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Circuit Diagnosis

Circuit Diagnostic Procedure

Refer to the following procedure for the circuit diagnosis:

1. Confirm the Fault

To do the proper repair, confirm the fault described by the customer firstly. Inspect the relevant component carefully and make record. DO NOT disassemble the component before confirmation of the fault scope and causes.

2. Read the Wiring Diagram and Analyze the Causes.

Make a complete analysis on the faulty components from power supply to ground according to the sub-system wiring diagram and determine the repair solution. If can not determine the repair solution, please read the system description in the "Description and Operation" in the workshop manual to clear the working principle. And inspect other circuits that has common part with the faulty circuit, for example, the fuse, ground, switch, etc. Inspect the circuit not covered in step 1. If other components on the common circuit work properly, it means the fault exists in its own circuit. Otherwise, the fuse or ground might has faults.

3. Inspect the Circuits and Components.

Always use the wiring diagram together with workshop manual and refer to the diagnostic procedure for the relevant circuits or components in the workshop manual. For the circuit with a control module, fully use diagnostic tools to do the test. Effective diagnosis should be a logical and reasonable operation. Fully use the diagnostic procedures in the workshop manual and start the inspection from the most likely causes and the compents be easiest to inspect.

4. Repair

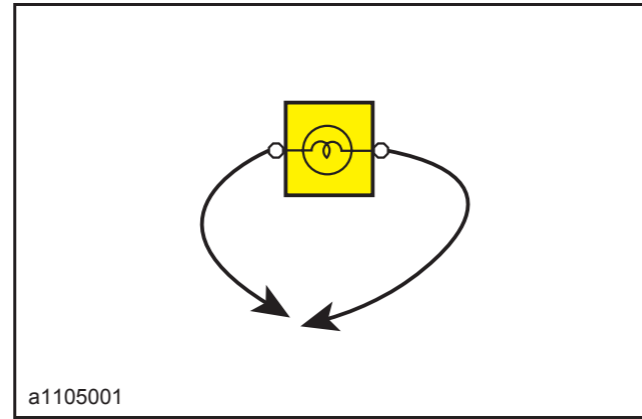
Repair the faulty circuit. Refer to the wiring diagram and workshop manual for fault treatment. For example, the treatment on bad connection to ground and the harness connector.

5. Confirm the Fault Removed.

After repair, confirm the fault removed and all functions work properly. For the fuse blown fault, check all the relevant circuits.

Circuit Diagnostic Device

1. Voltmeter and Test Light



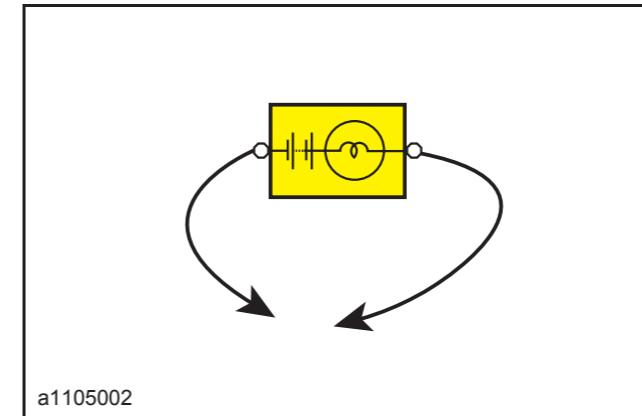
Use test light or voltmeter to check the circuit status.

Test light comprises a pair of wires and a 12V bulb. When inspecting, connect one wire to the ground and the other one to the measurement point. If the bulb is lit, it means the measurement point has power supply.

Warning : DO NOT use test light to test the control module voltage. To do so, it could damage the circuit inside the control module. Please use a voltmeter with 10M Ω or higher internal impedance (e.g. to test the ECM voltage.).

Voltmeter has the same connection method as the test light, but voltmeter can display the voltage value of the circuit. Use a voltmeter with high impedance to test the voltage. If the circuit has poor connection, the voltmeter may show the normal value, but the voltage can not drive the load successfully.

2. Test Light with Self-supply and Ohmmeter

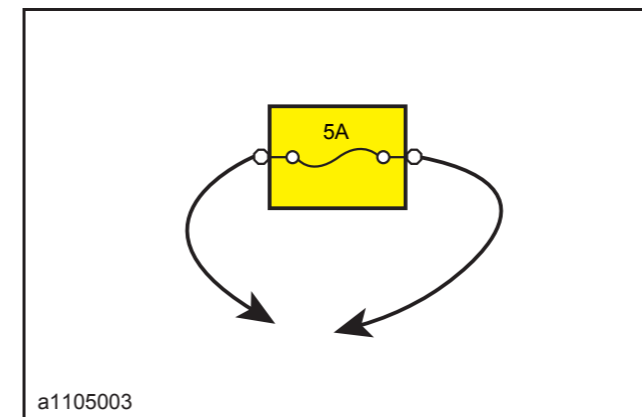


Use test light with own 12V power supply or ohmmeter to test the circuit continuity. Test light comprises a bulb, battery and a pair of wires. The bulb will be lit when the two wires contacted. Before test, disconnect the battery negative and pull out the fuse of the circuit to be tested. To test the circuit continuity, contact two wires to the two measurement points. If the bulb is lit, it means the circuit is continuous.

Warning : DO NOT use test light with self-supply to test the control module. To do so, it could damage the circuit inside the control module. Please use a ohmmeter with 10M Ω or higher internal impedance.

Ohmmeter has the same usage method as voltmeter, but ohmmeter can show the impedance value. The lower impedance, the better continuity.

3. Jumper with Fuse



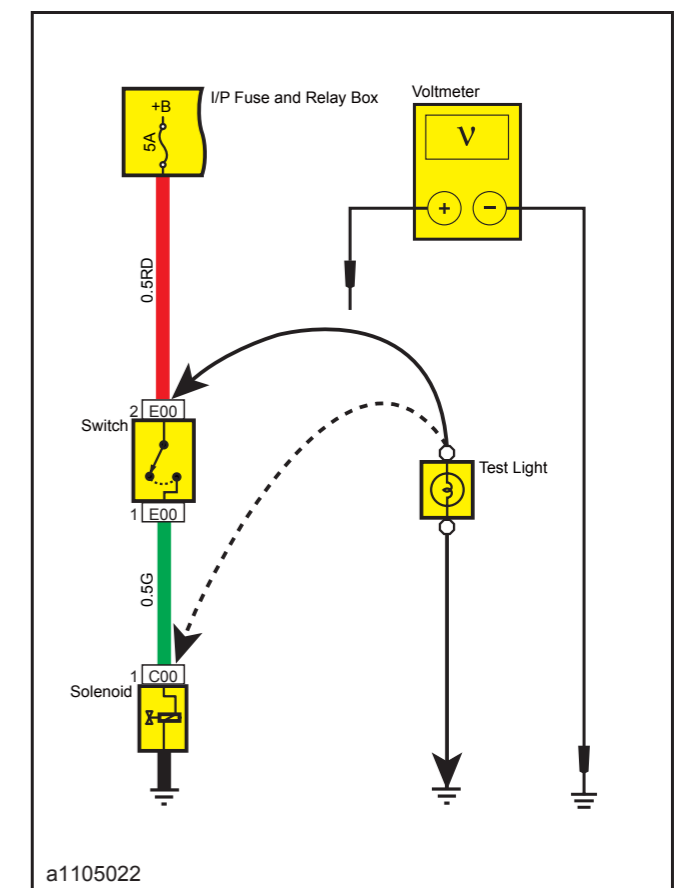
Use jumper to test a broken point for open loop circuit (circuit broken). The jumper

should be in tandem with the circuit to be tested.

Warning : To protect the circuit, DO NOT use the fuse with higher rated capacity than the circuit to be tested. DO NOT use the jumper as the input or output signal when a control module like ECM, TCM is in the circuit. To do so, it could damage the circuit inside the control module.

Fault Test

1. Voltage Test



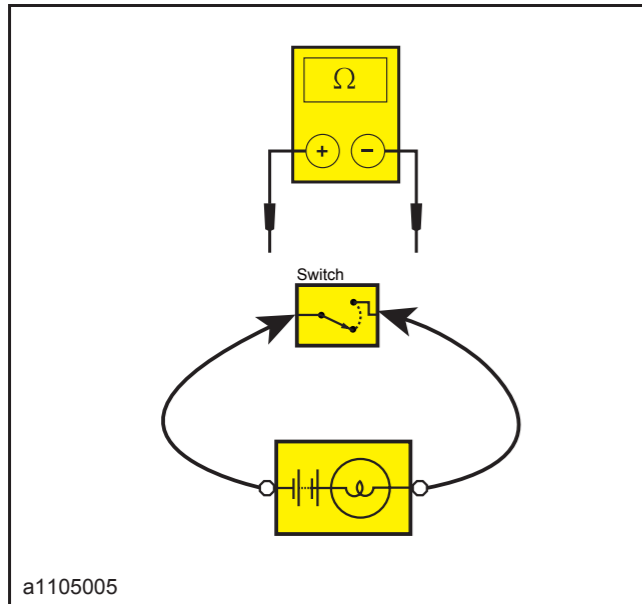
Voltage test process is to test the voltage at a certain point. When testing the connector terminals, insert the positive probe into the wire instead of breaking the harness.

- 1 When testing the voltage with test light or voltmeter, connect the negative wire of the test light or the negative probe of the voltmeter to the ground.
- 2 Connect the other wire of the test light or the positive probe of the voltmeter to the place to be tested.

Circuit Diagnosis

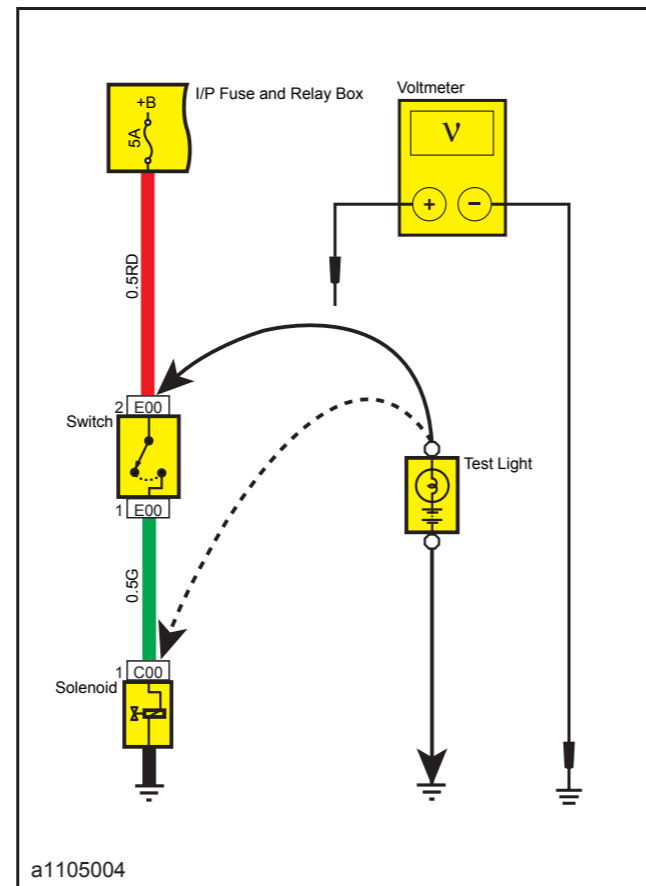
3 It means circuit fault if light is not lit. If using voltmeter and voltage display is lower than the rated value with more than 1V, it means the circuit fault.

2. Power Test



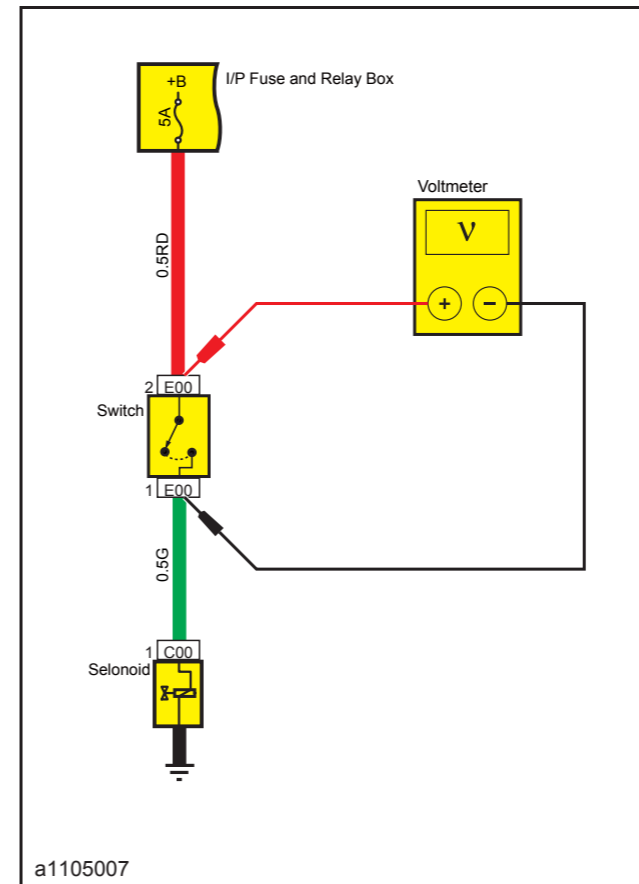
- 1 Disconnect the battery negative.
- 2 Connect one of the wire of the test light with self-supply or the probe of the ohmmeter to the component to be tested. If using ohmmeter, please contact the two probes each other and use reset button to adjust the ohmmeter to zero.
- 3 Connect the other wire of the test light or probe of the ohmmeter to the other side of the load to be tested.
- 4 If the bulb is lit, it means the circuit is continuous. If using ohmmeter, the impedance value should be very small or close to 0Ω .

3. Short Circuit Test



- 1 Disconnect battery negative.
 - 2 Connect one of the wire of the test light with self-supply or the probe of the ohmmeter to the outlet terminal of the fuse.
 - 3 Connect the other wire of the test light or probe of the ohmmeter to the ground.
 - 4 Disconnect all the loads to the fuse.
- ⚠ Note:** If not disconnect all the loads to the fuse, when testing the low impedance circuit like lights, the ohmmeter will always display the low impedance value. This will cause wrong judgement.
- 5 Do the careful test from the place closest to the fuse.
 - 6 If the bulb is lit or ohmmeter has value display less than 5Ω , it means the short circuit to the ground.

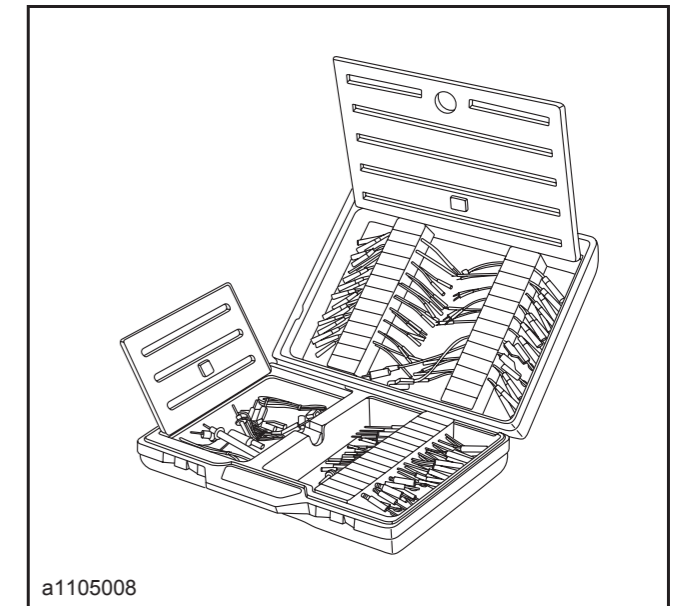
4. Voltage Drop Test



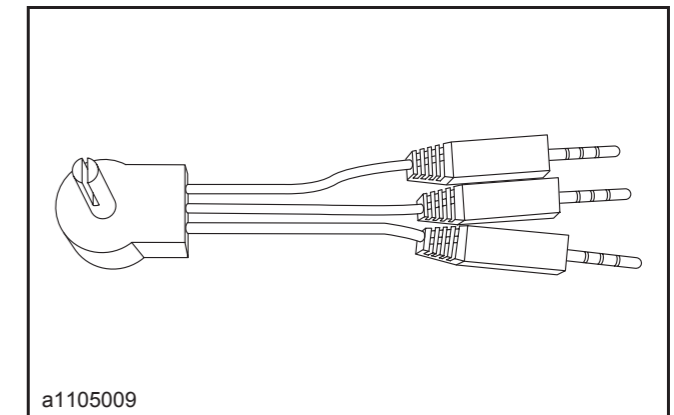
This is to test the voltage drop along the wire, connector or switch.

- 1 Connect the positive probe of the voltmeter to the end of the circuit close to the battery (connector or switch side).
- 2 Connect the negative probe to the other end of the circuit (the other side of the connector or switch).
- 3 Disconnect switch or connect it.
- 4 The voltmeter will display the voltage drop between the two test points.
- 5 If the drop is more than 0.1 V (less than 50 mV for 5 V voltage circuit), it means the circuit fault. Check loose, oxidation or corrosion circuit.

Repair Tools

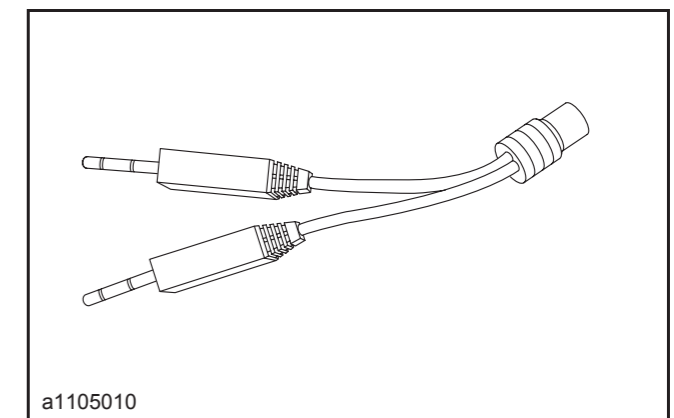


1. 5 KΩ Rheostat



It can simulate ohm-type sensor signals, like coolant temperature sensor, air intake temperature sensor, etc. And help to make quick adjustment on the performance of the component.

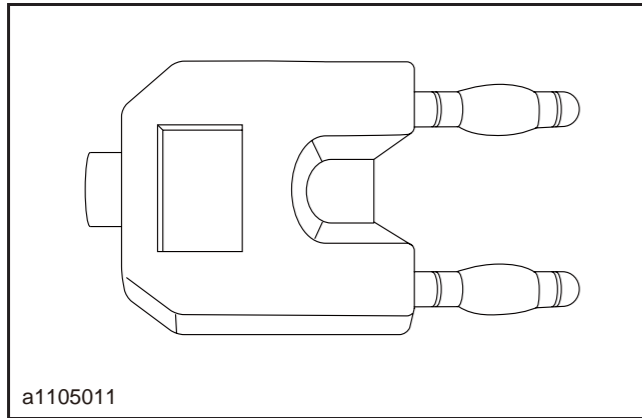
2. LED Test Light



Circuit Diagnosis

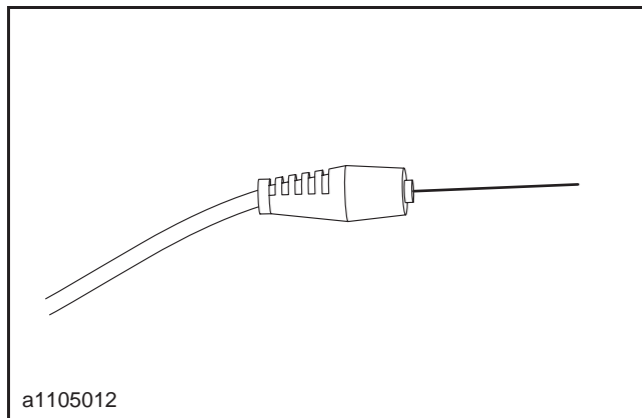
Bi-direction two-color LED light can change its color when exchanging the positive and negative. This feature can be used to test the PWM control signals of Hall sensor.

3. Airbag Test Tool



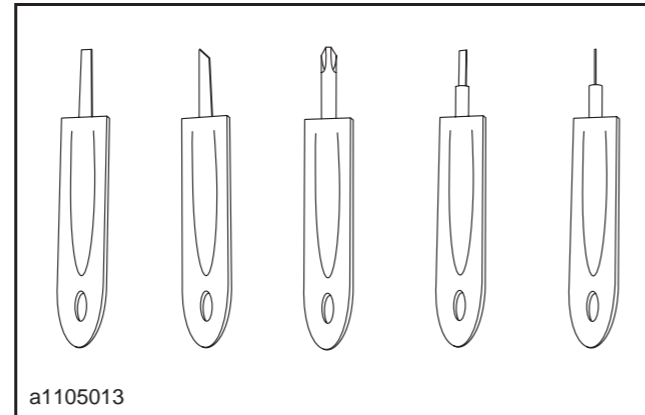
Before installing a new airbag, plug this tool to the airbag system, and use diagnostic tools to test the airbag system to confirm it works properly. After that, remove the airbag test tool and install the new airbag. This process can guarantee a safe airbag operation.

4. Probe



When testing a system component, insert this tool into the connector from the back and do not need to break the harness.

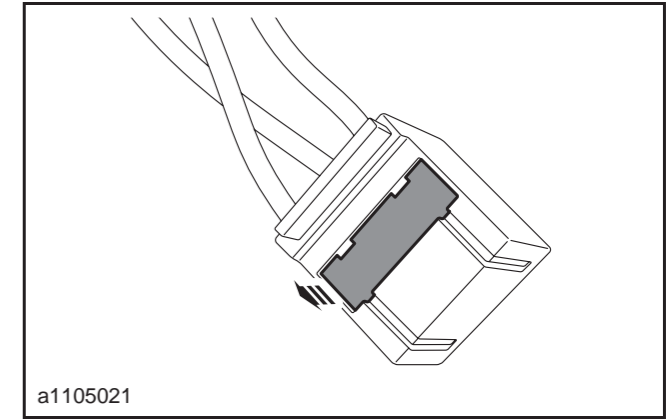
5. Terminal Repair Tool



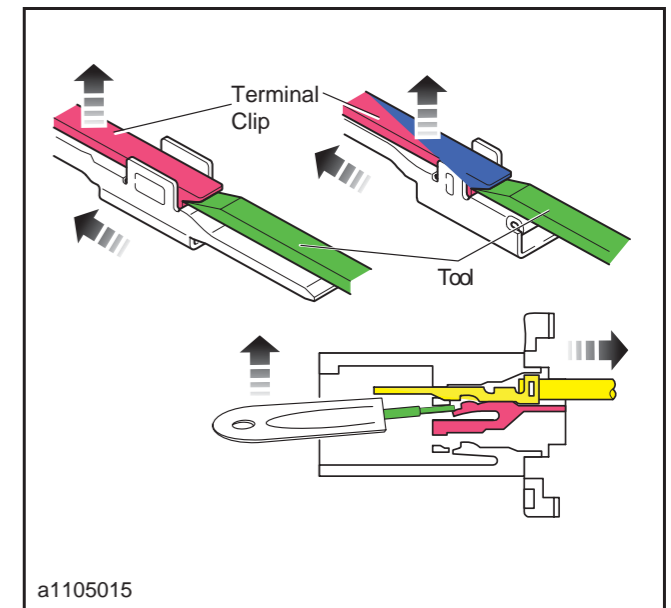
When repairing the terminals, use this tool to separate them from the connector.

Terminal Repair

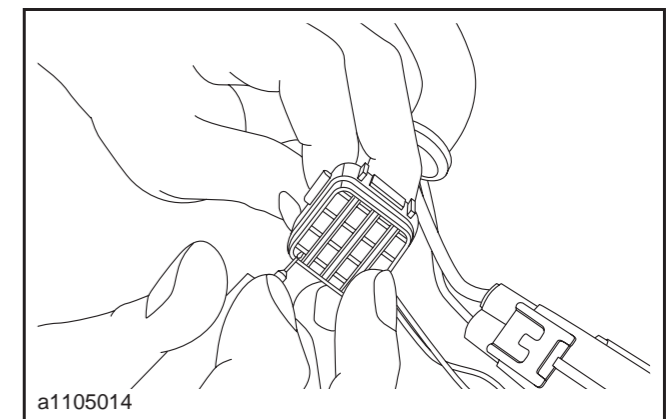
1. Remove the terminal pin.



2. Fix the clip with terminal repair tool.

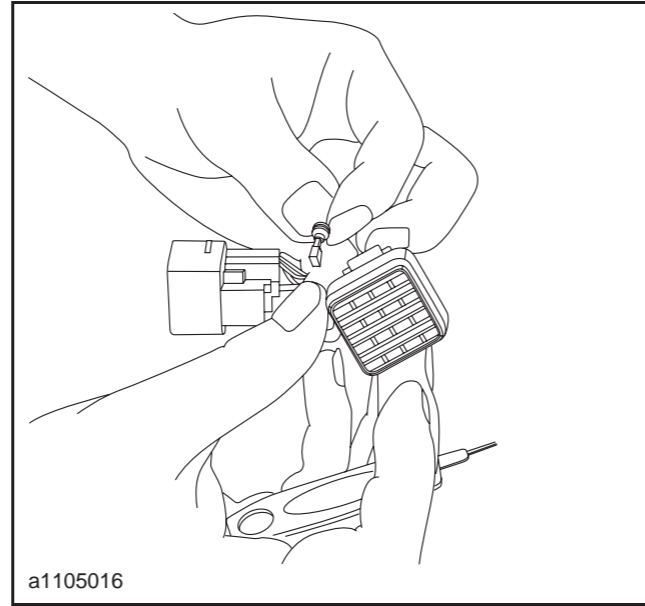


3. Pull out the terminal from the rear of connector.



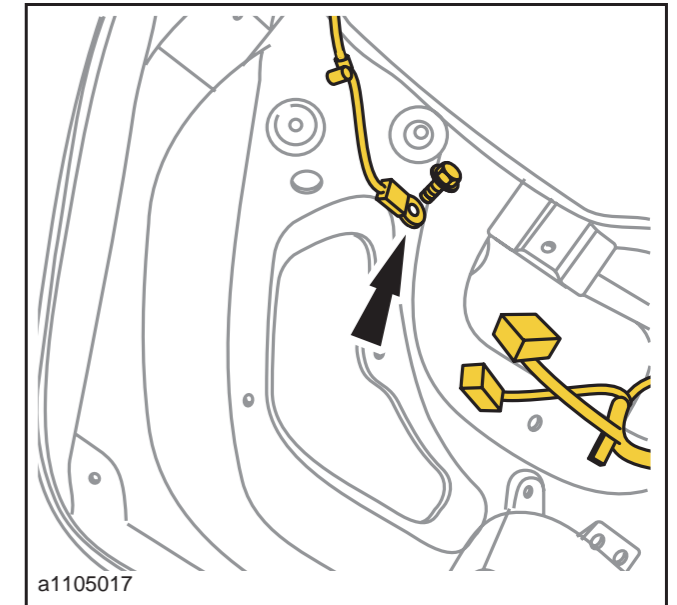
Circuit Diagnosis

4. Clean and repair the terminals.

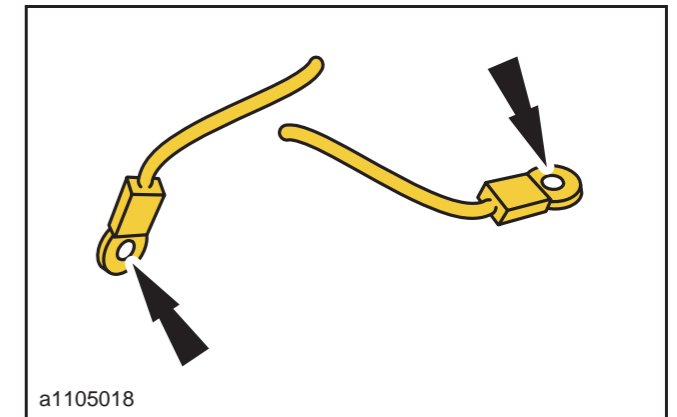


Poor Ground Connection Repair

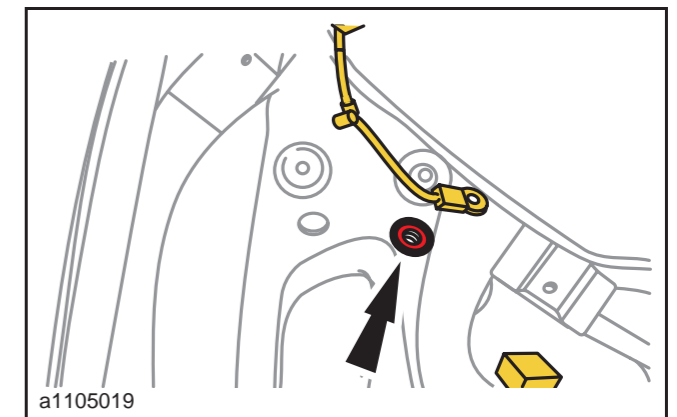
1. Remove the ground bolt.



2. Clean the two surfaces (both bolt side and car contact side) of the copper ring with grit cloth until the oxide completely cleared.



3. Clean the ground surface on the car with grit cloth until it completely clean.

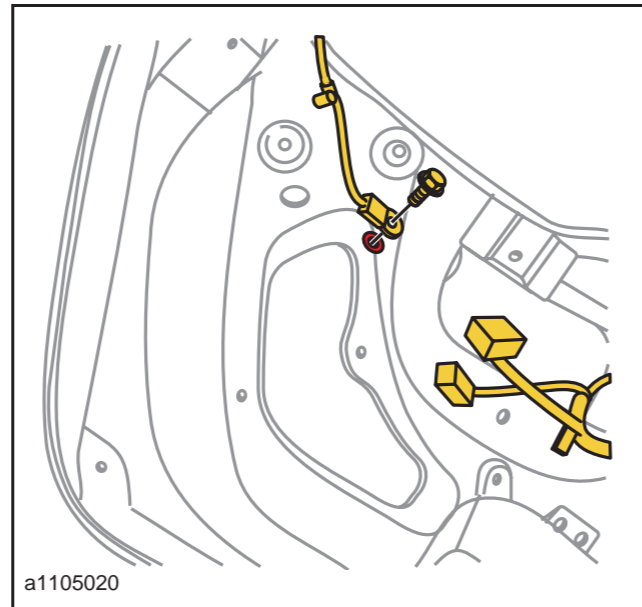


Circuit Diagnosis

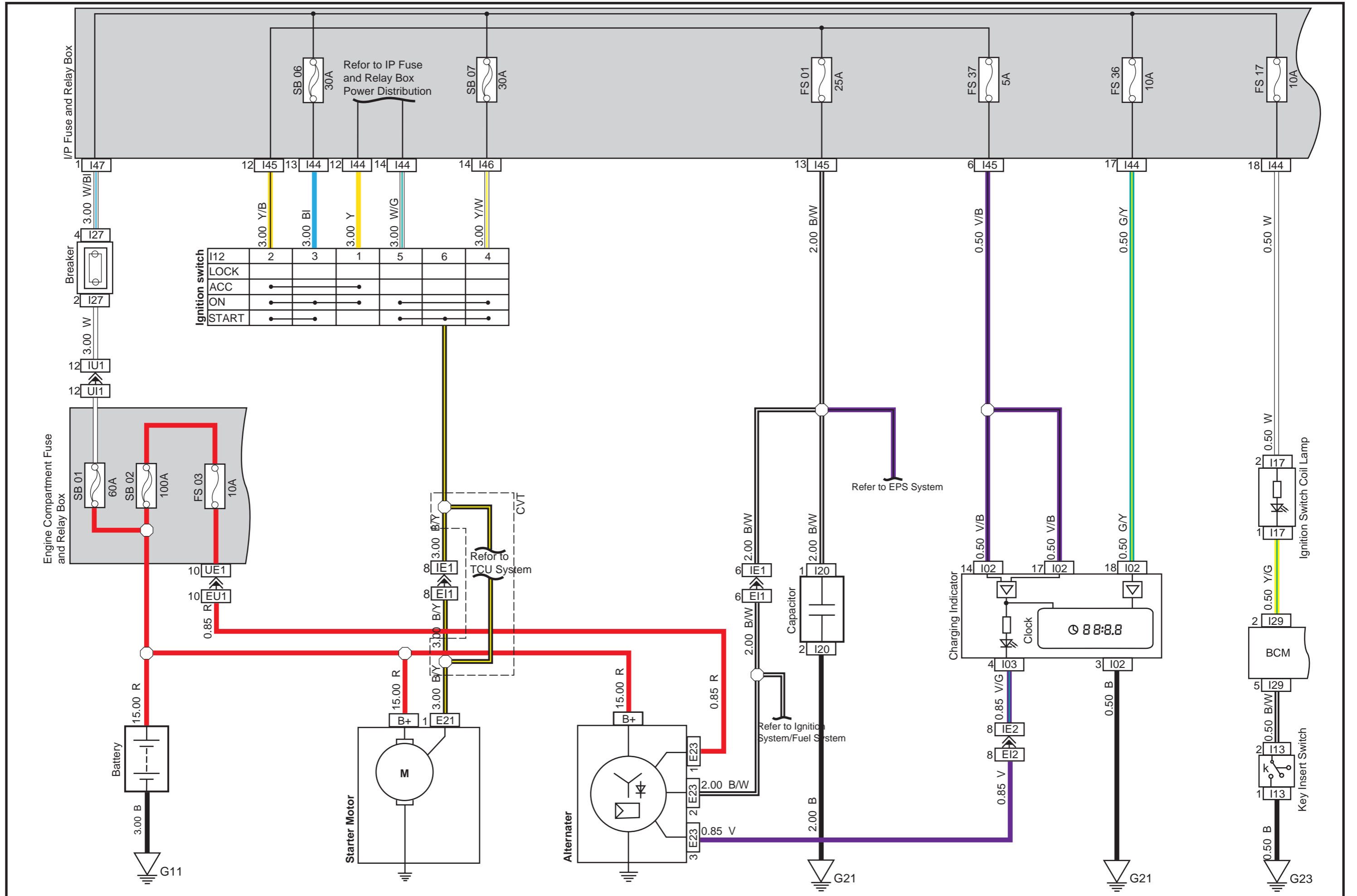
4. Install the harness and the bolt. Tighten to specified torque.

Torque: M6 Bolts 8 Nm

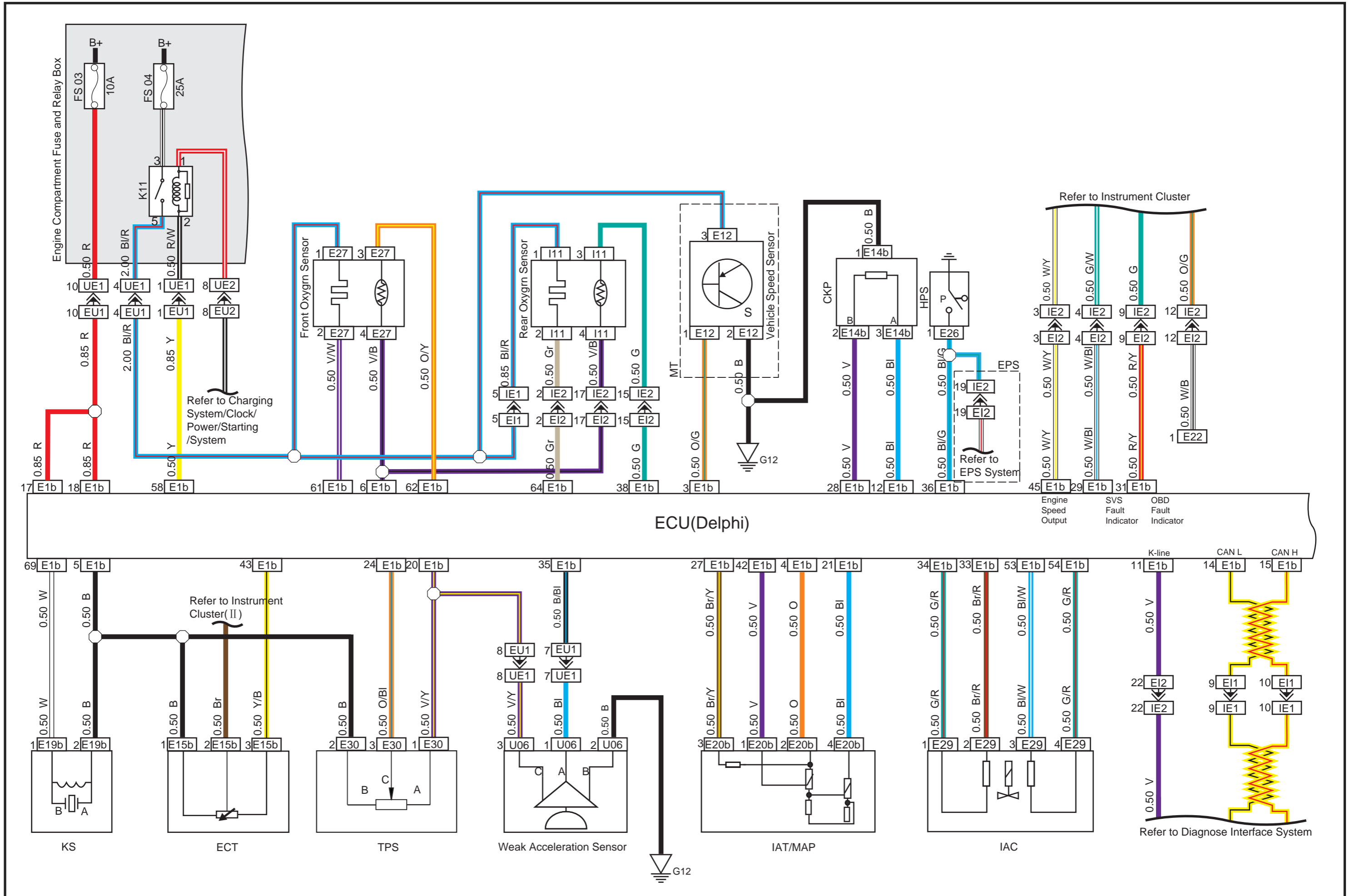
M8 Bolts 20 Nm



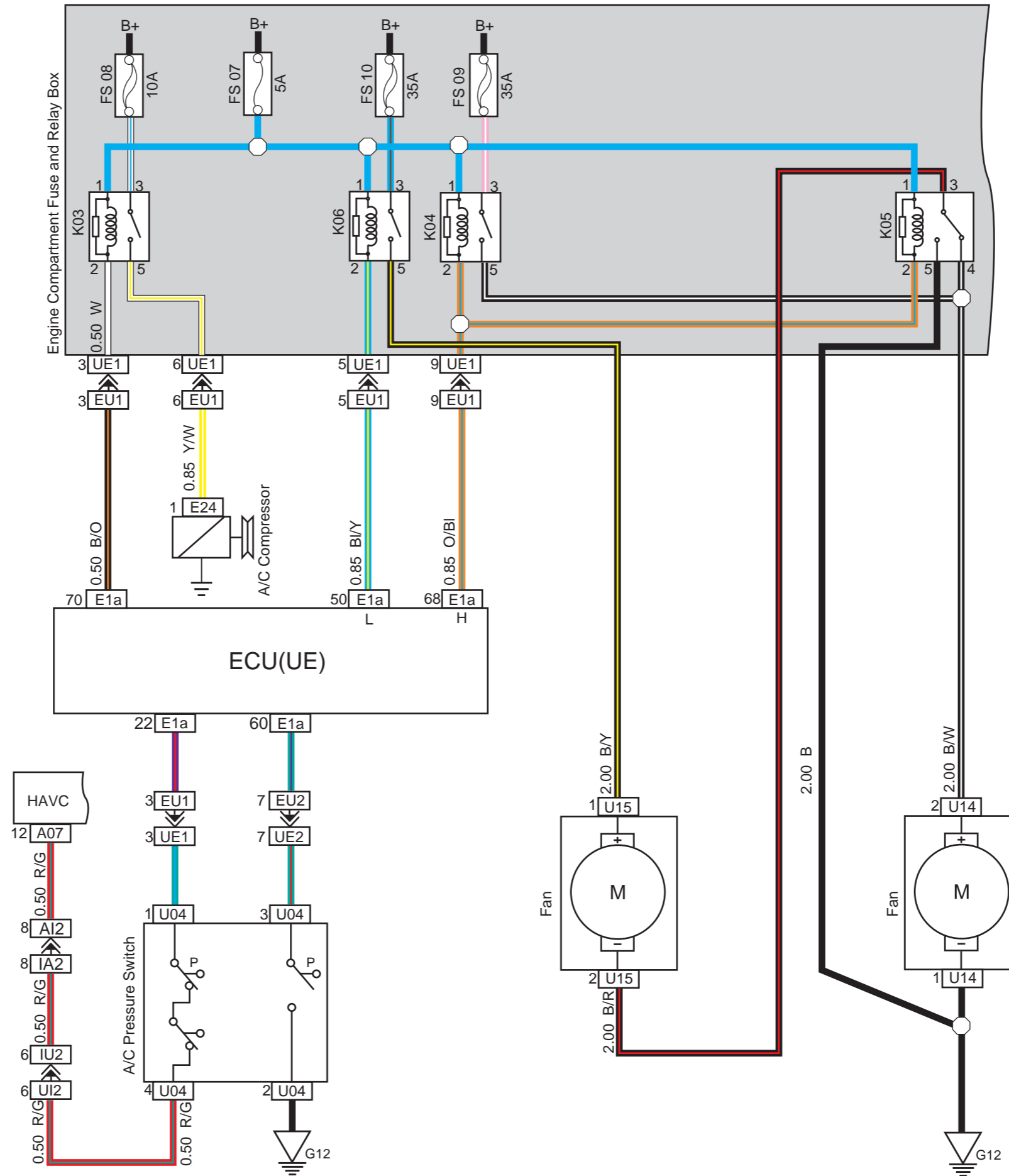
Charging System/Clock /Power /Starting System



Electronic Control System(Delphi)



Cooling System/Air Condition System(UE)



Cooling System/Air Condition System(Delphi)

