Altivar™ 61/71

Adjustable Speed Drives
Spare Parts Kits

Instruction Bulletin

30072-452-73
Rev. 02, 08/2012

Retain for future use.

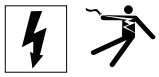
Frame Size 7A:
ATV61HD30N4, ATV61HD37N4
ATV71HD30N4, ATV71HD37N4

Schneider Electric™

Contents

Hazard Categories and Special Symbols

Read these instructions carefully and look at the equipment to become familiar with the device before trying to install, operate, service or maintain it. The following special messages may appear throughout this bulletin or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.



The addition of either symbol to a “Danger” or “Warning” safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.

ANSI 

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

IEC 

⚠ DANGER

DANGER indicates a hazardous situation which, if not avoided, **will result in** death or serious injury.

⚠ WARNING

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

⚠ CAUTION

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

NOTICE

NOTICE is used to address practices not related to physical injury. The safety alert symbol is not used with this signal word.

CAUTION

CAUTION, used without the safety alert symbol, indicates a 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: 888-778-2733
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 10 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.

About This Revision

Kit number VX5IM2195M1271 has replaced kits VX5A1HD37N4 and VZ3IM2195M1271.

Kit VX5IM2195M1271 contains a power board and IGBTs. The power board and IGBTs must be replaced together so that the gating circuit between the two parts matches.

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 Kits[1]

Kit Catalog No.	Description	For Use on Drive:
VX4A1108	Filter Board	ATV61HD30N4 ATV61HD37N4 ATV71HD30N4 ATV71HD37N4
VZ3N1207	Power Terminal Block	ATV61HD30N4 ATV61HD37N4 ATV71HD30N4 ATV71HD37N4
VZ3N1307	Wire Kit	ATV61HD30N4 ATV61HD37N4 ATV71HD30N4 ATV71HD37N4
VX5IM2145M1271	Power Board and Power IGBT[2] Modules	ATV61HD30N4 ATV71HD30N4
VX5IM2195M1271	Power Board and Power IGBT Modules	ATV61HD37N4, ATV71HD37N4
VZ3IM1145M1271	Braking IGBT Module	ATV61HD30N4 ATV61HD37N4 ATV71HD30N4 ATV71HD37N4
VZ3TD1057M1671	SCR[3] Modules	ATV61HD30N4 ATV71HD30N4
VZ3TD1072M1671	SCR Modules	ATV61HD37N4 ATV71HD37N4

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 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 page 61 of the installation procedures.
- 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 N•m (0–45 lb-in)
- Voltmeter, 1–1000 Vdc
- Allen wrenches:
  - 3 mm
  - 4 mm
- Driver bits:
  - T-20 Torx® driver
  - Size 2 magnetic tip Phillips® 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
- 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 filter board, unless you have first checked for voltage with a voltmeter!

To discharge filter 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.

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 10.

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 insulator
- ❑ The output bus bar cover plate
- ❑ The common mode choke assembly
- ❑ The control module cover
- ❑ The control module
- ❑ The top crossbrace
- ❑ The input bus bars
- ❑ The filter board
- ❑ The middle crossbrace
- ❑ The power board connections

You must perform some or all of the disassembly steps in this section to access the spare parts identified in Table 2. Consult Table 2 for the disassembly steps that must be performed for the corresponding spare parts.

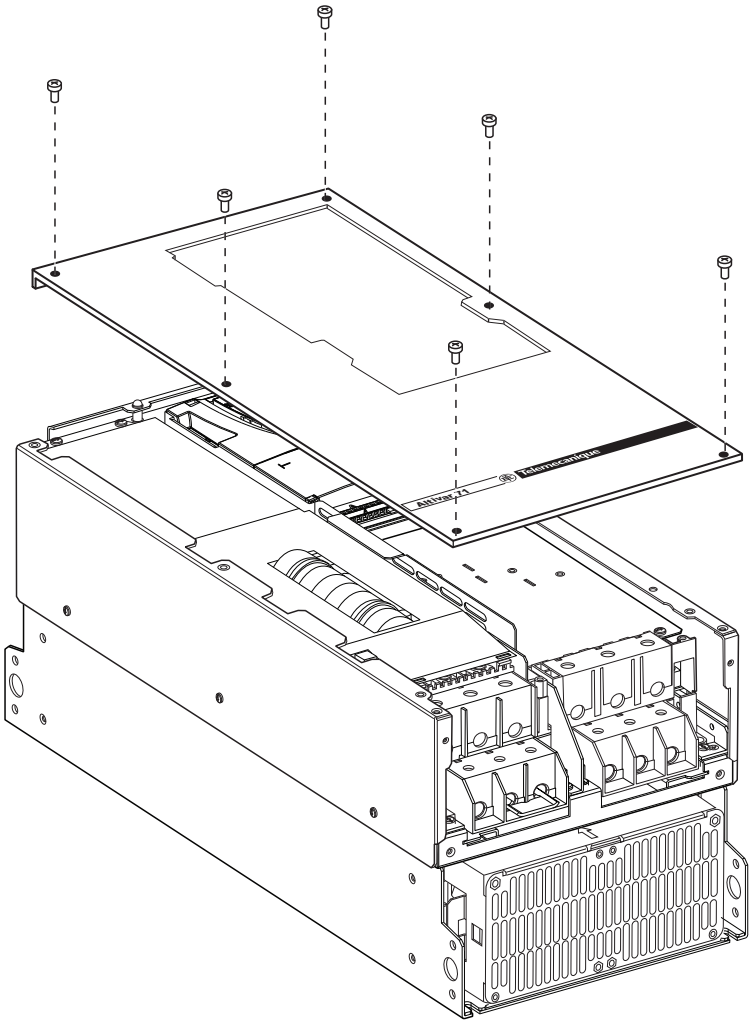
Table 2: Disassembly Steps

If you are replacing:	Perform disassembly steps:	Then follow procedure:
Filter board	**Steps 1–6**	Replacing the Filter Board VX4A1108 beginning on page 26
Power terminal block	**Steps 1–6**	Replacing the Power Terminal Block VZ3N1207 beginning on page 28
Power board and power IGBT modules	**Steps 1–13**	Replacing the Power Board and IGBT Modules VX5IM2145M1271 or VX5IM2195M1271 beginning on page 35
SCR modules	**Steps 1–13**	Replacing the Power IGBT Modules, the Braking IGBT Module, and the SCR Modules beginning on page 37
Braking IGBT module		

Remove the Front Cover

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

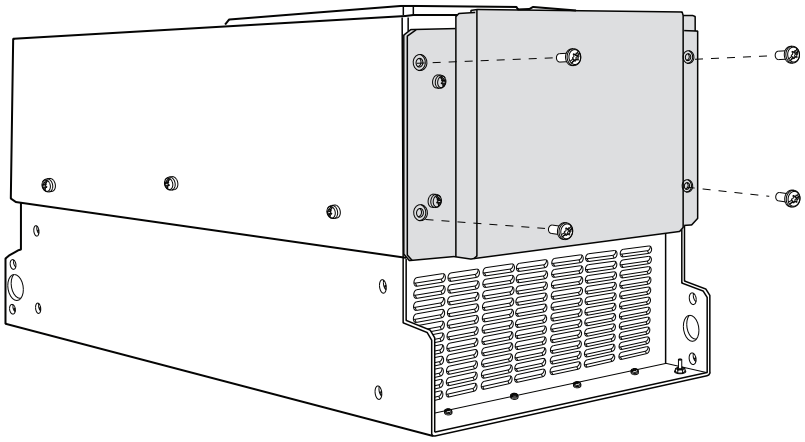
Figure 1: Front Cover Removal



Remove the Top Panel

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

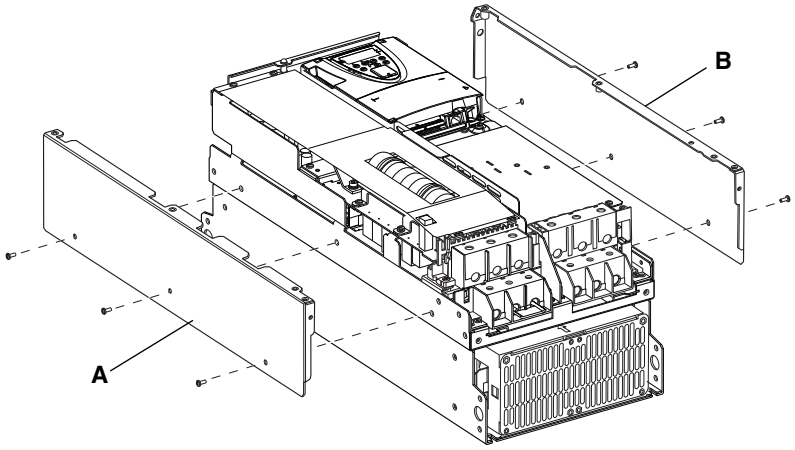
Figure 2: Top Panel Removal



Remove the Side Panels

3. Using a T-20 Torx driver, remove the left and right side panels as follows. See Figure 3.
   - — Remove three screws and take off the left side panel (**A**).
   - — Remove three screws and take off the right side panel (**B**).

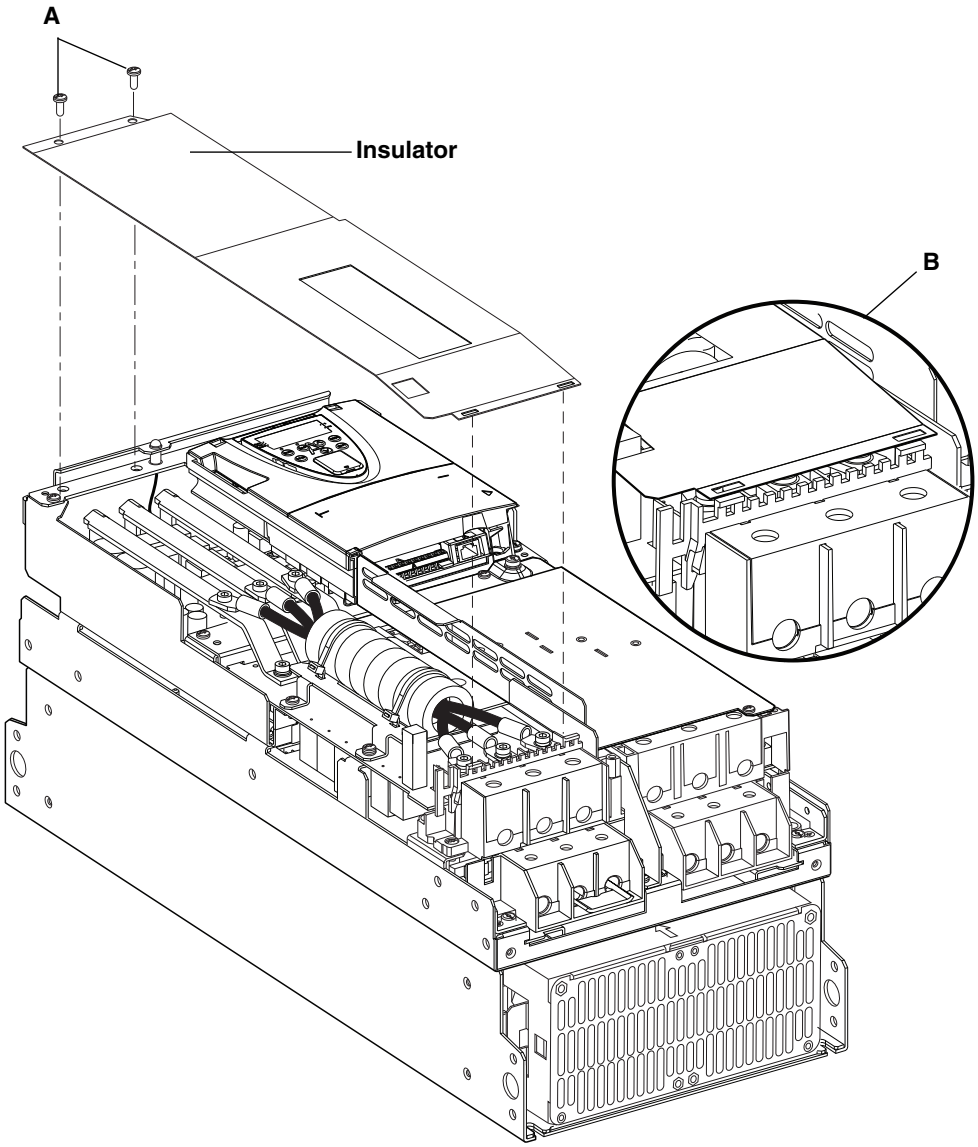
Figure 3: Side Panel Removal



Remove the Insulator

4. Remove the insulator as follows. See Figure 4.
   — Using a T-20 Torx driver, remove the two screws (**A**) securing the insulator to the top crossbrace.
   — Release the insulator from the two retaining hooks (**B**) on the power terminal block and remove it from the drive.

Figure 4: Insulator Removal



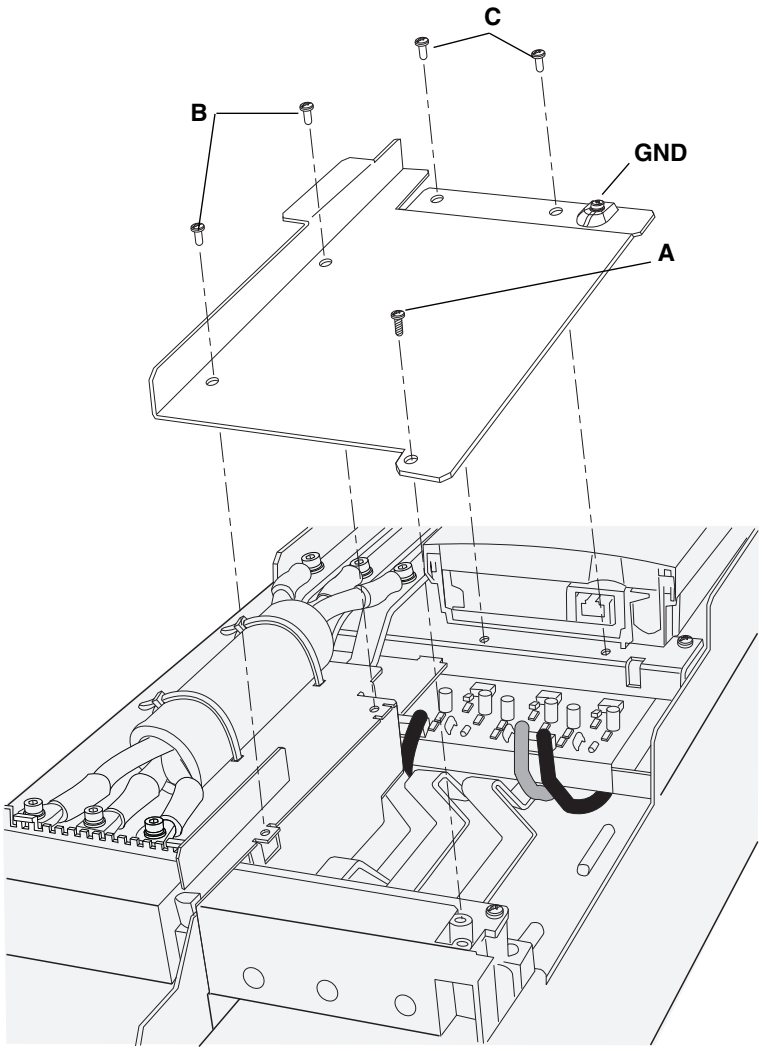
Remove the Output Bus Bar Cover Plate

5. Remove the output bus bar cover plate as follows. See Figure 5.
   - — Using a T-20 Torx driver, remove one screw (**A**) securing the cover plate to the power terminal block.
   - — Using a T-20 Torx driver, remove two screws (**B**) securing the cover plate to the choke assembly.
   - — Using a T-20 Torx driver, remove two screws (**C**) securing the cover plate to the middle crossbrace, and remove the cover plate from the drive.

NOTE: The screw (**A**) over the terminal block screws into plastic and has coarser threads than the screws that attach the cover plate to the choke assembly (**B**) and the crossbrace (**C**).

Do not remove the ground screw (**GND**) from the cover plate.

Figure 5: Output Bus Bar Cover Plate Removal



Remove the Common Mode Choke Assembly

6. Remove the common mode choke assembly as follows. See Figure 6 on page 18.
   - — Using a 3 mm Allen wrench, remove three screws (**A**) securing the choke assembly to the input bus bars and three screws (**B**) securing the assembly to input terminals L1, L2, and L3.

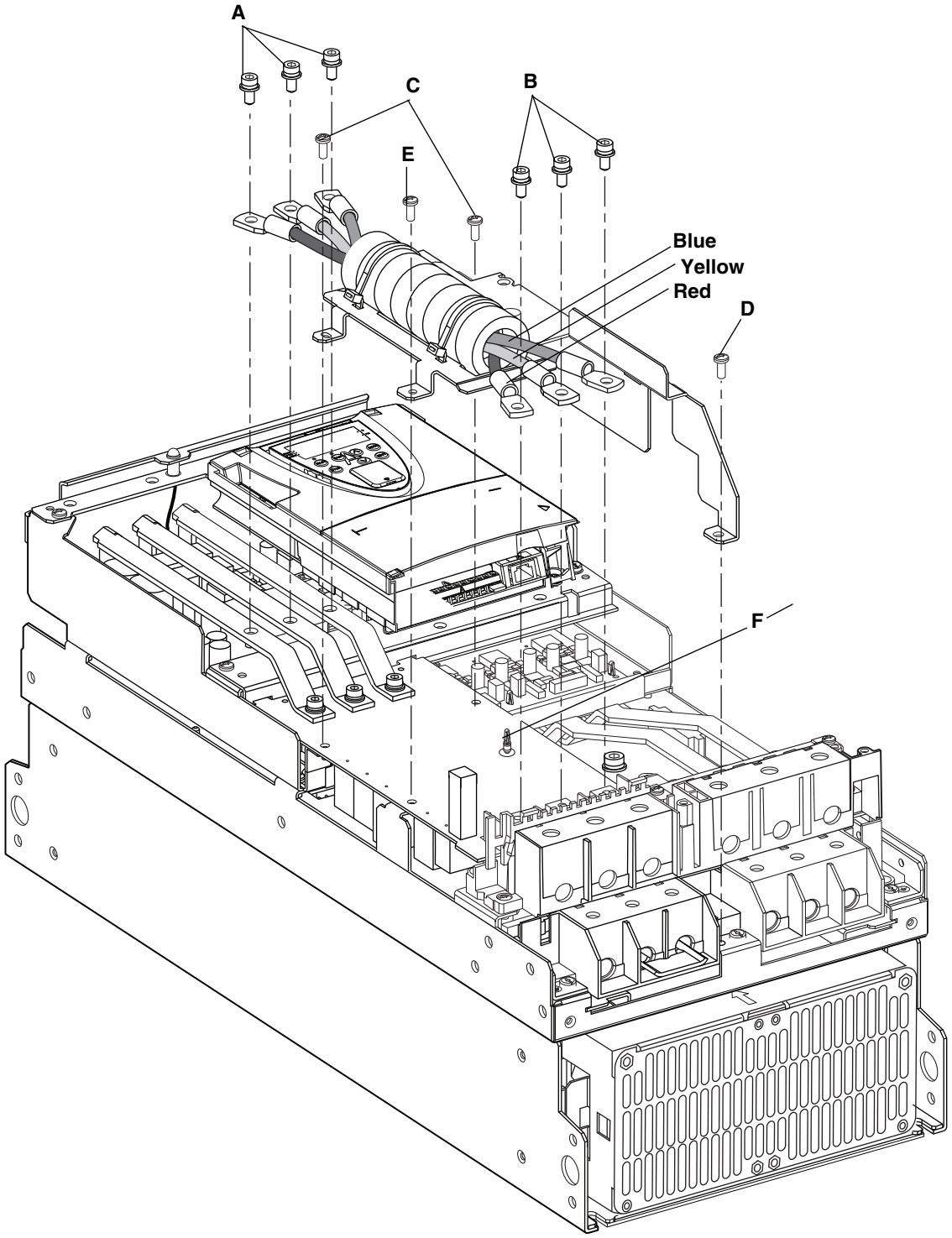
     Note the cable positions—the red cable goes to terminal L1, the yellow cable to terminal L2, and the blue cable to terminal L3.
   - — Using a T-20 Torx driver, remove two screws (**C**) securing the choke assembly to the filter board and one screw (**D**) securing the assembly to the drive frame.
   - — Using a size 2 Phillips driver, remove the remaining screw (**E**) securing the choke assembly to the filter board.
   - — Using needle-nose pliers, gently squeeze the retaining tab (**F**) on the filter board and remove the choke assembly from the drive.

NEXT STEP: If you are replacing the filter board, skip to Replacing the Filter Board VX4A1108 beginning on page 26.

If you are replacing the power terminal block, skip to Replacing the Power Terminal Block VZ3N1207 beginning on page 28.

For all other spare parts, continue with Step 7 on page 19.

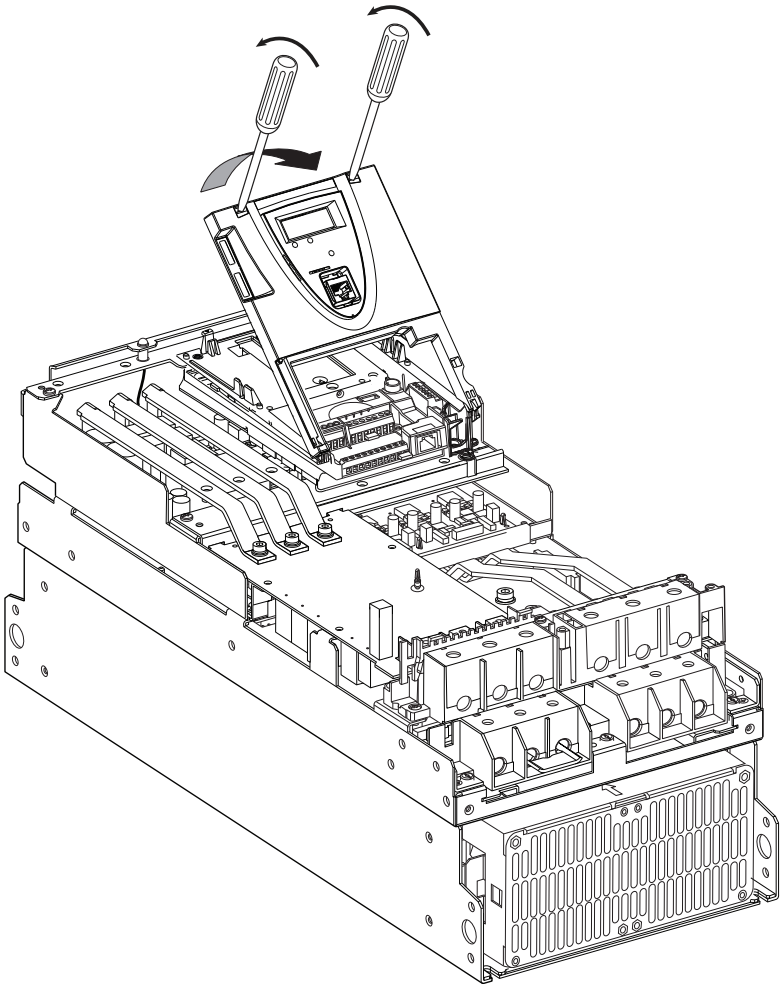
Figure 6: Common Mode Choke Assembly Removal



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 the control module. See Figure 7.

Figure 7: Control Module Cover Removal



Remove the Control Module

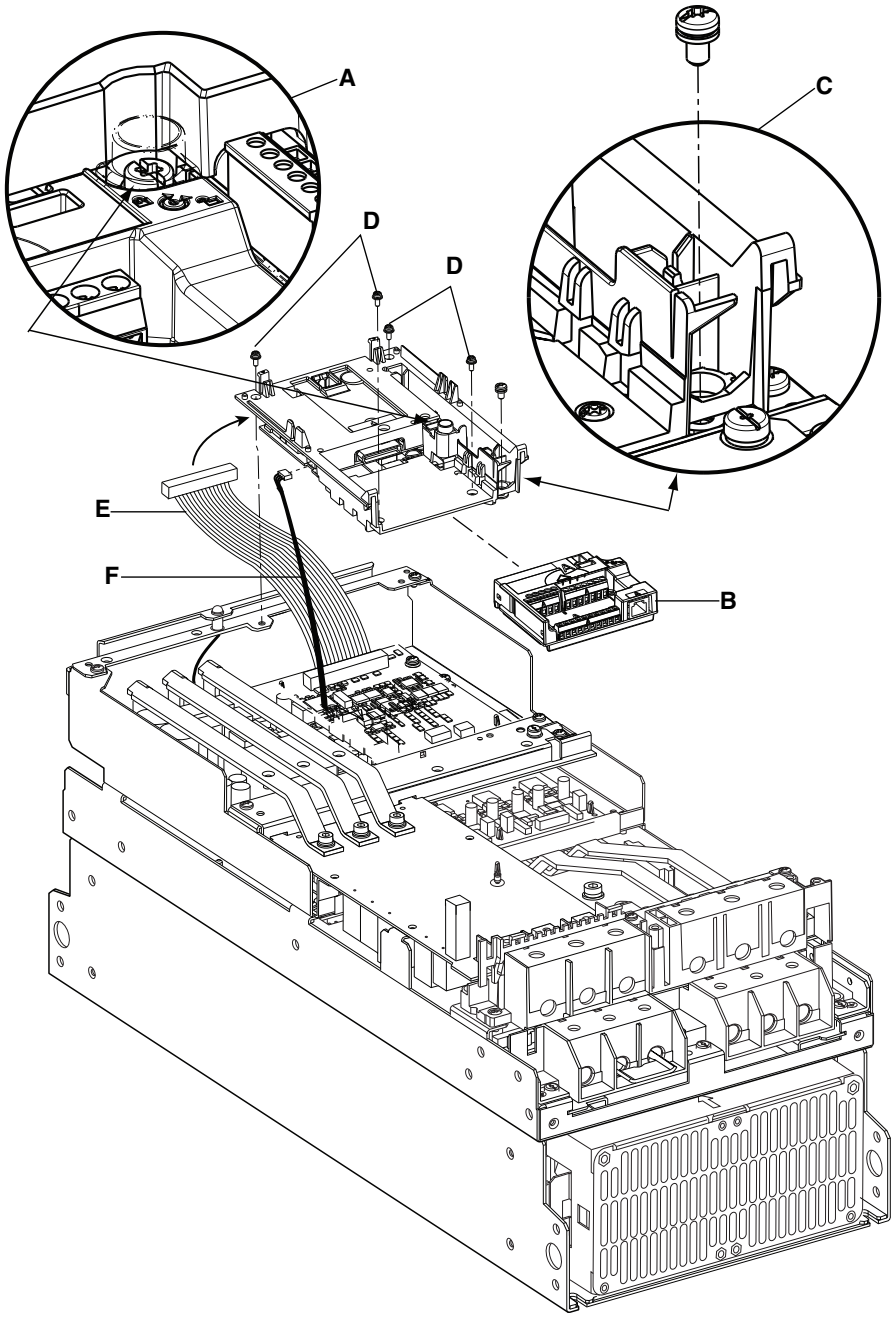
Table 3: Control Module Wiring

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

[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.

8. Remove the control module as follows. See Figure 8 on page 20.
   - — 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 2 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.

Figure 8: Control Module Removal

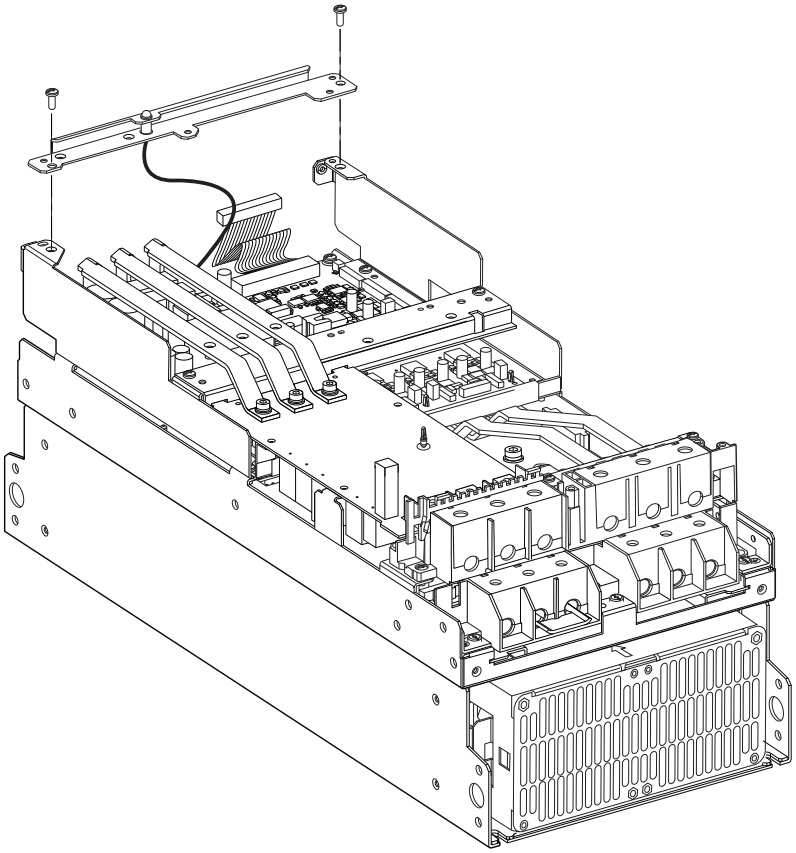


Remove the Top Crossbrace

9. Using a T-20 Torx driver, remove two screws securing the top crossbrace to the drive frame and move the crossbrace out of the way. See Figure 9.

> **NOTE:** The LED on the top crossbrace connects to terminal S205 on the power board. It may be easier to remove the connection from the power board after you remove the input bus bars in the next step.

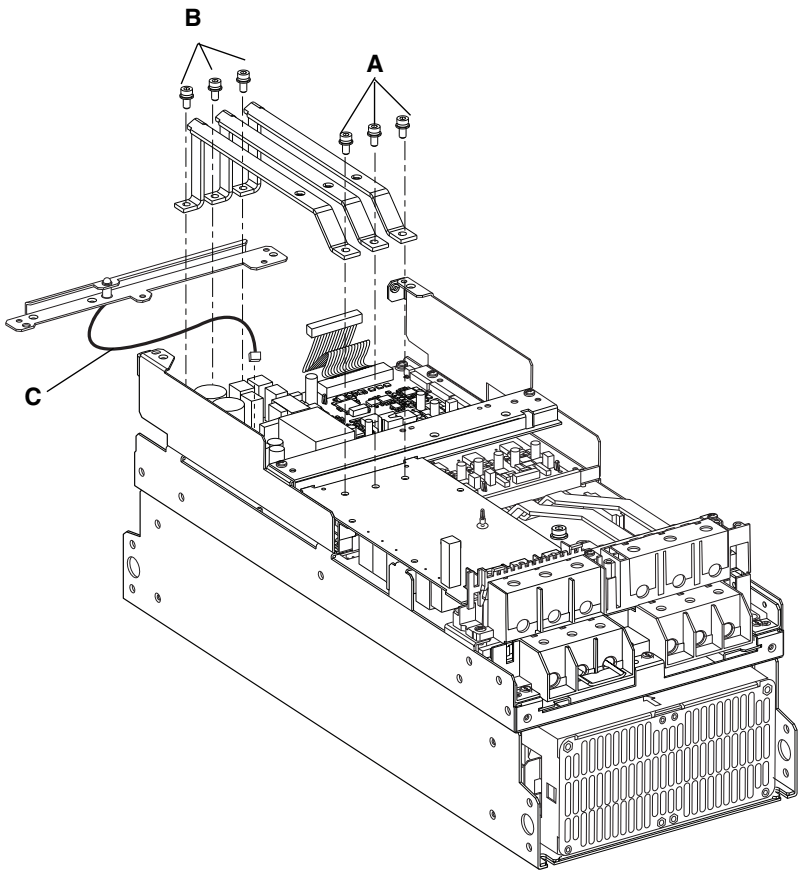
Figure 9: Top Crossbrace Removal



Remove the Input Bus Bars

10. Remove the three input bus bars as follows. See Figure 10.
    - — Using a 3 mm Allen wrench, remove the three screws (**A**) securing the input bus bars to the filter board.
    - — Using a 3 mm Allen wrench, remove the three screws (**B**) securing the input bus bars to the line terminals on the bus board.
    - — With the bus bars out of the way, remove the LED connection (**C**) from terminal S205 of the power board.

Figure 10: Input Bus Bar Removal



Remove the Filter Board

⚠ DANGER

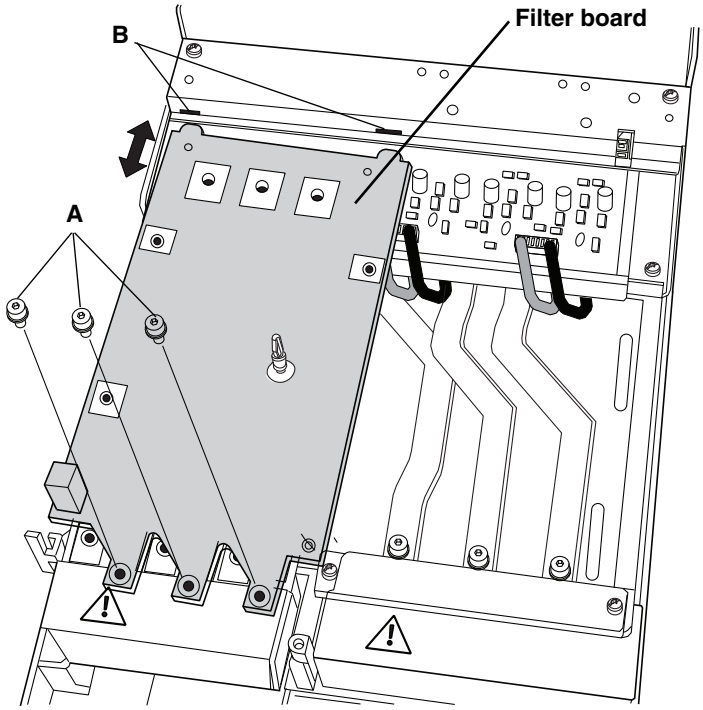
HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- 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 11.
- 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 11.

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

11. Remove the filter board as follows. See Figure 11.
    - Using a 3 mm Allen wrench, remove the three screws (**A**) securing the filter board to input terminals L1, L2, and L3.
    - Remove the filter board from its retaining slots (**B**) on the middle crossbrace, and remove the board from the drive.

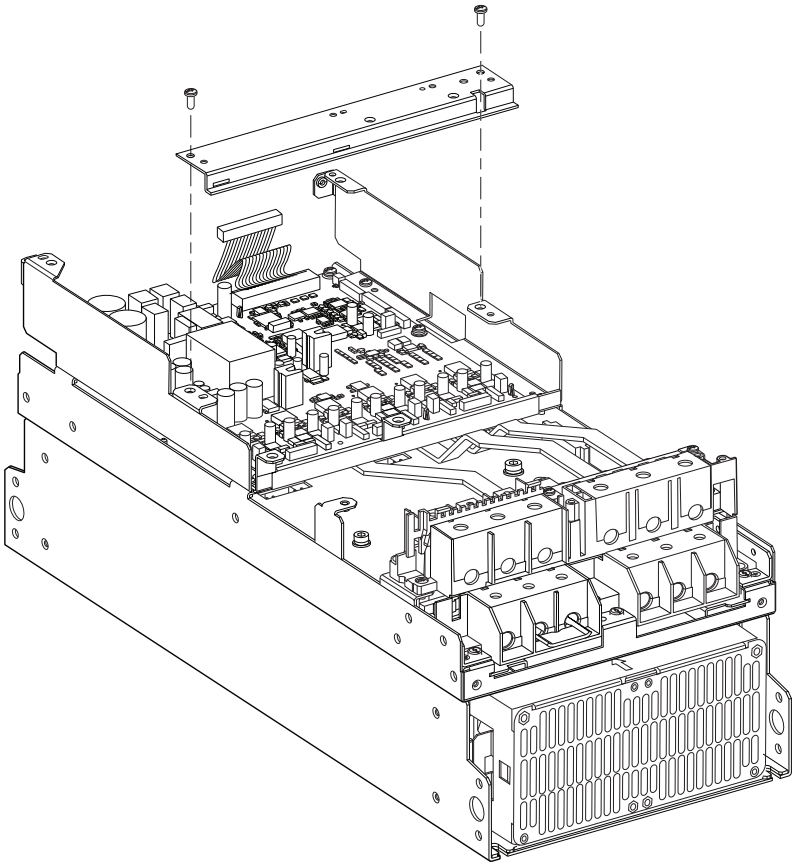
Figure 11: Filter Board Removal



Remove the Middle Crossbrace

12. Using a T-20 Torx driver, remove two screws securing the middle crossbrace to the drive frame and remove the crossbrace. See Figure 12.

Figure 12: Middle Crossbrace Removal



Remove the Power Board Connections

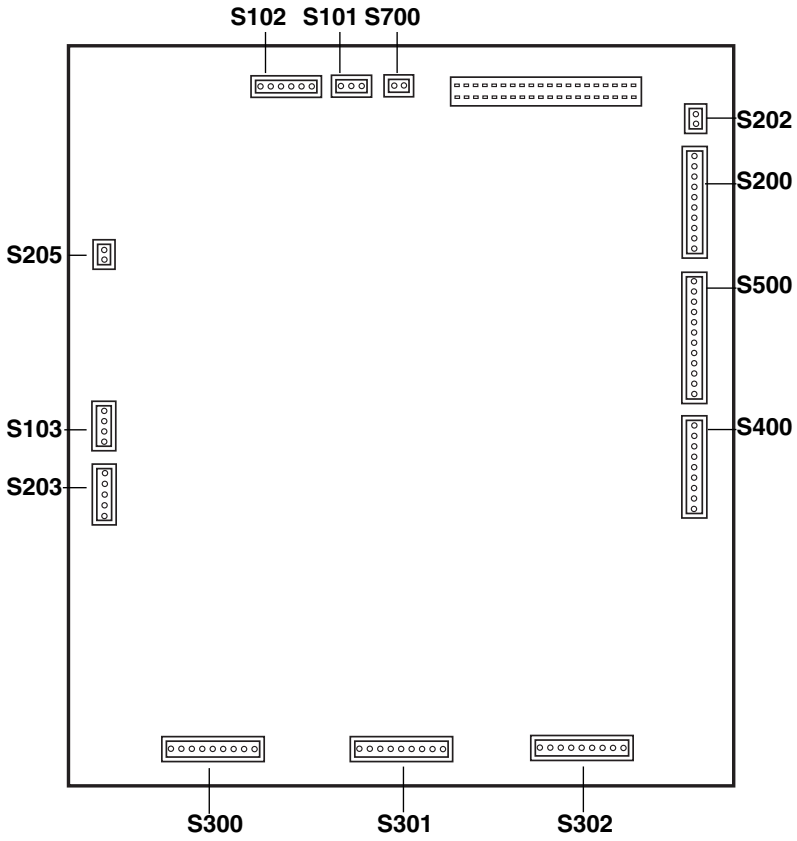
Table 4: Power Board Wiring

Wire No.[1]	Terminal No.	Description	To:
E107	**S102**	6-pin	SCR L1, L2, L3
E112	**S101**	3-pin	Bus board
E118	**S700**	2-pin	Thermal sensor
E102	**S205**	2-pin	LED
E101	**S103**	4-pin	Control module
E105	**S203**	5-pin	Main fan connector
E111	**S202**	2-pin	Bus board
E109	**S200**	10-pin	Bus board
E110	**S500**	12-pin	Power terminal block
E108	**S400**	9-pin	Braking IGBT module
			Bus board
E115	**S300**	9-pin	Power IGBT module
E116	**S301**	9-pin	Power IGBT module
E117	**S302**	9-pin	Power IGBT module

[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.

13. Using needle-nose pliers, carefully remove the following connections from the power board you are replacing. See Table 4 and Figure 13 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.

Figure 13: Power Board Connections



NEXT STEP: If you are replacing the power board, skip to Replacing the Power Board and IGBT Modules VX5IM2145M1271 or VX5IM2195M1271 beginning on page 35.

If you are replacing the power IGBT modules, the braking IGBT module, or the SCR modules, skip to Replacing the Power IGBT Modules, the Braking IGBT Module, and the SCR Modules beginning on page 37.

Replacing the Filter Board VX4A1108

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 10.

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

Before performing the steps in this procedure, perform Steps 1–6 of Disassembling the Drive beginning on page 12 to remove the following parts from the drive:

- ❏ The front cover
- ❏ The top panel
- ❏ The side panels
- ❏ The insulator
- ❏ The output bus bar cover plate
- ❏ The common mode choke assembly

Remove the Filter Board

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

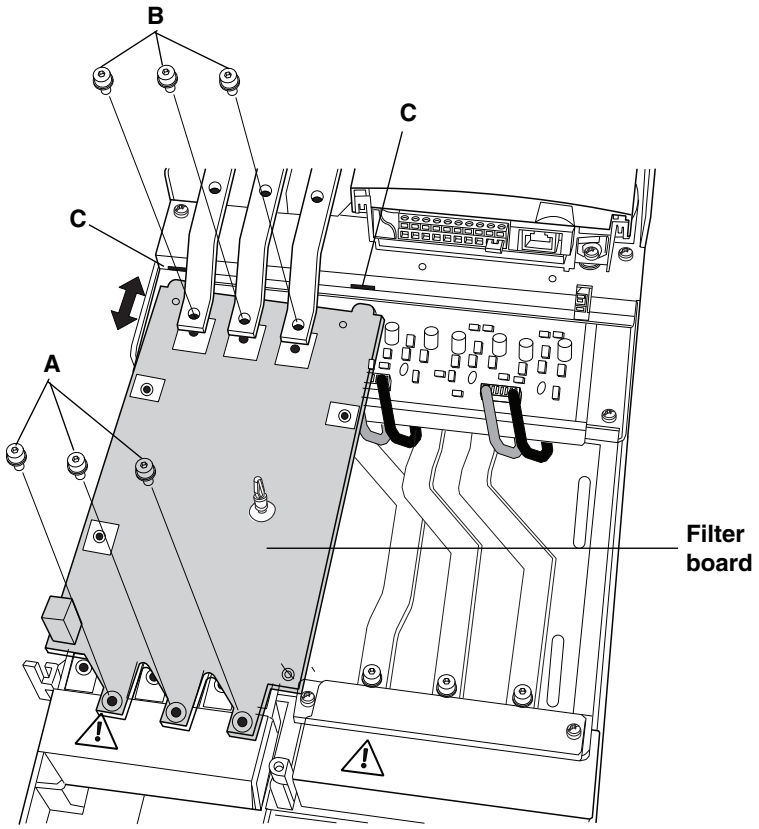
- When the controller is damaged, voltage may remain on certain energy storage capacitors after de-energization of the controller and discharge of the main capacitor bank.
- Before working on or near assemblies containing energy storage capacitors, verify that the capacitor voltages are less than 42 Vdc.
- The following assemblies have energy-storing capacitors:
  - — Filter board. See Figure 14 on page 27.
- 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 11.

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

Remove the filter board as follows. See Figure 14 on page 27.

1. Using a 3 mm Allen wrench, remove the three screws (**A**) securing the filter board to input terminals L1, L2, and L3.
2. Using a 3 mm Allen wrench, remove the three screws (**B**) securing the input bus bars to the filter board.
3. Slide the filter board out of its retaining slots (**C**) on the middle crossbrace, and remove the board from the drive.

Figure 14: Filter Board Replacement



Install the New Filter Board

Install the new filter board as follows. See Figure 14.

1. Position the filter board under the input bus bars and insert its retaining tabs into the slots (**C**) on the middle crossbrace. Ensure that the bottom of the board is correctly seated over input terminals L1, L2, and L3 on the terminal block.
2. Using a 3 mm Allen wrench, secure the input bus bars to the filter board with three screws (**B**). Tighten the screws to 2.6–3.3 N•m (23–29.2 lb-in).
3. Using a 3 mm Allen wrench, secure the filter board to input terminals L1, L2, and L3 with three screws (**A**). Tighten the screws to 2.1–2.7 N•m (18.5–24 lb-in).

NEXT STEP: If you are only replacing the filter board, skip to Reassembling the Drive beginning on page 51 and consult Table 8 for the next steps.

Replacing the Power Terminal Block VZ3N1207

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 the 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 10.

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

Before performing the steps in this procedure, perform Steps 1–6 of Disassembling the Drive beginning on page 12 to remove the following parts from the drive:

- ❑ The front cover
- ❑ The top panel
- ❑ The side panels
- ❑ The insulator
- ❑ The output bus bar cover plate
- ❑ The common mode choke assembly

Remove the Filter Board

⚠ DANGER

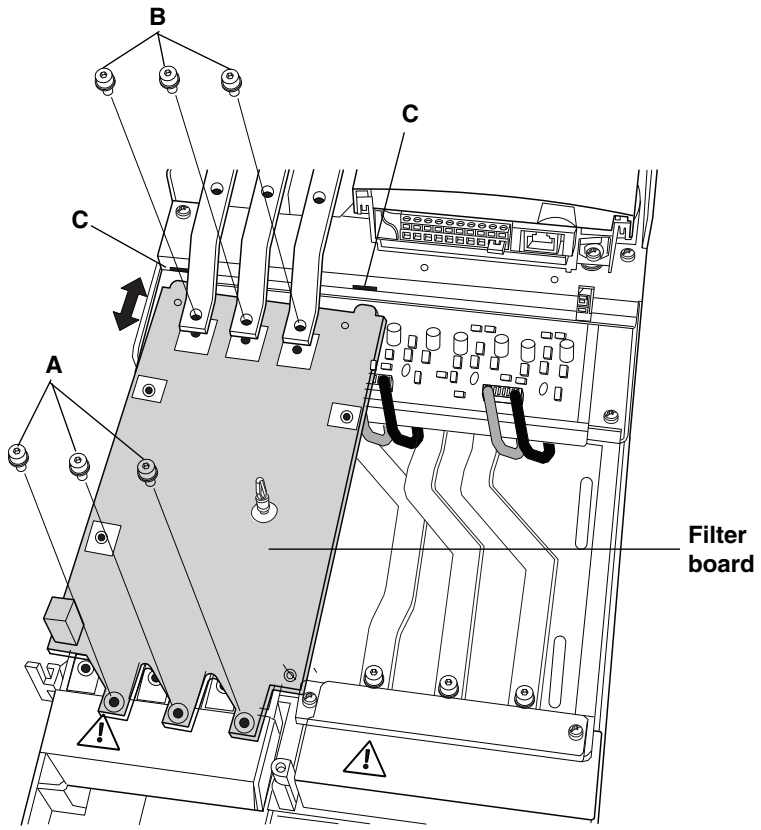
HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- 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 15 on page 29.
- 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 11.

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

1. Remove the filter board as follows. See Figure 15.
   - Using a 3 mm Allen wrench, remove the three screws (**A**) securing the filter board to input terminals L1, L2, and L3.
   - Using a 3 mm Allen wrench, remove the three screws (**B**) securing the input bus bars to the filter board.
   - Slide the filter board out of its retaining slots (**C**) on the middle crossbrace, and remove the board from the drive.

Figure 15: Filter Board Removal



Remove the Top Power Terminal Block

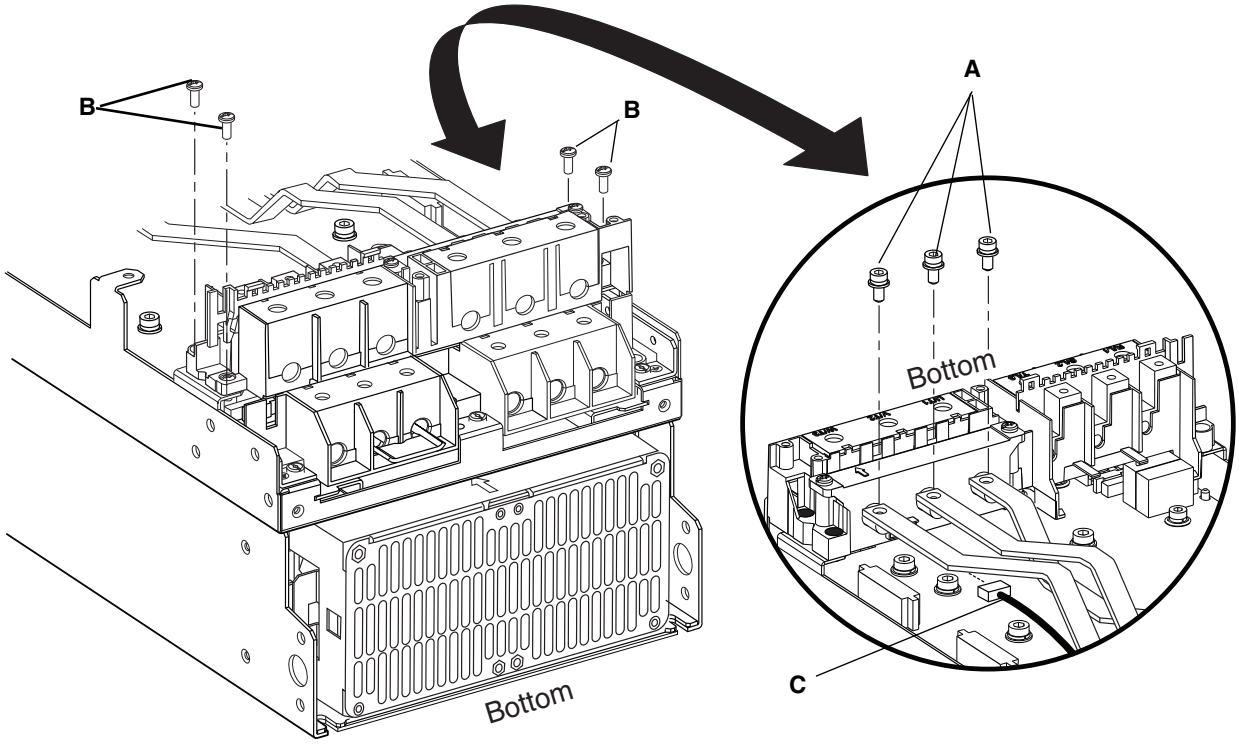
Table 5: Power Terminal Block Wiring

Wire No.[1]	Description	To:	Terminal No.
E110	6-pin	Power board	**S500**

[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.

2. Remove the top power terminal block as follows. See Figure 16.
   - — Using a 3 mm Allen wrench, remove the screws (**A**) from the three bus bars at output terminals T1, T2, and T3.
   - — Using a T-20 Torx driver, remove the four screws (**B**) securing the top terminal block to the drive frame.
   - — Using needle-nose pliers, unplug the 6-pin connector (**C**) from the terminal block.
   - — Remove the top terminal block from the drive.

Figure 16: Top Power Terminal Block Removal



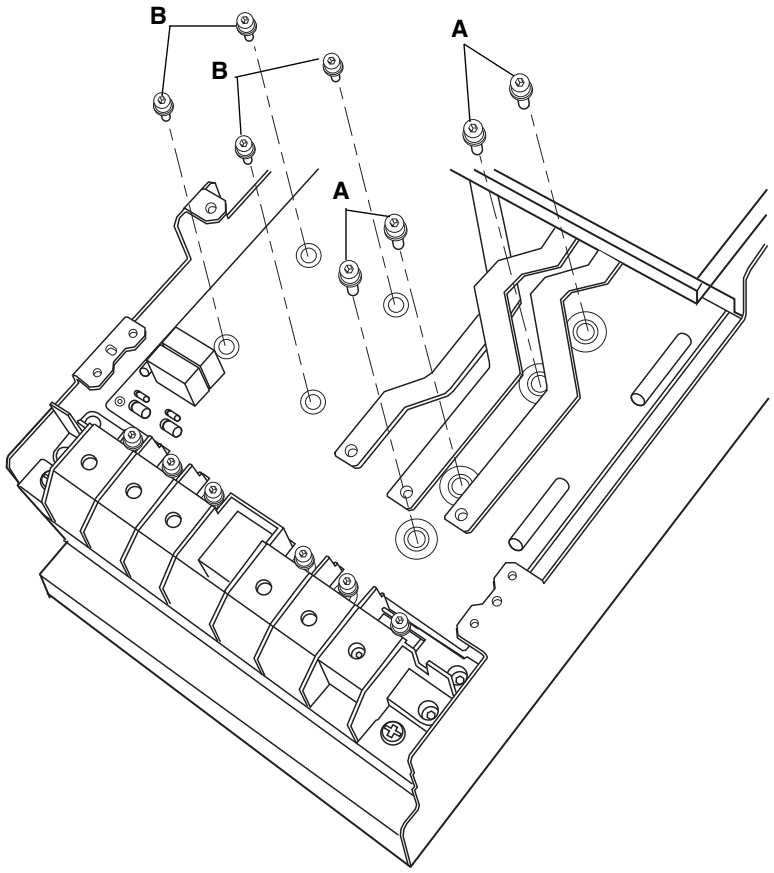
Remove the Bottom Power Terminal Block

3. Remove the bottom power terminal block as follows. See Figures 17 and 18 (pages 31 and 32).
   - — Using a 4 mm Allen wrench, remove four screws (**A**) securing the bus board to the DC bus capacitors.
   - — Using a 3 mm Allen wrench, remove four screws (**B**) securing the bus board to its mounting posts.
   - — Using a 3 mm Allen wrench, remove four screws (item **C** in Figure 18) securing the bottom terminal block to the bus board and two screws (item **D** in Figure 18) securing the terminal block to the drive frame.

> **NOTE:** The two end screws (**D**) are longer than the four middle screws (**C**). See Figure 18 on page 32.

   - — Using a T-20 Torx driver, remove the four screws (item **E** in Figure 18) securing the bottom terminal block to the drive frame.
   - — Pull the terminal block out from under the bus board and remove it from the drive.

Figure 17: Bus Board Hardware



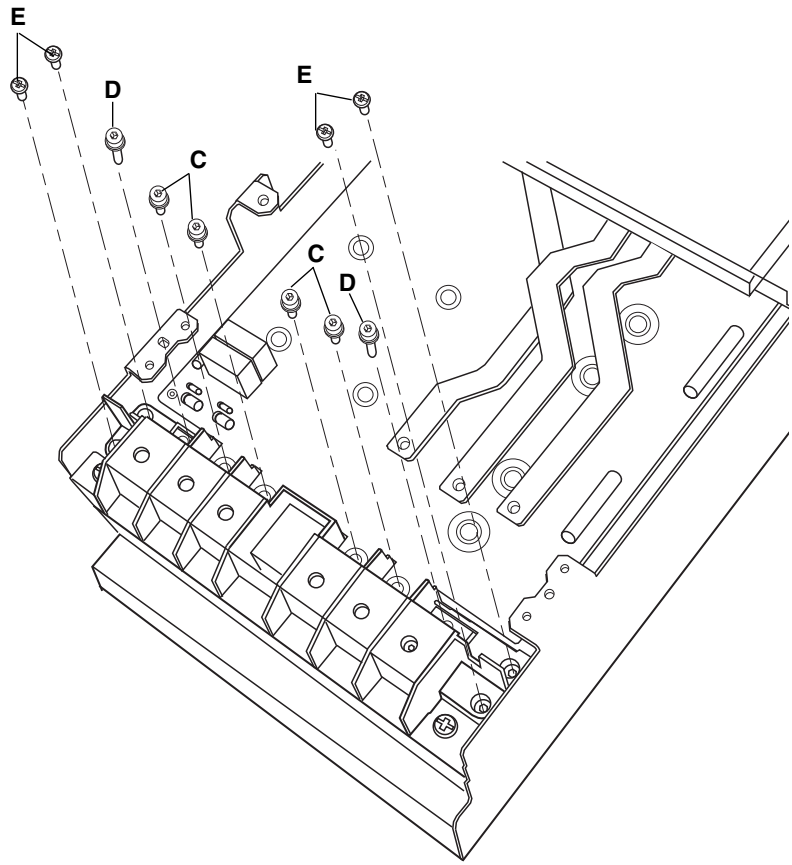
Replace the Bottom Power Terminal Block

4. Install the bottom portion of the new power terminal block as follows. See Figures 17 and 18 (pages 31 and 32).
   - — Insert the terminal block under the bus board.
   - — Using a T-20 Torx driver, secure the terminal block to the drive frame with four screws (**E**). Tighten the screws to 1.1–1.7 N•m (9.7–15.1 lb-in).
   - — Using a 4 mm Allen wrench, install the four screws (item **A** in Figure 17) securing the bus board to the DC bus capacitors. Tighten the screws to 4.2–5.1 N•m (37.2–45.1 lb-in).
   - — Using a 3 mm Allen wrench, install the four screws (item **B** in Figure 17) securing the bus board to its mounting posts. Tighten the screws to 2.6–3.3 N•m (23–29.2 lb-in).

NOTE: Note the differences in the six screws securing the terminal block to the bus board and to the drive frame. The two longer screws (**D**) go in the left and right positions, and the four shorter screws (**C**) go in the middle. See Figure 18.

   - — Using a 3 mm Allen wrench, secure the bottom terminal block to the bus board with four screws (**C**). Tighten the screws to 2.1–2.7 N•m (18.6–23.9 lb-in).
   - — Using a 3 mm Allen wrench, install the two screws (**D**) securing the terminal block to the drive frame. Tighten the screws to 2.1–2.7 N•m (18.6–23.9 lb-in).

Figure 18: Bottom Power Terminal Block Replacement



Replace the Top Power Terminal Block

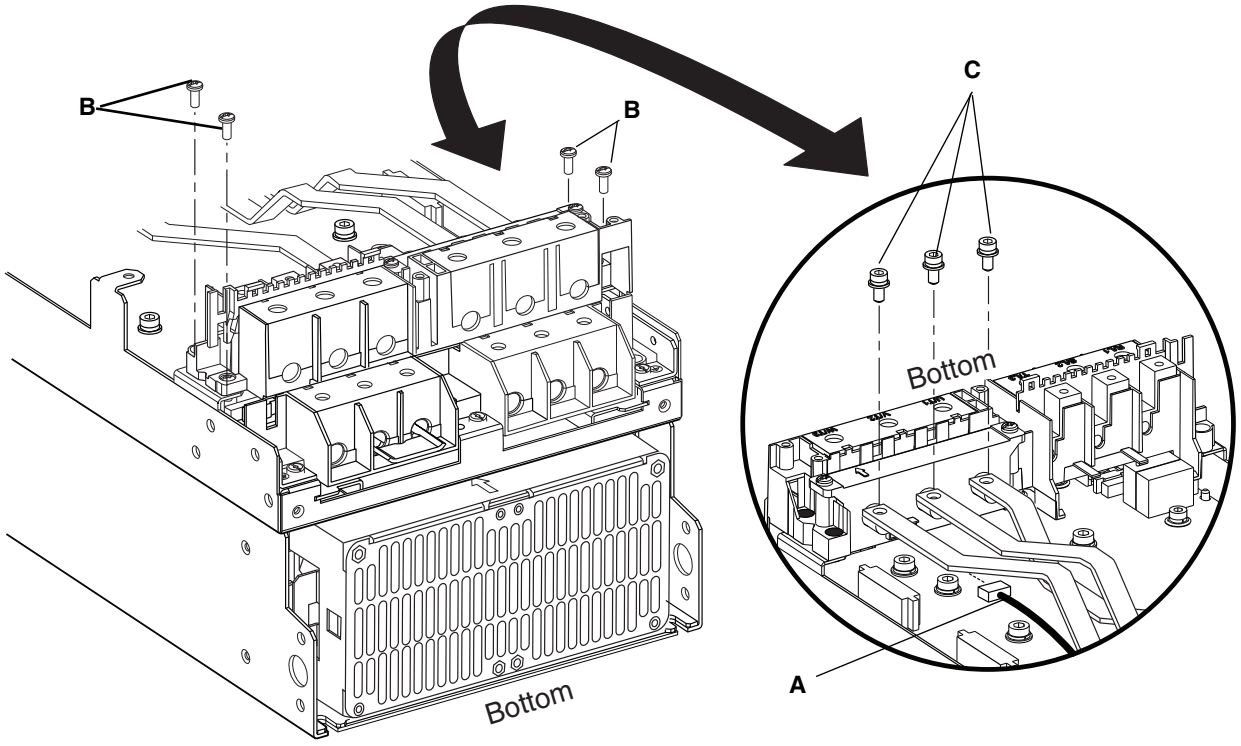
Table 6: Power Terminal Block Wiring

Wire No.[1]	Description	To:	Terminal No.
E110	6-pin	Power board	**S500**

[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.

5. Install the top portion of the new power terminal block as follows. See Figure 19.
   - — Plug the 6-pin connector (**A**) into the terminal block.
   - — Position the terminal block under the three bus bars at output terminals T1, T2, and T3.
   - — Using a T-20 Torx driver, install the four screws (**B**) securing the terminal block to the drive frame. Tighten the screws to 1.1–1.7 N•m (9.7–15.1 lb-in).
   - — Using a 3 mm Allen wrench, secure the bus bars to output terminals T1, T2, and T3 with three screws (**C**). Tighten the screws to 2.1– 2.7 N•m (18.5–24 lb-in).

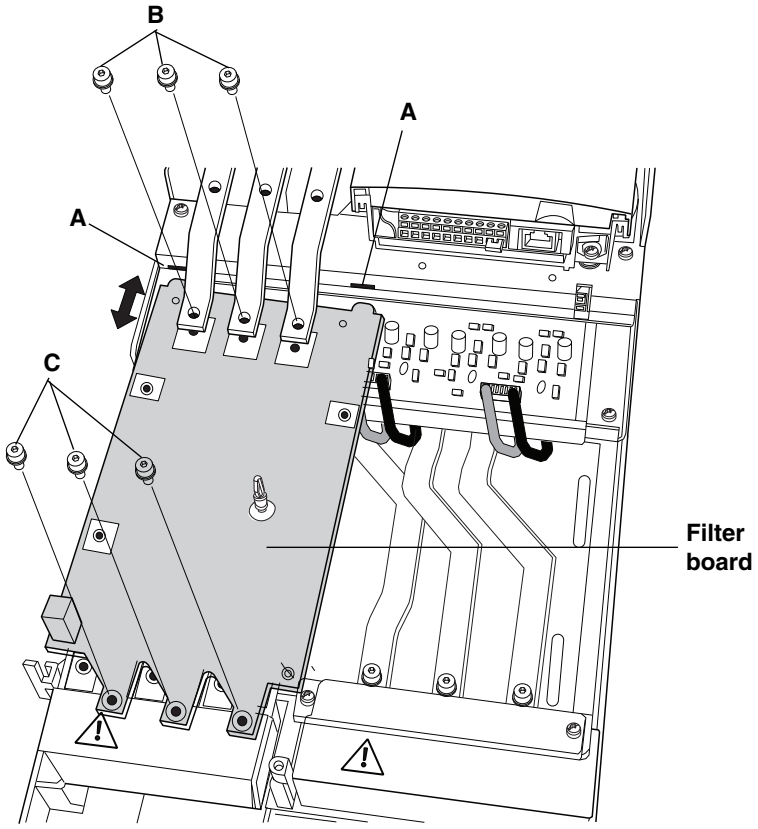
Figure 19: Top Power Terminal Block Replacement



Replace the Filter Board

6. Replace the filter board as follows. See Figure 20.
   - — Position the filter board under the input bus bars and insert its retaining tabs into the slots (**A**) on the middle crossbrace. Ensure that the bottom of the board is correctly seated over input terminals L1, L2, and L3 on the terminal block.
   - — Using a 3 mm Allen wrench, secure the input bus bars to the filter board with three screws (**B**). Tighten the screws to 2.6–3.3 N•m (23–29.2 lb-in).
   - — Using a 3 mm Allen wrench, secure the filter board to input terminals L1, L2, and L3 with three screws (**C**). Tighten the screws to 2.1–2.7 N•m (18.5–24 lb-in).

Figure 20: Filter Board Replacement



NEXT STEP: If you are only replacing the power terminal block, skip to Reassembling the Drive beginning on page 51 and consult Table 8 for the next steps.

Replacing the Power Board and IGBT Modules VX5IM2145M1271 or VX5IM2195M1271

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 10.

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

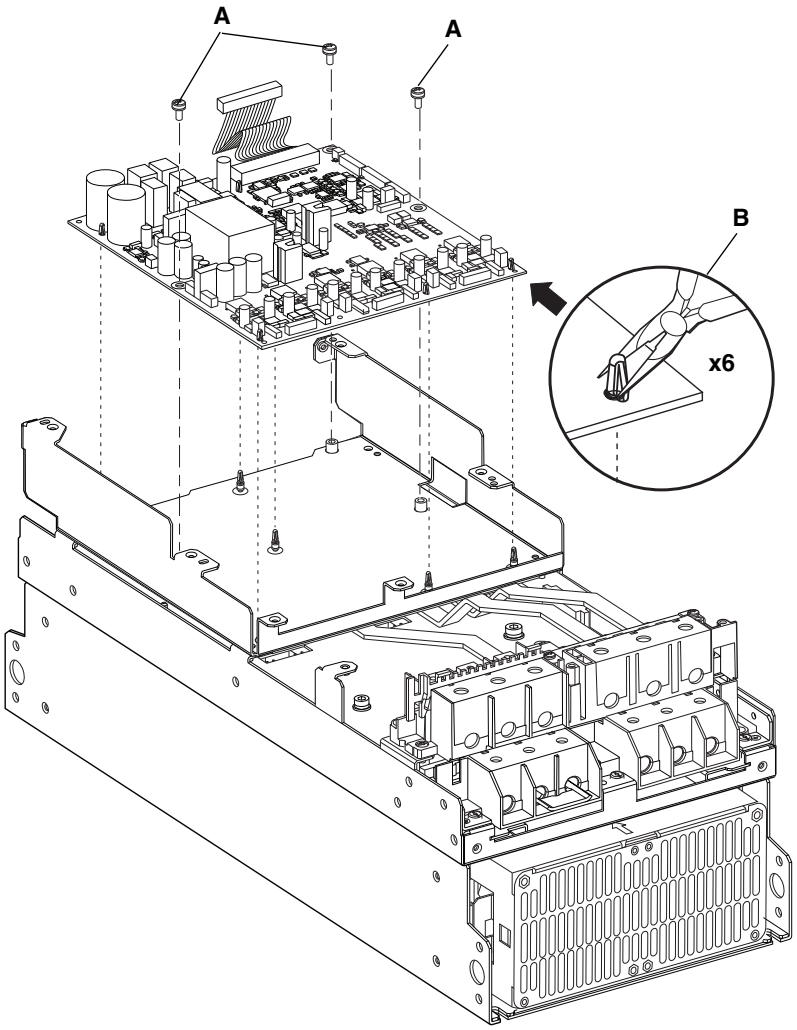
Before performing the steps in this procedure, perform Steps 1–13 of Disassembling the Drive beginning on page 12 to remove the following parts from the drive:

- ❏ The front cover
- ❏ The top panel
- ❏ The side panels
- ❏ The insulator
- ❏ The output bus bar cover plate
- ❏ The common mode choke assembly
- ❏ The control module cover
- ❏ The control module
- ❏ The top crossbrace
- ❏ The input bus bars
- ❏ The filter board
- ❏ The middle crossbrace
- ❏ The power board connections

Remove the Power Board

1. Remove the power board that you are replacing as follows. See Figure 21 on page 36.
   - — Using a size 2 Phillips driver, remove the three screws (**A**) securing the power board to the power board mounting plate.
   - — Using needle-nose pliers, gently compress the six plastic mounting posts (**B**), one at a time, while lifting the power board off the posts.
   - — Remove the power board from the drive.

Figure 21: Power Board Removal



Replace the Power Board

2. Install the new power board as follows. See Figure 21.
   - — Position the power board over the six plastic mounting posts (**B**) 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 screws (**A**) securing the power board to its mounting plate. Tighten the screws to 1.1–1.7 N•m (9.7–15.1 lb-in).

NEXT STEP: If you replaced the power board that comes with VX5IM2145M1271 or VX5IM2195M1271, you must also replace the power IGBT modules with the new ones that come in the kit. Continue with Replacing the Power IGBT Modules, the Braking IGBT Module, and the SCR Modules beginning on page 37.

Replacing the Power IGBT Modules, the Braking IGBT Module, and the 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 10.

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

This procedure covers replacement of the following components:

- Power insulated-gate bipolar transistor (IGBT) modules that come with the power board in kits VX5IM2145M1271 and VX5IM2195M1271
- Braking IGBT module: VZ3IM1145M1271
- Silicon controlled rectifier (SCR) modules: VZ3TD1057M1671 and VZ3TD1072M1671

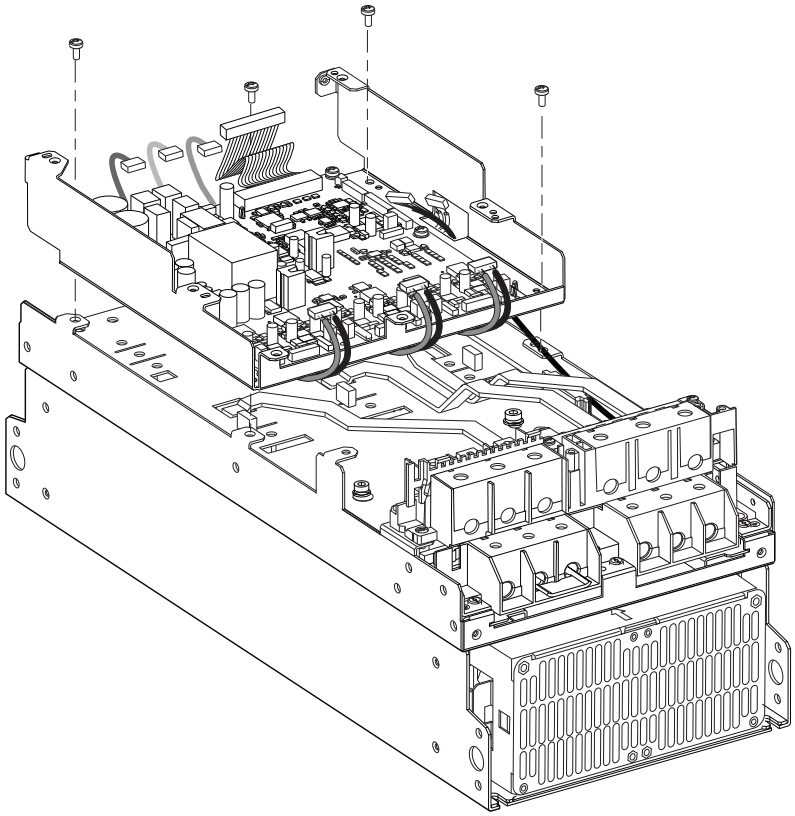
Before performing the steps in this procedure, perform Steps 1–13 of Disassembling the Drive beginning on page 12 to remove the following parts from the drive:

- ❑ The front cover
- ❑ The top panel
- ❑ The side panels
- ❑ The insulator
- ❑ The output bus bar cover plate
- ❑ The common mode choke assembly
- ❑ The control module cover
- ❑ The control module
- ❑ The top crossbrace
- ❑ The input bus bars
- ❑ The filter board
- ❑ The middle crossbrace
- ❑ The power board connections

Remove the Power Board Mounting Plate

1. Using a T-20 Torx driver, remove the four screws securing the power board mounting plate to the drive frame and remove the plate from the drive. See Figure 22.

Figure 22: Power Board Mounting Plate Removal



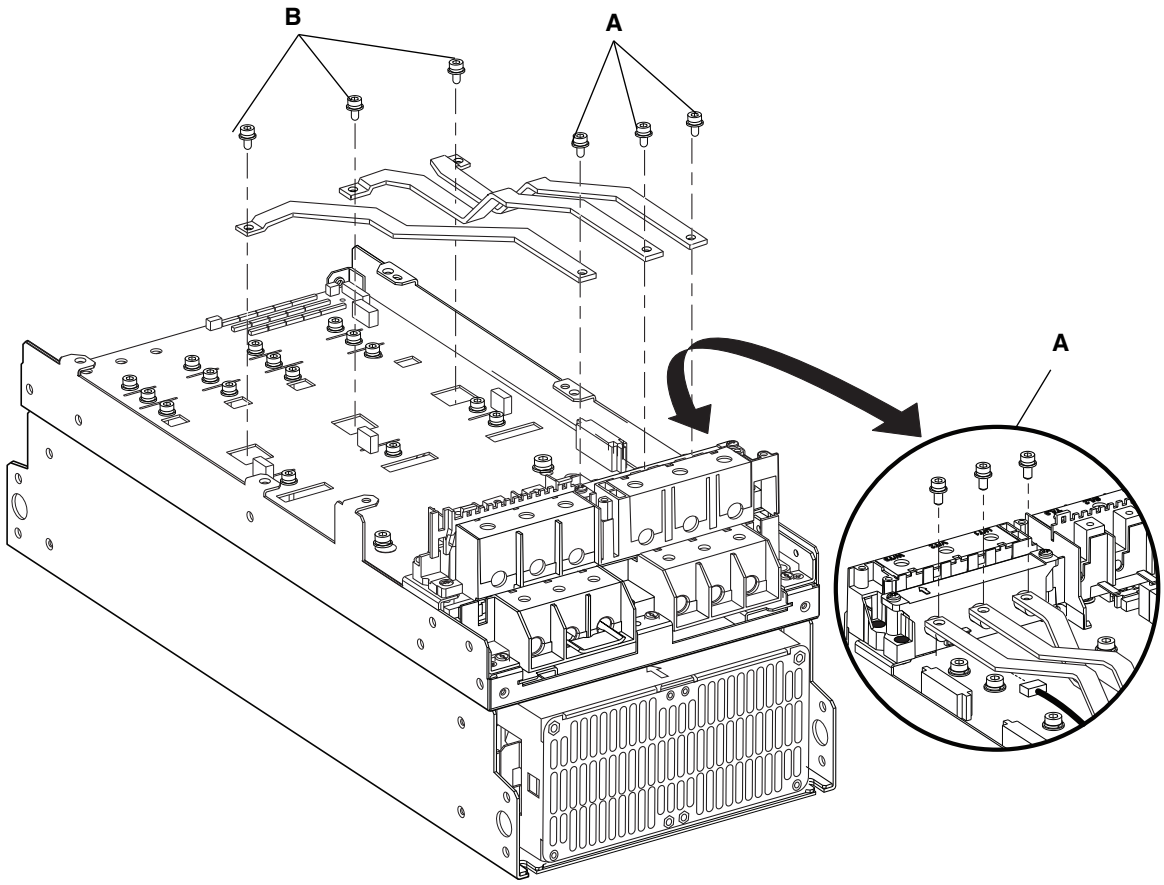
Remove the Output Bus Bars

2. Remove the output bus bars as follows. See Figure 23.
   - — Using a 3 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, remove the three screws (**B**) securing the top of the bus bars to the power IGBT modules.

> **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 power IGBT modules.

   - — Remove the output bus bars from the drive.

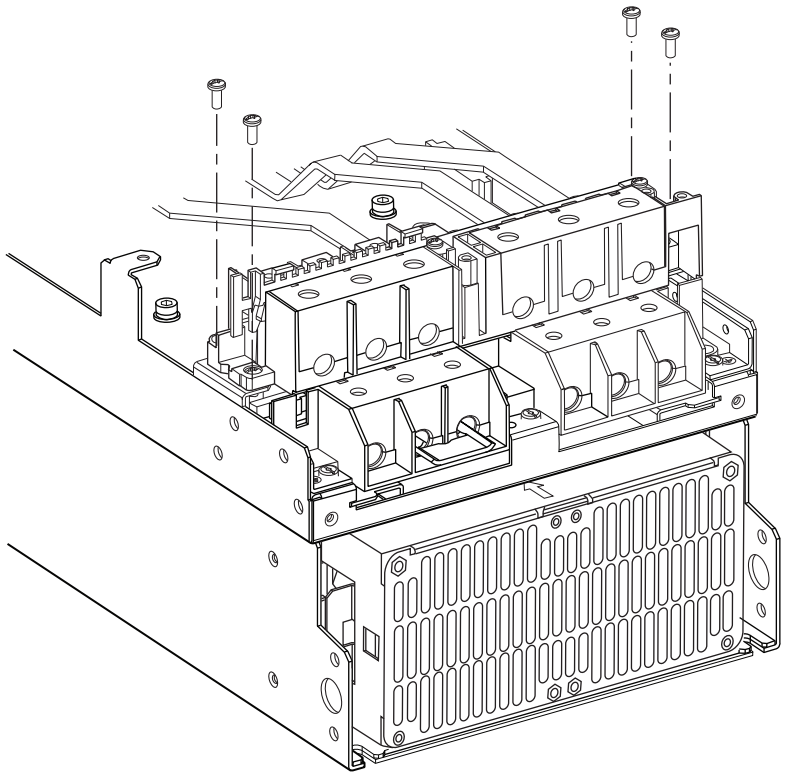
Figure 23: Output Bus Bar Removal



Remove the Top Power Terminal Block

3. Using a T-20 Torx driver, remove four screws securing the top power terminal block to the drive frame and remove the terminal block from the drive. See Figure 24.

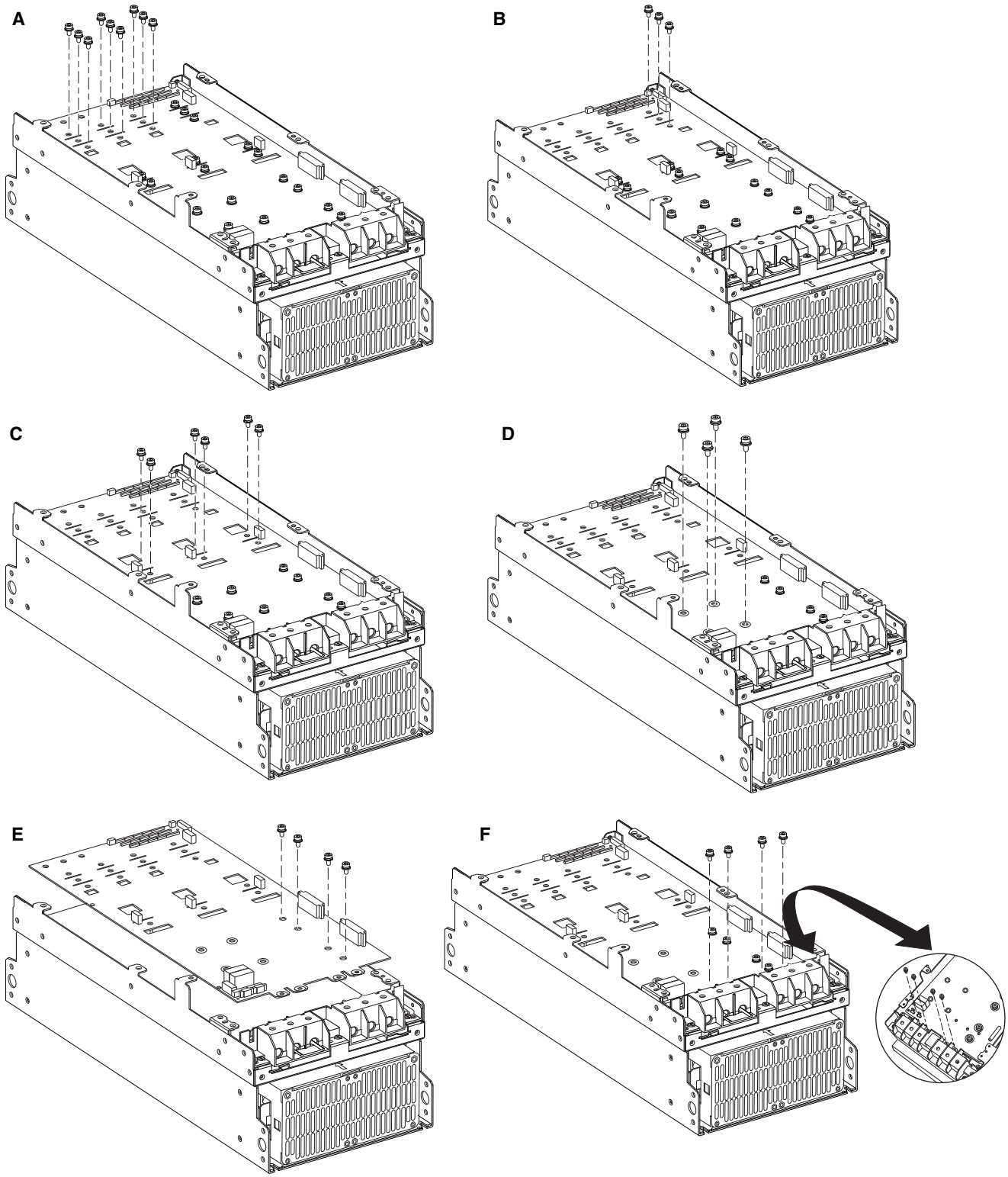
Figure 24: Power Terminal Block Removal



Remove the Bus Board

4. Remove the bus board as follows. See Figure 25 on page 41.
   - — Before removing the bus board, carefully note the wire connections for reassembly. See Table 7 and Figure 29 on page 45 for wiring.
   - — Using needle-nose pliers, remove the wiring from the three silicon controlled rectifiers (SCRs) and the four power IGBT modules.
   - — Using a 3 mm Allen wrench, remove nine screws (**A**) securing the bus board to the SCRs.
   - — Using a 3 mm Allen wrench, remove three screws (**B**) securing the bus board to the braking IGBT module.
   - — Using a 3 mm Allen wrench, remove six screws (**C**) securing the bus board to the power IGBT modules.
   - — Using a 3 mm Allen wrench, remove four screws (**D**) securing the bus board to the DC choke.
   - — Using a 4 mm Allen wrench, remove four screws (**E)** securing the bus board to the DC bus capacitors.
   - — Using a 3 mm Allen wrench, remove four screws (**F**) securing the bus board to the power terminal block.
   - — Remove the bus board from the drive to expose the SCR modules, IGBT modules, and capacitors.

Figure 25: Bus Board Removal



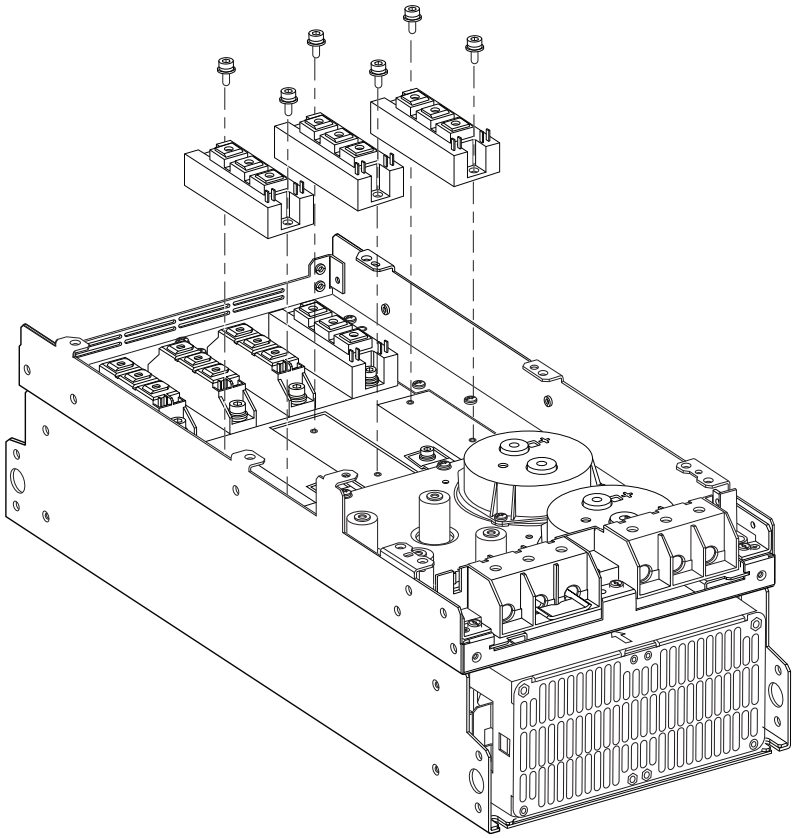
Replace the Power IGBT Modules

NEXT STEP: If you are replacing power board **that comes in kits VX5IM2145M1271 or VX5IM2195M1271**, you must also replace the power IGBT modules with the new ones that come in the power board kit.

If you are only replacing the SCR modules, omit Steps 5 and 6 and skip to “Replace the SCR Modules” on page 44.

5. Replace each of the three power IGBT modules as follows. See Figure 26.
   - — Using a 4 mm Allen wrench, remove two screws from the power 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 power 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 screws. Tighten the screws to 3.3–4.4 N•m (29.2–38.9 lb-in).
   - — Following the same steps, also replace the other two power IGBT modules.

Figure 26: Power IGBT module Replacement

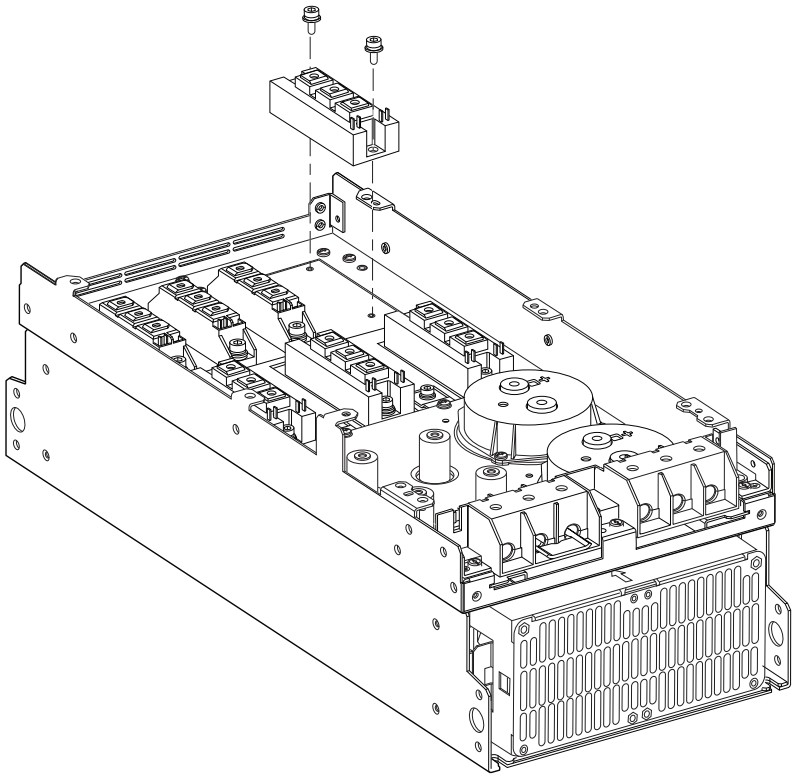


Replace the Braking IGBT Module

NEXT STEP: If you are only replacing the SCR modules, omit Step 6 and skip to “Replace the SCR Modules” on page 44.

6. Replace the braking IGBT module as follows. See Figure 27.
   - — Using a 4 mm Allen wrench, remove two 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 screws. Tighten the screws to 3.3–4.4 N•m (29.2–38.9 lb-in).

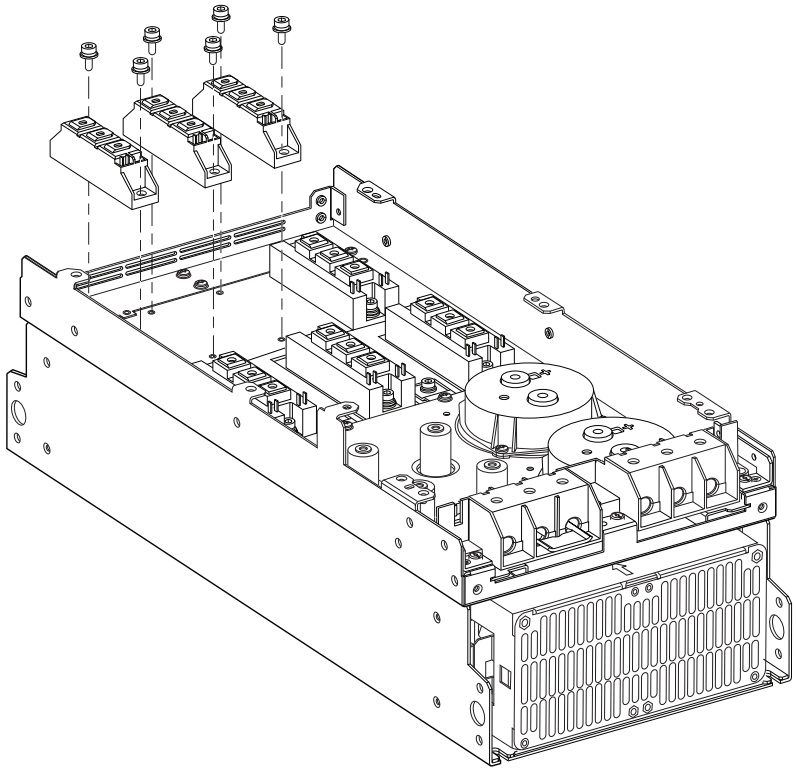
Figure 27: Braking IGBT Module Replacement



Replace the SCR Modules

7. Replace each of the three SCR modules as follows. See Figure 28.
   - — Using a 4 mm Allen wrench, remove two screws from the SCR 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 SCR 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 screws. Tighten the screws to 3.3–4.4 N•m (29.2–38.9 lb-in).
   - — Following the same steps, also replace the other two SCR modules.

Figure 28: Silicon Controlled Rectifier Module Replacement

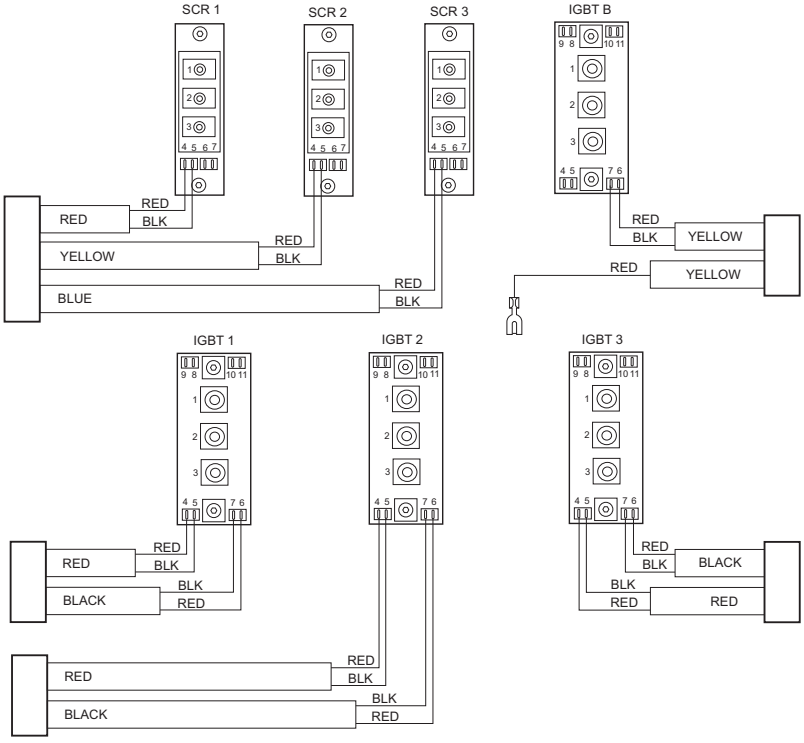


NOTE: See the wiring table and schematic on pages 80 and 81 for complete drive wiring. Wire numbers are given for cross referencing the wires with the wiring table and the schematic. The numbers do not appear on the wires.

Table 7: IGBT and SCR Module Wiring Table

Wire No.	Module No.	Terminal No.	Sleeve Color	Wire Color
Power IGBT Modules				
E115	1	**4**	Red	Red
		5		Black
		7	Black	Black
		6		Red
E116	2	**4**	Red	Red
		5		Black
		7	Black	Black
		6		Red
E117	3	**4**	Red	Red
		5		Black
		7	Black	Black
		6		Red
Braking IBGT Module				
E108	Braking	**7**	Yellow	Black
		6		Red
SCR Modules				
E107	1	**4**	Red	Red
		5		Black
	2	**4**	Yellow	Red
		5		Black
	3	**4**	Blue	Red
		5		Black

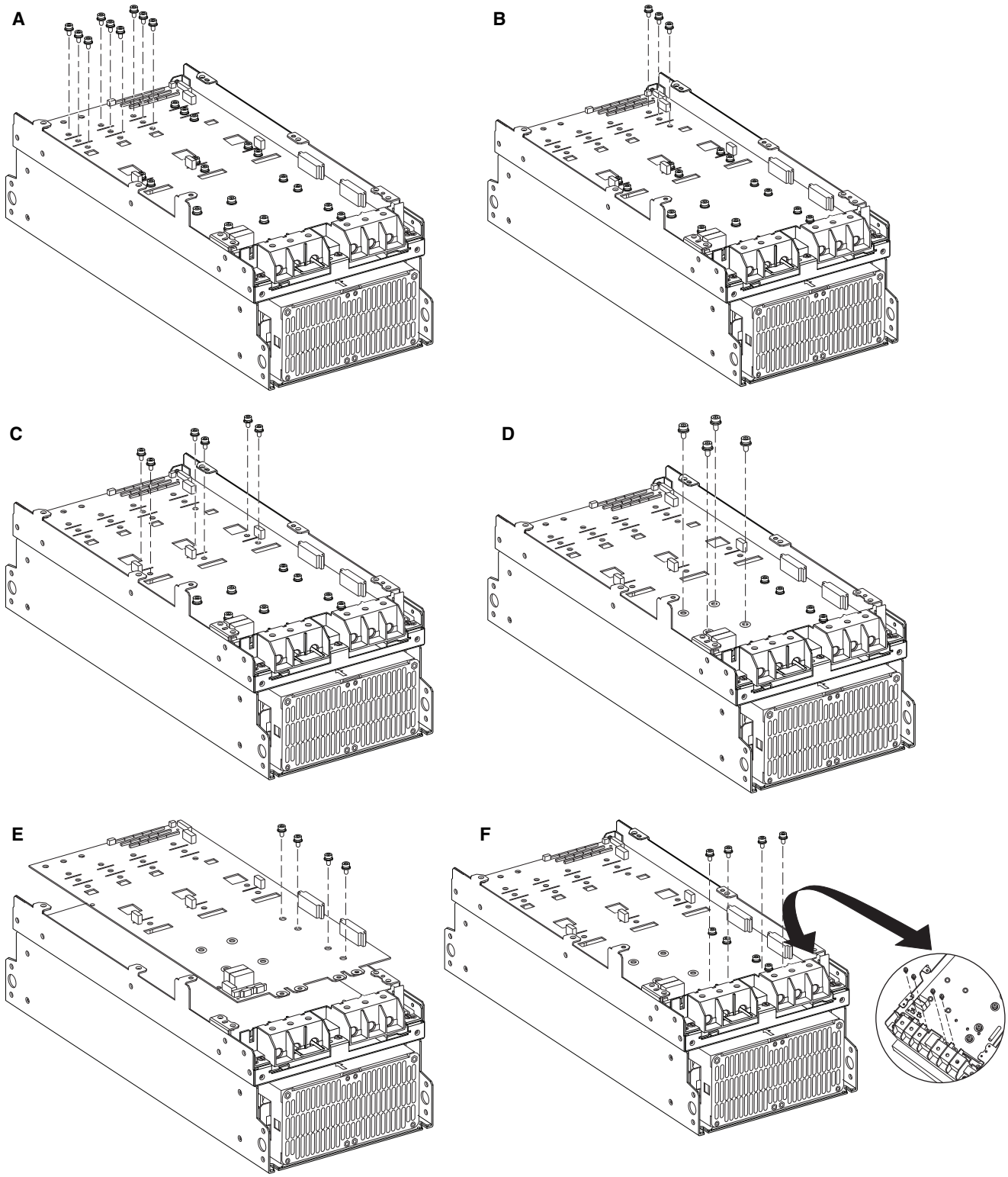
Figure 29: IGBT and SCR Module Wiring Schematic



Replace the Bus Board

8. Replace the bus board as follows. See Figure 30 on page 47.
   - — Routing the wiring harnesses between the drive frame and the bus board, position the bus in the drive. Take care not to pinch the cables between the bus board and the drive frame.
   - — Using a 3 mm Allen wrench, install nine screws (**A**) securing the bus board to the SCRs. Tighten the screws to 2.6–3.3 N•m (23–29.2 lb-in).
   - — Using a 3 mm Allen wrench, install three screws (**B**) securing the bus board to the braking IGBT module. Tighten the screws to 2.6–3.3 N•m (23–29.2 lb-in).
   - — Using a 3 mm Allen wrench, install six screws (**C**) securing the bus board to the power IGBT modules. Tighten the screws to 2.6–3.3 N•m (23–29.2 lb-in).
   - — Using a 3 mm Allen wrench, install four screws (**D**) securing the bus board to the DC choke. Tighten the screws to 2.6–3.3 N•m (23–29.2 lb-in).
   - — Using a 4 mm Allen wrench, install four screws (**E**) securing the bus board to the DC bus capacitors. Tighten the screws to 4.2–5.1 N•m (37.2–45.1 lb-in).
   - — Using a 3 mm Allen wrench, install four screws (**F**) securing the bus board to the power terminal block. Tighten the screws to 2.1–2.7 N•m (18.5–24 lb-in).
   - — Reinstall the wire connections to the SCR and IGBT modules. See Table 7 and Figure 29 on page 45 for wiring.

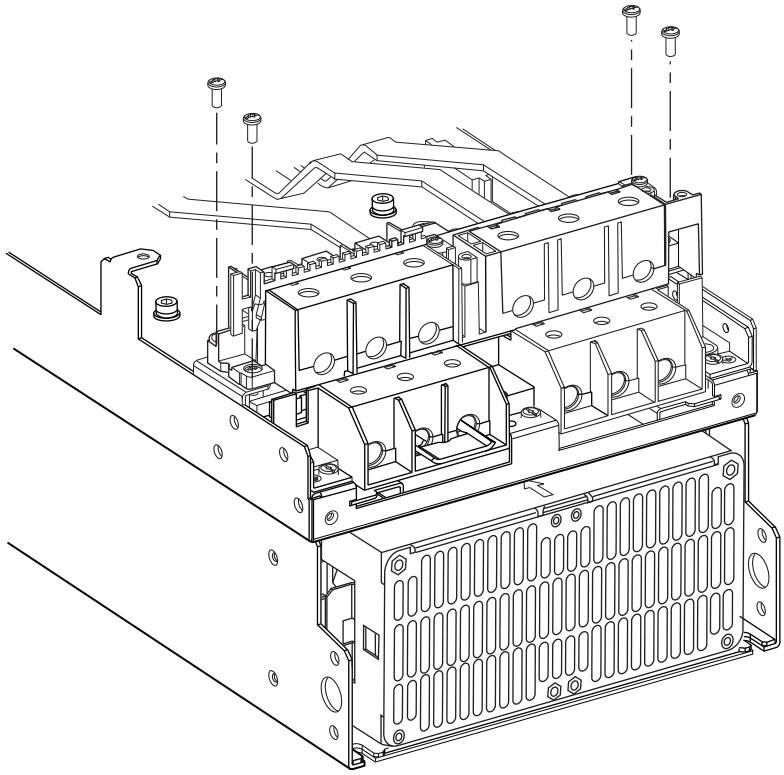
Figure 30: Bus Board Replacement



Replace the Top Power Terminal Block

9. Reinstall the top power terminal block as follows. See Figure 31.
   - — Position the power terminal block over its mounting holes on the drive frame.
   - — Using a T-20 Torx driver, install four screws securing the terminal block to the drive frame. Tighten the screws to 1.1–1.7 N•m (9.7–15.1 lb-in).

Figure 31: Power Terminal Block Replacement



Replace the Output Bus Bars

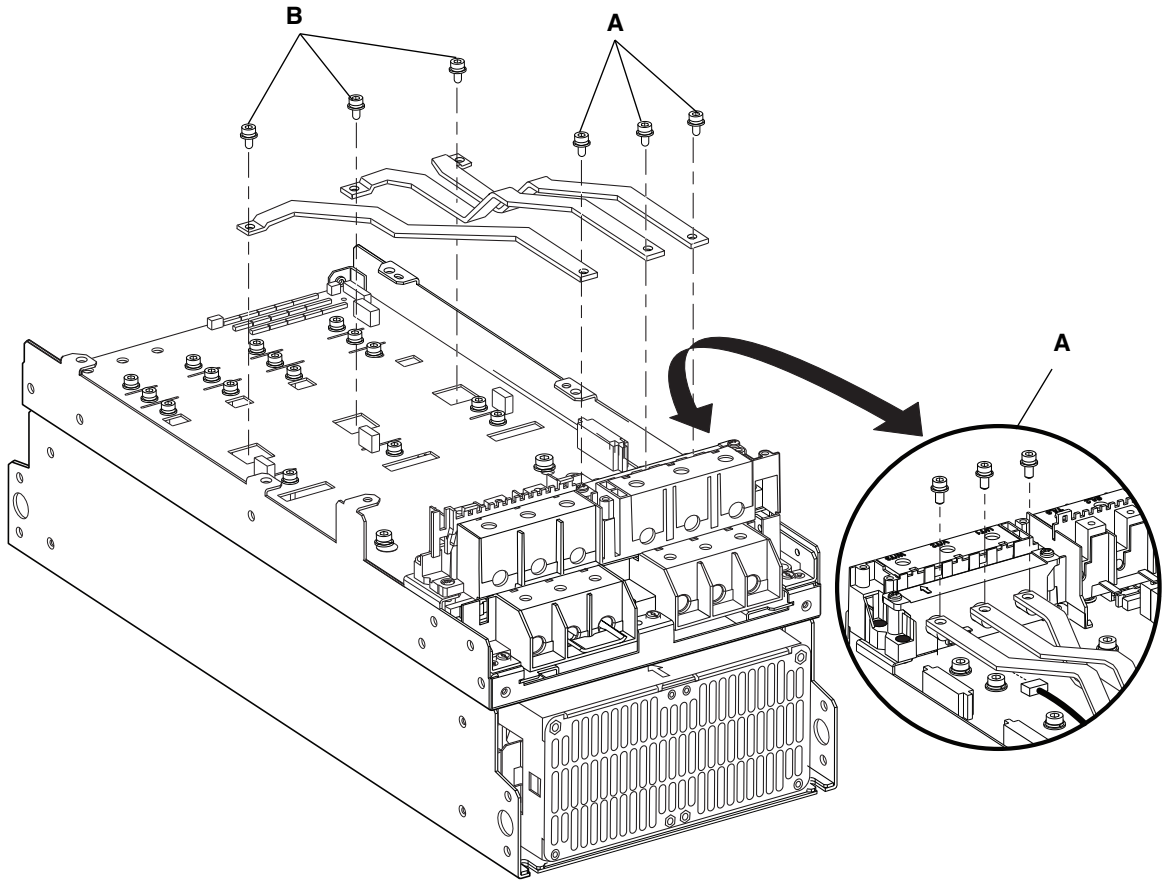
10. Replace the output bus bars as follows. See Figure 32.

> **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**) to the power IGBT modules.

— Using a 3 mm Allen wrench, install the three screws (**B**) securing the top of the output bus bars to the power IGBT modules.Tighten the screws to 2.6–3.3 N•m (23–29.2 lb-in).

— Using a 3 mm Allen wrench, install the three screws (**A**) securing the output bus bars to terminals T1, T2, and T2. Tighten the screws to 2.1–2.7 N•m (18.5–24 lb-in).

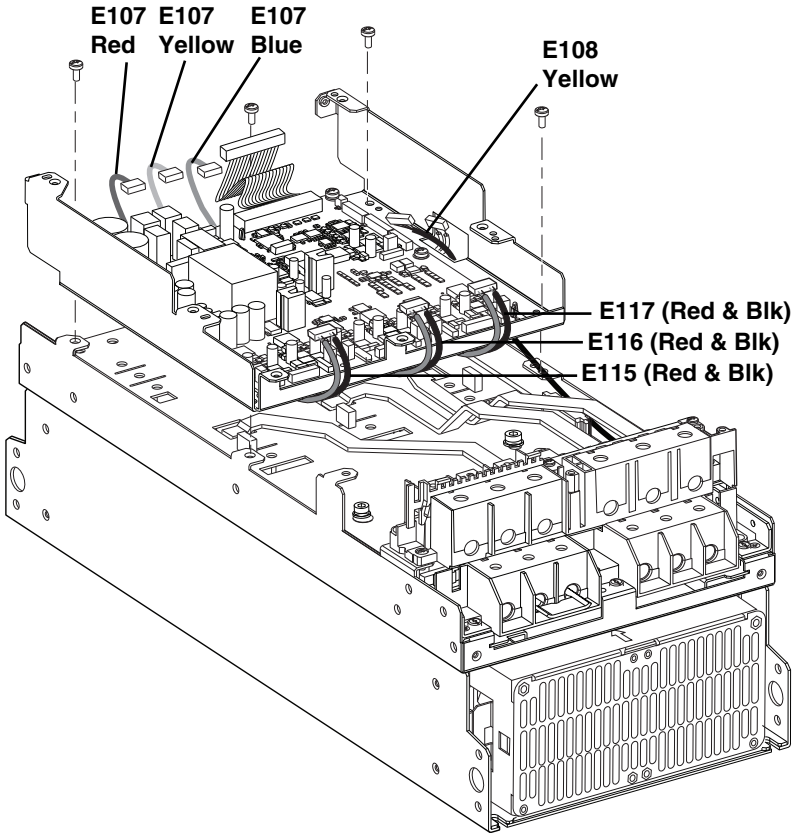
Figure 32: Output Bus Bar Replacement



Replace the Power Board Mounting Plate

11. Reinstall the power board mounting plate as follows.
    - — Routing the cables around the plate as shown in Figure 33. See Figure 47 on page 65 for wiring.
    - — Position the mounting plate over the drive frame. Take care not to pinch the cables between the mounting plate and 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 (9.7–15.1 lb-in).

Figure 33: Power Board Mounting Plate Replacement



NEXT STEP: Skip to Reassembling the Drive beginning on page 51 and consult Table 8 for the next steps.

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 10.

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 power board connections
- ❏ The middle crossbrace
- ❏ The filter board
- ❏ The input bus bars
- ❏ The top crossbrace
- ❏ The control module
- ❏ The control module cover
- ❏ The common mode choke assembly
- ❏ The output bus bar cover plate
- ❏ The insulator
- ❏ The side panels
- ❏ The top panel
- ❏ The front cover

You must perform some or all of the reassembly steps in this section after replacing the spare parts identified in Table 8. Consult Table 8 for the reassembly steps that must be performed for the corresponding spare parts.

Table 8: Reassembly Steps

If you replaced the:	Perform reassembly steps:
Filter board	**Steps 8–13**
Power terminal block	**Steps 8–13**
Power boards	**Steps 1–13**
SCR modules	**Steps 1–13**
Braking IGBT module	
Power IGBT modules	

Replace the Power Board Connections

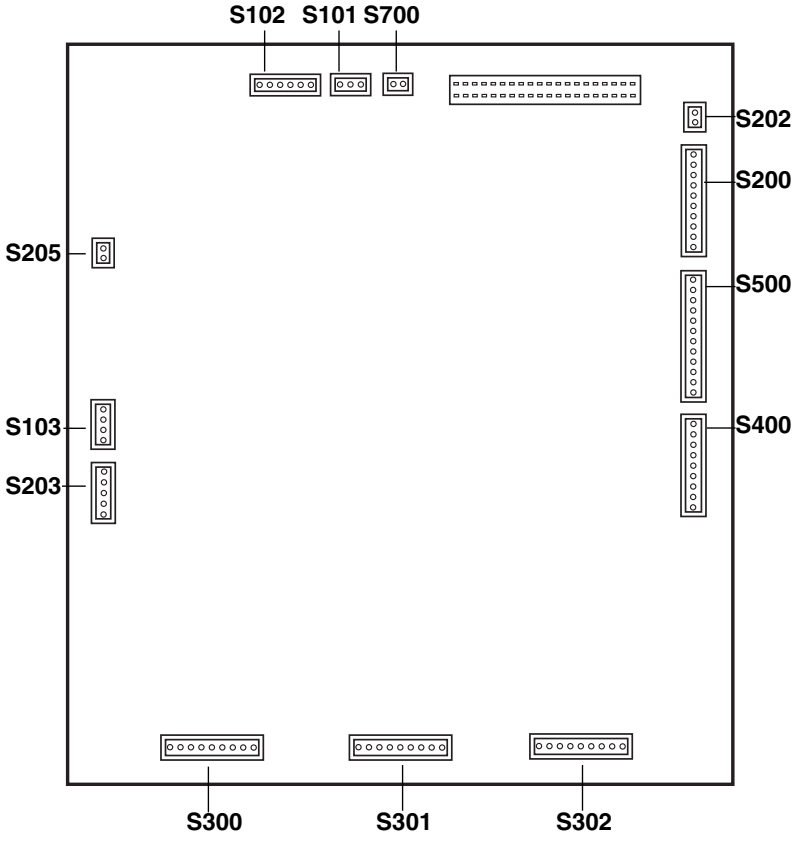
Table 9: Power Board Wiring

Wire No.[1]	Terminal No.	Description	To:
E107	**S102**	6-pin	SCR L1, L2, L3
E112	**S101**	3-pin	Bus board
E118	**S700**	2-pin	Thermal sensor
E102	**S205**	2-pin	LED
E101	**S103**	4-pin	Control module
E105	**S203**	5-pin	Main fan connector
E111	**S202**	2-pin	Bus board
E109	**S200**	10-pin	Bus board
E110	**S500**	12-pin	Power terminal block
E108	**S400**	9-pin	Braking IGBT module
			Bus board
E115	**S300**	9-pin	Power IGBT module
E116	**S301**	9-pin	Power IGBT module
E117	**S302**	9-pin	Power IGBT module

[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.

1. Install the following connections on the power board. See Table 9 and Figure 34 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 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.

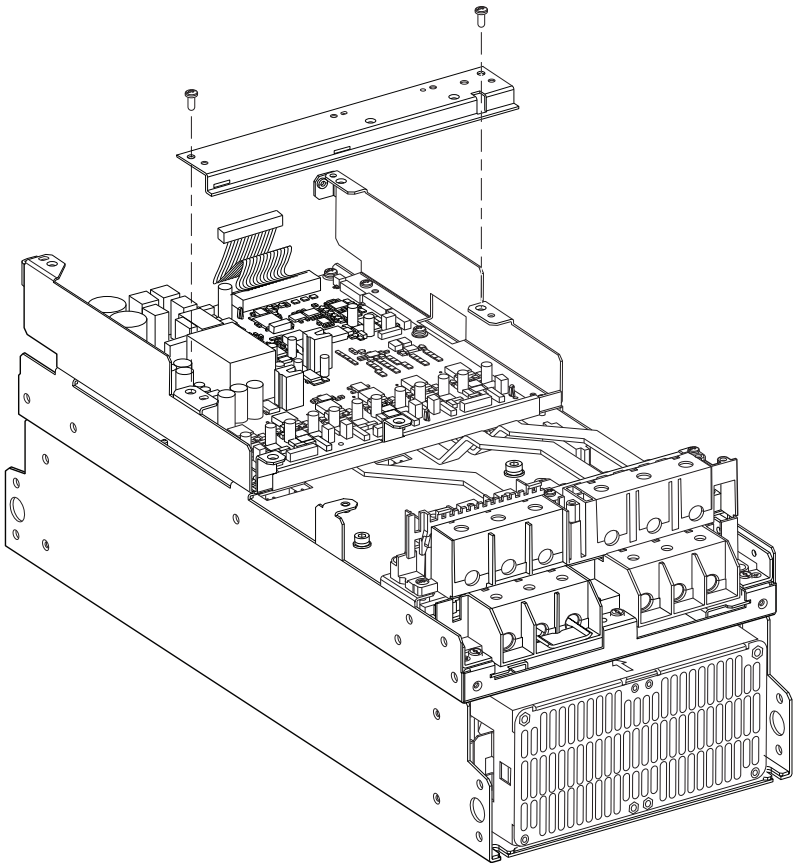
Figure 34: Power Board Connections



Replace the Middle Crossbrace

2. 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. See Figure 35. Tighten the screws to 1.1–1.7 N•m (9.7–15.1 lb-in).

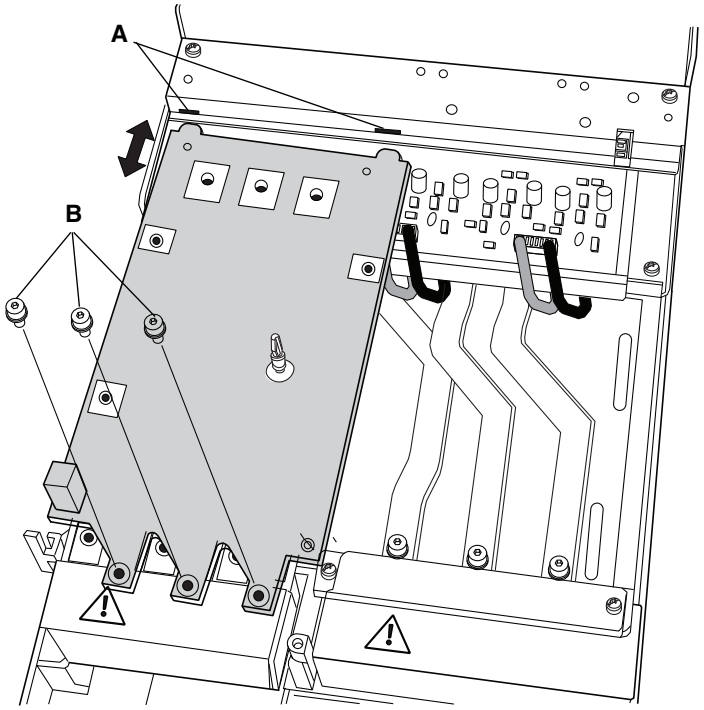
Figure 35: Middle Crossbrace Replacement



Replace the Filter Board

3. Reinstall the filter board as follows. See Figure 36.
   - — Insert the filter board retaining tabs into the slots (**A**) on the middle crossbrace. Ensure that the bottom of the board is correctly seated over input terminals L1, L2, and L3 on the terminal block.
   - — Using a 3 mm Allen wrench, secure the filter board to input terminals L1, L2, and L3 with three screws (**B**). Tighten the screws to 2.1–2.7 N•m (18.5–24 lb-in).

Figure 36: Filter Board Replacement



Replace the Input Bus Bars

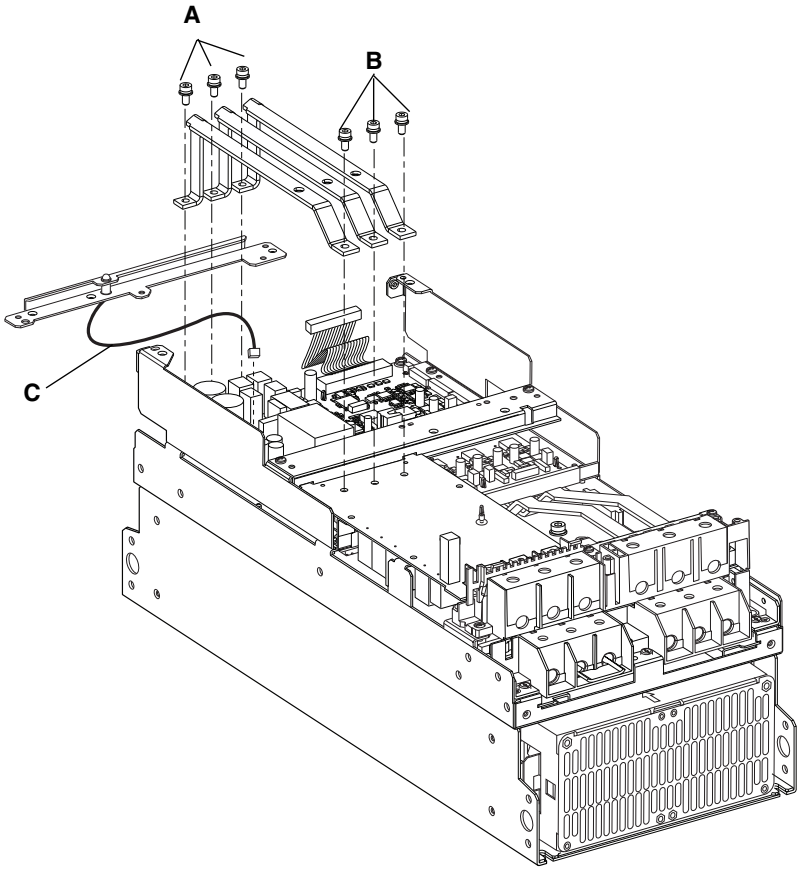
4. Replace the three input bus bars as follows. See Figure 37.

> **NOTE:** You will replace the top crossbrace in the next step. It may be easier to replace the LED connection (**C**) from the crossbrace to terminal S205 on the power board before you replace the input bus bars.

— Using a 3 mm Allen wrench, secure the input bus bars to the line terminals on the bus board with three screws (**A**). Tighten the screws to 2.6–3.3 N•m (23–29.2 lb-in).

— Using a 3 mm Allen wrench, secure the input bus bars to the filter board with three screws (**B**). Tighten the screws to 2.6–3.3 N•m (23–29.2 lb-in).

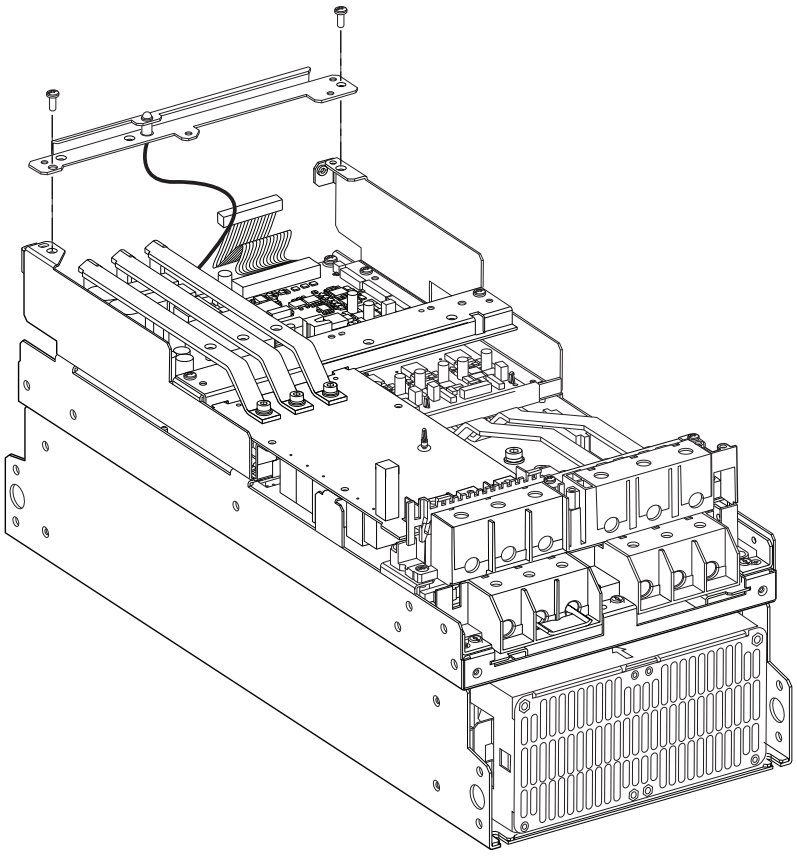
Figure 37: Input Bus Bar Replacement



Replace the Top Crossbrace

5. Install the top crossbrace as follows. See Figure 38.
   - — 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 (9.7–15.1 lb-in).
   - — Install the 2-pin connector from the LED to power board terminal S205. See Figure 34 on page 52 for the terminal location.

Figure 38: Top Crossbrace Replacement



Replace the Control Module

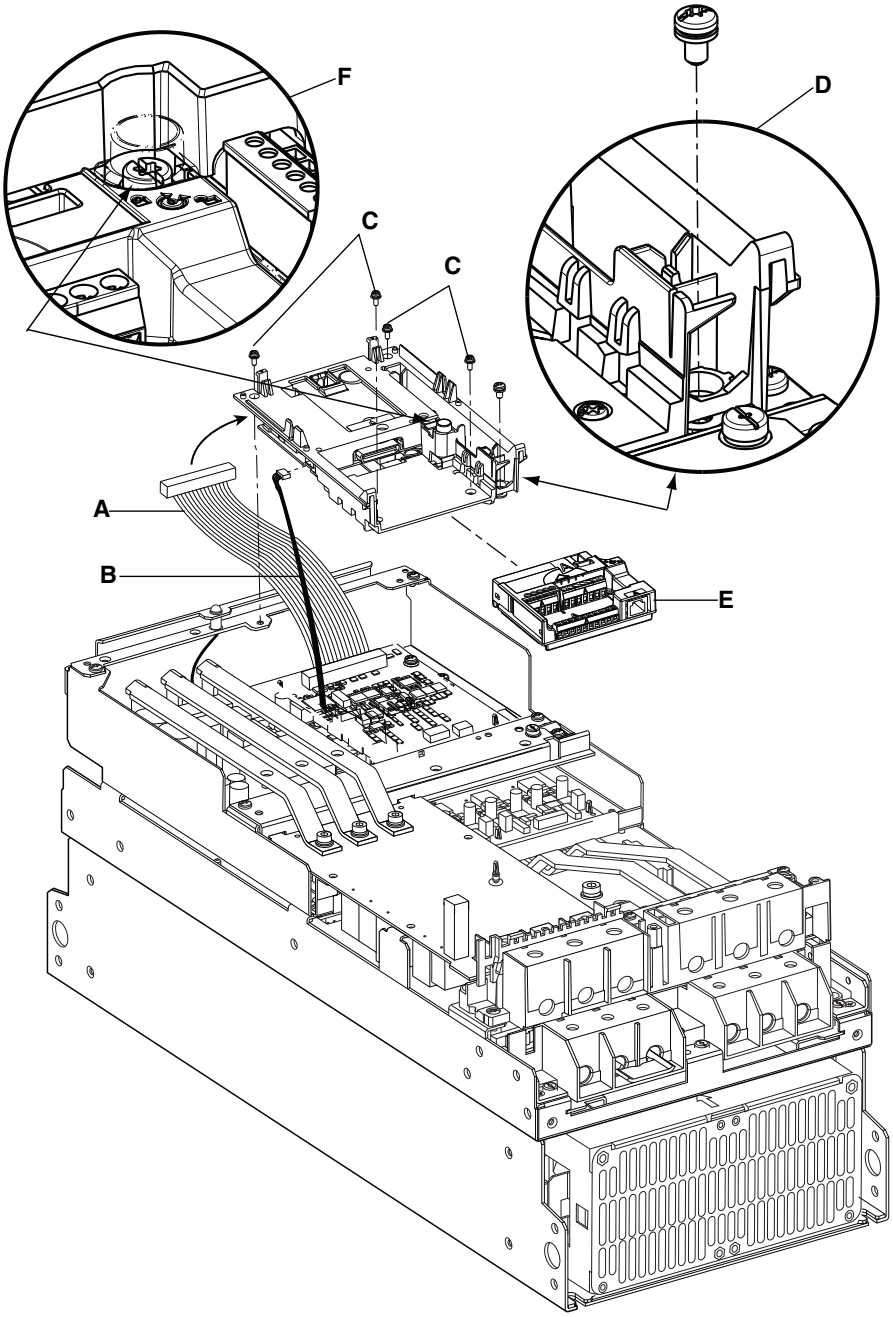
Table 10: Control Module Wiring

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

[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.

6. Reinstall the control module as follows. See Figure 39 on page 57.
   - — Carefully plug the 40-pin ribbon cable (**A**) into the back of the control module, and plug the 4-pin wire connector (**B**) into the left side of the control module.
   - — Position the control module over the top and middle crossbraces.
   - — Using a size 2 Phillips driver, install the four mounting screws (**C**) 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 (**D**) at the bottom right corner of the control module. Tighten the screw to 1.1–1.7 N•m (9.7–15.1 lb-in).
   - — Slide the terminal block (**E**) into the control module. Using a T-20 Torx driver, secure the spring-loaded screw (**F**) on the right side of the control module. Tighten the screw to 1.1–1.7 N•m (9.7–15.1 lb-in).

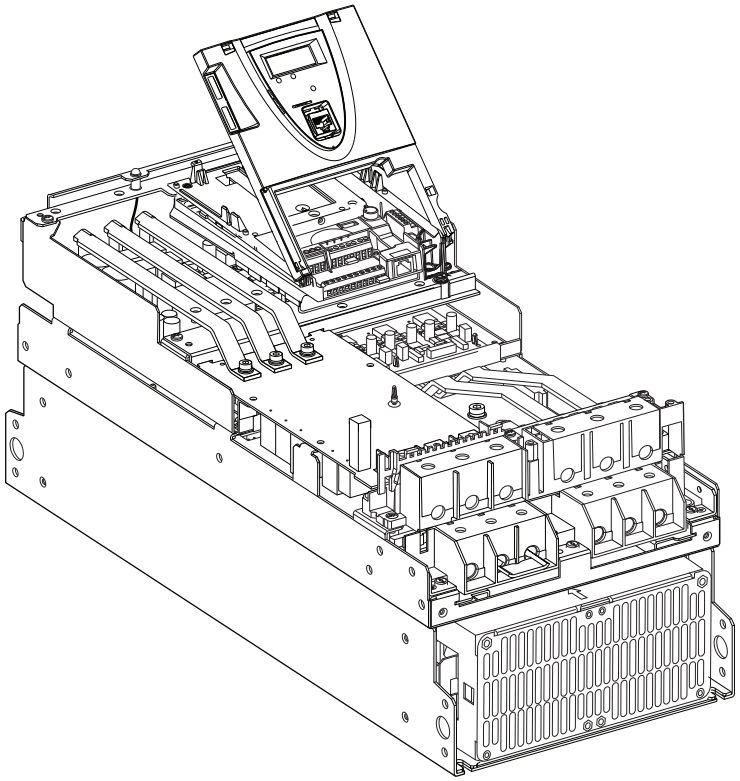
Figure 39: Control Module Replacement



Replace the Control Module Cover

7. Engage the tabs at the bottom of the control module cover and swing the cover down into place until the top snaps engage. See Figure 40.

Figure 40: Control Module Cover Replacement



Replace the Common Mode Choke Assembly

8. Reinstall the common mode choke assembly as follows. See Figure 41 on page 59.

   — Position the choke assembly between the input terminals and the input bus bars.

> **NOTE:** Orient the choke assembly with the red cable at input terminal L1, the yellow cable at terminal L2, and the blue cable at terminal L3.

   — Gently press the assembly down over the retaining tab (**A**) on the filter board until it is securely seated.

   — Using a T-20 Torx driver, secure the choke assembly to the filter board with two screws (**B**). Tighten the screws to 1.1–1.7 N•m (9.7–15.1 lb-in).

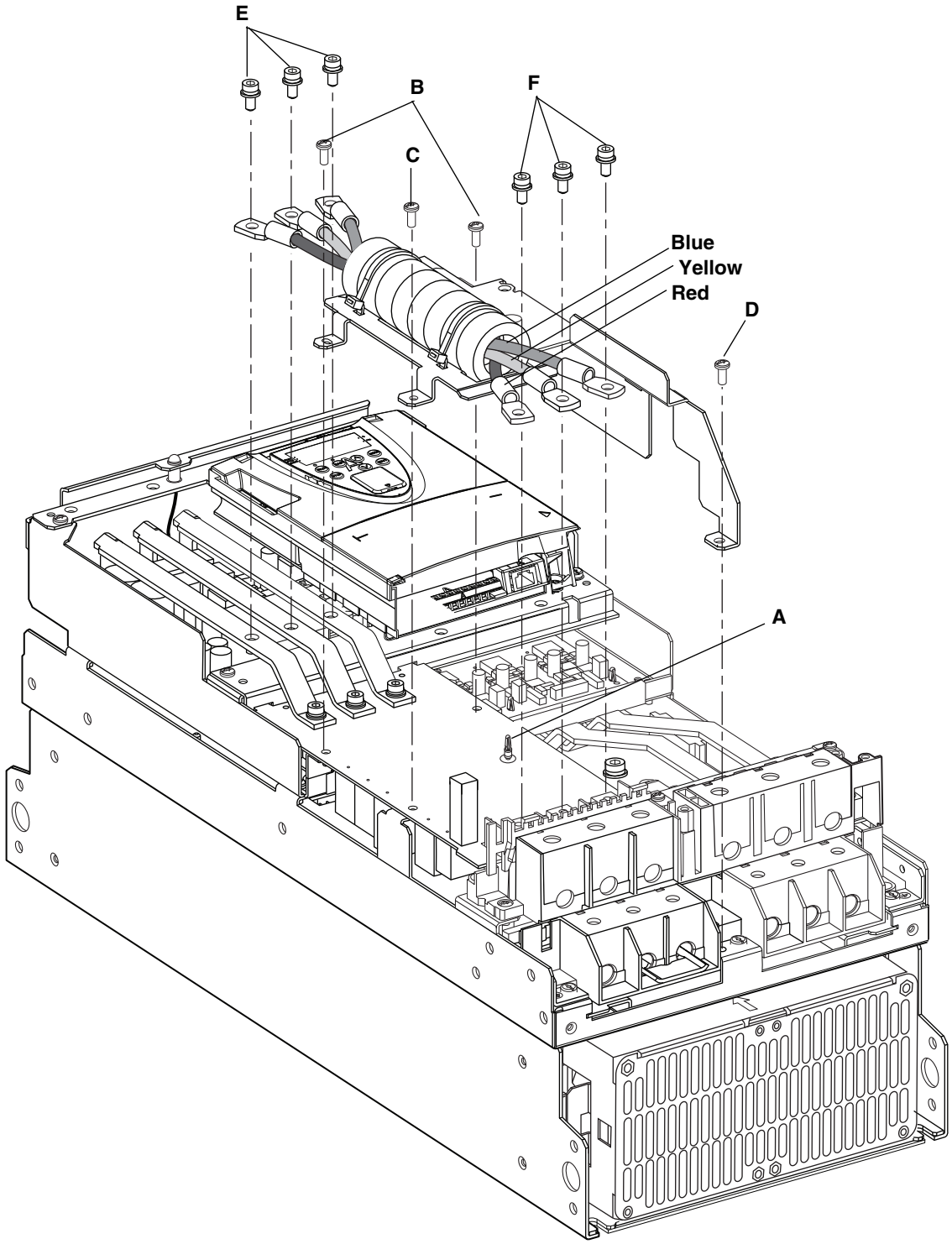
   — Using a size 2 Phillips driver, install the remaining screw (**C**) securing the choke assembly to the filter board. Tighten the screw to 1.1–1.7 N•m (9.7–15.1 lb-in).

   — Using a T-20 Torx driver, securing the choke assembly mounting plate to the drive frame with one screw (**D**). Tighten the screw to 1.1–1.7 N•m (9.7–15.1 lb-in).

   — Using a 3 mm Allen wrench, secure the choke assembly to the input bus bars with three screws (**E**). Tighten the screws to 2.6–3.3 N•m (23–29.2 lb-in).

   — Using a 3 mm Allen wrench, secure the choke assembly to input terminals L1, L2, and L3 with three screws (**F**). Tighten the screws to 2.1–2.7 N•m (18.6–23.9 lb-in).

Figure 41: Common Mode Choke Assembly Replacement

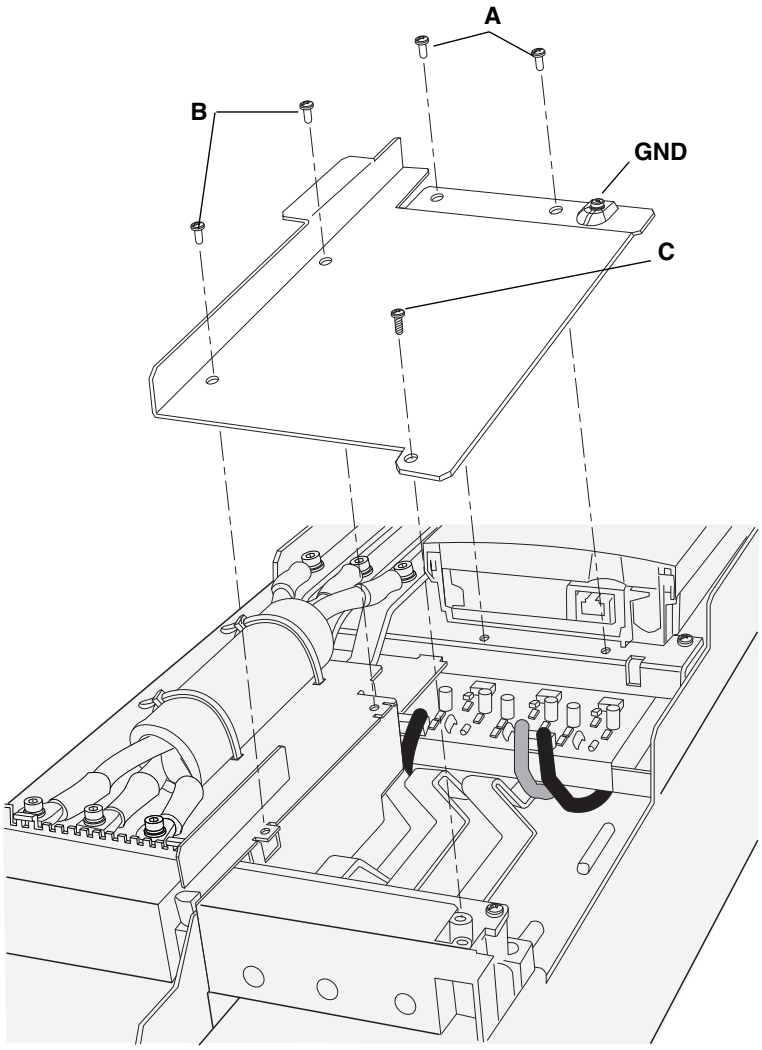


Replace the Output Bus Bar Cover Plate

NOTE: Note the differences in the output bus bar cover plate hardware. The screw (**C**) over the terminal block screws into plastic and has coarser threads than the screws that attach the cover plate to the choke assembly (**B**) and the crossbrace (**A**). Take care not to overtighten the screws in the terminal block or you may strip the threads.

9. Replace the output bus bar cover plate as follows. See Figure 42.
   - — Position the cover plate between the middle crossbrace and the power terminal block.
   - — 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 (9.7–15.1 lb-in).
   - — Using a T-20 Torx driver, secure the cover plate to the choke assembly with two screws (**B**). Tighten the screws to 1.1–1.7 N•m (9.7–15.1 lb-in).
   - — Using a T-20 Torx driver, secure the cover plate to the power terminal block with one screw (**C**). Tighten the screw to 1.8–2.2 N•m (15.9–19.5 lb-in).

Figure 42: Output Bus Bar Cover Plate Replacement



Replace the Insulator

⚠ DANGER

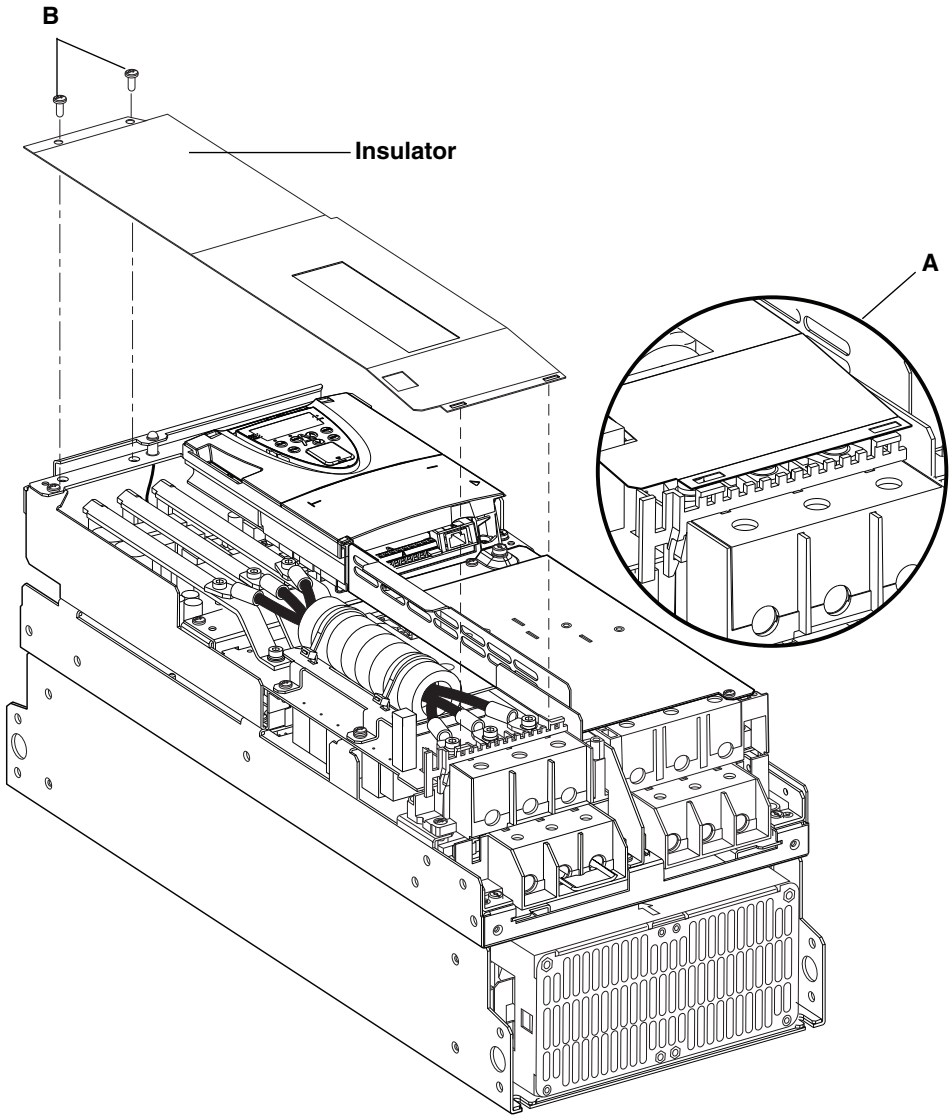
HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Install the insulator as shown in Figure 43.
- 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.

10. Replace the insulator as follows. See Figure 43.
    - — Secure the two slots in the insulator over the retaining hooks (**A**) on the power terminal block.
    - — Ensure that the right edge of the insulator is tucked under the output bus bar cover plate, and that it completely covers the input bus bars and the choke assembly.
    - — Using a T-20 Torx driver, secure the insulator to the top crossbrace with two screws (**B**).Tighten the screws to 1.1–1.7 N•m (9.7–15.1 lb-in).

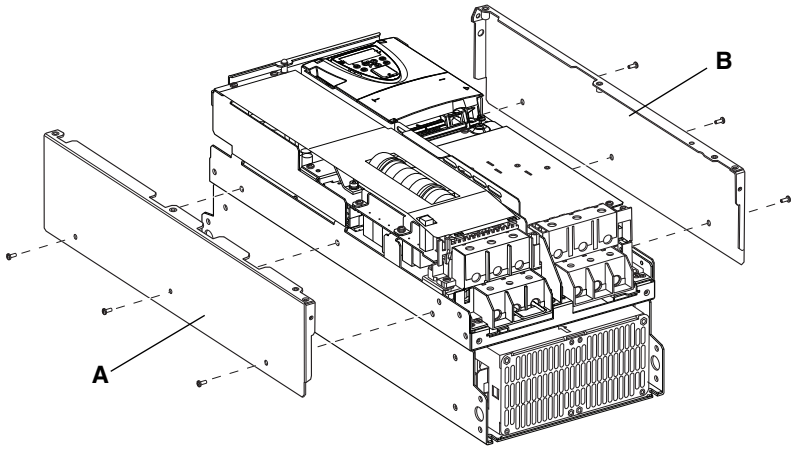
Figure 43: Insulator Replacement



Replace the Side Panels

11. Using a T-20 Torx driver, replace the side panels as follows. See Figure 44.
    - — Install the left side panel and secure it with three screws (**A**). Tighten the screws to 1.1–1.7 N•m (9.7–15.1 lb-in).
    - — Install the right side panel and secure it with three screws (**B**). Tighten the screws to 1.1–1.7 N•m (9.7–15.1 lb-in).

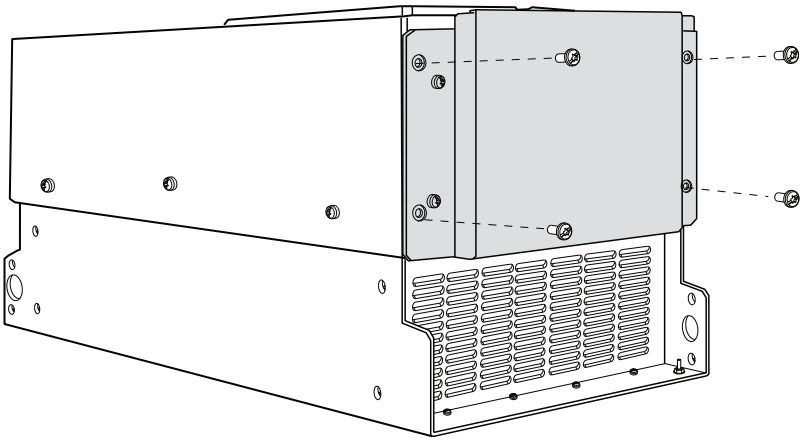
Figure 44: Side Panel Replacement



Replace the Top Panel

12. Using a T-20 Torx driver, install the top panel and secure it with four screws. See Figure 45. Tighten the screws to 1.1–1.7 N•m (9.7–15.1 lb-in).

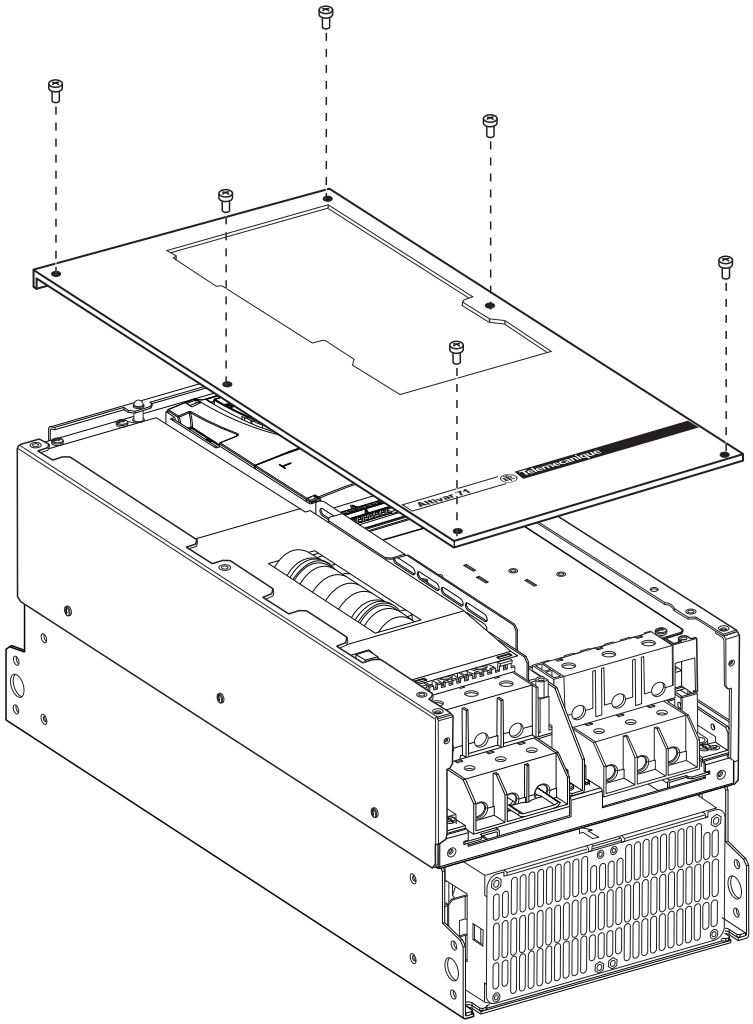
Figure 45: Top Panel Replacement



Replace the Front Cover

13. Using a size 2 Phillips driver, install the front cover and secure it with six screws. See Figure 46. Tighten the screws to 1.1–1.7 N•m (9.7–15.1 lb-in).

Figure 46: Front Cover Replacement



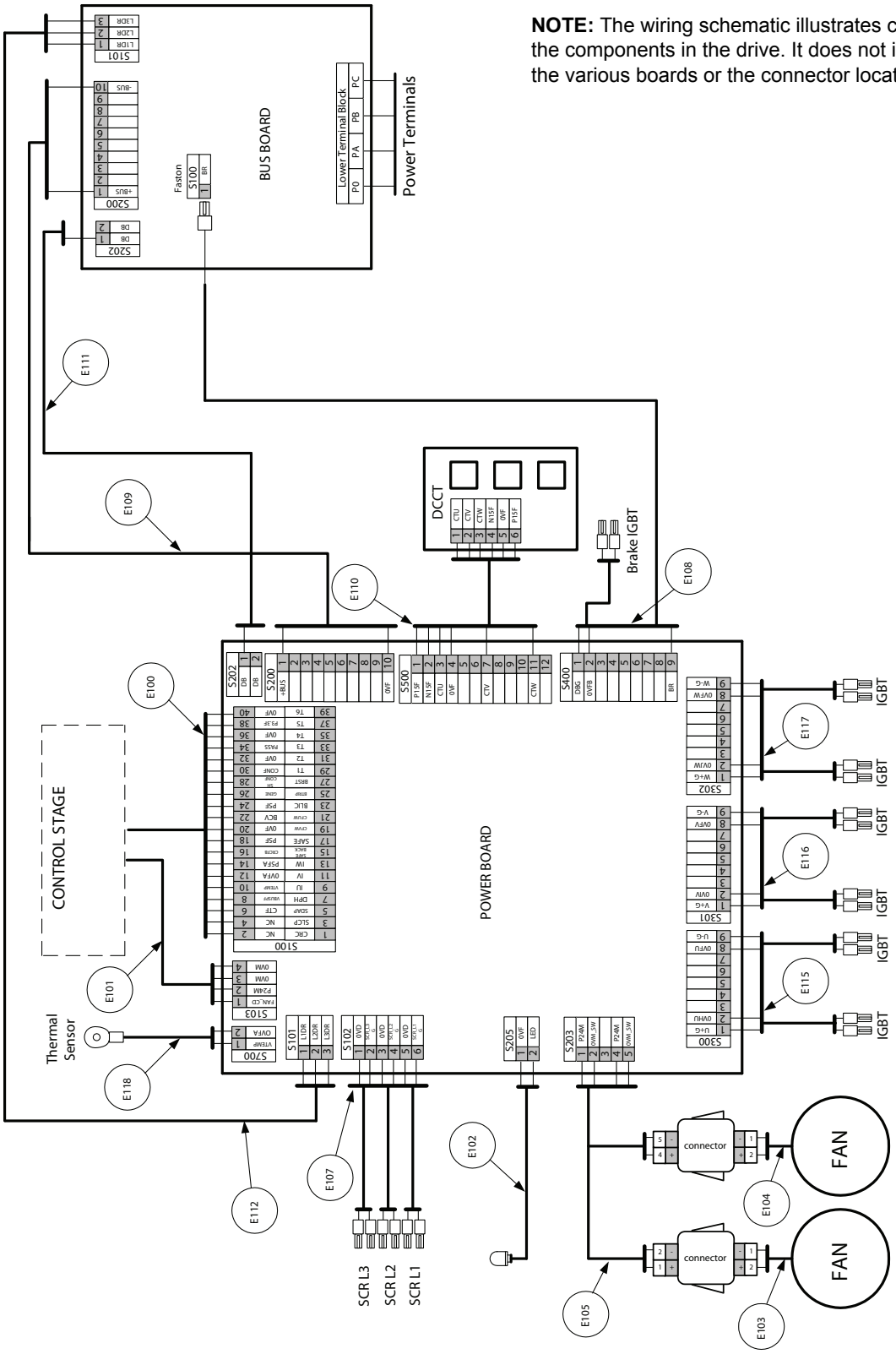
Wiring

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	Main fan connector	**—**	Main fan	**—**
E105	5-pin	Power board	**S203**	Main fan connector	**—**
E107	6-pin	Power board	**S102**	SCR L1, L2, L3	**4, 5**
E108	9-pin	Power board	**S400**	Braking IGBT module	**6, 7**
				Bus board	**S100**
E109	10-pin	Power board	**S200**	Bus board	**S200**
E110	12-pin	Power board	**S500**	Power terminal block	**—**
E111	2-pin	Power board	**S202**	Bus board	**S202**
E112	3-pin	Power board	**S101**	Bus 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 47: 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 Size 7A
Instruction Bulletin

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