REMY POWER PRODUCTS

February 2017

REMY TECHNICAL SERVICE BULLETIN

In this Remy Technical Service Bulletin, we provide diagnostic procedures that can be used for troubleshooting non-computer-controlled charging systems.

Batteries are perishable devices that eventually wear out as they deteriorate and become incapable of performing their job. In addition, new and/or good batteries may become discharged for various reasons. Because of this, a battery check should be the starting point for diagnosing all electrical system problems.

Diagnostic and troubleshooting procedures for vehicles without computer-controlled charging systems: Ford Application

When diagnosing vehicle charging systems, it is important to remember that alternators are rated in amperage. It is easy to condemn an alternator based on voltage readings alone. An alternator at idle produces approximately 60% of its amperage rating. When the vehicle's electrical loads exceed the alternator's capacity, voltage decreases. Excessive amperage loads can be caused by added accessories and/or failed components, such as radiator condenser fan motor, etc. Therefore, it is equally important to measure amperage output.

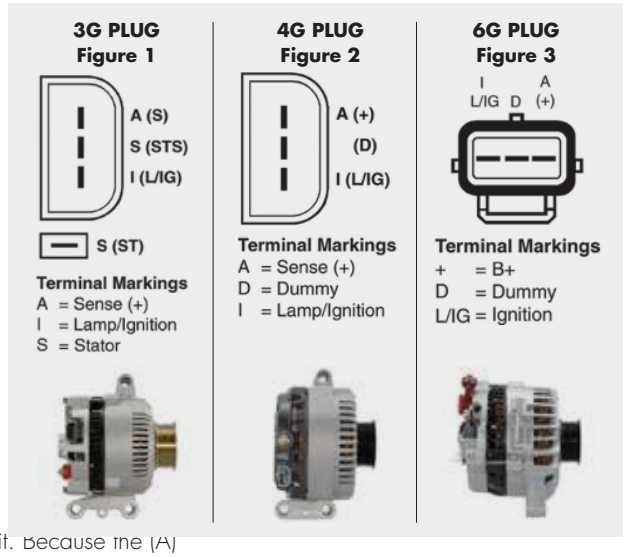
Note: An alternator reaches a higher internal operating temperature with increased load demands. Because the vehicle is at idle, this affects the cooling ability of the fans. Excessive internal heat can cause premature failure of the alternator.

Ford uses fusible links located in the alternator B+ circuits. Over time, these fusible links can lose their integrity. Simply doing a visual inspection of the cables and connections is not enough to determine if there is an adequate current delivery path. Voltage drop testing is critical to proper diagnostics. (Refer to Remy Technical Service Bulletin - December 2015 for voltage drop testing.)

Follow these steps to ensure proper diagnostics of the charging system.

1. **Perform a visual inspection under the hood.** Look at the belt tension and condition. Next, verify all electrical connections, main cables and plugs are clean and tight. Finally, make sure the alternator is mounted properly.
2. **Conduct battery testing.** Before testing the charging system, the battery needs to be verified as good. The battery base voltage should be at or above 12.4 volts before proceeding to load test. If the battery is less than 12.4 volts, charge and retest.
3. **Verify voltage at the (A) terminal of the regulator connector.** The (A) terminal carries the rotor field current and acts as a sense line.
   a. With the key in the off position, using a pin, back probe the (A) circuit at the voltage regulator.
   b. The reading should be battery voltage (12.4 volts or higher). If the reading is less than 12.4 volts, repair the (A) circuit.
4. **Measure the voltage at the alternator.** Once battery integrity has been verified, start the vehicle, hold the engine at around 1500 RPM and turn on all possible electrical loads.
   a. Measure voltage at the alternator. Place the black lead of the DC voltmeter on the case of the alternator and the red lead on the alternator B+ terminal.
      - If the reading is 12.6 volts or less, proceed to step 5.
      - If the voltage reading is between 13.8 and 14.8 volts, the alternator is working as designed.
   b. Measure voltage at the battery. Place the black lead of the DC voltmeter on the negative battery terminal of the battery and the red lead on the positive battery terminal of the battery.
      - If the reading is 12.6 volts or less, proceed to step 5.
      - If the voltage reading is between 13.8 and 14.8 volts, the alternator is working as designed.

5. **With the engine off, take a set of good jumper cables and connect one red clamp to battery positive and the other red clamp to the alternator B+ terminal.** Next, connect one black clamp to battery negative and the other black clamp to alternator ground/case. Pay special attention not to ground positive clamp once connected to battery positive.
6. **With the engine running, repeat step 4.** If the voltage reading is between 13.8 and 14.8 volts, then the alternator is functioning normally. The issue, then, lies either in the positive or negative pathway. The jumper cables have bypassed the issue and the root cause still needs to be identified. If voltage reading remains 12.6 or below, proceed to step 9.
7. **With the voltmeter still connected to the battery and the engine running, remove the red clamp from the alternator B+ terminal.** If the voltage remains the same, then this part of the circuit is good. If the voltage drops back down, the positive circuit needs repaired or replaced. Pay special attention not to ground positive clamp once removed from the alternator B+. A voltage drop may be due to high resistance in the main positive cable that is caused by a loose connection, corroded connections, fusible link, bus fuse or open circuit.
8. **With the voltmeter still connected to the battery and the engine running, remove the black clamp from the alternator ground/case.** If the voltage remains the same, then this part of the circuit is good. If the voltage drops back down, the negative ground circuit needs repaired or replaced. A voltage drop may be due to high resistance in the main negative cable that is caused by a loose connection, poor body ground or corroded connections.
9. **Begin diagnosis of the regulator control circuit by verifying that the regulator "L" terminal is receiving correct voltage.** The L terminal is the input signal to the regulator and also acts as an output by grounding the lamp circuit (charge indicator lamp bulb).
   a. With the ignition off, connect a test lamp (LED test lamp will not work) to B+ and back probe the regulator L terminal (see Figures 1-3 for L terminal location).
   b. Put a 12-volt reference to the L with resistance (test lamp) to mimic lamp light circuit.
   c. Next with Key On Engine Running (KOER) and voltmeter still connected to battery, take a reading:
      - If 12.6 volts or less, the alternator needs replaced.
      - If 13.8 to 14.8 volts after connecting the test light, the alternator is working as designed and the root cause lies with the control circuit. Possible reasons for a control circuit failure include internal instrument cluster failure; battery/charge indicator lamp bulb; instrument panel/gauge fuse blown; or corrosion at relay center or fuse block.
      - If the voltage reading remains 12.4 volts or less after conducting the above tests, then the alternator needs replaced.



Things to keep in mind:

- Depending on the year and model, the 6G (Figure 3) can be lamp light-activated, computer-monitored, or computer-controlled and computer-monitored. If the vehicle you are repairing is equipped with a 6G, then follow the steps in this Technical Service Bulletin for diagnostics.
- If 3G (Figure 1) alternator is overcharging, check S terminal wiring for integrity and repair/replace as needed. The 4G (Figure 2) has the S circuit internal.
- If the alternator is charging and the battery light is illuminated, perform put Key On Engine Off (KOEO) and unplug the regulator. If the light is still on, the L circuit is shorted to ground.
- If the tests in this Technical Service Bulletin have been successfully performed and a low output condition occurs, perform a voltage drop test on the (A) circuit. Because the (A) circuit carries the current for the rotor, a reduced voltage value in this circuit can cause reduced amperage output. The voltage drop should be below .2 volts. (Refer to Remy Technical Service Bulletin - December 2015 for voltage drop testing.)