

# **FX-Class and FXR-Class Inverter/Charger Service Instructions**

## **Purpose and Scope**

These instructions detail how to remove and replace the following parts of any FX-class or FXR-class inverter/charger.

- Control Printed-Circuit Board Assembly (PCBA)
- AC Printed-Circuit Board Assembly (PCBA)
- FET Printed-Circuit Board Assembly (PCBA)
- Ribbon Cables

These instructions extend to all FX, FXR, VFX, VFXR, GTFX, GVFX, and GFX models, including all mobile and international models.

## **Tools Required**

- #2 Phillips screwdriver
- 3/8" flat blade screwdriver
- 4mm hex wrench (included)
- Strap wrench
- Long-nose pliers
- 10mm socket with 12" extension & torque wrench
- 10mm wrench (standard and torque)
- Power supply (9-volt batteries may be used)
- Voltmeter or DVM

## **Disassembly**

This procedure describes the removal of all circuit boards in an FX-class or FXR-class inverter. The exact steps and order may vary with the repairs needed.

The order of removal depicted here is:

1. Control PCBA
2. AC PCBA
3. FET PCBA

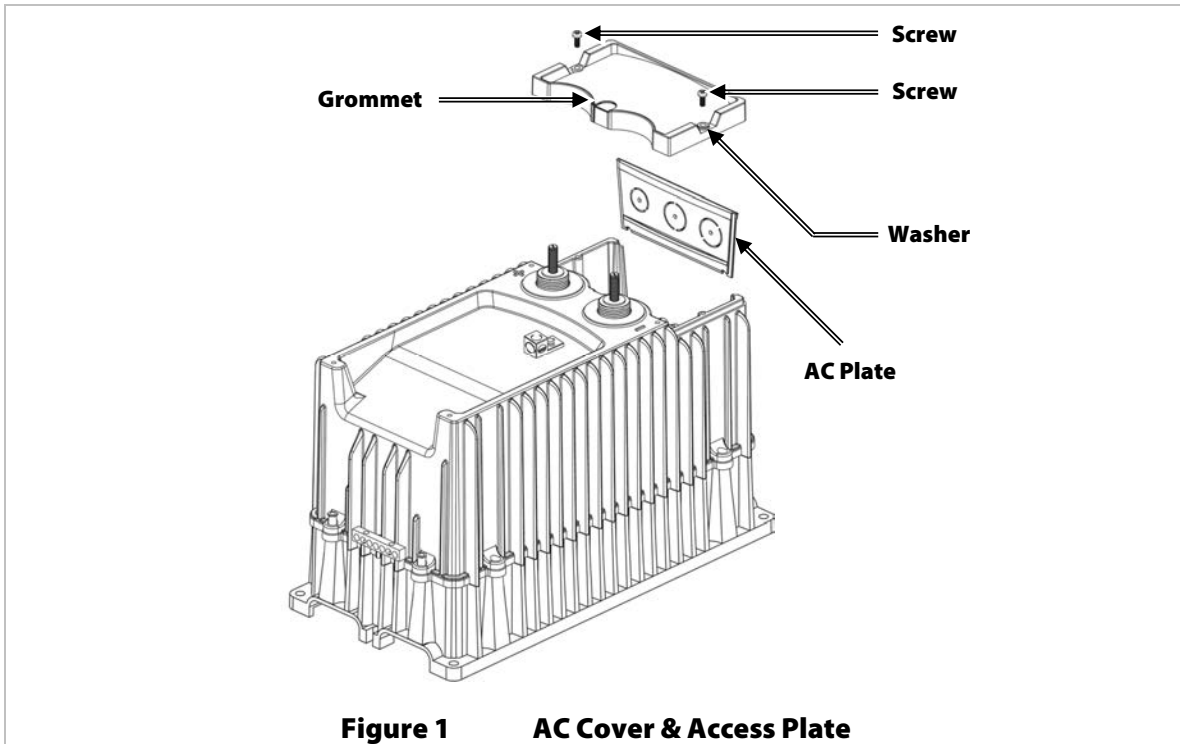
If not all boards need to be replaced, the installer may proceed through the steps that are required and ignore the subsequent disassembly. (Note that replacing the AC PCBA requires removal of the Control PCBA regardless of any other steps.)

The installer should then proceed to the reassembly and testing steps, which begin on page 7.

## FX-Class and FXR-Class

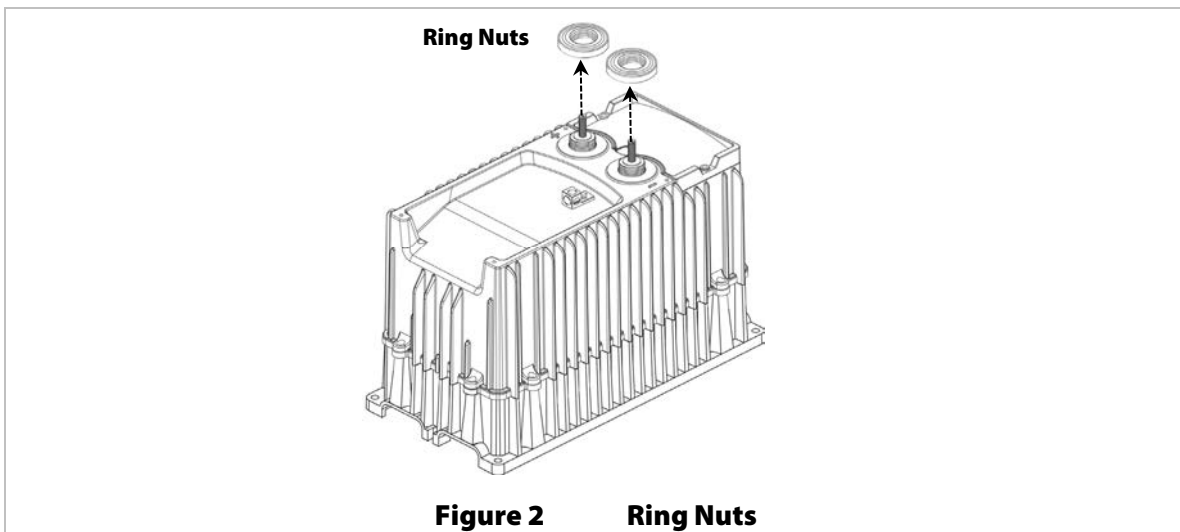
### To disassemble the inverter:

1. Disconnect power; turn off all DC and AC sources to the inverter.
2. Remove the DC Cover or Turbo Fan. Remove the battery terminal covers. Using a #2 Phillips screwdriver, remove the two screws attaching the AC Cover as shown in Figure 1. Remove the rubber washers, rubber grommet, and AC Cover as shown in Figure 1.



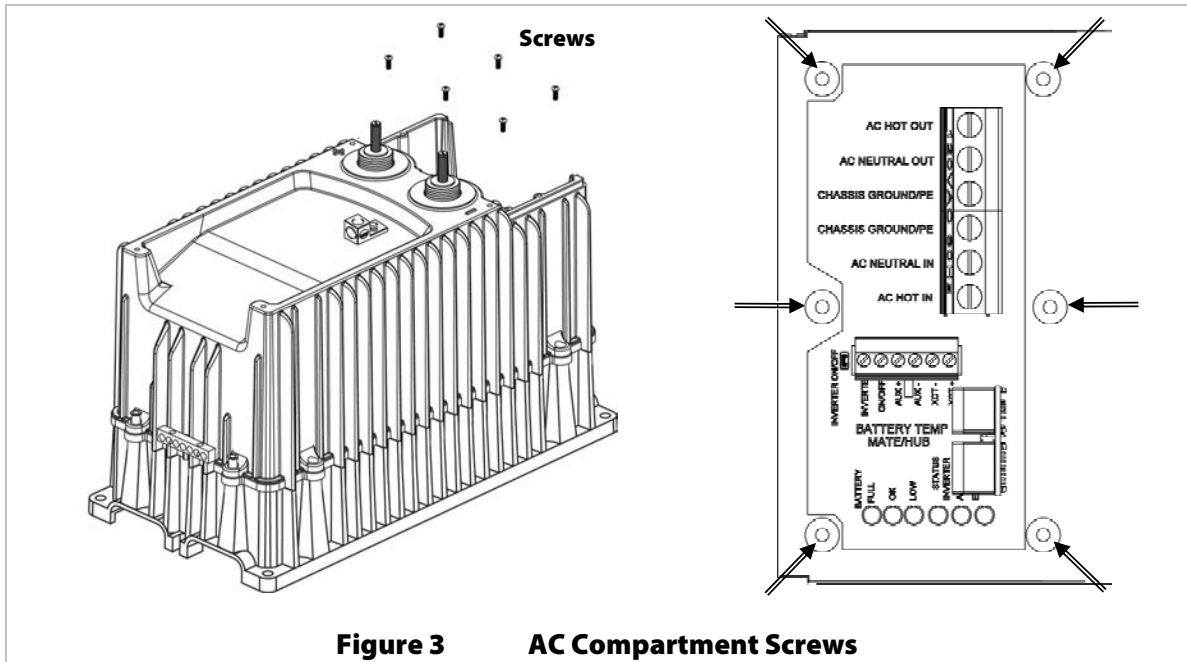
3. Remove the AC Plate. See Figure 1.
4. Disconnect all AC and DC wiring to the inverter. Using a meter, verify that no AC or DC voltage is present.
5. Using the strap wrench, remove the red and black ring nuts located on the battery terminals. See Figure 2.

**NOTE:** If the ring nuts are too tight, a hammer and flat screwdriver may be used to tap the ring nuts counterclockwise. A small pipe wrench may be used. Cover the jaws of the wrench with tape to minimize damage to the plastic nuts.



# Part Replacement Instructions

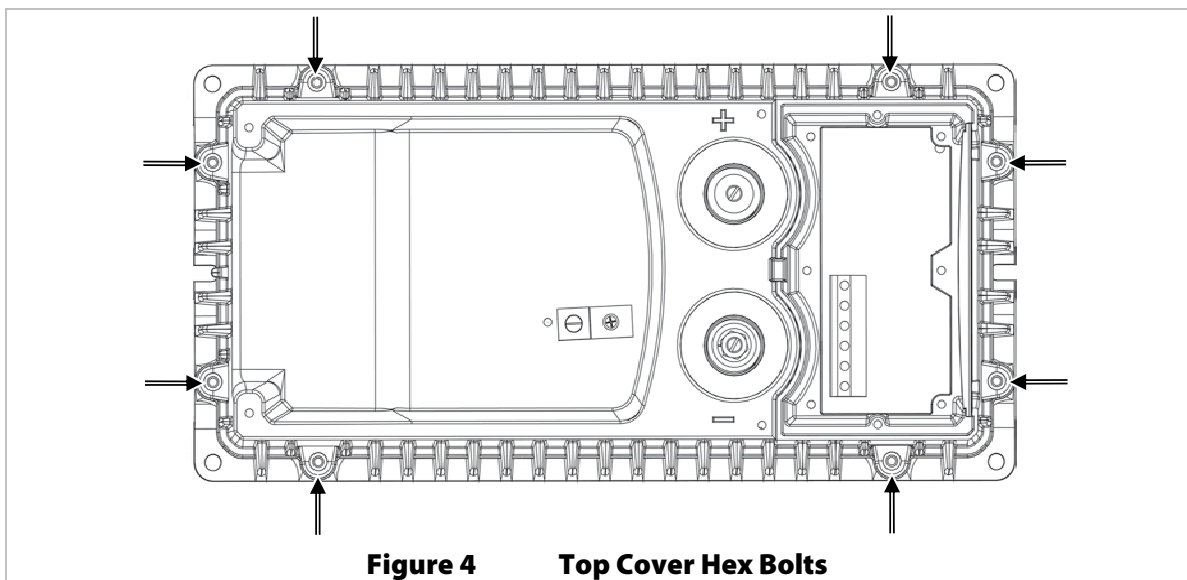
6. Using a #2 Phillips screwdriver, remove the 6 screws located in the AC wiring compartment. See Figure 3.



**Figure 3 AC Compartment Screws**

7. Using the 4mm hex wrench, remove all 8 hex bolts that connect the top cover to the bottom chassis of the inverter. The locations of these bolts are shown in Figure 4.

	<p><b>IMPORTANT:</b> After removing the hex bolts, read the next step carefully before removing the cover.</p>
	<p><b>CAUTION: Equipment Damage</b> Inverter components will be damaged if the cover is removed too quickly. The cover and fan are wired to the internal FET board with a PCB connector. See Figure 5.</p>

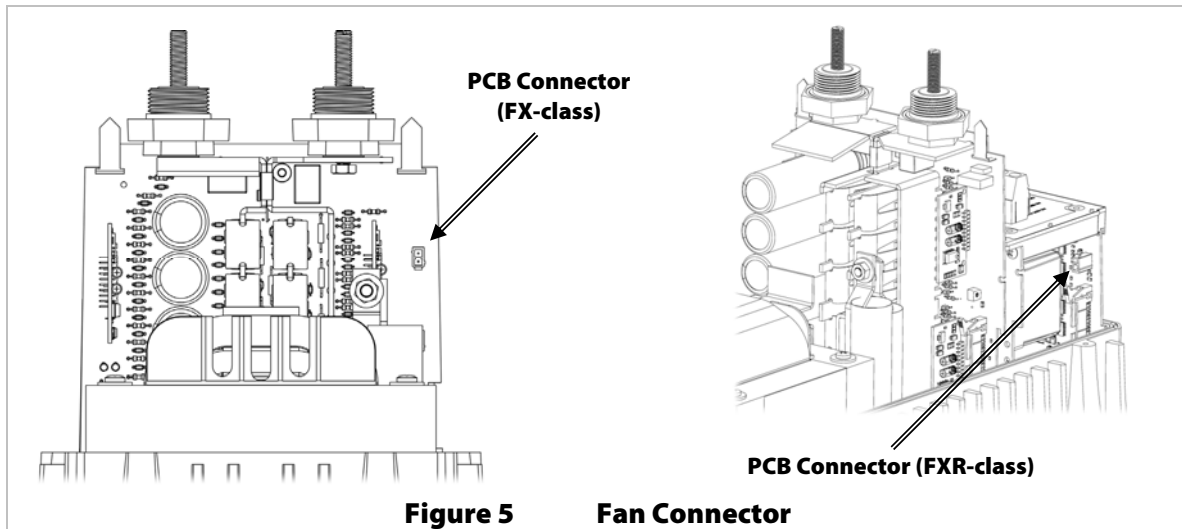


**Figure 4 Top Cover Hex Bolts**

8. Carefully lift the inverter cover, just far enough to locate the fan wire.

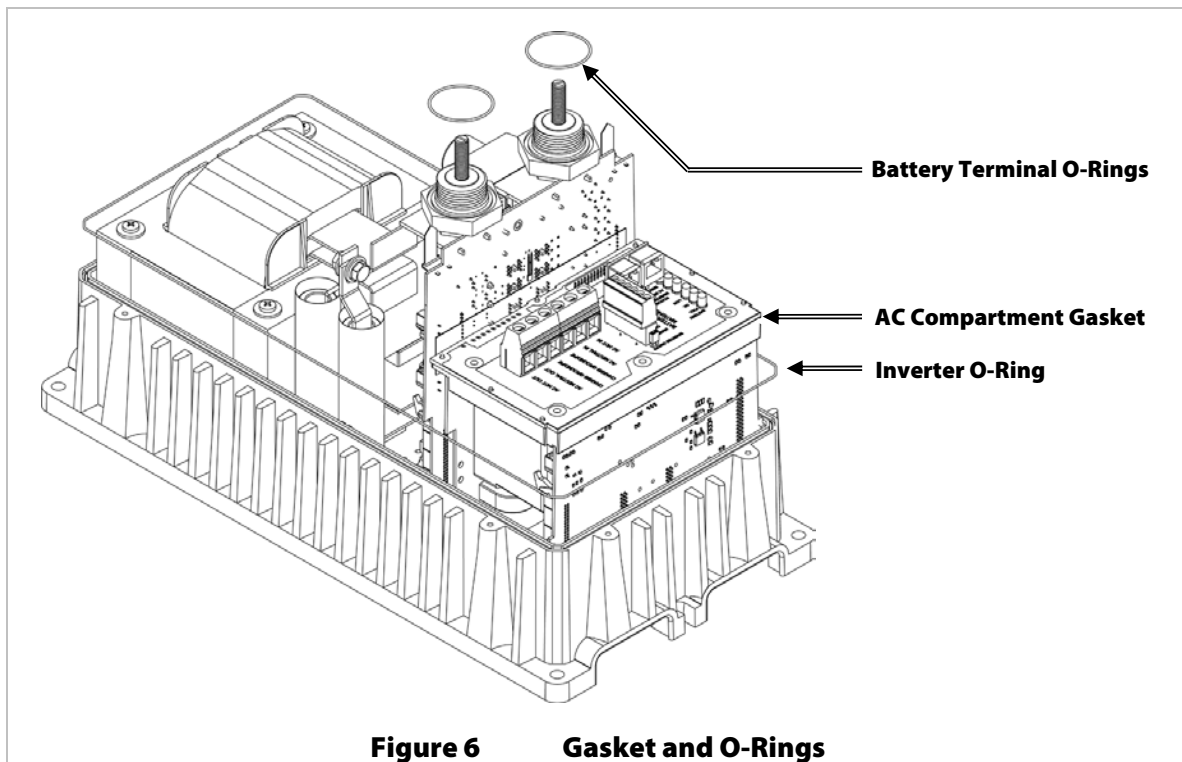
## FX-Class and FXR-Class

- Disconnect the fan wire. The connector locations are different for FX-class and FXR-class inverters. The locations are shown in Figure 5.



- Remove the top cover and set it aside.
- Remove the O-rings that are seated on the battery terminals. Remove the gasket located on top of the AC PCBA. See Figure 6.

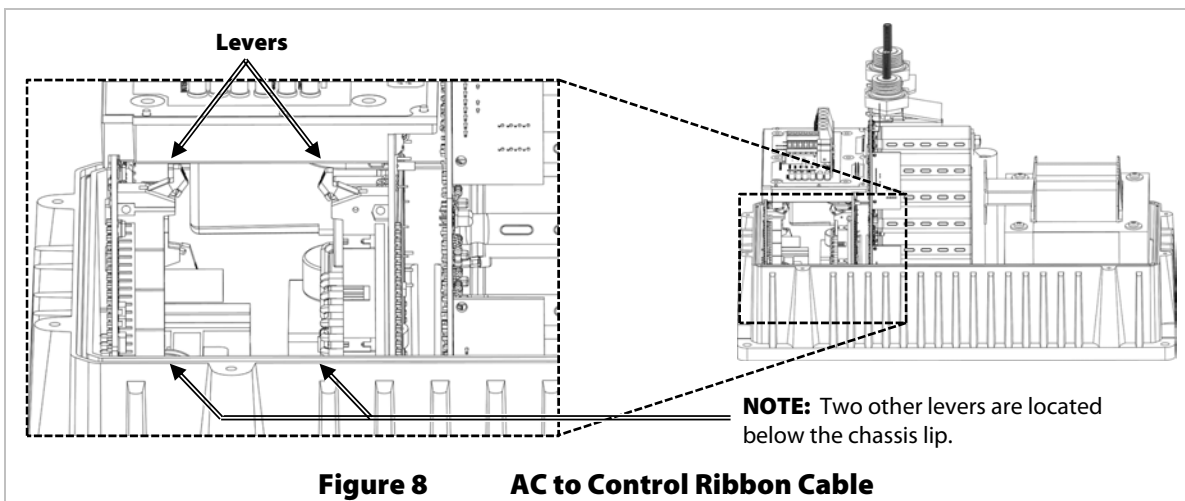
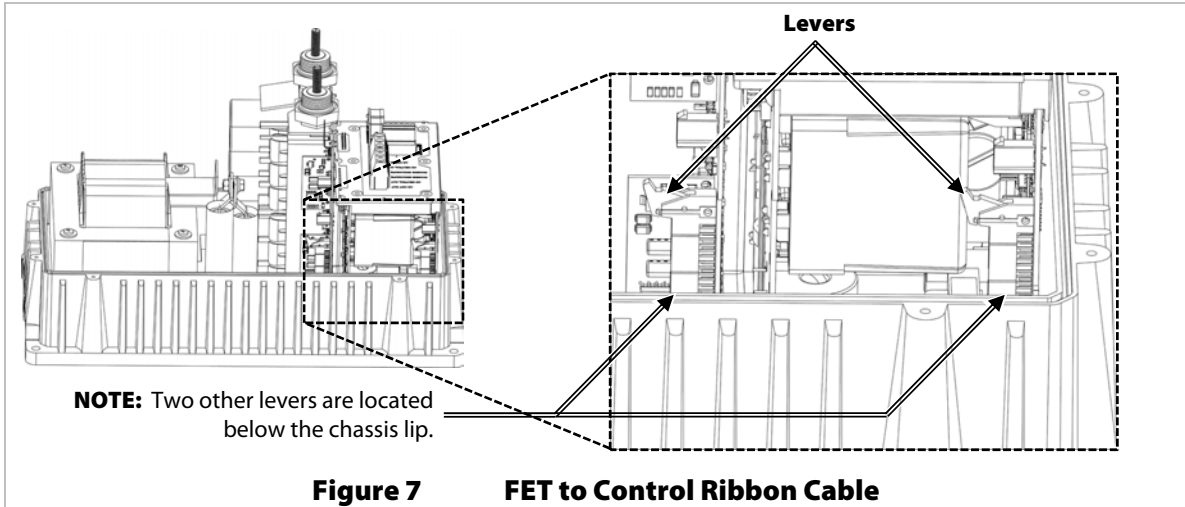
**NOTE:** A larger O-ring travels the perimeter of the chassis and may come off during disassembly. If so, reinstall the O-ring during reassembly.



- Remove the two ribbon cables that join all three circuit boards. One cable connects the FET PCBA to the Control PCBA. The other connects the AC PCBA to the Control PCBA.

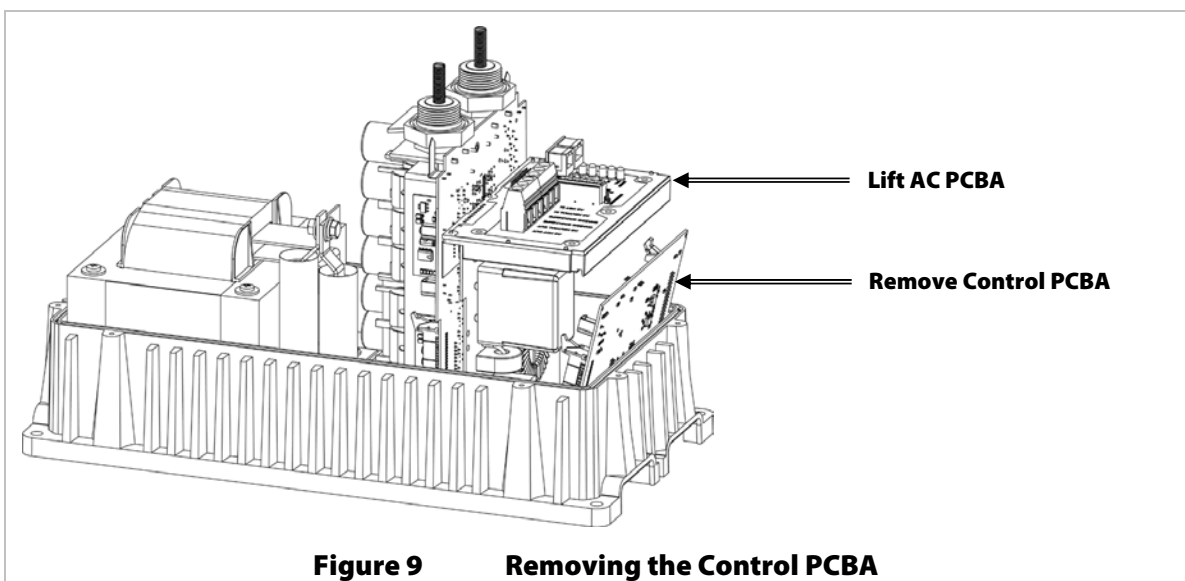
To remove the ribbon cables, release the levers on each connector that holds the cable in place. The locations of the cable connectors are shown in Figure 7 and Figure 8.

# Part Replacement Instructions



13. Gently lift the AC PCBA until there is resistance from the AC output wires connected to the AC Assembly. Pull out the Control PCBA. See Figure 9.

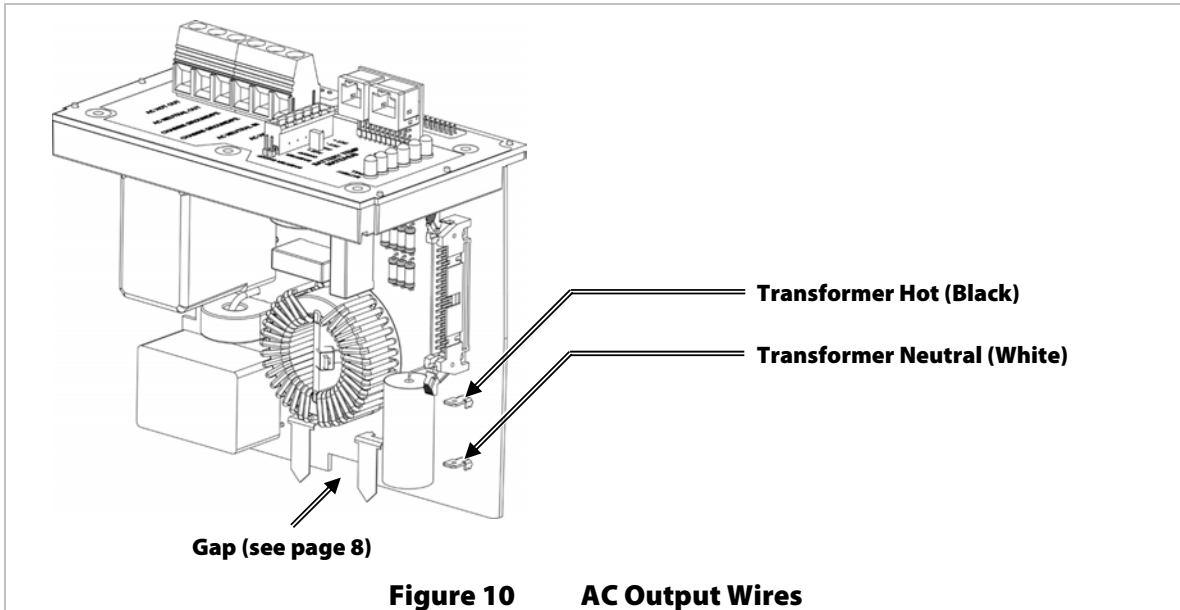
**NOTE:** No more disassembly is needed if the Control PCBA is the only board to be replaced.



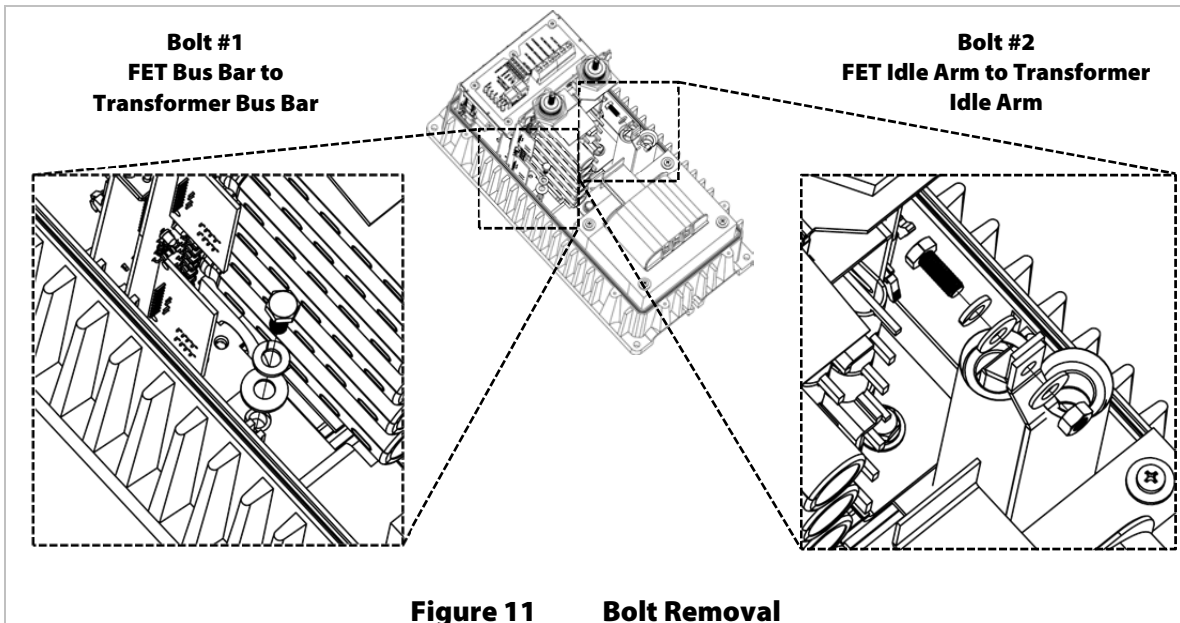
## FX-Class and FXR-Class

14. Before removing the AC PCBA, using a pair of long-nose pliers, disconnect the white and black AC output wires connected at the bottom of the board. (See Figure 10 for the location of the wire connectors.) Remove the AC PCBA.

**NOTE:** No more disassembly is needed if the AC and/or Control PCBA are the only boards to be replaced.



15. Remove the two bolts that connect the FET PCBA to the transformer. Use the 10mm socket with 12" extension on bolt #1 and two 10mm wrenches on Bolt #2. See Figure 11.

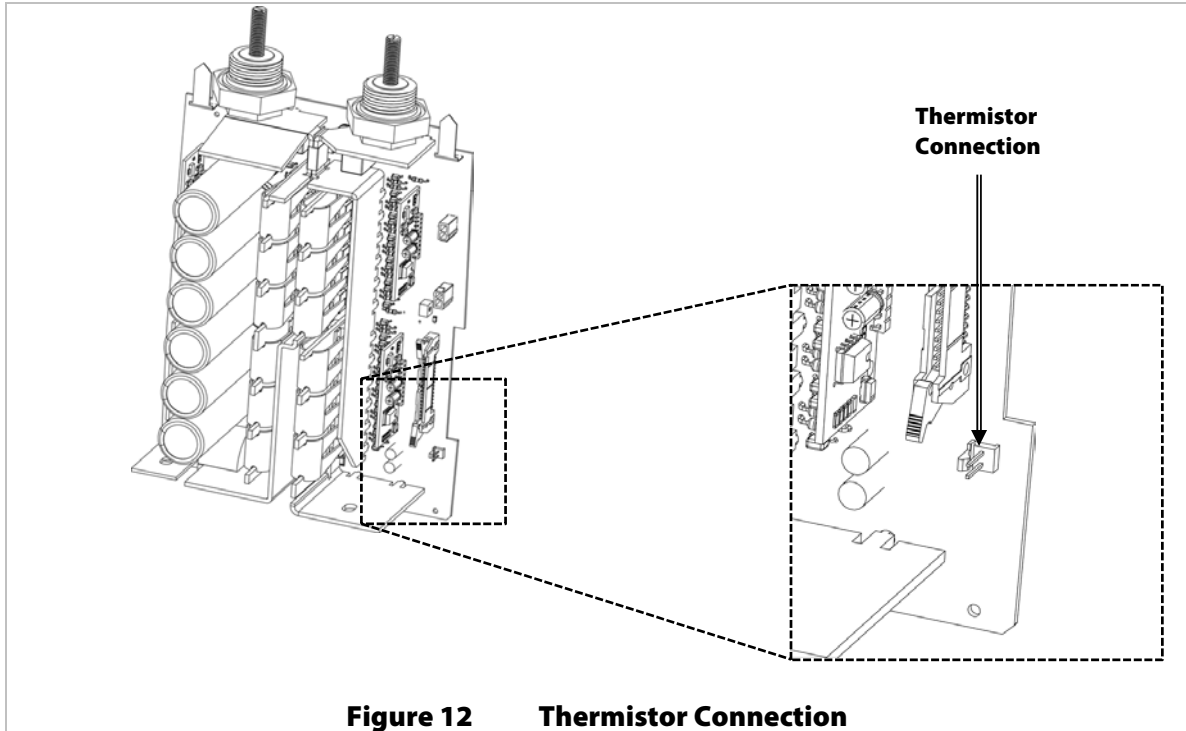


16. Remove the thermistor wire from the FET PCBA. Figure 12 shows the location of the connector.



### **CAUTION: Equipment Damage**

The thermistor wire must be disconnected **before** removing the FET PCBA from the inverter. Failure to do so will destroy the thermistor wire when it is pulled out. It will also damage the connections.



**Figure 12 Thermistor Connection**

17. Remove the FET PCBA.

## Assembly

The order of assembly depicted here is:

1. FET PCBA
2. AC PCBA
3. Control PCBA

If the FET and or AC boards do not need to be replaced or have not been removed, the installer may ignore these steps and proceed through the steps that are required. The installer should then proceed to the testing steps, which begin on page 11.

### To assemble the inverter:

1. Check the replacement FET PCBA to see if a thermistor clip was installed. (See Figure 12.) If one is present, remove it and discard.
2. Guide the FET PCBA into the proper slot of the chassis; lower it only halfway down. Plug the green thermistor wire from the transformer into the FET PCBA. (See Figure 12 for the location of this connector.) Push the FET PCBA all the way down into the chassis.

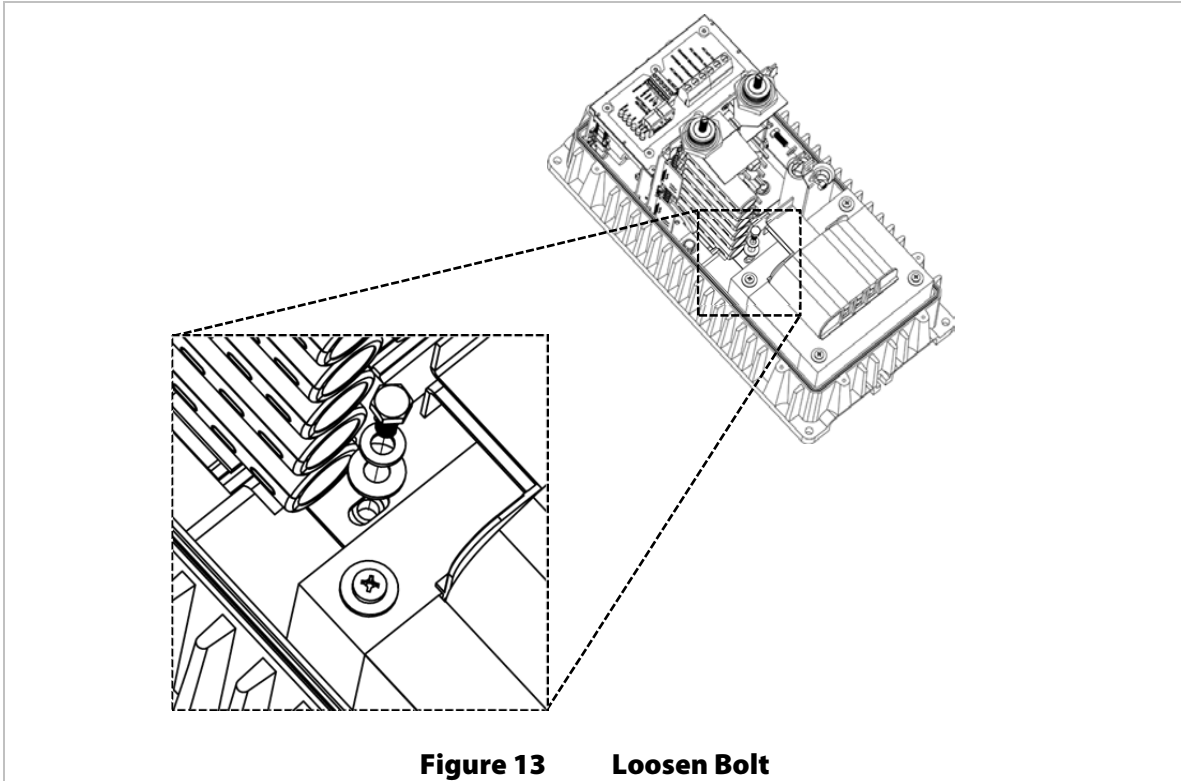


### IMPORTANT:

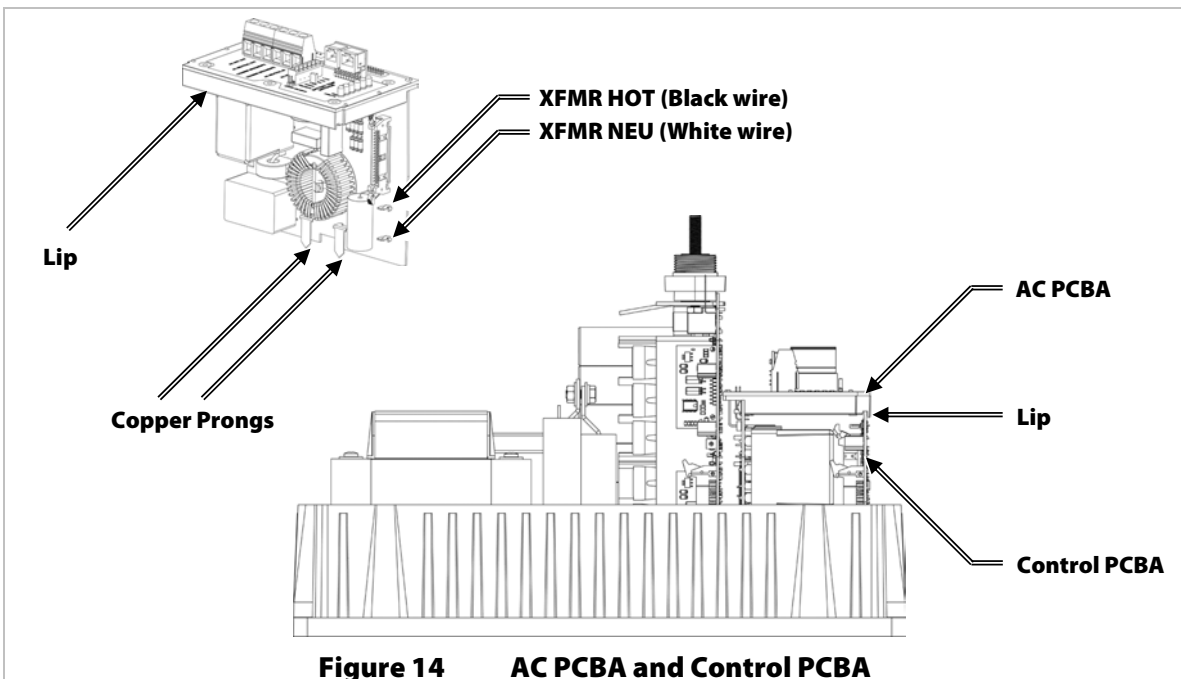
Ensure that the AC wires from the transformer (see step 5) are routed through the gap on the bottom of the FET PCBA. Routing them elsewhere may pinch the wires and could cause the inverter to fail.

## FX-Class and FXR-Class

3. Before bolting down the FET PCBA, it may be necessary to loosen the bolt that mounts the transformer bus bar to the transformer. Loosening this bolt will make it easier to align the FET PCBA correctly. See Figure 13.



4. Once the FET PCBA is aligned, tighten all bolts to a torque value of 72 in-lb.
5. Guide the AC PCBA half way down into the chassis. Attach the AC output wires to their connectors. The black wire connects to terminal XFMR HOT. The white wire connects to XFMR NEU. See Figure 14 (and also Figure 10 if necessary) for the location of the wire connectors.





## Part Replacement Instructions

- With the AC PCBA lifted as high as possible, guide the Control PCBA into its slot in the chassis. Lower the AC PCBA over the top of the Control PCBA. As shown in Figure 14, there is a “lip” on the AC PCBA that fits over the top of the Control PCBA.



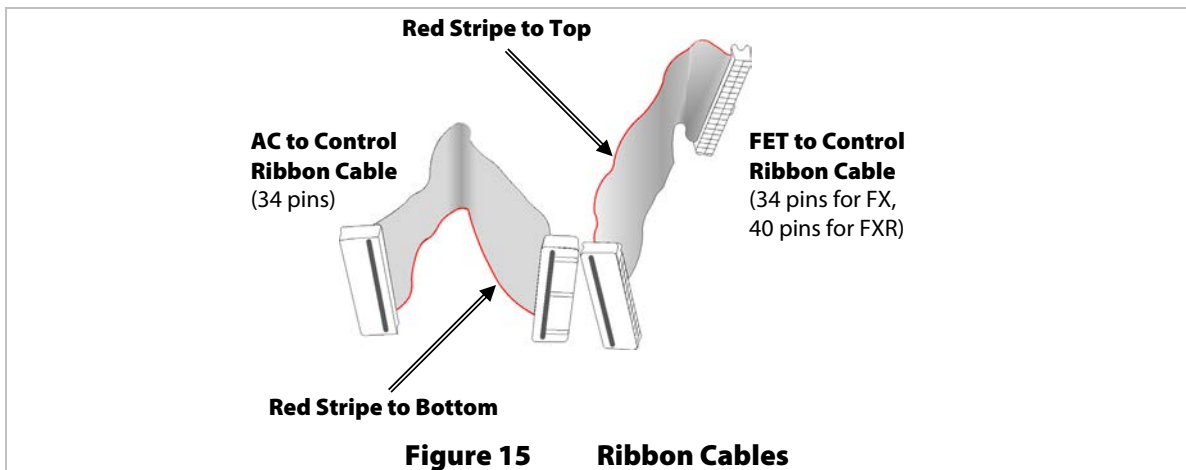
### IMPORTANT:

- Ensure the AC wires from the transformer (see step 5) are routed through the gap on the bottom of the AC PCBA. (See Figure 10.) Routing them elsewhere will pinch the wires and could cause the inverter to fail.
- Ensure that the copper prongs on the AC PCBA do not pinch the output wires when the board is lowered into place.

- Once each PCBA is seated and secured in the chassis, re-attach the ribbon cables to the boards.

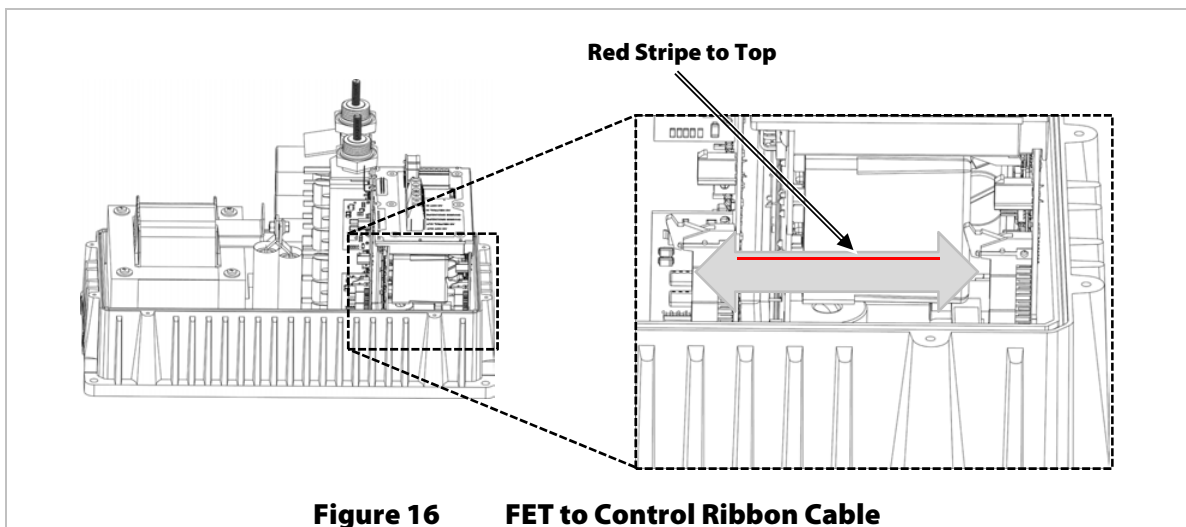
**NOTE:** FX-class inverters use two identical cables with 34 pins. Ensure that the cables are bent as shown in Figure 15 so that they can be routed correctly inside the inverter.

**NOTE:** FXR-class inverters do not have identical cables. **Do not confuse them.** The cable between the AC PCBA and Control PCBA has 34 pins. The cable between the FET PCBA and Control PCBA has 40 pins. Ensure the cables are bent as shown in Figure 15 so that they can be routed correctly inside the inverter.



**Figure 15 Ribbon Cables**

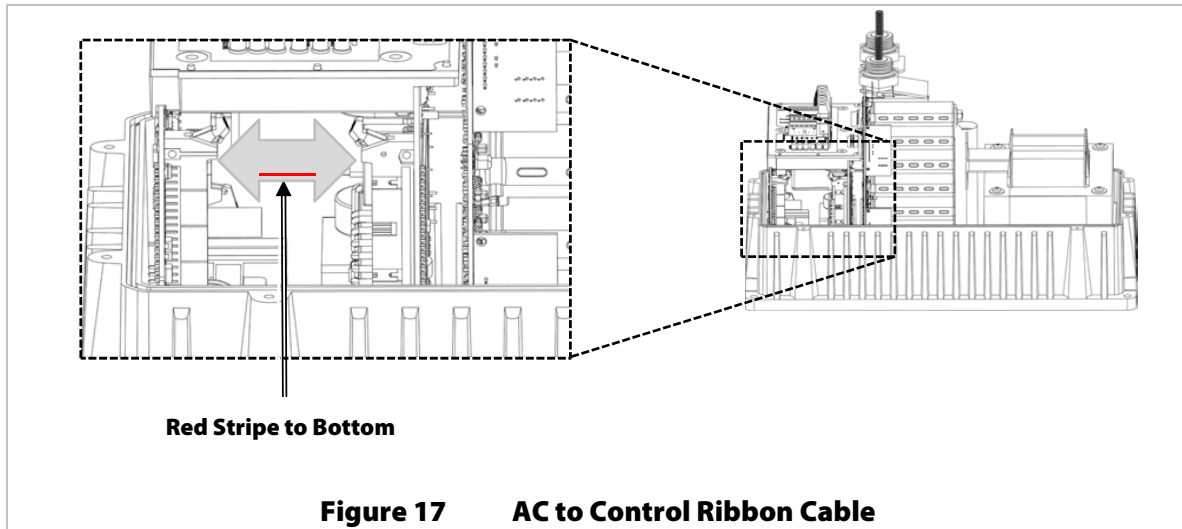
- Install the ribbon cable that is bent on one end to the FET PCBA and the Control PCBA. (See Figure 16 and also Figure 7 if necessary.) In the FX inverter, this cable has 34 pins. In the FXR inverter, it has 40 pins. Make sure the red stripe is oriented toward the **top** of the chassis. Push down on each end until the levers click and the plug is secure.



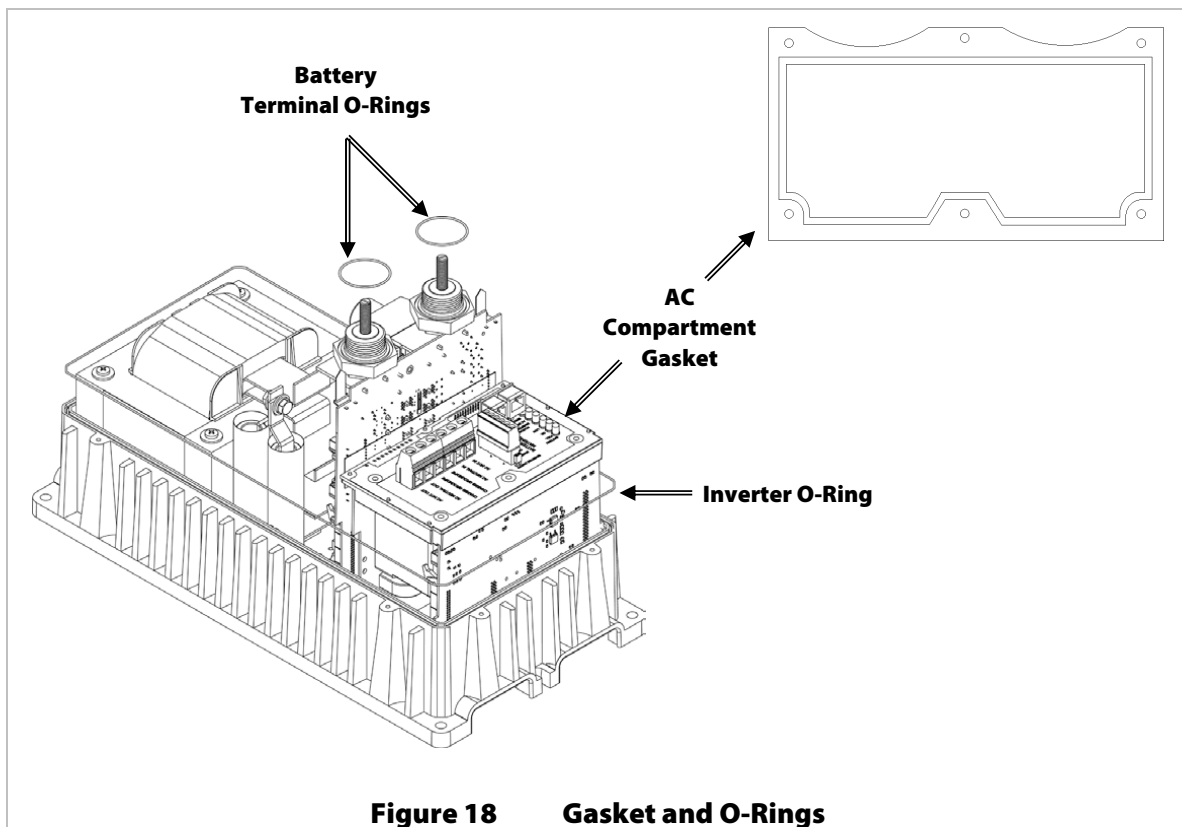
**Figure 16 FET to Control Ribbon Cable**

## FX-Class and FXR-Class

9. Install the ribbon cable that is bent in half to the AC PCBA and the Control PCBA. (See Figure 17 and also Figure 8 if necessary.) This cable has 34 pins. Make sure the red stripe is oriented toward the **bottom**. Push down on each end until the levers click and the plug is secure.



10. Install the gasket between the AC PCBA and the top cover. This gasket is used to keep water out. Make sure to line up the holes on the gasket with the holes in the AC PBCA. See Figure 18.



11. Install the two small O-rings on the FET PCBA battery terminals. See Figure 18.
12. If the large chassis O-ring is out of position, re-seat it into the groove on the chassis. See Figure 18.

## Testing

Before reinstalling the top cover, the inverter should be tested to ensure it was assembled correctly.

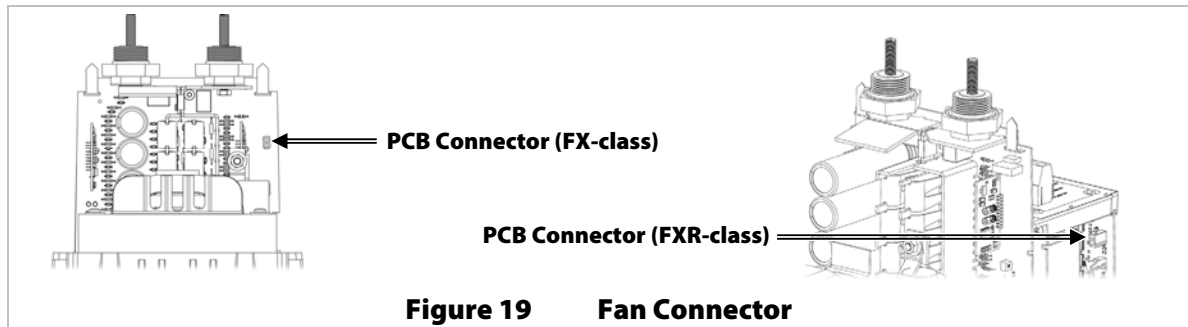
### To test an assembled inverter:

1. Connect a DC power supply to the inverter. Use an appropriate voltage for the inverter under test (12 volts, 24 volts, etc.). 9-volt batteries may be used if a power supply is not available. For a 12-volt or 24-volt model, use three 9-volt batteries in series. For a 48-volt unit, use six 9-volt batteries in series.
2. The inverter will go through a boot-up routine. The red LOW battery LED indicator will illuminate. It will then be replaced by the yellow OK indicator and possibly the green FULL indicator.
3. The fan, if plugged in, will come on. The fan does not need to be plugged in for testing, but the ERROR indicator will illuminate if the fan is not present.
4. The FX inverter is defaulted to the On state. The FXR inverter is defaulted to the Off state. Turn the FXR inverter on with the MATE3 system display, or remove and replace the ON/OFF jumper as shown in the Installation Manual. (Perform this with the FX inverter as needed, if it is not already on.)
5. After a few seconds the inverter should produce AC voltage, accompanied by the green INVERTER indicator. Check the output terminals with a DVM or voltmeter to confirm the presence of voltage. The AC voltage reading should be appropriate for the inverter model.
6. Once the inverter power-up sequence is confirmed, disconnect the DC power supply.
7. The test is successful if the inverter completed each routine. If this did not occur, it may be necessary to contact OutBack technical support for troubleshooting.

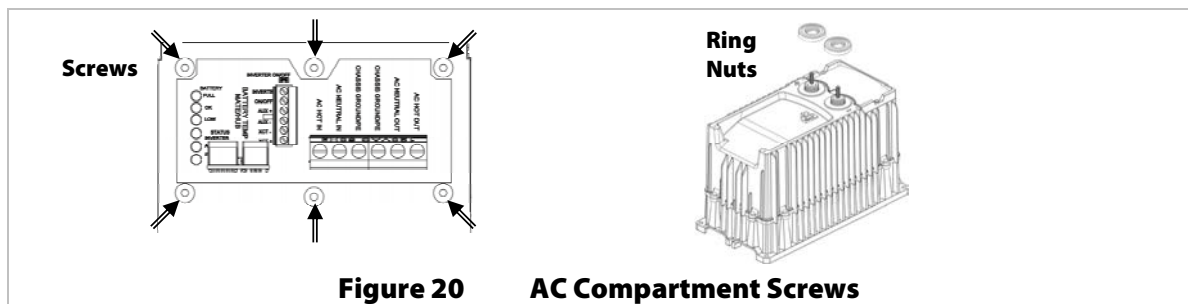
## Completion

### To finish reassembly:

1. Connect the fan cable. See Figure 19 and also Figure 5 if necessary. In the FXR inverter, the cable should be routed through notches in the AC and FET PCBA. Routing them elsewhere may pinch the cable.



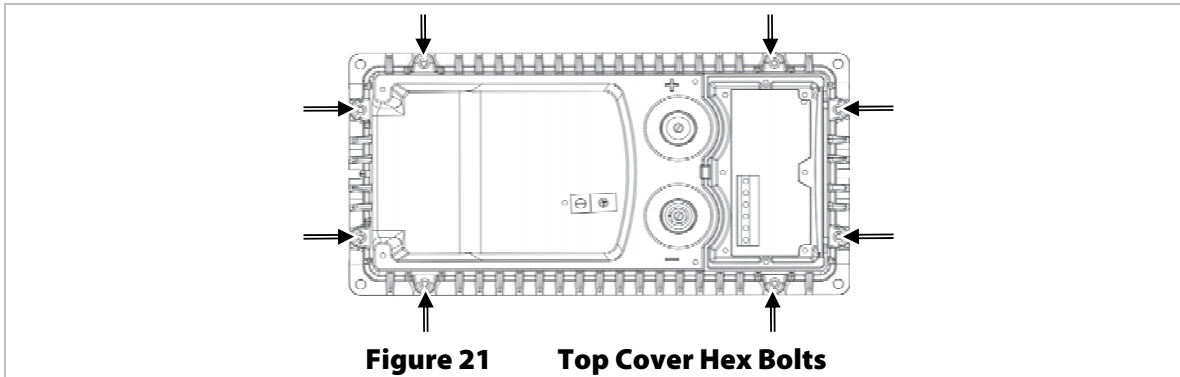
2. Place the top cover over the chassis so that the battery terminals protrude through the holes in the cover.



3. Insert, but do not tighten the 6 screws that connect the top cover to the AC Assembly. See Figure 20.
4. Reattach the red and black battery terminal nuts and tighten. Next tighten the 6 AC Assembly screws to a torque value of 15 in-lb. See Figure 20.

## FX-Class and FXR-Class

5. Install the 8 hex screws that attach the top cover to the chassis. Tighten to a torque value of 36 in-lb. See Figure 21.



6. If replacing the Control PCBA in a **sealed** FXR-class inverter, it must be re-programmed for that model. (The default setting is for a vented model.) Apply battery power to the inverter. Using the MATE3, press the "LOCK" button, press the "UP" button, and insert the "Installer" password. The default password is [1][7][3][2] but may have been changed. If necessary, contact the installer or OutBack technical support. Press the center button, select "Inverter", scroll down to "Model Select", press the center button, and then change the model to the correct (sealed) version. The results of this model change will take effect within 1 minute of making this change. Please allow this amount of time to pass without making any further changes to settings.

This completes the procedure for replacing circuit boards in the FX-class or FXR-class inverters.

## Recycling Parts

Use the box from the new circuit boards to return the old boards to OutBack Power Technologies for recycling, or use a local recycling service. Do not throw the old circuit boards into the garbage. Ship the old circuit boards to:

OutBack Power Technologies  
RMA# \_\_\_\_\_  
17827 – 59th Avenue NE  
Arlington, WA 98223, USA

## Contact Information

Address:	Corporate Headquarters 17825 – 59 <sup>th</sup> Avenue N.E. Suite B Arlington, WA 98223 USA	European Office Hansastrasse 8 D-91126 Schwabach, Germany
Telephone:	+1.360.435.6030 +1.360.618.4363 (Technical Support) +1.360.435.6019 (Fax)	+49.9122.79889.0 +49.9122.79889.21 (Fax)
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## Part Number

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