



POWERWARE[®]

9315

*Uninterruptible Power
Supply*

500 kVA - 750 kVA

T1 and T3
Installation Addendum

164201244-001 Rev. A

IMPORTANT SAFETY INSTRUCTIONS

Instructions Importantes Concernant La Sécurité

SAVE THESE INSTRUCTIONS

Conserver Ces Instructions

This manual contains important instructions for your Uninterruptible Power Supply (UPS) system. You should follow these instructions during the installation and maintenance of the UPS, options, accessories, and batteries.

Cette notice contient des instructions importantes concernant la sécurité.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at their own expense.

WARNING:

This is a product for restricted sales distribution to informed partners. Installation restrictions or additional measures may be needed to prevent disturbances.

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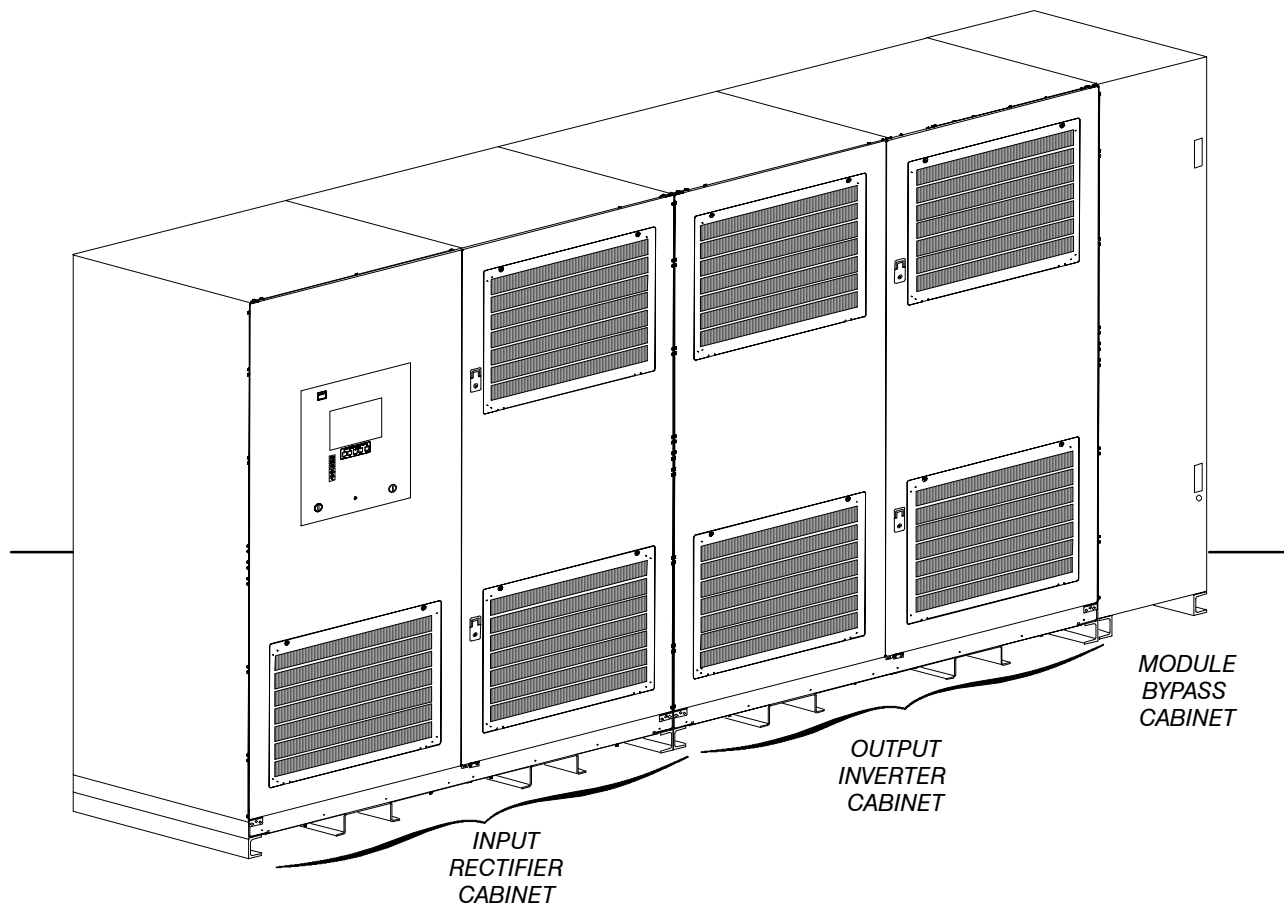
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Introduction

This manual provides information for removing and installing transformers T1 and T3. The procedures in this manual are provided to facilitate shipping the system when weight restrictions, at the receiving facility, prevent shipping the system with T1 and T3 assembled in the system cabinets.

The UPS system is housed in a free-standing cabinet, divided into three sections to facilitate shipping. The cabinet sections line up and match in style and color, and have safety shields behind the doors for hazardous voltage protection. The following illustration depicts a typical Powerware 9315 (500 kVA–750 kVA) UPS System.



Typical Powerware 9315 (500 kVA–750 kVA) UPS System

Using This Manual

Read and understand the procedures described in this manual to ensure trouble-free removal and installation of T1 and T3. Read through each procedure before you begin.

The information in this manual is divided into the chapters listed.

- **Introduction** – The Introduction provides a brief description of the purpose of the manual, a description of the content of each chapter, safety, text conventions used in the manual and reference information.
- **Chapter 1 – Getting Started** – describes how to prepare for the removal and installation of transformers T1 and T3. It discusses required equipment and removal and installation guidelines.
- **Chapter 2 – Removing Transformer T1** – describes how to remove transformer T1 from the UPS Inverter cabinet for separate shipment.
- **Chapter 3 – Removing Transformer T3** – describes how to remove transformer T3 from the UPS Rectifier cabinet for separate shipment.
- **Chapter 4 – Reinstalling Transformer T1** – describes how to unpack and reinstall transformer T1 into the UPS Output/Inverter cabinet.
- **Chapter 5 – Reinstalling Transformer T3** – describes how to unpack and reinstall transformer T3 into the UPS Input/Rectifier cabinet.
- **Chapter 6 – Dielectric Testing** – describes how to test the the UPS after transformer replacement.
- **Chapter 7 – Final Assembly** – describes installation of rear panels and front doors after testing is completed.

Conventions Used in This Manual

The text in this manual uses these conventions:

- **Bold type** highlights important concepts in discussions, key terms in procedures, and menu options.
- *Italic type* highlights notes and new terms where they are defined.
- Rectangular boxes containing bold type are warnings or cautions that pertain to the UPS or its electrical connections.

In this manual, the term *UPS* refers only to the UPS cabinet and its internal elements. The term *UPS system* refers to the entire power protection system — the UPS modules, battery strings and options or accessories installed.

Safety Considerations

The UPS cabinet is designed for industrial or computer room applications, and contain safety shields behind the doors. However, the UPS system is a sophisticated power system and should be handled with appropriate care, following these guidelines:

- **Keep surroundings clean and free from excess moisture.**
- **Do not operate the UPS system close to gas or electric heat sources.**
- **The system is not intended for outdoor use.**
- **The operating environment should be maintained within the parameters stated in this manual.**
- **Keep the cabinet doors closed and locked to ensure proper cooling airflow and to protect personnel from dangerous voltages inside the unit.**
- **The UPS system contains its own power source. Lethal voltages are present even when the UPS is disconnected from utility power.**

WARNING:

Only AUTHORIZED SERVICE PERSONNEL should perform maintenance on or service the UPS system.

If service or routine maintenance is required:

- **Ensure all power is disconnected before performing installation or service.**
- **Ensure the area around the UPS system is clean and uncluttered.**
- **Battery maintenance or battery replacement should be performed only by authorized service personnel.**
- **Observe all DANGER, CAUTION, and WARNING notices affixed to the inside and outside of the equipment.**

For More Information

This manual describes how to remove and install transformers T1 and T3. For information about the installation and operation of the Powerware 9315 (500 kVA – 750 kVA) UPS , refer to the following:

164201244	<i>Powerware® 9315 (500 kVA – 750 kVA) UPS Installation and Operation</i>
Installation	Provides installation instructions for the UPS cabinet, and optional components and accessories. Site preparation, planning for installation, and wiring and safety information are supplied. Detailed illustrations of cabinets and optional accessories, including dimensional and connection point drawings are provided.
Operation	Describes the UPS cabinet Control Panel and Monitor Panel, and explains the functions of the UPS; discusses the standard features of the UPS and optional accessories; provides procedures for starting and stopping the UPS, and information about maintenance and responding to system events. Also described are the RS–485 and RS–232 serial communications capabilities of the UPS system; discusses the two communications ports on the Customer Interface Panel inside the UPS and how to connect optional remote accessories to your UPS system; provides information about enabling, disabling, and customizing building alarms.

Contact your local Field Service office for information on how to obtain copies of this manual.

Getting Help

If you have a question about any of the information in this manual, or if you have a question this manual does not answer, please call Powerware Corporation Field Service:

United States	1-800-843-9433
Canada	1-800-461-9166
Outside the U.S.	Call your local representative

1.1 Required Tools and Equipment

Refer to Tables 1–1, 1–2, 1–3 for the tools and equipment required to remove or install transformers T1 and T3.

Table 1–1. Tools		
<i>Tool</i>	<i>Specifications</i>	<i>Comments</i>
Common Hand Tools	N/A	
Metric Open End Wrench Set	N/A	Use 13mm wrench for transformer lug bolts and nuts.
Metric Socket set	N/A	Use 13mm socket for transformer lug bolts and nuts.
Torque Wrench	0 to 25 Nm minimum	Used for all transformer lug bolts
Allen Wrench	5/32 inch	Used for K6 terminals

Table 1–2. Heavy Equipment	
<i>Equipment</i>	<i>Specifications</i>
Fork Lift Truck	4000 pound lifting capacity minimum

Table 1–3. Test Equipment	
<i>Equipment</i>	<i>Specifications</i>
Dielectric Voltage Withstand Tester	<ul style="list-style-type: none"> •Calibrated AC or DC potential output •Applied potential indicator •Audible or visual indicator of electrical breakdown •If the output transformer is less then 500 VA then the voltage meter must be connected across its output. If the output transformer is greater then 500 VA then the voltage may be measured on either the primary or a tertiary winding.
Test Jumpers	Various Lengths (3 feet to 10 feet)
Timing Device	Watch, clock or stopwatch

1.2 **Removal and Installation Guidelines**

Use the following guidelines to prepare for removing or installing transformers T1 and T3:

- Before beginning the removal or installation of the transformers, read and understand this manual.
- Use the procedures and illustrations in the following chapters to create a logical plan for performing the required procedures.
- Refer to the UPS Installation and Operation Manual referenced in the Introduction, for UPS cabinet handling and unpacking instructions.
- Choose a removal or installation work area that provides adequate space for access to the front and rear of the cabinets. In addition, space must be allowed for the fork lift truck to gain access to the rear of the cabinet and removal of the transformer.
- Failure to follow guidelines may invalidate UPS warranty.

1.3 **Preliminary Operational Checks**

Once Transformers T1 and T3 have been reinstalled, preliminary operational checks and startup must be performed.

NOTE: *Startup and operational checks should be performed only by authorized service personnel only.*

Removing Transformer T1



2.1 Transformer T1 Removal

WARNING:

Removal should be performed only by qualified personnel.

To remove Transformer T1, perform the procedures in the following paragraphs. Refer to Chapter 1 *Getting Started* for tools and equipment required to remove transformer.

2.1.1 Hardware Removal for Access to T1

To gain access to T1, perform the following procedure:

NOTE: *Retain all removed assemblies and hardware, and store in a safe place to prevent damage. Assemblies and hardware will be reinstalled upon completion of the removal procedure.*

1. Move the Output/Inverter Cabinet to the work area determined using the guidelines presented Chapter 1 *Getting Started*.
2. Open cabinet doors.
3. Remove top door hinges and remove doors.
4. Remove four rear panels from cabinet as follows (see figure 2–1):
 - a. Remove panel 1 by loosening four screws at bottom of panel and removing ten screws from top and sides. Remove panel.
 - b. Remove panel 2 by loosening four screws at bottom of panel and removing ten screws from top and sides. Remove panel.
 - c. Remove panel 3 by loosening four screws at bottom of panel and removing six screws from sides. Remove panel.
 - d. Remove panel 4 by loosening four screws at bottom of panel and removing six screws from sides. Remove panel.
5. Remove vertical center channel by removing two top and two bottom screws (see figure 2–2).
6. Remove rear transformer baffle by removing two screws(see figure 2–2).
7. Disconnect blower connectors B8P1 through B11P1.
8. Remove four front screws, and one left and one right side screw securing blower assembly B8–B11 (see figure 2–3).

WARNING:

Blower assemblies B8-B11 and B12-B15 are heavy and may require two persons to remove.

9. Slide blower assembly forward to disengage tabs from under lower dead front panel and remove assembly (see figure 2-3).
10. Remove two screws securing side inverter baffle and remove baffle (see figure 2-4).
11. Remove four screws securing front inverter baffle and remove baffle.
12. Disconnect blower connectors B12P1 through B15P1.
13. Loosen three bottom screws securing Blower Assembly B12-B15 (see figure 2-3).
14. Remove four top screws securing Blower Assembly B12-B15.
15. Slide blower assembly up and off of lower mounting screws and remove assembly.
16. Loosen three top screws on lower deadfront panel (see figure 2-3).
17. Remove eight screws from upper deadfront panel and remove panel.
18. Remove eight screws from lower deadfront panel and remove panel.
19. Remove front transformer baffle by removing two screws (see figure 2-5).

2.1.2 Disconnecting T1 Power Wiring

To disconnect T1 power wiring, perform the following procedure:

CAUTION:

In the following steps, ensure that no hardware falls into the transformer. As a precaution, cover the top of the transformer windings with a cloth or cardboard. Any hardware falling into the transformer must be removed.

1. Disconnect all output wires from transformer terminal lugs X1, X2, and X3. Reinstall hardware to terminal lugs and secure (see figure 2-5).
2. If used, disconnect all output wires from transformer terminal lugs X11, X21, X31. Reinstall hardware to terminal lugs and secure.
3. Disconnect all output wires from transformer terminal lugs X01, X02, and X03. Reinstall hardware to terminal lugs and secure.
4. Disconnect all input wires from transformer terminal lugs H1, H2, and H3. Reinstall hardware to terminal lugs and secure.
5. Disconnect and remove three jumper wires between terminal lugs H1 and H21, H2 and H31, and H3 and H11.
6. Disconnect transformer ground wire from cabinet base (see figure 2-2).

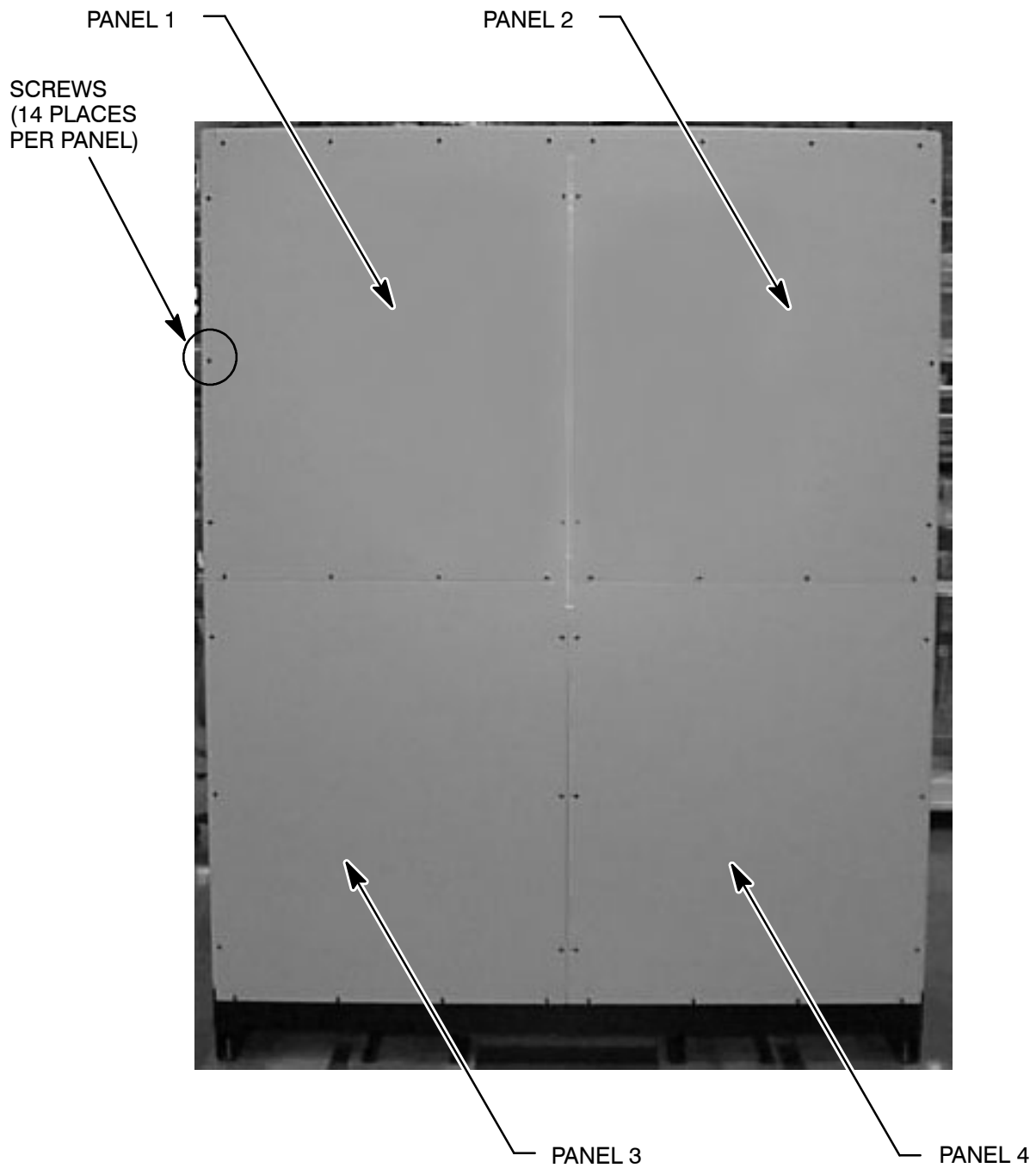


Figure 2–1. Output/Inverter Cabinet Rear Panels

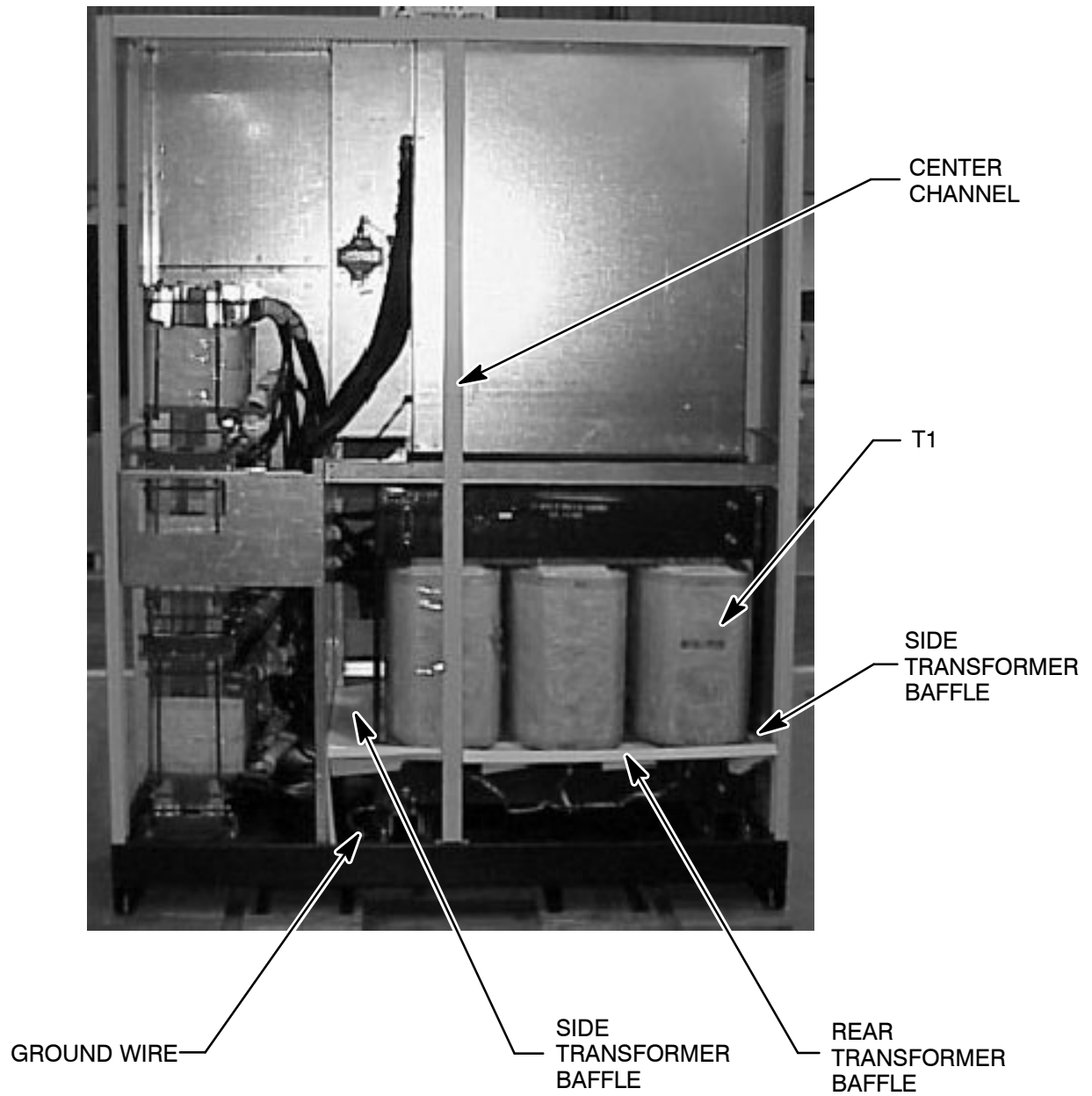


Figure 2-2. Output/Inverter Cabinet Rear Interior View

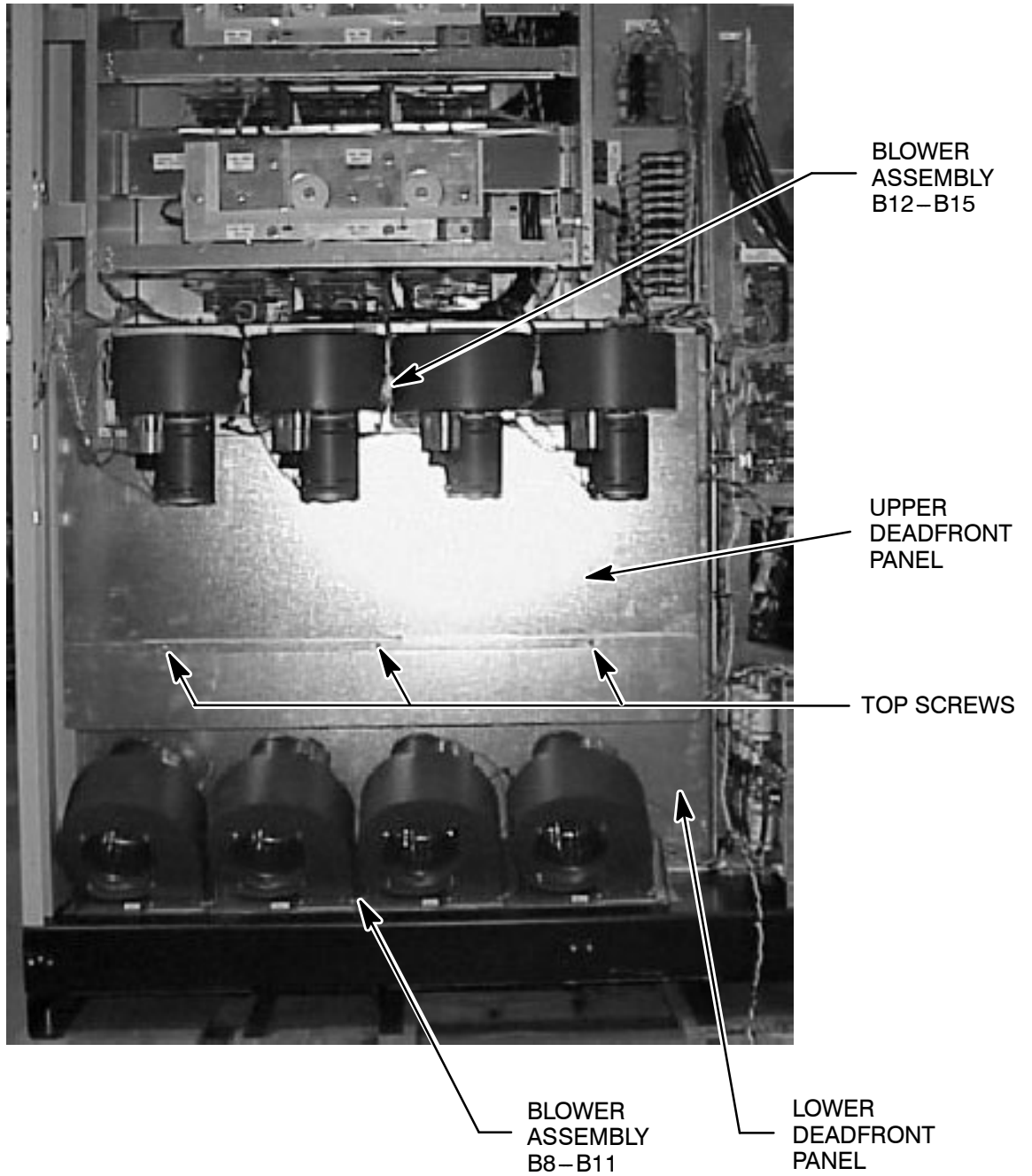


Figure 2-3. Output/Inverter Cabinet Front Interior View



FRONT
INVERTER
BAFFLE

BLOWER ASSEMBLY
B12–B15

SIDE
INVERTER
BAFFLE

Figure 2–4. Output/Inverter Blower Assembly B12–B15 Inverter Baffles

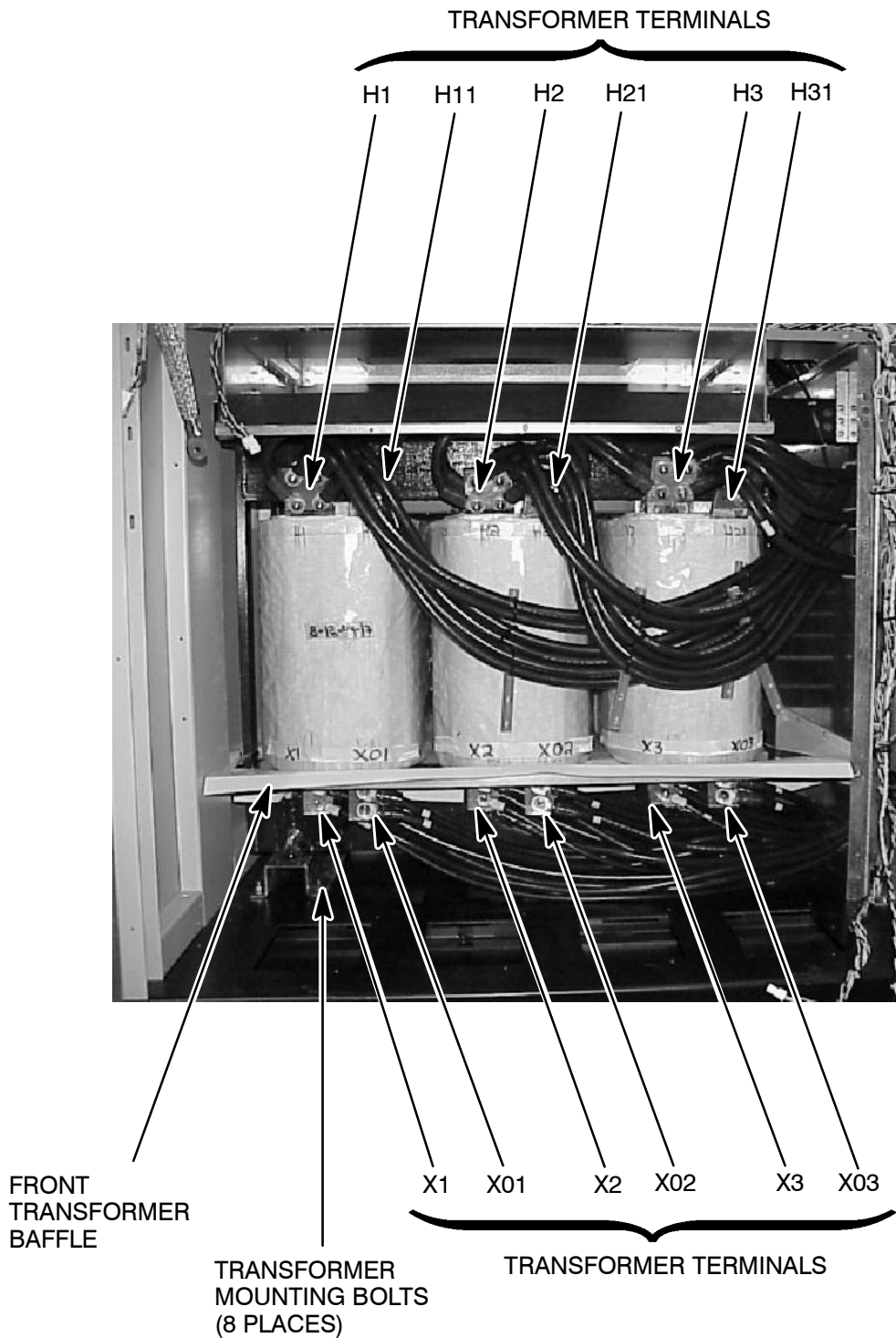


Figure 2-5. Transformer T1 Wiring

2.1.3 Removing T1

To remove T1, perform the following procedure:

CAUTION:

Lift only with forklift or transformer damage may occur.

NOTE: In steps 1 and 10, gain access to the transformer mounting hardware inside the cabinet base through the cooling air cutouts in the cabinet base.

1. Remove eight transformer mounting bolts, nuts, and washers securing transformer to cabinet base (see figure 2–5). Retain hardware.
2. Position the transformer power cables, so that the cables will not interfere with the removal of the transformer from the cabinet.
3. Adjust forks on fork lift to correspond to the spacing between the transformer mounting rails.
4. Slowly move fork lift into position under transformer.
5. Carefully lift transformer just enough to clear cabinet base. Ensure top of transformer does not come in contact with the horizontal cabinet brace.

NOTE: In step 6, hold side transformer baffles (see figure 2–2) away from transformer while removing transformer.

6. Move forklift backward, removing transformer from cabinet.

CAUTION:

In step 7, ensure that no hardware falls into the transformer. As a precaution, cover the top of the transformer windings with a cloth or cardboard. Any hardware falling into the transformer must be removed.

7. Connect jumper wires to transformer lugs using the information contained in table 2–1. Mount one wire to front of lug and one to back of lug, using two flat washers (one on back and one on front of bolt), one belleville washer, and one nut. Tighten bolts securely. See figure 2–5 for terminal lug locations.

Table 2–1. T1 Jumper Wire Installation

Wire Number	Number of Wires	From	To
154	2	T1-H3	T1-H11
155	2	T1-H1	T1-H21
156	2	T1-H2	T1-H31

8. Move transformer to shipping pallet and place on pallet.
9. Secure transformer to shipping pallet and cover with packing material.
10. Reinstall transformer mounting bolts into cabinet mounting holes for shipping.

2.1.4 Assembly and Hardware Reinstallation

To reinstall assemblies and hardware removed in paragraph 2.1.1, perform the following procedure:

NOTE: *In the following steps, use the hardware removed in paragraph 2.1.1.*

1. Install front transformer baffle and secure with two screws (see figure 2–5).
2. Install lower deadfront panel and secure with eight screws (see figure 2–3).
3. Slide upper deadfront panel over the three top screws on the lower deadfront panel. Secure upper panel with eight screws.
4. Secure three top screws on lower deadfront panel.

WARNING:

Blower assemblies B8–B11 and B12–B15 are heavy and may require two persons to remove.

5. Position Blower Assembly B12–B15 over cooling air cutouts on upper dead front panel and slide mounting slots over lower mounting screws (see figure 2–3).
6. Install four top screws securing blower assembly.
7. Secure three bottom screws attaching Blower Assembly B12–B15.
8. Move blower assembly wiring harness into position behind blowers.
9. Reconnect blower connectors B12P1 through B15P1 to connectors B12J1 through B15P1 on wiring harness.
10. Install front inverter baffle and secure with four screws (see figure 2–4).
11. Install side inverter baffle and secure with two screws.
12. Position Blower Assembly B8–B11 onto cabinet base and slide forward (toward the lower dead front panel) to engage tabs under lower dead front panel (see figure 2–3).
13. Secure blower assembly to cabinet base with four front screws, and one left and one right side screw.
14. Move blower assembly wiring harness into position behind blowers.
15. Reconnect blower connectors B8P1 through B11P1 to connectors B8J1 through B11P1 on wiring harness.
16. Install rear transformer baffle and secure with two screws (see figure 2–2).
17. Install vertical center channel and secure with two top and two bottom screws (see figure 2–2).

- 18.** Install four rear panels onto cabinet as follows (see figure 2–1):
 - a.** Install panel 4 over four screws at bottom of cabinet base. Secure with six screws on sides of panel and four at the bottom of panel.
 - b.** Install panel 3 over four screws at bottom of cabinet base. Secure with six screws on sides of panel and four at the bottom of panel.
 - c.** Install panel 2 above panel 4, inserting screws in bottom of panel into slots at the top of panel 4. Secure with ten screws on top and sides and four screws at bottom of panel.
 - d.** Install panel 1 above panel 3, inserting screws in bottom of panel into slots at the top of panel 3. Secure with ten screws on top and sides and four screws at bottom of panel.
- 19.** Install doors and top door hinges.
- 20.** Close cabinet doors.
- 21.** Proceed to Chapter 3 *Removing Transformer T3* of this manual.

3.1 Transformer T3 Removal

WARNING:

Removal should be performed only by qualified personnel.

To remove Transformer T3, perform the procedures in the following paragraphs. Refer to Chapter 1 *Getting Started* for tools and equipment required to remove transformer.

3.1.1 Hardware Removal for Access to T3

To gain access to T3, perform the following procedure:

NOTE: *Retain all removed assemblies and hardware, and store in a safe place to prevent damage. Assemblies and hardware will be reinstalled upon completion of the removal procedure.*

1. Move the Input\Rectifier Cabinet to the work area determined using the guidelines presented Chapter 1 *Getting Started*.
2. Open cabinet doors.
3. Remove top door hinges and remove doors.
4. Remove four rear panels from cabinet as follows (see figure 3–1):
 - a. Remove panel 1 by loosening four screws at bottom of panel and removing ten screws from top and sides. Remove panel.
 - b. Remove panel 2 by loosening four screws at bottom of panel and removing ten screws from top and sides. Remove panel.
 - c. Remove panel 3 by loosening four screws at bottom of panel and removing six screws from sides. Remove panel.
 - d. Remove panel 4 by loosening four screws at bottom of panel and removing six screws from sides. Remove panel.
5. Remove screw securing left side of transformer baffle to cabinet (see figure 3–2).
6. Remove four top and two bottom screws securing vertical center channel to cabinet (see figure 3–2).
7. Carefully disengage transformer baffle from transformer and remove vertical center channel with baffle attached from cabinet.
8. Remove three screws securing vertical center channel bracket to cabinet, and remove bracket (see figure 3–3).

9. Disconnect blower connectors B1P1 through B4P1 and move wiring harness to left side of cabinet.
10. Remove five front screws securing blower assembly B1 –B4 to cabinet base (see figure 3–4).
11. Loosen three screws securing the back of blower assembly B1 –B4 to cabinet base (see figure 3–4).

WARNING:

Blower assembly B1–B4 are heavy and may require two persons to remove.

12. Slide blower assembly forward to disengage screws and remove assembly (see figure 3–4).
13. Remove Input Filter A2 panel from cabinet as follows (see figure 3–5):
 - a. Disconnect wires from K6 terminals 2T1, 4T2 and 6T3.
 - b. Disconnect connector A2P1 from A2J1.
 - c. Loosen three bottom screws on Input Filter A2 panel.
 - d. Remove three top screws from Input Filter A2 panel and remove panel.
14. Remove four screws from lower deadfront panel and remove panel.
15. Remove CPT4 panel from cabinet as follows (see figure 3–5):
 - a. Disconnect connector P4 from J4.
 - b. Loosen three bottom screws on CPT4 panel.
 - c. Remove three top screws from CPT4 panel and remove panel.

3.1.2 Disconnecting T3 Power Wiring

To disconnect T3 power wiring, perform the following procedure:

CAUTION:

In the following steps, ensure that no hardware falls into the transformer. As a precaution, cover the top of the transformer windings with a cloth or cardboard. Any hardware falling into the transformer must be removed.

1. Disconnect all output wires from transformer terminal lugs X1, X2, and X3. Reinstall hardware to terminal lugs and secure (see figure 3–6).
2. Disconnect all output wires from transformer terminal lugs Y1, Y2, and Y3. Reinstall hardware to terminal lugs and secure.
3. Disconnect all input wires from transformer terminal lugs H1, H2, and H3. Reinstall hardware to terminal lugs and secure. Do not disconnect or remove jumper wires.
4. Disconnect and remove two jumper wires between terminal lugs Y01 and Y02, and Y02 and Y03.
5. Disconnect transformer ground wire from cabinet base (see figure 3–6).

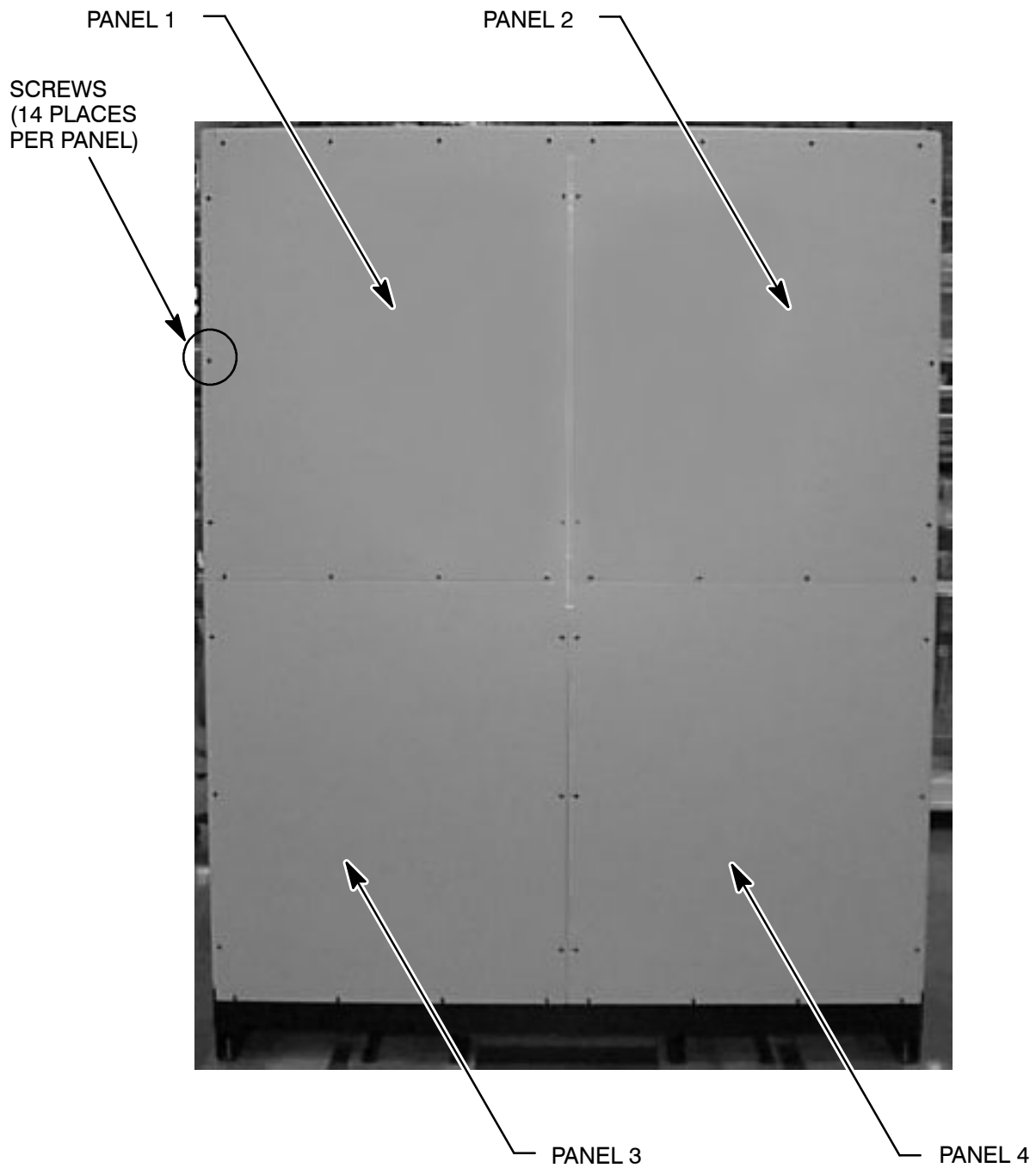


Figure 3–1. Input/Rectifier Cabinet Rear Panels

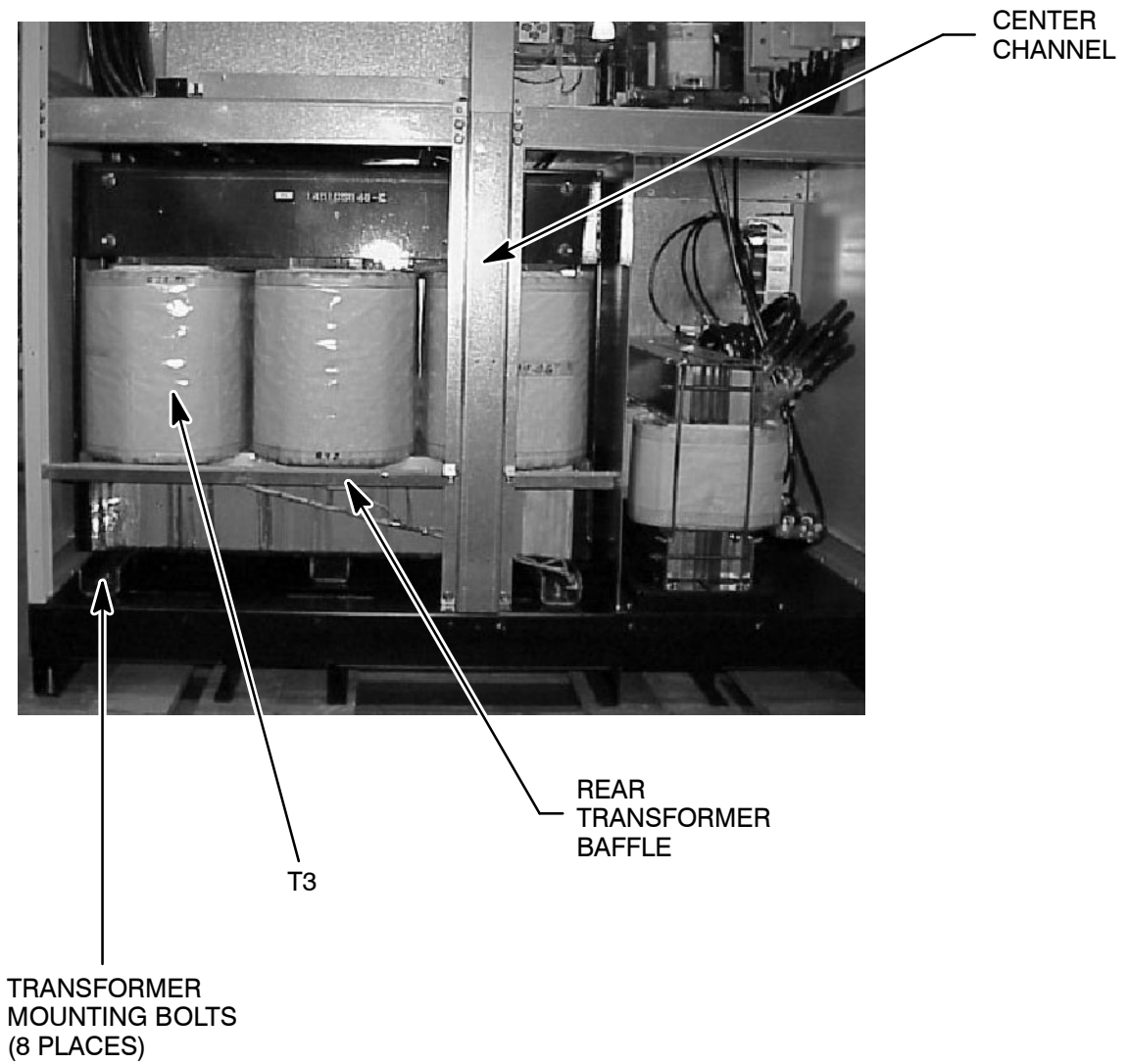
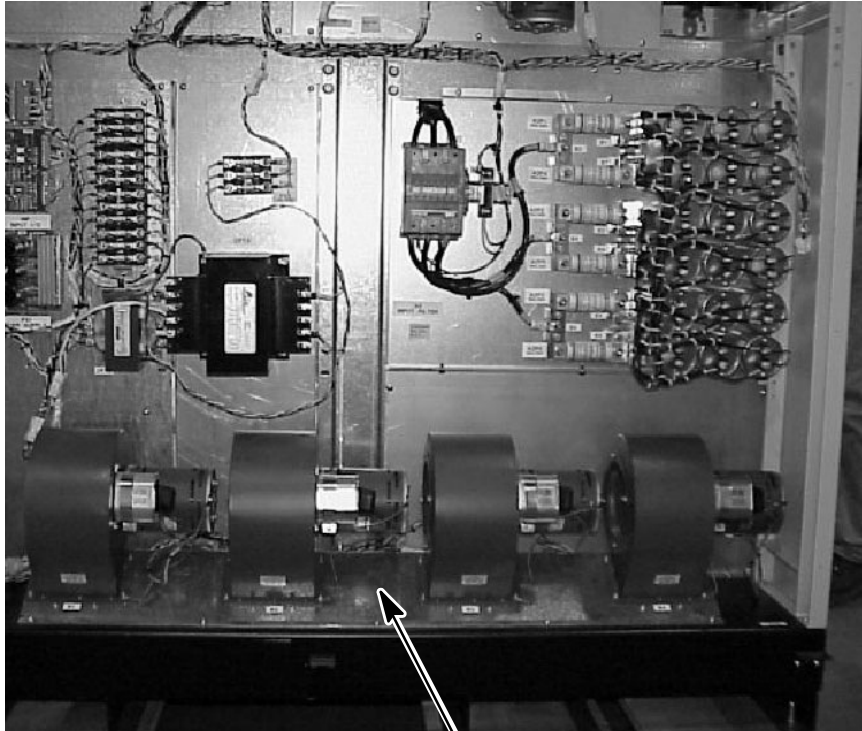


Figure 3–2. Input/Rectifier Cabinet Rear Interior View



CENTER
CHANNEL
BRACKET

Figure 3–3. Center Channel Bracket



BLOWER
ASSEMBLY
B1 – B4

Figure 3–4. Input/Rectifier Cabinet Front Interior View with Blowers

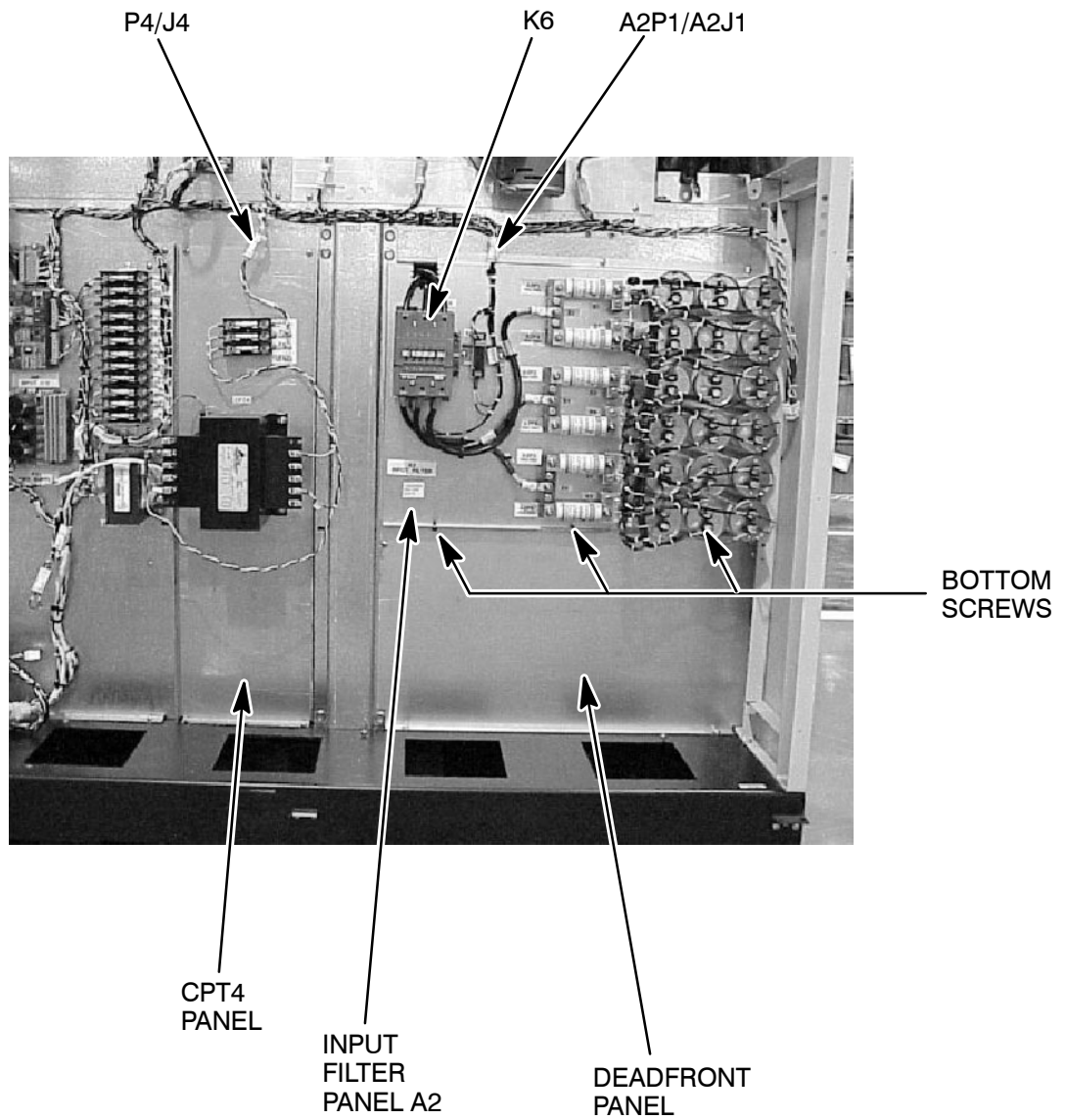


Figure 3–5. Input/Rectifier Cabinet Front Interior View Blowers Removed

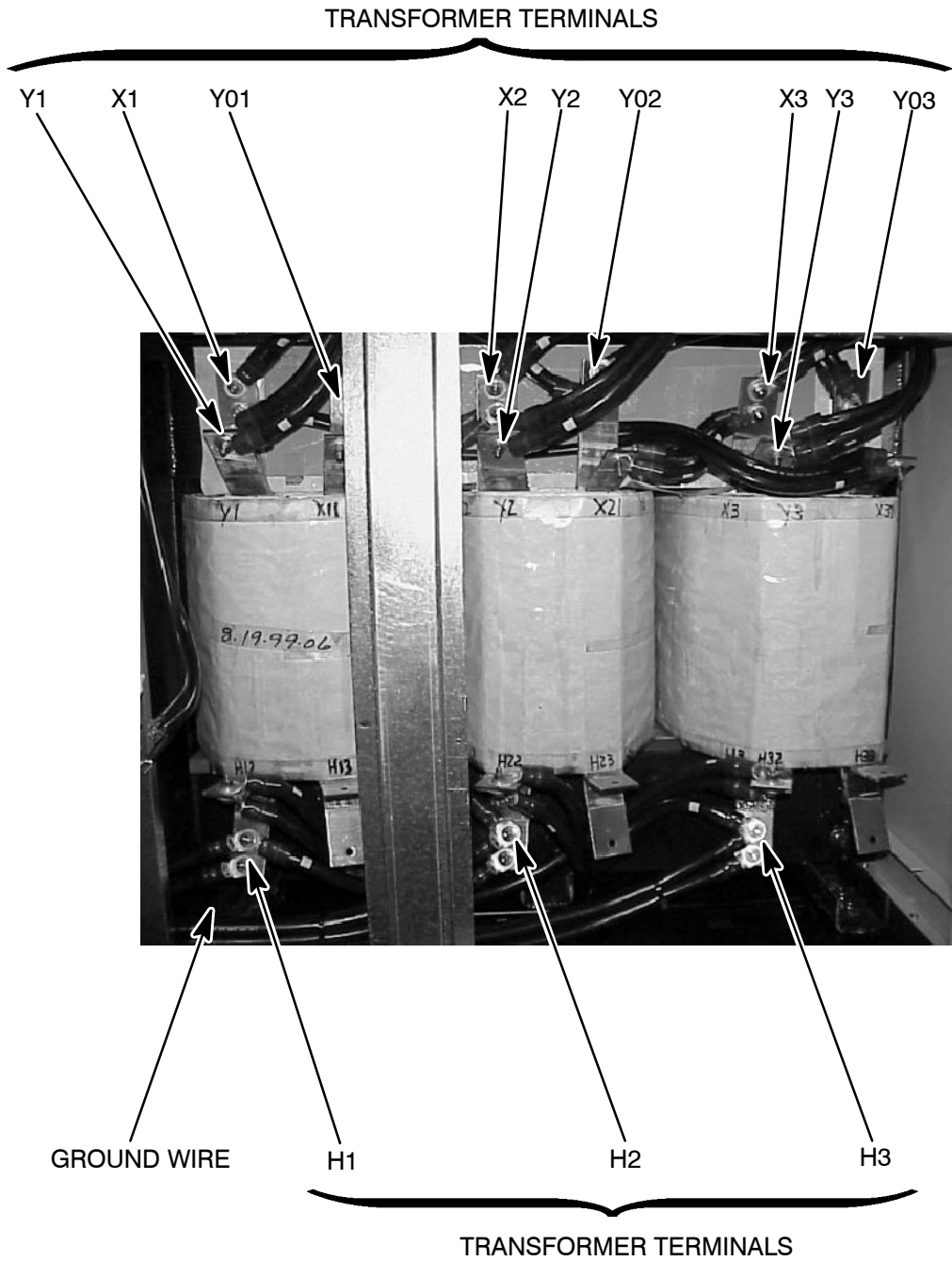


Figure 3–6. Transformer T3 Wiring

3.1.3 Removing T3

To remove T3, perform the following procedure:

CAUTION:

Lift only with forklift or transformer damage may occur.

1. Remove eight transformer mounting bolts and washers securing transformer to cabinet base (see figure 3–2). Retain hardware.
2. Position the transformer power cables, so that the cables will not interfere with the removal of the transformer from the cabinet.
3. Adjust forks on fork lift to correspond to the spacing between the transformer mounting rails.
4. Slowly move fork lift into position under transformer.
5. Carefully lift transformer just enough to clear cabinet base. Ensure top of transformer does not come in contact with the horizontal cabinet brace.
6. Move forklift backward, removing transformer from cabinet.

CAUTION:

In the step 7, ensure that no hardware falls into the transformer. As a precaution, cover the top of the transformer windings with a cloth or cardboard. Any hardware falling into the transformer must be removed.

7. Connect jumper wires to transformer lugs using the information contained in table 3–1. Mount one wire to front of lug and one to back of lug, using two flat washers (one on back and one on front of bolt), one belleville washer, and one nut. Tighten bolts securely. See figure 3–6 for terminal lug locations.

<i>Wire Number</i>	<i>Number of Wires</i>	<i>From</i>	<i>To</i>
118	2	T3-Y01	T3-Y02
119	2	T3-Y02	T3-Y03

8. Move transformer to shipping pallet and place on pallet.
9. Secure transformer to shipping pallet and cover with packing material.
10. Reinstall transformer mounting bolts into cabinet mounting holes for shipping.

3.1.4 Assembly and Hardware Reinstallation

To reinstall assemblies and hardware removed in paragraph 3.1.1, perform the following procedure:

NOTE: *In the following steps, use the hardware removed in paragraph 3.1.1.*

1. Install CPT4 panel into cabinet as follows (see figure 3–5):
 - a. Slide CPT4 panel over three screws in cabinet base.
 - b. Secure bottom of CPT4 panel with three screws.
 - c. Secure top of CPT4 panel with three screws.
 - d. Connect connector P4 to J4.
2. Install lower deadfront panel and secure with four screws (see figure 3–5).
3. Install Input Filter A2 panel into cabinet as follows (see figure 3–5):
 - a. Slide Input Filter A2 panel lower mounting screws over slots in lower deadfront panel.
 - b. Secure top of Input Filter A2 panel with three screws.
 - c. Secure three bottom screws attaching Input Filter A2 panel to lower deadfront panel.
 - d. Connect wires to K6 terminals using the information contained in table 3–2.

<i>Wire Number</i>	<i>Number of Wires</i>	<i>To</i>	<i>Notes</i>
109	1	2T1	Used with 50 Hz units only
110	1	4T2	Used with 50 Hz units only
111	1	6T3	Used with 50 Hz units only
109A	1	2T1	
110A	1	4T2	
111A	1	6T3	

- e. Connect connector A2P1 to A2J1.

WARNING:
Blower assembly B1–B4 are heavy and may require two persons to remove.

4. Position Blower Assembly B1–B4 onto cabinet base and slide forward (toward the lower dead front panel) to engage screws in cabinet base (see figure 3–4).
5. Secure blower assembly to base with five front screws.
6. Secure three rear screws attaching blower assembly to base.

- 7.** Move blower assembly wiring harness into position behind blowers.
- 8.** Reconnect blower connectors B1P1 through B4P1 to connectors B1J1 through B4P1 on wiring harness.
- 9.** Install vertical center channel, with transformer baffle attached, to cabinet while carefully engaging transformer baffle over transformer (see figure 3–2).
- 10.** Secure vertical center channel to cabinet with four top and two bottom screws.
- 11.** Secure left side of transformer baffle to cabinet with one screw (see figure 3–2).
- 12.** Install four rear panels onto cabinet as follows (see figure 3–1):
 - a.** Install panel 4 over four screws at bottom of cabinet base. Secure with six screws on sides of panel and four at the bottom of panel.
 - b.** Install panel 3 over four screws at bottom of cabinet base. Secure with six screws on sides of panel and four at the bottom of panel.
 - c.** Install panel 2 above panel 4, inserting screws in bottom of panel into slots at the top of panel 4. Secure with ten screws on top and sides and four screws at bottom of panel.
 - d.** Install panel 1 above panel 3, inserting screws in bottom of panel into slots at the top of panel 3. Secure with ten screws on top and sides and four screws at bottom of panel.
- 13.** Install doors and top door hinges.
- 14.** Close cabinet doors.

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4.1 Inspecting and Unpacking T1

The first task in preparing for installation is inspecting and unpacking Transformer T1. The transformer is shipped bolted to a wooden pallet and protected with outer protective packaging material, as shown in Figure 4–1.

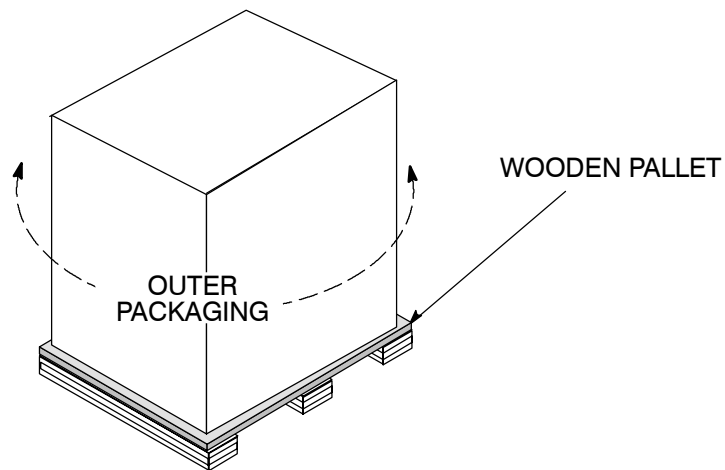


Figure 4–1. Transformer as Shipped, with Outer Packaging and Pallet

1. Carefully inspect the outer packaging for evidence of damage during transit.

CAUTION:
Do not install a damaged transformer. Report any damage to the carrier and contact your local sales or service office immediately.

2. Use a forklift or other material handling equipment to move the transformer to a convenient unpacking area. Insert the forklift between the pallet supports on the bottom of the unit.

CAUTION:
Do not tilt transformer more than 10 degrees from vertical.

3. Set the pallet on a firm, level surface, allowing enough clearance on each side for fork lift truck access.
4. If outer packaging is secured with steel bands, cut and remove the bands from around each cabinet.
5. Remove the protective covering from the cabinets.
6. After removing the protective covering, inspect the contents for any evidence of physical damage. If damage has occurred, contact the Powerware, Inc. Customer Service Department immediately to determine the extent of the damage and its impact upon further installation.

NOTE: *While awaiting installation, protect the unpacked transformer from moisture, dust, and other harmful contaminants. Failure to store and protect the transformer properly may invalidate the warranty.*

4.2 Transformer T1 Installation

WARNING:
Installation should be performed only by qualified personnel.

To install Transformer T1, perform the procedures in the following paragraphs. Refer to Chapter 1 *Getting Started* for tools and equipment required to install transformer.

4.2.1 Hardware Removal for Access to T1 Mounting Location

To gain access for T1 installation, perform the following procedure:

NOTE: *Retain all removed assemblies and hardware, and store in a safe place to prevent damage. Assemblies and hardware will be reinstalled upon completion of the installation procedure.*

1. Move the Output/Inverter Cabinet to the work area determined using the guidelines presented Chapter 1 *Getting Started*.
2. Open cabinet doors.
3. Remove top door hinges and remove doors.
4. Remove four rear panels from cabinet as follows (see figure 4–2):
 - a. Remove panel 1 by loosening four screws at bottom of panel and removing ten screws from top and sides. Remove panel.
 - b. Remove panel 2 by loosening four screws at bottom of panel and removing ten screws from top and sides. Remove panel.
 - c. Remove panel 3 by loosening four screws at bottom of panel and removing six screws from sides. Remove panel.
 - d. Remove panel 4 by loosening four screws at bottom of panel and removing six screws from sides. Remove panel.
5. Remove vertical center channel by removing two top and two bottom screws (see figure 4–3).

6. Remove rear transformer baffle by removing two screws(see figure 4–3).
7. Disconnect blower connectors B8P1 through B11P1.
8. Remove four front screws, and one left and one right side screw securing blower assembly B8–B11 (see figure 4–4).

WARNING:

Blower assemblies B8-B11 and B12-B15 are heavy and may require two persons to remove.

9. Slide blower assembly forward to disengage tabs from under lower dead front panel and remove assembly (see figure 4–4).
10. Remove two screws securing side inverter baffle and remove baffle (see figure 4–5).
11. Remove four screws securing front inverter baffle and remove baffle.
12. Disconnect blower connectors B12P1 through B15P1.
13. Loosen three bottom screws securing Blower Assembly B12–B15 (see figure 4–4).
14. Remove four top screws securing Blower Assembly B12–B15.
15. Slide blower assembly up and off of lower mounting screws and remove assembly.
16. Loosen three top screws on lower deadfront panel (see figure 4–4).
17. Remove eight screws from upper deadfront panel and remove panel.
18. Remove eight screws from lower deadfront panel and remove panel.
19. Remove front transformer baffle by removing two screws (see figure 4–6).

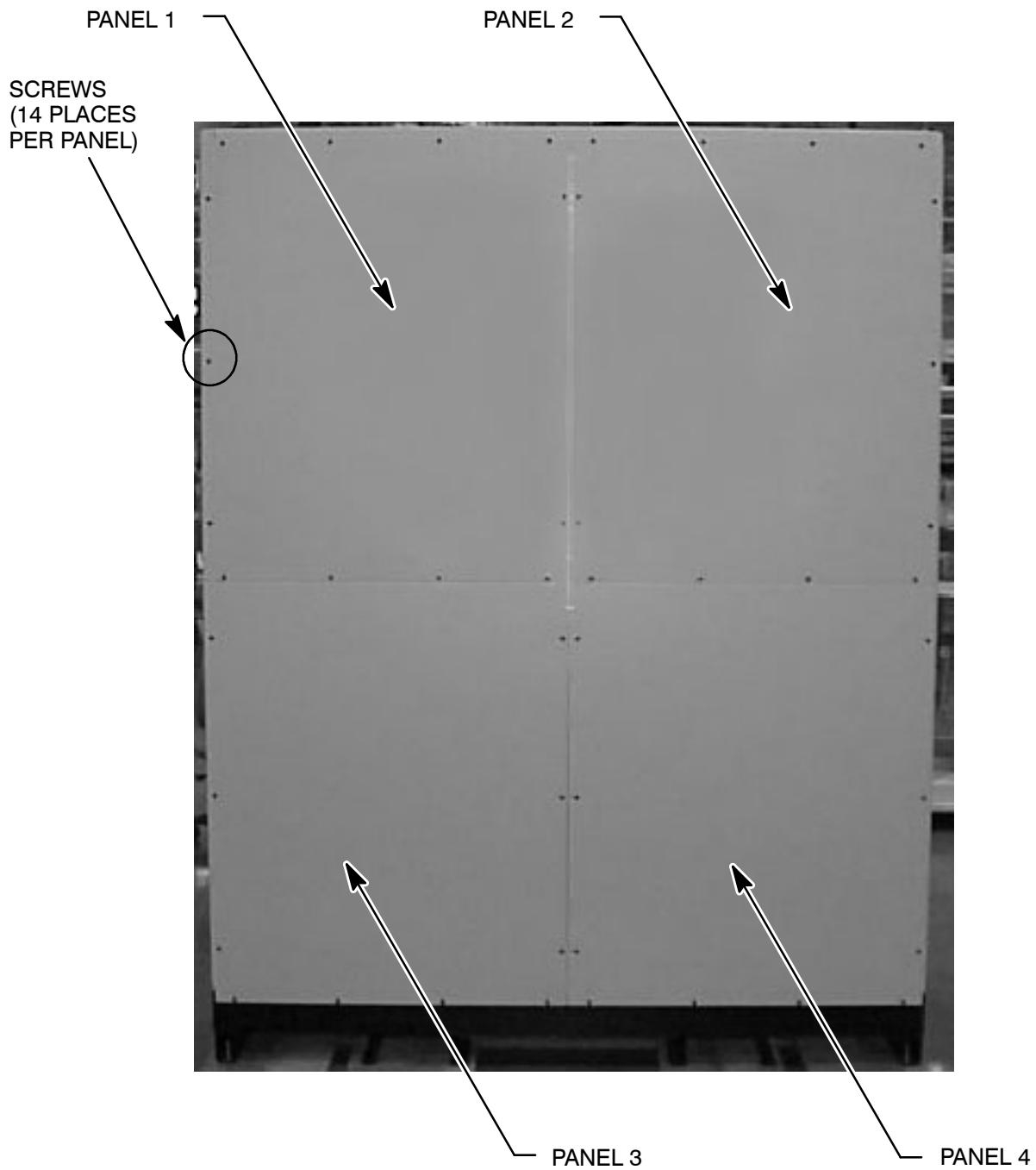


Figure 4–2. Output/Inverter Cabinet Rear Panels

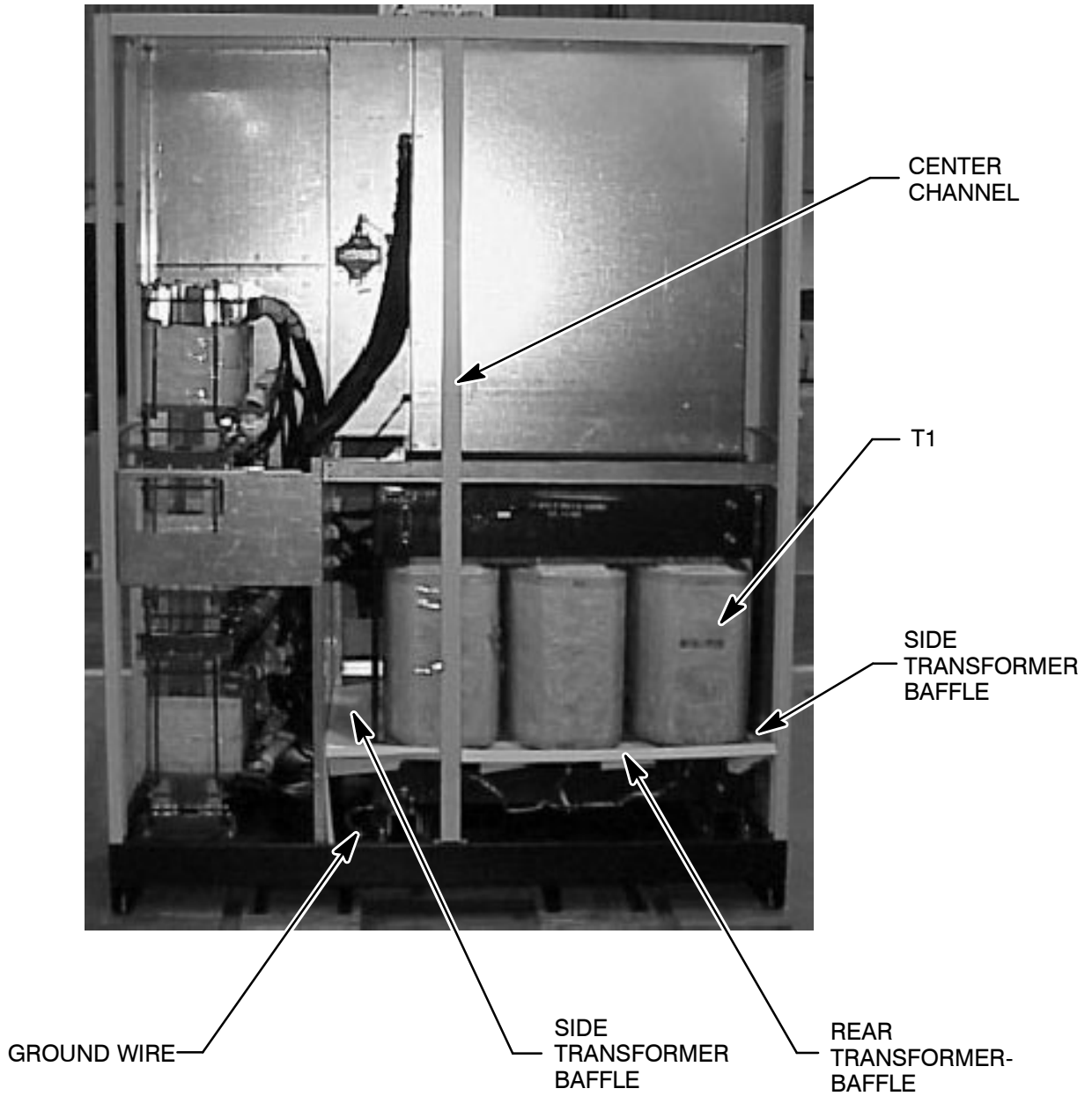


Figure 4-3. Output/Inverter Cabinet Rear Interior View

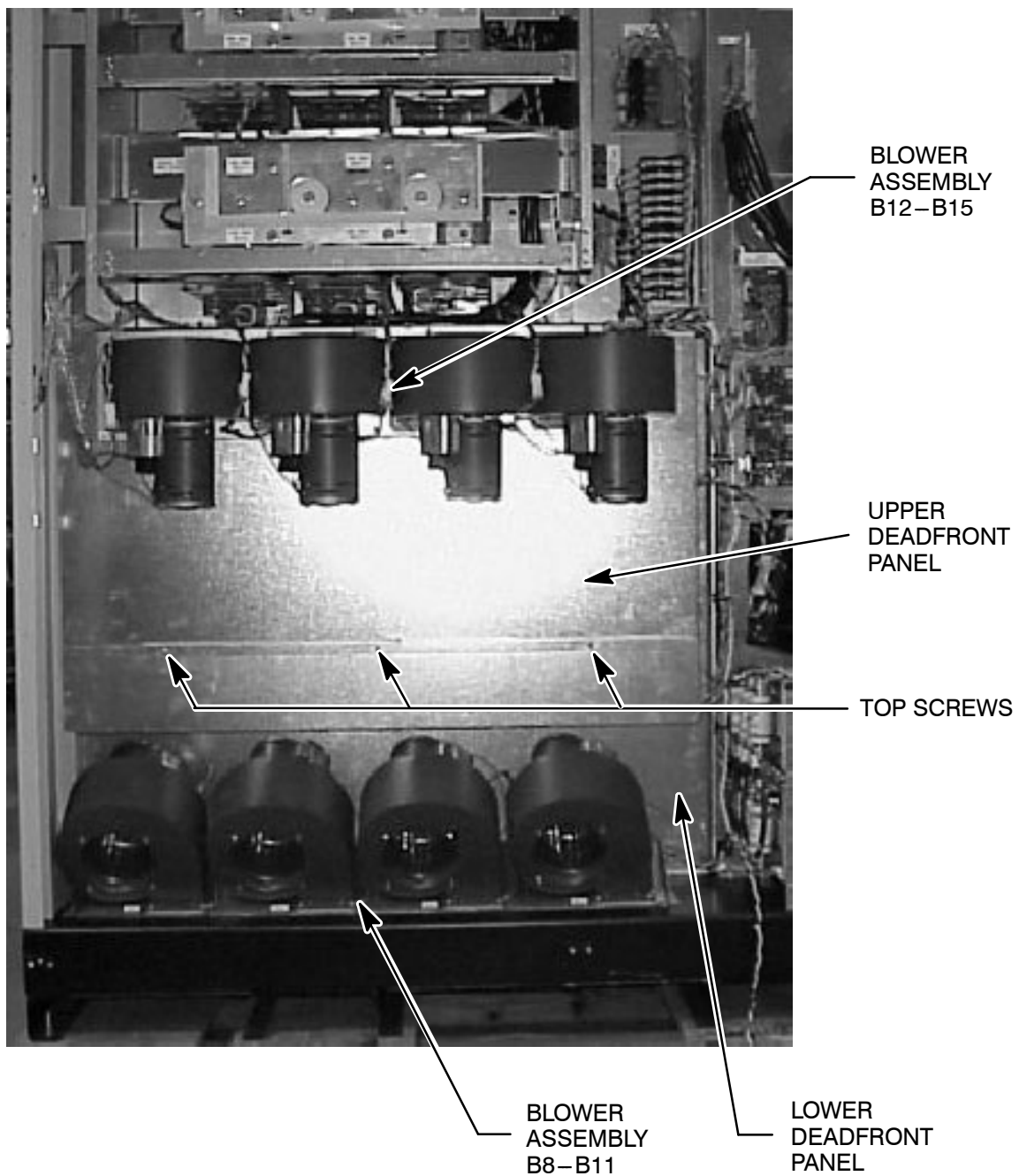


Figure 4-4. Output/Inverter Cabinet Front Interior View



FRONT
INVERTER
BAFFLE

BLOWER ASSEMBLY
B12-B15

SIDE
INVERTER
BAFFLE

Figure 4-5. Output/Inverter Blower Assembly B12-B15 Inverter Baffles

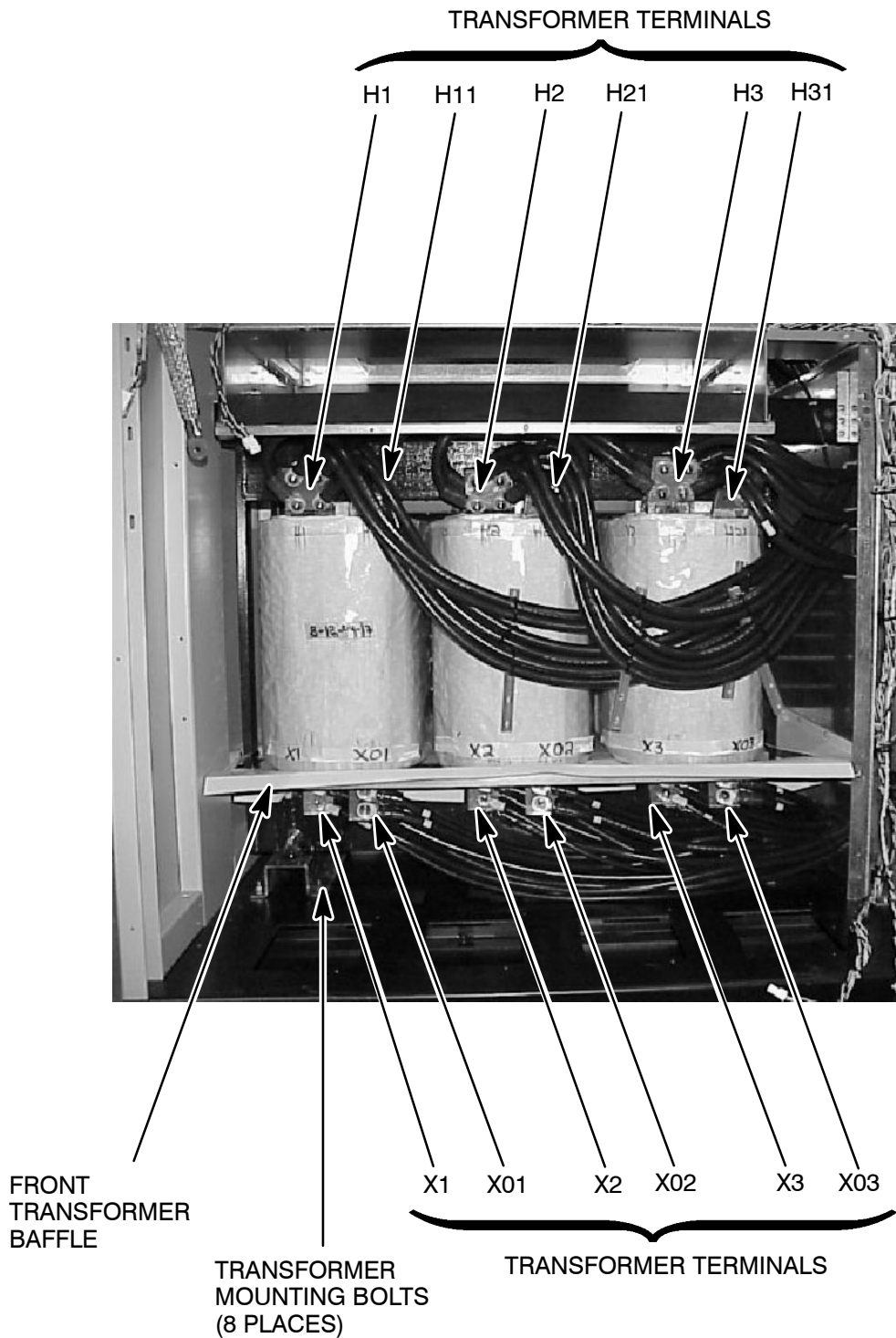


Figure 4-6. Transformer T1 Wiring

4.2.2 Installing T1

To install T1, perform the following procedure:

CAUTION:

In the step 1, ensure that no hardware falls into the transformer. As a precaution, cover the top of the transformer windings with a cloth or cardboard. Any hardware falling into the transformer must be removed.

1. If not already removed, disconnect and remove three jumper wires between transformer T1 terminal lugs H1 and H21, H2 and H31, and H3 and H11 (see figure 4–6).

NOTE: *In step 2 and 11, gain access to the transformer mounting hardware inside the cabinet base through the cooling air cutouts in the cabinet base.*

2. Remove eight transformer mounting bolts, nuts, and washers from cabinet base (see figure 4–6). Retain hardware.
3. Position the transformer power cables, so that the cables will not interfere with the installation of the transformer into the cabinet.
4. Remove bolts securing transformer to the pallet.

CAUTION:

Lift only with forklift or transformer damage may occur.

5. Adjust forks on fork lift to correspond to the spacing between the transformer mounting rails.

NOTE: *In step 6, lift transformer with the terminal side facing away from the fork lift.*

6. Slowly move fork lift into position under transformer and lift to clear pallet.
7. Move transformer into position at the rear of the output/inverter cabinet.
8. Carefully lift transformer just enough to clear cabinet base.

NOTE: *In step 9, hold side transformer baffles (see figure 4–3) away from transformer while installing transformer.*

9. Move forklift forward, installing transformer into cabinet. Ensure top of transformer does not come in contact with the horizontal cabinet brace.
10. Move transformer over mounting holes in cabinet base and lower transformer onto base.
11. Secure transformer with eight mounting bolts, nuts, and washers (see figure 4–6).

4.2.3 Reconnecting T1 Power Wiring

To reconnect T1 power wiring, perform the following procedure:

1. Connect transformer ground wire from transformer to cabinet base (see figure 4-3).

CAUTION:

In the following steps, ensure that no hardware falls into the transformer. As a precaution, cover the top of the transformer windings with a cloth or cardboard. Any hardware falling into the transformer must be removed.

2. Connect jumper wires to transformer lugs using the information contained in table 4-1. Mount one wire to front of lug and one to back of lug, using two flat washers (one on back and one on front of bolt), one belleville washer, and one nut. Tighten to the specified torque. See figure 4-6 for terminal lug locations and Drawing 164201244-001-1 for wiring diagram.

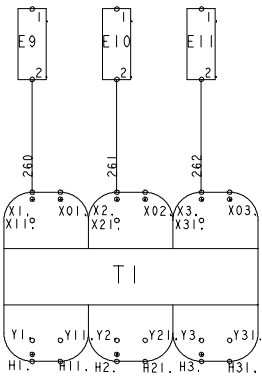
Table 4-1. T1 Jumper Wire Installation

<i>Wire Number</i>	<i>Number of Wires</i>	<i>From</i>	<i>To</i>	<i>Tightening Torque N-M (lb-ft)</i>
154	2	T1-H3	T1-H11	23(18.4)
155	2	T1-H1	T1-H21	23(18.4)
156	2	T1-H2	T1-H31	23(18.4)

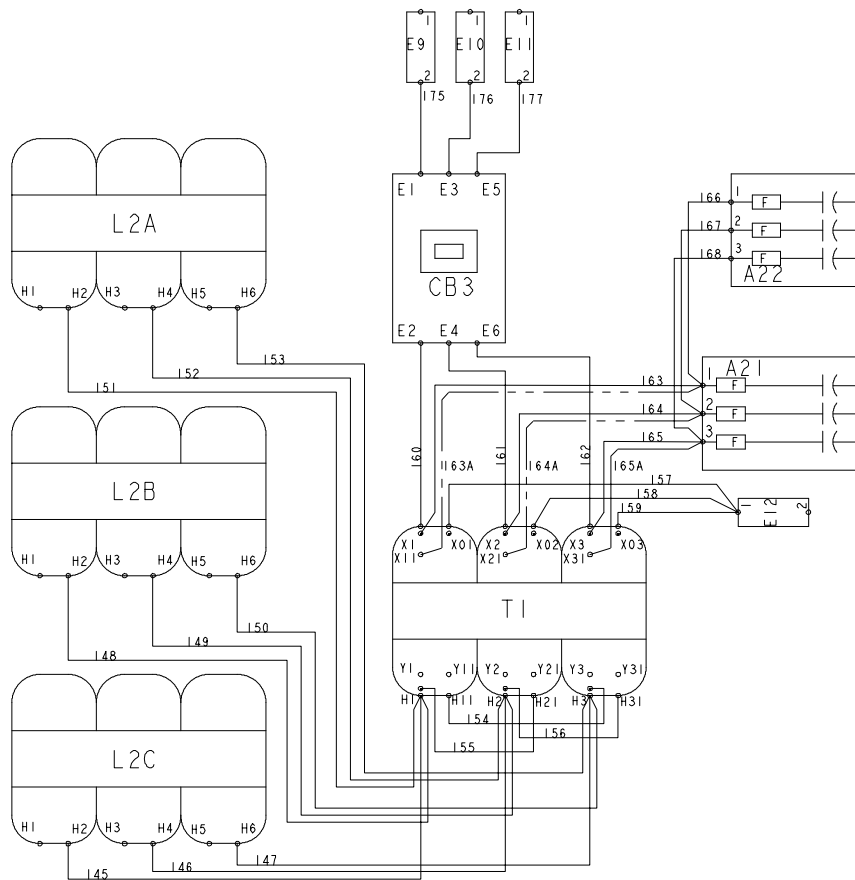
3. Connect input and output wires to transformer lugs using the information contained in table 4-2. If multiple wires are connected, mount one wire to front of lug and one to back of lug. Use two flat washers (one on back and one on front of bolt), one belleville washer, and one nut. Tighten to the specified torque. See figure 4-6 for terminal lug locations and Drawing 164201244-001-1 for wiring diagram.

Table 4–2. T1 Input and Output Wire Connections

<i>Wire Number</i>	<i>Number of Wires</i>	<i>To</i>	<i>Tightening Torque N-M (lb-ft)</i>	<i>Notes</i>
145	2	T1-H1	23(18.4)	
146	2	T1-H2	23(18.4)	
147	2	T1-H3	23(18.4)	
148	2	T1-H1	23(18.4)	
149	2	T1-H2	23(18.4)	
150	2	T1-H3	23(18.4)	
151	2	T1-H1	23(18.4)	
152	2	T1-H2	23(18.4)	
153	2	T1-H3	23(18.4)	
157	3	T1-X01	23(18.4)	
158	3	T1-X02	23(18.4)	
159	3	T1-X03	23(18.4)	
160	3	T1-X1	23(18.4)	Used when CB3 is not required
161	3	T1-X2	23(18.4)	Used when CB3 is not required
162	3	T1-X3	23(18.4)	Used when CB3 is not required
260	3	T1-X1	23(18.4)	Used when CB3 is required
261	3	T1-X2	23(18.4)	Used when CB3 is required
262	3	T1-X3	23(18.4)	Used when CB3 is required
163	1	T1-X1	23(18.4)	Used with 480 Volt units only
164	1	T1-X2	23(18.4)	Used with 480 Volt units only
165	1	T1-X3	23(18.4)	Used with 480 Volt units only
163A	1	T1-X11	23(18.4)	Used with 600 Volt units only
164A	1	T1-X21	23(18.4)	Used with 600 Volt units only
165A	1	T1-X31	23(18.4)	Used with 600 Volt units only



OPTIONAL HARNESS: USE
WHEN CB3 NOT REQUIRED



DESCRIPTION: **POWERWARE 9315 (500 kVA-750 kVA)
T1 POWER WIRING DIAGRAM**

DRAWING NO: 164201244-001-1

SHEET: 1 of 1

REVISION: A

DATE: 011500

4.2.4 Assembly and Hardware Reinstallation

To reinstall assemblies and hardware removed in paragraph 4.2.1, perform the following procedure:

NOTE: *In the following steps, use the hardware removed in paragraph 4.2.1.*

1. Install front transformer baffle and secure with two screws (see figure 4–6).
2. Install lower deadfront panel and secure with eight screws (see figure 4–4).
3. Slide upper deadfront panel over the three top screws on the lower deadfront panel. Secure upper panel with eight screws.
4. Secure three top screws on lower deadfront panel.

WARNING:

Blower assemblies B8–B11 and B12–B15 are heavy and may require two persons to remove.

5. Position Blower Assembly B12–B15 over cooling air cutouts on upper dead front panel and slide mounting slots over lower mounting screws (see figure 4–4).
6. Install four top screws securing blower assembly.
7. Secure three bottom screws attaching Blower Assembly B12–B15.
8. Move blower assembly wiring harness into position behind blowers.
9. Reconnect blower connectors B12P1 through B15P1 to connectors B12J1 through B15P1 on wiring harness.
10. Install front inverter baffle and secure with four screws (see figure 4–5).
11. Install side inverter baffle and secure with two screws.
12. Position Blower Assembly B8–B11 onto cabinet base and slide forward (toward the lower dead front panel) to engage tabs under lower dead front panel (see figure 4–4).
13. Secure blower assembly to cabinet base with four front screws, and one left and one right side screw.
14. Move blower assembly wiring harness into position behind blowers.
15. Reconnect blower connectors B8P1 through B11P1 to connectors B8J1 through B11P1 on wiring harness.
16. Install rear transformer baffle and secure with two screws (see figure 4–3).
17. Install vertical center channel and secure with two top and two bottom screws (see figure 4–3).
18. Proceed to Chapter 5 *Installing Transformer T3* of this manual. Do not reinstall front doors or rear panels.

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5.1 Inspecting and Unpacking T3

The first task in preparing for installation is inspecting and unpacking Transformer T3. The transformer is shipped bolted to a wooden pallet and protected with outer protective packaging material, as shown in Figure 5–1.

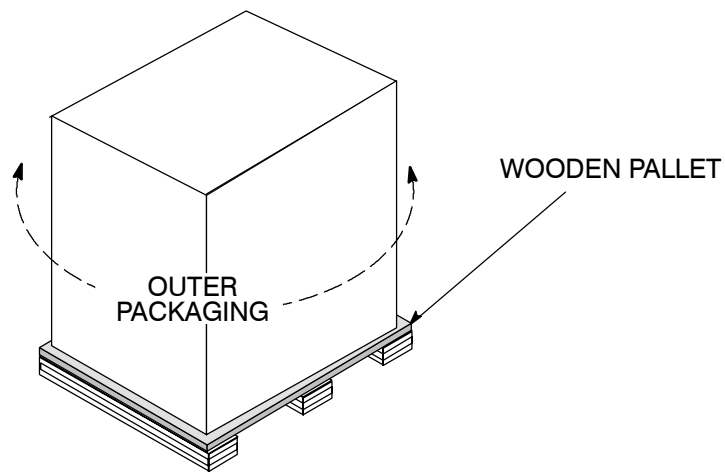


Figure 5–1. Transformer as Shipped, with Outer Packaging and Pallet

1. Carefully inspect the outer packaging for evidence of damage during transit.

CAUTION:

Do not install a damaged transformer. Report any damage to the carrier and contact your local sales or service office immediately.

2. Use a forklift or other material handling equipment to move the transformer to a convenient unpacking area. Insert the forklift between the pallet supports on the bottom of the unit.

CAUTION:

Do not tilt transformer more than 10 degrees from vertical.

3. Set the pallet on a firm, level surface, allowing enough clearance on each side for fork lift truck access.
4. If outer packaging is secured with steel bands, cut and remove the bands from around each cabinet.
5. Remove the protective covering from the cabinets.
6. After removing the protective covering, inspect the contents for any evidence of physical damage. If damage has occurred, contact the Powerware, Inc. Customer Service Department immediately to determine the extent of the damage and its impact upon further installation.

NOTE: *While awaiting installation, protect the unpacked transformer from moisture, dust, and other harmful contaminants. Failure to store and protect the transformer properly may invalidate the warranty.*

5.2 Transformer T3 Installation

WARNING:
Installation should be performed only by qualified personnel.

To install Transformer T3, perform the procedures in the following paragraphs. Refer to Chapter 1 *Getting Started* for tools and equipment required to install transformer.

5.2.1 Hardware Removal for Access to T3 Mounting Location

To gain access to T3, perform the following procedure:

NOTE: *Retain all removed assemblies and hardware, and store in a safe place to prevent damage. Assemblies and hardware will be reinstalled upon completion of the removal procedure.*

1. Move the Input\Rectifier Cabinet to the work area determined using the guidelines presented Chapter 1 *Getting Started*.
2. Open cabinet doors.
3. Remove top door hinges and remove doors.
4. Remove four rear panels from cabinet as follows (see figure 5–2):
 - a. Remove panel 1 by loosening four screws at bottom of panel and removing ten screws from top and sides. Remove panel.
 - b. Remove panel 2 by loosening four screws at bottom of panel and removing ten screws from top and sides. Remove panel.
 - c. Remove panel 3 by loosening four screws at bottom of panel and removing six screws from sides. Remove panel.
 - d. Remove panel 4 by loosening four screws at bottom of panel and removing six screws from sides. Remove panel.

5. Remove screw securing left side of transformer baffle to cabinet (see figure 5–3).
6. Remove four top and two bottom screws securing vertical center channel to cabinet (see figure 5–3).
7. Carefully disengage transformer baffle from transformer and remove vertical center channel with baffle attached from cabinet.
8. Remove three screws securing vertical center channel bracket to cabinet, and remove bracket (see figure 5–4).
9. Disconnect blower connectors B1P1 through B4P1 and move wiring harness to left side of cabinet.
10. Remove five front screws securing blower assembly B1–B4 to cabinet base (see figure 5–5).
11. Loosen three screws securing the back of blower assembly B1–B4 to cabinet base (see figure 5–5).

WARNING:

Blower assembly B1-B4 are heavy and may require two persons to remove.

12. Slide blower assembly forward to disengage screws and remove assembly (see figure 5–5).
13. Remove Input Filter A2 panel from cabinet as follows (see figure 5–6):
 - a. Disconnect wires from K6 terminals 2T1, 4T2 and 6T3.
 - b. Disconnect connector A2P1 from A2J1.
 - c. Loosen three bottom screws on Input Filter A2 panel.
 - d. Remove three top screws from Input Filter A2 panel and remove panel.
14. Remove four screws from lower deadfront panel and remove panel.
15. Remove CPT4 panel from cabinet as follows (see figure 5–6):
 - a. Disconnect connector P4 from J4.
 - b. Loosen three bottom screws on CPT4 panel.
 - c. Remove three top screws from CPT4 panel and remove panel.

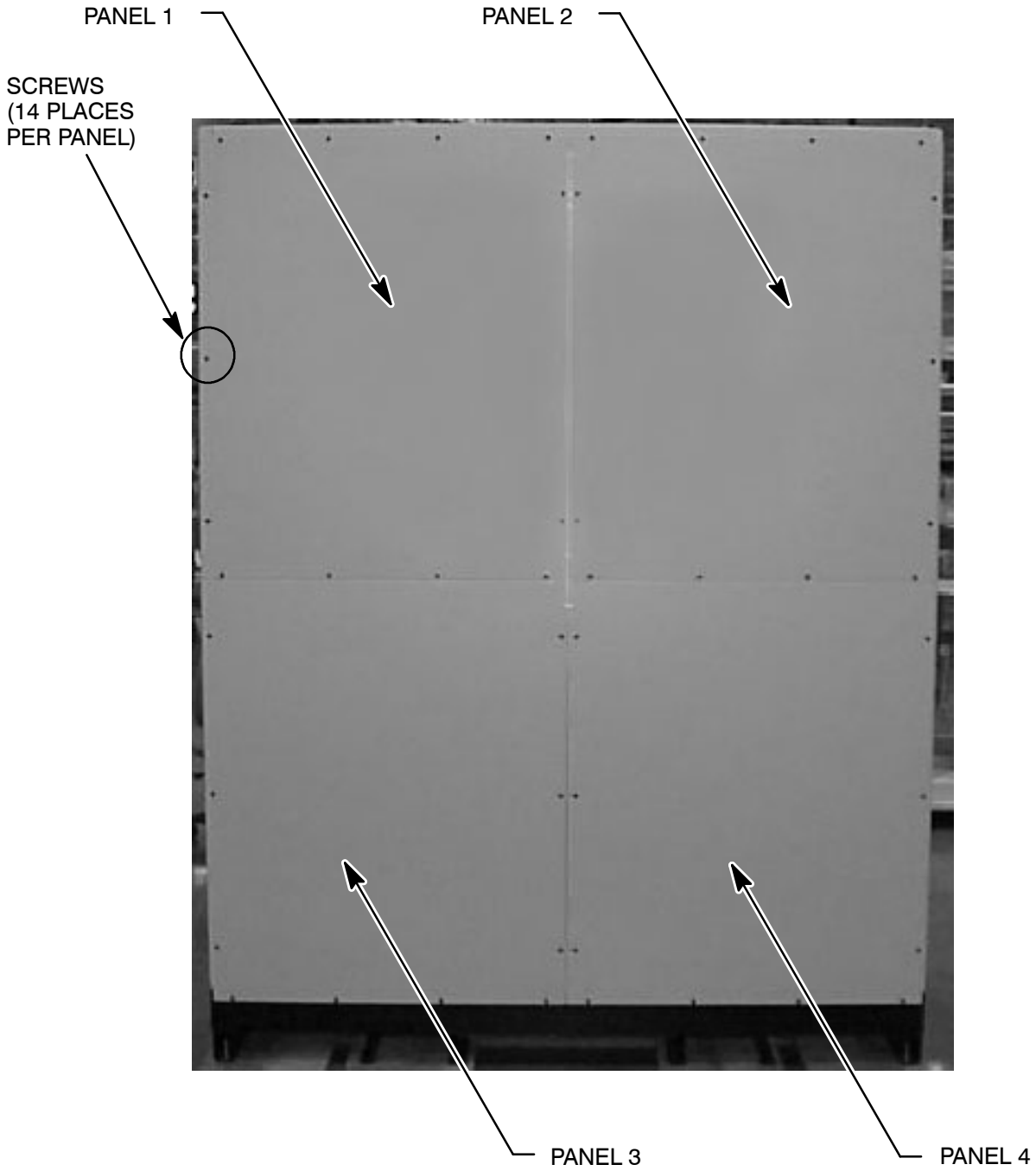


Figure 5–2. Input/Rectifier Cabinet Rear Panels

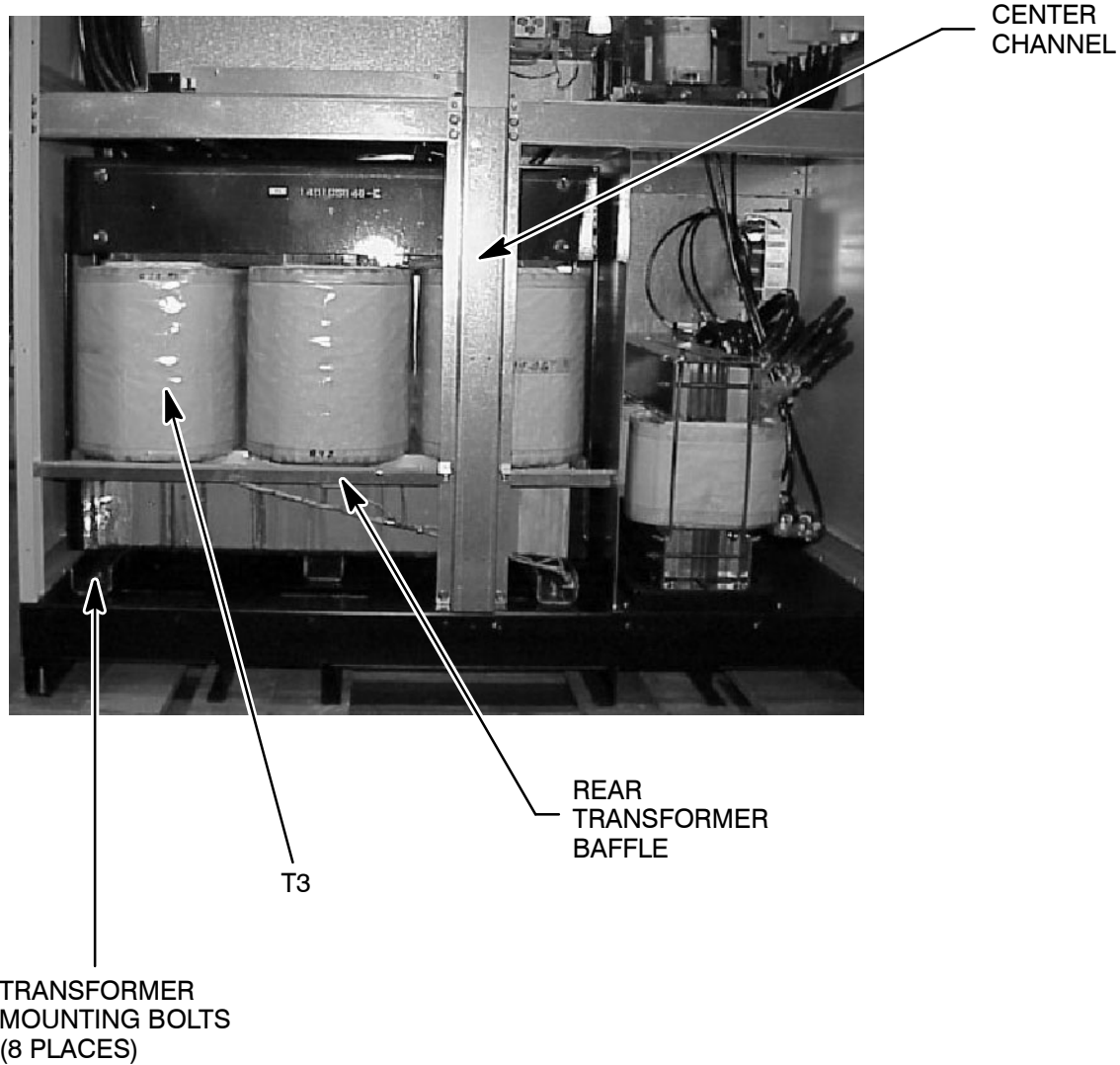
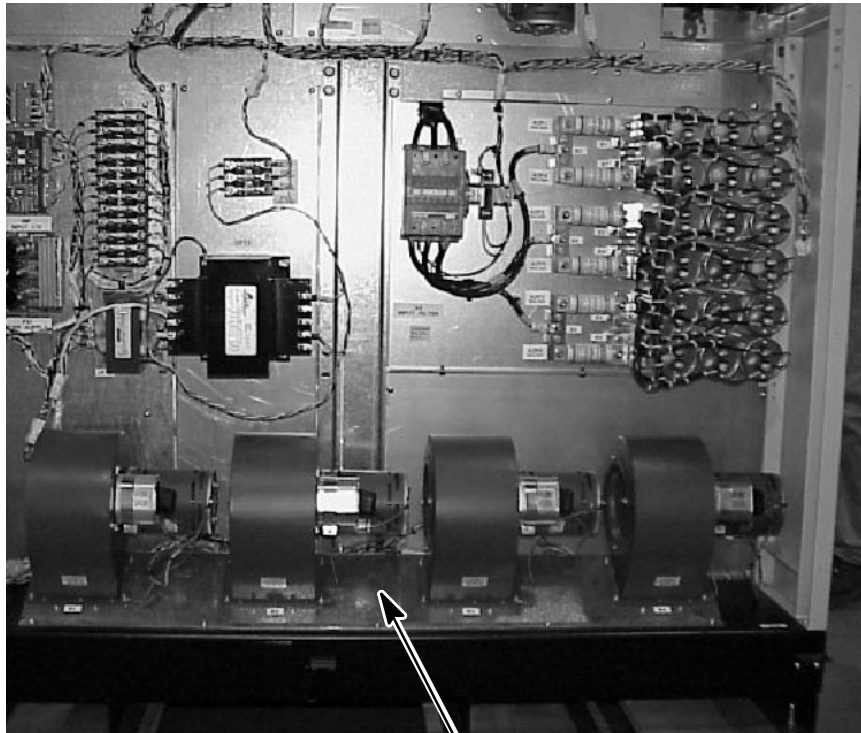


Figure 5–3. Input/Rectifier Cabinet Rear Interior View



CENTER
CHANNEL
BRACKET

Figure 5–4. Center Channel Bracket



BLOWER
ASSEMBLY
B1 – B4

Figure 5–5. Input/Rectifier Cabinet Front Interior View with Blowers

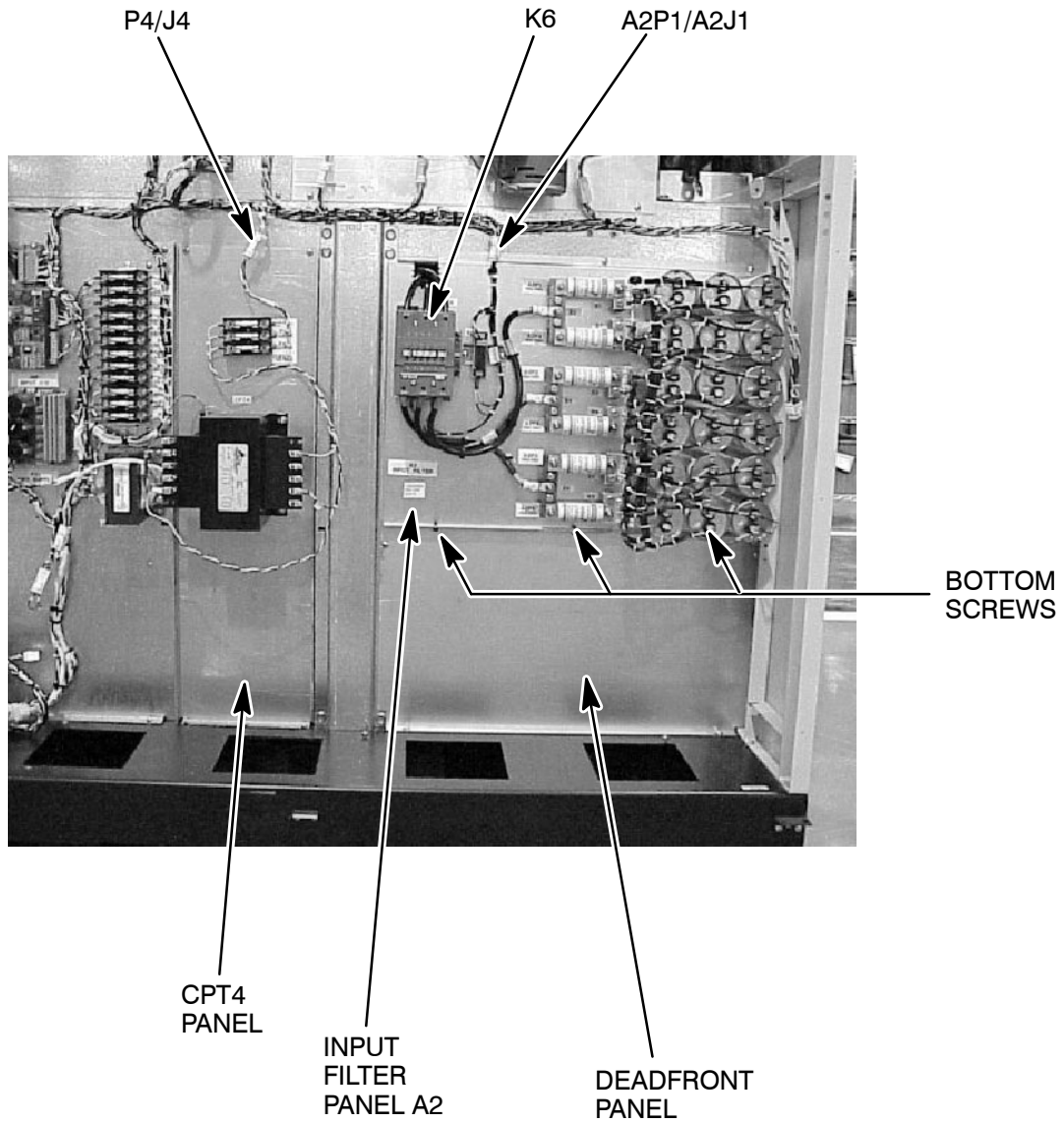


Figure 5–6. Input/Rectifier Cabinet Front Interior View Blowers Removed

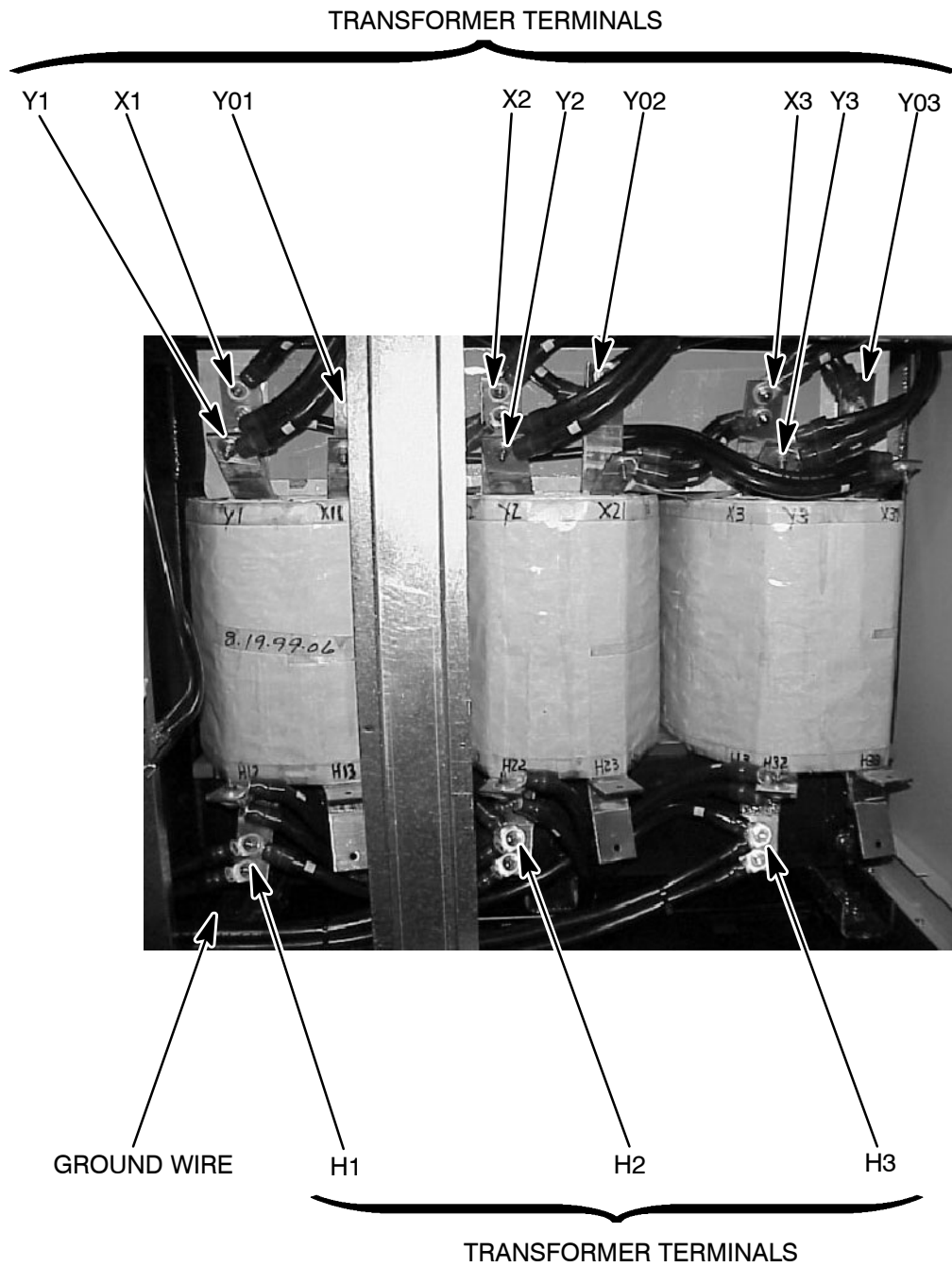


Figure 5-7. Transformer T3 Wiring

5.2.2 Installing T3

To install T3, perform the following procedure:

CAUTION:

In the step 1, ensure that no hardware falls into the transformer. As a precaution, cover the top of the transformer windings with a cloth or cardboard. Any hardware falling into the transformer must be removed.

1. If not already removed, disconnect and remove two jumper wires between terminal lugs Y01 and Y02, and Y02 and Y03 (see figure 5–7).
2. Remove eight transformer mounting bolts and washers securing transformer to cabinet base (see figure 5–3). Retain hardware.
3. Position the transformer power cables, so that the cables will not interfere with the installation of the transformer into the cabinet.
4. Remove bolts securing transformer to the pallet.

CAUTION:

Lift only with forklift or transformer damage may occur.

5. Adjust forks on fork lift to correspond to the spacing between the transformer mounting rails.
- NOTE:** *In step 6, lift transformer with the terminal side facing away from the fork lift.*
6. Slowly move fork lift into position under transformer and lift to clear pallet.
 7. Move transformer into position at the rear of the input/rectifier cabinet.
 8. Carefully lift transformer just enough to clear cabinet base.
 9. Move forklift forward, installing transformer into cabinet. Ensure top of transformer does not come in contact with the horizontal cabinet brace.
 10. Move transformer over mounting holes in cabinet base and lower transformer onto base.
 11. Secure transformer with eight mounting bolts (see figure 5–3).

5.2.3 Reconnecting T3 Power Wiring

To reconnect T3 power wiring, perform the following procedure:

1. Connect transformer ground wire from transformer to cabinet base (see figure 5–7).

CAUTION:

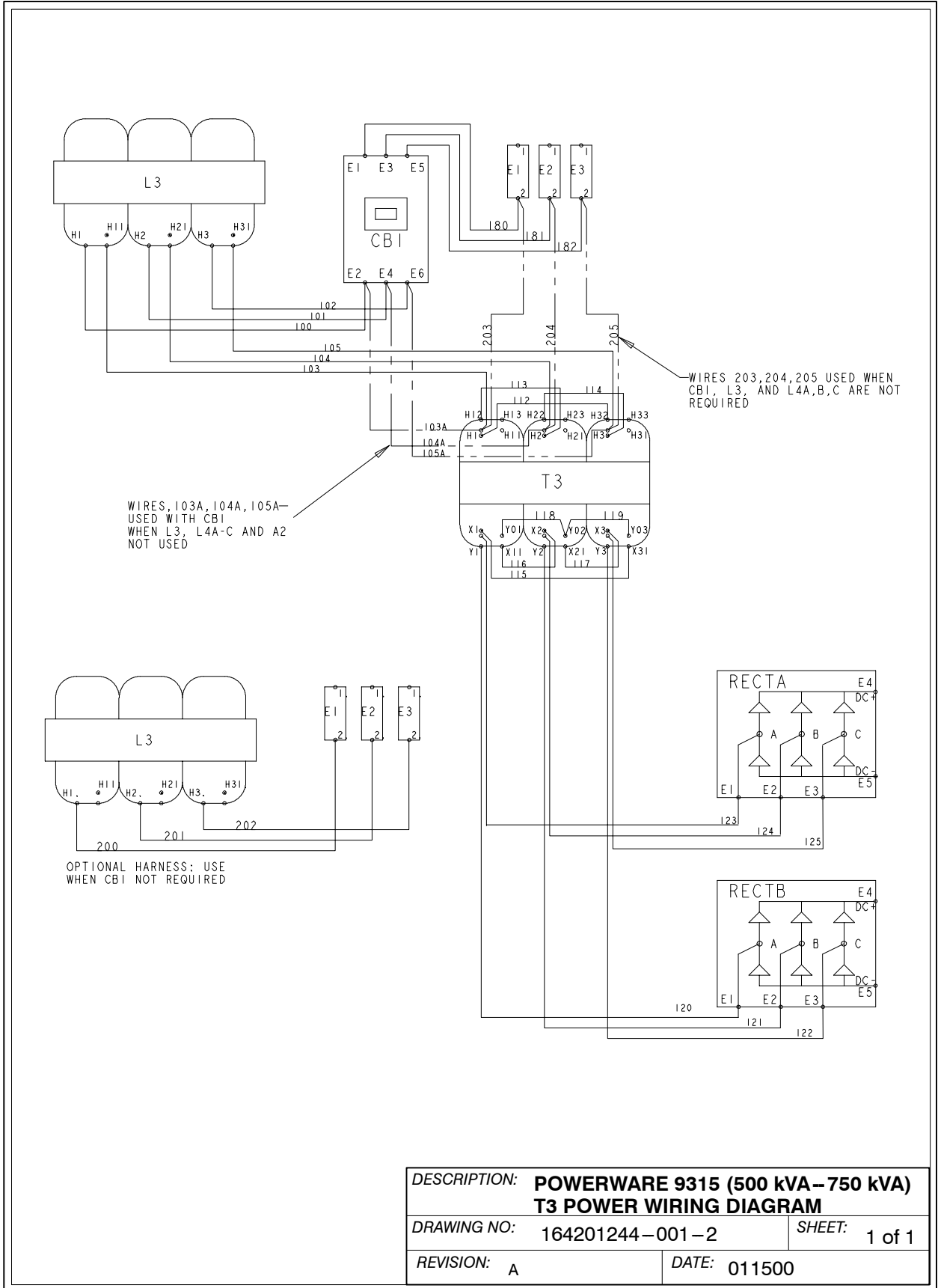
In the following steps, ensure that no hardware falls into the transformer. As a precaution, cover the top of the transformer windings with a cloth or cardboard. Any hardware falling into the transformer must be removed.

2. Connect jumper wires to transformer lugs using the information contained in table 5–1. Mount one wire to front of lug and one to back of lug, using two flat washers (one on back and one on front of bolt), one belleville washer, and one nut. Tighten to the specified torque. See figure 5–7 for terminal lug locations and Drawing 164201244–001–2 for wiring diagram.

<i>Wire Number</i>	<i>Number of Wires</i>	<i>From</i>	<i>To</i>	<i>Tightening Torque N-M (lb-ft)</i>
118	2	T3-Y01	T3-Y02	23(18.4)
119	2	T3-Y02	T3-Y03	23(18.4)

3. Connect input and output wires to transformer lugs using the information contained in table 5–2. If multiple wires are connected, mount one wire to front of lug and one to back of lug. Use two flat washers (one on back and one on front of bolt), one belleville washer, and one nut. Tighten to the specified torque. See figure 5–7 for terminal lug locations and Drawing 164201244–001–2 for wiring diagram.

<i>Wire Number</i>	<i>Number of Wires</i>	<i>To</i>	<i>Tightening Torque N-M (lb-ft)</i>	<i>Notes</i>
103	4	T3-H1	23(18.4)	Used when Input Filter A2 is required. Use longer bolt in top terminal lug hole.
104	4	T3-H2	23(18.4)	Used when Input Filter A2 is required. Use longer bolt in top terminal lug hole.
105	4	T3-H3	23(18.4)	Used when Input Filter A2 is required. Use longer bolt in top terminal lug hole.
103A	4	T3-H1	23(18.4)	Used with CB1 when Input Filter A2 is not required. Use longer bolt in top terminal lug hole.
104A	4	T3-H2	23(18.4)	Used with CB1 when Input Filter A2 is not required. Use longer bolt in top terminal lug hole.
105A	4	T3-H3	23(18.4)	Used with CB1 when Input Filter A2 is not required. Use longer bolt in top terminal lug hole.
203	4	T3-H1	23(18.4)	Used when CB1 and Input Filter A2 are not required. Use longer bolt in top terminal lug hole.
204	4	T3-H2	23(18.4)	Used when CB1 and Input Filter A2 are not required. Use longer bolt in top terminal lug hole.
205	4	T3-H3	23(18.4)	Used when CB1 and Input Filter A2 are not required. Use longer bolt in top terminal lug hole.
120	3	T3-Y1	23(18.4)	
121	3	T3-Y2	23(18.4)	
122	3	T3-Y3	23(18.4)	
123	3	T3-X1	23(18.4)	
124	3	T3-X2	23(18.4)	
125	3	T3-X3	23(18.4)	



DESCRIPTION: POWERWARE 9315 (500 kVA–750 kVA)		
T3 POWER WIRING DIAGRAM		
DRAWING NO:	164201244–001–2	SHEET: 1 of 1
REVISION:	A	DATE: 011500

5.2.4 Assembly and Hardware Reinstallation

To reinstall assemblies and hardware removed in paragraph 5.2.1, perform the following procedure:

NOTE: In the following steps, use the hardware removed in paragraph 5.2.1.

1. Install CPT4 panel into cabinet as follows (see figure 5–6):
 - a. Slide CPT4 panel over three screws in cabinet base.
 - b. Secure bottom of CPT4 panel with three screws.
 - c. Secure top of CPT4 panel with three screws.
 - d. Connect connector P4 to J4.
2. Install lower deadfront panel and secure with four screws (see figure 5–6).
3. Install Input Filter A2 panel into cabinet as follows (see figure 5–6):
 - a. Slide Input Filter A2 panel lower mounting screws over slots in lower deadfront panel.
 - b. Secure top of Input Filter A2 panel with three screws.
 - c. Secure three bottom screws attaching Input Filter A2 panel to lower deadfront panel.
 - d. Connect wires to K6 terminals using the information contained in table 5–3.

<i>Wire Number</i>	<i>Number of Wires</i>	<i>To</i>	<i>Notes</i>
109	1	2T1	Used with 50 Hz units only
110	1	4T2	Used with 50 Hz units only
111	1	6T3	Used with 50 Hz units only
109A	1	2T1	
110A	1	4T2	
111A	1	6T3	

- e. Connect connector A2P1 to A2J1.

WARNING:

Blower assembly B1-B4 are heavy and may require two persons to remove.

4. Position Blower Assembly B1–B4 onto cabinet base and slide forward (toward the lower dead front panel) to engage screws in cabinet base (see figure 5–5).
5. Secure blower assembly to base with five front screws.
6. Secure three rear screws attaching blower assembly to base.

7. Move blower assembly wiring harness into position behind blowers.
8. Reconnect blower connectors B1P1 through B4P1 to connectors B1J1 through B4P1 on wiring harness.
9. Install vertical center channel, with transformer baffle attached, to cabinet while carefully engaging transformer baffle over transformer (see figure 5–3).
10. Secure vertical center channel to cabinet with four top and two bottom screws.
11. Secure left side of transformer baffle to cabinet with one screw (see figure 5–3).
12. Proceed to Chapter 6 *Dielectric Testing* in this manual. Do not reinstall front doors or rear panels.

6.1 Dielectric Test Procedure After Transformer Replacement

This document specifies the procedure steps to be taken to perform a Dielectric Voltage Withstand test for the 750 product line after the power transformers T1 and T3 have been removed and replaced.

CAUTION:
Risk of Electric Shock – The procedure you are about to follow places a high voltage from conductive to grounded parts of the Unit Under Test (UUT). This voltage could shock either yourself or bystanders. You should never touch the UUT when the test is underway and notify bystanders about the test you will be conducting.

6.2 Equipment

Refer to Chapter 1 *Getting Started* for equipment requirements.

6.3 UUT Preparation

If a single module (RT) system is being tested, proceed to paragraph 6.3.1; if a multi-module system is being tested, proceed to paragraph 6.3.2.

6.3.1 Single Module (RT) Preparation

To prepare a single module UPS system for testing, perform the procedures in the following paragraphs.

6.3.1.1 Installing UPS Internal Power and Control Wiring

NOTE: *The cables used in steps 3 through 5 are coiled inside the Input/Rectifier cabinet and are attached at the factory to the output of the rectifier. The cables used in steps 8 and 9 are coiled inside the Module Bypass Cabinet (MBC) and are attached at the factory to the input of the MBC.*

- 1.** Position UPS cabinet sections side by side (Input /Rectifier cabinet on the left and Output/Inverter on the right).
- 2.** Remove the plastic shield covering the inverter input section of the Output/Inverter cabinet.
- 3.** Route DC Link cables from the rectifier output (Input/Rectifier cabinet) through cutout in cabinet sides to the inverter input (Output/Inverter cabinet).
- 4.** Connect positive DC Link power wiring to the inverter input. Connect two cables to each inverter. Refer to Appendix A of the referenced installation manual for terminal locations and tightening torque.
- 5.** Connect negative DC Link power wiring to the inverter input. Connect two cables to each inverter. Refer to Appendix A of the referenced installation manual for terminal locations and tightening torque.
- 6.** Reinstall inverter input section plastic shield.
- 7.** Remove the plastic shield covering the inverter output section of the Output/Inverter cabinet.
- 8.** Route the MBC input cables from the MBC through cutout in cabinet sides to the inverter output (Output/Inverter cabinet).
- 9.** Connect phase A, B, and C and Neutral power wiring from MBC to the respective inverter output. Refer to Appendix A of the referenced installation manual for terminal locations and tightening torques.
- 10.** Route ground braid from top of Output/Inverter cabinet to Input/Rectifier cabinet through cabinet cutouts. Braid is secured at the factory to the Output/Inverter cabinet mounting stud.
- 11.** Connect ground braid to Input/Rectifier cabinet mounting stud and secure.
- 12.** Route ground braid from top of MBC to Output/Inverter cabinet through cabinet cutouts. Braid is secured at the factory to the MBC mounting stud.
- 13.** Connect ground braid to Output/Inverter cabinet mounting stud and secure.
- 14.** Reinstall inverter output section plastic shield.
- 15.** Connect the Output/Inverter 15-pin control wiring harness connector P100 to the Input/Rectifier 15-pin control wiring harness connector J100. Refer to Appendix A of the referenced installation manual for connector locations.
- 16.** Connect the MBC 15-pin control wiring harness connector P101 to the Output/Inverter 15-pin control wiring harness connector J101. Refer to Appendix A of the referenced installation manual for connector locations.
- 17.** Connect 3-pin control wiring harness connector P6 from the MBC to connector J6 on Inverter number 2 control board. Refer to Appendix A of the referenced installation manual for connector locations.

6.3.1.2 Single Module (RT) Test Setup

1. Verify all fuses are installed.
2. Disconnect and isolate white ground wire at surge arrestor LA1. LA1 is located behind CB1.
3. Disconnect and isolate white ground wire at surge arrestor LA2. LA2 is located behind FBP.
4. Disconnect SCR_Drive_A PCB connectors J1, J2, and J9.
5. Disconnect SCR_Drive_B PCB connectors J1, J2, and J9.
6. Disconnect Inverter Control (IGBT) PCB 1 connectors J9, J11, J12, J13, J14, J15, and J16.
7. Disconnect Inverter Control (IGBT) PCB 2 connectors J9, J11, J12, J13, J14, J15, and J16.
8. Disconnect Inverter Control (IGBT) PCB 3 connectors J9, J11, J12, J13, J14, J15, and J16.
9. Disconnect Power Supply 1 connector J1 (this isolates frame ground stand-off bond).
10. Disconnect Power Supply 2 connector J1 (this isolates frame ground stand-off bond).
11. Disconnect Power Supply 3 connector J1 (this isolates frame ground stand-off bond).
12. Disconnect Bypass Control PCB connectors J1 and J2.

13. Connect test jumpers using the information contained in table 6–1.

Table 6–1. Single Module (RT) Test Jumper Installation		
<i>Number of Wires</i>	<i>From</i>	<i>To</i>
1	E1	E2
1	E2	E3
1	E3	E4
1	E4	E5
1	E5	A_Rect_E1
1	A_Rect_E1	A_Rect_E2
1	A_Rect_E2	A_Rect_E3
1	A_Rect_E3	B_Rect_E1
1	B_Rect_E1	B_Rect_E2
1	B_Rect_E2	B_Rect_E3
1	E5	Input_Filter_E2
1	Input_Filter_E2	Input_Filter_E4
1	Input_Filter_E4	Input_Filter_E6
1	A6_INVERTER_DC+	A6_INVERTER_ØC
1	A6_INVERTER_ØC	E9
1	E9	E10
1	E10	E11
1	E11	E12

- 14. If installed, manually close CB1.
- 15. If installed, manually close CB3.
- 16. Install static switch in MBC cabinet.
- 17. Manually close CBP.
- 18. Manually close FBP.

6.3.2 Multi-Module Preparation

To install a multi-module UPS system using a System Bypass Module, perform the procedures in the following paragraphs.

6.3.2.1 Installing UPS Internal Power and Control Wiring

NOTE: *The cables used in steps 3 through 5 are coiled inside the Input/Rectifier cabinet and are attached at the factory to the output of the rectifier.*

1. Position UPS cabinet sections side by side (Input /Rectifier cabinet on the left and Output/Inverter on the right).
2. Remove the plastic shield covering the inverter input section of the Output/Inverter cabinet.
3. Route DC Link cables from the rectifier output (Input/Rectifier cabinet) through cutout in cabinet sides to the inverter input (Output/Inverter cabinet).
4. Connect positive DC Link power wiring to the inverter input. Connect two cables to each inverter. Refer to Appendix A of the referenced installation manual for terminal locations and tightening torque.
5. Connect negative DC Link power wiring to the inverter input. Connect two cables to each inverter. Refer to Appendix A of the referenced installation manual for terminal locations and tightening torque.
6. Reinstall inverter input section plastic shield.
7. Route ground braid from top of Output/Inverter cabinet to Input/Rectifier cabinet through cabinet cutouts. Braid is secured at the factory to the Output/Inverter cabinet mounting stud.
8. Connect ground braid to Input/Rectifier cabinet mounting stud and secure.
9. Connect the Output/Inverter 15-pin control wiring harness connector P100 to the Input/Rectifier 15-pin control wiring harness connector J100. Refer to Appendix A of the referenced installation manual for connector locations.
10. Reinstall inverter output section plastic shield.

6.3.2.2 Multi-Module Test Setup

1. Verify all fuses are installed.
2. Disconnect and isolate white ground wire at surge arrestor LA1. LA1 is located behind CB1.
3. Disconnect SCR_Drive_A PCB connectors J1, J2, and J9.
4. Disconnect SCR_Drive_B PCB connectors J1, J2, and J9.
5. Disconnect Inverter Control (IGBT) PCB 1 connectors J9, J11, J12, J13, J14, J15, and J16.
6. Disconnect Inverter Control (IGBT) PCB 2 connectors J9, J11, J12, J13, J14, J15, and J16.
7. Disconnect Inverter Control (IGBT) PCB 3 connectors J9, J11, J12, J13, J14, J15, and J16.

8. Disconnect Power Supply 1 connector J1 (this isolates frame ground stand-off bond).
9. Disconnect Power Supply 2 connector J1 (this isolates frame ground stand-off bond).
10. Disconnect Machine Controller PCB connector J2.
11. Connect test jumpers using the information contained in table 6–1.

Table 6–2. Multi-Module Test Jumper Installation		
<i>Number of Wires</i>	<i>From</i>	<i>To</i>
1	E1	E2
1	E2	E3
1	E3	E4
1	E4	E5
1	E5	A_Rect_E1
1	A_Rect_E1	A_Rect_E2
1	A_Rect_E2	A_Rect_E3
1	A_Rect_E3	B_Rect_E1
1	B_Rect_E1	B_Rect_E2
1	B_Rect_E2	B_Rect_E3
1	E5	Input_Filter_E2
1	Input_Filter_E2	Input_Filter_E4
1	Input_Filter_E4	Input_Filter_E6
1	A6_INVERTER_DC+	A6_INVERTER_0C
1	A6_INVERTER_0C	E9
1	E9	E10
1	E10	E11
1	E11	E12

12. If installed, manually close CB1.
13. If installed, manually close CB3.

6.4 Dielectric Testing

6.4.1 Definitions

The definitions in the following paragraphs will be used to define potentially hazardous conditions when performing the steps of the hipot test procedure.



A **WARNING** is defined as any condition that can cause serious injury or be fatal to an associate.

WARNING flags will be positioned to identify where the potential for hazardous conditions or situations exists. Take all necessary precautions and use good judgement when performing these tests.

Follow the steps of the procedure in the order listed. Do not deviate from the listed order without permission from Test Engineering.

6.4.2 Testing

1. Connect the negative lead (black) of the hipot tester to the frame of the UUT and the positive lead (red) to the utility input.
2. Set hipot testing voltage, using table 6–3 to determine the proper voltage level.

NOTE: *If the UUT has different input and output voltages, the higher bus voltage is used to determine the hipot test voltage.*

<i>UUT AC In-put Voltage</i>	<i>AC Test Voltage</i>	<i>DC Test Voltage</i>
400VAC	1800	2546
480VAC	1960	2771
600VAC	2200	3111

3. Energize the Dielectric equipment and apply the full test voltage for one minute.
4. De–energize the Dielectric equipment and remove the red and black connections.

6.5 Returning System to Normal

If a single module (RT) system was tested, proceed to paragraph 6.5.1; if a multi-module system is being tested, proceed to paragraph 6.5.2.

6.5.1 Single Module (RT)

To return a single module UPS system to normal, perform the procedures in the following steps:

1. Disconnect jumpers installed for testing.
2. Connect white ground wire at surge arrestor LA1. LA1 is located behind CB1.
3. Connect white ground wire at surge arrestor LA2. LA2 is located behind FBP.
4. Connect SCR_Drive_A PCB connectors J1, J2, and J9.
5. Connect SCR_Drive_B PCB connectors J1, J2, and J9.
6. Connect Inverter Control (IGBT) PCB 1 connectors J9, J11, J12, J13, J14, J15, and J16.
7. Connect Inverter Control (IGBT) PCB 2 connectors J9, J11, J12, J13, J14, J15, and J16.
8. Connect Inverter Control (IGBT) PCB 3 connectors J9, J11, J12, J13, J14, J15, and J16.
9. Connect Power Supply 1 connector J1.
10. Connect Power Supply 2 connector J1.
11. Connect Power Supply 3 connector J1.
12. Connect Bypass Control PCB connectors J1 and J2.
13. Open all circuit breakers.
14. Proceed to Chapter 7 *Final Assembly* of this manual.

6.5.2 Multi-Module Installation

To return a multi-module UPS system using a System Bypass Module to normal, perform the procedures in the following steps:

1. Disconnect jumpers installed for testing.
2. Connect white ground wire at surge arrestor LA1. LA1 is located behind CB1.
3. Connect SCR_Drive_A PCB connectors J1, J2, and J9.
4. Connect SCR_Drive_B PCB connectors J1, J2, and J9.
5. Connect Inverter Control (IGBT) PCB 1 connectors J9, J11, J12, J13, J14, J15, and J16.

- 6.** Connect Inverter Control (IGBT) PCB 2 connectors J9, J11, J12, J13, J14, J15, and J16.
- 7.** Connect Inverter Control (IGBT) PCB 3 connectors J9, J11, J12, J13, J14, J15, and J16.
- 8.** Connect Power Supply 1 connector J1.
- 9.** Connect Power Supply 2 connector J1.
- 10.** Connect Machine Controller PCB connector J2.
- 11.** Open all circuit breakers.
- 12.** Proceed to Chapter 7 *Final Assembly* of this manual.

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7.1 Output/Inverter Cabinet

To install rear panels and front doors, perform the following procedure:

1. Install four rear panels onto cabinet as follows (see figure 4–2):
 - a. Install panel 4 over four screws at bottom of cabinet base. Secure with six screws on sides of panel and four at the bottom of panel.
 - b. Install panel 3 over four screws at bottom of cabinet base. Secure with six screws on sides of panel and four at the bottom of panel.
 - c. Install panel 2 above panel 4, inserting screws in bottom of panel into slots at the top of panel 4. Secure with ten screws on top and sides and four screws at bottom of panel.
 - d. Install panel 1 above panel 3, inserting screws in bottom of panel into slots at the top of panel 3. Secure with ten screws on top and sides and four screws at bottom of panel.
2. Install doors and top door hinges.

7.2 Input/Rectifier Cabinet

To install rear panels and front doors, perform the following procedure:

1. Install four rear panels onto cabinet as follows (see figure 5–2):
 - a. Install panel 4 over four screws at bottom of cabinet base. Secure with six screws on sides of panel and four at the bottom of panel.
 - b. Install panel 3 over four screws at bottom of cabinet base. Secure with six screws on sides of panel and four at the bottom of panel.
 - c. Install panel 2 above panel 4, inserting screws in bottom of panel into slots at the top of panel 4. Secure with ten screws on top and sides and four screws at bottom of panel.
 - d. Install panel 1 above panel 3, inserting screws in bottom of panel into slots at the top of panel 3. Secure with ten screws on top and sides and four screws at bottom of panel.
2. Install doors and top door hinges.
3. Proceed to installation of UPS contained in manual referenced in the *Introduction* of this manual.

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