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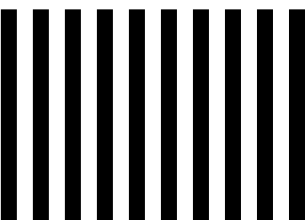
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Text Part Number: 78-15170-03

C O N T E N T S

About This Guide

This preface includes the following sections:

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- Warning Definition, page ix
- Cautions, page xii
- Obtaining Documentation, page xiv
- Documentation Feedback, page xv
- Obtaining Technical Assistance, page xv
- Obtaining Additional Publications and Information, page xvii

Document Objectives

This guide describes how to install the Cisco PIX security appliance hardware components.

Audience

This guide is for network administrators who perform any of the following tasks:

- Managing network security
- Installing and configuring firewalls, security appliances, or similar network equipment
- Managing default and static routes, and TCP and UDP services

Document Organization

This guide includes the following chapters:

- Chapter 1, "Preparing for Installation," describes the installation overview, safety recommendations, and general site requirements.

- Chapter 2, "PIX 501," provides a product overview, installation instructions, and lithium battery replacement instructions.

- Chapter 3, "PIX 506/506E," provides a product overview, installation instructions, and lithium battery replacement instructions.

- Chapter 4, "PIX 515/515E," provides a product overview, installation instructions, as well as the procedure to remove and replace the chassis cover. This chapter also includes installation procedures for the circuit board and installation of the DC model.

- Chapter 5, "PIX 520," provides a product overview, installation instructions, as well as the procedure to remove and replace the chassis cover. This chapter also includes the procedure for installation of the DC model.

- Chapter 6, "PIX 525," provides a product overview, installation instructions, as well as the procedure to remove and replace the chassis cover. This chapter also includes installation procedures for the circuit board and installation of the DC model.

- Chapter 7, "PIX 535," provides a product overview, installation instructions, as well as the installation procedure for the circuit board and installation of the DC model.

- Appendix A, "Cable Pinouts," provides cable pinouts.

Document Conventions

Command descriptions use these conventions:

- Braces ({ }) indicate a required choice.

- Square brackets ([ ]) indicate optional elements.

- Vertical bars (|) separate alternative, mutually exclusive elements.

- **Boldface** indicates commands and keywords that are entered literally as shown.

- *Italics* indicate arguments for which you supply values.

Examples use these conventions:

- Examples depict screen displays and the command line in `screen` font.

- Information you need to enter in examples is shown in **`boldface screen`** font.

- Variables for which you must supply a value are shown in *`italic screen`* font.

Graphic user interface access uses these conventions:

- **Boldface** indicates buttons and menu items.

- Selecting a menu item (or screen) is indicated by the following convention:

    Click **Start > Settings > Control Panel**.

✎

Note Means *reader take note*. Notes contain helpful suggestions or references to material not covered in the manual.

Warning Definition

⚠

Warning **IMPORTANT SAFETY INSTRUCTIONS**

This warning symbol means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. Use the statement number provided at the end of each warning to locate its translation in the translated safety warnings that accompanied this device.

SAVE THESE INSTRUCTIONS

Waarschuwing **BELANGRIJKE VEILIGHEIDSINSTRUCTIES**

Dit waarschuwingssymbool betekent gevaar. U verkeert in een situatie die lichamelijk letsel kan veroorzaken. Voordat u aan enige apparatuur gaat werken, dient u zich bewust te zijn van de bij elektrische schakelingen betrokken risico's en dient u op de hoogte te zijn van de standaard praktijken om ongelukken te voorkomen. Gebruik het nummer van de verklaring onderaan de waarschuwing als u een vertaling van de waarschuwing die bij het apparaat wordt geleverd, wilt raadplegen.

BEWAAR DEZE INSTRUCTIES

Varoitus **TÄRKEITÄ TURVALLISUUSOHJEITA**

Tämä varoitusmerkki merkitsee vaaraa. Tilanne voi aiheuttaa ruumiillisia vammoja. Ennen kuin käsittelet laitteistoa, huomioi sähköpiirien käsittelemiseen liittyvät riskit ja tutustu onnettomuuksien yleisiin ehkäisytapoihin. Turvallisuusvaroitusten käännökset löytyvät laitteen mukana toimitettujen käännettyjen turvallisuusvaroitusten joukosta varoitusten lopussa näkyvien lausuntonumeroiden avulla.

SÄILYTÄ NÄMÄ OHJEET

Attention **IMPORTANTES INFORMATIONS DE SÉCURITÉ**

Ce symbole d'avertissement indique un danger. Vous vous trouvez dans une situation pouvant entraîner des blessures ou des dommages corporels. Avant de travailler sur un équipement, soyez conscient des dangers liés aux circuits électriques et familiarisez-vous avec les procédures couramment utilisées pour éviter les accidents. Pour prendre connaissance des traductions des avertissements figurant dans les consignes de sécurité traduites qui accompagnent cet appareil, référez-vous au numéro de l'instruction situé à la fin de chaque avertissement.

CONSERVEZ CES INFORMATIONS

Warnung **WICHTIGE SICHERHEITSHINWEISE**

Dieses Warnsymbol bedeutet Gefahr. Sie befinden sich in einer Situation, die zu Verletzungen führen kann. Machen Sie sich vor der Arbeit mit Geräten mit den Gefahren elektrischer Schaltungen und den üblichen Verfahren zur Vorbeugung vor Unfällen vertraut. Suchen Sie mit der am Ende jeder Warnung angegebenen Anweisungsnummer nach der jeweiligen Übersetzung in den übersetzten Sicherheitshinweisen, die zusammen mit diesem Gerät ausgeliefert wurden.

BEWAHREN SIE DIESE HINWEISE GUT AUF.

Avvertenza **IMPORTANTI ISTRUZIONI SULLA SICUREZZA**

Questo simbolo di avvertenza indica un pericolo. La situazione potrebbe causare infortuni alle persone. Prima di intervenire su qualsiasi apparecchiatura, occorre essere al corrente dei pericoli relativi ai circuiti elettrici e conoscere le procedure standard per la prevenzione di incidenti. Utilizzare il numero di istruzione presente alla fine di ciascuna avvertenza per individuare le traduzioni delle avvertenze riportate in questo documento.

CONSERVARE QUESTE ISTRUZIONI

Advarsel **VIKTIGE SIKKERHETSINSTRUKSJONER**

Dette advarselssymbolet betyr fare. Du er i en situasjon som kan føre til skade på person. Før du begynner å arbeide med noe av utstyret, må du være oppmerksom på farene forbundet med elektriske kretser, og kjenne til standardprosedyrer for å forhindre ulykker. Bruk nummeret i slutten av hver advarsel for å finne oversettelsen i de oversatte sikkerhetsadvarslene som fulgte med denne enheten.

TA VARE PÅ DISSE INSTRUKSJONENE

Aviso **INSTRUÇÕES IMPORTANTES DE SEGURANÇA**

Este símbolo de aviso significa perigo. Você está em uma situação que poderá ser causadora de lesões corporais. Antes de iniciar a utilização de qualquer equipamento, tenha conhecimento dos perigos envolvidos no manuseio de circuitos elétricos e familiarize-se com as práticas habituais de prevenção de acidentes. Utilize o número da instrução fornecido ao final de cada aviso para localizar sua tradução nos avisos de segurança traduzidos que acompanham este dispositivo.

GUARDE ESTAS INSTRUÇÕES

¡Advertencia! **INSTRUCCIONES IMPORTANTES DE SEGURIDAD**

Este símbolo de aviso indica peligro. Existe riesgo para su integridad física. Antes de manipular cualquier equipo, considere los riesgos de la corriente eléctrica y familiarícese con los procedimientos estándar de prevención de accidentes. Al final de cada advertencia encontrará el número que le ayudará a encontrar el texto traducido en el apartado de traducciones que acompaña a este dispositivo.

GUARDE ESTAS INSTRUCCIONES

Varning! **VIKTIGA SÄKERHETSANVISNINGAR**

Denna varningssignal signalerar fara. Du befinner dig i en situation som kan leda till personskada. Innan du utför arbete på någon utrustning måste du vara medveten om farorna med elkretsar och känna till vanliga förfaranden för att förebygga olyckor. Använd det nummer som finns i slutet av varje varning för att hitta dess översättning i de översatta säkerhetsvarningar som medföljer denna anordning.

SPARA DESSA ANVISNINGAR

Figyelem **FONTOS BIZTONSÁGI ELOÍRÁSOK**

Ez a figyelmezeto jel veszélyre utal. Sérülésveszélyt rejto helyzetben van. Mielott bármely berendezésen munkát végezte, legyen figyelemmel az elektromos áramkörök okozta kockázatokra, és ismerkedjen meg a szokásos balesetvédelmi eljárásokkal. A kiadványban szereplo figyelmeztetések fordítása a készülékhez mellékelt biztonsági figyelmeztetések között található; a fordítás az egyes figyelmeztetések végén látható szám alapján kereseto meg.

ORIZZE MEG EZEKET AZ UTASÍTÁSOKAT!

Предупреждение **ВАЖНЫЕ ИНСТРУКЦИИ ПО СОБЛЮДЕНИЮ ТЕХНИКИ БЕЗОПАСНОСТИ**

Этот символ предупреждения обозначает опасность. То есть имеет место ситуация, в которой следует опасаться телесных повреждений. Перед эксплуатацией оборудования выясните, каким опасностям может подвергаться пользователь при использовании электрических цепей, и ознакомьтесь с правилами техники безопасности для предотвращения возможных несчастных случаев. Воспользуйтесь номером заявления, приведенным в конце каждого предупреждения, чтобы найти его переведенный вариант в переводе предупреждений по безопасности, прилагаемом к данному устройству.

СОХРАНИТЕ ЭТИ ИНСТРУКЦИИ

警告　重要的安全性说明

此警告符号代表危险。您正处于可能受到严重伤害的工作环境中。在您使用设备开始工作之前，必须充分意识到触电的危险，并熟练掌握防止事故发生的标准工作程序。请根据每项警告结尾提供的声明号码来找到此设备的安全性警告说明的翻译文本。

请保存这些安全性说明

警告　安全上の重要な注意事項

「危険」の意味です。人身事故を予防するための注意事項が記述されています。装置の取り扱い作業を行うときは、電気回路の危険性に注意し、一般的な事故防止策に留意してください。警告の各国語版は、各注意事項の番号を基に、装置に付属の「Translated Safety Warnings」を参照してください。

これらの注意事項を保管しておいてください。

Cautions

This section includes the following cautions:

DC Power Connection Warning

⚠

Caution　After wiring the DC power supply, remove the tape from the circuit breaker switch handle and reinstate power by moving the handle of the circuit breaker to the ON position.

Lightening Protection Installation Warning

⚠️
Caution Lightning protection or grounding blocks are required to isolate or protect the in-building equipment from the hazards associated with the outside plant or outside environment. Lightning protectors and/or grounding blocks are normally installed outside the building just prior to the coaxial cable entering the building.

Power Supply Disconnection Warning

⚠️
Caution Before working on a chassis or working near power supplies, unplug the power cord on AC units; disconnect the power at the circuit breaker on DC units.

Jewelry Removal Warning

⚠️
Caution Before working on equipment that is connected to power lines, remove jewelry (including rings, necklaces, and watches). Metal objects will heat up when connected to power and ground and can cause serious burns or weld the metal object to the terminals.

AC Power Disconnection Warning

⚠️
Caution Before working on a chassis or working near power supplies, unplug the power cord on AC units.

TN Power Warning

⚠️
Caution The device is designed to work with TN power systems.

48 VDC Power System

⚠️
Caution The customer 48 volt power system must provide reinforced insulation between the primary AC power and the 48 VDC output.

More Than One Power Cord

⚠️
Caution This unit might have more than one power cord. To reduce the risk of electrical shock, disconnect all power supply cords before servicing the unit.

Circuit Breaker (15A) Warning

⚠️

Caution   This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that a UL Listed and Certified fuse or circuit breaker no larger than 60 VDC, 15 A is used on all current-carrying conductors.

Grounded Equipment Warning

⚠️

Caution   This equipment is intended to be grounded. Ensure that the host is connected to earth ground during normal use.

Safety Cover Requirement

⚠️

Caution   The safety cover is an integral part of the product. Do not operate the unit without the safety cover installed. Operating the unit without the cover in place will invalidate the safety approvals and pose a risk of fire and electrical hazards.

Faceplates and Cover Panel Requirement

⚠️

Caution   Blank faceplates and cover panels serve three important functions: they prevent exposure to hazardous voltages and currents inside the chassis; they contain electromagnetic interference (EMI) that might disrupt other equipment; and they direct the flow of cooling air through the chassis. Do not operate the system unless all cards, faceplates, front covers, and rear covers are in place.

Wrist Strap Warning

⚠️

Caution   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.

Obtaining Documentation

Cisco documentation and additional literature are available on Cisco.com. Cisco also provides several ways to obtain technical assistance and other technical resources. These sections explain how to obtain technical information from Cisco Systems.

Cisco.com

You can access the most current Cisco documentation at this URL:

http://www.cisco.com/univercd/home/home.htm

You can access the Cisco website at this URL:

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You can find instructions for ordering documentation at this URL:

http://www.cisco.com/univercd/cc/td/doc/es_inpck/pdi.htm

You can order Cisco documentation in these ways:

- Registered Cisco.com users (Cisco direct customers) can order Cisco product documentation from the Ordering tool:

    http://www.cisco.com/en/US/partner/ordering/index.shtml

- Nonregistered Cisco.com users can order documentation through a local account representative by calling Cisco Systems Corporate Headquarters (California, USA) at 408 526-7208 or, elsewhere in North America, by calling 1 800 553-NETS (6387).

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Obtaining Technical Assistance

For all customers, partners, resellers, and distributors who hold valid Cisco service contracts, Cisco Technical Support provides 24-hour-a-day, award-winning technical assistance. The Cisco Technical Support Website on Cisco.com features extensive online support resources. In addition, Cisco Technical Assistance Center (TAC) engineers provide telephone support. If you do not hold a valid Cisco service contract, contact your reseller.

Cisco Technical Support Website

The Cisco Technical Support Website provides online documents and tools for troubleshooting and resolving technical issues with Cisco products and technologies. The website is available 24 hours a day, 365 days a year, at this URL:

http://www.cisco.com/techsupport

Access to all tools on the Cisco Technical Support Website requires a Cisco.com user ID and password. If you have a valid service contract but do not have a user ID or password, you can register at this URL:

http://tools.cisco.com/RPF/register/register.do

Note Use the Cisco Product Identification (CPI) tool to locate your product serial number before submitting a web or phone request for service. You can access the CPI tool from the Cisco Technical Support Website by clicking the **Tools & Resources** link under Documentation & Tools. Choose **Cisco Product Identification Tool** from the Alphabetical Index drop-down list, or click the **Cisco Product Identification Tool** link under Alerts & RMAs. The CPI tool offers three search options: by product ID or model name; by tree view; or for certain products, by copying and pasting **show** command output. Search results show an illustration of your product with the serial number label location highlighted. Locate the serial number label on your product and record the information before placing a service call.

Submitting a Service Request

Using the online TAC Service Request Tool is the fastest way to open S3 and S4 service requests. (S3 and S4 service requests are those in which your network is minimally impaired or for which you require product information.) After you describe your situation, the TAC Service Request Tool provides recommended solutions. If your issue is not resolved using the recommended resources, your service request is assigned to a Cisco TAC engineer. The TAC Service Request Tool is located at this URL:

http://www.cisco.com/techsupport/servicerequest

For S1 or S2 service requests or if you do not have Internet access, contact the Cisco TAC by telephone. (S1 or S2 service requests are those in which your production network is down or severely degraded.) Cisco TAC engineers are assigned immediately to S1 and S2 service requests to help keep your business operations running smoothly.

To open a service request by telephone, use one of the following numbers:

Asia-Pacific: +61 2 8446 7411 (Australia: 1 800 805 227)
EMEA: +32 2 704 55 55
USA: 1 800 553-2447

For a complete list of Cisco TAC contacts, go to this URL:

http://www.cisco.com/techsupport/contacts

Definitions of Service Request Severity

To ensure that all service requests are reported in a standard format, Cisco has established severity definitions.

Severity 1 (S1)—Your network is "down," or there is a critical impact to your business operations. You and Cisco will commit all necessary resources around the clock to resolve the situation.

Severity 2 (S2)—Operation of an existing network is severely degraded, or significant aspects of your business operation are negatively affected by inadequate performance of Cisco products. You and Cisco will commit full-time resources during normal business hours to resolve the situation.

Severity 3 (S3)—Operational performance of your network is impaired, but most business operations remain functional. You and Cisco will commit resources during normal business hours to restore service to satisfactory levels.

Severity 4 (S4)—You require information or assistance with Cisco product capabilities, installation, or configuration. There is little or no effect on your business operations.

Obtaining Additional Publications and Information

Information about Cisco products, technologies, and network solutions is available from various online and printed sources.

- Cisco Marketplace provides a variety of Cisco books, reference guides, and logo merchandise. Visit Cisco Marketplace, the company store, at this URL:

  http://www.cisco.com/go/marketplace/

- The Cisco *Product Catalog* describes the networking products offered by Cisco Systems, as well as ordering and customer support services. Access the Cisco Product Catalog at this URL:

  http://cisco.com/univercd/cc/td/doc/pcat/

- *Cisco Press* publishes a wide range of general networking, training and certification titles. Both new and experienced users will benefit from these publications. For current Cisco Press titles and other information, go to Cisco Press at this URL:

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- *Packet* magazine is the Cisco Systems technical user magazine for maximizing Internet and networking investments. Each quarter, Packet delivers coverage of the latest industry trends, technology breakthroughs, and Cisco products and solutions, as well as network deployment and troubleshooting tips, configuration examples, customer case studies, certification and training information, and links to scores of in-depth online resources. You can access Packet magazine at this URL:

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- *iQ Magazine* is the quarterly publication from Cisco Systems designed to help growing companies learn how they can use technology to increase revenue, streamline their business, and expand services. The publication identifies the challenges facing these companies and the technologies to help solve them, using real-world case studies and business strategies to help readers make sound technology investment decisions. You can access iQ Magazine at this URL:

  http://www.cisco.com/go/iqmagazine

- *Internet Protocol Journal* is a quarterly journal published by Cisco Systems for engineering professionals involved in designing, developing, and operating public and private internets and intranets. You can access the Internet Protocol Journal at this URL:

  http://www.cisco.com/ipj

- World-class networking training is available from Cisco. You can view current offerings at this URL:

  http://www.cisco.com/en/US/learning/index.html

Obtaining Additional Publications and Information

Preparing for Installation

This chapter describes how to install and add hardware upgrades that accompany the unit. The information in this guide applies to the PIX 501, PIX 506/506E, PIX 515/515E, PIX 520, PIX 525, and PIX 535. In this guide, the term "security appliance" refers to all models unless specifically noted otherwise.

⚠️

Caution   Installing PIX software Version 6.0(1), or a later version, on an older model of PIX hardware, such as a PIX "Classic" (PIX 10000) or PIX 510, causes the security appliance to reboot continuously until a software version previous to 6.0(1) is reinstalled.

This chapter includes the following sections:

- Installation Overview, page 1-1
- Safety Recommendations, page 1-2
- General Site Requirements, page 1-4

Installation Overview

To prepare for the installation of the PIX security appliance, perform the following steps:

✎

Note   If your PIX security appliance model supports a failover configuration, perform the steps that follow only on the primary (active) unit. (Not applicable to the PIX 501 or the PIX 506/506E.)

Step 1   Review the safety precautions outlined in the *Regulatory Compliance and Safety Information* document.

Step 2   Completely read the release notes for your respective software version.

Step 3   Unpack the PIX security appliance. The PIX security appliance consists of two main components, the PIX security appliance unit and a separate accessory kit. The accessory kit contains documentation, a power supply or cord, rack mounting hardware (not applicable to the PIX 501 or the PIX 506/506E), and additional software you can use with the PIX security appliance.

Step 4   Place the PIX security appliance on a stable work surface.

Safety Recommendations

Use the following guidelines and the information in the following sections to help ensure your safety and protect the PIX security appliance. The list of guidelines may not address all potentially hazardous situations in your working environment, so be alert and exercise good judgement at all times.

Note If you need to open the PIX security appliance case to install a hardware component, such as additional memory or an interface card, doing so does not affect your Cisco warranty. Upgrading the PIX security appliance does not require any special tools and does not create any radio frequency leaks.

The safety guidelines are as follows:

- Keep the chassis area clear and dust-free before, during, and after installation.
- Keep tools away from walk areas where you and others could fall over them.
- Do not wear loose clothing or jewelry, such as earrings, bracelets, or chains, that could get caught in the chassis.
- Wear safety glasses if you are working under any conditions that might be hazardous to your eyes.
- Do not perform any action that creates a potential hazard to people or makes the equipment unsafe.
- Never attempt to lift an object that is too heavy for one person to handle.

This section includes the following topics:

- Maintaining Safety with Electricity, page 1-2
- Preventing Electrostatic Discharge Damage, page 1-3

Maintaining Safety with Electricity

Warning **Before working on a chassis or working near power supplies, unplug the power cord on AC units; disconnect the power at the circuit breaker on DC units.**

Follow these guidelines when working on equipment powered by electricity:

- Before beginning procedures that require access to the interior of the PIX security appliance, locate the emergency power-off switch for the room in which you are working. Then, if an electrical accident occurs, you can act quickly to turn off the power.
- Do not work alone if potentially hazardous conditions exist anywhere in your work space.
- Never assume that power is disconnected from a circuit; always check the circuit.
- Look carefully for possible hazards in your work area, such as moist floors, ungrounded power extension cables, frayed power cords, and missing safety grounds.
- If an electrical accident occurs, proceed as follows:
    - Use caution; do not become a victim yourself.
    - Disconnect power from the system.

- If possible, send another person to get medical aid. Otherwise, assess the condition of the victim and then call for help.

- Determine if the person needs rescue breathing or external cardiac compressions; then take appropriate action.

- Use the PIX security appliance within its marked electrical ratings and product usage instructions.

- Install the PIX security appliance in compliance with local and national electrical codes as listed in the *Regulatory Compliance and Safety Information* document.

- PIX security appliance models equipped with AC-input power supplies are shipped with a three-wire electrical cord with a grounding-type plug that fits only a grounding-type power outlet. This is a safety feature that you should not circumvent. Equipment grounding should comply with local and national electrical codes.

- PIX security appliance models equipped with DC-input power supplies must be terminated with the DC input wiring on a DC source capable of supplying at least 15 amps. A 15-amp circuit breaker is required at the 48 VDC facility power source. An easily accessible disconnect device should be incorporated into the facility wiring. Be sure to connect the grounding wire conduit to a solid earth ground. We recommend that you use a closed loop ring to terminate the ground conductor at the ground stud.

  Other DC power guidelines are listed in the *Regulatory Compliance and Safety Information* document.

Preventing Electrostatic Discharge Damage

Electrostatic discharge (ESD) can damage equipment and impair electrical circuitry. ESD damage occurs when electronic components are improperly handled and can result in complete or intermittent failures.

- Always follow ESD-prevention procedures when removing and replacing components. Ensure that the chassis is electrically connected to earth ground. Wear an ESD-preventive wrist strap, ensuring that it makes good skin contact. Connect the grounding clip to an unpainted surface of the chassis frame to safely ground ESD voltages. To properly guard against ESD damage and shocks, the wrist strap and cord must operate effectively. If no wrist strap is available, ground yourself by touching the metal part of the chassis.

- For safety, periodically check the resistance value of the antistatic strap, which should be between 1 and 10 megohms (Mohms).

General Site Requirements

The topics in this section describe the requirements your site must meet for safe installation and operation of your system. Ensure that your site is properly prepared before beginning installation.

This section includes the following topics:

- Site Environment, page 1-4
- Preventive Site Configuration, page 1-4
- Power Supply Considerations, page 1-4
- Configuring Equipment Racks, page 1-5

Site Environment

The PIX security appliance can be placed on a desktop. Except for the PIX 501 and the PIX 506/506E, all other PIX security appliance models can be mounted in a rack. The location of the PIX security appliance and the layout of your equipment rack or wiring room are extremely important for proper system operation. Equipment placed too close together, inadequate ventilation, and inaccessible panels can cause system malfunctions and shutdowns, and can make PIX security appliance maintenance difficult.

When planning your site layout and equipment locations, keep in mind the precautions described in the next section "Preventive Site Configuration," to help avoid equipment failures and reduce the possibility of environmentally caused shutdowns. If you are currently experiencing shutdowns or unusually high errors with your existing equipment, these precautions may help you isolate the cause of failures and prevent future problems.

Preventive Site Configuration

The following precautions helps you plan an acceptable operating environment for your PIX security appliance and helps you avoid environmentally caused equipment failures:

- Electrical equipment generates heat. Ambient air temperature might not be adequate to cool equipment to acceptable operating temperatures without adequate circulation. Ensure that the room in which you operate your system has adequate air circulation.
- Always follow the ESD-prevention procedures described previously to avoid damage to equipment. Damage from static discharge can cause immediate or intermittent equipment failure.
- Ensure that the chassis cover is secure. The chassis is designed to allow cooling air to flow effectively within it. An open chassis allows air leaks, which may interrupt and redirect the flow of cooling air from internal components.

Power Supply Considerations

The PIX 515/515E, PIX 520, PIX 525, PIX 535, and PIX 10000, have AC power supplies. The PIX 515/515E, PIX 520, PIX 525, and PIX 535 models can have either an AC or DC power supply. The PIX 501 and the PIX 506/506E have an external power supply that converts AC to DC.

Observe the following considerations:

- Check the power at your site before installing the PIX security appliance to ensure that you are receiving "clean" power (free of spikes and noise). Install a power conditioner if necessary, to ensure proper voltages and power levels in the source voltage for the system.

- Install proper grounding for the site to avoid damage from lightning and power surges.

- In units equipped with AC-input power supplies, use the following guidelines:

    - The PIX 501, PIX 506/506E, and PIX 10000 models automatically select operating ranges of a low range of 90 to 135 volts or a high range of 180 to 270 volts.

    - The PIX 510 and PIX 520 models operate with a source voltage ranging from 100 to 240 VAC; the input power supply requires a 20 amp service minimum for North America and 10 amp or 16 amp for the international area.

    - The PIX 515/PIX 515E, PIX 525, and PIX 535 do not have a selectable operating range. Refer to the label on each model for the correct AC-input power requirement.

    - Several styles of AC-input power supply cords are available; make sure you have the correct style for your site.

    - Install an uninterruptible power source for your site, if possible.

    - Install proper site grounding facilities to guard against damage from lightning or power surges.

- In a unit equipped with DC-input power supplies, use the following guidelines:

    - Each DC-input power supply requires dedicated 15 amp service.

    - For DC power cables, we recommend that you use a minimum of 18 AWG wire cable.

Configuring Equipment Racks

Follow these tips to help plan for configuration of an equipment rack:

- PIX 515/515E, PIX 520, PIX 525, and PIX 535 security appliances require you to first attach rack mounting brackets to the units before mounting them in an equipment rack.

- Enclosed racks must have adequate ventilation. Ensure that the rack is not overly congested because each unit generates heat. An enclosed rack should have louvered sides and a fan to provide cooling air.

- When mounting a chassis in an open rack, ensure that the rack frame does not block the intake or exhaust ports. If the chassis is installed on slides, check the position of the chassis when it is seated all the way into the rack.

- In an enclosed rack with a ventilation fan in the top, excessive heat generated by equipment near the bottom of the rack can be drawn upward and into the intake ports of the equipment above it in the rack. Ensure that you provide adequate ventilation for equipment at the bottom of the rack.

- Baffles can help to isolate exhaust air from intake air, which also helps to draw cooling air through the chassis. The best placement of the baffles depends on the airflow patterns in the rack. Experiment with different arrangements to position the baffles effectively.

C H A P T E R **2**

PIX 501

This chapter describes how to install the PIX 501, and includes the following sections:

Note The PIX 501 is not supported in software Version 7.0(1).

PIX 501 Product Overview

This section describes the PIX 501 front and rear panels and the panel LEDs.

Figure 2-1 shows the front view of the PIX 501.

Figure 2-1   PIX 501 Front Panel
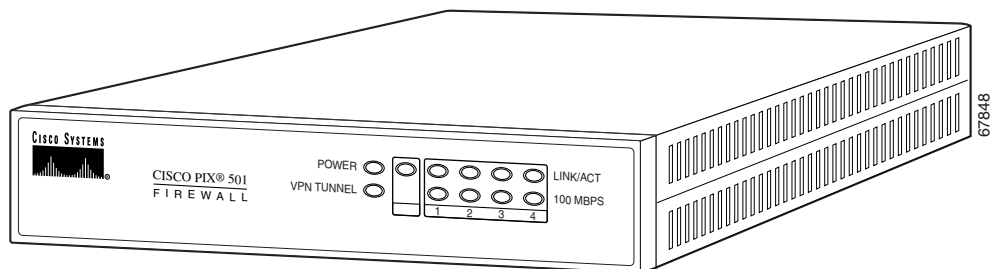
Figure 2-2 shows the rear view of the PIX 501.

Figure 2-2   PIX 501 Rear Panel
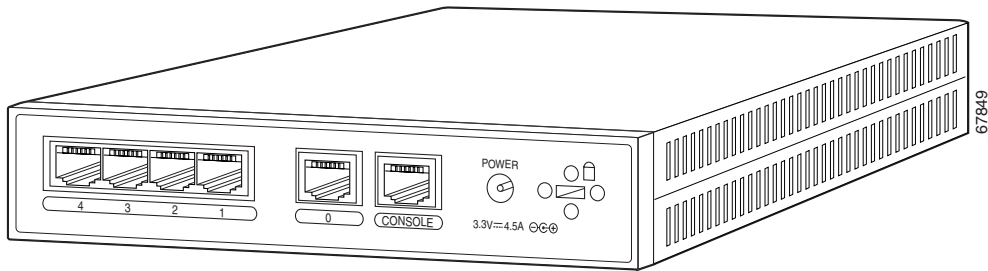
Figure 2-3 shows the PIX 501 front panel LEDs.

Figure 2-3   PIX 501 Front Panel LEDs
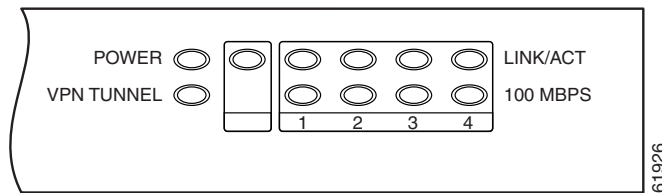
Table 2-1 lists the states of the PIX 501 front panel LEDs.

Table 2-1   PIX 501 Front Panel LEDs

LED	Color	State	Description
POWER	Green	On	The device is powered on.
		Off	The device is powered off.
LINK/ACT	Green	Flashing	Network activity, such as Internet access, is present.
		On	The correct cable is in use, and the connected equipment has power and is operational.
		Off	No link is established. **Tip** If the LINK/ACT LED does not light up, you might be using the wrong type of cable. Try replacing the yellow, straight-through Ethernet cable with the orange, crossover Ethernet cable.
VPN TUNNEL	Green	On	One or more IKE/IPSec VPN tunnels are established.
		Off	One or more IKE/IPSec VPN tunnels are disabled. If the standard configuration is not modified to support VPN tunnels, the LED does not light up because it is disabled by default. Also, the LED does not light up when PPTP/L2TP tunnels are established.
100 MBPS	Green	On	The interface is enabled at 100 Mbps (autonegotiated).
		Off	The interface is enabled at 10 Mbps.

Installing the PIX 501

Place the PIX 501 on a flat, stable surface. The PIX 501 is not rack mountable.

To install the PIX 501, perform the following steps:

Step 1   Connect Port 0, the outside Ethernet port, to the public network.

- Use the yellow Ethernet cable (72-1482-01) to connect the device to a switch or hub.
- Use the orange Ethernet cable (72-3515-01) to connect the device to a DSL modem, cable modem, or router.

Step 2   Connect your PC or the other network devices to one of the four switched inside ports (numbered 1 through 4).

Connecting a Power Supply Module to the PIX 501

This section describes how to connect the power supply module to a PIX 501. Use this information in conjunction with the *Regulatory Compliance and Safety Information* document.

To connect the power supply module to the PIX 501, perform the following steps:

Step 1   Connect the small, round connector of the power supply cable to the power connector on the rear panel (see Figure 2-4).

Step 2   Connect the AC power connector of the power supply input cable to an electrical outlet.

Note   The PIX 501 does not have a power switch. Completing Step 2 powers on the device.

Figure 2-4   Connecting the Power Supply Module to the PIX 501
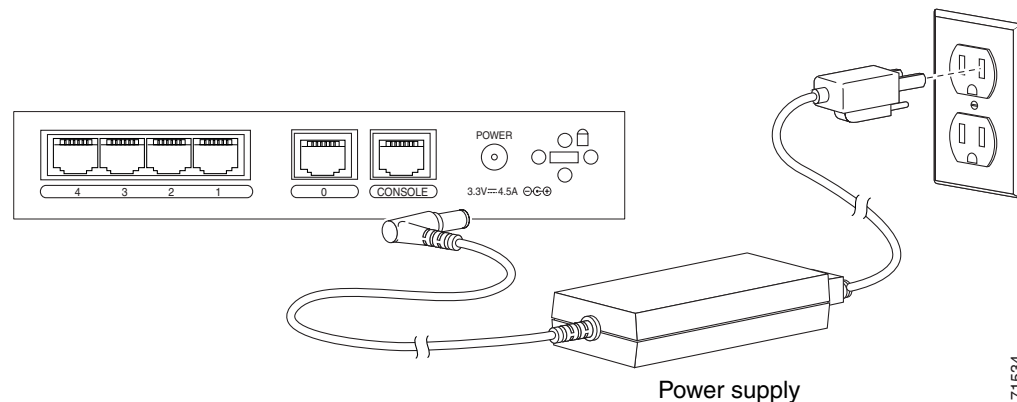
PIX 501 Cable Lock

The PIX 501 includes a slot that accepts standard desktop cable locks to provide physical security for small portable equipment, such as laptop computers (see Figure 2-5).

Figure 2-5   PIX 501 Security Cable Lock
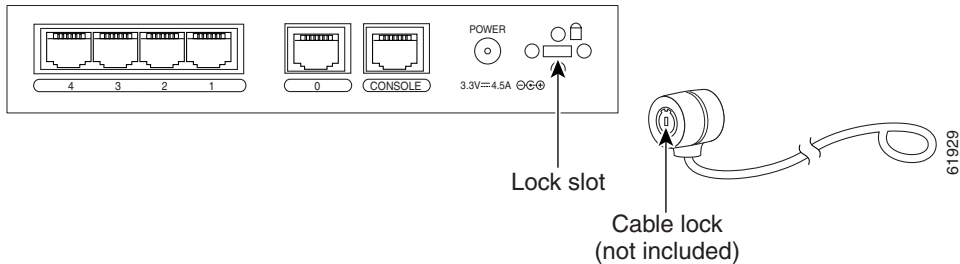
To install a security cable lock, perform the following steps:

Step 1   Attach the cable lock to the lock slot on the back panel of the PIX 501.

Step 2   Follow the directions from the manufacturer for attaching the other end of the device for securing the PIX 501.

Removing and Replacing the PIX 501 Chassis Cover

This section describes how to remove and replace the chassis cover from the PIX 501. This section includes the following topics:

- Removing the Chassis Cover, page 2-4
- Replacing the Chassis Cover, page 2-5

Removing the Chassis Cover

To remove the chassis cover, perform the following steps:

Note   Removing the chassis cover does not affect your Cisco warranty. Upgrading the PIX security appliance does not require any special tools and does not create any radio frequency leaks.

Step 1   Read the *Regulatory Compliance and Safety Information* document.

Step 2   Unplug the power cord from the power outlet to power off the security appliance.

Step 3   Disconnect the network interface cables.

Step 4 Turn the unit upside down so that the top of the chassis is resting on a flat surface, and the front of the chassis is facing toward you.

Step 5 Unscrew the single screw located on the bottom of the chassis, centered under the front panel (see Figure 2-6).

Figure 2-6   Removing PIX 501 Bottom Panel Screw
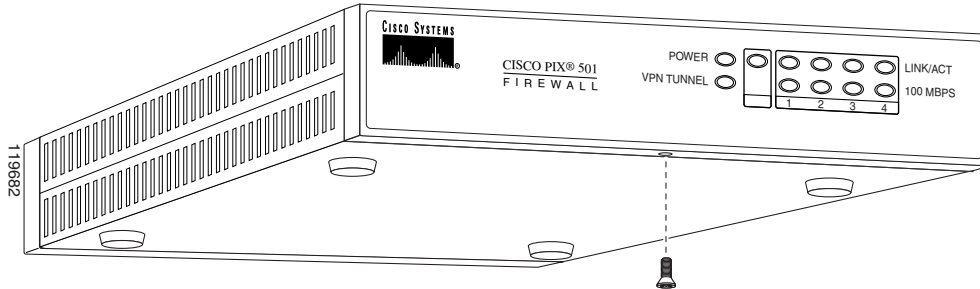
Step 6 Return the chassis to the upright position. Note that the chassis is comprised of two sections: top and bottom (see Figure 2-7).

Figure 2-7   Sliding the Chassis Cover Off the Chassis
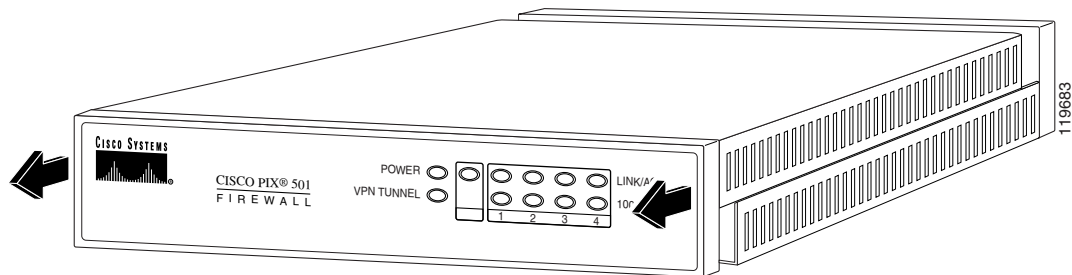
Step 7 With the front panel facing you, slide the top section toward you, and then lift it up and off the bottom section (see Figure 2-7).

Replacing the Chassis Cover

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Caution Do not operate PIX security appliances without the chassis cover installed. The chassis cover protects the internal components, prevents electrical shorts, and provides proper air-flow for cooling the electronic components.

To replace the chassis cover, perform the following steps:

Step 1 Place the chassis on a secure surface with the front panel facing you.

Step 2 Hold the chassis cover so the tabs at the rear of the chassis cover are aligned with the chassis bottom.

Step 3 Lower the front of the cover onto the chassis, making sure that the side tabs of the cover fit under the side panels of the chassis.

Step 4 Slide the chassis cover toward the front, making sure that the cover tabs fit under the back panel, and the back panel tabs fit under the chassis cover.

Step 5 Secure the chassis cover with the screw you set aside earlier.

Step 6 Reconnect the network interface cables.

Step 7 Place the PIX 501 on a flat, stable surface. The PIX 501 is not rack mountable.

Step 8 Reconnect the power cord to the power outlet to power on the security appliance.

Replacing a Lithium Battery

The PIX 501 has a lithium battery on the main circuit board (see Figure 2-8). This battery has an operating life of about ten years. When the battery loses its charge, the PIX security appliance cannot function. The lithium battery is a field-replaceable unit (FRU). You can use a standard 3V lithium battery to replace the used battery.

Figure 2-8   PIX 501 Lithium Battery Location
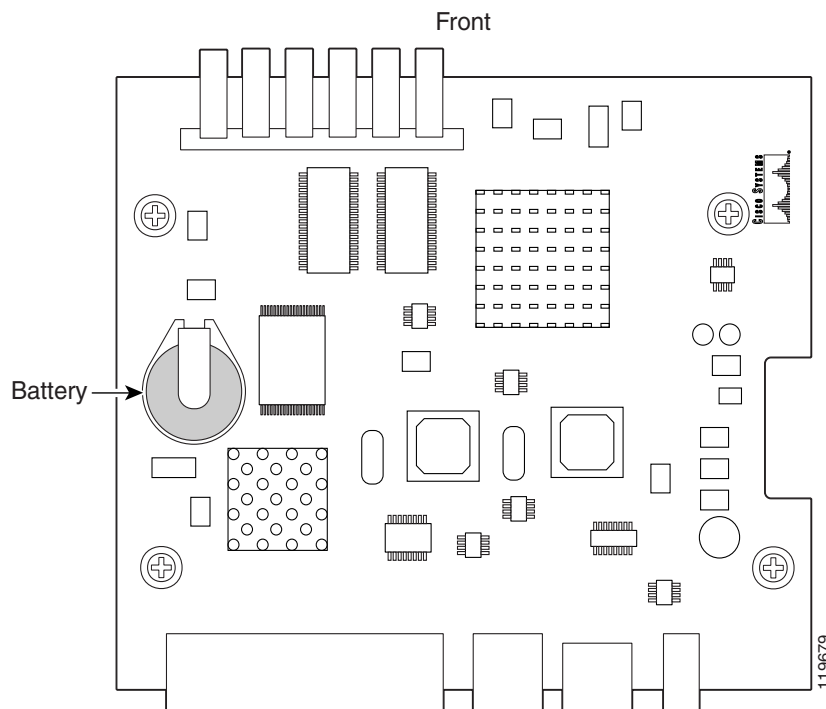
Warning **Danger of explosion exists if the lithium battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.**

To replace the lithium battery, perform the following steps:

Step 1   Remove the chassis cover as described in the "Removing the Chassis Cover" section on page 2-4.

Step 2   Use a flathead screwdriver to slide the battery out of the metal clip on the circuit board (see Figure 2-8).

Step 3   Place the used battery aside and replace it with a new battery. Install the new battery writing side up.

Step 4   The battery snaps into place as you slide it into the battery slot.

Step 5   Replace the chassis cover as described in the "Replacing the Chassis Cover" section on page 2-5.

PIX 506/506E

This chapter describes how to install a PIX 506/506E, and includes the following sections:

- PIX 506/506E Product Overview, page 3-1
- Installing the PIX 506/506E, page 3-3
- Connecting a Power Supply Module to the PIX 506/506E, page 3-4
- Removing and Replacing the PIX 506/506E Chassis Cover, page 3-6
- Replacing a Lithium Battery, page 3-7

Note The PIX 506 and the PIX 506E are the same except the PIX 506E has a faster processor and a different power supply.

The PIX 506 and the PIX 506E are not supported in software Version 7.0(1).

PIX 506/506E Product Overview

This section describes the PIX 506/506E front and rear panels and the panel LEDs.

Figure 3-1 shows the front view of the PIX 506/506E.

Figure 3-1   PIX 506/506E Front Panel

Figure 3-2 shows the rear view of the PIX 506/506E.

Figure 3-2   PIX 506/506E Rear Panel
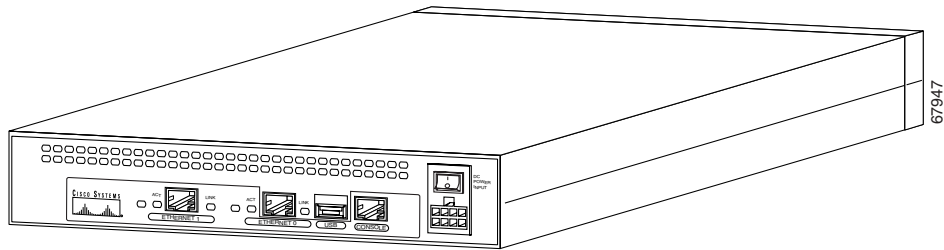
Figure 3-3 shows the PIX 506/506E front panel LEDs.

Figure 3-3   PIX 506/506E Front Panel LEDs
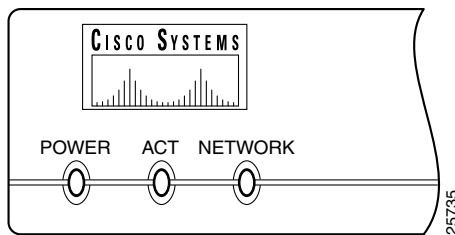
Table 3-1 lists the states of the PIX 506/506E front panel LEDs.

Table 3-1   PIX 506/506E Front Panel LEDs

LED	Color	State	Description
POWER	Green	On	The unit has power.
ACT	Green	Flashing	Active indicator—On when the software image has been loaded on the security appliance.
NETWORK	Green	Flashing	On when at least one network interface is passing traffic.

Figure 3-4 shows the PIX 506/506E rear panel LEDs.

Figure 3-4   PIX 506/506E Rear Panel LEDs
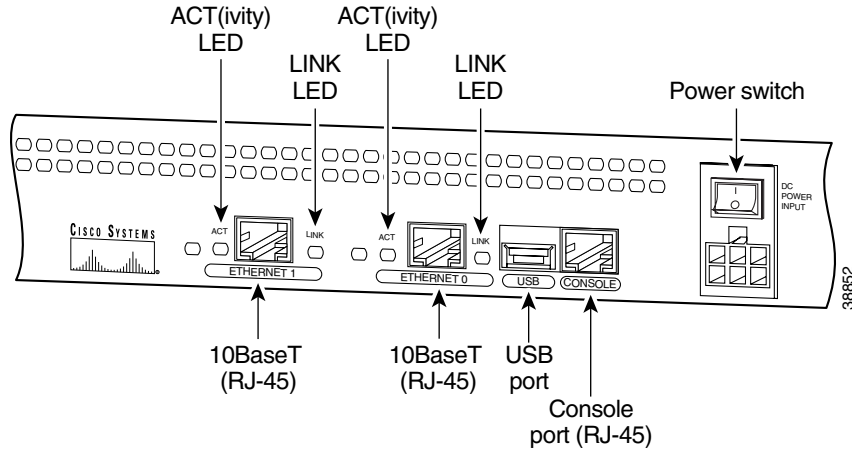
Table 3-2 lists the states of the PIX 506/506E rear panel LEDs.

Table 3-2   PIX 506/506E Rear Panel LEDs

LED	Color	State	Description
ACT	Green	On	Shows network activity.
LINK	Green	On	Shows that data is passing on the network to which the connector is attached.

The USB port at the left of the Console port is not used.

Installing the PIX 506/506E

Place the PIX 506/506E on a flat, stable surface. The PIX 506/506E is not rack mountable.

To install the PIX 506/506E, perform the following steps:

Step 1   Connect the cable so that you have either a DB-9 or DB-25 connector on one end as required by the serial port for your computer, and the other end is the RJ-45 connector.

Note   Use the RJ-45 Console port to connect a computer to enter configuration commands. Locate the serial cable from the accessory kit. The serial cable assembly consists of a null modem cable with RJ-45 connectors, and one DB-9 connector and one DB-25 connector.

Step 2   Connect the RJ-45 connector to the PIX 506/506E and connect the other end to the serial port connector on your computer (see Figure 3-7).

Figure 3-5   PIX 506/506E Serial Console Cable
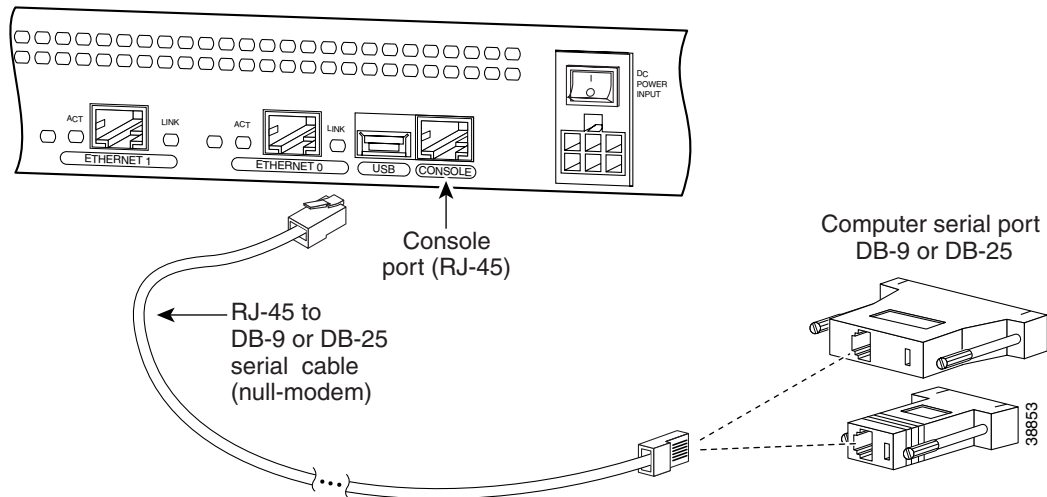
Step 3   Connect the inside network cable to the interface connector marked ETHERNET 0 *or* ETHERNET 1.

Note   The inside or outside network connections can be made to either interface port on the PIX 506/506E.

Step 4   Connect the outside network cable to the remaining Ethernet port.

Connecting a Power Supply Module to the PIX 506/506E

This section describes how to connect the power supply module to the PIX 506/506E. Use this information in conjunction with the *Regulatory Compliance and Safety Information* document.

The PIX 506/506E uses an external AC to DC power supply. Power is supplied to the PIX 506/506E by connecting the power supply to the back of the security appliance and connecting a separate AC power cord to the power supply.

Figure 3-6 displays the cable connection from the power supply to the PIX 506, and displays the AC power cord connector (at the opposite end of the power supply).

Figure 3-6   Connecting the Power Supply Module to the PIX 506 6-Pin Connector
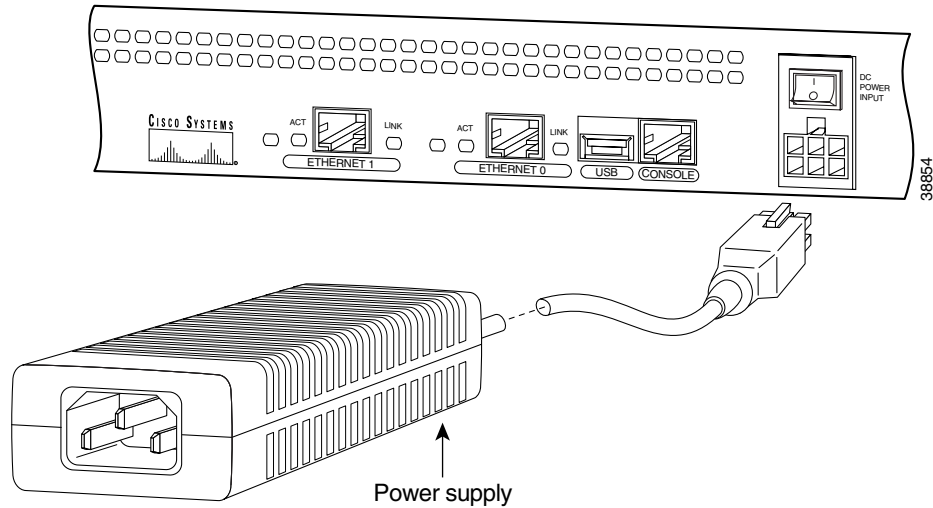
Power supply

Figure 3-7 displays the cable connection from the power supply to the PIX 506E, and displays the AC power cord connector (at the opposite end of the power supply).

Figure 3-7   Connecting the Power Supply Module to the PIX 506E 8-Pin Connector
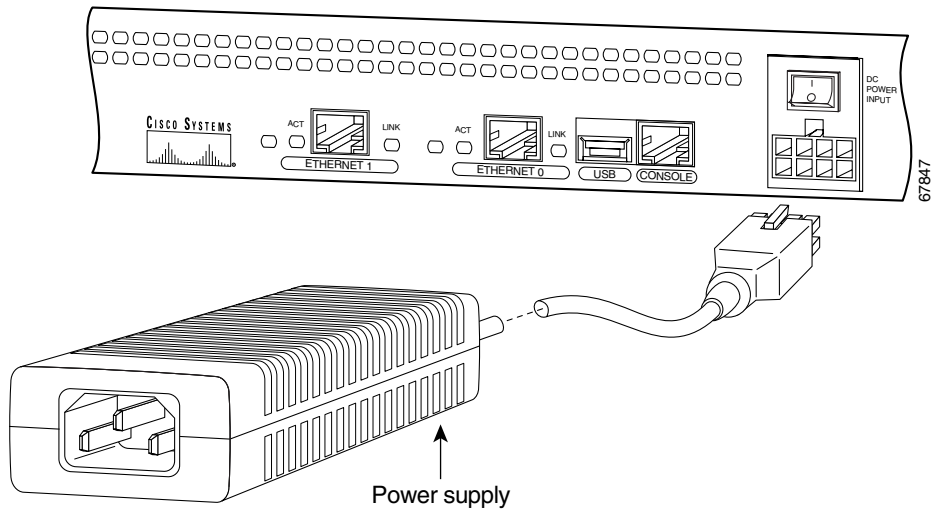
Power supply

To connect the power supply module, perform the following steps:

Step 1   Place the PIX 506/506E on a flat, stable surface. The PIX 506/506E is not rack mountable.

Step 2   Connect the power supply to the back of the PIX 506/506E. See Figure 3-6 for the PIX 506 and Figure 3-7 for the PIX 506E.

Step 3   When you are ready to start the PIX 506/506E, power on the unit from the switch at the rear of the unit.

Removing and Replacing the PIX 506/506E Chassis Cover

This section describes how to remove and replace the chassis cover from the PIX 506/506E. This section includes the following topics:

- Removing the Chassis Cover, page 3-6
- Replacing the Chassis Cover, page 3-7

Removing the Chassis Cover

To remove the chassis cover, perform the following steps:

Note Removing the chassis cover does not affect your Cisco warranty. Upgrading the PIX security appliance does not require any special tools and does not create any radio frequency leaks.

Step 1 Read the *Regulatory Compliance and Safety Information* document.

Step 2 Power off the security appliance and unplug the power cord.

Warning **Before working on a system that has an On/Off switch, turn OFF the power and unplug the power cord.**

Step 3 Disconnect the network interface cables.

Step 4 Remove the two screws from the back of the chassis (see Figure 3-8).

Figure 3-8   Removing PIX 506/506E Chassis Cover Screws
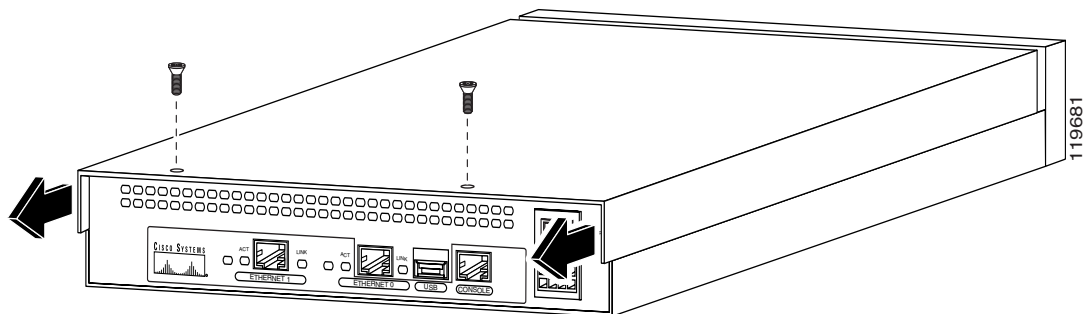
Step 5 With the rear panel facing you, slide the chassis cover back and then lift it up off the bottom section, as shown in Figure 3-8.

Replacing the Chassis Cover

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Caution   Do not operate PIX security appliances without the chassis cover installed. The chassis cover protects the internal components, prevents electrical shorts, and provides proper air-flow for cooling the electronic components.

To replace the chassis cover, perform the following steps:

Step 1   Place the chassis on a secure surface with the front panel facing you.

Step 2   Hold the chassis cover so the tabs at the rear of the cover are aligned with the bottom of the chassis.

Step 3   Lower the front of the cover onto the chassis, making sure that the side tabs of the cover fit under the side panels of the chassis.

Step 4   Slide the chassis cover toward the front, making sure that the cover tabs fit under the back panel, and the back panel tabs fit under the chassis cover.

Step 5   Secure the chassis cover with the screws you set aside earlier.

Step 6   Reconnect the network interface cables.

Step 7   Place the PIX 506/506E on a flat, stable surface. The PIX 506/506E is not rack mountable..

Step 8   Reconnect the power cord and power on the security appliance.

Replacing a Lithium Battery

The PIX 506/506E has a lithium battery on its main circuit board (see Figure 3-9). This battery has an operating life of about ten years. When the battery loses its charge, the PIX security appliance cannot function. The battery is a field-replaceable unit (FRU). You can use a standard 3V lithium battery to replace the used battery.

Figure 3-9   PIX 506/506E Lithium Battery Location
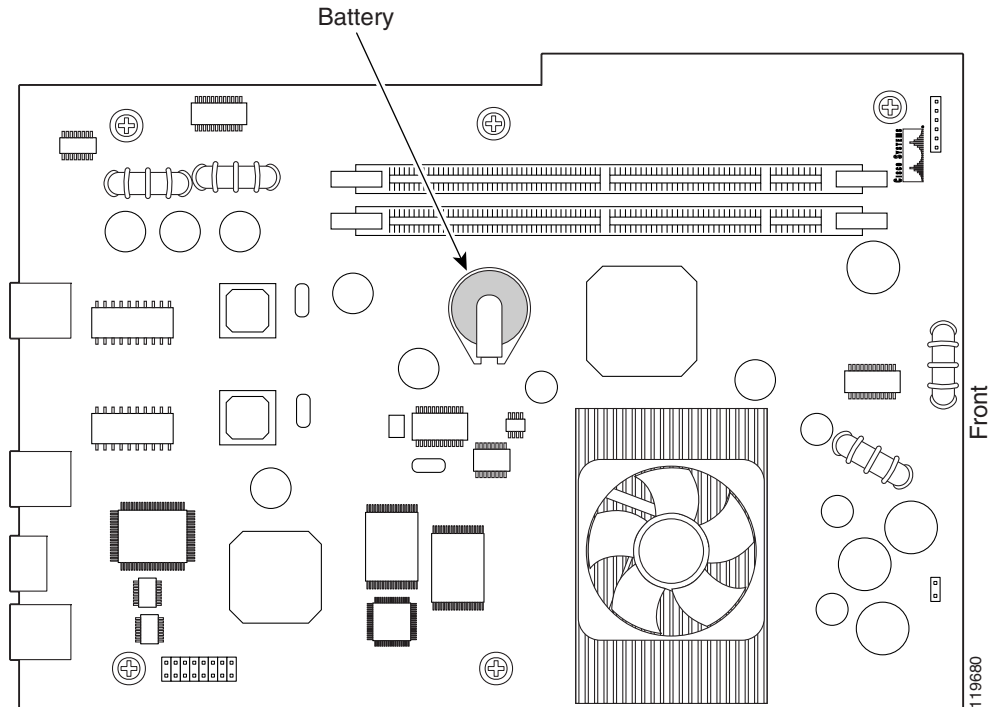
Battery

Front

119680

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Warning   **Danger of explosion exists if the lithium battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.**

To replace the lithium battery, perform the following steps:

Step 1   Remove the chassis cover as described in the "Removing the Chassis Cover" section on page 3-6.

Step 2   Use a flathead screwdriver to slide the battery out of the metal clip on the circuit board (see Figure 3-9).

Step 3   Place the used battery aside and replace it with a new battery. Install the new battery writing side up.

Step 4   The battery snaps into place as you slide it into the battery slot.

Step 5   Replace the chassis cover by lining up the cover tabs with the bottom panel tabs, and sliding the chassis cover back into the side and front panel slots on the chassis.

Step 6   Replace the chassis cover as described in the "Replacing the Chassis Cover" section on page 3-7.

PIX 515/515E

This chapter describes how to install the PIX 515/515E, and includes the following sections:

Note The PIX 515 and the PIX 515E are the same except that the PIX 515E has a faster processor.

PIX 515/515E Product Overview

This section describes the front and rear panels and the panel LEDs.

Figure 4-1 shows the front view of the chassis.

Figure 4-1   PIX 515/515E Front Panel

Figure 4-2 shows the rear view of the chassis.

Figure 4-2   PIX 515/515E Rear Panel
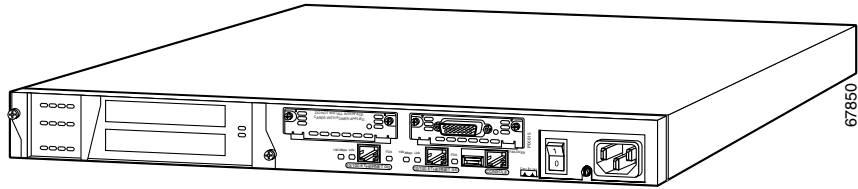
Figure 4-3 shows the front panel LEDs.

Figure 4-3   PIX 515/515E Front Panel LEDs
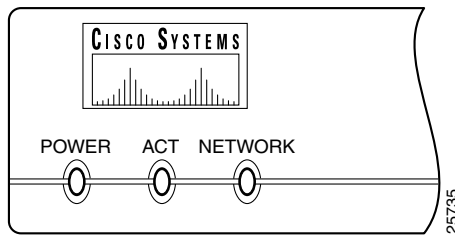
Table 4-1 lists the states of the front panel LEDs.

Table 4-1   PIX 515/515E Front Panel LEDs

LED	Color	State	Description
POWER	Green	On	On when the unit has power.
ACT	Green	On	On when the unit is the active failover unit. If failover is present, the light is on when the unit is the active unit.
		Off	Off when the unit is in standby mode. If failover is not enabled, this light is off.
NETWORK	Green	Flashing	On when at least one network interface is passing traffic.

Figure 4-4 shows the rear panel LEDs.

Figure 4-4   PIX 515/515E Rear Panel
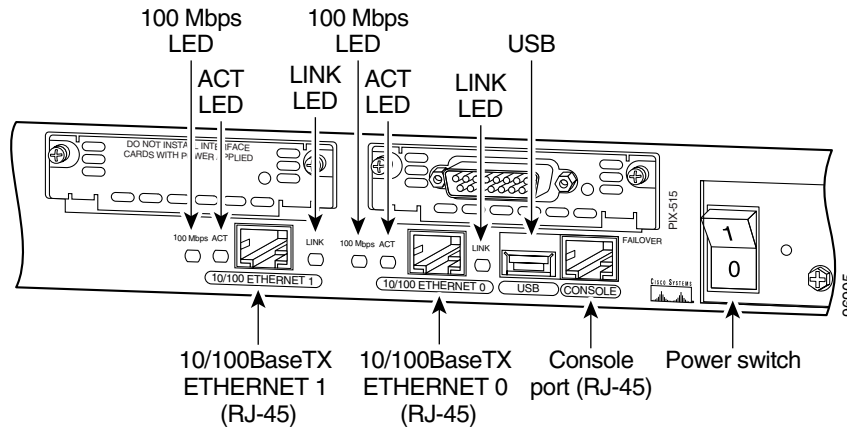
Table 4-2 lists the states of the rear panel LEDs.

Table 4-2   PIX 515/515E Rear Panel LEDs

LED	Color	Status	Description
100 Mbps	Green	On	100 megabits per second 100BaseTX communication. If the light is off, that port is using 10 megabits per second data exchange.
ACT	Green	Flashing	Shows that data is passing on the network to which the connector is attached.
LINK	Green	On	Shows that the connection uses full duplex data exchange where data is transmitted and received simultaneously.
		Off	If this light is off, half duplex is in effect.

The inside or outside network connections can be made to any available interface port on the PIX 515/515E. If you are only using the ETHERNET 0 and ETHERNET 1 ports, connect the inside network cable to the interface connector marked ETHERNET 0 *or* ETHERNET 1. Connect the outside network cable to the remaining Ethernet port.

The USB port to the left of the Console port is not used. The detachable plate above the ETHERNET 1 connector is also not used.

Installing the PIX 515/515E

This section contains the following topics:

- Surface Mounting the PIX 515/515E, page 4-4
- Removing and Replacing the PIX 515/515E Chassis Cover, page 4-13
- Vertical Mounting the PIX 515/515E, page 4-5
- Installing a Circuit Board in the PIX 515/515E, page 4-19

Surface Mounting the PIX 515/515E

To surface mount the chassis, perform the following steps:

Step 1 Locate the rubber feet on the black adhesive strip that shipped with the chassis.

Step 2 Place the chassis upside down on a smooth, flat surface.

Step 3 Peel off the rubber feet from the black adhesive strip and place them adhesive-side down onto the five round, recessed areas on the bottom of the chassis, as shown in Figure 4-5.

Step 4 Place the security appliance right-side up on a flat, smooth, secure surface.

Note The fan is not blocked by the device below if you surface mount the chassis on top of each other, the air is sucked in from the back and side vents and exhausted out with the help of the fan through the bottom of the chassis and then directed out the side of the channel by the channel feature on the bottom of the chassis.

Figure 4-5   Attaching the Rubber Feet to the PIX 515/515E

Fan

Unused
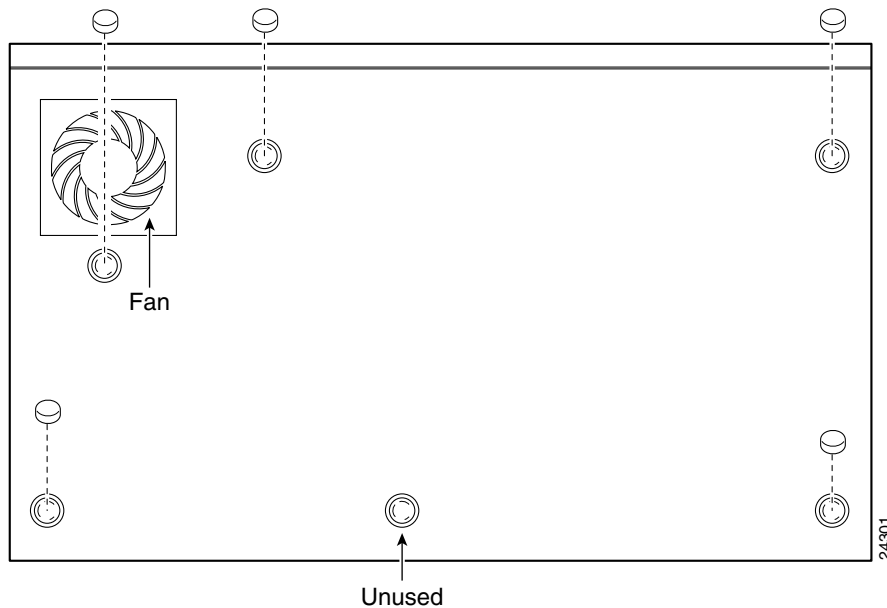
Rack Mounting the PIX 515/515E

Observe the following before installing the chassis into an equipment rack:

- To install optional circuit boards or memory, install the brackets on the unit for rack mounting, but do not put the chassis in the equipment rack before installing the new boards. You must remove the chassis cover to install or remove a circuit board. Refer to the "Removing and Replacing the PIX 515/515E Chassis Cover" section on page 4-13 for information.

  - For more information on installing a circuit board, refer to the "Installing a Circuit Board in the PIX 515/515E" section on page 4-19.

  - For more information on installing additional memory, refer to the "Installing a Memory Upgrade" section on page 4-16.

Note   The fan is not blocked by the device below if you mount the chassis on top of each other, the air is sucked in from the back and side vents and exhausted out with the help of the fan through the bottom of the chassis and then directed out the side of the channel by the channel feature on the bottom of the chassis.

To install the chassis in a rack, perform the following steps:

Step 1   Attach the bracket to the chassis using the supplied screws. You can attach the brackets to the holes near the front of the chassis.

Step 2   Attach the chassis to the equipment rack.

Vertical Mounting the PIX 515/515E

To mount the chassis vertically, attach the brackets to the side of the unit and mount the unit vertically as shown in Figure 4-6.

Figure 4-6   Installing the PIX 515/515E Vertically

24303
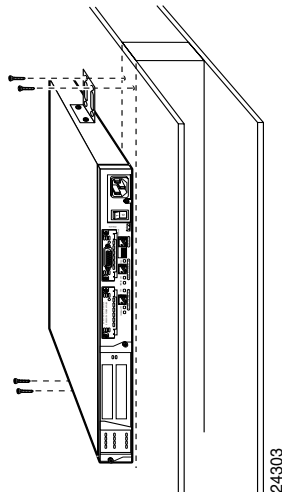
Installing the PIX 515/515E

To install the PIX 515/515E, perform the following steps:

Step 1   Connect the cable as shown in Figure 4-7 so that you have either a DB-9 or DB-25 connector on one end as required by the serial port for your computer, and the other end is the RJ-45 connector.

Note   Use the Console port to connect to a computer to enter configuration commands. Locate the serial cable from the accessory kit. The serial cable assembly consists of a null modem cable with RJ-45 connectors, and one DB-9 connector and a DB-25 connector.

Step 2   Connect the RJ-45 connector to the PIX 515/515E Console port and connect the other end to the serial port connector on your computer.

Figure 4-7   PIX 515/515E Serial Console Cable
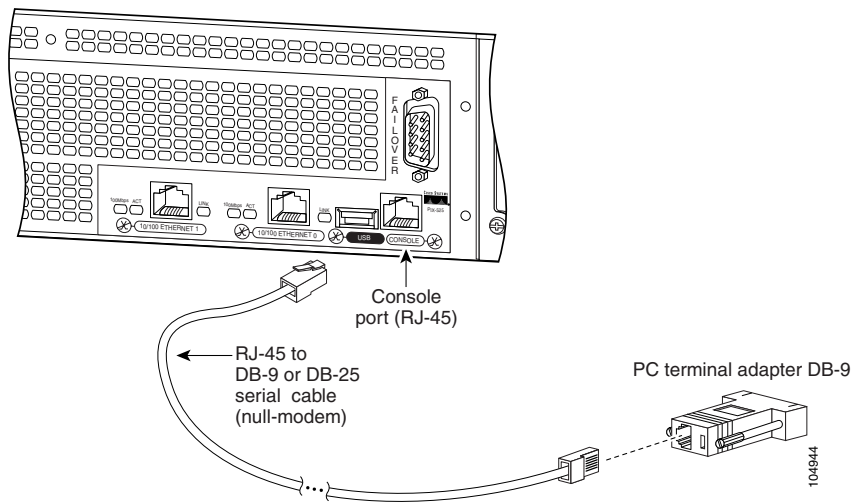
Note   If your unit has a four-port Ethernet circuit board already installed, refer to Figure 4-8. (The four-port Ethernet circuit board requires the PIX-515/515E-UR license to be accessed.) If it has one or two single-port Ethernet circuit boards, refer to Figure 4-9. If you need to install an optional circuit board, refer to the "Removing and Replacing the PIX 515/515E Chassis Cover" section on page 4-13 for more information.

Figure 4-8   Four-Port Ethernet Connectors in the PIX 515/515E
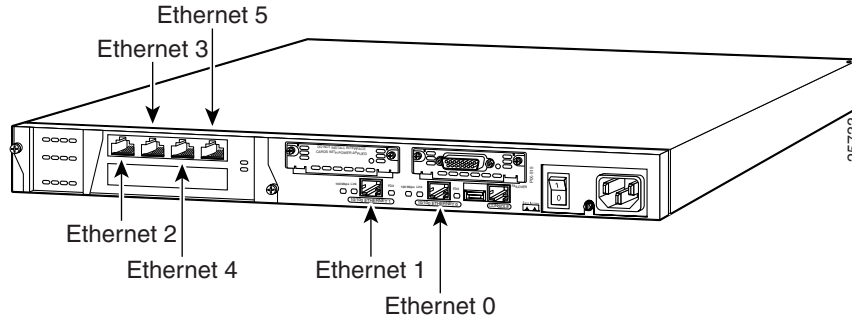
Step 3 Connect the inside, outside, or perimeter network cables to the interface ports. Starting from the top left the connectors are Ethernet 2, Ethernet 3, Ethernet 4, and Ethernet 5. The maximum number of allowed interfaces is 6.

Note Do not add a single-port circuit board in the extra slot below the four-port circuit board.

Figure 4-9   Two Single-Port Ethernet Connectors in the PIX 515/515E
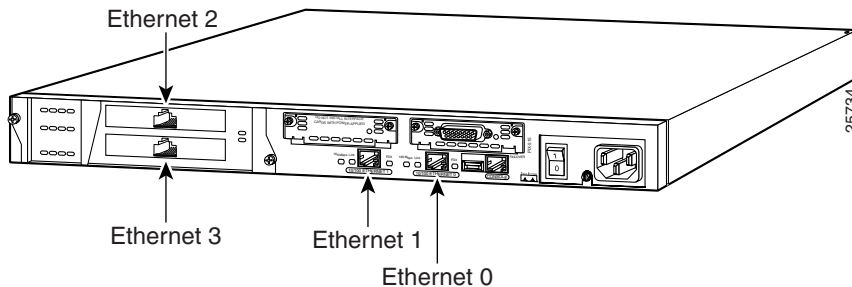
Note As shown in Figure 4-9, if your unit has one or two single-port Ethernet circuit boards installed in the auxiliary assembly on the left of the unit at the rear, the circuit boards are numbered top to bottom so that the top circuit board is Ethernet 2 and the bottom circuit board is Ethernet 3. (Additional Ethernet circuit boards require the PIX-515/PIX 515E-UR license to be accessed.)

If you have a second PIX security appliance to use as a failover unit, install the failover feature and cable as described in the "Installing Failover" section on page 4-9.

Note Do not power on the failover units until the active unit has been configured.

Step 4 Power on the unit from the switch at the rear to start the PIX 515/515E.

Table 4-3 lists the states of the LEDs on the four-port Ethernet circuit boards available for the PIX-515/515E.

Table 4-3   Status Lights on Four-Port Ethernet Circuit Boards

Board Model	LED position	Color	Status	Description
PIX-4FE	left	Green	On	Link enabled.
	right	Green	Flashing	Link activity.
PIX-4FE-66	left	Green	Flashing	Link activity.
	right	Green	On	100 MB link enabled.
			Off	10 MB link enabled.

PIX 515/515E Feature Licenses

If you have the PIX-515/515E-UR unrestricted feature license, the following options are available:

- If you have a second PIX 515/515E to use as a failover unit, install the failover feature and cable as described in the "Installing Failover" section on page 4-9.

- If needed, install the PIX security appliance syslog server as described in the **logging** command page in the command reference online at:

  http://cisco.com/en/US/products/sw/secursw/ps2120/prod_command_reference_list.html

- Refer to the "Removing and Replacing the PIX 515/515E Chassis Cover" section on page 4-13, for information about how to remove and replace the chassis cover if you need to install optional circuit boards.

Note It is very important to remove the chassis cover before installing circuit boards in the PIX 515/515E. Even though it appears possible to add or remove circuit boards from the back panel, removing the chassis cover greatly simplifies the process.

- If you need to install additional memory, refer to the "Installing a Memory Upgrade" section on page 4-16.

Note If, for any reason, you choose to downgrade to any software version, note that you must use the **clear flashfs** command before doing so. A new section is added to Flash memory that must be cleared before downgrading.

For information on upgrading feature licenses or downloading the latest software versions, refer to the the configuration guide online at:

http://www.cisco.com/en/US/products/sw/secursw/ps2120/prod_configuration_guides_list.html

This section includes the following topics:

- VPN Accelerator Card, page 4-9
- VPN Accelerator Card+, page 4-9

VPN Accelerator Card

The VPN Accelerator Card (VAC) for the Cisco PIX security appliance series is a card that provides high-performance, tunneling and encryption services suitable for site-to-site and remote access applications. The VAC is integrated with PIX 515 unrestricted (UR) and failover (FO) bundles. You can also purchase the VAC as a spare for use with PIX 515s that have a restricted (R) license.

VPN Accelerator Card+

The VAC+ is a 64-bit/66 MHz PCI card that provides faster tunneling and encryption services for Virtual Private Network (VPN) remote access, and site-to-site intranet and extranet applications, than the VAC. Each VAC+ occupies a single PCI slot in the system. The VAC+ is supported on any chassis that runs Version 6.3 software or later, has an appropriate license to run VPN software, and at least one PCI slot available. While the VAC continues to be supported in Version 6.3, if both types of cards, the VAC and the VAC+, are installed in a system running Version 6.3, the VAC card is ignored. The VAC+ runs at both 32-bit/33 MHz and 64-bit/66 MHz, and does not slow down the bus when other 66 MHz cards are installed. We strongly recommend that you install the VAC+ in a 64bit/66 MHz slot. Performance is degraded if this recommendation is not followed.

The VAC+ driver supports the following:

- 3DES, DES, AES, SHA1, MD5 for (IPSec) ESP protocol (For AES, only the CBC mode and key sizes of 128, 192, and 256 bits are supported).
- SHA1, MD5 for the (IPSec) AH protocol.
- Load sharing ESP and AH activity between up to three VAC+.
- Diffie-Hellman public key and shared secret generation.
- Any other crypto-related activity uses a software implementation.

Installing Failover

To install a failover connection, perform the following steps:

Step 1   Power off both the primary and secondary units.

> ✎
>
> **Note**   Both PIX security appliances must have the same model number, have at least as much RAM, have the same Flash memory size, and be running the same software version. Note that the PIX-4FE and PIX-4FE-66 cards are considered equivalent and interchangeable. You can install a PIX-4FE in the primary unit and a PIX-4FE-66 in the secondary unit, as long as you install them in the same slot number of each chassis. For example, if you install a PIX-4FE in Slot 1 of the primary unit, you must also install the PIX-4FE-66 in Slot 1 of the secondary unit.

Step 2   Locate the failover cable (shown in Figure 4-10). The cable is labeled "Primary" on one end and "Secondary" on the other.

Install the cable for the PIX 515/515E as shown in Figure 4-10.

Figure 4-10   PIX 515/515E Failover Cable Connection
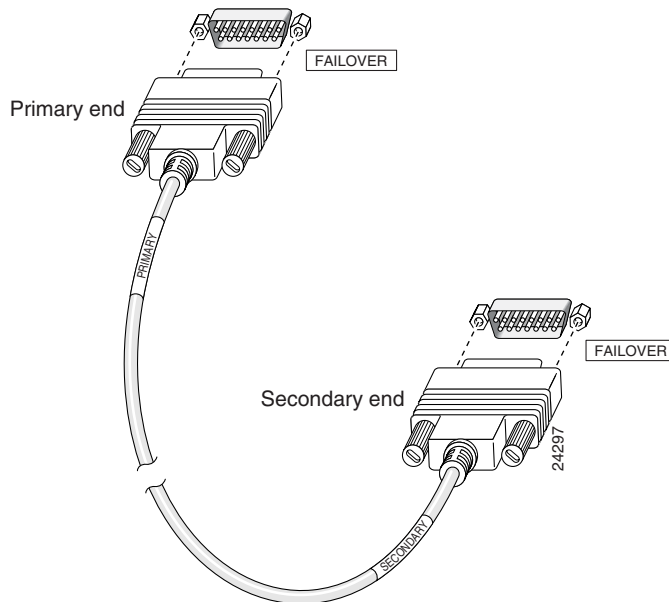
Note   You can connect the PIX 515 to the PIX 515, but you cannot connect the PIX 515 to the PIX 515E or vice versa. Both units must be identical.

Step 3   Connect the Primary end of the failover cable to the first PIX security appliance; that is, the one you have already configured.

Step 4   Connect the Secondary end of the failover cable to the standby unit.

Step 5   Connect a power cord to the power connector on the rear panel of each unit, and the other end of each power cord to (preferably separate) power outlets.

Step 6   If you are using Stateful Failover, use one of the following types of connections, that is appropriate for your system, between the dedicated interfaces on the PIX security appliance:

- Category 5 crossover cable directly connecting the primary unit to the secondary unit
- 100BaseTX half-duplex hub using Straight-through Category 5 cables
- 100BaseTX full duplex on a dedicated switch or dedicated VLAN of a switch

Figure 4-11 shows an example of a minimally configured PIX 515/515E with only the two interfaces on the motherboard used for network traffic.

Figure 4-11   Failover Connections
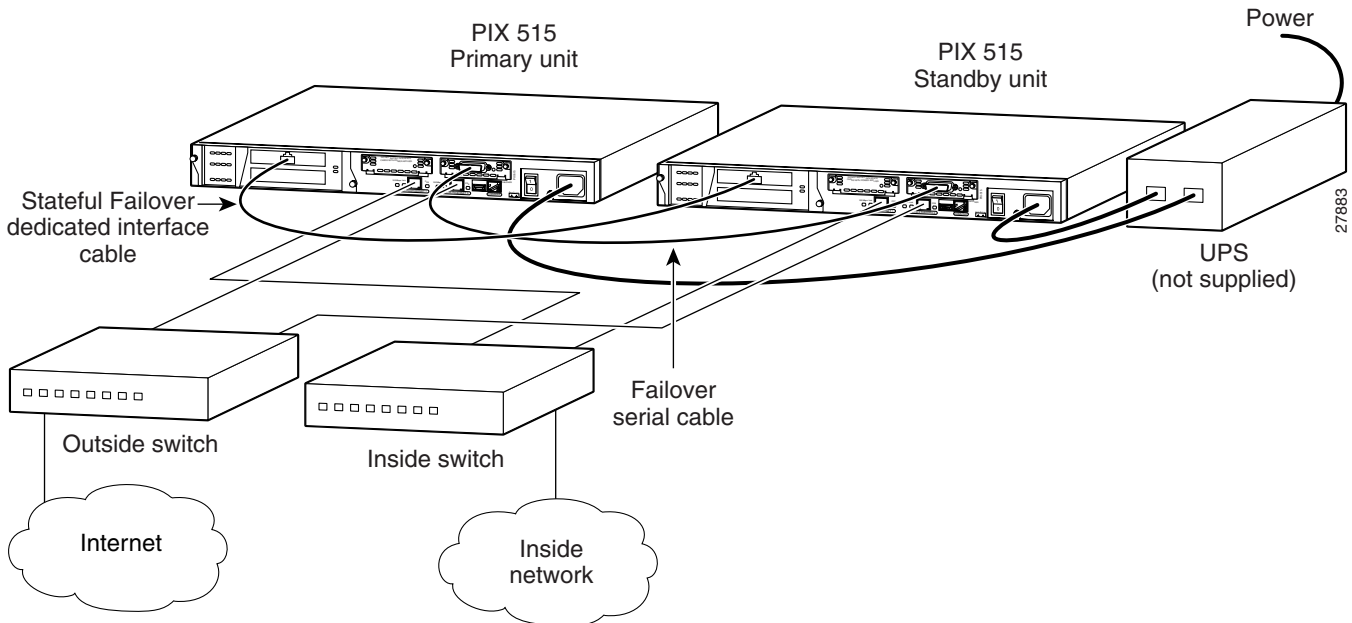
> ✎ **Note**   All enabled interfaces must be connected between the active and standby units. Only configure the active unit. On the PIX 515/515E, the active unit is indicated by the ACT LED on the front panel. (See Figure 4-3.)

> ⚠ **Caution**   Do not turn the power on until the units are connected and the primary unit is configured completely.

Step 7   Use the power switch at the back of the units to power on the primary unit and then power on the standby unit.

Within a few seconds, the active unit automatically downloads its configuration to the standby unit.

If the primary unit fails, the secondary unit automatically becomes active.

Installing LAN-Based Failover

LAN-based failover supports failover between two units connected over a dedicated Ethernet interface. LAN-based failover eliminates the need for a special failover cable and overcomes the distance limitations imposed by the failover cable.

Note   Both chassis must be the same model number, have the same amount of RAM, Flash memory, number and type of interfaces, and be running the same software version.

To set up a LAN-based failover connection, perform the following steps:

Step 1   Disconnect both PIX security appliances, so that there is no traffic flow between them. If the failover cable is connected to the PIX security appliance, disconnect it.

Step 2   Configure the PIX security appliances for LAN-based failover. Refer to the chapter on configuring LAN-based failover in the configuration guide online at:

http://www.cisco.com/en/US/products/sw/secursw/ps2120/prod_configuration_guides_list.html

Step 3   Power off both units.

Step 4   Connect the LAN failover interfaces to the dedicated switch/hub, as shown in Figure 4-12.

Note   A dedicated LAN interface and a dedicated switch (or VLAN) is required to implement LAN-based failover. You cannot use a crossover Ethernet cable to connect the two PIX security appliances.

Figure 4-12   LAN-Based Failover Connections

Step 5   If you are using Stateful Failover, use one of the following types of connections, that is appropriate for your system, between the dedicated interfaces on the PIX security appliance:

- 100BaseTX full duplex on a dedicated switch or dedicated VLAN of a switch
- 1000BaseTX full duplex on a dedicated switch or dedicated VLAN of a switch

⚠

Caution   Do not turn the power on until the units are connected and the primary unit is configured completely.

Step 6   Power the primary unit on first, *then* power on the secondary unit. Within a few seconds, the active unit automatically downloads its configuration to the standby unit.

If the primary unit fails, the secondary unit automatically becomes active.

Removing and Replacing the PIX 515/515E Chassis Cover

This section describes how to remove and replace the chassis cover from the PIX 515/515E. This section includes the following topics:

- Removing the Chassis Cover, page 4-13
- Replacing the Chassis Cover, page 4-15

Removing the Chassis Cover

To remove the chassis cover, perform the following steps:

✎

Note   Removing the chassis cover does not affect your Cisco warranty. Upgrading the PIX security appliance does not require any special tools and does not create any radio frequency leaks.

Step 1   Read the *Regulatory Compliance and Safety Information* document.

Step 2   Unplug the power cord from the power outlet. Ensure that the PIX 515/515E is powered off. Once the upgrade is complete, you can safely reconnect the power cord.

⚠

Warning   **Before working on a system that has an On/Off switch, turn OFF the power and unplug the power cord.**

Step 3   Remove the screws from the front of the chassis on the PIX 515/515E (Figure 4-13).

Figure 4-13   Removing PIX 515/515E Chassis Cover Screws

Top panel screws (4)
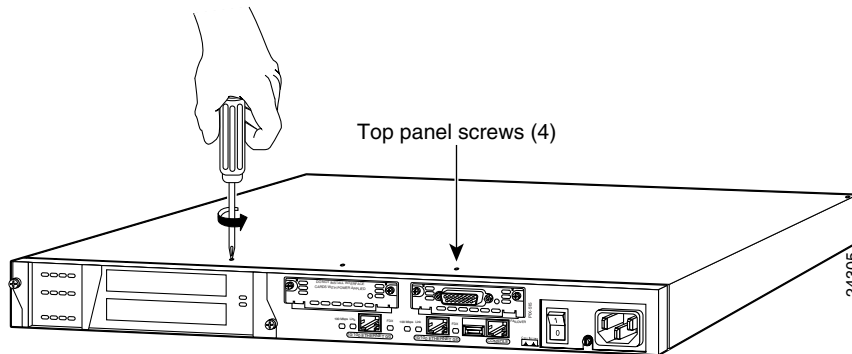
Step 4   With the front of the unit facing you, push the chassis cover back by about one inch as shown in Figure 4-14.

Figure 4-14   Pushing Back the Chassis Cover
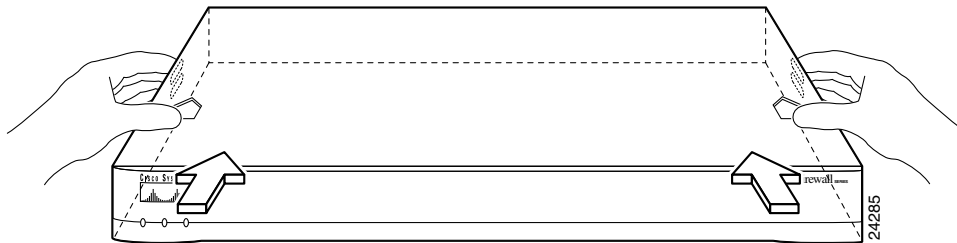
Step 5   Pull the chassis cover up as shown in Figure 4-15. Put the chassis cover in a safe place.

Figure 4-15   Pull the Chassis Cover up to Remove
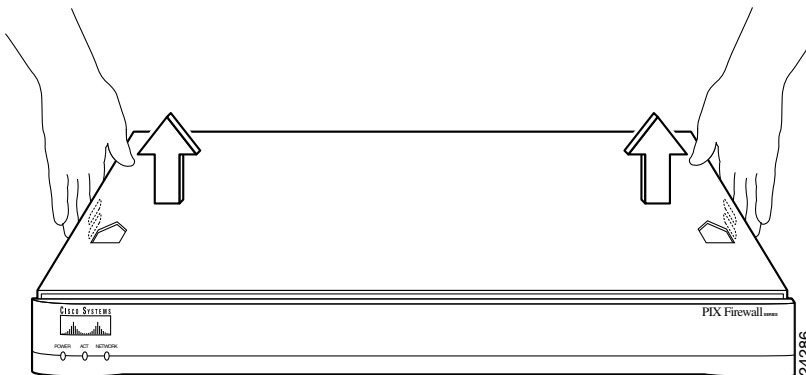
Replacing the Chassis Cover

⚠
Caution   Do not operate the PIX security appliance without the chassis cover installed. The chassis cover protects the internal components, prevents electrical shorts, and provides proper air-flow for cooling the electronic components.

To replace the chassis cover, perform the following steps:

Step 1   Place the chassis on a secure surface with the front panel facing you.

Step 2   Hold the chassis cover so the tabs at the rear of the chassis cover are aligned with the chassis bottom.

Step 3   Lower the front of the chassis cover onto the chassis, making sure that the chassis cover side tabs fit under the chassis side panels.

Step 4   Slide the chassis cover toward the front, making sure that the chassis cover tabs fit under the chassis back panel, and the back panel tabs fit under the chassis cover.

Step 5   Fasten the chassis cover with the screws you set aside earlier.

Step 6   Reinstall the chassis on a rack, wall, desktop, or table.

Step 7   Reinstall network interface cables.

Replacing a Lithium Battery

The PIX security appliance has a lithium battery on its main circuit board. This battery has an operating life of about ten years. When the battery loses its charge, the PIX security appliance cannot function. The lithium battery is not a field-replacable unit (FRU) for the PIX 515/515E. Contact Cisco TAC to replace the battery.

✎
Note   Do not attempt to replace this battery yourself.

⚠
Warning   **Danger of explosion exists if the lithium battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.**

Installing a Memory Upgrade

Observe the following warnings, cautions, and notes when installing additional system memory.

The following statement applies to DC models:

Warning   **Before performing any of the following procedures, ensure that power is removed from the DC circuit. To ensure that all power is OFF, locate the circuit breaker on the panel board that services the DC circuit, switch the circuit breaker to the OFF position, and tape the switch handle of the circuit breaker in the OFF position.**

The following statements apply to both AC and DC models:

Warning   **Before working on a system that has an On/Off switch, turn OFF the power and unplug the power cord.**

Caution   If you remove the chassis cover, always reinstall the cover. Running the PIX security appliance without the chassis cover causes the system to overheat and and might damage the electrical components.

Memory Installation Steps

Depending on the software version and feature license installed on the PIX 515/515E security appliance, you might need to upgrade the system memory to run newer software versions or more robust software features.

PIX software Version 6.3 and previous software releases require a minimum of 32 MB of memory with the Restricted license, and 64 MB of memory with the Unrestricted and Failover licenses.

PIX software Version 7.0 requires a minimum of 64 MB of memory with the Restricted license, and 128 MB of memory with the Unrestricted and Failover licenses.

If you want to upgrade the feature license from Restricted to Unrestricted or Failover, or upgrade the software from Version 6.3 to Version 7.0, you need to upgrade the memory.

Note   Software Version 7.0 is supported only on the PIX 515/515E security appliance. New PIX 515E security appliances shipped after the general availability of PIX software Version 7.0 have enough memory to run version 7.0 and the software license ordered.

Table 4-4 lists the minimum memory requirements for the various software versions and licenses.

Table 4-4   PIX 515/515E Minimum Memory Requirements

Software License	Software Version 6.3 and Previous Releases	Software Version 7.0 and Later Releases
Restricted	32 MB	64 MB
Unrestricted	64 MB	128 MB
Failover	64 MB	128 MB

To install memory, perform the following steps:

Step 1   If the PIX 515/515E security appliance is rack mounted, remove it from the rack and place it on a stable work surface.

Step 2   Disconnect the network interface cables and power cord from the PIX 515/515E security appliance.

Step 3   Unpack the items in the memory upgrade kit.

Step 4   Remove the chassis cover. Remove all screws holding the assembly in place. Refer to the "Removing and Replacing the PIX 515/515E Chassis Cover" section on page 4-13 for information on how to remove and replace the chassis cover.

Step 5   Determine the location of the memory sockets (see Figure 4-16).

Figure 4-16   PIX 515/515E System Memory Location
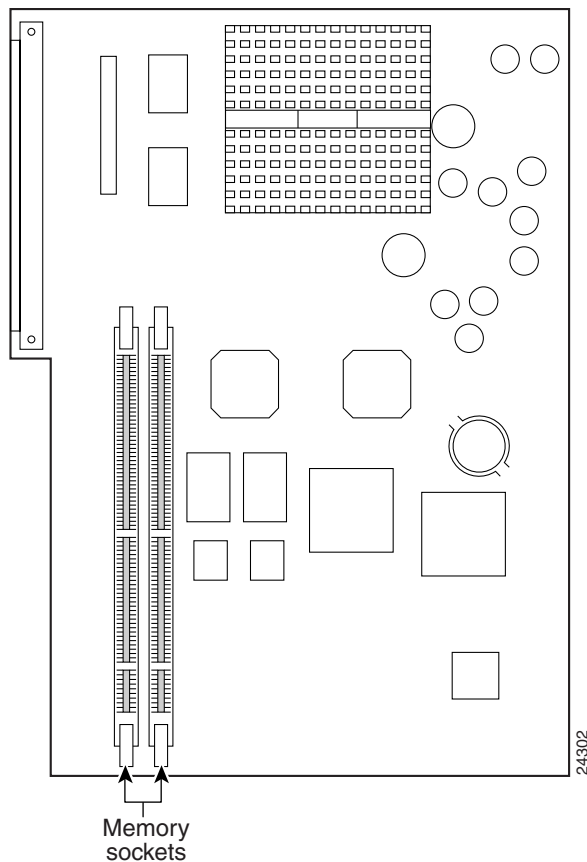
Step 6   Locate the wrist grounding strap in the accessory kit and connect one end to the unit as shown in Figure 4-17, or to the PIX security appliance chassis, and securely attach the other to your wrist so it contacts your bare skin.

Figure 4-17   Attaching the Wrist Strap to the PIX 515/515E
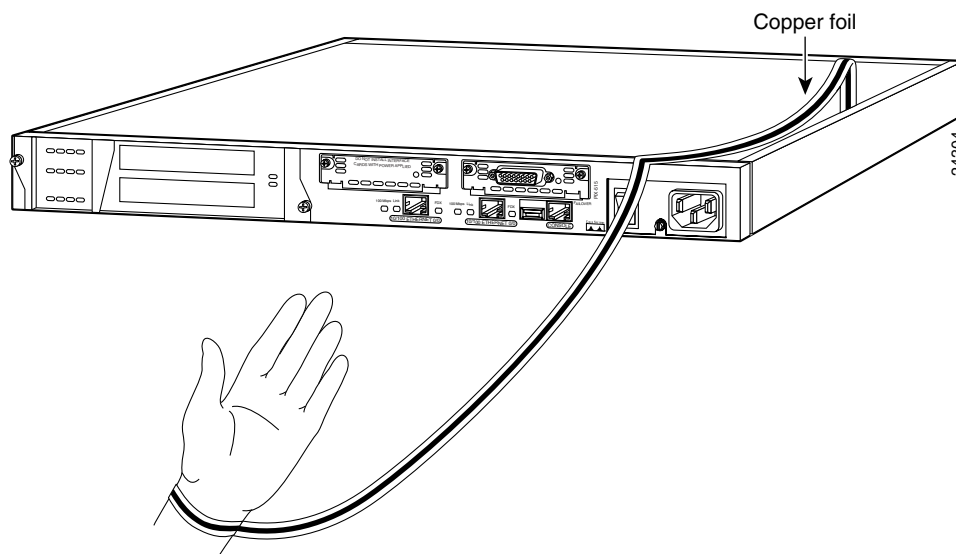
Step 7   If you are upgrading from:

- 32 MB to 64 MB of memory, install an additional 32 MB memory module into the empty socket for a new total of 64 MB of memory.

- 32 MB to 128 MB of memory, remove the existing 32 MB memory module. Open the two plastic wing connectors on the sides of the memory socket, and pull the old memory module up and out of the socket. Discard the old 32 MB memory module. Then install the two new 64 MB memory modules for a new total of 128 MB of memory.

- 64 MB to 128 MB of memory:

    – If two 32 MB memory modules are installed, remove them. Open the two plastic wing connectors on the sides of the memory socket, and pull the old memory module up and out of the socket. Repeat for the second memory module. Discard the old 32 MB memory modules. Then install the two new 64 MB memory modules for a new total of 128 MB of memory.

    – If one 64 MB memory module is installed, add an additional 64 MB memory module into the empty socket for a new total of 128 MB of memory.

Step 8   To install a new memory module, slide it into the memory socket and secure the plastic wing connectors on the sides of the socket. Use the markings on the motherboard to determine the socket numbers. Always install the first memory module into the lowest socket number. Then populate the second memory socket. See Figure 4-18 and Figure 4-19.

Figure 4-18   Inserting a Memory Module in the PIX 515/515E
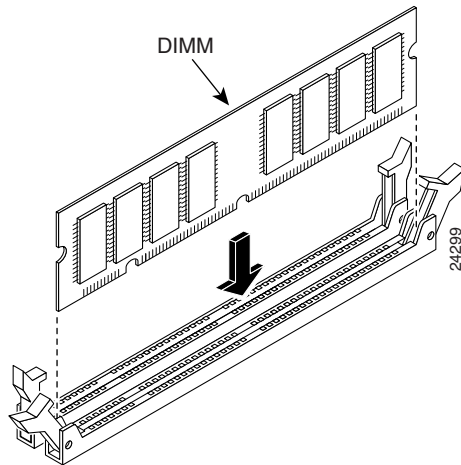
Figure 4-19   Securing a Memory Module in the PIX 515/515E
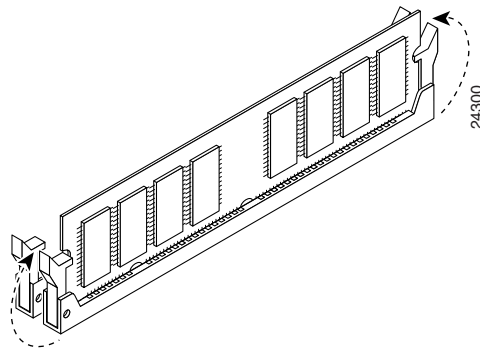
When you finish installing new memory, replace the chassis cover. Reattach the screws. If desired, rack mount the chassis and attach all cables and cords as discussed in previous sections. After the chassis is installed, you can view the amount of memory in the system startup messages or with the **show version** command.

Installing a Circuit Board in the PIX 515/515E

This section includes the following topics:

- Fast Ethernet Circuit Board, page 4-20
- VPN Accelerator Circuit Board, page 4-22

Fast Ethernet Circuit Board

The information in this section refers to both the AC and DC models of the PIX 515/515E.

The 4-port 64 bit/66 MHz FE card (PIX-4FE-66) is supported in software Versions 6.3, 6.2(2), 6.1(4), and 5.2(9), and later versions. These are the minimum software versions that support the card.

✎
Note   The PIX-4FE card continues to be supported but is no longer manufactured. The PIX-4FE and PIX-4FE-66 cards are considered equivalent and interchangeable. You can install a PIX-4FE in the primary unit and a PIX-4FE-66 in the secondary unit, as long as you install them in the same slot number of each chassis. For example, if you install a PIX-4FE in Slot 1 of the primary unit, you must also install the PIX-4FE-66 in Slot 1 of the secondary unit.

The new card has the following characteristics:

*   Includes an Intel 21154BE bridge and 4 Intel 82559 Ethernet MAC/PHY devices.
*   Supports 10/100mbps full/half-duplex operation on each port.
*   Retains bus performance when installed with other 66 MHz devices.
*   Does not support auto MDI/MDIX operation.

To install a circuit board in the PIX 515/515E, perform the following steps:

Step 1   Locate the grounding strap from the accessory kit. Fasten the grounding strap to your wrist so that it contacts your bare skin. Attach the other end to bare metal inside the PIX 515/515E chassis as shown in Figure 4-20.

Figure 4-20   Attaching the PIX 515/515E Grounding Strap
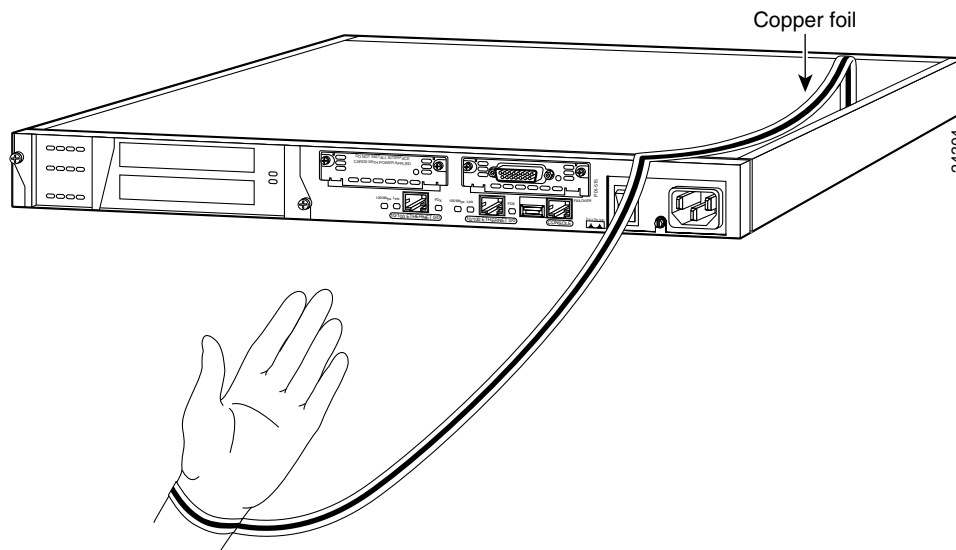
Step 2   Remove the screws from the rear assembly on the left and put the assembly aside.

Step 3   Insert a circuit board through the cage opening and into the slot as shown in Figure 4-21.

Figure 4-21   Inserting a Circuit Board into the PIX 515/515E
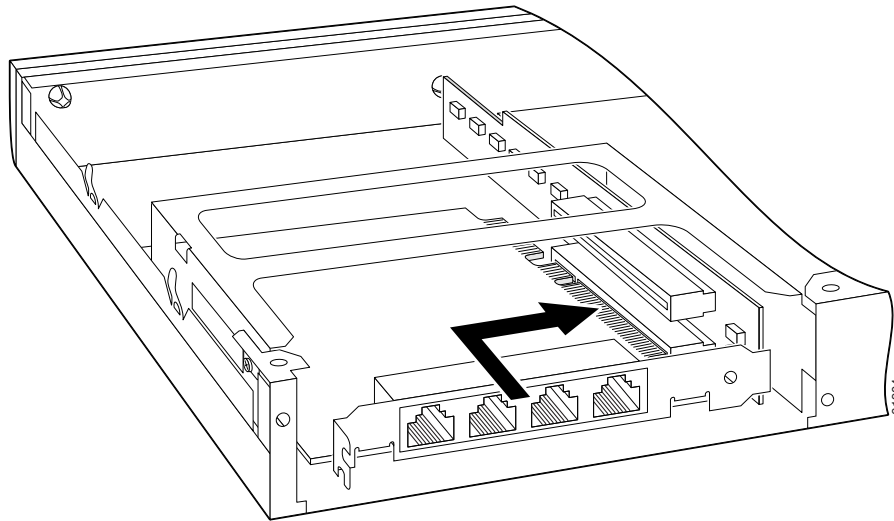
> ✎
> **Note**   When you insert a four-port Ethernet circuit board in the slot, the end of the circuit board connector extends past the end of the slot. This does not affect the use or operation of the circuit board.

Step 4   Attach the back cover plate making sure that the connecting flange on the circuit board goes through the slot on the back cover plate as shown in Figure 4-22.

Figure 4-22   Attaching PIX 515/515E Back Cover Plate
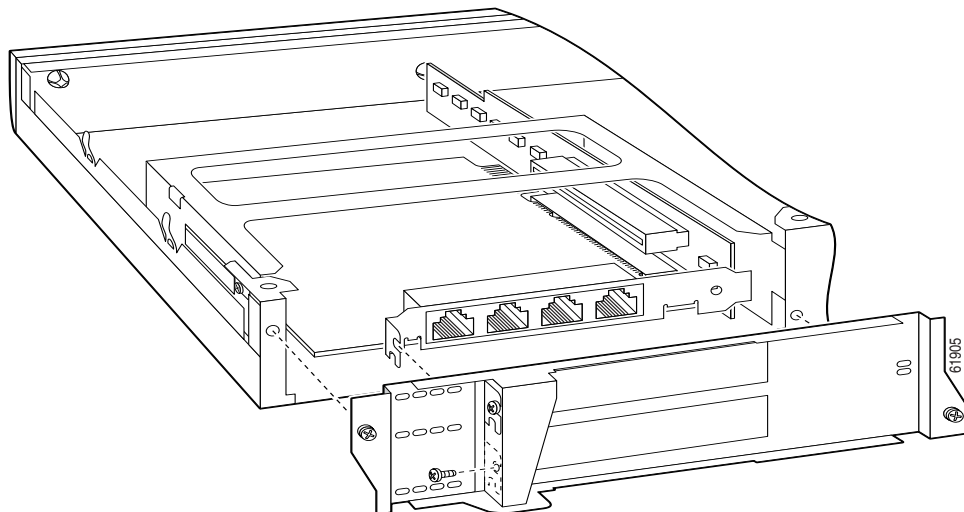
Step 5   Attach the screw to hold the circuit board connecting flange to the cover plate, and install the screws to attach the cover plate to the PIX 515/515E.

Step 6   Reattach the chassis cover.

Figure 4-23   4-Port Circuit Board Overlap
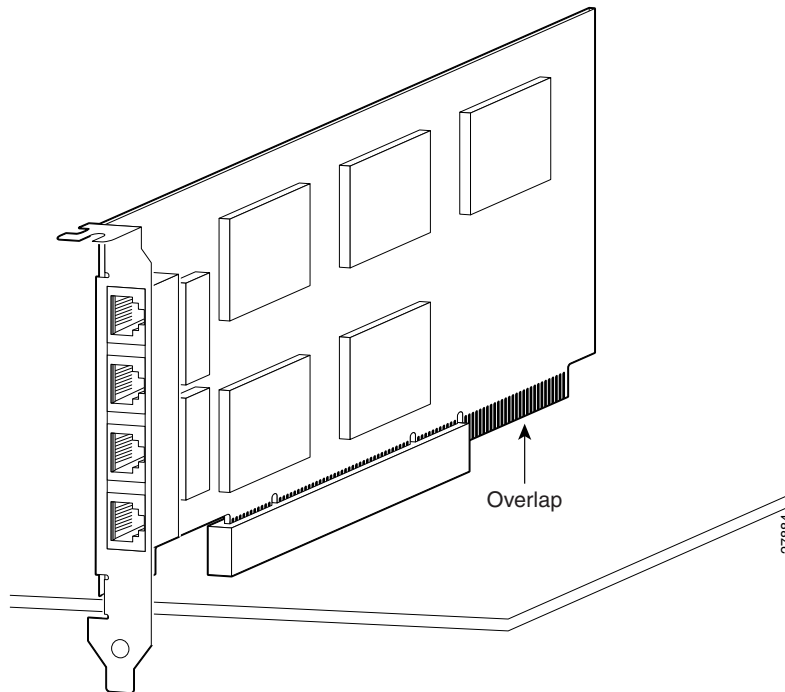
Overlap

Note   If you are installing a 4-port circuit board, note that the circuit board overlaps the slot connector on the motherboard. This does not affect the use or operation of the circuit board. See Figure 4-23.

VPN Accelerator Circuit Board

The VPN Accelerator (PIX-VPN-ACCEL) is an encryption and accelerator circuit board. The VPN Accelerator uses a PCI interface and therefore can only be installed in PIX security appliance platforms with PCI slots. The VPN Accelerator begins to function immediately after installation without the need of special installation configurations.

Note   The new VPN Accelerator cannot be used with the former PIX security appliance IPSec accelerator in the same chassis. The PIX security appliance IPSec accelerator was also known as the Private Link card.

Installing the PIX 515/515E DC Model

⚠️

Warning   **Before performing any of the following procedures, ensure that power is removed from the DC circuit. To ensure that all power is OFF, locate the circuit breaker on the panel board that services the DC circuit, switch the circuit breaker to the OFF position, and tape the switch handle of the circuit breaker in the OFF position.**

To install the PIX 515/515E DC power model, perform the following steps:

Step 1   Read the *Regulatory Compliance and Safety Information* document.

Step 2   Terminate the DC input wiring on a DC source capable of supplying at least 15 amps. A 15-amp circuit breaker is required at the 48 VDC facility power source. An easily accessible disconnect device should be incorporated into the facility wiring.

Step 3   Power off the PIX 515/515E. Ensure that power is removed from the DC circuit. To ensure that all power is OFF, locate the circuit breaker on the panel board that services the DC circuit, switch the circuit breaker to the OFF position, and tape the switch handle of the circuit breaker in the OFF position.

Step 4   As shown in Figure 4-24, the PIX 515/515E is equipped with two grounding holes at the back of the unit, which you can use to connect a two-hole grounding lug to the PIX 515/515E. Use 8-32 screws to connect a copper standard barrel grounding lug to the holes. The ground lug must be NRTL listed or recognized. In addition, the copper conductor (wires) must be used and the copper conductor must comply with the NEC code for ampacity. The PIX 515/515E requires a lug where the distance between the center of each hole is 0.56 inches. A lug is not supplied with the PIX 515/515E.

Figure 4-24   Attaching a Grounding Lug to the PIX Security Appliance
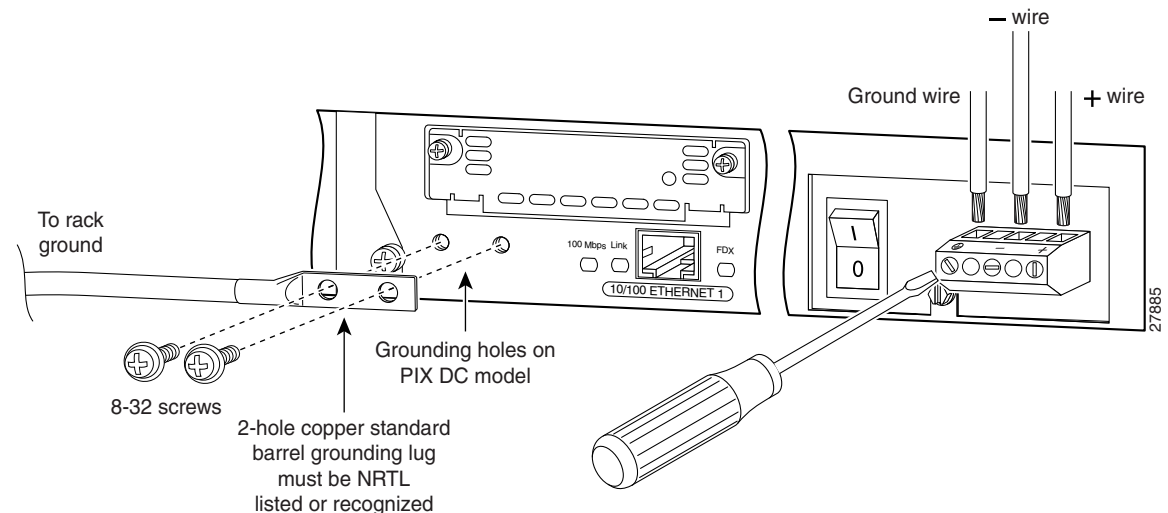
Step 5   Strip the ends of the wires for insertion into the power connect lugs on the PIX 515/515E.

Step 6   Insert the ground wire into the connector for the earth ground and tighten the screw on the connector. Refer to Figure 4-24 and, using the same method as for the ground wire, connect the negative wire and then the positive wire.

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

Step 7   After wiring the DC power supply, remove the tape from the circuit breaker switch handle and reinstate power by moving the handle of the circuit breaker to the ON position.

Step 8   Install any remaining interface boards as described in the "Installing a Circuit Board in the PIX 515/515E" section on page 4-19.

Step 9   Power on the unit from the switch at the rear of the unit.

> **Note**   If you need to power cycle the DC PIX 515/515E, wait at least five seconds between powering off the unit and powering it back on.

C H A P T E R **5**

PIX 520

This chapter guides you through the installation of the PIX 520, and includes the following sections:

- PIX 520 Product Overview, page 5-1
- Installing the PIX 520, page 5-4
- PIX 520 Feature Licenses, page 5-6
- Installing Failover, page 5-7
- Installing LAN-Based Failover, page 5-8
- Removing and Replacing the PIX 520 Chassis Cover, page 5-10
- Replacing a Lithium Battery, page 5-12
- Installing a Memory Upgrade, page 5-12
- Installing a Circuit Board in the PIX 520, page 5-15
- Installing the PIX 520 DC Model, page 5-21

Note The PIX 520 is not supported in software Version 7.0(1).

PIX 520 Product Overview

This section describes the PIX 520 front and rear panels and the panel LEDs.

Figure 5-1 shows the front view of the PIX 520.
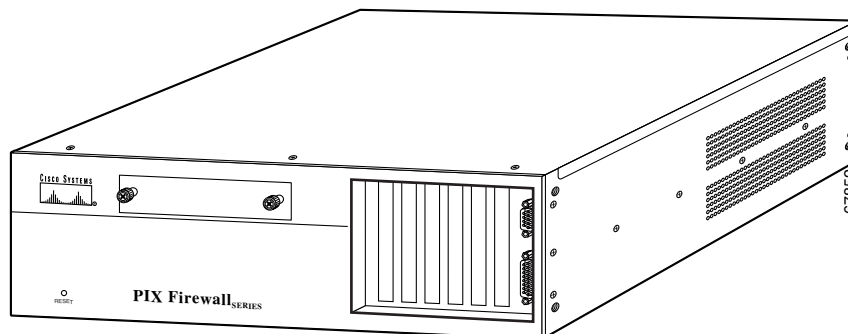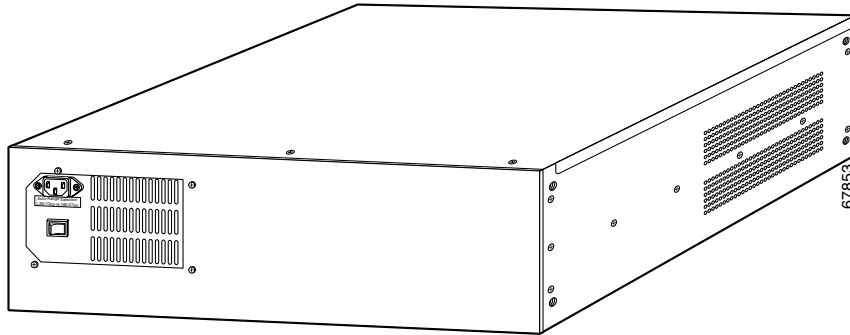
Figure 5-1 **PIX 520 Front Panel**

Figure 5-2 shows the rear view of the PIX 520.

Figure 5-2   PIX 520 Rear Panel

Note   Use of the four-port Ethernet circuit board changes the position of the outside and inside interfaces depending on the slot in which the circuit board is installed. Four-port Ethernet connectors are numbered from the top connector down sequentially. On horizontally mounted cards, the slots are numbered left to right.

The PIX 520 can be used with Ethernet circuit boards.

The four-port Ethernet circuit board provides four 10/100 Ethernet connections and has autosense capability. Connectors on the four-port Ethernet circuit board are numbered top to bottom sequentially; however, the actual device number depends on the slot in which the four-port Ethernet circuit board is installed.

Table 5-1 describes how the top connector is numbered.

Table 5-1   Numbering Devices with a Four-Port Connector

Slot 0 Contains	Slot 1 Contains	Slot 2 Contains	Four-Port Top Connector
4-port	Any	Any	ethernet0
Ethernet	4-port	Any	ethernet1
Ethernet	Ethernet	4-port	ethernet2
Token Ring	4-port	Any	ethernet0
Token Ring	Token Ring	4-port	ethernet0
Token Ring	Ethernet	4-port	ethernet1
Ethernet	Token Ring	4-port	ethernet1

With the four-port Ethernet circuit board, having a circuit board in slot 3 makes the number of interfaces greater than six; while the circuit board in slot 3 cannot be accessed, its presence does not cause problems with the PIX security appliance.

Figure 5-3 shows the location of the interfaces if you install a four-port Ethernet circuit board in slot 0.

Figure 5-3   Four-Port Ethernet Circuit Board Installed in Slot 0
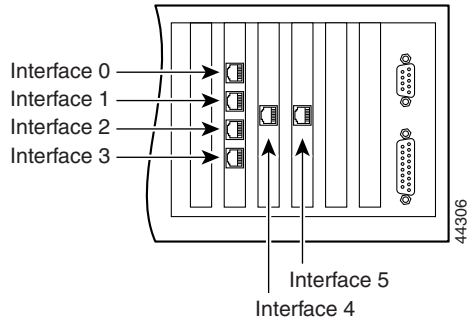
Figure 5-4 shows how the slots are numbered if a single-port Ethernet circuit board is inserted in slot 0, and a four-port Ethernet circuit board is inserted in slot 1.

Figure 5-4   Single-Port Ethernet Circuit Board Installed in Slot 0 and Four-Port Ethernet Circuit Board Installed in Slot 1
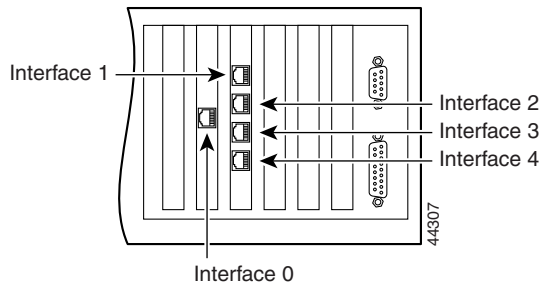
Figure 5-5 shows how the slots are numbered if single-port Ethernet circuit boards are installed in slot 0 and in slot 1, and a four-port Ethernet circuit board is inserted in slot 2.

Figure 5-5   Single-Port Ethernet Circuit Board Installed in Slot 0 and 1 and Four-Port Ethernet Circuit Board Installed in Slot 2
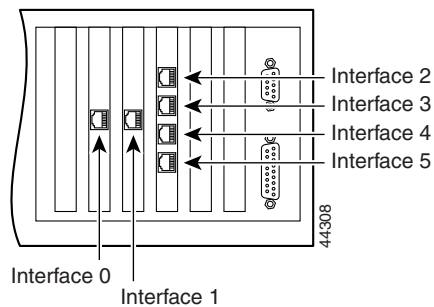
Installing the PIX 520

To install the PIX 520, perform the following steps:

Step 1   Refer to Figure 5-6 for information on the features of the PIX 520.

Figure 5-6   *PIX 520 Front, Rear, and Side Panels*
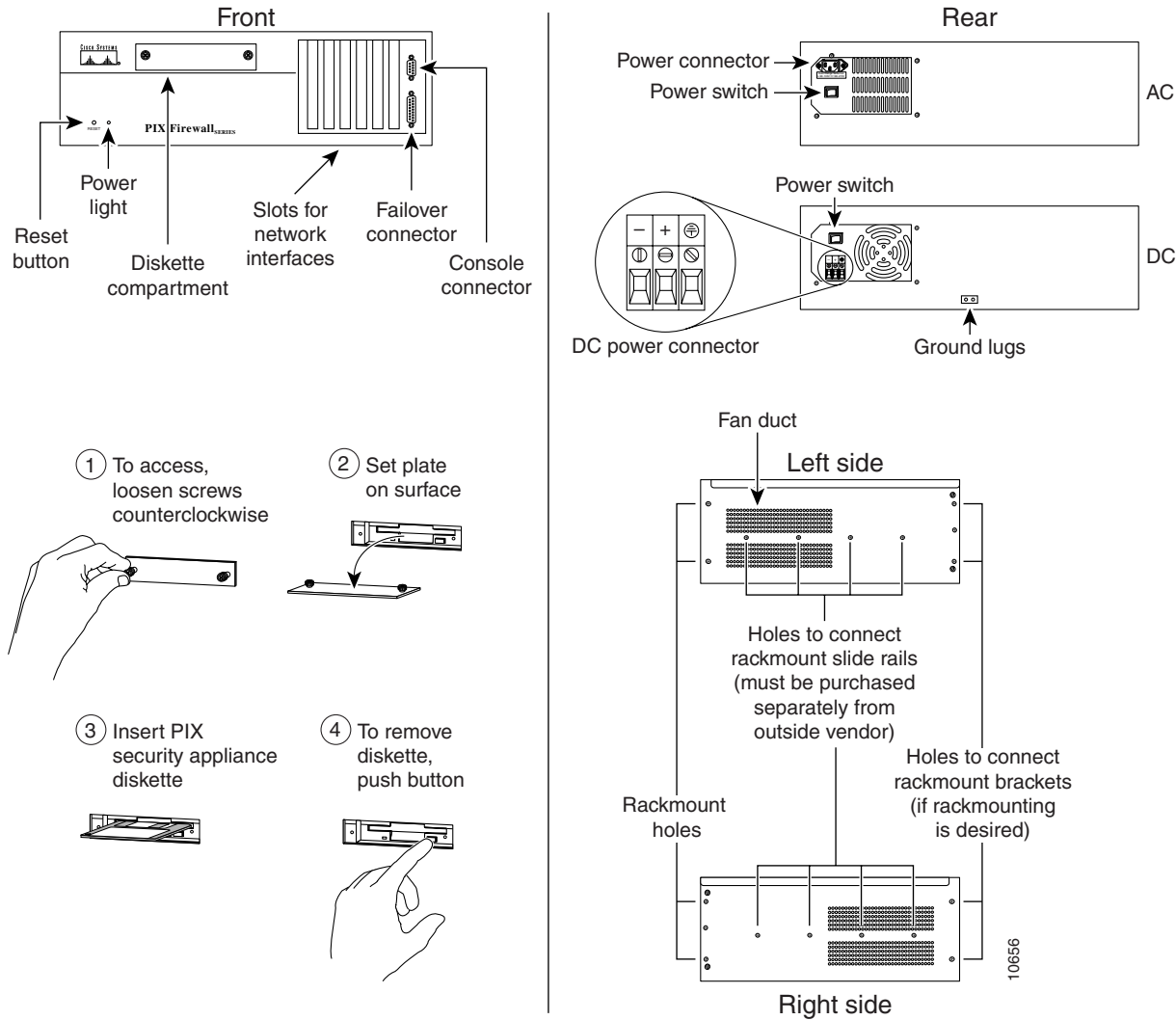
Step 2   Connect network cables to each of the PIX security appliance network interfaces. On the PIX 520, connect the cables at the front of the unit.

If you are not installing a four-port Ethernet circuit board, add the cables as shown in Figure 5-7.

Figure 5-7   Up to Four Single-Port Interfaces in the PIX Security Appliance

Interface 3
Interface 2
Interface 1
Interface 0
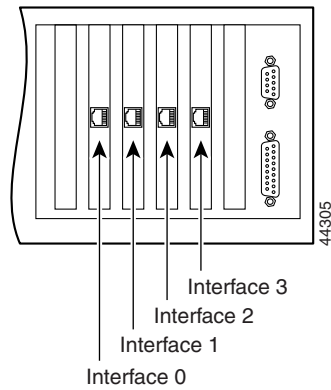
Installing Interface Cables to the PIX 520

To install interface cables to the PIX 520, perform the following steps:

Step 1   Locate the serial cable. The serial cable assembly consists of a null modem cable with RJ-45 connectors, two separate DB-9 connectors, and a separate DB-25 connector as shown in Figure 5-8.

Step 2   Install the serial cable between the PIX security appliance and your console computer.

Figure 5-8   PIX Security Appliance Serial Cable Assembly

PIX security appliance
console connector

Console
port (DB-9)

Computer serial port
DB-25 or DB-9

DB-9-to-DB-25
serial cable
(null-modem)
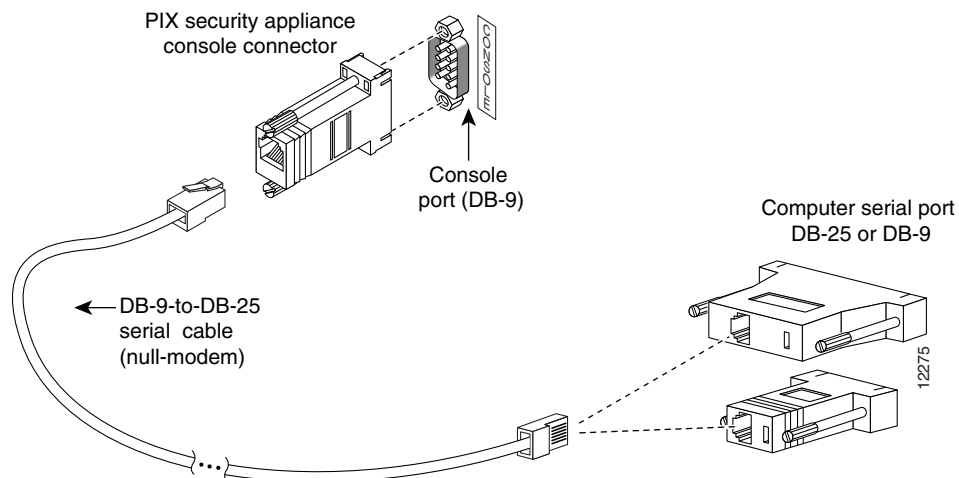
Step 3   Connect one of the DB-9 serial connectors to the console connector on the front panel of the PIX security appliance.

Step 4   Connect one end of the RJ-45 null modem cable to the DB-9 connector.

Step 5   If you are installing an AC voltage PIX security appliance, connect the power cord to the power connector on the rear panel of the PIX security appliance, and to a power outlet.

If you are installing a DC voltage PIX security appliance, refer to the "Installing the PIX 520 DC Model" section on page 5-21.

Step 6   The following options are available:

a. If you have a second PIX security appliance to use as a failover unit, install the failover feature and cable as described in the "Installing Failover" section on page 5-7.

Note Do not power on the failover units until the primary unit is configured.

- If needed, install the PIX security appliance syslog server as described in the **logging** command page in the command reference online at:

http://www.cisco.com/en/US/products/sw/secursw/ps2120/prod_command_reference_list.html

b. If you need to install an optional circuit board such as a single-port Ethernet board, or the four-port Ethernet board, refer to the "Installing a Circuit Board in the PIX 520" section on page 5-15 for more information.

c. If you need to install additional memory, refer to the "Installing a Memory Upgrade" section on page 5-12.

If you are ready to start configuring the PIX security appliance, power on the unit. Refer to the configuration guide online at:

http://www.cisco.com/en/US/products/sw/secursw/ps2120/prod_configuration_guides_list.html

Always check the release notes first before configuring the PIX security appliance for the latest release details. You can find the latest versions of release notes online at:

http://www.cisco.com/en/US/products/sw/secursw/ps2120/prod_release_notes_list.html

PIX 520 Feature Licenses

If you have a PIX 520-UR unrestricted feature license, the following options are available:

- If you have a second PIX 520 to use as a failover unit, install the failover feature and cable as described in the "Installing Failover" section on page 5-7.

- If needed, install the PIX security appliance syslog server as described in the **logging** command in the command reference online at:

http://cisco.com/en/US/products/sw/secursw/ps2120/prod_command_reference_list.html

- Refer to the "Installing LAN-Based Failover" section on page 5-8 for information about how to remove and replace the chassis cover if you need to install optional circuit boards.

Note It is very important to remove the chassis cover before installing circuit boards in the PIX 520. Even though it appears possible to add or remove circuit boards from the back panel, removing the chassis cover greatly simplifies the process.

- If you need to install additional memory, refer to the "Installing a Memory Upgrade" section on page 5-12.

Installing Failover

To install a failover connection, perform the following steps:

✎
Note   This section only applies to PIX security appliance units with a "UR" (unrestricted) license.

Step 1   Power off both the primary and secondary units.

✎
Note   Both PIX security appliances must be the same model number, have at least as much RAM, have the same Flash memory size, and be running the same software version.

Step 2   Locate the Failover cable (shown in Figure 5-9). This cable is shipped separately from the PIX security appliance. The cable is labeled Primary on one end and Secondary on the other. Install the cable for the PIX 520 as shown in Figure 5-9.

Figure 5-9   PIX 520 Failover Cable Connection
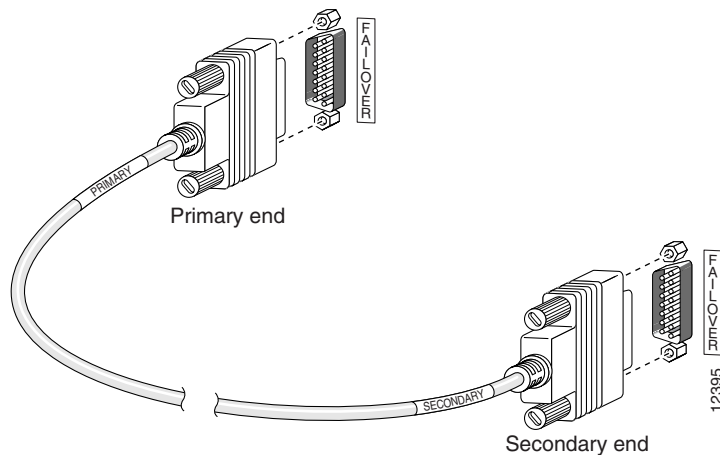
Step 3   Connect the Primary end of the Failover cable to the first PIX security appliance unit, that is, the one you have already configured.

Step 4   Connect the Secondary end of the Failover cable to the standby unit.

Step 5   Connect a power cord to the power connector on the rear panel of each unit, and the other end of each power cord to (preferably separate) power outlets.

Step 6   If you are using Stateful Failover, use one of the following types of connections, that is appropriate for your system, between the dedicated interfaces on the PIX security appliance units:

- Category 5 crossover cable directly connecting the primary unit to the secondary unit.

- 100BaseTX half-duplex hub using straight Category 5 cables.

- 100BaseTX full duplex on a dedicated switch or dedicated VLAN of a switch.

- All enabled interfaces must be connected between the active and standby units. Only configure the active unit. On the PIX 520, you can access the console and determine which unit is active with the **show failover** command in the command reference online at:

  http://cisco.com/en/US/products/sw/secursw/ps2120/prod_command_reference_list.html.

⚠

Caution   Do not turn the power on until the units are connected and the primary unit is configured completely.

Step 7   Use the power switch at the back of the units to power the primary unit on and then power on the standby unit.

Within a few seconds, the active unit automatically downloads its configuration to the standby unit.

If the primary unit fails, the secondary unit automatically becomes active.

Installing LAN-Based Failover

LAN-based failover supports failover between two units connected over a dedicated Ethernet interface. LAN-based failover eliminates the need for a special Failover cable and overcomes the distance limitations imposed by the Failover cable.

For information on configuring a LAN-based failover, refer to the configuration guide online at:

http://www.cisco.com/en/US/products/sw/secursw/ps2120/prod_configuration_guides_list.html

✎

Note   Both chassis must be the same model number, have the same amount of RAM, Flash memory, number and type of interfaces, and be running the same software version.

To set up a LAN-based failover connection, perform the following steps:

Step 1   Disconnect both the PIX security appliances, so that there is no traffic flow between them. If the Failover cable is connected to the PIX security appliance, disconnect it.

Step 2   Configure the PIX security appliances for LAN-based failover. Refer to the chapter on configuring LAN-based failover in the configuration guide online at:

http://www.cisco.com/en/US/products/sw/secursw/ps2120/prod_configuration_guides_list.html

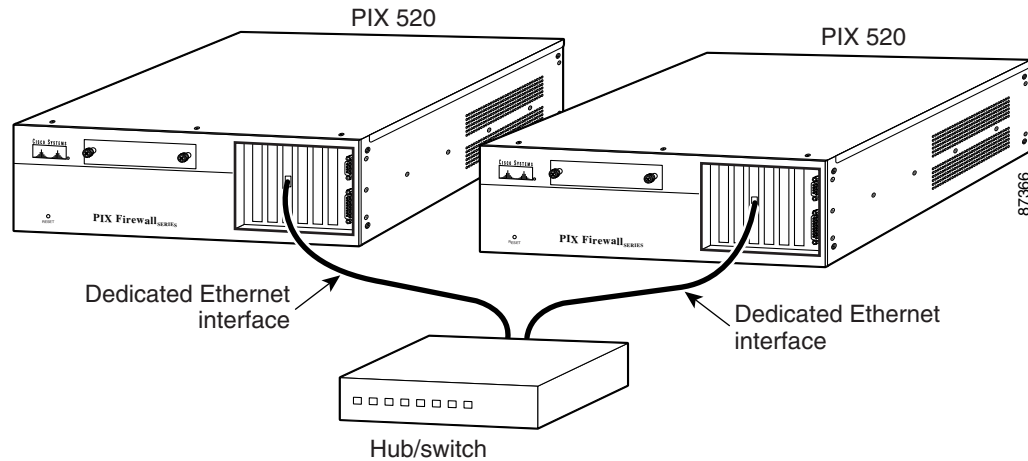**Step 3**   Power off both units.

Step 4   Connect the LAN failover interfaces to the dedicated switch/hub, as shown in Figure 5-10.

✎

Note   A dedicated LAN interface and a dedicated switch (or VLAN) is required to implement LAN-based failover. You cannot use a crossover Ethernet cable to connect the two PIX security appliances.

Figure 5-10   LAN-Based Failover Connections

Step 5   If you are using Stateful Failover, use one of the following types of connections, that is appropriate for your system, between the dedicated interfaces on the PIX security appliances:

- Category 5 crossover cable directly connecting the primary unit to the secondary unit.
- 100BaseTX full duplex on a dedicated switch or dedicated VLAN of a switch.
- 1000BaseTX full duplex on a dedicated switch or dedicated VLAN of a switch.

> **Note**   For Stateful Failover on the PIX 520, if you have Gigabit Ethernet (GE) interfaces, then the failover link must be GE.

> ⚠ **Caution**   Do not turn the power on until the units are connected and the primary unit is configured completely.

Step 6   Power the primary unit on first, *then* power on the secondary unit. Within a few seconds, the active unit automatically downloads its configuration to the standby unit.

If the primary unit fails, the secondary unit automatically becomes active.

Removing and Replacing the PIX 520 Chassis Cover

This section describes how to remove and replace the chassis cover from the PIX 520. This section includes the following topics:

- Removing the Chassis Cover, page 5-10
- Replacing the Chassis Cover, page 5-11

Removing the Chassis Cover

To remove the chassis cover, perform the following steps:

Note   Removing the PIX security appliance case does not affect your Cisco warranty. Upgrading the PIX security appliance does not require any special tools and does not create any radio frequency leaks.

Step 1   Read the *Regulatory Compliance and Safety Information* document.

Step 2   Ensure that the PIX security appliance is powered off. Unplug the power cord from the power outlet. Once the upgrade is complete, you can safely reconnect the power cord.
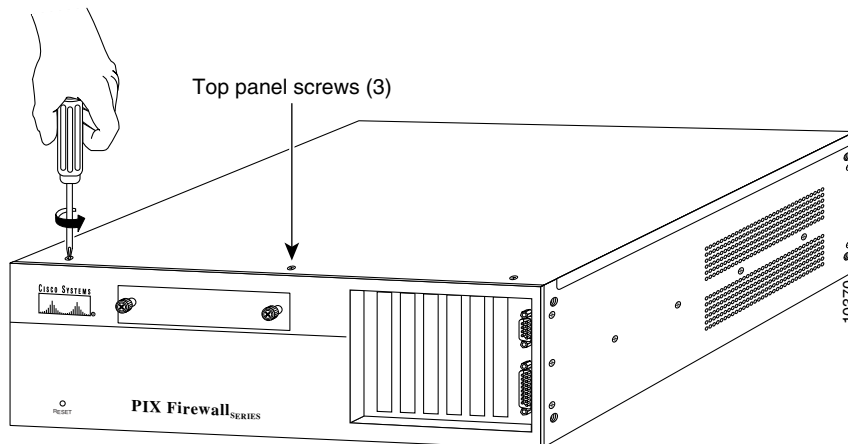
Warning   **Before working on a system that has an On/Off switch, turn OFF the power and unplug the power cord.**
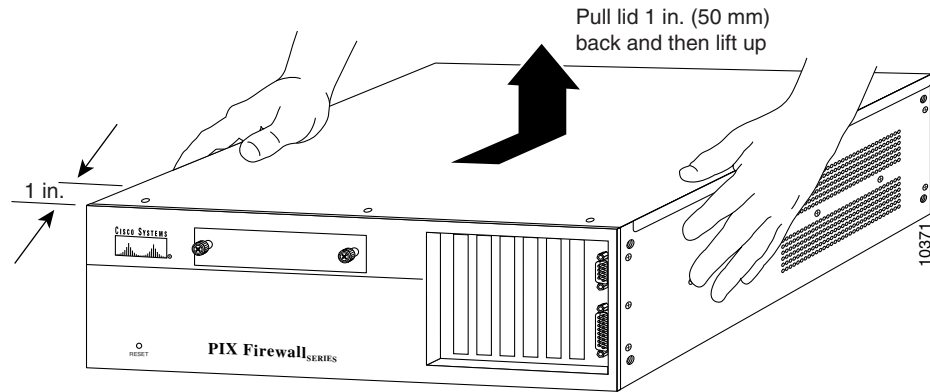
Step 3   Remove the three screws holding the chassis cover in place, as shown in Figure 5-11.

Figure 5-11   Removing the Chassis Cover Screws

Step 4   Remove the chassis cover as shown in Figure 5-12.

Figure 5-12   Removing the Chassis Cover

Replacing the Chassis Cover

⚠️
Caution   Do not operate PIX security appliance units without the chassis cover installed. The chassis cover protects the internal components, prevents electrical shorts, and provides proper air-flow for cooling the electronic components.

To replace the chassis cover, perform the following steps:

Step 1   Replace the chassis cover, as shown in Figure 5-13.

Step 2   Secure the three screws.

Step 3   Reinstall all interface cables.

Figure 5-13   Replacing the Chassis Cover

Replacing a Lithium Battery

The PIX security appliance has a lithium battery on its main circuit board. This battery has an operating life of about ten years. When the battery loses its charge, the PIX security appliance cannot function. The lithium battery is not a field-replacable unit (FRU). Contact Cisco TAC to replace the battery.

Note Do not attempt to replace this battery yourself.

Warning **Danger of explosion exists if the lithium battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.**

Installing a Memory Upgrade

Observe the following warnings, cautions, and notes when installing additional PIX security appliance system memory.

The following statement applies to DC models:

Warning **Before performing any of the following procedures, ensure that power is removed from the DC circuit. To ensure that all power is OFF, locate the circuit breaker on the panel board that services the DC circuit, switch the circuit breaker to the OFF position, and tape the switch handle of the circuit breaker in the OFF position.**

The following statement applies to both AC and DC models:

Warning **Before working on a system that has an On/Off switch, turn OFF the power and unplug the power cord.**

Caution Always remove old memory before installing new memory.

Note After installing additional memory in the PIX 520, do not remove the memory strips and power on the unit, or the PIX security appliance will become inoperable.

Caution If you remove the PIX security appliance chassis chassis cover, always reinstall the chassis cover. Running the PIX security appliance without the chassis cover causes overheating and damage to electrical components.

Memory Installation Steps

To install additional system memory, perform the following steps:

Step 1   If the unit is rack-mounted, remove network wires and any cords connecting to the PIX security appliance. The PIX 520 should be removed from the rack and placed on a stable working surface. Ensure that the unit is unplugged from its power source.

Step 2   Unpack the items in the memory upgrade kit.

Remove the chassis cover from the PIX security appliance. Remove all screws holding the assembly in place. Refer to the "Removing and Replacing the PIX 520 Chassis Cover" section on page 5-10 for more information.

Step 3   Determine the location of your system memory sockets (see Figure 5-14).

Step 4   Use the markings on the motherboard to determine the socket numbers. Always install the first memory strip into the lowest socket number. Progressively add memory boards into higher numbered sockets.

Figure 5-14   PIX 520 System Memory Location
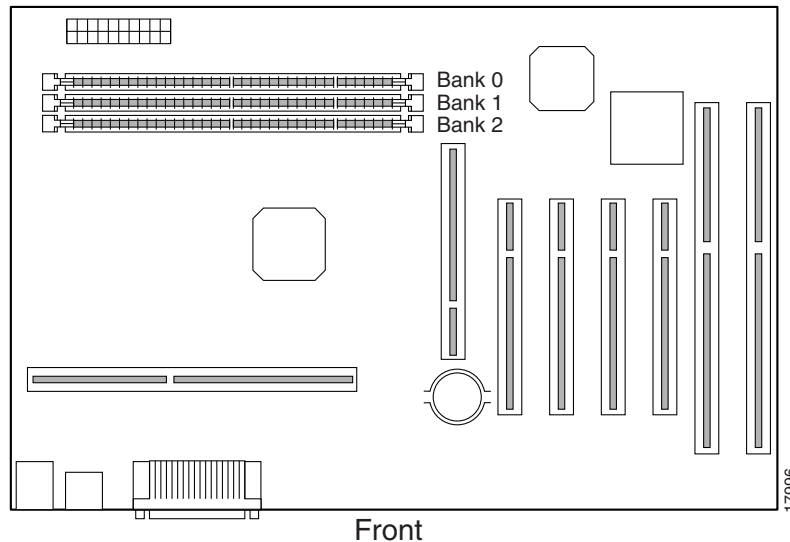
Step 5   Locate the wrist grounding strap in the accessory kit and connect one end to the unit as shown in Figure 5-17, or to the PIX security appliance chassis, and securely attach the other to your wrist so it contacts your bare skin.

Step 6   With the wrist strap on your wrist, carefully grasp the memory strip from either end. Note that a DIMM strip has notches.

Step 7   To install a DIMM strip:

- Remove the old memory strip by opening the two plastic wing connectors, and pulling the old strip up. Discard the old strip.

- When installing the memory strip in the PIX 520, install the new strip in Bank 0 as shown in Figure 5-15 and Figure 5-16, by opening the two plastic wing connectors, inserting the strip, and closing the wing connectors.

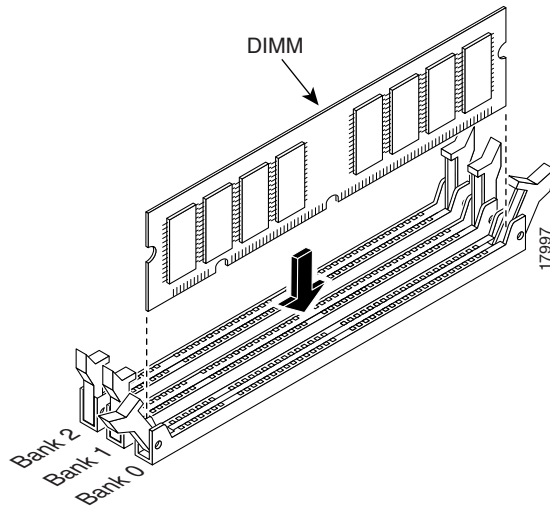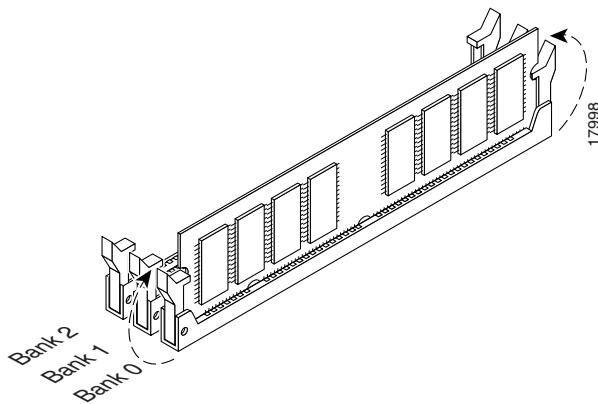*Figure 5-15   Inserting a DIMM Memory Strip in the PIX 520*

Figure 5-16   Securing a DIMM Memory Strip in the PIX 520

- When you finish inserting new RAM memory, replace the chassis cover on the chassis. Reattach the screws. If desired, rack mount the PIX security appliance and attach all cables and cords as discussed in previous sections. After the PIX security appliance is installed, you can view the amount of RAM memory in the system startup messages or with the **show version** command in the command reference online at:

  http://cisco.com/en/US/products/sw/secursw/ps2120/prod_command_reference_list.html.

Installing a Circuit Board in the PIX 520

The information in this section refers to the installation of a circuit board in the PIX 520.

The 4-port 64 bit/66 MHz FE card (PIX-4FE-66) is supported in software Versions 6.3, 6.2(2), 6.1(4), and 5.2(9), and later versions. These are the minimum software versions that support the card.

Note   The PIX-4FE card continues to be supported but is no longer manufactured.

The new card has the following characteristics:

- Includes an Intel 21154BE bridge and 4 Intel 82559 Ethernet MAC/PHY devices.
- Supports 10/100mbps full/half-duplex operation on each port.
- Retains bus performance when installed with other 66 MHz devices.
- Does not support auto MDI/MDIX operation.

This section includes the following topics:

- 16 MB Flash Circuit Board, page 5-18
- VPN Accelerator Circuit Board, page 5-19
- Gigabit Ethernet Circuit Board, page 5-20
- Installing the PIX 520 DC Model, page 5-21

To install a circuit board in the PIX 520, perform the following steps:

Step 1   Locate the grounding strap from the accessory kit. Fasten the grounding strap to your wrist so that it contacts your bare skin. Attach the other end to bare metal inside the PIX security appliance chassis as shown in Figure 5-17.

Figure 5-17   Attaching Grounding Strap to Your Wrist and to the PIX Security Appliance
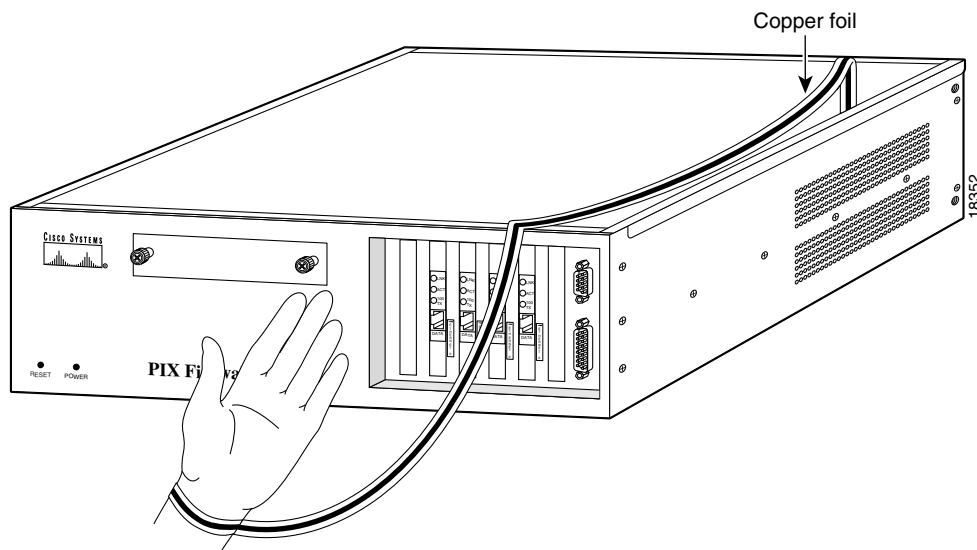
Step 2   Insert the new circuit board, as shown in Figure 5-18, and secure it using the screw provided with the circuit board.

Figure 5-18   Installing the New Circuit Board
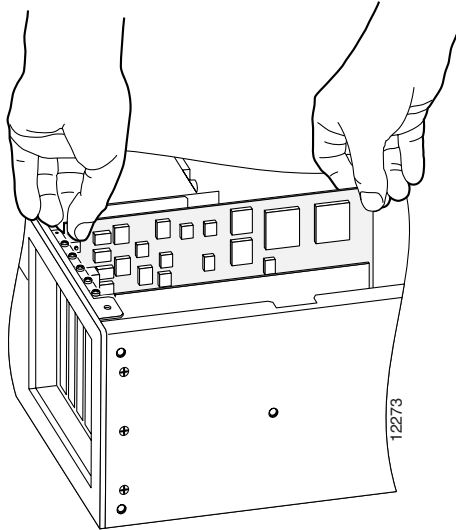
Step 3   Figure 5-19 displays how the circuit boards are numbered according to their position. If you have Version 4.4 and a four-port Ethernet circuit board, refer to the "PIX 520 Product Overview" section on page 5-1.

Note   When adding a network interface or encryption circuit board, install the new circuit board in the first empty slot to the right of the existing network interface circuit board.

Figure 5-19   PIX Security Appliance Network Circuit Boards
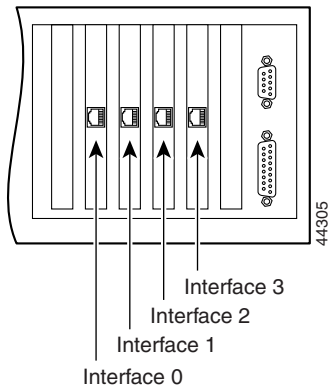
Step 4 If you are installing a 4-port circuit board, note that the circuit board will overlap the slot connector on the motherboard. This does not affect the use or operation of the circuit board. See Figure 5-20.

Figure 5-20   4-Port Circuit Board Overlap
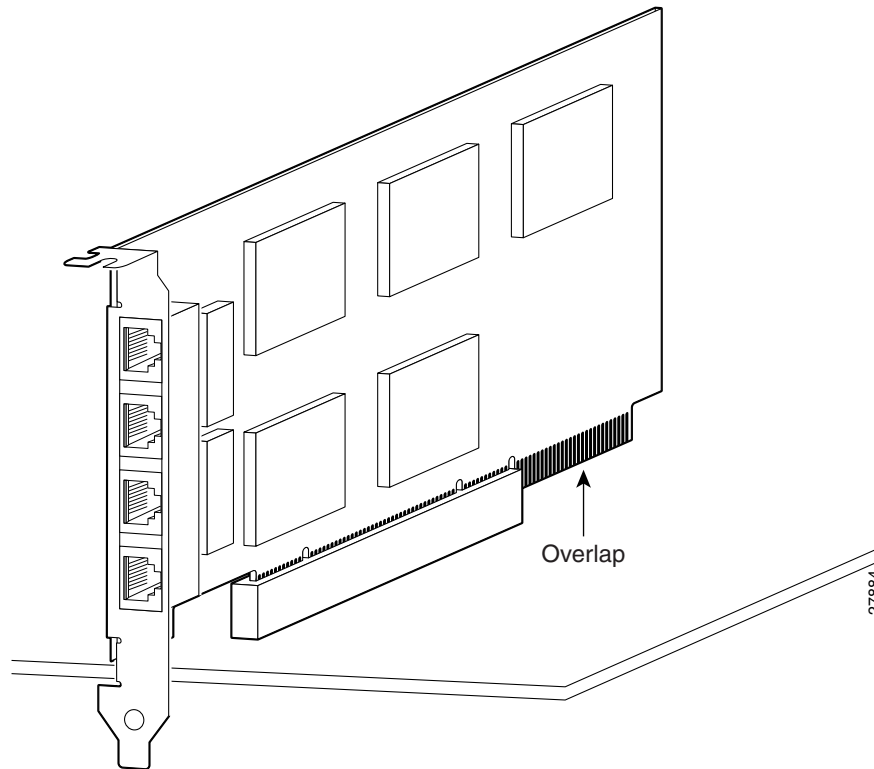
Overlap

16 MB Flash Circuit Board

Along with upgrading your Flash memory to 16 MB, the PIX security appliance 16 MB Flash circuit board includes pre-installed PIX security appliance software and a UR (unrestricted) 56-bit DES encryption license. The 16 MB Flash circuit board installs into the PIX security appliance ISA slot.

An illustration of the 16 MB Flash circuit board is shown in Figure 5-21.

Figure 5-21   PIX Security Appliance 16 MB Flash Circuit Board
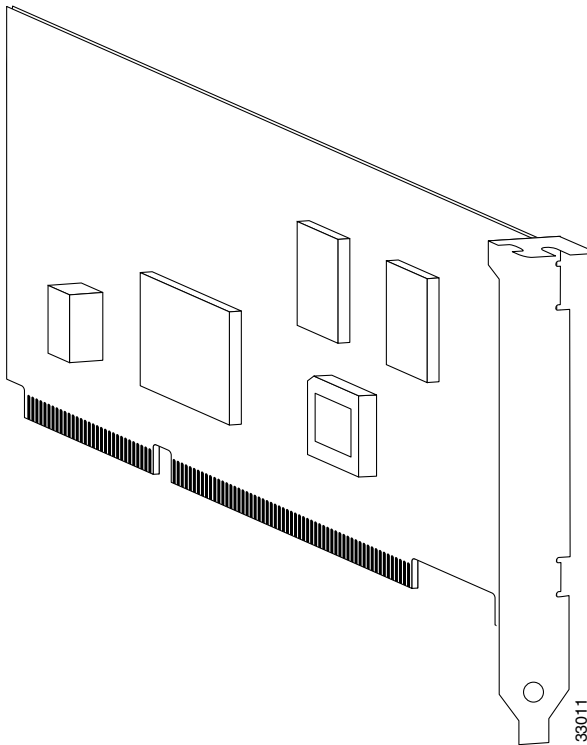
Use the following information to install a 16 MB Flash circuit board:

- The PIX security appliance must have a minimum of 32 MB of RAM memory.
- You must obtain a new activation key if you will be using 3DES.
- The PIX security appliance should not be downgraded to a software revision lower than 5.0(3) after the new software from the 16 MB circuit board is installed.
- If you downgrade from software Version 5.3 to 5.2 or lower, you will lose private data (keys, certifications, and CRLs) that are stored in Flash memory. You need to use the **clear flashfs** command, **downgrade 5.0 | 5.1 | 5.2** options if your PIX security appliance has 16 MB Flash memory, private data stored in the Flash memory, and you used the **ca save all** command to save these items in Flash memory.

To install the 16 MB Flash circuit board, perform the following steps:

Step 1   Record the present PIX security appliance unit serial number.

Step 2   Record the new serial number from the 16 MB Flash circuit board.

> **Note**   After installation, the serial number of the PIX security appliance changes to the serial number supplied with the 16 MB Flash circuit board.

Step 3   Create a backup of your present configuration (to use later to reconfigure your system).

Step 4   Obtain a new Activation key (if using 3DES).

Step 5   Remove any previously installed Flash memory circuit boards from the unit.

> **Caution**   Do not remove or reposition the 16 MB Flash circuit board. The PIX security appliance will not work if this jumper is moved.

Step 6   Install the 16 MB Flash circuit board into an available ISA slot in the PIX security appliance chassis.

VPN Accelerator Circuit Board

The VPN Accelerator (PIX-VPN-ACCEL) is an encryption and accelerator circuit board. The VPN Accelerator uses a PCI interface and therefore can only be installed in PIX security appliance platforms with PCI slots. The VPN Accelerator begins to function immediately after installation without the need of special installation configurations.

> **Note**   The new VPN Accelerator cannot be used with the former PIX security appliance IPSec accelerator in the same chassis. The PIX security appliance IPSec accelerator was also known as the Private Link card.

An illustration of the VPN Accelerator is shown in Figure 5-22.

*Figure 5-22   VPN Accelerator Circuit Board*
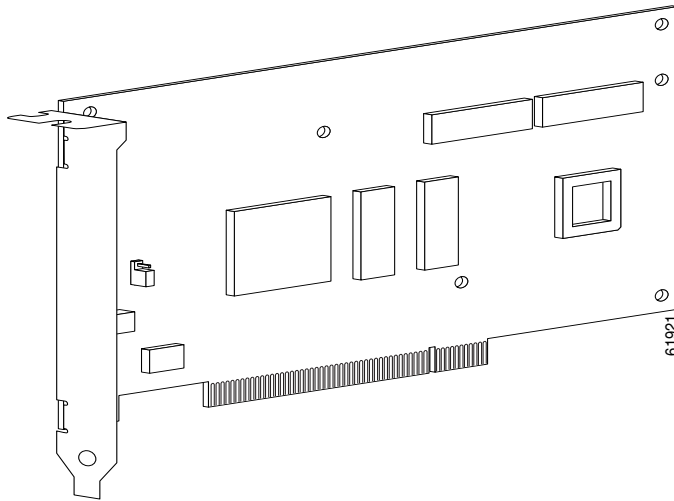
Gigabit Ethernet Circuit Board

PIX security appliance supports 1000 Mbps (Gigabit) Ethernet. The Gigabit Ethernet circuit board uses only has one hardware speed and the following duplex options:

- 1000SXfull—Forces full-duplex operation
- 1000BaseSX—Forces half-duplex operation
- 1000auto—Auto negotiates full or half duplex

The Gigabit Ethernet circuit board and the fiber optic cable connection are shown in Figure 5-23.

Figure 5-23   Gigabit Ethernet Circuit Board
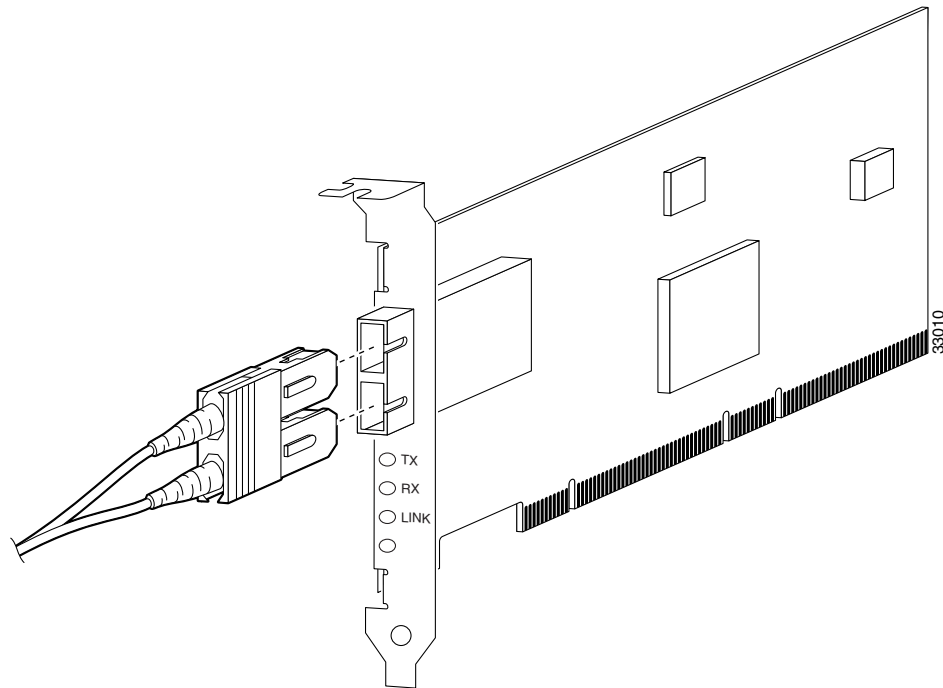
The Gigabit Ethernet circuit board has three LEDs:

- TX—Transmitting data
- RX—Receiving data
- LINK—The Gigabit Ethernet circuit board has established a network connection
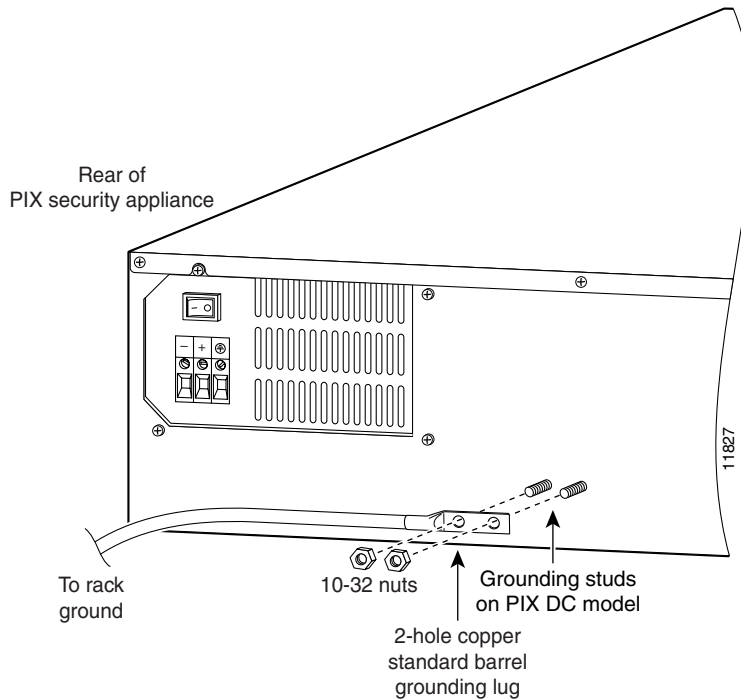
Installing the PIX 520 DC Model

Warning   **Before performing any of the following procedures, ensure that power is removed from the DC circuit. To ensure that all power is OFF, locate the circuit breaker on the panel board that services the DC circuit, switch the circuit breaker to the OFF position, and tape the switch handle of the circuit breaker in the OFF position.**

To install the PIX 520 DC power model, perform the following steps:

Step 1   Read the *Regulatory Compliance and Safety Information* document.

Step 2   Terminate the DC input wiring on a DC source capable of supplying at least 15 amps. A 15-amp circuit breaker is required at the 48 VDC facility power source. An easily accessible disconnect device should be incorporated into the facility wiring.

**Step 3**   Be sure the PIX 520 power is off by checking the power switch at the rear of the unit.

Step 4 As shown in Figure 5-24, the PIX 520 is equipped with two grounding studs at the back of the unit, which you can use to connect a two-hole grounding lug to the PIX 520. Use the 10-32 nuts provided with the PIX 520 to connect a copper standard barrel grounding lug to the studs. The PIX 520 requires a lug where the distance between the center of each hole is 0.56 inches. A lug is not supplied with the PIX 520.

Figure 5-24   Attaching a Grounding Lug to the PIX Security Appliance

Step 5 Ensure that power is removed from the DC circuit. To ensure that all power is OFF, locate the circuit breaker on the panel board that services the DC circuit, switch the circuit breaker to the OFF position, and tape the switch handle of the circuit breaker in the OFF position.

Step 6 Strip the ends of the wires for insertion into the power connect lugs on the PIX 520.

Step 7 Insert the ground wire into the connector for the earth ground and tighten the screw on the connector (see Figure 5-25). Using the same method as for the ground wire, connect the negative wire and then the positive wire.

Figure 5-25   Attaching DC Power Cables
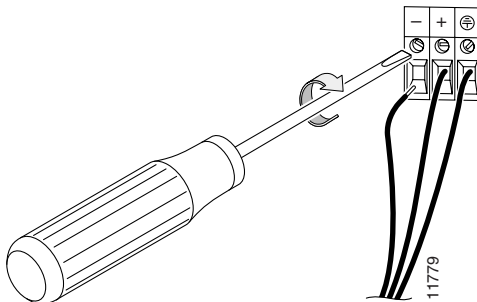
Step 8   Reconnect power to the PIX 520. After wiring the DC power supply, remove the tape from the circuit breaker switch handle and reinstate power by moving the handle of the circuit breaker to the ON position.

Step 9   Insert the PIX 520 system diskette in the drive at the front of the unit.

Step 10   If needed, install the interface boards as described in the "Installing a Circuit Board in the PIX 520" section on page 5-15.

Step 11   Power on the unit from the switch at the rear of the unit.

Note   If you need to power cycle the DC PIX security appliance, wait at least five seconds between powering off the unit and powering it back on.

C H A P T E R **6**

PIX 525

This chapter guides you through the installation of the PIX 525, and includes the following sections:

- PIX 525 Product Overview, page 6-1
- Installing the PIX 525, page 6-3
- PIX 525 Feature Licenses, page 6-5
- Installing Failover, page 6-6
- Installing LAN-Based Failover, page 6-8
- Removing and Replacing the PIX 525 Chassis Cover, page 6-9
- Replacing a Lithium Battery, page 6-12
- Installing a Memory Upgrade, page 6-12
- Installing a Circuit Board in the PIX 525, page 6-15
- Installing a DC Power Supply, page 6-19

PIX 525 Product Overview

Figure 6-1 show the front view of the PIX 525.

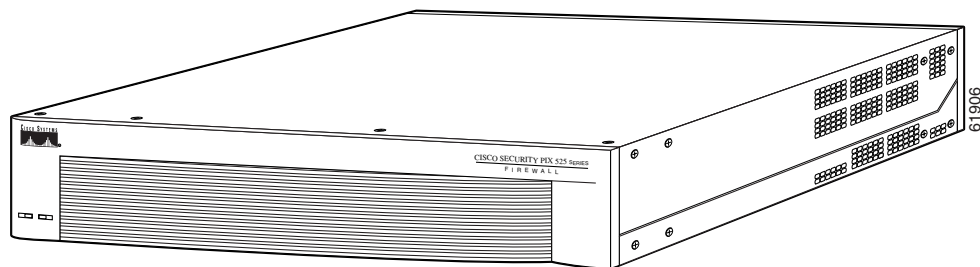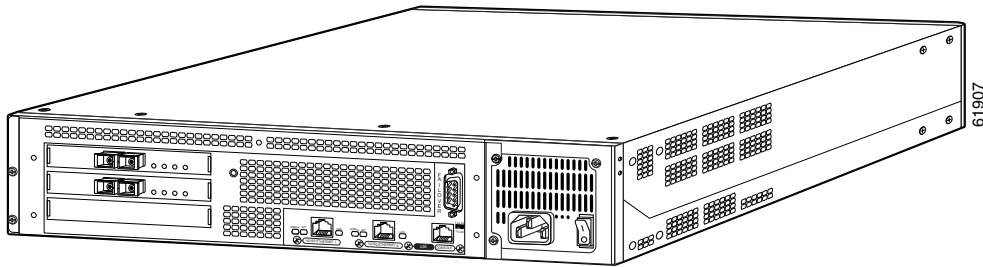**Figure 6-1   PIX 525 Front Panel**

Figure 6-2 shows the rear view of the PIX 525.

Figure 6-2   PIX 525 Rear Panel

There are two LEDs on the front panel of the PIX 525 (see Figure 6-3).
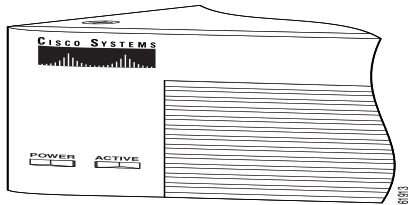
Figure 6-3   PIX 525 Front Panel LEDs

Table 6-1 lists the state of the PIX 525 front panel LEDs.

Table 6-1   PIX 525 Front Panel LEDs

LED	Color	State	Description
POWER	Green	On	On when the unit has power.
ACT	Green	On	On when the unit is the active failover unit.
		Off	Off when the unit is in standby mode.

There are three LEDs for the each RJ-45 interface port and three types of fixed interface connectors on the back of the PIX 525.

Figure 6-4 shows the PIX 525 rear panel LEDs.

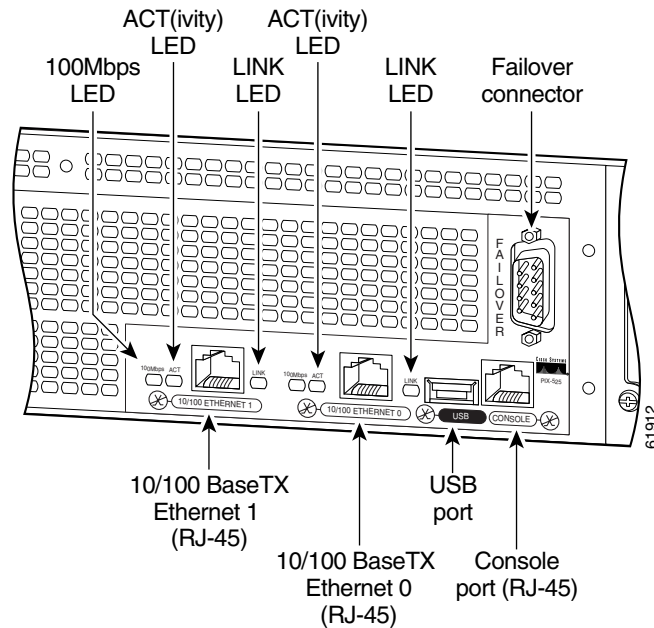*Figure 6-4   PIX 525 Rear Panel LEDs*

Table 6-2 lists the states of the PIX 525 rear panel LEDs.

Table 6-2   PIX 525 Rear Panel LEDs

LED	Color	State	Description
100 Mbps	Green	On	Port 100 megabits per second 100BaseTX communication.
		Off	Port is using 10 megabits per second data exchange.
ACT	Green	Flashing	Shows network activity.
LINK	Green	On	Shows that data is passing through that interface.

The PIX 525 has RJ-45, network and console connectors, as well as a DB-15 Failover cable connector. The USB port is not used at this time.

Installing the PIX 525

To install the PIX 525, perform the following steps:

Step 1   The PIX 525 provides one set of brackets for installing the unit in an equipment rack. Complete these steps if the unit is going to be installed into an equipment rack:

a.   Attach the brackets to the holes near the front of the unit on each side of the PIX 525 using the supplied screws.

b.   Attach the unit to the equipment rack.

Step 2   Connect the cable so that you have either a DB-9 or DB-25 connector on one end as required by the serial port for your computer, and the other end is the RJ-45 connector as shown in Figure 6-5.

Note   Use the Console port to connect a computer to enter configuration commands. Locate the serial cable from the accessory kit. The serial cable assembly consists of a null modem cable with RJ-45 connectors, and one DB-9 connector and a DB-25 connector.

Step 3   Connect the RJ-45 serial cable connector to the PIX 525 console connector and connect the other end to the serial port connector on your computer.

Figure 6-5   PIX 525 Rear Panel
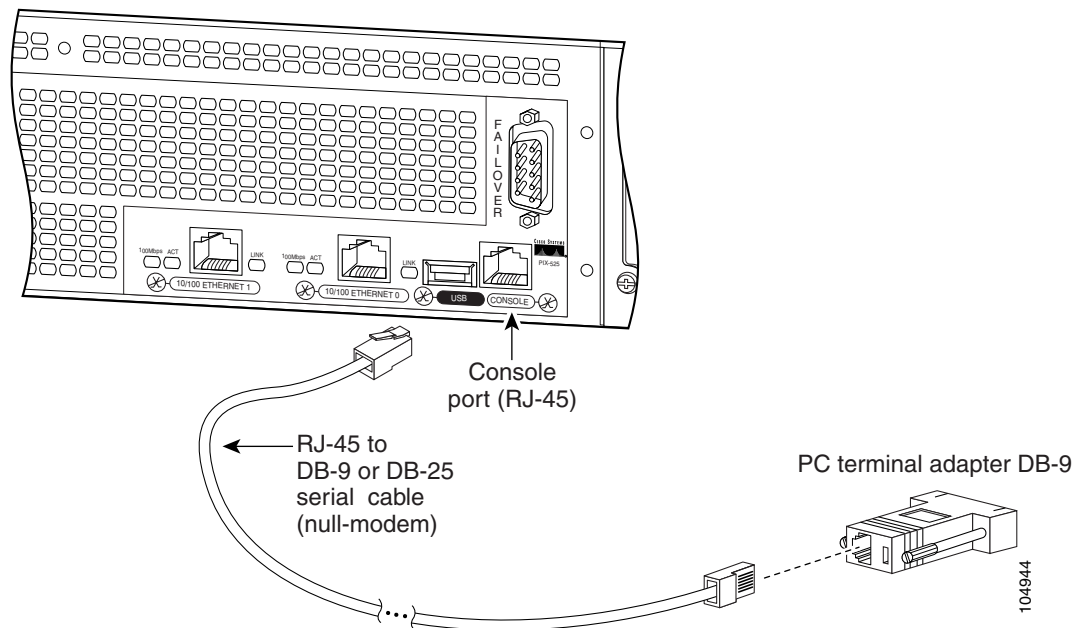
Step 4   Connect the outside network cable to the remaining Ethernet port. Refer to the "PIX 525 Feature Licenses" section on page 6-5 for information on how to configure the ports.

Note   The inside or outside network connections can be made to any available interface port on the PIX 525. If you are only using the ETHERNET 0 and ETHERNET 1 ports, connect the inside network cable to the interface connector marked ETHERNET 0 *or* ETHERNET 1.

Step 5   If you need to install an optional circuit board, refer to the "Installing a Circuit Board in the PIX 525" section on page 6-15. If you need to install memory, refer to the "Installing a Memory Upgrade" section on page 6-12 for more information.

Note   It is not necessary to remove the chassis cover of the PIX 525 to access the circuit boards or memory.

Step 6 Connect the network cables to the expansion interface ports. (The inside, outside, or perimeter network connections can be made to any available interface port on the PIX 525.) The first expansion port number, at the top left, is interface 2. Starting from that port and going from left to right and top to bottom, the next port is interface 3, the next is interface 4, and so on. Refer to the "PIX 525 Feature Licenses" section on page 6-5 for information on how to configure the ports.

Step 7 If you have a second PIX security appliance to use as a failover unit, install the failover feature and cable as described in the "Installing Failover" section on page 6-6.

> **Note** Do not power on the standby failover unit until the primary unit is configured.

Step 8 When you are ready to start the PIX 525, power on the unit from the switch at the rear of the unit.

PIX 525 Feature Licenses

If you have the PIX-525-UR unrestricted feature license, the following options are available:

- If you have a second PIX 525 to use as a failover unit, install the failover feature and cable as described in the "Installing Failover" section on page 6-6.

- If needed, install the PIX security appliance syslog server as described on the **logging** command page in the command reference online at:

  http://cisco.com/en/US/products/sw/secursw/ps2120/prod_command_reference_list.html

- If you need to install an optional circuit board, refer to the "Installing a Circuit Board in the PIX 525" section on page 6-15.

- If you need to install additional memory, refer to the "Installing a Memory Upgrade" section on page 6-12.

For information on upgrading feature licenses or downloading the latest software versions, refer to the configuration guide online at:

http://www.cisco.com/en/US/products/sw/secursw/ps2120/prod_configuration_guides_list.html

This section includes the following topics:

- VPN Accelerator Card, page 6-6
- VPN Accelerator Card+, page 6-6

VPN Accelerator Card

The VPN Accelerator Card (VAC) for the Cisco PIX security appliance series is a card that provides high-performance, tunneling and encryption services suitable for site-to-site and remote access applications. The VAC is integrated with PIX 525 unrestricted (UR) and failover (FO) bundles. You can also purchase the VAC as a spare for use with PIX 525 units that have a restricted (R) license.

VPN Accelerator Card+

The VAC+ is a 64-bit/66 MHz PCI card that provides faster tunneling and encryption services for Virtual Private Network (VPN) remote access, and site-to-site intranet and extranet applications, than the VAC. Each VAC+ occupies a single PCI slot in the system. The VAC+ is supported on any chassis that runs software Version 6.3 or later, has an appropriate license to run VPN software, and at least one PCI slot available. While the VAC continues to be supported in Version 6.3, if both types of cards, the VAC and the VAC+, are installed in a system running Version 6.3, the VAC card is ignored. The VAC+ runs at both 32-bit/33 MHz and 64-bit/66 MHz, and does not slow down the bus when other 66 MHz cards are installed. We strongly recommend that you install the VAC+ in a 64bit/66 MHz slot. Performance will be degraded if this recommendation is not followed.

The VAC+ driver supports the following:

- 3DES, DES, AES, SHA1, MD5 for (IPSec) ESP protocol (For AES, only the CBC mode and key sizes of 128, 192, and 256 bits are supported).
- SHA1, MD5 for the (IPSec) AH protocol.
- Load sharing ESP and AH activity between up to three VAC+.
- Diffie-Hellman public key and shared secret generation.
- Any other crypto-related activity uses a software implementation.

Installing Failover

To install a failover connection, perform the following steps:

**Step 1**   Power off both the primary and secondary units.

Note   Both PIX security appliances must have the same model number, have at least as much RAM, have the same Flash memory size, and be running the same software version. Note that the PIX-4FE and PIX-4FE-66 cards are considered equivalent and interchangeable. You can install a PIX-4FE in the primary unit and a PIX-4FE-66 in the secondary unit, as long as you install them in the same slot number of each chassis. For example, if you install a PIX-4FE in Slot 1 of the primary unit, you must also install the PIX-4FE-66 in Slot 1 of the secondary unit.

Step 2   Locate the failover cable (shown in Figure 6-6). This cable is shipped separately from the PIX security appliance. The cable is labeled "Primary" on one end and "Secondary" on the other.

Install the cable for the PIX 525 as shown in Figure 6-6.

Figure 6-6   PIX 525 Failover Cable Connection
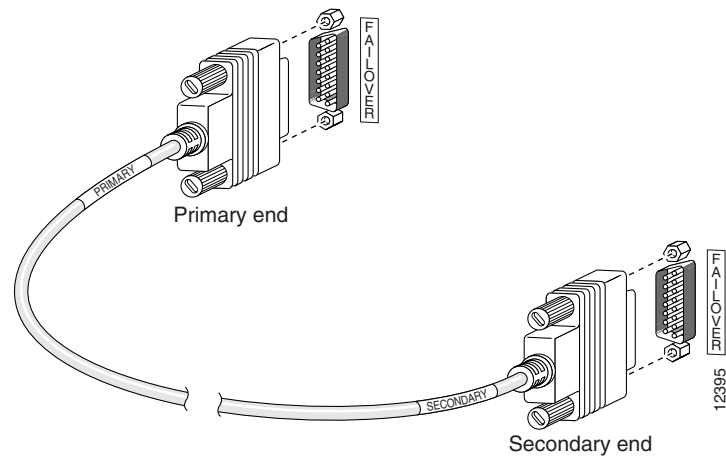
Step 3   Connect the Primary end of the failover cable to the first PIX security appliance; that is, the one you have already configured.

> **Note**   We highly recommend that you use a GE failover link when connecting the PIX 525 with GE interfaces.

Step 4   Connect the Secondary end of the failover cable to the standby unit.

Step 5   Connect a power cord to the power connector on the rear panel of each unit, and the other end of each power cord to (preferably separate) power outlets.

Step 6   If you are using Stateful Failover, use one of the following types of connections, that is appropriate for your system, between the dedicated interfaces on the PIX security appliance:

- Category 5 crossover cable directly connecting the primary unit to the secondary unit
- 100BaseTX half-duplex hub using Straight-through Category 5 cables
- 100BaseTX full duplex on a dedicated switch or dedicated VLAN of a switch

> **Note**   All enabled interfaces must be connected between the active and standby units. Only configure the active unit. On the PIX 525, the active unit is indicated by the ACT LED on the front panel (see Figure 6-3).

⚠
Caution   Do not turn the power on until the units are connected and the primary unit is configured completely.

Step 7   Power on the primary unit first, *then* power on the secondary unit. Within a few seconds, the active unit automatically downloads its configuration to the standby unit.

If the primary unit fails, the secondary unit automatically becomes active.

Installing LAN-Based Failover

LAN-based failover supports failover between two units connected over a dedicated Ethernet interface. LAN-based failover eliminates the need for a special failover cable and overcomes the distance limitations imposed by the failover cable.

> **Note** Both PIX security appliances must be the same model number, have the same amount of RAM, Flash memory, number and type of interfaces, and be running the same software version.

To set up a LAN-based failover connection, perform the following steps:

Step 1 Disconnect both PIX security appliance, so that there is no traffic flow between them. If the failover cable is connected to the PIX security appliance, disconnect it.

Step 2 Configure the PIX security appliance for LAN-based failover. Refer to the chapter on configuring LAN-based failover in the configuration guide online at:

http://www.cisco.com/en/US/products/sw/secursw/ps2120/prod_configuration_guides_list.html

Step 3 Power off both units.

Step 4 Connect the LAN failover interfaces to the dedicated switch/hub, as shown in Figure 6-7.

> **Note** A dedicated LAN interface and a dedicated switch (or VLAN) is required to implement LAN-based failover. You cannot use a crossover Ethernet cable to connect the two PIX security appliances.

Figure 6-7   LAN-Based Failover Connections
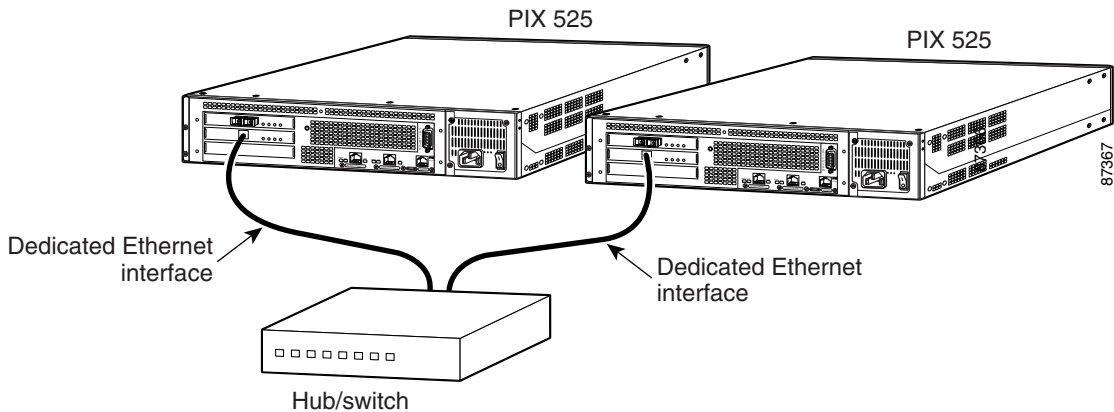
Step 5 If you are using Stateful Failover, use one of the following types of connections, that is appropriate for your system, between the dedicated interfaces on the PIX security appliance units:

- 100BaseTX full duplex on a dedicated switch or dedicated VLAN of a switch
- 1000BaseTX full duplex on a dedicated switch or dedicated VLAN of a switch

⚠

Caution Do not turn the power on until the units are connected and the primary unit is configured completely.

Step 6 Power the primary unit on first, *then* power on the secondary unit. Within a few seconds, the active unit automatically downloads its configuration to the standby unit.

If the primary unit fails, the secondary unit automatically becomes active.

Removing and Replacing the PIX 525 Chassis Cover

This section describes how to remove and replace the chassis cover from PIX 525. This section includes the following topics:

- Removing the Chassis Cover, page 6-9
- Replacing the Chassis Cover, page 6-11

Removing the Chassis Cover

✎

Note Removing the PIX security appliance chassis cover does not affect your Cisco warranty. Upgrading the PIX security appliance does not require any special tools and does not create any radio frequency leak.

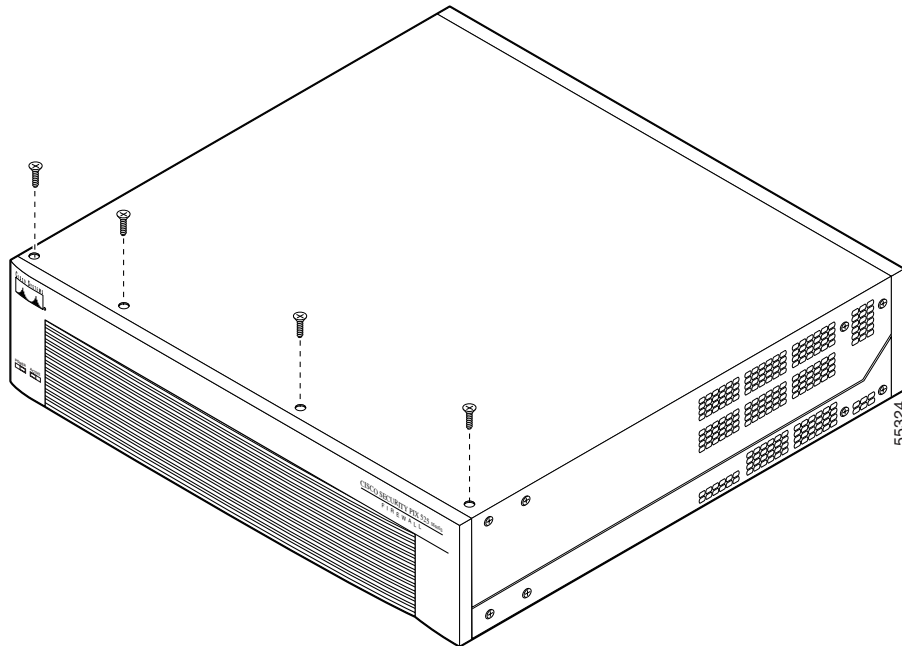To remove the chassis cover, perform the following steps:

Step 1 Read the *Regulatory Compliance and Safety Information* document.

Step 2 Power off the PIX 525 and disconnect site power.

✎

Note The power switch is part of the power supply.

Step 3 Place the PIX 525 so that the front panel is facing you. If you place the PIX 525 on a table, ensure that you have clear access to all sides.

Step 4 Remove the four screws on the chassis cover. (See Figure 6-8.)

Figure 6-8   Removing the Chassis Cover Screws

55324

Step 5   Lift the chassis cover upward and pull it away from the tabs on the rear of the chassis. (See Figure 6-9.)

Figure 6-9   Removing the Chassis Cover

Chassis cover

Front panel

Chassis bottom

55325
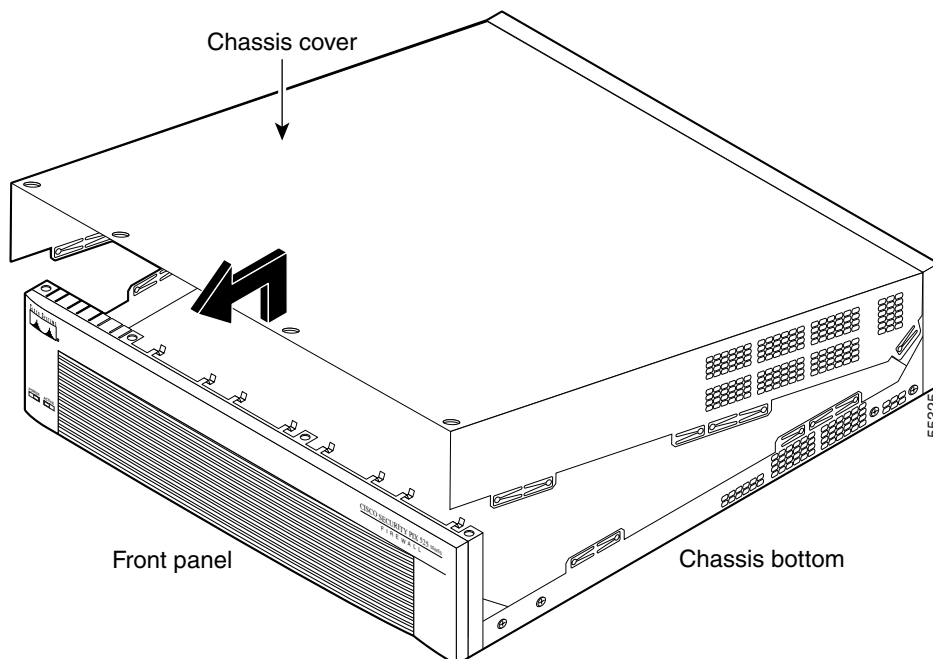
Replacing the Chassis Cover

To replace the chassis cover, perform the following steps:

Step 1   Place the chassis bottom so that the front panel is facing you.

Step 2   Hold the chassis cover over the chassis bottom, and align each of the cover tabs with the chassis tabs at the top rear of the chassis. (See Figure 6-10.)

Step 3   Lower the front of the top cover to close the chassis, and ensure the following:

- The chassis cover tabs fit under the edge of the chassis rear panel so that they are not exposed.
- The chassis tabs fit under the chassis cover so that they are not exposed.
- The chassis cover side tabs on both sides fit inside the chassis side panels so that they are not exposed.

When the chassis cover is properly assembled, no tabs are visible.

Step 4   Secure the chassis cover with the four screws you previously removed.

Step 5   Reinstall all interface cables.

Figure 6-10   Replacing the Chassis Cover
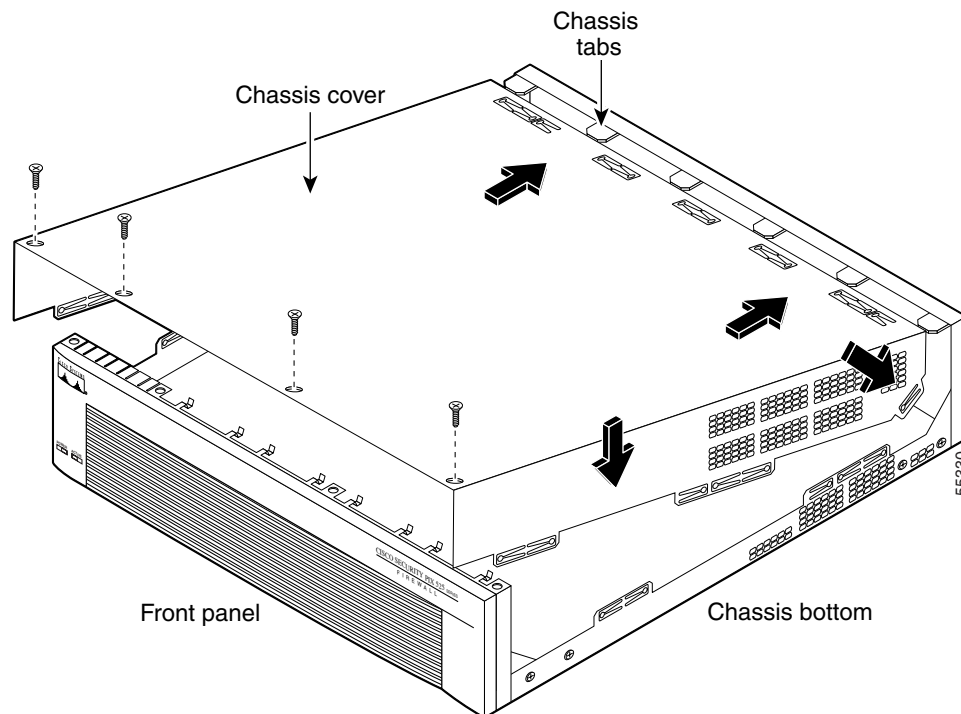
Step 6   Connect the power to the site power and power on the PIX 525. The internal power supply fan should go on.

Replacing a Lithium Battery

The PIX security appliance has a lithium battery on its main circuit board. This battery has an operating life of about ten years. When the battery loses its charge, the PIX security appliance cannot function. The lithium battery is not a field-replacable unit (FRU). Contact Cisco TAC to replace the battery.

Note   Do not attempt to replace this battery yourself.

Warning   **Danger of explosion exists if the lithium battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.**

Installing a Memory Upgrade

Observe the following warnings, cautions, and notes when installing additional PIX security appliance system memory.

The following statement applies to DC models:

Warning   **Before performing any of the following procedures, ensure that power is removed from the DC circuit. To ensure that all power is OFF, locate the circuit breaker on the panel board that services the DC circuit, switch the circuit breaker to the OFF position, and tape the switch handle of the circuit breaker in the OFF position.**

The following statement applies to both AC and DC models:

Warning   **Before working on a system that has an On/Off switch, turn OFF the power and unplug the power cord.**

Caution   Always remove old memory before installing new memory.

Caution   If you remove the PIX security appliance chassis cover, always reinstall the cover. Running the PIX security appliance without the chassis cover causes overheating and damage to electrical components.

Memory Installation Steps

PIX software Version 7.0 requires a minimum of 128 MB of memory with the Restricted license, and 256 MB of memory with the Unrestricted and Failover licenses.

To install additional system memory, perform the following steps:

Step 1   If the unit is rack-mounted, remove network wires and any cords connecting to the PIX security appliance. Ensure that the unit is unplugged from its power source.

Step 2   Unpack the items in the memory upgrade kit.

Step 3   Remove the component tray and all the screws holding the assembly in place. Refer to the "Removing and Replacing the PIX 525 Chassis Cover" section on page 6-9 for more information.

Step 4   Determine the location of your system memory sockets (see Figure 6-11).

Step 5   Use the markings on the motherboard to determine the socket numbers. Always install the first memory strip into the lowest socket number. Progressively add memory strips into higher numbered sockets.

Figure 6-11   System Memory Location on the PIX 525 Component Tray
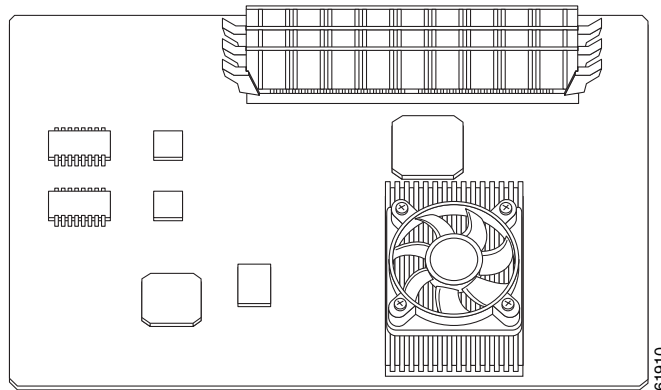
Step 6   Locate the wrist grounding strap in the accessory kit and connect one end to the unit or to the PIX security appliance chassis, and securely attach the other to your wrist so it contacts your bare skin.

Step 7   With the wrist strap on your wrist, carefully grasp the memory strip from either end. Note that a DIMM strip has notches.

Step 8   To install a DIMM strip:

- Remove the old memory strip by opening the two plastic wing connectors, and pulling the old strip up. Discard the old strip.

- When installing the memory strip in a PIX 525, install the new strip in Bank 0 as shown in Figure 6-12 and Figure 6-13, by opening the two plastic wing connectors, inserting the strip, and closing the wing connectors.

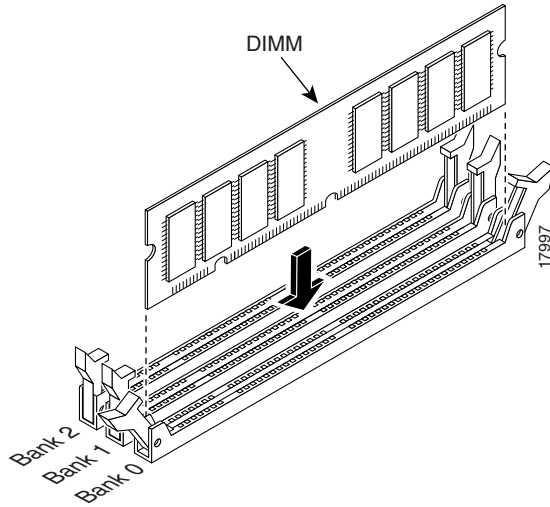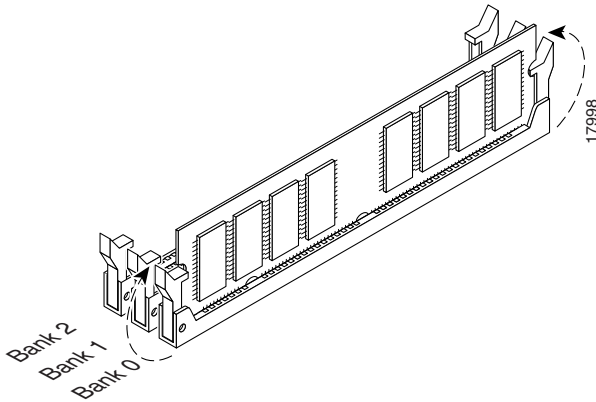*Figure 6-12   Inserting a DIMM Memory Strip in the PIX 525*

Figure 6-13   Securing a DIMM Memory Strip in the PIX 525

When you finish inserting new RAM memory, reinstall the tray on the PIX 525. Reattach the screws. If desired, rack mount the PIX security appliance and attach all cables and cords as discussed in previous sections. After the PIX security appliance is installed, you can view the amount of RAM memory in the system startup messages or with the **show version** command.

Installing a Circuit Board in the PIX 525

This section includes the following topics:

- Fast Ethernet Circuit Board, page 6-17
- VPN Accelerator Circuit Board, page 6-18
- Gigabit Ethernet Circuit Board, page 6-18

Note The PIX 525 Restricted Interface Options can have a maximum of six interfaces, and for the Unrestricted Interface Options, a maximum of eight interfaces.

Table 6-3 lists the possible options/examples of configuration choices available for the PIX 525 restricted and unrestricted interface options.

Table 6-3   PIX 525 Interface Options

Restricted Interface Options	Unrestricted Interface Options
3 FE	3 FE
2 FE + 1 VPN Accelerator	2 FE + 1 VPN Accelerator
3 GE	3 GE
2 GE + 1 VPN Accelerator	2 GE + 1 VPN Accelerator
1 GE + 1 FE	1 GE + 2 FE
1 GE + 1 FE + 1 VPN Accelerator	1 GE + 1 FE + 1 VPN Accelerator
1 4-Port FE	1 4-port FE
1 4-Port FE + 1 VPN Accelerator	1 4-port FE + 2 FE
2 4-port FE	2 4-port FE
	1 4-port FE + 2 GE
	1 4-port FE + 1 VPN Accelerator
	1 4-port FE + 1 VPN Accelerator + 1 FE
	1 4-port FE + 1 VPN Accelerator + 1 GE

To install a circuit board in the PIX 525, perform the following steps:

Step 1 Locate the grounding strap from the accessory kit. Fasten the grounding strap to your wrist so that it contacts your bare skin. Attach the other end to bare metal on the PIX 525 chassis.

Step 2 Remove the screws from the rear panel of the component tray and slide the tray out (see Figure 6-14).

*Figure 6-14   The Component Tray at the Back of the PIX 525*
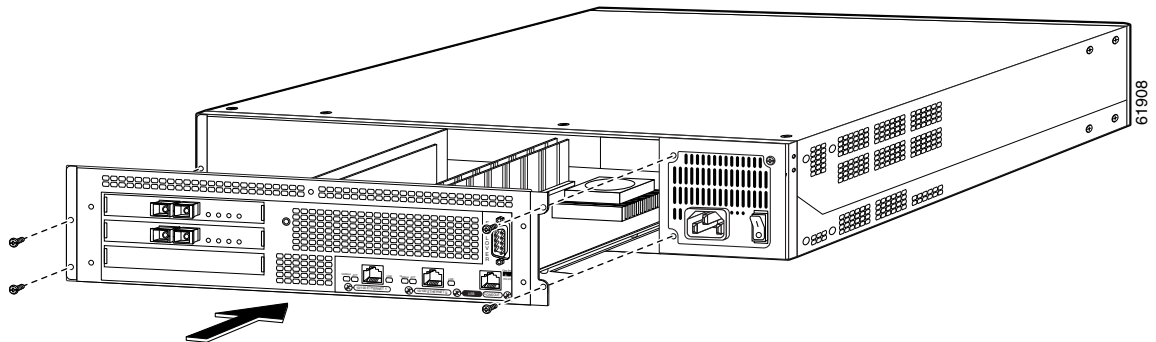
Step 3   Remove the screw and cover plate from the circuit board slot.

Step 4   Use Figure 6-15 as a guide to install a circuit board into a PCI slot on the component tray.

Step 5   Attach the screw to hold the circuit board connecting flange to the rear cover plate on the component tray.

Figure 6-15   Inserting an Expansion Board into a PCI Slot on the PIX 525 Component Tray
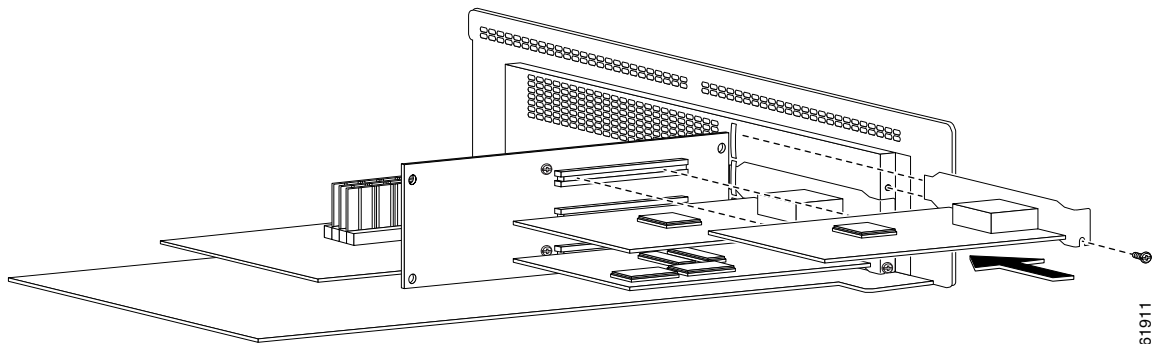
Step 6   Figure 6-16 shows circuit boards in PCI slots on the component tray.

Figure 6-16   Expansion Boards in PCI Slots on the PIX 525 Component Tray
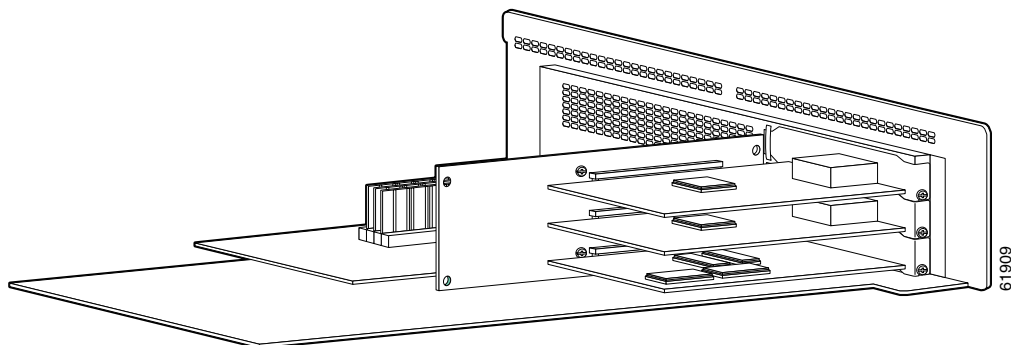
Step 7   Reinstall the component tray into the PIX 525 chassis.

Fast Ethernet Circuit Board

The 4-port 64 bit/66 MHz FE card (PIX-4FE-66) is supported in software Versions 6.3, 6.2(2), 6.1(4), and 5.2(9), and later versions. These are the minimum software versions that support the card.

Note The PIX-4FE card continues to be supported but is no longer manufactured. The PIX-4FE and PIX-4FE-66 cards are considered equivalent and interchangeable. You can install a PIX-4FE in the primary unit and a PIX-4FE-66 in the secondary unit, as long as you install them in the same slot number of each chassis. For example, if you install a PIX-4FE in Slot 1 of the primary unit, you must also install a PIX-4FE-66 in Slot 1 of the secondary unit.

The new card has the following characteristics:

- Includes an Intel 21154BE bridge and four Intel 82559 Ethernet MAC/PHY devices.
- Supports 10/100 mbps full/half-duplex operation on each port.
- Retains bus performance when installed with other 66-MHz devices.
- Does not support auto MDI/MDIX operation.

Figure 6-17   4-Port Circuit Board Overlap
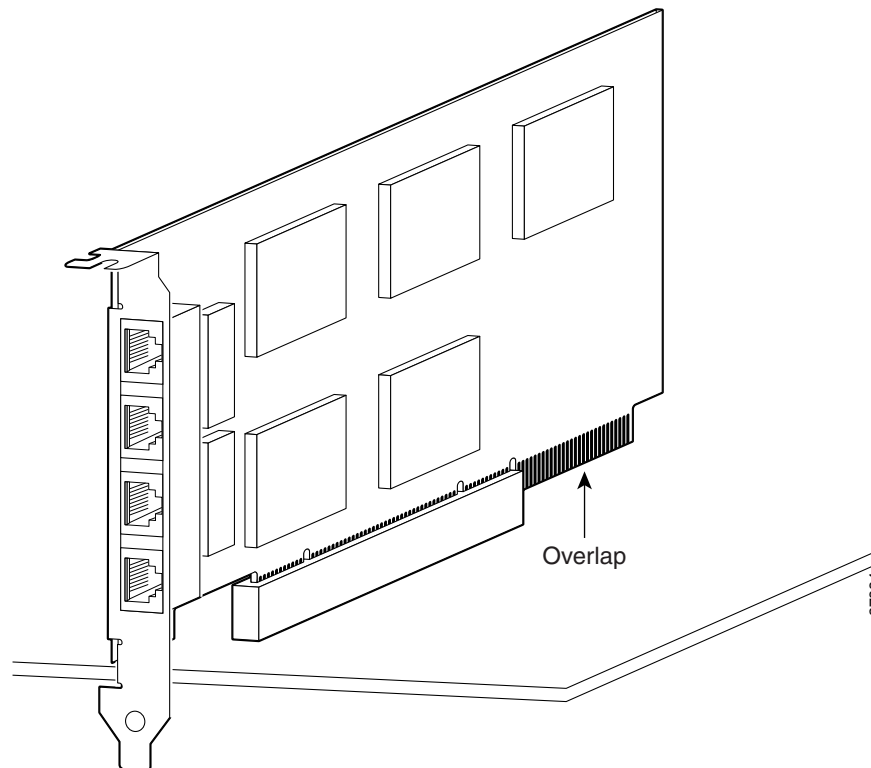
Note If you are installing a 4-port circuit board, note that the circuit board overlaps the slot connector on the motherboard. This does not affect the use or operation of the circuit board. See Figure 6-17.

VPN Accelerator Circuit Board

The VPN Accelerator (PIX-VPN-ACCEL) is an encryption and accelerator circuit board. The VPN Accelerator uses a PCI interface and therefore can only be installed in PIX security appliance platforms with PCI slots. The VPN Accelerator begins to function immediately after installation without the need of special installation configurations.

Note   The new VPN Accelerator cannot be used with the former PIX security appliance IPSec accelerator in the same chassis. The PIX security appliance IPSec accelerator was also known as the Private Link card.

An illustration of the VPN Accelerator is shown in Figure 6-18.

Figure 6-18   PIX Security Appliance VPN Accelerator Circuit Board
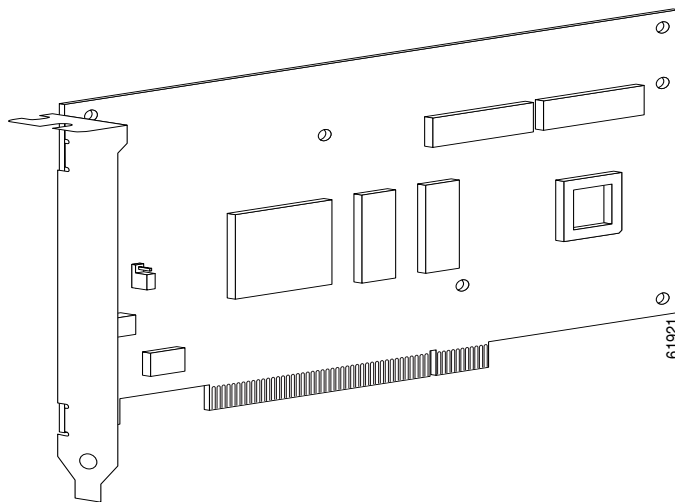
Gigabit Ethernet Circuit Board

PIX security appliance supports 1000 Mbps (Gigabit) Ethernet. The Gigabit Ethernet circuit board has only one hardware speed and supports the following duplex options:

- 1000SXfull—Forces full-duplex operation
- 1000BaseSX—Forces half-duplex operation
- 1000auto—Auto negotiates full or half duplex

Note   We highly recommend that you use a GE failover link when connecting the PIX 525 with GE interfaces.

The Gigabit Ethernet circuit board and the fiber optic cable connection are shown in Figure 6-19.

Figure 6-19   Gigabit Ethernet Circuit Board
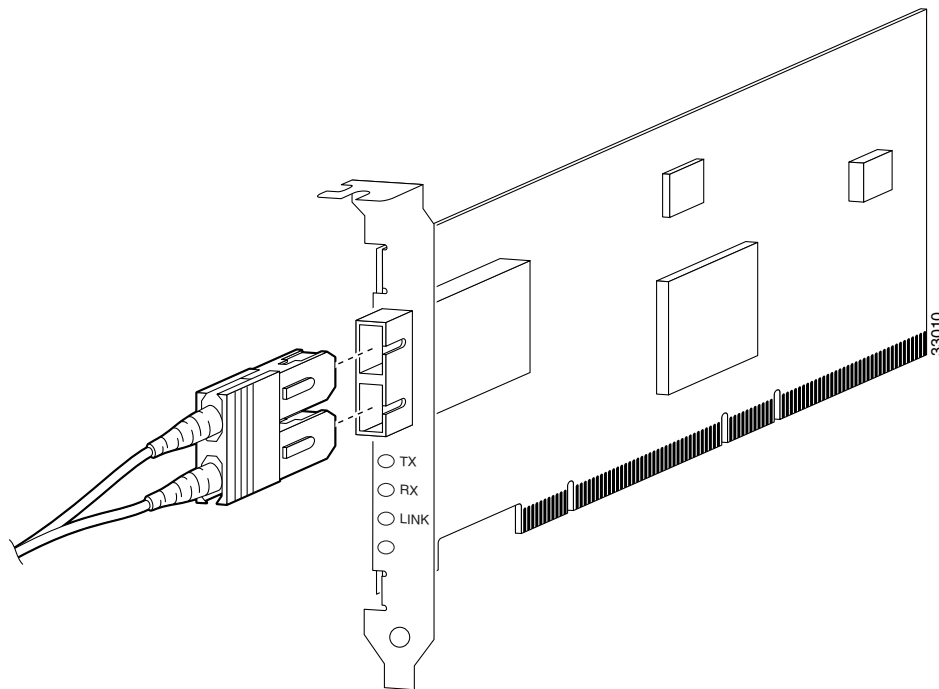
The Gigabit Ethernet circuit board has three LEDs:

- TX—Transmitting data
- RX—Receiving data
- LINK—The Gigabit Ethernet circuit board has established a network connection

Installing a DC Power Supply

Warning   **Before performing any of the following procedures, ensure that power is removed from the DC circuit. To ensure that all power is OFF, locate the circuit breaker on the panel board that services the DC circuit, switch the circuit breaker to the OFF position, and tape the switch handle of the circuit breaker in the OFF position.**

To install the DC power supply, perform the following steps:

Step 1   Place the power supply as shown in Figure 6-20, and then slide it toward the rear panel. You will be able to feel the chassis hook engage with the slot on the bottom of the power supply.

Step 2   Reinstall the three screws that secure the power supply on the back panel of the chassis.

Figure 6-20   Inserting the Power Supply in the Chassis
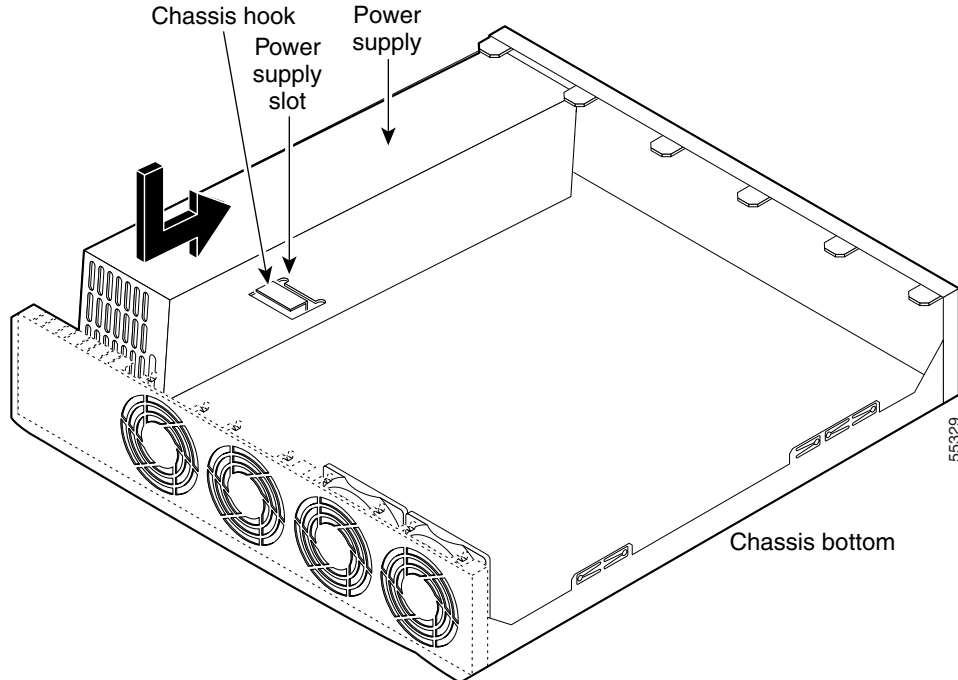
Step 3   Connect the six-pin connector to the motherboard.

Step 4   Route the fan cables on top of fans exactly as shown in Figure 6-21. Note that the two longest cables are connected to the two installed fans on the right. The connectors to these two fans will fit into the space between the second and third fans.

Step 5   Reconnect the power connector.

Figure 6-21   Routing the Fan Cables
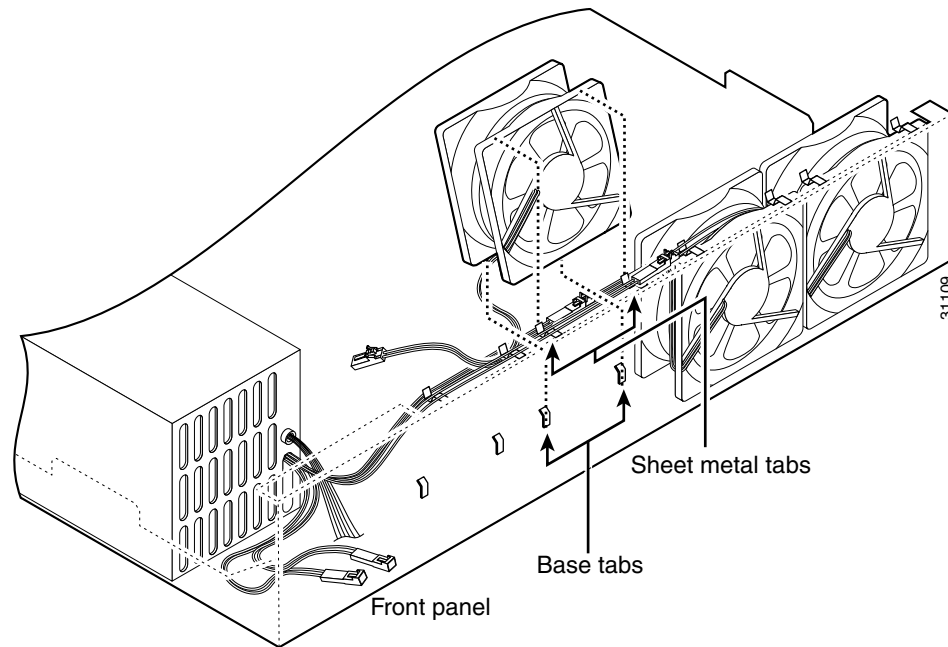
Step 6   Insert the second fan as shown in Figure 6-21, making sure that the fan cable feeds to your left. Position the cables to the two installed fans so that they will fit over the first and second fans. Press the fan into place between the four sheet metal tabs.

Step 7   Reconnect the two-pin fan cables to the remaining fan, as shown in Figure 6-22.

Figure 6-22   Reconnecting the Fan Cables
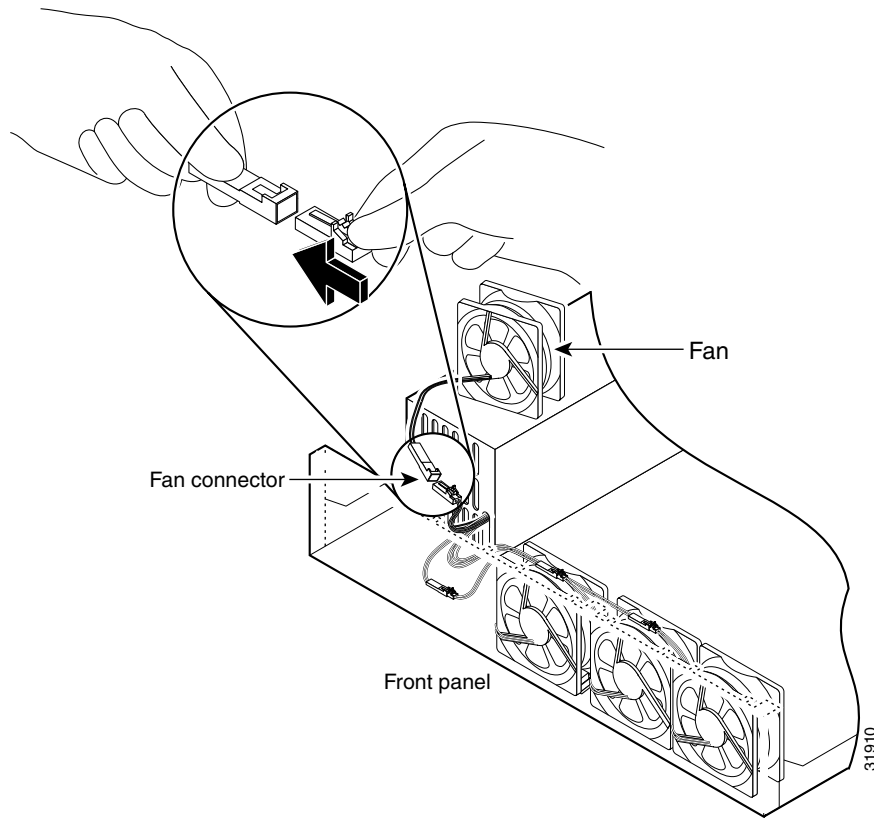
Step 8   Reinstall the remaining fan. Make sure you orient the fan so that the cables feed to the right (toward the second fan). Route the cable over the fan before you reconnect it. When correctly assembled, the cables appear as shown in Figure 6-23.

Step 9   Starting with the fan farthest away from the power supply, bend the cable clamps over wires and into the gap between chassis and fan housing.

Figure 6-23   Correct Fan Cable Routing
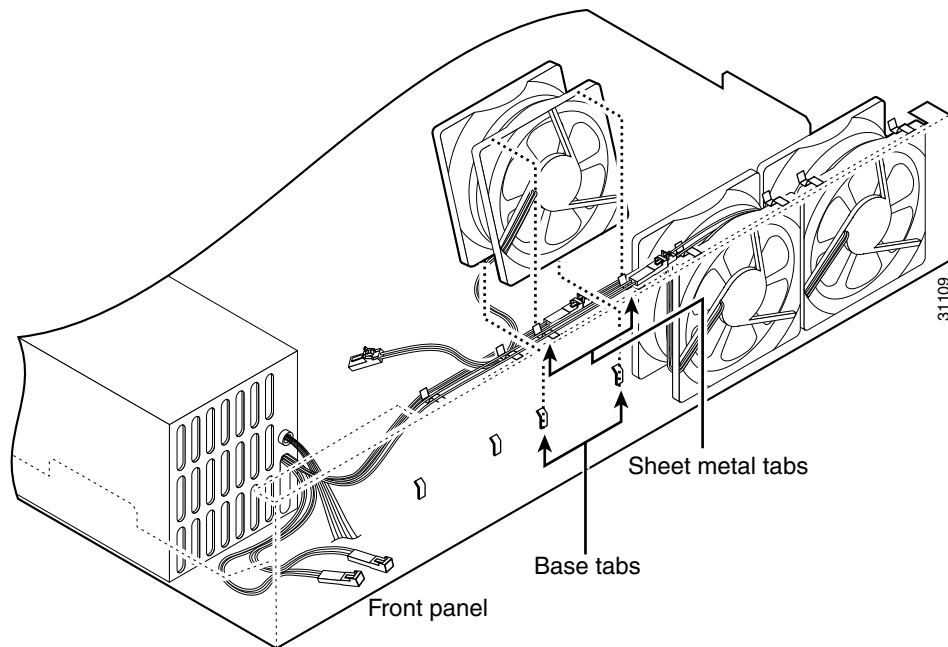
Step 10   Replace the air separator as shown in Figure 6-24, holding all cables to the right of the separator as you slip it into the chassis.

Figure 6-24   Replacing the Air Separator
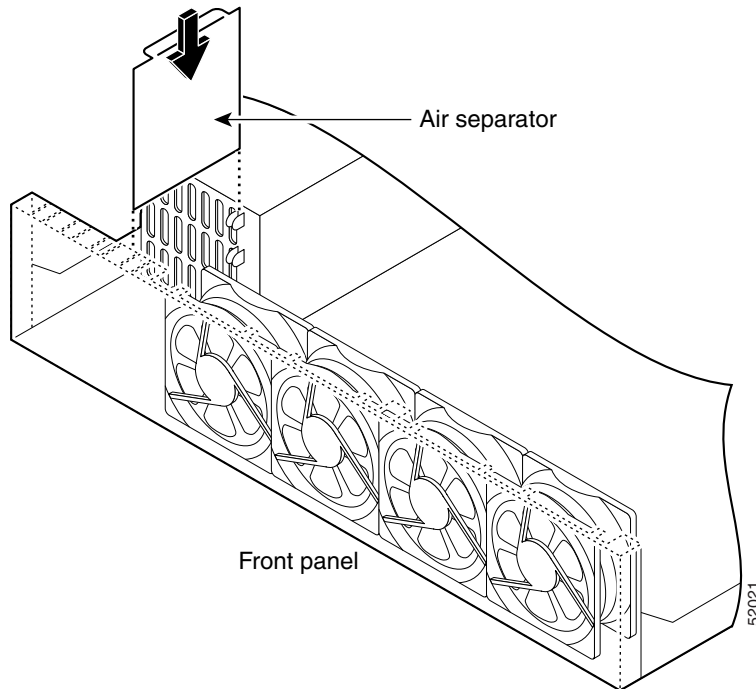
Step 11   Replace the chassis cover as described in the "Replacing the Chassis Cover" section on page 6-11.

Rerouting the Fan Wiring

If the fan wiring in your router is not routed on top of the fans, you need to reroute the fan wiring. This will make future power supply replacement easier.

To reroute the fan wiring, perform the following steps:

Step 1   Pull the fan closest to the power supply away from the sheet metal tabs. (See Figure 6-25.)

Note   To help with reconnecting the cables, write down which colored cable connects to which fan. See Table 6-4 for a list of the wire colors. There are three different lengths of two-wire ± 12 VDC power cables. The two shortest cables go to the two fans that you will remove in Step 9. The two longer cables go to the two remaining fans you will remove in Step 10 and Step 11. The remaining cable goes to the power connector on the backplane. These cables are color-coded.

Figure 6-25   Pulling the Fan Away from the Tabs
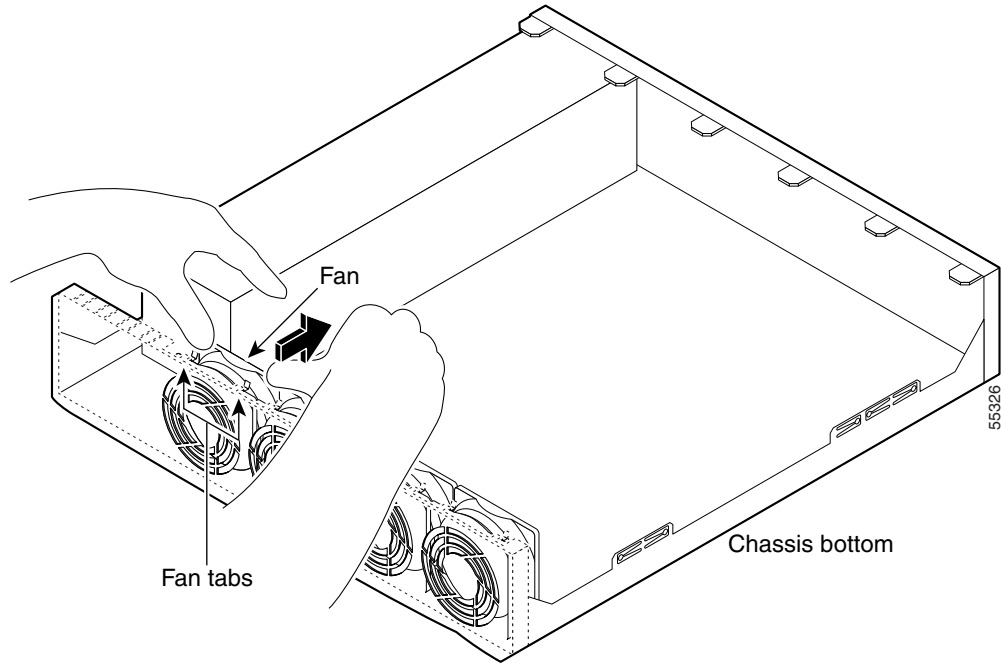
Step 2   Lift the fan out of the chassis as shown in Figure 6-26.

Figure 6-26   Removing the Fan
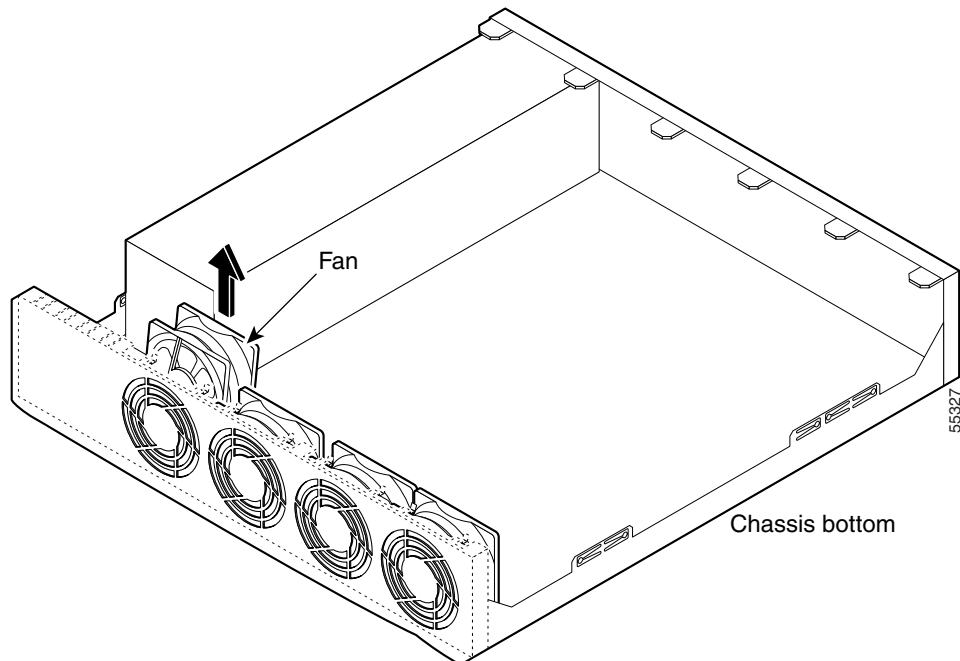
Step 3   Depress the tab as shown in Figure 6-27.

⚠️
Caution   Do not attempt to remove the fan cables without first depressing the tab as shown in Figure 6-27. You can damage the fan cables by applying stress if the connector is not removed properly.

Step 4   Disconnect the fan cable as shown in Figure 6-27, and set the fan aside.

Figure 6-27   Disconnecting the Fan Cable
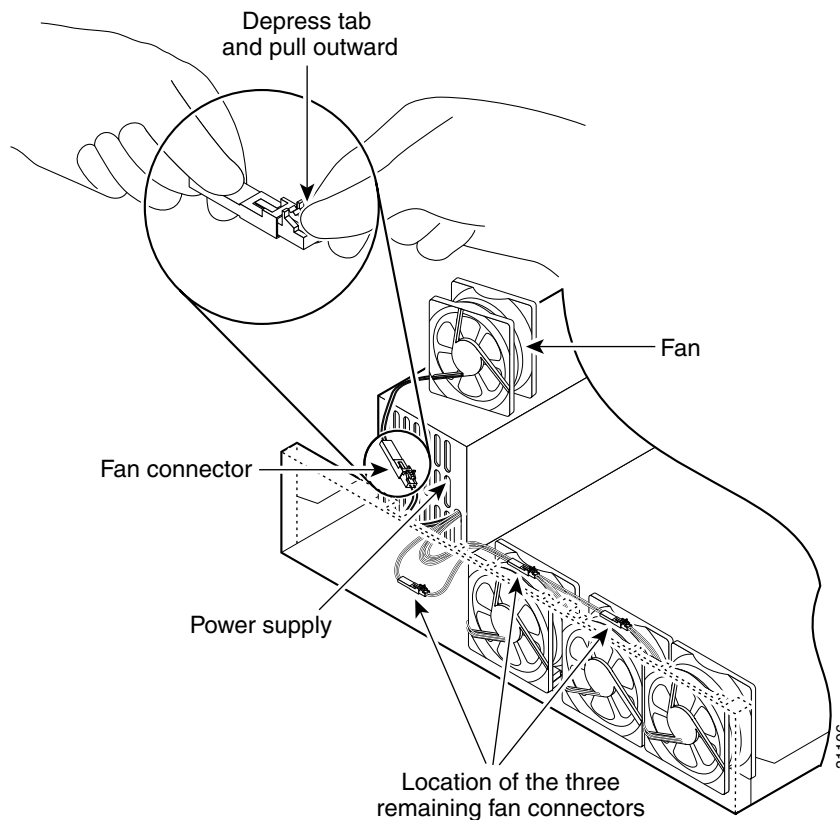
Step 5   Remove the next fan and disconnect its cable.

Step 6   Remove the cables for the two remaining fans. Remove the last two fans.

Step 7   Replace the fans, starting with the fan farthest away from the power supply. If the bezel is removed, make sure the fan farthest away from the power supply does not cover the bezel holes.

✎
Note   Make sure that the label on the fan faces the chassis wall to ensure proper airflow direction.

Step 8   Install cable clamps onto the fans by aligning cable clamp holes over fan mounting holes and pressing rivets through both. (See Figure 6-28.)

Figure 6-28   Inserting Cable Clamp to the Fan
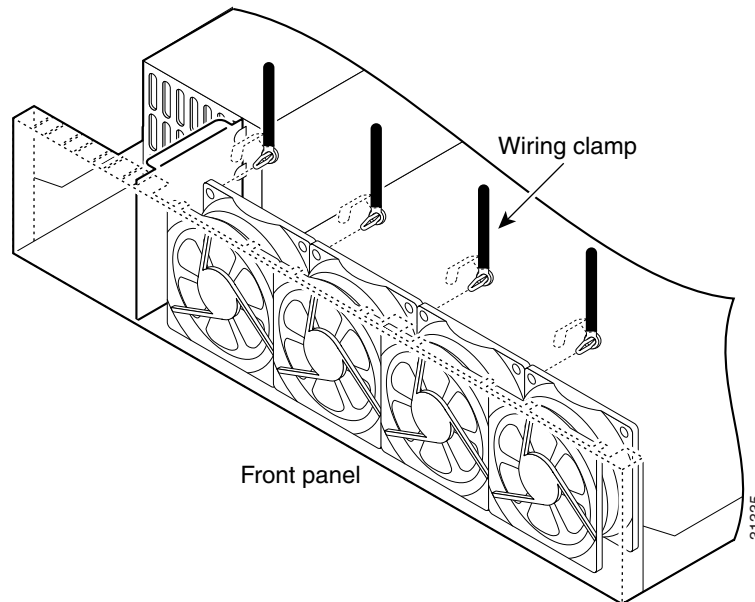
Step 9   Reconnect the two-pin fan cables to the remaining fan, as shown in Figure 6-28. Fan wiring colors are listed in Table 6-4.

Step 10   Route the fan wire on the top surface of the fans. Place the fan wires straight, and do not twist the wires together. Locate the connectors in the gap between the fans. (See Figure 6-23.)

Step 11   Starting with the fan farthest away from the power supply, bend the cable clamps over the wires and into the gap between the chassis and fan housing.

Table 6-4   Fan Wiring Colors

Fan Number	Wire Colors
1 (closest to power supply)	Purple and black
2	Green and black
3	Blue and black
4 (farthest away from power supply)	Brown and black

Step 12   Terminate the DC input wiring on a DC source capable of supplying at least 15 amps. A 15-amp circuit breaker is required at the 48 VDC facility power source. An easily accessible disconnect device should be incorporated into the facility wiring.

Step 13   Be sure the PIX 525 power is off by checking the power switch at the rear of the unit.

Step 14   As shown in Figure 6-29, the PIX 525 is equipped with two grounding studs at the back of the unit, which you can use to connect a two-hole grounding lug to the PIX 525. Use the 10-32 nuts provided with the PIX 525 to connect a copper standard barrel grounding lug to the studs. The PIX 525 requires a lug where the distance between the center of each hole is 0.56 inches. A lug is not supplied with the PIX 525.

Figure 6-29   Attaching a Grounding Lug to the PIX Security Appliance
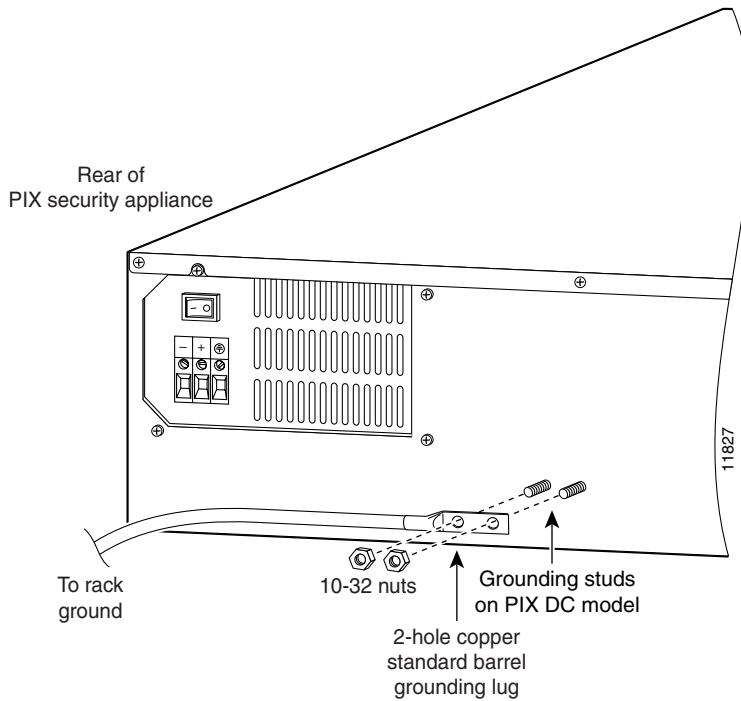
Step 15   Ensure that power is removed from the DC circuit. To ensure that all power is OFF, locate the circuit breaker on the panel board that services the DC circuit, switch the circuit breaker to the OFF position, and tape the switch handle of the circuit breaker in the OFF position.

Step 16   Strip the ends of the wires for insertion into the power connect lugs on the PIX 525.

Step 17   Refer to Figure 6-30 and insert the ground wire into the connector for the earth ground and tighten the screw on the connector. Using the same method as for the ground wire, connect the negative wire and then the positive wire.

Figure 6-30   Attaching DC Power Cables
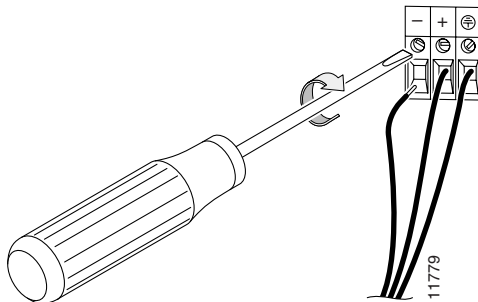
Step 18 Reconnect power to the PIX 525. After wiring the DC power supply, remove the tape from the circuit breaker switch handle and reinstate power by moving the handle of the circuit breaker to the ON position.

Step 19 Insert the PIX 525 system diskette in the drive at the front of the unit.

Step 20 Power on the unit from the switch at the rear of the unit.

If you need to power cycle the DC PIX security appliance, wait at least 5 seconds between powering off the unit and powering it back on.

PIX 535

This chapter describes the installation of the PIX 535, and includes the following sections:

PIX 535 Product Overview

Note The PIX 535 chassis cover should not be removed. The user-serviceable components are accessed by a removable tray at the back panel of each model. If you need to remove the PIX 535 chassis cover for any reason, use the related information in the "Removing and Replacing the PIX 515/515E Chassis Cover" section on page 4-13 as a guideline.

Figure 7-1 shows the front view of the PIX 535.

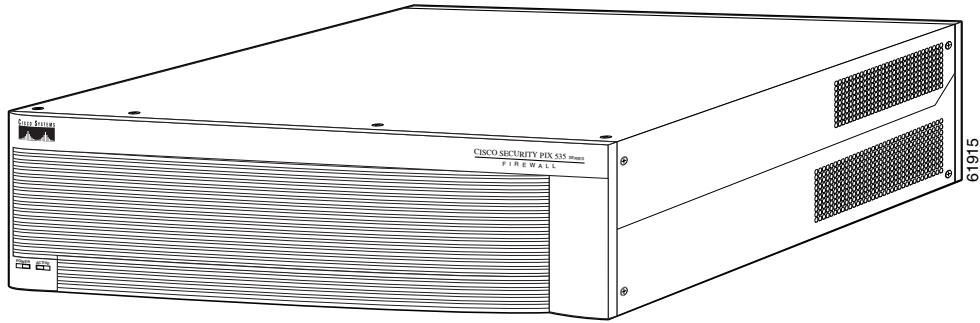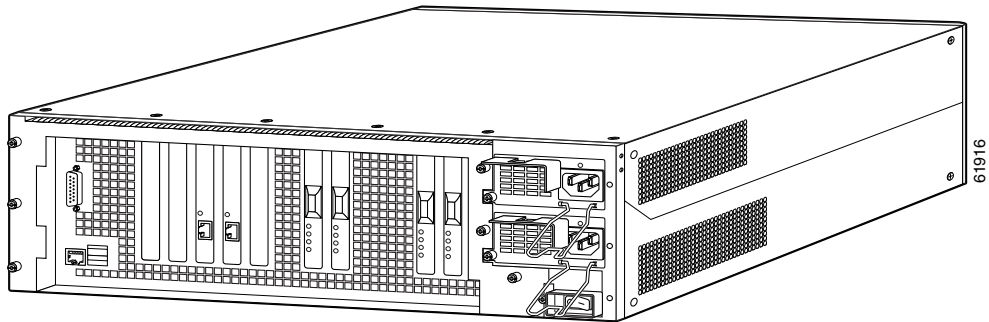*Figure 7-1   PIX 535 Front Panel*

Figure 7-2 shows the rear view of the PIX 535.

Figure 7-2   PIX 535 Rear Panel

The PIX 535 has a fixed RJ-45 Console connector and a DB-15 Failover cable connector the USB port is not used at the present time.

Figure 7-3 shows the PIX 535 front panel LEDs.
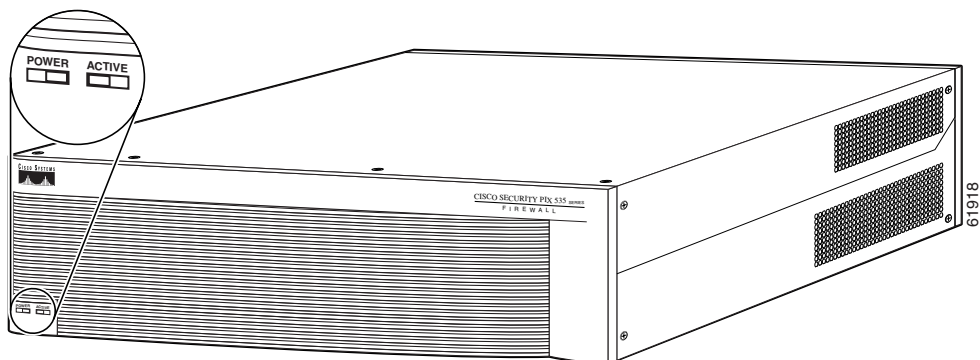
Figure 7-3   PIX 535 Front Panel LEDs

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Table 7-1 lists the states of the PIX 535 front panel LEDs.

Table 7-1   PIX 535 Front Panel LEDs

LEDs	State	Description
POWER	On	Unit has power.
ACT	On	On when the unit is the active failover unit. If failover is present the light is on when the unit is the active unit.
	Off	Off when the unit is in standby mode.

Figure 7-4 shows the PIX 535 rear panel LEDs.
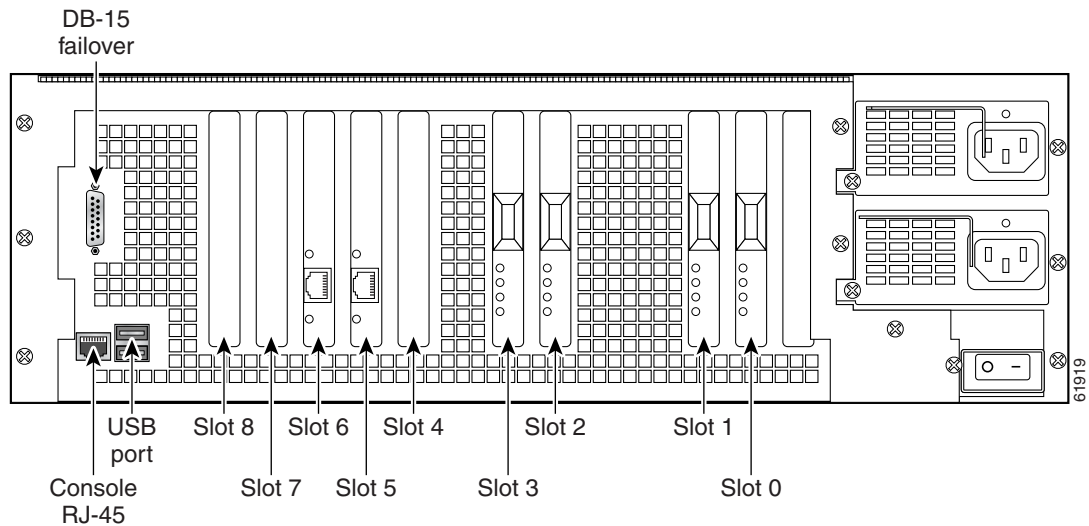
Figure 7-4   PIX 535 Rear Panel LEDs

Table 7-2 lists the states of the PIX 535 LEDs.

Table 7-2   PIX 535 Rear Panel LEDs

LEDs	State	Description
100 Mbps	On	100 megabits per second 100BaseTX communication.
	Off	If the light is off during network activity, that port is using 10 megabits per second data exchange.
ACT	On	Shows network activity.
LINK		Shows that data is passing through that interface.
FDX	On	Shows that the connection uses full-duplex data exchange where data can be transmitted and received simultaneously.
	Off	If this light is off, half duplex is in effect.

PIX 535 Network Interface Description

There are three separate buses for the nine interface slots in the PIX 535. The interfaces are counted from right to left on the PIX 535.

The slots and buses are configured as follows:

- Slots 0 and 1-64-bit/66 MHz Bus 0

- Slots 2 and 3-64-bit/66 MHz Bus 1

- Slots 4 to 8-32-bit/33 MHz Bus 2

For optimum performance and throughput for the interface circuit boards, use the following guidelines:

- A total of eight interfaces are configurable on the PIX 535 with the restricted license, and a total of ten are configurable with the unrestricted license.

- For best performance, the PIX-1GE-66 (66 MHz) circuit boards should be installed in a 64bit/66 MHz card slot, before they are installed in a 32-bit/33 MHz card slot. You can install up to nine PIX-1GE-66 circuit boards in the PIX 535. If it is necessary to install PIX-1GE-66 circuit boards in a 32-bit/33 MHz card slot, it would be best to use these for interfaces with lower throughput requirements.

- If Stateful Failover is enabled for PIX-1GE-66 traffic, the failover link must be PIX-1GE-66. The amount of Stateful Failover information is proportional to the amount of traffic flowing through the PIX security appliance and if not configured properly, loss of state information or 256-byte block depletion can occur.

- The PIX-1FE circuit board (33 MHz) can be installed in any bus or slot (32-bit/33 MHz or 64-bit/66 MHz). Up to nine PIX-1FE circuit boards, or up to two PIX-4FE, circuit boards can be installed. The PIX-1FE circuit boards should be installed in the 32-bit/33 MHz card slots first.

- The PIX-4FE card can only be installed in a 32-bit/33 MHz card slot and must never be installed in a 64-bit/66 MHz card slot. Installation of this circuit board in a 64-bit/66 MHz card slot can cause the system to hang at boot time.

- The PIX-4FE-66 may be installed in any slot. If there is a shortage of 64-bit/66 MHz card slots (the slots are being used for 1GE-66 or PIX-VACPLUS), the PIX-4FE-66 should be installed in 32-bit/33 MHz card slot.

Note   On the PIX-4FE card, port 0 is on the top and port 3 is on the bottom.

- Do not mix the PIX-1FE circuit boards with the PIX-1GE-66 circuit boards on the same 64-bit/66 MHz bus (Bus 0 or Bus 1). The overall speed of the bus is reduced by the lower speed circuit board.

- The PIX-1GE circuit board is not recommended for use in the PIX 535, as it can severely degrade performance. It is only capable of half the throughput of the

- PIX-1GE-66 circuit board. If this circuit board is detected in the PIX 535, a warning about degraded performance will be issued.

- The VPN Accelerator (PIX-VPN-ACCEL) can only be installed in a 32-bit/33 MHz card slot.

- The VPN Accelerator Card+ (PIX-VACPLUS) should always be installed in a 64-bit/66 MHz card slot. VPN performance will be degraded by roughly a factor of 4 if this recommendation is not followed.

Table 7-3 lists the relative throughput of the Gigabit Ethernet combinations.

Table 7-3   Relative Throughput of Gigabit Ethernet Combinations

Gigabit Ethernet Card	Bus Type	Shared with 33 MHz Device	Speed
PIX-1GE-66	64/66	No	100%
PIX-1GE-66	64/66	Yes	50%
PIX-1GE-66	32/33	No	25%
PIX-1GE	64/66	No	50%
PIX-1GE	32/33	No	25%

Installing the PIX 535

This section includes the following topics:

- Before Installing the PIX 535, page 7-5
- Mounting the PIX 535, page 7-5
- PIX 535 Network Interface Installation, page 7-6

Before Installing the PIX 535

Observe the following before installing the PIX security appliance:

- Review the safety precautions outlined in the *Regulatory Compliance and Safety Information* document.
- Place the PIX security appliance on a stable work surface.

Mounting the PIX 535

To mount the PIX 535 on a rack, perform the following steps:

Step 1   Attach the mounting brackets to the unit using the supplied screws.

Step 2   Attach the brackets to the holes near the front on both sides of the unit.

Step 3   Attach the unit to the equipment rack.

PIX 535 Network Interface Installation

Note   If your PIX security appliance model supports a failover configuration, complete the steps that follow only on the active (primary) unit.

To connect interfaces to the PIX 535, perform the following steps:

Step 1   Connect the cable so that you have either a DB-9 or DB-25 connector on one end as required by the serial port for your computer, and the other end is the RJ-45 connector.

Note   Use the Console port to connect to a computer to enter configuration commands. Locate the serial cable from the accessory kit. The serial cable assembly consists of a null modem cable with RJ-45 connectors, and one DB-9 connector and a DB-25 connector.

Step 2   Connect the cable to the PIX 535 RJ-45 Console connector port and connect the other end of the cable to the serial port connector on your computer.

Step 3   Connect the inside, outside, or perimeter network cables to the interface ports. Starting from the right and moving left, the connectors are Ethernet 0, Ethernet 1, Ethernet 2, and so forth. The maximum number of allowed interfaces is 8. The inside or outside network connections can be made to any available interface port on the PIX 535.

Note   If you have a second PIX security appliance to use as a failover unit, install the failover feature and cable as described in the "Installing Failover" section on page 7-8.

Caution   Do not power on the failover units until the active unit is configured.

Step 4   When you are ready to start the PIX 535, power on the unit from the switch at the rear of the unit.

PIX 535 Feature Licenses

If you have the PIX-535-UR unrestricted feature license, the following options are available:

- If you have a second PIX 535 to use as a failover unit, install the failover feature and cable as described in the "Installing Failover" section on page 7-8.

- If needed, install the PIX security appliance syslog server as described in the **logging** command page in the command reference online at:

    http://cisco.com/en/US/products/sw/secursw/ps2120/prod_command_reference_list.html

- If you need to install an optional circuit board, refer to the "Installing a Circuit Board in the PIX 535" section on page 7-14.

- If you need to install additional memory, refer to the "Installing a Memory Upgrade" section on page 7-11.

For information on upgrading feature licenses or downloading the latest software versions, refer to the configuration guide online at:

http://www.cisco.com/en/US/products/sw/secursw/ps2120/prod_configuration_guides_list.html.

This section includes the following topics:

VPN Accelerator Card, page 7-7

VPN Accelerator Card+, page 7-7

VPN Accelerator Card

The VPN Accelerator Card (VAC) for the Cisco PIX security appliance series is a card that provides high-performance, tunneling and encryption services suitable for site-to-site and remote access applications. The VAC is integrated with PIX 535 unrestricted (UR) and failover (FO) bundles. You can also purchase the VAC as a spare for use with PIX 535 units that have a restricted (R) license.

Note   Installing a VAC and an 82557 based FE card on the PIX 535 could result in a system hang.

VPN Accelerator Card+

The VAC+ is a 64-bit/66 MHz PCI card that provides faster tunneling and encryption services for Virtual Private Network (VPN) remote access, and site-to-site intranet and extranet applications, than the VAC. Each VAC+ occupies a single PCI slot in the system. The VAC+ is supported on any chassis that runs Version 6.3 software, has an appropriate license to run VPN software, and at least one PCI slot available. While the VAC continues to be supported in Version 6.3, if both types of cards, the VAC and the VAC+, are installed in a system running Version 6.3, the VAC card is ignored. The VAC+ runs at both 32-bit/33MHz and 64-bit/66 MHz, and does not slow down the bus when other 66 MHz cards are installed. We strongly recommend that you install the VAC+ in a 64bit/66 MHz slot. Performance is degraded if this recommendation is not followed.

The VAC+ driver supports the following:

- 3DES, DES, AES, SHA1, MD5 for (IPSec) ESP protocol (For AES, only the CBC mode and key sizes of 128, 192, and 256 bits are supported).

- SHA1, MD5 for the (IPSec) AH protocol.

- Load sharing ESP and AH activity between up to three VAC+.

- Diffie-Hellman public key and shared secret generation.

- Any other crypto-related activity uses a software implementation.

Installing Failover

To set up a failover connection, perform the following steps:

Step 1   Power off both the primary and secondary units.
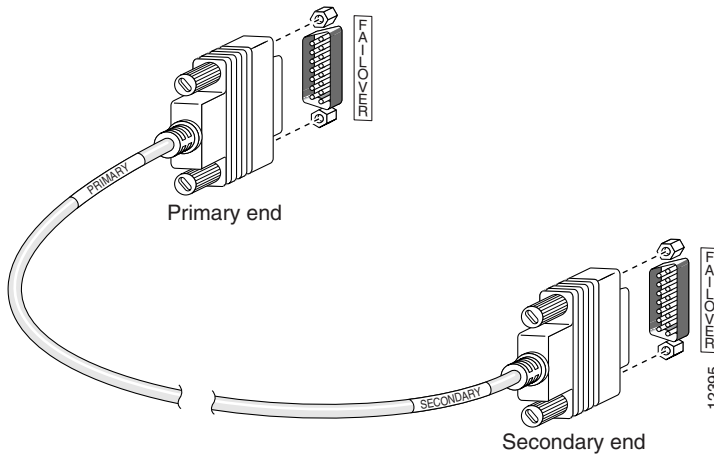
✏️

Note   Both chassis must be the same model number, have at least as much RAM, have the same Flash memory size, and be running the same software version. Note that the PIX-4FE and PIX-4FE-66 cards are considered equivalent and interchangeable. You can install a PIX-4FE in the primary unit and a PIX-4FE-66 in the secondary unit, as long as you install them in the same slot number of each chassis. For example, if you install a PIX-4FE in Slot 1 of the primary unit, you must also install the PIX-4FE-66 in Slot 1 of the secondary unit.

Step 2   Locate the failover cable (shown in Figure 7-5). This cable is shipped separately from the PIX security appliance. The cable is labeled "Primary" on one end and "Secondary" on the other.

Install the cable for the PIX 535 as shown in Figure 7-5.

Figure 7-5   PIX 535 Failover Cable Connection

Primary end

Secondary end

Step 3   Connect the Primary end of the failover cable to the first PIX security appliance, that is, the one you have already configured.

Step 4   Connect the Secondary end of the failover cable to the standby unit.

Step 5   Connect a power cord to the power connector on the rear panel of each unit, and the other end of each power cord to (preferably separate) power outlets.

Step 6   If you are using Stateful Failover, use one of the following types of connections, that is appropriate for your system, between the dedicated interfaces on the PIX security appliance:

*   Category 5 crossover cable directly connecting the primary unit to the secondary unit
*   100BaseTX full duplex on a dedicated switch or dedicated VLAN of a switch
*   1000BaseTX full duplex on a dedicated switch or dedicated VLAN of a switch

✏️

Note   For Stateful Failover on the PIX 535, you must use a Gigabit Ethernet (GE) failover link with GE interfaces.

⚠️

Caution   Do not turn the power on until the units are connected and the primary unit is configured completely.

Step 7   Power the primary unit on first, *then* power on the secondary unit. Within a few seconds, the active unit automatically downloads its configuration to the standby unit.

Step 7   If the primary unit fails, the secondary unit automatically becomes active.

✎

Note   All enabled interfaces must be connected between the active and standby units. Only configure the active unit. On the PIX 535, the active unit is indicated by the ACT LED on the front panel (see Figure 7-1).

Installing LAN-Based Failover

LAN-based failover supports failover between two units connected over a dedicated Ethernet interface. LAN-based failover eliminates the need for a special failover cable and overcomes the distance limitations imposed by the failover cable.

✎

Note   Both PIX security appliances must be the same model number, have the same amount of RAM, Flash memory, number and type of interfaces, and be running the same software version.

To set up a LAN-based failover connection, perform the following steps:

Step 1   Disconnect both PIX security appliance, so that there is no traffic flow between them. If the failover cable is connected to the PIX security appliance, disconnect it.

Step 2   Configure the PIX security appliance for LAN-based failover. Refer to the chapter on configuring LAN-based failover in the configuration guide online at:

http://www.cisco.com/en/US/products/sw/secursw/ps2120/prod_configuration_guides_list.html

Step 3   Power off both units.

Step 4   Connect the LAN failover interfaces to the dedicated switch/hub, as shown in Figure 7-6.

✎

Note   A dedicated LAN interface and a dedicated switch (or VLAN) is required to implement LAN-based failover. You cannot use a crossover Ethernet cable to connect the two PIX security appliances.

Figure 7-6   LAN-Based Failover Connections

Step 5   If you are using Stateful Failover, use one of the following types of connections, that is appropriate for your system, between the dedicated interfaces on the PIX security appliance:

- 100BaseTX full duplex on a dedicated switch or dedicated VLAN of a switch

- 1000BaseTX full duplex on a dedicated switch or dedicated VLAN of a switch

Note   For Stateful Failover on the PIX 535, you must use a Gigabit Ethernet (GE) failover link with GE interfaces.

Caution   Do not turn the power on until the units are connected and the primary unit is configured completely.

Step 6   Power the primary unit on first, *then* power on the secondary unit. Within a few seconds, the active unit automatically downloads its configuration to the standby unit.

If the primary unit fails, the secondary unit automatically becomes active.

Replacing a Lithium Battery

The PIX security appliance has a lithium battery on its main circuit board. This battery has an operating life of about ten years. When the battery loses its charge, the PIX security appliance cannot function. The lithium battery is not a field-replaceable unit (FRU). Contact Cisco TAC to replace the battery.

Note   Do not attempt to replace this battery yourself.

Warning   **Danger of explosion exists if the lithium battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.**

Installing a Memory Upgrade

The following statement applies to DC models only:

Warning   **Before performing any of the following procedures, ensure that power is removed from the DC circuit. To ensure that all power is OFF, locate the circuit breaker on the panel board that services the DC circuit, switch the circuit breaker to the OFF position, and tape the switch handle of the circuit breaker in the OFF position.**

The following statement applies to both AC and DC models:

Warning   **Before working on a system that has an On/Off switch, turn OFF the power and unplug the power cord.**

Caution   Running the PIX security appliance without the chassis cover causes the system to overheat and damages the electrical components. If you remove the chassis cover to perform a maintenance procedure, like installing additional memory, be sure to replace the cover after you have finished the procedure.

To install additional system memory, perform the following steps:

Step 1   Power off the security appliance.

Step 2   Remove all cables connected to the security appliance and unplug it from its power source.

Step 3   If the chassis is rack-mounted, remove it from the rack and set it on flat, stable surface.

Step 4   Unpack the items in the memory upgrade kit.

Step 5   Locate the grounding strap in the upgrade kit. Connect one end of the strap to an unpainted metal surface on the PIX security appliance chassis. Attach the other end to your wrist, making sure that it contacts your bare skin.

Step 6   At the rear panel of the chassis, loosen the attachment screws that hold the component tray in place and slide the tray out.

Step 7   Locate the system memory sockets (see Figure 7-7).

Populate memory Bank 0 first, then Bank 1. Memory sockets J40 and J43 comprise Bank 0; J41 and J44 comprise Bank 1. The PIX security appliance comes with 512 MB of RAM installed by default, so Bank 0 (J40 and J43) should be populated already. Install the additional 512 MB of RAM in Bank 1 (J41 and J44).

The memory DIMM pair that comprises a memory bank must be identical. Make sure that memory from the same vendor is placed together in the each memory bank (J40 and J43 in Bank 0 or J41 and J44 in Bank 1).

Figure 7-7   System Memory Location on the PIX 535 Component Tray
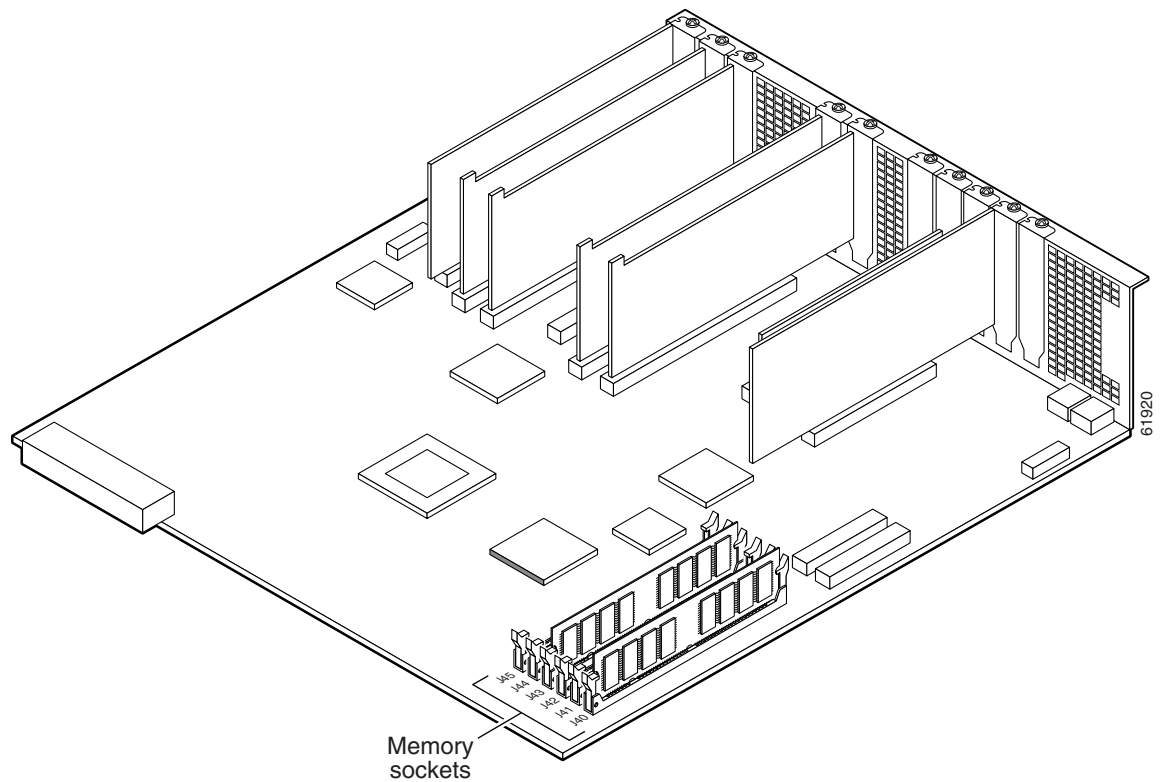
Step 8 Install the first DIMM strip in socket J41 and the second DIMM strip in socket J44, as shown in Figure 7-8 and Figure 7-9.

   a. Carefully grasp the DIMM strip from either end, being careful not to touch the components on the strip. Note that the DIMM strip is notched, which prevents it from being installed incorrectly. So, do not force installation.

   b. Open the two plastic wing connectors at the sides of the memory socket, insert the DIMM strip, and close the wing connectors to secure it in place.

Figure 7-8   Inserting a DIMM Memory Strip in the PIX 535
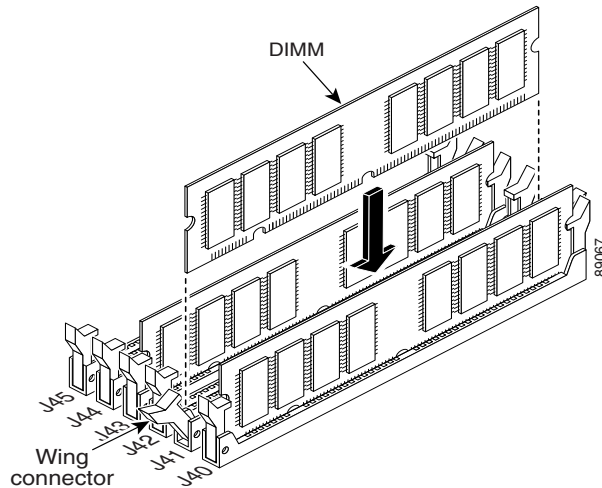
Figure 7-9   Securing a DIMM Memory Strip in the PIX 535
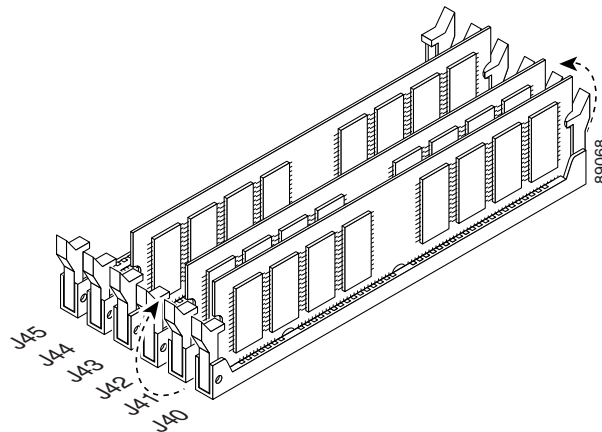
Step 9 Reinstall the component tray and the screws that hold the assembly in place.

Step 10 Remove the grounding wrist-strap.

Step 11 Rack-mount the chassis or place it on a flat, stable surface.

Step 12 Reconnect all cables to the security appliance and plug it into its power source.

Step 13 Power on the security appliance.

Note You can verify that the security appliance recognizes the new RAM memory that you installed by looking at the system startup messages or by entering the **show version** command.

Installing a Circuit Board in the PIX 535

The 4-port 64 bit/66 MHz FE card (PIX-4FE-66) is supported in software Versions 6.3, 6.2(2), 6.1(4), and 5.2(9), and later versions. These are the minimum software versions that support the card.

Note The PIX-4FE card continues to be supported but is no longer manufactured. The PIX-4FE and PIX-4FE-66 cards are considered equivalent and interchangeable. You can install a PIX-4FE in the primary unit and a PIX-4FE-66 in the secondary unit, as long as you install them in the same slot number of each chassis. For example, if you install a PIX-4FE in Slot 1 of the primary unit, you must also install the PIX-4FE-66 in Slot 1 of the secondary unit.

The new card has the following characteristics:

- Includes an Intel 21154BE bridge and four Intel 82559 Ethernet MAC/PHY devices.
- Supports 10/100 mbps full/half-duplex operation on each port.
- Retains bus performance when installed with other 66-MHz devices.
- Does not support auto MDI/MDIX operation.

This section includes the following topics:

- PIX 535 Circuit Board Options, page 7-14
- Circuit Board Slot Description, page 7-16
- Installing a Circuit Board, page 7-17
- 16 MB Flash Circuit Board, page 7-18
- VPN Accelerator Circuit Board, page 7-20
- Gigabit Ethernet Circuit Board, page 7-20

PIX 535 Circuit Board Options

Table 7-4 lists the optional circuit board combinations that are available for the PIX 535. The PIX 535 supports up to ten interfaces. A maximum of eight interfaces are available with a restricted license, and ten interfaces are available with an unrestricted license.

Note Table 7-4 applies only to PIX security appliance Version 6.1(1) and later. Earlier versions of PIX security appliance support fewer interface options.

Table 7-4   PIX 535 Interface Options

Restricted Interface Options	Unrestricted Interface Options
8 GE	9 GE
8 GE + 1 VPN Accelerator	8 GE + 1 FE
7 GE + 1 FE	8 GE + 1 VPN Accelerator
7 GE + 1 FE + 1 VPN Accelerator	7 GE + 2 FE
6 GE + 2 FE	7 GE + 1 FE + 1 VPN Accelerator
6 GE + 2 FE + 1 VPN Accelerator	6 GE + 3 FE
5 GE + 3 FE	6 GE + 2 FE + 1 VPN Accelerator
5 GE + 3 FE + 1 VPN Accelerator	5 GE + 4 FE
4 GE + 4 FE	5 GE + 3 FE + 1 VPN Accelerator
4 GE + 4 FE + 1 VPN Accelerator	5 GE + 1 FE + 1 4-port FE
3 GE + 5 FE	5 GE + 1 FE + 1 4-port FE + 1 VPN Accelerator
3 GE + 5 FE + 1 VPN Accelerator	4 GE + 5 FE
2 GE + 6 FE	4 GE + 4 FE + 1 VPN Accelerator
2 GE + 6 FE + 1 VPN Accelerator	4 GE + 2 FE + 1 4-port FE
2 GE + 2FE + 1 4-port FE	4 GE + 2 FE + 1 4-port FE + 1 VPN Accelerator
2 GE + 2FE + 1 4-port FE + 1 VPN Accelerator	3 GE + 6 FE
1 GE + 3 FE + 1 4-port FE	3 GE + 5 FE + 1 VPN Accelerator
1 GE + 3 FE + 1 4-port FE + 1 VPN Accelerator	3 GE + 1 4-port FE + 3 FE
8 FE	3 GE + 5 FE + 1 VPN Accelerator
8 FE + 1 VPN Accelerator	3 GE + 3 FE + 1 4-port FE
4 FE + 1 4-port	3 GE + 3 FE+ 1 4-port FE + 1 VPN Accelerator
4 FE + 1 4-port + 1 VPN Accelerator	2 GE + 2 4-port FE
2 4-port + 1 VPN Accelerator	2 GE + 2 4-port FE + 1 VPN Accelerator
	2 GE + 4 FE +1 4-port FE
	2 GE + 4 FE + 1 4-port FE + + 1 VPN Accelerator
	2 GE + 7 FE
	2 GE + 6 FE + 1 VPN Accelerator
	9 FE
	8 FE + 1 VPN Accelerator
	2 4-port FE + 2 FE
	2 4-port FE + 2 FE + 1 VPN Accelerator
	1 4-port FE card + 6 FE
	1 4-port FE card + 6 FE + 1 VPN Accelerator
	1GE + 1FE + 2 x 4FE cards

Circuit Board Slot Description

There are nine circuit board slots (see Figure 7-10) using three separate buses for the PIX 535.

Figure 7-10   PIX 535 Back Panel Detail
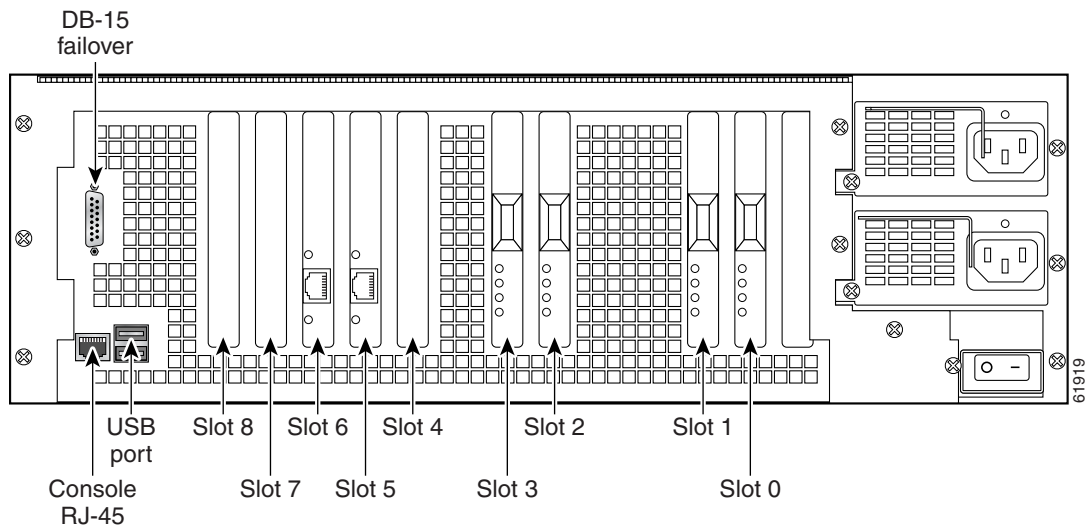
The slots and buses are configured as follows:

- Slots 0 and 1—64-bit/66 MHz Bus 0
- Slots 2 and 3—64-bit/66 MHz Bus 1
- Slots 4 to 8—32-bit/33 MHz Bus 2

For optimum performance and throughput for the interface circuit boards, you must use the following guidelines:

- A total of eight interface circuit boards are configurable with the restricted license and a total of ten are configurable with the unrestricted license.
- PIX-1GE-66 (66 MHz) circuit boards can be installed in any slot, but should be installed in the 64-bit/66 MHz Bus first. Up to eight PIX-1GE-66 circuit boards can be installed.
- The FE circuit board (33 MHz) can be installed in any bus or slot (32-bit/33 MHz or 64-bit/66 MHz). Up to eight single-port FE circuit boards or up to two four-port FE circuit boards can be installed.
  - The four-port FE circuit board should only be installed in the 32-bit/33 MHz Bus.

Note   The numbering of the FE circuit boards in monitor mode begins at the 32-bit slots; do not install any FE circuit boards in the 64-bit slots.

- Do not mix the 33 MHz circuit boards with the 66 MHz GE circuit boards on the same 64-bit/66 MHz bus (Bus 0 or Bus 1). The overall speed of the bus will be reduced by the lower speed circuit board.
- The VPN Accelerator circuit board should only be installed in the 32-bit/33 MHz Bus.

Installing a Circuit Board

Note   It is not necessary to remove the chassis cover on the PIX 535 to install or replace a circuit board. A component tray, that slides out from the rear panel, contains slots for installing circuit boards and memory boards.

To install a circuit board in the PIX 535, perform the following steps:

Step 1   Locate the grounding strap from the accessory kit. Fasten the grounding strap to your wrist so that it contacts your bare skin. Attach the other end to bare metal on the PIX 535 chassis.

Figure 7-11   The Component Tray at the Back of the PIX 535
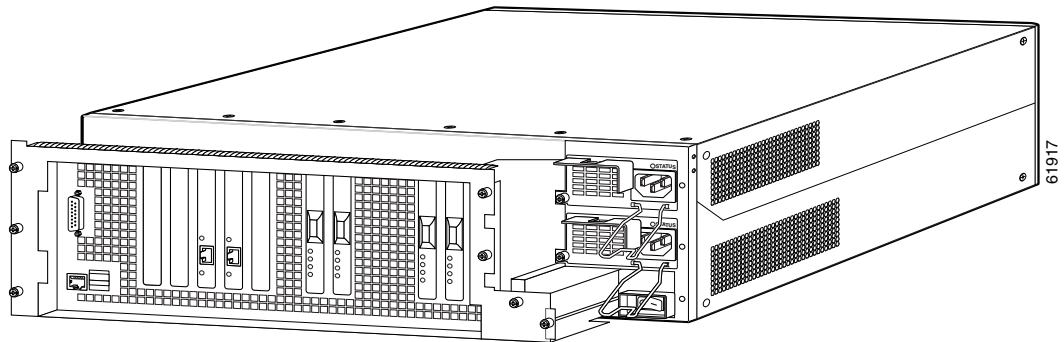
Step 2   Loosen the attachment screws from the rear panel of the component tray and slide the tray out.

Step 3   Select a slot for the circuit board and remove the screw and slot cover plate from the back panel on the component tray.

Step 4   Install the circuit board into the slot. The front plate on the circuit board should be against the slot opening on the component tray back panel.

Step 5   Use the screw that was removed in Step 3 to attach the circuit board front plate to the component tray rear panel.

Step 6   Reinstall the component tray and tighten the attachment screws.

Figure 7-12   4-Port Circuit Board Overlap
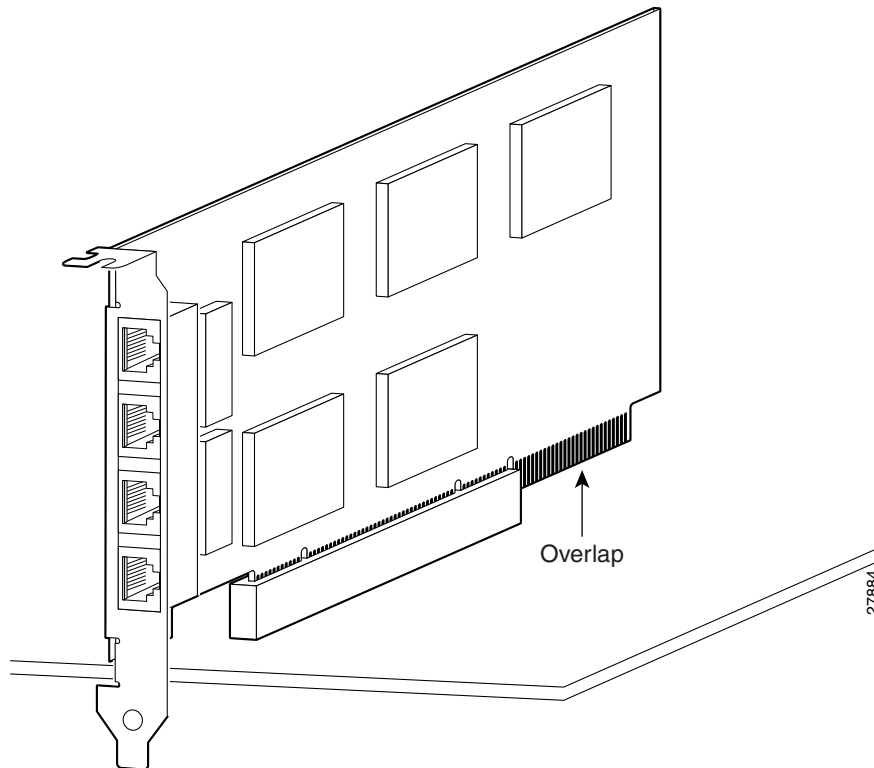
Overlap

27884

✎
Note   If you are installing a 4-port circuit board, note that the circuit board will overlap the slot
connector on the motherboard. This does not affect the use or operation of the circuit board.
Figure 7-12 illustrates how this appears.

16 MB Flash Circuit Board

Along with upgrading your Flash memory to 16 MB, the PIX security appliance 16 MB Flash circuit
board includes pre-installed PIX security appliance software and a UR (unrestricted) 56-bit DES
encryption license. The 16 MB Flash circuit board installs into the PIX security appliance ISA slot.

An illustration of the 16 MB Flash circuit board is shown in Figure 7-13.

Figure 7-13   16 MB Flash Circuit Board
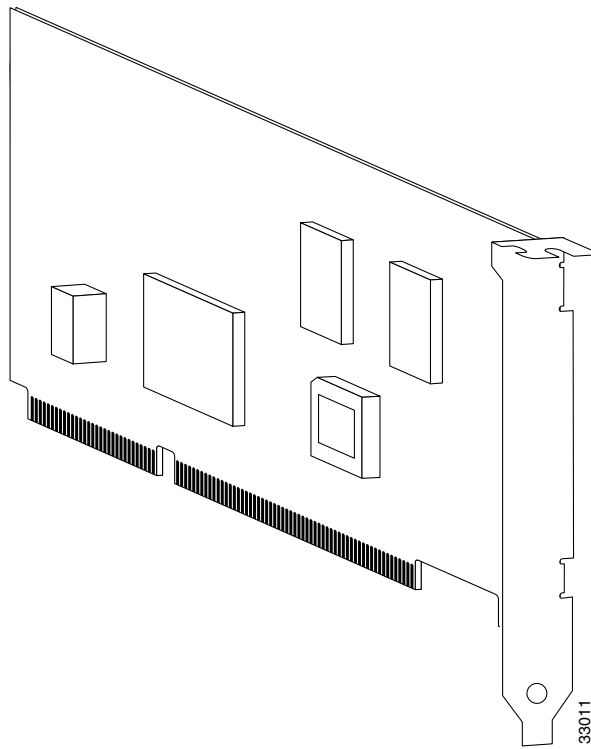
You must observe the following when installing a 16 MB Flash circuit board:

- The PIX security appliance must have a minimum of 32 MB of RAM memory.
- You must obtain a new activation key if you use 3DES.
- The PIX security appliance should not be downgraded to a software revision lower than 5.0(3) after the new software from the 16 MB circuit board is installed.
- If you downgrade from software Version 5.3 to 5.2 or lower, you will lose private data (keys, certifications, and CRLs) that are stored in Flash memory. You need to use the **clear flashfs** command, **downgrade 5.0 | 5.1 | 5.2** options if your PIX security appliance has 16 MB Flash memory, private data stored in the Flash memory, and you used the **ca save all** command to save these items in Flash memory.

To install the 16 MB Flash circuit board, perform the following steps:

Step 1   Record the present PIX security appliance serial number.

Step 2   Record the new serial number from the 16 MB Flash circuit board.

After installation, the serial number of the PIX security appliance becomes the serial number supplied with the 16 MB Flash circuit board.

Step 3   Create a backup of your present configuration (to use later to reconfigure your system).

Step 4   Obtain a new Activation key (if using 3DES).

Step 5   Remove any previously installed Flash memory circuit boards from the unit.

Step 6   The jumper on the PIX security appliance 16 MB Flash circuit board must not be removed or repositioned. The PIX security appliance system will not work if this jumper is moved.

Step 7   Install the 16 MB Flash circuit board into an available ISA slot in the PIX security appliance chassis.

VPN Accelerator Circuit Board

The VPN Accelerator (PIX-VPN-ACCEL) is an encryption and accelerator circuit board. The VPN Accelerator uses a PCI interface and therefore can only be installed in PIX security appliance platforms with PCI slots. The VPN Accelerator begins to function immediately after installation without the need of special installation configurations.

Note   The new VPN Accelerator cannot be used with the former PIX security appliance IPSec accelerator in the same chassis. The PIX security appliance IPSec accelerator was also known as the Private Link card.

An illustration of the VPN Accelerator is shown in Figure 7-14.

Figure 7-14   PIX Security Appliance VPN Accelerator Circuit Board
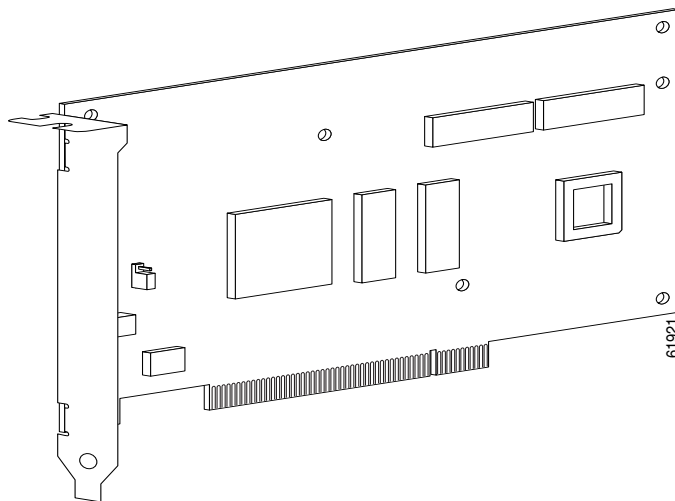
Gigabit Ethernet Circuit Board

PIX security appliance supports 1000 Mbps (Gigabit) Ethernet. The Gigabit Ethernet circuit board has only one hardware speed and supports the following duplex options:

- 1000SXfull—Forces full-duplex operation
- 1000BaseSX—Forces half-duplex operation
- 1000auto—Auto negotiates full or half duplex

Note You must use a GE failover link when connecting the PIX 535 with GE interfaces.

The Gigabit Ethernet circuit board and the fiber optic cable connection are shown in Figure 7-15.

Figure 7-15   Gigabit Ethernet Circuit Board
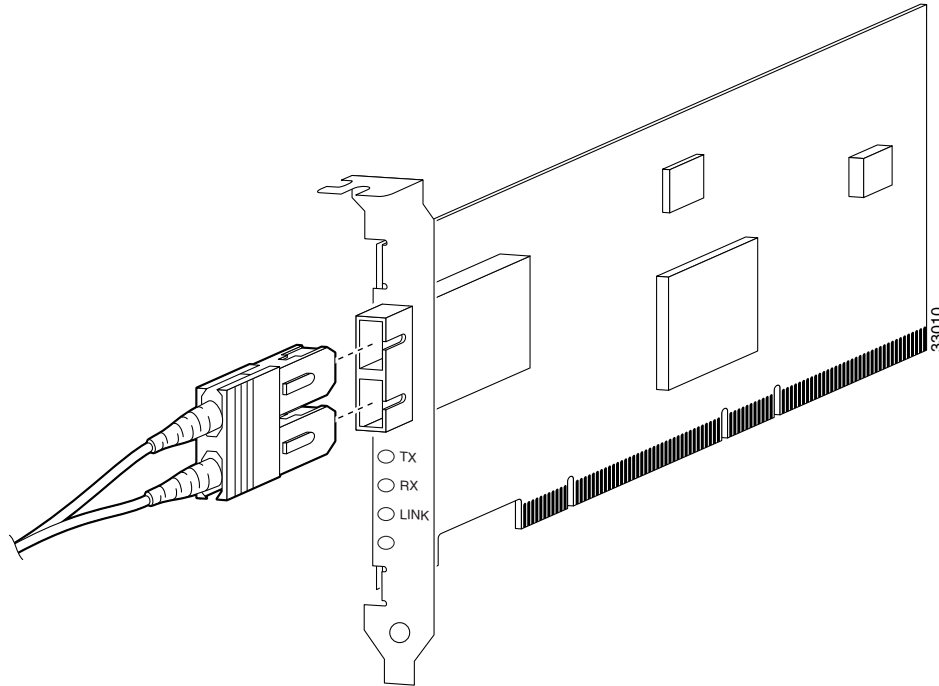
The Gigabit Ethernet circuit board has three LEDs:

- TX—Transmitting data
- RX—Receiving data
- LINK—The Gigabit Ethernet circuit board has established a network connection

Installing the PIX 535 DC Model

Warning **Before performing any of the following procedures, ensure that power is removed from the DC circuit. To ensure that all power is OFF, locate the circuit breaker on the panel board that services the DC circuit, switch the circuit breaker to the OFF position, and tape the switch handle of the circuit breaker in the OFF position.**

To install the PIX 535 DC power model, perform the following steps:

Step 1 Remove the blank cover plate, if a blank cover plate is installed on the PIX 535.

Step 2 Read the *Regulatory Compliance and Safety Information* document for your respective software version.

Step 3   Terminate the DC input wiring on a DC source capable of supplying at least 15 amps. A 15-amp circuit breaker is required at the -48 VDC facility power source. An easily accessible disconnect device should be incorporated into the facility wiring.

Step 4   Be sure the PIX 535 power is off by checking the power switch at the rear of the unit.

Step 5   As shown in Figure 7-16, the PIX 535 is equipped with two grounding holes at the back of the unit, which you can use to connect a two-hole grounding lug to the PIX 535. Use M3.5 x 7 mm thread-forming screws to connect a copper standard barrel grounding lug to the holes. The PIX 535 requires a grounding lug where the distance between the center of each hole is 0.56 inches. A grounding lug is not supplied with the PIX 535.

Figure 7-16   Attaching a Grounding Lug to the PIX 535 DC
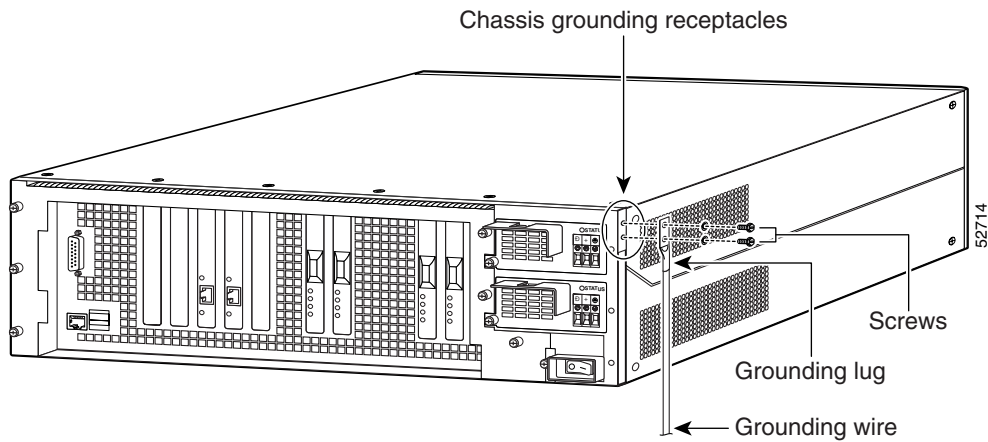
Step 6   Ensure that power is removed from the DC circuit. To ensure that all power is OFF, locate the circuit breaker on the panel board that services the DC circuit, switch the circuit breaker to the OFF position, and tape the switch handle of the circuit breaker in the OFF position.

Step 7   Strip the ends of the wires for insertion into the power connect lugs, located to the left of the power switch.

Step 8   Refer to Figure 7-17 and insert the ground wire into the connector for the earth ground and tighten the screw on the connector. Using the same method as for the ground wire, connect the negative wire and then the positive wire.

Figure 7-17   Attaching DC Power Cables
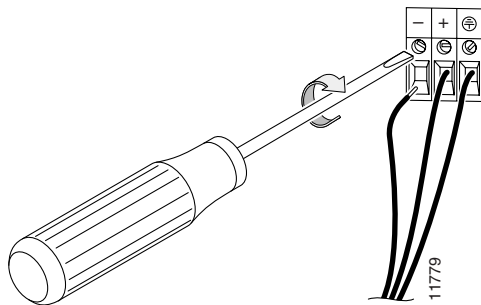
Step 9   Reconnect power to the PIX 535. After wiring the DC power supply, remove the tape from the circuit breaker switch handle and reinstate power by moving the handle of the circuit breaker to the ON position.

Step 10   If needed, install the interface boards as described in the "Installing a Circuit Board in the PIX 535" section on page 7-14.

Step 11   Power on the unit from the switch at the rear of the unit.

> **Note**   If you need to power cycle the DC PIX 535, wait at least 5 seconds between powering off the unit and powering it back on.

Your unit is now ready to configure. Refer to the configuration guide online at:

http://www.cisco.com/en/US/products/sw/secursw/ps2120/prod_configuration_guides_list.html.

Cable Pinouts

The appendix provides the following pinout information:

- 10BaseT and 100BaseTX Connectors, page A-1
- Console Port (RJ-45), page A-2
- RJ-45 to DB-9 or DB-25 Serial Cable, page A-4
- Failover Cable Pinouts, page A-4

10BaseT and 100BaseTX Connectors

The 10BaseT and 100BaseTX ports use standard RJ-45 connectors. The 10BaseT and 100BaseTX ports have their transmit (TD) and receive (RD) pairs internally crossed.

Figure A-1 shows the 10BaseT and the 100BaseTX connector (RJ-45).

Figure A-1   RJ-45 10BaseT and 100BaseTX Connector
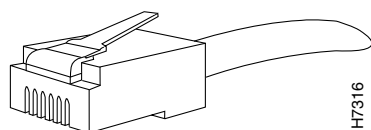
Table A-1 shows the connector pinout.

Table A-1   10BaseT and 100BaseTX Connector (RJ-45) Pinouts

Pin	Description
1	TX+
2	TX-
3	RX+
4	-
5	-
6	RX-
7	-
8	-

Console Port (RJ-45)

Cisco products use the following three types of RJ-45 cables:

- Straight-through

- Crossover

- Rolled

Note   Cisco does not provide these cables; they are widely available from other sources.

Figure A-2 shows the RJ 45 cable.

Figure A-2   RJ-45 Cable

87654321
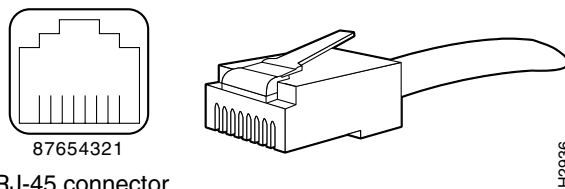
RJ-45 connector

To identify the RJ-45 cable type, hold the two ends of the cable next to each other so you can see the colored wires inside the ends, as shown in Figure A-3.

Figure A-3   RJ-45 Cable Identification
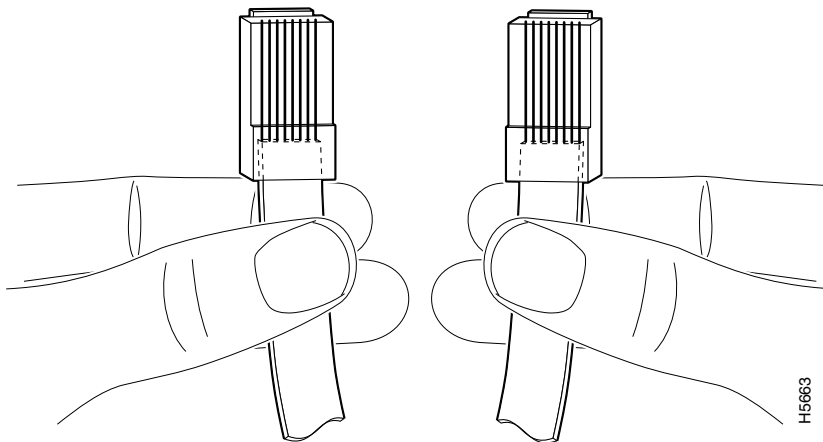
Examine the sequence of colored wires to determine the type of RJ-45 cable, as follows:

- Straight-through—The colored wires are in the same sequence at both ends of the cable (see Table A-2).

- Crossover—The first (far left) colored wire at one end of the cable is the third colored wire at the other end of the cable (see Table A-3).

- Rolled—The colored wires at one end of the cable are in the reverse sequence of the colored wires at the other end of the cable (see Table A-4).

Table A-2   RJ-45 Straight-Through (Ethernet) Cable Pinouts

Signal	Pin	Pin	Pin
TX+	1	1	TX+
TX-	2	2	TX-
RX+	3	3	RX+
-	4	4	-
-	5	5	-
RX-	6	6	RX-
-	7	7	-
-	8	8	-

Table A-3   RJ-45 Crossover (Ethernet) Cable Pinouts

Signal	Pin	Pin	Pin
TX+	1	3	RX+
TX-	2	6	RX-
RX+	3	1	TX+
-	4	4	-
-	5	5	-
RX-	6	2	TX-
-	7	7	-
-	8	8	-

Table A-4   RJ-45 Rolled (Console) Cable Pinouts

Signal	Pin	Pin	Pin
-	1	8	-
-	2	7	-
-	3	6	-
-	4	5	-
-	5	4	-
-	6	3	-

Table A-4   RJ-45 Rolled (Console) Cable Pinouts (continued)

Signal	Pin	Pin	Pin
-	7	2	-
-	8	1	-

RJ-45 to DB-9 or DB-25 Serial Cable

Table A-5 lists the cable pinouts for RJ-45 to DB-9 or DB-25.

Table A-5   Cable Pinouts for RJ-45 to DB-9 or DB-25

Signal	RJ-45 Pin	DB-9 Pin	DB-25 Pin
RTS	8	8	5
DTR	7	6	6
TxD	6	2	3
GND	5	5	7
GND	4	5	7
RxD	3	3	2
DSR	2	4	20
CTS	1	7	4

Failover Cable Pinouts

Figure A-4 shows the pinouts of a crossover cable, should you use this with the Stateful Failover dedicated interface.

Figure A-4   Stateful Failover Dedicated Interface Crossover Cable Pinouts
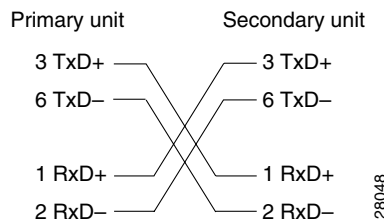
Should you need to test the cable you received, the pinouts are shown in Figure A-5.

Figure A-5   Failover Serial Cable Pinouts

```
Primary Side                                    Secondary Side
Power Detect          1 ─────────────── 10
Foreign Plug Detect   9 ─────────────── 14 ────┐
Rx Data               2 ─────────────── 3       │  Loopback
Power Source         10 ─────────────── 1       │  Inside
Tx Data               3 ─────────────── 2       │  Chassis
Local Plug Detect    11 ─┐                       │
Plug Driver           4 ─┴─────────────── 6 ────┘
Primary Select       12 ─┘               ┌─ 12 Secondary Select
Ground                5 ─────────────────┴─ 5
         Loopback  ┌─ 6 ──────────────── ┌─ 4
         Inside    │                      └─ 11
         Chassis   │                                        12069
                   └─ 14 ─────────────── 9
```

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