Countries:	BAHAMAS, BOLIVIA, BELIZE, CANADA, CHILE, TAIWAN, COLOMBIA, COSTA RICA, DOMINICAN REPUBLIC, ECUADOR, EL SALVADOR, GUAM, GUATEMALA, GUYANA, HAITI, HONDURAS, JAMAICA, KOREA, SOUTH KOREA, ARUBA, NICARAGUA, PANAMA, PERU, TRINIDAD AND TOBAGO, UNITED STATES, URUGUAY, VENEZUELA, Curaçao	**Document ID:**	IK0800403
Availability:	ISIS, NotSIR	**Revision:**	21
Major System:	Electrical	**Created:**	11/1/2012
Current Language:	English	**Last Modified:**	4/24/2024
Other Languages:	Français, Español,	**Author:**	Anthony Tondola
Viewed:	37035		

Less Info

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Title: Alternator Troubleshooting and Diagnostics

Applies To: All

Change Log

Please refer to the change log text box below for recent changes to this article:

04/22/2024 - Updated article to include references to the new Autometer tool.
03/08/2022 - Updated article owner groups.
11/29/2018 - Updated the Midtronics manual hyperlink
11/27/2017 - Author updated for feedback purposes.
06/15/2017 - Corrected cable drop specs.

DESCRIPTION

This document details the procedure that must be followed to ensure proper Alternator troubleshooting and diagnostics.

The procedure requires using the **AutoMeter BCT-468NAVK Tester** and **Alternator Diagnostic Worksheet.**

NOTE: AutoMeter Warranty Authorization Codes and Charging System Charge Codes are now required on every Navistar Warranty Alternator replacement (excluding 55 over-the-counter parts).

NOTE: While it is not required, completing the Alternator Diagnostic Worksheet is still recommended. Critical diagnostic testing values can be recorded on this worksheet, and it is recommended to use this worksheet anytime an alternator is diagnosed.

SYMPTOM(s)

Diagnostic Trouble Codes & Dashboard Indicator Lights:

DTC/Light	Description

No Faults or Warning Lights	

Customer Observations or Concerns:

- Overcharging
- Undercharging
- Fluctuating Battery (Voltage) Gauge
- Low battery system voltage
- Red battery warning light
- Batteries aren't Charging
- Battery gauge reading too high
- Battery gauge reading too low

SPECIAL TOOL(s) / SOFTWARE

Tool Description	Tool Number	Comments	Instructions
AutoMeter Battery and Electrical System Analyzer	BCT-468NAVK		Instruction Manual
Tool, Fluke 88V/A Automotive Meter Combo Kit	ZTSE4357-Kit		

DIAGNOSTICS

Step	Action	Decision
1	Feature code confirmation: Power Pack 3 Alternator **Does this vehicle have a Power Pack 3 alternator--DuraStar or WorkStar with feature code 60AJN, 60AJP,60AAC, or 60AAE?** For further information on the Power Pack 3 feature click here	**Yes:** Go to Power Pack 3 Diagnostics linked Here **No:** Go to Step 2

Step	Action	Decision
2	Inspect the accessory drive belt for the following : • Excessive cracking • Missing/torn ribs	**Yes:** Go to Step 3

	• Excessive edge wear • Contamination **Note:** belts may not be covered under warranty--verify warranty policy. **Is the accessory drive belt usable?**	**No:** Replace Belt, and retest

Step	Action	Decision
3	Check the accessory drive belt auto tensioner for the following: • Does the auto tensioner pulley spin freely? • Does the tensioner arm move smoothly through its entire range of motion? • Is there spring tension through the entire range of motion? • Is the tensioner, at a mid-point, within its range of travel? • Inspect for loose Alternator Pulley **Was "yes" the answer to ALL of the previous questions?**	**Yes:** Go to Step 4 **No:** Replace accessory drive belt auto tensioner and retest

Step	Action	Decision
4	Inspect alternator cables and connections for the following : • Loose crimps • Corrosion • Damage • Proper routing **Are all alternator cables and connections free of issues?**	**Yes:** Go to Step 5 **No:** Repair/Replace any defective Alternator Cables and Connections and retest

Step	Action	Decision
5	If the Alternator has an ignition (IGN) terminal, there must be power present at all times. Use a volt meter to measure the voltage at the terminal. **Is the voltage reading 12.4V or greater?**	**Yes: (or IGN terminal not present):** Go to Step 6 **No:** Find Circuit issue and repair. Then Retest.

Step	Action	Decision
6	If the Alternator has a battery voltage-sensing feature. • Verify that the sense wire is securely connected to the "S" (Sense) Terminal • Visually inspect the circuit to the batteries, to verify the circuit is not damaged.	**Yes:** Go to Step 7 **No:** Reinstall/repair the Voltage Sensing Wire on the appropriate

	See Appendix D for an illustration describing the issue **Note:** If voltage sense is not equipped on the alternator go to Step 7. The voltage sense wire should NOT be connected to the "L" (Lamp) Terminal **Note:** For further terminal information see Appendix F. **Is the Voltage Sensing Wire hooked up correctly, and not damaged?**	terminal and then retest

Step	Action	Decision
7	**AutoMeter Full System Test** Complete the "Full System Test" as described in the AutoMeter Operator Manual. **Full System Test:** • Isolated Battery Test • Battery Pack Test • Charging System Test • Charging System Voltage Drop Test • Staring System Test • Starting System Voltage Drop Test **Note:** Use battery stud adaptors on each battery tested. Failure to do so will yield inaccurate results. **Note:** Keep all generated warranty codes during testing to be later submitted on Warranty Claim (If warranty applies) **What were the results of the full system test?**	**Full System Test Pass:** Retest for concern **Failed Battery:** Record WAC - Replace any bad batteries and retest for concern **Failed Alternator:** Record WAC - Replace alternator and retest for concern **Failed Starter:** Record WAC - Replace starter and retest for concern **Failed Voltage Drop:** Repair or replace any battery cables that have excess voltage drop and retest for concern

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Warranty Information

When troubleshooting and replacing an alternator, technicians must utilize the **AutoMeter BCT-468NAVK Tester**, and obtain a Warranty Authorization Code (WAC).

NOTE: A Warranty Authorization Code (WAC) is now required on all alternator replacements. The only exception is (55) Over the Counter Parts Warranty replacement.

NOTE: While it is not required, completing the Alternator Diagnostic Worksheet is still recommended. Critical diagnostic testing values can be recorded on this worksheet, and it is recommended to use this worksheet anytime an alternator is diagnosed.

NOTE: The **Midtronics EXP Tester** may still be used for alternator diagnostics and Warranty Authorization Code (WAC) generation.

Warranty Return Information

Due to the high rate of damaged alternators, all alternators sent back via warranty/service contract/service part must be undamaged and testable.

Unwarrantable Damage includes :

- Stripped pulley/terminal threads
- Missing/damaged terminals
- Foreign object damage
- Missing parts that render unit untestable
- Cracked Housing
- Alternators returned in disassembled condition

Warranty Claim Coding:

Group:	08000 - Generating System
Noun:	018 - Alternator Assy

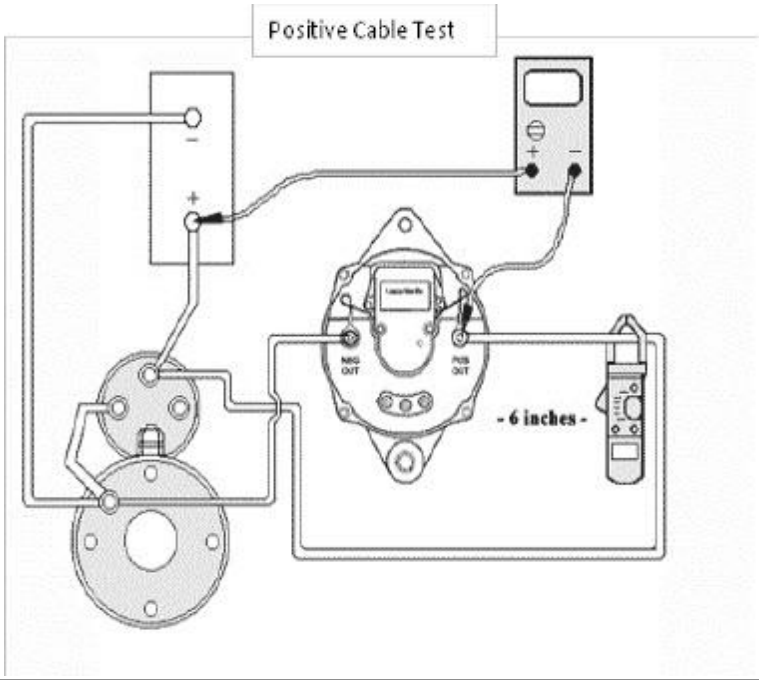
Standard Repair Time(s):

Refer to the SRT Manual for Repair Times

Other Resources

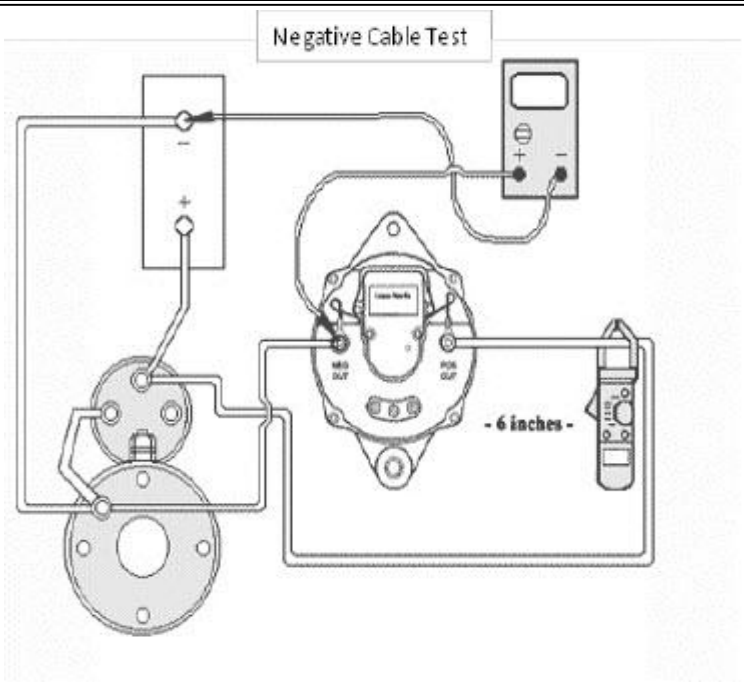
Master Service Information Site

Appendix Section

Appendix A - Positive Cable Test


1. Connect ammeter to positive alternator cable.
2. Make sure ammeter is at least 6 inches (15 cm) away from alternator, to eliminate possibility of faulty readings.
3. Connect voltmeter’s negative lead to positive terminal of alternator.
4. Connect voltmeter's positive lead to positive terminal on battery.
5. Start engine and set engine 1500 RPMs.
6. Turn on vehicle loads until 75% of alternator’s rated output is achieved on ammeter display.
7. If necessary, use a carbon pile tester to apply load on alternator.
8. Record measured voltage to checklist.
9. Turn off engine.

Appendix B - Negative Cable Test



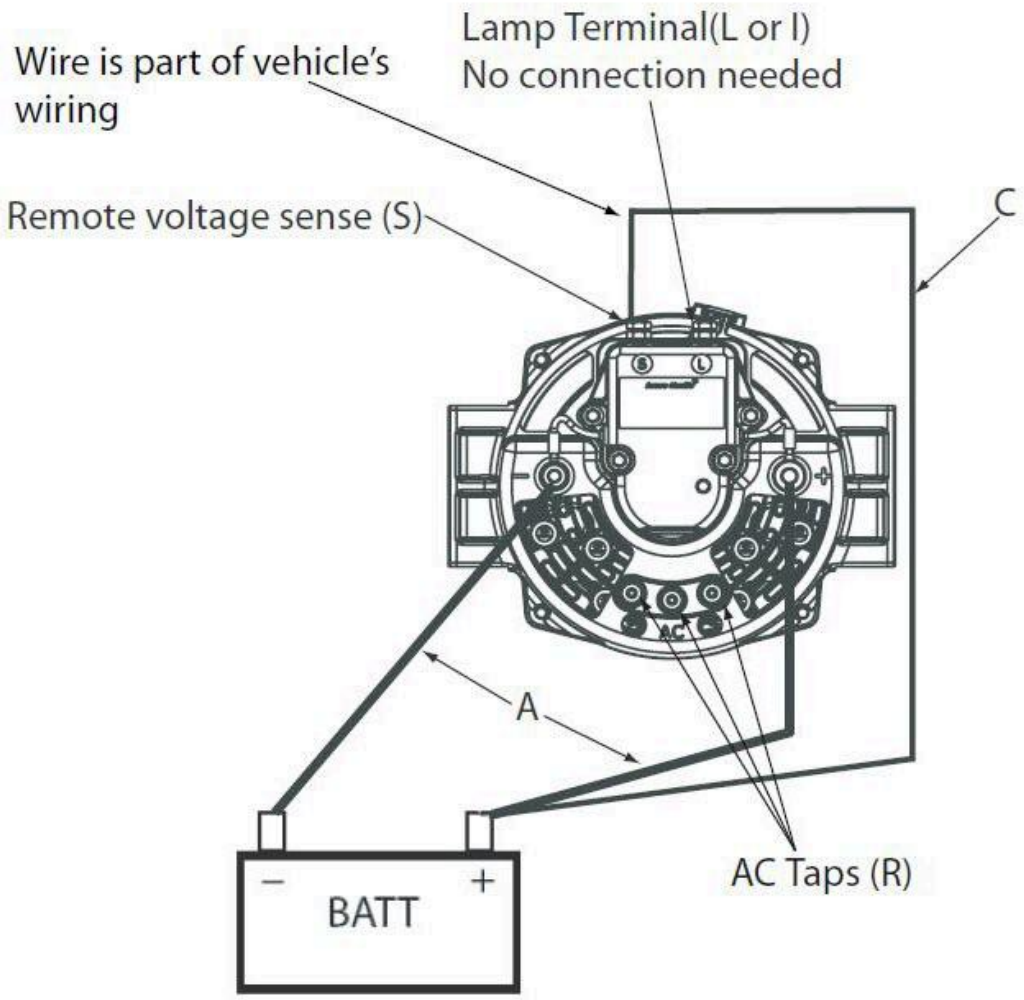
1. Connect ammeter to positive alternator cable.
2. Verify the ammeter is at least 6 inches (15 cm) away from alternator, to eliminate possibility of faulty readings.
3. Connect voltmeter’s negative lead to negative terminal of battery.
4. Connect voltmeter's positive lead to negative output terminal on alternator.
5. Start engine and set engine 1500 RPMs.
6. Turn on vehicle loads until 75% of alternator’s rated output is achieved on ammeter display.
7. If necessary, use a carbon pile tester to apply load on alternator.
8. Record measured voltage to checklist.
9. Turn off engine.

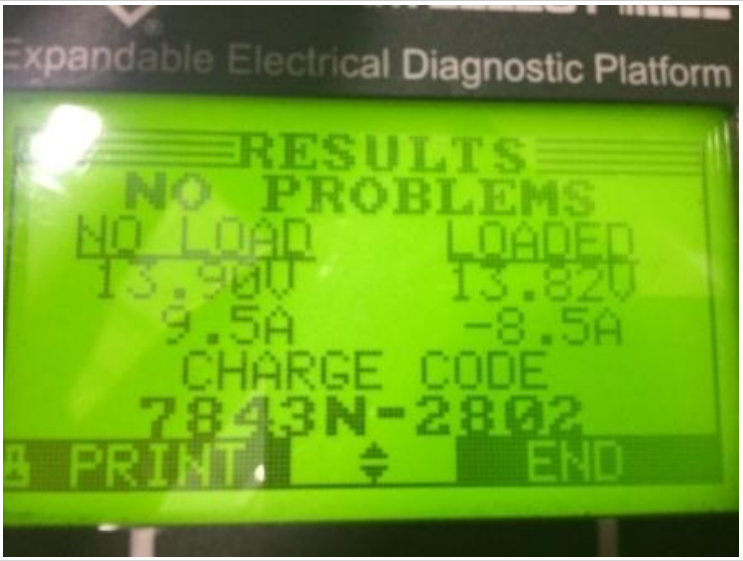
Appendix C

Action	Corrections and Warranty Determination
1. Record alternator date code	Part label must be intact. If label is missing or destroyed, a justifiable reason must be presented and accepted by a representative before a claim process is initiated. A missing or intentionally destroyed label may void the warranty. If date code is newer than vehicle manufacture or in-service date, this is a replacement part. The date code must coincide with the date of invoice when

	the part was purchased, or be validated by an “install date”.
2. Inspect for excessive dirt, grease, or oil	Excessive dirt, grease, or oil soaked/saturated condition: Oil and grease on surface and/or interior of alternator will prevent unit from cooling properly, causing premature failure. This may also create a low voltage condition on the vehicle. Check and correct any sources of excessive oil, grease, and dirt. Check for missing shields, leaking hoses, or fraying belts.
3. Inspect for rust and corrosion.	Alternators can become rusted or corroded such that they cannot function, or function intermittently. Examples are positive side rectifiers shorted to case by a “corrosive bridge”, the rotor rusted and seized to the stator, or electrical connections open due to corrosion.
4. Inspect for damaged shaft, mounting bosses, housing	Bent, broken, cracked or elongated mounting holes, impact marks or cracked housings render all products unacceptable for warranty.
5. Inspect for signs of arcing or shorts to housing or connection points.	Signs of arcing or direct shorts to housing or connection points, including hardware dropped or loose inside of alternator housing, improperly connected or modified electrical connectors, or cut/severed wires will void warranty.
6. Inspect mounting brackets	Make sure charging system components are securely mounted to their applicable brackets. Brackets, in turn, must be bolted securely to the engine. Poorly mounted charging system components lead to vibration damage and diminished drive belt performance.

Appendix D



Appendix E


Appendix F		
Leece Neville Terminal ID Chart:		
Terminal Names	**Connection**	**Description**

B+, (+)	Positive Battery Connection	
B-, (-)	Negative Battery Connection	
L	Lamp	Provides ground when fault or unit is not operating
IGN	Ignition switched B+ (only on when ignition is on)	Power supplied to this terminal by ignition
D+	Trio	Provides voltage when operating to power regulator or signal relay
S	Remote Sense	Voltage supplied to this terminal provides reference voltage to regulate to
AC, W, R	Stator terminal	Phase tap from stator
F+	Field connection (positive)	Field resistance can be measured between F+ and F-
F-	Field connection (negative)	Field resistance can be measured between F+ and F-

Delco Remy Terminal ID Chart:

Terminal	Function
Battery Positive (B+) and Ground Terminals: all case grounded alternators	Alternator output terminals
Battery Positive (B+) and Battery Negative (B-): all case insulated alternators	Alternator output terminals
Relay (R) Terminal or Phase (P) Terminal	Alternating speed signal at 1/2 system voltage (Half wave rectified. A terminal is provided to monitor the voltage of one phase. The maximum current loading is 4 amps, and may be used for tachometers, hour meters etc...
Indicator (I) Terminal	Constant current source or sink to reduce turn-on speed or indicate fault (1 amp max). This terminal carries full system voltage
Lamp (L) Terminal	Constant 1 amp current sink only to indicate charging system condition. The L terminal will function as a fault indicator by pulling the applied voltage low, and hence terminal L is capable of sinking a current of up to 1 Amp indefinitely when the alternator is not working
Sense (S) Terminal	Connection point for remote voltage sensing. Battery voltage may be sensed using an external sense. In the event the sense wire becomes disconnected, or is not in use, the battery voltage sense circuit will automatically revert to internal sensing on most models
Field (FM) Terminal	Available on only certain products. The FM terminal is used to monitor the pulse width modulated (PWM)field voltage. With the alternator field referenced to ground, the FM terminal is connected to the high side of the field using a 10,000 ohm resistor. When the field switch is turned on, essentially battery voltage appears at the FM terminal, and thus the average voltage a Terminal FM is directly proportional to field strength. When the ECU recognizes a full filed condition, it can activate fast idle to maintain required loads