

ALTERNATOR BENCH TESTS

ALTERNATOR BENCH TESTS

Before removing the alternator from the aircraft, make the "on-the-plane" test as outlined on Page 6.

A diode tester, a test light, a voltmeter, ammeter and carbon pile are recommended for bench testing the alternator. The voltmeter, ammeter and carbon pile are often combined in one unit; the combination tester is illustrated. Testers of this type are readily available from Automotive Equipment Suppliers.

An alternate recommended method of bench testing the alternator and its components requires the use of a Volt-Ohm-Milliammeter (VOM). Equipment of this type is generally available from electronic equipment suppliers. Typical VOM's which would be adequate are the Simpson 260, Triplet 630 and other equivalent models.

TESTING DIODES:

Several diode testers are available which permit diode testing without the inconvenience and time consuming procedure of disconnecting stator lead wires.

The Sun Electric diode tester, Model RDT 2, is a typical type. Specific instructions provided by the tester manufacturer should be followed.

1. With the stator and rectifier assembly removed from rear housing, connect test clip from diode tester to negative stud as shown. Gently push, pull, and wiggle the connections while testing diodes to locate intermittent conditions.

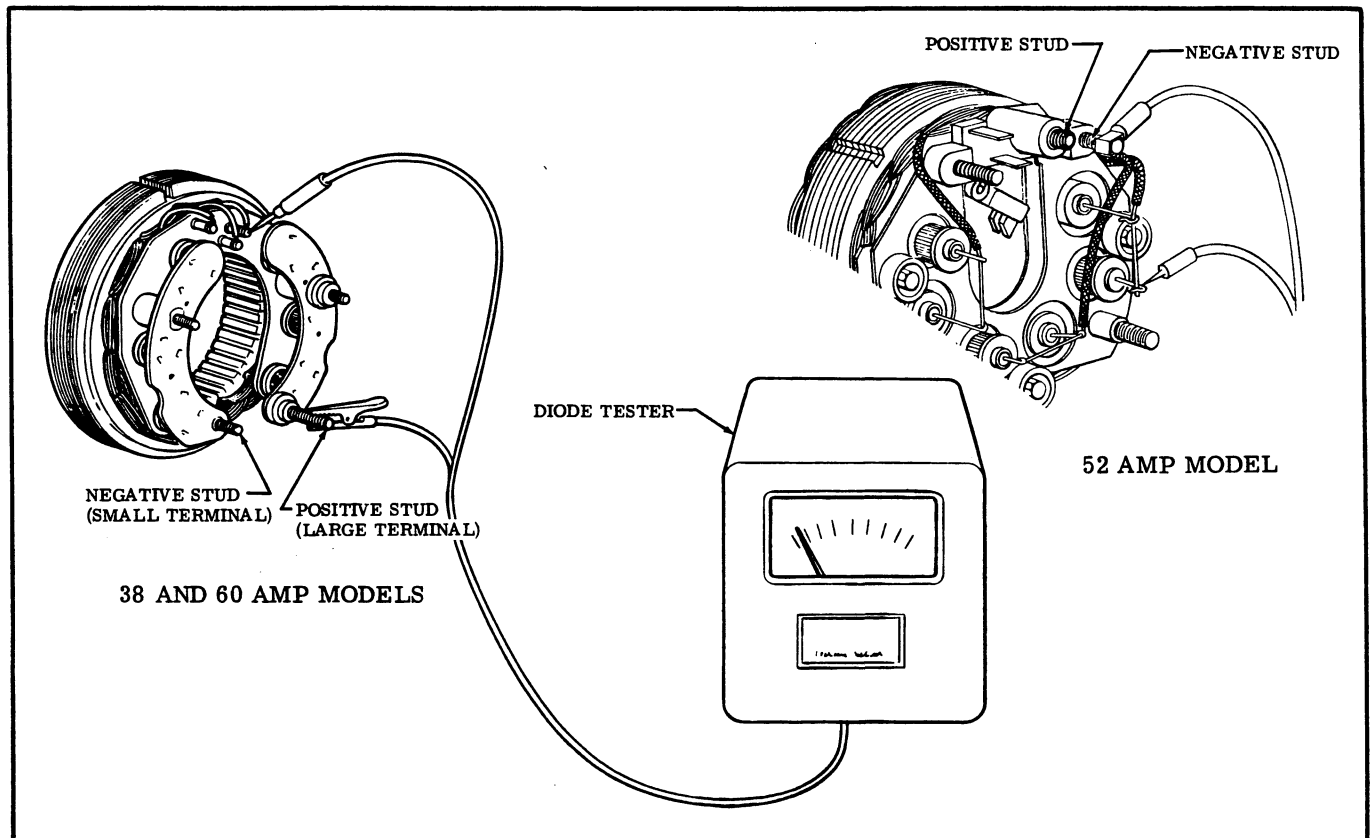


FIGURE 46

ALTERNATOR BENCH TESTS

2. Touch the test prod to each of the three stator wires which connect the positive and negative diodes together. In general, the meter reading should be the same for all three diodes. A low reading will usually indicate a faulty soldered connection at one of the diode terminations. Shorted and open diodes will cause specific meter indications which depend upon the tester type. Refer to the instruction manual.
3. Move the test clip to the positive stud and repeat test as outlined in preceding steps.

TESTING DIODES - ALTERNATE METHOD (VOM)

1. Disassemble the stator leads from the rectifier assembly as shown in Figure 41.
2. Calibrate the VOM on the R x 1 multiplier range scale. (Zero reading with the leads shorted together.)
3. Positive diode test -
 - A. Connect one test probe to the large positive terminal stud and touch the other test probe to each of the three stator terminals. Note the three ohmmeter readings, they must be identical.
 - B. Reverse the test probes and repeat the test. Note the three ohm meter readings, again they should be identical to each other but not the same as in step A above.
 - C. Three of the ohm meter readings should show a low resistance reading of approximately 6 to 20 ohms in one of the above steps and an infinite reading (no meter movement) in the other step. If these readings are not obtained, the rectifier is defective and must be replaced.

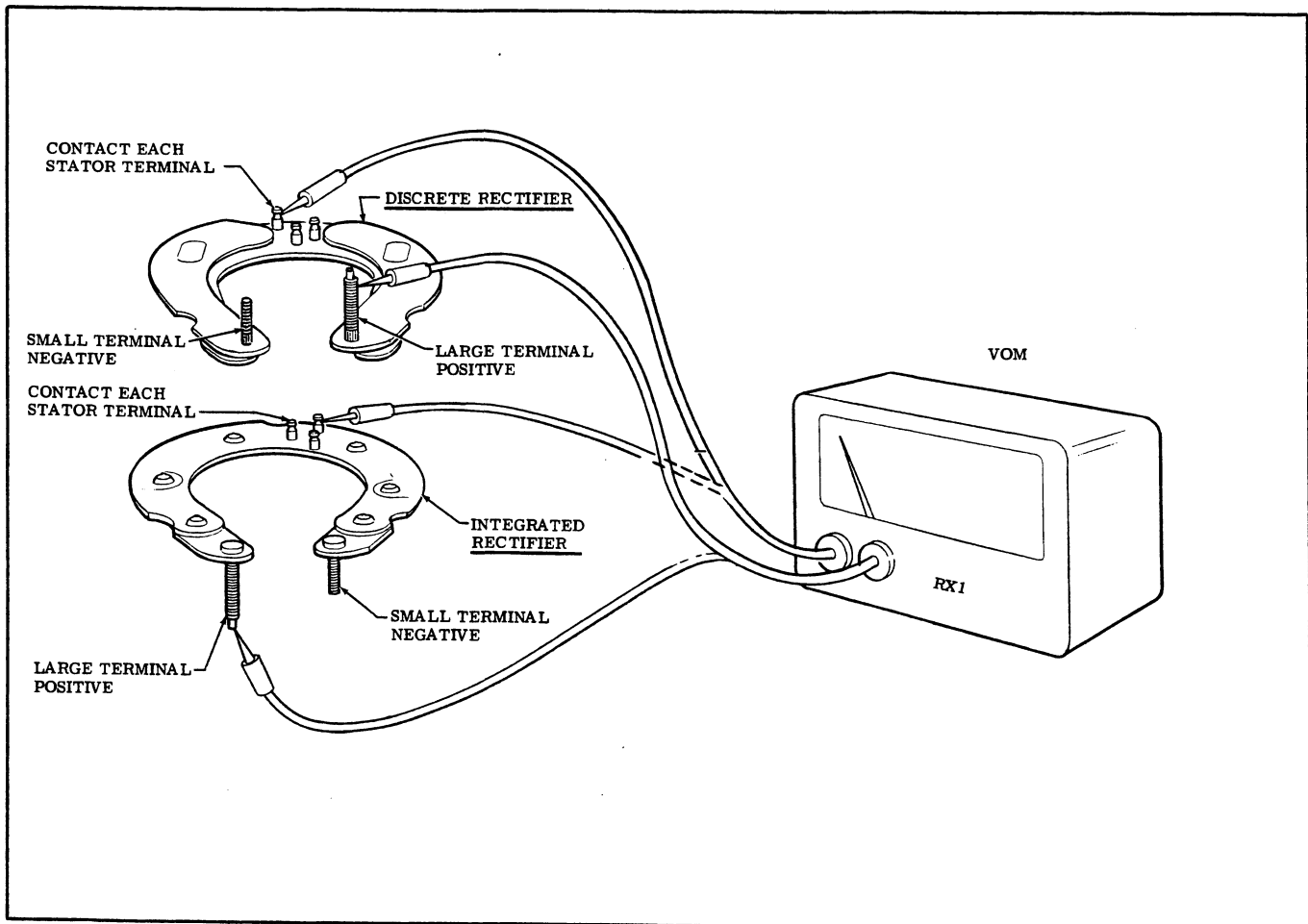


FIGURE 47

ALTERNATOR BENCH TESTS

4. Negative diode test -

Repeat above Steps A, B and C but connect one test probe to the small negative terminal stud and the other probe to the stator terminals.

5. Examine the rectifier assembly for cracked or burnt areas and overall general appearance, free of damage.

NOTES

It is of little importance as to the sequence that is followed in taking the resistance readings across each diode, but what is important is that in one direction, a reading of 6 to 20 ohms is obtained while an infinite (∞) reading is obtained in the other direction (probes reversed).

Some VOM's due to their electrical circuitry and characteristics may indicate a slightly different reading in one direction, example 35 ohms. If all the diodes indicate this same reading in one direction and infinity in the other direction, the rectifier assembly should be considered functionally OK and acceptable for further service.

TESTING STATOR

COIL TEST

Shorted turns within any coil, and coil-to-coil shorts will burn or discolor the insulation on the affected turns or coils.

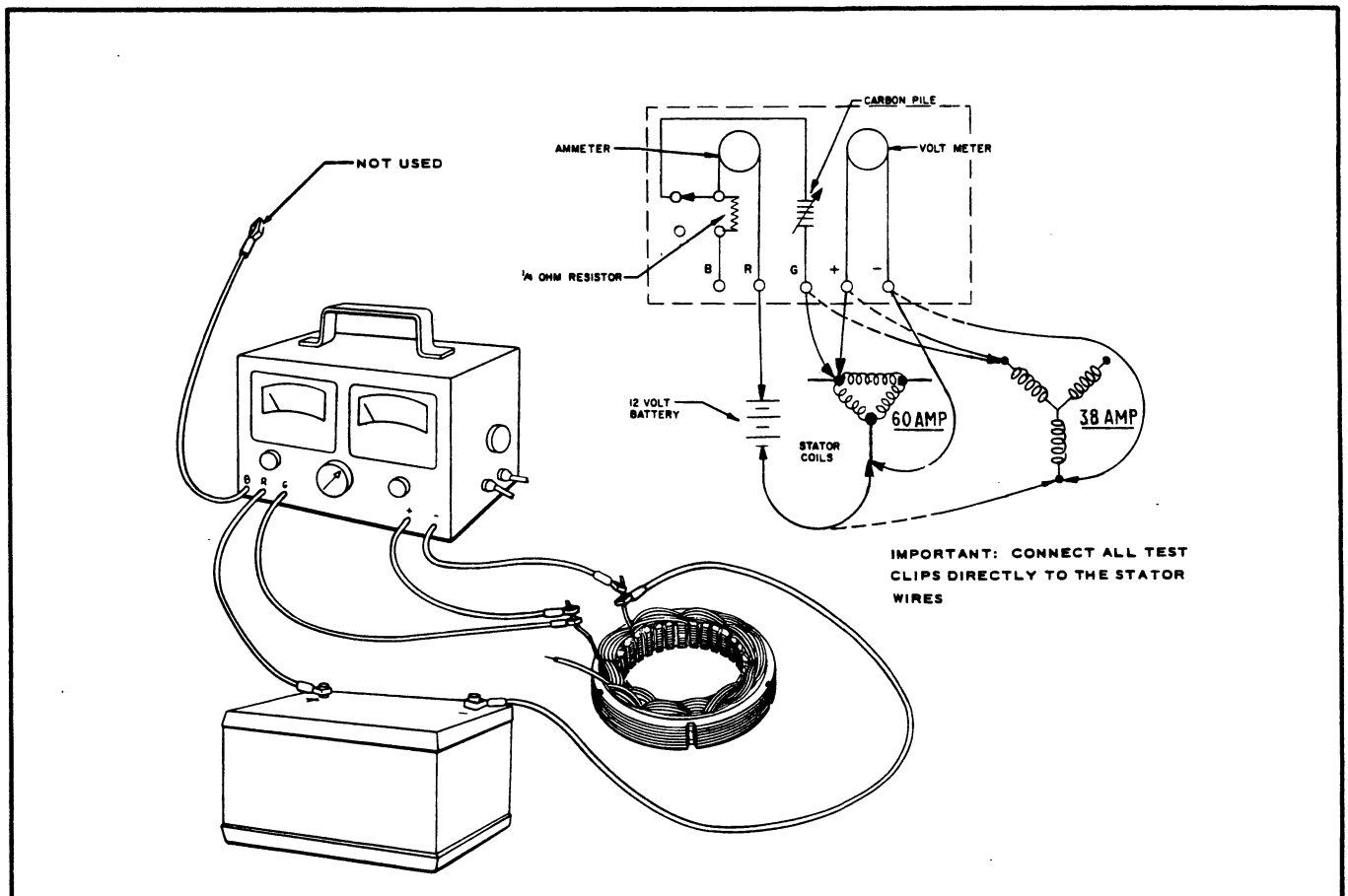


FIGURE 48

ALTERNATOR BENCH TESTS

The purpose of this test is to locate shorted coils and faulty splices. In effect, the test hook-up results in a high-current "ohmmeter" which is sensitive to slight changes in coil resistance.

An automotive type tester which has a voltmeter, an ammeter and a carbon pile combined in one unit is recommended for testing the stator coils. The Sun Electric Volts-Amps Tester Model VAT 20 is typical. Individual test units may be used if they are available.

1. With the stator assembly disconnected from the rectifier assembly, connect the tester as shown. The voltmeter test clips must be attached to the coil wire directly. A separate carbon pile rheostat in series with an ammeter and a 12 volt battery comprises the basis circuit; see schematic.
2. Adjust carbon pile to produce 20 amperes of current flow. The voltmeter should indicate 7.2 to 7.5 volts on 38 amp models, 6.7 to 7.2 volts on 52 amp models and 3.4 to 3.6 volts on 60 amp models.

If voltage is too high, check splice and repair. Re-test stator when repairs are complete. If voltage is still too high, replace stator.

If voltage is too low, a section of the coil is shorted and the stator must be replaced.

Shorted turns, within a given coil, can also be detected by special test instruments and necessary adaptors designed to measure phase-to-phase A. C. voltage while the alternator is operating under load. These tests will reveal any significant imbalance voltage in the stator coils as an indication of shorted turns. Usually these tests are performed on an electric motor powered test machine.

GROUND TEST

WARNING

Stator must be disconnected from rectifier when this test is made. Faulty or damaged insulation between the coil wires and the stator core can cause grounded stator coils. A relatively high voltage is used in this test to detect slight leakage before actual failure occurs. Always use care to avoid electrical shock from bodily contact with the test prods during use. Remove tester plug from outlet when not in use.

1. Insert plug into 115 volt A.C. outlet. Use a 7 to 15 watt bulb. Perform test on wooden bench or provide insulation for alternator.

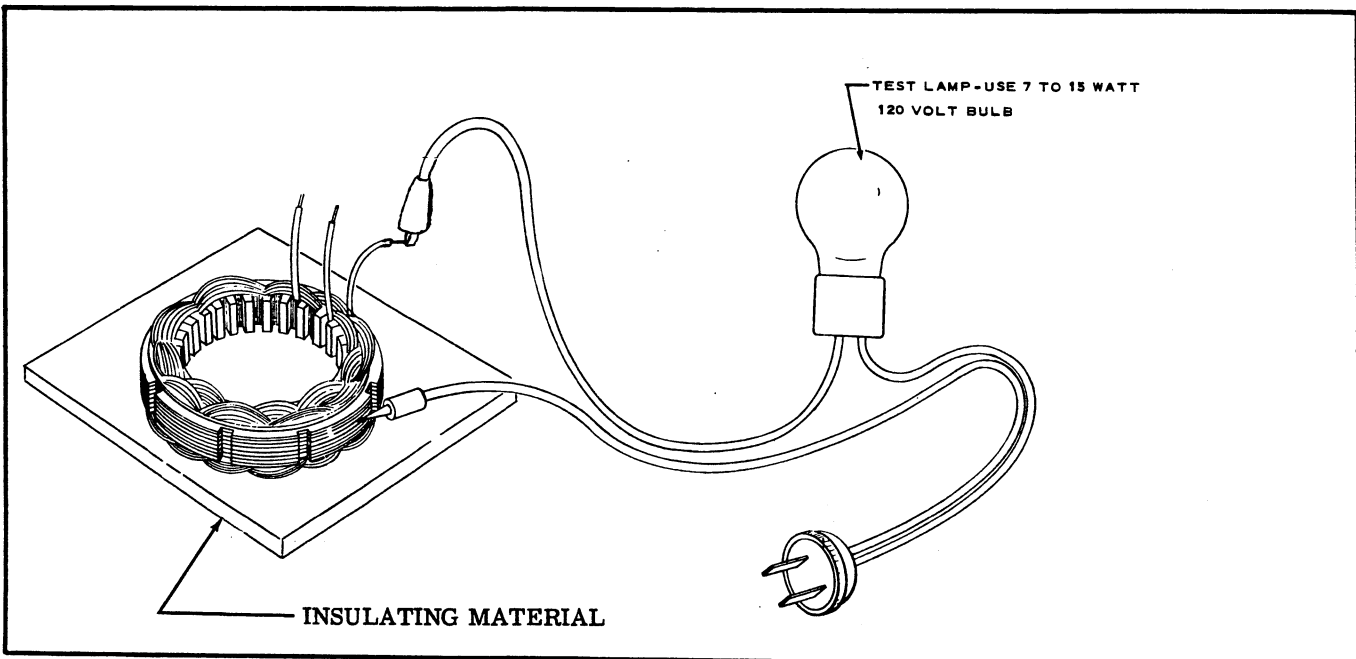


FIGURE 49

ALTERNATOR BENCH TESTS

2. Touch one test prod to bare metal surface of stator core and the other prod to bare stator lead wire. Test lamp should not light.
3. Replace stator assembly if even the slightest glow is seen in test lamp.

TESTING STATOR - ALTERNATE METHOD (VOM)

COIL TEST

1. Disconnect the stator assembly from the rectifier as shown in Figure 41.
2. Remove as much dirt and grease as practical from the stator using a clean cloth or compressed air.

CAUTION

Do not use any solvents or liquid cleaners as this may attack the wire insulation and render the assembly unfunctional.

3. Visually inspect the stator windings for discoloration or burned windings and flaking of the wire insulation. Shorted turns within any coil and coil to coil shorts will always burn and discolor the insulation on the affected turns. If any marked difference in wire color can be distinguished from one coil to another, replace the stator assembly.

GROUND TEST - 38 amp and 60 amp assemblies

4. Calibrate the VOM on the RX 100 multiplier range scale (Zero reading with the leads shorted together).
5. Connect one probe to any one of the stator leads. Touch the other test probe to the bare metal surface of the stator core. No meter movement should occur. If a slight movement is detected or full scale deflection occurs, replace the stator assembly.

OPEN COIL TEST

6. Calibrate the VOM on the R x 1 multiplier range scale (Zero reading with the leads shorted together.)

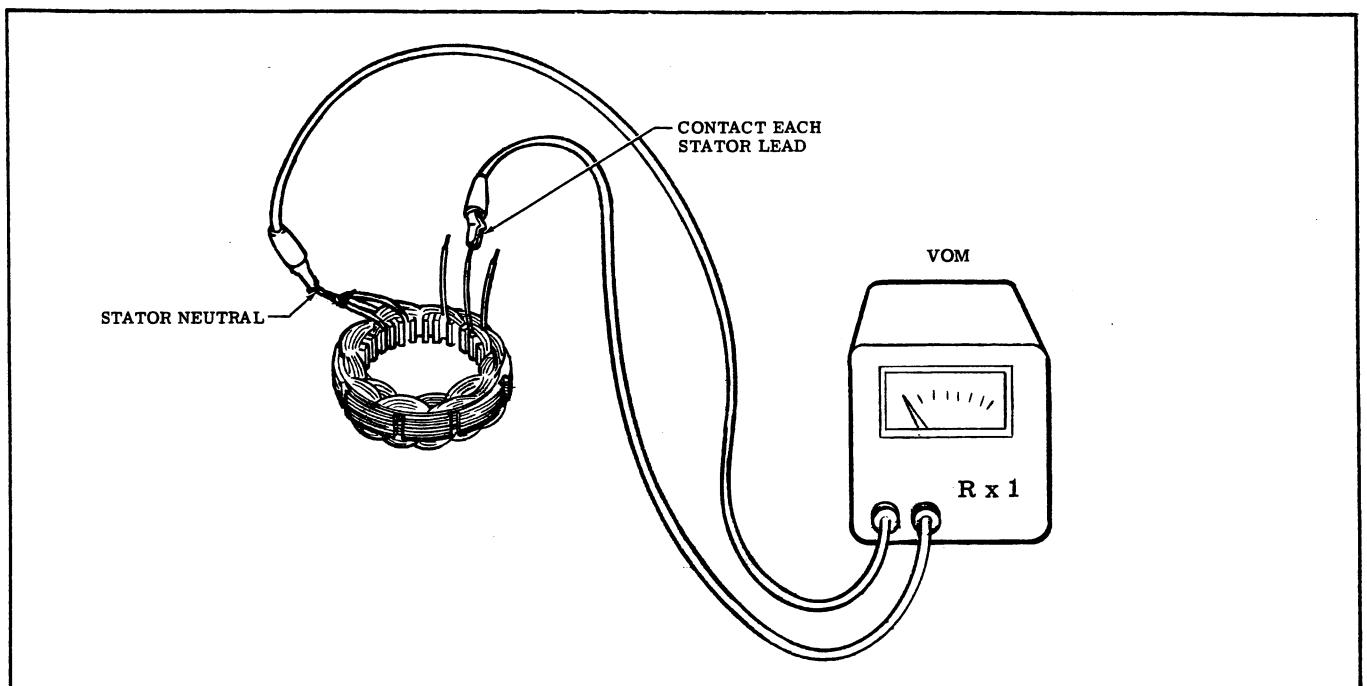


FIGURE 50

ALTERNATOR BENCH TESTS

7. Stator Assembly - 38 amp only.

Connect one test probe to the neutral stator connection as shown in Figure 50.

Touch each of the other three stator leads with the other test probe. A reading of 5 ohms or more for any one of the windings indicates an open circuit. Check the solder connection at the stator neutral terminal and retest. If resistance reading is still too high, replace the stator assembly. A normal indication for each of the three readings should be 1 ohm or less.

8. Stator Assembly - 60 amp only.

Unsolder and disconnect one of the stator coil junction connections and connect the test probes to the coil as shown below.

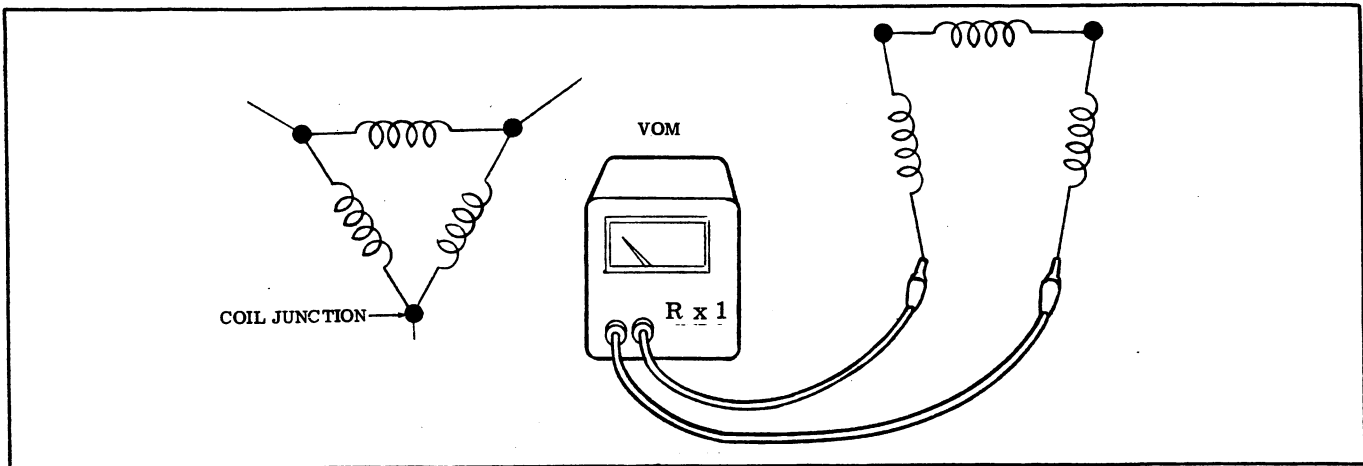


FIGURE 51

A reading of 5 ohms or more indicates an open circuit. If resistance is above 5 ohms, check the remaining two solder connections for cold solder joints and retest. If resistance is still too high, replace stator assembly. Otherwise, connect and resolder the coil together and place back in service. A normal indication of 1 ohm or less should be expected.

TESTING ROTOR

COIL TEST

Insulation will flake off of a badly burned rotor coil. Replace a rotor having a discolored or burned coil.

Measurements must be made at the slip-ring terminals. Do not attempt to measure coil resistance through the brushes of an assembled alternator. The brushes add resistance to the circuit causing erroneous readings.

1. Use an ohmmeter to check rotor coil resistance.
 - A. 12 VOLT SYSTEM - The ohmmeter should indicate 4.0 ohms.
 - B. 24 VOLT SYSTEM - The ohmmeter should indicate 12.0 ohms.

ALTERNATOR BENCH TESTS

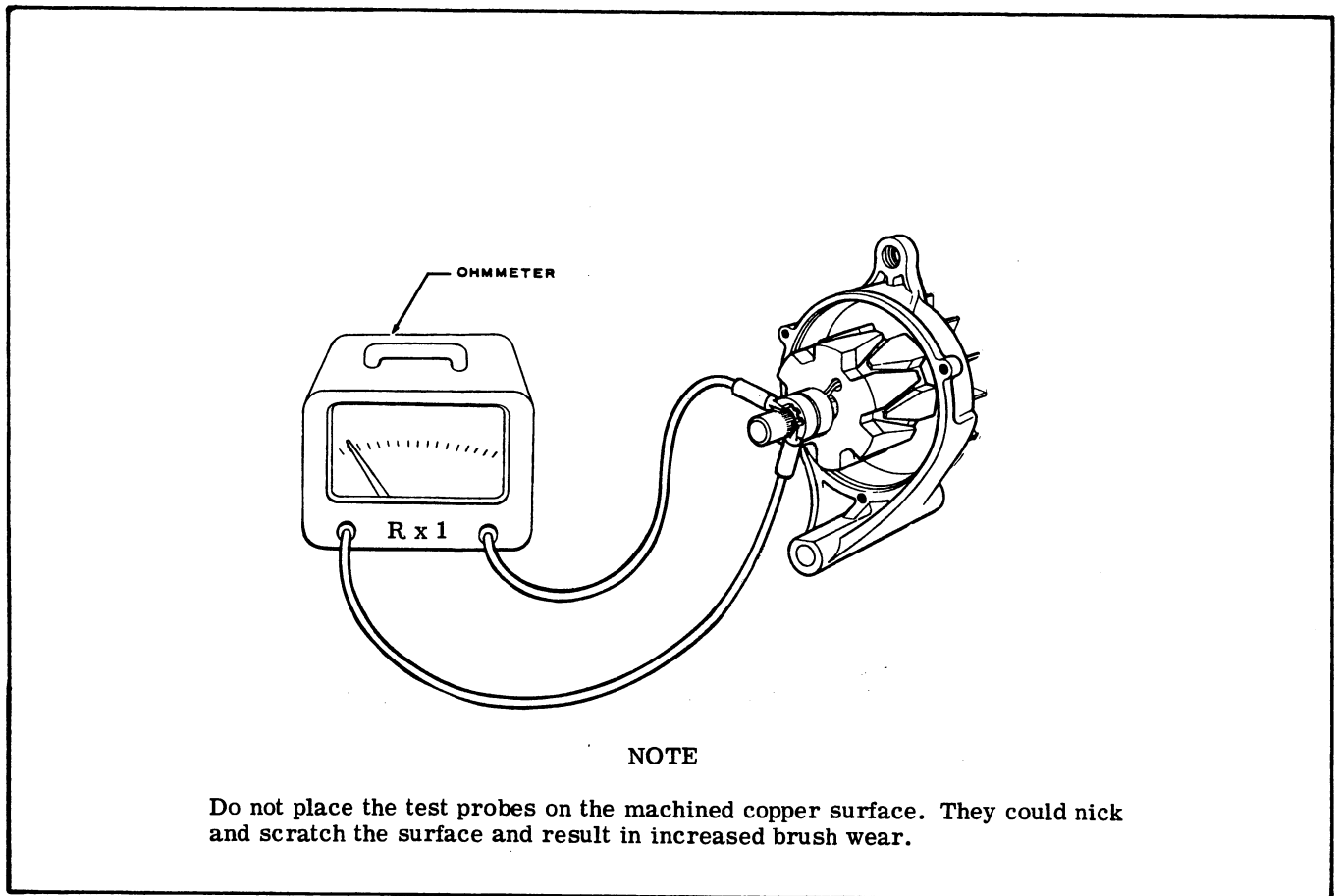


FIGURE 52

2. Inspect the soldered connection at the slip ring terminals. Repair if necessary and recheck coil.
3. Replace rotor assembly if coil fails test.

The stop ring is serviced with the replacement rotor assembly and should not be transferred from the failed rotor.

GROUND TEST

Grounded rotor coils are caused by defective coil or lead wire insulation which allows wire contact to some metal part of the rotor. Damaged regulator voltage limiter contacts usually result from the increased field current flow.

1. Insert plug into 115 volt A.C. outlet. Use a 7 to 15 watt bulb. Perform test on wooden bench or provide insulation for alternator.
2. Touch one test prod to bare metal surface of rotor shaft or pole finger and the other to the slip ring terminal. Test lamp should not light. Do not place test probe on the slip ring surface.
3. Replace rotor assembly if even the slightest glow is seen in test lamp.

ALTERNATOR BENCH TESTS

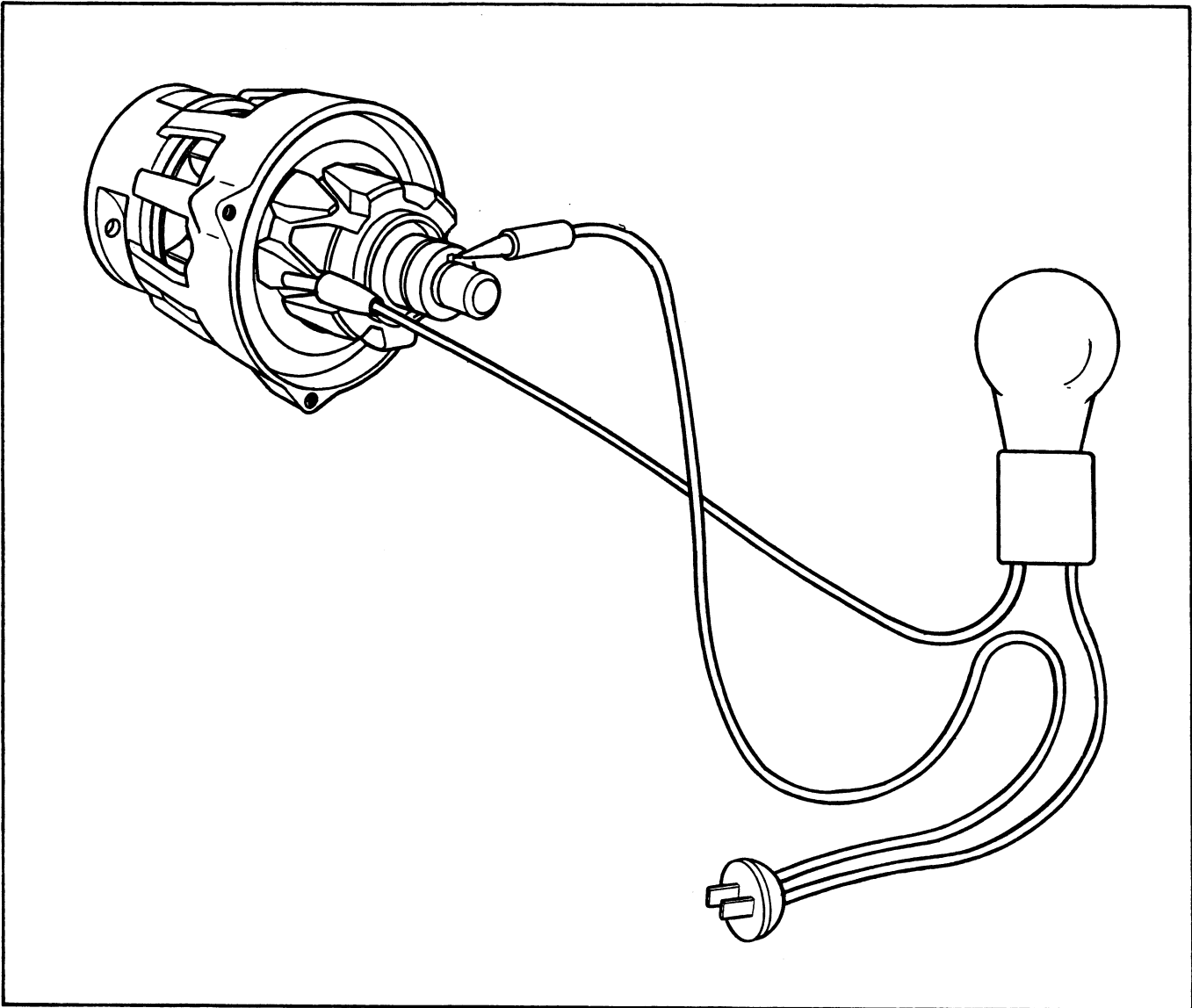


FIGURE 53

TESTING ROTOR - ALTERNATE METHOD (VOM)

Coil Test

An open or shorted field coil is generally the result of a broken lead wire, cold solder joint at the slip ring terminals or burnt wire insulation.

The following test checks for a shorted or open field coil.

1. Calibrate the VOM on the R x 1 multiplier range scale (Zero reading with the leads shorted together.)
2. Connect the test probes to the slip ring terminals as shown on the following page.

CAUTION

Do not allow the test probes to make contact with the rotor shaft while the resistance is being measured.

ALTERNATOR BENCH TESTS

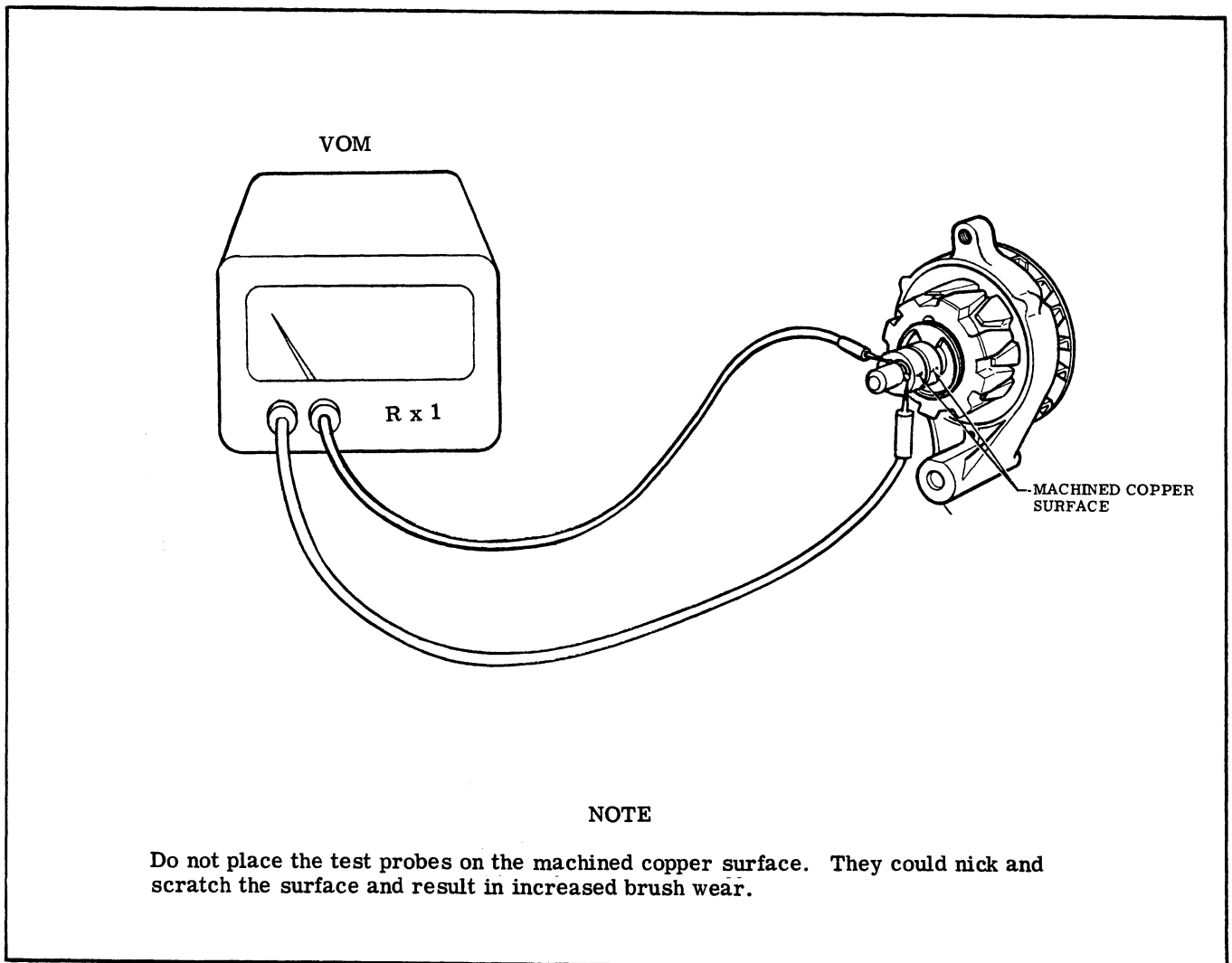


FIGURE 54

3. Ohmmeter readings.

| Rotor Assembly | Normal Reading (Approximately) ohms | Defective Field | |
|----------------|---|-----------------|-----------------|
| | | Open ohms | Shorted ohms |
| 14 volt | 3 to 7 | ∞ | 0 to 2 |
| 28 volt | 11 to 14 | ∞ | 0 to 2 |

Replace the rotor assembly if the indicated resistance is not within the normal reading as indicated above.

4. Inspect the solder connection and slip ring terminals to make certain that they are not bent and touching the shaft, or that excess solder is not grounding the coil. Repair and retest if necessary.

ALTERNATOR BENCH TESTS

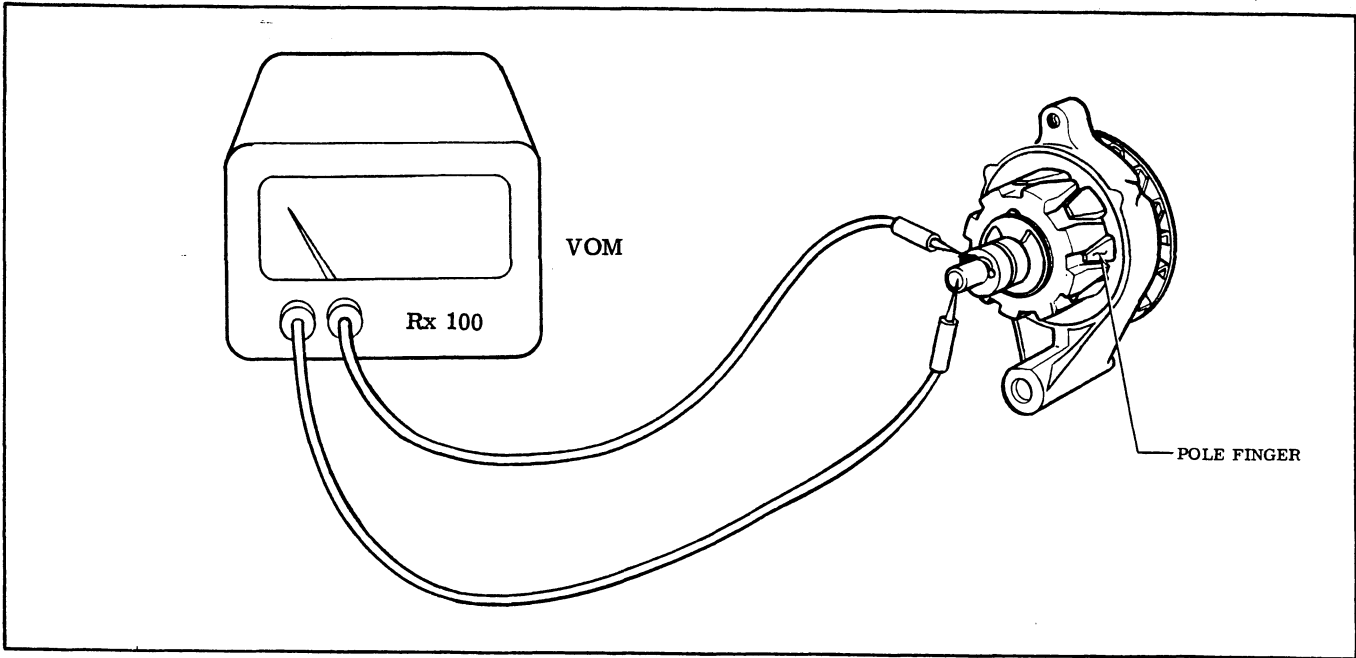


FIGURE 55

GROUND TEST

5. Calibrate the VOM on the R x 100 multiplier range scale.
6. Connect one test probe to one of the slip ring terminals. Touch the other probe to the pole finger or the rotor shaft. No meter movement should occur.
7. Replace the rotor assembly if even the slightest movement is detected in the ohmmeter.

SHOP NOTES:
