XM3-HP™ Power Supply Oil Capacitor Troubleshoot & Replacement

Overview

During normal (utility) operation, the XM3-HP™ power supply utilizes a ferroresonant transformer and an AC oil capacitor to form the resonant tank circuit. This circuit provides excellent noise and spike attenuation, output short-circuit current-limiting, and output voltage regulation.

The symptom of low output voltage or output failure on the XM3-HP power supply may be attributed to a failing AC oil capacitor in the power supply tank circuit. The AC oil capacitor includes a pressure-limiting interrupter that will break the electrical contact to one electrode. This is a normal failure mode, signaling the component has reached end of life.

CAUTION!

Only qualified personnel should perform this task.

WARNING! ELECTRICAL HAZARD

The oil capacitor poses a risk for electrical shock. Caution should be taken when handling the oil capacitor during the replacement process.

NOTICE:

For supplemental troubleshooting information, refer to the XM3-HP™ CableUPS Technical Manual *(Alpha p/n 017-882-B0-001)*.

NOTICE:

For an accurate voltage reading, only use a true RMS AC voltmeter. Voltages read remotely or on the display cannot accurately be used to determine if the oil capacitor is failing.

Troubleshooting

With a true RMS AC voltmeter, measure the AC Output 1 or 2 of the XM3-HP power supply while the unit is connected to the broadband network and running in Normal Mode. If output voltage is below 84V for 89V configured units, or below 59V for 63V configured units, this indicates that oil capacitor may be failing. For verification, place the power supply in Self Test (battery) mode, which does not utilize the oil capacitor, and check the output voltage to see if it returns to the configured (63 or 89VAC) voltage. If the measured output voltage increases closer to the configured 63 or 89VAC in battery mode, the AC oil capacitor has likely failed. The power supply should be replaced and returned to an authorized repair facility.

It is also possible to replace the oil capacitor with the following procedure. Contact Technical Support at +1 800-863-3364 for details on the replacement oil capacitor. The serial number of the XM3-HP power supply will be required.

Tools Required:

- True RMS Voltmeter
- #2 Phillips-head screwdriver (long 8+ in (200+ mm) shaft is recommended)
- Torque screwdriver
- 5/16 in (8 mm) Open end wrench or socket
- Capacitor discharge pen (recommended)
- Electrical insulating gloves (recommended)

Procedure:

1. Completely shut down the power supply; verify all power is removed including the utility input power and battery input power. For safety, all connections and cables must be removed from the power supply. To maintain output power to the broadband network, consider using the APP9015S or APP9022S service power supply while performing service to the XM3-HP™ power supply.
2. Remove Inverter Module and locate the oil capacitor **(Fig. 1)**.

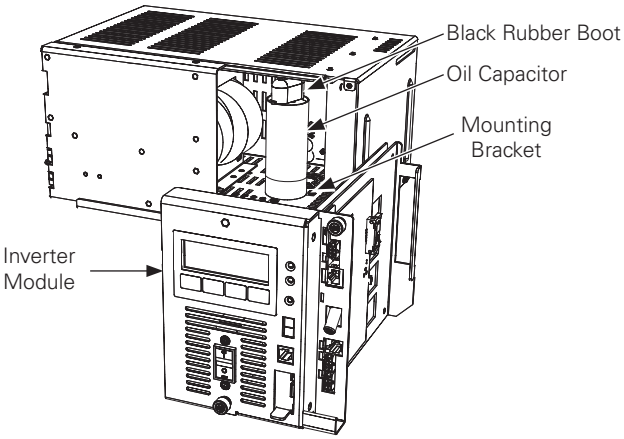

Fig. 1, Removing Inverter Module

WARNING! ELECTRICAL HAZARD

Do not touch the capacitor terminals. To prevent electrical shock, wear insulated gloves when handling the oil capacitor.

3. Slide the black rubber boot up the capacitor wires to expose the wire connectors. Be careful to not to not touch the capacitor terminals due to potential shock hazard. Using electrical insulated gloves is recommended.
4. In a typical de-powered unit, the transformer winding should be shorting out the cap to discharge it and zero volts should be the norm. Using the true RMS meter, measure between the terminals of the capacitor to ensure the voltage is zero. If the voltage is not zero, apply a capacitor discharge pen **(Fig. 2)** until the voltage drops to zero.
   Note: If the terminals are not easily accessible, loosen the Philips-head clamping screw **(Fig. 3)** and rotate the oil capacitor until the terminals are accessible.

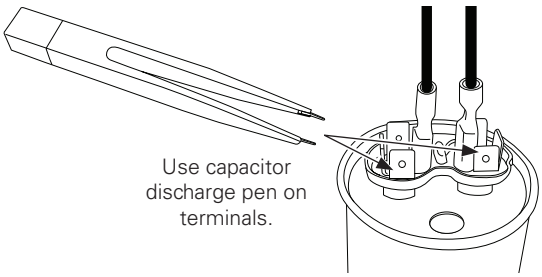

Fig. 2, Capacitor Discharge Pen

NOTICE:

These capacitors can store up to 660VAC, so it may take a few seconds to discharge completely. Please note, there are other methods to discharge a capacitor such as using an insulated screw driver across both terminals simultaneously. Please consult with your company's best practices and procedures.

5. If not done in the previous step, loosen, but do not completely remove the Phillips-head clamping screw of the mounting bracket (**Fig. 3**), then pull the oil capacitor straight up from its mounting bracket.

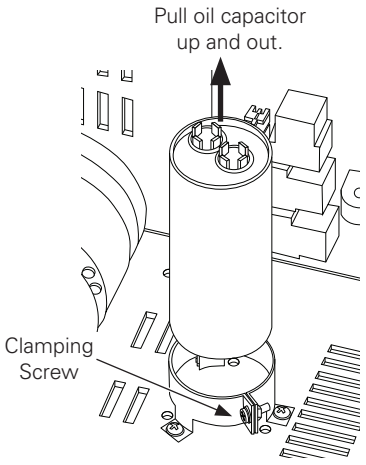

Fig. 3, Replacing Oil Capacitor

6. Remove the two wires from the top of the oil capacitor spade connectors. If using small pliers to assist in removing the wires, DO NOT squeeze or deform the rolled ends of the connectors. Grab the crimped area over the wire and pull straight off.

NOTICE:

The wires and connections are not polarized and can be attached to either terminal. The oil capacitor label should face forward.

7. Repeat Step 4 to discharge the new replacement capacitor to ensure the voltage is zero before installing.
8. Connect wire (A) to the new replacement oil capacitor from the transformer and connect wire (B) to oil capacitor from P13 on the power distribution PCBA as shown in **Fig. 4**. Ensure that both wires shown in **Fig. 4** are not connected to the same group of capacitor terminals (this would short circuit the winding).
9. Re-install the black rubber boot over the new oil capacitor terminals as shown in **Fig. 5**.
10. Verify no wires are routed around the right side of the oil capacitor that would interfere with inserting the inverter module.
11. Install the new oil capacitor into its mounting bracket and tighten the clamping screw. Torque to 15 in-lb.
12. Replace the inverter module.
13. Reconnect all the connections to the power supply that were disconnected in Step 1.
14. Turn the power supply back on, allow it to reach Normal Mode, and verify no alarms are present.
15. Measure the output voltage as noted in the troubleshooting section above.
16. Start the Self Test, verify no alarms are present, and repeat the measurement.
17. Procedure is complete.

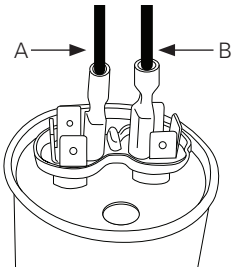

Fig. 4, Connecting Oil Capacitor

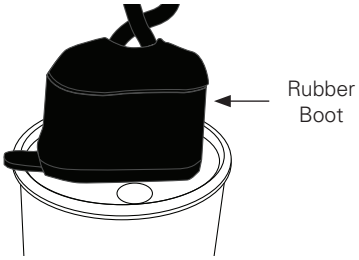

Fig. 5, Rubber Boot on Oil Capacitor Terminals

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