

Token Ring for Indy™ Installation Guide

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Introduction

The *Token Ring for Indy Installation Guide* shows you how to install the IRIS[®] Token Ring board into your Indy[™] workstation. IRIS Token Ring provides 802.5 Token Ring connectivity for Indy. It is an optional network product consisting of a Token Ring controller board (hardware) and a driver (software).

Indy has one built-in Ethernet connection and two GIO option slots. The IRIS Token Ring board connects to one Indy GIO option slot connector and occupies the space of two option slot boards. Your Indy can accommodate one IRIS Token Ring board in addition to the built-in Ethernet connection.

The *IRIS Token Ring Release Notes* provide instructions for installing the software and configuring the new network connections.

The *IRIS Token Ring Administration Guide* contains instructions for configuring the network connections with site-specific parameters and describes the product's error messages.

Audience

The Token Ring for Indy product is designed for customer installation and configuration. No special training or experience is necessary.

Product Support

Silicon Graphics[®], Inc., provides a comprehensive product support and maintenance program for its customers. If you are in North America and would like support for your Silicon Graphics-supported products, contact the Technical Assistance Center at 1-800-800-4SGI. If you are outside North America, contact the Silicon Graphics subsidiary or authorized distributor in your country.

Installing the IRIS Token Ring Board

This guide tells you how to install the IRIS Token Ring network board in your Indy workstation.

Prerequisites

Before you start installing the Token Ring board, answer the following questions:

1. Is your Indy currently operating or has it been functional recently? If yes, continue to the next question.
 - To bring your workstation to a functioning state, follow the instructions in the *Indy Workstation Owner's Guide*. Doing this first verifies that everything works properly before you install the Token Ring board.
2. Has your Indy been configured as a networked station? For example, does it have a name other than the default *IRIS*. If yes, continue to the next question.
 - You can verify your Indy's name with the command below:

```
% /usr/bsd/hostname
```

Your Indy must have a name other than *IRIS*. Follow the instructions in the *Personal System Administration Guide* for naming your Indy.

3. Have you installed and configured the IRIS Token Ring software? If yes, continue to the next question.
 - To install and configure the IRIS Token Ring software, follow the instructions in the *IRIS Token Ring Release Notes*, before installing the board.

4. Do you want your Indy to have two network connections—Ethernet and Token Ring? If yes, continue. If no, skip to the next section.
5. Is the Ethernet connection functional? If yes, go to the next section.
 - One way to verify that the Ethernet connection is functional is to contact another station using the *ping* command:

```
% /usr/etc/ping hostname
64 bytes from . . . time=x ms
<Ctrl-c>
```

```
----hostname PING Statistics----
x pkts trnsmtd,x pkts rcvd, x% packet loss
```

If the packet loss is less than 100%, the station's Ethernet connection is functional.

If the Ethernet connection is not functional, follow the instructions in the *Personal System Administration Guide* to set up your Indy as a networked IRIS.

The IRIS Token Ring Package

The IRIS Token Ring product is an optional package shipped separately from your Indy.

Caution: The IRIS Token Ring board and Indy's internal components are sensitive to static electricity. Handle all Indy boards carefully, and use the wrist strap (shipped with your Token Ring board) to avoid any flow of static electricity.

Your IRIS Token Ring package should contain all of the items listed below. If anything is missing, contact your sales representative.

- the IRIS Token Ring board, inside an antistatic bag
- a Phillips screwdriver
- a package of screws
- a ferrite attachment
- an antistatic wrist strap

- a CD-ROM disk containing the software and release notes
- this manual (*Token Ring for Indy Installation Guide*)
- the *IRIS Token Ring Administration Guide*

Carefully follow all of the steps in the following sections to install the IRIS Token Ring board.

Installing the IRIS Token Ring Board

The instructions for installing your IRIS Token Ring product (board and software) are divided into three documents, as summarized in Table 1-1.

Table 1-1 Locating Installation Instructions

| Document | Installation Steps Covered |
|--------------------------------------|--|
| IRIS Token Ring Release Notes | Installing and configuring the IRIS Token Ring software. Do this first. |
| This guide | Installing the Token Ring board. Connecting Indy to the site's Token Ring network. Verifying the board's basic functionality. |
| IRIS Token Ring Administration Guide | Information about 802.5 Token Ring. Information on configuring IRIS Token Ring network connections. Verifying operation of the IRIS Token Ring connection. Explaining terminology and operation. Error messages. |

Getting Ready

To prepare for the installation, follow these steps:

1. Verify that the following two statements are both true:
 - IRIS Token Ring software has been installed, following the instructions in the *IRIS Token Ring Release Notes*.
 - IRIS Token Ring has been configured, following the instructions in the *IRIS Token Ring Release Notes* or in the *IRIS Token Ring Administration Guide*.

If both statements are true, proceed to the next step. If one or both are not true, follow the instructions in the appropriate document to make both statements true before proceeding.

2. Have the following items nearby:
 - wrist strap
 - Phillips screwdriver
 - IRIS Token Ring board, still in its antistatic bag.

Shutting Down the System

To shut down the system, press and release the power button on the front of the Indy workstation, as shown in Figure 1-1. The system software shuts down, and the system powers off automatically.

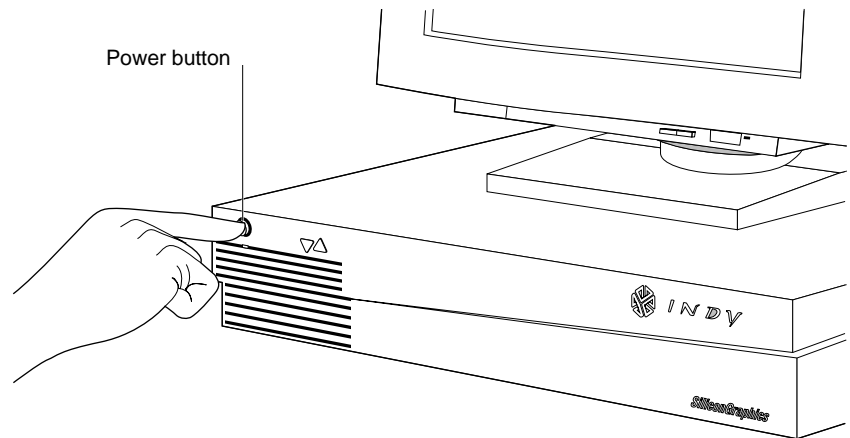


Figure 1-1 Turning Off the Indy Workstation

Removing the Top Cover

Follow these steps to remove the top cover of your Indy workstation:

1. If the monitor is on top of the workstation, move it to one side.

Caution: Monitors are very heavy. Have someone help you move it.

2. Disconnect the black power cable and the monitor cable from the back of the Indy workstation.

There are several other cables connected to the rear of the Indy chassis. Disconnecting them is optional, however, you'll have more room to work with when removing the screws from the back panel.

Note: Before removing any exterior cables, familiarize yourself with their location so that you'll find it easier when reconnecting them later.

3. Facing the front of the Indy workstation, place your right thumb on the small channel at the back of the cover, and your second and third fingers under the finger ledge, as shown in Figure 1-2.

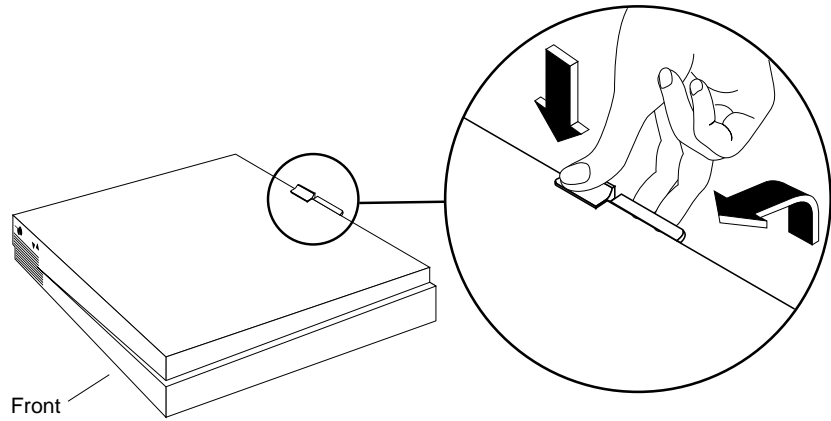


Figure 1-2 Removing the Top Cover From the Indy Workstation

4. Snap the cover loose by bracing your thumb against the lip and pushing up the finger ledge with the second and third fingers, followed by a small push toward the front.
5. Slide the cover forward about one inch and tilt it up to remove it.

Attaching the Wrist Strap

Wear the wrist strap to prevent the flow of static electricity, which can damage the components in the Indy workstation.

Caution: The components inside Indy are extremely sensitive to static electricity. Handle all chips and modules carefully, and wear the wrist strap shipped with the upgrade package while replacing parts inside the system.

To attach the wrist strap, follow these steps:

1. Put the wrist strap over your wrist, making sure it is tight against your arm.
2. Attach the alligator clip to a metal part of the Indy chassis.

Installing the Token Ring Board

Follow these steps to install the Token Ring board.

1. Check if there are faceplates covering the GIO option ports on the back of the Indy, as shown in Figure 1-3.
2. If there are faceplates covering the ports, use a Phillips screwdriver to remove the screw and washer on each faceplate.

Save the faceplates. If you remove the Token Ring board in the future and do not replace it, you should reinstall the faceplates.

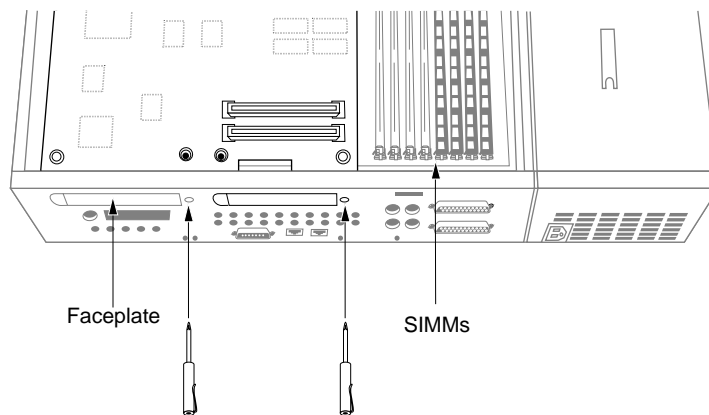


Figure 1-3 Removing the Faceplates From the GIO Option Ports

3. Install the Token Ring board.
 - Grasp the Token Ring board by the sides, with the connector on the underside, as shown in Figure 1-4.
 - Lower the Token Ring board over the graphics board, inserting the board's external I/O connector through the open slot on the rear of the workstation.
 - Loosely place the Token Ring board on top of the graphics board so that the connector on the underside of the Token Ring board matches the connector on the graphics board, as shown in Figure 1-4.
 - Check that each screw hole on the Token Ring board is sitting directly above a matching standoff (tall, hexagonal post) on the graphics board.

Caution: The pins in the connector are delicate. Gently wiggle or reposition the Token Ring board to fit the pins of the connector into the connector on the graphics board. Do not apply any pressure until the pins fit properly.

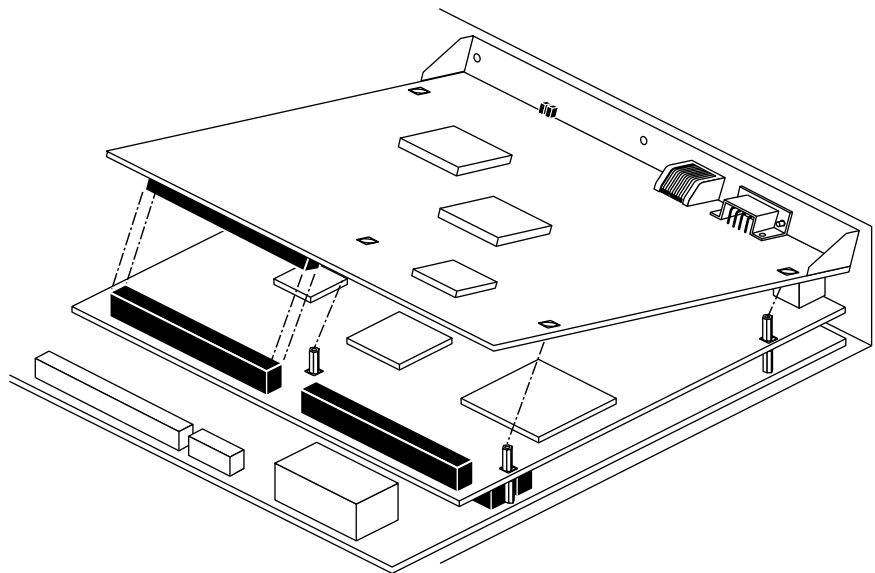


Figure 1-4 Positioning the Token Ring Board Over the Graphics Board

4. Press to seat the Token Ring board connector into the graphic board's connector, as shown in Figure 1-5.
 - Place your fingers or thumbs on the Token Ring board above where the connectors are located.
 - Press down gently but firmly until the connectors fit snugly.
5. Verify that the Token Ring board is properly seated.

Caution: Do not press hard enough to bend the graphics board.

Look underneath the Token Ring board to see the connectors. The connectors must be touching along the entire shared surface, as shown in Figure 1-5. Be sure to check each end of the connection.

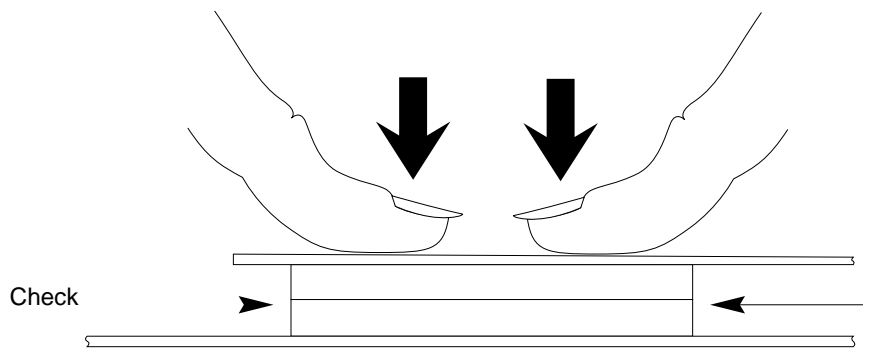


Figure 1-5 Seating the Token Ring Board's Connector

6. Insert three Phillips screws through the rear of the workstation.

- Remove three screws from the plastic bag that comes with this package.
- Tighten the three screws in the locations shown in Figure 1-6.

If the screw holes do not line up, the board may not be seated all the way.

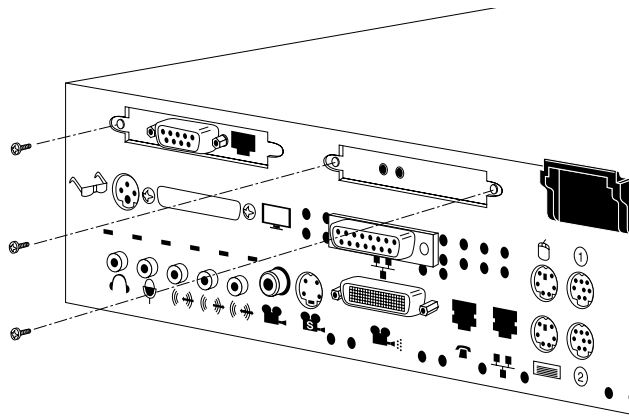


Figure 1-6 Inserting the Screws on the Rear of the Workstation

7. Secure the Token Ring board as follows.

- Remove four Phillips screws from the plastic bag that comes with this package.
- Using a Phillips screwdriver, insert and tighten the four screws in the locations shown in Figure 1-7. As you tighten the screws, alternate among them so that the board is fastened evenly.

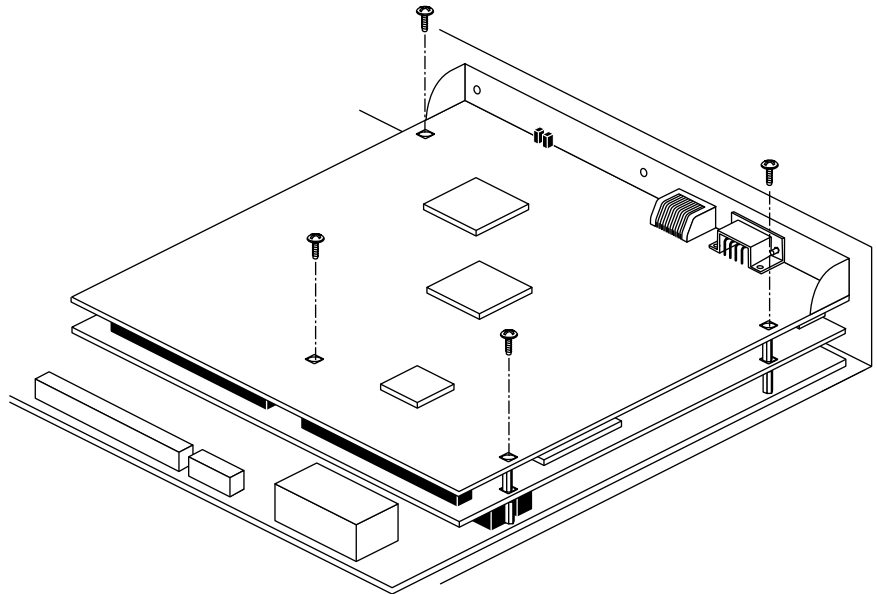


Figure 1-7 Inserting the Screws on the Token Ring Board

You are finished installing the Token Ring board, and are ready to replace the top cover.

Replacing the Top Cover and Connecting the Cables

To replace the cover of your Indy workstation, follow these steps:

1. Facing the front of the system, lower the cover a few inches from its fully closed position, as shown in Figure 1-8.
2. Tilt the cover and insert the tab through the slot in the rear of the chassis.
3. Slide the cover toward the back of the chassis until it snaps into place.

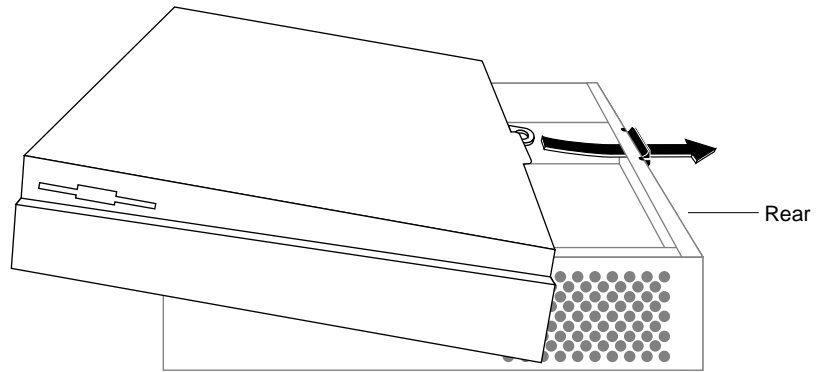


Figure 1-8 Replacing the Top Cover on the Indy Workstation

4. Connect the power cable, monitor cable, and any other cables you removed earlier.

Connecting Indy to the Site's Token Ring Network

To connect Indy to your site's Token Ring network, follow the instructions in this section.

Note: The IRIS Token Ring product is shipped with a configuration for 16 megabit per second (Mbps) transmission speed. If your local area network operates at 4Mbps, you will need to change this configuration before attaching the board to the network. See "About IRIS Token Ring and 4 Mbps Rings " in the *IRIS Token Ring Release Notes* for instructions.

1. Locate one Token Ring adapter cable to connect the Token Ring board to your site's Token Ring network. This cable is part of your site's current equipment, not part of your order.

The adapter cable can be either one of the following:

- shielded twisted pair (EIA/TIA-568 Type 1) cable terminated on the adapter board end with a DB-9 connector (illustrated in Figure 1-9), or

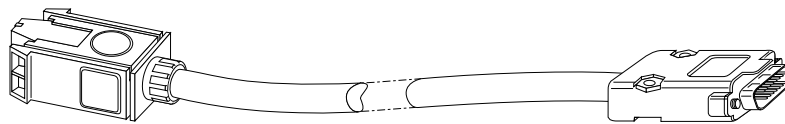


Figure 1-9 Shielded Twisted Pair Adapter Cable with DB-9 Connector

- 4-, 6-, or 8-wire unshielded twisted pair (EIA/TIA-568 Type 3, 22 or 24 gauge [AWG]) cable with RJ-45 connectors (illustrated in Figure 1-10). If you are installing this cable, you will also need the ferrite attachment shown in Figure 1-10.

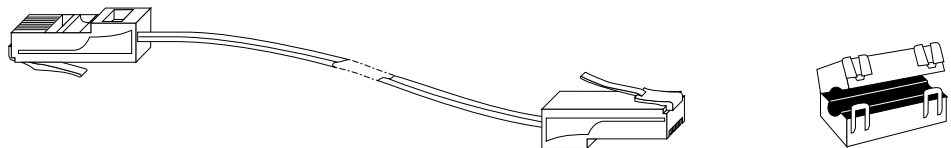


Figure 1-10 Unshielded Twisted Pair Adapter Cable with RJ-45 Connectors and Ferrite Attachment

For 4-Mbps rings, the Type 3 adapter cable can be category 3, 4, or 5. For 16-Mbps rings, the Type 3 adapter cable can be category 4 or 5.

Note: Silicon Graphics does not support IRIS Token Ring boards that are connected with adapter cables that do not match one of the configurations described above.

2. Attach the adapter cable to the appropriate connector on the Token Ring I/O panel on the back of the Indy workstation.

Caution: Connect only *one* cable to the IRIS Token Ring board's I/O panel. Connecting cables to both connectors on the I/O panel may damage the board irreparably.

3. Attach the other end of the adapter cable to the wall faceplate (or other attachment device). The faceplate or attachment device is part of your site's equipment, not part of the IRIS Token Ring product.

Note: Once you restart the system (as explained in the next section), do not disconnect the adapter cable from either the workstation's I/O panel or the wallplate. Doing this causes the adapter board to transition into a state that prevents additional attempts to insert into the ring. In this situation, the user experiences a non-responsive network connection. This problem can be remedied only by shutting down the system, powering off the computer (to reset the Token Ring board), and restarting the computer.

4. If you attached an RJ45 unshielded twisted pair cable, close the ferrite attachment around the cable near the back of the Indy, as shown in Figure 1-11.

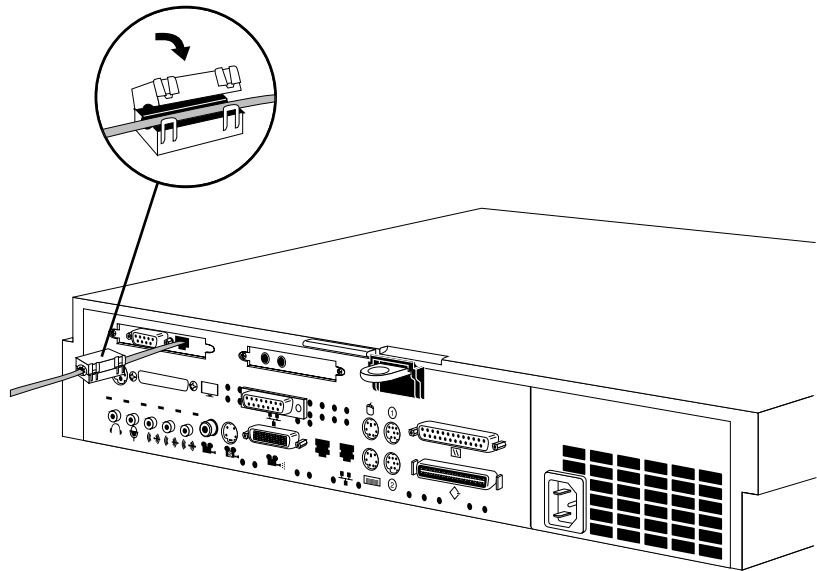


Figure 1-11 Closing the Ferrite Attachment Around the Unshielded Twisted Pair Cable

Finishing the Installation

To finish the installation, restart the system, rebuild the operating system, and reboot, as described below.

1. Turn on the power on the front of the Indy workstation.

Note: Do not turn on the power until the IRIS Token Ring board is connected to the site's ring. When the IRIS Token Ring board fails to insert itself into the ring, it transitions into a non-responsive state that requires you to power off the computer to fix.

The system starts up.

2. You will see the following on your screen:

```
Automatically reconfiguring the operating system.  
Reboot to start using the reconfigured kernel.
```

If you do not see the "reconfigure" message, the system does not know about the new network interface. Make sure that you have installed the IRIS Token Ring software. If you have, the board may not be firmly seated into its slot connector. Go to the beginning of this guide and reinstall the board.

3. When the login display appears, log in.
4. Open a shell window by choosing "Unix Shell" from the Desktop toolchest.
5. Become superuser and reboot the system to start using the new operating system:

```
% /bin/su  
Password: thepassword  
# /etc/reboot
```

The installation is complete.

Follow the instructions in Chapter 2 to verify that the network connection(s) is functional.

Verifying the IRIS Token Ring Connection

To verify that the new IRIS Token Ring network connection is functional, follow the instructions in this chapter.

Verifying Board Functionality

To verify that the board is functional, follow the steps in this section.

1. Verify that the LED on the front of the Indy is green.

If the LED is not steady green, something is wrong with the CPU board or with the electrical supply. Check that the power cable is plugged into a working electrical socket and that it is seated firmly in its receptacle on the back of the Indy. If this is not the problem, follow the instructions in the “Troubleshooting” section of the *Indy Workstation Owner’s Guide*. Do not proceed until the CPU board’s LED is green.

2. Log on to the system. Open a shell window by choosing “Unix Shell” from the Desktop toolchest.
3. Type the command below to verify that the IRIS Token Ring board has been recognized by the software (see Figure 2-1):

```
% /bin/hinv
```

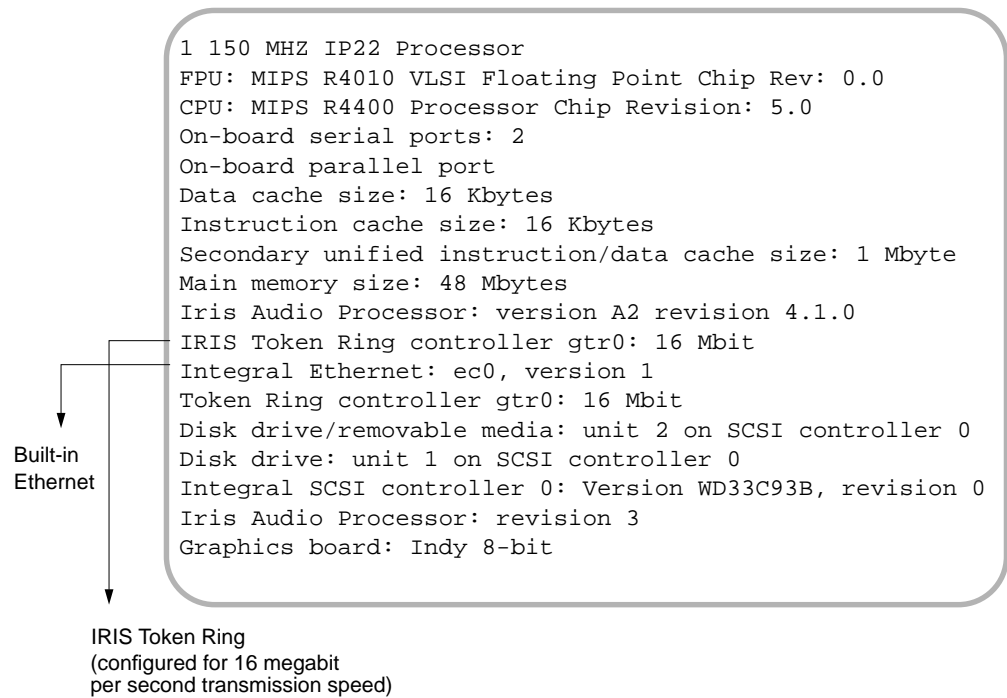


Figure 2-1 Example of the *hinvt* Display

4. If the IRIS Token Ring board/network interface is listed, as shown in Figure 2-1, go to the next step.

If the interface is not listed, the operating system did not recognize the board during the last reboot. If this occurs, follow these steps:

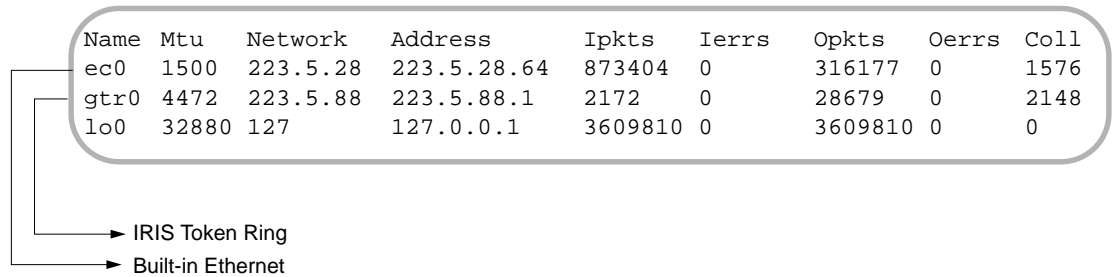
- Did you install the IRIS Token Ring software? If you did, proceed. If not, follow the instructions in the *IRIS Token Ring Release Notes* to install the software, then restart the verification procedure.

You can verify installation with the command

```
% /usr/sbin/versions tokenring
```

- Did you rebuild the operating system and reboot? If you did, proceed. If not (or if in doubt), follow the instructions in the section "Finishing the Installation" in Chapter 1. When you finish, restart the verification procedure.

- Did you configure your network interfaces (*/etc/hosts* file and possibly the */etc/config/netif.options* file)? If you did, proceed. If not, follow the instructions in the *IRIS Token Ring Release Notes* to configure the network connection(s), then restart the verification procedure.
 - Verify that your network configuration (*/etc/hosts* file and */etc/config/netif.options* file) has been set up correctly. For example, the */etc/hosts* file must contain one line for each network connection: one for Token Ring and, if connected, one for Ethernet. If Token Ring is the primary (or only) network connection, the *netif.options* file must have a line containing this entry: `iflname=gtr0`
If the configuration information is correct, continue. If not, correct the problem, reboot the system, then restart the verification procedure.
 - If none of the above bullets is a problem, it is possible that the Token Ring board is not seated firmly into its slot connector. Go to the beginning of this guide and reinstall the board. Take extra precautions in seating the Token Ring board into its slot connector. When you finish, restart the verification procedure.
 - If the Token Ring board still does not appear, it is possible that the board is defective. Contact Silicon Graphics' Technical Assistance Center.
5. Type the command below to list the configured network interfaces:
- ```
% /usr/etc/netstat -in
```
6. The display should look similar to Figure 2-2. In this example, Ethernet is the primary interface and Token Ring is secondary. No interface should have an asterisk next to its name; the asterisk indicates that the network interface is disabled. All interfaces should have addresses in the Network and Address columns.



**Figure 2-2** Example of a *netstat -in* Display

7. Look at the yellow and green light emitting diodes (LEDs) on the Token Ring board's I/O panel on the back of the Indy. If the signals behave as described below, the board is functional. If you see a pattern not described below, there may be a problem; see the section "LED Signals" in this chapter.
  - YELLOW ON, GREEN ON during power up, for less than 10 seconds.
  - YELLOW OFF, GREEN ON or OFF during operation.

## Verifying Network Connections

To verify that each network connection is functional, follow the instructions in this section. To perform this verification, you use *ping -r* (lower case -r, not -R) to verify that this station can communicate with one other station on each local area network (LAN) listed in the *netstat* display (except the loopback, *lo0*).

**Note:** These verification instructions depend on the TCP/IP protocol stack. They assume that there are other stations on the 802.5 Token Ring network using TCP/IP.

1. Obtain the name of at least one station on each local area network to which this station is connected.

Two methods for obtaining station names are described below. The *networkaddress* variables used are the values in the Network column of the *netstat* display (illustrated in Figure 2-2).

- For sites with NIS, create a file with the names and addresses of stations located on the local area network for each network connection. Use one or both of these command lines:

```
% /usr/bin/ypcat hosts | grep networkaddress > gtr0.s
% /usr/bin/ypcat hosts | grep networkaddress > ec0.s
```

For example, to obtain the names of stations on the Token Ring network shown in Figure 2-2 you would use the following command line:

```
% /usr/bin/ypcat hosts | grep 223.5.88 > gtr0.s
```

- For distributed (non-NIS) sites, create a file with the names and addresses of stations located on the local area network for each network connection. Use one or both of these command lines:

```
% /bin/grep gtr0_networkaddress /etc/hosts > gtr0.s
% /bin/grep ec0_networkaddress /etc/hosts > ec0.s
```

**Note:** If your Indy does not contain entries for one or both network addresses, update your */etc/hosts* file, as explained in the section on adding and deleting hosts in the *Personal System Administration Guide*.

For example, to obtain the names of stations on the Token Ring network shown in Figure 2-2, use the following command line:

```
% /bin/grep 223.5.88 /etc/hosts > gtr0.s
```

2. Communicate with one station on the LAN attached to the *gtr0* connection. For the variable *gtr0\_station*, you can use any of the names or IP addresses from the *gtr0.s* file, except the station's own.

```
% /usr/etc/ping -r gtr0_station
PING stationname (IPaddress): 56 data bytes
64 bytes from ... time=x ms
...
```

```
<Ctrl-c>
----stationname PING Statistics----
packets trans, # pckts rcvd, x% packet loss
```

The *ping* has succeeded if the value shown for packet loss is less than 100%.

3. If the station has an Ethernet connection, communicate with one station on the *ec0* connection. For the variable *ec0\_station*, you can use any of the names from the *ec0.s* file, except the station's own.

```
% /usr/etc/ping -r ec0_station
PING stationname (IPaddress): 56 data bytes
64 bytes from ... time=x ms
...
```

```
<Ctrl-c>
----stationname PING Statistics----
packets trans, # pckts rcvd, x% packet loss
```

The *ping* has succeeded if the value shown for packet loss is less than 100%.

4. If one *ping* on each network succeeded, you have completed the verification procedure. All of the network connections are functioning. Use the commands below to remove the files with the lists of stations:

```
% /bin/rm ec0.s
% /bin/rm gtr0.s
```

If the *ping* on a network fails, follow the instructions in the next section, "Troubleshooting."

## Troubleshooting

The troubleshooting steps in this section are written for network administrators. The instructions assume some familiarity with networking tasks; however, references are provided so that a novice can learn about network administration while performing these steps.



## When All Network Connection Tests Fail

If the *ping* verification tests fail for all of the network connections, the system probably has been configured incorrectly.

1. Verify that the station's network interface configuration (as displayed by *netstat -in*, illustrated in Figure 2-2) is correct.

**Note:** Descriptions of valid Token Ring configurations are provided in Chapter 2 of the *IRIS Token Ring Administration Guide*.

2. Verify that the operating system software on the local workstation supports TCP/IP.

**Note:** The Toolchest's Networking Tool can be used for this step, as explained in the *Personal System Administration Guide*.

## When One Network Connection Test Fails

If one of the *ping* verification tests succeeds, but the other fails, follow the instructions in this section to resolve the problem.

1. Select two different stations on the network interface for which *ping* failed. Try to *ping -r* the new stations using the numerical addresses (instead of the names). If either *ping* works, the network connection is functional. If both of these *pings* fail, proceed to the next step.
2. Check that the cable connections at the Indy's I/O panel and at the site's connector (wall plate or MAU/LAM for Token Ring; transceiver for Ethernet) are tightly connected. For the Token Ring, if any of the connections are loose (or if you disconnect any of the connections while checking them), shutdown the system, turn off the power, and restart the system.
3. Try step 1 (above) for that network interface again. If both *pings* still fail, proceed to the next step.
4. Verify that the network portion of the addresses you are attempting to *ping* match the network address displayed by the */usr/etc/netstat -in* command. (See Figure 2-2 for an example of the *netstat* display.)

**Note:** The network portion of the address consists of the leftmost digits.

5. If the network addresses match, continue to the next step. If the network addresses do not match, repeat the steps in the section “Verifying Network Connections” to obtain and test a new selection of stations. Take extra precautions to ensure that you use the correct network addresses.

If the verification procedure continues to fail, continue to the next step.

6. From another workstation, verify that the local area network is functioning properly.

If the 802.5 Token Ring LAN is functioning properly but this verification test fails, contact Silicon Graphics’ Technical Assistance Center about your IRIS Token Ring board.

## LED Signals

This section describes the patterns displayed by the two light-emitting diodes (LEDs) on the IRIS Token Ring board:

- YELLOW OFF, GREEN OFF

This pattern has three different meanings, depending on when the pattern is displayed. Each situation is described below.

- During normal operation, this pattern indicates that the board is receiving frames from the physical medium (cable). Normal operation also includes the GREEN ON pattern during transmission, as described below.
- During the downloading of firmware, this pattern indicates that the downloading is proceeding normally. Firmware downloading takes less than 15 seconds.
- When this pattern is the only pattern seen after turning on the power and when the pattern persists for over 2 minutes, it indicates that the IRIS Token Ring board is either dysfunctional or is not receiving power. If the operating system did not start, there is a problem with the Indy workstation (not the IRIS Token Ring board). Follow the instructions in the “Troubleshooting” section of the *Indy Owner’s Guide*. If the operating system did start, the IRIS Token Ring board is either not seated firmly in its connection or it is dysfunctional. Follow the board installation instructions to reinstall

the board, taking extra precautions to seat the board firmly into its connector. Reboot the system. If the problem persists, contact Silicon Graphics' Technical Assistance Center.

- YELLOW OFF, GREEN ON

Indicates normal operation when the board is transmitting a data frame onto the physical medium (cable).

- YELLOW ON, GREEN ON/OFF

Indicates normal operation during a power up or reset. Should last less than 15 seconds.

After power up or reset, this signal combination indicates a problem. Reboot the system. If the problem persists, contact Silicon Graphics' Technical Assistance Center.

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