

PowerFlex 700 Drive - Frame 7 Components Replacement



Important User Information

Solid-state equipment has operational characteristics differing from those of electromechanical equipment. Safety Guidelines for the Application, Installation and Maintenance of Solid State Controls (publication [SGI-1.1](#) available from your local Rockwell Automation sales office or online at <http://www.rockwellautomation.com/literature/>) describes some important differences between solid-state equipment and hard-wired electromechanical devices. Because of this difference, and also because of the wide variety of uses for solid-state equipment, all persons responsible for applying this equipment must satisfy themselves that each intended application of this equipment is acceptable.

In no event will Rockwell Automation, Inc. be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Rockwell Automation, Inc. cannot assume responsibility or liability for actual use based on the examples and diagrams.

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Throughout this manual, when necessary, we use notes to make you aware of safety considerations.



WARNING: Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.



ATTENTION: Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you identify a hazard, avoid a hazard, and recognize the consequence.



SHOCK HAZARD: Labels may be on or inside the equipment, for example, a drive or motor, to alert people that dangerous voltage may be present.



BURN HAZARD: Labels may be on or inside the equipment, for example, a drive or motor, to alert people that surfaces may reach dangerous temperatures.

IMPORTANT

Identifies information that is critical for successful application and understanding of the product.

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Notes:

This manual contains new and updated information.

New and Updated Information

This table contains the changes made to this revision.

| Topic | Page |
|---|--------------------|
| Added Heatsink Fan Transformer kit, 1336-T-SP5A, to table of component kits. (Instructions were already in this manual, but the kit was not listed in the table.) | 7 |
| Added T-Comm Board kit, SK-G9-TCOMM, to table of component kits. | 7 |
| Added T-Comm Board removal and installation instructions. | 27 |

Notes:

Preface

Introduction

This publication provides guidelines for replacing the major components in the PowerFlex 700 Frame 7 drive.

Component Kits

All kits include necessary components, ESD wrist strap and hardware (if required), and thermal grease (if required).

| Description | Kit Catalog No. | Notes |
|--------------------------------|-------------------|--|
| Precharge Board | SK-G9-PRE1-V480 | AC input |
| | 1336-PB-SP22C | DC input |
| Main Control Board | SK-G9-VMCB1-D0 | 115V I/O |
| | SK-G9-VMCB1-C0 | 24V I/O |
| T-Comm Board | SK-G9-TCOMM | |
| Switch Mode Power Supply Board | SK-G9-PWRS1-D0 | |
| Power Interface Board | SK-G9-GDB1-D292 | 292A Drives |
| | SK-G9-GDB1-D325 | 325A Drives |
| Heatsink Fan | SK-G1-FAN1-F7 | |
| Heatsink Fan Transformer | 1336-T-SP5A | 480 to 120 Auto transformer (fan only) |
| Current Transducer | SK-G1-CT1-F7 | Includes one Transducer. |
| Inverter Power Module (IGBT) | SK-G1-QOUT1-F7 | Includes •Two IGBTs. •Two Gate Interface Boards. |
| Inverter Snubber Kit | SK-G1-INVSNB1-F7 | Includes: •One Snubber Board. •One Resistor. |
| SCR Snubber Kit | SK-G1-SCRSNUBRB | AC input requires three kits. DC input requires one kit. |
| Converter Power Module (SCR) | SK-G1-SCR1-F7 | AC input. Kit includes three SCR Modules. |
| DC Precharge SCR Module | SK-G1-SCR2-F7 | DC input. Kit includes one SCR Module |
| Thermal Sensors | SK-G1-THM1-F7 | Includes: •Main Control Panel Thermal Sensor •Heatsink Thermal Sensor. |
| Bus Fuse | 1336-F1-SP6A | |
| Bus Capacitor | SK-G1-BUSCAP1-F7 | Includes one Capacitor. |
| MOV | SK-G1-MOV1-F7 | AC input. |
| DC Link Choke | SK-G1-DCCHOKE1-F7 | AC input. |
| Balancing Resistor | 1336-RLOAD-SP4A | Includes one Resistor. |

Refer to the master parts list for the most up-to-date information:

<http://www.ab.com/support/abdrives/powerflex70/PF7ReleasedParts.pdf>

Recommended Tools

The following list of tools is provided for your reference to disassemble and assemble the drive and components. This list may not be all-encompassing for your situation. Not all tools are needed for some components. Refer to pertinent sections for details.

| Description | Notes |
|---|--|
| Torque wrench (metered in lb-in or N-m), T30 and T40 bits | |
| Torque seal or colored marker | |
| Screwdrivers (standard, Phillips, star — various sizes) | |
| Magnetic screwdriver, long | |
| Socket set, metric | |
| Cylindrical pick-up magnet | |
| Pliers, regular and needle-nose | |
| Wire cutters | |
| Volt ohm meter | Used to test Inverter Snubber Resistors |
| Isopropyl alcohol | |
| Nylon tie wraps | |
| Pencil | |
| 14 or 16 gauge wire, about 10 cm (4 in.) | Needed whenever IGBT gates are exposed. Used to short the gates. |
| Two (2) #10 wire lugs, either fork or ring | |

Safety Precautions

The precautions and general installation requirements provided in the PowerFlex 700 Frame 7-10 Installation Instructions (publication 20B-IN014) and the PowerFlex 700 User Manual (publication 20B-UM002) must be followed in addition to those included here.



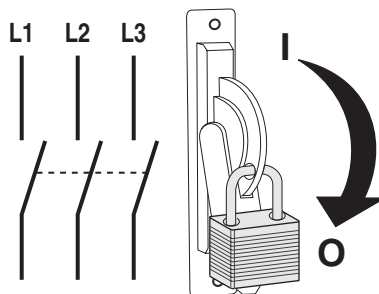
ATTENTION: To avoid an electric shock hazard, ensure that all power has been removed before proceeding. In addition, before servicing, verify that the voltage on the bus capacitors has discharged. Check the DC bus voltage at the Power Terminal Block by measuring between the DC+ & DC– terminals, between the DC+ terminal and the chassis, and between the DC– terminal and the chassis. The voltage must be zero for all three measurements.

ATTENTION: Remove power before making or breaking cable connections. When you remove or insert a cable connector with power applied, an electrical arc may occur. An electrical arc can cause personal injury or property damage by:

- sending an erroneous signal to your system's field devices, causing unintended machine motion.
- causing an explosion in a hazardous environment.

ATTENTION: Electrical arcing causes excessive wear to contacts on both the module and its mating connector. Worn contacts may create electrical resistance.

1. Turn off and lock out input power. Wait five minutes.
2. Verify that there is no voltage at the drive's input power terminals.
3. Check the DC bus voltage at the Power Terminal Block by measuring between the DC+ and DC– terminals, between the DC+ terminal and the chassis, and between the DC– terminal and the chassis. The voltage must be zero for all three measurements.



ATTENTION: This assembly contains parts and sub-assemblies that are sensitive to electrostatic discharge. Static control precautions are required when servicing this assembly. Component damage may result if you ignore electrostatic discharge control procedures. If you are not familiar with static control procedures, reference Allen-Bradley Publication 8000-4.5.2 Guarding Against Electrostatic Damage, or any other applicable ESD protection handbook.



ATTENTION: The information in this publication is merely a guide for proper installation. Rockwell Automation, Inc. cannot assume responsibility for the compliance or the noncompliance to any code (national, local, or otherwise) for the proper installation of this drive or associated equipment. A hazard of personal injury and/or equipment damage exists if codes are ignored.



ATTENTION: Only qualified personnel familiar with adjustable frequency AC drives and associated machinery should plan or implement the installation, start-up, and subsequent maintenance of the system. Failure to comply may result in personal injury and/or equipment damage.



ATTENTION: HOT surfaces can cause severe burns. **Do not** touch the heatsink surface during operation of the drive. After disconnecting power, allow time for cooling.



ATTENTION: Replace all protective shields before applying power to the drive. Failure to replace protective shields may result in death or serious injury.

Important Initial Steps

Read and follow these statements before performing any service on the drive.

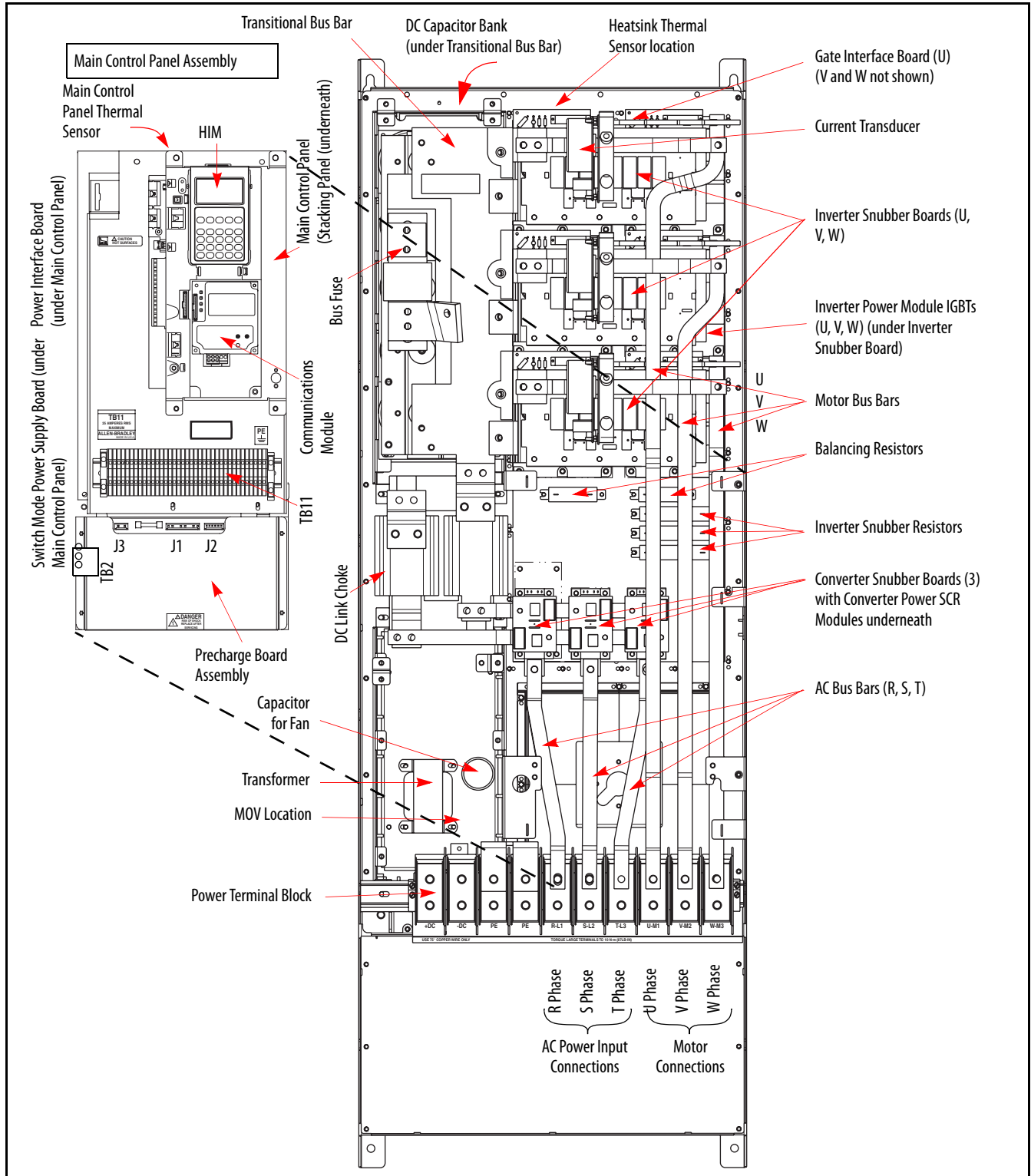
- Read and follow the precautions in [Safety Precautions on page 9](#).
- Identify components to be replaced using the figures in [Component Diagrams and Torque Specs on page 13](#).
- Remove protective shields only as necessary.
- Before disconnecting any wire or cable, verify that it is labeled. Also, when removing components, note hardware type and location.
- When torquing any fasteners, use a colored marker or torque seal to mark each screw after torquing so you know when all are done and to indicate signs of any subsequent tampering.
- Refer to the product installation documentation for startup and other instructions after servicing.

Notes:

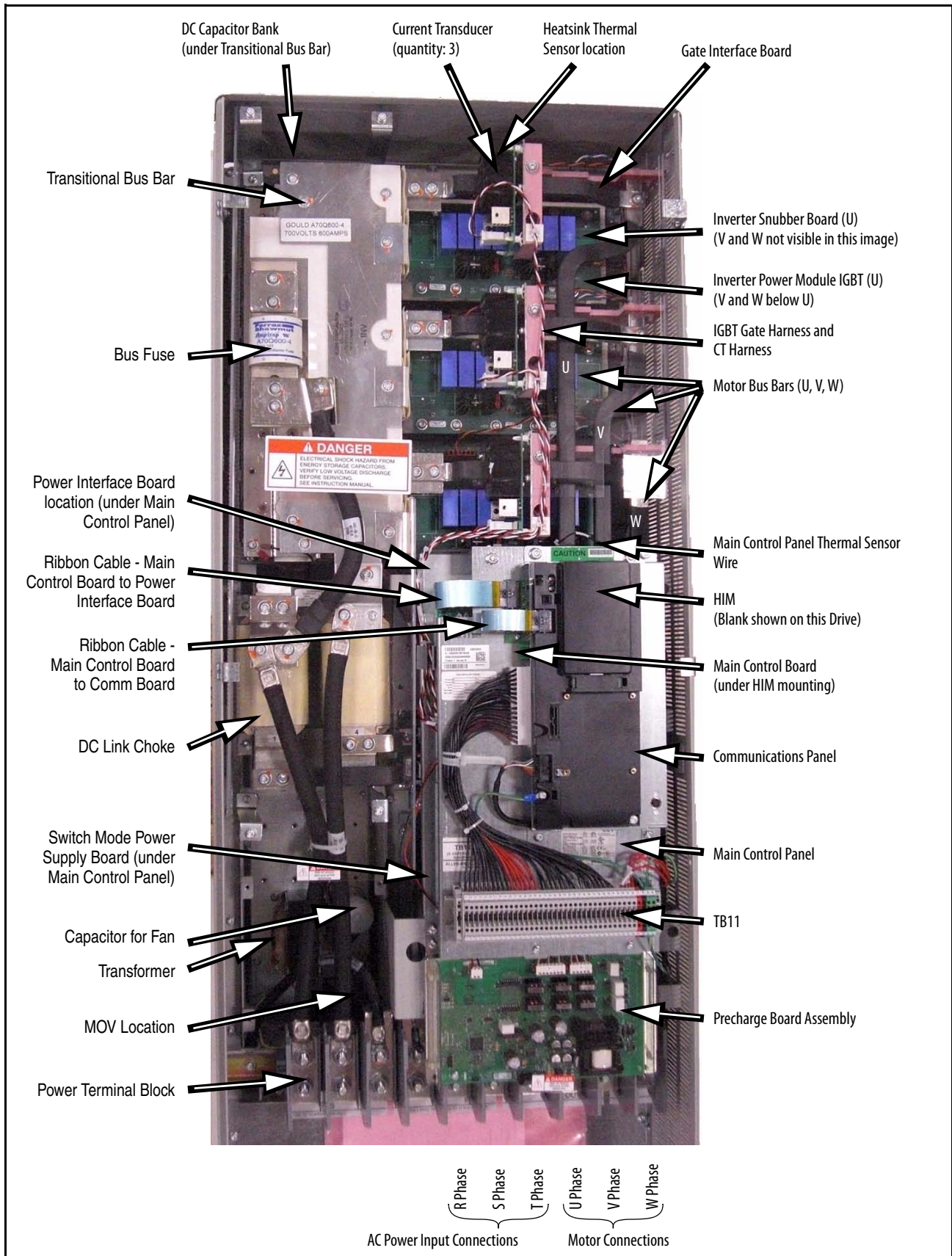
Component Diagrams and Torque Specs

Drive Components

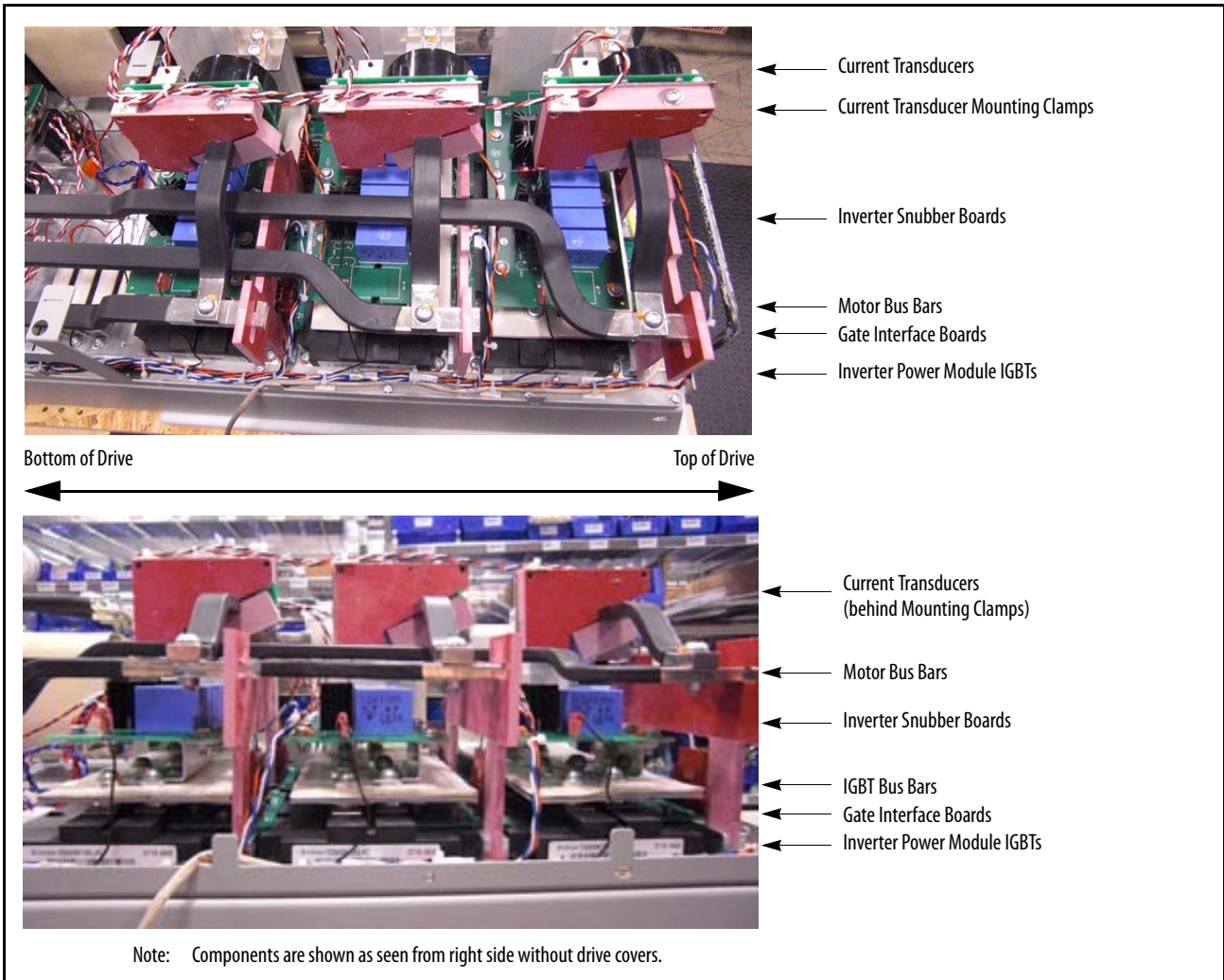
AC input drive is shown.



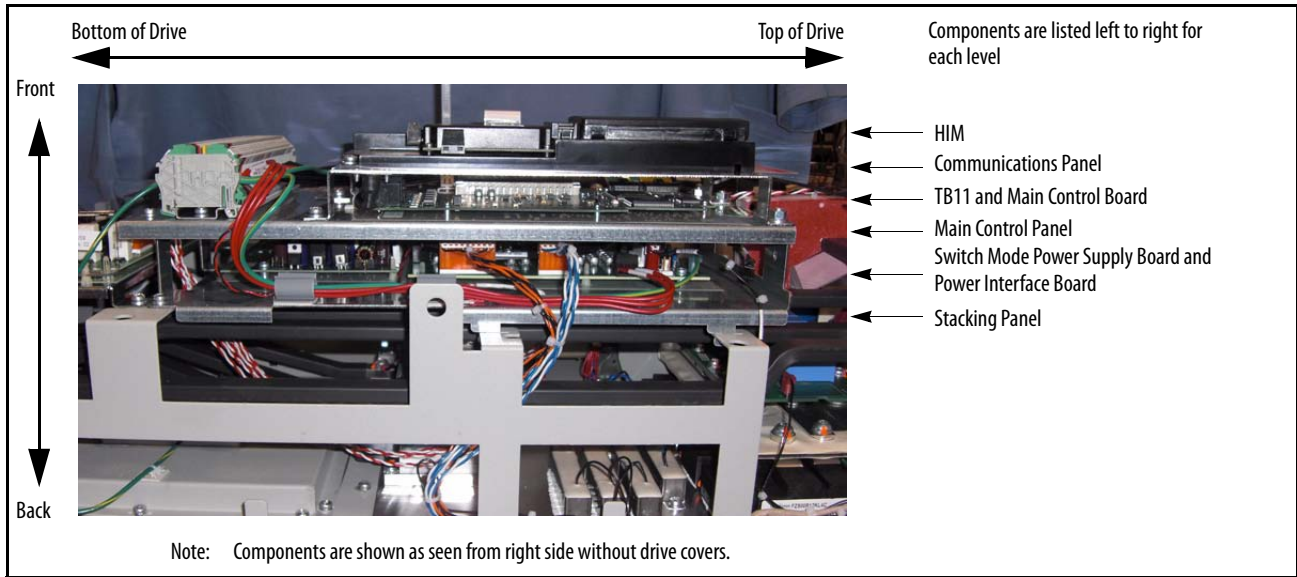
AC input drive is shown.



Inverter Section



Main Control Panel Assembly



Fastener Torque Specifications

Torque Sequence

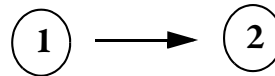
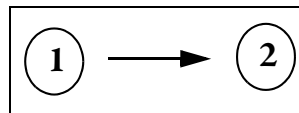


ATTENTION: When mounting components to a drive's heat sink, component fastener torque sequences and tolerances are crucial to component-to-heat sink heat dissipation.

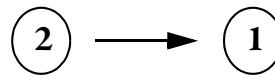
Components can be damaged if initial tightening procedure is not performed to specification.

The following illustrates initial and final tightening sequences for components fastened to a heat sink using two, four, and six screws. Initial torque is 1/3 (33%) of final torque, except six-point mountings, which require 0.7 N•m (6 lb•in) The numeric illustration labels are for your assistance. Drive components do not carry these labels.

Figure 1 - Two-Point Mounting



Initial Sequence



Final Sequence

Figure 2 - Four-Point Mounting

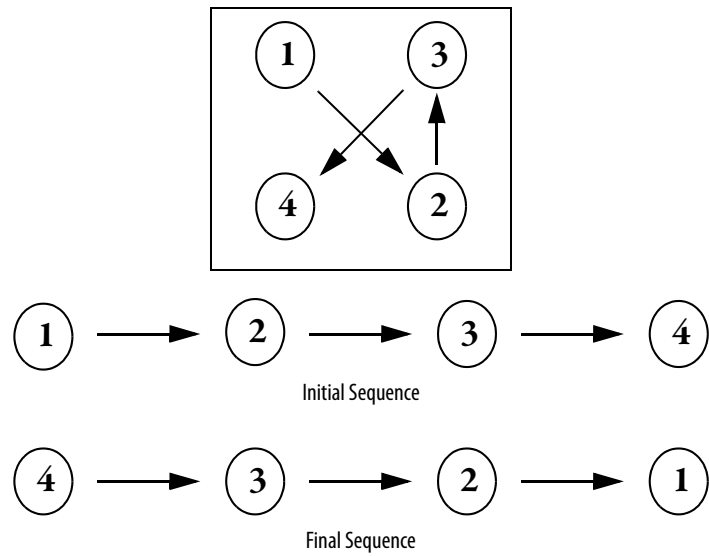
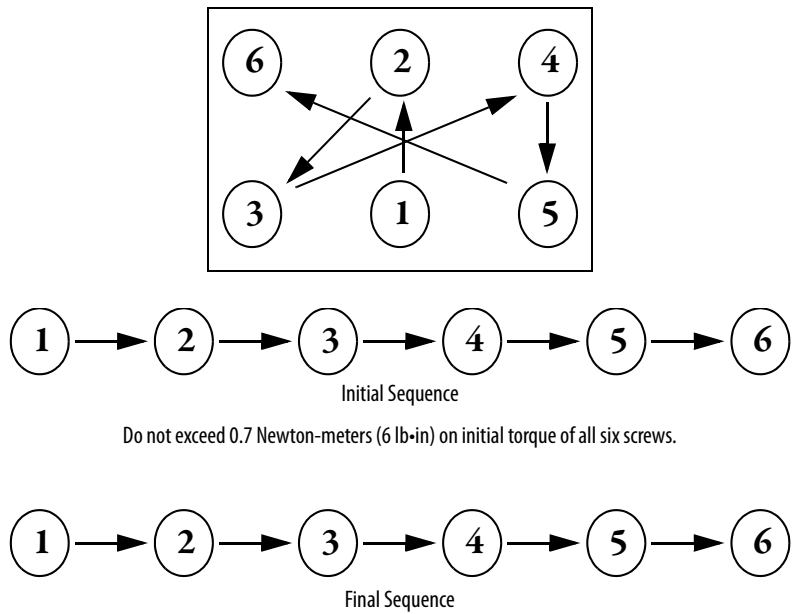


Figure 3 - Six-Point Mounting



Torque Specifications

The following table lists fastener locations by component, how the fasteners are used, and torque specifications. Refer to [Torque Sequence](#) in this chapter for fastening two-point, four-point, and six-point components to the heat sink.

| Component | Fastener Application | Torque lb-in | Torque N-m | |
|--------------------------------------|---|-------------------|------------|-----|
| Fan Motor | Motor to Fan Cover Assembly | 14 | 2 | |
| Fan Cover Assembly | Assembly to chassis | 26 | 3 | |
| Fan Transformer | Transformer to chassis | 26 | 3 | |
| Fan Capacitor | Capacitor to chassis | Hand tighten | | |
| MOV Surge Suppressor | MOV to chassis | 14 | 2 | |
| Inverter Snubber Resistor | Resistor to heat sink | Initial sequence: | 6 | 0.7 |
| | | Final sequence: | 26 | 3 |
| Inverter Snubber Resistor | Wires to Capacitor Bus Bar Assembly | 50 | 6 | |
| Inverter Snubber Bracket | Bracket to Power Module | 80 | 9 | |
| Inverter Snubber Board | Board to Brackets | 50 | 6 | |
| Converter Snubber Board | Board to Input Rectifier | 50 | 6 | |
| Balancing Resistor | Resistor to heat sink | Initial sequence: | 6 | 0.7 |
| | | Final sequence: | 26 | 3 |
| Balancing Resistor | Wires to Capacitor Bus Bar Assembly | 50 | 6 | |
| Heatsink Thermal Sensor | Thermistor to heatsink | 14 | 2 | |
| Bus Capacitor Holder | Holder to Bus Capacitors | 26 | 3 | |
| Capacitor Bus Bar Assembly | Assembly to Bus Capacitors | 50 | 6 | |
| Gate Interface Board | Board to Power Modules | 14 | 2 | |
| Inverter Power Module (IGBT) Bus Bar | Bus Bar to Power Modules | 80 | 9 | |
| Inverter Power Module (IGBT) | Module to heat sink | Initial sequence: | 6 | 0.7 |
| | | Final sequence: | 32 | 3.6 |
| DIN Rail (TB1) | Rail to chassis | 50 | 6 | |
| PE Shortening Bar | Bar to TB1 | 80 | 9 | |
| Converter Power Module (SCR) | SCR to heat sink | Initial sequence: | 6 | 0.7 |
| | | Final sequence: | 50 | 6 |
| Transitional Bus Bar Assembly | Assembly to Power Module Bus Bar Assembly | 80 | 9 | |
| Bus Fuse F1 | Fuse to Transitional Bus Bar | 80 | 9 | |
| DC Bus Inductor L1 | Inductor to chassis | 50 | 6 | |
| Bus Bar Cable Adaptor | Adaptor to Transitional Bus Bar and DC Bus Inductor | 80 | 9 | |
| Converter Bus and Motor Bus Bars | Bus Bars to all connections | 80 | 9 | |
| Wires (PE) | Wires to Ground Stud | 80 | 9 | |
| Wires | Wires to TB1 | 80 | 9 | |
| Wire (TE) | Wire to TB1 | 50 | 6 | |

| Component | Fastener Application | Torque lb-in | Torque N-m |
|---|-------------------------------------|-------------------------|-----------------------|
| Wires | Wires to TB2 | 7 | 0.8 |
| Wires | Wires to TB3 | 8 – 10 | 0.9 – 1.1 |
| CT Mounting Plate | Mounting Plate to CT Clamping Plate | 14 | 2 |
| CT Clamping Plate | Clamping Plate to Bus Bar | 26 | 3 |
| Power Cables | Cables to terminals | 80 | 9 |
| Main Control, Gate Driver, Precharge Board Mounting Plates | Plates to chassis | 26 | 3 |
| High Voltage Guard | Guard to chassis | 26 | 3 |

Notes:

Basic Component Removal Procedures

The procedures in this section are required by many of the replacement procedures described in this manual in addition to replacement of these components themselves.

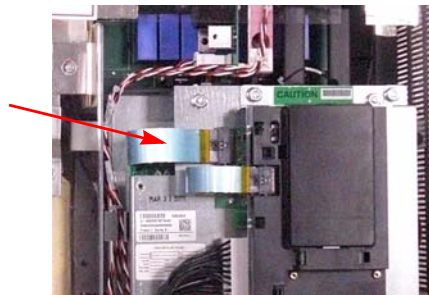
DO NOT perform any of the procedures in this section unless specified by the instructions for the component you are replacing.

Remove Main Control Panel Assembly

Refer to the figures in [Component Diagrams and Torque Specs on page 13](#) for these instructions.

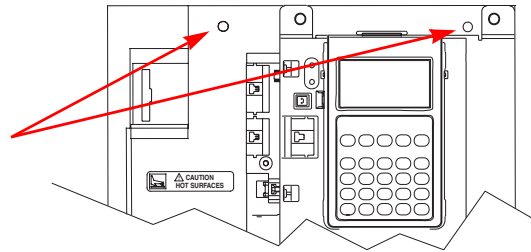
Remove Components

1. Read and follow the [Safety Precautions on page 9](#) and [Important Initial Steps on page 11](#).
2. Remove safety shields as needed.
3. Remove the ribbon cable going from the Main Control Board (J2) to the Power Interface Board (J1).



4. Remove the two screws on the Main Control Panel below TB11 for the Main Control Board.
5. Verify that all wiring to lower side of TB11 is properly labeled and then disconnect wiring from TB11.

- Remove the two nuts at the top of the Main Control Panel.



- Remove Main Control Panel; support.
- Disconnect wire harnesses from TB11 to the Switch Mode Power Supply Board (J4 connector) and at TB1 and TB2 on the Power Interface Board.
- Label and disconnect all customer wiring from TB11.
- Carefully set the Main Control Panel aside.

Install Components

When instructed for the component you are replacing, reinstall the Main Control Panel Assembly components in the reverse order of removal.

Remove Stacking Panel

Refer to the figures in [Component Diagrams and Torque Specs on page 13](#) for these instructions.

Remove Components

- Perform [Remove Main Control Panel Assembly on page 21](#).
- Remove remaining wiring harnesses from the Power Interface Board. Do not disconnect the wiring between the Power Interface Board and the Switch Mode Power Supply Board.

| Connector | Connected Components |
|---------------|---|
| J14, J15, J16 | U, V, W Phase CT |
| J24 | +Bus IN of Power Interface Board to J1 of Precharge Board |
| J7 | Main Control Panel Thermal Sensor |
| J18 | U, V, W negative gates |
| J23 | U, V, W positive gates |

- Disconnect the Main Control Panel Assembly Thermal Sensor wire from the Monitor Wire. (See diagram at the start of [Main Control Panel Thermal Sensor on page 45](#).)
- Remove the two screws at the bottom of the Stacking Panel for the Power Interface and the Switch Mode Power Supply Boards. Remove the panel by sliding it up and out.

Install Components

When instructed for the component you are replacing, reinstall the Stacking Panel components in the reverse order of removal.

Remove Precharge Board Assembly

Refer to the figures in [Component Diagrams and Torque Specs on page 13](#) for these instructions.

Remove Components

1. Read and follow the [Safety Precautions on page 9](#) and [Important Initial Steps on page 11](#).
2. Using pliers if needed, remove the three (3) wiring/harnesses (J1, J2, J3) at the top of the board.

Note: Some connectors may not be labeled. Be sure to label them.
3. For DC input only: Verify that customer wiring to TB2 is properly labeled and then disconnect wiring from TB2.
4. Unscrew the two mounting screws at the top of the mounting panel.
5. Slide the board and mounting plate out by pulling down and out.

Install Components

When instructed for the component you are replacing, reinstall the Precharge Board Assembly components in the reverse order of removal.

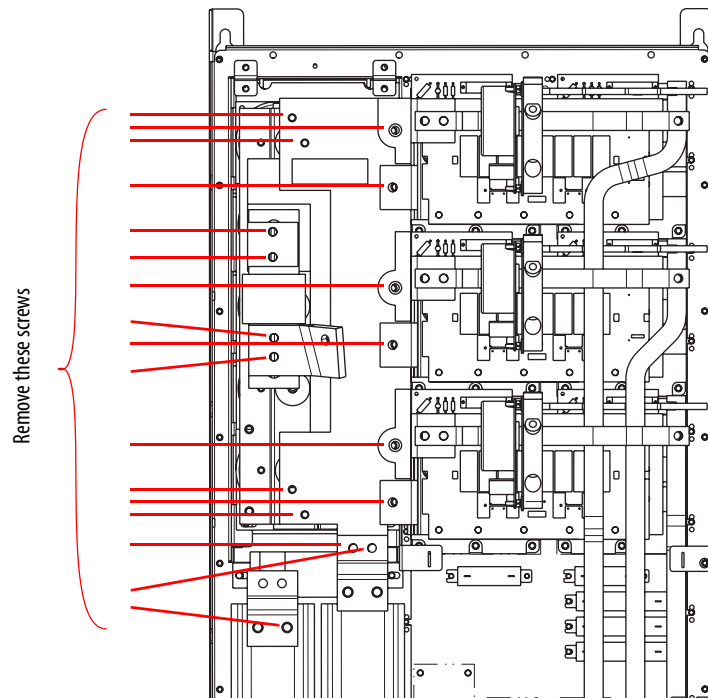
Remove Transitional Bus Bar

Refer to the figures in [Component Diagrams and Torque Specs on page 13](#) for these instructions.

Remove Components

1. Read and follow the [Safety Precautions on page 9](#) and [Important Initial Steps on page 11](#).
2. Remove the upper safety cover (four screws).
3. Locate the Transitional Bus Bar.

Figure 4 - Screws on Panel over Transitional Bus Bar



TIP When you remove the screws in the next step, you will remove the Bus Fuse as well. There is a plate over the top end of the Bus Fuse which will be free upon removal of the screws. Do not let the plate fall.

4. Using [Figure 4-](#), remove the seventeen (17) screws for the Transitional Bus Bar.
5. Slide the Transitional Bus Bar to the left and out.
This allows access to the wire connections below it if needed.

Install Components

When instructed for the component you are replacing, reinstall the Transitional Bus Bar components in the reverse order of removal.

Only torque screws after all components are in place.

Component Replacement Procedures

Precharge Board

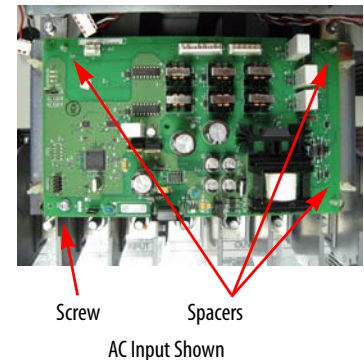
Refer to the figures in [Component Diagrams and Torque Specs on page 13](#) for these instructions.

Remove Components

1. Read and follow the [Safety Precautions on page 9](#) and [Important Initial Steps on page 11](#).
2. Remove the safety cover over the Precharge Board.
3. For DC input only: Verify that customer wiring to TB2 is properly labeled and then disconnect wiring from TB2.
4. Using pliers if needed, remove the three (3) wiring/harnesses (J1, J2, J3) at the top of the board.

Note: Some connectors may not be properly labeled. Be sure to label them appropriately.

5. Remove the Precharge Board mounting star screw located at the lower left corner of the Precharge Board.
6. For AC input: Using your fingers or needle-nose pliers, squeeze the wings of each of the three spacers and separate the Precharge Board from the mounting plate.
7. For DC input: Turn each of the six (6) lock screws 1/4 turn counterclockwise to unlock.
8. Remove the Precharge Board.



Install Components

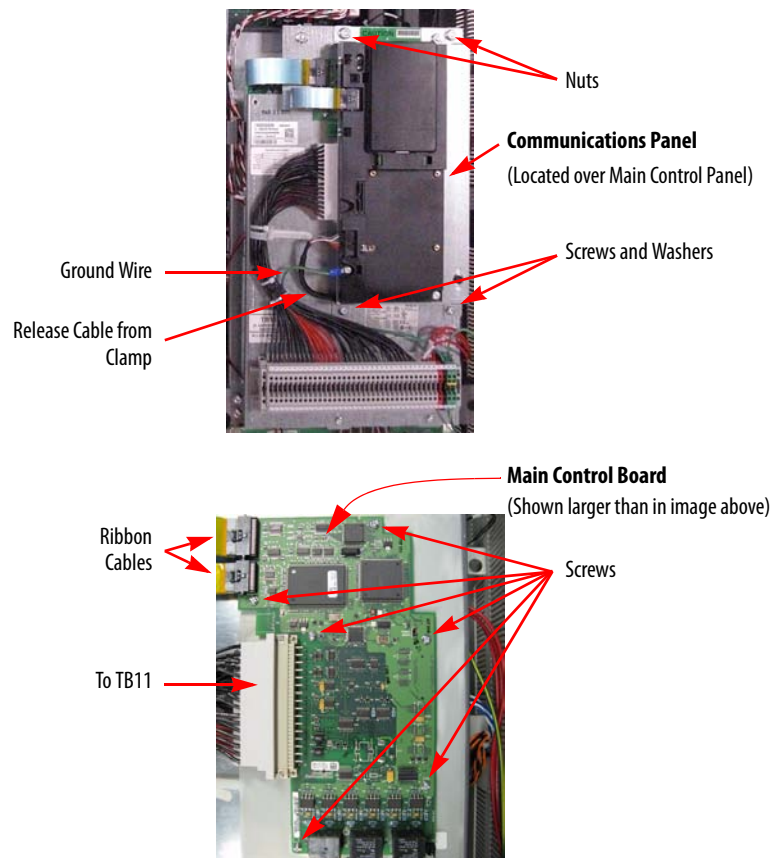
1. Install the new Precharge Board.
2. Reconnect wiring.
3. Replace all safety shields and enclosure covers before applying power to the drive.

Main Control Board

Refer to the figures in [Component Diagrams and Torque Specs on page 13](#) for these instructions.

Remove Components

1. Read and follow the [Safety Precautions on page 9](#) and [Important Initial Steps on page 11](#).
2. Remove safety shields as needed.



3. Unscrew the green/yellow ground wire from the Communications Panel.
4. Remove the two nuts and two screws and washers for the Communications Panel.
5. Disconnect both ribbon cables from the left side of the Main Control Board.
6. Holding the Communications Panel, release the cable at the bottom of the panel from its clamp and set the Communications Panel aside.
7. If needed, unscrew and disconnect the wire set going to TB11 from the Main Control Board.
8. Unscrew the six (6) screws holding the Main Control Board.
9. Remove the Main Control Board.

Install Components

1. Install the new Main Control Board.
2. Reassemble all components in the reverse order of removal.
3. Reconnect all cables.
4. Replace all safety shields and enclosure covers before applying power to the drive.

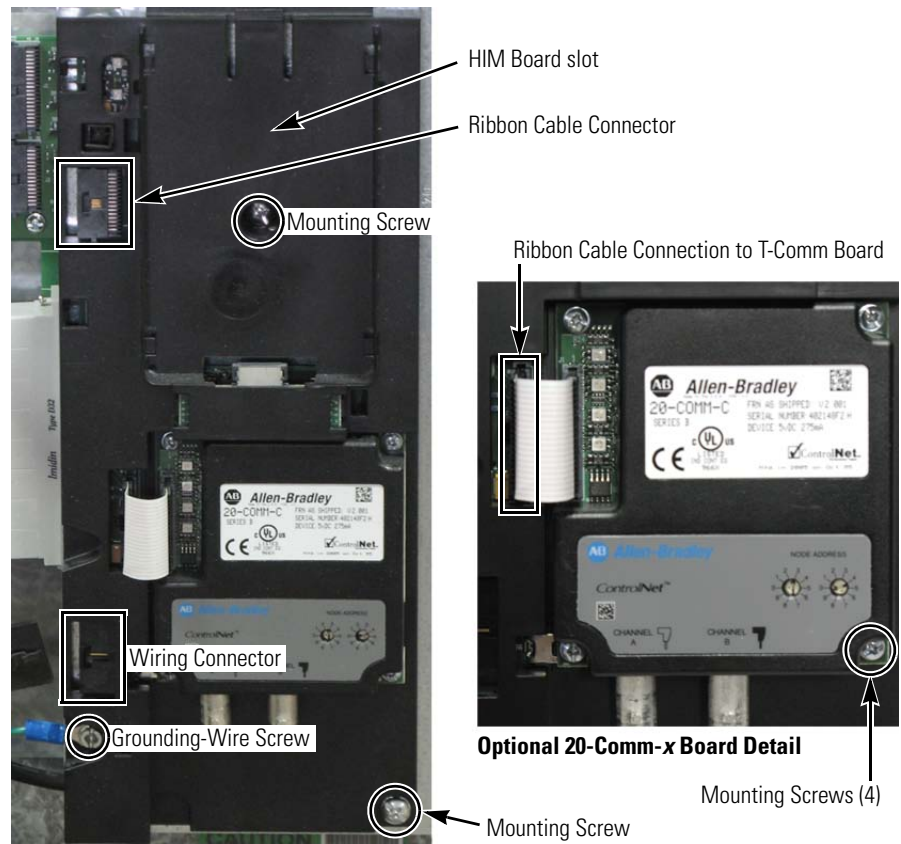
T-Comm Board

See [Component Diagrams and Torque Specs on page 13](#) to locate the component detailed in these instructions.

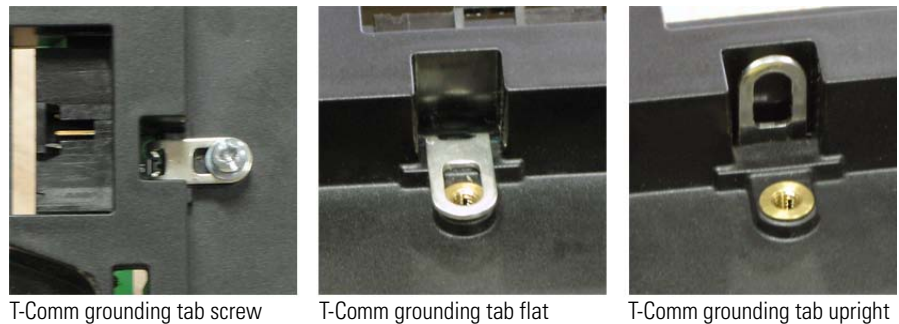
Remove Components

1. Read and follow the [Safety Precautions on page 9](#) and [Important Initial Steps on page 11](#).
2. Remove the Main Control Board:
 - a. Remove the HIM board from its slot (if used).
 - b. Disconnect the ribbon cable from the Main Control Board (connects to J1 on Power Interface Board).
 - c. Disconnect the wiring connector from the Main Control Board (connects to 8-pin serial port in the lower-right corner of Main Control Board panel).
 - d. Remove and save the grounding-wire screw (connects to PE on TB11).
 - e. Remove and save the two mounting screws for the Main Control Board.

f. Remove the Main Control Board.

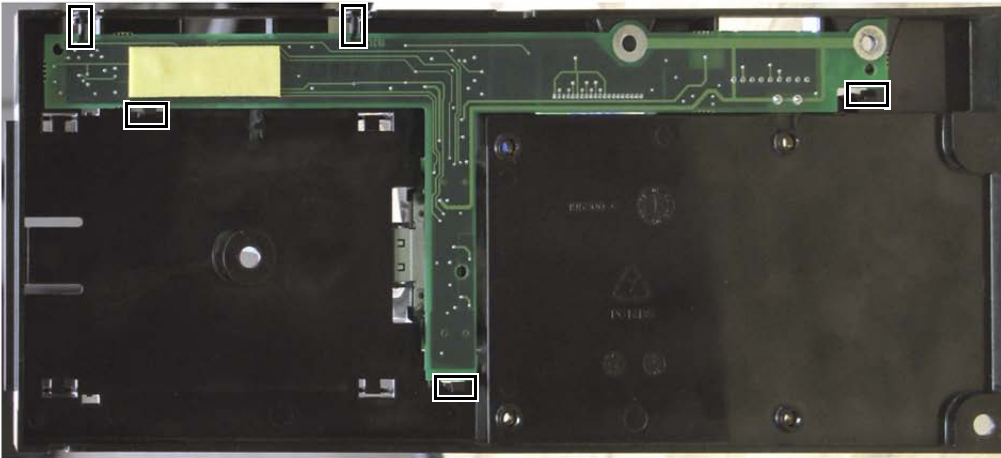


3. Remove the 20-Comm-*x* Board (if used):
 - a. Disconnect the ribbon cable between the 20-Comm-*x* Board and T-Comm board; disconnect only from the T-Comm board.
 - b. Remove and save the four mounting screws.
4. If the 20-Comm-*x* Board is not used, remove the screw securing the T-Comm grounding tab.



5. Place the tip of a flathead screwdriver between the T-Comm grounding tab and screw mount. Gently pry up until the grounding tab is in an upright position or about 90 degrees from the screw mount.

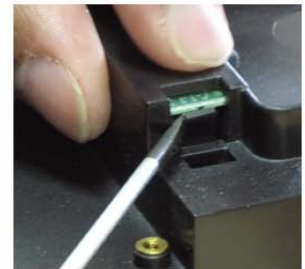
- If needed, use the same flathead screwdriver tip to pry the seven locking tabs away from the T-Comm Board.



T-Comm Board Locking Tab Locations

Five locking tabs are on the back side of the Main Control Board (above); two are on the front side in the area between the optional HIM and 20-Comm-x board slots (upper right).

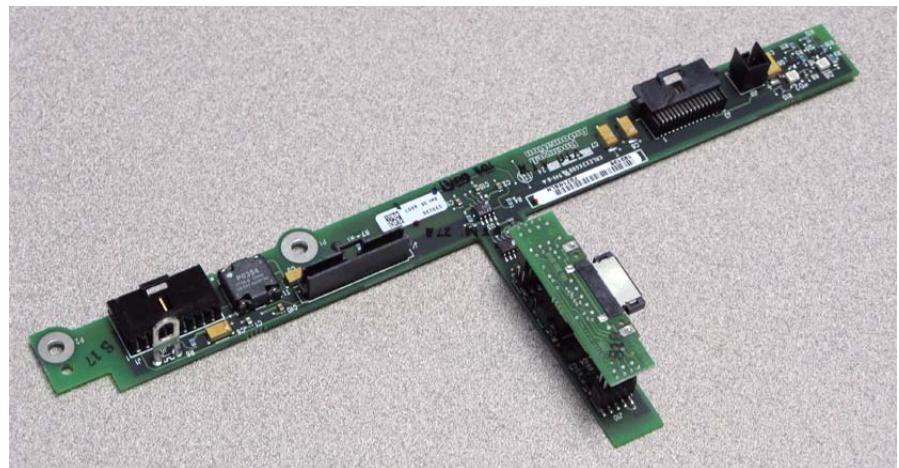
NOTE: Use a flathead screwdriver tip to pry the locking tabs away from the T-Comm Board (lower right).



- Remove the T-Comm Board from the Main Control Board; return or dispose of it properly.

Install Components

- Install the new T-Comm Board.



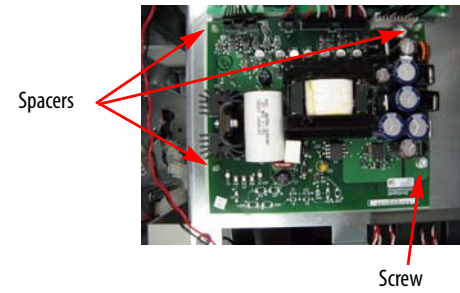
- Verify the board is locked into all seven locking tabs.
- Carefully bend the T-Comm grounding tab until it is flush with the screw mount on the Main Control Board.
- Reassemble all components in the reverse order of removal.
- Reconnect all cables, safety shields and enclosure covers before applying power to the drive.

Switch Mode Power Supply Board

Refer to the figures in [Component Diagrams and Torque Specs on page 13](#) for these instructions.

Remove Components

1. Perform [Remove Main Control Panel Assembly on page 21](#).
2. Disconnect all cables (J2, J4, J3, J1) from the Switch Mode Power Supply Board.
3. Remove the Switch Mode Power Supply Board mounting star screw located at the lower right corner of the board.
4. Using your fingers or needle-nose pliers, squeeze the wings of each of the three spacers and separate the Switch Mode Power Supply Board from the mounting plate.
5. Remove the Switch Mode Power Supply Board.



Install Components

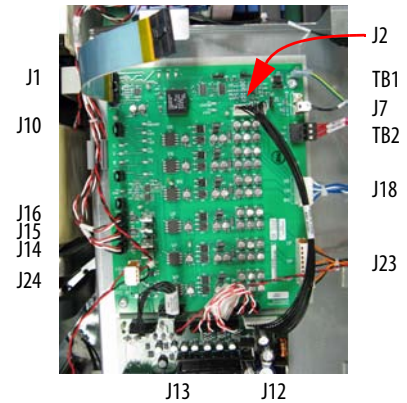
1. Install the new Switch Mode Power Supply Board.
Tighten board screws to 1.7 N•m (15 lb•in)
2. Reconnect all cables.
3. Reassemble all components in the reverse order of removal.
Tighten sheet metal screws to 3.2 N•m (28 lb•in)
4. Reconnect the ribbon cable going from the Power Interface Board (J1) to the Main Control Board (J2).
5. Replace all safety shields and enclosure covers before applying power to the drive.

Power Interface Board

Refer to the figures in [Component Diagrams and Torque Specs on page 13](#) for these instructions.

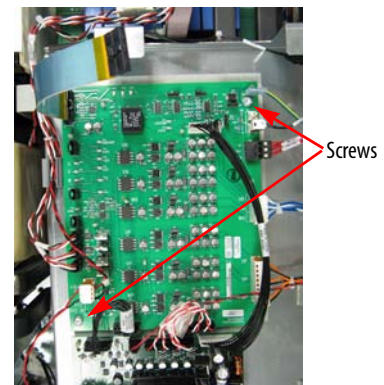
Remove Components

1. Read and follow the [Safety Precautions on page 9](#) and [Important Initial Steps on page 11](#).
2. Perform [Remove Main Control Panel Assembly on page 21](#).
3. Remove remaining wiring harnesses from the Power Interface Board, including the wiring between the Power Interface Board and the Switch Mode Power Supply Board.



| Connector | Connected Components |
|-----------|---|
| J1 | Main Control Board |
| J10 | Precharge Board (only on DC input systems) |
| J16 | W Phase CT |
| J15 | V Phase CT |
| J14 | U Phase CT |
| J24 | +Bus IN of Power Interface Board to J1 of Precharge Board |
| J13 | Switch Mode Power Supply Board |
| J12 | Switch Mode Power Supply Board |
| J23 | U, V, W positive gates (upper phase) |
| J18 | U, V, W negative gates (lower phase) |
| TB2 | TB11 |
| J7 | Monitor Wire to thermal sensors |
| TB1 | TB11 |

4. Remove the two Power Interface Board mounting star screws located at the upper right and lower left corners of the board.
5. Using your fingers or needle-nose pliers, squeeze the wings of each of the nine (9) spacers and remove the Power Interface Board from the mounting plate.

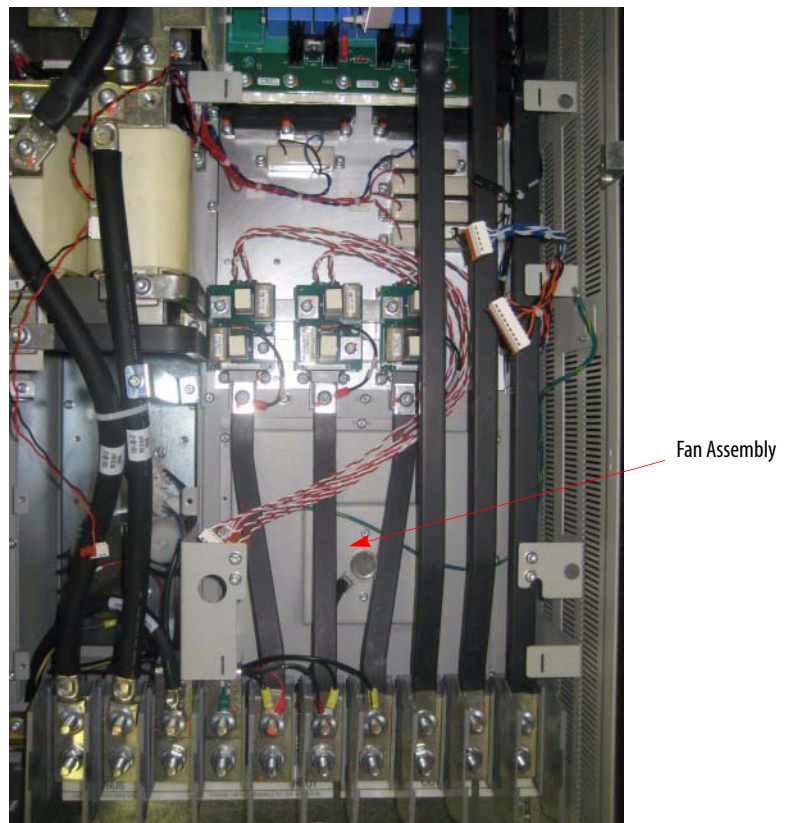


Install Components

1. Install the new Power Interface Board.
Tighten board screws to 1.7 N•m (15 lb•in)
2. Reconnect all wiring except the ribbon cable going from the Power Interface Board (J1) to the Main Control Board (J2).
3. Reinstall the Main Control Panel Assembly.
Tighten sheet metal screws to 3.2 N•m (28 lb•in)
4. Reconnect the ribbon cable going from the Power Interface Board (J1) to the Main Control Board (J2).
5. Replace all safety shields and enclosure covers before applying power to the drive.

Fan

The Fan is located behind the Main Control Panel assembly and Precharge Board.



Refer to the figure below and the figures in [Component Diagrams and Torque Specs on page 13](#) for these instructions.

Remove Components

1. Read and follow the [Safety Precautions on page 9](#) and [Important Initial Steps on page 11](#).
2. Perform [Remove Main Control Panel Assembly on page 21](#).
3. Perform [Remove Stacking Panel on page 22](#).
4. Perform [Remove Precharge Board Assembly on page 23](#).
5. Verify that all wiring to Power Terminal Block is properly labeled and then remove all nuts and disconnect accompanying wires from the Power Terminal Block, including the DC+ and DC- Bus cables, the PE jumper cable to chassis ground, and the PE Bus Bar (located over the third and fourth Terminal Blocks).

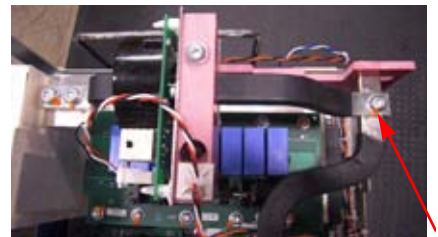
TIP For easier removal of the PE jumper cable, flex the cable to relieve the strain on lug.

Remove these nuts and wiring.

Label and remove all wiring here.



6. Remove the single screws on the right end of U, V, and W Current Transducer bus bars. The Current Transducer assemblies do not need to be removed.



7. Remove the U, V, and W Bus Bars.

To do so, move the top end of the bar to the right and the bottom end of the bar to the left, pull down on a angle, then rotate the bar 180° and fully remove the bar.

8. Remove the screws and accompanying wires for R, S, and T Bus Bars at the SCR.
9. Remove the R, S, T Bus Bars.



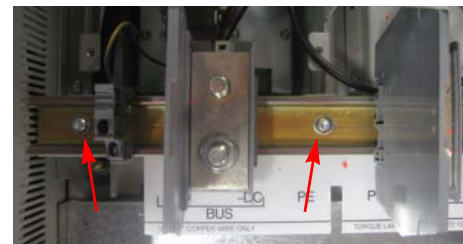
R, S, T Bus Bars at SCR

TIP Label Bus Bars for correct orientation when reinstalling later.

10. Remove at least two terminal blocks from the DIN rail by pushing down on the metal tab on top of the terminal block while lifting the bottom of the terminal block out toward you and up.

TIP If desired for ease of access to individual terminal blocks, remove barriers between terminal blocks by pulling out on a slight down- or upward angle.

11. Remove the three screws for the DIN rail, two toward the left end and one at the right end.



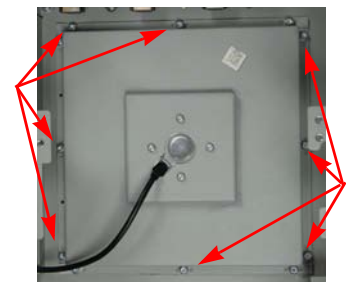
Screws at Left End of DIN Rail

TIP Slide remaining terminal blocks sideways as needed to access screws.

12. Remove the DIN rail.
13. Unplug Fan wire.

14. Remove the 12 screws at the exterior of fan cover.

Do not remove screws near Fan cable at this time.



15. Remove the Fan cover and the Fan.

You may need to pry the cover from the drive enclosure.

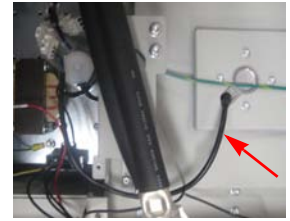
16. Remove the four screws near Fan cable that hold the Fan and cover together.



Install Components

1. If needed, remove the old gasket from Fan cover and replace gasket.
2. Mate cover and new Fan, positioning Fan cable in notch of opening in cover.

3. Install the four screws that hold the Fan and cover together.
4. Place Fan unit in position, locating Fan wire in bottom left corner.
5. Install the 12 screws at the exterior of fan cover.
6. Reconnect Fan wire.
7. Reassemble remaining components in reverse order.



TIP When replacing Motor Bus Bars, remove nearby terminal block barriers to provide additional maneuvering space.

8. Replace all safety shields and enclosure covers before applying power to the drive.

Fan Transformer

Refer to the figures in [Component Diagrams and Torque Specs on page 13](#) for these instructions.

Remove Components

1. Read and follow the [Safety Precautions on page 9](#) and [Important Initial Steps on page 11](#).
2. Perform [Remove Precharge Board Assembly on page 23](#).
3. Label and unscrew or disconnect wires for the Transformer.
4. Unscrew Transformer mounting brackets.

Install Components

1. Install new Transformer by screwing mounting brackets to drive.
2. Reconnect all wires and connectors for the Transformer.
3. Reassemble remaining components in reverse order.
4. Replace all safety shields and enclosure covers before applying power to the drive.

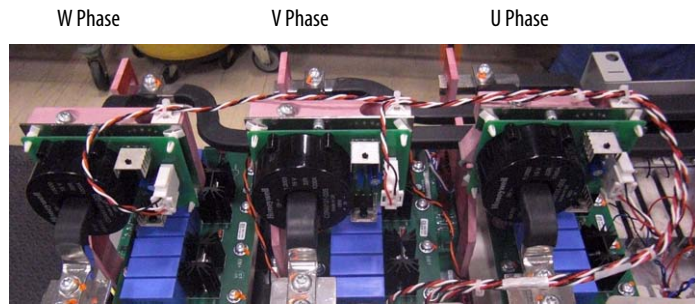
Current Transducer

Refer to the figures in [Component Diagrams and Torque Specs on page 13](#) for these instructions.

Remove Components

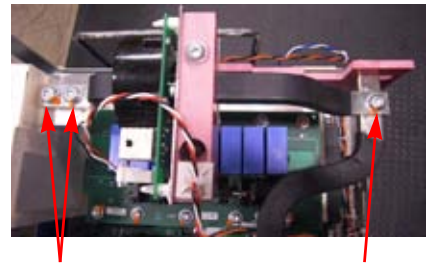
1. Read and follow the [Safety Precautions on page 9](#) and [Important Initial Steps on page 11](#).
2. Remove the safety cover.

3. Locate the Current Transducer to be replaced.

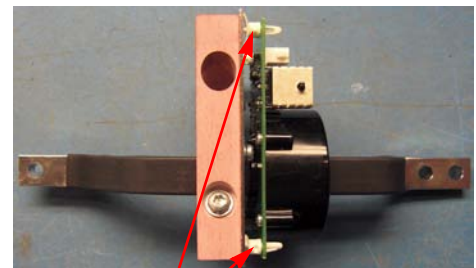


4. Disconnect the wiring harness from the transducer board. Clip the wire tie and remove the wiring harness.

5. Remove the three button head screws that secure the bus bar. Move the bus bar and transducer to an ESD-safe flat surface for working with it.

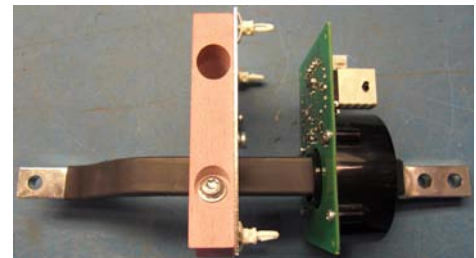


6. Using your fingers or needle-nose pliers, squeeze the wings of each of the four spacers and separate the transducer and board from the mounting clamp.

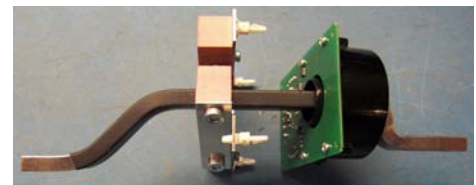


Spacers

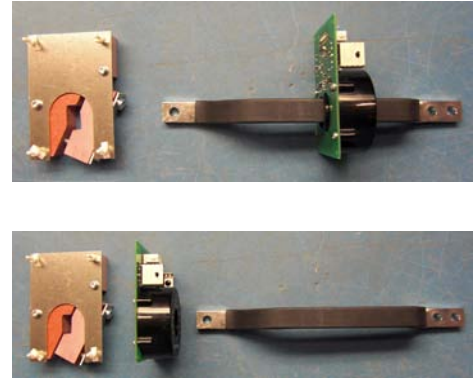
7. Loosen the two screws that hold the two sections of the CT mounting clamp, but do not take the screws completely out. Only loosen them so that the end is flush with the bottom of the CT mounting clamp.



8. Remove mounting clamp from the bus bar by sliding the gentle bend of the bus bar (the end with only one screw hole) through the assembly, taking care not to damage the transducer or the insulation on the bus bar.

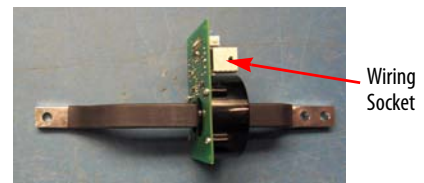


9. Remove transducer assembly (transducer and board) from the bus bar by sliding the gentle bend of the bus bar (the end with only one screw hole) through the assembly, taking care not to damage the insulation on the bus bar or loosen the wiring. Discard old transducer.

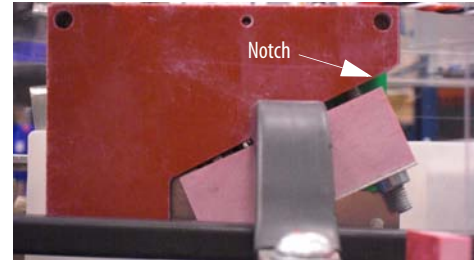


Install Components

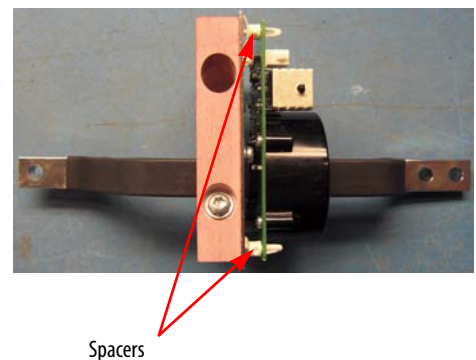
1. Position the mounting bar with the end with two screw holes to your right.
2. Orient the transducer with the wiring socket away from you and its board to your left. Slide transducer onto the bus bar by sliding the gentle bend of the bus bar through the assembly, taking care not to damage the insulation on the bus bar and not to loosen the wiring.



3. Orient the transducer mounting clamp with the smaller section on the bottom and the notch toward you.
4. Slide the mounting clamp onto the bus bar by sliding the gentle bend of the bus bar (the end with only one screw hole) through the assembly, taking care not to damage the insulation on the bus bar or loosen the wiring.



5. Attach the new transducer to the spacers. Verify that each spacer locks. Tighten the clamp screws of the mounting bracket finger tight.
6. Position the CT assembly and bus bar into place. Tighten its three screws and torque to 1.6 N•m (14 lb•in.) Use a colored marker or torque seal to mark each screw after torquing so you know when all are done and to indicate signs of any tampering.



7. Loosen the mounting bracket screws and align the CT assembly on the bus bar with the remaining transducers.
8. Torque the mounting bracket screws to 5.9 N•m (52 lb•in)
9. Reconnect the wiring harness. Secure with a wire tie.
10. Replace all safety shields and enclosure covers before applying power to the drive.

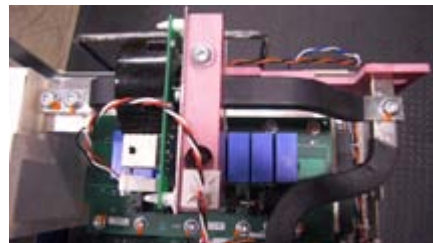
Inverter Snubber Board

Important: The Inverter Snubber Board and its associated Resistor do not need to be replaced at the same time.

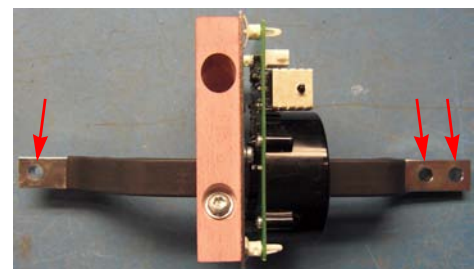
Refer to the figures in [Component Diagrams and Torque Specs on page 13](#) for these instructions.

Remove Components

1. Read and follow the [Safety Precautions on page 9](#) and [Important Initial Steps on page 11](#).
2. Perform [Remove Main Control Panel Assembly on page 21](#).
3. Perform [Remove Stacking Panel on page 22](#).
4. Perform [Remove Precharge Board Assembly on page 23](#).
5. Locate the Inverter Snubber Board to be replaced.



6. Remove the Current Transducer assembly mounted over the board to be replaced.
 - a. Disconnect the wiring harness from the transducer board. Clip the wire tie and remove the wiring harness.
 - b. Remove the three button head screws that secure the bus bar. Move the bus bar and transducer to an ESD-safe flat surface.



7. For all Snubber Boards, remove the U-Phase Motor Bus Bar to gain access to the board being replaced.

TIP Depending on spacing, it may be required that all three CTs and Bus Bars be removed before the U Phase Bus Bar can be removed.

- a. Remove the top nut at the U-Phase output terminal block.
 - b. If not already removed, disconnect the U-Phase Current Transducer at its top end.
 - c. Slide the Motor Bus Bar out of the notch at the top.
 - d. Slide the bar out of the enclosure if possible, or at least down and out of the way. To do so, move the top end of the bar to the right and the bottom end of the bar to the left, pull down on a angle, then rotate the bar 180° and fully remove the bar.
8. For the W-Phase Snubber Board, follow the sub-steps in [Step 7.](#) above to remove the V-Phase Motor Bus Bar.
 9. Use needle-nose pliers to remove the wire at J1 from Snubber Board to be replaced.
 10. Remove the ten (10) T30 hex screws that secure the Snubber Board. Remove the board and discard.

Install Components

1. Install the new Snubber Board with the J1 terminal lug towards the right side of the drive. Torque screws to 5.6 N•m (50 lb•in) Reconnect wire at J1.
2. Reposition any Motor Bus Bars that were removed, but do Not tighten screws at this time.
3. Position the CT assembly and bus bar into place. Tighten its three screws and torque to 1.6 N•m (14 lb•in) Use a colored marker or torque seal to mark each screw after torquing so you know when all are done and to indicate signs of any tampering.
4. Torque screws for any Motor Bus Bars that were removed to 9.0 N•m (80 lb•in)
5. Reassemble remaining components in reverse order.
6. Replace all safety shields and enclosure covers before applying power to the drive.

Inverter Snubber Resistor

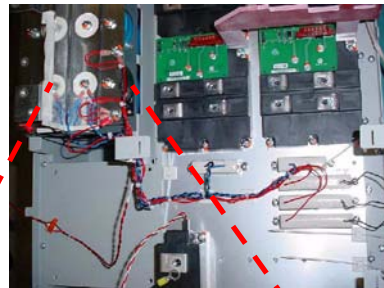
Important: The Inverter Snubber Board and its associated Resistor do not need to be replaced at the same time. Test the Resistor as instructed below before replacing it.

Refer to the figures in [Component Diagrams and Torque Specs on page 13](#) for these instructions.

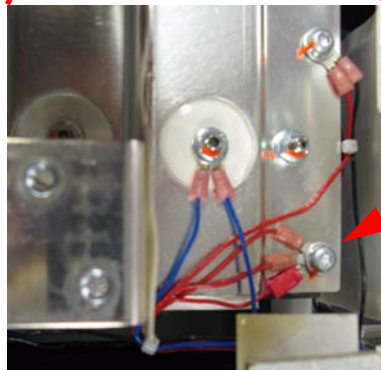
Remove Components

1. Read and follow the [Safety Precautions on page 9](#) and [Important Initial Steps on page 11](#).
2. Remove safety shields as needed.
3. Test **all** Snubber Resistors.
 - a. Using pliers, remove the push-on J1 connector from the Inverter Snubber Board. Place one probe of a volt ohm meter inside the connector.
 - b. At the bottom right of the DC capacitor bank, under the Transitional Bus Bar, locate the screw with several connections (typically three, with one for each Snubber Resistor). Place the other probe of the volt ohm meter on that screw. The reading should be 8 ohms.

Shown with
Transitional Bus Bar
and other
components
removed



Inverter
Snubber
Resistors



Test Screw
(common point)

- c. If the reading is 8 ohms, the Inverter Snubber Resistor does not need to be replaced and this test and this procedure are complete; do not perform the remainder of this procedure.
- d. If the reading is other than 8 ohms, continue with the instructions in [Step 4...Step 10](#). to replace any faulty Resistor.

4. Perform [Remove Main Control Panel Assembly on page 21](#).
5. Perform [Remove Stacking Panel on page 22](#).
6. Perform [Remove Transitional Bus Bar on page 23](#).
7. Using pliers, remove the wire with push-on connector from the Snubber Board associated with the Resistor to be replaced.

To locate its Resistor, follow the wire from the Snubber Board to its Resistor, carefully clipping the wire ties along the way.
8. Follow the other Resistor wire going from the Resistor to the Positive Inverter Bus (beneath the Negative Inverter Bus), carefully clipping the wire ties along the way. Remove the screw for the Resistor wire.
9. Remove the Resistor to be replaced by unscrewing it from the heatsink.
10. Using isopropyl alcohol, clean any grease off of the location where the Resistor is to be mounted.

Install Components

1. Apply a thin bead of thermal grease to the full length of the metal bottom of the new Resistor. Spread grease evenly.
2. Align the wire with push-on connector to the right and align the wire with the ring lug connector to the left.
3. Mount the new Resistor on heatsink with screws. Torque to 2.9 N•m (26 lb•in)
4. Connect the wire with the ring lug connector to the original location on the Positive Inverter Bus.
5. Connect the wire with push-on connector to J1 of its Inverter Snubber Board.
6. Replace all wire ties.
7. Reassemble remaining components in reverse order.
8. Replace all safety shields and enclosure covers before applying power to the drive.

Inverter Power Module (IGBT)

Important: Kit includes two (2) IGBT modules and two (2) Gate Interface Boards. It is recommended that both IGBT modules for a phase be replaced at the same time.

Refer to the figures in [Component Diagrams and Torque Specs on page 13](#) for these instructions.

Remove Components

1. Read and follow the [Safety Precautions on page 9](#) and [Important Initial Steps on page 11](#).
2. Locate the Inverter Power Module to be replaced.
3. Perform [Remove Transitional Bus Bar on page 23](#).
4. Perform [Remove Components on page 38](#) for the Inverter Snubber Board over the IGBT modules to be replaced, but do not discard the Inverter Snubber Board.
5. Remove the two Inverter Snubber brackets (two screws each) for each board. Set aside.



Inverter Snubber Brackets

6. Disconnect the positive and negative IGBT bus bars (four T40 screws each).
7. Using a pencil, mark the sides of the IGBT Bus Bar to note location for later installation.

Exact positioning is critical for alignment of other components, especially the Transitional Bus Bar unit.

8. Remove the IGBT Bus Bar from the modules. Set aside.



9. Disconnect connections for the Gate Interface Boards.

10. Remove the Gate Interface Boards (three (3) screws) and discard.
11. Remove the six (6) screws for the IGBT modules.
12. Remove the IGBT modules by tipping the top edge out first. Discard.



Note: Picture shows new IGBT modules with conductive tape, but existing modules will not have conductive tape.

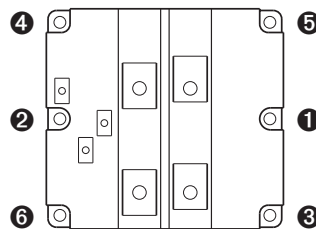
Install Components

1. Perform the following steps for one IGBT module at a time.
 - a. Using isopropyl alcohol, thoroughly clean the surface of the Heatsink.
- Important:** The replacement IGBT modules are supplied with a conductive tape across the terminals. Do Not remove the tape until instructed.
- b. Verify that the mounting surface of the new IGBT module is clean. If not, clean with isopropyl alcohol.
 - c. Using a 3" putty knife or similar tool, apply a thin even coating of the supplied thermal grease to the mounting surface of the IGBT module.

Use enough thermal grease to create a conductive coating, but not so much that the two surfaces can rock.

Important: In the next step, take care to not disturb any of the thermal grease on the IGBT module.

- d. Place the IGBT module on the Heatsink and install with supplied screws and tighten using this torque sequence:



IGBT Torque Sequence

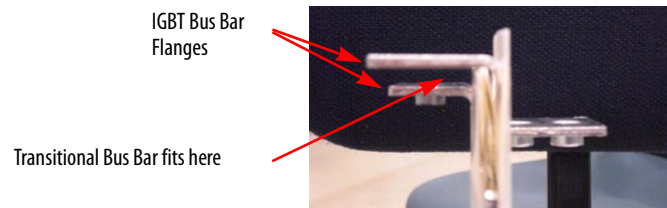
First Sequence: 0.7 N-m (6.0 lb.-in.)
Final Sequence: 3.6 N-m (32 lb.-in.)

- e. Remove the conductive tape from the IGBT module and immediately install a new Gate Interface Board.



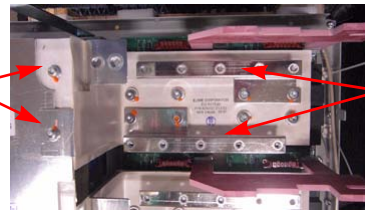
After the conductive tape is removed, the IGBT module's gate terminals must not be exposed longer than one minute.

2. Repeat [Step 1](#), for the second IGBT module.
3. Reconnect the Gate Interface Board connections.
4. Place the IGBT Bus Bar on the IGBT modules (over the Gate Interface Boards) with its flanges fitting over and under the Transitional Bus Bar.



[Step 4.](#)

IGBT Bus Bar
screws



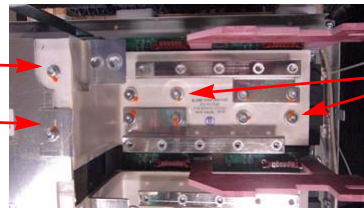
[Step 5.](#)

Inverter Snubber Brackets
Be sure to orient brackets as
shown.

5. Install M6 screws for the IGBT module Bus Bar but do not torque at this time.
6. Install the Inverter Snubber Brackets parallel to each other but do not torque at this time.
7. Install remaining M6 screws for the IGBT module and Bus Bar.

[Step 8.](#)

DC+
DC-



[Step 6., Step 7.](#)

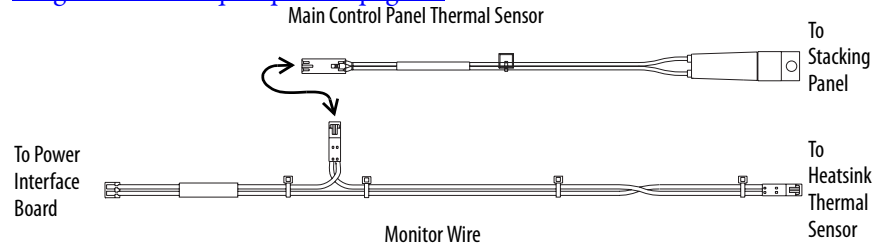
Remaining IGBT Bus
Bar screws

8. Torque all screws on the Inverter Snubber Brackets and on the IGBT module Bus Bar to 9.0 N•m (80 lb•in)
9. Torque DC+ and DC- M6 screws to 5.9 N•m (52 lb•in)
10. Install the new Snubber Board with the terminal lug towards the outside of the drive. Torque screws to 5.6 N•m (50 lb•in)
11. Position each Motor Bus Bar but do not torque mounting screws yet.
12. Position each Current Transducer and install screws but do not torque yet.

13. Torque the left screws for each Current Transducer to 5.9 N•m (52 lb•in)
14. Set each Motor Bus Bar in final position and torque the remaining Current Transducer screw to 5.9 N•m (52 lb•in)
15. Torque each Motor Bus Bar mounting screw (at the bottom) to 9.0 N•m (80 lb•in)
16. Reassemble remaining components in reverse order.
17. Replace all safety shields and enclosure covers before applying power to the drive.

Main Control Panel Thermal Sensor

The Main Control Panel Thermal Sensor is located at the upper left of the Main Control Panel Assembly and is connected to the Heatsink Thermal Sensor by the Monitor Wire. Refer to the diagram below and to the figures in [Component Diagrams and Torque Specs on page 13](#) for these instructions.



Remove Components

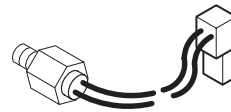
1. Read and follow the [Safety Precautions on page 9](#) and [Important Initial Steps on page 11](#).
2. Perform [Remove Main Control Panel Assembly on page 21](#).
3. Perform [Remove Stacking Panel on page 22](#).
4. Unscrew one end of the sensor from the Stacking Panel.
Note: This screw and nut are small. Take care that they do not drop.
5. Disconnect the other end from the Monitor Wire.

Install Components

1. Apply thermal grease to the metal side of the new Main Control Panel Thermal Sensor and install it with supplied screw with star washer toward the panel. Torque screw to 1.7 N•m (15 lb•in)
2. Reconnect the Monitor Wire.
3. Reinstall the Main Control Panel Assembly.
4. Replace all safety shields and enclosure covers before applying power to the drive.

Heatsink Thermal Sensor

The Heatsink Thermal Sensor is located at the top of the Heatsink under the U Phase Gate Interface Board, with beige insulated wiring. It is connected to the Power Interface Board assembly by the Monitor Wire.



Heatsink Thermal Sensor

Refer to the diagram above and to the figures in [Component Diagrams and Torque Specs on page 13](#) for these instructions.

Remove Components

1. Read and follow the [Safety Precautions on page 9](#) and [Important Initial Steps on page 11](#).
2. Make a jumper wire consisting of wire plus two (2) #10 wire lugs, either fork or ring, illustrated below.



14 or 16 gauge wire, about 10 cm (4 in.)

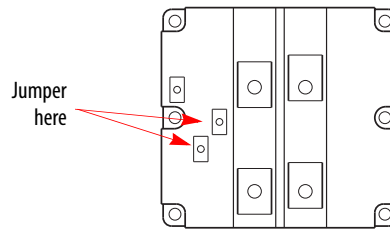
3. Perform [Remove Main Control Panel Assembly on page 21](#).
4. Perform [Remove Stacking Panel on page 22](#).
5. Perform [Remove Precharge Board Assembly on page 23](#).
6. To gain access to the wire harness in a later step, you must remove the Current Transducers over the U, V, and W Phase Bus Bars. Unscrew the button head screws on each transducer bus bar. Move the transducers to a safe location.
7. On the input power terminal block, remove the top nuts securing the U, V, and W Phase Motor Bus Bars.
8. Slide the top of each bus bar to the right, unlocking it from the ground, and remove each bus bar from the unit.
9. Remove the U Phase Inverter Snubber Board.
10. Remove the two Inverter Snubber Board brackets.
11. Remove the IGBT module bus.

Important: Read and follow the [Safety Precautions on page 9](#) and [Important Initial Steps on page 11](#).



ATTENTION: The IGBT gate terminals must not be exposed longer than one minute. Do not let the gate connections remain disconnected longer than one minute.
Locate jumper wire (from [Step 2](#)) before proceeding to the next step.

12. Remove the left Gate Interface Board located over the Heatsink Thermal Sensor. You do not need to disconnect the connector.
13. Connect the jumper wire to gate connections on the IGBT module.



14. Carefully cut the wire ties securing the Heatsink Thermal Sensor. Do Not cut the harness.
15. Access the sensor connector to the Monitor Wire, located approximately under the W Phase Current Transducer Bus Bar at the right side of the unit. Disconnect the sensor connector.
16. Using a 5/16" offset open-end wrench, remove the sensor.

Install Components

1. Install the new Heatsink Thermal Sensor.
2. Torque sensor to 1.6 N•m (14 lb•in)
3. Connect the other end of the sensor wire to the Monitor Wire.
4. Replace all wire ties to secure the wiring harness.
5. Remove the jumper wire to gate connections on the IGBT module and immediately reinstall the left Gate Interface Board onto the IGBT module.
6. Reassemble remaining components in reverse order.
7. Replace all safety shields and enclosure covers before applying power to the drive.

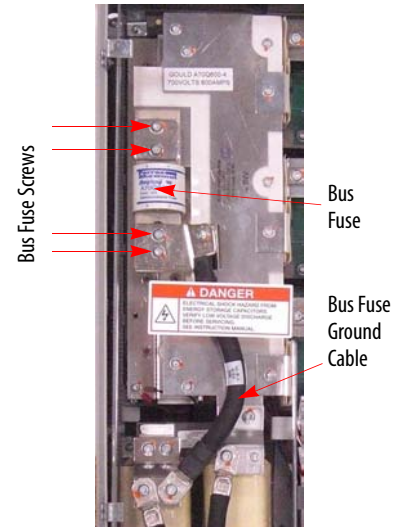
Bus Fuse

The Bus Fuse is located on the Transitional Bus Bar.

Refer to the figure here and the figures in [Component Diagrams and Torque Specs on page 13](#) for these instructions.

Remove Components

1. Read and follow the [Safety Precautions on page 9](#) and [Important Initial Steps on page 11](#).



TIP When you remove the screws in the next step, you will remove the Bus Fuse as well. There is a plate over the top end of the Bus Fuse that will be free upon removal of the screws. Do not let the plate fall.

2. Remove the four screws (noted in diagram above) for the Bus Fuse.
3. Remove Fuse.

Install Components

1. Install new Bus Fuse.
2. Torque screws to 9.0 N•m (80 lb•in)
3. Reassemble remaining components in reverse order.
4. Replace all safety shields and enclosure covers before applying power to the drive.

Bus Capacitor

Refer to the figures in [Component Diagrams and Torque Specs on page 13](#) for these instructions.

Remove Components

1. Read and follow the [Safety Precautions on page 9](#) and [Important Initial Steps on page 11](#).
2. Perform [Remove Transitional Bus Bar on page 23](#).
3. Label and remove all wires and connectors from the Bus Capacitor Bus Bar.
4. Remove nuts and washers fastening the Bus Capacitor Bus Bar.
5. Remove the Bus Capacitor Bus Bar.
6. Remove Capacitors by pulling them out.

Install Components

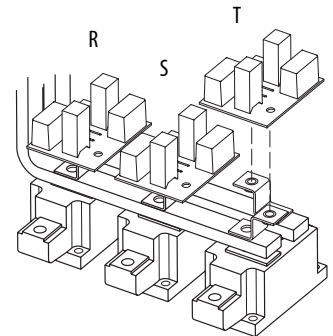
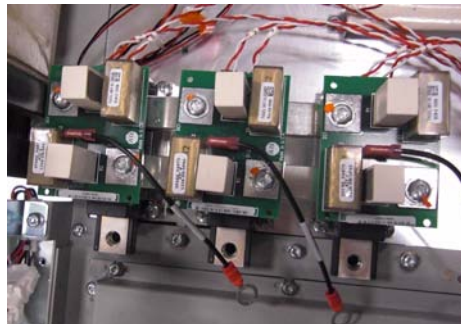
1. Replace screw posts for each new Capacitor using a 3 mm angle hex wrench.
2. Place Capacitors into position in drive.
3. Place Capacitor bank bus onto Capacitors.
4. Install washers and nuts onto posts.
Note: Install all posts, washers, and nuts before tightening.
5. Reconnect all wires and connectors.
6. Reassemble remaining components in reverse order.
7. Replace all safety shields and enclosure covers before applying power to the drive.

Converter Snubber Board - AC Input Only

Refer to the figures in [Component Diagrams and Torque Specs on page 13](#) for these instructions.

Remove Components

1. Read and follow the [Safety Precautions on page 9](#) and [Important Initial Steps on page 11](#).
2. Locate the Converter Snubber Board to be replaced. (Some wires below shown disconnected.)



3. Perform [Remove Main Control Panel Assembly on page 21](#).
4. Perform [Remove Stacking Panel on page 22](#).
5. Perform [Remove Precharge Board Assembly on page 23](#).
6. For the T-Phase Converter Snubber Board, if the U-Phase Motor Bus Bar must be removed for space considerations, then
 - If space allows, remove the U-Phase Current Transducer and then disconnect both ends of the U Phase Motor Bus Bar and remove it to gain access to the Converter Snubber Board.
 - Otherwise if space does *not* allow, using the instructions in [Step 2. ... Step 5. in Component Replacement Procedures on page 25](#), remove all three Current Transducer assemblies and move them to a safe location, but do not disassemble them.
7. Label and disconnect any push-on wire connector from the Converter Snubber Board to be replaced.
8. Remove the two (2) T30 screws that secure the board. Remove the board and discard.

Install Components

1. Install the new Snubber Board. Torque screws to 2.9 N•m (26 lb•in)
2. Reconnect all wires.
3. If removed, reinstall the U Phase Motor Bus Bar and torque screws to 9.0 N•m (80 lb•in)
4. Reassemble remaining components in reverse order.
5. Replace all safety shields and enclosure covers before applying power to the drive.

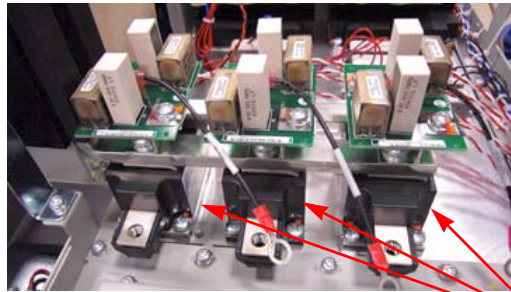
Converter Power Module (SCR) - AC Input Only

Important: If any SCR module fails, all three SCR modules should be replaced. (Kit includes all three modules.)

Refer to the figures in [Component Diagrams and Torque Specs on page 13](#) for these instructions.

Remove Components

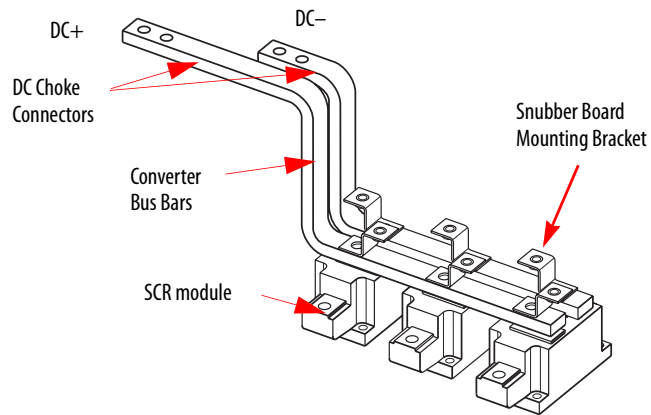
1. Read and follow the [Safety Precautions on page 9](#) and [Important Initial Steps on page 11](#).
2. Locate the Converter SCR modules (R, S, T) to be replaced.



Converter SCR Modules

3. Perform [Remove Main Control Panel Assembly on page 21](#).
4. Perform [Remove Stacking Panel on page 22](#).
5. Using the instructions in [Converter Snubber Board - AC Input Only on page 50](#), remove all three Converter Snubber Boards.
6. Label and note the position of the SCR module leads. Remove the leads.
7. Remove the two (2) M6 screws that hold the AC Bus Bar to SCR, one (1) screw per SCR.
8. Remove the top nut at the input power terminal block.
9. Remove the three AC Bus Bars (R, S, T).
10. Remove the six Snubber Board Mounting Brackets (M6 T40 screws).
11. Remove the four (4) M6 screws from the DC Link Choke terminal (1) and (4).

12. Remove the Converter Bus Bars (DC+ and DC-).



13. Disconnect the SCR gate leads.

14. Remove the four (4) Phillips screws that hold each SCR to the Heatsink.

15. Remove the SCR modules.

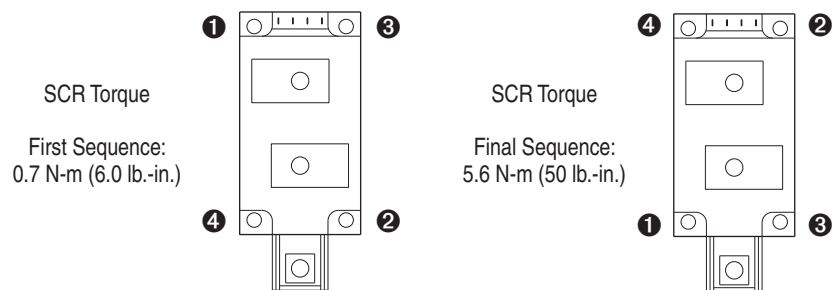
Install Components

1. Using isopropyl alcohol, thoroughly clean the surface of the Heatsink.
2. Verify that the mounting surface of each new SCR module is clean. If not, clean with isopropyl alcohol.
3. Using a 3" putty knife or similar tool, apply a thin even coating of the supplied thermal grease to the mounting surface of each SCR module.

Use enough thermal grease to create a conductive coating, but not so much that the two surfaces can rock.

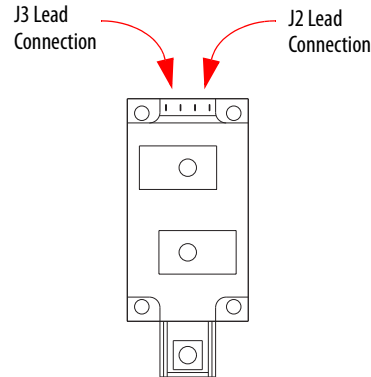
Important: In the next step, take care to not disturb any of the thermal grease on the SCR module.

4. Install each new SCR module with supplied screws and tighten using this torque sequence:



5. Install the SCR module leads from the Precharge Board J2 and J3. For each SCR module, the left connection is for the J3 lead and the right connection is for the J2 lead.

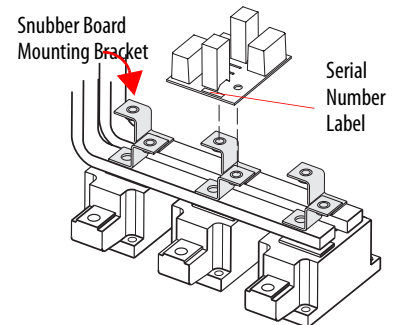
Note: J3 has its red wire on the left and white wire on the right, while J2 has its red wire on the right and white wire on the left.



6. Install the Converter Bus Bars (DC+ and DC-) per the diagram in [Step 12](#), on page [52](#) but do not torque screws at this time.

7. Install the Snubber Board Mounting Brackets oriented as in the diagram to the right, Torque to 9.0 N•m (80 lb•in)

8. Install Snubber Boards, oriented with the serial number as shown in the diagram to the right. Torque to 2.9 N•m (26 lb•in)



9. Replace leads.
10. Install AC Bus Bars (R, S, T). Torque both ends to 9.0 N•m (80 lb•in)
11. Torque screws for Converter Bus Bars to 9.0 N•m (80 lb•in)
12. Reassemble remaining components in reverse order.
13. Replace all safety shields and enclosure covers before applying power to the drive.

MOV - AC Input Only

Refer to the figures in [Component Diagrams and Torque Specs on page 13](#) for these instructions.

Remove Components

1. Read and follow the [Safety Precautions on page 9](#) and [Important Initial Steps on page 11](#).
2. Locate the MOV assembly.
3. Perform [Remove Precharge Board Assembly on page 23](#).
4. Note wire placement and connections. Disconnect the MOV ground wire and its R, S, and T wires at the top nut on the input power terminal block.
5. Unscrew MOV mounting brackets.
6. Remove the MOV assembly.

Install Components

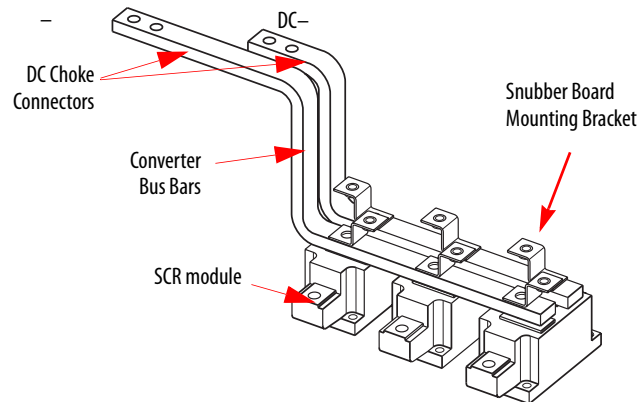
1. Install the new MOV assembly. Tighten the MOV mounting screw to 2.9 N•m (26 lb•in)
2. Reconnect all wires and connectors for the MOV.
3. Torque the R, S, and T Phase power terminal block nuts to 9.8 N•m (80 lb•in)
4. Reinstall the Precharge Board.
5. Replace all safety shields and enclosure covers before applying power to the drive.

DC Link Choke - AC Input Only

Refer to the figures in [Component Diagrams and Torque Specs on page 13](#) for these instructions.

Remove Components

1. Read and follow the [Safety Precautions on page 9](#) and [Important Initial Steps on page 11](#).
2. Locate the DC Link Choke.
3. Perform [Remove Main Control Panel Assembly on page 21](#).
4. Perform [Remove Stacking Panel on page 22](#).
5. Using the instructions in [Converter Snubber Board - AC Input Only on page 50](#), remove all three Converter Snubber Boards.
6. Remove the six Snubber Board mounting brackets (M6 T40 screws).
7. Remove the four (4) M6 screws from the DC Link Choke terminals labeled 1 and 4.
8. Remove the Converter Bus Bars (DC+ and DC-).



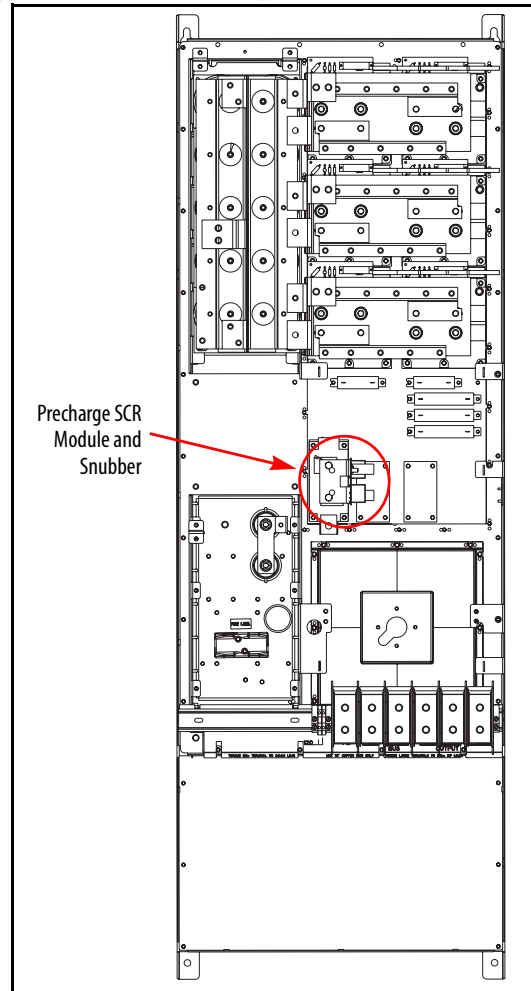
9. Perform [Remove Transitional Bus Bar on page 23](#)
10. Remove the four (4) screws for the DC Link Choke mounting brackets.
11. Remove the DC Link Choke.

Install Components

1. Install new DC Link Choke by screwing mounting brackets to drive.
2. Torque screws to 9.0 N•m (80 lb•in)
3. Reassemble remaining components in reverse order.
4. Replace all safety shields and enclosure covers before applying power to the drive.

Precharge SCR Module Snubber Board - DC Input Only

Figure 5 - Precharge SCR Module Location (DC Input Drive Shown)



Refer to the figures in [Component Diagrams and Torque Specs on page 13](#) and [Figure 5 -](#) above for these instructions.

Remove Components

1. Read and follow the [Safety Precautions on page 9](#) and [Important Initial Steps on page 11](#).
2. Locate the Precharge SCR module Snubber Board to be replaced.
3. Remove the upper and lower safety shields.
4. Perform [Remove Main Control Panel Assembly on page 21](#).
5. Perform [Remove Stacking Panel on page 22](#).
6. Remove the push-on lead from the Snubber Board.
7. Unscrew and remove the Snubber Board from its bus bar. Set aside.

Install Components

1. Replace washers on Snubber Board Bus Bar studs.
2. Replace insulation over washers.
3. Place new Snubber Board over insulation.
4. Install M6 nuts on studs with star washer side facing Snubber Board. Do not tighten yet.
5. Center insulation around washers so it is not pinched between the Bus Bar and any washer or nut.
6. Torque M6 nuts to 2.9 N•m (26 lb•in)
7. Replace push-on wire.
8. Reassemble remaining components in reverse order.
9. Replace all safety shields and enclosure covers before applying power to the drive.

Precharge SCR Module - DC Input Only

Refer to the figures in [Component Diagrams and Torque Specs on page 13](#) and [Figure 5 - on page 56](#) for these instructions.

Remove Components

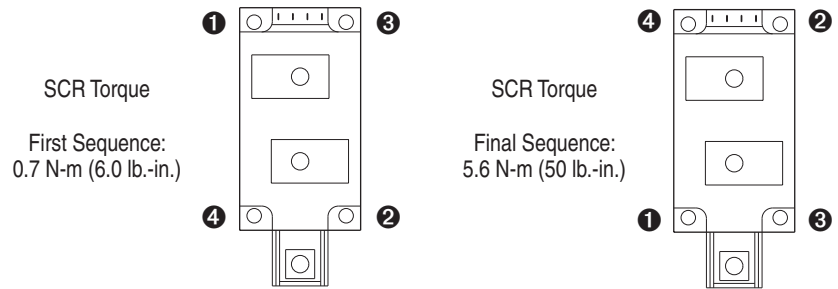
1. Read and follow the [Safety Precautions on page 9](#) and [Important Initial Steps on page 11](#).
2. Locate the Precharge SCR module to be replaced.



3. Perform [Remove Main Control Panel Assembly on page 21](#).
4. Perform [Remove Stacking Panel on page 22](#).
5. Label and remove power cables (DC+ and DC-) and all connected wires from the SCR module.
6. Remove the entire Snubber Board Bus Bar assembly, including its lead wires, and carefully set assembly aside.
7. Remove the SCR module and discard.

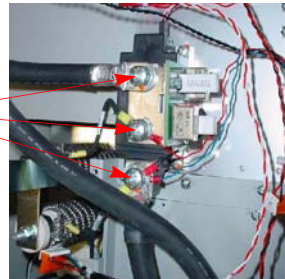
Install Components

1. Clean the surface of the Heatsink mounting surface with isopropyl alcohol.
2. Thoroughly clean the mounting surface of the new SCR module and apply a thin even coating of the supplied thermal grease.
3. Install SCR module with supplied screws and torque using the sequence and specifications shown in the diagram below.



4. Install the Snubber Board Bus Bar and assembly with its lead wires and the DC cables (both positive) as shown below. Hold the lead wires in place while you torque DC cable screws to 12.2 N•m (108 lb•in)

Torque DC cables to 12.2 N•m (108 lb•in)
Shown with Phillips screws, but may be hex nuts.



5. Reassemble remaining components in reverse order.
6. Replace all safety shields and enclosure covers before applying power to the drive.

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If you experience a problem within the first 24 hours of installation, review the information that is contained in this manual. You can contact Customer Support for initial help in getting your product up and running.

| | |
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Publication 20B-IN017B-EN-P - September 2011

Supersedes Publication 23P-UM001A-EN-P - March 2010

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