

## Testing and Adjusting

### C3.3 Generator Sets

Media Number -UENR4440-03

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i02484966

## Alternator - Test

SMCS - 1405-081

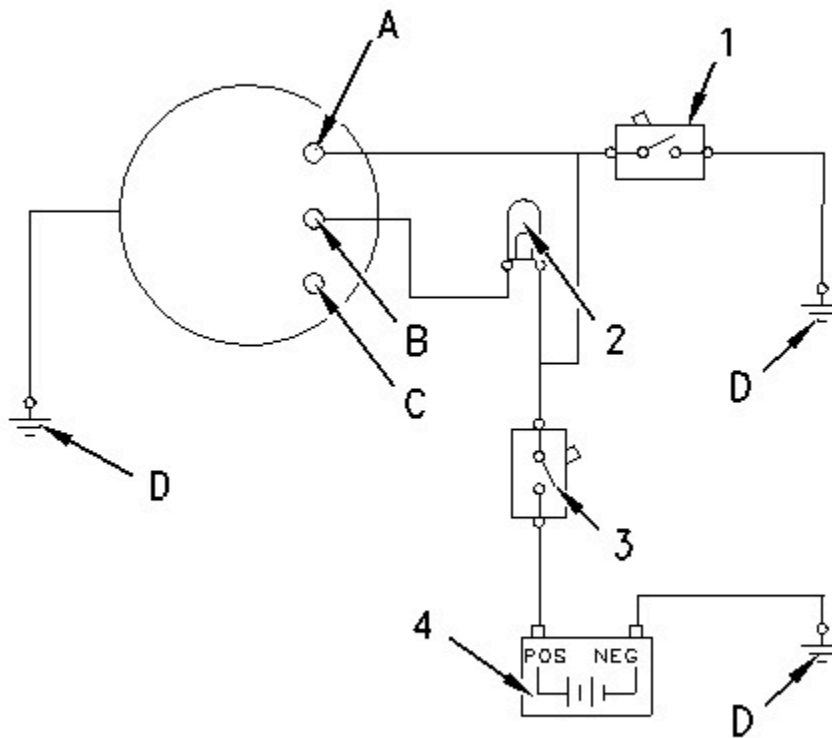


Illustration 1

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Typical wiring schematic for an alternator

- (A) Terminal "B+"
- (B) Terminal "D+"
- (C) Terminal "W"
- (D) Ground
- (1) Electrical switch
- (2) Dash light
- (3) Ignition switch
- (4) Battery

## Warning Lamp Does Not Illuminate

The warning lamp for the charging system should illuminate when the ignition switch is in the ON position. Follow the steps below in order to test your system.

Table 1

<b>Required Tools</b>			
<b>Tool</b>	<b>Part Number</b>	<b>Part Name</b>	<b>Qty</b>
A	6V-7070	Digital Multimeter	1

1. Check the light bulb. Replace the light bulb if the element is broken.
2. Use Tooling (A) to check the battery voltage. Check the battery voltage with the ignition switch OFF.
3. Check the voltage between the terminal (A) and ground. The measured voltage should equal the battery voltage.
4. Turn the ignition switch to the ON position. Check the voltage between terminal (B) and ground. If the voltage is more than 2 Volts the alternator needs to be replaced.

## **Warning Light is On When the Engine is Running**

1. Start the engine and run the engine at fast idle.
  2. Use Tooling (A) to measure the battery voltage.
  3. Measure the voltage between terminal (A) and ground.
  4. Measure the voltage between terminal (B) and ground.
  5. The measured voltage for terminal (A) and terminal (B) should be 13 to 15 volts for a 12 volt system.  
The measured voltage for terminal (A) and terminal (B) should be 26 to 30 volts for a 24 volt system.
  6. If the voltages do not match replace the alternator.
  7. Increase the engine to full throttle. Turn an electrical load ON.
  8. Measure the voltage between terminal (A) and ground.
  9. Measure the voltage between terminal (B) and ground.
  10. The measured voltage for terminal (A) and terminal (B) should be 13 to 15 volts for a 12 volt system.  
The measured voltage for terminal (A) and terminal (B) should be 26 to 30 volts for a 24 volt system.
  11. Replace the alternator if the voltage does not match.
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## Battery - Test

SMCS - 1401-081

Most of the tests of the electrical system can be done on the engine. The wiring insulation must be in good condition. The wire and cable connections must be clean, and both components must be tight.



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**Never disconnect any charging unit circuit or battery circuit cable from the battery when the charging unit is operated. A spark can cause an explosion from the flammable vapor mixture of hydrogen and oxygen that is released from the electrolyte through the battery outlets. Injury to personnel can be the result.**

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The battery circuit is an electrical load on the charging unit. The load is variable because of the condition of the charge in the battery.

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### NOTICE

**The charging unit will be damaged if the connections between the battery and the charging unit are broken while the battery is being charged. Damage occurs because the load from the battery is lost and because there is an increase in charging voltage. High voltage will damage the charging unit, the regulator, and other electrical components.**

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See Special Instruction, SEHS7633, "Battery Test Procedure" for the correct procedures to use to test the battery. This publication also contains the specifications to use when you test the battery.

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## Electric Starting System - Test

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### General Information

All electrical starting systems have four elements:

- Ignition switch
- Start relay
- Starting motor solenoid
- Starting motor

Start switches have a capacity of 5 to 20 amperes. The coil of a start relay draws about 1 ampere between test points. The switch contacts of the start relay for the starting motor are rated between 100 and 300 amperes. The start relay can easily switch the load of 5 to 50 amperes for the starting motor solenoid.

The starting motor solenoid is a switch with a capacity of about 1000 amperes. The starting motor solenoid supplies power to the starter drive. The starting motor solenoid also engages the pinion to the flywheel.

The starting motor solenoid has two coils. The pull-in coil draws about 40 amperes. The hold-in coil requires about 5 amperes.

When the magnetic force increases in both coils, the pinion gear moves toward the ring gear of the flywheel. Then, the solenoid contacts close in order to provide power to the starting motor. When the solenoid contacts close, the ground is temporarily removed from the pull-in coil. Battery voltage is supplied on both ends of the pull-in coil while the starting motor cranks. During this period, the pull-in coil is out of the circuit.

Cranking of the engine continues until current to the solenoid is stopped by releasing the ignition switch.

Power which is available during cranking varies according to the temperature and condition of the batteries. The following chart shows the voltages which are expected from a battery at the various temperature ranges.

Table 1

Typical Voltage Of Electrical System During Cranking At Various Ambient Temperatures	
Temperature	12 Volt System
-23 to -7°C (-10 to 20°F)	6 to 8 volts