Installation and Reference Guide

HP J3233B
HP J3234B
HP J3272A
HP J3247A
HP J3248A

HP AdvanceStack 100Base-T Hubs and Switch Modules

Publication Number
5967-2285
Edition 1
April 1998

Applicable Product
HP J3233B AdvanceStack 100Base-T Hub-12TXM
HP J3234B AdvanceStack 100Base-T Hub-12TX
HP J3272A AdvanceStack 100Base-T Hub-24TX
HP J3247A AdvanceStack 10/100TX Switch Port Module
HP J3248A AdvanceStack 100FX Switch Port Module

Disclaimer
The information contained in this document is subject to change without notice. HEWLETT-PACKARD COMPANY MAKES NO WARRANTY OF ANY KIND WITH REGARD TO THIS MATERIAL, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Hewlett-Packard shall not be liable for errors contained herein or for incidental or consequential damages in connection with the furnishing, performance, or use of this material.

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 booklet 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

Package Contents

Carefully unpack the contents of the package and verify them against the checklist given below. This checklist applies to both the HP AdvanceStack 100Base-T Hub-12TXM, the HP AdvanceStack 100Base-T Hub-12TX, and the HP AdvanceStack 100Base-T Hub-24TX.

Package Checklist

☑ **HP J3233B AdvanceStack 100Base-T Hub-12TXM**
Fast Ethernet Stackable Hub with 12 100Base-TX Ports; including SNMP Management Support

or

HP J3234B AdvanceStack 100Base-T Hub-12TX
Fast Ethernet Stackable Hub with 12 100Base-TX Ports

or

HP J3272A AdvanceStack 100Base-T Hub-24TX
Fast Ethernet Stackable Hub with 24 100Base-TX Ports

with optional

HP J3247A 10/100TX Switch Port Module
Fast Ethernet 10/100Base-TX Switch Port Module with 1 MDI-X port and 1 MDI cascade port

or

HP J3248A 100FX Switch Port Module
Fast Ethernet 100Base-FX Switch Port Module with SC-type RX and TX ports

☑ One rack mount kit

☑ Four rubber foot pads

☑ Power cord, one of the following:

Australia/New Zealand (8120-6810)
Denmark (8120-6814)
Europe (8120-6811)
Japan (8120-6798)
Switzerland (8120-6815)
United States/Canada (8120-6812)
United Kingdom (8120-6809)

☑ One 0.2 meter Stacking Cable. Used for connecting hubs together into a stack via the Stacking Ports. Provides both data and management channels.

☑ One serial cable. Used for VT-100 console interface configuration and for out-of-band and SLIP management.

☑ Installation manual

☑ Warranty booklet

Please inform your reseller immediately should there be any wrong, missing, or damaged parts.

If possible, retain the carton, including the original packing materials. Use them again to repack the unit in case there is a need to return it for repair.

Quick Installation

Hewlett-Packard's Hub-12TX/Hub-12TXM models each contain 12 Fast Ethernet 100Base-TX, RJ-45 (MDI-X) ports, one MDI cascade port, and one Expansion Slot for an optional connection using 10/100TX and 100FX Switch Port Module. The Hub-24TX contains 24 Fast Ethernet 100Base-TX, RJ-45 (MDI-X) ports, and one MDI cascade port.

The design built into the front display panel and configuration options provides a friendly interface that simplifies installation and network troubleshooting. If you are already familiar with basic network operations, you should be able to install this hub as described below:

1. Unpack the HP 100Base-T unit.

2. Find a location close to the network devices you need to connect, and within easy reach of an electrical outlet.

3. Mount the hub on a desktop or any other flat surface. If you are installing multiple hubs, you can stack them on top of each other (after attaching the foot pads), or install them in a standard EIA 19-inch rack. Note that these hubs do not support wall mounting. See Chapter 2 for more details.

4. Connect any devices that use a standard 100Base-TX RJ-45 connector to the RJ-45 (MDI-X) station ports (for example, a workstation or server). Use 100Ω Category 5 unshielded twisted-pair (UTP) or 100Ω shielded twisted-pair (STP) cable. Also be sure that the length of any twisted-pair connection does not exceed 100 meters. (Refer to Chapter 2 for a more detailed description of calculating the maximum cable length permitted between two end nodes.)

5. If you are stacking multiple hubs, connect the Stacking Cable between the Stacking Ports (Out and In), found on the rear panel of the hub, on adjacent hubs. Run a simple chain starting at the Out port on the first managed hub (Hub-

12TXM), and ending at the In port on the last hub. No more than five hubs can be connected via the Stacking Cable.

Note: When connecting hubs with the Stacking Cable, they are all part of the same collision domain by default. Also if a Hub-12TXM is present, all of the hubs are managed by it.

6. Isolate any hubs you want to remove from the stack's collision domain.

For the Hub-12TXM, use the *Hub Configuration* screen in the VT-100 console interface. Select the *System Configuration* option from the main menu and press Enter. Select the *Hub Configuration* option from the *System Configuration* menu and press Enter. Then select a hub from the *Hub Selection* menu and press Enter. The system displays the *Hub Configuration* screen. In the Isolate field, press Enter and then use <Ctrl+N> to change the setting to Yes. Then press Enter to save the new value. See Chapter 4 for more details on using the VT-100 console interface.

For the Hub-12TX/Hub-24TX, enter the command "i" in the Status section of the *Main Configuration* menu, then press "y" to confirm the change of isolation status. Press Enter to save the new value.

7. Connect isolated hubs to the stack's main collision domain. You may do this in one of two ways.

If you have an optional 10/100TX Switch Port Module, you can connect an isolated hub to other hubs in the stack, while still segmenting the collision domains, using one of the following two methods:

- **Install the Switch Port Module in the isolated hub** in the stack. Run a connection from the 100Base-TX port on the optional 10/100TX Switch Port Module on this hub to any station port on a non-isolated hub in the stack. Make sure you connect to an MDI port on the hub if you are running off the MDI-X port on the module, or vice versa.

- **Install the Switch Port Module on a non-isolated hub** in the stack and run a connection from the Switch Port Module to a station port on the isolated hub.

When connecting a hub to the 10/100TX Switch Port Module, the maximum cable length is 100 meters. This is a bridged connection and keeps the collision domain on the isolated hub separate from the main collision domain of the other hubs in the stack.

If you do not have an available Switch Port Module, the isolated hub can be connected to the stack collision domain by the following method.

- Run straight-through, twisted-pair cable from the hub's MDI port to an MDI-X port on a switch or router. Make sure the switch or router has RJ-45 ports; if not, attach a standard MAU for the AUI port to achieve the connection.

8. Connect the overall stack to the extended network by connecting a hub to an internetwork device.

- Run straight-through, twisted-pair cable from the hub's MDI port to an MDI-X port on a switch, bridge or router. Make sure the router has RJ-45 ports; if not, attach a standard MAU for the AUI port to achieve the connection.

Notes: 1. When using the 12MDI/24MDI port, remember that port 12MDI-X/24MDI-X cannot be used.
2. If you have hubs that are isolated in the stack, in order to connect the stack collision domain to the network, use the station port of a hub that is NOT isolated.

9. Verify network communications.

- you have made all the necessary connections
- you can access any connected resources
- the hub's indicators are functioning properly
- the power cords for all connected devices are connected to a valid power source

Special Considerations to Note

The following are special considerations to note:

- When connecting an end node to the Switch Port on the Switch Port Module, the maximum cable length is 100 meters for twisted-pair cable, and two kilometers for fiber. Refer to Chapter 2 for a more detailed description of the maximum cable length permitted.
- For integrating legacy networks, the 10/100TX Switch Port Module provides for connection via either 100Base-TX or 10Base-T. A 10/100TX Switch Port Module uses auto-sensing to set the transmission speed at 10 or 100 Mbit/s, even if the target device does not support auto-negotiation (for transmission mode, full duplex or half duplex).
- The Switch Port Modules support both half-duplex and full-duplex communications. However, for this hub to correctly set the transmission mode, the attached device must also support auto-negotiation. If auto-negotiation fails, the transmission mode defaults to half duplex. If this setting is not suitable, then the transmission mode must be manually configured using the *Exp Slot Configuration* screen in the VT-100 console interface (see Chapter 4).
- To reactivate auto-negotiation on the 10/100TX Switch Port Module, just unplug a connection from the Switch Port on the hub and plug it in again. Remember that full-duplex mode can only be used for switched (not shared) connections on its own collision domain. When connecting to a shared collision domain (i.e., another hub) set the transmission mode for half duplex.
- Depending on your network configuration, you may attain better performance by making a direct connection from the HP 100Base-T Hub to an interconnection device rather than using a Switch Port Module. Making a connection from a Switch Port Module may introduce slightly more delay.

- Make sure you connect the stack (main collision domain) to the extended network. If you have hubs in the stack that are isolated, be certain to use a station port of a hub that is NOT isolated in order to connect the stack collision domain to the extended network.
- If you are inserting a Hub-24TX into a stack of Hub-12TX/Hub-12TXMs that has been running an existing firmware revision, make sure to download the latest version of firmware so that your devices will be compatible and can connect with one another with no problems. See the section on the Xmodem Download VT-100 Interface console screen in chapter 4 for more information about firmware downloads.
- A network management station on the extended network should be able to access a Hub-12TXM in the stack in order to manage all the devices in the stack's collision domain. Make sure that the Hub-12TXM is NOT isolated, it should be in the stack's main collision domain and connected to the extended network.

About this Guide

This guide is designed for the experienced network installer. It describes how to install and operate the HP AdvanceStack 100Base-T system. After reading this manual, you should be able to use the front display panel and configure options to manage all your network connections.

This manual covers the following topics:

Chapter 1 - **Product Overview**
Brief description of Fast Ethernet, followed by a description of this hub and a summary of its important features and specifications.

Chapter 2 - **Installing the System**
Installing a HP 100Base-T hub and making basic network connections. Also includes details on performing tasks using significant components on the hub including ports and indicators.

Chapter 3 - **Setting up Network Connections**
Shows sample network configurations for a local area network.

Chapter 4 - **Configuring the System**
Describes how to manage the system via the VT-100 console interface.

Chapter 5 - **Hardware Reference**
Detailed description of indicator panel and ports.

Appendices - Troubleshooting, pin assignments, and product specifications.

Contents

Chapter 3: Setting up Network Connections 3-1

Chapter 4: Configuring the System 4-1

List of Figures

List of Tables

Chapter 1: Product Overview

Introduction to Fast Ethernet

Standard 10 Mbit/s Ethernet has served well for past generations of 286 and 386 machines performing simple file transfers. However, with the inevitable growth in corporate network size and the introduction of fully-functional 32-bit PC architectures, and operating systems running complex applications, 10 Mbit/s Ethernet has become a serious bottleneck.

Among the recent flood of choices for upgrading media bandwidth, 100 Mbit/s Fast Ethernet has the benefits of low cost, compatibility with existing Ethernet applications, and the fact that it can run on top of an installed base of twisted-pair cabling.

Moreover, by using a dual-speed switch (10 or 100 Mbit/s), Fast Ethernet can be easily integrated into an existing 10 Mbit/s Ethernet environment with no need for protocol translation or changes to network software. It also includes specifications for a media-independent interface (MII), which permits a switched connection to any of the 100Base-T sublayers; i.e., 100Base-TX (10Base-T), or 100Base-T4.

Brief Description of the HP 100Base-T Hubs

The HP 100Base-T Hubs provide a powerful and innovative LAN network enhancement and management product series. All hubs support a Fast Ethernet isolation architecture that enhances traffic management and network bandwidth utilization. This system offers the network manager a wide range of flexible configuration options, allowing you to increase your network's bandwidth tenfold or more. In

addition, the entire installation can be monitored via SNMP protocol through any network management station.

Moreover, the HP 100Base-T Hubs provide advanced network security features including “Intrusion Protection” which ensures that only designated workstations are able to transmit packets onto the network. Management access via the out-of-band serial port or in-band via Telnet is also password protected.

The basic components of this network system include:

Full Connectivity

- Provides 12 or 24 RJ-45 (MDI-X) 100Base-TX Fast Ethernet (shielded) hub ports for connecting devices to the network using straight-through shielded or unshielded twisted-pair cable (100Ω Cat 5 UTP or STP)
- 1 RJ-45 (MDI) cascade port for connection to a switch, eliminating the need for crossover cables
- 1 Expansion Slot for optional Switch Port Modules which provide a connection to 10/100Base-TX or 100Base-FX via the Switch Port
- An architecture that supports stack isolation to enhance network traffic management and bandwidth utilization
- Stacking Ports for connecting to multiple hubs in a Hub-12TX /Hub-24TX stack via a Stacking Cable
- On-board management via the RS-232 Console Port connected directly to a terminal, or to a local or remote computer (that provides a standard RS-232 port) running a VT-100 console

Hub-12TX

Fast Ethernet Stackable Hub with 12 100Base-TX Ports

The Hub-12TX conforms to the IEEE 802.3u hub specification. It also collects port statistics and records events for system administration. Basic configuration is provided by the VT-100 console interface.

This hub can be used in a standalone configuration to form a simple LAN networking two to 12 computers using the RJ-45 hub ports.

Moreover, when stacked with other hubs through the Stacking Ports and connected to an SNMP management device (e.g., the Hub-12TXM), it can be monitored and controlled through in-band or out-of-band channels.

Two to five hubs can be stacked and connected together with the Stacking Cable, each additional hub correspondingly increasing the stack's collision domain. Just one Hub-12TXM placed in a stack is sufficient to manage all other hubs.

Hub-12TXM

Fast Ethernet Stackable Hub with 12 100Base-TX Ports; including SNMP Management Support

This model conforms to both the IEEE 802.3u hub specification and the Simple Network Management Protocol (SNMP). It not only functions as a 12-port Fast Ethernet hub, but also provides an SNMP-based network management agent for monitoring and controlling various network components. It can monitor up to five hubs connected to the same stack (including itself) through the Stacking Port connection. This hub provides SNMP management for the connected stack via various Management Information Bases (MIBs), including MIB II, several hub MIBs, and a private MIB.

Hub-24TX

Fast Ethernet Stackable Hub with 24 100Base-TX Ports

The Hub-24TX conforms to the IEEE 802.3u hub specification. It functions in the same way as the Hub-12TX, except that it does not have a slot to accept the Switch Port Modules.

This hub can be used in a standalone configuration to form a simple LAN networking two to 24 computers using the RJ-45 hub ports. It can also be stacked with other hubs through the Stacking Ports and connected to an SNMP management device (e.g., the Hub-12TXM). Similarly, it can be monitored and controlled through in-band or out-of-band channels.

Switch Port Modules

100Base-TX (HP J3247A AdvanceStack 10/100TX Switch Port Module)

Provides one RJ-45 MDI-X port and one RJ-45 MDI port, of which only one can be used at a time. Transmission speed is automatically set to 10 or 100 Mbit/s via auto-sensing, and the mode is set to half or full duplex via auto-negotiation.

100Base-FX (HP J3248A AdvanceStack 100FX Switch Port Module)

Provides one SC type connector for 100Base-FX connection. Transmission speed is always 100 Mbit/s and transmission mode is manually set to half or full duplex using the VT-100 console interface.

Network Management Software

HP AdvanceStack Assistant

This Windows and Unix-based network management software discovers the HP 100Base-T hubs and displays device symbols in a Topology View, a network map that shows the placement of the hub in relation to other devices on the same stack, segment, or subnetwork.

HP AdvanceStack Assistant should be installed on the network management station designated to manage the HP 100Base-T stack. Note that you need a Hub-12TXM in your collision domain to use HP AdvanceStack Assistant via the console port. The workstation may communicate with the stack via a network connection or from a remote site (using SLIP over TCP/IP). If isolated architecture is used, the network management station should be connected to the same segment as the SNMP management agent (i.e., Hub-12TXM).

The minimal configuration for a PC network management station includes a 66MHz Intel 486 PC platform with 24 Mbytes of RAM and 30 Mbytes available space on the hard drive, a VGA display, and Windows 95 or Windows NT 3.51.

Distinguishing Features of the HP 100Base-T Hubs

The HP 100Base-T Hubs provide the following key features:

- Stack isolation architecture allowing the network to be split into multiple collision domains
- Supports fault-tolerant configuration by allowing port backup links and agent backup
- Supports management functions via SNMP
- Supports VT-100 console management
- Discovery and mapping features using HP AdvanceStack Assistant
- The VT-100 console agent supports nearly any network environment by providing management options via SNMP/IP and SNMP/IPX
- Provides security features including port intrusion protection, as well as password protection for out-of-band access or Telnet network access
- Hot swap function allows you to add/remove hubs in the stack without disrupting communications
- SNMP backup agents

Features of the HP 100Base-T Hubs

Features of the HP AdvanceStack 100Base-T Hubs are:

General Features -

Basic Hub Functions

- Transmits all incoming frames to the other hubs in the stack collision domain using the Stacking Cable
- Automatically partitions and reconnects devices which experience excessive collisions
- Jabber lockup protection provided by disabling any port that receives 64 Kbytes of continuous data, and re-enabling the port after the condition improves

Outstanding Performance

- Total bandwidth of up to 500 Mbit/s
- The Stacking Cable contains a high-speed management channel
- Manages up to five hubs using the Stacking Cable. The Hub-12TXM can manage up to four other hubs via the management channel in the Stacking Cable

Management Features -

Extensive Management Capabilities

- An extensive indicator panel for reporting network activity, unit configuration and facilitating problem diagnosis
- Menu-driven system configuration can be accessed via a local or remote terminal connection to the hub's serial port, using either a standard VT-100 terminal or a PC running a VT-100 console interface
- The Hub-12TXM with SNMP support for discovery and mapping using the HP AdvanceStack Assistant network management program
- Provides one serial 9-pin RS-232 port for local and remote out-of-band network management

- BOOTP support for dynamic address assignment
- Flash ROM on board the Hub-12TXM for easily updating the SNMP agent, using either standard firmware updating software or HP's Download Manager program, an agent downloading Windows program
- Firmware update supported for the Hub-12TXM via out-of-band Xmodem file transfer through the serial port, or TFTP file transfer over the network

Installation Features -

Easy Installation

- Flexible installation for desktop or rack (standard 19" size)
- Plug-and-play design
- Self-diagnostics
- Automatic ID assignment for auto-configuration

Standards and Architecture Compatibility -

Complete Standards Conformance

- Adapts to universal wide range voltage power (i.e., 100-240 VAC, 50-60 Hz)
- Conforms to IEEE 802.3u Class I repeater specification and 100Base-TX standard (i.e., 100 Mbit/s Fast Ethernet)
- Optional Switch Port Modules conform to relevant IEEE specifications and standards for respective media types
- Supports MIB II, Ethernet Repeater MIB, Ethernet MIB, and private MIB
- Conforms to Simple Network Management Protocol (SNMP)

Features of HP AdvanceStack Switch Port Modules

Features of the HP AdvanceStack 10/100TX and 100FX Switch Port Modules are:

Networking Flexibility (via Switch Port Modules)

- One Expansion Slot supports optional slide-in Switch Port Modules for connection to 10Base-T, 100Base-TX or 100Base-FX (on a separate collision domain)
- Transparent bridging (between stack and external device) via optional Switch Port Modules
- Uses adaptive cut-through switching (which dynamically changes among standard cut-through, fragment-free cut-through, and store-and-forward depending on the CRC error rate)
- Two transmission modes: full duplex or half duplex
- Auto-detects transmission speed at 100 Mbit/s or 10 Mbit/s (10/100TX Switch Port Module only)
- Auto-negotiates transmission mode for full duplex and half duplex (if same feature is supported by attached device); otherwise can be manually configured (10/100TX Switch Port Module only)
- Automatically learns MAC addresses to build a routing information database
- Automatically filters local traffic
- Transparent to all higher level protocols

Data Switching with the Switch Port Modules

Switching Technology

The Switch Port Modules that plug into the Expansion Slot on the front panel of the AdvanceStack Hub-12TX/Hub-12TXM use advanced switching techniques to provide a high-speed network backbone. Each Switch Port Module acts as a two-port Ethernet switch that segments the stack from the extended network.

The module scans the destination address from the packet header, searches the routing table provided for the incoming port and forwards the packet only if required, often before fully received. A learning function stores the address and corresponding segment identifier of each incoming and outgoing packet in a routing table. This information is subsequently used to filter packets whose destination address is on the same segment as the source address. This confines network traffic to its respective domain, reducing the overall load on the network.

Configuration Options for the Switch Port Modules

The Switch Port Modules can be connected to a subnetwork, or directly to a server or key workstation, or to an isolated hub in the stack. In addition to partitioning an overloaded network, they provide a connection between legacy 10Base-T networks and the newer generation 100Base-TX, and can be configured to operate in either full-duplex or half-duplex data transfer mode to support the interconnection requirements of other high-speed devices.

The 10/100Base-TX and 100Base-FX media both support full-duplex operation.

These modules perform cut-through switching, which can direct a packet according to the destination address scanned from the packet header. This technique results in packet transmission at near-zero latency.

As a device functioning on the media access control (MAC) layer, the Switch Port Modules are protocol independent, and therefore compatible with TCP/IP, NetWare, DECnet and XNS protocols. They can provide a connection between conventional 10Base-T and high-speed 100Base-TX networks; or can serve as a bridge in a 100Base-TX or 100Base-FX environment. Moreover, where traditional 100Base-TX networks restrict the maximum distance between end-nodes to 205 meters, these modules break down this barrier. By breaking your network into smaller and more manageable segments, each linked to the larger network with a Switch Port Module, the maximum distance for communications between end-nodes is unlimited (depending on the specific timing requirements of your network applications).

Switching Methods

Traditional bridges and routers use a switching method called **store-and-forward** in which the entire frame must be received before the device can perform a table look-up for the destination node and forward the packet to the corresponding port. As a result, each packet experiences a significant delay. It may be necessary to use store-and-forward when a lot of data errors are occurring over the network, or when connecting to very slow devices. Compared to this "safe" mode of operation, **cut-through** switching significantly reduces packet transmission delay by picking the destination address out of the header as soon as it is received, and directing the frame to the appropriate segment (or the backbone) long before the full packet has been received. The remaining technique, employed to improve data reliability, is called **fragment-free cut-through.** It uses a more conservative approach to cut-through that waits until the collision window has elapsed (i.e., the first full 64 bytes have been received) before processing the packet. This prevents runts from being passed along, effectively cleaning up the data stream.

Although cut-though switching is recommended as the fastest method for most applications, the other methods mentioned above are also supported by the Switch Port Modules to guarantee flawless performance. To ensure that you can manage any kind of network load, the modules use **adaptive cut-through** switching based on an algorithm. This method dynamically changes the way it handles data based on the current error rate. These switching alternatives start at standard cut-through for a clean data environment, change to fragment-free cut-through for a moderate error rate, and then progress to store-and-forward for a highly contentious environment. By using this method, the Switch Port Modules deliver the best networking performance under any environment.

Moreover, in addition to using adaptive switching to optimize throughput, these modules also support back pressure to eliminate frame loss after the switch port's buffers (that store incoming packets) fill by "blocking" unwanted traffic from being passed onto a segment.

Chapter 2: Installing the System

This chapter describes how to install the HP AdvanceStack 100Base-T Hubs and establish network connections. You may install this hub on any level surface (e.g., a table or shelf) or in a standard equipment rack. However, please take note of the following minimum site requirements before you begin.

Note: The HP 100Base-T Hubs do not support wall mounting.

Pre-Installation Requirements

Before you start actual hardware installation, make sure you can provide the right operating environment, including power requirements, sufficient physical space, and proximity to other network devices that are to be connected. Verify the following installation requirements:

- Power requirements: 100 to 240 VAC (± 10%) at 50 to 60 Hz. The hub's power supply automatically adjusts to the input voltage level.
- The hub should be located in a cool dry place, with at least 10 cm. of space at the front and back for ventilation.
- Place the hub out of direct sunlight, and away from heat sources or areas with a high amount of electromagnetic interference.
- If you intend to mount the hub in a rack, make sure you have the mounting screws, brackets, bolts and nuts, and the correct tools.
- Be sure the network cables and connectors needed for installation are available.

Hardware Installation

This hub is suitable for desktop or rack-mount installation. A good location is at the center of all the devices you want to link, close to the extended network, and near a power outlet.

These hubs can be stacked with other hubs using a mounting rack or directly on top of one another. Refer to the sections on *Stacking Hubs without a Rack* or *Mounting Hubs in a Rack* for a description of these methods.

If you don't want to stack the hub with other hubs now, or if you plan to use the hub in a standalone configuration, skip this step and proceed to *Connecting the Hub System*.

Stacking Hubs without a Rack

The hub can be stacked anywhere there is a sufficiently large flat space, such as on a table or desktop.

1. Stick the self-adhesive rubber foot pads (that come with this package) on each of the 4 hollow spaces located on the bottom of the first hub.
2. Place the first hub on a firm and flat surface in the area where you want the stack to be installed.
3. Attach the rubber feet on each hub before stacking them. They cushion the hub against shock/vibrations and provide space between each hub for ventilation.

You do not need the rack mount kit if you are not mounting the hub in a rack. Keep the mounting brackets and screws, however, for possible future use.

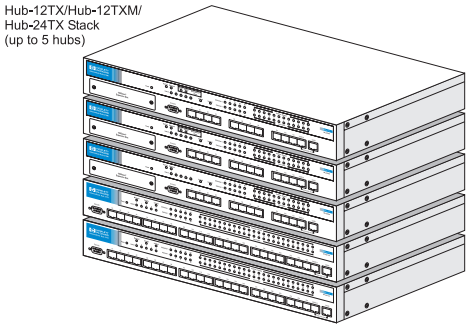


Figure 2.1 Stacking Hubs without a Rack

Mounting Hubs in a Rack

Please comply with the following instructions to ensure that your hub is securely mounted in the rack.

1. Use a standard EIA 19-inch rack.
2. Use a Phillips (i.e., cross-head) screwdriver to attach the brackets to the sides of the hub.
3. Position the hub in the rack by lining up the holes in the brackets with the appropriate holes on the rack, and then use the supplied screws to mount the hub in the rack.

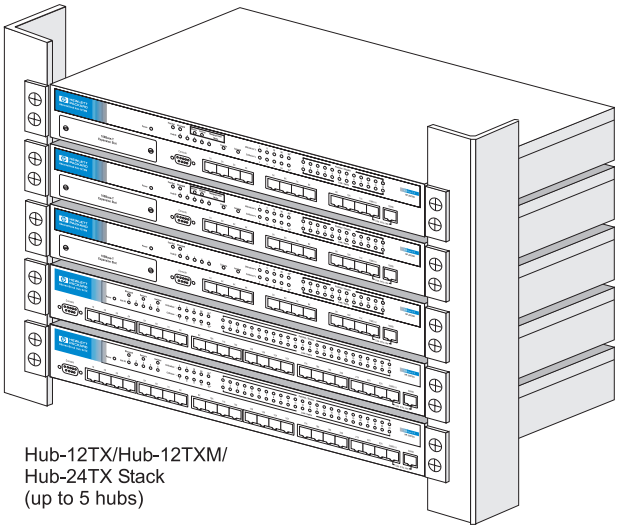


Figure 2.2 Mounting Hubs Using a Mounting Rack

Connecting the Hub System

Remember to label all your connections at both ends of the cable to facilitate troubleshooting or future changes to network configuration.

The HP 100Base-T Hubs have 12 or 24 RJ-45 shielded ports (i.e., 100Base-TX) that support connections to 100 Mbit/s Fast Ethernet. Ports 1 - 12/24 (MDI-X) allow you to connect to devices such as a workstation or server. While Port 12/Port 24 (MDI) lets you easily cascade to a compatible switch or router (i.e., connecting from MDI to MDI-X ports on either device).

The Hub-12TX/Hub-12TXM also provides an Expansion Slot for plugging in optional Switch Port Modules. These modules support a single connection to 100Base-TX (or 10Base-T) or 100Base-FX. They provide a convenient way to attach to devices which use an alternate media type (e.g., linking fiber optic cable to a remote device).

The transmission speed for 100Base-TX ports on the optional Switch Port Modules is automatically set at 10 or 100 Mbit/s to match the operating speed of the attached device. Moreover, the transmission mode of the 100Base-TX and 100Base-FX ports on the optional modules is set at full or half duplex to match the optimum capability of the attached device.

Note: Auto-negotiation sets the transmission mode automatically on the 10/100TX Switch Port Module, but not on the 100Base-FX module. You need to manually set the transmission mode in the 100Base-FX module using the VT-100 console interface.

Making a Connection via an MDI-X Hub Port

You can connect an RJ-45 station port on the hub to any device that uses a standard 100Base-TX (802.3u), RJ-45 compliant network interface, such as a workstation or server, or also to a router (depending on the port type implemented).

1. Prepare the network devices you wish to network. Make sure you have installed suitable 100Base-TX LAN adapters in the end nodes before making a connection to any of the hub's ports. You also need to prepare straight-through

100Ω Category 5 shielded or unshielded twisted-pair cables with RJ-45 plugs at both ends.

2. Connect one end of the cable to the RJ-45 port of the network device, and the other end to any available (MDI-X) port on the hub. Just remember that if you use Port 12MDI-X or Port 24MDI-X, the cascade port (12MDI/24MDI) cannot be used. When inserting an RJ-45 plug, be sure the tab on the plug clicks into position to ensure that it is properly seated. Using the hub in either a stack or a standalone configuration, you can network up to 12 or 24 nodes. Note that a stack can have up to 120 nodes.

Do not plug a phone jack connector into the RJ-45 port. This may damage the hub. Instead, use only twisted-pair cables with RJ-45 connectors that conform with FCC standards.

Notes:
1. Make sure each twisted-pair cable does not exceed 100 meters.
2. We advise using Category 5 cable for all network connections to avoid any confusion or inconvenience in the future when you upgrade attached devices to Fast Ethernet.
3. You may also connect a device to the Switch Port located on the hub's front panel if required. However, be sure you use a Switch Port Module that meets your communication requirements. Refer to *Data Switching with the Switch Port Modules* in Chapter 1 for more details.
4. To facilitate troubleshooting, label all network cables to indicate the attached device and location.

Connecting the Stacking Cable

Plug one end of the Stacking Cable (provided with the base package) in the Out port of the top hub and the other end to the In port of the next hub. Repeat this step for each hub in the stack. Form a simple chain starting at the Out port on the first hub and ending at the In port on the last hub. Refer to the Stacking Ports section in Chapter 5 for related information.

Hubs in a stack can only be managed by the network management agent through the Stacking Cable. In a managed stack, you should therefore use the Stacking Ports to make Out to In connections, with a management agent (i.e., a Hub-12TXM) included in the chain.

Making a Connection via the MDI Cascade Port

The HP 100Base-T Hub is a Class I repeater. Class I repeaters cannot be cascaded to another hub in the same collision domain.

The cascade port can only be connected to another device which breaks up the collision domain (e.g., an Ethernet switch).

Stackable Fast Ethernet hubs are generally restricted to Class I repeater types due to the timing requirements for passing traffic through the Stacking Cable. Although Class I repeaters cannot be cascaded to another device in the same collision domain via the cascade port, more powerful interconnection options are provided via the hub's Stacking Cable and optional Switch Port Modules.

The MDI port can only be connected to another device which breaks up the collision domain (e.g., an Ethernet switch).

Prepare straight-through 100Ω Category 5 shielded or unshielded twisted-pair cables with RJ-45 plugs at both ends. Connect one end of the cable to the 12MDI/24MDI port on this hub, and the other end to a standard MDI-X station port on the other device. Remember that when using the cascade port (12MDI/24MDI), hub port 12MDI-X/24MDI-X cannot be used. When inserting an RJ-45 plug, be sure the tab on the plug clicks into position to ensure that it is properly seated.

Notes:
1. Make sure the length of twisted-pair cable does not exceed 100 meters.
2. To connect to another device (i.e., anything other than a repeater), you may also run straight-through twisted-pair cabling from an MDI-X port on this hub to an MDI port on the other device. However, if you must connect to another device via station ports at both ends of the cable, use crossover cabling.

Connecting to a Switch Port Module

The AdvanceStack Hub-12TX/Hub-12TXM includes a network Expansion Slot on the front panel that supports connection to 10/100Base-TX or 100Base-FX. The 10/100TX Switch Port Module acts as a two-port switch that can forward and filter data frames at media speed. One port is connected to the hub's internal repeater bus, while the other port (on the hub's front panel) can be used to connect the hub to any compatible network device. The optional Switch Port Modules include:

10/100Base-TX - HP J3247A AdvanceStack 10/100TX Switch Port Module

100Base-FX - HP J3248A AdvanceStack 100FX Switch Port Module

Note: The 10/100TX Switch Port Module automatically adjusts to 10 or 100 Mbit/s using auto-sensing.

The Switch Port Modules are not hot-swappable. Be sure you power off the hub before installing or removing these modules.

Installing a Switch Port Module - If you need to install a Switch Port Module, take the following steps:

Retain the face plate for possible future use.

1. Disconnect power to the hub.
2. Remove the face plate on the Expansion Slot (or a previously installed Switch Port Module) by removing the two screws with a Phillips (i.e., cross-head) screwdriver.
3. Before opening the package that contains the module, touch the bag to the hub casing to discharge any potential static electricity.
4. Remove the module from the anti-static shielded bag.
5. Holding the module level, gently insert the module, ensuring that it engages the guides. Then insert it all the way.
6. If you are sure the module is properly mated with the connector, replace the retainer screws to secure the module in the Expansion Slot.
7. Run the corresponding media type between the Switch Port Module and the target device.

Connecting Twisted-pair Cabling - For the 10/100Base-TX module, prepare Category 5 straight-through twisted-pair cables with RJ-45 plugs at both ends. When connecting the module directly to an end-node device (e.g., a workstation or file server), a bridge or router, run cable from the MDI-X port on the Switch Port Module to the target device. However, when connecting the module to a hub or switch, connect one end of the cable to the MDI port on the module, and the other end to an MDI-X port

Avoid running your cables near equipment that may generate electromagnetic interference.

on the target device (or vice versa). When inserting an RJ-45 plug, be sure the tab on the plug clicks into position to ensure that it is properly seated. Note that the length of twisted-pair cable should not exceed 100 meters.

Connecting Fiber Optic Cabling - For the 100Base-FX module, prepare fiber optic cable with SC-type connectors at both ends. When connecting the module directly to an end-node device (e.g., workstation or file server), run cable from the Rx (Tx) port on the module to the Tx (Rx) port on the target device (i.e., two separate cables). Also, when cascading Switch Port Modules, make similar connections between the current module and the next device in the stack (i.e., using two separate cables). When inserting a cable, be sure the tab on the plug clicks into position, to ensure that it is properly seated. Note that as a general rule, the length of fiber optic cable for a single switched link should not exceed 2 kilometers. However, timing constraints and power budgeting must also be considered when calculating the maximum cable length for your specific environment.

Collision Domain Timing Constraints - Where fiber optic cable and twisted-pair links exist in a single collision domain with other repeater devices, the fiber length has to be limited to satisfy Fast Ethernet timing constraints. The following table should be used as a guide for the maximum fiber length as applied in four basic topology models (IEEE802.3u).

Basic Topology Model	Max. Fiber Length
Single Switched Link - full duplex	2000 m
- half duplex	412 m
With Class I Repeater - TX/FX links only	160 m
- if any T4 links present	131 m
With 1 Class II Repeater - TX/FX links only	208 m
With 2 Class II Repeaters - TX/FX links only	111 m

Table 2.1 Maximum Fiber Lengths for Basic Topology Models

Distance Limit and Power Loss in Fiber Optics - When using fiber optic cabling, the maximum length between two hubs can be up to 2 kilometers. However, you must consider power loss when calculating the actual length of cable that can be used with your system. You can calculate power loss with the following formula:

$$m = \frac{(p\ dB - i\ dB)}{c\ dB/km}$$

Variable	Description
m	cable length (kilometers)
p dB	power budget
i dB	intervening devices (e.g., patch cables and splices)
c dB/km	loss per kilometer of cable

Table 2.2 Calculating the Power Budget for Fiber Optic Devices

Note: To determine the power loss incurred by intervening devices and specific cable type, inquire with the manufacturer. The power budget depends on the gauge of cable as shown below.

Gauge of Fiber Cable	Power Budget
50/125 µm	9.2 dB
62.5/125 µm	13 dB

Table 2.3 Power Budget for Common Fiber Optic Devices

For a sample calculation, assume the following values:

- cable gauge - 62.5/125 µm, which means a 13 dB power budget,
- 2 patch panels along the path, each with 1.5 dB power loss,
- 1 splice with 1 dB power loss, and
- inherent power loss in the cable is 4 dB/km

The maximum cable length is therefore:

$$m = \frac{13\ dB - 4\ dB}{4\ dB/km} = 2.25\ km$$

Note: Even though your calculations for power loss may indicate a longer permissible length based on signal strength (as seen in the preceding example), we advise remaining within the recommended limits.

When the 100Base-FX link is set for the full-duplex communications (i.e., a dedicated connection), cable length should not exceed 2 kilometers. However, when the link is set for half-duplex communications (i.e., a shared collision domain), cable length should not exceed 412 meters (IEEE 802.3u). Also cable length could be limited further by timing constraints depending on what devices exist in the same shared collision domain. (See preceding section.)

Maximum Segment Length - In contrast to cascading devices through hub ports, cascading through the Switch Port Module breaks up the collision domain. The number of devices that can be cascaded is therefore theoretically unlimited. However, in practice, the length of a cascade (even one passing through Switch Ports, as implemented in the modules) may be limited by the time-out requirements of the particular applications running over the network.

Setting the Communication Mode - The 10/100TX and 100FX Switch Port Modules both support half and full-duplex communications. The 10/100Base-TX module uses auto-negotiation to determine the transmission mode for any new connection made. Note that the module attempts to detect if the connecting device is using full duplex. If it is not, then the next test is for half duplex communication. However, if a connected device does not also support auto-negotiation, and a link cannot be established using half duplex (i.e., the last state tested by auto-negotiation), then you must manually set the transmission mode for the concerned port to full or half duplex via the VT-100 console interface (Chapter 4). The transmission mode for the 100Base-FX module must be set manually as the 100Base-FX standard does not support auto-negotiation.

Bridging Functions - The Switch Port Modules form a separate collision domain from the rest of the ports in the stack. They therefore provide fully transparent or learning bridging functions which enable the module to automatically learn node addresses required to filter and forward traffic based on the destination address (i.e., traffic is filtered if the destination

address is in the local collision domain, or forwarded if the destination is in a remote collision domain).

Note: Devices connected to the Switch Port Module exist in a separate collision domain, and cannot be controlled by a management agent in the stack.

Switching Functions - These modules also provide functions commonly found on an Ethernet switch. The scheme used to process data packets is automatically adjusted to optimize system performance. Cut-through, fragment-free cut-through, or store-and-forward processing may be used depending on the current error rate. (Refer to Data Switching with the Switch Port Modules in Chapter 1 for a detailed discussion of these processing methods.)

In addition to the features listed above, the Switch Port Modules also use back pressure to eliminate frame loss when its port buffers fill, by "slowing" the traffic received from end stations connected directly to this port. This prevents packets being dropped due to full buffers.

Interconnecting Stack Segments - Any hub can be completely isolated from others in the stack (an isolated collision domain). Only when the hub is attached to the stack's collision domain can it communicate with all hubs in the stack. (Refer to the discussion on Configuring Hub Parameters in Chapter 4.)

The best way to interconnect isolated hubs in a stack is to connect a 10/100TX Switch Port Module on one hub to a port on an isolated hub, using an MDI to MDI-X connection. Switch Port Modules can be used in this way to interconnect all isolated hubs in a stack. Refer to Chapter 3 for various interconnection examples.

Powering on the Hub

1. Plug one end of the power cord into a power outlet, and the other end into the power socket at the rear of the hub (in that order for reasons of safety).
2. Check the LED indicator marked Power on the front panel to see if it is on.
3. The hub performs a self-diagnostic test upon power-on. (Note that this test takes about 50 seconds to complete.) For details about the system self-diagnostic test, refer to the following section.

The unit supports a "hot swap" feature which permits you to connect/disconnect Stacking Cables without powering off the hub and without disrupting the operation of the hubs in the stack. However, when changing Switch Port Modules, first disconnect power to the concerned hub.

Diagnostic Tests

Upon power on, the system performs an internal self-diagnostic test of major hub components. If any component fails during the test, the hub will try to complete the diagnostic procedure. Otherwise, the system will halt. For related information, refer to Diagnostic Test Indicators in Chapter 5.

Note: You can run system diagnostics at any time via the VT-100 console interface (by selecting *Restart the Agent* option). However, when testing begins, the system leaves normal operation. If no problem is encountered by diagnostics, the system automatically returns to normal operation.

Hot Swap

The HP 100Base-T Hubs support a "hot swap" capability that allows you to connect/disconnect hubs or media connectors from the system with minimal disruption to the network. You can remove any network cabling without affecting traffic passing across the internal repeater bus. However, if the Stacking Cable is disconnected at any point in the stack, or is not properly terminated, all Ethernet and management traffic passing through the cable will be disrupted.

When changing modules in the Expansion Slot, first disconnect power to the concerned hub.

Configuring a Manageable Stack

To manage the stack with the VT-100 console interface, the stack must include a Hub-12TXM (i.e., a unit with an SNMP agent).

You should also consider adding a backup SNMP agent to provide greater management reliability for critical applications. The procedures required to install these system components are described below.

Installing an SNMP Backup Agent

The VT-100 console interface only provides access to the private MIB.

Just add the Hub-12TXM(s) to the stack and let the system automatically choose the Master agent and the backup agent based on position in the Stacking Cable chain. The Master indicator on the device chosen as the primary agent will turn ON. The Backup indicator will turn ON for all other Hub-12TXMs.

Verifying Port Status

Check each connection by viewing the port status indicators listed below. (For a more detailed description on these indicators, refer to Chapter 5.)

LED	Color	State	Indication
Link	green	On	Port has established a valid network connection. The RJ-45 plug has been properly seated in the RJ-45 port.
Traffic	green	Blinking	Traffic is traversing the port.
Tx/Rx	green	Blinking	Traffic is traversing the port.
100[1]	green	On	Communications have been set to a speed of 100 Mbit/s.
FDX	green	On	Communications have been set to full-duplex mode.

1. The indicator appears on the front of the 10/100TX Switch Port Module.

Table 2.4 Checking Key LED Indicators

If the Link status indicator is not functioning properly, or you experience any other difficulties in setting up the switch, refer to Appendix A.

Verifying System Operation

Verify that all attached devices have a valid connection. The hub monitors link status for each port. If any device is properly connected to the hub and transmitting a link beat signal, the Link indicator lights for the corresponding port. If the Link indicator fails to light when you connect a device to the hub, check the following items:

- Be sure the media cable is properly attached to the connected device and the hub. Verify that the cable connector snaps into place when attached.
- See if the media cable is functioning properly by using it for another port and attached device that displays valid indications when connected to the network.

- Verify that you have not exceeded the specified limits for any attached media type as summarized in the following table:

Media Type	Maximum Length (meters)
Twisted Pair	100
Fiber Optic	412 (single switched link - at half duplex) 2000 (single switched link - at full duplex) 160 (with Class I repeater - TX/FX links only) 131 (with Class I repeater - if any T4 links present) 208 (with 1 Class II repeater - TX/FX links only) 111 (with 2 Class II repeaters - TX/FX links only)

Table 2.5 Maximum Cable Length

- If a computer is attached to the hub, verify that its LAN adapter is functioning properly by trying it in another computer that has been successfully connected to the network.
- When using a 10/100TX or 100FX Switch Port Module, both sides of each connection must use the same transmission mode (i.e., full or half duplex). If the device connected to the hub operates at full duplex but does not support auto-negotiation, then you must manually set the transmission mode via the VT-100 console interface. (Refer to section on Setting the Communication Mode earlier in this chapter.)
- Verify that your cable is Category 5.

If you still can't resolve the problem, please refer to Troubleshooting in Appendix A.

Chapter 3: Setting up Network Connections

This chapter outlines several sample configurations for a local area network utilizing specific features of an HP 100Base-T Hubs stack.

As described in Chapter 2, up to five HP 100Base-T Hubs can be connected together using the Stacking Cable, which attaches to the Stacking Ports (on the rear panel), to create a complete hub stack. Hubs connected in this way form a single collision domain that extends across all hubs in the stack. To exclude a hub in the stack from this collision domain, it is possible to "isolate" it through configuration options in the VT-100 console interface (refer to Chapter 4 for details). Using the HP 100Base-T Hubs stack isolation architecture together with optional Switch Port Modules provides considerable flexibility when setting up network connections.

Special Architecture Used for the HP 100Base-T Hubs

Isolation Architecture

The HP 100Base-T Hubs support stack connections, or isolation connections, for each hub. You can choose to attach a hub to the stack collision domain, or leave it isolated except for the management channel. This type of architecture makes the system more flexible, provides better traffic load sharing and data protection, improves network bandwidth utilization, and simplifies troubleshooting.

Carefully plan your network setup to make this architecture work well for your system. Form a common domain for devices that need to frequently communicate with each other by attaching them to the stack and isolate hubs containing heavy traffic that do not need to communicate with the stack but need to be managed. In this way you can arrange network

resources to balance traffic and thereby increase overall network efficiency.

To combine the separate collision domains into an interconnected network, attach each hub to a switch or similar device, such as one of HP's AdvanceStack switches, or use the optional Switch Port Modules.

Stacking Cable Management Channel

To manage other hubs by an SNMP agent (i.e., Hub-12TXM), the hubs must all be connected by the Stacking Cable which contains a management channel. The management link in a chain of cascaded hubs must be connected to discover and place the stack in an HP AdvanceStack Assistant Topology View. At most, five hubs can be managed and linked together using the Stacking Cable connection.

Hub ID Setting

In a stacked system, each hub should have a unique ID number to identify itself. Each hub automatically sets an ID number if attached to an SNMP management agent (i.e., Hub-12TXM) through the Stacking Port. When a new hub is inserted in the stack, the next available hub identifier is assigned to the new hub (i.e., the identifier numbers are not changed for previously configured hubs). When the stack includes a management agent, you can also set hub IDs using the VT-100 console interface. Refer to the section on the VT-100 console interface screen Hub Configuration in Chapter 4 for more information.

Using Management Agents

The Hub-12TXM includes an SNMP management agent. To add SNMP functionality to an entire stack, a Hub-12TXM must be included in the stack. You may include multiple agents in a stack to provide a fail-safe backup management agent.

SNMP Backup Agent

The HP 100Base-T Hubs system supports a backup function for the management agent. This special function allows the stack to have two or more SNMP network management agents, wherein one agent is configured as the Master agent and others as Backup agents.

The agent in backup mode behaves as a Hub-12TX/Hub-24TX. But if the Master agent fails, the Backup agent takes over its functions using the latest data mirrored from the Master, including its IP address. Note that to manage the stack out-of-band after the Backup has assumed control, you must plug your PC or modem into the serial port of the Backup agent. If you are using HP AdvanceStack Assistant, just ensure that your network management station can access the new control agent via its current network connection.

Note: Placing redundant agents in a stack will cause the system to set the agent at the top of the Stacking Cable chain as the Master, and the others as Backups. If more than one backup exists in a stack, the backup agent higher up the Stacking Cable chain will be chosen to function as the Master if it fails. Moreover, if a new agent is added to the top of the Stacking Cable chain, the system will set this as the Master and mirror the latest data from the agent with the longest up-time.

Backup Links Function

The HP 100Base-T Hubs system supports a backup link function (i.e., a redundant link), provided a Hub-12TXM is included in the stack. A hub system can have up to 10 pairs of Backup Links. These links are configurable using the VT-100 console interface. When a primary link fails, the backup (i.e., secondary) link automatically takes over. To configure Backup Links, go to the *Backup Links* menu in the VT-100 console interface for the Hub 12-TXM.

Notes:
1. To prevent traffic from looping, the primary port is enabled and the backup link port disabled. If the system is functioning normally, the Link indicator for the primary port and the Partition indicator for the backup link port will be on.
2. It is common practice to attach these links to the same physical device (e.g., two separate adapter cards on a critical server). However, to provide more flexibility, this is not enforced by the VT-100 console interface.

Security Features

Intrusion Protection

Any port on the hub can be configured with an authorized source address. If an unauthorized intruder is detected, the network management station can be notified, or a trap can be sent and the port disabled.

Sample Network Configurations

The HP 100Base-T Hubs are designed to provide flexibility in configuring network connections. This hub can be used as a simple standalone hub or connected to other network interconnection devices in various configurations. This section includes sample applications, most of which take advantage of the hub's isolation technique, using the Switch Port Modules. Pay attention to the examples that illustrate how to isolate a hub from the stack.

Connecting Hubs to the Stack

All hubs in a stacked system are by definition connected with the Stacking Cable. In this example, a stacked system using the Stacking Cable through the Stacking Ports, connects five hubs together in a single collision domain.

Note that connecting all hubs in the same stack groups all nodes attached to the stack in a single collision domain. All Ethernet frames transmitted by any node are seen by every other node in the stack. For a heavily loaded network, you can significantly improve performance by isolating a hub from the stack. For more information on isolating a hub, see the next procedure.

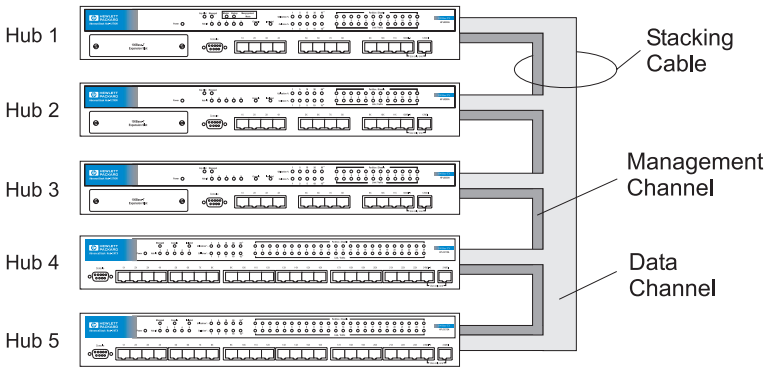


Figure 3.1 Attaching All Hubs to the Stack Collision Domain

Isolating Specific Hub Connections

You can connect or isolate the hubs in a stack. In a stacked system, some hubs may be connected to the stack collision domain while others are isolated. In this example, hubs 1, 2, 3 and 4 are in the stack while hub 5 is isolated from the stack. To isolate hubs from the stack use the *Hub Configuration* screen in the VT-100 console interface (see the Hub Configuration screen in the VT-100 console interface in Chapter 4). Note that the collision domain of the isolated hub (hub 5) is separated from the collision domain of the hubs in the stack (hubs 1, 2, 3 and 4). This technique is very useful in instances when one hub is receiving unusually high traffic and may be slowing the traffic on all of the hubs in the stack. Hub 5 is providing improved performance because traffic associated with it is removed from the stack. With careful planning, you can restrict access for specific user groups to required connections only.

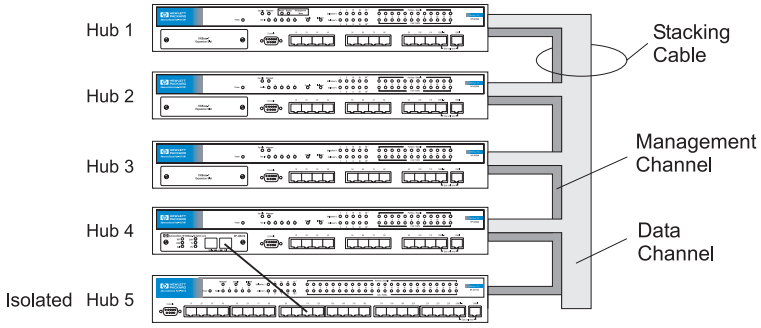


Figure 3.2 Linking Part of the Stack to the Stack Collision Domain with Straight-through, Category 5 Twisted-pair Cable

Note: A hub isolated from the stack collision domain can still be managed via the management channel, even though the hub is not receiving or transmitting network traffic through the Stacking Cable.

Isolating Multiple Hubs

In this example, each isolated hub has its own collision domain. Hubs 1 to 5 are not transmitting network traffic to other hubs through the Stacking Cable.

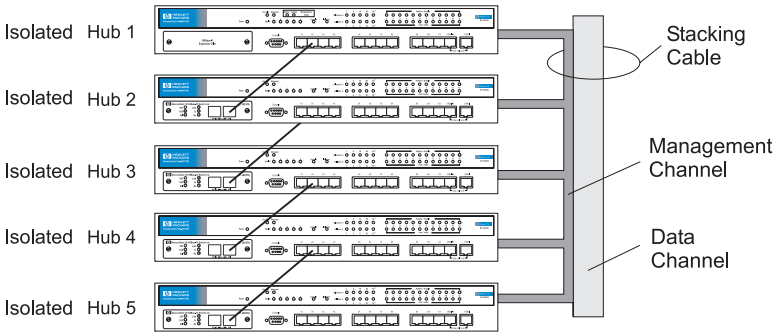


Figure 3.3 Stacking Isolated Hubs with Straight-through, Category 5 Twisted-pair Cable

If Hub-12TX units are isolated, they can still be managed via the management channel embedded in the Stacking Cable, even though the hubs are not transmitting or receiving network traffic through the Stacking Cable. This allows any hub to be isolated from the stack's central collision domain, but still enables them to be managed by a Hub-12TXM through the management channel.

Extending the Network with Alternate Connections

You can extend your network by connecting any of the hubs in a stacked system to other compatible hubs via the Switch Port Module. In the diagram below, a standalone hub is connected to hub 3 in the stacked system using the Switch Port Module. However, remember that the Hub-12TXM agent can only manage hubs connected to it through the Stacking Cable.

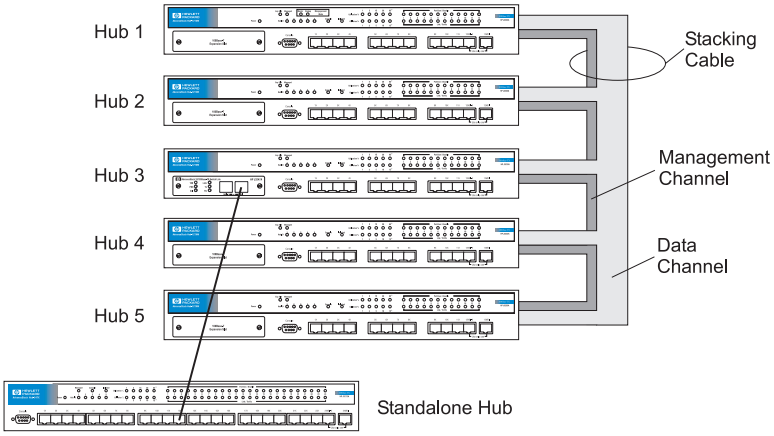


Figure 3.4 Linking Stacked Hubs to Standalone Hubs via Stacking Cable and Cascaded Connections with Straight-through, Category 5 Twisted-pair Cable

Linking the Stack to a Management Station

In a stacked system, connect the management station to either a Hub-12TXM or to a hub that is not isolated from the stack. Note that to manage the main collision domain, the management station cannot be connected to a hub that is isolated from the stack collision domain because it must communicate with the management agent on the Hub-12TXM. Therefore, in this example, the management station cannot be connected to hub 5 and access the Hub-12TXM because hub 5 is isolated.

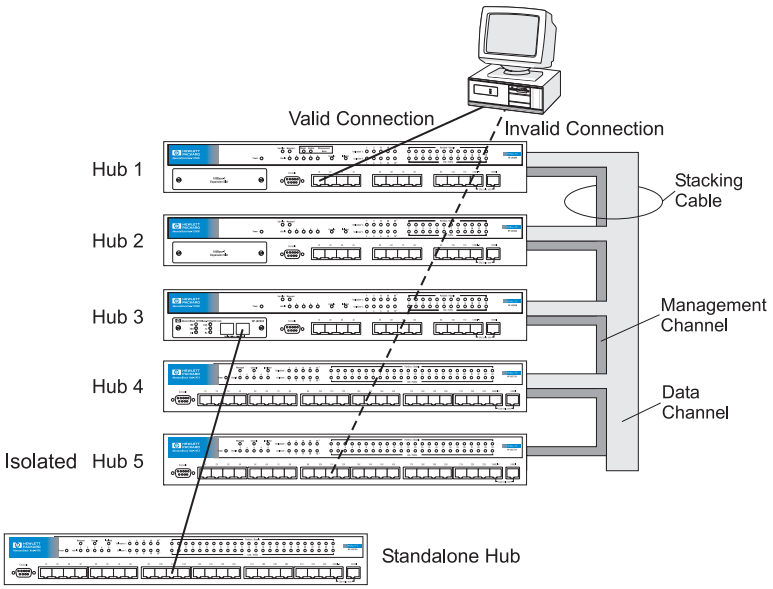


Figure 3.5 Linking Stacked Hubs to a Network Management Station

Interconnecting Isolated Collision Domains

Isolated collision domains within a stacked system can be combined into an interconnected network using the Switch Port Modules. For example, you can connect all of the different collision domains in the stack using several Switch Port Modules as shown below. Each Switch Port Module serves as a bridge between isolated collision domains in the stack. Using this approach, you provide a higher bandwidth by using three separate collision domains, but still permit stations to communicate with nodes in other isolated collision domains, as required. The following figure shows how bandwidth has been raised from 100Mbit/s to 300Mbit/s.

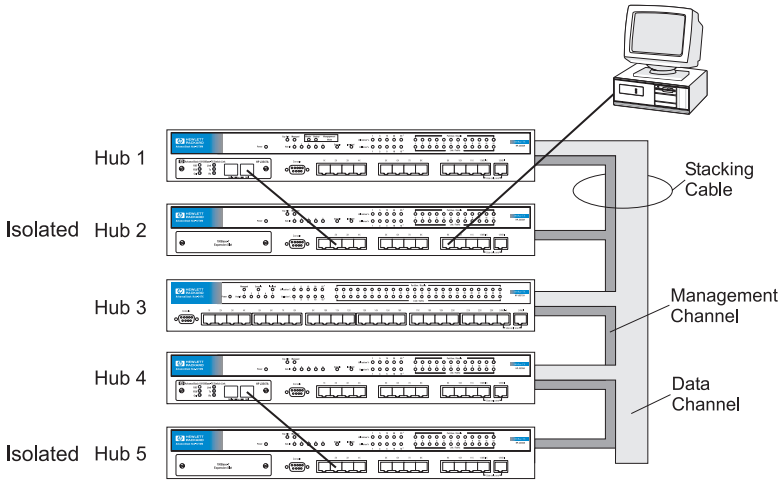


Figure 3.6 Linking Isolated Collision Domains in a Stacked System

Connecting Remote Stacks

Fiber optic cable provides an advantage for inter-stack connections because it can be connected over greater distances. This enables multiple stacks in remote locations to be connected. The HP 100Base-T Hubs stacks can be connected by using the fiber port on the 100FX Switch Port Module. For example, you can connect two stacks by running a fiber cable from the FX port on the Switch Port Module in a hub in one stack to the fiber port on the Switch Port Module of any hub in a remote stack. This Switch Port-to-Switch Port connection provides a full-duplex connection, enabling you to connect two stacks that are as far apart from each other as two kilometers. You can also connect two stacks by running a Category 5 twisted-pair cable from the 10/100TX Switch Port Module of any hub to any station port of a hub in the remote stack. However, when you connect directly to a hub using twisted-pair cable the maximum separation between stacks is 100 meters.

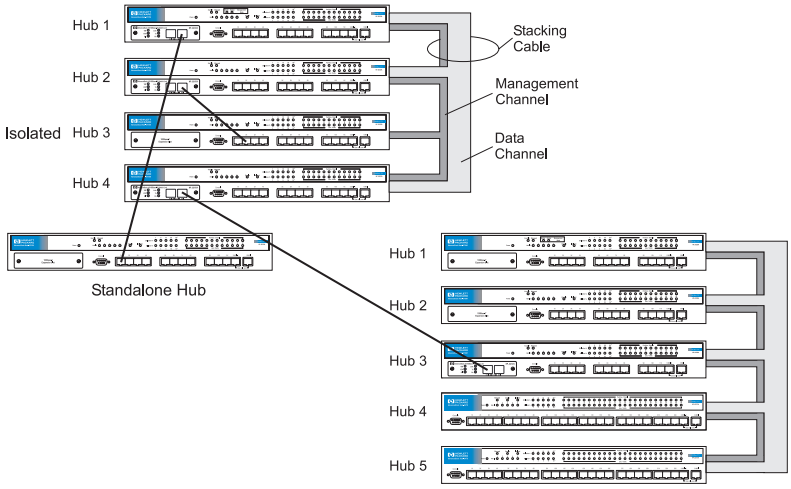


Figure 3.7 Connecting Remote Stacks using Switch Port Modules

Connecting to the Extended Network

The stack can be connected to the extended network by attaching the HP 100Base-T Hub to a device such as an HP AdvanceStack switch. The following figure shows a direct connection from a stacked hub's MDI port to a 100Base-TX switch that is serving as a collapsed network backbone.

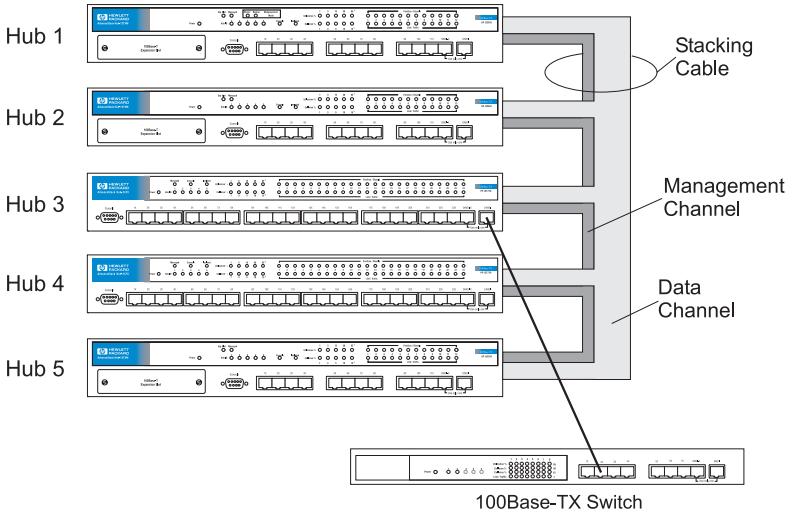


Figure 3.8 Connecting to the Extended Network

Chapter 4: Configuring the System

Making the Connections Required for System Configuration

The HP 100Base-T Hubs provide a menu-driven VT-100 console interface. This can be accessed by making a connection to the Console Port on the front of the hub (using a terminal or a computer running a terminal emulation program). Moreover, when configuring the Hub-12TXM, you can Telnet into the hub from any computer attached to the network, or call into the hub from a remote computer using a modem connection.

Note: The HP Hub-12TXM controls the configuration for the entire stack of hubs it is in.

The Hub-12TXM model also provides an on-board management agent based on Simple Network Management Protocol (SNMP). This agent allows you to discover the hub (and connected stack) from any PC attached to the network with HP AdvanceStack Assistant. This software provides advanced management functions using a straight-forward graphical user interface.

This chapter describes how to perform basic configuration, and manage the overall stack, via:

- Direct connection - making a local connection via the hub's Console Port to the menu-driven VT-100 console interface.
- Network connection - Ability to Telnet over the network to the menu-driven VT-100 console interface.
- Remote connection - making a modem connection via the hub's Console Port to the menu-driven VT-100 console interface.

It also describes how to access the SNMP agent over a network using HP AdvanceStack Assistant.

Direct Connection

The Hub-12TX and Hub-24TX do not include a management agent. Configuration options for these models are therefore limited to direct connection only. Moreover, configuration via the Console Port on these models is limited to that hub only (i.e., the attached stack cannot be managed with these models).

Attach a VT-100 compatible terminal, or a PC running a terminal emulation program, to the DB9 Console Port on the front of any HP 100Base-T Hub model. Use the included null modem cable that complies with the wiring assignments provided in Appendix B.

When attaching to a PC, set terminal emulation type to VT-100, specify the port used by your PC (i.e., COM 1~4), and then set communications to 8 data bits, 1 stop bit, no parity, and 9600 bps. Set flow control to "none."

The Hub-12TX and Hub-24TX can only be managed via a direct connection, or via a Hub-12TXM unit located in the same stack.

Network Connection

The on-board configuration menu on the Hub-12TXM can also be accessed by connecting a PC to any available port on the stacked system. If proper network interconnections are available, you can access the management agent from anywhere in the attached network. However, if the stack has hubs that are isolated, you must connect to the collision domain containing the SNMP management agent.

Local Network Telnet Connection

Before accessing a hub using a Telnet connection, be sure you have already set the agent's IP address via the VT-100 console interface or boot protocol.

Prior to accessing the hub via a Telnet connection, you must first configure it with a valid IP address, subnet mask, and default gateway using an out-of-band connection or boot protocol. (Refer to Using the VT-100 Console Interface later in this chapter.) After configuring the hub's IP parameters, you can Telnet into its menu-driven VT-100 console interface from anywhere within the attached network.

Local Network Connection

If you want to use HP AdvanceStack Assistant to discover the HP 100Base-T Hubs system, then first set up your Network Management Station (NMS). The NMS is the personal computer used to run your network management software. HP provides Windows and Unix-based network management through software called HP AdvanceStack Assistant. This Windows software comes with the hubs as part of the product offering.

Before accessing a hub using AdvanceStack Assistant, be sure you have already set the agent's IP address via the VT-100 console interface or boot protocol.

If proper network connections are available, you can access HP AdvanceStack Assistant from anywhere in the attached network. However, prior to accessing the Hub-12TXM using HP AdvanceStack Assistant, you must first configure the hub with a valid IP address, subnet mask, and default gateway using the VT-100 console interface.

After completing hardware installation, configure the hub using the out-of-band VT-100 console interface. Refer to the following sections for details on configuration.

Remote Connection

If you want to use a remote PC to configure the Hub-12TXM via a modem connection, at the remote site make sure the modem's baud rate is 9600 and that the AT command set is supported.

Configuring the Hub-12TXM Site

Connect your modem and PC at the remote site. Remotely configure the hub using the VT-100 console interface.

Connect the hub's DB9 Console Port to the modem's serial port using a standard serial cable. For most modems, which use a 25-pin port, you will have to provide an RS-232 cable with a 9-pin connector on one end and a 25-pin connection on the other end. You do not have to set the modem communication parameters at the hub's site, because the hub will automatically configure it to auto-answer mode. Just set the modem to force Data Set Ready (DSR) signals.

Configuring the Remote Site

At the remote site, connect the PC's COM port (COM 1~4) to the modem's serial port. Set terminal emulation type to VT-100, specify the port used by your PC (i.e., COM 1~4), and then set communications to 8 data bits, 1 stop bit, no parity, and 9600 bps. Also be sure you set the flow control to "none."

Remote Configuration Methods

Remote Out of Band - If you establish a remote connection as described in the previous section, you can use the on-board configuration functions on the Hub-12TXM via the VT-100 console interface. See the section on Using the VT-100 Console Interface later in this chapter for more information. However, note that the Hub-12TXM on-board configuration functions only provide access to the hub's private MIB.

Before accessing a hub using a SLIP link, be sure you have already set the hub's serial IP address via the VT-100 console interface.

Remote In-Band - You can also make a remote network connection to the Hub-12TXM via the Console Port using the SLIP protocol over TCP/IP. This connection can only be made with the VT-100 console interface, and not HP AdvanceStack Assistant. Note that the system functions as a router when you use IP protocol over a SLIP link to the Console Port, providing direct access to all attached network resources.

To establish a SLIP link to the Console Port, be sure you first set the hub's serial IP via the VT-100 console interface. Note that the hub's serial IP address and it's IP address must be different, but both should be on the same subnet. When accessing the hub, the PC at the remote site must also be configured with the same serial IP address as the hub.

Note: The winsocket used by both Windows 95 and Windows NT supports the SLIP protocol. To configure, start the Windows Accessories Dial-Up Networking and select SLIP as the server type.

Configuring Your System

You can configure the HP 100Base-T Hubs using the VT-100 console interface.

On-board configuration requires a terminal or a computer running a terminal emulation program as your working platform. There are three valid connection types to the hub:

- **Out of band connection**
  The workstation, normally within the vicinity of the hub, is directly connected to the Console Port on the HP 100Base-T Hub.
- **Telnet connection**
  The workstation is connected to a remote Hub-12TXM via a networked Telnet connection.
- **Modem connection**
  The workstation is connected to a remote Hub-12TXM hub via modems.

The physical setup and connections required for on-board configuration are described in detail under Direct Connection, Network Connection and Remote Connection in this chapter. To open the HP 100Base-T Hubs VT-100 console interface, do the following:

1. Activate an HP 100Base-T Hub VT-100 console interface from a local console, via Telnet, or via modem connection as described below.

   From a local console -

   When connecting a PC to the hub, use a VT-100 terminal emulation package to connect to the specific Com port that is attached to the hub. Configure the connection for 9600 baud, 8 data bits, no parity bits, 1 stop bit, and no flow control. Then press Enter.

From a Telnet connection -

Telnet into the target hub using its assigned IP address.

From a remote modem connection -

Use a VT-100 terminal emulation package to connect to the Com port that is attached to the modem. Configure the connection for 9600 baud, 8 data bits, no parity bits, and 1 stop bit. Then dial in to the hub.

If the screen is blank, press the Enter key several times until the login screen appears. If diagnostic messages indicate a failure, refer to Troubleshooting in Appendix A. Once the connection has been properly established, the login screen for the on-board configuration program should appear.

2. The login procedure for the Hub-12TX/Hub-24TX VT-100 console interface requires no password or user name, although the VT-100 Console Interface does display a password prompt. Simply press Enter to enter the VT-100 Console Interface menu system. Access privileges are Read/Write, and the default password is blank (i.e., no password has been pre-configured). You can set a password if you want by using the Change Password option in the Main Menu.

   When logging into the Hub-12TXM, there are two fixed user types, Admin and Guest. The Administrator account has read/write access, and the Guest has read-only access. You must provide both a user name and password to log in, however for initial configurations, both the user name and password is blank. Just press the Enter key. Administrator is the highest privilege level in the Hub-12TXM VT-100 console interface. The administrator should define a password, record it and put it in a safe place. If you have not already done so, select *User Passwords* under the *Console Security* menu in the VT-100 console interface and enter a password.

   The configuration parameters you can access after logging into the system are described in the following section.

Using the VT-100 Console Interface

The Hub-12TX, Hub-12TXM and Hub-24TX all provide a menu-driven VT-100 console interface. The VT-100 console interface differs for the Hub-24TX, Hub-12TX and the Hub-12TXM. The connection types allowed and options provided are summarized below:

- The Hub-24TX is designed as a manageable hub, without an on-board SNMP agent. Therefore, when an SNMP agent (i.e., the Hub-12TXM) is connected to this hub via the Stacking Cable, its Console Port will be disabled, and configuration must be carried out using the Hub-12TXM. However, if this hub is not connected to an agent, you can configure it by making a direct connection to the Console Port.
- The Hub-12TX is also designed as a manageable hub, without an on-board SNMP agent. Like the Hub-24TX, it can be configured by being connected to a Hub-12TXM in a stack, or if there is no agent, by a direct connection to the Console Port.
- When configuring a Hub-12TXM and connected stack, you can use a direct connection to the Console Port, use a Telnet connection from a networked computer, or use a standard modem connection from a remote computer.

System Configuration for the Hub-24TX

With the VT-100 console interface you can carry out basic configuration on the attached hub, such as setting the hub ID or isolating the hub from the stack. Set up a direct connection to the hub, press the Enter key several times, and enter the password (or just press the Enter key if you have not yet configured the password). The following menu will be displayed after logging on.

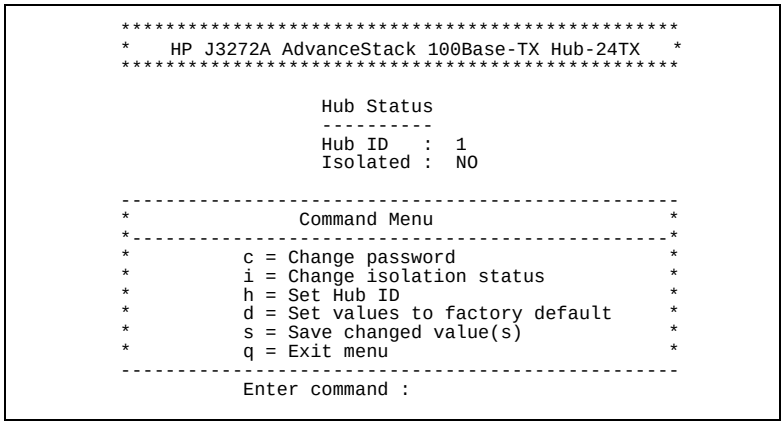


Figure 4.1 Main Configuration Menu (Hub-24TX only)

Note: Input options for the selected item are displayed at the bottom of the interface screen.

Menu selections are briefly described in following table.

Command	Description
Change password	Press "c" to change the password. Passwords can be up to 5 characters long and are case sensitive.
Change isolation status	Press "i" to isolate the hub from the stack's collision domain.
Set hub ID	Press "h" to set the hub identifier to any value from 1 ~ 5. When stacked with a management agent, note that all hub identifiers are automatically configured.
Set values to factory default	Press "d" to set hub values back to factory defaults.
Save changed value(s)	Press "s" to write all configuration changes to nonvolatile memory. You must save your changes, or they will be lost the next time you restart the system.
Exit	Press "q" to quit the configuration menu and return to the command prompt.

Table 4.1 Configuration Options in Main Menu (Hub-24TX only)

System Configuration for the Hub-12TX

With the VT-100 console interface you can carry out basic configuration on the attached hub, such as setting the hub ID, isolating the hub from the stack, or configuring the Switch Port Module. Set up a direct connection to the hub, press the Enter key three times, and enter the password (or just press the Enter

key if you have not yet configured the password). The following menu will be displayed after logging on.

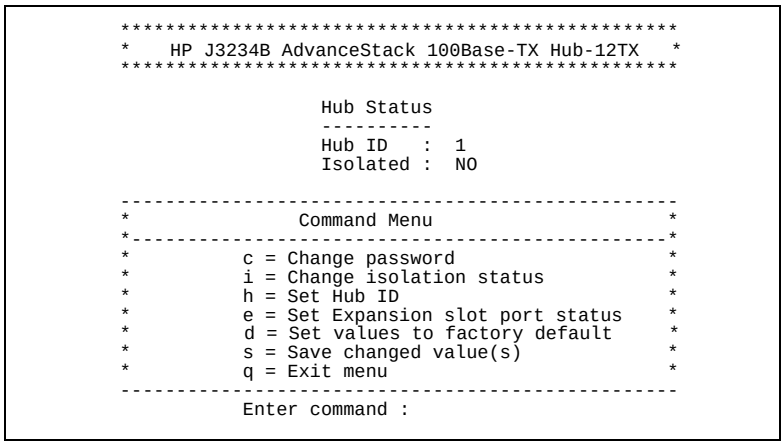


Figure 4.2 Main Configuration Menu (Hub-12TX only)

Note: Input options for the selected item are displayed at the bottom of the interface screen.

Menu selections are briefly described in following table.

Command	Description
Change password	Press “c” to change the password. Passwords can be up to 5 characters long and are case sensitive.
Change isolation status	Press “i” to isolate the hub from the stack’s collision domain.
Set hub ID	Press “h” to set the hub identifier to any value from 1 ~ 5. When stacked with a management agent, note that all hub identifiers are automatically configured.
Set Expansion Slot status	Press “e” to display the menu for the Switch Port Module. Refer to the following table for a description of the configuration options for this module.
Set values to factory default	Press “d” to set hub values back to factory defaults.
Save changed value(s)	Press “s” to write all configuration changes to nonvolatile memory. You must save your changes, or they will be lost the next time you restart the system.
Exit	Press “q” to quit the configuration menu and return to the command prompt.

Table 4.2 Configuration Options in Main Menu (Hub-12TX only)

Configuring the Switch Port Module

To configure the Switch Port Module, press “e”. The following menu will be displayed.

```
*********************************************
*   HP J3234B AdvanceStack 100Base-TX Hub-12TX   *
*********************************************

              Exp Slot Port Status
              --------------------
         Duplex        :  100/Full Duplex
         Forward       :  adaptive cut-through
         Back Pressure :  enable

-------------------------------------------------
*               Command Menu                    *
-------------------------------------------------

*           d = Set duplex mode                 *
*           m = Set forward mode                *
*           b = Set back pressure               *
*           r = Return to Main Menu             *
-------------------------------------------------
         Enter command :
```

Figure 4.3 Configuration Menu for Switch Port Module (Hub-12TX only)

Note: Input options for the selected item are displayed at the bottom of the interface screen.

The current settings for the Switch Port Module are displayed in the status field. Menu selections are briefly described in the following table.

Command	Description
Set duplex mode	Press “d” to set the transmission mode to 10/Half Duplex, 10/Full Duplex, 100/Half Duplex, 100/Full Duplex, or Auto Detect. The duplex mode setting is automatically saved to the hub’s EEPROM, therefore there is no need to reconfigure if the power to the hub is lost.
Set forward mode	Press “m” to set the frame forwarding mode to adaptive cut-through or store & forward.
Set back pressure	Press “b” to enable or disable back pressure.
Return to Main Menu	Press “r” to return to the Main Menu.

Table 4.3 Configuration Options for Switch Port Module (Hub-12TX only)

System Configuration for the Hub-12TXM and Stack

With this interface you can define system parameters, manage and control stacked hubs and associated ports, and monitor network conditions. Set up a VT-100 console connection to the hub, press the Enter key three times, and enter a user name and password. There are two fixed user types, Admin (read/write access) and Guest (read only access). The default user names and passwords are blank. The following menu will be displayed after logging on.

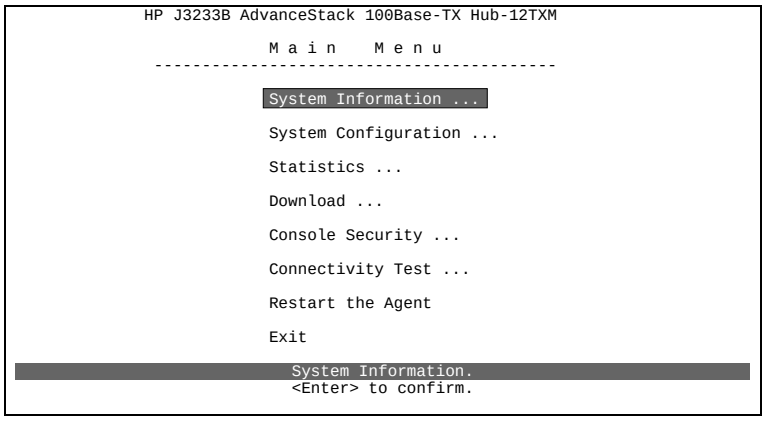


Figure 4.4 Main Configuration Menu

Notes: Input options for the selected item are displayed at the bottom of the interface screen. For items which require you to choose an option, follow your input by pressing the Enter key. Use <Ctrl+N> to scroll through an options list, <Ctrl+Z> to move to an upper level menu, or <Ctrl+E> to close the configuration program.

To select a configuration item, use the arrow keys to position the cursor (i.e., the highlighted box), and then press the Enter key. Configuration items followed by dots (...) open up another menu screen. Menu selections are briefly described in the following table.

Field	Description
System Information	Identifies the system.
System Configuration	Network parameters, SNMP agent, hub, port and backup links configuration menus.
Statistics	Displays for network, hub and port performance information.
Download	Download new firmware by TFTP (network) or Xmodem (Console Port).
Console Security	Defines password for administrator and guest. Also sets the time the system will wait without receiving any keyboard input before logging you off the VT-100 console interface.
Connectivity Test	Performs connection tests between the agent and another designated device on the network.
Restart the Agent	Reboots the system.
Exit	Exits the configuration interface and returns to operating system.

Table 4.4 Main Configuration Menu

Displaying System Information

Choose *System Information* from the *Main* menu to display and modify general information about the Hub-12TXM stack, or for quick system identification. View a description of the system similar to that displayed in the following example:

```
                HP J3233B AdvanceStack 100Base-TX Hub-12TXM

                          System Information
                        ------------------------

     Back to Previous Menu

     System Description : HP J3233B AdvanceStack 100Base-TX Hub-12TXM

     System Object ID   : 1.3.6.1.4.1.11.2.3.7.5.18

     System Up Time     : 26333 (0 day 0 hr 4 min 23 sec)

     System Name        : R&D Stack

     Contact            : Chris

     Location           : 2nd floor


                          Back to previous panel.
            <Enter> to confirm, <Ctrl+Z> to back to Main Menu
```

Figure 4.5 System Information Menu

Menu items are briefly described in the following table.

Field	Description
System Description	Model name of the hub unit.
System Object ID	Object identifier as defined in MIB II.
System Up Time	Length of time the Hub-12TXM management agent has been running.
System Name	Name assigned to the hub system.
Contact	Contact person for the system.
Location	Specifies area or location where the system resides.

Table 4.5 System Information Menu

System Configuration

Choose *System Configuration* from the *Main* menu to display and modify all the network, SNMP agent, hub and port parameters in the Hub-12TXM stack. The configuration options available are displayed in the following example:

```
HP J3233B AdvanceStack 100Base-TX Hub-12TXM

System Configuration
----------------------------

Back to Previous Menu

Network Configuration ...

SNMP Configuration ...

Hub Configuration ...

Port Configuration ...

Port Intrusion Control ...

Backup Links ...

Set management values to factory defaults ...


Back to previous menu.
<Enter> to confirm, <Ctrl+Z> to back to Main Menu
```

Figure 4.6 System Configuration Menu

Menu items are briefly described in the following table.

Field	Description
Network Configuration	Configures IP, IPX and SNMP parameters.
SNMP Configuration	Configures communities, as well as IP and IPX trap managers.
Hub Configuration	Isolates/attaches a hub to the stack; sets bootup option; and also sets protocol status for SNMP/IP and SNMP/IPX.
Port Configuration	Disables/enables a port, shows link and partition state, as well as allowing you to set the communication mode to full or half-duplex for the Switch Module.
Port Intrusion Control	Sets the authorized entry address, and defines response for detected intrusion.
Backup Links	Sets up to 10 pairs of backup link ports. Each pair contains a master and backup port. The backup port is normally disabled. When the master port fails, the system disables the master port and enables the backup port to maintain the link.
Set management values to factory defaults	Sets hub values back to factory defaults.

Table 4.6 System Configuration Menu

Changing the Network Configuration

To access the Hub-12TXM system with network tools such as SNMP, Telnet or TFTP, you must configure the hub to use IP or IPX protocols. Use the *Network Configuration* menu to display the following screen:

```
                HP J3233B AdvanceStack 100Base-TX Hub-12TXM

                        Network Configuration
                    ------------------------------

                          Back to Previous Menu

 IP Configuration :                IPX Configuration :

    IP Address  : 203.70.236.54     IPX Frame Type       : IPX 802.2 FRAME

    Subnet Mask : 255.255.255.0     Internal IPX Network : AC-B3-00-31

    Gateway IP  : 203.70.236.254    IPX Protocol         : DISABLED

    Serial IP   : 203.70.236.9

    IP Protocol : ENABLED

    Update EEPROM

                          Back to previous menu.
          <Enter> to confirm, <Ctrl+Z> to back to Main Menu
```

Figure 4.7 Network Configuration Menu

Menu items are briefly described in the following table.

Field	Description
IP Configuration	The hub system may be run on SNMP protocol over UDP/IP transport protocol. In this environment, all systems on the Internet, such as network interconnection devices and management stations are assigned an IP address.
IP Address	IP address of this device.
Subnet Mask	Subnet mask of this IP network. This mask identifies the host address bits used for routing to specific subnets.
Gateway IP	Gateway used in passing trap messages from the hub agent to the management station.
Serial IP	IP address used to access hub configuration via an out-of-band SLIP connection to the Console Port.
IP Protocol	This can be enabled or disabled.
IPX Configuration	
IPX Frame Type	The selected format used on the LAN; i.e., this type is that used by the IPX network where the hub is installed. If the specified frame type is not detected, the hub will automatically detect the current type. (Values: 802.3, Ethernet II, SNAP, 802.2)
Internal IPX Network	This address is composed of Net Number which identifies the IPX network number for the connected slot.
IPX Protocol	This can be enabled or disabled.
Update EEPROM	This command saves the IP address for the selected segment to nonvolatile memory, and makes it effective immediately.

Table 4.7 Network Configuration Menu

Configuring the SNMP Agent

When using SNMP-based network management software, you must specify basic parameters that control access to the system. Use the *SNMP Configuration* menu to display the following screen parameters:

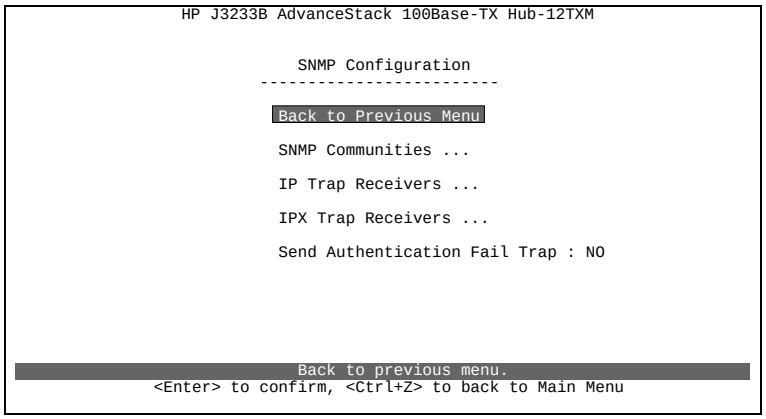


Figure 4.8 SNMP Configuration Menu

Menu items are briefly described in the following table.

Field	Description
SNMP Communities	The community strings authorized for trap management access. All community strings used for IP and IPX Trap Receivers must be listed in this table.
IP Trap Receivers	IP management stations selected to receive trap messages from the system.
IPX Trap Receivers	IPX management stations selected to receive trap messages from the system.
Send Authentication Fail Trap	Issue a trap message if anyone attempts to access the configuration program without the proper user name and password.

Table 4.8 SNMP Configuration Menu

Configuring SNMP Communities

Access to the hub's on-board management agent via network management software is controlled with community strings. Use the *SNMP Communities* command to edit community strings and access rights as shown below:

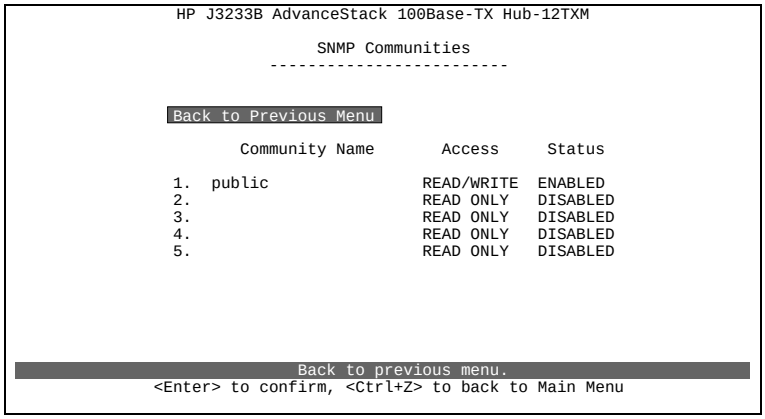


Figure 4.9 SNMP Communities Menu

Menu items are briefly described in the following table.

Field	Description
Community Name	A community entry authorized for management access.
Access	Management access is restricted to Read Only or Read/Write.
Status	The current entry can be ENABLED or DISABLED.

Table 4.9 SNMP Communities Menu

Configuring IP Trap Receivers

When the hub experiences an unusual event, a message is issued to all listed network managers. Networks compliant with Internet Protocol (IP) can pass trap messages to *IP Trap Receivers* as shown below:

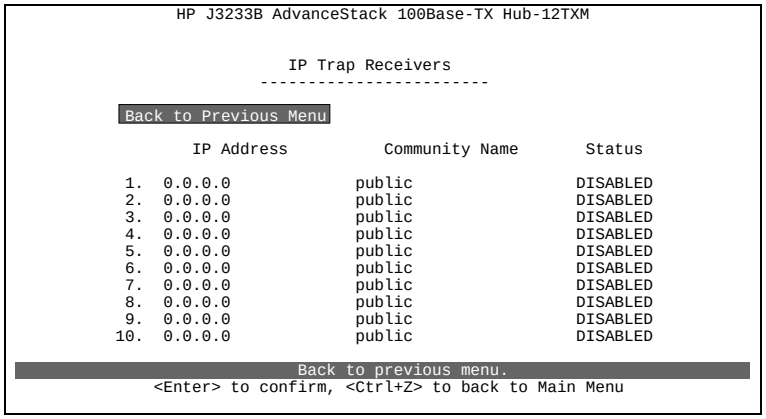


Figure 4.10 IP Trap Receivers Menu

Menu items are briefly described in the following table.

Field	Description
IP Address	IP address of the trap receiver. (Use dotted decimal notation.)
Community Name	The community string required for trap access.
Status	The current entry can be ENABLED or DISABLED.

Table 4.10 IP Trap Receivers Menu

Configuring IPX Trap Receivers

When the hub experiences an unusual event, a message is issued to all listed network managers. Networks compliant with Internetwork Packet Exchange (NetWare IPX) protocol can pass trap messages to *IPX Trap Receivers* as shown below:

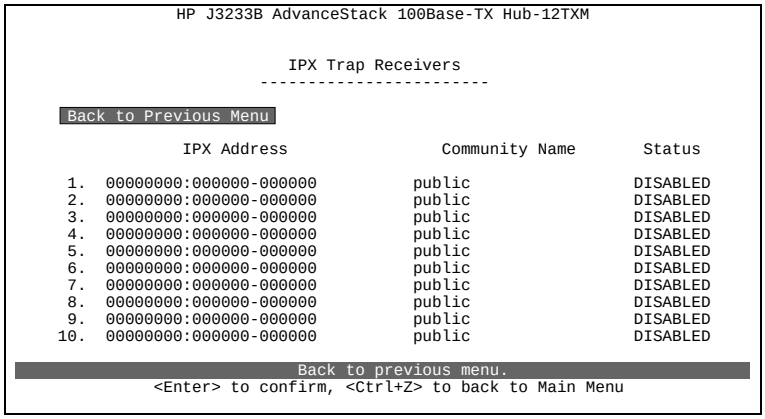


Figure 4.11 IPX Trap Receivers Menu

Menu items are briefly described in the following table.

Field	Description
IPX Address	IPX address of the trap receiver. (Provide network number and MAC address components.)
Community Name	The community string required for trap management access.
Status	The status of the current entry can be set to ENABLED or DISABLED.

Table 4.11 IPX Trap Receivers Menu

Configuring Hub Parameters

Select *Hub Configuration* under the *System Configuration* menu to configure any hub in the stack. This menu is used to configure the hub and SNMP agent. Use the following menu to select the required hub, or to change the numeric identifier for any hub in stack.

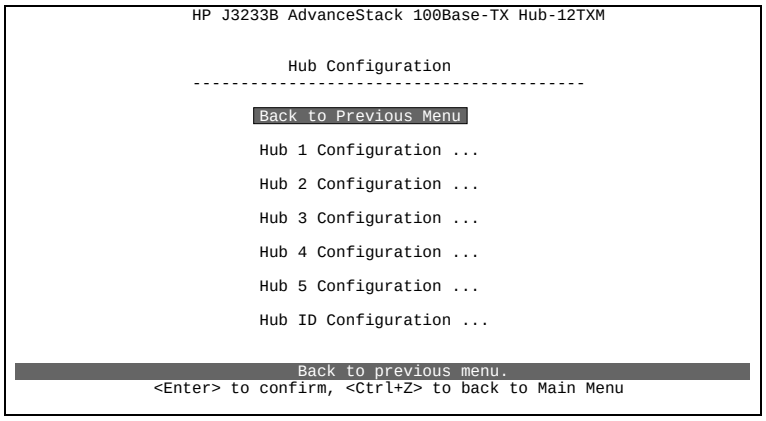


Figure 4.12 Hub Configuration: Hub Selection Menu

Hub Configuration

To configure a hub, select it from the list shown above. The following Hub Configuration menu will appear, allowing you set parameters for the base hub unit and the SNMP agent for a Hub-12TXM.

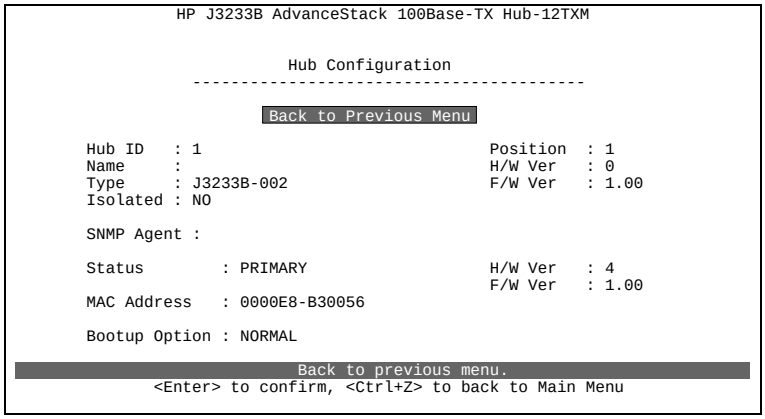


Figure 4.13 Hub Configuration Menu

Menu items are briefly described in the following table.

Entity	Field	Description
(Hub Unit)	Hub ID	Hub identifier within the stack. (Up to 5 hubs may be connected via the Stacking Cable's management channel.)
	Position	The physical position in the stack.
	Name	Any user-defined name for the selected hub.
	Type	Indicates hub type as HP J3233B , HP J3234B, or HP J3272A.
	H/W Ver	Indicates the current hardware version number of the hub board.
	F/W Ver	Indicates the current firmware version number of the hub board.
	Isolated	Enables you to remove a hub from the collision domain of the stack.
SNMP Agent	Status	Defines the status of the management agent as Primary or Backup.
	H/W Ver	Indicates the current hardware version number for the management board.
	F/W Ver	Indicates the current firmware version number for the management board.
	Mac Address	MAC address of the management agent.

Entity	Field	Description
SNMP Agent	Bootup Option	Specifies bootup method as - *NORMAL* - Use on-board ROM code and default IP address. *TFTP DOWNLOAD* - Get system code from TFTP server (and use default IP address). This process is repeated each time power to the hub is reset. *BOOTP GET IP* - Get IP address from server (and use on-board ROM code). *BOOTP DOWNLOAD* - Get IP address and system code from server. Image is stored in temporary memory. *NO BOOTP TFTP REQUEST* - Do not issue BOOTP request. Wait for download via out-of-band. *BOOTP UPGRADE FIRMWARE* - Get IP address and system code from server. Image is stored in nonvolatile memory, and BOOTP option reset to NORMAL. Note that this is the only network option that places the image in nonvolatile memory.

Table 4.12 Hub Configuration Menu

Hub ID Configuration

To change the numeric hub identifier, select *Hub ID Configuration* from the *Hub Configuration: Hub Selection* menu shown above. The following *Hub ID Configuration* menu will appear. After changing a hub identifier, verify the change with "Update Above Settings" command. Note that Position 1 means that the hub has no Stacking Cable on its "In" port.

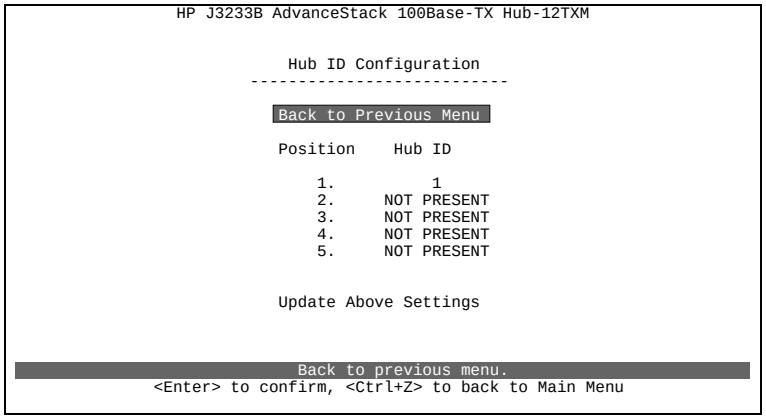


Figure 4.14 Hub ID Configuration Menu

Configuring Port Parameters

Select *Port Configuration* under the *System Configuration* menu to configure the ports for any hub in the stack. Select the port type for the required hub from the following menu.

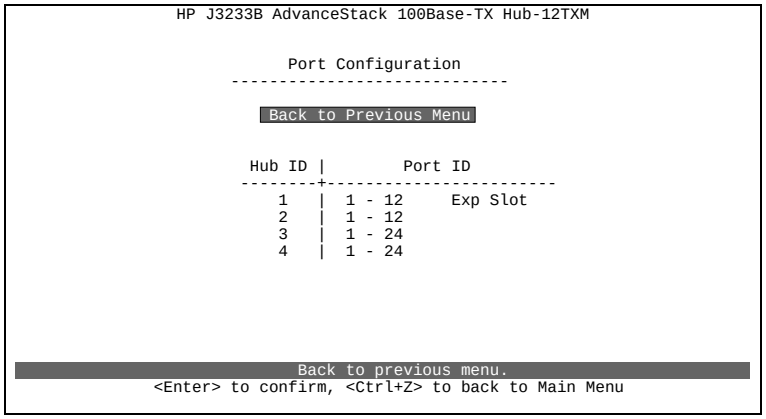


Figure 4.15 Port Configuration: Port Selection Menu

Configuring Hub Ports

If you select the hub port type (i.e., 1 through 12), the *Port Configuration Menu* will open. This menu displays the ID and stack position of the selected hub, and also allows you to enable/disable any hub port in the selected hub.

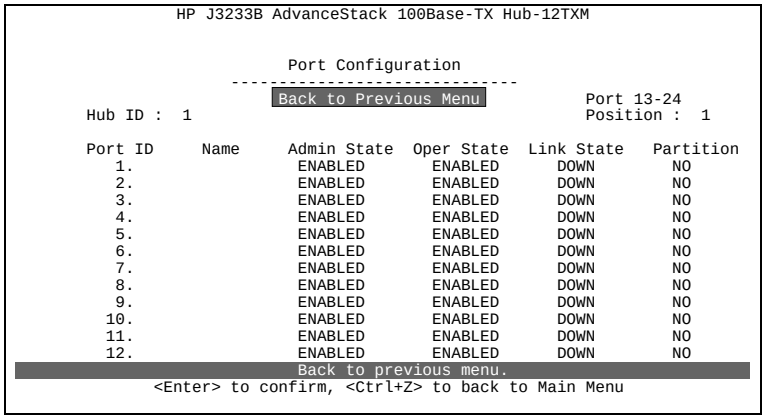


Figure 4.16 Port Configuration Menu

Menu items are briefly described in the following table.

Field	Description
Port 13-24 (1-12)	For a model Hub-24TX, this field can be used to toggle between displays for Ports 1-12 and Ports 13-24. This same toggle will also happen immediately by scrolling to the bottom of the Ports 1-12 sceen, or to the top of the Ports 13-24 screen. Note, this field is not displayed for 12-port hubs.
Hub ID	Hub identifier within the stack.
Position	The physical position in the stack (as determined by position from the hub with no connection on its "In" port).
Port ID	Numeric identifier of station port on the hub.
Name	User-defined name for selected port.
Admin State	User-configured state for the port.
Oper State	The current operating state of the port. Any port may be automatically ENABLED or DISABLED if configured as one of a Backup Link pair.
Link State	Indicates if the port has a valid connection to an external device.
Partition	Indicates if the port is partitioned. (Refer to Partition/Disable Indicators in Chapter 5 for a more detailed description of the reasons a port may be partitioned.)

Table 4.13 Port Configuration Menu

Configuring the Switch Port Module

If you select *Exp Slot* (i.e., Switch Port Module) on the *Port Configuration: Port Selection* menu, the *Exp Slot Port Configuration Menu* will open. This menu allows you to configure various communication parameters for this module.

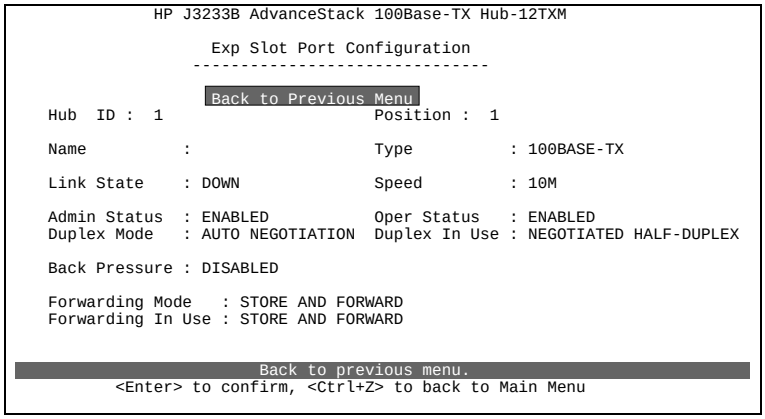


Figure 4.17 Exp Slot Port Configuration Menu

Menu items are briefly described in the following table.

Field	Description
Hub ID	Hub identifier within the stack.
Position	The physical position in the stack (as determined by its position from the top of the Stacking Cable).
Name	User-defined name for selected port.
Type	Types for the Switch Port Modules include 10/100Base-TX, 100Base-FX.
Link State	Indicates if the port has a valid connection to an external device.
Speed	The 10/100Base-TX module relies on auto-sensing to set the speed at 10 or 100 Mbit/s, while the 100Base-FX module is fixed at 100Mbit/s.
Admin Status	The Switch Port Module port may be manually configured as ENABLED or DISABLED.
Oper Status	The state of the Switch Port Module port, as configured in Admin Status.
Duplex Mode	The available options are 10/Half Duplex, 10/Full Duplex, 100/Half Duplex, 100/Full Duplex and Auto Negotiation. The Switch Port Modules for 10/100Base-TX and 100Base-FX can be manually set to half duplex or full duplex. The 10/100TX Switch Port Module can also be set to auto-negotiation.
Duplex In Use	The Switch Port Module for 10/100Base-TX can auto-negotiate to half or full duplex.
Back Pressure	When the internal buffers on this port begin to fill, it can be configured to signal the connected device to slow transmission by setting this field to ENABLED.
Forwarding Mode	The scheme by which frames are processed and forwarded through this module can be set to Adaptive Cut-through or Store-and-Forward.
Forwarding In Use	Adaptive cut-through will dynamically change from Cut-through to Fragment-free Cut-through, to Store-and-forward depending on the current error rate.

Table 4.14 Exp Slot Port Configuration Menu

Port Intrusion Control

Select *Port Intrusion Control* on the *System Configuration* menu to restrict access for any port to an authorized source address. Select the required hub from the following menu.

```
HP J3233B AdvanceStack 100Base-TX Hub-12TXM

                Port Intrusion Control
              -------------------------------

                 Back to Previous Menu

                  Hub 1 Ports Intrusion Control ...

                  Hub 2 Ports Intrusion Control ...

                  Hub 3 Ports Intrusion Control ...

                  Hub 4 Ports Intrusion Control ...

                  Hub 5 Ports Intrusion Control ...


                        Back to previous menu.
<Enter> to confirm, <Ctrl+Z> to back to Main Menu
```

Figure 4.18 Port Intrusion Control: Hub Selection Menu

Use the *Port Intrusion Control* Menu to define the MAC address for the device authorized to access a port, and set the response type, as shown in the following example.

```
HP J3233B AdvanceStack 100Base-TX Hub-12TXM

                Port Intrusion Control
              -------------------------------
        Back to Previous Menu    Port 13-24
Hub ID :  1                      Position :  1

Port ID   Authorized MAC Address Intrusion Action
   1.     000000-000000          INACTIVE
   2.     000000-000000          INACTIVE
   3.     000000-000000          INACTIVE
   4.     000000-000000          INACTIVE
   5.     000000-000000          INACTIVE
   6.     000000-000000          INACTIVE
   7.     000000-000000          INACTIVE
   8.     000000-000000          INACTIVE
   9.     000000-000000          INACTIVE
  10.     000000-000000          INACTIVE
  11.     000000-000000          INACTIVE
  12.     000000-000000          INACTIVE
                Back to previous menu.
<Enter> to confirm, <Ctrl+Z> to back to Main Menu
```

Figure 4.19 Port Intrusion Control Menu

Menu items are briefly described in the following table.

Field	Description
Port 13-24 (1-12)	For a model Hub-24TX, this field can be used to toggle between displays for Ports 1-12 and Ports 13-24. This same toggle will also happen immediately by scrolling to the bottom of the Ports 1-12 sceen, or to the top of the Ports 13-24 screen. Note, this field is not displayed for 12-port hubs.
Hub ID	Hub identifier within the stack.
Position	The physical position in the stack (as determined by its position from the top of the Stacking Cable).
Port ID	Selects any station port on the hub.
Authorized MAC Address	Defines the MAC address that is authorized to attach to this port.
Intrusion Action	Response to a detected intrusion can be set to: *INACTIVE* - no action taken, *WARNING* - trap message is issued to the management station, or *WARNING & DISABLE* - trap message is issued and port is disabled. **Note:** If a port is disabled by an unauthorized intrusion attempt, it must be manually re-enabled using the Admin State field in the Port Configuration menu.

Table 4.15 Port Intrusion Control Menu

Defining Backup Ports

Select *Backup Links* under the *System Configuration* menu to define up to 10 Primary/Backup port pairs. If the connection to the primary port fails, the backup port will automatically take over. For greater reliability, primary and backup ports should be located on different hubs. Use the following menu to specify and activate backup link pairs.

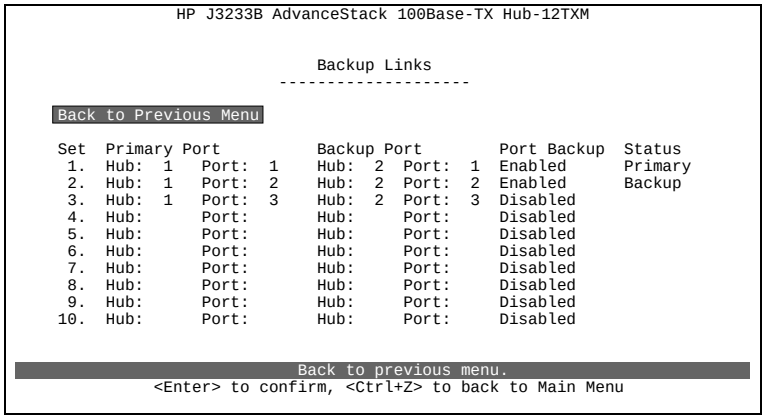


Figure 4.20 Backup Links Menu

Menu items are briefly described in the following table.

Field	Description
Set	Identifier for up to 10 backup port pairs.
Primary Port	Pair member serving as the primary link.
Hub	Hub ID for the master port.
Port	Port identifier for the master port.
Backup Port	Pair member serving as the backup link.
Hub	Hub ID for the backup port.
Port	Port identifier for the backup port.
Port Backup	Each backup pair can be set to Enabled or Disabled. Enabled: Upon failure of the primary link will be utilized. Disabled: Upon failure of the primary link, the backup link will not be utilized.
Status	PRIMARY is displayed if the primary port is currently linked. BACKUP is displayed if the primary port is not currently linked.

Table 4.16 Backup Links Menu

System Statistics

From the *Main* menu select *Statistics* to access all information on system performance. Statistics can be displayed for any hub or port in the stack, or for the stack as a whole. An example menu is shown below.

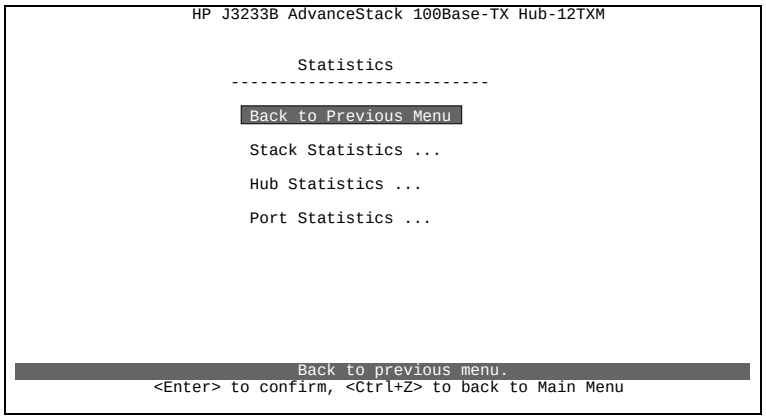


Figure 4.21 Statistics Menu

Menu items are described in the following table.

Field	Description
Stack Statistics	Displays network performance for the whole stack.
Hub Statistics	Displays network performance for each hub.
Port Statistics	Displays network performance for each port.

Table 4.17 Statistics Menu

Stack Statistics

From the *Statistics* menu select *Stack Statistics* to access this information. An example menu is shown below.

Screen statistics are not automatically refreshed from the agent. Select *Refresh Statistics* to update the displayed values.

The values displayed have been accumulated since the last system reboot.

```
HP J3233B AdvanceStack 100Base-TX Hub-12TXM

                Stack Statistics
              ----------------------------

            Back to Previous Menu

             Refresh Statistics

             Frames            :        4928
             Bytes             :      794031
             Collisions        :           5
             Alignment Errors  :           0
             CRC Errors        :           0
             Total Errors      :           0
             Symbol Errors     :           0

                        Back to previous menu.
          <Enter> to confirm, <Ctrl+Z> to back to Main Menu
```

Figure 4.22 Stack Statistics Menu

Stack statistics can be used to check on the general health of your hardware and network connections. If any of the error indications are extremely high (for example, collisions or CRC errors), you should take appropriate measures to resolve the problem.

Displayed items are briefly described in the following table.

Field	Description
Frames	Number of frames passing through the stack.
Bytes	Number of bytes passing through the stack.
Collisions	Number of simultaneous node transmissions detected by the stack.
Alignment Errors	Number of mis-synchronized data packets detected by the stack.
CRC Errors	Number of Ethernet Cyclic Redundancy Check errors detected by the stack.
Total Errors	Total number of errors, including CRC, alignment, FramesTooLong, ShortEvents, LateEvents, Jabber, and DataRateMismatches detected in the stack.
Symbol Errors	Number of symbol errors (i.e., code-group errors including collision artifacts or transmission errors). Note that these errors are unique to 100Mbit/s analog signals.

Table 4.18 Stack Statistics Menu

Hub Statistics

From the *Statistics* menu select *Hub Statistics* to access this information. Hub statistics can be displayed for any hub in the stack. Select the required hub from the menu.

Screen statistics are not automatically refreshed from the agent. Select *Refresh Statistics* to update the displayed values.

The values displayed have been accumulated since the last system reboot.

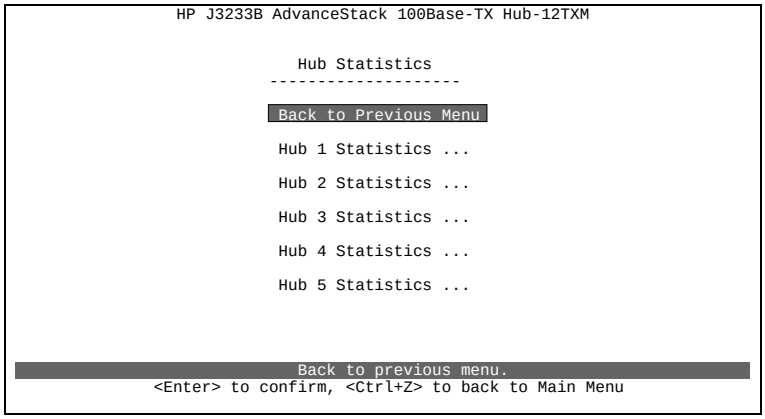


Figure 4.23 Hub Statistics: Hub Selection Menu

Hub statistics can be used to check on the general health of your hardware and network connections. If any of the error indications are extremely high (for example, collisions or CRC errors), you should take appropriate measures to resolve the problem.

Screen statistics are not automatically refreshed from the agent. Select *Refresh Statistics* to update the displayed values.

The values displayed have been accumulated since the last system reboot.

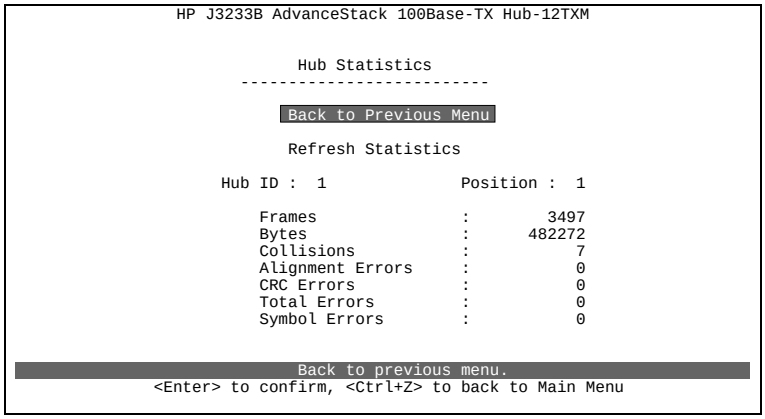


Figure 4.24 Hub Statistics Window

Displayed items are briefly described in the following table.

Field	Description
Hub ID	Hub identifier within the stack.
Position	The physical position in the stack (as determined by its position from the hub with no connection on the "In" port).
Frames	Number of frames passing through this device.
Bytes	Number of bytes passing through this device.
Collisions	Number of simultaneous node transmissions detected by this device.
Alignment Errors	Number of mis-synchronized data packets detected by this device.
CRC Errors	Number of Ethernet Cyclic Redundancy Check errors detected by this device.
Total Errors	Total number of errors, including CRC, alignment, FramesTooLong, ShortEvents, LateEvents, Jabber, and DataRateMismatches detected on this device.
Symbol Errors	Number of symbol errors (i.e., code-group errors including collision artifacts or transmission errors). Note that these errors are unique to 100Mbit/s analog signals.

Table 4.19 Hub Statistics Window

Port Statistics

Displays statistics for any port in the stack. Select the required port from the following menu.

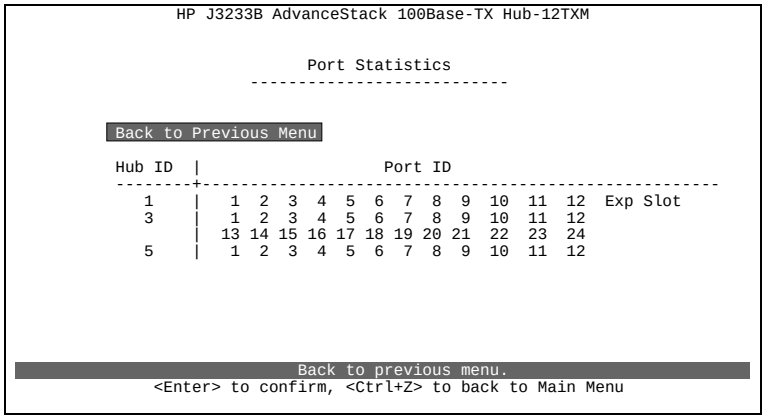


Figure 4.25 Port Statistics: Port Selection Menu

Statistics for Hub Ports

Statistics for hub ports cover a wide range of Ethernet variables. If any of the error indications are extremely high, there may be a problem with the port, the attached device, or the network cabling. (The System Diagnostics section in Appendix A provides help on troubleshooting.) The Port Statistics window is shown below.

Screen statistics are not automatically refreshed from the agent. Select *Refresh Statistics* to update the displayed values.

The values displayed have been accumulated since the last system reboot.

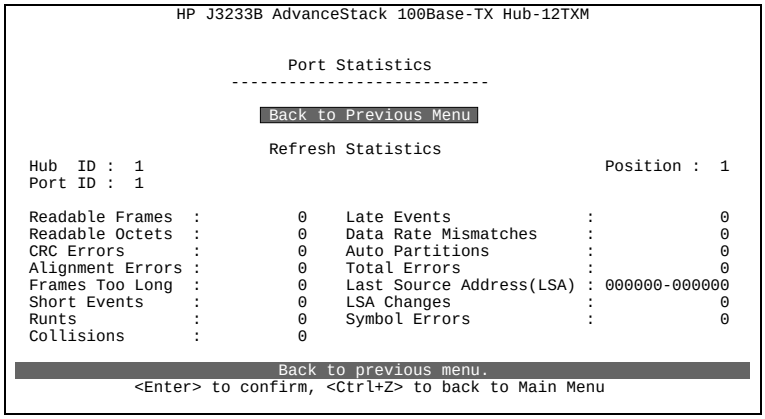


Figure 4.26 Port Statistics Menu

Displayed items are briefly described in the following table.

Field	Description
Hub ID	Hub identifier within the stack.
Position	The physical position in the stack (as determined by position from the top of the Stacking Cable).
Port ID	Port identifier on the hub.
Readable Frames	Number of good frames received.
Readable Octets	Number of good octets received.
CRC Errors	Number of Ethernet Cyclic Redundancy Check errors.
Alignment Errors	Number of mis-synchronized data packets detected by this device.
Frames Too Long	Number of times frame length has exceeded the maximum allowable size (i.e., 1518 bytes).
Short Events	Number of short fragments.
Runts	Number of fragments (that were too long to qualify as short events).
Collisions	Number of simultaneous node transmissions detected by this port.
Late Events	Number of frames where a collision occurred late in the transmission.
Data Rate Mis.	Number of frames for which the data rate does not match the local frequency.
Auto Partitions	Number of times this port has been automatically partitioned due to jabber.
Total Errors	Total number of errors, including CRC, alignment, FramesTooLong, ShortEvents, LateEvents, Jabber, and DataRateMismatches detected on this port.
Last Source Addr.	Last source address (LSA). Most recently recorded address of device that generated the most recent packets seen on the port.
LSA Changes	Number of times the source address has changed.
Symbol Errors	Number of symbol errors (i.e., code-group errors including collision artifacts or transmission errors). Note that these errors are unique to 100Mbit/s analog signals.

Table 4.20 Port Statistics Menu

Statistics for Switch Port Module

Statistics for the Switch Port Module include the basic Ethernet variables shown below.

Screen statistics are not automatically refreshed from the agent. Select *Refresh Statistics* to update the displayed values.

The values displayed have been accumulated since the last system reboot.

```
                HP J3233B AdvanceStack 100Base-TX Hub-12TXM

                              Exp Slot Statistics
                            ----------------------------

                              Back to Previous Menu

                              Refresh Statistics
        Hub  ID :  1                                        Position :  1


        In Frames         :    1356777   CRC Errors         :          26
        In Octets         :  327000798   Frames Too Long    :           0
        In Discarded      :     160751   Runts              :          20
        Out Frames        :       7642   Collisions         :        1228
        Out Octets        :     763166
        Out Discarded     :         64


                              Back to previous menu.
                <Enter> to confirm, <Ctrl+Z> to back to Main Menu
```

Figure 4.27 Exp Slot Port Statistics Menu

Displayed items are briefly described in the following table.

Field	Description
Hub ID	Hub identifier within the stack.
Position	The physical position in stack (as determined by its position from the top of the Stacking Cable).
In Frames	Number of frames received.
In Octets	Number of octets received.
In Discarded	Number of frames received and filtered.
Out Frames	Number of frames transmitted.
Out Octets	Number of octets transmitted.
Out Discarded	Number of frames transmitted and filtered (i.e., hub➔Exp Slot interface).
CRC Errors	Number of Ethernet Cyclic Redundancy Check errors.
Frames Too Long	Number of times frame length has exceeded the maximum allowable size (i.e., 1518 bytes).
Runts	Number of fragments.
Collisions	Number of simultaneous node transmissions detected by this module.

Table 4.21 Exp Slot Port Statistics Menu

Downloading System Software

Select *Download* from the *Main* menu to download new firmware updates into the hub. You may upgrade firmware from a server attached to the local network via TFTP, or remotely via a serial link using Xmodem. An example of this menu is shown below.

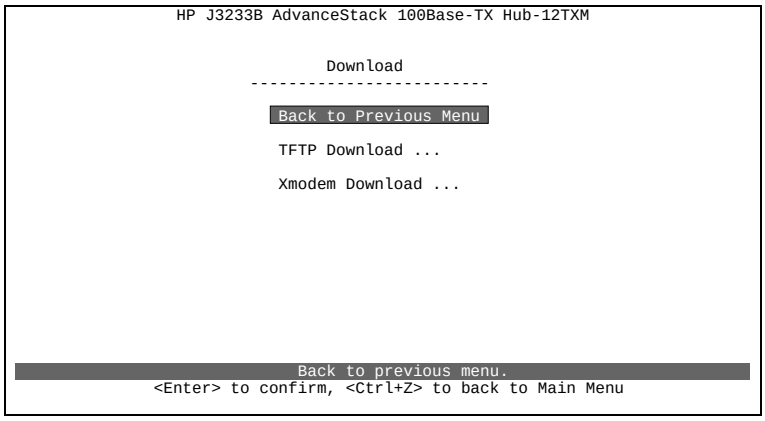


Figure 4.28 Download Menu

Displayed items are described in the following table.

Field	Description
TFTP Download	Downloads new version of firmware to update your system (via network).
Xmodem Download	Downloads new version of firmware to update your system (via Console Port).

Table 4.22 Download Menu

Downloading System Software via a TFTP Server

Use the *TFTP Download* command under the *Download* menu to download firmware updates into the hub. You may upgrade firmware from a server attached to the local network, or remotely via a serial link using TFTP over SLIP.

Specify the IP address for the TFTP server, the filename, and the download mode. The download file should be an AdvanceStack Hub-12TXM *.bin file from HP; otherwise the

agent will not accept it. Also be sure that you have already set the required bootup option for the target hub under the *Hub Configuration* menu.

Download status is indicated by messages at the bottom of the screen. Firmware is first loaded into a temporary buffer. If you selected download for permanent use, it will then be transferred to nonvolatile memory. After you download the firmware, the agent will be reset and you will have to log into the VT-100 console interface again. The following screen shows an example of the TFTP download menu.

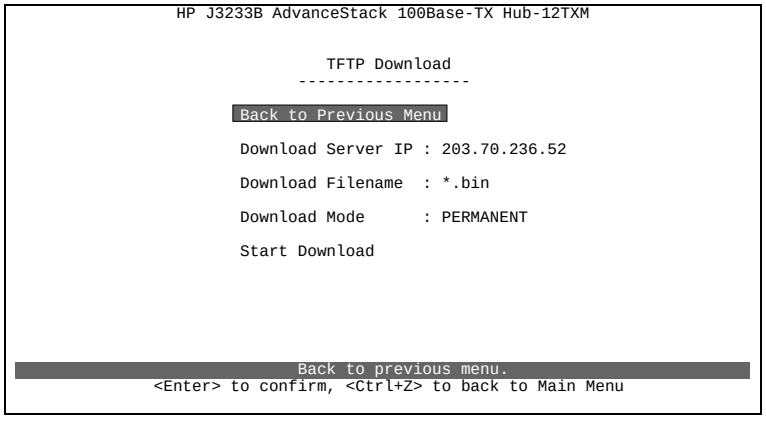


Figure 4.29 TFTP Download Menu

Menu items are briefly described in the following table.

Field	Description
Download Server IP	IP address of a TFTP server. (TFTP stands for Trivial File Transfer Protocol.)
Download Filename	The *.bin file to download.
Download Mode	You can download to permanent flash ROM or temporary storage in RAM (for test purposes). However, if you download to temporary memory, this firmware will be lost upon power off. To update new agent firmware for permanent use, it must be downloaded to flash ROM.
Start Download	Command to start the download.

Table 4.23 TFTP Download Menu

Xmodem Download

Enter *Xmodem Download* under the *Download* menu to download firmware to the hub. The Xmodem protocol is used to transfer binary files over a PC connection (i.e., using terminal emulation or modem access software).

Specify the download mode and select *Start Download*. Open the file transfer utility in your terminal emulation or modem access program, specify the filename, and then start file transfer. When transferring files from your computer, be sure you specify "Send" or "Upload" file. The file should be an AdvanceStack Hub-12TXM *.bin file from HP; otherwise the agent will not accept it. Also be sure that you have already set the required bootup option for the target hub under the *Hub Configuration* menu.

File transfer status is indicated by messages at the bottom of the screen. Firmware is first loaded into a temporary buffer. If you selected download for permanent use, it will then be transferred to nonvolatile memory. After you finish transferring the firmware, the agent will be reset and you will have to log back into the configuration program again. The following screen shows an example of the Xmodem Download menu.

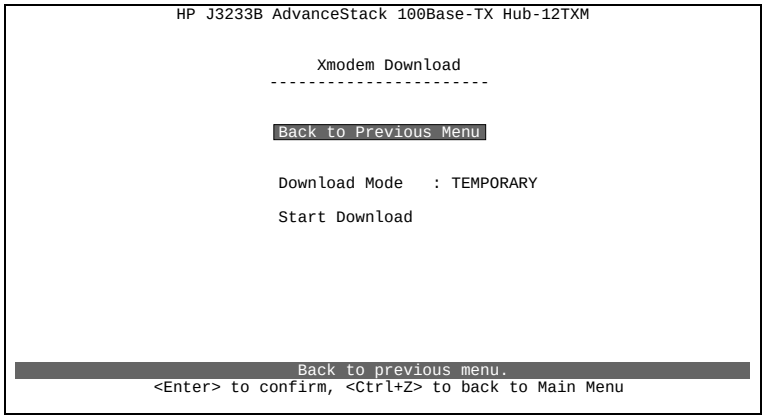


Figure 4.30 Xmodem Download Menu

Menu items are briefly described in the following table.

Field	Description
Download Mode	You can upload to permanent flash ROM or temporary storage in RAM (for test purposes only).
Start Download	Initiate the file transfer process.

Table 4.24 Xmodem Download Menu

Console Security

The *Console Security* menu enables both the setting of user passwords and the console timeout.

Changing User Passwords: The VT-100 console interface includes two fixed user types, Admin and Guest. The access privilege is Read/Write for administrator and Read Only for guest. The default user names and passwords are blank. The administrator is the only user with write access for agent parameters. You should therefore assign a password to administrator as soon as possible, and store it in a safe place.

Console Timeout: This function instructs the configuration program to automatically lock the console if no keyboard input is detected for the defined delay time.

The *Console Security* menu is shown below.

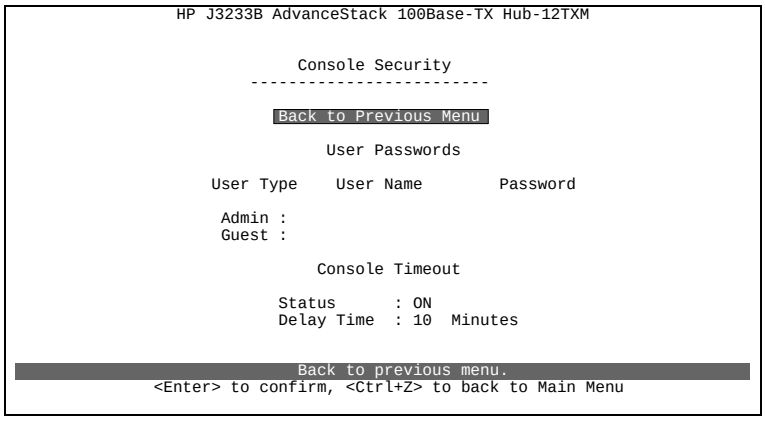


Figure 4.31 Console Security Menu

Menu items are briefly described in the following table.

Field		Description
User Passwords	User Type	There are only two fixed user types - Admin and Guest. The respective access rights are Read/Write and Read Only.
	User Name	The login name required for access to the management agent (not case sensitive). The hubs come with no default user names. You must set them. To enter the VT-100 Console Interface menu system at the User Name prompt, press Enter.
	Password	The password that must be provided with the user name to access the system (not case sensitive). The hubs come with no default passwords. You must set them. To enter the VT-100 Console Interface menu system at the Password prompt, press Enter.
Console Timeout	Status	The console lockup feature can be turned on or off.
	Delay Time	The delay time for console timeout can be set for any value in the range of 0 ~ 99 minutes.

Table 4.25 Console Security Menu

Connectivity Test

Use the *Connectivity Test* menu to perform checks on the connection between the Hub-12TXM and another designated device on the network.

There is an IP and IPX Ping Test, plus a Link Test. For the Link Test, the designated device is identified by its MAC address, and for the Ping test it is identified by its network (IP or IPX) address. Packets are sent from the Hub-12TXM to the designated device which then returns a reply. If a reply is received by the management station, the test passes. The number of successful and failed tests are logged and can be compared to the specified number of test repetitions.

The *Connectivity Test* menu is shown below.

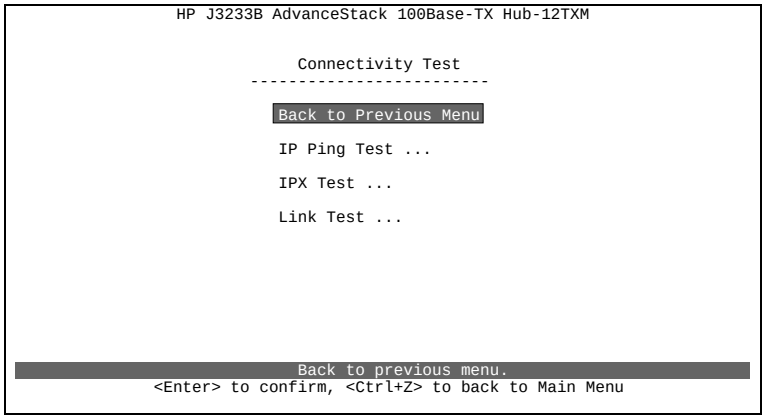


Figure 4.32 Connectivity Test Menu

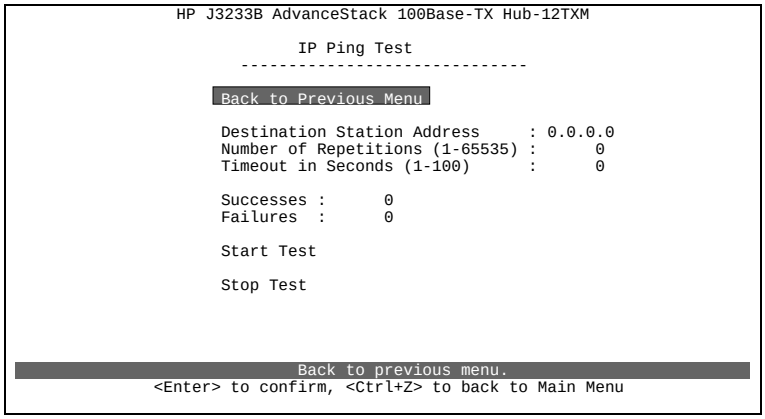


Figure 4.33 IP Ping Test Menu

Menu items are briefly described in the following table.

Field	Description
Destination Station Address	The IP address of the designated device with which you wish to perform connectivity tests.
Number of Repetitions	The number of times a test will be repeated.
Timeout in Seconds	The maximum time allowed for a test packet to be sent and returned.
Successes	The number of logged successful tests.
Failures	The number of logged failed tests.
Start Test	Start connectivity tests.
Stop Test	Stop connectivity tests.

Table 4.26 IP Ping Test Menu

The *IPX Ping Test* menu is shown below.

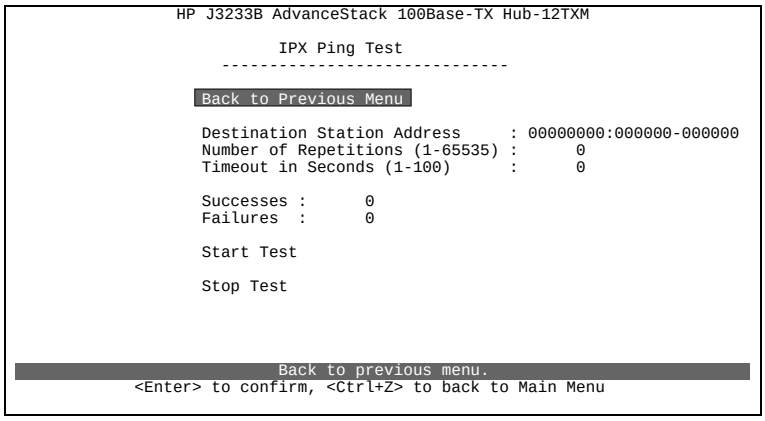


Figure 4.34 IPX Ping Test Menu

Menu items are briefly described in the following table.

Field	Description
Destination Station Address	The IPX address of the designated device with which you wish to perform connectivity tests.
Number of Repetitions	The number of times a test will be repeated.
Timeout in Seconds	The maximum time allowed for a test packet to be sent and returned.
Successes	The number of logged successful tests.
Failures	The number of logged failed tests.
Start Test	Start connectivity tests.
Stop Test	Stop connectivity tests.

Table 4.27 IPX Ping Test Menu

The *Link Test* menu is shown below.

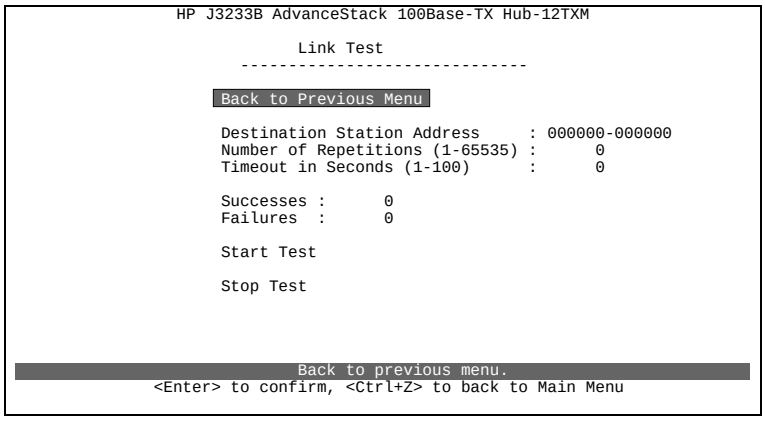


Figure 4.35 Link Test Menu

Menu items are briefly described in the following table.

Field	Description
Destination Station Address	The MAC address of the designated device with which you wish to perform connectivity tests.
Number of Repetitions	The number of times a test will be repeated.
Timeout in Seconds	The maximum time allowed for a test packet to be sent and returned.
Successes	The number of logged successful tests.
Failures	The number of logged failed tests.
Start Test	Start connectivity tests.
Stop Test	Stop connectivity tests.

Table 4.28 Link Test Menu

Rebooting the Hub

Use the *Restart the Agent* command under the *Main Menu* to reset the agent and all devices managed by the agent. The hardware configuration for the agent and system tests are displayed on the VT-100 console, similar to the messages shown in the following example.

```
SYSTEM CONFIGURATION:
---------------------
EPROM size: 128KB (configured)
Flash ROM size: 512KB
EEPROM size: 8KB
DRAM size: 4MB
Input FIFO: 1024 bytes
Output FIFO: 1024 bytes

SYSTEM TESTS:
-------------
Console I/O test...
    !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ
    [\]^_`abcdefghijklmnopqrstuvwxyz{|}~
Flash ROM test...
    Checksum test passed
EEPROM header test...
    Checksum test passed
DRAM test...
    Address ripple test passed
    Walking 0 test passed
    Walking 1 test passed
    Refresh test passed

Output FIFO testing OK ! SIZE 1024 bytes
Input FIFO testing OK ! SIZE 1024 bytes

SYSTEM TESTS COMPLETED
----------------------
```

Figure 4.36 Screen Messages for Rebooting the Hub

Exiting the VT-100 Console Interface

Use the *Exit* command under the Main Menu to close the VT-100 console interface. Note that this command and <Ctrl+E> have the same effect.

Chapter 5: Hardware Reference

Before connecting any network device to this hub, please review Chapter 2 for information on system installation, Chapter 3 for a brief look at common network architectures, and Chapter 4 for information on system configuration via the menu-driven VT-100 console interface. This chapter describes the hardware features of the HP 100Base-T Hubs. If you are not sure how to make network connections, or do not understand the hub's indicators, you should refer to this chapter.

The HP 100Base-T Hubs provide a manageable 100 Mbit/s Fast Ethernet stack. It also supports optional network Switch Port Modules that can be used to connect the hub (or stack) to the extended network with 10/100Base-TX or 100Base-FX media types. Moreover, these Switch Port Modules serve to break up the local collision domain, allowing you to overcome the limited network diameter normally associated with Fast Ethernet.

This hub provides a simple interface for configuring or monitoring network connections. Figure 5.1 shows the Hub-12TXM front panel, which includes a comprehensive array of indicators, 12 RJ-45 station ports, and an Expansion Slot for plugging in an optional Switch Port Module. Each Hub-12TX/Hub-12TXM model has similar indicators and other front panel components. However, note that the Management Mode LEDs, Master and Backup, are only present on the Hub-12TXM.

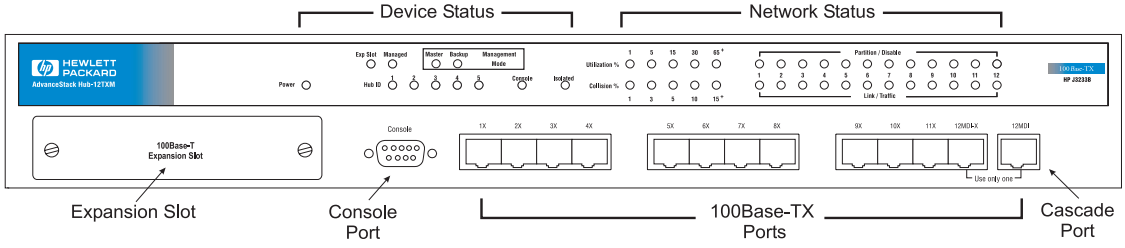


Figure 5.1 Front Panel of the Hub-12TXM

Figure 5.2 shows the Hub-24TX front panel, which includes a comprehensive array of indicators and 24 RJ-45 station ports. Note that there is no Expansion Slot on this hub, so it does not accept the Switch Port Modules. It has the same indicators as the Hub-12TX, except that there is no Exp Slot LED and the Console and Isolated LEDs are positioned differently.

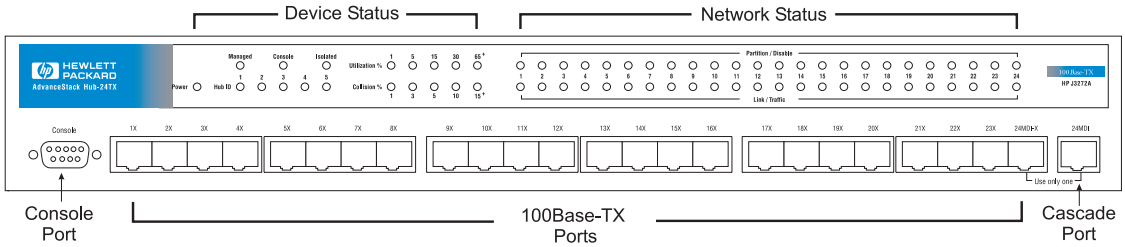


Figure 5.2 Front Panel of the Hub-24TX

Indicator Panel

The front panel includes comprehensive indicators for monitoring the hub. It displays the status of the network connections for each port, the hub's connection to the stack, and the status of each on-board SNMP agent. A quick glance can provide critical information, such as if a problem exists on the network. The following sections describe the function of each indicator.

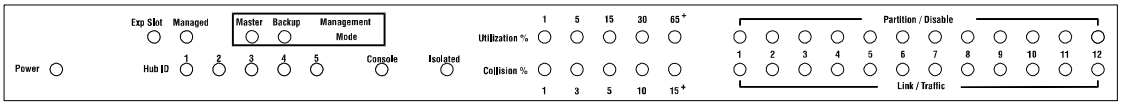


Figure 5.3 Indicators

Power

Color: Green
Function: Indicator for power supply

State	Indication
ON	Unit is receiving power.
OFF	Power is disconnected, or power supply has failed.

Table 5.1 Power Indicator

Exp Slot

Color: Green
Function: Displays status of the Switch Port Module

State	Indication
ON	Unit is installed and functioning properly.
OFF	No module is installed in the Expansion Slot.
BLINKING	Module has failed.

Table 5.2 Switch Port Module Indicator

There are two optional Switch Port Modules as described under Connecting to a Switch Port Module in Chapter 2. The indicators provided with each module are described below.

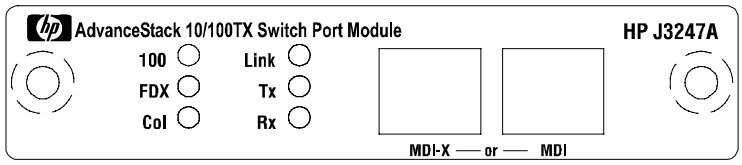


Figure 5.4 HP J3247A for 100Base-TX

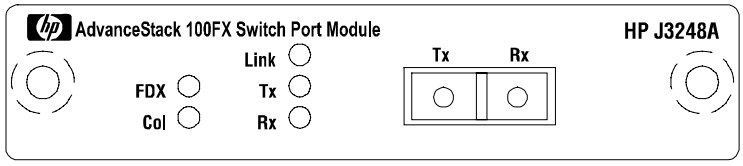


Figure 5.5 HP J3248A for 100Base-FX

LED	Color	State	Indication
100[1]	Green	ON	Port is set at 100Mbit/s.
		OFF	Port is set at 10Mbit/s.
FDX	Green	ON	Port is set for full-duplex operation.
		OFF	Port is set for half-duplex operation.
Col	Yellow	BLINKING	Packet collisions, blinking is proportional to the collision ratio.
Link	Green	ON	Port has a valid network connection.
Tx	Green	BLINKING	Port is transmitting packets; blinking is proportional to traffic passing through the port.
Rx	Green	BLINKING	Port is receiving packets; blinking is proportional to traffic passing through the port.

1 - Only present on the 10/100TX Switch Port Module

Table 5.3 Switch Port Module Indicators

Managed

Color: Green

Function: Indicates a valid connection between hub and agent

LED State	Indication Hub-12TX/24TX	Indication Hub-12TXM
ON	Hub has a valid connection with an agent through the Stacking Port.	Hub agent is active.
OFF	Hub is in a standalone configuration, or does not have a valid connection to an agent.	N/A
BLINKING		Hub agent has failed.

Table 5.4 Managed Indicator

Management Mode Indicators

Color: Green

Labels: Master, Backup

Function: Displays status of the on-board management agent

LED Condition		Indication
Master	Backup	
ON	OFF	SNMP agent is functioning as the primary agent.
OFF	ON	SNMP agent is functioning as a backup agent.
OFF	OFF	SNMP agent is not installed or has failed.

Table 5.5 Management Mode Indicators

Hub ID

Color: Green
Function: Indicates Unit ID Setting

In a stacked system with a Hub-12TXM present, each hub unit has a unique ID. The HP 100Base-T Hubs are equipped with a function that automatically sets the hub ID, freeing the user from this task. The unit's Hub ID LED indicators are marked "1, 2, 3, 4, 5." In normal operation one LED will display a steady light to indicate each hub's ID; while in configuration mode, the LEDs will blink.

Console

Color: Green
Function: Indicates a connection to a management console

LED Activity	Indication
ON	Agent has a valid RS-232 serial port, or Telnet connection to a management console and a user is logged in.
OFF	No user is logged in via a management console connection.

Table 5.6 Console Indicator

Isolated

Color: Green
Function: Indicates the hub is isolated from the collision domain of the stack

LED Activity	Indication
ON	Hub is isolated from the stack.
OFF	Hub is attached to the collision domain of the stack.

Table 5.7 Isolated Indicator

Utilization %

Color: Green and yellow
Function: Indicates the percentage of network bandwidth currently utilized

Label (%)	Color	Function
1, 5, 15	Green	Indicates percentage of LAN bandwidth in use by valid data.
30, 65+	Yellow	

Table 5.8 Utilization Indicators

There are five LEDs representing the percentage of network bandwidth in use by the attached stack (or isolated hub). When active, these LEDs look like a stereo's equalizer display. The hub updates this display every 0.5 seconds.

For example, if network utilization reaches 1%, the LED labeled 1 will light. However, if network utilization rises above 1% (e.g., 30%), the LED labeled 30 and all the other LEDs before it (i.e., 1, 5, and 15) will light in rapid succession.

These LEDs monitor the share of valid network frames transmitted by the stack (or this hub, if isolated) within a 100Mbit/s bandwidth. They provide a quick way to monitor the current traffic load relative to the capacity available to the attached collision domain.

Collision %

Color: Green and yellow

Label (%)	Color	Function
1, 3, 5	Green	Shows percentage of packet collisions occurring out of the total packets received by the hub.
10, 15+	Yellow	

Table 5.9 Collision Indicators

Collisions occur when two or more devices connected to a hub attempt to transmit data simultaneously on the network. When a collision occurs, devices pause and then re-transmit after a

pseudo-random wait period. Because wait periods differ among devices, successive collisions become increasingly improbable.

The Collision % LEDs assist the network manager in monitoring the percentage of packet collisions occurring relative to the total packets received by the stack (or hub, if isolated). Similar to Utilization % LEDs, the Collision % LEDs have five numbers representing collision percentage. When collisions reach a level marked on the LED display, the corresponding LED lights up.

For example, if packet collisions reach 1%, the LED labeled 1 will light up. However, if collisions go beyond 1% (e.g., 15%), the LED labeled 15^{+} and all the other LEDs before it (i.e., 1, 3, 5, and 10) will also light up in rapid succession.

When more than 64 consecutive collisions occur on the cable segment connected to a port, that port is automatically partitioned by the hub. The hub automatically reconnects this port when a data packet longer than 512 bits (normal) is transmitted or received by the partitioned port without collision. This applies to all STP station ports and the cascade port.

Port Status Indicators

There are 12 or 24 pairs of port status indicators. Each pair consists of a Link/Traffic LED (in the bottom row) and Partition/Disable LED (in the top row). The last pair displays status for both the 12MDI-X/24MDI-X and 12MDI/24MDI port, either of which is currently in use. Also note that port status for the Switch Port Module is displayed directly on the module as described in the section on Switch Port Module Indicator earlier in this chapter.

Link/Traffic

Color: Green
Function: Indicates port link and activity

State	Indication
ON	Indicates a valid link has been established on this port.
OFF	No valid link has been established on this port.
BLINKING	Indicates that the port is receiving packets; blinking is proportional to the traffic passing through the port.

Table 5.10 Link/Traffic

Link - The Link/Traffic LED should light up when a device (e.g., computer) establishes a valid connection via the RJ-45 port.

Troubleshooting - If the Link/Traffic LED does not light up when a device is connected to a port, check that both the hub and connected device are powered on. For devices connected to the hub using twisted-pair cable, check that the cable length does not exceed 100 meters. You should use standard, straight-through cables and **not** crossover or other specialized cables.

Traffic - Refers to the movement of packets received by the port. A port's Link/Traffic LED will blink in proportion to the amount of traffic passing through the port. The network manager can easily determine the activity on a port by viewing this LED.

Partition/Disable

Color: Yellow
Function: Indicates port has been partitioned due to network error or intentionally disabled

State	Condition	Indication
ON	Partitioned	Indicates port has been partitioned due to an abnormal network condition.
OFF	OK	Port is in good condition.
BLINKING	Disabled	Indicates the port has been disabled via Console Interface.

Table 5.11 Partition/Disable Indicators

Partition - A port is temporarily partitioned when a line error or too many collisions are detected on the attached collision domain. While automatically partitioned, the port continues to receive data from the segment. However, data is **not** transmitted onto the segment. When the problem is corrected or a valid data packet is received through the port, it is automatically reconnected. When partitioning occurs, the port's Partition/Disable LED will be continually lit. Otherwise, this LED should be OFF.

Disable - Disabling a port is the same as manually partitioning it, except that you must also manually reconnect it. For example, to prevent a certain device from accessing the network or to reduce network traffic you may opt to disable the port. No incoming packet transmission can occur on a disabled port. Ports can be disabled/enabled using the VT-100 console interface.

☞ The Partition/Disable LEDs are also used as diagnostic LEDs. Please refer to *Diagnostic Test Indicators* for more information.

Diagnostic Test Indicators

After power on, the hub automatically performs a diagnostic test of hardware components. The diagnostic tests display results for the HP 100Base-T repeater board via the Partition/Disable LEDs on the front panel. Test results for the Hub-12TXM management agent can only be seen via the VT-100 console interface. The following table shows how test results for the repeater board are indicated by the Partition/Disable LEDs.

Partition/Disabled LED Indicator	Test Function/Component of Hub Repeater Board
1	Boot ROM
2	Hub Configuration EEPROM
3	RAM for Repeater Board CPU
4	Repeater Information Base SRAM
5	Repeater Interface Controller
7	Routing Table for Internal Exp Port
8	Input Queue for Internal Exp Port
9	Output Queue for Internal Exp Port
10	Routing Table for External Exp Port
11	Input Queue for External Exp Port
12	Output Queue for External Exp Port

Table 5.12 Diagnostic Results

The system tests each component one at a time. The corresponding indicator will light up (ON) after test completion to show which component failed the test. No light means all the hub components passed the diagnostics.

State	Indication
ON	Corresponding hardware component failed the diagnostic test.
OFF	Corresponding hardware component successfully passed the diagnostic test.

Table 5.13 Diagnostic Indicators

The HP 100Base-T Hubs will complete the test cycle even if a problem is detected on any of the components. If all Partition/Disable LEDs are off, then all the tested components have successfully passed diagnostics.

Network Connections

The front panel on the HP 100Base-T Hubs provide the following network options:

- Connections to end-node devices using RJ-45 station ports.
- Cascaded connection to a compatible switch or router using the cascade port.
- Extended network connection using the Switch Port Modules for 10/100Base-TX or 100Base-FX.

Station Ports

The hub has 12 or 24 RJ-45 station ports that can be used to connect end-node devices (e.g., file servers, workstations or printers). Be sure you have a Fast Ethernet LAN adapter installed in the device to be connected to the hub. Then connect it to any available RJ-45 station port on the hub (i.e., 1X ~ 12MDI-X) using straight-through shielded or unshielded (100Ω STP or UTP) twisted-pair cable.

Cascade Port

A compatible switch or other network interconnection device can be attached to the 12MDI/24MDI cascade port. Use straight-through shielded or unshielded (100Ω STP or UTP) twisted-pair cable to connect to an MDI-X station port on the target device. Refer to the section on Making a Connection via the MDI Cascade Port in Chapter 2 for a detailed description on cascading.

Note: This device is a Class I repeater and cannot be cascaded to another hub within the same collision domain.

Console Port

The unit has one 9-pin RS-232 male connector labeled Console. It can be used to perform basic configuration or to establish a network management connection with the hub. By using a direct or remote connection, in conjunction with a terminal emulation program, you can access the HP 100Base-T Hubs VT-100 console interface. This console interface can be used to configure the attached hub or stack, and to upgrade system firmware. Complete details on how to set up a connection to the serial port and how to use the VT-100 console interface are included in Chapter 4.

Note: Configuration options provided for the Hub-12TX and Hub-24TX are limited because these models do not include an agent. Moreover, configuration via the Console Port on these models is limited to the attached hub only (i.e., it cannot manage other hubs in the stack).

Rear Panel Components

The rear panel is similar for all models. The figure below shows the rear panel, which includes a power socket and two Stacking Ports used for stacking up to five hubs. For easier management and control of the hub, familiarize yourself with the ports and power socket provided on the rear panel of the hub.

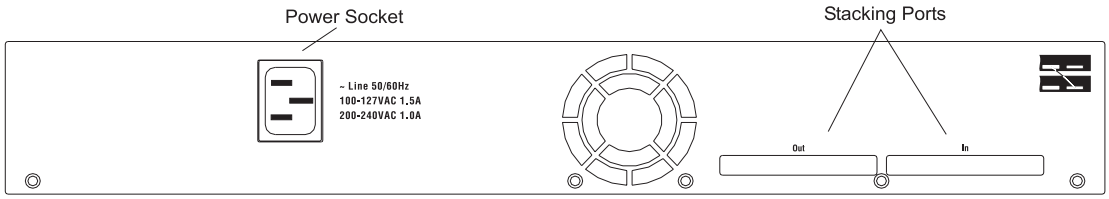


Figure 5.6 Rear Panel

Power Socket

The power socket accepts AC power from 100 to 240V at 50 to 60 Hz. The hub is equipped with a universal full-range power source.

Stacking Ports

The unit has two Stacking Ports labeled In and Out for combining the hub with other compatible hubs to form a single hub stack (up to a maximum of five hubs). The Stacking Cable that comes with this package is used specifically for these ports. Only hubs connected through the In and Out Stacking Ports can be managed by a network management agent (Hub-12TXM).

In

Using a Stacking Cable, connect this port to the Out port of any HP 100Base-T Hub.

Out

Using a Stacking Cable, connect this port to the In port of any HP 100Base-T Hub.

The unit also supports “hot swap” for the Stacking Cable. This allows you to unplug the Stacking Cable while the unit is powered on. However, if the Stacking Cable is disconnected at any point in the stack, or is not properly terminated, all Ethernet and management traffic passing through the cable will be disrupted.

Appendix A: Troubleshooting

Diagnosing Hub Indicators

The HP 100Base-T Hub can be easily monitored through its comprehensive panel indicators. These indicators assist the network manager in identifying problems the hub may encounter. This section describes common problems you may encounter and possible solutions.

Symptom: *Link* indicator does not light up (green) after making a connection.

Cause: Network interface (e.g., a LAN adapter on the attached device), network cable, or hub port is defective.

Solution: Check the power cord of both the hub and the attached device and power source connections. If connections are secure then try a different outlet, or try a different power cord to see if the power cord is the problem. Be sure the network cable is plugged into both the hub and corresponding device. Verify that the proper cable type is used and its length does not exceed specified limits (Chapter 2). Check the LAN adapter on the attached device and cable connections for possible defects. Replace the defective LAN adapter or cable if necessary. If the problem persists, contact your HP-authorized reseller.

Symptom: *Power* indicator does not light up (green) after power on.

Cause: Defective power outlet, power cord, or internal power supply.

Solution: Check the power outlet by plugging in another device that is functioning properly. Check the power cord with another device. If these measures fail to resolve the problem, have the unit's power supply replaced by your authorized reseller.

Use the diagnostic procedures described in Chapter 2 and Chapter 5 to verify that all other system components are

functioning properly. If any component fails the diagnostic test, contact your HP-authorized reseller for assistance.

System Diagnostics

Power and Cooling Problems

If the Power indicator does not turn on when the power cord is plugged in, you may have a problem with the power outlet, power cord, or internal power supply as explained in the previous section. However, if the unit powers off after running for a while, check for loose power connections, power losses or surges at the power outlet, and verify that the fans on the back of the unit are unobstructed and running prior to shutdown. If you still cannot isolate the problem, then the internal power supply may be defective. In this case, contact your HP-authorized reseller for assistance.

Installation

Verify that all system components have been properly installed. If one or more components appear to be malfunctioning (e.g., the power cord or network cabling), test them in an alternate environment where you are sure that all the other components are functioning properly.

Transmission Mode

If any devices are attached to a 10/100TX Switch Port Module, and operate at full duplex but do not support auto-negotiation, then you must manually set the transmission mode for this port on the hub. The transmission mode must always be set manually for the 100FX Switch Port Module.

The default method of selecting the transmission mode for the 10/100TX Switch Port Module is auto-negotiation. Therefore, if the Link signal is disrupted (e.g., by unplugging the network cable

and plugging it back in again, or by resetting the power), the port will try to reestablish communications with the attached device via auto-negotiation. If auto-negotiation fails, then communications are set to half duplex by default. Based on this type of industry-standard connection policy, if you are using a full-duplex device that does not support auto-negotiation, communications can be easily lost (i.e., reset to the wrong mode) whenever the attached device is reset or experiences a power fluctuation. The best way to resolve this problem is to upgrade these devices to versions which support auto-negotiation.

Cabling

1. Verify that the cabling type is correct. Be sure all cable connectors are securely seated in the required ports. Use 100Ω Category 5 cable for all twisted-pair connections to 100Base-TX ports. Straight-through cable should be used for all standard twisted-pair connections.
2. When cascading two devices using RJ-45 station ports at both ends of the cable (i.e., not an MDI port), make sure a crossover cable is used. Crossover cable should only be used when a cascade port is not available.
3. Make sure all devices are connected to the network. Equipment may have been unintentionally disconnected from the network.

LAN Adapters

Make sure the LAN adapters installed in workstations are compatible and are in good working condition.

Physical Configuration

If problems occur after altering the network configuration, restore the original connections, and try to track the problem down by implementing the new changes, one step at a time. Ensure that cable distances and other physical aspects of the installation do not exceed 100Base-TX specifications (refer to Chapter 2).

System Integrity

As a last resort verify the hub's integrity with a power-on reset. Turn the power to the hub off and then on several times. If the problem still persists and you have completed all the preceding diagnoses, then contact your HP-authorized reseller for further assistance. (Refer to Appendix F.)

Appendix B: Pin Assignments

RJ-45 Port

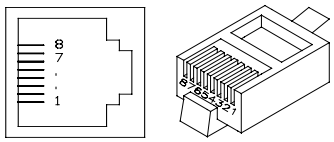


Figure B.1
RJ-45 Connector
(on the Hub Side)

RJ-45 station ports (MDI-X) can be attached to any devices that use a standard network interface (e.g., a workstation or server). RJ-45 cascade ports (MDI) can be cascaded to a station port on similar networking devices (e.g., another switch or router). Use unshielded twisted-pair (UTP) or shielded twisted-pair (STP) cable for RJ-45 connections: 100Ω Category 3, 4 or 5 cable for 10 Mbit/s connections or 100Ω Category 5 cable for 100 Mbit/s connections. Also be sure that the length of any twisted-pair connection does not exceed 100 meters.

Pin	Assignment for MDI-X Station Ports 1 ~ 12/24	Assignment for MDI Cascade Port
1	Receive Data +	Transmit Data +
2	Receive Data -	Transmit Data -
3	Transmit Data +	Receive Data +
6	Transmit Data -	Receive Data -
4,5,7,8	Not Used	Not Used

Table B.1 RJ-45 Pin Assignments

Schematics for both straight and crossover twisted-pair cable are shown below.

Straight-Through

(Hub)		(Adapter)
1	———	1
2	———	2
3	———	3
6	———	6

Crossover

(Hub)		(Hub)
1	╲ ╱	1
2	╲ ╱	2
3	╱ ╲	3
6	╱ ╲	6

DB9 Serial Port Pin Description

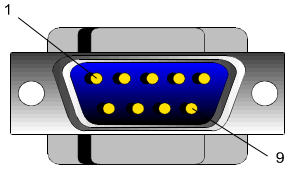


Figure B.2
DB9 Serial Port
(on the Hub Side)

The DB9 serial port on the front panel is used to connect the hub to a management device. The VT-100 console interface can be accessed from a terminal, a PC running a terminal emulation program, or from a remote location via a modem connection. Network management software (which provides a graphical interface) can also be used to discover and map the hub from a remote location via a modem connection, running SLIP over TCP/IP. You can use the serial port to configure port settings (e.g., enabled or disabled), or to update device firmware. The pin assignments used to connect various device types to the hub's Console Port are provided in the following tables.

EIA Circuit	CCITT Signal	Description	Hub's DB9 DTE Pin #	PC DB9 DTE Pin #	Modem DB25 DCE Pin #	Signal Direction DTE -DCE
CF	109	**DCD** (Data Carrier Detected)	1	1	8	< --------
BB	104	**RxD** (Received Data)	2	2	3	< --------
BA	103	**TxD** (Transmitted Data)	3	3	2	-------- >
CD	108.2	**DTR** (Data Terminal Ready)	4	4	20	-------- >
AB	102	**SG** (Signal Ground)	5	5	7	----------
CC	107	**DSR** (Data Set Ready)	6	6	6	< --------
CA	105	**RTS** (Request-to-Send)	7	7	4	-------- >
CB	106	**CTS** (Clear-to-Send)	8	8	5	< --------
CE	125	**RI** (Ring Indicator)	9	9	22	< --------

Table B.2 DB9 Port Pin Assignments

Hub's 9-Pin Serial Port to PC's 9-Pin COM Port

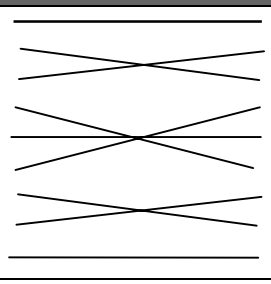
Hub's 9-Pin Serial Port	Cable Wiring	PC's 9-Pin COM Port
1 DCD		1 DCD
2 RXD		2 RXD
3 TXD		3 TXD
4 DTR		4 DTR
5 SGND		5 SGND
6 DSR		6 DSR
7 RTS		7 RTS
8 CTS		8 CTS
9 RI		9 RI

Table B.3 RS-232-C "Null Modem" Cable Connection from Hub's 9-Pin Serial Port to PC's 9-Pin COM Port

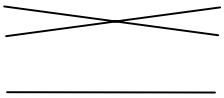
Hub's 9-Pin Serial Port	Cable Wiring	PC's 9-Pin COM Port
1 DCD		1 DCD
2 RXD		2 RXD
3 TXD		3 TXD
4 DTR		4 DTR
5 SGND		5 SGND
6 DSR		6 DSR
7 RTS		7 RTS
8 CTS		8 CTS
9 RI		9 RI

Table B.4 Minimum Cable Connection from Hub's 9-Pin Serial Port to PC's 9-Pin COM Port

Hub's 9-Pin Serial Port to PC's 25-Pin DTE Port

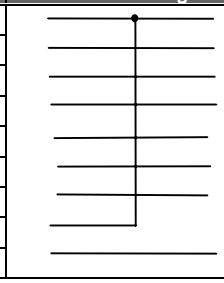
Hub's 9-Pin Serial Port	Cable Wiring	PC's 25-Pin DTE Port
1 DCD		4 RTS
2 RXD		3 TXD
3 TXD		2 RXD
4 DTR		6 DSR
5 SGND		7 SGND
6 DSR		20 DTR
7 RTS		5 CTS
8 CTS		8 DCD
9 RI		22 RI

Table B.5 Full-Pin Connection from Hub's 9-Pin Serial Port to PC's 25-Pin DTE Port

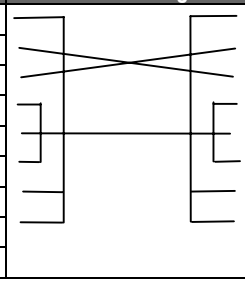
Hub's 9-Pin Serial Port	Cable Wiring	PC's 25-Pin DTE Port
1 DCD		4 RTS
2 RXD		3 TXD
3 TXD		2 RXD
4 DTR		6 DSR
5 SGND		7 SGND
6 DSR		20 DTR
7 RTS		5 CTS
8 CTS		8 DCD
9 RI		22 RI

Table B.6 Three-Pin Connection from Hub's 9-Pin Serial Port to PC's 25-Pin DTE Port

Hub's 9-Pin Serial Port to Modem's 25-Pin DCE Port

Hub's 9-Pin Serial Port		Modem's 25-Pin DCE Port
1	< ---------- DCD ----------	8
2	< ---------- RXD ----------	3
3	---------- TXD --------- >	2
4	---------- DTR --------- >	20
5	---------- SGND ---------	7
6	< ---------- DSR ----------	6
7	---------- RTS --------- >	4
8	< --------- CTS ----------	5
9	< ---------- RI ----------	22

Table B.7 Hub's 9-Pin Serial Port to Modem's 25-Pin DCE Port Pin Assignments

Appendix C: Modem Configuration

Before installing the modems (one attached to the hub's console port and one attached at the user end to a terminal or PC), configure them by connecting, one at a time, to a PC or terminal and issuing the appropriate AT command. Then install the modems in the appropriate locations, one connected to the Hub-12TXM and one connected to a PC or terminal.

The modems listed in this appendix have been tested and found to work properly with the Hub-12TXM using the initialization strings shown in the following tables.

Hayes Smartmodem Optima 28.8 (V.34)

At the hub end:	Issue the following AT command: AT&FQ2&C2&D3S0=1&W0
At the user end:	Issue the following AT command: AT&FW1&C1&W

Hayes Acura 288 V.34 + FAX

At the hub end:	Issue the following AT command: AT&FQ2&C2&D3S0=1&W0
At the user end:	Issue the following AT command: AT&FW1&C1&W

US Robotics Courier V.FC/V.34

At the hub end:	Issue the following AT command: AT&F&C0S0=1&W0
At the user end:	Issue the following AT command: AT&F&W

Megahertz XJ2288 PCMCIA card modem

At the user end:	Issue the following AT command: AT&F\N0&W

Practical Peripherals PM288MT II V.34

At the hub end:	Issue the following AT command: AT&F0&C2S0=102&D3&W0
At the user end:	Issue the following AT command: AT&F0&W0

Appendix C: Modem Configuration

Before installing the modems (one attached to the hub's console port and one attached at the user end to a terminal or PC), configure them by connecting, one at a time, to a PC or terminal and issuing the appropriate AT command. Then install the modems in the appropriate locations, one connected to the Hub-12TXM and one connected to a PC or terminal.

The modems listed in this appendix have been tested and found to work properly with the Hub-12TXM using the initialization strings shown in the following tables.

Hayes Smartmodem Optima 28.8 (V.34)

At the hub end:	Issue the following AT command: AT&FQ2&C2&D3S0=1&W0
At the user end:	Issue the following AT command: AT&FW1&C1&W

Hayes Acura 288 V.34 + FAX

At the hub end:	Issue the following AT command: AT&FQ2&C2&D3S0=1&W0
At the user end:	Issue the following AT command: AT&FW1&C1&W

US Robotics Courier V.FC/V.34

At the hub end:	Issue the following AT command: AT&F&C0S0=1&W0
At the user end:	Issue the following AT command: AT&F&W

Megahertz XJ2288 PCMCIA card modem

At the user end:	Issue the following AT command: AT&F\N0&W

Practical Peripherals PM288MT II V.34

At the hub end:	Issue the following AT command: AT&F0&C2S0=102&D3&W0
At the user end:	Issue the following AT command: AT&F0&W0

Appendix D: Product Specifications

Product Specifications

Hub Board	Access Method	CSMA/CD, 100 Mbit/s
	Standards Conformance	IEEE 802.3u 100Base-TX
	Communication Rate	100 Mbit/s on all Ports
	Communication Mode	Half duplex
	Media Supported	100Ω Cat 5 twisted-pair (2-pair) STP and UTP
	Number of Ports	Hub-12TX/Hub-12TXM: 12 100Base-TX RJ-45 shielded station ports (Port 12 provides MDI-X or MDI connection); 1 Expansion Slot for Switch Port Modules Hub-24TX: 24 100Base-TX RJ-45 shielded station ports (Port 24 provides MDI-X or MDI connection) All Models: 2 Stacking Ports for stack interconnection; and 1 serial port for system management
	Configuration	On-board VT-100 console interface configuration via serial port or Telnet
	Indicator Panel	Comprehensive array of LEDs for displaying hub ID, network utilization, collision rate, Switch Port Module, management agents, hub isolation, port link/traffic, and port partition/disable
	Microprocessor	8031 (Hub-12TX/Hub-24TX); i960CA (Hub-12TXM)
	Fault Tolerance	Hot swappable; backup SNMP agent; redundant port links
	Dimensions	440mm x 305mm x 65mm (17.3″ x 12.0″ x 2.6″)
	Power Requirements	Full range power input, 100 to 240V, 50/60 Hz, 60 watts max.
	Temperature	5°C to 40°C (Standard Operating)
	Humidity	5% to 85% (Noncondensing)
	Certification	CE Mark
	Emissions	FCC Class A, VCCI Class A, CISPR 22 Class A, EN55022
	Immunity	IEC 801-2,3,4,6 EN50082-1, EN60555-2 Class A, EN60555-3
	Safety	UL 1950, CSA 950, EN60950

Hub Stack	Expansion	Up to 5 modules (120 ports)
	Expansion Interface	Stacking Cable
	Configuration	Automatic hub-ID and bus termination
	Isolation	Supports hub isolation from the stack
Switching Port	Access Method	CSMA/CD, 100 Mbit/s
	Standards Conformance	IEEE 802.3u 100Base-TX, FX
	Communication Rate	10/100Base-TX, 10 or 100 Mbit/s (via auto-sensing): 100Base-FX, 100 Mbit/s only
	Communication Mode	Full or half duplex for 10/100Base-TX (via auto-negotiation), 100Base-FX (via manual configuration)
	Media Supported	*100Base-TX* 100Ω twisted-pair (2-pair); Cat 5 for 100 Mbit/s, or Cat 3,4,5 for 10 Mbit/s
		100Base-FX 50/125 μm or 62.5/125 μm multimode fiber, wavelength equals 1300 nanometers
	Number of Ports	2 100Base-TX RJ-45 ports (1 MDI, 1 MDI-X), or 1 100Base-FX SC-type port
	Indicator Panel	Comprehensive array of LEDs for displaying port link, collision, traffic, transmission speed, transmission mode
	Switching Criteria -	
	Network Bridging Function	filtering, forwarding and learning
	Switching Method	adaptive cut-through: cut-through, fragment-free cut-through, and store-and-forward
	Maximum Filtering Rate	line speed
	Maximum Forwarding Rate	line speed
	Network Latency	less than 20 microseconds
	Address Table	4K entries/port
	Queue Buffer	160K bytes

Appendix E: Safety and Regulatory Statements

This chapter covers the following topics:

- mounting precautions
- power precautions
- safety and regulatory statements

Mounting Precautions

When you put a hub into a rack, follow these mounting precautions:

- The rack or cabinet should be adequately secured to prevent it from becoming unstable and/or falling over. The first hub (or single hub) should be mounted in a position toward the bottom of the rack for stability and to make it easier to stack the other hubs on top.
- Before mounting a hub, plan its location and orientation relative to other devices and equipment. Also consider the cabling that will be attached to the hub and the ports that will be used. Verify that there is room for the grouped cables to trail out from the side of the hub. Allow at least 2.54 cm (1 inch) in the front of the hub. At the back of the hub, allow at least 3.8 cm (1 1/2 inches) of space for the power cord.
- Ensure that HP 100Base-T Hubs do not overload the power circuits, wiring, and over-current protection. To determine the possibility of overloading the supply circuits, add together the amperage ratings from the nameplates of all your hubs (and other equipment) installed on the same circuits and compare the total with the rating limits for the supply circuits.
- Make sure that the power source circuits are properly grounded, then use the supplied power cord to connect the HP 100Base-T Hub to the circuit. See the Safety Statements in this chapter.
- Do not install the hub in an environment where the operating ambient temperatures might exceed 55^{o}C (131^{o}F).
- Make sure the air flow around the sides of the hub is not restricted.

Power Precautions

Follow these precautions when unplugging and plugging in power to the hub.

Caution

If your installation requires a different power cord than the one supplied with the hub, be sure to use a power cord displaying the mark of the safety agency that defines the regulations for power cords in your country. The mark is your assurance that the power cord can be used safely with the hub.

Note

The hub does not have a power switch; it is powered on when the power cord is plugged in. The hub's power supply automatically adjusts to any AC power source between 100-127 volts and 200-240 volts. There are no voltage range settings to configure.

When installing the hub, note that the AC outlet must be installed near the equipment and should be easily accessible.

Safety Information

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

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

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 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.

CAUTION 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.

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 verge-wissern, 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

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 WARNINGdenota un pericolo che può causare lesioni o morte.

CAUTION La dicituraCAUTION denota un pericolo che può danneggiare le attrezzature.

Non procedere oltre un avviso di WARNING o di CAUTIONprima 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 collegaento 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

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。

Safety Information (Chinese)

HP 网络产品使用安全手册

使用须知

欢迎使用惠普网络产品，为了您及仪器的安全，请注意如下事项
1．仪器要和地线相接。要使用有正确接地插头的电源线，使用中国国家规定的220V电源。
2．避免高湿度和灰尘多的地方，否则易引起仪器内部部件的损坏。
3．避免接近高温，避免接近直接热源，如直射太阳光、暖气等其它发热体。
4．不得有异物或液体落入机内，以免部件短路。
5．不要将强磁体放置于仪器附近。

警告

为了防止火灾或触电事故，请不要将该机放置于淋雨或潮湿处。

安装

安装辅助管理模块请参看安装指南。

保修及技术支持

如果您按以上步骤正确使用但遇到了问题，或想了解其它产品性能，请按以下方式与我们联络。

如果是硬件故障:
1．与售出单位或当地维修机构联系。
2．惠普维修中心:
北京市海淀区知春路56号　中航科技大厦
邮政编码:　100086
电话:　010-62625666　转　6101
如果是软件问题:
1．惠普技术支持中心热线电话:　010-62625666　转　5600 至5610
2．传真自动回复系统:　010-65055280

Regulatory Statements

FCC Class A Statement (for U.S.A. Only)

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 interference to radio communications. Operation of this equipment in a residential area may cause interference in which case the user will be required to correct the interference at his own expense.

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。

European Community

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

Note: 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 measures.

Canada

This product complies with Class A Canadian EMC requirements.

Australia

This product complies with Australia/New Zealand EMC Class A requirements.

Declaration of Conformity

The following Declaration of Conformity for the HP J3233B/J3234B/ J3272A AdvanceStack Hub-12TX, Hub-12TXM, Hub-24TX and Switch Port Modules complies with ISO/IEC Guide 22 and EN 45014. The declaration identifies the product, the manufacturer's name and address, and the specifications that are recognized in the European community.

DECLARATION OF CONFORMITY
according to ISO/IEC Guide 22 and EN45014

Manufacturer's Name: Hewlett-Packard Company

Manufacturer's Address: 8000 Foothills Blvd.
Roseville, CA 95747-5502
U.S.A.

declares that the product:

Product Name: HP AdvanceStack 100Base-T Hub-12 TXM
HP AdvanceStack 100Base-T Hub-12 TX
HP AdvanceStack 100Base-T Hub-24TX

Model Number: HP J3233B
HP J3234B
HP J3272A

Accessories: HP J3247A, HP J3248A

conforms to the following Product Specifications:

Safety: EN60950 (1992)+A1,A2 / IEC 950:1991+A1,A2

EMC: EN 55022 (1994) / CISPR-22 (1993) class A
EN50082-1 (1992)
IEC 1000-4-2 (1995), 4 kV CD, 8 kV AD
IEC 1000-4-3 (1995), 3 V/m
IEC 1000-4-4 (1995): 1 kV-(power line)
0.5 kV-(signal line)
ENV 50141 (1993), 3Vrms

Supplementary Information:

The product herewith complies with the requirements of the Low Voltage Directive 73/23/EEC and the EMC Directive 89/336/EEC and carries the CE marking accordingly. LEDs in this product(s) are Class-1 in accordance with EN60825-1:1994.

The J3247A and J3248A are accessories for the J3233B and J3234B.

Tested with Hewlett-Packard Co. products only.

Roseville, March 30, 1998

Karen Dorniak, Quality Manager

European Contact: Your local Hewlett-Packard Sales and Service Office or Hewlett-Packard GmbH, Department TRE, Herrenberger Strasse 130, D-71034 Böblingen(FAX:+49-7031-14-3143).

Appendix F: Product Support Services

Hewlett-Packard offers support through the use of automated electronic services including:

- World Wide Web
- HP Network Phone-In Support (NPS)
- HP FIRST FAX Retrieval Service

World Wide Web

http://www.hp.com/go/network_city

From this web site you can view information about HP's complete networking product line. If you have a growing network and need help designing it, download the *Designing HP AdvanceStack Workgroup Networks Guide* or call 1-800-752-0900 to receive a copy through mail.

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.

Additional HP Support Services

In addition to the above services, you can purchase various HP telephone support services which provide you expert HP technical assistance:

- Network Phone-In Support provides you support at an hourly rate. In the USA, call 1-800-790-5544. In other countries, please contact your local HP Response Center to see if this service is available in your country.
- HP SupportPack Comprehensive Network Support provides complete problem resolution for medium to large interconnected local and wide area networks. Contact your HP Authorized Reseller or the nearest HP Sales and Support Office for more information.
- HP SupportPack LAN Support provides assistance with NOS usage, fault isolation, and problem resolution for small to medium LANs, available in 5- and 10-incident packages. Contact your HP Authorized Reseller or the nearest HP Sales and Support Office for more information.

Glossary

100Base-TX

IEEE's specifications for 100Mbit/s Ethernet using 2-pairs of Category 5 twisted-pair cable. The HP 100Base-T Hub models require 100Ω STP or UTP cable.

100Base-FX

IEEE's specifications for 100Mbit/s Ethernet using multimode fiber optic cable. The 100FX Switch Port Module must be used to support fiber optic cable with SC-type connectors.

BOOTP

Boostrap protocol used to load the operating system for devices connected to the network.

Cascade Port

An MDI RJ-45 port used to connect compatible devices in a daisy-chain configuration using straight-through twisted-pair cable. To cascade two devices, either run a connection from the cascade port on one device to a station port on the other device, or cascade the two devices by running crossover cable between MDI-X station ports on both devices. Remember that the HP 100Base-T Hub is a Class I Fast Ethernet Repeater and cannot be cascaded to another device in the same collision domain.

Collision

A condition in which two packets transmitted over a medium interfere with each other. Their interference makes both signals unintelligible. The transmitting devices have to halt transmission for a random period of time before trying to send data again. Note that collisions do not occur on full-duplex connections.

Configuration

The way to set up a computer, server, or local area network.

Connection

A logical binding between two or more users of an interconnection service.

Ethernet

A network communication system developed and standardized by DEC, Intel, and Xerox, using baseband transmission, CSMA/CD access, logical bus topology, and coaxial cable. The successor IEEE 802.3 standard provides for integration into the OSI model and extends the physical layer and media with repeaters and implementations that operate on fiber optics, baseband, and twisted-pair.

Fast Ethernet

100 Mbit/s network communication system based on Ethernet and the CSMA/CD access method.

File Transfer Protocol (FTP)

An application protocol used for transferring files to network devices.

IEEE 802.3 Standard

Standard for the physical and electrical connections in local area networks developed by the IEEE (Institute of Electrical and Electronics Engineers). The IEEE 802.3u standard covers these same issues for 100 Mbit/s networks.

In-Band

A way of communicating with a network device via a network connection.

Jabber

Refers to an abnormal Ethernet frame transmission. The frames causing jabber are normally much too long. It may come from a malfunctioning Ethernet LAN adapter and may cause data loss for all network users.

LED

Light emitting diode on the front panel of the HP 100Base-T Hub used for monitoring a hub or network condition.

MAC (Media Access Control)

A portion of the networking protocol that governs access to the transmission medium, facilitating the exchange of data between network nodes.

MDI Port (Medium Dependent Interface)

MDI is the IEEE standard for the twisted-pair interface to 10Base-T (or 100Base-TX) . This RJ-45 port can be used with straight-through cable to connect the hub to a network interconnection device, such a switch. Pin-out assignments are shown in Appendix B.

MDI-X Port (Medium Dependent Interface - Crossed)

This RJ-45 port, which crosses the receive and transmit signals internally, can be used with straight-through cable to connect the switch or hub to any device that has a standard network interface (e.g., workstation, server or router). Pin-out assignments are shown in Appendix B.

MIB (Management Information Base)

An acronym for Management Information Base. It is a set of database objects that contains information about the device.

MII (Media Independent Interface)

IEEE's specifications for a multi-media interface that supports 100Base-TX, 100Base-T4, 100Base-FX or 10Base-T.

Network Management Station

The computer used to run SNMP management software (e.g., HP AdvanceStack Assistant). It is used by the network manager to monitor the network and devices on the network.

Out-of-Band

A way of communicating with a network device from outside the standard network channels via the serial port.

RJ-45 Connector

Most common terminator for twisted-pair wiring.

SLIP (Serial Line Internet Protocol)

Internet protocol used to transfer IP datagrams over serial lines.

SNMP (Simple Network Management Protocol)

The application protocol offering network management services in the Internet suite of protocols.

Stacking Ports

SCSI ports found at the back of the HP 100Base-T Hub labeled In and Out. These ports are used for linking the hub to other compatible hubs using HP's Stacking Cable.

Star Topology

Physical connections for RJ-45 ports are limited to a star configuration (i.e., similar to a hub and spoke arrangement). This topology also requires that only one path exists between any two nodes, and that data transmitted by any node is concurrently available to all other nodes within the same local network (i.e., immediate collision domain).

Station Port (MDI-X)

MDI-X ports which are used for connecting the hub to any workstation or server that has a properly installed network LAN adapter. (For port 12/24, the selector switch must be set to 12MDI-X/24MDI-X.)

STP (Shielded Twisted-Pair)

100Ω Category 5 twisted-pair wire covered with an external aluminum-foil or woven-copper shield designed to reduce excessive noise pick up or radiation.

UTP (Unshielded Twisted-Pair)

Cable composed of insulated wires twisted together to reduce electrical interference.

Xmodem

A protocol used to transfer files between devices. Data is grouped in 128-bytes blocks and error-corrected.

Index

A

B

C

D

F

H

I

L

M

N

O

P

Q

R

S

T

U

V

HP Software Product License Agreement

Attention: Use of the software is subject to the HP software license terms documented below. Using the software indicates your acceptance of these terms. If you do not accept these terms, you may return the software and the products with which the software is supplied for a full refund.

Hewlett-Packard Software License Terms

The following Terms govern your use of the Software unless you have a separate written agreement with Hewlett-Packard (HP).

License Grant: HP grants you a license to Use one copy of the version of the Software identified in your documentation on a computer then containing any of the HP Network Products provided with this Software. The Software may only be used with such products . "Use" means storing, loading, installing, executing or displaying the Software. You may not modify or disable any licensing or control features of the Software.

Ownership: The Software is owned and copyrighted by HP or its third party suppliers. Your license confers no title or ownership in the Software and should not be construed as a sale of any rights in the Software. HP's third party suppliers may protect their rights in the event of any violation of these terms.

Copies and Adaptations: You may only make copies or adaptations of the Software for archival purposes or when copying or adaptation is an essential step in the authorized Use of the Software. You must reproduce all copyright notices in the original Software on all authorized copies or adaptations. You may not copy the Software onto any bulletin board or similar system.

No Disassembly or Decryption: You may not disassemble, decompile or decrypt the Software unless HP's prior written consent is obtained. In some jurisdictions, HP's consent may not be required for disassembly or decompilation. Upon request, you will provide HP with reasonably detailed information regarding any disassembly or decompilation.

Transfer: Your license will automatically terminate upon any transfer of the Software. Upon transfer, you must deliver the original and all complete, partial or electronically stored copies of the Software and related documentation to the transferee. The transferee must accept these Terms as a condition to the transfer.

Termination: HP may terminate your license upon notice for failure to comply with any of these Terms. Upon termination, you must immediately destroy the Software, together will all copies, adaptations and merged portions in any form.

Export Requirements: You may not export or re-export the Software or any copy or adaptation in violation of any applicable laws or regulations.

U.S. Government Restricted Rights: The Software and documentation have been developed entirely at private expense and are provided a "Commercial Computer Software" or "restricted computer software". Use, duplication or disclosure by the U.S. Government or a U.S. Government subcontractor is subject to the restrictions set forth in subparagraph (c) (1) (ii) of the Rights in Technical Data and Computer Software clauses in DFARS 252.227-7013 or as set forth in subparagraph (c) (1) and (2) of the Commercial Computer Software - Restricted Rights clauses at FAR 52.227-19, as applicable. The Contractor is Hewlett-Packard Company, 3000 Hanover Street, Palo Alto, California 94304.

HP J3233B
HP J3234B
HP J3272A
HP J3247A
HP J3248A
E0498-R01
150870-101