Installing the Cisco ONS 15540

This chapter describes the installation procedures for the Cisco ONS 15540 chassis and its components. This chapter includes the following sections:

Note Before you install, operate, or service the system, read the *Regulatory Compliance and Safety Information for the Cisco ONS 15500 Series* for important safety information you should know before working with the system.

Note To ensure that your hardware is supported by your release of Cisco IOS software, see the "New and Changed Information" section on page xii. Also refer to the "Hardware Supported" section of the latest release notes for the Cisco ONS 15540 ESP.

Warning **During this procedure, wear grounding wrist straps to avoid ESD damage to the card. Do not directly touch the backplane with your hand or any metal tool, or you could shock yourself.**

Before Installing

Before you install the shelf, you must complete the following tasks:

- Unpack and inspect the shelf.
- Maintain a network record.
- Mount the shelf.

Caution Use extreme care when removing or installing connectors so you do not damage the connector housing or scratch the end-face surface of the fiber. Always install protective covers on unused or disconnected components to prevent contamination. Always clean fiber connectors before installing them.

Unpacking and Inspecting the Shelf

The Cisco ONS 15540 shelf comes with the standard mounting set. The shelf is thoroughly inspected before shipment. If any damage has occurred during transportation or if any item is missing, notify your Cisco customer service representative immediately.

Upon receipt, inspect the equipment as follows:

Step 1 Take inventory.

Compare the equipment inside with the packing slip and the equipment list provided by customer service. If there are any discrepancies, notify the Customer Service Center.

Step 2 Check for external damage.

Visually check all components and immediately report any shipping damage to your customer service representative. Have the following information ready:

- Invoice number of shipper (see packing slip)
- Model and serial number of the damaged unit
- Description of damage
- Effect of damage on the installation

Maintaining a Network Record

Fill out the information in Appendix B, "Maintenance and Network Records," so you will have a record of all of your hardware, configuration options, and network settings.

Mounting the Shelf

The unit is designed for rack-mounting in a cabinet rack. Use star-type lock washers on the rack screws to ensure a good conductive connection between the chassis and the rack. For information about installing the units in a customer cabinet, see the instructions from the cabinet manufacturer.

Note A value added reseller can configure a Cisco ONS 15540 ESP in a rack, but all hardware with optical connectors need to be repacked and shipped out in separate boxes and reinstalled at customer sites.

Rack-Mounting the Shelf

You can install the Cisco ONS 15540 ESP chassis in a standard 19-inch rack, a 21-inch rack, or a 23-inch rack. Table 2-1 lists the correct L bracket part number required for each installation.

Table 2-1 L Bracket Part Numbers

Rack	L Bracket Part Number
19-inch	700-15196-01
21-inch	700-15176-01
23-inch	700-18074-01

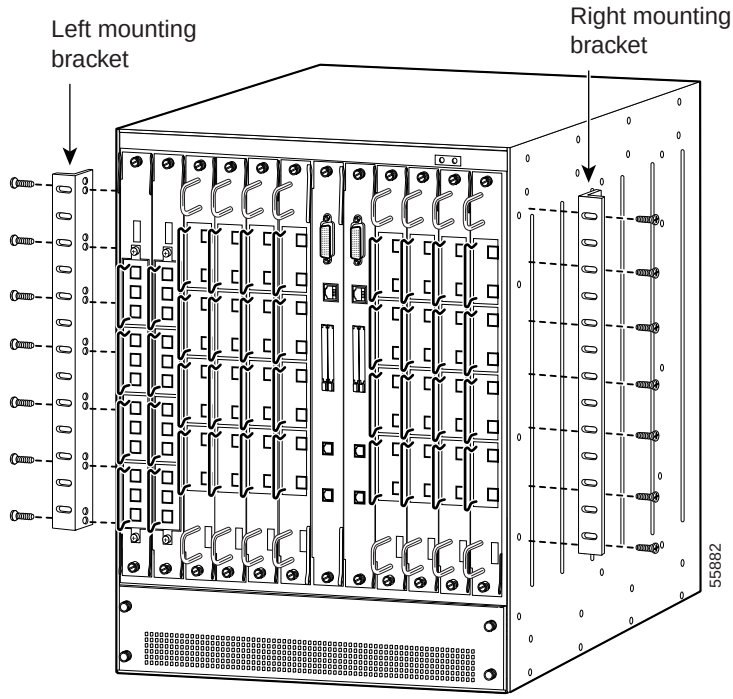
Three chassis fit in a standard rack. However, if you use the external AC-input power supply, you can install two chassis with the power supply.

To rack-mount the shelf, follow these steps:

Step 1 Place the L brackets on the sides of the chassis.

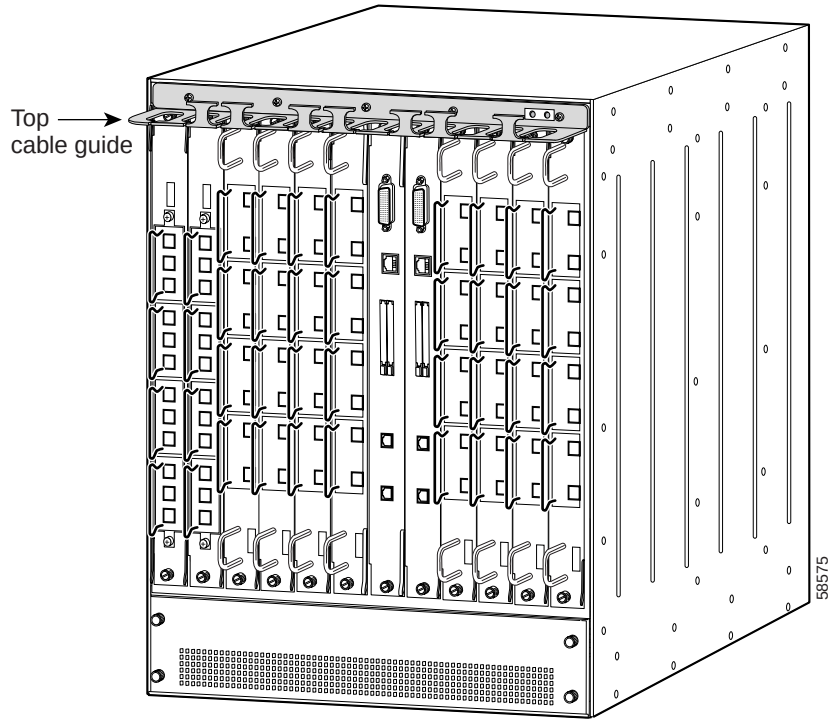
Step 2 Secure the L brackets to the chassis using the 14 M4 Phillips countersunk-head screws provided in the rack-mount kit. (See Figure 2-1.) Use seven screws on each L bracket on the sides of the chassis.

Figure 2-1 Attaching L Brackets



Step 3 Place the top cable guide over the top of the chassis. Ensure that the earth contact is visible through the cable guide. (See Figure 2-2.)

Figure 2-2 Cable Guide on the Shelf



Step 4 Secure the cable guide to the shelf with five 6-32 screws.

Tip Install the bottom cable management guide after you install the shelf in the rack.

Installing the Shelf

Warning **Only trained and qualified personnel should be allowed to install, replace, or service this equipment.**

To install the chassis in the rack, follow these steps:

Step 1 Grasp the bottom edge of the chassis with one hand near the front and the other near the back. With one person at each side of the chassis, slowly lift the chassis in unison.

Step 2 Position the chassis in the rack.

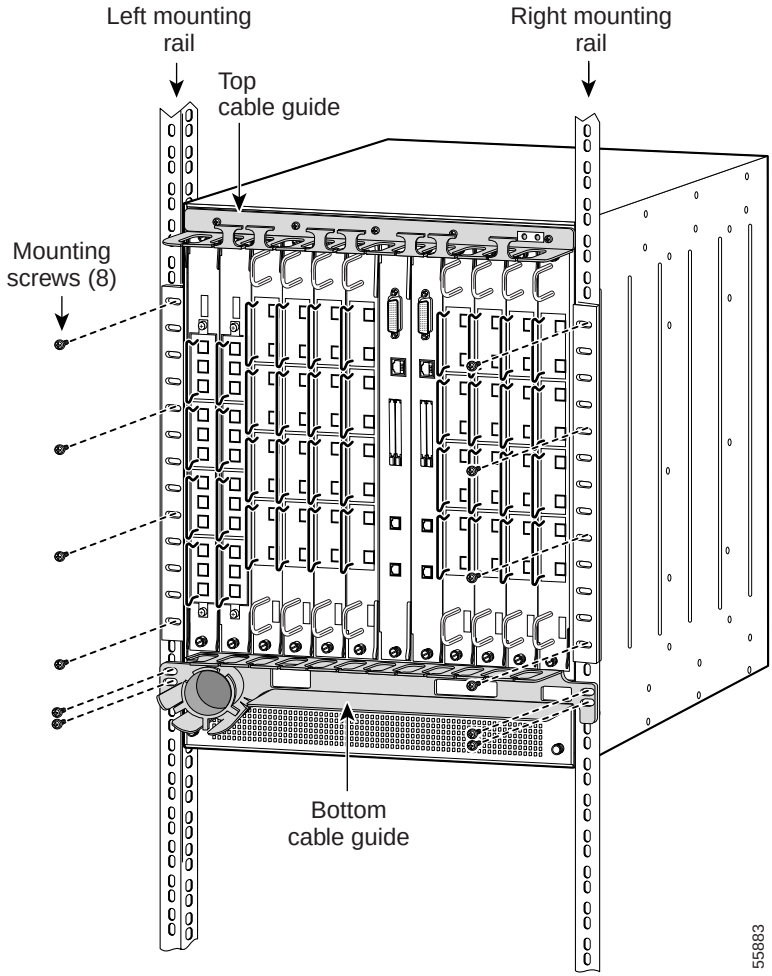
Step 3 Align the mounting holes in the L bracket and the bottom cable management guide with the mounting holes in the equipment rack. (See Figure 2-3.)

Step 4 Install the 12–24 or 10–32 screws through the elongated holes in the L bracket and into the threaded holes in the mounting post.

Step 5 Place the bottom cable guides over the fan assembly.

Step 6 Secure the cable guide to the rack with the 6-32 screws. (See Figure 2-3.)

Figure 2-3 Installing the Shelf in the Rack



Grounding the Shelf

Two system (earth) grounding holes are provided in an enclosure near the top of the chassis.

Shelf Grounding Guidelines

To make an adequate grounding connection, you need the following parts and tools:

- Grounding lug.
- Lug mounting adapter.
- Two M4 (metric) hex-head screws with locking washers.
- One grounding wire (6 AWG recommended). The length of the grounding wires depends on the location of your Cisco ONS 15540 within the site and its proximity to proper grounding facilities.
- Number 2 Phillips head screwdriver.
- Crimping tool. This tool must be large enough to accommodate the girth of the grounding lug when you crimp the grounding cable into the lug.
- Wire-stripping tool.

Note The grounding lugs, grounding wire, and M4 screws are included in your accessory kit that ships with the system.

Shelf Grounding Procedures

This section describes how to connect the Cisco ONS 15540 to earth ground. You must complete this procedure before connecting system power or powering up your shelf.

Tip If you use the cable management guides, install the grounding equipment *after* you install the top cable management guide.

To ground the shelf, follow these steps:

Step 1 Use a wire-stripping tool to remove approximately 0.75 inch (20 mm) of the covering from the end of the grounding wire.

Step 2 Insert the stripped end of the grounding wire into the open end of the grounding lug.

Step 3 Use the crimping tool to secure the grounding wire in place in the grounding lug.

Step 4 Locate the grounding receptacle on the chassis. (See Figure 2-4.)

Step 5 Remove the label that covers the grounding receptacle.

Note Step 6 is optional if you are not using the top cable management guide.

Step 6 Place the lug mounting adapter against the grounding receptacle at the top of the chassis.

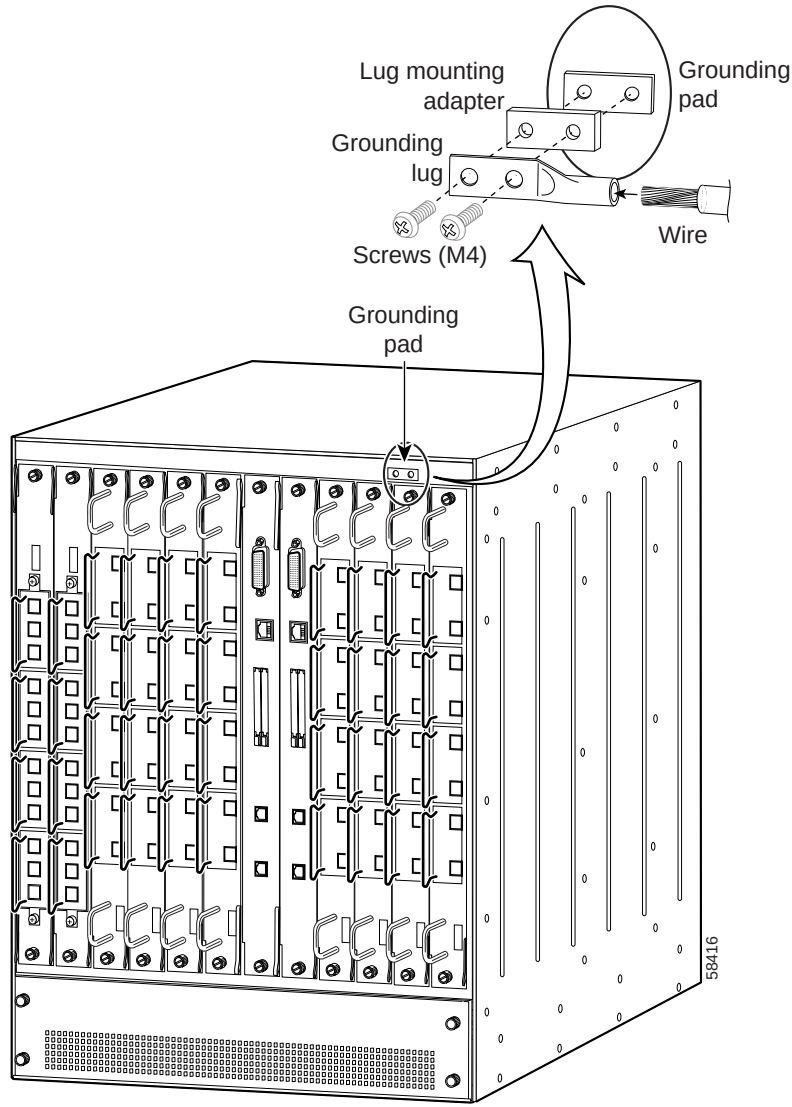
Step 7 Place the grounding lug against the lug mounting adapter.

Step 8 Insert two screws through the holes in the grounding lug and the grounding receptacle. Ensure that the grounding lug does not interfere with other hardware or rack equipment. (See Figure 2-4.)

Step 9 Install the locking washers and nuts; tighten them to secure the grounding lug to the grounding receptacle.

Step 10 Prepare the other end of the grounding wire and connect it to an appropriate grounding point in your site to ensure adequate earth ground for the Cisco ONS 15540.

Figure 2-4 Grounding Receptacle



Installing Strain Relief Brackets

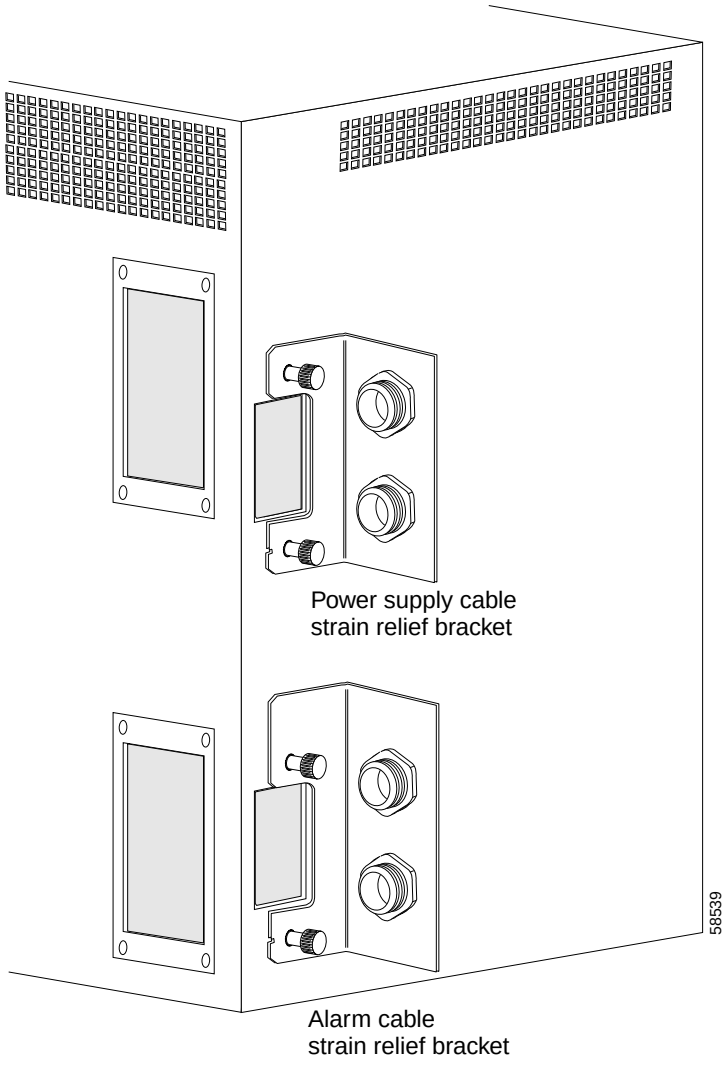
The Cisco ONS 15540 system uses a power supply cable strain relief bracket for connections to its power supply and an alarm cable strain relief bracket for alarm cable connections. The strain relief brackets must be installed after the shelf is rack mounted and installed in the rack. The brackets are required for proper function of the power supply and alarm cables.

To install the strain relief brackets, follow these steps:

Step 1 Place the strain relief bracket over the designated slots on the back panel. (See Figure 2-5.)

Step 2 Use the two screws provided to secure the strain relief bracket to the shelf.

Figure 2-5 Cable Strain Relief Brackets



To power the system, see the "Powering Up the Shelf" section on page 2-29.

Installing and Removing Motherboards and Processor Cards

The mux/demux motherboards, line card motherboards, and processor cards are hot-swappable. This section describes the procedures for installing and removing the motherboards and processor cards from the chassis.

Installing Mux/Demux Motherboards and Processor Cards

To install a mux/demux motherboard or processor card, follow these steps:

Step 1 Remove the failed motherboard, processor card, or filler motherboard from the shelf.

Step 2 Take the new motherboard or processor card from the shipping container.

Step 3 Insert the motherboard carefully into the chassis slot while guiding the upper and lower edges of the motherboard or processor card in the tracks until its connectors come into contact with the backplane connectors.

Step 4 Use your thumb and forefinger of each hand to simultaneously push the motherboard or processor card in until it is fully seated in the backplane connector.

Step 5 Use a 3/16-inch flat-blade screwdriver to tighten the captive installation screws.

Step 6 Check the LED to ensure proper installation. See Table 1-1 on page 1-6 for line card motherboard LED descriptions, Table 1-6 on page 1-17 for mux/demux motherboard LED descriptions, and Table 1-7 on page 1-18 for processor card LED descriptions.

Save the filler motherboards with the packaging material.

Removing Mux/Demux Motherboards and Processor Cards

To remove the mux/demux motherboards and processor cards, follow these steps:

Step 1 Remove all cables from the modules installed in the motherboard, if applicable, or the processor card.

Step 2 Install appropriate dust covers on the fiber cable connectors and the blind plugs into the connectors on the motherboard or processor card.

Step 3 Use a 3/16-inch flat-blade screwdriver to loosen the captive installation screws.

Step 4 Use the captive installation screws to pull the motherboard or processor card out of the slot in the chassis.

Place the removed motherboard or processor card in a container appropriate for shipping and storage. To install a replacement motherboard or processor card, see the "Installing Mux/Demux Motherboards and Processor Cards" section on page 2-14.

Installing Line Card Motherboards

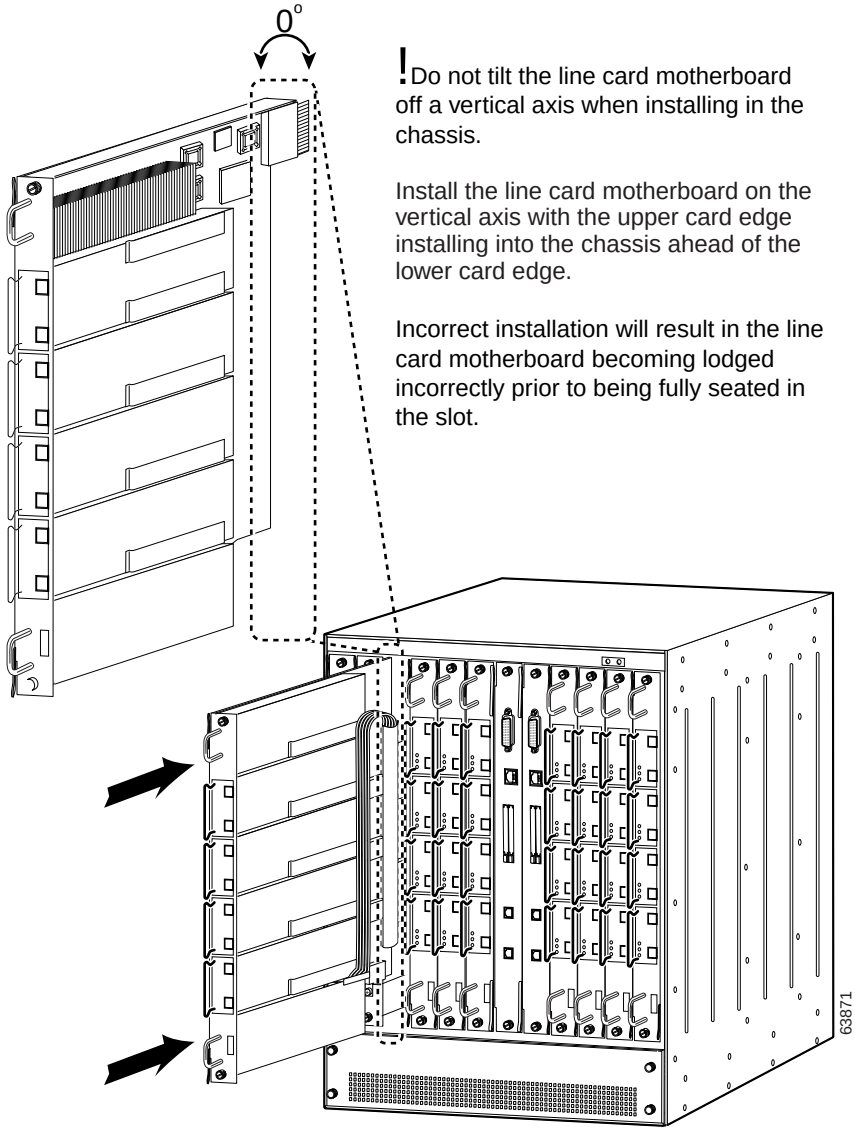
To install a line card motherboard, follow these steps:

Step 1 Remove the failed line card motherboard from the shelf.

Step 2 Take the new line card motherboard from the shipping container.

Step 3 Align the top of the line card motherboard and slide the line card motherboard into the chassis slot. (See Figure 2-6.)

Figure 2-6 Installing a Line Card Motherboard



! Do not tilt the line card motherboard off a vertical axis when installing in the chassis.

Install the line card motherboard on the vertical axis with the upper card edge installing into the chassis ahead of the lower card edge.

Incorrect installation will result in the line card motherboard becoming lodged incorrectly prior to being fully seated in the slot.

Step 4 Use the handles to push the line card motherboard in until it is fully seated in the backplane connector.

Step 5 Use a 3/16-inch flat-blade screwdriver to tighten the captive installation screws.

Step 6 Check the LED to ensure proper installation. See Table 1-1 on page 1-6 for line card motherboard LED descriptions.

Removing Line Card Motherboards

To remove the line card motherboards, follow these steps:

Step 1 Remove all cables from the modules installed in the line card motherboard if applicable.

Step 2 Install appropriate dust covers on the fiber cable connectors and the blind plugs into the connectors on the line card motherboard.

Step 3 Use a 3/16-inch flat-blade screwdriver to loosen the captive installation screws.

Step 4 Use the handles to pull the line card motherboard out of the slot in the chassis.

Place the removed line card motherboard in a container appropriate for shipping and storage. To install a replacement line card motherboard, see the "Installing Line Card Motherboards" section on page 2-15.

Installing and Removing Modules

The mux/demux modules and transponder modules are hot-swappable. This section describes the procedure for installing and removing modules from the motherboards.

Warning **During this procedure, wear grounding wrist straps to avoid ESD damage to the card. Do not directly touch the backplane with your hand or any metal tool, or you could shock yourself.**

Installing Modules

This section describes how to install mux/demux and transponder modules. If you are installing a 16-channel mux/demux module, see the "Installing 16-Channel Mux/Demux Modules" section on page 2-19. If you are installing an Type 2 extended range transponder with selectable transceivers, see the "Installing the Type 2 Extended Range Transponder Modules with SFP Optics" section on page 2-21.

To install the mux/demux modules or transponder modules, follow these steps:

Step 1 Remove the failed module or the filler module from the motherboard.

Step 2 Take a new module from the shipping container.

Step 3 Insert the module carefully into the motherboard slot while guiding the upper and lower edges of the module in the tracks until its connectors come into contact with the backplane connectors. You hear a click when it is connected.

Note Make sure the module has no cables attached to it before installing it into the line card motherboard.

Step 4 Attach the appropriate cables.

Note Wait one minute before installing another module into the motherboard.

Step 5 Save the filler modules with the packaging material.

Installing 16-Channel Mux/Demux Modules

This section describes the procedure for replacing 4-channel or 8-channel mux/demux modules with 16-channel terminal mux/demux modules.

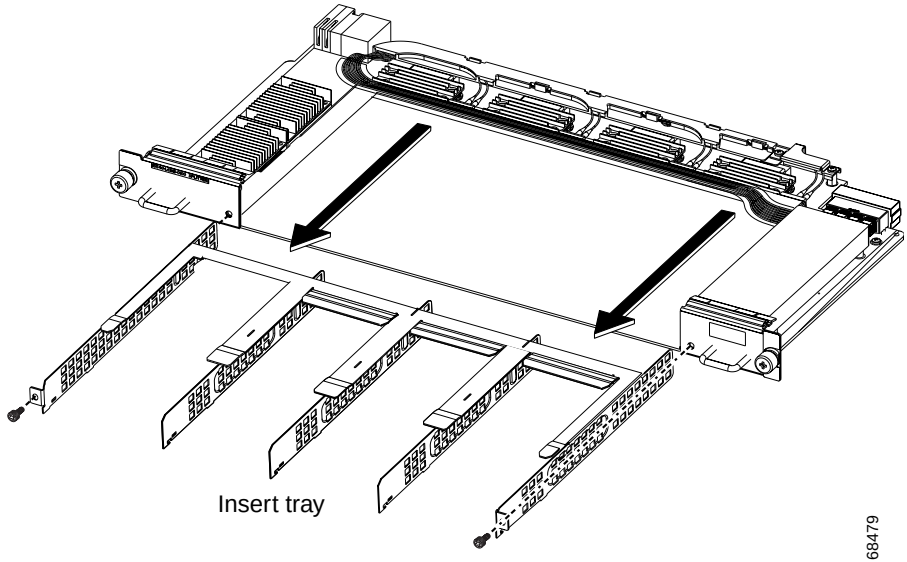
To install the 16-channel terminal mux/demux module, follow these steps:

Step 1 Remove all cables, including the OSC cables, from all of the mux/demux modules in the line card motherboard.

Step 2 Remove the modules from the line card motherboard. See the "Removing Modules" section on page 2-28.

Step 3 Loosen the screws on the inset tray and use the screws to pull the tray out of the line card motherboard. (See Figure 2-7.)

Figure 2-7 Removing the Insert Tray



Step 4 Insert the correct inset tray for the 16-channel mux/demux module and secure the tray to the line card motherboard by tightening the screws.

Step 5 Take a new module from the shipping container.

Step 6 Insert the 16-channel mux/demux module with OSC carefully into the top motherboard slot while guiding the upper and lower edges of the module in the tracks until its connectors come into contact with the backplane connectors. You hear a click when it is connected.

Note Make sure the module has no cables attached to it before installing it into the line card motherboard.

Step 7 Insert the 16-channel mux/demux module without OSC carefully into the bottom motherboard slot while guiding the upper and lower edges of the module in the tracks until its connectors come into contact with the backplane connectors. You hear a click when it is connected.

Step 8 Attach the OSC cables and all other appropriate cables. The connections on the 16-channel mux/demux modules are one-to-one.

Step 9 Check the LEDs to ensure proper installation. See Table 1-6 on page 1-17 for LED descriptions.

Installing Mux/Demux and 2.5 Gbps Transponder Modules

To install the mux/demux modules or 2.5 transponder modules follow these steps:

Step 1 Remove the failed module or the filler module from the motherboard.

Step 2 Take a new module from the shipping container.

Step 3 Insert the module carefully into the motherboard slot while guiding the upper and lower edges of the module in the tracks until its connectors come into contact with the backplane connectors. You hear a click when it is connected.

Step 4 Attach the appropriate cables.

Save the filler modules with the packaging material.

Installing the Type 2 Extended Range Transponder Modules with SFP Optics

Note Only use Cisco-certified SFP optics for the Type 2 extended range transponders.

To install the Type 2 extended range transponders with SFP optics, follow these steps:

Step 1 Take the desired transceiver from the shipping container.

Step 2 Install the SFP by inserting it into the extended reach transponder. Push the SFP until it is securely set in the module.

Step 3 Insert the extended reach transponder module carefully into the motherboard slot while guiding the upper and lower edges of the module in the tracks until its connectors come into contact with the backplane connectors. You hear a click when it is connected.

Step 4 Push the latch on the module down to secure the module in place.

Step 5 Attach the appropriate cables.

Removing SFP Optics from the Type 2 Extended Range Transponders

There are two types of SFP optics that can be installed in the extended reach transponder modules. The connectors on the SFP optics are:

- MT-RJ connector
- LC connector

The MT-RJ connector is typically used for lower rate connections (ESCON and OC-3). The LC connector is typically used for higher rate connections (Gigabit Ethernet and Fibre Channel). Each connector requires a different method of removal. Each type of SFP requires a different method of removal.

Note Use the **show hardware** command to see what SFP optic you have currently installed in your module.

Removing SFP Optics with MT-RJ Connectors

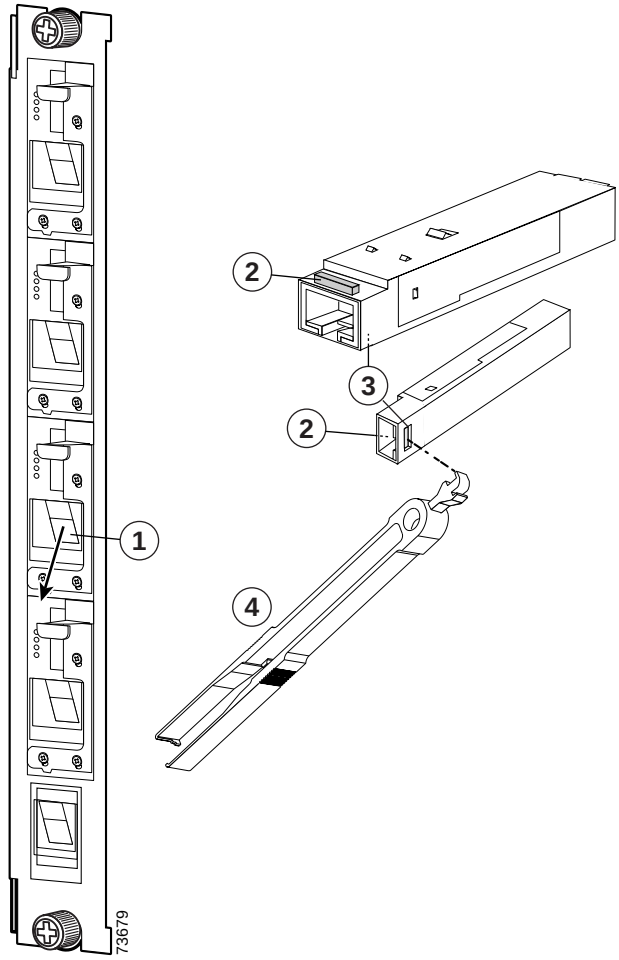
Note You need the cable installation and removal tool to remove the SFP with the MT-RJ connector.

To remove an SFP with an MT-RJ connector from the extended reach transponder module, follow these steps:

Step 1 Remove the cable from the desired SFP.

Step 2 Remove the SFP from the module by pushing against the lever on the SFP to release it from the module. (See Figure 2-8.)

Figure 2-8 Removing the SFP with MT-RJ Connector



1	SFP placement in the module	**3**	Hole where the SFP extraction end of the tool is inserted
2	Lever on the SFP (two views)	**4**	SFP extraction and cable installation and removal tool

Step 3 Use the tool to remove the ADP by inserting the tool into the side of the transceiver and pulling it out of the module.(See Figure 2-8.)

Step 4 Place the removed SFP in a container appropriate for shipping and storage.

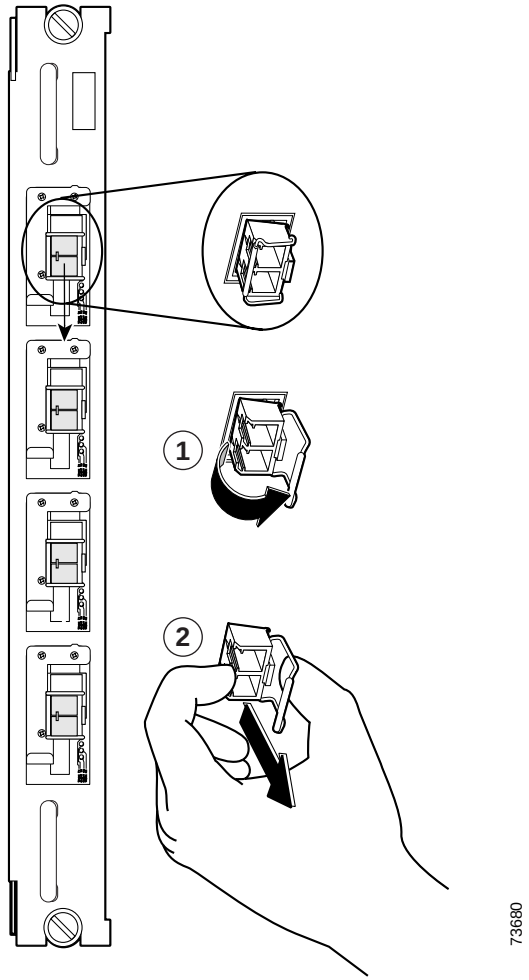
Removing SFP Optics with LC Connectors

To remove an SFP with an LC connector from the extended reach transponder module, follow these steps:

Step 1 Remove the cable from the desired SFP.

Step 2 Remove the SFP from the module by pulling the latch on top of the SFP to release it from the module. (See Figure 2-9.)

Figure 2-9 Removing the SFP with the LC Connector



1	Release latch	**2**	SFP removal

Step 3 Continue to pull the latch down and use the latch to pull the SFP out of the module. (See Figure 2-9.)

Step 4 Place the removed SFP in a container appropriate for shipping and storage.

Using CLI Prior to 2.5-Gbps Transponder Module Removal

Removing a 2.5-Gbps transponder module from the Cisco ONS 15540 ESP causes bit rate errors on other transponder modules in the 2.5-Gbps line card motherboard. Although these errors do not affect system traffic, you can avoid them using the following privileged EXEC command before removing the transponder module:

Command	Purpose
hw-module subslot *slot/subslot* **power off**	Turns off the power to a 2.5-Gbps transponder module.

Note The **hw-module subslot power** command is only supported on modules installed in 2.5-Gbps line card motherboards with hardware version 5.1, or later, and with LRC (line card redundancy controller) functional image version 2.72, or later.

To determine the functional image and hardware versions on your system, use the show hardware detail command.

Note Wait 60 seconds after removing a 2.5-Gbps transponder module before inserting a 2.5-Gbps transponder module into the same subcard position in the 2.5-Gbps line card motherboard.

Example

The following example shows how to turn off the power to a 2.5-Gbps transponder module before removing it:

```
Switch# hw-module subslot 8/1 power off
Warning: Power OFF subcard 8/1.  Continue? [confirm]y
Switch#
```

Verifying 2.5-Gbps Transponder Module Power Status

To verify the status of the power to a 2.5-Gbps transponder module, use the following privileged EXEC command:

Command	Purpose
show hardware linecard *slot*	Displays hardware information for a specific slot in the shelf.

Example

The following example shows how to display the power status of the subcards in a 2.5-Gbps line card motherboard:

```
Switch# show hardware linecard 8
------------------------------------------------------------------
Slot Number             : 8/*
Controller Type         : XpndrMotherboard
On-Board Description    : TRANSPONDER_MOTHER_PHASE_0
Orderable Product Number: N/A
Board Part Number       : 73-5813-05
Board Revision          : 05
Serial Number           : CAB0517HLRV
Manufacturing Date      : 03/30/2001
Hardware Version        : 5.1
RMA Number              : 0x00
RMA Failure Code        : 0x00
Functional Image Version: 2.55
Subcard Power Control   : 0:ON, 1:OFF, 2:ON, 3:ON
<Information deleted.>
```

Removing Modules

Warning **High-performance devices on this card can get hot during operation. To remove the card, hold it by the faceplate and bottom edge. Allow the card to cool before touching any other part of it or before placing it in an antistatic bag.**

Note You can avoid bit rate errors that can cause the system to issue alarms if an alarm threshold is exceeded by turning off the power to the online module with the **how-module subset power** command before removing a transponder module. Use the **show hardware linecard** command to display the status of the power to a transponder module.

To remove a module from your unit without interrupting system operation, follow these steps:

Step 1 Remove all cables from the desired module.

Step 2 Remove the module by carefully pulling it out of the slot in the motherboard.

Step 3 Reinstall the blank filler module.

Step 4 Place the removed module in a container appropriate for shipping and storage.

Installing and Removing the Fan Assembly

The fan assembly is hot-swappable. Fan status is reported to the processor cards. Table 2-2 lists the status for the fan assembly. If a major alarm occurs, the fan assembly should be replaced.

Note Use the **show facility-alarm status** command to verify it is the fan that is causing the major alarm. If the output shows “Fan” as the source, replace the fan assembly.

Table 2-2 Fan Assembly Status

Fan Failure	Status
None	Normal
One	Minor
Two or more	Major

To replace the fan assembly in the Cisco ONS 15540, follow these steps:

Step 1 Carefully remove the bottom cable management guide secured over the fan assembly by loosening the 6-32 screws from the rack and pulling it off of the shelf.

Step 2 Place the cable management guide near the rack.

Step 3 Unscrew the captive installation screws on the fan assembly.

Step 4 Grasp the fan assembly captive installation screws and pull them towards you.

Step 5 Pull the fan assembly out of the bay and put it aside.

Step 6 Place the new fan assembly into the front chassis cavity so it rests on the chassis. Lift the fan assembly up slightly and align the top and bottom guides.

Step 7 Push the fan assembly into the chassis until the captive installation screws meet the chassis.

Step 8 Tighten each of the captive installation screws.

Step 9 Power up the system and verify fan assembly operation by checking the fan assembly status. The fan status is normal when operating properly.

Powering Up the Shelf

The system is powered by redundant -48 VDC inputs. Two models (15540-PWR-AC and 15540-ACPS-N-E) of redundant external AC-input power supplies are available or DC-input power can be provided directly.

The external power supplies are single-phase, AC-DC, 1050 W, -48 V output power supplies. The external power supplies are installed in an external power shelf that fits into a standard equipment rack. The following note and warnings apply to direct DC-connected installations.

Note The DC return is to remain isolated from the system frame and chassis (DC-I).

Warning **A readily accessible disconnect device must be incorporated in the building's installation wiring.**

Warning **This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that a Listed and Certified fuse or circuit breaker 25A, minimum 60 VDC, is used on all current-carrying conductors.**

If an external AC-input power supply is not used, proceed to the "Connecting DC-Input Power from the 15540-PWR-AC Power Supply" section on page 2-37.

Rack-Mounting the 15540-PWR-AC External Power Shelf

The external power shelf is available in two models. This section describes the installation of the 15540-PWR-AC external power shelf. See the "Rack-Mounting the 15540-ACPS-N-E External Power Shelf" section on page 2-41 for the other model.

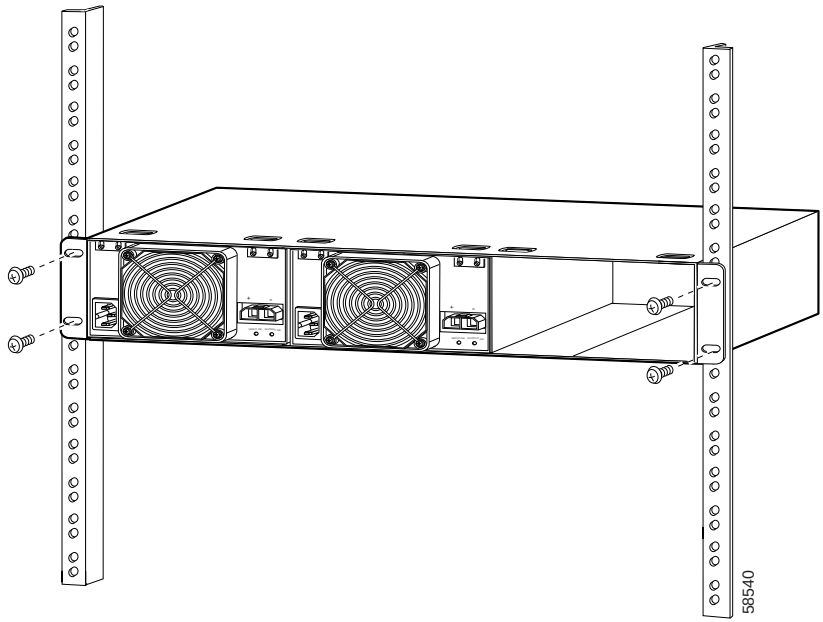
Note Make sure you install the 15540-PWR-AC external power shelf close enough to your chassis so that you can connect all power cords to the chassis and to the power outlet. We recommend that you install the 15540-PWR-AC external power shelf directly above your Cisco ONS 15540 chassis, leaving one half inch of space between the chassis and the power shelf or in a directly adjacent rack. The external power shelf is a 19-inch (483 mm) wide rack mount shelf, 3.5 inches (86 mm) high and 12 inches (305 mm) deep.

To install the 15540-PWR-AC external power shelf in an equipment rack, follow these steps:

Step 1 Align the mounting holes in the L brackets with the mounting holes in the equipment rack.

Step 2 Secure the 15540-PWR-AC external power shelf using four (two per side) 12-24 x 3/4-inch screws through the elongated holes in the L bracket and into the threaded holes in the mounting post. (See Figure 2-10.)

Figure 2-10 Installing the 15540-PWR-AC External Power Shelf in the Rack



Step 3 Use a tape measure and level to ensure that the 15540-PWR-AC external power shelf is installed straight and level.

Installing and Connecting the 15540-PWR-AC External Power Supply

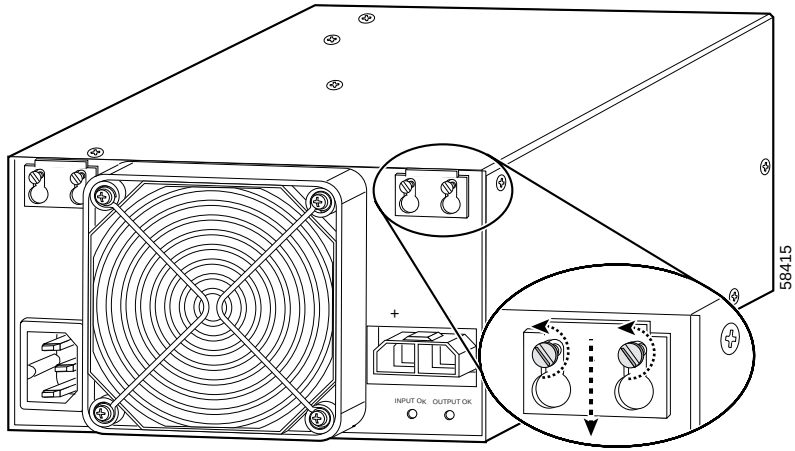
After you have installed the 15540-PWR-AC external power shelf in the equipment rack, you can install the 15540-PWR-AC power supplies. If you have not installed the 15540-PWR-AC external power shelf, see the "Rack-Mounting the 15540-PWR-AC External Power Shelf" section on page 2-30.

To install a 15540-PWR-AC power supply, follow these steps:

Step 1 Make sure that the 15540-PWR-AC power supply you are installing is not plugged in to a power outlet.

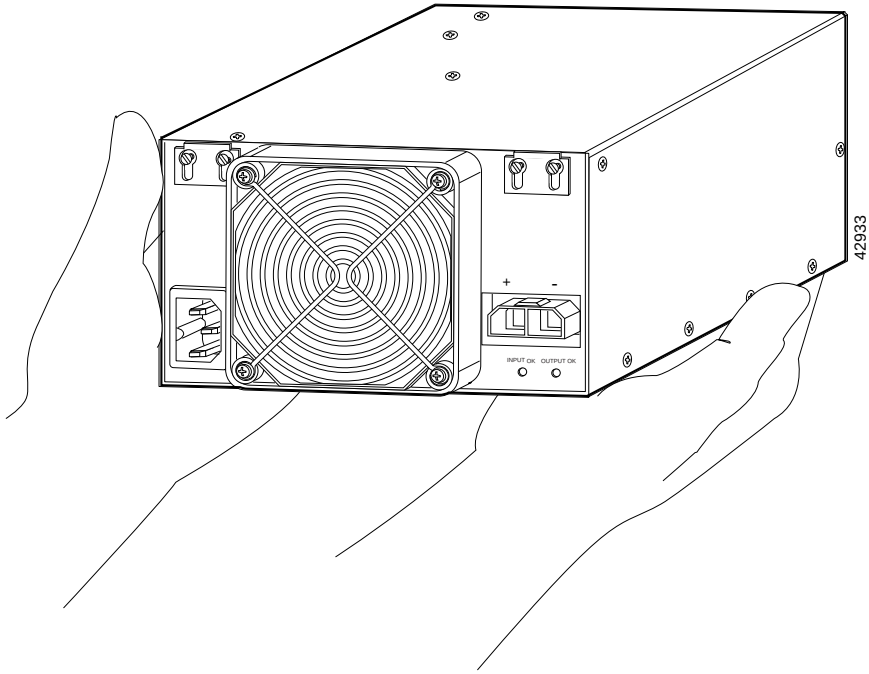
Step 2 Loosen the screws on the attachment plates on the upper left and right corners of the external power supply so you can slide the attachment plates down. (See Figure 2-11.)

Figure 2-11 Sliding the External Power Supply Attachment Plates Down



Step 3 Grasp the 15540-PWR-AC power supply handle with one hand. Place your other hand underneath to support the bottom of the external power supply. (See Figure 2-12.)

Figure 2-12 Handling the 15540-PWR-AC Power Supply

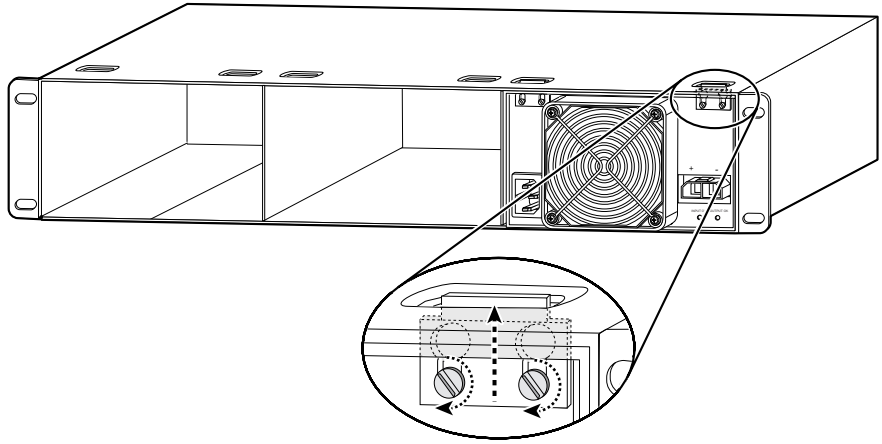


Caution Use both hands to install and remove the 15540-PWR-AC power supply.

Step 4 Slide the 15540-PWR-AC power supply all the way into the 15540-PWR-AC external power shelf bay, aligning the attachment plates with the slots on the top of the external power shelf.

Step 5 Slide each attachment plate up so that the upper edge is wedged into the 15540-PWR-AC external power shelf slot and use a screwdriver to tighten the two screws on each attachment plate. (See Figure 2-13.)

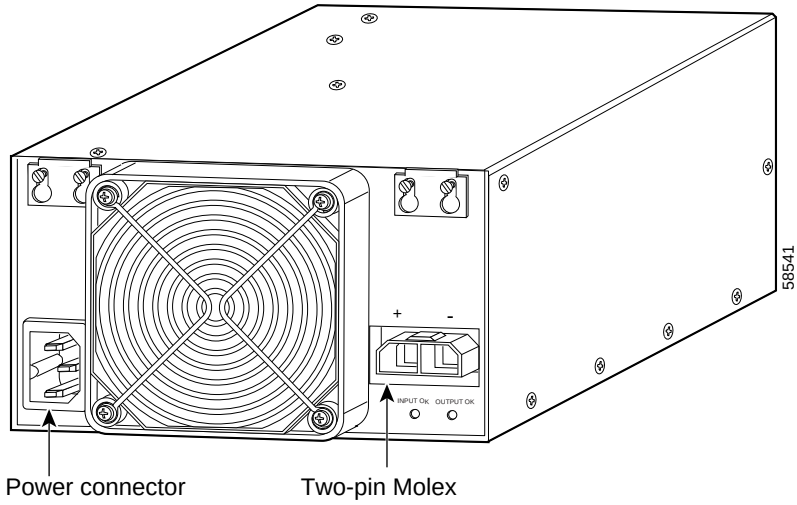
Figure 2-13 Tightening the Attachment Plates



Step 6 Ensure that all site power and grounding requirements described in the *Regulatory Compliance and Safety Information for the Cisco ONS 15500 Series* have been met before you connect the external power supply to a power source.

Step 7 Plug one end of the two-pin Molex cord into the external power supply. (See Figure 2-14.)

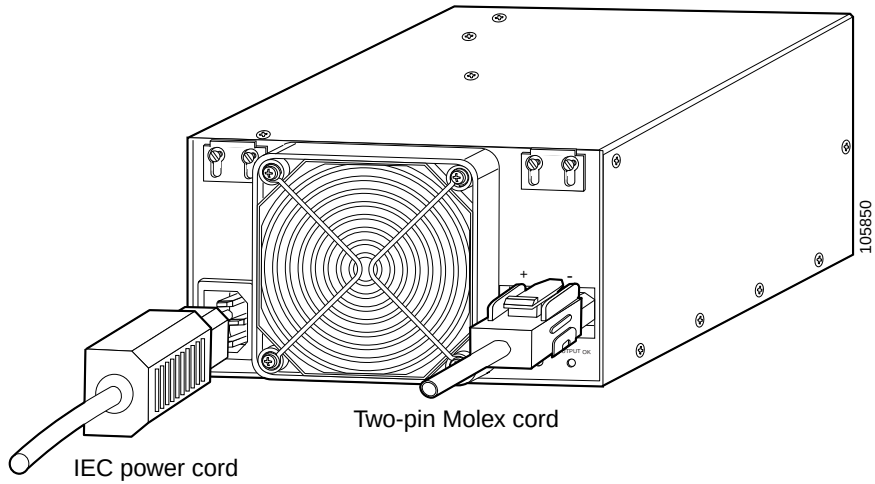
Figure 2-14 Power Connector and Two-Pin Molex Connector



Step 8 Connect the other end of the two-pin Molex cord to the chassis.

Step 9 Connect the other end of the power cord to an AC-power input source. (See Figure 2-15.)

Figure 2-15 Connecting the 15540-PWR-AC Power Supply to the Chassis



Caution In a system with multiple 15540-PWR-AC power supplies, connect each power supply to a separate AC-input power source. In case of a power source failure, the second source is still available and can maintain maximum overcurrent protection for each power connection.

Step 10 Verify 15540-PWR-AC power supply operation by checking the power supply front panel LEDs:

- INPUT OK LED is on.
- OUTPUT OK LED is on.

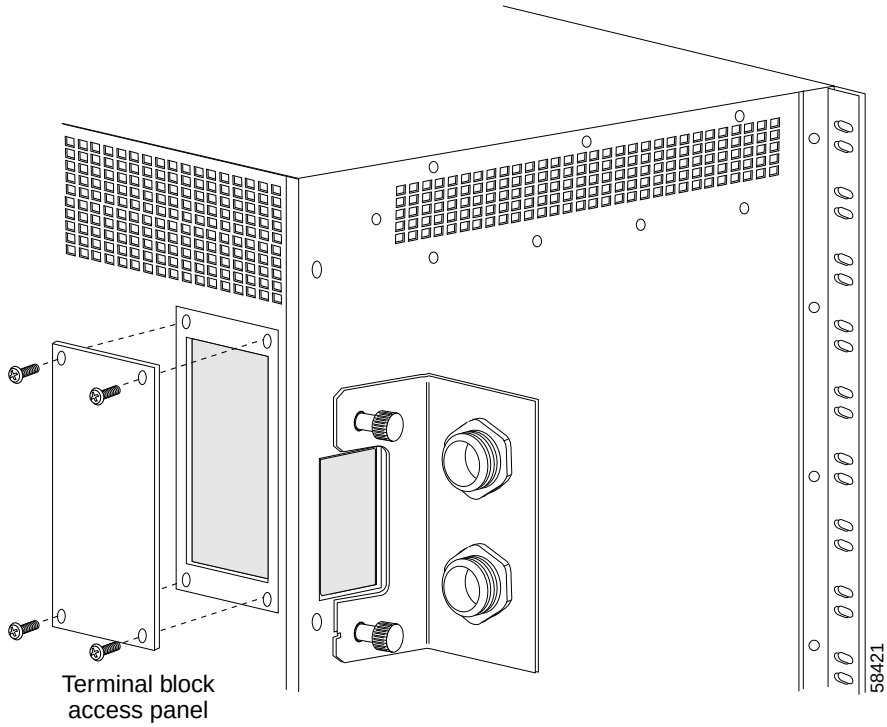
Step 11 Check the external power supply status from the system console by entering the **show hardware** command. For more information on commands, refer to the *Cisco ONS 15540 ESP Configuration Guide and Command Reference*.

Connecting DC-Input Power from the 15540-PWR-AC Power Supply

To apply DC-input power to your Cisco ONS 15540 shelf, follow these steps:

Step 1 Remove the four screws from the terminal block access panel on the back panel of the chassis. (See Figure 2-16.)

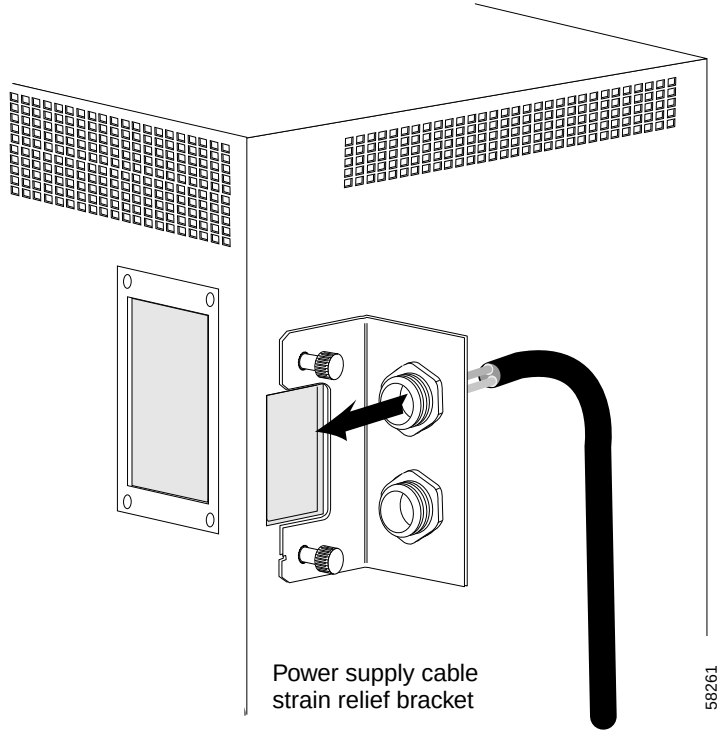
Figure 2-16 Removing the Terminal Block Access Panel



Step 2 Remove the insulation of each wire on both ends of the interconnection cables at a length of about a 1/4 inch (6 mm).

Step 3 Insert the cord through the power supply cable strain relief on the back left side of the chassis. (See Figure 2-17.)

Figure 2-17 Inserting the Cord Through the Power Supply Cable Strain Relief



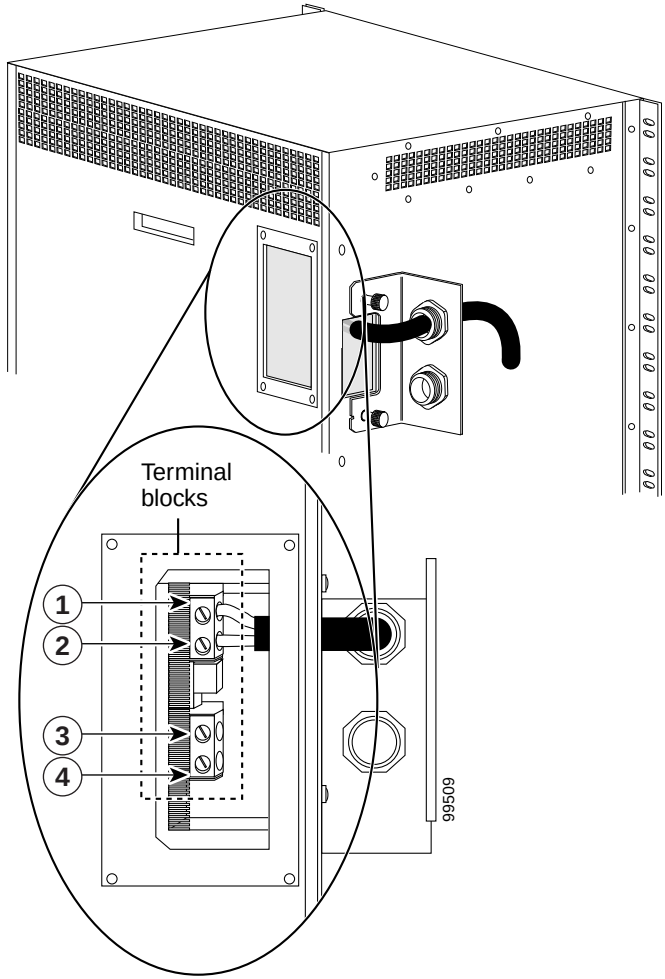
Step 4 Connect the wires of the cables to the terminal blocks. (See Figure 2-18.) Wire the cables in the following sequence:

- Red lead to the terminal labeled RTNA.
- Black lead to the terminal labeled -48A.

Note The ground connections should always be connected first and disconnected last.

Note The second power supply cable should be connected to the terminals labeled RTNB and -48B.

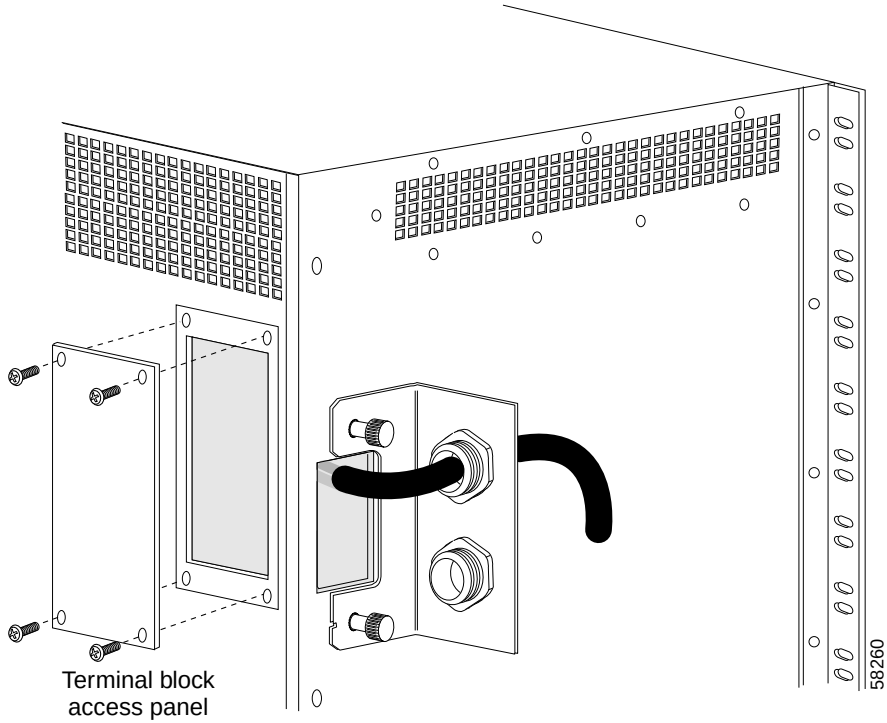
Figure 2-18 Connecting Cable Wires to the Terminal Blocks



1	RTNA	**3**	RTNB
2	–48VA	**4**	–48VB

Step 5 Reinstall the terminal block access panel onto the chassis. Use the same four screws used in Step 1 to secure the panel. (See Figure 2-19.)

Figure 2-19 Reinstalling the Terminal Block Access Panel



Step 6 Turn the power on using the corresponding power switch of the power supply.

Rack-Mounting the 15540-ACPS-N-E External Power Shelf

This section describes the installation of the 15540-ACPS-N-E external power shelf.

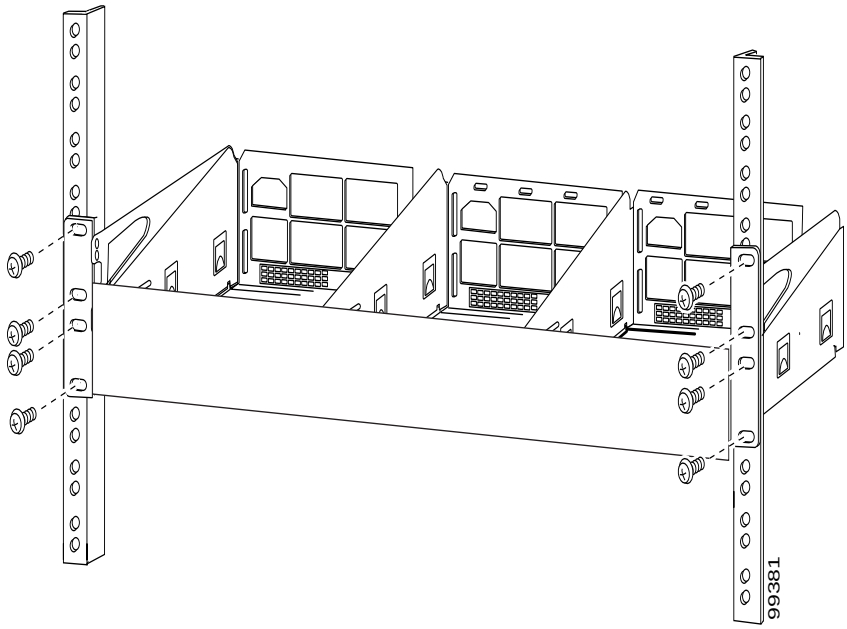
Note Make sure you install the 15540-ACPS-N-E external power shelf close enough to your chassis so that you can connect all power cords to the chassis and to the power outlet. We recommend that you install the 15540-ACPS-N-E external power shelf directly above your Cisco ONS 15540 chassis, leaving one-half inch of space between the chassis and the power shelf or in a directly adjacent rack. The external power shelf is a 19-inch (483 mm) wide rack mount shelf, 3.5 inches (86 mm) high and 12 inches (305 mm) deep.

To install the 15540-ACPS-N-E external power shelf in an equipment rack, follow these steps:

Step 1 Align the mounting holes of the external power shelf with the mounting holes in the equipment rack.

Step 2 Secure the external power shelf using eight (four per side) 12-24 x 3/4-inch screws through the holes in the external power shelf and into the threaded holes in the mounting post. (See Figure 2-20.)

Figure 2-20 Installing the 15540-ACPS-N-E External Power Shelf in the Rack



Step 3 Use a tape measure and level to ensure that the external power shelf is installed straight and level.

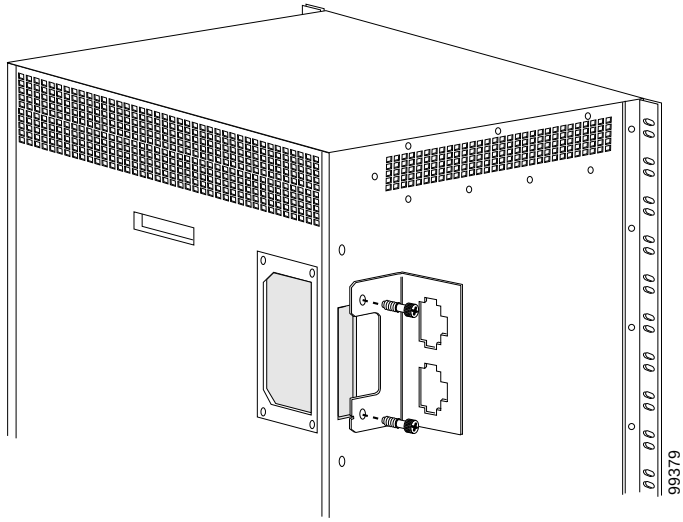
Step 4 Remove the spacer bar after the external power shelf is secured to the rack.

Connecting DC-Input Power from the 15540-ACPS-N-E External Power Shelf

To apply DC-input power to your Cisco ONS 15540 shelf, you must install a cable strain relief bracket and two DC power cables. The two DC power cables are connected to each other at the cable strain relief bracket. To complete the connections, follow these steps:

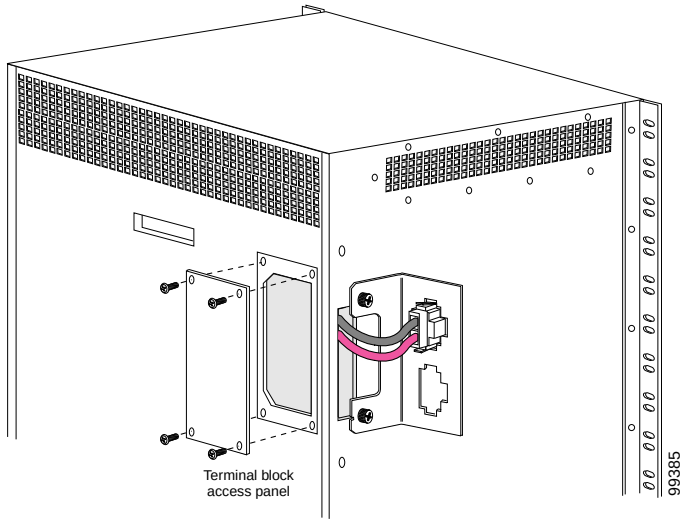
Step 1 Attach the cable strain relief bracket to the side of the Cisco 15540 chassis. (See Figure 2-21.)

Figure 2-21 Installing the Cable Strain Relief Bracket



Step 2 Remove the four screws from the terminal block access panel on the back panel of the chassis. (See Figure 2-22.)

Figure 2-22 Removing the Terminal Block Access Panel



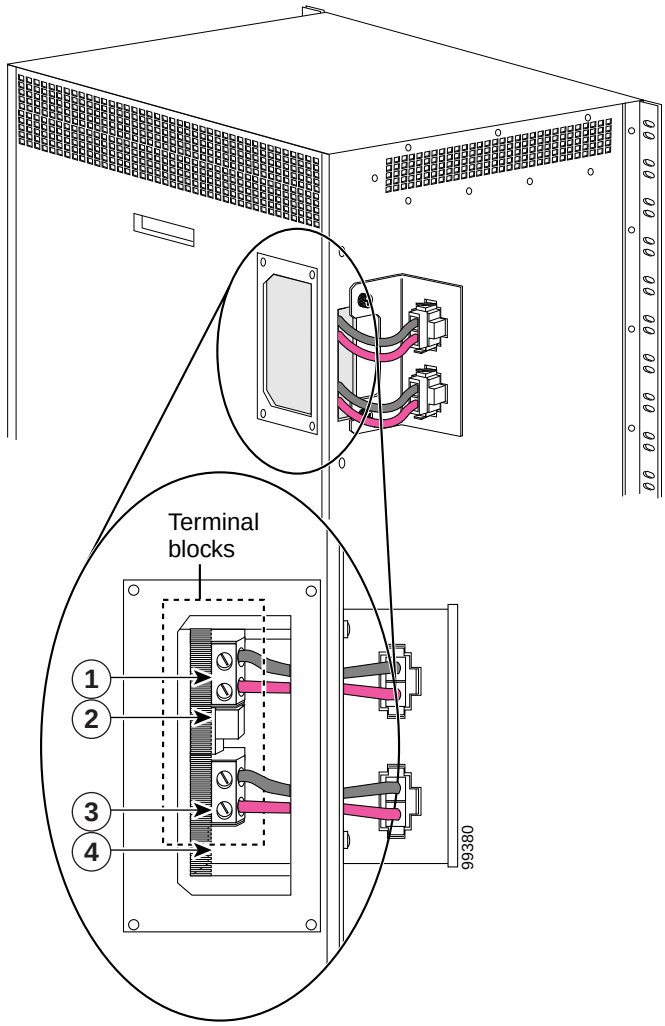
Step 3 Snap the cable connector of the short DC power cable into the cable strain relief bracket. (See Figure 2-22.)

Step 4 Insert the cable through the left rear of the chassis and connect the leads to the terminal blocks (see Figure 2-23) in the following sequence:

- Black lead to RTNA.
- Red lead to –48A.

Note The ground connections should always be connected first and disconnected last.

Figure 2-23 Connecting Cable Wires to the Terminal Blocks



1	RTNA	**3**	RTNB
2	–48VA	**4**	–48VB

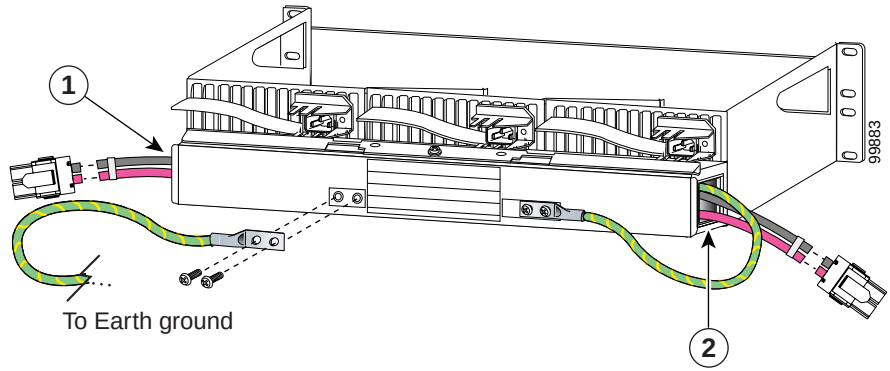
Step 5 Repeat Step 3 and Step 4, connecting the second set of cables in the following sequence:

- Black lead to RTNB.
- Red lead to –48B.

Step 6 Reinstall the terminal block access panel onto the chassis. Use the same four screws used in Step 2 to secure the panel. (See Figure 2-22.)

Step 7 Use two number 10 screws to attach the earth ground lead to the ground lugs on the rear of the 15540-ACPS-N-E external power shelf. (See Figure 2-24.)

Figure 2-24 Connecting to Earth Ground

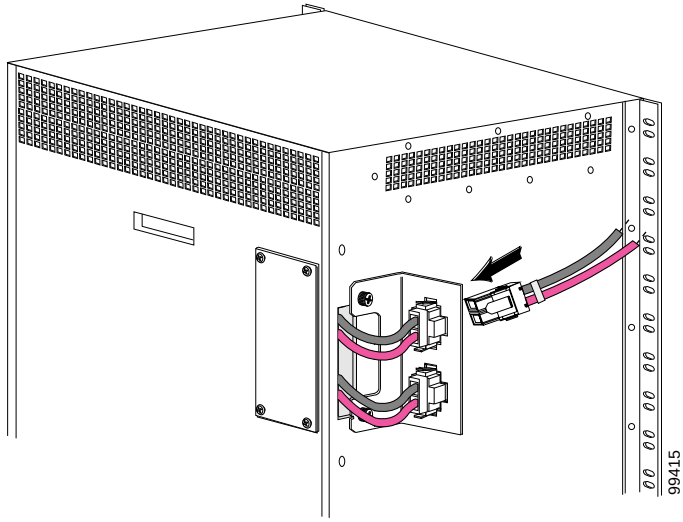


1	Side B	**2**	Side A

Step 8 Connect the earth ground lead to an appropriate ground source.

Step 9 Attach the side A and side B cable ends to the short DC power cables at the cable strain relief bracket. (See Figure 2-25.)

Figure 2-25 Connecting the DC Power Cables



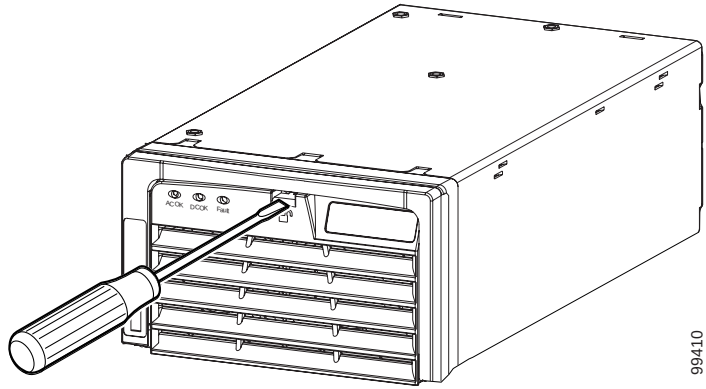
Installing and Connecting the 15540-ACPS-N-E External Power Supply

After you have installed the 15540-ACPS-N-E external power shelf in the equipment rack, you can install the external power supplies. If you have not installed the external power shelf, see the "Rack-Mounting the 15540-ACPS-N-E External Power Shelf" section on page 2-41.

To install the 15540-ACPS-N-E power supply, follow these steps:

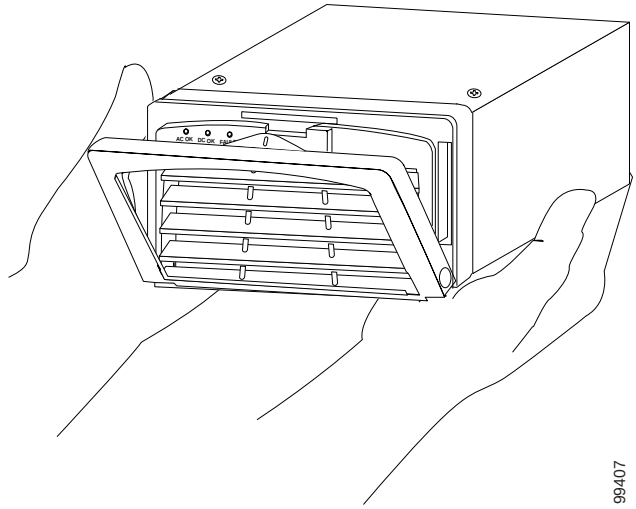
Step 1 Use a flat blade screwdriver to push in on the release handle latch until the release handle opens. (See Figure 2-26.)

Figure 2-26 Opening the Release Handle



Step 2 With the release handle partially open, place both hands underneath the bottom of the external power supply and carry it to the external power shelf. (See Figure 2-27.)

Figure 2-27 Handling the 15540-ACPS-N-E Power Supply

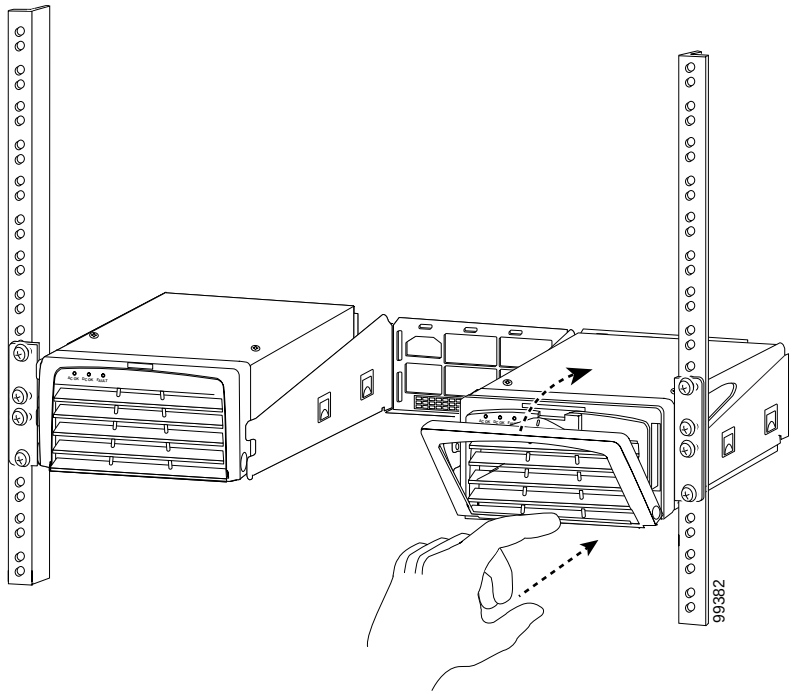


Caution Use both hands to install and remove the 15540-ACPS-N-E power supply.

Step 3 Slide the 15540-ACPS-N-E power supply all the way into the 15540-ACPS-N-E external power shelf bay until the release handle closes. (See Figure 2-28.)

Note The 15540-ACPS-N-E power supply will not function in the center bay of the 15540-ACPS-N-E external power shelf. Install the blank power supply in the center bay.

Figure 2-28 Installing the 15540-ACPS-N-E Power Supply

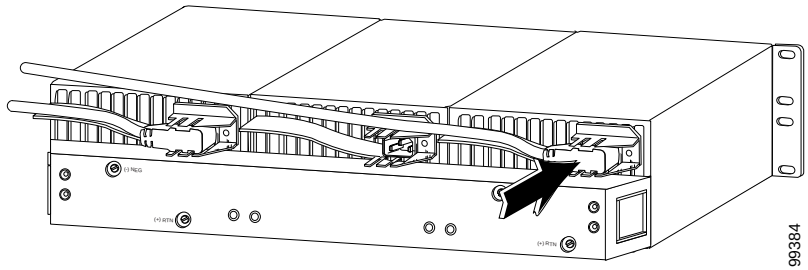


Step 4 Ensure that all site power and grounding requirements described in the *Regulatory Compliance and Safety Information for the Cisco ONS 15500 Series* have been met before you connect the 15540-ACPS-N-E power supply to a power source.

Caution In a system with multiple power supplies, connect each power supply to a separate AC-input power source. In case of a power source failure, the second source is still available.

Step 5 Connect the power cord to the 15540-ACPS-N-E external power shelf. (See Figure 2-29.)

Figure 2-29 Installing the AC Power Cord



Step 6 Verify 15540-ACPS-N-E power supply operation by checking the power supply front panel LEDs:

- AC OK LED is on.
- DC OK LED is on.

Step 7 Check the external power supply status from the system console by entering the **show hardware** command. For more information on commands, refer to the *Cisco ONS 15540 ESP Configuration Guide and Command Reference*.

Using Y-Cable

Using an external 2:1 combiner (the y-cable), connections between the client equipment and the transponder interfaces are duplicated. This means each input and output client signal is connected to two transponder interfaces, one active and one standby. During any interval, one of the transmitters at the client interface is turned on and is generating the required optical signal, and the second transmitter is off.

Refer to the *Cisco ONS 15540 ESP Planning Guide* for y-cable configuration guidelines.

Attaching the Y-Cable

To attach the y-cable to the transponder modules, follow these steps:

Step 1 Read the configuration guidelines in the *Cisco ONS 15540 ESP Configuration Guide and Command Reference*.

Step 2 Choose which ports you will use.

Step 3 Lift the shutters on the two intended ports and attach one end of the two-sided cable to each of the ports.

Step 4 Attach the other end to the client equipment if not already attached.