Traverse Hardware Installation and Commissioning Guide

TR5.0.x

October 2011
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CONTENTS

Chapter 1
Installation and Commissioning Overview
- Traverse Installation Process ............................................. 1
- Traverse Shelf Interface Specifications ................................. 2
- Traverse System Rack Installation ........................................ 2
- Required Equipment and Tools ........................................... 2
- Traverse Shelf Back Covers ............................................. 4
- Grounding the Shelf and Fan Tray Holder ............................. 4
- Traverse System Rack Hardware Installation Process .............. 5

Chapter 2
Traverse System Configuration Examples
- Traverse System Configuration Example ............................... 8
- Example Traverse Shelf Card Layout .................................. 9

Chapter 3
Precautions to Installing Traverse Equipment
- Environmental Precautions ............................................. 12
- Hardware Installation Precautions .................................... 13
- Electrical Precautions ................................................... 14
- Fiber Optic Cabling Precautions ....................................... 15
- Card Precautions ......................................................... 16
- Electrostatic Discharge Protection ..................................... 17
- ESD Jack Locations ..................................................... 18

Chapter 4
Removing and Replacing Back Covers
- Required Equipment and Tools ......................................... 21
- Main Backplane Covers .................................................. 21
- Remove and Replace the Fiber Optic Management Tray Cover .... 23
- Remove and Replace the Fiber Management Tray Cover ........... 23
- Remove and Replace the Traverse 600 Fiber Management Tray Cover .... 24
- Remove the PDAP Protective Back Cover ............................ 26
- Replace the PDAP Protective Back Cover ............................. 26

Chapter 5
Inserting and Removing Cards
- Required Equipment and Tools ......................................... 27
- Clean Fiber Optic MPX Connectors .................................... 28
- Insert a Card ..................................................................... 31
- Remove a Card ............................................................... 36

Chapter 6
Insert Fan Module and Air Filters
Chapter 7
Traverse System Hardware Installation
- Install the Rack Adapters ........................................ 46
- Install the Traverse Shelf ........................................ 47
- Flush Mount a Traverse Shelf .................................. 48
- Install the Front Inlet Fan Tray Holder ......................... 49
- Install the Fan Tray Holder with Separate Air Ramp ....... 50
- Install the Air Ramp .............................................. 52

Chapter 8
Traverse 2000 Installation into a 19-inch Rack
- Vertical Traverse 2000 Rack Configuration ...................... 56
- Install the Horizontal Rack Adapter Brackets .................. 58
- Install the Front Inlet Fan Tray Holder in a 19-inch Rack ... 59
- Install a Traverse 2000 in a 19-inch Rack ...................... 61

Chapter 9
Power System Overview
- Power Distribution and Alarm Panel (PDAP) Description .... 63
- PDAP Installation and Cabling Process ......................... 64

Chapter 10
Power System Hardware Installation
- Required Equipment and Tools .................................. 65
- Power System Installation ........................................ 66
- Grounding the PDAP ............................................. 68

Chapter 11
Battery and Battery Return Distribution
- Required Equipment and Tools .................................. 69
- Battery and Battery Return Distribution Cabling Procedures ... 71
- Connect PDAP-4S Battery Distribution Cables .................. 71
- Connect PDAP-4S Battery Return Distribution Cables ......... 74
- Connect PDAP-15A Battery Distribution Cables ................. 77
- Connect PDAP-15A Battery Return Distribution Cables ....... 79

Chapter 12
Battery and Battery Return Supply
- Required Equipment and Tools .................................. 84
- Connect Battery Supply Cables to the PDAP .................... 85
- Connect Battery Return Supply Cables to the PDAP ........... 87
- Connect Supply Cables to the Central Office Source ........... 89
- Verify Polarity ...................................................... 91
Chapter 13
Traverse Node Start-up and Commissioning

- Before You Begin .............................................. 93
- Required Node Commissioning Parameters ................... 96
- Conditional Node Commissioning Parameters .................. 98
- Commissioning Process ........................................ 100
- Insert the Active GCM ........................................ 100
- Commission the Node ......................................... 101
- Insert the Standby GCM and All Cards in the Traverse Node .... 104
- Visual Status During and After Start-up ......................... 105

Chapter 14
Hardware Installation

- Before You Begin .............................................. 107
- Power Distribution and Alarm Panel (PDAP) Description ........ 108
- Power System (PDAP-15A) Installation ........................ 109
- Back Cover ....................................................... 110
- Hardware Installation ........................................ 110
- Grounding the Shelf ......................................... 112
- Rack Adapter Installation ...................................... 112

Chapter 15
Installing the Wall Mount Bracket

- Wall Mount Bracket Specifications ................................ 113
- Attach the Wall Mount Bracket ................................ 114
- Install the Shelf in the Wall Mount Bracket ....................... 115

Chapter 16
Installation and Commissioning Checklists

- Power System Hardware Installation Checklist ................. 118
- Traverse System Hardware Installation Checklist ............... 119
- Network Cabling Checklist .................................... 121
- Alarm Cabling Checklist ...................................... 123
- Timing and Management Cabling Checklist ..................... 126
- Power Cabling Checklist ...................................... 128
- Node Start-up and Commissioning Checklist .................... 131
Chapter 1
Installation and Commissioning Overview

Introduction
This chapter includes the following topics:
- Traverse Installation Process
- Traverse Shelf Interface Specifications
- Traverse System Rack Installation

Traverse Installation Process
Use these steps as a guideline to installing and commissioning a Traverse system

Important: Do not install Traverse cards (modules) until all installation and cabling procedures are complete.

Table 1 Installation Process and References

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Read the precautions before attempting to install the shelf.</td>
<td>Chapter 3—“Precautions to Installing Traverse Equipment”</td>
</tr>
<tr>
<td>2</td>
<td>Familiarize yourself with common procedures such as inserting and removing cards and back cover.</td>
<td>This guide</td>
</tr>
<tr>
<td>3</td>
<td>Install the hardware, e.g., the optional power distribution and alarm panel (PDAP) and the Traverse shelf.</td>
<td>This chapter, Traverse System Rack Installation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>This guide, Chapter 10—“Power System Hardware Installation”</td>
</tr>
<tr>
<td>4</td>
<td>Install network cabling.</td>
<td>Traverse Cabling and Cabling Specifications Guide</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Chapter 1—“Installation and Commissioning Overview”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Chapter 11—“Network Interface Cabling Overview”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Chapter 12—“Network Cabling using ECMs”</td>
</tr>
<tr>
<td>5</td>
<td>Install alarm cabling.</td>
<td>Traverse Cabling and Cabling Specifications Guide</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Chapter 6—“Alarm Interface Specifications”</td>
</tr>
<tr>
<td>6</td>
<td>Install timing cabling.</td>
<td>Traverse Cabling and Cabling Specifications Guide</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Chapter 7—“Timing Interface Specifications”</td>
</tr>
</tbody>
</table>
Traverse shelf interface specifications are in the following chapters:

- Network Interface specification chapters
- Alarm, Timing, and Management specification chapters
- Power Interface specification chapters
- Cable Management specification chapters

The Traverse system consists of the following rack hardware installation components:

- Traverse shelf
- Fan tray holder
- Fan tray module
- Air ramp (optional equipment, depending on installation need)

**Important:** Do not install Traverse cards (modules) until all installation and cabling procedures are complete.

This chapter provides the following information, including an instruction guide to the procedures for installing the Traverse system components into a 7-foot (2133.6 mm) high, 19-inch or 23-inch (483 mm or 584 mm) wide telco rack.

- **Required Equipment and Tools**
- **Traverse Shelf Back Covers**
- **Grounding the Shelf and Fan Tray Holder**
- **Traverse System Rack Hardware Installation Process**

The following equipment and tools are required to install the Traverse 1600 or Traverse 2000 shelf and front inlet fan tray holder with integrated air ramp into a rack:

- Standard 7-foot (2133.6 mm) high, 19-inch or 23-inch (483 mm or 584 mm) wide telco rack.
• Standard conductive plated rack adapters\(^1\) (mounted with thread-forming screws) are required for installing 19-inch (483 mm) wide equipment into a 23-inch (584 mm) wide rack.
  – (SDH network only) Standard conductive plated rack adapters may be required for installing the Traverse 1600 and other related equipment into ETSI-specific racks.

• Two horizontal conductive-plated rack adapter brackets (mounted with thread-forming screws) are required for vertical-mount installation of the Traverse 2000 system into a standard 7-foot (2133.6 mm) high, 19-inch (483 mm) wide telco rack.

• Traverse 1600 or Traverse 2000 shelf
• Fan tray holder
• Air ramp (already integrated with front-inlet fan tray holder type)
• Fourteen appropriate-sized (e.g., 12-24) thread-forming screws for securing and grounding the rack equipment. Torque screws to 65 lbs/in.
• A 5/16-inch (8 mm) socket for all thread-forming screws
• Electrostatic Discharge (ESD) wrist strap
• Stepladder (optional)

A second person to lift and position the Traverse 1600 or Traverse 2000 shelf. The Traverse 1600 shelf weighs 15 pounds (6.8 kg) without cards. The Traverse 2000 shelf weighs 16 pounds (7.2 kg) without cards.

The following other hand tools are required for the remaining installation sections of this manual. Refer to the remaining sections in this manual for further installation details:

• Large flat blade screwdriver for backplane covers and electrical connector modules (ECMs)
• Large Phillips screwdriver for the fiber optic maintenance tray cover
• Small flat blade screwdriver for network interface ECM Telco cable assemblies
• Various wire-wrap, crimping, punchdown, stripping, and cutting tools (as well as connectors) for network interface cabling (copper and coax) at an intermediate patch panel; for timing cabling (twisted-pair or balun—twisted-pair to coax); for DCN Ethernet and external RS-232 interfaces; and for power cabling.
• A 1/4-inch socket (or nutdriver) for Traverse shelf backplane power terminal connections
• Volt Ohm Meter (VOM) for power cabling
• A 5/16-inch (8 mm) and 7/16-inch (11 mm) socket for PDAP-4S power cabling
• A Phillips screwdriver and 5/16-inch (8 mm) socket for PDAP-15A power cabling
• A 3/8-inch (9 mm) and 9/16-inch (14 mm) socket for PDAP-2S power cabling
• Wire brush for removing paint and non-conductive material on the rack.

---

\(^1\) Two 2-Rack Unit (RU) rack adapters are required for Traverse 1600 front inlet fan tray holder 23-inch (600 mm) rack installation. Two 10-RU rack adapters are required for Traverse 1600 shelf 23-inch (600 mm) rack installation. The PDAP, Traverse 1600 shelf, and front inlet fan tray holder can be installed in a 23-inch (600 mm) rack using two 15-RU rack adapters instead of individual rack adapters for each piece of equipment.
Traverse Shelf Back Covers

The Traverse shelf has removable back covers to provide access to the fiber optic backplane, main backplane, and front inlet fan tray holder connector. The covers are easily removed for cabling, but must be replaced during normal operation to ensure proper air flow and electromagnetic interference (EMI) protection. For more information, see Chapter 4—“Removing and Replacing Back Covers.”

Grounding the Shelf and Fan Tray Holder

The Traverse shelf and fan tray holder are grounded to the rack using thread-forming screws (minimum of three per side) and conductive plated rack adapters for Traverse 1600 23-inch (584 mm) or Traverse 2000 19-inch (483 mm) rack installation. No additional grounding procedures are required when installed in a properly grounded telco rack.

**Important:** For NEBS compliance, remove paint and any other non-conductive coatings on the surfaces between the mounting hardware and the rack framework. Clean all surfaces and apply an antioxidant before joining.

**WARNING!** The grounding terminals on the backplane are for power terminal cables only and SHOULD NOT be used for chassis grounding.

![Figure 1  Grounding Terminals on Backplane](image)
Depending on the Traverse system rack hardware installation requirements, there are varying procedures to complete. The following process guides you through the procedures and gives references to meet your installation requirements.

**Important:** Read through the instructions completely before installing the rack equipment for proper order of installation.

### Table 2 Traverse System Rack Hardware Installation Process

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Read the precautions before attempting to install the shelf.</td>
<td>Chapter 3—“Precautions to Installing Traverse Equipment”</td>
</tr>
<tr>
<td>2</td>
<td>Install a power system (if not already done).</td>
<td>Chapter 10—“Power System Hardware Installation”</td>
</tr>
</tbody>
</table>
| 3    | Install rack adapters as necessary. The Traverse 1600 system requires rack adapters for 23-inch (584 mm) rack installation. The Traverse 2000 system requires rack adapters for 19-inch (483 mm) (vertical) rack installation. | • **Traverse 1600 in a 23-inch (584 mm) rack.** Refer to Chapter 7—“Traverse System Hardware Installation,” **Install the Rack Adapters.** Repeat for each Traverse system component.  
  or  
  • **Traverse 2000 in a 19-inch (483 mm) rack.** Refer to Chapter 8—“Traverse 2000 Installation into a 19-inch Rack,” **Install the Horizontal Rack Adapter Brackets.** Repeat for each Traverse 2000 system component. |
| 4    | Is the Traverse shelf going to be installed directly below another vendor’s equipment? Install a standalone air ramp. | Chapter 7—“Traverse System Hardware Installation,” **Install the Air Ramp**   |

**Note:** This does not apply to the (vertical-mount) Traverse 2000 in a 19-inch (483 mm) rack. 
**Note:** In a Force10-only equipment installation, the standalone air ramp is not required, but optional.
Install the Traverse system. • Refer to Chapter 7—“Traverse System Hardware Installation,” *Install the Traverse Shelf*

or

• Are you installing a Traverse 2000 in a 19-inch (483 mm) rack? Refer to Chapter 8—“Traverse 2000 Installation into a 19-inch Rack,” *Install the Front Inlet Fan Tray Holder in a 19-inch Rack*

The Rack Hardware Installation Process procedure is complete.

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
<th>Reference</th>
</tr>
</thead>
</table>
| 5    | Install the Traverse system.     | • Refer to Chapter 7—“Traverse System Hardware Installation,” *Install the Traverse Shelf*  
   |           | or        |  
   |           | • Are you installing a Traverse 2000 in a 19-inch (483 mm) rack? Refer to Chapter 8—“Traverse 2000 Installation into a 19-inch Rack,” *Install the Front Inlet Fan Tray Holder in a 19-inch Rack* |
| 6    | The Rack Hardware Installation Process procedure is complete. | Continue to the Traverse Cabling and Cabling Specifications Guide, Chapter 11—“Network Interface Cabling Overview”  
   |           | **Note:** You may choose to first proceed to Chapter 12—“Battery and Battery Return Supply.” Once the power cabling is complete, follow through all other remaining sections of this manual beginning with Chapter 11—“Network Interface Cabling Overview” in the Traverse Cabling and Cabling Specifications Guide. |
Chapter 2
Traverse System Configuration Examples

Introduction

This chapter includes the following topics:

• Traverse System Configuration Example
• Example Traverse Shelf Card Layout
A single rack configuration can contain up to four Traverse shelves, fan tray holders, air ramps, and a fuse panel. Other hardware that may be in the same or an adjacent rack is as follows:

- 10/100BaseT patch panel
- DS1 patch panel
- DS3 patch panel
- E1 patch panel
- E3 patch panel
- Fiber optic patch panel
- Other third-party equipment as required

**Figure 2** Traverse 1600 Rack Configuration
The following graphic provides an example of card placement for a Traverse 1600 shelf carrying multiple services and bandwidths. Included in this example are:

- (6) DS3/EC-1,
- (2) OC-3/STM-1,
- (2) OC-12/STM-4,
- (2) OC-48/STM-16,
- (2) VT/TU 5G Switch,
- and (2) GCM cards.

Figure 3  Example Traverse 1600 Shelf Card Layout
Chapter 3
Precautions to Installing Traverse Equipment

Introduction
This chapter is intended to provide all necessary precautions. Follow these precautions to ensure personal safety and to avoid any equipment damage during installation, configuration, or maintenance procedures. The precautions listed in this chapter relate to the Traverse system, including: Traverse 1600, Traverse 2000, and Traverse 600 shelves unless otherwise noted.

• Environmental Precautions
• Hardware Installation Precautions
• Electrical Precautions
• Fiber Optic Cabling Precautions
• Card Precautions
• Electrostatic Discharge Protection
• ESD Jack Locations

Three types of precautionary statements are used in the Traverse/TransNav documentation:

WARNING! May cause personal injury if the warning is not followed; for example, this warning applies to electrical hazards.

OPTIC WARNING! May cause personal injury if the warning is not followed; for example, this warning applies to optical hazards.

Important: May cause equipment damage if the precaution is not followed; for example, this note applies to electrostatic damage to equipment.
Environmental Precautions

**Important:** Traverse systems are designed to comply with GR-1089-CORE, GR-63-CORE, and CE Mark requirements. Install and operate the Traverse system in environments that do not expose wiring, cabling, or connectors to the outside plant. Acceptable applications include Central Office Environments (COEs), Electronic Equipment Enclosures (EEEs), Controlled Environment Vaults (CEVs), huts, and customer premises environment.

The Traverse systems are classified as being powered by Class A1 voltages per GR-1089-CORE.

The Traverse system design supports installation in locations with restricted access.

**Important:** Always use caution while working in an environment with rotating or moving equipment parts (e.g., fan modules).

**Important:** This symbol is on the product and means do not discard Force10 products into residential or commercial waste.

Most countries or regions have established methods and procedures to collect and recycle electronic and electrical waste. Contact your local authorities for established procedures. If no local procedures are available, contact the Force10 Networks Technical Assistance Center (TAC).
Important: Always use thread-forming screws when installing a Traverse shelf to ensure electrical continuity. This is especially critical when installing equipment in a rack coated with a non-conductive coating.

Important: To ensure proper air flow, 3/8-inch (9.5 mm) of space is required between the Fuse Panel and the first Traverse 1600 or Traverse 2000 shelf in a standard horizontal-mount installation.

Important: Traverse 2000 shelf installation into a 19-inch (483 mm) wide telco rack is a standard-mount only—5 inch (127 mm) forward. A flush-mount configuration is not currently available.

Important: The fan tray holder, with fan tray module and fan filter, must be installed either directly below the Traverse 1600 or Traverse 2000 shelf in a standard horizontal installation or flush with the Traverse 2000 shelf in a 19-inch rack installation (vertical) so that there is no gap between the shelf and fan tray holder to ensure proper air flow.

Important: The Traverse shelf has a removable back cover to provide access to the main and fiber optic backplane and fan tray holder connector. The cover removes easily for cabling, but must be replaced during normal operation to ensure proper air flow and electromagnetic interference (EMI) protection.

Important: If installing a Traverse 2000 shelf vertically, the following requirements must be met to ensure proper airflow:

- If the front door is solid, the front of the fan tray must be at least 2 inches (50.8mm) from the inside surface of the front door.
  - Force10 recommends that the front door be a full mesh screen to allow air to be drawn into the front of the fan tray. The screen must be cleaned on a regular basis to ensure dust and debris do not impede air flow.
- Vent the rear door of the cabinet to increase airflow.
- Vent the top of the cabinet to draw exhaust air from the cabinet.
  - Force10 recommends adding an exhaust fan for better cooling.
**Important:** Carefully plan your power supply capacity. The Force10 PDAP with standard 40 amp fuses at -40 VDC provides 1600 watts. Force10 recommends using higher amperage fuses if your power requirements go above a minimum of 1400 watts. If you fail to make sufficient plans to meet the power requirements of your specific configuration and the power draw goes above the maximum capacity of your power supply design, it can cause a circuit breaker to trip, resulting in a loss of traffic.

**Electrical Precautions**

**WARNING!** Only power-certified personnel should install power equipment and cabling.

**WARNING!** Do not install Traverse cards (modules) until all installation and cabling procedures are complete and you verify the correct polarity of your power installation.

**WARNING!** A common return jumper plate is pre-installed on the shelf to help prevent system damage in the event of faulty wiring. If you remove this jumper plate, you MUST check and verify polarity before installing the battery and battery return cabling. Reverse polarity from incorrect wiring can cause sparking and may result in fire or other severe damage. Verify that the polarity is the same (-48VDC) for both -48VDC_A and -48VDC_B battery cable connections. Verify that the polarity is the same (RETURN) for both RETURN_A and RETURN_B battery return cable connections.

**WARNING!** Do not connect central office battery and battery return supply cables at the central office source until all cabling at the Fuse Panel and Traverse shelf backplane is complete. Before connecting the supply cables, go to the front of the PDAP and verify that all circuit breakers are in the OFF position, TPA fuse holders are empty, and that GMT fuse positions are empty or contain dummy fuses.

**WARNING!** The protective back covers are removed from the Fuse Panel during cabling activities. Fuse Panel back covers must be replaced after cabling is complete and before -48 VDC power supply cables are connected to the central office source. The Fuse Panel protective back covers must remain in place during normal operation to protect against possible electric shock.
Important: Carefully plan your power supply capacity. The Force10 PDAP-4S with standard 40 amp fuses at -40 VDC provides 1600 watts. Force10 recommends using higher amperage fuses if your power requirements go above a minimum of 1400 watts. If you fail to make sufficient plans to meet the power requirements of your specific configuration and the power draw goes above the maximum capacity of your power supply design, it can cause a circuit breaker to trip, resulting in a loss of traffic.

Important: The Traverse shelf design is compatible with the Common Bonding Network (CBN).

Important: Always use a properly grounded Electrostatic Discharge (ESD) wrist strap when connecting copper cables to the Fuse Panel, main backplane, and fan tray holder. Plug the ESD wrist strap into the ESD jack provided on the Traverse front inlet fan module, standalone air ramp, or other confirmed source of earth ground. Refer to ESD Jack Locations.

Fiber optic cabling precautions

OPTIC WARNING! The Traverse system is a class 1 product that contains a class IIIb laser and is intended for operation in a closed environment with fiber attached. Do not look into the optical connector of the transmitter with power applied. Laser output is invisible and eye damage can result. Do not defeat safety features that prevent looking into the optical connector.

OPTIC WARNING! The optical connector system used on the Traverse fiber optic backplane is designed with a mechanical shutter mechanism that blocks physical and visual access to the optical connector. Do not defeat this safety feature designed to prevent eye damage.

OPTIC WARNING! Follow all warning labels when working with optical fibers. Always wear eye protection when working with optical fibers. Never look directly into the end of a terminated or unterminated fiber or connector as it may cause eye damage.
**Important:** To prevent possible damage to the fiber optic cables, do not twist or cross one cable over another.

**Important:** To prevent possible damage to the fiber optic cables, do not bend optical fibers in a radius less than 1½-inches (38.1 mm).

**Important:** Always use a properly grounded Electrostatic Discharge (ESD) wrist strap when connecting optical cables to the fiber optic backplane. Plug the ESD wrist strap into the ESD jack provided on the Traverse front inlet fan module, standalone air ramp, or other confirmed source of earth ground. Refer to ESD Jack Locations.

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**Card Precautions**

**Important:** Always use a properly grounded Electrostatic Discharge (ESD) wrist strap when handling Traverse cards to prevent damage to the circuitry. Plug the ESD wrist strap into the ESD jack provided on the Traverse front inlet fan module, standalone air ramp, or other confirmed source of earth ground. Refer to ESD Jack Locations.

**Important:** Do not install Traverse cards (modules) until all installation and cabling procedures are complete.

**Important:** Handle cards with care. Dropping a card can cause component or other damage beyond repair or use.

**Important:** Handle cards by the edges and faceplate only. Do not touch any card connectors or components.

**Important:** Observe all electrostatic sensitive device warnings and precautions when handling Traverse cards.
Electrostatic Discharge Protection

To avoid damage to Traverse integrated circuits, a properly grounded Electrostatic Discharge (ESD) wrist strap must be worn during the following installation and maintenance activities:

- Handling Traverse cards.
- Connecting copper or optical cables to the fuse panel, Traverse main backplane, fiber optic backplane, and fan tray module.

Important: Insert the card into the Traverse 1600 or Traverse 2000 shelf using the guides at the top and bottom of the card cage for proper alignment. Make sure the card is vertical (in a standard installation) from top to bottom and that the card stays in the guides from the front to the back of the shelf.

Important: Insert the card in the Traverse 600 shelf using the guides for proper alignment. If the Traverse 600 shelf is installed horizontally make sure the card is horizontal, from left to right and that the card stays in the guides.

Important: Cards should insert easily into the Traverse shelf, do not force the card into position. If the card does not insert easily, slide it back out and verify you are placing it in the correct position and inserting the card into the correct guides (top and bottom for Traverse 1600 or Traverse 2000, side-to-side for Traverse 600).

Important: Do not place an electrical card (of another type) in the slot directly to the left of any 10/100BaseTX-inclusive card:

- NGE
- NGE Plus

Important: To ensure EMI protection and proper cooling, place one-slot wide blank faceplates in any empty Traverse slots. Blank faceplates must be ordered separately.
ESD jacks provide a ground for the ESD wrist strap and are located on the following Traverse units:
- Front inlet fan module; a component of the front inlet fan tray holder
- Traverse 1600 or Traverse 2000 standalone air ramp
- Traverse 600 fan tray panel

![Figure 4  Front Inlet Fan Module ESD Jack Location](image)

![Figure 5  Air Ramp with ESD Jack Locations](image)
The Traverse 600 shelf has an ESD jack located on the fan tray panel.

Figure 6  Traverse 600 with ESD Jack Location
Chapter 4
Removing and Replacing Back Covers

Introduction
This chapter provides step-by-step instructions for removing back covers:
• Required Equipment and Tools
• Main Backplane Covers
• Remove and Replace the Fiber Optic Management Tray Cover
• Remove the PDAP Protective Back Cover
• Replace the PDAP Protective Back Cover

Refer to this chapter as required while completing the Traverse Hardware Installation and Commissioning Guide procedures. Use the topic labels in the left margin to scan this document for the tasks you need to review.

Required Equipment and Tools
The following equipment and tools are required to complete these procedures:
• Traverse shelf
• PDAP
• Electrostatic Discharge (ESD) wrist strap
• Large flat blade screwdriver for backplane covers
• Large Phillips screwdriver for fiber optic management tray cover

Main Backplane Covers
Electrical connector modules (ECM) are used for network interface cabling using standard copper/coax cables and connectors. Three types of main backplane covers are used (alarm and timing cover, power cover, and blank covers) to protect the main backplane where ECMs are not plugged in.

Covers are removed from the Traverse shelf during installation and cabling activities. Covers must be replaced after cabling is complete to ensure air cooling from shelf to shelf and electromagnetic interference (EMI) protection during normal operation.

Each cover is removed from the shelf chassis using a flat blade screwdriver to remove the screws.

Important: Always wear a properly grounded Electrostatic Discharge (ESD) wrist strap when removing back covers from the Traverse shelf as there are static-sensitive components on the main backplane.
These covers are shown in the following graphics along with the electrical connector modules.

Figure 5  Traverse 1600 and Traverse 2000 Main Backplane Covers

Figure 6  Traverse 600 Backplane Cover
The fiber optic management tray cover is removed during cabling activities. This cover must be replaced after cabling is complete to protect fiber optic connections during normal operation.

**Important:** Always wear a properly grounded Electrostatic Discharge (ESD) wrist strap when removing Traverse back covers as there are static-sensitive components on the backplane.

The Traverse 1600 and Traverse 2000 procedure to remove and replace the fiber optic management tray cover is similar. The Traverse 600 procedure is different.

- **Remove and Replace the Fiber Management Tray Cover**
- **Remove and Replace the Traverse 600 Fiber Management Tray Cover**

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**Remove and Replace the Fiber Management Tray Cover**

Follow these instructions to remove and replace the fiber optic management tray cover from a Traverse 1600 or Traverse 2000 shelf.

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Loosen the three captive fasteners at the top of the fiber optic management tray cover using a Phillips screwdriver.</td>
</tr>
<tr>
<td>2</td>
<td>Pull the cover straight back to remove.</td>
</tr>
</tbody>
</table>

**Table 3 Remove and Replace the Fiber Optic Management Tray Cover**

**Figure 7 Fiber Optic Management Tray Cover with Fasteners**
Follow these instructions to remove and replace the fiber optic backplane cover from a Traverse 600 shelf.

**Table 3  Remove and Replace the Fiber Optic Management Tray Cover**

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>To replace the fiber optic management tray cover, line up the fasteners with the holes at the top of the chassis.</td>
</tr>
<tr>
<td>4</td>
<td>Push the cover straight forward and tighten the fasteners.</td>
</tr>
<tr>
<td>5</td>
<td>The Remove and Replace the Fiber Optic Management Tray Cover procedure is complete.</td>
</tr>
</tbody>
</table>

**Table 4  Remove and Replace the Traverse 600 Fiber Management Tray Cover**

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Loosen the two captive fasteners at the top of the fiber optic management tray cover.</td>
</tr>
<tr>
<td>2</td>
<td>Pull the cover straight back to remove.</td>
</tr>
</tbody>
</table>
To replace the fiber optic management tray cover, line up the fasteners on top of the fiber optic management tray cover with the holes at the top of the chassis.

Push the cover straight forward and tighten the fasteners.

The Remove and Replace the Traverse 600 Fiber Management Tray Cover procedure is complete.

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>To replace the fiber optic management tray cover, line up the fasteners on top of the fiber optic management tray cover with the holes at the top of the chassis.</td>
</tr>
<tr>
<td>4</td>
<td>Push the cover straight forward and tighten the fasteners.</td>
</tr>
<tr>
<td>5</td>
<td>The Remove and Replace the Traverse 600 Fiber Management Tray Cover procedure is complete.</td>
</tr>
</tbody>
</table>
Follow these instructions to remove the PDAP protective back cover.

**WARNING!** The protective back cover is removed from the PDAP during power cabling activities. PDAP back covers must be replaced after cabling is complete and before −48 VDC power supply cables are connected to the central office source. The PDAP protective back cover must remain in place during normal operation to protect against possible electric shock.

### Table 5 Remove the PDAP Protective Back Cover

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Loosen (you need not remove) the two thumb screws securing the protective cover onto the back panel.</td>
</tr>
<tr>
<td>2</td>
<td>Pull the protective cover straight out to remove.</td>
</tr>
<tr>
<td>3</td>
<td>The Remove the PDAP Protective Back Cover procedure is complete.</td>
</tr>
</tbody>
</table>

Follow these instructions to replace the PDAP protective back cover.

### Table 6 Replace the PDAP Protective Back Cover

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Align the protective cover to the back panel with the two thumb screws.</td>
</tr>
<tr>
<td>2</td>
<td>Tighten the two thumb screws to secure the protective cover.</td>
</tr>
<tr>
<td>3</td>
<td>The Replace the PDAP Protective Back Cover procedure is complete.</td>
</tr>
</tbody>
</table>
**Chapter 5**

**Inserting and Removing Cards**

**Introduction**

This chapter provides basic step-by-step instructions for inserting and removing cards in a Traverse shelf. Refer to this chapter as required while completing the Traverse Installation and Commissioning Guide procedures.

- **Required Equipment and Tools**
  - Clean Fiber Optic MPX Connectors
  - Insert a Card
  - Remove a Card

For a card placement example, refer first to the Traverse Hardware Guide, Chapter 2—“Traverse System Configuration Examples,” **Example Traverse Shelf Card Layout**.

Exact placement of the cards into Traverse shelf slots is explained in Operations and Maintenance Guide, Chapter 21—“Card Placement Planning and Guidelines.”

**Required Equipment and Tools**

The following hardware equipment and tools are required to place cards in a Traverse shelf.

**General**

- Electrostatic Discharge (ESD) wrist strap
- Eye protection
- 1-slot wide blank faceplates for any empty slots to ensure EMI protection and proper cooling. Blank faceplates must be ordered separately.

**Traverse Shelf**

- MPX cleaning materials to clean fiber optic cable and card MPX connectors:
  - Isopropyl alcohol of at least 91% purity
  - Lint-free wipes
  - Lint-free cleaning swabs with urethane foam heads
  - Pressurized optical duster (canned air)
• 1 or 2 control cards, as well as any spares
• System interface card (SIM) cards

Note: The number and combination of SIMs is based on your network requirements and physical cabling at the Traverse main and fiber optic backplanes.

Clean Fiber Optic MPX Connectors

It is critical that the cable and card MPX connectors are clean to ensure proper operation. Force10 recommends that you visually inspect the MPX connectors on both the fiber optic cables and optical cards using fiber optic magnification equipment. Force10 also recommends that you clean the fiber optic cable and card MPX connectors using the following procedure.

OPTIC WARNING! The Traverse system is a class 1 product that contains a class IIIb laser and is intended for operation in a closed environment with fiber attached. Do not look into the optical connector of the transmitter when power is applied. Laser output is invisible and eye damage can result. Follow these safety features to prevent looking into the optical connector.

OPTIC WARNING! The optical connector system used on the Traverse fiber optic backplane is designed with a mechanical shutter mechanism that blocks physical and visual access to the optical connector. Follow this safety feature as it is designed to prevent eye damage.

OPTIC WARNING! Follow all warning labels when working with optical fibers. Always wear eye protection when working with optical fibers. Never look directly into the end of a terminated or unterminated fiber or connector, as it may cause eye damage.

Important: Always wear a properly grounded Electrostatic Discharge (ESD) wrist strap when handling and placing cards in the Traverse shelf. Follow all warnings and instructions included in card packaging to prevent electrostatic damage.

Important: Handle cards by the edges and faceplate only. Do not touch any card connectors or components.

Important: Do not touch the end of the MPX connectors.
<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
</tr>
</thead>
</table>
| 1    | Was the fiber optic cable pre-cabled?  
  • If yes, continue to Step 2.  
  • If no, continue to Step 3. |
| 2    | Remove the fiber optic cable MPX connector(s) from the fiber optic backplane. |
| 3    | Clean the fiber optic cable MPX connector with 91% IPA alcohol, a lint-free wipe, and a pressurized optical duster (canned air). |
| 4    | Align the “white reference marker” on the MPX connector with the white stripe on the left side of the fiber optic backplane housing.  
  **Note:** For a Traverse 600 shelf type, see Figure 8 in Step 5. |

**Figure 7  Fiber Optic Backplane Housing A and B**

For specifications, refer to the Traverse Cabling and Cabling Specifications Guide, Chapter 1—“Fiber Optic Interface Cabling Specifications,” *General MPX Connector to Optical Fiber Port Assignment*. 
Align the “white reference marker” on the MPX connector with the white stripe on the left side of the Traverse 600 fiber optic backplane housing.

Figure 8 Traverse 600 Fiber Optic Backplane Housing A and B

Gently push the MPX connector back into the correct fiber optic backplane housing.

Repeat Steps 2 through 6 for each MPX connector.
Table 6 Clean Cable and Card MPX Connectors (continued)

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Remove the dust cap from the optical card MPX connector(s).</td>
</tr>
</tbody>
</table>

![Figure 9 Optical Card MPX Connector](image)

<table>
<thead>
<tr>
<th>9</th>
<th>Clean the optical card MPX connector with 91% IPA alcohol, a lint-free wipe, and a pressurized optical duster (canned air).</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Continue to the next procedure, <strong>Insert a Card</strong>.</td>
</tr>
</tbody>
</table>

**Insert a Card**

**Important:** Always use a properly grounded Electrostatic Discharge (ESD) wrist strap when handling Traverse cards (modules). Plug the ESD wrist strap into the ESD jack provided on the Traverse front inlet fan card, standalone air ramp, or other confirmed source of earth ground. Refer to Chapter 3—“Precautions to Installing Traverse Equipment,” [ESD Jack Locations](#).

**Important:** Do not install Traverse cards until all installation and cabling procedures are complete.

**Important:** Handle cards by the edges and faceplate only. Do not touch any card connectors or components.
**Important:** Observe all electrostatic sensitive device warnings and precautions when handling Traverse cards.

**Important:** Insert the card into the Traverse shelf using the guides at the top and bottom of the card cage for proper alignment. Make sure the card is **vertical**, from top to bottom, and that the card stays in the guides from the front to the back of the shelf.

**Important:** Do not place an electrical card (of another type) in the slot directly to the left of any 10/100BaseTX-inclusive card:
- NGE
- NGE Plus
- EoPDH

**Important:** Cards should insert easily into the Traverse shelf. Do not force the card into position. If the card does not insert easily, slide it back out, verify you are placing it in the correct position and inserting the card into the correct guides top and bottom.

**Important:** Insert the card in the Traverse 600 shelf using the guides for proper alignment. If the Traverse 600 shelf is installed horizontally make sure the card is **horizontal**, from left to right, and that the card stays in the guides.

**Important:** To ensure EMI protection and proper cooling, place one-slot wide blank faceplates in any empty Traverse slots. Blank faceplates must be ordered separately.
Follow these steps to insert a card.

Table 1  Insert a Card

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Is this an optical card with MPX connectors?</td>
</tr>
<tr>
<td></td>
<td>• If yes, complete the Clean MPX Connectors procedure before proceeding.</td>
</tr>
<tr>
<td></td>
<td>• If no, continue to Step 2.</td>
</tr>
<tr>
<td>2</td>
<td>Flip the card locking tabs up. Hold the card with the tabs parallel to the top and bottom of the card.</td>
</tr>
</tbody>
</table>

![Figure 10  Card Locking Tabs in the Unlocked Position](image)

*OPS 00083

Guide Pins

Locking Tabs in Open Position

OPG 0063*
Important: Each slot in the Traverse shelf has guides to properly align the card into position for contact with the main and mesh backplanes. Use these guides to ensure the card is properly aligned. This is easier to do if you are eye level with the shelf. The card should insert easily into the Traverse shelf. Do not force the card into position.

Insert the card in the Traverse 1600 or Traverse 2000 shelf using the guides at the top and bottom of the card cage for proper alignment. Make sure the card is vertical, from top to bottom, and that the card stays in the guides from the front to the back of the shelf.

![Figure 11 Traverse 1600 or Traverse 2000 Shelf with Guides](image1)

Figure 11 Traverse 1600 or Traverse 2000 Shelf with Guides

Insert the card in the Traverse 600 shelf using the guides for proper alignment. If the Traverse 600 shelf is installed horizontally as in the following figure, make sure the card is horizontal (from left to right) and that the card stays in the guides from the front to the back of the shelf.

![Figure 12 Traverse 600 Shelf with Guides](image2)

Figure 12 Traverse 600 Shelf with Guides
Push the center of the card faceplate until the locking tabs begin to close and the locking tabs start to roll around the lip of the Traverse shelf. The optical card makes an audible “click” indicating it is making contact with the fiber optic backplane connectors.

Push the locking tabs down. The tabs must close around each end of the card to lock the card in place.

Press the tabs into their locked position to secure the card. The card is locked into position when the top and bottom tabs are pressed down completely and the locking tabs are secured in the lip of the Traverse shelf.

The Insert a Card procedure is complete.

Table 1  Insert a Card (continued)

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Push the center of the card faceplate until the locking tabs begin to close and the locking tabs start to roll around the lip of the Traverse shelf. The optical card makes an audible “click” indicating it is making contact with the fiber optic backplane connectors.</td>
</tr>
<tr>
<td>5</td>
<td>Push the locking tabs down. The tabs must close around each end of the card to lock the card in place.</td>
</tr>
<tr>
<td>6</td>
<td>Press the tabs into their locked position to secure the card. The card is locked into position when the top and bottom tabs are pressed down completely and the locking tabs are secured in the lip of the Traverse shelf.</td>
</tr>
<tr>
<td>7</td>
<td>The Insert a Card procedure is complete.</td>
</tr>
</tbody>
</table>
Remove a Card

**Important:** A properly grounded ESD wrist strap must be worn at all times while handling Traverse cards to prevent damage to the circuitry.

**Important:** Handle cards by the edges and face plate only. Do not touch any card connectors or components.

Follow these instructions to remove a card from a slot in a shelf.

**Table 2 Remove a Card**

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Flip the locking tabs up to unlock the card.</td>
</tr>
<tr>
<td>2</td>
<td>Hold the card with the tabs parallel to the top and bottom of the card and pull it straight out of the slot.</td>
</tr>
<tr>
<td>3</td>
<td>The Remove a Card procedure is complete.</td>
</tr>
</tbody>
</table>

**Figure 14 Card Tabs in the Unlocked Position**

![Card Tabs in the Unlocked Position](image)
Chapter 6
Insert Fan Module and Air Filters

Introduction
This chapter includes step-by-step instructions to insert a fan module and air filter. The Traverse system supports three fan assembly types. Refer to the correct fan module and air filter procedure in this chapter depending on the fan assembly type.

- Required Equipment and Tools
- Insert a Traverse 1600 and Traverse 2000 Fan Assembly
- Insert a Traverse 1600 and Traverse 2000 Fan Air Filter
- Insert a Traverse 600 Fan Assembly
- Insert a Traverse 600 Fan Air Filter

Required Equipment and Tools
The following equipment and tools are required to install the fan and air filter:
- Fan tray holder pre-installed (for Traverse 1600 and Traverse 2000)
- Fan module (Traverse 1600 and Traverse 2000) or Fan assembly (Traverse 600)
- Air filter¹
- Electrostatic Discharge (ESD) wrist strap

¹ Fan tray air filters are available in 63% arrestance at 300 FPM—feet per minute (91.4 meters per minute) and 80% arrestance at 300 FPM (91.4 meters per minute) depending on your installation requirements.
Follow these instructions to insert the front inlet fan module for the Traverse 1600 or Traverse 2000 into the fan tray holder.

**Important:** Wear a properly grounded Electrostatic Discharge (ESD) wrist strap when installing the fan module as it contains static-sensitive components.

### Table 3 Insert a Traverse 1600 and Traverse 2000 Fan Assembly

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lift the front inlet fan card to be level with the front inlet fan tray holder. Slide the fan card into the front of the fan tray holder and push it straight in until the two connectors engage.</td>
</tr>
<tr>
<td>2</td>
<td>The front inlet fan card is in the correct position when it is flush with the front of the fan tray holder. <strong>Important:</strong> Do not force the fan card into position. If it does not plug in easily, slide it back out. Check for any obstructions or a damaged connector that might prevent it from sliding into position and verify it is in the correct guides before attempting to insert it again.</td>
</tr>
<tr>
<td>3</td>
<td>Tighten the captive fasteners to secure it.</td>
</tr>
<tr>
<td>4</td>
<td>Continue to the next procedure, <strong>Insert a Traverse 1600 and Traverse 2000 Fan Air Filter.</strong></td>
</tr>
</tbody>
</table>
The front inlet fan module requires a foam air filter that is placed at the top of the front inlet fan tray holder after the fan module is installed.

The front inlet fan tray air filters are available in 63% or 80% arrestance at 300 FPM—feet per minute (91.4 meters per minute) depending on your installation requirements. The following procedure provides step-by-step instructions on how to insert the front inlet fan tray air filter.

Table 4  Insert a Traverse 1600 and Traverse 2000 Fan Air Filter

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>If you are replacing an old air filter, carefully remove the old air filter from the fan tray holder to avoid contaminating the equipment.</td>
</tr>
<tr>
<td>2</td>
<td>Install the new air filter. Grasp the air filter flexible pull tab.</td>
</tr>
<tr>
<td>3</td>
<td>Insert the air filter in the gap between the top of the front inlet fan card and the top of the front inlet fan tray holder. Slide the air filter along the fan tray holder guides until the filter is flush with the front of the fan tray holder.</td>
</tr>
<tr>
<td>4</td>
<td>The Insert a Traverse 1600 and Traverse 2000 Fan Air Filter procedure is complete.</td>
</tr>
</tbody>
</table>
Insert a Traverse 600 Fan Assembly

The Traverse 600 fan assembly (module with integral fan tray) is bundled and shipped with the Traverse 600 system. Proceed with the following steps to install the fan assembly.

**Important:** Wear a properly grounded Electrostatic Discharge (ESD) wrist strap when installing the fan tray module as it contains static-sensitive components.
Table 5 Insert a Traverse 600 Fan Assembly

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Loosen the two captive screws on the right-front cover of the Traverse 600 fan assembly to release it.</td>
</tr>
<tr>
<td>2</td>
<td>Open the right-front fan assembly cover.</td>
</tr>
</tbody>
</table>

**Figure 0-6  Fan Assembly Front Cover - Traverse 600**
Hold the fan assembly vertically with the fan card facing left and lift it level with the fan cage. Slide the fan assembly into the fan cage along the guides and push it straight in until it connects to the back of the shelf.

**Important:** Do not force the fan tray card into position. If it does not plug in easily, slide it back out. Check for any obstructions or a damaged connector that might prevent it from sliding into position and verify it is lined up in the correct guides.

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Hold the fan assembly vertically with the fan card facing left and lift it level with the fan cage. Slide the fan assembly into the fan cage along the guides and push it straight in until it connects to the back of the shelf. <strong>Important:</strong> Do not force the fan tray card into position. If it does not plug in easily, slide it back out. Check for any obstructions or a damaged connector that might prevent it from sliding into position and verify it is lined up in the correct guides.</td>
</tr>
</tbody>
</table>

**Figure 0-7 Traverse 600 Fan Assembly Installation**

4 The Insert a Traverse 600 Fan Assembly procedure is complete.
The Traverse 600 fan assembly (fan module with integral fan tray) requires a foam air filter that is placed to the left of the fan assembly after the fan module is installed. The Traverse 600 fan air filters are available in 63% or 80% arrestance at 300 FPM—feet per minute (91.4 meters per minute) depending on your installation requirements.

The following procedure provides step-by-step instructions on how to insert the air filter.

**Table 8 Insert a Traverse 600 Fan Air Filter**

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>If you are replacing an old air filter, carefully remove the old air filter from the fan tray holder to avoid contaminating the equipment.</td>
</tr>
<tr>
<td>2</td>
<td>Install the new air filter. Grasp the air filter flexible pull tab.</td>
</tr>
<tr>
<td>3</td>
<td>Insert the air filter in the gap between the fan assembly and the left of the fan cage. Slide the air filter along the guides until the filter is flush.</td>
</tr>
<tr>
<td>4</td>
<td>The Insert a Traverse 1600 and Traverse 2000 Fan Air Filter procedure is complete.</td>
</tr>
</tbody>
</table>

*Figure 9 Traverse 600 Fan Assembly Air Filter*
Chapter 7
Traverse System Hardware Installation

Introduction
For hardware installation overview and guidelines, refer first to Chapter 1—“Installation and Commissioning Overview.”

This chapter provides the following procedures to complete a standard horizontal-mount installation of a Traverse shelf and fan tray holder with integrated or separate air ramp into a standard 7-foot (2133.6 mm) high, 19-inch or 23-inch (483 mm or 584 mm) wide telco rack.

• Install the Rack Adapters
• Install the Traverse Shelf
• Flush Mount a Traverse Shelf
• Install the Front Inlet Fan Tray Holder
• Install the Fan Tray Holder with Separate Air Ramp
• Install the Air Ramp

Important: Do not install Traverse cards (modules) until all installation and cabling procedures are complete.

Please refer to Chapter 15—“Installing the Wall Mount Bracket” if you are installing a Traverse 600 shelf in a wall-mount cabinet.

Refer to Chapter 7—“Traverse System Hardware Installation” to complete a vertical and standard 5 inch (127 mm) forward-mount installation of the Traverse 2000 system into a standard 7-foot (2133.6 mm) high, 19-inch (483 mm) wide telco rack.

The instructions may be too detailed if you are experienced in central office installations. In this case, scan the topic labels in the left margin for tasks to review or refer to Chapter 16—“Installation and Commissioning Checklists.”
Install the Rack Adapters

Use standard rack adapters to install Traverse system components into a 23-inch (584 mm) telco rack. Rack adapters come with thread-forming mounting screws and in various lengths depending on your installation requirements.

Install the Traverse system in the central office bay and rack designated by your engineering work order using a minimum of six 12-24 thread-forming screws.

**Table 9  Install the Rack Adapters**

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Install conductive plated rack adapters on both sides of the rack for the relevant Traverse system component. Align and position the rack adapter slots with the holes in the rack.</td>
</tr>
<tr>
<td>2</td>
<td>Place and tighten thread-forming screws through the rack adapter slots and into the rack. Thread-forming screws are used to ground the rack adapters and Traverse system component to the rack. Torque screws to 65 lbs/in.</td>
</tr>
<tr>
<td>3</td>
<td>Within the procedures shown in the next step, you will place and tighten screws on each side of the Traverse system component to secure it to the rack adapters and thus the rack.</td>
</tr>
</tbody>
</table>
| 4    | The Install the Rack Adapters procedure is complete. Continue to the installation procedure for the specific Traverse system component.  
  - Install the Traverse Shelf  
  - Install the Front Inlet Fan Tray Holder  
  - Install the Fan Tray Holder with Separate Air Ramp  
  - Install the Air Ramp |
Install the Traverse Shelf

Install the Traverse shelf in the central office bay and rack designated by your engineering work order using a minimum of six 12-24 thread-forming screws.

**Important:** Install the first Traverse shelf below the Fuse Panel in the rack. A 3/8-inch (9.5 mm) space is required between the Fuse Panel and the first Traverse shelf to allow for proper air flow.

**Important:** If the Traverse shelf is to be installed below another vendor’s equipment, an air ramp must be installed above the Traverse shelf.

**Note:** Standard conductive plated rack adapters may be required for installation. If so, refer to Install the Rack Adapters.

**Table 10 Install the Traverse Shelf, Standard Configuration**

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lift the Traverse shelf to its assigned position in the rack.</td>
</tr>
<tr>
<td>2</td>
<td>Align the flange holes with the holes in the rack. Each shelf flange has three 1-RU slots at the top, middle, and bottom for easy alignment.</td>
</tr>
<tr>
<td>3</td>
<td>Place thread-forming screws through at least one horizontal flange slot and two others on each side of the shelf and into the rack to maintain squareness.</td>
</tr>
<tr>
<td>4</td>
<td>Partially tighten the thread-forming screws. Using a level, position the shelf.</td>
</tr>
<tr>
<td>5</td>
<td>After positioning the shelf, tighten the screws to secure and ground the shelf to the rack. Torque screws to 65 lbs/in.</td>
</tr>
</tbody>
</table>
| 6    | The Install the Traverse Shelf, Standard Configuration procedure is complete. Continue to the next procedure. Which fan tray holder type?  
  • Install the Front Inlet Fan Tray Holder  
  • Install the Fan Tray Holder with Separate Air Ramp |
Flush Mount a Traverse Shelf

In a standard configuration, the mounting flanges are set so the chassis or fan tray extends out five inches from the front edge of the rack. To flush-mount the Traverse shelf, use the following instructions.

Table 11 Install the Traverse Shelf, Flush Mount Configuration

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Remove the mounting flanges from each side of the chassis or fan tray. Save the screws for remounting the flanges.</td>
</tr>
<tr>
<td>2</td>
<td>Rotate the flanges so the mounting bracket is toward the front of the chassis and fan tray.</td>
</tr>
<tr>
<td>3</td>
<td>Re-attach the flanges to each side of the chassis or fan using the screws removed when the mounting flanges were removed from the chassis.</td>
</tr>
<tr>
<td>4</td>
<td>Lift the Traverse shelf to its assigned position in the rack.</td>
</tr>
<tr>
<td>5</td>
<td>Align the flange holes with the holes in the rack. Each shelf flange has three 1-RU slots at the top, middle, and bottom for easy alignment.</td>
</tr>
<tr>
<td>6</td>
<td>Place thread-forming screws through at least one horizontal flange slot and two others on each side of the shelf and into the rack to maintain squareness.</td>
</tr>
<tr>
<td>7</td>
<td>Partially tighten the thread-forming screws. Using a level, position the shelf.</td>
</tr>
<tr>
<td>8</td>
<td>After positioning the shelf, tighten the screws to secure and ground the shelf to the rack. Torque screws to 65 lbs/in.</td>
</tr>
</tbody>
</table>
| 9    | The Install the Traverse Shelf, Standard Configuration procedure is complete. Continue to the next procedure. Which fan tray holder type?  
  - Install the Front Inlet Fan Tray Holder  
  - Install the Fan Tray Holder with Separate Air Ramp |
The front inlet fan tray holder (with integrated air ramp) is required to cool the Traverse shelf during normal operation. Follow these installation steps.

**Important:** Install the front inlet fan tray holder directly below the Traverse shelf so that no gap remains in order to ensure proper air flow.

**Note:** Standard conductive plated rack adapters may be required for installation. If so, refer to Install the Rack Adapters.

### Table 12 Install the Front Inlet Fan Tray Holder

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>It is easier to connect the front inlet fan tray holder power cable to the Traverse backplane before installing the front inlet fan tray holder in the rack. Grasp the power cable and bring it out the top of the front inlet fan tray holder.</td>
</tr>
<tr>
<td>2</td>
<td>Bring the fan tray holder power cable with the 18-pin connector up to its mating connector on the Traverse main backplane. Push up on the connector until it locks into position. The tab on the connector locks it into place.</td>
</tr>
<tr>
<td>3</td>
<td>Lift and position the fan tray holder directly below the Traverse shelf so that there is no gap between the shelf and the fan tray holder. <strong>Note:</strong> The front inlet fan tray holder flange has two 1-RU slots.</td>
</tr>
<tr>
<td>4</td>
<td>Align the flange holes with the holes on the rack.</td>
</tr>
</tbody>
</table>
Table 12 Install the Front Inlet Fan Tray Holder (continued)

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Place thread-forming screws through the flange slot on each side of the front inlet fan tray holder and into the rack.</td>
</tr>
<tr>
<td>6</td>
<td>Partially tighten the thread-forming screws and position the front inlet fan tray holder.</td>
</tr>
<tr>
<td>7</td>
<td>Tighten the screws to secure and ground the front inlet fan tray holder to the rack. Torque screws to 65 lbs/in.</td>
</tr>
<tr>
<td>8</td>
<td>Complete the following procedure in Chapter 6—“Insert Fan Module and Air Filters,” Insert a Traverse 1600 and Traverse 2000 Fan Air Filter to install the fan tray module and air filter.</td>
</tr>
<tr>
<td>9</td>
<td>The Install the Front Inlet Fan Tray Holder procedure is complete. Continue to the Traverse Cabling and Cabling Specifications Guide, Chapter 11—“Network Interface Cabling Overview.”</td>
</tr>
</tbody>
</table>

Table 13 Install the Fan Tray Holder with Separate Air Ramp

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>It is easier to connect the fan tray holder power cable to the Traverse backplane before installing the fan tray holder in the rack.</td>
</tr>
<tr>
<td>2</td>
<td>Remove the back panel from the fan tray holder by loosening the two thumbscrews. The power cable is connected to the inside of the fan tray holder back panel.</td>
</tr>
</tbody>
</table>

The fan tray holder with separate air ramp is required to cool the Traverse shelf during normal operation. The fan tray holder must be installed directly below the Traverse shelf. Follow these fan tray holder power cabling and installation steps.

**Note:** Standard conductive plated rack adapters may be required for installation. If so, refer to Install the Rack Adapters.

Install the Fan Tray Holder with Separate Air Ramp

![Fan Tray Holder Back Panel](image_url)
Table 13  Install the Fan Tray Holder with Separate Air Ramp (continued)

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Bring the fan tray holder power cable with the 18-pin connector up to its mating connector on the Traverse main backplane. Push up on the 18-pin connector until it locks into position. The tab on the connector locks it into place.</td>
</tr>
<tr>
<td>4</td>
<td>Lift and position the fan tray holder directly below the Traverse shelf. <strong>Note:</strong> The fan tray holder flange has one 1-RU slot.</td>
</tr>
<tr>
<td>5</td>
<td>Align the flange holes with the holes on the rack.</td>
</tr>
<tr>
<td>6</td>
<td>Place thread-forming screws through the flange slot on each side of the fan tray holder and into the rack.</td>
</tr>
</tbody>
</table>

![Figure 12  Fan Tray Cable Connection at the Main Backplane](image1)

![Figure 13  Fan Tray Holder without Fan Tray Module](image2)
Install the Air Ramp

Install the air ramp directly below the fan tray holder.

**Important:** If installing a Traverse shelf below another vendor’s equipment, install a standalone air ramp directly above the Traverse shelf.

Follow these air ramp installation steps.

**Note:** Standard conductive plated rack adapters may be required for installation. If so, refer to **Install the Rack Adapters**.

### Table 13 Install the Fan Tray Holder with Separate Air Ramp (continued)

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Partially tighten the thread-forming screws and position the fan tray holder.</td>
</tr>
<tr>
<td>8</td>
<td>Tighten the screws to secure and ground the fan tray holder to the rack. Torque screws to 65 lbs/in.</td>
</tr>
<tr>
<td>9</td>
<td>Bring the fan tray holder power cable (connected to the fan tray holder back panel) into position at the back of the fan tray holder. Line up the male connector to the female connector on the fan tray holder while tightening the back panel thumb screws.</td>
</tr>
<tr>
<td>10</td>
<td>The Install the Fan Tray Holder with Separate Air Ramp procedure is complete. Continue to the next procedure, <strong>Install the Front Inlet Fan Tray Holder</strong>.</td>
</tr>
</tbody>
</table>

### Table 14 Install the Air Ramp

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lift and position the air ramp. See the figure in Step 2 for a front view. <strong>Note:</strong> The air ramp flange has one 1-RU slot.</td>
</tr>
<tr>
<td>2</td>
<td>Align the flange holes with the holes on the rack.</td>
</tr>
</tbody>
</table>
3. Place thread-forming screws through the flanges on each side of the air ramp and into the rack.

4. Partially tighten the thread-forming screws and position the air ramp.

5. Tighten the screws to secure the air ramp to the rack. Torque screws to 65 lbs/in.

6. Was this a standalone air ramp installation?
   - Yes. Go to the next step.
   - No.

7. The Install the Air Ramp procedure is complete.
   Continue to the Traverse Cabling and Cabling Specifications Guide, Chapter 11—“Network Interface Cabling Overview.”

---

Table 14  Install the Air Ramp (continued)

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Place thread-forming screws through the flanges on each side of the air ramp and into the rack.</td>
</tr>
</tbody>
</table>

Figure 14  Air Ramp
Chapter 8
Traverse 2000 Installation into a 19-inch Rack

Introduction
For hardware installation overview and guidelines, refer first to Chapter 1—“Installation and Commissioning Overview.”

This chapter provides the following information and procedures to complete a vertical- and standard 5 inch (127 mm) forward-mount installation of the Traverse 2000 system into a standard 7-foot (2133.6 mm) high, 19-inch (483 mm) wide telco rack.

Important: These instructions also apply to the installation of ETSI 600mm racks.

• Vertical Traverse 2000 Rack Configuration
• Install the Horizontal Rack Adapter Brackets
• Install the Front Inlet Fan Tray Holder in a 19-inch Rack
• Install a Traverse 2000 in a 19-inch Rack
The following diagram shows the configuration and specifications of a vertical Traverse 2000 rack mount assembly.

**Important:** Force10 recommends installing a maximum of two Traverse 2000 systems per rack.

**Important:** Install the shelf and fan in a standard 5-inch (127 mm) forward-mount from the rails.

![Figure 9 Traverse 2000 Vertical 19-inch (483 mm) Rack Configuration](image)

**Figure 9** Traverse 2000 Vertical 19-inch (483 mm) Rack Configuration
Install the fiber guides as shown in Figure 11.

For proper airflow, the following requirements must be met to ensure the unit is cooled properly when installed vertically:

- Force10 recommends that the front door be a full mesh screen to allow air to be drawn into the front of the fan tray. The screen must be cleaned on a regular basis to ensure dust and debris do not impede air flow.
  - If the front door is solid, the front of the fan tray must be at least 2 inches (50.8 mm) from the inside surface of the front door.
- Vent the rear door of the cabinet to increase airflow.
- Vent the top of the cabinet to draw exhaust air from the cabinet. For better cooling, Force10 recommends adding an exhaust fan.
- Keep an area of at least 2 inches (50.8 mm) around the cabinet in all directions clear of cables and other items.
Use horizontal rack adapter brackets included with the vertical mount kit to install the vertical-mount Traverse 2000 shelf and fan tray holder into a 19-inch (483 mm) telco rack. Mount the horizontal bracket to the rack rails using two thread-forming screws per side. A fiber management bracket is also included in the vertical mount kit.

**Important:** Position the horizontal brackets so that there is 21.725 inches (551.82 mm) of vertical space between the bottom of the upper bracket and the top of the lower bracket to mount the Traverse 2000 system vertically.

**Important:** Each horizontal bracket has the word “left” on it to identify the necessary left-side alignment as you face the front of the rack.

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lift the upper horizontal bracket to its assigned rack position and align the bracket slots with the rack holes, maintaining squareness.</td>
</tr>
<tr>
<td>2</td>
<td>Place and tighten thread-forming screws through the bracket slots and into the rack. Thread-forming screws are used to ground the rack adapters and any Traverse system component to the rack.</td>
</tr>
<tr>
<td>3</td>
<td>Repeat Steps 1 and 2 for the lower horizontal bracket. The lower bracket must be 21.7250 inches (551.82 mm) from the top bracket. See Figure 9.</td>
</tr>
<tr>
<td>4</td>
<td>The Install the Horizontal Rack Adapter Brackets procedure is complete. Continue to the next procedure, <strong>Install the Front Inlet Fan Tray Holder in a 19-inch Rack.</strong></td>
</tr>
</tbody>
</table>
The front inlet fan tray holder (with integrated air ramp) is required to cool the Traverse shelf during normal operation. Follow these installation steps.

**Important:** Install the front inlet fan tray holder so it will be flush with the bottom of the Traverse shelf and that no gap remains to ensure proper air flow.

### Table 16 Install the Front Inlet Fan Tray Holder in a 19-inch Rack

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Remove the tabs on each side of the fan tray holder prior to installing the fan tray holder in the rack. To remove, bend the tabs back and forth until the tab breaks off.</td>
</tr>
</tbody>
</table>
| 2    | Lift and rotate the fan tray holder to its assigned vertical and standard 5 inch (127 mm) forward-mount rack position.  
**Note:** The bottom of the fan tray holder faces the right-front rack rail. |
| 3    | Align the fan tray holder flange holes with the holes in the horizontal rack adapter brackets (on the right, facing the rack front). |
| 4    | Place a thread-forming screw through the center of the left 1-RU flange slot on each end of the front inlet fan tray holder and into the rack.  
**Note:** The front inlet fan tray holder flange has two 1-RU slots. |
| 5    | Partially tighten the thread-forming screws and position the front inlet fan tray holder. |
Tighten the screws to secure and ground the front inlet fan tray holder to the rack.

The Install the Front Inlet Fan Tray Holder in a 19-inch Rack procedure is complete.
Continue to the next procedure, **Install a Traverse 2000 in a 19-inch Rack.**
Install a Traverse 2000 in a 19-inch Rack

Install the Traverse 2000 shelf in the central office bay and 19-inch (483 mm) rack designated by your engineering work order using a minimum of six thread-forming screws.

**Important:** Install the first Traverse shelf below the Fuse Panel. All vertically-mounted Traverse 2000 shelves must be mounted with slot 1 on the bottom.

<table>
<thead>
<tr>
<th>Table 17</th>
<th>Install a Traverse 2000 in a 19-inch Rack</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step</td>
<td>Procedure</td>
</tr>
<tr>
<td>1</td>
<td>Lift the Traverse 2000 shelf to its assigned rack vertical and standard 5 inch (127 mm) forward-mount position. Make sure slot 1 is at the bottom.</td>
</tr>
<tr>
<td>2</td>
<td>Align the shelf flange holes with the holes in the horizontal rack adapter brackets (starting from the left, facing the rack front).</td>
</tr>
<tr>
<td>3</td>
<td>Place and partially tighten a thread-forming screw through the center horizontal flange slot of the upper and lower shelf flanges. You will place the remaining screws in a following step.</td>
</tr>
<tr>
<td>4</td>
<td>Before completing the shelf installation, connect the power cable for the front inlet fan tray holder to the Traverse backplane. Grasp the power cable and bring it out the top of the front inlet fan tray holder.</td>
</tr>
</tbody>
</table>

![Figure 12 Rotated Traverse Shelf Flange Slots](image)
Bring the fan tray holder power cable with the 18-pin connector up to its mating connector on the Traverse main backplane. Push in the connector until it locks into position. The tab on the connector locks it into place.

---

**Figure 13  Fan Tray Power Connection at the Main Backplane**

Is the Traverse shelf flush with the fan tray holder?

- **Yes.** Go to the next step.
- **No.** Move the Traverse shelf flush with the fan tray holder.

**Note:** If space still remains between the fan tray and the Traverse shelf, loosen the fan tray holder screws, move the fan try until it is flush with the shelf, then retighten the screws.

---

Place the remaining two thread-forming screws on each end of the shelf and into the horizontal rack adapter brackets, maintaining squareness.

---

Partially tighten the thread-forming screws and position the shelf using a level as necessary.

---

After positioning the shelf, tighten the screws to secure and ground the shelf to the rack.

---

The Install a Traverse 2000 in a 19-inch Rack procedure is complete. Continue to and complete the procedures in Chapter 6—“Insert Fan Module and Air Filters” to install the fan tray module and air filter.
Chapter 9
Power System Overview

Introduction
Several power system equipment choices are available to the user in order to provide power distribution and alarm capabilities in a Traverse system installation. The Force10 power distribution and alarm panel (PDAP) is one choice and is considered an optional, adjunct component of the Traverse system.

This chapter includes the following topics:
• Power Distribution and Alarm Panel (PDAP) Description
• PDAP Installation and Cabling Process

For Traverse power terminal locations, refer to any one of the Traverse rear view topics in the Traverse Hardware Guide.

Important: Carefully plan your power supply capacity. The Force10 PDAP-4S with standard 40 amp fuses at –40 VDC provides 1600 watts. Force10 recommends using higher amperage fuses if your power requirements go above a minimum of 1400 watts. If you fail to make sufficient plans to meet the power requirements of your specific configuration, and the power draw goes above the maximum capacity of your power supply design, it can cause a circuit breaker to trip, resulting in a loss of traffic.

For power consumption values, refer to the Planning and Engineering Guide, Chapter 1—“Traverse Equipment Specifications,” Power Consumption.

Power Distribution and Alarm Panel (PDAP) Description
The Traverse system is powered by the central office battery (–48 VDC). Redundant central office (CO) battery and battery return is connected to the Power Distribution and Alarm Panel (PDAP).

The PDAP provides the following:
• Terminates redundant –48 VDC central office battery
• Terminates central office battery return
• Distributes redundant battery and battery return
• Provides power protection for Traverse shelves and auxiliary equipment
• Visually display input power, fuse power, and critical, major, and minor bay alarms
The following process guides you through the procedures and gives references to meet PDAP (optional equipment) installation requirements.

**Table 18 PDAP Installation and Cabling Process and References**

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Read the precautions before attempting to install the shelf.</td>
<td>Chapter 3—“Precautions to Installing Traverse Equipment”</td>
</tr>
<tr>
<td>2</td>
<td>Carefully plan your power system design.</td>
<td>Planning and Engineering Guide, Chapter 1—“Traverse Equipment Specifications,” Power Consumption</td>
</tr>
<tr>
<td>3</td>
<td>Power system hardware may have already been installed.</td>
<td>Chapter 1—“Installation and Commissioning Overview,” Traverse System Rack Installation</td>
</tr>
<tr>
<td>4</td>
<td>Install the Battery and Battery Return Cabling</td>
<td>Chapter 11—“Battery and Battery Return Distribution”</td>
</tr>
<tr>
<td>5</td>
<td>Install the Battery and Battery Supply Cabling</td>
<td>Chapter 12—“Battery and Battery Return Supply”</td>
</tr>
</tbody>
</table>
| 6    | The PDAP Installation and Cabling Process is complete.                   | Are all the Traverse system components installed and Network Interface, Alarm, Ethernet, and RS-232 connections complete?  
  • **Yes.** Continue to Chapter 13—“Traverse Node Start-up and Commissioning”  
  • **No.** Complete all remaining component installation and cable connections. Once complete, then (and only then) continue to Chapter 13—“Traverse Node Start-up and Commissioning”      |
Chapter 10
Power System Hardware Installation

Introduction
This chapter provides step-by-step instructions on how to install a PDAP in a standard 7-foot (2133.6 mm) high, 19-inch or 23-inch (483 mm or 584 mm) wide telco rack.

This chapter provides the following topics to complete power system installation.

• Required Equipment and Tools
• Power System Installation
• Grounding the PDAP

The instructions may be too detailed if you are experienced in central office installations. In this case, scan the topic labels in the left margin for tasks to review or refer to Chapter 16—“Installation and Commissioning Checklists.”

Required Equipment and Tools
The following equipment and tools are required to install the power system hardware:

• Standard 7-foot (2133.6 mm) high, 19-inch or 23-inch (483 mm or 584 mm) wide telco rack
• Standard conductive plated rack adapters with tread-forming screws required for rack installation, where applicable
• Power system (e.g., PDAP-4S or PDAP-15A)
• Four appropriate-sized (e.g., 12-24) thread-forming screws for securing and grounding the equipment
• A 5/16-inch socket for thread-forming screws
• Green (#10 AWG or 6 mm² yellow-green) copper ground wire for grounding:
  – Up to #4 AWG (25 mm²) for the PDAP-4S (depending on the input interrupt device)
  – Up to #6 AWG (15 mm²) for the PDAP-15A (depending on the input interrupt device)
• 1 – double-hole copper barrel cable lug for ground terminal connection:
  – 1 – 1/4-inch (6.35 mm) (clearance hole with .625-inch spacing) for the PDAP-4S
  – 1 – M5 (0.19-inch or 5 mm) (clearance hole with .625-inch spacing) for the PDAP-15A
• Step ladder (optional)
Install the power system hardware (e.g., PDAP-4S or PDAP-15A) in the central office bay and rack designated by your engineering work order. Install the power system at the top (using the first set of mounting holes) of a rack above the first Traverse shelf.

**WARNING!** Ensure battery supply cables are not connected to the PDAP or central office battery source before beginning this procedure to avoid personal injury.

**Important:** Always wear a properly grounded Electrostatic Discharge (ESD) wrist strap when making cable connections to the PDAP and Traverse backplane.

**Important:** Complete battery and battery return distribution cabling before bringing central office battery and battery return supply to the PDAP.

**Note:** Standard conductive plated rack adapters may be required for installation. If so, refer to Chapter 7—“Traverse System Hardware Installation,” Install the Rack Adapters.

### Table 19 Power System Hardware Installation

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Power systems have a flange with a keyhole slot. Partially tighten a thread-forming screw in the correct position on each side of the rack, leave about 1/4 inch (6.35 mm) of space between the rack and the screw head.</td>
</tr>
<tr>
<td>2</td>
<td>Position and lower the power system so the keyhole slots rest on the partially tightened screws.</td>
</tr>
<tr>
<td>3</td>
<td>Tighten screws.</td>
</tr>
<tr>
<td>4</td>
<td>Place two additional screws and tighten to secure the power system to the rack.</td>
</tr>
</tbody>
</table>

![Figure 11  Power System Keyhole Slots](image_url)
5. Connect the grounding wire to the PDAP and to a confirmed source of Earth ground.

Note: The PDAP-2S is grounded to the rack using thread-forming screws and conductive plated rack adapters—as required for 23-inch (584 mm) rack installation. No additional grounding procedures are required when installed in a properly grounded telco rack.

6. The Power System Hardware Installation procedure is complete. Continue on to Chapter 11—“Battery and Battery Return Distribution.”
Grounding the PDAP

There is a chassis ground location on the PDAP-4S and PDAP-15A for connecting a grounding wire. Connect the grounding wire to the PDAP and to a confirmed source of earth ground. For PDAP chassis ground locations, refer to the Traverse Cabling and Cabling Specifications Guide, Chapter 9—“Power Interface Specifications,” Power Distribution and Alarm Panel (PDAP) Description.

The PDAP-2S is grounded to the rack using thread-forming screws and conductive plated rack adapters—as required for 23-inch (584 mm) rack installation. No additional grounding procedures are required when installed in a properly grounded telco rack. Isolate DC power returns from frame ground (DC-I).

**Important:** For NEBS compliance, remove paint and any other non-conductive coatings on the surfaces between the mounting hardware and the rack framework. Clean all surfaces and apply anti-oxidant before joining.

Coat all bare conductors with an appropriate anti-oxidant compound before crimp connections are made. Bring all connectors to a bright finish and coat with an anti-oxidant before making the connection.
Chapter 11
Battery and Battery Return Distribution

Introduction

For power system installation overview and guidelines, refer first to Chapter 9—“Power System Overview.”

This chapter provides step-by-step instructions on how to connect battery and battery return distribution cables from each Traverse shelf in a single-rack configuration to the PDAP.

- Required Equipment and Tools
- Battery and Battery Return Distribution Cabling Procedures

The instructions may be too detailed if you are experienced in CO installations. In this case, scan the topic labels in the left margin for tasks to review or refer to Chapter 16—“Installation and Commissioning Checklists.”

Required Equipment and Tools

The following equipment and tools are required to make central office battery and battery return distribution connections to each Traverse shelf and the PDAP.

Important: Read through Chapter 3—“Precautions to Installing Traverse Equipment,” Electrical Precautions before you begin.

General

- Electrostatic Discharge (ESD) wrist strap
- Diagonal cutters
- Crimping tool
- Volt Ohm Meter (VOM)

Note: Power (-48VDC and RETURN) copper area wire colors are dependent on your local cable requirements.
Traverse shelf only

- 4 – #10 (clearance hole with .625-inch spacing) double-hole copper barrel cable lugs to connect battery distribution (-48VDC) cables (e.g., #8 AWG or 9 mm² for PDAP-4S or -2S, #12 AWG or 3.3 mm² for PDAP-15A red or gray copper area wire) and battery return distribution (RETURN) cables (e.g., #8 AWG or 9 mm² for PDAP-4S or -2S, #12 AWG or 3.3 mm² for PDAP-15A black or blue copper area wire) to the Traverse backplane
- 8 – #8-32 SEMS screws to connect battery distribution (-48VDC) and battery return distribution (RETURN) cables to the Traverse backplane
- A common power return jumper plate to prevent faulty wiring short circuit. This item comes pre-installed at the common return (RETURN_A RETURN_B) power terminals on the bottom-center of the Traverse backplane
- A 1/4-inch socket (or nutdriver) for Traverse shelf backplane power terminal connections

PDAP-4S only

- 2 – battery distribution (-48VDC) cables (e.g., #8 AWG or 9 mm² red or gray copper area wire)
- 2 – battery return distribution (RETURN) cables (e.g., #8 AWG or 9 mm² black or blue copper area wire)
- 4 – #10 single-hole copper barrel cable lugs to connect battery distribution (-48VDC) cables (e.g., #8 AWG or 9 mm² red or gray copper area wire) and battery return distribution (RETURN) cables (e.g., #8 AWG or 9 mm² black or blue copper area wire) to the PDAP-4S
- 4 – #10-32 KEP nuts to connect battery distribution (-48VDC) and battery return distribution (RETURN) cables to the PDAP-4S
- A 5/16-inch (8 mm) socket

PDAP-15A only

- 2 – battery distribution (-48VDC) cables (e.g., #12 AWG or 3.3 mm² red or gray copper area wire)
- 2 – battery return distribution (RETURN) cables (e.g., #12 AWG or 3.3 mm² black or blue copper area wire)
- 4 – #6 single-hole copper barrel cable lugs to connect battery distribution (-48VDC) cables (e.g., #12 AWG or 3.3 mm² red or gray copper area wire) and battery return distribution (RETURN) cables (e.g., #12 AWG or 3.3 mm² black or blue copper area wire) to the PDAP-15A
- 4 – SEMS screws to connect battery distribution (-48VDC) and battery return distribution (RETURN) cables to the PDAP-15A
- A Phillips screwdriver
Battery and battery return distribution cabling procedures are written for each PDAP type. Refer to the correct procedures based on the type of PDAP installed in the rack:

- Connect PDAP-4S Battery Distribution Cables
- Connect PDAP-4S Battery Return Distribution Cables
- Connect PDAP-15A Battery Distribution Cables
- Connect PDAP-15A Battery Return Distribution Cables

**Connect PDAP-4S Battery Distribution Cables**

The PDAP-4S distributes central office battery (-48VDC) to up to four Traverse 1600 or Traverse 2000 shelves in a rack.

**WARNING!** Ensure battery supply cables are not connected to the PDAP or central office battery source before beginning this procedure to avoid personal injury.

**Important:** Always wear a properly grounded Electrostatic Discharge (ESD) wrist strap when making cable connections to the PDAP and Traverse main backplane.

**Important:** Complete battery and battery return distribution cabling before bringing central office battery and battery return supply to the PDAP-4S.

Follow these steps to connect battery distribution cables (-48VDC) from a Traverse shelf to the PDAP-4S.

**Note:** Traverse 2000 main backplane graphics are used in the following procedure. Battery (-48VDC_A and -48VDC_B) terminals are located in the same place on the Traverse 1600 backplane.

### Table 20 Connect PDAP-4S Battery Distribution Cables

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Remove the protective cover from the back of the PDAP-4S. Refer to Chapter 4—“Removing and Replacing Back Covers,” <a href="#">Remove the PDAP Protective Back Cover</a> for details.</td>
</tr>
<tr>
<td>2</td>
<td>Remove the back cover from the [first] Traverse shelf in the rack. Refer to Chapter 4—“Removing and Replacing Back Covers,” <a href="#">Main Backplane Covers</a> for details.</td>
</tr>
</tbody>
</table>
Table 20  Connect PDAP-4S Battery Distribution Cables (continued)

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Use the supplied -48VDC cable or use a crimping tool to attach a double-hole copper barrel cable lug to one end of the battery distribution (-48VDC) wire for the battery distribution cable connection to the Traverse shelf.</td>
</tr>
<tr>
<td>4</td>
<td>Remove the SEMS screws from the Traverse shelf –48VDC_A power terminals using a 1/4-inch socket (or nutdriver).</td>
</tr>
<tr>
<td>5</td>
<td>Place the battery distribution double-hole copper barrel cable lug over the –48VDC_A power terminals on the Traverse main backplane. Replace and tighten the SEMS screws using a 1/4-inch socket (or nutdriver).</td>
</tr>
<tr>
<td>6</td>
<td>Route the battery &quot;A&quot; distribution cable (-48VDC) from the Traverse –48VDC_A power terminals through the bottom cable port of the shelf, up the rack rails, and over to the PDAP-4S –48VDC power terminals to determine the length of the cable.</td>
</tr>
<tr>
<td>7</td>
<td>Use diagonal cutters to cut the battery distribution (-48VDC) cable to the correct length.</td>
</tr>
<tr>
<td>8</td>
<td>Use a crimping tool to attach a single-hole copper barrel cable lug to the end of the battery distribution (-48VDC) cable.</td>
</tr>
</tbody>
</table>
Remove the KEP nut from the PDAP-4S battery "A" distribution power terminal, position A1 (shelf 1).

Figure 13   PDAP-4S Battery Distribution Power Terminals

**Note:** Battery "A" distribution power terminal positions on the PDAP-4S are: position A1 (shelf 1), A2 (shelf 2), A3 (shelf 3), and position A4 (shelf 4). Battery "B" distribution power terminal positions on the PDAP-4S are: position B1 (shelf 1), B2 (shelf 2), B3 (shelf 3), and position B4 (shelf 4).

Place the single-hole copper barrel cable lug on the battery "A" distribution power terminal (position A1). Replace and tighten the nut.

Repeat Steps 1 through 10 for the battery "B" distribution cable (i.e., connect the battery cable from the Traverse –48VDC_B power terminals to position B1 of the PDAP-4S battery distribution terminals).

Are there additional Traverse shelves in the rack?
- **Yes.** Repeat Steps 1 through 11 for each Traverse shelf.
- **No.** Continue to Step 13.

The Connect PDAP-4S Battery Distribution Cables procedure is complete. Continue to the next procedure, Connect PDAP-4S Battery Return Distribution Cables.

---

Table 20  Connect PDAP-4S Battery Distribution Cables (continued)

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>9</strong></td>
<td>Remove the KEP nut from the PDAP-4S battery &quot;A&quot; distribution power terminal, position A1 (shelf 1).</td>
</tr>
<tr>
<td><strong>10</strong></td>
<td>Place the single-hole copper barrel cable lug on the battery &quot;A&quot; distribution power terminal (position A1). Replace and tighten the nut.</td>
</tr>
<tr>
<td><strong>11</strong></td>
<td>Repeat Steps 1 through 10 for the battery &quot;B&quot; distribution cable (i.e., connect the battery cable from the Traverse –48VDC_B power terminals to position B1 of the PDAP-4S battery distribution terminals).</td>
</tr>
<tr>
<td><strong>12</strong></td>
<td>Are there additional Traverse shelves in the rack?</td>
</tr>
<tr>
<td></td>
<td>• <strong>Yes.</strong> Repeat Steps 1 through 11 for each Traverse shelf.</td>
</tr>
<tr>
<td></td>
<td>• <strong>No.</strong> Continue to Step 13.</td>
</tr>
<tr>
<td><strong>13</strong></td>
<td>The Connect PDAP-4S Battery Distribution Cables procedure is complete. Continue to the next procedure, Connect PDAP-4S Battery Return Distribution Cables.</td>
</tr>
</tbody>
</table>
The PDAP-4S distributes central office battery return (RETURN) to up to four Traverse 1600 or Traverse 2000 shelves in a rack. Follow these steps to connect battery return distribution (RETURN) cables from a Traverse shelf to the PDAP-4S.

**Note:** Traverse 2000 main backplane graphics are used in the following procedure. Battery return distribution (RETURN_A, common RETURN_A RETURN_B, and RETURN_B) terminals are located in the same place on the Traverse 1600 backplane.

### Table 21 Connect PDAP-4S Battery Return Distribution Cables

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
</tr>
</thead>
</table>
| 1    | Did you first complete the Connect PDAP-4S Battery Distribution Cables?  
• Yes. Continue to the next step.  
• No. Go to the procedure, Connect PDAP-4S Battery Distribution Cables, to complete this cabling first. |
| 2    | Use the supplied RETURN cable or use a crimping tool to attach a double-hole copper barrel cable lug to one end of the battery return distribution (RETURN) wire for the battery return distribution cable connection to the Traverse shelf. |
| 3    | Remove SEMS screws from the Traverse shelf RETURN_A power terminals using a 1/4-inch socket (or nutdriver). |
| 4    | Place the battery return distribution double-hole copper barrel cable lug over the RETURN_A power terminals. Replace and tighten the SEMS screws using a 1/4-inch socket (or nutdriver). |
Bring the battery return distribution (RETURN) cable from the Traverse RETURN_A power terminals through the bottom cable port of the shelf, up the rack rails, and over to the PDAP-4S battery return distribution terminals on the PDAP-4S to determine the length of the cable.

Use diagonal cutters to cut the battery return distribution (RETURN) cable to the correct length.

Use a crimping tool to attach a single-hole copper barrel cable lug to the end of the battery return distribution (RETURN) cable.
Remove the KEP nut from the PDAP-4S battery return "A" distribution power terminal, position A1 (shelf 1).

Note: Battery return "A" distribution power terminal positions on the PDAP-4S are: position A1 (shelf 1), A2 (shelf 2), A3 (shelf 3), and position A4 (shelf 4). Battery return "B" distribution power terminal positions on the PDAP-2S are: position B1 (shelf 1), B2 (shelf 2), B3 (shelf 3), and position B4 (shelf 4).

Place the single-hole copper barrel cable lug on the battery "A" distribution power terminal (position A1). Replace and tighten the nut.

Repeat Steps 1 through 10 to connect battery return "B" distribution (RETURN) cable (i.e., connect the battery return cable from the Traverse RETURN_B power terminals to position B1 on the PDAP-4S battery return distribution terminals).

Do you want to maintain the common return configuration using the pre-installed common return jumper plate?

- Yes. Go to the next step.
- No. For a separate return configuration, remove the SEMS screws and common return jumper plate from the common return (RETURN_A RETURN_B) power terminals at the bottom-center of the Traverse main backplane. Replace and tighten the SEMS screws using a 1/4-inch socket (or nutdriver).

**WARNING!** For the separate return configuration, remember to verify equivalent polarity (-48VDC) of the cable connections at the A and B side battery (-48VDC) power terminals. Verify equivalent polarity (RETURN) of the cable connections at the A and B side battery return (RETURN) power terminals.
Table 21  Connect PDAP-4S Battery Return Distribution Cables (continued)

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
</tr>
</thead>
</table>
| 12   | Are there additional Traverse shelves in the rack?  
|      | • Yes. Repeat Steps 1 through 11 for the second shelf.  
|      | • No. Continue to Step 13. |
| 13   | The Connect PDAP-4S Battery Return Distribution Cables procedure is complete.  
|      | Continue to Chapter 12—“Battery and Battery Return Supply.”. |

Connect PDAP-15A Battery Distribution Cables

The PDAP-15A distributes central office battery (-48VDC) to the Traverse 600 shelf.

**WARNING!** Ensure battery supply cables are not connected to the PDAP or central office battery source before beginning this procedure to avoid personal injury.

**Important:** Always wear a properly grounded Electrostatic Discharge (ESD) wrist strap when making cable connections to the PDAP and Traverse main backplane.

**Important:** Complete battery and battery return distribution cabling before bringing central office battery and battery return supply to the PDAP-15A.

Follow these steps to connect battery distribution (-48VDC) cables from a Traverse 600 shelf to the PDAP-15A.

Table 22  Connect PDAP-15A Battery Distribution Cables

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Remove the protective cover from the back of the PDAP-15A. Refer to Chapter 4—“Removing and Replacing Back Covers,” <a href="#">Remove the PDAP Protective Back Cover</a> for details.</td>
</tr>
<tr>
<td>2</td>
<td>Remove the back cover from the [first] Traverse shelf in the rack. Refer to Chapter 4—“Removing and Replacing Back Covers,” <a href="#">Main Backplane Covers</a> for details.</td>
</tr>
</tbody>
</table>
### Table 22 Connect PDAP-15A Battery Distribution Cables (continued)

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Use the supplied -48VDC cable or use a crimping tool to attach a single-hole copper barrel cable lug to one end of the battery distribution (-48VDC) wire for the battery distribution cable connection at the Traverse shelf.</td>
</tr>
<tr>
<td>4</td>
<td>Remove the SEMS screw from the Traverse –48VDC_A power terminal.</td>
</tr>
<tr>
<td>5</td>
<td>Place the battery distribution copper barrel cable lug over the –48VDC A power terminal on the backplane. Replace and tighten the screw.</td>
</tr>
<tr>
<td>6</td>
<td>Route the battery &quot;A&quot; distribution (-48VDC) cable from the –48VDC_A power terminal through the side cable port of the Traverse shelf, up the rack rails, and over to the PDAP-15A power terminal to determine the length of the cable.</td>
</tr>
<tr>
<td>7</td>
<td>Use diagonal cutters to cut the battery distribution (-48VDC) cable to the correct length.</td>
</tr>
<tr>
<td>8</td>
<td>Use a crimping tool to attach a single-hole copper barrel cable lug to the end of the battery distribution (-48VDC) cable.</td>
</tr>
<tr>
<td>9</td>
<td>Remove the SEMS screw from the battery &quot;A&quot; distribution power terminal, position A1 (shelf 1).</td>
</tr>
</tbody>
</table>

---

**Figure 16 Battery Distribution Cable Connection**

**Figure 17 PDAP-15A Battery Distribution Power Terminals**
The PDAP-15A distributes central office battery return (RETURN) to the Traverse 600 shelf.

Follow these steps to connect battery return distribution (RETURN) cables from a Traverse shelf to the PDAP-15A.

Table 23  Connect PDAP-15A Battery Return Distribution Cables

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
</tr>
</thead>
</table>
| 1    | Did you first complete the Connect PDAP-15A Battery Distribution Cables?  
      | • Yes. Go to the next step.  
      | • No. Go to Table 22  Connect PDAP-15A Battery Distribution Cables, page -77 to complete this cabling first. |
| 2    | Use the supplied RETURN cable or use a crimping tool to attach a single-hole copper barrel cable lug to one end of an the battery return distribution (RETURN) wire for the battery return distribution cable connection at the Traverse shelf. |
| 3    | Remove the SEMS screw from the RETURN_A power terminal. |
| 4    | Place the single-hole copper barrel cable lug on the battery return distribution (RETURN) terminal. Replace and tighten the screw. |
5 Route the battery return distribution (RETURN) cable from the RETURN_A power terminal through the side cable port of the Traverse shelf, up the rack rails, and over to the PDAP-15A power terminals to determine the length of the cable.

6 Use diagonal cutters to cut the battery return distribution (RETURN) cable to the correct length.

7 Use a crimping tool to attach a single-hole copper barrel cable lug to the end of the battery return distribution (RETURN) cable.

8 The PDAP-15A provides battery return A and B distribution terminal lugs. Remove the SEMS screw from the battery return terminal lug.

9 Place the battery return distribution cable lug over the RETURN A power terminal. Replace and tighten the screw.

10 Repeat Steps 2 through 9 to connect battery return “B” distribution cable (i.e., connect the battery return (RETURN) cable from the Traverse RETURN_B power terminals to the position B1 battery return distribution terminal on the PDAP-15A).
Do you want to maintain the common return configuration using the pre-installed common return jumper plate?

- **Yes.** Go to the next step.
- **No.** For a separate return configuration, remove the SEMS screws and common return jumper plate from the common return (RETURN_A RETURN_B) power terminals at the bottom-center of the Traverse main backplane. Replace and tighten the SEMS screws.

  **WARNING!** For the separate return configuration, remember to verify equivalent polarity (-48VDC) of the cable connections at the A and B side battery (-48VDC) power terminals. Verify equivalent polarity (RETURN) of the cable connections at the A and B side battery return (RETURN) power terminals.

The Connect PDAP-15A Battery Return Distribution Cables procedure is complete.

Continue to Chapter 12—“Battery and Battery Return Supply.”

---

**Table 23 Connect PDAP-15A Battery Return Distribution Cables (continued)**

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
</tr>
</thead>
</table>
| 11   | Do you want to maintain the common return configuration using the pre-installed common return jumper plate?  
- **Yes.** Go to the next step.  
- **No.** For a separate return configuration, remove the SEMS screws and common return jumper plate from the common return (RETURN_A RETURN_B) power terminals at the bottom-center of the Traverse main backplane. Replace and tighten the SEMS screws.  
  **WARNING!** For the separate return configuration, remember to verify equivalent polarity (-48VDC) of the cable connections at the A and B side battery (-48VDC) power terminals. Verify equivalent polarity (RETURN) of the cable connections at the A and B side battery return (RETURN) power terminals. |
| 12   | The Connect PDAP-15A Battery Return Distribution Cables procedure is complete.  
Continue to Chapter 12—“Battery and Battery Return Supply.” |
Chapter 12
Battery and Battery Return Supply

Introduction
For power system installation overview and guidelines, refer first to
Chapter 9—“Power System Overview.”

This chapter provides step-by-step instructions on how to connect:
• Battery cables from the central office power supply to the PDAP.
• Battery return cables from the central office battery return supply to the PDAP.

The topics are as follows:
• Required Equipment and Tools
• Connect Battery Supply Cables to the PDAP
• Connect Battery Return Supply Cables to the PDAP
• Connect Supply Cables to the Central Office Source
• Verify Polarity
• Verify Voltage

The instructions may be too detailed if you are experienced in CO installations. In this case, scan the topic labels in the left margin for tasks to review or refer to Chapter 16—“Installation and Commissioning Checklists.”
The following equipment and tools are required to make central office battery and battery return supply connections to the PDAP.

**Important:** Read through Chapter 3—“Precautions to Installing Traverse Equipment,” *Electrical Precautions* before you begin.

**General:**
- 2 – (customer-supplied) battery supply cables
- 2 – (customer-supplied) battery return supply cables
- 4 – (customer-supplied) copper cable lugs for connection at the central office battery source

**Important:** The customer-supplied battery and battery return supply cables and lugs are required for power distribution to the current feed size. Refer to your local electrical code for cable and lug requirements based on input feed size.

- Electrostatic Discharge (ESD) wrist strap
- Crimping tool
- Diagonal cutters
- Volt Ohm Meter (VOM)

**PDAP-4S only:**
- 4 – 1/4-inch (clearance hole with 3/4-inch spacing) double-hole copper barrel cable lugs for battery and battery return supply cable connection to the PDAP-4S
- 8 – 1/4-20 nuts to connect battery and battery return supply cables to the PDAP-4S
- 8 – 1/4-inch lock washers to connect battery and battery return supply cables to the PDAP-4S
- 8 – 1/4-inch flat washers to connect battery and battery return supply cables to the PDAP-4S
- A 7/16-inch (11 mm) socket
- For further information, refer to the Telect website at [www.telect.com](http://www.telect.com) and request the publication for Model #009-8005-1404.

**PDAP-15A only:**
- 4 – #10 (clearance hole with 5/8-inch spacing) double-hole copper barrel cable lugs for battery and battery return supply cable connection to the PDAP-15A
- 4 – M5 (0.19-inch or 5 mm) nuts to connect battery and battery return supply cables at the PDAP-15A
- 4 – M5 (0.19-inch or 5 mm) lock washers to connect battery and battery return supply cables at the PDAP-15A
- A 5/16-inch (8 mm) socket
- For further information, refer to the Telect website at [www.telect.com](http://www.telect.com) and request the publication for Model #0HPGMT05BR.
Battery “A” and “B” supply cables (customer-supplied) are run from the central office battery distribution fuse bay (BDFB), or other central office battery source, to the PDAP. Complete battery and battery return distribution cabling before bringing central office battery and battery return supply cables to the PDAP.

Follow these steps to connect battery supply cables to the PDAP.

**WARNING!** Ensure battery supply cables are not connected to central office battery source before beginning this procedure to avoid personal injury.

**Important:** Always wear a properly grounded Electrostatic Discharge (ESD) wrist strap when making cable connections to the PDAP and Traverse main backplane.

### Table 24  Connect Battery Supply Cables to the PDAP

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Run battery “A” and “B” supply cables from the BDFB across the horizontal cable rack and down the rack rails to the PDAP following local procedures.</td>
</tr>
<tr>
<td>2</td>
<td>Remove the protective cover from the back of the PDAP. Refer to Chapter 4—“Removing and Replacing Back Covers,” <em>Remove the PDAP Protective Back Cover</em> for detailed instructions.</td>
</tr>
<tr>
<td>3</td>
<td>Bring the cables to the battery “A” and “B” supply PDAP-4S or PDAP-15A terminal studs or PDAP-2S bus bars.</td>
</tr>
<tr>
<td>4</td>
<td>Cut the battery supply cables to the correct length.</td>
</tr>
</tbody>
</table>
5. Use a crimping tool to attach double-hole copper barrel cable lugs to the ends of the battery supply cables for connection to the PDAP.

6. Remove the nuts and lock washers from the PDAP battery “A” and “B” NEG VDC input terminal lugs.

7. Place the double-hole copper barrel cable lug on the battery “A” NEG VDC input terminal lugs. Replace the lock washers and tighten nuts.

8. Place the double-hole copper barrel cable lug on the battery “B” NEG VDC input lugs. Replace the lock washers and tighten the nuts.

9. The Connect Battery Supply Cables to the PDAP procedure is complete. Continue to the next procedure, Connect Battery Return Supply Cables to the PDAP.

Table 24  Connect Battery Supply Cables to the PDAP (continued)

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Use a crimping tool to attach double-hole copper barrel cable lugs to the ends of the battery supply cables for connection to the PDAP.</td>
</tr>
<tr>
<td>6</td>
<td>Remove the nuts and lock washers from the PDAP battery “A” and “B” NEG VDC input terminal lugs.</td>
</tr>
<tr>
<td>7</td>
<td>Place the double-hole copper barrel cable lug on the battery “A” NEG VDC input terminal lugs. Replace the lock washers and tighten nuts.</td>
</tr>
<tr>
<td>8</td>
<td>Place the double-hole copper barrel cable lug on the battery “B” NEG VDC input lugs. Replace the lock washers and tighten the nuts.</td>
</tr>
<tr>
<td>9</td>
<td>The Connect Battery Supply Cables to the PDAP procedure is complete. Continue to the next procedure, Connect Battery Return Supply Cables to the PDAP.</td>
</tr>
</tbody>
</table>
Battery return supply cables (customer-supplied) are run from the central office battery return bus bar, or other central office battery return source, to the PDAP.

**WARNING!** Ensure battery supply cables are not connected to central office battery source before beginning this procedure to avoid personal injury.

**Important:** Always wear a properly grounded Electrostatic Discharge (ESD) wrist strap when making cable connections to the PDAP and Traverse main backplane.

Follow these steps to connect battery return supply cables to the PDAP.

### Table 25 Connect Battery Return Supply Cables to the PDAP

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
</tr>
</thead>
</table>
| 1    | Did you first complete the *Connect Battery Supply Cables to the PDAP*?  
      | • **Yes.** Continue to the next step.  
      | • **No.** Go to Table 24 *Connect Battery Supply Cables to the PDAP*, page -85 to complete this cabling first. |
2 Run battery return “A” and “B” supply cables from the battery return supply across the horizontal cable rack and down the rails to the battery return supply PDAP-4S or PDAP-15A terminal studs or PDAP-2S bus bars following local procedures.

3 Cut the battery return supply cables to the correct length.

4 Use a crimping tool to attach double-hole copper barrel cable lugs to the end of the battery return supply cables for connection to the PDAP.

5 Remove the lock washers, flat washers (PDAP-4S only), and nuts from the PDAP battery return “A” and “B” RETURN bus bars.
Connect Supply Cables to the Central Office Source

Follow these steps to connect battery and battery return supply cables and lugs (customer-supplied) to the central office source.

**WARNING!** Use extreme caution when working with battery and battery return supply cables. Remove all metal jewelry when working with power circuits.

**WARNING!** Complete continuity testing before connecting battery and battery return cables to the central office source.

---

Table 25  Connect Battery Return Supply Cables to the PDAP (continued)

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Place the double-hole copper barrel cable lug on the battery return “A” RETURN terminal lugs. Replace the lock washers, flat washers (PDAP-4S only), and tighten the nuts.</td>
</tr>
<tr>
<td>7</td>
<td>Place the double-hole copper barrel cable lug on the battery return “B” RETURN terminal lugs. Replace the lock washers, flat washers (PDAP-4S only), and tighten the nuts. <strong>WARNING!</strong> Use a Volt Ohm Meter (VOM) to verify continuity of battery and battery return supply cables.</td>
</tr>
<tr>
<td>8</td>
<td>Replace the protective cover on the back of the PDAP. Refer to Chapter 4—“Removing and Replacing Back Covers,” Replace the PDAP Protective Back Cover for detailed instructions.</td>
</tr>
<tr>
<td>9</td>
<td>The Connect Battery Return Supply Cables to the PDAP procedure is complete. Continue to the next procedure, Connect Supply Cables to the Central Office Source.</td>
</tr>
</tbody>
</table>

---
Table 26  Connect Supply Cables to the Central Office Source

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><strong>WARNING!</strong> Before connecting the supply cables, go to the front of the PDAP and verify that all circuit breakers are in the OFF position, TPA fuse holders are empty, and that GMT fuse positions are empty or contain dummy fuses.</td>
</tr>
</tbody>
</table>

![PDAP-4S Front View](image1)

Make sure TPA fuse holders are empty

Make sure GMT fuses are empty or contain dummy fuses

![PDAP-15A Front View](image2)

Make sure GMT fuses are empty or contain dummy fuses

![PDAP-2S Front View](image3)

Make sure GMT fuses are empty or contain dummy fuses
Verify Polarity

Confirm polarity between the battery and battery return supply PDAP connections.

**WARNING!** Go to the front of the PDAP and verify that all circuit breakers are in the OFF position and fuse holders are empty before verifying polarity or voltage.

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Connect battery and battery return supply cables (at the BDFB and battery return source) following local procedures or arrange for a local central office technician to make these connections.</td>
</tr>
</tbody>
</table>
| 3    | The Connect Supply Cables to the Central Office Source procedure is complete. Are all the Traverse system components installed and Network Interface, Alarm, Ethernet, and RS-232 connections complete?  
  - **Yes.** Continue to Chapter 13—“Traverse Node Start-up and Commissioning.”  
  - **No.** Complete all remaining component installation and cable connections. Once complete, then (and only then) continue to Chapter 13—“Traverse Node Start-up and Commissioning.” |

---

Verify Polarity

Confirm polarity between the battery and battery return supply PDAP connections.

**WARNING!** Go to the front of the PDAP and verify that all circuit breakers are in the OFF position and fuse holders are empty before verifying polarity or voltage.

![Figure 21 PDAP-4S Battery and Return Supply Terminal Connections](image1)

![Figure 22 PDAP-15A Battery and Return Supply Terminal Connections](image2)
Verify Voltage

Use a VOM to measure the voltage present at the NEG VDC "A" and "B" input lugs on the PDAP. Voltage reading must be between –48 and –60 VDC.
Chapter 13
Traverse Node Start-up and Commissioning

Introduction
The Traverse node is ready for power-up after all the hardware is installed: shelf, fan tray, and air ramp, cabling (network, alarm, timing, Ethernet, power), and polarity and voltage testing are complete. This chapter provides instructions to start up and commission a Traverse shelf:

• Before You Begin
• Required Node Commissioning Parameters
• Conditional Node Commissioning Parameters
• Commissioning Process
• Visual Status During and After Start-up

Before You Begin
Review this information before you begin.

Table 27  Node Start-up Requirements

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read through the entire chapter and gather together reference material first.</td>
<td>This chapter.</td>
</tr>
<tr>
<td>All hardware is installed.</td>
<td>This guide</td>
</tr>
<tr>
<td></td>
<td>• Chapter 1—“Installation and Commissioning Overview”</td>
</tr>
<tr>
<td></td>
<td>• Chapter 5—“Inserting and Removing Cards”</td>
</tr>
<tr>
<td></td>
<td>• Chapter 6—“Insert Fan Module and Air Filters”</td>
</tr>
<tr>
<td></td>
<td>• Chapter 7—“Traverse System Hardware Installation”</td>
</tr>
</tbody>
</table>
### Table 27  Node Start-up Requirements (continued)

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>All cabling is installed.</td>
<td>Traverse Cabling and Cabling Specifications Guide</td>
</tr>
<tr>
<td></td>
<td>• Chapter 10—“Cable Management Specifications”</td>
</tr>
<tr>
<td></td>
<td>• Chapter 11—“Network Interface Cabling Overview”</td>
</tr>
<tr>
<td></td>
<td>Traverse Hardware Installation and Commissioning Guide</td>
</tr>
<tr>
<td></td>
<td>• Chapter 9—“Power System Overview”</td>
</tr>
<tr>
<td>Polarity and voltage testing is complete.</td>
<td>Chapter 12—“Battery and Battery Return Supply”</td>
</tr>
<tr>
<td></td>
<td>• Verify Polarity</td>
</tr>
<tr>
<td></td>
<td>• Verify Voltage</td>
</tr>
<tr>
<td>Note: Once testing is complete, plug fuses into the fuse panel.</td>
<td></td>
</tr>
<tr>
<td>Power is turned on to the Traverse.</td>
<td>Important: Switch on power to the Traverse shelves and fan trays at the power system before placing any cards in the shelf.</td>
</tr>
<tr>
<td>A PC or laptop with hyperterminal or other VT-100 terminal emulation software.</td>
<td>Planning and Engineering Guide, Chapter 5—“TransNav Management System Requirements”</td>
</tr>
<tr>
<td>A standard, straight-through serial port cable with:</td>
<td>Traverse Cabling and Cabling Specifications Guide</td>
</tr>
<tr>
<td>• 9-pin RS-232-C (DB-9) male connector on one end (to connect to the General Control Module card)</td>
<td>Chapter 8—“Management Interface Specifications”</td>
</tr>
<tr>
<td>• A 9-pin or 25-pin RS-232-C (DB9 or DB-25) connector to match the connector on your PC</td>
<td></td>
</tr>
<tr>
<td>CLI command reference</td>
<td>TransNav Management System CLI Guide</td>
</tr>
</tbody>
</table>

Planning and Engineering Guide, Chapter 5—“TransNav Management System Requirements”
**Table 27 Node Start-up Requirements (continued)**

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Reference</th>
</tr>
</thead>
</table>
| Required node commissioning parameters. **Note:** IP address information is typically provided by your local network administrator and is required for management purposes. Traverse node IP addresses should be allocated from the same domain. | • Network administrator  
• **Required Node Commissioning Parameters**  
• Planning and Engineering Guide, Chapter 7—“IP Address Planning” |
| Conditional node commissioning parameters. | **Conditional Node Commissioning Parameters** |
Required Traverse node commissioning parameters are provided by your local network administrator and are listed in the following table.

**Note:** When commissioning a DCS-768 node and the node fails to commission, verify that a new Traverse 2000 chassis is in place which provides support for additional capacity.

### Table 0-1 Required Node Commissioning Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
</table>
| Node ID      | The Node ID is the node name used to access CLI node-level commands after commissioning. It is also the node name displayed in the TransNav GUI at the bottom of the Shelf View window.  
  **Important:** Enter the name of the node (node-id) using a recommended maximum of 15 characters. Use alphanumeric characters and hyphens only. Do not use punctuation, spaces, or special characters in this field. The node name (node-id) is case-sensitive. Ensure that this node name (node-id) is identical to the Node Name GUI parameter that may have been configured during any node preprovisioning.  
  **Important:** Node names must begin with a letter. They cannot begin with a number. |
| Node IP      | The Node IP address is also known as the Router IP in a data network environment.  
  The Node IP address is provided by your local network administrator and is based on the network topology.  
  See the Planning and Engineering Guide, Chapter 7—“IP Address Planning” for details on assigning IP addresses to network nodes. |

(node-id)  
(node-ip)
Standard

(standard)

Standard is required to set the default technology standard for multi-standard (SONET/SDH) cards found during discovery. For example, in Traverse the 12-port DS3/E3/EC-1 is a multi-standard card. The Standard parameter values are:

- **ANSI_only.** An ANSI-only node. A user can only see ANSI options.
- **ANSI_default.** In Traverse, a gateway node with the ANSI mode as default. Default settings are ANSI but can be switched to SDH for dual mode optical/electrical cards. In TE-100, for an ANSI node, but an operator will be able to see SDH options. DS3/E3 mode and timing mode can be switched.
- **ITU_default.** In Traverse, a gateway node with the ITU mode as default. Default settings are SDH but can be switched to SONET for dual mode optical/electrical cards. In TE-100, an SDH node, but an operator will be able to see ANSI options. DS3/E3 mode and timing mode can be switched.

Operation Mode

(oper-mode)

(Traverse only.) Operation Mode is required to set either an ADM or DCS mode for the node. This command generates a node restart. The Operation Mode parameter values are:

- **ADM:** Add-drop multiplexer
- **DCS-96:** Single-shelf DCS application
- **DCS-384:** Matrix shelf in a DCS application
- **DCS-IO:** Input/output shelf in a DCS application
- **DCS-768:** High density matrix shelf in a DCS application

**Important:** If the Operation Mode parameter is set to one of the DCS modes, then it is mandatory to also set the Matrix STS Access ID (MS AID) Format. For more information, see Conditional Node Commissioning Parameters.

Optical bandwidth

(opt-bandwidth)

(TE-100 only) Specifies the optical bandwidth of the system module. Specify one of the following values:

- **OC3/STM1** for an OC-3 or STM-1 SFP interface
- **OC12/STM4** for an OC-12 or STM-4 SFP interface
- **OC48/STM16** for an OC-48 or an STM-16 SFP interface

---

**Table 0-1 Required Node Commissioning Parameters (continued)**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard</td>
<td>Standard is required to set the default technology standard for multi-standard (SONET/SDH) cards found during discovery. For example, in Traverse the 12-port DS3/E3/EC-1 is a multi-standard card. The Standard parameter values are:</td>
</tr>
<tr>
<td><strong>Standard</strong></td>
<td>- <strong>ANSI_only.</strong> An ANSI-only node. A user can only see ANSI options.</td>
</tr>
<tr>
<td><strong>Standard</strong></td>
<td>- <strong>ANSI_default.</strong> In Traverse, a gateway node with the ANSI mode as default. Default settings are ANSI but can be switched to SDH for dual mode optical/electrical cards. In TE-100, for an ANSI node, but an operator will be able to see SDH options. DS3/E3 mode and timing mode can be switched.</td>
</tr>
<tr>
<td><strong>Standard</strong></td>
<td>- <strong>ITU_default.</strong> In Traverse, a gateway node with the ITU mode as default. Default settings are SDH but can be switched to SONET for dual mode optical/electrical cards. In TE-100, an SDH node, but an operator will be able to see ANSI options. DS3/E3 mode and timing mode can be switched.</td>
</tr>
<tr>
<td>Operation Mode</td>
<td>(Traverse only.) Operation Mode is required to set either an ADM or DCS mode for the node. This command generates a node restart. The Operation Mode parameter values are:</td>
</tr>
<tr>
<td><strong>Operation Mode</strong></td>
<td>- <strong>ADM:</strong> Add-drop multiplexer</td>
</tr>
<tr>
<td><strong>Operation Mode</strong></td>
<td>- <strong>DCS-96:</strong> Single-shelf DCS application</td>
</tr>
<tr>
<td><strong>Operation Mode</strong></td>
<td>- <strong>DCS-384:</strong> Matrix shelf in a DCS application</td>
</tr>
<tr>
<td><strong>Operation Mode</strong></td>
<td>- <strong>DCS-IO:</strong> Input/output shelf in a DCS application</td>
</tr>
<tr>
<td><strong>Operation Mode</strong></td>
<td>- <strong>DCS-768:</strong> High density matrix shelf in a DCS application</td>
</tr>
<tr>
<td><strong>Important:</strong> If the Operation Mode parameter is set to one of the DCS modes, then it is mandatory to also set the Matrix STS Access ID (MS AID) Format. For more information, see Conditional Node Commissioning Parameters.</td>
<td></td>
</tr>
<tr>
<td>Optical bandwidth</td>
<td>(TE-100 only) Specifies the optical bandwidth of the system module. Specify one of the following values:</td>
</tr>
<tr>
<td><strong>Optical bandwidth</strong></td>
<td>- <strong>OC3/STM1</strong> for an OC-3 or STM-1 SFP interface</td>
</tr>
<tr>
<td><strong>Optical bandwidth</strong></td>
<td>- <strong>OC12/STM4</strong> for an OC-12 or STM-4 SFP interface</td>
</tr>
<tr>
<td><strong>Optical bandwidth</strong></td>
<td>- <strong>OC48/STM16</strong> for an OC-48 or an STM-16 SFP interface</td>
</tr>
</tbody>
</table>
Conditional Node Commissioning Parameters

Depending on where the node is located in the network, you may need to commission the parameters described in the following table.

### Table 14 Conditional Node Commissioning Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
</table>
| MSAID format *(msaid-format)* | If this node is part of a DCS application (Traverse system only), choose the MSAID format:  
• MSAid-VT-Seq  
• MSAid-VT-GR253  
• MSAid-VTG-VT  
See the TransNav Management System Provisioning Guide, Chapter 37—“DCS Application Overview,”  
**MSAID Formats** for explanations of MSAID formats. |
| Backplane DCN IP *(bp-dcn-ip)* | Required on each node that is connected or routed to the management server or on any node with a subtended device.  
The backplane DCN Ethernet interface IP address is provided by your local network administrator and is based on the network topology.  
Enter an IP address if this node is connected to the management server (either directly or through a router) or to a TransAccess product.  
See the Planning and Engineering Guide, Chapter 7—“IP Address Planning” for details on assigning IP addresses to network nodes. |
| Backplane DCN Mask *(bp-dcn-mask)* | Required for each bp-dcn-ip. This value depends on site practices.  
Enter the appropriate address mask of the bp-dcn-ip address. |
| Backplane DCN Gateway *(bp-dcn-gw-ip)* | Required for each bp-dcn-ip. This value depends on site practices.  
If the node is connected directly to the management server, this address is the IP gateway of the management server.  
If there is a router between the management server and this node, this address is the IP address of the port on the router connected to the Ethernet interface on the back of the Traverse node. |
### EMS IP (ems-ip)

Required if there is a router between this node and the management server. This address is the IP address of the TransNav management server. This address is provided by your local network administrator and is based on the network topology. See the Planning and Engineering Guide, Chapter 7—“IP Address Planning” for details on assigning IP addresses to network nodes.

### EMS Mask (ems-mask)

Required for each ems-ip. This value depends on site practices. This address is the address mask of the IP address on the management server (ems-ip).

### EMS Gateway (ems-gw-ip)

Required for each ems-ip. This value depends on site practices. This address is the IP address of the port on the router connected to the Ethernet interface on the back of the Traverse shelf. This address is the same address as bp-dcn-gw-ip.
Commissioning Process

Complete the following procedures in the commissioning process.

**Important:** Refer to Visual Status During and After Start-up and the Operations and Maintenance Guide, Chapter 8—“LEDs and Module Status,” Power and Standby LED Indicators—All Modules as necessary.

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Power up the node. See Chapter 9—“Power System Overview.”</td>
</tr>
<tr>
<td>2</td>
<td>Insert the Active GCM.</td>
</tr>
<tr>
<td>3</td>
<td><strong>Commission the Node.</strong> For examples of network timing, refer to the TransNav Management System Provisioning Guide, Chapter 3—“Configure Network Timing,” Network Timing Examples.</td>
</tr>
<tr>
<td>4</td>
<td>Insert the Standby GCM and All Cards in the Traverse Node.</td>
</tr>
<tr>
<td>5</td>
<td>The Commissioning Process is complete.</td>
</tr>
</tbody>
</table>

**Insert the Active GCM**

Insert a GCM in Traverse slot GCMA or GCMB; this becomes the active GCM.

**Important:** Always wear a properly grounded ESD wrist strap when working with Traverse cards.

For detailed information, refer to the procedures in Chapter 5—“Inserting and Removing Cards.”

- **Clean Fiber Optic MPX Connectors** if you are placing a GCM with integrated optics (GCM OC-12/STM-4 or GCM OC-48/STM-16)
- **Insert a Card**

**Important:** The GCM power LED is solid green indicating that the GCM has power. The solid green Active/Standby LED indicates the active GCM card. Use the CLI to commission and configure the active GCM.
**Commission the Node**

**Important:** TransNav CLI commands are used in the following procedures. TransNav system software is backward compatible with the previous major release.

**WARNING!** Do not change the Node ID or Node IP Address once these are set during commissioning. Changing the Node ID or Node IP Address will affect services.

Follow these steps to commission the node.

**Table 2 Commission the Node**

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
</tr>
</thead>
</table>
| 1    | Is the active GCM card inserted into the Traverse shelf?  
    | • **Yes.** Connect a serial port cable to the active GCM RS-232 interface (DB-9 connector) and to your PC or laptop. Refer to the Traverse Hardware Guide, Chapter 6—“General Control Module (GCM) Cards” for the location of the RS-232 interface on the faceplate of the GCM.  
    | • **No.** First, **Insert the Active GCM**, then connect the serial cable as stated above. |
| 2    | Power up your PC or laptop. |
| 3    | Start VT-100 emulation software. |
| 4    | Open your terminal emulation session. |
| 5    | Enter the correct parameters settings for the communications port (COM1 or COM2):  
    | Baud Rate: 9600  
    | Data Bits: 8  
    | Parity: None  
    | Stop Bits: 1  
    | Flow Control: None  
    | **Note:** In some instances, it may be necessary to enable Line Feed. |
| 6    | **Important:** You may have to press the Enter button several times to establish the session and to receive the Force10 logo and session prompt.  
    | Your terminal responds with the Force10 logo.  
    | Please type CLI to start a new session... |
| 7    | To log on to the CLI:  
    | Type: **CLI** |
The CLI responds:

Login:
Type: admin
Password:
Type: admin

At the command line, type the following command sequence:

```
exec node commission node-id nodeName node-ip
aaa.bbb.ccc.ddd standard technologyStandard
oper-mode operationMode
```

See Required Node Commissioning Parameters for the descriptions of these parameters.

At the command prompt:
Changing node commissioning will result in a reinitialization of the Database. Are you sure? [yes|no]:
Type y to reinitialize the database on the GCM.

If the value in the Operation Mode (oper-mode) parameter is DCS-IO, DCS-96, or DCS-384, enter the following command:

```
set node general msaid-format msaidFormat
```

See Conditional Node Commissioning Parameters for the descriptions of this parameter.

Is this node connected to a DCN or a subtended device?
• No. Go to Step 14.
• Yes. Enter the backplane DCN IP address information.
  Type: `set node ip bp-dcn-ip aaa.bbb.ccc.ddd
          bp-dcn-mask aaa.bbb.ccc.ddd bp-dcn-gw-ip
          aaa.bbb.ccc.ddd`
  where:
  `aaa.bbb.ccc.ddd` is the correct IP address from your network administrator.

Is this node is connected or routed to the management server?
• No. Go to Step 14.
• Yes. Enter the EMS IP information:
  Type: `set node ip ems-ip aaa.bbb.ccc.ddd ems-mask
         aaa.bbb.ccc.ddd ems-gw aaa.bbb.ccc.ddd`
  where:
  `aaa.bbb.ccc.ddd` is the correct IP address from your network administrator.

---

**Table 2 Commission the Node (continued)**

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
</tr>
</thead>
</table>
| 8    | The CLI responds:  
  Login:  
  Type: admin  
  Password:  
  Type: admin |
| 9    | At the command line, type the following command sequence:  
  `exec node commission node-id nodeName node-ip
   aaa.bbb.ccc.ddd standard technologyStandard
   oper-mode operationMode`
  See Required Node Commissioning Parameters for the descriptions of these parameters. |
| 10   | At the command prompt:  
  Changing node commissioning will result in a reinitialization of the Database. Are you sure? [yes|no]:  
  Type y to reinitialize the database on the GCM. |
| 11   | If the value in the Operation Mode (oper-mode) parameter is DCS-IO, DCS-96, or DCS-384, enter the following command:  
  `set node general msaid-format msaidFormat`
  See Conditional Node Commissioning Parameters for the descriptions of this parameter. |
| 12   | Is this node connected to a DCN or a subtended device?  
  • No. Go to Step 14.  
  • Yes. Enter the backplane DCN IP address information.  
    Type: `set node ip bp-dcn-ip aaa.bbb.ccc.ddd
            bp-dcn-mask aaa.bbb.ccc.ddd bp-dcn-gw-ip
            aaa.bbb.ccc.ddd`
    where:
    `aaa.bbb.ccc.ddd` is the correct IP address from your network administrator. |
| 13   | Is this node is connected or routed to the management server?  
  • No. Go to Step 14.  
  • Yes. Enter the EMS IP information:  
    Type: `set node ip ems-ip aaa.bbb.ccc.ddd ems-mask
            aaa.bbb.ccc.ddd ems-gw aaa.bbb.ccc.ddd`
    where:
    `aaa.bbb.ccc.ddd` is the correct IP address from your network administrator. |
Restart the node:
Type: `exec node restart`
CLI responds: Are you sure you want to execute this command? [yes|no]:
Type: `yes`
The node begins the restart sequence.

Exit your terminal emulation session.

The **Commission the Node** procedure is complete.
Continue to **Insert the Standby GCM and All Cards in the Traverse Node**.

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
</tr>
</thead>
</table>
| 14   | Restart the node:  
            - Type: `exec node restart`  
            - CLI responds: Are you sure you want to execute this command? [yes|no]:  
            - Type: `yes`  
            - The node begins the restart sequence. |
| 15   | Exit your terminal emulation session. |
| 16   | The **Commission the Node** procedure is complete.  
            - Continue to **Insert the Standby GCM and All Cards in the Traverse Node**. |
Insert the standby GCM and all other cards in the node after commissioning is complete on the active GCM. Follow these steps to continue inserting cards in the shelf:

Refer to the Operations and Maintenance Guide, Chapter 21—“Card Placement Planning and Guidelines” and the following procedures in the Traverse Hardware Installation and Commissioning Guide, Chapter 5—“Inserting and Removing Cards” for detailed information:

- **Clean Fiber Optic MPX Connectors** if inserting optical cards
- **Insert a Card**

  **Important:** Always wear a properly grounded ESD wrist strap when working with Traverse cards.

### Table 3 Insert the Standby GCM and All Other Cards

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Insert the standby GCM in the remaining GCM slot, GCMA or GCMB. The Active/Standby LED on the standby GCM flashes amber while it is synchronizing with the active GCM.</td>
</tr>
<tr>
<td>2</td>
<td>Wait for synchronization to complete on the standby GCM. The Active/Standby LED flashes green indicating that it is the standby GCM and that synchronization is complete.</td>
</tr>
<tr>
<td>3</td>
<td>Insert the remaining cards in the Traverse node based on your engineering work order and the physical cabling at the main and fiber optic backplanes. Refer to the Operations and Maintenance Guide, Chapter 21—“Card Placement Planning and Guidelines” for more information. <strong>Note:</strong> All cards and ports come up “locked” and the port LEDs remain “off”. Cards and ports are “unlocked” or enabled as part of equipment configuration. Refer to the TransNav Management System Provisioning Guide for more information.</td>
</tr>
<tr>
<td>4</td>
<td>The <strong>Insert the Standby GCM and All Cards in the Traverse Node</strong> procedure is complete. The Traverse system installation, start-up, and commissioning are complete.</td>
</tr>
</tbody>
</table>
The GCM power LED indicates the status of start-up and initialization. The GCM power LED will go through the following sequence:

**Flashing red**

Power On Self Test (POST) is started.

**Solid green**

Initialization complete and successful.

For more information on LEDs, see the Operations and Maintenance Guide, Chapter 8—“LEDs and Module Status.”

**Important:** The solid green Active/Standby LED indicates the active GCM card. Use the CLI to commission and configure the active GCM.

---

1 The POST takes approximately one minute to run and it invokes the LED activity for initialization.
Chapter 14
Hardware Installation

Introduction
This chapter provides instructions for installing the power distribution and alarm panel (PDAP-15A, an optional power supply solution provided by Force10) and the TraverseEdge 100 (TE-100) shelf into a 7-foot (2200 mm), 19- or 23-inch (ETSI/500 mm or 600 mm) telco rack.

- Before You Begin
- Power Distribution and Alarm Panel (PDAP) Description
- Power System (PDAP-15A) Installation
- Back Cover
- Hardware Installation
- Grounding the Shelf
- Rack Adapter Installation

Before You Begin
Review this information before you start the installation procedure.

Table 4 Installation Procedure Requirements

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Reference</th>
</tr>
</thead>
</table>
| Familiarize yourself with all precautions and common procedures | Chapter 3—“Precautions to Installing Traverse Equipment”  
Chapter 4—“Removing and Replacing Back Covers”  
Chapter 5—“Inserting and Removing Cards”  
Chapter 6—“Insert Fan Module and Air Filters” |
| Electrostatic Discharge (ESD) wrist strap         | Chapter 3—“Precautions to Installing Traverse Equipment,” ESD Jack Locations |

Equipment and Tools

- Standard 7-foot (2200 mm) high, 19- or 23-inch (ETSI/500 mm or 600 mm) wide telco rack
- Standard conductive plated rack adapters with tread-forming screws required for rack installation
- Stepladder (optional)

PDAP-15A Installation

- Power system (e.g., PDAP-15A)
The TE-100 system is powered by an external power supply (or central office) battery (–48 VDC). The redundant external power supply (or central office) battery and battery return can be connected to the optional Power Distribution and Alarm Panel (PDAP-15A) supplied by Force10 or to an equivalent GMT fuse panel to meet building installation requirements.

The Force10 PDAP-15A has a 10-position Universal GMT Panel. Fuse input connections are made at the back of the PDAP-15A.

The PDAP-15A provides the following:
- Terminates redundant –48 VDC central office battery.
- Terminates central office battery return.
- Distributes redundant battery and battery return.
- Provides power protection for TE-100 shelves and auxiliary equipment.
- Displays input power, fuse power, and critical, major, and minor bay alarms.
- Provides a power disconnect device for the TE-100 shelves and auxiliary equipment

For detailed specifications, see the Traverse Hardware Guide, Chapter 5—“Power Distribution and Alarm Panels” and Traverse Cabling and Cabling Specifications Guide, Chapter 9—“Power Interface Specifications.”

The following procedures assume that you are using the Force10 PDAP. If you are using another fuse panel, you may find these steps helpful for general reference.

---

### Table 4  Installation Procedure Requirements (continued)

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green (6 mm² yellow-green) copper ground wire (up to #6 AWG for the PDAP-15A depending on the input interrupt device) for grounding.</td>
<td></td>
</tr>
<tr>
<td>1 double-hole copper barrel cable lugs (M5 stud with 5/8-inch spacing) for ground terminal connection.</td>
<td></td>
</tr>
<tr>
<td>Large phillips head screwdriver or lex socket</td>
<td></td>
</tr>
<tr>
<td>Four 12-24 thread-forming screws</td>
<td></td>
</tr>
</tbody>
</table>

### Power Distribution and Alarm Panel (PDAP) Description

The TE-100 shelf
- Four 12-24 thread-forming screws
- A 5/16-inch socket for all thread-forming screws
- A 1/4-inch socket (or nut driver) for TE-100 shelf backplane power terminal connections

---

The TE-100 shelf installation requires the following:
- Fourteen 12-24 thread-forming screws
- A 5/16-inch socket for all thread-forming screws
- A 1/4-inch socket (or nut driver) for TE-100 shelf backplane power terminal connections

---

For detailed specifications, see the Traverse Hardware Guide, Chapter 5—“Power Distribution and Alarm Panels” and Traverse Cabling and Cabling Specifications Guide, Chapter 9—“Power Interface Specifications.”

The following procedures assume that you are using the Force10 PDAP. If you are using another fuse panel, you may find these steps helpful for general reference.
Power System (PDAP-15A) Installation

Install the power system hardware (e.g., PDAP-15A) in the bay and rack designated by your engineering work order. Install the power system at the top (using the first set of mounting holes) of a rack above the TE-100 shelf.

**WARNING!** Ensure battery supply cables are not connected to the PDAP-15A or central office battery source before beginning this procedure to avoid personal injury.

**Important:** Always wear a properly grounded Electrostatic Discharge (ESD) wrist strap when making cable connections to the PDAP-15A and TE-100 backplane.

**Important:** Complete battery and battery return distribution cabling before bringing central office battery and battery return supply to the PDAP-15A.

**Important:** For NEBS compliance, remove paint and any other non-conductive coatings on the surfaces between the mounting hardware and the rack framework. Clean all surfaces and apply anti-oxidant before joining. Coat all bare conductors with an appropriate anti-oxidant compound before crimp connections are made. Bring all connectors to a bright finish and coat with an anti-oxidant before making the connection.

**Note:** Standard conductive plated rack adapters may be required for installation. If so, refer to **Rack Adapter Installation**, page 112.

**Table 5 Install Power System Hardware**

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The PDAP-15A has a flange with a keyhole slot. Partially tighten a 12-24 thread-forming screw in the correct position on each side of the rack, leaving about 1/4 inch (6.3 mm) of space between the rack and the screw head.</td>
</tr>
<tr>
<td>2</td>
<td>Position and lower the power system so the keyhole slots rest on the partially tightened screws.</td>
</tr>
<tr>
<td>3</td>
<td>Tighten screws.</td>
</tr>
</tbody>
</table>

**Figure 15 Typical PDAP Rack Installation**
The TE-100 shelf has a removable back cover to provide access to the backplane. The cover is easily removed for cabling, but must be replaced during normal operation to ensure proper air flow and electromagnetic interference (EMI) protection. Refer to Chapter 4—“Removing and Replacing Back Covers.”

Install the TE-100 shelf in the central office bay and rack designated by your engineering work order, using a minimum of six 12-24 thread-forming screws.

**Important:** Always use a properly grounded Electrostatic Discharge (ESD) wrist strap when handling TE-100 modules. Plug the ESD wrist strap into the ESD jack on the TE-100 fan assembly, backplane, or other confirmed source of earth ground. Refer to Chapter 3—“Precautions to Installing Traverse Equipment,” [ESD Jack Locations](#).

**Important:** Observe all electrostatic sensitive device warnings and precautions when handling the TE-100 shelf.

The instructions may be too detailed if you are experienced in central office installations. In this case, scan the topic labels in the left margin for tasks to review or refer to Chapter 16—“Installation and Commissioning Checklists.”

### Table 5  Install Power System Hardware (continued)

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Place two additional screws and tighten to secure the power system to the rack.</td>
</tr>
<tr>
<td>5</td>
<td>Connect the grounding wire to the PDAP and to a confirmed source of Earth ground.</td>
</tr>
<tr>
<td>6</td>
<td>The Install Power System Hardware procedure is complete. Continue to the next procedure, Install the TE-100 Shelf.</td>
</tr>
</tbody>
</table>

**Back Cover**

The TE-100 shelf has a removable back cover to provide access to the backplane. The cover is easily removed for cabling, but must be replaced during normal operation to ensure proper air flow and electromagnetic interference (EMI) protection. Refer to Chapter 4—“Removing and Replacing Back Covers.”

---

**Hardware Installation**

Install the TE-100 shelf in the central office bay and rack designated by your engineering work order, using a minimum of six 12-24 thread-forming screws.

**Important:** Always use a properly grounded Electrostatic Discharge (ESD) wrist strap when handling TE-100 modules. Plug the ESD wrist strap into the ESD jack on the TE-100 fan assembly, backplane, or other confirmed source of earth ground. Refer to Chapter 3—“Precautions to Installing Traverse Equipment,” [ESD Jack Locations](#).

**Important:** Observe all electrostatic sensitive device warnings and precautions when handling the TE-100 shelf.

The instructions may be too detailed if you are experienced in central office installations. In this case, scan the topic labels in the left margin for tasks to review or refer to Chapter 16—“Installation and Commissioning Checklists.”
Standard conductive plated rack adapters may be required for installation. If so, refer to Rack Adapter Installation, page 112.

Table 6 Install the TE-100 Shelf

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
</tr>
</thead>
</table>
| 1    | Does your installation require a rack adapter installation?  
      | • Yes. Refer to Chapter 14—“Hardware Installation,” Rack Adapter Installation, page 112.  
      | • No. Go to the next step. |
| 2    | Lift the shelf to its assigned position in the rack.  
      | **Note:** If you plan to install a cable strain-relief bar, allow enough space to accommodate the bar and cables below the shelf. |
| 3    | Align the flange holes with the holes in the rack. |
| 4    | Place a thread-forming screws through flange slots on both sides of the shelf and adjust as needed to maintain squareness. |
|      | ![Figure 17 Flange Slots on the Shelf](image) |
| 5    | Partially tighten the thread-forming screws, and use a level to position the shelf. |
| 6    | After positioning the shelf using the level, tighten the screws to secure and ground the shelf to the rack. |
| 7    | The Install the TE-100 Shelf procedure is complete. Go to the Traverse Cabling and Cabling Specifications Guide, Chapter 17—“Alarm Interface Cabling.” |

**Important:** Do not install TE-100 modules (cards) until all installation and cabling procedures are complete.
Grounding the Shelf

The shelf is grounded to the rack using thread-forming screws and conductive plated rack adapters (as required for 23-inch (600 mm) rack installation). No additional grounding procedures are required when installed in a properly grounded telco rack.

Important: (SONET network only) For NEBS compliance, remove paint and any other non-conductive coatings on the surfaces between the mounting hardware and the rack framework. Clean all surfaces and apply anti-oxidant before joining.

Rack Adapter Installation

Use standard rack adapters to install TE-100 shelf components into a 23-inch (600 mm) telco rack. Rack adapters come with thread-forming mounting screws and in various lengths depending on your installation requirements.

Install the TE-100 shelf in the central office bay and rack designated by your engineering work order using a minimum of six 12-24 thread-forming screws.

Table 7 Install Rack Adapters

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Install conductive plated rack adapters on both sides of the rack. Align and position the rack adapter slots with the holes in the rack.</td>
</tr>
<tr>
<td>2</td>
<td>Place and tighten thread-forming screws through the rack adapter slots and into the rack. Thread-forming screws are used to ground the rack adapters (and TE-100 shelf) to the rack.</td>
</tr>
<tr>
<td>3</td>
<td>Place and tighten screws on each side of the TE-100 to secure it to the rack adapters (and thus the rack).</td>
</tr>
<tr>
<td>4</td>
<td>The Install Rack Adapters procedure is complete. Continue to the Hardware Installation, page 111.</td>
</tr>
</tbody>
</table>
Chapter 15
Installing the Wall Mount Bracket

Introduction
This section describes the optional wall mount bracket and provides instructions on how to install it for TE-100 or TE-206 shelves.

Wall Mount Bracket Specifications
Each wall mount bracket is shipped with the equipment specified in the following table. Installations for TE-206 shelves require 23-inch mounting brackets for use with the wall mount bracket. The 23-inch mounting brackets are shipped with the TE-206 shelf.

Table 8 Wall Mount Bracket Specifications

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions</td>
<td>inches 27.75” x 18.50” x 1.5”</td>
</tr>
<tr>
<td></td>
<td>centimeters 704.85 mm x 469.9 mm x 38.1 mm</td>
</tr>
<tr>
<td>Weight</td>
<td>pounds 13.0 lbs</td>
</tr>
<tr>
<td></td>
<td>kilograms 5.9 kg</td>
</tr>
</tbody>
</table>

Equipment Provided

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-1/2” LAG screws, Qty 4</td>
<td>For mounting bracket to wall</td>
</tr>
<tr>
<td>Washers, Qty 4</td>
<td>For use with LAG screws</td>
</tr>
<tr>
<td>10-32 x 3/8” PPH SEM screws, Qty 4</td>
<td>To ground bracket to cable</td>
</tr>
</tbody>
</table>

Equipment Required, not provided

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level</td>
<td>To ensure wall mount bracket is installed level.</td>
</tr>
<tr>
<td>Electric drill with Phillips head bit or Phillips head screwdriver</td>
<td>To install ground cable to wall mount bracket</td>
</tr>
<tr>
<td>5/16” Hex driver</td>
<td>For shelf mounting hardware.</td>
</tr>
<tr>
<td>Voltmeter</td>
<td>For confirming wall mount bracket is grounded</td>
</tr>
<tr>
<td>Lugs¹</td>
<td>For grounding cable on bracket</td>
</tr>
</tbody>
</table>

¹ #10 hole lug, 5/8” spacing. Allows for two-hole lug up to 6 AWG wire.
The wall mount bracket allows the TE-100 or TE-206 shelf to be installed on a wall instead of in a traditional telecom rack. Force10 recommends having at least three inches of clearance around the unit after installation is complete.

At each corner of the wall mount bracket are holes for mounting the bracket to the studs in the wall. The mounting bracket holes can be used to mount the bracket on studs with 15”, 16”, or 17” centers.

Install the wall mount bracket using either a right- or left-hand orientation. These are the only factory-supported mounting orientations.

**Note:** A right-hand orientation allows better airflow around the unit.

For clarity, these instructions are explained using a right-hand orientation (the front cable tie holes and brackets are on the right; insertion of the shelf onto the bracket is from the right).

Using the 2-1/2” LAG screws and washers, attach the wall mount bracket to the wall.
Install the Shelf in the Wall Mount Bracket

After attaching the wall mount bracket to the wall, insert the TE-100 or TE-206 shelf onto the bracket from the front of the shelf. Installing the TE-206 shelf requires the 23” mounting brackets that are shipped with the shelf.

Holding the shelf on either side, slide the unit onto the bracket until the front of the shelf lines up with the front of the two perpendicular brackets.

Securely attach the shelf to the brackets using the 12-24 screws supplied in the shelf kit.

Connect the grounding cable on the shelf to the bracket using the lugs.

Route the cables from the back or front of the shelf using the cable tie holes on the wall mount bracket. Secure the cables in place using cable zip ties.

**Note:** Prior to removing a module for maintenance, release the cable zip ties that connect the fiber harness to the wall mount bracket.

![Ground Connection](image1.png)

**Figure 17  TE-100 installed on Wall Mount Bracket**

Use a volt meter to ensure the wall mount bracket and shelf are grounded before applying power to the unit.
Chapter 16
Installation and Commissioning Checklists

Introduction
This chapter includes checklists to provide the basic steps necessary to complete Traverse system hardware installation, cabling and initial configuration steps. Each step references the related detail-level procedure for additional information.

- Power System Hardware Installation Checklist
- Traverse System Hardware Installation Checklist
- Network Cabling Checklist
- Alarm Cabling Checklist
- Timing and Management Cabling Checklist
- Power Cabling Checklist
- Node Start-up and Commissioning Checklist
Basic precautions for electrostatic discharge protection, electrical and fiber optic cabling are provided in the Traverse Hardware Installation and Commissioning Guide, Chapter 3—“Precautions to Installing Traverse Equipment.”

All power system hardware installation detail-level procedure references are to the Traverse Hardware Installation and Commissioning Guide, Chapter 10—“Power System Hardware Installation.” Required equipment and tools are also provided as part of this chapter.

Table 9  Power System Hardware Installation Checklist

<table>
<thead>
<tr>
<th>Step</th>
<th>Description and Procedure Reference</th>
</tr>
</thead>
</table>
| 1    | Install the power system hardware (e.g., PDAP-4S, PDAP-15A, or PDAP-2S) in the central office bay and rack indicated on your engineering work order using thread-forming screws. Ground the hardware to a properly grounded telco rack.  
  **Note:** Installation of power system hardware in a 23-inch (584 mm or other ETSI) rack requires standard conductive plated rack adapters. Refer to the Traverse Hardware Installation and Commissioning Guide, Chapter 7—“Traverse System Hardware Installation,” **Install the Rack Adapters.**  
  **Power System (PDAP).** Install the power system at the top of the equipment rack. The detail-level installation procedure is in the Traverse Hardware Installation and Commissioning Guide, Chapter 7—“Traverse System Hardware Installation.” |
| 2    | All Traverse System Hardware Installation Checklist steps are complete. |
Basic precautions for electrostatic discharge protection, electrical and fiber optic cabling are provided in the Traverse Hardware Installation and Commissioning Guide, Chapter 3—“Precautions to Installing Traverse Equipment.”

All network cabling detail-level procedure references are found in the Traverse Hardware Installation and Commissioning Guide. Required equipment and tools are also provided as part of each installation chapter.

**Table 10 Traverse System Hardware Installation Checklist**

<table>
<thead>
<tr>
<th>Step</th>
<th>Description and Procedure Reference</th>
</tr>
</thead>
</table>
| 1    | Is power system hardware installation complete?  
      Yes. Go to Step 2. 
      No. Refer to the Power System Hardware Installation Checklist. |
| 2    | **Install Rack Adapters.**  
      Install rack adapters as necessary for:  
      - Traverse 1600 system installation in a 23-inch (584 mm) rack. Refer to Chapter 7—“Traverse System Hardware Installation,” Install the Rack Adapters and repeat for each Traverse system component.  
      - Traverse 2000 system installation in a 19-inch (483 mm) rack. Refer to Chapter 8—“Traverse 2000 Installation into a 19-inch Rack,” Install the Horizontal Rack Adapter Brackets and repeat for each Traverse 2000 system component |
| 3    | **Traverse System.**  
      Are you installing a Traverse 2000 system in a 19-inch (483 mm) rack?  
      - Yes. Install the fan first, then the shelf. Refer to Chapter 8—“Traverse 2000 Installation into a 19-inch Rack”:  
        - Install the Front Inlet Fan Tray Holder in a 19-inch Rack  
        - Install a Traverse 2000 in a 19-inch Rack  
        - Go to Step 5  
      - No. Install the shelf first, then the fan. Remember to install the first Traverse shelf below the power system with a 3/8-inch (9.5 mm) space (for non-vertical installations only) to allow for proper air flow. Refer to Chapter 7—“Traverse System Hardware Installation.”  
        - Install the Traverse Shelf  
        - Go to the next step |
4 **Fan Tray Holder (and Air Ramp).** A fan tray holder with air ramp is required for each Traverse shelf to ensure proper cooling. Connect the fan tray holder power cable to the J1 FAN TRAY INTERFACE connector on the Traverse main backplane. Install the fan tray holder directly below the Traverse shelf in the rack.

Select one of the detail-level installation procedures in the Traverse Hardware Installation and Commissioning Guide, Chapter 7—“Traverse System Hardware Installation” depending on the fan tray holder type:

- Install the Front Inlet Fan Tray Holder
- Install the Fan Tray Holder with Separate Air Ramp

5 **Fan Tray Module (and Air Filter).** Install the fan tray module into the fan tray holder. Place the foam air filter in the gap between the fan module and the top of the fan tray holder.

Select one group of detail-level installation procedures in the Traverse Hardware Installation and Commissioning Guide, Chapter 6—“Insert Fan Module and Air Filters” depending on the fan tray type:

- Front Inlet:
  - Insert a Traverse 1600 and Traverse 2000 Fan Assembly
  - Insert a Traverse 1600 and Traverse 2000 Fan Air Filter

6 All Traverse System Hardware Installation Checklist steps are complete.
Basic precautions for electrostatic discharge protection, electrical and fiber optic cabling are provided in the Traverse Hardware Installation and Commissioning Guide, Chapter 3—“Precautions to Installing Traverse Equipment.” Cable management is provided in the Traverse Cabling and Cabling Specifications Guide.

All network cabling detail-level procedure references are to the Traverse Cabling and Cabling Specifications Guide. Required equipment and tools are also provided as part of each cabling chapter.

**Important:** Always wear a properly grounded ESD wrist strap when making connections at the Traverse main backplane or fiber optic backplane. Plug the ESD wrist strap into the ESD jack provided on the air ramp or other confirmed source of earth ground.

**OPTIC WARNING!** Follow all directions and warning labels when working with optical fibers. Always wear eye protection when working with optical fibers. Never look directly into the end of a terminated or unterminated fiber or connector as it may cause eye damage.

### Table 11  Network Cabling Checklist

<table>
<thead>
<tr>
<th>Step</th>
<th>Description and Procedure Reference</th>
</tr>
</thead>
</table>
| 1    | **Plug-in Electrical Connector Modules (ECM).** Plug-in ECM(s) into the main backplane as required for DS1, DS3, E1, E3 Ethernet (10/100BaseTX and/or GbE TX) cabling. Detail-level cabling procedures are in:  
  • Chapter 14—“DS1 and E1 Cabling Procedures,” **Plug-in Electrical Connector Module**  
  • Chapter 15—“DS3 and E3 Cabling Procedures,” **Plug-in DS3/E3 Electrical Connector Module**  
  • Chapter 16—“Ethernet (Electrical) Cabling Procedures,” **Plug-in Ethernet Protection ECM** |
Complete Cabling. Complete network cabling based on the type of ECM installed.

- Chapter 14—“DS1 and E1 Cabling Procedures”:
  - DS1 (100 ohm) and E1 (120 ohm) Cabling at the DS1/E1 ECM
  - E1 (75 ohm) Cabling at the Electrical Connector Module
- Chapter 15—“DS3 and E3 Cabling Procedures,” DS3 and E3 Cabling at the Electrical Connector Module
- Chapter 16—“Ethernet (Electrical) Cabling Procedures,” Ethernet Protection Cabling at the Electrical Connector Module

(SDH network only) Attach clamp-on ferrites around 10/100BaseTX cables. Attach one clamp-on ferrite (1 turn) on each 10/100BaseTX cable 152.4 mm (6-inches) from the 50-pin connector.

Connect Fiber Optic Cables. Connect fiber optic cables from the central office optical distribution frame (ODF) or fiber optic patch panel to the Traverse fiber optic backplane. Refer to the Traverse Cabling and Cabling Specifications Guide, Chapter 1—“Fiber Optic Interface Cabling Specifications” for specifications.

The detail-level fiber optic cabling procedure is in Chapter 13—“Fiber Optic Cabling Procedures,” MPX Fiber Optic Cabling.

For information on acceptable minimum/maximum output power and receiver levels refer to the Operations and Maintenance Guide, Chapter 19—“Traverse Transmit and Receive Signal Levels.”

All Network Cabling Checklist steps are complete.

<table>
<thead>
<tr>
<th>Step</th>
<th>Description and Procedure Reference</th>
</tr>
</thead>
</table>
| 2    | Complete Cabling. Complete network cabling based on the type of ECM installed. Detail-level cabling procedures are in: • Chapter 14—“DS1 and E1 Cabling Procedures”:
  - DS1 (100 ohm) and E1 (120 ohm) Cabling at the DS1/E1 ECM
  - E1 (75 ohm) Cabling at the Electrical Connector Module
• Chapter 15—“DS3 and E3 Cabling Procedures,” DS3 and E3 Cabling at the Electrical Connector Module
• Chapter 16—“Ethernet (Electrical) Cabling Procedures,” Ethernet Protection Cabling at the Electrical Connector Module |
| 3    | (SDH network only) Attach clamp-on ferrites around 10/100BaseTX cables. Attach one clamp-on ferrite (1 turn) on each 10/100BaseTX cable 152.4 mm (6-inches) from the 50-pin connector. |
| 4    | Connect Fiber Optic Cables. Connect fiber optic cables from the central office optical distribution frame (ODF) or fiber optic patch panel to the Traverse fiber optic backplane. Refer to the Traverse Cabling and Cabling Specifications Guide, Chapter 1—“Fiber Optic Interface Cabling Specifications” for specifications.
  The detail-level fiber optic cabling procedure is in Chapter 13—“Fiber Optic Cabling Procedures,” MPX Fiber Optic Cabling.
  For information on acceptable minimum/maximum output power and receiver levels refer to the Operations and Maintenance Guide, Chapter 19—“Traverse Transmit and Receive Signal Levels.” |
| 5    | All Network Cabling Checklist steps are complete. |
Alarm Cabling Checklist

Basic precautions for electrostatic discharge protection, electrical and fiber optic cabling are provided in the Traverse Hardware Installation and Commissioning Guide, Chapter 3—“Precautions to Installing Traverse Equipment.” Cable management is provided in the Traverse Cabling and Cabling Specifications Guide, Chapter 10—“Cable Management Specifications.”

All alarm cabling detail-level procedure references are to the Traverse Cabling and Cabling Specifications Guide, Chapter 17—“Alarm Interface Cabling.” Required equipment and tools are also provided as part of each cabling chapter.

Important: Always wear a properly grounded ESD wrist strap when making connections at the fuse alarm panel (e.g., PDAP-2S or PDAP-4S) and Traverse main backplane. Plug the ESD wrist strap into the ESD jack provided on the air ramp or other confirmed source of earth ground.

Table 12  Power, Fuse, Visual, Audible, Environmental and Fail-safe Alarm Cabling Checklist

<table>
<thead>
<tr>
<th>Step</th>
<th>Description and Procedure Reference</th>
</tr>
</thead>
</table>
| 1    | Connect Fuse Alarm Panel (Optional PDAP-4S or PDAP-15A only) Power Alarm Wires. Connect power alarm wires at the back of the fuse alarm panel and to a central office power alarm panel as required. Select the appropriate detail-level alarm cabling procedure in Chapter 17—“Alarm Interface Cabling”:  
  - PDAP-4S Power Alarm Connections  
  - PDAP-15A Power Alarm Connections |
| 2    | Connect Fuse Alarm Panel (Optional PDAP) Fuse Alarm Wires. Connect fuse A and B alarm wires at the back of the fuse alarm panel and to a central office fuse alarm panel as required. The detail-level alarm cabling procedure is in Chapter 17—“Alarm Interface Cabling”:  
  - PDAP-4S Fuse Alarm Connections  
  - PDAP-15A Power Alarm Connections |
| 3    | Connect Fuse Alarm Panel (Optional PDAP) Visual Alarm Input Wires. Connect visual alarm input wires at the back of the fuse alarm panel as required. The detail-level alarm cabling procedure is located in Chapter 17—“Alarm Interface Cabling”:  
  - PDAP-4S Visual Alarm Input Connections  
  - PDAP-15A Visual Alarm Input Connections |
4 Connect Visual Alarm Output Wires at each Shelf in the Rack. Terminate visual alarm output wires at the CRITVIS, MAJVIS, MINVIS wire-wrap posts on the main backplane and at the central office visual alarm panel, if not connected to a PDAP. Detail-level alarm cabling procedures are located in Chapter 17—“Alarm Interface Cabling”:

- Audible Alarm Output Connections at the First Shelf
- Audible Alarm Output Connections at the Next Shelf

5 Connect Audible Alarm Output Wires at each Shelf in the Rack. Terminate audible alarm output wires at the CRITAUD, MAJAUD, MINAUD wire-wrap posts on the main backplane and to the central office audible alarm panel. Detail-level alarm cabling procedures are located in Chapter 17—“Alarm Interface Cabling”:

- Audible Alarm Output Connections at the First Shelf
- Audible Alarm Output Connections at the Next Shelf

6 Connect Remote Visual and Audible Alarm Output Wires at each Shelf in the Rack. Terminate remote visual and audible alarm output wires at the REMVIS and REMAUD wire-wrap posts on the main backplane and the central office remote alarm cross-connect panel. The location of these wire-wrap posts on the main backplane are provided in the Traverse Cabling and Cabling Specifications Guide, Chapter 6—“Alarm Interface Specifications,” Alarm Output Wire-Wrap Posts.

7 Connect Environmental Alarm Input Wires at each Shelf in the Rack. Terminate environmental alarm input wires at the ENV IN and RTN wire-wrap posts on the main backplane and at the equipment being monitored. The location of these wire-wrap posts on the main backplane are provided in the Traverse Cabling and Cabling Specifications Guide, Chapter 6—“Alarm Interface Specifications,” Environmental Alarm Wire-Wrap Posts and EAM.
8. **Connect Visual or Audible Fail-safe Alarm Wires at each Shelf in the Rack.** Terminate fail-safe alarm wires at the FAILSAFE wire-wrap posts on the main backplane and the central office visual or audible alarm panel. The location of these wire-wrap posts on the main backplane are provided in the Traverse Cabling and Cabling Specifications Guide, Chapter 6—“Alarm Interface Specifications,” **Alarm Output Wire-Wrap Posts**.

9. **(SDH network only) Attach clamp-on ferrites around alarm cable bundles.** Two ferrites around the cable bundle (1 turn), one 152.4 mm (6-inches) from the rack, the other 304.8 to 457.2 mm (12 to 18-inches) from the rack.

10. All **Alarm Cabling Checklist** steps are complete.

<table>
<thead>
<tr>
<th>Step</th>
<th>Description and Procedure Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td><strong>Connect Visual or Audible Fail-safe Alarm Wires at each Shelf in the Rack.</strong> Terminate fail-safe alarm wires at the FAILSAFE wire-wrap posts on the main backplane and the central office visual or audible alarm panel. The location of these wire-wrap posts on the main backplane are provided in the Traverse Cabling and Cabling Specifications Guide, Chapter 6—“Alarm Interface Specifications,” <strong>Alarm Output Wire-Wrap Posts</strong>.</td>
</tr>
<tr>
<td>9</td>
<td><strong>(SDH network only) Attach clamp-on ferrites around alarm cable bundles.</strong> Two ferrites around the cable bundle (1 turn), one 152.4 mm (6-inches) from the rack, the other 304.8 to 457.2 mm (12 to 18-inches) from the rack.</td>
</tr>
<tr>
<td>10</td>
<td>All <strong>Alarm Cabling Checklist</strong> steps are complete.</td>
</tr>
</tbody>
</table>
Basic precautions for electrostatic discharge protection, electrical and fiber optic cabling are provided in the Traverse Hardware Installation and Commissioning Guide, Chapter 3—“Precautions to Installing Traverse Equipment.” Cable management is provided in the Traverse Cabling and Cabling Specifications Guide, Chapter 10—“Cable Management Specifications.”

All timing and management cabling detail-level procedure references are to the Traverse Cabling and Cabling Specifications Guide. Required equipment and tools are also provided as part of each cabling chapter.

**Important:** Always wear a properly grounded ESD wrist strap when making connections at the Traverse main backplane. Plug the ESD wrist strap into the ESD jack provided on the air ramp or other confirmed source of earth ground.

### Table 13 Timing and Management Cabling Checklist

<table>
<thead>
<tr>
<th>Step</th>
<th>Description and Procedure Reference</th>
</tr>
</thead>
</table>
| 1    | **Connect T1/E1 or CC2M Timing Wires.** Connect input and output timing wires from the central office BITS/SASE T1/E1 or CC2M timing source to the Traverse main backplane T1/E1 or CC2M wire-wrap posts. Detail-level timing procedures are located in Chapter 18—“Traverse Timing Interface Cabling”:  
  - **T1/E1 Timing Interface Input**  
  - **T1/E1 Timing Interface Output**  
  - **CC2M Timing Interface Input**  
  - **CC2M (2MHz) Timing Interface Output** |
<p>| 2    | <strong>Verify Jumpers on Main Backplane Headers J2 and J3.</strong> The location of these jumpers is provided in Chapter 18—“Traverse Timing Interface Cabling,” Verify Preset Jumpers on Headers J2 and J3. |
| 3    | <strong>Connect DCN Ethernet (Management) Cabling.</strong> Connect DCN Ethernet cabling from the LAN/WAN network device to the Traverse main backplane J4 (ETHERNET) RJ-45 connector. The detail-level DCN Ethernet interface connection procedure is located in Chapter 19—“Management Interface Cabling,” DCN Ethernet Interface Connection. |</p>
<table>
<thead>
<tr>
<th>Step</th>
<th>Description and Procedure Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td><strong>(SDH network only) Attach clamp-on ferrite to Ethernet cable.</strong> One ferrite (2 turns) on each DCN Ethernet cable 152.4 mm (6-inches) from the rack. One turn is defined as a single pass through the ferrite hole. Refer to the Traverse Cabling and Cabling Specifications Guide, Chapter 10—“Cable Management Specifications,” Ferrite Requirements.</td>
</tr>
<tr>
<td>6</td>
<td>All <strong>Timing and Management Cabling Checklist</strong> steps are complete.</td>
</tr>
</tbody>
</table>
Basic precautions for electrostatic discharge protection, electrical and fiber optic cabling are provided in the Traverse Hardware Installation and Commissioning Guide, Chapter 3—“Precautions to Installing Traverse Equipment.” Cable management is provided in Chapter 10—“Cable Management Specifications.”

All power cabling detail-level procedure references are to the Traverse Hardware Installation and Commissioning Guide. Required equipment and tools are also provided as part of each chapter.

**WARNING!** Use extreme caution when working with battery and battery return supply cables. Remove all metal jewelry when working with power circuits.

**Important:** Always wear a properly grounded ESD wrist strap when making connections at the PDAP and Traverse main backplane. Plug the ESD wrist strap into the ESD jack provided on the air ramp or other confirmed source of earth ground.

### Table 14 Power Cabling Checklist

<table>
<thead>
<tr>
<th>Step</th>
<th>Description and Procedure Reference</th>
</tr>
</thead>
</table>
| 1    | **Connect Battery and Battery Return Distribution Cabling.** Connect battery and battery return distribution cabling from the Traverse main backplane power terminals to the back of the PDAP. Detail-level battery distribution cabling procedures are located in Chapter 11—“Battery and Battery Return Distribution”:  
  - Connect PDAP-4S Battery Distribution Cables  
  - Connect PDAP-4S Battery Return Distribution Cables  
  - Connect PDAP-15A Battery Distribution Cables  
  - Connect PDAP-15A Battery Return Distribution Cables |
### Table 14  Power Cabling Checklist (continued)

<table>
<thead>
<tr>
<th>Step</th>
<th>Description and Procedure Reference</th>
</tr>
</thead>
</table>
| 2    | **Connect Central Office Battery “A” and “B” Supply Cabling.** Connect central office battery “A” and “B” supply cabling from the battery distribution fuse bay (BDFB)—or other central office battery source—to PDAP battery supply terminal lugs.  
**WARNING!** Ensure battery supply cables are not connected to central office battery source before beginning this procedure to avoid personal injury.  
The detail-level battery supply cabling procedure is located in Chapter 12—“Battery and Battery Return Supply,” [Connect Battery Supply Cables to the PDAP](#). |
| 3    | **Connect Central Office Battery Return “A” and “B” Supply Cabling.** Connect central office battery return “A” and “B” supply cabling from the battery return bus bar (or other central office battery return source) to PDAP battery return supply terminal lugs.  
**WARNING!** Ensure battery supply cables are not connected to central office battery source before beginning this procedure to avoid personal injury.  
The detail-level battery return supply cabling procedure is located in Chapter 12—“Battery and Battery Return Supply,” [Connect Battery Supply Cables to the PDAP](#). |
| 4    | **Connect Battery and Battery Return Supply Cables to the Central Office Source.** Connect battery and battery return supply cables to the central office source following local procedures or arrange for a local central office technician to make these connections.  
**WARNING!** Complete continuity testing before connecting battery and battery return cables to the central office source.  
**WARNING!** Before connecting the supply cables, go to the front of the PDAP and verify that all circuit breakers are in the OFF position, TPA fuse holders are empty, and that GMT fuse positions are empty or contain dummy fuses  
The detail-level supply cabling to the central office source procedure is located in Chapter 12—“Battery and Battery Return Supply,” [Connect Supply Cables to the Central Office Source](#). |
Verify Polarity and Voltage. Confirm polarity between the battery and battery return supply connections at the PDAP-2S or PDAP-4S. Measure the voltage present at the NEG VDC “A” and “B” input lugs on the PDAP.

**WARNING!** Go to the front of the PDAP and verify that all circuit breakers are in the OFF position and fuse holders are empty before verifying polarity or voltage.

Procedures are provided in Chapter 12—“Battery and Battery Return Supply”:
- Verify Polarity
- Verify Voltage

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<th>Description and Procedure Reference</th>
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| 5    | **Verify Polarity and Voltage.** Confirm polarity between the battery and battery return supply connections at the PDAP-2S or PDAP-4S. Measure the voltage present at the NEG VDC “A” and “B” input lugs on the PDAP. **WARNING!** Go to the front of the PDAP and verify that all circuit breakers are in the OFF position and fuse holders are empty before verifying polarity or voltage. Procedures are provided in Chapter 12—“Battery and Battery Return Supply”:
  - Verify Polarity
  - Verify Voltage |
| 6    | All Power Cabling Checklist steps are complete. |
Basic precautions and procedures for handling cards and electrostatic discharge protection are provided in the Traverse Hardware Installation and Commissioning Guide, Chapter 3—“Precautions to Installing Traverse Equipment” and Chapter 5—“Inserting and Removing Cards.”

All Traverse node start-up and commissioning detail-level procedure references are to the Traverse Hardware Installation and Commissioning Guide. Required equipment and tools are also provided as part of start-up and card placement chapters.

**Important:** Always wear a properly grounded ESD wrist strap when handling and placing cards into the Traverse shelf. Plug the ESD wrist strap into the ESD jack provided on the air ramp or other confirmed source of earth ground.

**OPTIC WARNING!** Follow all directions and warning labels when working with optical fibers. Always wear eye protection when working with optical fibers. Never look directly into the end of a terminated or unterminated fiber or connector as it may cause eye damage.

<table>
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<th>Step</th>
<th>Description and Procedure Reference</th>
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</table>
| 1    | **Switch on Power to the Traverse Shelves (nodes).**  
      | Battery “A” and “B” PDAP-2S circuit breakers, PDAP-4S TPA fuse holders, and PDAP-15A GMT fuse holders are located on the front of the PDAP. Switch the PDAP-2S circuit breakers to the ON position or install an operable PDAP-4S TPA or PDAP-15A GMT fuse for each installed shelf beginning with A1 and B1. Leave the other PDAP-2S circuit breakers in the OFF position or PDAP-4S TPA or PDAP-15A GMT fuse holders empty.  
      | **Important:** The input power and critical alarm LEDs display on the PDAP indicating no cards are place in the Traverse shelf. The fan tray holder power LED is green.  
      | Refer to Chapter 13—“Traverse Node Start-up and Commissioning,” Commissioning Process. |
| 2    | **Insert the Active GCM in Slot GCMA or GCMB.**  
      | **Important:** The GCM power LED is solid green indicating that the GCM has power. The solid green Active/Standby LED indicates that it is the active GCM card. Initial configuration is done through the active GCM via the CLI. |
3 Connect your Laptop to the Active GCM RS-232 Interface.

Connect your laptop to the active GCM RS-232 interface (DB-9) connector using a standard straight-through serial port cable. Open up VT100 emulation software on your laptop and create your terminal emulation session.

The detail-level commissioning procedure for the following steps is provided in Chapter 13—“Traverse Node Start-up and Commissioning,” Commission the Node.

4 Logon to the TransNav Management System Command Line Interface (CLI).

Enter a login (admin) and password (admin) to access the node for initial configuration.

5 Begin Commissioning Command Sequence.

At the command line, type the following command sequence:

```
exec node commission node-id nodeName
node-ip aaa.bbb.ccc.ddd standard
technologyStandard oper-mode operationMode
<Enter>
```

See Chapter 13—“Traverse Node Start-up and Commissioning,” Required Node Commissioning Parameters for the descriptions of these parameters.

6 Reinitialize the GCM Database.

At the command prompt, type Y to reinitialize the database on the GCM.

7 Configure Node Conditional Parameters.

Configure the conditional parameters for the node:

```
set node general msaid-format msaidFormat
<Enter>
```

```
set node ip bp-dcn-ip aaa.bbb.ccc.ddd
bp-dcn-mask aaa.bbb.ccc.ddd bp-dcn-gw-ip
aaa.bbb.ccc.ddd<Enter>
```

```
set node ip ems-ip aaa.bbb.ccc.ddd ems-mask
aaa.bbb.ccc.ddd ems-gw aaa.bbb.ccc.ddd<Enter>
```

See Chapter 13—“Traverse Node Start-up and Commissioning,” Conditional Node Commissioning Parameters for the descriptions of these parameters.
8 **Restart the Node.**

At the command prompt, type the following sequence:

```
exec node restart<Enter>
```

CLI responds: Are you sure you want to execute this command? [yes|no]:

Type: **yes**<Enter>

The node begins the restart sequence.

9 **Exit the CLI.**

Exit your terminal emulation session.

10 **Place the Standby GCM in the Remaining GCM slot.**

**Important:** The Active/Standby LED on the standby GCM flashes amber while it is synchronizing with the active GCM.

**Important:** Wait for synchronization to complete. The Active/Standby LED flashes green indicating that it is the standby GCM and that synchronization is complete.

11 **Place the Remaining Cards.**

Plan card placement for the Traverse shelf based on completed network interface cabling and card placement recommendations provided in the Operations and Maintenance Guide, Chapter 21—“Card Placement Planning and Guidelines.” Also refer to the following procedures in the Traverse Hardware Installation and Commissioning Guide, Chapter 5—“Inserting and Removing Cards” for detailed instructions:

- Clean Fiber Optic MPX Connectors if you are placing optical cards
- Insert a Card

12 **Place 1-slot Wide Blank Faceplates.**

Place 1-slot wide blank faceplates in any empty Traverse card cage slots to ensure EMI protection and proper cooling.

13 All Node Start-up and Commissioning Checklist steps are complete.
INDEX

Numerics
10/100BaseT
   module placement
      precaution statement, 17
A
Air
   ramp
      installation, 52
B
Battery
   return distribution cabling
      PDAP-15A, 79
      PDAP-4S, 74
C
Cabling
   battery
      return supply, 87
      supply cabling, 85
   battery distribution
      PDAP-15A, 77
      PDAP-4S, 71
   battery return distribution
      PDAP-15A, 79
      PDAP-4S, 74
   checklist
      alarm, 123
      network, 121
      power, 128
      timing, Ethernet, RS-232, 126
Card
   insert, 31
   insert and remove, 27
   placement 10/100BaseTX precaution statement, 32
   remove, 36
Central office
   power supply, 89
Checklist
   cabling
      alarm, 123
      network, 121
      timing, Ethernet, RS-232, 126
      initial configuration, 131
      installation
      power system hardware, 119
   system hardware, 119
   power
      cabling, 128
   Cleaning MPX connectors, 28
   CLI
      commands
         initial configuration, 102, 132
   Commissioning
      node, 93
      node-id, 96
      node-ip, 96
      oper-mode, 97
      process, 100
      standard
      default node parameter, 97
   Configuration
      CLI commands, 102, 132
   Connectors, cleaning, 28
E
Electrical
   precautions, 14
   Electrostatic discharge
      jack location, 18
      precautions, 17
Environmental
   precautions, 12
   ESD, see Electrostatic discharge
F
Fan
   tray holder
      installation, 50
Front
   inlet fan tray holder
      air filter installation, 39
      power cabling, 49
      rack installation, 49, 59
G
Grounding
   front inlet fan tray holder, 4
   PDAP and the shelf, 68
   shelf, 4, 112
H
Hardware
checklist
installation, power system, 118
installation checklist, 119
precautions, 13

I
Install
air ramp, 52
fan tray holder, 50
front inlet fan tray air filter, 39
front inlet fan tray holder, 49, 59
hardware
requirements, 107
rack adaptation, 46
rack adapter, 112
shelf, 47, 61
T2000, rotated, 55
Installation
checklist
power system hardware, 118
system hardware, 119

L
LEDs
visual status
GCM start-up, 105

M
Module
insert, 31
see also card
MPX connectors
cleaning, 28

N
Node
commissioning, 100
ID, 96
IP, 96
start-up and commissioning, 93
Nutdriver, 1/4-inch
shelf power connections, 3, 108

O
Operation mode
commissioning, 97

P
PDAP
19-inch rack installation, 66, 109
ETSI rack installation, 66
protective back cover
remove, 26
replace, 26
Polarity
verify, 91
Power
battery distribution cabling
PDAP-15A, 77
PDAP-4S, 71
battery return distribution
PDAP-15A, 79
PDAP-4S, 74
battery return supply cabling, 87
battery supply cabling, 85
node, 93
supply
central office, 89
Precaution statements, 11
10/100BaseT
module placement, 17
electrical, 14
electrostatic discharge, 17
environmental, 12
hardware, 13
module, 16

S
Shelf
back covers
removing, 21, 23
replacing, 21
flush mounting, 48
grounding, 112
rack adapter installation, 112
rack installation, 47, 61
adaptation, 46
start-up and commissioning, 93
Start-up
initial configuration
checklist, 131
LED
GCM visual status, 105
node, 93
System
configuration
example, 8

V
Verify
polarity, 91
voltage, 92
Voltage
verify, 92

W

Warning statements, see Precaution statements