marathon®

4 DEDICATED SINGLE PHASE LIMA ®MAC GENERATOR
LIGHT TOWER DUTY MODELS 250MSL1278 AND 250MSL1299

SERVICE PROCEDURE – ELECTRICAL COMPONENT TESTING

HI POTENTIAL TESTS

None of the windings, either rotating or stationary should be Hi-Potted while connected to the rectifier assemblies. Stationary windings should be disconnected from the stationary rectifier assembly, and rotors disconnected from the two full wave exciter rotor mounted rectifier bridges prior to performing Hi-Pot testing.

WINDING CONTINUITY TEST

The following lead connections should show continuity:

1. Alternator (Main) stator: 1, 2, and 11, 3 – 4.
2. Exciter stator: 5 – 6: 7 – 8: 9 – 10.
3. Exciter rotor: All three leads.
4. Alternator (Main) rotor: Both leads.

On an alternator that already has the exciter stator and main stator inter-connected, alternator stator and exciter stator continuity may be checked by disconnecting main stator lead T5 and exciter lead T10 from the terminal strip, exciter stator leads T7 and T9 from the ground lug, and unsoldering main stator lead T11 from the voltage adjust resistor. See Figure 1. In this case the shunt winding should be checked with the ohmmeter in both polarities as CR-5 will show a circuit in one direction. Also with on ohmmeter polarity, a circuit will show between the shunt (T5 and T6) and one series winding (T9 and T10)

WINDING POLARITY TEST

The following tests will show proper winding polarities and lead tagging. Both the exciter stator and main stator windings can be checked without disconnecting any inter- connecting leads. Refer to Figure 1 above to assist in making these tests.

1. Exciter Stator

A. Shunt windings: Connect a 12 volt DC power supply, positive to shunt lead T6, and negative to shunt lead T5. A compass should show all three shunt poles (small wire) with the same polarity.

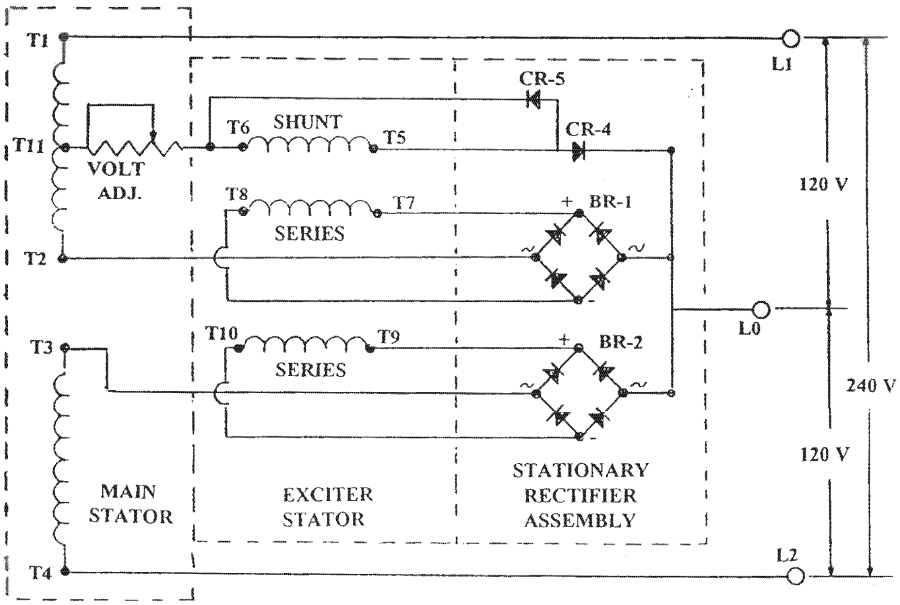
B. Series Windings (There are two sets of series pole windings)

a. Connect a 12 volt DC power supply, positive to series lead T7, and negative to series lead T8. A compass should show all three series poles (larger wire) with

the same polarities, but these should have the opposite polarity those shown b the shunt poles

B. The other series winding should be checked in the same manner with the positive lead of the DC power supply applied to series lead T9, and the negative lead applied to series lead T10. A compass should show the same results in all three of these series poles, and of the opposite polarity of the shunt poles as detailed in (a) above.

Figure 1 240/120 Volt Connection



2. Main Stator

A. **Main stator and excite stator inter-connected.** Connect the generator leads T1, T2, T3, and T4 to the terminal board for 240/120 volt operation. Apply a 12 volt DC to generator leads T1 and T4 – polarity of the DC supply is of no importance. A compass should show alternating north-south deflections as it is moved around the main stator – two norths and two souths.

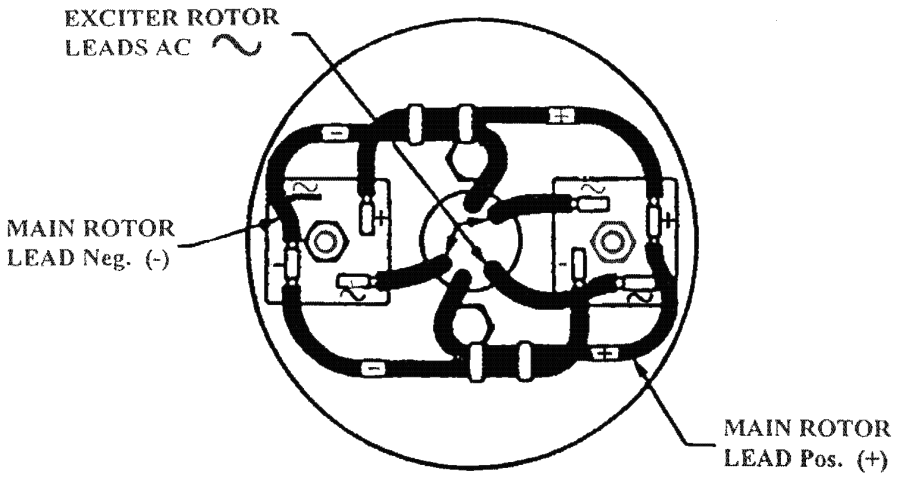
B. **Stators not inter- connected.** Do not make connections of generator leads T1, T2, T3, and T4 to the terminal bored. Tie together generator leads T2 and T3. Apply a 12 volt DC power supply to generator leads T1 and T4 and check the main stator as in (a) above.

3. Main Rotor. Disconnect the two main rotor leads from the rotating rectifier assembly. Applying a DC power supply to the two main rotor leads should result in alternating north and south poles. Use an impedance test to determine shorted turns in the pole widings.

ROTATING RECTIFIER ASSEMBLY – FIGURE 2

The rotating rectifier assembly consists of two full wave molded bridge rectifiers mounted on the exciter rotor core with cap screws. Each molded bridge consists of a Positive (-) terminal, a Negative (-) terminal, and two AC terminals marked with an AC sine wave symbol. Test equipment can be a battery powered continuity checker, an ohmmeter, or a multimeter with a diode checker mode. To test the molded bridge rectifiers. Remove all external leads from the bridge terminal posts.

Figure 2 ROTATING RECTFIER ASSEMBLY



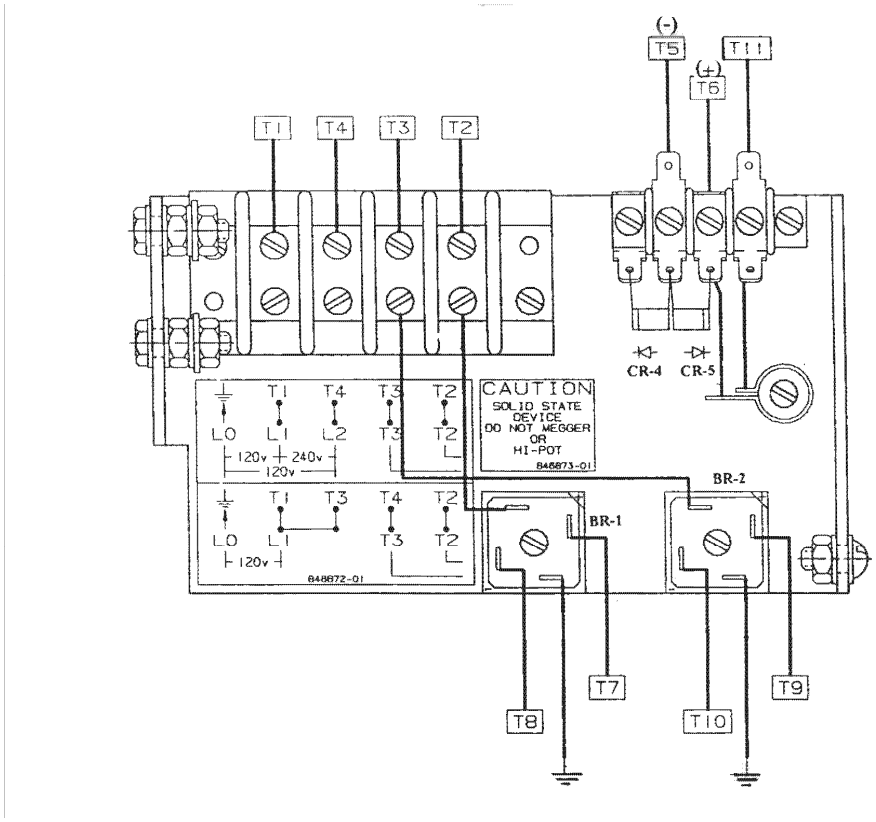
1. Apply one probe of the tester to the Positive (+) terminal of the bridge, and the other probe to each of the two AC terminals in succession. The readings should be identical. That is: if a battery-light checker is used, you should see either a light, or no light with the second probe in contact with each AC terminal. Reverse the tester probes such that the probe that was affixed to the (+) terminal is now used to make contact with the AC terminals, and the probe that was used to contact the AC terminals is now affixed to the (+) terminal. The readings should be identical, but opposite from those observed in the first procedure. That is, if the bttery-light checker showed a light the first time it should show no light this time (or vice versa). The same will not be true for an ohmmeter or diode tester. A low or near zero reading the first time should result in an infinity reading with the probes reversed, or an infinity reading the first time should result in a low or zero reading with the probes reversed. If these tests do not result in proper readings, the bridge should be considered defective.

2. Repeat the above test procedure using the Negative (-) bridge terminal as the reference. As in step 1 above, if this procedure does not result in the proper readings, the bridge should be considered defective. Repeat both procedures on the

second bridge assembly. If either bridge assembly tests defective, good practice would be to replace both bridges, not just the defective bridge. The reasoning behind this is that both bridge assemblies are essentially the same circuit, and should have been exposed to the same stresses. If one bridge has been stressed to failure, the second bridge should be considered “suspect”.

STATIONARY RECTIFIER ASSEMBLY

Figure 3



1. Open or shorted diode.

A. Shunt Diodes CR-4 and CR-5 may be checked without being disconnected. When checking these diodes while still connected, they will not show infinity in the reverse direction as when disconnected, but they will indicate a definite difference in resistance when checked in each direction. Both diodes CR-4 and CR-5 must be unsoldered from the terminal strip to be checked as individual diodes.

B. Bridge rectifiers BR1 and BR2 are the same single phase full wave bridge rectifiers as used in the rotating rectifier assembly, and are tested as described in the paragraph above- Rotation Rectifier Assembly. (See Figure 2)

2. Diode Polarity

A. Diodes CR-4 and CR-5 are “pigtail” type diodes. The leads of these diodes are connected to the small terminal strip on the stationary rectifier assembly as shown in Figure 3. Not that the lead opposite to the tapered or banded end of both CR-4 and CR-5 are soldered to the terminal to which generator lead T5 is affixed.

B. Bridge rectifiers BR-1 and BR-2 have the polarities marked as shown in Figure 2.

SERVICE PROCEDURE- RESTORING RESIDUAL MAGNETISM

The 4 lead single phase Lima ® MAC generator requires approximately 12 volts DC to restore the residual magnetism (flash the field) This DC voltage is applied to generator leads T5 and T6 affixed to the small terminal strip on the stationary rectifier assembly. See Figure 3 above. Lead T6 is positive (+) and lead T5 is negative (-) These two leads are connected to the terminal tabs on the small rectifier assembly. When flashing the field with the leads secured to the terminal strip. **USE AN UNDERGROUNDED 12 VOLT DC SOURCE.** If the only source of DC is a grounded source such as a cranking battery with the negative grounded, leads T5 and T6 must be lifted from the terminal stip prior to flashing. Apply the 12 volts directly to those two leads. Negative (-) to lead T5 and positive (+) to lead T6. Field flashing of the 4 lead single phase Lima®MAC generator requires approximately 12 volts DC to restore the residual magnetism (flash the field) This DC voltage is applied to generator leads T5 and T6 affixed to the small terminal strip on the stationary rectifier assembly. See Figure 3 above. Lead T6 is positive (+) and lead T5 is negative (-). These two leads are connected to the terminal tabs on the small rectifier assembly. When flashing the field with the leads secured to the terminal strip. **USE AN UNGROUNDED 12 VOLT DC SOURCE.** If the only source of DC is grounded source such as cranking battery with the negative grounded, leads T5 and T6 must be lifted from the terminal strip prior to flashing. Apply the 12 volts directly to these two leads. Negative (-) to lead T5 and positive (+) to lead T6. Field flashing of the 4 lead single phase Lima®MAC generator may be accomplished with the unit at rest or while it is running.

TROUBLE SHOOTING – PROBLEMS AND POSSIBLE CAUSES WILL NOT GENERATE A VOLTAGE

1. Loss of residual magnetism

A. Flash the field. See restoring residual magnetism above.

2. Open Main Rotor

A. Cut winding
B. Open inter-pole connections.
C. Leads not properly brazed.

3. Rotating Rectifier Assembly.

A. Shorted or open diode

B. Loose, or improperly crimped flag terminal lugs on main or exciter rotor leads
C. Flag terminals loose or not securely seated on bridge rectifier terminals

4. Shunt Rectifier (CR-4, CR-5) See Figure 3.
A. Open or shorted diode
B. Either CR-3 or CR-4 (or both) connected backwards.

6. Open Exciter Rotor
7. Open Voltage Adjust Resistor

8. Exciter Rotor.
A. Open or grounded winding
B. Connections to diode bridge assembly not proper.

GENERATOR PRODUCES LOW VOLTAGE.

1. Rotating Rectifier Assembly.
A. Open diode
B. Loose crimps on flag terminal, or loose connection. See 2. D above.

2. Mis-alignment of rotor and stator. Single bearing units. Check XG dimension
3. Exciter rotor – rectifier assembly connected wrong
4. Improperly rewound main or exciter stator

HIGH VOLTAGE.

1. Main stator tap T11 is improperly installed. (Stator improperly rewound.)
2. Improperly wound main or exciter stator. Improper number of turns in the winding

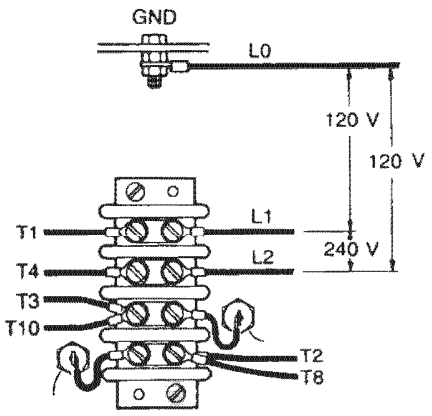
VOLTAGE PROPER AT NO LOAD, COLLAPSES UNDER LOAD.

1. Shunt leads T5 and T6 are reversed on the terminal strip
2. Series leads T7 and T8 or T9 and T10 are reserved on the terminal strip.
3. Series rectifier bridge BR-1 and/or BR-2 are shorted, or improperly connected

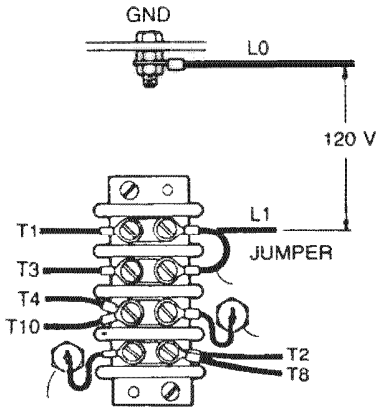
VOLTAGE ADJUSTER RESISTOR BURNS OUT WHEN FLASHED, OR DURING TEST

1. R-5 is shorted or connected backwards

EXTERNAL CONNECTIONS



240/120 Volt 2 or 3 Lead Service



120 Volt 2 Lead Service