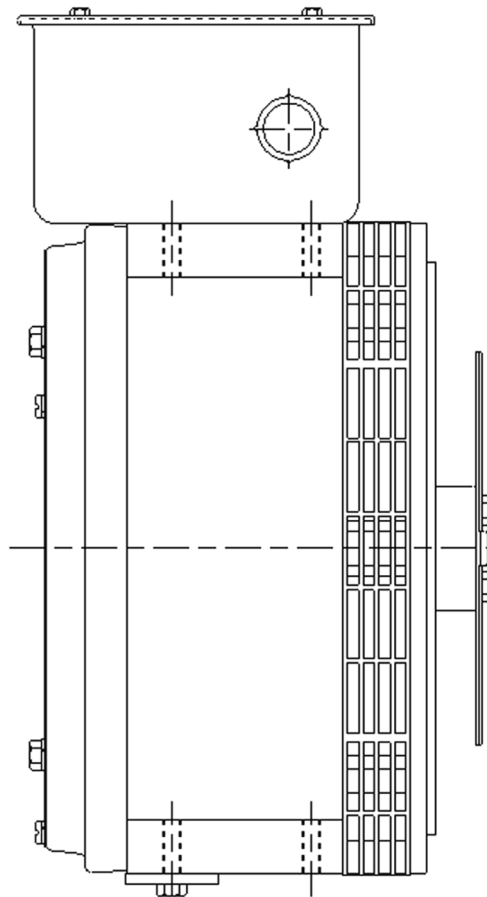


PANCAKE CAPACITOR GENERATOR

Installation, Operation, and Maintenance Manual



 **MARATHON[®]
ELECTRIC**
A Subsidiary of Regal-Beloit Corporation

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INTRODUCTION

Thank you for choosing a Marathon Electric Capacitor Generator.

Please read the installation and service sections of this manual carefully before starting the generator. A clean environment and proper installation are as critical to generator performance as the engineering of the internal components. If you have any difficulty installing or servicing your Marathon generator, our service and technical staff will be happy to help you. We are confident that by following these guidelines, you will get many years of reliable service from your Marathon generator.

General Data

Construction:	Capacitor Excitation
Speed:	60 Hz 1850 rpm at no load 1800 rpm at full load 50 Hz 1550 rpm at no load 1500 rpm at full load
Air cooled	
Max. Ambient Temp.	40°C
Insulation:	Class F
Voltage Response	0.1 sec.

Capacitor generators are designed to operate at a specific frequency. For 50 hertz units, consult with the factory for model selection.

Initial Inspection

Your Marathon generator has been carefully inspected and tested before leaving the factory. However, it is wise to examine the generator before installation. Carefully unpack and examine the generator. If there is any damage, file a damage claim with the shipper or agent immediately. Save all packaging materials for inspection by agent.

SAFETY

PLEASE REMEMBER SAFETY FIRST. If you are not sure of the instructions or procedures contained in this manual, seek qualified help before continuing. **When in doubt, ask.**

This manual emphasizes the safety precautions necessary during the installation, operation, and maintenance of your Capacitor generator. Each section has caution and warning messages. These messages are for your safety, and the safety of the equipment involved. If any of the cautions or warnings are not readily understood, seek clarification from qualified personnel before proceeding.

Before any service work is done, disconnect all power sources and, where appropriate, lock out all controls to prevent an unexpected start-up of the generator set driver. Proper grounding (earthing) in compliance with local and national electrical codes and standards must be provided. These safety precautions are necessary to prevent potential serious personal injury or even death.

The hazards associated with lifting or moving your generator are pointed out in the installation and service sections. Incorrect lifting or moving can result in personal injury or damage to the unit.

Prior to start-up of the unit ensure that all generator leads are properly connected and insulated. **Always assume that there will be voltage present at the generator**

terminals whenever the generator's shaft is rotating and proceed accordingly.

Use extreme caution when handling capacitors. A potential shock condition exists even when the engine has shut off. See page 4 for the proper handling of capacitors.

This manual is not intended to be a substitute for properly trained personnel. Installation and repairs should only be attempted by those qualified and trained. The cautions and warnings point out known conditions and situations that are potentially hazardous. Each installation may well create its own set of hazards. No manual can cover every possible situation.

INSTALLATION

Location/Environment

The engine-generator set must be installed in a protected environment, with a minimal exposure to fumes, moisture, dust, and dirt.

THE OUTSIDE AIR TEMPERATURE MUST NOT EXCEED 40°C (104°F) FOR CONTINUOUS DUTY USE.

- DO NOT obstruct the generator intake and outlet air passages.
- Provide sufficient air circulation around the set to remove engine heat and to provide ample generator cooling.
- Hot air from the engine radiator must not enter the generator.
- Check the mounting surface to be sure that it is rigid enough to keep vibration and noise to a minimum.

Base Mounting

Mount generator securely. Before tightening hold-down bolts, use shims as necessary under the generator feet for uniform support. If this is not done, the frame may become distorted resulting in excess vibration that could damage the generator.

Mechanical Mounting (Refer to Figure 1):

To mount a single-bearing capacitor generator to an engine:

- If connected, disconnect the positive (+) terminal from the engine cranking battery.
- Place a jack or other support under the engine flywheel housing.
- Remove the pot cover from the back of the generator and disconnect all incoming power leads.
- Remove the exhaust screen band.
- Place a strap around generator rotor assembly and support from hoist.

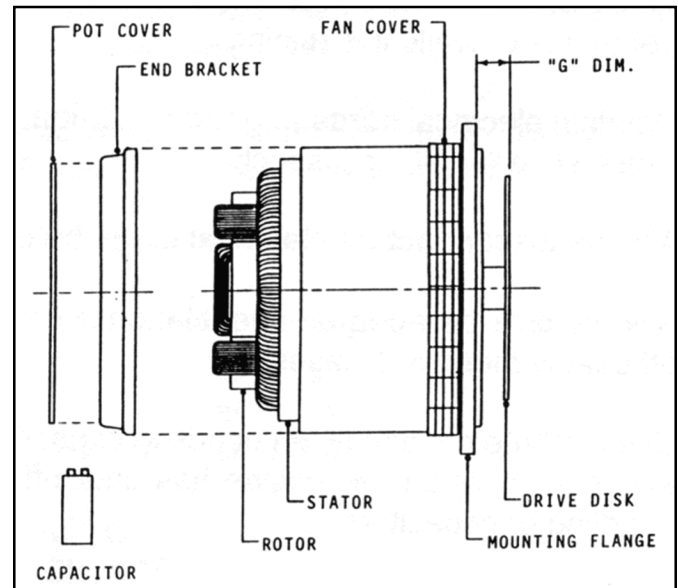


Figure 1 – General Assembly

- Pull the rotor assembly from the frame. **CAUTION:** Do not scratch or cut the copper stator winding when removing rotor.
- Bolt the rotor assembly's drive disc to the engine flywheel, using the proper size flat washers and S.A.E. grade 8 bolts. Torque the drive disc mounting bolts to the engine manufacturer's specifications.
- Push the generator frame assembly carefully back over the rotor. Mount the frame assembly to the engine flywheel housing with the proper size bolts, lock washer, and nuts.
- Remount the exhaust screen band.
- Reconnect all incoming power leads. See the wiring diagram supplied with this manual.
- Remount the pot cover and fasten securely.
- Remove the jack support from under the engine flywheel housing.
- Reconnect the positive (+) terminal lead to the engine cranking battery.

Electrical Connections

For electrical connections, see connection diagrams on page 7. Ground (earth) the generator frame and neutral lead in accordance with all National and Local Electrical Codes. **Failure to properly ground (earth) the generator could result in severe personal injury or even death!**

NOTE: Be sure that ALL electrical connections are correct before starting generator.

OPERATION

Initial Start-up

- a. Carefully inspect the generator before start-up. Check all electrical connections, and ensure that all bolts have been securely fastened.
- b. Rotate the shaft. The shaft and rotor assembly should turn freely. **Do not use the fan as a fulcrum to bar over the unit.**
- c. Start engine. See the engine manufacturer's operating manual for proper engine starting procedures.
- d. Check vibration. If excessive, check all mechanical connections.
- e. The generator voltage is adjusted at the factory to a specified speed; however, it is advisable to verify upon installation.

GENERATOR SPEED

Rating	No Load rpm	Minimum Full Load rpm
60 Hz	1800 – 1850	1800 less 1%
50 Hz	1500 – 1550	1500 less 1%

- f. Observe and record the generator voltage at no load and at full load. Immediately after start-up (cold) and after 30 minutes of full load (hot). The voltage is easily adjustable by adjusting the engine speed. The voltage will increase as the generator rpm is increased.
- g. If voltage cannot be adjusted, see the section on TROUBLE SHOOTING, page 6.
- h. Check the temperature rise after running for 30 minutes at full load. If excessive, examine the generator for the following:
 1. Obstructed air flow
 2. Hot air feeding into the inlet of the generator
 3. Bypassed air (air not pulled through generator)
- i. Examine ratings and actual load applied to determine if the generator rating may be too low for the load applied.

The ambient temperature must not exceed 40°C. (104°F). For operation at higher ambient temperatures, reduce the generator kW rating 1% for each degree above 40°C. For operation at high altitudes, reduce the generator kW rating 2% for each 1000 ft above sea level.

Frame temperatures above 60°C. (140°F) are too high, indicating a temperature rise in the copper windings of 105°C (121°F) or more.

Capacitor Excitation/Voltage Regulation

A single capacitor is used to regulate the voltage to within 5% of the rated load. Use extreme caution when handling capacitors. The capacitor will still contain high voltage even after the engine has stopped operating.

Always discharge the capacitor before handling. Use an insulated conductor (jumper wire) or a screw driver with an insulated handle to short across the capacitor terminals, and discharge the capacitor prior to handling.

MAINTENANCE

Periodic Inspection

Clean and inspect generator after every 200 hours of normal operating time. If the generator is housed in a harsh environment, it is advisable to clean and inspect the unit more frequently. If dirt and grease is allowed to build-up, the generator will run hotter, lose efficiency, and reduce the life of the generator.

Remove pot cover to examine the rotor, shaft, and bearing for excessive wear. Replace the bearing after 10,000 hours of normal operating time or sooner if wear is evident.

Cleaning

Remove all dust, dirt, and oil and grease build-up from external surfaces. Use a low-pressure air hose (25-psi maximum) to blow dirt and grease from the internal components through the fan opening. Clean inside the control box. Check for loose or damaged lead wires and loose components mounted in the box.

NOTE: Do not remove any internal generator parts or warranty is void.

SERVICE

Flashing the Rotor - Refer to Figures 2 and 3

NOTE: Do not run the generator during this operation.

- a. Disconnect all incoming power leads to the generator.
- b. Connect the (+) lead of a 12 volt battery to the "R" connection.
- c. Connect the (-) lead of the battery to the rotor shaft.
- d. Disconnect battery leads.
- e. Check the generator no load terminal voltage. It should be within $\pm 10\%$ of rated value.

- f. If residual voltage is normal, the capacitor is defective and should be replaced.

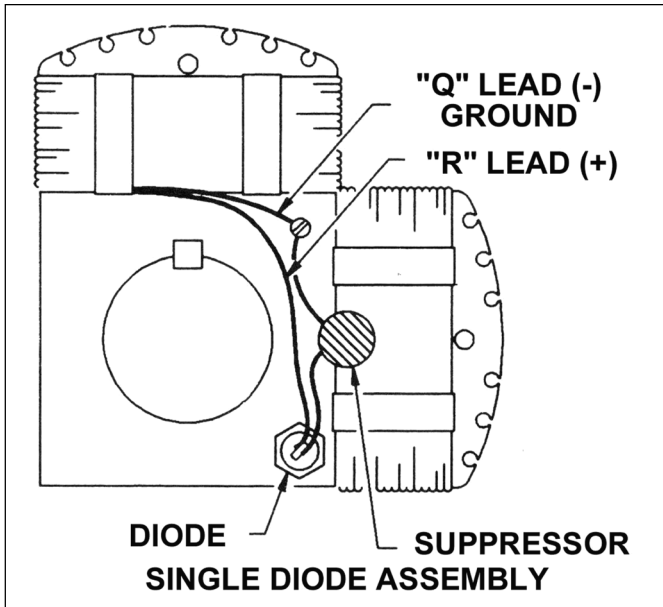


Figure 2

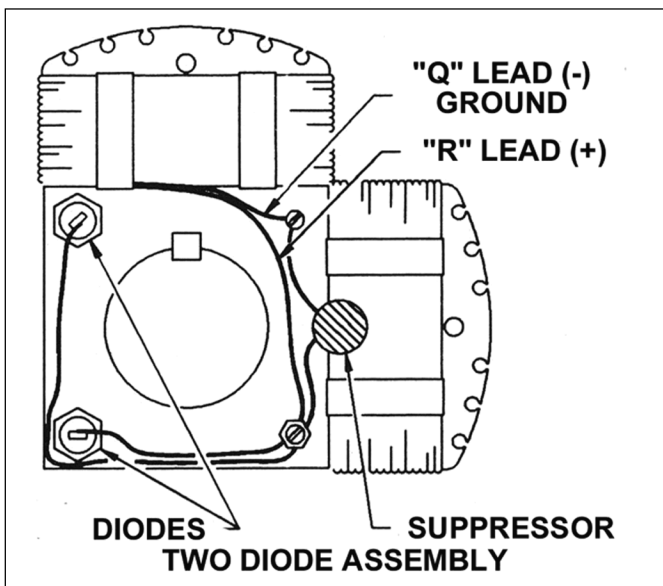


Figure 3

Checking the Capacitor Charge

- Check the capacitor "charge and discharge" readings using an ohmmeter on the RX-1000 scale.
- Place the ohmmeter leads on the capacitor terminals one at a time. A meter deflection should be seen (charging), followed by a slow return to infinity (discharging).
- Reverse the ohmmeter leads and repeat the procedure. The results should be the same. No meter deflection or continuity indicates a defective capacitor. Replace the device.

Checking Diodes

- Check each diode individually by removing the (+) rotor lead stud connection (see Figures 2 and 3). Diodes are good if the resistance reading is approximately mid-scale on the lowest ohm rating.
- Check for leakage in each diode by reversing their polarity. Diodes are good if the resistance reading is infinite. A faulty diode will give a resistance value of zero.
- Prior to installing a replacement diode, clean the surface of the exciter rotor core, and run a bead of a thermal-electrical compound around the base of the diode. The diode threads should not be coated.
- Torque the diode base to 20–30 in-lb. **Do not over torque the diode base.**

Ordering Parts

When ordering parts, always include the name and quantity of each part along with the serial and model numbers from the generator nameplate.

For parts ordering information, contact:
 Marathon Electric Manufacturing Corporation
 100 E. Randolph St.
 P.O. Box 8003
 Wausau, WI 54402-8003
 Phone: 715.675.8257
 or: 800.477.6362, ext. 8257

RETURNED GOODS

Consult Marathon Electric Manufacturing Corporation for authorization before returning any product. We cannot be responsible for any items returned without authorization.

CAUTION: Single bearing generators must have their rotor assembly properly secured to prevent damage during transit to the factory, or to an authorized service center.

TROUBLE SHOOTING

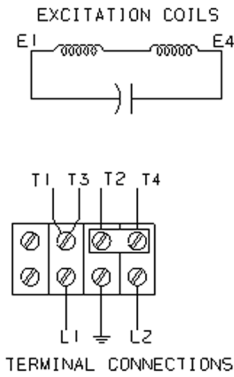
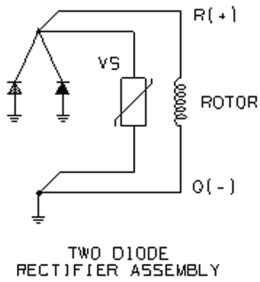
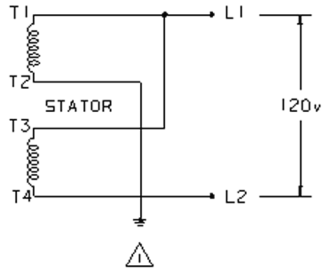
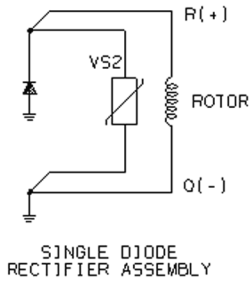
Visual Examination

Inspect the generator visually. Look for obvious damage such as: Charred windings, pinched wires, cracked insulation, loose terminal lugs, etc. All connections should be fastened securely. Check the operating speed and see that the unit has been reassembled and reconnected correctly.

SYMPTOM	CAUSE	SOLUTION
<i>Will not hold voltage - Loss of residual magnetism</i>	Unit has been stored. Rotor shorting out when unit gets hot. Pinched leads. Defective Capacitor. Defective Diodes Defective Surge Suppressor.	Flash Rotor (see SERVICE section). Check rotor windings for broken or burned wires. Examine all lead wires and correct. Replace. Replace. Replace.
<i>Full voltage at no load Voltage drops at full load</i>	Loose or broken lead wires. Rotor opened or shorted. Stator ground or shorted.	Check lead wires and connections for broken wires and loose connections. Compare connections with the wiring diagram supplied with generator. Measure resistance between leads. Consult Factory.
<i>Low Voltage</i>	Loss of residual magnetism. Low engine speed. Faulty diode.	Flash Rotor (see SERVICE section). Check engine speed and generator ratings. 1800 rpm/60 Hz Replace diode.
<i>Voltage too high</i>	Fast engine speed.	Check engine speed and generator ratings. 1800 rpm/60 Hz
<i>Uncontrollable voltage</i>	Incorrect engine adjustment.	Check engine operation, speed, fuel lines & injector.
<i>No voltage at no-load or full-load</i>	Faulty suppressor.	Disconnect from circuit. If there is an obvious increase in voltage, replace the suppressor.
<i>Voltage spikes appearing in sine wave</i>	Incorrect engine adjustment, fuel line, or poor gas. Loose connection. Bad ground connection. Load induced.	Change fuel filter and check engine speed. Inspect all connections. Inspect all ground connections. Filter load.

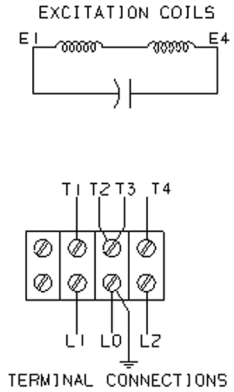
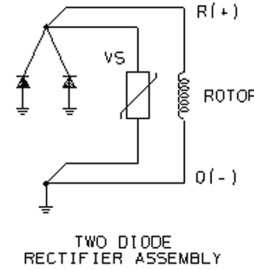
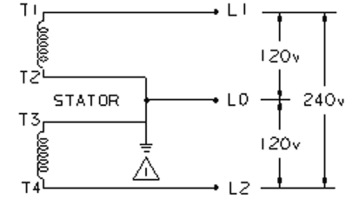
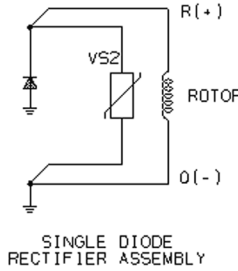
CONNECTION DIAGRAMS

120 VOLT CONNECTION



⚠
GENERATOR FRAME TO GROUND (EARTH)
CONNECTION MUST BE MADE IN ACCORDANCE
WITH NATIONAL AND LOCAL ELECTRICAL CODES.

240/120 VOLT CONNECTION



⚠
GENERATOR FRAME TO GROUND (EARTH)
CONNECTION MUST BE MADE IN ACCORDANCE
WITH NATIONAL AND LOCAL ELECTRICAL CODES.

Marathon Electric Mfg. Corp.
100 East Randolph Street
P.O. Box 8003
Wausau, WI 54402-8003
Phone: (715) 675-3359
Fax: (715) 675-8026