Charging System 812FJ

Student Manual

Charging System

Activity 3

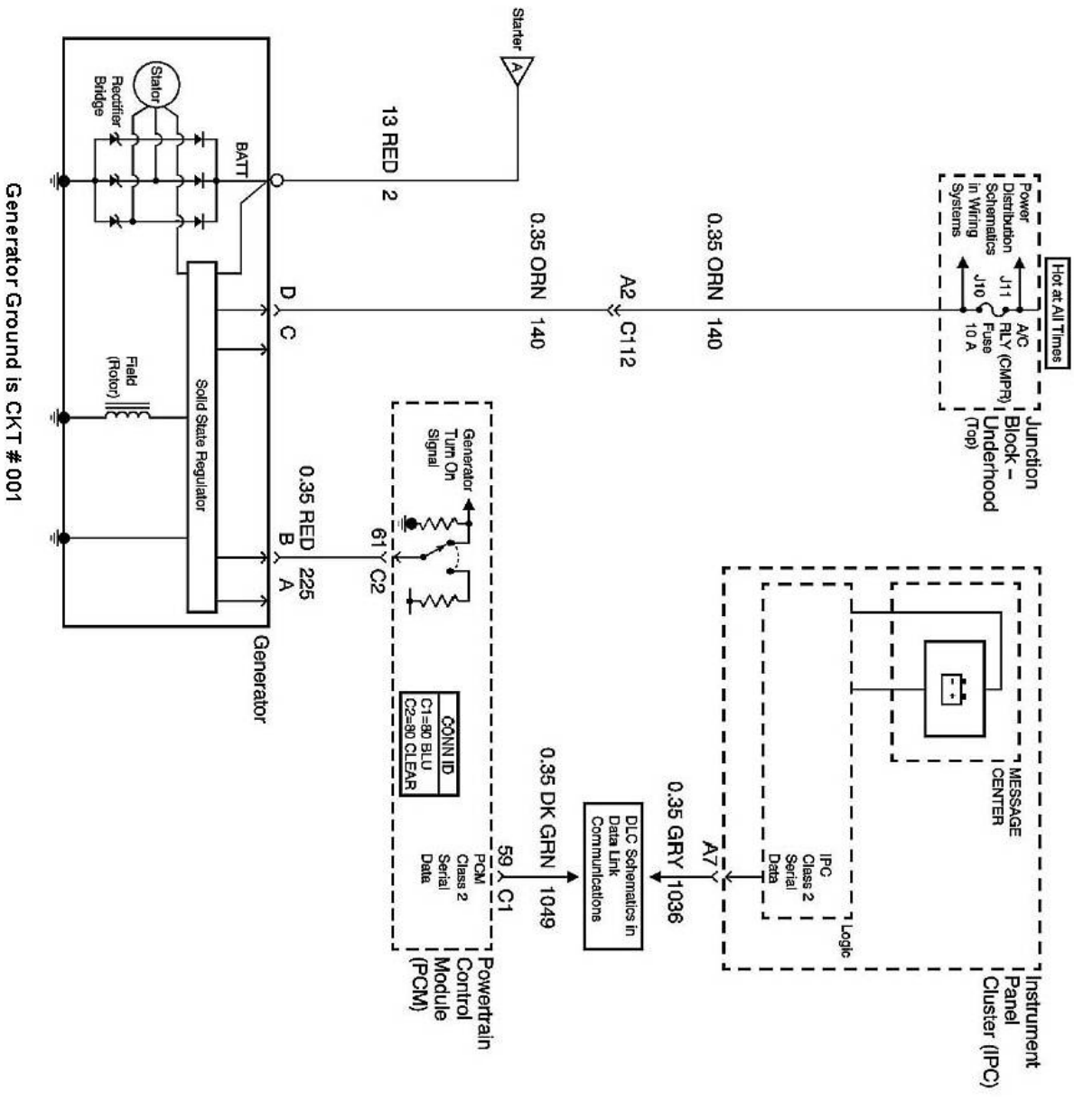
Charging System Testing

Performance Objectives:
• Perform preliminary checks on charging system.
• Perform Charging System Test per Service Manual Information.

Tools and Materials:
• ATech Model 812FJ Charging System Trainer
• Fully charged 12-Volt Battery
• Jumper Cables (to connect the battery to the trainer)
• Starting and Charging Tester with inductive ammeter and carbon-pile load (VAT 40 or equivalent)
• Digital Multi-Meter

References:
• Ford Starting and Charging System Diagnosis Reference Book
• 2003 Chevrolet Impala Service Manual Information

CHARGING SYSTEM SCHEMATIC



Reference Book:
• Read pages 5-1 to 5-8 in the Reference Book.

Review Questions:
• Answer the Review Questions on page 5-9. **Do not write in the Reference Book**.
Use a separate piece of paper to record your answers. (Answers are provided on page 5-10).

Diagnosis and Testing:
Diagnosis of any system begins with a review of that system's description and operation. This was covered in Charging System Activity 2.

The second diagnostic step for any module-controlled system would be a diagnostic system check which looks for diagnostic trouble codes and verifies that any networked control modules can communicate with each other and with the scan tool. This step will provide information that the technician will use in determining the most accurate and direct diagnostic path.

The ATech Model 812FJ Charging System Trainer has a built-in scan tool that will display and control charging system functions. Optionally, a Tech 2 (or equivalent) scan tool can be used in system diagnosis if it is available.

Note: The ATech Model 812FJ Charging System Trainer does not have network communication functions built in. Network communication diagnosis is beyond the scope of this Charging Systems course.

The third diagnostic step is a visual inspection of the system in question. Add-on devices which could affect charging system operation should be noted. Inspect the easily accessible or visible system components for obvious damage or conditions which could cause a system problem, set a DTC or cause a customer complaint.

Service Manual Information:
• Refer to Generator Usage on Page 4 of the Service Manual Information, the Charging System Test on Page 5 of the Service Manual Information, and the Charging System Schematic on the preceding page and answer the following questions:

Note: As per Step 2, the Charging System Test must be performed with a good, fully-charged battery installed for the results to be accurate. Battery testing and service is covered in Activities 7 through 11 of this course.

1. Step 3, sub-step 3 of the Charging System Test directs the technician to use a scan tool to command the GEN-L Terminal OFF and ON. This refers to which circuit?
   a. RED 2 (generator output)
   b. ORN 140 (system voltage sense)
   c. RED 225 (generator turn on signal)
   d. GRY 1036 (Class 2 Serial Data)

2. Step 4, sub-step 1 of the Charging System Test directs the technician to turn on several loads. How many amps do you think are applied by the four loads specified in this step?
   a. 10 amps
   b. 20 amps
   c. 50 amps
   d. 100 amps

Note: This measurement of system voltage with the charging system operational and some load applied by the vehicle accessories is a form of load test. It is not a definitive test of the charging system's rated output, but it can still provide useful information in the event a Starting and Charging Tester or carbon pile load device is not available.

3. The trainer uses a K43 generator. (This is the GM Regular Production Option, or RPO code designation.) Step five of the Charging System Test directs the technician to locate the load test value as specified in the Generator Usage document in the Service Manual Information. What is the correct load test value for this generator?
   a. 125 amps
   b. 105 amps
   c. 87.5 amps
   d. 73 amps

4. If the measurement in Step 6 is greater than 15.5 volts, what is the next step?
   a. Step 7
   b. Step 9
   c. Step 12
   d. Step 14

5. Step 9 directs the technician to measure:
   a. Charging system ground side voltage drop
   b. Charging system power side voltage drop
   c. Charging system power side voltage output
   d. Charging system power side amperage output

6. Step 10 directs the technician to measure:
   a. Charging system ground side voltage drop
   b. Charging system power side voltage drop
   c. Charging system power side voltage output
   d. Charging system power side amperage output

Conclusion:

Charging system tests begin with a visual inspection and preliminary check of battery posts, cables, generator and regulator connections, and the generator drive belt. The battery must be fully charged. Charging system tests should be performed following manufacturer's procedures.

Complete the On-Trainer Worksheet at this time.

On-Trainer Worksheet

Activity 3

Charging System Testing

Tools and Materials:
• ATech Model 812FJ Charging System Trainer
• Fully charged 12-Volt Battery
• Jumper Cables (to connect the battery to the trainer)
• Starting and Charging Tester with inductive ammeter and carbon-pile load (VAT 40 or equivalent)
• Digital Multi-Meter

Procedures:
• Set the System Power Switch to the OFF position.
• Set the Ignition Switch to the OFF position.
• Set the Motor Switch (located on the trainer side of the motor) to the OFF (down) position.
• Make sure both of the trainer's Connector switches are in the connected position.
• Make sure the Scan Tool Mode / User Mode switch is in the down (User Mode) position.
• Connect the ATech Charging System Trainer to the 12-Volt Battery.
Be sure to observe the correct polarity!
• Connect the Starting and Charging Tester to the 12-Volt Battery. The inductive amp probe should be connected around the generator's output lead

Note: Follow the instructions supplied with your Starting and Charging Tester for connection and use.

• Connect the DMM to the trainer's positive and negative battery tip jacks, and set it to measure DC Volts.
• Turn the System Power Switch on.
• Turn the Ignition Switch on.

Built-in Scan Tool:
• Switch the Scan Tool Mode / User Mode switch to the up (Scan Tool Mode) position.

There are two options available on the trainer's scan tool display:
- Pressing the 1 key on the keypad displays the commanded GEN-L status and Battery Voltage.
- Pressing the 2 key on the keypad displays DTC information.

• Press the 1 key.

1. What is the current, commanded GEN-L status?
   a. On
   b. Off

2. Is this normal with the key on and engine off?
   a. Yes
   b. No

• Press the 1 key again.

3. What is the current, commanded GEN-L status?
   a. On
   b. Off

4. Is the trainer's GEN-L indicator on?
   a. Yes
   b. No

• Press the 2 key to turn the GEN-L circuit off.
• Press the * key to return to the scan tool mode main menu.
• Press the 2 key to display DTC information.
• Press the 1 key to check for DTCs.

5. Are there any stored DTCs?
   a. Yes
   b. No

• Press the * key twice to return to the scan tool mode main menu.

Service Manual Information:

• Refer to Generator Usage on Page 4 of the Service Manual Information, the Charging System Test on Page 5 of the Service Manual Information, and the Charging System Schematic at the beginning of this activity as needed.

Note: All answers to questions with measured values are approximate. Choose the answer that is the closest to your actual measurement.

Note: Step and sub-step refer to the Service Manual Information. Question refers to the numbered questions in this activity.

Procedures:

• Following the step-by-step Service Manual Information procedure, perform the Charging System Test on the trainer. Skip steps 1 and 2 (there are no DTCs set and you should be starting with a known-good, fully-charged battery for this on-trainer exercise), and start with step 3. Check off each step as you perform it.

• Step 3 has four sub-steps.
  • For Step 3-1, use the trainer's scan tool mode.
  • For Step 3-2, flip the Motor Switch (located on the trainer side of the motor) to the ON (up) position.
  • For Step 3-3, use the trainer's scan tool mode.
  • For Step 3-4, use the DMM (or the trainer's Battery Voltage display) to observe voltage.

6. As per Step 3-3, does the voltage change with each command?
   a. Yes
   b. No

• Step 4 has three sub-steps.
   • For Step 4-1, use the Starting and Charging Tester to apply a 50A load to the charging system.
   • For Step 4-2, use the DMM (or the trainer's Battery Voltage display) to observe voltage.
   • For Step 4-3, the trainer's electric motor is "geared" to turn the generator at a speed equivalent to an engine speed of 2500 RPM.

7. Is the observed voltage within the specified value in Step 4?
   a. Yes
   b. No

• Step 5 has eight sub-steps. Skip to 5-8, as the other seven sub-steps should have already been done at this point. (The Starting and Charging Tester is already connected, the GEN-L circuit should be on, and the trainer should already be running.)

Note: You should have answered Question 3 on Page 3-4 with the correct load test value (73 A).

8. Is the generator output greater than or equal to the load test value as specified?
   a. Yes
   b. No

9. What does this mean?
   a. More testing is needed
   b. The charging system is OK

• Set the Motor Switch (located on the trainer side of the motor) to the OFF (down) position.
• Set the Ignition Switch to the OFF position.
• Set the System Power Switch to the OFF position.
• Disconnect the ATech Charging System Trainer from the 12-Volt Battery.

Conclusion:

Charging system tests should be performed following manufacturer's procedures.