



CHAPTER 5

Maintaining the Router

The router is equipped as ordered and is ready for installation and startup when it is shipped. As network requirements change, you may need to upgrade the system by adding or changing components. This chapter describes how to maintain router components.

Procedures for maintaining the router are described in the following sections:

- [Powering Off the Router, page 5-2](#)
- [Cleaning or Replacing the Chassis Air Filter, page 5-5](#)
- [Cleaning or Replacing the Chassis Air Filter, page 5-5](#)
- [Removing and Replacing the Blower Module, page 5-9](#)
- [Removing and Replacing AC and DC Power Subsystem Components, page 5-12](#)
- [Removing and Replacing Cards from the Chassis, page 5-37](#)
- [Removing and Installing a Chassis, page 5-42](#)

Prerequisites and Preparation

Before you perform any of the procedures in this chapter, be sure that you:

- Review the [“Safety Guidelines” section on page 2-2](#).
- Read the safety and ESD-prevention guidelines described in the [“Compliance and Safety Information” section on page 2-3](#).
- Ensure that you have all of the necessary tools and equipment before beginning the procedure.
- Have access to the following documents during the installation:
 - *Regulatory Compliance and Safety Information for Cisco 12000 Series Routers* publication that shipped with the router.

Powering Off the Router

Most Cisco XR 12410 router field-replaceable units (FRUs) can be removed and replaced with the power on and the system operating. This is known as online insertion and removal (OIR). Power supplies, line cards, the RP, CSCs, SFCs, and alarm cards all support OIR. Unless otherwise noted, the maintenance tasks described in this chapter can be performed while the router remains powered on.

In some cases it may be necessary to power off the router, for example, to upgrade both power supplies and PDUs. Use the following procedure to power off the router.

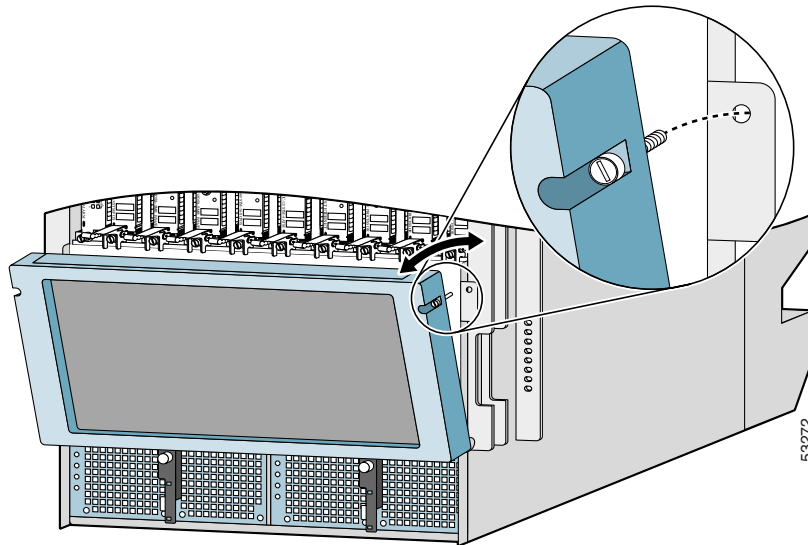
-
- Step 1** Set the power switch on each power supply to the off (0) position.
 - Step 2** Power off all circuit breakers for the source power lines connected to the power supplies.
 - Step 3** Verify that the Pwr OK indicator on each power supply is off.
 - Step 4** Verify that the OK indicator on the blower module is off.
-

Removing and Replacing the Air Filter Door Front Cover

Use the following procedure to remove and replace the air filter door front cover.

- Step 1** Loosen the captive screws on each side of the air filter door and swing the door away from the switch fabric and alarm card cage.

Figure 5-1 Opening the Air Filter Door

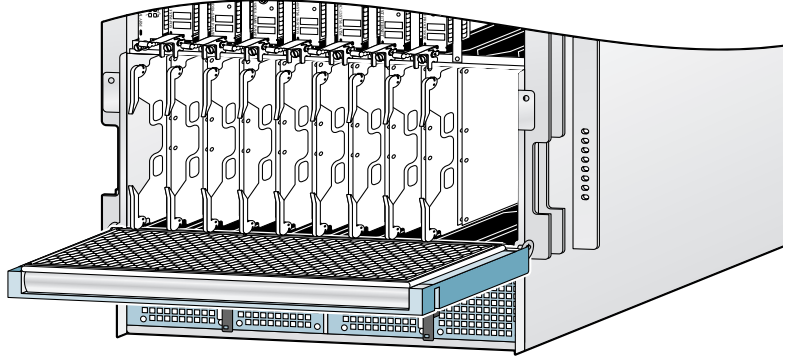


Caution

Be especially careful not to damage the honeycomb screen on the back of the air filter door and on the inside of the switch fabric and alarm card cage. Damaging the honeycomb screen can restrict the air flow and cause overheating and diminish EMI protection.

- Step 2** Remove the (4) screws from each corner that fasten the partial front cover to the air filter door ([Figure 5-2](#)).
- Set aside the screws; you will need them to install the replacement front cover.

Figure 5-2 *Removing the Air Filter Door Front Cover*



- Step 3** Hold the replacement front cover by its outside edges and align the screw holes in the front cover with the holes on the air filter door.
- Step 4** Secure the front cover to the air filter door using the (4) screws that you removed in Step 2.



Caution

Do not overtighten the screws. Overtightening the screws can damage the threaded holes in the air filter door.

- Step 5** Close the air filter door and tighten the captive screws.



Caution

Align and seat the door carefully to avoid damaging the EMI-preventive gaskets on the door. The air filter door must be closed and secured at all times to maintain correct EMI performance.

Cleaning or Replacing the Chassis Air Filter

The Cisco XR 12410 router is equipped with a user-serviceable air filter that prevents dust from being drawn into the router. One time per month (or more often in dusty environments), examine the air filter for damage and cleanliness.



Caution

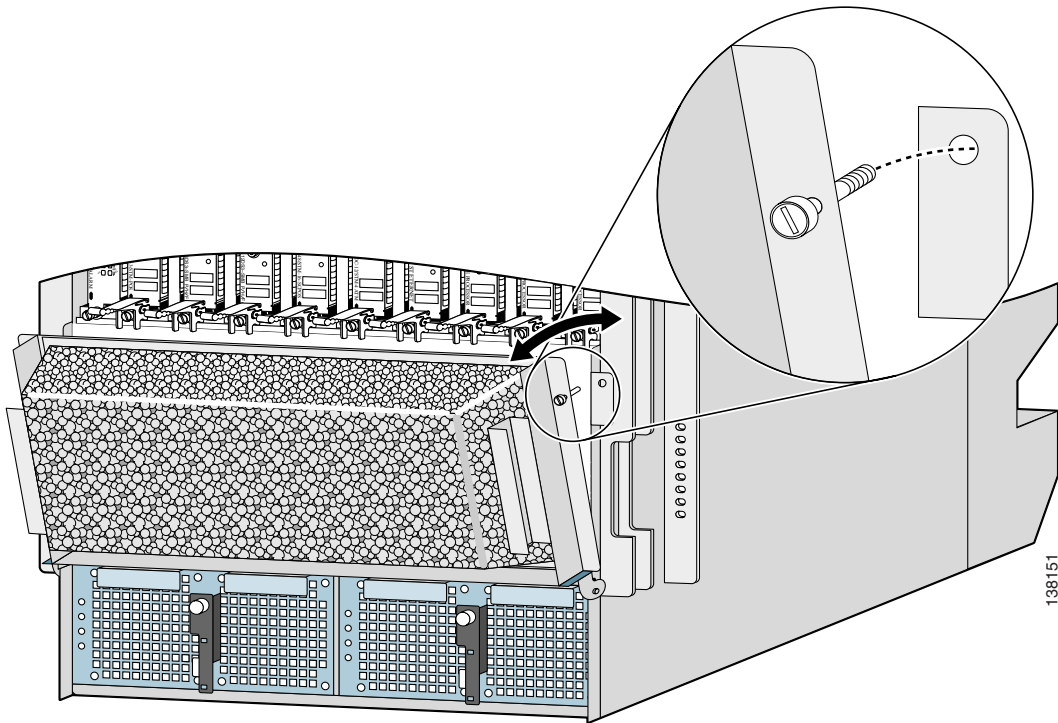
Damage to the air filter can restrict the airflow, cause overheating in the router, and degrade EMI performance. Be careful when cleaning and replacing the filter.

Cleaning or Replacing a Chassis Air Filter

Use the following procedure to clean or replace the air filter.

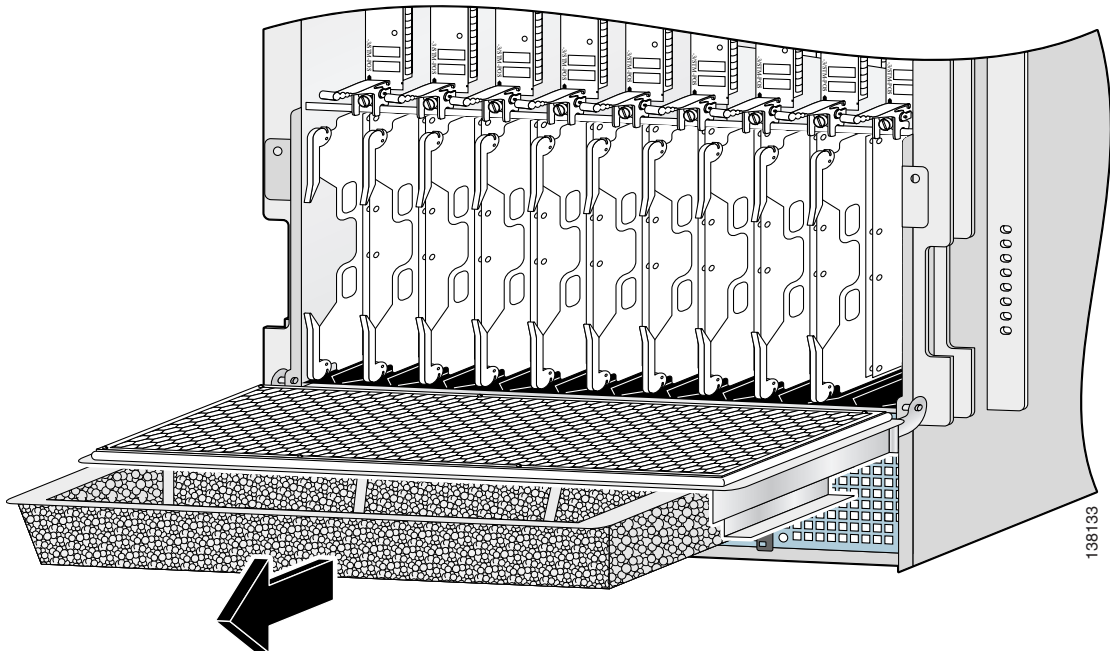
- Step 1** Loosen the captive screw on each side of the air filter door and pivot the door open (Figure 5-3).

Figure 5-3 Opening the Chassis Air Filter Door



Step 2 Remove the air filter by sliding it out of the door (Figure 5-4).

Figure 5-4 Removing the Chassis Air Filter



Step 3 Visually check the condition of the air filter to determine whether to clean it or install a new replacement filter:

- Dirty—You can either vacuum or replace the filter.

**Caution**

Do not vacuum the air filter while it is installed in the chassis. Before you clean it, you must remove the air filter completely to prevent contaminants from being drawn into the router.

- Worn or torn—If the filter appears worn or torn, dispose of it in a responsible manner and install a new replacement (12000/10-FILTER=).

Step 4 Slide the new or cleaned air filter into the air filter door (honey comb side down).

Step 5 Close the air filter door and tighten the captive screws (see [Figure 5-3](#)).

**Caution**

Align and seat the door carefully to avoid damaging the EMI-preventive gaskets on the door. The air filter door must be closed and secured at all times to maintain correct EMI performance.

Removing and Replacing the Blower Module

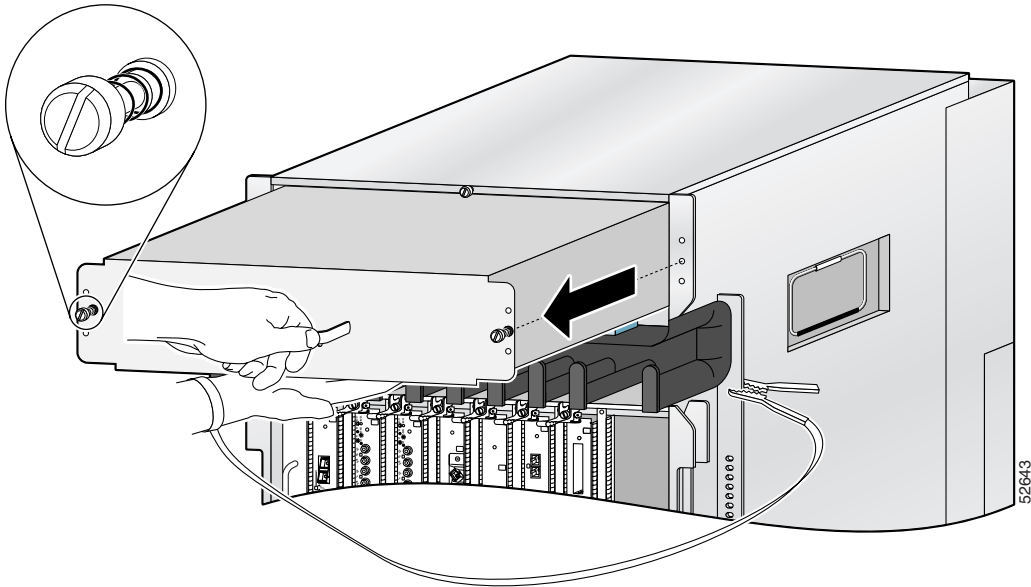
Use the following procedure to remove and replace the blower module.

- Step 1** Remove the blower module from the chassis (Figure 5-5):
- Loosen the captive screw on each side of the blower module.
 - Pull the blower module halfway out of the module bay.
 - Slide out the blower module completely from the module bay while supporting it with your other hand.

**Warning**

The blower module weighs approximately 20 pounds (9 kg). Use two hands when handling the blower module.

Figure 5-5 Removing the Blower Module



Removing and Replacing the Blower Module

- Step 2** Install the new blower module into the chassis ([Figure 5-6](#)):
- Lift the blower module (with two hands) and slide it halfway into the module bay.
 - Slowly push the blower module into the chassis until it mates with the backplane connector at the back of the module bay.

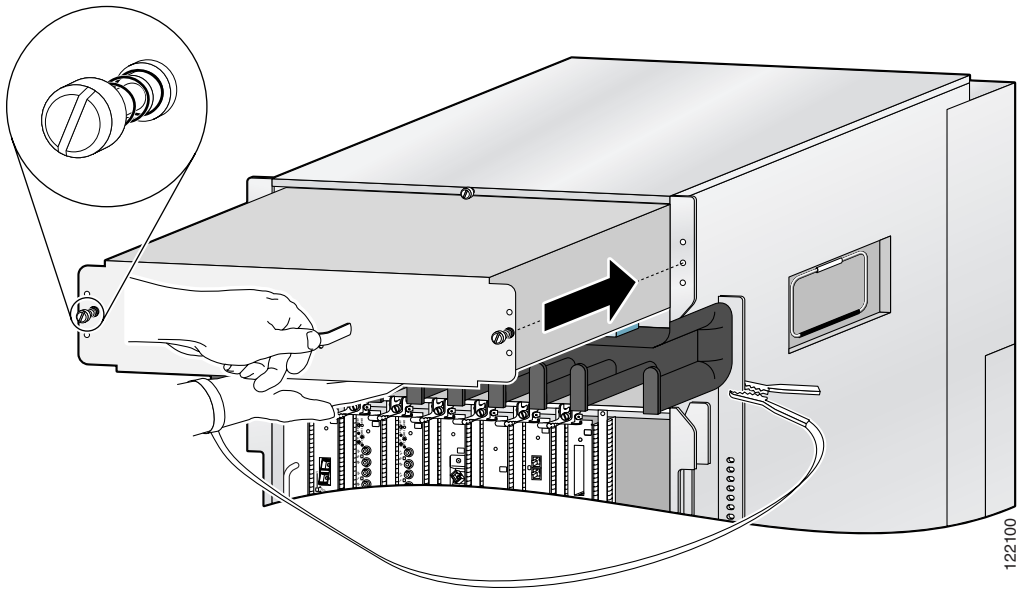


Caution

To prevent damage to the connectors, do not use excessive force when inserting the blower module into the chassis.

- Tighten the captive screws on the blower module to secure it to the chassis.
 - The (green) OK status indicator on the front of the blower module goes on. If the OK indicator does not light, see the [“Troubleshooting the Blower Module Installation”](#) section on page 5-11.

Figure 5-6 Installing the Blower Module



Troubleshooting the Blower Module Installation

Use the following procedure to troubleshoot the blower module if it is not operating properly after installation.

-
- Step 1** Be sure the router is powered on and that all power cords are connected properly.
- Step 2** Loosen the captive screws and reseal the blower module to the chassis.
- Retighten the captive screws to ensure the blower module is properly seated to the backplane connector.
- Step 3** Check the blower module status indicators:
- OK (green)—Indicates that the blower module is operating normally. This indicator should light as soon as the blower module is installed and receives power from the backplane connector.
 - If this indicator remains on, and the blower module fans fail to operate after several attempts to reseal the blower module, replace it with a spare.
 - If the spare blower module also fails, power off the router and contact a Cisco service representative for assistance.
 - Fail (red)—This indicator remains off during normal operation. If this indicator is on, the system has detected a fan failure or other fault in the blower module.
 - If this indicator remains on, and the blower module fans fail to operate after several attempts to reseal the blower module, replace it with a spare.
 - If the spare blower module also fails, power off the router and contact a Cisco service representative for assistance.
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Removing and Replacing AC and DC Power Subsystem Components

This section contains removal and replacement procedures for the AC and DC power systems used with the Cisco XR 12410 router. The following tools and equipment are required to remove and install power equipment:

- Number 1 Phillips screwdriver
- 3/16-inch flat-blade screwdriver
- An ESD-preventive wrist strap

Installation Guidelines

The Cisco XR 12410 router supports online insertion and removal (OIR). If you are replacing a redundant power supply, you can remove and install the power supply while the system remains powered on without causing an electrical hazard or damage to the system. This feature enables you to replace a power supply while the system maintains all routing information and ensures session preservation.

However, to maintain operational redundancy, proper cooling, and meet EMI compliance standards, you must have both working power supplies installed. When you remove a failed power supply with the router in operation, perform the replacement as quickly as possible. Before you begin the removal and installation procedure, make sure you have the tools and the replacement power supply ready.



Caution

You cannot mix power supply types within the chassis. If you are replacing a 2400 W power supply from an older system with a newer 2800 W power supply, you must replace both power supplies and the PDUs. You must shut down the router to perform the upgrade. Be sure to notify the appropriate personnel that all routing traffic stops while the upgrade takes place.

**Caution**

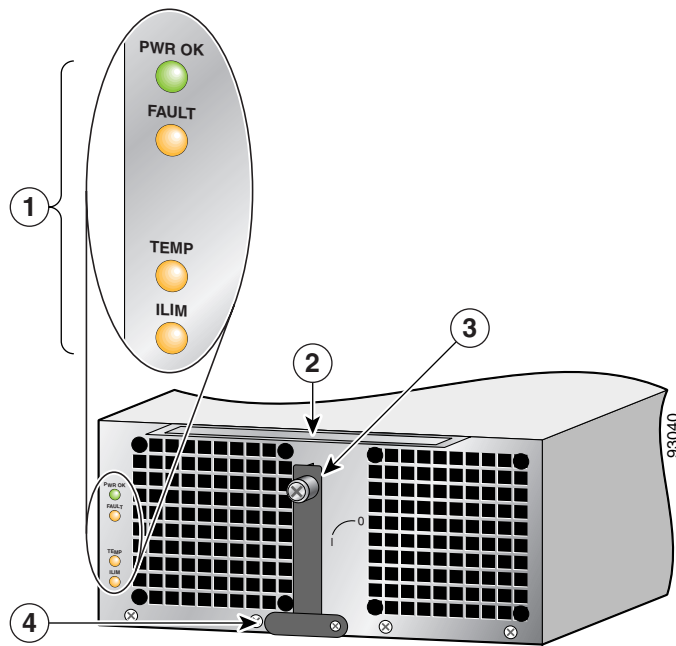
Cisco XR 12410 router configured with non-enhanced fabric and a single power supply and with more than five Engine5 line-cards may fail to boot during the start-up procedures. To safeguard against this possibility ensure that the chassis is configured with two power supplies or configured with the enhanced fabric.

Removing and Replacing an AC PEM

This section contains the procedure to remove and replace an AC PEM from the chassis.

Figure 5-7 identifies the components of an AC PEM.

Figure 5-7 AC PEM Components



1	Status indicators	3	Ejector lever
2	Handle	4	Power ON/OFF switch (shown in the ON/1 position)

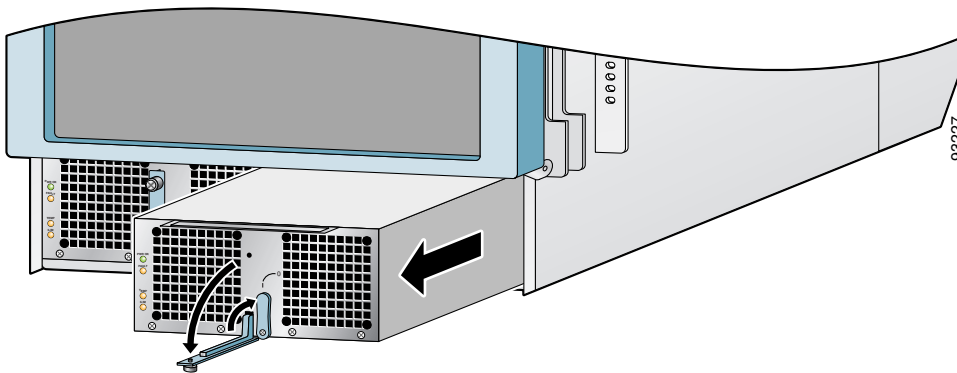
Use the following procedure to remove and replace an AC PEM.

-
- Step 1** Set the power switch to the off (0) position.
- Step 2** Unplug the power supply cord from its AC outlet.
- Step 3** Power off the circuit breaker assigned to that AC outlet.
- Step 4** Remove the PEM from the chassis (Figure 5-8):
- d. Loosen the captive screw on the ejector lever.
 - e. Pivot the lever down to eject the PEM from its bay.
 - f. Slide the power supply out of its bay while supporting it with your other hand.

**Warning**

The power supply weighs approximately 20 pounds (9 kg). Use two hands to remove the power supply.

Figure 5-8 Removing an AC Power Supply



Removing and Replacing AC and DC Power Subsystem Components

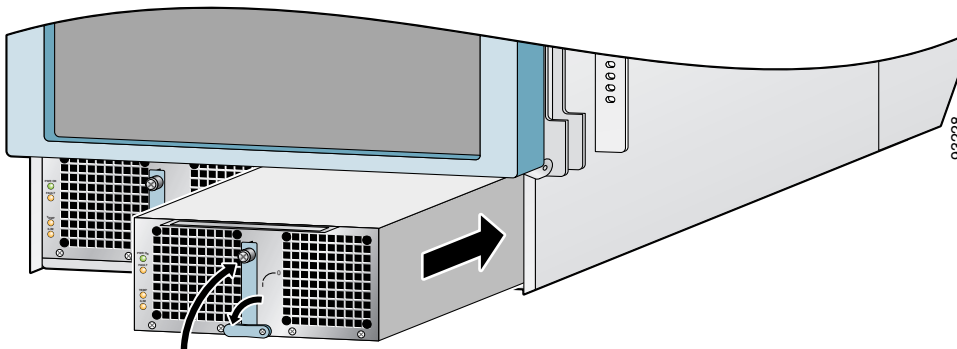
- Step 5** Install the new power supply (Figure 5-9):
- Slide the power supply into the bay until it mates with its backplane connector.
 - Lift the ejector lever into place and tighten the captive screw to securely seat the power supply to the backplane connector.



Caution

To prevent damage to the power shelf backplane connector, do not use excessive force when inserting the power supply into the chassis.

Figure 5-9 Installing an AC Power Supply



- Step 6** Power on the circuit breaker to that AC outlet.
- Step 7** Plug the power supply cable into its AC outlet.
- Step 8** Set the power switch to the on (1) position.

The (green) Pwr OK indicator on the front of the power supply should light. If the indicator does not light, see the “[Troubleshooting the AC Power Supply Installation](#)” section on page 5-17.

Troubleshooting the AC Power Supply Installation

Use the following procedure to troubleshoot the AC power supply if it is not operating properly after installation.

-
- Step 1** Make sure the power supply is seated properly:
- Eject and reseat the PEM. Make sure:
 - The captive screw on the ejector lever is tightened securely.
 - The power switch is set to the on (1) position.
- Step 2** Make sure the router is powered on and that all power cords are connected properly:
- Power cords on the horizontal trough are secured in place with their retention clips.
 - Power cords at the power source end are securely plugged into their own AC power outlet.
- Each AC power supply operating in the nominal range of 200 to 240 VAC requires a minimum service of 20 A, North America (or 13 A, international).
- Source AC circuit breaker is switched on.
- Step 3** Check the power supply status indicators:
- Pwr OK (green)—Indicates that the power supply is operating normally, and the source AC voltage is within the nominal operating range of 200 VAC to 240 VAC. This indicator lights when the power supply switch is set to the on (1) position.
 - If the Pwr OK indicator remains off after checking all of the power sources, replace the power supply with a spare.
 - If the spare power supply does not work, replace its PDU.

- Fault (yellow)—Indicates that the system has detected a fault within the power supply. This indicator remains off during normal operation.

If the indicator is on:

- Toggle the power switch off and then on. If the indicator remains on after several attempts to power it on, replace the power supply with a spare.
 - If the spare power supply also fails, the problem could be a faulty power shelf backplane connector. Power off the router and contact a Cisco service representative for assistance.
- Temp (yellow)—Indicates that the power supply is in an over-temperature condition, causing a shut-down to occur.
 - Verify that the power supply fans are operating properly.
 - Verify that the blower module is operating properly.
 - If the power supply fans and the blower module are operating properly, replace the existing power supply with a spare.
 - Ilim—Indicates the power supply is operating in a current-limiting condition.
 - Each power cord should be connected to a dedicated AC power source. Each AC power supply operating in the nominal range of 200 to 240 VAC requires a minimum service of 20 A, North America (or 13 A, international).
-

Removing and Replacing an AC PDU

Use the following procedure to remove and replace an AC PDU.

-
- Step 1** Set the power switch to the off (0) position.
- Step 2** Unplug the power supply cord from its AC outlet.
- Step 3** Power off the circuit breaker assigned to the PDU you are removing.

**Warning**

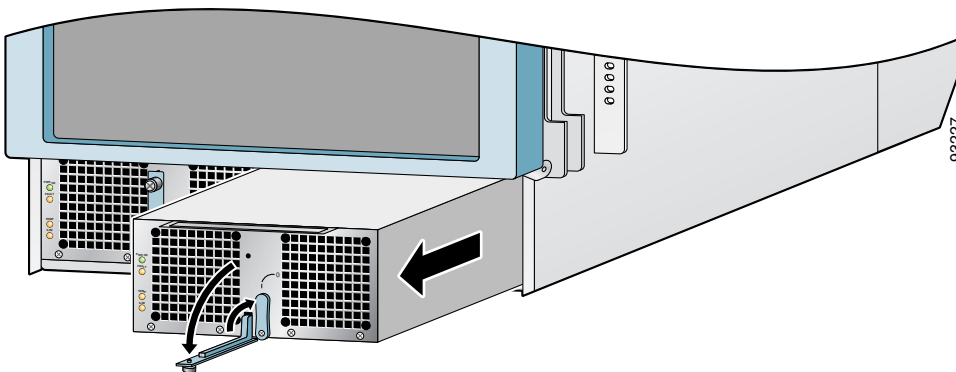
To ensure that power remains off while you are performing this procedure, tape the circuit breaker switch in the off (0) position.

- Step 4** Eject the PEM from the chassis ([Figure 5-10](#)):
- Loosen the captive screw on the ejector lever and pivot the lever down to eject the PEM from its bay.
 - Pull out the power supply halfway from its bay.

**Note**

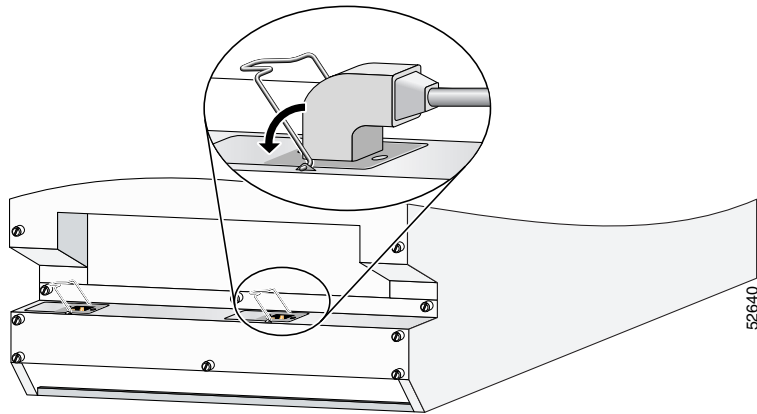
It is not necessary to completely remove the power supply. You can leave the power supply in its bay while you replace the AC PDU.

Figure 5-10 Ejecting an AC Power Supply



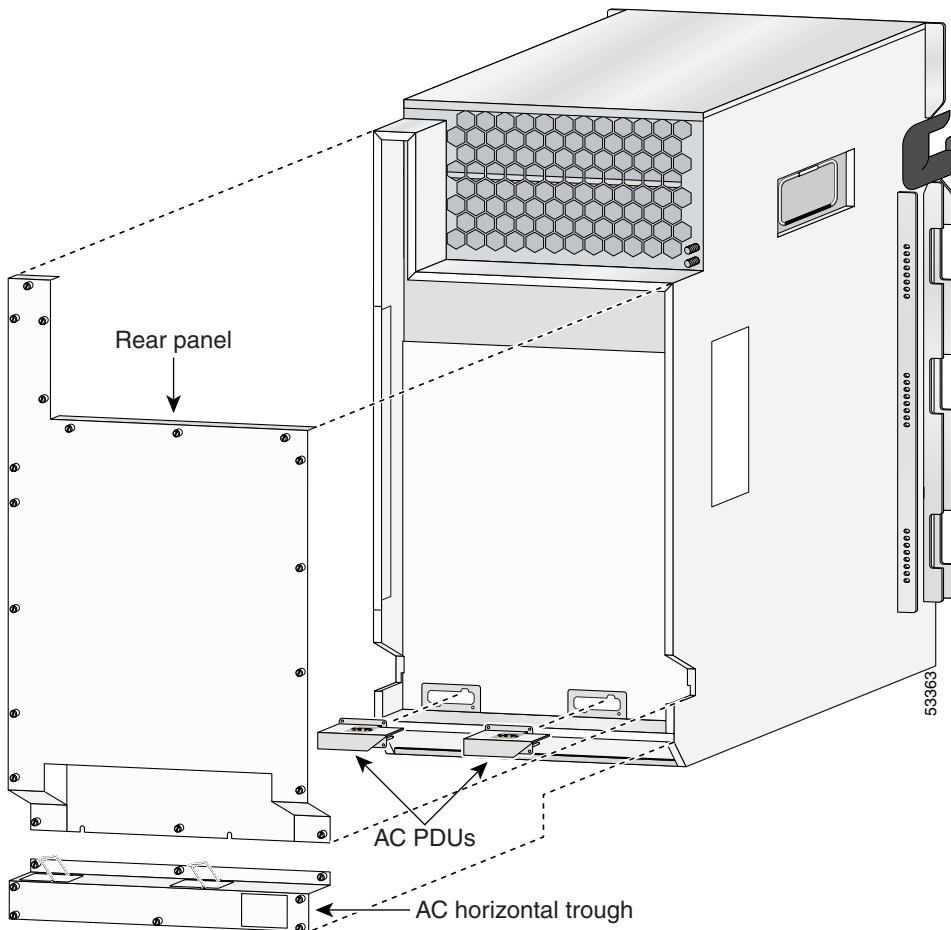
- Step 5** Release the retention clip and disconnect the power cable from the AC power connector on the horizontal trough (Figure 5-11).

Figure 5-11 *Disconnecting an AC Power Cord*



- Step 6** Remove the rear chassis components (Figure 5-12):
- Loosen the (6) captive screws on the AC horizontal trough and remove it.
 - Loosen the (16) captive screws that secure the rear panel to the chassis and remove it.
 - Remove the (4) screws securing the AC PDU to the chassis and remove the PDU.

Figure 5-12 Removing Rear AC Chassis Components



- Step 7** Install the rear chassis components (see [Figure 5-12](#)):
- Install the new AC PDU and tighten the (4) screws to secure it to the chassis.
 - Replace the rear panel and tighten the (16) captive screws.



Note The rear panel has a lip that fits over the top of the chassis. Be sure to fit the bottom of the rear panel above the AC horizontal trough.

- Replace the AC horizontal trough and tighten the (6) captive screws.

- Step 8** Reconnect the power cable to the AC power connector on the horizontal trough and secure the cable with the retention clip (see [Figure 5-11](#)).

- Step 9** Reinstall the power supply ([Figure 5-13](#)):

- Slowly push the power supply into the chassis until it mates with the backplane connector at the back of the bay.

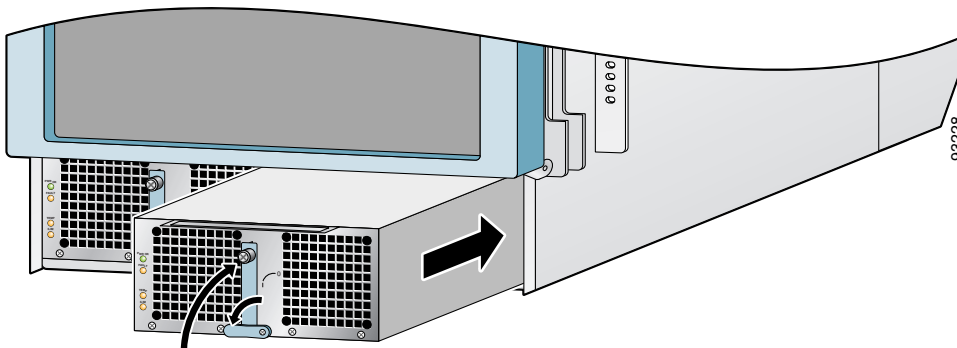


Caution

To prevent damage to the power shelf backplane connector, do not use excessive force when inserting the power supply into the chassis.

- Lift the ejector lever into place and tighten the captive screw to securely seat the power supply to the backplane connector.

Figure 5-13 Installing an AC Power Supply



- Step 10** Power on the circuit breaker.

Step 11 Plug the power supply cable into its AC outlet.

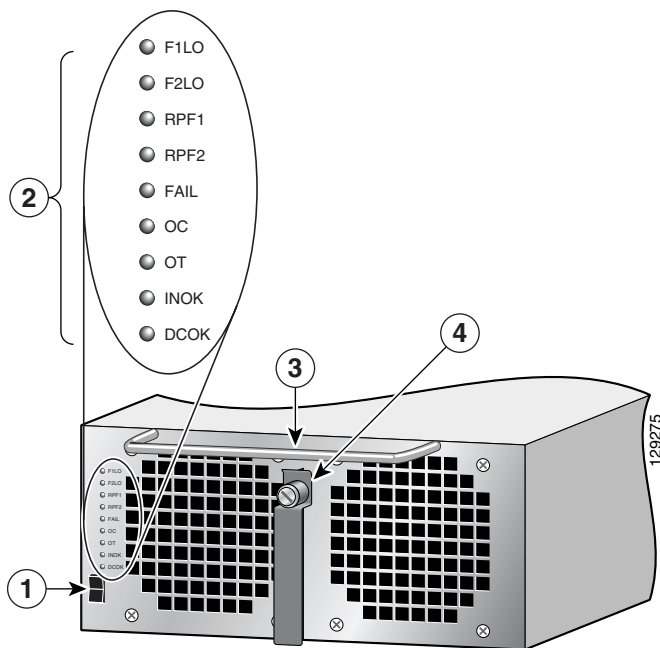
Step 12 Set the power switch to the on (1) position.

The (green) Pwr OK indicator on the front of the power supply should light. If the indicator does not light, see the [“Troubleshooting the AC Power Supply Installation”](#) section on page 5-17.

Removing and Replacing a DC PEM

This section contains the procedure to remove and replace a DC power entry module (PEM) from the chassis. [Figure 5-14](#) shows the DC PEM components.

Figure 5-14 DC PEM Components—2800 Watt



■ Removing and Replacing AC and DC Power Subsystem Components

1	Power on/off switch	3	Handle
2	Status indicators	4	Ejector lever

Use the following procedure to remove and replace a DC PEM.

-
- Step 1** Set the power switch to the off (0) position.
- Step 2** Power off the circuit breaker assigned to the PEM you are removing.

**Warning**

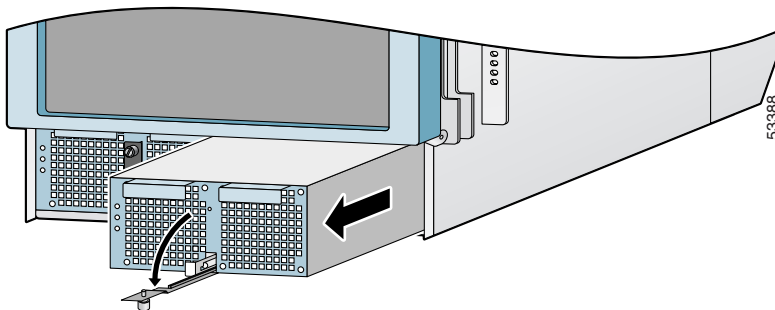
To ensure that power remains off while you are performing this procedure, tape the circuit breaker switch in the off (0) position.

- Step 3** Remove the PEM from the chassis (Figure 5-15):
- Loosen the captive screw on the ejector lever.
 - Pivot the lever down to eject the PEM from its bay.
 - Slide the PEM out of its bay while supporting it with your other hand.

**Warning**

The DC PEM weighs approximately 14 pounds (6.35 kg). Use two hands to remove the power supply.

Figure 5-15 Removing a DC PEM



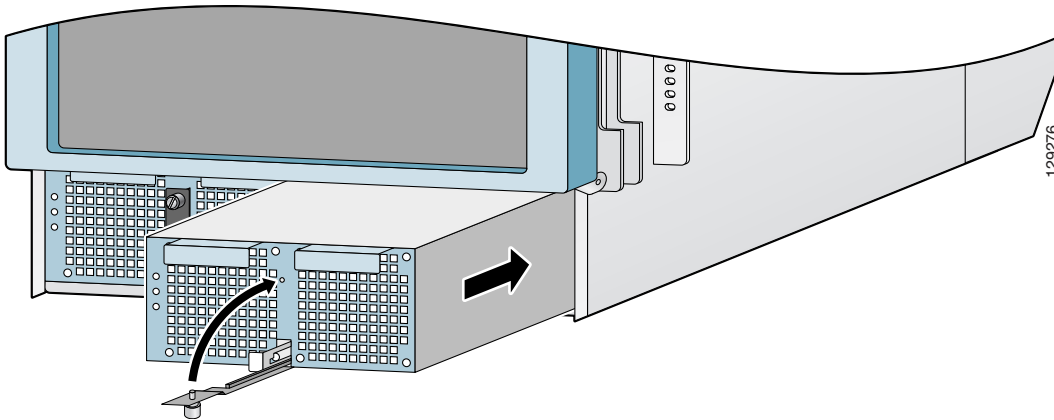
- Step 4** Install the new DC PEM into the chassis (Figure 5-16):
- Slowly push the power supply into the chassis until it mates with the backplane connector at the back of the bay.

**Caution**

To prevent damage to the power shelf backplane connector, do not use excessive force when inserting a power supply into the chassis.

- Lift the ejector lever into place and tighten the captive screw to securely seat the power supply to the backplane connector.

Figure 5-16 Installing a DC PEM



- Step 5** Power on the circuit breaker.
- Step 6** Set the power switch to the on (1) position.

The (green) Pwr OK indicator on the front of the power supply should light. If the indicator does not light, see the [“Troubleshooting a 2800 W DC PEM Installation”](#) section on page 5-27.

Troubleshooting a 2800 W DC PEM Installation

Use the following procedure to troubleshoot the DC PEM if it is not operating properly after installation.

-
- Step 1** Make sure the PEM is seated properly:
- Eject and reseat the PEM. Make sure:
 - The captive screw on the ejector lever is tightened securely.
 - The power switch is set to the on (1) position.
- Step 2** Make sure the router is powered on and that all power cords are connected properly.
- Step 3** Check the PEM status indicators:
- F1LO (Feeder 1 Low) (flashing yellow)—Indicates that input connections to the PDU (Feeder 1) were removed, or the input voltage is below the minimum. Make sure that:
 - Power cords are securely attached to their PDU terminal studs.
 - Power cords are securely attached at the DC source end.
 - The source DC circuit breaker is switched on.

If the indicator is still flashing after you perform the above checks, replace the power supply.

During normal operation, this indicator remains off.
 - F2LO (Feeder2 Low) (flashing yellow)—Indicates that input connections to the PDU (Feeder 2) are removed or the input voltage is below the minimum. Make sure that:
 - Power cords are securely attached to their PDU terminal studs.
 - Power cords are securely attached at the DC source end.
 - The source DC circuit breaker is switched on.

If the indicator is still flashing after you perform the above checks, replace the power supply.

During normal operation, this indicator remains off.

- RPF1 (Reverse Polarity Feeder 1) (flashing yellow)—The PDU (Feeder 1) is miswired. See [Step 8](#) of the “[Removing and Replacing a DC PDU](#)” procedure on [page 5-29](#). During normal operation, this indicator remains off.
- RP21 (Reverse Polarity Feeder 2) (flashing yellow)—The PDU (Feeder 2) is mis-wired. See [Step 8](#) of the “[Removing and Replacing a DC PDU](#)” procedure on [page 5-29](#). During normal operation, this indicator remains off.
- Fail (red)—Lights in conjunction with the following indicators (which flash) to show the type of power supply failure:
 - F1LO
 - F2LO
 - OC
 - OT
- OC (Over Current) (flashing red)—Indicates the input or output current has exceeded its limit and that an overload or short circuit has occurred:
 - Set the power supply switch to off (0) and then back to the on (1) position.
 - If the indicator is still flashing, eject and reseal the power supply.
 - If the indicator is still flashing, replace the power supply.
- OT (Over Temperature) (steady or flashing red)—Indicates that the power supply is in an overtemperature condition, causing a shut-down to occur.
 - Flashing red—Indicates a locked power supply fan. Replace the power supply.
 - Steady red—Indicates an overtemperature condition. Verify that all fans in the blower module are operating properly.
 - If all the blower module fans function, replace the power supply.
- INOK (green)—Indicates that the power supply is operating normally, and the source DC voltage is within the nominal operating range of –48 to –60 VDC. This indicator lights when the power switch is set to the on (1) position. If there is a power supply failure, the INOK indicator shuts off.

- DCOK (green)—Indicates that the power supply is operating normally, and is within the nominal operating range. This indicator lights a few seconds after the DCOK indicator lights. If there is a power supply failure, the INOK indicator shuts off.
-

Removing and Replacing a DC PDU

Use the following procedure to remove and replace a DC PDU.

**Note**

This procedure describes how to replace a single PDU. The procedure is the same if you are replacing both PDUs.

Step 1

Set the power switch to the off (0) position.

Step 2

Power off the circuit breaker assigned to the PDU you are removing.

**Warning**

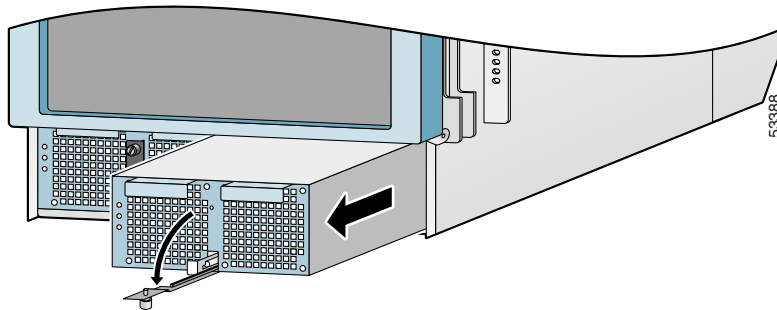
To ensure that power remains off while you are performing this procedure, tape the circuit breaker switch in the off (0) position.

- Step 3** Eject the PEM from the chassis (Figure 5-17):
- a. Loosen the captive screw on the ejector lever and pivot the lever down to eject the PEM from its bay.
 - b. Pull out the PEM halfway from its bay.



Note It is not necessary to completely remove the power supply. You can leave the power supply in its bay while you replace the DC PDU.

Figure 5-17 Ejecting a DC PEM



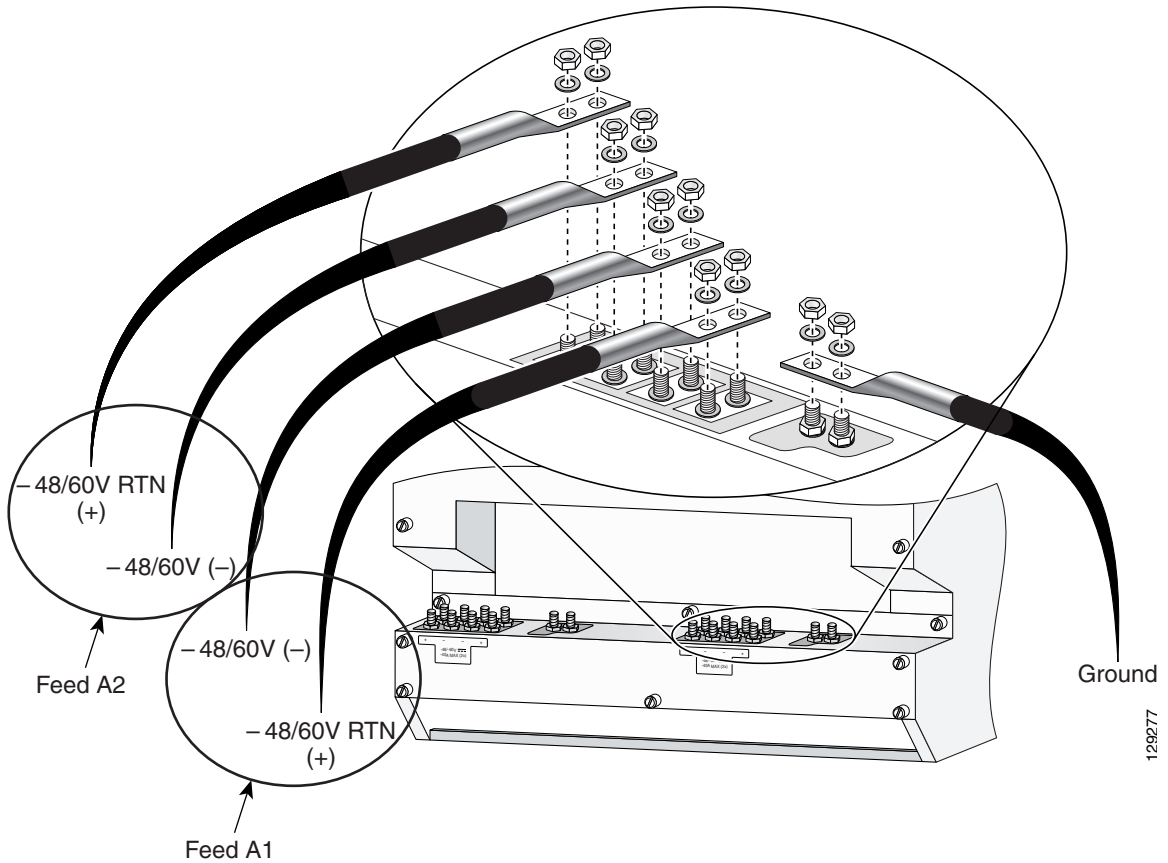
- Step 4** Remove the clear plastic safety covers over the PDUs (see Figure 5-19).

- Step 5** Disconnect the DC power cables from their terminals in the following order and note the color of each cable (Figure 5-18):
- a. Negative cables first.
 - b. Positive cables next.
 - c. Ground cable last.
 - d. Repeat steps a, b, and c for the other PDU.
 - e. Go to [Step 6](#).

**Warning**

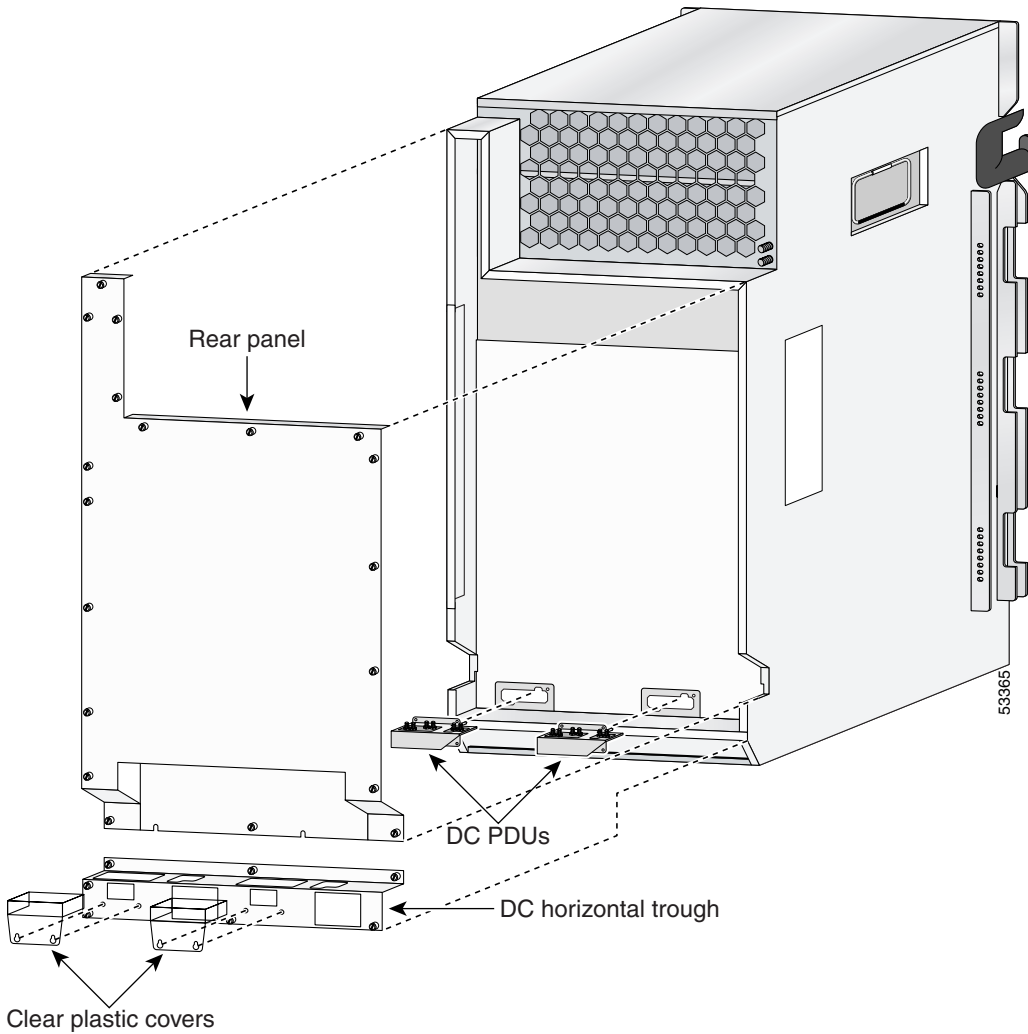
To prevent injury and damage to the equipment, always remove the source DC power cables and ground from the power shelf terminals *in the following order*: (1) negative (-), (2) positive (+), (3) ground.

Figure 5-18 Disconnecting the DC Power Cables—2800 W DC PDU



- Step 6** Remove the rear chassis components (Figure 5-19):
- a. Loosen the (6) captive screws on the DC horizontal trough and remove it.
 - b. Loosen the (16) captive screws that secure the rear panel to the chassis and remove it.
 - c. Remove the (4) screws securing the DC PDU to the chassis and remove the PDU.

Figure 5-19 Rear DC Chassis Components



- Step 7** Install the rear chassis components (Figure 5-19):
- Install the new DC PDU and tighten the (4) screws to secure it to the chassis.
 - Replace the rear panel and tighten the (16) captive screws.



Note The rear panel has a lip that fits over the top of the chassis. Be sure to fit the bottom of the rear panel above the DC horizontal trough.

- Replace the DC horizontal trough and tighten the (6) captive screws.



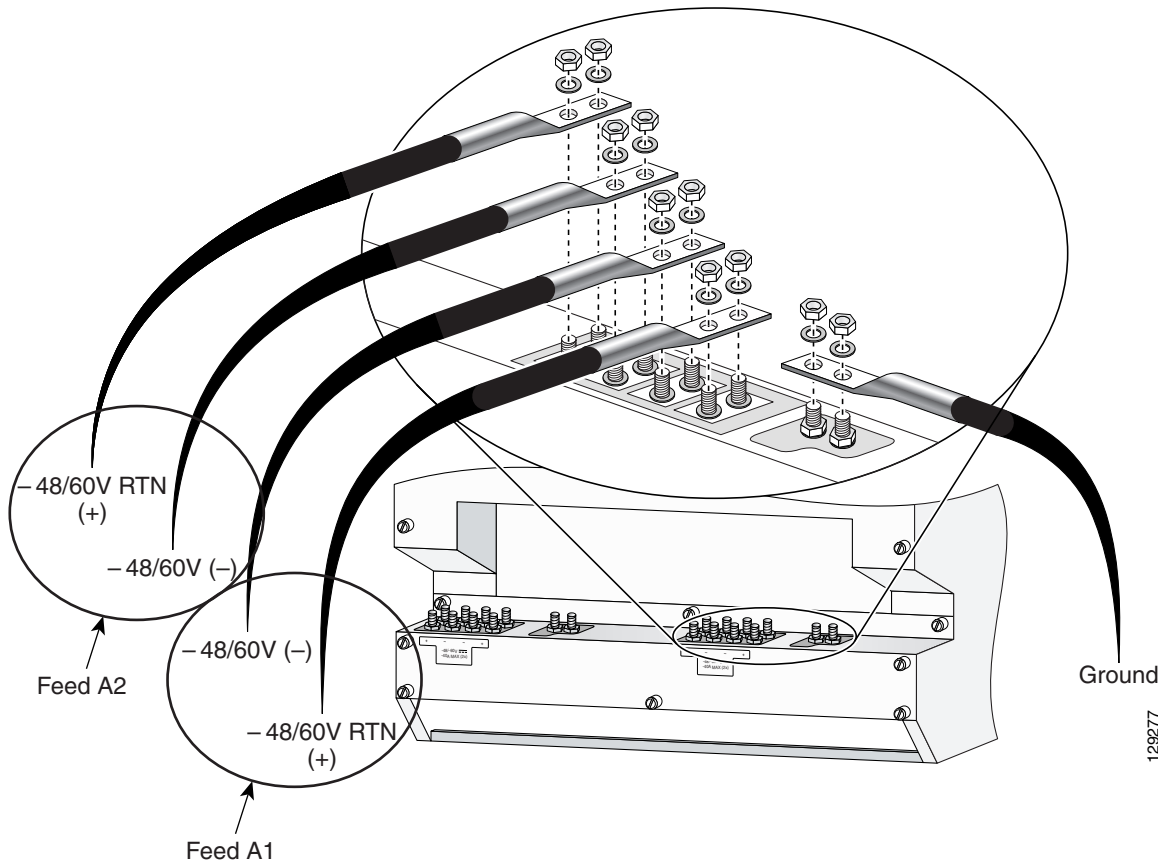
Caution If you have installed an upgraded PDU to accommodate 2800 W PEM, do not use the old DC horizontal trough. Be sure to install the replacement DC horizontal trough which has the correct voltage and warning labels attached to it.

- Step 8** Reconnect the W DC power cables in the following order (Figure 5-20):
- Ground cables first.
 - Positive cables next.
 - Negative cable last.
 - Repeat steps a, b, and c for the other PDU.
 - Go to [Step 9](#).



Warning

To prevent injury and damage to the equipment, always attach the ground and source DC power cable lugs to the power shelf terminals in the following order: (1) ground to ground, (2) positive (+) to positive (+), (3) negative (-) to negative (-).

Figure 5-20 Connecting the DC Power Cables—2800 W PDU

- Step 9** Replace the clear plastic safety covers over the PDUs and tighten the screws (see [Figure 5-19](#)).

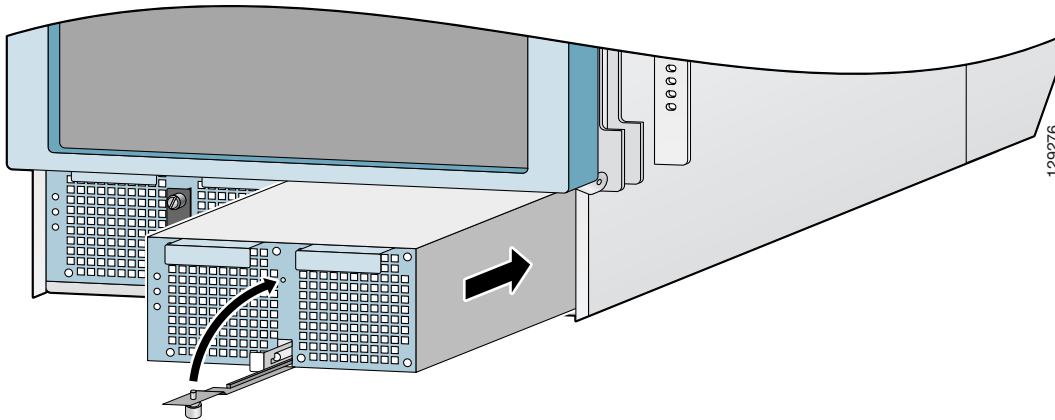
- Step 10** Reinstall the DC PEM into the chassis (Figure 5-21):
- Slowly push the power supply into the chassis until it mates with the backplane connector at the back of the bay.

**Caution**

To prevent damage to the power shelf backplane connector, do not use excessive force when inserting a power supply into the chassis.

- Lift the ejector lever into place and tighten the captive screw to securely seat the power supply to the backplane connector.

Figure 5-21 Installing a DC PEM



- Step 11** Power on the circuit breaker.
- Step 12** Set the power switch to the on (1) position.

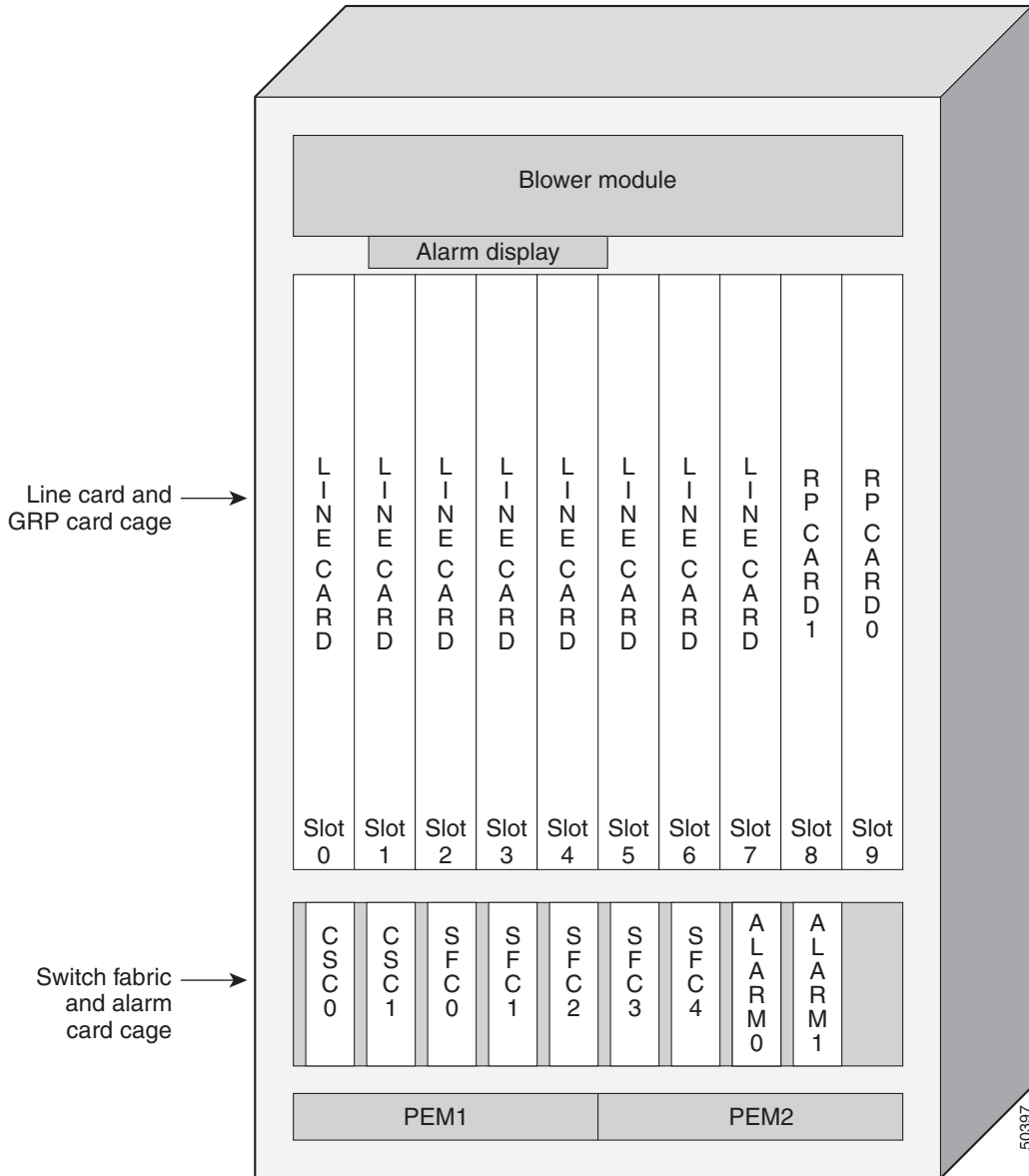
The (green) Pwr OK indicator on the front of the power supply should light. If the indicator does not light, see the [“Troubleshooting a 2800 W DC PEM Installation”](#) section on page 5-27.

Removing and Replacing Cards from the Chassis

This section contains the procedures to remove cards from the chassis.

[Figure 5-22](#) shows the slot locations of the various cards.

Figure 5-22 Router Components and Slot-Numbering



50997

Removing and Replacing Cards from the Line Card and RP Card Cage

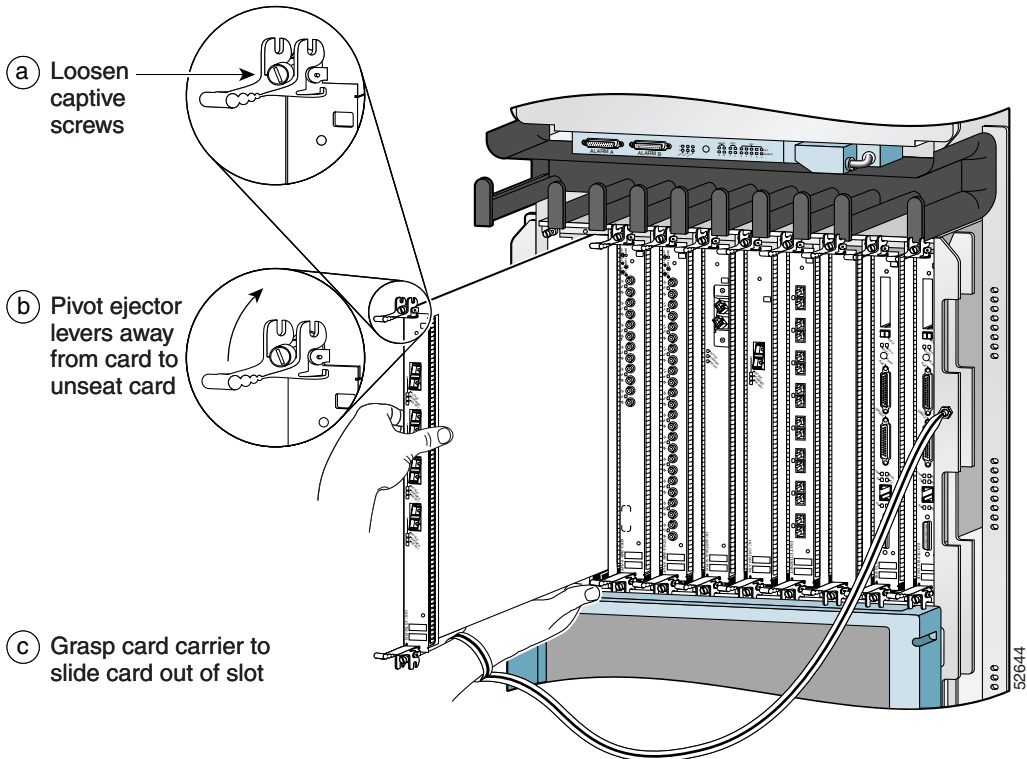
This section describes the procedures for removing and installing a router processor (RP) card or a line card. The line card and RP card cage has 10 slots (numbered 0 through 9, from left to right). Line cards are installed in slots 0 through 7; RPs are installed in slots 8 and 9 (see [Figure 5-22](#)).

**Caution**

Handle all cards by the metal card carrier edges only; avoid touching the board or any connector pins. After removing a card, carefully place it in an antistatic bag or similar environment to protect it from ESD and dust in the optic ports (fiber-optic line cards).

Use the following procedure to remove and replace a line card or RP from the card cage:

-
- Step 1** Disconnect any cables from the card.
- Step 2** Remove the card:
- a. Loosen the captive screws at the top and bottom of the front panel ([Figure 5-23a](#)).
 - b. Pivot the ejector levers to unseat the card from the backplane connector ([Figure 5-23b](#)).
 - c. Slide the card out of the slot ([Figure 5-23c](#)) and place it directly into an antistatic bag or other ESD-preventive container.
- Step 3** Replace the card by reversing the procedures in Steps 1 and 2.
-

Figure 5-23 Removing a Line Card from the Line Card and RP Card Cage

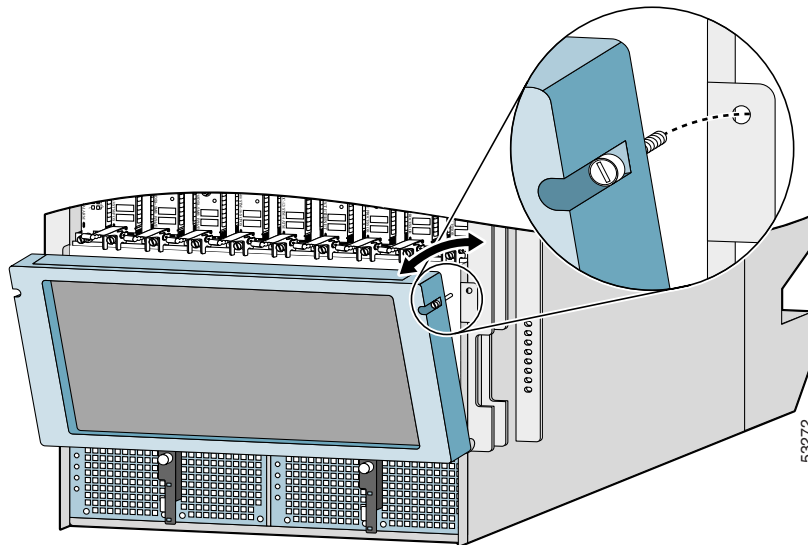
Removing and Replacing Cards from the Switch Fabric and Alarm Card Cage

The switch fabric and alarm card cage is located behind the air filter door on the front of the chassis. The card cage has 9 keyed, vertical card slots for the clock scheduler cards, switch fabric cards, and alarm cards (see [Figure 5-22](#)):

Use the following procedure to remove and replace cards from the switch fabric and alarm card cage.

-
- Step 1** Loosen the captive screws on each side of the air filter door and swing the door away from the switch fabric and alarm card cage ([Figure 5-24](#)).

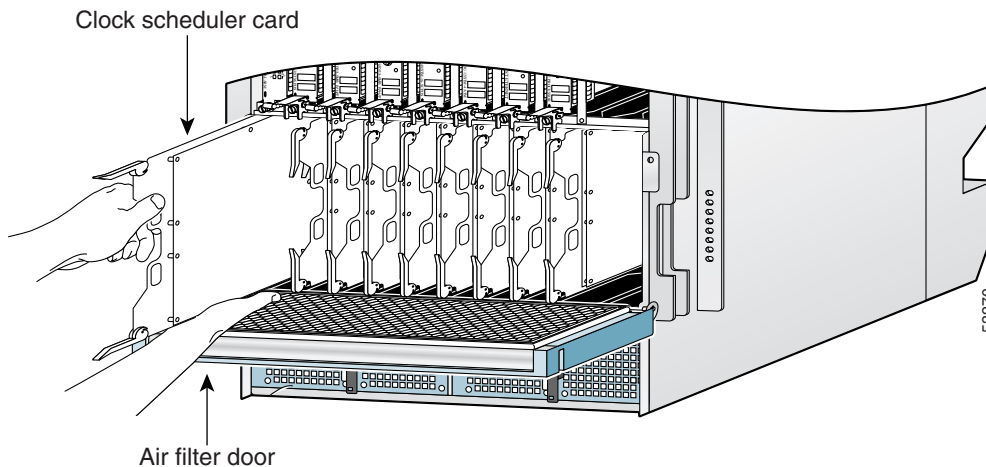
Figure 5-24 Opening the Air Filter Door



Removing and Installing a Chassis

- Step 2** Remove the card (a CSC in this example):
- a. Pivot the ejector levers to unseat the card from the backplane connector.
 - b. Grasp the card by its metal card carrier and slide the card out of the slot ([Figure 5-25](#)).
 - Place the card directly into an antistatic bag or other ESD-preventive container.

Figure 5-25 Removing a Card from the Switch Fabric and Alarm Card Cage



- Step 3** To install the card, reverse the procedure in Step 2.
- Step 4** Close the air filter door and tighten the captive screws.

Removing and Installing a Chassis

This section provides the procedures to remove and replace a chassis. You may need to perform this procedure to replace a defective chassis or move it to another location. These instructions include the steps directing you to removal and replacement instructions for individual components such as power supplies and line cards.

Removing a Chassis from the Equipment Rack

Use the following procedure to remove the chassis and its components from the equipment rack.

-
- Step 1** Power off the router (see [Powering Off the Router](#), page 5-2).
- Step 2** Power off the circuit breakers to the power supplies.
- Step 3** Disconnect the power cords from the PDUs on the rear of the chassis.
- For AC PDUs, see [Step 5 of Removing and Replacing an AC PDU](#), page 5-19.
 - For 2800 W DC PDUs, see [Step 5 of Removing and Replacing a DC PDU](#), page 5-29.
- Step 4** Disconnect the supplemental bonding and grounding connection (if there is one) from the chassis (see [Supplemental Bonding and Grounding Connections](#), page 3-26).
- Step 5** Remove the power supplies (see [Removing and Replacing an AC PEM](#), page 5-14, or [Removing and Replacing a DC PEM](#), page 5-23).
- Step 6** Remove the blower module (see [Removing and Replacing the Blower Module](#), page 5-9).
- Step 7** Disconnect RP cables connected to the console port, auxiliary port, or either of the Ethernet ports, RJ-45 or MII.

Label each of the RP cables before you disconnect the cables.

- Step 8** Disconnect any cables connected to the external alarm port on the alarm display. Label each of the alarm display cables before you disconnect the cables.
- Step 9** Disconnect the line card interface cables:
- a.** Identify the type of line card and its slot number. Write this information on a piece of paper before you disconnect the cables. You'll need this information when you reinstall the line cards.
 - b.** Identify the line card cable and its port connection. Label the cable with this information.
 - c.** Starting with the bottom port of the line card (on line cards with multiple ports), disconnect the interface cable connectors from each of the line card ports.
 - d.** Loosen the captive screw at each end of the line card cable-management bracket and pull the cable-management bracket away from the line card.
 - e.** Carefully remove the cables from the horizontal cable tray and carefully place the cable bundle out of the way.
 - f.** Repeat steps **a** through **e** for each line card.
- Step 10** Remove cards from the line card and RP card cage (see [Removing and Replacing Cards from the Line Card and RP Card Cage, page 5-39](#)).
- Step 11** Remove cards from the switch fabric and alarm card cage (see [Removing and Replacing Cards from the Switch Fabric and Alarm Card Cage, page 5-41](#)).
- Step 12** Remove the chassis air filter (see [Cleaning or Replacing the Chassis Air Filter, page 5-5](#)).

Step 13 Remove the chassis from the rack.



Warning

An empty chassis weighs approximately 125 pounds (56.7 kg). You need two people to remove the chassis from the equipment rack safely.

- a. Using the side handles to support the weight of the chassis, remove the screws that attach the chassis rack mount flanges to the rack posts.



Warning

There is nothing to support the chassis in the rack when you remove the screws if the optional rack-mount support brackets are not installed.

- b. Carefully lift the chassis out of the rack and set it aside.
-

Installing a Replacement Chassis in the Equipment Rack

Use the following procedure to install the replacement chassis and components in the equipment rack.

-
- Step 1** Install the new chassis in the rack (see [Rack-Mounting the Router Chassis, page 3-15](#)).
 - Step 2** Install the power supplies (see [Removing and Replacing an AC PEM, page 5-14](#), or [Removing and Replacing a DC PEM, page 5-23](#)).
 - Step 3** Install the blower module (see [Removing and Replacing the Blower Module, page 5-9](#)).
 - Step 4** Install cards in the line card and RP card cage (see [Removing and Replacing Cards from the Line Card and RP Card Cage, page 5-39](#)).
 - Step 5** Install cards in the switch fabric and alarm card cage (see [Removing and Replacing Cards from the Switch Fabric and Alarm Card Cage, page 5-41](#)).
 - Step 6** Install the chassis air filter (see [Cleaning or Replacing the Chassis Air Filter, page 5-5](#)).
 - Step 7** Connect all line card and interface cables (see [Connecting Line Card Network Interface Cables, page 3-34](#)).

- Step 8** Connect the supplemental bonding and grounding connection (if there is one) to the chassis (see [Supplemental Bonding and Grounding Connections](#), page 3-26).
- Step 9** Connect the power cords to the PDUs on the rear of the chassis.
- For AC PDUs, see [Step 8](#) of [Removing and Replacing an AC PDU](#), page 5-19.
 - For 2800 W DC PDUs, see [Step 8](#) of [Removing and Replacing a DC PDU](#), page 5-29.
- Step 10** Power on the circuit breakers to the power supplies.
- Step 11** Power on the router.
-

Packing a Defective Chassis for Shipment

Use the packaging that came with the replacement chassis to repack and ship the defective chassis.