


### 1.0 Description

These instructions provide information on removing and replacing the control board in a ME, MS or RD Series inverter/charger with a new control board (part number: TCB-MEXXXX, TCB-MSXXX or TCB-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 control 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 inverter's 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 control 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, inspect the new control board to ensure there is no obvious physical damage to it. Look at the Model ID Label on the new control board (see figure 1 or 2, item A) and verify that the model number on this label corresponds to the model number of the inverter that is being repaired. 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.

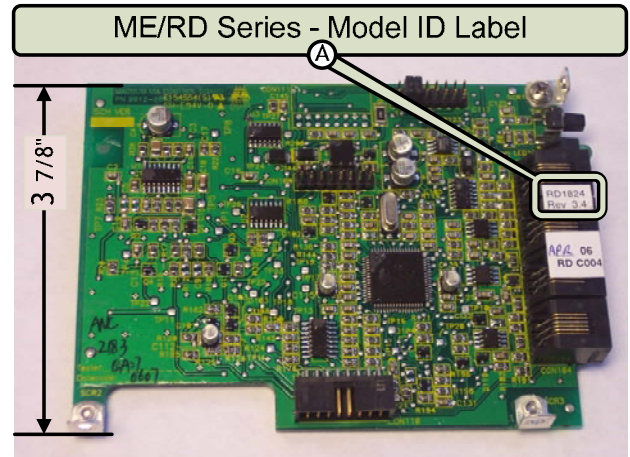


Figure 1, ME or RD Series Control Board

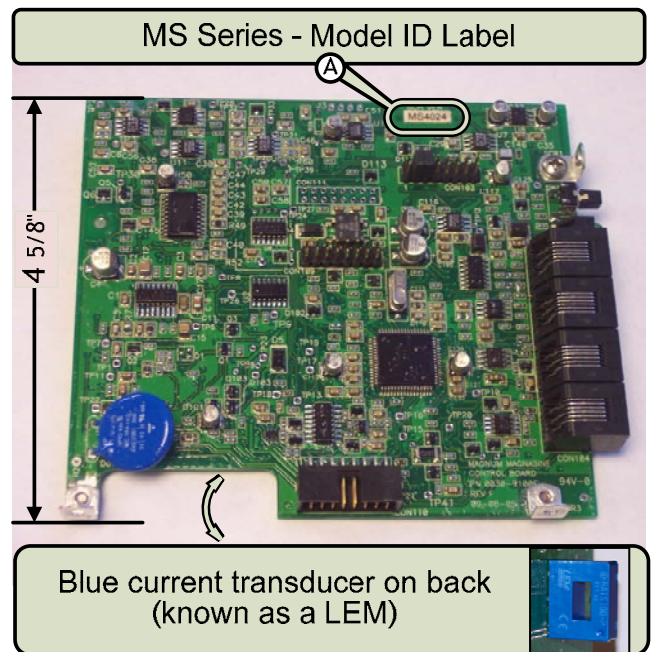


Figure 2, MS Series Control Board

#### 2.3 Required Tools and Equipment

Before attempting to replace the control board, ensure you have the following tools and equipment:

- T15 Torx head screwdriver (≥ 6" shaft required) - for #6-32 screws.

MS Series Inverter/Chargers also require:

- 7/16" socket with ≥ 6" extension and socket wrench - for 1/4-20 bolts.
- Torque wrench (130 in-lbs torque required) - for 1/4-20 bolts with 7/16" head.
- General purpose pliers (requires ≥ 1" jaw opening)

## 3.0 Removing and Replacing the ME/RD Series Control Board

This section provides information on removing and replacing the control board in a ME or RD Series inverter.

If you are replacing a control board in a MS Series inverter, proceed to section 4.0.

### 3.1 Removing the ME/RD Series Control Board

3.1.1 Remove the inverter's top cover and familiarize yourself with the internal components as described in [Top Cover Removal and Replacement with Internal Component Identification \(ME, MS or RD Series Inverter/Charger\), Service Instructions: 64-1001](#).

3.1.2 Locate the ME/RD Series control board in the inverter (figure 6, item A) and remove two #6-32 screws securing it to the inverter base; see figure 3, item B.

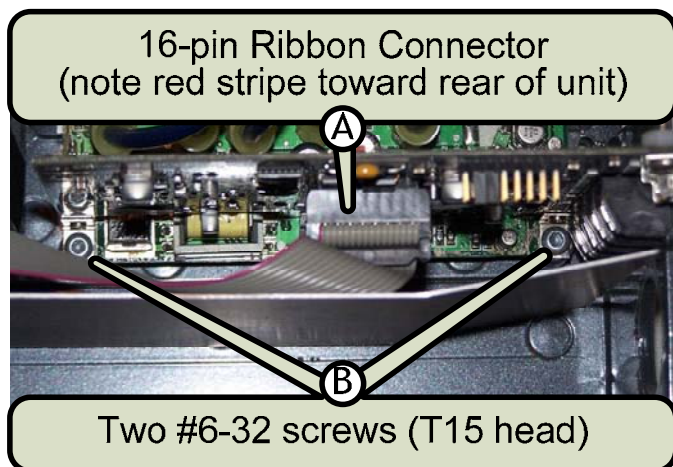



Figure 3, Top View of Control Board

3.1.3 Firmly pull up on the control board by its top edge (or upper corners) to remove it from the bottom 16-pin FET board connector.

3.1.4 Locate and pull off the 16-pin ribbon connector; see figure 3, item A.

3.1.5 The control board is now removed, using ESD precautions, place it component-side up on a grounded, static-free surface until it can be placed in an antistatic bag to be returned with any other replaced components.

### 3.2 Replacing the ME/RD Series Control Board

 If the FET board also needs to be replaced, follow the information described in either the [Small FET Board Removal and Replacement \(ME or RD Series Inverter/Charger\), Service Instructions: 64-1004](#) or the [Large FET Board Removal and Replacement \(ME, MS or RD Series Inverter/Charger\), Service Instructions: 64-1005](#) depending on your particular FET board - before replacing the control board.

3.2.1 Remove the new control board from its antistatic bag and connect the 16-pin ribbon cable connector. Ensure it is connected with the red stripe on the ribbon cable facing toward the rear of the inverter (refer to figure 3, item A for reference) and the connector pins are aligned correctly before pushing in.

3.2.2 Insert the new control board into the bottom 16-pin connector located on the FET board. Ensure the connector pins are aligned correctly before pushing in.

3.2.3 Replace the two #6-32 screws (T15 head) to secure the new control board to the FET board; see figure 3, item A.

3.2.4 The new control board is now installed, review all the connections a final time and ensure they are correctly made.


3.2.5 If there are no other internal components to replace, reinstall the top cover as described in the [Top Cover Removal and Replacement with Internal Component Identification \(ME, MS or RD Series Inverter/Charger\), Service Instructions: 64-1001](#).

## 4.0 Removing and Replacing the MS Series Control Board

### 4.1 Removing the MS Series Control Board

4.1.1 Remove the inverter's top cover and familiarize yourself with the inverter's internal components as described in the [Top Cover Removal and Replacement with Internal Component Identification \(ME, MS or RD Series Inverter/Charger\), Service Instructions: 64-1001](#).

4.1.2 Locate the MS Series control board (figure 7, item A) in the inverter and verify that it has a blue DC current transducer (referred to hereafter the "LEM") on the back; see figure 7, item C.


 **Note:** The MS Series inverter was made with two types of control boards; the earlier "non-LEM" type and the current "LEM" type. This document provides instructions only on replacing the LEM type control board. If repairing a MS Series inverter that does not have a LEM type control board, contact Magnum Energy for assistance.

4.1.3 Locate and remove the two #6-32 screws (T15 head) securing the control board; see figure 3, item B.

4.1.4 Firmly pull up on the control board by its top edge (or upper corners) to remove it from the bottom 16-pin connector on the FET board. The current sense wire (figure 7, item B) will still be attached thru the LEM on the back.

4.1.5 Look on the front of the control board and pull on the 16-pin ribbon connector to remove; see figure 3, item A.

4.1.6 Move the control board aside to provide access to the ¼-20 bolt (7/16" head) screwed into the negative FET buss-bar; see figure 7, item F. Remove this ¼-20 bolt and at the same time use a pair of pliers to hold the negative FET buss-bar in-place. This will prevent the buss-bar from twisting while this bolt is being removed; see figure 4.

 Note: Record how this hardware is removed, it will need to be reconnected in the same way.

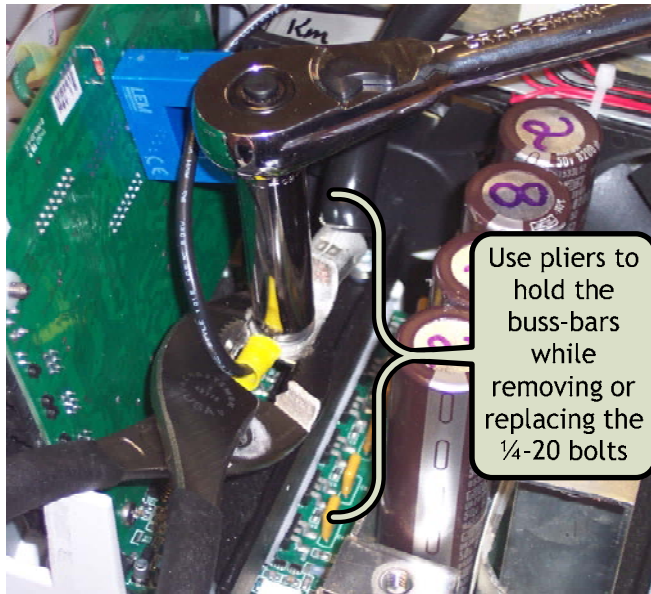



Figure 4, Preventing Buss-bars from twisting

4.1.7 After removing the bolt, pull the loose side of the current sense wire (figure 7, item B) out of the LEM.

4.1.8 The control board is now removed, using ESD precautions, place this control board aside until it can be placed in an antistatic bag to be returned with any other replaced components.

## 4.2 Replacing the MS Series Control Board

 If the FET board also needs to be replaced, follow the information described in the [Large FET Board Removal and Replacement \(ME, MS or RD Series Inverter/Charger\), Service Instructions: 64-1005](#) - before replacing the MS Series control board.

4.2.1 Remove the new control board from its antistatic bag and place the loose side of the current sense wire (figure 7, item B) back thru the LEM.

4.2.2 Reconnect the negative buss-cable and the current sense wire (running thru the LEM) to the negative FET buss-bar using the ¼-20 bolt; this connection must be torqued to 130 in. lbs. Use a pair of pliers to hold the negative FET buss-bar in-place while this bolt is being tightened to prevent the buss-bar from twisting or breaking. See figure 4 for reference.



**Caution:** Ensure these ¼-20 bolts are reconnected in the same way as they were removed and are correctly torqued. These connections are required to carry very high DC current and an improper connection will affect the performance of the inverter and may cause damage; see figure 5 for reference.

4.2.3 Reconnect the 16-pin ribbon cable connector to the front of the new control board. Ensure it is connected with the red stripe on the ribbon cable facing toward the rear of the inverter (refer to figure 3, item A for reference) and the connector pins are aligned correctly before pushing in.

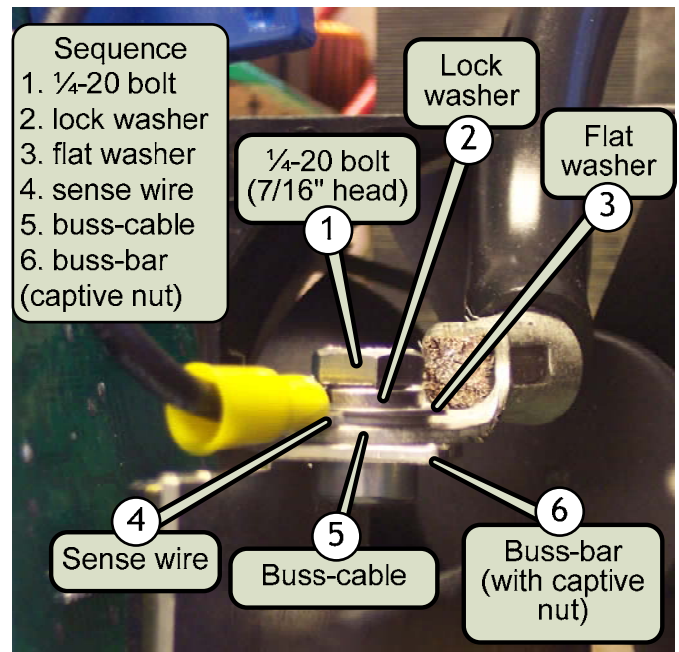


Figure 5, Connections to Buss-bar

4.2.4 Insert the new control board into the bottom 16-pin FET board connector; ensure the connector pins are aligned correctly before pushing in.

4.2.5 After the new control board is inserted into the bottom 16-pin FET board connector, screw in the two #6-32 screws (T15 head) to secure the new control board to the FET board; see figure 3 item B.

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

4.2.7 If there are no other internal components to replace, reinstall the top cover as described in the [Top Cover Removal and Replacement with Internal Component Identification \(ME, MS or RD Series Inverter/Charger\), Service Instructions: 64-1001](#).

## 5.0 Identifying Components in the Control Board Section

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

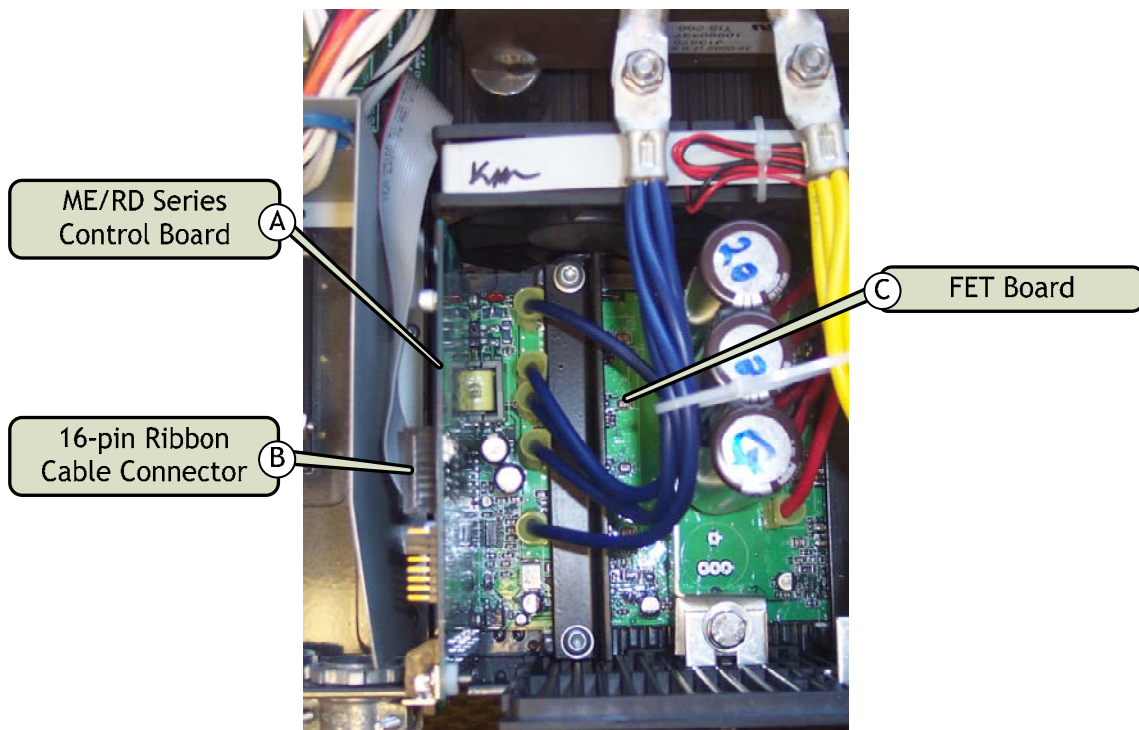


Figure 6, ME or RD Series Inverter - Control Board Section

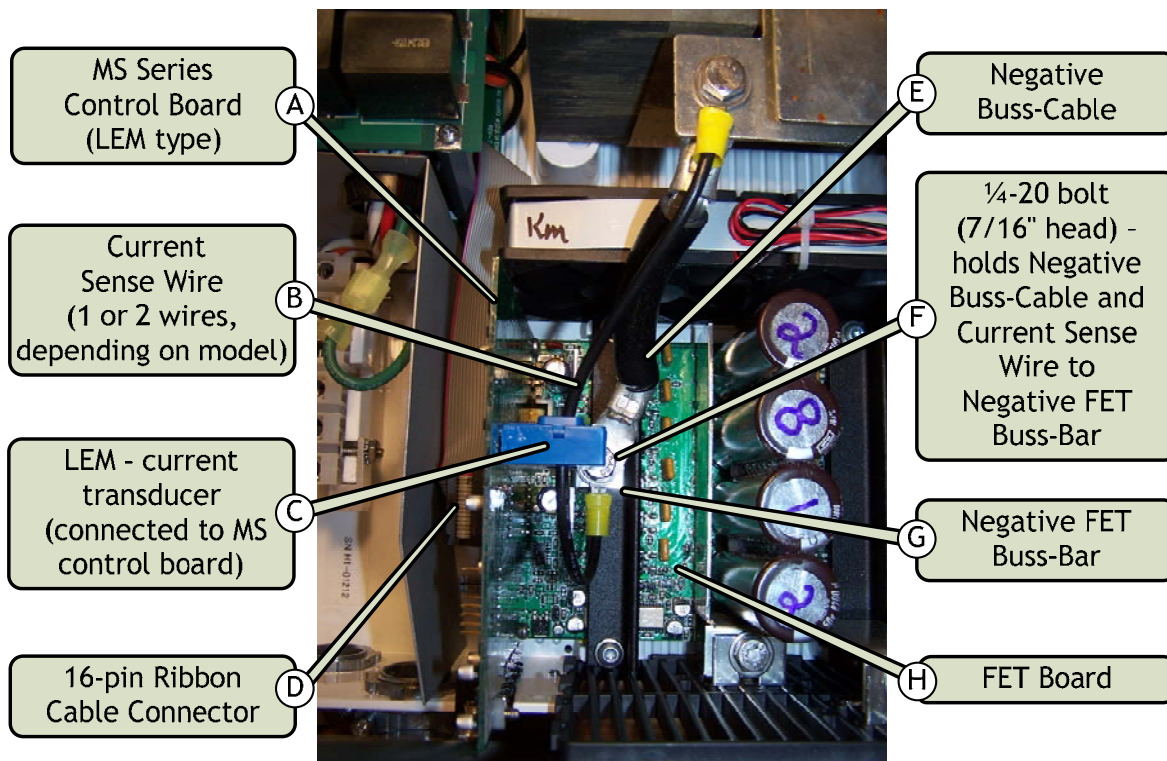


Figure 7, MS Series Inverter - Control Board Section