HP Router 650

Installation Guide

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Product Numbers

This guide provides operating instructions for the following Hewlett-Packard Company products: J2340A

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Ce produit et la documentation s'y rapportant devront être étudiés avant l'installation et l'utilisation, afin de se familiariser avec les symboles et instructions de sécurité. Reportez-vous à la section «Informations concernant la sécurité».

Hinweise zur Sicherheit

Sehen Sie sich das Produkt an und0 lesen Sie die begleitende Dokumentation, damit Sie vor der Installation und dem Betrieb mit den Sicherheitsmarkierungen und Anleitungen vertraut sind. Bitte lesen Sie das Kapitel mit der Überschrift "Hinweise zur Sicherheit".

Considerazioni sulla sicurezza

Esaminare il prodotto e la relativa documentazione per familiarizzarsi con gli avvisi e le istruzioni di sicurezza prima dell'installazione e dell'uso. Vedere la sezione di questo documento intitolata "Considerazioni sulla sicurezza".

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Antes de instalar y hacer funcionar el producto, se deben estudiar el producto y la documentación relacionada a fin de familiarizarse con las indicaciones de advertencia e instrucciones. Ver la sección del documento titulada "Consideraciones sobre seguridad".

Regulatory Information

The product described in this document complies with specific international regulations. See the document section entitled "Regulatory Statements" for the applicable regulatory information.

Informations concernant la réglementation

Le produit décrit dans le présent document satisfait à des normes internationales spécifiques. Pour plus de détails sur les réglementations applicables, reportez-vous à la section «Regulatory Statements».

Informationen über Kontrollvorschriften

Das in diesem Dokument beschriebene Produkt erfüllt bestimmte internationale Kontrollvorschriften. Für Informationen über die zutreffenden Kontrollvorschriften lesen Sie bitte das Kapitel mit der Überschrift "Regulatory Statements".

Informazioni sulla regolamentazione

Il prodotto descritto in questo documento è conforme alle specifiche normative internazionali. Vedere la sezione del documento intitolata "Regulatory Statements" per le informazioni sulle normative competenti.

Informacin reglamentaria

El producto que se describe en este documento cumple con determinados reglamentos internacionales.

En cuanto a la información reglamentaria correspondiente, ver la sección del documento titulada "Regulatory Statements".

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規制適合について

本文書に記載された製品は関連する国際規制に適合しています。詳細は"Regulatory Statements"の項をご参照ください。

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安全のために

本製品の設置、操作を行う前に、必ずマニュアル及び関連文書中の安全表示、使用上の注意をお読みください。"Safety Information"の項をご参照ください。

Preface

This manual is a both a task-oriented installation guide and a reference describing the hardware aspects of router features, operation, and troubleshooting. The organization is as follows:

Chapter 1: Installation Begins with the parts list and continues with the steps for installation, from preparing the network through mounting the router, connecting the network cables, and initializing and verifying the router.

Chapter 2: Description and Operation Covers the features of the hardware, including status LED indications, buttons, resetting and clearing, and the initialization sequence.

Chapter 3: Troubleshooting Provides basic tips, status LED interpretation and indicated actions, verifying LED operation, and various diagnostic tests, plus procedures for replacing faulty modules.

Appendixes Provide cable and connector descriptions, modem configuration data (for remote console access), specifications, safety, warranty, and regulatory information, and a subject index.

1

Installation

Ensure that you have the following items.

Accessory kit. The kit (5063-4270) contains the following accessories:

- 2 Mounting brackets (5182-3314)
- 4 0.7-mm #M4 screws (0515-0780)
- 4 5/8-in #12-24 screws (2940-0283)
- 4 5/8-in #10-32 screws (2680-0302)
- 5 Interface card labels (5182-3315)
- 4 Self-adhesive rubber feet (0403-0427)

Power cord. Your router is provided with one of the following power cords:

- Australia (8120-1369)
- Denmark (8120-2956)
- Europe (8120-1689)
- Japan (8120-4753)
- Switzerland (8120-2104)
- United Kingdom (8120-1351)
- United States/Canada (8120-1378)

Caution

If your installation requires a different power cord, make sure you use a power cord bearing the mark of the safety agency in your country that defines the regulations for power cords. That is your assurance that the power cord can be used safely with the router.

Cables and Adapters. The kit (5063-5950) contains the following cable and adapters:

- Console cable (F1047-80002)
- 25-pin terminal adapter (5181-6640)
- 25-pin modem adapter (5181-6642)

For details, refer to appendix A, “Cables and Adapters.”

Interface Cards. You can install up to four interface cards in the router chassis—for example, you can install:

- HP J2435A 4-Port Ethernet/802.3 Interface
- HP J2437A 4-Port Token Ring Interface
- HP J2434A 4-Port WAN Interface

For a list of all interface cards that can be installed in the router, refer to the *HP Network Connectivity Product Catalog*.

Other Optional Accessories

- HP J2446A Redundant Power Supply
- HP J2443A 8-Mbyte Memory Upgrade

Documentation

- *Documentation Map* (5962-8316)
- *Installation Guide* (this manual, 5962-8317)
- *User's Guide* (5962-8304)
- *Operator's Reference* (5962-8305)
- *HP Routing Services and Applications* (5962-8770E)
- *Release Notes* (5962-8319)
- *Caution: Static-Sensitive Devices* (5962-8318)

Prepare the network.

1. Complete the network plan. Include network maps and the location of power sources, computers, data-link equipment, hubs or repeaters, bridges, other routers, and cabling (and cabling types and length). Verify the design limits for the cable lengths and the number of repeaters and nodes in your network.

   It is recommended that separate maps be used for each routing service. The network maps should show:
   - The connections between each network device.
   - The type of cable used for each connection.
   - Network layer addresses where applicable.
   - Other information that will need to be configured on the devices, such as DTE/DCE designations.

2. Install all LAN and WAN links. Verify the LAN cabling. Verify that WAN-link-terminating equipment is operational. Verify with your WAN-link-service provider that the WAN link is operating correctly.

3. You need a console to verify and configure the router initially. The console must be an ANSI or VT100 terminal or a PC running an ANSI or VT100 terminal emulator. If the console is located at a remote location, you also need a modem at the console and a modem at the router for connecting the console to the router. Installation of the console is included later in this installation procedure.

Mount the router.

Before mounting the router, make sure the router's power cord is correct for your country's ac power receptacle. Do not attach the power cord yet.

Rack or Cabinet Mounting

Warning

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

1. Remove the protective film from the top and front of the router.
2. Using a Phillips (cross-head) screwdriver, remove the top and bottom screws from the front of one side of the router (see figure 1-1). (Save these screws in case you later want to remove the router from the rack or cabinet and mount it on a table instead.)

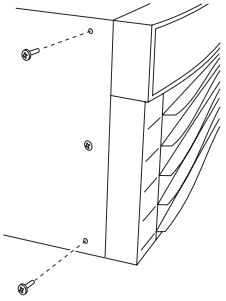


Figure 1-1. Screw Removal

Mount the router.

3. Position one of the two mounting brackets over the holes as shown in figure 1-2. The edge of the bracket with the large hole in the center should face the router, and the other bracket edge should face *front*.

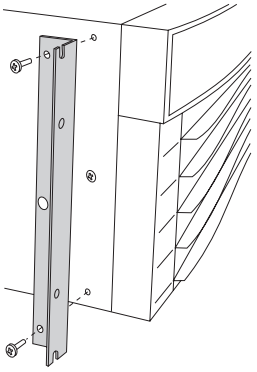


Figure 1-2. Bracket Position

4. Using a Phillips (cross-head) screwdriver, secure the bracket to the router with two 10-mm #M4 screws.

5. Repeat steps 2–4 to attach a bracket to the other side of the router.

Warning

The router weighs about 36 pounds (with no interface cards and one power supply installed) . If the rack or cabinet is empty, install the router at the bottom; if not, install the router as close to the bottom as possible. (If a lightweight device is already installed at the bottom, you may want to remove it, install the router at the bottom, then reinstall that device above the router.) If the router is mounted high, the rack or cabinet may become unstable and possibly fall over.

Note

The accessories kit includes both 5⁄8-in. #10-32 and 5⁄8-in. #12-24 screws. Some racks and cabinets require #10-32 screws, others require #12-24 screws. Make sure you have the screws that are required for your rack or cabinet before mounting the router.

6. On each side of the rack, insert one 5/8-in. screw at the top of a pair of holes that are 1/2-in. apart. (See figure 1-3; note that in a standard 19-inch telco rack, the screw hole pattern is repetitive—there are two pairs of holes spaced 5/8-in. apart followed by one pair of holes spaced 1/2-in. apart.) Finger-tighten the screws about 3–4 revolutions (until the screw threads begin to appear on the inside of the rack post).

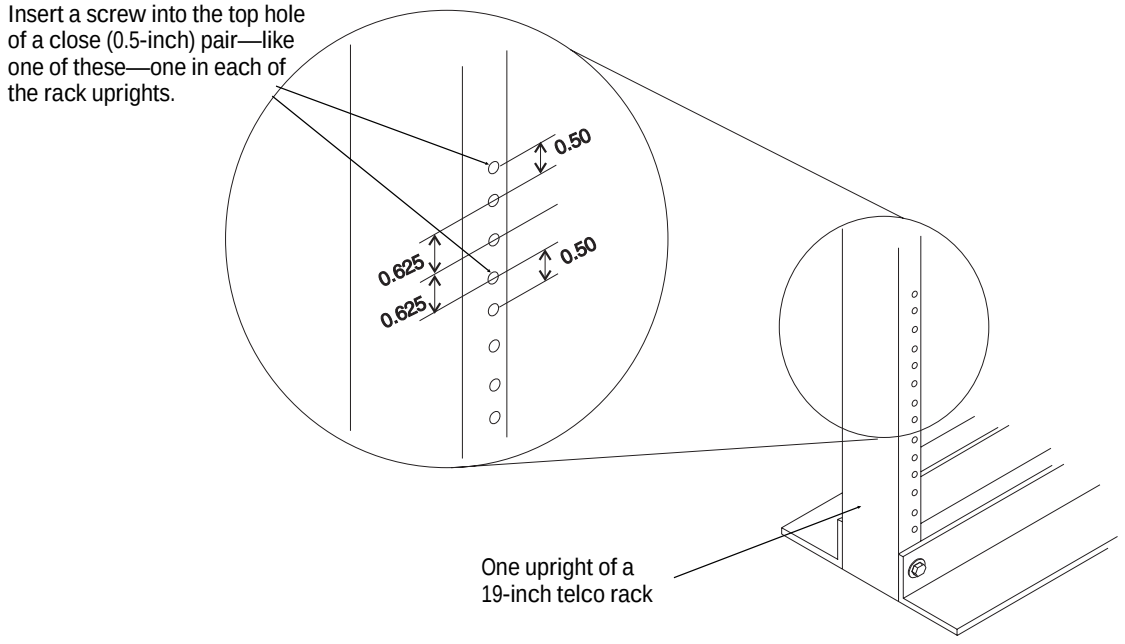


Figure 1-3. Rack Holes

Warning **Due to the weight of the router, the assistance of another person will help when mounting the router in the next step. You can minimize the weight of the router by removing the power supply (plus any interface cards or a second power supply that may already be installed).**

7. Lift the router to the rack or cabinet, and rest the slots at the bottoms of the brackets over the screws protruding from the upright of the rack or cabinet. Each bracket should be positioned on the *front* of the upright. (See figure 1-4.)

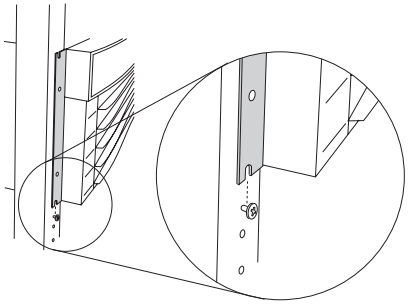


Figure 1-4. Mounting the Router

8. On each side, insert another 5/8-in. screw through the upper of the two closed holes in the bracket, and finger-tighten it into the upright.

9. On each side, move the screw from the slot at the bottom of the bracket to the lower of the two closed holes in the bracket.

10. Using a Phillips (cross-head) screwdriver, tighten the two screws on each side.

Table Mounting

Attach the self-adhesive rubber feet to the bottom of the router. Set the router on a table near the power source.

Install interface card(s).

You can install any of the optional interface cards into any of the four available chassis slots (2–5). (The routing engine must remain installed in slot 1.)

Notes

The following installation procedure describes how to install an interface card in an empty slot. If you are installing an interface card in place of one already installed in a slot, refer to “Replacing an Interface Card (System Online)” (page 3-21) or “Replacing the Routing Engine or an Interface Card (System Offline)” (page 3-27).

This installation procedure is applicable to any of the interface cards. For installation procedures specific to a particular interface card, refer to the documentation provided with it.

All slots must be filled, either with card blanks or with interface cards—you should not use the router with a slot open.

1. Connect a grounding wrist strap to your wrist and to the back of the router.

2. Press down slightly on the insides of both locks on the card bezel (see figure 1-6), then swing them outward until the bezel disengages (see figure 1-5).

Install interface card(s).

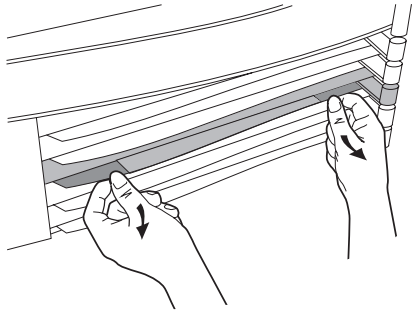


Figure 1-5. Unlocking Card Bezel

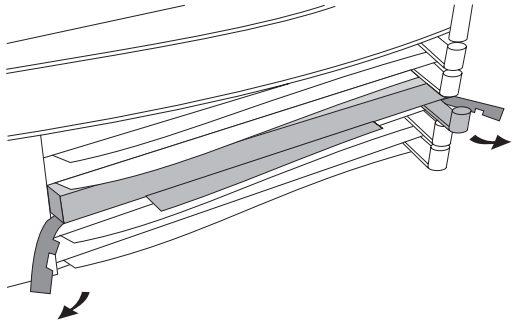


Figure 1-6. Disengaging Card Bezel

3. Grasping the left and right ends of the bezel, pull out until the tray is about half exposed.

4. Grasping the sides of the tray, remove the card blank from the router. Keep the card blank so that it can be reinstalled if the interface card needs to be removed.

5. Holding the card by the sides of its tray, slide the back of the card about half-way into the router.

6. Pull the locks on the bezel outward, then push evenly on both ends of the bezel until it engages fully and the locks swing inward to about 45°. (See figure 1-7.)

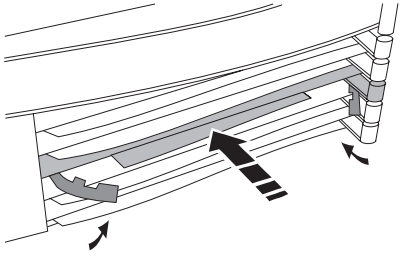


Figure 1-7. Reinstalling Interface Card

7. Push the two locks evenly to close them, pressing downward slightly to secure them in place.

8. Open the front door of the router by pulling its lock—the round post at the upper right—to the right.

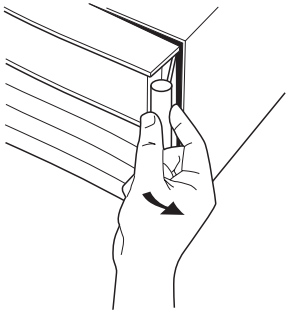


Figure 1-8. Opening Router Door

9. Remove the blank strip from the position corresponding to the slot where you installed the interface card, then insert the LED label strip provided with the card as far as it will go.

10. Bend the end of the label strip toward the back of the router, creating a 90° fold.

11. Close the router door.

12. To the left of each slot is a label on which you can write the name of the department or site served by the interface card installed there. (Additional labels are supplied in the router's accessories kit and also with each interface card.) To replace the label, slide it out from the right. Position the new label with its shiny side facing the router, and slide it in from the right.

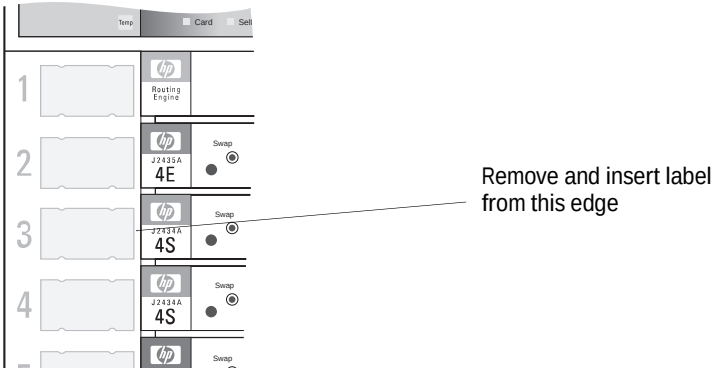


Figure 1-9. Interface Card Label Location

Note

If you have installed a new 4-Port Ethernet/802.3 Interface card, each of its four ports contains a preinstalled internal ThinLAN transceiver. You can replace any of these transceivers with another transceiver, such as for twisted-pair or fiber-optic cabling, or with an AUI port module, which lets you connect external transceivers such as for ThickLAN cabling. Instructions for replacing the transceivers in the 4-Port Ethernet/802.3 Interface card are provided in the *4-Port Ethernet/802.3 Interface Installation Guide*.

Connect a console.

You must connect a console to the router in order to verify and configure it.

Connecting a Local Console

1. Use the supplied console cable (or one of the other options described in appendix A, “Cables and Adapters”) to connect the router’s console port (located on the routing engine) to an ANSI or VT100 terminal, or to a PC emulating an ANSI or VT100 terminal.

2. Start up and configure the terminal or (if using a PC) the terminal emulation program for the following:
   - ANSI or VT100
   - 1 stop bit
   - 8 bits/character
   - Xon/Xoff handshaking
   - No parity
   - Baud rate of 38400, 19200, 9600, 4800, 2400, 1200, or 300
   - Screen size of 24 lines
   - If using Microsoft® Windows Terminal:
     - Cursor: Underline
     - Show Scroll Bars: unchecked
     - Use Function, Arrow, and Ctrl Keys for Windows: unchecked
     - Flow Control: None

Connecting a Remote Console

1. Use the supplied console cable and modem adapter (or one of the other options described in appendix A, “Cables and Adapters”) to connect the router’s console port (located on the routing engine) to a full-duplex, asynchronous (character-mode) modem. (For supported modems and their configuration requirements, see appendix B, “Modem Configuration.”)

2. At the remote site, connect an ANSI or VT100 terminal, or a PC emulating an ANSI or VT100 terminal, to the remote modem. Then establish the link between the terminal’s modem and the router’s modem (for information on doing this, refer to the documentation for the terminal-emulation or communications software used at the remote terminal or PC).

3. Start up and configure the terminal for the following:
   - ANSI or VT100
   - 1 stop bit
   - 8 bits/character
   - Xon/Xoff handshaking
   - No parity
   - Baud rate of 9600, 4800, 2400, 1200, or 300
   - Screen size of 24 lines
   - If using Microsoft Windows Terminal:
     – Cursor: Underline
     – Show Scroll Bars: unchecked
     – Use Function, Arrow, and Ctrl Keys for Windows: unchecked
     – Flow Control: None

Connect network cables.

With the power still off (you'll switch it on in the procedure "Plug in and verify router hardware" on page 1-18), connect the network cables as described in the documentation for the interface card(s). You should also make sure that all network equipment and links are ready.

Caution

Static discharge may damage equipment. Do not touch the router connector pins or the cable connector pins.

Note

For most interface cards (excluding, for example, the HP J2437A 4-Port Token Ring Interface), if any port has no network attached, the port's Net Fail LED is lit after the router starts. To avoid unnecessary event log messages, remember to disable that port when you configure the router. For information on interpreting the Net Fail LED and other LED error indications, refer to "Interpreting LED Error Patterns," page 3-3.

To help keep the network cables orderly—and out of the way when interface cards are being removed or installed—arrange the cables over the bars at the right of the router.

These cable-management bars have slots in them that you can use for tie-wrapping the network cables. Included with each interface card is a tie-wrap that you can use to wrap the cables and then attach the bundle to the cable management bar, as shown in figure 1-10.

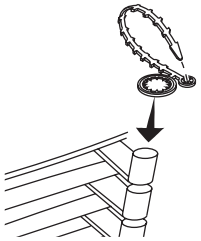


Figure 1-10. Cable-Management Bar and Tie-Wrap

Connect network cables.

Some cables (such as WAN cables) will not fit inside the cable management bars. You can use the tie-wraps to bundle the extra cables and hang them on the outside of the bar.

Plug in and verify router hardware.

Note

If you will be installing a second power supply, it may be more convenient to do so now; however, you can also install it later (without switching off the first power supply). For information about installing a second power supply, refer to the documentation accompanying the HP J2446A Redundant Power Supply.

The router automatically adapts to the correct ac voltage range for your power source.

1. Plug a power cord into the power socket on the back of the router nearest the side (the socket labeled “Factory-installed power supply”).
2. Plug the other end of the power cord into an ac power source.
3. Open the front door on the router, switch the power supply on by pressing the top of the switch (marked with “I”), then close the door. (While the power supply is connected to a power source and is switched on, the LED on the power switch is lit.)

The router’s self-test begins when the power is switched on. It can continue for 15–35 seconds, depending on how many interface cards are installed. During the test, the Status LED for the router is orange and the Self-test LED for the routing engine (the second LED in the first row) is green.

Plug in and verify router hardware.

When the self-test is complete:

- The Status LED should be green.
- The Pwr, Fan, and Temp LEDs should be off.
- In each row of LEDs for an interface slot where a module (the routing engine or an interface card) is installed, the Card LED (the first LED in each row) should be green and the Self-test LED (the second LED in each row) should be off.
- In each row of LEDs for an interface slot where a module is not installed, all LEDs should be off.

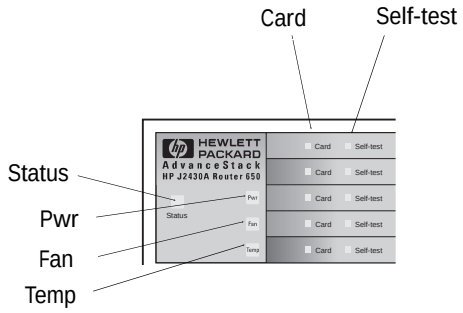


Figure 1-11. Router and Module Status LED Locations

Note If any LED appears differently, refer to chapter 3, "Troubleshooting."

4. After the Status LED turns green, look for the following line of text on the console's display:

   ```
   Waiting for speed sense.
   ```

   or a line of garbled characters.

Note If a line of characters does not appear on the console, refer to chapter 3, "Troubleshooting."

5. Press Return and wait for either the Main menu, or the copyright screen (if a password has been set) with a prompt for you to type the password.

Note

If your console is set to 9600 baud, you should have to press Return only once. If the console is set to another speed, you may have to press Return more than once.

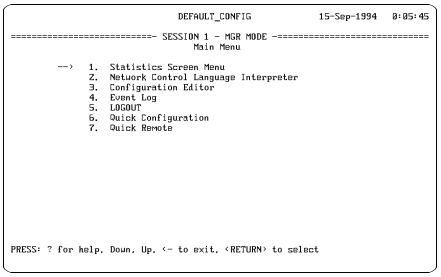


Figure 1-12. Main Menu Screen

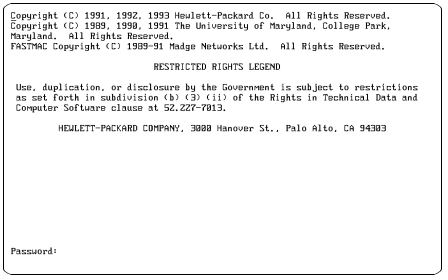


Figure 1-13. Copyright and Password Screen

6. If the Copyright screen appears, type the password and press Return. The Main menu screen then appears. The system has booted.

Note

If neither the Copyright screen nor the Main menu appears, press Return again, pause, and then repeat if necessary. (Speed sensing may require more than one Return for your type of connection.) If pressing Return several times does not establish the console connection, refer to chapter 3, “Troubleshooting.”

Configure and boot the router.

Configuring the router assigns values to the parameters that control its networking operation. The router creates a set of default values in the configuration the first time it is booted. This default state allows the router to function minimally as a remote bridge when connected to LANs and WANs. However, interconnection and routing in your network may require that you change additional configuration parameters. Hewlett-Packard recommends that you use the Quick Configuration utility to enter as many of these additional values as as you need. In some cases, using Quick Configuration may be all that you need to do. Or you can then use other configuration tools, such as the Configuration Editor, to enter the other values that may be needed or desirable.

You have the following configuration options:

- **Quick Configuration** creates or changes the configuration from a single screen that presents the most commonly used router parameters. You can use this tool for a "getting started" configuration either for the initial installation or after using the Reset and Clear buttons to set the router to its default configuration. (Refer to "Reset, Clear, and Diag Buttons" on page 2-9.) You can also use this tool to view and/or change an existing configuration.

  Starting from the Main menu (see figure 1-14), press 6 to select "Quick Configuration." Follow the prompts on the screen and the Help presented at the bottom of the screen.

  For details on using Quick Configuration, saving your changes, booting the router, and then exiting Quick Configuration, refer to the *User's Guide*. Quick Configuration includes an option for booting the router before exiting:

  - You can answer yes to the question about booting if your network map specifies no additional parameters. (If you know your network requires further configuration before operating, do not boot within Quick Configuration; instead, use the Configuration Editor to do the remaining configuration and boot the router. You can use a "hotkey" to jump to the Configuration Editor from Quick Configuration; refer to "How to use the 'HotKeys'" in the *User's Guide*.) Proceed to the steps for setting the time, setting passwords, and verifying the installation, starting on page 1-26.

- You can exit without booting; then you will boot using the procedure described at the end of this list on page 1-23. After exiting, you will return to the Main menu.

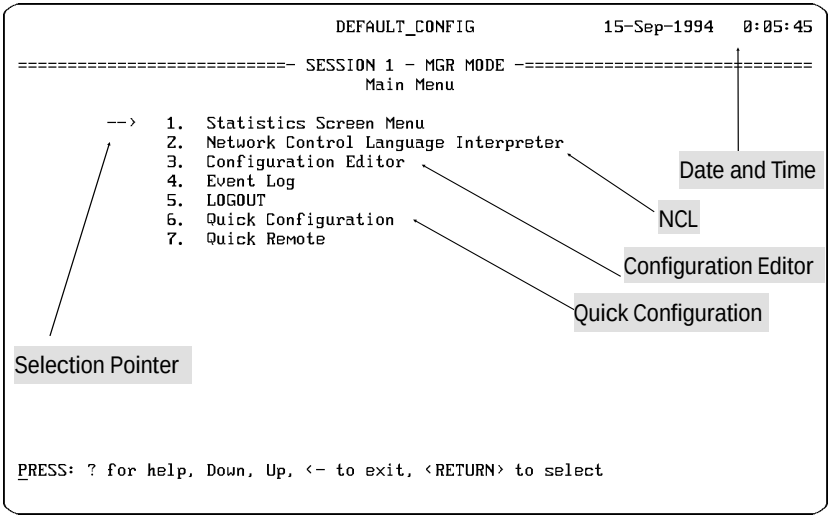


Figure 1-14. Main Menu Screen

- **Configuration Editor** can be used after using Quick Configuration if your network design calls for such features as spanning tree bridging, static routes, or filtering, or if you have other requirements for interoperating with other devices. The Configuration Editor presents a hierarchy of menus and screens that include all parameters available for customizing and integrating the router into your network (including the subset of parameters you can access through Quick Configuration).

  At the Main menu (see figure 1-14), press 3 to select "Configuration Editor."

  - For details on using the Configuration Editor, saving your changes, and exiting, refer to the *User's Guide*. After exiting, you will return to the Main menu.
  - Then you will boot the router using the procedure described at the end of this list (page 1-23).

- You could use Quick Configuration to create a minimal initial configuration and boot the router, and then you would be able to determine in the verification steps in the last section of this procedure whether you need to configure more parameters to further customize and fully integrate the router into your network. If so, access the the Configuration Editor from the Main menu (option 3), then return to the booting steps below and verify the configuration again.
- After using Quick Configuration to set the router's network addresses, such as the IP address and subnet mask, you can complete a fully customized configuration file using HP OpenView Interconnect Manager (or another source of a complete configuration file that fits the particular router model being installed) and transfer the file to the router.

  For details on HP OpenView Interconnect Manager, refer to the product's documentation. The router's *User's Guide* includes instructions for transferring configuration files.
- Another option is to use only the Configuration Editor, instead of Quick Configuration, to configure the router or to modify an existing configuration.

Note

If you later replace an interface card with a different type of interface card (for example, if you replace an Ethernet/802.3 card with a token ring card), or if you later install a card in a slot that formerly was empty, you must specify the new card for that slot in the configuration.

Booting the Router

If you have not booted the router as part of Quick Configuration, or if you have made and saved further changes using Configuration Editor, use the following procedure to boot the router when you are ready to implement the configuration changes.

1. Starting from the Main menu (see figure 1-14), press 2 to select "Network Control Language Interpreter" (NCL). You will then see the NCL prompt. This prompt matches the current system name. For example, if the system name is `DEFAULT_CONFIG`, then the NCL prompt appears as shown in figure 1-15.

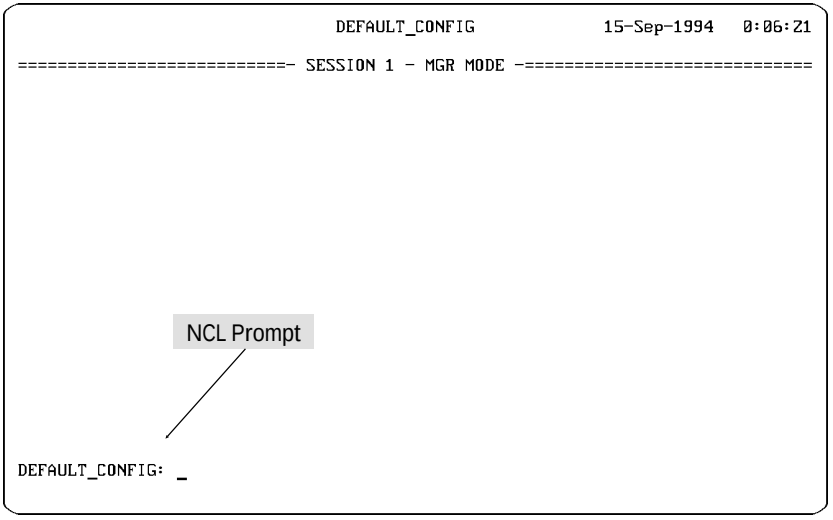


Figure 1-15. Default NCL Prompt

2. Boot the router (with your new configuration) by typing `boot` at the NCL prompt and pressing Return, as follows:

   ```
   DEFAULT_CONFIG: boot Return
   ```

3. If your router does not have a manager password, skip to the next step. If the router has a previously set manager password, you must enter the password before booting can proceed. In this case, you are prompted to enter the password:

   ```
   Enter current manager password:
   ```

   Type your manager password and press Return.

   (If you've forgotten the password and need to clear it, refer to "Clearing the Passwords: The Clear Button", page 2-11.)

4. The following message prompts you to verify that you want to boot the router:

   ```
   Do you want to reboot the system? [y/n]
   ```

   Press Y to proceed with booting.

5. After the router boots (which takes only a few seconds), you will see the speed sensing prompt:

   ```
   Waiting for speed sense.
   ```

   or a line of garbled characters.

   Press Return one or more times, as necessary, to re-synchronize the router with the console and to display the copyright screen.

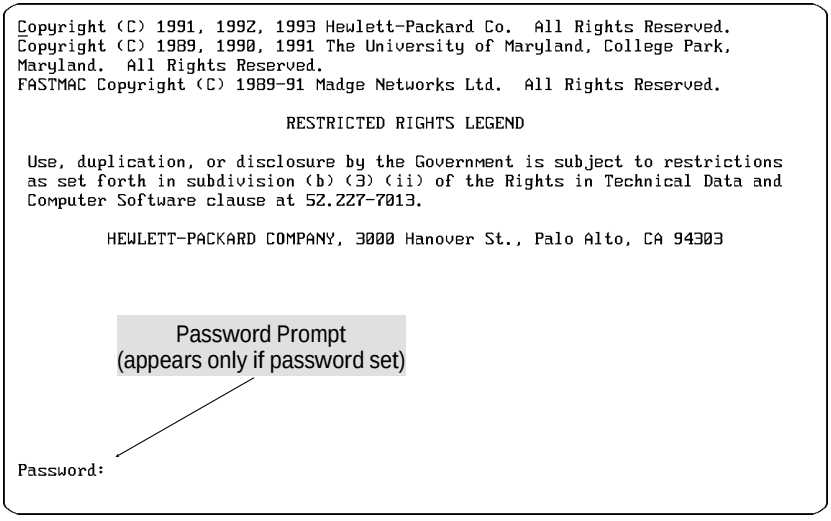


Figure 1-16. Copyright Screen

6. When the copyright screen appears:

   - If the password prompt appears, type the password and press Return to display the Main menu.

     (Use the manager password if you have one and will be doing any tasks requiring it, such as setting the date and time (next step). The subsequent step, “Set Manager and User Passwords” (page 1-28), describes which tasks require the password. Otherwise, use the user password.)

   - If, instead, this message appears:

     ```
     Press any key to continue
     ```

     Press Return to display the Main menu.

(Optional) Set the correct time and date.

Each time you power up your router, it starts with a default time and date that differs from the actual time and date. Whether you set the correct time and date or not depends on how you want the correct time and date to be maintained in your network. When the time and date in one router is used as the source for time and date in another router, this control is termed the "Time Protocol service."

1. Identify the Time Protocol usage for your router and determine whether to set the date and time:

If the router will operate as a:	Set date and time?
Client of Time Protocol service	No
Server of Time Protocol service	Yes
Both client and server of Time Protocol service	No *
Neither client nor server of Time Protocol service	Yes

*The router designated as "server only" provides the Time Protocol service. If no router is designated "server only," then a client/server router should provide the Time Protocol service.

2. If you determine a need to set the time and date, use NCL's Time command. (If you do not need to set the time and date, proceed with the subsequent procedures for setting passwords and verifying the installation, starting on page 1-28.)

   At the Main menu (see figure 1-14), press [2] to select "Network Control Language Interpreter." The NCL prompt—`DEFAULT_CONFIG:` or another system name you have configured—then appears at the bottom of the screen, as shown in figure 1-17.

Set the correct time and date.

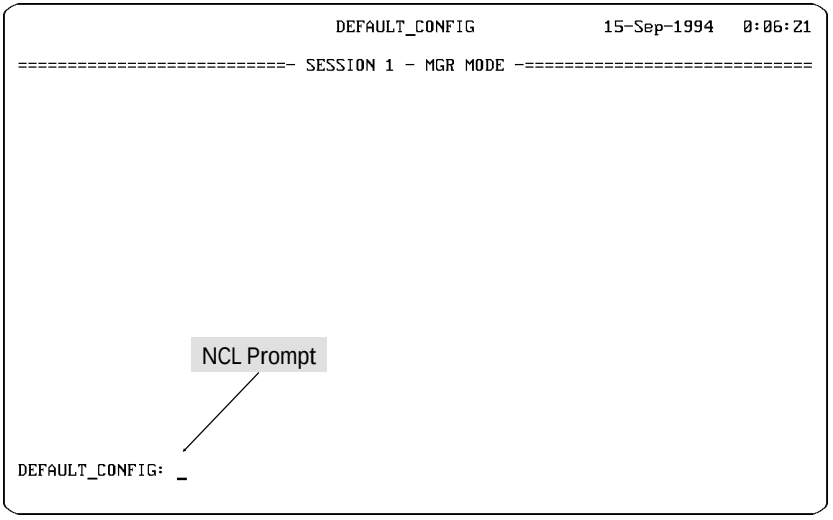


Figure 1-17. NCL Screen with Default Prompt

3. At the prompt, enter the Time command with the date and time:

   `time` ***mm/dd/yy hh:mm:ss*** Return

   where:

mm = month	***hh*** = hour
dd = day	***mm*** = minutes
yy = year	***ss*** = seconds

4. Use the Exit command to exit from NCL and return to the Main menu:

   `exit` Return

Note

For details on the Time command and other NCL commands, refer to chapter 16 of the *Operator's Reference*.

(Optional) Set manager and user passwords.

Passwords are optional. If no password is set, anyone can use the console to access the router for viewing, booting, changing the configuration, resetting statistics or variables, and using various commands. Two passwords, a user and manager password, can be set to control access to two levels of functions:

- User password: allows viewing the statistics, event log, MIB variables, and configuration settings.
- Manager password: allows access to the following system management tasks:
  - assigning a user password
  - saving a modified configuration
  - booting the router
  - resetting statistics or MIB variables
  - enabling or disabling services
  - downloading a configuration
  - changing a password
  - changing the date and time
  - using the Fget, Fput, Ping, and Test commands
  - all the functions allowed for the user password

With both passwords set, the password entered by the user when beginning the console session controls the level of access allowed during that session.

Set manager and user passwords.

1. At the Main menu (see figure 1-14), press 2 to select "Network Control Language Interpreter." The NCL prompt—`DEFAULT_CONFIG:` or another system name you have configured—then appears at the bottom of the screen, as shown in figure 1-18.

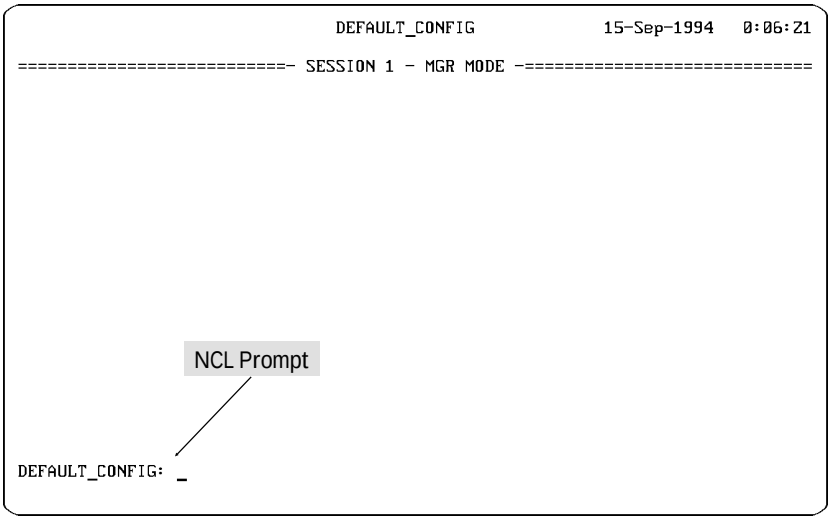


Figure 1-18. NCL Screen with Default Prompt

2. At the prompt, enter the Password command:
   `password` Return.

3. Follow the prompts to set the manager password.

4. To set the user password, repeat steps 2 and 3, substituting the user password for the manager password in step 3.

Verify router initialization and configuration.

Earlier in the installation procedure it is normal to verify proper router hardware operation. (See “Plug in and verify router hardware.” on page 1-18.) At this point in the procedure, after you have configured and booted the router, you should verify that the router has initialized properly for your intended application. You are checking two conditions in the steps below:

- Verify that the network links are operational.
- Verify that all networks can be reached by the router.

You can save steps by operating from the Network Control Language Interpreter (NCL). Select NCL from the Main menu.

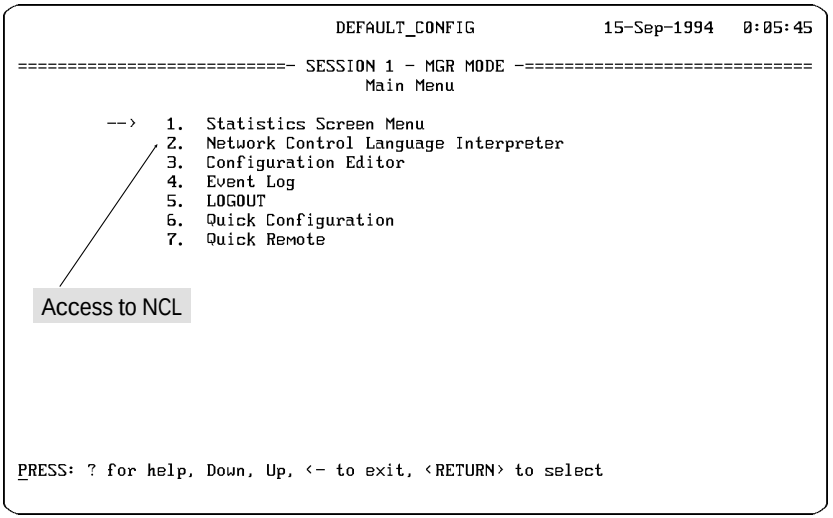


Figure 1-19. NCL Access from the Main Menu

Note

For further details on the procedures in this section, refer to the *Operator’s Reference*.

Examine the event log.

Among the events posted to the event log are those which indicate the success or failure of the configuration and initialization. Events are occurrences such as enabling circuits and services, changes in spanning tree states, and error conditions. Each event is labeled with the date, time, severity, and a mnemonic for the software resource that generated the message.

1. Access the event log.

   You can see the most recent event in the second line of the console screen. However, checking events is easier if you display and interactively scroll around the entire log. One way to access the interactive log is to select “Event Log” from the Main menu. The second way is to use NCL’s Logi command, which is more convenient if you will be working in NCL more frequently than the Main menu. Upon entering the event log, you will see the first event for the most recent reboot at the top of the display. To navigate among the events displayed, use the following control keys. You can also see new events added to the end of the list.

Return	Advance display by one page
P	Roll back display by one page
↓	Advance display by one event
↑	Roll back display by one event
→	Display last page (newest events)
C	Display first page of events for most recent reboot
H	Display help for event log (including more control keys)
←	Exit from event log

   Refer to chapter 5 of the *User’s Guide* for more key options and other information about display control keys, a full explanation of the parts of an event line, the severity ratings, the number and range of events kept in the log, and the meaning of each event message.

2. In the event log, verify that the circuits and services that you configured are being enabled. The events being listed in the event log should be consistent with information recorded on the network plan and maps.

3. Verify that no warning, major, or fatal events have occurred.

Examine the statistics screens.

1. Access the statistics screens by using NCL's Stats command or by selecting Statistics Screen menu from the Main menu. A menu of statistics screens is presented.

```
                              DEFAULT_CONFIG              15-Sep-1994   0:06:55

============================- SESSION 1 - MGR MODE -=============================
                            Statistics Screen Menu

         -->   1.  Circuit Statistics
               2.  Per Second Statistics
               3.  Bridge Statistics
               4.  DoD IP Router Statistics
               5.  DECnet Router Statistics
               6.  IPX Router Statistics
               7.  Xerox Router Statistics
               8.  AppleTalk Router Statistics
               9.  Buffers Usage Statistics
              10.  Return to Previous Menu









PRESS: ? for help, Down, Up, <- to exit, <RETURN> to select
```

Figure 1-20. Example of the Statistics Screen Menu

For more information on the statistics screens, refer to chapter 6 of the *User's Guide*.

Note

The Statistics Screen Menu list the statistics only for those services that have been configured.

2. Select and examine the Circuit Statistics screen. Verify that error-free data is being exchanged over enabled circuits. Match the circuit names with those on the network maps.

3. Select and examine the individual statistics screen for each routing and bridging service configured on the router. Verify that the configured services are exchanging frames or packets as expected. The information listed should match the information on the network maps. The statistics should reflect the circuit groups, network interfaces, and traffic patterns expected for the router configuration and the devices attached to the network.

The following service statistics screens are available:

Bridge Statistics This screen summarizes bridge traffic volume for each circuit group. It shows the number of frames that were received, forwarded, flooded, and dropped. The bridge service must be configured for this screen to be available.

DoD IP Router Statistics This screen provides summary data for each IP network interface. The interfaces are identified by their IP addresses. The screen shows the number of IP datagrams received, forwarded, delivered to upper-layer protocols, and dropped. The DoD Internet (IP) routing service must be configured for this screen to be available.

DECnet Router Statistics This screen summarizes DECnet traffic volume for each circuit group. It shows the number of data packets received, forwarded, and dropped. The statistics do not represent traffic generated by DECnet routing layer control messages, such as Hello and routing messages. The DECnet routing service must be configured for this screen to be available.

IPX Router Statistics This screen provides summary data for each IPX network interface. The interfaces are identified by the IPX network numbers of the networks they are connected to. It shows the number of datagrams received, forwarded, delivered to upper-layer protocols, and dropped. The IPX routing service must be configured for this screen to be available.

XNS Router Statistics This screen provides summary data for each XNS network interface. The interfaces are identified by the XNS network numbers of the networks they are connected to. The screen shows the number of XNS datagrams received, forwarded, delivered to an upper layer protocol, and dropped. The XNS routing service must be configured for this screen to be available.

AppleTalk Router Statistics This screen summarizes AppleTalk traffic volume for each circuit group. It shows the number of packets received, forwarded, and dropped. The AppleTalk routing service must be configured for this screen to be available.

Examine the bridging and routing tables.

NCL commands beginning with “rget” are used to verify that the bridging and routing tables represent the expected network topology. Rget commands are based on SNMP; IP routing or IP host-only service must be enabled to use them. The following are the Rget commands for each bridging and routing service.

(For more information on Rget commands, refer to chapter 16 of the *Operator’s Reference*.)

RGETB Use the Rgetb command to display the bridge forwarding and filtering table for this node. Verify that the bridging service is learning addresses. Verify proper configuration of source or destination address filters.

RGETR Use the Rgetr command to display the IP routing table for this node. Verify that entries exist for all IP subnetworks represented in the network map. Check the next-hop entries to determine the route that IP packets will take to each destination subnet. Verify the number of hops to these subnets; a very large metric may indicate that the route is invalid (type field I).

RGETIR Use the Rgetir command to display the IPX routing table for this node. Verify that entries exist for all IPX networks represented in the network map. Check the next-hop entries to determine the route IPX packets will take to each destination network. Verify the number of hops to these networks; a very large metric may indicate that the route is invalid (type field I).

RGETIS Use the Rgetis command to display the IPX server table for this node. Using your IPX network map, verify that the router has learned about all IPX servers. Note that if IPX SAP filters are being used in the network, your router may be restricted from learning about some servers.

RGETXR Use the Rgetxr command to display the XNS routing table for a this node. Verify that entries exist for all of the XNS networks represented in your network map. Check the next-hop entries to determine the route the XNS packets will take to each destination network. Verify the number of hops to these networks; a very large metric value may indicate that the route is invalid (type field I).

RGETD Use the Rgetd command to display the DECnet router configuration table. Use this table and the network map to determine that all DECnet circuit groups are enabled and are currently active.

RGETDN Use the Rgetdn command to display the DECnet router level 1 (intra-area) routing table for this node. Use this table and the network map to verify that the router has learned about all routers and end nodes in its area. Also, trace the paths to the destination nodes to verify that the hop counts and path costs are as expected.

RGETDA Use the Rgetda command to display the DECnet router level 2 (inter-area) routing table for this node. Use this table and the network map to verify that the router has learned about a path to all areas. Trace the paths to the level 2 router in the destination area to verify that hop counts and path costs are as expected. Note that DECnet routing services on HP routers are always level 1 and level 2 routing services, but this may not be true for DECnet routing services from other vendors.

RGETATR Use the Rgetatr command to display the AppleTalk routing table. Verify that network range entries exist for all AppleTalk networks. The network ranges should be consistent with those recorded on the network map. Check the next-hop entries to determine the route that AppleTalk packets will take to each destination network. Verify that the number of hops to these subnets is what you expect. Check the status field to verify that there are no entries that are marked suspect or bad.

Test node accessibility.

Use NCL's Ping command to test that specific IP routers or end nodes can be reached. Ping can be used on a router with IP routing enabled to test particular end nodes and routers that run IP. Use the specific IP address of the target. To verify a newly installed router, perform the Ping command on another router and use the IP address of the router being verified as the destination.

To send an AppleTalk Echo Protocol (AEP) request message to a specific AppleTalk node address, use NCL's Atping command.

For more complete information on Ping, refer to page 3-18 in this manual, and to chapter 16 of the *Operator's Reference*.

Note

If the steps in this verification section show that network links are not operating as desired, re-examine the configuration performed in earlier steps. Some links and services may need further customization beyond your initial configuration; you may need to use the Configuration Editor to change more parameters. (For information about using the Configuration Editor, refer to chapter 4 of the *User's Guide*; for information about the parameters and their defaults, refer to part I, "Dictionary of Configuration Parameters", of the *Operator's Reference*.) Return to the configuration and booting steps earlier in this chapter, and then repeat the verification steps.

2

Description and Operation

Features

The HP AdvanceStack Router 650 provides high-performance local/ remote bridging and multiprotocol routing for interconnecting LANs and WANs. It supports the following routing services:

- TCP/IP
- Novell IPX
- DECnet Phase IV
- AppleTalk Phase 2
- Xerox XNS
- Transparent Bridging with Spanning Tree
- Translational Bridging
- Source Route Bridging
- Synchronous Pass-Through

If a packet arrives with an unsupported protocol, the router uses its bridging capability to send the packet toward its destination. This allows full support for environments where non-routable, uncommon, or unsupported protocols may exist.

The router can accomodate up to four interface cards, such as the HP J2434A 4-Port WAN Interface. This interface card includes four WAN ports supporting RS-232/V.24/V.28, RS-422/RS-449/V.36, V.35, or X.21 interfaces. These provide direct point-to-point, PPP, and ISDN connections to other routers. WAN support includes private, public, or hybrid networks using X.25, Frame Relay, SMDS, and ISDN, over point-to-point and/or switched circuits, with support for dial connections.

For a list of all interface cards that can be installed in the router, refer to the *HP Network Connectivity Product Catalog*.

A console port allows access to the router by a terminal, or by a terminal emulator on a personal computer. Through this interface, you can configure, monitor, and troubleshoot the routers. This RS-232 console interface can be accessed either locally, or remotely through a modem. The baud rate is automatically detected. Also, enhancements to the router's operating system can be downloaded to the router through this port.

Additional Features:

- Optional redundant power supply (HP J2446A) ensures maximum uptime. Front-panel indicator light signals power supply failure.
- Optional 8-Mbyte memory upgrade (HP J2443A) increases memory on the routing engine to 16 Mbytes.
- Interface cards, power supplies, and cooling module can be hot swapped.
- "Quick Remote" automatically satisfies Bootp requests from other HP routers, which eliminates the need for technical expertise at remote sites.
- Detachable brackets for mounting in a 19-inch rack or cabinet.
- Automatic sensing of the power voltage range with no switches needed.
- Redundant variable-speed fans ensure maximum uptime. Front-panel indicator lights signal temperature or cooling-module failure.
- The option to automatically recover from power failure while maintaining the current configuration.
- Front-panel LEDs that are clearly visible at a glance. These LEDs include a global status LED to indicate overall health or failure at a glance. More detailed is provided by LEDs for port traffic, net failure, processing utilization, and diagnosis of particular modules and options.

Also, you can remotely manage an HP router through a workstation running HP OpenView Interconnect Manager in HP-UX, or through any other standard SNMP network management system.

After using the console interface with Quick Configuration to configure IP routing, you can use such applications on network servers to do all other router configuration remotely.

Note For detailed product specifications, see appendix C.

LEDs and Buttons

Router Status LEDs

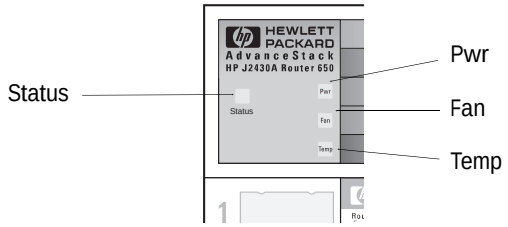


Figure 2-1. Router Status LEDs

The Status LED is a quick indicator of the overall state of the router. When it is lit green, the router is operating normally; when it is lit orange, some failure has occurred, and you should check for other orange LEDs to determine the cause of the failure.

Status appears:

- Green when the router is operating normally and when the self-test is complete with no errors. (The Status LED remains green when a network is down or when an interface slot is empty; these conditions allow the remaining interface cards to operate normally.)
- Orange when the self-test is running. (A full self-test occurs when the power is switched on; it lasts 15–35 seconds, depending on how many interface cards are installed. A minimal self-test occurs when the Reset or Diag button is pressed; it lasts about 7 seconds.) If an error is found during the self-test, the Status LED remains orange and one or more of the other router status or module status LEDs will also be lit orange. It also remains lit during the configuration clearing procedure (page 2-12).

  The Status LED also appears orange when there is a failure of the fan or of one of two installed power supplies, or when there is a temperature warning.

If the Status LED remains orange at the end of the self-test or turns orange during operation of the router, refer to chapter 3, "Troubleshooting."

- Unlit when the routing engine is not properly installed in module slot 1.

Pwr appears orange if two power supplies are installed and there is a failure in one of them. To determine which power supply is faulty, open the router door; the faulty power supply is the one for which the LED on the power switch is *not* lit.

Fan appears orange when there is a failure in the cooling module. If the Fan LED is lit during router operation, replace the cooling module.

Temp appears orange when the temperature exceeds specifications. If, during operation of a router mounted in a cabinet, the Temp LED is lit and the Fan LED is *not* lit, verify that the airflow around the router is not restricted. The temperature where the router is installed should be within the range specified in appendix C.

The Pwr, Fan, and Temp LEDs also appear orange momentarily at the beginning of the self-test.

Module Status LEDs

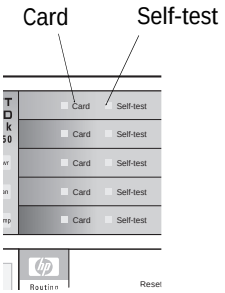


Figure 2-2. Module Status LEDs

Card appears:

- Green when the router is operating normally and when the self-test is complete with no errors. (The Card LED remains green when a network is down, when an interface slot is empty, when there is a failure of the cooling module or of one of two installed power supplies, or when there is a temperature warning. These conditions allow the other modules in the router to operate normally.)
- Orange when the self-test is in progress, or when there is a failure of the corresponding module after the self-test or during router operation.
  - If a Card LED remains orange at the end of the self-test, either the routing engine, one of the interface cards, or some other part of the router is faulty. For more information, refer to chapter 3, "Troubleshooting."
  - If a Card LED turns orange during router operation, there has been a software failure. (The router's Status LED will also turn orange in this condition.) This condition will remain only a few seconds until the router reboots (which will occur unless Auto Reboot in the configuration has been disabled). For more information, refer to chapter 3, "Troubleshooting."
  - If the Card LED is orange during router operation and *none* of the Net Fail LEDs is lit, the card may not be seated properly. (The Card LED flashes orange, and the Self-test LED flashes green.)

Self-test appears green when the self-test is in progress, when there is a failure of the corresponding module after the self-test, or when the corresponding inteface card is not properly installed. The Self-test LED for the routing engine appears green when there is a failure of either the routing engine, any interface card, or some other part of the router. For more information, refer to chapter 3, "Troubleshooting."

Port Status LEDs

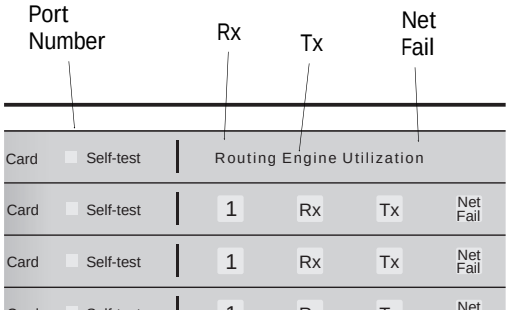


Figure 2-3. Port Status LEDs

Note

For most interface cards, the 3rd through 18th LEDs are used to indicate the port status, as described in this section. If a particular interface card uses these LEDs differently, its documentation will describe that use.

There are four port status LEDs for each of the four ports.

Port Number indicates the number of the port, 1–4. The number appears green during the self-test and when the router is operating normally.

Rx flickers green as packets are being received through the corresponding port. The frequency of the flickering indicates the amount of traffic. In heavy traffic, it may appear as if it is lit all of the time.

Tx flickers green as packets are being transmitted through the corresponding port. The frequency of the flickering indicates the amount of traffic. In heavy traffic, it may appear as if it is lit all of the time.

Net Fail appears orange when either the corresponding port or the attached network has failed during a self-test or during router operation.

Routing Engine Utilization LEDs

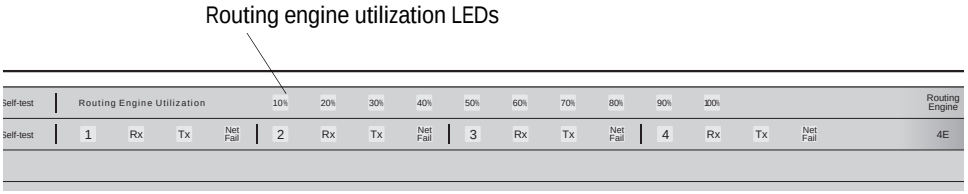


Figure 2-4. Routing Engine Utilization LEDs

The routing engine utilization LEDs indicate the degree of utilization of the routing engine. An excessively high percentage of utilization decreases throughput. If you see consistently high utilization—over 50–60%—reconfiguring the network will improve overall network throughput, efficiency, and response time.

It is normal for the routing engine utilization LEDs to indicate high utilization percentages during the self-test.

Swap Button and LED

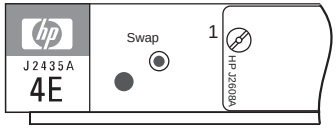


Figure 2-5. Swap Button and LED

The Swap button and LED on each interface card are used to “hot swap” the card—that is, to replace it without switching the router off and taking all networks down. For details, refer to “Replacing an Interface Card (System Online)," page 3-21.

Reset, Clear, and Diag Buttons

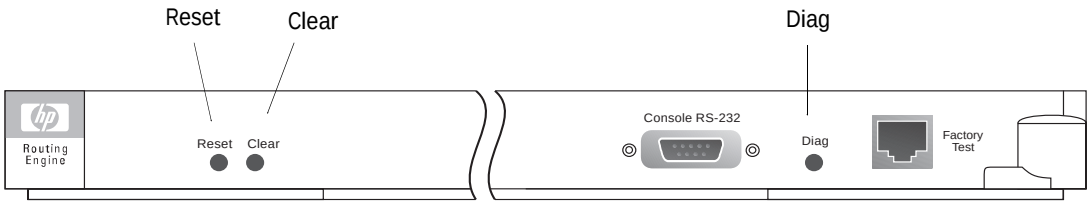


Figure 2-6. Location of Reset, Clear, and Diag Buttons

The Reset, Clear, and Diag buttons on the routing engine let you perform the following tasks:

- **Resetting the router** runs a minimal self-test and initializes (boots) the router, regardless of the current operating mode.
- **Clearing the password(s)** removes the current password(s), if any, without interrupting the current state of the router. This protects you from being denied console, Telnet, TFTP, or HP Openview Interconnect Manager access if you have forgotten the password(s).
- **Clearing the router** removes the current password(s), erases all configuration changes to the default (factory) configuration, and boots the router. Use this feature only if you are prepared to lose the router's current configuration. You must use this procedure if the configuration is so corrupted that the console becomes inaccessible.
- **Obtaining diagnostic information** by pressing the Diag button resets the router and generates diagnostic messages that appear on the console, in the event log (which can be displayed from the Main menu), and in the crash history (which can be displayed using NCL's Crash command).

Resetting the Router: The Reset Button

Using a non-conducting, pointed implement such as a wooden pencil or a toothpick, press and release the recessed Reset button on the routing engine. (See figure 2-6 on page 2-9.) Resetting does the following:

- Lights all router , module, and port status LEDs while the Reset button is pressed.
- Runs a minimal self-test of the routing engine. During the test, the Status LED for the router is orange, the Card LED for the routing engine is orange, and the Self-test LED for the routing engine is green.
- Initializes (boots) the router, using the most recently saved configuration.
- Displays "`Waiting for speed sense`" on the console so you can start a console session if needed. (Refer to "Plug in and verify router hardware" on page 1-18.)

Switching the power off and then on resets the router as described above, plus it performs a more extensive self-test. However, while pressing the Reset button preserves the event log (which can be displayed from the Main menu) and the crash history (which can be displayed using NCL's Crash command), this information is lost when you switch the power off and on.

For more information about resetting, see "Initialization Sequence" on page 2-15.

Notes

Resetting does not affect any current password(s).

Any configuration changes you have not yet saved (in either Quick Configuration or the Configuration Editor) are discarded. That is, the router initializes with whatever configuration was last saved.

If the Status LED does not turn green within a couple of minutes after pressing and releasing the Reset button, the self-test has failed. In this case, check the Pwr, Fan, Temp, and Card LEDs for the error and refer to chapter 3, "Troubleshooting."

Clearing the Passwords: The Clear Button

Using a non-conducting, pointed implement such as a wooden pencil or a toothpick, press and release the recessed Clear button on the routing engine. (See figure 2-6 on page 2-9.)

Note

Access to the router will no longer be limited by either a manager or user password. Using the Clear button removes all constraints on access by anyone using the console, Telnet, TFTP, or network management.

To set new passwords, use the Network Control Language (NCL) Password command on the console. For more information, refer to chapter 16 of the *Operator's Reference* or to "Set manager and user passwords" in this manual, page 1-28).

Clearing the Router: The Reset and Clear Buttons in Combination

The combination of the Reset and Clear buttons restores all factory defaults, including configuration defaults. It also removes the manager and user passwords. You might want to use this procedure (as described below), for example, in situations such as the following:

- So many settings in the configuration need to be changed that it would be easier to start over with the factory defaults.
- You want to redeploy the router somewhere else using a different configuration.
- The configuration has become so corrupted that you cannot access the router from the console.

Caution

The Reset-Clear combination erases the changes made to the router configuration and restores the default (factory) configuration values. This means that bridging (without spanning tree), but not routing, is then enabled on all ports.

Note

The Reset and Clear buttons are recessed. To press each button, use a non-conducting pointed implement like a wooden pencil or a toothpick. (See figure 2-6 on page 2-9.)

Note Do not wait more than 5 seconds after step 2 below. Holding the Clear button too long prevents this procedure from working.

1. Press the Reset button, and while holding it down, immediately press and hold the Clear button.

   All LEDs are lit while Reset is pressed. (All Card LEDs are orange, and all Self-test LEDs are green.)

2. Release the Reset button, but continue to hold the Clear button.

   The Card LEDs turn orange, and the Self-test LED for the routing engine begins flashing.

3. Release the Clear button within five seconds.

Note If the Self-test LED has stopped flashing (and the Status LED has turned orange), you waited too long—prevents this procedure from working. If this happens, recover by restarting the procedure. (If a console is connected, the interface for RMON will appear; you can ignore it and restart the procedure.)

   The Self-test LED stops flashing and remains lit during the self-test portion of the initialization sequence. (For more information about this, see “Initialization Sequence” below on page 2-15.) This self-test lasts about 8 seconds. The Self-test LED goes off when the self-test is complete (if no failures have been detected).

4. You may need to press Return more than once to get console access.

Obtaining Diagnostic Information: The Diag Button

Using a non-conducting, pointed implement such as a wooden pencil or a toothpick, press and release the recessed Diag button on the routing engine. (See figure 2-6 on page 2-9.)

Pressing the Diag button resets the router just as does pressing the Reset button, plus it also generates diagnostic messages that appear on the console, in the event log (which can be displayed from the Main menu), and in the crash history (which can be displayed using NCL's Crash command; for details, refer to chapter 16 of the *Operator's Reference*). When the router appears to "hang," use the Diag button rather than the Reset button. If this does not reset the router, then try pressing the Reset button.

Some of the diagnostic tips in tables 3-1 and 3-2 refer you to entries in the event log (which can be displayed from the Main menu) and the crash history (which can be displayed using NCL's Crash command). To display either the event log or the crash history, you must have a console connected to the router before you switch the router on, with the PC or terminal set to 9600 baud.

Initialization Sequence

Whenever the router is powered on, or when its Reset or Diag button is pressed:

1. The router automatically goes through a self-test. (A full self-test occurs when the power is switched on; it lasts 15–35 seconds, depending on how many interface cards are installed. A minimal self-test occurs when the Reset or Diag button is pressed; it lasts about 7 seconds.) During the self-test, the Status LED for the router is orange, the Card LED for the routing engine is orange, and the Self-test LED for the routing engine is green.

Note

If you boot the router using NCL's Boot command or the booting option in Quick Configuration on the console, the initialization sequence begins at step 2.

2. The router's clock is reset to the time the router was last running. Or, if the Time Protocol is configured to run on this router, the time is set to the time found on a time server.

3. The router operating code (software) is automatically executed.

4. Dynamic variables (such as the counters and events) are reset.

5. The configuration is read from the PCMCIA flash card into active circuitry. This implements any configuration changes saved since the router was last reset.

6. Communication is automatically started with the devices that are connected to the router and with the routing applications that are configured. Bridging and routing tables are reset.

   (Procedures for connecting devices are in chapter 1, "Installation." Procedures for configuring routing applications are in the *User's Guide*.)

7. If a console is connected to the router, the session is restarted. The message "`Waiting for speed sense`" appears on the console. Since the correct speed for your terminal has not been sensed yet, that 9600-baud message may appear garbled. When you see the new text on your console (or simply a few seconds after the Self-test LED turns off), press Return and pause. Repeat if necessary until the router senses and matches your baud rate. Your console session then begins.

   (The detailed procedure for connecting a console is in chapter 1, "Installation.")

3

Troubleshooting

Basic Troubleshooting Tips

Note

Some of the router's console commands are used for the troubleshooting instructions in this chapter. Refer to "Connect a console" (page 1-14) for details on connecting to the console port. For details on the Configuration Editor, refer to chapter 4 of the *User's Guide*. For details on NCL (Network Command Language Interpreter) commands, refer to chapter 16 of the *Operator's Reference*.

- Make sure that you have a valid network topology. If you have trouble after a recent change to the network, switch back to the previous topology. If you no longer have trouble, the new topology is probably at fault.
- Make sure that the router is plugged in and that cable connections are secure.
- If the console port does not work, refer to "Connect a console" (page 1-14), and then check "Troubleshooting a Terminal or Modem Connection" (page 3-14.)
- Check the router status, module status, and port status LEDs. For information about using patterns of these LEDs to diagnose failures, refer to tables 3-1 and 3-2 (pages 3-3 through 3-8). For more details regarding these LEDs, refer to "LEDs and Buttons" in chapter 2 (page 2-4).
- If none of the troubleshooting procedures in this chapter solves the problem, press the Diag button on the routing engine. If the problem persists, call for service from your HP dealer or service provider.

Interpreting LED Error Patterns

If a failure occurs when power to the router is cycled (switched off and on), refer to table 3-1 below for information about using LED patterns to diagnose the failure. If a failure occurs during router operation, refer to table 3-2 (page 3-6).

Notes

In tables 3-1 and 3-2, a black box indicates an orange LED, a gray box indicates a green LED, and an empty box indicates an unlit LED.

Some of the diagnostic tips in tables 3-1 and 3-2 refer you to entries in the event log (which can be displayed from the Main menu) and the crash history (which can be displayed using NCL's Crash command). To display either the event log or the crash history, you must have a console connected to the router before you switch the router on, with the PC or terminal set to 9600 baud.

If an LED error pattern according to table 3-1 or 3-2 seems to indicate a failure but the router nevertheless appears to be operating correctly, refer to "Verifying LED Operation," page 3-9.

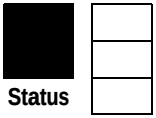
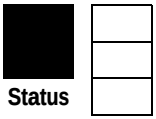
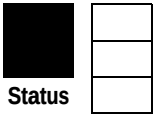
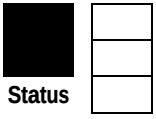
For most interface cards, the 3rd, 7th, 11th, and 15th LEDs are used to indicate the Port Number, and the 6th, 10th, 14th, and 18th LEDs are used to indicate Net Fail—as shown in this table. If a particular interface card uses these LEDs differently, its documentation describes that use.

Table 3-1. LED Error Patterns During Power-On Self-Test*

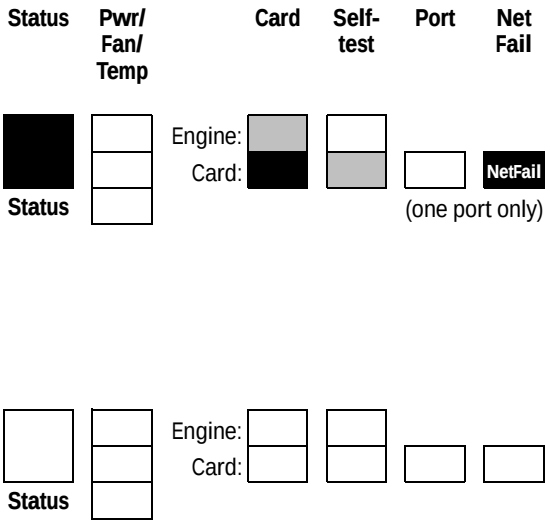
Status	Pwr/ Fan/ Temp	Card	Self-test	Port†	Net† Fail	Diagnostic Tips
						Routing Engine Failure
Status		Engine: / Card:			NetFail	Refer to "Troubleshooting a Routing Engine Failure During Power-On Self-Test," page 3-12.

* In this table, a black box indicates an orange LED, a gray box indicates a green LED, and an empty box indicates an unlit LED.

† The Port Number LED for each port, when lit, shows its port number on its interface card. Unless otherwise specified, the Port Number and Net Fail LEDs appear as shown for *all* ports on the interface card.

Status	Pwr/ Fan/ Temp		Card	Self-test	Port	Net Fail	Diagnostic Tips
		Engine: Card:				NetFail	**Interface Card/Slot Failure** 1. Switch the power off and on to reboot the router. 2. If this error persists, move the card from this slot to another slot, and move the card from that other slot into this slot. ■ If this error recurs in the original slot, the router is faulty. ■ If this error recurs in the new slot, the card is faulty.
		Engine: Card:				NetFail	**Interface Card/Slot Configuration Mismatch** Look in the event log (which can be displayed from the Main menu) for the entry "Slot *x* HWID and Line configuration mismatch" (where *x* is the number of the slot). ■ If that entry appears in the event log, specify the new card for that slot in the configuration (refer to "Configure and boot the router," page 1-21). ■ If that entry does not appear in the event log, call for service from your HP dealer or service provider.
		Engine: Card:					**Interface Card Apparently Not Present** 1. Verify that the interface card is seated properly in the router slot. 2. If this error persists, move the card from this slot to another slot, and move the card from that other slot into this slot. • If this error recurs in the original slot, the router is faulty. • If this error recurs in the new slot, the card is faulty.
		Engine: Card:			n/a	n/a	**Interface Card Apparently Not Seated** 1. Verify that the interface card is seated properly in the router slot. 2. If this error persists, move the card from this slot to another slot, and move the card from that other slot into this slot. • If this error recurs in the original slot, the router is faulty. • If this error recurs in the new slot, the card is faulty.

n/a This LED is not important for the diagnosis.



Diagnostic Tips

Port Failure

1. If this error persists, replace the cable and/or (if ThinLAN) its terminator.
2. If this error persists and the port is an Ethernet/802.3 interface, replace the transceiver. If the error still persists or if the port is a different type, the card is faulty.

Note: if this error has occurred, the remaining ports on the card can be used.

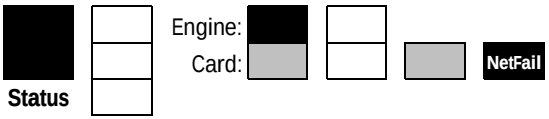
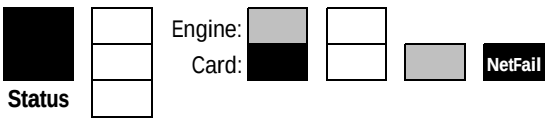
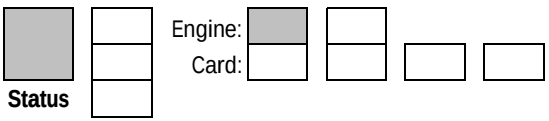
General Failure

1. Verify that the power cable is connected to a power source and to the proper receptacle on the back of the router.
2. Verify that the routing engine is seated properly in router slot 1.
3. If the error persists, replace the power supply.
4. If the error persists, either the routing engine or the router is faulty.

Note

After trying each diagnostic tip in table 3-2 below, reboot the router as directed; if a failure then occurs, use table 3-1, "LED Error Patterns During Power-On Self-Test," to interpret the LED error patterns.

Table 3-2. LED Error Patterns During Router Operation*

Status	Pwr/ Fan/ Temp		Card	Self-test	Port†	Net† Fail	Diagnostic Tips
							**Routing Engine Software Failure** If this error occurs, this pattern of LEDs appears only for a few seconds until the router reboots (which will occur unless Auto Reboot in the configuration has been disabled). If Auto Reboot has been disabled, press the Reset button on the routing engine to force the router to reboot. After the router reboots, information about the failure will appear in the crash history (which can be displayed using NCL's Crash command) and in the event log (which can be displayed from the Main menu).
							**Interface Card Software Failure** If this error occurs, this pattern of LEDs appears only for a few seconds until the router reboots (which will occur unless Auto Reboot in the configuration has been disabled). If Auto Reboot has been disabled, enable the card either by hot-swapping it (do steps 1–5 and 8–11 of the procedure "Replacing an Interface Card [System Online], page 3-21) or by using NCL's Enable command (see the *Operator's Reference*). Information about the failure will appear in the crash history (which can be displayed using NCL's Crash command) and in the event log (which can be displayed from the Main menu).
							**Interface Card Apparently Not Present** 1. If there is an interface card in this slot, verify that it is seated properly in the router slot. 2. If this error persists, switch the power off and on, then check the LEDs for failures as indicated in table 3-1.

* In this table, a black box indicates an orange LED, a gray box indicates a green LED, and an empty box indicates an unlit LED.

† The Port Number LED for each port, when lit, shows its port number on its interface card. Unless otherwise specified, the Port Number and Net Fail LEDs appear as shown for *all* ports on the interface card.

Status	Pwr/ Fan/ Temp		Card	Self-test	Port	Net Fail	Diagnostic Tips
		Engine:					**Port Failure**
		Card:				NetFail	1. Verify that the node at the other end is up and running. 2. If this error persists, replace the cable and/or (if ThinLAN) its terminator. 3. If this error persists, and the port is an Ethernet/802.3 interface, replace the transceiver; if the port is a WAN interface, verify that its configuration is correct. 4. Initiate the hot-swap self-test by doing either of the following: • Hot-swap the card (do steps 1–5 and 8–11 of the procedure "Replacing an Interface Card [System Online]," page 3-21). • Use NCL's Disable command followed by the Enable command (see the *Operator's Reference*). 5. Wait a few seconds for the self-test to complete, then check the Card and Self-test LEDs. • If the Card LED remains orange and the Self-test LED remains green, the card is faulty. • If the Card LED turns green and the Self-test LED turns off, call for service from your HP dealer or service provider. Note: if this error has occurred, the remaining ports on the card can be used.
Status					(one port only)		
		Engine:					**Interface Card Apparently Not Seated During Hot Swap**
		Card:	*	*			Verify that the interface card is seated properly in the router slot.
Status							
		Engine:					**Interface Card Self-Test Failure During Hot Swap**
		Card:				NetFail	1. Note any error messages in the event log (which can be displayed from the Main Menu). 2. Switch the power off and on, then check the LEDs for failures as indicated in table 3-1.
Status							

* Flashing.

Status	Pwr/ Fan/ Temp	Card	Self-test	Port	Net Fail	Diagnostic Tips
 Status	**Pwr** / n/a / n/a	Engine: n/a Card: n/a	n/a n/a	n/a	n/a	**Power Supply Failure** 1. Open the router door, and check the LEDs on the switches of the power supplies. 2. For the power supply on which the switch LED is *not* lit, verify that the power cable is securely connected to the power source and to the proper receptacle on the back of the router. 3. If the power cable is connected properly, replace the power supply.
 Status	n/a / **Fan** / n/a	Engine: n/a Card: n/a	n/a n/a	n/a	n/a	**Cooling Module Failure** Replace the cooling module.
 Status	n/a / n/a / **Temp**	Engine: n/a Card: n/a	n/a n/a	n/a	n/a	**Temperature Warning** If the Fan LED is not lit and the router is mounted in a cabinet, verify that the airflow around the router is not restricted. The temperature where the router is installed should be within the range specified in appendix C.

n/a This LED is not important for the diagnosis.

Verifying LED Operation

If you suspect a non-operating LED—for example, if the LEDs indicate a failure as shown in table 3-1 or table 3-2, or they have some anomalous pattern (for example, off or red); but the router nevertheless appears to be operating correctly—you can verify the LEDs by resetting the router using the following procedure.

Caution

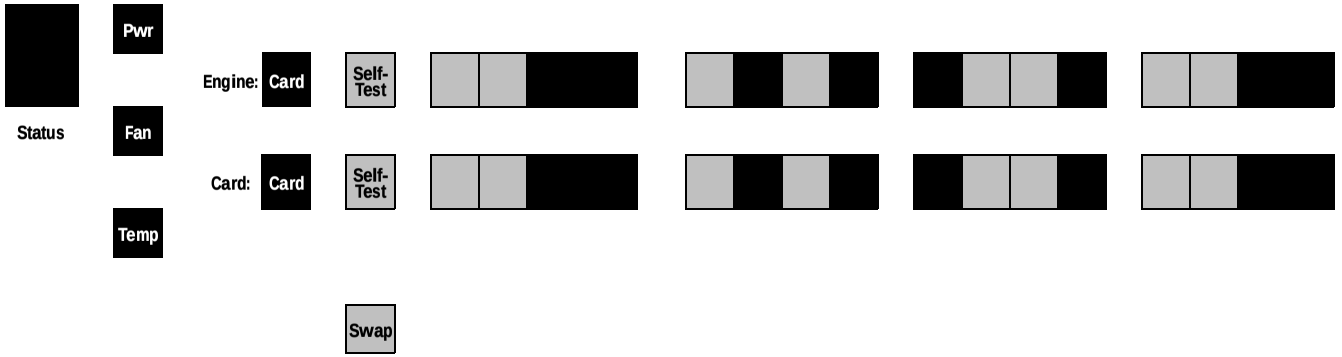
Resetting the router causes bridging and routing tables to be reset. For other effects, see "Initialization Sequence" on page 2-15.

Press and hold the Reset button, and verify that while you are holding it, all of the router status, module status, and port status LEDs are lit. Also, for each interface card, verify that the Swap LED is lit and that the colors of the port status LEDs match those shown in table 3-3 (page 3-10).

If any of the router status, module status, and port status LEDs is not lit, or if any LED that table 3-3 indicates should be orange appears green or red instead, the router must be replaced.

If a Swap LED is not lit, you *can* use the card, but it should not be hot swapped: if you need to replace the card, you should use the procedure "Replacing the Routing Engine or an Interface Card (System Offline)" (page 3-27) rather than the procedure "Replacing an Interface Card (System Online)."

Table 3-3. Proper LED Operation*



* A black box indicates an orange LED; a gray box indicates a green LED.

Identifying a Bad Component

Testing the Router Only

To perform a self-test of the router's internal circuitry, switch the power on and off. (For details regarding what happens when the power is switched on, refer to "Initialization Sequence," page 2-15.)

To diagnose a failure that occurs during the power-on self-test, refer to table 3-1; to diagnose a failure that occurs during router operation, refer to table 3-2.

The power-on self-test does not test the ports on the interface cards. Information about testing the ports on an interface card is provided in the card's documentation.

Troubleshooting a Routing Engine Failure During Power-On Self-Test

When a routing engine failure occurs during the power-on self-test, as indicated by the LED pattern shown for that failure in table 3-1:

1. If, at the end of the self-test any of the first four routing engine utilization LEDs is lit (but none of the others is lit), replace the routing engine. (*All* of the routing engine utilization LEDs are lit at the beginning of the self-test.)
2. Connect a console to the router, with the PC or terminal set to 9600 baud.
3. Switch the router power off and on.
4. If an error message appears on the console, use the procedure in table 3-4.

Table 3-4. Error Messages for a Routing Engine Failure

Error	Diagnostic Tips
`Code DRAM refresh test failed, mask XXXXXXXX.`	The routing engine is faulty.
`Console port break bit is stuck on.`	1. Turn the power on and off. 2. If this error message appears again, refer to "Troubleshooting a Terminal or Modem Connection," page 3-14.
`Debug port break bit is stuck on.`	The routing engine is faulty.
`Failed SCC interrupt test, errcode X.` (where X = 1 - 3)	The routing engine is faulty.
`Flash CRC error.`	The flash card or the routing engine may be faulty; call for service from your HP dealer or service provider.
`Flash doesn't seem to be installed.`	1. Verify that the flash card is properly installed (refer to "Replacing the PCMCIA Flash Card," page 3-31). 2. If the flash card is installed properly, the routing engine is faulty; call for service from your HP dealer or service provider.

Error	Diagnostic Tips
`Flash seems to be shorted.`	The routing engine may be faulty; call for service from your HP dealer or service provider.
`Flash seems to be unprogrammed.`	The routing engine may be faulty; call for service from your HP dealer or service provider.
`Returned from ISL, return code = X.` (where X = 1 - 9)	The routing engine may be faulty; call for service from your HP dealer or service provider.
Any other error, followed by: `A hardware problem was detected while running selftest. To enter the selftest monitor, press 's'. To attempt to load operating code, press any other key. If no key is pressed within 10 seconds, an attempt will be made to load operating code.`	1. Record the error and press Return to continue. 2. Call for service from your HP dealer or service provider.

Troubleshooting a Terminal or Modem Connection

If the automatic speed sensing does not connect your console and give you the router's copyright and Main menu screens, as described under "Connect a console" (page 1-14), then try the "Reset speed sensing," Adjust baud rate," and "Reset the terminal" procedures (pages 3-14 through 3-15) in sequence.

If none of those procedures result in proper console access:

1. Check the LEDs (refer to "Interpreting LED Error Patterns," page 3-3).

2. If the LEDs appear to be normal, the routing engine is faulty.

Reset speed sensing:

1. Detach the console cable from the router.

2. Reattach the console cable to the router.

3. Look for the line of text on your console that indicates waiting for speed sensing; then press Return to display the copyright screen or the Main menu screen. If neither of these screens appears, press Return again. If pressing Return four or five times does not display either the copyright or Main menu screen, go on to "Adjust Baud Rate" below.

Adjust baud rate:

1. Temporarily set the baud rate of the terminal or terminal emulator to 9600, if available, or to the slowest setting.

2. Detach the console cable from the router.

3. Reattach the console cable to the router.

4. Look for the line of text on your console that indicates waiting for speed sensing; then press Return to display the copyright screen or the Main menu screen. If neither of these screens appears, press

Return again. If pressing Return four or five times does not display either the copyright or Main menu screen, then ensure that you are using the correct console cable. (Refer to "HP Cables and Adapters," page A-2.) If the cable is correct, then repeat this procedure for each other baud rate available for your terminal until you find a rate that gives you a successful connection. If you cannot establish a successful connection, go on to "Reset the terminal" below.

Reset the terminal:

1. Switch the terminal or PC's power *off* and then *on* once.

2. Make sure the configuration for your terminal or emulation matches the requirements listed under "Connect a console" (page 1-14).

3. Look for the line of text on your console that indicates waiting for speed sensing; then press Return to display the copyright screen or the Main menu screen. If neither of these screens appears, press Return again several times.

Testing a Link

The router provides information on network links in the event log, statistics, routing tables, and the management information base. The router provides three other specific link tests, Ping, AppleTalk Ping, and Telnet, described below. Note that you can use HP network management software to test the link; see the help screens for the software.

Tests from Other Devices

This is the procedure to find the station address (also called MAC, physical, or Ethernet address) of a port on this router for use in an IEEE 802.3 test from another network device.

1. At the Main menu, select the Network Control Language Interpreter (NCL). The NCL prompt—`DEFAULT_CONFIG:` or another system name you have configured—then appears at the bottom of the screen, as illustrated below.

```
                              DEFAULT_CONFIG              15-Sep-1994   0:06:21

============================- SESSION 1 - MGR MODE -=============================
```

```
DEFAULT_CONFIG: _
```

Figure 3-1. Example of NCL Screen with Default Prompt

2. Enter the following command:

   `get cct.`***`cct-name`***`.mac_addr` Return

   where:

   `cct-name` is the configured circuit name for the port. Examples of circuit names are `ETHER1` and `ETHER3`.

3. Note the station address listed as a result.

4. Use the Exit command to exit from NCL and return to the Main menu:

   `exit` Return

Ping

Ping is a network-layer test that sends an Internet Control Message Protocol (ICMP) echo request message to another node that has an IP address and is able to respond to an ICMP echo request message. The router must have IP routing configured in order to use this test.

1. From the Main menu, select the Network Control Language Interpreter (NCL). The NCL prompt then appears at the bottom of the screen. (See figure 3-1 on page 3-16.)

   At the NCL prompt, enter one of the following sequences:

   `ping` ***`x.x.x.x`*** Return

   `ping` ***`x.x.x.x count`*** Return

   `ping` ***`x.x.x.x count wait`*** Return

   where:

   `x.x.x.x` is the target node's IP address in dotted decimal notation.

   `count` (optional) is the number of times to repeat the echo request packet. If an integer is not included, the packet is sent once.

   `wait` (optional) is how many seconds to wait for a response. If a second integer is not included, the response must be received in five seconds to be successful.

2. You will see a message, indicating either that the target node is alive—meaning that communications are passing successfully from the router to the remote node on a specific link—or that the remote node did not respond. If you cannot reach any remote node, the problem must be isolated to the router, the links used in the test, or all of the remote nodes.

3. Use the Exit command to exit from NCL and return to the Main menu:

   `exit` Return

For more details, refer to chapter 16 of the *Operator's Reference*.

AppleTalk Ping

AppleTalk Ping is a network-layer test that sends an AppleTalk Echo Protocol (AEP) message to another AppleTalk node. The router must have AppleTalk routing configured in order to use this test.

1. From the Main menu, select the Network Control Language Interpreter (NCL). The NCL prompt then appears at the bottom of the screen. (See figure 3-1 on page 3-16.)

   At the NCL prompt, enter one of the following sequences:

   `atping` ***`x.y`*** Return

   `atping` ***`x.y wait`*** Return

   where:

   `x` is the target node's network number.

   `y` is the node identifier.

   `wait` (optional) is how many seconds to wait for a response. If a second integer is not included, the response must be received in five seconds to be successful.

2. You will see a message, indicating either that the target node is alive—meaning that communications are passing successfully from the router to the remote node on a specific link—or that the remote node did not respond. If you cannot reach any remote node, the problem must be isolated to the router, the links used in the test, or all of the remote nodes.

3. Use the Exit command to exit from NCL and return to the Main menu:

   `exit` Return

For more details, refer to chapter 16 of the *Operator's Reference*.

Telnet

Telnet is an upper-layer service that allows you to interact with a remote node's console interface, by establishing a virtual terminal connection. This section describes the Telnet console connection *from* an HP router that has IP routing and a Telnet session configured *to* a router or end node that has Telnet service and is suspected of not routing successfully.

4. From the Main menu, select the Network Control Language Interpreter (NCL). The NCL prompt then appears at the bottom of the screen. (See figure 3-1 on page 3-16.)

5. At the NCL prompt, enter the Telnet command:

   `telnet` ***`x.x.x.x`*** Return

   where:

   `x.x.x.x` is the IP address of the remote node in dotted decimal notation.

6. Once the connection is established, Telnet passes your keystrokes to the remote system.

   If the remote system is another HP router:

   a. You will see the system name of the remote node as the NCL prompt at the bottom of your display. Check the event log and routing tables of the remote node as you do for your own router. Use the Exit command to leave NCL and return to the remote node's Main menu:

      `exit` Return

   b. To disconnect the Telnet session, use the Logout option from the remote node's Main menu, and when you are prompted with:

      `Do you want to disconnect? [Y/N:]`

      press Y for "yes". The remote node is disconnected, the Telnet session ends, and your local node's system name appears as the prompt on your display.

   If the remote system is *not* another HP router, then type the appropriate commands to interact with that system and to disconnect Telnet.

7. Use the Exit command to exit from NCL and return to the Main menu:

   `exit` Return

Replacing a Module

You can replace any interface card or the cooling module without taking the system offline (that is, without switching the router off and taking all networks down). If you have installed a second power supply, you can also replace either power supply without taking the system offline. (Replacing a module without taking the system offline is often called "hot swapping.")

To replace the routing engine or the PCMCIA flash card, or to replace the power supply if a second power supply has not been installed, you must take the system offline; refer to "Replacing a Module (System Offline)," page 3-27.

Replacing an Interface Card (System Online)

Notes

If you are replacing an interface card with a different type of interface card (for example, if you are replacing an Ethernet/802.3 card with a token ring card), or if you are installing a card in a slot that formerly was empty, you must specify in the configuration the new card for that slot after the card has been installed. (Refer to "Configure and boot the router," page 1-21.)

The following procedure is applicable to any of the interface cards. For replacement procedures specific to a particular interface card, refer to the documentation provided with it.

1. Disconnect all cables from the interface card, and save them for reconnection after the new card is installed.
2. Connect a grounding wrist strap to your wrist and to the back of the router.
3. If the Swap LED is not on (see figure 3-5), press the Swap button, and hold it until the Swap LED turns on (about 1–5 seconds).

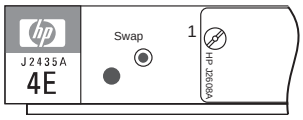


Figure 3-2. Swap Button and LED

4. Press down slightly on the insides of both locks on the card bezel (see figure 3-5), then swing them outward until the bezel disengages (see figure 3-4).

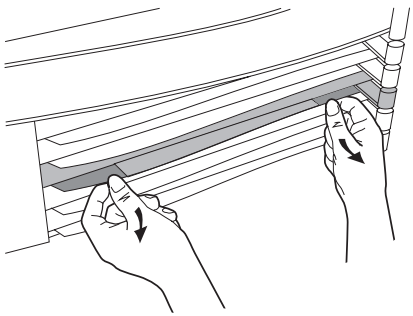


Figure 3-3. Unlocking Card Bezel

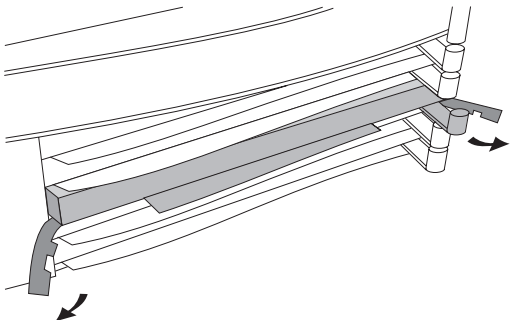


Figure 3-4. Disengaging Card Bezel

5. Grasping the left and right ends of the bezel, pull out until the tray is about half exposed.

6. Grasping the sides of the tray, remove the interface card from the router.

Note

If you are not ready to install the new interface card now, reinstall the card blank using the next three steps described below for installing the new interface card. (All slots must be filled, either with card blanks or with interface cards—you should not use the router with a slot open.)

7. Holding the new interface card by the sides of its tray, slide the back of the tray about half-way into the router.

8. Pull the locks on the bezel outward, then push evenly on both ends until the card fully engages and the locks swing inward to about 45°. (See figure 3-5.)

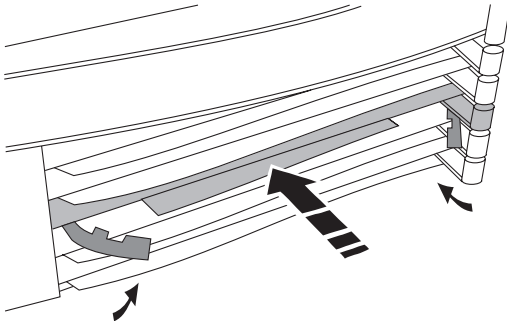


Figure 3-5. Installing Interface Card

9. Push the two locks evenly to close them, pressing downward slightly to secure them in place.

10. Check that the Card LED has turned green and the Self-test LED has turned off.

    - If these LEDs continue flashing, the card is not seated properly. Adjust the position of the card by pushing evenly on both ends, and ajust the positions of the lock evenly.
    - If the Card LED remains orange and the Self-test LED remains on, the card has failed the self-test. Refer to "Interface Card Self-Test Failure During Hot Swap" in table 3-2, "LED Error Patterns During Router Operation".

11. Reconnect the cables that you disconnected in step 1.

Note

If you are replacing an interface card with a different type of interface card (for example, if you are replacing an Ethernet/802.3 card with a token ring card), be sure to replace the LED label strip as described in the next four steps. If you are replacing an interface card with another card of the same type, you can skip these steps.

12. Open the front door of the router by pulling its lock—the round post at the upper right—to the right. (See figure 3-8.)

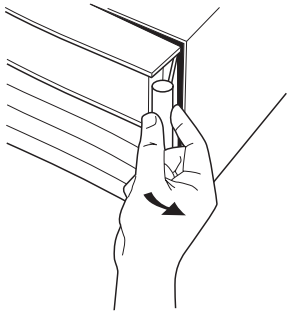


Figure 3-6. Opening Router Door

13. Remove the LED label strip from the position corresponding to the slot where you replaced the interface card, then insert the LED label strip provided with the new card as far as it will go.

14. Bend the end of the label strip toward the back of the router, creating a 90° fold.

15. Close the router door again.

16. To replace the label at the left of the slot that identifies the department or site served by the interface card, slide it out from the right. Position the new label with its shiny side facing the router, and slide it in from the right. (Additional labels are provided in the router's accessories kit and also with each interface card.)

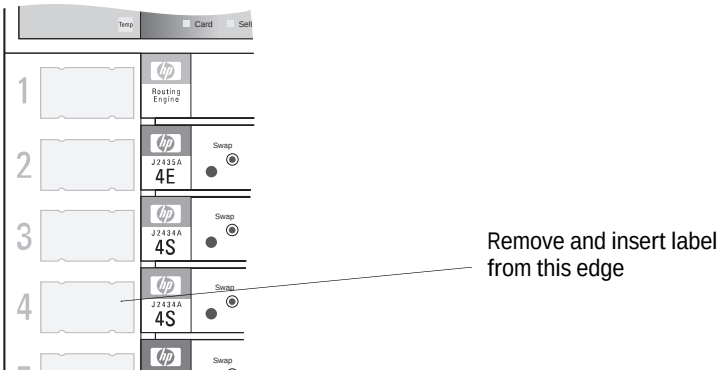


Figure 3-7. Interface Card Label Location

Replacing the Routing Engine or an Interface Card (System Offline)

Notes

The router's configuration information is stored in the PCMCIA flash card mounted on the routing engine. If you need to replace the routing engine because of some problem other than one in the flash card and you don't want to re-enter the configuration information, refer to "Replacing the PCMCIA Flash Card," page 3-31.

If you are replacing an interface card with a different type of interface card (for example, if you are replacing an Ethernet/802.3 card with a token ring card), or if you are installing a card in a slot that formerly was empty, you must specify in the configuration the new card for that slot after the card has been installed. (Refer to "Configure and boot the router," page 1-21.)

The following installation procedure is applicable to the routing engine and to any of the interface cards. For installation procedures specific to a particular interface card, refer to the documentation provided with it.

1. Disconnect all cables from the module, and save them for reconnection after the new module is installed.

2. Open the front door of the router by pulling its lock—the round post at the upper right—to the right. (See figure 3-8.)

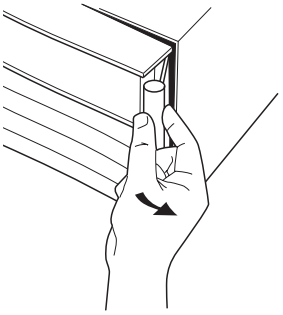


Figure 3-8. Opening Router Door

3. Switch the power supply off by pressing the bottom of its switch (marked with "❍"). If two power supplies are installed, switch both off.

4. Connect a grounding wrist strap to your wrist and to the back of the router.

5. Press down slightly on the insides of both locks on the module bezel, then swing them outward until the module disengages.

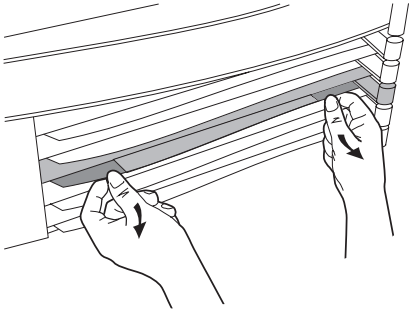


Figure 3-9. Unlocking Module

6. Grasping the left and right edges of the bezel, pull out until the tray is about half exposed.

7. Grasping the sides of the tray, remove the module from the router.

Note If you are replacing an interface card but you are not ready to install the new interface card now, reinstall the card blank using the next three steps described below for installing the new interface card. (A slot should not be left empty.)

8. Holding the new module by the sides of its tray, slide the back of the module about half-way into the router.

9. Pull the locks on the module outward, then push evenly on both ends of its bezel until it engages fully and the locks swing inward to about 45°. (See figure 3-10.)

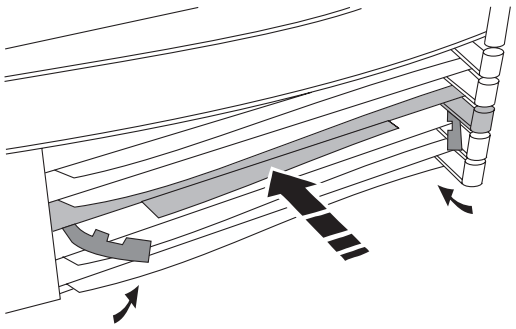


Figure 3-10. Installing Module

10. Push the two locks evenly to close them, pressing downward slightly to secure them in place.

11. Reconnect the cables that you disconnected in step 1.

Note If you are replacing an interface card with a different type of interface card (for example, if you are replacing an Ethernet/802.3 card with a token ring card), be sure to replace the LED label strip as described in the next two steps. If you are replacing an interface card with another card of the same type, you can skip these steps.

12. Remove the LED label strip in the router door from the position corresponding to the slot where you installed the new interface card, then insert the LED label strip provided with that card as far as it will go.

13. Bend the end of the label strip toward the back of the router, creating a 90° fold.

14. Switch the power supply on by pressing the top of the switch (marked with "I"), then close and lock the router door.

15. To replace the label at the left of the slot that identifies the department or site served by the interface card, slide it out from the right. Position the new label with its shiny side facing the router, and slide it in from the right. (Additional labels are provided in the router's accessories kit and also with each interface card.)

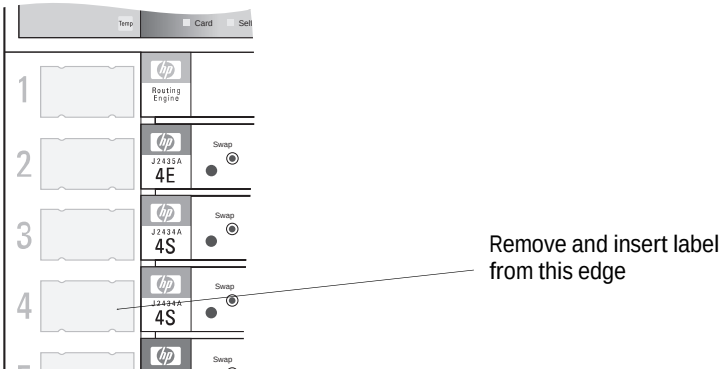


Figure 3-11. Interface Card Label Location

Replacing the PCMCIA Flash Card

A new PCMCIA flash card is not available from HP separately from the routing engine. If the flash card needs to be replaced, you must replace the routing engine; the replacement routing engine comes with a new flash card preinstalled on it.

The configuration is stored in the flash card. If you need to replace the routing engine because of some problem other than one in the flash card and you don't want to re-enter the configuration, you can use the following procedure to install your current flash card in place of the new one provided with the new routing engine.

Note

Instead of using the procedure below, you can transfer the configuration from your current flash card to the new flash card using NCL commands. First, copy the configuration from your current flash card to another router or to a PC console. (To ensure accurate transfer of the configuration, it's best to do this after making a change to the configuration and *before* a router failure occurs.) Next, install the new routing engine; finally, copy the configuration from the other router or the PC console to the new flash card on the new routing engine.

For information about copying a configuration to another router over a network, refer to "Using TFTP to Transfer Operating Code, Configuration, and NCL Display" in the *User's Guide*. For information about copying a configuration to a PC console, refer to "Using PC Modem Access to Transfer Configuration and NCL Display" in the *User's Guide*.

1. Remove the routing engine using steps 1–7 of the procedure described under "Replacing the Routing Engine or an Interface Card (System Offline)" (pages 3 -27 through 3-29), and place it on a flat surface.

2. Connect a grounding wrist strap to your wrist and to the tray of the routing engine.

3. Press in on the lockshaft on the flash card housing. The flash card should eject until its left end is flush with the interface card.

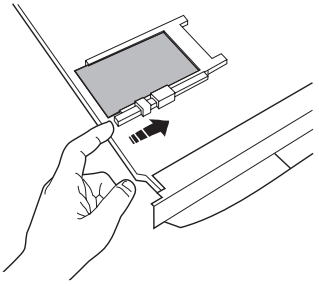


Figure 3-12. Ejecting Flash Card

4. Grasping the exposed end of the flash card, remove it from its housing.

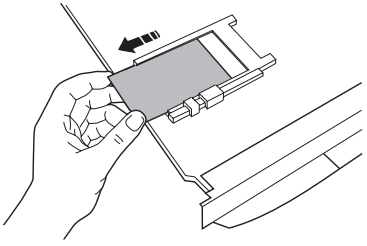


Figure 3-13. Removing Flash Card

5. Position the new flash card to the left of the housing, with the HP label facing up and the arrow on the label pointing toward the housing.

6. Insert the right end of the flash card into the left end of the housing, lifting it slightly to engage properly in the housing.

7. Push the flash card further into the housing as far as it will go; its lockshaft will move to the left. When properly seated, the end of the flash card will be flush with the end of its lockshaft.

8. Reinstall the routing engine using steps 8–11 and 14 of the procedure described under “Replacing the Routing Engine or an Interface Card (System Offline)” (pages 3-29 through 3-30).

Replacing the Power Supply

If a second power supply has been installed, you can replace either of the two power supplies without taking the system offline (that is, you can "hot swap" one of two installed power supplies).

Caution

Be careful not to open the router door more than 90°. Opening the door further could damage it.

Note

If a second power supply has been installed and one of them has been found to be faulty (that is, the Pwr LED is lit), the faulty power supply is the one for which the switch LED is *not* lit.

1. Disconnect the power cord from the faulty power supply, and save it for reconnection after the new module is installed.

2. Open the front door of the router by pulling its lock—the round post at the upper right—to the right.

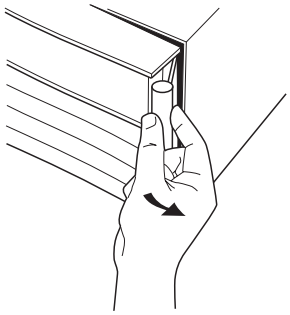


Figure 3-14. Opening Router Door

3. Using a Torx T-10 screwdriver, remove the screw(s) from the top corner(s) of the power supply. (See figure 3-15.) A power supply installed in the left compartment has screws in both corners; a power supply installed in the right compartment has a screw only in the upper-left corner.

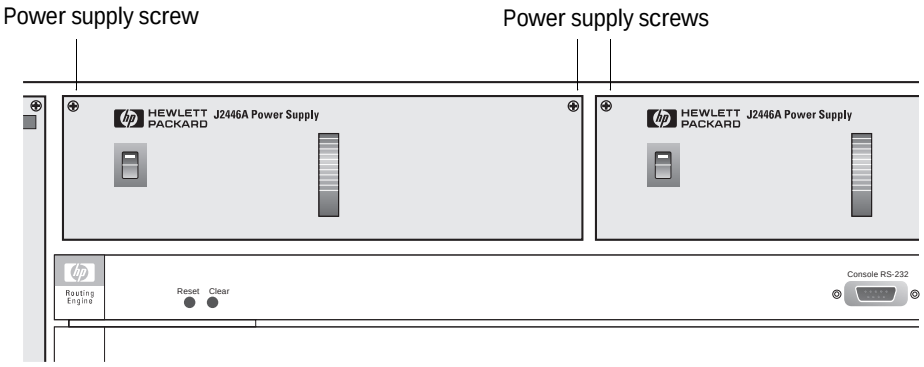


Figure 3-15. Power Supply Screws

4. Pull the handle on the power supply, and remove it from its compartment.

5. Insert the new power supply into the compartment, and push it all the way back.

6. Insert and tighten the screw(s) you removed in step 3.

7. Reconnect the power cord that you disconnected in step 1.

8. Switch the power supply on by pressing the top of the switch (marked with "I").

9. Close and lock the router door.

Replacing the Cooling Module

You can replace the cooling module without taking the system offline (that is, the cooling module can be “hot swapped”).

Caution

Be careful not to open the router door more than 90°. Opening the door further could damage it.

1. Unlock the front door of the router, and open the door to about 90°.
2. Using a Torx T-10 screwdriver, remove the screws from the upper- and lower-right corners of the cooling module.

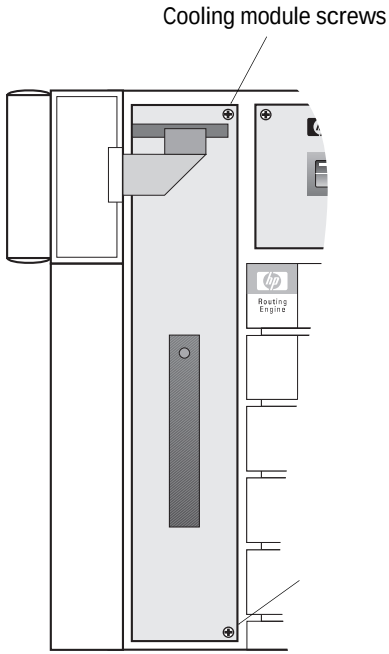


Figure 3-16. Cooling Module Screws

3. Holding the door open at 90°, grasp the handle on the cooling module and pull the cooling module out about 1 inch.

4. Holding the door open at 90°, pull the white tab to disconnect the cable from its connector.

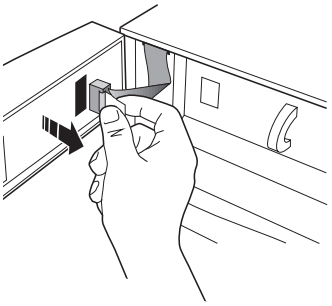


Figure 3-17. Disconnecting Cable

Note While removing the cooling module from its compartment in the next step, ensure that the cooling module housing does not catch on the three screws on the inside of the router door.

5. Holding the door open at 90°, grasp the handle on the cooling module and remove it from its compartment.

Note In the next step, be sure that the cooling module is perfectly vertical and is perfectly parallel to the router. If the module is tilted, you might not be able to insert it further into the module housing.

6. Holding the door open at 90°, place the new cooling module at the front of its housing, then carefully push it back into the housing until the mounting ears for the screws are about 1 inch from the holes in the router chassis. You may need to wiggle the cooling module and/or adjust its position so that it slides in properly.

7. Reconnect the cable that you disconnected in step 4 (see figure 3-17). Press the connector in place with your finger.

8. Holding the door open at 90°, continue sliding the cooling module back until the mounting ears for the screws are flush against the holes in the router chassis.

9. Insert and tighten the screws you removed in step 2.

10. Close and lock the router door.

A

Cables and Adapters

This appendix provides:

- Part numbers and pin-outs for the HP cable and the HP adapters supplied with the router for connecting to a PC/terminal or modem.
- Part numbers and pin-outs for alternate HP cables that can be used for connecting to a PC/ terminal or modem.
- The minimum pin-outs required if you will be making a cable or purchasing a non-HP console cable, rather than using an HP cable.

For information about LAN and WAN cables, refer to the documentation provided with the interface card to which they will be connected.

HP Cables and Adapters

Cable and Connector on Router	Connector on Attached Device	HP Product or Part Number
RS-232 cable for a PC or terminal connecting to router console port	9-pin male	F1047-80002 cable *
	9-pin female	F1047-80002 cable * *plus* 9-pin gender changer †
	25-pin male	F1047-80002 cable * *plus* 5181-6640 adapter * *plus* 25-pin gender changer †, *or* 24542H ‡ cable
	25-pin female	F1047-80002 cable * *plus* 5181-6640 adapter *, *or* 24542G ‡ cable
RS-232 cable for a modem connecting to router console port	25-pin female	F1047-80002 cable * *plus* 5181-6642 adapter *, *or* 24542M cable

***** This cable or adapter is supplied with the router.

† This part is not supplied with the router and is not available from HP; but it is generally available from most suppliers of cable adapters.

‡ If this cable is used, the DTR signal must be on (high) in your terminal emulation program or in your terminal, and the parameters "Enable DTR on Initialization" and "Ignore DCD" must be left at their default settings (refer to "Configuration of Console Signals" on page A-3).

Configuration of Console Signals

You can specify in the configuration how the router handles the DTR (Data Terminal Ready) and DCD (Data Carrier Detect) signals. (DCD is sometimes referred to simply as CD, Carrier Detect.)

DTR

The parameter “Enable DTR on Initialization” in the User Session menu of the configuration controls whether the console port always maintains DTR on (high). Use the default setting of “Yes” if the console port is directly connected to a PC or terminal.

If the console port is connected to a modem and you experience modem-related problems—for example, if the modem answers prematurely or attempts to dial the phone—change this setting to “No.”

DCD

The parameter “Ignore DCD” on the User Session menu of the configuration controls whether the console port ignores DCD. When DCD is *not* provided to the console port—for example, if you are using the supplied console cable to directly connect to a PC or terminal— this parameter should be left at the default setting of “Yes.”

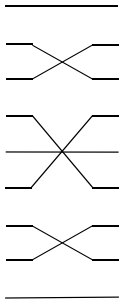
(When the router is configured to ignore DCD, the transition to a connected state is determined by the state of the DSR signal. When DSR transitions to ON, the router attempts to speed sense; when DSR transitions to OFF, the router terminates the session.)

Change this setting to “No” if the console port is connected to a cable or device that maintains DCD on (high).

HP Cable and Adapter Pin-Outs

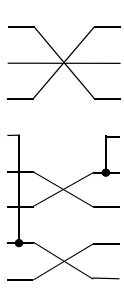
Console Cable (F1047-80002)

Signal	Router	PC or Terminal (9-pin)	Signal
DCD	1	1	DCD
Rx	2	2	Rx
Tx	3	3	Tx
DTR	4	4	DTR
Gnd	5	5	Gnd
DSR	6	6	DSR
RTS	7	7	RTS
CTS	8	8	CTS
RI	9	9	RI

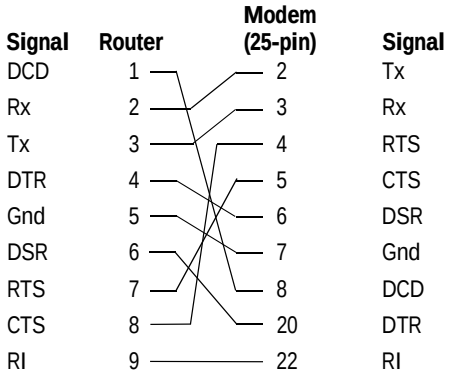


25-Pin Terminal Adapter (5181-6640)

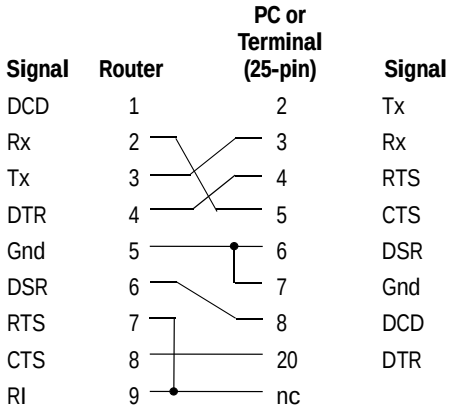
Signal	Router	PC or Terminal (25-pin)	Signal
		1	
DCD	1	2	Tx
Rx	2	3	Rx
Tx	3	4	RTS
DTR	4	5	CTS
Gnd	5	6	DSR
DSR	6	7	Gnd
RTS	7	8	DCD
CTS	8	20	DTR
RI	9	22	
		25	



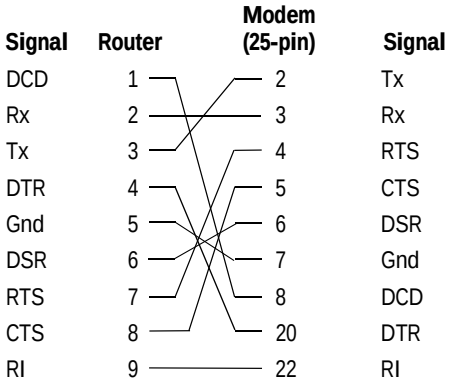
25-Pin Modem Adapter (5181-6642)



Alternate Console-to-Terminal Cable (24542G, 24542H)



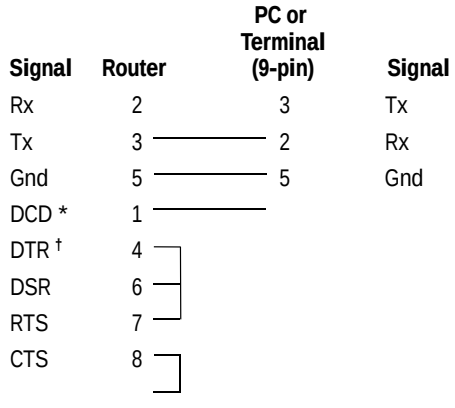
Alternate Console-to-Modem Cable (24542M)



Minimum Pin-Outs

If you will be purchasing a non-HP console cable or making your own cable, rather than using the supplied console cable or an alternate HP console cable, the cable must have the following minimum pin-outs.

Connecting to PC or Terminal with 9-Pin Connector



* The DCD signal may be left unconnected if the router is configured to ignore DCD.

† Note that the router must be configured to raise DTR. (Refer to "Configuration of Console Signals," page A-3.)

Connecting to PC or Terminal with 25-Pin Connector

Signal	Router		PC or Terminal (25-pin)	Signal
Rx	2	———	2	Tx
Tx	3	———	3	Rx
Gnd	5	———	7	Gnd
DCD *	1	⌐		
DTR †	4	—		
DSR	6	⌙		
RTS	7	⌐		
CTS	8	⌙		

* The DCD signal may be left unconnected if the router is configured to ignore DCD.
† Note that the router must be configured to raise DTR. (Refer to "Configuration of Console Signals," page A-3.)

Connecting to Modem with 25-Pin Connector

Signal	Router		Modem (25-pin)	Signal
Rx	2		3	Rx
Tx	3	———	2	Tx
Gnd	5	———	7	Gnd
DCD	1	———	8	DCD
DTR	4	———	20	DTR
DSR	6	———	6	DSR
RTS	7	———	4	RTS
CTS	8	———	5	CTS
RI	9	———	22	RI

B

Modem Configuration

Note The following modems were tested at 9600 baud and operate correctly with the configurations indicated.

HP 50759A Support Link

At the router end:

For an 8-position switch, set switch 4 down, all others up.

For a 4-position switch, set switch 2 up, all others down.

At the console end:

For an 8-position switch, set switches 3 and 8 down, all others up.

For a 4-position switch, set all switches down.

Hayes V-series ULTRA Smartmodem

At the router end:

Configure with a terminal or PC using the following sequence:

```
at&f&c1&d2&s1
ats0=1
```

At the console end:

Configure with a terminal or PC using the defaults.

Intel High-Speed External Faxmodem

At the router end:

Configure with a terminal or PC using the following sequence:

```
at&f
ats0=1
```

At the console end:

Configure with a terminal or PC using the following sequence:

```
at&f
```

US Robotics Courier HST Dual Standard with ASL

At the router end:

Set switches 3, 8, and 10 down (set to off), all others up (set to on).

At the console end:

Set switches 3, 5, 8, and 10 down (set to off), all others up (set to on).

C

Specifications

Physical

Dimensions	44.7 cm by 29.7 cm by 22.2 cm (17.6 in. by 11.9 in. by 8.7 in.)
Weight *	21 kg (46.3 lbs)

* With four interface cards and two power supplies installed.

Power Consumption

Maximum current at 100-127 Vac	4 amp
Maximum current at 200-240 Vac	2.5 amp

These current ratings represent the total current drawn by the router, regardless of whether one or two power supplies are installed.

The router automatically adjusts to voltage in the range of 90-240 Vac and to cycles in the range of 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	15% to 95% at 40°C (104°F), non-condensing	90% at 65°C (149°F)
Altitude	4.6 km (15,000 ft)	4.6 km (15,000 ft)

Electromagnetic

Emissions

U.S.A., Canada, and Latin America	FCC part 15 class A
Europe, Japan, and other countries	CISPR-22 (1985) class A
Europe	EN 55022 (1988) class A
Japan	VCCI class 1

ESD Immunity

Europe	IEC 801-2 (1991): 4kV CD, 8kV AD

Radiated Immunity

Europe	IEC 801-3 (1984): 3 V/m

EFT/Burst Immunity

Europe	IEC 801-4 (1988): 0.5 kV signal lines, 1.0 kV power line

Acoustical (for Germany)

Geraeuschemission	LwA < 55 dB am fiktiven Arbeitsplatz nach DIN 45635 T.19

Safety Approvals

CSA 950
UL 1950
IEC 950/EN60950

Data Communications Specifications

	Cable Interfaces
Console port	EIA RS-232 or CCITT V.24/V.28, asynchronous
Ethernet/802.3 ports	IEEE 802.3 standards, Ethernet 1.0 and 2.0
WAN port (with the appropriate cable)	EIA RS-232 and CCITT V.24/V.28, synchronous, EIA RS-422/449 and CCITT V.36, CCITT X.21, CCITT V.35
	ISO 2593 and MIL-C-28747

Data Communications The HP J2430A Router 650 is approved under Approval Number NS/G/1234/J/100003 for indirect connection to public telecommunication systems within the United Kingdom.

Safety Information

Safety Symbols

Documentation reference symbol. If the product is marked with this symbol, refer to the product documentation to get more information about the product.

WARNING A WARNING in the manual denotes a hazard that can cause injury or death.

CAUTION A CAUTION in the manual denotes a hazard that can damage equipment.

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

Grounding

This is a safety class I product and has a protective earthing terminal. 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 this product. Any servicing, adjustment, maintenance, or repair must be performed only by service-trained personnel.

Informations concernant la sécurité

Symboles de sécurité

Symbole de référence à la documentation. Si le produit est marqué de ce symbole, reportez-vous à la documentation du produit afin d'obtenir des informations plus détaillées.

AVERTISSEMENT Dans la documentation, un AVERTISSEMENT indique un danger susceptible d'entraîner des dommages corporels ou la mort.

ATTENTION Un texte de mise en garde intitulé ATTENTION indique un danger susceptible de causer des dommages à l'équipement.

Ne continuez pas au-delà d'une rubrique AVERTISSEMENT ou ATTENTION 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.

Hinweise zur Sicherheit

Sicherheitssymbole

Symbol für Dokumentationsverweis. Wenn das Produkt mit diesem Symbol markiert ist, schlagen Sie bitte in der Produktdokumentation nach, um mehr Informationen über das Produkt zu erhalten.

VORSICHT Eine VORSICHT in der Dokumentation symbolisiert eine Gefahr, die Verletzungen oder sogar Todesfälle verursachen kann.

ACHTUNG ACHTUNG in der Dokumentation symbolisiert eine Gefahr, die das Gerät beschädigen kann.

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

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

Für LAN-Kabelerdung:

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

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

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

Considerazioni sulla sicurezza

Simboli di sicurezza

Simbolo di riferimento alla documentazione. Se il prodotto è contrassegnato da questo simbolo, fare riferimento alla documentazione sul prodotto per ulteriori informazioni su di esso.

PERICOLO La dicitura PERICOLO denota un pericolo che può causare lesioni o morte.

ATTENZIONE La dicitura ATTENZIONE denota un pericolo che può danneggiare le attrezzature.

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

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

Per la messa a terra dei cavi LAN:

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

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

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

Consideraciones sobre seguridad

Símbolos de seguridad

Símbolo de referencia a la documentación. Si el producto va marcado con este símbolo, consultar la documentación del producto a fin de obtener mayor información sobre el producto.

ADVERTENCIA Una ADVERTENCIA en la documentación señala un riesgo que podría resultar en lesiones o la muerte.

PRECAUCION Una PRECAUCION en la documentación señala un riesgo que podría resultar en averías al equipo.

No proseguir después de un símbolo de ADVERTENCIA o PRECAUCION 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.

Regulatory Statements and Warranties

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

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

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

この装置は，第一種情報装置(商工業地域において使用されるべき情報装置)で商工業地域での電波障害防止を目的とした情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）基準に適合しております。

従って，住宅地域またはその隣接した地域で使用すると，ラジオ，テレビジョン受信機等に受信障害を与えることがあります。

取扱説明書に従って正しい取り扱いをして下さい。

VCCI Class 1 (Japan Only) for the HP J2430A Router 650

European Community

This equipment complies with ISO/IEC Guide 22 and EN 55022 Class A.

Note

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

Declaration of Conformity

The following Declaration of Conformity complies with ISO/IEC Guide 22 and EN 45014. It identifies the product, the manufacturer's name and address, and the applicable 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
U.S.A.

declares that the product:

Product Name: HP Router 650

Model Number: HP J2430A (Router Chassis & pwr. supply)
HP J2432A (Router Engine Module)
HP J2435A (Quad Port Ethernet Module)
HP J2434A (Quad Port Synchronous Module)
HP J2437A (Quad Port Token Ring Module)

conforms to the following Product Specifications:

Safety: IEC 950:1986+A1,A2/EN60950 (1988)+A1,A2

EMC: EN 55022 (1988) / CISPR-22 (1985) class A
prEN 55024-2 (1990) / IEC 801-2 (1991) 4 kV CD, 8 kV AD
prEN 55024-3 (1991) / IEC 801-3 (1984), 3 V/m
prEN 55024-4 (1992) / IEC 801-4 (1988): 1 kV-(power line)
0.5 kV-(signal line)

Supplementary Information:

The product herewith complies with the requirements of the Low Voltage Directive 73/23/EEC and the EMC Directive 89/336/EEC.The above products have also been type tested and certified to Net 1 and Net 2 requirements.

Tested with Hewlett-Packard Co. products only.

Roseville, July 13, 1994

Sandra L. Sheehan, Quality Manager

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

Three-Year Limited Hardware Warranty

Hewlett-Packard warrants this product against defects in materials and workmanship for a period of three years from receipt by the end user. If HP receives notice of such defects during the warranty period, HP will, at its option, either repair or replace products that prove to be defective.

Should HP be unable to repair or replace the product within a reasonable amount of time, customer's alternative exclusive remedy shall be a refund of the purchase price upon return of the product.

Exclusions The above warranty shall not apply to defects resulting from: improper or inadequate maintenance by customer; customer-supplied software or interfacing; unauthorized modification or misuse; operation outside of the environmental specifications for the product; or improper site preparation and maintenance.

Warranty Limitations HP makes no other warranty, either expressed or implied, with respect to this product. HP specifically disclaims the implied warranties of merchantability and fitness for a particular purpose. Some states or provinces do not allow limitations on the duration of an implied warranty, so the above limitation or exclusion might not apply to you. However, any implied warranty of merchantability or fitness is limited to the three-year duration of this written warranty.

This warranty gives you specific legal rights, and you might also have other rights that vary from state to state, or province to province.

Exclusive Remedies The remedies provided herein are customer's sole and exclusive remedies. In no event shall HP be liable for any direct, indirect, special, incidental, or consequential damages, whether based on contract, tort, or any other legal theory. Some states or provinces do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion might not apply to you.

Third-Party Products HP designed the HP routers described in this guide to operate with industry-standard hardware and software products.

HP has conducted limited testing with certain non-HP products to determine compatibility with the HP routers described in this guide. Please contact your HP authorized LAN dealer or HP representative for the current list of tested products.

HP relies in part upon information from the suppliers of non-HP products and makes no warranty, expressed or implied, with respect to the operation of these products or their compliance with worldwide regulatory requirements. HP advises customers to conduct independent examination to determine suitable levels of compatiblity for the customer's individual needs.

Gewährleistung HP gewährleistet, daß die Geräte frei von Material- und Fabrikationsfehlern sind. Die Gewährleistungsfrist beträgt drei Jahre ab Lieferung. Etwaige fehlerhafte Geräte werden nach eigenem Ermessen repariert oder ersetzt.

Garantía Esta pieza de hardware está garantizada por HP contra defectos de materiales o manufactura por un período de tres años a partir del momento en que el usuario la recibe. Durante dicho período de garantía, HP o un distribuidor autorizado, reparará o reemplazará, según su criterio, aquellos productos que resulten defectuosos.

Garantie Hewlett-Packard garantit le matériel d'informatique personnelle contre tout défaut de matière ou de fabrication pour une période de trois ans à compter de la réception du matériel par l'utilisateur. Hewlett-Packard ou le distributeur agréé HP choisira de remplacer ou de réparer tout produit défectueux.

Garanzia La Hewlett-Packard garantisce i propri prodotti hardware per computer contro i difetti di materiali e di fabbricazione per un periodo di tre anni dal giorno in cui li riceve l'utente finale. Durante il periodo di garanzia, la Hewlett-Packard o un Rivenditore autorizzato riparerà o sostituirà i prodotti che risultassero difettosi.

Software and Firmware Warranty

Hewlett-Packard warrants that the software or firmware, when properly installed, will not fail to execute their programming instructions due to defects in material or workmanship for a period of ninety (90) days from the date of purchase from HP or its Authorized Reseller. If HP receives notice of such defects within the warranty period, HP will at its option either repair or replace the software or firmware media that does not execute its programming instructions due to such defects, or refund the purchase price.

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