



See Pages 2, 3, and 4 for Technical Specifications

WARNING This symbol is used to indicate presence of hazards that can cause severe personal injury, death or substantial property damage.

CAUTION This symbol is used to indicate presence of hazards that can cause minor personal injury or property damage.

NOTICE This symbol is used to indicate special instructions on installation, operation, or maintenance that are important, but not related to personal injury hazards.

WARNING This alternator contains no serviceable parts except pulley, fan, louvered end cover, and regulator. Manufacturer's hazardous location certification is void if repaired except for the pulley, fan, louvered end cover, and regulator which may be replaced with factory parts.

WARNING Explosion hazard—substitution of components may impair suitability for Class I, Division 2.

ADVERTISSEMENT Risque d'explosion—la substitution de composants peut rendre ce matériel inacceptable pour les emplacements de Classe I, Division 2.

WARNING Explosion hazard—do not replace any component unless power has been switched off or the area is known to be non-hazardous.

ADVERTISSEMENT Risque d'explosion—couper le courant ou s'assurer que l'emplacement est désigné non dangereux avant de remplacer le composants.

WARNING Explosion hazard—do not disconnect equipment unless power has been switched off or area is known to be non-hazardous.

ADVERTISSEMENT Risque d'explosion—avant de déconnecter l'équipement, couper le courant ou s'assurer que l'emplacement est désigné non dangereux.

Installation Instructions

WARNING Improper installation of alternator in an explosive environment can cause severe personal injury, death, or substantial property damage. Alternator must be installed by a qualified person trained in the installation of alternators in explosive atmospheres. For CSA and UL classifications and atmospheric conditions, see page 2 of these instructions.

- 1. Mount alternator on a suitable bracket and secure with hardware per alternator drawing on page 2 of these instructions.

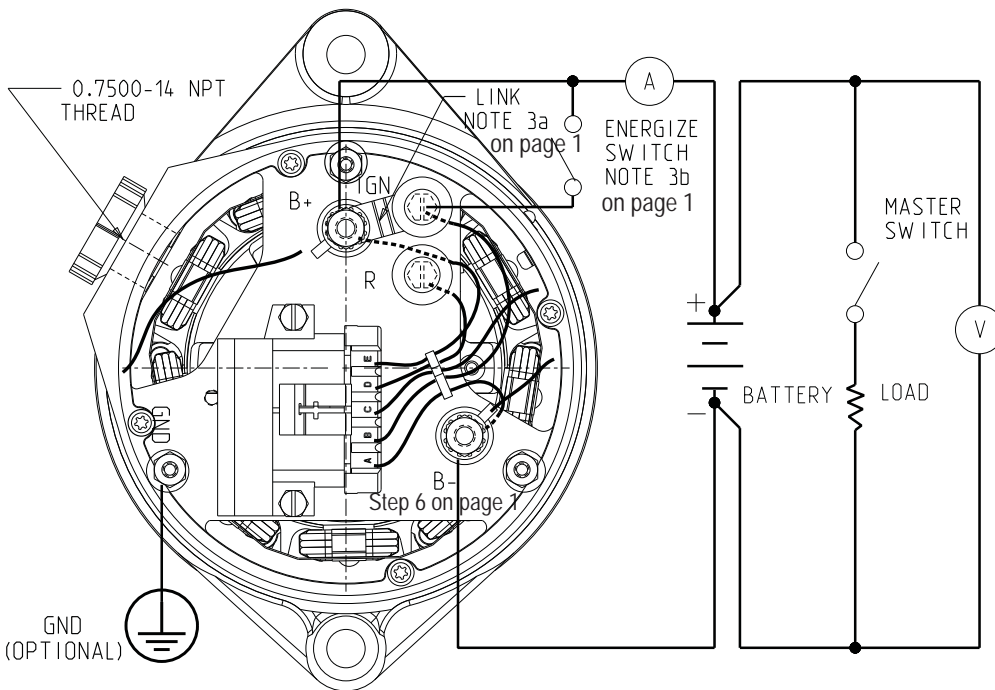
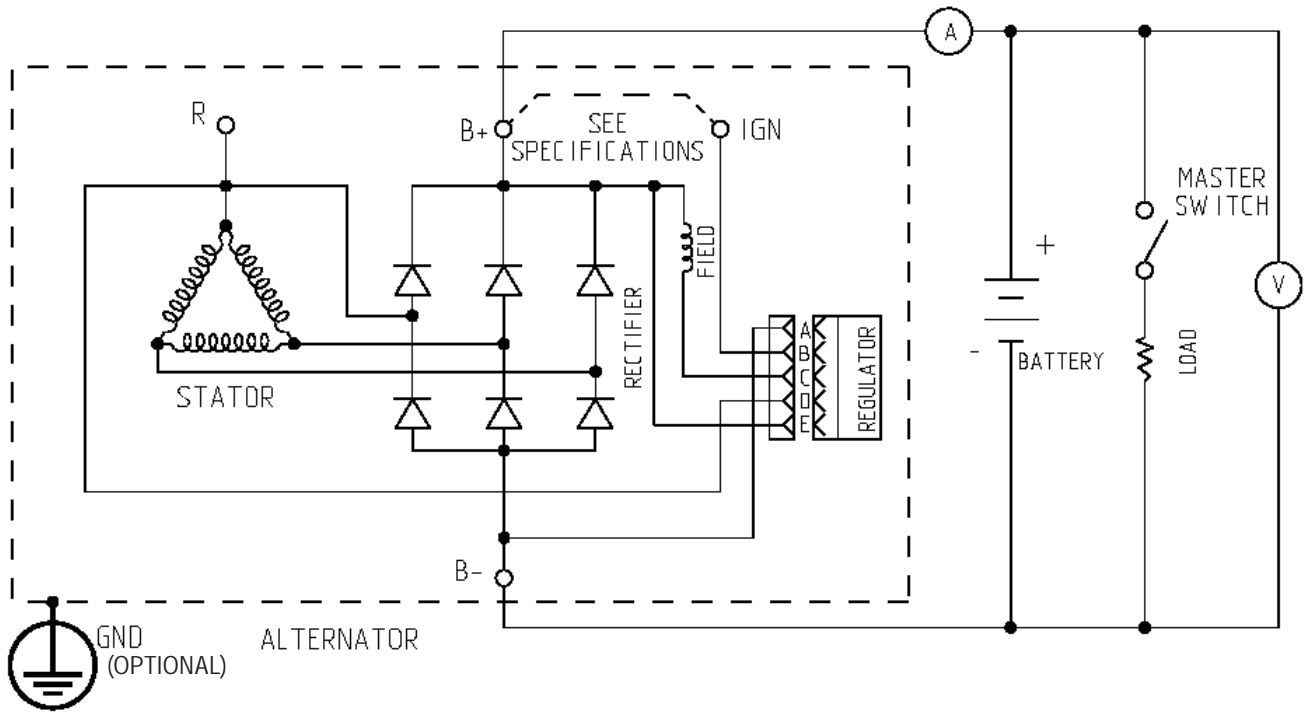
- 2. Remove anti-drive end (ADE) louvered end cover from the alternator.
- 3. One of the following two alternator circuits described below is required to operate alternator.
 - a. If alternator is to be self-energized, be sure the link is connected between B+ stud and IGN terminal (as shipped). This alternator relies on residual magnetism to operate. Observe all applicable safety procedures when performing the following operation: If necessary, restore lost magnetism by connecting test light between B+ stud and R terminal for 1-3 seconds while alternator shaft IS NOT TURNING and battery is connected to illuminate test light. Check for magnetic field at pulley. If magnetized, remove test light, start alternator, and test.
 - b. If the alternator is to be energized through ignition key, connect energizing signal lead directly to IGN terminal and remove link between B+ stud and IGN terminal. Torque IGN terminal bolt to 2 Nm/18 lb. in. This alternator relies on residual magnetism to operate. Ensure battery voltage is present at IGN terminal. Observe all applicable safety procedures when performing the following operation: If necessary, restore lost magnetism by connecting test light between B+ stud and R terminal for 1-3 seconds while alternator shaft IS NOT TURNING and battery is connected to illuminate test light. Check for magnetic field at pulley. If magnetized, remove test light, start alternator, and test.
- 4. Connect B+ cable to B+ stud on alternator. See wire chart on page 3 for correct cable size and length. Torque terminal nut to 9 Nm/80 lb. in.
- 5. Connect R lead to R terminal on alternator if required for vehicle operation (optional connection). Torque R terminal bolt to 2 Nm/18 lb. in.
- 6. Connect B- cable to B- terminal stud on alternator (B- is an isolated ground). B- cable gauge should be same as gauge of battery positive cable. Torque terminal nut to 9 Nm/80 lb. in.

CAUTION Supply wires suitable for rated load at 90°C ambient shall not exceed 200°C.
ATTENTION Utiliser des câbles d'alimentation appropriée pour 200°C.

- 7. Perform a final inspection on the installation.
- 8. Re-install ADE louvered end cover on alternator. Position louvers consistent with deflection of rain or fluids during normal operating conditions. Fasten with screws and washers in four places. Use a suitable adhesive such as Loctite® 222. Follow manufacturer's instructions. Torque screws to 3.4 Nm/30 lb. in.
- 9. Install suitable alternator drive belt.
- 10. Start engine. Confirm operation of charging system meets specification.



Installation Instructions (CONT'D)



WIRE GAUGE/LENGTH TABLE			
VOLTAGE DROP BETWEEN: ALT. B+ AND BAT B+ OR ALT. B- AND BAT B-			
MAXIMUM LENGTH OF WIRE FEET (METERS)			
MINIMUM WIRE GAUGE AWG [mm ²]	(28V 60A ALTERNATOR) 0.4 VOLTAGE DROP AT 60A	(14V 70A ALTERNATOR) 0.2 VOLTAGE DROP AT 70A	
8 [8]	5 [1.5]	4.5 [1.4]	
6 [14]	8 [2.9]	7 [2.1]	
4 [20]	13 [4.0]	11 [3.4]	
2 [35]	21 [6.4]	18 [5.5]	
1 [40]	26.5 [8.1]	23 [7.0]	
1/0 [60]	33.5 [10.2]	29 [8.8]	
2/0 [70]	42.5 [13.0]	36.5 [11.1]	
3/0 [95]	53.5 [16.3]	46 [14.0]	



C.E. NIEHOFF & CO.

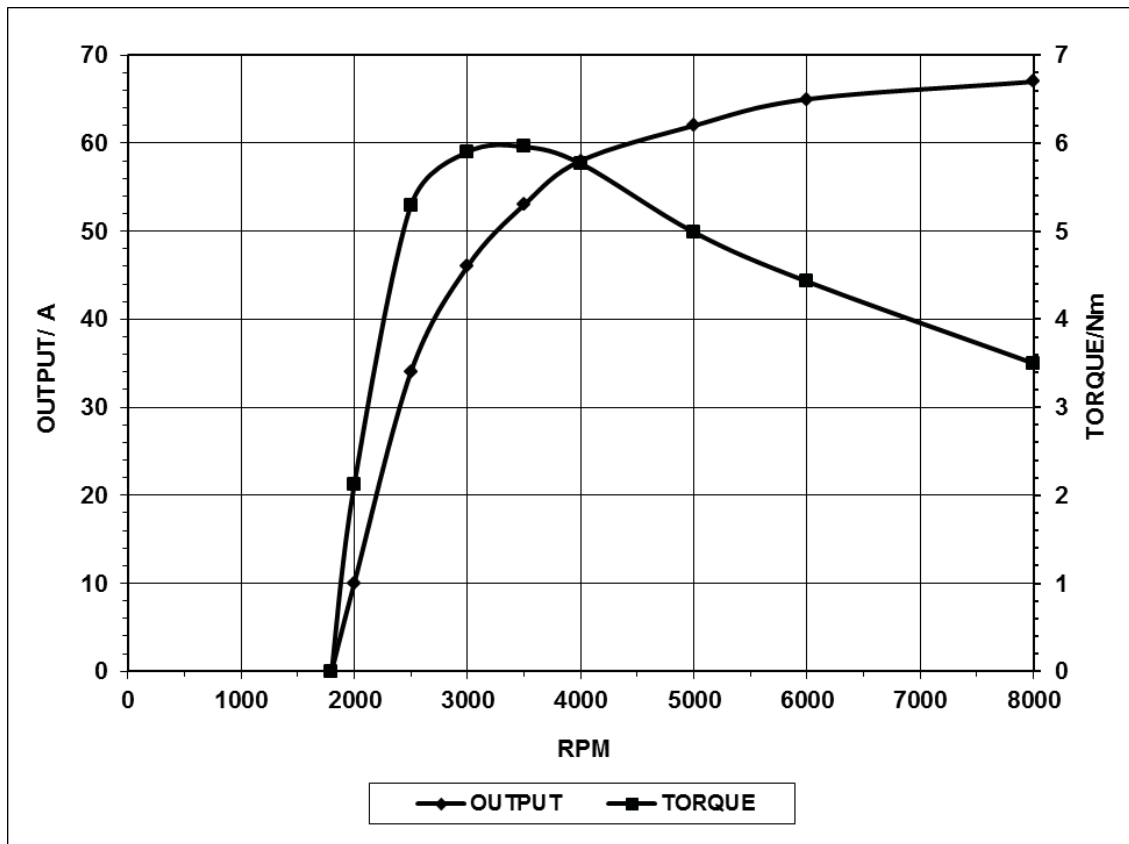
ALTERNATOR CHARACTERISTICS FOR 28V, 60A, C130 C132

ALTERNATOR CHARACTERISTICS FOR 28 VOLTS/ 60 AMPS:

APPLICABLE MODELS: C130, C132

OUTPUT CURVE: OUTPUT AMPERES VERSUS ALTERNATOR SHAFT SPEED IN RPM AT 28.0 VOLTS.

TORQUE CURVE: DRIVE TORQUE IN Nm VERSUS ALTERNATOR SHAFT SPEED IN RPM REQUIRED TO PRODUCE OUTPUT CURVE.



ALL MEASUREMENTS DEPICTED ON PERFORMANCE CURVES ARE TAKEN AT 22°C/72°F AMBIENT TEMPERATURE (UNLESS OTHERWISE SPECIFIED) AND A STABILIZED MACHINE TEMPERATURE AT MAXIMUM OUTPUT CURRENT WITH VOLTAGE CONSTANT AS SPECIFIED PER SAE J56/ISO 8854.

ABBREVIATIONS:

RPM REVOLUTIONS PER MINUTE

Nm NEWTON-METER

Conversion: 1 Nm = 8.85 Pound Inch (LBIN)

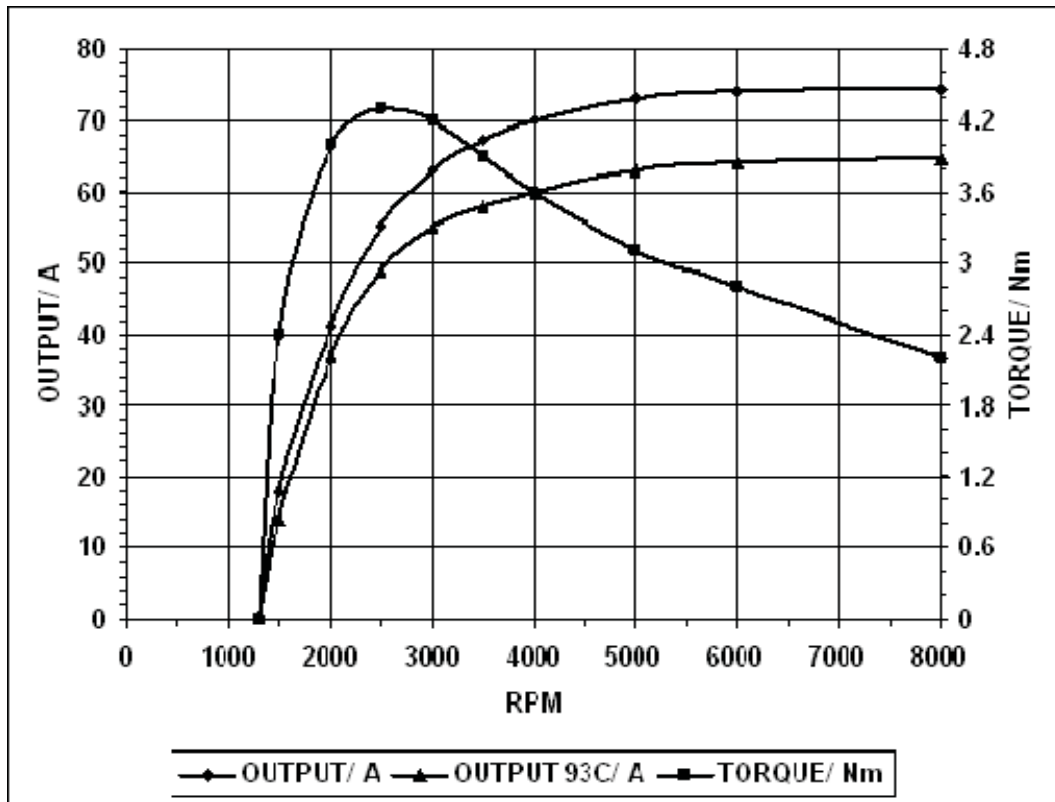


ALTERNATOR CHARACTERISTICS FOR 14 VOLTS/ 70 AMP:

APPLICABLE MODELS: C131

OUTPUT CURVE: OUTPUT AMPERES VERSUS ALTERNATOR SHAFT SPEED IN RPM AT 13.8 VOLTS.

TORQUE CURVE: DRIVE TORQUE IN Nm VERSUS ALTERNATOR SHAFT SPEED IN RPM REQUIRED TO PRODUCE OUTPUT CURVE.



ALL MEASUREMENTS DEPICTED ON PERFORMANCE CURVES ARE TAKEN AT 104°F (40°C) AMBIENT TEMPERATURE (UNLESS OTHERWISE SPECIFIED) AND A STABILIZED MACHINE TEMPERATURE AT MAXIMUM OUTPUT WITH VOLTAGE CONSTANT AS SPECIFIED.

ABBREVIATIONS:

RPM REVOLUTIONS PER MINUTE

Nm NEWTON-METER

Conversion: 1 Nm = 8.85 Pound Inch (LBIN)



Pulley Replacement

Remove existing pulley (see Figure 1):

1. Remove pulley nut and washer.
2. Remove and discard pulley.

Install new pulley (see Figure 1):

1. Install new pulley and fasten with pulley nut and washer.
2. Keep pulley, fan, and shaft from spinning while torquing pulley nut to 68 Nm/50 lb. ft.

Drive End (DE) Fan Replacement

Remove existing DE fan (see Figure 1):

1. Remove pulley nut and washer.
2. Remove pulley.
3. Remove woodruff key and discard fan.

Install new DE fan (see Figure 1):

1. Place new fan on shaft.
2. Install woodruff key.
3. Install pulley and fasten with pulley nut and washer.
4. Keep pulley, fan, and shaft from spinning while torquing pulley nut to 68 Nm/50 lb. ft.

Anti-drive End (ADE) Louvered End Cover Replacement

Remove ADE Cover on Alternator (see Figure 1):

1. Remove hardware and ADE cover.

Install new ADE Cover on Alternator (see Figure 1):

1. Install new ADE cover. Position louvers consistent with deflection of rain or fluids during normal operating conditions.
2. Fasten in four places with screws and washers. Use a suitable adhesive such as Loctite® 222. Follow manufacturer's instructions. Torque screws to 3.4 Nm/30 lb. in.

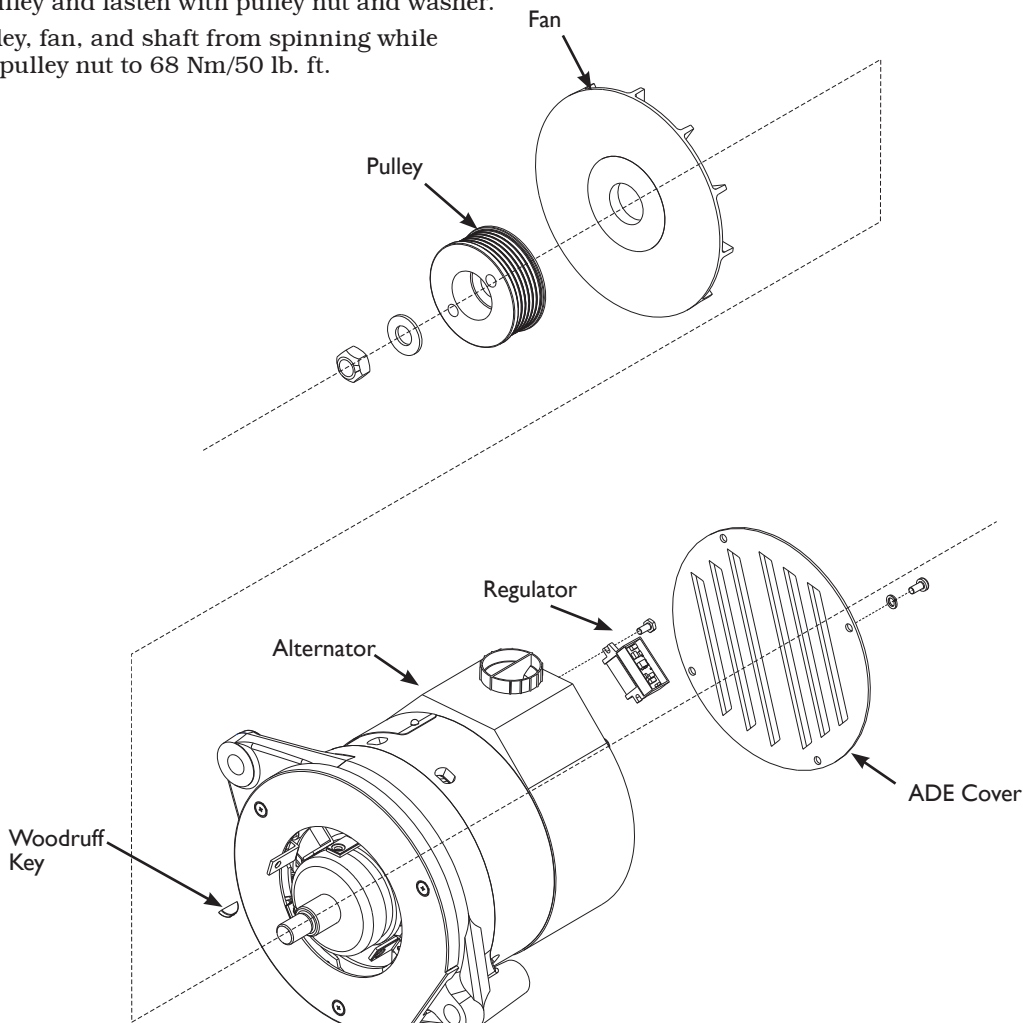


Figure 1 – Parts Replacement



Anti-drive End (ADE) Regulator Replacement

Remove ADE Regulator on Alternator (see Figures 1 and 2):

1. Remove hardware and ADE cover.
2. Remove and discard hardware attaching regulator to plate.
3. Unplug alternator-to-regulator harness from regulator.
4. Discard regulator.

Install new ADE Regulator on Alternator (see Figures 1 and 2):

1. Plug alternator-to-regulator harness securely into new regulator.
2. Install new regulator on plate using new screws from kit. Use a suitable adhesive such as Loctite® 222. Follow manufacturer's instructions. Torque screws to 2.8 Nm/25 lb. in.
3. Install ADE louvered end cover. Position louvers consistent with deflection of rain or fluids during normal operating conditions.
4. Fasten cover in four places with screws and washers. Use a suitable adhesive such as Loctite® 222. Follow manufacturer's instructions. Torque screws to 3.4 Nm/30 lb. in.

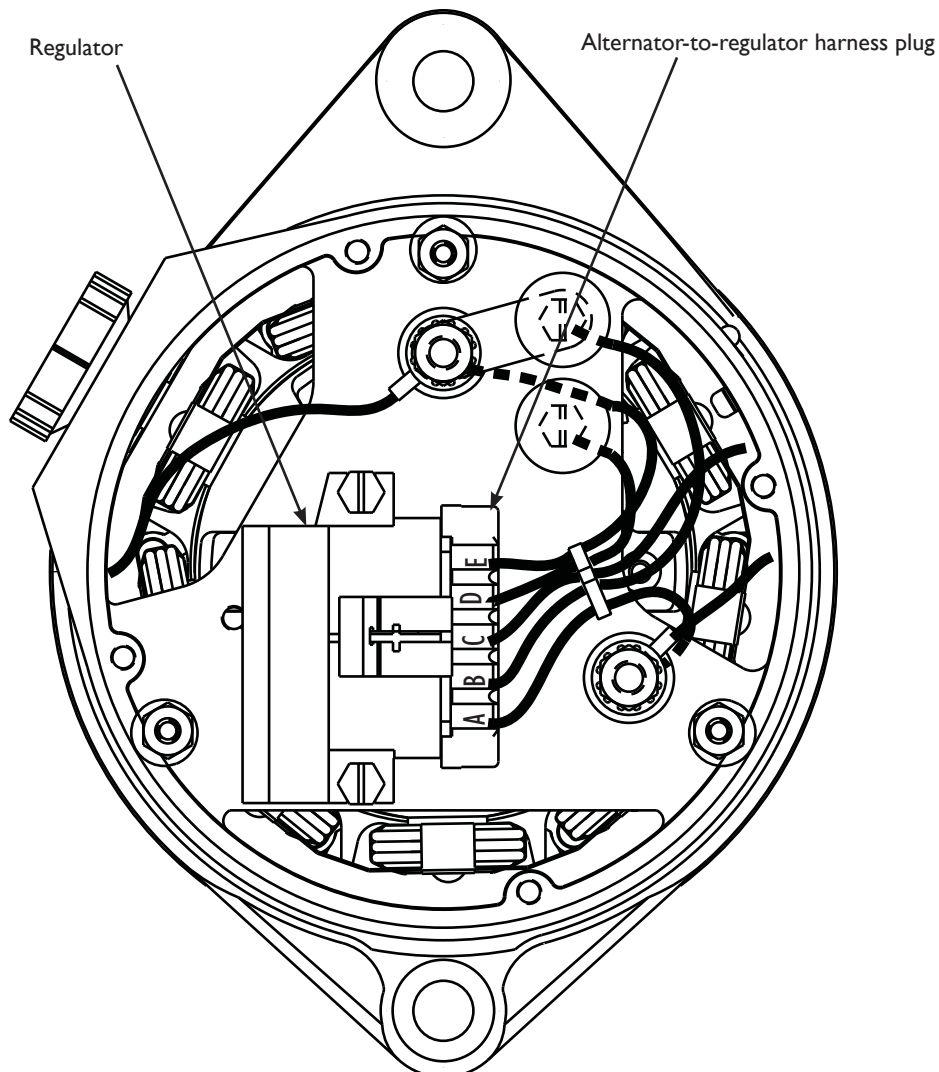


Figure 2 –Regulator Replacement



Tools and Equipment for Bench Testing

- Testing Electrical Components, page 12.
- Digital Multimeter (DMM)
- Ammeter (digital, inductive)
- Test bench with 5–10 hp motor able to drive alternator to 8000 rpm. Mount alternator per test bench manufacturer’s instructions. Make sure test bench batteries are charged at 95% or higher.

Bench Tests

- Voltage at regulator setpoint ± 0.2 V is considered “normal.”
- Alternator rated output (listed on nameplate) $\pm 10\%$ is determined at 6000 rpm at 72°F.
- Run alternator for 15 minutes to stabilize readings.
- Alternator/regulator should be connected to test bench per schematic diagram on page 3.

CAUTION

When connecting alternator to test bench, make sure batteries are connected per schematic diagram on page 3.

NOTICE

Alternator/regulator will not function without being properly connected to power source.

BENCH TEST 1: NO-LOAD TEST

With battery connected and nominal electrical load set as shown in Table 1, run alternator at 2000-2500 rpm shaft speed.

- If alternator passes No-Load Test, go to Full Load Test.
- If alternator fails No-Load Test, go to Static Tests.

ALT.	AMPS	VOLTS
C130, C131, C132	5-40	*Regulator Setpoint ± 0.2

* Regulator setpoint is listed on page 10 by alternator model or shown on regulator nameplate.

BENCH TEST 2: FULL LOAD TEST

With battery connected and electrical load set as shown in Table 2, run alternator at 5000-8000 rpm shaft speed.

- If alternator **passes** Full Load Test, alternator is functioning properly.
- If alternator **fails** Full Load Test, go to Static Tests.

ALT.	AMPS	VOLTS
C130 C132	60	*Regulator Setpoint ± 0.2
C131	70	*Regulator Setpoint ± 0.2

* Regulator setpoint is listed on page 10 by alternator model or shown on regulator nameplate.

WARNING

Alternators should not be powered during static tests. Connections required during testing can cause shorts and damage alternator.

NOTICE

Static tests should confirm on-vehicle and on-bench tests.

Tools and Equipment for Static Testing

- Testing Electrical Components, page 12.
- Digital Multimeter (DMM)
- Ammeter (digital, inductive)
- Regulator tester

Regulator Test

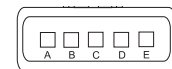
- Regulator tester tests all regulator functions.
- If regulator tester is used, follow regulator tester manufacturer’s instructions.
- If regulator tester is not available, regulator can only be tested for a shorted field-switching transistor. Follow Regulator Test below.

REGULATOR TEST: CHECK FOR SHORTED FIELD-SWITCHING TRANSISTOR

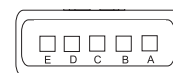
1. Set DMM to diode test scale.
2. See Figure 3. Connect one meter lead to pin C in regulator receptacle and connect other lead to pin A in regulator receptacle. Observe meter reading. Reverse leads and observe meter reading. If DMM reads zero in either direction, field-switching transistor is shorted. Replace regulator. If regulator failure is indicated, field coil failure must also be suspected.

CONNECTIONS

- A ➔ B-
- B ➔ IGN
- C ➔ F-
- D ➔ Phase (R)
- E ➔ B+



Regulator Receptacle



Alternator-to-Regulator Harness Plug

Figure 3 Regulator Harness Connections



Internal Circuit Tests

- Internal Circuit Tests will show the condition of internal circuits through the alternator via alternator-to-regulator harness.
- Some disassembly will be necessary to access the components. Do not disassemble the alternator beyond what the tests require.
- Before performing Internal Circuit Tests, check for visible signs of damaged components.
- The expected reading/result listed for each test must be obtained. Replace any component that fails the test.

NOTICE

Service technicians should understand and follow all information in the service manual when servicing the product.

CAUTION

Failure to perform the complete series of Internal Circuit Tests can result in improper diagnosis of alternator condition.

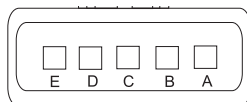
TABLE 3 Pin-to-Pin Tests (See Figure 4)

TEST NO.	METER SCALE & SYMBOL	METER (+) LEAD CONNECTION	METER (-) LEAD CONNECTION	TESTED CIRCUIT	EXPECTED READING
1	Ohms Ω	Socket A	Alternator Case	Isolated ground	OL (infinity)
2*	Ohms Ω	Socket E	Socket C	Field coil resistance	4.8±0.2 ohms
3	Ohms Ω	Socket E	Alt. B- Terminal	Field coil insulation	OL (infinity)
	Ohms Ω	Socket E	Alternator Case	Field coil insulation	OL (infinity)
4	Ohms Ω	Socket C	Alt. B- Terminal	Field coil insulation	OL (infinity)
	Ohms Ω	Socket C	Alternator Case	Field coil insulation	OL (infinity)
5	Diode Test \rightarrow	Socket D	Alt. B+ Terminal	Phase winding and diode	<0.7 volts (flow)
6	Diode Test \rightarrow	Alt. B+ Terminal	Socket D	Phase winding and diode	OL (blocking)
7	Diode Test \rightarrow	Socket D	Alt. B- Terminal	Phase winding and diode	OL (blocking)
8	Diode Test \rightarrow	Alt. B- Terminal	Socket D	Phase winding and diode	<0.7 volts (flow)
9	Ohms Ω	Socket E	Alt. B+ Terminal	Regulator power circuit	0 ohms
10	Ohms Ω	Socket A	Alt. B- Terminal	Regulator ground circuit	0 ohms
11	Diode Test \rightarrow	Alt. B+ Terminal	Alt. B- Terminal	All diodes in parallel	OL (blocking)
12	Diode Test \rightarrow	Alt. B- Terminal	Alt. B+ Terminal	All diodes in parallel	<0.8 volts (flow)
13	Ohms Ω	R Terminal	Alternator Case	Stator insulation	OL (infinity)

* Applies only when field coil is attached to rectifier/housing assembly. The same field coil is used in all alternator models, so expected reading will be the same for all models.

CONNECTIONS

- A \rightarrow B-
- B \rightarrow IGN
- C \rightarrow F-
- D \rightarrow Phase (R)
- E \rightarrow B+



Alternator-to-Regulator Harness Connector

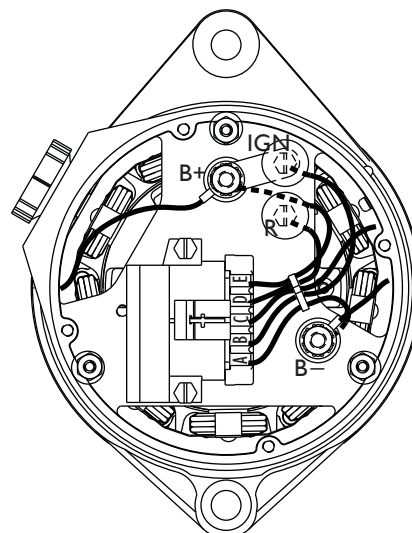
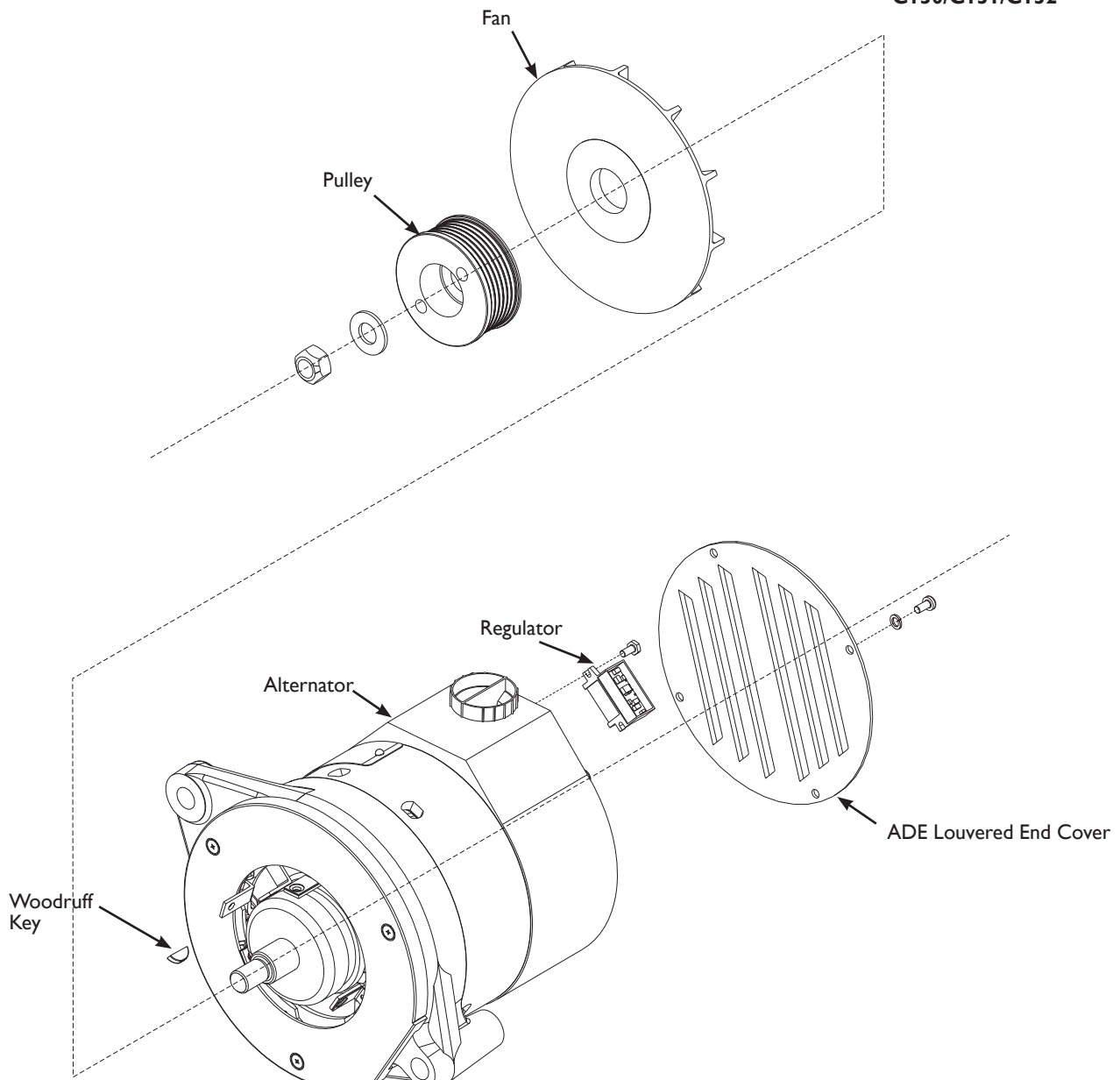
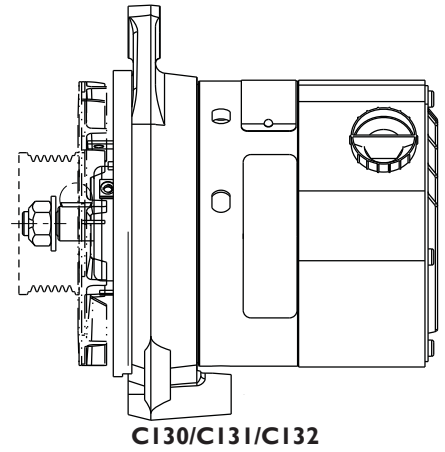


Figure 4 Alternator Connections



CI30/CI31/CI32 Parts View





C130/C131/C132								
ALTERNATOR MODEL	VOLTS	AMPS	WATTS	Model	Steps	REGULATOR Settings	Temp. Comp.(2)	ALT. WEIGHT kg/lb
C130	24	60	1680	A2-139	N/A	28.0	Flat	10.17/22.4
C130-1/C130-4/ C130-5	28.0	60	1680	A2-139	N/A	28.0	Flat	10.17/22.4
C130-3	27.6	60	1680	A2-161	N/A	27.6	Flat	10.17/22.4
C131/C131-1/ C131-2	14.2	70	980	A2-152	N/A	14.2	Flat	10.17/22.4
C131-3	13.8	70	980	A2-162	N/A	13.8	Flat	10.17/22.4
C131-4	13.2	70	980	A2-168	N/A	13.2	Flat	10.17/22.4
C132/C132-1	28.0	60	1680	A2-139	N/A	28.0	Flat	10.17/22.4

NOTES

1. The alternator has an isolated ground.
2. Temperature compensation—see definition below.

Flat temperature compensation: Regulator controls voltage range in a near-constant state during the vehicle operating conditions. CEN flat-temperature compensated regulators have preset voltage setpoints.

Setpoint: Voltage value to which regulator is set. Voltage value is established by battery type and vehicle duty cycle. Setpoint value is fixed (flat compensation).



Testing Guidelines

Professional service technicians rely on these 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.

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.

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.

Dynamic/Live testing:

- Definition: Connecting power and ground to a component to test operation/function out of circuit.
- Be sure to directly and securely jumper leads to source terminals of the component being tested.
- Be sure to touch the contact end of jumper leads only to the power supply or battery terminals. Touching a contact end to component terminals may create an arc and damage component terminals.

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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