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SERVICE MANUAL

TRW ALTERNATOR

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ABOUT IMPROVEMENTS

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TROUBLESHOOTING

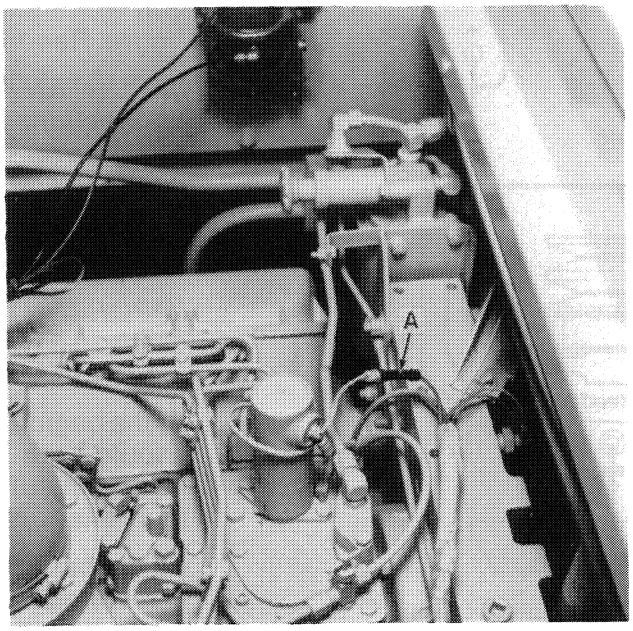

FIGURE 1

Using the troubleshooting procedures in this section will help to easily diagnose any alternator problems.

1. Check belt tension. Use a belt tension gauge to check the alternator drive belts and readjust if necessary.

   New belts should be tensioned so 5.3 to 6.5 lbs. (23.6 to 28.9 N) of force applied midway between the water pump and alternator will deflect each belt ¼" (6 mm).

   Tension on belts that have been operated for at least one hour should be maintained at 17/64" (7 mm) deflection when 2.9 to 3.5 lbs. (12.9 to 15.6 N) of force is applied midway between the water pump and alternator.

   IMPORTANT: Do not over-tension alternator drive belts as this will cause premature bearing failure.

2. Check to be sure all electrical connections in the charging circuit are clean and tight. Remove any corrosion from the connections, especially at the battery.
3. Check batteries to be sure they are in good condition and fully charged before doing any testing. Replace the batteries if there is any doubt about their condition.
4. Basic Test
   a. Disconnect the power wire to the fuel shut-off solenoid on top of the engine. See A, Figure 1.
   b. Turn on all the lights and accessories. Crank the engine for 10 to 15 seconds to partially discharge the batteries.
   c. Stop cranking the engine and turn off all lights and accessories. Reconnect the power wire to the fuel shut-off solenoid.

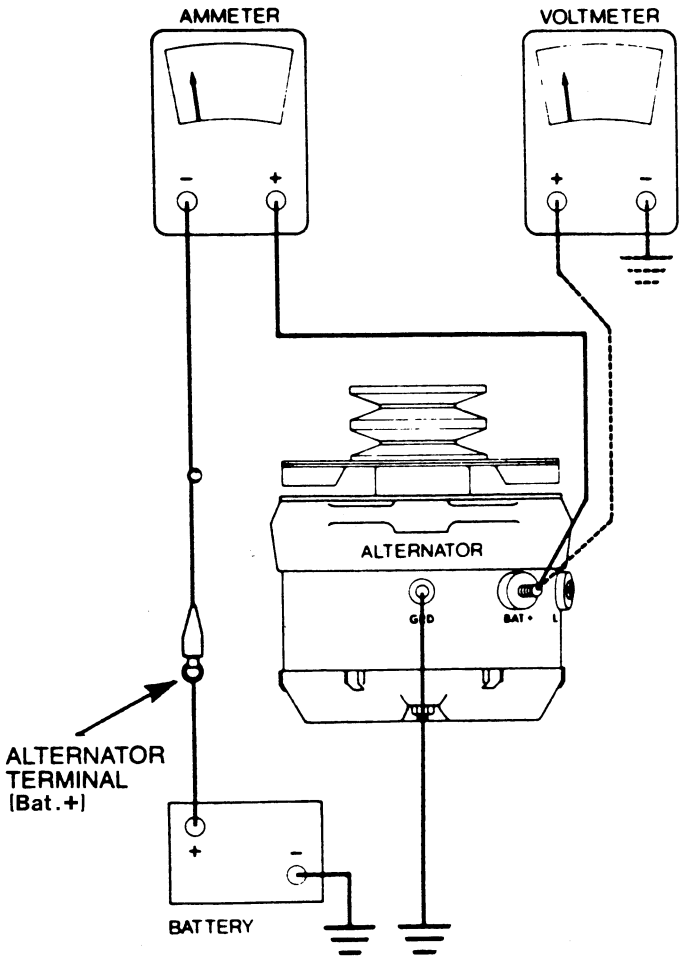

FIGURE 2

d. Disconnect the battery ground cable. Disconnect battery lead at alternator and attach a 0-150 ampere ammeter as shown in Figure 2. Also, connect a 0-40-volt voltmeter as shown in the same figure. Reconnect battery ground cable.

IMPORTANT: Make sure all ammeter connections are capable of carrying the rated current and that all voltmeter connections are made at the alternator.

e. Start engine and operate at 1500-2000 RPM. Note the meter readings.

IMPORTANT: If voltmeter reading exceeds 15.5 volts, stop the engine. Replace the regulator.

At the beginning of this test, the ammeter should read 72-88 amps (if the battery has been sufficiently discharged). Normal voltage range is 13.7 to 14.9 volts.

As the battery approaches a full charge, the voltage will rise as the amps fall. When voltage and amps stabilize, note readings and refer to chart.

Amps	Volts	Diagnosis
High	Low (under 13.7)	Charging system is functioning properly but battery is not yet fully charged. Let the charging system bring the battery up to full charge. As the battery reaches full charge, the current should drop and the voltage should stabilize between 13.7 and 14.9 volts. (Batteries could be defective.)
High	Normal (13.7-14.0	Continue to watch the meters until the current drops or the voltage exceeds 14.9 volts. If current drops and voltage remains within 13.7 and 14.9 volts, the charging system is functioning properly.
High	High (over 14.9)	If voltage exceeds 14.9 volts, the regularor should be replaced.
Low	Low (under 13.7)	Alternator and/or regulator should be replaced. Go to step 5 for additional testing.
Low	Normal (13.7-14.9)	Charging system functioning properly.
Low	High (over 14.9)	Replace regulator and check batteries.

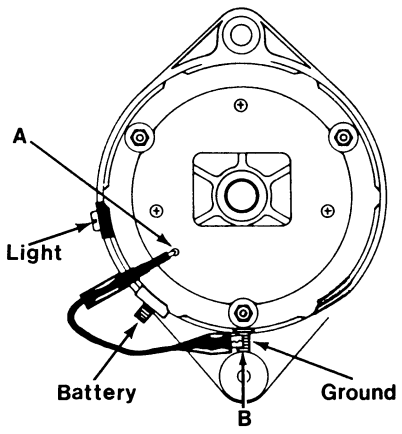

FIGURE 3

5. Regulator Bypass Test

   a. Remove flange nut, rotating screen, and hardened washers.

   b. Start engine and operate at full throttle. Turn on lights and accessories.

   c. Connect alligator clip of jumper wire to alternator ground as shown at B, Figure 3.

   d. Insert probe end of jumper wire into hole in the end cover, as shown at A, Figure 3, until it touches the screw head on the regulator. Note meter readings.

      IMPORTANT: Probe connection to the regulator must only last a fraction of a second. Prolonged contact will damage the regulator.

      If voltage and/or current rises when connection is made, and falls when disconnected, the alternator is functioning properly and the regulator should be replaced.

      If output rises and remains high when bypass is removed, alternator and regulator are good. (The regulator was not re-energized after it was last installed.)

      If output remains low, alternator requires repair. See "Static Testing" section.

6. Indicator Light Circuit Test

   Connect a #57 bulb between the light terminal of the alternator and the positive terminal of the battery. The bulb should light when alternator is stopped and go out when alternator is providing output. If not functioning properly, replace regulator.

7. Heat Sink Diode Test

   a. Remove alternator as detailed in the "Disassembly" section.

   b. Remove heat sink assembly as detailed in the "Disassembly" section.

   c. Touch one lead of a continuity tester to the "BAT+" (output) terminal of the heat sink assembly, and the other lead to each of the three heat sink phase terminals.

      All three readings should be alike, i.e., lamp will light on all three or remain out on all three. If all three readings are not alike, replace the heat sink assembly.

   d. Repeat the previous step, but with the test leads reversed. All readings should be opposite of the those in the previous step. If the lamp was out in the previous step, it should now be on and vice-versa. If any reading is the same as the previous step, one or more diodes are defective and the heat sink assembly must be replaced.

   e. Repeat the steps in "c" and "d" above, except touch one lead to the alternator frame instead of the output terminal. If any diode is open or shorted, the heat sink assembly must be replaced.

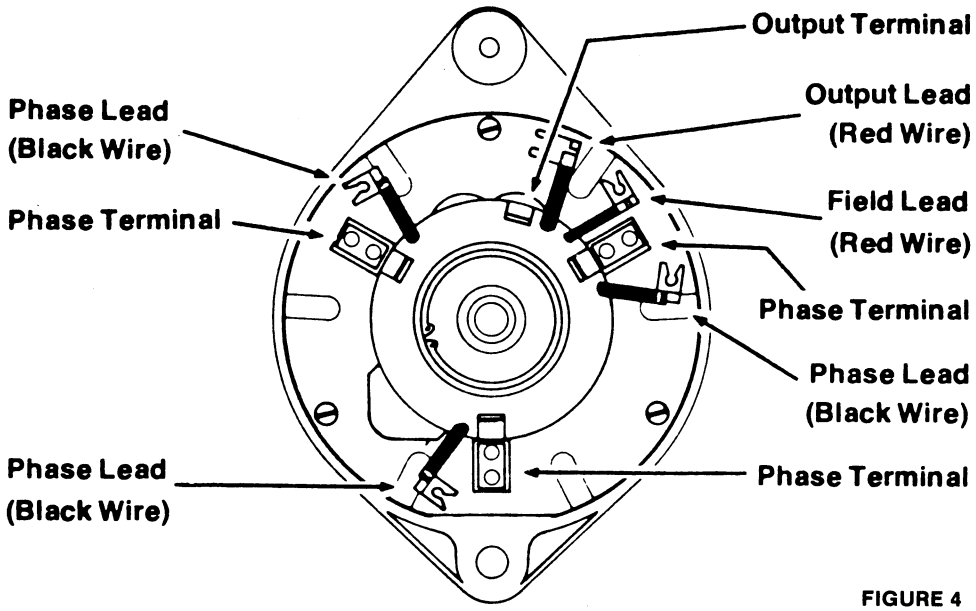

FIGURE 4

8. Stator Test
   a. Remove regulator as detailed in the "Disassembly" section.
   b. Connect a continuity tester between each successive pair of stator phase leads (black wire). See Figure 4. If lamp does not light, the stator is open and the alternator assembly must be replaced.
   c. Connect a Hy-Pot tester between any one of the three phase leads and the alternator frame. If the Hy-Pot tester trips, the stator is grounded and the alternator assembly must be replaced.
9. Field Coil Test
   a. Connect an ohmmeter across the field lead in Figure 4 and the field lead in Figure 5. The ohmmeter should read 5 ± 1 ohms.

NOTE: Be sure ohmmeter is zeroed before beginning test.

If ohmmeter reads anything other than 5 ± 1 ohms, the alternator assembly must be replaced.

   b. Connect one ohmmeter lead to the field lead in Figure 4 and the other lead to the alternator frame. Any needle movement indicates a grounded field coil and requires replacement of the alternator assembly.
   c. Connect one ohmmeter lead to the field lead in Figure 5 and the other lead to the alternator frame. Any needle movement indicates a grounded field coil and requires replacement of the alternator assembly.

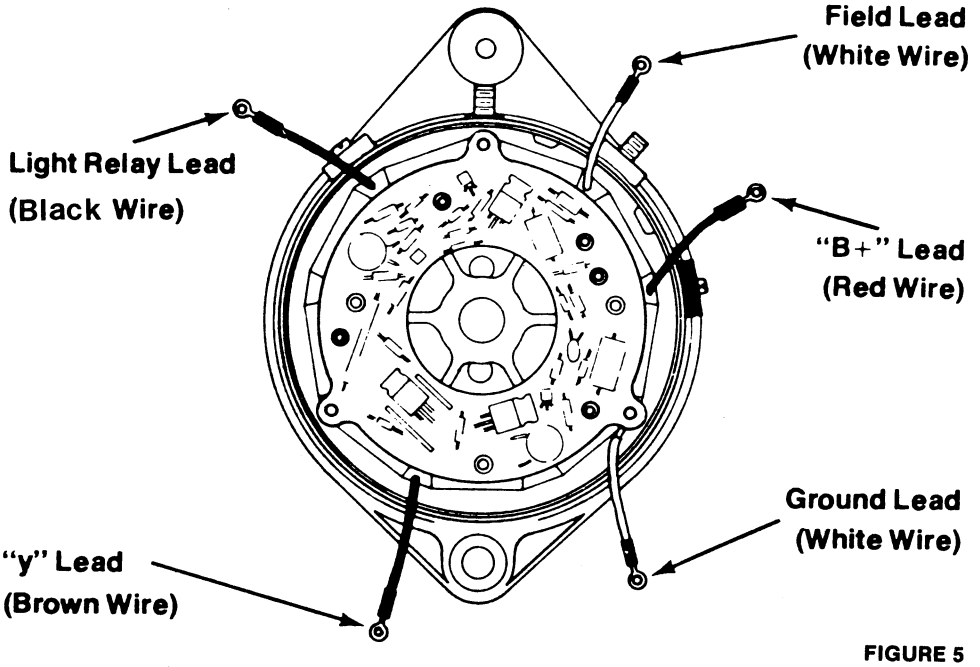

FIGURE 5

DISASSEMBLY

ALTERNATOR REMOVAL

1. Remove negative cable from battery.
2. Relieve belt tension, and then remove alternator from mount.
3. Remove "Ground, "BAT.+" and "L" terminal wires from alternator.

   NOTE: Metric hardware is used for wire connections.
4. Alternator assembly is now free for removal.

SCREEN, GUARD AND END COVER

1. Clamp sheave in a padded jaw vise to hold alternator.
2. Remove lock nut from screen.

   IMPORTANT: Do not use an impact wrench as it may damage the protective coating on the regulator and/or heat sink.
3. Lift off screen and hardened flat washers as shown in Figure 6.
4. Remove the three screws from the screen guard and lift off guard as shown in Figure 7.

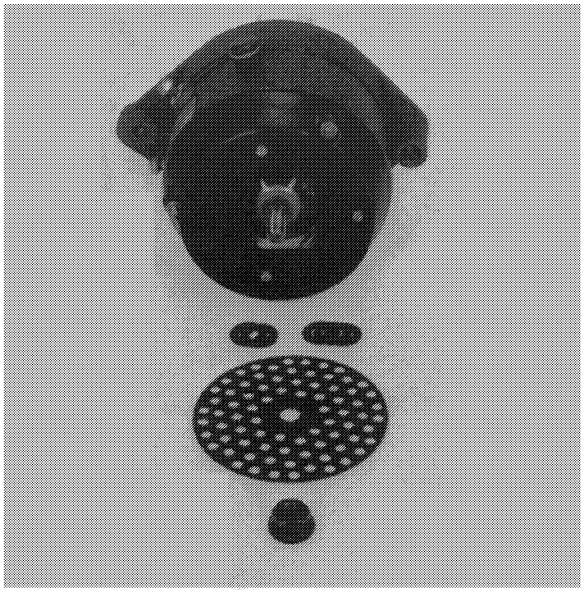

FIGURE 6

5. Remove the three lock nuts from the alternator studs and lift the end cover off the alternator as shown in Figure 8.

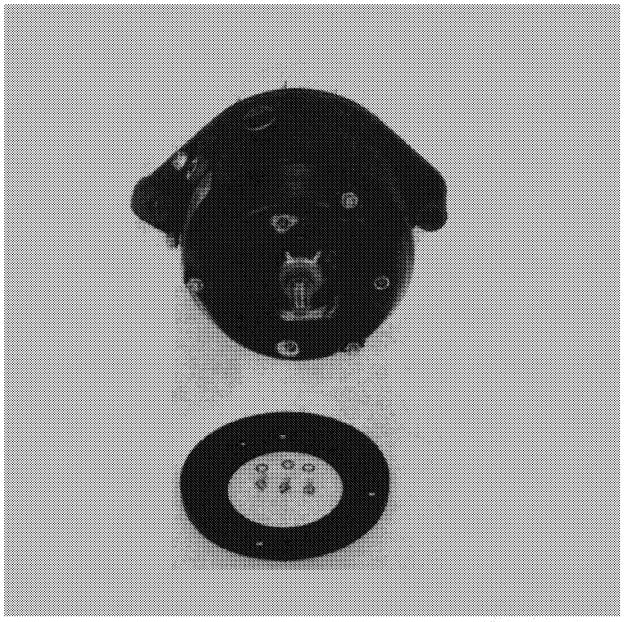

FIGURE 7

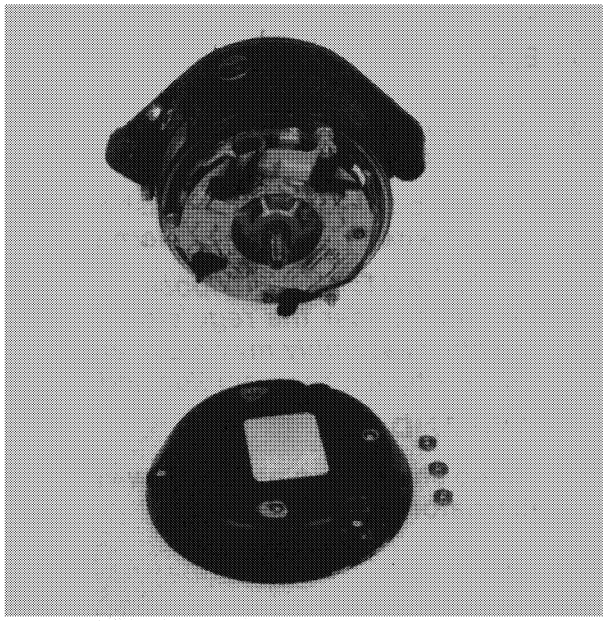

FIGURE 8

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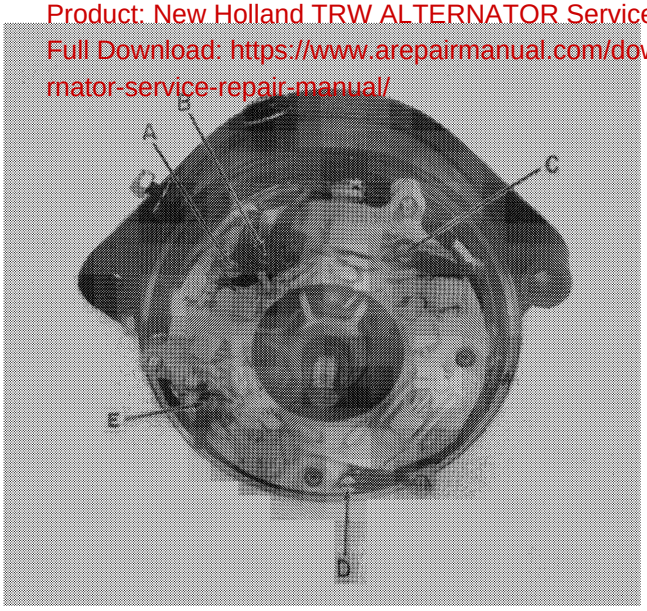

FIGURE 9

FIGURE 10

REGULATOR

1. Clean all wire connections at regulator stand-offs as shown in Figure 9. Note wire color locations.
2. Remove screws and washers from:

A, Figure 9	White wire	Field lead
B, Figure 9	Red wire	Battery lead
C, Figure 9	White wire	Ground lead
D, Figure 9	Brown wire	"Y" lead
E, Figure 9	Black wire	Light relay lead

3. Lift regulator from alternator as shown in Figure 10.

   Remove bushings (3), flat washers (2), and ground wire (1), from the alternator studs.

   IMPORTANT: Do not loosen the flange lock nuts under the regulator. The stator and shell assembly may move and cause a failure after it is reassembled and operated.

SHEAVE AND FAN

1. Clamp sheave in a padded jaw vise to hold alternator.
2. Remove lock nut and hardened flat washer.

   IMPORTANT: Do not use an impact wrench as it may damage the protective coating on the regulator and/or heat sink.
3. Slide sheave and fan off the shaft. See Figure 11.

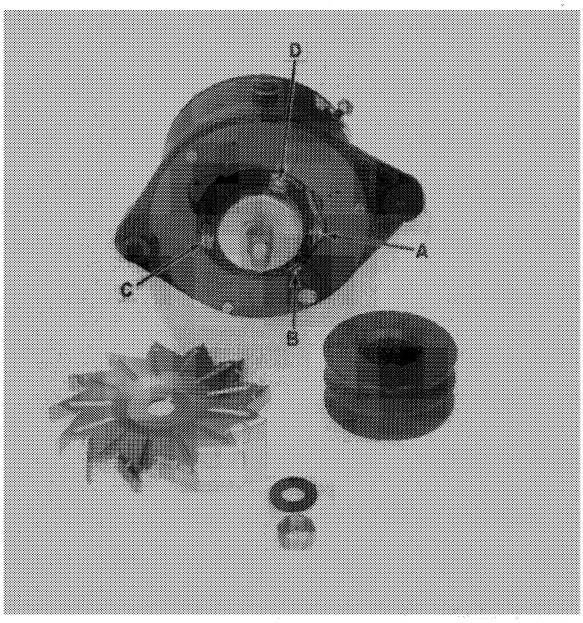

FIGURE 11

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