Small FET Board Removal and Replacement (ME or RD Series Inverter/Chargers)

1.0 Description

These instructions provide information on removing and replacing the small FET Board in a ME or RD Series inverter/charger with a new small FET board (kit part number: TFB-MEXXXX or TFB-RDXXXX).

Note: This document is part of a series of Service Instructions to help qualified personnel replace components that have failed or been damaged.

2.0 Installation Preparation

Before removing or replacing the small FET board, read this entire document and follow all instructions.

2.1 Safety Precautions

Follow all electrical safety precautions and ESD prevention guidelines below and in the *Electrical Safety Precautions and Electrostatic Discharge Prevention, Service Instructions: 64-1000*.

Warning: Hazardous voltages are present within the inverter when power is applied. Do not remove the inverters top cover without first turning off and disconnecting all AC and DC power to the inverter. Always replace the top cover before reconnecting power.

Warning: The capacitors inside the inverter store electric energy even after all AC and DC power is removed. After disconnecting all AC and DC power to the inverter, short the positive and negative DC terminals together to dissipate this energy.

Caution: Observe all ESD safety precautions while working with the small FET board and within the inverter. Failure to follow ESD safety precautions could result in damage to internal components and the inverter.

2.2 Included Materials

Before dismantling the inverter, open the small FET board kit and inspect the new FET board to ensure there is no obvious physical damage. Verify that the Model ID Label on this new FET board (see figure 1, item D) corresponds to the model number of the inverter that is being repaired and that the small FET board kit contains all the components shown in figure 1. Contact Magnum Energy if any item appears to be damaged, missing or incorrect.

Note: All removed items must be returned if repair is for warranty consideration; save the packing material and shipping container to use when returning the removed items.

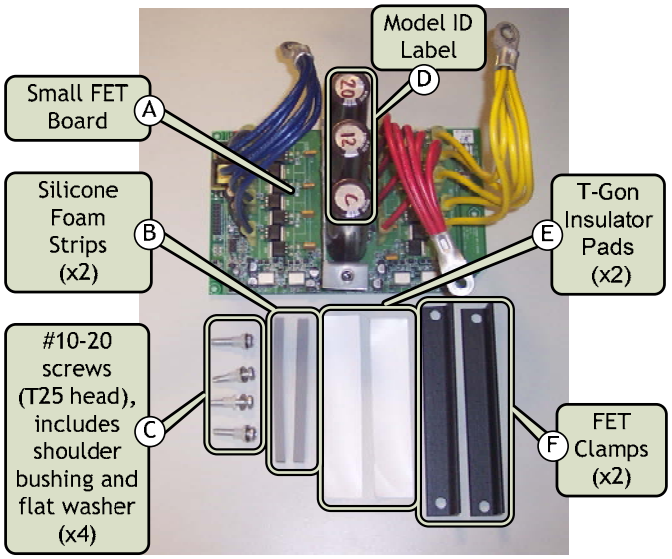

Figure 1, Small FET Board Kit

2.3 Required Tools and Equipment

Before disassembling the inverter, ensure you have the following tools and equipment to remove and replace the small FET board:

- T15 Torx head screwdriver (≥ 6" shaft required) – for #6-32 screws.
- T25 Torx head screwdriver – for #10-32 screws.
- 7/16" socket, socket wrench and ≥ 6" extension – for ¼-20 bolts.
- Torque wrench (130 in-lbs torque required) – for ¼-20 bolts with 7/16" head.
- 7/16" open ended wrench.

2.4 Pre-installation

The inverter's top cover, DC terminal plate and control board will need to be removed before the small FET board can be replaced. Perform the following Service Instructions to remove these components:

- *Top Cover Removal and Replacement with Internal Component Identification (ME, MS or RD Series Inverter/Chargers), Service Instructions: 64-1001*.
- *DC Terminal Plate Removal and Replacement (ME, MS or RD Series Inverter/Chargers), Service Instructions: 64-1002*.
- *Control Board Removal and Replacement (ME, MS or RD Series Inverter/Chargers), Service Instructions: 64-1003*.

Only after all these Service Instructions have been accomplished, proceed to section 3.0 to remove and replace the small FET board.

3.0 Removing and Replacing the Small FET Board

Note: The inverters in this document may include options that you do not have, therefore the following illustrations may not exactly match the inverter being repaired.

3.1 Removing the Small FET Board

3.1.1 After removing the inverter's top cover, DC terminal plate and control board; locate and familiarize yourself with the components in the small FET board section; see figure 7.

3.1.2 Remove the two ¼-20 bolts holding the yellow and blue FET buss-wires to the transformer lugs (see figure 7, items A and E). Use a 7/16" wrench to hold the nut while each bolt is being unscrewed.

Caution: Record how this hardware is removed, it will need to be reconnected in exactly the same way or the performance of the inverter will be affected.

3.1.3 Locate and disconnect the two fan supply connectors (figure 7, item F).

3.1.4 Locate and remove the #6-32 screw (T15 head) on the right side of the FET board (figure 7, item H).

3.1.5 Locate and remove the four #10-32 screws (T25 head) holding the FET clamps (figure 7, item D). These four screws with flat washers and shoulder bushings will not be reused; place them aside to be returned if for warranty consideration; otherwise they can be discarded.

3.1.6 Remove the two FET clamps (figure 7, item C). These FET clamps and any loose material will not be reused; place them aside to be returned if for warranty consideration; otherwise they can be discarded.

3.1.7 Using ESD precautions, remove the FET board. If it is for warranty consideration, place it component-side up on a grounded, static-free surface until it can be placed in an antistatic bag to be returned; otherwise, it can be discarded.

3.1.8 After the FET board has been removed, remove any material (T-Gon™ insulator pads, tape, any metal particles, etc.) under the FET board or on the inverter base. The inverter FET baseplate should be clean (see figure 2).

Note: Ensure the baseplate area under the FET board is clean and smooth to the touch. If it is not clean, use a lint free cloth to clean and remove any particles. If there is any tape attached to the inverter FET base, it should be removed.

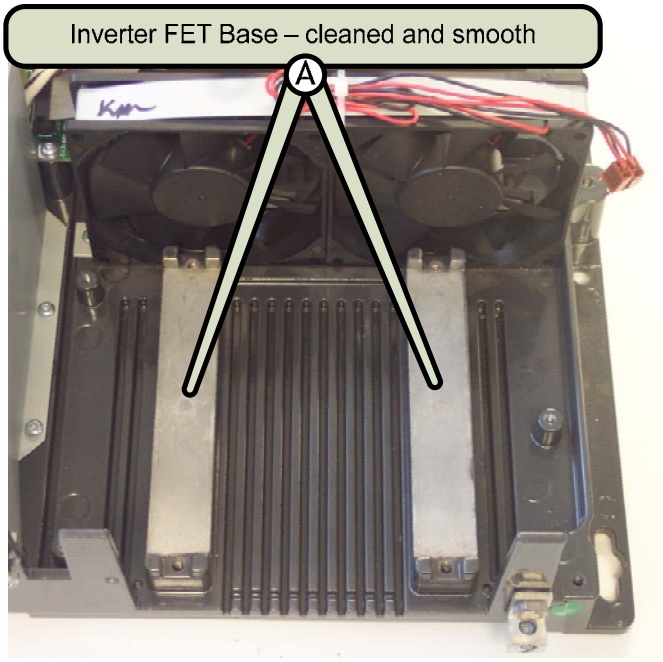

Figure 2, Inverter FET Base

3.2 Replacing the Small FET Board

3.2.1 Place the two new T-Gon™ insulator pads on the inverter FET baseplate (see figure 3).

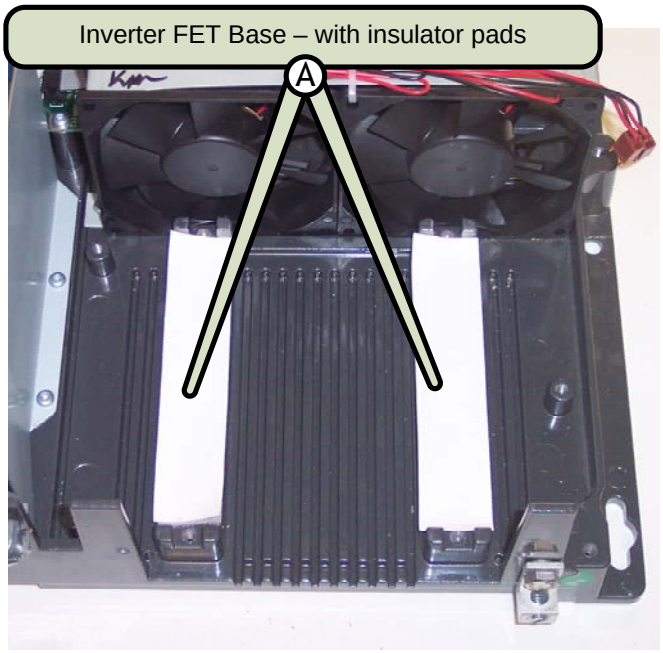

Figure 3, Inverter FET Base with T-Gon Insulator Pads

3.2.2 Using ESD precautions; remove the new FET board from its antistatic bag and place it over the two new T-Gon™ insulator pads – ensure these insulator pads are not moved.

Caution: The insulator pads provide an insulating barrier between the inverter baseplate and the FET's. If the FETS touch the baseplate directly - damage would occur when the inverter is connected to DC or AC power.

3.2.3 While holding the new FET board in place on the insulator pads, replace the #6-32 screw on the right side of the FET board (figure 7, item H). This will help hold the FET board and the insulator pads in-place until the FET clamps are installed.

3.2.4 Place a new silicone foam strip (shiny side up and down) in the center of each row of FETS, see figure 4.

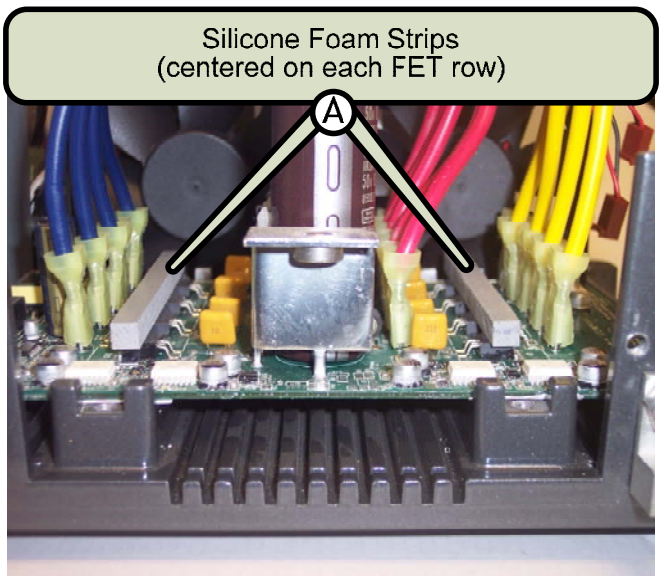

Figure 4, Silicone Foam on FET rows

3.2.5 Place a new FET clamp over each new silicone foam strip and then place the four new #10-32 screws (T25 head) - with flat washer and shoulder bushings - into the four holes on the two new FET clamps.

3.2.6 Alternate tightening the four #10-32 screws until each screw is tight and the FET clamp is flush against the inverter base. Make a mark on each screw for reference and back out the screw one full turn to provide the correct tension to the FET's. See figure 5 for reference.

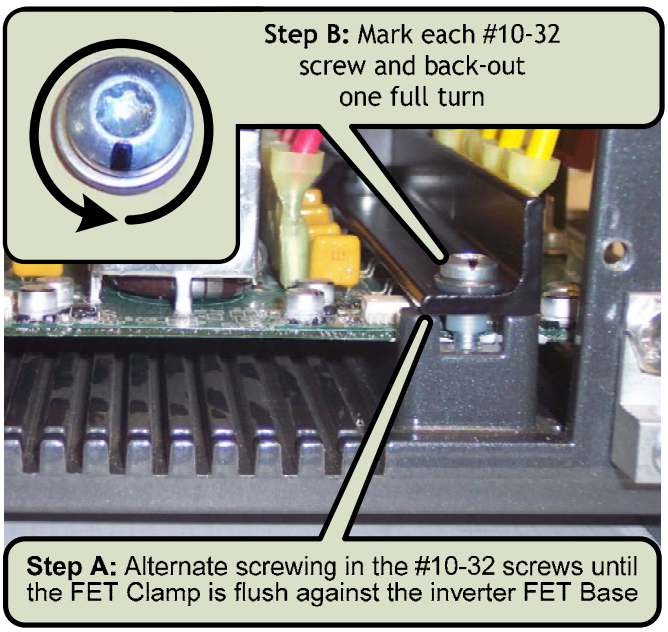

Figure 5, FET Clamp to inverter FET base tension

3.2.7 Reconnect the two ¼-20 bolts holding the yellow and blue FET buss-wires to the transformer lugs (see figure 7, items A and E) and torque to 130 in. lbs. Use a 7/16" wrench to hold the nuts while the bolts are tightened.

Caution: Ensure the blue buss-wire is connected to the transformer lug on the negative side and the yellow buss-wire is connected to the transformer lug on the positive side or damage to the inverter may occur, see figure 7 for reference.

Caution: Ensure these ¼-20 bolts are reconnected in the same way as they were removed and are correctly torqued. These connections carry very high DC current and an improper connection will affect the performance of the inverter and may cause damage. See figure 6 for reference.

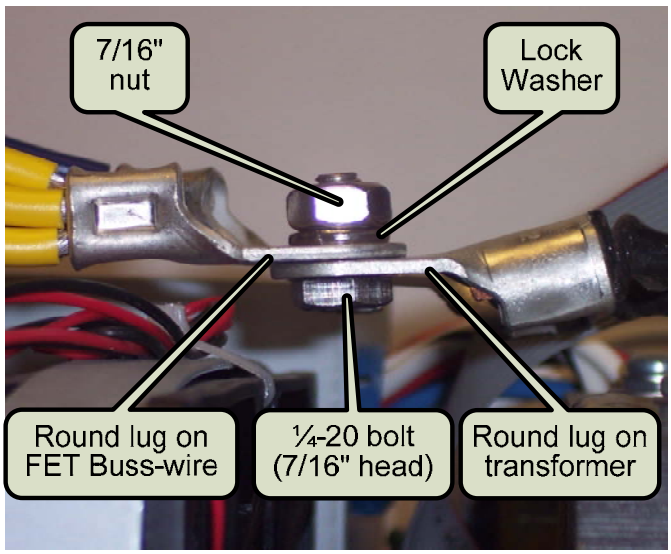

Figure 6, FET Buss-wire to Transformer Connection

3.2.8 Reconnect the two fan supply connectors.

3.2.9 The new FET board is now installed; review all the connections a final time to ensure they are correct.

3.2.10 If there are no other internal repairs to perform, replace the control board, the DC terminal plate and the inverter's top cover using the appropriate Service Instructions noted in Section 2.4.

4.0 Identifying Components in the Small FET Board Section

Although Magnum Energy has multiple inverter models and uses a slightly different FET board for each model, the location of the small FET board for each inverter series is identical. Familiarize yourself with the components of the small FET board to assist with its removal and replacement.

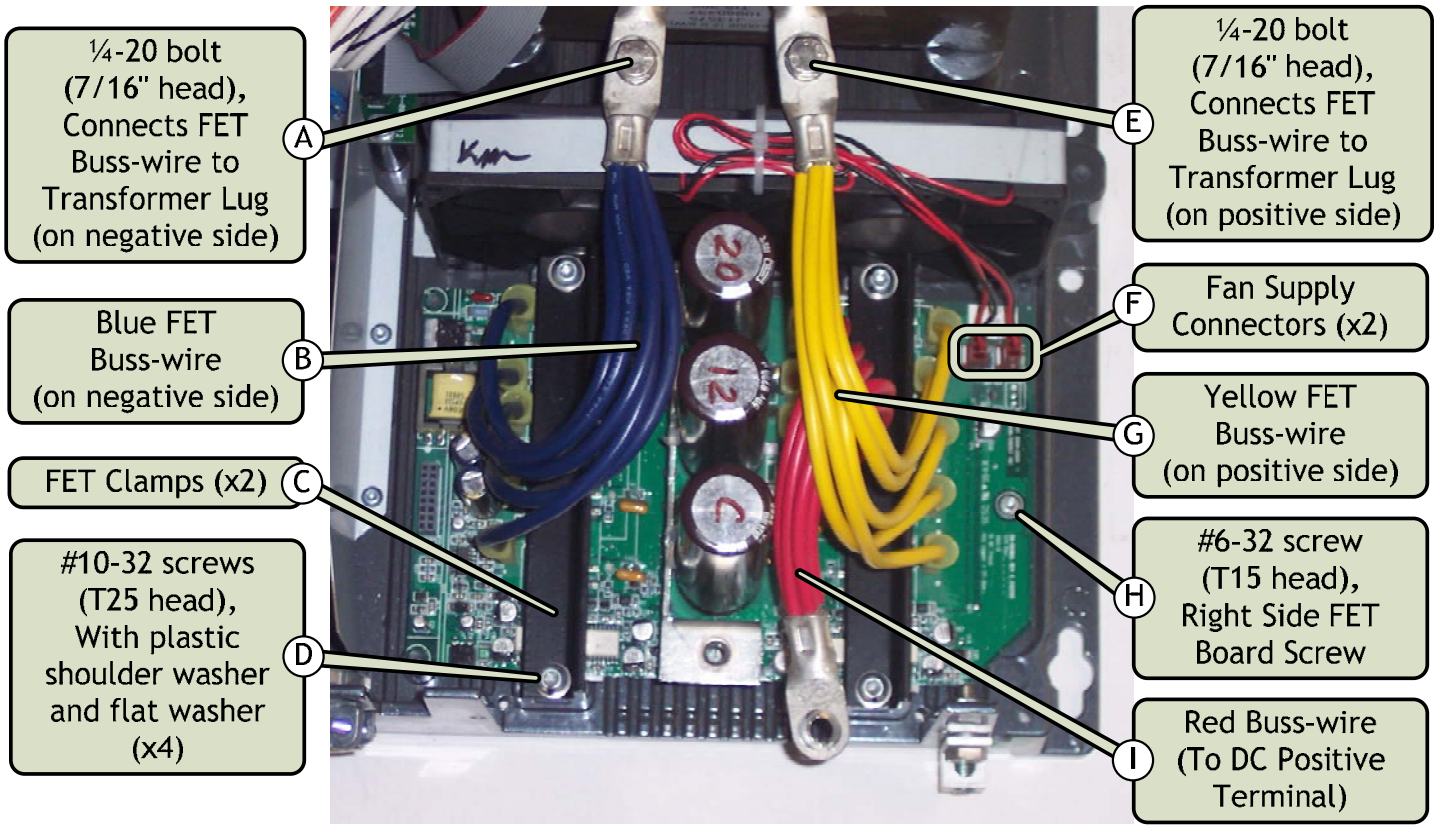

Figure 7, Small FET Board Section