

MOTOROLA ALTERNATORS

Jaguar XJ6, XJS

NOTE: Some XJ6 and XJS models use Lucas Alternators. See appropriate article in this section. Also see SEV Motorola Alternators.

DESCRIPTION

Motorola alternators are conventional 3-phase, self-rectifying type alternators. Six silicon diodes, 3 positive and 3 negative, are used to rectify AC current.

APPLICATION

Model	Type
XJ6 With Air Conditioning	9AR 2512P
XJS	9AR 2533P

SPECIFICATIONS

Application	Amps@RPM	Voltage
XJ6	70@1050	14
XJS	70@1100	14

TESTING

ON-VEHICLE TESTING

Preliminary Checks

1) Be sure battery is fully charged and that alternator drive belt is properly adjusted. Never disconnect battery, alternator or regulator with engine running.

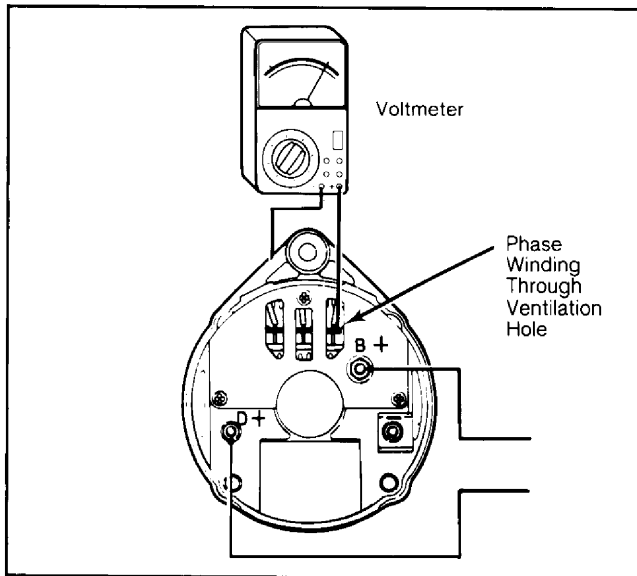
2) Do not ground field winding (terminal EX), connected to regulator by Green wire. If alternator is to be removed or installed, always disconnect battery first.

Stator Winding Test

1) Turn ignition switch "OFF". Using a voltmeter, check voltage on any of the 3 phases of stator windings, accessible through ventilation holes.

2) Connect voltmeter negative lead to ground and positive lead to phase winding. See Fig. 2. Voltmeter should indicate zero (0) volts.

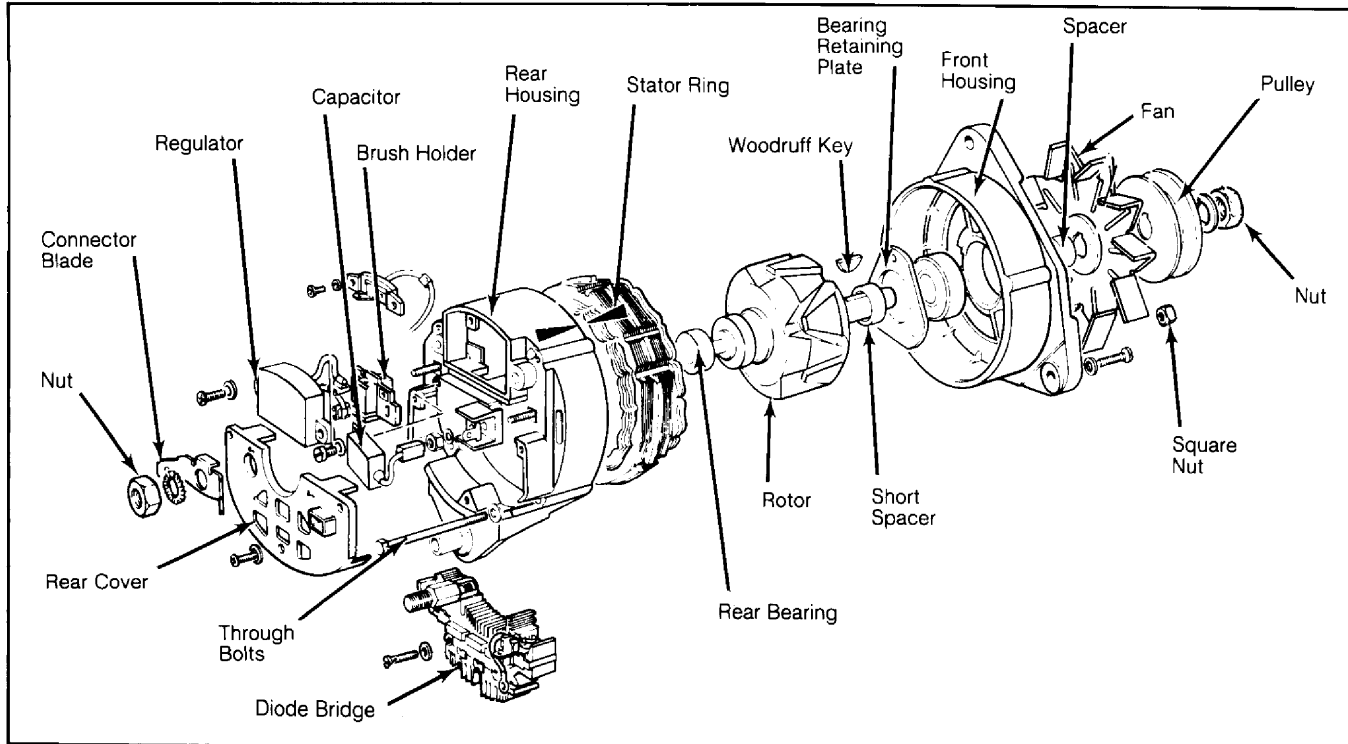
Fig. 2: Checking Voltage Between Stator Windings and Ground



Insert voltmeter positive probe through ventilation hole.

3) Connect negative lead to phase winding, and positive lead to alternator's output terminal (B+). See Fig. 3. Again, voltmeter should read zero (0) volts.

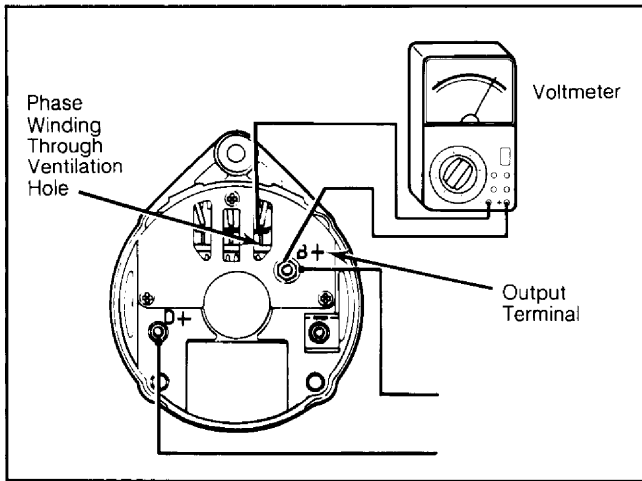
Fig. 1: Exploded View of Motorola Alternator Used by Jaguar



Alternators & Regulators

MOTOROLA ALTERNATORS (Cont.)

Fig. 3: Checking Voltage Between Stator Windings and Alternator Positive Terminal



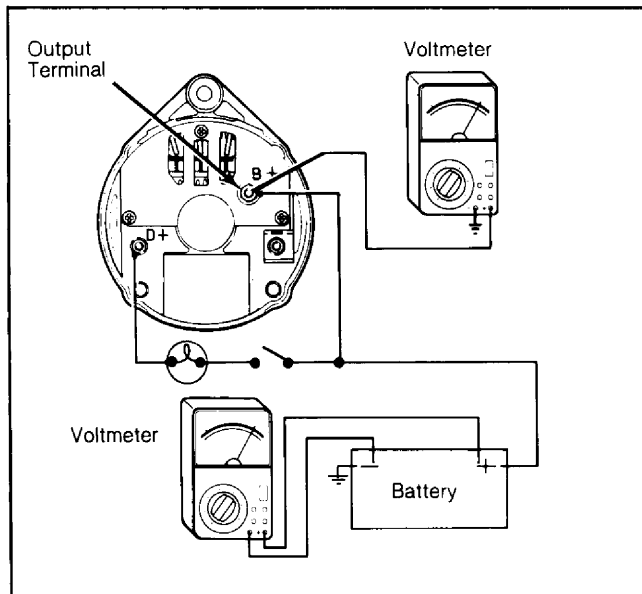
Insert negative probe through ventilation hole.

4) Any reading other than zero (0) volts in steps 2) and 3) indicates a defective positive rectifier diode. Replace diode bridge.

Battery Connections Test

1) Turn ignition switch "OFF". Connect voltmeter positive lead to alternator's output terminal (B+). Ground negative lead. Note reading. Connect voltmeter positive lead to battery positive terminal, and negative lead to battery negative terminal. See Fig. 4.

Fig. 4: Checking Battery Connections with Voltmeter



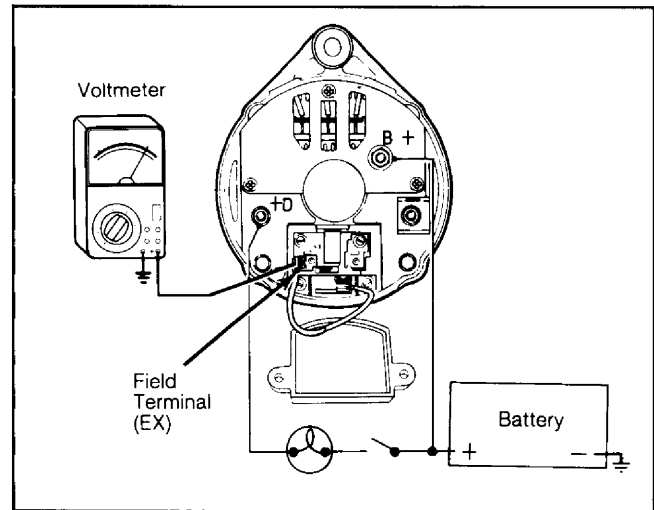
Readings should be identical in both tests.

2) Both readings should be the same. If voltage at alternator output terminal (B+) is lower than battery voltage, or if it fluctuates, check for broken wires, faulty connections or corroded terminals.

Field Circuit Test

1) Turn ignition "ON", but do not start engine. Check voltage at slip ring by touching positive probe of voltmeter to field terminal (EX) with regulator attaching screws removed. See Fig. 5.

Fig. 5: Checking Field Circuit (Regulator Wire Connected)

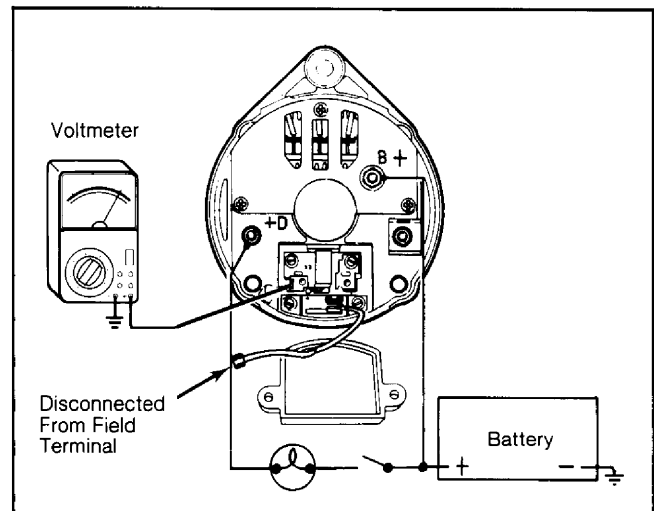


Voltage should not exceed 2 volts.

2) If voltmeter reads more than 2 volts, field circuit is defective. Examine brushes, brush leads and holder. Replace brushes if shorter than .15" (4 mm). If voltmeter reads zero (0) volts, check connections to regulator, ignition switch and indicator lamp.

3) Check regulator circuit by removing Green lead from field terminal (EX) and measuring voltage across field windings. See Fig. 6. Voltage should not exceed 2 volts. If voltage is correct, proceed to Output Voltage Test. If 8-12 volts is indicated, alternator is defective.

Fig. 6: Checking Regulator Circuit with Voltmeter



Green wire must be removed from field terminal.

4) If voltage in step 3) was incorrect, proceed to next test.

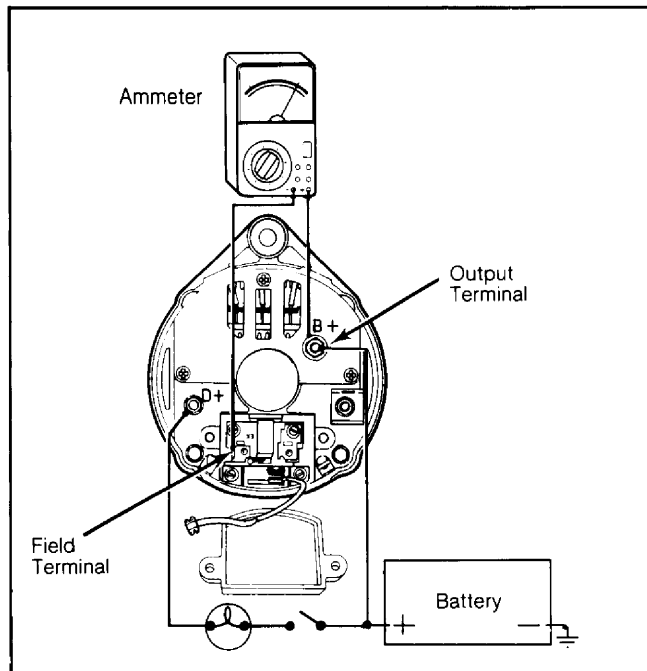
Additional Field Circuit Test

1) Turn ignition switch "ON", and run engine faster than idle speed. If incorrect readings were experienced in previous test, retest field circuit by disconnecting regulator from field terminal (EX).

2) Connect an ammeter between field (EX) terminal and output terminal (B+). Use a field rheostat in series with ammeter. This will prevent damage to ammeter from excessive current flow if field is shorted. See Fig. 7.

MOTOROLA ALTERNATORS (Cont.)

Fig. 7: Checking Field Circuit with an Ammeter



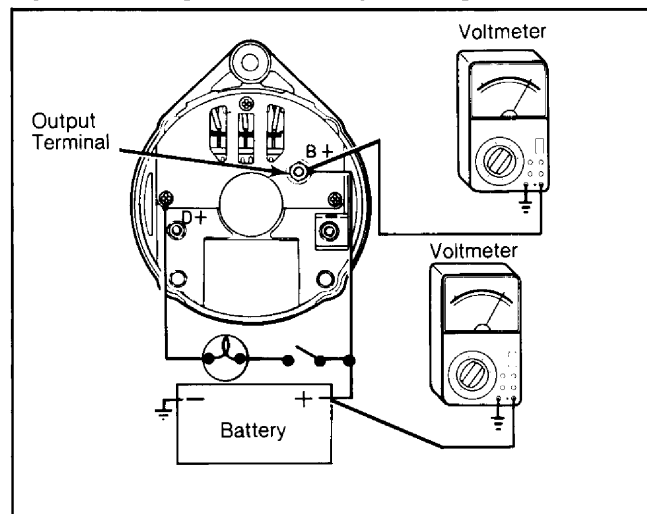
Use field rheostat in series with ammeter.

3) Ammeter should read 1-1.5 amps. If ammeter registers less than 1 amp, recheck brushes, leads and slip rings.

Output Voltage Test

1) Turn ignition "ON", and allow engine to run faster than idle speed. Connect voltmeter negative lead to ground and positive lead to output terminal (B+). See Fig. 8.

Fig. 8: Checking Alternator Output Voltage



Voltage should equal battery voltage.

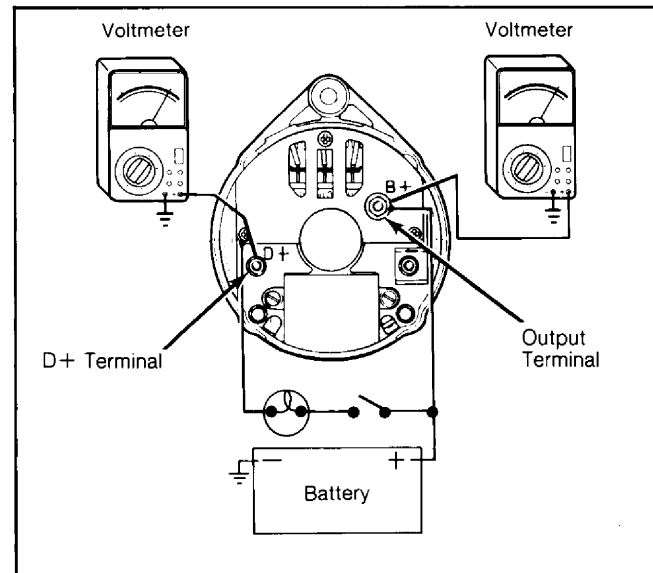
2) Check voltage across battery terminals. Both voltage readings should be 13.7-14.7 volts. If voltage differs more than .3 volt between battery and output terminals, check wiring and terminals for corrosion or breaks.

Voltage Comparison Test

1) Turn ignition switch "ON", and run engine faster than idle speed. Attach voltmeter negative lead to

ground. In turn, touch positive lead to output terminal (B+) and to D+ terminal. See Fig. 9.

Fig. 9: Comparing Voltage at B and D Positive Terminals



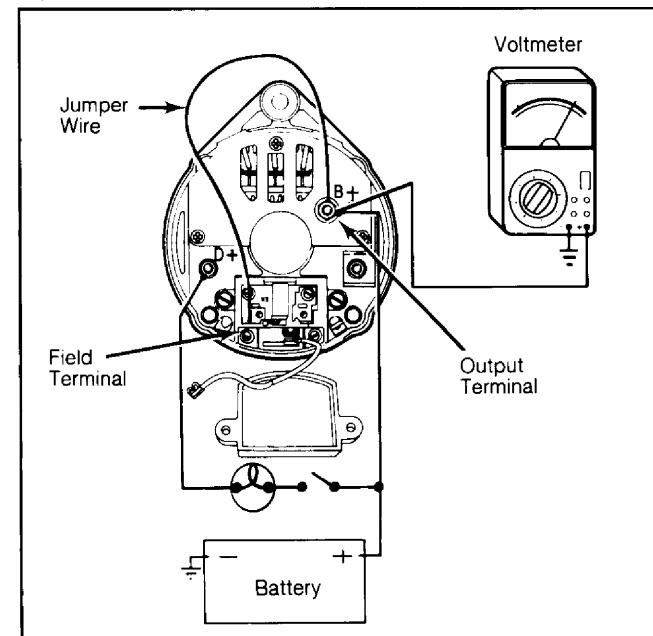
Voltage readings should be the same.

2) Voltage readings should be the same at both points. If voltage varies more than .5 volt, a faulty diode exists.

Regulator and Diode Test

1) Disconnect regulator field lead (EX). Attach jumper wire from field terminal (EX) to output terminal (B+). See Fig. 10. Turn ignition "ON", and run engine at fast idle speed.

Fig. 10: Checking Regulator and Diodes



Attach jumper wire to field and output terminals.

2) Connect negative lead of voltmeter to ground and positive lead to output terminal (B+).

Alternators & Regulators

MOTOROLA ALTERNATORS (Cont.)

3) If voltage rises to 14-16 volts in this test, but did not reach 14 volts in Output Voltage Test, regulator is defective.

4) If output voltage does not rise, and field current has been proven satisfactory in Field Circuit Test and Additional Field Circuit Test, either alternator stator or the rectifier diodes are defective.

OVERHAUL

DISASSEMBLY

1) Remove nut, lock washer, and connector blade from output terminal (B+) at rear cover. Remove set screw and washer, securing capacitor to housing. Separate connector blade and remove capacitor.

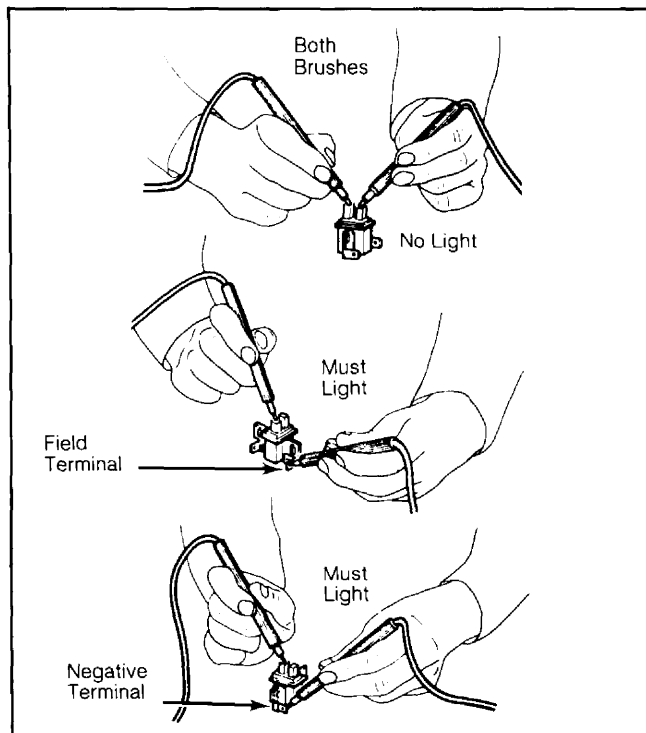
2) Remove rear cover. Identify wiring colors, and remove regulator. Remove brush holder. Clamp pulley, and remove pulley nut. Remove small washer, fan and large washer from spindle. Remove Woodruff key and spacer.

3) Remove 4 through bolts, washers and square nuts. Separate front and rear housings. If separation is difficult, place spindle in protected jaws of vise. Using care not to damage stator and windings, remove rear housing, stator and diode bridge. Rear bearing will remain with spindle.

4) Remove spindle from vise, and remove front housing and spacer. Remove front and rear bearings, only if necessary. Mark position of stator ring in rear housing to ensure proper reassembly.

5) To avoid overheating diodes, rapidly unsolder leads of 3-phase windings and Red D+ lead from diode bridge. Use long-nosed pliers to grip each terminal as wire is unsoldered.

Fig. 11: Checking Brush Assembly with a Test Light



Bulb should not light when both brushes are touched.

6) Remove diode bridge and washers. Lift housing from stator, detach 2 terminals from housing, and remove D+ lead.

BENCH TESTING

Brush Assembly Test

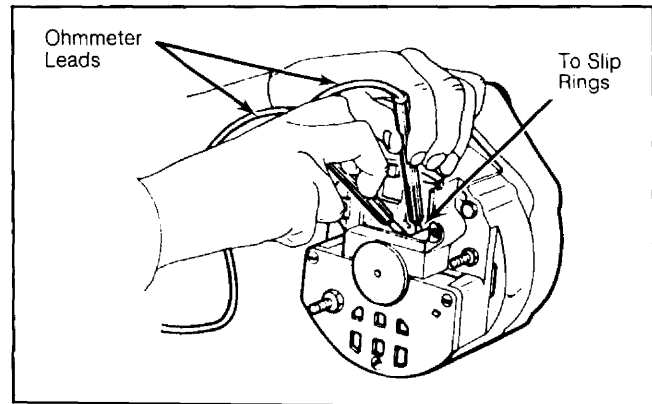
1) Using a test light, touch probes to each brush. Bulb should not light. See Fig. 11.

2) Connect test leads to field terminal and its corresponding brush. Bulb must light, even when brush is moved in its holder. Transfer test leads to negative terminal and the other brush. Bulb must again light even if brush is moved in its holder.

Rotor Test

Connect ohmmeter leads to each slip ring. See Fig. 12. Resistance should be between 3.8 and 5.2 ohms. With ohmmeter connected between a slip ring and alternator housing, reading should be infinity.

Fig. 12: Checking Rotor Resistance with an Ohmmeter



Leads should touch each slip ring.

Diode Test

1) To check positive diode, connect a battery lead in series with a test light to B+ terminal. Connect other lead, in turn, to each phase terminal. See Fig. 13. Reverse connections. Bulb should light in 1 direction only.

2) To check negative diode, connect a battery lead to the heat sink. Connect the other battery lead, in series with a test light, in turn, to each phase terminal. See Fig. 13. Reverse connections, and bulb should light in 1 direction only.

3) To check the diode trio, connect a battery lead to a phase terminal. Connect the other lead, in series with a test light, to the other side of the diode. See Fig. 13. Reverse connections. Bulb should light in 1 direction only.

4) Check other 2 diodes in the same way. If bulb lights in both directions, or fails to light in either direction, the diode being tested is defective.

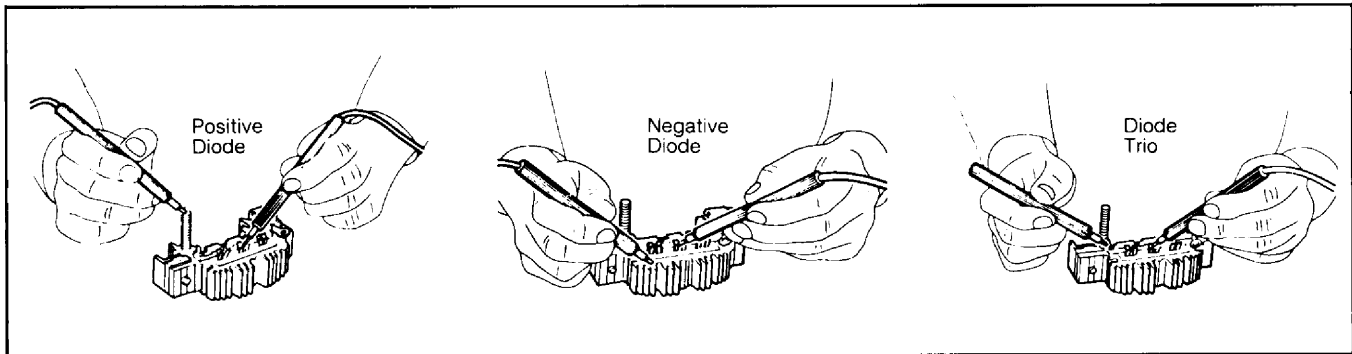
REASSEMBLY

1) To reassemble, reverse the disassembly procedure, noting the following. Use a new "O" ring in recess of rear bearing housing. Place stator and coils in recess position, with 3 leads passing back through housing.

2) When soldering leads, use long-nose pliers as a thermal shunt to protect diode assembly from excessive heat. Use new bearings, as required. Larger inside diameter of short spacer (on front end of spindle) should be next to rotor.

MOTOROLA ALTERNATORS (Cont.)

Fig. 13: Checking Diodes with a 12-Volt Test Light



Connections are shown for positive and negative diodes and diode trio.

3) If front bearing was removed, use Loctite sealing compound on screw threads and capped holes in retainer plate. Use Loctite on through bolt and nut threads.