

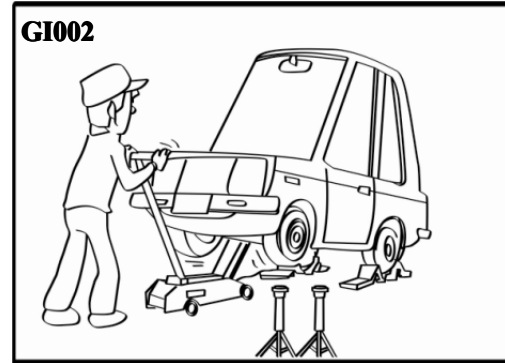
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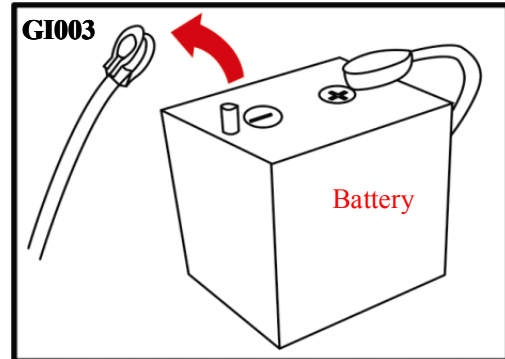
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- Before jacking up the vehicle, put wheel chocks or other tire blocks under the wheels to prevent the vehicle from moving. After jacking up the vehicle, support the vehicle weight with safety stands at the points designated for proper lifting before working on the vehicle. This operation should be done on a level ground.



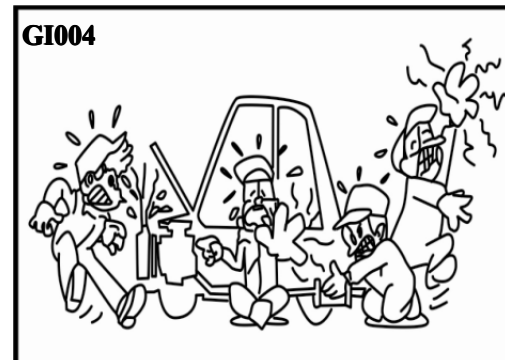
- When removing a heavy component such as the engine or transmission, please do not waggle it using excessive force in order to disconnect it. Also, do not allow them to strike adjacent parts, especially the brake pipes and master cylinder.



- Before starting repairs which do not require battery power: Turn off ignition switch and disconnect the negative battery terminal.

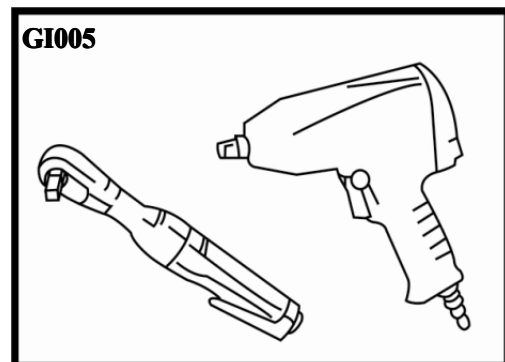
- If the terminal is disconnected, memory in the control module will be cleared.

- To prevent scalds: Avoid contact with hot metal parts. Do not remove the radiator cap when the engine is hot.



- Dispose of drained oil or the solvent used for cleaning parts in an appropriate manner.

- Clean all removed parts in the designated liquid or solvent prior to inspection and assembly.

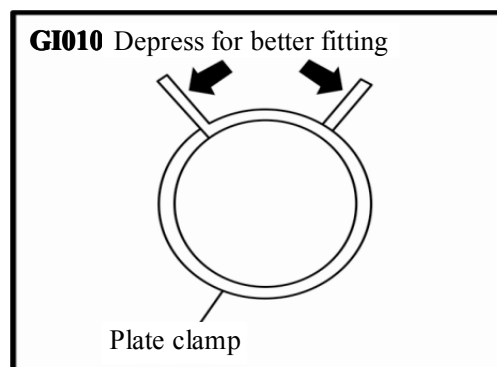


- Replace oil seals, gaskets, packings, O-rings, locking washers, cotter pins, self-locking nuts, etc. with new ones.

- Replace inner and outer races of tapered roller bearings and needle bearings as a set.

- Arrange the removed parts in accordance with their assembled locations and sequence.

- After installing plate clamps, apply force to them in the direction of the arrow in the figure, clamping rubber hose equally.



Precautions for engine oil:

Prolonged and repeated contact with used engine oil may cause skin cancer. Therefore, avoid direct skin contact with used oil. If skin contact is made, wash thoroughly with soap or cleanser as soon as possible.

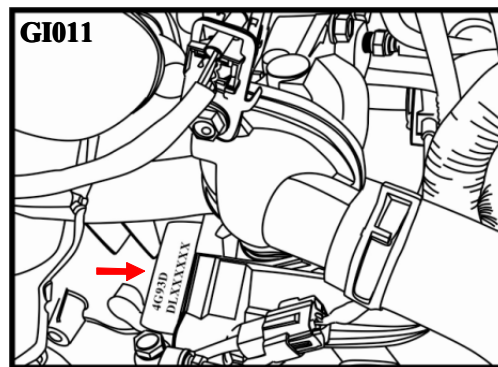
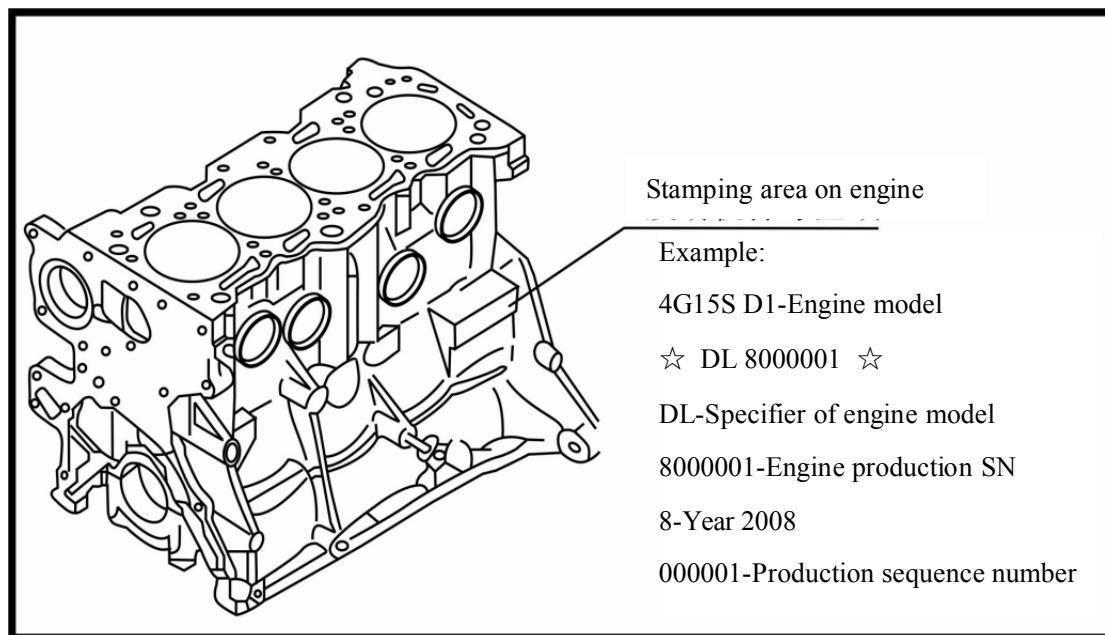
Health protection precautions:

- Avoid prolonged and repeated contact with engine oil, particularly used engine oil.
- Wear protective clothing. Please use impervious gloves where practicable.
- Please do not put oily rags in pockets.
- Please do not contaminate clothes, particularly underwear, with oil.
- Heavily soiled clothing and oil impregnated footwear should not be worn. Overalls should be cleaned regularly.
- First aid treatment should be obtained immediately for skin cuts and other body wounds.
- Apply barrier cream to skin before starting each work in order to help the removal of oil from the skin.
- Wash with soap and water to ensure all oil is removed (skin cleansers and nail brushes will help). Use lanolin in replace of the natural skin oils which have been removed.
- Please do not use gasoline, kerosene, diesel oil, gas oil, thinners or solvents for cleaning skin.
- If skin disorders develop, take medical measures without delay.
- Where practical, degrease components prior to use.
- Where there is a risk of eye contact, goggles or face shields should be worn; in addition, an eye wash facility should be provided.

Environmental protection precautions:

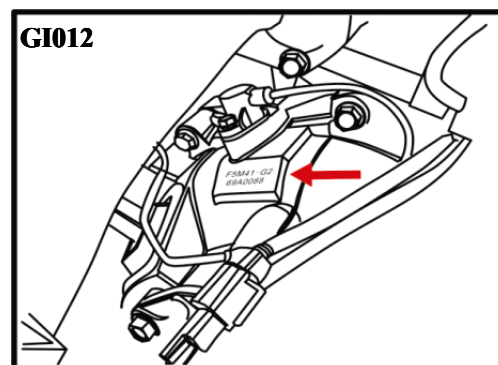
Dispose of waste oil and oil filters through officially approved waste disposal contractors to licensed waste disposal sites, or to the waste oil reclamation enterprises. If you have any question on disposal of waste substances, contact the local authority.

It is illegal to pour used oil on to the ground, down sewers or drain ditches, or into water sources; the laws and regulations concerning pollution vary between regions.



Manual transmission model:

Location of F5M41-61 transmission model is shown in the figure.



Vehicle parameters:

List of Vehicle Parameters

Overall body size	
Overall length (mm)	4550
Overall width (mm)	1775

and radiator cool down.

Engine maintenance

Checking drive belts:

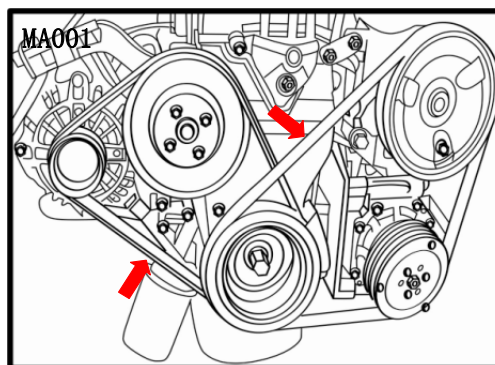
Be sure to perform the following when engine is stopped.

- ① Check alternator drive belt for cracks, flying chips, wear condition, and oil traces and adjust its tension.

Method: When checking status of alternator drive belt, check for cracks, flying chips and wear condition while rotating it.

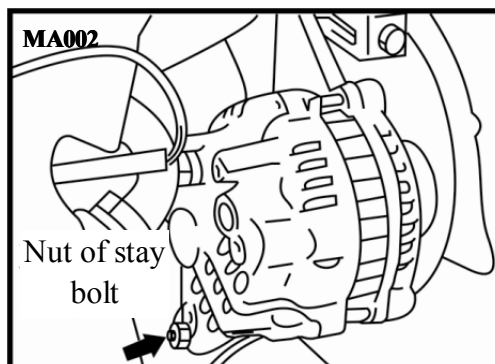
- ② Check drive belt deflection at a point on belt midway between pulleys.

- Inspection should be done only when engine is cold, or over 30 minutes after engine is stopped.
- When measuring the deflection, apply 100 N at the marked point.
- Adjust if the belt deflection exceeds the limit.
- Specified value of belt deflection: 8.3~10.4mm.



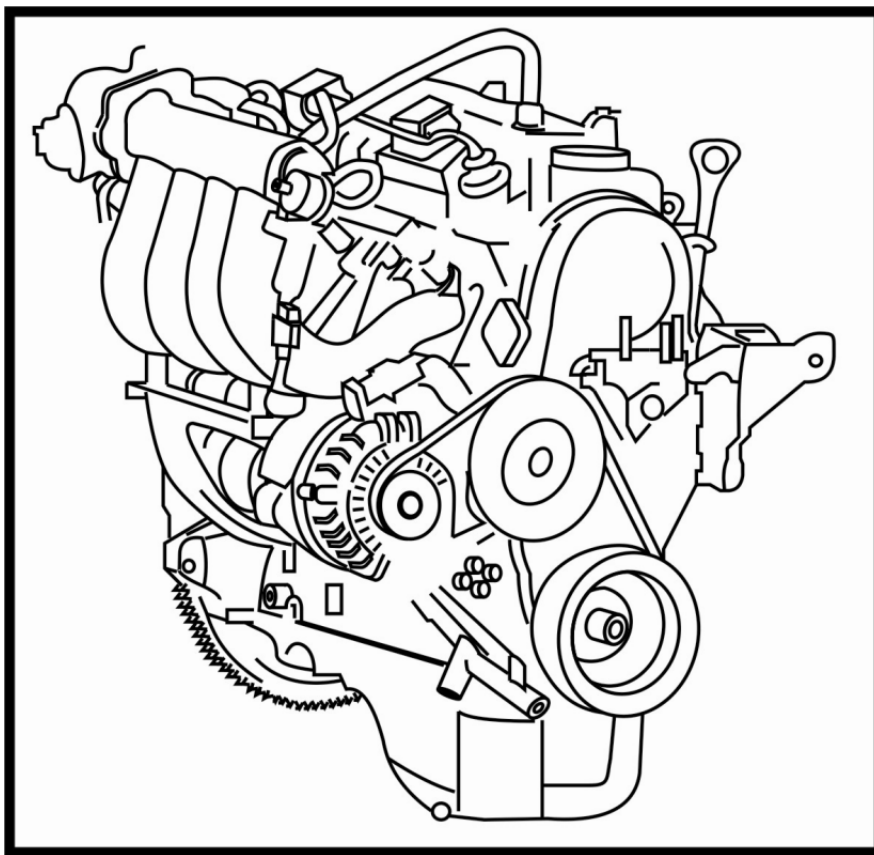
Alternator drive belt tension adjustment:

1. Unscrew nut of alternator stay bolt.
2. Unscrew lock nut of belt tightener.



Engine Structure Overview

The exterior of the engine is shown in the figure:



Outside View of Engine Assembly

As shown in the figure, this engine assembly is mainly used on B-Class models manufactured by JAC Motors.



B-Class models

Inspection after removal:

Crankshaft clearance:

Crankshaft clearance can be measured easily with a plastigage. Follow the procedure below to measure crankshaft clearance using plastigage.

1. Wipe off all engine oil from crankshaft journal and bearing inner surface.
2. Install bearing.
3. Cut plastigage so that its length matches bearing width. Then put it on journal along axial direction of journal.
4. Install crankshaft bearing shell cover gently, and tighten bolts to the specified torque.
5. Remove bolts, and remove crankshaft bearing shell cover gently.
6. Measure squeezed part on plastigage at the widest point using the scale printed on plastigage bag.

Standard value: 0.02-0.04mm

Limit value: 0.1mm

Caution:

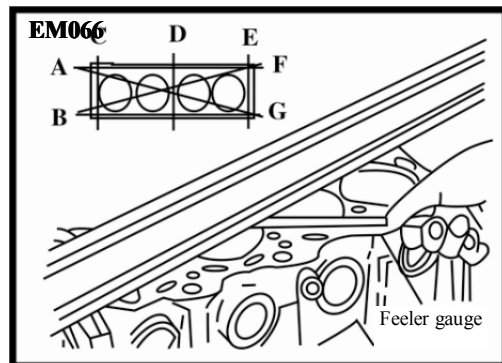
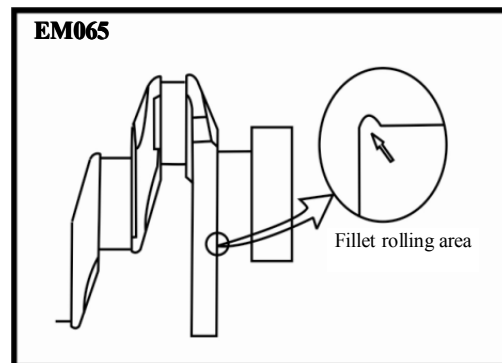
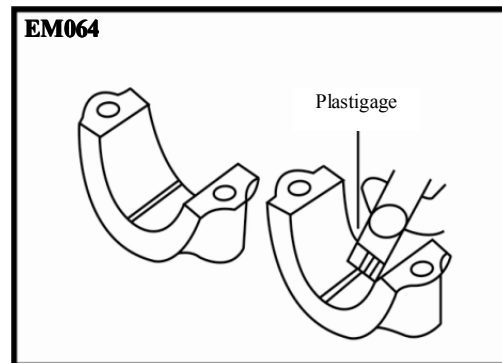
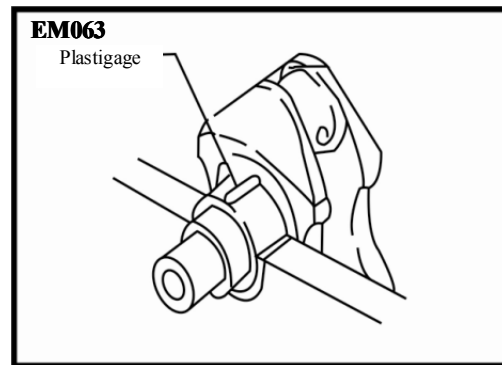
- Both connecting rod journal and main journal of crankshaft are rolled and need not to be machined to reduced sizes.

Cylinder block

1. Inspect for cracks, rust and corrosion visually and check cylinder block using defect inspection agent. Repair defects as far as possible or replace cylinder block.
2. Keep top surface free of gasket debris and other foreign materials. Check for cylinder block top surface distortion using straightedge and feeler gauge.

Standard value: <0.03mm

Limit value: <0.1mm



Item	Recommended lubricant	Quantity (including lubricant in oil filter)
Engine oil (API grade)	15W-40 SJ grade or above	3.5L

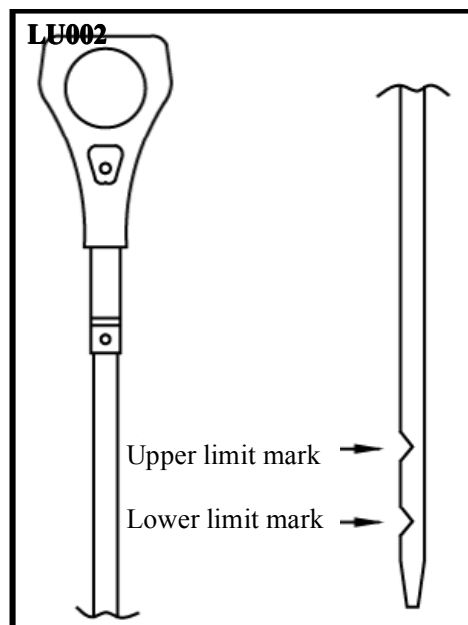
Engine Oil

Engine oil level:

Note:

Before starting engine, park vehicle horizontally and firmly and check the engine oil level. If engine is already started, stop it and wait 10 minutes before checking.

1. Pull out oil level gauge and wipe off engine oil on it with a clean rag.
2. Insert oil level gauge fully back to its tube.
3. Pull out oil level gauge again to check the oil level and make sure the level is within the range shown in the figure at top right.



4. If the oil level is below “MIN” scale, refill with designated engine oil.
5. Start engine and stop it after idling it for 5 minutes, and then wait a moment before checking if the engine oil level is within the specified range.

Engine oil appearance:

- Check engine oil for white turbidity or heavy contamination.
- If engine oil becomes turbid and white, it is highly probable that it is contaminated with engine coolant. Repair or replace damaged parts.

Engine oil leak check:

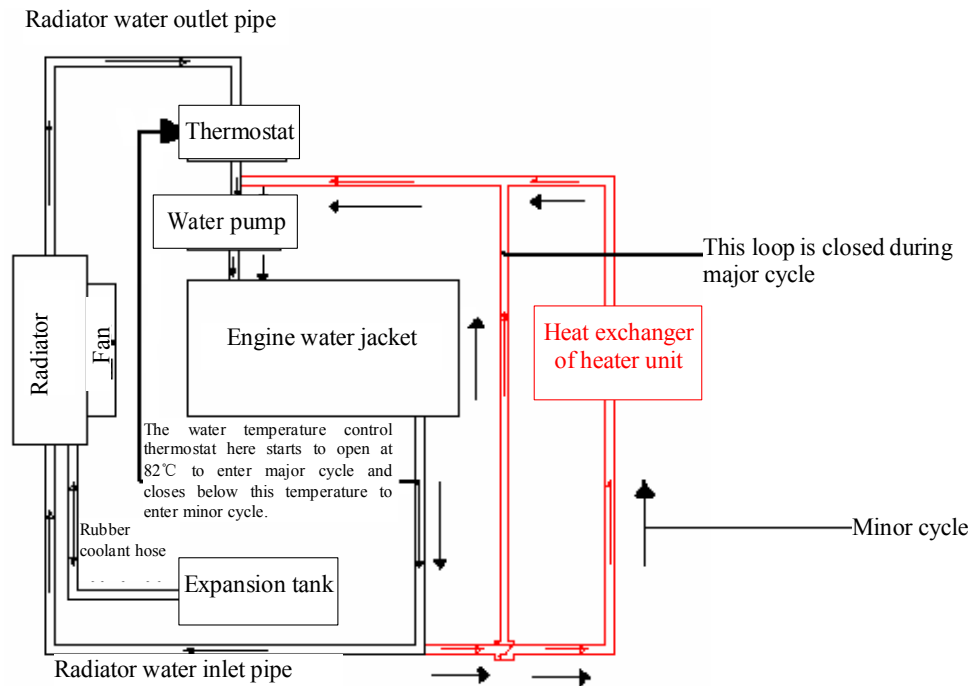
Check for engine oil leakage around the following areas:

- Oil pan
- Oil pan drain bolt
- Oil pressure switch
- Oil filter
- Mating surface between cylinder block and cylinder head
- Crankshaft oil seals (front and rear)
- Mating surface between cylinder head and rocker arm cover
- Front camshaft oil seal

Oil pressure check:

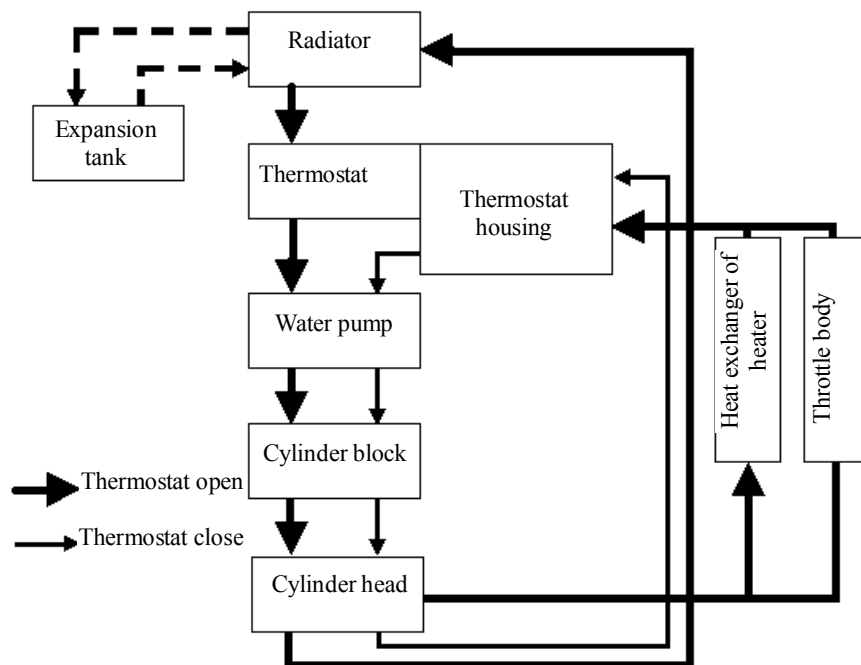
Cooling System Circuit

1. Cooling circuit diagram



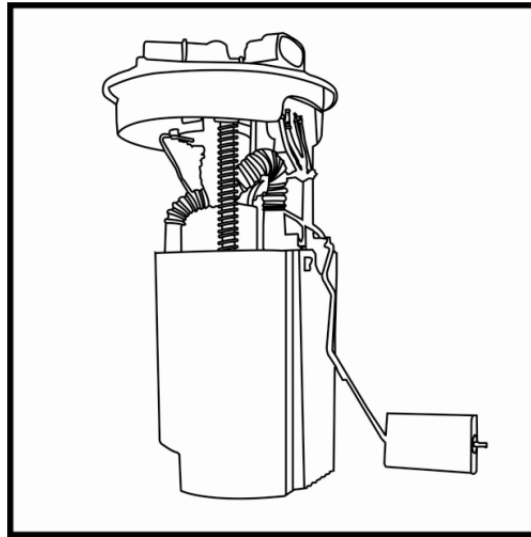
Cooling System Circuit Diagram

2. Cooling diagram



Cooling Diagram

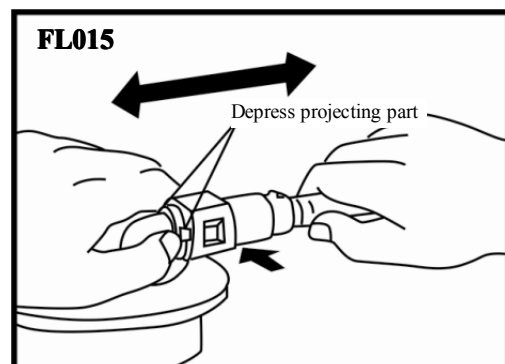
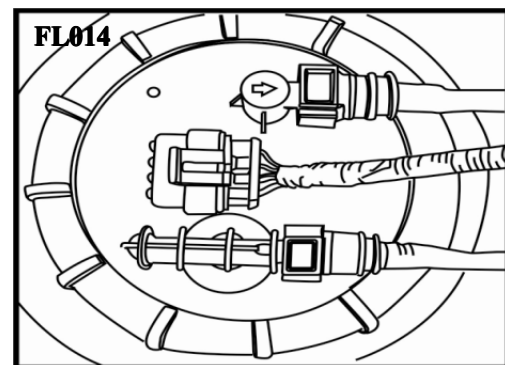
Fuel Pump



Fuel Pump Assembly Drawing

Removal:

- 1) Check fuel level on fuel gauge. If fuel gauge indicates a “FULL” or close to “FULL” position, drain fuel from fuel tank until the level indicated by fuel gauge is below “E”.
- 2) Release fuel pressure from the fuel lines.
- 3) Open fuel filler cap to release pressure in fuel tank.
- 4) Remove rear seat cushion.
- 5) Remove fuel tank service lid.
- 6) Pry off with a flat screwdriver directly.
- 7) Disconnect harness connector and fuel tube connector of fuel pump component.
 - Harness connector of fuel pump component.
 - Hold the sides of connector, push in its tabs and pull out fuel tube.
 - If connector sticks to resin tube, push and pull connector several times until they start to move. Then pull out connector.
 - Be sure to keep junctions clean and

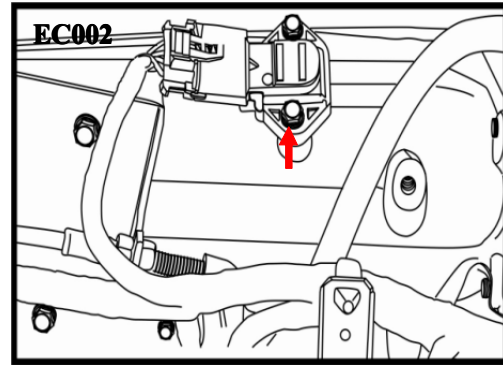


1) Component position description:

It is mounted on intake manifold as shown in the figure at right.

2) Component description:

① The sensor is a combination of an intake manifold absolute pressure (MAP) sensor and an intake air temperature (IAT) sensor.



② The MAP sensor is a pressure-sensitive variable resistor. It measures pressure variations in intake manifold that result in engine load and speed changes and converts the variations into voltages for output. The MAP sensor is also used to measure barometric pressure at starting and, under certain conditions, allows automatic regulation by the ECM at different altitudes. The ECM provides the MAP sensor with a 5V voltage and receives voltages through signal wire. The sensor provides a line ground through its variable resistor. Input signals of the MAP sensor affect the ECM's control over fuel output and ignition timing.

③ The intake air temperature sensing unit is a negative temperature coefficient (NTC) thermistor of which the resistance decreases with intake air temperature rise. This sensor sends a voltage indicating intake air temperature changes to the controller.

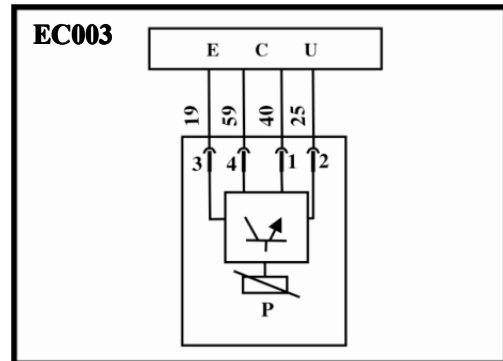
3) Descriptions of component pins:

Pin 1: 40#-ground, sensor

Pin 2: 25#-output, temperature signal

Pin 3: 19#-5V power supply from ECU

Pin 4: 59#-output, intake air pressure signal



4) Symptoms and inspection methods:

■ Symptoms: Engine misses, poor idle, etc.

■ General sources of trouble: 1. Abnormal high pressure or reverse heavy current during use; 2. vacuum unit damaged during maintenance.

■ Maintenance precautions: During maintenance, it is forbidden to impact vacuum unit with high pressure gas; when replacing the sensor after a malfunction is detected, check for normal generator output voltage and current carefully.

■ Inspection methods:

① Disconnect harness connector, and check resistance between pins 1 and 2 of the component.

■ Rated resistance at 20°C: 2.5kΩ±5%

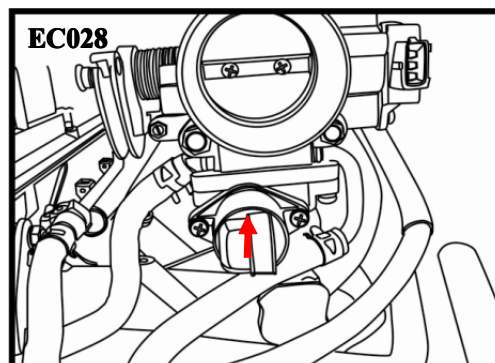
Idle stepper motor:

1) Component position description:

It is mounted on throttle body.

2) Component description:

By controlling change frequency of current direction in coil, the ECU can control moves of the stepper motor thus adjusting cross-section area of bypass and flow rate of air flowing through.



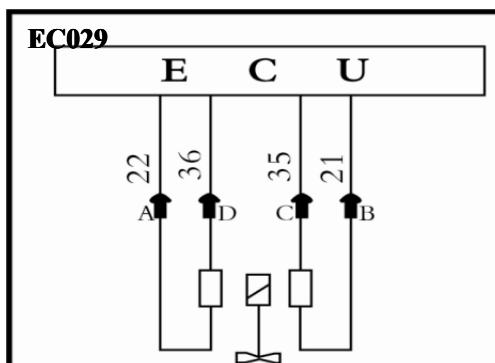
3) Descriptions of component pins:

Pin A: connected to 22# pin of ECU

Pin B: connected to 21# pin of ECU

Pin C: connected to 35# pin of ECU

Pin D: connected to 36# pin of ECU



4) Symptoms and inspection methods:

■ Symptoms: Too high idle speed, misfire at idle, etc.

■ General sources of trouble:

Abnormal idle adjustment of stepper motor caused by partial blocking of air bypass due to accumulation of dust and oil gas, etc.

■ Inspection method:

① Check resistance.

Note: Check with harness connector disconnected.

■ Rated resistance: $53 \pm 5.3 \Omega$

■ Self-learning: Turn ignition switch ON without starting the engine immediately. Wait 5s before starting the engine.

If poor engine idle is detected then, be sure to simply repeat above step.

Front oxygen sensor will be heated directly after engine start. Rear oxygen sensor will be heated only when theoretical temperature in catalytic converter is above 308°C.

Step 1: Read “Mode 3” and “Mode 7” with a diagnostic tester.			
Read result 1		Read result 2	
In Mode 3	In Mode 7	In Mode 3	In Mode 7
Fault information available	Fault information not available	Fault information not available	Fault information available
P0053			P0053
Maintenance tip: The fault has been recognized. Its cause may be the following: 1) Front oxygen sensor heating function is disabled. Replace the sensor.		Maintenance tip: The fault has not been finally recognized. Wait for the system to finish diagnosis.	

8) DTC P0054: Rear oxygen sensor heater internal resistance improper

Description of oxygen sensor heater diagnosis: The system identifies if heater output is correct by measuring sensor heater resistance. In some adverse circumstances, oxygen sensor will be damaged by condensates, especially at cold start.

Front oxygen sensor will be heated directly after engine start. Rear oxygen sensor will be heated only when theoretical temperature in catalytic converter is above 308°C.

Step 1: Read “Mode 3” and “Mode 7” with a diagnostic tester.			
Read result 1		Read result 2	
In Mode 3	In Mode 7	In Mode 3	In Mode 7
Fault information available	Fault information not available	Fault information not available	Fault information available
P0054			P0054
Maintenance tip: The fault has been recognized. Its cause may be the following: 1) Rear oxygen sensor heating function is disabled. Replace the sensor.		Maintenance tip: The fault has not been finally recognized. Wait for the system to finish diagnosis.	