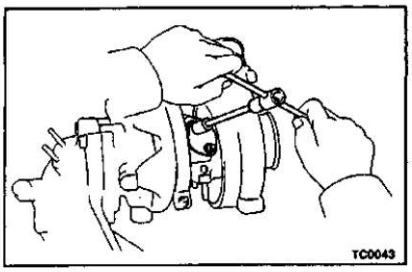
NOTICE: After replacing the turbocharger assembly, pour approx. 20 cm' (1.2 cu in.) of fresh oil into the oil inlet and turn the impeller wheel by hand to splash oil on the bearing.



1. INSTALL TURBINE OUTLET ELBOW

Install a new gasket and the outlet elbow with the six nuts.

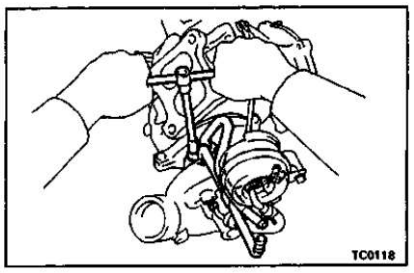
Torque: 64 N–m (650 kgf–cm, 47 ft–lbf)



2. INSTALL SIDE BEARING HOUSING PLATE

Install a new gasket and the housing plate with the two nuts.

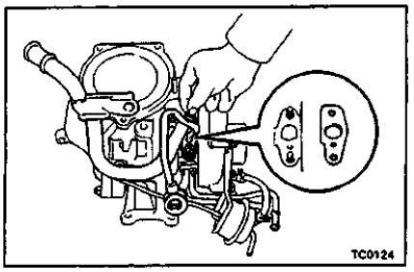
Torque: 11 N .m (120 kgf–cm, 9 ft–lbf)



3. INSTALL TURBO WATER PIPE

Install a new gasket and the water pipe with the two nuts and two bolts.

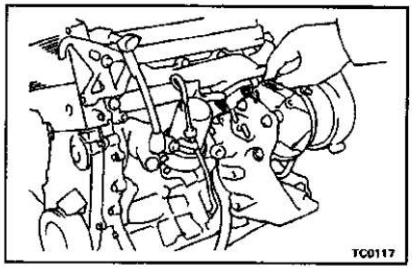
Torque:. 11 N–m (120 kgf–cm, 9 ft–lbf)



4. INSTALL TURBO OIL PIPE

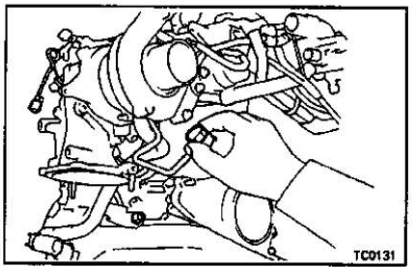
(a) Align the oil holes of the a new gasket and the tur–, bocharger housing.

(b) Install the gasket and oil pipe with the two nuts. Do not torque the nuts yet.

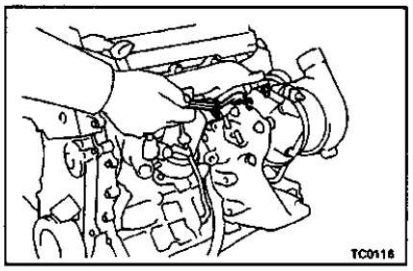


5. INSTALL TURBOCHARGER

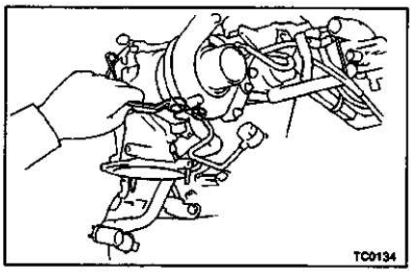
(a) Install a new gasket and the turbocharger with the four nuts. Do not torque the nuts.



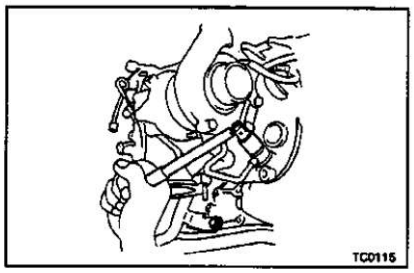
(b) Install the oil pipe with the bolt, two new gaskets and union bolt. Do not torque the bolt and union bolt.



(c) Tighten the four nuts holding the turbocharger to the exhaust manifold.
Torque: 64 N–m (650 kgf–cm, 47 ft–lbf)

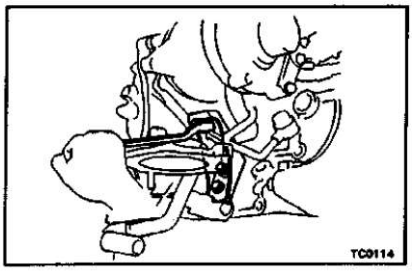


(d) Tighten the two nuts holding the oil pipe to the tur–bocharger.
Torque: 17 N–m (175 kgf–cm, 13 ft–lbf)



(e) Tighten the union bolt holding the oil pipe to the cylinder block.
Torque: 51 N–m (525 kgf–cm, 38 ft–lbf)

(f) Tighten the bolt holding the bracket of the oil pipe to the cylinder block.
Torque: 43 N–m (440 kgf–cm, 32 ft–lbf)



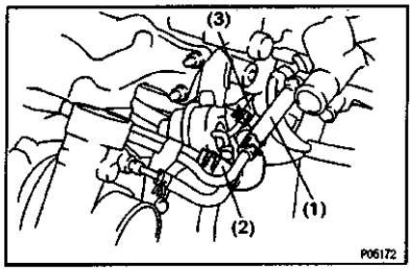
6. INSTALL TURBOCHARGER STAY

Install the turbocharger stay with the three bolts.

Torque:

69 N–m (705 kgf–cm, 51 ft–lbf) for turbocharger side

59 N–m (600 kgf–cm, 43 ft–lbf) for cylinder block side



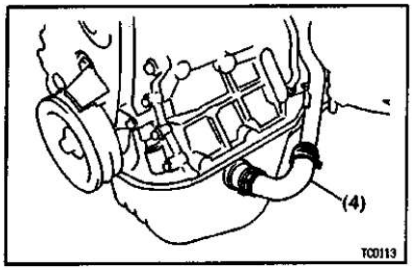
7. CONNECT HOSES

Disconnect the following hoses:

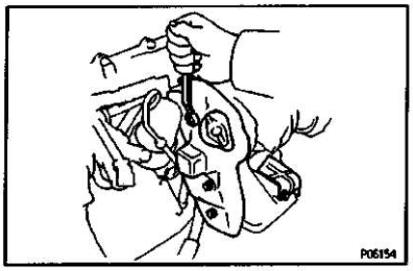
(1) Water hose to water inlet housing

(2) Water hose to water by–pass pipe

(3) Air hose to actuator



(4) Oil hose to turbo oil pipe

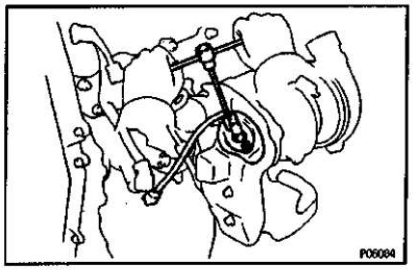


8. INSTALL HEAT INSULATORS OF TURBINE OUTLET ELBOW

(a) Install the RH heat insulator with the three bolts.

(b) Install the LH heat insulator with the two bolts.

(c) Install the oil dipstick.

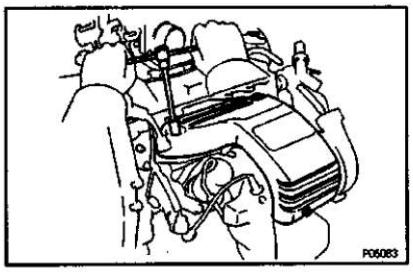


9. INSTALL OXYGEN SENSOR

(a) Install a new gaskets, the oxygen sensor and cover with the two nuts.

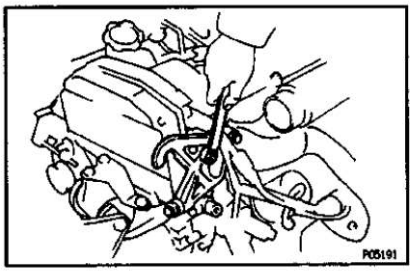
Torque: 44 N–m (450 kgf–cm, 33 ft–lbf)

(b) Connect the oxygen sensor connector.



10. INSTALL TURBOCHARGER HEAT INSULATOR

Install the heat insulator with the three bolts.



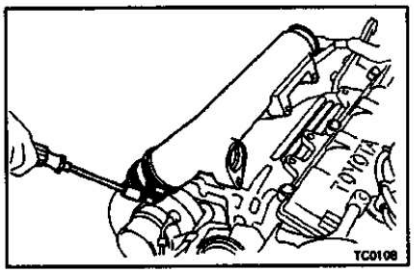
11. INSTALL RH FRONT ENGINE HANGER

Install the engine hanger with the four bolts.

Torque:

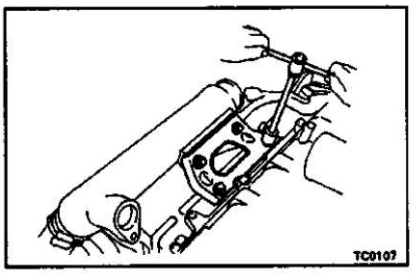
39 N–m (400 kgf–cm 29 ft–lbf) for cylinder head

61 N–m (620 kgf–cm 45 ft–lbf) for mounting bracket



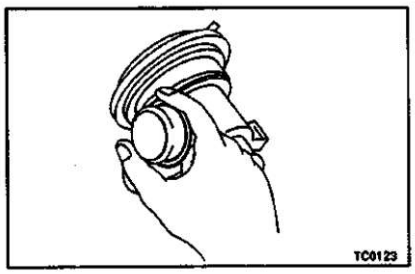
12. INSTALL NO.4 AIR TUBE

(a) Connect the air connector and air tube to the turbo–charger.



(b) Install the air tube stay with the four bolts.

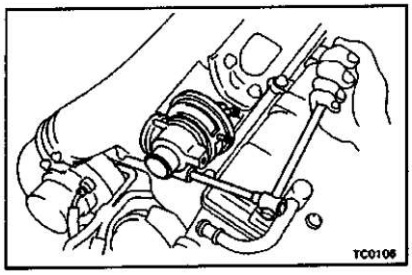
Torque: 19 N–m (195 kgf–cm, 14 ft–lbf)



13. INSTALL AIR BY–PASS VALVE

(a) Install a new O–ring to the air by–pass valve.

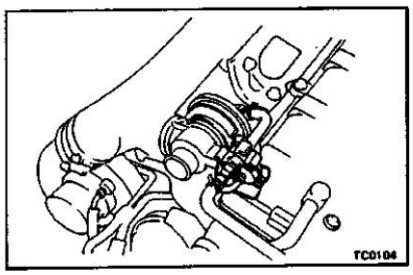
(b) Apply soapy water on the O–ring.



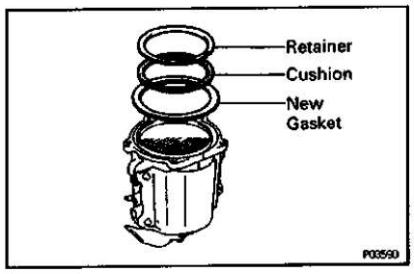
(c) Install the air by–pass valve with the bolt.
Torque: 19 N–m (195 kgf–cm, 14 ft–lbf)

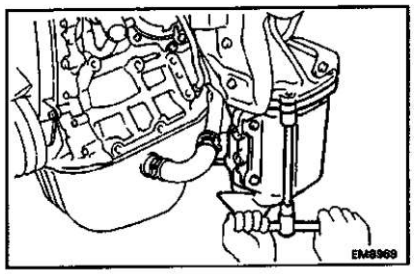
14. INSTALL CLAMPS OF AIR BY–PASS HOSE AND VTV
Install the two clamps with the bolt.

15. CONNECT AIR BY–PASS HOSES
(a) Connect the two air by–pass hoses.
(b) Install the air by–pass hose and VTV to the clamps.

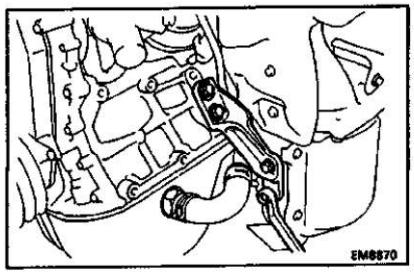


16. INSTALL MAIN TWC
(a) Place the cushion, retainer and a new gasket on the TWC.

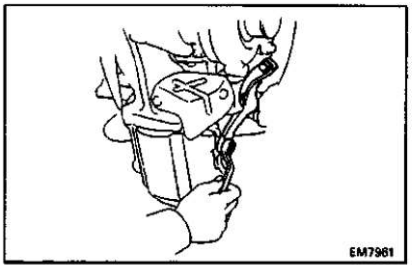




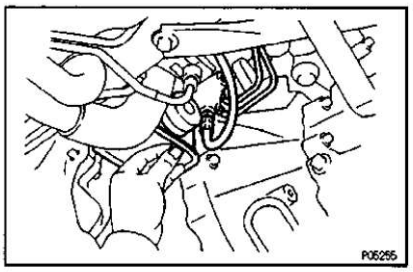
(b) Install the TWC with the three bolts and two nuts.
Torque: 29 N–m (300 kgf–cm, 22 ft–lbf)



(c) Install the RH TWC stay with the four bolts.
Torque: 59 N–m (600 kgf–cm, 43 ft–lbf)

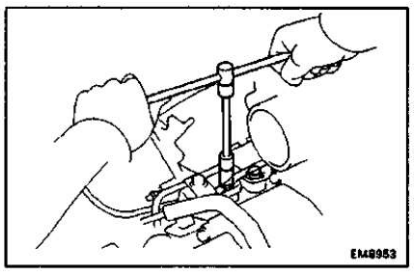


(d) Install the LH TWC stay with the three bolts.
Torque: 59 N–m (600 kgf–cm, 43 ft–lbf)

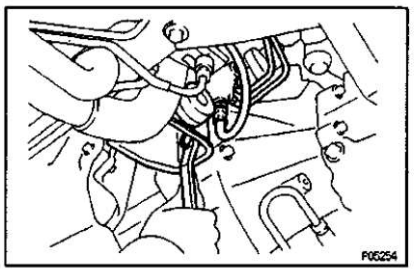


17. INSTALL CLUTCH RELEASE CYLINDER AND FRONT ENGINE MOUNTING BRACKET

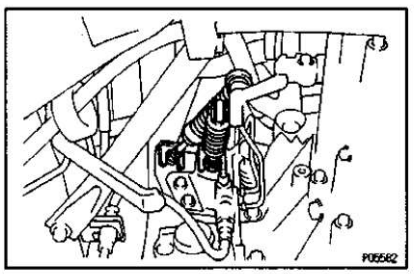
(a) Temporarily install the release cylinder and mounting bracket with the two bolts.



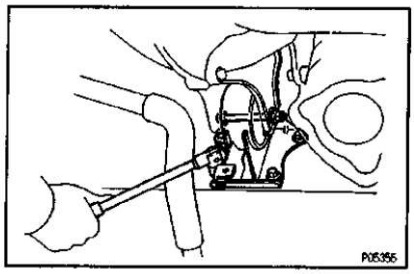
(b) Install the clutch release cylinder with the two bolts.
Torque: 12 N–m (120 kgf–cm, 9 ft–lbf)



(c) Tighten the two bolts holding the clutch release cylinder to the transaxle.
Torque: 77 N–m (790 kgf–cm, 57 ft–lbf)



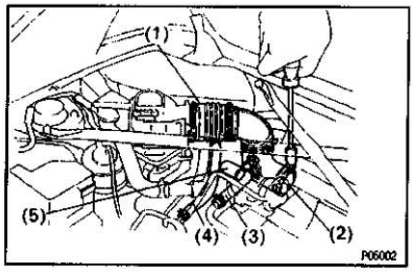
(d) Connect the two transaxle control cables to the transaxle.



18. INSTALL FRONT ENGINE MOUNTING INSULATOR

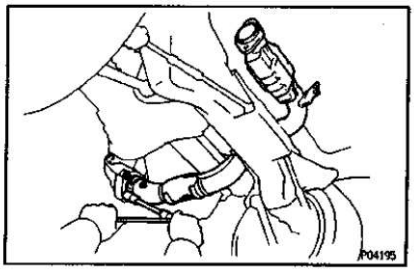
(a) Install the mounting insulator to the body with the four bolts.
Torque: 77 N–m (790 kgf–cm, 57 ft–lbf)

(b) Install the mounting insulator to the mounting bracket with the through bolt and nut.
Torque: 96 N–m (980 kgf–cm, 71 ft–lbf)



19. REMOVE AIR CLEANER HOSE

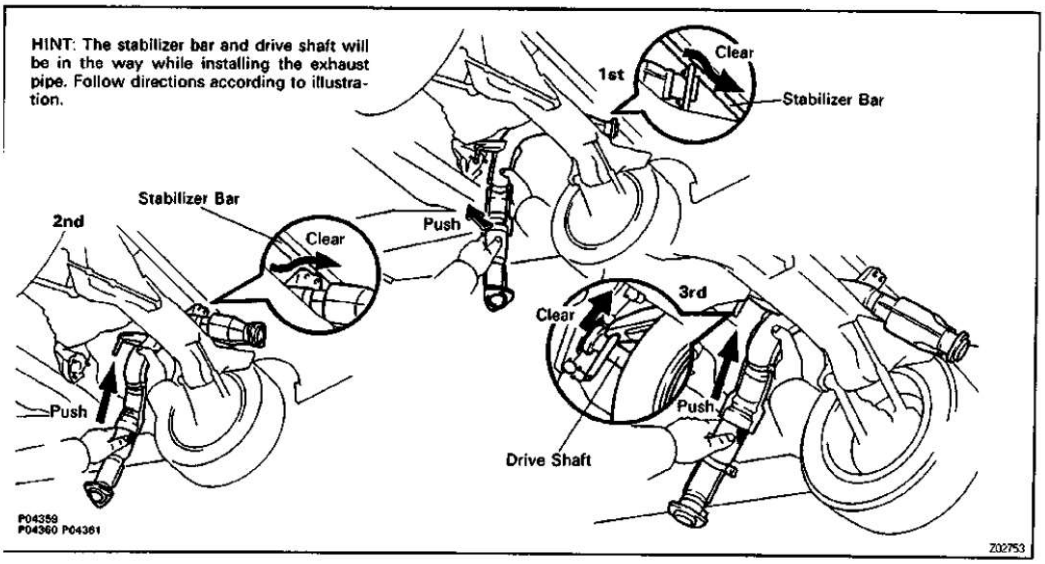
Disconnect the following hoses, and remove the air cleaner hose:
(1) Air cleaner hose from air flow sensor
(2) Air cleaner hose from turbocharger
(3) PCV hose from cylinder head cover
(4) Air hose from No.2 air hose
(5) Air hose from air by–pass valve

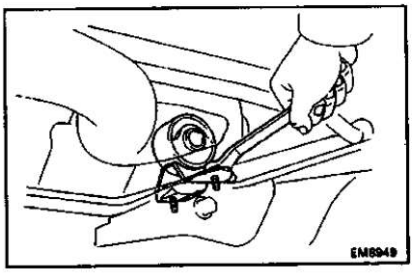


20. INSTALL FRONT EXHAUST PIPE

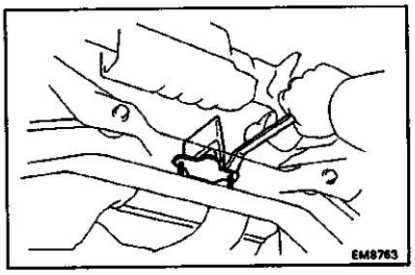
(a) Place a new gasket to the front of the front exhaust pipe.

(b) Using a 14 mm deep socket wrench, install the front exhaust pipe with three new nuts.
Torque: 62 N–m (630 kgf–cm, 46 ft–lbf)

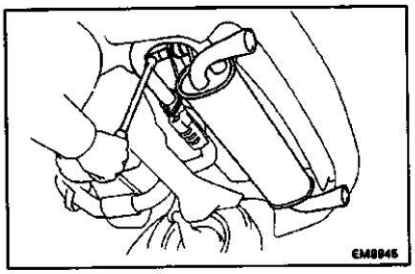




(c) Install the support bracket with the two bolts.
Torque: 21 N–m (210 kgf–cm, 15 ft–lbf)

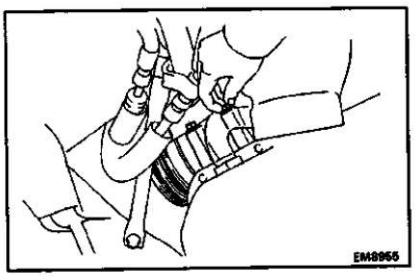


(d) Install the damper with the two bolts.
Torque: 21 N–m (210 kgf–cm, 15 ft–lbf)



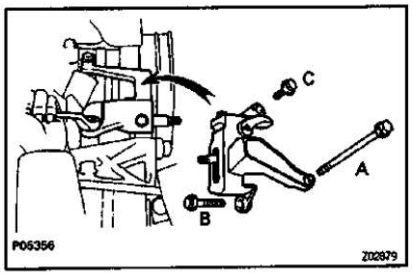
21. INSTALL TAILPIPE

(a) Place a new gasket to the rear of the front exhaust pipe.
(b) Install the tailpipe to the body bracket with the two bolts and nut.
Torque:66 N–m (670 kgf–cm, 48 ft–lbf)
(c) Install the two bolts holding the front exhaust pipe tc the tailpipe.
Torque: 43 N–m (440 kgf–cm, 32 ft–lbf)
(d) Install the two bolts holding the front exhaust pipe bracket to the tailpipe bracket.
Torque: 19 N–m (190 kgf–cm, 14 ft–lbf)

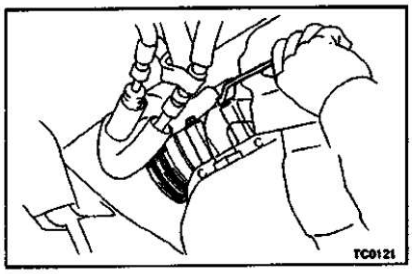


22. INSTALL A/C COMPRESSOR

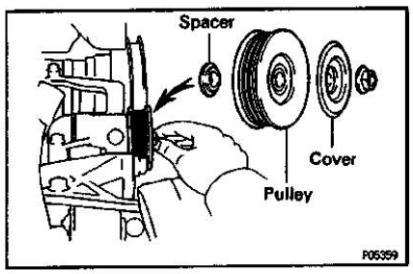
(a) Temporarily install the A/C compressor two bolts.



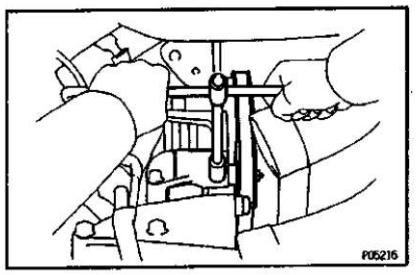
(b) Install the idler pulley bracket with the three bolts.
Torque:
25 N–m (250 kgf–cm, 18 ft–lbf) for A
27 N–m (275 kgf–cm, 20 ft–lbf) for B
37 N–m (375 kgf–cm, 27 ft–lbf) for C
(c) Connect the A/C compressor connector.



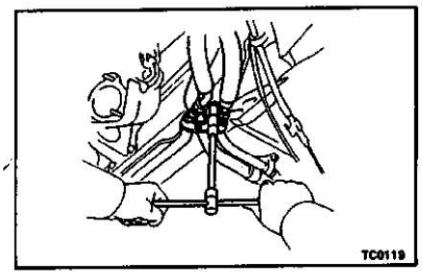
(d) Tighten the two bolts of the lower side of the A/C compressor.
Torque: 25 N–m (260 kgf–cm, 18 ft–lbf)



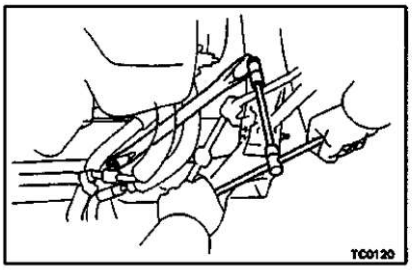
(e) Temporarily install the spacer, pulley and pulley cover with the nut.



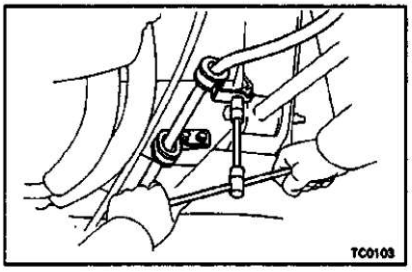
(f) Install the drive belt with the adjusting bolt.
(g) Tighten the idler pulley nut.



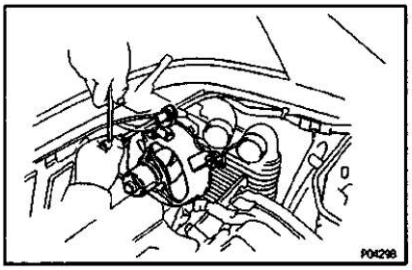
(h) Install the two A/C pipes with the two clamps and nut.



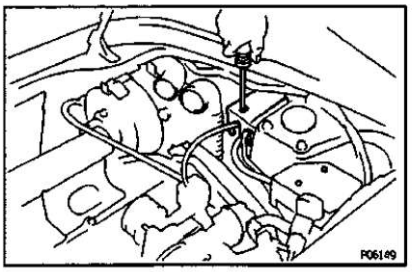
(i) Install the lower suspension brace with the two bolts.
Torque: 73 N–m (740 kgf–cm, 54 ft–lbf)



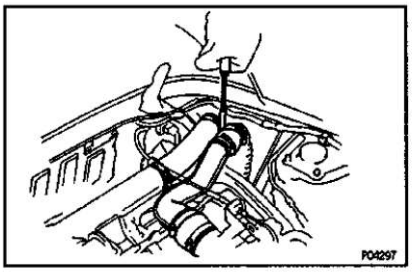
(j) Install the parking brake cable with the two clamps and three bolts.



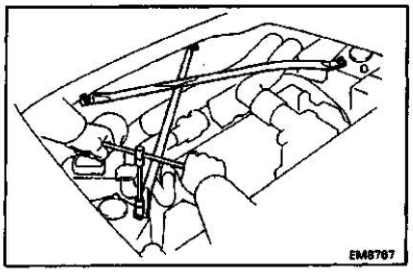
23. INSTALL ENGINE COMPARTMENT COOLING FAN
(a) Install the cooling fan with the three bolts.
(b) Connect the cooling fan connector.



24. (w/ CRUISE CONTROL SYSTEM) INSTALL CRUISE CONTROL ACCELERATOR LINKAGE



25. INSTALL NO.1 AND NO.2 INTAKE AIR CONNECTORS



26. INSTALL UPPER SUSPENSION BRACE

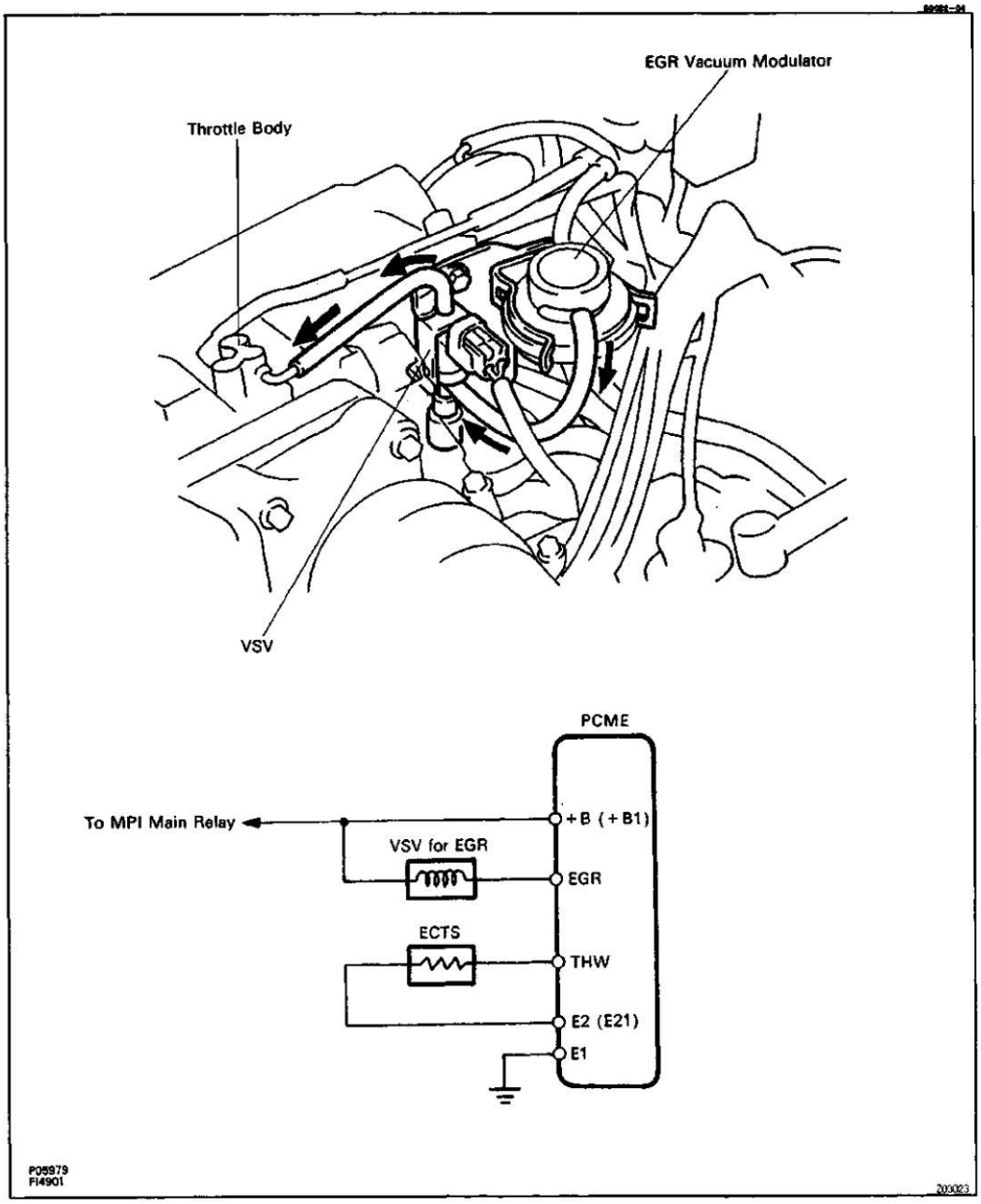
Install the upper brace with the two bolts and two nuts.

Torque:

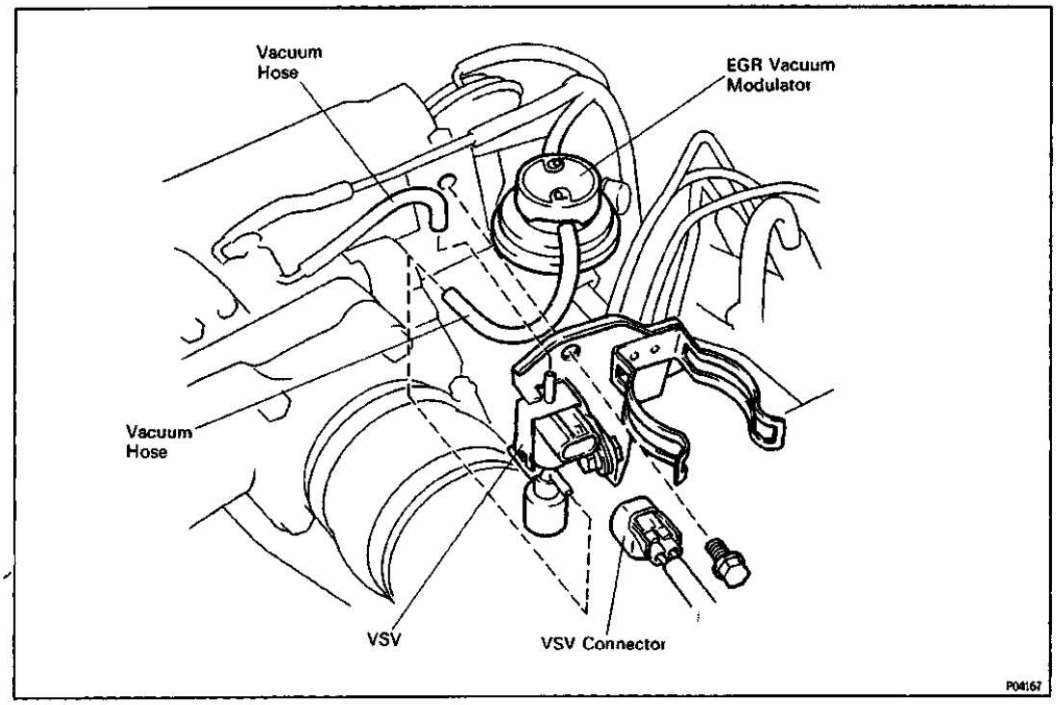
73 N–m (740 kgf–cm, 54 ft–lbf) for bolt
64 N–m (650 kgf–cm, 47 ft–lbf) for nut

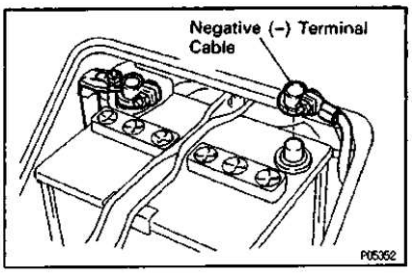
27. INSTALL RH ENGINE HOOD SIDE PANEL
28. CONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY
29. FILL WITH ENGINE COOLANT
30. START ENGINE AND CHECK FOR LEAKS
31. CHECK ENGINE OIL LEVEL
32. RECHECK ENGINE COOLANT LEVEL
33. INSTALL ENGINE UNDER COVERS

VSV
(For EGR)


EGR Vacuum Modulator
Throttle Body
VSV
PCME
To MPI Main Relay
+B (+B1)
VSV for EGR
EGR
ECTS
THW
E2 (E21)
E1
P05979
FI4901
203023

COMPONENTS FOR REMOVAL AND INSTALLATION



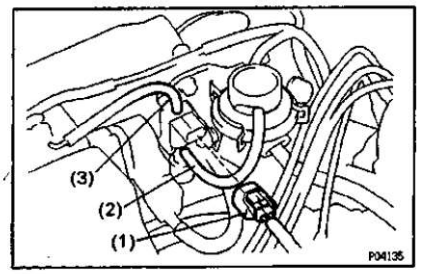


VSV INSPECTION

(See Components for Removal and Installation)

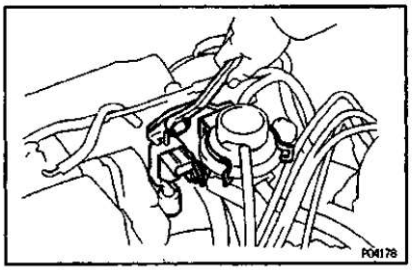
1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY

CAUTION: Turn the ignition switch to 'LOCK'. Disconnect the negative terminal from the battery. Wait at least 20 seconds before proceeding with work.

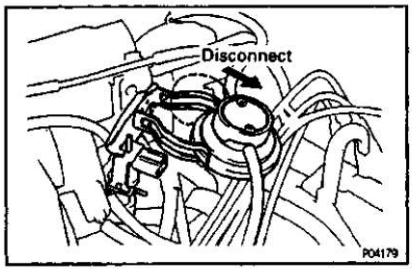


2. REMOVE VSV

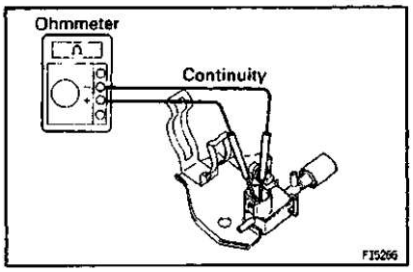
(a) Disconnect the following connector and hoses:
(1) VSV connector
(2) Vacuum hose (from EGR vacuum modulator) from port E of VSV
(3) Vacuum hose (from throttle body) from port G of VSV



(b) Remove the bolt, and disconnect the VSV from the intake manifold.



(c) Disconnect the clamp from the EGR vacuum modu–lator, and remove the VSV.



3. INSPECT VSV

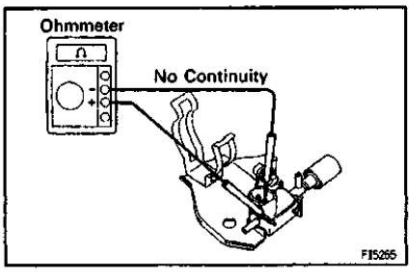
A. Inspect VSV for open circuit

Using an ohmmeter, check that there is continuity between the terminals.

Resistance (Cold):

33–39Ω

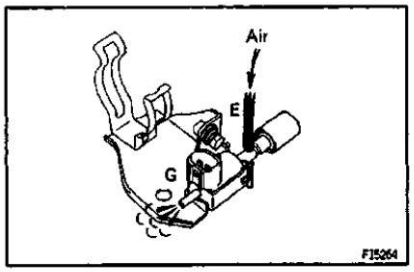
If there is no continuity, replace the VSV.



B. Inspect VSV for ground

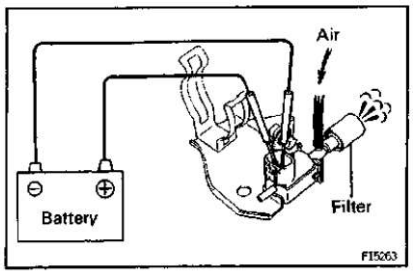
Using an ohmmeter, check that there is no continuity between each terminal and the body.

If there is continuity, replace the VSV.

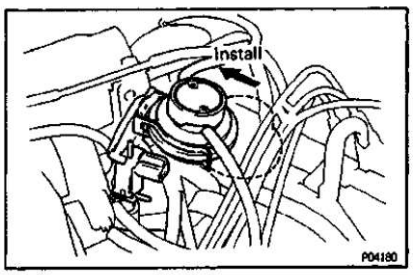


C. Inspect VSV operation

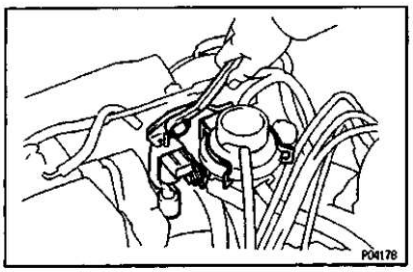
(a) Check that the air flows from port E to port G.



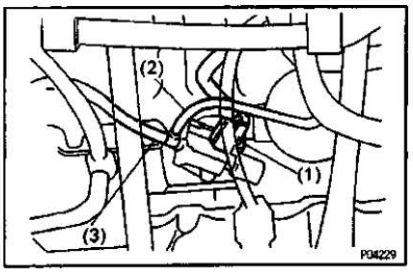
(b) Apply battery voltage across the terminals.
(c) Check that the air flows from port E to the filter.
If operation is not as specified, replace the VSV.



4. REINSTALL VSV
(a) Connect the EGR vacuum modulator to the EGR vacuum modulator.



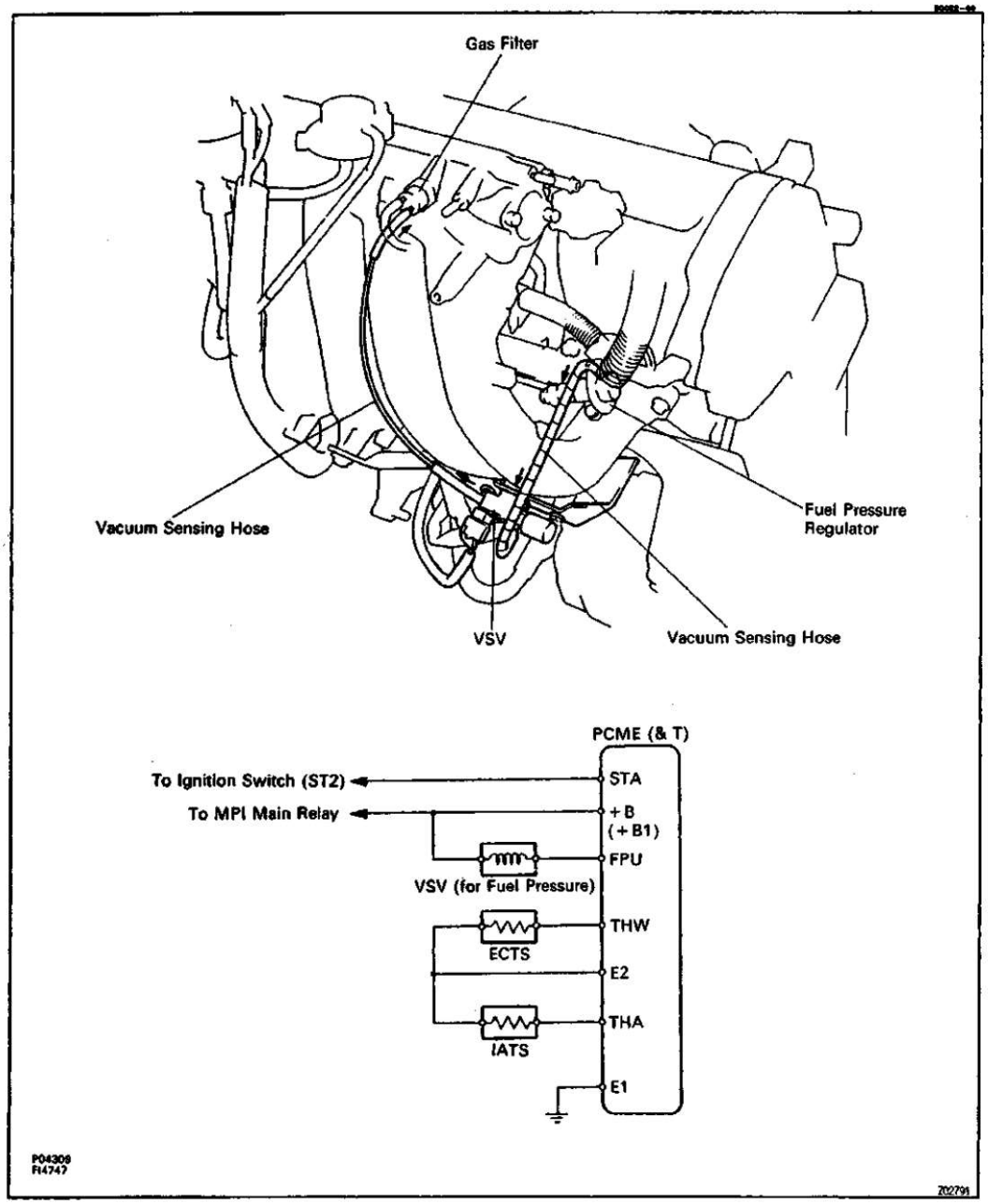
(b) Install the VSV with the bolt and screw.



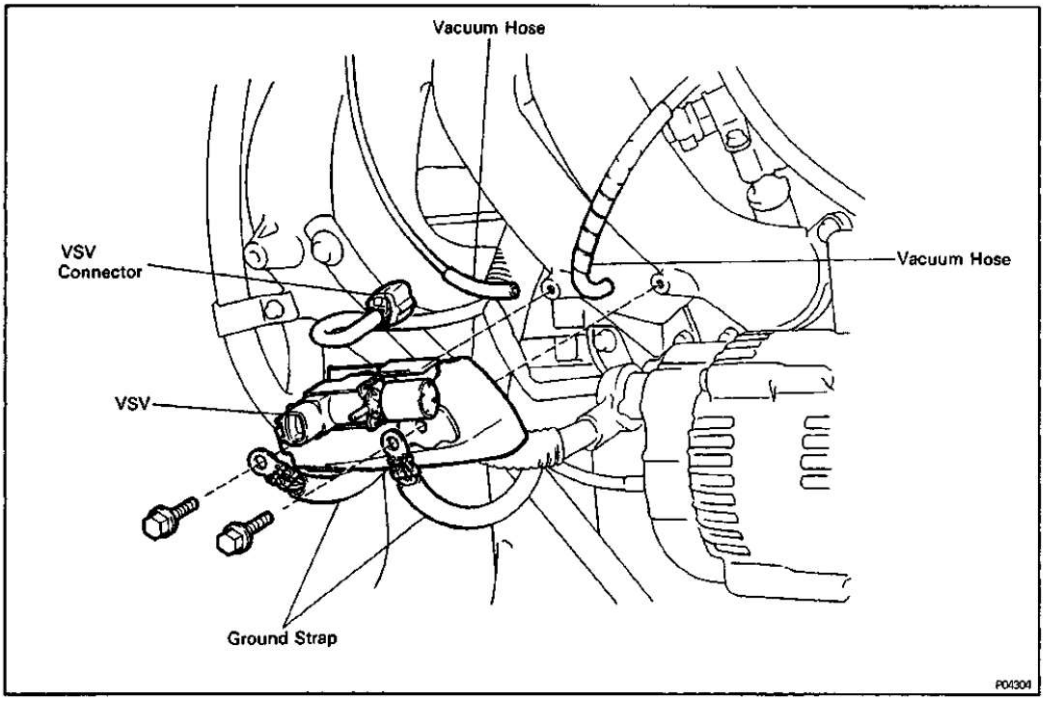
(c) Connect the following connector and hoses:
(1) VSV connector
(2) Vacuum hose (from EGR vacuum modulator) to port E of VSV
(3) Vacuum hose (from throttle body) to port G of VSV

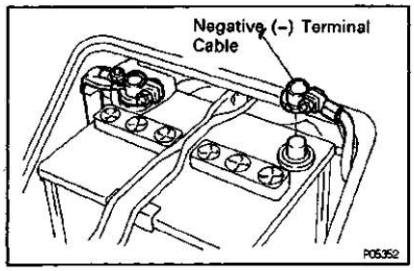
5. RECONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY

VSV
(For Fuel Pressure)



COMPONENTS FOR REMOVAL AND INSTALLATION



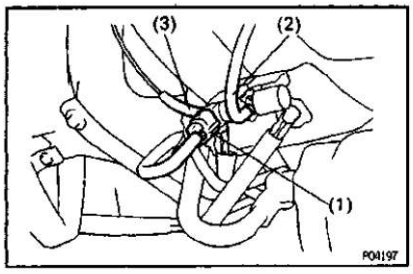


VSV INSPECTION

(See Components for Removal and Installation)

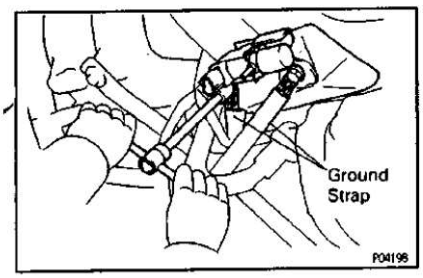
1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY

CAUTION: Turn the ignition switch to 'LOCK'. Disconnect the negative terminal from the battery. Wait at least 20 seconds before proceeding with work.

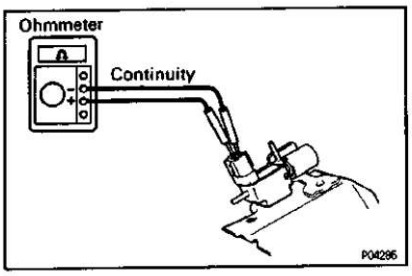


2. REMOVE VSV

(a) Disconnect the following connector and hoses:
(1) VSV connector
(2) Vacuum hose (from fuel pressure regulator) from port E of VSV
(3) Vacuum hose (from gas filter)from port G of VSV



(b) Remove the two bolts and VSV. Disconnect the two ground straps.



3. INSPECT VSV

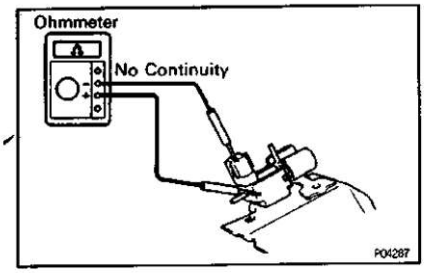
A. Inspect VSV for open circuit

Using an ohmmeter, check that there is continuity between the terminals.

Resistance (Cold):

37–44Ω

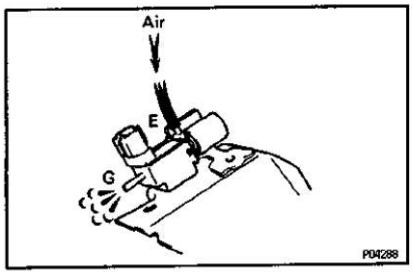
If there is no continuity, replace the VSV.



B. Inspect VSV for ground

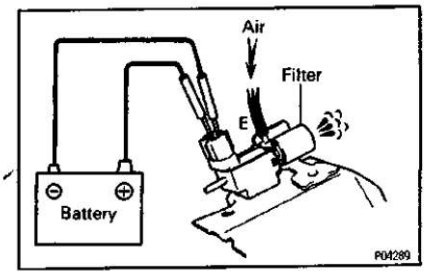
Using an ohmmeter, check that there is no continuity between each terminal and the body.

If there is continuity, replace the VSV.



C. Inspect VSV operation

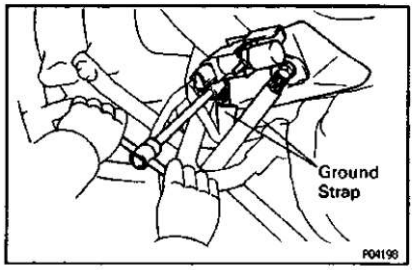
(a) Check that the air flows from port E to port G.



(b) Apply battery voltage across the terminals.

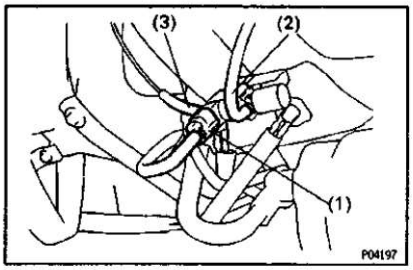
(c) Check that the air flows from port E to the filter.

If operation is not as specified, replace the VSV.



4. REINSTALL VSV

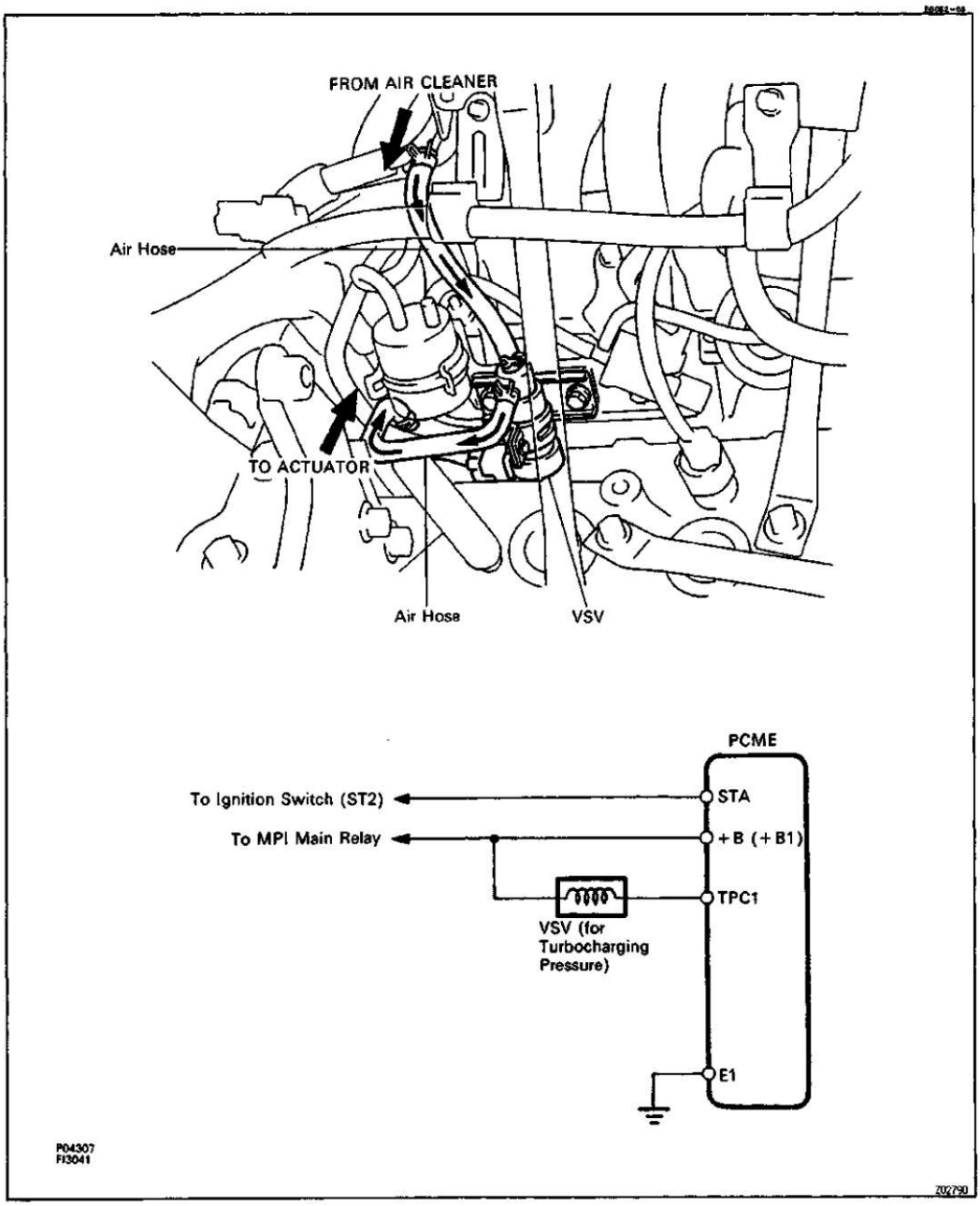
(a) Install the VSV with the bolt. Connect the two ground straps.



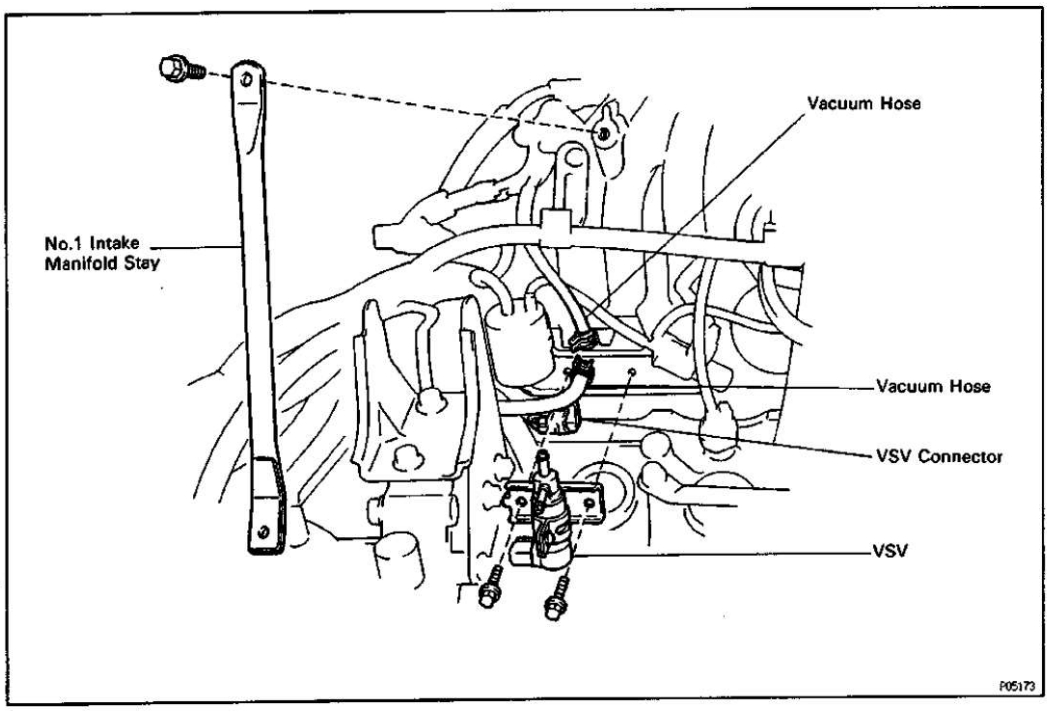
(b) Connect the following connector and hoses:
(1) VSV connector
(2) Vacuum hose (from fuel pressure regulator) from port E of VSV
(3) Vacuum hose (from gas filter)from port G of VSV

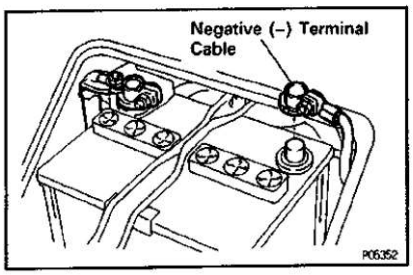
5. RECONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY

VSV
(For Turbocharging Pressure)



COMPONENTS FOR REMOVAL AND INSTALLATION



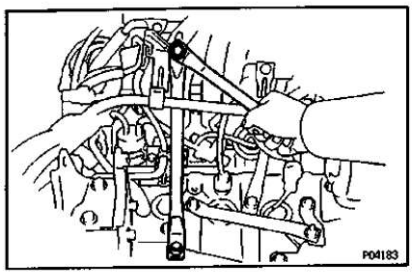


VSV INSPECTION

(See Components for Removal and Installation)

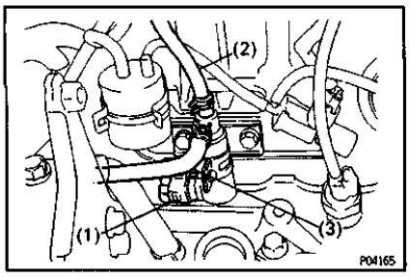
1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY

   CAUTION: Turn the ignition switch to "LOCK". Disconnect the negative terminal from the battery. Wait at least 20 seconds before proceeding with work.



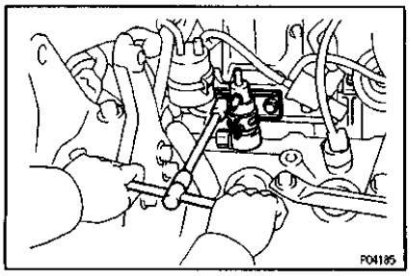
2. REMOVE NO.1 INTAKE MANIFOLD STAY

   Remove the two bolts and intake manifold stay.

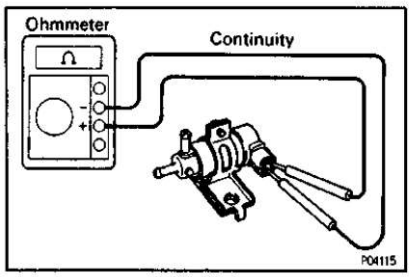


3. REMOVE VSV

(a) Disconnect the following connector and hoses:
(1) VSV connector
(2) Air hose (from actuator) from port E of VSV
(3) Air hose (from No.1 air tube) from port F of VSV



(b) Remove the two and VSV.



4. INSPECT VSV

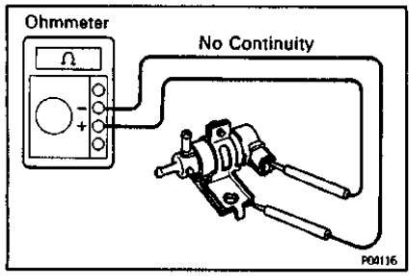
A. Inspect VSV for open circuit

Using an ohmmeter, check that there is continuity between the terminals.

Resistance (Cold):

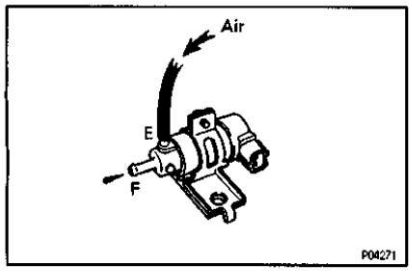
24–30Ω

If there is no continuity, replace the VSV.



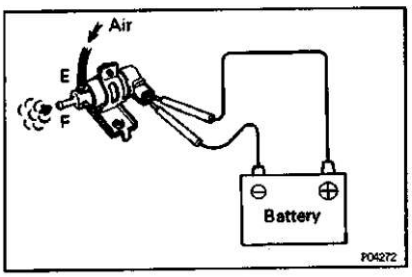
B. Inspect VSV for ground

Using an ohmmeter, check that there is no continuity between each terminal and the body.
If there is continuity, replace the VSV.

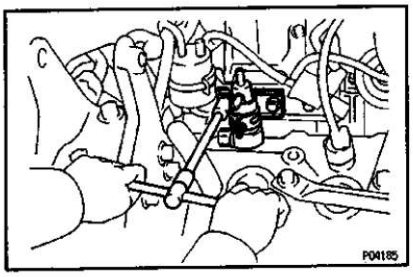


C. Inspect VSV operation

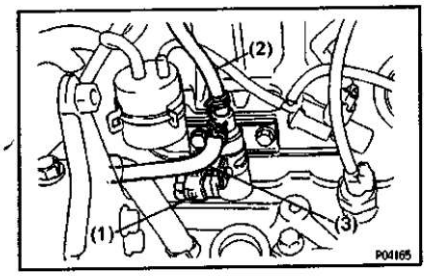
(a) Check that the air does not flow from port E to port F.



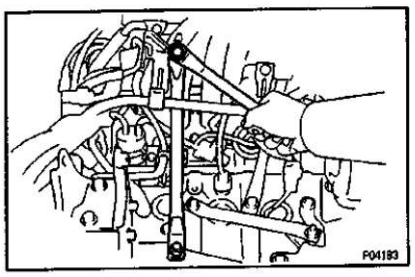
(b) Apply battery voltage across the terminals.
(c) Check that the air flows from port E to port F.
If operation is not as specified, replace the VSV.



5. REINSTALL VSV
(a) Install the VSV with the bolt and screw.



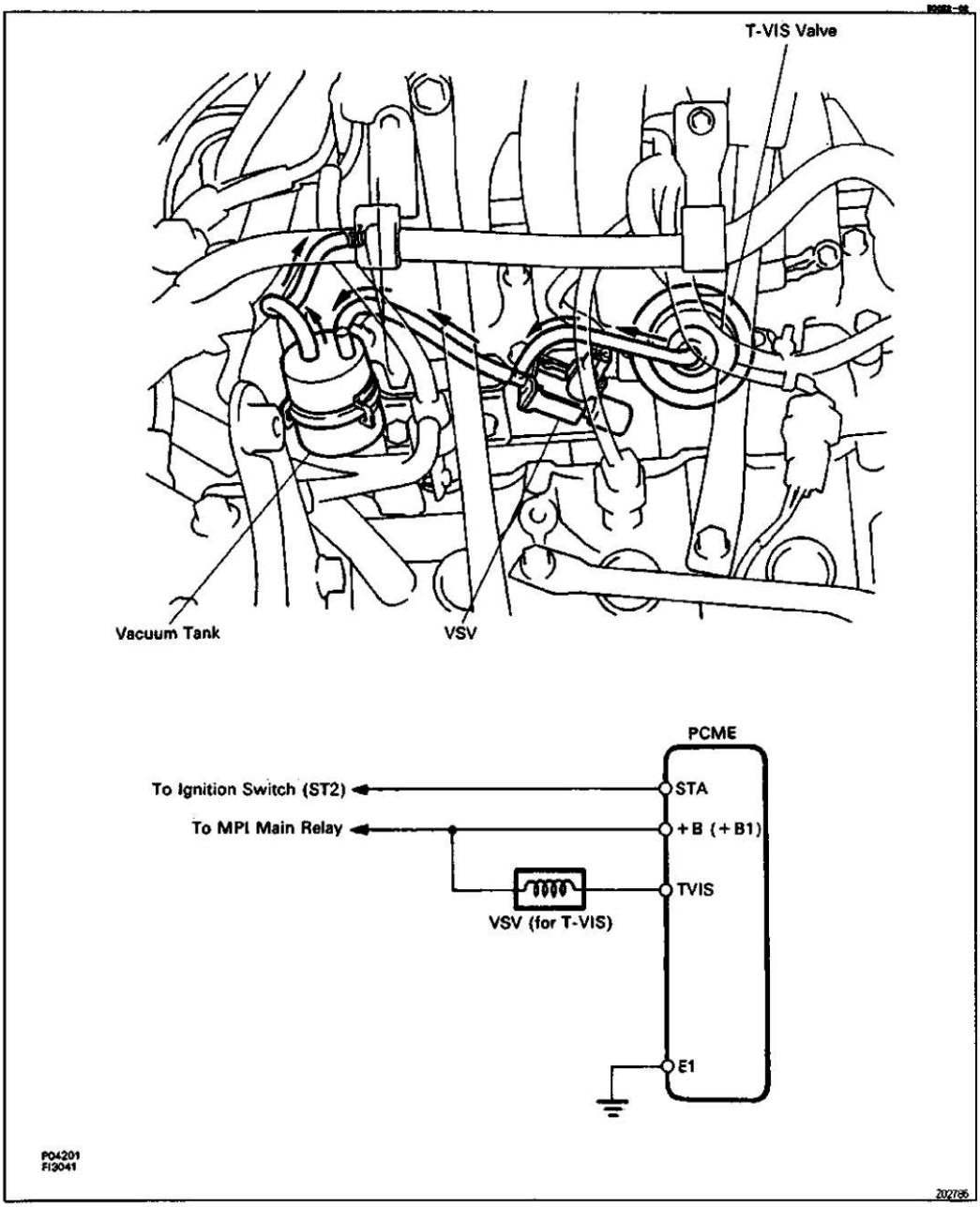
(b) Connect the following connector and hoses:
(1) VSV connector
(2) Air hose (from actuator) to port E of VSV
(3) Air hose (from No. 1 air tube) to port F of VSV



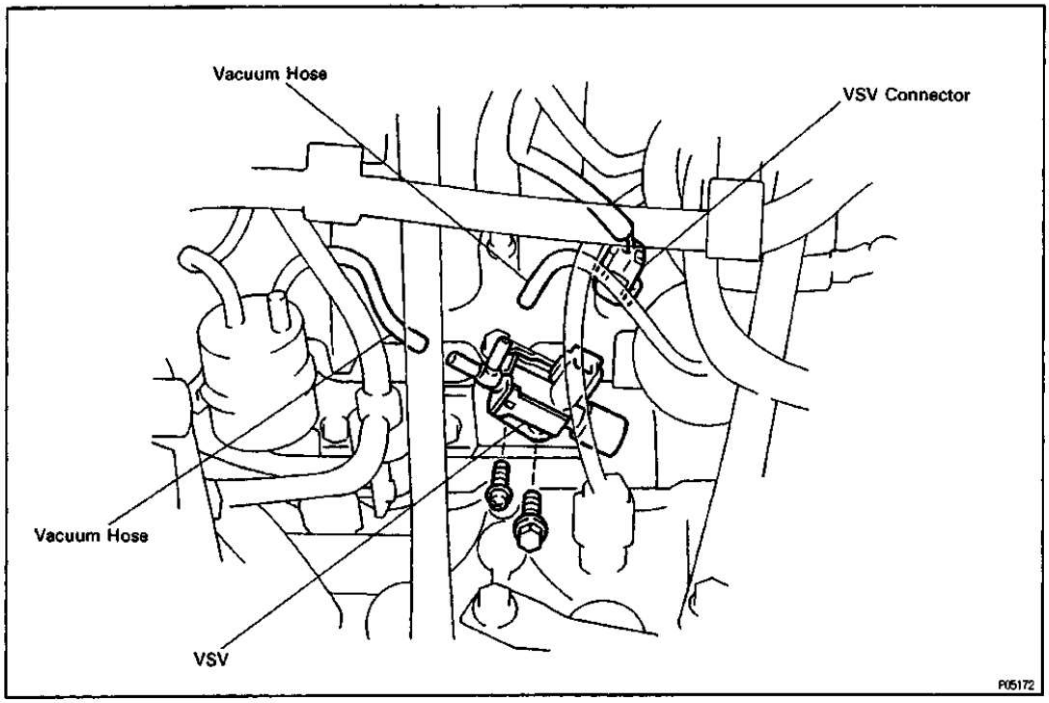
6. REINSTALL No.1 INTAKE MANIFOLD STAY
Install the intake manifold stay with the two bolts.
Torque: 25 N–m (260 kgf.cm, 19 ft–lbf)

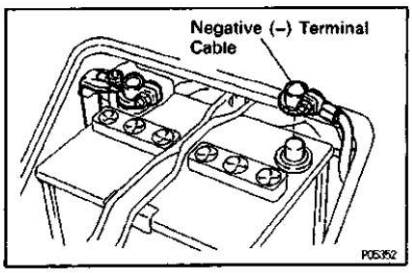
7. RECONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY

VSV
(For T–VIS)


T-VIS Valve
Vacuum Tank
VSV
PCME
To Ignition Switch (ST2)
To MPI Main Relay
STA
+B (+B1)
TVIS
VSV (for T-VIS)
E1
P04201
FI3041
202786

COMPONENTS FOR REMOVAL AND INSTALLATION



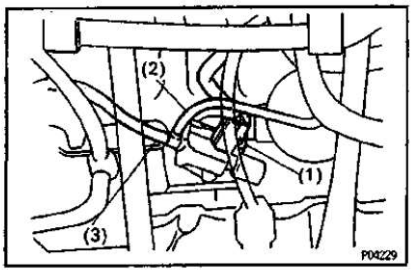


VSV INSPECTION

(See Components for Removal and Installation)

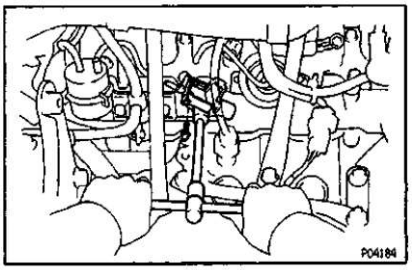
1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY

CAUTION: Turn the ignition switch to "LOCK". Disconnect the negative terminal from the battery. Wait at least 20 seconds before proceeding with work.

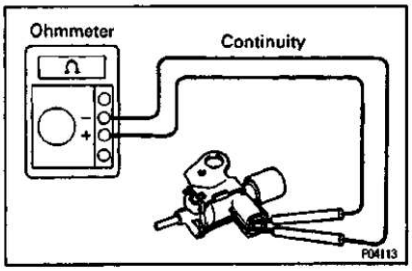


2. REMOVE VSV

(a) Disconnect the following connector and hoses:
(1) VSV connector
(2) Vacuum hose (from T–VIS valve) from port E of VSV
(3) Vacuum hose (from vacuum tank) from port F of VSV



(b) Remove the screw, bolt and VSV.



3. INSPECT VSV

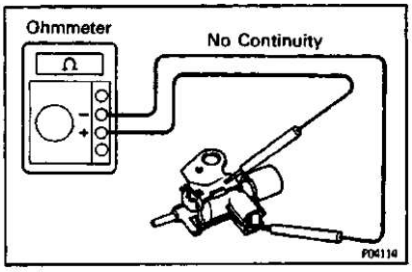
A. Inspect VSV for open circuit

Using an ohmmeter, check that there is continuity between the terminals.

Resistance (Cold):

33–39Ω

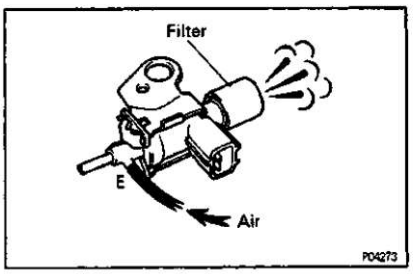
If there is no continuity, replace the VSV.



B. Inspect VSV for ground

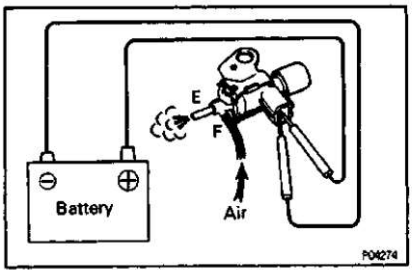
Using an ohmmeter, check that there is no continuity between each terminal and the body.

If there is continuity, replace the VSV.



C. Inspect VSV operation

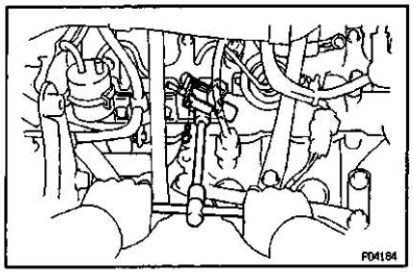
(a) Check that the air flows from port E to the filter.



(b) Apply battery voltage across the terminals.

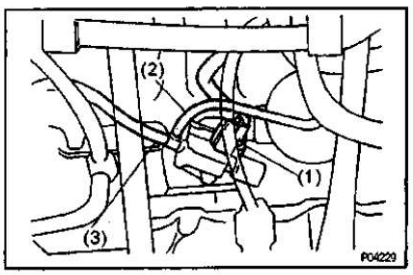
(c) Check that the air flows from port E to port F.

If operation is not as specified, replace the VSV.



4. REINSTALL VSV

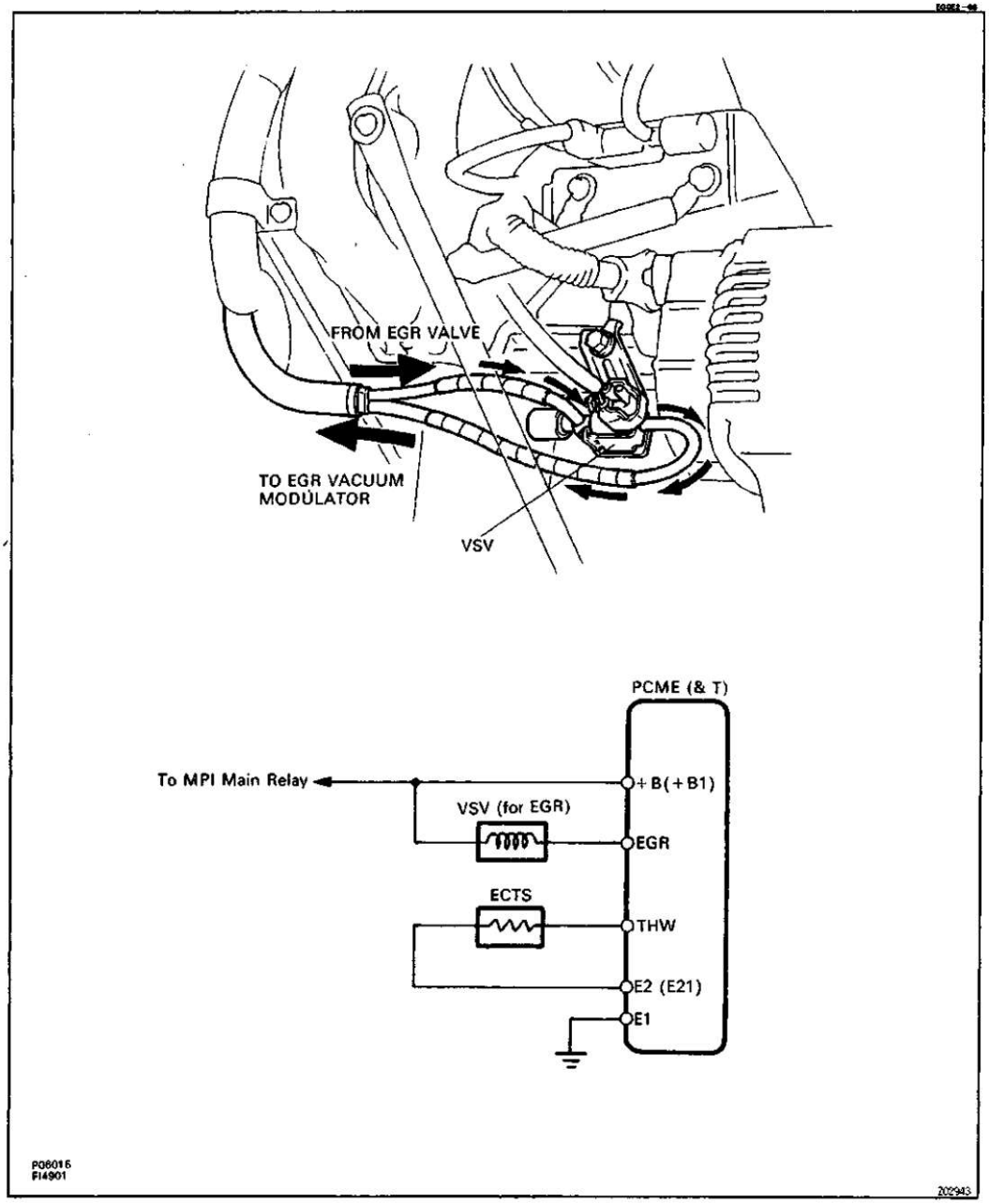
(a) Install the VSV with the bolt and screw.



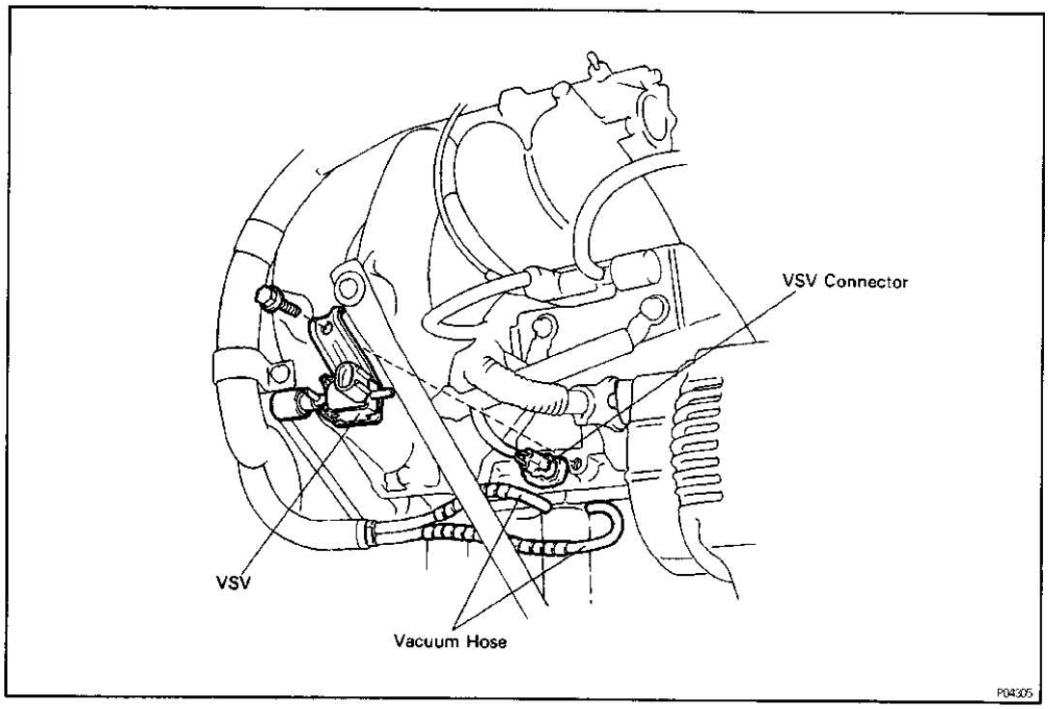
(b) Connect the following connector and hoses:
(1) VSV connector
(2) Vacuum hose (from T–VIS valve) to port E of VSV
(3) Vacuum hose (from vacuum tank) to port F of VSV

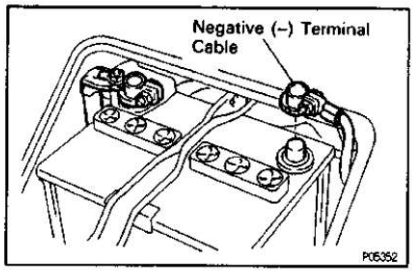
5. RECONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY

VSV (For EGR)


FROM EGR VALVE
TO EGR VACUUM MODULATOR
VSV
PCME (& T)
To MPI Main Relay
+B(+B1)
VSV (for EGR)
EGR
ECTS
THW
E2 (E21)
E1
PG6016
FI4901
202943

COMPONENTS FOR REMOVAL AND INSTALLATION



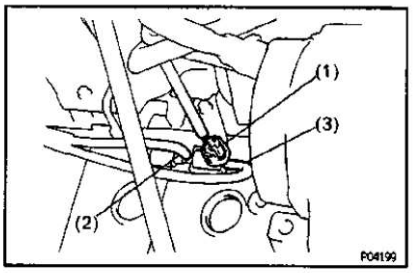


VSV INSPECTION

(See Components for Removal and Installation)

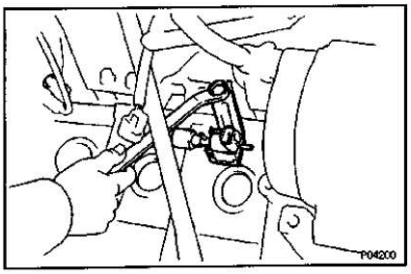
1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY

CAUTION: Turn the ignition switch to "LOCK". Disconnect the negative terminal from the battery. Wait at least 20 seconds before proceeding with work.

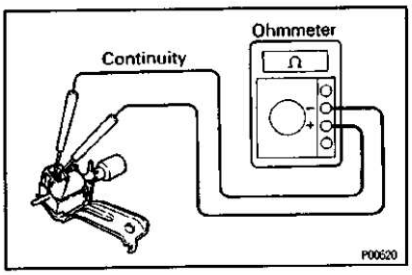


2. REMOVE VSV

(a) Disconnect the following connector and hoses:
(1) VSV connector
(2) Vacuum hose (from EGR valve) from port E of VSV
(3) Vacuum hose (from port "Q" of EGR vacuum modulator) from port G of VSV



(b) Remove the bolt and VSV.



3. INSPECT VSV

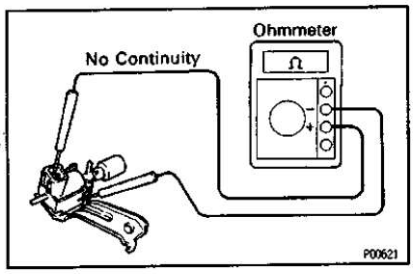
A. Inspect VSV for open circuit

Using an ohmmeter, check that there is continuity between the terminals.

Resistance (Cold):

33–39Ω

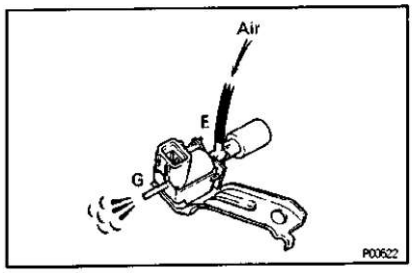
If there is no continuity, replace the VSV.



B. Inspect VSV for ground

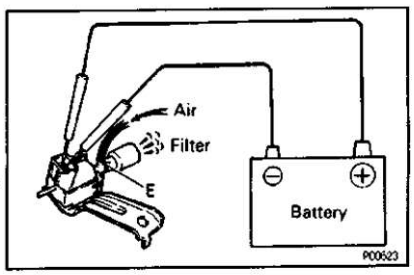
Using an ohmmeter, check that there is no continuity between each terminal and the body.

If there is continuity, replace the VSV.



C. Inspect VSV operation

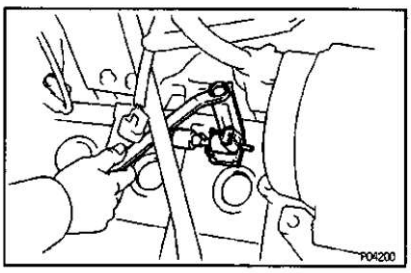
(a) Check that the air flows from port E to port G.



(b) Apply battery voltage across the terminals.

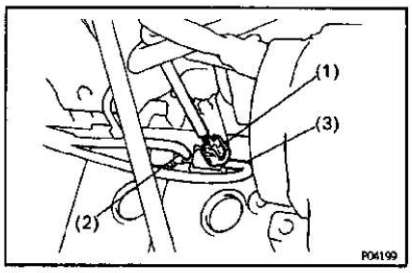
(c) Check that the air flows from port E to the filter.

If operation is not as specified, replace the VSV.



4. REINSTALL VSV

(a) Install the VSV with the bolt.

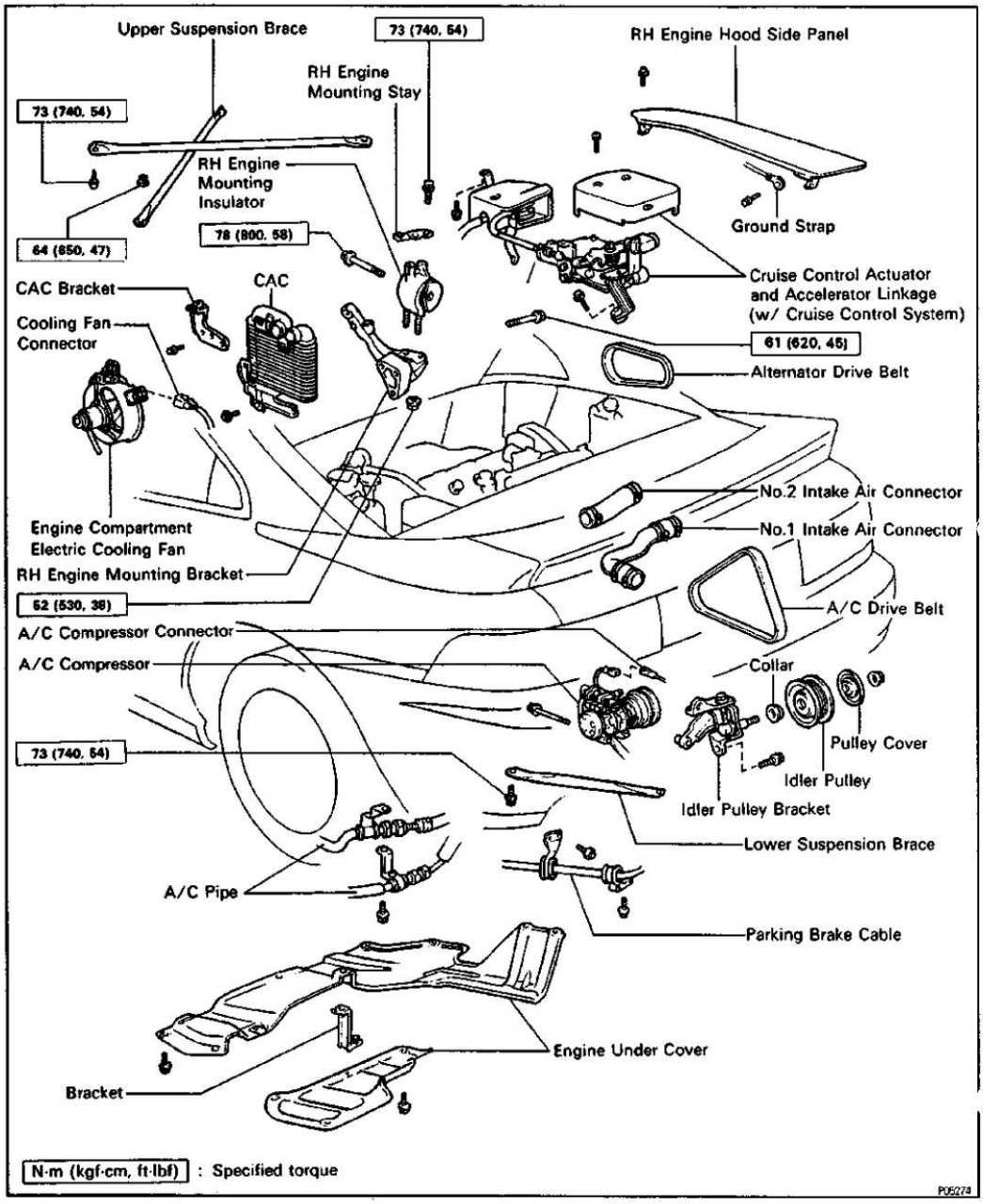


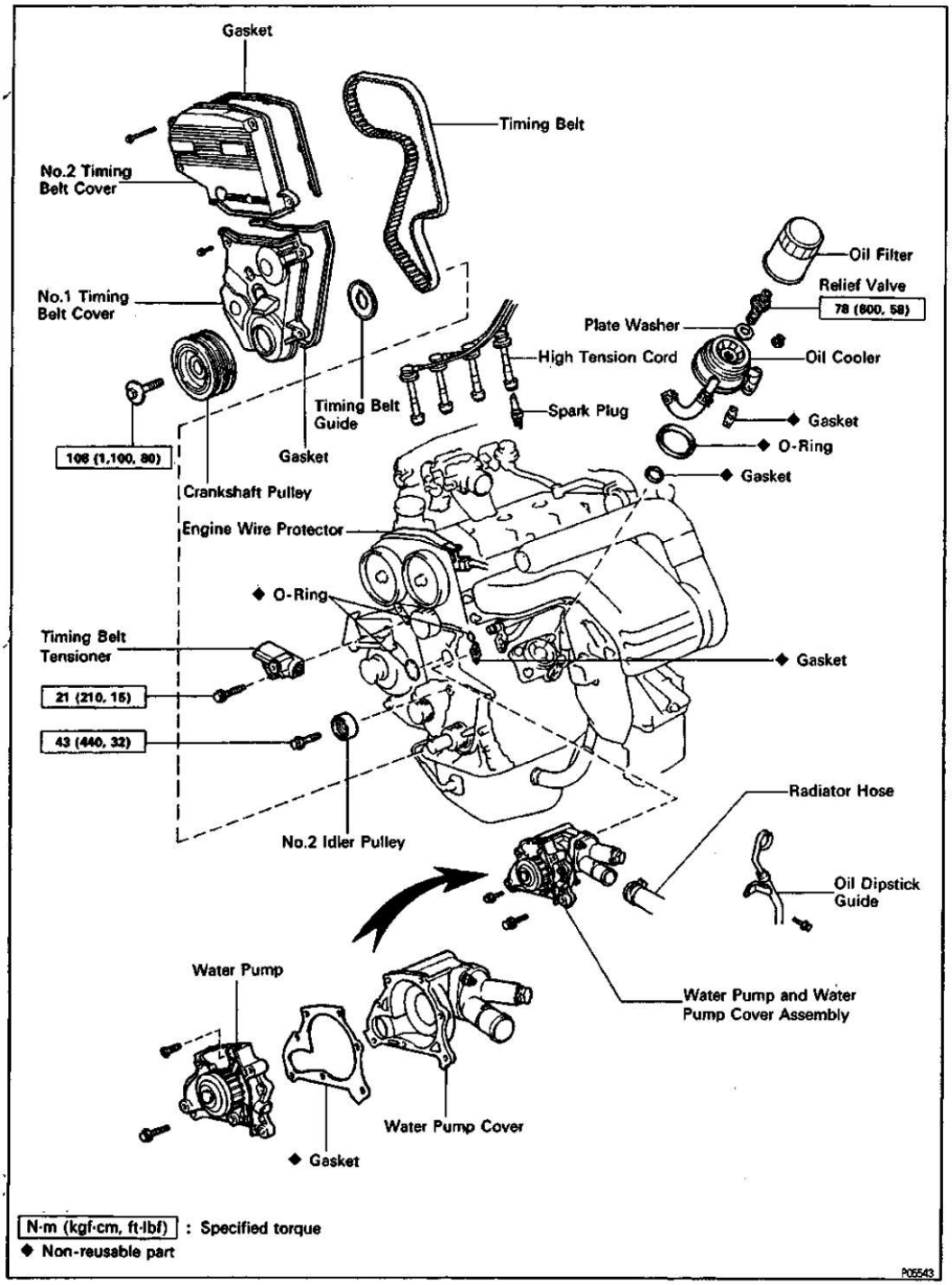
(b) Connect the following connector and hoses:
(1) VSV connector

5. RECONNECT CABLE TO NEGATIVE TERMINAL 4F BATTERY

WATER PUMP

COMPONENTS FOR REMOVAL AND INSTALLATION




Gasket
Timing Belt
No.2 Timing Belt Cover
No.1 Timing Belt Cover
Oil Filter
Relief Valve
78 (800, 58)
Plate Washer
High Tension Cord
Oil Cooler
Timing Belt Guide
Spark Plug
◆ Gasket
◆ O-Ring
◆ Gasket
108 (1,100, 80)
Gasket
Crankshaft Pulley
Engine Wire Protector
◆ O-Ring
Timing Belt Tensioner
◆ Gasket
21 (210, 15)
43 (440, 32)
No.2 Idler Pulley
Radiator Hose
Oil Dipstick Guide
Water Pump
Water Pump and Water Pump Cover Assembly
Water Pump Cover
◆ Gasket
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part
P05543

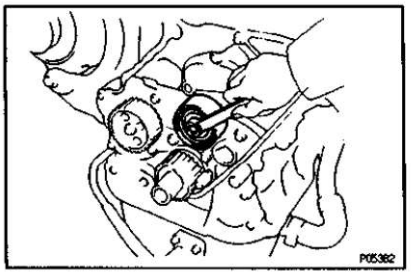
WATER PUMP REMOVAL

(See Components for Removal and Installation)

1. DRAIN ENGINE COOLANT

2. REMOVE TIMING BELT

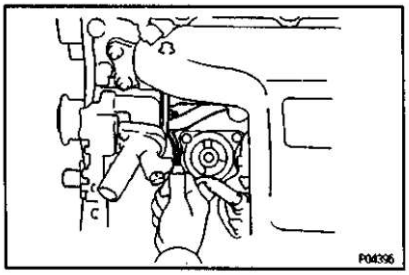
(See steps 1 to 26 and 28 to 31 in Timing Belt Removal under Engine Mechanical)



3. REMOVE NO.2 IDLER PULLEY

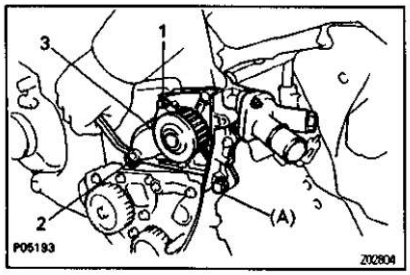
Remove the bolt and pulley.

4. DISCONNECT RADIATOR HOSE FROM WATER OUTLET



5. REMOVE WATER PUMP AND WATER PUMP COVER ASSEMBLY

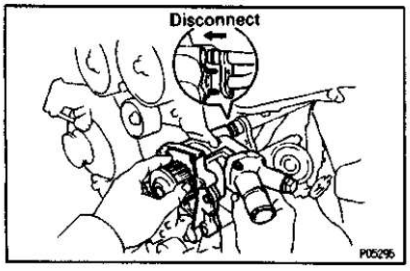
(a) Remove the two nuts holding the water pump to the water by–pass pipe.



(b) (w/o A/C)

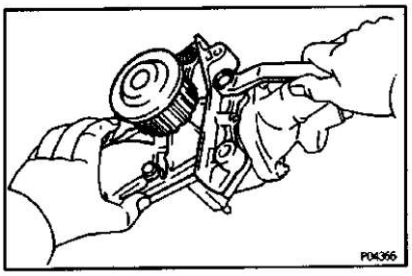
Remove the bolt (A).

(c) Remove the three bolts in the sequence shown.



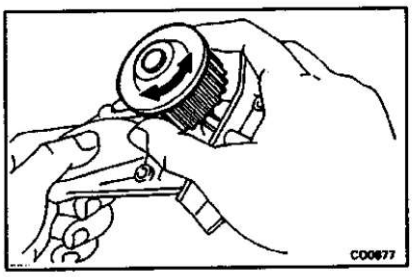
(d) Disconnect the water pump cover from the water by –pass pipe, and remove the water pump and water pump cover assembly.

(e) Remove the gasket and two O–rings from the water pump and water by–pass pipe.



6. REMOVE WATER PUMP FROM WATER PUMP COVER

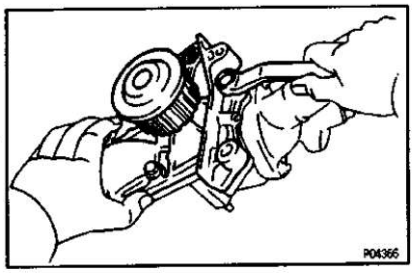
Remove the screw, two bolts, water pump and gasket.



WATER PUMP INSPECTION

INSPECT WATER PUMP

Turn the pulley and check that the water pump bearing moves smoothly and quietly.



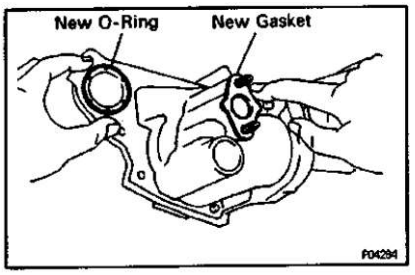
WATER PUMP INSTALLATION

(See Components for Removal and Installation)

1. INSTALL WATER PUMP TO WATER PUMP COVER

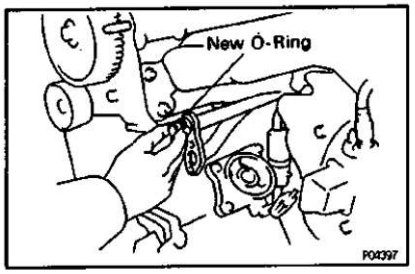
Install a new gasket and the water pump with the screw and two bolts.

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



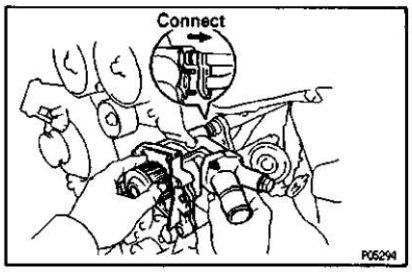
2. INSTALL WATER PUMP AND WATER PUMP COVER ASSEMBLY

(a) Install new O–ring and gasket to the water pump cover.

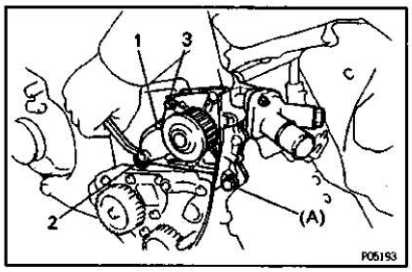


(b) Instal a new O–ring to the water by–pass pipe.

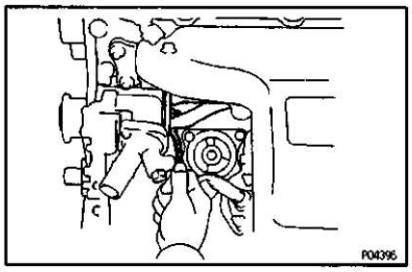
(c) Apply soapy water to the O–ring on the water by–pass pipe.



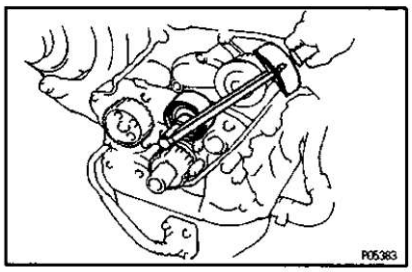
(d) Connect the water pump cover to the water by–pass pipe. Do not install the nuts yet.



(e) Install the water pump with the three bolts. Tighten the bolts in the sequence shown.
Torque: 7.8 N–m (80 kgf–cm, 69 in–lbf)
(f) (w/o A/C)
Install the bolt (A).
Torque: 27 N–m (275 kgf–cm, 20 ft–lbf)



(g) Install the two nuts holding the water pump cover to the water by–pass pipe.
Torque: 12 N–m (120 kgf–cm, 9 ft–lbf)

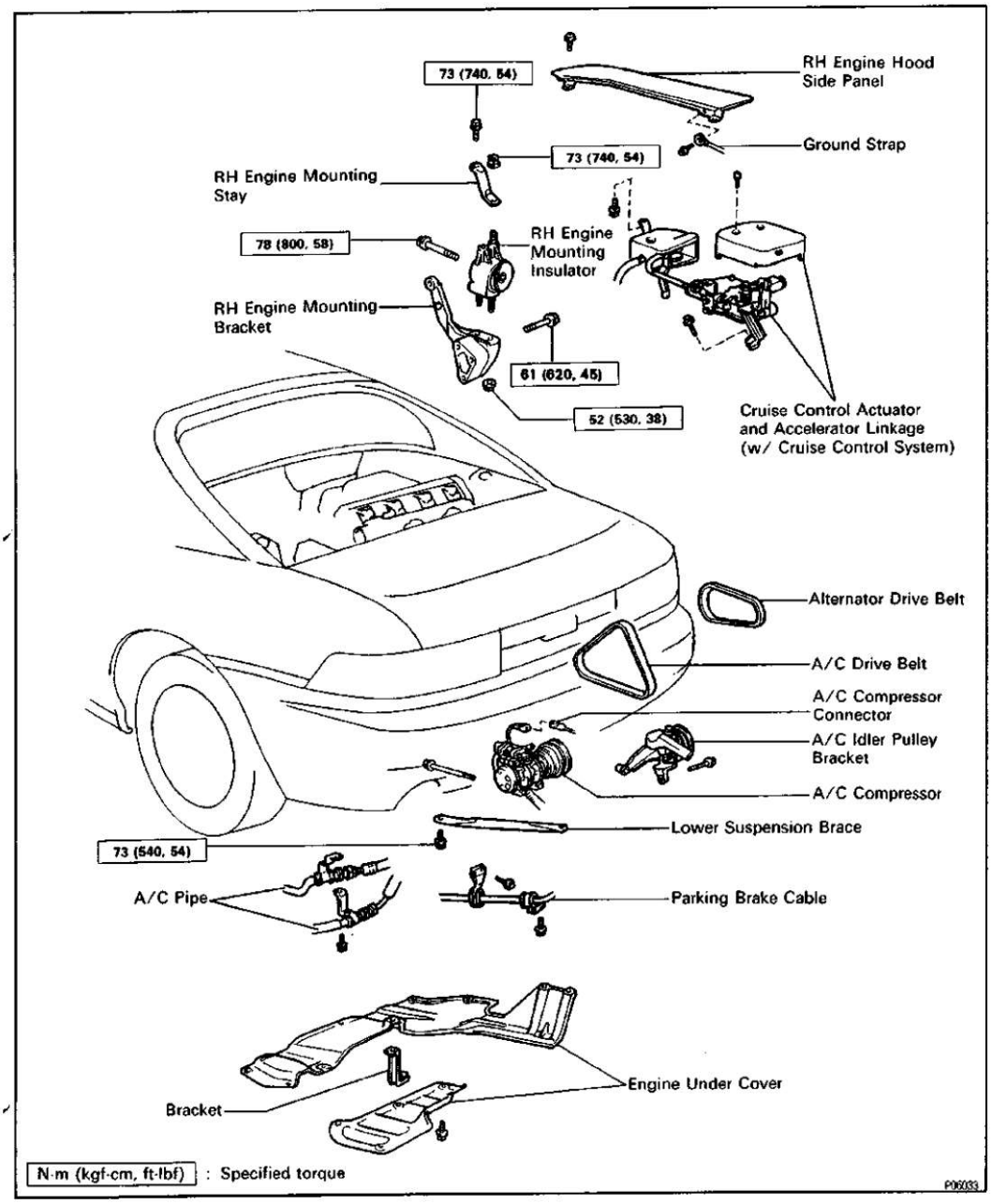


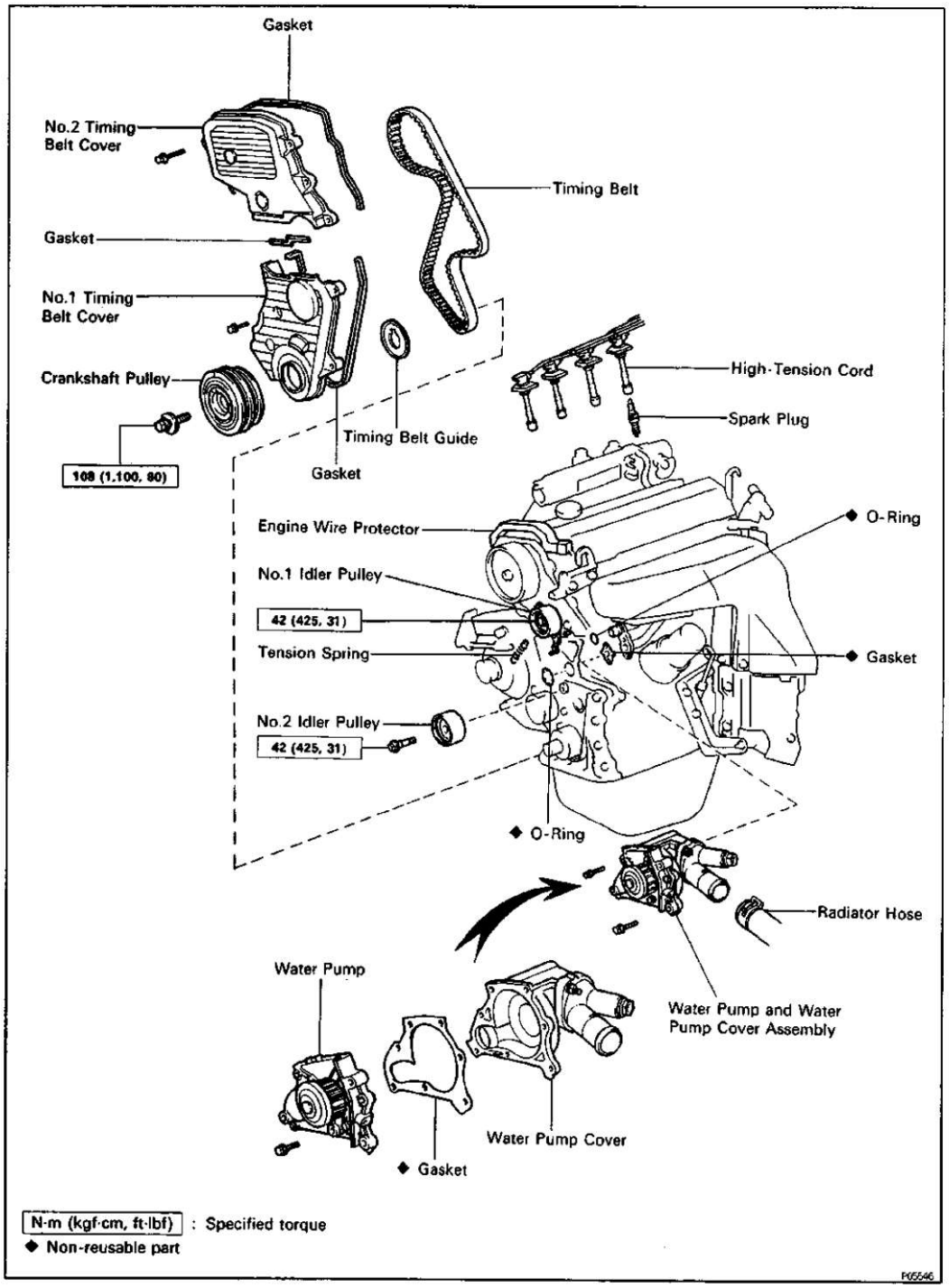
3. INSTALL NO.2 IDLER PULLEY
(a) Install the pulley with the bolt.
Torque: 43 N–m (440 kgf–cm, 32 ft–lbf)
(b) Check that the idler pulley moves smoothly.

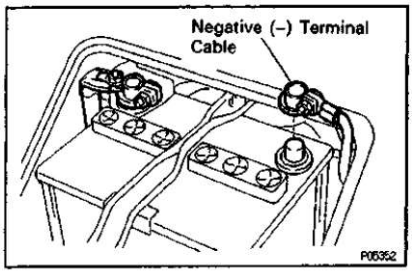
4. CONNECT LOWER RADIATOR HOSE TO WATER INLET
5. INSTALL TIMING BELT
(See steps 3. 5 to 8 to 36 in Timing Belt Installation under Engine Mechanical)
6. FILL WITH ENGINE COOLANT
7. START ENGINE AND CHECK FOR COOLANT LEAKS

WATER PUMP

COMPONENTS FOR REMOVAL AND INSTALLATION



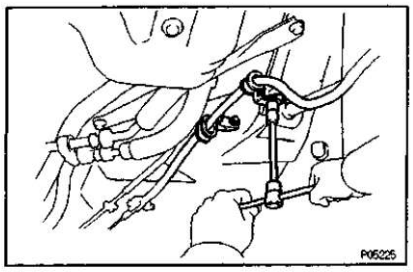

Gasket
No.2 Timing Belt Cover
Timing Belt
Gasket
No.1 Timing Belt Cover
Crankshaft Pulley
108 (1,100, 80)
Timing Belt Guide
Gasket
High-Tension Cord
Spark Plug
Engine Wire Protector
◆ O-Ring
No.1 Idler Pulley
42 (425, 31)
Tension Spring
◆ Gasket
No.2 Idler Pulley
42 (425, 31)
◆ O-Ring
Radiator Hose
Water Pump
Water Pump and Water Pump Cover Assembly
Water Pump Cover
◆ Gasket
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part
P05546



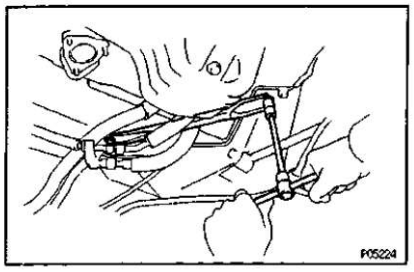
WATER PUMP REMOVAL

1. DISCONNECT CABLE FROM NEGATIVE TERMINAL OF BATTERY
   CAUTION: Turn the ignition switch to "LOCK" Disconnect the negative terminal from the battery. Wait at least 20 seconds before proceeding with work.

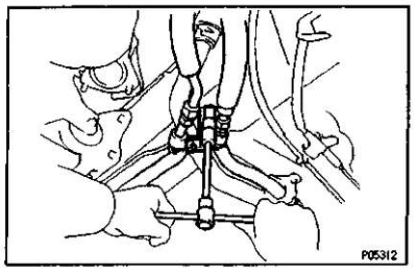
2. REMOVE ENGINE UNDER COVERS
3. REMOVE RH ENGINE HOOD SIDE PANEL
4. DRAIN ENGINE COOLANT



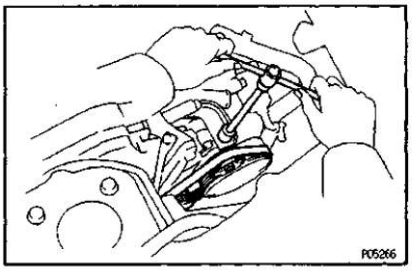
5. DISCONNECT A/C COMPRESSOR FROM ENGINE
   (a) Remove the three clamp bolts, and disconnect the parking brake cable.



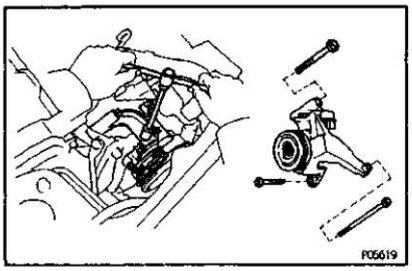
   (b) Remove the two bolts and lower suspension brace.



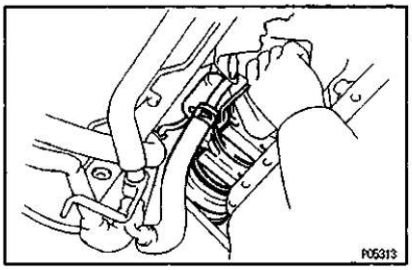
   (c) Remove the clamp nut, and disconnect the two A/C pipes.



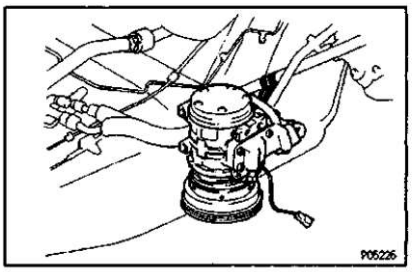
(d) Loosen the idler pulley nut.
(e) Loosen the adjusting bolt, and remove the drive belt.



(f) Disconnect the A/C compressor connector.
(g) Remove the three bolts and idler pulley bracket.

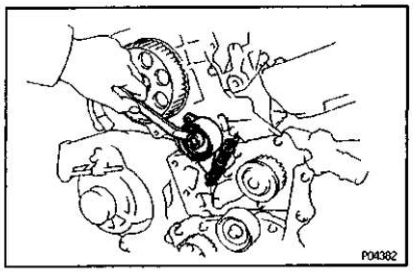


(h) Remove the two bolts, and disconnect the A/C compressor from the engine.



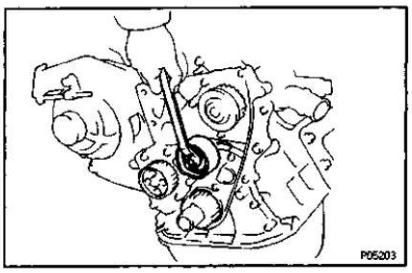
HINT: Suspend the A/C compressor to strut rod with a string.

6. REMOVE TIMING BELT
(See steps 4 to 6 and 8 to 22 in Timing Belt Removal under Engine Mechanical)
7. DISCONNECT RADIATOR HOSE FROM WATER OUTLET



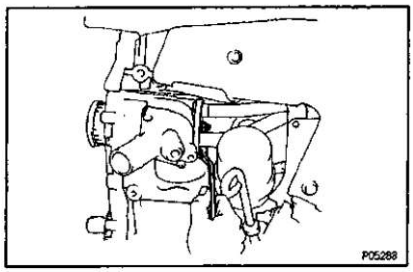
8. REMOVE TIMING BELT TENSION SPRING

Loosen the No.1 idler pulley bolt, and remove the tension spring.



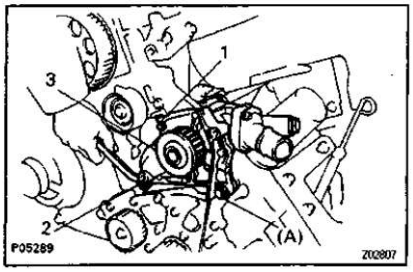
9. REMOVE No.2 IDLER PULLEY

Remove the bolt and pulley.



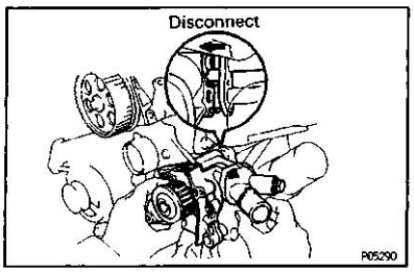
10. REMOVE WATER PUMP AND WATER PUMP COVER ASSEMBLY

(a) Remove the two nuts holding the water pump to the water by–pass pipe.



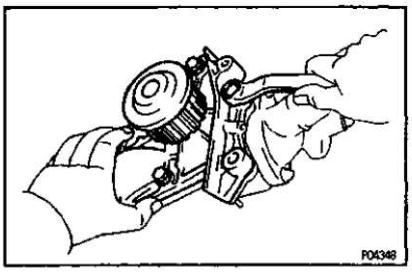
(b) (w/o A/C)
Remove bolt (A).

(c) Remove the three bolts in the sequence shown.



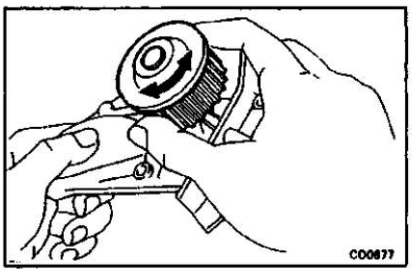
(d) Disconnect the water pump cover from the water by –pass pipe, and remove the water pump and water pump cover assembly.

(e) Remove the gasket and two O–rings from the water pump and water by–pass pipe.



11. REMOVE WATER PUMP FROM WATER PUMP COVER

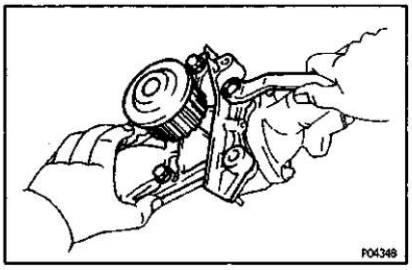
Remove the three bolts, water pump and gasket.



WATER PUMP INSPECTION

INSPECT WATER PUMP

Turn the pulley and check that the water pump bea–ring moves smoothly and quietly.



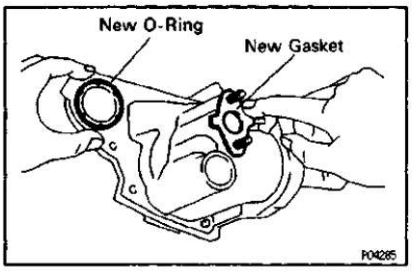
WATER PUMP INSTALLATION

(See Components for Removal and Installation)

1. INSTALL WATER PUMP TO WATER PUMP COVER

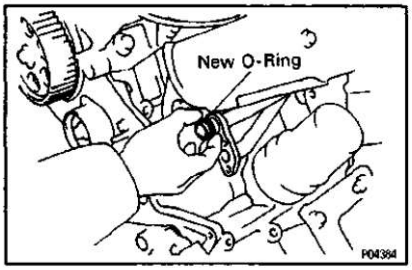
Install a new gasket and the water pump with the three bolts.

Torque: 8.8 N–m (90 kgf–cm, 78 in.–lbf)



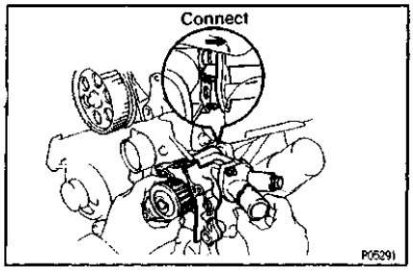
2. INSTALL WATER PUMP AND WATER PUMP COVER ASSEMBLY

(a) Install new O–ring and gasket to water pump cover.

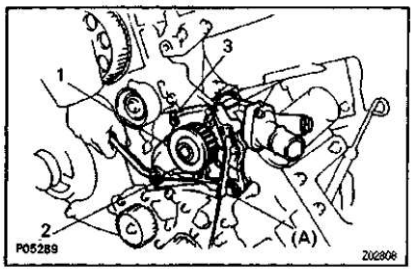


(b) Instal a new O–ring to the water by–pass pipe.

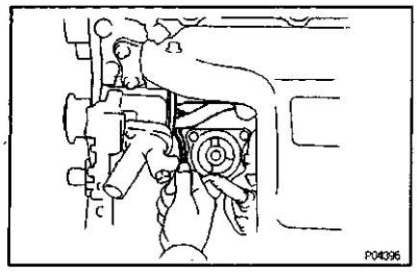
(c) Apply soapy water to the 0– ring on the water by–pass pipe.



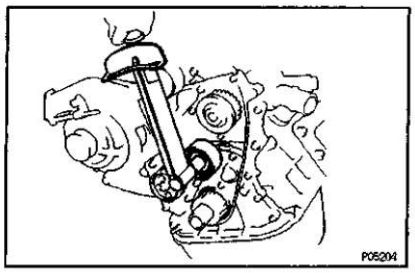
(d) Connect the water pump cover to the water by–pass pipe. Do not install the nuts yet.



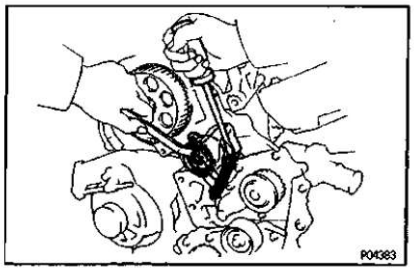
(e) Install the water pump with the three bolts. Tighten the bolts in the sequence shown.
Torque: 8.8 N–m (90 kgf–cm, 78 in.–lbf)
(f) (w/o, A/C)
Install the bolt (A).
Torque: 27 N–m (275 kgf–cm, 20 ft–lbf)



(g) Install the two nuts holding the water pump cover to the water by–pass pipe.
Torque: 9.3 N–m (95 kgf–cm, 82 in.–lbf)



3. INSTALL NO.2 IDLER PULLEY
(a) Install the pulley with the bolt.
Torque: 42 N–m (425 kgf–cm, 31 ft–lbf)
(b) Check that the idler pulley moves smoothly.

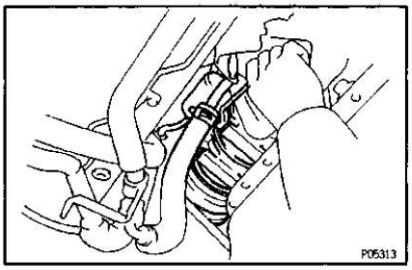


4. INSTALL TIMING BELT TENSION SPRING
(a) Install the tension spring.
(b) Pry the No. 1 pulley toward the left as far as it will go, and tighten the pulley bolt.

5. CONNECT LOWER RADIATOR HOSE TO WATER INLET

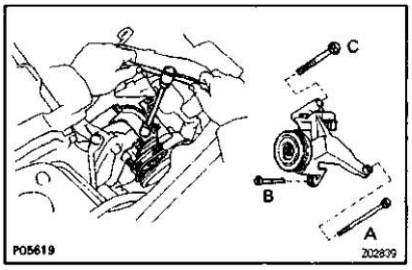
6. INSTALL TIMING BELT

(See steps 5 to 19 and 21 to 23 in Timing Belt ' Installation under Engine Mechanical)



7. INSTALL A/C COMPRESSOR

(a) Temporarily install the A/C compressor with the two bolts

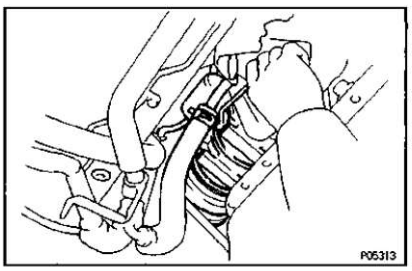


(b) Install the idler pulley bracket with the three bolts.

Torque:

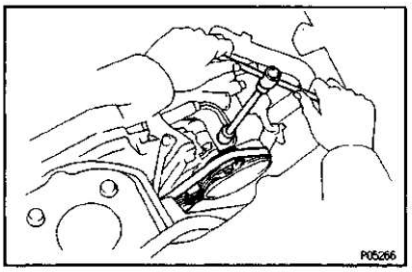
25 N–m (250 kgf–cm, 18 ft–lbf) for A
27 N–m (275 kgf–cm, 20 ft–lbf) for B
37 N–m (375 kgf–cm, 27 ft–lbf) for C

(c) Connect the A/C compressor connector.



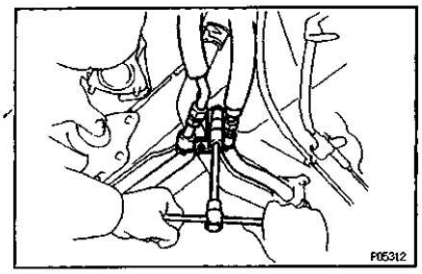
(d) Tighten the two bolts of the lower side of the A/C compressor.

Torque: 25 N–m (250 kgf–cm, 18 ft–lbf)

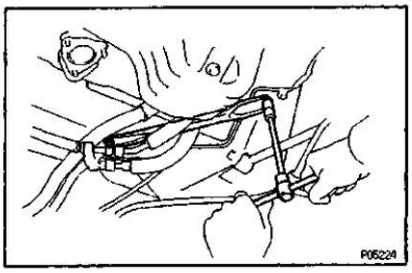


(e) Install the drive belt with the adjusting bolt.

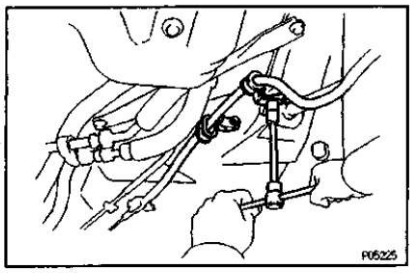
(f) Tighten the idler pulley nut.



(g) Install the A/C pipes with the two clamps and nut.



(h) install the lower suspension brace with the two bolts.
Torque: 73 N–m (740 kgf–cm, 54 ft–lbf)



(i) Install the parking brake cable with the two clamps and three bolts.

8. CONNECT CABLE TO NEGATIVE TERMINAL OF BATTERY
9. FILL WITH ENGINE COOLANT
10. START ENGINE AND CHECK FOR COOLANT LEAKS
11. INSTALL RH ENGINE HOOD SIDE PANEL
12. INSTALL ENGINE UNDER COVERS