

Altivar® 61/71

Adjustable Speed Drives

Spare Parts Kits

Instruction Bulletin

30072-452-74

Rev. 01, 10/2009

Retain for future use.



For Frame Sizes 7B and 8:

ATV61HD45N4, ATV61HD55N4, ATV61HD75N4,
ATV61HD30M3X, ATV61HD37M3X, ATV61HD45M3X

ATV71HD45N4, ATV71HD55N4, ATV71HD75N4,
ATV71HD30M3X, ATV71HD37M3X, ATV71HD45M3X

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Hazard Categories and Special Symbols

The following symbols and special messages may appear in this document or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

A lightning bolt or ANSI man symbol in a “Danger” or “Warning” safety label on the equipment indicates an electrical hazard which, as indicated below, can or will result in personal injury if the instructions are not followed.

The exclamation point symbol in a safety message in a manual indicates potential personal injury hazards. Obey all safety messages introduced by this symbol to avoid possible injury or death.

Symbol	Name
	Lightning Bolt
	ANSI Man
	Exclamation Point

⚠ DANGER
DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING
WARNING indicates a potentially hazardous situation which, if not avoided, can result in death or serious injury.

⚠ CAUTION
CAUTION indicates a potentially hazardous situation which, if not avoided, can result in minor or moderate injury.

CAUTION
CAUTION , used without the safety alert symbol, indicates a potentially hazardous situation which, if not avoided, can result in property damage.

Product Support

For support and assistance, contact the Product Support Group. The Product Support Group is staffed from Monday through Friday, 8:00 am until 6:00 pm Eastern time, to assist with product selection, start-up, and diagnosis of product or application problems. Emergency phone support is available 24 hours a day, 365 days a year.

Toll free: 888-SquareD (888-778-2733)
 E-Mail: drive.products.support@us.schneider-electric.com
 Fax: 919-217-6508

Before You Begin

Read and follow these precautions before performing any procedure with this drive.

The word “drive” as used in this bulletin refers to the controller portion of the adjustable speed drive as defined in the National Electrical Code (NEC).

▲ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Read and understand this manual before installing or operating the Altivar® 61 or 71 drive. Installation, adjustment, repair, and maintenance must be performed by qualified personnel.
- The user is responsible for compliance with all international and national electrical code requirements with respect to grounding of all equipment.
- Many parts of this drive, including the printed circuit boards, operate at the line voltage. DO NOT TOUCH. Use only electrically insulated tools.
- DO NOT touch unshielded components or terminal strip screw connections with voltage present.
- DO NOT short across terminals PA/+ and PC/- or across the DC bus capacitors.
- Before servicing the drive:
 - Disconnect all power, including external control power that may be present.
 - Place a “DO NOT TURN ON” label on all power disconnects.
 - Lock all power disconnects in the open position.
 - WAIT 15 MINUTES to allow the DC bus capacitors to discharge. Then follow the “Bus Voltage Measurement Procedure” on page 12 to verify that the DC voltage is less than 42 V. The drive LED is not an indicator of the absence of DC bus voltage.
- Install and close all covers before applying power or starting and stopping the drive.

Failure to follow these instructions will result in death or serious injury.

Introduction

This instruction bulletin contains replacement procedures for the Altivar® 61 (ATV61) and Altivar® 71 (ATV71) spare parts kits identified in Table 1. Read and understand the instructions in this document and other referenced documents before installing the kits.

Table 1: Altivar® 61 and 71 Spare Parts Kits¹

Kit Catalog No.	Description	For Use On Drive:	
		Frame Size	Model
VX4A1109	Filter Board	Frame Size 7B	ATV61HD30M3X ATV61HD37M3X ATV61HD45M3X ATV71HD30M3X ATV71HD37M3X ATV71HD45M3X
VX4A1110	Filter Board	Frame Size 8	ATV61HD45N4 ATV61HD55N4 ATV61HD75N4 ATV71HD45N4 ATV71HD55N4 ATV71HD75N4
VZ3IM2201M1271	Power IGBT ² Modules	Frame Size 7B	ATV61HD30M3X ATV71HD30M3X
VX5A1HD30M3X	Power Board	Frame Size 7B	ATV61HD30M3X ATV71HD30M3X
VZ3IM2301M1271	Power IGBT Modules	Frame Size 7B	ATV61HD37M3X ATV71HD37M3X
VX5A1HD37M3X	Power Board	Frame Size 7B	ATV61HD37M3X ATV71HD37M3X
VZ3IM2401M1271	Power IGBT Modules	Frame Size 7B	ATV61HD45M3X ATV71HD45M3X
VX5A1HD45M3X	Power Board	Frame Size 7B	ATV61HD45M3X ATV71HD45M3X
VX5IM2200M1271	Power Board and Power IGBT Modules	Frame Size 8	ATV61HD45N4 ATV71HD45N4
VX5IM2300M1271	Power Board and Power IGBT Modules	Frame Size 8	ATV61HD55N4 ATV71HD55N4
VX5IM2400M1271	Power Board and Power IGBT Modules	Frame Size 8	ATV61HD75N4 ATV71HD75N4
VZ3TD1072M1671	SCR ³ Modules	Frame Size 8	ATV61HD45N4 ATV71HD45N4
VZ3TD1092M1671	SCR Modules	Frame Size 8, 7B	ATV61HD30M3X ATV61HD55N4 ATV71HD30M3X ATV71HD55N4
VZ3TD1132M1671	SCR Modules	Frame Size 8, 7B	ATV61HD37M3X ATV61HD75N4 ATV71HD37M3X ATV71HD75N4
VZ3TD1162M1671	SCR Modules	Frame Size 7B	ATV61HD45M3X ATV71HD45M3X
VZ3IM1195M0671	Braking IGBT Module	Frame Size 7B	ATV61HD30M3X ATV71HD30M3X

Table 1: Altivar® 61 and 71 Spare Parts Kits¹ (continued)

Kit Catalog No.	Description	For Use On Drive:	
VZ3IM1300M0671	Braking IGBT Module	Frame Size 7B	ATV61HD37M3X ATV61HD45M3X ATV71HD37M3X ATV71HD45M3X
VZ3IM1300M1271	Braking IGBT Module	Frame Size 8	ATV61HD45N4 ATV61HD55N4 ATV61HD75N4 ATV71HD45N4 ATV71HD55N4 ATV71HD75N4
VZ3N1310	Wire Kit	Frame Size 7B	ATV61HD30M3X ATV61HD37M3X ATV61HD45M3X ATV71HD30M3X ATV71HD37M3X ATV71HD45M3X
VZ3N1313	Wire Kit	Frame Size 8	ATV61HD45N4 ATV61HD55N4 ATV61HD75N4 ATV71HD45N4 ATV71HD55N4 ATV71HD75N4

¹ For kit contents, refer to document 30072-452-44.

² IGBT: Insulated-gate bipolar transistor

³ SCR: Silicon controlled rectifier

Related Documentation

For drive installation instructions, refer to the following documents:

- *Altivar® 61 Installation Manual 0.5 to 100 HP*, module no. 1760643.
- *Supplementary Instructions to ATV61 Variable Speed Drives Installation Manual—Low Horsepower*, document no. 30072-452-63.
- *Altivar® 61 Installation Manual 75 to 900 HP*, module no. 1760655.
- *Supplementary Instructions to ATV61 Variable Speed Drives Installation Manual—High Horsepower*, document no. 30072-452-49.
- *Altivar® 71 Installation Manual 0.5 to 100 HP*, module no. 1755843.
- *Altivar® 71 Installation Manual 75 to 700 HP*, module no. 1755849.
- *Altivar® 71 Drive Controllers Errata to Bulletin atv71e_installation_manual_en_v3*, document no. 30072-452-25.

All documentation referenced in this bulletin is provided with the drive or on the CD-ROM included with the spare parts kits. You can also download the documentation from the Technical Library at www.schneider-electric.us.

Receiving, Handling, and Storage

Electrostatic Precautions

⚠ CAUTION

STATIC SENSITIVE COMPONENTS

Circuit boards and option cards can be damaged by static electricity. Observe the electrostatic precautions below when handling controller circuit boards or testing components.

Failure to follow these instructions can result in injury or equipment damage.

Observe the following precautions for handling static-sensitive components:

- Keep static-producing material such as plastic, upholstery, and carpeting out of the immediate work area.
- Store static-sensitive components in protective packaging when they are not installed in the drive.
- When handling a static-sensitive component, wear a conductive wrist strap connected to the component or drive through a minimum of 1 megohm resistance.
- Avoid touching exposed conductors and component leads with skin or clothing.

Inspecting the Spare Part Kits

After receiving the ATV61/ATV71 spare parts kit:

- Ensure that the catalog number printed on the kit label is the same as that on the packing slip and corresponding purchase order. Contact your Schneider Electric representative if there are any errors.
- Remove the kit from its packaging and inspect it for damage. If any damage is found, notify the carrier and your Schneider Electric representative.
- To store the kit, replace any static-sensitive parts in their protective packaging and store them at -25 to +70 °C (-13 to +158 °F).

⚠ WARNING

DAMAGED EQUIPMENT

Do not install or operate any equipment that appears damaged.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Preliminary Recommendations

Before beginning the installation procedures, read and understand all the information in this section.

Qualified Personnel

For the protection of personnel and equipment, a qualified person must perform the procedures detailed in this instruction bulletin.

A qualified person is one who has skills and knowledge related to the construction and operation of this electrical equipment and the installation, and has received safety training to recognize and avoid the hazards involved. Refer to the most current release of NFPA 70E®, “Standard for Electrical Safety in the Workplace,” for safety training requirements.

In addition, the person must be:

- Able to read, interpret, and follow the instructions and precautions in this instruction bulletin and the other documentation referenced.
- Able to use the required tools listed in this instruction bulletin in a safe and correct manner.

Working Procedures

Observe the following working procedures:

- Use only the components provided with the kits listed in Table 1 beginning on page 7. Do not attempt to repair the drive with other spare parts or equipment.
- If the part being replaced includes labels, ensure that the labels are applied to the replacement part. If the labels are not available in the kit, contact your Schneider Electric representative.
- Mount the spare parts only in the locations specified in the installation procedures.
- Route and position the wires as shown in the instructions. Use the wires and cables provided with the spare parts kits or with the drive. Do not modify the wires and cables. Do not route wires and cables outside of the drive enclosure.
- Install the insulator as specified on pages 17 and 59 of the installation procedures.
- Install the washers under the snubber capacitors and balancing resistors as specified on pages 46 and 47.
- Observe the hardware and torque requirements specified in the installation procedures. Do not substitute hardware. Carefully segregate and label all removed hardware and parts for use in reassembly of the drive.
- Mount all panels and covers as specified in the installation procedures.

Tools Required

- Flathead screw driver, 2.5 mm width
- Needle-nose pliers
- Torque wrench, 0–5.1 N•m (0–45.1 lb-in)
- Voltmeter, 1–1000 Vdc
- Allen wrenches:
 - 3 mm
 - 4 mm
- Driver bits:
 - T-20 Torx[®] driver
 - Size 1 magnetic tip Phillips[®] driver
 - Size 2 magnetic tip Phillips[®] driver
 - 8 mm nut driver

Installation Procedures

Power Removal and Bus Voltage Measurement

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

Read and understand the precautions in "Introduction" starting on page 7 before performing this procedure.

Failure to follow these instructions will result in death or serious injury.

The DC bus voltage can exceed 1,000 Vdc. Use a properly rated voltage-sensing device when performing this procedure. To measure the DC bus voltage:

1. Disconnect all power.
2. Wait 15 minutes to allow the DC bus to discharge.
3. Measure the voltage of the DC bus between the PA/+ and PC/- terminals to ensure that the voltage is less than 42 Vdc. These terminals are clearly labeled on each drive.
4. If the DC bus capacitors do not discharge completely, contact your local Schneider Electric representative. Do not repair or operate the drive.

⚠ CAUTION

IMPROPER DRIVE OPERATION

- If the drive is not turned on for a long period, the performance of its electrolytic capacitors will be reduced.
- If the drive is stopped for a prolonged period, turn the drive on every two years for at least 5 hours to restore the performance of the capacitors, then check its operation.
- Do not connect the drive directly to line voltage. Increase the voltage gradually using an adjustable AC source.

Failure to follow these instructions can result in injury or equipment damage.

Discharging Stored Energy in Capacitors

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- When the controller is damaged, voltage may remain on certain energy storage capacitors after de-energization of the controller and discharge of the main capacitor bank.
- Before working on or near assemblies containing energy storage capacitors, verify that the capacitor voltages are less than 42 Vdc.
- The following assemblies have energy-storing capacitors:
 - Filter board
 - Rectifier snubber board
 - Snubber capacitors
- Always check for the presence of voltage using a voltmeter set to the 1000 Vdc scale. When voltage is present, allow the voltmeter to discharge the capacitor's stored charge.

Failure to follow these instructions will result in death or serious injury.

Capacitors are used throughout the drives as energy storage devices. Some of the capacitors can store potentially lethal amounts of energy during normal controller operation.

When power is removed from an undamaged controller, the stored energy in these capacitors is automatically discharged to nonhazardous levels. However, the discharge mechanisms in a damaged controller may not be operating properly, and stored energy may be present on printed circuit boards.

Do not touch traces on printed circuit boards, such as the line filter board and rectifier snubber board, unless you have first checked for voltage with a voltmeter!

To discharge filter board capacitors and rectifier snubber board capacitors, use a voltmeter set to the 1000 Vdc scale. It will take approximately 6.6 minutes for a 10 megohm input impedance voltmeter to discharge a 10 microfarad capacitor from 700 V to less than 42 V. It will take approximately 40 seconds for a 1 megohm input impedance voltmeter to discharge a 10 microfarad capacitor from 700 V to less than 50 V.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Do not use a voltmeter to discharge stored energy on the DC bus capacitors.
- If the energy on the DC bus capacitors remains greater than 42 Vdc after 15 minutes, contact Product Support.

Failure to follow these instructions will result in death or serious injury.

Replacing the Filter Board VX4A1109, VX4A1110

IMPORTANT: Label and retain all removed hardware and cables for use in reassembly.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

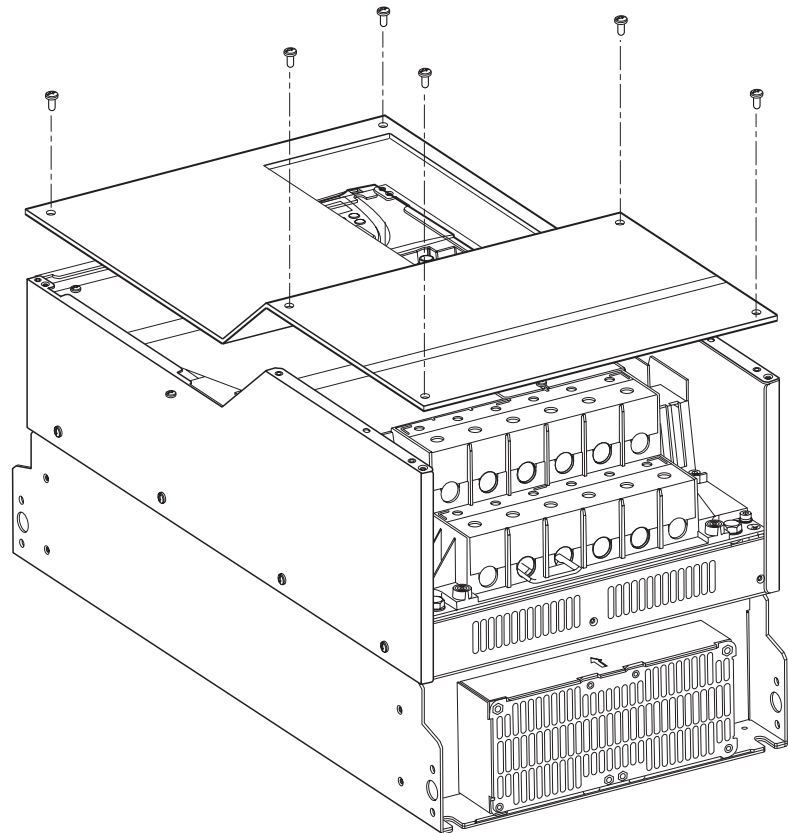
- Read and understand the precautions in “Introduction” starting on page 7 before performing this procedure.
- Before working on this equipment, turn off all power supplying it and perform the DC bus voltage measurement procedure on page 12.

Failure to follow these instructions will result in death or serious injury.

Remove the Front Cover

1. Using a size 2 Phillips driver, remove six screws and take off the front cover. See Figure 1.

Figure 1: Front Cover Removal (Frame Size 8 Shown)

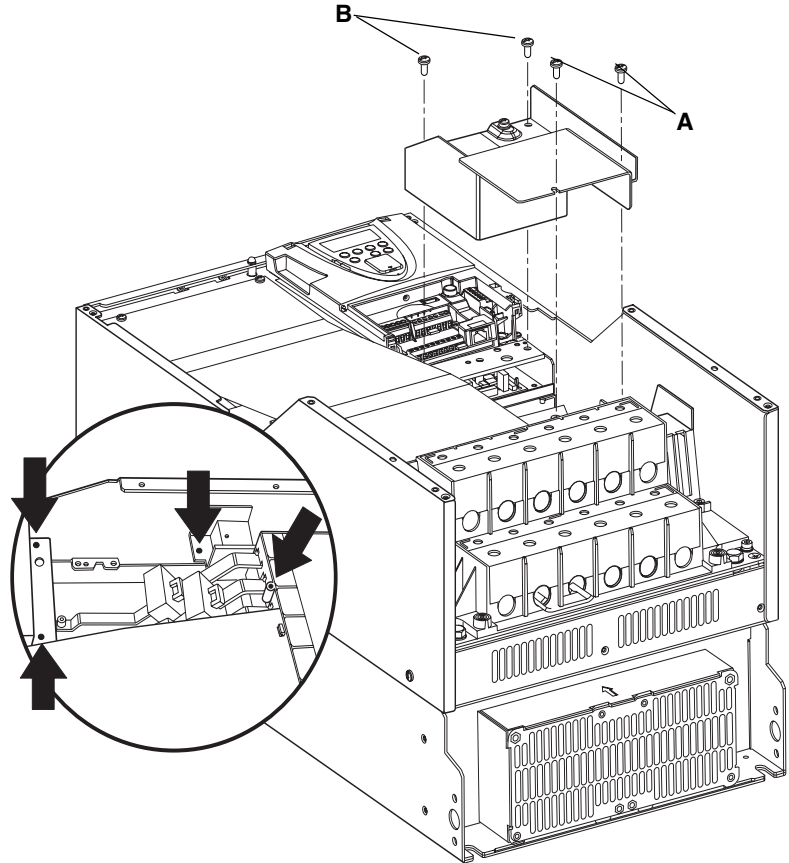


Remove the Output Bus Bar Cover Plate

NOTE: The two screws (A) over the terminal block screw into plastic and have coarser threads than the two screws (B) that attach the cover plate to the crossbrace.

- Using a T-20 Torx driver, remove four screws and remove the output bus bar cover plate between the middle crossbrace and the power terminal block. See Figure 2.

Figure 2: Output Bus Bar Cover Plate Removal



Remove the Insulator

- Remove the insulator as follows. See Figure 3 on page 17.
 - Using a T-20 Torx driver, remove the two screws (A) securing the insulator to the top crossbrace.
 - Gently release the insulator from the three retaining hooks (B) on the power terminal block and remove it from the drive.

Replace the Filter Board

4. Remove the filter board as follows. See Figure 3 on page 17.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- When the controller is damaged, voltage may remain on certain energy storage capacitors after de-energization of the controller and discharge of the main capacitor bank.
- Before working on or near assemblies containing energy storage capacitors, verify that the capacitor voltages are less than 42 Vdc.
- The following assemblies have energy-storing capacitors:
 - Filter board. See Figure 3 on page 17.
 - Rectifier snubber board
 - Snubber capacitors
- Always check for the presence of voltage using a voltmeter set to the 1000 Vdc scale. When voltage is present, allow the voltmeter to discharge the capacitor's stored charge. Refer to "Discharging Stored Energy in Capacitors" on page 13.

Failure to follow these instructions will result in death or serious injury.

Table 2: Filter Board Wiring

Wire No. ¹	Terminal No.	Description	To:
E111	S202	2-pin	Power board
E112	S101	3-pin	Power board

¹ See the wiring table and schematic on pages 64 and 65 for complete drive wiring. Wire numbers are given for cross referencing the wires with the wiring table and the schematic. The numbers do not appear on the wires.

- Remove two plastic inserts (C) from the power terminal block to access the terminals.
- Using a 4 mm Allen wrench, remove the three screws (D) securing the filter board at input terminals L1, L2, and L3.

NOTE: Removing these three screws also releases the input bus bars from the terminal block.

- Using a T-20 Torx driver, remove the two screws (E) securing the filter board to its plastic mounting supports.
- Using a size 2 Phillips driver, remove one screw (F) securing the filter board to the drive frame.
- Slide the filter board up and out of the drive.
- Carefully remove the 2-pin connector and the 3-pin connector from the top of the filter board.

5. Install the new filter board as follows. See Figure 3 on page 17.

- Install the 2-pin connector at terminal S202 and the 3-pin connector at terminal S101 at the top of the filter board.
- Slide the filter board into position over the input bus bars. Align the bottom three mounting slots with the input bus bar mounting slots at terminals L1, L2, and L3.
- Using a 4 mm Allen wrench, install the three screws (D) securing the filter board and input bus bars at input terminals L1, L2, and L3. Tighten the screws to 2.1– 2.7 N•m (18.6–23.9 lb-in).
- Replace the plastic inserts (C) over the power terminal block.
- Using a T-20 Torx driver, install the two screws (E) securing the filter board to its plastic mounting supports. Tighten the screws to 1.8–2.2 N•m (15.9–19.5 lb-in). Take care not to overtighten the screws or you may strip the threads.
- Using a size 2 Phillips driver, install one screw (F) securing the filter board to the drive frame. Tighten the screw to 1.1–1.7 N•m (9.7–15.0 lb-in).

Replace the Insulator

6. Reinstall the insulator as follows. See Figure 3.

⚠ DANGER

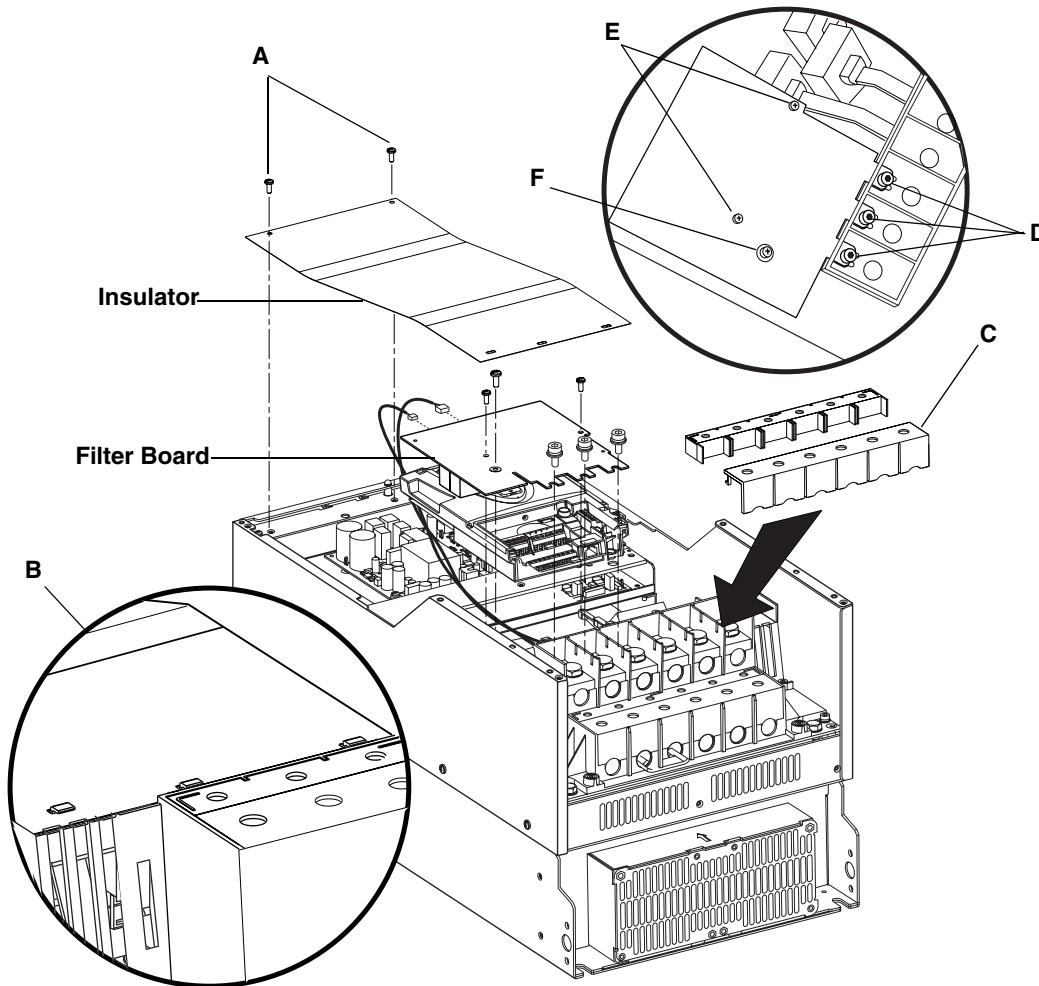
HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Install the insulator as shown in Figure 3.
- Before installing the insulator, ensure that it has no tears or cracks. If the insulator is damaged, contact your Schneider Electric representative.
- Do not install a damaged insulator.

Failure to follow these instructions will result in death or serious injury.

- Secure the three slots in the insulator over the retaining hooks (B) on the terminal block.
- Using a T-20 Torx driver, secure the insulator to the top crossbrace with two screws (A). Tighten the screws to 1.1–1.7 N•m (9.7–15.0 lb-in).

Figure 3: Filter Board Replacement



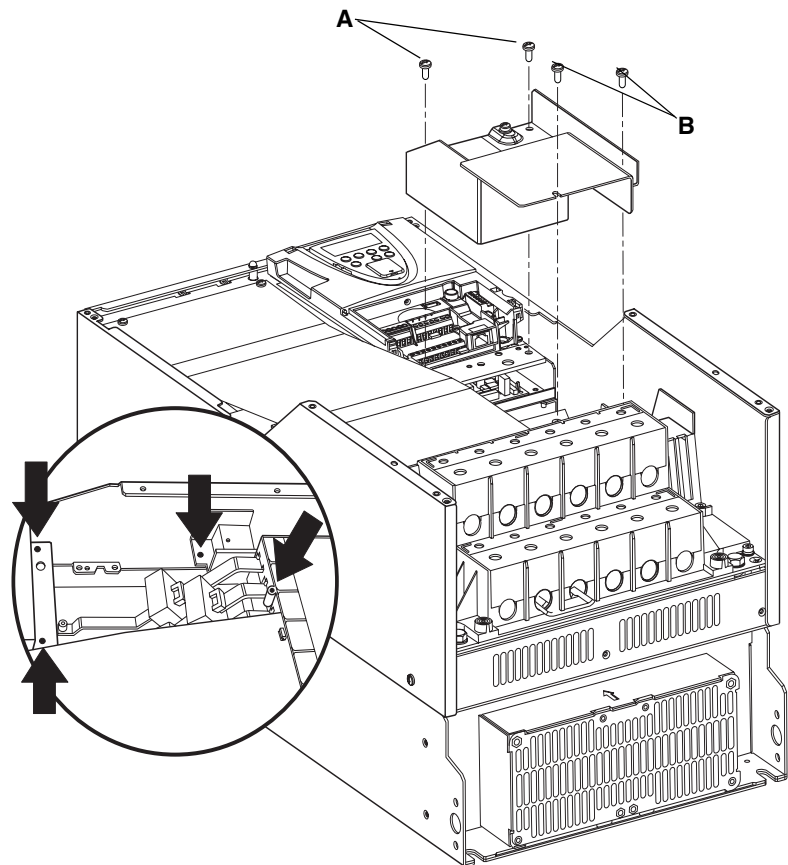
Replace the Output Bus Bar Cover Plate

7. Reinstall the output bus bar cover plate. See Figure 4.
 - Position the cover plate between the middle crossbrace and the power terminal block.

NOTE: Note the differences in the four screws that secure the bus bar cover plate. The two screws (**B**) over the terminal block screw into plastic and have coarser threads than the two screws (**A**) that attach the cover plate to the middle crossbrace. Take care not to overtighten the screws or you may strip the threads.

- Using a T-20 Torx driver, secure the cover plate to the middle crossbrace with two screws (**A**). Tighten the screws to 1.1–1.7 N•m (9.7–15.0 lb-in).
- Using a T-20 Torx driver, install the two screws (**B**) securing the cover plate to the power terminal block. Tighten the screws to 1.8–2.2 N•m (15.9–19.5 lb-in).

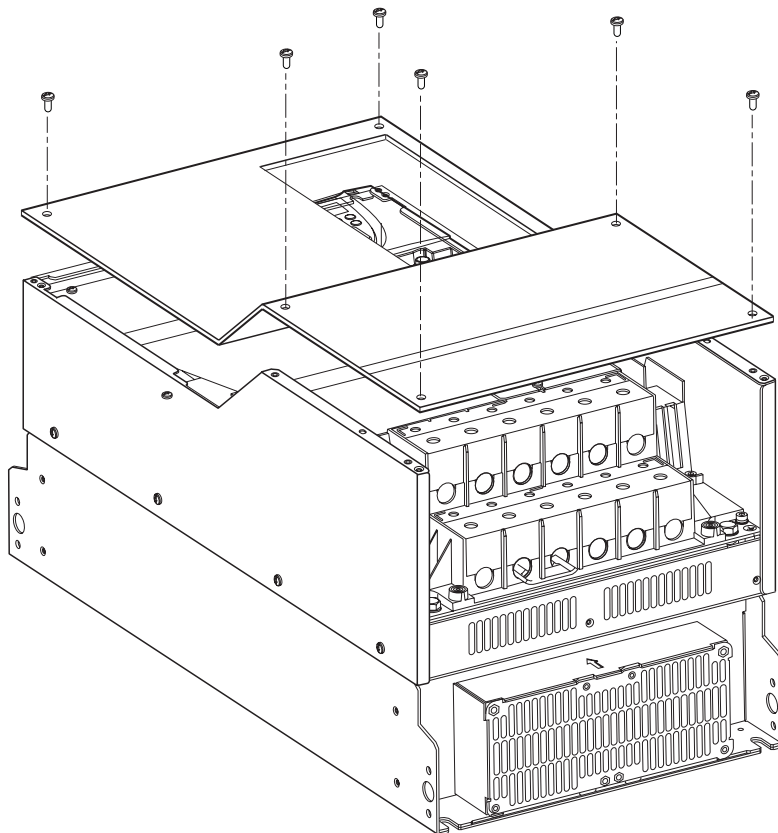
Figure 4: Output Bus Bar Cover Plate Replacement



Replace the Front Cover

8. Replace the front cover. Using a size 2 Phillips driver, secure the cover with 6 screws. See Figure 5. Tighten the screws to 1.1–1.7 N•m (9.7–15.0 lb-in).

Figure 5: Front Cover Replacement (Frame Size 8 Shown)



Disassembling the Drive

IMPORTANT: Label and retain all removed hardware and cables for use in reassembly.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Read and understand the precautions in “Introduction” starting on page 7 before performing this procedure.
- Before working on this equipment, turn off all power supplying it and perform the DC bus voltage measurement procedure on page 12.

Failure to follow these instructions will result in death or serious injury.

This section contains instructions for removing the following parts from the drive:

- The front cover
- The top panel
- The side panels
- The output bus bar cover plate
- The insulator
- The filter board
- The control module cover
- The control module
- The crossbraces

Perform all of the steps in this section before replacing the following parts:

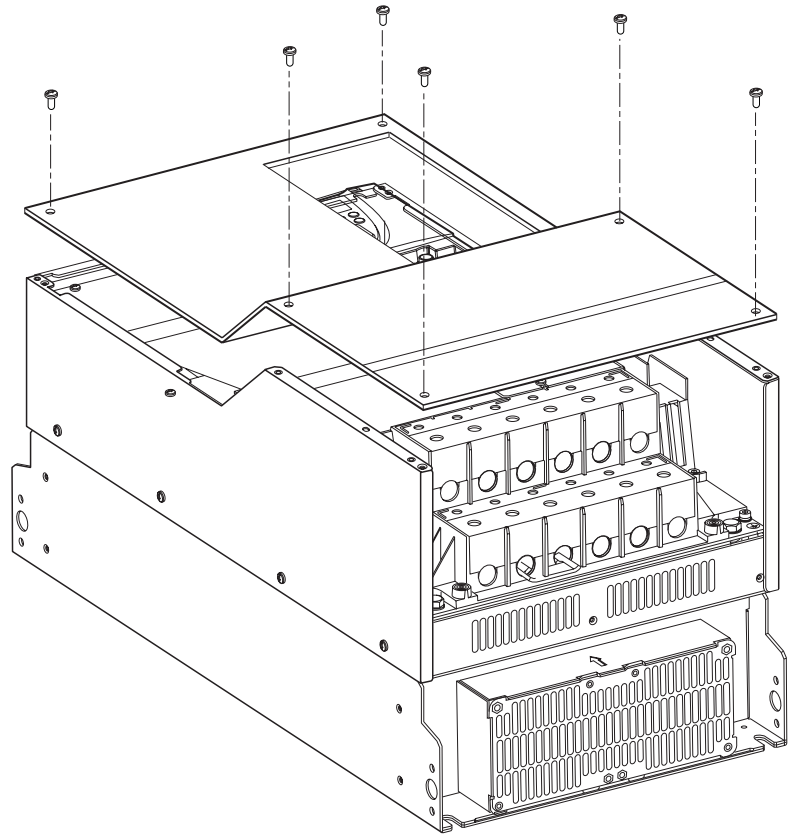
- Power board
- Power IGBT modules
- Braking IGBT modules
- SCR modules

Remove the Front Cover

IMPORTANT: Label and retain all removed hardware and cables for use in reassembly.

1. Using a size 2 Phillips driver, remove six screws and take off the front cover. See Figure 6.

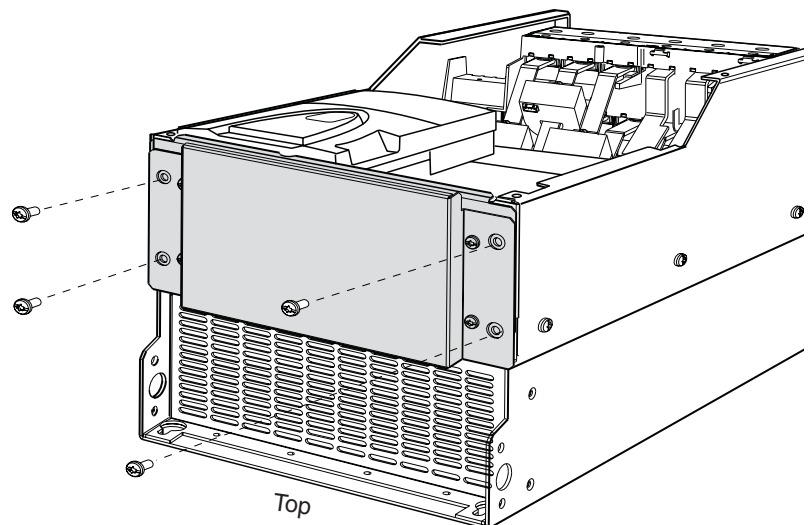
Figure 6: Front Cover Removal (Frame Size 8 Shown)



Remove the Top Panel

2. Using a T-20 Torx driver, remove four screws and take off the top panel. See Figure 7.

Figure 7: Top Panel Removal (Frame Size 8 Shown)



Remove the Side Panels

3. Using a T-20 Torx driver, remove the left and right side panels as follows. See Figure 8.

— **Frame size 8:**

Remove four screws and take off the left side panel (A).

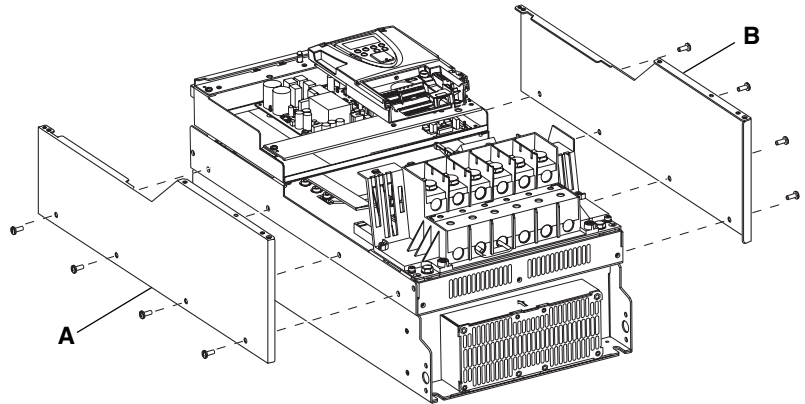
Remove four screws and take off the right side panel. (B)

— **Frame size 7B:**

Remove three screws and take off the left side panel.

Remove three screws and take off the right side panel.

Figure 8: Side Panel Removal (Frame Size 8 Shown)

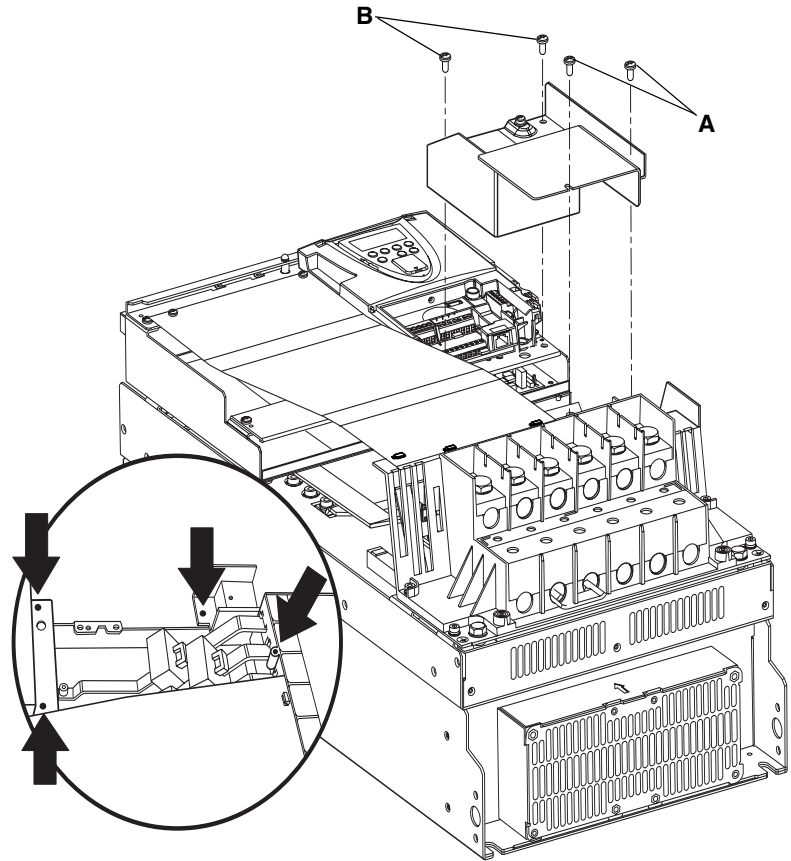


Remove the Output Bus Bar Cover Plate

NOTE: The two screws (A) over the terminal block screw into plastic and have coarser threads than the two screws (B) that attach the cover plate to the crossbrace.

- Using a T-20 Torx driver, remove four screws and remove the output bus bar cover plate between the middle crossbrace and the power terminal block. See Figure 9.

Figure 9: Output Bus Bar Cover Plate Removal



Remove the Insulator

5. Remove the insulator as follows. See Figure 10 on page 25.
 - Using a T-20 Torx driver, remove the two screws (A) securing the insulator to the top crossbrace.
 - Gently release the insulator from the three retaining hooks (B) on the power terminal block and remove it from the drive.

Remove the Filter Board

6. Remove the filter board as follows. See Figure 10.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- When the controller is damaged, voltage may remain on certain energy storage capacitors after de-energization of the controller and discharge of the main capacitor bank.
- Before working on or near assemblies containing energy storage capacitors, verify that the capacitor voltages are less than 42 Vdc.
- The following assemblies have energy-storing capacitors:
 - Filter board. See Figure 10 on page 25.
 - Rectifier snubber board
 - Snubber capacitors
- Always check for the presence of voltage using a voltmeter set to the 1000 Vdc scale. When voltage is present, allow the voltmeter to discharge the capacitor’s stored charge. Refer to “Discharging Stored Energy in Capacitors” on page 13.

Failure to follow these instructions will result in death or serious injury.

- Remove two plastic inserts (C) from the power terminal block to access the terminals.
- Using a 4 mm Allen wrench, remove the three screws (D) securing the filter board at input terminals L1, L2, and L3.

NOTE: Removing these three screws also releases the input bus bars from the terminal block.

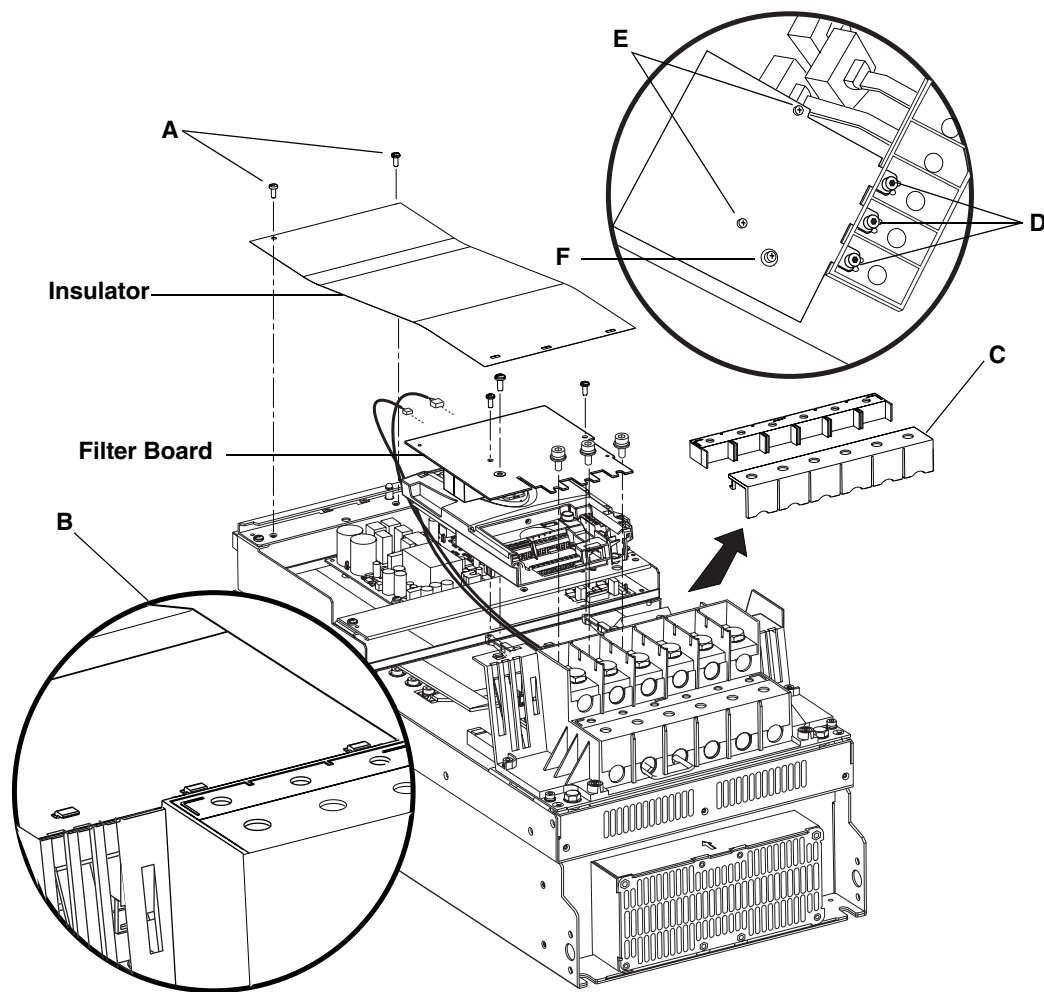
- Using a T-20 Torx driver, remove the two screws (E) securing the filter board to its plastic mounting supports.
- Using a size 2 Phillips driver, remove one screw (F) securing the filter board to the drive frame.
- Slide the filter board up and out of the drive.
- Carefully remove the 2-pin connector and the 3-pin connector from the top of the filter board.

Table 3: Filter Board Wiring

Wire No. ¹	Terminal No.	Description	To:
E111	S202	2-pin	Power board
E112	S101	3-pin	Power board

¹ See the wiring table and schematic on pages 64 and 65 for complete drive wiring. Wire numbers are given for cross referencing the wires with the wiring table and the schematic. The numbers do not appear on the wires.

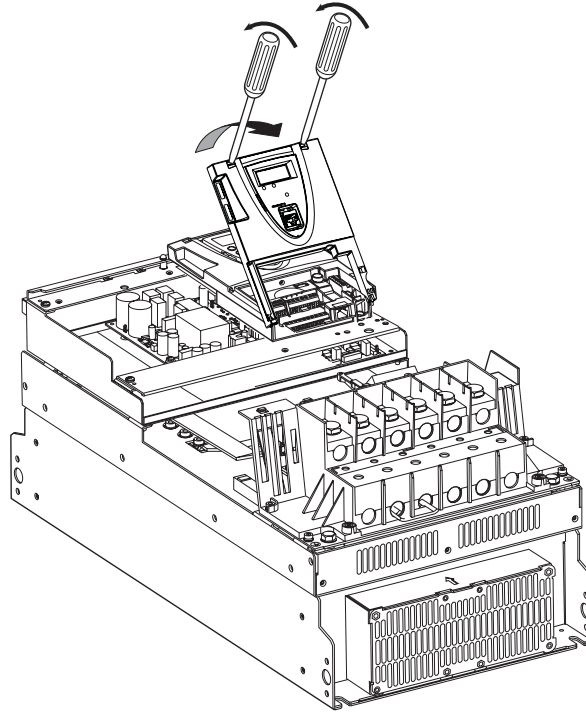
Figure 10: Filter Board Removal



Remove the Control Module Cover

7. Using two small flathead screwdrivers, gently pull forward the retaining snaps on the control module cover and lift the cover off of the control module. See Figure 11.

Figure 11: Control Module Cover Removal



Remove the Control Module

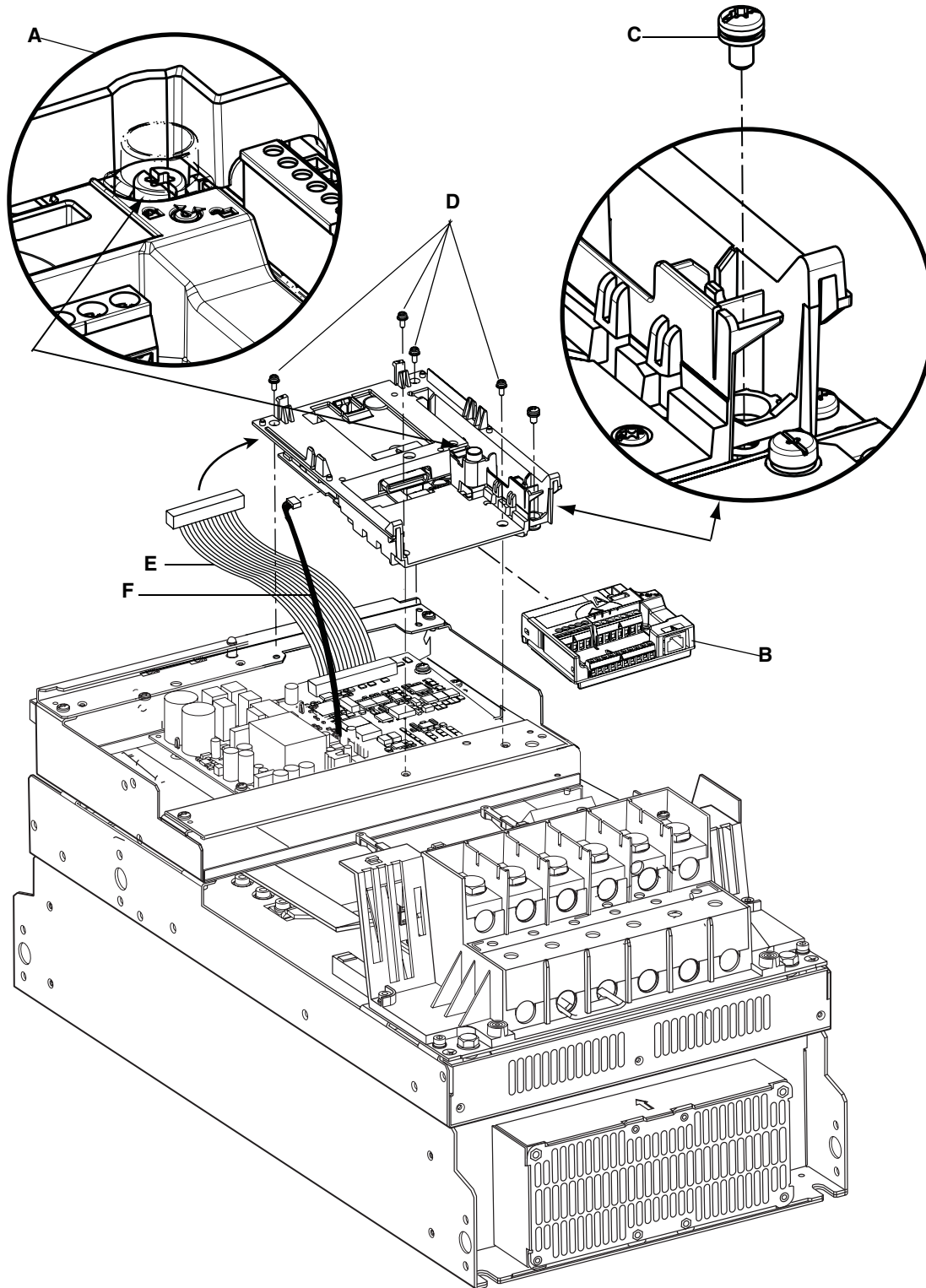
8. Remove the control module from the drive as follows. See Figure 12 on page 27.
 - Using a T-20 Torx driver, loosen the spring-loaded screw (A) on the right side of the control module.
 - Slide the control terminal board (B) down, and remove it from the control module.
 - Using a size 2 Phillips driver, remove one screw (C) from the bottom right of the control module.
 - Using a size 1 Phillips driver, remove the four screws (D) securing the control module to the frame crossbraces, and take the control module out of the drive.
 - Carefully remove the 40-pin ribbon connector (E) from the top of the control module and the 4-pin connector (F) from the left side of the control module.

Table 4: Control Module Wiring

Wire No. ¹	Terminal No.	Description	To:
E100	S100	40-pin	Power board
E101	S103	4-pin	Power board

¹ See the wiring table and schematic on pages 64 and 65 for complete drive wiring. Wire numbers are given for cross referencing the wires with the wiring table and the schematic. The numbers do not appear on the wires.

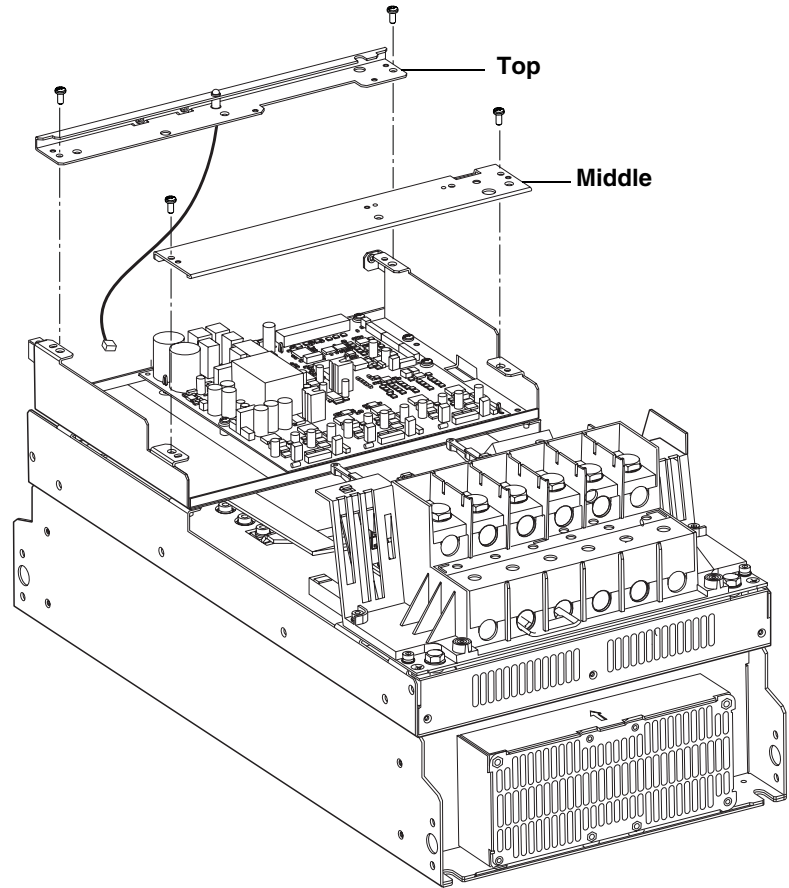
Figure 12: Control Module Removal



Remove the Crossbraces

9. Remove the frame crossbraces from the drive as follows. See Figure 13.
 - Using a T-20 Torx driver, remove two screws securing the top crossbrace to the drive frame.
 - Remove the LED connection from terminal S205 of the power board and remove the top crossbrace from the drive.
 - Using a T-20 Torx driver, remove two screws securing the middle crossbrace to the drive frame and remove the crossbrace.

Figure 13: Crossbrace Removal



Replacing the Power Board, Power IGBT Modules, Braking IGBT Module, and SCR Modules

IMPORTANT: Label and retain all removed hardware and cables for use in reassembly.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Read and understand the precautions in “Introduction” starting on page 7 before performing this procedure.
- Before working on this equipment, turn off all power supplying it and perform the DC bus voltage measurement procedure on page 12.

Failure to follow these instructions will result in death or serious injury.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- When the controller is damaged, voltage may remain on certain energy storage capacitors after de-energization of the controller and discharge of the main capacitor bank.
- Before working on or near assemblies containing energy storage capacitors, verify that the capacitor voltages are less than 42 Vdc.
- The following assemblies have energy-storing capacitors:
 - Filter board
 - Rectifier snubber board. See item B in Figure 22 on page 39.
 - Snubber capacitors. See item E in Figure 17 on page 33.
- Always check for the presence of voltage using a voltmeter set to the 1000 Vdc scale. When voltage is present, allow the voltmeter to discharge the capacitor’s stored charge. Refer to “Discharging Stored Energy in Capacitors” on page 13.

Failure to follow these instructions will result in death or serious injury.

This section contains instructions for replacing the following parts. It is necessary to remove parts from the drive before replacing these components. Perform all steps of “Disassembling the Drive” beginning on page 20 before performing the steps in this procedure.

Power board with power insulated-gate bipolar transistor (IGBT) modules:
VX51M2200M1271
VX51M2300M1271
VX51M2400M1271
Power IGBT modules:
VZ3IM2201M1271
VZ3IM2301M1271
VZ3IM2401M1271
Silicon controlled rectifier (SCR) modules:
VZ3TD1072M1671
VZ3TD1092M1671
VZ3TD1132M1671
VZTD1162M1671

Power boards:
VX5A1HD30M3X
VX5A1HD37M3X
VX5A1HD45M3X
Braking IGBT modules:
VZ3IM1300M1271
VZ3IM1195M0671
VZ3IM1300M0671

Remove the Power Board Connections

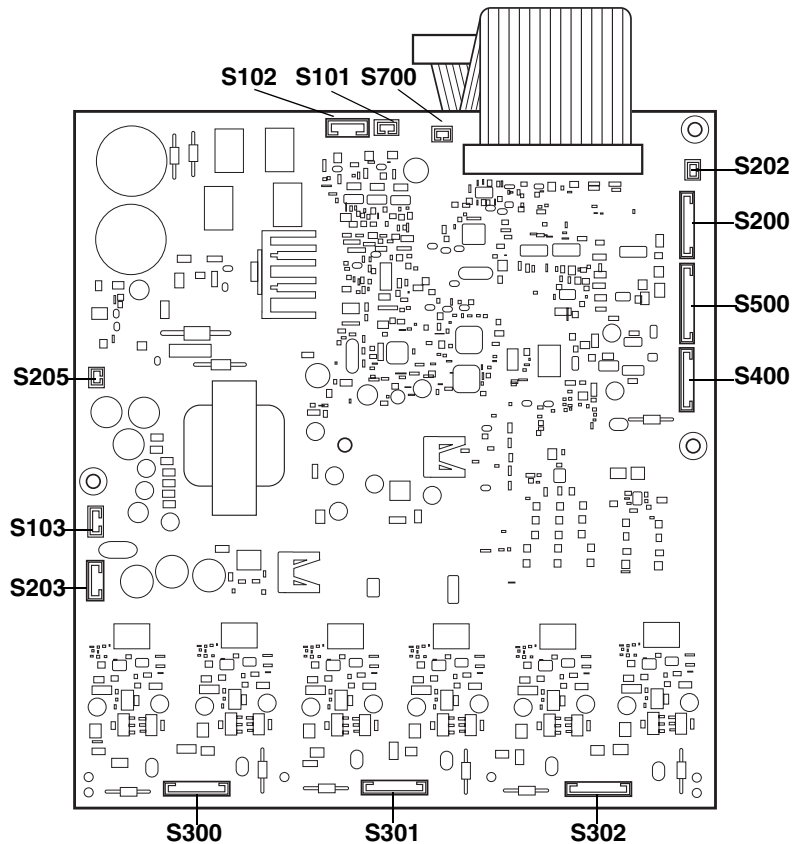
1. Using needle-nose pliers, carefully remove the following connections from the power board. See Table 5 and Figure 14 for connector locations.
 - At the top of the board, from left to right remove: the 6-pin connector from terminal S102, the 3-pin connector from terminal S101, and the 2-pin connector from terminal S700.
 - At the left side of the board, from top to bottom remove: The 2-pin connector from terminal S205, the 4-pin connector from terminal S103, and the 5-pin connector from terminal S203.
 - At the right side of the board, from top to bottom remove: the 2-pin connector from terminal S202, the 10-pin connector from terminal S200, the 12-pin connector from terminal S500, and the 9-pin connector from terminal S400.
 - At the bottom of the board, from left to right remove: the 9-pin connector from terminal S300, the 9-pin connector from terminal S301, and the 9-pin connector from terminal S302.

Table 5: Power Board Wiring

Wire No. ¹	Terminal No.	Description	To:
E112	S101	3-pin	Filter board
E107	S102	6-pin	SCR L1, L2, L3
E101	S103	4-pin	Control module
E109	S200	10-pin	+/- Bus bar
E111	S202	2-pin	Filter board
E105	S203	5-pin	Fan
E115	S300	9-pin	Power IGBT module
E116	S301	9-pin	Power IGBT module
E117	S302	9-pin	Braking IGBT module
E108	S400	9-pin	Braking IGBT module
			BR Bus bar
E110	S500	12-pin	SCR modules
E118	S700	2-pin	Thermal sensor
E102	S205	2-pin	LED

¹ See the wiring table and schematic on pages 64 and 65 for complete drive wiring. Wire numbers are given for cross referencing the wires with the wiring table and the schematic. The numbers do not appear on the wires.

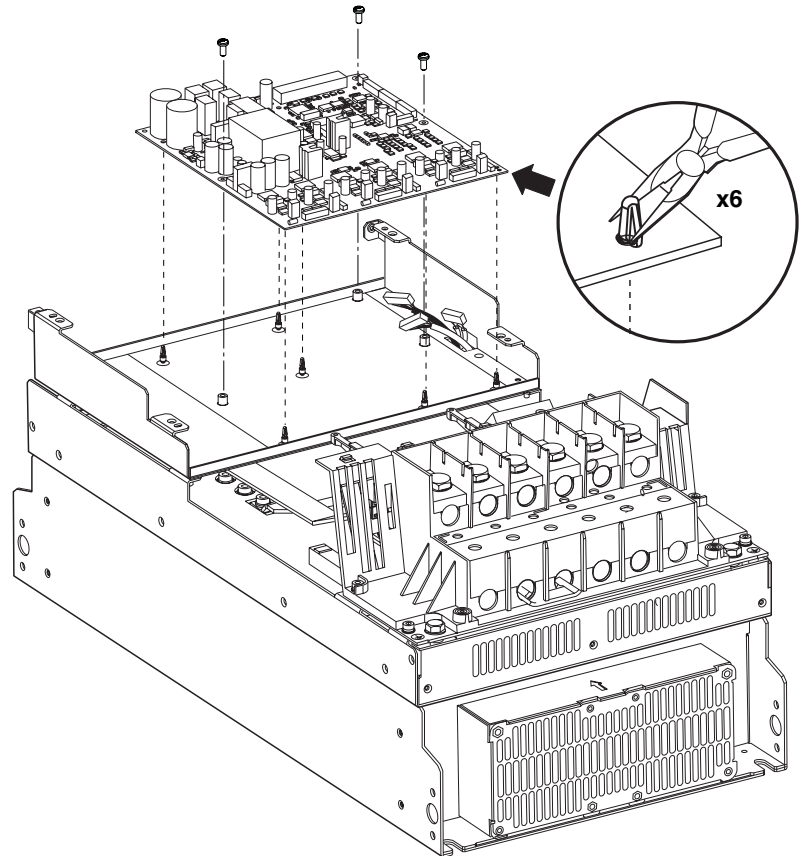
Figure 14: Power Board Connections



Remove the Power Board

2. Remove the power board as follows. See Figure 15.
 - Using a size 2 Phillips driver, remove the three screws securing the power board to the power board mounting plate.
 - Using needle-nose pliers, gently compress the six plastic mounting posts, one at a time, while lifting the power board off the posts.
 - Remove the power board from the drive.

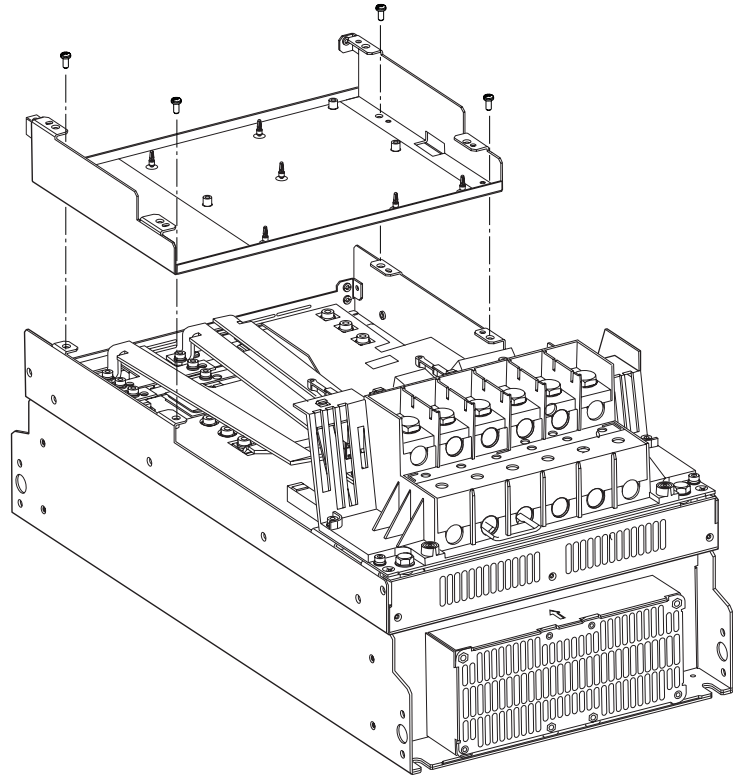
Figure 15: Power Board Removal



Remove the Power Board Mounting Plate

- Using a T-20 Torx driver, remove the four screws securing the power board mounting plate and lift the plate out of the drive. See Figure 16.

Figure 16: Power Board Mounting Plate Removal



Remove the Input Bus Bars

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- When the controller is damaged, voltage may remain on certain energy storage capacitors after de-energization of the controller and discharge of the main capacitor bank.
- Before working on or near assemblies containing energy storage capacitors, verify that the capacitor voltages are less than 42 Vdc.
- The following assemblies have energy-storing capacitors:
 - Filter board
 - Rectifier snubber board.
 - Snubber capacitors. Item E in Figure 17 on page 33.
- Always check for the presence of voltage using a voltmeter set to the 1000 Vdc scale. When voltage is present, allow the voltmeter to discharge the capacitor's stored charge. Refer to "Discharging Stored Energy in Capacitors" on page 13.

Failure to follow these instructions will result in death or serious injury.

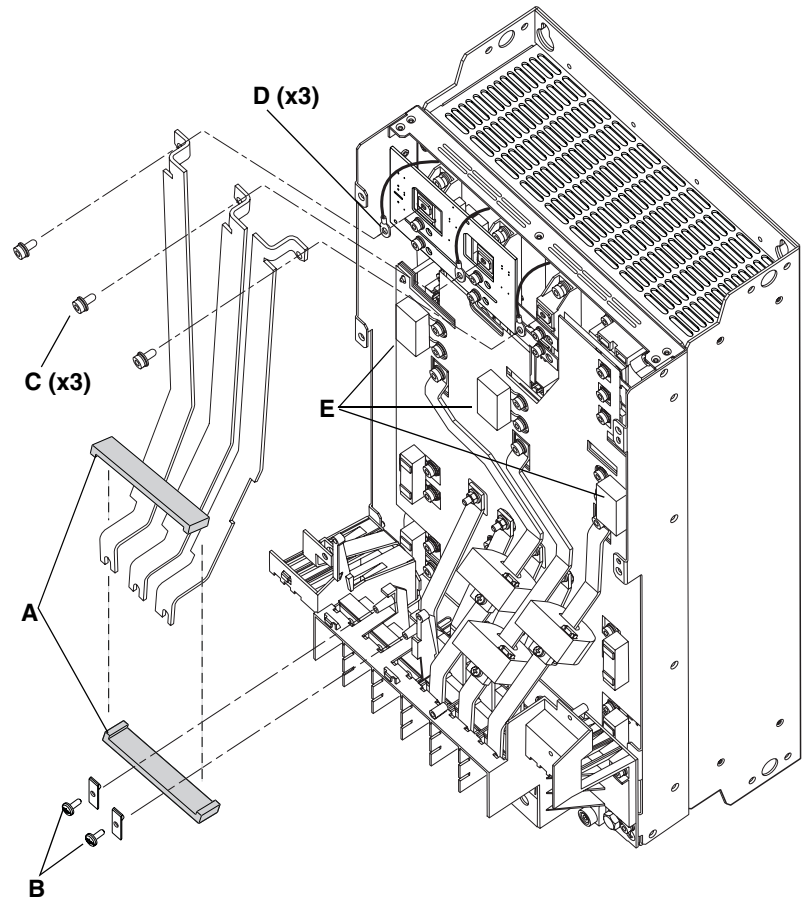
4. Remove the three bus bars at input terminals L1, L2, and L3 as follows. See Figure 17.
 - Frame size 7B drives have a two-piece ferrite core (A) at the input terminals that is not present on the frame size 8 drives. Using a T-20 Torx driver, remove two screws (B) and the metal brackets securing the ferrite core to its mounting posts, and remove the top part of the ferrite core.
 - Using a 3 mm Allen wrench, remove the three screws (C) securing the top of the bus bars to the SCR modules.

NOTE: You removed the three screws securing the bus bars to input terminals L1, L2, and L3 when you removed the filter board.

- Remove the lugs (D) between the SCR module terminals and the SCR snubber board.
- Frame size 7B drives only: Remove the bottom piece of the ferrite core from the terminal block.

Figure 17: Input Bus Bar Removal

NOTE: Frame size 7B drives do not have snubber capacitors (E).



Remove the Output Bus Bars

5. Remove the output bus bars as follows. Figure 18.
 - Using a 4 mm Allen wrench, remove the three screws (A) securing the bus bars at output terminals T1, T2, and T2.
 - Using a 3 mm Allen wrench (frame size 7B) or a 4 mm Allen wrench (frame size 8), remove the three screws (B) securing the top of the bus bars to the bus board.

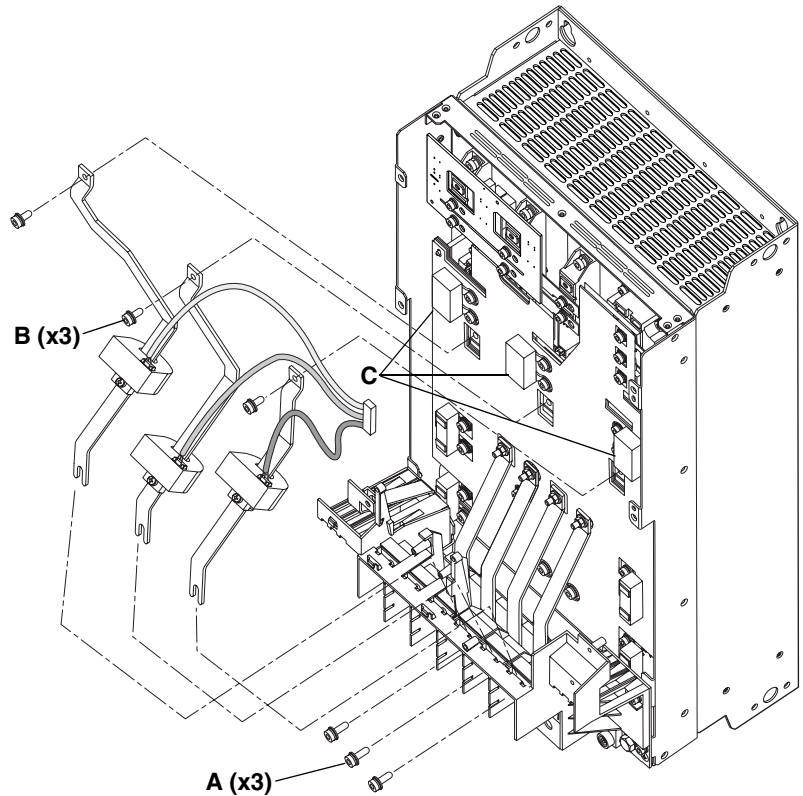
NOTE: Note the differences in the output bus bar hardware. The three screws (A) at the output terminals are longer than the three screws (B) at the bus board.

Note also the sleeve colors on the bus bars: T1: Red, T2: Yellow
T3: Blue

- Remove the output bus bars from the drive. It is not necessary to remove the connections from the current sensors on the bus bars.

NOTE: Frame size 7B drives do not have snubber capacitors (C).

Figure 18: Output Bus Bar Removal

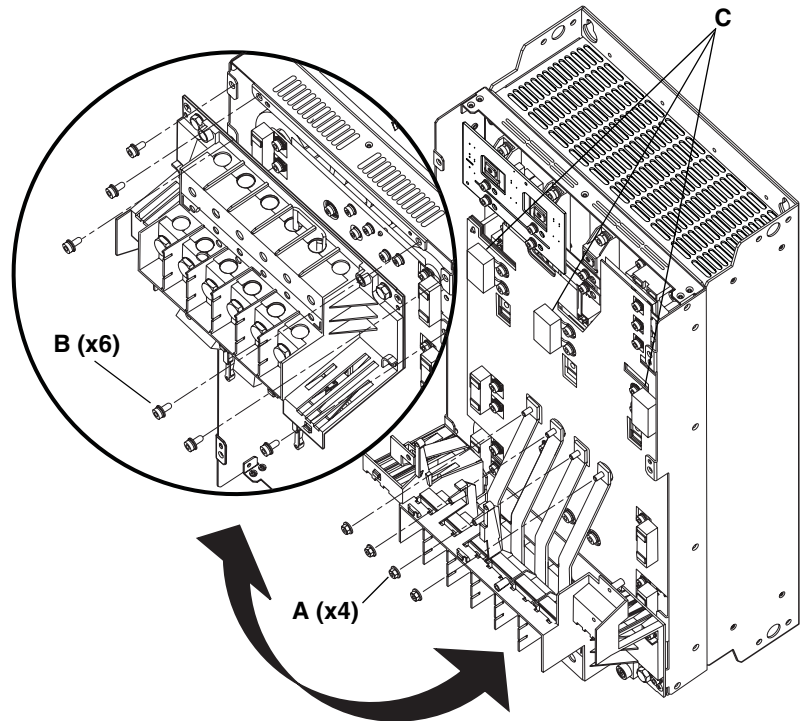


Remove the Power Terminal Block

6. Remove the power terminal block as follows. See Figure 19.
 - Using an 8 mm nut driver, remove the four nuts (**A**) securing the bus bars from terminals PO, PA/+, PB, and PC/- to the bus board.
 - Using a 3 mm Allen wrench, remove six screws (**B**) securing the terminal block to the drive frame and remove the terminal block and bus bars from the drive.

Figure 19: Power Terminal Block Removal

NOTE: Frame size 7B drives do not have snubber capacitors (**C**).



Remove the Balancing Resistors

7. Remove the balancing resistors from the bus board as follows. See Figure 20.

Frame size 7B drives have only one balancing resistor, shown shaded in Figure 20. Frame size 8 drives have all four balancing resistors illustrated in the figure.

NOTE: For frame size 8 drives, note and record the orientation and hardware arrangement of the four balancing resistors:

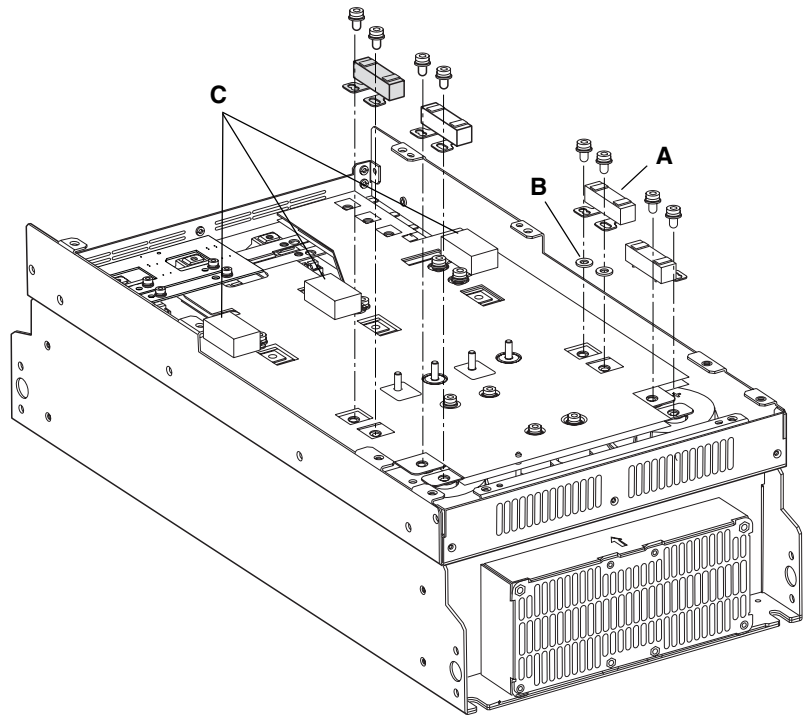
The mounting lugs on the top two resistors and the bottom left resistor are on the left. The mounting lugs on the bottom right resistor are on the right.

There are washers (**B**) between the bus board and the mounting lugs on the top right (**A**) resistor. Retain the washers for reinstallation.

- **Frame size 7B:** Using a 3 mm Allen wrench, remove two screws from the shaded resistor and remove the resistor from the bus board.
- **Frame size 8:** Using a 4 mm Allen wrench, remove two screws from each resistor and remove the resistors from the bus board.

Figure 20: Balancing Resistor Removal

NOTE: Frame size 7B drives do not have snubber capacitors (**C**).



Remove the Snubber Capacitors: Frame Size 8 Only

8. Frame size 8 drives have snubber capacitors on the power IGBT modules. Remove the three snubber capacitors from the bus board as follows. See Figure 21.

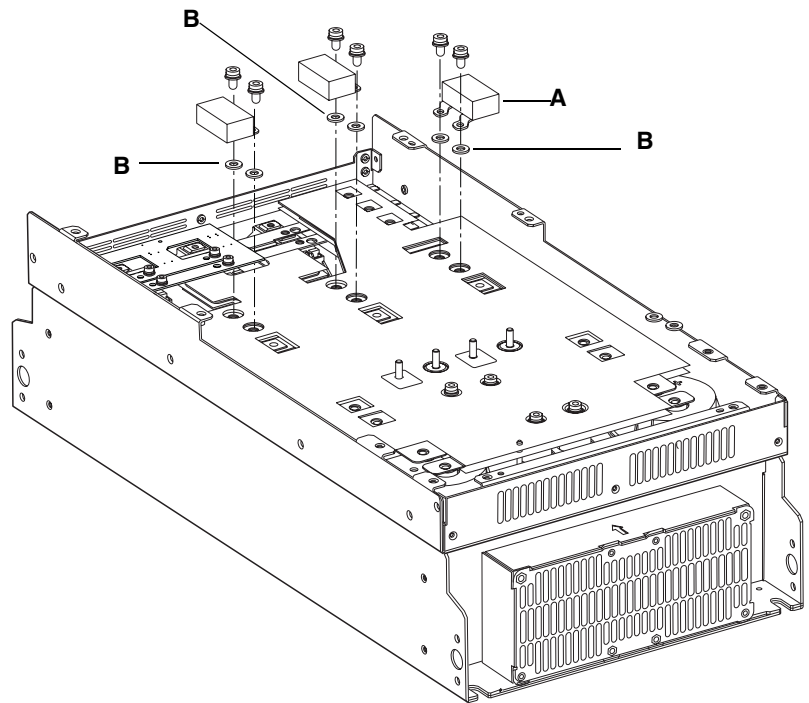
NOTE: Note the orientation and hardware arrangement of the three snubber capacitors:

The mounting lugs on the left and middle capacitors are on the right; the mounting lugs on the right capacitor (**A**) are on the left.

There are washers (**B**) between the bus board and the mounting lugs on all three capacitors. Retain the washers for reinstallation.

- Using a 4 mm Allen wrench, remove the two screws and washers securing each of the three snubber capacitors to the bus board and remove the capacitors from the drive.

Figure 21: Snubber Capacitor Removal



Remove the Bus Board

9. Remove the bus board as follows. See Figure 22 on page 39.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- When the controller is damaged, voltage may remain on certain energy storage capacitors after de-energization of the controller and discharge of the main capacitor bank.
- Before working on or near assemblies containing energy storage capacitors, verify that the capacitor voltages are less than 42 Vdc.
- The following assemblies have energy-storing capacitors:
 - Filter board
 - Rectifier snubber board. See item B in Figure 22 on page 39.
 - Snubber capacitors
- Always check for the presence of voltage using a voltmeter set to the 1000 Vdc scale. When voltage is present, allow the voltmeter to discharge the capacitor's stored charge. Refer to "Discharging Stored Energy in Capacitors" on page 13.

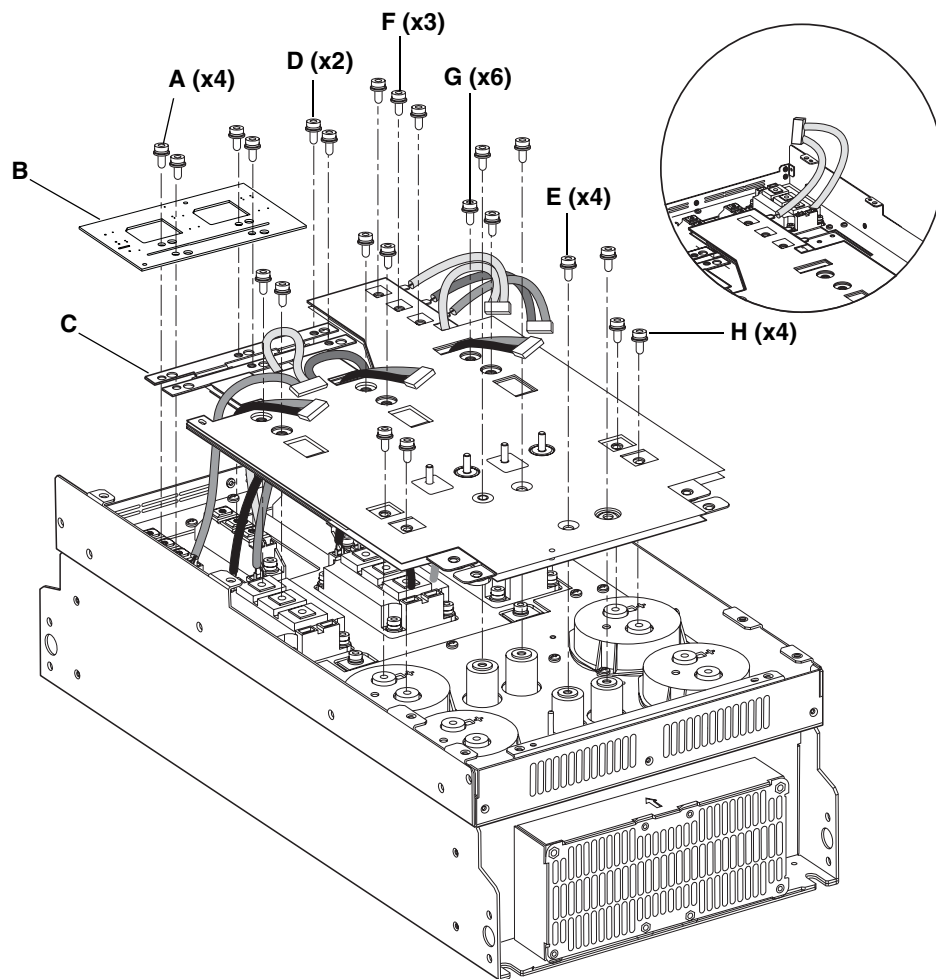
Failure to follow these instructions will result in death or serious injury.

- Using a 3 mm Allen wrench, remove four screws (**A**) securing the rectifier snubber board (**B**) to SCR modules 1 and 2, and remove the snubber board from the bus board.

NOTE: The four screws also go through the SCR bus bars (**C**). Removing them releases the SCR bus bars from SCR modules 1 and 2. For the position of the SCR modules, see Figure 28 on page 43.

- Using a 3 mm Allen wrench, remove two screws (**D**) securing the SCR bus bars to SCR 3.
- Using a 4 mm Allen wrench, remove four screws (**E**) securing the bus board to the DC bus.
- Using a 4 mm Allen wrench, remove three screws (**F**) securing the bus board to the braking IGBT module.
- On frame size 7B drives only, using a 3 mm Allen wrench, remove six screws (**G**) securing the bus board to the power IGBT modules.
- On frame size 7B only, using a 4 mm Allen wrench, remove four screws (**H**) securing the bus board to the capacitors.
- Remove the yellow cable from terminals 4 and 5 of SCR module 2, and remove the blue cable from terminals 4 and 5 of SCR module 3. See Table 8 and Figure 28 (pages 42–43), wire E107.
- Remove the bus board from the drive to expose the SCR modules, IGBT modules, and capacitors.
- Remove the yellow connector between the bus board and terminals 6 and 7 of SCR module 3. See Table 8 and Figure 28 (pages 42–43), wire E108.

Figure 22: Bus Board Removal



Replace the Power IGBT Modules

Next Steps: If you are replacing the power board, you must also replace the three power IGBT modules. Continue with Step 10.

If you are only replacing the braking IGBT module, skip to “Replace the Braking IGBT Module” on page 41.

If you are only replacing the SCR modules, skip to “Replace the SCR Modules” on page 42.

10. Replace each of the three power IGBT modules as follows. See Figure 24.

The power IGBT modules are mounted with two or four screws, depending on the drive rating. Be sure to install all mounting hardware when replacing the power IGBT modules.

- Before removing the IGBT modules, carefully note and label the wire connections for reassembly. See Table 6 and Figure 28 (page 43) for wiring.
- Using a 4 mm Allen wrench, remove two or four screws from the IGBT module and remove the module from the heatsink.
- Clean the portion of the heatsink that makes contact with the module.
- Evenly coat the bottom of the new IGBT module with a thin layer of thermal compound.
- Position the new module on the heatsink.
- Using a 4 mm Allen wrench, secure the module with two or four screws. If the power IGBT modules in your drive are mounted with four screws, initially tighten them, in the sequence shown in Figure 23, to 0.7–1.0 N•m (6.2–8.9 lb-in), and then to a final torque of 3.3–4.4 N•m (29.2–38.9 lb-in).
- Reinstall the wire connections to the module. See Table 6 and Figure 28 (page 43).
- Following the same steps, also replace the other two power IGBT modules.

Table 6: Power IGBT Module Wiring¹

Wire No. ²	IGBT No.	Terminal No.	Sleeve Color	Wire Color	To:
E115	1	4	Red	Red	Power Board
		5		Black	
		7	Black	Black	
		6		Red	
E116	2	4	Red	Red	Power Board
		5		Black	
		7	Black	Black	
		6		Red	
E117	3	4	Red	Red	Power Board
		5		Black	
		7	Black	Black	
		6		Red	

¹ See Figure 28 on page 43 for a wiring diagram and IGBT module positions.

² See the wiring table and schematic on pages 64 and 65 for complete drive wiring. Wire numbers are given for cross referencing the wires with the wiring table and the schematic. The numbers do not appear on the wires.

Figure 24: Power IGBT Module Replacement (Frame Size 8 Shown)

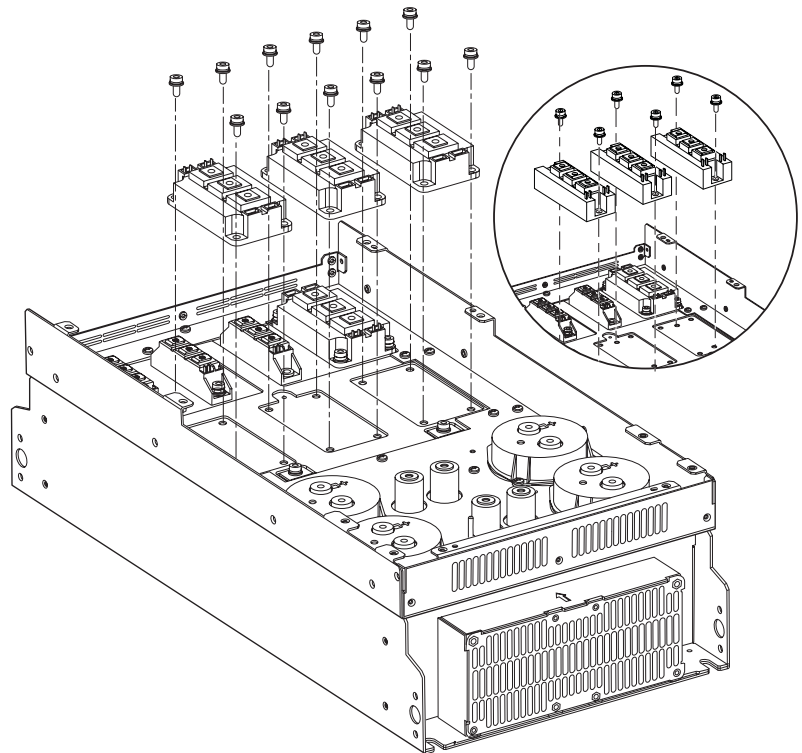
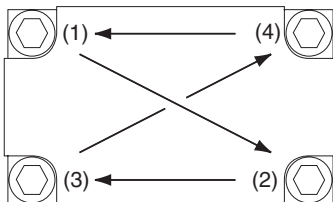


Figure 23: Torque Sequence



Replace the Braking IGBT Module

Next Steps: If you are only replacing the silicon controlled rectifier, skip Step 11 and continue with “Replace the SCR Modules” on page 42.

Table 7: Braking IGBT Module Wiring¹

Wire No. ²	Terminal No.	Sleeve Color	Wire Color	To:
E108	7	Yellow	Black	Power Board
	8		Red	

¹ See Figure 28 on page 43 for a wiring diagram and braking IGBT module position.

² See the wiring table and schematic on pages 64 and 65 for complete drive wiring. Wire numbers are given for cross referencing the wires with the wiring table and the schematic. The numbers do not appear on the wires.

11. Replace the braking IGBT module as follows. See Figure 26.

Note that the braking IGBT module is mounted with two or four screws, depending on the drive rating. Be sure to install all mounting hardware when replacing the braking IGBT module.

- Before removing the braking IGBT module, carefully note and label the wire connections for reassembly. See Table 7 and Figure 28 (page 43) for wiring.
- Using a 4 mm Allen wrench, remove two or four screws from the braking IGBT module and remove the module from the heatsink.
- Clean the portion of the heatsink that makes contact with the module.
- Evenly coat the bottom of the new braking IGBT module with a thin layer of thermal compound.
- Position the new module on the heatsink.
- Using a 4 mm Allen wrench, secure the module with two or four screws. If the power IGBT modules in your drive are mounted with four screws. Initially tighten the screws, in the sequence shown in Figure 25, to 0.7–1.0 N•m (6.2–8.9 lb-in), and then to a final torque of 3.3–4.4 N•m (29.2–38.9 lb-in).
- Reinstall the wire connections to the module. See Table 7 and Figure 28 (page 43).

Figure 25: Torque Sequence

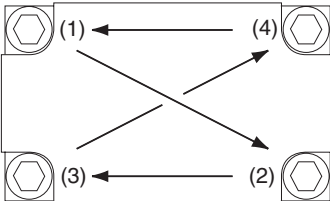
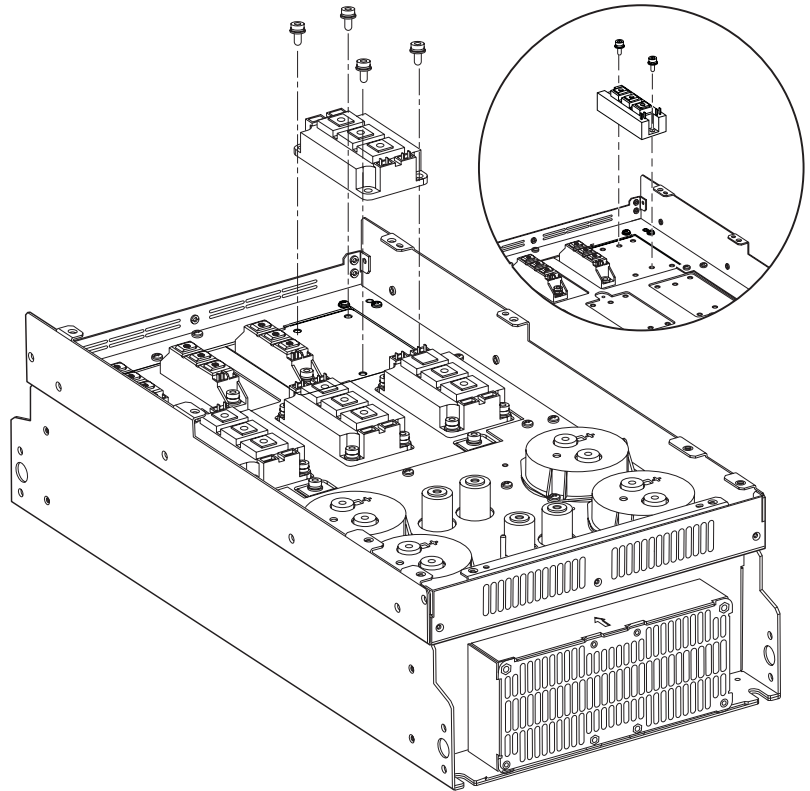


Figure 26: Braking IGBT Module Replacement (Frame Size 8 Shown)



Replace the SCR Modules

Table 8: SCR Module Wiring¹

Wire No. ²	SCR No.	Terminal No.	Sleeve Color	Wire Color	To:
E107	1	4	Red	Red	Power Board
		5		Black	
	2	4	Yellow	Red	
		5		Black	
	3	4	Blue	Red	
		5		Black	

¹ See Figure 28 on page 43 for a wiring diagram.

² See the wiring table and schematic on pages 64 and 65 for complete drive wiring. Wire numbers are given for cross referencing the wires with the wiring table and the schematic. The numbers do not appear on the wires.

12. Replace each of the three SCR modules as follows. See Figure 27.

- Before removing the SCR modules, carefully note and label the wire connections for reassembly. See Table 8 and Figure 28 (page 43) for wiring.
- Using a 4 mm Allen wrench, remove two screws from the SCR and remove the module from the heatsink.
- Clean the portion of the heatsink that makes contact with the module.
- Evenly coat the bottom of the new SCR with a thin layer of thermal compound.
- Position the new module on the heatsink.
- Using a 4 mm Allen wrench, secure the module with two screws. Tighten the screws to 3.3–4.4 N•m (29.2–38.9 lb-in).
- Reinstall the wire connections to the module. See Table 8 and Figure 28 (page 43).
- Following the same steps, also replace SCR modules 2 and 3.

Figure 27: SCR Module Replacement (Frame Size 8 Shown)

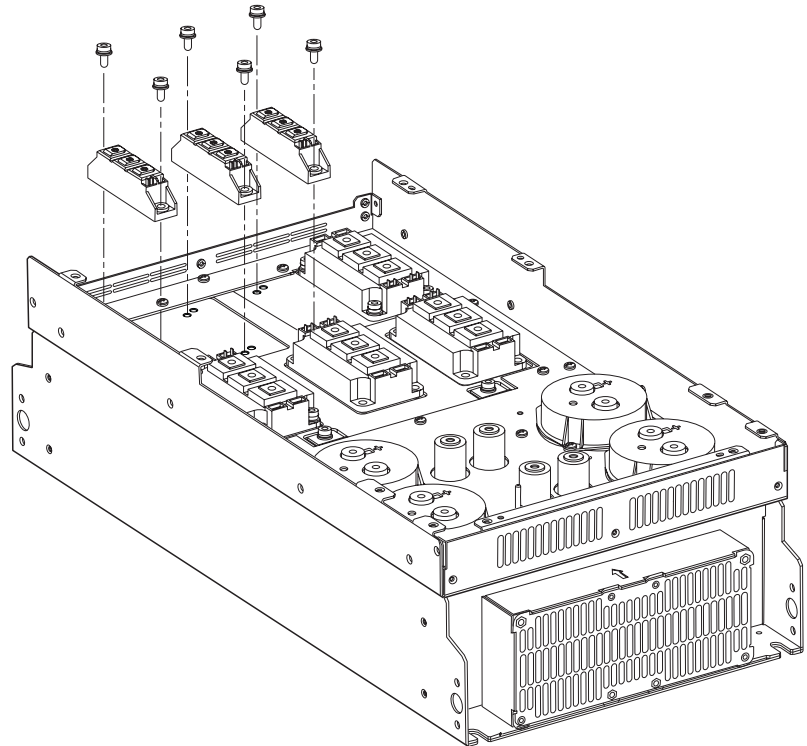
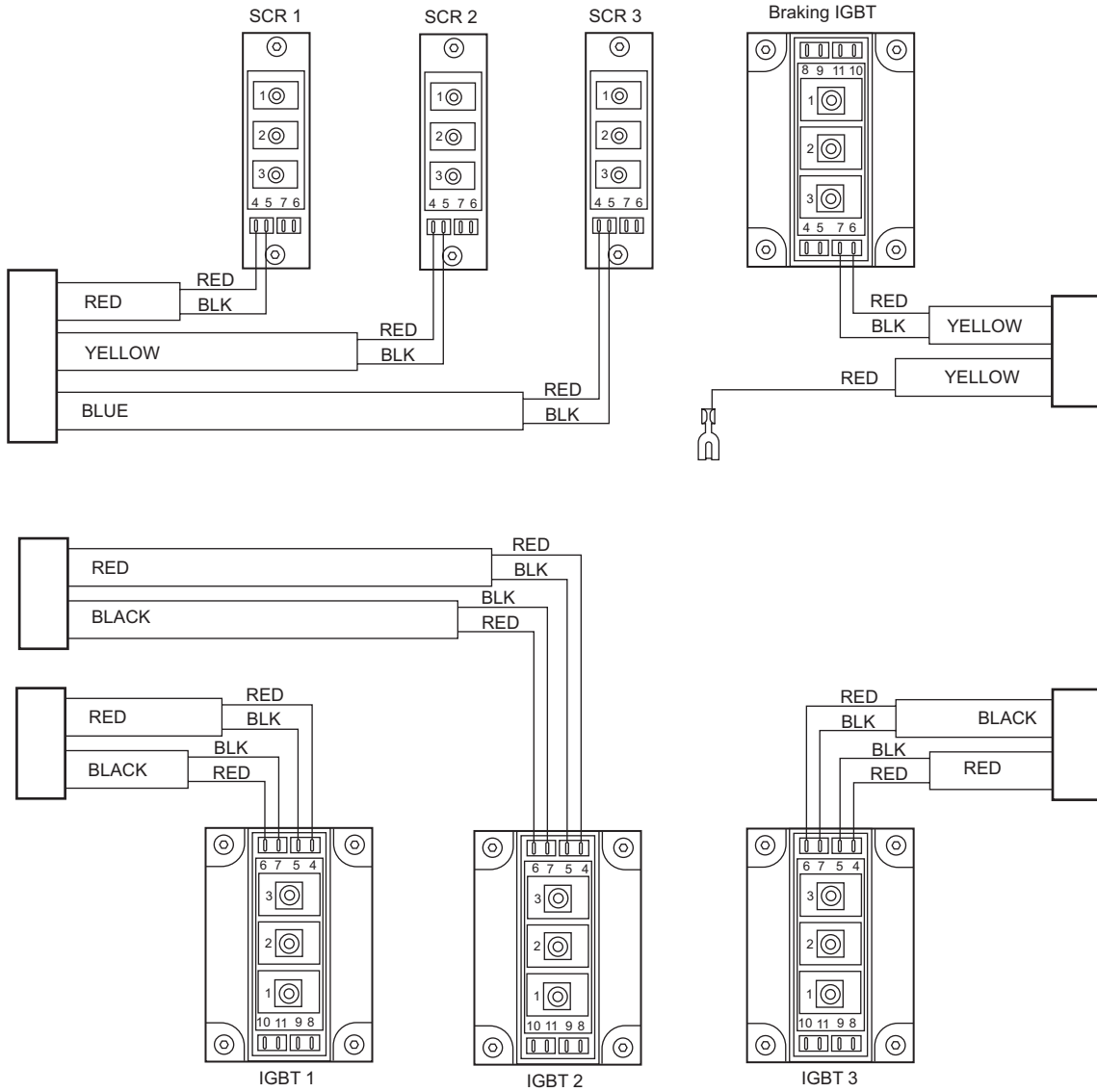


Figure 28: IGBT and SCR Module Wiring

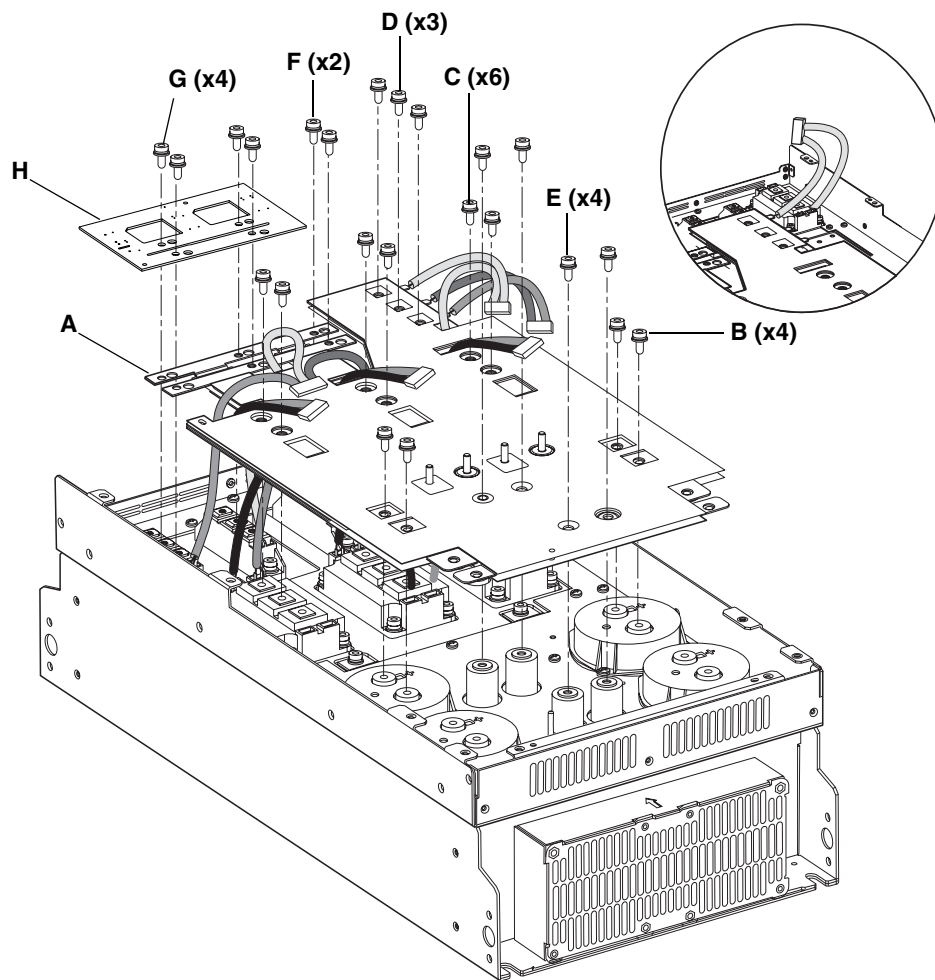


Replace the Bus Board

13. Reinstall the bus board as follows. See Figure 29 on page 45.
 - Route the wiring harnesses through the bus board as illustrated in Figure 29. Take care not to pinch the cables between the bus board and the drive frame.
 - Connect the yellow cable from terminals 6 and 7 of SCR module 3 to the side of the bus board. (See Table 8 and Figure 28 on pages 42–43, wire E108.)
 - Position the bus board in the drive with the two SCR bus bars (**A**) facing up and towards the top of the controller.
 - Install the yellow cable in terminals 4 and 5 of SCR module 2, and install the blue cable in terminals 4 and 5 of SCR module 3. (See Table 8 and Figure 28 on pages 42–43, wire E107.)
 - On frame size 7B only, using a 4 mm Allen wrench, secure the bus board to the capacitors with four screws (**B**). Tighten the screws to 4.2–5.1 N•m (37.2–45.1 lb-in).
 - On frame size 7B only, using a 3 mm Allen wrench, secure the bus board to the power IGBT modules with six screws (**C**). Tighten the screws to 2.6–3.3 N•m (23.0–29.2 lb-in).
 - Using a 4 mm Allen wrench, install three screws (**D**) securing the bus board to the braking IGBT module. Tighten the screws to 4.2–5.1 N•m (37.2–45.1 lb-in).
 - Using a 4 mm Allen wrench, install four screws (**E**) securing the bus board to the DC bus. Tighten the screws to 4.2–5.1 N•m (37.2–45.1 lb-in).
 - Install the connection between the bus board and terminals 4 and 5 of SCR module 2. This wire has a yellow sleeve. (See Table 8 and Figure 28 (pages 42–43), wire E107.)
 - Using a 3 mm Allen wrench, install two screws (**F**) securing the SCR bus bars to SCR module 3. Tighten the screws to 2.6–3.3 N•m (23.0–29.2 lb-in).
 - Using a 3 mm Allen wrench, install four screws (**G**) securing the rectifier snubber board (**H**) to the bus board at SCR modules 1 and 2. Tighten the screws to 2.6–3.3 N•m (23.0–29.2 lb-in).

NOTE: These four screws (**G**) also go through the SCR bus bars.

Figure 29: Bus Board Replacement (Frame Size 8 Shown)



**Replace the Snubber Capacitors:
Frame Size 8 Only**

14. Reinstall the three snubber capacitors on the bus board as follows. See Figure 30.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

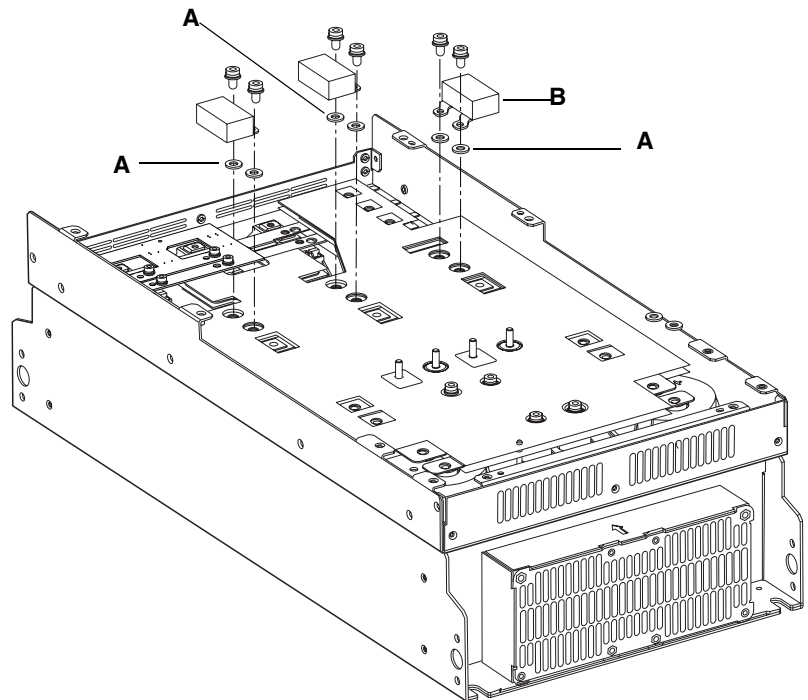
For proper spacing, you must reinstall the washers (item **A** in Figure 30) between the bus board and the mounting lugs of the snubber capacitors.

Failure to follow these instructions will result in death or serious injury.

NOTE: Orient the left and middle snubber capacitors with the mounting lugs on the right. Orient the right snubber capacitor (**B**) with the mounting lugs on the left.

- Using a 4 mm Allen wrench, install the washers (**A**) and two screws securing each of the three snubber capacitors to the bus board. Tighten the screws to 4.2–5.1 N•m (37.2–45.1 lb-in).

Figure 30: Snubber Capacitor Replacement



Replace the Balancing Resistors

15. Reinstall the balancing resistors on the bus board as follows. See Figure 31.

Frame size 7B drives have only one balancing resistor, shown shaded in Figure 31. Frame size 8 drives have all four balancing resistors illustrated in the figure.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

For proper spacing, you must reinstall the washers (item **B** in Figure 31) between the bus board and the mounting lugs of the top right balancing resistor (item **A** in Figure 31).

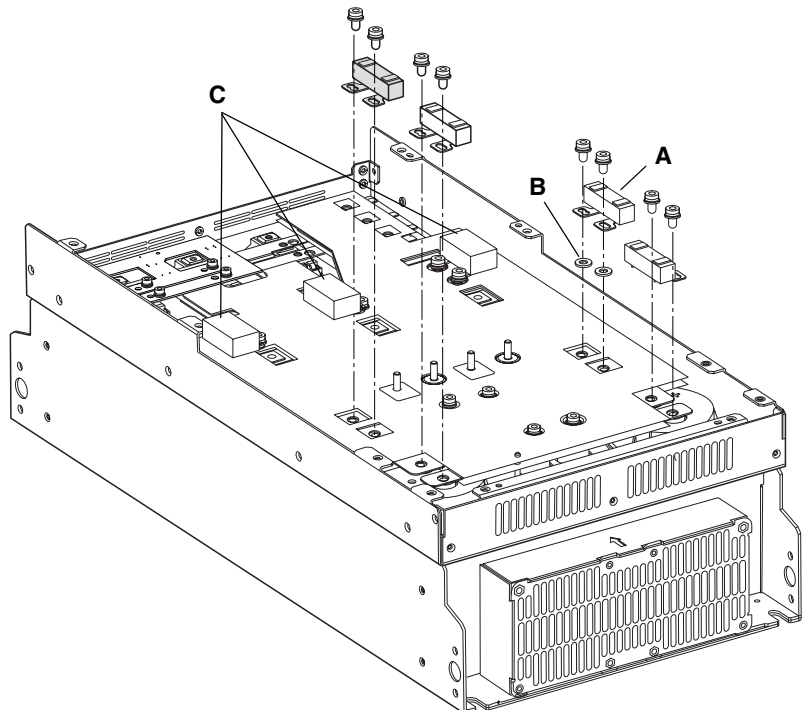
Failure to follow these instructions will result in death or serious injury.

NOTE: Orient the top two resistors and the bottom left resistor with the mounting lugs on the left. Orient the bottom right resistor with the mounting lugs on the right.

- **Frame size 7B:** Using a 3 mm Allen wrench, install two screws securing the balancing resistor shown shaded to the bus board. Tighten the screws to 2.6–3.3 N•m (23.0–29.2 lb-in).
- **Frame size 8:** Using a 4 mm Allen wrench, install the washers (**B**) and two screws securing the top right balancing resistor (**A**) to the bus board. Tighten the screws to 4.2–5.1 N•m (37.2–45.1 lb-in).
Using a 4 mm Allen wrench, install the two screws securing each of the other three balancing resistors to the bus board. Tighten the screws to 4.2–5.1 N•m (37.2–45.1 lb-in).

Figure 31: Balancing Resistor Replacement

NOTE: Frame size 7B drives do not have snubber capacitors (**C**).



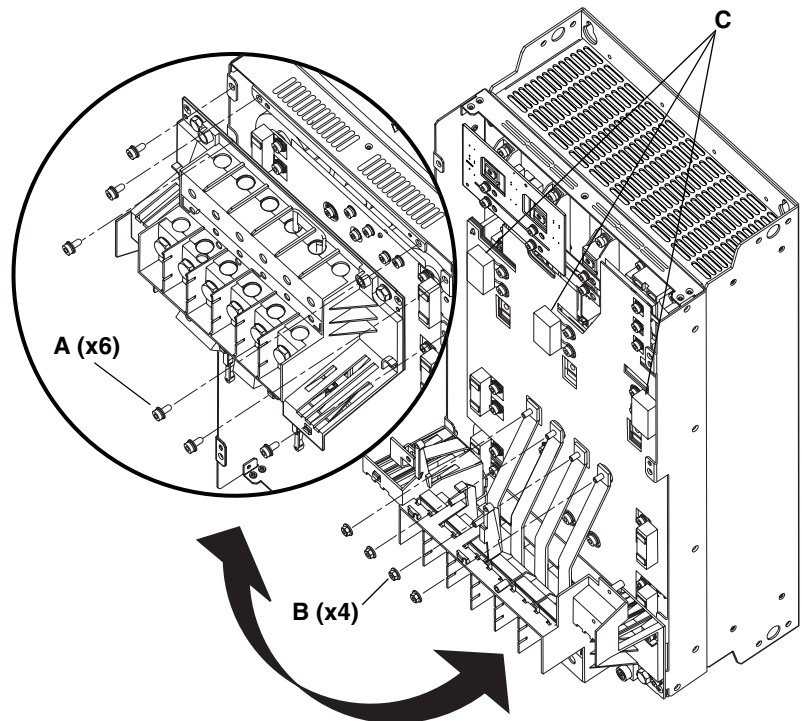
Replace the Power Terminal Block

16. Reinstall the power terminal block as follows. See Figure 32.

- Position the power terminal block over its mounting holes on the drive frame. Ensure that the four bus bars from terminals PO, PA/+, PB, and PC/- are seated over their mounting lugs on the bus board.
- Using a 3 mm Allen wrench, install six screws (A) securing the terminal block to the drive frame. Tighten the screws to 2.1–2.7 N•m (18.6–23.9 lb-in).
- Using an 8 mm nut driver, install the four nuts (B) securing the bus bars to the bus board. Tighten the screws to 2.6–3.3 N•m (23.0–29.2 lb-in).

Figure 32: Power Terminal Block Replacement

NOTE: Frame size 7B drives do not have snubber capacitors (C).



Replace the Output Bus Bars

17. Replace the output bus bars as follows. See Figure 33.

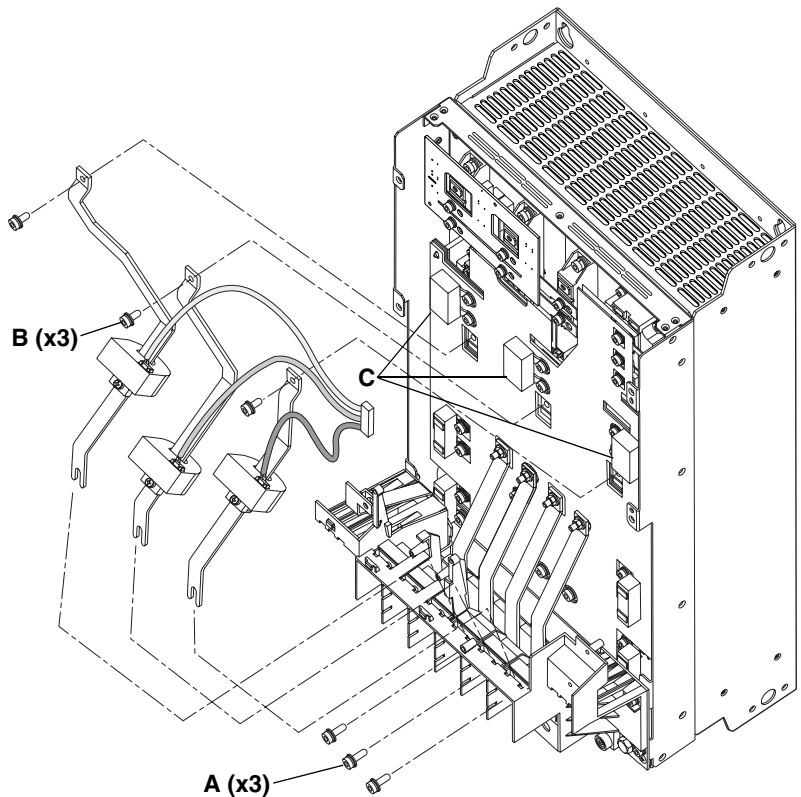
NOTE: Note the differences in the output bus hardware. The three screws **(A)** at output terminals T1, T2, and T3 are longer than the three screws **(B)** at the bus board.

Note also the sleeve colors on the bus bars: T1: Red, T2: Yellow, T3: Blue

- **Frame size 7B:** Using a 3 mm Allen wrench, install the three screws **(B)** securing the top of the bus bars to the bus board. Tighten the screws to 2.6–3.3 N•m (23.0–29.2 lb-in).
- **Frame size 8:** Using a 4 mm Allen wrench, install the three screws **(B)** securing the top of the bus bars to the bus board. Tighten the screws to 4.2–5.1 N•m (37.2–45.1 lb-in).
- Using a 4 mm Allen wrench, install the three screws **(A)** securing the bus bars at output terminals T1, T2, and T2. Tighten the screws to 2.1–2.7 N•m (18.6–23.9 lb-in).

Figure 33: Output Bus Bar Replacement

NOTE: Frame size 7B drives do not have snubber capacitors **(C)**.



Replace the Input Bus Bars

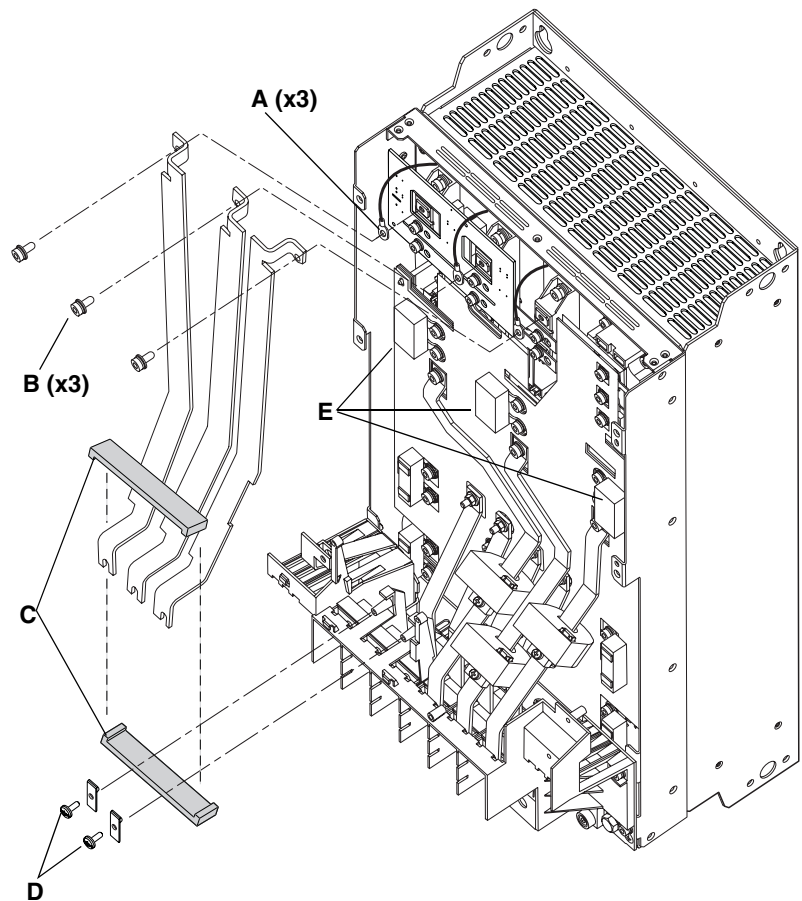
18. Replace the three bus bars at input terminals L1, L2, and L3 as follows. See Figure 34.

- Position the three lugs (A) from the SCR snubber board over the SCR terminals.
- Using a 3 mm Allen wrench, secure the top of the bus bars to the SCR modules with three screws (B). Tighten the screws to 2.6–3.3 N•m (23.0–29.2 lb-in). For 75 kW controllers, tighten the screws to 4.2–5.1 N•m (37.2–45.1 lb-in).
- Frame size 7B drives have a two-piece ferrite core (C) at the bottom of the input bus bars that is not present on the frame size 8 drives. Place the bottom piece of the ferrite core on the terminal block as shown in Figure 34, and position the input bus bars over it.
- Install the top piece of the ferrite core over the bus bars. Using a T-20 Torx driver, secure the ferrite core to its mounting posts with two metal brackets and two screws (D). Tighten the screws to 0.7–0.9 N•m (6.2–8.0 lb-in).

NOTE: You will replace the three screws securing the bus bars to input terminals L1, L2, and L3 when you replace the filter board.

NOTE: Frame size 7B drives do not have snubber capacitors (E).

Figure 34: Input Bus Bar Replacement

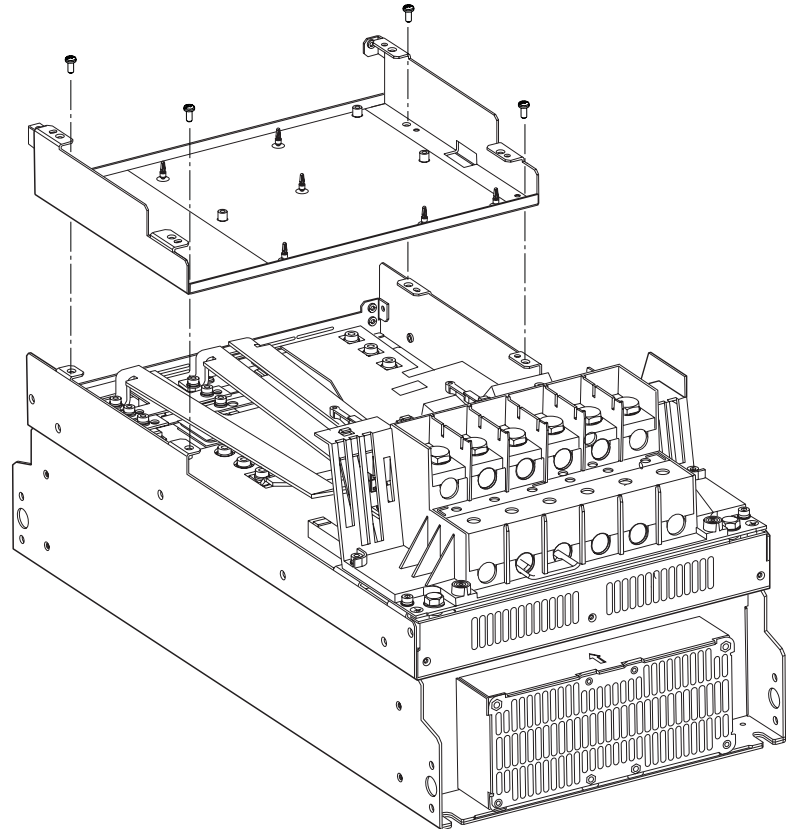


Replace the Power Board Mounting Plate

19. Reinstall the power board mounting plate as follows. See Figure 35.

- Position the mounting plate over the drive frame.
- Using a T-20 Torx driver, install the four screws securing the mounting plate to the drive frame. Tighten the screws to 1.1–1.7 N•m (9.7–15.0 lb-in).

Figure 35: Power Board Mounting Plate Replacement

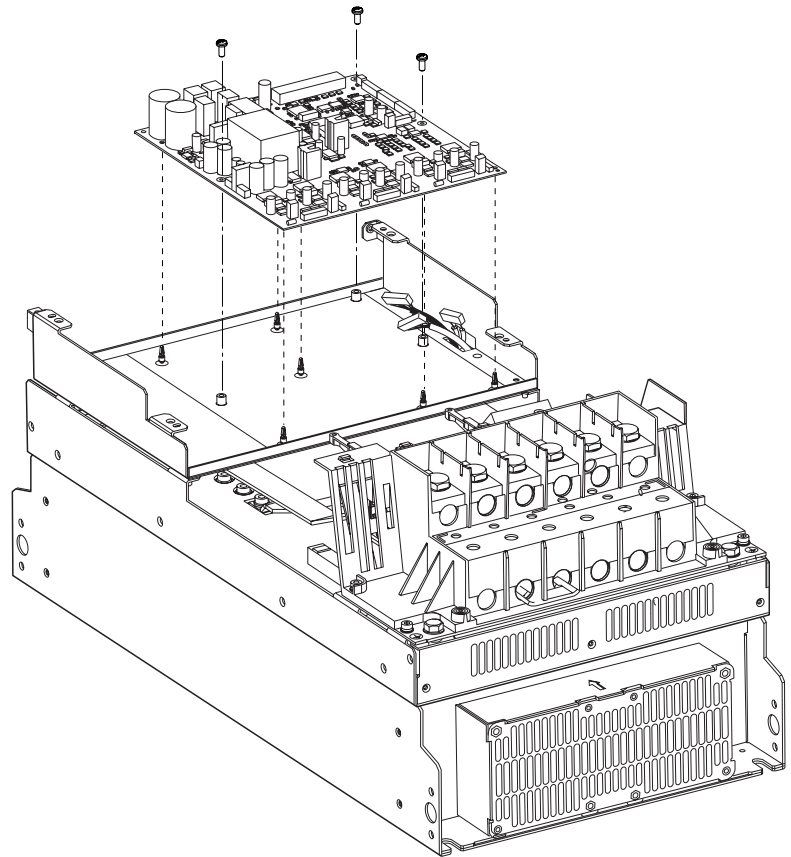


Replace the Power Board

20. Install the new power board, or replace the existing one, as follows. See Figure 36.

- Position the power board over the six plastic mounting posts on the power board mounting plate, and gently push the board down over the posts until it is securely seated.
- Using a size 2 Phillips driver, install the three power board mounting screws. Tighten the screws to 1.1–1.7 N•m (9.7–15.0 lb-in).

Figure 36: Power Board Replacement



Replace the Power Board Connections

21. Install the following connections on the power board. See Table 9 and Figure 37 for connector locations.

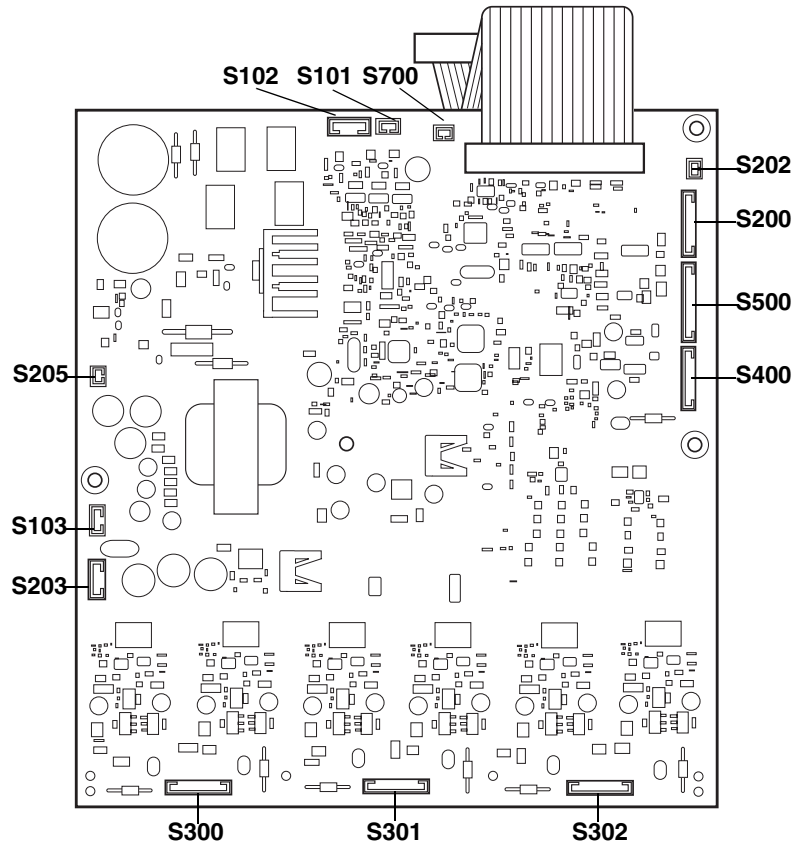
- At the top of the board, from left to right install: the 6-pin connector at terminal S102, the 3-pin connector at terminal S101, and the 2-pin connector at terminal S700.
- At the left side of the board, from top to bottom install: the 2-pin connector at terminal S205, the 4-pin connector at terminal S103, and the 5-pin connector at terminal S203.
- At the right side of the board, from top to bottom install: the 2-pin connector at terminal S202, the 10-pin connector at terminal S200, the 12-pin connector at terminal S500, and the 9-pin connector at terminal S400.
- At the bottom of the board, from left to right install: the 9-pin connector at terminal S300, the 9-pin connector at terminal S301, and the 9-pin connector at terminal S302.

Table 9: Power Board Wiring

Wire No. ¹	Terminal No.	Description	To:
E112	S101	3-pin	Filter board
E107	S102	6-pin	SCR L1, L2, L3
E101	S103	4-pin	Control module
E109	S200	10-pin	+/- Bus bar
E111	S202	2-pin	Filter board
E105	S203	5-pin	Fan
E115	S300	9-pin	Power IGBT module
E116	S301	9-pin	Power IGBT module
E117	S302	9-pin	Braking IGBT module
E108	S400	9-pin	Braking IGBT module
			BR Bus bar
E110	S500	12-pin	SCR modules
E118	S700	2-pin	Thermal sensor
E102	S205	2-pin	LED

¹ See the wiring table and schematic on pages 64 and 65 for complete drive wiring. Wire numbers are given for cross referencing the wires with the wiring table and the schematic. The numbers do not appear on the wires.

Figure 37: Power Board Connections



Reassembling the Drive

IMPORTANT: Label and retain all removed hardware and cables for use in reassembly.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Read and understand the precautions in “Introduction” starting on page 7 before performing this procedure.
- Before working on this equipment, turn off all power supplying it and perform the DC bus voltage measurement procedure on page 12.

Failure to follow these instructions will result in death or serious injury.

This section contains instructions for replacing the following parts on the drive:

- The crossbraces
- The control module
- The control module cover
- The filter board
- The insulator
- The output bus bar cover plate
- The side panels
- The top panel
- The front cover

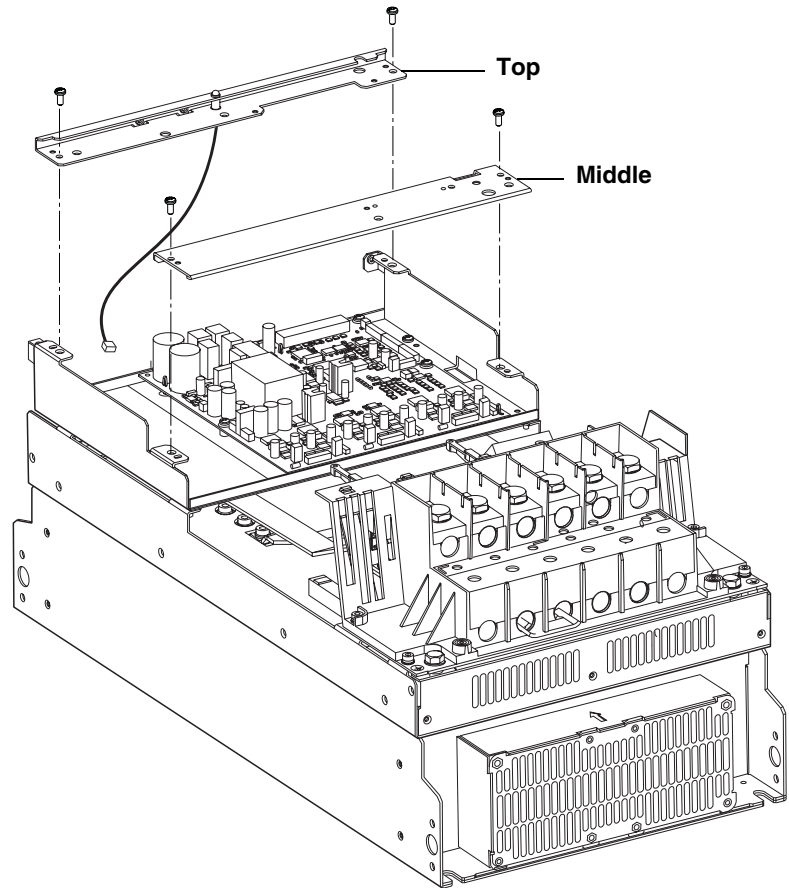
Perform all of the reassembly steps in this section after replacing the following parts:

- Power board
- Power IGBT modules
- Braking IGBT modules
- SCR modules

Replace the Crossbraces

1. Reinstall the crossbraces onto the drive frame as follows. See Figure 38.
 - Position the middle crossbrace on the drive frame. Using a T-20 Torx driver, install the two mounting screws at the right and left sides of the crossbrace. Tighten the screws to 1.1–1.7 N•m (9.7–15.0 lb-in).
 - Position the top crossbrace on the drive frame. Using a T-20 Torx driver, install the two mounting screws at the right and left sides of the crossbrace. Tighten the screws to 1.1–1.7 N•m (9.7–15.0 lb-in).
 - Plug the LED connection from the top crossbrace into terminal S205 of the power board.

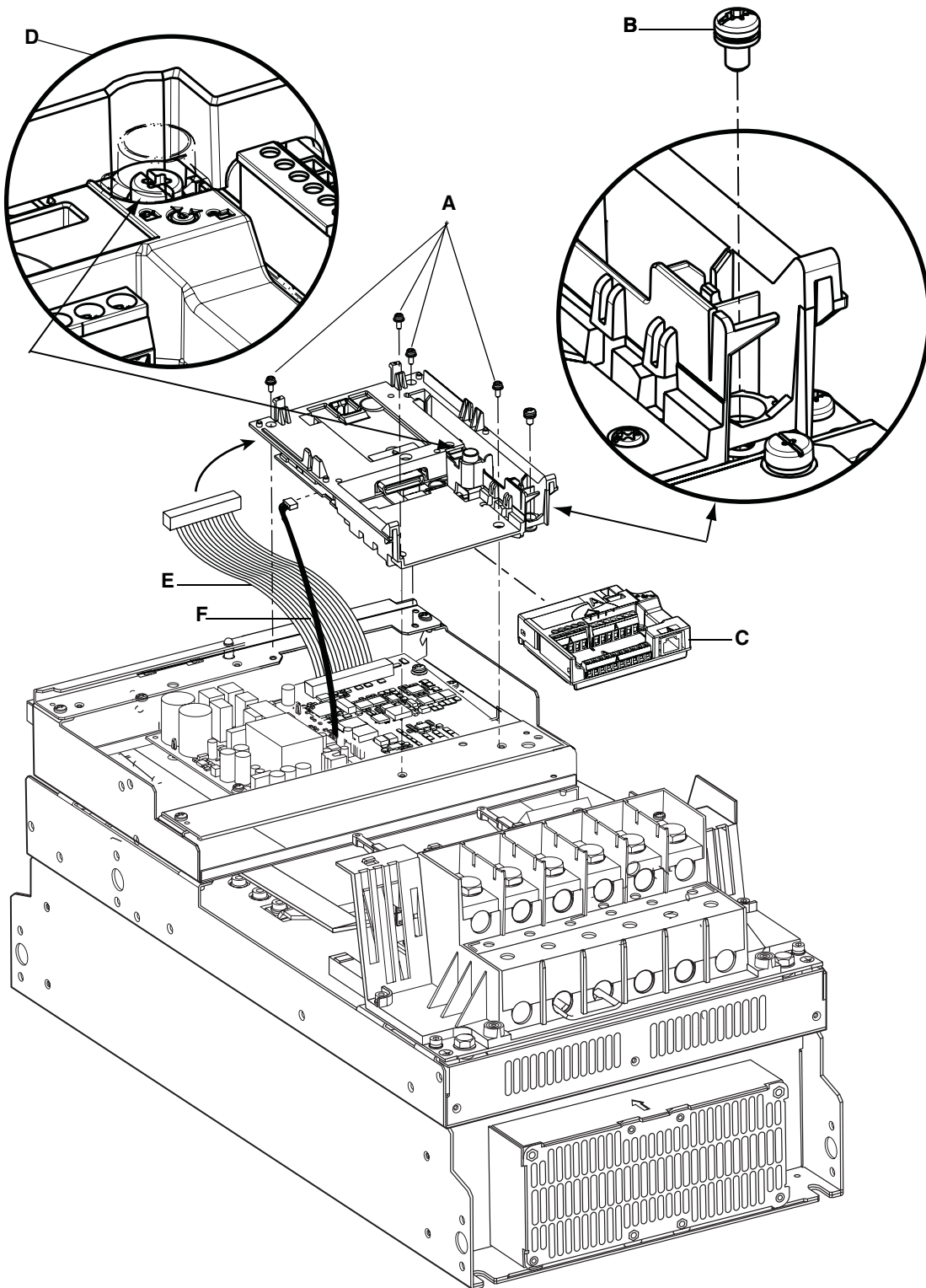
Figure 38: Crossbrace Replacement



Replace the Control Module

2. Reinstall the control module as follows. See Figure 39 on page 57.
 - Carefully plug the 40-pin ribbon cable (**E**) into the back of the control module, and plug the 4-pin wire connector (**F**) into the left side of the control module.
 - Position the control module over the top and middle crossbraces.
 - Using a size 1 Phillips driver, install the four mounting screws (**A**) securing the control module to the crossbraces. Tighten the screws to 0.49–0.69 N•m (4.3–6.1 lb-in).
 - Using a size 2 Phillips driver, install the mounting screw (**B**) at the bottom right corner of the control module. Tighten the screw to 1.1–1.7 N•m (9.7–15.0 lb-in).
 - Slide the control terminal board (**C**) into the control module. Using a T-20 Torx driver, secure the spring-loaded screw (**D**) on the right side of the control module. Tighten the screw to 1.1–1.7 N•m (9.7–15.0 lb-in).

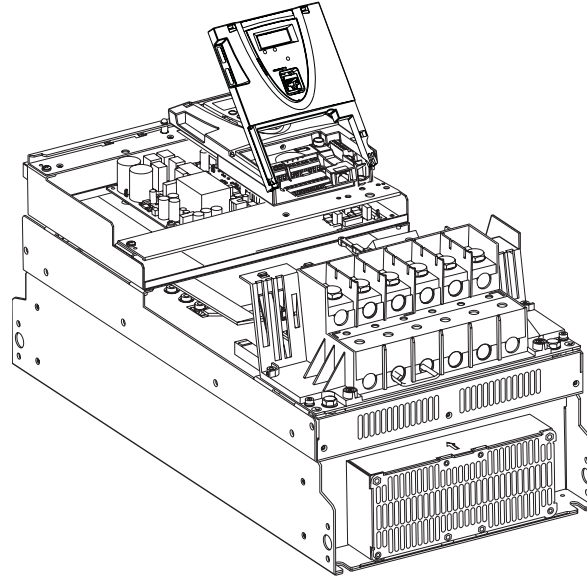
Figure 39: Control Module Replacement



Replace the Control Module Cover

3. Guide the control module cover into place and gently press it down until the snaps engage. See Figure 40.

Figure 40: Control Module Cover Replacement



Replace the Filter Board

Table 10: Filter Board Wiring

Wire No. ¹	Terminal No.	Description	To:
E111	S202	2-pin	Power board
E112	S101	3-pin	Power board

¹ See the wiring table and schematic on pages 64 and 65 for complete drive wiring. Wire numbers are given for cross referencing the wires with the wiring table and the schematic. The numbers do not appear on the wires.

4. Replace the filter board as follows. See Figure 41 on page 59.
 - Install the 2-pin connector at terminal S202 and the 3-pin connector at terminal S101 at the top of the filter board.
 - Slide the filter board into position over the input bus bars. Align the filter board's bottom three mounting slots with the input bus bar mounting slots at terminals L1, L2, and L3.
 - Using a 4 mm Allen wrench, install the three screws (**A**) securing the filter board and input bus bars at input terminals L1, L2, and L3. Tighten the screws to 2.1–2.7 N•m (18.6–23.9 lb-in).
 - Replace the plastic inserts (**B**) over the power terminal block.
 - Using a T-20 Torx driver, install the two screws (**C**) securing the filter board to its plastic mounting supports. Tighten the screws to 1.8–2.2 N•m (15.9–19.5 lb-in). Take care not to overtighten the screws or you may strip the threads.
 - Using a size 2 Phillips driver, install one screw (**D**) securing the filter board to the drive frame. Tighten the screw to 1.1–1.7 N•m (9.7–15.0 lb-in).

Replace the Insulator

5. Reinstall the insulator as follows. See Figure 41.

⚠ DANGER

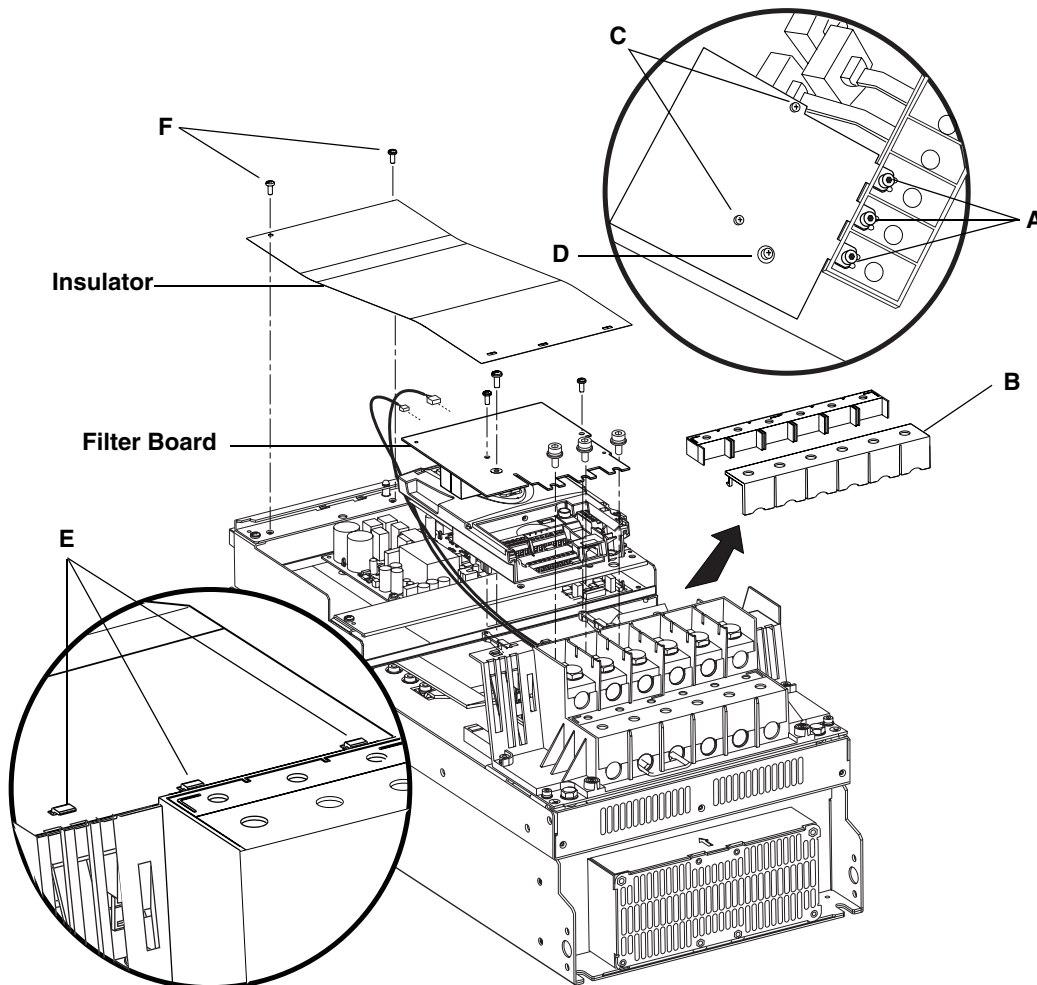
HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Install the insulator as shown in Figure 41.
- Before installing the insulator, ensure that it has no tears or cracks. If the insulator is damaged, contact your Schneider Electric representative.
- Do not install a damaged insulator.

Failure to follow these instructions will result in death or serious injury.

- Secure the three slots in the insulator (**E**) over the retaining hooks on the terminal block.
- Using a T-20 Torx driver, secure the insulator to the top crossbrace with two screws (**F**). Tighten the screws to 1.1–1.7 N•m (9.7–15.0 lb-in).

Figure 41: Filter Board Replacement



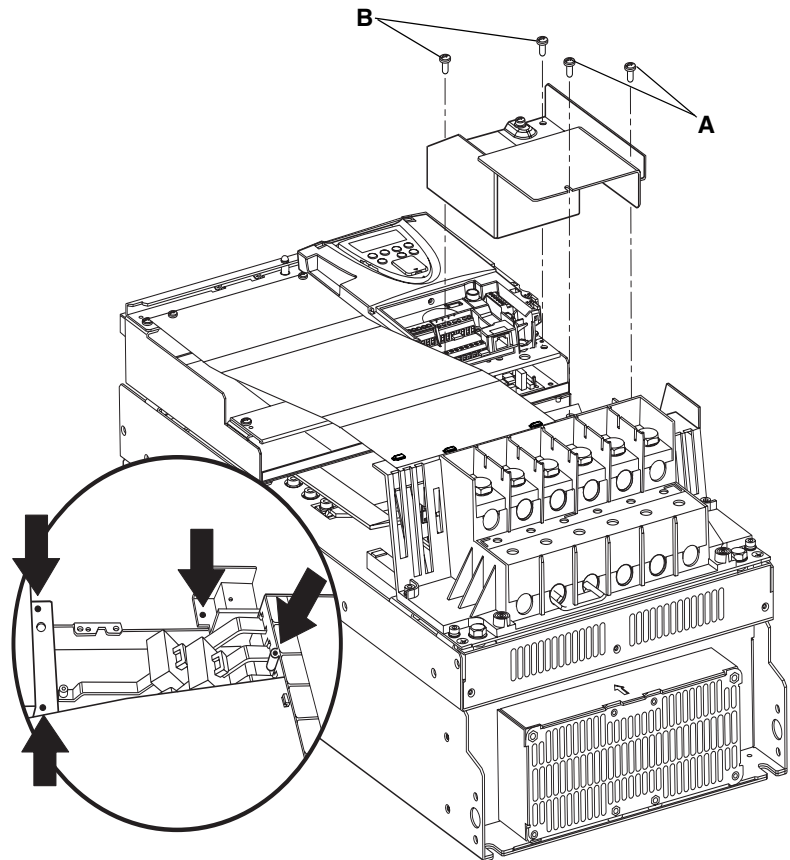
Replace the Output Bus Bar Cover Plate

6. Reinstall the output bus bar cover plate. See Figure 42.
 - Position the cover plate between the middle crossbrace and the power terminal block.

NOTE: Note the differences in the four screws that secure the bus bar cover plate. The two screws (**A**) over the terminal block screw into plastic and have coarser threads than the two screws (**B**) that attach the cover plate to the middle crossbrace. Take care not to overtighten the screws or you may strip the threads.

- Using a T-20 Torx driver, secure the cover plate to the middle crossbrace with two screws. (**B**). Tighten the screws to 1.1–1.7 N•m (9.7–15.0 lb-in).
- Using a T-20 Torx driver, install the two screws (**A**) securing the cover plate to the power terminal block. Tighten the screws to 1.8–2.2 N•m (15.9–19.5 lb-in).

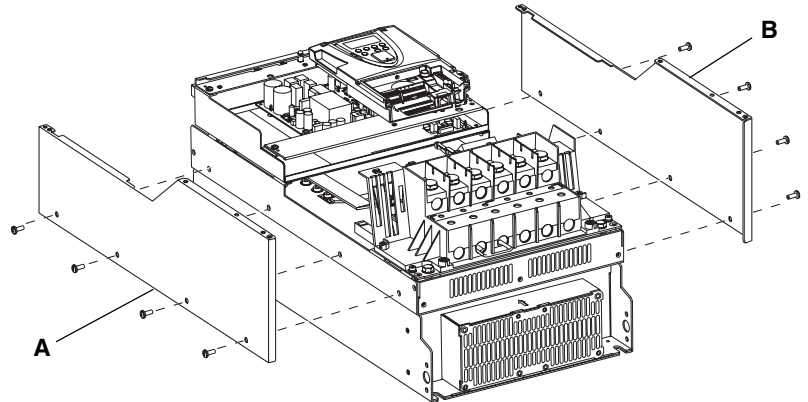
Figure 42: Output Bus Bar Cover Plate Replacement



Replace the Side Panels

7. Using a T-20 Torx driver, replace the side panels as follows. See Figure 43.
 - Reinstall the left side panel and secure it with three (frame size 7B) or four (frame size 8) screws (**A**). Tighten the screws to 1.1–1.7 N•m (9.7–15.0 lb-in).
 - Reinstall the right side panel and secure it with three (frame size 7B) or four (frame size 8) screws (**B**). Tighten the screws to 1.1–1.7 N•m (9.7–15.0 lb-in).

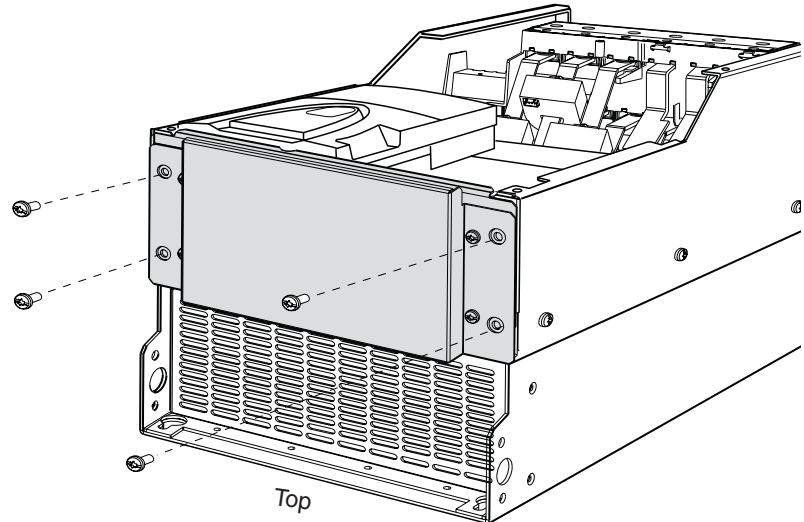
Figure 43: Side Panel Replacement (Frame Size 8 Shown)



Replace the Top Panel

8. Replace the top panel as follows. See Figure 44.
 - Using a T-20 Torx driver, reinstall the top panel and secure it with four screws. Tighten the screws to 1.1–1.7 N•m (9.7–15.0 lb-in).

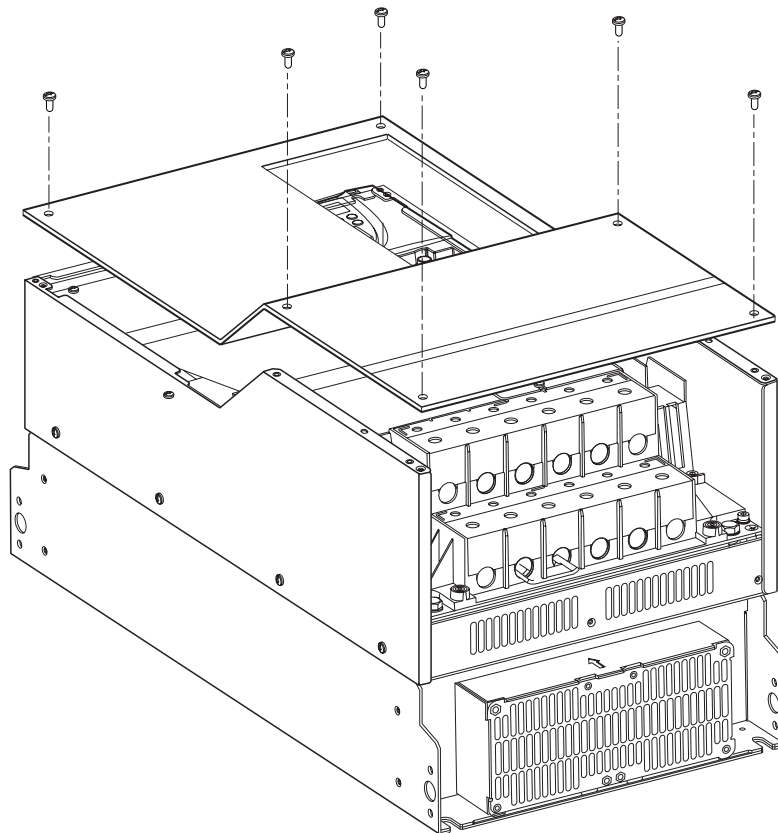
Figure 44: Top Panel Replacement (Frame Size 8 Shown)



Replace the Front Cover

- Using a size 2 Phillips driver, install the front cover and secure it with six screws. Tighten the screws to 1.1–1.7 N•m (9.7–15.0 lb-in). See Figure 45.

Figure 45: Front Cover Replacement (Frame Size 8 Shown)



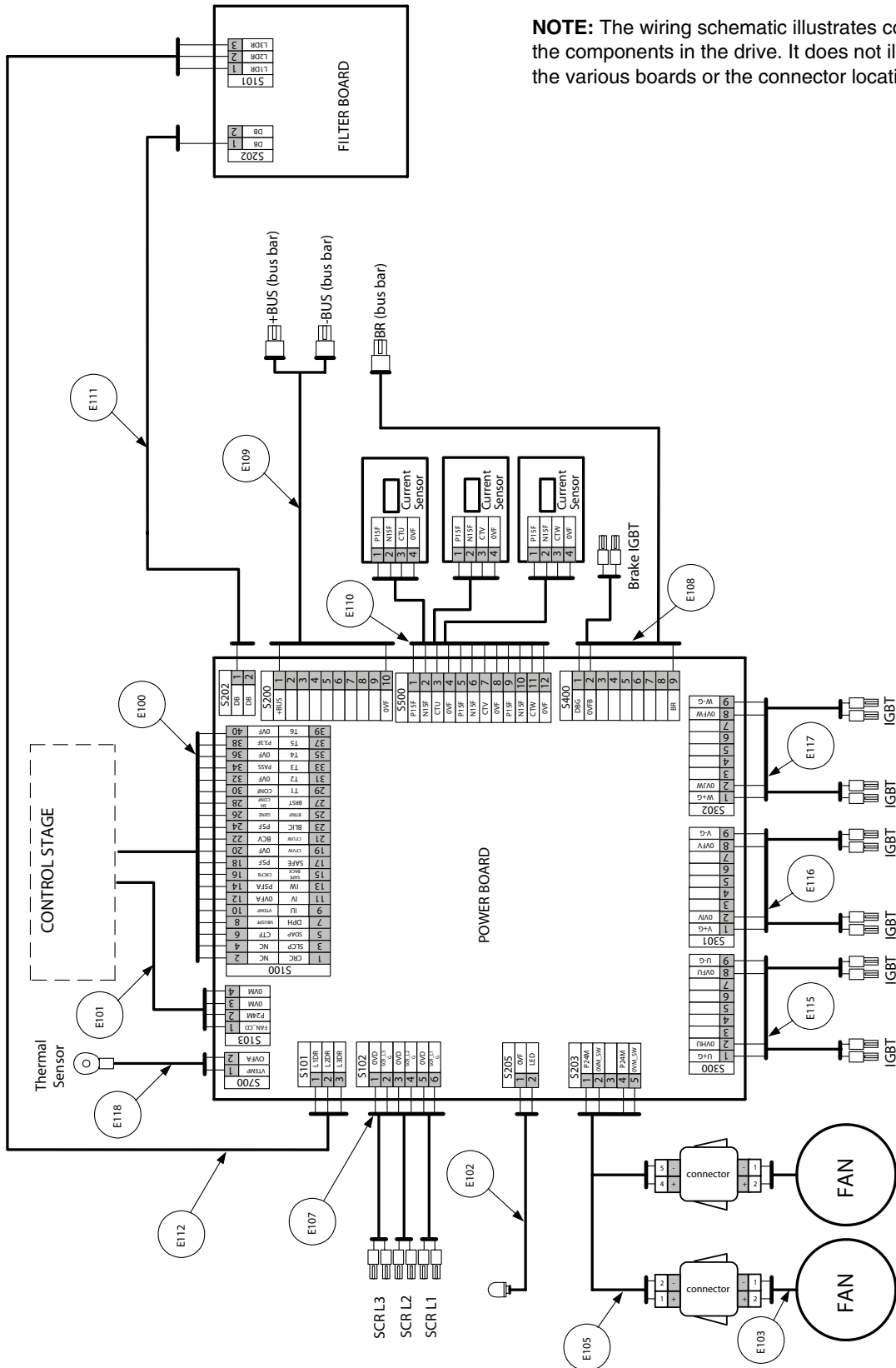
Wiring

Table 11: Wiring Table

Wire No. ¹	Description	From:		To:	
		Component	Terminal No.	Component	Terminal No.
E100	40-pin	Power board	S100	Control module	—
E101	4-pin	Power board	S103	Control module	—
E102	2-pin	Power board	S205	LED	—
E103	2-pin	Main fan connector	—	Main fan	—
E104	2-pin	Power board	—	Main fan connector	—
E105	5-pin	Power board	S203	Fan	—
E107	6-pin	Power board	S102	SCR L1, L2, L3	—
E108	9-pin	Power board	S400	Braking IGBT module	6, 7
				IB bus bar	—
E109	10-pin	Power board	S200	+/- Bus bar	—
E110	12-pin	Power board	S500	SCR modules	4,5
E111	2-pin	Power board	S202	Filter board	S202
E112	3-pin	Power board	S101	Filter board	S101
E115	9-pin	Power board	S300	Power IGBT module	4, 5, 6, 7
E116	9-pin	Power board	S301	Power IGBT module	4, 5, 6, 7
E117	9-pin	Power board	S302	Power IGBT module	4, 5, 6, 7
E118	2-pin	Power board	S700	Thermal sensor	—

¹ Wire numbers are given for cross referencing the wires with the schematic on page 65. The numbers do not appear on the wires.

Figure 46: Wiring Schematic



NOTE: The wiring schematic illustrates connections between the components in the drive. It does not illustrate the layout of the various boards or the connector locations on them.

**Spare Parts Kits for Altivar® 61/71 Drives, Frame Sizes 7B and 8
Instruction Bulletin**

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