INTRODUCTION

GENERAL

This section has a description and the repair procedures for the alternator with a voltage regulator as part of the alternator.

⚠ CAUTION

When using an arc welder, always disconnect the ground lead from the lift truck battery to prevent alternator or battery damage. Attach the welding ground clamp as close to the weld area as possible to prevent welding current from damaging the bearings.

The diodes and resistors in the electrical system can be damaged if the following cautions are not followed:

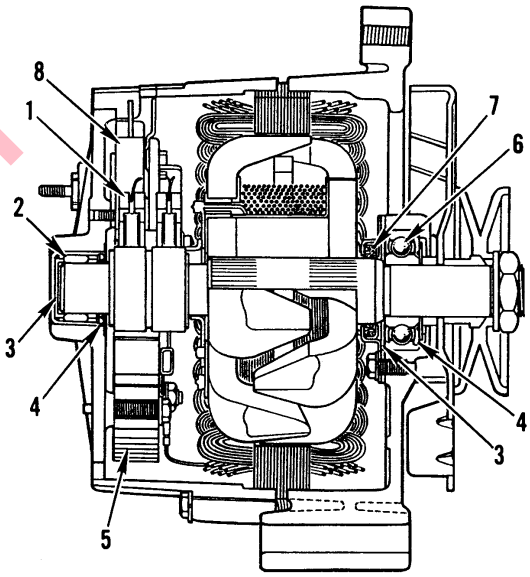
- **Do not disconnect the battery when the engine is running. The voltage surge can damage the diodes and resistors in the electrical system.**
- **Do not disconnect an electric wire before the engine is stopped and the switches are "OFF".**
- **Do not cause a short–circuit by connecting the electric wires to the wrong terminals. Make sure a correct identification is made of the wire before it is connected.**
- **Make sure a battery is the correct voltage and polarity before it is connected.**
- **Do not check for current flow by making a spark because the electronic components can be damaged.**

NOTE: Information on alternators manufactured outside the United States is in the SRM (service repair manual) sections for lift trucks that use those alternators.

DESCRIPTION
(See FIGURE 1. and FIGURE 2.)

NOTE: For this SRM section, the alternators are in two groups, Type A and Type B. The two types are very similar, but the Type A alternators have a set of three diodes (diode set) as well as the diode bridge. The Type B alternator has zener diodes as part of the diodes in the diode bridge. This alternator does not have a diode set, but does have an additional fan inside the rear housing. The basic operation of both types is very similar.

The alternator generates an alternating current when the engine is running. The alternator is either **ON** or **OFF**. The alternator generates maximum current when it is **ON** and no current when it is **OFF**. The regulator switches the alternator between **ON** and **OFF** to get the average current needed to charge the battery. Alternator output is directly changed by engine speed and rotor field current. The alternating current is changed to a direct current by the diode bridge inside the alternator.



DELCO TYPE A SHOWN 7010

1. BRUSH ASSEMBLY
2. ROLLER BEARING
3. GREASE RESERVOIR
4. LIP SEAL
5. DIODE BRIDGE
6. BALL BEARINGS
7. FELT SEAL
8. REGULATOR

FIGURE 1. ALTERNATOR CROSS SECTION

The alternator has these parts:

A stator
A rotor
A diode bridge
A diode set (Type A only)
Two end housings or frame halves
A solid–state voltage regulator

The direct current from the diodes of the diode bridge flows to the output or "BAT" terminal. A capacitor between the "BAT" terminal and the electrical ground removes any remaining alternating current from the direct current. The capacitor also protects the diodes from high voltages. The voltage is controlled by the amount of

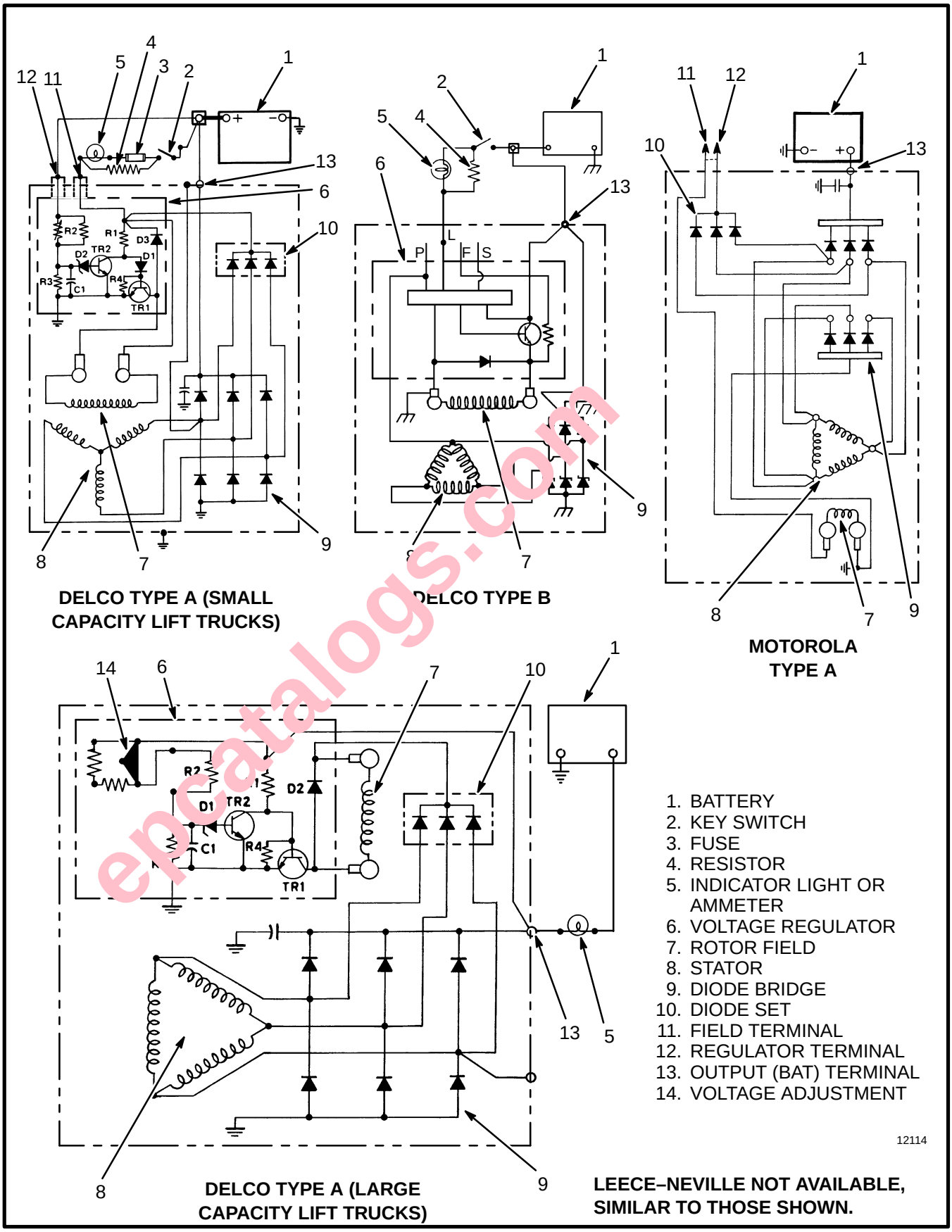


FIGURE 2. SCHEMATIC FOR THE ALTERNATORS

current flowing through the field winding in the alternator and the rpm of the rotor. The voltage regulator, inside the housing, contains a transistor, diodes, resistors and capacitor. The voltage regulator cannot be repaired.

The voltage regulator controls the alternator to charge the battery. The voltage is set by the manufacturer and is not usually adjustable. Battery voltage decreases as the starting circuit and other circuits take energy from the battery. When the key switch is put in the "**IGN**" position, the voltage regulator is energized. A positive current flows to the field terminal ("F" or "1") on Type A alternators "(L") on type B. The battery sends a positive current to the regulator terminal (Type A "R" or "2") and the "BAT" terminal. The regulator senses a decrease in battery voltage and increases the alternator output to charge the battery.

NOTE: On some large capacity lift trucks, the alternator has an external voltage adjustment.

REPAIRS

GENERAL

NOTE: Use the **TROUBLESHOOTING** and **CHECKS AND ADJUSTMENTS** sections of this SRM before starting any repair procedures. Make sure that repair or replacement of that part is necessary before removal, disassembly, or replacement of the part.

⚠ WARNING

Always disconnect the battery ground cable before making repairs to prevent possible damage and injury. Install a tag on the battery terminal so that no one connects the cable or the terminal.

REMOVAL AND DISASSEMBLY (Type A) (See FIGURE 3., FIGURE 4. or FIGURE 5.)

NOTE: There are some checks of the alternator that are done with the alternator on the engine. See the **CHECKS AND ADJUSTMENTS** section of this SRM before starting any removal or repair procedures.

NOTE: Many parts of the Leece–Neville alternator can be replaced without disassembling the alternator. See FIGURE 5. The alternator must be disassembled to replace only the diode bridge, filter capacitor, rotor, stator, or bearings.

1. Disconnect the battery ground cable. Install labels and disconnect the wires at the alternator. Loosen the alternator mount capscrews and remove the drive belt. Remove the capscrews that hold the alternator to the engine.

2. On Leece–Neville alternators, remove the brushes, voltage regulator or diode set. Install labels on all wires for correct connection during installation.

3. Put a mark on each housing and on the stator for correct alignment during assembly. Remove the bolts that hold the housings together. Separate the housings and stator.

4. Put the rotor in a vise that has soft jaws. Do not tighten the vise to cause rotor distortion. Use a socket wrench to remove the pulley nut. Remove the pulley, fan, collar, spacer, shield, or other parts between the fan and housing. Remove the front housing from the rotor.

5. Remove any nuts or screws that fasten parts inside to the rear housing. Then remove the stator assembly from the rear housing so that the other parts can be removed. Remove the screws for the capacitor, diode bridge, diode set, brushes and other parts as necessary. If the stator will be removed from the diode bridge, make sure the wires have tags for correct connection during assembly.

6. Mark the stator to show the position of the brushes and connector or diode bridge assembly. Use pliers as a heat sink to keep heat from the diodes. Use a soldering iron to remove the stator leads from the diode assembly.

7. Remove the bearings from the housings only if they will be replaced.

CLEANING

⚠ CAUTION

Never use solvent on the parts of the alternator.

Use compressed air to remove dirt from the alternator. Clean the brushes and slip rings with a clean dry cloth.

NOTE: If necessary, use fine abrasive cloth to polish the slip rings. The abrasive cloth must be number 500 to 600. Remove all dust. Turn the rotor while polishing the slip rings.

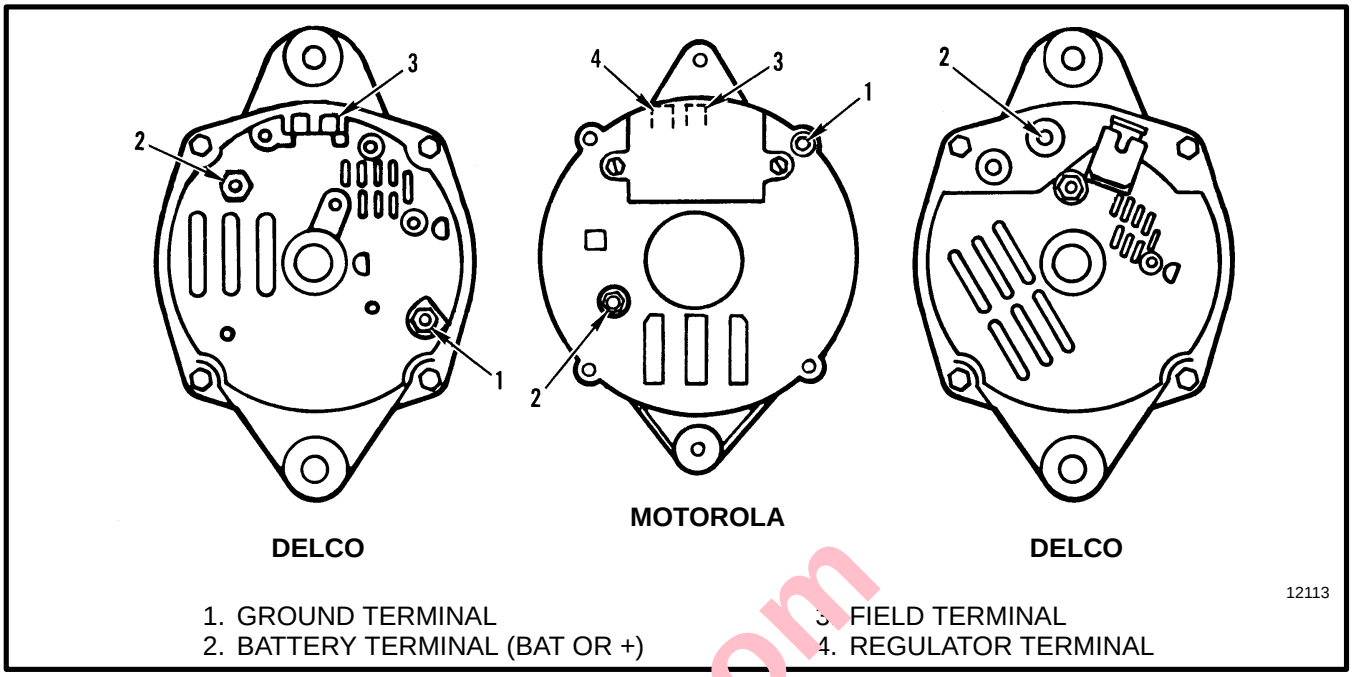


FIGURE 3. TYPE A ALTERNATORS, REAR VIEWS

ASSEMBLY (Type A) (See FIGURE 3., FIGURE 4. or FIGURE 5.)

1. For Delco (Type A) alternators, install new bearing(s) in the housings as follows:

   a. Install a new plug and seal in the rear housing. Push the bearing from the outside of the housing until the top of the bearing is even with the outside of the housing. Hold the housing with the collar on the inside of the housing. Keep the lip of the seal away from the bearing. Lubricate the bearing area with Delco–Remy grease, part number 1948791.

   b. Install a new bearing in the front housing. Fill one quarter of the grease reservoir with Delco–Remy grease, part number 1948791, or equivalent. Move the grease so that it touches the bearing when the retainer plate is installed.

   c. Add the same type of grease to fill the area between the retainer plate and the bearing. Install the spacer, gasket, and retainer plate on the bearing. Fasten the retainer plate in position with the three screws and lock washers.

2. For Motorola and Leece–Neville alternators, use a press to install the rear bearing on the rotor. Install the bearing and bearing retainer in the front housing. If used, install the spacer on the bearing.

⚠ CAUTION

Hold the rotor in a vise that has soft jaws. Do not tighten the vise more than necessary.

3. Install the front housing on the rotor. If used, install the spacer or shield, shaft key, and washer. Install the fan, pulley, lock washer, and nut. Tighten the nut to 54 to 81 Nm (40 to 60 lb_f ft).

4. Install the diode bridge and heat sink in the reverse order of disassembly. Make sure the insulators and washers are in the correct positions. Install the capacitor.

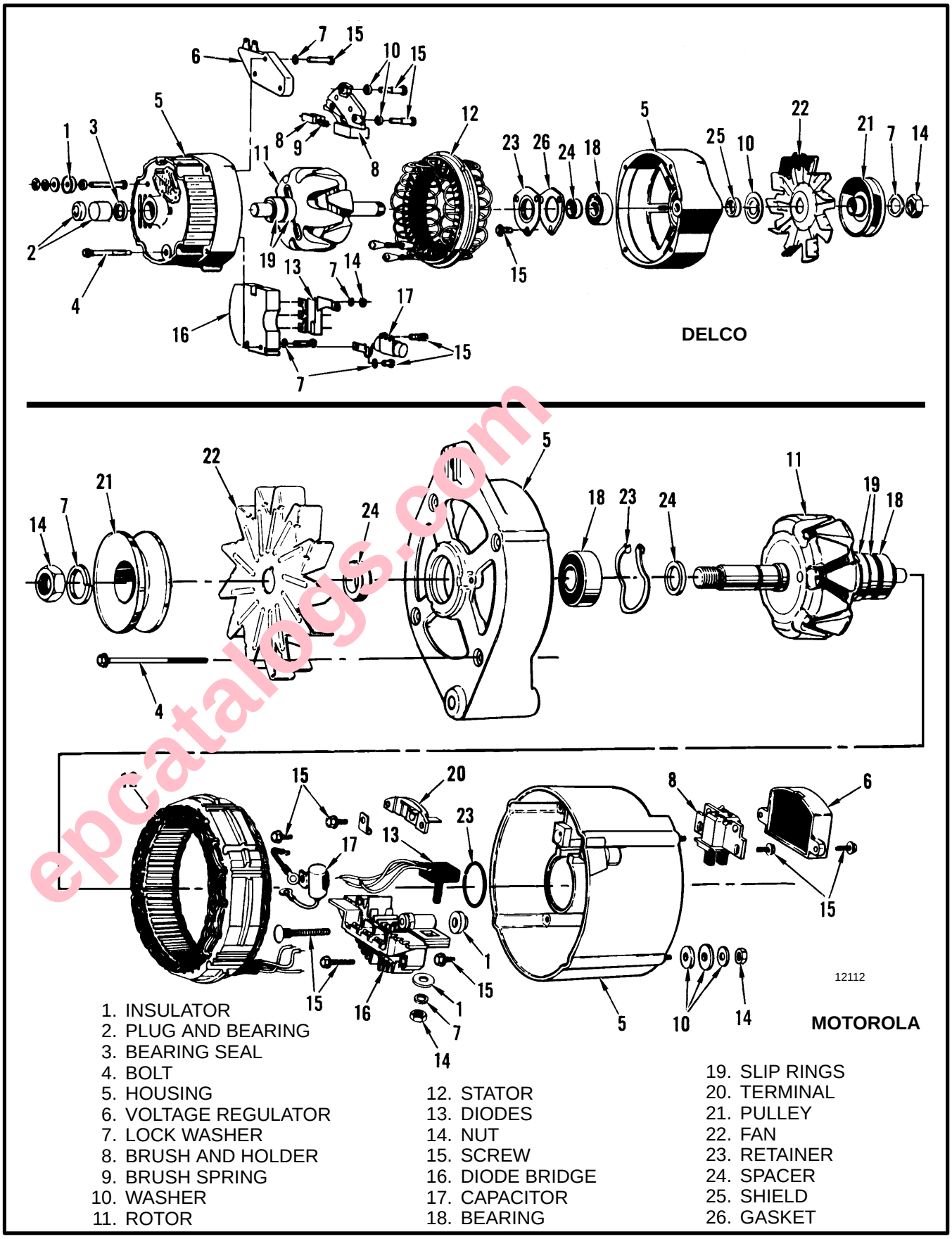
⚠ CAUTION

Be sure to install the insulators. Make sure the heat sink does not touch the housing.

5. On Delco alternators, install parts as follows:

   a. Install the brush and holder, voltage regulator, and diodes from the inside of the alternator. Make sure the insulator sleeves are on the screws for the brush holder. Install the capacitor.

   b. Install the stator in the rear housing. Connect the three wires from the stator to the diode bridge and fasten at the studs. Connect the wires from the diodes to the studs on the diode bridge. Install and tighten the three lock washers and nuts.



1. INSULATOR
2. PLUG AND BEARING
3. BEARING SEAL
4. BOLT
5. HOUSING
6. VOLTAGE REGULATOR
7. LOCK WASHER
8. BRUSH AND HOLDER
9. BRUSH SPRING
10. WASHER
11. ROTOR
12. STATOR
13. DIODES
14. NUT
15. SCREW
16. DIODE BRIDGE
17. CAPACITOR
18. BEARING
19. SLIP RINGS
20. TERMINAL
21. PULLEY
22. FAN
23. RETAINER
24. SPACER
25. SHIELD
26. GASKET

FIGURE 4. TYPE A ALTERNATORS, EXPLODED VIEWS