



**TX1225504-UN: Alternator Test—Engine Control Unit (ECU) Excitation**

**LEGEND:**

- 2 - Alternator
- 3 - Switched Power
- 4 - Excitation Terminal (marked D+)
- 5 - B+
- 6 - Exciter Diodes
- 7 - Positive Diodes
- 8 - Stator
- 9 - AC Terminal (marked W)
- 10 - Excitation Winding (field)
- 11 - Negative Diodes
- 12 - Regulator
- 13 - To Display Module (voltage indicator)
- 14 - Alternator Excitation Diode
- 15 - Engine Control Unit (ECU)

**12 V System**

1. Complete the following checks before beginning alternator test procedure:
  - Check condition of belt, looking for belt damage or belt slippage.
  - Check battery state of charge.
  - Check both positive and negative electrical connections at the alternator and battery/batteries. Connections must be tight and free of corrosion.

Proper belt operation, battery condition, and electrical connections are an essential part of the charging system and must be in good condition before proceeding with alternator test.

2. Turn off all electrical loads on machine, such as blower fan in cab and all vehicle lights, to test charging system at low electrical load.
3. Start engine and set engine speed to slow idle. Measure Vdc at B+ terminal on the alternator.

1. If the voltage is greater than 13.5 volts [Note: For 12 V systems with maintenance-free batteries, B+ voltage should be 14.1 Vdc or greater.] and there are no active diagnostic trouble codes (DTCs) for alternator excitation issues, then the alternator is operating properly. Go back to step 1 and repeat belt, battery charge, and terminal checks.
2. If there is an active DTC for alternator excitation issue, proceed to step 5.
3. If the voltage is less than 13.5 volts [Note: For 12 V systems with maintenance-free batteries, B+ voltage should be 14.1 Vdc or greater.] , proceed to step 4.
4. Set engine speed to fast idle. Measure Vdc at B+ terminal on the alternator.
  1. If the voltage is less than 13.5 volts [Note: For 12 V systems with maintenance-free batteries, B+ voltage should be 14.1 Vdc or greater.] , replace the alternator.
  2. If the voltage is greater than 13.5 volts [Note: For 12 V systems with maintenance-free batteries, B+ voltage should be 14.1 Vdc or greater.] , go to step 5.
5. Remove the wire from D+ terminal on the alternator. Measure Vdc on the wire that was removed.
  1. If the voltage is less than 13.5 volts, then there is a problem with the engine control unit (ECU) or the wire harness.
  2. If the voltage at the D+ terminal is 13.5 volts or greater, put the wire back on the D+ terminal, and set the engine to high idle. If the B+ terminal is less 13.5 volts [Note: For 12 V systems with maintenance-free batteries, B+ voltage should be 14.1 Vdc or greater.] , replace the alternator.
6. Repeat steps 3—5 with high electrical load (all vehicle lights on and blower fan on high speed).

## **24 V System**

1. Complete the following checks before beginning alternator test procedure:
  - Check condition of belt, looking for belt damage or belt slippage.
  - Check battery state of charge.
  - Check both positive and negative electrical connections at the alternator and battery/batteries. Connections must be tight and free of corrosion.

Proper belt operation, battery condition, and electrical connections are an essential part of the charging system and must be in good condition before proceeding with alternator test.
2. Turn off all electrical loads on machine, such as blower fan in cab and all vehicle lights, to test charging system at low electrical load.
3. Start engine and set engine speed to slow idle. Measure Vdc at B+ terminal on the alternator.
  1. If the voltage is greater than 27.0 volts [Note: For 24 V systems with maintenance-free batteries, B+ voltage should be 28.2 Vdc or greater.] and there are no active diagnostic trouble codes (DTCs) for alternator excitation issues, then the alternator is operating properly. Go back to step 1 and repeat belt, battery charge, and terminal checks.
  2. If there is an active DTC for alternator excitation issue, proceed to step 5.
  3. If the voltage is less than 27.0 volts [Note: For 24 V systems with maintenance-free batteries,