PHOBOS E100

10/100Base-T EISA Adapter
User Guide

Part No.: 10-0001 Rev. A1

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1: INTRODUCTION

The Phobos E100 10/100Base-T EISA adapter is a 32-bit adapter with an Extended Industry Standard Architecture (EISA) for use in SGI's Indigo^{2TM}. In this guide the adapter is referred to as the Phobos E100 adapter. It operates whether or not bus mastering is enabled.

This adapter is a dual-speed adapter connected to an Ethernet network with a single RJ-45 connector over unshielded twisted-pair (UTP) cable. The adapter can operate at either 10Mbps or 100Mbps.

ADAPTER FEATURES

The Phobos E100 adapter provides the following features:

- 10 or 100Mbps network operation
- Three status LEDs
- Single shielded RJ-45 connector for use at either speed (Category 5 UTP for 100Base-TX Fast Ethernet networks)

CONVENTIONS

The following lists text and icon conventions that are used throughout this guide:

Text Conventions

- Items in **bold** should be typed in as they appear
- Items in *italics* are produced by the system
- Items offset by [brackets] are keys that you should press when instructed to do so

Important Notices

CAUTION: Cautions contain directions that you must follow to avoid immediate system damage or loss of data.

NOTE: Information notes call attention to important features or instructions.

2: INSTALLING NETWORK HARDWARE

This chapter describes how to install the Phobos E100 adapter in your computer and connect it to a network.

INSPECTING THE ADAPTER

Before installing the adapter in your computer, you should visually inspect it for damage that might have occurred during shipment from the factory.

CAUTION: Each adapter is packed in an antistatic packaging to protect it during shipment. To avoid damaging any static-sensitive components after removal from the container, be sure to reduce any static electricity on your person. One way to do this is to touch the metal chassis of your computer. You can maintain grounding by wearing a wrist strap attached to the chassis.

1. Open the shipping container and carefully remove its contents. The package should contain the following items:

   - Phobos E100 EISA 10/100Base-T adapter
   - *Phobos EISA 10/100Base-T Network Adapter User Guide*
   - Phobos Fast Ethernet Driver CD

2. Verify that you have received all items listed above, and inspect each item for damage.

If you find any omissions or damage, contact your network supplier and the carrier that delivered the package.

CONNECTING TO THE NETWORK

This section describes how to connect 10Mbps or 100Mbps network cables to the Phobos E-100 EISA adapter.

NOTE: We recommend connecting the adapter to the network before loading drivers.

The backplate of the adapter contains one RJ-45 connector. For 10Base-T Ethernet networks, the Phobos E100 adapter uses Category 3, 4, or 5 unshielded twisted-pair (UTP) cable. For 100Base-TX Ethernet networks, the Phobos E100 supports Category 5 UTP cabling. The adapter uses an on-board transceiver with twisted-pair cable. To establish a valid 10Mbps connection, the cable must be connected to a 10Base-T hub. To establish a valid 100Mbps connection, the cable must be connected to a 100Base-TX hub. Connect the network cable as follows:

1. Make sure that the connector on your cable is wired appropriately for standard 10Base-T or 100Base-TX adapter cards.

   NOTE: The UTP wire pairs and pin definitions for 100Base-TX are identical to those for 10Base-T when used with Category 5 UTP cable. The "straight-through" connection should be made from the Phobos E100 EISA adapter through the cable and connectors to the hub. No crossover in the cable is required.

2. Align the RJ-45 connector on the end of the twisted-pair cable with the notch on the adapter's connector and insert it into the adapter connector.

3: CONFIGURING THE ADAPTER

This chapter explains how to configure the Phobos E100 EISA adapter.

LOGIN

Login as root or use the SU command to become root.

CAUTION: If you do not know the root password for the system, contact your system administrator.

1. Starting from power-off. Press the power switch. On power up the system will ask for a login name. Enter **root** and the root password when prompted..

2. If you entered the correct password for root you will see a number sign (#) has become the prompt. You can continue with inserting the CD-ROM.

3. If the machine is already on and is logged in as a user, enter **su** to login as root. Then enter the root password when prompted.

INSERT AND MOUNT THE CD

1. Insert the CD into the CD-ROM drive.

3. Enter the **df** command to verify **mediad** is running.

3. If **mediad** is not running, enter the **hinv** command to determine the SCSI address of your CD-ROM drive.

   Then use the **mount** command to mount the CD-ROM Drive, using the appropriate command line listed below. Replace "#" with the SCSI address.

   Internal CD-ROM:

   ```
   mount -r /dev/dsk/dks/dks0d#s7
   ```

   External CD-ROM:

   ```
   mount -r /dev/dsk/dks/dks1d#s7
   ```

INSTALL THE DRIVER

1. Enter the **inst** command.

2. Specify the location of the software using the **from** command.

   For installation on an Indigo² ™ use:
   ```
   Inst> from /CDROM/5.3/dist
   ```

   or:
   ```
   Inst> from /CDROM/6.2/dist
   ```

3. Install the software by entering **go**.

4. Exit installation by entering **quit**.

5. At this point the driver has been installed. Reboot the system to enable the new driver using the **shutdown** command.
   ```
   shutdown -g0
   ```

6. After the system has been rebooted, there will be a new network interface named "fe0". Verify this by using the **ifconfig** command.
   ```
   ifconfig fe0
   ```

   Which should return:
   ```
   fe0: flags=822<BROADCAST,NOTRAILERS,MULTICAST>
   ```

   You may now use ifconfig to configure the interface. Please see SGI's *IRIX™ Advanced Site and Server Administration Guide* for further information on configuring network devices.

SETTING ADAPTER OPERATING SPEED

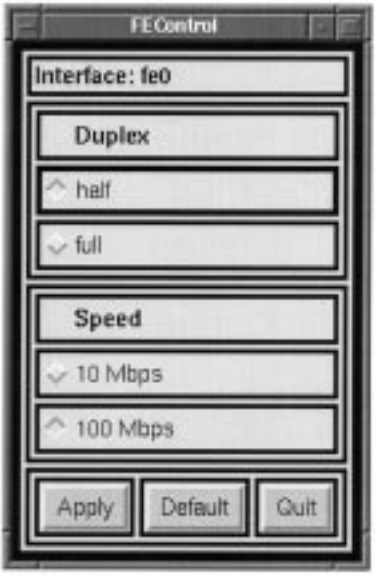
Once the adapter has been assigned an internet address, you must set the operating speed of the adapter. The adapter can operate at 10Mbps (standard Ethernet) or 100Mbps (Fast Ethernet). The default factory setting is 100Mbps. If you are connected to a 100Mbps link you do not neet to do anything. Otherwise you must use the text based command **fe_control** or the Graphical User Interface command **FEControl** to set the operating speed of the adapter.

1. To set the operating speed of the interface to 100Mbps using **fe_control**, enter this command:
   /usr/bin/fe_control fe0 half 100

   To set the operating speed of the interface to 10Mbps:
   /usr/bin/fe_control fe0 half 10

   If you are connected to an ethernet switch and your port is configured for full duplex, you may substitute **full** for **half** in the above examples. If you are unsure, use **half**.

2. Alternatively, you can use the FEControl utility to set the speed and duplex mode. Enter **/usr/bin/FEControl** to start the utility. Use the options in the "FEControl" window to change the settings. Click "Apply" to implement your choices. Click "Default" to return the E100 to factory settings. Click "Quit" to exit the utility.



4: INSTALLING AND REMOVING STANDALONE OPTION BOARDS

This chapter tells you how to install and remove Phobos E100 EISA (Extended Industry Standard Architecture) boards. EISA boards add functionality to your system through a standard bus. For more detailed information, please refer to the *SGI Indigo² IMPACT™ Workstation Owners Guide*.

INSTALLING EISA BOARDS

To install an EISA board, you must shut down the system, remove the cover, attach a wrist strap, install the option board, replace the cover, and start up the system.

1. Shut down and power off the system.
2. Disconnect the power and monitor cable from the back of the workstation.
3. Remove the cover.
   - Press down on the tabs on each side of the bezel and remove
   - Remove the lockbar, if one is installed
   - Pull bezel down and away from the chassis and remove top cover

   For more detailed instructions on removing the cover, please refer to the *SGI's IMPACT™ Workstation Owners Guide*.

INSTALLING OPTION BOARDS AND THE SOLID IMPACT™ GRAPHICS BOARD SET

For more information, please refer to the *SGI's IMPACT™ Workstation Owners Guide*. For an overview of how to install an EISA option board, follow these steps:

CAUTION: The EISA board is extremely sensitive to static electricity; you must wear a wrist strap while installing it. The wrist strap prevents the flow of static electricity, which could damage the board.

1. Ground yourself to a metal part of the Indigo² IMPACT™ chassis.

2. Move the workstation or position yourself so that you are facing the option slots. The option slots are located at the side and rear of the workstation.

3. Open the metal panel located in front of the option slots by pulling up on the panel and lowering it.

4. Remove the retention pin on the right side of the boards.

   NOTE: Check the placement of the retention pin. It hangs in front of the board, not beside it.

5. Locate the EISA connector for the board or boards you are installing.

   For proper placement of your option board in relation to the board set you purchased with your Indigo² IMPACT™ workstation, see the *IMPACT™ Workstation Owners Guide* or refer to the table on the following page:

Board Combination	Slots to Use
Solid IMPACT board plus 1 EISA board	Place Solid IMPACT board in Slot B and EISA board in Slot A or Slot C
Solid IMPACT board plus 2 EISA boards	Place Solid IMPACT board in Slot B and EISA boards in Slot A and Slot C
Solid IMPACT board plus 3 EISA boards	Place Solid IMPACT board in Slot D and EISA boards in Slots A, B, and C

INSTALLING OPTION BOARDS AND THE MAXIMUM & HIGH IMPACT™ GRAPHICS BOARD SET

Install the board set in the same slots as before. If you need help locating the correct slots for your board, please refer to *IMPACT™ Workstation Owners Guide*.

1. Remove the corresponding I/O panel over the slot. This makes the port accessible.

   NOTE: If your site has multiple Indigo² IMPACT™ workstations, it is a good idea to save at least one set of I/O panels to reinstall in the workstation should you need to remove an option board.

2. Install the board.

3. Insert and tighten the screw that holds the board to the chassis.

4. Hang the retention pin so that it sits in front of the board set. The retention pin prevents the board set from moving away from the connectors. (Use the retention pin as a plumb line to determine if the board set is properly seated. If the pin is tilted, push on the board set until it is properly connected).

5. Tip the metal panel up until it snaps into place.

6. Replace the cover and bezel. (For more information on replacing the workstation cover and bezel, please refer to SGI's *IMPACT™ Workstation Owners Guide*).

7. Reconnect the power and monitor cables and turn on the workstation.

REMOVING EISA OPTION BOARDS

To remove a EISA option board, follow these steps:

1. For instructions on how to shut down and power off the system and removing the cover, see the *IMPACT™ Workstation Owners Guide*.

2. Ground yourself to a metal part of the Indigo² IMPACT™ workstation.

   CAUTION: The EISA board is extremely sensitive to static electricity; you must wear the wrist strap while removing it. The wrist strap prevents the flow of static electricity, which could damage the board.

3. Move the workstation or position yourself so that you are facing the option slots. The option slots are located on the side toward the rear of the workstation.

4. Open the metal panel located in front of the option slots by pulling up on the panel and lowering it down.

   NOTE: Look at the placement of the retention pin before you remove it. It hangs between the edge of the board set and the metal panel you just opened.

5. Remove the retention pin.

6. Remove the screw attaching the option board to the workstation slot which is located on the metal bracket on the upper left side of the board.

7. Pull the board out of the workstation

- Grasp the board with both hands, and pull it out of the slot.

- Set the board down on a flat, antistatic surface so that the side with the chips on it faces up.

8. If you are replacing the board, see the *IMPACT™ Workstation Owners Guide*.

9. If you are not immediately replacing the board, install the metal I/O panel. You need a Phillips screwdriver to do so.

CAUTION: The I/O panel is required to keep your graphics boards at the appropriate temperature and to prevent interference with other electrical equipment. See the *IMPACT™ Workstation Owners Guide* for more information.

10. Hang the retention pin so that it sits in front of the board set. The retention pin prevents the board set from moving away from the connectors.

11. Replace the cover. For instructions, see the *IMPACT™ Workstation Owners Guide*.

You have now finished removing the option board.

For detailed instructions on how to turn on the workstation, see the *IMPACT™ Workstation Owners Guide*.

5: SETTING UP NETWORK INTERFACE

This chapter explains how to set up the Network Interface Card (NIC) as a primary or secondary interface. Follow these instructions to set up the network interface.

1. Use the **cd** command to change the directory. Enter:
   ```
   cd /etc/config
   ```

2. Open the file **netif.options** using the text editor of your choice. If you are not familiar with **vi** or another text editor, please contact your system administrator.

3. To make the NIC the primary interface, locate the line:
   ```
   :  if1name=
   ```

   And change it to read:
   ```
   if1name=fe0
   ```

4. To make the NIC a secondary interface, choose the appropriate name line (i.e., if[2|3|4]name)
   ```
   :  if#name=
   ```

   And change it to read:
   ```
   if#name=fe0
   ```

   Replace the number sign (#) with the number of the appropriate device.

5. Save your changes. After rebooting the NIC will be set up as the interface you specified.

6: BASIC TROUBLESHOOTING

This chapter explains how to isolate and solve Phobos E100 EISA adapter problems.

1. Check cable length.

If the twisted-pair cable has an improper length or cable rating, the adapter may not function properly. Make sure the cable segment is compliant with 10Base-T or 100Base-TX recommendations. Maximum length for all types of cabling for this adapter is 100 meters.

2. Make sure link light is active.

The green link light on the back of the adapter should become active when the twisted-pair cable is plugged in. If the link light is not active then check the switch/hub on the other end of the cable and check the cable length, as described above.

3. Make sure speed setting is correct.

The speed of the adapter must be set to work with the current network configuration. The network speed is determined by the switch/hub that the adapter is connected to. As root, use **`fe_control`** to configure the speed of the adapter. If connected to a switch then the switch must also be configured properly.

4. Make sure interface is there using **`ifconfig`** and **`netstat`**.

`ifconfig` can be used to configure and display network interface information. The following example is from a class C network. Note that the netmask and **broadcast** fields of the **`ifconfig fe0`** output may differ due to a different network class and subnet configuration.

The following is an example of ifconfig:

```
~> /usr/etc/ifconfig fe0

fe0:flags=c63<UP,BROADCAST,NOTRAILERS,RUNNING,FILTMULTI,MULTICAST>
inet 123.45.678.90 netmask 0xffffff00 broadcast 123.45.678.255
```

Netstat displays the current routing tables including known subnets and traffic statistics. The "fe0" interface should appear in the right most column after the loopback interface "lo0". Also, use the **netstat** command to check the IP address for the default gateway. The following is an example of **netstat** use.

```
~> /usr/etc/netstat -rn

   Routing tables
Destination    Gateway         Flags MTU  RTT    RTTvar Use    Interface
127.0.0.1      127.0.0.1       UH    0    0.438  0.375  29308  lo0
123.45.678.90  127.0.0.1       UH    0    0.438  0.375  532846 lo0
default        123.45.678.111  UG    0    0      0      28689  fe0
123.45.675     123.45.678.111  UG    0    0      0      49067  fe0
123.45.676     123.45.678.111  UG    0    0      0      0      fe0
123.45.677     123.45.678.111  UG    0    0      0      0      fe0
123.45.678     123.45.678.90   U     0    0      0      853977 fe0
```

See the ifconfig (1m) and netstat (1) manual pages for more information on these commands.

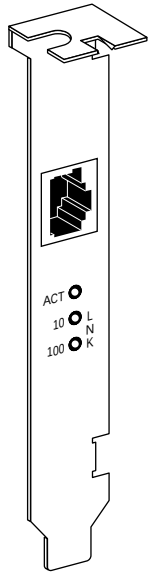
5. Make sure you can ping on the same subnet.

Ping is a utility used to test network operation. Being able to ping on the same subnet proves that the adapters are functioning and configured properly. Note that if a switch is being used, it must also be configured properly for ping to work. The following is an example of a ping on the same subnet.

```
~> /usr/etc/ping 123.45.678.91

PING  123.45.678.91 (123.45.678.91) :  56 data bytes

64 bytes from 123.45.678.91: icmp_seq=0 ttl=225 time=1 ms
64 bytes from 123.45.678.91  icmp_seq=1 ttl=225 time=1 ms
64 bytes from 123.45.678.91: icmp_seq=2 ttl=225 time=1 ms
64 bytes from 123.45.678.91: icmp_seq=3 ttl=225 time=1 ms

----123.45.678.91 PING Statistics-----
4 packets transmitted, 4 packets received, 0% packet loss
round-trip min/avg/max = 1/1/1ms
```

6. Check LEDs to make sure all are working properly. Each Phobos E100 EISA adapter has three LEDs, as shown in the figure below.

NOTE: The adapter must be physically connected to the network and network drivers must be loaded for the LEDs to work.



The following table summarizes Phobos E100 EISA Adapter LED functions.

LED	Description	Flashing	Steady	Off
10 LNK	Green: Shows link integrity and polarity reversal	Reversed cable polarity	Good 10Base-T connection between adapter and hub	No connection between adapter and hub
100 LNK	Green: Shows link integrity	Not applicable	Good 100Base-TX connection between adapter and hub	No connection between adapter and hub
ACT	Yellow: Indicates port traffic for either speed	Network traffic present	Not applicable	No traffic

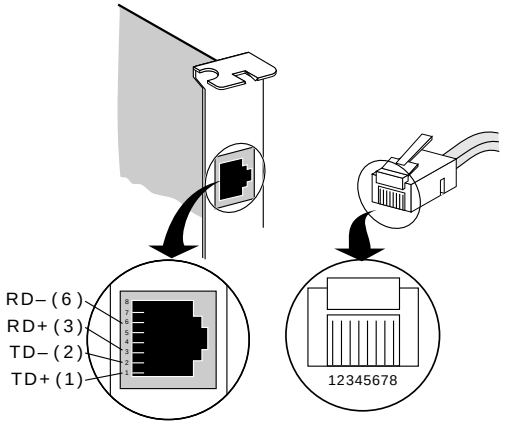
If you experience any problems, first make sure that the driver is loaded, that the proper cable is connected to the adapter port, and that the hub complies with the adapter specifications (10Mbps 10Base-T or 100Mbps 100Base-TX). Then recheck the LED.

A: SPECIFICATIONS

This appendix lists the specifications for the Phobos E100 EISA adapter. It also contains pin assignments for the adapter's RJ-45 connector.

ADAPTER CARD SPECIFICATIONS

Network Interface	10Mbps Ethernet 10Base-T	Ethernet IEEE 802.3 industrystandard for a 10Mbps baseband; CSMA/CD local area network
	100Mbps Ethernet 100Base-TX	Ethernet IEEE 802.3u for a 100Mbps baseband standard CSMA/CD local area network
Physical Dimensions	Length: Height:	15.764 cm (6.148 in) 10.641 cm (4.150 in)
Environmental Operating Range	Operating temperature: Humidity: Altitude:	0º to 70º C (32º to 158º F) 10 to 90% noncondensing To 3,000 meters (9,840 ft)
Power Requirements	Operating voltage:	+5V ± 5% @ 500 mA max +12V ± 5% @ 160 mA max



NOTE: When Category 5 UTP cable is used, the pin assignments are identical for 10Base-T and 100Base-TX.

CABLING REQUIREMENTS

When properly connected to a 10Base-T network, the Phobos E100 adapter operates in 10Base-T mode and supports standard 10Base-T cable topologies and types, including Category 3, 4, or 5 UTP for 10Mbps.

When properly connected to a 100Base-TX network, the Phobos E100 adapter operates in 100Base-TX mode and supports Category 5 cable only.

In either case, the cable, quality, distance, and connectors must comply with the EIA/TIA 568 "Commercial Building Wiring Standard" and the Technical Services Bulletin TSB38 standards.

The maximum UTP cable distance is 100 meters at either speed.

B: GLOSSARY

10BASE-T	The IEEE standard for a 10 megabit per second baseband network on twisted-pair cable.
100BASE-T	The IEEE standard for 100 megabit per second CSMA/CD over two pairs of Category 5 UTP or STP wire.
Bus	An electronic pathway along which signals are transmitted from one area of a computer to another.
Configuration	The software settings that allow different hardware components of a computer system to communicate with one another.
CSMA/CD	Carrier Sense Multiple Access with Collision Detection. A baseband protocol with a built-in collision-detection technique.
Driver	A program, usually resident in server or workstation memory, that controls the network hardware (such as adapters or controllers) or implements the protocol stacks through which higher-level applications communicate with the network hardware.
EISA	Extended Industry Standard Architecture. The EISA 32-bit extended AT personal computer bus architecture is compatible with the 16-bit ISA architecture and is found on SGI Indigo^{2TM} workstations.
Ethernet	A local area network standard defining a physical medium and its method of placing data, or packet signaling, on a cable. Access to the cable is based on CSMA/CD (carrier sense multiple access with collision detection).
Fast Ethernet	A 100 Mbps technology based on the 10BASE-T Ethernet CSMA/CD network access method.
Server	In a client-server computing environment, a device that provides access to network services, such as printers or applications.

Transceiver	A hardware device that links a node to a network cable and functions as both a transmitter and a receiver.
Twisted-pair	Wiring similar to that found in the telephone system, consisting of two insulated wires loosely twisted around each other to help cancel out induced noise in balanced circuits.

C: LICENSING AND SPECIFICATIONS

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FCC CLASS B CERTIFICATION

Icon West Incorporated
Model No: E100
FCC ID: DF63C97-TX
Made in U.S.A.

This device complies with Part 15 of FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

WARNING: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules, and the Canadian Department of Communications Equipment Standards entitled, "Digital Apparatus," ICES-003. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from the one which the receive is connected to.
- Consult the dealer or an experienced radio/TV technician for help.

The user may find the following booklet prepared by the Federal Communications Commission helpful: *The Interference Handbook*. This booklet is available from the U.S. Government Printing Office, Washington, D.C. 20402. Stock No. 004-000-00345-4.

For information regarding the "Declaration of Conformity" or the CE notice for this NIC please contact Phobos Corporation at 488 E. Winchester, Suite 100, Salt Lake City, UT 84107.

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