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Viewed:	3104		

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Title: Alternator Troubleshooting and Diagnostics

Applies To: All

CHANGE LOG

09/09/2014 - Author updated for feedback purposes
09/09/2014 - Removed Pulley Nut Torque Step (formerly Step 4)
08/22/2014 - Updated iKnow to step based format
4/17/2014 - Alternator Diagnostic Worksheet was reformatted and made into a fillable PDF Form. the Form can be printed out and filled in or filled in on your computer.

Description :

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

The procedure requires the use of the **Midtronics EXP Tester**, and **Alternator Diagnostic Worksheet.**
Benefits of using this procedure are:

Symptom(s) :

Overcharging
Undercharging
Fluctuating Battery Gauge
Red Battery Warning Light

Customer Complaints :

Customer may state the following concerns :

Low Battery System Voltage
Red Battery Warning Light
Batteries aren't Charging
Battery Gauge reading too high
Battery Gauge reading too low
Battery Gauge fluctuating

Special Tool(s) or Software :

Tool Description	Tool Number	Comments
Midtronics EXP Tester	**EXP1000HD**	
Digital Multimeter		

DIAGNOSTIC PROCEDURE

Step	Action	Decision
1	Feature Code Confirmation : Power Pack 3 Alternator Does this vehicle have a Power Pack 3 Alternator equipped ? (Vehicles : DuraStar, WorkStar)(feature codes : 60AJN, 60AJP,60AAC,60AAE)	Yes: Go to Power Pack 3 Diagnostics linked Here No: Go to Step 2

	For further information on this feature click here	

Step	Action	Decision
2	Inspect Accessory Drive Belt for the following : - Excessive Cracking - Missing/Torn Ribs - Excessive Edge Wear - Contamination Note : Belts May not be covered under warranty be sure to check warranty policy. Is the Accessory Drive Belt able to be re-used?	Yes: Go to Step 3 No: Replace Belt, and retest

Step	Action	Decision
3	Check Accessory Drive Belt Auto Tensioner for the following : - Does the Auto Tensioner Pulley turn Freely without binding? - Does the Tensioner Arm move smotthily through its entire range of motion? - Do you feel significant spring tension through range of motion? - With Proper Belt installed is the tensioner at a mid point within its range of travel? Did you answer "yes" 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	Feature Code Confirmation : Leece Neville Does this vehicle have a Leece Neville Alternator equipped with feature codes ? 08GXD, 08GXE, 08GXC, or 08GXB Does your vehicle have this feature code?	Yes: Go to Step 6 No: Go to Step 7

Step	Action	Decision
6	Leece Neville Symptom Verification 1. Alternator voltage is intermittently high (above the normal running range of 13.8-14.8V). 2. Voltage as seen on the volt gauge spikes above15V temporarily, and then drops to normal range. 3. Voltage gauge fluctuates abnormally. Is the Vehicle experiencing any of the issues above?	Yes: Replace Alternator and Retest(See Appendix C for replacement guidlines) No: Go to Step 7

Step	Action	Decision
7	If the Alternator incorporates an ignition (IGN) terminal this terminal must have battery voltage present above 12.4 V Note : If IGN terminal is not present on Alternator go ahead to Step 9 Is your voltage 12.4V+ ?	Yes: Go to Step 8 No: Find Circuit issue and repair. Then Retest.

Step	Action	Decision
8	If the Alternator has a battery voltage sensing feature. Verify that the sense wire is securely connected to the "S" (Sense) Terminal, and visually inspect circuit to the batteries to verify the circuit is not damaged. **See Appendix D for illustration describing the issue** Note : If voltage sense is not equipped on the alternator go ahead to Step 10 Note : The voltage sense wire should NOT be connected to the "L" (Lamp) Terminal Is Voltage Sensing Wire hooked up correctly, and not damaged?	Yes: Go to Step 9 No: Reinstall/repair Voltage Sensing Wire to appropriate terminal and then retest

Step	Action	Decision
9	Battery Pack Break Down Test 1. Do the "Test Preparation" as described in Section 4 of the Midtronics EXP Instruction Manual. 2. Select "System Test" and follow procedure for testing battery individual battery, as described in Section 5 of the Midtronics EXP Instruction Manual Note : Do not test as a pack test individually NOte : Be sure to use midtronics battery stud adaptors on each battery tested. Failure to do so will yield inaccurate results. Note : Be sure to obtain and submit all generated warranty codes during testing to later be submitted on Warranty Claim (If warranty applies) What were the individual test results for each Battery?	Good Battery(s) : Go to Step 10 Replace/Bad Cell : Replace bad batteries and re-perform Step 9 Charge and Retest : Charge batteries and reperform Step 9

Step	Action	Decision
10	Starter and Alternator Performance Test Continue with Midtronics System Test, Section 5, for Starter and Alternator : 1. Connect positive (+), and negative (-) test leads to batteries 2. Following Midtronics prompts, conduct "Starter System Test" and "Charging System Test" 3. When prompted choose 'Amp Clamp Available' option if available Was a problem with the alternator detected?	Yes: Go to Step 11 No: Alternator is Operating as designed

Step	Action	Decision
11	**Note : If leads are not available go Step 12** 1. Connect the Midtronics DMM Test Leads 2. Perfrom the Cable Drop Test as described in Section 7 of the Midtronics Manual 3. Record indicated Voltage drops from the Midtronics tool, into the Alternator Diagnostic Worksheet	Yes: Refer to Charging System Decision and Diode Decision in Midtronics manual. Follow instructions for further inspections and re-tests. No: Go to Step 12

Step	Action	Decision
12	Did tester give results of "clean and retest", or "replace" wiring? Positive Cable Circuit Test if Midtronics Cable Drop Test Leads (DMM Test Leads) are not available **(Illustration in Appendix A)** 1. Connect Ammeter to positive alternator Cable 2. Make sure Ammeter is atleast 6 inches away from alternator to eliminate the possibility of faulty readings. 3. Connect Voltemeter's negative lead to the positive terminal of the alternator 4. Connect the voltmeter's positive lead to the positive terminal of the battery. 5. Start engine and set engine 1500 RPM's 6. Turn on vehicle loads until 75% of alternators rated output is acheieved 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 **Note : Record Measured Voltage Drops into the Alternator Diagnostic Worksheet** **Note : Clean and tighten connections, or replace wiring as needed** **Note : Refer to the table, "charging System Decision" in the Midtronics Instruction Manual. Follow instructions for further inspections and re-tests** Was the reading greater than .25 Volts?	Yes: Correct voltage drop, and re-test before proceeding No: Go to Step 13

Step	Action	Decision
13	Negative Cable Circuit Test if Midtronics Cable Drop Test Leads (DMM Test Leads) are not available **(Illustration Shown in Appendix B)** 1. Connect Ammeter to positive alternator Cable 2. Make sure Ammeter is atleast 6 inches away from alternator to eliminate the possibility of faulty readings. 3. Connect Voltemeter's negative lead to the negative terminal of the Battery 4. Connect the voltmeter's positive lead to the negative output terminal on the alternator. 5. Start engine and set engine 1500 RPM's 6. Turn on vehicle loads until 75% of alternators rated output is acheieved on ammeter display	Yes: Correct voltage drop,and re-test before proceeding No: Go to Step 14

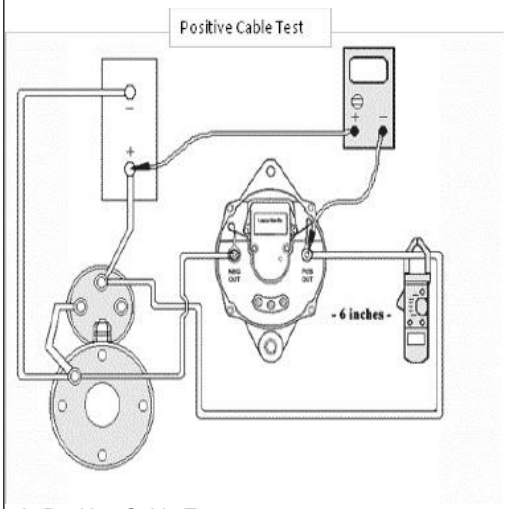
	7. If necessary, use a carbon pile tester to apply load on alternator 8. Record Measured voltage to checklist 9. Turn off engine **Note : Record Measured Voltage Drops into the Alternator Diagnostic Worksheet** **Note : Clean and tighten connections, or replace wiring as needed** **Note : Refer to the table, "charging System Decision" in the Midtronics Instruction Manual. Follow instructions for further inspections and re-tests** Was the reading greater than .25 Volts?	

Step	Action	Decision
14	Replace Alternator 1. Enter "Charging System Decision" result into Alternator Diagnostics Worksheet 2. Perform the following Inspections on the old alternator, and correct for any related problems before installing new alternator **(Follow steps in Appendix C below)** After replacing the alternator has the Customer's concern corrected?	Yes: Release the vehicle No: Reassemble the truck back to driving condition, and contact your supervisor.

Appendix :

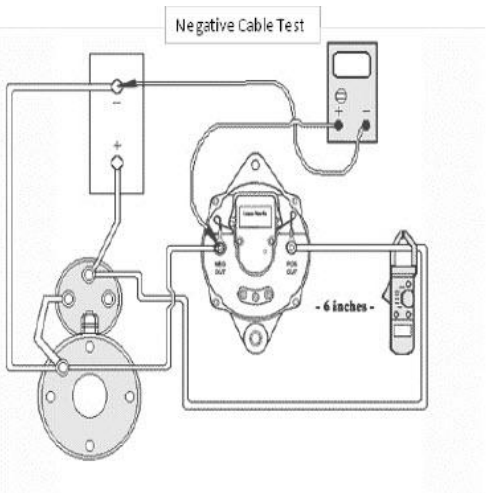
Appendix A :

Perform the following manual voltage drop tests:



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 :



B. Negative Cable Test

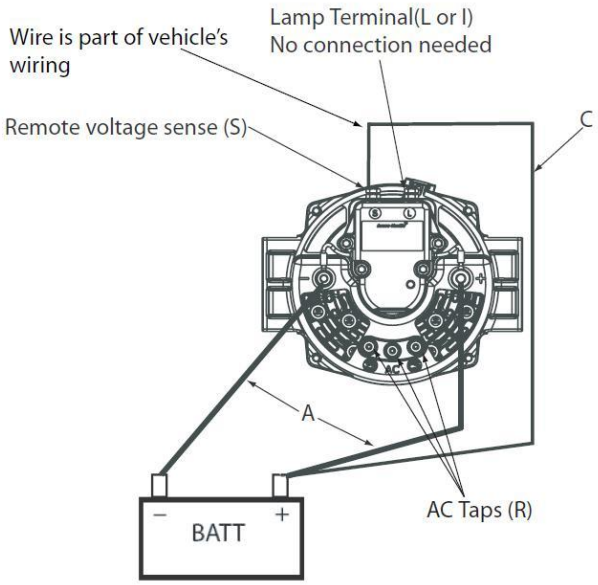
1. Connect ammeter to positive alternator cable.
2. Verify the ammeter is at least 6 inches (15 cm) away from alternator, to eliminate possibility of faulty readings.
3. Connect voltmeter's negative lead to negative terminal of battery.
4. Connect voltmeter's positive lead to negative output terminal 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 :

Fig. 1



WARRANTY INFORMATION

When troubleshooting a replacing an alternator, technicians must utilize the **Midtronics EXP Tester**, and submit a **Alternator Diagnostic Worksheet**. Critical diagnostic testing values are to be recorded on the worksheet, and submitted with the claims on iClaim.

Exception: Worksheet is not required for over-the-counter parts warranty when no vehicle is present to perform diagnostics.

All alternators replaced under warranty may be requested back for evaluation. Any that are found to be non-defective or unnecessarily replaced, may be charged back.

Warranty Claim Coding:

Group:	08000
Noun:	018

Standard Repair Time(s):

Description	SRT Link or Code	Hours
Alternator Diagnostics	Select model	0.5
Positive Cable Test	Select model	0.1
Negative Cable Test	Select model	0.1
Replace Alternator	Select model	Select model

Hide Details

Feedback Information

Viewed: 3103
Helpful: 28
Not Helpful: 7

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