installation guide

hp procurve switch 2124

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HP Procurve
Switch 2124

Installation Guide

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Applicable Products

HP Procurve Switch 2124 (HP J4868A)

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Before installing and operating this product, please read the "Installation Precautions" in chapter 2, "Installing the Switch 2124", and the safety statements in appendix C, "Safety and EMC Regulatory Statements".

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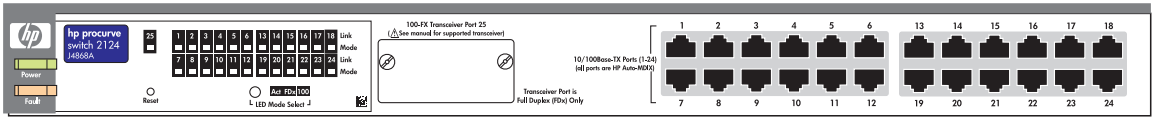
Contents

Introducing the HP Procurve Switch 2124

The HP Procurve Switch 2124 is a multiport switch that can be used to build high-performance switched workgroup networks. This switch is a store-and-forward device that offers low latency for high-speed networking.

HP Procurve Switch 2124 (HP J4868A)



Throughout this manual, this switch will be abbreviated as the Switch 2124.

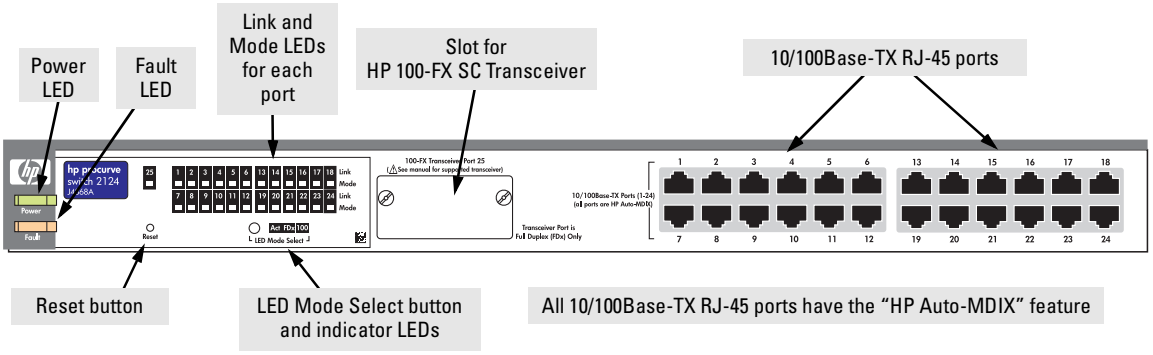
The Switch 2124 has 24 auto-sensing 10/100Base-TX RJ-45 ports, and a slot for installing an HP 100-FX SC Transceiver (HP J4853A).

You can directly connect end node devices such as computers, printers, and servers to this switch, providing dedicated bandwidth to those devices. You can also connect this switch to hubs, other switches, or routers as part of your network infrastructure.

This chapter describes your HP Switch 2124 including:

- Front and back of the switch
- Features
- Switch operation overview

Front of the Switch



Network Ports

- 24 auto-sensing 10/100Base-TX RJ-45 ports
  All these ports have the "HP Auto-MDIX" feature, which means that you can use either straight-through or crossover twisted-pair cables to connect any network devices to the switch.
- One transceiver slot for installing the HP 100-FX SC Transceiver (HP J4853A)

Reset Button

This button is used to reset the switch while it is powered on. This action executes the switch self test, and may clear certain error conditions that have occurred.

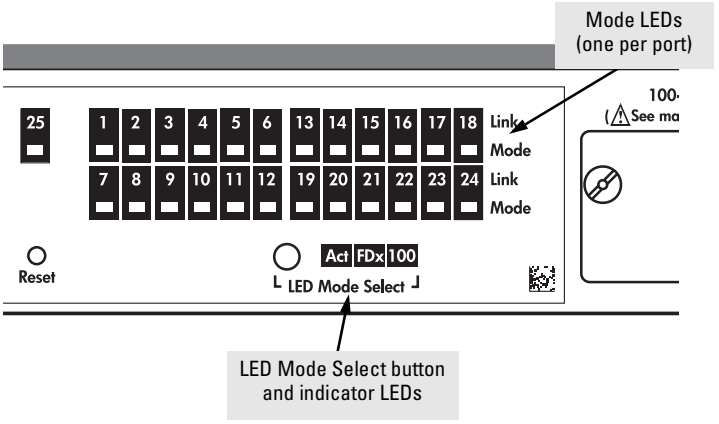
LEDs

Table 1-1. Switch LEDs

Switch LEDs	State	Meaning
Power (green)	On	The switch is receiving power.
	Off	The switch is NOT receiving power.
Fault (orange)	Off	The normal state; indicates that there are no fault conditions on the switch.
	Blinking*	An unsupported transceiver has been installed in the transceiver slot. Under this condition, the Port 25 Link LED will also blink simultaneously.
	On	On briefly after the switch is powered on or reset, at the beginning of switch self test. If on for a prolonged time, the switch has a hardware failure, or has failed its self test. See chapter 3, "Troubleshooting" for more information.
Link (green – overlaid with the port number)	On	Indicates the port is enabled and receiving a link indication from the connected device.
	Off	One of these conditions exists: • no active network cable is connected to the port • the port is not receiving link beat (RJ-45 ports), or sufficient light (transceiver port) • for Port 25 (transceiver port), the transceiver has failed
	Blinking* (Port 25 only)	If the Port 25 Link LED is blinking simultaneously with the Fault LED, it indicates that an unsupported transceiver has been installed in the transceiver slot.
Mode (green)	Displays network activity information, or whether the port is configured for full-duplex operation, or 100 Mbps operation depending on the mode selected. See "LED Mode Select Button and Indicator LEDs" on the next page for more information.	
LED Mode Select indicators (3 green LEDs)	Act	Indicates that the port Mode LEDs are displaying network activity information.
	FDx	Indicates that the port Mode LEDs are lit for ports that are in Full Duplex Mode.
	100	Indicates that the port Mode LEDs are lit for ports that are operating at 100 Mbps.
*** The blinking behavior is an on/off cycle once every 1.6 seconds, approximately.**		

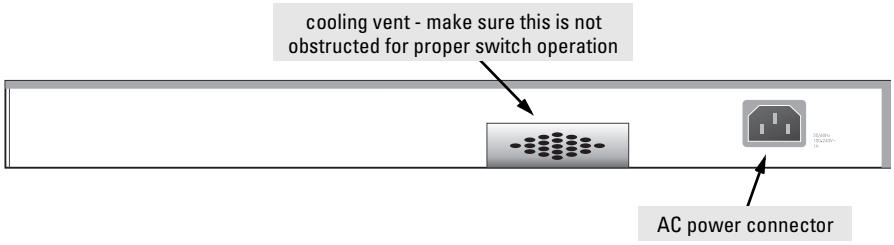
LED Mode Select Button and Indicator LEDs

To optimize the amount of information that can be displayed for each of the switch ports without overwhelming you with LEDs, the Switch 2124 uses a Mode LED for each port. The operation of this LED is controlled by the LED Mode Select button, and the current setting is indicated by the Mode indicator LEDs near the button. Press the button to change from one mode to the next.



- If the Activity (Act) indicator LED is lit, the Mode LED for each port displays activity information for the port — it flickers as network traffic is received and transmitted through the port.
- If the Full Duplex (FDx) indicator LED is lit, the Mode LEDs light for those ports that are operating in full duplex.
- If the 100 Mbps (100) indicator LED is lit, the Mode LEDs light for those ports that are operating at 100 Mbps.

Back of the Switch



Power Connector

The Switch 2124 does not have a power switch; it is powered on when connected to an active AC power source. The switch automatically adjusts to any voltage between 100--240 volts and either 50 or 60 Hz. There are no voltage range settings required.

Features

The features of the Switch 2124 include:

- 24 auto-sensing 10/100Base-TX RJ-45 ports with "HP Auto-MDIX"
- a slot for installing an HP 100-FX SC Transceiver (HP J4853A)
- plug-and-play networking — all ports are enabled — just connect the network cables to active network devices and your switched network is operational
- "HP Auto-MDIX" on all 10/100 twisted-pair ports, meaning that **all connections can be made using straight-through twisted-pair cables**. Cross-over cables are not required, although they will also work. The pin operation of each port is automatically adjusted for the attached device: if the switch detects that another switch or hub is connected to the port, it configures the port as MDI; if the switch detects that an end-node device is connected to the port, it configures the port as MDI-X.
- automatic learning of the hardware addresses in the switch's 4000-entry address forwarding table
- automatically negotiated full-duplex operation for the fixed 10/100 RJ-45 ports when connected to other auto-negotiating devices — the transceiver port always operates at full duplex.
- auto-negotiation of flow control for ports operating at full duplex

Switch Operation Overview

Address Table Operation

Address Learning. As devices are connected to the switch ports, either directly or through hubs or other switches that are connected to the switch, the MAC addresses of those devices are learned automatically and stored in the Switch 2124's 4000-entry address table. The switch also identifies the number of the port on which each address is learned so it knows the relative network location of each device.

Forwarding, Filtering, Flooding. When the switch receives a packet, it determines the destination address, and looks for the address in the address table. Based on the port location of that address, the switch then determines whether to forward, filter-out, or flood the packet.

- **forward** - if the destination address is on a different port than the one on which the packet was received, the packet is forwarded to the destination port and on to the destination device.
- **filter out** - if the destination address is on the same port as the one on which the packet was received, the packet is filtered out. The switch thereby isolates local traffic so the rest of the network connected to the switch does not use bandwidth dealing with unnecessary traffic.
- **flood** - whenever a new destination address is found in a packet received on a port, the destination address will not yet be in the switch's address table and the Switch 2124 cannot know whether to forward or filter out the packet. In this case, it sends the packet to all the other switch ports. This is referred to as "flooding". When the destination device receives the packet, it replies, and the switch learns the new address from the reply packet. Then, all future packets destined for that address are forwarded or filtered out appropriately.

Network Moves and Changes. When devices are moved in the network, and become connected to a different switch port, the Switch 2124 automatically recognizes the change and updates the address table with the new port location of the device. Communication with the device is automatically maintained, without any address table manipulation being required.

Installing the Switch 2124

The HP Switch 2124 is easy to install. It comes with an accessory kit that includes the brackets for mounting the switch in a standard 19-inch telco rack or an equipment cabinet, or on a wall, and with rubber feet that can be attached so the switch can be securely located on a horizontal surface. The brackets are designed to allow mounting the switch in a variety of orientations.

This chapter shows you how to install your Switch 2124.

Included Parts

The Switch 2124 has the following components shipped with it:

- *HP Procurve Switch 2124 Installation Guide* (J4868-90001), this manual
- Customer Support/Warranty booklet
- Accessory kit (5064-2085)
  - two mounting brackets
  - four 8 mm M4 screws to attach the mounting brackets to the switch
  - four 5/8-inch number 12-24 screws to attach the switch to a rack
  - four rubber feet
- Power cord, one of the following:

Australia/New Zealand	8120-6803
China	8120-8377
Continental Europe	8120-6802
Denmark	8120-6806
Japan	8120-6804
Switzerland	8120-6807
United Kingdom/Hong Kong/Singapore	8120-8709
United States/Canada/Mexico	8120-6805

Installation Procedures

Summary

Follow these easy steps to install your switch. The rest of this chapter provides details on these steps.

1. **Prepare the installation site.** Make sure that the physical environment into which you will be installing the switch is properly prepared including having the correct network cabling ready to connect to the switch, and having a good location for the switch. *Please see page 2-3 for some installation precautions.*
2. **(Optional) Install the transceiver.** The Switch 2124 has a slot for installing an HP 100-FX SC Transceiver (HP J4853A). Depending on where you will locate the Switch 2124, it may be easier to install the transceiver first.
3. **Verify that the switch passes its self test.** This is a simple process of plugging the switch into a power source and observing that the LEDs on the switch's front panel show correct operation. *See page 2-7.*
4. **Mount the switch.** The Switch 2124 can be mounted in a 19-inch telco rack or equipment cabinet, on a wall, or on a horizontal surface.
5. **Connect power to the switch.** Once the switch is mounted, plug it in to the nearby AC power source.
6. **Connect the network devices.** Using the appropriate network cables, connect computers, printers, servers, hubs, other switches, routers, and other network devices to the switch ports.

At this point, the switch is fully installed and your network should be up and running. See the rest of this chapter if you need more detailed information on any of these installation steps.

Installation Precautions:

Follow these precautions when installing your HP Switch 2124.

Warning

- The rack or cabinet should be adequately secured to prevent it from becoming unstable and/or falling over.

  Devices installed in a rack or cabinet should be mounted as low as possible, with the heaviest device at the bottom and progressively lighter devices installed above.

Cautions

- Make sure that the power source circuits are properly grounded, then use the power cord supplied with the switch to connect it to the power source.
- If your installation requires a different power cord than the one supplied with the switch, be sure the cord is adequately sized for the switch's current requirements. In addition, 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 switch.
- When installing the switch, note that the AC outlet should be near the switch and should be easily accessible in case the switch must be powered off.
- Ensure that the switch does not overload the power circuits, wiring, and over-current protection. To determine the possibility of overloading the supply circuits, add together the ampere ratings of all devices installed on the same circuit as the switch and compare the total with the rating limit for the circuit. The maximum ampere ratings are usually printed on the devices near the AC power connectors.
- Do not install the switch in an environment where the operating ambient temperature might exceed 55°C (131°F).
- Make sure the air flow around the sides and back of the switch is not restricted.
- Make sure that if no transceiver is installed in the transceiver slot, the cover plate is installed to cover the slot. A cover plate is required for safe operation, and to ensure proper switch cooling.

1. Prepare the Installation Site

- **Cabling Infrastructure** - Ensure that the cabling infrastructure meets the necessary network specifications. See the following table for cable types and lengths, and see appendix B, "Switch Ports and Network Cables" for more information:

Table 2-1. Summary of Cable Types to Use with the Switch

Port Type	Cable Type	Length Limits
10/100Base-TX	• **10 Mbps operation:** Category 3, 4, or 5, 100-ohm differential unshielded twisted-pair (UTP) or shielded twisted-pair (STP). • **100 Mbps operation:** Category 5, 100-ohm differential UTP or STP.	100 meters. **Note:** Since the 10Base-T operation is through 10/100Base-TX ports, if you ever want to upgrade the ports to 100Base-TX, it would be best to cable the ports initially with category 5 cable. The 10/100-Base-TX ports on the Switch 2124 include the "HP Auto-MDIX" feature, which allows you to use either straight-through or crossover twisted-pair cables for connecting to *any* network devices including end nodes, such as computers, or to other switches, hubs, and routers.
100Base-FX *for transceiver connection*	62.5/125 μm or 50/125 μm (core/cladding) diameter, graded-index, multimode fiber-optic cables, complying with the ITU-T G.651 and ISO/IEC 793-2 Type A1b or A1a respectively, fitted with SC connectors.	2 kilometers for full-duplex connections. (When installed in a Switch 2124, the HP 100-FX SC Transceiver operates only in full-duplex mode.)

- **Installation Location** - Before installing the switch, plan its location and orientation relative to other devices and equipment:
  - At the front of the switch, leave at least 7.6 cm (3 inches) of space for the twisted-pair and fiber-optic cabling.
  - At the back of the switch, leave at least 7.6 cm (3 inches) of space for the power cord and cooling.
  - On the sides of the switch, leave at least 3.8 cm (1 1/2 inches) for cooling.

2. Install An Optional Transceiver

Install an optional HP 100-FX SC Transceiver into the transceiver slot as shown in the illustration below, or by following the instructions in the manual that comes with the transceiver.

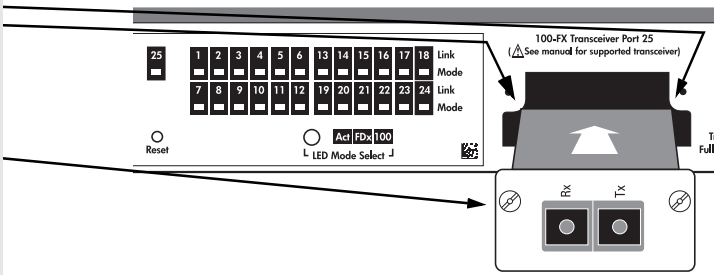
The slot cover can be removed with either a flat-bladed or Torx T-10 screwdriver. Retain the slot cover for future use.

Transceiver Notes

- Install only the HP J4853A 100-FX SC Transceiver into the transceiver slot in the Switch 2124.
- Make sure the transceiver is fully installed and that you screw in the retaining screws to secure the transceiver in place.
- If you do not install a transceiver in the slot, make sure that the slot cover plate is still attached over the slot for safe operation and proper switch cooling.
- In the Switch 2124, the transceiver can operate only at full duplex. Half duplex operation is not supported.

Installing a Transceiver

1. Unplug the AC power from the switch.
2. Insert the transceiver into the guides and slide it in until it stops.
3. Press in firmly until the transceiver is flush with the face of the switch.
4. Tighten the retaining screws on the transceiver until they are secure, but do not overtighten them.
5. Plug the AC power back into the switch to reboot the switch and initialize the transceiver.

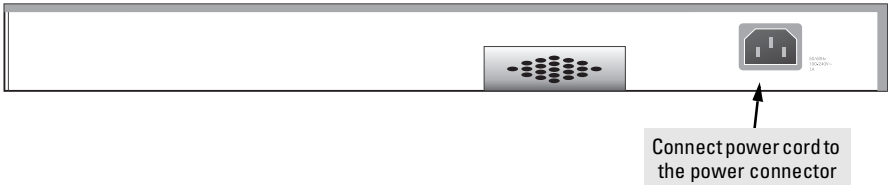


Supported Transceiver Model: Install only the HP J4853A 100-FX SC Transceiver into the transceiver slot.

3. Verify the Switch Operates Correctly

After you have optionally installed a transceiver, but before mounting the switch in its network location, you should first check that it is working properly by plugging it into a power source and verifying that it passes its self test.

1. Connect the power cord supplied with the switch to the power connector on the back of the switch, and then into a nearby properly grounded electrical outlet.



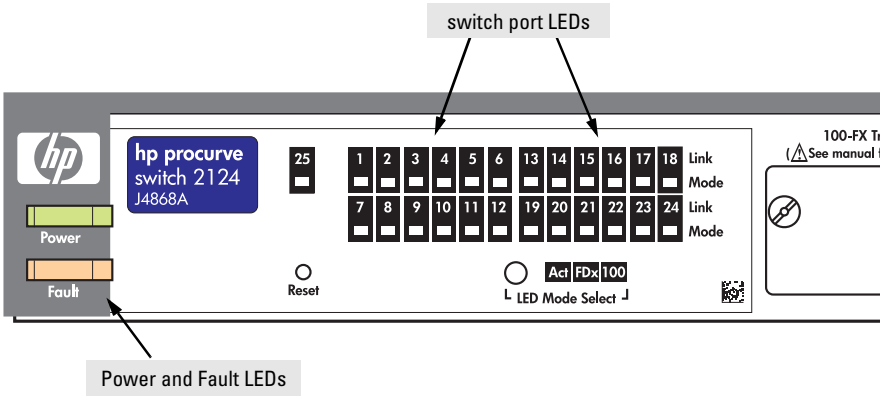
Note

The Switch 2124 does not have a power switch. It is powered on when the power cord is connected to the switch and to a power source. For safety, the power outlet should be located near the switch installation.

The switch automatically adjusts to any voltage between 100-240 volts and either 50 or 60 Hz. There are no voltage range settings required.

If your switch requires a different power cord than the one supplied with the switch, please see the Installation Precautions on page 2-3.

2. Check the LEDs on the switch. The LED behavior is described on the next page.



When the switch is powered on, it performs its diagnostic self test. The self test takes approximately 3 seconds to complete.

LED Behavior:

During the self test:

- All the switch and port LEDs are on.

When the self test completes successfully:

- The large **Power** LED remains on.
- The large **Fault** LED goes off.
- The LED Mode Select **Act** remains on.
- The port LEDs (**Link** and **Mode**) go into their normal operational mode:
  - If the ports are connected to active network devices, the **Link** LEDs stay on and the **Mode** LEDs behave according to the mode selected. In the default mode (Activity), the Mode LEDs should flicker showing network activity on the port.
  - If the ports are not connected to active network devices, the **Link** and **Mode** LEDs will stay off.

If the LED display is different than what is described above, especially if the **Fault** LED stays on for more than 10 seconds or it starts blinking, the self test has not completed correctly. Refer to chapter 3, "Trouble-shooting" for diagnostic help.

4. Mount the Switch

After a transceiver has been installed and you have verified that the switch passes its self test, you are ready to mount the switch in a stable location. The Switch 2124 can be mounted in these ways:

- in a rack or cabinet
- on a horizontal surface
- on a wall

Rack or Cabinet Mounting

The Switch 2124 is designed to be mounted in any EIA-standard 19-inch telco rack or in an equipment cabinet such as a server cabinet.

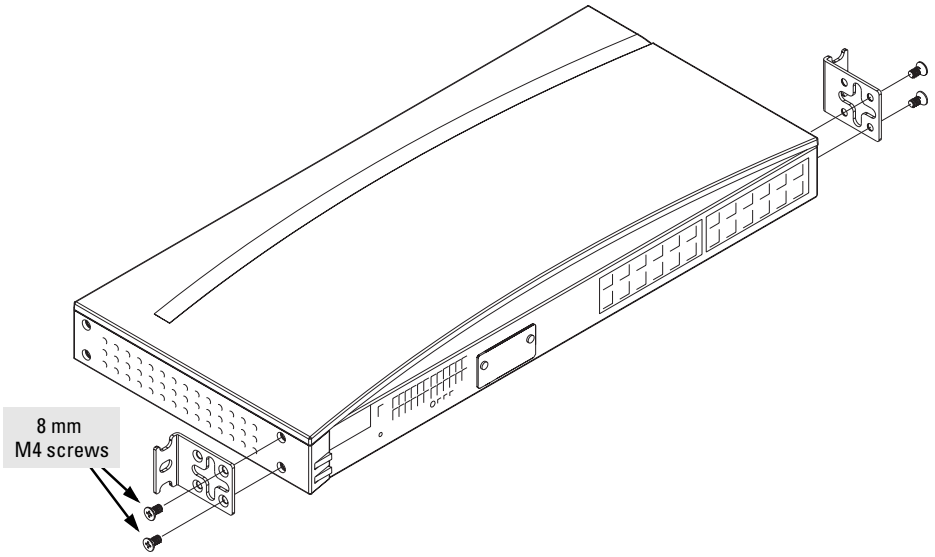
Warning

For safe operation, please read the Installation Precautions on page 2-3 before mounting the switch.

Equipment Cabinet Note

If you are installing the switch in an equipment cabinet, use the clips and screws that came with the cabinet in place of the 12-24 screws that are supplied with the switch. Plan which four holes you will be using in the cabinet and install all four clips and partially install the two bottom screws, as described in step 2 on the next page. Then proceed to step 3.

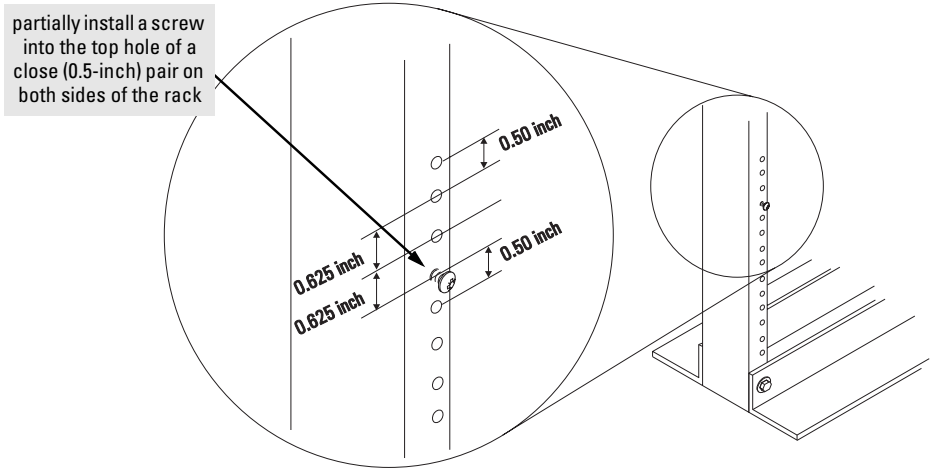
1. Use a #1 Phillips (cross-head) screwdriver and attach the mounting brackets to the switch with the included 8-mm M4 screws.



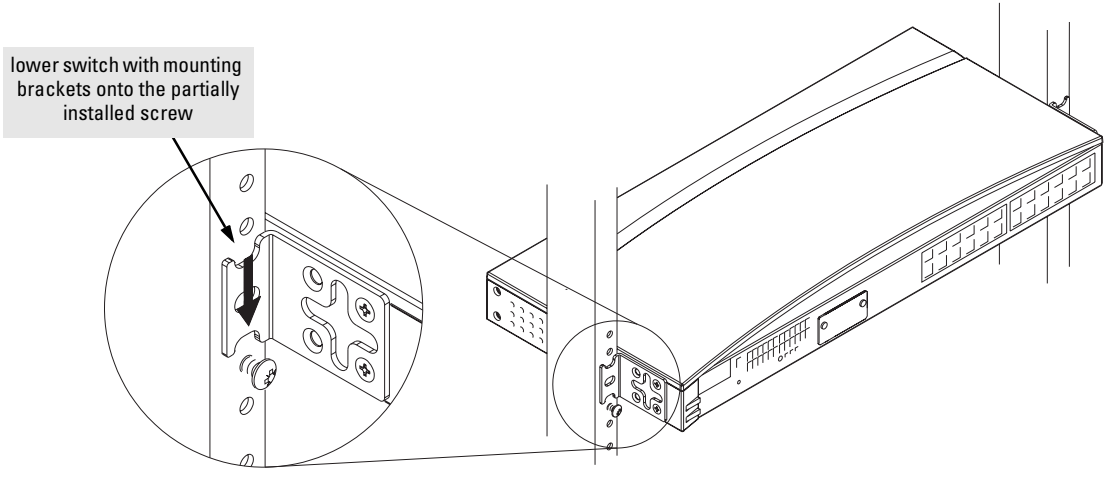
Note

Steps 2, 3, and 4 below describe a convenient method of mounting the switch in a rack by placing it on two screws that you first install in the rack. You may, instead, just hold the switch with attached brackets up to the rack and move it vertically until rack holes line up with the bracket notches, then insert and tighten the four screws holding the brackets to the rack.

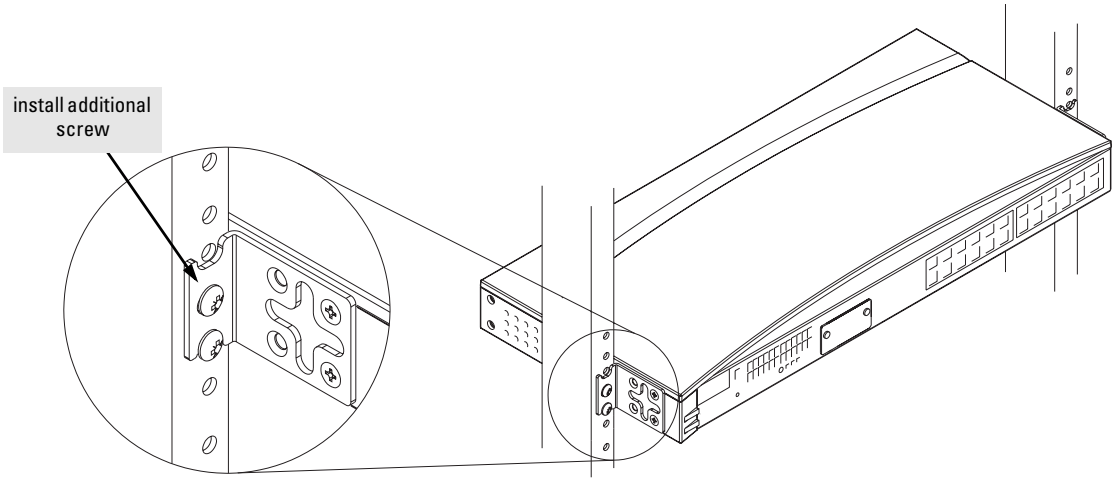
2. Partially install a screw (5/8-inch number 12-24) into the top hole of a pair of holes that are 0.5 inches apart in each rack/cabinet upright as shown in the illustration below. Ensure that the screws are at the same level in each upright.



3. Place the switch in the rack and lower it so the notches in the bottom of the bracket slide onto the screws, then tighten these screws.



4. Install the other number 12-24 screw into the upper hole in each bracket. Tighten these screws.



Wall Mounting

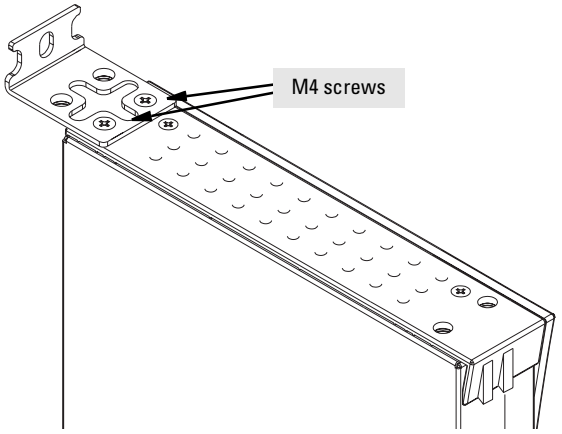
You can mount the switch on a wall as shown in the illustrations below.

Caution

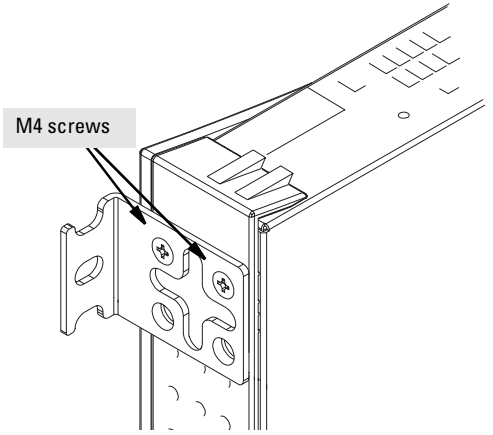
The switch should be mounted only to a wall or wood surface that is at least 1/2-inch plywood or its equivalent.

1. Use a #1 Phillips (cross-head) screwdriver and attach the mounting brackets to the switch with the included 8-mm M4 screws.

For "Bookshelf" Wall Mounting

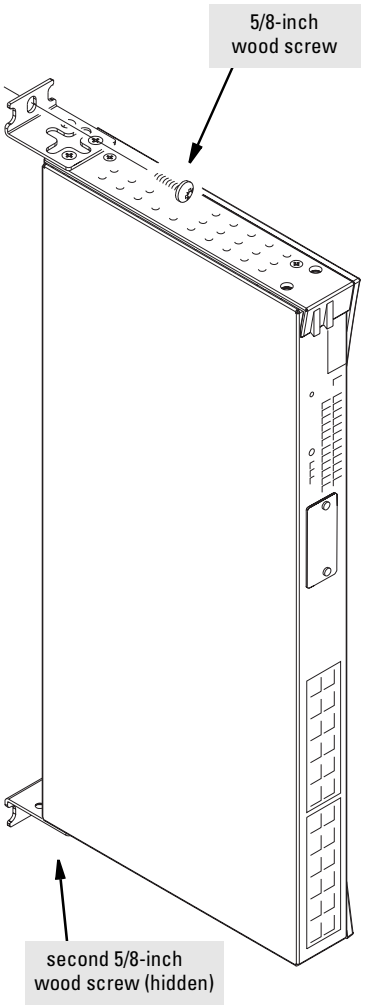


For "Flat" Wall Mounting

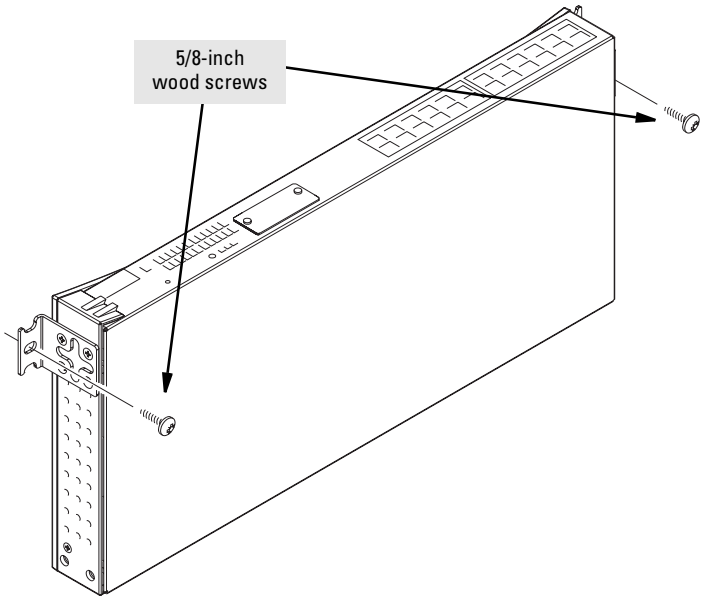


2. Attach the switch to the wall or wood surface with 5/8-inch number 12 wood screws (not included).

For "Bookshelf" Wall Mounting



For "Flat" Wall Mounting



Horizontal Surface Mounting

Place the switch on a table or other horizontal surface. The switch comes with rubber feet in the accessory kit that can be used to help keep the switch from sliding on the surface. Attach the rubber feet to the four corners on the bottom of the switch within the embossed angled lines. Use a sturdy surface in an uncluttered area. You may want to secure the networking cables and switch power cord to the table leg or other part of the surface structure to help prevent tripping over the cords.

Note

Make sure the air flow is not restricted around the sides and back of the switch.

5. Connect the Switch to a Power Source

1. Plug the included power cord into the switch's power connector and into a nearby AC power source.
2. Re-check the LEDs during self test. See "LED Behavior" on page 2-7.

6. Connect the Network Cables

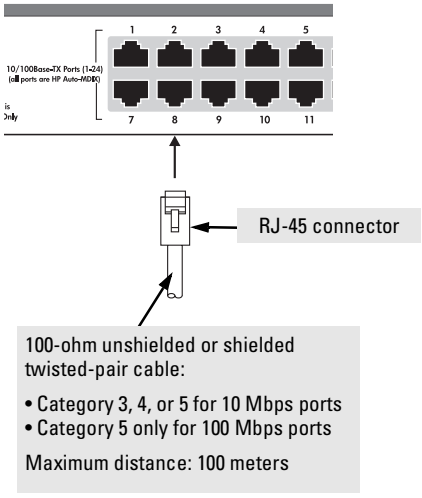
Connect the network cables, described under "Cabling Infrastructure" (page 2-4), from the network devices or your patch panels to the fixed RJ-45 ports on the switch, or to an HP 100-FX SC Transceiver, if one is installed in the switch.

Using the RJ-45 Connectors (10/100Base-TX ports)

To connect:
Push the RJ-45 plug into the RJ-45 jack until the tab on the plug clicks into place. When power is on for the switch and for the connected device, the Link LED for the port should light to confirm a powered-on device (for example, an end node) is at the other end of the cable.

If the Link LED does *not* go on when the network cable is connected to the port, see "Diagnosing with the LEDs" in chapter 3, "Troubleshooting".

To disconnect:
Press the small tab on the plug and pull the plug out of the jack.



Connecting Cables to the HP 100-FX SC Transceiver

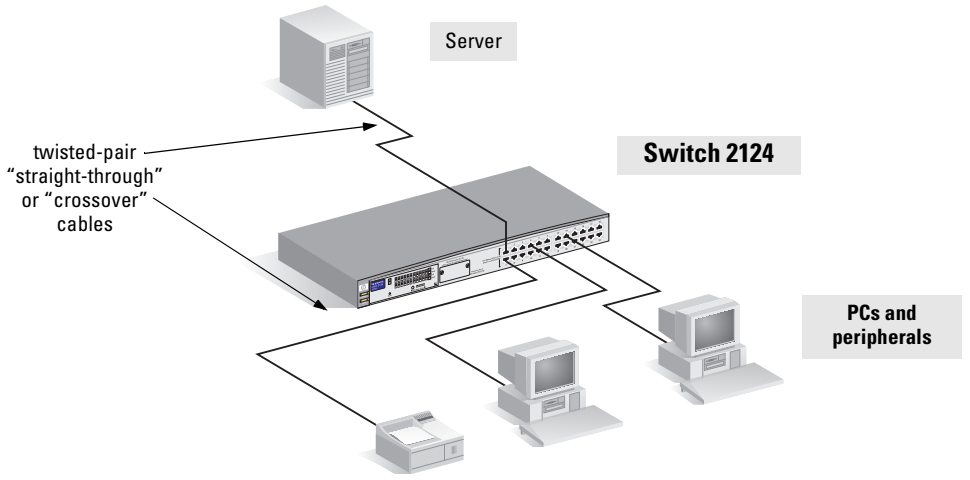
If you have an HP 100-FX SC Transceiver installed in the switch, see the documentation accompanying the transceiver for information on connecting fiber-optic cables to the transceiver, and for fiber-optic cabling configurations.

The transceiver documentation also covers troubleshooting procedures for connections to the transceiver, but, in general for all the switch ports, when a network cable from an active network device is connected to the port, the Link LED for that port should become lit. If the Link LED does *not* become lit when the network cable is connected to the port, there may be a problem with the cable or other component. See "Diagnosing with the LEDs" in chapter 3, "Troubleshooting".

Example Network Topologies

This section shows you a few example network topologies in which the Switch 2124 is implemented. For more topology information, see the HP network products World Wide Web site, *http://www.hp.com/go/hpprocurve*.

As a Desktop Switch

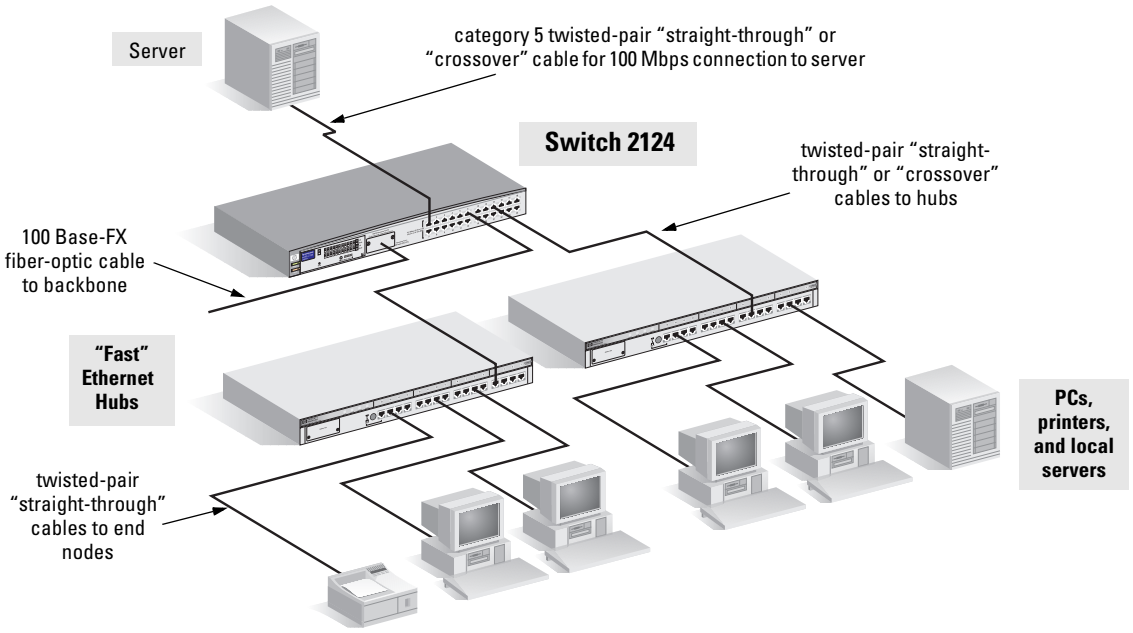


The Switch 2124 is designed to be used primarily as a desktop switch to which end nodes, printers and other peripherals, and servers are directly connected, as shown in the above illustration. Notice that the end node devices are connected to the switch by "straight-through" or "crossover" twisted-pair cables. Either cable type can be used because of the "HP Auto-MDIX" feature on the Switch 2124.

Note

The HP 100-FX SC Transceiver, when installed in a Switch 2124, operates only at 100 Mbps and full duplex. It cannot operate at half duplex. The illustrations on the next two pages show fiber-optic connections between the HP 100-FX SC Transceiver installed in Switch 2124 units and other 100Base-FX devices. Because of the fixed full-duplex operation of the transceiver in the Switch 2124, the device at the other end of any such connection must be configured the same: 100 Mbps, full duplex, or the connection will not operate correctly.

As a Segment Switch



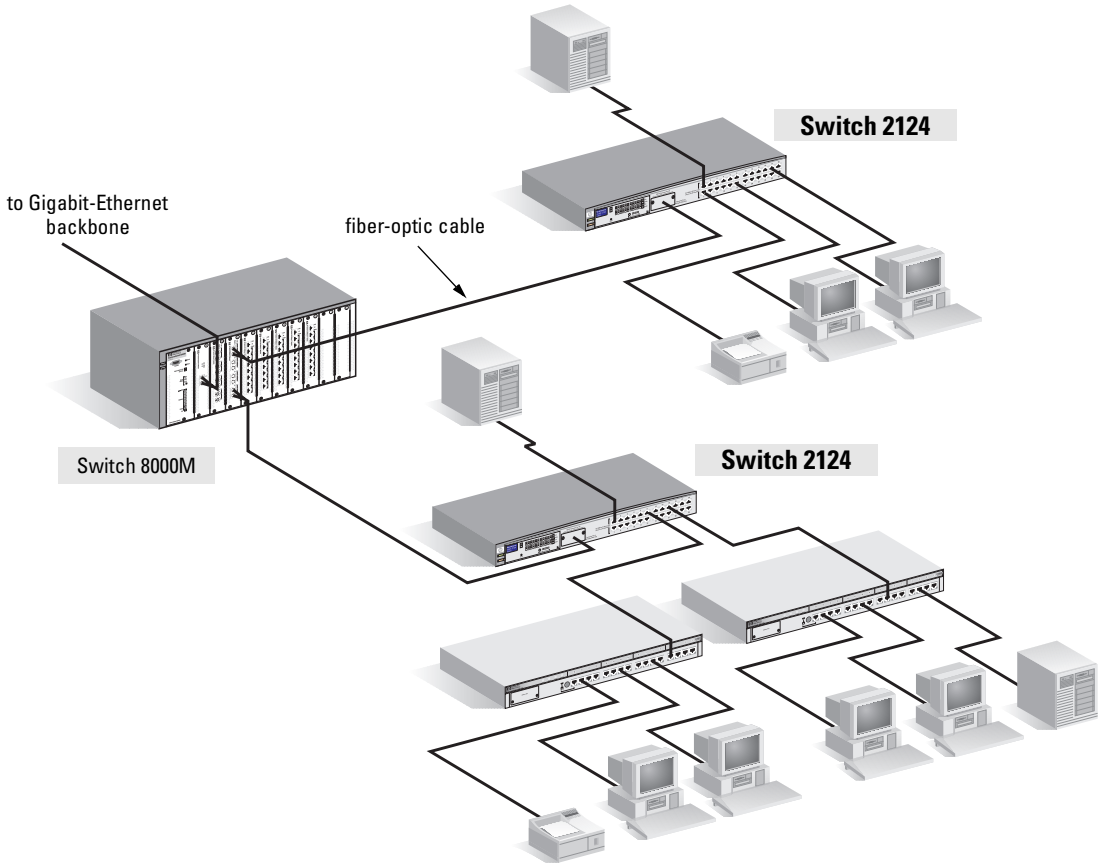
The Switch 2124 also works well as a segment switch. That is, with its high performance, it can be used for interconnecting network segments — simply connect the network hubs that form those segments to the switch, or you can also connect other switches.

In the illustration above, two "Fast" Ethernet hubs with PCs, printers, and local servers attached, are both connected to a Switch 2124. The devices attached to the two hubs can now communicate with each other through the switch. They can also all communicate with the server that is connected to the switch.

Because the Switch 2124 has the "HP Auto-MDIX" feature, the connections between the switch and the hubs, and between the switch and end nodes or servers can be through category 5 "straight-through" or "crossover" twisted-pair cable. Category 3 or 4 cable can also be used if the connection is 10 Mbps only. In all cases, the device ports must be configured to auto negotiate the link characteristics for this feature to work.

The switch, in turn, is connected to a network backbone through fiber-optic cabling connected to an HP 100-FX SC Transceiver installed in the switch. Now, all the devices on these network segments can access other network resources that are connected elsewhere on the network backbone.

Connecting to a Backbone Switch



The simpler desktop and segment networks shown in the previous two examples can easily be combined and expanded. For example, you could use an HP Procurve Switch 8000M to interconnect each of your smaller switched workgroups to form a larger switched network. All the devices in this network can communicate with each other. With a Gigabit-SX Module, for example, installed in the Switch 8000M, the entire switched topology could be connected to a campus backbone, as shown in the illustration above.

Note

For the 100Base-FX connection between the Switch 2124 and the Switch 8000 to work properly, be sure that the 100Base-FX port on the Switch 8000 is configured to 100 Mbps and full duplex.

Troubleshooting

This chapter describes how to troubleshoot your Switch 2124 including the following:

Basic Troubleshooting Tips

Most problems are caused by the following situations. Check for these items first when starting your troubleshooting:

- **Connecting the RJ-45 ports to devices that have a fixed full-duplex configuration**. The Switch 2124 RJ-45 ports are configured as "Auto". That is, when connecting to attached devices, the switch will operate in one of two ways to determine the link speed and the communication mode (half duplex or full duplex):
  - if the connected device is also configured to Auto, the switch will automatically negotiate both link speed and communication mode
  - if the connected device has a fixed configuration, for example 100 Mbps, at half or full duplex, the switch will automatically sense the link speed, but will default to a communication of *half* duplex

  Because the Switch 2124 behaves in this way (*in compliance with the IEEE 802.3 standard*), if a device connected to the switch RJ-45 ports has a fixed configuration at *full* duplex, the device will not connect correctly to the switch. The result will be high error rates and very inefficient communications between the switch and the device.

  Make sure that all devices connected to the Switch 2124 RJ-45 ports are configured to auto negotiate, or are configured to connect at half duplex (all hubs are configured this way, for example).
- **Connecting the 100Base-FX transceiver port to other devices**. An HP 100-FX SC Transceiver installed in the Switch 2124 operates only at 100 Mbps and full duplex. When connecting this port to any other device,

make sure that the port on that device is configured the same. Otherwise, the communication over that link could have high error rates and could be very inefficient, or the link might not be established at all.

- **Faulty or loose cables.** Look for loose or obviously faulty connections. If they appear to be OK, make sure the connections are secure. If that does not correct the problem, try a different cable.
- **Non-standard cables.** Non-standard and miswired cables may cause network collisions and other network problems, and can seriously impair network performance. Use a new correctly-wired cable or compare your cable to the cable in appendix B, "Switch Ports and Network Cables" for pinouts and correct cable wiring. A category 5 cable tester is a recommended tool for every 100Base-TX network installation.
- **Improper Network Topologies.** It is important to make sure you have a valid network topology. Common topology faults include excessive cable length and excessive repeater delays between end nodes. If you have network problems after recent changes to the network, change back to the previous topology. If you no longer experience the problems, the new topology is probably at fault. Example topologies are shown at the end of chapter 2 in this book, and some topology configuration guidelines can be found online at the HP Procurve web site, *http://www.hp.com/go/hpprocurve* in the Information Library section.

  In addition, you should make sure that your network topology contains ***no data path loops***. Between any two end nodes, there should be only one active cabling path at any time. Data path loops will cause broadcast storms that will severely impact your network performance.

For more information on possible network problems and their solutions, refer to the technical note "Troubleshooting LAN Performance and Intermittent Connectivity Problems", which can be found on the HP Procurve web site, *http://www.hp.com/go/hpprocurve* in the Information Library section.

Diagnosing with the LEDs

Table 3-1 shows LED patterns on the switch that indicate problem conditions.

1. Check in the table for the LED pattern that you see on your switch.
2. Refer to the corresponding diagnostic tip on the next few pages.

Table 3-1. LED Error Indicators

LED Pattern Indicating Problems			
Power	**Fault**	**Port Link**	**Diagnostic Tips**
Off with power cord plugged in	*	*	❶
On	Prolonged On	*	❷
On	Off	Off with cable connected	❸
On	Blinking†	Blinking† (for port 25)	❹

*** This LED is not important for the diagnosis.**
† The blinking behavior is an on/off cycle once every 1.6 seconds, approximately.

Diagnostic Tips:

Tip Number	Problem	Solution
❶	The switch is not plugged into an active AC power source, or the switch's power supply may have failed.	1. Verify that the power cord is plugged into an active power source and to the switch. Make sure these connections are secure. 2. Try power cycling the switch by unplugging and plugging the power cord back in. 3. If the Power LED is still not on, verify that the AC power source works by plugging another device into the outlet. Or try plugging the switch into a different outlet or try a different power cord. If the power source and power cord are OK and this condition persists, the switch power supply may have failed. Call your HP-authorized LAN dealer, or use the electronic support services from HP to get assistance. See the Customer Support/ Warranty booklet for more information.
❷	A switch hardware failure has occurred during self test.	Try power cycling the switch. If the fault indication reoccurs, the switch may have failed. Call your HP-authorized LAN dealer, or use the electronic support services from HP to get assistance. See the Customer Support/Warranty booklet for more information.

Tip Number	Problem	Solution
❸	The network connection is not working properly.	Try the following procedures: • For the indicated port, verify that both ends of the cabling, at the switch and the connected device, are connected properly. • Verify the connected device and switch are both powered *on* and operating correctly. • Verify that you have used the correct cable type for the connection. – For twisted-pair connections to the fixed 10/100 ports, either "straight-through" or "crossover" cables can be used because of the switch's "HP Auto-MDIX" feature. – For fiber-optic connections, verify that the transmit port on the switch is connected to the receive port on the connected device, and the switch receive port is connected to the transmit port on the connected device. • Verify that the connected devices comply with the IEEE 802.3 standard, including transmission of the Link Beat signal. See "Testing Twisted-Pair Cabling" on page 3-5. • Try the "Testing End-to-End Network Communications" procedures on page 3-6. • If the other procedures don't resolve the problem, try using a different port or a different cable. • For Port 25 (transceiver port), it may indicate that the transceiver has failed. Call your HP-authorized LAN dealer, or use the electronic support services from HP to get assistance. See the Customer Support/Warranty booklet for more information.
❹	An unsupported transceiver has been installed in the transceiver slot.	The Switch 2124 supports installation of *only* the HP J4853A 100-FX SC Transceiver. If you have installed any other transceiver, the Port 25 Link LED will blink simultaneously with the switch Fault LED.

Hardware Diagnostic Tests

Testing the Switch by Resetting It

If you believe that the switch is not operating correctly, you can reset the switch to test its circuitry and operating code. To reset a switch, either:

- Unplug and plug in the power cord (power cycling)
- Press the reset button on the front of the switch

Power cycling the switch and pressing the Reset button both cause the switch to perform its power-on self-test, which could resolve any temporary operational problems.

Checking the Switch LEDs

The self-test passes if the Fault LED on the front of the switch goes off after approximately 3 seconds. If this LED stays on longer than 10 seconds or begins blinking, an error condition has been detected on the switch.

See “Diagnosing with the LEDs” on page 3-3 for information on interpreting the LED patterns.

Testing Twisted-Pair Cabling

Network cables that fail to provide a link or provide an unreliable link between the switch and the connected network device may not be compatible with the IEEE 802.3 10Base-T or 100Base-TX standards. The twisted-pair cables attached to the Switch 2124 must be compatible with the appropriate standards. To verify that your cable is compatible with these standards, use a qualified cable test device.

HP also offers a wire testing service. Contact your HP-authorized LAN dealer or your local HP sales office for more information.

Testing End-to-End Network Communications

Both the switch and the cabling can be tested by running an end-to-end communications test — a test that sends known data from one network device to another through the switch. For example, if you have two PCs on the network that have LAN adapters between which you can run a link-level test or Ping test through the switch, you can use this test to verify that the entire communication path between the two PCs is functioning correctly. See your LAN adapter documentation for more information on running a link test or Ping test.

HP Customer Support Services

If you are still having trouble with your switch, Hewlett-Packard offers support 24 hours a day, seven days a week through the use of a number of automated electronic services. See the Customer Support/Warranty booklet that came with your switch for information on how to use these services to get technical support. The HP Procurve web site, *http://www.hp.com/go/hpprocurve* also provides up-to-date support information.

Additionally, your HP-authorized network reseller can provide you with assistance, both with services that they offer and with services offered by HP.

Specifications

Physical

Width:	44.2 cm (17.4 in)
Depth:	20.5 cm (8.1 in)
Height:	4.4 cm (1.7 in)
Weight :	2.5 kg (5.5 lbs)

Electrical

The switch automatically adjusts to any voltage between 100-240 volts and either 50 or 60 Hz.

AC voltage:	100–240 volts
Maximum current:	1.0 A
Frequency range:	50/60 Hz

Environmental

	Operating	**Non-Operating**
Temperature:	0°C to 55°C (32°F to 131°F)	-40°C to 70°C (-40°F to 158°F)
Relative humidity: (non-condensing)	15% to 95% at 40°C (104°F)	15% to 90% at 65°C (149°F)
Maximum altitude:	4.6 km (15,000 ft)	4.6 km (15,000 ft)

Acoustic

Geräuschemission LwA=40 dB am fiktiven Arbeitsplatz nach DIN 45635 T.19

Noise Emission LwA=40 dB in a virtual workspace according to DIN 45635 T.19

Connectors

- The 10/100 Mbps RJ-45 twisted-pair ports are compatible with the IEEE 802.3u 100Base-TX and IEEE 802.3 10Base-T standards.
- The 100 Mbps SC fiber-optic port on the optional transceiver is compatible with the IEEE 802.3u 100Base-FX standard.

Safety

The Switch 2124 complies with these safety standards:

- EN60950 / IEC 950
- CSA 22.2 No. 950
- NOM-019-SCFI-1994
- UL 1950

Switch Ports and Network Cables

This appendix includes switch connector information and network cable information for cables that should be used with the Switch 2124, including minimum pin-out information and specifications for twisted-pair cables.

Note Incorrectly wired cabling is the most common cause of problems for LAN communications. HP recommends that you work with a qualified LAN cable installer for assistance with your cabling requirements.

Switch Ports

Twisted Pair

- The fixed RJ-45 10/100Base-TX ports on the switch accept 100-ohm differential unshielded and shielded twisted-pair cable with RJ-45 connectors as described on the next page.

Fiber-Optic

- The SC-type connector port on the HP 100-FX SC Transceiver transmits at 1300 nm wavelength, and accepts the multimode fiber-optic cables for 100Base-FX described on the next page.

Cables

Twisted-Pair

10 Mbps Operation	Category 3, 4, or 5 100-ohm differential unshielded twisted-pair (UTP) or shielded twisted-pair (STP) cable, complying with IEEE 802.3 10Base-T specifications, fitted with RJ-45 connectors
100 Mbps Operation	Category 5 100-ohm differential UTP or STP cable, complying with IEEE 802.3u 100Base-TX specifications, fitted with RJ-45 connectors

Fiber-Optic

100Base-FX	62.5/125 µm or 50/125 µm (core/cladding) diameter, graded-index, multimode fiber-optic cables, complying with the ITU-T G.651 and ISO/IEC 793-2 Type A1b or A1a respectively, fitted with SC connectors

Twisted-Pair Cable/Connector Pin-Outs

The "HP Auto-MDIX" Feature: The fixed 10/100Base-TX ports on the Switch 2124 all have the "HP Auto-MDIX" feature. They automatically detect the type of port on any device connected to the Switch 2124 and then operate as either an MDI or MDI-X port, whichever is appropriate. If you connect a Switch 2124 twisted-pair port to another switch or hub, which typically have MDI-X ports, the Switch 2124 ports operates as an MDI port and connects correctly. If you connect an end node, such as a server or PC which typically have MDI ports, to the Switch 2124, the switch port operates as an MDI-X port and connects correctly.

So, for any connection, a "straight-through" twisted-pair cable can be used — *you no longer have to use "crossover" cables*. If you do happen to use a correctly wired crossover cable, though, the switch will still be able to automatically detect the MDI/MDI-X operation of the connected device and will link correctly.

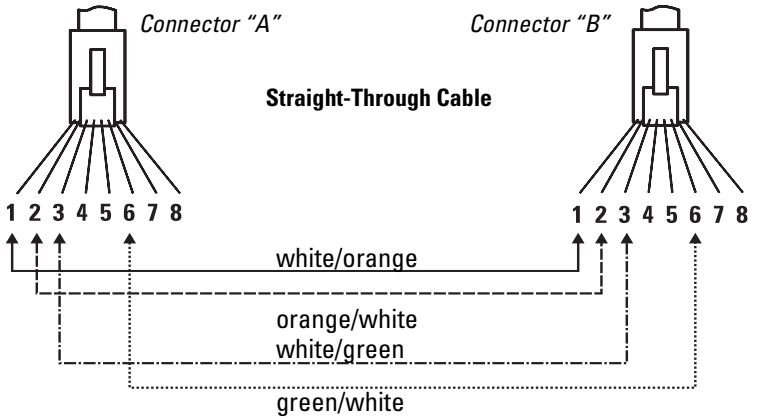
Other Wiring Rules:

- All twisted-pair wires used for 10 Mbps, and 100 Mbps operation must be twisted through the entire length of the cable. The wiring sequence must conform to EIA/TIA 568-B (not USOC). See the Pin Assignment tables below the cable illustrations later in this appendix for a listing of the signals used on each pin.
- For 10 Mbps connections to the ports, you can use 100-ohm differential Category 3, 4, or 5 unshielded (UTP) or shielded (STP) twisted-pair cable, as supported by the IEEE 802.3 10Base-T standard.
- For 100 Mbps connections to the ports, use 100-ohm differential Category 5 UTP or STP cable only, as supported by the IEEE 802.3u 100Base-TX standard.

Straight-Through Twisted-Pair Cable for 10 Mbps or 100 Mbps Network Connections

Because of the "HP Auto-MDIX" operation of the 10/100 ports on the switch, for all network connections, to PCs, servers or other end nodes, or to hubs or other switches, you can use "straight-through" cables.

Cable Diagram



Note

Pins 1 and 2 on connector "A" *must* be wired as a twisted pair to pins 1 and 2 on connector "B".
Pins 3 and 6 on connector "A" *must* be wired as a twisted pair to pins 3 and 6 on connector "B".
Pins 4, 5, 7, and 8 are not used in this application, although they may be wired in the cable.

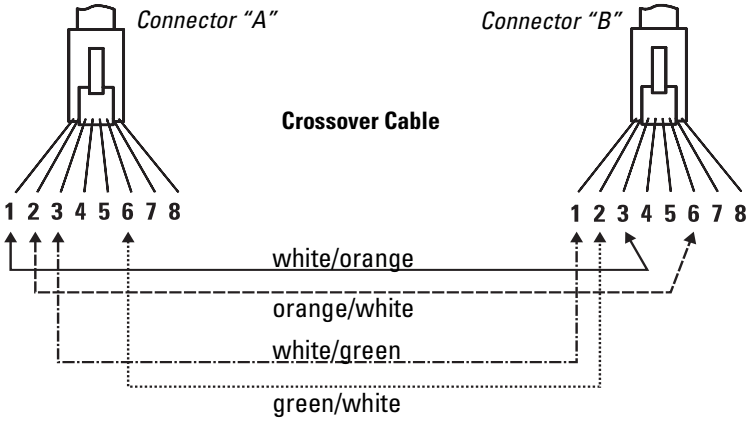
Pin Assignments

Switch End (MDI-X)		**Computer, Transceiver, or Other End**	
Signal	**Pins**	**Pins**	**Signal**
receive +	1 ◄	1	transmit +
receive -	2 ◄	2	transmit -
transmit +	3 ►	3	receive +
transmit -	6 ►	6	receive -

Crossover Twisted-Pair Cable for 10 Mbps or 100 Mbps Network Connection

The "HP Auto-MDIX" operation of the 10/100 ports on the switch also allows you to use "crossover" cables for all network connections, to PCs, servers or other end nodes, or to hubs or other switches.

Cable Diagram.



Note

Pins 1 and 2 on connector "A" *must* be wired as a twisted pair to pins 3 and 6 on connector "B".
Pins 3 and 6 on connector "A" *must* be wired as a twisted pair to pins 1 and 2 on connector "B".
Pins 4, 5, 7, and 8 are not used in this application, although they may be wired in the cable.

Pin Assignments

Switch End (MDI-X)		**Hub or Switch Port, or Other MDI-X Port End**	
Signal	**Pins**	**Pins**	**Signal**
receive +	1	6	transmit -
receive -	2	3	transmit +
transmit +	3	2	receive -
transmit -	6	1	receive +

Safety and EMC Regulatory Statements

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	Eine WARNING in der Dokumentation symbolisiert eine Gefahr, die Verletzungen oder sogar Todesfälle verursachen kann.
CAUTION	CAUTION in der Dokumentation symbolisiert eine Gefahr, die dis Gerät beschädigen kann.
	Fahren Sie nach dem Hinweis WARNING oder CAUTION erst fort, nachdem Sie den Gefahrenzustand verstanden und die entsprechenden Maßnahmen ergriffen haben.

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

Für LAN-Kabelerdung:

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

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

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

Considerazioni sulla sicurezza

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 (Japan)

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 (China)

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，请您务必注意如下事项:

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. 避免高温和尘土多的地方，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. 不要有异物或液体落入机内，以免部件短路。
5. 不要将磁体放置于仪器附近。

警告

为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

如果您按照以上步骤操作时遇到了困难，或想了解其它产品性能，请按以下 方式与我们联络。

如是硬件故障:

1. 与 售 出 单 位 或 当 地 维 修 机 构 联 系 。
2. 中 国 惠 普 有 限 公 司 维 修 中 心 地 址:
   北 京 市 海 淀 区 知 春 路 49号 希 格 玛 大 厦
   联 系 电 话: 010-62623888 转 6101
   邮 政 编 码: 100080

如是软件问题:

1. 惠 普 用 户 响 应 中 心 热 线 电 话: 010-65645959
2. 传 真 自 动 回 复 系 统: 010-65645735

EMC Regulatory Statements

U.S.A.

FCC Class A

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 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.

Canada

This product complies with Class A Canadian EMC requirements.

Australia/New Zealand

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

Japan

VCCI Class A

この装置は、情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）の基準に基づくクラスＡ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。

Korea

사용자 안내문 : A 급기기

이기기는 업무용으로 전자파 적합등록을 받은 기기이오니, 판매자 또는 사용자는 이점을 주의하시기 바라며, 만약 잘못 구입하셨을 때에는 구입한 곳에서 비업무용으로 교환하시기 바랍니다.

Taiwan

警告使用者：這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當的對策。

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 ProCurve Switch 2124

Model Number: J4868A

Accessories: J4853A

Conforms to the following Product Specifications:

Safety:
EN60950:1992 +A1, A2, A3, A4, A11 / IEC 60950:1991 +A1, A2, A3, A4
EN60825-1:1994 / IEC 825-1:1993, Class 1
GB4943:1995

EMC:
CISPR 22:1997 / EN 55022:1998 Class A
CISPR 24:1997 / EN 55024:1998

IEC 61000-3-2:1995 / EN 61000-3-2:1995 +A1:1998 +A2:1998 - Harmonics
IEC 61000-3-3:1994 / EN 61000-3-3:1995 - Flicker
GB9254:1998

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.

Tested with Hewlett-Packard Co. products only.

Roseville, May 30th, 2001

Mike Avery,
Regulatory Engineering 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).

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