Installation Guide

HP J3138A

HP AdvanceStack Internet Router

HP Customer Support Services

How to get the latest software/agent firmware
You can download the file, J3138A.exe, from the HP BBS, HP FTP Library Service, CompuServe, and the World Wide Web. After you download the file, **extract** the file by typing: *filename* /x. For example, type J3138A.exe /x.

HP BBS
Set your modem to no parity, eight bits, 1 stop bit, set speed up to 14400 bps, and with your telecommunication program (e.g., Windows Terminal) dial (208) 344-1691 to get the latest software for your HP networking product.

HP FTP Library Service
1. FTP to Internet IP Address — ftp ftp.hp.com.
2. Log in as anonymous and press Return at the password prompt.
3. Enter bin to set the transfer type.
4. Enter cd /pub/networking/software.
5. Enter get *filename* to transfer the file to your computer, then quit.

CompuServe
1. Login to CompuServe.
2. Go to the "hp" service.
3. Select "HP Systems, Disks, Tapes, etc."
4. Select "Networking Products" library.
5. Download *filename* then quit.

World Wide Web
http://www.hp.com/go/network_city
Select the "Support" section.

From this web site, you can also download information on the HP Switching Hubs and HP AdvanceStack Assistant. If you have a growing network, download the *Designing HP AdvanceStack Workgroup Networks Guide* or call 1-800-752-0900 to receive a copy through mail.

(over for more services)

HEWLETT® PACKARD

Obtain the latest code (J3138A.exe) from

HP FTP Library: ftp ftp.hp.com

World Wide Web: http://www.hp.com/go/network_city

HP BBS: (208) 344-1691

(over)

HP NETWORK CONNECTIVITY

HP FIRST Fax Retrieval Service

HP FIRST is an automated fax retrieval service that is available 24 hours a day, seven days a week. HP FIRST provides information on the following topics:

- Product information
- Troubleshooting instructions
- Technical reviews and articles
- Configuration information

To access HP FIRST, dial one of the following phone numbers:

Location	Phone Number
U.S. and Canada Only	Dial 1 (800) 333-1917 with your fax machine or touch-tone phone and press 1.
Outside the U.S. and Canada	Dial 1 (208) 344-4809 from your fax machine and press 9.

To receive a list of currently available documents, enter document number 19941. The information you requested will be sent to you by return fax.

HP Network Phone-In Support (NPS)

In addition to the above services, the HP Network Phone-In Support (NPS) service provides expert technical assistance for U.S.A. customers through an NPS contract or at an hourly rate (1-800-790-5544) Monday through Friday, 5 am to 6 pm, Pacific Time. You may also contact your HP Authorized Reseller or the nearest HP Sales and Support Office to purchase an NPS contract.

CompuServe:	Go the the “hp” service. Select HP systems, etc. Select Networking Products. Download the file.
Network Phone-In Support (hourly):	1-800-790-5544

HP AdvanceStack Internet Router

Installation Guide

Publication Number

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Applicable Product

HP J3138A

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Hewlett-Packard assumes no responsibility for the use or reliability of its software on equipment that is not furnished by Hewlett-Packard.

Warranty

See the warranty card included with the product.

A copy of the specific warranty terms applicable to your Hewlett-Packard product and replacement parts can be obtained from your HP sales and service office or HP-authorized reseller.

Hewlett-Packard Company
8000 Foothills Boulevard, m/s 5551
Roseville, California 95747-5551
http://www.hp.com/go/network_city

Contents

HP AdvanceStack Internet Router Overview

The HP AdvanceStack Internet Router provides multiprotocol routing capability between WANs (Wide Area Networks) and LANs (Local Area Networks). This router module is designed to plug into the expansion slot of HP AdvanceStack 10Base-T Switching Hubs, the HP AdvanceStack Switch 208 and Switch 224, and the HP AdvanceStack 2C and Internet Router Module Bundle.

This router provides an easy to install, cost efficient and scalable connectivity solution for small offices needing access to the Internet or for remote offices requiring access to a central site, especially central sites equipped with Cisco Systems™ routers.

It is based on Cisco's 2503 hardware platform and includes all its hardware features except the PCMCIA support for Flash memory.

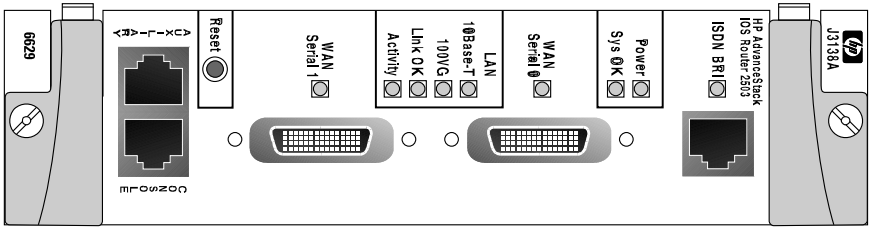


Figure 1-1. HP J3138A AdvanceStack Internet Router

Hardware Features

- Internal Ethernet, IEEE (Institute of Electrical and Electronics Engineers) 802.3 and 802.12 connection to an HP AdvanceStack host device
- Two high speed (T1/E1, i.e., 1.544 Mbps/2.048 Mbps) synchronous WAN ports with shielded DB-60 connectors. By connecting appropriate cables these WAN ports support the following standards in data terminal equipment (DTE) and data communications equipment (DCE) mode: EIA/TIA-232, EIA/TIA-449, V.35 and X.21 interfaces. EIA-530 standard is also supported in DTE mode only.
- One ISDN BRI port with S/T interface. The S/T interface can be used as the WAN link from the router. The S/T interface has a shielded RJ-45 connector. An external network terminal 1 (NT1) device is required to connect to the ISDN BRI line from the provider. (In Europe, it is already incorporated.)
- The ISDN BRI port supports speeds up to 128 Kbps. Data compression provided in the *Cisco IOS Desktop subset* will be included.
- One EIA/TIA-232 console port (up to 19200 bps, async only) with shielded RJ-45 connector, for local system access using a console terminal.
- One EIA/TIA-232 auxiliary port (up to 19200 bps, async only) with shielded RJ-45 connector, for remote system access using a modem.
- Main microprocessor, Motorola 68EC030-20 MHz
- 8 Mbytes of Flash memory SIMM
- 8 Mbytes of DRAM SIMM
- Stores all *Cisco IOS* software in Flash SIMM for reliability and convenient software updating over the network

Software Features

Based on Cisco IOS version 11.x. Cisco IOS Software Category — Desktop without IBM

- LAN support — IP, transparent bridging and translational bridging, concurrent routing and bridging, LAN extension host, GRE, Novell, IPX, AppleTalk 1 and 2, DECnet IV.
- WAN services — HDLC, PPP, X.25, Frame Relay, ISDN, SMDS, SW56, IPXWAN 2.0
- WAN Optimization —- Header, link and payload compression, dial-on-demand, dial backup, bandwidth-on-demand, custom and priority queuing, weighted fair queuing, snapshot routing.
- IP Routing — RIP, IGRP, Enhanced IGRP, OSPF, BGP, EGP, PIM, NHRP, policy-based routing
- Other Routing — IPX, RIP, NLSP, RTMP, AURP, SMRP
- Management — AutoInstall, SNMP, Telnet
- Security — Access lists, extended access lists, access security, TACACS+, MD5 routing authentication
- Remote Node — SLIP, PPP, CSLIP, CPPP, DHCP, IP pooling, async master interfaces, IPX and ARAP on virtual async interfaces, ARA 1.0/2.0, IPXCP, MacIP, ATCP
- Terminal services — Telnet, rlogin, X.25 PAD

NOTE

- PPP includes support for LAN protocols supported by the feature set, address negotiation, PAP and CHAP authentication, and PPP compression.
- X.25 includes switching.
- ISDN support includes calling line identification (ANI), X.25 over the B channel, ISDN subaddressing, and applicable WAN optimization features.
- ISDN Bandwidth-on-demand supports 2 B channel calls to the same destination.
- X.25 payload compression, Frame Relay payload compression will be first supported in subsequent Cisco IOS Software Release 11.0 software maintenance releases.
- Remote node and Terminal services have limited support on auxiliary ports

Ordering Information

Cables and Adapters

The HP AdvanceStack Router is accompanied with the following cables and adapters, refer to appendix A “Cable Specifications” for more details.

Console / Auxiliary Port kit which consists of the following items -

- RJ-45-to-RJ-45 roll-over-cable
- RJ-45-to-DB-9 female DTE adapter (labeled Terminal)
- RJ-45-to-DB-25 female DTE adapter (labeled Terminal)
- RJ-45-to-DB-25 male DCE adapter (labeled Modem)

The following WAN cables can be procured from HP, refer to appendix A “Cable Specifications” for more details.

- EIA/TIA-232 DTE (HP J3140A)
- EIA/TIA-449 DTE (HP J3141A)
- V.35 DTE (HP J3139A)
- X.21 DTE (HP J3142A)

The following WAN cables can be procured from Cisco Systems directly at the address given in the section “Cisco Systems Contact Information” later in this chapter. Refer to appendix A “Cable Specifications” for more details.

- EIA/TIA-232 DCE (CAB-232FC)
- EIA/TIA-449 DCE (CAB-449FC)
- V.35 DCE (CAB-V35FC)
- X.21 DCE (CAB-X21FC)
- EIA-530 DTE (CAB-530MC)

Documentation

The HP AdvanceStack Router is accompanied with a CD-ROM and an installation guide, which together contain all the documentation necessary to install, configure and operate the router. Printed versions of the CD-ROM contents as well as other documents referred to in this manual can be obtained directly from Cisco Systems, Inc. at the address given below.

Cisco Systems Contact Information

Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA

World Wide Web URL: *http://www.cisco.com*

Tel: 408-526-4000
800-553-NETS (6387)
Fax: 408-526-4100

Installing the HP AdvanceStack Internet Router

This chapter covers the hardware installation process for the HP AdvanceStack Internet Router. For details on configuring the HP AdvanceStack Internet Router refer to chapter 3 “Configuring the HP AdvanceStack Internet Router”.

Verifying Included Parts

The router module has the following components shipped with it:

- Console / Auxiliary Port kit which consists of the following items:
  - RJ-45-to-RJ-45 roll-over-cable
  - RJ-45-to-DB-9 female DTE adapter (labeled Terminal)
  - RJ-45-to-DB-25 female DTE adapter (labeled Terminal)
  - RJ-45-to-DB-25 male DCE adapter (labeled Modem)
- CD-ROM containing all documentation necessary to install, configure, and maintain the router.
- This manual: *HP AdvanceStack Router Module Installation Guide* (J3138A-90001)
- Warranty booklet
- Module Label envelope with Expansion Slot LEDs Label

Required Tools and Parts

The router installation requires some tools and parts that are not provided as standard equipment with the router. Following are the tools and parts required to install the router:

- Flat-blade screwdrivers: small, 3/16-inch (0.476 cm) and medium, 1/4-inch (0.625 cm); or Torx-10
- ESD-preventive wrist strap
- A cable for each LAN and WAN interface

In addition, you might need the following external equipment:

- CSU/DSU (Channel Service Unit / Data Service Unit)
- NT1 device for ISDN BRI WAN connections, if not supplied by your service provider. (In Europe, it is already incorporated.)
- Console terminal (an ASCII terminal or a PC running terminal emulation software) configured for 9600 baud, 8 data bits, no parity, and 2 stop bits. A terminal is required unless you are using the AutoInstall procedure. See the section “Connecting the Console Terminal and Modem” later in this chapter for instructions on connecting a console terminal.
- Modem for remote access (optional)

Preparing to Connect to a Network

When setting up your router, consider distance limitations and potential electromagnetic interference (EMI) as defined by the EIA.

WARNING

The serial, console, and auxiliary ports contain safety extra-low voltage (SELV) circuits. BRI circuits are treated like telephone-network voltage (TNV) circuits. Avoid connecting SELV circuits to TNV circuits.

ISDN Connections

Use a BRI cable to connect the router directly to an ISDN. (See table 2-1.)

WARNING

Network hazardous voltages are present in the BRI cable. If you detach the BRI cable, detach the end away from the router to avoid possible electric shock. Network hazardous voltages are also present on the system card in the area of the BRI port (RJ-45 connector), regardless of when power is turned OFF.

WARNING

The ISDN connection is regarded as a source of voltage that should be inaccessible to user contact. Do not attempt to tamper with or open any public telephone operator (PTO)-provided equipment or connection hardware. Any hardwired connection (other than by nonremovable, connect-one-time-only lug) must be made only by PTO staff or suitably trained engineers.

Table 2-1 lists the specifications for ISDN BRI Cables. Refer to the section "ISDN BRI Port and Cable Pinouts" in appendix A "Cable Specifications" for pinouts.

Table 2-1. ISDN BRI Cable Specifications (S/T Cable)

Specification	High-Capacitance Cable	Low-Capacitance Cable
Resistance (at 96kHz)	160 ohms/km	160 ohms/km
Capacitance (at 1 kHz)	120 nanoFarads/km	30 nanoFarads/km
Impedance (96 kHz)	75 ohms	150 ohms
Wire diameter	0.024 inch (0.6 mm)	0.024 inch (0.6 mm)
Distance limitation	32.8 feet (10 m)	32.8 feet (10 m)

Synchronous Serial Connections

Before you connect a device to the synchronous serial port, you will need to know the following:

- The type of device, DTE or DCE, you are connecting to the synchronous serial interface
- The type of connector, male or female, required to connect to the device.
- The signaling standard required by the device.

DTE or DCE

A device that communicates over a synchronous serial interface is either a DTE or DCE device. A DCE device provides a clock signal that paces the communications between the devices and the router. A DTE device does not provide a clock signal. DTE devices usually connect to DCE devices. The documentation that came with the device should indicate whether it is a DTE or DCE device. (Some devices have a jumper to select either mode.) If you cannot find the information in the documentation, refer to table 2-2 to help you select the proper device type.

Table 2-2. Typical DTE and DCE Devices

Device Type	Gender	Typical Devices
DTE	Male[1]	* Terminal * PC
DCE	Female[2]	* Modem * CSU/DSU[3] * Multiplexer

1. If pins protrude from the base of the connector, the connector is male.
2. If the connector has holes to accept pins, the connector is female.
3. Channel service unit/data service unit.

Signaling Standards Supported

The synchronous serial port supports the following signaling standards: EIA/TIA-232, EIA/TIA-449, V.35, X.21, and EIA-530. You can order a DB-60 shielded serial transition cable from HP that has the appropriate connector for the standard you specify. The router end of the shielded serial transition cable has a DB-60 connector, which connects to the DB-60 port on the rear panel of the router. The other end of the serial transition cable is available with the connector appropriate for the standard you specify. The documentation for the device you want to connect should indicate the standard used for that device. The synchronous serial port can be configured as DTE or DCE (except EIA-530, which is DTE only), depending on the attached cable. To order a shielded serial transition cable, refer to the section "Ordering Information" in chapter 1 "HP AdvanceStack Internet Router Overview" and appendix A "Cable Specifications".

NOTE

All serial ports configured as DTE require external clocking from a CSU/DSU or other DCE device.

Although attempting to manufacture your own serial cables is not recommended (because of the small size of the pins on the DB-60 serial connector), cable pinouts are provided in appendix A "Cable Specifications".

Distance Limitations

Serial signals can travel a limited distance at any given bit rate; generally, the slower the data rate, the greater the distance. All serial signals are subject to distance limits, beyond which a signal degrades significantly or is completely lost.

Table 2-3 lists the maximum speeds and distances for EIA/TIA-232 signals. This signalling standard supports unbalanced circuits at signal speeds up to 64 Kbps.

Table 2-3. EIA/TIA-232 Speed and Distance Limitations

Data Rate (Baud)	Distance (Feet)	Distance (Meters)
2400	200	60
4800	100	30
9600	50	15
19200	50	15
38400	50	15
64000	25	7.6

Balanced drivers allow EIA/TIA-449 signals to travel greater distances than the EIA/TIA-232 signals. Table 2-4 lists the maximum speeds and distances for EIA/TIA-449, which are also valid for V.35, X.21, and EIA-530 signals.

Table 2-4. EIA/TIA-449, V.35, X.21, and EIA-530 Speed and Distance Limitations

Data Rate (Baud)	Distance (Feet)	Distance (Meters)
2400	4100	1250
4800	2050	625
9600	1025	312
19200	513	156
38400	256	78
56000	102	31
154400 (T1)	50	15

CAUTION

The EIA/TIA-449 and V.35 interfaces support data rates up to 2.048 Mbps. Exceeding this maximum could result in loss of data and is not recommended.

Console and Auxiliary Port Considerations

All router models include an asynchronous serial console and auxiliary port. The console and auxiliary ports provide access to the router either locally (with a console terminal) or remotely (with a modem). This section discusses important cabling information to consider before connecting a console terminal (an ASCII terminal or PC running terminal emulation software) to the console port or modem to the auxiliary port.

The main difference between the console and auxiliary ports is that the auxiliary port supports hardware flow control and the console port does not. Flow control paces the transmission of data between sending device and a receiving device. Flow control ensures that the receiving device can absorb the data sent to it before the sending device sends more. When the buffers on the receiving device are full, a signal is sent to the sending device to suspend transmission until the data in the buffers has been processed. Because the auxiliary port supports flow control, it is ideally suited for use with the high-speed transmissions of a modem. Console terminals transmit at slower speeds than modems; therefore, the console port is ideally suited for use with console terminals.

Console Port Connections

The router includes an EIA/TIA-232 asynchronous serial console port (RJ-45). Depending on the cable and the adapter used, this port will appear as a DTE or DCE device at the end of the cable. Your router comes with cables and adapters to connect a console terminal (an ASCII terminal or PC running terminal emulation software) to the console port. To connect an ASCII terminal to the console port, use the RJ-45 roll-over cable with the female RJ-45-to-DB25 adapter (labeled Terminal). To connect a PC running terminal emulation software to the console port, use the RJ-45 roll-over cable with the female RJ-45-to-DB-9 adapter (labeled Terminal). The default parameters for the console port are 9600 baud, 8 data bits, no parity, and 2 stop bits. The console port does not support hardware flow control. For detailed information about installing a console terminal, see the section “Connecting the Console Terminal and Modem” later in this chapter. See appendix A “Cable Specifications” for cable and port pinouts.

Auxiliary Port Connections

The router includes an EIA/TIA-232 asynchronous serial auxiliary port (RJ-45) that supports flow control. Depending on the cable and the adapter used, this port will appear as a DTE or DCE device at the end of the cable. Your router includes a cable and an adapter to connect a modem to the auxiliary port. To connect a modem to the auxiliary port, use the RJ-45 roll-over cable with the male RJ-45-to-DB-25 adapter (labeled Modem). For detailed information about connecting devices to the auxiliary port, see the section “Connecting the Console Terminal and Modem” later in this chapter. See appendix A “Cable Specifications” for cable and port pinouts.

Installing the Module

The HP AdvanceStack Internet Router module can be installed in any HP AdvanceStack host device such as hubs or switches with an *Expansion Slot*. *Expansion Slot* is the official name for the slot in an HP AdvanceStack host device which can take an add-on module such as this router module.

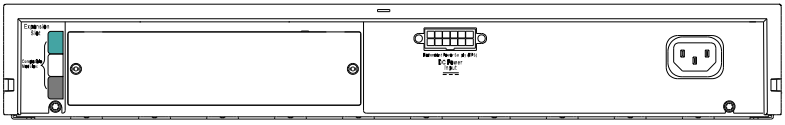
NOTE

Static electricity can severely damage sensitive electronic components on the router module. While handling the router module and installing it in the host device, follow these procedures to avoid damage from static electricity:

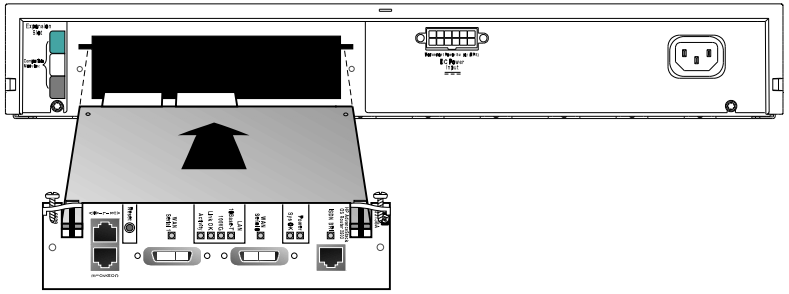
- Handle the module by its faceplate, and avoid touching the components and circuitry on the boards.
- Equalize any static charge difference between your body and the host device either by wearing a grounded wrist strap and attaching it to the host device chassis, or by frequently touching the host device chassis while you are installing the module.

To install the module into the host device, follow these steps:

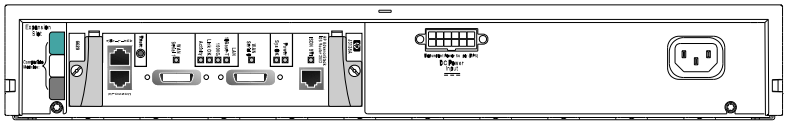
1. Turn off the power. Remove the Expansion Slot Cover Plate.



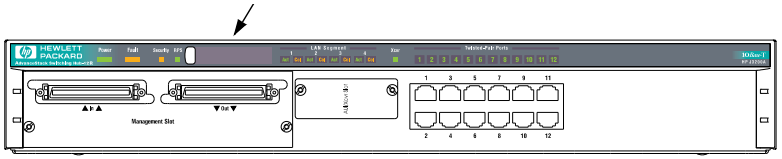
2. Insert the HP Internet Router module into the HP AdvanceStack host device.



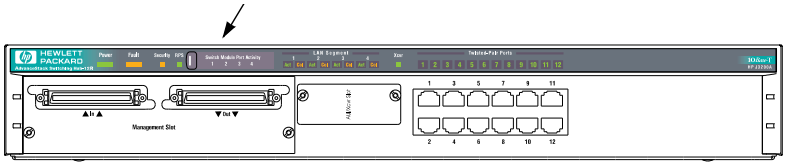
3. Lift the extractor handles up.



4. Tighten the two screws that hold it in place. *Be careful not to overtighten the screws.*
5. On the front of the host device, remove the blank label from the Expansion Slot LEDs.



6. Insert the router module label.



Connecting to the Network

This section explains how to connect the router to your network. The LAN connection is made automatically when the router is installed in the host device. The synchronous serial and ISDN ports are used to connect the router to a WAN.

NOTE

Not all the cables required to connect the router to a network are provided with the router. However, cables can be ordered from HP. For ordering information refer to the section “Ordering Information” in chapter 1 “HP AdvanceStack Internet Router Overview” and appendix A “Cable Specifications”.

WARNING

Do not work on the system or connect or disconnect cables during periods of lightning activity.

Connecting to a WAN

Take the following steps to connect the router to a WAN:

1. Use a serial transition cable to connect the synchronous serial port (DB-60) to a synchronous modem or CSU/DSU.

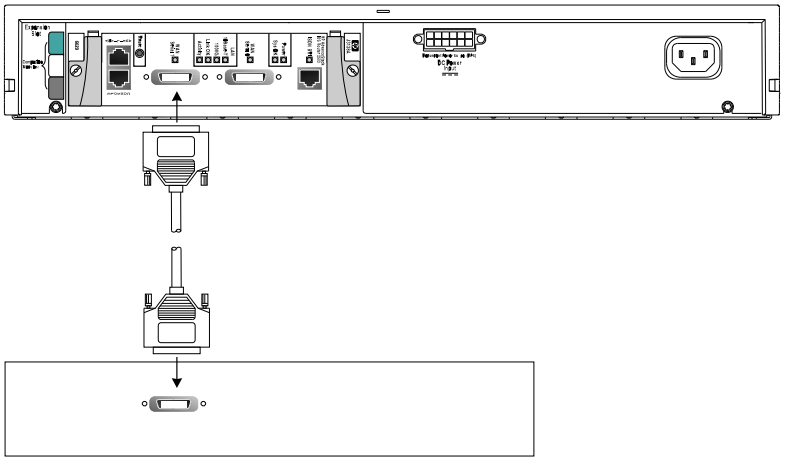


Figure 2-1. Connecting the Synchronous Serial Port to a Synchronous Modem.

2. Use a straight-through RJ-45-to-RJ45 cable to connect the ISDN BRI port (RJ-45) to an NT1 device.

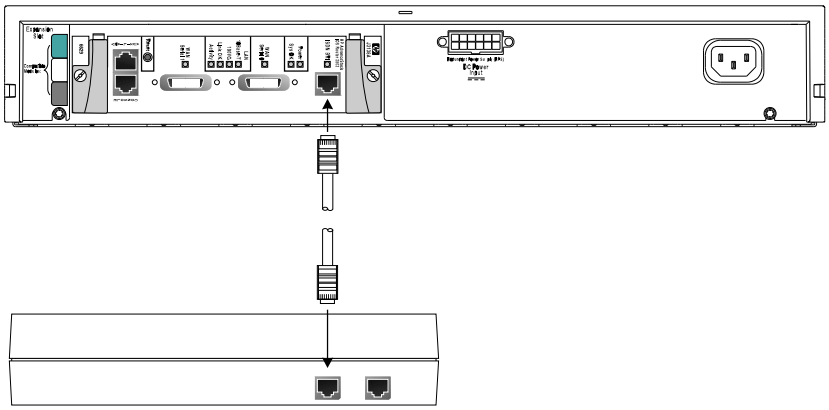


Figure 2-2. Connecting the ISDN BRI Port to an NT1 Device

Connecting the Console Terminal and Modem

Use a console terminal for local administrative access to the router. You can connect only a terminal to the console port. Use the auxiliary port with a terminal or a modem for remote access to the router.

Connecting to the Console Port

Take the following steps to connect a terminal (an ASCII terminal or a PC running terminal emulation software) to the console port on the router.

1. Use an RJ-45 roll-over cable and an RJ-45-to-DB-25 or RJ-45-to-DB-9 adapter to connect a console terminal to the console port. The adapters provided by HP are labeled “Terminal”.

   Additional information on roll-over cable pinouts is provided in the appendix A “Cable Specifications”.

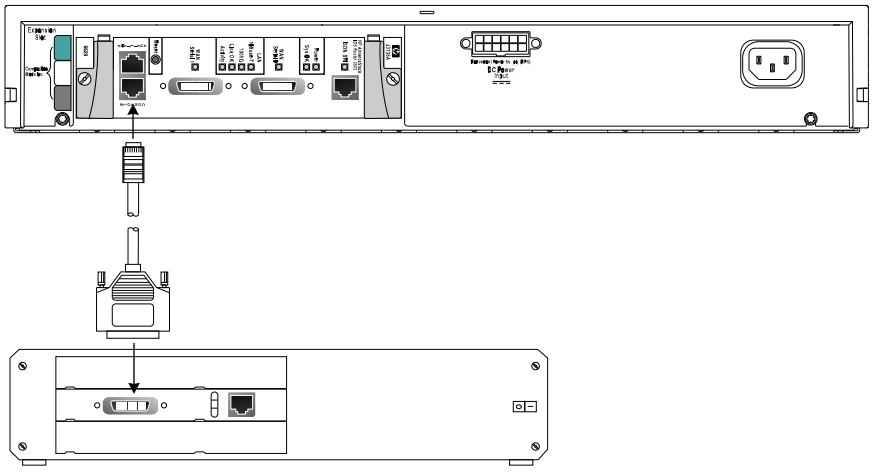


Figure 2-3. Connecting the Console Terminal

2. Configure your terminal or PC terminal emulation software for 9600 baud, 8 data bits, no parity, and 2 stop bits.

Connecting a Modem to the Auxiliary Port

Take the following steps to connect a modem to the auxiliary port on the router:

1. Use an RJ-45 roll-over cable with an RJ-45-to-DB-25 or RJ-45-to-DB-9 adapter to connect a modem to the auxiliary port. The adapters provided by HP are labeled “Modem”.

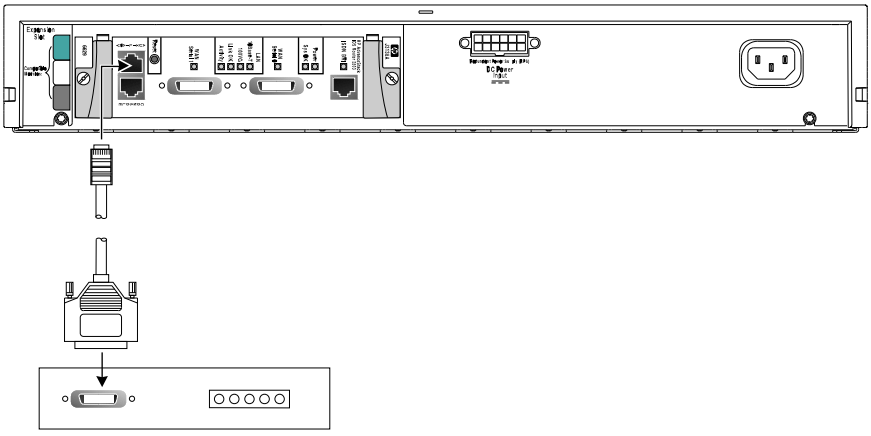


Figure 2-4. Connecting a Modem to the Auxiliary Port

2. Make sure that your modem and the auxiliary port on the router are configured for the same transmission speed (38400 baud is typical) and hardware flow control with Data Carrier Detect (DCD) and Data Terminal Ready (DTR) operations.

What to Do After Installing the Router Hardware

After you have installed the router, proceed to chapter 3 “Configuring the HP AdvanceStack Internet Router” for initial software configuration information.

Configuring the HP AdvanceStack Internet Router

This chapter describes how to configure the HP AdvanceStack Internet Router and contains the following sections:

- Booting the Router for the First Time
- Configuring the Router for the First Time
- Cisco IOS Software Basics
- Configuring ISDN
- Verifying Network Connectivity
- Getting More Information

This chapter provides minimum software configuration information; it is not meant as comprehensive router configuration instructions. Detailed software configuration information is available in the Cisco IOS configuration guide and command reference publications. These publications are available on the documentation CD that came with your router or you can order printed copies. Refer to the section "Ordering Information" in chapter 1 "HP AdvanceStack Internet Router Overview".

Booting the Router for the First Time

Each time you power on the router, it goes through the following boot sequence:

1. The router goes through power-on self-test diagnostics to verify basic operation of the CPU, memory, and interfaces.
2. The system bootstrap software (boot image) executes and searches for a valid Cisco IOS image (router operating system software). The source of the Cisco IOS image (Flash memory or a Trivial File Transfer Protocol [TFTP] server) is determined by the configuration register setting. The factory-default setting for the configuration register is 0x2102, which

indicates that the router should attempt to load a Cisco IOS image from Flash memory. Use the "show version" command at the privileged EXEC prompt to show the setting.

3. If after five attempts a valid Cisco IOS image is not found in Flash memory, the router reverts to boot ROM mode (which is used to install or upgrade a Cisco IOS image).
4. If a valid Cisco IOS image is found, then the router searches for a valid configuration file.
5. If a valid configuration file is not found in NVRAM, the router runs the System Configuration Dialog so you can configure it manually. For normal router operation, there must be a valid Cisco IOS image in Flash memory and a configuration file in NVRAM.

The first time you boot your router, you will need to configure the router interfaces and then save the configuration to a file in NVRAM.

Configuring the Router for the First Time

You can configure the router using one of the following procedures, which are described in this section:

- System Configuration Dialog—Recommended if you are not familiar with Cisco IOS commands.
- Configuration mode—Recommended if you are familiar with Cisco IOS commands.
- AutoInstall—Recommended for automatic installation if another router running Cisco IOS software is installed on the network. This configuration method must be set up by someone with experience using Cisco IOS software.

NOTE Acquire the correct network addresses from your system administrator or consult your network plan to determine the correct addresses before you begin to configure the router.

Proceed with the procedure that best fits the needs of your network configuration and Cisco IOS software experience level. If you will be using configuration mode or AutoInstall to configure the router, and you would like a quick

review of the Cisco IOS software, refer to the section “Cisco IOS Software Basics” later in this chapter. Otherwise, proceed with the next section “Using the System Configuration Dialog”.

Using the System Configuration Dialog

If you do not plan to use AutoInstall, make sure all the WAN cables are disconnected from the router. This will prevent the router from attempting to run the AutoInstall process. The router will attempt to run AutoInstall whenever you power it ON if there is a WAN connection on both ends and the router does not have a configuration file stored in NVRAM. It can take several minutes for the router to determine that AutoInstall is not connected to a remote TCP/IP host.

If your router does not have a configuration (setup) file and you are not using AutoInstall, the router will automatically start the setup command facility. An interactive dialog called the System Configuration Dialog appears on the console screen. This dialog helps you navigate through the configuration process by prompting you for the configuration information necessary for the router to operate.

Many prompts in the System Configuration Dialog include default answers, which are included in square brackets following the question. To accept a default answer, press **Return**; otherwise, enter your response.

This section gives an example configuration using the System Configuration Dialog. When you are configuring your router, respond as appropriate for your network.

At any time during the System Configuration Dialog, you can request help by typing a question mark (?) at a prompt.

Before proceeding with the System Configuration Dialog, obtain from your system administrator the node addresses and the number of bits in the subnet field (if applicable) of the router ports.

Take the following steps to configure the router using the System Configuration Dialog:

1. Connect a console terminal to the console port on the rear panel of your router, and then turn on the power ON on the host device. Note that the router may also be installed in a host device with the power already on. (For more information, refer to the section “Connecting the Console Terminal and Modem” in chapter 2 “Installing the HP AdvanceStack Internet Router”.)

NOTE The default parameters for the console port are 9600 baud, 8 data bits, no parity, and 2 stop bits.

2. After about 30 seconds, information similar to the following is displayed on the console screen.

NOTE The messages displayed vary, depending on the interfaces on the rear panel of the router and the Cisco IOS release and feature set you selected. The screen displays in this section are for reference only and may not exactly reflect the screen displays on your console.

```
System Bootstrap, Version X.X(XXXX) [XXXXX XX], RELEASE SOFTWARE
Copyright (c) 1986-199X by Cisco Systems
2500 processor with 4096 Kbytes of main memory

Notice: NVRAM invalid, possibly due to write erase.

F3: 5797928+162396+258800 at 0x3000060

                Restricted Rights Legend

Use, duplication, or disclosure by the Government is
subject to restrictions as set forth in subparagraph
(c) of the Commercial Computer Software - Restricted
Rights clause at FAR sec. 52.227-19 and subparagraph
(c) (1) (ii) of the Rights in Technical Data and Computer
Software clause at DFARS sec. 252.227-7013.

           Cisco Systems, Inc.
           170 West Tasman Drive
           San Jose, California 95134-1706


Cisco Internetwork Operating System Software
IOS (tm) X000 Software (XXX-X-X), Version XX.X(XXXX) [XXXXX XXX]
Copyright (c) 1986-199X by Cisco Systems, Inc.
Compiled Fri 20-Oct-9X 16:02 by XXXXX
Image text-base: 0x03030FC0, data-base: 0x00001000
HP J3138A Router (68030) processor (revision L) with 4092K/2048K
bytes of memory.
Processor board ID 00000000
Bridging software.
SuperLAT software copyright 1990 by Meridian Technology Corp).
X.25 software, Version X.X, NET2, BFE and GOSIP compliant.
TN3270 Emulation software (copyright 1994 by TGV Inc).
Basic Rate ISDN software, Version X.X.
X Ethernet/IEEE 802.3 interface.
2 Serial network interfaces.
```

```
1 ISDN Basic Rate interface.
32K bytes of non-volatile configuration memory.
8192K bytes of processor board System flash (Read ONLY)

Notice: NVRAM invalid, possibly due to write erase.
         --- System Configuration Dialog ---

At any point you may enter a question mark '?' for help.
Refer to the 'Getting Started' Guide for additional help.
Use ctrl-c to abort configuration dialog at any prompt.
Default settings are in square brackets '[]'.
Would you like to enter the initial configuration dialog? [yes]:
```

3. Press **Return** or enter **yes** to begin the configuration process.
4. When the System Configuration Dialog asks whether you want to view the current interface summary, press **Return** or enter **yes**:

```
First, would you like to see the current interface summary? [yes]:

Any interface listed with OK? value "NO" does not have a valid
configuration
```

Interface*	**IP-Address**	**OK?**	**Method**	**Status**	**Protocol**
Ethernet0	unassigned	NO	not set	up	down
BRI0	unassigned	NO	not set	up	up
Serial0	unassigned	NO	not set	down	down
Serial1	unassigned	NO	not set	down	down

```
*If you are attached to a VG device, you will see the speficiation
for VG0
```

5. Configure the global parameters. A typical configuration follows:

```
Configuring global parameters:

  Enter host name [Router]:
```

Next, you are prompted to enter an enable secret password. There are two types of privileged-level passwords:

- Enable secret password (a very secure, encrypted password)
- Enable password (a less secure, nonencrypted password)

The enable password is used when the enable secret password does not exist.

For maximum security, be sure the passwords are different. If you enter the same password for both, the router will not accept your entry.

6. Enter an enable secret password:

```
The enable secret is a one-way cryptographic secret used
instead of the enable password when it exists.

Enter enable secret: pail

The enable password is used when there is no enable secret
and when using older software and some boot images.
```

7. Enter the enable and virtual terminal passwords:

```
Enter enable password: shovel
Enter virtual terminal password: vterm1
```

8. Press **Return** to accept Simple Network Management Protocol (SNMP) management, or enter **no** to refuse it:

```
Configure SNMP Network Management? [yes]: no
```

9. In the following example, the router is configured for AppleTalk, Internet Protocol (IP), and Internetwork Packet Exchange (IPX). Configure the appropriate protocols for your router:

```
Configure Vines? [no]:
Configure LAT? [no]:
Configure AppleTalk? [no]: yes
  Multizone networks? [no]: yes
Configure DECnet? [no]:
Configure IP? [yes]:
  Configure IGRP routing? [yes]:
  Your IGRP autonomous system number [1]: 15
Configure CLNS? [no]:
Configure bridging? [no]:
Configure IPX? [no]: yes
Configure XNS? [no]:
Configure Apollo? [no]:
```

10. Next, to configure the ISDN BRI port, enter the ISDN BRI switch type. The switch type appropriate for the router depends on the ISDN service provider's equipment. Table 3-1 lists the ISDN switch types.

```
Enter ISDN BRI Switch Type [none]: basic-5ess
```

Table 3-1. ISDN Switch Type

Country	ISDN Switch Type	Description
Australia	basic-ts013	Australian TS013 switches
Europe	basic-1tr6	German 1TR6 ISDN switches
	basic-nwnet3	Norwegian NET3 ISDN switches (phase 1)
	basic-net3	NET3 ISDN switches (UK and others)
	vn2	French VN2 ISDN switches
	vn3	French VN3 ISDN switches
Japan	ntt	Japanese NTT ISDN switches
New Zealand	basic-nznet3	New Zealand NET3 switches
North America	basic-5ess	AT&T basic rate switches
	basic-dms100	NT DMS-100 basic rate switches
	basic-ni1	National ISDN-1 switches

Configuring the ISDN BRI Interface

This section describes how to configure the ISDN BRI interface.

The ISDN BRI interface is configured to allow connection to ISDN WANs. Determine which protocols to support on the ISDN BRI interface and enter the appropriate responses. In the following example, the system is configured for IP, AppleTalk, and IPX:

```
Configuring interface BRI0:
Is this interface in use? [yes]
Configure IP on this interface? [yes]
IP address for this interface: 172.16.71.1
Number of bits in subnet field [0]: 8
Class B network is 172.16.0.0, 8 subnet bits; mask is
    255.255.255.0
  Configure AppleTalk on this interface? [no]: yes
    Extended AppleTalk network? [no]: yes
    AppleTalk starting cable range [0]: 1
    AppleTalk ending cable range [1]: 2
    AppleTalk zone name [myzone]:
    AppleTalk additional zone name: otherzone
    AppleTalk additional zone name:
  Configure IPX on this interface? [no]: yes
    IPX network number [1]: B000
```

After you have completed the entire initial router configuration using the System Configuration Dialog, proceed to the section "Configuring ISDN" later in this chapter for additional ISDN configuration information.

Configuring Ethernet or VG Interfaces

It is necessary to decide and configure the network protocols you want to support on the LAN interface.

1. Press **Return** to configure the LAN interface:

```
Configuring interface Ethernet0:
  (or VG0 depending on what device the router module has been
   attached to)

Is this interface in use? [yes]:
```

2. Determine which protocols you want to support on the LAN interface and enter the appropriate responses. In the following example, the system is configured for IP, AppleTalk, and IPX:

```
Configure IP on this interface? [yes]:
  IP address for this interface: 172.16.72.1
  Number of bits in subnet field [8]: 8
  Class B network is 172.16.0.0, 8 subnet bits; mask is
  255.255.255.0
Configure AppleTalk on this interface? [no]: yes
  Extended AppleTalk network? [no]: yes
  AppleTalk starting cable range [0]: 3
  AppleTalk ending cable range [1]: 3
  AppleTalk zone name [myzone]:
  AppleTalk additional zone name: otherzone
  AppleTalk additional zone name:
Configure IPX on this interface? [no]: yes
  IPX network number [1]: B001
```

NOTE If you configure for Ethernet and the router module is plugged into a VG device, you must reconfigure the router module for VG to operate properly.

Configuring the Synchronous Serial Interfaces

The synchronous serial interfaces are configured to allow connection to WANs. After the Ethernet port on your router has been configured, take the following steps to configure the synchronous serial interfaces:

1. Press **Return** or enter **yes** to configure serial port 0:

```
Configuring interface Serial0:
Is this interface in use? [yes]:
```

2. Determine which protocols you want on the synchronous serial interface and enter the appropriate responses. In the following example, the system is configured for IP, AppleTalk, and IPX:

```
Configure IP on this interface? [yes]:
Configure IP unnumbered on this interface? [no]:
  IP address for this interface: 172.16.73.1
  Number of bits in subnet field [8]:
  Class B network is 172.16.0.0, 8 subnet bits; mask is
  255.255.255.0
Configure AppleTalk on this interface? [no]: yes
  Extended AppleTalk network? [yes]:
  AppleTalk starting cable range [2]: 4
  AppleTalk ending cable range [3]: 4
  AppleTalk zone name [myzone]: ZZ Serial
  AppleTalk additional zone name:
Configure IPX on this interface? [no]: yes
  IPX network number [2]: B002
```

3. Configure the second synchronous serial interface, for example, as follows:

```
Configuring interface Serial1:
  Is this interface in use? [yes]:
  Configure IP on this interface? [yes]:
  Configure IP unnumbered on this interface? [no]:
    IP address for this interface: 172.16.74.2
    Number of bits in subnet field [8]:
    Class B network is 172.16.0.0, 8 subnet bits; mask is
    255.255.255.0
  Configure AppleTalk on this interface? [no]: yes
    AppleTalk starting cable range [3]: 5
    AppleTalk ending cable range [4]: 5
    AppleTalk zone name [myzone]: ZZ Serial
    AppleTalk additional zone name:
  Configure IPX on this interface? [no]: yes
    IPX network number [3]: B003
```

4. The configuration you entered is now displayed and you are asked if you want to use the displayed configuration. If you enter **no**, you will lose the configuration information you just entered and you can begin the configuration again. If you enter **yes**, the configuration will be entered and saved in the startup configuration:

```
Use this configuration? [yes/no]: yes
Building configuration...
Use the enabled mode 'configure' command to modify this configuration.

Press RETURN to get started!
```

Proceed to the section “Cisco IOS Software Basics” for more information about the Cisco IOS software.

Using Configuration Mode

You can configure the router manually if you do not want to use AutoInstall or the prompt-driven System Configuration Dialog. Take the following steps to configure the router manually:

1. Connect a console terminal following the instructions in the section “Connecting the Console Terminal and Modem” in chapter 2 “Installing the HP AdvanceStack Internet Router”, and then turn the power ON on the host device. (Note that the router may also be installed in a host device with the power already on.)
2. When you are prompted to enter the initial dialog, enter **no** to go into the normal operating mode of the router:

   ```
   Would you like to enter the initial dialog? [yes]: no
   ```

3. After a few seconds you will see the user EXEC prompt (Router>). Enter the **enable** command to enter privileged EXEC mode. You can only make configuration changes in privileged EXEC mode:

   ```
   Router> enable
   ```

   The prompt changes to the privileged EXEC prompt:

   ```
   Router#
   ```

4. Enter the **configure terminal** command at the privileged EXEC prompt to enter configuration mode:

   ```
   Router# configure terminal
   ```

   You can now enter any changes you want to the configuration. You will probably want to perform the following tasks:

   - Assign a host name for the router using the **hostname** command.
   - Enter an enable secret password using the **enable password** command.
   - Assign addresses to the interfaces using the *protocol* **address** command.
   - Specify which protocols to support on the interfaces.

Refer to the Cisco IOS configuration guide and command reference publications for more information about the commands you can use to configure the router. To verify the configuration entries, use the "write terminal" command at the privileged EXEC prompt.

5. When you are finished configuring the router, enter the **exit** command until you return to the privileged EXEC prompt (Router#).
6. To save the configuration changes to NVRAM, enter the **copy running-config startup-config** command at the privileged EXEC prompt.

```
Router# copy running-config startup-config
********
```

The router will now boot with the configuration you entered.

Using AutoInstall

The AutoInstall process is designed to configure the router automatically after connection to your WAN. In order for AutoInstall to work properly, a Transmission Control Protocol/Internet Protocol (TCP/IP) host on your network must be preconfigured to provide the required configuration files. The TCP/IP host may exist anywhere on the network as long as the following two conditions are maintained:

1. The host must be on the remote side of the router's synchronous serial connection to the WAN.
2. User Datagram Protocol (UDP) broadcasts to and from the router and the TCP/IP host must be enabled.

This functionality is coordinated by your system administrator at the site where the TCP/IP host is located. You should not attempt to use AutoInstall unless the required files have been provided on the TCP/IP host. For more information, refer to the Cisco IOS configuration guide and command reference publications.

Take the following steps to prepare your router for the AutoInstall process:

1. Attach the WAN cable to the router.
2. Power ON or Reset the router.
3. The router will load the operating system image from Flash memory. If the remote end of the WAN connection is connected and properly configured, the AutoInstall process will begin.

4. If AutoInstall completes successfully, enter the **copy running-config startup-config** command in privileged EXEC mode to write the configuration data to the router's NVRAM:

```
Router# copy running-config startup-config
```

   Taking this step saves the configuration settings that the AutoInstall process created to the router's NVRAM. If you do not do this, the configuration will be lost the next time you reload the router.

Cisco IOS Software Basics

This section provides you with some basic information about the Cisco IOS software and includes the following sections:

- Cisco IOS Modes of Operation
- Getting Context-Sensitive Help
- Saving Configuration Changes

Cisco IOS Modes of Operation

The Cisco IOS software provides access to several different command modes. Each command mode provides a different group of related commands.

For security purposes, the Cisco IOS software provides two levels of access to commands: user and privileged. The unprivileged user mode is called user EXEC mode. The privileged mode is called privileged EXEC mode and requires a password. The commands available in user EXEC mode are a subset of the commands available in privileged EXEC mode.

Table 3-2 describes some of the most commonly used modes, how to enter the modes, and the resulting prompts. The prompt helps you identify which mode you are in and, therefore, which commands are available to you.

Table 3-2. Cisco IOS Operating Modes

Mode of Operation	Usage	How to Enter the Mode	Prompt
User EXEC	User EXEC commands allow you to connect to remote devices, change terminal settings on a temporary basis, perform basic tests, and list system information. The EXEC commands available at the user level are a subset of those available at the privileged level.	Log in.	Router>
Privileged EXEC	Privileged EXEC commands set operating parameters. The privileged command set includes those commands contained in user EXEC mode, and also the **configure** command through which you can access the remaining command modes. Privileged EXEC mode also includes high-level testing commands, such as **debug**.	From user EXEC mode, enter the **enable** EXEC command.	Router#
Global configuration	Global configuration commands apply to features that affect the system as a whole.	From global configuration mode, enter the **configure** privileged EXEC command.	Router(config)#
Interface configuration	Interface configuration commands modify the operation of an interface such as an Ethernet, ISDN, or serial port. Many features are enabled on a per-interface basis. Interface configuration commands always follow an interface global configuration command, which defines the interface type.	From global configuration mode, enter the **interface** *type number* command. For example, enter the **interface serial 0** command to configure the serial 0 interface.	Router(config-if)#
ROM monitor	ROM monitor commands are used to perform low-level diagnostics. You can also use the ROM monitor commands to recover from a system failure and stop the boot process in a specific operating environment.[a]	From privileged EXEC mode, enter the **reload** EXEC command or reset/power-cycle the router. Press Break during the first 60 seconds while the system is booting.	>

a. You can modify the configuration register value using the **config-reg** configuration command. Refer to the Cisco IOS configuration guide for more information.

Almost every configuration command also has a "no" form. In general, use the "no" form to disable a feature or function. Use the command without the keyword **"no"** to reenable a disabled feature or to enable a feature that is disabled by default. For example, IP routing is enabled by default. To disable IP routing, enter the **no ip routing** command and enter **ip routing** to reenable it. The Cisco IOS software command reference publication provides the complete syntax for the configuration commands and describes what the no form of a command does. Note that you cannot override or modify a parameter of an existing command. It must first be deleted and then use "no" form.

Getting Context-Sensitive Help

In any command mode, you can get a list of available commands by entering a question mark (?).

```
Router> ?
```

To obtain a list of commands that begin with a particular character sequence, type in those characters followed immediately by the question mark (?). Do not include a space. This form of help is called word help, because it completes a word for you.

```
Router# co?
configure  connect  copy
```

To list keywords or arguments, enter a question mark in place of a keyword or argument. Include a space before the question mark. This form of help is called command syntax help because it reminds you which keywords or arguments are applicable based on the command, keywords, and arguments you have already entered.

```
Router# configure ?
  memory    Configure from NV memory
  network   Configure from a TFTP network host
  terminal  Configure from the terminal
  <cr>
```

You can also abbreviate commands and keywords by entering just enough characters to make the command unique from other commands. For example, you can abbreviate the **show** command to **sh**.

Saving Configuration Changes

Any time you make changes to the router configuration, you must save the changes to memory because if you do not they will be lost if there is a system reload or power outage. There are two types of configuration files: the running (current operating) configuration and the startup configuration. The running configuration is stored in RAM; the startup configuration is stored in NVRAM.

To display the current running configuration, enter the **show running-config** command. Enter the **copy running-config startup-config** command to save the current running configuration to the startup configuration file in NVRAM.

```
Router> enable
Router# copy running-config startup-config
```

To display the startup configuration, enter the **show startup-config** command. Enter the **copy startup-config running-config** command to write the startup configuration to the running configuration:

```
Router> enable
Router# copy startup-config running-config
```

To erase both configuration files (and start over), enter the **write erase** and **reload** commands:

```
Router> enable
Router# write erase
Router# reload
```

CAUTION

This command sequence will erase the entire router configuration in RAM and NVRAM and reload the router.

Configuring ISDN

This section describes a recommended ISDN configuration for one or two B channels. In the examples that follow, the BRI port is configured for IP routing, Challenge Handshake Authentication Protocol (CHAP), and Point-to-Point Protocol (PPP) encapsulation.

For your reference, an example configuration follows in the next section, “Example ISDN Configuration”. You may want to refer to Example ISDN Configuration during this procedure.

Take the following steps to configure the router for a basic ISDN PPP connection on a single B channel or two B channels, substituting the correct addresses and host names as appropriate for your network:

1. Enter privileged EXEC mode:

```
Router> enable
password: enablepassword
```

2. Enter the **configure terminal** command to enter global configuration mode. Then enter the host name of the current router, the user name of the target router (the router to which packets will be sent), and the password that the routers will use for CHAP caller identification. The user name and password are case sensitive and must match the host name and password of the target router (even if it is not a Cisco router):

```
Router# configure terminal
Router (config)# hostname currentrouter
Router (config)# username targetrouter password abc
```

3. Enter the **isdn switch-type** command to configure the ISDN switch type (such as basic-5ess, basic-dms100, or basic-ni1). Refer to 3-1, earlier in this chapter, for a list of ISDN switch types supported.

```
Router (config)# isdn switch-type switch-type
```

4. Configure the IP address and subnet mask for the LAN interface:

```
Router (config)# interface type port_number
Router (config-if)# ip address ipaddress subnetmask
```

5. Configure the IP address and subnet mask for the BRI interface:

```
Router (config-if)# interface bri port_number
Router (config-if)# ip address ipaddress subnetmask
```

6. If you are using an ISDN switch type (such as Basic NI1 or DMS-100) that requires a service profile identifier (SPID), enter the SPID and optional local directory number (LDN). The SPID and LDN are assigned by the ISDN service provider.

   The SPID is a number that identifies the service to which you have subscribed. A SPID is not required for AT&T 5ESS service configured for a point-to-point connection.

   The LDN is an optional seven-digit phone number for the channel.

```
Router (config-if)# isdn spid1 SPID_no [LDN]
Router (config-if)# isdn spid2 SPID_no [LDN]
```

7. Configure the router for PPP encapsulation and CHAP authentication:

```
Router (config-if)# encapsulation ppp
Router (config-if)# ppp authentication chap
```

8. Enter the **load-threshold** or **ppp multilink** command to set up a second B channel.

   For bandwidth on demand, enter the **load-threshold** command to set the ISDN load threshold. The load threshold determines the percentage of network load at which the second ISDN B channel is activated. The value ranges from 1 to 255 (100 percent). In the following example, the value of 128 means that when the first B channel reaches 50 percent of its bandwidth capacity (128 equals 50 percent of 255), the second B channel will activate to assist with the bandwidth load:

```
Router (config-if)# dialer load-threshold 128
```

   Alternatively, you can use Multilink PPP to activate a second ISDN line. For Multilink PPP to work, the router must be running Cisco IOS Release 11.0(3) or a later release (cannot be a non-IOS HP router), and both the current router and target router must support Multilink PPP:

```
Router (config-if)# ppp multilink
```

9. Enter the **dialer map** command to provide the information necessary to successfully route packets to the target router. Do not use periods or hyphens when entering the number to dial:

```
Router (config-if)# dialer map protocol targetBRIport_ipaddress name
targetrouter_number
```

10. Enter the **dialer-group** command to specify the number of the group permitted to access the router:

```
Router (config-if)# dialer-group groupnumber
```

11. Enter the **exit** command to exit interface configuration mode.

12. Enter the **dialer list** command to specify the groups and protocols permitted to access the router:

    ```
    Router (config)# dialer-list groupnumber protocol protocol_type
    permit
    ```

13. Configure a static route to allow connection to the target router's LAN. Enter the IP address and subnet mask of the target router's LAN interface, and the IP address of the target router's BRI port:

    ```
    Router (config)# ip route targetrouter_ipnetwork subnetmask
    targetBRIport_ipaddress
    ```

14. Enter the **exit** command to exit global configuration mode.
15. Enter the **copy running-config startup-config** command to save the configuration to NVRAM.

Example ISDN Configuration

For your reference, table 3-3 shows an example configuration for two Cisco routers using IP over ISDN. In the example, the current router (branch1) is at a remote site and the target router (main1) is at a central site.

Table 3-3. Example ISDN Configuration

Configuration for the Current Router	Configuration for the Target Router
Router> **enable** password: **pail1** Router# **config term** Router (config)# **hostname branch1** branch1 (config)# **username main1 password secret1** branch1 (config)# **isdn switch-type basic-dms100** branch1 (config)# **interface Ethernet 0** branch1 (config-if)# **ip address 172.16.80.170 255.255.255.0** branch1 (config-if)# **interface bri 0** branch1 (config-if)# **ip address no shutdown 172.16.71.1 255.255.255.0** branch1 (config-if)# **isdn spid1 415988488501 9884885** branch1 (config-if)# **isdn spid2 415988488602 9884886** branch1 (config-if)# **dialer load-threshold 128** branch1 (config-if)# **ppp multilink** branch1 (config-if)# **encapsulation ppp** branch1 (config-if)# **ppp authentication chap** branch1 (config-if)# **dialer map ip 172.16.71.2 name main1 9884883** branch1 (config-if)# **dialer group 1** no shutdown branch1 (config-if)# **exit** branch1 (config)# **dialer-list 1 protocol ip permit** branch1 (config)# **ip route 172.16.0.0 255.255.0.0 172.16.71.2** branch1 (config)# **ip route 0.0.0.0 172.16.71.2** branch1 (config)# **exit** branch1# **copy running-config startup-config** branch1#	Router> **enable** password: **pail2** Router# **config term** Router (config)# **hostname main1** main1 (config)# **username branch1 password secret1** main1 (config)# **isdn switch-type basic-dms100** main1 (config)# **interface Ethernet 0** main1 (config-if)# **ip address 172.16.64.190 255.255.255.0** no shutdown main1 (config-if)# **interface bri 0** main1 (config-if)# **ip address 172.16.71.2 255.255.255.0** main1 (config-if)# **isdn spid1 415988488201 9884882** main1 (config-if)# **isdn spid2 415988488302 9884883** main1 (config-if)# **dialer load-threshold 128** main1 (config-if)# **ppp multilink** main1 (config-if)# **encapsulation ppp** main1 (config-if)# **ppp authentication chap** main1 (config-if)# **dialer map ip 172.16.71.1 name branch1 9884885** main1 (config-if)# **dialer group 1** no shutdown main1 (config-if)# **exit** main1 (config)# **dialer-list 1 protocol ip permit** main1 (config)# **ip route 172.16.80.0 255.255.0.0 172.16.71.1** main1 (config)# **exit** main1# **copy running-config startup-config** main1#

Verifying Network Connectivity

After you have installed and configured the router, you can use the following commands in user EXEC mode to verify network connectivity:

- **telnet**—Logs in to a remote node
- **ping**—Sends a special datagram to the destination device, then waits for a reply datagram from that device
- **trace**—Discovers the routes that packets take when traveling from one router to another

If there is a problem with network connectivity, refer to the section“Reading the LEDs” in chapter 4 “Maintaining the HP AdvanceStack Internet Router” and check the cable connections. If there is still a problem, check the router configuration.

Getting More Information

For more information about router software configuration, refer to the Cisco IOS configuration guide and command reference publications. These publications are available on the documentation CD that accompanied your router or you can order printed copies. Refer to the section “Ordering Information” in chapter 1 “HP AdvanceStack Internet Router Overview” for ordering information.

Maintaining the HP AdvanceStack Internet Router

This chapter contains information about maintenance procedures you might need to perform on your router as your internetworking needs change.

This chapter includes the following sections:

- Reading the LEDs
- Upgrading the Boot ROMs
- Recovering Lost Passwords
- Virtual Configuration Register Settings
- Copying a Cisco IOS Image to Flash Memory

Reading the LEDs

The LEDs indicate the current operating condition of the router. You can observe the LEDs, note any fault condition that the router is encountering, and then contact your system administrator or HP customer service, if necessary.

There are two sets of LEDs for the HP AdvanceStack Router.

- A set of the four LEDs on the front panel of the host device.
- A set of LEDs on the front panel of the HP AdvanceStack Internet Router.

Table 4-1 describes the LEDs which are located on the front panel of the host device.

Table 4-1. LEDs on the Host Device Front Panel

LED	State	Description
WAN 1 Activity	Off	Inactivity on the synchronous serial port 1. If you are sure some data activity is going on this port, check the serial 1 cable connection.
	On/Flashing	Transmitting/Receiving data on the synchronous serial port 1.
WAN 0 Activity	Off	Inactivity on the synchronous serial port 0. If you are sure some data activity is going on this port, check the serial 0 cable connection.
	On/Flashing	Transmitting/Receiving data on the synchronous serial port 0.
BRI Activity	Off	Inactivity on the ISDN BRI port. If you are sure some data activity is going on this port, check the BRI cable connection.
	On/Flashing	Transmitting/Receiving data on the ISDN BRI port.
LAN Activity	Off	Inactivity on the LAN Ethernet port. If you are sure some data activity is going on this port, check the Ethernet cable connection that goes into the front of the host device.
	On/Flashing	Transmitting/Receiving data on the LAN Ethernet port.

NOTE Although the "Fault" orange LED on the host device front panel is not for this HP AdvanceStack Internet Router only, the fault condition of the router is OR'ed with the fault condition from other devices in the host and the host itself. Therefore it is necessary to check all devices in the host device, including this HP J3138A Internet Router, if the "Fault" orange LED on the host device front panel is flashing.

Table 4-2 describes the LEDs, which are located on the front panel of the HP AdvanceStack Internet Router.

Table 4-2. LEDs on the HP AdvanceStack Internet Router Front Panel

LED	State	Description
ISDN BRI	Off	Inactivity on the ISDN BRI port. If you are sure some data activity is going on this port, check the BRI cable connection.
	On/Flashing	Transmitting/Receiving data on the ISDN BRI port.
Power	Off	Power if off.
	On	Power is on.
Sys OK	Off	An error has occurred. Reset the router. If the LED remains off, contact HP customer service.
	On	The router is working properly.
WAN Serial 0	Off	Inactivity on the synchronous serial port 0. If you are sure some data activity is going on this port, check the serial 0 cable connection.
	On/Flashing	Transmitting/Receiving data on the synchronous serial port 0.
LAN 10Base-T	On	The router is connected to a 10Base-T network.
100VG	On	The router is connected to a 100VG network.
Link OK	On	10Base-T Link Beat signal has been detected on the Ethernet (IEEE 802.3) LAN.
Activity	Off	Inactivity on the LAN Ethernet port. If you are sure some data activity is going on this port, check the Ethernet cable connection that goes into the front of the host device.
	On/Flashing	Transmitting/Receiving data on the LAN Ethernet port.
WAN Serial 1	Off	Inactivity on the synchronous serial port 1. If you are sure some data activity is going on this port, check the serial 1 cable connection.
	On/Flashing	Transmitting/Receiving data on the synchronous serial port 1.

NOTE If the router comes out of reset, yet both 10Base-T and 100VG LEDs are on or that they are both off, an error has occurred. Contact HP customer service.

For troubleshooting information, refer to the *System Error Messages* and *Debug Command Reference* publications of Cisco Systems, found on the CD-ROM accompanying the router. You can also access "Technical Assistance" at the World Wide Web URL *http://www.cisco.com* (Cisco Connection Online) for a list of frequently asked questions and other technical tips.

Upgrading the Boot ROMs

The Boot ROMs are not user upgradeable. Please contact your nearest HP field service representative for further information.

Recovering Lost Passwords

This section explains how to recover the following types of passwords:

- An enable secret password (a very secure, encrypted password)—Available on routers running Cisco IOS Release 10.3(2) or later.
- An enable password (a less secure, nonencrypted password)—Used when the enable secret password does not exist.
- A console password—Prevents unauthorized users from attempting to change the router configuration. When a console password is set, you must provide a password to log in to the console and access user EXEC mode.

The key to recovering a lost enable password is to set the configuration register so that the contents of NVRAM are ignored (0x142), which allows you to see the password. The enable secret password is encrypted and cannot be recovered; it must be replaced. The enable and console passwords might be encrypted or clear text.

Take the following steps to recover a lost password:

1. Plan for about one-half hour of system downtime. The password recovery procedure requires a system reload.
2. Connect a terminal to the console port on the rear panel of the router. Make sure the terminal is configured to operate at 9600 baud, 8 data bits, no parity, and 2 stop bits.

3. Enter the **show version** command to display the existing configuration register value. The configuration register value is on the last line of the display. Note whether the configuration register is set to enable or disable Break.
4. The factory-default configuration register value is 0x2102. Notice that the third digit from the right in 0x2102 is 1, which disables Break. If the third digit is *not* 1, Break is enabled.
5. If the configuration register is set to disable Break, power cycle the router or press the reset button on the router's front panel. (Turn the router OFF, wait five seconds, and then turn the router ON again.) Within 60 seconds of turning ON the router, press the Break key or send a Break signal. The ROM monitor prompt (>) appears.
6. If the configuration register is set to enable Break, press the Break key or send a Break signal to the router.

NOTE

If your keyboard does not have a Break key, refer to your terminal or terminal emulation software documentation for information about how to send a Break signal to the router.

7. Enter the **o/r** command to reset the configuration register to boot from the boot ROMs and ignore NVRAM:

```
> o/r 0x142
```

8. Enter the **initialize** command to initialize the router:

```
> initialize
```

9. The router power cycles and the configuration register is set to 0x142. The router boots the system image in Flash memory and the System Configuration Dialog appears:

```
--- System Configuration Dialog ---
```

10. Enter **no** in response to the System Configuration Dialog prompts until the following message appears:

```
Press RETURN to get started!
```

11. Press **Return**.

12. Enter privileged EXEC mode and then enter the **show startup-config** command to display the passwords in the configuration file:

```
Router> enable
Router# show startup-config
```

13. Scan the configuration file displayed for the passwords (the enable and enable secret passwords are usually near the beginning of the file and the console password is near the end of the file). An example display follows:

```
enable secret 5 $1$ORPP$s9syZt4uKn3SnpuLDrhuei
enable password sand
.
.
line con 0
password seashells
```

Proceed to step 14 to replace an enable secret, console, or enable password. If there is no enable secret password, note the enable and console passwords, if they are not encrypted, and proceed to step 17.

CAUTION

Do not take the next three steps unless you have determined that you must change or replace the enable, enable secret, or console passwords. Failure to follow the steps as shown might cause you to erase your router configuration.

14. Enter the **configure memory** command to modify or replace passwords in NVRAM:

```
Router# configure memory
```

15. Enter the **configure terminal** command to enter configuration mode:

```
Router# configure terminal
```

16. Change only the passwords that are necessary for your configuration. The following example shows how to change all three types of passwords. The first two lines show how to change the enable secret and enable passwords. The last two lines show how to change the console password:

```
Router(config)# enable secret pail
Router(config)# enable password shovel
Router(config)# line con 0
Router(config-line)# password con1
```

For maximum security, be sure the enable secret and enable passwords are different.

You can remove individual passwords by using the **no** form of these commands. For example, enter the **no enable secret** command to remove the enable secret password.

17. Configure all interfaces to be administratively up. In the following example, the Ethernet 0 port is configured to be administratively up:

```
Router(config-line)# interface ethernet 0
Router(config-if)# no shutdown
```

    Enter the equivalent commands for all interfaces that were originally configured.

18. Set the configuration register to the original value you noted in step 3 or the factory-default value (0x2102). The following example shows how to set the configuration register to the factory-default value:

```
Router(config-if)# config-register 0x2102
Router(config)#
```

19. Press **Ctrl-Z** to exit configuration mode.

CAUTION

Do not take the next three steps unless you have changed or replaced a password or you might erase your router configuration. If you did not change or replace a password, proceed to step 23 and log in.

20. Enter the **copy running-config startup-config** command to save the new configuration to NVRAM. This command copies the changes you just made to the running configuration to the startup configuration. The following message appears:

```
Router# copy running-config startup-config
Building configuration...
[OK]
Router#
```

21. Reboot the router:

```
Router# reload
Proceed with reload? [confirm]
```

22. Press **Return** to confirm. When the router reboots it will use the new configuration register value you set in step 18.
23. Log in to the router with the new or recovered passwords.

Virtual Configuration Register Settings

The router has a 16-bit virtual configuration register, which is written into NVRAM. You might want to change the virtual configuration register settings for the following reasons:

- Set and display the configuration register value
- Force the system into the ROM monitor or boot ROM
- Select a boot source and default boot filename
- Enable or disable the Break function
- Control broadcast addresses
- Set the console terminal baud rate
- Recover a lost password (ignore the configuration file in NVRAM)
- Enable TFTP server boot

Table 4-3 lists the meaning of each of the virtual configuration memory bits, and defines the boot field names.

CAUTION

To avoid confusion and possibly halting the router, remember that valid configuration register settings might be combinations of settings and not just the individual settings listed in table 4-3. For example, the factory default value of 0x2102 is a combination of settings.

Table 4-3. Virtual Configuration Register Bit Meanings

Bit No.[a]	Hexadecimal	Meaning
00–03	0x0000–0x000F	Boot field
06	0x0040	Causes system software to ignore the contents of NVRAM (startup-config)
07	0x0080	OEM bit is enabled
08	0x0100	Break is disabled
10	0x0400	IP broadcast with all zeros
11–12	0x0800–0x1000	Console line speed
13	0x2000	Load the boot ROM software if a Flash boot fails five times
14	0x4000	IP broadcasts do not have network numbers
15	0x8000	Enable diagnostic messages and ignore the contents of NVRAM

a. The factory default value for the configuration register is 0x2102. This value is a combination of the following: bit 13 = 0x2000, bit 8 = 0x0100, and bits 00 to 03 = 0x0002.

Changing Configuration Register Settings

Take the following steps to change the configuration register while running the Cisco IOS software:

1. Enter the **enable** command and your password to enter privileged mode:

```
Router> enable
Password:
Router#
```

2. Enter the **configure terminal** command at the privileged EXEC prompt (Router#):

```
Router# configure terminal
```

3. To set the contents of the configuration register, enter the configuration command **config-register** *value*, where *value* is a hexadecimal number preceded by 0x (see table 4-3 and table 4-4):

```
config-register 0xvalue
```

   (The virtual configuration register is stored in NVRAM.)

Table 4-4. Explanation of Boot Field (Configuration Register Bits 00 to 03)

Boot Field	Boot Process
0x0	Stops the boot process in the ROM monitor
0x1	Stops the boot process in the boot ROM monitor
0x3–0xF	Specifies a default filename for booting over the network from a TFTP server Enables boot system commands that override the default filename for booting over the network from a TFTP server
0x2	Full boot process, which loads the Cisco IOS image from Flash memory

4. Press **Ctrl-Z** to exit configuration mode. The new settings will be saved to memory; however, the new settings do not take effect until the system software is reloaded by rebooting the router.
5. To display the configuration register value currently in effect and the value that will be used at the next reload, enter the **show version** EXEC command. The value displays on the last line of the screen display:

```
Configuration register is 0x142 (will be 0x102 at next reload)
```

6. Reboot the router. The new value takes effect. Configuration register changes take effect only when the router restarts, which occurs when you switch the power OFF and ON or when you enter the **reload** command.

Virtual Configuration Register Bit Meanings

The lowest four bits of the virtual configuration register (bits 3, 2, 1, and 0) form the boot field. (See table 4-4.) The boot field specifies a number in binary form. If you set the boot field value to 0, you must boot the operating system manually by entering the **b** command at the bootstrap prompt, as follows:

```
> b [tftp] flash filename
```

The **b** command options are as follows:

- **b**—Boots the default system software from ROM
- **b flash**—Boots the first file in Flash memory
- **b** *filename [host]*—Boots from the network using a TFTP server
- **b flash** *[filename]*—Boots the file *filename* from Flash memory

For more information about the command **b [tftp] flash** *filename*, refer to the Cisco IOS configuration guide and command reference publications.

If you set the boot field value to a value of 0x2 to 0xF, and a valid system boot command is stored in the configuration file, the router boots the system software as directed by that value. If you set the boot field to any other bit pattern, the router uses the resulting number to form a default boot filename for booting from the network using a TFTP server. (See table 4-5.)

Table 4-5. Default Boot Filenames

Action or Filename	Bit 3	Bit 2	Bit 1	Bit 0
bootstrap mode	0	0	0	0
ROM software	0	0	0	1
cisco2-igs	0	0	1	0
cisco3-igs	0	0	1	1
cisco4-igs	0	1	0	0
cisco5-igs	0	1	0	1
cisco6-igs	0	1	1	0
cisco7-igs	0	1	1	1
cisco10-igs	1	0	0	0
cisco11-igs	1	0	0	1
cisco12-igs	1	0	1	0
cisco13-igs	1	0	1	1
cisco14-igs	1	1	0	0
cisco15-igs	1	1	0	1
cisco16-igs	1	1	1	0
cisco17-igs	1	1	1	1

In the following example, the virtual configuration register is set to boot the router from Flash memory and to ignore Break at the next reboot of the router:

```
Router> enable
password: enablepassword
Router# conf term
Enter configuration commands, one per line.
Edit with DELETE, CTRL/W, and CTRL/U; end with CTRL/Z
config-register 0x102
boot system flash [filename]
^Z
Router#
```

The router creates a default boot filename as part of the automatic configuration processes. The boot filename consists of *cisco*, plus the octal equivalent of the boot field number, a hyphen, and the processor type.

NOTE A boot system configuration command in the router configuration in NVRAM overrides the default boot filename.

Bit 8 controls the console Break key. Setting bit 8 (the factory default) causes the processor to ignore the console Break key. Clearing bit 8 causes the processor to interpret the Break key as a command to force the system into the bootstrap monitor, thereby halting normal operation. A break can be sent in the first 60 seconds while the system reboots, regardless of the configuration settings.

Bit 10 controls the host portion of the IP broadcast address. Setting bit 10 causes the processor to use all zeros; clearing bit 10 (the factory default) causes the processor to use all ones. Bit 10 interacts with bit 14, which controls the network and subnet portions of the broadcast address. (See table 4-6.)

Table 4-6. Configuration Register Settings for Broadcast Address Destination

Bit 14	Bit 10	Address (<net> <host>)
Off	Off	<ones> <ones>
Off	On	<zeros> <zeros>
On	On	<net> <zeros>
On	Off	<net> <ones>

Bits 11 and 12 in the configuration register determine the baud rate of the console terminal.

Table 4-7 shows the bit settings for the four available baud rates. (The default baud rate is 9600.)

Table 4-7. System Console Terminal Baud Rate Settings

Baud	Bit 12	Bit 11
9600	0	0
4800	0	1
1200	1	0
2400	1	1

Bit 13 determines the server response to a bootload failure. Setting bit 13 causes the server to load operating software from ROM after five unsuccessful attempts to load a boot file from the network. Clearing bit 13 causes the server to continue attempting to load a boot file from the network indefinitely. The default setting for bit 13 is 1.

Enabling Booting from Flash Memory

To disable Break (after 60 seconds) and enable the **boot system flash** command, enter the **config-register** command with the value shown in the following example:

```
Router> enable
Password: enablepassword
Router# config term
Enter configuration commands, one per line.
Edit with DELETE, CTRL/W, and CTRL/U; end with CTRL/Z
config-reg 0x2102
^Z
Router#
```

Copying a Cisco IOS Image to Flash Memory

You may need to copy a new Cisco IOS image to Flash memory whenever a new image or maintenance release becomes available. Use the **copy tftp flash** command for the copy procedure.

Take the following steps to copy a new image to Flash memory:

1. Enter the **show flash** command to make sure there is enough space available before copying a file to Flash memory. Compare the size of the file you want to copy to the amount of available Flash memory displayed.
2. Make a backup copy of the current image.
3. Enter enable mode and then enter the **copy tftp flash** command to copy the new image into Flash memory:

```
Router> enable
Password: enablepassword
Router# copy tftp flash
```

The following messages display:

```
                          ****  NOTICE  ****
Flash load helper vX.0
This process will accept the copy options and then terminate
the current system image to use the ROM based image for the copy.
Routing functionality will not be available during that time.
If you are logged in via telnet, this connection will terminate.
Users with console access can see the results of the copy operation.
                           ----  ********  ----
Proceed? [confirm]
```

4. Press **Return** to confirm. If there is an image already in Flash memory, the router displays the name and size of the file. Then the router prompts you for the IP address or name of the remote host:

   ```
   Address or name of remote host [hostname]?
   ```

   The remote host can be a server or another router with a valid Flash system software image.

5. Enter the IP address or name of the remote host. The router then prompts you for the name of the source file:

   ```
   Source file name?
   ```

6. Enter the name of the source file. The following prompt displays:

   ```
   Destination file name [filename]?
   ```

7. Press **Return** to accept the default filename or enter a different filename. Messages similar to the following display:

   ```
   Accessing file 'master/igs-j-l.110-4.2' on hostname...
   Loading master/igs-j-l.110-4.2 from 172.16.72.1 (via Ethernet0): !
   [OK]

   Erase flash device before writing? [confirm] yes
   ```

8. Enter **yes** to erase the contents of Flash memory. The following message displays:

   ```
   Flash contains files. Are you sure you want to erase? [confirm] yes
   ```

9. Enter **yes** to confirm that you want to erase the contents of Flash memory. Messages similar to the following display:

```
%SYS-5-RELOAD: Reload requested

%FLH: master/igs-j-l.110-4.2 from 172.16.72.1 to flash ...

System flash directory:
File Length   Name/status
  1   3459776 username/igs-i-l
[3459840 bytes used, 4928768 available, 8388608 total]Configuration
mapped ip address 172.16.72.1 to hostname
Accessing file 'master/igs-j-l.110-4.2' on hostname...
Loading master/igs-j-l.110-4.2 from 172.16.72.1 (via Ethernet0): !
[OK]

Erasing device... eeeeeeeeeeeeeeeeeeeeeeeeeeeeeeee ...erased
Loading master/igs-j-l.110-4.2 from 172.16.72.1 (via Ethernet0):
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
[OK - 6196336/8388608 bytes]

Verifying checksum...  OK (0x2997)
Flash copy took 0:03:38 [hh:mm:ss]
%FLH: Re-booting system after download
```

The system reboots using the new image in Flash memory.

NOTE

For more information about the **copy tftp flash** command and other related commands, refer to the Cisco IOS configuration guide and command reference publications.

Maintenance

Cable Specifications

This appendix provides the following pinout information:

- Console and Auxiliary Port Signals and Pinouts
- Synchronous Serial Cable Assemblies and Pinouts
- ISDN BRI Port and Cable Pinouts

NOTE All pins not listed in the tables in this appendix are not connected.

If you prefer to order cables, refer to the section "Ordering Information" in chapter 1 "HP AdvanceStack Internet Router Overview" for ordering information.

Console and Auxiliary Port Signals and Pinouts

Your router comes with a console and auxiliary cable kit, which contains the cable and adapters you need to connect a console terminal (an ASCII terminal or PC running terminal emulation software) or modem to your router. The console and auxiliary cable kit includes the following items:

- RJ-45-to-RJ-45 roll-over cable. (See the next section, "Identifying a Roll-Over Cable," for more information.)
- RJ-45-to-DB-9 female DTE adapter (labeled "TERMINAL").
- RJ-45-to-DB-25 female DTE adapter (labeled "TERMINAL").
- RJ-45-to-DB-25 male DCE adapter (labeled "MODEM").

For console connections, proceed to the section "Console Port Signals and Pinouts" later in this appendix; for modem connections, proceed to the section "Auxiliary Port Signals and Pinouts" later in this appendix.

Identifying a Roll-Over Cable

You can identify a roll-over cable by comparing the two modular ends of the cable. Holding the cables side-by-side, with the tab at the back, the wire connected to the pin on the outside of the left plug should be the same color as the wire connected to the pin on the outside of the right plug. (See figure A-1). If your cable came from Cisco Systems, pin 1 will be white on one connector, and pin 8 will be white on the other (a roll-over cable reverses pins 1 and 8, 2 and 7, 3 and 6, and 4 and 5).

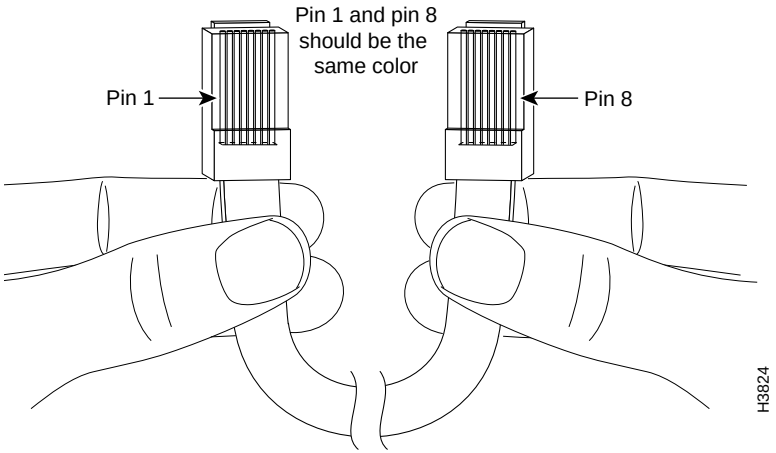


Figure A-1. Identifying a Roll-Over Cable

Console Port Signals and Pinouts

Use the thin, flat, RJ-45-to-RJ-45 roll-over cable and RJ-45-to-DB-9 female DTE adapter (labeled "TERMINAL") to connect the console port to a PC running terminal emulation software. Table A-1 lists the pinouts for the asynchronous serial console port, the RJ-45-to-RJ-45 roll-over cable, and the RJ-45-to-DB-9 female DTE adapter (labeled "TERMINAL").

Table A-1. Console Port Signaling and Cabling Using a DB-9 Adapter

Console Port (DTE)	RJ-45-to-RJ-45 Roll-Over Cable		RJ-45-to-DB-9 Terminal Adapter	Console Device
Signal	**RJ-45 Pin**	**RJ-45 Pin**	**DB-9 Pin**	**Signal**
RTS	1[a]	8	8	CTS
DTR	2	7	6	DSR
TxD	3	6	2	RxD
GND	4	5	5	GND
GND	5	4	5	GND
RxD	6	3	3	TxD
DSR	7	2	4	DTR
CTS	8[a]	1	7	RTS

a. Pin 1 is connected internally to Pin 8.

Use the thin, flat, RJ-45-to-RJ-45 roll-over cable and RJ-45-to-DB-25 female DTE adapter (labeled "TERMINAL") to connect the console port to a terminal. Table A-2 lists the pinouts for the asynchronous serial console port, the RJ-45-to-RJ-45 roll-over cable, and the RJ-45-to-DB-25 female DTE adapter (labeled "TERMINAL").

Table A-2. Console Port Signaling and Cabling Using a DB-25 Adapter

Console Port (DTE)[a]	RJ-45-to-RJ-45 Roll-Over Cable		RJ-45-to-DB-25 Terminal Adapter	Console Device
Signal	**RJ-45 Pin**	**RJ-45 Pin**	**DB-25 Pin**	**Signal**
RTS	1[b]	8	5	CTS
DTR	2	7	6	DSR
TxD	3	6	3	RxD
GND	4	5	7	GND
GND	5	4	7	GND
RxD	6	3	2	TxD
DSR	7	2	20	DTR
CTS	8[b]	1	4	RTS

a. You can use the same cabling to connect a console to the auxiliary port.
b. Pin 1 is connected internally to Pin 8.

Auxiliary Port Signals and Pinouts

Use the thin, flat, RJ-45-to-RJ-45 roll-over cable and RJ-45-to-DB-25 male DCE adapter (labeled “MODEM”) to connect the auxiliary port to a modem. Figure A-2 shows how to connect the auxiliary port to a modem. Table A-3 lists the pinouts for the asynchronous serial auxiliary port, the RJ-45-to-RJ-45 roll-over cable, and the RJ-45-to-DB-25 male DCE adapter (labeled “MODEM”).

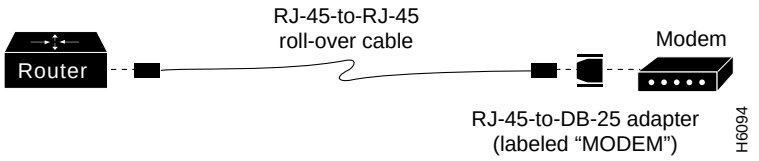


Figure A-2. Connecting the Auxiliary Port to a Modem

Table A-3. Auxiliary Port Signaling and Cabling Using a DB-25 Adapter

Auxiliary Port (DTE)	RJ-45-to-RJ-45 Roll-Over Cable		RJ-45-to-DB-25 Modem Adapter	Modem
Signal	**RJ-45 Pin**	**RJ-45 Pin**	**DB-25 Pin**	**Signal**
RTS	1[a]	8	4	RTS
DTR	2	7	20	DTR
TxD	3	6	3	TxD
GND	4	5	7	GND
GND	5	4	7	GND
RxD	6	3	2	RxD
DSR	7	2	8	DCD
CTS	8[1]	1	5	CTS

a. Pin 1 is connected internally to Pin 8.

Synchronous Serial Cable Assemblies and Pinouts

The illustrations and tables in this section provide assembly drawings and pinouts for the EIA-530 DTE, EIA/TIA-232, EIA/TIA-449, V.35, and X.21 DTE and DCE cables, which are used with the synchronous serial WAN port (labeled “SERIAL”).

EIA-530

Figure A-3 shows the EIA-530 serial cable assembly, and A-4 lists the pinouts. Arrows indicate signal direction: —> indicates DTE to DCE, and <— indicates DCE to DTE.

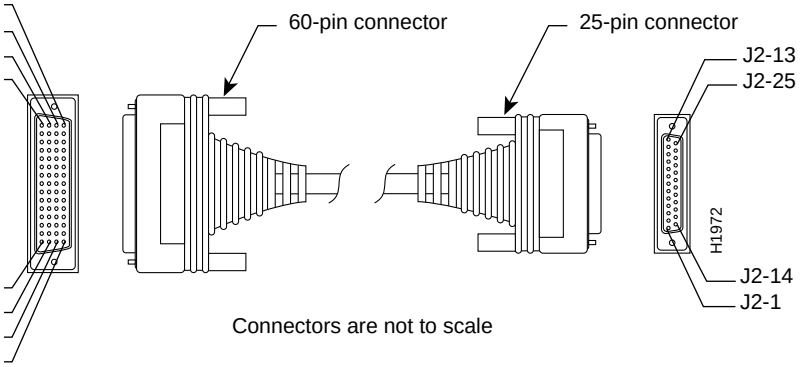


Figure A-3. EIA-530 Serial Cable Assembly

Table A-4. EIA-530 DTE Cable Pinouts (DB-60 to DB-25)

60 Pin	Signal	25 Pin	Signal	Direction DTE DCE[a]
J1-11 J1-12	TxD/RxD+ TxD/RxD–	J2-2 J2-14	BA(A), TxD+ BA(B), TxD–	—> —>
J1-28 J1-27	RxD/TxD+ RxD/TxD–	J2-3 J2-16	BB(A), RxD+ BB(B), RxD–	<— <—
J1-9 J1-10	RTS/CTS+ RTS/CTS–	J2-4 J2-19	CA(A), RTS+ CA(B), RTS–	—> —>
J1-1 J1-2	CTS/RTS+ CTS/RTS–	J2-5 J2-13	CB(A), CTS+ CB(B), CTS–	<— <—
J1-3 J1-4	DSR/DTR+ DSR/DTR–	J2-6 J2-22	CC(A), DSR+ CC(B), DSR–	<— <—
J1-46 J1-47	Shield_GND MODE_2	J2-1 —	Shield —	Shorted
J1-48 J1-49	GND MODE_1	— —	— —	Shorted
J1-5 J1-6	DCD/DCD+ DCD/DCD–	J2-8 J2-10	CF(A), DCD+ CF(B), DCD–	<— <—
J1-24 J1-23	TxC/RxC+ TxC/RxC–	J2-15 J2-12	DB(A), TxC+ DB(B), TxC–	<— <—
J1-26 J1-25	RxC/TxCE+ RxC/TxCE–	J2-17 J2-9	DD(A), RxC+ DD(B), RxC–	<— <—
J1-44 J1-45	LL/DCD Circuit_GND	J2-18 J2-7	LL Circuit_ GND	—> –
J1-7 J1-8	DTR/DSR+ DTR/DSR–	J2-20 J2-23	CD(A), DTR+ CD(B), DTR–	—> —>
J1-13 J1-14	TxCE/TxC+ TxCE/TxC–	J2-24 J2-11	DA(A), TxCE+ DA(B), TxCE–	—> —>
J1-51 J1-52	GND MODE_DCE	— —	— —	Shorted

a. The EIA-530 interface operates in DTE mode only. A DCE cable is not available for the EIA-530 interface.

EIA/TIA-232

Figure A-4 shows the EIA/TIA-232 cable assembly. Table A-5 lists the DTE pinouts. Table A-6 lists the DCE pinouts. Arrows indicate signal direction: —> indicates DTE to DCE, and <— indicates DCE to DTE.

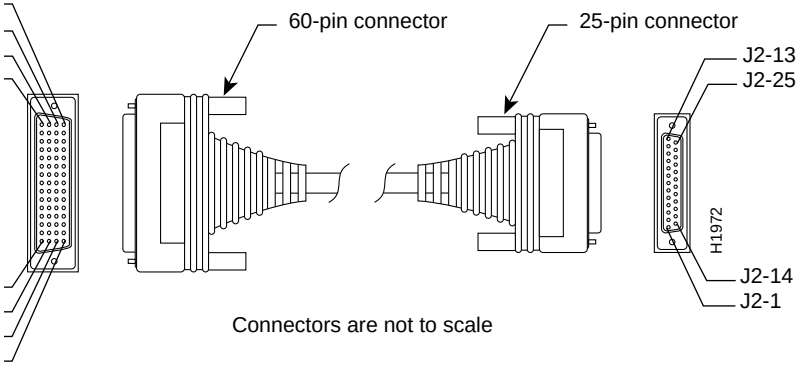


Figure A-4. EIA/TIA-232 Cable Assembly

Table A-5. EIA/TIA-232 DCE Cable Pinouts (DB-60 to DB-25)

60 Pin	Signal	Description	Direction	25 Pin	Signal
J1-50 J1-51 J1-52	MODE_0 GND MODE_DCE	Shorting group	–	–	–
J1-46	Shield GND	Single	–	J2-1	Shield GND
J1-41 Shield	TxD/RxD –	Twisted pair no. 5	—> –	J2-2 Shield	TxD –
J1-36 Shield	RxD/TxD –	Twisted pair no. 9	<— –	J2-3 Shield	RxD –
J1-42 Shield	RTS/CTS –	Twisted pair no. 4	—> –	J2-4 Shield	RTS –
J1-35 Shield	CTS/RTS –	Twisted pair no. 10	<— –	J2-5 Shield	CTS –
J1-34 Shield	DSR/DTR –	Twisted pair no. 11	<— –	J2-6 Shield	DSR –
J1-45 Shield	Circuit GND –	Twisted pair no. 1	– –	J2-7 Shield	Circuit GND –
J1-33 Shield	DCD/LL –	Twisted pair no. 12	<— –	J2-8 Shield	DCD –
J1-37 Shield	TxC/NIL –	Twisted pair no. 8	<— –	J2-15 Shield	TxC –
J1-38 Shield	RxC/TxCE –	Twisted pair no. 7	<— –	J2-17 Shield	RxC –
J1-44 Shield	LL/DCD –	Twisted pair no. 2	—> –	J2-18 Shield	LTST –
J1-43 Shield	DTR/DSR –	Twisted pair no. 3	—> –	J2-20 Shield	DTR –
J1-39 Shield	TxCE/TxC –	Twisted pair no. 6	—> –	J2-24 Shield	TxCE –

Table A-6. EIA/TIA-232 DCE Cable Pinouts (DB-60 to DB-25)

60 Pin	Signal	Description	Direction	25 Pin	Signal
J1-50 J1-51	MODE_0 GND	Shorting group	–	–	–
J1-46	Shield GND	Single	–	J2-1	Shield GND
J1-36 Shield	RxD/TxD –	Twisted pair no. 9	<— –	J2-2 Shield	TxD –
J1-41 Shield	TxD/RxD –	Twisted pair no. 5	—> –	J2-3 Shield	RxD –
J1-35 Shield	CTS/RTS –	Twisted pair no. 10	<— –	J2-4 Shield	RTS –
J1-42 Shield	RTS/CTS –	Twisted pair no. 4	—> –	J2-5 Shield	CTS –
J1-43 Shield	DTR/DSR –	Twisted pair no. 3	—> –	J2-6 Shield	DSR –
J1-45 Shield	Circuit GND –	Twisted pair no. 1	– –	J2-7 Shield	Circuit GND
J1-44 Shield	LL/DCD –	Twisted pair no. 2	—> –	J2-8 Shield	DCD –
J1-39 Shield	TxCE/TxC –	Twisted pair no. 7	—> –	J2-15 Shield	TxC –
J1-40 Shield	NIL/RxC –	Twisted pair no. 6	—> –	J2-17 Shield	RxC –
J1-33 Shield	DCD/LL –	Twisted pair no. 12	<— –	J2-18 Shield	LTST –
J1-34 Shield	DSR/DTR –	Twisted pair no. 11	<— –	J2-20 Shield	DTR –
J1-38 Shield	RxC/TxCE –	Twisted pair no. 8	<— –	J2-24 Shield	TxCE –

EIA/TIA-449

Figure A-5 shows the EIA/TIA-449 cable assembly. Table A-7 lists the DTE pinouts. Table A-8 lists the DCE pinouts. Arrows indicate signal direction: —> indicates DTE to DCE, and <— indicates DCE to DTE.

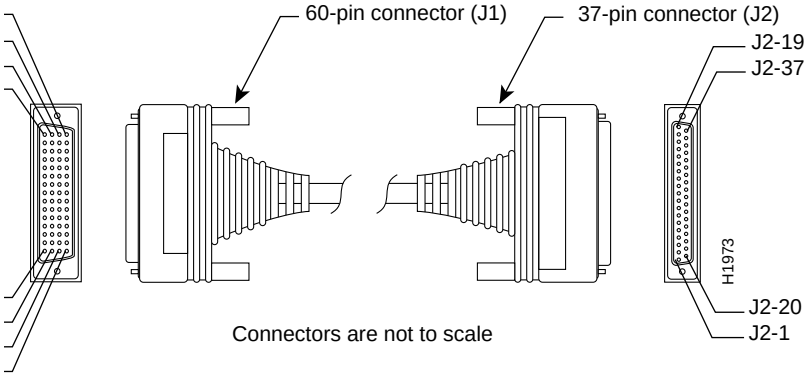


Figure A-5. EIA/TIA-449 Cable Assembly

Table A-7. EIA/TIA-449 DTE Cable Pinouts (DB-60 to DB-37)

60 Pin	Signal	Description	Direction	37 Pin	Signal
J1-49 J1-48	MODE_1 GND	Shorting group	– –	–	–
J1-51 J1-52	GND MODE_DCE	Shorting group	– –	–	–
J1-46	Shield_GND	Single	_	J2-1	Shield GND
J1-11 J1-12	TxD/RxD+ TxD/RxD–	Twisted pair no. 6	—> —>	J2-4 J2-22	SD+ SD–
J1-24 J1-23	TxC/RxC+ TxC/RxC–	Twisted pair no. 9	<— <—	J2-5 J2-23	ST+ ST–
J1-28 J1-27	RxD/TxD+ RxD/TxD–	Twisted pair no. 11	<— <—	J2-6 J2-24	RD+ RD–
J1-9 J1-10	RTS/CTS+ RTS/CTS–	Twisted pair no. 5	—> —>	J2-7 J2-25	RS+ RS–
J1-26 J1-25	RxC/TxCE+ RxC/TxCE–	Twisted pair no. 10	<— <—	J2-8 J2-26	RT+ RT–
J1-1 J1-2	CTS/RTS+ CTS/RTS–	Twisted pair no. 1	<— <—	J2-9 J2-27	CS+ CS–
J1-44 J1-45	LL/DCD Circuit_GND	Twisted pair no. 12	—> _	J2-10 J2-37	LL SC
J1-3 J1-4	DSR/DTR+ DSR/DTR–	Twisted pair no. 2	<— <—	J2-11 J2-29	DM+ DM–
J1-7 J1-8	DTR/DSR+ DTR/DSR–	Twisted pair no. 4	—> —>	J2-12 J2-30	TR+ TR–
J1-5 J1-6	DCD/DCD+ DCD/DCD–	Twisted pair no. 3	<— <—	J2-13 J2-31	RR+ RR–
J1-13 J1-14	TxCE/TxC+ TxCE/TxC–	Twisted pair no. 7	—> —>	J2-17 J2-35	TT+ TT–
J1-15 J1-16	Circuit_GND Circuit_GND	Twisted pair no. 9	– –	J2-19 J2-20	SG RC

Table A-8. EIA/TIA-449 DCE Cable Pinouts (DB-60 to DB-37)

60 Pin	Signal	Description	Direction	37 Pin	Signal
J1-49	MODE_1	Shorting group	–	–	–
J1-48	GND				
J1-46	Shield_GND	Single	–	J2-1	Shield GND
J1-28	RxD/TxD+	Twisted pair no. 11	<—	J2-4	SD+
J1-27	RxD/TxD–		<—	J2-22	SD–
J1-13	TxCE/TxC+	Twisted pair no. 7	—>	J2-5	ST+
J1-14	TxCE/TxC–		—>	J2-23	ST–
J1-11	TxD/RxD+	Twisted pair no. 6	—>	J2-6	RD+
J1-12	TxD/RxD–		—>	J2-24	RD–
J1-1	CTS/RTS+	Twisted pair no. 1	<—	J2-7	RS+
J1-2	CTS/RTS–		<—	J2-25	RS–
J1-24	TxC/RxC+	Twisted pair no. 9	—>	J2-8	RT+
J1-23	TxC/RxC–		—>	J2-26	RT–
J1-9	RTS/CTS+	Twisted pair no. 5	—>	J2-9	CS+
J1-10	RTS/CTS–		—>	J2-27	CS–
J1-29	NIL/LL	Twisted pair no. 12	—>	J2-10	LL
J1-30	Circuit_GND		–	J2-37	SC
J1-7	DTR/DSR+	Twisted pair no. 4	—>	J2-11	DM+
J1-8	DTR/DSR–		—>	J2-29	DM–
J1-3	DSR/DTR+	Twisted pair no. 2	<—	J2-12	TR+
J1-4	DSR/DTR–		<—	J2-30	TR–
J1-5	DCD/DCD+	Twisted pair no. 3	—>	J2-13	RR+
J1-6	DCD/DCD–		—>	J2-31	RR–
J1-26	RxC/TxCE+	Twisted pair no. 10	<—	J2-17	TT+
J1-25	RxC/TxCE–		<—	J2-35	TT–
J1-15	Circuit_GND	Twisted pair no. 8	_	J2-19	SG
J1-16	Circuit_GND		_	J2-20	RC

V.35

Figure A-6 shows the V.35 cable assembly. Table A-9 lists the DTE pinouts. Table A-10 lists the DCE pinouts. Arrows indicate signal direction: —> indicates DTE to DCE, and <— indicates DCE to DTE.

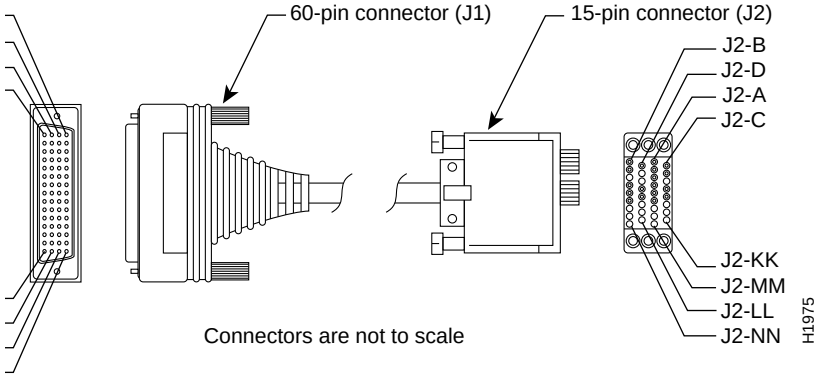


Figure A-6. V.35 Cable Assembly

Table A-9. V.35 DTE Cable Pinouts (DB-60 to 34-Pin)

60 Pin	Signal	Description	Direction	34 Pin	Signal
J1-49 J1-48	MODE_1 GND	Shorting group	– –	–	–
J1-50 J1-51 J1-52	MODE_0 GND MODE_DCE	Shorting group	–	–	–
J1-53 J1-54 J1-55 J1-56	TxC/NIL RxC_TxCE RxD/TxD GND	Shorting group	–	–	–
J1-46	Shield_GND	Single	–	J2-A	Frame GND
J1-45 Shield	Circuit_GND –	Twisted pair no. 12	– –	J2-B Shield	Circuit GND –
J1-42 Shield	RTS/CTS –	Twisted pair no. 9	—> –	J2-C Shield	RTS –
J1-35 Shield	CTS/RTS –	Twisted pair no. 8	<— –	J2-D Shield	CTS –
J1-34 Shield	DSR/DTR –	Twisted pair no. 7	<— –	J2-E Shield	DSR –
J1-33 Shield	DCD/LL –	Twisted pair no. 6	<— –	J2-F Shield	RLSD –
J1-43 Shield	DTR/DSR –	Twisted pair no. 10	—> –	J2-H Shield	DTR –
J1-44 Shield	LL/DCD –	Twisted pair no. 11	—> –	J2-K Shield	LT –
J1-18 J1-17	TxD/RxD+ TxD/RxD–	Twisted pair no. 1	—> —>	J2-P J2-S	SD+ SD–
J1-28 J1-27	RxD/TxD+ RxD/TxD–	Twisted pair no. 5	<— <—	J2-R J2-T	RD+ RD–
J1-20 J1-19	TxCE/TxC+ TxCE/TxC–	Twisted pair no. 2	—> —>	J2-U J2-W	SCTE+ SCTE–
J1-26 J1-25	RxC/TxCE+ RxC/TxCE–	Twisted pair no. 4	<— <—	J2-V J2-X	SCR+ SCR–
J1-24 J1-23	TxC/RxC+ TxC/RxC–	Twisted pair no. 3	<— <—	J2-Y J2-AA	SCT+ SCT–

Table A-10. V.35 DCE Cable Pinouts (DB-60 to 34-Pin)

60 Pin	Signal	Description	Direction	34 Pin	Signal
J1-49 J1-48	MODE_1 GND	Shorting group	– –	–	–
J1-50 J1-51	MODE_0 GND	Shorting group	– –	–	–
J1-53 J1-54 J1-55 J1-56	TxC/NIL RxC_TxCE RxD/TxD GND	Shorting group	–	–	–
J1-46	Shield_GND	Single	–	J2-A	Frame GND
J1-45 Shield	Circuit_GND –	Twisted pair no. 12	– –	J2-B Shield	Circuit GND –
J1-35 Shield	CTS/RTS –	Twisted pair no. 8	<— –	J2-C Shield	RTS –
J1-42 Shield	RTS/CTS –	Twisted pair no. 9	—> –	J2-D Shield	CTS –
J1-43 Shield	DTR/DSR –	Twisted pair no. 10	—> –	J2-E Shield	DSR –
J1-44 Shield	LL/DCD –	Twisted pair no. 11	—> –	J2-F Shield	RLSD –
J1-34 Shield	DSR/DTR –	Twisted pair no. 7	<— –	J2-H Shield	DTR –
J1-33 Shield	DCD/LL –	Twisted pair no. 6	<— –	J2-K Shield	LT –
J1-28 J1-27	RxD/TxD+ RxD/TxD–	Twisted pair no. 5	<— <—	J2-P J2-S	SD+ SD–
J1-18 J1-17	TxD/RxD+ TxD/RxD–	Twisted pair no. 1	—> —>	J2-R J2-T	RD+ RD–
J1-26 J1-25	RxC/TxCE+ RxC/TxCE–	Twisted pair no. 4	<— <—	J2-U J2-W	SCTE+ SCTE–
J1-22 J1-21	NIL/RxC+ NIL/RxC–	Twisted pair no. 3	—> —>	J2-V J2-X	SCR+ SCR–
J1-20 J1-19	TxCE/TxC+ TxCE/TxC–	Twisted pair no. 2	—> —>	J2-Y J2-AA	SCT+ SCT–

X.21

Figure A-7 shows the X.21 cable assembly. Table A-11 lists the DTE pinouts. Table A-12 lists the DCE pinouts. Arrows indicate signal direction: —> indicates DTE to DCE, and <— indicates DCE to DTE.

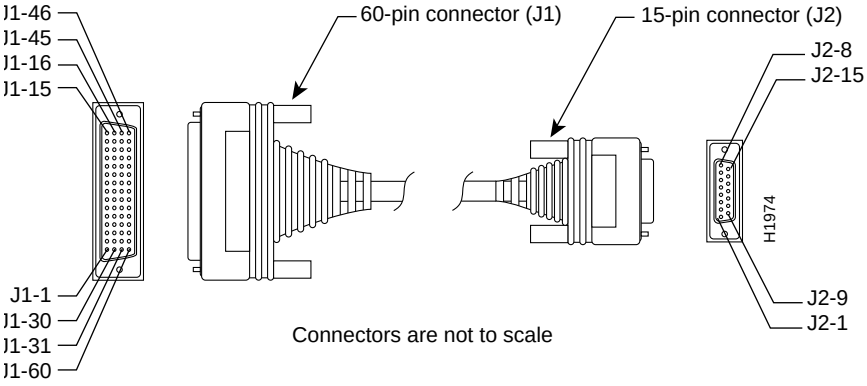


Figure A-7. X.21 Cable Assembly

Table A-11. X-21 DTE Cable Pinouts (DB-60 to DB-15)

60 Pin	Signal	Description	Direction	15 Pin	Signal
J1-48 J1-47	GND MODE_2	Shorting group	–	–	–
J1-51 J1-52	GND MODE_DCE	Shorting group	–	–	–
J1-46	Shield_GND	Single	–	J2-1	Shield GND
J1-11 J1-12	TxD/RxD+ TxD/RxD–	Twisted pair no. 3	—> —>	J2-2 J2-9	Transmit+ Transmit–
J1-9 J1-10	RTS/CTS+ RTS/CTS–	Twisted pair no. 2	—> —>	J2-3 J2-10	Control+ Control–
J1-28 J1-27	RxD/TxD+ RxD/TxD–	Twisted pair no. 6	<— <—	J2-4 J2-11	Receive+ Receive–
J1-1 J1-2	CTS/RTS+ CTS/RTS–	Twisted pair no. 1	<— <—	J2-5 J2-12	Indication+ Indication–
J1-26 J1-25	RxC/TxCE+ RxC/TxCE–	Twisted pair no. 5	<— <—	J2-6 J2-13	Timing+ Timing–
J1-15 Shield	Control_GND –	Twisted pair no. 4	– –	J2-8 Shield	Control GND –

Table A-12. X.21 DCE Cable Pinouts (DB-60 to DB-15)

60 Pin	Signal	Description	Direction	15 Pin	Signal
J1-48 J1-47	GND MODE_2	Shorting group	–	–	–
J1-46	Shield_GND	Single	–	J2-1	Shield GND
J1-28 J1-27	RxD/TxD+ RxD/TxD–	Twisted pair no. 6	<— <—	J2-2 J2-9	Transmit+ Transmit–
J1-1 J1-2	CTS/RTS+ CTS/RTS–	Twisted pair no. 1	<— <—	J2-3 J2-10	Control+ Control–
J1-11 J1-12	TxD/RxD+ TxD/RxD–	Twisted pair no. 3	—><br—>	J2-4 J2-11	Receive+ Receive–
J1-9 J1-10	RTS/CTS+ RTS/CTS–	Twisted pair no. 2	—><br—>	J2-5 J2-12	Indication+ Indication–
J1-24 J1-23	TxC/RxC+ TxC/RxC–	Twisted pair no. 4	—><br—>	J2-6 J2-13	Timing+ Timing–
J1-15 Shield	Control_GND –	Twisted pair no. 5	– –	J2-8 Shield	Control GND –

ISDN BRI Port and Cable Pinouts

Table A-13 lists the ISDN BRI port pinouts. The straight-through RJ-45-to-RJ-45 cable, used to connect to the ISDN BRI port, is not included.

Table A-13. BRI Port (RJ-45) Pinout

RJ-45 8 Pin[a]	TE[b]	NT[c]	Polarity
3	Transmit	Receive	+
4	Receive	Transmit	+
5	Receive	Transmit	–
6	Transmit	Receive	–

a. Pins 1, 2, 7, and 8 are not used.

b. TE refers to terminal terminating layer 1 aspects of TE1, TA, and NT2 functional groups.

c. NT refers to network terminating layer 1 aspects of NT1 and NT2 functional groups.

HP J3138A Specifications

Physical

Width:	15.5 cm (6.1 in)
Depth:	11.8 cm (4.6 in)
Height:	4.4 cm (1.7 in)
Weight (without Modules or RPS:	0.13 kg (0.28 lbs)

Power consumption

+5 V	4.5 A max.
+12 V	500 mA max.
-12 V	300 mA max.
Total Power Consumption	25 W max.

Environmental

	Operating	**Non-Operating**
Temperature	0^{o}C to 55^{o}C (32^{o} F to 131^{o}F)	40^{o}C to 70^{o}C (-40^{o}F to 158^{o}F)
Relative Humidity (noncondensing)	15 to 95% at 40^{o}C (104^{o}F)	15 to 90% at 65^{o}C (149^{o}F)
Maximum Altitude	4.6 Km (15,000 ft)	4.6 Km (15,000 ft)

Connectors

The RJ-45 twisted-pair ports are compatible with the IEEE 802.3 Type 10Base-T standard.

Electromagnetic

Emissions:	FCC part 15 Class A CISPR-22 Class A / EN 55022 Class A VCCI Level I
Immunity:	See the Declaration of Conformity for details at the end of the Safety and Regulatory Statements in the Switching Hubs manual.
Safety:	Complies with: IEC 950: (1991) + A1, A2 / .EN60950 I (1992) + A1, A2
Acoustic Noise	Not Applicable

Safety and Regulatory Statements

Safety Information

Safety Symbols.

	Documentation reference symbol. If the product is marked with this symbol, refer to the product documentation to get more information about the product.
WARNING	A WARNING in the manual denotes a hazard that can cause injury or death.
CAUTION	A CAUTION in the manual denotes a hazard that can damage equipment.

Do not proceed beyond a WARNING or CAUTION notice until you have understood the hazardous conditions and have taken appropriate steps.

Grounding.
These are safety class I products and have protective earthing terminals. There must be an uninterruptible safety earth ground from the main power source to the product's input wiring terminals, power cord, or supplied power cord set. Whenever it is likely that the protection has been impaired, disconnect the power cord until the ground has been restored.

For LAN cable grounding:

- If your LAN covers an area served by more than one power distribution system, be sure their safety grounds are securely interconnected.
- LAN cables may occasionally be subject to hazardous transient voltages (such as lightning or disturbances in the electrical utilities power grid). Handle exposed metal components of the network with caution.

Servicing.
There are no user-serviceable parts inside these products. Any servicing, adjustment, maintenance, or repair must be performed only by service-trained personnel.

These products do not have a power switch; they are powered on when the power cord is plugged in.

Informations concernant la sécurité

Symboles de sécurité

	Symbole de référence à la documentation. Si le produit est marqué de ce symbole, reportez-vous à la documentation du produit afin d'obtenir des informations plus détaillées.
WARNING	Dans la documentation, un WARNING indique un danger susceptible d'entraîner des dommages corporels ou la mort.
CAUTION	Un texte de mise en garde intitulé CAUTION indique un danger susceptible de causer des dommages à l'équipement.

Ne continuez pas au-delà d'une rubrique WARNING ou CAUTION avant d'avoir bien compris les conditions présentant un danger et pris les mesures appropriées.

Cet appareil est un produit de classe I et possède une borne de mise à la terre. La source d'alimentation principale doit être munie d'une prise de terre de sécurité installée aux bornes du câblage d'entrée, sur le cordon d'alimentation ou le cordon de raccordement fourni avec le produit. Lorsque cette protection semble avoir été endommagée, débrancher le cordon d'alimentation jusqu'à ce que la mise à la terre ait été réparée.

Mise à la terre du câble de réseau local:

- si votre réseau local s'étend sur une zone desservie par plus d'un système de distribution de puissance, assurez-vous que les prises de terre de sécurité soient convenablement interconnectées.
- Les câbles de réseaux locaux peuvent occasionnellement être soumis à des surtensions transitoires dangereuses (telles que la foudre ou des perturbations dans le réseau d'alimentation public). Manipulez les composants métalliques du réseau avec précautions.

Aucune pièce contenue à l'intérieur de ce produit ne peut être réparée par l'utilisateur. Tout dépannage, réglage, entretien ou réparation devra être confié exclusivement à un personnel qualifié.

Cet appareil ne comporte pas de commutateur principal ; la mise sous tension est effectuée par branchement du cordon d'alimentation.

Hinweise zur Sicherheit

Sicherheitssymbole.

	Symbol für Dokumentationsverweis. Wenn das Produkt mit diesem Symbol markiert ist, schlagen Sie bitte in der Produktdokumentation nach, um mehr Informationen über das Produkt zu erhalten.
WARNING	Eine WARNING in der Dokumentation symbolisiert eine Gefahr, die Verletzungen oder sogar Todesfälle verursachen kann.
CAUTION	CAUTION in der Dokumentation symbolisiert eine Gefahr, die das Gerät beschädigen kann.

Fahren Sie nach dem Hinweis WARNING oder CAUTION erst fort, nachdem Sie den Gefahrenzustand verstanden und die entsprechenden Maßnahmen ergriffen haben.

Dies ist ein Gerät der Sicherheitsklasse I und verfügt über einen schützenden Erdungsterminal. Der Betrieb des Geräts erfordert eine ununterbrochene Sicherheitserdung von der Hauptstromquelle zu den Geräteingabeterminals, den Netzkabeln oder dem mit Strom belieferten Netzkabelsatz voraus. Sobald Grund zur Annahme besteht, daß der Schutz beeinträchtigt worden ist, das Netzkabel aus der Wandsteckdose herausziehen, bis die Erdung wiederhergestellt ist.

Für LAN-Kabelerdung:

- Wenn Ihr LAN ein Gebiet umfaßt, das von mehr als einem Stromverteilungssystem beliefert wird, müssen Sie sich vergewissern, daß die Sicherheitserdungen fest untereinander verbunden sind.
- LAN-Kabel können gelegentlich gefährlichen Übergangsspannungen ausgesetzt werden (beispielsweise durch Blitz oder Störungen in dem Starkstromnetz des Elektrizitätswerks). Bei der Handhabung exponierter Metallbestandteile des Netzwerkes Vorsicht walten lassen.

Dieses Gerät enthält innen keine durch den Benutzer zu wartenden Teile. Wartungs-, Anpassungs-, Instandhaltungs- oder Reparaturarbeiten dürfen nur von geschultem Bedienungspersonal durchgeführt werden.

Dieses Gerät hat keinen Netzschalter; es wird beim Anschließen des Netzkabels eingeschaltet.

Considerazioni sulla sicurezza

Simboli di sicurezza.

	Simbolo di riferimento alla documentazione. Se il prodotto è contrassegnato da questo simbolo, fare riferimento alla documentazione sul prodotto per ulteriori informazioni su di esso.
WARNING	La dicitura WARNING denota un pericolo che può causare lesioni o morte.
CAUTION	La dicitura CAUTION denota un pericolo che può danneggiare le attrezzature.

Non procedere oltre un avviso di WARNING o di CAUTION prima di aver compreso le condizioni di rischio e aver provveduto alle misure del caso.

Questo prodotto è omologato nella classe di sicurezza I ed ha un terminale protettivo di collegamento a terra. Dev'essere installato un collegamento a terra di sicurezza, non interrompibile che vada dalla fonte d'alimentazione principale ai terminali d'entrata, al cavo d'alimentazione oppure al set cavo d'alimentazione fornito con il prodotto. Ogniqualvolta vi sia probabilità di danneggiamento della protezione, disinserite il cavo d'alimentazione fino a quando il collegamento a terra non sia stato ripristinato.

Per la messa a terra dei cavi LAN:

- se la vostra LAN copre un'area servita da più di un sistema di distribuzione elettrica, accertatevi che i collegamenti a terra di sicurezza siano ben collegati fra loro;
- i cavi LAN possono occasionalmente andare soggetti a pericolose tensioni transitorie (ad esempio, provocate da lampi o disturbi nella griglia d'alimentazione della società elettrica); siate cauti nel toccare parti esposte in metallo della rete.

Nessun componente di questo prodotto può essere riparato dall'utente. Qualsiasi lavoro di riparazione, messa a punto, manutenzione o assistenza va effettuato esclusivamente da personale specializzato.

Questo apparato non possiede un commutatore principale; si mette scotto tensione all'inserirsi il cavo d'alimentazione.

Consideraciones sobre seguridad

Símbolos de seguridad.

	Símbolo de referencia a la documentación. Si el producto va marcado con este símbolo, consultar la documentación del producto a fin de obtener mayor información sobre el producto.
WARNING	Una WARNING en la documentación señala un riesgo que podría resultar en lesiones o la muerte.
CAUTION	Una CAUTION en la documentación señala un riesgo que podría resultar en averías al equipo.

No proseguir después de un símbolo de WARNING o CAUTION hasta no haber entendido las condiciones peligrosas y haber tomado las medidas apropiadas.

Este aparato se enmarca dentro de la clase I de seguridad y se encuentra protegido por una borna de puesta a tierra. Es preciso que exista una puesta a tierra continua desde la toma de alimentación eléctrica hasta las bornas de los cables de entrada del aparato, el cable de alimentación o el juego de cable de alimentación suministrado. Si existe la probabilidad de que la protección a tierra haya sufrido desperfectos, desenchufar el cable de alimentación hasta haberse subsanado el problema.

Puesta a tierra del cable de la red local (LAN):

- Si la LAN abarca un área cuyo suministro eléctrico proviene de más de una red de distribución de electricidad, cerciorarse de que las puestas a tierra estén conectadas entre sí de modo seguro.
- Es posible que los cables de la LAN se vean sometidos de vez en cuando a voltajes momentáneos que entrañen peligro (rayos o alteraciones en la red de energía eléctrica). Manejar con precaución los componentes de metal de la LAN que estén al descubierto.

Este aparato no contiene pieza alguna susceptible de reparación por parte del usuario. Todas las reparaciones, ajustes o servicio de mantenimiento debe realizarlos solamente el técnico.

Este producto no tiene interruptor de potencia; se activa cuando se enchufa el cable de alimentación.

Safety Information *(Japanese)*

安全性の考慮

安全記号

マニュアル参照記号。製品にこの記号がついている場合はマニュアルを参照し、注意事項等をご確認ください。

WARNING　マニュアル中の「WARNING」は人身事故の原因となる危険を示します。

CAUTION　マニュアル中の「CAUTION」は装置破損の原因となる危険を示します。

「WARNING」や「CAUTION」の項は飛ばさないで必ずお読みください。危険性に関する記載事項をよく読み、正しい手順に従った上で次の事項に進んでください。

これは安全性クラスIの製品で保護用接地端子を備えています。主電源から製品の入力配線端子、電源コード、または添付の電源コード・セットまでの間、切れ目のない安全接地が存在することが必要です。もしこの保護回路が損なわれたことが推測されるときは、接地が修復されるまで電源コードを外しておいてください。

LAN ケーブルの接地に関して:

- もし貴社の LAN が複数の配電システムにより電力を受けている領域をカバーしている場合には、それらのシステムの安全接地が確実に相互に結合されていることを確認してください。
- LAN ケーブルは時として危険な過度電圧（例えば雷や、配電設備の電力網での障害）にさらされることがあります。露出した金属部分の取扱いには十分な注意をはらってください。

本製品の内部にはユーザーが修理できる部品はありません。サービス、調整、保守および修理はサービス訓練を受けた専門家におまかせください。

本製品には電源スイッチがありません。電源コードを接続したとき電源入となります。

Regulatory Statements

FCC Class A Statement (for U.S.A. Only) when using unshielded cables.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area may cause harmful interference in which case the user will be required to correct the interference at his own expense.

FCC Statement (For U.S.A. Only)
Federal Communications Commission Radio Frequency Interference Statement.

Warning: This equipment generates, uses, and can radiate radio frequency energy. If it is not installed and used in accordance with the instruction manual, it may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment.

If this equipment causes interference to radio reception (which can be determined by unplugging the power cord from the equipment) try these measures: Re-orient the receiving antenna. Relocate the equipment with respect to the receiver. Plug the equipment and receiver into different branch circuits. Consult your dealer or an experienced technician for additional suggestions.

FCC Part 68. General Requirements

- This equipment complies with part 68 of the FCC rules. On the back of this equipment is a label that contains, among other information, the FCC registration number and ringer equivalence number (REN) for this equipment. If requested, this information must be provided to the telephone company.

  This Model J3138A has the FCC Digital Interface Code of 02IS5. The FCC Service Order Code is 6.0N.
- The REN is used to determine the quantity of devices which may be connected to the telephone line. Excessive REN's on the telephone line may result in the devices not ringing in response to an incoming call. In most, but not all areas, the sum of the REN's should not exceed five (5.0). To be certain of the number of devices that may be connected to the line, as determined by the total REN's, contact the telephone company to determine the maximum REN for the calling area.
- No USOC jacks have yet been specified for ISDN equipment.

  An FCC compliant telephone cord and modular plug is provided with this equipment. This equipment is designed to be connected to the telephone network or premises wiring using a compatible modular jack which is Part 68 compliant.
- This equipment cannot be used on telephone company-provided coin service. Connection to Party Line Service is subject to state tariffs.
- If this equipment causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. If advance notice isn't practical, the telephone company will notify the customer as soon as possible. Also, you will be advised of your right to file a complaint with the FCC if you believe it is necessary.
- The telephone company may make changes in its facilities, equipment, operations, or procedures that could affect the operation of the equipment. If this happens, the telephone company will provide advance notice in order for you to make the necessary modifications in order to maintain uninterrupted service.
- If trouble is experienced with this equipment, please contact Hewlett-Packard Company warranty information. If the trouble is causing harm to the telephone network, the telephone company may request you remove the equipment from the network until the problem is resolved.
- No repairs can be done by the customer.
- It is recommended that the customer install and AC surge arrestor in the AC outlet to which this device is connected. This is to avoid damaging the equipment caused by local lightning strikes and other electrical surges.

For service:

Hewlett-Packard Company
3625 Cincinnati Avenue
Rocklin, California 95765-1288

VCCI Class 1 (For Japan Only).

注意

この装置は、情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）の基準に基づく第一種情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

Note

This is a class A product. In a domestic environment, this product may cause radio interference, in which case the user may be required to take adequate measures.

Complies with Canadian EMC Class A requirements.

European Community

This equipment complies with ISO/IEC Guide 22 and EN55022 Class A with unshielded cables and EN55022.

With unshielded cables this is a Class A product. In a domestic environment, this product may cause radio interference, in which case the user may be required to take adequate measure.

Canada

This product complies with Class A Canadian EMC requirements when using unshielded cables and Class B EMC requirements when using shielded cables.

NOTE

This is a class A product. In a domestic environment, this product may cause radio interference, in which case the user may be required to take adequate measures.

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Technical information in this document is subject to change without notice.

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