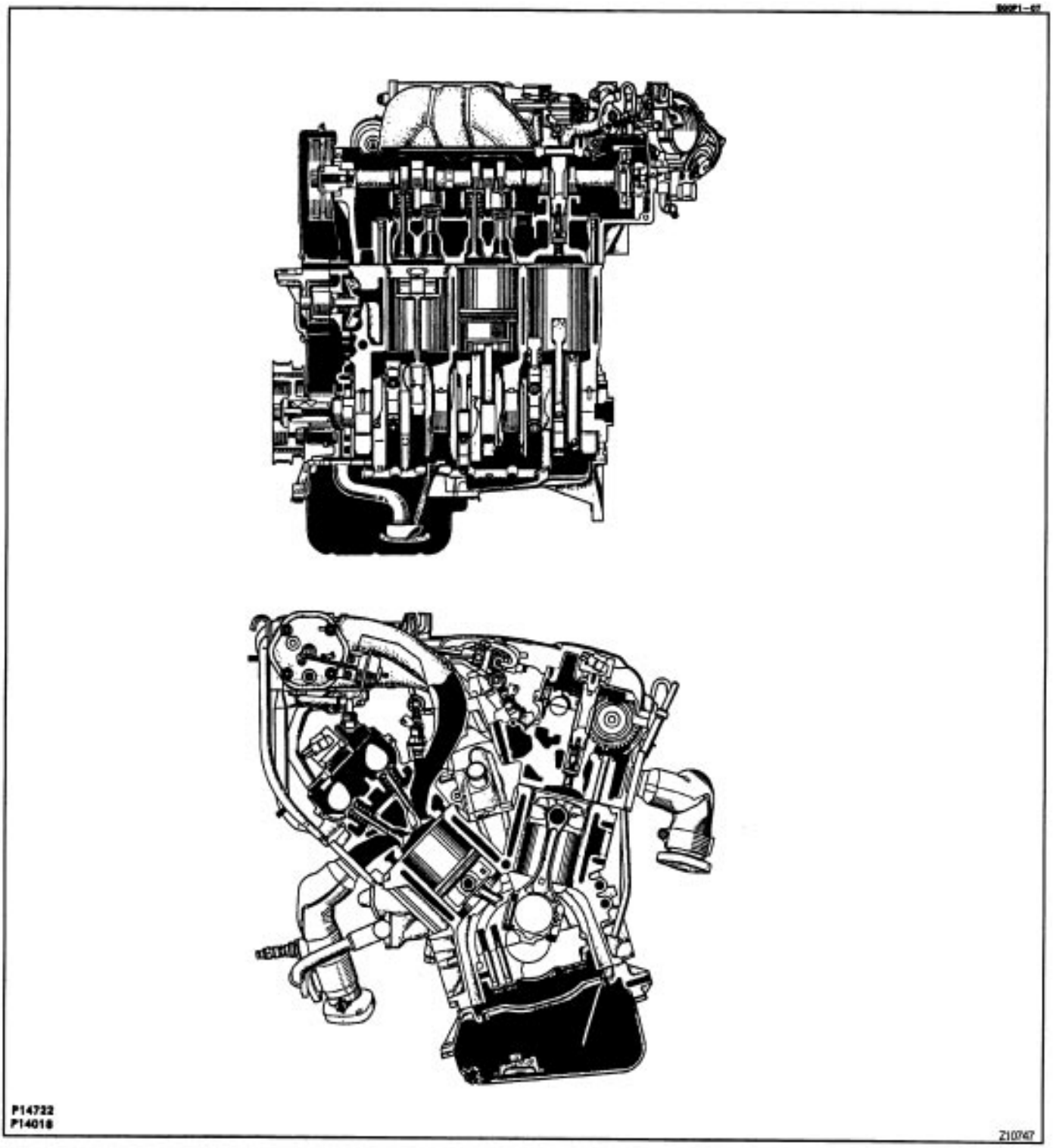
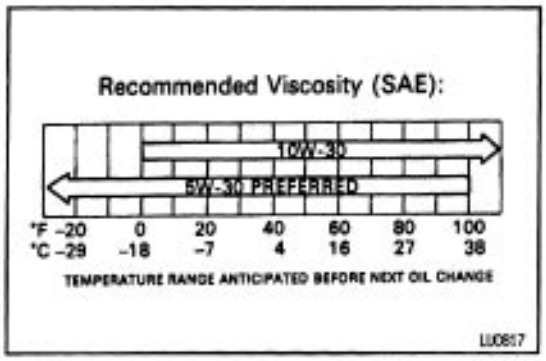
ENGINE MECHANICAL

DESCRIPTION

The 1 MZ–FE engine is a V–6, 3.0 liter 24 valve DOHC engine.

OPERATION





ENGINE OIL INSPECTION

1. CHECK OIL QUALITY

Check the oil for deterioration, entry of water, dis–coloring or thinning.

If oil quality is visibly poor, replace the oil.

Oil grade:

API grade SG or SH, Energy – Conserving H or ILSAC multigrade engine oil. Recommended viscosi–ty is as shown in the illustration, with SAE 5W–30 being the preferred engine oil.

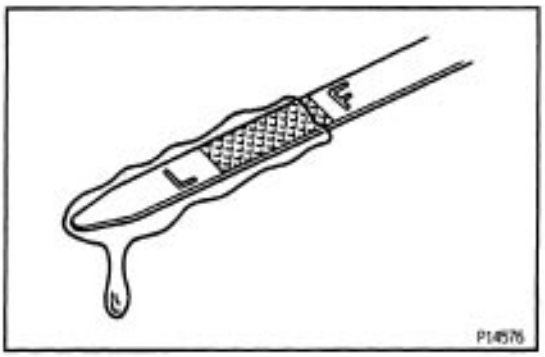
Drain and refill capacity:

w/ Oil filter change

4.7 liters (5.0 US qts, 4.1 Imp, qts)

w/o Oil filter change

4.5 liters (4.8 US qts, 4.0 Imp. qts)



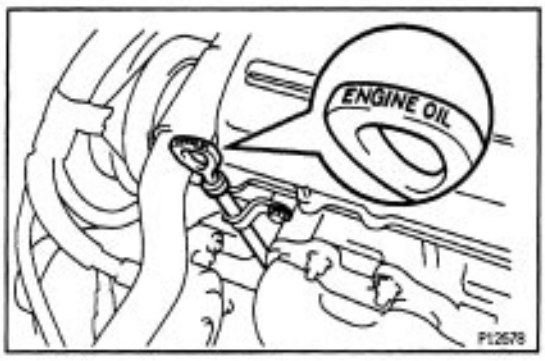
2. CHECK ENGINE OIL LEVEL

The oil level should be between the ”L” and ”F” marks on the dipstick.

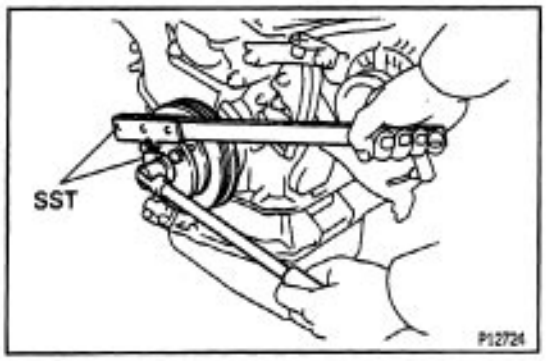
If low, check for leakage and add oil up to the ”F” mark.

NOTICE:

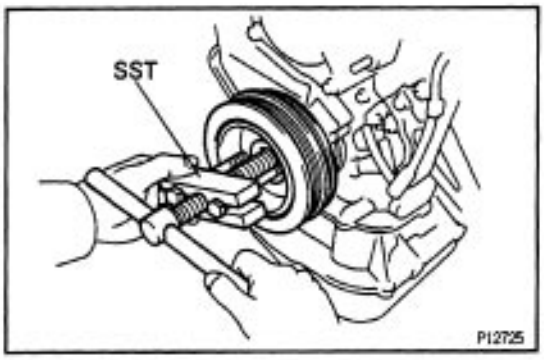
- **Do not fill with engine oil above the ’F’ mark.**



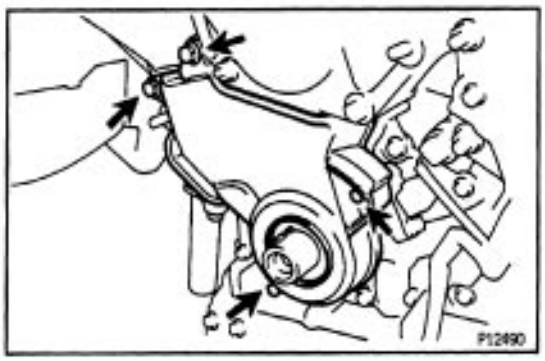
- **Install the oil dipstick facing the direction shown in the illustration.**



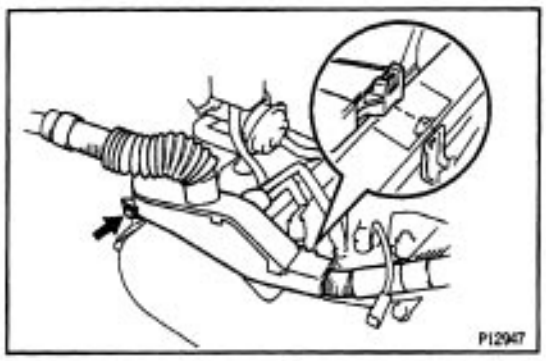
11. REMOVE CRANKSHAFT PULLEY
(a) Using SST, remove the pulley bolt.
SST 09213–54016, 09330–00021



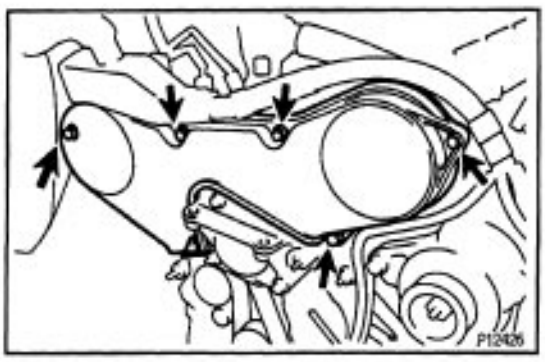
(b) Using SST, remove the pulley.
SST 09213–00060



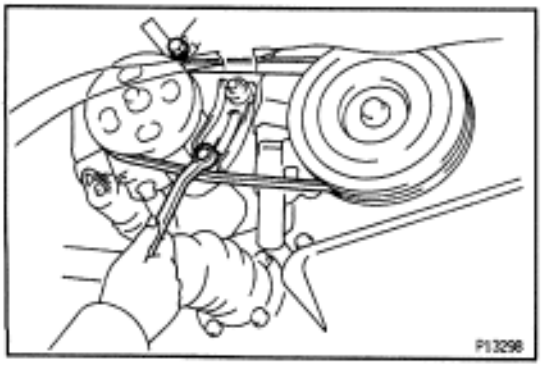
12. REMOVE No.1 TIMING BELT COVER
Remove the 4 bolts and timing belt cover.



13. DISCONNECT ENGINE WIRE
(a) Remove the bolt holding the engine wire to the No.3 timing belt cover.
(b) Disconnect the engine wire from the clamp.



14. REMOVE N0.2 TIMING BELT COVER
Remove the 5 bolts and timing belt cover.



21. INSTALL AND ADJUST PS DRIVE BELT

Install the drive belt with the pivot and adjusting bolts.

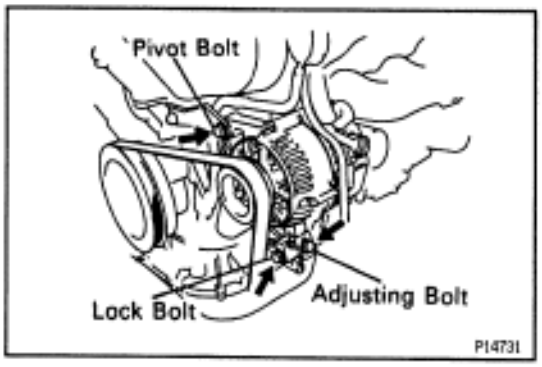
Drive belt tension:

New belt

150 ± 185 l bf

Used belt

115 ± 20 lbf



22. INSTALL GENERATOR DRIVE BELT

Adjust the drive belt. (See CH section)

Drive belt tension:

New belt

175 ± 5 lbf

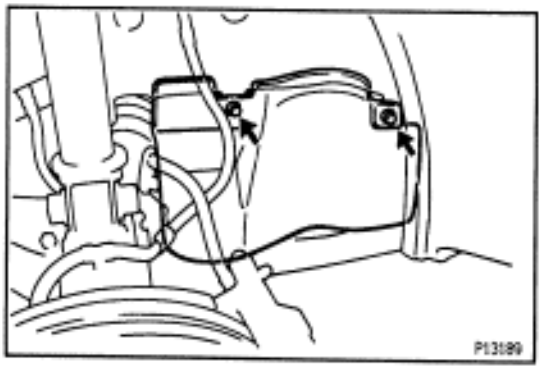
Used belt

115 ± 20 lbf

23. INSTALL COOLANT RESERVOIR TANK

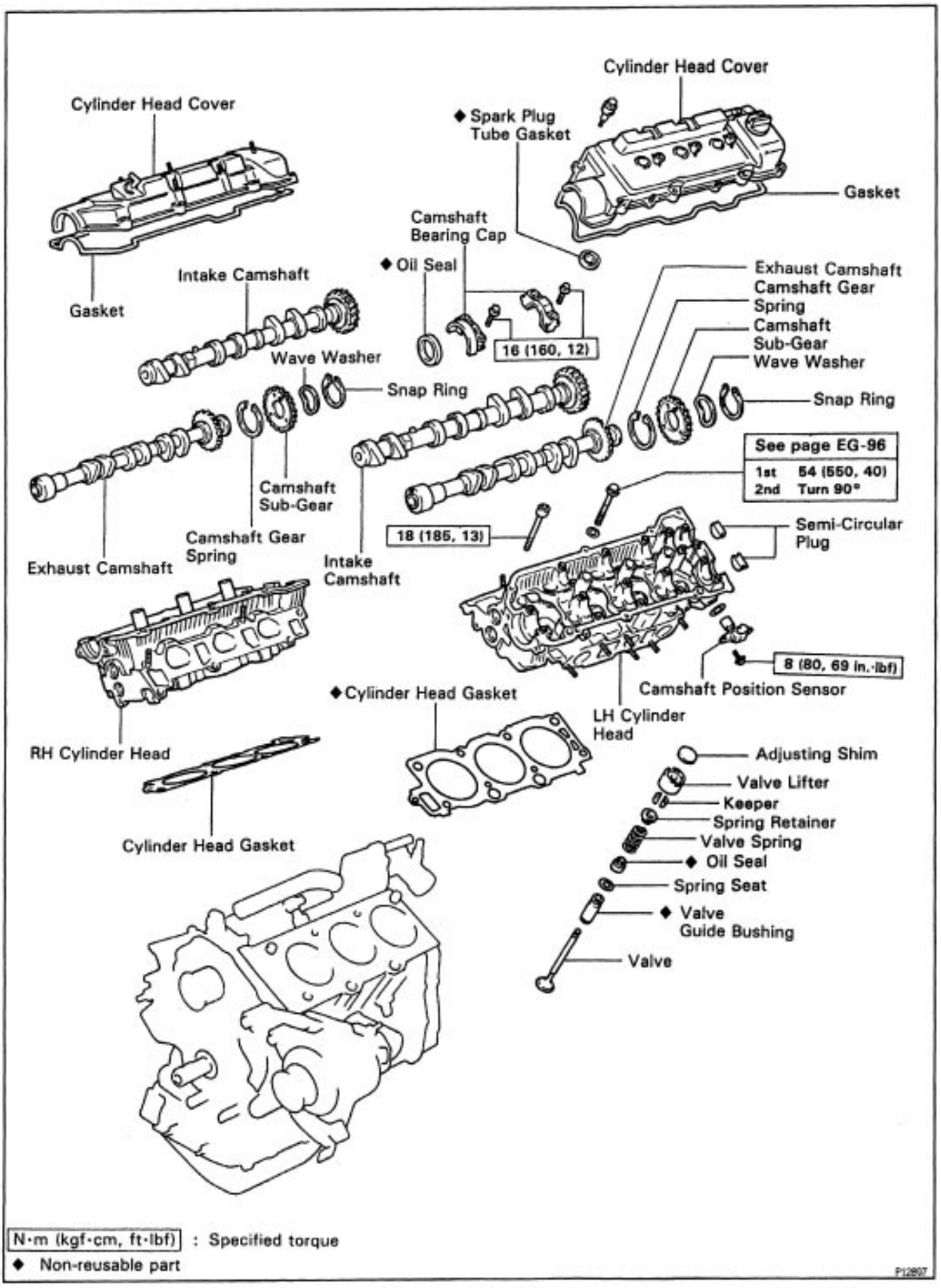
24. CONNECT NEGATIVE (–) TERMINAL CABLE TO BATTERY

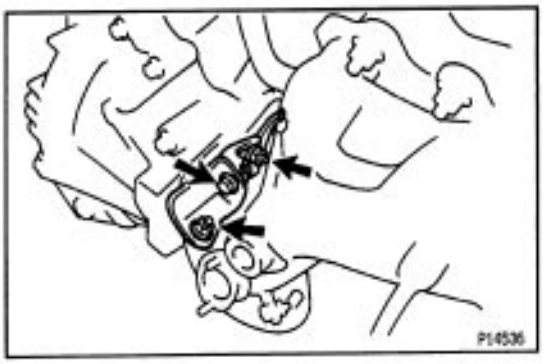
25. START ENGINE, AND CHECK FOR ABNORMAL NOISE AND SMOOTH OPERATION



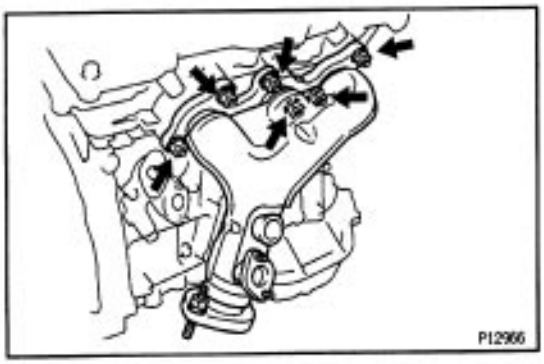
26. INSTALL RH FENDER APRON SEAL

27. INSTALL RH FRONT WHEEL

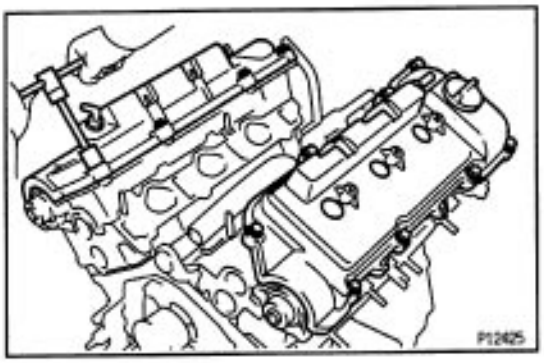

Cylinder Head Cover
Cylinder Head Cover
◆ Spark Plug Tube Gasket
Gasket
Camshaft Bearing Cap
◆ Oil Seal
Gasket
Intake Camshaft
16 (160, 12)
Exhaust Camshaft
Camshaft Gear
Spring
Camshaft Sub-Gear
Wave Washer
Wave Washer
Snap Ring
Snap Ring
See page EG-96
1st 54 (550, 40)
2nd Turn 90°
Camshaft Sub-Gear
Camshaft Gear Spring
18 (185, 13)
Semi-Circular Plug
Exhaust Camshaft
Intake Camshaft
8 (80, 69 in.·lbf)
Camshaft Position Sensor
◆ Cylinder Head Gasket
LH Cylinder Head
RH Cylinder Head
Adjusting Shim
Valve Lifter
Keeper
Spring Retainer
Valve Spring
◆ Oil Seal
Spring Seat
◆ Valve Guide Bushing
Valve
Cylinder Head Gasket
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part
P12897



(c) Remove the bolts, 2 nuts, exhaust manifold stay and exhaust manifold plate.

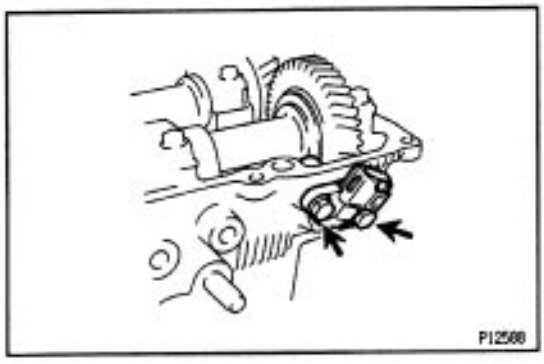


(d) Remove the 6 nuts, exhaust manifold and gasket.



46. REMOVE CYLINDER HEAD COVERS

Remove the 8 bolts, cylinder head cover and gasket.
Remove the 2 cylinder head covers.

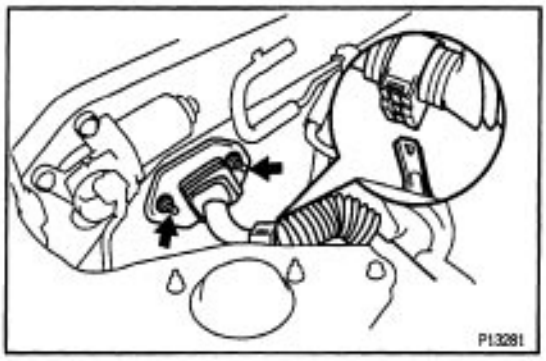


47. REMOVE CAMSHAFT POSITION SENSOR

(a) Remove the bolt and position sensor.
(b) Remove the gasket from the position sensor.

48. REMOVE CAMSHAFTS

NOTICE: Since the thrust clearance of the camshaft is small, the camshaft must be held 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.



20. CONNECT ENGINE WIRE TO CABIN

(a) Push in the engine wire through the cowl panel. Install the 2 nuts.

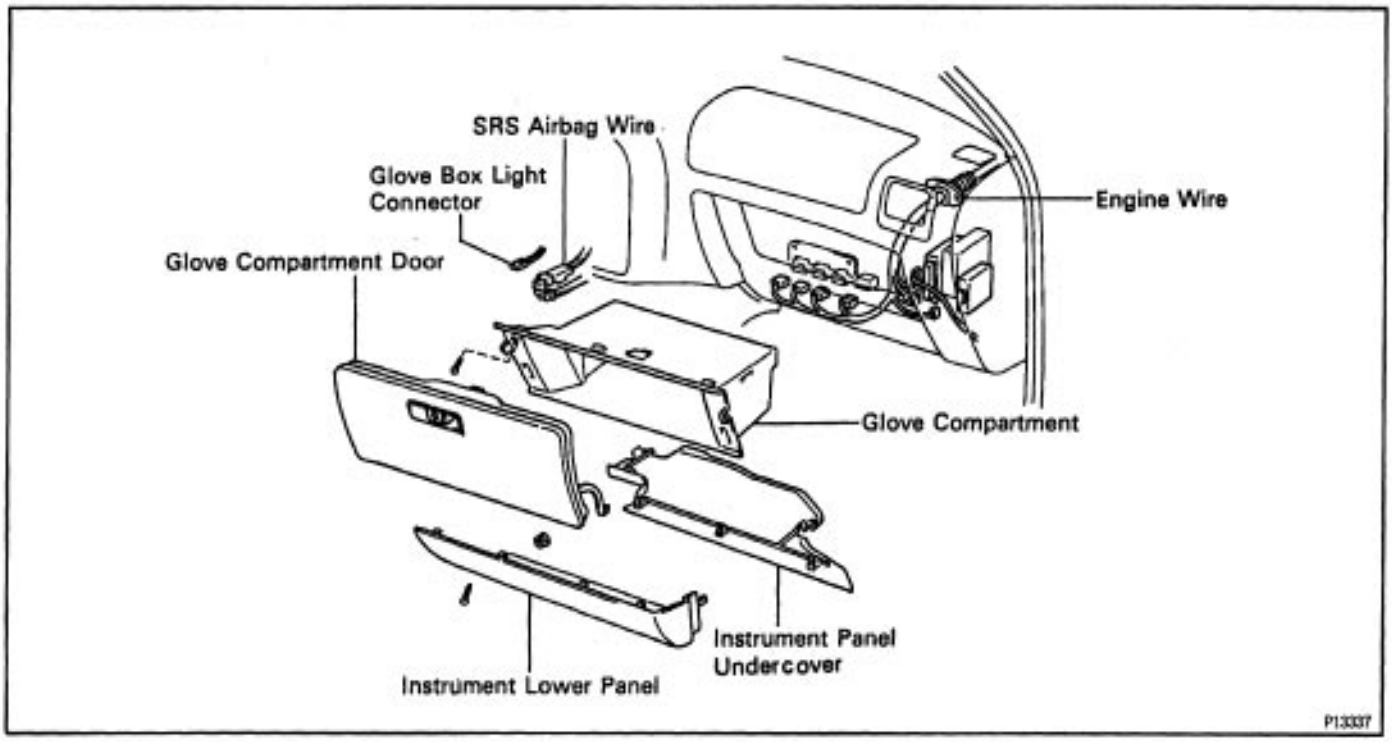
(b) Connect the wire clamp.

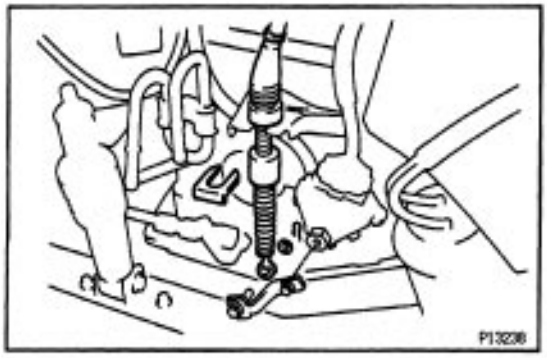
(c) Connect the following connectors:

(1) 3 engine ECM connectors
(2) 5 cowl wire connectors
(3) Cooling fan ECU connector

(d) Install the following parts:

(1) Glove compartment
(2) Glove compartment door
(3) Lower instrument panel
(4) Under cover

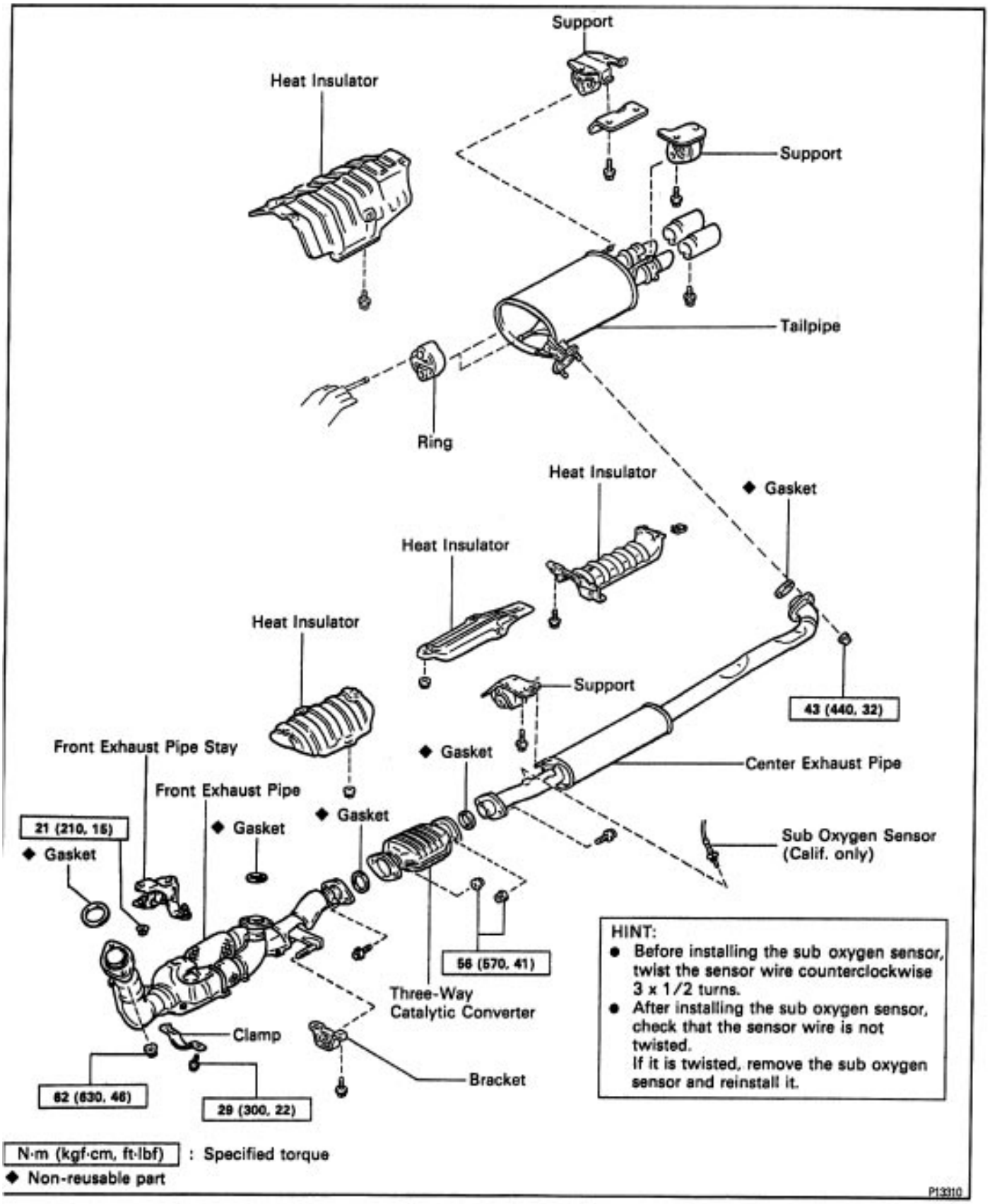




21. CONNECT TRANSAXLE CONTROL CABLE TO TRANSAXLE

EXHAUST SYSTEM

COMPONENTS



EMISSION CONTROL SYSTEMS

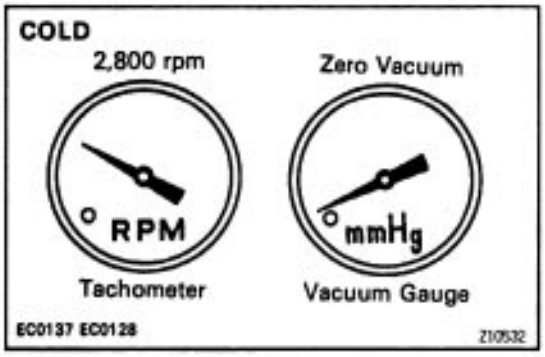
DESCRIPTION

The emission control systems are installed to reduce the amount of HC, CO and NOx emitted from the engine, and to also prevent release of evaporated fuel from the gasoline tank and prevent atmospheric release of blow–by gas.
The system consists of the PCV, EVAP, EGR and TWC.
The function of each system is shown in the following table.

System	Abbreviation	Purpose
Positive crankcase ventilation	PCV	Reduces blow–by gas
Evaporative emission control	EVAP	Reduces evaporative HC
Exhaust gas recirculation	EGR	Reduces NOx
Three–way catalytic converter	TWC	Reduces C0, HC and NOx
Sequential multiport fuel injection’	SFI	Regulates all engine conditions for reduction of exhaust emissions.

*For inspection and repair of the SFI system, refer to the SFI section.

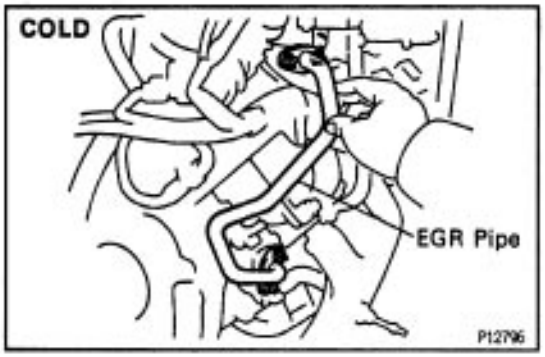
V02937



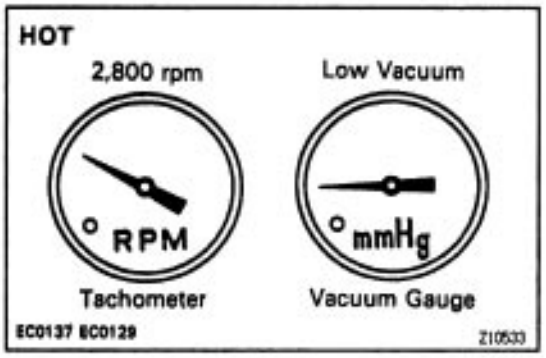
5. INSPECT VSV OPERATION WITH COLD ENGINE

(a) The engine coolant temperature should be below 55_2 C (1131_2F).

(b) Check that the vacuum gauge indicates zero at 2,800 rpm.



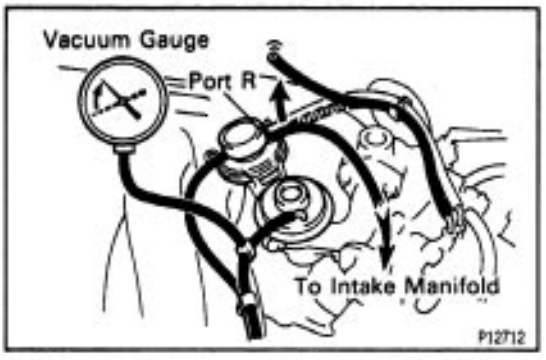
(c) Check that the EGR pipe is not hot.



6. INSPECT OPERATION OF VSV AND EGR VACUUM MODULATOR WITH HOT ENGINE

(a) Warm up the engine to above 80_2C (176° F).

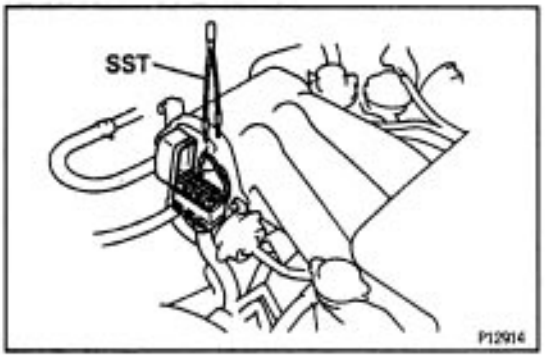
(b) Check that the vacuum gauge indicates low vacuum at 2,800 rpm.



(c) Disconnect the vacuum hose from 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 3,500 rpm.

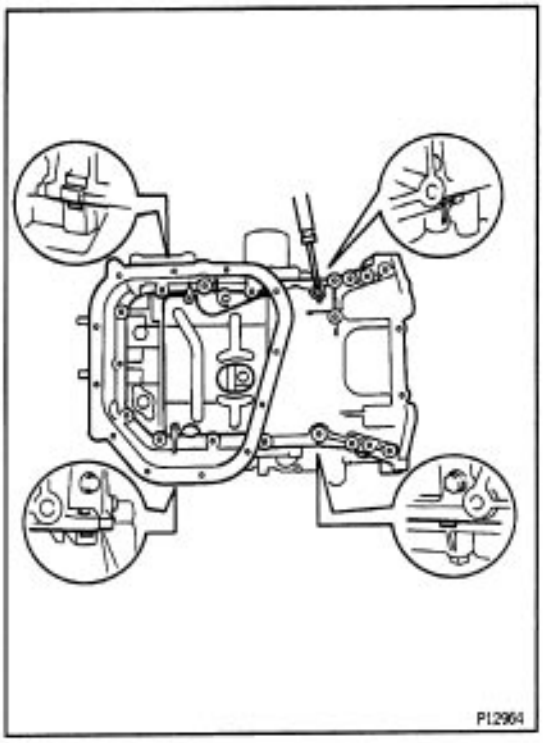
HINT: As exhaust gas is increasingly recirculated, the engine will start to misfire.



7. DISCONNECT TERMINALS TE1 AND E1

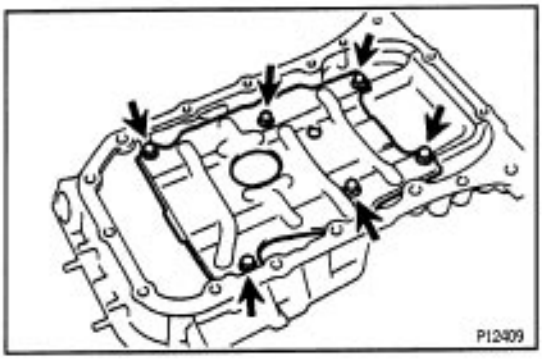
Remove the SST from the data link connector 1.

SST 09843–18020



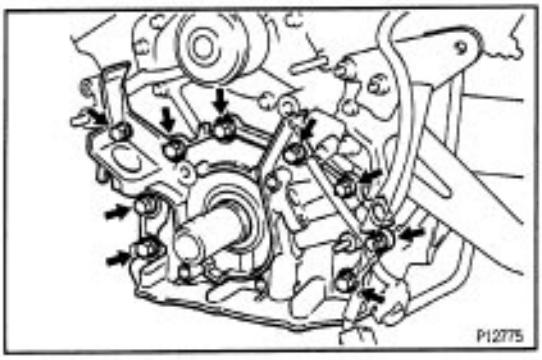
(b) Using a screwdriver, remove the No. 1 oil pan by prying the portions between the cylinder block and No.1 oil pan.

NOTICE: Be careful not to damage the contact surfaces of the cylinder block and No.1 oil pan.



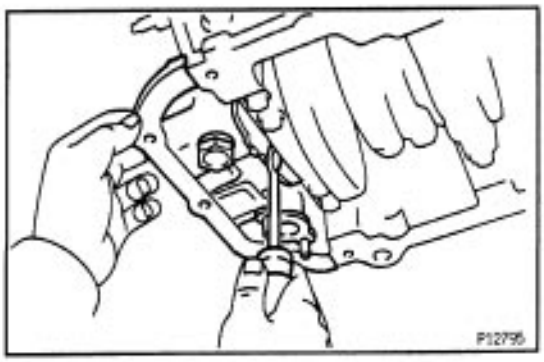
20. REMOVE OIL PAN BAFFLE PLATE

Remove the 6 bolts and baffle plate.



21. REMOVE OIL PUMP

(a) Remove the 9 bolts.



(b) Remove the oil pump by prying a screwdriver between the oil pump and main bearing cap.

(c) Remove the 0–ring.

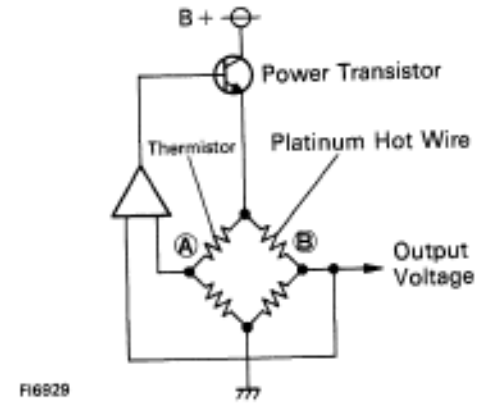
DTC P0100 Mass Air Flow Circuit Malfunction

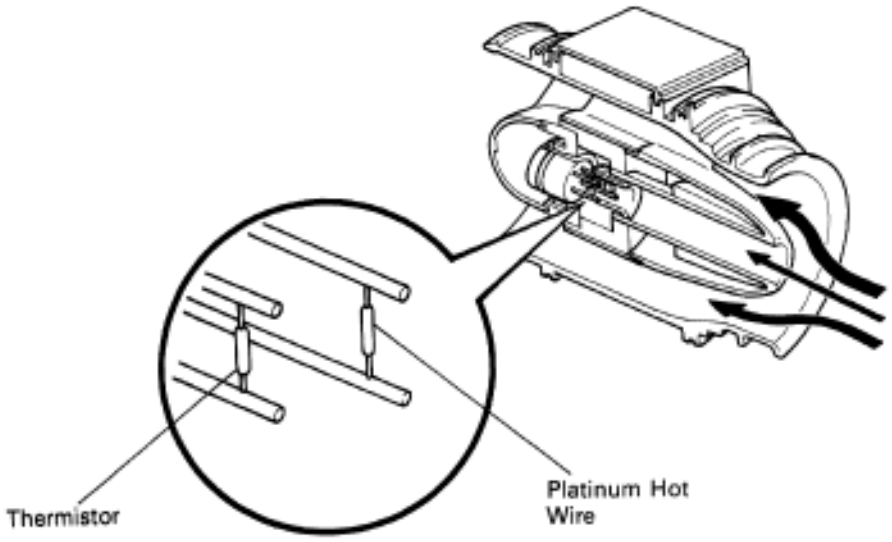
CIRCUIT DESCRIPTION

The mass air flow meter uses a platinum hot wire. The hot wire air flow meter consists of a platinum hot wire, thermistor and a control circuit installed in a plastic housing. The hot wire air flow meter works on the principle that the hot wire and thermistor located in the intake air bypass of the housing detect any changes in the intake air temperature.

The hot wire is maintained at the set temperature by controlling the current flow through the hot wire. This current flow is then measured as the output voltage of the air flow meter.

The circuit is constructed so that the platinum hot wire and thermistor provide a bridge circuit, with the power transistor controlled so that the potential of (A) and (B) remains equal to maintain the set tem–perature.





DTC No.	Diagnostic Trouble Code Detecting Condition	Trouble Area
P0I00	Open or short in mass air flow meter circuit with engine speed 4,000 rpm or less.	• Open or short in mass air flow meter circuit • Mass air flow meter • ECM

If the ECM detects diagnostic trouble code ”P01 00” it operates the fail safe function, keeping the ignition timing and injection volume constant and making it possible to drive the vehicle.

DIAGNOSTIC CHART
TOYOTA hand–held tester

1	Connect the TOYOTA hand–held tester and read value of EGR gas temperature.	OK	G o to step 4

NG

2	Check for short in harness and ECM.	OK	Replace EGR gas temp. sensor.

NG

3	Check for short in harness or ECM.	OK	Repair or replace harness or connector.

NG

Check and replace ECM.

4	Check the VSV for EG R.	OK	Check EGR valve.

NG

5	Check operation of the VSV for EG R.	NG	Replace VSV for EG R.

OK

Check for open in harness and connector between J/B No.2 and ECM.

DTC P1600 EMC BATT Malfunction

CIRCUIT DESCRIPTION

Battery voltage is supplied to terminal BATT of the ECM even when the ignition switch is OFF for use by the diagnostic trouble code memory and air–fuel ratio adaptive control value memory, etc.

DTC No.	Diagnostic Trouble Code Detecting Condition	Trouble Area
P1600	Open in back up power source circuit.	• Open in back up power source circuit. • ECM

HINT: If DTC P1600 appear, the ECM does not store another diagnostic trouble code.

DIAGNOSTIC CHART

1 Check voltage of terminal BATT.

OK → Check and replace ECM.

NG

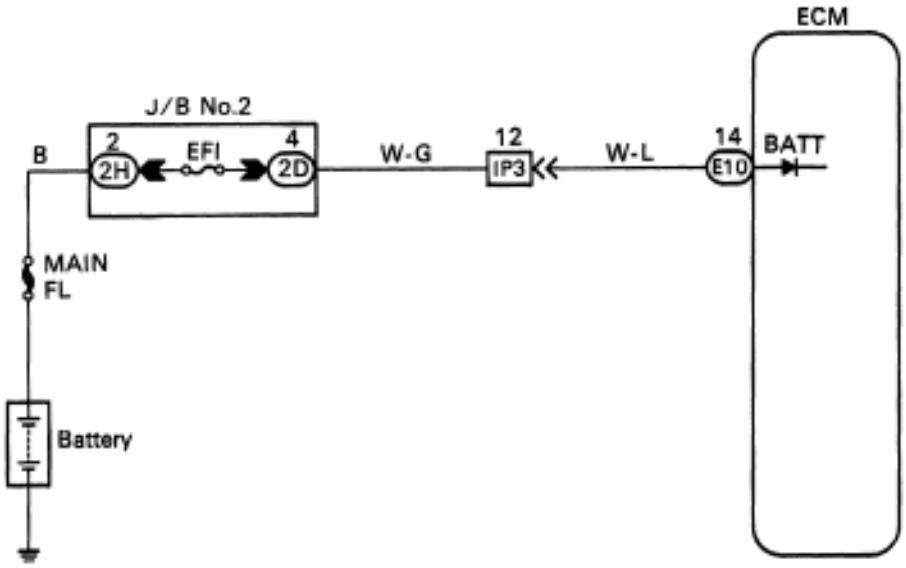
2 Check EFI fuse.

NG → Check for short in all the harness and components connected to EFI fuse.

OK

Check and repair harness or connector between battery, EFI fuse and ECM.

WIRING DIAGRAM



FI6681

INSPECTION PROCEDURE
OBDII scan tool (excluding TOYOTA hand–held tester)

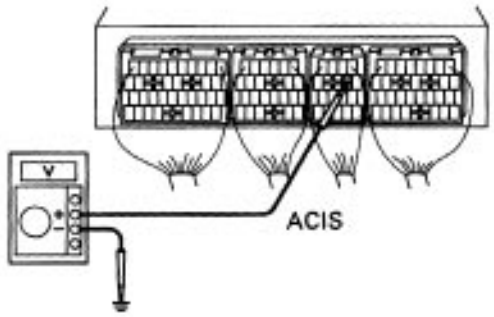
1 **Check IACV control VSV (See page EG2–598, step 2)**

OK

NG **Replace IACV control VSV.**

2 **Check voltage between terminal ACIS of ECM connector and body ground.**

IG ON



BE6653
FI7026

P (1) Remove glove compartment
(See page EG2–309).
(2) Turn ignition switch ON.

C Measure voltage between terminal ACIS of ECM connector and body ground.

OK **Voltage: 9 –14 V**

OK

NG **Check for open and short in harness and connector between EFI main relay and ECM (Seepage IN–31).**

3 **Check for vacuum tank (See page EG2–277).**

OK

NG **Repair or replace.**

Check and replace ECM (See page IN–36).