

### GENERAL INFORMATION

The main components of the generator are: armature, field coils, cooling fan, brushes, brush holder assembly, end brackets, rectifier and voltage regulator. Before performing any maintenance on the generator, isolate and/or disable the drive system so the unit can not be accidentally started while being repaired.

The troubleshooting chart lists various symptoms of poor generator operation with possible causes and the appropriate corrective action. You will need a volt-ohm meter or test light to check some of the causes. For some of the other causes you will need to check generator speed. To check generator speed you can use a frequency meter, a tachometer, or a 120V-60Hz electric clock and a correctly operating wrist watch. (Run the electric clock on generator power and compare the clock's second hand movement with that of the wrist watch. They should run at the same speed. If clock runs faster, generator speed is too high, and vice versa.)

#### CAUTION: Equipment Damage

*Most electrical equipment in North America operates satisfactorily at frequencies between 59 and 61 Hz (cycles per second.) Operating the generator at frequencies outside that range may cause damage to the generator and/or to electrical equipment driven by the generator.*

### Periodical Maintenance

Service/maintenance items include periodic external physical inspection for missing hardware or damage to mounting or drive system and checking the oil level in the gear case. It is recommended that the generator be operated at least monthly under normal loads to familiarize operators with the procedures and controls as well as to dry out any accumulated condensation or other moisture in the generator electrical windings. The maintenance and service attention invested will insure getting the peak performance that was designed into the unit.

Routine preventive maintenance minimizes costly repairs and generator down-time. Before each use, inspect the generator: gear case oil level should be correct, cooling vents and screens should be clear, and generator mounting hardware should be tight. Clean and inspect the generator after storing it for long periods, and after using it in extremely dusty conditions or in severe weather, such as rain or blowing snow.

### Generator Maintenance

#### A. Brushes

Under ordinary circumstances, brushes will operate for extremely long periods without requiring replacement. They should be inspected after the first 500 hours of operation, and

after every 200 hours of operation thereafter. Remove brushes one at a time and check for length; be sure that each moves freely in the brush holder. Brushes should be replaced when worn down to 3/8". Replace brushes in complete sets, never singly. When replacing brushes, be careful to reconnect the lead wires properly.

Poor contact (or "skipping") between brush and slip ring is caused by oil and grit, flint, or other hard substance on the brush, or by the brush not being properly shaped to fit the slip rings. Remedy these defects by fitting the brushes to the slip-ring curvature. Place # 00 sandpaper under the brushes with the abrasive side to the brushes, and work it back and forth until the brushes are the same shape as the slip-rings.

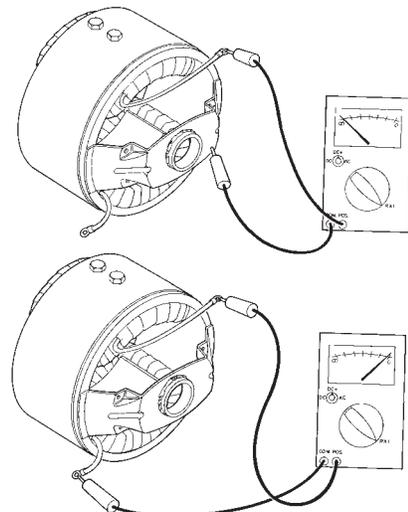
#### B. Slip rings

The four continuous copper rings located on the end of the armature are the generator output slip rings. For proper generator output, the surface of the slip rings must have a smooth, shiny, highly polished finish. Normal brush seating will transfer a shiny black finish that will seat the copper surface. This finish should not be removed unless it becomes dull or begins to build up. Under sustained use, it is advisable to check and if necessary, polish the ring surfaces with a crocus cloth to maintain the smooth finish.

### ELECTRICAL TESTING

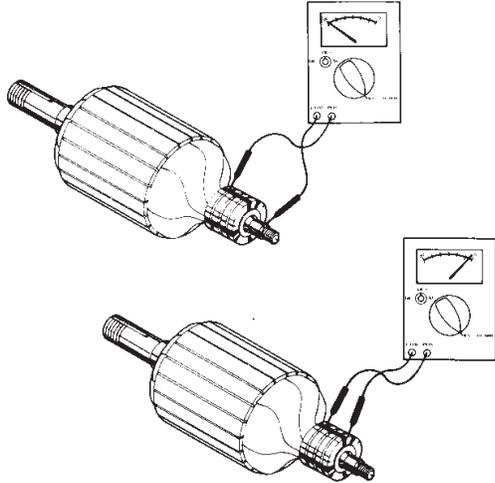
#### A. Testing generator fields for opens and grounds.

1. Disconnect field leads from rectifier or the regulator.
2. Set multimeter to read resistance, and connect the meter leads to the field leads. If field is open, meter will read infinite resistance (very high ohms). Repair or replace field if it is open.
3. Leaving one meter lead connected to the field, connect the other meter lead to the field shell. If meter indicates continuity (any reading -should be infinite resistance). The



field is grounded and should be repaired or replaced. To determine which of the fields is grounded, cut the connector between the two coils and retest to determine which

### B. Testing the Armature for Opens and Grounds



1. Remove all brushes.
2. Ground fault test - set multimeter to read high resistance (meg-ohms). Holding one meter lead against a clean spot on the armature shaft, touch the other lead to each of the slip rings (one at a time) while observing the meter. If meter indicates continuity (any reading lower than one meg-ohm), the armature is grounded. Dirt between the slip rings and on the insulator surface can cause grounding. If grounding was indicated, carefully clean all dirt off the slip rings and their insulators and then recheck it. Replace the armature if it is grounded and unrepairable.
3. Open Test. Set meter to read low resistance (R x 1 ohms). Holding one meter lead on surface of slip ring No. 1, touch other meter lead to surface of slip ring No. 2 while observing the meter. Meter should indicate continuity (low resistance - less than one ohm is typical). If the meter indicates open circuit (infinite resistance) part of armature winding is open. This may be caused by a repairable defect in the connection at the slip ring, however generally an open armature will have to be replaced. Continue reading the continuity between slip ring No. 2 to No. 3 and No.2 and No.4. All the slip rings should have continuity to slip ring number 2, the neutral ring.

**NOTE:** If these tests have not located the trouble, remove the armature and have it tested for opens, shorts, and grounds on a growler.

### C. Testing Rectifiers

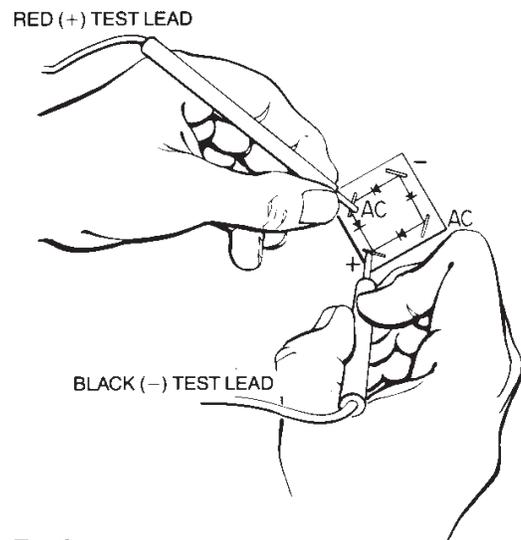
The field excitation is supplied through a full wave bridge rectifier. This type of rectifier has four terminals, two AC, a DC positive and a DC negative.

A rectifier may be tested in the following manner:

1. Disconnect all leads from rectifier.
2. Connect the red ohmmeter lead to the positive DC (+) terminal.
3. Connect the black lead to each of the AC terminals in turn. Either a high or low resistance reading will be obtained.
4. Reverse the meter leads, (black lead to the DC POS (+)

and red to the AC terminals, each in turn. An opposite reading should be observed.

5. Connect the red ohmmeter lead to the negative DC (-) terminal.
6. Connect the black lead to each of the AC terminals in turn. Either a high or low resistance reading will be obtained.
7. Reverse the meter leads, (black lead to the DC NEG (-) and red to the AC terminals, each in turn. An opposite reading should be observed.
8. Check each terminal to the case. An open circuit (very high resistance) reading should be observed. A battery powered test light is used. Follow the same procedures described above. A good diode element will allow current to pass to the light in the test lamp when the leads are connected in the forward direction.
9. If the rectifier fails any of the above tests, it should be considered defective and replaced.



### Condenser Testing

Condensers are built into the generator circuit to minimize radio interference during operation. If a condenser shorts out, it will also short out the generator output. To determine whether a condenser is shorted, stop the generator and disconnect the condenser lead wire from the brush holder. Using a multimeter on the R x 100 scale, check the resistance of the condenser. Normal response is a sharp swing of the meter towards low resistance and then a steady rise towards high resistance (open circuit). If the capacitor is shorted it will show as a constant low resistance.

Otherwise, restart the generator without the capacitor connected to recheck the generator for output. If the generator then provides power, the condenser was at fault and should be replaced. (If the generator doesn't provide power, the problem was not caused by that condenser, reconnect the lead wire).

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