

## 3. General Description

### A: CAUTION

1) Airbag system wiring harness is routed near the ECM, main relay and fuel pump relay.

#### CAUTION:

- All airbag system wiring harnesses and connectors are yellow. Do not use electrical test equipment on these circuits.
- Be careful not to damage the airbag system wiring harness when servicing the ECM, TCM, main relay and fuel pump relay.

2) Never connect the battery in reverse polarity.

- The ECM will be destroyed instantly.
- The fuel injector and other parts will be damaged.

3) Do not disconnect the battery terminals while the engine is running.

A large counter electromotive force will be generated in the generator, and this voltage may damage electronic parts such as ECM etc.

4) Before disconnecting the connectors of each sensor and ECM, be sure to turn the ignition switch to OFF. Perform the Clear Memory Mode after connecting the connectors.

5) Poor contact has been identified as a primary cause of this problem. Measure the voltage or resistance of individual sensor or all electrical control modules using a tapered pin with a diameter of less than 0.64 mm (0.025 in). Do not insert the pin more than 5 mm (0.20 in) into the part.

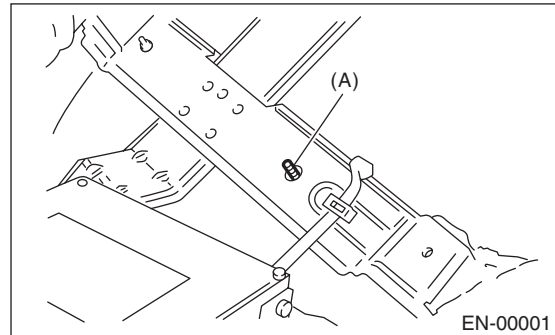
6) Before removing the ECM from the located position, disconnect two cables on battery. Otherwise, the ECM may be damaged.

#### CAUTION:

**When replacing the ECM, be careful not to use the wrong spec. ECM to avoid any damage on the fuel injection system.**

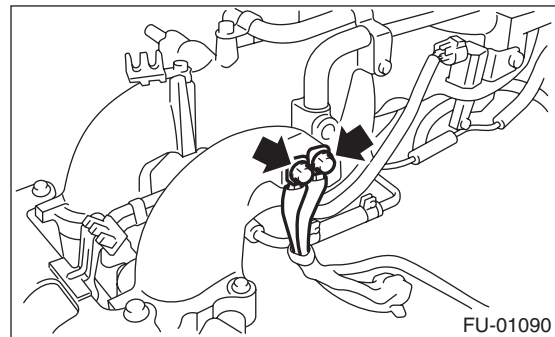
7) Connectors of each sensor in the engine compartment and the harness connectors on the engine side and body side are all designed to be waterproof. Even if the connectors are waterproof, take care not to allow water to get into them when washing the vehicle, or when servicing the vehicle in rainy weather.

8) Use ECM mounting stud bolts at the body side grounding point when measuring voltage and resistance inside the passenger compartment.

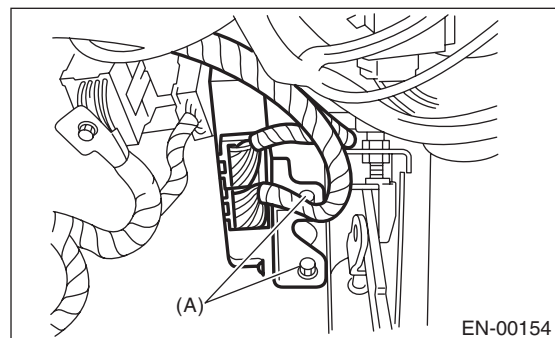


(A) Stud bolt

9) Use the engine ground terminal or engine assembly for the grounding point to the body when measuring the voltage and resistance in engine compartment.



10) Use TCM mounting stud bolts at the body side grounding point when measuring voltage and resistance inside the passenger compartment.



(A) Stud bolt

11) Every MFI-related part is a precision part. Do not drop them.

## General Description

### ENGINE (DIAGNOSTICS)

12) Observe the following cautions when installing a radio in MFI equipped models.

#### CAUTION:

- The antenna must be kept as far apart as possible from control unit. (The ECM is located under the steering column, inside of the instrument panel lower trim panel.)
- The antenna feeder must be placed as far apart as possible from the ECM and MFI harness.
- Carefully adjust the antenna for correct matching.
- When mounting a large power type radio, pay special attention to the three items mentioned above.
- Incorrect installation of the radio may affect the operation of ECM.

13) Before disconnecting the fuel hose, disconnect the fuel pump connector and crank the engine for five seconds or more to release pressure in the fuel system. If engine starts during this operation, run it until it stops.

14) Problems in the electronic-controlled automatic transmission may be caused by failure of the engine, the electronic control system, the transmission body, or by a combination of these. These three (the engine, electronic control system and transmission) causes must be distinguished clearly when performing diagnostics.

15) Diagnostics should be conducted with simple, easy operations first, and then with complicated, difficult operations. The most important thing in diagnostics is to understand the customer's complaint, and distinguish among the causes of engine, electronic control system and transmission.

16) For AT models, do not hold the stall test for five seconds or more at one time. (Fully open the throttle from closed throttle to decrease engine speed.)

17) For the model with ABS, the ABS warning light may illuminate when performing driving test with jacked-up or lifted-up condition, but this is not a system malfunction. The reason for this is the speed difference between the front and rear wheels. After diagnosis of engine control system, perform the ABS memory clear procedure of self-diagnosis function.

## B: INSPECTION

Before performing diagnostics, check the following item which might affect engine problems.

### 1. BATTERY

1) Measure the battery voltage and specific gravity of electrolyte.

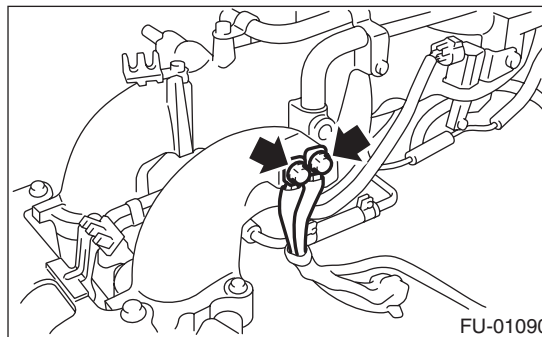
**Standard voltage: 12 V**

**Specific gravity: Above 1.260**

2) Check the condition of the main and other fuses, and harnesses and connectors. Also check for proper grounding.

### 2. ENGINE GROUND

Check if the engine ground terminal is properly connected to engine.



## C: NOTE

### 1. DESCRIPTION

- The on-board diagnostics (OBD) system detects and indicates a fault in various inputs and outputs of the complex electronic control. Malfunction indicator light in the combination meter indicates occurrence of a fault or trouble.
- Further, against such a failure or sensors as may disable the drive, the fail-safe function is provided to ensure the minimal driveability.
- The OBD system incorporated with the vehicles within this engine family complies with OBD-II Regulations. The OBD system monitors the components and the system malfunction listed in "Engine Section" which affects on emissions.
- When the system decides that a malfunction occurs, malfunction indicator light illuminates. At the same time of the malfunction indicator light illumination or blinking, a DTC and a freeze frame engine conditions are stored into on-board computer.
- The OBD system stores freeze frame engine condition data (engine load, engine coolant temperature, fuel trim, engine speed and vehicle speed, etc.) into on-board computer first when it detects a malfunction.
- If the OBD system detects the various malfunctions including the fault of fuel trim or misfire, the OBD system first stores freeze frame engine conditions about the fuel trim or misfire.
- When the malfunction does not occur again for three consecutive driving cycles, malfunction indicator light is turned off, but DTC remains at on-board computer.
- When troubleshooting the vehicle which complies with OBD-II regulations, connect the Subaru Select Monitor or general scan tool to the vehicle.

### 2. ENGINE AND EMISSION CONTROL SYSTEM

- The Multipoint Fuel Injection (MFI) system is a system that supplies the optimum air-fuel mixture to the engine for all the various operating conditions through the use of the latest electronic technology.

With this system, the fuel which is pressurized at a constant pressure is injected into the intake air passage of the cylinder head. The injection quantity of fuel is controlled by an intermittent injection system, where the electro-magnetic injection valve (fuel injector) opens for a short period of time depending on the quantity of air required for one cycle of operation. In actual operation, the injection quantity is determined by the duration of an electric pulse applied to the fuel injector and this permits simple, yet highly precise metering of the fuel.

- Further, all the operating conditions of the engine are converted into electric signals, and this results in additional features of the system, such as large improved adaptability, easier addition of compensating element etc.

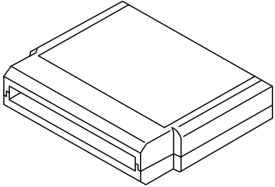

The MFI system also has the following features:

- Reduced emission of harmful exhaust gases.
- Reduction in fuel consumption.
- Increased engine output.
- Superior acceleration and deceleration.
- Superior startability and warm-up performance in cold weather since compensation is made for engine coolant and intake air temperature.

# General Description

ENGINE (DIAGNOSTICS)

## D: PREPARATION TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18482AA010	18482AA010	CARTRIDGE	Troubleshooting for electrical system.
 ST22771AA030	22771AA030	SUBARU SELECT MONITOR KIT	Troubleshooting for electrical system.