



## LIMA<sup>®</sup> MAC TROUBLESHOOTING WORK SHEET

### CALLER INFORMATION

Date: \_\_\_\_/\_\_\_\_/\_\_\_\_ Caller: \_\_\_\_\_ Company: \_\_\_\_\_  
Phone: \_\_\_\_/\_\_\_\_/\_\_\_\_ Fax: \_\_\_\_/\_\_\_\_/\_\_\_\_ E-mail \_\_\_\_\_  
Location: \_\_\_\_\_ Is Caller: ☐ **Original Purchaser** (Marathon Customer)  
☐ **Current Owner** ☐ **Service Shop** If asked to call Site: Site Contact:  
Name \_\_\_\_\_ Phone: \_\_\_\_/\_\_\_\_/\_\_\_\_ Location \_\_\_\_\_  
Does Caller consider problem to be under Warranty? **Yes** ☐ **No** ☐ If yes refer to Warranty Service Department. Ext 8237. This form may be used to start an NMR.

### GENERATOR & APPLICATION DATA:

Part No.: \_\_\_\_\_ Serial No.: \_\_\_\_\_ Frame Size: \_\_\_\_\_ No. Bearings \_\_\_\_\_  
kW: \_\_\_\_\_ Hz: \_\_\_\_\_ Phase: \_\_\_\_\_ #Leads: \_\_\_\_\_ System Voltage: \_\_\_\_\_ Duty: Prime Power ☐ Stby ☐  
Unit Age or hours of operation. \_\_\_\_\_ If two bearing generator, how driven? **Direct Drive** ☐ **Belt Driven** ☐  
Connection: { **Wye: High** ☐ **Low** ☐ } { **Delta: High** ☐ **Low** ☐ } { **Zig-Zag: High** ☐ **Low** ☐ } **Dbl Delta** ☐ **4 Ld 1 Ph.** ☐  
If Serial Number is 120530 or higher, Invoice Number and MEMC Customer name is in AS400 – (MEBS) **Invoice** \_\_\_\_\_  
Application Definition: \_\_\_\_\_

### SYMPTOMS/FAILURE MODE:

### TROUBLE SHOOTING QUESTIONS AND ADVICE:

Has generator speed been confirmed? **Yes** ☐ **No** ☐ Advice that both voltage and frequency functions of generator shaft speed. LIMA<sup>®</sup> MAC generators usually require a minimum of 1350 PM to allow build up of voltage. For 440 Frame and large MAC units, minimum build up speed is in the area of 1600 RPM. Suggest a hand held tachometer or strobe be used to confirm RPM.

Did failure occur during operation? **Yes** ☐ **No** ☐ If yes: Was there Smoke/Fire/Sparks? **Yes** ☐ **No** ☐ If yes, suggest taking unit to service shop. If no, suggest check rectifiers. If at start-up, had the unit been in storage for a period of time prior to attempted start-up? Suggest flashing the field. Check rectifier assembly.

Is there residual voltage? **Yes** ☐ **No** ☐ If yes, what is it line-to-line? \_\_\_\_\_ Is residual voltage balanced between phases? **Yes** ☐ **No** ☐ If yes, most likely not a problem in the stators. Try flashing. If no, check connections. If all O.K., suggest possible main/exciter stator problem – take to service shop.

Did voltage decay more or less slowly over a period of time? **Yes** ☐ **No** ☐ If yes, suggest possible main rotor problem. Take to service shop.

Is voltage good at no load, but decays under load? **Yes** ☐ **No** ☐ If yes, check engine speed, perhaps fuel system problems or overload. If two bearing belt driven, check for belt slippage. Check series interconnections between exciter stator and main stator. Look for corroded or poor junctions, broken or chaffed leads, etc. Check load – possible very low power factor load.

Does main stator show a definite burn pattern over the entire winding? **Yes** ☐ **No** ☐ If yes, does it appear as though one entire phase has been overloaded? **Yes** ☐ **No** ☐ If yes, have customer check load leads from generator to circuit breaker. Possible fault in leads. This is most common in irrigation applications where circuit breakers are in pivot panel, not at generator



## SELF VOLTAGE REGULATED TYPE LIMA<sup>®</sup> MAC GENERATOR TROUBLE SHOOTING GUIDE

### CAUSE

### CHECK & REMEDY

#### SYMPTOM – NO VOLTAGE

**UNDERSPEED** – MAC generators will not achieve initial voltage build-up much below 1500 RPM.

**LOSS OF RESIDUAL VOLTAGE** – Residual magnetism is provided by permanent magnets embedded in the main rotor poles. This may be lost by exposure to a strong external magnetic field from any source such as lightening, or if the unit has been in storage for an extended period of time. In addition, disassembly for service may also result in loss of residual magnetism.

**DEFECTIVE DIODES IN RECTIFIER ASSEMBLY**

**OPEN, OR CORRODED INTERCONNECTIONS,** - Interconnections, or interconnecting lead wire problems.

**FAULTY WINDING** – Open, grounded, or shorted winding, rewind damaged winding as necessary.

**VERIFY SPEED** – Measure RPM with either hand held tachometer or strobe. Adjust prime mover speed as necessary.

**FLASH FIELD** – A momentary short circuit of any two is generator output load leads should be sufficient to correct this condition. Do not make solid connection, just brush the leads together. Consult service manual for complete procedure instructions.

**CHECK RECTIFIER ASSEMBLY** – Replace or repair assembly. If individual diodes are replaced, replace all 6 diodes.

**INSPECT AND REPAIR AS REQUIRED.**

**CHECK WINDINGS** – Test for open, grounded or shorted windings. If winding is burned, check burn pattern. Repair, rewind, or replace defective winding.

#### SYMPTOM – LOW VOLTAGE

**UNDERSPEED**- MAC volts-per-hertz characteristics causes voltage to decrease in direct proportional to decrease in RPM.

**OVERLOAD**- MAC voltage will tend to droop with overload, especially if overload exceeds 10%. In addition, the prime mover may be losing speed with overload causing voltage to droop.

**LOW LAGGING POWER FACTOR**- Load power factor is considerably lower than 0.80 lagging, and MAC excitation system is under-compounding.

**CORRODED INTERCONNECTIONS**- Interconnections between main and exciter stators have corroded and become high resistance connections.

**FAULTY DIODES**- If a shorted diode exists, DC voltage imposed upon main rotor will be reduced to approx 67% of normal.

**VERIFY AND ADJUST RPM**- See No Voltage above.

**REDUCE LOAD**

**CORRECT POWER FACTOR**- Add power factor correction capacitors as needed.

**REPAIR**- Break apart junctions and rejoin.

**REPAIR OR REPLACE**- Replace rectifier assembly, or repair by replacing all 6 diodes on the assembly.