Troubleshooting Guide
for N1388 Alternator

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.

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.

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 megohm 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.
**CEN N1388 Alternator**

**Description and Operation**

**N1388** 28 V (300 A) alternator is self-rectifying. All windings and current-transmitting components are non-moving, so there are no brushes or slip rings to wear out. Load-dump protection limits peak voltage to less than 55 volts during maximum load change over speed range in batteryless operation. Peak amplitude of voltage including ripple during normal batteryless operation is less than 40 volts. Radio noise suppression is in accordance with Mil-Std 461A, Notice 4 RE05 and CE07. Alternator output has soft start feature after energize.

Ignition switch energizes regulator, and then field coil is energized.

Voltage setpoint adjustment is available on alternator control unit:
- Tropic= 27.4±0.25V
- Normal= 28.1±0.15V
- Arctic= 28.8±0.25V

**N3012** regulator furnished with some of these units is flat temperature compensated at 28.1±0.15 V at 72º F. See page 3 for troubleshooting.

**N3210** regulator furnished with some of these units is flat temperature compensated at 28.1±0.15 V at 72º F. The alternator voltage adjust plug must be set in the TROPIC position. Regulator features OVCO, which activates if B+ voltage exceeds setpoint by +3 V for more than 3 seconds. Manual reset by interruption of energize signal. Automatic reset when B+ voltage falls to 5 V below setpoint. Regulator shuts down if B+ signal is disconnected. See page 4 for OVCO 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
— energize switch for function
— N3210: Voltage select plug on alternator must be set to “tropic” position

### Chart 1 – No Output

| Energize switch on, engine on: Disconnect harness from energize receptacle. Test for battery voltage at B+ terminal on alternator to ground, and then between B– terminal on alternator and socket B on energize harness plug end. Does battery voltage exist at both locations? |
|------------------|--|
| Yes              | No |

When performing the following test, first connect jumper to socket A in regulator receptacle. Make circuit connection with other end of jumper to B– terminal on alternator. Connecting at ground side will prevent a spark from damaging the socket in the receptacle.

**CAUTION**

Energize switch off, engine off: Reconnect energize harness. Disconnect regulator-to-alternator harness. Momentarily (1 sec.) jumper socket A in regulator receptacle to B– terminal on alternator. Touch shaft with steel tool to detect any magnetism. Is shaft magnetized?

| Yes | No |

Run engine and re-test charging circuit. Is charging system performing properly?

| Yes | No |

With regulator-to-alternator harness and energize harness disconnected, perform series of tests with DMM:

1) With meter set on ohms, connect red lead to pin B of energize receptacle and black lead to socket B of regulator receptacle. Meter should read 40-55 ohms.

2) With meter set on ohms, check field coil resistance across socket A of regulator receptacle and B+ terminal on alternator. Resistance should measure nominal 1.0-3.0 ± 0.2 ohms. Field coil is defective if reading is less than 0.5 ohms or greater than 3.5 ohms.

3) With meter set on ohms, check for continuity between socket C of regulator receptacle and B– terminal on alternator.

Did all three tests provide correct readings?

| Yes | No |

**ENERGIZE HARNESS PLUG END**

**ENERGIZE PIN CONNECTIONS**

- Pin A: Not used
- Pin B: Energize
- Pin C: Not used

**REGULATOR SOCKET CONNECTIONS**

- Socket A: F–
- Socket B: Energize
- Socket C: Ground
- Socket D: B+
- Socket E: Not used

**Figure 4 — N1388 Control Assembly**

**Regulator is defective.**

**Alternator is defective.**

**System is operative.**
**N3210: OVCO Troubleshooting**

Shut down vehicle and restart engine. If alternator functions normally after restart, a “no output condition” was normal response of voltage regulator to “high voltage” condition. Inspect condition of electrical system, including loose battery cables, both positive and negative. If battery disconnects from system, it could cause “high voltage” condition in electrical system, causing OVCO circuit to trip.

If you have reset alternator once, and electrical system returns to normal charge voltage condition, there may have been a one-time, high voltage spike, causing OVCO circuit to trip.

If OVCO circuit repeats cutout a second time in short succession and shuts off alternator field circuit, try third restart. If OVCO circuit repeats cutout, check that socket A in alternator-to-regulator harness is not shorted to B–. If it is shorted, alternator is defective. If not, regulator is defective.