Revision 1, June 2009

FLASHWAVE® 7500

Release 6.1

Issue 1, May 2009

COMPATIBLE WITH:

- NETSMART® 1500 Version 6
- NETSMART® 500 Version 3.11
- NETSMART® 2000 Version 3.3

FNC-7500-0061-200

EQUIPMENT INSTALLATION

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Copyrights, Trademarks, and Disclaimers

COMPLIANCE

FCC

This equipment has been tested and found to comply with the limits for Class A digital devices, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interferences when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio energy and if not installed 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, which the user will be required to correct at his/her expense.

Industry Canada

This digital apparatus does not exceed the Class A limits for noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications to ICES-003.

Cet appareil numérique ne dépasse pas la Classe UNE limites pour les émissions de bruit de la série d'appareil numérique hors dans les Règlements d'Intervention de Radio du Département Canadien de Communications aux NMB-003.

DECLARATION OF CONFORMITY

CE Certification

The FLASHWAVE® 7500 ETSI system meets all requirements for CE marking. It has been evaluated to and found compliant with the following standards:

- 2004/108/EEC (EMC Directive)
- EN 60950-1:2006, Information Technology Equipment Safety; General Requirements

The FLASHWAVE 7500 ETSI system has been evaluated to and meets the requirements of IEC 60825-1: 2001 and IEC 60825-2:2004 & A1:2006 for a Class 1 laser product.

IMPORTANT

Observe all warnings in the text or on equipment labels regarding high-voltage or high-temperature conditions. The following warnings and figures apply to most Fujitsu products.

Plug-In Unit Cautions

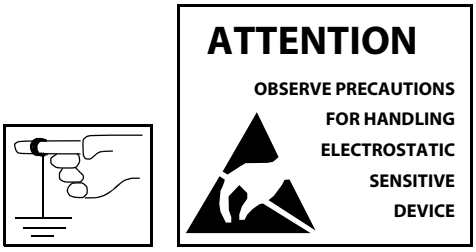
Observe the following precautions when handling plug-in units:

- Hold the plug-in unit only by its edges.
- Slowly and firmly push a plug-in unit into its slot to avoid damaging the unit. Do not force the unit. A slow insertion method minimizes power surges during installation. The longer ground connector pins ensure the ground circuit is connected first.

ESD Cautions

Units are stamped with anti-electrostatic markings (shown at right). Observe the following precautions to avoid damage from electrostatic discharge (ESD):

- Always transport and store the unit in an ESD approved shipping bag.
- Always wear an ESD wrist strap, with a minimum 1-megohm resistance, that is connected to safety ground. Do not use a damaged wrist strap.



Anti-Electrostatic Markings

Fiber Warnings

Danger: Never handle exposed fiber with your bare hands or touch it to your body. Fiber fragments can enter the skin and are difficult to detect and remove.

Avertissements de Fibre

La Danger: Jamais la poignée a exposé la fibre avec vos mains nues ou le touche à votre corps. Les fragments de fibre peut entrer la peau et sont difficiles de détecter et enlever.

Laser Safety Precautions

The FLASHWAVE 7500 ETSI system consists of Class 1 and Class 1M optical interface units. In accordance with IEC 60825-1: 2001, all laser apertures are identified with one or both of the following labels:

Danger: The FLASHWAVE 7500 system generates invisible laser radiation. Observe the following precautions:

- Avoid direct exposure to the beam.
- Never look into the end of a fiber, fiber cord, or fiber pigtail. Permanent eye damage or blindness can occur quickly when laser radiation is present.
- Viewing the laser output with certain optical instruments designed for use at a distance (for example, telescopes and binoculars) may pose an eye hazard.
- The label on the right is attached to laser transmitting and receiving units as a reminder.
- Use of controls, adjustments, or procedures other than those specified may result in hazardous laser radiation exposure.

Les Précautions laser de Sécurité

Le FLASHWAVE 7500 ETSI système consiste en la Classe 1 et Classe 1M unités d'interface optiques. Conformément à IEC 60825-1: 2001, toutes ouvertures laser sont identifiées avec un ou les deux des étiquettes suivantes:

La Danger: . Le FLASHWAVE 7500 système produit du rayonnement de laser invisible. Observez les précautions suivantes:

- Eviter l'exposition directe au rayon.
- Jamais le regard dans la fin d'une fibre, une corde de fibre, ou la natte de fibre. Les dommages permanent d'oeil ou la cécité peut arriver rapidement quand le rayonnement laser est actuel.
- La vue de la production laser avec les certains instruments optiques conçus pour l'usage à une distance (par exemple, les téléscopes et les jumelles) peut poser un danger d'oeil.
- L'étiquette est attachée sur la droite à transmettre de laser et aux unités de réception comme un rappel.
- L'Usage de contrôles ou d'ajustements ou l'exécution ou les procédures autrement que ces spécifié en ceci ont pour résultat l'exposition de rayonnement hasardeuse.

Installation Restrictions

Systems shall be installed only in restricted access areas (for example, dedicated equipment rooms or equipment closets) in accordance with the National Electrical Code, ANSI/NFPA 70.

Care should be taken not to compromise the stability of the rack by the installation of this equipment.

Restrictions d'Installation

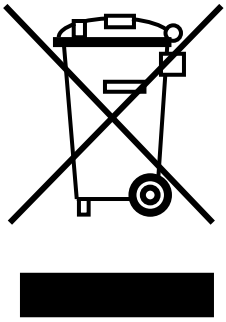
Les systèmes seront seulement installés dans les secteurs d'accès limités (par exemple, les pièces d'équipement dédié ou les placards d'équipement) conformément au Code Electrique National, ANSI/NFPA 70.

Le soin devrait être pris pour ne pas compromettre la stabilité de l'étagère par l'installation de cet équipement.

Flammable Liquids Warning

Danger: Do not use flammable liquids or sprays around telecommunications equipment. Electrical fan motors and other potential ignition sources within the equipment might ignite the flammable material and cause personal injury or damage to the equipment. If uncertain about whether a liquid or spray is flammable, contact the manufacturer.

Proper Disposal Procedures for Information Technology Equipment within the EU



Electrical and electronic equipment or units that bear the crossed-out wheeled bin symbol must be disposed of in accordance with European Directive 2002/96/EC for Waste Electrical and Electronic Equipment (WEEE).

Network communications or commercial equipment customers can dispose of Fujitsu equipment by contacting the Fujitsu regional office in your country. Customers can locate regional offices at http://www.fujitsu.com/global/.

Fujitsu will ensure the proper recycling, reuse, and other forms of recovery of WEEE. Potential hazardous substances in WEEE can harm the environment. You can contribute to the elimination of these effects through your cooperation.

Additional WEEE disposal information may be found at:
http://www.fujitsu.com/global/about/environment/activity/disposal.html

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DOCUMENT CHANGE NOTICE

This notice lists the reasons for, location of, and a description of document changes. When the changes are extensive, a general statement giving the nature of the revisions is provided.

Reason for Document Change: Updated for Release 6.1

Location of Change	Description of Change
Section 4.12.2, Installing Rack Covers [p. 4-43]	This is a new procedure.
Section 4.12.3, Installing Aisle End Panels [p. 4-60]	This is a new procedure.

This practice was not updated for Revision 1.

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3 Small Configuration

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1

INTRODUCTION

This practice contains general installation procedures for the FLASHWAVE® 7500 system. Installation teams should use these procedures for installing equipment racks and shelves, circuit breaker panels, wiring and cabling, and other miscellaneous items. Shelf backplane connectors and rack/shelf grounding information is also provided.

For a detailed description of the FLASHWAVE 7500 plug-in unit installation procedures, initial application of power to the system and system provisioning, refer to *System Turn-Up*, or to *System Turn-Up*.

FLASHWAVE 7500 system is a Class I laser product incorporating Class I and IIIb laser diodes. It complies with FDA Radiation Performance Standards, 21CFR1040.10.

FLASHWAVE 7500 system should be installed only in restricted access areas in accordance with articles 110-16, 110-17, and 110-18 of the National Electrical Code, ANSI/NFA 70.

FLASHWAVE 7500 equipment should be rack mounted above a concrete, or other noncombustible, surface only.

The power source for FLASHWAVE 7500 equipment should be reliably earth-grounded.

The FLASHWAVE 7500 system is intended to be grounded to an Isolated Bonding Network (IBN). However, the system can be deployed in a Common Bonding Network (CBN) if properly configured.

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2

CORE CONFIGURATION

This chapter includes the following procedures:

2.1 Overview

This chapter provides prerequisites and procedures for installing a rack and installing or connecting the shelves, plug-in units, and cables that make up the FLASHWAVE® 7500 Core Configuration system. This chapter also describes the basic rack configurations for the FLASHWAVE 7500 Core Configuration system. Additionally, this chapter describes the backplane of the FLASHWAVE 7500 Optical/Tributary shelf. Procedures for attaching cables to the Optical/Tributary shelf backplane are provided in Section 2.13, Installing Cables [p. 2-60].

> ***Note:*** *In a Core Configuration, the Optical/Tributary shelf is the 23-inch Universal shelf. The name of a specific shelf depends on its function (determined by the connections to its backplane and the plug-in units installed). An Optical shelf supports the main wavelength division multiplexing (WDM) facilities; a Tributary shelf provides client services. In layouts with two to six Optical shelves, the main shelf is called the Main Optical shelf, and the other shelves are called the Auxiliary Optical shelves.*

The information contained in the following sections applies to all Core Configuration applications, including Universal ILA, Express, and 2D-ROADM.

Before performing the installation procedures, review the following subsections describing prerequisites, standard rack configurations, and flange kits.

2.2 Prerequisites

Insure that all FLASHWAVE 7500 Core Configuration equipment has been received, and all data forms and job engineering drawings have been completed and are available.

The tools required for performing procedures listed in this chapter include the following:

- Common hand tools
- Digital multimeter (DMM)

2.3 Rack Configurations

The FLASHWAVE 7500 Core Configuration system racks can be configured in several variations. Fujitsu recommends ordering the top-level part number of a particular rack, which includes the rack, the appropriate shelves, the rack wiring and cabling, and other miscellaneous devices and equipment as required. The system racks are installed on-site in accordance with local plans and procedures.

Another option is to order racks populated with a minimum of shelves and then add to the complement as required (the racks are wired for a full complement of shelves). In addition, the FLASHWAVE 7500 Core Configuration system equipment, minus the rack, can be ordered and installed in customer-supplied racks.

> ***Note:*** *Due to NEBS™ Earthquake-resistance requirements, the LAS shelf should always be installed at the top of the rack in any configuration.*

Figures 2-1 [p. 2-4] through 2-7 [p. 2-10] show the standard rack configurations for a FLASHWAVE 7500 Core Configuration NE. For detailed procurement information, refer to *Ordering Information*, or contact your Fujitsu sales representative.

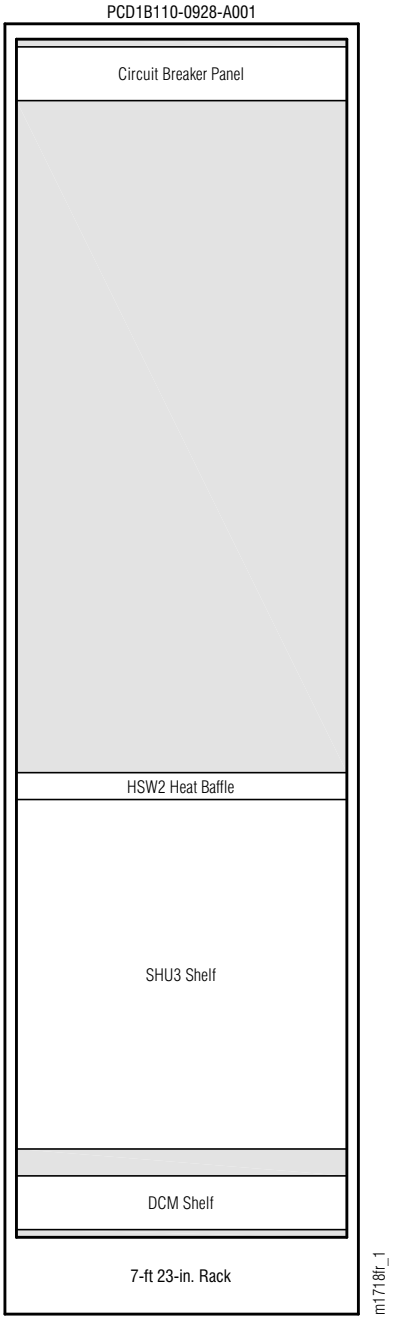


Figure 2-1: Rack Configuration with One Universal Shelf and One DCM Shelf (PCD1B110-0928-A001) (Core Configuration)

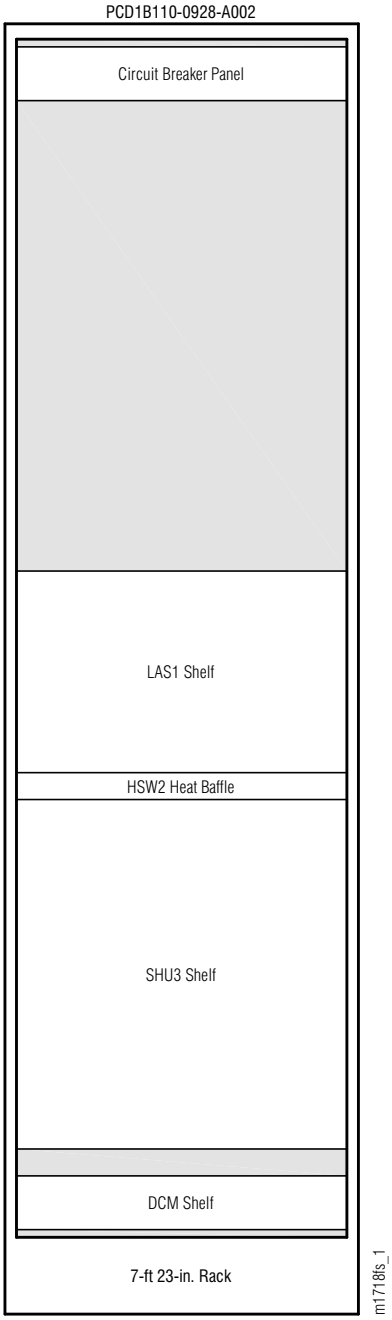


Figure 2-2: Rack Configuration with One Universal Shelf, One LAS, and One DCM Shelf (PCD1B110-0928-A002) (Core Configuration)

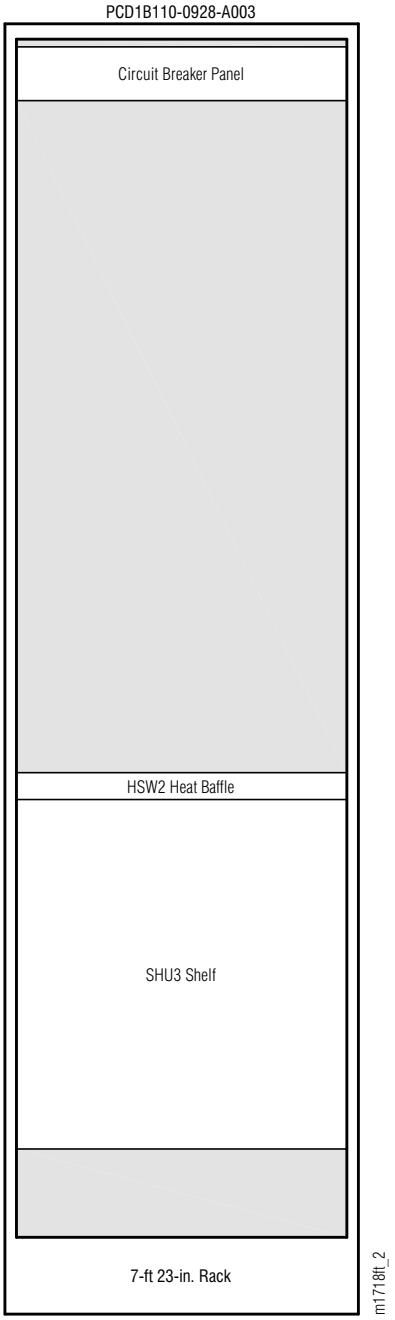


Figure 2-3: Rack Configuration with One Universal Shelf (PCD1B110-0928-A003) (Core Configuration)

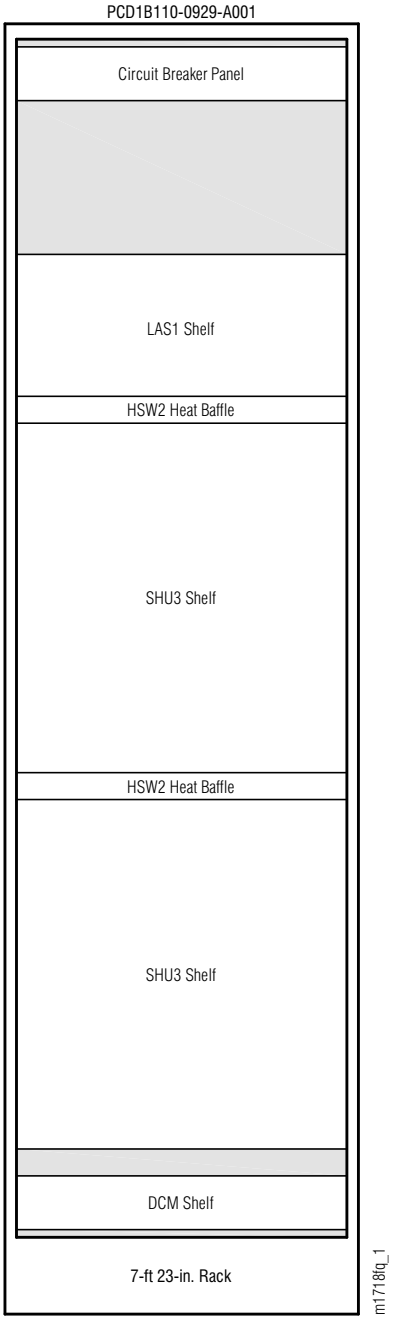


Figure 2-4: Rack Configuration with Two Universal Shelves, One LAS, and One DCM Shelf (PCD1B110-0929-A001) (Core Configuration)

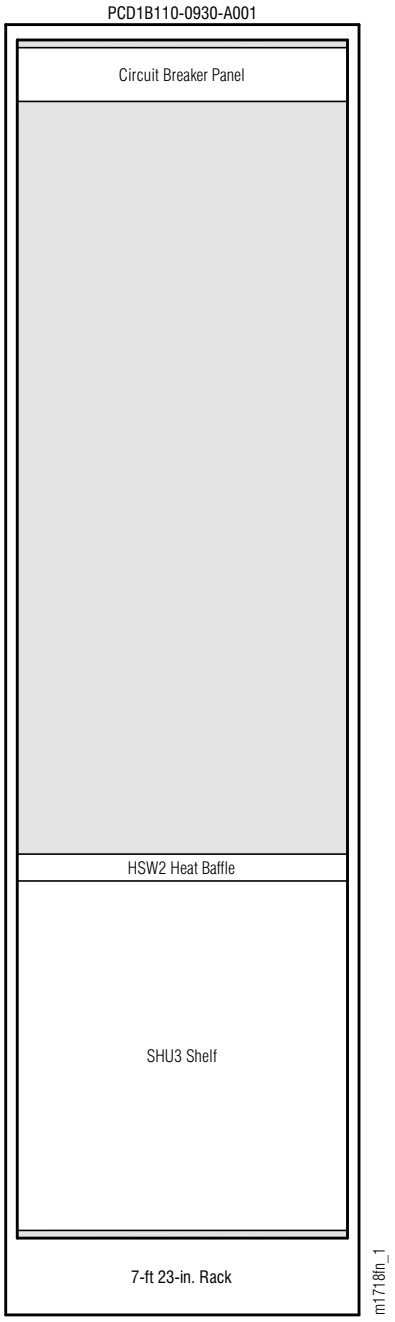


Figure 2-5: Rack Configuration with One Universal Shelf Only (PCD1B110-0930-A001) (Core Configuration)

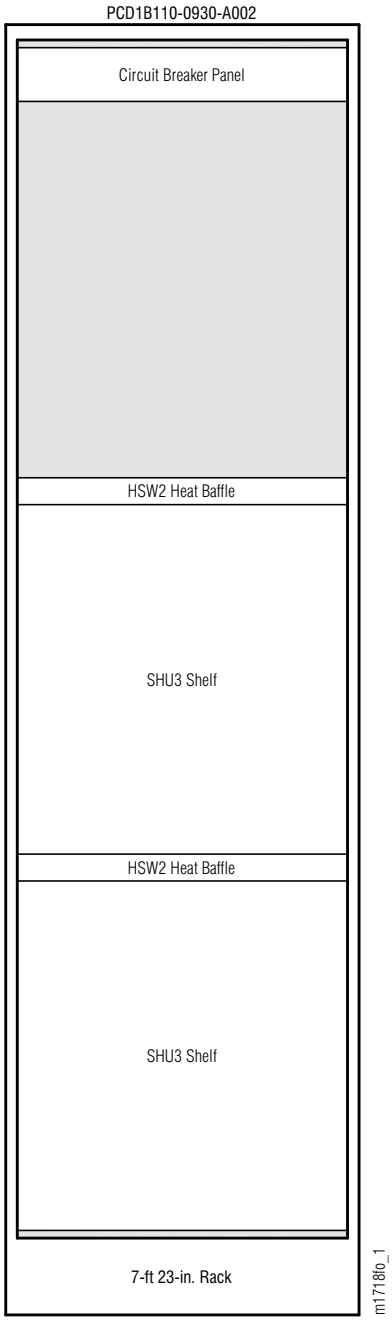


Figure 2-6: Rack Configuration with Two Universal Shelves Only (PCD1B110-0930-A002) (Core Configuration)

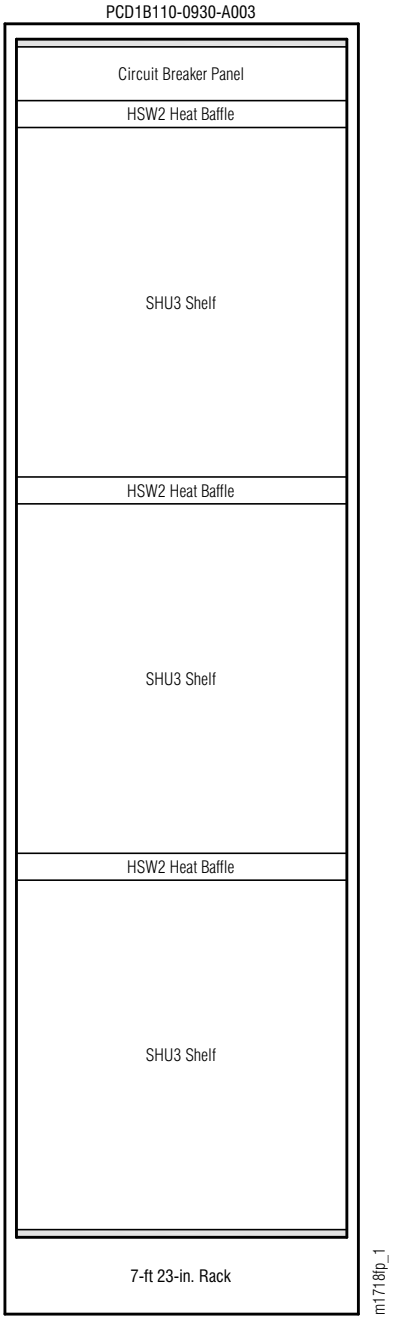


Figure 2-7: Rack Configuration with Three Universal Shelves Only (PCD1B110-0930-A003) (Core Configuration)

2.4 Storing, Unpacking, and Inspecting Equipment

This section describes how to store, unpack, and inspect the FLASHWAVE 7500 equipment. It includes the following subsections:

Note: *Review* Section 2.5 [p. 2-16] *for rack installation criteria.*

2.4.1 Storing Equipment

When equipment is to be kept in storage, the equipment should be left in the shipping containers. The storage bags for shelves and plug-in units are coated with a conductive material to protect plug-in units from damage by electrostatic discharge (ESD). Observe all warning labels used by Fujitsu to indicate electrostatic-sensitive devices.

2.4.2 Unpacking and Inspecting the Equipment Rack

This procedure provides guidelines for unpacking and inspecting a standard rack. Fujitsu recommends that the installation team familiarize themselves with the specific area where the installation is to be performed, examine the racks, and ensure that sufficient workspace to unpack the racks is available.

DANGER:

Improper handling of the equipment rack can result in serious injury or death. Always use a forklift or lifting sling with block and tackle to lift or move the equipment rack. Keep all personnel clear of the equipment rack while it is being lifted. Do not attempt to handle and install the racks without sufficient assistance.

Follow this procedure to unpack and inspect the equipment rack:

Step	Task
1	Identify the equipment rack to be installed.

2 Before unpacking the equipment rack, inspect the container (see Figure 2-8 [p. 2-12]) for signs of shipping damage. Claims for shipping damage must be filed with the transportation company in accordance with their published procedure.

Figure 2-8: Example of an Equipment Rack in Shipping Container

Note: *A shipping label is located on the front of the equipment rack container. Compare this with the shipping documents.*

3 Is this the correct shipment for this location?

If YES:
Continue with Step 4 [p. 2-12].

If NO:
Go to Step 16 [p. 2-14].

4 Using all data sheets and job engineering drawings, verify that the information matches the installation site.

5 Using industrial shears, cut the two shipping bands from the container. See Figure 2-8 [p. 2-12] for the location of the shipping bands.

After the last shipping band is cut, the top of the shipping container will fall away.

6 At the front-left or -right corner of the container (see Figure 2-9 [p. 2-13]), use a box cutter to cut the container away from the equipment rack. Start cutting from the top of the shipping container to the bottom.

Figure 2-9: Removing Shipping Container from an Equipment Rack

7 After the shipping container is cut open, remove it from the equipment rack.

8 Inspect the rack thoroughly to ensure that it is not damaged.

9 Is there any noticeable damage to the rack?

If YES:
Go to Step 16 [p. 2-14].

If NO:
Continue with Step 10 [p. 2-13].

Note: *The equipment rack should be completely covered with bubble wrap to prevent damage during shipment.*

10 At the side of the rack, use industrial shears to cut open the bubble wrap. Start cutting from the bottom of the rack to the top.

WARNING:

Always cut at the side of the rack to avoid damaging the equipment. Standard configuration racks are delivered prewired. Do not cut or disconnect any wires.

11 Carefully remove the bubble wrap from the rack.

12 Is there any noticeable damage to the rack after the bubble wrap is removed?

If YES:
Go to Step 16 [p. 2-14].

If NO:
Continue with Step 13 [p. 2-14].

13 Does the rack contain equipment (standard rack configuration)?

If YES:
Continue with Step 14 [p. 2-14].

If NO:
Go to Step 18 [p. 2-14].

14 Locate the serial numbers on the left side of each equipment shelf mounted in the rack. Compare the serial numbers with the serial numbers on the shipping documents.

15 Do the serial numbers on the equipment and the shipping documents match?

If YES:
Go to Step 17 [p. 2-14].

If NO:
Continue with Step 16 [p. 2-14].

16 Notify the transportation company if the equipment was damaged or if an improper shipment was received. DO NOT continue the installation of the equipment until the problem has been corrected. After the problem is resolved, repeat this procedure beginning with Step 2 [p. 2-12].

17 Update office records according to local procedures.

18 Do you want to install the equipment rack now?

If YES:
Proceed to Section 2.5, Installing the Rack [p. 2-16].

If NO:
This procedure is complete.

2.4.3 Unpacking and Inspecting System Equipment

This procedure provides guidelines for unpacking system equipment and ensuring the safe arrival of all equipment. Fujitsu recommends that the installation team familiarize themselves with the specific area where the installation is to be performed, examine the racks to be used, and ensure that sufficient workspace is available to unpack the equipment.

DANGER:

Do not attempt to handle and install the shelves without sufficient assistance. The Optical/Tributary shelf weighs approximately 48.5 lb (22 kg) empty (without fans). Equipped, the Optical/Tributary shelf weighs significantly more. Handling the equipment without sufficient assistance may result in personal injury, damage to the equipment, or both.

WARNING:

Do not use the internal walls of any shelf as a lifting point or lift support. Doing so may damage the plug-in unit rail support.

Step	Task
1	Before unpacking the equipment, inspect the containers for signs of shipping damage. Claims for shipping damage must be filed with the transportation company in accordance with their published procedure.
2	Unpack and inventory individual system equipment components; however, leave all plug-in units in their original, individual containers until they are installed during system turn-up. When unpacking, use the checkoff list accompanying each shipment to determine that all items are present before proceeding with the installation. If a shortage of any kind exists, notify the appropriate Fujitsu representative.
3	Inspect the inside and outside of the shelves for damage.
4	Check for debris possibly lodged in each shelf backplane.
5	Update office records according to local procedures.

This procedure is complete.

2.5 Installing the Rack

This procedure details the steps required to install a standard rack. Fujitsu recommends that the installation team familiarize themselves with the specific area where the installation is to be performed, examine the rack, and ensure that sufficient workspace is available to install the rack.

DANGER:

Improper handling of the equipment rack can result in serious injury or death. Always use a forklift or lifting sling with block and tackle to lift or move the equipment rack. Keep all personnel clear of the equipment rack while it is being lifted. Do not attempt to handle and install the racks without sufficient assistance.

CAUTION:

The rack should be mounted only on a concrete or other noncombustible surface.

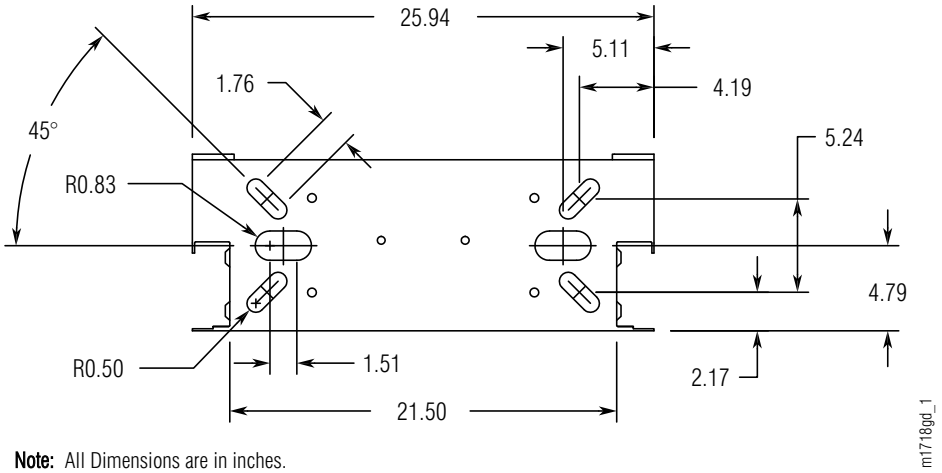
The following tools are required to perform this procedure:

- Hammer
- Drill
- Drill bits sufficient to drill into the flooring
- Punch
- Common hand tools, including a wrench or ratchet set

Follow this procedure to install the equipment rack:

Step	Task
1	Identify the equipment rack to be installed.
2	Inspect all shipping documents to ensure that the correct shipment was received. Refer to Section 2.4.2, Unpacking and Inspecting the Equipment Rack [p. 2-11].
3	Using the documentation supplied with the rack package, mark the floor for proper mounting.

Figure 2-10 [p. 2-17] shows an **example** mounting diagram. Mounting diagrams will vary depending on equipment and location.



Note: All Dimensions are in inches.

Figure 2-10: Example Diagram—7 feet x 23 inch Equipment Rack Floor Dimensions

4 Using a punch and hammer, mark the position where the holes are to be drilled.

5 Determine the type of floor anchor to be used.

6 Is the floor anchor for a concrete floor?

If YES:
Go to Step 7 [p. 2-17].

If NO:
Go to Step 14 [p. 2-18].

7 In accordance with the dimensions of the anchor to be used, drill the holes in the concrete floor.

8 Clean the drill shavings from the holes.

9 Install an anchor in each of the holes.

10 Remove any debris from the area in which the rack will be mounted.

11 Move the rack into position, aligning each of the holes in the base of the rack to the anchors.

12 Install the mounting bolts into the anchors, and tighten them to within 0.5 inch of the equipment rack baseplate. Do not fully tighten at this time.

13 Go to Step 19 [p. 2-18].

14 Drill the holes in the floor in accordance with the dimensions of the mounting bolts being used.

15 Remove any debris from the area in which the rack will be mounted.

16 Move the rack into position, aligning each of the holes in the base of the rack to the anchors.

17 Install the mounting bolts with lock washers through the equipment rack baseplate and the floor.

18 Install the nuts to the bolts under the floor. Tighten them until the lock washers begin to compress. Do not fully tighten at this time.

19 Secure the top of the equipment rack according to the job specifications.

Some equipment racks are secured to existing overhead framework while others are secured to an adjacent wall using a horizontal mounting brace. All overhead mounting hardware should be tightened after assembly.

20 Tighten the floor mounting bolts.

Note: *If the rack is installed on a raised floor, there will likely be some type of supports needed. Instructions for seismic zone installation must also be considered. Follow your local practices for support and bracing of the rack.*

21 Measure the vertical alignment of the 7-foot equipment rack. It must be vertically aligned to within 3/16 inch.

22 Is the equipment rack within the tolerance level specified in Step 21 [p. 2-18]?

If YES:
Go to Step 27 [p. 2-19].

If NO:
Continue with Step 23 [p. 2-18].

23 Loosen the floor mounting bolts and top mounting hardware, and adjust the equipment rack using shims on the mounting hardware. All shims and adjustments must meet locally acceptable guidelines.

24 Retighten all mounting hardware.

25 Measure the vertical alignment of the 7-foot equipment rack. It must be vertically aligned to within 3/16 inch.

26 Is the equipment rack within the tolerance level specified in Step 25 [p. 2-19]?

If YES:
Continue with Step 27 [p. 2-19].

If NO:
Go back to Step 23 [p. 2-18].

27 Update office records according to local procedures.

This procedure is complete.

2.6 Installing the Circuit Breaker Panel

The circuit breaker panel (CBP) (see Figure 2-11 [p. 2-20]) should be the first item installed in the rack. For procedures to install the CBP, refer to *Circuit Breaker Panel*. After the CBP is installed at the top of the rack, the other equipment can be installed.

Note: *The CBP may not have circuit breakers CB1 through CB4 installed. Locate the HA15B-0001-C365 circuit breaker kit, if required, for labels and circuit breaker units.*

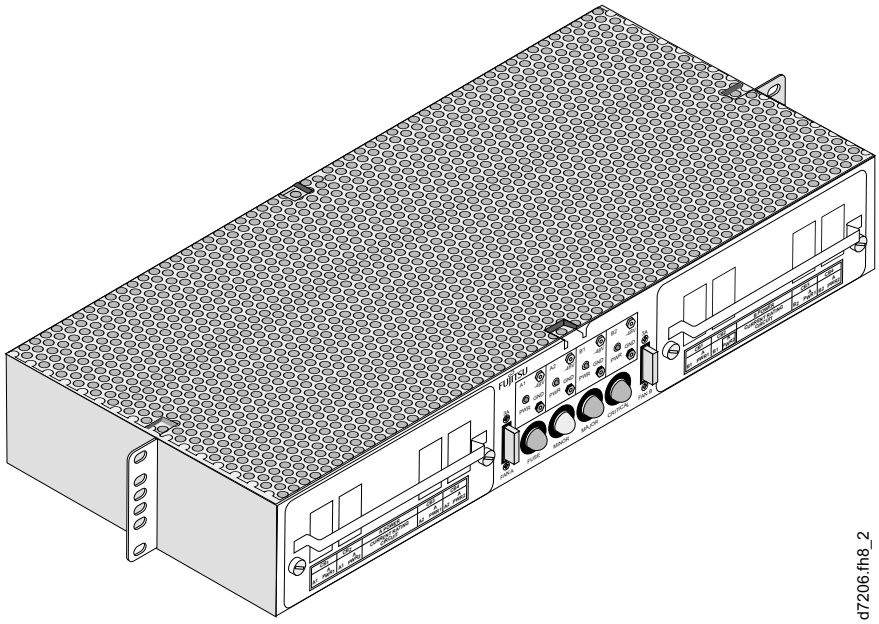


Figure 2-11: Circuit Breaker Panel, HA15B-001-B361

2.7 Connecting Office Battery to the Circuit Breaker Panel

This section includes the following subsections:

If not done previously as part of an earlier FLASHWAVE 7500 installation, the office-battery power cables must be connected to the circuit breaker panel (CBP) power input connectors. However, the office-battery ends of the power cables must not be connected to the primary power source until the CBP is completely installed.

> ***Note:*** *In this section, the term* battery *refers to the office DC power feed for the bay in which the equipment is being mounted.*

The CBP supports four separate battery/return power sources:

- BATT A1/RTN A1
- BATT A2/RTN A2
- BATT B1/RTN B1
- BATT B2/RTN B2

Each power input connection consists of a pair of parallel-wired, threaded studs. For example, BATT A1 and RTN A1 both have two threaded studs.

An additional connector is provided for frame ground.

For additional details on the CBP, refer to *Circuit Breaker Panel*.

The following tools are required:

- No. 1 Phillips® screwdriver
- 7/16-inch socket wrench

2.7.1 Connecting Office Battery to Circuit Breaker Panel

See Figure 2-12 [p. 2-22] for the location of terminals on the rear of the CBP. Power cabling includes the following:

- –48 V battery supply (BATT A1, BATT A2, BATT B1, and BATT B2)
- Battery return (RTN A1, RTN A2, RTN B1, and RTN B2)
- Frame ground (FG)

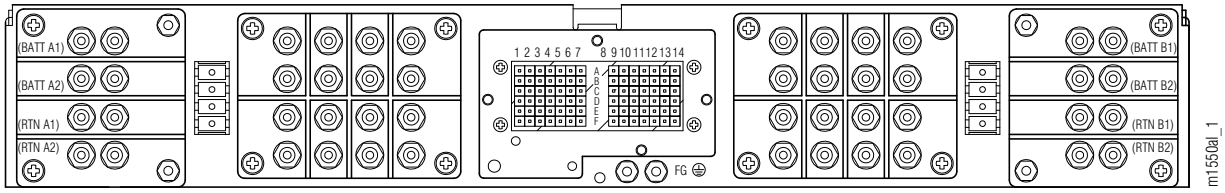


Figure 2-12: Rear View of CBP

DANGER:

Carefully follow the instructions in this section to avoid personal injury, damage to the equipment, or both. Installing power cables that are already connected at one end to a voltage source can result in an electrical accident.

Step	Task
1	Verify that the office-battery ends of the power cables are not connected to the office batteries. These connections are the last to be made after the CBP has been installed. If necessary, follow local procedures to disconnect office power from these cables or remove circuit breakers from the rack CBP. Use a DMM to ensure that the voltage is 0 V DC (with reference to the battery ground) at the equipment-rack end of the cables. ***Note:*** *For FLASHWAVE 7500 equipment, circuit breakers (or fuses) should be sized to ensure that the maximum input current does not exceed 80 percent of the circuit breaker (or fuse) size. Use 30 A circuit breakers (or fuses) to ensure that this requirement is met for all configurations of the FLASHWAVE 7500 equipment.*
2	Remove the protective covers that protect the A/B battery terminals at both ends on the rear panel of the CBP. See Figure 2-12 [p. 2-22] for the CBP.
3	Remove the top nuts and washers from the threaded studs for all BATT and RTN connections being installed.

4 Locate the double-lug connector on the CBP end of the power cable that is to be connected to battery source A1 at the end of this procedure.

5 Place the single two-hole lug on the two BATT A1 studs so that the cable is easily routed toward the outside edge of the shelf.

Note: *A washer may be required as a standoff between the circuit breaker panel and the lug.*

6 Install the washer and nut, and tighten according to local standards.

7 Locate the single two-hole lug on the CBP end of the power cable that is to provide the return for battery source A1 at the end of this procedure.

8 Place the single two-hole lug on the two RTN A1 studs so that the return cable is easily routed toward the outside edge of the shelf.

Note: *A washer may be required as a standoff between the circuit breaker panel and the lug.*

9 Install the washer and nut and tighten according to local standards.

10 Repeat Steps 4 [p. 2-23] through 9 [p. 2-23], substituting A2 for A1, then B1 for A1, and finally B2 for A1.

11 Connect the frame ground lead to the FG terminal located just below the pin block. See Figure 2-12 [p. 2-22].

Note: *This grounding procedure assumes that the frame ground and power ground are terminated at a central ground bus (ground window). Refer to Telcordia TR-TSY-000513.*

12 Verify that no strands of wire are shorting terminals together and that leads are securely fastened.

13 Replace the plastic cover over the input connectors.

14 On the front panel of the CBP, set all circuit breakers to the OFF position.

15 Observing local procedures, connect each of the power cables to the office batteries and office ground as appropriate.

This procedure is complete.

2.7.2 Checking Battery Voltage at Circuit Breaker Panel

Note: *In this procedure, the term* battery *refers to the DC power feed for the rack in which the equipment is being mounted.*

Note: *This procedure assumes that power cables have been connected between the office battery and the CBP and that the battery power is on.*

The test equipment required is a DMM (digital multimeter).

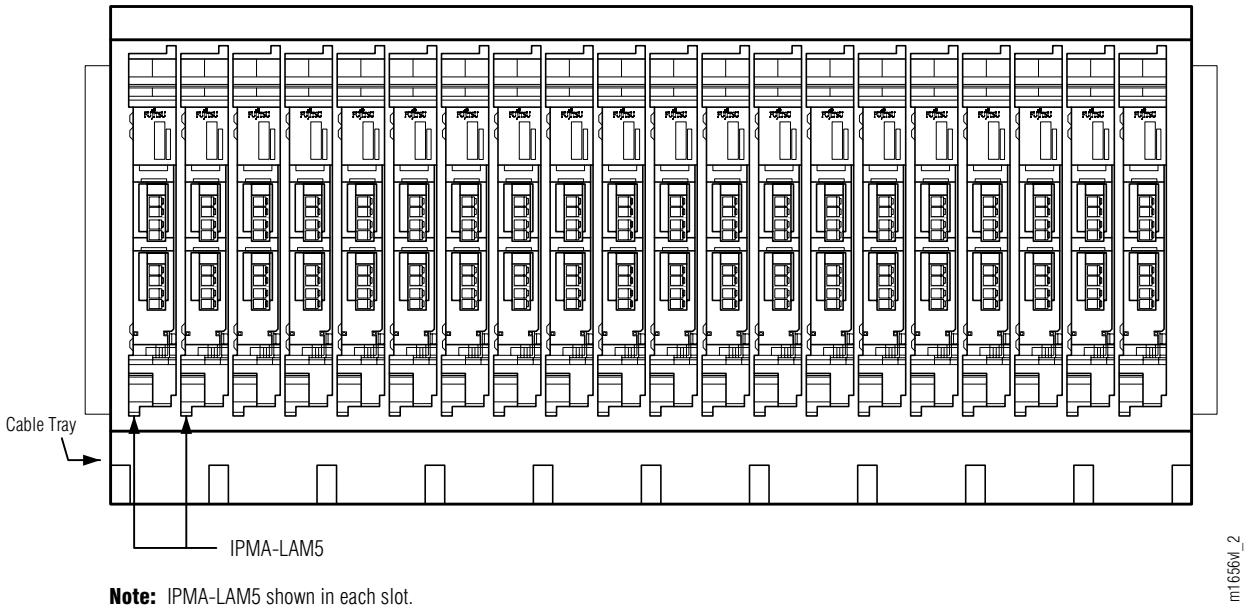
Step	Task
1	Set the DMM switches to measure voltage between 40 and 60 V DC.
2	On the front panel of the CBP, set all circuit breakers to the ON position.
3	Connect the negative DMM test lead to the first GND connector on the front panel, and connect the positive DMM test lead to the associated input voltage test point (–48 V) on the front of the CBP. See Figure 2-12 [p. 2-22]. The input voltage should be between –40 and –57 V DC.
4	Is the DMM measurement between –40 and –57 V DC? **If YES:** Continue with Step 5 [p. 2-24]. **If NO:** Report trouble to the installation group. When trouble is corrected, repeat Step 3 [p. 2-24].
5	Disconnect the DMM leads.
6	Repeat Steps 3 [p. 2-24] through 5 [p. 2-24] for each applicable –48 V/GND pair.
7	On the CBP front panel, set all circuit breakers to the OFF position. This procedure is complete.

2.8 Installing Optical/Tributary Shelf, LAS, and Heat Baffle

This procedure provides instructions for installing a generic shelf and heat baffle, if required, into a relay rack. A rack or other suitable mounting structure must already be installed in accordance with local plans and procedures. See Figure 2-13 [p. 2-25], Figure 2-14 [p. 2-26], and Figure 2-15 [p. 2-27] for front views of the Optical shelf, the Tributary shelf, and the lambda access shelf (LAS1) respectively. These three shelves are mounted using the generic shelf procedures.

Figure 2-13: Optical Shelf—Populated with Plug-In Units (Front View) (Core Configuration)

Figure 2-14: Tributary Shelf—Populated with Plug-In Units (Front View) (Core Configuration)



Note: IPMA-LAM5 shown in each slot.

Figure 2-15: LAS1—Populated with LAMs (Front View) (Core Configuration)

The Fujitsu part number for the 23-inch Optical/Tributary shelf is FC9682SHU3, the 23-inch LAS is FC9682LAS1, and the 23-inch heat baffle is FC9682HSW2.

The heat baffle is mounted in a specific location as shown in the rack configurations in Figures 2-1 [p. 2-4] through 2-7 [p. 2-10]. Review these figures to determine when, as the shelves are installed, the heat baffle should be added. Installation is minimal.

Do not install the Optical/Tributary shelf directly above any air-blocking product. LAS shelves and DCM shelves are examples of air-blocking products. Leave at least 1U (1.75 inches) of air clearance space between the shelf and any air-blocking product installed beneath the Optical/Tributary shelf.

The Optical/Tributary shelf can be installed at the bottom of the rack if adequate air clearance is present between the bottom of the shelf and the floor. If air clearance between the bottom of the shelf and the floor is not adequate, mount the Optical/Tributary shelf near the bottom of the rack leaving 1U (1.75 inches) of air clearance space below it.

A heat baffle is required for each Optical/Tributary shelf and must be installed directly above the shelf.

Note: *The FLASHWAVE 7500 shelves do not have front covers because of front-access fiber cabling.*

Note: Figures 2-13 [p. 2-25] and 2-14 [p. 2-26] *are shown fully populated for instructional purposes. At installation, the shelves do not have plug-in units installed. The shelves are not populated until system turn-up.*

Note: *The LAS1 should be mounted in the rack that best facilitates the fiber management of the MPO-to-MPO cabling from the Optical shelf at the time of installation. The LAS1 contains only passive components and does not require any power connections.*

DANGER:

Do not attempt to handle and install the shelves without sufficient assistance. The Optical/Tributary shelf weighs approximately 95 lb (43.0 kg) empty (without fans). Equipped, the Optical/Tributary shelf weighs significantly more. Handling the equipment without sufficient assistance may result in personal injury, damage to the equipment, or both.

WARNING:

Do not use the internal walls of any shelf as a lifting point or lift support. Doing so may damage the plug-in unit rail support.

CAUTION:

Do not compromise the stability of the rack when installing this equipment. Unstable racks can fall resulting in equipment damage.

Step	Task
1	If not already done, remove the shelf and heat baffle from the shipping container.
2	Ensure that all plug-in units are removed from the shelf. ***Note:*** *Do not remove filler panels.*
3	Secure the shelf to the rack using five screw slots on each side of the shelf as shown in Figure 2-16 [p. 2-29].

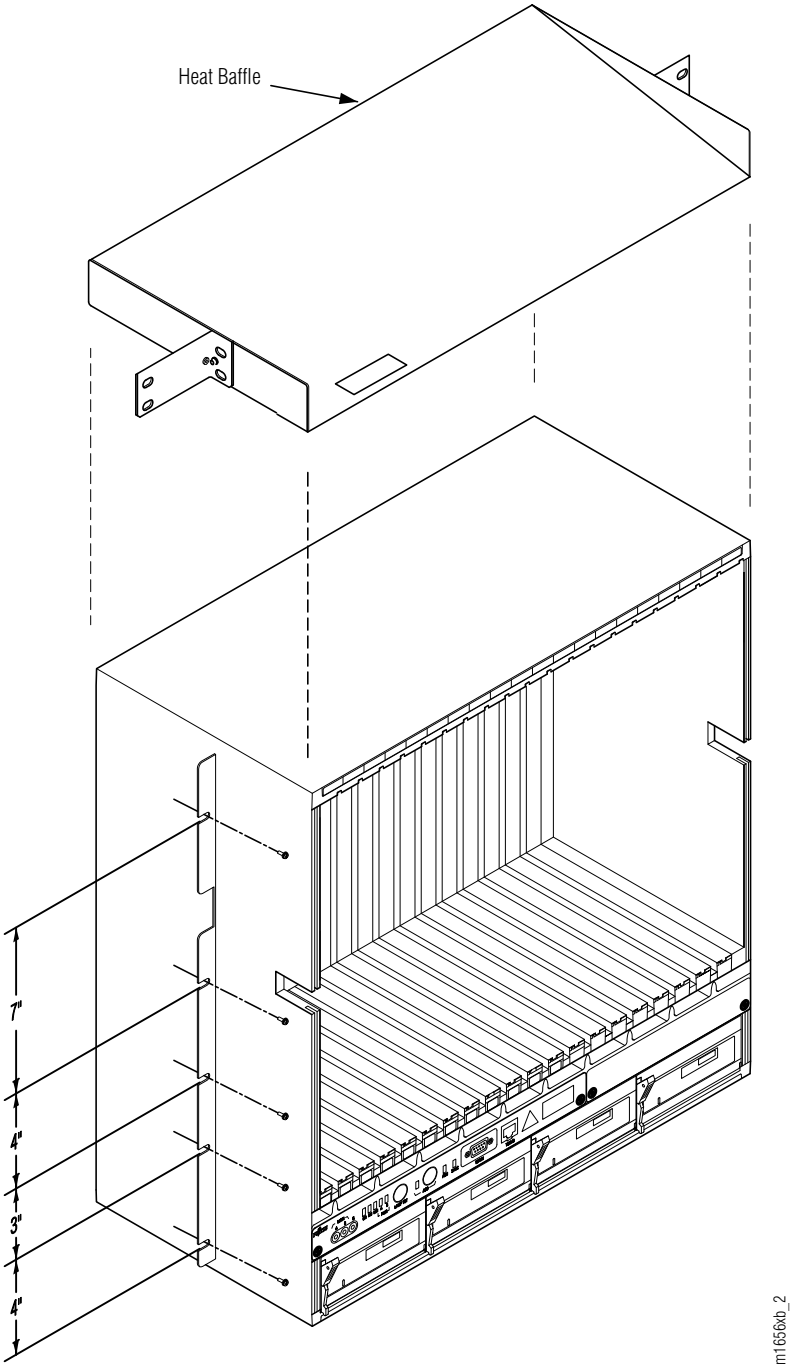


Figure 2-16: Typical Shelf Mounting with Heat Baffle (Core Configuration)

4 Review Figures 2-1 [p. 2-4] through 2-7 [p. 2-10] and install the heat baffle in the rack where applicable. Install the heat baffle as shown in Figure 2-16 [p. 2-29].

Note: *The heat baffle ensures that air pushed upward through the shelf is deflected to the rear of the rack. Use two screws on each side of the assembly.*

5 Clearly mark or label each Optical/Tributary shelf according to local practice.

Note: *The recommended labeling scheme is shown in Figure 2-17 [p. 2-31]. In this scheme, each shelf is labeled with its shelf AID (for example, OS1 for the Main Optical shelf). As shown, the shelf AID is determined by shelf position within the hierarchy of LAN connections. Throughout this documentation, shelves are identified by shelf AID.*

This procedure is complete.

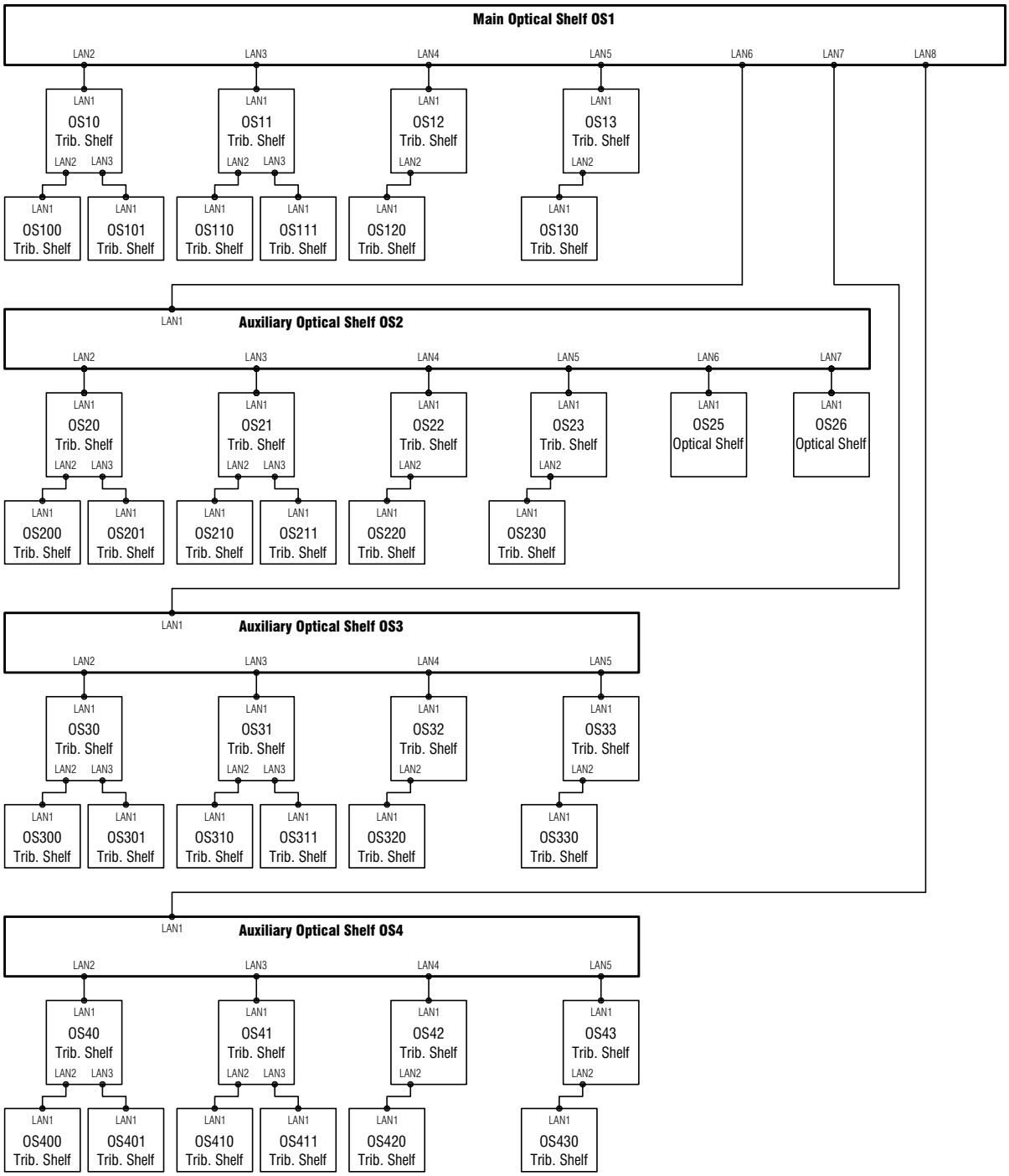


Figure 2-17: Suggested Optical/Tributary Shelf Labeling Scheme

2.9 Installing Fans and DCM Shelf

This procedure provides instructions for installing the Optical/Tributary shelf fans and the dispersion compensation module (DCM) shelf (if required). It includes the following subprocedures:

2.9.1 Installing Shelf Fans

This procedure provides installation instructions for the four cooling fans used by the Optical/Tributary shelf (see Figure 2-18 [p. 2-32]).

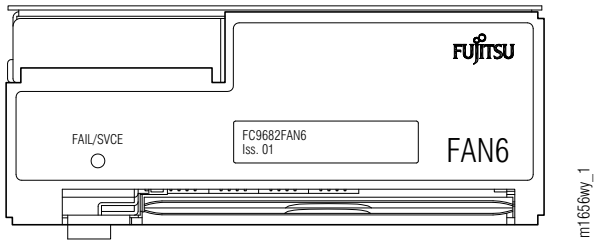


Figure 2-18: Fan Unit (Front View) (Core Configuration)

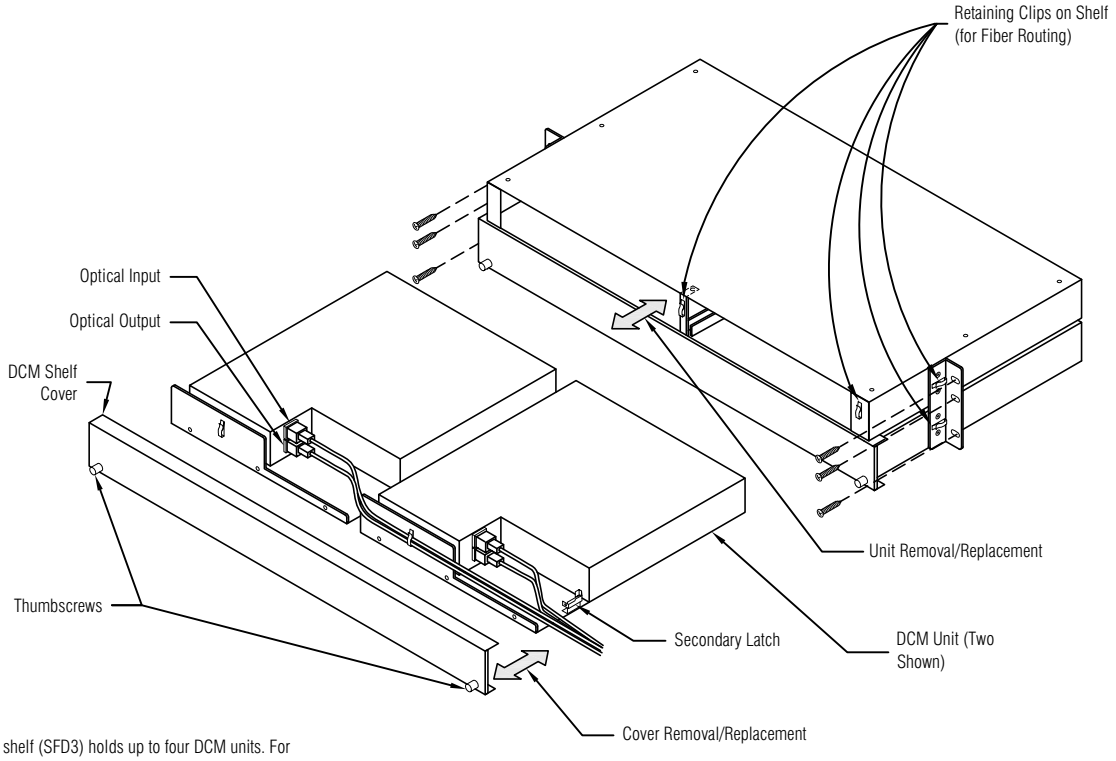
Step	Task
1	If not already done, unpack four fan plug-in units from the shipping container.
2	If not already done, install a fan filter in the fan tray located at the bottom of each fan unit.
3	Install the fan plug-in units into the bottom portion of each Optical/Tributary shelf. (Refer to *Maintenance and Trouble Clearing*, Section 8.8, Replacing FAN6 Plug-In Unit and Fan Filter [p. 8-28] for detailed information.)

Note: *The connectors on the back of the fan engage the shelf backplane connectors and are secured in place with an extractor lever (located on the left side of the fan assembly front panel).*

2.9.2 Installing the 23-Inch DCM Shelf

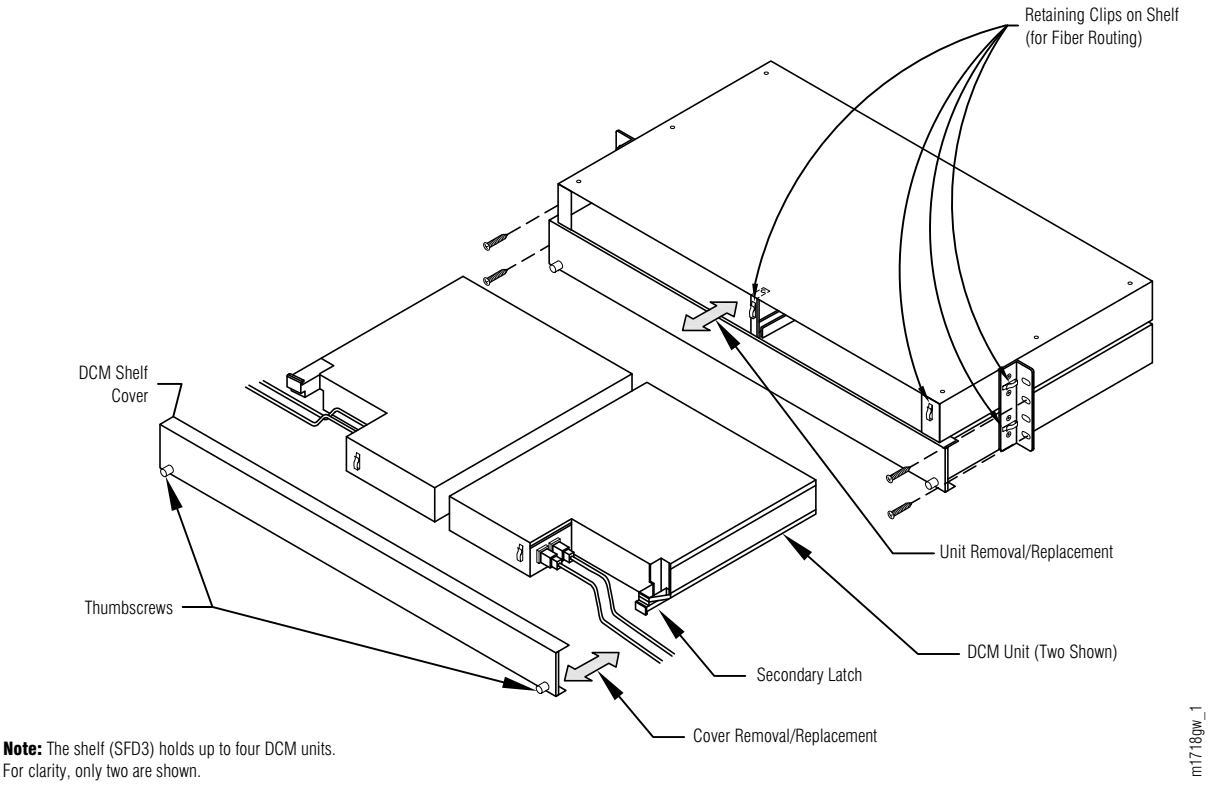
The dispersion compensation module (DCM) shelf (FC9512SFD3), if needed, provides dispersion compensation for dense wavelength division multiplexing (DWDM) signals entering the NE.

Figure 2-19 [p. 2-33] shows the 23-inch DCM shelf (SFD3) with two single-height DCM units. Figure 2-20 [p. 2-34] shows Issue 03 of the 23-inch DCM shelf (SFD3) with two single-height DCM units. Issue 03 of the SFD3 DCM shelf supports DCM fiber diversity mounting units, which allows the routing of fiber to either side of the shelf.



Note: The shelf (SFD3) holds up to four DCM units. For clarity, only two are shown.

Figure 2-19: DCM Unit and 23-Inch SFD3 Shelf (Exploded View)



Note: The shelf (SFD3) holds up to four DCM units. For clarity, only two are shown.

Figure 2-20: SFD3 (Issue 03) 23-Inch DCM Shelf Showing Fiber Diversity

The following procedure provides installation instructions for the 23-inch DCM shelf (SFD3):

Step	Task
1	Unpack the SFD3 shelf from the shipping container. The DCM units do not need to be removed from the SFD3 shelf if they are already installed. The shelf can hold up to four single-height DCM units, although the normal complement is two DCM units per shelf.

2 Install the SFD3 shelf in the bottom of the rack that contains the Optical shelf (if space permits) or in a rack adjacent to the Optical shelf. Secure the shelf to the rack using three rack mounting screws on each side of the shelf.

Note: *If hole alignment does not permit three screws on each side, it is acceptable to secure the shelf with only two screws on each side.*

3 If the shelf came without the DCM units already installed:

a. Locate the appropriate units to be installed and remove them from their protective ESD packaging.

b. Loosen the thumbscrews and remove the faceplate/cover from the shelf.

c. Carefully slide each DCM unit into the appropriate shelf slot.

d. Replace the cover and tighten the thumbscrews to secure each unit in the shelf.

This procedure is complete.

2.10 Installing Power, Ground, and Alarm Cables

This procedure provides instructions for installing power, ground, and alarm cabling for standard rack configurations. It includes the following subprocedures:

2.10.1 Reference Material

The cables and cable harnesses used are listed in Table 2-1 [p. 2-37] and shown in Figure 2-21 [p. 2-38].

> ***Note:*** *Connections to the shelf power terminal strip should use copper conductors only.*

Figures 2-22 [p. 2-39] through 2-24 [p. 2-41] show schematics for installing power, ground, and alarm cabling between the rack, shelves and CBP for the following standard rack configurations:

- Rack with one Universal shelf (Figure 2-22 [p. 2-39])
- Rack with two Universal shelves (Figure 2-23 [p. 2-40])
- Rack with three Universal shelves (Figure 2-24 [p. 2-41])

Each standard rack configuration includes a circuit breaker panel (CBP) with power terminals as shown in Figure 2-25 [p. 2-42]. The circuit breakers within the CBP are associated with shelves listed in Table 2-2 [p. 2-42].

Figure 2-26 [p. 2-43] shows the Optical/Tributary shelf backplane. Figure 2-27 [p. 2-44] shows the power cabling.

Figure 2-28 [p. 2-45] shows the rack alarm cable harness, which gets wire wrapped to the CBP. Connectors along this harness mate to shelf alarm cables (see Figure 2-29 [p. 2-46]) that plug into alarm ports on the shelf backplane.

Table 2-1: Power, Ground, and Alarm Cable Connections (Core Configuration)

Part Number	Use	Description	Term Type	Wire Gauge
HA15B-0001-C413	–48 V DC and ground	5-wire rack/shelf power harness, one set per shelf	10 AWG crimp lugs	10 AWG
HA660-1106-T003	Rack alarms	6-connector daisy-chained alarm harness, one connector per shelf (CNA through CNF), one harness per rack	D-sub 25-pin, terminates with wire-wrap at CBP	24 AWG
HA660-1102-T015	Shelf alarms	Alarm cable from rack alarm cable connector to shelf backplane alarm connector, one per shelf	D-sub 25-pin, CN1 at rack alarm end, CN2 at shelf alarm end	24 AWG
PC15L-0001-C045	Frame ground	Frame ground stranded wire cable from rack to CBP, one per rack	Terminal lugs, both ends, installed	6 AWG, stranded

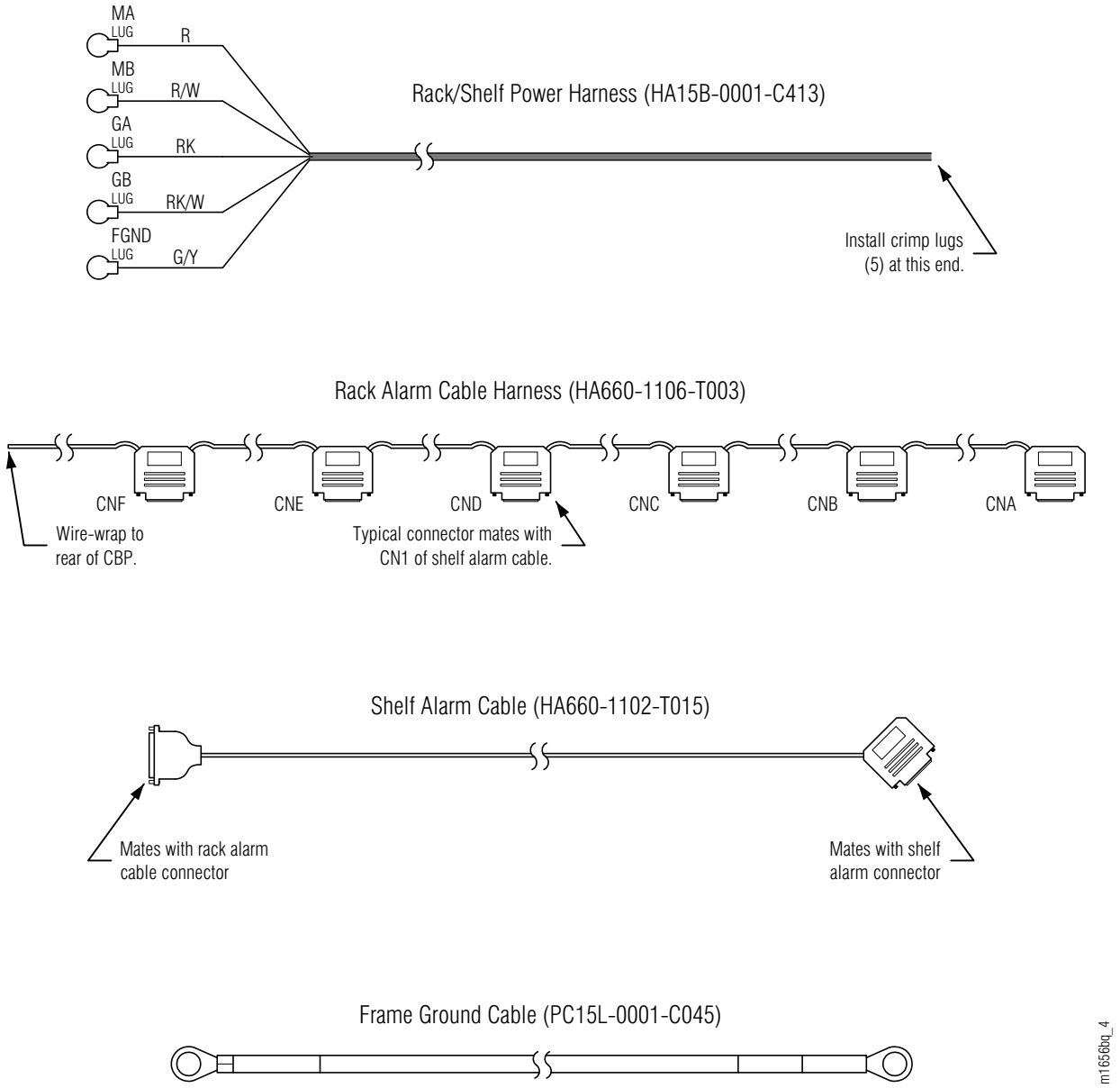


Figure 2-21: Power, Alarm, and Ground Cables

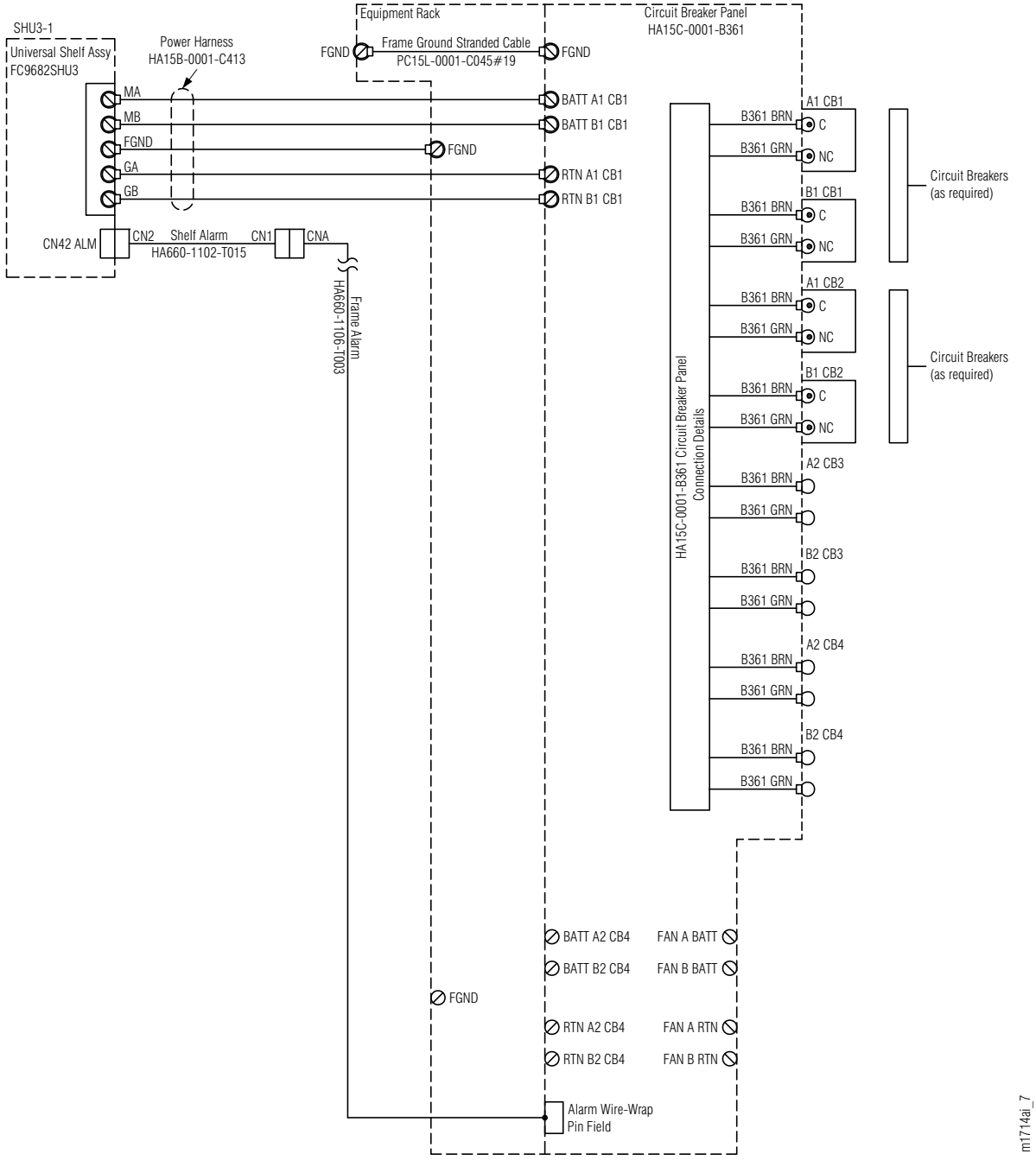


Figure 2-22: Cabling Schematic for Rack with One Universal Shelf (Core Configuration)

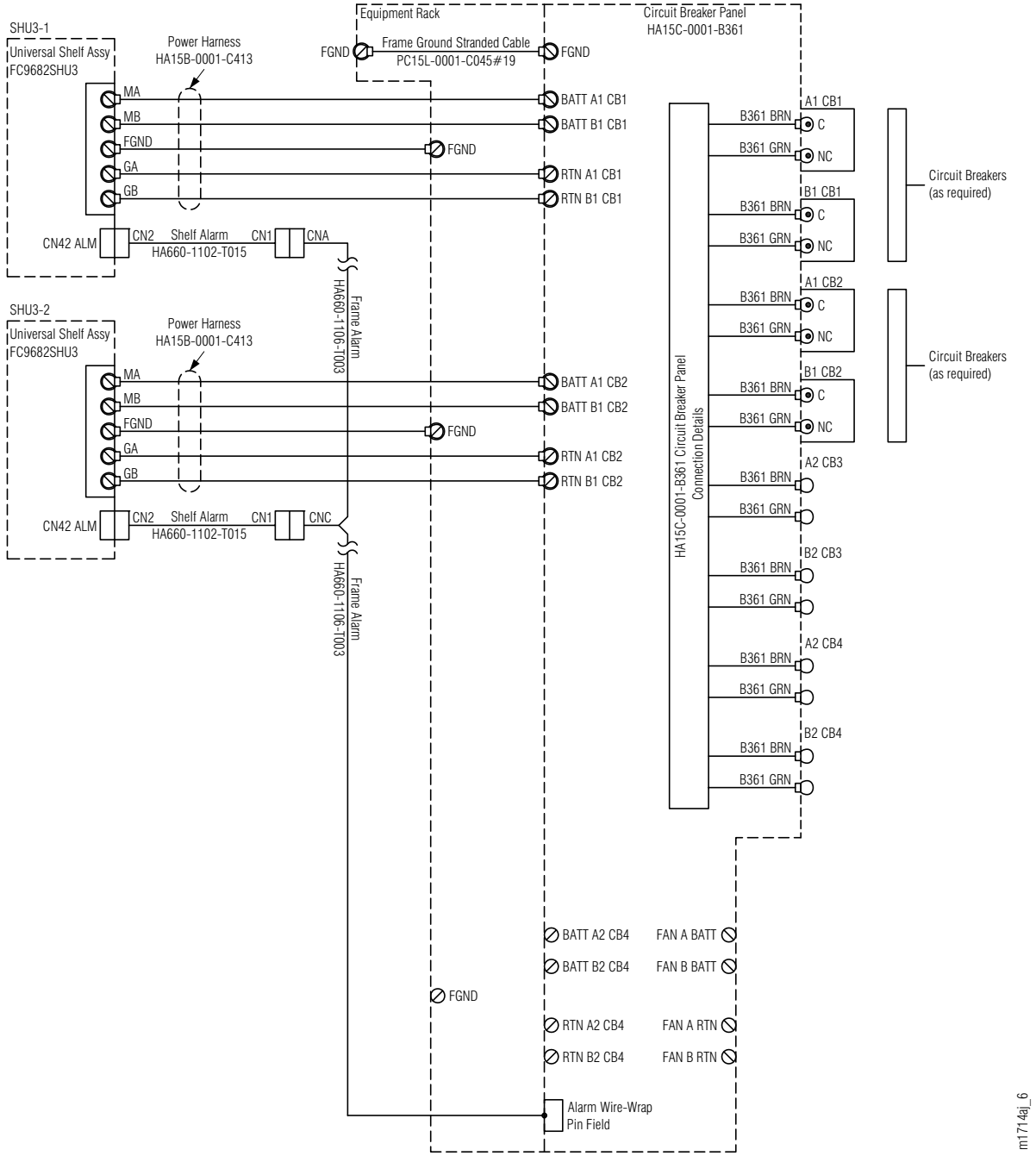


Figure 2-23: Cabling Schematic for Rack with Two Universal Shelves (Core Configuration)

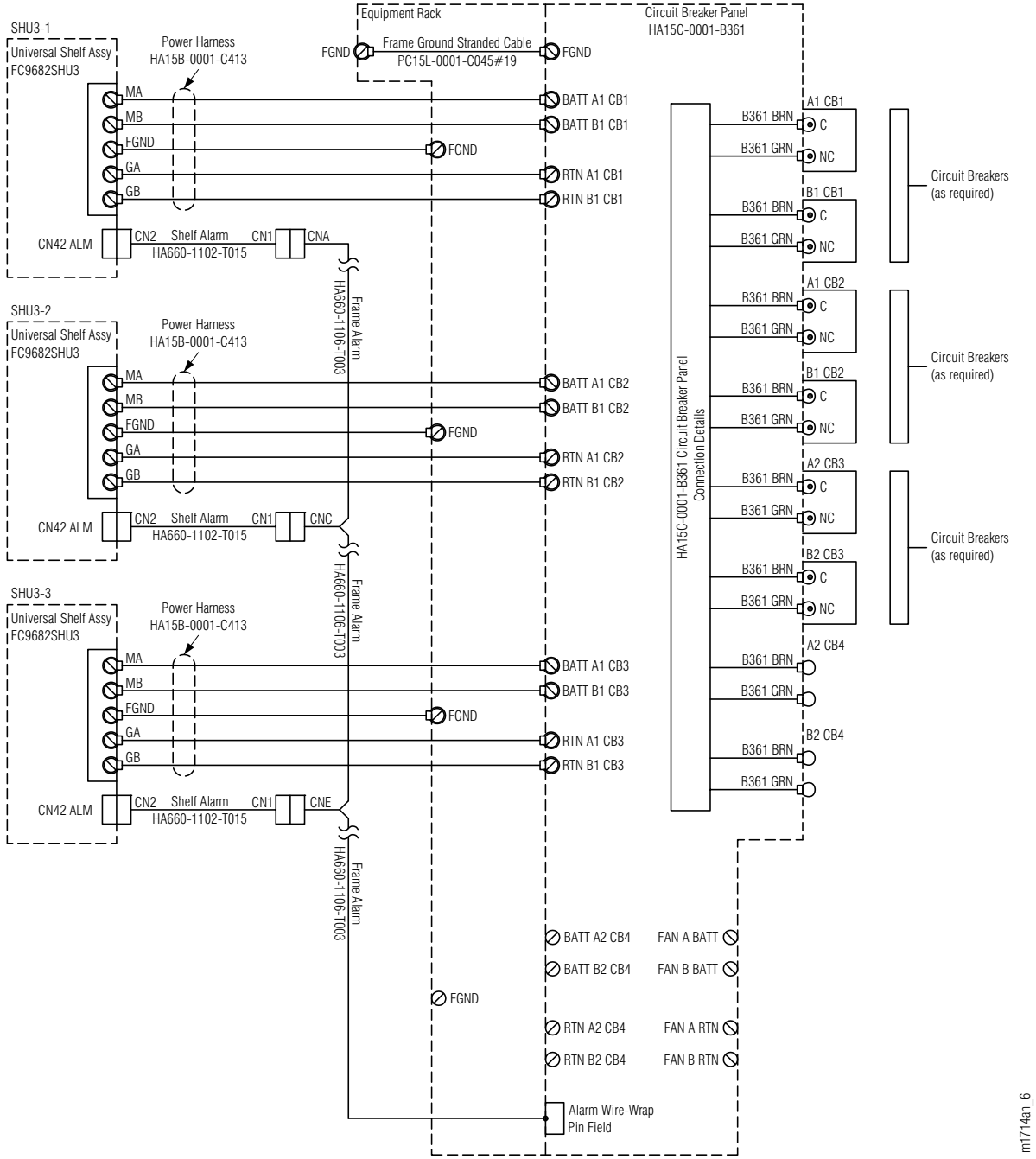


Figure 2-24: Cabling Schematic for Rack with Three Universal Shelves (Core Configuration)

Table 2-2: Association of Shelves to Circuit Breakers (Core Configuration)

Circuit Breaker	Rack Configuration		
	Rack with One Universal Shelf (Figure 2-22 [p. 2-39])	Rack with Two Universal Shelves (Figure 2-23 [p. 2-40])	Rack with Three Universal Shelves (Figure 2-24 [p. 2-41])
	Shelf Name	Shelf Name	Shelf Name
CB1	SHU3-1	SHU3-1	SHU3-1
CB2	n/a	SHU3-2	SHU3-2
CB3	n/a	n/a	SHU3-3

Note: *The HA15B-0001-B361 CBP has dual-post output power connectors.*

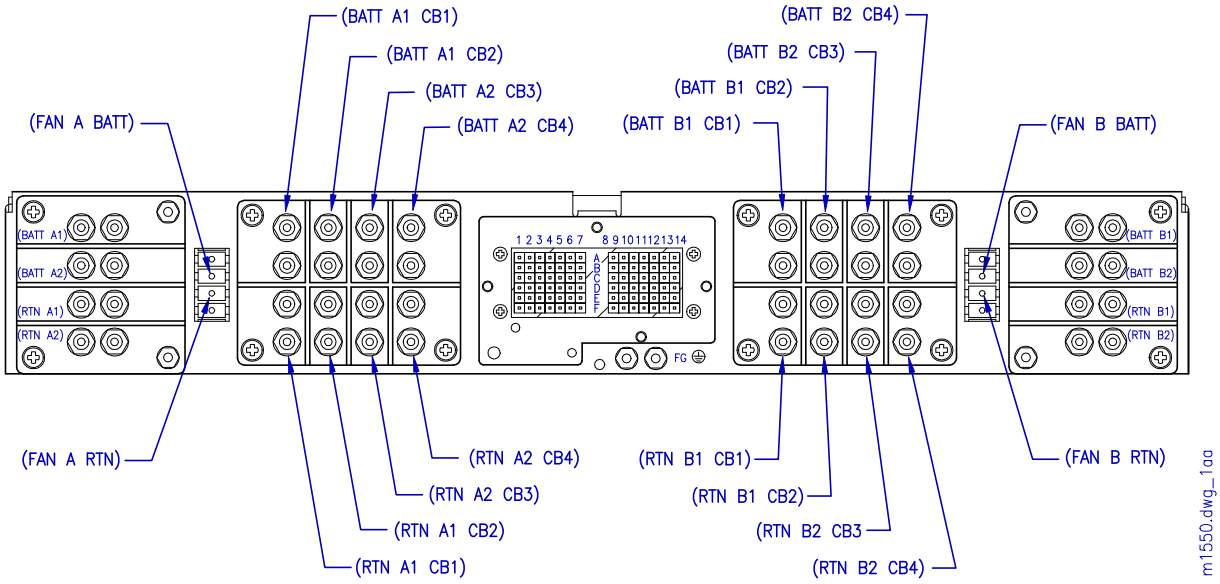


Figure 2-25: Circuit Breaker Panel Rear View (HA15B-0001-B361)

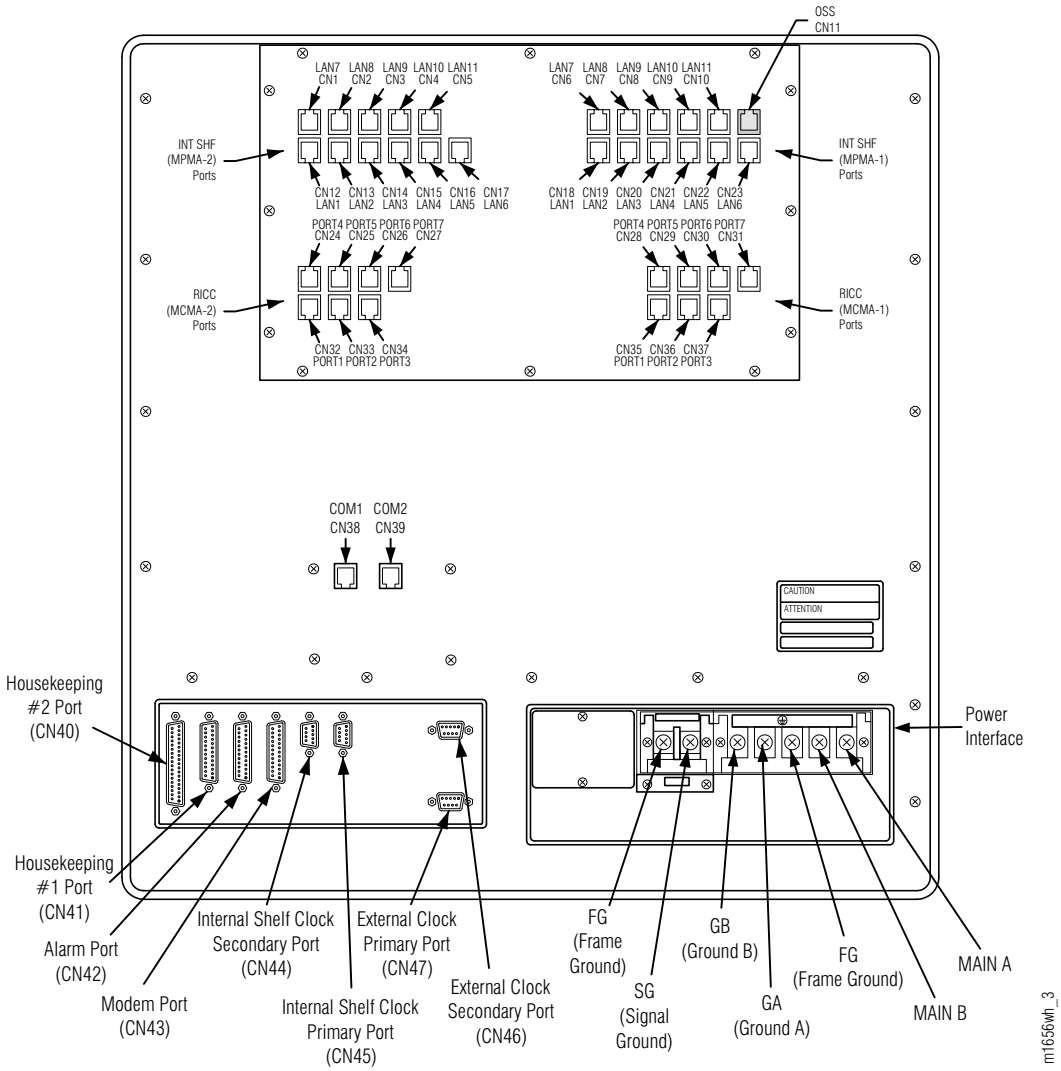
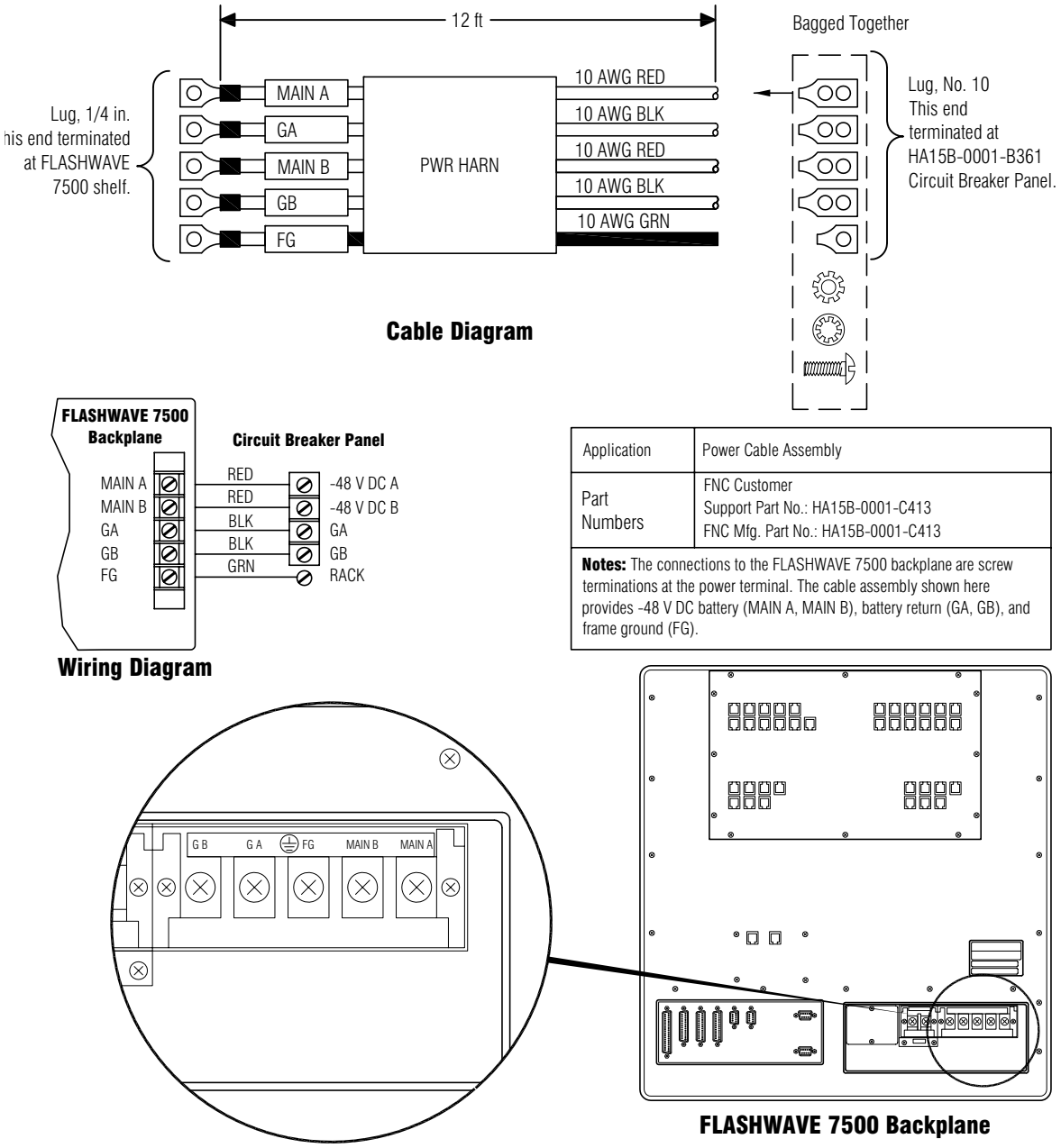


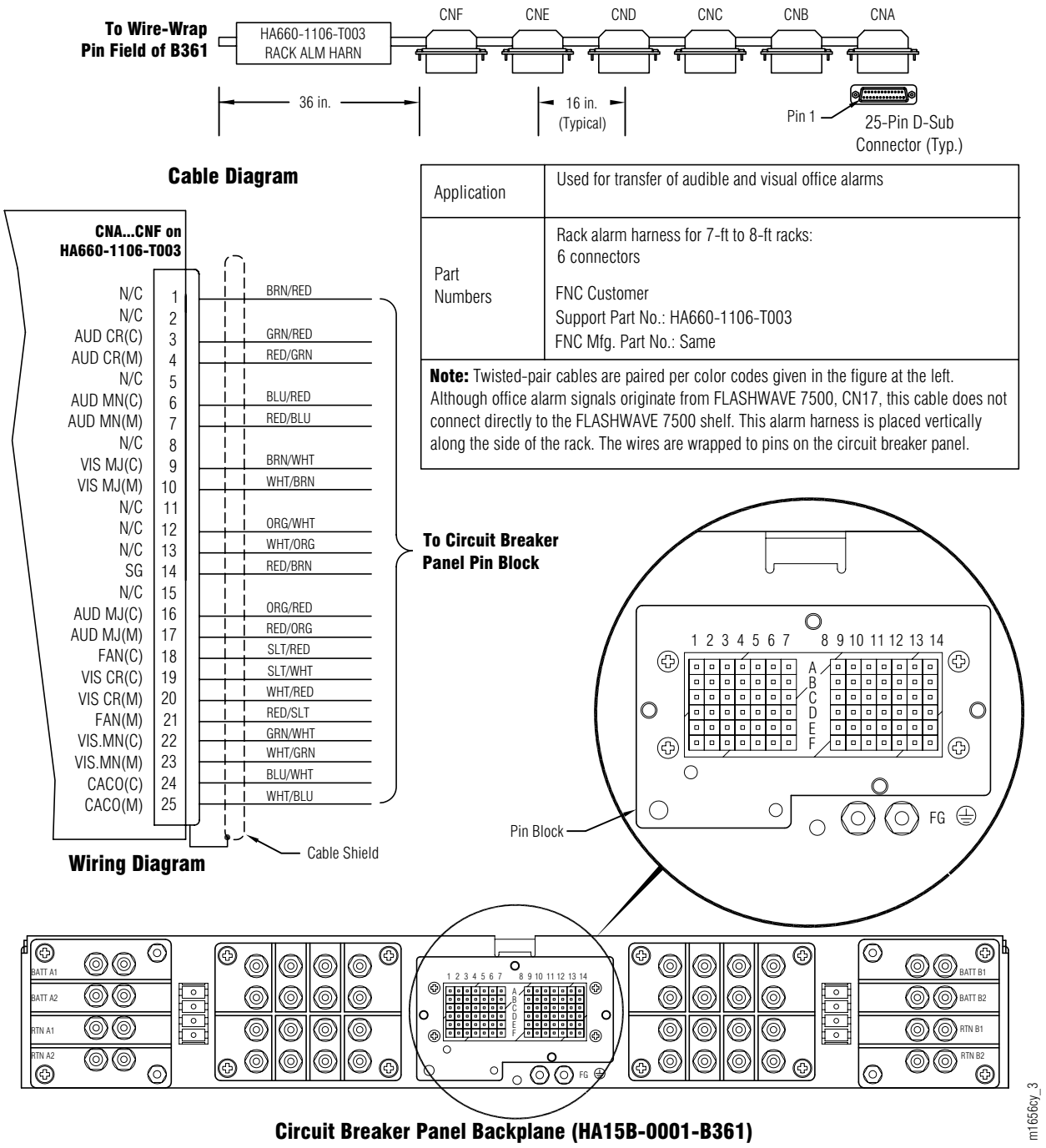
Figure 2-26: Optical/Tributary Shelf Backplane (Core Configuration)



Application	Power Cable Assembly
Part Numbers	FNC Customer Support Part No.: HA15B-0001-C413 FNC Mfg. Part No.: HA15B-0001-C413

Notes: The connections to the FLASHWAVE 7500 backplane are screw terminations at the power terminal. The cable assembly shown here provides -48 V DC battery (MAIN A, MAIN B), battery return (GA, GB), and frame ground (FG).

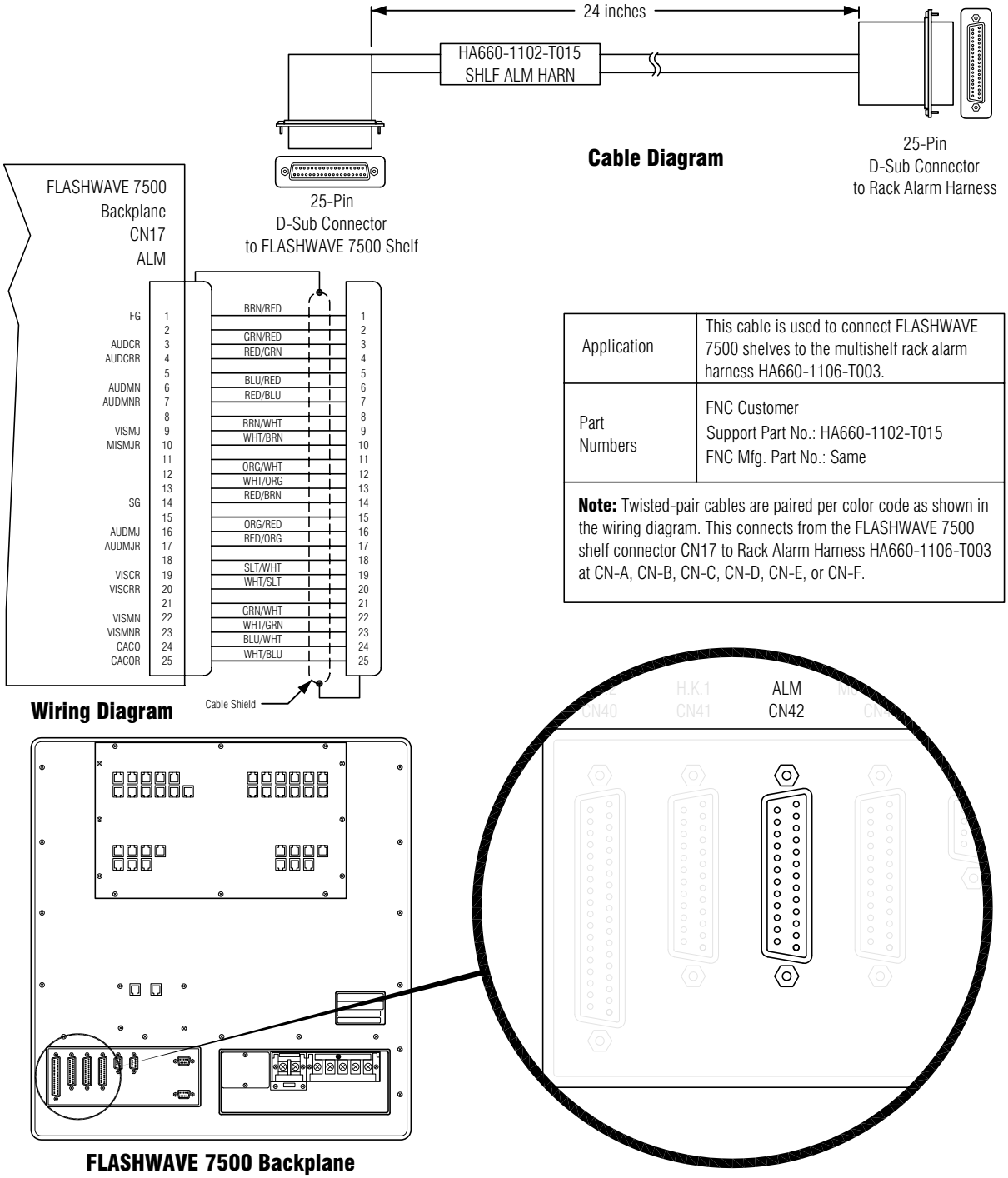
Figure 2-27: Optical/Tributary Shelf Power Cabling (Core Configuration)



Application	Used for transfer of audible and visual office alarms
Part Numbers	Rack alarm harness for 7-ft to 8-ft racks: 6 connectors FNC Customer Support Part No.: HA660-1106-T003 FNC Mfg. Part No.: Same

Note: Twisted-pair cables are paired per color codes given in the figure at the left. Although office alarm signals originate from FLASHWAVE 7500, CN17, this cable does not connect directly to the FLASHWAVE 7500 shelf. This alarm harness is placed vertically along the side of the rack. The wires are wrapped to pins on the circuit breaker panel.

Figure 2-28: Rack Alarm Harness Wire-Wrap Connection to CBP



Application	This cable is used to connect FLASHWAVE 7500 shelves to the multishelf rack alarm harness HA660-1106-T003.
Part Numbers	FNC Customer Support Part No.: HA660-1102-T015 FNC Mfg. Part No.: Same
Note: Twisted-pair cables are paired per color code as shown in the wiring diagram. This connects from the FLASHWAVE 7500 shelf connector CN17 to Rack Alarm Harness HA660-1106-T003 at CN-A, CN-B, CN-C, CN-D, CN-E, or CN-F.	

Figure 2-29: Optical/Tributary Shelf Alarm Cabling (Core Configuration)

2.10.2 Installing Power, Ground, and Alarm Cables

This subprocedure includes the following subtasks:

Use this procedure to install power, ground, and alarm cabling for a rack of FLASHWAVE 7500 Core Configuration equipment.

DANGER:

Use properly insulated tools and do not allow tools, cables, or other metal objects to connect across terminals. At this point, –48 V DC power has been applied to the CBP, and improper handling may result in personal injury, damage to equipment, or both. Fujitsu recommends that office power be removed from the rack using local procedures.

> ***Note:*** *Ensure that all cables installed in this procedure are properly bundled, laced, and secured to the rack in accordance with local procedures. Connectors should be secured in place using connector retaining screws.*

Install power, ground, and alarm cables for one rack of FLASHWAVE 7500 Core Configuration equipment as follows:

Identify Cabling Schematic

Step	Task

1 If you have not already done so, review the reference material presented in Section 2.10.1, Reference Material [p. 2-36].

2 In the following list, identify the cabling schematic appropriate for your rack configuration:

- Rack with one Universal shelf (Figure 2-22 [p. 2-39])
- Rack with two Universal shelves (Figure 2-23 [p. 2-40])
- Rack with three Universal shelves (Figure 2-24 [p. 2-41])

Disconnect Power from CBP

3 If installing into a powered rack, disconnect office power (recommended) or remove circuit breakers from the CBP.

4 Use a DMM to ensure 0 V DC (with reference to the battery ground) at the point of disconnection.

Install Shelf Power Harnesses CB1

5 Refer to the cabling schematic (identified in Step 2 [p. 2-48]) and Table 2-2 [p. 2-42]) to identify the shelf that is to be connected to circuit breaker 1 (CB1).

6 Locate the rack/shelf power harness (HA15B-0001-C413, Figure 2-21 [p. 2-38]) for the shelf.

Note: *The length of the cables may be altered at the discretion of the installer to ensure proper length.*

7 Prepare the power leads by installing the terminal lugs (wrapped in a plastic bag shipped with the cable) that are required on one end of the cable (see Figure 2-21 [p. 2-38]). Ensure that no wire strands are shorting terminals together and that leads are securely fastened. The cable should now have terminal lugs on both ends of the power cable.

Note: *The shelf power wiring is the same with all rack configurations. Observe the color coding of the power cable.*

8 On the backplane of the shelf identified in Step 5 [p. 2-48], remove the plastic cover on the shelf power terminal strip located on the bottom right of the shelf backplane (see Figure 2-27 [p. 2-44]).

9 Connect both ends of cable GA of the power harness as follows:

a. Identify lug GA in the power harness (see Figure 2-21 [p. 2-38]) and connect it to shelf terminal GA (see Figure 2-27 [p. 2-44]).

b. Connect the other end of the same cable to CBP terminal RTN A1 CB1 (see Figure 2-25 [p. 2-42]).

10 Connect both ends of cable GB of the power harness as follows:

a. Identify lug GB in the power harness (see Figure 2-21 [p. 2-38]) and connect it to shelf terminal GB (see Figure 2-27 [p. 2-44]).

b. Connect the other end of the same cable to CBP terminal RTN B1 CB1 (see Figure 2-25 [p. 2-42]).

11 Connect both ends of cable MA of the power harness as follows:

a. Identify lug MA in the power harness (see Figure 2-21 [p. 2-38]) and connect it to shelf terminal MAIN A (see Figure 2-27 [p. 2-44]).

b. Connect the other end of the same cable to CBP terminal BATT A1 CB1 (see Figure 2-25 [p. 2-42]).

12 Connect both ends of cable MB of the power harness as follows:

a. Identify lug MB in the power harness (see Figure 2-21 [p. 2-38]) and connect it to shelf terminal MAIN B (see Figure 2-27 [p. 2-44]).

b. Connect the other end of the same cable to CBP terminal BATT B1 CB1 (see Figure 2-25 [p. 2-42]).

13 Connect both ends of cable FGND of the power harness as follows:

a. Identify lug FGND in the power harness (see Figure 2-21 [p. 2-38]) and connect it to shelf terminal FG (see Figure 2-27 [p. 2-44]).

b. Connect the other end of the same cable to the equipment rack frame ground.

14 Replace the plastic cover over the shelf backplane terminal strip.

Install Shelf Power Harnesses CB2

15 Refer to the cabling schematic (identified in Step 2 [p. 2-48]) and Table 2-2 [p. 2-42]. Is a shelf to be connected to circuit breaker 2 (CB2)?

If YES:
Go to Step 16 [p. 2-50].

If NO:
Go to Step 35 [p. 2-53].

16 Locate the rack/shelf power harness (HA15B-0001-C413, Figure 2-21 [p. 2-38]) for the shelf.

Note: *The length of the cables may be altered at the discretion of the installer to ensure proper length.*

17 Prepare the power leads by installing the terminal lugs (wrapped in a plastic bag shipped with the cable) that are required on one end of the cable (see Figure 2-21 [p. 2-38]). Ensure that no wire strands are shorting terminals together and that leads are securely fastened. The cable should now have terminal lugs on both ends of the power cable.

Note: *The shelf power wiring is the same with all rack configurations. Observe the color coding of the power cable.*

18 On the backplane of the shelf identified in Step 15 [p. 2-50], remove the plastic cover on the shelf power terminal strip located on the bottom right of the shelf backplane (see Figure 2-27 [p. 2-44]).

19 Connect both ends of cable GA of the power harness as follows:

a. Identify lug GA in the power harness (see Figure 2-21 [p. 2-38]) and connect it to shelf terminal GA (see Figure 2-27 [p. 2-44]).

b. Connect the other end of the same cable to CBP terminal RTN A1 CB2 (see Figure 2-25 [p. 2-42]).

20 Connect both ends of cable GB of the power harness as follows:

a. Identify lug GB in the power harness (see Figure 2-21 [p. 2-38]) and connect it to shelf terminal GB (see Figure 2-27 [p. 2-44]).

b. Connect the other end of the same cable to CBP terminal RTN B1 CB2 (see Figure 2-25 [p. 2-42]).

21 Connect both ends of cable MA of the power harness as follows:

a. Identify lug MA in the power harness (see Figure 2-21 [p. 2-38]) and connect it to shelf terminal MAIN A (see Figure 2-27 [p. 2-44]).

b. Connect the other end of the same cable to CBP terminal BATT A1 CB2 (see Figure 2-25 [p. 2-42]).

22 Connect both ends of cable MB of the power harness as follows:

a. Identify lug MB in the power harness (see Figure 2-21 [p. 2-38]) and connect it to shelf terminal MAIN B (see Figure 2-27 [p. 2-44]).

b. Connect the other end of the same cable to CBP terminal BATT B1 CB2 (see Figure 2-25 [p. 2-42]).

23 Connect both ends of cable FGND of the power harness as follows:

a. Identify lug FGND in the power harness (see Figure 2-21 [p. 2-38]) and connect it to shelf terminal FG (see Figure 2-27 [p. 2-44]).

b. Connect the other end of the same cable to the equipment rack frame ground.

24 Replace the plastic cover over the shelf backplane terminal strip.

Install Shelf Power Harnesses CB3

25 Refer to the cabling schematic (identified in Step 2 [p. 2-48]) and Table 2-2 [p. 2-42]. Is a shelf to be connected to circuit breaker 3 (CB3)?

If YES:
Go to Step 26 [p. 2-51].

If NO:
Go to Step 35 [p. 2-53].

26 Locate the rack/shelf power harness (HA15B-0001-C413, Figure 2-21 [p. 2-38]) for the shelf.

Note: *The length of the cables may be altered at the discretion of the installer to ensure proper length.*

27 Prepare the power leads by installing the terminal lugs (wrapped in a plastic bag shipped with the cable) that are required on one end of the cable (see Figure 2-21 [p. 2-38]). Ensure that no wire strands are shorting terminals together and that leads are securely fastened. The cable should now have terminal lugs on both ends of the power cable.

Note: *The shelf power wiring is the same with all rack configurations. Observe the color coding of the power cable.*

28 On the backplane of the shelf identified in Step 25 [p. 2-51], remove the plastic cover on the shelf power terminal strip located on the bottom right of the shelf backplane (see Figure 2-27 [p. 2-44]).

29 Connect both ends of cable GA of the power harness as follows:

a. Identify lug GA in the power harness (see Figure 2-21 [p. 2-38]) and connect it to shelf terminal GA (see Figure 2-27 [p. 2-44]).

b. Connect the other end of the same cable to CBP terminal RTN A1 CB3 (see Figure 2-25 [p. 2-42]).

30 Connect both ends of cable GB of the power harness as follows:

a. Identify lug GB in the power harness (see Figure 2-21 [p. 2-38]) and connect it to shelf terminal GB (see Figure 2-27 [p. 2-44]).

b. Connect the other end of the same cable to CBP terminal RTN B1 CB3 (see Figure 2-25 [p. 2-42]).

31 Connect both ends of cable MA of the power harness as follows:

a. Identify lug MA in the power harness (see Figure 2-21 [p. 2-38]) and connect it to shelf terminal MAIN A (see Figure 2-27 [p. 2-44]).

b. Connect the other end of the same cable to CBP terminal BATT A1 CB3 (see Figure 2-25 [p. 2-42]).

32 Connect both ends of cable MB of the power harness as follows:

a. Identify lug MB in the power harness (see Figure 2-21 [p. 2-38]) and connect it to shelf terminal MAIN B (see Figure 2-27 [p. 2-44]).

b. Connect the other end of the same cable to CBP terminal BATT B1 CB3 (see Figure 2-25 [p. 2-42]).

33 Connect both ends of cable FGND of the power harness as follows:

a. Identify lug FGND in the power harness (see Figure 2-21 [p. 2-38]) and connect it to shelf terminal FG (see Figure 2-27 [p. 2-44]).

b. Connect the other end of the same cable to the equipment rack frame ground.

34 Replace the plastic cover over the shelf backplane terminal strip.

Install Frame Ground Cable

35 Locate the frame ground cable (PC15L-0001-C045, Figure 2-21 [p. 2-38]).

36 Connect both ends of the frame ground cable as follows:

a. Connect one end of the frame ground cable to the equipment rack frame ground.

Note: *The equipment rack frame ground is a grounding point on the frame itself. On some racks, it is a screw hole that has a piece of tape over it. The tape is used to keep the paint off of a small portion of the rack so that when the tape is removed, the grounding point provides a good electrical connection to the frame. Other rack types may require you to scrape the paint off the screw hole.*

b. Connect the other end to the CBP frame ground terminal (located just below the wire wrap terminal block on the CBP rear panel (see Figure 2-25 [p. 2-42]).

Install Rack Alarm Cable Harness

37 Locate the rack alarm cable harness (HA660-1106-T003, Figure 2-21 [p. 2-38]).

Note: *The end of the rack alarm cable harness is not terminated with a connector. It is wire wrapped to the local office alarm facilities or at the CBP alarm-termination block.*

38 Review the following schematics:

- Rack alarm cable harness diagram (HA660-1106-T003 in Figure 2-21 [p. 2-38])
- Rack cabling schematic (identified in Step 2 [p. 2-48])

  Note: *Locate the rack alarm cable harness (HA660-1106-T003) within this schematic.*
- Rack alarm harness wire-wrap connection to CBP shown in Figure 2-28 [p. 2-45]

39 Using wire-wrap connections, connect the free wire ends of the rack alarm cable harness (HA660-1106-T003) to the wire-wrap pins on the CBP rear panel or local office alarm facilities. Refer to *Cable and Wiring Guide*, for wire-wrap, color-code details and *Circuit Breaker Panel*, for CBP alarm block details.

40 Secure the rack alarm cable to the interior of the rack so that the cable connectors (CNA through CNF) face the rear of the shelves.

Note: *Rack alarm cable connectors (CNA through CNF) have identical pinouts to the office alarm cable described in* Section 2.13.6 [p. 2-67].

Install Shelf Alarm Cables

41 Within the rack cabling schematic (identified in Step 2 [p. 2-48]) identify the shelf alarm cables (HA660-1102-T015) that connect shelves to the rack alarm cable harness (HA660-1106-T003). One shelf alarm cable is required for each shelf.

Figure 2-29 [p. 2-46] shows how the shelf alarm cable (HA660-1102-T015) connects to an Optical/Tributary shelf backplane.

42 For each shelf in the rack, connect both ends of shelf alarm cable (HA660-1102-T015) as follows:

a. Connect one end of the cable to the appropriate connector (CNA through CNF) of the rack alarm cable harness (HA660-1106-T003), as indicated in rack cabling schematic.

b. Connect the other end of the cable to the office alarm port on the shelf backplane as shown in Figure 2-29 [p. 2-46] (Optical shelf) or Figure 2-29 [p. 2-46] (Tributary shelf).

43 Repeat Step 42 [p. 2-54] for each shelf in the rack.

Final Checks

44 Dress and lace all cables, and secure to the rack interior using standard local procedures.

45 Using local procedures, reconnect the battery office power that was removed from the rack, or reinstall the circuit breakers.

This procedure is complete.

2.11 Checking Power at Optical/Tributary Shelf

This procedure is used for verifying the power connections to the Optical/Tributary shelf.

DANGER:

Use caution when working on the power strip at the top of any shelf to avoid personal injury, damage to equipment, or both. Avoid touching terminals or uninsulated conductors.

Step	Task
1	Set the CBP circuit breakers for the installed shelves to the ON position. See Figure 2-23 [p. 2-40] for the appropriate circuit breaker, if necessary.
2	Remove the plastic cover over the power strip on the shelf backplane.
3	Connect the negative DMM test lead to the GA ground terminal on the rear-panel power strip, and connect the positive DMM test lead to the MAIN A voltage terminal. See Figure 2-30 [p. 2-55]. If required, record the test results for future reference.

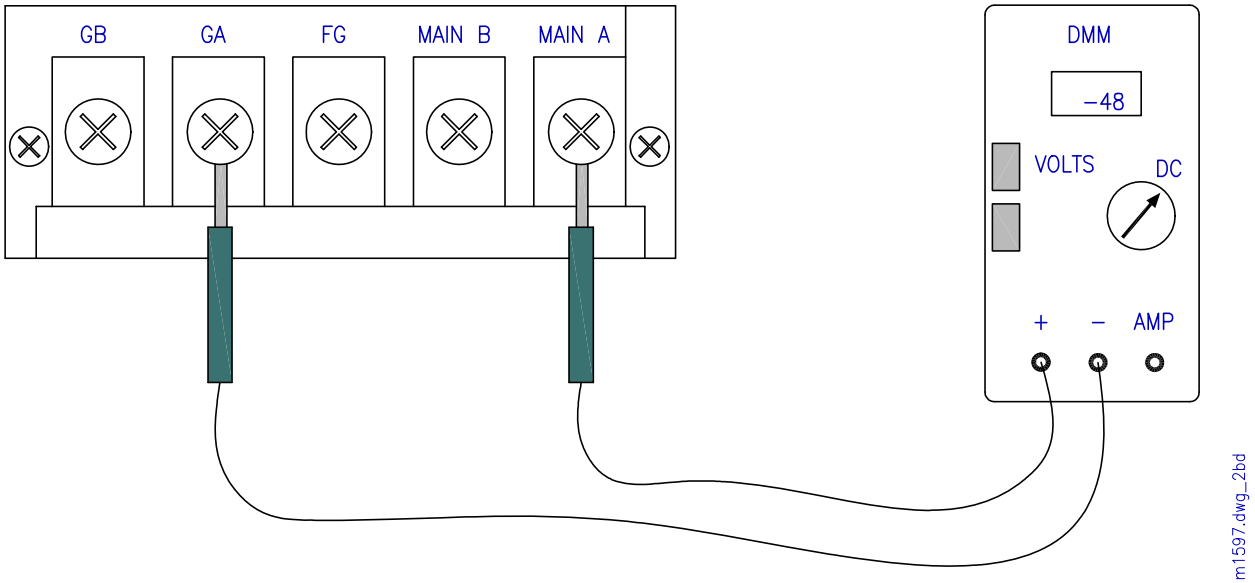


Figure 2-30: Supply Voltage Check

4 Is the DMM measurement between –40 and –57 V DC?

If YES:
Go to Step 5 [p. 2-56].

If NO:
Report as a trouble item to the installation group and repeat voltage checks after the trouble is corrected.

5 Connect the negative DMM test lead to the GB ground terminal on the rear-panel power strip, and connect the positive DMM test lead to the MAIN B voltage terminal. If required, record the test results for future reference.

6 Is the DMM measurement between –40 and –57 V DC?

If YES:
Go to Step 7 [p. 2-56].

If NO:
Report as a trouble item to the installation group and repeat voltage checks after trouble is corrected.

7 Reinstall the plastic cover over the power strip on the shelf backplane.

8 At the front of the Optical/Tributary shelf, locate the front-panel voltage test points (see Figure 2-31 [p. 2-56]), connect the negative DMM test lead to the G (ground) test point, and connect the positive DMM test lead to the MAIN A test point.

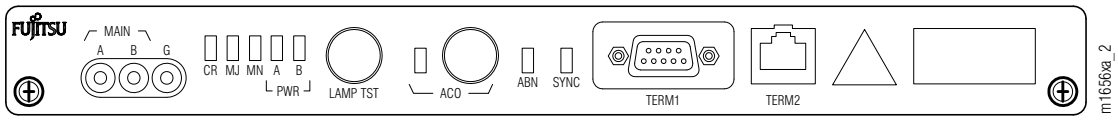


Figure 2-31: Front-Panel Voltage Test Points (Optical/Tributary Shelf) (Core Configuration)

9 Is the DMM measurement between –40 and –57 V DC?

If YES:
Go to Step 10 [p. 2-57].

If NO:
Report as a trouble item to the installation group and repeat voltage checks after trouble is corrected.

10 At the front of the Optical/Tributary shelf, locate the front-panel voltage test points (see Figure 2-31 [p. 2-56]), connect the negative DMM test lead to the G (ground) test point, and connect the positive DMM test lead to the MAIN B test point.

11 Is the DMM measurement between –40 and –57 V DC?

If YES:
Go to Step 12 [p. 2-57].

If NO:
Report as a trouble item to the installation group and repeat voltage checks after trouble is corrected.

12 Repeat the preceding steps for the remaining Tributary shelves.

13 Check the frame ground connections and readings according to local procedures.

This procedure is complete.

2.12 Checking Ground Resistance at the Optical/Tributary Shelf Power Input

Ideally, frame ground and battery return at the shelf power input connectors are common to each other. Essentially a resistance of 0 ohms should be present between them and little or no voltage potential across frame ground and battery return.

The test equipment required is a DMM or a voltmeter and ohmmeter that can accurately detect low resistance levels. See Figure 2-32 [p. 2-58].

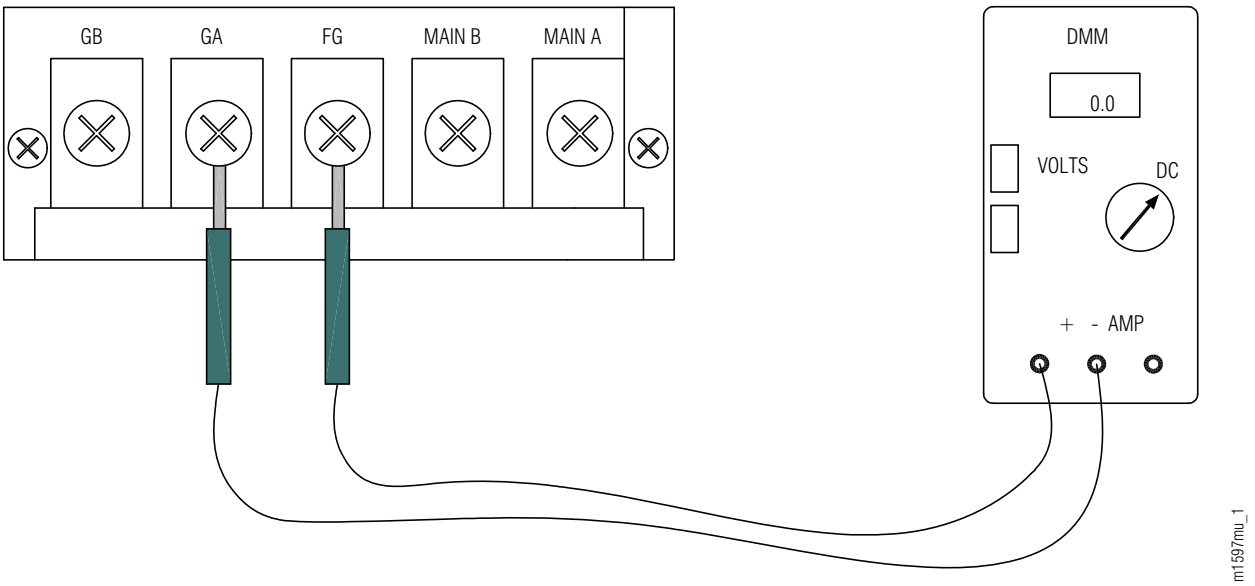


Figure 2-32: Ground Voltage Check Example

Step	Task
1	Use the DMM set to the voltmeter function or a voltmeter to measure the voltage between frame ground and each of the battery return points. The reading should be very close to 0 V DC.
2	Does the voltage exceed 1 V DC? **If YES:** Do not continue with Step 3 [p. 2-59] until the voltage source has been eliminated. For technical assistance, call 1-800-USE-FTAC (800-873-3822). **If NO:** Continue with Step 3 [p. 2-59].

3 Use the DMM set for the ohms function or an ohmmeter to measure the resistance between frame ground and each of the battery return points (A and B) on the shelf. The reading should be very close to 0 ohms.

4 Is the reading close to 0 ohms?

If YES:
Continue with Step 5 [p. 2-59].

If NO:
Do not continue with Step 5 [p. 2-59] until the voltage source has been eliminated. For technical assistance, call 1-800-USE-FTAC (800-873-3822).

5 Swap the DMM or ohmmeter leads between frame ground and battery return, and verify the same reading as described in Step 3 [p. 2-59].

This procedure is complete.

2.13 Installing Cables

This section includes the following subsections:

2.13.1 Overview

The procedures in this section cover the connections made to the Optical/Tributary shelf backplane of the FLASHWAVE 7500 Core Configuration system. Figure 2-33 [p. 2-61] shows the backplane connectors and connector designations for the Optical/Tributary shelf.

All fiber cabling and connections to the shelf plug-in units are made during system turn-up. Refer to *System Turn-Up*, for fiber cabling information. For a detailed description of FLASHWAVE 7500 cables and shelf connectors, refer to *Cable and Wiring Guide*.

> ***Note:*** *Some of the connectors on the Optical/Tributary shelf backplane may be for future use. However, this practice defines all connectors on the shelf backplane and applicable cables that may be used in future releases.*

> ***Note:*** *All cabling from the Optical/Tributary shelf backplane should be connected only to other shelves and equipment within the same building.*

2.13.2 Prerequisites

The tools required for performing the procedures listed in this section are as follows:

- Cable termination tools
- Common hand tools

2.13.3 Optical/Tributary Shelf Backplane

System cable connections are made to the connectors located on the Optical/Tributary shelf backplane as shown in Figure 2-33 [p. 2-61] and described in the sections that follow. Power, ground, and alarm cabling was covered in Section 2.10 [p. 2-36].

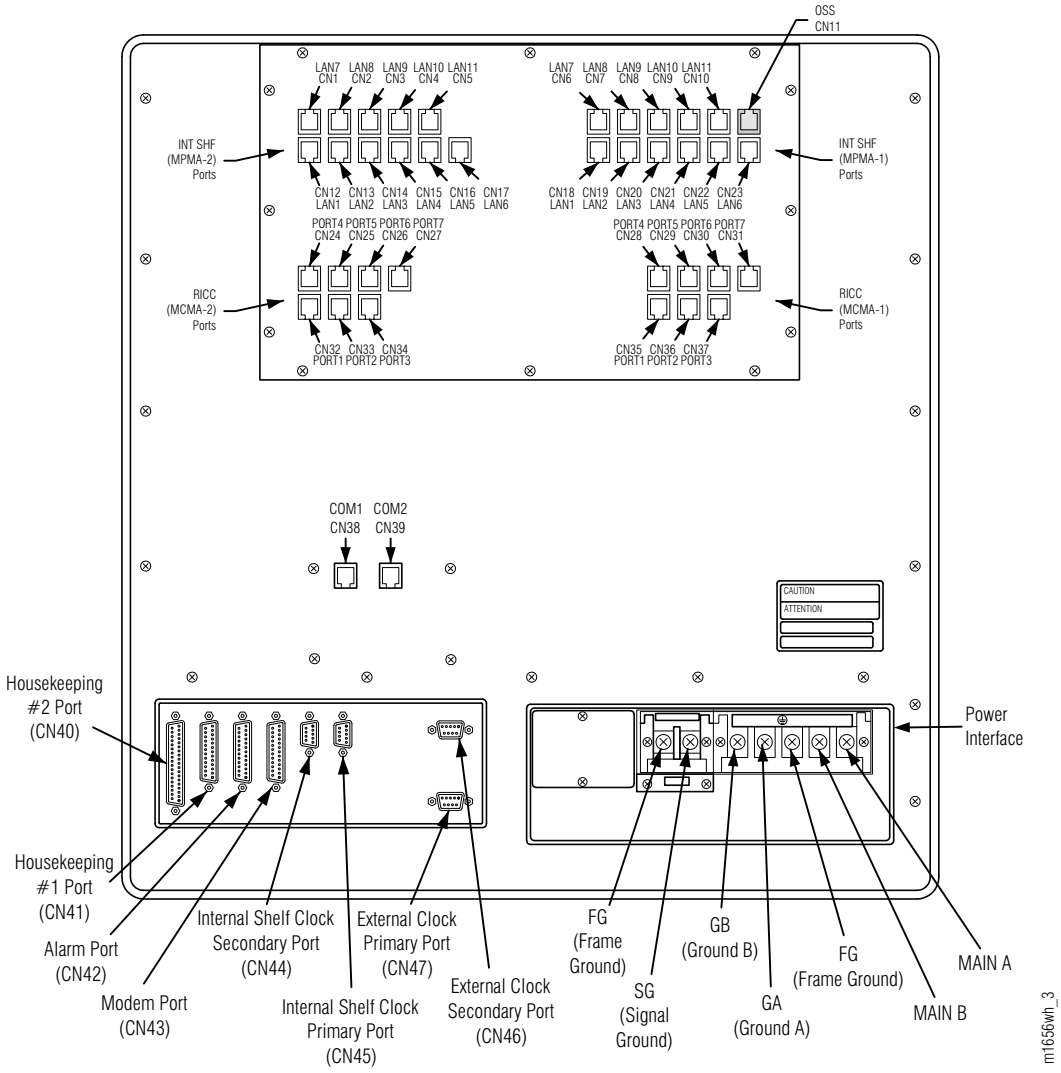


Figure 2-33: Optical/Tributary Backplane Connectors (Core Configuration)

Note: *Fiber cabling for the LAS1 (if used) is installed during system turn-up as described in System Turn-Up.*

2.13.4 Installing Modem Cable (Main Optical Shelf Backplane)

This procedure provides instructions for installing the 25-pin, D-sub modem cable on the Main Optical shelf backplane. Table 2-3 [p. 2-62] lists pertinent information for this cable. Figure 2-34 [p. 2-62] shows the cable connector pinouts.

Note: *The modem cable is a standard RS-232 straight-through (not null-modem) cable available at most computer supply stores.*

Table 2-3: Modem Cable Information (Core Configuration)

Cable Part Number	Backplane Connector Number	Cable Description	Connector Type	Cable Wire Size
21-176-xxx[a]	CN43	Modem access to remote NE	25-pin D-sub	24 AWG

[a] xxx = length in feet

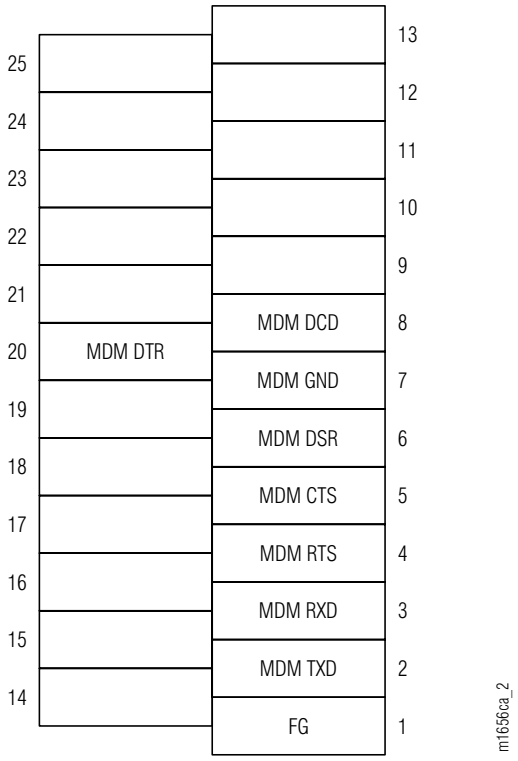


Figure 2-34: Connector Pinouts, 25-Pin D-Sub Modem Cable

Step	Task
1	Connect the modem cable to connector CN43 (Main Optical shelf), and secure it with retaining screws. See Figure 2-33 [p. 2-61].
2	Connect the other end of the modem cable to the appropriate external modem.

Note: *To connect a PC directly to connector CN43, use a null-modem cable in place of the 21-176-xxx cable.*

This procedure is complete.

2.13.5 Installing Housekeeping Cables (Main Optical Shelf)

This procedure provides instructions for assembling the housekeeping 1 (HK1) and housekeeping 2 (HK2) cables and installing them on the Main Optical shelf backplane. Table 2-4 [p. 2-64] lists pertinent information for these cables. Figures 2-35 [p. 2-64] and 2-36 [p. 2-65] show the cable connector pinouts.

Table 2-4: Housekeeping Cable Information (Core Configuration)

Cable Part Number	Backplane Connector Number	Cable Description	Connector Type	Cable Wire Size
21-626-xxx[a]	CN41	HK1 input of housekeeping alarm signals from ancillary equipment	25-pin D-sub	24 AWG
21-537-xxx[a]	CN40	HK2 control of housekeeping alarm signals from ancillary equipment	37-pin D-sub	24 AWG

[a] xxx = length in feet

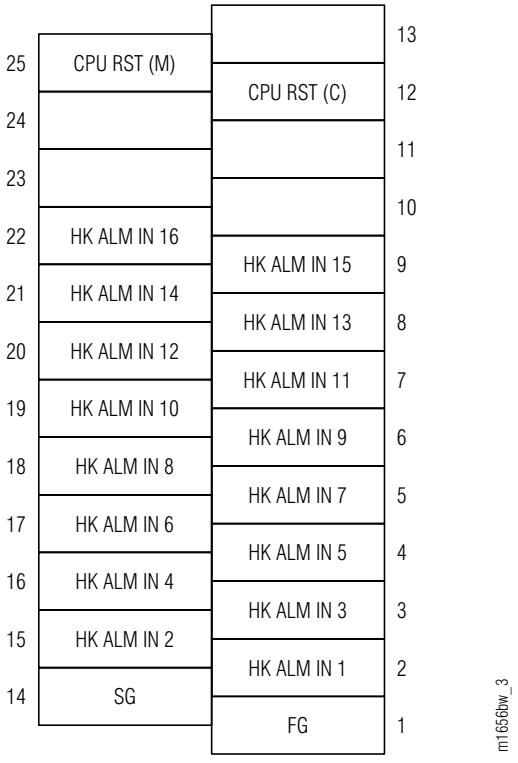


Figure 2-35: Connector Pinouts, HK1 Cable

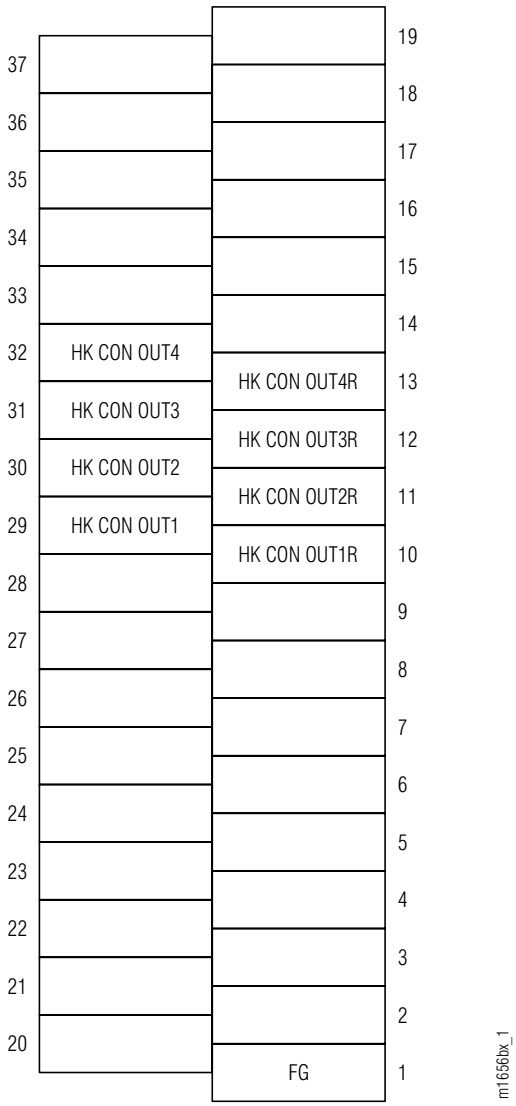


Figure 2-36: Connector Pinouts, HK2 Cable

Step	Task
1	Connect the HK1 input housekeeping cable to backplane connector CN41 (Main Optical shelf), and secure it in place using retaining screws. See Figure 2-33 [p. 2-61].

Note: *The far end of 21-626-xxx is not terminated with a connector.*

2 Connect the other end of the HK1 input housekeeping cable to the appropriate alarm termination point on the local environmental alarm termination block. Refer to *Cable and Wiring Guide*, for color code details.

Note: *Pins 12 and 25 of HK1 can be used to initiate a remote CPU reset.*

3 Connect the HK2 control housekeeping cable to backplane connector CN40 (Main Optical shelf), and secure it with retaining screws. See Figure 2-33 [p. 2-61].

4 Connect the other end of the HK2 control housekeeping cable to the appropriate alarm termination point on the local environmental alarm termination block. Refer to *Cable and Wiring Guide*, for color code details.

5 Record the termination points used, and provide documentation to site personnel.

This procedure is complete.

2.13.6 Installing Office Alarm Cable (Optical/Tributary Shelf)

This procedure provides instructions for connecting the office alarm cable. The cable should already have been installed as described in Section 2.10 [p. 2-36]. Table 2-5 [p. 2-67] lists additional information for this cable. Figure 2-37 [p. 2-68] shows the shelf alarm cable connector pinouts.

Note: *The connector pinouts for the rack alarm cable connectors (CNA through CNF) are the same as CN42.*

Table 2-5: Connectors for Alarms (Core Configuration)

Cable Part Number	Backplane Connector Number	Cable Description	Connector Type	Cable Wire Size
HA660-1102-T015	CN42	Output of system alarm signals through the rack alarm harness to the circuit breaker panel. This cable connects the shelf alarms to the rack alarm cable harness. See Figure 2-21 [p. 2-38] and Figure 2-29 [p. 2-46].	25-pin D-sub	24 AWG
HA660-1106-T003	n/a	Rack alarm cable harness providing six daisy-chain termination points (CNA through CNF) for shelf alarm cabling. Terminates at wire wrap facilities as required. See Figure 2-21 [p. 2-38] and Figure 2-28 [p. 2-45].	25-pin D-sub	24 AWG

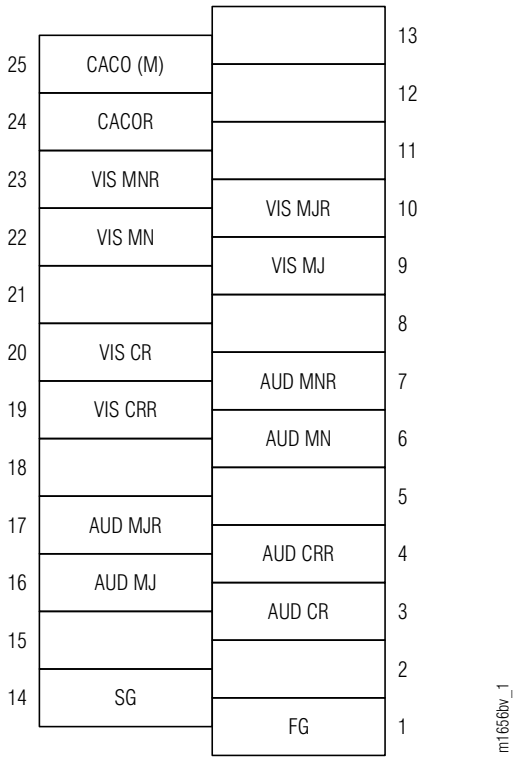


Figure 2-37: Connector Pinouts, Alarm Cable

Step	Task
1	If not already installed, refer to Section 2.10 [p. 2-36] to install the alarm cable. See Figure 2-21 [p. 2-38] for cable assembly drawings and Figures 2-22 [p. 2-39] through 2-24 [p. 2-41] for power, ground, and alarm cabling diagrams.
2	Ensure that backplane alarm connector CN42 of the Optical/Tributary shelves (see Figure 2-33 [p. 2-61]) is connected to a shelf cable assembly that terminates into one of the rack alarm cable harness connectors (CNA through CNF, Figures 2-22 [p. 2-39] through 2-24 [p. 2-41]).
3	The end of the multiconnector, rack alarm cable assembly (not terminated and nonconnectorized) is wire wrapped to the local office alarm facilities or at the CBP alarm termination block. Refer to *Cable and Wiring Guide*, for wire-wrap color code details and *Circuit Breaker Panel*, for CBP alarm block details. This procedure is complete.

2.13.7 Installing OSS Cable (Main Optical Shelf)

This procedure provides instructions for assembling the OSS cable and installing it on the Main Optical shelf backplane (CN11). Table 2-6 [p. 2-69] lists pertinent information for this cable. Figure 2-38 [p. 2-69] shows the cable connector pinouts.

Table 2-6: OSS Cable Information (Core Configuration)

Cable Part Number	Backplane Connector Number	Cable Description	Connector Type	Cable Wire Size
21-096-xxx or 21-094-xxx[a]	CN11	Ethernet connection	8-pin RJ-45	24 AWG

[a] xxx = length in feet

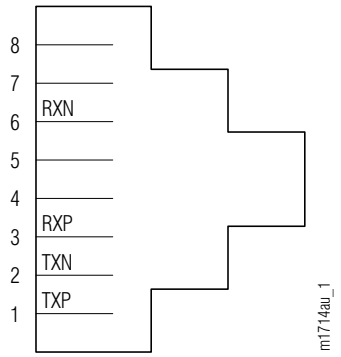


Figure 2-38: Connector Pinouts, OSS Cable

Step	Task
1	Connect the cable to shelf backplane connector CN11 (Main Optical shelf). See Figure 2-33 [p. 2-61].
2	Connect the other end of the cable to the appropriate router or hub.

Note: *The 21-094-xxx cable can also be used to connect a PC to the TERM2 Ethernet port on the Optical shelf front panel.*

Note: *The OSS port has automatic cable-detect capability to properly function with both crossover and straight cables.*

This procedure is complete.

2.13.8 Installing LAN Cable (Optical/Tributary Shelf)

This procedure provides instructions for connecting to the LAN ports on the Optical/Tributary shelf backplane. Table 2-7 [p. 2-70] lists pertinent information for these cables. Figure 2-39 [p. 2-70] shows the cable connector pinouts.

Table 2-7: LAN Cable Information (Core Configuration)

Cable Part Number	Backplane Connector Number	Cable Description	Connector Type	Cable Wire Size
21-332-xxx[a]	For the Main Optical shelf: CN6, CN7, CN19…CN23 For Auxiliary Optical shelves: CN6, CN18…CN23 For Tributary shelves: CN18 and CN19	LAN connection	RJ-45	24 AWG

[a] xxx = length in feet

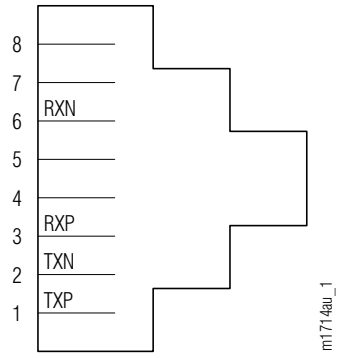


Figure 2-39: Connector Pinouts, LAN Cable

Step	Task
1	Connect the RJ-45 connector on one end of the LAN cable (21-332-xxx) to the Tributary shelf or Auxiliary Optical shelf backplane connector CN18.

2 Connect the other end of the LAN cable to the appropriate Main Optical shelf backplane connector (CN6, CN7, CN19…CN23), Auxiliary Optical shelf backplane connector (CN19…CN22), or Tributary shelf backplane connector (CN19 or CN20) as indicated in Figure 2-40 [p. 2-72] and Table 2-8 [p. 2-73].

Note: *If the node is an asymmetric HUB node (Keyword HUBMODE=MANUAL in the ED-SYS command), the system can include two additional shelves (Optical shelves OS25 and OS26) shown in Figure 2-40 [p. 2-72]. Both connect to shelf OS2 in the hierarchy of LAN connections but do not support subtending Tributary shelves.*

3 Proceed to Section 2.13.9, Installing RICC Cable (Optical Shelf) [p. 2-75], if RICC cables are required.

This procedure is complete.

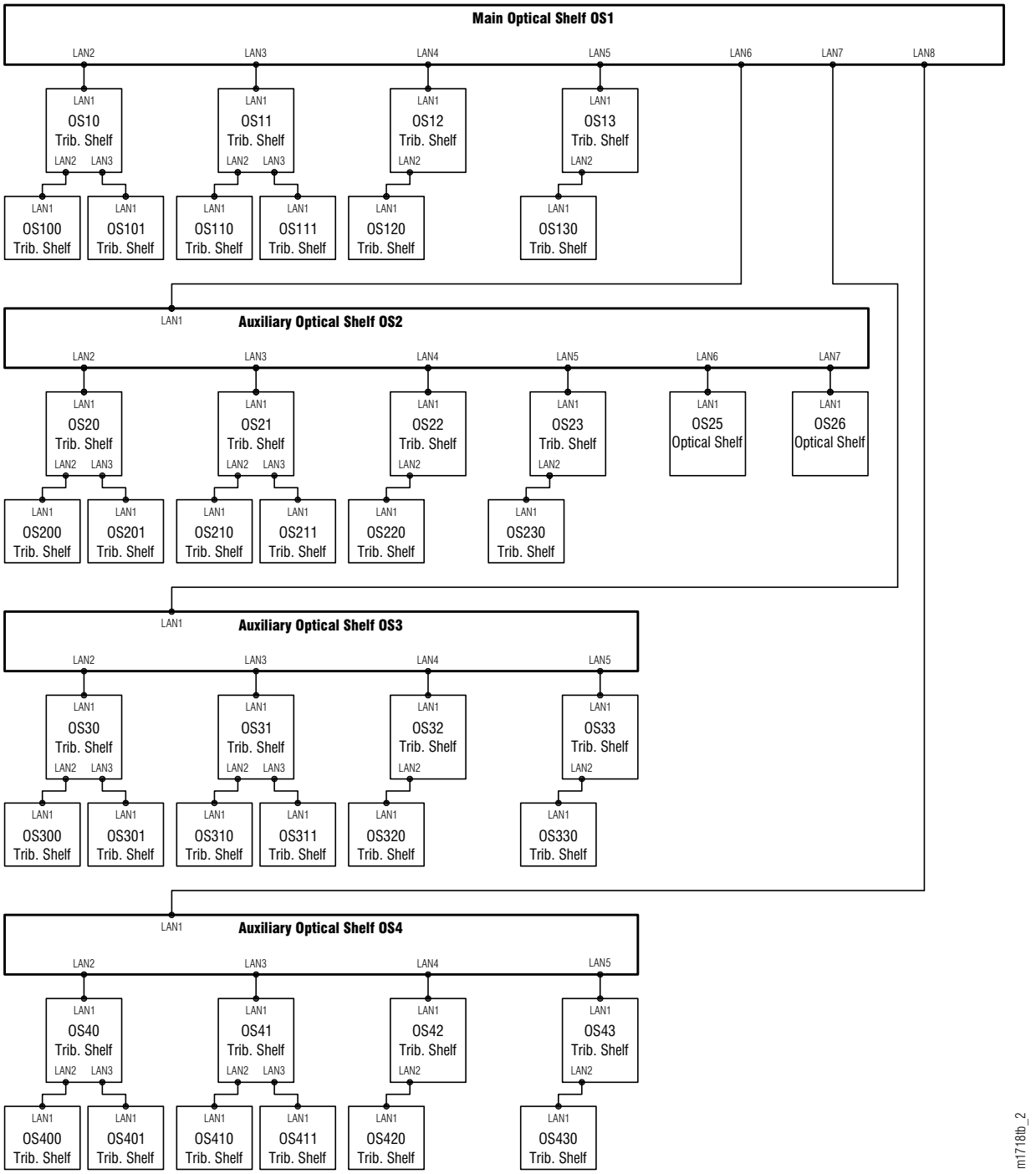


Figure 2-40: Hierarchy of LAN Connections (Core Configuration)

Table 2-8: LAN Connections (Core Configuration) (1 of 2)

From			To		
Shelf	**Connector**	**Label**	**Shelf**	**Connector**	**Label**
OS1 (Main Optical)	CN19	LAN2	OS10 (Tributary)	CN18	LAN1
	CN20	LAN3	OS11 (Tributary)	CN18	LAN1
	CN21	LAN4	OS12 (Tributary)	CN18	LAN1
	CN22	LAN5	OS13 (Tributary)	CN18	LAN1
	CN23	LAN6	OS2 (Auxiliary Optical)	CN18	LAN1
	CN6	LAN7	OS3 (Auxiliary Optical)	CN18	LAN1
	CN7	LAN8	OS4 (Auxiliary Optical)	CN18	LAN1
OS10 (Tributary)	CN19	LAN2	OS100 (Tributary)	CN18	LAN1
	CN20	LAN3	OS101 (Tributary)	CN18	LAN1
OS11 (Tributary)	CN19	LAN2	OS110 (Tributary)	CN18	LAN1
	CN20	LAN3	OS111 (Tributary)	CN18	LAN1
OS12 (Tributary)	CN19	LAN2	OS120 (Tributary)	CN18	LAN1
OS13 (Tributary)	CN19	LAN2	OS130 (Tributary)	CN18	LAN1
OS2 (Auxiliary Optical)	CN19	LAN2	OS20 (Tributary)	CN18	LAN1
	CN20	LAN3	OS21 (Tributary)	CN18	LAN1
	CN21	LAN4	OS22 (Tributary)	CN18	LAN1
	CN22	LAN5	OS23 (Tributary)	CN18	LAN1
	CN23	LAN6	OS25 (Auxiliary Optical)	CN18	LAN1
	CN6	LAN7	OS26 (Auxiliary Optical)	CN18	LAN1
OS20 (Tributary)	CN19	LAN2	OS200 (Tributary)	CN18	LAN1
	CN20	LAN3	OS201 (Tributary)	CN18	LAN1
OS21 (Tributary)	CN19	LAN2	OS210 (Tributary)	CN18	LAN1
	CN20	LAN3	OS211 (Tributary)	CN18	LAN1
OS22 (Tributary)	CN19	LAN2	OS220 (Tributary)	CN18	LAN1
OS23 (Tributary)	CN19	LAN2	OS230 (Tributary)	CN18	LAN1

Table 2-8: LAN Connections (Core Configuration) (2 of 2)

From			To		
Shelf	**Connector**	**Label**	**Shelf**	**Connector**	**Label**
OS3 (Auxiliary Optical)	CN19	LAN2	OS30 (Tributary)	CN18	LAN1
	CN20	LAN3	OS31 (Tributary)	CN18	LAN1
	CN21	LAN4	OS32 (Tributary)	CN18	LAN1
	CN22	LAN5	OS33 (Tributary)	CN18	LAN1
OS30 (Tributary)	CN19	LAN2	OS300 (Tributary)	CN18	LAN1
	CN20	LAN3	OS301 (Tributary)	CN18	LAN1
OS31 (Tributary)	CN19	LAN2	OS310 (Tributary)	CN18	LAN1
	CN20	LAN3	OS311 (Tributary)	CN18	LAN1
OS32 (Tributary)	CN19	LAN2	OS320 (Tributary)	CN18	LAN1
OS33 (Tributary)	CN19	LAN2	OS330 (Tributary)	CN18	LAN1
OS4 (Auxiliary Optical)	CN19	LAN2	OS40 (Tributary)	CN18	LAN1
	CN20	LAN3	OS41 (Tributary)	CN18	LAN1
	CN21	LAN4	OS42 (Tributary)	CN18	LAN1
	CN22	LAN5	OS43 (Tributary)	CN18	LAN1
OS40 (Tributary)	CN19	LAN2	OS400 (Tributary)	CN18	LAN1
	CN20	LAN3	OS401 (Tributary)	CN18	LAN1
OS41 (Tributary)	CN19	LAN2	OS410 (Tributary)	CN18	LAN1
	CN20	LAN3	OS411 (Tributary)	CN18	LAN1
OS42 (Tributary)	CN19	LAN2	OS420 (Tributary)	CN18	LAN1
OS43 (Tributary)	CN19	LAN2	OS430 (Tributary)	CN18	LAN1

2.13.9 Installing RICC Cable (Optical Shelf)

This procedure provides instructions for connecting to the RICC ports on the Optical shelf backplane. Table 2-9 [p. 2-75] lists pertinent information for these cables. Figure 2-41 [p. 2-75] shows the cable connector pinouts.

> ***Note:*** *RICC cables are only installed as needed with an asymmetric HUB node and are not part of the equipment installation. For more information on symmetric and asymmetric HUB nodes, refer to System Description and Engineering,* Section 2.2, Core Configuration [p. 2-2].

Table 2-9: RICC Cable Information (Core Configuration)

Cable Part Number	Backplane Connector Number	Cable Description	Connector Type	Cable Wire Size
21-332-xxx[a]	CN24…CN26, CN28…CN30, CN32…CN37 (Main and Auxiliary Optical shelves)	RICC connection	RJ-45	24 AWG

[a] xxx = length in feet

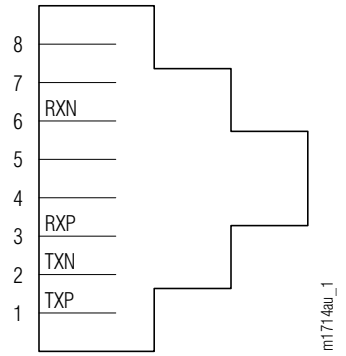


Figure 2-41: Connector Pinouts, RICC Cable

Step	Task
1	Connect the RJ-45 connector on one end of the RICC cable (21-332-xxx) to Main Optical shelf backplane connector CN24…CN26, CN28…CN30 or CN32…CN37.

2 Connect the other end of the RICC cable to the appropriate Auxiliary Optical shelf backplane connector indicated in Table 2-10 [p. 2-77].

3 Referring to Tables 2-10 [p. 2-77] through 2-13 [p. 2-80], repeat Steps 1 [p. 2-75] and 2 [p. 2-76] for all the RICC connections between the Main Optical shelf and all the Auxiliary Optical shelves in the configuration, as well as all the connections between all the Auxiliary shelves.

This procedure is complete.

Table 2-10: RICC Connections from OS1 to OSn (Core Configuration)

From				To			
Shelf	**Port**	**Connector**	**Label**	**Shelf**	**Port**	**Connector**	**Label**
OS1 (Main)	OS1-12-PC1	CN32	PORT1	OS2 (Auxiliary)	OS2-12-PC1	CN32	PORT1
	OS1-12-PC2	CN33	PORT2	OS2 (Auxiliary)	OS2-10-PC1	CN35	PORT1
	OS1-12-PC3	CN34	PORT3	OS3 (Auxiliary)	OS3-12-PC1	CN32	PORT1
	OS1-12-PC4	CN24	PORT4	OS3 (Auxiliary)	OS3-10-PC1	CN35	PORT1
	OS1-12-PC5	CN25	PORT5	OS4 (Auxiliary)	OS4-12-PC1	CN32	PORT1
	OS1-12-PC6	CN26	PORT6	OS4 (Auxiliary)	OS4-10-PC1	CN35	PORT1
	OS1-10-PC1	CN35	PORT1	OS2 (Auxiliary)	OS2-12-PC2	CN33	PORT2
	OS1-10-PC2	CN36	PORT2	OS2 (Auxiliary)	OS2-10-PC2	CN36	PORT2
	OS1-10-PC3	CN37	PORT3	OS3 (Auxiliary)	OS3-12-PC2	CN33	PORT2
	OS1-10-PC4	CN28	PORT4	OS3 (Auxiliary)	OS3-10-PC2	CN36	PORT2
	OS1-10-PC5	CN29	PORT5	OS4 (Auxiliary)	OS4-12-PC2	CN33	PORT2
	OS1-10-PC6	CN30	PORT6	OS4 (Auxiliary)	OS4-10-PC2	CN36	PORT2

Table 2-11: RICC Connections from OS2 to OSn (Core Configuration)

From				To			
Shelf	**Port**	**Connector**	**Label**	**Shelf**	**Port**	**Connector**	**Label**
OS2 (Auxiliary)	OS2-12-PC1	CN32	PORT1	OS1 (Main)	OS1-12-PC1	CN32	PORT1
	OS2-12-PC2	CN33	PORT2	OS1 (Main)	OS1-10-PC1	CN35	PORT1
	OS2-12-PC3	CN34	PORT3	OS3 (Auxiliary)	OS3-12-PC3	CN34	PORT3
	OS2-12-PC4	CN24	PORT4	OS3 (Auxiliary)	OS3-10-PC3	CN37	PORT3
	OS2-12-PC5	CN25	PORT5	OS4 (Auxiliary)	OS4-12-PC3	CN34	PORT3
	OS2-12-PC6	CN26	PORT6	OS4 (Auxiliary)	OS4-10-PC3	CN37	PORT3
	OS2-10-PC1	CN35	PORT1	OS1 (Main)	OS1-12-PC2	CN33	PORT2
	OS2-10-PC2	CN36	PORT2	OS1 (Main)	OS1-10-PC2	CN36	PORT2
	OS2-10-PC3	CN37	PORT3	OS3 (Auxiliary)	OS3-12-PC4	CN24	PORT4
	OS2-10-PC4	CN28	PORT4	OS3 (Auxiliary)	OS3-10-PC4	CN28	PORT4
	OS2-10-PC5	CN29	PORT5	OS4 (Auxiliary)	OS4-12-PC4	CN24	PORT4
	OS2-10-PC6	CN30	PORT6	OS4 (Auxiliary)	OS4-10-PC4	CN28	PORT4

Table 2-12: RICC Connections from OS3 to OSn (Core Configuration)

From				To			
Shelf	**Port**	**Connector**	**Label**	**Shelf**	**Port**	**Connector**	**Label**
OS3 (Auxiliary)	OS3-12-PC1	CN32	PORT1	OS1 (Main)	OS1-12-PC3	CN34	PORT3
	OS3-12-PC2	CN33	PORT2	OS1 (Main)	OS1-10-PC3	CN37	PORT3
	OS3-12-PC3	CN34	PORT3	OS2 (Auxiliary)	OS2-12-PC3	CN34	PORT3
	OS3-12-PC4	CN24	PORT4	OS2 (Auxiliary)	OS2-10-PC3	CN37	PORT3
	OS3-12-PC5	CN25	PORT5	OS4 (Auxiliary)	OS4-12-PC5	CN25	PORT5
	OS3-12-PC6	CN26	PORT6	OS4 (Auxiliary)	OS4-10-PC5	CN29	PORT5
	OS3-10-PC1	CN35	PORT1	OS1 (Main)	OS1-12-PC4	CN24	PORT4
	OS3-10-PC2	CN36	PORT2	OS1 (Main)	OS1-10-PC4	CN28	PORT4
	OS3-10-PC3	CN37	PORT3	OS2 (Auxiliary)	OS2-12-PC4	CN24	PORT4
	OS3-10-PC4	CN28	PORT4	OS2 (Auxiliary)	OS2-10-PC4	CN28	PORT4
	OS3-10-PC5	CN29	PORT5	OS4 (Auxiliary)	OS4-12-PC6	CN26	PORT6
	OS3-10-PC6	CN30	PORT6	OS4 (Auxiliary)	OS4-10-PC6	CN30	PORT6

Table 2-13: RICC Connections from OS4 to OSn (Core Configuration)

From				To			
Shelf	**Port**	**Connector**	**Label**	**Shelf**	**Port**	**Connector**	**Label**
OS4 (Auxiliary)	OS4-12-PC1	CN32	PORT1	OS1 (Main)	OS1-12-PC5	CN25	PORT5
	OS4-12-PC2	CN33	PORT2	OS1 (Main)	OS1-10-PC5	CN29	PORT5
	OS4-12-PC3	CN34	PORT3	OS2 (Auxiliary)	OS2-12-PC5	CN25	PORT5
	OS4-12-PC4	CN24	PORT4	OS2 (Auxiliary)	OS2-10-PC5	CN29	PORT5
	OS4-12-PC5	CN25	PORT5	OS3 (Auxiliary)	OS3-12-PC5	CN25	PORT5
	OS4-12-PC6	CN26	PORT6	OS3 (Auxiliary)	OS3-10-PC5	CN29	PORT5
	OS4-10-PC1	CN35	PORT1	OS1 (Main)	OS1-12-PC6	CN26	PORT6
	OS4-10-PC2	CN36	PORT2	OS1 (Main)	OS1-10-PC6	CN30	PORT6
	OS4-10-PC3	CN37	PORT3	OS2 (Auxiliary)	OS2-12-PC6	CN26	PORT6
	OS4-10-PC4	CN28	PORT4	OS2 (Auxiliary)	OS2-10-PC6	CN30	PORT6
	OS4-10-PC5	CN29	PORT5	OS3 (Auxiliary)	OS3-12-PC6	CN26	PORT6
	OS4-10-PC6	CN30	PORT6	OS3 (Auxiliary)	OS3-10-PC6	CN30	PORT6

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3

SMALL CONFIGURATION

This chapter includes the following procedures:

3.1 Overview

This chapter provides prerequisites and procedures for installing a rack and installing or connecting the shelves, plug-in units, and cables that make up the FLASHWAVE® 7500 Small Configuration system. This chapter also describes the basic rack configurations for the FLASHWAVE 7500 Small Configuration system. Additionally, this chapter describes the backplane of the FLASHWAVE 7500 Optical/Tributary shelf. Procedures for attaching cables to the Optical/Tributary shelf backplane are provided in Section 3.19, Installing Cables [p. 3-108].

> ***Note:*** *In a Small Configuration, the Optical/Tributary shelf is the 19-inch Universal shelf. The name of a specific shelf depends on its function (determined by the connections to its backplane and the plug-in units installed). An Optical shelf supports the main ring wavelength division multiplexing (WDM) facilities; a Tributary shelf provides client services.*

The information contained in the following sections applies to all Small Configuration applications, including Universal ILA, Express, 40-Ch WSS, 40-Ch 2D-ROADM, 32-Ch ROADM, and 32-Ch FOADM.

The 2D-ROADM system requires one optical shelf and several tributary shelves.

Before performing the installation procedures, review the following subsections describing prerequisites, standard rack configurations, and flange kits.

3.2 Prerequisites

Insure that all FLASHWAVE 7500 Small Configuration equipment has been received, and all data forms and job engineering drawings have been completed and are available.

The tools required for performing procedures listed in this chapter include the following:

- Common hand tools
- Digital multimeter (DMM)

3.3 Rack Configurations and Shelf Flange Kits

This section describes rack configurations and shelf flange kits for mounting shelves in the racks. It includes the following subsections:

3.3.1 Standard Rack Configurations

The FLASHWAVE 7500 Small Configuration system racks can be configured in several variations. Fujitsu recommends ordering the top-level part number of a particular rack, which would include the rack, the appropriate shelves and plug-in units, the rack wiring and cabling, and other miscellaneous devices and equipment as required. The system racks are installed on site in accordance with local plans and procedures.

Another consideration is to order racks populated with a minimum of shelves and then add to the complement as required (the racks are wired for a full complement of shelves). In addition, the FLASHWAVE 7500 Small Configuration system equipment, minus the rack, can be ordered and installed in customer-supplied racks.

> ***Note:*** *Due to NEBS™ Earthquake-resistance requirements, Fujitsu recommends that no additional SHU2 shelf be placed on top of an LAS shelf in any configuration. Always position the LAS shelf as the topmost shelf in the rack when adding additional SHU2 shelves.*

Figures 3-1 [p. 3-5] through 3-13 [p. 3-17] show the standard rack configurations for a FLASHWAVE 7500 Small Configuration NE. For detailed procurement information, refer to *Ordering Information*, or contact your Fujitsu sales representative.

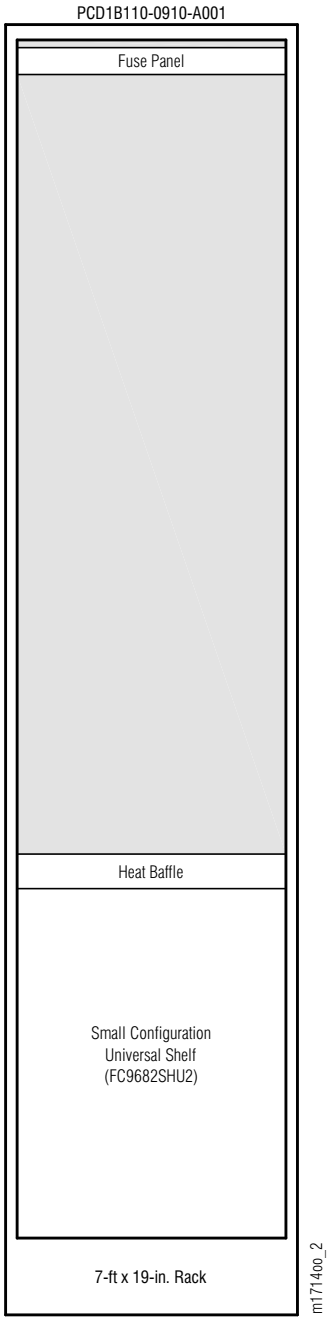


Figure 3-1: Rack Configuration with One Universal Shelf Only (PCD1B110-0910-A001) (Small Configuration)

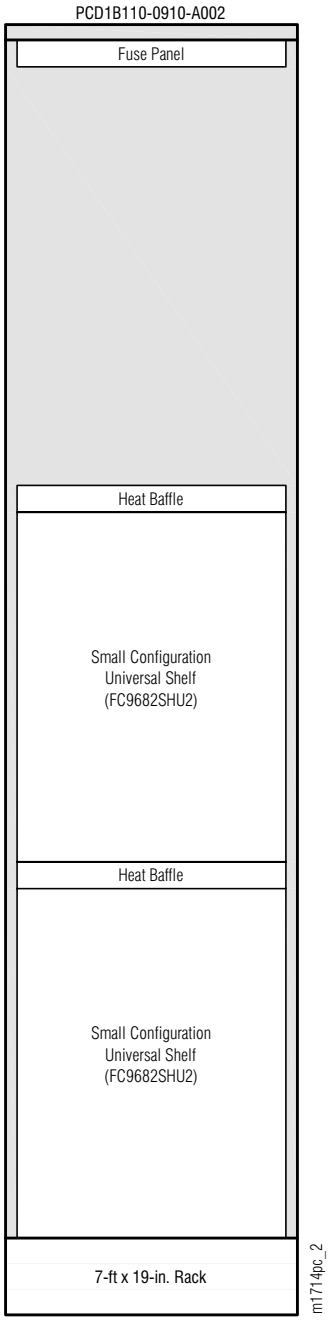


Figure 3-2: Rack Configuration with Two Universal Shelves Only (PCD1B110-0910-A002) (Small Configuration)

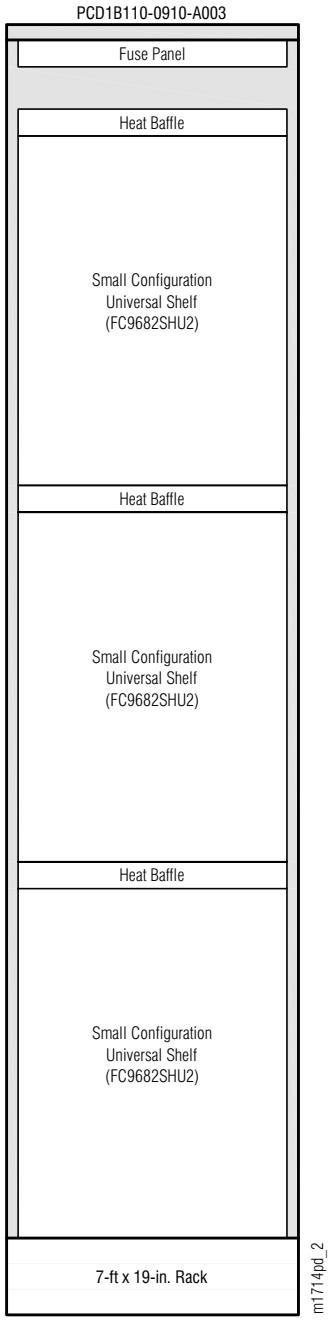


Figure 3-3: Rack Configuration with Three Universal Shelves Only (PCD1B110-0910-A003) (Small Configuration)

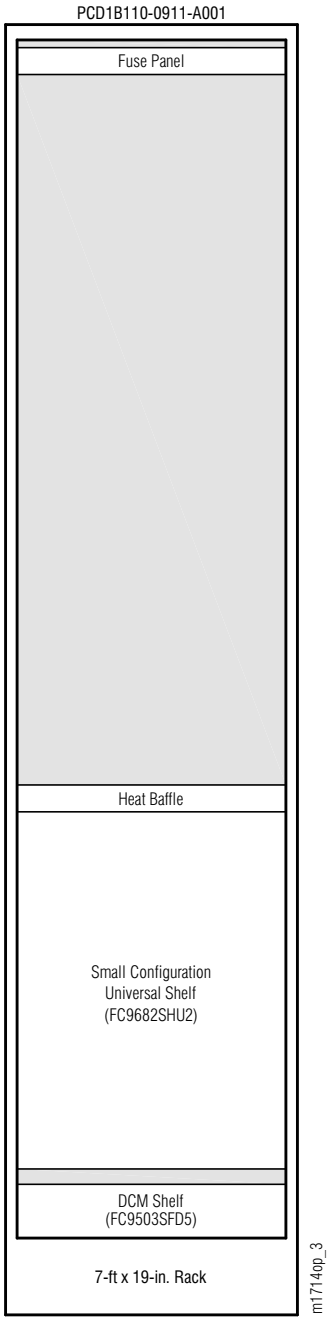


Figure 3-4: Rack Configuration with One Universal Shelf and One DCM Shelf (PCD1B110-0911-A001) (Small Configuration)

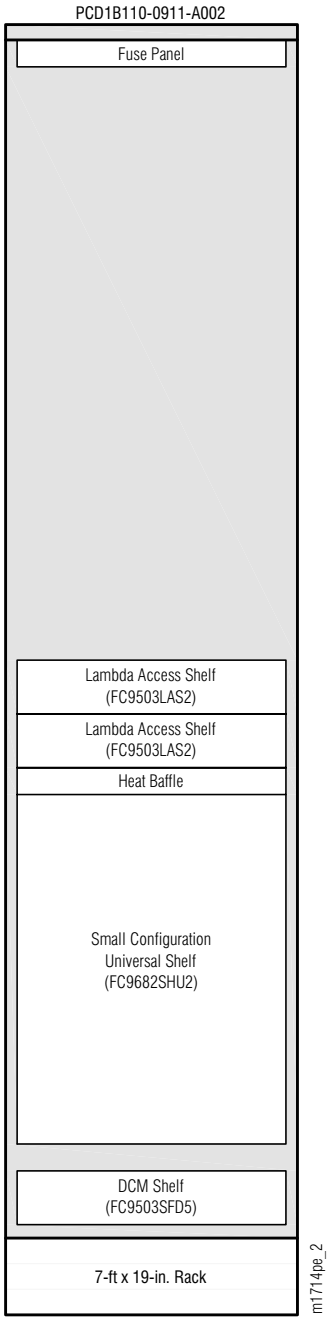


Figure 3-5: Rack Configuration with One Universal Shelf, Two LAS Shelves, and One DCM Shelf (PCD1B110-0911-A002) (Small Configuration)

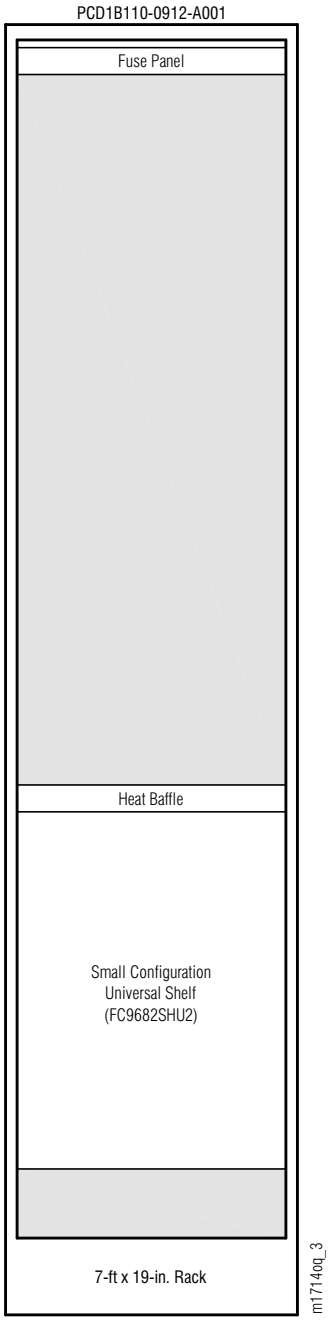


Figure 3-6: Rack Configuration with One Universal Shelf Only (PCD1B110-0912-A001) (Small Configuration)

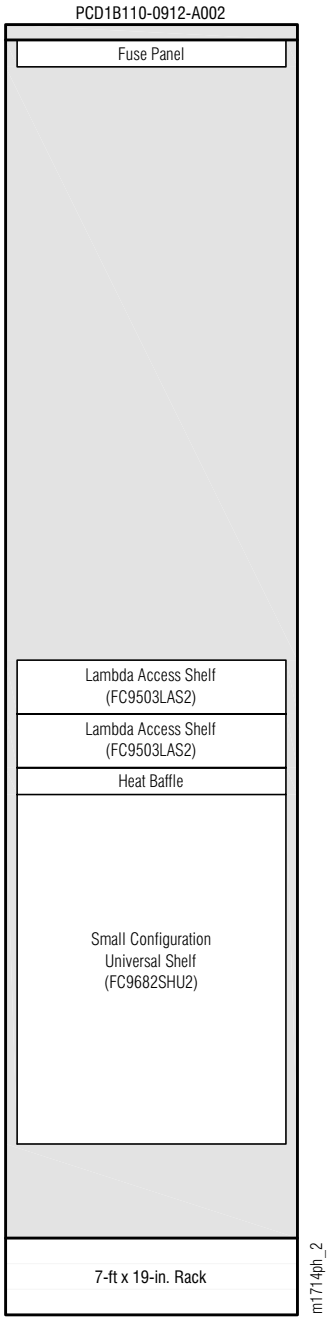


Figure 3-7: Rack Configuration with One Universal Shelf and Two LAS Shelves (PCD1B110-0912-A002) (Small Configuration)

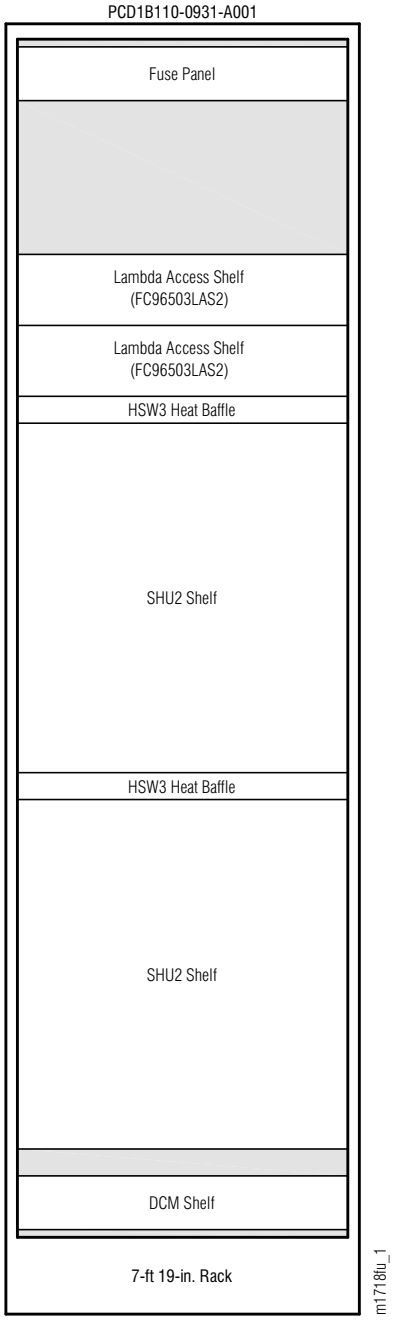


Figure 3-8: Rack Configuration with Two Universal Shelves, Two LAS Shelves, and One DCM Shelf (PCD1B110-0931-A001) (Small Configuration)

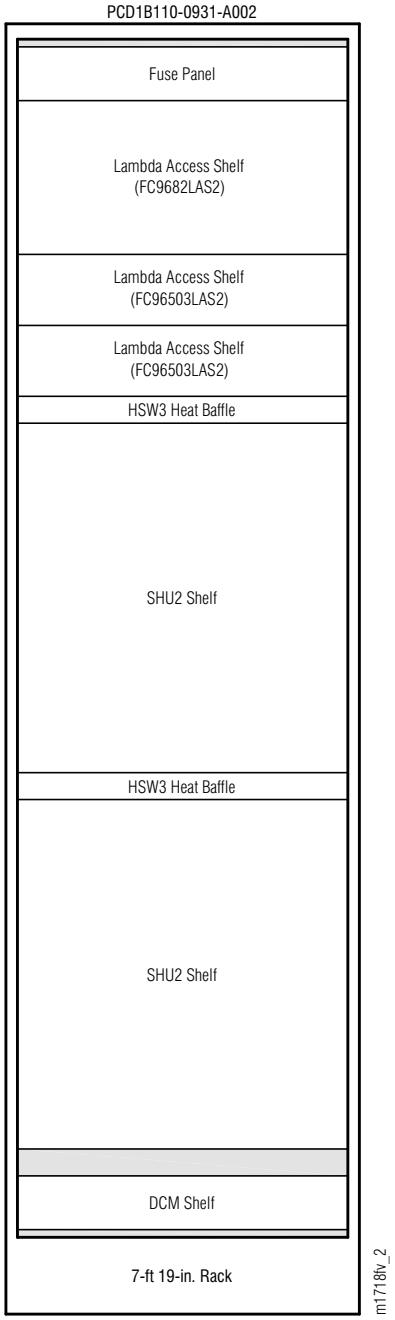


Figure 3-9: Rack Configuration with Two Universal Shelves, Three LAS Shelves, and One DCM Shelf (PCD1B110-0931-A002) (Small Configuration)

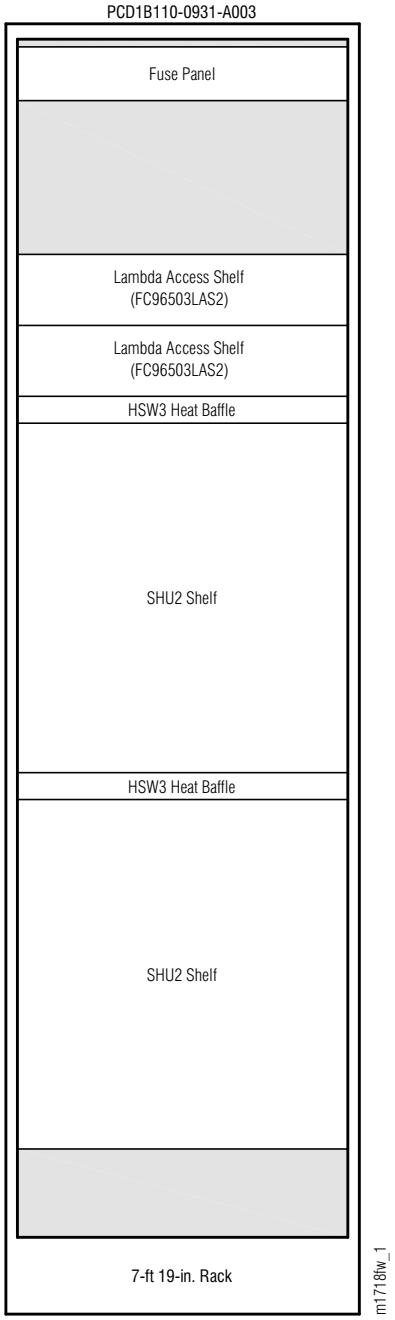


Figure 3-10: Rack Configuration with Two Universal Shelves and Two LAS Shelves (PCD1B110-0931-A003) (Small Configuration)

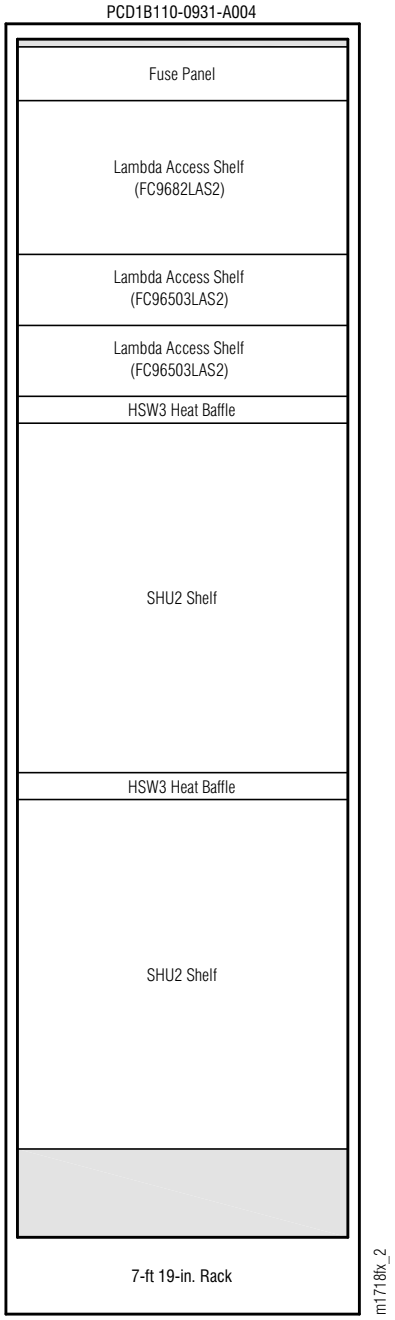


Figure 3-11: Rack Configuration with Two Universal Shelves and Three LAS Shelves (PCD1B110-0931-A004) (Small Configuration)

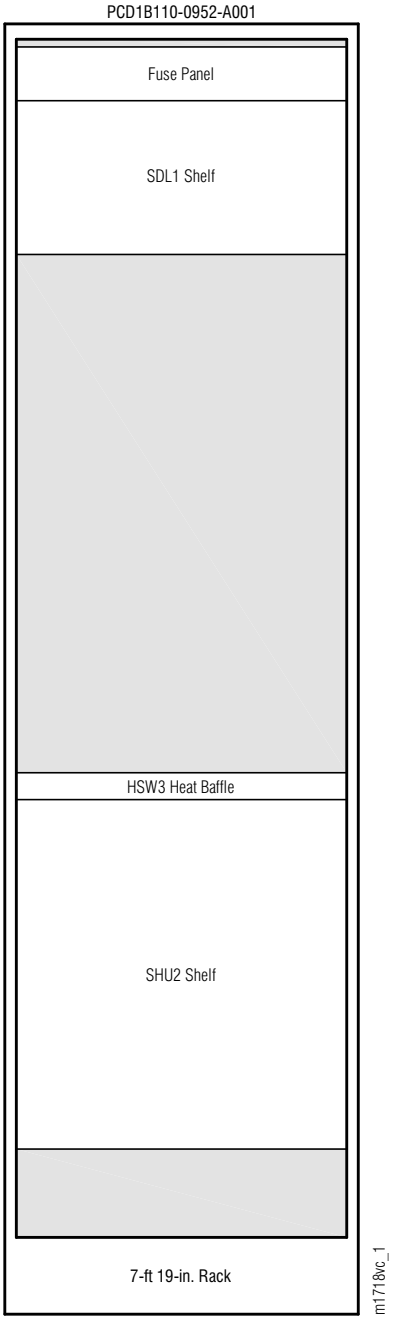


Figure 3-12: Rack Configuration with One Universal Shelf and One LAM/DCM Shelf (PCD1B110-0952-A001) (Small Configuration)

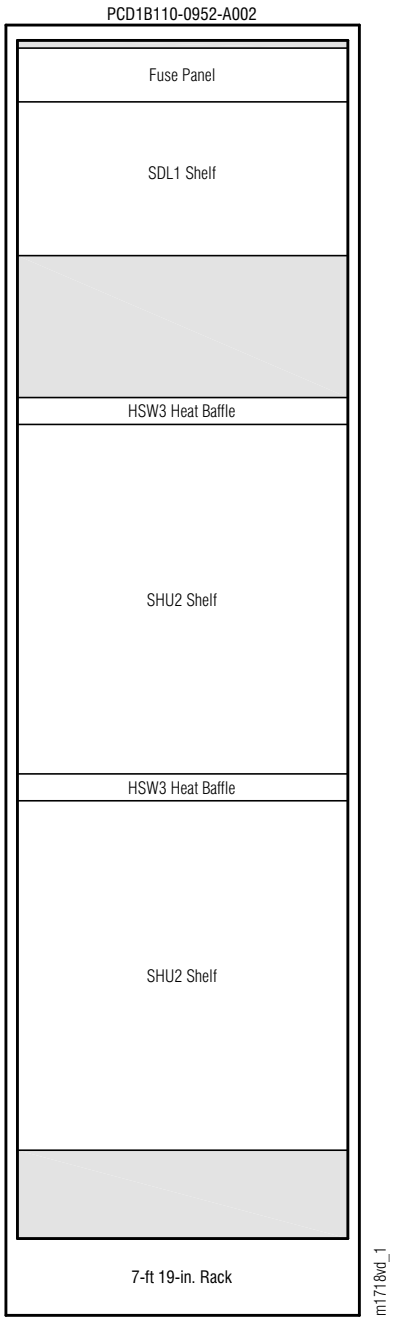


Figure 3-13: Rack Configuration with Two Universal Shelves and One LAM/DCM Shelf (PCD1B110-0952-A002) (Small Configuration)

3.3.2 Flange Kits for 19-Inch and 23-Inch Racks

The Small Configuration shelves can be installed in either a 19-inch CO relay rack or in a 23-inch CO relay rack. Table 3-1 [p. 3-18] lists shelves and mounting flanges applicable to 19-inch rack applications. Table 3-2 [p. 3-19] lists shelves and mounting flanges applicable to 23-inch rack applications.

Table 3-1: Shelves and Flange Kits for 19-Inch Rack Applications (Small Configuration)

Shelf	Shelf Name (Part Number) Description	Flange Kit Name (Part Number) Description
Optical/Tributary shelf	SHU2 (FC9682SHU2) Universal Small shelf	RCMA-FLG5 (FC9682FLG5) 19-inch flange kit for Small Configuration Optical/Tributary shelf
Power Distribution	19-inch fuse panel[a]	n/a
Heat Baffle	HSW3 (FC9682HSW3) 19-inch Heat Baffle	RCXP-FLG3 (FC9503FLG3-I02) 19-inch mounting flange kit for HSW3 (FC9682HSW3) heat baffle
DCM shelf	SFD5 (FC9503SFD5) 19-inch DCM shelf	RCMA-FLG5 (FC9682FLG5) 19-inch mounting flange kit for DCM shelf (FC9503SFD5)
LAS2 shelf	LAS2 (FC9503LAS2) 19-inch 2U LAS2 shelf	RCXP-FLG5 (FC9503FLG5) 19-inch mounting flange kit for 2U LAS2 shelf (FC9503LAS2)
LAS2 shelf	LAS2 (FC9682LAS2) 19-inch 6U LAS2 shelf	RCMA-FLG7 (FC9682FLG7) 19-inch mounting flange kit for 6U LAS2 shelf (FC9682LAS2)
SDL1 shelf	SDL1 (FC9682SDL1) 19-inch Combo LAM/DCM	RCMA-FLGB (FC9682FLGB) 19-inch SDL1 shelf flange kit for Combo LAM/DCM (FC9682SDL1)

[a] Fujitsu does not manufacture a 19-inch CBP. For 19-inch rack applications, Fujitsu recommends using the N215116-N/L31 fuse panel manufactured by Noran Tel Ltd. Refer to Noran Tel documentation for installation instructions for the N215116-N/L31 fuse panel. This unit can be ordered through Fujitsu using part number 06-331-444.

Table 3-2: Shelves and Flange Kits for 23-Inch Rack Applications (Small Configuration)

Shelf	Shelf Name (Part Number) Description	Flange Kit Name (Part Number) Description
Optical/Tributary shelf	SHU2 (FC9682SHU2) Universal Small shelf	RCMA-FLG6 (FC9682FLG6) 23-inch mounting flange kit for Small Configuration Optical/Tributary shelf
Power Distribution	CBP (HA15B-001-B361) 23-inch circuit breaker panel	n/a
Heat Baffle	HSW2 (FC9682HSW2) 23-inch heat baffle	n/a
	HSW3 (FC9682HSW3) 19-inch heat baffle	RCXP-FLG4 (FC9503FLG4-I02) 23-inch mounting flange kit for HSW3 (FC9682HSW3) heat baffle
DCM shelf	SFD3 (FC9512SFD3) 23-inch DCM shelf	n/a
	SFD5 (FC9503SFD5) 19-inch DCM shelf	RCXP-FLG6 (FC9503FLG6) 23-inch mounting flange kit for SFD5 DCM shelf (FC9503SFD5)
LAS2 shelf	LAS2 (FC9503LAS2) 19-inch 2U LAS2 shelf	RCXP-FLG6 (FC9503FLG6) 23-inch mounting flange kit for 2U LAS2 shelf (FC9503LAS2)
LAS2 shelf	LAS2 (FC9682LAS2) 19-inch 6U LAS2 shelf	RCMA-FLG8 (FC9682FLG8) 23-inch mounting flange kit for 6U LAS2 shelf (FC9682LAS2)

3.4 Storing, Unpacking, and Inspecting Equipment

This section describes how to store, unpack, and inspect the FLASHWAVE 7500 equipment. It includes the following subsections:

Note: *Review* Section 3.5 [p. 3-25] *for rack installation criteria.*

3.4.1 Storing Equipment

When equipment is to be kept in storage, the equipment should be left in the shipping containers. The storage bags are coated with a conductive material to protect plug-in units from damage by electrostatic discharge (ESD). Observe all warning labels used by Fujitsu to indicate electrostatic-sensitive devices.

3.4.2 Unpacking and Inspecting the Equipment Rack

This procedure provides guidelines for unpacking and inspecting a standard rack. Fujitsu recommends that the installation team familiarize themselves with the specific area where the installation is to be performed, examine the racks, and ensure that sufficient workspace to unpack the racks is available.

DANGER:

Improper handling of the equipment rack can result in serious injury or death. Always use a forklift or lifting sling with block and tackle to lift or move the equipment rack. Keep all personnel clear of the equipment rack while it is being lifted. Do not attempt to handle and install the racks without sufficient assistance.

Follow this procedure to unpack and inspect the equipment rack:

Step	Task
1	Identify the equipment rack to be installed.

2 Before unpacking the equipment rack, inspect the container (see Figure 3-14 [p. 3-21]) for signs of shipping damage. Claims for shipping damage must be filed with the transportation company in accordance with their published procedure.

Figure 3-14: Example of an Equipment Rack in Shipping Container

Note: *A shipping label is located on the front of the equipment rack container. Compare this with the shipping documents.*

3 Is this the correct shipment for this location?

If YES:
Continue with Step 4 [p. 3-21].

If NO:
Go to Step 16 [p. 3-23].

4 Using all data sheets and job engineering drawings, verify that the information matches the installation site.

5 Using industrial shears, cut the two shipping bands from the container. See Figure 3-14 [p. 3-21] for the location of the shipping bands.

After the last shipping band is cut, the top of the shipping container will fall away.

6 At the front-left or -right corner of the container (Figure 3-15 [p. 3-22]), use a box cutter to cut the container away from the equipment rack. Start cutting from the top of the shipping container to the bottom.

Figure 3-15: Removing Shipping Container from an Equipment Rack

7 After the shipping container is cut open, remove it from the equipment rack.

8 Inspect the rack thoroughly to ensure that it is not damaged.

9 Is there any noticeable damage to the rack?

If YES:
Go to Step 16 [p. 3-23].

If NO:
Continue with Step 10 [p. 3-22].

Note: *The equipment rack should be completely covered with bubble wrap to prevent damage during shipment.*

10 At the side of the rack, use industrial shears to cut open the bubble wrap. Start cutting from the bottom of the rack to the top.

WARNING:

Always cut at the side of the rack to avoid damaging the equipment. Standard configuration racks are delivered prewired. Do not cut or disconnect any wires.

11 Carefully remove the bubble wrap from the rack.

12 Is there any noticeable damage to the rack after the bubble wrap is removed?

If YES:
Go to Step 16 [p. 3-23].

If NO:
Continue with Step 13 [p. 3-23].

13 Does the rack contain equipment (standard rack configuration)?

If YES:
Continue with Step 14 [p. 3-23].

If NO:
Go to Step 18 [p. 3-23].

14 Locate the serial numbers on the left side of each equipment shelf mounted in the rack. Compare the serial numbers with the serial numbers on the shipping documents.

15 Do the serial numbers on the equipment and the shipping documents match?

If YES:
Go to Step 17 [p. 3-23].

If NO:
Continue with Step 16 [p. 3-23].

16 Notify the transportation company if the equipment was damaged or if an improper shipment was received. DO NOT continue the installation of the equipment until the problem has been corrected. After the problem is resolved, repeat this procedure beginning with Step 2 [p. 3-21].

17 Update office records according to local procedures.

18 Do you want to install the equipment rack now?

If YES:
Proceed to Section 3.5, Installing the Rack [p. 3-25].

If NO:
This procedure is complete.

3.4.3 Unpacking and Inspecting Equipment

This procedure provides guidelines for unpacking system equipment and ensuring the safe arrival of all equipment. Fujitsu recommends that the installation team familiarize themselves with the specific area where the installation is to be performed, examine the racks to be used, and ensure that sufficient workspace to unpack the equipment is available.

DANGER:

Do not attempt to handle and install the shelves without sufficient assistance. The Optical/Tributary shelf weighs approximately 48.5 lb (22 kg) empty (without fans). Equipped, the Optical/Tributary shelf weighs significantly more. Handling the equipment without sufficient assistance may result in personal injury, damage to the equipment, or both.

WARNING:

Do not use the internal walls of any shelf as a lifting point or lift support. Doing so may damage the plug-in unit rail support.

Step	Task
1	Before unpacking the equipment, inspect the containers for signs of shipping damage. Claims for shipping damage must be filed with the transportation company in accordance with their published procedure.
2	Unpack and inventory individual system equipment components; however, leave all plug-in units in their original, individual containers until they are installed during system turn-up. When unpacking, use the checkoff list accompanying each shipment to determine that all items are present before proceeding with the installation. If a shortage of any kind exists, notify the appropriate Fujitsu representative.
3	Inspect the inside and outside of the shelves for damage.
4	Check for debris possibly lodged in each shelf backplane.
5	Update office records according to local procedures.
	This procedure is complete.

3.5 Installing the Rack

This procedure details the steps required to install a standard rack. Fujitsu recommends that the installation team familiarize themselves with the specific area where the installation is to be performed, examine the rack, and ensure that sufficient workspace to install the rack is available.

DANGER:

Improper handling of the equipment rack can result in serious injury or death. Always use a forklift or lifting sling with block and tackle to lift or move the equipment rack. Keep all personnel clear of the equipment rack while it is being lifted. Do not attempt to handle and install the racks without sufficient assistance.

CAUTION:

The rack should be mounted on a concrete or other noncombustible surface only.

The following tools are required to perform this procedure:

- Hammer
- Drill
- Drill bits sufficient to drill into the flooring
- Punch
- Common hand tools, including a wrench or ratchet set

Follow this procedure to install the equipment rack:

Step	Task
1	Identify the equipment rack to be installed.
2	Inspect all shipping documents to ensure that the correct shipment was received. Refer to Section 3.4.2, Unpacking and Inspecting the Equipment Rack [p. 3-20].
3	Using the documentation supplied with the rack package, mark the floor for proper mounting. Figure 3-16 [p. 3-26] shows an **example** mounting diagram. Mounting diagrams will vary depending on equipment and location.
4	Using a punch and hammer, mark the position where the holes are to be drilled.
5	Determine the type of floor anchor to be used.

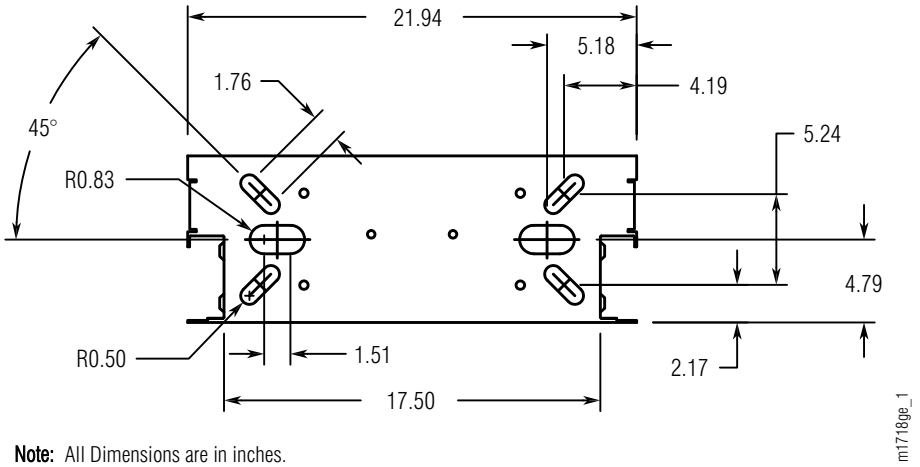


Figure 3-16: Example Diagram—7 feet x 19 inch Equipment Rack Floor Dimensions

6 Is the floor anchor for a concrete floor?

If YES:
Go to Step 7 [p. 3-26].

If NO:
Go to Step 14 [p. 3-26].

7 In accordance with the dimensions of the anchor to be used, drill the holes in the concrete floor.

8 Clean the drill shavings from the holes.

9 Install an anchor in each of the holes.

10 Remove any debris from the area in which the rack will be mounted.

11 Move the rack into position, aligning each of the holes in the base of the rack to the anchors.

12 Install the mounting bolts into the anchors, and tighten them to within 0.5 inch of the equipment rack baseplate. Do not fully tighten at this time.

13 Go to Step 19 [p. 3-27].

14 Drill the holes in the raised floor in accordance with the dimensions of the mounting bolts being used.

15 Remove any debris from the area in which the rack will be mounted.

16 Move the rack into position, aligning each of the holes in the base of the rack to the anchors.

17 Install the mounting bolts with lock washers through the equipment rack baseplate and the raised floor.

18 Install the nuts to the bolts under the raised floor. Tighten them until the lock washers begin to compress, but do not fully tighten them now.

19 Secure the top of the equipment rack according to the job specifications. Some equipment racks are secured to existing overhead framework, while others are secured to an adjacent wall using a horizontal mounting brace. All overhead mounting hardware should be tightened after assembly.

20 Tighten the floor mounting bolts.

Note: *If the rack is installed on a raised floor, there will likely be some type of supports needed. Instructions for seismic zone installation must also be considered. Follow your local practices for support and bracing of the rack.*

21 Measure the vertical alignment of the 7-foot equipment rack. Ensure vertical alignment is within 3/16 inch.

22 Is the equipment rack within the tolerance level specified in Step 21 [p. 3-27]?

If YES:
Go to Step 27 [p. 3-28].

If NO:
Continue with Step 23 [p. 3-27].

23 Loosen the floor mounting bolts and top mounting hardware, and adjust the equipment rack using shims on the mounting hardware. All shims and adjustments must meet locally acceptable guidelines.

24 Retighten all mounting hardware.

25 Measure the vertical alignment of the 7-foot equipment rack. It must be vertically aligned to within 3/16 inch.

26 Is the equipment rack within the tolerance level specified in Step 25 [p. 3-27]?

If YES:
Continue with Step 27 [p. 3-28].

If NO:
Go back to Step 23 [p. 3-27].

27 Update office records according to local procedures.

This procedure is complete.

3.6 Installing the Circuit Breaker Panel or Fuse Panel

The circuit breaker panel (CBP) (see Figure 3-17 [p. 3-29]) or fuse panel (see the note that follows) should be the first item installed in the rack. For procedures to install the CBP, refer to *Circuit Breaker Panel*. After the CBP or fuse panel is installed at the top of the rack, the other equipment can be installed.

Note: *Fujitsu does not manufacture a 19-inch CBP. For 19-inch rack applications, Fujitsu recommends using the N215116-N/L31 fuse panel manufactured by Noran Tel Ltd. Refer to Noran Tel documentation for installation instructions for the N215116-N/L31 fuse panel. This unit can be ordered through Fujitsu using part number 06-331-444.*

Note: *The CBP may not have circuit breakers CB1 through CB4 installed. Locate the HA15B-0001-C365 circuit breaker kit, if required, for labels and circuit breaker units.*

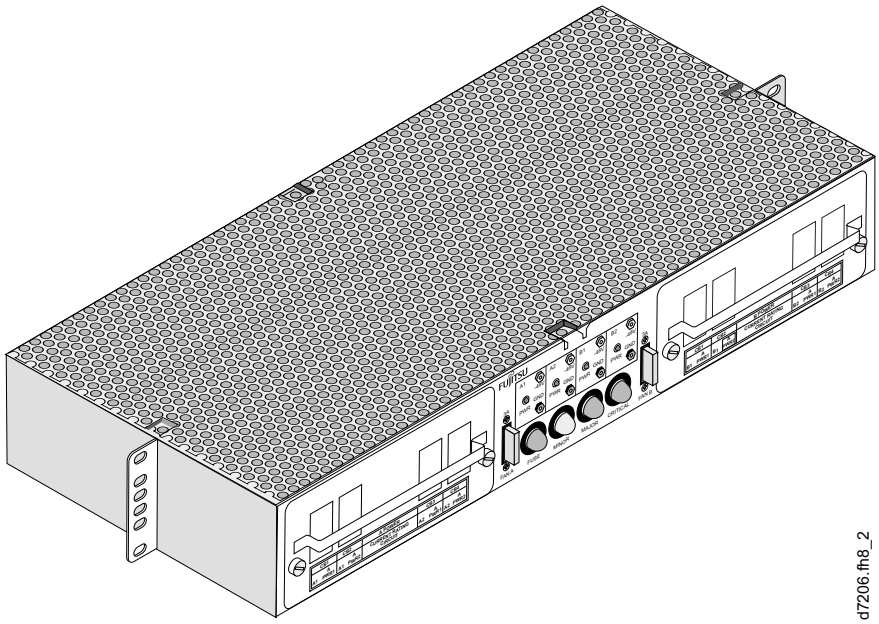


Figure 3-17: Circuit Breaker Panel, HA15B-001-B361

3.7 Connecting and Checking Office Battery to the CBP

This section includes the following subsections:

If not done previously as part of an earlier FLASHWAVE 7500 installation, the office-battery power cables must be connected to the CBP power input connectors. However, the office-battery ends of the power cables must not be connected to the primary power source until the CBP is completely installed.

> ***Note:*** *In this section, the term* battery *refers to the office DC power feed for the bay in which the equipment is being mounted.*

The CBP supports four separate battery/return power sources:

- BATT A1/RTN A1
- BATT A2/RTN A2
- BATT B1/RTN B1
- BATT B2/RTN B2

Each power input connection consists of a pair of parallel-wired, threaded studs. For example, BATT A1 and RTN A1 both have two threaded studs.

An additional connector is provided for frame ground.

For additional details about the CBP, refer to *Circuit Breaker Panel*.

The following tools are required:

- No. 1 Phillips screwdriver
- 7/16 inch socket wrench

3.7.1 Connecting Office Battery to Circuit Breaker Panel

See Figure 3-18 [p. 3-31] for the location of terminals on the rear of the CBP. Power cabling includes the following:

- –48 V battery supply (BATT A1, BATT A2, BATT B1, and BATT B2)
- Battery return (RTN A1, RTN A2, RTN B1, and RTN B2)
- Frame ground (FG)

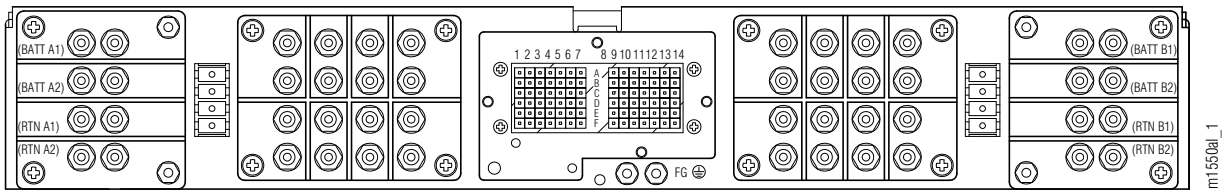


Figure 3-18: Rear View of CBP

DANGER:

Carefully follow the instructions in this section to avoid personal injury, damage to the equipment, or both. Installing power cables that are already connected at one end to a voltage source can result in an electrical accident.

Step	Task
1	Verify that the office-battery ends of the power cables are not connected to the office batteries. These connections are the last to be made after the CBP has been installed. If necessary, follow local procedures to disconnect office power from these cables or remove circuit breakers from the rack CBP. Use a DMM to ensure that the voltage is 0 V DC (with reference to the battery ground) at the equipment-rack end of the cables. ***Note:*** *For FLASHWAVE 7500 equipment, circuit breakers (or fuses) should be sized to ensure that the maximum input current does not exceed 80 percent of the circuit breaker (or fuse) size. Use 30 A circuit breakers (or fuses) to ensure that this requirement is met for all configurations of the FLASHWAVE 7500 equipment.*
2	Remove the protective covers that protect the A/B battery terminals at both ends on the rear panel of the CBP. See Figure 3-18 [p. 3-31] for the CBP.
3	Remove the top nuts and washers from the threaded studs for all BATT and RTN connections being installed.

4 Locate the double-lug connector on the CBP end of the power cable that is to be connected to battery source A1 at the end of this procedure.

5 Place the single two-hole lug on the two BATT A1 studs so that the cable is easily routed toward the outside edge of the shelf.

Note: *A washer may be required as a standoff between the circuit breaker panel and the lug.*

6 Install the washer and nut and tighten according to local standards.

7 Locate the single two-hole lug on the CBP end of the power cable that is to provide the return for battery source A1 at the end of this procedure.

8 Place the single two-hole lug on the two RTN A1 studs so that the return cable is easily routed toward the outside edge of the shelf.

Note: *A washer may be required as a standoff between the circuit breaker panel and the lug.*

9 Install the washer and nut and tighten according to local standards.

10 Repeat Steps 4 [p. 3-32] through 9 [p. 3-32], substituting A2 for A1, then B1 for A1, and finally B2 for A1.

11 Connect the frame ground lead to the FG terminal located just below the pin block. See Figure 3-18 [p. 3-31].

Note: *This grounding procedure assumes that the frame ground and power ground are terminated at a central ground bus (ground window). Refer to Telcordia TR-TSY-000513.*

12 Verify that no strands of wire are shorting terminals together and that leads are securely fastened.

13 Replace the plastic cover over the input connectors.

14 On the front panel of the CBP, set all circuit breakers to the OFF position.

15 Observing local procedures, connect each of the power cables to the office batteries and office ground as appropriate.

This procedure is complete.

3.7.2 Checking Battery Voltage at Circuit Breaker Panel

Note: *In this procedure, the term* battery *refers to the DC power feed for the rack in which the equipment is being mounted.*

Note: *This procedure assumes that power cables have been connected between the office battery and the CBP and that the battery power is on.*

The test equipment required is a DMM (digital multimeter).

Step	Task
1	Set the DMM switches to measure voltage between 40 and 60 V DC.
2	On the front panel of the CBP, set all circuit breakers to the ON position.
3	Connect the negative DMM test lead to the first GND connector on the front panel, and connect the positive DMM test lead to the associated input voltage test point (–48 V) on the front of the CBP. See Figure 3-18 [p. 3-31]. The input voltage should be between –40 and –57 V DC.
4	Is the DMM measurement between –40 and –57 V DC? **If YES:** Continue with Step 5 [p. 3-33]. **If NO:** Report trouble to the installation group. When trouble is corrected, repeat Step 3 [p. 3-33].
5	Disconnect the DMM leads.
6	Repeat Steps 3 [p. 3-33] through 5 [p. 3-33] for each applicable –48 V/GND pair.
7	On the CBP front panel, set all circuit breakers to the OFF position. This procedure is complete.

3.8 Installing the Optical/Tributary Shelf

The FLASHWAVE 7500 Small Configuration system is based upon the Universal Small shelf (FC9682SHU2) which can be configured as either an Optical or a Tributary shelf.

These shelves are each 19 inches wide (nominally) and can be installed in either a 19-inch relay rack (see Figure 3-19 [p. 3-35]) or a 23-inch relay rack (see Figure 3-20 [p. 3-36]). In either case, two flanges are used. Table 3-3 [p. 3-34] lists the flange kit part numbers.

Table 3-3: Flange Kits for Optical/Tributary Shelf Installation

Flange Kit	Part Number
Flange kit for 19-inch relay rack installation	FC9682FLG5
Flange kit for 23-inch relay rack installation	FC9682FLG6

The rack or other suitable mounting structure must already be installed in accordance with local plans and procedures.

Do not install the Optical or Tributary shelf directly above any air-blocking product. LAS shelves and DCM shelves are examples of air-blocking products. Leave at least 1U (1.75 inches) of air clearance space between the shelf and any air-blocking product installed beneath the Optical or Tributary shelf.

The Optical or Tributary shelf can be installed at the bottom of the rack if there is adequate air clearance space between the bottom of the shelf and the floor. If air clearance between the bottom of the shelf and the floor is not adequate, mount the Optical or Tributary shelf near the bottom of the rack leaving 1U (1.75 inches) of air clearance space below it.

Figures 3-21 [p. 3-37] and 3-22 [p. 3-38] show front views of the Optical shelf and the Tributary shelf for reference.

> ***Note:*** Figures 3-21 [p. 3-37] and 3-22 [p. 3-38] *are shown fully populated for instructional purposes. At installation, the shelves do not have plug-in units installed. The shelves are not populated and provisioned until system turn-up.*

> ***Note:*** *The FLASHWAVE 7500 shelves do not have front covers because of front-access fiber cabling.*

DANGER:

Do not attempt to handle and install the shelves without sufficient assistance. The Optical and Tributary shelves weigh approximately 95 lb (43.0 kg) empty (without fans). Equipped, the Optical and Tributary shelves weigh significantly more. Handling the equipment without sufficient assistance may result in personal injury, damage to the equipment, or both.

WARNING:

Do not use the internal walls of any shelf as a lifting point or lift support. Doing so may damage the plug-in unit rail support.

CAUTION:

Do not compromise the stability of the rack when installing this equipment. Unstable racks can fall resulting in equipment damage.

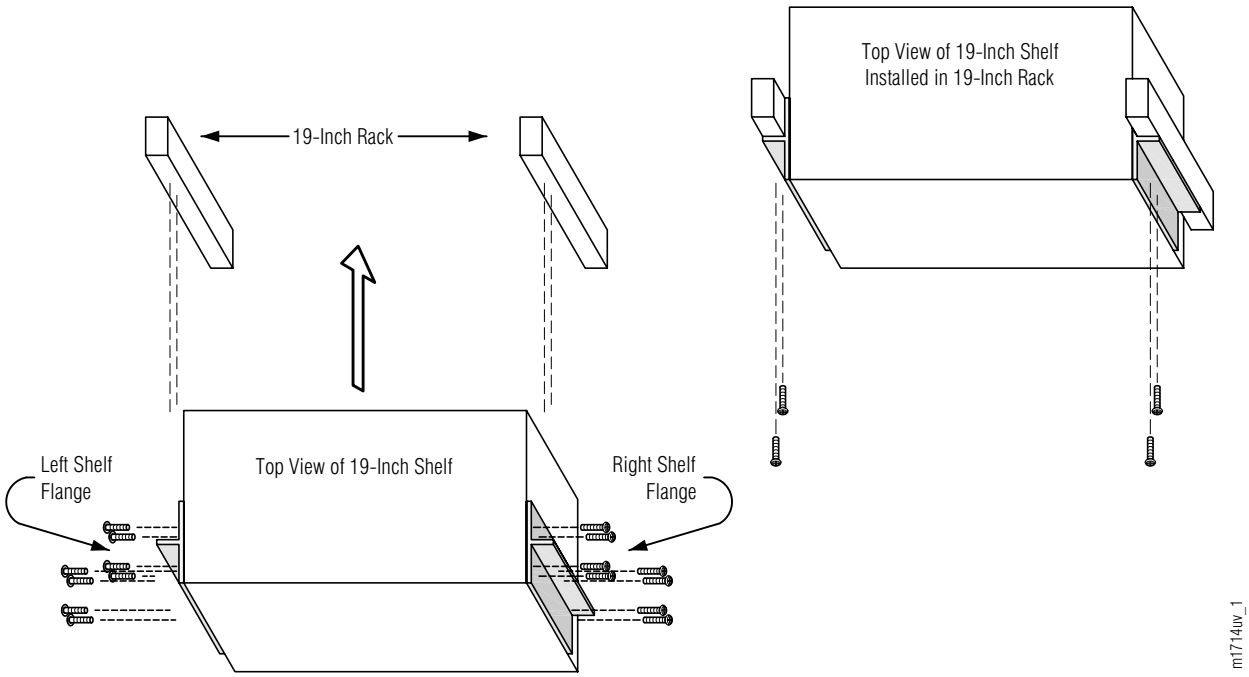


Figure 3-19: Optical/Tributary Shelf Mounting in 19-Inch Rack

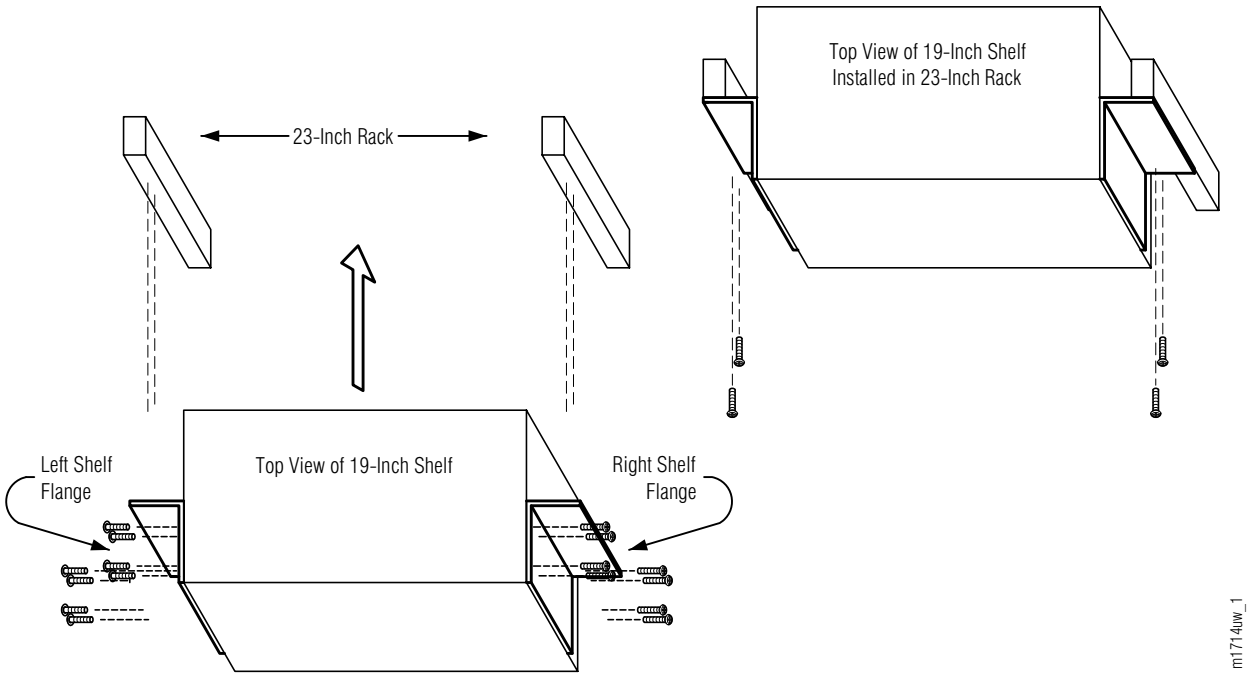


Figure 3-20: Optical/Tributary Shelf Mounting in 23-Inch Rack

Figure 3-21: Optical Shelf—Populated with Plug-In Units (Front View) (32-Channel ROADM Small Configuration)

Figure 3-22: Tributary Shelf—Populated with Plug-In Units (Front View) (Small Configuration)

Install the Optical/Tributary shelf as follows:

Step	Task
1	If not already done, remove the shelf from the shipping container.

2 Is the Optical/Tributary shelf to be installed in a 19-inch relay rack?

If YES:
Proceed to Step 3 [p. 3-39].

If NO:
Proceed to Step 8 [p. 3-42].

3 Get the flange kit for 19-inch rack mounting. Table 3-3 [p. 3-34] lists the flange kit part numbers.

4 Identify the left and right shelf flanges. See Figures 3-19 [p. 3-35] and 3-23 [p. 3-39].

Note: *At first glance the two flanges for 19-inch rack mounting appear to be identical, but they are not. See Figure 3-23 [p. 3-39]. When properly mounted, the cutout appears at the front of the shelf (see Figure 3-24 [p. 3-40]) and flange holes align with the shelf mounting holes (see Figure 3-25 [p. 3-41]).*

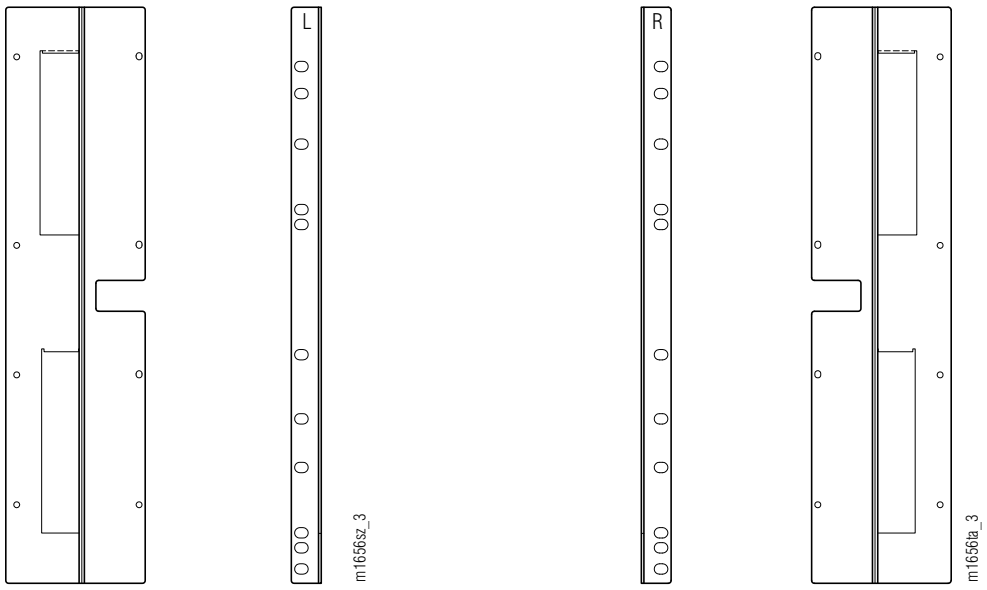


Figure 3-23: Optical/Tributary Shelf Mounting Flanges for 19-Inch Rack Mounting (Front and Side Views)

5 Identify the eight flange mounting holes on the side of the Optical/Tributary shelf. See Figure 3-24 [p. 3-40].

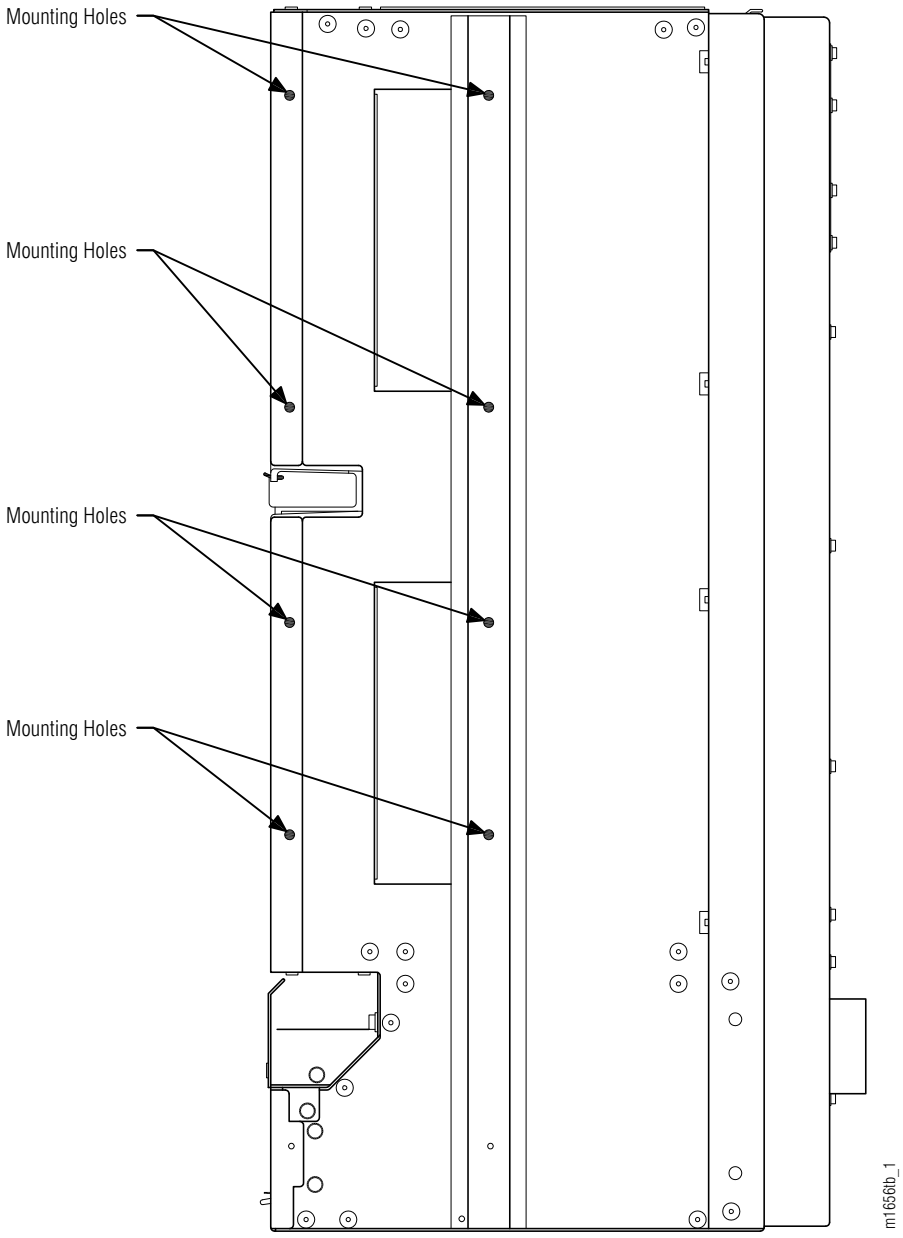


Figure 3-24: Flange Mounting Holes on Right-Side View of Optical/Tributary Shelf

6 Using eight pan-head Phillips M4 screws (8 mm long) on each side, secure the left and right shelf flanges to the Optical/Tributary shelf as shown in Figure 3-19 [p. 3-35].

Figure 3-25 [p. 3-41] shows a right-side view of the Optical/Tributary shelf after the flange is mounted.

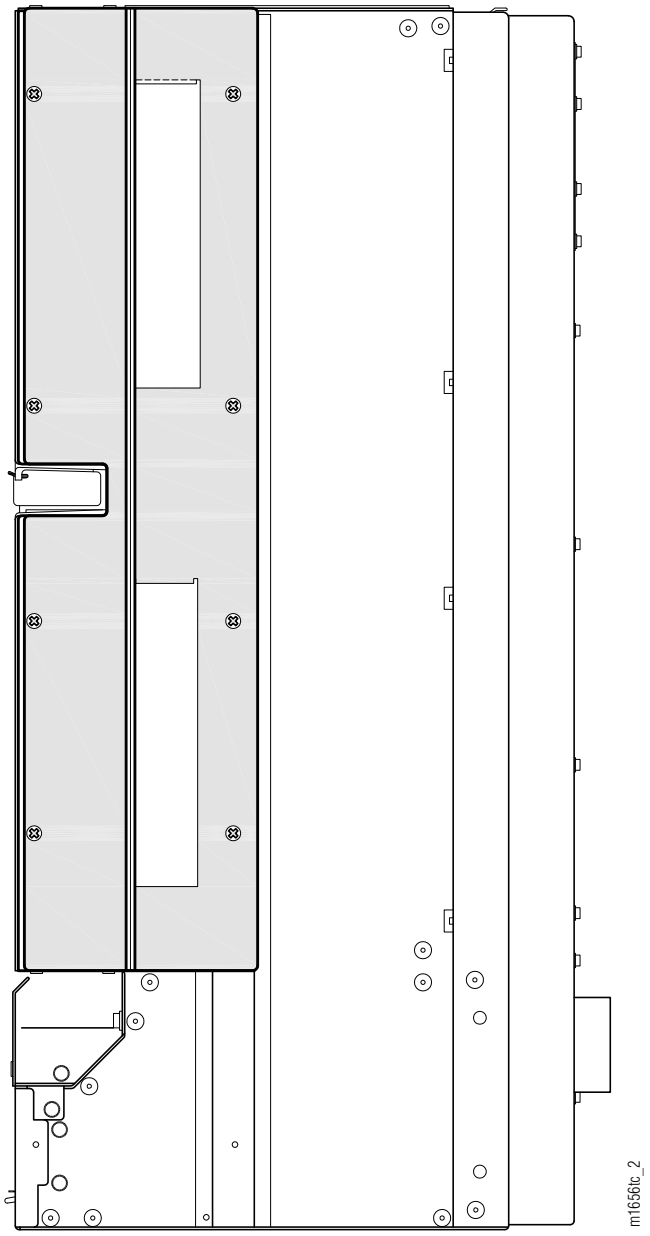


Figure 3-25: Flange Mounted on Right Side of Optical/Tributary Shelf (19-Inch Rack Installation)

7 Proceed to Step 12 [p. 3-44].

8 Get the flange kit for 23-inch rack mounting. Table 3-3 [p. 3-34] lists the flange kit part numbers.

9 Identify the left and right shelf flanges. See Figure 3-20 [p. 3-36] and Figure 3-26 [p. 3-42].

Note: *At first glance the two flanges for 23-inch rack mounting appear to be identical, but they are not. See Figure 3-26 [p. 3-42]. When properly mounted, the cutout appears at the front of the shelf (see Figure 3-27 [p. 3-43]) and flange holes align with the shelf mounting holes (see Figure 3-28 [p. 3-44]).*

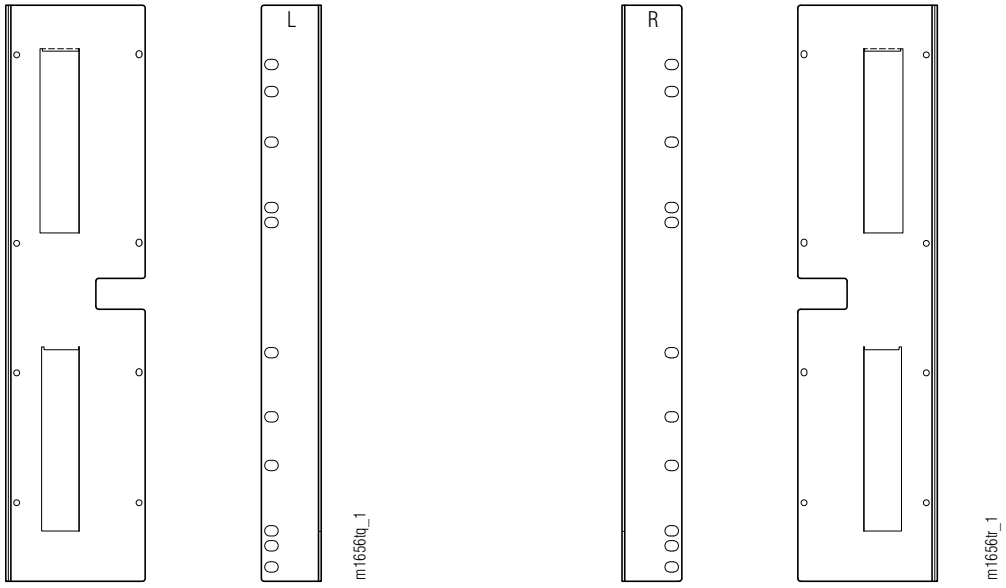


Figure 3-26: Optical/Tributary Shelf Mounting Flanges for 23-Inch Rack Mounting (Front and Side Views)

10 Identify the flange mounting holes on the sides of the Optical/Tributary shelf. See Figure 3-27 [p. 3-43].

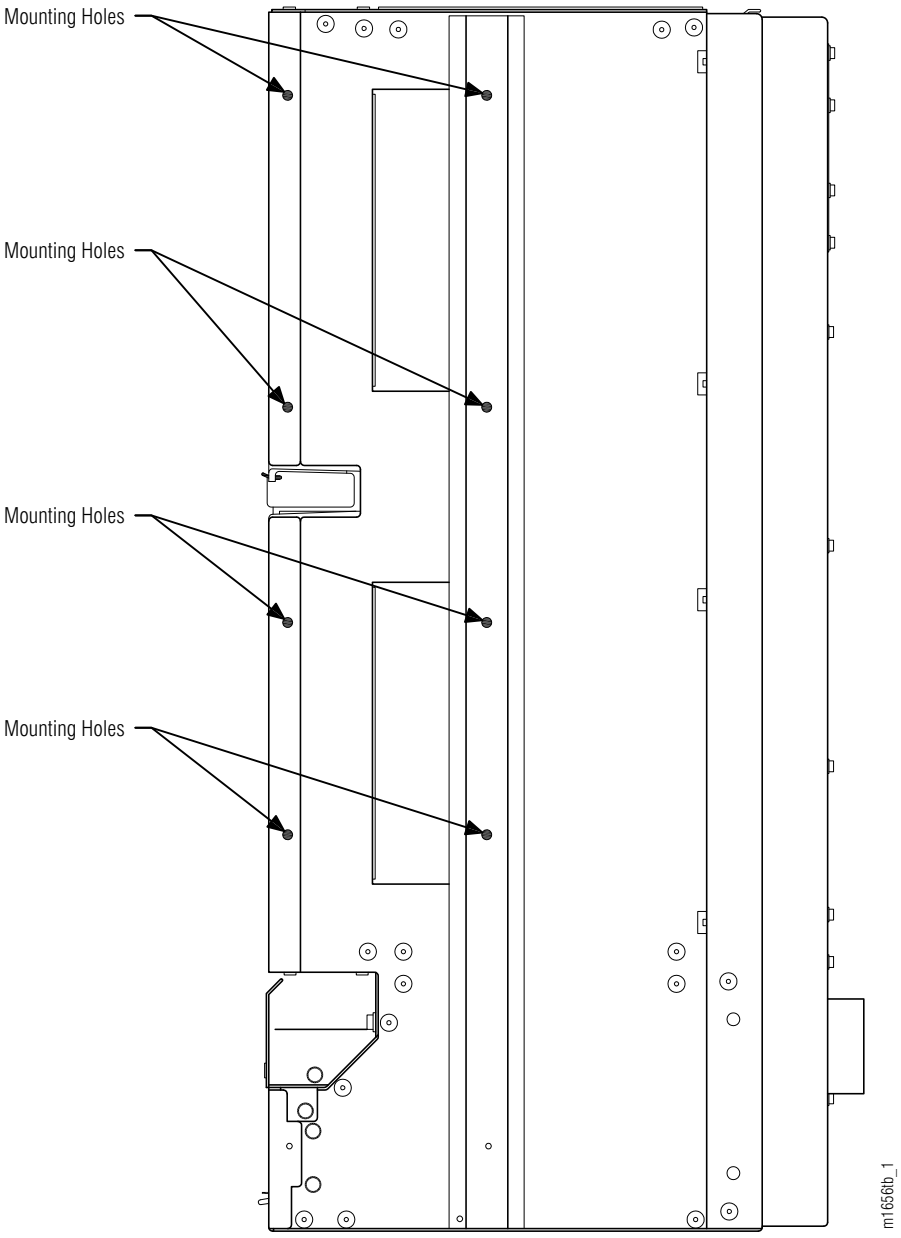


Figure 3-27: Flange Mounting Holes on Right Side of Optical/Tributary Shelf

11 Using eight pan-head Phillips M4 screws (8 mm long) on each side, secure the left and right shelf flanges to the Optical/Tributary shelf as shown in Figure 3-20 [p. 3-36].

Figure 3-28 [p. 3-44] shows a right-side view of the Optical/Tributary shelf after the flange is mounted.

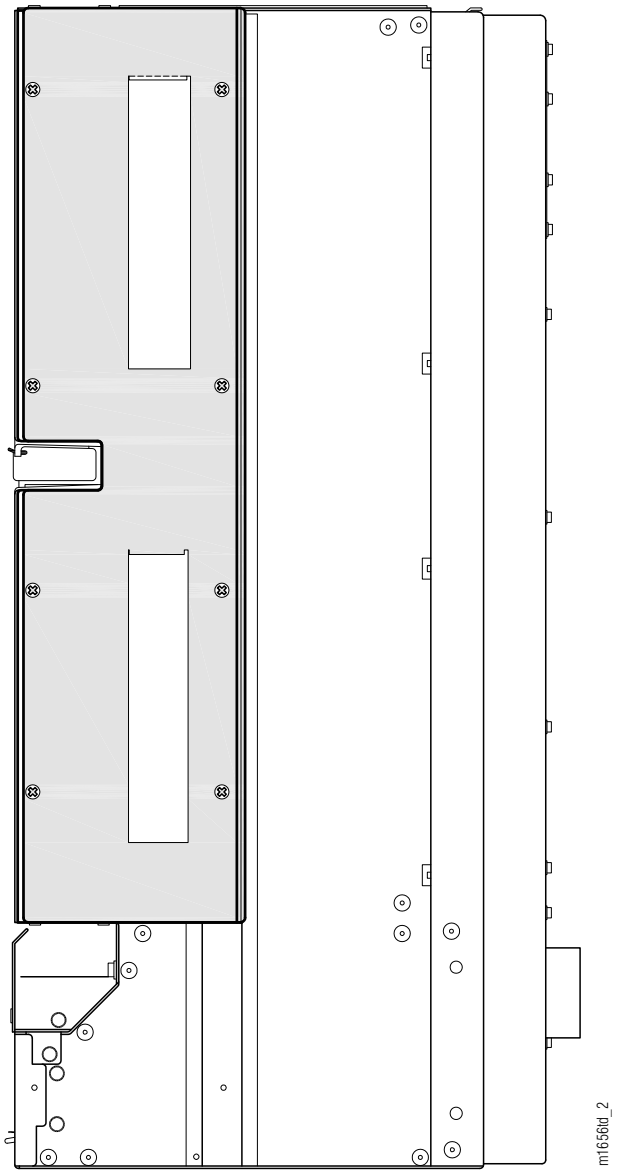


Figure 3-28: Flange Mounted on Right Side of Optical/Tributary Shelf (23-Inch Rack Installation)

12 Install the Optical/Tributary shelf in the rack. Secure the shelf to the rack using four rack mounting screws on each side of the shelf.

This procedure is complete.

3.9 Installing the 23-Inch (FC9682HSW2) Heat Baffle

When used, the heat baffle is positioned directly above or beneath an Optical or Tributary shelf (see Figures 3-1 [p. 3-5] through 3-11 [p. 3-15]). If it is positioned above the shelf, as shown in Figure 3-29 [p. 3-45], the heat baffle ensures that air pushed upward through the shelf is deflected to the rear of the rack. If it is positioned under the shelf, the heat baffle ensures that air entering from below comes from the front of the rack.

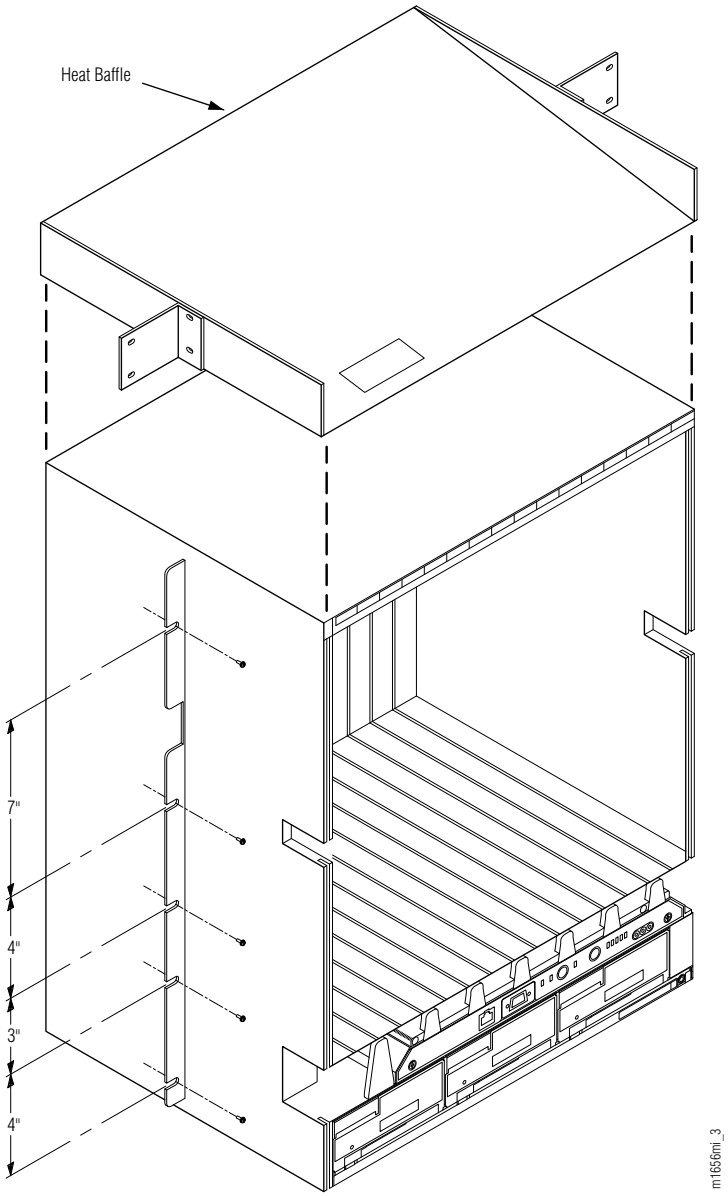


Figure 3-29: Typical Shelf Mounting with Heat Baffle (Small Configuration)

This procedure provides instructions for installing the 23-inch (FC9682HSW2) heat baffle (see Figure 3-29 [p. 3-45]) in a 23-inch relay rack.

> ***Note:*** *The 19-inch (FC9503HSW3) heat baffle can also be installed in a 23-inch rack for use for Small Configuration systems. Refer to* Section 3.10, Installing the 19-Inch (FC9682HSW3) Heat Baffle [p. 3-47].

Step	Task
1	If not already done, remove the heat baffle from the shipping container.
2	Secure the heat baffle to the rack using two rack mounting screws on each side of the assembly.

Note: *Ensure that the heat baffle is oriented as shown in* Figure 3-29 [p. 3-45] *so that air pushed upward from below is deflected to the rear. If the heat baffle is mounted under the shelf, use the same orientation so that air enters the shelf from the front of the rack.*

This procedure is complete.

3.10 Installing the 19-Inch (FC9682HSW3) Heat Baffle

When used, the heat baffle is positioned directly above or beneath an Optical or Tributary shelf (see Figures 3-1 [p. 3-5] through 3-11 [p. 3-15]). If it is positioned above the shelf, as shown in Figure 3-30 [p. 3-47], the heat baffle ensures that air pushed upward through the shelf is deflected to the rear of the rack. If it is positioned under the shelf, the heat baffle ensures that air entering from below comes from the front of the rack.

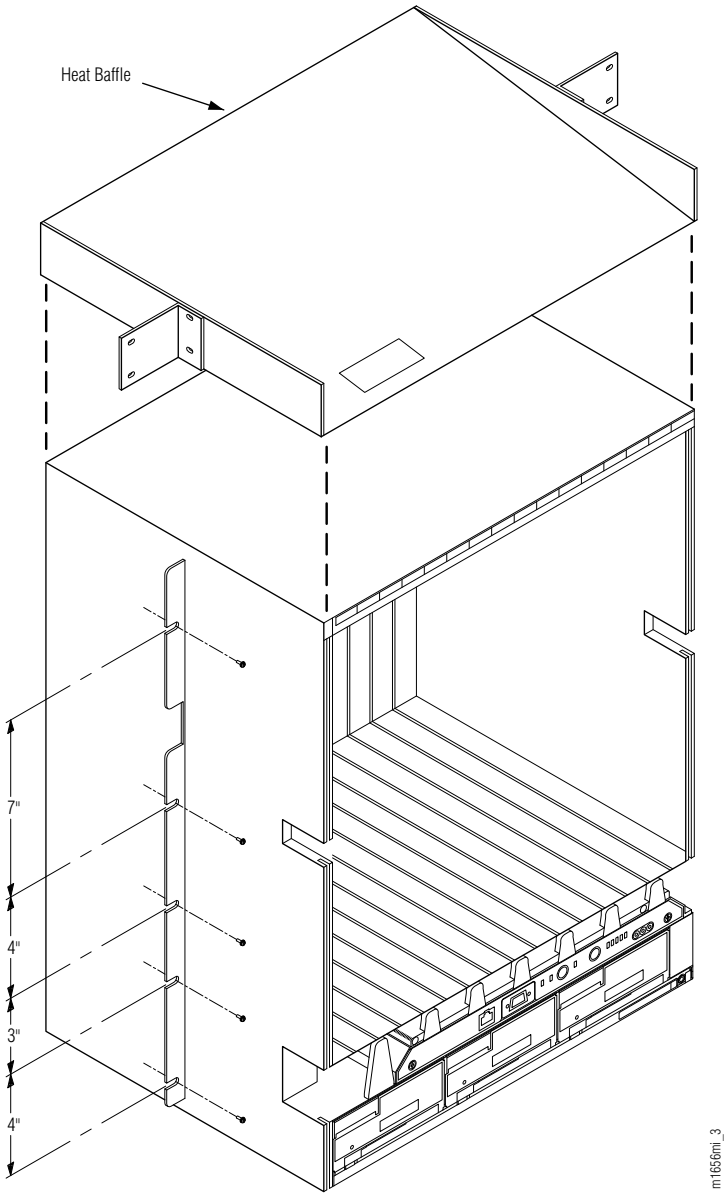


Figure 3-30: Typical Shelf Mounting with Heat Baffle (Small Configuration)

This procedure provides instructions for installing the 19-inch (FC9682HSW3) heat baffle (see Figure 3-30 [p. 3-47]) in a 19-inch or 23-inch relay rack.

The FC9682HSW3 heat baffle has a nominal width of 19 inches and can be installed in either a 19-inch relay rack (see Figure 3-31 [p. 3-48]) or a 23-inch relay rack (see Figure 3-32 [p. 3-49]). In either case, two flanges are used. Table 3-4 [p. 3-48] lists the flange kit part numbers.

Note: *The 23-inch (FC9682HSW2) heat baffle can be used instead of the 19-inch (FC9682HSW3) heat baffle in 23-inch rack applications. Refer to* Section 3.9, Installing the 23-Inch (FC9682HSW2) Heat Baffle [p. 3-45].

Table 3-4: Flange Kits for 19-Inch Heat Baffle Installation

Flange Kit	Part Number
Flange kit for 19-inch relay rack installation	FC9503FLG3
Flange kit for 23-inch relay rack installation	FC9503FLG4

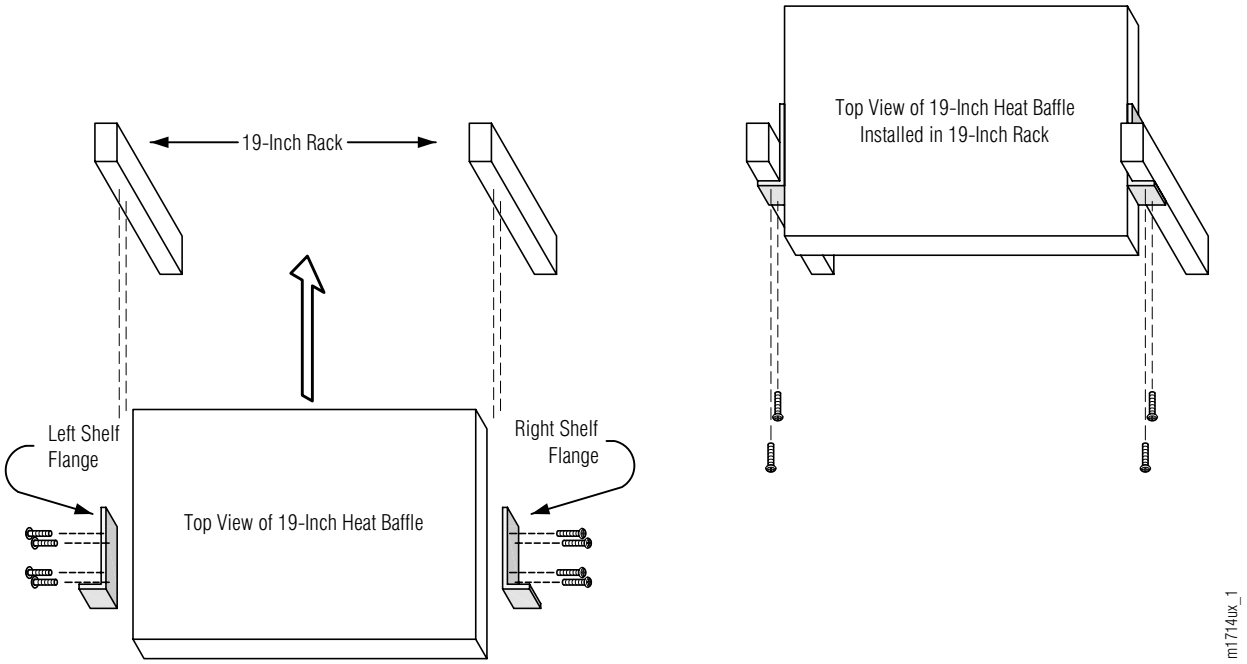


Figure 3-31: 19-Inch Heat Baffle Mounting in 19-Inch Relay Rack

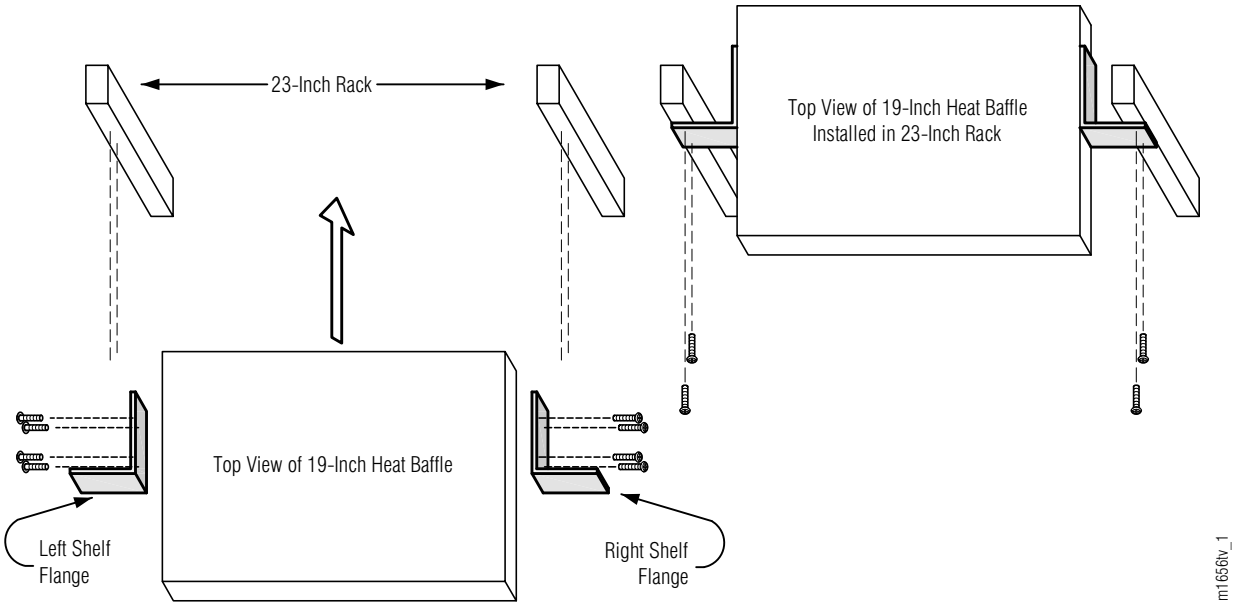


Figure 3-32: 19-Inch Heat Baffle Mounting in 23-Inch Relay Rack

Install the 19-inch (FC9682HSW3) heat baffle as follows:

Step	Task
1	Unpack the heat baffle from the shipping container.
2	Get the appropriate flange kit for rack mounting (19-inch or 23-inch). Table 3-4 [p. 3-48] lists the flange kit part numbers.

3 Identify the left and right shelf flanges. See Figure 3-31 [p. 3-48] or Figure 3-32 [p. 3-49] and Figure 3-33 [p. 3-50].

Note: *At first glance the two flanges appear to be identical, but they are not. As shown in Figure 3-33 [p. 3-50] for 19-inch rack mounting, the four clearance holes on the side of each flange are closer to the bottom of the flange than to the top. The flanges for 23-inch rack mounting are similar.*

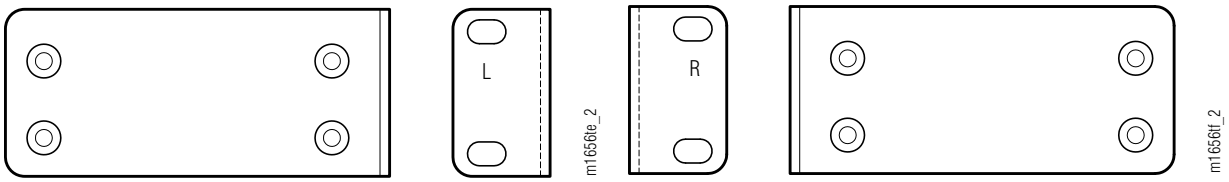


Figure 3-33: 19-Inch Heat Baffle Mounting Flanges (Front and Side Views)

4 Is the heat baffle to be installed in a 19-inch relay rack?

If YES:
Proceed to Step 5 [p. 3-50].

If NO:
Proceed to Step 8 [p. 3-51].

5 Identify the flange mounting holes for 19-inch rack installation on the side of the heat baffle. See Figure 3-34 [p. 3-50].

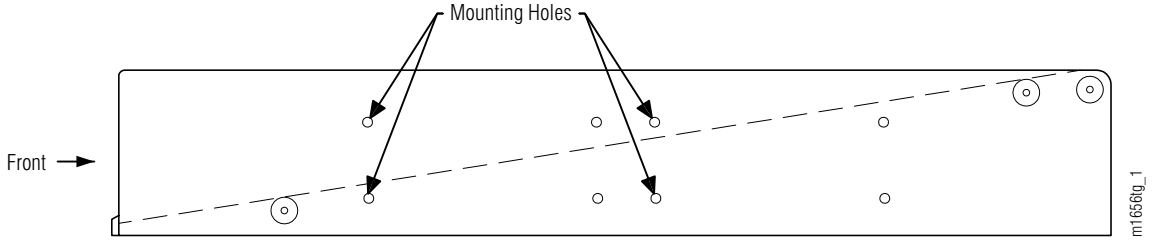


Figure 3-34: Flange Mounting Holes on Right Side of Heat Baffle (19-Inch Rack Installation)

6 Using four pan-head Phillips M4 screws (8 mm long) on each side, secure the left and right shelf flanges to the heat baffle as shown in Figure 3-31 [p. 3-48].

Figure 3-35 [p. 3-51] shows a right-side view of the heat baffle after the flange is mounted.

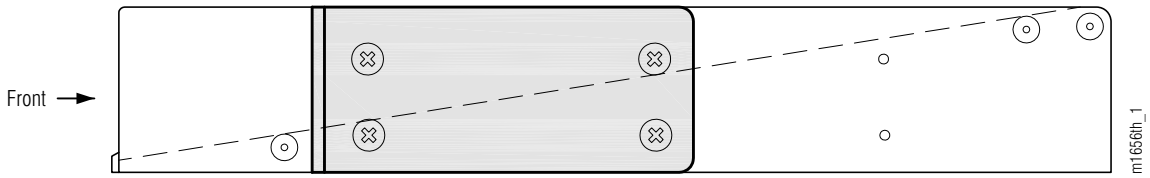


Figure 3-35: Flange Mounted on Right Side of Heat Baffle (19-Inch Rack Installation)

7 Proceed to Step 10 [p. 3-52].

8 Identify the flange mounting holes for 23-Inch rack installation on the side of the heat baffle. See Figure 3-36 [p. 3-51].

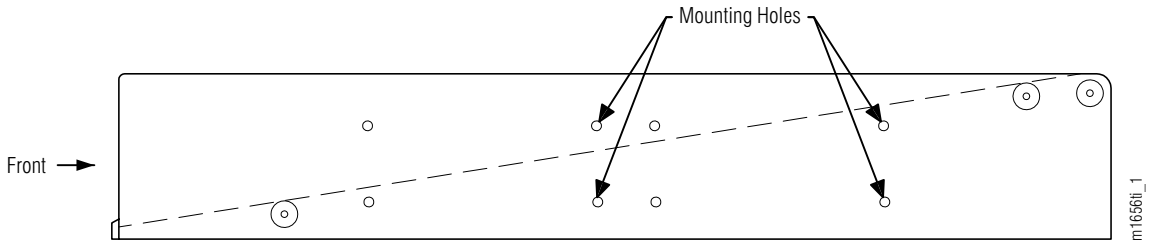


Figure 3-36: Flange Mounting Holes on Right Side of Heat Baffle (23-Inch Rack Installation)

9 Using four pan-head Phillips M4 screws (8 mm long) on each side, secure the left and right shelf flanges to the heat baffle as shown in Figure 3-32 [p. 3-49].

Figure 3-37 [p. 3-52] shows a right-side view of the heat baffle after the flange is mounted.

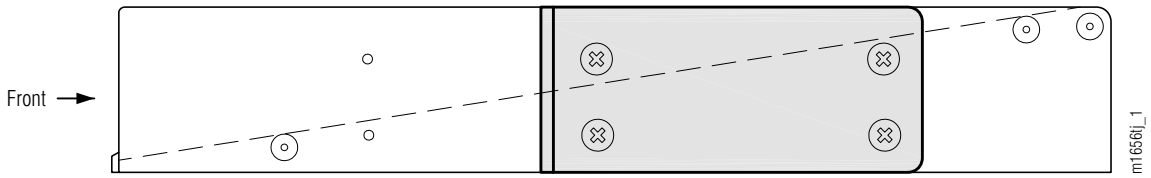


Figure 3-37: Flange Mounted on Right Side of Heat Baffle (23-Inch Rack Installation)

10 Secure the heat baffle to the rack using two rack mounting screws on each side of the assembly.

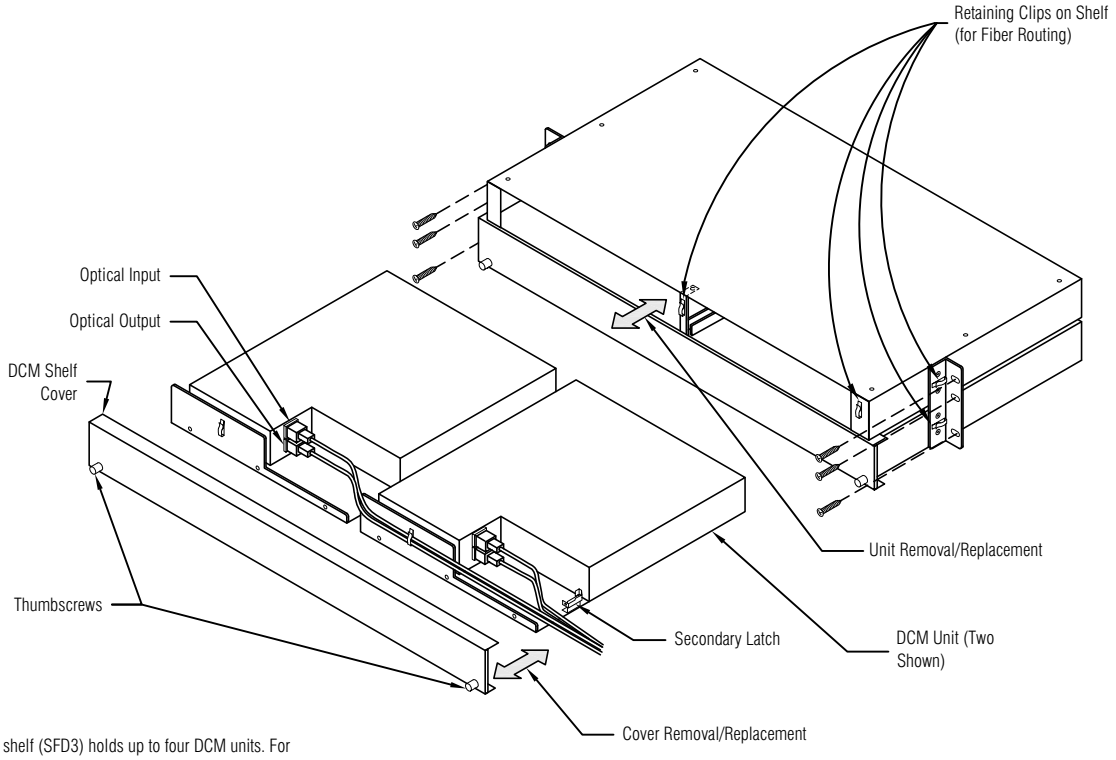
Note: *Ensure that the heat baffle is oriented as shown in* Figure 3-30 [p. 3-47] *so that air pushed upward from below is deflected to the rear. If the heat baffle is mounted under the shelf, use the same orientation so that air enters the shelf from the front of the rack.*

This procedure is complete.

3.11 Installing the 23-Inch (SFD3) DCM Shelf

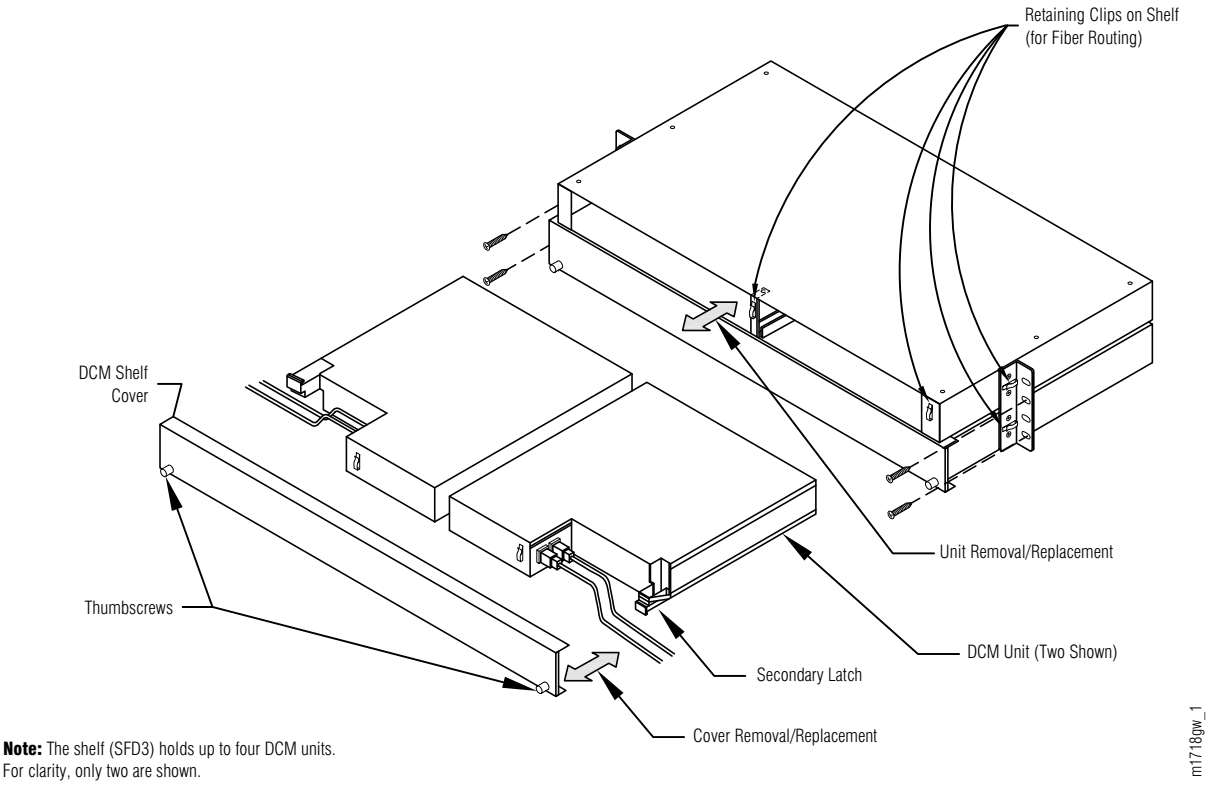
The dispersion compensation module (DCM) shelf (FC9512SFD3) provides dispersion compensation for dense wavelength division multiplexing (DWDM) signals entering the NE and is installed only if required.

Figure 3-38 [p. 3-53] shows the 23-inch DCM shelf (SFD3) with two single-height DCM units. Figure 3-39 [p. 3-54] shows Issue 03 of the 23-inch DCM shelf (SFD3) with two single-height DCM units. Issue 03 of the SFD3 DCM shelf supports DCM fiber diversity mounting units, which allows the routing of fiber to either side of the shelf.



Note: The shelf (SFD3) holds up to four DCM units. For clarity, only two are shown.

Figure 3-38: DCM Unit and 23-Inch SFD3 Shelf (Exploded View)



Note: The shelf (SFD3) holds up to four DCM units. For clarity, only two are shown.

Figure 3-39: SFD3 (Issue 03) 23-Inch DCM Shelf Showing Fiber Diversity

The following procedure provides installation instructions for the 23-inch DCM shelf (SFD3):

> ***Note:*** *The 19-inch (SFD5) DCM shelf can also be installed in 23-inch racks for use with Small Configuration systems. Refer to* Section 3.12, Installing the 19-Inch (SFD5) DCM Shelf [p. 3-56].

Step	Task
1	Unpack the SFD3 shelf from the shipping container. The DCM units do not need to be removed from the SFD3 shelf if they are already installed. The shelf can hold up to four DCM units, although the normal complement is two DCM units per shelf.

2 Install the SFD3 shelf in the bottom of the rack that contains the Optical shelf (if space permits) or in a rack adjacent to the Optical shelf. Secure the shelf to the rack using three rack mounting screws on each side of the shelf.

Note: *If hole alignment does not permit three screws on each side, it is acceptable to secure the shelf with only two screws on each side.*

3 If the shelf came without the DCM units already installed:

a. Locate the appropriate units to be installed and remove them from their protective ESD packaging.

b. Loosen the thumbscrews and remove the faceplate/cover from the shelf.

c. Carefully slide each DCM unit into the appropriate shelf slot.

d. Replace the cover and tighten the thumbscrews to secure each unit in the shelf.

This procedure is complete.

3.12 Installing the 19-Inch (SFD5) DCM Shelf

The DCM shelf, if needed, provides dispersion compensation for dense wavelength division multiplexing (DWDM) signals entering the NE.

The SFD5 DCM shelf (FC9503SFD5, Figure 3-40 [p. 3-56]) has a nominal width of 19 inches and can be installed in either a 19-inch relay rack (see Figure 3-41 [p. 3-57]), or in a 23-inch relay rack (see Figure 3-42 [p. 3-57]). In either case, two flanges are used. Table 3-5 [p. 3-56] lists the flange kit part numbers.

> ***Note:*** *The 23-inch (SFD3) DCM shelf can be used instead of the SFD5 shelf in 23-inch rack applications. Refer to* Section 3.11, Installing the 23-Inch (SFD3) DCM Shelf [p. 3-53].

Table 3-5: Flange Kits for SFD5 Shelf Installation

Flange Kit	Part Number
Flange kit for 19-inch relay rack installation	FC9503FLG5
Flange kit for 23-inch relay rack installation	FC9503FLG6

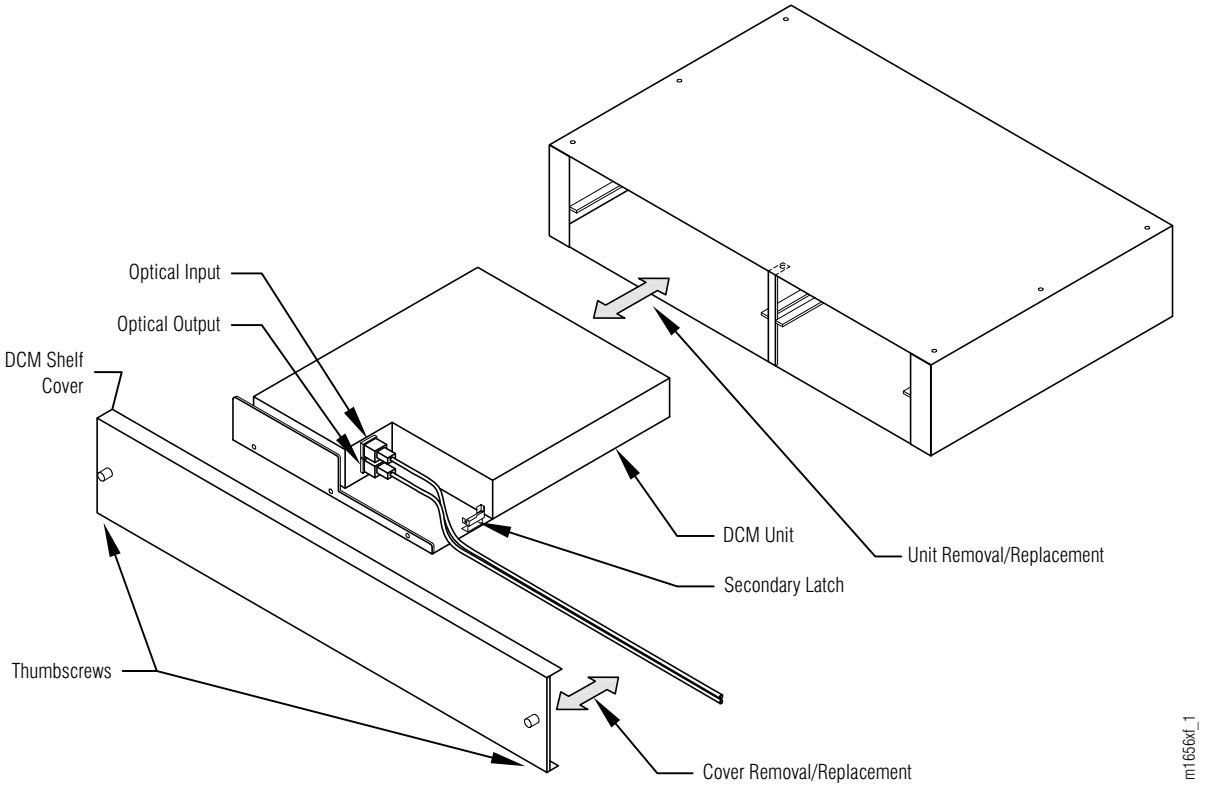


Figure 3-40: DCM Unit and 19-Inch SFD5 Shelf (Exploded View)

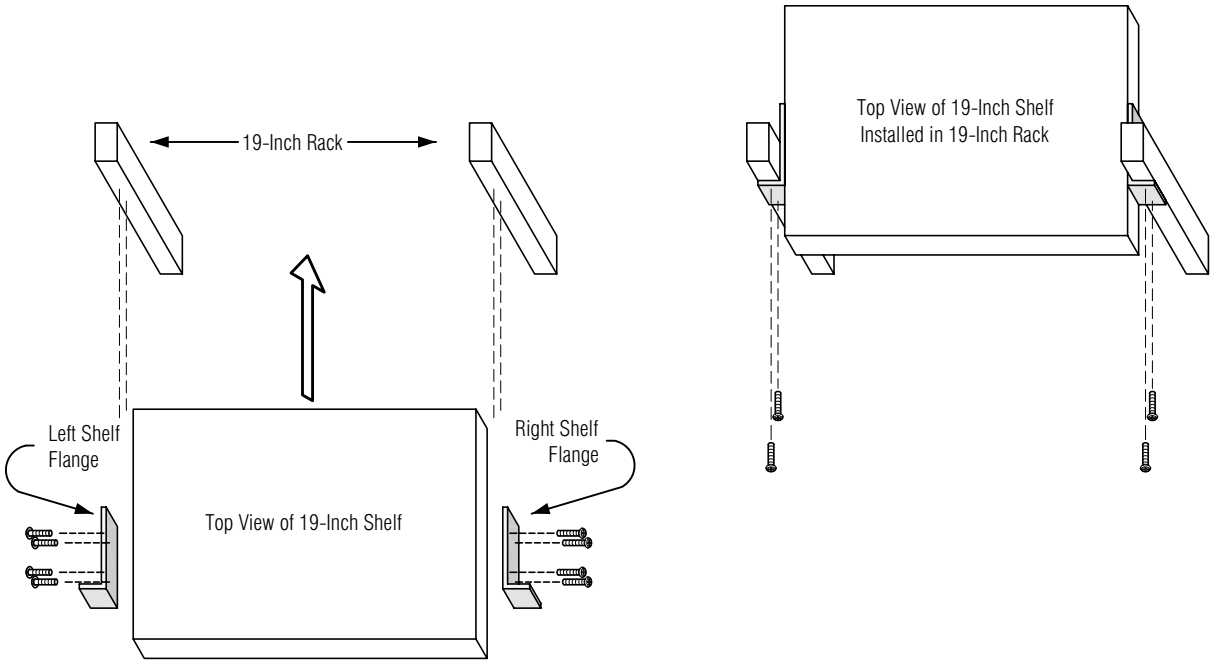


Figure 3-41: SFD5 Shelf Mounting in 19-Inch Relay Rack

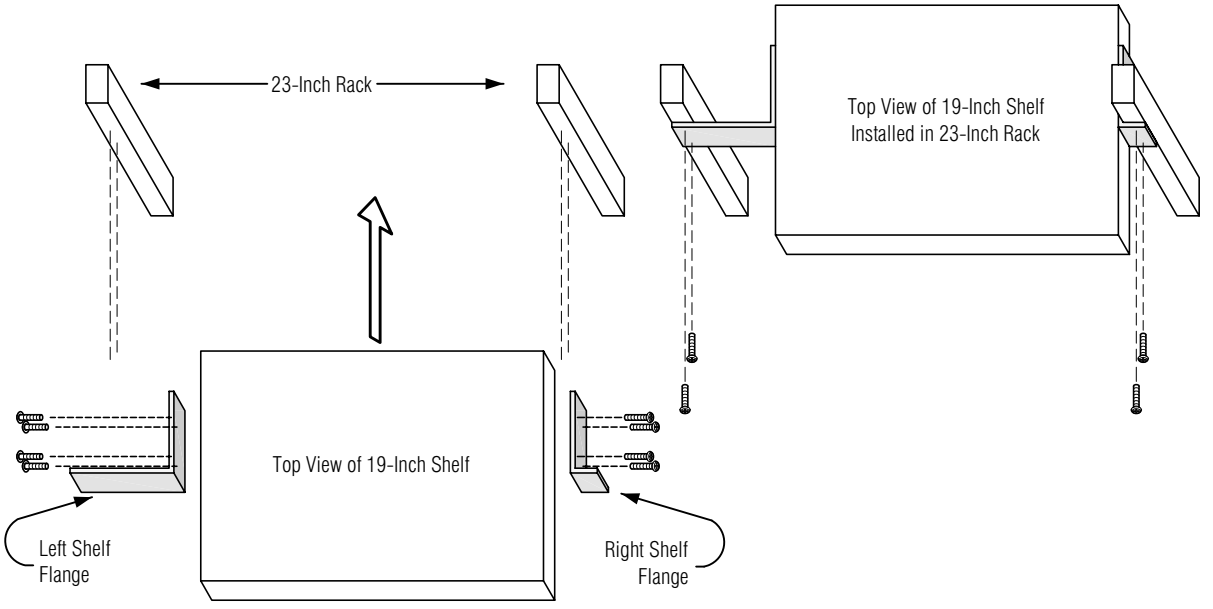


Figure 3-42: SFD5 Shelf Mounting in 23-Inch Relay Rack

Install the SFD5 shelf as follows:

Step	Task
1	Unpack the SFD5 shelf from the shipping container. The DCM units do not need to be removed from the DCM shelf if they are already installed. The shelf can hold up to two DCM units.
2	Is the SFD5 shelf to be installed in a 19-inch relay rack? **If YES:** Proceed to Step 3 [p. 3-58]. **If NO:** Proceed to Step 9 [p. 3-60].
3	Get the flange kit for 19-inch rack mounting. Table 3-5 [p. 3-56] lists the flange kit part numbers.

4 Identify the left and right shelf flanges. See Figure 3-41 [p. 3-57] and Figure 3-43 [p. 3-59].

Note: *At first glance the two flanges for 19-inch rack mounting appear to be identical, but they are not. As shown in Figure 3-43 [p. 3-59], the top two clearance holes are slightly farther apart than the bottom two clearance holes.*

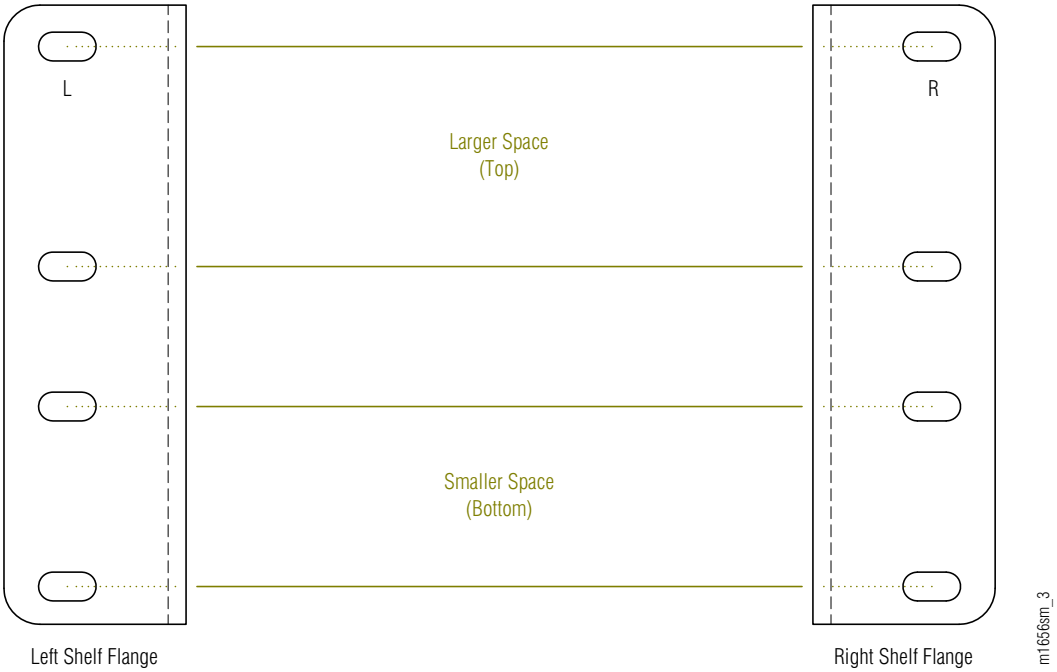


Figure 3-43: SFD5 Shelf Mounting Flanges (Front View)

5 Identify the flange mounting holes for 19-Inch rack installation on the side of the SFD5 shelf. See Figure 3-44 [p. 3-59].

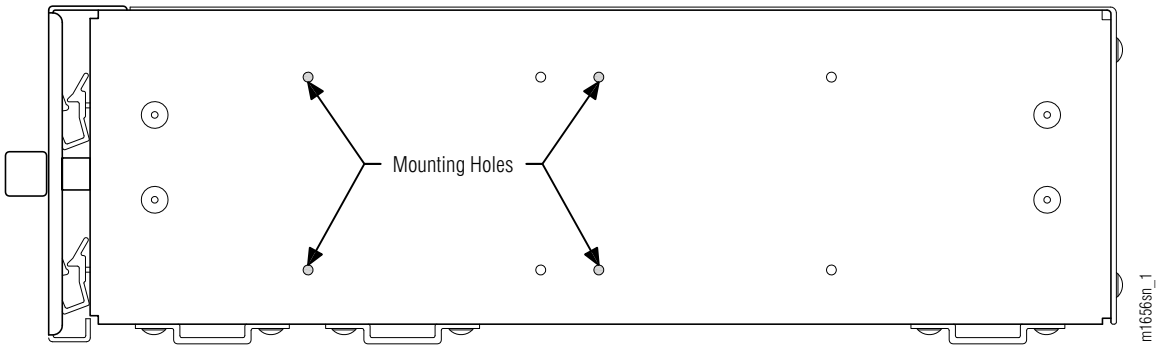


Figure 3-44: Flange Mounting Holes on Right Side of SFD5 Shelf (19-Inch Rack Installation)

6 Using four pan-head Phillips M4 screws (8 mm long) on each side, secure the left and right shelf flanges to the SFD5 shelf as shown in Figure 3-41 [p. 3-57].

Figure 3-45 [p. 3-60] shows a right-side view of the SFD5 shelf after the flange is mounted.

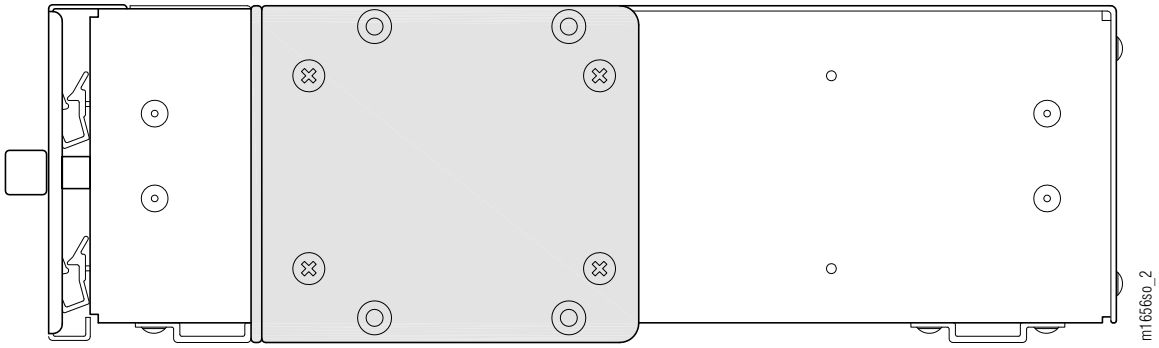


Figure 3-45: Flange Mounted on Right Side of SFD5 Shelf (19-Inch Rack Installation)

7 Proceed to Step 12 [p. 3-61].

8 Get the flange kit for 23-inch rack mounting. Table 3-5 [p. 3-56] lists the flange kit part numbers.

9 Identify the left and right shelf flanges. See Figure 3-42 [p. 3-57].

10 Identify the flange mounting holes for 23-Inch rack installation on the side of the SFD5 shelf. See Figure 3-46 [p. 3-60].

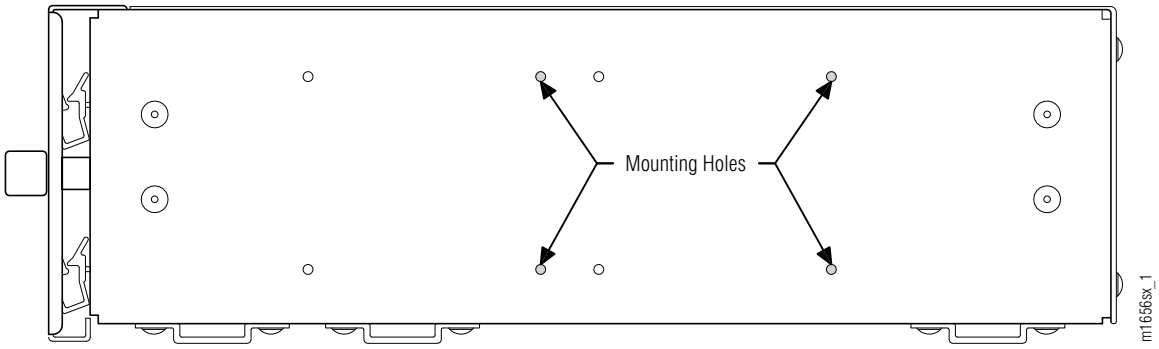


Figure 3-46: Flange Mounting Holes on Right Side of SFD5 Shelf (23-Inch Rack Installation)

11 Using four pan-head Phillips M4 screws (8 mm long) on each side, secure the left and right shelf flanges to the SF5 shelf as shown in Figure 3-42 [p. 3-57].

Figure 3-47 [p. 3-61] shows a right-side view of the SFD5 shelf after the flange is mounted.

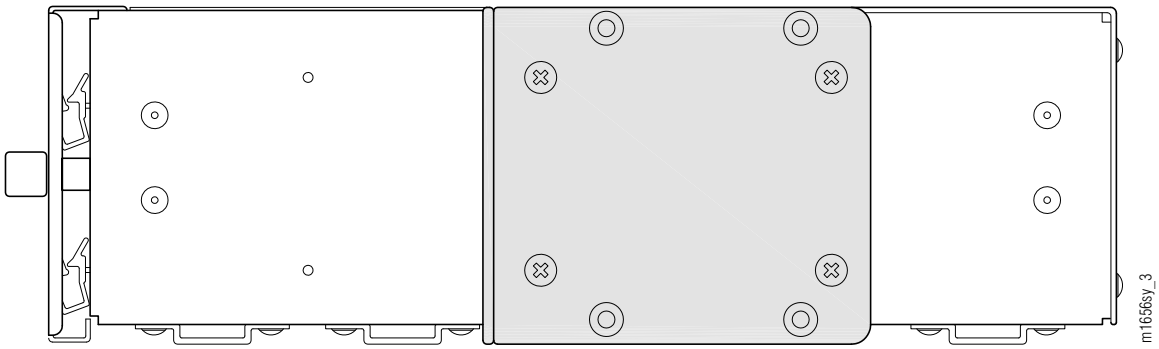


Figure 3-47: Flange Mounted on Right Side of SFD5 Shelf (23-Inch Rack Installation)

12 Install the DCM shelf in the bottom of the rack. Secure the shelf to the rack using three rack mounting screws on each side of the shelf.

Note: *If hole alignment does not permit three screws on each side, it is acceptable to secure the shelf with only two screws on each side.*

13 If the shelf came without the DCM units already installed:

a. Locate the appropriate units to be installed and remove them from their protective ESD packaging.

b. Loosen the thumbscrews and remove the faceplate/cover from the shelf.

c. Carefully slide each DCM unit into the appropriate shelf slot.

d. Replace the cover and tighten the thumbscrews to secure each unit in the shelf.

This procedure is complete.

3.13 Installing the LAS2 Shelf

This procedure includes the following subprocedures:

Two versions of the LAS2 shelf are available:

- Shelf FC9503LAS2, shown in Figure 3-48 [p. 3-62], houses up to two lambda access modules (LAMs) of type IPXP-LAM1.
- Shelf FC9682LAS2, shown in Figure 3-49 [p. 3-63], houses up to sixteen LAMs of type IPMA-LAM5.

Both versions of the LAS2 shelf contain only passive components and do not require any power connections.

> ***Note:*** Figures 3-48 [p. 3-62] and 3-49 [p. 3-63] *are shown fully populated for instructional purposes. At installation, the shelves do not have plug-in units installed. The shelves are not populated until system turn-up.*

> ***Note:*** *The LAS2 is a recommended fiber management option and may not be part of the procured shelf complement. The FC9503LAS2 shelf houses the passive LAMs (LAM1) used to terminate the MPO-to-MPO cable from the Optical shelf SWXP units (32-Ch ROADM application) or MDXP units (32-Ch FOADM application) and output fiber pairs to the optical line cards (OLCs). The FC9682LAS2 shelf houses the passive LAMs (LAM5) used to terminate the MPO-to-MPO cable from the Tributary Shelf OLCs to FLASHWAVE LIGHTGUARD units.*

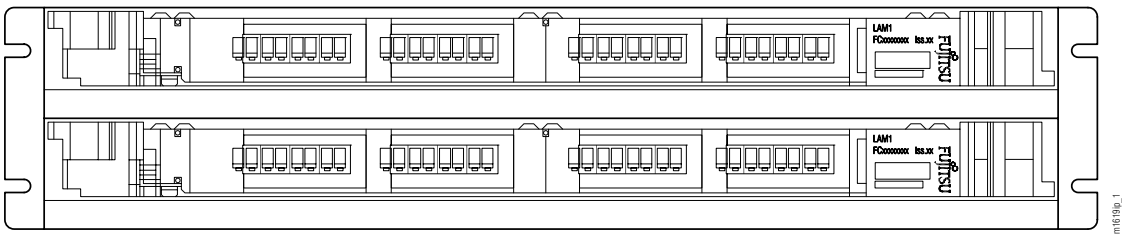
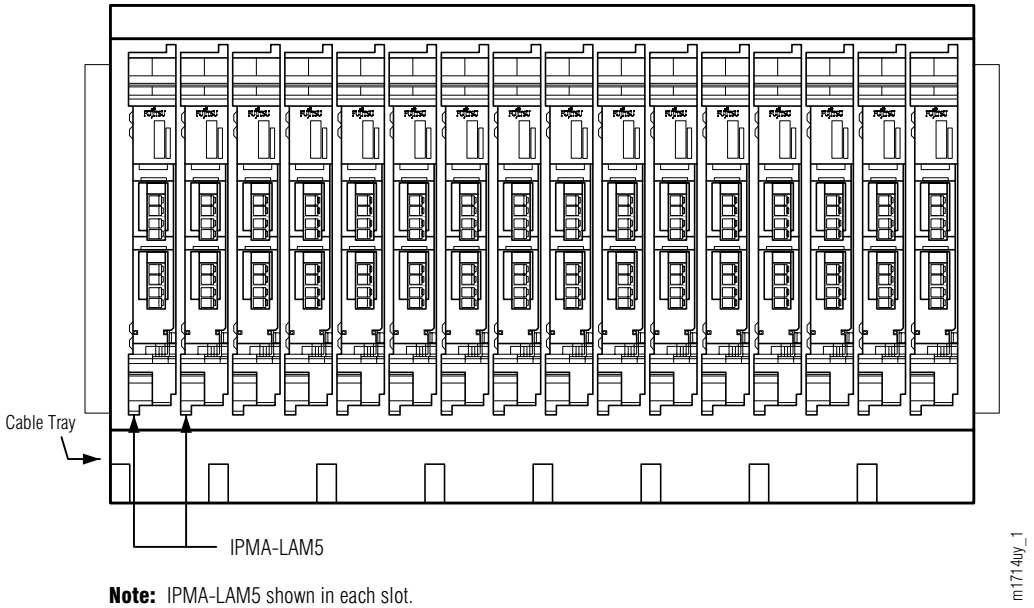


Figure 3-48: FC9503LAS2—Populated with LAMs (Front View) (Small Configuration)



Note: IPMA-LAM5 shown in each slot.

Figure 3-49: FC9682LAS2—19-Inch LAS Populated with LAMs (Front View) (Small Configuration)

3.13.1 Install FC9503LAS2 Shelf

The FC9503LAS2 shelf has a nominal width of 19 inches and can be installed in either a 19-inch relay rack (see Figure 3-50 [p. 3-64]) or a 23-inch relay rack (see Figure 3-51 [p. 3-64]). In either case, two flanges are used. Table 3-6 [p. 3-65] lists the flange kit part numbers for the FC9503LAS2 shelf.

DANGER:

Do not attempt to handle and install the shelves without sufficient assistance. The LAS2 shelf weighs approximately 15 lb (7 kg) empty (without LAMs). Equipped, the LAS2 weighs significantly more. Handling the equipment without sufficient assistance may result in personal injury, damage to the equipment, or both.

WARNING:

Do not use the internal walls of any shelf as a lifting point or lift support. Doing so may damage the plug-in unit rail support.

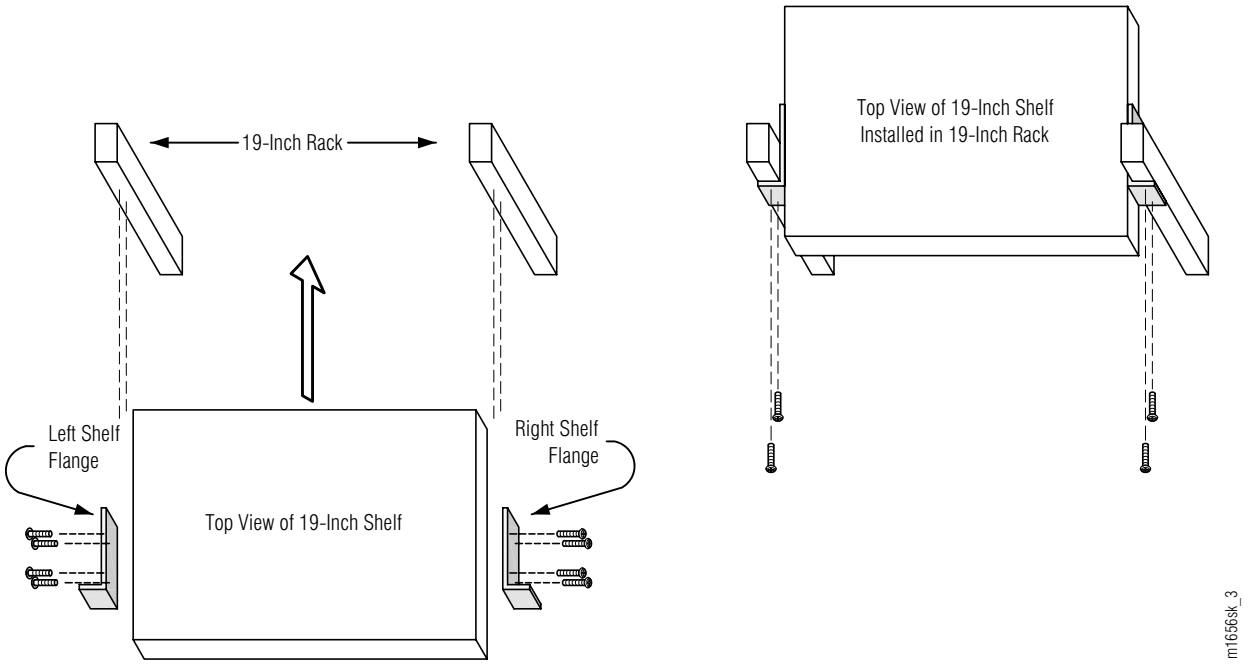


Figure 3-50: FC9503LAS2 Shelf Mounting in 19-Inch Relay Rack

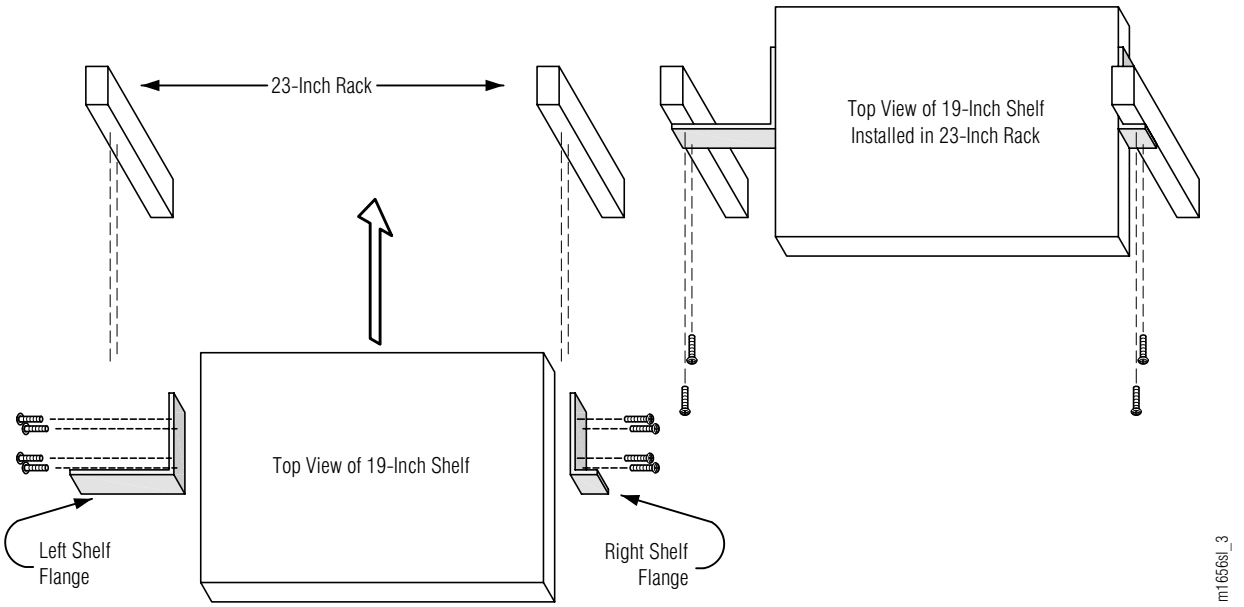


Figure 3-51: FC9503LAS2 Shelf Mounting in 23-Inch Relay Rack

Table 3-6: Flange Kits for FC9503LAS2 Shelf Installation

Flange Kit	Part Number
Flange kit for 19-inch relay rack installation	FC9503FLG5
Flange kit for 23-inch relay rack installation	FC9503FLG6

Install the FC9503LAS2 shelf as follows:

Step	Task
1	Unpack the FC9503LAS2 shelf from the shipping container.
2	Is the FC9503LAS2 to be installed in a 19-inch relay rack? **If YES:** Proceed to Step 3 [p. 3-65]. **If NO:** Proceed to Step 8 [p. 3-67].
3	Get the flange kit for 19-inch rack mounting. Table 3-6 [p. 3-65] lists the flange kit part numbers.

4 Identify the left and right shelf flanges. See Figure 3-50 [p. 3-64] and Figure 3-52 [p. 3-66].

Note: *At first glance, the two flanges for 19-inch rack mounting appear to be identical, but they are not. As shown in Figure 3-52 [p. 3-66], the top two clearance holes are slightly farther apart than the bottom two clearance holes.*

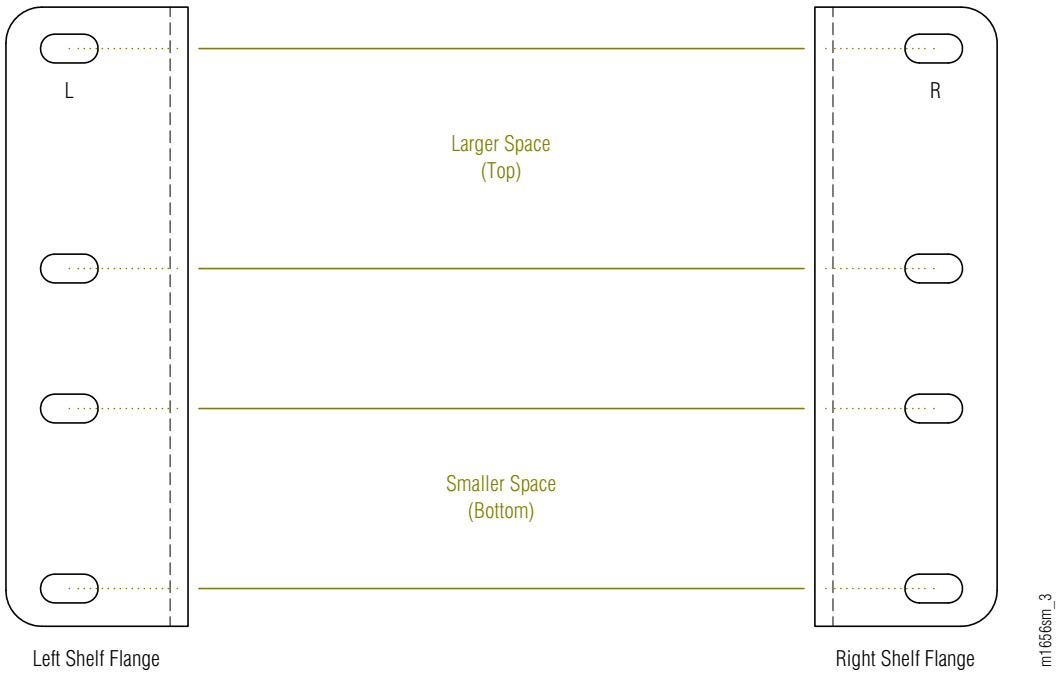


Figure 3-52: FC9503LAS2 Shelf Mounting Flanges (Front View)

5 Identify the flange mounting holes for 19-inch rack installation on the side of the FC9503LAS2 shelf. See Figure 3-53 [p. 3-66].

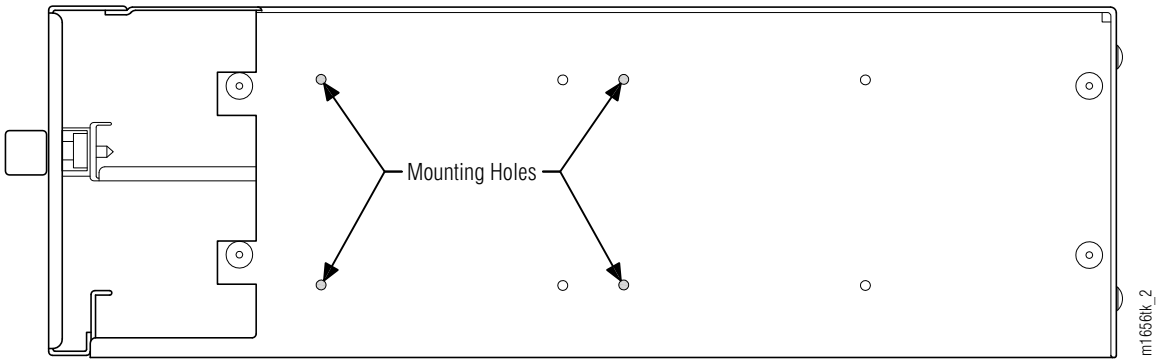


Figure 3-53: Flange Mounting Holes on Right Side of FC9503LAS2 Shelf (19-Inch Rack Installation)

6 Using four pan-head Phillips M4 screws (8 mm long) on each side, secure the left and right shelf flanges to the FC9503LAS2 shelf as shown in Figure 3-50 [p. 3-64].

Figure 3-54 [p. 3-67] shows a right-side view of the FC9503LAS2 shelf after the flange is mounted.

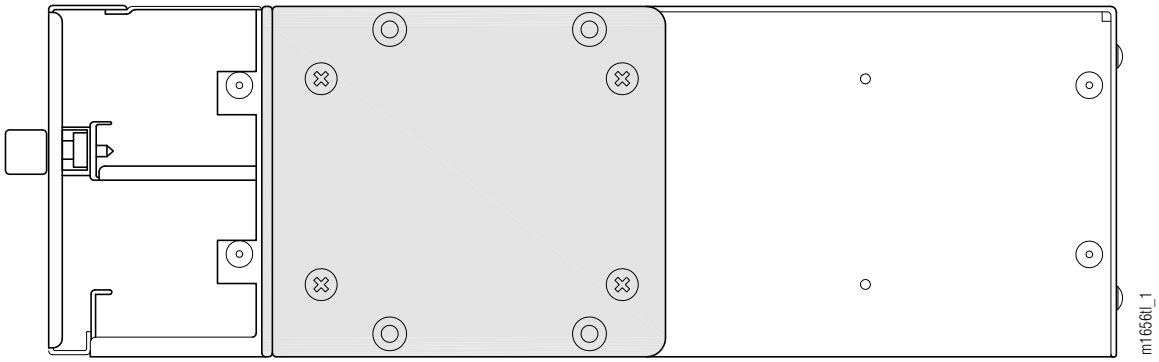


Figure 3-54: Flange Mounted on Right Side of FC9503LAS2 Shelf (19-Inch Rack Installation)

7 Proceed to Step 12 [p. 3-68].

8 Get the flange kit for 23-inch rack mounting. Table 3-6 [p. 3-65] lists the flange kit part numbers.

9 Identify the left and right shelf flanges. See Figure 3-51 [p. 3-64].

10 Identify the flange mounting holes for 23-inch rack installation on the side of the FC9503LAS2 shelf. See Figure 3-55 [p. 3-67].

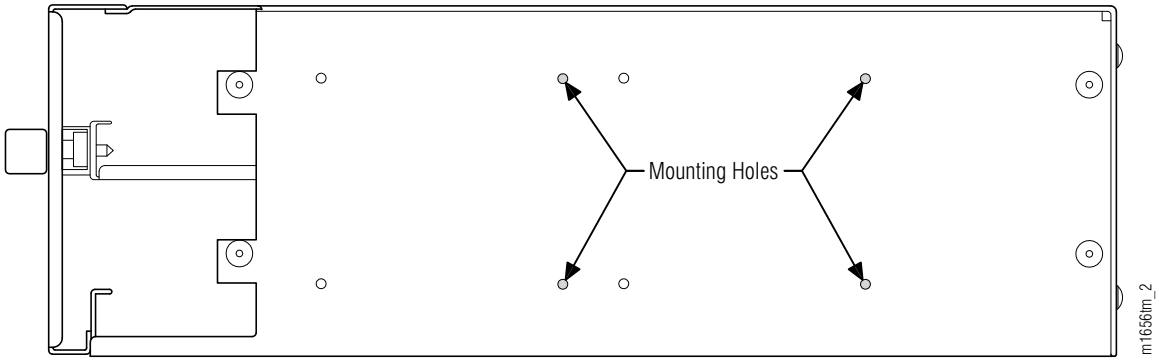


Figure 3-55: Flange Mounting Holes on Right Side of FC9503LAS2 Shelf (23-Inch Rack Installation)

11 Using four pan-head Phillips M4 screws (8 mm long) on each side, secure the left and right shelf flanges to the FC9503LAS2 shelf as shown in Figure 3-51 [p. 3-64].

Figure 3-56 [p. 3-68] shows a right-side view of the FC9503LAS2 shelf after the flange is mounted.

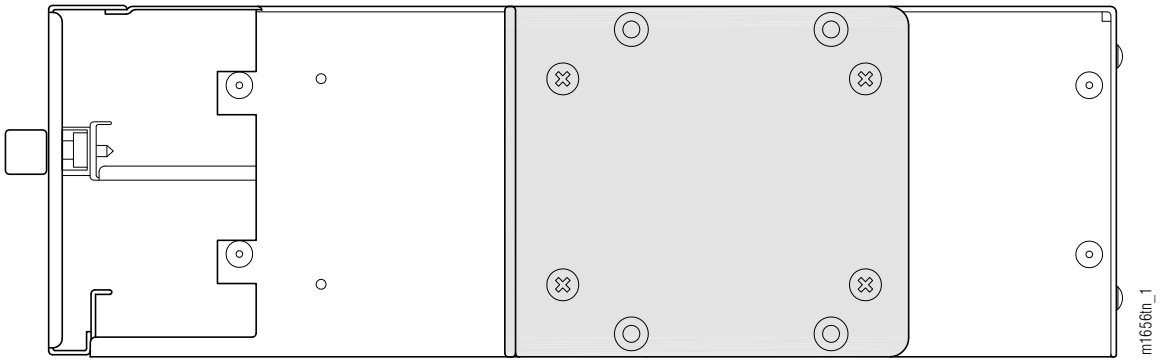


Figure 3-56: Flange Mounted on Right Side of FC9503LAS2 Shelf (23-Inch Rack Installation)

12 Secure the FC9503LAS2 shelf to the rack using three rack mounting screws on each side of the assembly.

Note: *If hole alignment does not permit three screws on each side, securing the shelf with only two screws on each side is acceptable.*

This procedure is complete.

3.13.2 Install FC9682LAS2 Shelf

The FC9682LAS2 shelf has a nominal width of 19 inches and can be installed in either a 19-inch relay rack (see Figure 3-57 [p. 3-69]) or a 23-inch relay rack (see Figure 3-58 [p. 3-70]). In either case, two flanges are used. Table 3-7 [p. 3-70] lists the flange kit part numbers for the FC9682LAS2 shelf.

DANGER:

Do not attempt to handle and install the shelves without sufficient assistance. The LAS2 shelf weighs approximately 15 lb (7 kg) empty (without LAMs). Equipped, the LAS2 weighs significantly more. Handling the equipment without sufficient assistance may result in personal injury, damage to the equipment, or both.

WARNING:

Do not use the internal walls of any shelf as a lifting point or lift support. Doing so may damage the plug-in unit rail support.

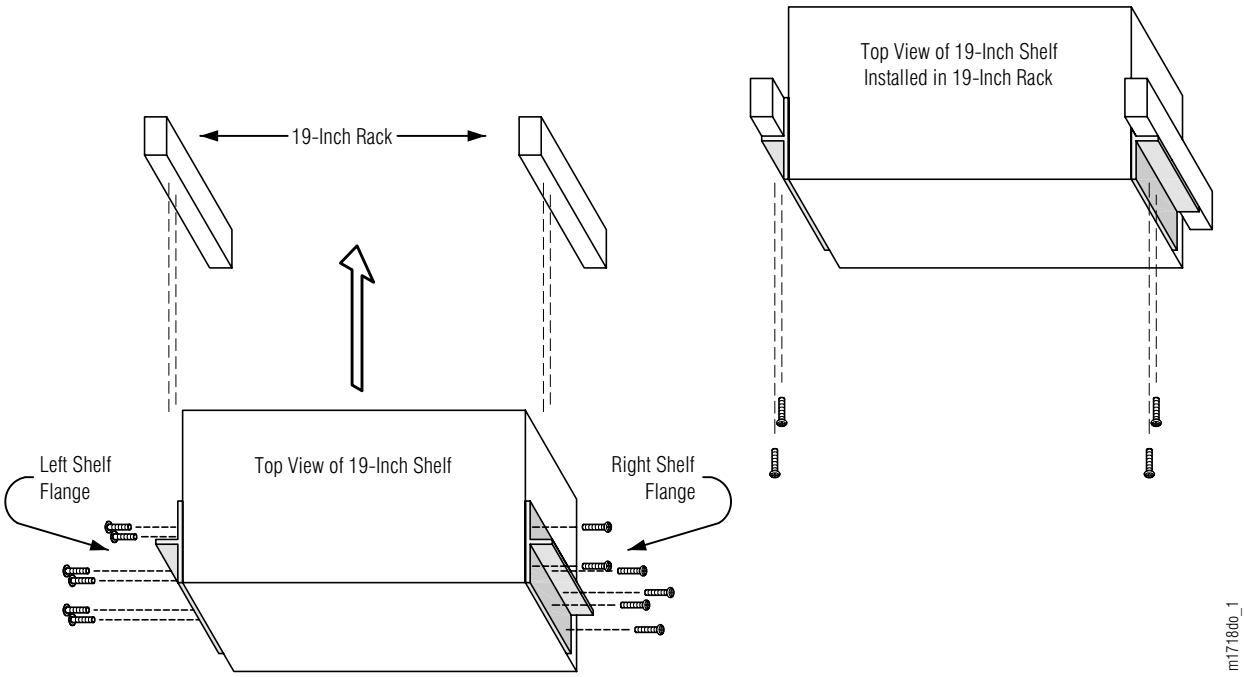


Figure 3-57: FC9682LAS2 Shelf Mounting in 19-Inch Relay Rack

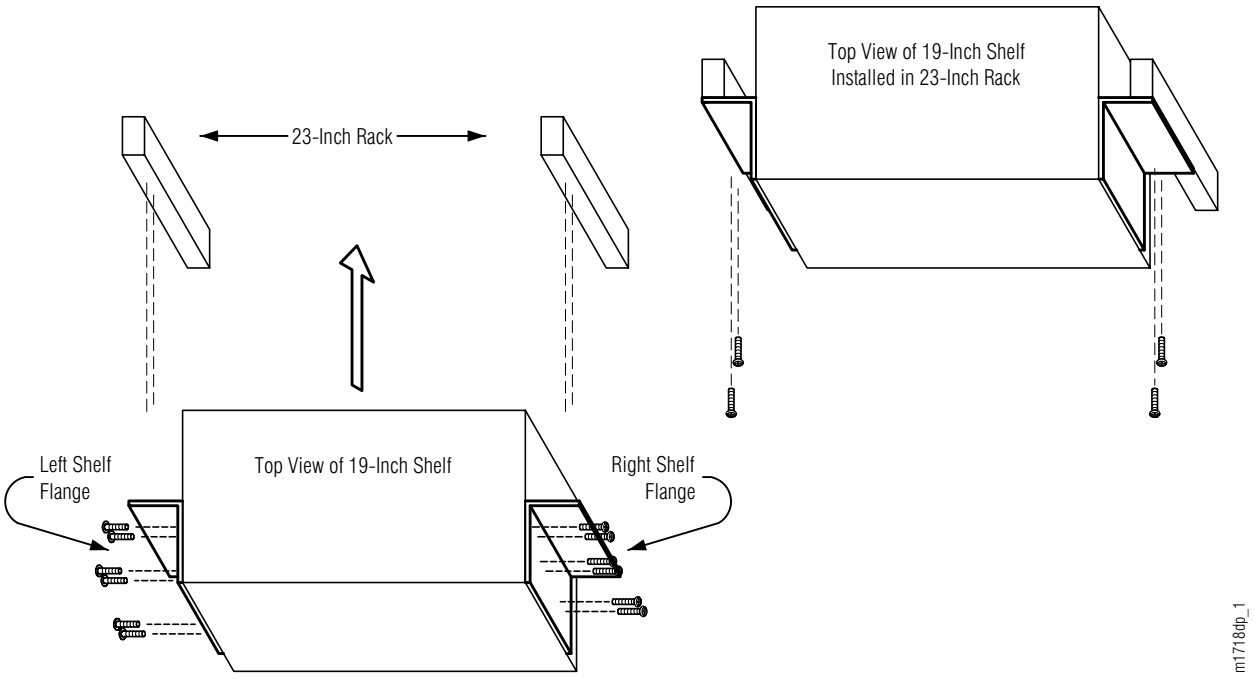


Figure 3-58: FC9682LAS2 Shelf Mounting in 23-Inch Relay Rack

Table 3-7: Flange Kits for FC9682LAS2 Shelf Installation

Flange Kit	Part Number
Flange kit for 19-inch relay rack installation	FC9682FLG7
Flange kit for 23-inch relay rack installation	FC9682FLG8

Install the FC9682LAS2 shelf as follows:

Step	Task
1	If not already done, remove the shelf from the shipping container.
2	Is the FC9682LAS2 shelf to be installed in a 19-inch relay rack?

If YES:
Proceed to Step 3 [p. 3-71].

If NO:
Proceed to Step 8 [p. 3-73].

3 Get the flange kit for 19-inch rack mounting. Table 3-7 [p. 3-70] lists the flange kit part numbers.

4 Identify the left and right shelf flanges. See Figure 3-57 [p. 3-69] and Figure 3-59 [p. 3-71].

Note: *At first glance, the two flanges for 19-inch rack mounting appear to be identical, but they are not. See Figure 3-59 [p. 3-71]. When properly mounted, the rectangular cutout (hole) in the flange should align with the rectangular cutout (hole) in the shelf. Also, the flange holes should align with the shelf mounting holes. See Figures 3-60 [p. 3-72] and 3-61 [p. 3-73].*

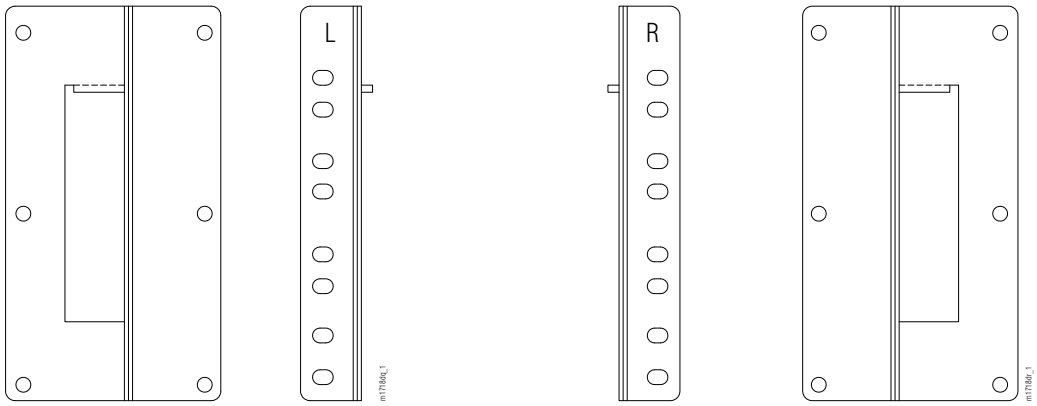


Figure 3-59: FC9682LAS2 Shelf Mounting Flanges for 19-Inch Rack Mounting (Front and Side Views)

5 Identify the six flange mounting holes on the side of the FC9682LAS2 shelf. See Figure 3-60 [p. 3-72].

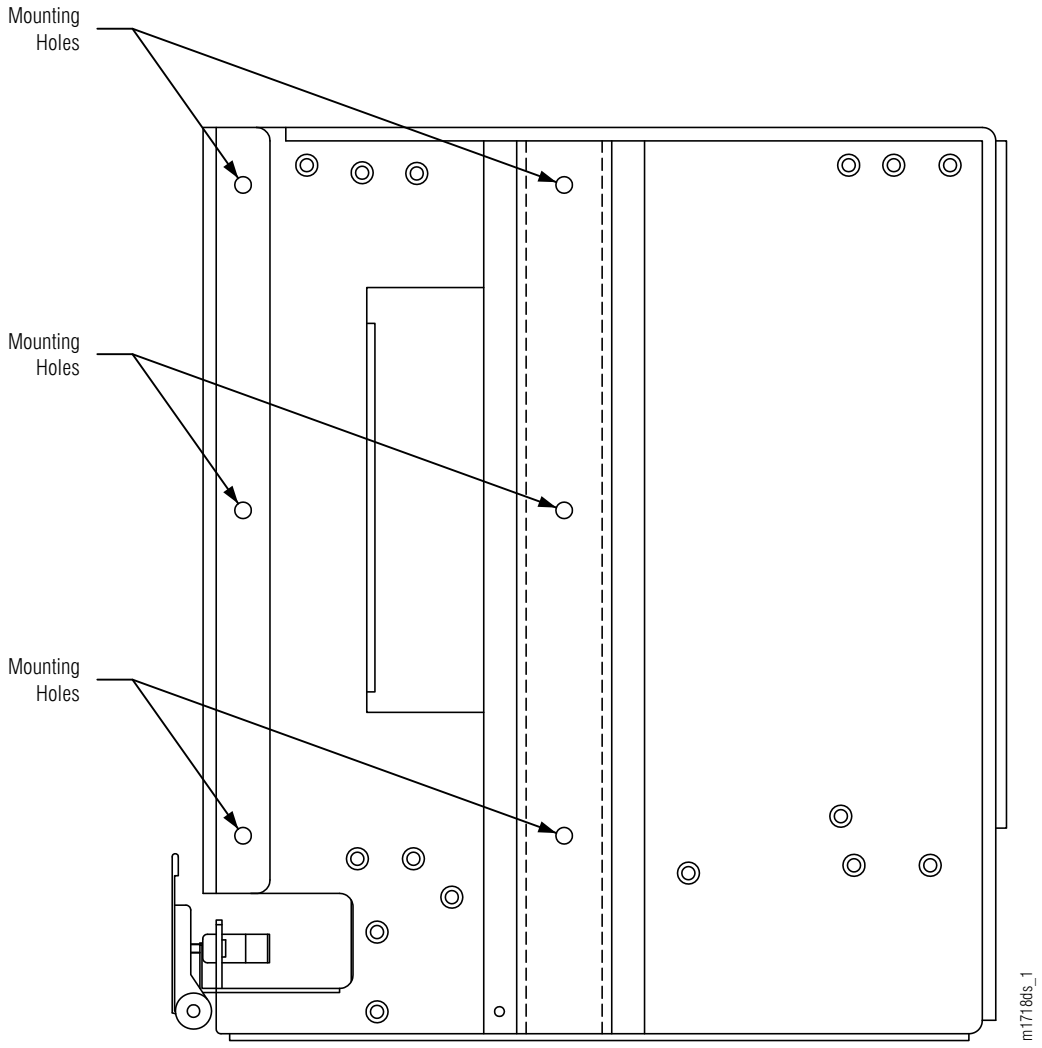


Figure 3-60: Flange Mounting Holes on Right Side of FC9682LAS2 Shelf

6 Using six pan-head Phillips M4 screws (8 mm long) on each side, secure the left and right shelf flanges to the FC9682LAS2 shelf as shown in Figure 3-57 [p. 3-69].

Figure 3-61 [p. 3-73] shows a right-side view of the FC9682LAS2 shelf after the flange is mounted.

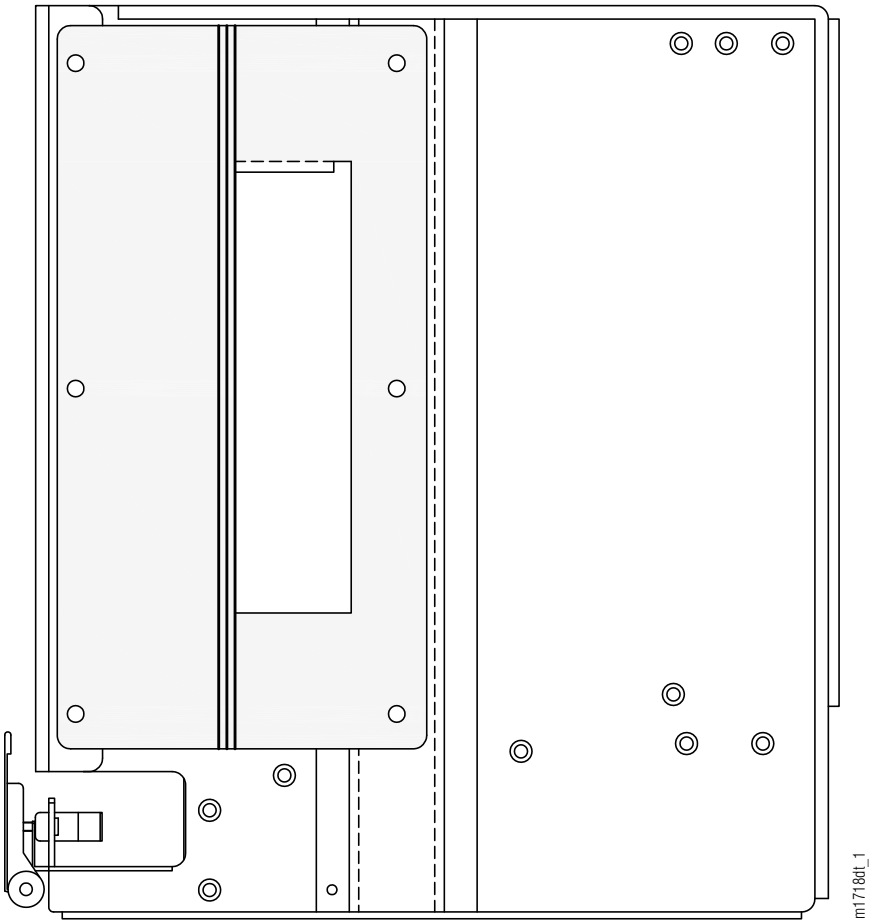


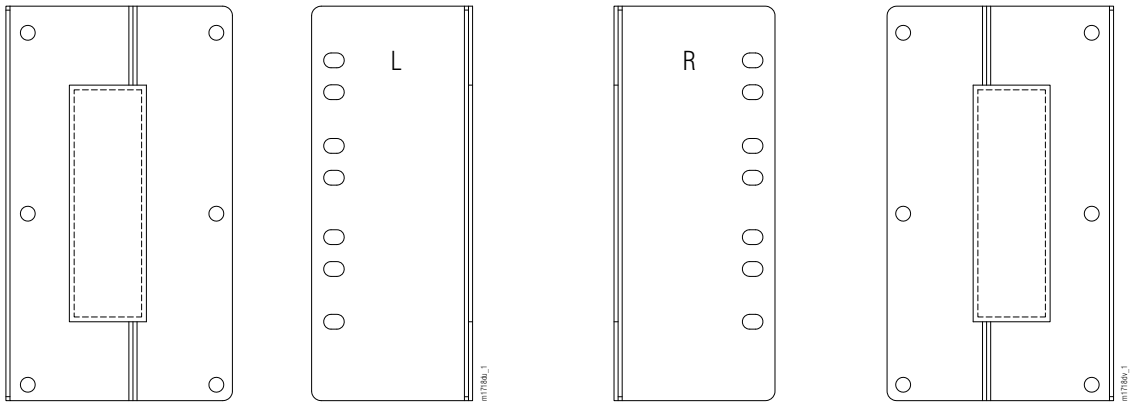
Figure 3-61: Flange Mounted on Right Side of FC9682LAS2 Shelf (19-Inch Rack Installation)

7 Proceed to Step 12 [p. 3-76].

8 Get the flange kit for 23-inch rack mounting. Table 3-7 [p. 3-70] lists the flange kit part numbers.

9 Identify the left and right shelf flanges. See Figure 3-58 [p. 3-70] and Figure 3-62 [p. 3-74].

Note: *At first glance, the two flanges for 19-inch rack mounting appear to be identical, but they are not. See Figure 3-62 [p. 3-74]. When properly mounted, the rectangular cutout (hole) in the flange should align with the rectangular cutout (hole) in the shelf. Also, the flange holes should align with the shelf mounting holes. See Figures 3-63 [p. 3-75] and 3-64 [p. 3-76].*



Left Shelf Flange **Right Shelf Flange**

Figure 3-62: FC9682LAS2 Shelf Mounting Flanges for 23-Inch Rack Mounting (Front and Side Views)

10 Identify the flange mounting holes on the sides of the FC9682LAS2 shelf. See Figure 3-63 [p. 3-75].

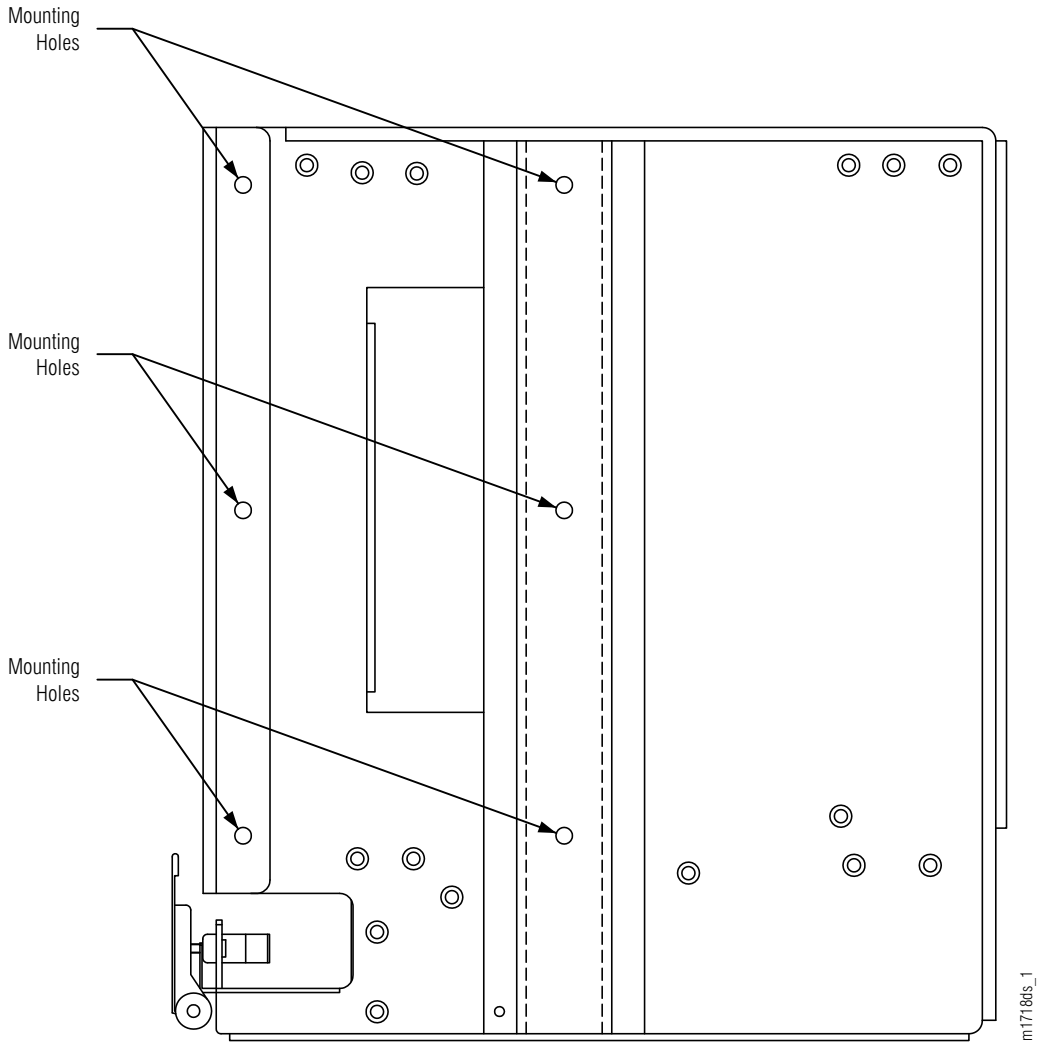


Figure 3-63: Flange Mounting Holes on Right Side of FC9682LAS2 Shelf

11 Using six pan-head Phillips M4 screws (8 mm long) on each side, secure the left and right shelf flanges to the FC9682LAS2 shelf as shown in Figure 3-58 [p. 3-70].

Figure 3-64 [p. 3-76] shows a right-side view of the FC9682LAS2 shelf after the flange is mounted.

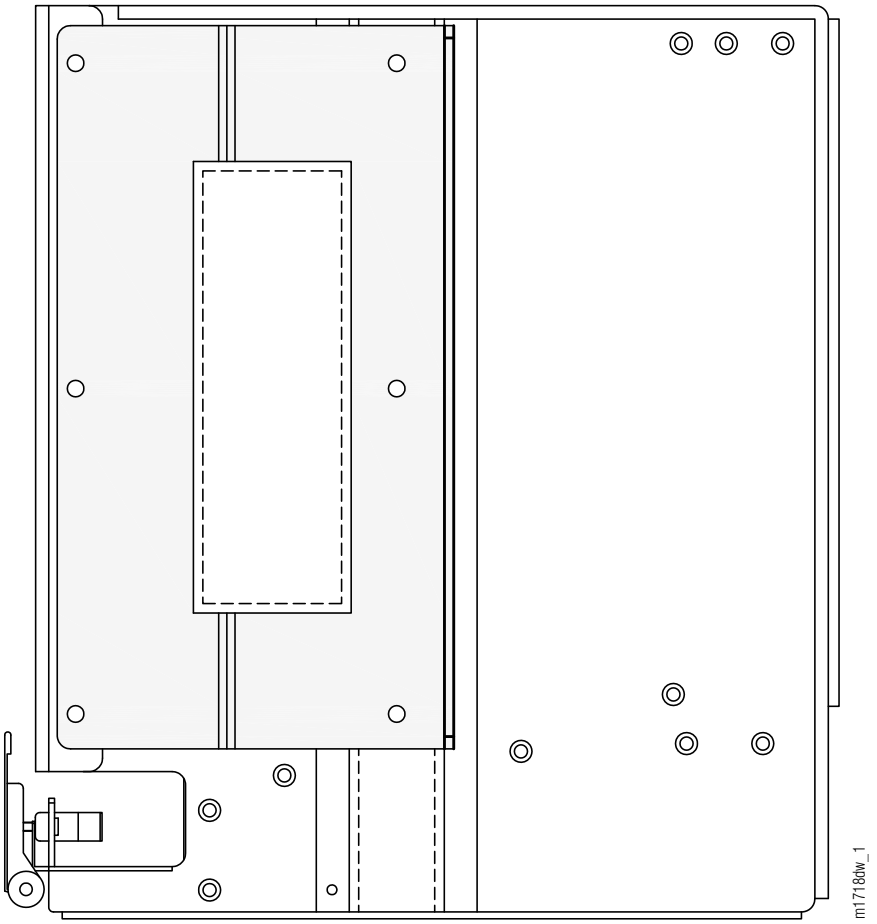


Figure 3-64: Flange Mounted on Right Side of FC9682LAS2 Shelf (23-Inch Rack Installation)

12 Install the FC9682LAS2 shelf in the rack. Secure the shelf to the rack using three rack mounting screws on each side of the shelf.

Note: *If hole alignment does not permit three screws on each side, securing the shelf with only two screws on each side is acceptable.*

This procedure is complete.

3.14 Installing the LAM/DCM Shelf (SDL1)

The LAM/DCM shelf, if needed, provides dispersion compensation for dense wavelength division multiplexing (DWDM) signals entering the NE and lambda access connections for OLC units.

The SDL1 DCM shelf (FC9682SDL1, Figure 3-65 [p. 3-77]) can be installed in a Small rack (see Figure 3-66 [p. 3-78]). The Small mounting flange kit for the DCM shelf (FC9682FLG5) is used.

The shelf can hold up to two DCM units.

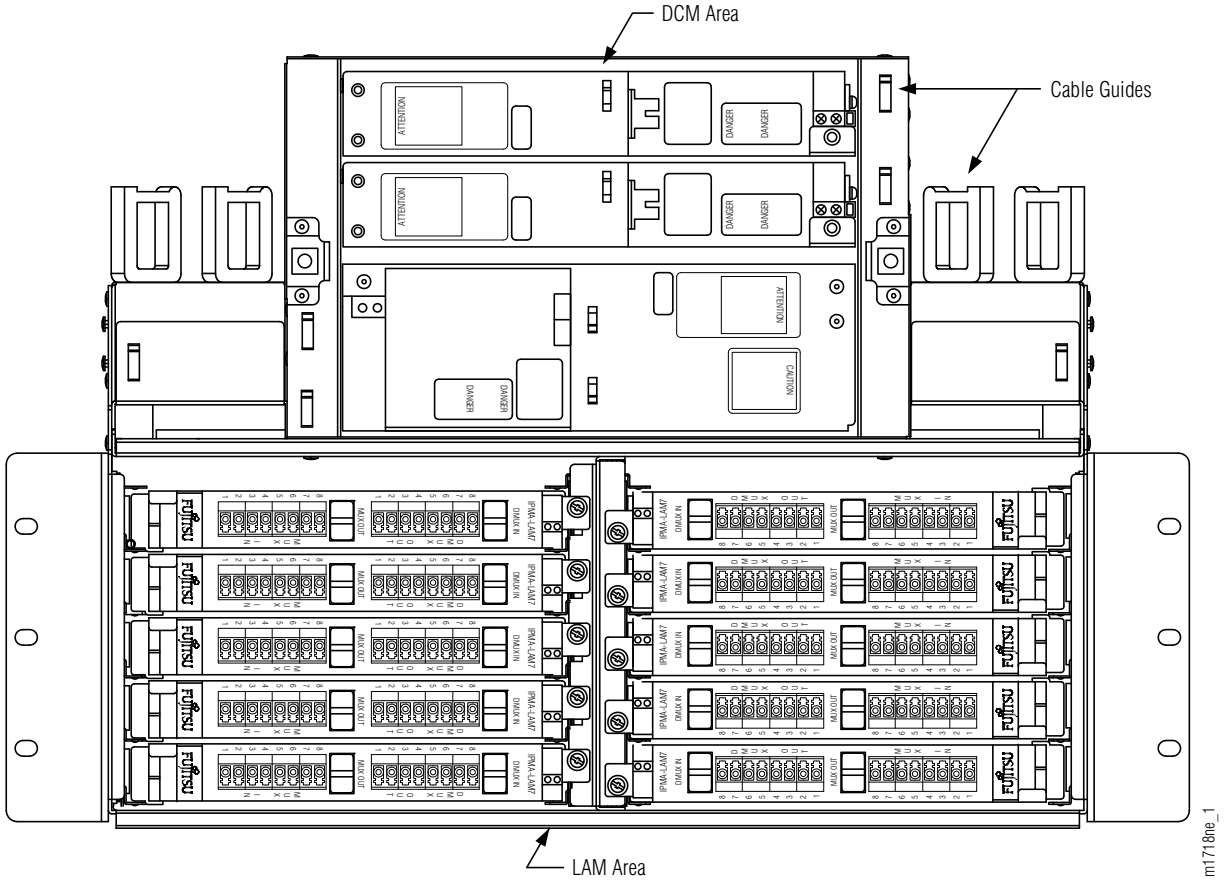


Figure 3-65: LAM/DCM Shelf (SDL1)

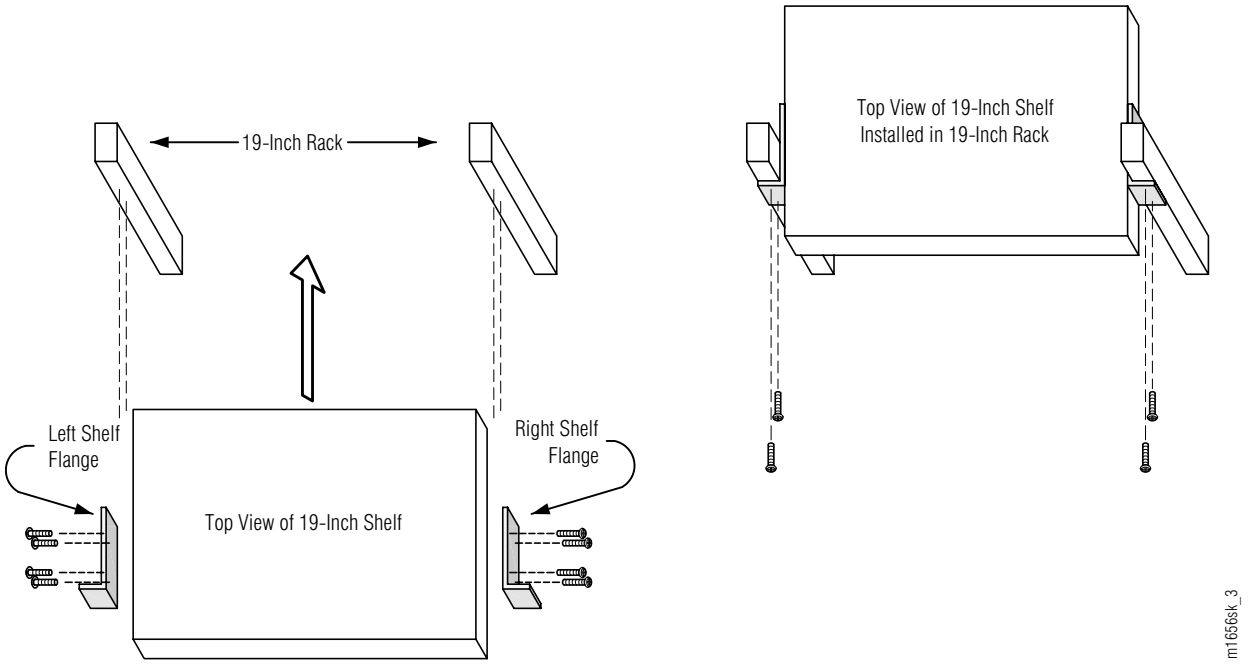


Figure 3-66: SDL1 Shelf Mounting in Small Rack

Install the SDL1 shelf as follows:

Step	Task
1	Unpack the SDL1 shelf from the shipping container.
2	Get the flange kit for Small rack mounting (FC9682FLG5), see Section 3.3.2, Flange Kits for 19-Inch and 23-Inch Racks [p. 3-18].

3 Identify the shelf flanges. See Figures 3-66 [p. 3-78] and 3-67 [p. 3-79].

Note: *The layout of the clearance holes is identical for the two flanges for Small rack mounting.*

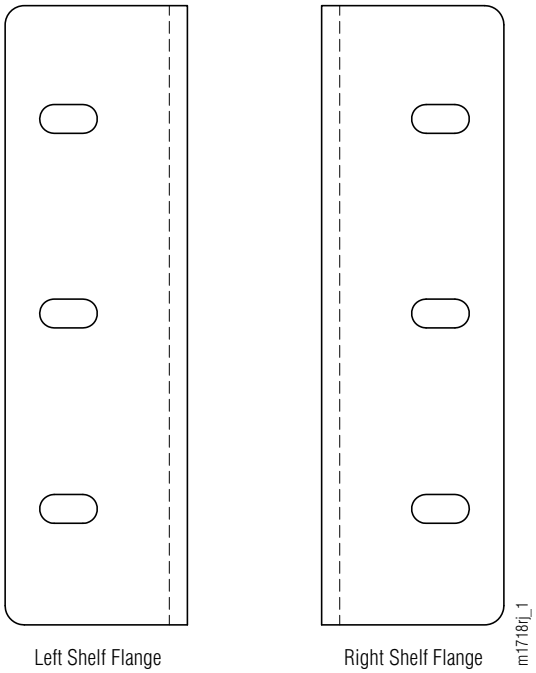


Figure 3-67: SDL1 Shelf Mounting Flanges (Front View)

4 Identify the flange mounting holes for Small rack installation on the side of the SDL1 shelf. See Figure 3-68 [p. 3-80].

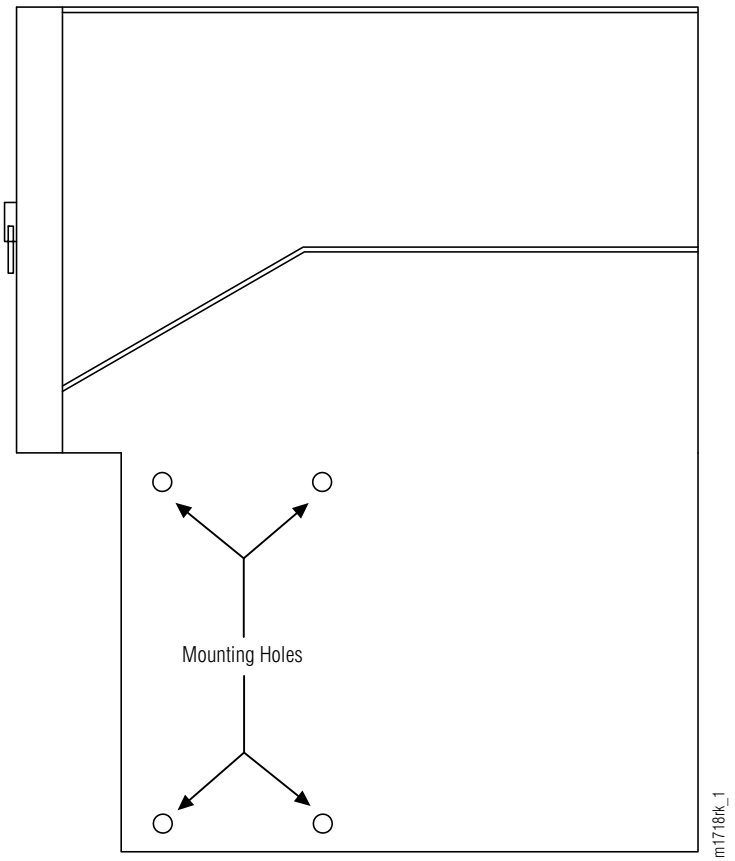


Figure 3-68: Flange Mounting Holes on Right Side of SDL1 Shelf (Small Rack Installation)

5 Using four pan-head Phillips M4 screws (8 mm long) on each side, secure the shelf flanges to the SDL1 shelf as shown in Figure 3-41 [p. 3-57].

Figure 3-69 [p. 3-81] shows a right-side view of the SDL1 shelf after the flange is mounted.

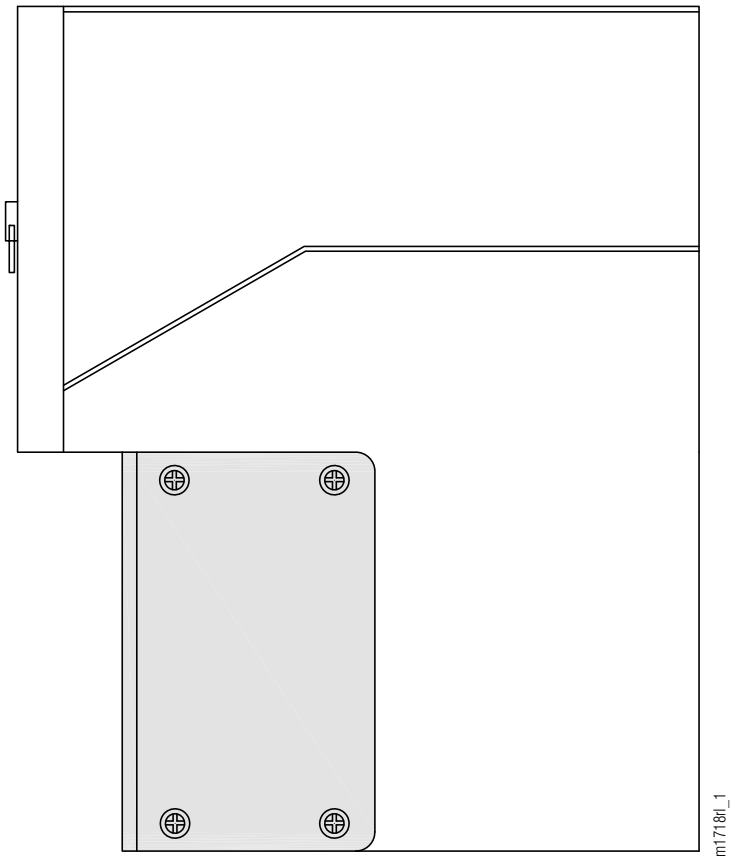


Figure 3-69: Flange Mounted on Right Side of SDL1 Shelf (Small Rack Installation)

6 Install the SDL1 shelf in the rack directly above the heat baffle. Secure the shelf to the rack using three rack mounting screws on each side of the shelf.

Note: *If hole alignment does not permit three screws on each side, it is acceptable to secure the shelf with only two screws on each side.*

7 If the shelf came without the DCM units already installed:

a. Locate the appropriate units to be installed, and remove them from their protective ESD packaging.

b. Loosen the thumbscrews, and remove the faceplate/cover from the shelf.

c. Carefully slide each DCM unit into the appropriate shelf slot.

d. Replace the cover, and tighten the thumbscrews to secure each unit in the shelf.

This procedure is complete.

3.15 Installing Fans

This procedure provides installation instructions for the four cooling fans used by the Optical/Tributary shelf (see Figure 3-70 [p. 3-83]).

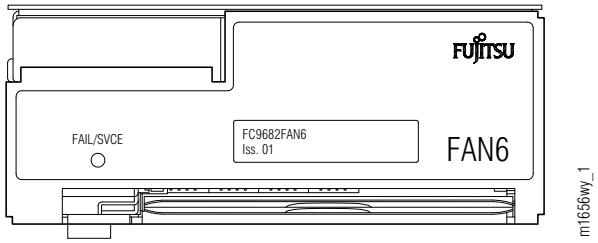


Figure 3-70: Fan Unit (Front View) (Small Configuration)

Step	Task
1	If not already done, unpack four fan plug-in units from the shipping container.
2	If not already done, install a fan filter in the fan tray located at the bottom of each fan unit.
3	Install the fan plug-in units into the bottom portion of each Optical/Tributary shelf. (Refer to Section 8.8, Replacing FAN6 Plug-In Unit and Fan Filter [p. 8-28] for a detailed information.) ***Note:*** *The connectors on the back of the fan engage the shelf backplane connectors and are secured in place with an extractor lever (located on the left side of the fan assembly front panel).* This procedure is complete.

3.16 Installing Power, Ground, and Alarm Cables

This procedure provides instructions for installing power, ground, and alarm cabling for standard rack configurations. It includes the following subprocedures:

3.16.1 Reference Material

This subsection describes instructions for installing power, ground, and alarm cabling for 23-inch rack configurations. Fujitsu does not manufacture a 19-inch CBP. For 19-inch rack applications, Fujitsu recommends using the N215116-N/L31 fuse panel manufactured by Noran Tel Ltd. Refer to Noran Tel documentation for installation instructions for the N215116-N/L31 fuse panel. This unit can be ordered through Fujitsu using part number 06-331-444.

The cables and cable harnesses used are listed in Table 3-8 [p. 3-85] and shown in Figure 3-71 [p. 3-86].

Note: *Connections to the shelf power terminal strip should use copper conductors only.*

Figures 3-72 [p. 3-87] through 3-74 [p. 3-89] show schematics for installing power, ground, and alarm cabling between the rack, shelves and CBP for the following standard rack configurations:

- Rack with one Universal shelf (Figure 3-72 [p. 3-87])
- Rack with two Universal shelves (Figure 3-73 [p. 3-88])
- Rack with three Universal shelves (Figure 3-74 [p. 3-89])

Each standard rack configuration includes a circuit breaker panel (CBP) with power terminals as shown in Figure 3-75 [p. 3-90]. The circuit breakers within the CBP are associated with shelves as shown in Table 3-9 [p. 3-90].

Figure 3-76 [p. 3-91] shows the Optical/Tributary shelf backplane. Figure 3-77 [p. 3-92] shows the power cabling.

Figure 3-78 [p. 3-93] shows the rack alarm cable harness, which gets wire wrapped to the CBP. Connectors along this harness mate to shelf alarm cables (Figures 3-79 [p. 3-94]) that plug into alarm ports on the shelf backplane.

Table 3-8: Power, Ground, and Alarm Cable Connections (Small Configuration)

Part Number	Use	Description	Term Type	Wire Gauge
HA15B-0001-C413	–48 V DC and ground	5-wire rack/shelf power harness, one set per shelf	10 AWG crimp lugs	10 AWG
HA660-1106-T003	Rack alarms	6-connector daisy-chained alarm harness, one connector per shelf (CNA through CNF), one harness per rack	D-sub 25-pin, terminates with wire-wrap at CBP	24 AWG
HA660-1102-T015	Shelf alarms	Alarm cable from rack alarm cable connector to shelf backplane alarm connector, one per shelf	D-sub 25-pin, CN1 at rack alarm end, CN2 at shelf alarm end	24 AWG
PC15L-0001-C045	Frame ground	Frame ground stranded wire cable from rack to CBP, one per rack	Terminal lugs, both ends, installed	6 AWG, stranded

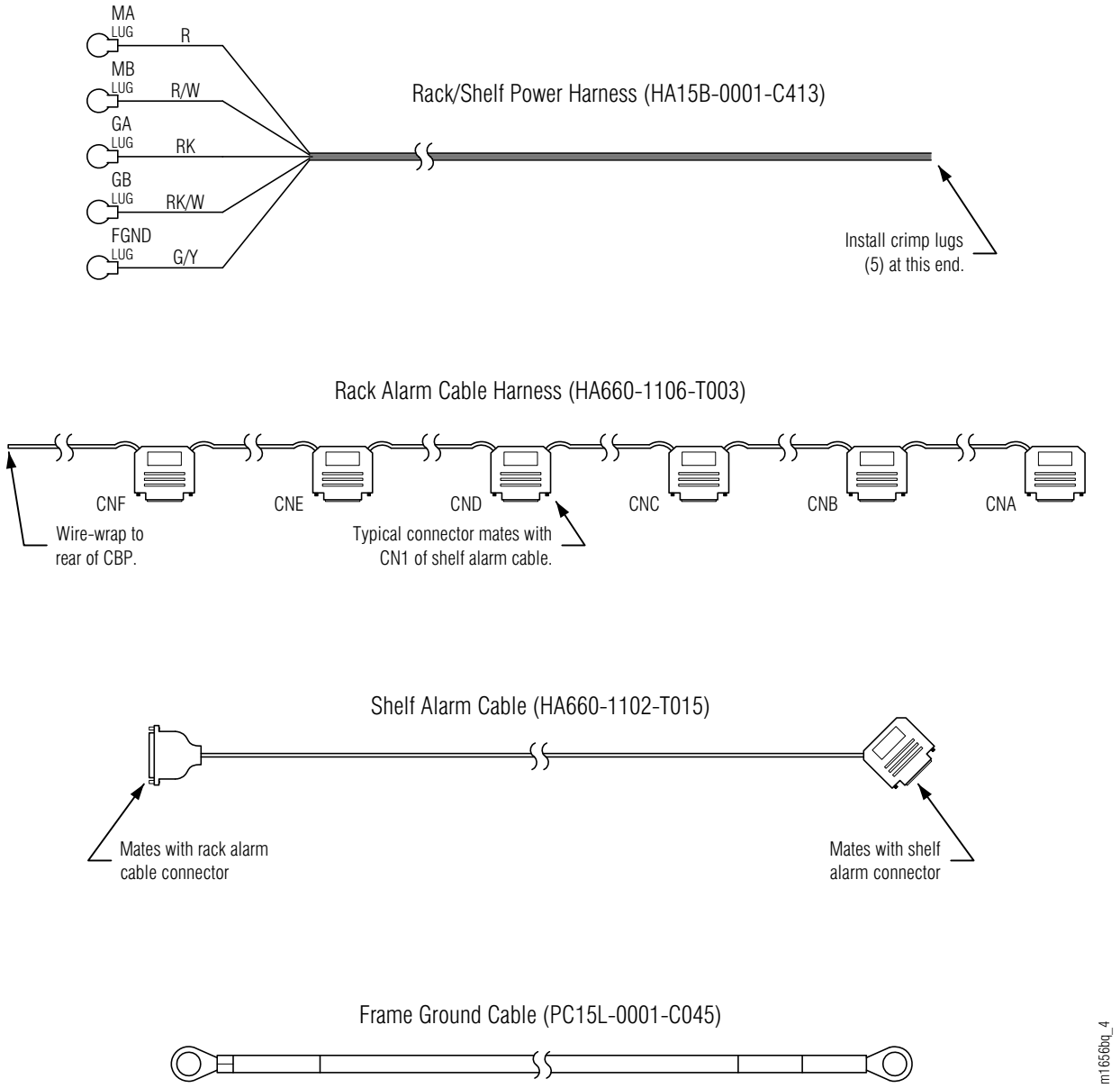


Figure 3-71: Power, Alarm, and Ground Cables

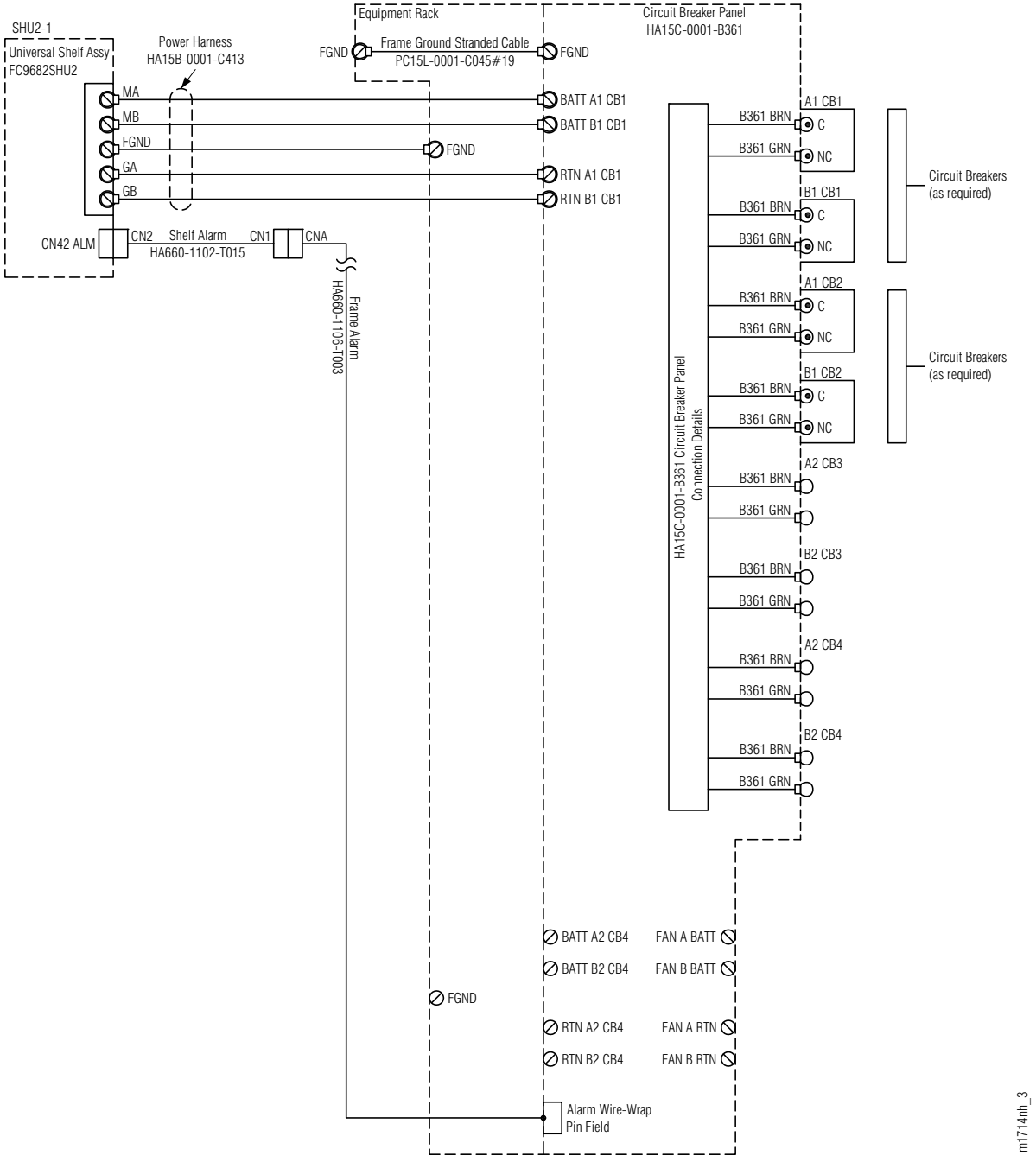


Figure 3-72: Cabling Schematic for Rack with One Universal Shelf (Small Configuration)

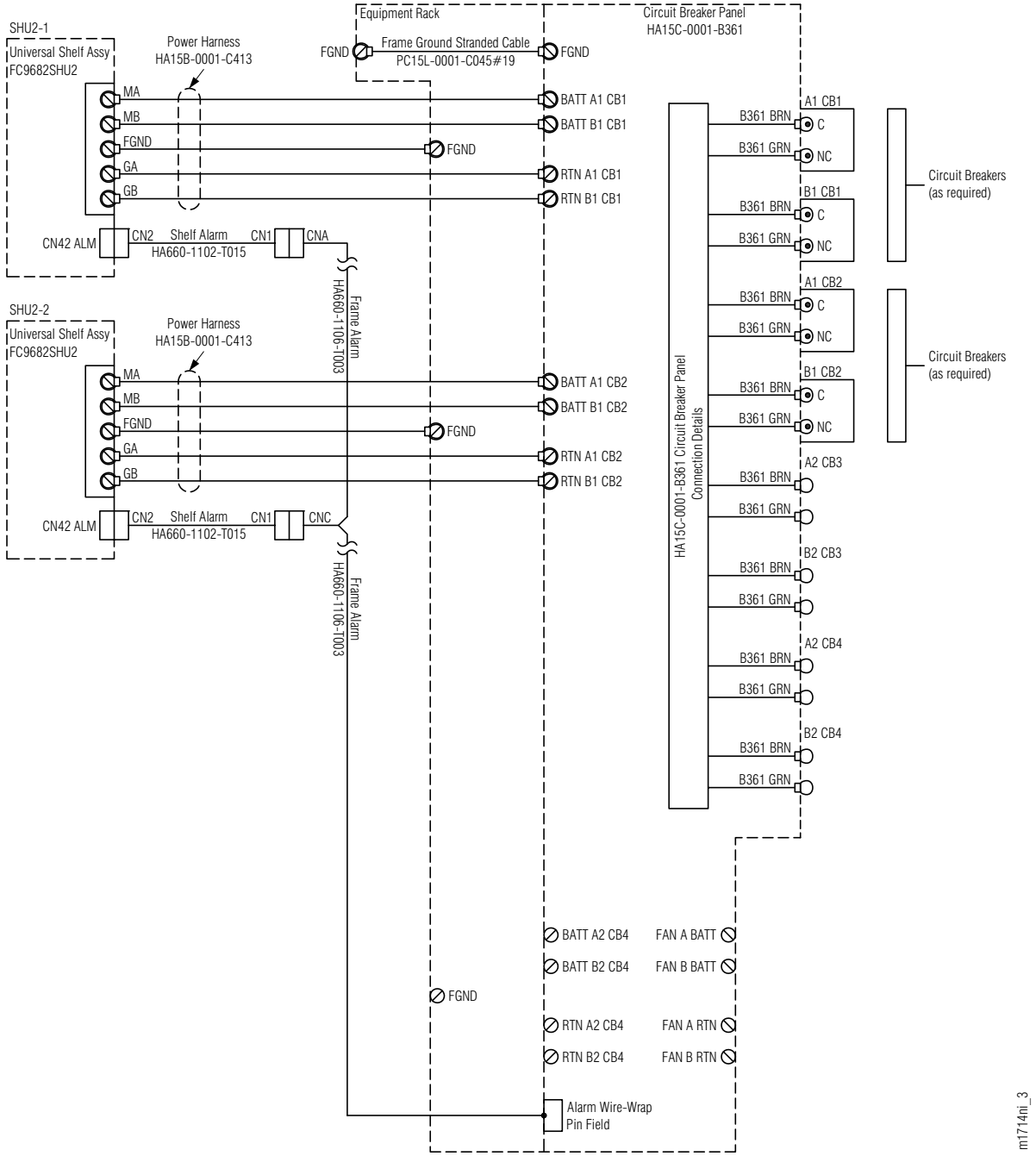


Figure 3-73: Cabling Schematic for Rack with Two Universal Shelves (Small Configuration)

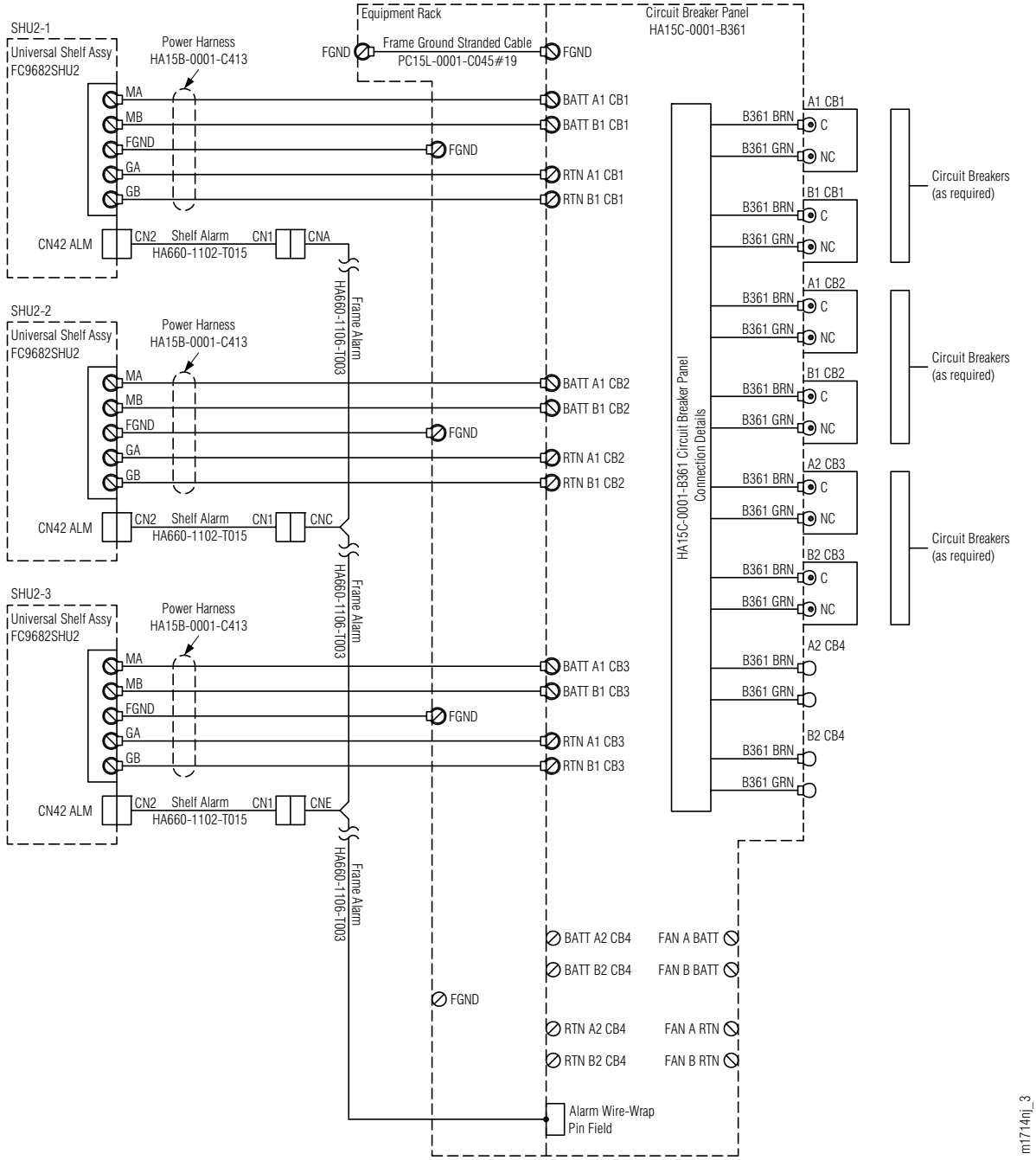


Figure 3-74: Cabling Schematic for Rack with Three Universal Shelves (Small Configuration)

Table 3-9: Association of Shelves to Circuit Breakers (Small Configuration)

Circuit Breaker	Rack Configuration		
	Rack with One Universal Shelf (Figure 3-72 [p. 3-87])	Rack with Two Universal Shelves (Figure 3-73 [p. 3-88])	Rack with Three Universal Shelves (Figure 3-74 [p. 3-89])
	Shelf Name	Shelf Name	Shelf Name
CB1	SHU2-1	SHU2-1	SHU2-1
CB2	n/a	SHU2-2	SHU2-2
CB3	n/a	n/a	SHU2-3

Note: *The HA15B-0001-B361 CBP has dual-post output power connectors.*

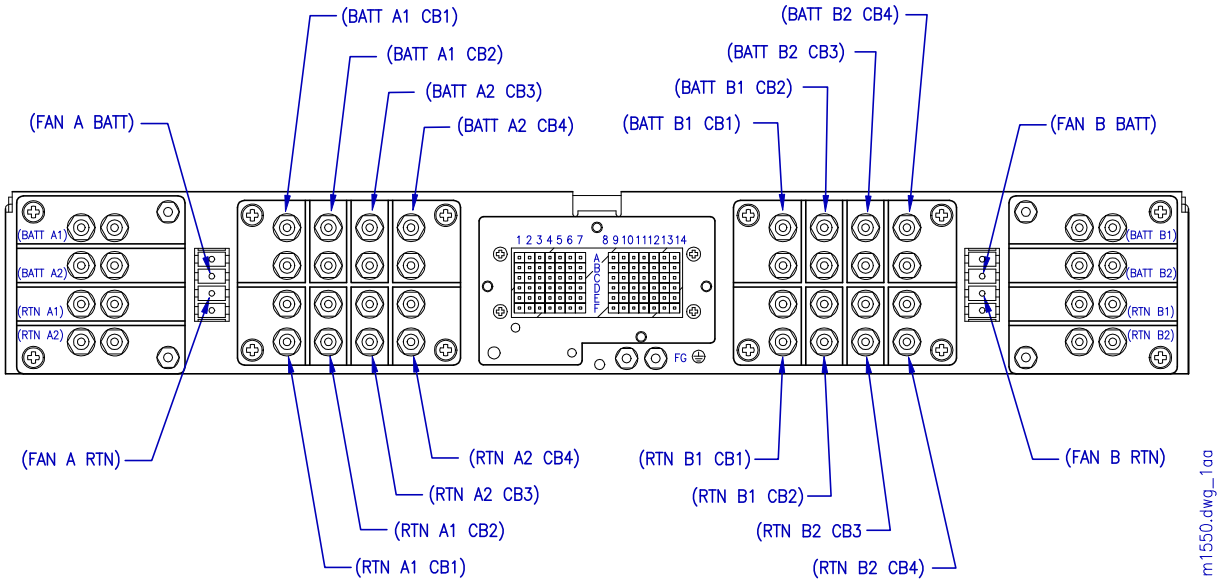


Figure 3-75: Circuit Breaker Panel Rear View (HA15B-0001-B361)

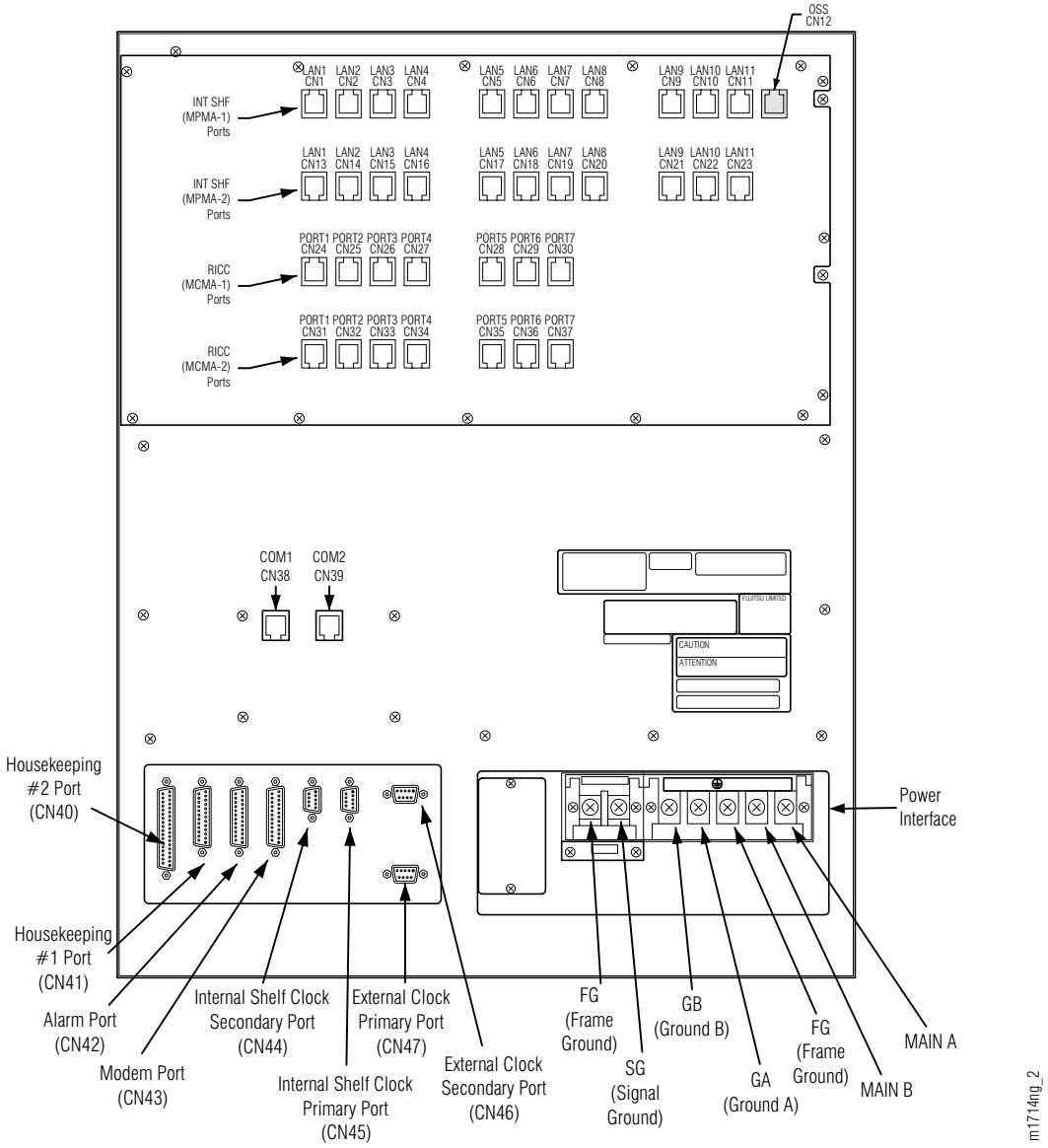


Figure 3-76: Optical/Tributary Shelf Backplane (Small Configuration)

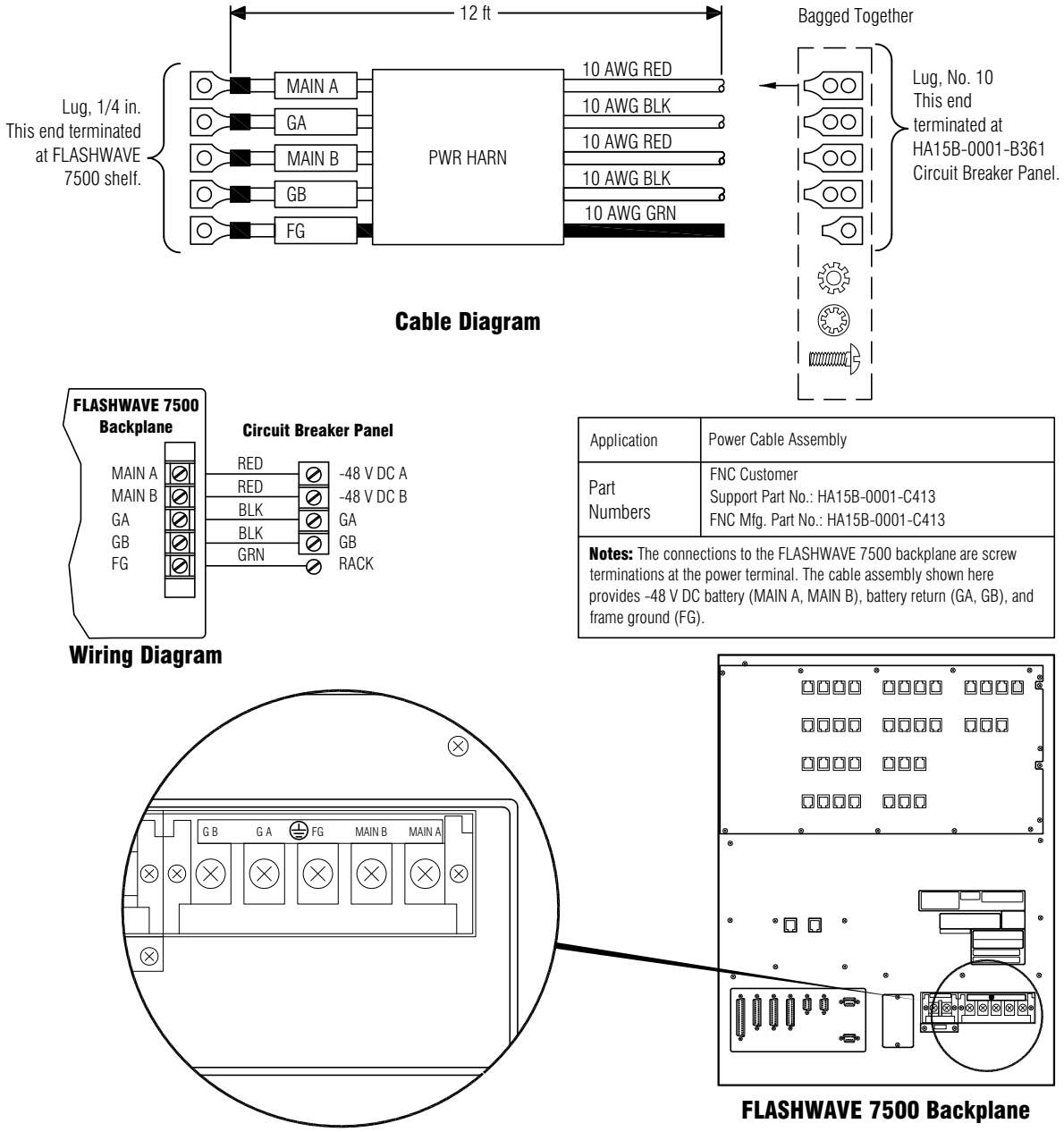
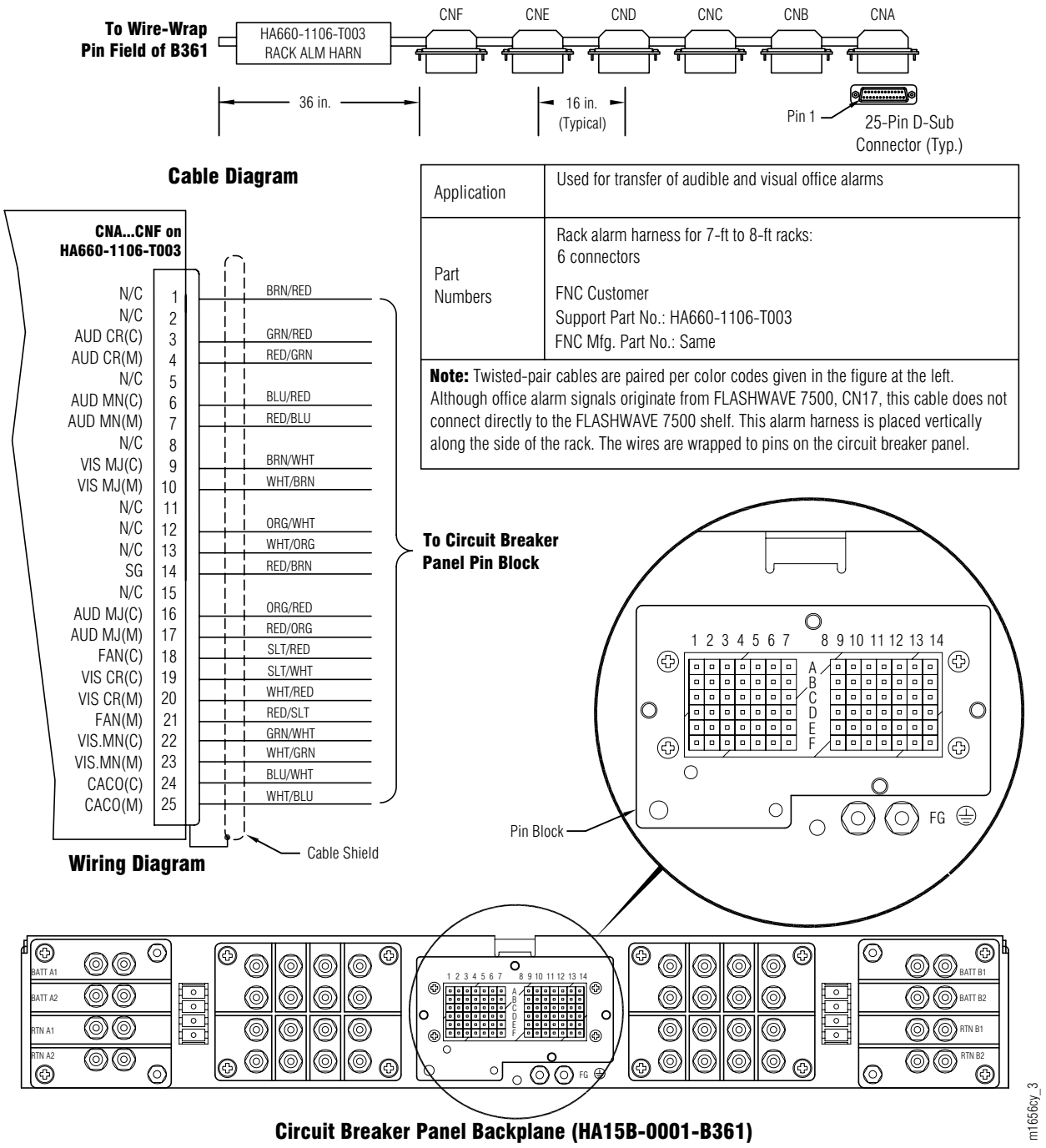


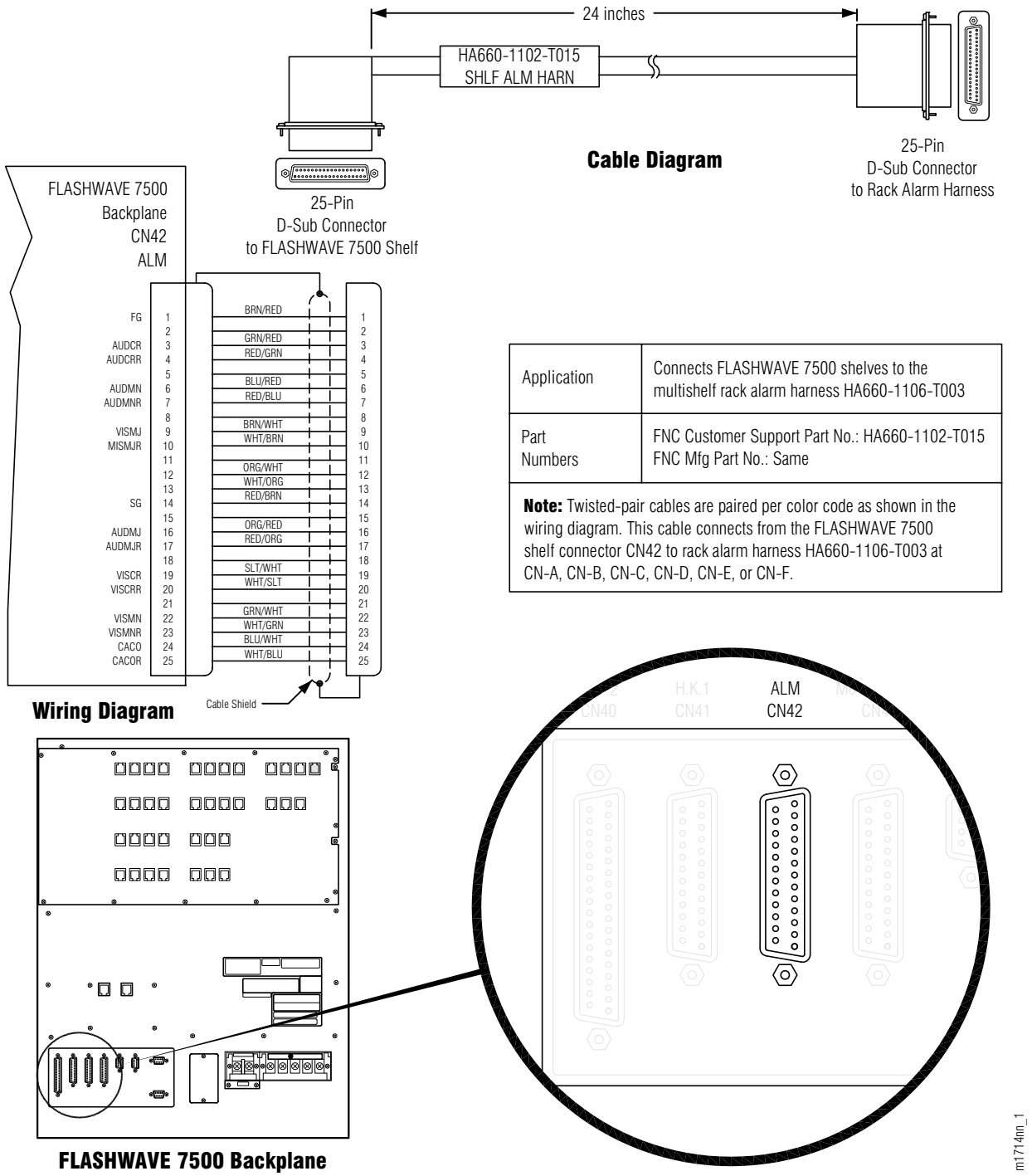
Figure 3-77: Optical/Tributary Shelf Power Cabling (Small Configuration)



Application	Used for transfer of audible and visual office alarms
Part Numbers	Rack alarm harness for 7-ft to 8-ft racks: 6 connectors FNC Customer Support Part No.: HA660-1106-T003 FNC Mfg. Part No.: Same

Note: Twisted-pair cables are paired per color codes given in the figure at the left. Although office alarm signals originate from FLASHWAVE 7500, CN17, this cable does not connect directly to the FLASHWAVE 7500 shelf. This alarm harness is placed vertically along the side of the rack. The wires are wrapped to pins on the circuit breaker panel.

Figure 3-78: Rack Alarm Harness Wire-Wrap Connection to CBP



Application	Connects FLASHWAVE 7500 shelves to the multishelf rack alarm harness HA660-1106-T003
Part Numbers	FNC Customer Support Part No.: HA660-1102-T015 FNC Mfg Part No.: Same

Note: Twisted-pair cables are paired per color code as shown in the wiring diagram. This cable connects from the FLASHWAVE 7500 shelf connector CN42 to rack alarm harness HA660-1106-T003 at CN-A, CN-B, CN-C, CN-D, CN-E, or CN-F.

Figure 3-79: Optical/Tributary Shelf Alarm Cabling (Small Configuration)

3.16.2 Installing Power, Ground, and Alarm Cables

This subprocedure includes the following subtasks:

Use this procedure to install power, ground, and alarm cabling for a rack of FLASHWAVE 7500 Small Configuration equipment.

DANGER:

Use properly insulated tools and do not allow tools, cables, or other metal objects to connect across terminals. At this point, –48 V DC power has been applied to the CBP, and improper handling may result in personal injury, damage to equipment, or both. Fujitsu recommends that office power be removed from the rack using local procedures.

> ***Note:*** *Ensure that all cables installed in this procedure are properly bundled, laced, and secured to the rack in accordance with local procedures. Connectors should be secured in place using connector retaining screws.*

Install power, ground, and alarm cables for one rack of FLASHWAVE 7500 Small Configuration equipment as follows:

Identify Cabling Schematic

Step	Task

1 If you have not already done so, review the reference material presented in Section 3.16.1, Reference Material [p. 3-84].

2 In the following list, identify the cabling schematic appropriate for your rack configuration:

- Rack with one Universal shelf (Figure 3-72 [p. 3-87])
- Rack with two Universal shelves (Figure 3-73 [p. 3-88])
- Rack with three Universal shelves (Figure 3-74 [p. 3-89])

Disconnect Power from CBP

3 If installing into a powered rack, disconnect office power (recommended) or remove circuit breakers from the CBP.

4 Use a DMM to ensure 0 V DC (with reference to the battery ground) at the point of disconnection.

Install Shelf Power Harnesses CB1

5 Refer to the cabling schematic (identified in Step 2 [p. 3-96]) and Table 3-9 [p. 3-90]) to identify the shelf that is to be connected to circuit breaker 1 (CB1).

6 Locate the rack/shelf power harness (HA15B-0001-C413, Figure 3-71 [p. 3-86]) for the shelf.

Note: *The length of the cables may be altered at the discretion of the installer to ensure proper length.*

7 Prepare the power leads by installing the terminal lugs (wrapped in a plastic bag shipped with the cable) that are required on one end of the cable (see Figure 3-71 [p. 3-86]). Ensure that no wire strands are shorting terminals together and that leads are securely fastened. The cable should now have terminal lugs on both ends of the power cable.

Note: *The shelf power wiring is the same with all rack configurations. Observe the color coding of the power cable.*

8 On the backplane of the shelf identified in Step 5 [p. 3-96], remove the plastic cover on the shelf power terminal strip located on the bottom right of the shelf backplane (see Figure 3-77 [p. 3-92]).

9 Connect both ends of cable GA of the power harness as follows:

a. Identify lug GA in the power harness (see Figure 3-71 [p. 3-86]) and connect it to shelf terminal GA (see Figure 3-77 [p. 3-92]).

b. Connect the other end of the same cable to CBP terminal RTN A1 CB1 (see Figure 3-75 [p. 3-90]).

10 Connect both ends of cable GB of the power harness as follows:

a. Identify lug GB in the power harness (see Figure 3-71 [p. 3-86]) and connect it to shelf terminal GB (see Figure 3-77 [p. 3-92]).

b. Connect the other end of the same cable to CBP terminal RTN B1 CB1 (see Figure 3-75 [p. 3-90]).

11 Connect both ends of cable MA of the power harness as follows:

a. Identify lug MA in the power harness (see Figure 3-71 [p. 3-86]) and connect it to shelf terminal MAIN A (see Figure 3-77 [p. 3-92]).

b. Connect the other end of the same cable to CBP terminal BATT A1 CB1 (see Figure 3-75 [p. 3-90]).

12 Connect both ends of cable MB of the power harness as follows:

a. Identify lug MB in the power harness (Figure 3-71 [p. 3-86]) and connect it to shelf terminal MAIN B (see Figure 3-77 [p. 3-92]).

b. Connect the other end of the same cable to CBP terminal BATT B1 CB1 (see Figure 3-75 [p. 3-90]).

13 Connect both ends of cable FGND of the power harness as follows:

a. Identify lug FGND in the power harness (see Figure 3-71 [p. 3-86]) and connect it to shelf terminal FG (see Figure 3-77 [p. 3-92]).

b. Connect the other end of the same cable to the equipment rack frame ground.

14 Replace the plastic cover over the shelf backplane terminal strip.

Install Shelf Power Harnesses CB2

15 Refer to the cabling schematic (identified in Step 2 [p. 3-96]) and Table 3-9 [p. 3-90]. Is a shelf to be connected to circuit breaker 2 (CB2)?

If YES:
Go to Step 16 [p. 3-98].

If NO:
Go to Step 35 [p. 3-101].

16 Locate the rack/shelf power harness (HA15B-0001-C413, Figure 3-71 [p. 3-86]) for the shelf.

Note: *The length of the cables may be altered at the discretion of the installer to ensure proper length.*

17 Prepare the power leads by installing the terminal lugs (wrapped in a plastic bag shipped with the cable) that are required on one end of the cable (see Figure 3-71 [p. 3-86]). Ensure that no wire strands are shorting terminals together and that leads are securely fastened. The cable should now have terminal lugs on both ends of the power cable.

Note: *The shelf power wiring is the same with all rack configurations. Observe the color coding of the power cable.*

18 On the backplane of the shelf identified in Step 15 [p. 3-98], remove the plastic cover on the shelf power terminal strip located on the bottom right of the shelf backplane (see Figure 3-77 [p. 3-92]).

19 Connect both ends of cable GA of the power harness as follows:

a. Identify lug GA in the power harness (see Figure 3-71 [p. 3-86]) and connect it to shelf terminal GA (see Figure 3-77 [p. 3-92]).

b. Connect the other end of the same cable to CBP terminal RTN A1 CB2 (see Figure 3-75 [p. 3-90]).

20 Connect both ends of cable GB of the power harness as follows:

a. Identify lug GB in the power harness (see Figure 3-71 [p. 3-86]) and connect it to shelf terminal GB (see Figure 3-77 [p. 3-92]).

b. Connect the other end of the same cable to CBP terminal RTN B1 CB2 (see Figure 3-75 [p. 3-90]).

21 Connect both ends of cable MA of the power harness as follows:

a. Identify lug MA in the power harness (see Figure 3-71 [p. 3-86]) and connect it to shelf terminal MAIN A (see Figure 3-77 [p. 3-92]).

b. Connect the other end of the same cable to CBP terminal BATT A1 CB2 (see Figure 3-75 [p. 3-90]).

22 Connect both ends of cable MB of the power harness as follows:

a. Identify lug MB in the power harness (see Figure 3-71 [p. 3-86]) and connect it to shelf terminal MAIN B (see Figure 3-77 [p. 3-92]).

b. Connect the other end of the same cable to CBP terminal BATT B1 CB2 (see Figure 3-75 [p. 3-90]).

23 Connect both ends of cable FGND of the power harness as follows:

a. Identify lug FGND in the power harness (see Figure 3-71 [p. 3-86]) and connect it to shelf terminal FG (see Figure 3-77 [p. 3-92]).

b. Connect the other end of the same cable to the equipment rack frame ground.

24 Replace the plastic cover over the shelf backplane terminal strip.

Install Shelf Power Harnesses CB3

25 Refer to the cabling schematic (identified in Step 2 [p. 3-96]) and Table 3-9 [p. 3-90]. Is a shelf to be connected to circuit breaker 3 (CB3)?

If YES:
Go to Step 26 [p. 3-99].

If NO:
Go to Step 35 [p. 3-101].

26 Locate the rack/shelf power harness (HA15B-0001-C413, Figure 3-71 [p. 3-86]) for the shelf.

Note: *The length of the cables may be altered at the discretion of the installer to ensure proper length.*

27 Prepare the power leads by installing the terminal lugs (wrapped in a plastic bag shipped with the cable) that are required on one end of the cable (see Figure 3-71 [p. 3-86]). Ensure that no wire strands are shorting terminals together and that leads are securely fastened. The cable should now have terminal lugs on both ends of the power cable.

Note: *The shelf power wiring is the same with all rack configurations. Observe the color coding of the power cable.*

28 On the backplane of the shelf identified in Step 25 [p. 3-99], remove the plastic cover on the shelf power terminal strip located on the bottom right of the shelf backplane (see Figure 3-77 [p. 3-92]).

29 Connect both ends of cable GA of the power harness as follows:

a. Identify lug GA in the power harness (see Figure 3-71 [p. 3-86]) and connect it to shelf terminal GA (see Figure 3-77 [p. 3-92]).

b. Connect the other end of the same cable to CBP terminal RTN A1 CB3 (see Figure 3-75 [p. 3-90]).

30 Connect both ends of cable GB of the power harness as follows:

a. Identify lug GB in the power harness (see Figure 3-71 [p. 3-86]) and connect it to shelf terminal GB (see Figure 3-77 [p. 3-92]).

b. Connect the other end of the same cable to CBP terminal RTN B1 CB3 (see Figure 3-75 [p. 3-90]).

31 Connect both ends of cable MA of the power harness as follows:

a. Identify lug MA in the power harness (see Figure 3-71 [p. 3-86]) and connect it to shelf terminal MAIN A (see Figure 3-77 [p. 3-92]).

b. Connect the other end of the same cable to CBP terminal BATT A1 CB3 (see Figure 3-75 [p. 3-90]).

32 Connect both ends of cable MB of the power harness as follows:

a. Identify lug MB in the power harness (see Figure 3-71 [p. 3-86]) and connect it to shelf terminal MAIN B (see Figure 3-77 [p. 3-92]).

b. Connect the other end of the same cable to CBP terminal BATT B1 CB3 (see Figure 3-75 [p. 3-90]).

33 Connect both ends of cable FGND of the power harness as follows:

a. Identify lug FGND in the power harness (see Figure 3-71 [p. 3-86]) and connect it to shelf terminal FG (see Figure 3-77 [p. 3-92]).

b. Connect the other end of the same cable to the equipment rack frame ground.

34 Replace the plastic cover over the shelf backplane terminal strip.

Install Frame Ground Cable

35 Locate the frame ground cable (PC15L-0001-C045, Figure 3-71 [p. 3-86]).

36 Connect both ends of the frame ground cable as follows:

a. Connect one end of the frame ground cable to the equipment rack frame ground.

Note: *The equipment rack frame ground is a grounding point on the frame itself. On some racks, it is a screw hole that has a piece of tape over it. The tape is used to keep the paint off of a small portion of the rack so that when the tape is removed, the grounding point provides a good electrical connection to the frame. Other rack types may require you to scrape the paint off the screw hole.*

b. Connect the other end to the CBP frame ground terminal (located just below the wire wrap terminal block on the CBP rear panel (see Figure 3-75 [p. 3-90]).

Install Rack Alarm Cable Harness

37 Locate the rack alarm cable harness (HA660-1106-T003, Figure 3-71 [p. 3-86]).

Note: *The end of the rack alarm cable harness is not terminated with a connector. It is wire wrapped to the local office alarm facilities or at the CBP alarm-termination block.*

38 Review the following schematics:

- Rack alarm cable harness diagram (HA660-1106-T003 in Figure 3-71 [p. 3-86])
- Rack cabling schematic (identified in Step 2 [p. 3-96])

  Note: *Locate the rack alarm cable harness (HA660-1106-T003) within this schematic.*
- Rack alarm harness wire-wrap connection to CBP shown in Figure 3-78 [p. 3-93]

39 Using wire-wrap connections, connect the free wire ends of the rack alarm cable harness (HA660-1106-T003) to the wire-wrap pins on the CBP rear panel or local office alarm facilities. Refer to *Cable and Wiring Guide*, for wire-wrap, color-code details and *Circuit Breaker Panel*, for CBP alarm block details.

40 Secure the rack alarm cable to the interior of the rack so that the cable connectors (CNA through CNF) face the rear of the shelves.

Note: *Rack alarm cable connectors (CNA through CNF) have identical pinouts to the office alarm cable described in* Section 3.19.6 [p. 3-115].

Install Shelf Alarm Cables

41 Within the rack cabling schematic (identified in Step 2 [p. 3-96]) identify the shelf alarm cables (HA660-1102-T015) that connect shelves to the rack alarm cable harness (HA660-1106-T003). One shelf alarm cable is required for each shelf.

Figure 3-79 [p. 3-94] shows how the shelf alarm cable (HA660-1102-T015) connects to an Optical/Tributary shelf backplane.

42 For each shelf in the rack, connect both ends of shelf alarm cable (HA660-1102-T015) as follows:

a. Connect one end of the cable to the appropriate connector (CNA through CNF) of the rack alarm cable harness (HA660-1106-T003), as indicated in rack cabling schematic.

b. Connect the other end of the cable to the office alarm port on the shelf backplane as shown in Figure 3-79 [p. 3-94] (Optical or Tributary shelf).

43 Repeat Step 42 [p. 3-102] for each shelf in the rack.

Final Checks

44 Dress and lace all cables, and secure to the rack interior using standard local procedures.

45 Using local procedures, reconnect the battery office power that was removed from the rack, or reinstall the circuit breakers.

This procedure is complete.

3.17 Checking Power at Optical/Tributary Shelf

This procedure is used for verifying the power connections to the Optical/Tributary shelf.

DANGER:

Use caution when working on the power strip at the top of any shelf to avoid personal injury, damage to equipment, or both. Avoid touching terminals or uninsulated conductors.

Step	Task
1	Set the CBP circuit breakers for the installed shelves to the ON position. See Figure 3-73 [p. 3-88] for the appropriate circuit breaker, if necessary.
2	Remove the plastic cover over the power strip on the shelf backplane.
3	Connect the negative DMM test lead to the GA ground terminal on the rear-panel power strip, and connect the positive DMM test lead to the MAIN A voltage terminal. See Figure 3-80 [p. 3-103]. If required, record the test results for future reference.

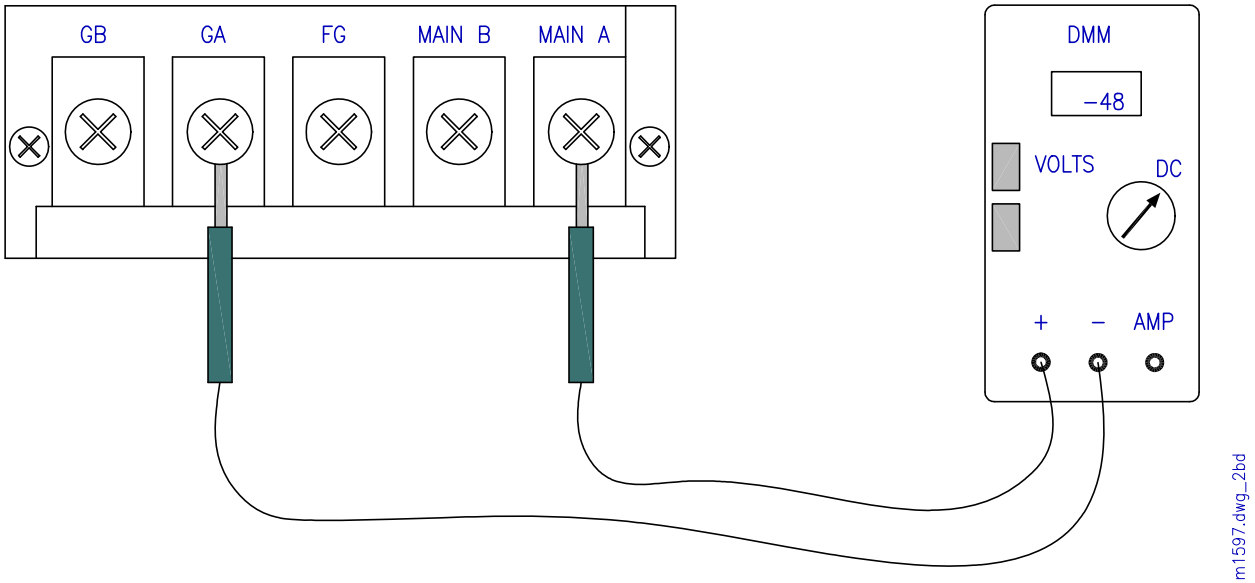


Figure 3-80: Supply Voltage Check

4 Is the DMM measurement between –40 and –57 V DC?

If YES:
Go to Step 5 [p. 3-104].

If NO:
Report as a trouble item to the installation group and repeat voltage checks after the trouble is corrected.

5 Connect the negative DMM test lead to the GB ground terminal on the rear-panel power strip, and connect the positive DMM test lead to the MAIN B voltage terminal. If required, record the test results for future reference.

6 Is the DMM measurement between –40 and –57 V DC?

If YES:
Go to Step 7 [p. 3-104].

If NO:
Report as a trouble item to the installation group and repeat voltage checks after trouble is corrected.

7 Reinstall the plastic cover over the power strip on the shelf backplane.

8 At the front of the Optical/Tributary shelf, locate the front-panel voltage test points (see Figure 3-81 [p. 3-104]), connect the negative DMM test lead to the G (ground) test point, and connect the positive DMM test lead to the MAIN A test point.

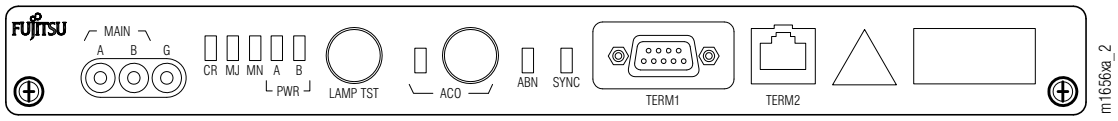


Figure 3-81: Front-Panel Voltage Test Points (Optical/Tributary Shelf) (Small Configuration)

9 Is the DMM measurement between –40 and –57 V DC?

If YES:
Go to Step 10 [p. 3-105].

If NO:
Report as a trouble item to the installation group and repeat voltage checks after trouble is corrected.

10 At the front of the Optical/Tributary shelf, locate the front-panel voltage test points (see Figure 3-81 [p. 3-104]), connect the negative DMM test lead to the G (ground) test point, and connect the positive DMM test lead to the MAIN B test point.

11 Is the DMM measurement between –40 and –57 V DC?

If YES:
Go to Step 12 [p. 3-105].

If NO:
Report as a trouble item to the installation group and repeat voltage checks after trouble is corrected.

12 Repeat the preceding steps for the remaining Tributary shelves.

13 Check the frame ground connections and readings according to local procedures.

This procedure is complete.

3.18 Checking Ground Resistance at the Optical/Tributary Shelf Power Input

Ideally, frame ground and battery return at the shelf power input connectors are common to each other. Essentially a resistance of 0 ohms should be present between them and little or no voltage potential across frame ground and battery return.

The test equipment required is a DMM or a voltmeter and ohmmeter that can accurately detect low resistance levels. See Figure 3-82 [p. 3-106].

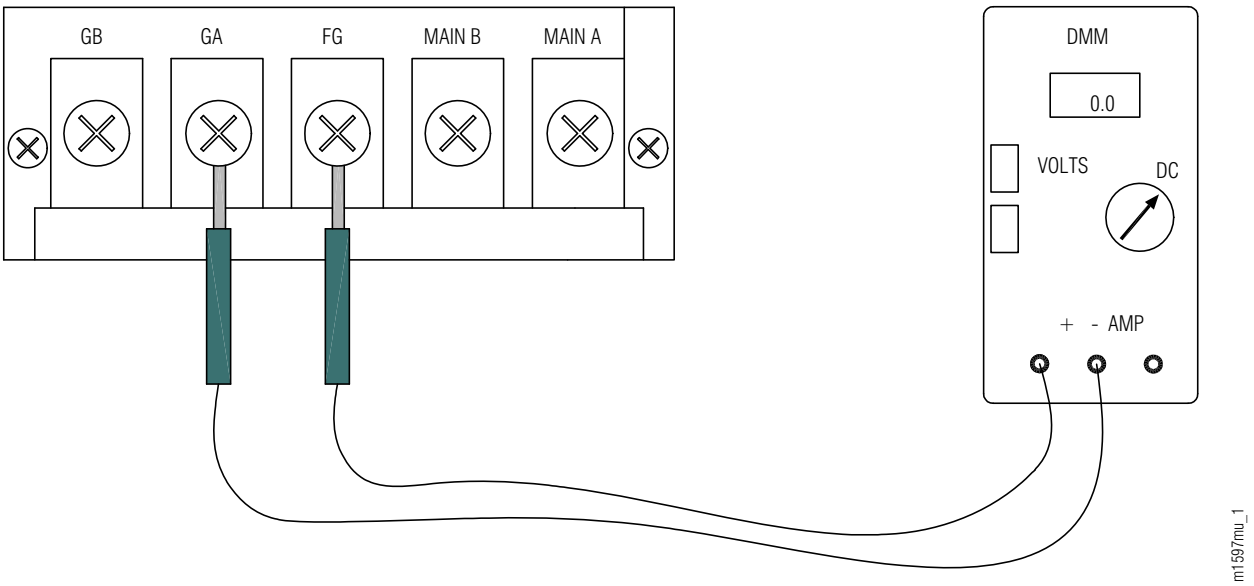


Figure 3-82: Ground Voltage Check Example

Step	Task
1	Use the DMM set to the voltmeter function or a voltmeter to measure the voltage between frame ground and each of the battery return points. The reading should be very close to 0 V DC.
2	Does the voltage exceed 1 V DC? **If YES:** Do not continue with Step 3 [p. 3-107] until the voltage source has been eliminated. For technical assistance, call 1-800-USE-FTAC (800-873-3822). **If NO:** Continue with Step 3 [p. 3-107].

3 Use the DMM set for the ohms function or an ohmmeter to measure the resistance between frame ground and each of the battery return points (A and B) on the shelf. The reading should be very close to 0 ohms.

4 Is the reading close to 0 ohms?

If YES:
Continue with Step 5 [p. 3-107].

If NO:
Do not continue with Step 5 [p. 3-107] until the voltage source has been eliminated. For technical assistance, call 1-800-USE-FTAC (800-873-3822).

5 Swap the DMM or ohmmeter leads between frame ground and battery return, and verify the same reading as described in Step 3 [p. 3-107].

This procedure is complete.

3.19 Installing Cables

This section includes the following subsections:

3.19.1 Overview

The procedures provided in this section cover the connections made to the Optical/Tributary shelf backplane of the FLASHWAVE 7500 Small Configuration system. A simplified backplane illustration (see Figure 3-83 [p. 3-109]) shows the backplane connectors and connector designations for the Optical/Tributary shelf.

All fiber cabling and connections to the shelf plug-in units are made during system turn-up. Refer to *System Turn-Up*, for fiber cabling information. For a detailed description of FLASHWAVE 7500 cables and shelf connectors, refer to *Cable and Wiring Guide*.

> ***Note:*** *Some of the connectors on the Optical/Tributary shelf backplane may be for future use. However, this practice defines all connectors on the shelf backplane and applicable cables that may be used in future releases.*

> ***Note:*** *All cabling from the Optical/Tributary shelf backplane should be connected only to other shelves and equipment within the same building.*

3.19.2 Prerequisites

The tools required for performing the procedures listed in this section are as follows:

- Cable termination tools
- Common hand tools

3.19.3 Optical/Tributary Shelf Backplane

System cable connections are made to the connectors located on the Optical/Tributary shelf backplane as shown in Figure 3-83 [p. 3-109] and described in the sections that follow. Power, ground, and alarm cabling was covered in Section 3.16 [p. 3-84].

Note: *Fiber cabling for the LAS2 (if used) is installed during system turn-up as described in System Turn-Up.*

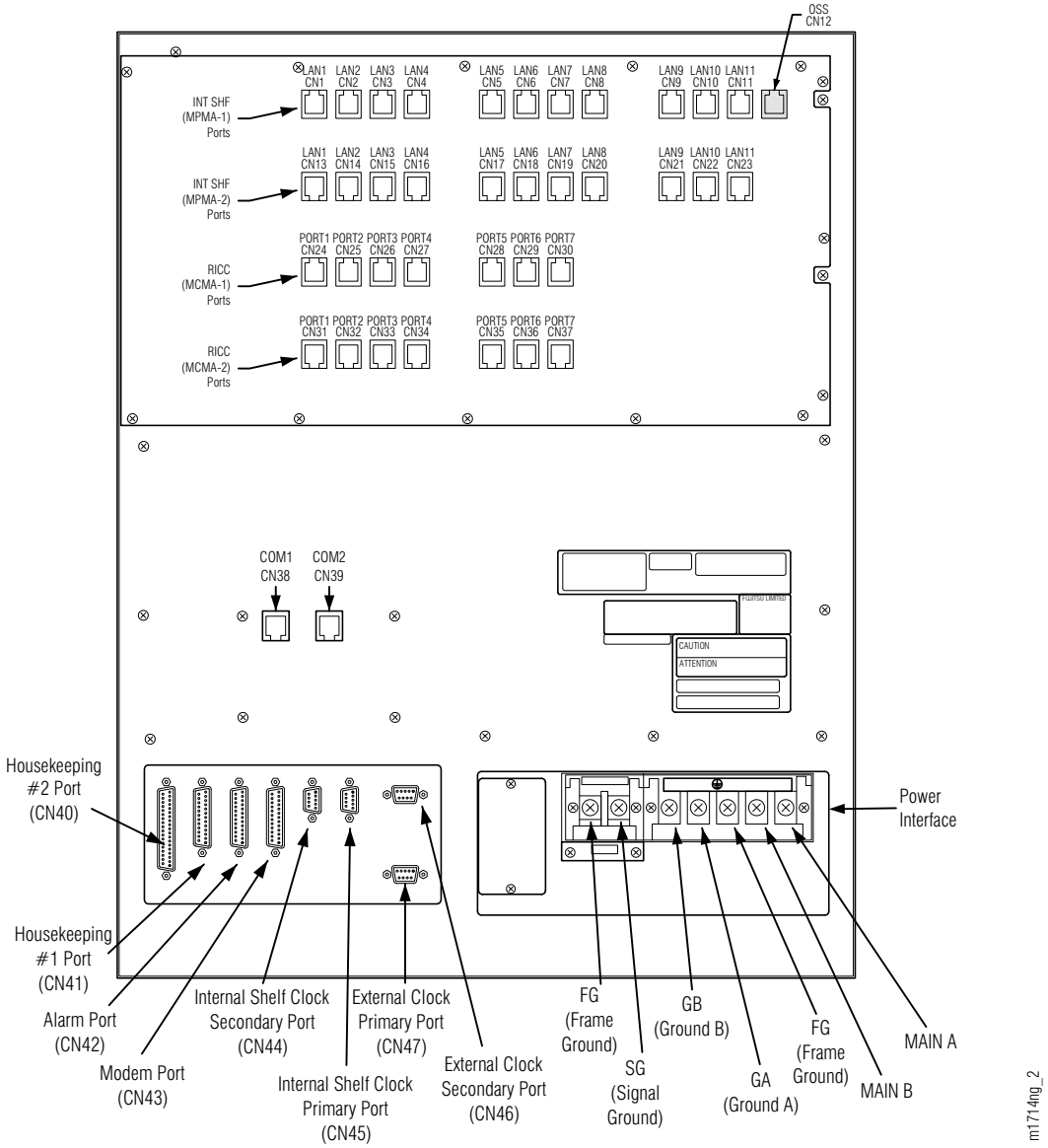


Figure 3-83: Optical/Tributary Backplane Connectors (Small Configuration)

3.19.4 Installing Modem Cable (Main Optical Shelf Backplane)

This procedure provides instructions for installing the 25-pin, D-sub modem cable and installing it on the Main Optical shelf backplane. Table 3-10 [p. 3-110] lists pertinent information for this cable. Figure 3-84 [p. 3-110] shows the cable connector pinouts.

Note: *The modem cable is a standard RS-232 straight-through (not null-modem) cable available at most computer supply stores.*

Table 3-10: Modem Cable Information (Small Configuration)

Cable Part Number	Backplane Connector Number	Cable Description	Connector Type	Cable Wire Size
21-176-xxx[a]	CN43	Modem access to remote NE	25-pin D-sub	24 AWG

[a] xxx = length in feet

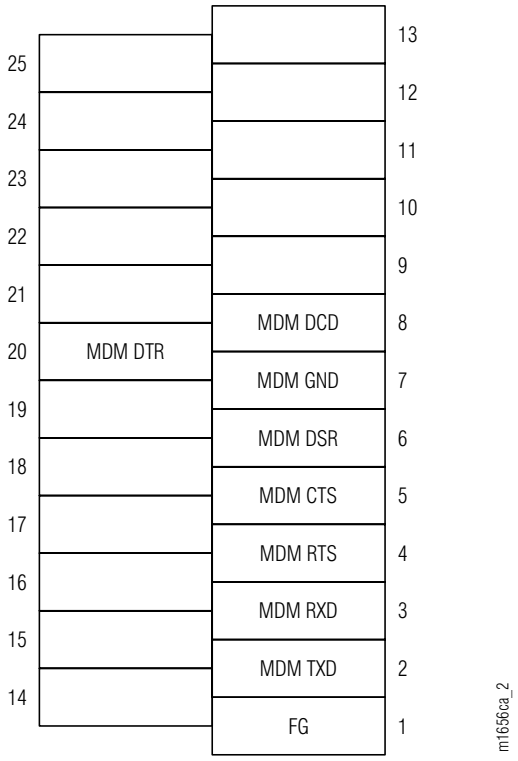


Figure 3-84: Connector Pinouts, 25-Pin D-Sub Modem Cable

Step	Task
1	Connect the modem cable to connector CN43 (Main Optical shelf), and secure with retaining screws. See Figure 3-83 [p. 3-109].
2	Connect the other end of the modem cable to the appropriate external modem.

Note: *To connect a PC directly to connector CN43, use a null-modem cable in place of the 21-176-xxx cable.*

This procedure is complete.

3.19.5 Installing Housekeeping Cables (Main Optical Shelf)

This procedure provides instructions for assembling the housekeeping 1 (HK1) and housekeeping 2 (HK2) cables and installing them on the Main Optical shelf backplane. Table 3-11 [p. 3-112] lists pertinent information for these cables. Figures 3-85 [p. 3-112] and 3-86 [p. 3-113] show the cable connector pinouts.

Table 3-11: Housekeeping Cable Information (Small Configuration)

Cable Part Number	Backplane Connector Number	Cable Description	Connector Type	Cable Wire Size
21-626-xxx[a]	CN41	HK1 input of housekeeping alarm signals from ancillary equipment	25-pin D-sub	24 AWG
21-537-xxx[a]	CN40	HK2 control of housekeeping alarm signals from ancillary equipment	37-pin D-sub	24 AWG

[a] xxx = length in feet

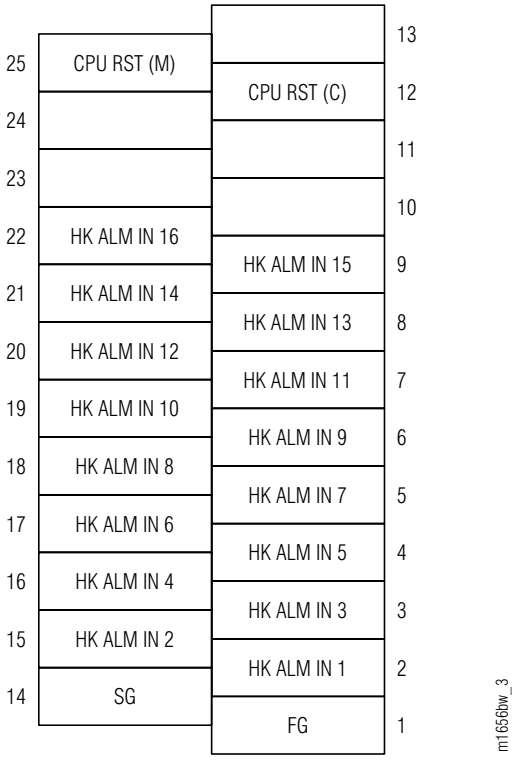


Figure 3-85: Connector Pinouts, HK1 Cable

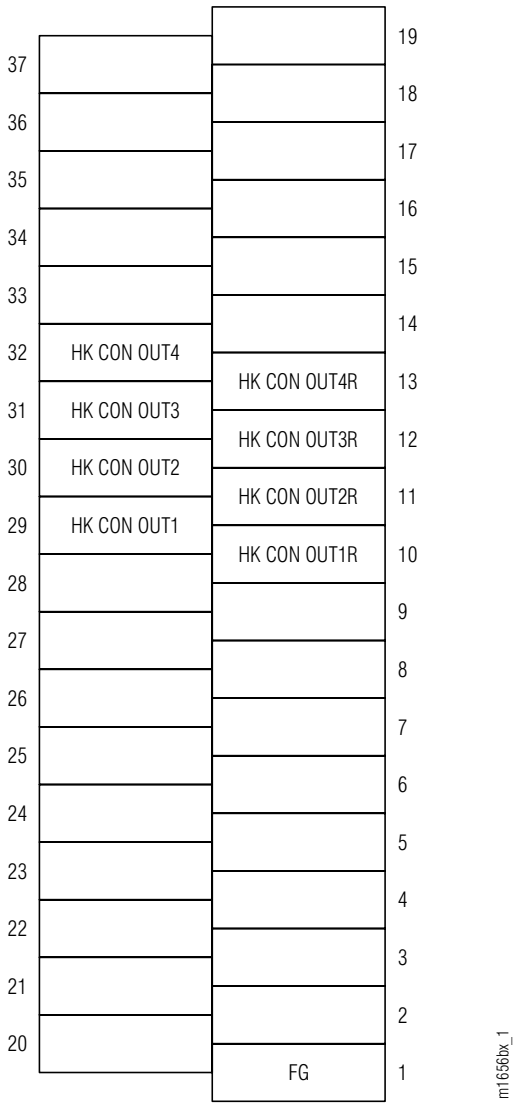


Figure 3-86: Connector Pinouts, HK2 Cable

Step	Task
1	Connect the HK1 input housekeeping cable to backplane connector CN41 (Main Optical shelf), and secure in place using retaining screws. See Figure 3-83 [p. 3-109].

Note: *The far end of 21-626-xxx is not terminated with a connector.*

2 Connect the other end of the HK1 input housekeeping cable to the appropriate alarm termination point on the local environmental alarm termination block. Refer to *Cable and Wiring Guide*, for color code details.

Note: *Pins 12 and 25 of HK1 can be used to initiate a remote CPU reset.*

3 Connect the HK2 control housekeeping cable to backplane connector CN40 (Optical shelf), and secure with retaining screws. See Figure 3-83 [p. 3-109].

4 Connect the other end of the HK2 control housekeeping cable to the appropriate alarm termination point on the local environmental alarm termination block. Refer to *Cable and Wiring Guide*, for color code details.

5 Record the termination points used, and provide documentation to site personnel.

This procedure is complete.

3.19.6 Installing Office Alarm Cable (Optical/Tributary Shelf)

This procedure provides instructions for connecting the office alarm cable. The cable should already have been installed as described in Section 3.16 [p. 3-84]. Table 3-12 [p. 3-115] lists additional information for this cable. Figure 3-87 [p. 3-116] shows the shelf alarm cable connector pinouts.

Note: *The connector pinouts for the rack alarm cable connectors (CNA through CNF) are the same as CN42.*

Table 3-12: Connectors for Alarms (Small Configuration)

Cable Part Number	Backplane Connector Number	Cable Description	Connector Type	Cable Wire Size
HA660-1102-T015	CN42	Output of system alarm signals through the rack alarm harness to the circuit breaker panel. This cable connects the shelf alarms to the rack alarm cable harness. See Figure 3-71 [p. 3-86] and Figure 3-79 [p. 3-94].	25-pin D-sub	24 AWG
HA660-1106-T003	n/a	Rack alarm cable harness providing six daisy-chain termination points (CNA through CNF) for shelf alarm cabling. Terminates at wire wrap facilities as required. See Figure 3-71 [p. 3-86] and Figure 3-78 [p. 3-93].	25-pin D-sub	24 AWG

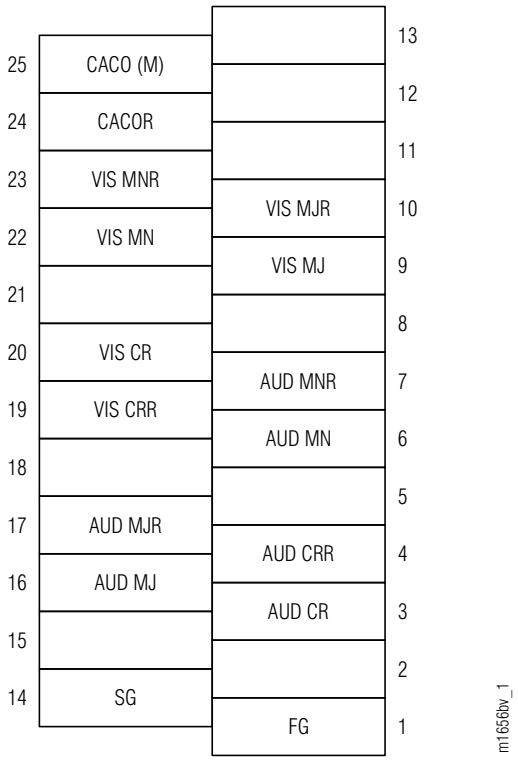


Figure 3-87: Connector Pinouts, Alarm Cable

Step	Task
1	If not already installed, refer to Section 3.16 [p. 3-84] to install the alarm cable. See Figure 3-71 [p. 3-86] for cable assembly drawings and Figures 3-72 [p. 3-87] through 3-74 [p. 3-89] for power, ground, and alarm cabling diagrams.
2	Ensure that backplane alarm connector CN42 of the Optical Tributary shelves (see Figure 3-83 [p. 3-109]) are connected to a shelf cable assembly that terminates into one of the rack alarm cable harness connectors (CNA through CNF; see Figures 3-72 [p. 3-87] through 3-74 [p. 3-89]).
3	The end of the multiconnector, rack alarm cable assembly (not terminated and nonconnectorized) is wire wrapped to the local office alarm facilities or at the CBP alarm termination block. Refer to *Cable and Wiring Guide*, for wire-wrap color code details and *Circuit Breaker Panel*, for CBP alarm block details. This procedure is complete.

3.19.7 Installing OSS Cable (Optical Shelf)

This procedure provides instructions for assembling the OSS cable and installing it on the Optical shelf backplane (CN12). Table 3-13 [p. 3-117] lists pertinent information for this cable. Figure 3-88 [p. 3-117] shows the cable connector pinouts.

Table 3-13: OSS Cable Information (Small Configuration)

Cable Part Number	Backplane Connector Number	Cable Description	Connector Type	Cable Wire Size
21-332-xxx or 21-094-xxx[a]	CN12	Ethernet connection	8-pin RJ-45	24 AWG

[a] xxx = length in feet

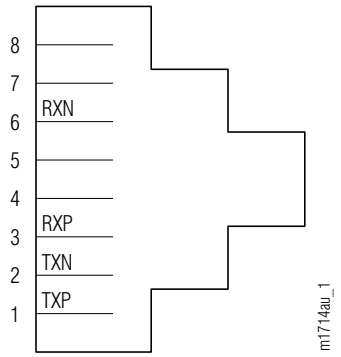


Figure 3-88: Connector Pinouts, OSS Cable

Step	Task
1	Connect the cable to shelf backplane connector CN12 (Optical shelf). See Figure 3-83 [p. 3-109].
2	Connect the other end of the cable to the appropriate router or hub.

Note: *The 21-094-xxx cable can also be used to connect a PC to the TERM2 Ethernet port on the Optical shelf front panel.*

Note: *The OSS port has automatic cable-detect capability to properly function with both crossover and straight cables.*

This procedure is complete.

3.19.8 Installing LAN Cable (Optical/Tributary Shelf)

This procedure provides instructions for connecting to the LAN ports on the Optical/Tributary shelf backplane. Table 3-14 [p. 3-118] lists pertinent information for these cables. Figure 3-89 [p. 3-118] shows the cable connector pinouts.

Table 3-14: LAN Cable Information (Small Configuration)

Cable Part Number	Backplane Connector Number	Cable Description	Connector Type	Cable Wire Size
21-332-xxx[a]	For the Optical shelf: CN2 CN6	LAN connection	RJ-45	24 AWG
	For Tributary shelves: CN1 CN3			

[a] xxx = length in feet

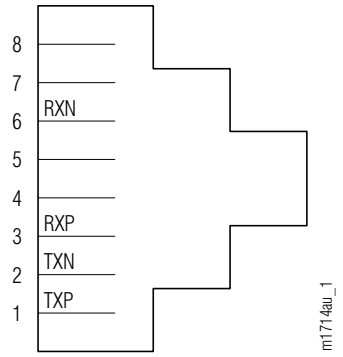


Figure 3-89: Connector Pinouts, LAN Cable

Step	Task
1	Connect the RJ-45 connector on one end of the LAN cable (21-332-xxx) to the primary Tributary shelf or Auxiliary Optical shelf backplane connector CN1.

2 Connect the other end of the LAN cable to the appropriate Optical shelf backplane connector (CN2…CN6), Auxiliary Optical shelf backplane connector (CN2…CN5), or Tributary shelf backplane connector (CN2 or CN3), as shown in Figure 3-90 [p. 3-119] and listed in Table 3-15 [p. 3-119].

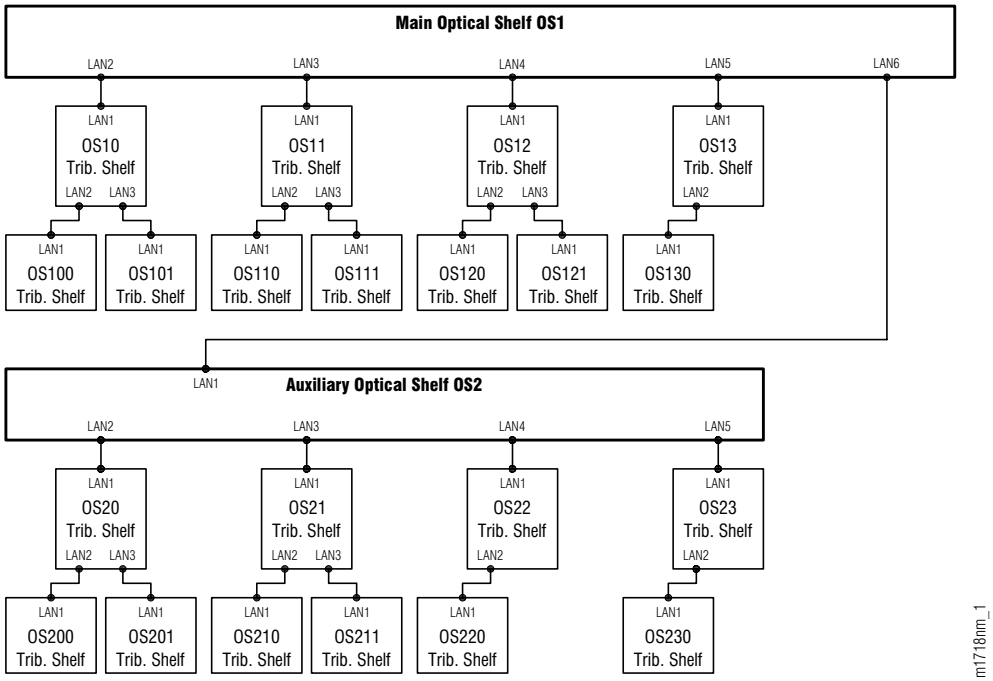


Figure 3-90: Hierarchy of LAN Connections (Small Configuration)

Table 3-15: LAN Connections (Small Configuration) (1 of 2)

From			To		
Shelf	**Connector**	**Label**	**Shelf**	**Connector**	**Label**
OS1 (Main Optical)	CN2	LAN2	OS10 (Tributary)	CN1	LAN1
	CN3	LAN3	OS11 (Tributary)	CN1	LAN1
	CN4	LAN4	OS12 (Tributary)	CN1	LAN1
	CN5	LAN5	OS13 (Tributary)	CN1	LAN1
	CN6	LAN6	OS2 (Auxiliary Optical)	CN1	LAN1
OS10 (Tributary)	CN2	LAN2	OS100 (Tributary)	CN1	LAN1
	CN3	LAN3	OS101 (Tributary)	CN1	LAN1

Table 3-15: LAN Connections (Small Configuration) (2 of 2)

From			To		
Shelf	**Connector**	**Label**	**Shelf**	**Connector**	**Label**
OS11 (Tributary)	CN2	LAN2	OS110 (Tributary)	CN1	LAN1
	CN3	LAN3	OS111 (Tributary)	CN1	LAN1
OS12 (Tributary)	CN2	LAN2	OS120 (Tributary)	CN1	LAN1
	CN3	LAN3	OS121 (Tributary)	CN1	LAN1
OS13 (Tributary)	CN2	LAN2	OS130 (Tributary)	CN1	LAN1
OS2 (Auxiliary Optical)	CN2	LAN2	OS20 (Tributary)	CN1	LAN1
	CN3	LAN3	OS21 (Tributary)	CN1	LAN1
	CN4	LAN4	OS22 (Tributary)	CN1	LAN1
	CN5	LAN5	OS23 (Tributary)	CN1	LAN1
OS20 (Tributary)	CN2	LAN2	OS200 (Tributary)	CN1	LAN1
	CN3	LAN3	OS201 (Tributary)	CN1	LAN1
OS21 (Tributary)	CN2	LAN2	OS210 (Tributary)	CN1	LAN1
	CN3	LAN3	OS211 (Tributary)	CN1	LAN1
OS22 (Tributary)	CN2	LAN2	OS220 (Tributary)	CN1	LAN1
OS23 (Tributary)	CN2	LAN2	OS230 (Tributary)	CN1	LAN1

3 Proceed to Section 3.19.9, Installing RICC Cable (Optical Shelf) [p. 3-121], if RICC cables are required.

This procedure is complete.

3.19.9 Installing RICC Cable (Optical Shelf)

This procedure provides instructions for connecting to the RICC ports on the Optical shelf backplane. Table 3-16 [p. 3-121] lists pertinent information for these cables. Figure 3-91 [p. 3-121] shows the cable connector pinouts.

Note: *The RICC cable is only required for HUB configurations.*

Table 3-16: RICC Cable Information (Small Configuration)

Cable Part Number	Backplane Connector Number	Cable Description	Connector Type	Cable Wire Size
21-332-xxx[a]	CN24, CN25, CN31, and CN32 (Main and Auxiliary Optical shelves)	RICC connection	RJ-45	24 AWG

[a] xxx = length in feet

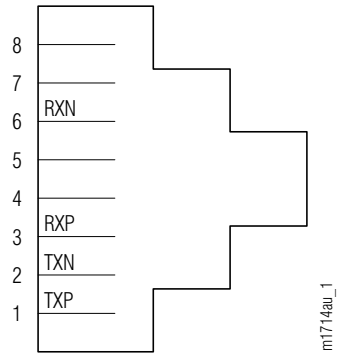


Figure 3-91: Connector Pinouts, RICC Cable

Step	Task
1	Connect the RJ-45 connector on one end of the RICC cable (21-332-xxx) to Main Optical shelf backplane connector CN24, CN25, CN31, or CN32.
2	Connect the other end of the RICC cable to the appropriate Auxiliary Optical shelf backplane connector indicated in Table 3-17 [p. 3-122].

Table 3-17: RICC Connections from OS1 to OS2 (Small Configuration)

From				To			
Shelf	**Port**	**Connector**	**Label**	**Shelf**	**Port**	**Connector**	**Label**
OS1 (Main)	OS1-16-PC1	CN31	PORT1	OS2 (Auxiliary)	OS2-16-PC1	CN31	PORT1
	OS1-16-PC2	CN32	PORT2		OS2-14-PC1	CN24	PORT1
	OS1-14-PC1	CN24	PORT1		OS2-16-PC2	CN32	PORT2
	OS1-14-PC2	CN25	PORT2		OS2-14-PC2	CN25	PORT2

This procedure is complete.

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4

ETSI CONFIGURATION

This chapter includes the following procedures:

4.1 Overview

This chapter provides prerequisites and procedures for installing a rack and installing or connecting the shelves, plug-in units, and cables that make up the FLASHWAVE® 7500 ETSI Configuration system. This chapter also describes the basic rack configurations for the FLASHWAVE 7500 ETSI Configuration system. Procedures for attaching cables to the Optical/Tributary shelf are provided in Section 4.16, Installing Cables [p. 4-77].

> ***Note:*** *In an ETSI Configuration, the Optical/Tributary shelf is the ETSI shelf (FC9682SHU4). The name of a specific shelf depends on its function as determined by the connections to its station interface area (SIA) and the plug-in units installed. An Optical shelf supports the main ring wavelength division multiplexing (WDM) facilities; a Tributary shelf provides client services.*

The information contained in the following sections applies to the ETSI 40-Ch WSS Configuration application.

Before performing the installation procedures, review the following subsections describing prerequisites, standard rack configurations, and flange kits.

4.2 Prerequisites

Ensure that all FLASHWAVE 7500 ETSI Configuration equipment has been received, and all data forms and job engineering drawings have been completed and are available.

The tools required for performing procedures listed in this chapter include the following:

- Common hand tools
- Digital multimeter (DMM)

4.3 Rack Configurations and Shelf Flange Kits

This section describes rack configurations and shelf flange kits for mounting shelves in the racks. It includes the following subsections:

4.3.1 Standard Rack Configurations

The FLASHWAVE 7500 ETSI Configuration system racks can be configured in several variations. Fujitsu recommends ordering the top-level part number of a particular rack, which would include the rack, the appropriate shelves and plug-in units, the rack wiring and cabling, and other miscellaneous devices and equipment as required. The system racks are installed on site in accordance with local plans and procedures.

Another consideration is to order racks populated with a minimum of shelves and then add to the complement as required (the racks are wired for a full complement of shelves). In addition, the FLASHWAVE 7500 ETSI Configuration system equipment, minus the rack, can be ordered and installed in customer-supplied racks.

Figures 4-1 [p. 4-4] through 4-5 [p. 4-8] show the standard rack configurations for a FLASHWAVE 7500 ETSI Configuration NE. For detailed procurement information, refer to *Ordering Information*, or contact your Fujitsu sales representative.

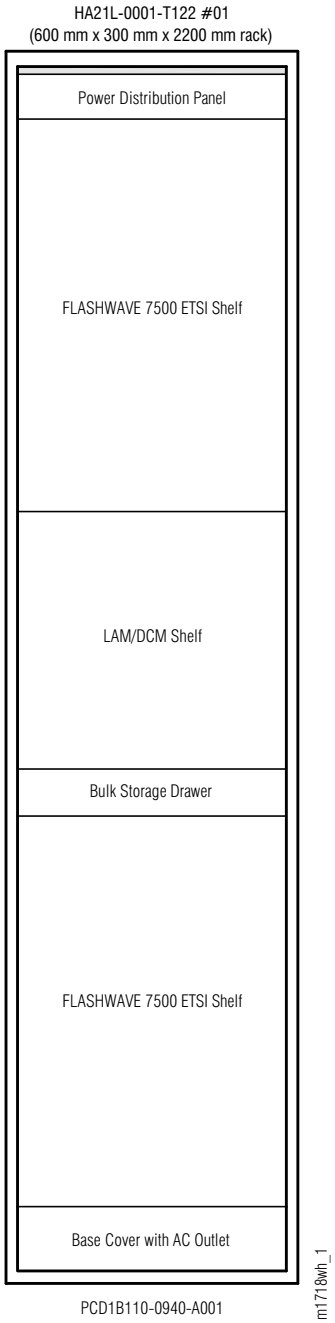


Figure 4-1: Rack Configuration with Two FLASHWAVE 7500 Optical Shelves and One LAM/DCM Shelf (PCD1B110-0940-A001) (ETSI Configuration)

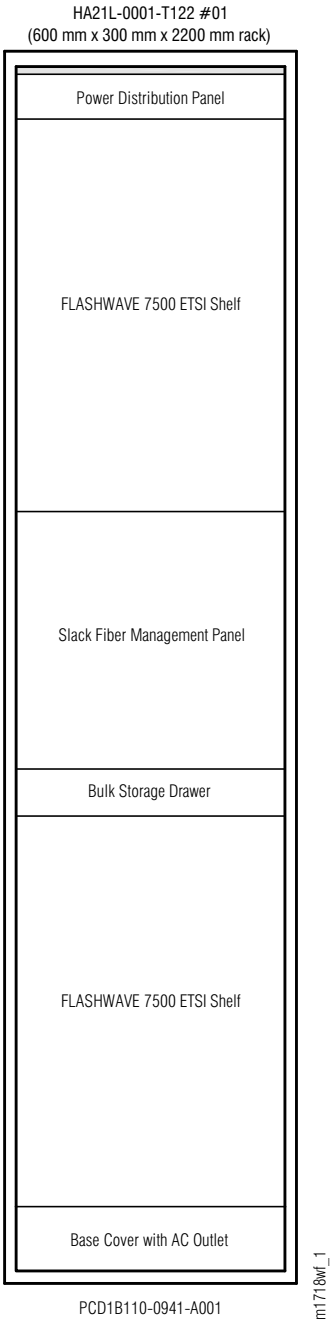


Figure 4-2: Rack Configuration with Two FLASHWAVE 7500 Shelves (PCD1B110-0941-A001) (ETSI Configuration)

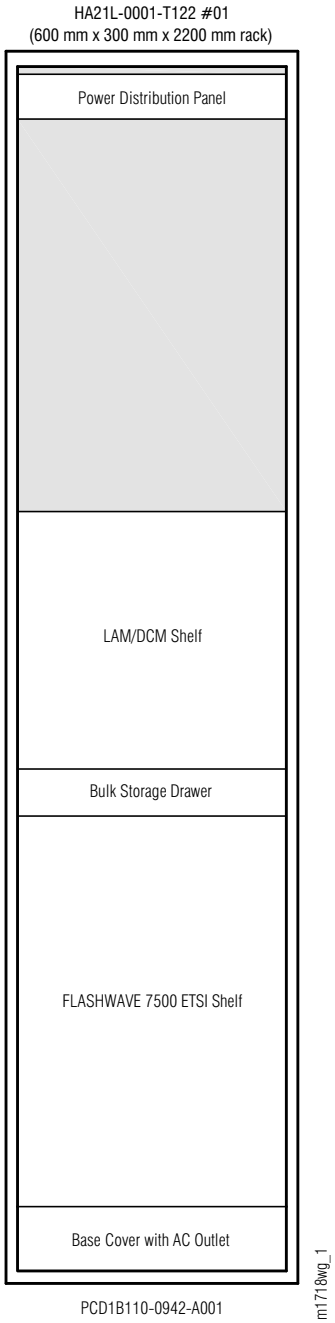


Figure 4-3: Rack Configuration with One FLASHWAVE 7500 Shelf and One LAM/DCM Shelf (PCD1B110-0942-A001) (ETSI Configuration)

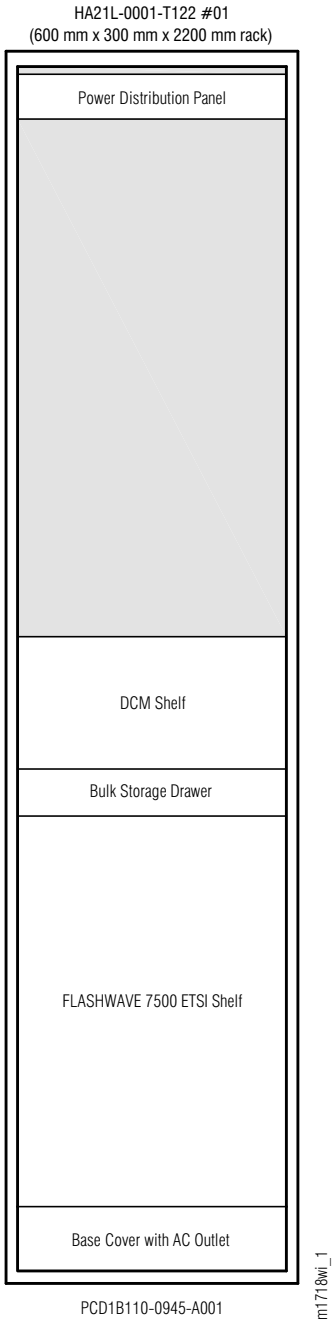


Figure 4-4: Rack Configuration with One ILA Shelf (PCD1B110-0945-A001) (ETSI Configuration)

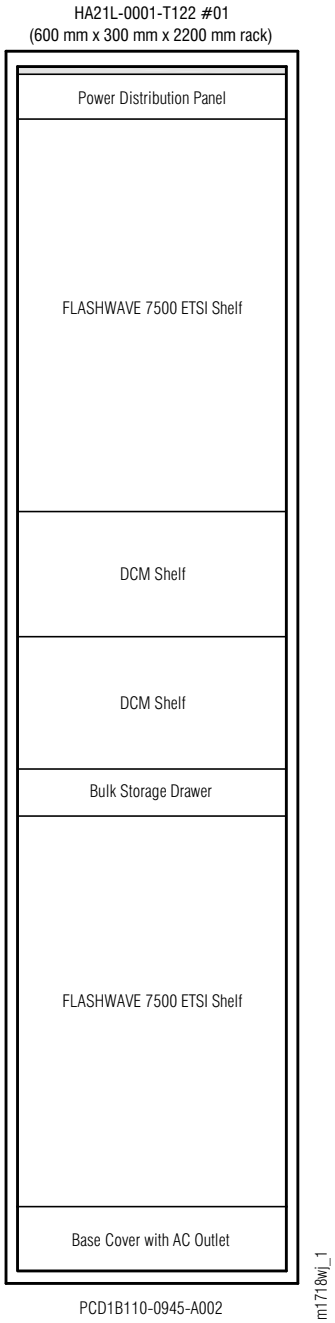


Figure 4-5: Rack Configuration with Two ILA Shelves (PCD1B110-0945-A002) (ETSI Configuration)

4.3.2 Flange Kits for ETSI Racks

Table 4-1 [p. 4-9] lists shelves and mounting flanges applicable to ETSI rack applications.

Table 4-1: Shelves and Flange Kits for ETSI Rack Applications

Shelf	Shelf Name (Part Number) Description	Flange Kit Name (Part Number) Description
Optical/Tributary shelf	SHU4 (FC9682SHU4) ETSI shelf	Comes with shelf
Power Distribution	ETSI power distribution panel (PDP)[a]	n/a
Heat Baffle	HSW4 (FC9682HSW4) ETSI Heat Baffle	Comes with shelf
DCM Shelf	SFD6 (FC9682SFD6) ETSI DCM shelf	ETSI mounting flange kit for DCM shelf (FC9682FLGD)
LAM/DCM Shelf	LAM/DCM (FC9682SDL1) ETSI LAM/DCM shelf	ETSI flange adapter kit for LAM/DCM shelf (FC9682FLGA)

[a] Fujitsu does not manufacture a power distribution panel for ETSI applications. Fujitsu recommends using the ADC # PWX-1LFA2DF fuse panel manufactured by ADC Telecommunications, Inc. Refer to ADC documentation for installation instructions for the ADC # PWX-1LFA2DF fuse panel. This unit can be ordered through Fujitsu using part number PC15L-0001-C083#01.

4.4 Storing, Unpacking, and Inspecting Equipment

This section describes how to store, unpack, and inspect the FLASHWAVE 7500 equipment. It includes the following subsections:

Note: *Review* Section 4.5 [p. 4-15] *for rack installation criteria.*

4.4.1 Storing Equipment

When equipment is to be kept in storage, the equipment should be left in the shipping containers. The storage bags are coated with a conductive material to protect plug-in units from damage by electrostatic discharge (ESD). Observe all warning labels used by Fujitsu to indicate electrostatic-sensitive devices.

4.4.2 Unpacking and Inspecting the Equipment Rack

This procedure provides guidelines for unpacking and inspecting a standard rack. Fujitsu recommends that the installation team familiarize themselves with the specific area where the installation is to be performed, examine the racks, and ensure that sufficient workspace to unpack the racks is available.

DANGER:

Improper handling of the equipment rack can result in serious injury or death. Always use a forklift or lifting sling with block and tackle to lift or move the equipment rack. Keep all personnel clear of the equipment rack while it is being lifted. Do not attempt to handle and install the racks without sufficient assistance.

Follow this procedure to unpack and inspect the equipment rack:

Step	Task
1	Identify the equipment rack to be installed.

2 Before unpacking the equipment rack, inspect the container (see Figure 4-6 [p. 4-11]) for signs of shipping damage. Claims for shipping damage must be filed with the transportation company in accordance with their published procedure.

Figure 4-6: Example of an Equipment Rack in Shipping Container

Note: *A shipping label is located on the front of the equipment rack container. Compare this with the shipping documents.*

3 Is this the correct shipment for this location?

If YES:
Continue with Step 4 [p. 4-11].

If NO:
Go to Step 16 [p. 4-13].

4 Using all data sheets and job engineering drawings, verify that the information matches the installation site.

5 Using industrial shears, cut the two shipping bands from the container. See Figure 4-6 [p. 4-11] for the location of the shipping bands.

After the last shipping band is cut, the top of the shipping container will fall away.

6 Use a pry bar to remove the lid of the crate to access the ETSI rack. See Figure 4-6 [p. 4-11].

7 Remove the equipment rack.

8 Inspect the rack thoroughly to ensure that it is not damaged.

9 Is there any noticeable damage to the rack?

If YES:
Go to Step 16 [p. 4-13].

If NO:
Continue with Step 10 [p. 4-12].

Note: *The equipment rack should be completely covered with shrink wrap to prevent damage during shipment.*

10 At the side of the rack, use industrial shears to cut open the shrink wrap. Start cutting from the bottom of the rack to the top.

WARNING:

Always cut at the side of the rack to avoid damaging the equipment. Standard configuration racks are delivered prewired. Do not cut or disconnect any wires.

11 Carefully remove the shrink wrap from the rack.

12 Is there any noticeable damage to the rack after the shrink wrap is removed?

If YES:
Go to Step 16 [p. 4-13].

If NO:
Continue with Step 13 [p. 4-12].

13 Does the rack contain equipment (standard rack configuration)?

If YES:
Continue with Step 14 [p. 4-12].

If NO:
Go to Step 18 [p. 4-13].

14 Locate the serial numbers on the left side of each equipment shelf mounted in the rack, and compare the serial numbers with the serial numbers on the shipping documents.

15 Do the serial numbers on the equipment and the shipping documents match?

If YES:
Go to Step 17 [p. 4-13].

If NO:
Continue with Step 16 [p. 4-13].

16 Notify the transportation company if the equipment was damaged or if an improper shipment was received. DO NOT continue the installation of the equipment until the problem has been corrected. After the problem is resolved, repeat this procedure beginning with Step 2 [p. 4-11].

17 Update office records according to local procedures.

18 Do you want to install the equipment rack now?

If YES:
Proceed to Section 4.5, Installing the Rack [p. 4-15].

If NO:
This procedure is complete.

4.4.3 Unpacking and Inspecting Equipment

This procedure provides guidelines for unpacking system equipment and ensuring the safe arrival of all equipment. Fujitsu recommends that the installation team familiarize themselves with the specific area where the installation is to be performed, examine the racks to be used, and ensure that sufficient workspace to unpack the equipment is available.

DANGER:

Do not attempt to handle and install the shelves without sufficient assistance. The Optical/Tributary shelf weighs approximately 48.5 lb (22 kg) empty (without fans). Equipped, the Optical/Tributary shelf weighs significantly more. Handling the equipment without sufficient assistance may result in personal injury, damage to the equipment, or both.

WARNING:

Do not use the internal walls of any shelf as a lifting point or lift support. Doing so may damage the plug-in unit rail support.

Step	Task
1	Before unpacking the equipment, inspect the containers for signs of shipping damage. Claims for shipping damage must be filed with the transportation company in accordance with their published procedure.
2	Unpack and inventory individual system equipment components; however, leave all plug-in units in their original, individual containers until they are installed during system turn-up. When unpacking, use the checkoff list accompanying each shipment to determine that all items are present before proceeding with the installation. If a shortage of any kind exists, notify the appropriate Fujitsu representative.
3	Inspect the inside and outside of the shelves for damage.
4	Check for debris possibly lodged in each shelf station interface area (SIA).
5	Update office records according to local procedures. This procedure is complete.

4.5 Installing the Rack

This procedure details the steps required to install a standard rack. Fujitsu recommends that the installation team familiarize themselves with the specific area where the installation is to be performed, examine the rack, and ensure that sufficient workspace to install the rack is available.

DANGER:

Improper handling of the equipment rack can result in serious injury or death. Always use a forklift or lifting sling with block and tackle to lift or move the equipment rack. Keep all personnel clear of the equipment rack while it is being lifted. Do not attempt to handle and install the racks without sufficient assistance.

CAUTION:

The rack should be mounted on a concrete or other noncombustible surface only.

The following tools are required to perform this procedure:

- Hammer
- Drill
- Drill bits sufficient to drill into the flooring
- Punch
- Common hand tools, including a wrench or ratchet set

Follow this procedure to install the equipment rack:

Step	Task
1	Identify the equipment rack to be installed.
2	Inspect all shipping documents to ensure that the correct shipment was received. Refer to Section 4.4.2, Unpacking and Inspecting the Equipment Rack [p. 4-10].
3	Using the documentation supplied with the rack package, mark the floor for proper mounting.

Figure 4-7 [p. 4-16] shows an **example** mounting diagram. Mounting diagrams will vary depending on equipment and location.

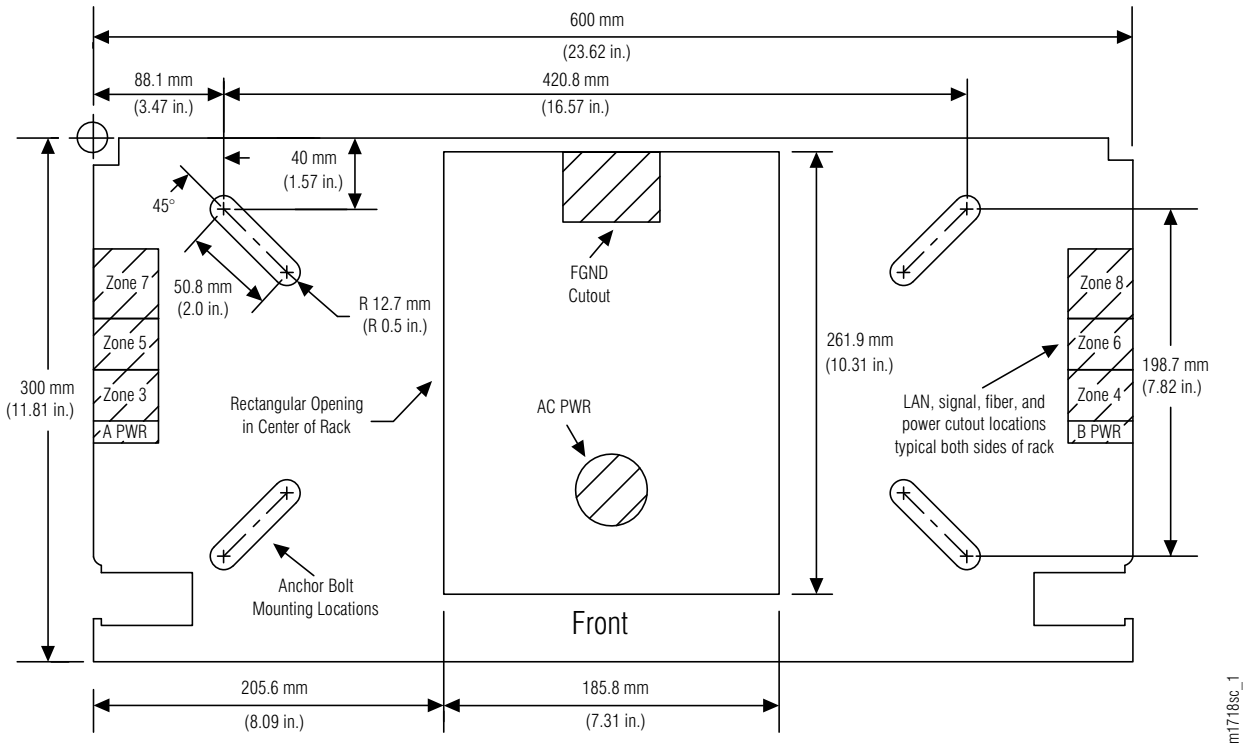


Figure 4-7: Example Diagram—Equipment Rack Floor Dimensions

4 Using a punch and hammer, mark the position where the holes are to be drilled.

5 Determine the type of floor anchor to be used.

6 Is the floor anchor for a concrete floor?

If YES:
Go to Step 7 [p. 4-16].

If NO:
Go to Step 14 [p. 4-17].

7 In accordance with the dimensions of the anchor to be used, drill the holes in the concrete floor.

8 Clean the drill shavings from the holes.

9 Install an anchor in each of the holes.

10 Remove any debris from the area in which the rack will be mounted.

11 Move the rack into position, aligning each of the holes in the base of the rack to the anchors.

12 Install the mounting bolts into the anchors, and tighten them to within 12.7 mm (0.5 inch) of the equipment rack baseplate. Do not fully tighten at this time.

13 Go to Step 19 [p. 4-17].

14 Drill the holes in the raised floor in accordance with the dimensions of the mounting bolts being used.

15 Remove any debris from the area in which the rack will be mounted.

16 Move the rack into position, aligning each of the holes in the base of the rack to the anchors.

17 Install the mounting bolts with lock washers through the equipment rack baseplate and the raised floor.

18 Install the nuts to the bolts under the raised floor. Tighten them until the lock washers begin to compress, but do not fully tighten them now.

19 Secure the top of the equipment rack according to the job specifications. Some equipment racks are secured to existing overhead framework, while others are secured to an adjacent wall using a horizontal mounting brace. All overhead mounting hardware should be tightened after assembly.

20 Tighten the floor mounting bolts.

Note: *If the rack is installed on a raised floor, there will likely be some type of supports needed. Instructions for seismic zone installation must also be considered. Follow your local practices for support and bracing of the rack.*

21 Measure the vertical alignment of the 2200 mm (86.6 inches) equipment rack. Ensure vertical alignment is within 4.76 mm (0.1875 inches).

22 Is the equipment rack within the tolerance level specified in Step 21 [p. 4-17]?

If YES:
Go to Step 27 [p. 4-18].

If NO:
Continue with Step 23 [p. 4-18].

23 Loosen the floor mounting bolts and top mounting hardware, and adjust the equipment rack using shims on the mounting hardware. All shims and adjustments must meet locally acceptable guidelines. Shims are not supplied with the ETSI rack.

24 Retighten all mounting hardware.

25 Measure the vertical alignment of the 2200 mm (86.6 inches) equipment rack. Ensure vertical alignment is to within 4.76 mm (0.1875 inches).

26 Is the equipment rack within the tolerance level specified in Step 25 [p. 4-18]?

If YES:
Continue with Step 27 [p. 4-18].

If NO:
Go back to Step 23 [p. 4-18].

27 Update office records according to local procedures.

This procedure is complete.

4.6 Installing the ETSI Power Distribution Panel

The ETSI power distribution panel (PDP) (see Figure 4-8 [p. 4-19]) should be the first item installed in the rack. After the PDP is installed at the top of the rack, the other equipment can be installed.

Note: *Fujitsu does not manufacture a power distribution panel for ETSI applications. Fujitsu recommends using the ADC # PWX-1LFA2DF fuse panel manufactured by ADC Telecommunications, Inc. Refer to ADC documentation for installation instructions for the ADC # PWX-1LFA2DF fuse panel. This unit can be ordered through Fujitsu using part number PC15L-0001-C083#01.*

Note: *The PDP may not have fuses A1-1 through B2-2 installed. Locate the 46-287-003 TPA 15A or 46-290-003 TPA 30A fuse kit, if required, for labels and fuses.*

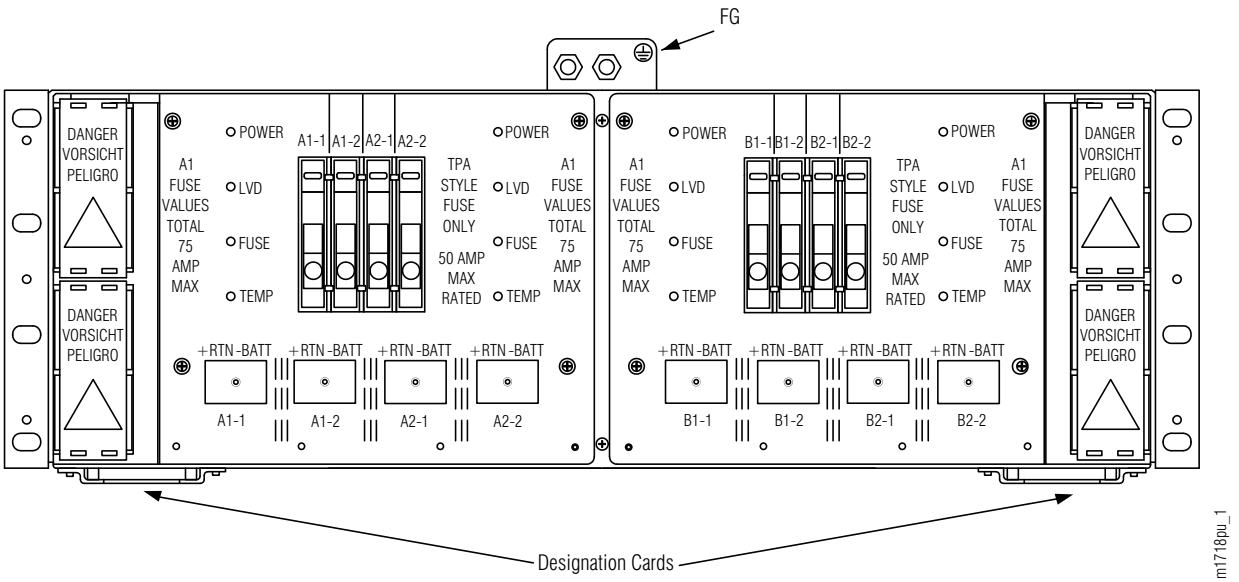


Figure 4-8: ETSI Power Distribution Panel, PC15L-0001-C083#01

4.7 Connecting and Checking Office Battery to the PDP

This section includes the following subsections:

If not done previously as part of an earlier FLASHWAVE 7500 installation, the office-battery power cables must be connected to the PDP power input connectors. However, the office-battery ends of the power cables must not be connected to the primary power source until the PDP is completely installed.

> ***Note:*** *In this section, the term* battery *refers to the office DC power feed for the bay in which the equipment is being mounted.*

The PDP supports four separate battery/return power sources:

- A1 Input
- A2 Input
- B1 Input
- B2 Input

Each power input connection consists of a pair of 2-hole compression lugs (0.25 inch holes on 0.625 inch centers).

An additional connector is provided for chassis ground.

For additional details on the PDP, refer to ADC # PWX-1LFA2DF documentation supplied by the vendor.

The following tools are required:

- No. 1 Phillips screwdriver
- 7/16 inch socket wrench

4.7.1 Connecting Office Battery to PDP

See Figure 4-9 [p. 4-21] for the location of terminals on the front of the PDP. Power cabling includes the following:

- –48 V battery supply (A1-, A2-, B1-, and B2-)
- Battery return (A1+, A2+, B1+, and B2+)
- Chassis ground

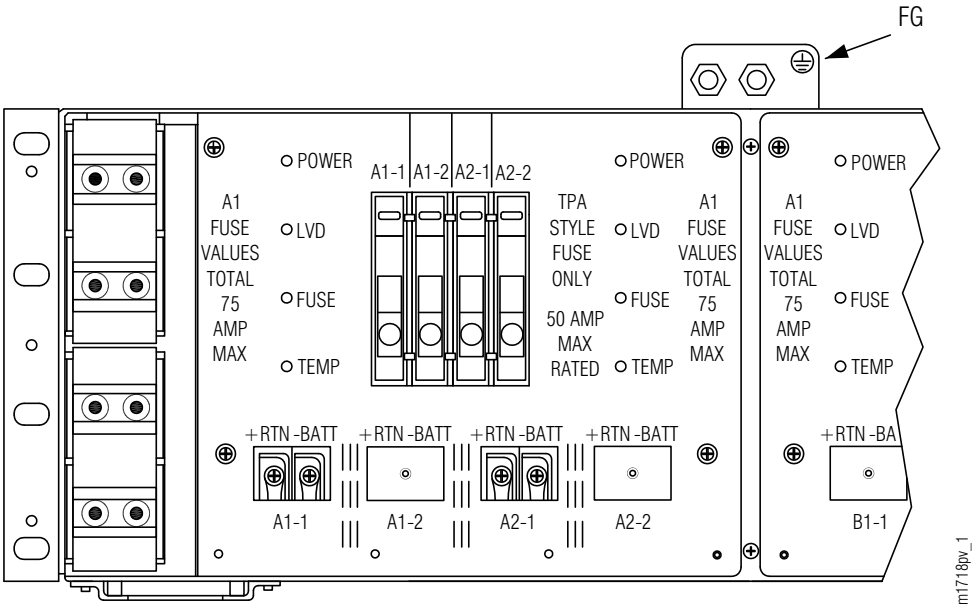


Figure 4-9: Front View of ETSI PDP

DANGER:

Carefully follow the instructions in this section to avoid personal injury, damage to the equipment, or both. Installing power cables that are already connected at one end to a voltage source can result in an electrical accident.

Step	Task
1	Verify that the office-battery ends of the power cables are not connected to the office batteries. These connections are the last to be made after the PDP has been installed. If necessary, follow local procedures to disconnect office power from these cables or remove fuses from the rack PDP. Use a DMM to ensure that the voltage is 0 V DC (with reference to the battery ground) at the equipment-rack end of the cables. ***Note:*** *For FLASHWAVE 7500 equipment, fuses should be sized to ensure that the maximum input current does not exceed 80 percent of the fuse size. Use 30 A fuses to ensure that this requirement is met for all configurations of the FLASHWAVE 7500 equipment.*
2	Remove the protective covers that protect the A/B battery terminals at both ends on the PDP panel. See Figure 4-9 [p. 4-21] for the PDP.
3	Remove the top nuts and washers from the threaded studs for all + and - connections being installed.
4	Locate the double-lug connector on the PDP end of the power cable that is to be connected to battery source A1 at the end of this procedure.
5	Place the single two-hole lug on the two A1 - studs so that the cable is easily routed toward the outside edge of the shelf. ***Note:*** *A washer may be required as a standoff between the circuit breaker panel and the lug.*
6	Install the washer and nut and tighten according to local standards.
7	Locate the single two-hole lug on the PDP end of the power cable that is to provide the return for battery source A1 at the end of this procedure.
8	Place the single two-hole lug on the two A1 + studs so that the return cable is easily routed toward the outside edge of the shelf. ***Note:*** *A washer may be required as a standoff between the circuit breaker panel and the lug.*
9	Install the washer and nut and tighten according to local standards.

10 Repeat Steps 4 [p. 4-22] through 9 [p. 4-22], substituting A2 for A1, then B1 for A1, and finally B2 for A1.

11 Connect the frame ground lead to the FG terminal located at the top of the PDP. See Figure 4-9 [p. 4-21].

Note: *This grounding procedure assumes that the frame ground and power ground are terminated at a central ground bus (ground window). Refer to Telcordia TR-TSY-000513.*

12 Verify that no strands of wire are shorting terminals together and that leads are securely fastened.

13 Replace the plastic cover over the input connectors.

14 On the front panel of the PDP, remove fuses A1-1 through B2-2.

15 Observing local procedures, connect each of the power cables to the office batteries and office ground as appropriate.

This procedure is complete.

4.7.2 Checking Battery Voltage at PDP

Note: *In this procedure, the term* battery *refers to the DC power feed for the rack in which the equipment is being mounted.*

Note: *This procedure assumes that power cables have been connected between the office battery and the PDP and that the battery power is on.*

The test equipment required is a DMM.

Step	Task
1	Set the DMM switches to measure voltage between 40 and 60 V DC.
2	On the front panel of the PDP, install all fuses.
3	Connect the negative DMM test lead to the first chassis ground connector on the front panel, and connect the positive DMM test lead to the associated input voltage test point (–48 V) on the front of the PDP. See Figure 4-9 [p. 4-21]. The input voltage should be between –40 and –57 V DC.
4	Is the DMM measurement between –40 and –57 V DC? **If YES:** Continue with Step 5 [p. 4-24]. **If NO:** Report trouble to the installation group. When trouble is corrected, repeat Step 3 [p. 4-24].
5	Disconnect the DMM leads.
6	Repeat Steps 3 [p. 4-24] through 5 [p. 4-24] for each applicable –48 V/GND pair.
7	On the PDP front panel, remove fuses A1-1 through B2-2. This procedure is complete.

4.8 Installing the Optical/Tributary Shelf

The FLASHWAVE 7500 ETSI Configuration system is based upon the ETSI shelf (FC9682SHU4), which can be configured as either an Optical or a Tributary shelf.

The ETSI rack must already be installed in accordance with local plans and procedures.

Figure 4-10 [p. 4-26] shows the Optical and Tributary shelf mounting in the ETSI rack. Figures 4-11 [p. 4-27] and 4-12 [p. 4-28] show front views of the Optical shelf and the Tributary shelf for reference.

> ***Note:*** Figures 4-11 [p. 4-27] and 4-12 [p. 4-28] *are shown fully populated for instructional purposes. At installation, the shelves do not have plug-in units installed. The shelves are not populated and provisioned until system turn-up.*

> ***Note:*** *The FLASHWAVE 7500 shelves do not have front covers because of front-access fiber cabling.*

DANGER:

Do not attempt to handle and install the shelves without sufficient assistance. The Optical/Tributary shelf weighs approximately 48.5 lb (22 kg) empty (without fans). Equipped, the Optical/Tributary shelf weighs significantly more. Handling the equipment without sufficient assistance may result in personal injury, damage to the equipment, or both.

WARNING:

Do not use the internal walls of any shelf as a lifting point or lift support. Doing so may damage the plug-in unit rail support.

CAUTION:

Do not compromise the stability of the rack when installing this equipment. Unstable racks can fall resulting in equipment damage.

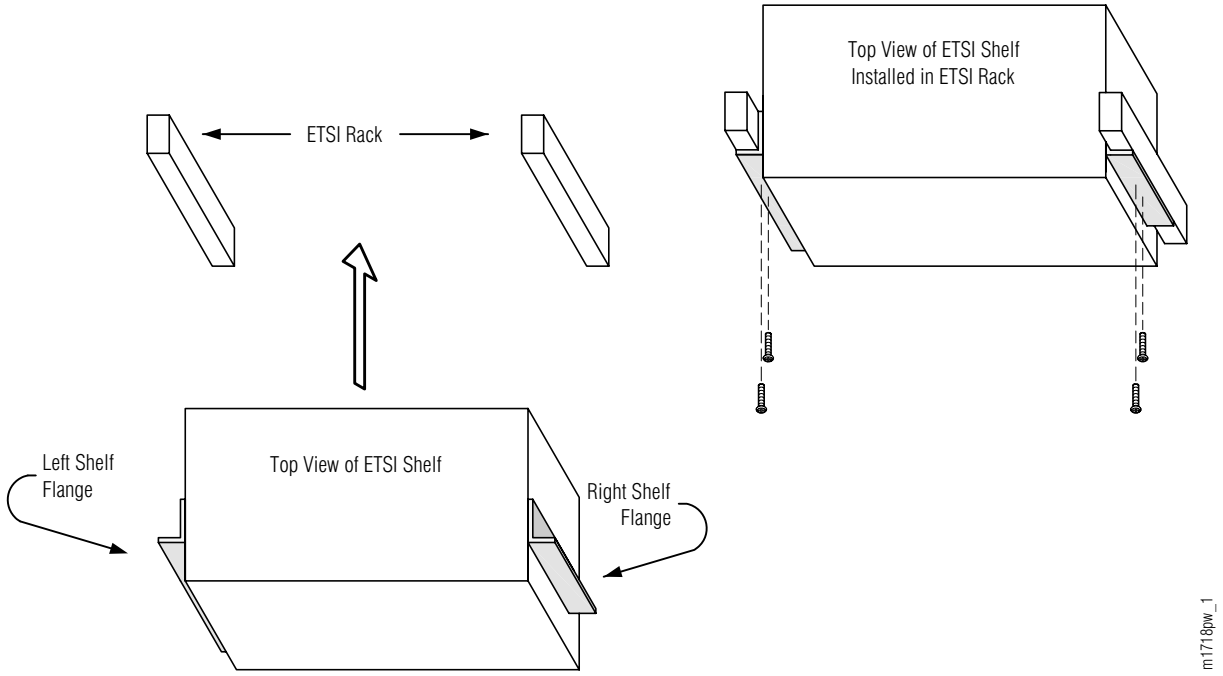


Figure 4-10: Optical/Tributary Shelf Mounting in ETSI Rack

Figure 4-11: Optical Shelf—Populated with Plug-In Units (ETSI Configuration)

Figure 4-12: Tributary Shelf—Populated with Plug-In Units (ETSI Configuration)

Install the Optical/Tributary shelf as follows:

Step	Task
1	If not already done, remove the shelf from the shipping container.
2	Install the Optical/Tributary shelf in the ETSI rack. Secure the shelf to the rack using five rack mounting screws on each side of the shelf. This procedure is complete.

4.9 Installing the ETSI (FC9682HSW4) Heat Baffle

The ETSI heat baffle is positioned directly above an ETSI core shelf and directly under a DCM or LAM/DCM shelf (see Figure 4-13 [p. 4-29]). The heat baffle ensures that air pushed upward through the shelf below is deflected to the front of the rack.

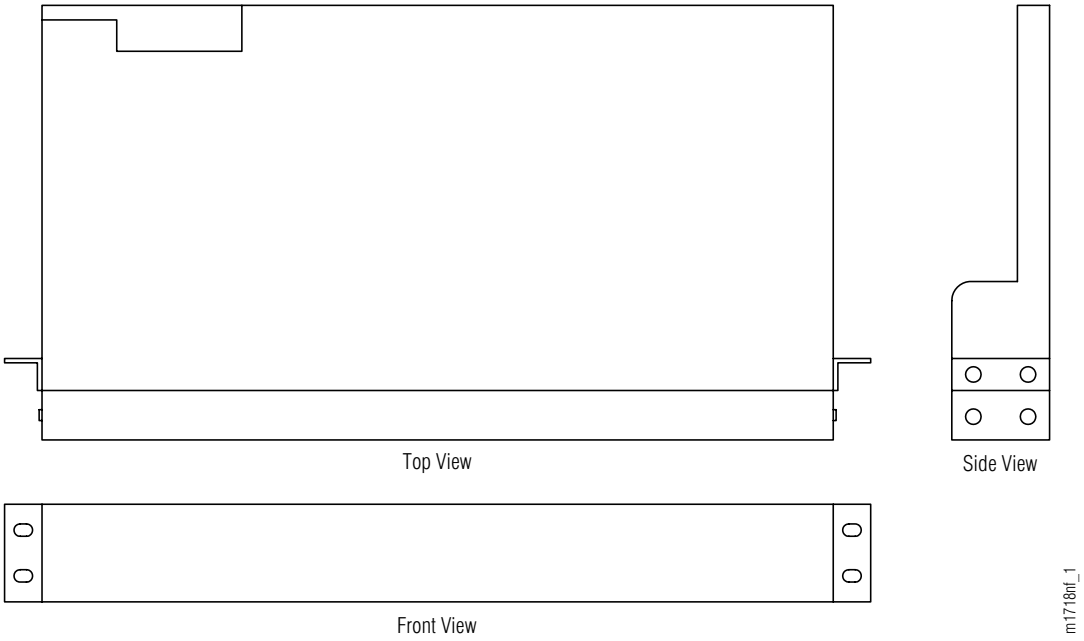


Figure 4-13: HSW4 Heat Baffle (ETSI Configuration)

This procedure provides instructions for installing the ETSI (FC9682HSW4) heat baffle (see Figure 4-13 [p. 4-29]) in an ETSI rack.

Step	Task
1	If not already done, remove the heat baffle from the shipping container.
2	Secure the heat baffle to the rack using two rack mounting screws on each side of the assembly. ***Note:*** *Ensure that the heat baffle is oriented as shown in Figure 4-13 [p. 4-29] so that air pushed upward from below is deflected to the rear. If the heat baffle is mounted under the shelf, use the same orientation so that air enters the shelf from the front of the rack.* This procedure is complete.

4.10 Installing the ETSI DCM (SFD6) Shelf

The ETSI DCM (SFD6) shelf used in ILA applications, if needed, provides dispersion compensation for dense wavelength division multiplexing (DWDM) signals entering the NE.

The SFD6 DCM shelf (FC9682SFD6, Figure 4-14 [p. 4-31]) can be installed in an ETSI rack (see Figure 4-15 [p. 4-32]). The ETSI mounting flange kit for the DCM shelf (FC9682FLGD) is used.

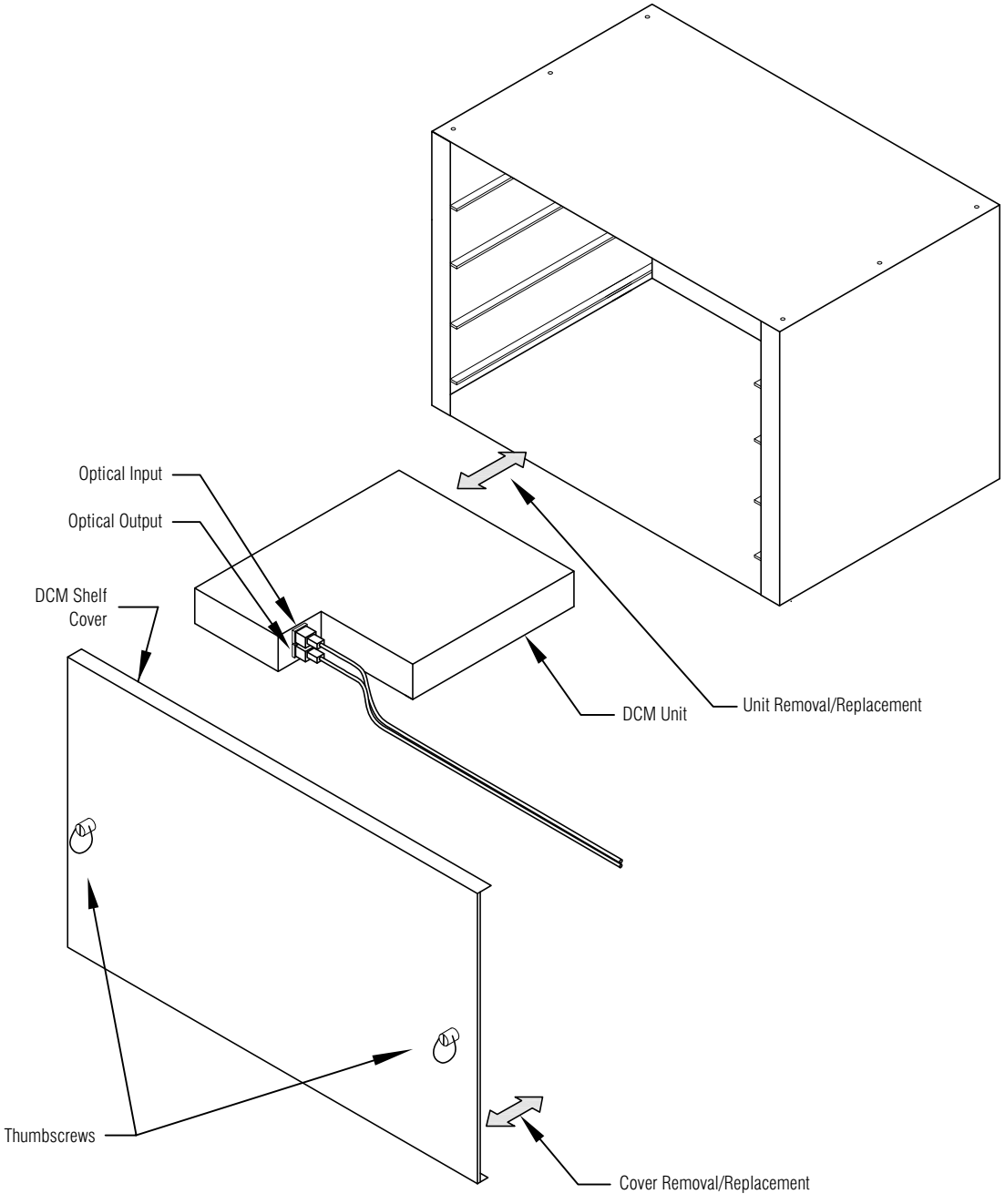


Figure 4-14: ETSI DCM (SFD6) Shelf

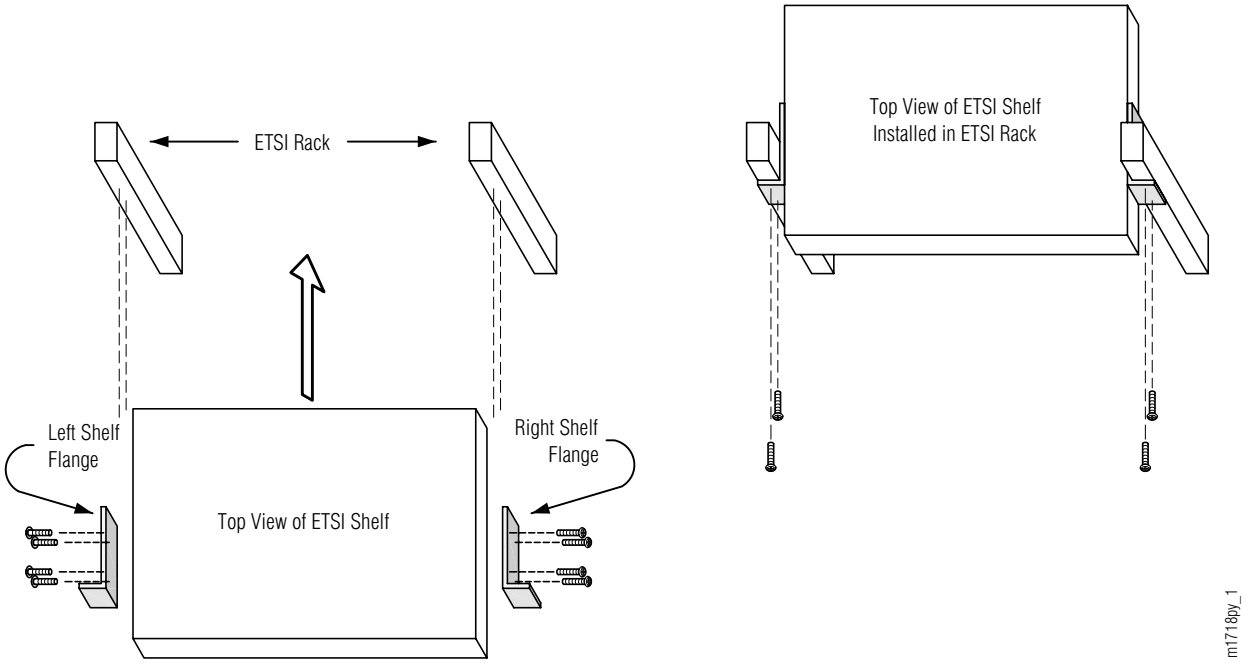


Figure 4-15: SFD6 Shelf Mounting in ETSI Rack

Install the SFD6 shelf as follows:

Step	Task
1	Unpack the SFD6 shelf from the shipping container. The DCM units do not need to be removed from the DCM shelf if they are already installed. The shelf can hold up to two DCM units.
2	Get the flange kit for ETSI rack mounting (FC9682FLGD).

3 Identify the left and right shelf flanges. See Figure 4-15 [p. 4-32] and Figure 4-16 [p. 4-33].

Note: *At first glance the two flanges for ETSI rack mounting may appear to be identical, but they are not. As shown in Figure 4-16 [p. 4-33], the space between the upper edges and the top clearance holes is slightly larger (3 mm) than the space between the lower edges and the bottom clearance holes.*

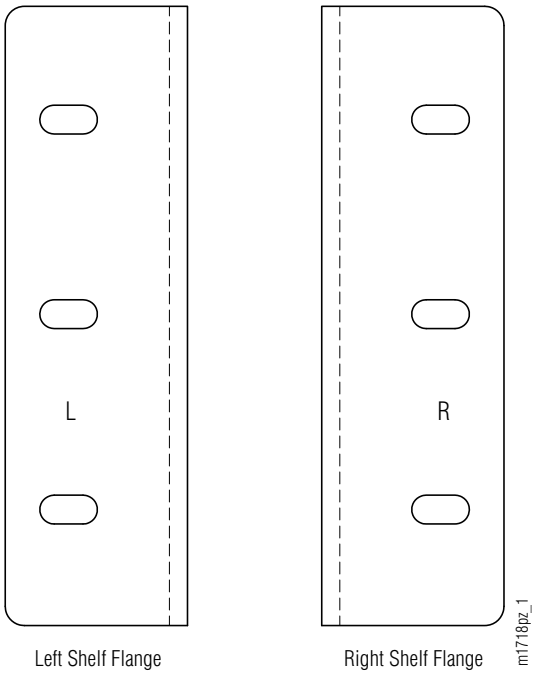


Figure 4-16: SFD6 Shelf Mounting Flanges (Front View)

4 Identify the flange mounting holes for ETSI rack installation on the side of the SFD6 shelf. See Figure 4-17 [p. 4-34].

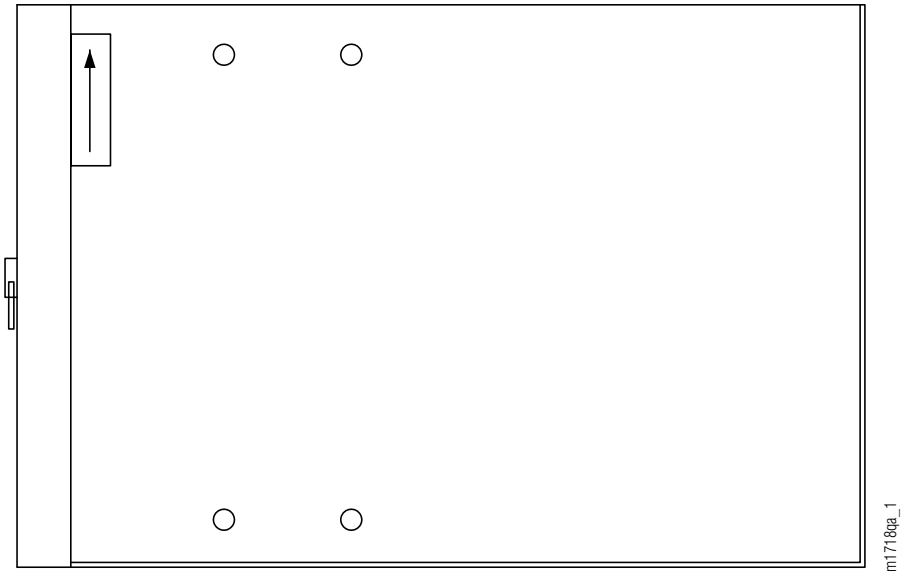


Figure 4-17: Flange Mounting Holes on Right Side of SFD6 Shelf (ETSI Rack Installation)

5 Using four pan-head Phillips M4 screws (8 mm long) on each side, secure the left and right shelf flanges to the SFD6 shelf as shown in Figure 4-15 [p. 4-32].

Figure 4-18 [p. 4-35] shows a right-side view of the SFD6 shelf after the flange is mounted.

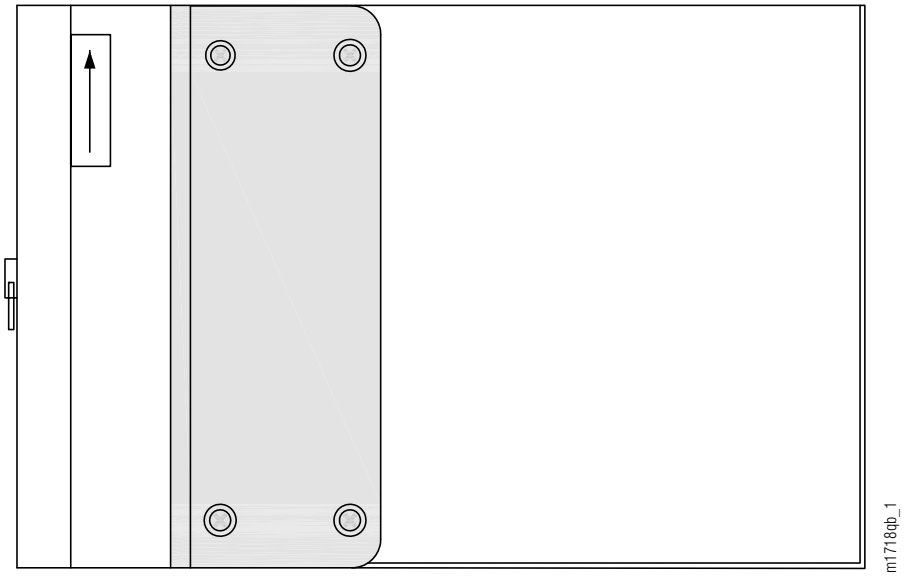


Figure 4-18: Flange Mounted on Right Side of SFD6 Shelf (ETSI Rack Installation)

6 Install the SFD6 shelf in the rack directly above the heat baffle. Secure the shelf to the rack using three rack mounting screws on each side of the shelf.

Note: *If hole alignment does not permit three screws on each side, it is acceptable to secure the shelf with only two screws on each side.*

7 Install the DCM units using the following steps:

a. Locate the appropriate units to be installed and remove them from their protective ESD packaging.

b. Loosen the thumbscrews and remove the faceplate/cover from the shelf.

c. Carefully slide each DCM unit into the appropriate shelf slot.

d. Replace the cover and tighten the thumbscrews to secure each unit in the shelf.

This procedure is complete.

4.11 Installing the ETSI LAM/DCM Shelf (SDL1)

The ETSI LAM/DCM shelf, if needed, provides dispersion compensation for dense wavelength division multiplexing (DWDM) signals entering the NE and lambda access connections for OLC units.

The SDL1 DCM shelf (FC9682SDL1, Figure 4-19 [p. 4-36]) can be installed in an ETSI rack (see Figure 4-20 [p. 4-37]). The ETSI mounting flange kit for the DCM shelf (FC9682FLGA) is used.

The shelf can hold up to two DCM units.

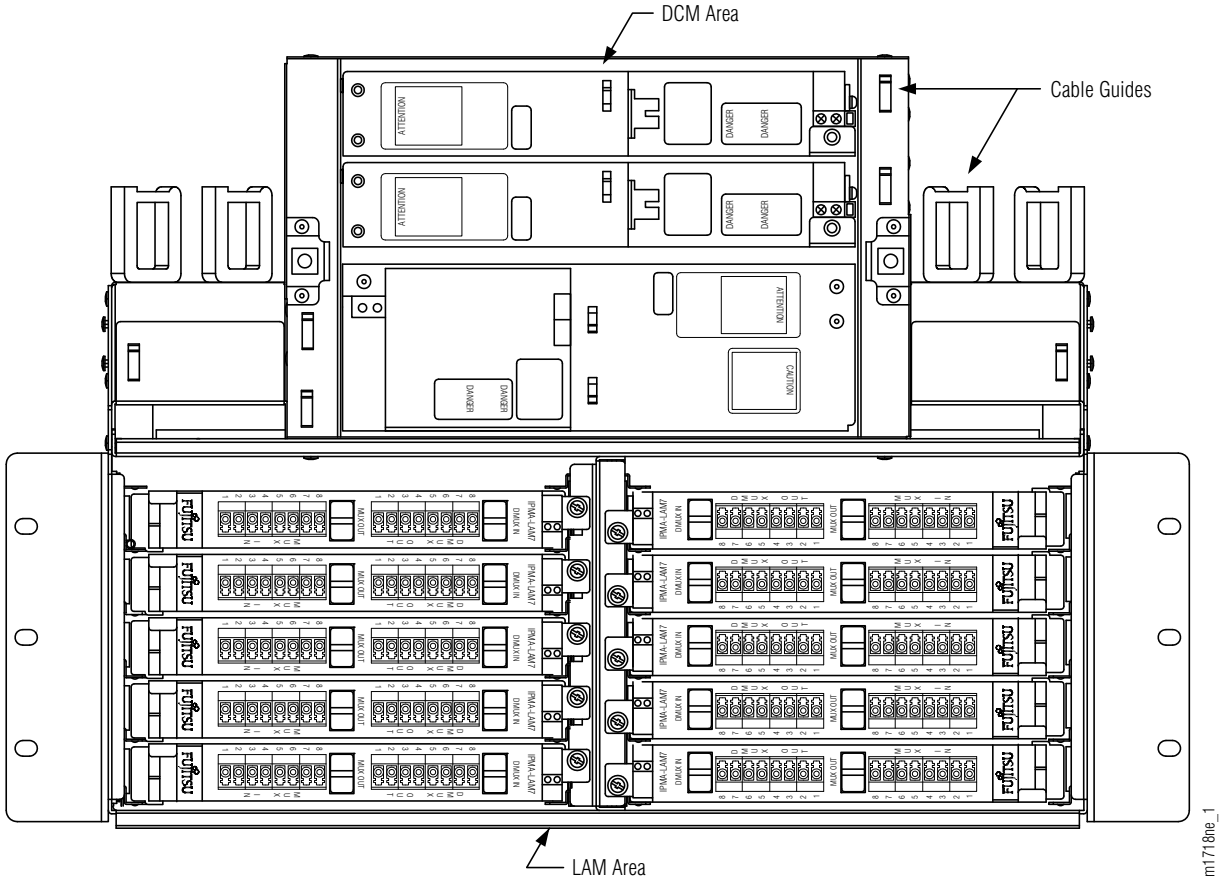


Figure 4-19: ETSI LAM/DCM Shelf (SDL1)

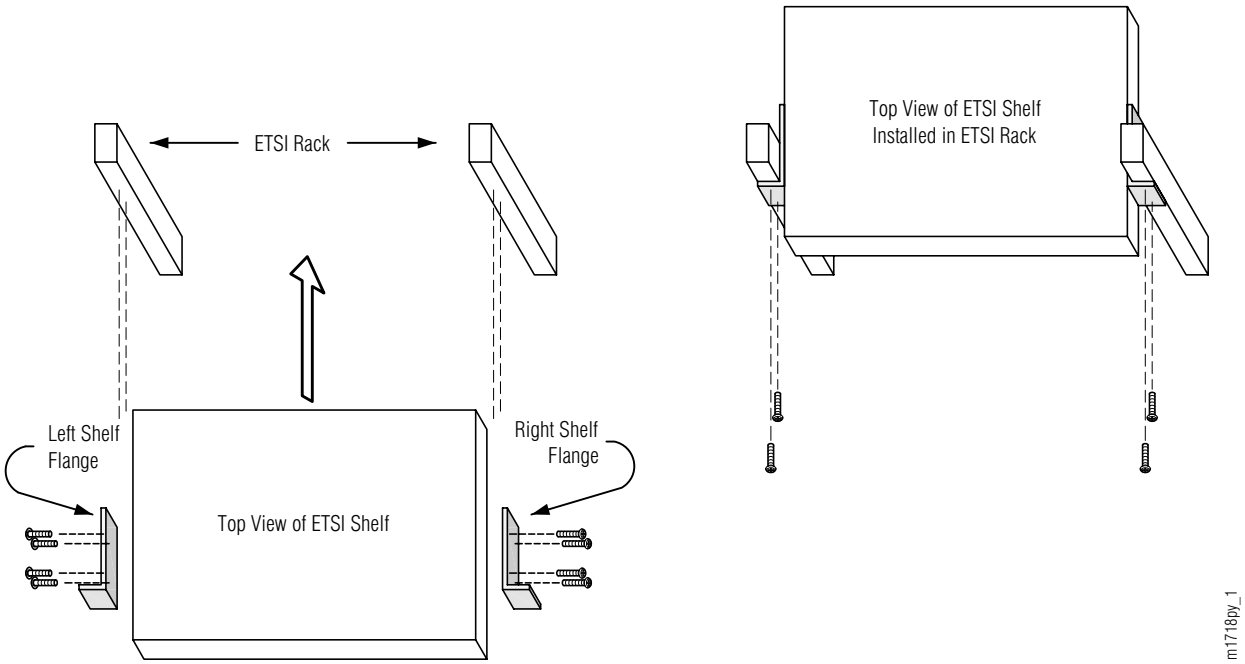


Figure 4-20: SDL1 Shelf Mounting in ETSI Rack

Install the SDL1 shelf as follows:

Step	Task
1	Unpack the SDL1 shelf from the shipping container.
2	Get the flange kit for ETSI rack mounting (FC9682FLGA). See Section 4.3.2, Flange Kits for ETSI Racks [p. 4-9].

3 Identify the shelf flanges. See Figure 4-20 [p. 4-37] and Figure 4-21 [p. 4-38].

Note: *The layout of the clearance holes is identical for the two flanges for ETSI rack mounting.*

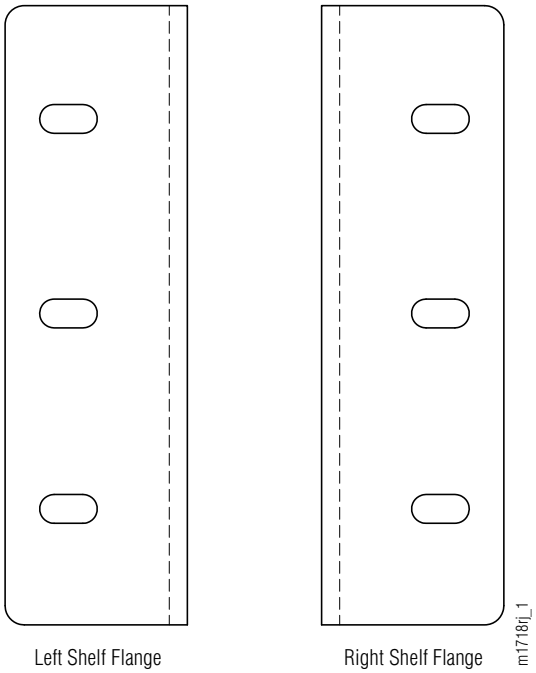


Figure 4-21: SDL1 Shelf Mounting Flanges (Front View)

4 Identify the flange mounting holes for ETSI rack installation on the side of the SDL1 shelf. See Figure 4-22 [p. 4-39].

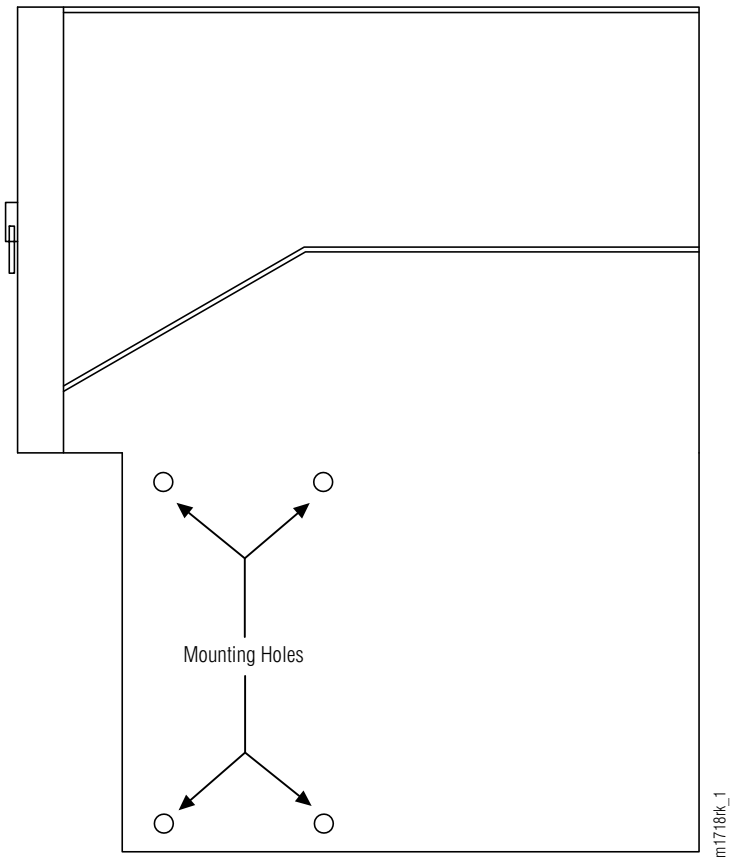


Figure 4-22: Flange Mounting Holes on Right Side of SDL1 Shelf (ETSI Rack Installation)

5 Using four pan-head Phillips M4 screws (8 mm long) on each side, secure the shelf flanges to the SDL1 shelf as shown in Figure 4-15 [p. 4-32].

Figure 4-23 [p. 4-40] shows a right-side view of the SDL1 shelf after the flange is mounted.

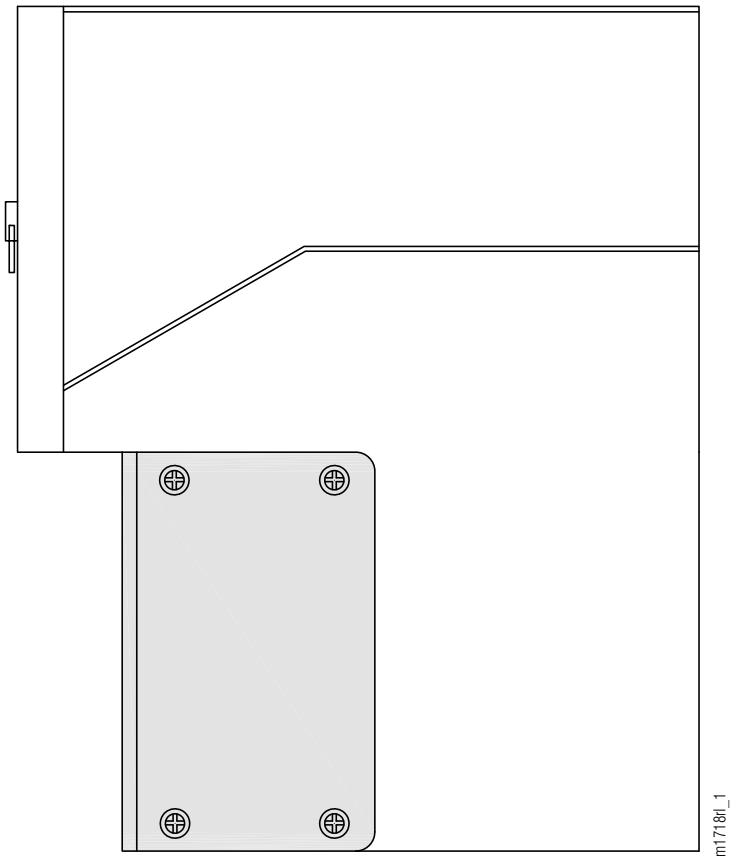


Figure 4-23: Flange Mounted on Right Side of SDL1 Shelf (ETSI Rack Installation)

6 Install the SDL1 shelf in the rack directly above the heat baffle. Secure the shelf to the rack using three rack mounting screws on each side of the shelf.

Note: *If hole alignment does not permit three screws on each side, it is acceptable to secure the shelf with only two screws on each side.*

7 If the shelf came without the DCM units already installed:

a. Locate the appropriate units to be installed and remove them from their protective ESD packaging.

b. Loosen the thumbscrews and remove the faceplate/cover from the shelf.

c. Carefully slide each DCM unit into the appropriate shelf slot.

d. Replace the cover and tighten the thumbscrews to secure each unit in the shelf.

This procedure is complete.

4.12 Installing Fans, Rack Covers, and End Panels

This procedure provides instructions for installing the Optical/Tributary shelf fans, optional rack covers, and end panels. It includes the following subprocedures:

4.12.1 Installing Shelf Fans

This procedure provides installation instructions for the four cooling fans used by the Optical/Tributary shelf (see Figure 4-24 [p. 4-42]).

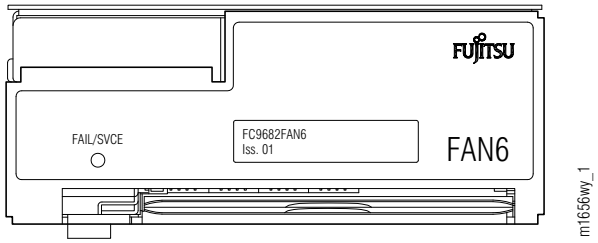


Figure 4-24: Fan Unit (Front View) (ETSI Configuration)

Step	Task
1	If not already done, unpack four fan plug-in units from the shipping container.
2	If not already done, install a fan filter in the fan tray located at the bottom of each fan unit.
3	Install the fan plug-in units into the bottom portion of each Optical/Tributary shelf. (Refer to *Maintenance and Trouble Clearing,* Section 8.8, Replacing FAN6 Plug-In Unit and Fan Filter [p. 8-28] for detailed information.)

This procedure is complete.

Note: *The connectors on the back of the fan engage the shelf backplane connectors and are secured in place with an extractor lever (located on the left side of the fan assembly front panel).*

4.12.2 Installing Rack Covers

This procedure provides installation instructions for the three optional covers used to prevent the accidental removal of cards and fiber at select sites (see Figure 4-25 [p. 4-43]).

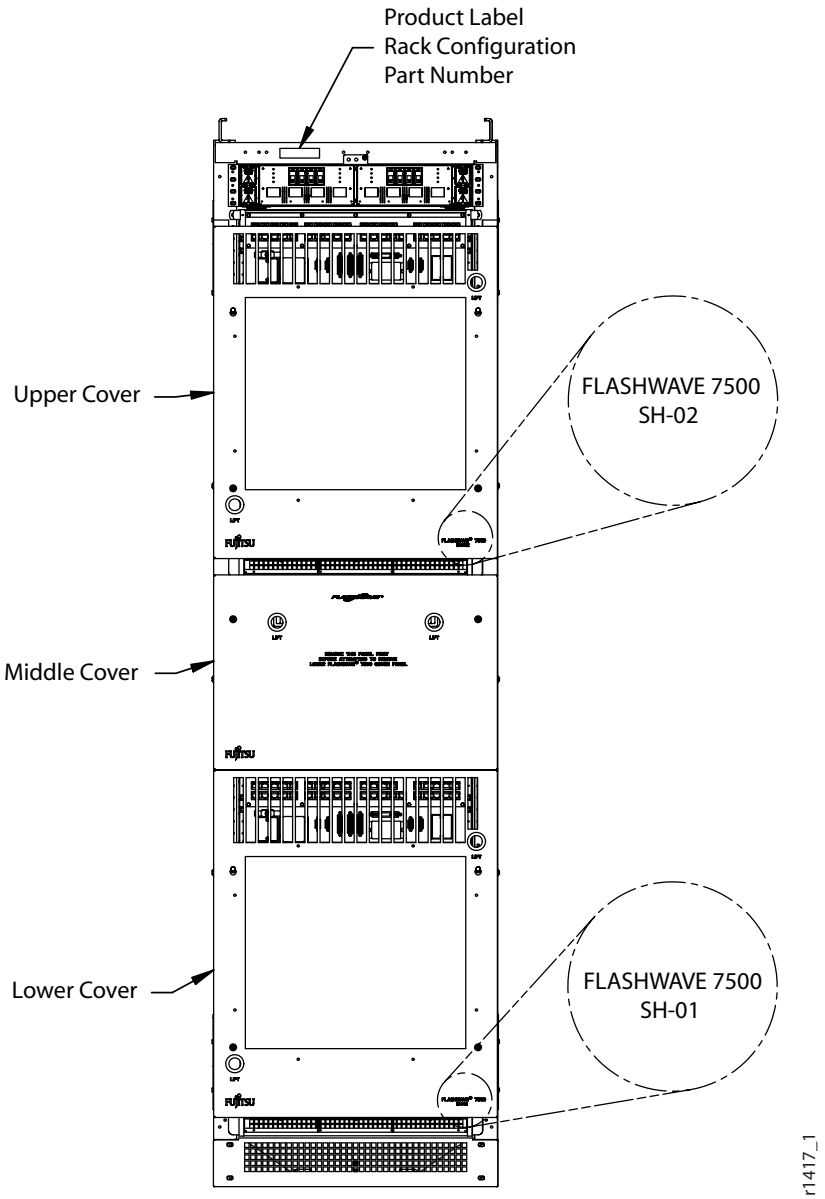


Figure 4-25: FLASHWAVE 7500 Optional Covers on Rack (Front View) (ETSI Configuration)

Note: *Fujitsu recommends that you install the ETSI rack cover panels from bottom to top, in ascending order, for an easier installation.*

Step	Task
1	If not already done, unpack the three covers and mounting hardware from the shipping container.
2	Remove and discard the four mounting screws from the lower FLASHWAVE 7500 shelf (see Figure 4-26 [p. 4-44]).

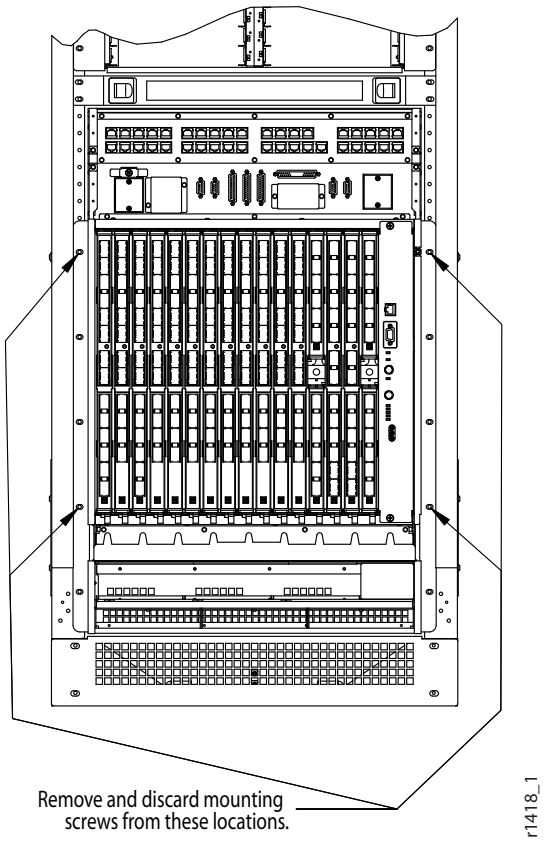


Figure 4-26: Lower Cover Mounting Screw Locations

3 In the mounting holes vacated in Step 2 [p. 4-44], install two of each type of standoff as shown in Figure 4-27 [p. 4-45]. Ensure that the external tooth lockwasher is installed on the standoffs before tightening.

Note: *The standoffs with the "hook" ends are installed in the two upper locations. The standoffs with the threaded holes are installed in the lower locations.*

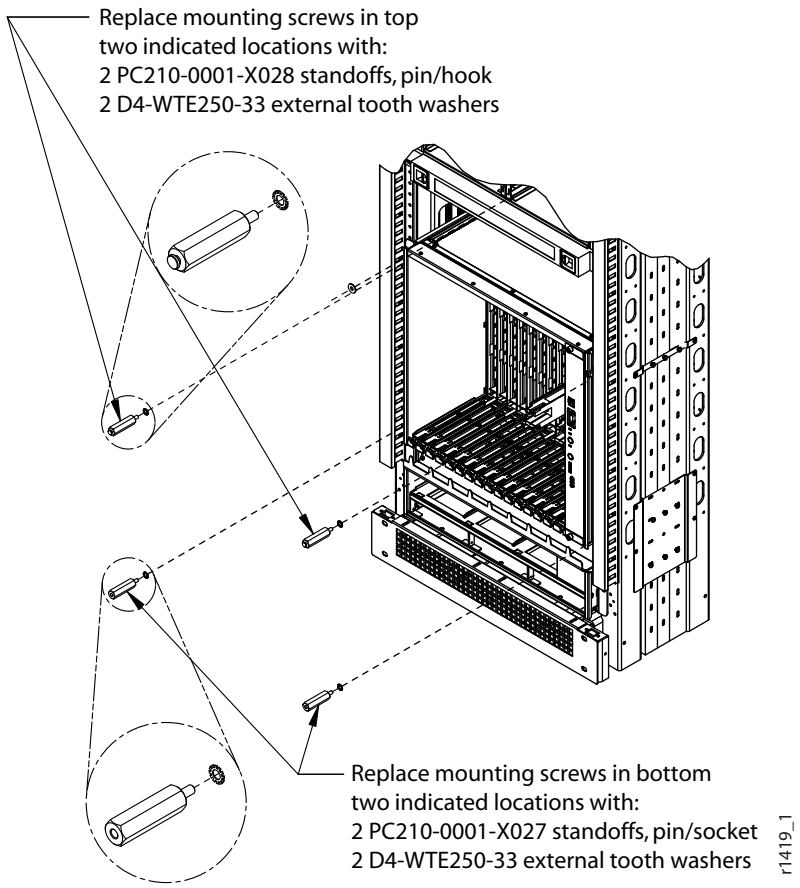


Figure 4-27: Lower Cover Mounting Screws and Standoff Locations

4 Position the keyholes in the lower ETSI cover panel over the hook of the upper two standoffs. Let the panel drop down into the slot formed by the hook. Secure the panel in place by tightening the two lower captive panel screws using the Hex Torx pin tool provided by the ETSI Rack Cover Kit. See Figure 4-28 [p. 4-46].

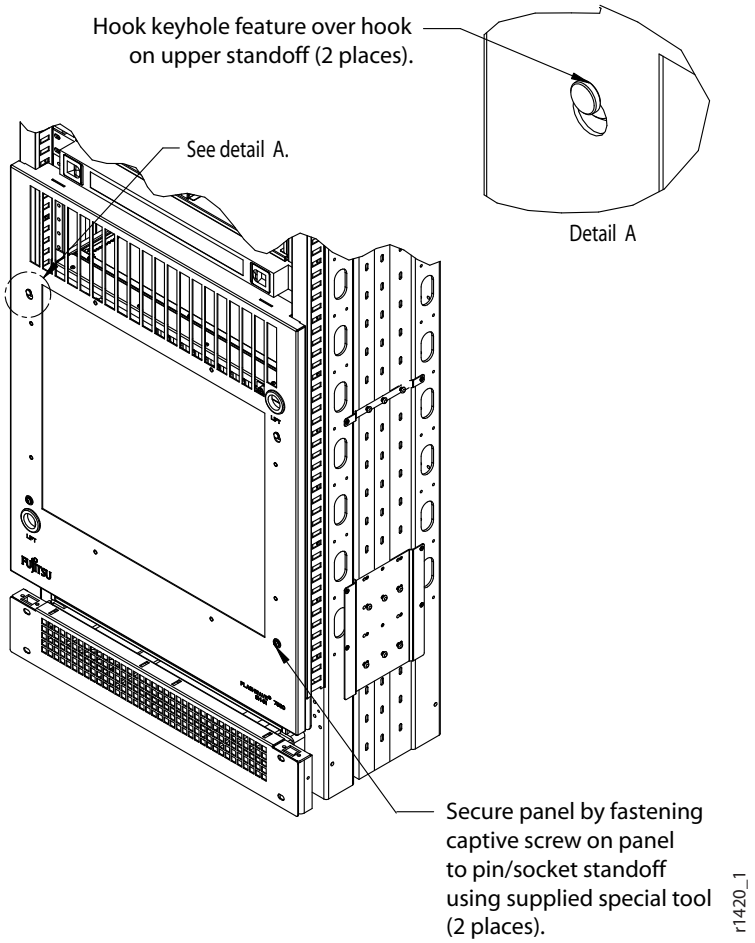


Figure 4-28: Lower Cover Panel Installation Details

5 Locate the mounting hole locations for the ETSI middle rack cover. See Figures 4-29 [p. 4-47] through 4-32 [p. 4-49] to review and select the appropriate configuration. Using the selected figure as a reference, remove and discard the two mounting screws or mark the mounting hole locations.

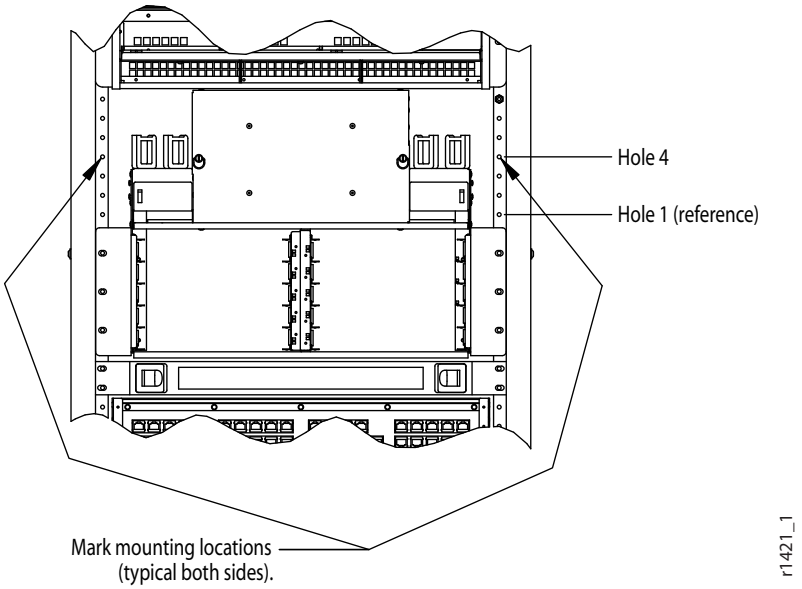


Figure 4-29: Middle Cover Mounting Holes (One LAM/DCM Shelf)

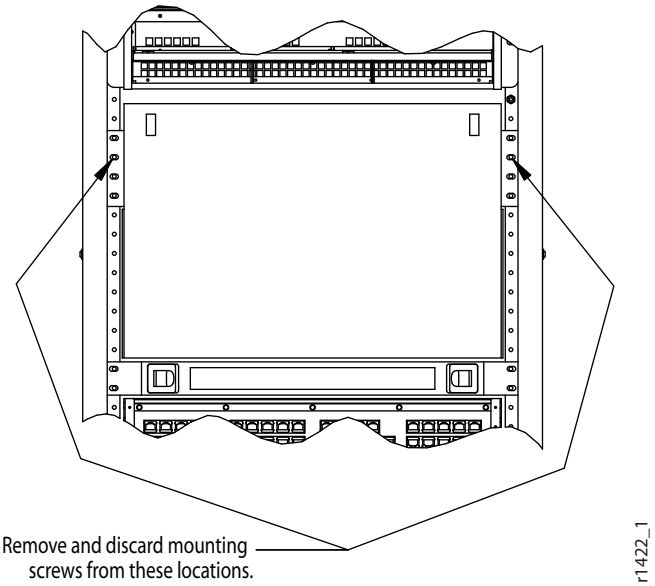


Figure 4-30: Middle Cover Mounting Holes (Slack Fiber Management Shelf)

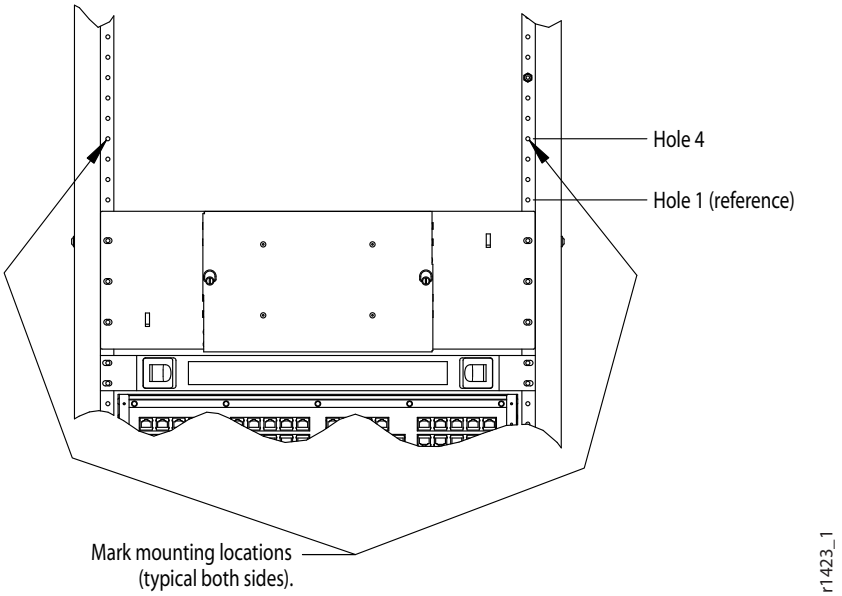


Figure 4-31: Middle Cover Mounting Holes (One DCM Shelf)

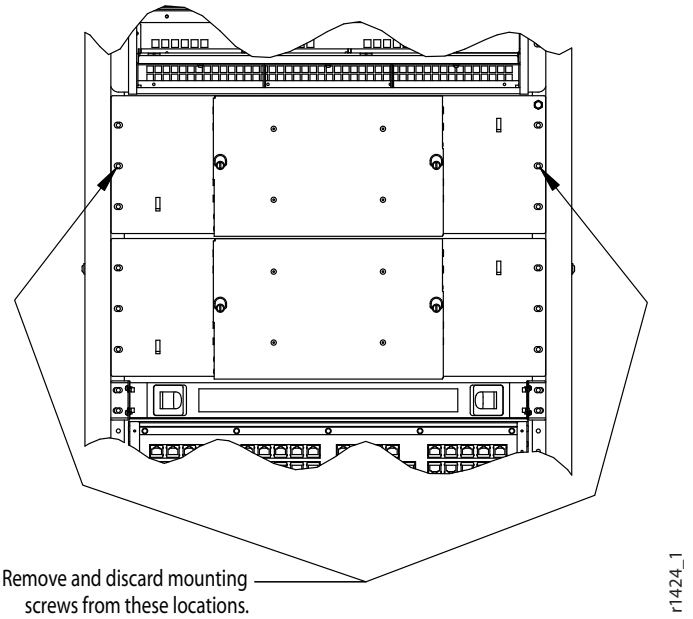


Figure 4-32: Middle Cover Mounting Holes (Two DCM Shelves)

6 Install two of the threaded-hole standoff types in the mounting holes identified in Step 5 [p. 4-47] per the applicable figure. Ensure that the applicable external tooth washers and flat washers are installed on the standoffs before you tighten them. See Figures 4-33 [p. 4-50] through 4-36 [p. 4-53] for the applicable illustration.

Note: *The standoff locations that mount directly to the ETSI rack, and not on the mounting flange of an equipment shelf, require that the flat washer act as a spacer.*

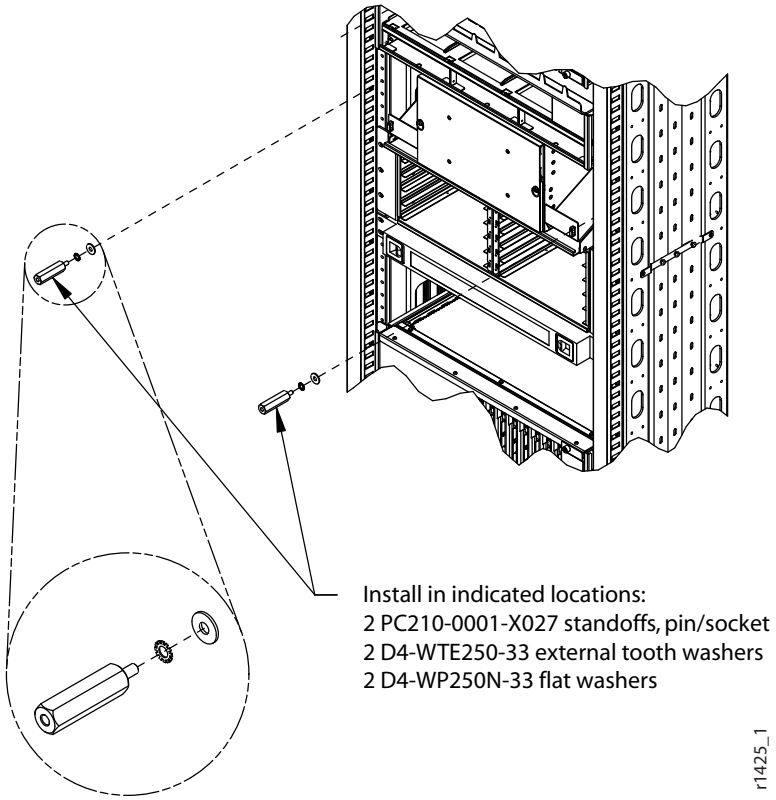


Figure 4-33: Middle Cover Standoffs (One LAM/DCM Shelf)

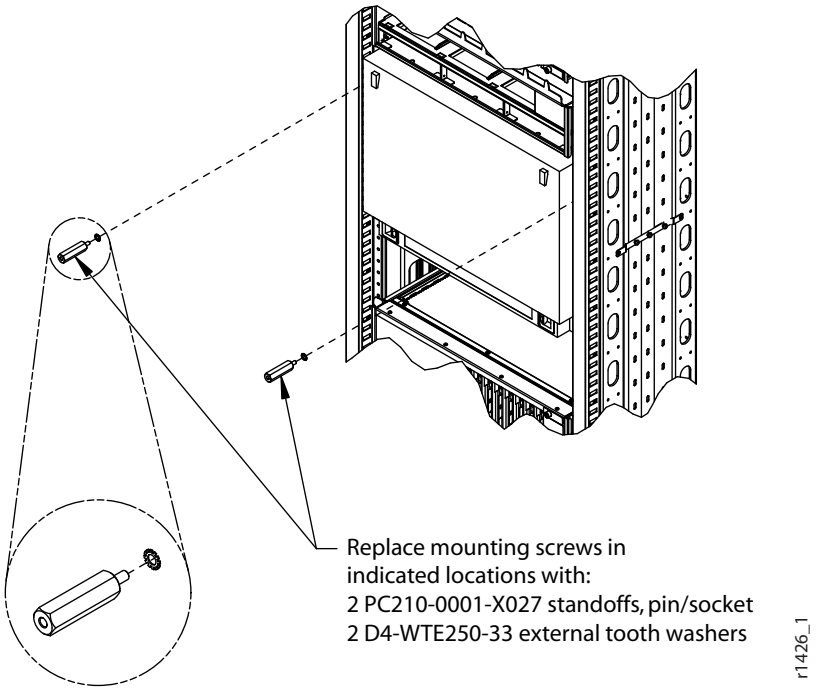


Figure 4-34: Middle Cover Standoffs (Slack Fiber Management Shelf)

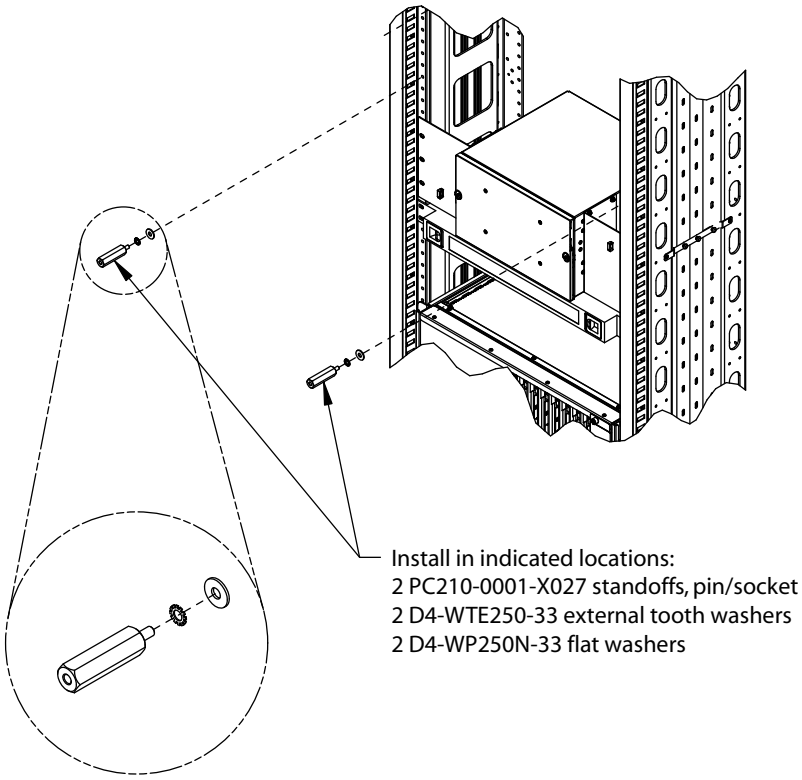


Figure 4-35: Middle Cover Standoffs (One DCM Shelf)

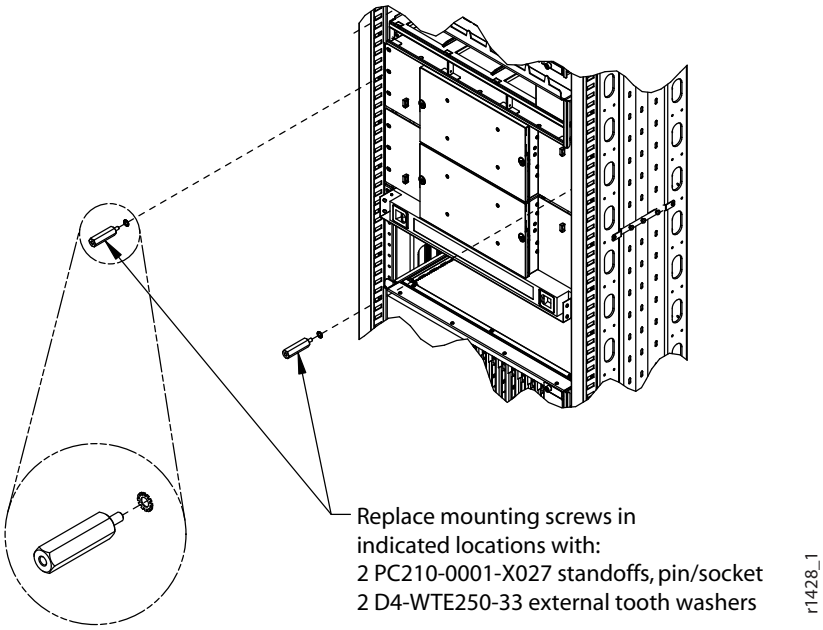


Figure 4-36: Middle Cover Standoffs (Two DCM Shelves)

7 Align the tabs on the bottom of the middle panel with the slots on the top edge of the lower panel installed. Secure the panel by tightening the two captive panel screws using the Hex Torx pin tool provided in the kit. See Figure 4-37 [p. 4-54].

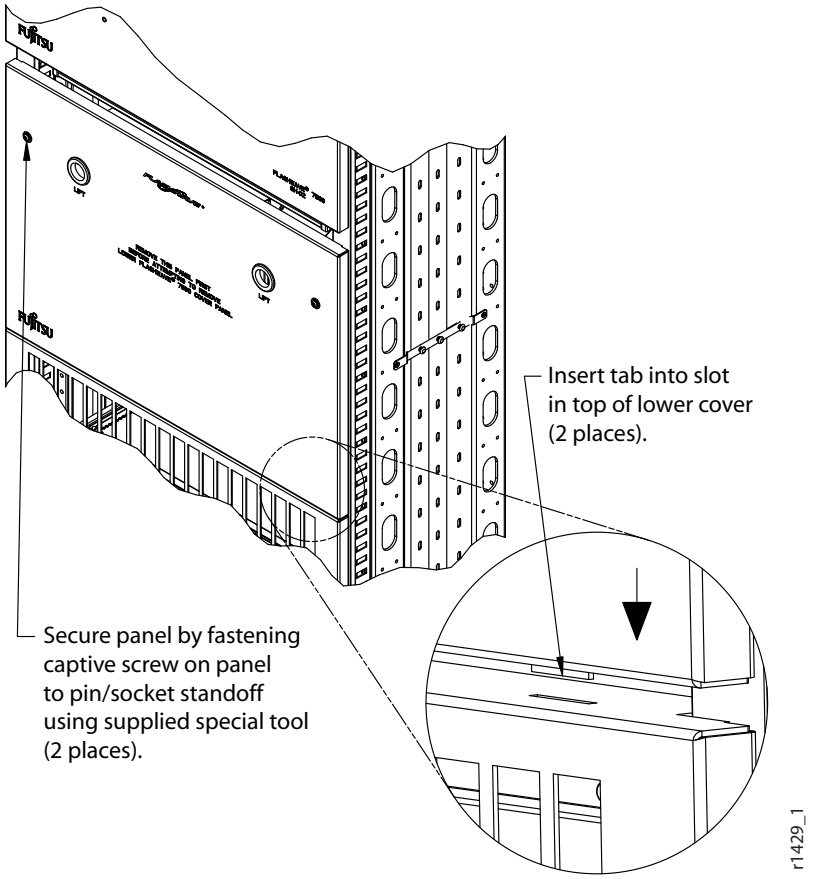


Figure 4-37: Securing the Middle Cover Panel

8 Locate the mounting hole locations for the ETSI upper rack cover. See Figures 4-38 [p. 4-55] and 4-39 [p. 4-56] to review and select the applicable configuration. Using the selected figure as a reference, remove and discard the four mounting screws, or mark the mounting hole locations.

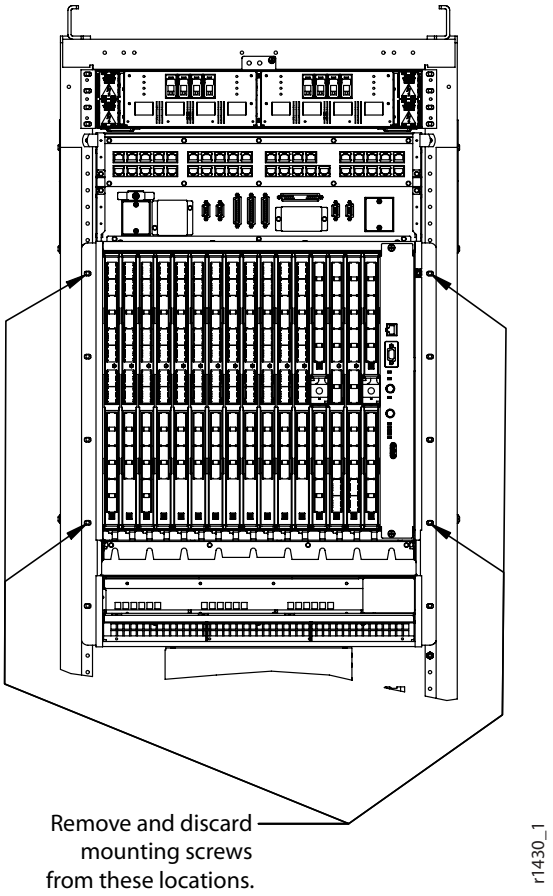


Figure 4-38: Upper Cover Standoffs with Upper FLASHWAVE 7500 Shelf

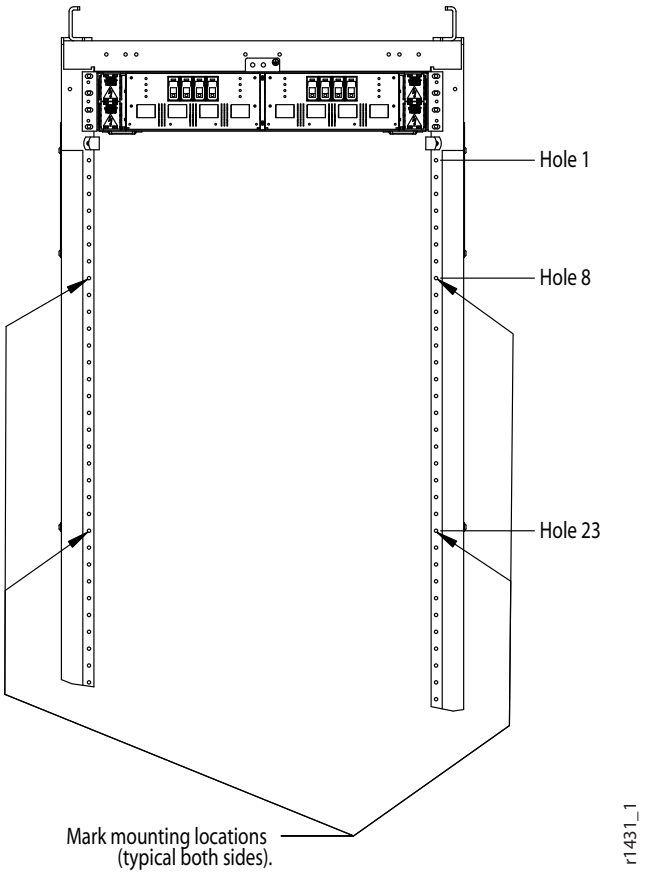


Figure 4-39: Upper Cover Standoffs without Upper FLASHWAVE 7500 Shelf

9 Install two of each type of standoff in the mounting holes identified in Step 8 [p. 4-55] as shown in the figure. Ensure that the applicable external tooth washers and flat washers are installed on the standoffs before you tighten them. See Figures 4-40 [p. 4-57] and 4-41 [p. 4-58].

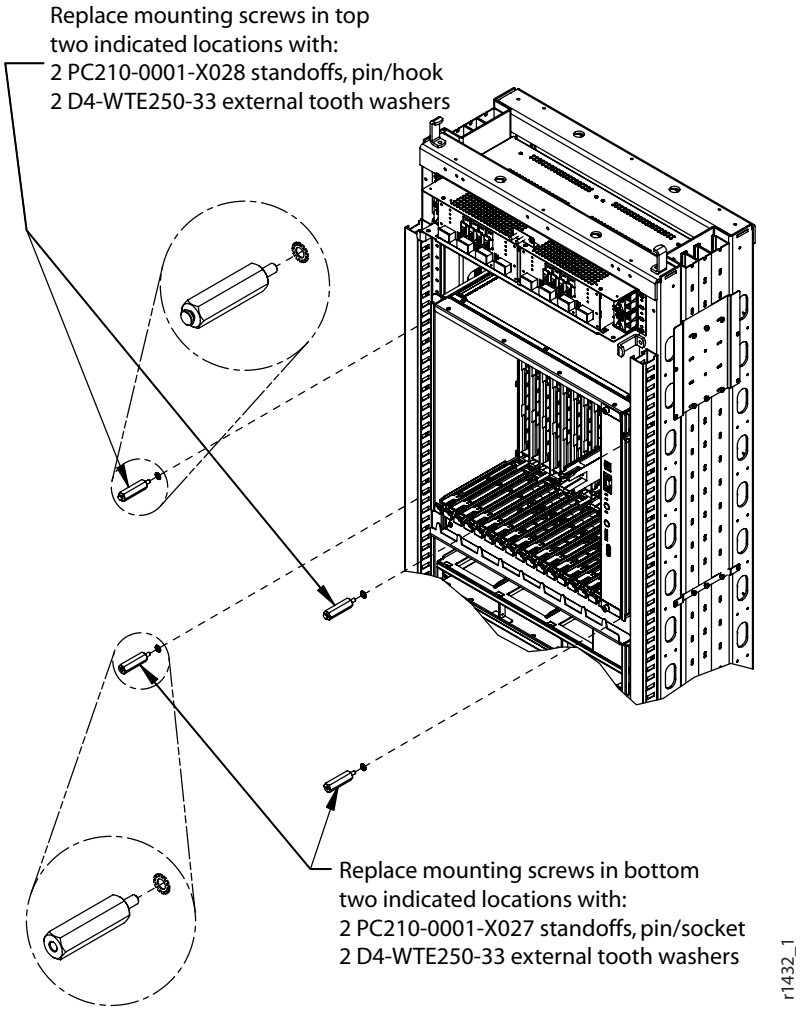


Figure 4-40: Upper Cover Mounting Screws/Standoffs with Upper FLASHWAVE 7500 Shelf

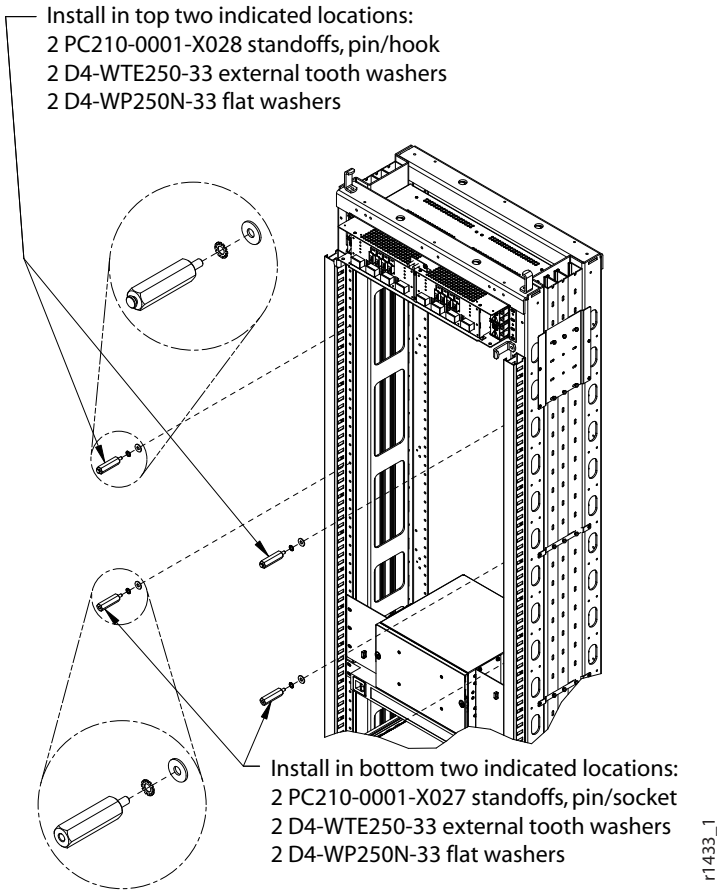


Figure 4-41: Upper Cover Mounting Screws/Standoffs without Upper FLASHWAVE 7500 Shelf

10 Position the keyholes in the ETSI upper cover panel over the hook of the upper two standoffs. Let the panel drop down in the slot formed by the hook. Secure the panel in place by tightening the two lower captive panel screws using the Hex Torx tool provided in the ETSI Rack Cover Kit. See Figure 4-42 [p. 4-59].

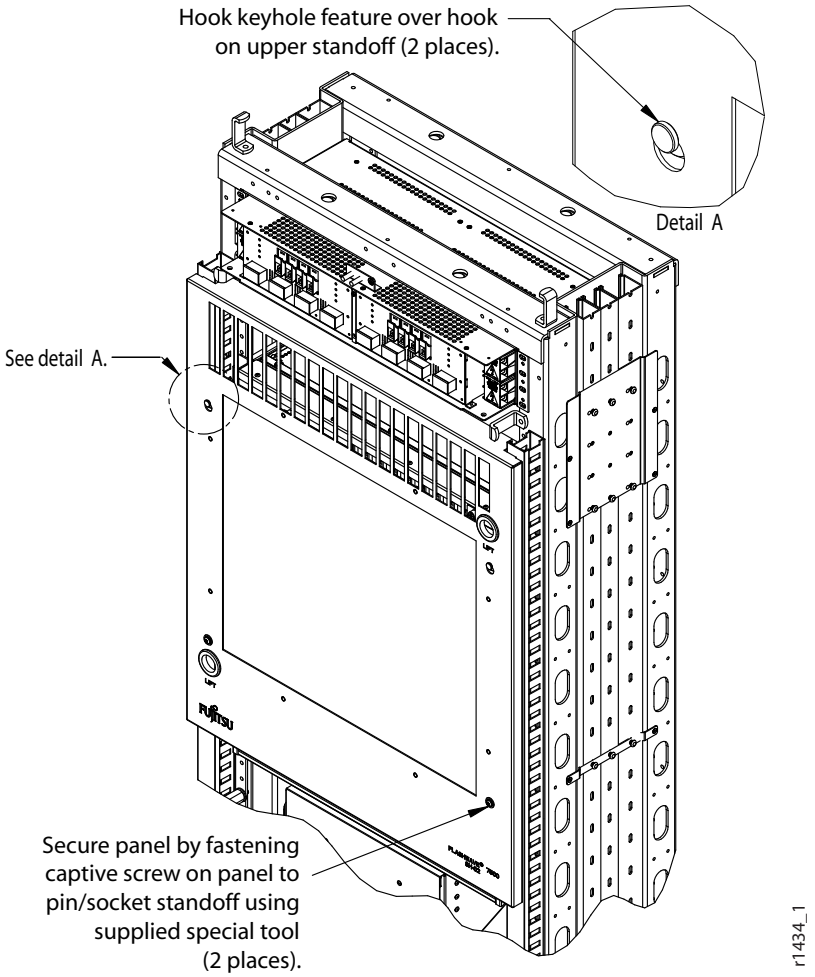


Figure 4-42: Securing the Upper Cover Panel

11 Clean up the work area.

12 Update office records per local practices.

13 Store the Hex Torx pin tool in a location determined by the site supervisor for easy access for future maintenance activities.

This procedure is complete.

4.12.3 Installing Aisle End Panels

This procedure provides instructions for installing the end panel on ETSI racks (see Figure 4-43 [p. 4-61]).

> ***Note:*** *This panel is intended to prevent accidental removal of cards and fiber and is for an ETSI only application.*

Step	Task
1	If not already done, remove the end panel and mounting hardware from the shipping container.
2	Install the M5 screws and washers at the top of the rack, leaving approximately 1/8 inch to allow the notch in the end panel to slip between the washer and the frame. See Figure 4-43 [p. 4-61].
3	Position the end panel over the M5 screws installed in Step 2 [p. 4-60], and lower the panel until the screws are seated in the slots at the top of the frame.
4	Attach the bottom of the panel to the frame with M6 screws and washers.
5	Attach the cover panel with 8-32 screws.

This procedure is complete.

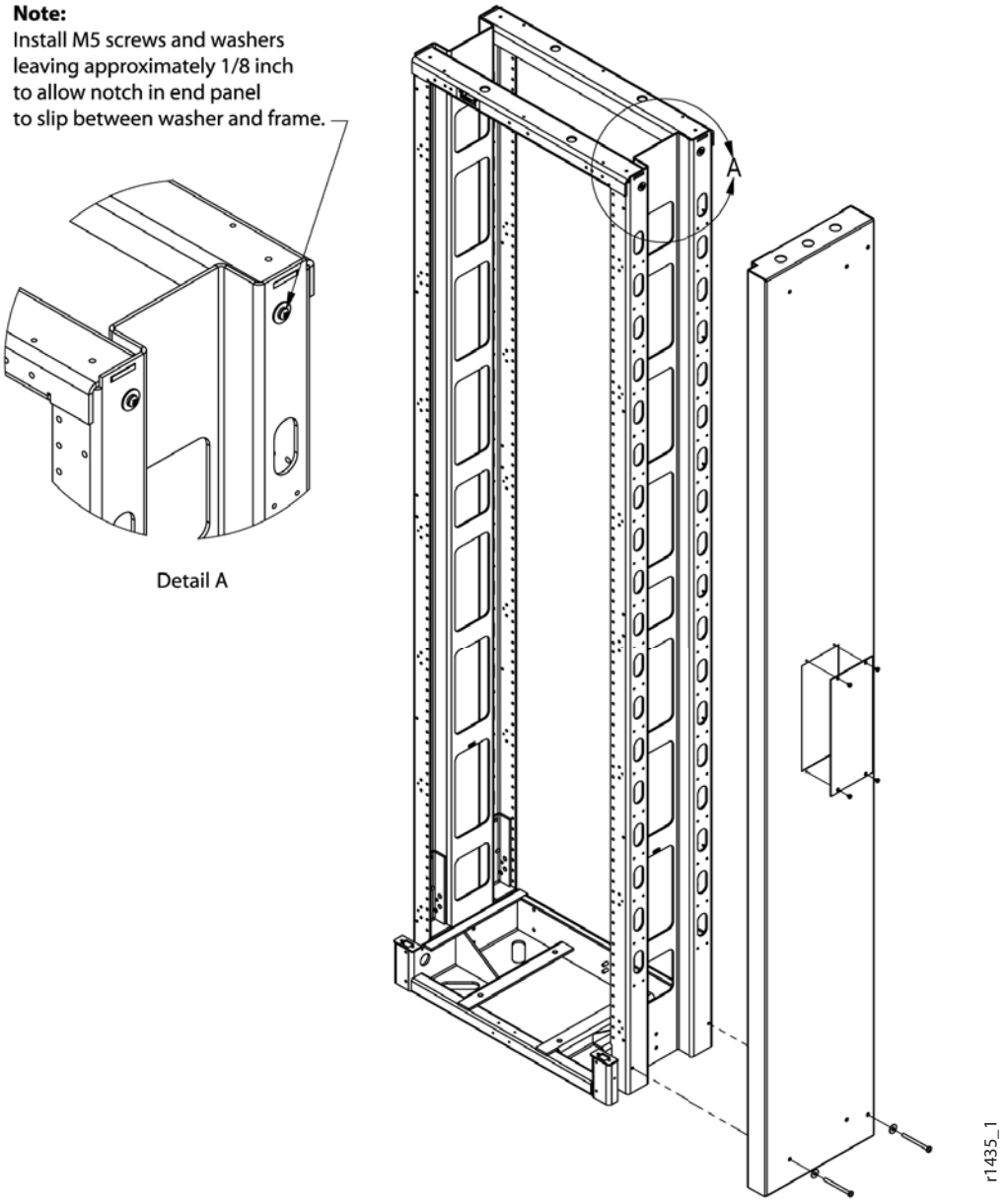


Figure 4-43: Optional Aisle End Panel for Rack (ETSI Configuration)

4.13 Installing Power and Ground Cables

This procedure provides instructions for installing power, ground, and alarm cabling for standard rack configurations. It includes the following subprocedures:

4.13.1 Reference Material

This subsection describes instructions for installing power and ground cabling for ETSI rack configurations. Fujitsu does not manufacture a power distribution panel (PDP) for ETSI applications. Fujitsu recommends using the ADC # PWX-1LFA2DF fuse panel manufactured by ADC Telecommunications, Inc. Refer to ADC documentation supplied with the product for installation instructions for the ADC # PWX-1LFA2DF fuse panel. This unit can be ordered through Fujitsu using part number PC15L-0001-C083#01.

The cables and cable harnesses used are listed in Table 4-2 [p. 4-63] and shown in Figure 4-44 [p. 4-63].

Note: *Connections to the shelf power terminal strip should use copper conductors only.*

Figures 4-45 [p. 4-64] through 4-47 [p. 4-65] show schematics for installing power and ground cabling between the rack, shelves and PDP for the following standard rack configurations:

Each standard rack configuration includes a PDP with power terminals as shown in Figure 4-45 [p. 4-64].

Figure 4-46 [p. 4-64] shows the Optical/Tributary shelf station interface area (SIA), and Figure 4-47 [p. 4-65] shows the power cabling.

Table 4-2: Power and Ground Cable Connections (ETSI Configuration)

Part Number	Use	Description	Term Type	Wire Gauge
PC660-0105-T019	–48 V DC and ground	3-wire rack/shelf power and frame ground harness, one set per shelf	10 AWG crimp lugs	10 AWG
PC660-0105-T020	–48 V DC and ground	2-wire rack/shelf power harness, one set per shelf	10 AWG crimp lugs	10 AWG
PC660-0105-T021	Frame ground	Frame ground stranded wire cable from rack to PDP, one per rack	Terminal lugs, both ends, installed	6 AWG, stranded

Note: *The PDP has dual-post output power connectors.*

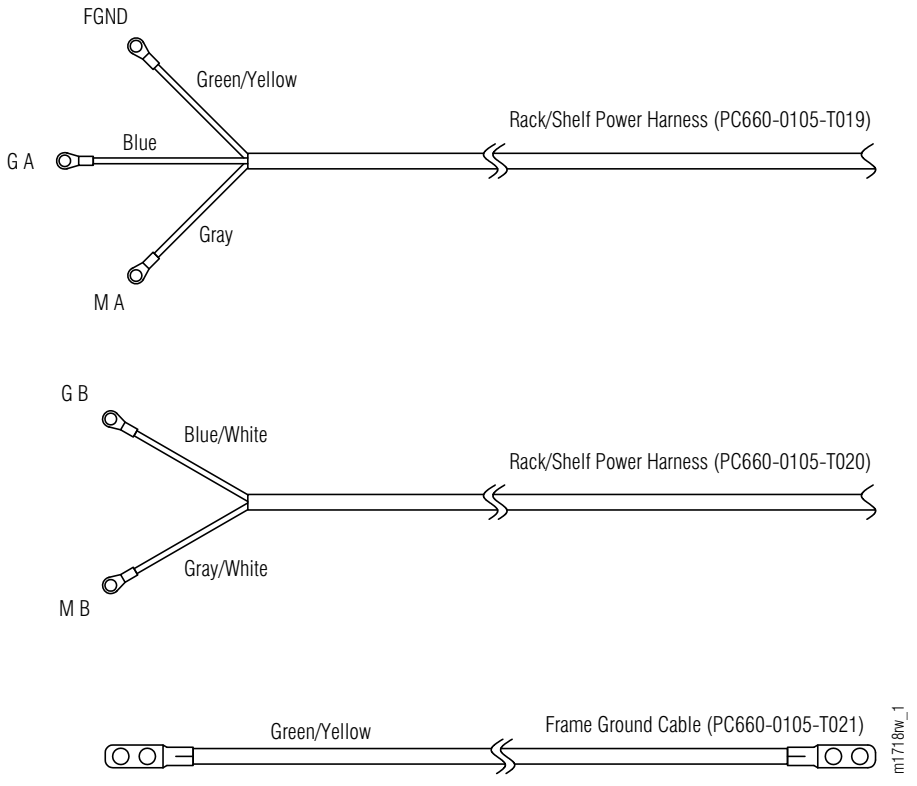


Figure 4-44: ETSI Power and Ground Cables

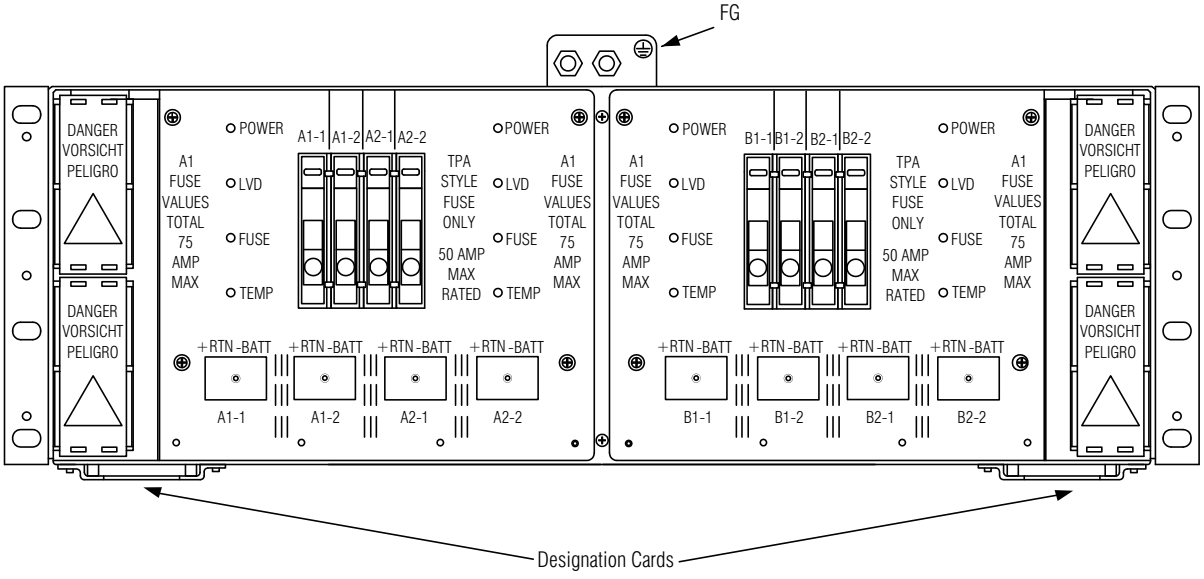


Figure 4-45: Front View of PDP

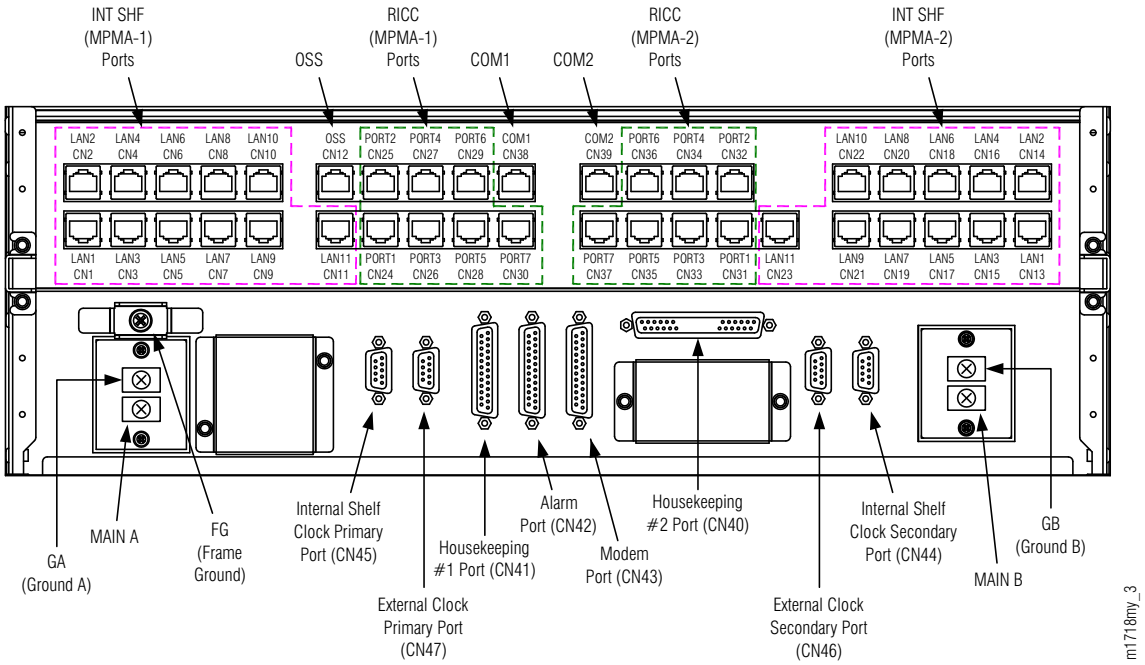
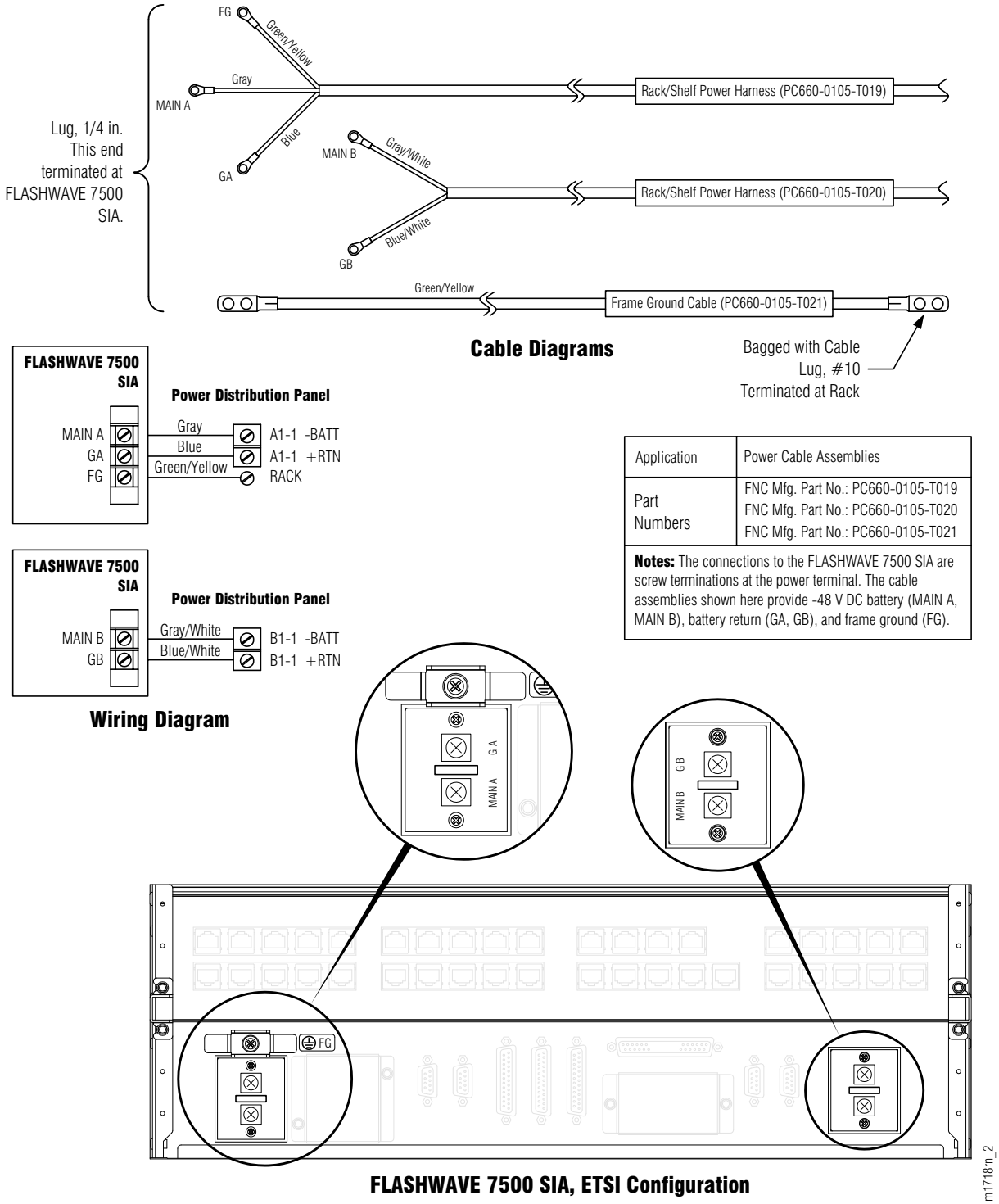


Figure 4-46: Optical/Tributary Station Interface Area (SIA) (ETSI Configuration)



Application	Power Cable Assemblies
Part Numbers	FNC Mfg. Part No.: PC660-0105-T019 FNC Mfg. Part No.: PC660-0105-T020 FNC Mfg. Part No.: PC660-0105-T021

Notes: The connections to the FLASHWAVE 7500 SIA are screw terminations at the power terminal. The cable assemblies shown here provide -48 V DC battery (MAIN A, MAIN B), battery return (GA, GB), and frame ground (FG).

Figure 4-47: Optical/Tributary Shelf Power Cabling (ETSI Configuration)

4.13.2 Installing Power and Ground Cables

This subprocedure includes the following subtasks:

Use this procedure to install power, ground, and alarm cabling for a rack of FLASHWAVE 7500 ETSI Configuration equipment.

DANGER:

Use properly insulated tools and do not allow tools, cables, or other metal objects to connect across terminals. At this point, –48 V DC power has been applied to the PDP, and improper handling may result in personal injury, damage to equipment, or both. Fujitsu recommends that office power be removed from the rack using local procedures.

> ***Note:*** *Ensure that all cables installed in this procedure are properly bundled, laced, and secured to the rack in accordance with local procedures. Connectors should be secured in place using connector retaining screws.*

Install power, ground, and alarm cables for one rack of FLASHWAVE 7500 ETSI Configuration equipment as follows:

Identify Cabling Schematic

Step	Task
1	If you have not already done so, review the reference material presented in Section 4.13.1, Reference Material [p. 4-62].

Disconnect Power from PDP

2 If installing into a powered rack, disconnect office power (recommended) or remove fuses from the PDP.

3 Use a DMM to ensure 0 V DC (with reference to the battery ground) at the point of disconnection.

Install Shelf Power Harnesses A1 and B1

4 Identify the shelf that is to be connected to buses A1 and B1.

5 Locate the rack/shelf power harnesses (PC660-0105-T019 and PC660-0105-T020, Figure 4-44 [p. 4-63]) for the shelf.

Note: *The length of the cables may be altered at the discretion of the installer to ensure proper length.*

6 Prepare the power leads by installing the terminal lugs that are required on one end of the cable (see Figure 4-44 [p. 4-63]). Ensure that no wire strands are shorting terminals together and that leads are securely fastened. The cable should now have terminal lugs on both ends of the power cable.

Note: *The shelf power wiring is the same with all rack configurations. Observe the color coding of the power cable.*

7 On the station interface area (SIA) of the shelf identified in Step 4 [p. 4-67], remove the plastic covers on the shelf power terminal strips located on the bottom left and bottom right of the SIA (see Figure 4-47 [p. 4-65]).

8 Connect both ends of cable GA of the power harness as follows:

a. Identify lug GA in the power harness (see Figure 4-44 [p. 4-63]) and connect it to shelf terminal GA (see Figure 4-47 [p. 4-65]).

b. Connect the other end of the same cable to PDP terminal A1-1 +RTN (see Figure 4-45 [p. 4-64]).

9 Connect both ends of cable GB of the power harness as follows:

a. Identify lug GB in the power harness (see Figure 4-44 [p. 4-63]) and connect it to shelf terminal GB (see Figure 4-47 [p. 4-65]).

b. Connect the other end of the same cable to PDP terminal B1-1 +RTN (see Figure 4-45 [p. 4-64]).

10 Connect both ends of cable MA of the power harness as follows:

a. Identify lug MA in the power harness (see Figure 4-44 [p. 4-63]) and connect it to shelf terminal MAIN A (see Figure 4-47 [p. 4-65]).

b. Connect the other end of the same cable to PDP terminal A1-1 -BATT (see Figure 4-45 [p. 4-64]).

11 Connect both ends of cable MB of the power harness as follows:

a. Identify lug MB in the power harness (see Figure 4-44 [p. 4-63]) and connect it to shelf terminal MAIN B (Figure 4-47 [p. 4-65]).

b. Connect the other end of the same cable to PDP terminal B1-1 -BATT (see Figure 4-45 [p. 4-64]).

12 Connect both ends of cable FGND of the power harness as follows:

a. Identify lug FGND in the power harness (see Figure 4-44 [p. 4-63]) and connect it to shelf terminal FG (see Figure 4-47 [p. 4-65]).

b. Connect the other end of the same cable to the equipment rack frame ground.

13 Replace the plastic covers over the SIA terminal strips.

Install Shelf Power Harnesses A2 and B2

14 Is a shelf to be connected to buses A2 and B2?

If YES:
Go to Step 15 [p. 4-69].

If NO:
Go to Step 24 [p. 4-70].

15 Locate the rack/shelf power harnesses (PC660-0105-T019 and PC660-0105-T020, Figure 4-44 [p. 4-63]) for the shelf.

Note: *The length of the cables may be altered at the discretion of the installer to ensure proper length.*

16 Prepare the power leads by installing the terminal lugs that are required on one end of the cable (see Figure 4-44 [p. 4-63]). Ensure that no wire strands are shorting terminals together and that leads are securely fastened. The cable should now have terminal lugs on both ends of the power cable.

Note: *The shelf power wiring is the same with all rack configurations. Observe the color coding of the power cable.*

17 On the SIA of the shelf identified in Step 14 [p. 4-68], remove the plastic covers on the shelf power terminal strips located on the bottom left and bottom right of the SIA (see Figure 4-47 [p. 4-65]).

18 Connect both ends of cable GA of the power harness as follows:

a. Identify lug GA in the power harness (see Figure 4-44 [p. 4-63]) and connect it to shelf terminal GA (see Figure 4-47 [p. 4-65]).

b. Connect the other end of the same cable to PDP terminal A2-1 +RTN (see Figure 4-45 [p. 4-64]).

19 Connect both ends of cable GB of the power harness as follows:

a. Identify lug GB in the power harness (see Figure 4-44 [p. 4-63]) and connect it to shelf terminal GB (see Figure 4-47 [p. 4-65]).

b. Connect the other end of the same cable to PDP terminal B2-1 +RTN (see Figure 4-45 [p. 4-64]).

20 Connect both ends of cable MA of the power harness as follows:

a. Identify lug MA in the power harness (see Figure 4-44 [p. 4-63]) and connect it to shelf terminal MAIN A (see Figure 4-47 [p. 4-65]).

b. Connect the other end of the same cable to PDP terminal A2-1 -BATT (see Figure 4-45 [p. 4-64]).

21 Connect both ends of cable MB of the power harness as follows:

a. Identify lug MB in the power harness (see Figure 4-44 [p. 4-63]) and connect it to shelf terminal MAIN B (see Figure 4-47 [p. 4-65]).

b. Connect the other end of the same cable to PDP terminal B2-1 -BATT (see Figure 4-45 [p. 4-64]).

22 Connect both ends of cable FGND of the power harness as follows:

a. Identify lug FGND in the power harness (see Figure 4-44 [p. 4-63]) and connect it to shelf terminal FG (see Figure 4-47 [p. 4-65]).

b. Connect the other end of the same cable to the equipment rack frame ground.

23 Replace the plastic cover over the shelf SIA terminal strip.

Install Frame Ground Cable

24 Locate the frame ground cable (PC660-0105-T021, Figure 4-44 [p. 4-63]).

25 Connect both ends of the frame ground cable as follows:

a. Connect one end of the frame ground cable to the equipment rack frame ground.

Note: *The equipment rack frame ground is a grounding point on the frame itself. On some racks, it is a screw hole that has a piece of tape over it. The tape is used to keep the paint off of a small portion of the rack so that when the tape is removed, the grounding point provides a good electrical connection to the frame. Other rack types may require you to scrape the paint off the screw hole.*

b. Connect the other end to the PDP frame ground terminal located at the top of the PDP (see Figure 4-45 [p. 4-64]).

Final Checks

26 Dress and lace all cables, and secure to the rack interior using standard local procedures.

27 Using local procedures, reconnect the battery office power that was removed from the rack, or reinstall the fuses.

This procedure is complete.

4.14 Checking Power at Optical/Tributary Shelf

This procedure is used for verifying the power connections to the Optical/Tributary shelf.

DANGER:

Use caution when working on the power strip at the top of any shelf to avoid personal injury, damage to equipment, or both. Avoid touching terminals or uninsulated conductors.

Step	Task
1	Set the PDP fuses for the installed shelves to the ON position. See Figure 4-45 [p. 4-64] for the appropriate circuit breaker, if necessary.
2	Remove the plastic cover over the power strip on the shelf station interface area (SIA).
3	Connect the negative DMM test lead to the GA ground terminal on the SIA power strip, and connect the positive DMM test lead to the MAIN A voltage terminal. See Figure 4-48 [p. 4-71]. If required, record the test results for future reference.

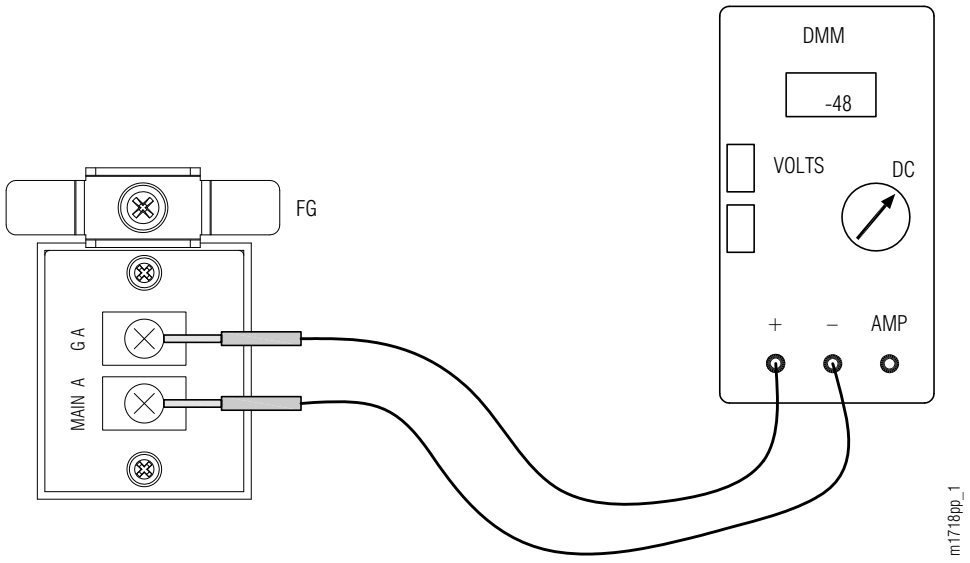


Figure 4-48: Supply Voltage Check

4 Is the DMM measurement between –40 and –57 V DC?

If YES:
Go to Step 5 [p. 4-72].

If NO:
Report as a trouble item to the installation group and repeat voltage checks after the trouble is corrected.

5 Connect the negative DMM test lead to the GB ground terminal on the SIA power strip, and connect the positive DMM test lead to the MAIN B voltage terminal. If required, record the test results for future reference.

6 Is the DMM measurement between –40 and –57 V DC?

If YES:
Go to Step 7 [p. 4-72].

If NO:
Report as a trouble item to the installation group and repeat voltage checks after trouble is corrected.

7 Reinstall the plastic cover over the power strip on the shelf SIA.

8 At the front of the Optical/Tributary shelf, locate the front-panel voltage test points (see Figure 4-49 [p. 4-73]), connect the negative DMM test lead to the G (ground) test point, and connect the positive DMM test lead to the MAIN A test point.

9 Is the DMM measurement between –40 and –57 V DC?

If YES:
Go to Step 10 [p. 4-72].

If NO:
Report as a trouble item to the installation group and repeat voltage checks after trouble is corrected.

10 At the front of the Optical/Tributary shelf, locate the front-panel voltage test points (see Figure 4-49 [p. 4-73]), connect the negative DMM test lead to the G (ground) test point, and connect the positive DMM test lead to the MAIN B test point.

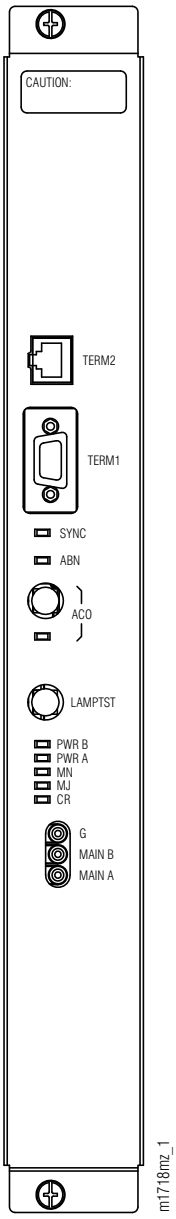


Figure 4-49: Front-Panel Voltage Test Points (Optical/Tributary Shelf) (ETSI Configuration)

11 Is the DMM measurement between –40 and –57 V DC?

If YES:
Go to Step 12 [p. 4-74].

If NO:
Report as a trouble item to the installation group and repeat voltage checks after trouble is corrected.

12 Repeat the preceding steps for the remaining Tributary shelves.

13 Check the frame ground connections and readings according to local procedures.

This procedure is complete.

4.15 Checking Ground Resistance at the Optical/Tributary Shelf Power Input

Ideally, frame ground and battery return at the shelf power input connectors are common to each other. Essentially a resistance of 0 ohms should be present between them and little or no voltage potential across frame ground and battery return.

The test equipment required is a DMM or a voltmeter and ohmmeter that can accurately detect low resistance levels. See Figure 4-50 [p. 4-75].

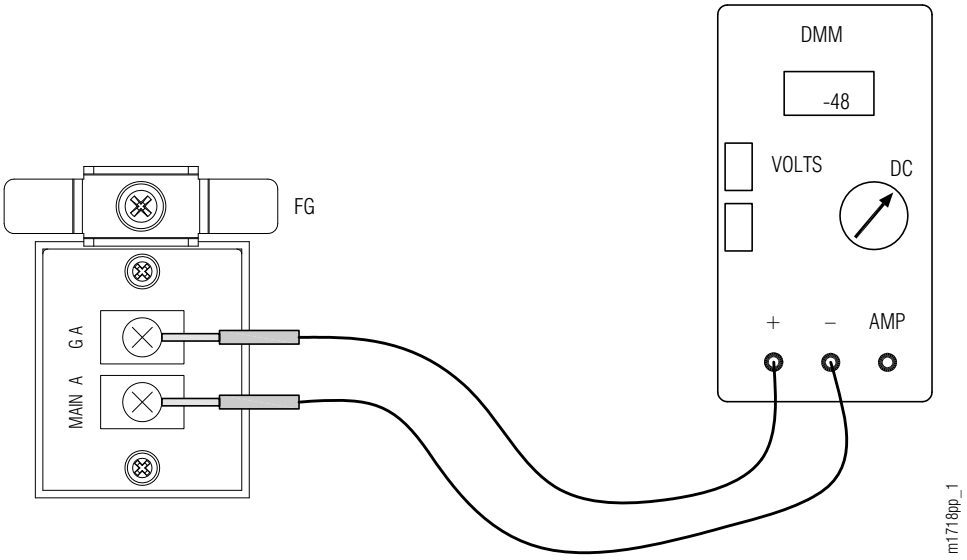


Figure 4-50: Ground Voltage Check Example

Step	Task
1	Use the DMM set to the voltmeter function or a voltmeter to measure the voltage between frame ground and each of the battery return points. The reading should be very close to 0 V DC.
2	Does the voltage exceed 1 V DC? **If YES:** Do not continue with Step 3 [p. 4-76] until the voltage source has been eliminated. For technical assistance, call 1-800-USE-FTAC (800-873-3822). **If NO:** Continue with Step 3 [p. 4-76].

3 Use the DMM set for the ohms function or an ohmmeter to measure the resistance between frame ground and each of the battery return points (A and B) on the shelf. The reading should be very close to 0 ohms.

4 Is the reading close to 0 ohms?

If YES:
Continue with Step 5 [p. 4-76].

If NO:
Do not continue with Step 5 [p. 4-76] until the voltage source has been eliminated. For technical assistance, call 1-800-USE-FTAC (800-873-3822).

5 Swap the DMM or ohmmeter leads between frame ground and battery return, and verify the same reading as described in Step 3 [p. 4-76].

This procedure is complete.

4.16 Installing Cables

This section includes the following subsections:

4.16.1 Overview

The procedures provided in this section cover the connections made to the Optical/Tributary shelf station interface area (SIA) of the FLASHWAVE 7500 ETSI Configuration system. An SIA illustration (see Figure 4-51 [p. 4-78]) shows the SIA connectors and connector designations for the Optical/Tributary shelf.

All fiber cabling and connections to the shelf plug-in units are made during system turn-up. Refer to *System Turn-Up*, for fiber cabling information. For a detailed description of FLASHWAVE 7500 cables and shelf connectors, refer to *Cable and Wiring Guide*.

> ***Note:*** *Some of the connectors on the Optical/Tributary shelf SIA may be for future use. However, this practice defines all connectors on the shelf SIA and applicable cables that may be used in future releases.*

> ***Note:*** *All cabling from the Optical/Tributary shelf SIA should be connected only to other shelves and equipment within the same building.*

4.16.2 Prerequisites

The tools required for performing the procedures listed in this section are as follows:

- Cable termination tools
- Common hand tools

4.16.3 Optical/Tributary Shelf SIA

System cable connections are made to the connectors located on the Optical/Tributary shelf station interface area (SIA) as shown in Figure 4-51 [p. 4-78] and described in the sections that follow. Power, ground, and alarm cabling was covered in Section 4.13 [p. 4-62].

Note: *Fiber cabling for the LAS (if used) is installed during system turn-up as described in System Turn-Up.*

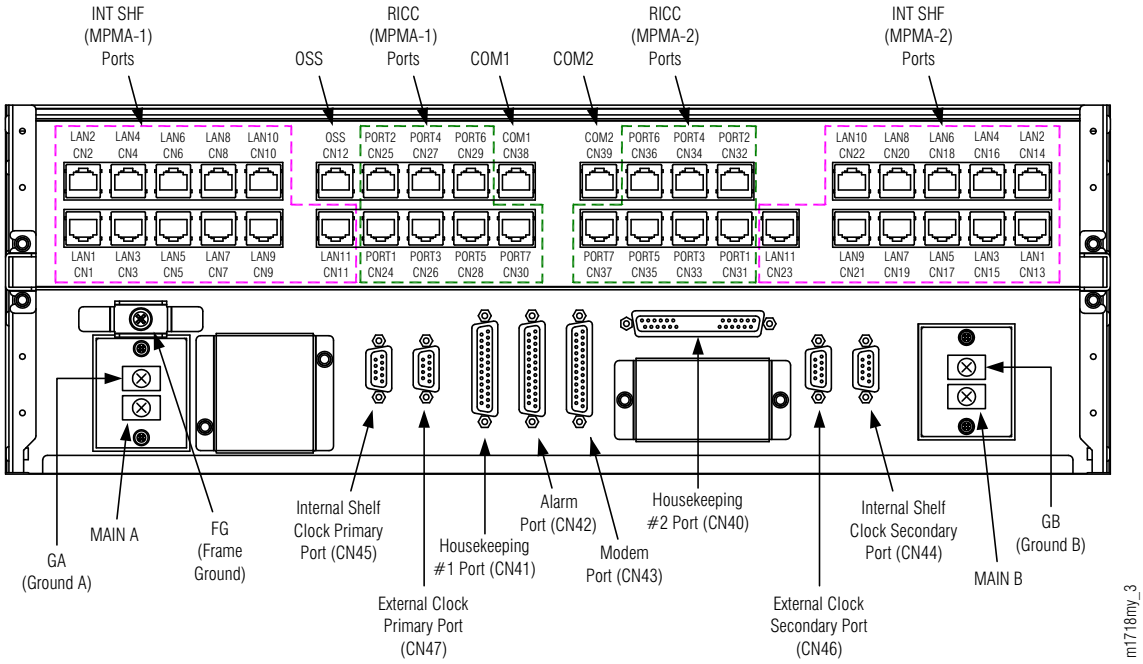


Figure 4-51: Optical/Tributary SIA Connectors (ETSI Configuration)

4.16.4 Installing Modem Cable (Main Optical Shelf SIA)

This procedure provides instructions for installing the 25-pin, D-sub modem cable on the Main Optical shelf SIA. Table 4-3 [p. 4-79] lists pertinent information for this cable. Figure 4-52 [p. 4-79] shows the cable connector pinouts.

> ***Note:*** *The modem cable is a standard RS-232 straight-through (not null-modem) cable available at most computer supply stores.*

Table 4-3: Modem Cable Information (ETSI Configuration)

Cable Part Number	SIA Connector Number	Cable Description	Connector Type	Cable Wire Size
21-176-xxx[a]	CN43	Modem access to remote NE	25-pin D-sub	24 AWG

[a] xxx = length in feet

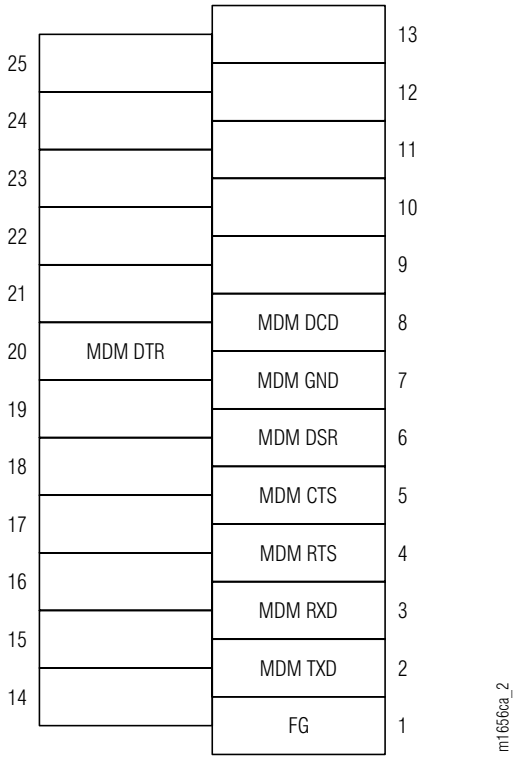


Figure 4-52: Connector Pinouts, 25-Pin D-Sub Modem Cable

Step	Task
1	Connect the modem cable to connector CN43 (Main Optical shelf) and secure with retaining screws. See Figure 4-51 [p. 4-78].
2	Connect the other end of the modem cable to the appropriate external modem.

Note: *To connect a PC directly to connector CN43, use a null-modem cable in place of the 21-176-xxx cable.*

This procedure is complete.

4.16.5 Installing OSS Cable (Main Optical Shelf)

This procedure provides instructions for installing the OSS cable on the Main Optical shelf SIA (CN12). Table 4-4 [p. 4-81] lists pertinent information for this cable. Figure 4-53 [p. 4-81] shows the cable connector pinouts.

Table 4-4: OSS Cable Information (Small Configuration)

Cable Part Number	SIA Connector Number	Cable Description	Connector Type	Cable Wire Size
21-332-xxx or 21-094-xxx[a]	CN12	Ethernet connection	8-pin RJ-45	24 AWG

[a] xxx = length in feet

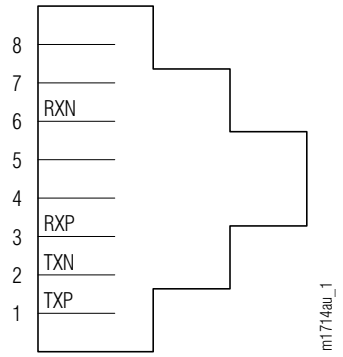


Figure 4-53: Connector Pinouts, OSS Cable

Step	Task
1	Connect the cable to SIA connector CN12 (Main Optical shelf). See Figure 4-51 [p. 4-78].
2	Connect the other end of the cable to the appropriate router or hub.

Note: *The 21-094-xxx cable can also be used to connect a PC to the TERM2 Ethernet port on the Optical shelf front panel.*

Note: *The OSS port has automatic cable-detect capability to properly function with both crossover and straight cables.*

This procedure is complete.

4.16.6 Installing LAN Cable (Optical/Tributary Shelf)

This procedure provides instructions for connecting to the LAN ports of the Optical and Tributary shelves. LAN port connectors are located in the station interface area (SIA) at the top front of the ETSI Optical/Tributary shelf (SHU4). Table 4-5 [p. 4-82] lists pertinent information for these cables. Figure 4-54 [p. 4-82] shows the cable connector pinouts.

Table 4-5: LAN Cable Information (ETSI Configuration)

Cable Part Number	Connector Number	Cable Description	Connector Type	Cable Wire Size
21-332-xxx[a]	For the Optical shelf: CN2, CN6	LAN connection	RJ-45	24 AWG
	For Tributary shelves: CN1, CN3			

[a] xxx = length in feet

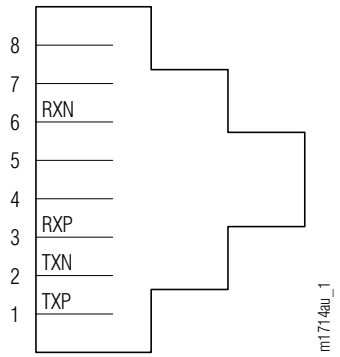


Figure 4-54: Connector Pinouts, LAN Cable

Step	Task
1	Connect the RJ-45 connector on one end of the LAN cable (21-332-xxx) to the primary Tributary shelf or Auxiliary Optical shelf connector CN1.

2 Connect the other end of the LAN cable to the appropriate Optical shelf connector (CN2…CN6), Auxiliary Optical shelf connector (CN2…CN5), or Tributary shelf connector (CN2 or CN3), as indicated in Figure 4-55 [p. 4-83] and Table 4-6 [p. 4-83].

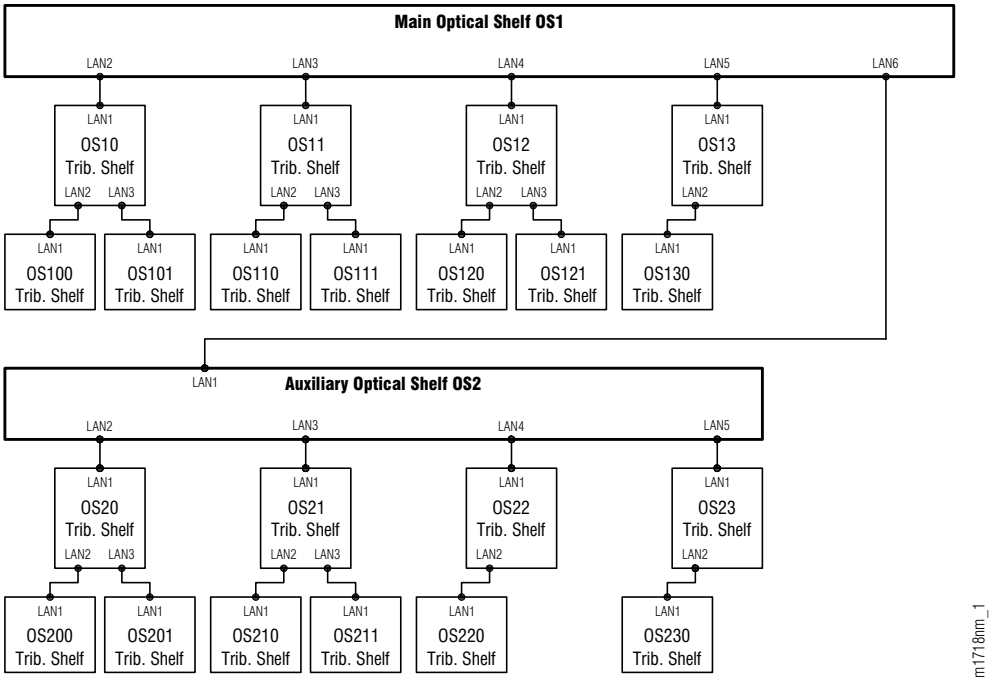


Figure 4-55: Hierarchy of LAN Connections (ETSI Configuration)

Table 4-6: LAN Connections (ETSI Configuration) (1 of 2)

From			To		
Shelf	**Connector**	**Label**	**Shelf**	**Connector**	**Label**
OS1 (Main Optical)	CN2	LAN2	OS10 (Tributary)	CN1	LAN1
	CN3	LAN3	OS11 (Tributary)	CN1	LAN1
	CN4	LAN4	OS12 (Tributary)	CN1	LAN1
	CN5	LAN5	OS13 (Tributary)	CN1	LAN1
	CN6	LAN6	OS2 (Auxiliary Optical)	CN1	LAN1
OS10 (Tributary)	CN2	LAN2	OS100 (Tributary)	CN1	LAN1
	CN3	LAN3	OS101 (Tributary)	CN1	LAN1

Table 4-6: LAN Connections (ETSI Configuration) (2 of 2)

From			To		
Shelf	**Connector**	**Label**	**Shelf**	**Connector**	**Label**
OS11 (Tributary)	CN2	LAN2	OS110 (Tributary)	CN1	LAN1
	CN3	LAN3	OS111 (Tributary)	CN1	LAN1
OS12 (Tributary)	CN2	LAN2	OS120 (Tributary)	CN1	LAN1
	CN3	LAN3	OS121 (Tributary)	CN1	LAN1
OS13 (Tributary)	CN2	LAN2	OS130 (Tributary)	CN1	LAN1
OS2 (Auxiliary Optical)	CN2	LAN2	OS20 (Tributary)	CN1	LAN1
	CN3	LAN3	OS21 (Tributary)	CN1	LAN1
	CN4	LAN4	OS22 (Tributary)	CN1	LAN1
	CN5	LAN5	OS23 (Tributary)	CN1	LAN1
OS20 (Tributary)	CN2	LAN2	OS200 (Tributary)	CN1	LAN1
	CN3	LAN3	OS201 (Tributary)	CN1	LAN1
OS21 (Tributary)	CN2	LAN2	OS210 (Tributary)	CN1	LAN1
	CN3	LAN3	OS211 (Tributary)	CN1	LAN1
OS22 (Tributary)	CN2	LAN2	OS220 (Tributary)	CN1	LAN1
OS23 (Tributary)	CN2	LAN2	OS230 (Tributary)	CN1	LAN1

3 Proceed to Section 4.16.7, Installing RICC Cable (Optical Shelf) [p. 4-85], if RICC cables are required.

This procedure is complete.

4.16.7 Installing RICC Cable (Optical Shelf)

This procedure provides instructions for connecting to the RICC ports on the Optical shelf. RICC port connectors are located in the station interface area (SIA) at the top front of the ETSI Optical shelf (SHU4).Table 4-7 [p. 4-85] lists pertinent information for these cables. Figure 4-56 [p. 4-85] shows the cable connector pinouts.

Note: *The RICC cable is only required for HUB configurations.*

Table 4-7: LAN Cable Information (ETSI Configuration)

Cable Part Number	Connector Number	Cable Description	Connector Type	Cable Wire Size
21-332-xxx[a]	CN24, CN25, CN31, and CN32 (Main and Auxiliary Optical shelves)	RICC connection	RJ-45	24 AWG

[a] xxx = length in feet

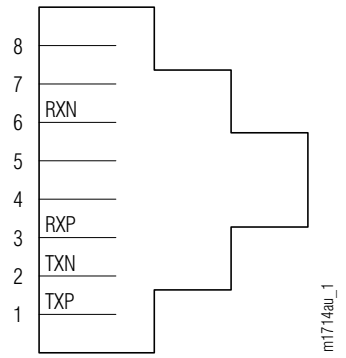


Figure 4-56: Connector Pinouts, RICC Cable

Step	Task
1	Connect the RJ-45 connector on one end of the RICC cable (21-332-xxx) to connector CN24, CN25, CN31, or CN32 in the SIA of the Main Optical shelf.
2	Connect the other end of the RICC cable to the appropriate Auxiliary Optical shelf connector indicated in Table 4-8 [p. 4-86].

Table 4-8: RICC Connections from OS1 to OS2 (ETSI Configuration)

From				To			
Shelf	**Port**	**Connector**	**Label**	**Shelf**	**Port**	**Connector**	**Label**
OS1 (Main)	OS1-16-PC1	CN31	PORT1	OS2 (Auxiliary)	OS2-16-PC1	CN31	PORT1
	OS1-16-PC2	CN32	PORT2		OS2-14-PC1	CN24	PORT1
	OS1-14-PC1	CN24	PORT1		OS2-16-PC2	CN32	PORT2
	OS1-14-PC2	CN25	PORT2		OS2-14-PC2	CN25	PORT2

This procedure is complete.

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5

EXTENSION CONFIGURATION

This chapter includes the following procedures:

5.1 Overview

This chapter provides prerequisites and procedures for installing a rack and installing or connecting the shelves, plug-in units, and cables that make up the FLASHWAVE® 7500 Extension Configuration system. Additionally, this chapter describes the backplane of the FLASHWAVE 7500 Extension shelf, which is used in the Extension Configuration. Procedures for attaching cables to the Extension shelf backplane are provided in Section 5.13, Installing Cables [p. 5-48].

> ***Note:*** *In an Extension Configuration, the Extension shelf is the 23-inch Universal shelf.*

Before performing the installation procedures, review the following subsections describing prerequisites, standard rack configurations, and flange kits.

5.2 Prerequisites

Insure that all FLASHWAVE 7500 Extension Configuration equipment has been received, and all data forms and job engineering drawings have been completed and are available.

The tools required for performing procedures listed in this chapter include the following:

- Common hand tools
- Digital multimeter (DMM)

5.3 Rack Configurations

The FLASHWAVE 7500 Extension Configuration system racks can be configured in several variations. Fujitsu recommends ordering the top-level part number of a particular rack, which includes the rack, the appropriate shelves, the rack wiring and cabling material, and other miscellaneous devices and equipment as required. The system racks are installed on-site in accordance with local plans and procedures. For detailed procurement information, refer to *Ordering Information*, or contact your Fujitsu sales representative.

> ***Note:*** *Due to NEBS™ Earthquake-resistance requirements, the LAS shelf should always be installed at the top of the rack, in any configuration.*

5.4 Storing, Unpacking, and Inspecting Equipment

This section describes how to store, unpack, and inspect the FLASHWAVE 7500 equipment. It includes the following subsections:

Note: *Review* Section 5.5 [p. 5-8] *for rack installation criteria.*

5.4.1 Storing Equipment

When equipment is to be kept in storage, it should be left in the shipping containers. The storage bags for shelves and plug-in units are coated with a conductive material to protect plug-in units from being damage by electrostatic discharge (ESD). Observe all warning labels used by Fujitsu to indicate electrostatic-sensitive devices.

5.4.2 Unpacking and Inspecting the Equipment Rack

This procedure provides guidelines for unpacking and inspecting a standard rack. Fujitsu recommends that the installation team familiarize themselves with the specific area where the installation is to be performed, examine the racks, and ensure that sufficient workspace to unpack the racks is available.

DANGER:

Improper handling of the equipment rack can result in serious injury or death. Always use a forklift or lifting sling with block and tackle to lift or move the equipment rack. Keep all personnel clear of the equipment rack while it is being lifted. Do not attempt to handle and install the racks without sufficient assistance.

Follow this procedure to unpack and inspect the equipment rack:

Step	Task
1	Identify the equipment rack to be installed.

2 Before unpacking the equipment rack, inspect the container (see Figure 5-1 [p. 5-4]) for signs of shipping damage. Claims for shipping damage must be filed with the transportation company in accordance with their published procedure.

Figure 5-1: Example of an Equipment Rack in Shipping Container

Note: *A shipping label is located on the front of the equipment rack container. Compare this with the shipping documents.*

3 Is this the correct shipment for this location?

If YES:
Continue with Step 4 [p. 5-4].

If NO:
Go to Step 16 [p. 5-6].

4 Using all data sheets and job engineering drawings, verify that the information matches the installation site.

5 Using industrial shears, cut the two shipping bands from the container. See Figure 5-1 [p. 5-4] for the location of the shipping bands.

After the last shipping band is cut, the top of the shipping container will fall away.

6 At the front-left or -right corner of the container (see Figure 5-2 [p. 5-5]), use a box cutter to cut the container away from the equipment rack. Start cutting from the top of the shipping container to the bottom.

Figure 5-2: Removing Shipping Container from an Equipment Rack

7 After the shipping container is cut open, remove it from the equipment rack.

8 Inspect the rack thoroughly to ensure that it is not damaged.

9 Is there any noticeable damage to the rack?

If YES:
Go to Step 16 [p. 5-6].

If NO:
Continue with Step 10 [p. 5-5].

Note: *The equipment rack should be completely covered with bubble wrap to prevent damage during shipment.*

10 At the side of the rack, use industrial shears to cut open the bubble wrap. Start cutting from the bottom of the rack to the top.

WARNING:

Always cut at the side of the rack to avoid damaging the equipment. Standard configuration racks are delivered prewired. Do not cut or disconnect any wires.

11 Carefully remove the bubble wrap from the rack.

12 Is there any noticeable damage to the rack after the bubble wrap is removed?

If YES:
Go to Step 16 [p. 5-6].

If NO:
Continue with Step 13 [p. 5-6].

13 Does the rack contain equipment (standard rack configuration)?

If YES:
Continue with Step 14 [p. 5-6].

If NO:
Go to Step 18 [p. 5-6].

14 Locate the serial numbers on the left side of each equipment shelf mounted in the rack, and compare the serial numbers with the serial numbers on the shipping documents.

15 Do the serial numbers on the equipment and the shipping documents match?

If YES:
Go to Step 17 [p. 5-6].

If NO:
Continue with Step 16 [p. 5-6].

16 Notify the transportation company if the equipment was damaged or if an improper shipment was received. DO NOT continue the installation of the equipment until the problem has been corrected. After the problem is resolved, repeat this procedure beginning with Step 2 [p. 5-4].

17 Update office records according to local procedures.

18 Do you want to install the equipment rack now?

If YES:
Proceed to Section 5.5, Installing the Rack [p. 5-8].

If NO:
This procedure is complete.

5.4.3 Unpacking and Inspecting Equipment

This procedure provides guidelines for unpacking system equipment and ensuring the safe arrival of all equipment. Fujitsu recommends that the installation team familiarize themselves with the specific area where the installation is to be performed, examine the racks to be used, and ensure that sufficient workspace is available to unpack equipment.

DANGER:

Do not attempt to handle and install the shelves without sufficient assistance. The Extension shelf weighs approximately 48.5 lb (22 kg) empty (without fans). Equipped, the Extension shelf weighs significantly more. Handling the equipment without sufficient assistance may result in personal injury, damage to the equipment, or both.

WARNING:

Do not use the internal walls of any shelf as a lifting point or lift support. Doing so may damage the plug-in unit rail support.

Step	Task
1	Before unpacking the equipment, inspect the containers for signs of shipping damage. Claims for shipping damage must be filed with the transportation company in accordance with their published procedure.
2	Unpack and inventory individual system equipment components; however, leave all plug-in units in their original, individual containers until they are installed during system turn-up. When unpacking, use the checkoff list accompanying each shipment to determine that all items are present before proceeding with the installation. If a shortage of any kind exists, notify the appropriate Fujitsu representative.
3	Inspect the inside and outside of the shelves for damage.
4	Check for debris possibly lodged in each shelf backplane.
5	Update office records according to local procedures.
	This procedure is complete.

5.5 Installing the Rack

This procedure details the steps required to install a standard rack. Fujitsu recommends that the installation team familiarize themselves with the specific area where the installation is to be performed, examine the rack, and ensure that sufficient workspace is available to install the rack.

DANGER:

Improper handling of the equipment rack can result in serious injury or death. Always use a forklift or lifting sling with block and tackle to lift or move the equipment rack. Keep all personnel clear of the equipment rack while it is being lifted. Do not attempt to handle and install the racks without sufficient assistance.

CAUTION:

The rack should be mounted only on a concrete or other noncombustible surface.

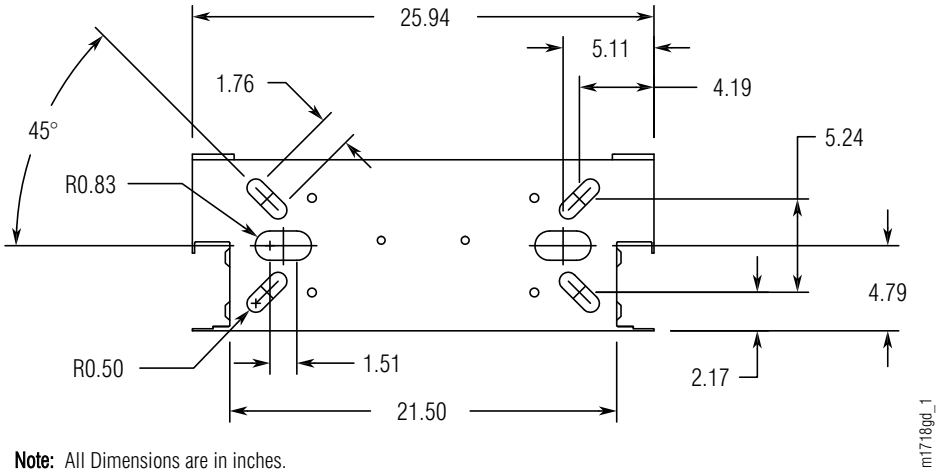
The following tools are required to perform this procedure:

- Hammer
- Drill
- Drill bits sufficient to drill into the flooring
- Punch
- Common hand tools, including a wrench or ratchet set

Follow this procedure to install the equipment rack:

Step	Task
1	Identify the equipment rack to be installed.
2	Inspect all shipping documents to ensure that the correct shipment was received. Refer to Section 5.4.2, Unpacking and Inspecting the Equipment Rack [p. 5-3].
3	Using the documentation supplied with the rack package, mark the floor for proper mounting.

Figure 5-3 [p. 5-9] shows an **example** mounting diagram. Mounting diagrams will vary depending on equipment and location.



Note: All Dimensions are in inches.

Figure 5-3: Example Diagram—7 feet x 23 inch Equipment Rack Floor Dimensions

4 Using a punch and hammer, mark the position where the holes are to be drilled.

5 Determine the type of floor anchor to be used.

6 Is the floor anchor for a concrete floor?

If YES:
Go to Step 7 [p. 5-9].

If NO:
Go to Step 14 [p. 5-10].

7 In accordance with the dimensions of the anchor to be used, drill the holes in the concrete floor.

8 Clean the drill shavings from the holes.

9 Install an anchor in each of the holes.

10 Remove any debris from the area in which the rack will be mounted.

11 Move the rack into position, aligning each of the holes in the base of the rack to the anchors.

12 Install the mounting bolts into the anchors, and tighten them to within 0.5 inch of the equipment rack baseplate. Do not fully tighten at this time.

13 Go to Step 19 [p. 5-10].

14 Drill the holes in the floor in accordance with the dimensions of the mounting bolts being used.

15 Remove any debris from the area in which the rack will be mounted.

16 Move the rack into position, aligning each of the holes in the base of the rack to the anchors.

17 Install the mounting bolts with lock washers through the equipment rack baseplate and the floor.

18 Install the nuts to the bolts under the floor. Tighten them until the lock washers begin to compress. Do not fully tighten at this time.

19 Secure the top of the equipment rack according to the job specifications.

Some equipment racks are secured to existing overhead framework while others are secured to an adjacent wall using a horizontal mounting brace. All overhead mounting hardware should be tightened after assembly.

20 Tighten the floor mounting bolts.

Note: *If the rack is installed on a raised floor, there will likely be some type of supports needed. Instructions for seismic zone installation must also be considered. Follow your local practices for support and bracing of the rack.*

21 Measure the vertical alignment of the 7-foot equipment rack. It must be vertically aligned to within 3/16 inch.

22 Is the equipment rack within the tolerance level specified in Step 21 [p. 5-10]?

If YES:
Go to Step 27 [p. 5-11].

If NO:
Continue with Step 23 [p. 5-10].

23 Loosen the floor mounting bolts and top mounting hardware, and adjust the equipment rack using shims on the mounting hardware. All shims and adjustments must meet locally acceptable guidelines.

24 Retighten all mounting hardware.

25 Measure the vertical alignment of the 7-foot equipment rack. It must be vertically aligned to within 3/16 inch.

26 Is the equipment rack within the tolerance level specified in Step 25 [p. 5-11]?

If YES:
Continue with Step 27 [p. 5-11].

If NO:
Go back to Step 23 [p. 5-10].

27 Update office records according to local procedures.

This procedure is complete.

5.6 Installing the Circuit Breaker Panel

The circuit breaker panel (CBP) (see Figure 5-4 [p. 5-12]) should be the first item installed in the rack. For procedures to install the CBP, refer to *Circuit Breaker Panel*. After the CBP is installed at the top of the rack, the other equipment can be installed.

Note: *The CBP may not have circuit breakers CB1 through CB4 installed. Locate the HA15B-0001-C365 circuit breaker kit, if required, for labels and circuit breaker units.*

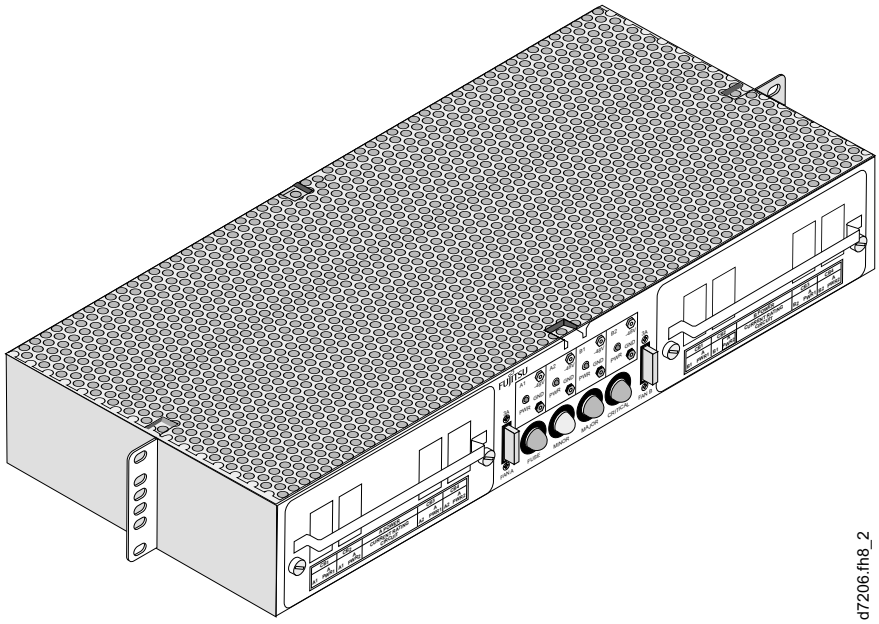


Figure 5-4: Circuit Breaker Panel, HA15B-001-B361

5.7 Connecting Office Battery to the Circuit Breaker Panel

This section includes the following subsections:

If not done previously as part of an earlier FLASHWAVE 7500 installation, the office-battery power cables must be connected to the circuit breaker panel (CBP) power input connectors. However, the office-battery ends of the power cables must not be connected to the primary power source until the CBP is completely installed.

> ***Note:*** *In this section, the term* battery *refers to the office DC power feed for the bay in which the equipment is being mounted.*

The CBP supports four separate battery/return power sources:

- BATT A1/RTN A1
- BATT A2/RTN A2
- BATT B1/RTN B1
- BATT B2/RTN B2

Each power input connection consists of a pair of parallel-wired, threaded studs. For example, BATT A1 and RTN A1 both have two threaded studs.

An additional connector is provided for frame ground.

For additional details on the CBP, refer to *Circuit Breaker Panel*.

The following tools are required:

- No. 1 Phillips® screwdriver
- 7/16-inch socket wrench

5.7.1 Connecting Office Battery to Circuit Breaker Panel

See Figure 5-5 [p. 5-14] for the location of terminals on the rear of the CBP. Power cabling includes the following:

- –48 V DC battery supply (BATT A1, BATT A2, BATT B1, and BATT B2)
- Battery return (RTN A1, RTN A2, RTN B1, and RTN B2)
- Frame ground (FG)

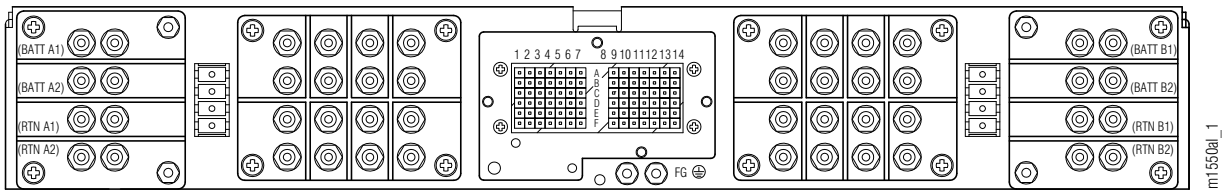


Figure 5-5: Rear View of CBP

DANGER:

Carefully follow the instructions in this section to avoid personal injury, damage to the equipment, or both. Installing power cables that are already connected at one end to a voltage source can result in an electrical accident.

Step	Task
1	Verify that the office-battery ends of the power cables are not connected to the office batteries. These connections are the last to be made after the CBP has been installed. If necessary, follow local procedures to disconnect office power from these cables or remove circuit breakers from the rack CBP. Use a DMM to ensure that the voltage is 0 V DC (with reference to the battery ground) at the equipment-rack end of the cables. ***Note:*** *For FLASHWAVE 7500 equipment, circuit breakers (or fuses) should be sized to ensure that the maximum input current does not exceed 80 percent of the circuit breaker (or fuse) size. Use 30 A circuit breakers (or fuses) to ensure that this requirement is met for all configurations of the FLASHWAVE 7500 equipment.*
2	Remove the protective covers that protect the A/B battery terminals at both ends on the rear panel of the CBP. See Figure 5-5 [p. 5-14] for the CBP.
3	Remove the top nuts and washers from the threaded studs for all BATT and RTN connections being installed.

4 Locate the double-lug connector on the CBP end of the power cable that is to be connected to battery source A1 at the end of this procedure.

5 Place the single two-hole lug on the two BATT A1 studs so that the cable is easily routed toward the outside edge of the shelf.

Note: *A washer may be required as a standoff between the circuit breaker panel and the lug.*

6 Install the washer and nut, and tighten according to local standards.

7 Locate the single two-hole lug on the CBP end of the power cable that is to provide the return for battery source A1 at the end of this procedure.

8 Place the single two-hole lug on the two RTN A1 studs so that the return cable is easily routed toward the outside edge of the shelf.

Note: *A washer may be required as a standoff between the circuit breaker panel and the lug.*

9 Install the washer and nut and tighten according to local standards.

10 Repeat Steps 4 [p. 5-15] through 9 [p. 5-15], substituting A2 for A1, then B1 for A1, and finally B2 for A1.

11 Connect the frame ground lead to the FG terminal located just below the pin block (see Figure 5-5 [p. 5-14]).

Note: *This grounding procedure assumes that the frame ground and power ground are terminated at a central ground bus (ground window). Refer to Telcordia TR-TSY-000513.*

12 Verify that no strands of wire are shorting terminals together and that leads are securely fastened.

13 Replace the plastic cover over the input connectors.

14 On the front panel of the CBP, set all circuit breakers to the OFF position.

15 Observing local procedures, connect each of the power cables to the office batteries and office ground as appropriate.

This procedure is complete.

5.7.2 Checking Battery Voltage at Circuit Breaker Panel

Note: *In this procedure, the term* battery *refers to the DC power feed for the rack in which the equipment is being mounted.*

Note: *This procedure assumes that power cables have been connected between the office battery and the CBP and that the battery power is on.*

The test equipment required is a DMM.

Step	Task
1	Set the DMM switches to measure voltage between 40 and 60 V DC.
2	On the front panel of the CBP, set all circuit breakers to the ON position.
3	Connect the negative DMM test lead to the first GND connector on the front panel, and connect the positive DMM test lead to the associated input voltage test point (–48 V) on the front of the CBP. See Figure 5-5 [p. 5-14]. The input voltage should be between –40 and –57 V DC.
4	Is the DMM measurement between –40 and –57 V DC? **If YES:** Continue with Step 5 [p. 5-16]. **If NO:** Report trouble to the installation group. When trouble is corrected, repeat Step 3 [p. 5-16].
5	Disconnect the DMM leads.
6	Repeat Steps 3 [p. 5-16] through 5 [p. 5-16] for each applicable –48 V/GND pair.
7	On the CBP front panel, set all circuit breakers to the OFF position. This procedure is complete.

5.8 Installing Extension Shelf and Heat Baffle

This procedure provides instructions for installing a generic shelf and heat baffle, if required, into a relay rack. A rack, or other suitable mounting structure, must already be installed in accordance with local plans and procedures.

The Fujitsu part number for the 23-inch Extension shelf is FC9682SHU3, and the 23-inch heat baffle is FC9682HSW2.

Do not install the Extension shelf directly above any air-blocking product. DCM shelves are examples of air-blocking products. Leave at least 1U (1.75 inch) of air clearance space between the shelf and any air-blocking product installed beneath the Extension shelf.

The Extension shelf can be installed at the bottom of the rack if adequate air clearance is present between the bottom of the shelf and the floor. If air clearance between the bottom of the shelf and the floor is not adequate, mount the Extension shelf near the bottom of the rack leaving 1U (1.75 inch) of air clearance space below it.

A heat baffle is required for each Extension shelf and must be installed directly above the shelf.

Note: *The FLASHWAVE 7500 shelves do not have front covers because of front-access fiber cabling.*

DANGER:

Do not attempt to handle and install the shelves without sufficient assistance. The Extension shelf weighs approximately 95 lb (43.0 kg) empty (without fans). Equipped, the Extension shelf weighs significantly more. Handling the equipment without sufficient assistance may result in personal injury, damage to the equipment, or both.

WARNING:

Do not use the internal walls of any shelf as a lifting point or lift support. Doing so may damage the plug-in unit rail support.

CAUTION:

Do not compromise the stability of the rack when installing this equipment. Unstable racks can fall resulting in equipment damage.

Step	Task
1	If not already done, remove the shelf and heat baffle from the shipping container.
2	Ensure that all plug-in units are removed from the shelf.

Note: *Do not remove filler panels.*

3 Secure the shelf to the rack using five screw slots on each side of the shelf as shown in Figure 5-6 [p. 5-18].

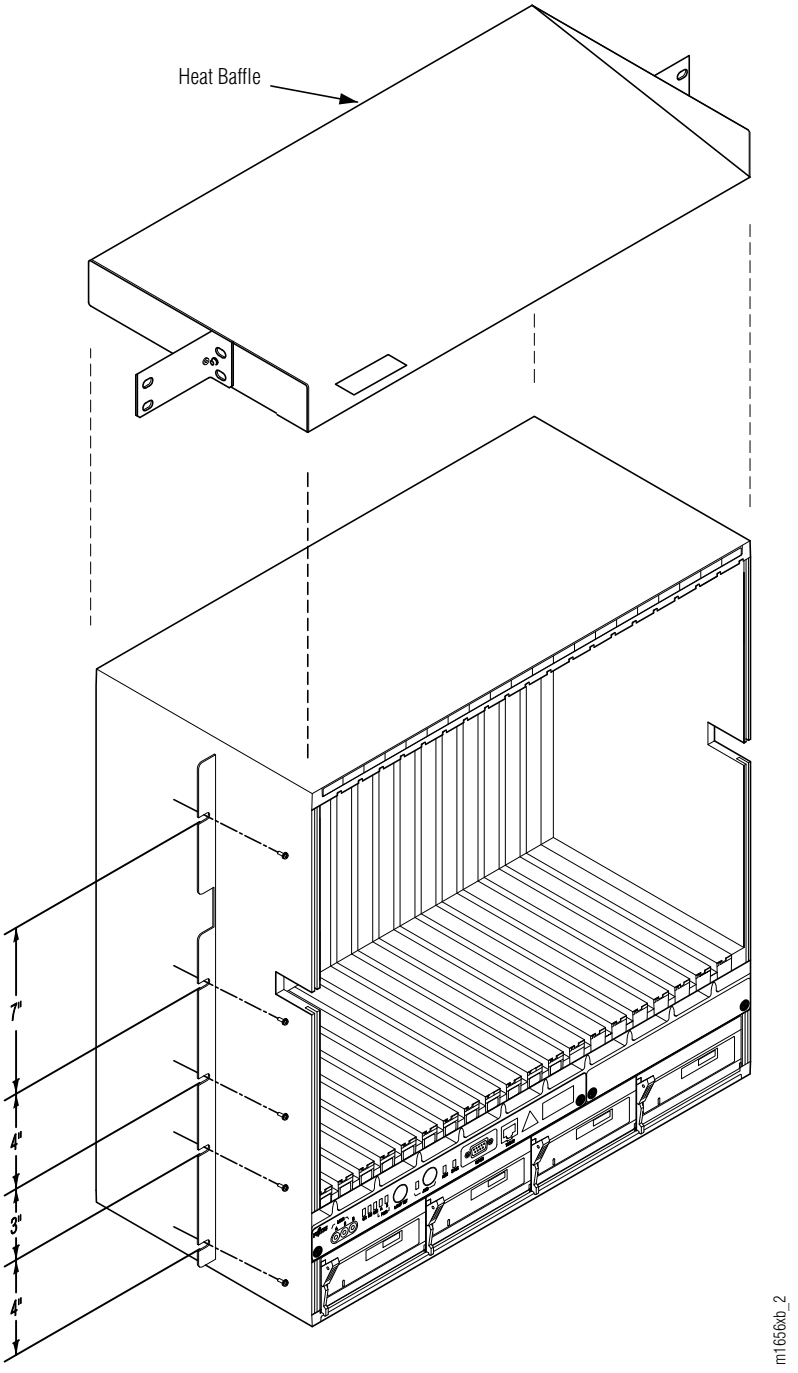


Figure 5-6: Typical Shelf Mounting with Heat Baffle (Extension Configuration)

4 Install the heat baffle as shown in Figure 5-6 [p. 5-18].

Note: *The heat baffle ensures that air pushed upward through the shelf is deflected to the rear of the rack. Use two screws on each side of the assembly.*

5 Clearly mark or label each Extension shelf according to local practices.

This procedure is complete.

5.9 Installing Fans and DCM Shelf

This procedure provides instructions for installing the Extension shelf fans and the dispersion compensation module (DCM) shelf (if required). It includes the following subprocedures:

5.9.1 Installing Shelf Fans

This procedure provides installation instructions for the four cooling fans used by the Extension shelf (see Figure 5-7 [p. 5-20]).

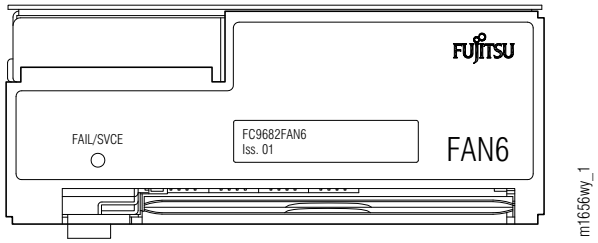


Figure 5-7: Fan Unit (Front View) (Extension Configuration)

Step	Task
1	If not already done, unpack four fan plug-in units from the shipping container.
2	If not already done, install a fan filter in the fan tray located at the bottom of each fan unit.
3	Install the fan plug-in units into the bottom portion of each Extension shelf. (Refer to *Maintenance and Trouble Clearing*, Section 8.8, Replacing FAN6 Plug-In Unit and Fan Filter [p. 8-28] for a detailed information.)

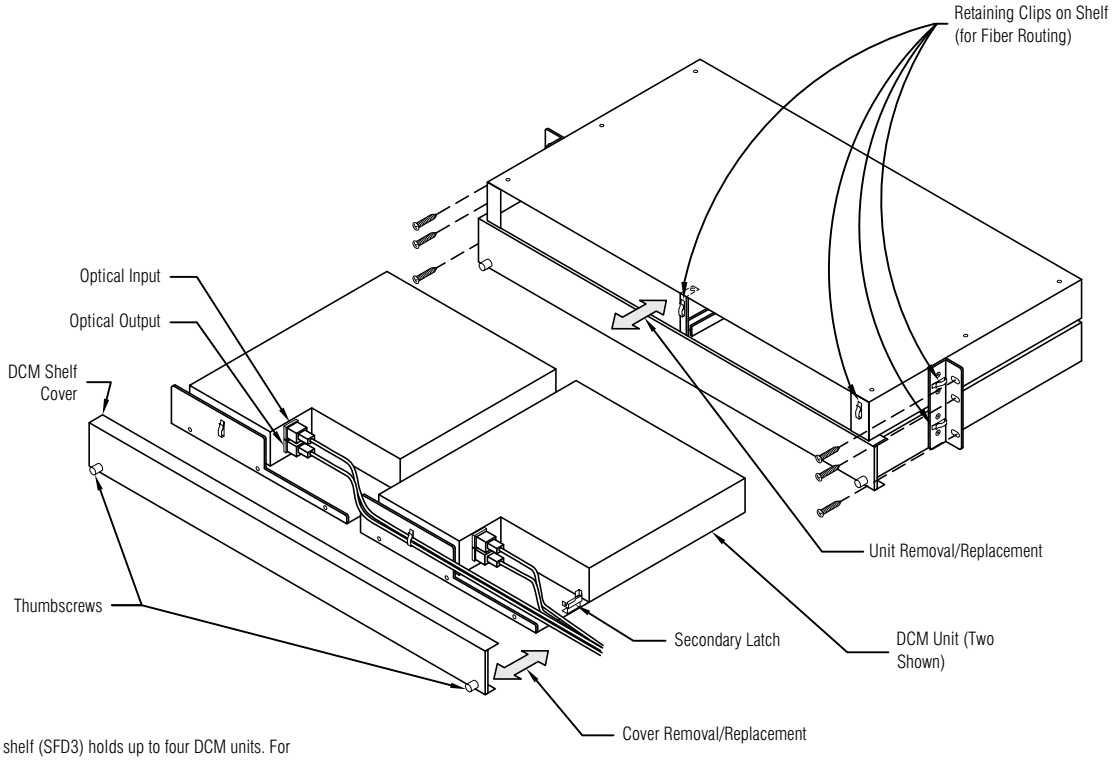
Note: *The connectors on the back of the fan engage the shelf backplane connectors and are secured in place with an extractor lever (located on the left side of the fan assembly front panel).*

This procedure is complete.

5.9.2 Installing the 23-Inch DCM Shelf

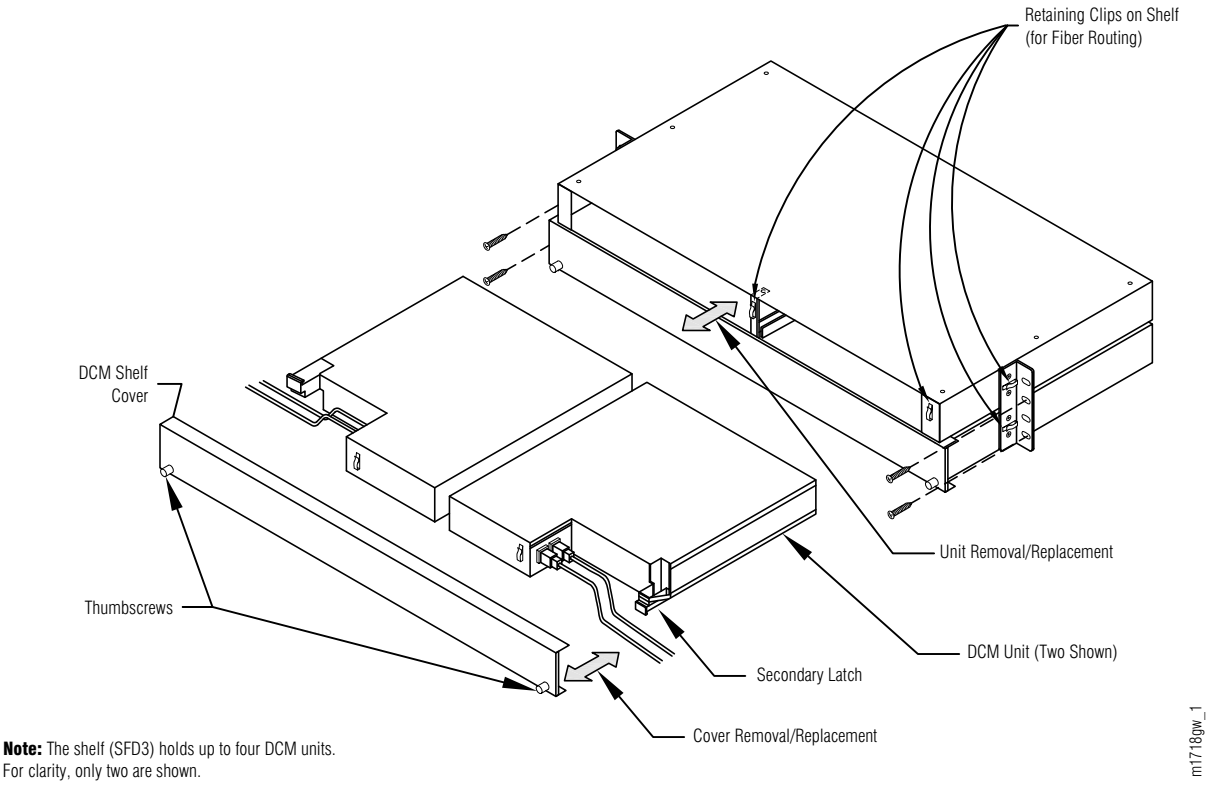
The dispersion compensation module (DCM) shelf (FC9512SFD3), if needed, provides dispersion compensation for dense wavelength division multiplexing (DWDM) signals entering the NE.

Figure 5-8 [p. 5-21] shows the 23-inch DCM shelf (SFD3) with two single-height DCM units. Figure 5-9 [p. 5-22] shows Issue 03 of the 23-inch DCM shelf (SFD3) with two single-height DCM units. Issue 03 of the SFD3 DCM shelf supports DCM fiber diversity mounting units, which allows the routing of fiber to either side of the shelf.



Note: The shelf (SFD3) holds up to four DCM units. For clarity, only two are shown.

Figure 5-8: DCM Unit and 23-Inch SFD3 Shelf (Exploded View)



Note: The shelf (SFD3) holds up to four DCM units. For clarity, only two are shown.

Figure 5-9: SFD3 (Issue 03) 23-Inch DCM Shelf Showing Fiber Diversity

The following procedure provides installation instructions for the 23-inch DCM shelf (SFD3):

Step	Task
1	Unpack the SFD3 shelf from the shipping container. The DCM units do not need to be removed from the SFD3 shelf if they are already installed. The shelf can hold up to four single-height DCM units, although the normal complement is two DCM units per shelf.

2 Install the SFD3 shelf in the bottom of the rack that contains the Optical shelf (if space permits) or in a rack adjacent to the Optical shelf. Secure the shelf to the rack using three rack mounting screws on each side of the shelf.

Note: *If hole alignment does not permit three screws on each side, it is acceptable to secure the shelf with only two screws on each side.*

3 If the shelf came without the DCM units already installed:

a. Locate the appropriate units to be installed and remove them from their protective ESD packaging.

b. Loosen the thumbscrews and remove the faceplate/cover from the shelf.

c. Carefully slide each DCM unit into the appropriate shelf slot.

d. Replace the cover and tighten the thumbscrews to secure each unit in the shelf.

This procedure is complete.

5.10 Installing Power, Ground, and Alarm Cables

This procedure provides instructions for installing power, ground, and alarm cabling for standard rack configurations. It includes the following subprocedures:

5.10.1 Reference Material

The cables and cable harnesses are listed in Table 5-1 [p. 5-24] and shown in Figure 5-10 [p. 5-25].

Table 5-1: Power, Ground, and Alarm Cable Connections (Extension Configuration)

Part Number	Use	Description	Term Type	Wire Gauge
HA15B-0001-C413	–48 V DC and ground	5-wire rack/shelf power harness, one set per shelf	10 AWG crimp lugs	10 AWG
HA660-1106-T003	Rack alarms	6-connector daisy-chained alarm harness, one connector per shelf (CNA through CNF), one harness per rack	D-sub 25-pin, terminates with wire-wrap at CBP	24 AWG
HA660-1102-T015	Shelf alarms	Alarm cable from rack alarm cable connector to shelf backplane alarm connector, one per shelf	D-sub 25-pin, CN1 at rack alarm end, CN2 at shelf alarm end	24 AWG
PC15L-0001-C045	Frame ground	Frame ground stranded wire cable from rack to CBP, one per rack	Terminal lugs, both ends, installed	6 AWG, stranded

Note: *Connections to the shelf power terminal strip should use copper conductors only.*

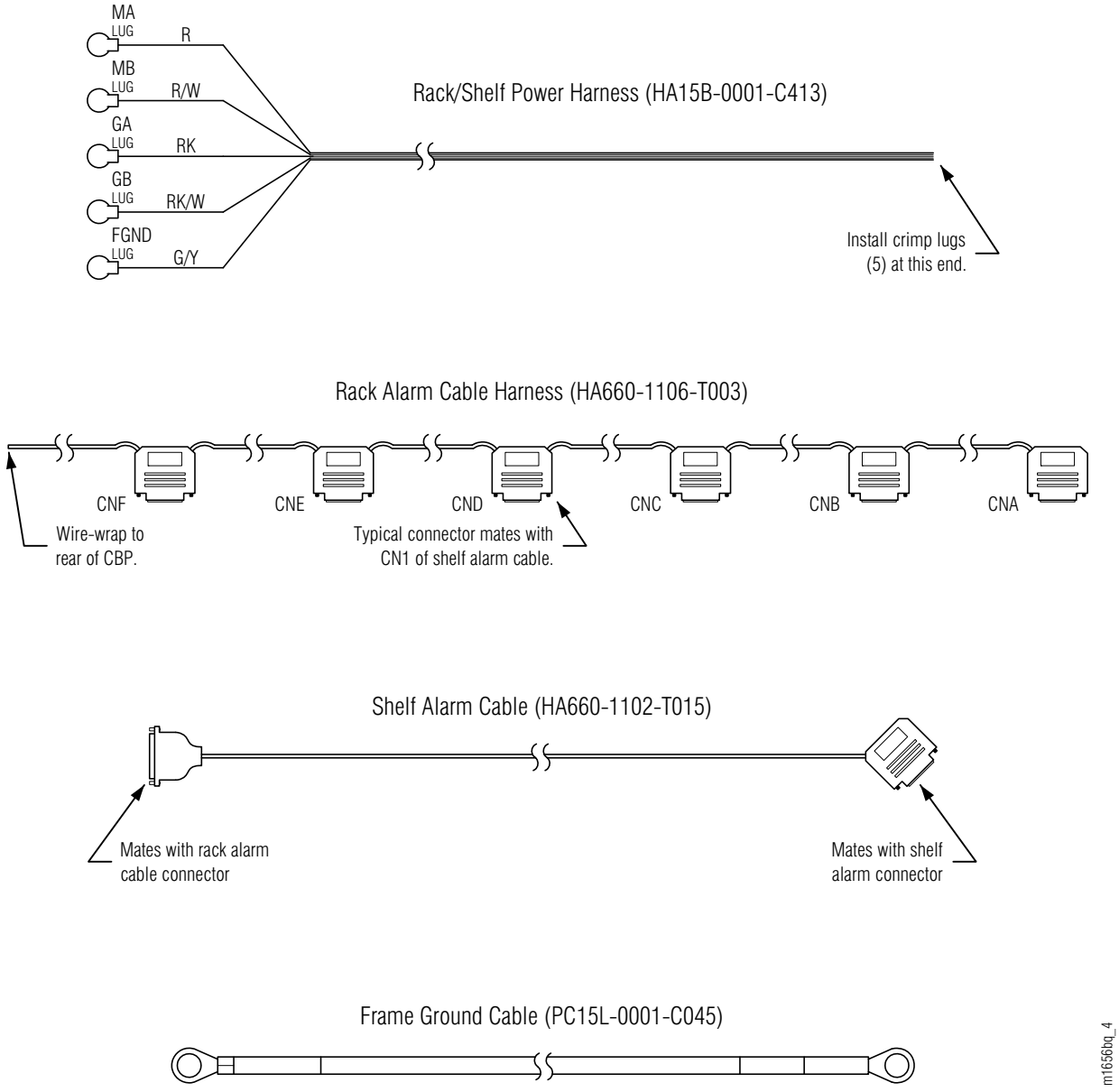


Figure 5-10: Power, Alarm, and Ground Cables

Figures 5-11 [p. 5-27] through 5-13 [p. 5-29] show schematics for installing power, ground, and alarm cabling between the rack, shelves and CBP for the following standard rack configurations:

- Rack with one Universal shelf (Figure 5-11 [p. 5-27])
- Rack with two Universal shelves (Figure 5-12 [p. 5-28])
- Rack with three Universal shelves (Figure 5-13 [p. 5-29])

Each standard rack configuration includes a circuit breaker panel (CBP) with power terminals as shown in Figure 5-14 [p. 5-30]. The circuit breakers within the CBP are associated with shelves listed in Table 5-2 [p. 5-30].

Figure 5-15 [p. 5-31] shows the Extension shelf backplane. Figure 5-16 [p. 5-32] shows the power cabling.

Figure 5-17 [p. 5-33] shows the rack alarm cable harness, which gets wire wrapped to the CBP. Connectors along this harness mate to shelf alarm cables (see Figure 5-18 [p. 5-34]) that plug into alarm ports on the shelf backplane.

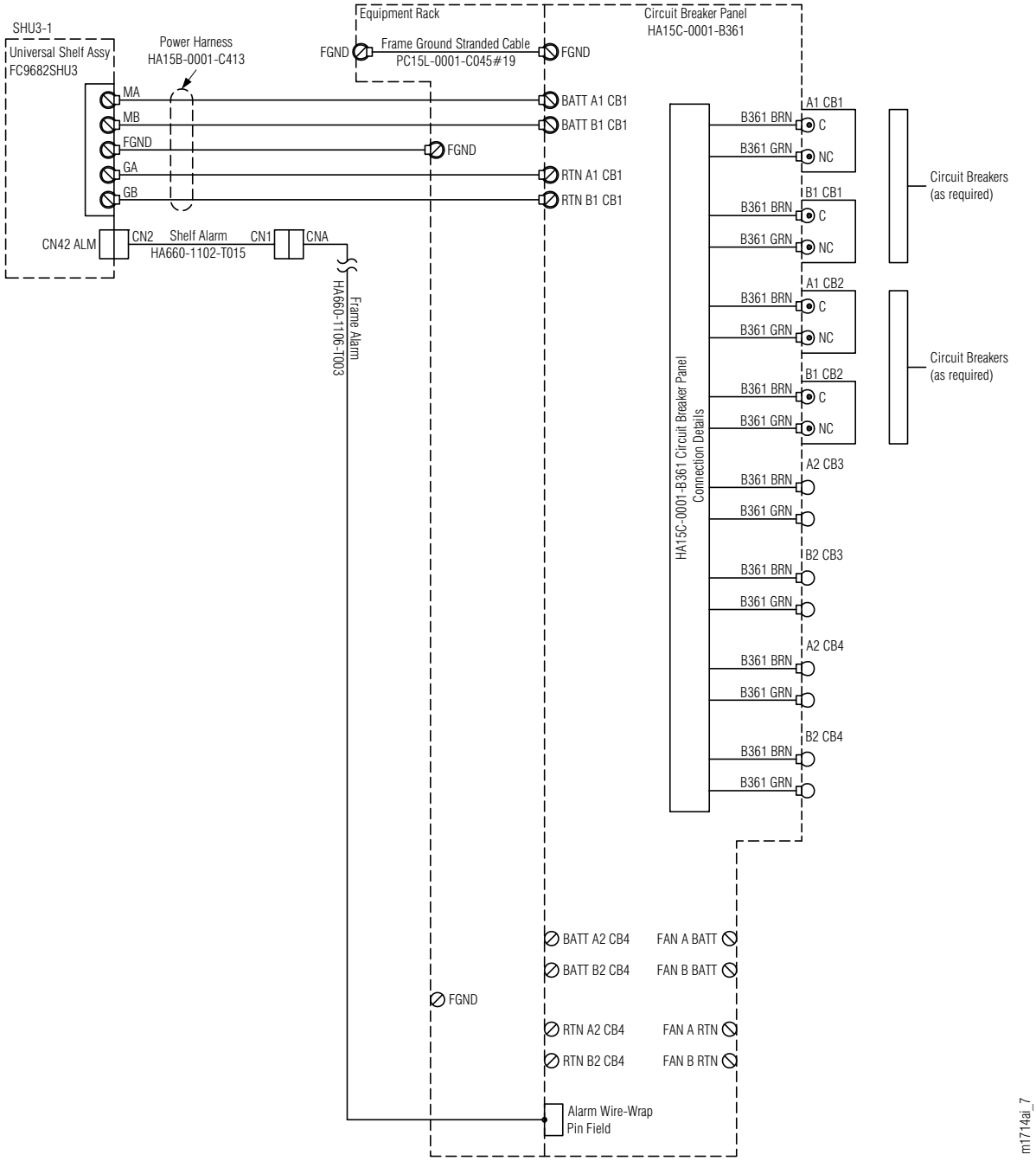


Figure 5-11: Cabling Schematic for Rack with One Universal Shelf (Extension Configuration)

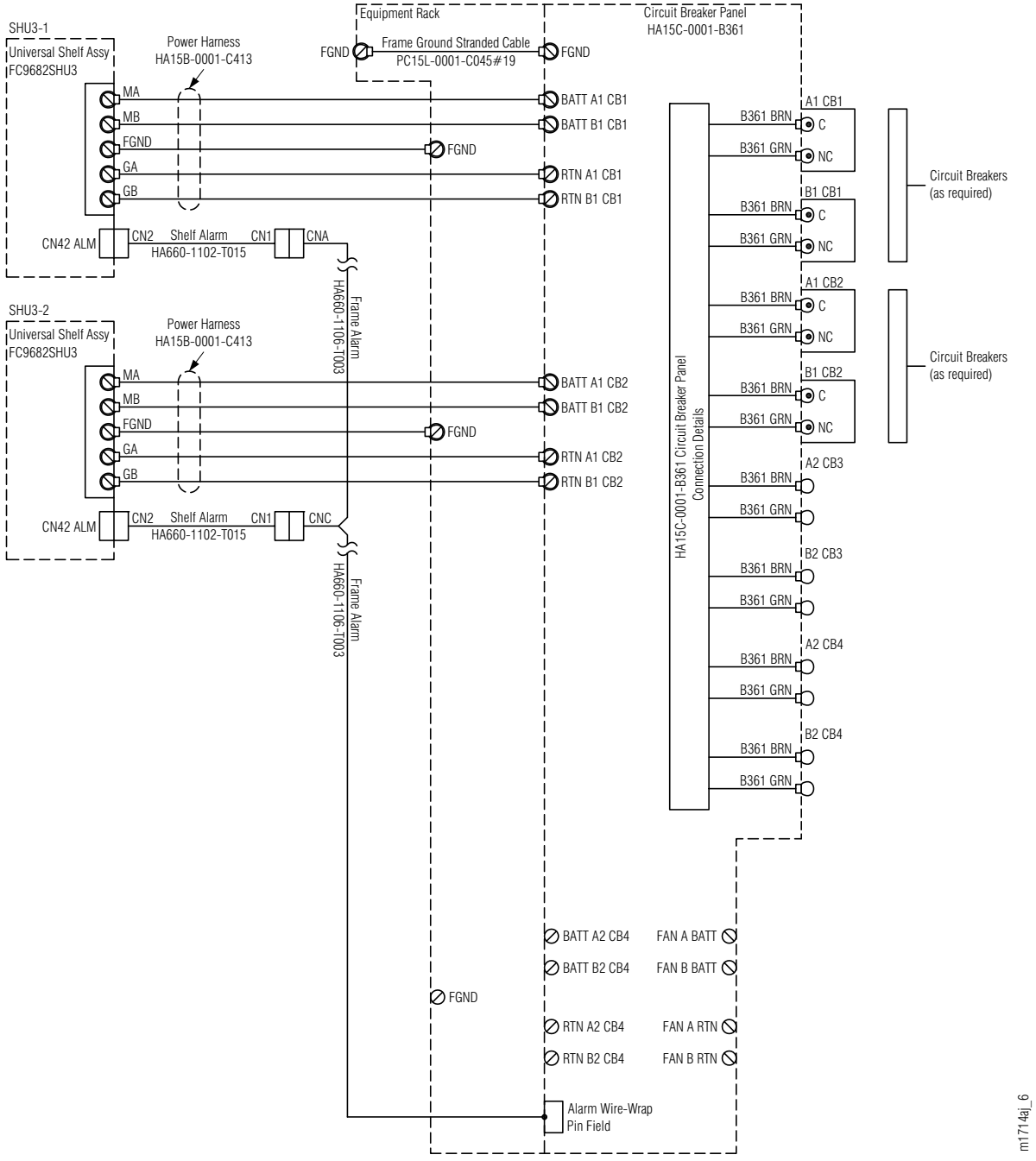


Figure 5-12: Cabling Schematic for Rack with Two Universal Shelves (Extension Configuration)

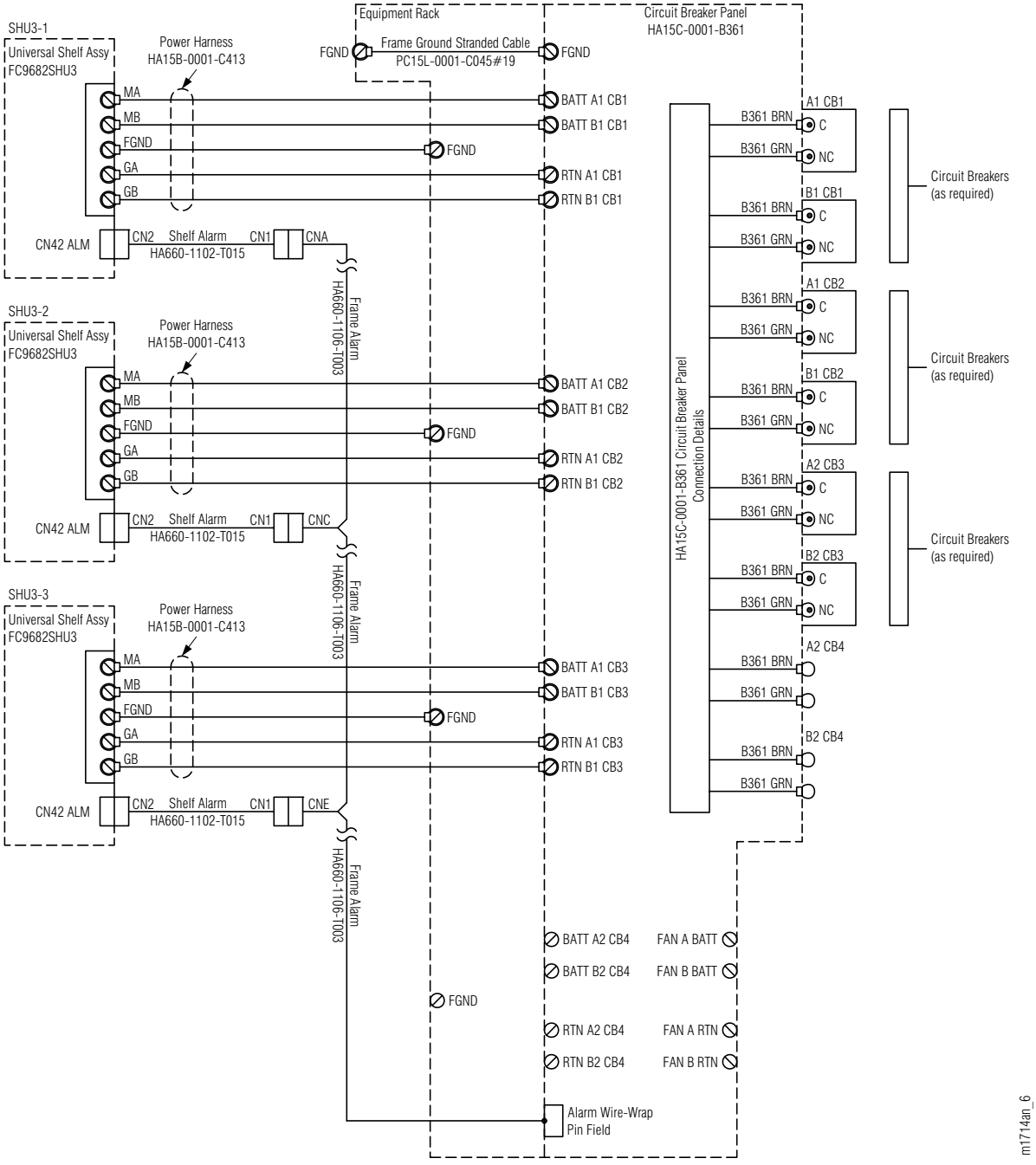


Figure 5-13: Cabling Schematic for Rack with Three Universal Shelves (Extension Configuration)

Table 5-2: Association of Shelves to Circuit Breakers (Extension Configuration)

Circuit Breaker	Rack Configuration		
	Rack with One Universal Shelf (Figure 5-11 [p. 5-27])	Rack with Two Universal Shelves (Figure 5-12 [p. 5-28])	Rack with Three Universal Shelves (Figure 5-13 [p. 5-29])
	Shelf Name	Shelf Name	Shelf Name
CB1	SHU3-1	SHU3-1	SHU3-1
CB2	n/a	SHU3-2	SHU3-2
CB3	n/a	n/a	SHU3-3

Note: *The HA15B-0001-B361 CBP has dual-post output power connectors.*

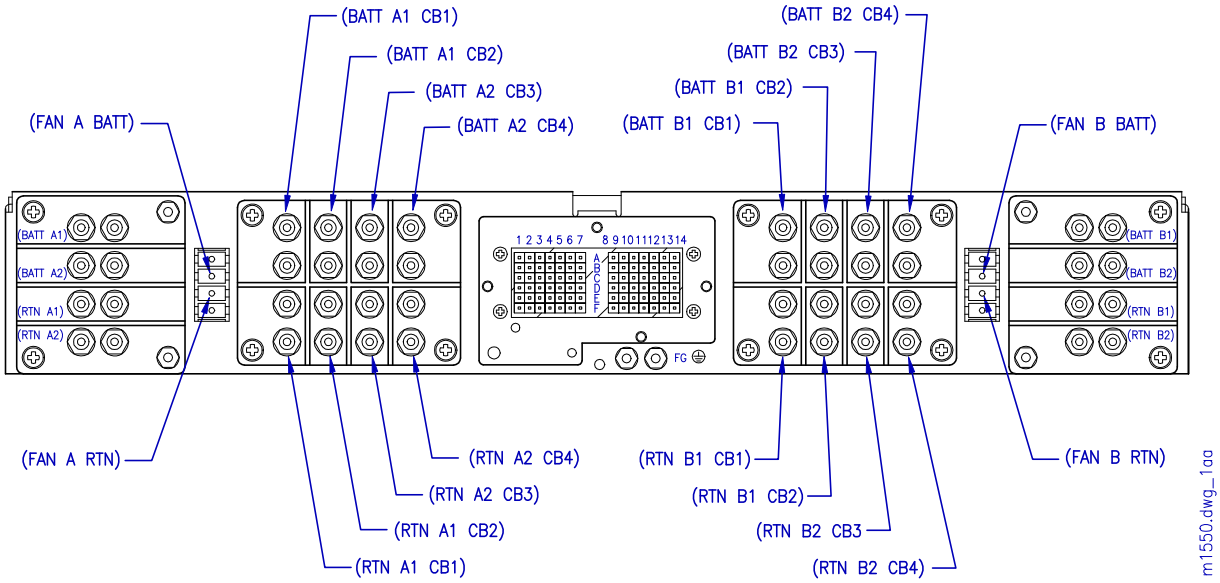


Figure 5-14: Circuit Breaker Panel Rear View (HA15B-0001-B361)

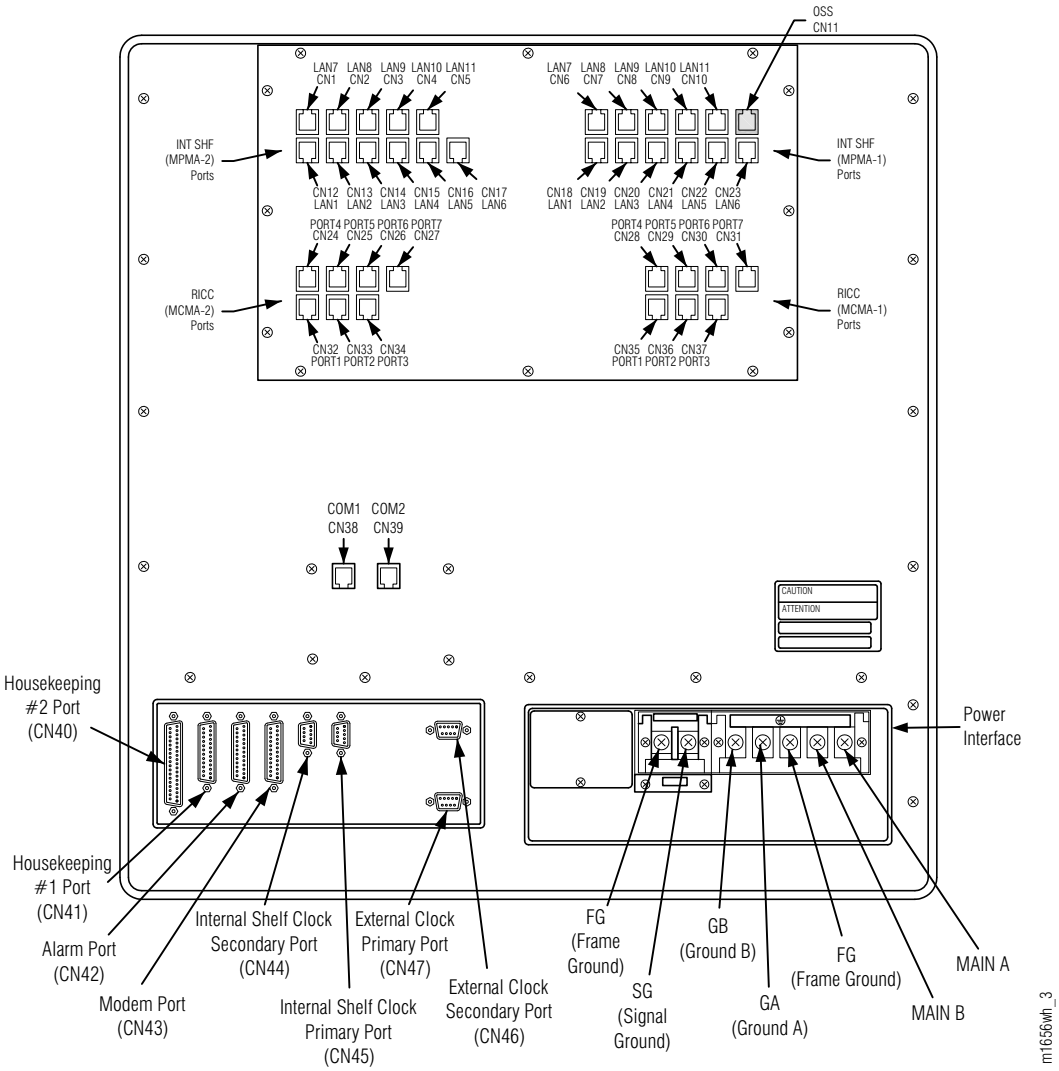


Figure 5-15: Extension Shelf Backplane (Extension Configuration)

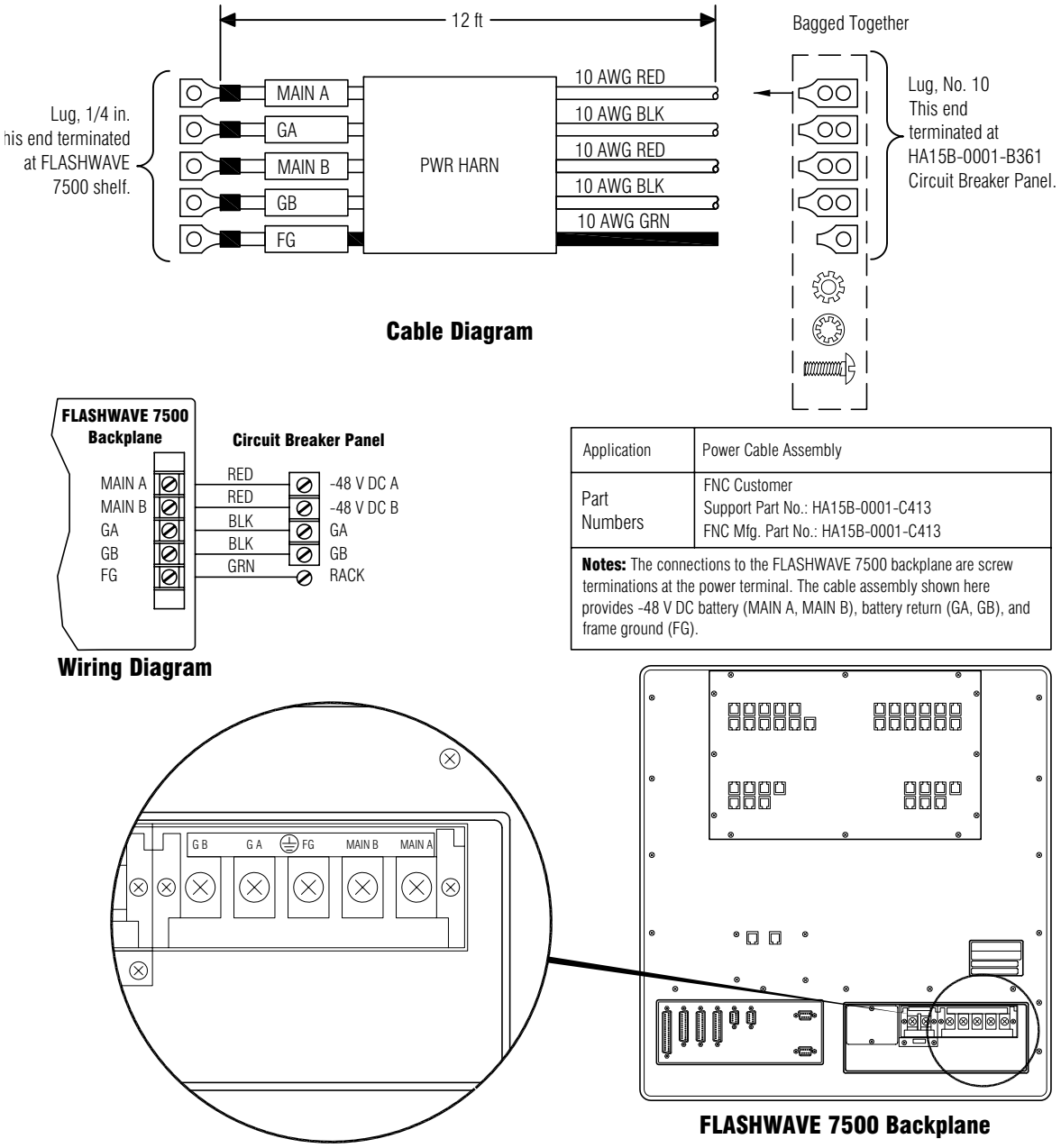
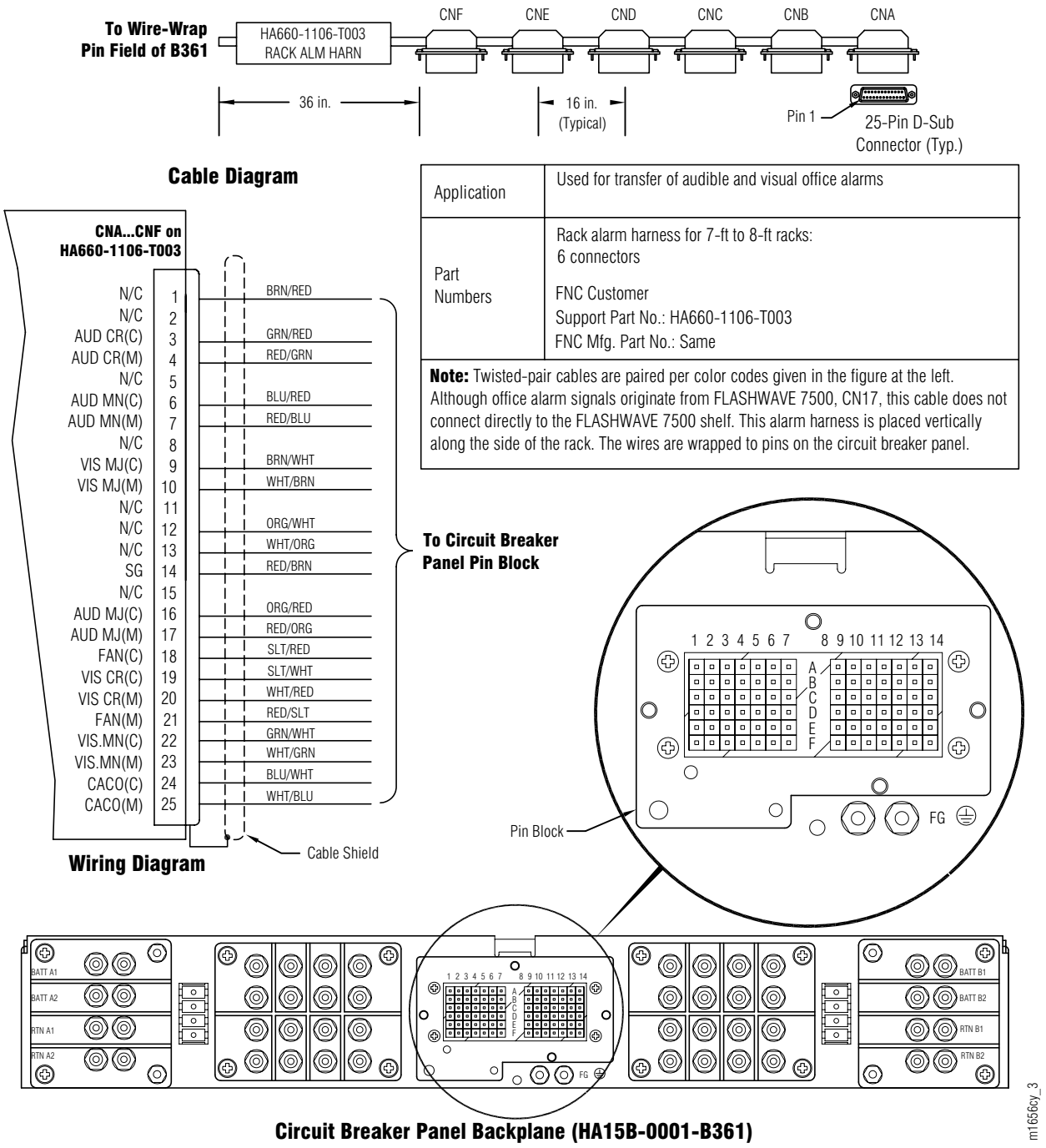


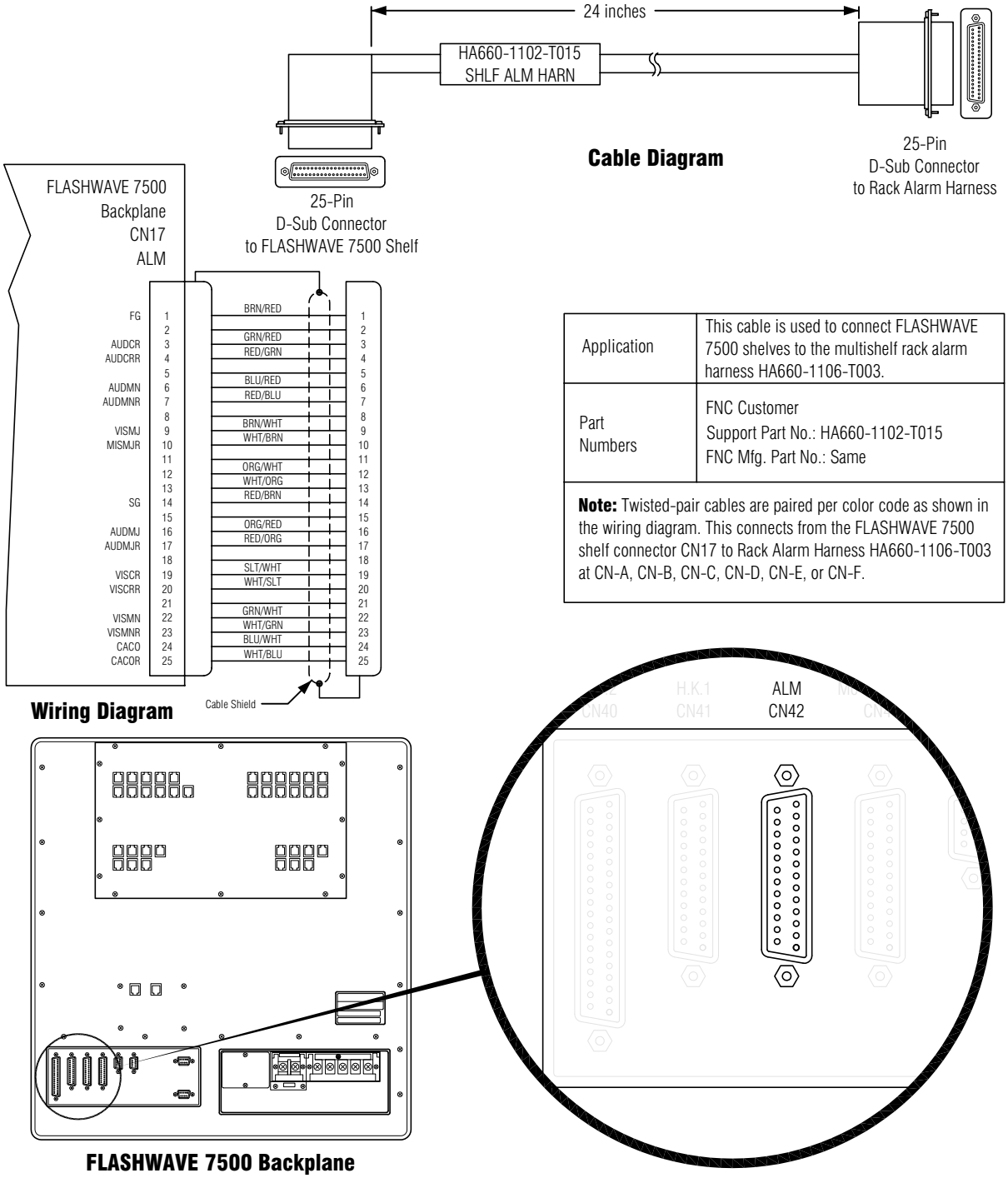
Figure 5-16: Extension Shelf Power Cabling (Extension Configuration)



Application	Used for transfer of audible and visual office alarms
Part Numbers	Rack alarm harness for 7-ft to 8-ft racks: 6 connectors FNC Customer Support Part No.: HA660-1106-T003 FNC Mfg. Part No.: Same

Note: Twisted-pair cables are paired per color codes given in the figure at the left. Although office alarm signals originate from FLASHWAVE 7500, CN17, this cable does not connect directly to the FLASHWAVE 7500 shelf. This alarm harness is placed vertically along the side of the rack. The wires are wrapped to pins on the circuit breaker panel.

Figure 5-17: Rack Alarm Harness Wire-Wrap Connection to CBP



Application	This cable is used to connect FLASHWAVE 7500 shelves to the multishelf rack alarm harness HA660-1106-T003.
Part Numbers	FNC Customer Support Part No.: HA660-1102-T015 FNC Mfg. Part No.: Same
Note: Twisted-pair cables are paired per color code as shown in the wiring diagram. This connects from the FLASHWAVE 7500 shelf connector CN17 to Rack Alarm Harness HA660-1106-T003 at CN-A, CN-B, CN-C, CN-D, CN-E, or CN-F.	

Figure 5-18: Extension Shelf Alarm Cabling (Extension Configuration)

5.10.2 Install Power, Ground, and Alarm Cables

This subprocedure includes the following subtasks:

Use this procedure to install power, ground, and alarm cabling for a rack of the FLASHWAVE 7500 Extension Configuration equipment.

DANGER:

Use properly insulated tools and do not allow tools, cables, or other metal objects to connect across terminals. At this point, –48 V DC power has been applied to the CBP, and improper handling may result in personal injury, damage to equipment, or both. Fujitsu recommends that office power be removed from the rack using local procedures.

> ***Note:*** *Ensure that all cables installed in this procedure are properly bundled, laced, and secured to the rack in accordance with local procedures. Connectors should be secured in place using connector retaining screws.*

Install power, ground, and alarm cables for one rack of FLASHWAVE 7500 Extension Configuration equipment as follows:

Identify Cabling Schematic

Step	Task

1 If you have not already done so, review the reference material presented in Section 5.10.1, Reference Material [p. 5-24].

2 In the following list, identify the cabling schematic appropriate for your rack configuration:

- Rack with one Universal shelf (Figure 5-11 [p. 5-27])
- Rack with two Universal shelves (Figure 5-12 [p. 5-28])
- Rack with three Universal shelves (Figure 5-13 [p. 5-29])

Disconnect Power from CBP

3 If installing into a powered rack, disconnect office power (recommended) or remove circuit breakers from the CBP.

4 Use a DMM to ensure 0 V DC (with reference to the battery ground) at the point of disconnection.

Install Shelf Power Harnesses CB1

5 Refer to the cabling schematic (identified in Step 2 [p. 5-36]) and Table 5-2 [p. 5-30]) to identify the shelf that is to be connected to circuit breaker 1 (CB1).

6 Locate the rack/shelf power harness (HA15B-0001-C413, Figure 5-10 [p. 5-25]) for the shelf.

Note: *The length of the cables may be altered at the discretion of the installer to ensure proper length.*

7 Prepare the power leads by installing the terminal lugs (wrapped in a plastic bag shipped with the cable) that are required on one end of the cable (see Figure 5-10 [p. 5-25]). Ensure that no wire strands are shorting terminals together and that leads are securely fastened. The cable should now have terminal lugs on both ends of the power cable.

Note: *The shelf power wiring is the same with all rack configurations. Observe the color coding of the power cable.*

8 On the backplane of the shelf identified in Step 5 [p. 5-36], remove the plastic cover on the shelf power terminal strip located on the bottom right of the shelf backplane (see Figure 5-16 [p. 5-32]).

9 Connect both ends of cable GA of the power harness as follows:

a. Identify lug GA in the power harness (see Figure 5-10 [p. 5-25]) and connect it to shelf terminal GA (see Figure 5-16 [p. 5-32]).

b. Connect the other end of the same cable to CBP terminal RTN A1 CB1 (see Figure 5-14 [p. 5-30]).

10 Connect both ends of cable GB of the power harness as follows:

a. Identify lug GB in the power harness (see Figure 5-10 [p. 5-25]) and connect it to shelf terminal GB (see Figure 5-16 [p. 5-32]).

b. Connect the other end of the same cable to CBP terminal RTN B1 CB1 (see Figure 5-14 [p. 5-30]).

11 Connect both ends of cable MA of the power harness as follows:

a. Identify lug MA in the power harness (see Figure 5-10 [p. 5-25]) and connect it to shelf terminal MAIN A (see Figure 5-16 [p. 5-32]).

b. Connect the other end of the same cable to CBP terminal BATT A1 CB1 (see Figure 5-14 [p. 5-30]).

12 Connect both ends of cable MB of the power harness as follows:

a. Identify lug MB in the power harness (see Figure 5-10 [p. 5-25]) and connect it to shelf terminal MAIN B (see Figure 5-16 [p. 5-32]).

b. Connect the other end of the same cable to CBP terminal BATT B1 CB1 (see Figure 5-14 [p. 5-30]).

13 Connect both ends of cable FGND of the power harness as follows:

a. Identify lug FGND in the power harness (see Figure 5-10 [p. 5-25]) and connect it to shelf terminal FG (see Figure 5-16 [p. 5-32]).

b. Connect the other end of the same cable to the equipment rack frame ground.

14 Replace the plastic cover over the shelf backplane terminal strip.

Install Shelf Power Harnesses CB2

15 Refer to the cabling schematic (identified in Step 2 [p. 5-36]) and Table 5-2 [p. 5-30]. Is a shelf to be connected to circuit breaker 2 (CB2)?

If YES:
Go to Step 16 [p. 5-38].

If NO:
Go to Step 35 [p. 5-41].

16 Locate the rack/shelf power harness (HA15B-0001-C413, Figure 5-10 [p. 5-25]) for the shelf.

Note: *The length of the cables may be altered at the discretion of the installer to ensure proper length.*

17 Prepare the power leads by installing the terminal lugs (wrapped in a plastic bag shipped with the cable) that are required on one end of the cable (see Figure 5-10 [p. 5-25]). Ensure that no wire strands are shorting terminals together and that leads are securely fastened. The cable should now have terminal lugs on both ends of the power cable.

Note: *The shelf power wiring is the same with all rack configurations. Observe the color coding of the power cable.*

18 On the backplane of the shelf identified in Step 15 [p. 5-38], remove the plastic cover on the shelf power terminal strip located on the bottom right of the shelf backplane (Figure 5-16 [p. 5-32]).

19 Connect both ends of cable GA of the power harness as follows:

a. Identify lug GA in the power harness (see Figure 5-10 [p. 5-25]) and connect it to shelf terminal GA (see Figure 5-16 [p. 5-32]).

b. Connect the other end of the same cable to CBP terminal RTN A1 CB2 (see Figure 5-14 [p. 5-30]).

20 Connect both ends of cable GB of the power harness as follows:

a. Identify lug GB in the power harness (see Figure 5-10 [p. 5-25]) and connect it to shelf terminal GB (see Figure 5-16 [p. 5-32]).

b. Connect the other end of the same cable to CBP terminal RTN B1 CB2 (see Figure 5-14 [p. 5-30]).

21 Connect both ends of cable MA of the power harness as follows:

a. Identify lug MA in the power harness (see Figure 5-10 [p. 5-25]) and connect it to shelf terminal MAIN A (see Figure 5-16 [p. 5-32]).

b. Connect the other end of the same cable to CBP terminal BATT A1 CB2 (see Figure 5-14 [p. 5-30]).

22 Connect both ends of cable MB of the power harness as follows:

a. Identify lug MB in the power harness (see Figure 5-10 [p. 5-25]) and connect it to shelf terminal MAIN B (see Figure 5-16 [p. 5-32]).

b. Connect the other end of the same cable to CBP terminal BATT B1 CB2 (Figure 5-14 [p. 5-30]).

23 Connect both ends of cable FGND of the power harness as follows:

a. Identify lug FGND in the power harness (see Figure 5-10 [p. 5-25]) and connect it to shelf terminal FG (see Figure 5-16 [p. 5-32]).

b. Connect the other end of the same cable to the equipment rack frame ground.

24 Replace the plastic cover over the shelf backplane terminal strip.

Install Shelf Power Harnesses CB3

25 Refer to the cabling schematic (identified in Step 2 [p. 5-36]) and Table 5-2 [p. 5-30]. Is a shelf to be connected to circuit breaker 3 (CB3)?

If YES:
Go to Step 26 [p. 5-39].

If NO:
Go to Step 35 [p. 5-41].

26 Locate the rack/shelf power harness (HA15B-0001-C413, Figure 5-10 [p. 5-25]) for the shelf.

Note: *The length of the cables may be altered at the discretion of the installer to ensure proper length.*

27 Prepare the power leads by installing the terminal lugs (wrapped in a plastic bag shipped with the cable) that are required on one end of the cable (see Figure 5-10 [p. 5-25]). Ensure that no wire strands are shorting terminals together and that leads are securely fastened. The cable should now have terminal lugs on both ends of the power cable.

Note: *The shelf power wiring is the same with all rack configurations. Observe the color coding of the power cable.*

28 On the backplane of the shelf identified in Step 25 [p. 5-39], remove the plastic cover on the shelf power terminal strip located on the bottom right of the shelf backplane (see Figure 5-16 [p. 5-32]).

29 Connect both ends of cable GA of the power harness as follows:

a. Identify lug GA in the power harness (see Figure 5-10 [p. 5-25]) and connect it to shelf terminal GA (see Figure 5-16 [p. 5-32]).

b. Connect the other end of the same cable to CBP terminal RTN A1 CB3 (see Figure 5-14 [p. 5-30]).

30 Connect both ends of cable GB of the power harness as follows:

a. Identify lug GB in the power harness (see Figure 5-10 [p. 5-25]) and connect it to shelf terminal GB (see Figure 5-16 [p. 5-32]).

b. Connect the other end of the same cable to CBP terminal RTN B1 CB3 (see Figure 5-14 [p. 5-30]).

31 Connect both ends of cable MA of the power harness as follows:

a. Identify lug MA in the power harness (see Figure 5-10 [p. 5-25]) and connect it to shelf terminal MAIN A (see Figure 5-16 [p. 5-32]).

b. Connect the other end of the same cable to CBP terminal BATT A1 CB3 (see Figure 5-14 [p. 5-30]).

32 Connect both ends of cable MB of the power harness as follows:

a. Identify lug MB in the power harness (see Figure 5-10 [p. 5-25]) and connect it to shelf terminal MAIN B (see Figure 5-16 [p. 5-32]).

b. Connect the other end of the same cable to CBP terminal BATT B1 CB3 (see Figure 5-14 [p. 5-30]).

33 Connect both ends of cable FGND of the power harness as follows:

a. Identify lug FGND in the power harness (see Figure 5-10 [p. 5-25]) and connect it to shelf terminal FG (see Figure 5-16 [p. 5-32]).

b. Connect the other end of the same cable to the equipment rack frame ground.

34 Replace the plastic cover over the shelf backplane terminal strip.

Install Frame Ground Cable

35 Locate the frame ground cable (PC15L-0001-C045, Figure 5-10 [p. 5-25]).

36 Connect both ends of the frame ground cable as follows:

a. Connect one end of the frame ground cable to the equipment rack frame ground.

Note: *The equipment rack frame ground is a grounding point on the frame itself. On some racks, it is a screw hole that has a piece of tape over it. The tape is used to keep the paint off of a small portion of the rack so that when the tape is removed, the grounding point provides a good electrical connection to the frame. Other rack types may require you to scrape the paint off the screw hole.*

b. Connect the other end to the CBP frame ground terminal (located just below the wire wrap terminal block on the CBP rear panel shown in Figure 5-14 [p. 5-30]).

Install Rack Alarm Cable Harness

37 Locate the rack alarm cable harness (HA660-1106-T003, Figure 5-10 [p. 5-25]).

Note: *The end of the rack alarm cable harness is not terminated with a connector. It is wire wrapped to the local office alarm facilities or at the CBP alarm-termination block.*

38 Review the following schematics:

- Rack alarm cable harness diagram (HA660-1106-T003 in Figure 5-10 [p. 5-25])
- Rack cabling schematic (identified in Step 2 [p. 5-36])

  Note: *Locate the rack alarm cable harness (HA660-1106-T003) within this schematic.*
- Rack alarm harness wire-wrap connection to CBP shown in Figure 5-17 [p. 5-33]

39 Using wire-wrap connections, connect the free wire ends of the rack alarm cable harness (HA660-1106-T003) to the wire-wrap pins on the CBP rear panel or local office alarm facilities. Refer to *Cable and Wiring Guide*, for wire-wrap, color-code details and *Circuit Breaker Panel*, for CBP alarm block details.

40 Secure the rack alarm cable to the interior of the rack so that the cable connectors (CNA through CNF) face the rear of the shelves.

Note: *Rack alarm cable connectors (CNA through CNF) have identical pinouts to the office alarm cable described in* Section 5.13.6 [p. 5-55].

Install Shelf Alarm Cables

41 Within the rack cabling schematic (identified in Step 2 [p. 5-36]) identify the shelf alarm cables (HA660-1102-T015) that connect shelves to the rack alarm cable harness (HA660-1106-T003). One shelf alarm cable is required for each shelf.

Figure 5-18 [p. 5-34] shows how the shelf alarm cable (HA660-1102-T015) connects to an Extension shelf backplane.

42 For each shelf in the rack, connect both ends of shelf alarm cable (HA660-1102-T015) as follows:

a. Connect one end of the cable to the appropriate connector (CNA through CNF) of the rack alarm cable harness (HA660-1106-T003), as indicated in rack cabling schematic.

b. Connect the other end of the cable to the office alarm port on the shelf backplane as shown in Figure 5-18 [p. 5-34] (Extension shelf).

43 Repeat Step 42 [p. 5-42] for each shelf in the rack.

Final Checks

44 Dress and lace all cables, and secure to the rack interior using standard local procedures.

45 Using local procedures, reconnect the battery office power that was removed from the rack, or reinstall the circuit breakers.

This procedure is complete.

5.11 Checking Power at Extension Shelf

This procedure is used for verifying the power connections to the Extension shelf.

DANGER:

Use caution when working on the power strip at the top of any shelf to avoid personal injury, damage to equipment, or both. Avoid touching terminals or uninsulated conductors.

Step	Task
1	Set the CBP circuit breakers for the installed shelves to the ON position. See Figure 5-12 [p. 5-28] for the appropriate circuit breaker, if necessary.
2	Remove the plastic cover over the power strip on the shelf backplane.
3	Connect the negative DMM test lead to the GA ground terminal on the rear-panel power strip, and connect the positive DMM test lead to the MAIN A voltage terminal (see Figure 5-19 [p. 5-43]). If required, record the test results for future reference.

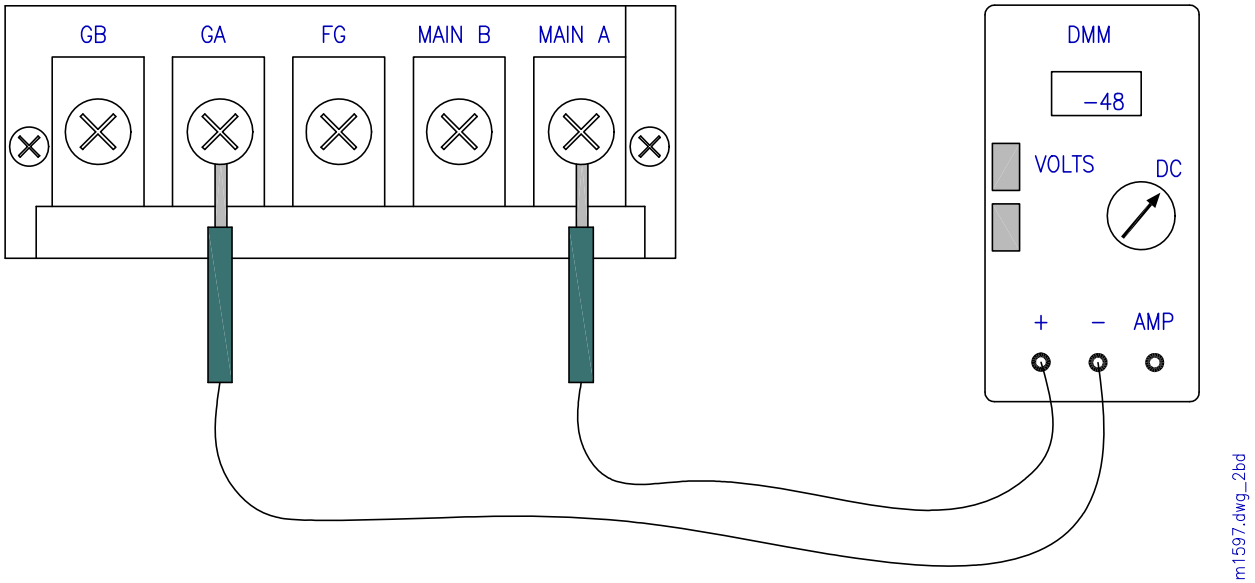


Figure 5-19: Supply Voltage Check

4 Is the DMM measurement between –40 and –57 V DC?

If YES:
Go to Step 5 [p. 5-44].

If NO:
Report as a trouble item to the installation group and repeat voltage checks after the trouble is corrected.

5 Connect the negative DMM test lead to the GB ground terminal on the rear-panel power strip, and connect the positive DMM test lead to the MAIN B voltage terminal. If required, record the test results for future reference.

6 Is the DMM measurement between –40 and –57 V DC?

If YES:
Go to Step 7 [p. 5-44].

If NO:
Report as a trouble item to the installation group and repeat voltage checks after trouble is corrected.

7 Reinstall the plastic cover over the power strip on the shelf backplane.

8 At the front of the Extension shelf, locate the front-panel voltage test points (see Figure 5-20 [p. 5-44]), connect the negative DMM test lead to the G (ground) test point, and connect the positive DMM test lead to the MAIN A test point.

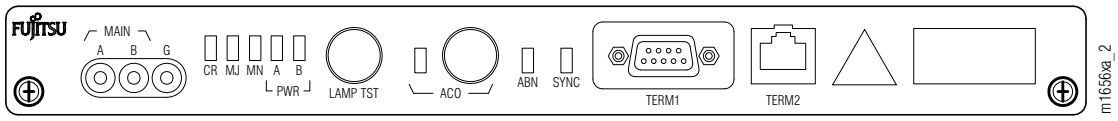


Figure 5-20: Front-Panel Voltage Test Points (Extension Shelf) (Extension Configuration)

9 Is the DMM measurement between –40 and –57 V DC?

If YES:
Go to Step 10 [p. 5-45].

If NO:
Report as a trouble item to the installation group and repeat voltage checks after trouble is corrected.

10 At the front of the Extension shelf, locate the front-panel voltage test points (see Figure 5-20 [p. 5-44]), connect the negative DMM test lead to the G (ground) test point, and connect the positive DMM test lead to the MAIN B test point.

11 Is the DMM measurement between –40 and –57 V DC?

If YES:
Go to Step 12 [p. 5-45].

If NO:
Report as a trouble item to the installation group and repeat voltage checks after trouble is corrected.

12 Repeat the preceding steps for the remaining Extension shelves.

13 Check the frame ground connections and readings according to local procedures.

This procedure is complete.

5.12 Checking Ground Resistance at the Extension Shelf Power Input

Ideally, frame ground and battery return at the shelf power input connectors are common to each other. Essentially a resistance of 0 ohms should be present between them and little or no voltage potential across frame ground and battery return.

The test equipment required is a DMM or a voltmeter and ohmmeter that can accurately detect low resistance levels. See Figure 5-21 [p. 5-46].

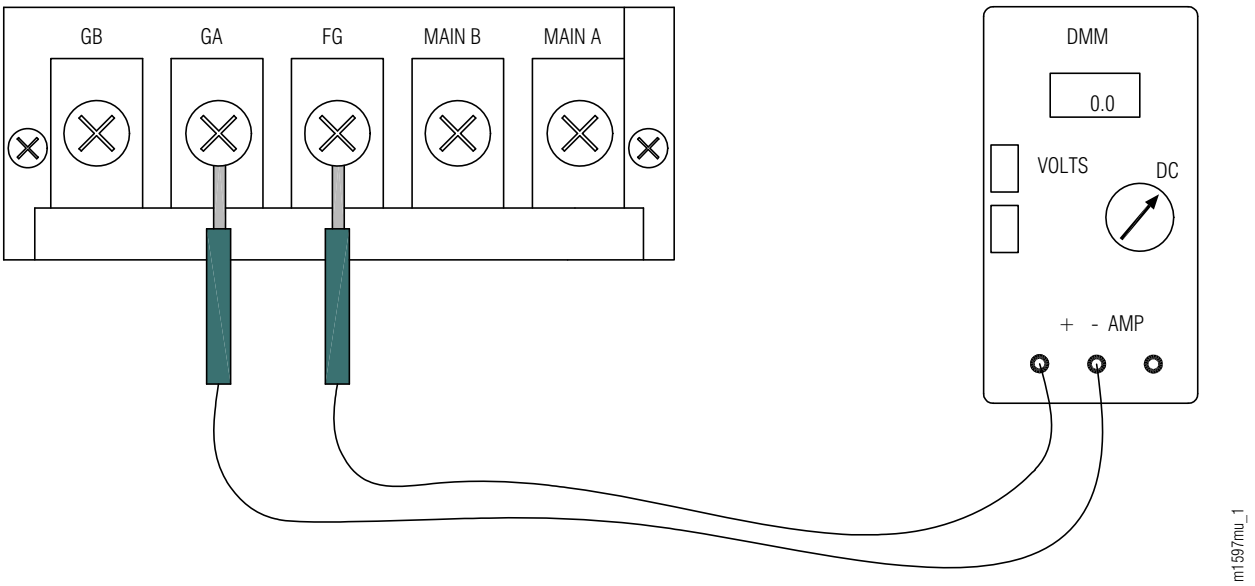


Figure 5-21: Ground Voltage Check Example

Step	Task
1	Use the DMM set to the voltmeter function or a voltmeter to measure the voltage between frame ground and each of the battery return points. The reading should be very close to 0 V DC.
2	Does the voltage exceed 1 V DC? **If YES:** Do not continue with Step 3 [p. 5-47] until the voltage source has been eliminated. For technical assistance, call 1-800-USE-FTAC (800-873-3822). **If NO:** Continue with Step 3 [p. 5-47].

3 Use the DMM set for the ohms function or an ohmmeter to measure the resistance between frame ground and each of the battery return points (A and B) on the shelf. The reading should be very close to 0 ohms.

4 Is the reading close to 0 ohms?

If YES:
Continue with Step 5 [p. 5-47].

If NO:
Do not continue with Step 5 [p. 5-47] until the voltage source has been eliminated. For technical assistance, call 1-800-USE-FTAC (800-873-3822).

5 Swap the DMM or ohmmeter leads between frame ground and battery return, and verify the same reading as described in Step 3 [p. 5-47].

This procedure is complete.

5.13 Installing Cables

This section includes the following subsections:

5.13.1 Overview

The procedures in this section cover the connections made to the Extension shelf backplane of the FLASHWAVE 7500 Extension Configuration system. Figure 5-22 [p. 5-49] shows the backplane connectors and connector designations for the Extension shelf.

All fiber cabling and connections to the shelf plug-in units are made during system turn-up. Refer to *System Turn-Up*, for fiber cabling information. For a detailed description of FLASHWAVE 7500 cables and shelf connectors, refer to *Cable and Wiring Guide*.

> ***Note:*** *Some of the connectors on the Extension shelf backplane may be for future use. However, this practice defines all connectors on the shelf backplane and applicable cables that may be used in future releases.*

> ***Note:*** *All cabling from the Extension shelf backplane should be connected only to other shelves and equipment within the same building.*

5.13.2 Prerequisites

The tools required for performing the procedures listed in this section are as follows:

- Cable termination tools
- Common hand tools

5.13.3 Extension Shelf Backplane

System cable connections are made to the connectors located on the Extension shelf backplane as shown in Figure 5-22 [p. 5-49] and described in the sections that follow. Power, ground, and alarm cabling was covered in Section 5.10 [p. 5-24].

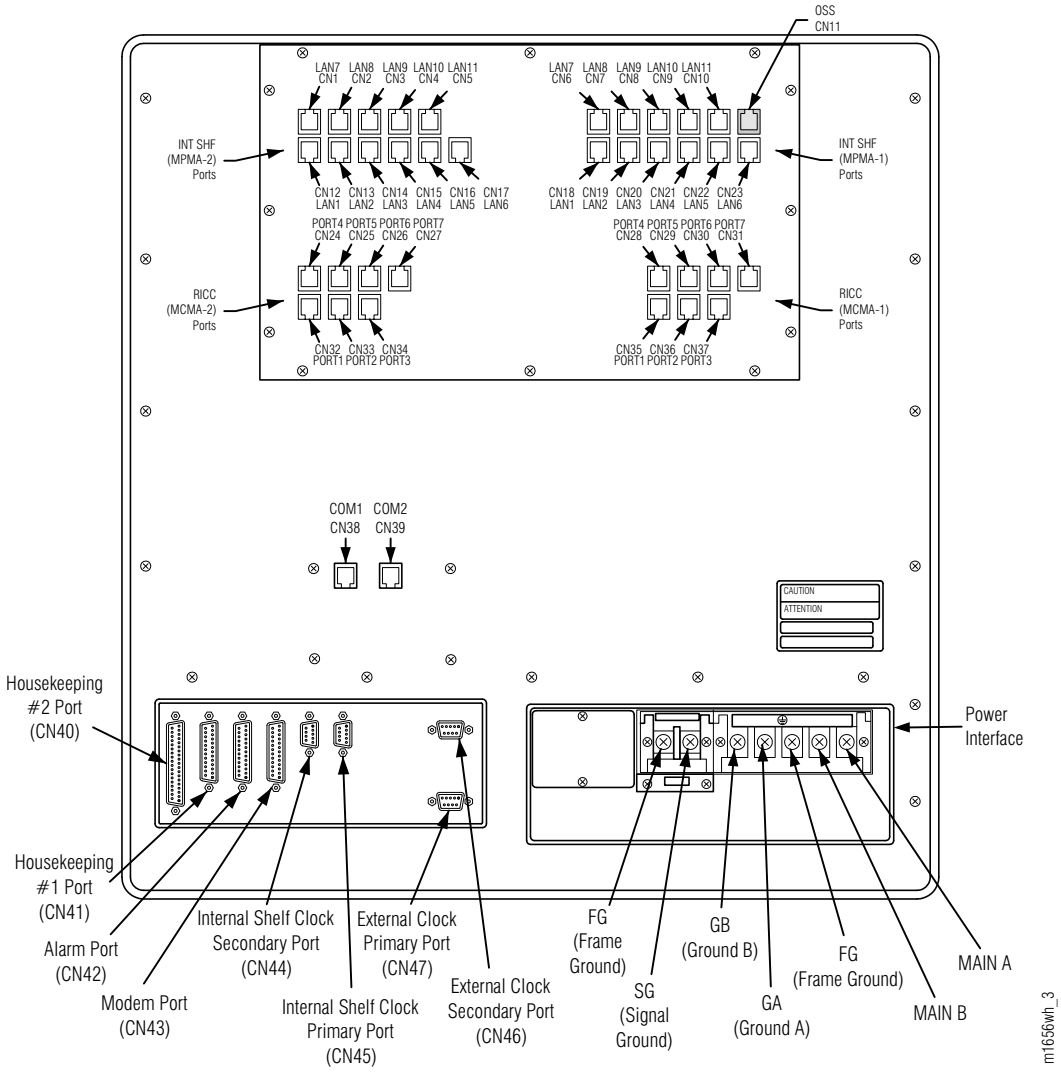


Figure 5-22: Extension Backplane Connectors (Extension Configuration)

Note: *Fiber cabling for the LAS1 (if used) is installed during system turn-up as described in System Turn-Up.*

5.13.4 Installing Modem Cable

This procedure provides instructions for installing the 25-pin D-sub modem cable and installing it on the Extension shelf backplane. Table 5-3 [p. 5-50] lists pertinent information for this cable. Figure 5-23 [p. 5-50] shows the cable connector pinouts.

Note: *The modem cable is a standard RS-232 straight-through (not null modem) cable available at most computer supply stores.*

Table 5-3: Modem Cable Information (Extension Configuration)

Cable Part Number	Backplane Connector Number	Cable Description	Connector Type	Cable Wire Size
21-176-xxx[a]	CN43	Modem access to remote NE	25-pin D-sub	24 AWG

[a] xxx = length in feet

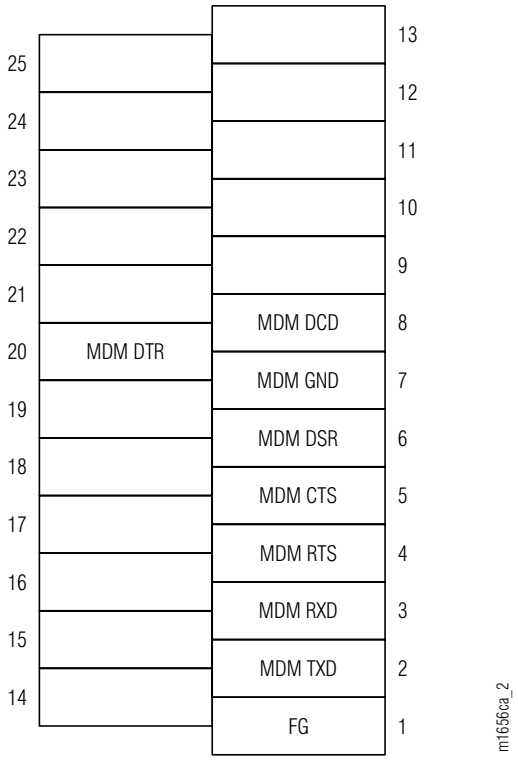


Figure 5-23: Connector Pinouts, 25-Pin D-Sub Modem Cable

Step	Task
1	Connect the modem cable to connector CN43 (Extension shelf) and secure with retaining screws. See Figure 5-22 [p. 5-49].
2	Connect the other end of the modem cable to the appropriate external modem. ***Note:*** *To connect a PC directly to connector CN43, use a null-modem cable in place of the 21-176-xxx cable.* This procedure is complete.

5.13.5 Installing Housekeeping Cables

This procedure provides instructions for assembling the housekeeping 1 (HK1) and housekeeping 2 (HK2) cables and installing them on the Extension shelf backplane. Table 5-4 [p. 5-52] lists pertinent information for these cables. Figures 5-24 [p. 5-52] and 5-25 [p. 5-53] shows cable connector pinouts.

Table 5-4: Housekeeping Cable Information (Extension Configuration)

Cable Part Number	Backplane Connector Number	Cable Description	Connector Type	Cable Wire Size
21-626-xxx[a]	CN41	HK1 input of housekeeping alarm signals from ancillary equipment	25-pin D-sub	24 AWG
21-537-xxx[a]	CN40	HK2 control of housekeeping alarm signals from ancillary equipment	37-pin D-sub	24 AWG

[a] xxx = length in feet

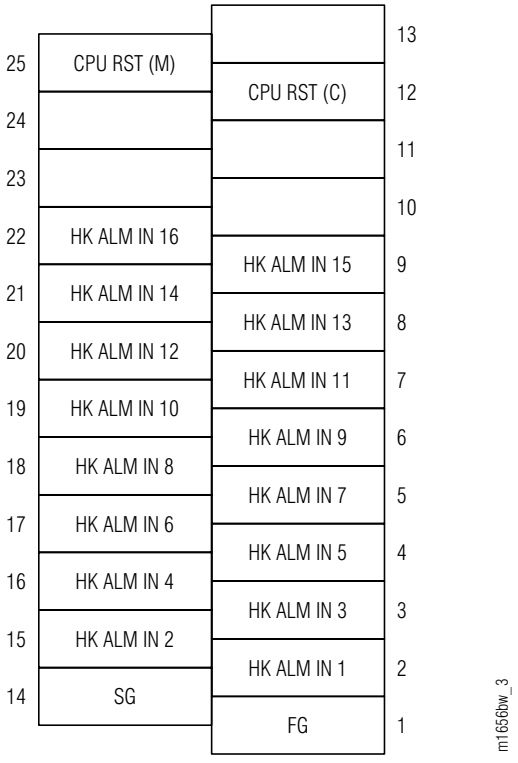


Figure 5-24: Connector Pinouts, HK1 Cable

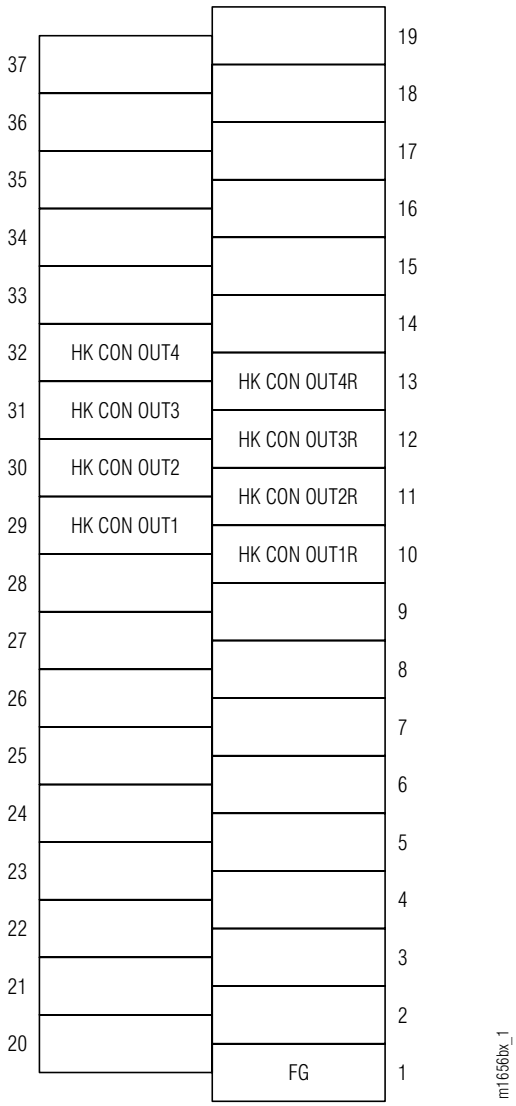


Figure 5-25: Connector Pinouts, HK2 Cable

Step	Task
1	Connect the HK1 input housekeeping cable to backplane connector CN41 (Extension shelf) and secure it in place using retaining screws. See Figure 5-22 [p. 5-49].

Note: *The far end of 21-626-xxx is not terminated with a connector.*

2 Connect the other end of the HK1 input housekeeping cable to the appropriate alarm termination point on the local environmental alarm termination block. Refer to *Cable and Wiring Guide*, for color code details.

Note: *Pins 12 and 25 of HK1 can be used to initiate a remote CPU reset.*

3 Connect the HK2 control housekeeping cable to backplane connector CN40 (Extension shelf), and secure with retaining screws. See Figure 5-22 [p. 5-49].

4 Connect the other end of the HK2 control housekeeping cable to the appropriate alarm termination point on the local environmental alarm termination block. Refer to *Cable and Wiring Guide*, for color code details.

5 Record the termination points used, and provide documentation to site personnel.

This procedure is complete.

5.13.6 Installing Office Alarm Cable

This procedure provides instructions for connecting the office alarm cable. The cable should already have been installed as described in Section 5.10 [p. 5-24]. Table 5-5 [p. 5-55] lists additional information for this cable. Figure 5-26 [p. 5-56] shows the shelf alarm cable connector pinouts.

Note: *The connector pinouts for the rack alarm cable connectors (CNA through CNF) are the same as CN42.*

Table 5-5: Connectors for Alarms (Extension Configuration)

Cable Part Number	Backplane Connector Number	Cable Description	Connector Type	Cable Wire Size
HA660-1102-T015	CN42	Output of system alarm signals through the rack alarm harness to the circuit breaker panel. This cable connects the shelf alarms to the rack alarm cable harness. See Figure 5-10 [p. 5-25] and Figure 5-18 [p. 5-34].	25-pin D-sub	24 AWG
HA660-1106-T003	n/a	Rack alarm cable harness providing six daisy-chain termination points (CNA through CNF) for shelf alarm cabling. Terminates at wire wrap facilities as required. See Figure 5-10 [p. 5-25] and Figure 5-17 [p. 5-33].	25-pin D-sub	24 AWG

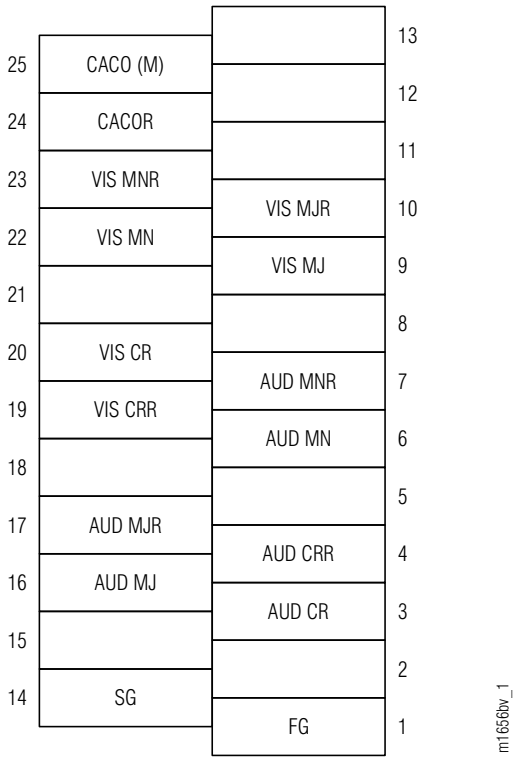


Figure 5-26: Connector Pinouts, Alarm Cable

Step	Task
1	If not already installed, refer to Section 5.10 [p. 5-24] to install the alarm cable. See Figure 5-10 [p. 5-25] for cable assembly drawings and Figures 5-11 [p. 5-27] through 5-13 [p. 5-29] for power, ground, and alarm cabling diagrams.
2	Ensure that backplane alarm connector CN42 of the Extension shelf (Figure 5-22 [p. 5-49]) is connected to a shelf cable assembly that terminates into one of the rack alarm cable harness connectors (CNA through CNF, see Figures 5-11 [p. 5-27] through 5-13 [p. 5-29]).
3	The end of the multiconnector, rack alarm cable assembly (not terminated and nonconnectorized) is wire wrapped to the local office alarm facilities or at the CBP alarm termination block. Refer to *Cable and Wiring Guide*, for wire-wrap color code details and *Circuit Breaker Panel*, for CBP alarm block details. This procedure is complete.

5.13.7 Installing OSS Cable

This procedure provides instructions for assembling the OSS cable and installing it on the Extension shelf backplane (CN11). Table 5-6 [p. 5-57] lists pertinent information for this cable. Figure 5-27 [p. 5-57] shows the cable connector pinouts.

Table 5-6: OSS Cable Information (Extension Configuration)

Cable Part Number	Backplane Connector Number	Cable Description	Connector Type	Cable Wire Size
21-332-xxx or 21-094-xxx[a]	CN11	Ethernet connection	8-pin RJ-45	24 AWG

[a] xxx = length in feet

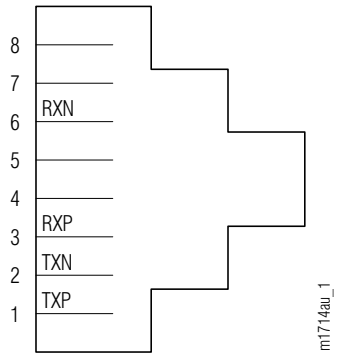


Figure 5-27: Connector Pinouts, OSS Cable

Step	Task
1	Connect the cable to shelf backplane connector CN11 (see Figure 5-22 [p. 5-49]).
2	Connect the other end of the cable to the appropriate router or hub.

Note: *The 21-094-xxx cable can also be used to connect a PC to the TERM2 Ethernet port on the Extension shelf front panel.*

Note: *The OSS port has automatic cable-detect capability to properly function with both crossover and straight cables.*

This procedure is complete.

Revision 1, June 2009

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6

INSTALLING/REMOVING MODULES, FILLER PANELS AND PLUG-IN UNITS

This chapter includes the following procedures:

6.1 Overview

This chapter provides prerequisites and procedures for installing Plug-in Units, Filler Panels and Modules used in the FLASHWAVE® 7500 Core, Small, ETSI, and Extension Configuration systems.

6.2 Prerequisites

The following considerations apply when installing/removing Modules, Filler Panel and Plug-in Unit procedures:

- All rules and precautions are to be observed regarding electrostatic discharge (ESD).
- Insure that all data forms and job engineering drawings have been completed and are available.

6.3 Installing/Removing Shelf Plug-In Units

This procedure includes the following subprocedures:

The procedures in this section are for removing and installing the plug-in units into a shelf slot.

The following cautions must be adhered to when removing and installing all plug-in units:

WARNING:

Do not push plug-in units quickly into the slot. Seat all plug-in units (including the fans) with a slow but firm motion to avoid damage to the plug-in unit or backplane connections.

WARNING:

Plug-in units can be damaged by an ESD during installation or removal. Read the general notes (depending on the configuration) for plug-in unit storage, unpacking, and handling in:

- Core: Section 2.4, Storing, Unpacking, and Inspecting Equipment [p. 2-11]
- Small: Section 3.4, Storing, Unpacking, and Inspecting Equipment [p. 3-20]
- ETSI: Section 4.4, Storing, Unpacking, and Inspecting Equipment [p. 4-10]
- Extension: Section 5.4, Storing, Unpacking, and Inspecting Equipment [p. 5-3]

WARNING:

Wear an ESD wrist strap with a minimum resistance of 1 megohm when handling plug-in units to prevent possible plug-in unit damage. Before using the strap, check it for opens, shorts, and the minimum resistance value. If the strap does not pass these checks, do not use it.

6.3.1 Removing Plug-In Unit

Step	Task
1	Locate the shelf plug-in unit that is to be replaced. See Figure 6-8 [p. 6-14].
2	Label and remove all fibers connected to the unit being replaced.
3	Gently pull open the top and bottom extractor levers until the plug-in unit is free from the rear connector. See Figure 6-1 [p. 6-4].

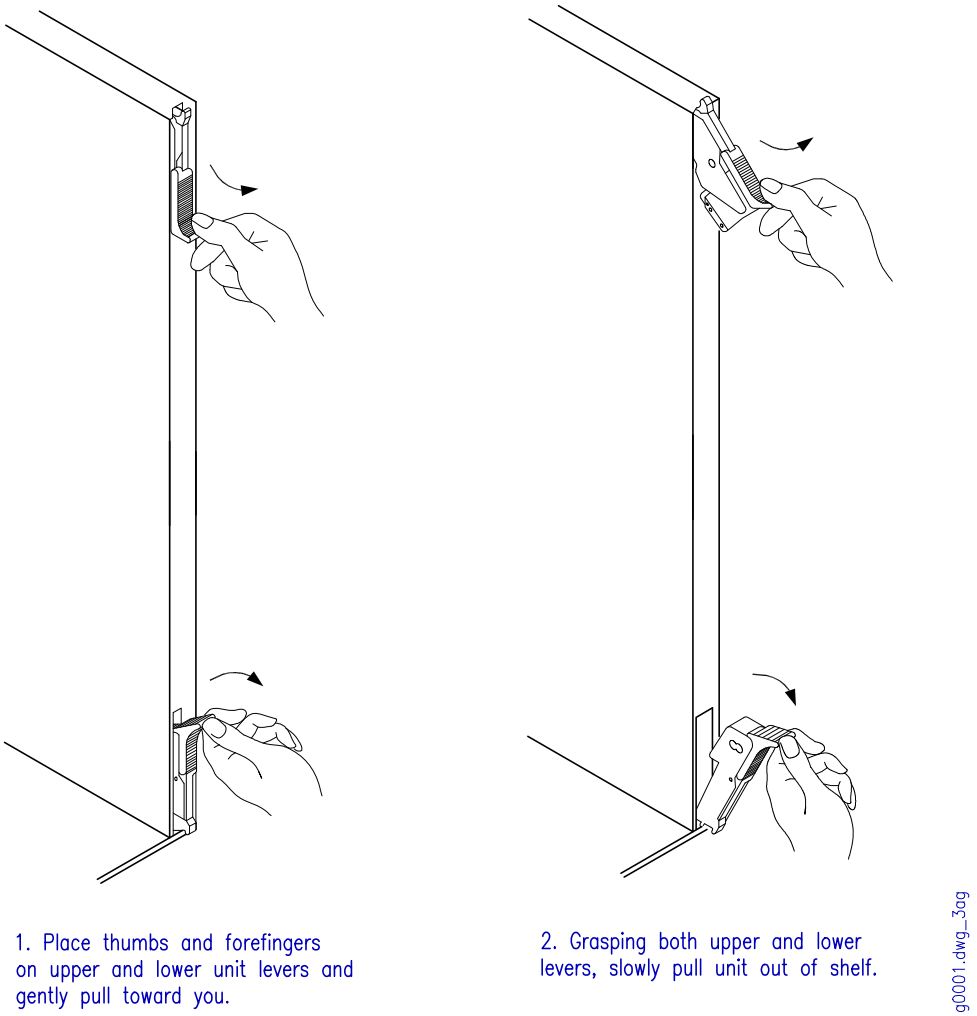

Figure 6-1: Plug-In Unit Removal Sequence

4 Grasp both upper and lower plug-in unit levers with thumbs and forefingers, and slowly pull the plug-in unit out of the shelf.

5 Place the plug-in unit in ESD protective packaging.

This procedure is complete.

6.3.2 Installing Plug-In Unit

Step	Task

1 Locate the replacement plug-in unit or the plug-in unit to be installed.

2 Remove the plug-in unit from its ESD protective packaging.

3 Ensure that the top and bottom extractor levers are open. See Figure 6-2 [p. 6-5].

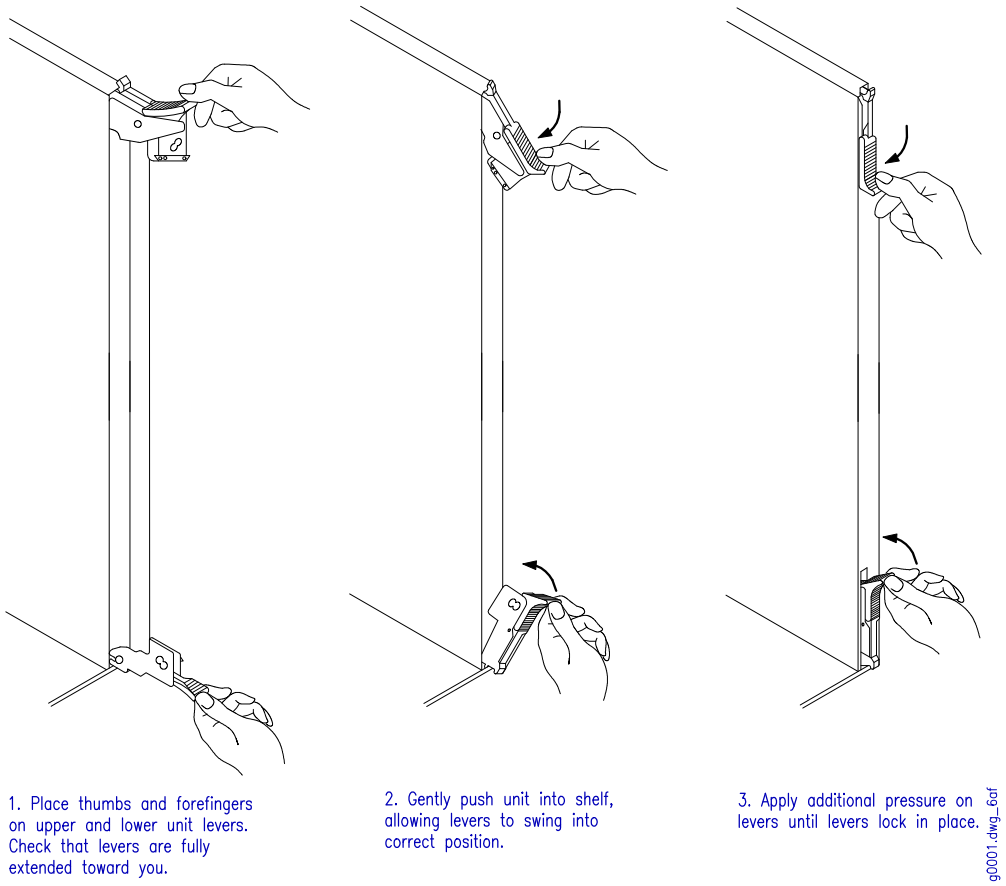

Figure 6-2: Plug-In Unit Installation Sequence

4 Carefully slide the plug-in unit into the appropriate shelf slot, ensuring that the latches mesh properly into the grooves of the shelf. Do not use the latches to force the plug-in unit into the shelf.

5 Reconnect the labeled fibers.

This procedure is complete.

6.4 Installing/Removing Filler Panels

This procedure provides instructions for removing and installing filler panels. It includes the following subprocedures:

6.4.1 Removing Filler Panels

Remove a filler panel as follows:

Step	Task
1	Locate the filler panel that is to be removed. See Figures 6-4 [p. 6-9] and 6-5 [p. 6-10].
2	Press the top and bottom release tabs and gently pull the filler panel unit out of the shelf, as shown in Figure 6-3 [p. 6-8].

This procedure is complete.

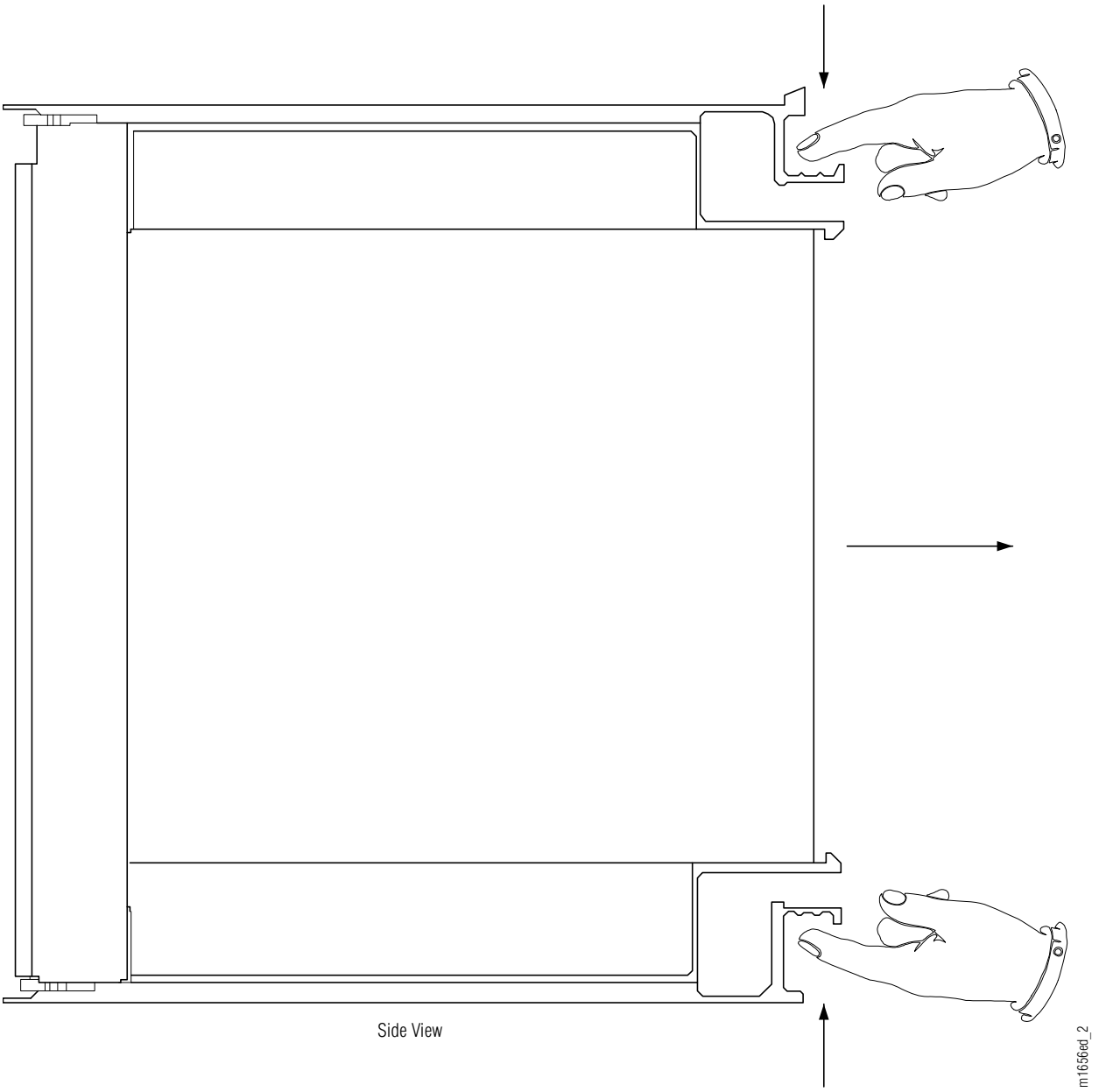

Figure 6-3: Removing a Filler Panel

6.4.2 Installing Filler Panels

This procedure provides installation instructions for the filler panels used by the Optical/Tributary shelf. The filler panels ensure proper airflow throughout the shelf. Additionally, all unused equipment slots, both half size (see Figure 6-4 [p. 6-9]) and full size (see Figure 6-5 [p. 6-10]), must be occupied by a filler panel to meet FCC electromagnetic interference (EMI) compliance requirements.

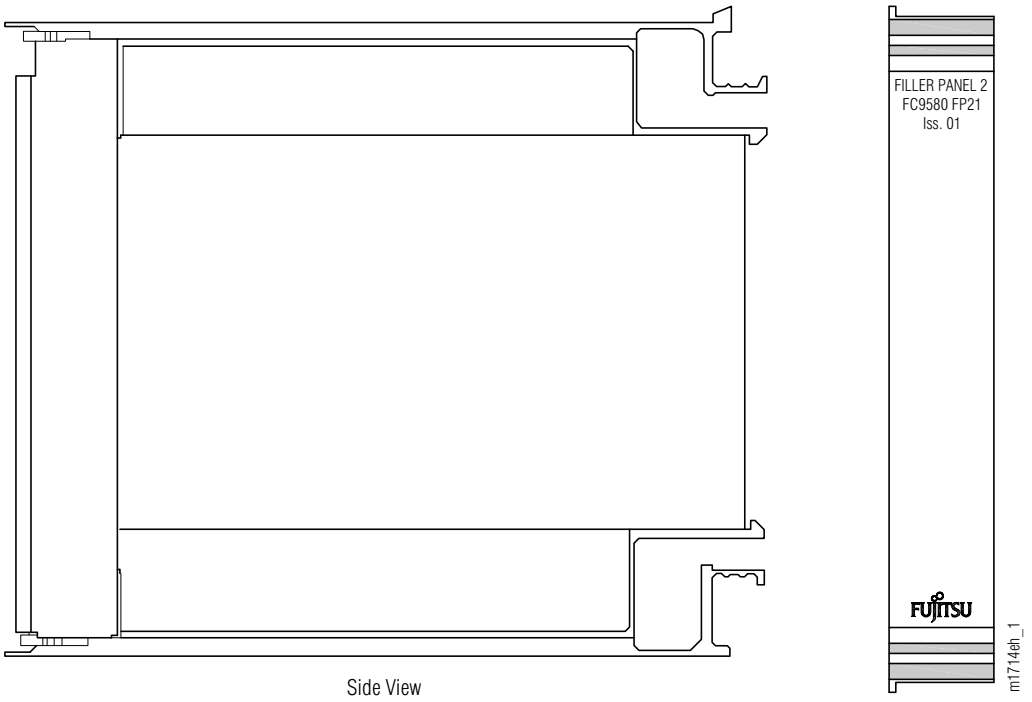

Figure 6-4: Half-Size Filler Panel

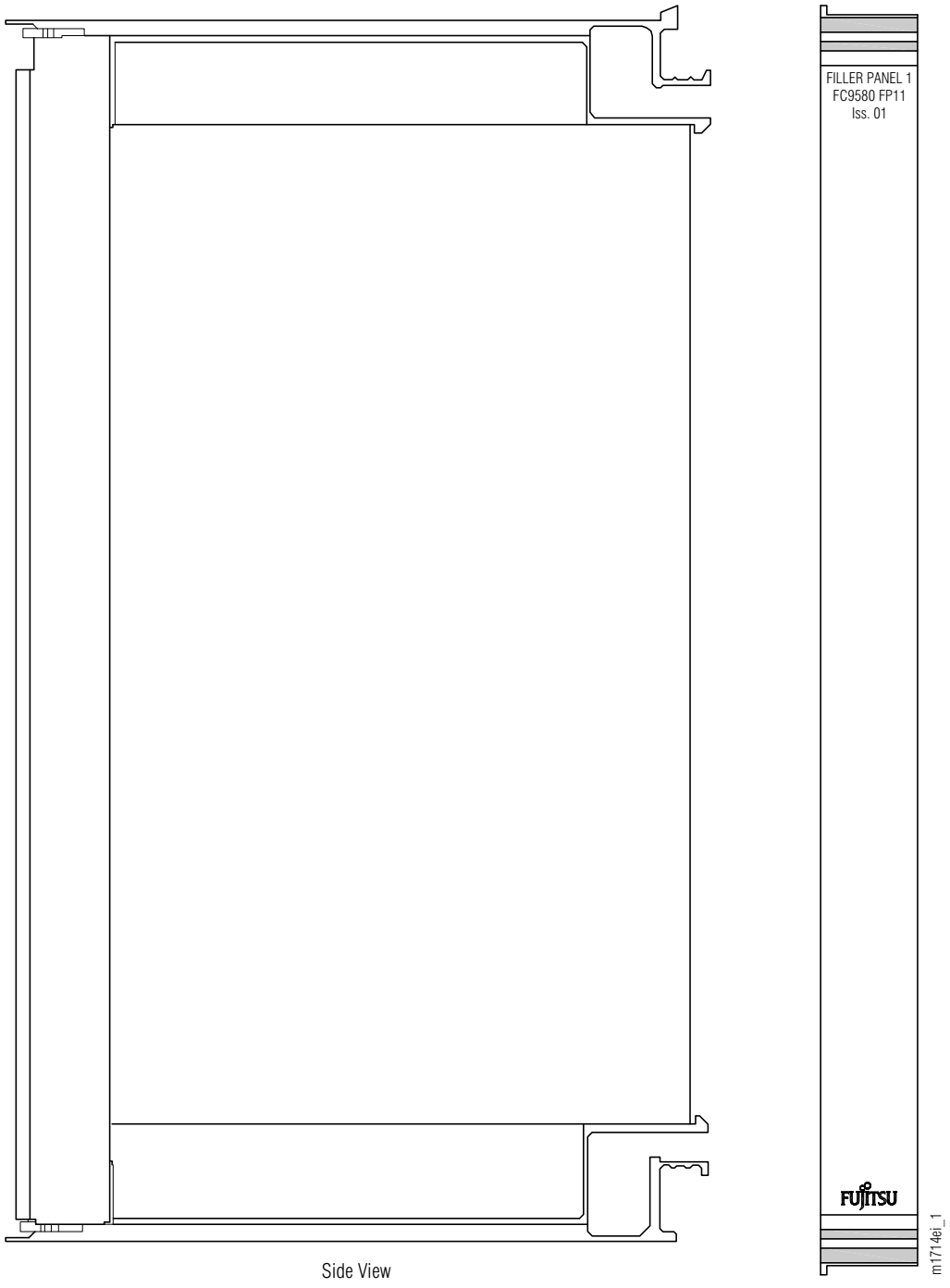

Figure 6-5: Full-Size Filler Panel

Step	Task
1	If not already done, unpack the required number of filler panels from the shipping container. Waiting until the shelf is fully populated at system turn-up may be necessary to determine the unused equipment slots.
2	Install each filler panel in an unused equipment slot as follows:
	a. Carefully slide the plug-in unit into the appropriate shelf slot, ensuring that the guides mesh properly into the grooves of the shelf.
	b. Gently push the faceplate as shown in Figure 6-6 [p. 6-11] to seat the filler panel.
	This procedure is complete.

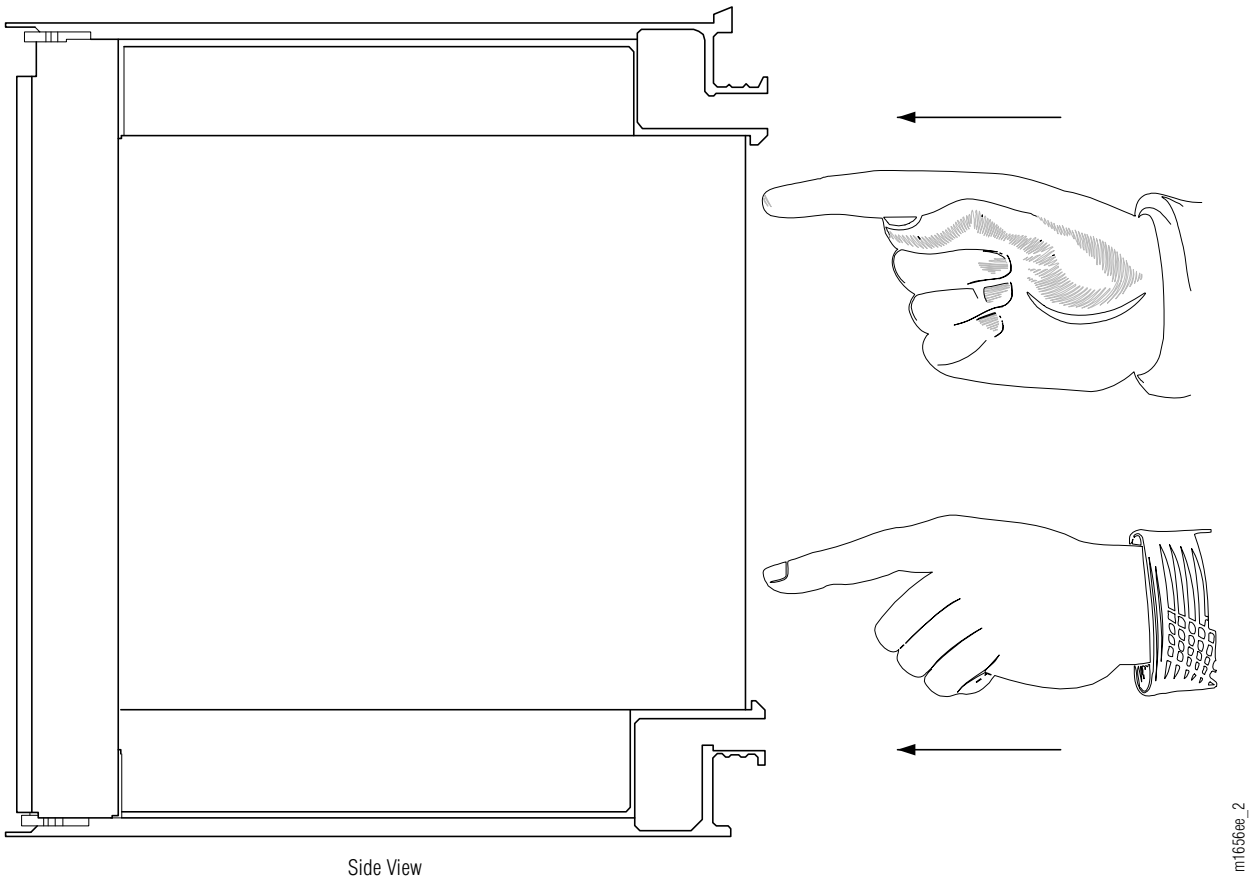

Figure 6-6: Insert Filler Panel

6.5 Installing/Removing SFP Modules in a Muxponder or Flexponder™ Unit

This procedure includes the following subprocedures:

The following procedures are used for removing and installing small form-factor pluggable (SFP) modules.

6.5.1 Removing an SFP Module from a Muxponder or Flexponder Unit

This procedure lists the steps for removing an SFP module in an IFMA-8TCx or IFMA-GUC1 (muxponder) plug-in unit or an IFMA-BUC1 or IFMA-BXC1 (Flexponder) plug-in unit.

Observe the following precautions when removing and installing all plug-in units:

DANGER:

Never look into the end of a fiber-optic cable. Permanent eye damage or blindness can occur very quickly if the laser light is present. Follow local safety precautions regarding fiber.

DANGER:

Never handle exposed fiber with bare hands or touch it to your body. A fiber fragment could enter the skin and be very difficult to detect and remove. Follow local safety precautions regarding fiber.

CAUTION:

Do not remove the wrong fiber connections. Removing a fiber connection that is in use will disrupt service.

Perform the following steps to remove the SFP module:

Step	Task
1	Locate the muxponder/Flexponder plug-in unit that contains the SFP module to be removed.

2 Is an installed SFP module to be removed from the muxponder plug-in unit?

If YES:
Continue with Step 3 [p. 6-13].

If NO:
Proceed to Step 4 [p. 6-14].

3 For a muxponder unit, completely loosen the two thumb screws on the front of the plug-in unit. These screws secure the stainless steel client connection drawer. See Figures 6-7 [p. 6-13] and 6-8 [p. 6-14]. Gently pull the thumb screws forward to open the drawer and expose the SFP modules and client fiber connections, if present. Proceed to Step 5 [p. 6-15].

Figure 6-7: IFMA-8TCx Muxponder Unit with Client Connection Drawer Open

Drawer Closed **Drawer Open**

Figure 6-8: Client Connection Drawer on IFMA-GUC1 Muxponder

4 For a Flexponder plug-in unit, lift the hinged door on the front of the plug-in unit to expose the SFP modules and client fiber connections, if present.

Note: *Older versions of the IFMA-BUC1 unit have the hinged door. Newer versions of the IFMA-BUC1 unit do not have a hinged door. The IFMA-BXC1 unit does not have a hinged door.*

5 Locate the module to be removed, and inspect the fiber connections (if any). See Figure 6-9 [p. 6-15]. Verify that each fiber is clearly marked or labeled to identify the connector to which it connects.

Note: *Fiber marking or labeling depends on local practice.*

Figure 6-9: Fiber Connections to SFP Module Installed in IFMA-GUC1 Unit

6 Is each fiber clearly marked to show the connector to which it connects?

If YES:
Continue to Step 7 [p. 6-15].

If NO:
Mark or label fibers according to local practice. Then repeat this step.

7 Disconnect the fiber-optic cables from the module to be removed.

8 To remove the SFP module from the plug-in unit, press the detent button on the left side of the SFP module (see Figure 6-10 [p. 6-16]) to release the module from the plug-in unit, and then pull the module straight out.

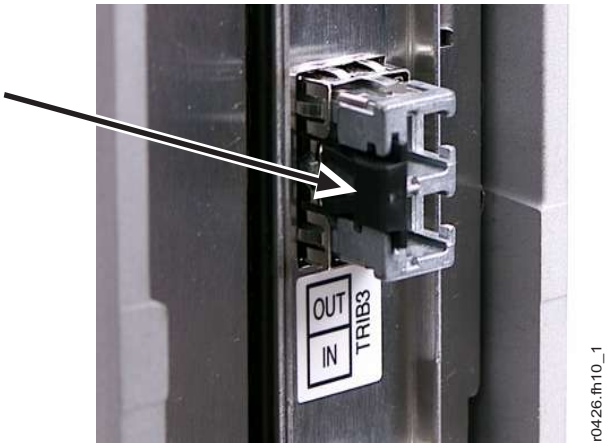

Figure 6-10: Detent Button on Front of SFP Module Installed in IFMA-8TCx Unit

9 Carefully install an optical connector cover into the SFP module.

10 Set the SFP module aside for repair paperwork processing.

11 Is another SFP module being installed in the same position?

If YES:
Continue with Step 12 [p. 6-16].

If NO:
Proceed to Step 13 [p. 6-16].

12 If necessary, record the serial number and issue number of the replacement module, and then proceed to Section 6.5.2 [p. 6-17].

13 For a muxponder plug-in unit, close the stainless steel client connection drawer (see Figure 6-8 [p. 6-14]), and gently tighten the two thumb screws that secure it on the front of the muxponder plug-in unit. For a Flexponder plug-in unit, lower the hinged door to cover the front of the plug-in unit, if present.

Note: *Older versions of the IFMA-BUC1 unit have the hinged door. Newer versions of the IFMA-BUC1 unit do not have a hinged door. The IFMA-BXC1 unit does not have a hinged door.*

This procedure is complete.

6.5.2 Installing an SFP Module in a Muxponder or Flexponder Unit

This procedure lists the steps for installing an SFP module in an IFMA-8TCx or IFMA-GUC1 (muxponder) plug-in unit or an IFMA-BUC1 or IFMA-BXC1 (Flexponder) plug-in unit.

DANGER:

Never look into the end of a fiber-optic cable. Permanent eye damage or blindness can occur very quickly if the laser light is present. Follow local safety precautions regarding fiber.

DANGER:

Never handle exposed fiber with bare hands or touch it to your body. A fiber fragment could enter the skin and be very difficult to detect and remove. Follow local safety precautions regarding fiber.

CAUTION:

Do not remove the wrong fiber connections. Removing a fiber connection that is in use will disrupt service.

Perform the following steps to install the SFP module:

Step	Task
1	Inspect the SFP module (see Figure 6-11 [p. 6-18]) for damage or debris, and remove the optical connector cover.

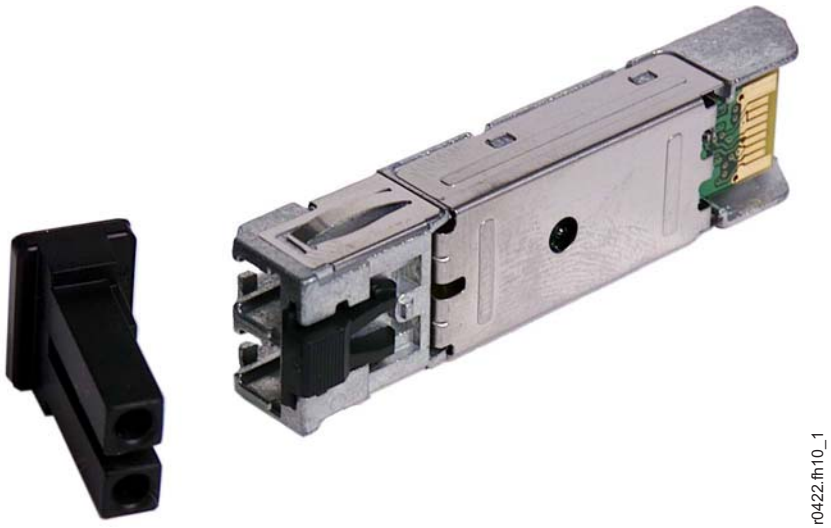

Figure 6-11: SFP Module with Optical Connector Cover Removed

2	Locate the muxponder/Flexponder plug-in unit that will contain the SFP module being installed.
3	If necessary, record the serial number and issue number of the module being installed.
4	Install the module into the proper SFP slot of the muxponder/Flexponder plug-in unit.
5	Will fibers be connected to the module at this time? **If YES:** Continue with Step 6 [p. 6-18]. **If NO:** Go to Step 9 [p. 6-19].
6	Clean the optical connectors. Refer to *Fiber Cable Handling*.
7	Connect the fiber-optic cables to the SFP module.

8 Was the module installed in a muxponder unit?

If YES:
Continue with Step 9 [p. 6-19].

If NO:
Proceed to Step 10 [p. 6-19].

9 For a muxponder plug-in unit, close the stainless steel client connection drawer (see Figure 6-8 [p. 6-14]), and gently tighten the two thumb screws that secure it on the front of the muxponder plug-in unit.

10 For a Flexponder plug-in unit, lower the hinged door to cover the front of the plug-in unit, if present.

Note: *Older versions of the IFMA-BUC1 unit have the hinged door. Newer versions of the IFMA-BUC1 unit do not have a hinged door. The IFMA-BXC1 unit does not have a hinged door.*

This procedure is complete.

6.6 Installing/Removing XFP Modules in a 4:1 10G Muxponder Unit

This procedure includes the following subprocedures:

The following procedures are used for removing and installing 10G small form-factor pluggable (XFP) modules:

6.6.1 Removing an XFP Module from a 4:1 10G Muxponder Unit

This procedure lists the steps for removing an XFP module from an IFMA-QMC1 (muxponder) plug-in unit.

Observe the following precautions when removing and installing all plug-in units:

DANGER:

Never look into the end of a fiber-optic cable. Permanent eye damage or blindness can occur very quickly if the laser light is present. Follow local safety precautions regarding fiber.

DANGER:

Never handle exposed fiber with bare hands or touch it to your body. A fiber fragment could enter the skin and be very difficult to detect and remove. Follow local safety precautions regarding fiber.

CAUTION:

Do not remove the wrong fiber connections. Removing a fiber connection that is in use will disrupt service.

Perform the following steps to remove the XFP module:

Step	Task
1	Locate the muxponder plug-in unit that contains the XFP module to be removed.

2 Locate the XFP module to be removed, and inspect the fiber connections to it (if any). Verify that each fiber is clearly marked or labeled to identify the connector to which it connects.

Note: *Fiber marking or labeling depends on local practice.*

3 Is each fiber clearly marked to show the connector to which it connects?

If YES:
Continue to Step 4 [p. 6-21].

If NO:
Mark or label fibers according to local practice. Then repeat this step.

4 Disconnect the fiber-optic cables from the XFP module to be removed.

5 To remove the XFP module from the plug-in unit, press the detent button on the left side of the XFP module to release the XFP module from the plug-in unit, and then pull the XFP module straight out.

6 Carefully install optical connector covers into the XFP module.

7 Set the module aside for repair paperwork processing.

8 Is another XFP module being installed in the same position?

If YES:
Continue to Step 9 [p. 6-21].

If NO:
Proceed to Step 10 [p. 6-21].

9 If necessary, record the serial number and issue number of the replacement XFP module, and then proceed to Section 6.6.2 [p. 6-21].

10 Close the stainless steel client connection drawer (see Figure 6-8 [p. 6-14]), and gently tighten the two thumb screws that secure it on the front of the muxponder plug-in unit.

This procedure is complete.

6.6.2 Installing an XFP Module in a 4:1 10G Muxponder Unit

This procedure lists the steps for installing an XFP module in an IFMA-QMC1(muxponder) plug-in unit.

DANGER:

Never look into the end of a fiber-optic cable. Permanent eye damage or blindness can occur very quickly if the laser light is present. Follow local safety precautions regarding fiber.

DANGER:

Never handle exposed fiber with bare hands or touch it to your body. A fiber fragment could enter the skin and be very difficult to detect and remove. Follow local safety precautions regarding fiber.

CAUTION:

Do not remove the wrong fiber connections. Removing a fiber connection that is in use will disrupt service.

Perform the following steps to install the XFP module:

Step	Task
1	Inspect the XFP module (see Figure 6-12 [p. 6-22]) for damage or debris, and remove the optical connector cover.

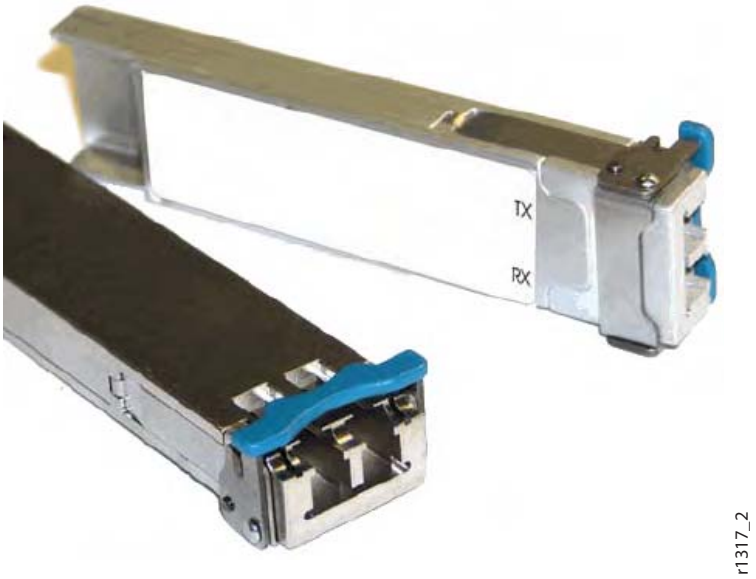

Figure 6-12: Detent Button (Blue) on Front of XFP Module

2	Locate the muxponder plug-in unit that will contain the XFP module being installed.

3 If necessary, record the serial number and issue number of the XFP module being installed.

4 Install the module into the proper slot of the muxponder plug-in unit.

5 Will fibers be connected to the XFP module at this time?

If YES:
Continue with Step 6 [p. 6-23].

If NO:
Go to Step 8 [p. 6-23].

6 Clean the optical connectors. Refer to *Fiber Cable Handling*.

7 Connect the fiber-optic cables to the XFP module.

8 Close the stainless steel client connection drawer (see Figure 6-8 [p. 6-14]), and gently tighten the two thumb screws that secure it on the front of the muxponder plug-in unit.

This procedure is complete.

Revision 1, June 2009

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