



WARNING

Before troubleshooting any CEN products, the service technician should:

- read, understand, and agree to follow all information contained in this troubleshooting guide.
- understand the operational characteristics of the electrical charging system components to be tested.
- be proficient at the use of tools and test equipment used in troubleshooting CEN products.

Hazard Definitions

These terms are used to bring attention to presence of hazards of various risk levels or to important information concerning product life.

WARNING

Indicates presence of hazard(s) that can cause severe personal injury, death, or substantial property damage if ignored.

CAUTION

Indicates presence of hazards that will or can cause minor personal injury or property damage.

NOTICE

Indicates special instructions on installation, operation or maintenance that are important but not related to personal injury hazards.

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Testing Guidelines

Professional service technicians rely on the following guidelines when testing electrical components.

Voltage testing:

- Set meter to proper scale and type (AC or DC).
- Be sure to zero the meter scale or identify the meter burden by touching meter leads together. Meter burden must be subtracted from final reading obtained.
- Be sure the meter leads touch source area only. Prevent short circuit damage to test leads or source by not allowing meter leads to touch other pins or exposed wires in test area.

Voltage drop testing:

- Measure voltage between B+ on alternator or source and B- (ground) on alternator or source. Record obtained reading. Move to batteries or other source and measure again between B+ and B- terminals on battery or other source. Difference between the two readings represents voltage lost within the circuit due to but not limited to inadequate cable gage or faulty connections.
- Voltage drop measurements must be taken with all electrical loads or source operating.

Resistance (ohm) testing:

- Set meter to proper scale.
- Be sure to zero the meter scale or identify the meter burden by touching meter leads together. Meter burden must be subtracted from final reading obtained.
- Be sure the meter leads touch source area only. Prevent altering the reading by not allowing fingers or body parts to touch meter leads or source during reading.
- Be sure reading is taken when source is at 70°F. Readings taken at higher temperatures will increase the reading. Conversely, readings taken at lower temperatures will decrease the reading.
- Be sure to test directly at the source. Testing through extended harnesses or cable extensions may increase the reading.

CAUTION

When testing field coil or stators, most shorts to ground will measure 0-100 ohms. Test readings may also show higher, other than OL, typically in the megaohm range, when windings are dust-covered, wet, or oily from environment. Be sure to distinguish between defective readings and surface debris readings when determining the test results.

Dynamic/Live testing:

Definition: Connecting power and ground to a component to test operation/function out of circuit.

1. Be sure to connect jumper leads directly and securely to source contacts of the component being tested.
2. Be sure to make any connection to power and ground at the power supply or battery source terminals. Do not make connection at component source terminals as that may create an arc and damage component source terminals.



CEN NI617

Alternator Description and Operation

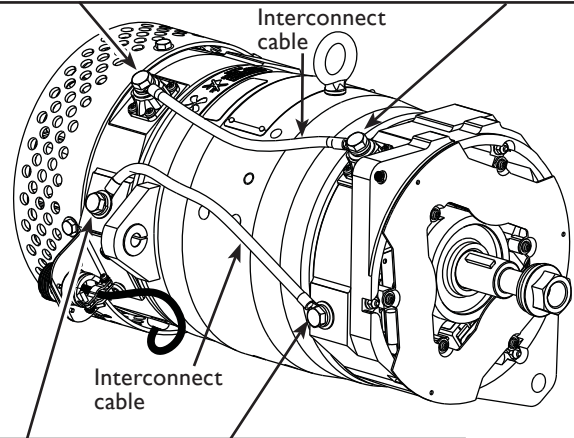
N1617 570 A 28 V alternator is internally rectified. All windings and current-transmitting components are non-moving, so there are no brushes or slip rings to wear out. Energize switch activates regulator. Field coil is then energized. Alternator output current is self-limiting and will not exceed rated capacity of alternator.

N3264 remote-mounted regulator used with these units:

- regulates alternator voltage so that neither Battery A signal nor Battery B signal exceeds 30.0 volts.
- is negative temperature compensated according to switch-selected vehicle battery type. Switch is factory-set to position 1. Customer selects position per application
 - Position 1 for Gel, AGM
 - Position 2 for 6TLFP, 6TLMF

B+ connections on alternator

Both positive cables must be connected together at alternator or isolator input when alternator is installed in vehicle and during operation. Interconnect cable is part of vehicle cabling.



B- connections on alternator

Both ground cables must be connected to vehicle's common ground. An interconnect cable is required as shown if a single cable to vehicle common ground is used.

Figure 1 — NI617 Alternator

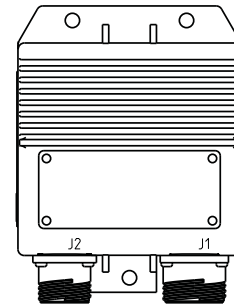


Figure 2 — N3264 Regulator Connections

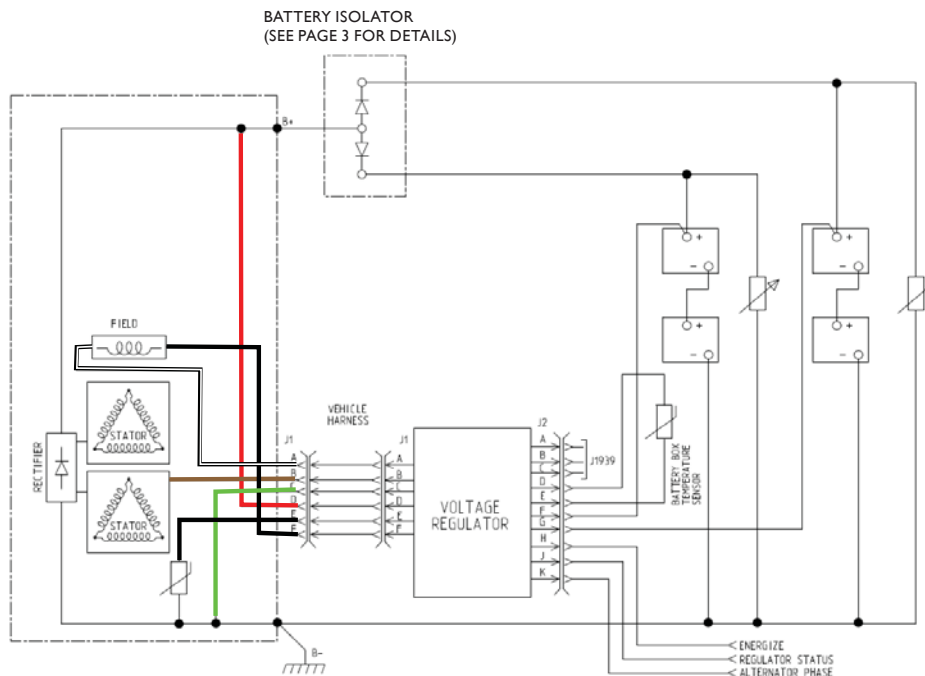


Figure 3 — Schematic Diagram of NI617 Alternator with N3264 Regulator



N2013 Battery Isolator Description and Operation

N2013 battery isolator used with this charging system:

- allows alternator to charge two battery banks at the same time.
- allows one battery bank to discharge without draining the other.
- is rated for 14 V or 28 V DC nominal. 600 A max. current.
- operates optimally between -40°C to 65°C (-40°F to 149°F) ambient temperature.
- includes voltage ripple filter connected to negative ground.

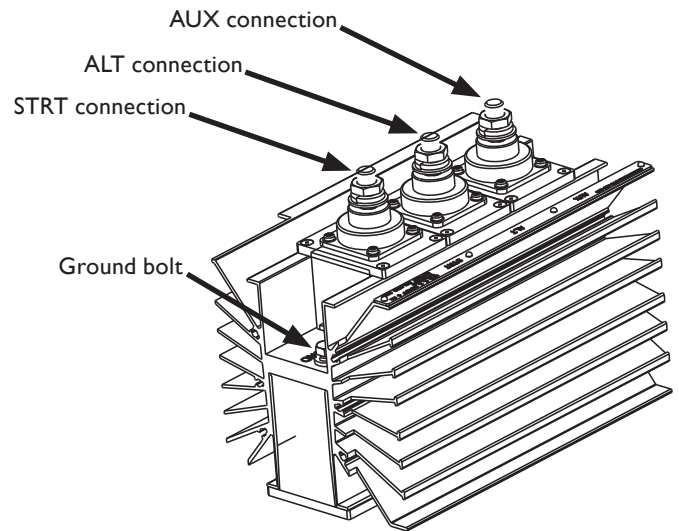


Figure 4 – N2013 Battery Isolator

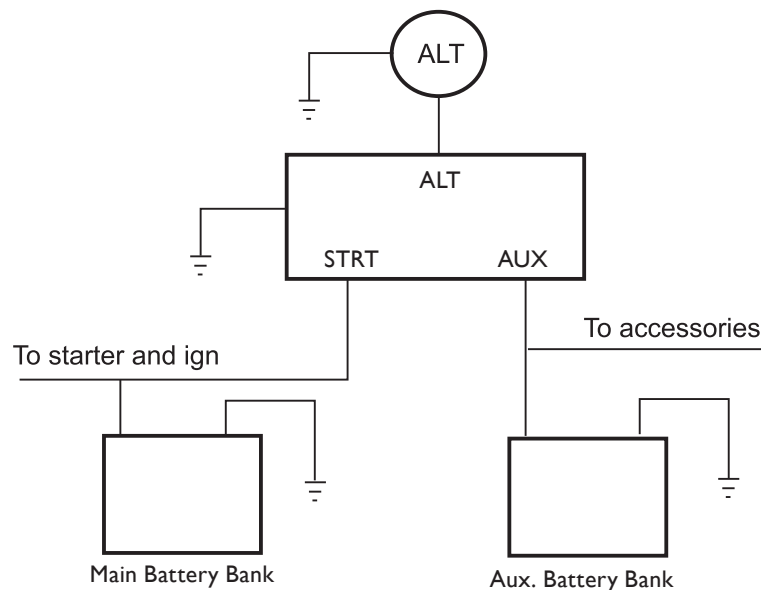


Figure 5 - Generic Wiring Schematic for Reference Only—See Vehicle Manufacturer Specifications



NOTICE

Perform on-vehicle troubleshooting before attempting on-bench tests or static tests.

Tools and Equipment for Testing

- Digital Multimeter (DMM)
- Ammeter (digital, inductive)

Chart 1: No Power to Main Battery Bank (STRT) or Aux. Battery Bank (AUX) with Engine Running

Before Troubleshooting, Check Batteries for Proper Charge Voltage. See Page 1.

Disconnect battery master switches.

Set DMM to diode test. Connect DMM red lead to STRT terminal on isolator. Connect black lead to ALT terminal on isolator. DMM should read blocking in this direction. Then reverse leads. DMM should read flow in this direction. Repeat for AUX and ALT terminals. Tests should read flow in one direction and blocking in the other direction. Did readings pass the tests?

Yes

No

Go to Chart 2 on page 5 to troubleshoot alternator.

Battery isolator is defective.

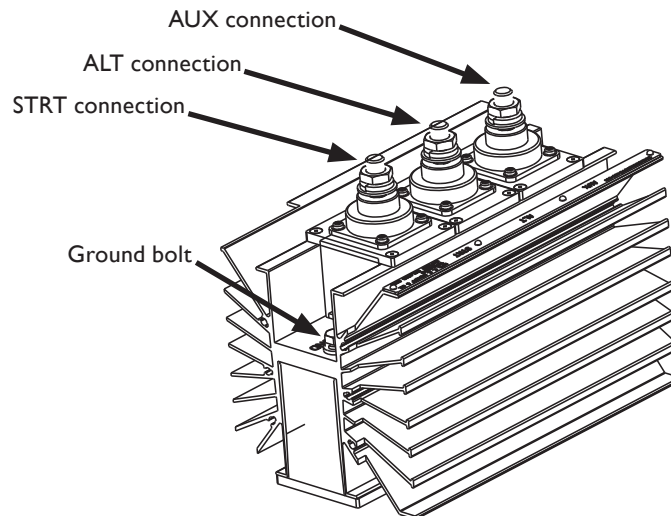


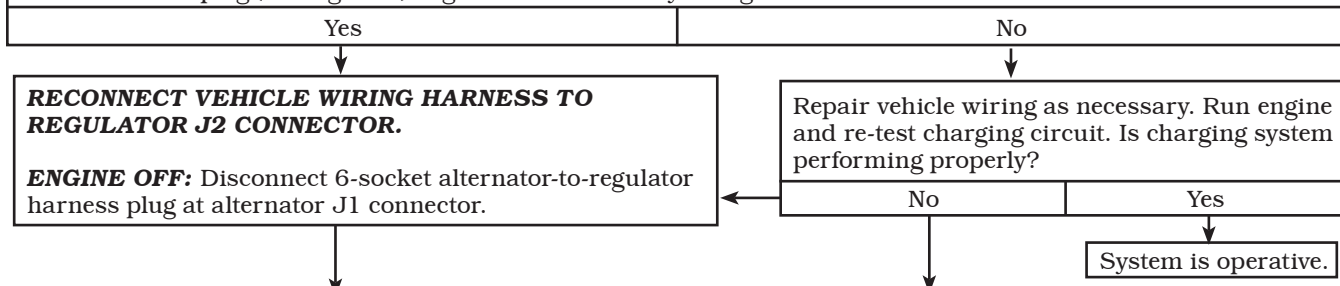
Figure 6 – N2013 Battery Isolator



Chart 2: No Alternator Output – Test Charging Circuit

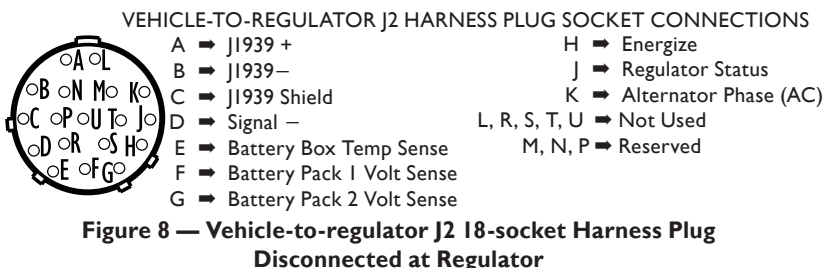
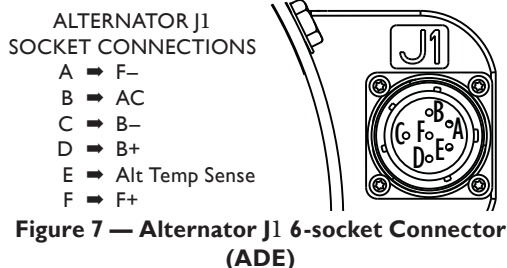
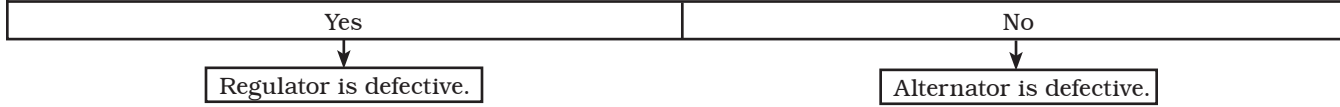
- TEST MEASUREMENTS ARE TAKEN ON HARNESS CONNECTOR AT ALTERNATOR. TEST MEASUREMENT AT AN EXTENDED HARNESS PLUG MAY AFFECT RESULTS.
- REMOTE-MOUNTED REGULATORS: CHECK CONDITION OF FUSES IN EXTENDED WIRING HARNESS AND PIN-TO-PIN CONTINUITY BEFORE TROUBLESHOOTING.
- BEFORE STARTING DIAGNOSTIC SEQUENCE, VERIFY THE FOLLOWING AND REPAIR/REPLACE IF NOT TO SPEC:
 - BATTERIES FOR STATE-OF-CHARGE (24.5-25.5 V), CONDITION, AND SECURE CONNECTIONS
 - MASTER BATTERY SWITCH FOR FUNCTION

MASTER BATTERY SWITCH ON, KEY ON, ENGINE ON: Test for battery voltage at B+ terminal on alternator ADE to ground. Disconnect vehicle wiring harness at regulator J2 connector and test for battery voltage at socket H on vehicle harness plug (see Figure 8) to ground. Does battery voltage exist at both locations?



MASTER BATTERY SWITCH ON, KEY OFF, ENGINE OFF: Readings of all five tests must pass.

1. Battery voltage test: Connect DMM red lead to socket D on alternator J1 6-socket connector (see Figure 7). Connect DMM black lead to socket C on same connector. Battery voltage should exist.
2. Field coil resistance test: Set DMM to ohms test. Field resistance between sockets F and A on alternator J1 6-socket connector should measure nominal $1.0-1.5 \pm 0.2$ ohms. Field coil is defective if reading is less than 0.5 ohms or greater than 3 ohms.
3. Significant magnetism test:
 - a. Securely connect one jumper wire between socket F on alternator J1 6-socket connector and B+ terminal on alternator ADE.
 - b. Insert one end of **second** jumper wire in socket A on alternator J1 6-socket connector. Momentarily (1 sec.) touch other end of **second** jumper wire to alternator B- terminal. Spark will occur at B- terminal. Touch steel tool to shaft to detect significant magnetism.
 - c. Remove both jumper wires.
4. Alternator temperature sensor circuit test: Set DMM to ohms test. Sensor resistance between socket E on alternator J1 6-socket connector and B- terminal on alternator should measure 80-130K ohms at 70°F (20°C). Note: If ambient temperature is higher, resistance will measure less than listed and vice versa.
5. Phase supply test: Set DMM to diode test. Connect DMM black lead to socket B on alternator J1 6-socket connector. Connect red lead to alternator B+ terminal on ADE. DMM should read blocking in this direction. Then reverse leads. DMM should read flow in this direction. Repeat for socket B and B- terminal. Tests should read flow in one direction and blocking in the other direction.



If you have questions about your alternator or any of these test procedures, or if you need to locate a Factory Authorized Service Dealer, please contact us at:

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