IP19 200/250 MHz Board Upgrade Installation Instructions

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Introduction

This guide describes how to install the 200/250 MHz IP19 board in a CHALLENGE, Onyx, or Reality Station system. It contains the following chapters:

- Chapter 1, “Overview,” provides a description of the 200/250 MHz IP19 board, including features, MFLOP ratings, allowable configurations, and software compatibility.
- Chapter 2, “Installation Instructions,” describes how to install the 200/250 MHz board in the customer’s system.
- Chapter 3, “Returning the Old IP19 Board,” describes the RMA procedure for the old IP19 boards.

Chapter 1

Overview

This chapter provides an overview of the 200/250 MHz IP19 CPU board.

1.1 Description

The 200/250 MHz IP19 is virtually identical to previous revisions of the IP19 board, with the exception of the features listed in the next section. The 200 MHz IP19 is currently available in 2 and 4 CPU versions; the 250 MHz IP19 is available in 1, 2, and 4 CPU versions.

1.1.1 IP19 200/250 MHz Features

The 200/250 MHz version of the IP19 board contains the following new features compared to previous versions of the IP19:

- a 200 or 250 MHz internal clock speed
- a 4 MB secondary cache per CPU
- two cache address jumpers per CPU (to accommodate the 4 MB cache)
- a new EAROM

1.1.2 Performance

The R4400 can issue up to 1 floating point instruction every other (internal) clock tick. The PEAK MFLOP rating for a single R4400 chip running at 200 MHz is 100 MFLOPs. Table 1-1 lists the PEAK MFLOP ratings for various IP19 boards:

Table 1-1 Comparison of PEAK MFLOPs for 100, 150, 200, and 250 MHz IP19 Boards

Board	CPU Type	Clock Speed (Internal)	PEAK MFLOPs Per Board
IP19	R4400	100 MHz	100 MFLOPs 200 MFLOPs
IP19	R4400	150 MHz	150 MFLOPs 300 MFLOPs

Table 1-1 Comparison of PEAK MFLOPs for 100, 150, 200, and 250 MHz IP19 Boards

Board	CPU Type	Clock Speed (Internal)	PEAK MFLOPs Per Board
IP19	R4400	200 MHz	200 MFLOPs 400 MFLOPs
IP19	R4400	250 MHz	250 MFLOPs 500 MFLOPs

1.1.3 Power Consumption and Heat Dissipation

Power consumption is approximately 144 watts per board. Heat dissipation is fairly close to the 150 MHz version of the IP19 board.

No additional power bricks (power boards) and off-line switchers are required for systems that are being upgraded from previous versions of the IP19 to the 200/250 MHz version. Also, there are no additional site power requirements as a result of the upgrade.

1.1.4 Environmental

Operating and non-operating conditions (humidity, temperature, altitude, and so forth) are unchanged.

1.2 Supported Configurations

The 200/250 MHz version of the IP19 board can be used in all CHALLENGE, Onyx, and Reality Station systems.

1.3 IP19 Compatibility–Mixing Different CPU Speeds/Cache Sizes

IP19 boards with different clock speeds and cache sizes can be mixed in a CHALLENGE or Onyx chassis provided it meets the following requirements:

- The system is running IRIX 5.3.

  Note: Prior to IRIX 5.3, cache management code in the IRIX OS demanded that all the processors have the same cache size. In IRIX 5.3, a per processor strategy permits the mixing of 1 and 4 MB cache. For additional background information see FIBs 458 and 501.

- The system uses the IP19s listed in Table 1-2.

Table 1-2 IP19 Boards That Can Be Mixed in a CHALLENGE or Onyx System

IP19 Board Type	Valid Part Numbers
One CPU, 100 MHz	030-0642-002 or later
Two CPUs, 100 MHz	030-0249-013 or later
Four CPUs, 100 MHz	030-0250-013 or later
One CPU, 150 MHz	030-0525-004 or later
Two CPUs, 150 MHz	030-0374-009 or later
Four CPUs, 150 MHz	030-0375-009 or later
Two CPUs, 200 MHz	030-0652-001 or later
Four CPUs, 200 MHz	030-0653-001 or later
One CPU, 250 MHz	030-0806-001 or later
Two CPUs, 250 MHz	030-0805-001 or later
Four CPUs, 250 MHz	030-0804-001 or later

Caution: Do not mix IP19s manufactured with fab P/N 034-0345-002 with IP19s manufactured with previous fabs (P/N 034-0250-002 or 034-0250-003) in the same system. This may cause the system to hang or in some cases cause a CMOS chip on the board to overheat and possibly smoke.

Note: If you are intermixing IP19 CPUs with different clock speeds you also need to install patch 676. This patch enables the IRIX 5.3 kernel to support mixed IP19 speeds and cache sizes configurations. Consult the product release notes for additional information.

1.4 System Software Requirements

The 200 MHz IP19 board works in any CHALLENGE, Onyx, or Reality Station system running IRIX 5.2 or later. The 250 MHZ IP19 board requires IRIX 5.3.

Note: If you are running the Audio/Serial Option (ASO or “SAMz”) with an IP19/250 MHz board, you must install the ASO software version 1.1 or later to support this configuration. Consult the product release notes as needed.

1.5 IO4 PROM Version Requirements

The IP19/250 upgrade requires IO4 PROM version 3.16 or higher. Patch 900 on the IP19/250 upgrade CD contains IO4 PROM revision 3.17. This patch must be installed for all IP19/250 upgrades.

The IP19/200 MHz upgrade is less restrictive and can operate with IO4 PROM version 3.14 or higher.

Chapter 2

Installation Instructions

This Chapter describes how to install a 200/250 MHz IP19 CPU board in an existing CHALLENGE or Onyx system.

2.1 Overview

Figure 2-1 provides an overview of the upgrade.

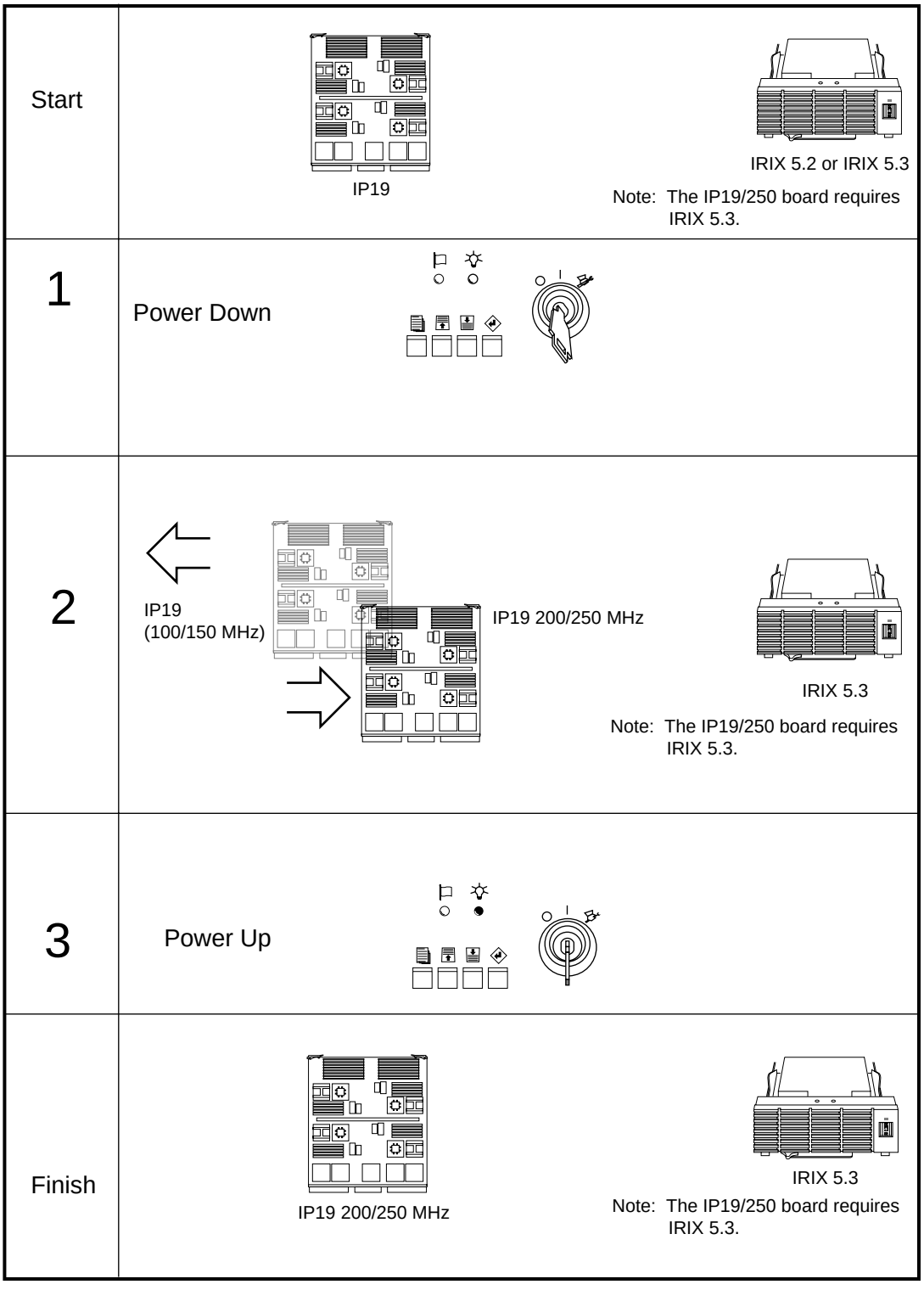

Figure 2-1 Overview of the IP19 200/250 MHz Upgrade

The steps to upgrade the system are:

- Ensure that the system is stable and is already at the latest level of retrofit modifications. See Section 2.2, “Verifying the System Revision Level.”
- Verify that you have all the required components before proceeding with the installation. See Section 2.3, “Checking the Kit Contents.”
- Verify that the customer’s system has been backed up.
- If you are intermixing IP19 boards with different speeds and cache sizes, verify that the board versions are compatible. See Section 2.4, “Mixing and Matching IP19 Boards.”
- If you are upgrading to the IP191/250 MHz board(s), reflash the IO4 PROMs to version 3.17. See Section 2.5, “Flashing the IO4 PROM for IP19/250 MHz Upgrades.”
- Power off the system and remove all 100 MHz and 150 MHz IP19 boards if necessary. Afterwards, install new 200/250 MHz IP19 boards. See Section 2.6, “Installing the New IP19 Board.”
- Install additional software patches as required. See Section 2.7, “Installing the S/W Patch CD.”
- Check the new configuration using the *hinv* command. See Section 2.8, “Verifying the System Configuration.”
- Pack and return the old IP19 boards with their SRAM SIMMs in place. See Chapter 3, “Returning the Old IP19 Board.”

2.1.1 Safety

Be sure to follow the safety guidelines outlined in this section, before proceeding with the installation procedures.

Warning: **Installation of these upgrades requires specific training and technical knowledge. These instructions are provided for use by Silicon Graphics system support engineers or other Silicon Graphics-trained personnel only. This equipment utilizes electrical power internally that is hazardous if the equipment is improperly disassembled.**

Caution: This equipment is extremely sensitive and is susceptible to damage caused by electrostatic discharge (ESD). ESD is an electrical discharge (spark) caused by the buildup of electrical potential on clothing and other materials. You must use proper ESD-preventive measures.

Follow these ESD-preventive measures:

- Connect a ground strap to your wrist when installing and removing peripherals.
- Be sure that you and all of the electrical equipment that you handle during this installation remain at a ground potential of zero to avoid damage from ESD.
- Remove a board from its antistatic bag only when you are properly grounded with a ground strap, and only when you are working on the board or installing it.

In addition, do not use an ohmmeter on a board.

2.2 Verifying the System Revision Level

Verify that the customer's system is at the retrofit-II level or later. The *CHALLENGE and Onyx Retrofit II Requirements* document (P/N 802-0113-001) describes the level at which a system must be to apply the retrofit II.

Note: Ensure that the system is stable and does not have any known problems.

2.3 Checking the Kit Contents

The major contents of the IP19 200/250 MHz upgrade kit are:

- IP19 200 MHz board (two CPUs P/N 030-0652-001 and four CPUs P/N 030-0653-001)
- IP19 250 MHz board (one CPU P/N 030-0806-001, two CPUs P/N 030-0805-001 and four CPUs P/N 030-0804-001)
- Shipping box in which to pack the old IP19 boards.
- RMA labels for old IP19s.

2.4 Mixing and Matching IP19 Boards

See Section 1.3, "IP19 Compatibility–Mixing Different CPU Speeds/Cache Sizes," for guidelines on intermixing different versions of the IP19 boards.

Note: If you are intermixing IP19 CPUs with different clock speeds you also need to install patch 676. This patch enables the IRIX 5.3 kernel to support mixed IP19 speeds and cache sizes configurations. Consult the product release notes for additional information.

2.5 Flashing the IO4 PROM for IP19/250 MHz Upgrades

The next part of the IP19/250 MHz upgrade process is to flash the IO4 PROM using code contained on patch 900 from the upgrade CD. The IP19/250 upgrade requires the IO4 PROM code level to be at 3.16 or higher. This new PROM code is necessary for the IO4 board to work with the IP19/250 board.

Note: Patch 900 on the upgrade CD contains IO4 PROM revision 3.17. PROM version 3.16 (which was shipped on earlier IP19/250 MHz systems) works properly, but 3.17 is recommended.

If you are upgrading to an IP19/200 MHz board, you do not need to reflash the IO4 PROM.

There are two ways to flash the IO4 PROM:

- under the IRIX operating system using *inst -f*

- through the command monitor (IO4 prompt) using *flash -T*

Either method produces the same result. However, the *inst -f* method is recommended, since it allows the system to have limited operability in case of a problem (see Section 2.5.2 for additional information). Just make sure that you do not reboot or issue the *halt* command if a failure should occur.

2.5.1 Checking the IO4 PROM Version

If you are not sure of the current IO4 PROM version, use one of these two methods.

- At an IRIX shell as superuser, type the following:

  ```
  # flashio -v
  ```

  You should see a message similar to the following.

  ```
  Slot 5: Flashprom version is 317
  ```

- Bring the system to the command monitor level.

  At the command monitor (IO4) prompt, enter:

  ```
  >> version
  ```

  You should see a display similar to the following.

  ```
  IO4 PROM Monitor SGI Version 3.14 Rev A IP19
  ```

  Note: The number 3.14 indicates that the IO4 PROM has been previously flashed with an IRIX 5.2.

2.5.2 Flashing the IO4 Under IRIX (inst -f)

This is the recommended IO4 flashing method. Follow the steps given below in this section to flash the IO4 PROM with IRIX running.

Caution: If the installation fails, do *not* reboot or halt the system. Instead, retry the installation. If the installation continues to fail, continue running the system until a replacement IO4 board can be obtained**.**

It is very important to have the system running, so that the operating system tools and commands can be available to diagnose failures.

1. Using an ASCII terminal, boot the system and log in as root.

   Note: It is possible to run this procedure using a graphics monitor; however, it is generally safer to run the steps through an ASCII terminal in case the graphics subsystem fails during installation.

2. (*Optional*) On a laptop computer, turn on the record option, or open up a script file so that you can record and later review problems that may occur during the upgrade.

3. Create a copy of the current IO4 flash code by typing the following command:

   ```
   # cp /usr/cpu/firmware/IO4prom.bin /usr/cpu/firmware/io4prom.bin.save
   ```

   Note: If the installation fails, you can use the original code to reflash the IO4 board.

4. If a CD-ROM drive is not already installed on the system, install it now.
5. If required, mount the CD-ROM drive as shown in the following example:

   mount -r /dev/dsk/dks0d*n*s7/CDROM

   where *n* is the address of the CD-ROM reader.
6. Install the IO4 PROM software from the upgrade CD distribution media using *inst*:

   inst -f /CDROM/dist/io4prom

   This copies a new PROM image (version 3.17) from the distribution CD (from patch 900) and reflashes the contents of the flash PROM in the IO4. This new flash code is required to boot the IP19/250 board and is backwards-compatible with other versions of the IP19 board. If multiple IO4 boards are present, all of these boards are flashed with the new PROM contents as well.

   Note: No further steps are required to reflash any of the boards, including the IO4, GE10, or the old IP19.
7. You should then see a display similar to the following:

```
Default location of new software is xxxxxx

If you are a first-time inst user, give the command “help beginner”.

Inst Main Menu

 1. from [source]                Specify location of software to be installed
 2. list [keywords] [names]      Display information about software subsystems
 3. go                           Perform software installation and removal now
 4. install [keywords] [names]   Select subsystems to be installed
 5. remove [keywords] [names]    Select subsystems to be removed
 6. keep [keywords] [names]      Do not install or remove these subsystems
 7. step [keywords] [names]      Enter interactive mode for instal/remove/keep
 8. versions [args]              Get information about installed software
 9. help [topic]                 Get help in general or on a specific word
10. admin                        Go to the Administrative Commands Menu
11. quit                         Terminate software installation
```

8. At the *inst* main menu, enter **list** to verify the software:

```
Inst> list

Reading installation history database
Reading product description from /CDROM/dist/io4prom:

io4prom IO4prom for 32bit OS systems, 5.3

i = installation requested           I = already installed
r = removal requested                X = older version installed
k = no action/keep existing version  N = newer version installed

* = default subsystem at initial installation
@ = subsystem must be installed from the miniroot
+ = subsystem required for basic system functionality

Subsystems available for installation (list installable):

Subsystem Description
```

```
i io4prom.sw.prom * IO4prom binary
```

9. After verifying that the correct software is called out, enter **go** to begin installation.

```
Inst> go

Computing disk space changes:

Installing new versions of selected io4prom.sw subsystems

Installation and/or removal succeeded.
You can insert another tape or CD-ROM now.
Type "quit" if you are ready to leave the installation tool.
```

10. When the installation has completed, enter **quit**.

```
Inst> quit
#
```

If you see the following error message during this process, the IO4 board may be bad:

```
IO4 was not flashed correctly
```

If you see this message, do not reboot or halt the system until you can replace the IO4 board with a new board. After the IO4 board is replaced, return to this procedure to reflash the replacement IO4.

11. When the IO4 is successfully flashed, shut down IRIX with the *shutdown* command:

```
shutdown 0
```

12. Power off the system by turning the key on the System Controller panel.
13. Shut off the circuit breaker on the back of the system chassis.

You are now ready to install or swap out the IP19 boards. Proceed with Section 2.6, "Installing the New IP19 Board."

2.5.3 Flashing the IO4 Through the Command Monitor (flash -T)

A second way to flash the IO4 PROM is to use the *flash -T* command through the command monitor. Some SSEs may prefer the command monitor method since it flashes only the microcode in the IO4 PROM, whereas the *inst-f* method flashes the microcode in both the IO4 PROM and the system disk.

If you have a flashing failure while using the *inst-f* method, you can potentially damage both the IO4 board and the hard disk. However, this problem is unlikely to occur. If you have a flashing failure using the command monitor method, the problem is limited to the IO4 board.

Follow these steps to flash the IO4 PROM through the command monitor:

1. Using an ASCII terminal, boot the system and log in as root.

Note: It is possible to run this procedure using a graphics monitor; however, it is safer to run the steps through an ASCII terminal in case the graphics subsystem fails during installation.

2. Load the upgrade CD-ROM into the drive. If you do not have a CD-ROM, see steps 4 and 5 in Section 2.5.2, “Flashing the IO4 Under IRIX (inst -f).”

3. At the command monitor (IO4) prompt, enter:

   >> version

   You should see a display similar to the following.

   ```
   IO4 PROM Monitor SGI Version 3.14 Rev A IP19
   ```

   Note: The number 3.14 indicates that the IO4 PROM has been previously flashed with an IRIX 5.2.

4. Enter **hinv** to find the controller number and ID number of the CD-ROM. You should see a display line similar to the following:

   ```
   SCSI controller 0 cdrom(5)
   ```

   Note: The display line specifies the controller number 0 and the ID number 5. This is *very important* information. You need to use these numbers later to access the contents of the CD-ROM to flash the IO4 PROM.

5. Check if you can communicate with the CD-ROM by typing the following:

   >> ls dksc(scsi controller#**,**CD-ROM ID**#,8)**

   Note: The number 8 is the volume header section.

   Using the values obtained in our example, the command line would be:

   ```
   >> ls dksc(0,5,8)io4prom
   ```

   You should see a listing of the contents of the CD-ROM.

6. If you are able to communicate with the CD-ROM, flash the IO4 with the following command:

   >> flash -T dksc(scsi controller#**,**CD-ROM ID**#,8)io4prom**

   Using the values obtained in our example, the command line would be:

   ```
   >> flash -T dksc(0,5,8)io4prom
   ```

   Caution: Be sure to specify the -T (total) option. If you don’t, only a portion of the IO4 PROM is erased by the *flash* command. As a result, there may not be enough memory space for the new IO4 PROM image and the flashing process will then fail.

7. Reboot or reset the system after the flashing process is complete and proceed to Section 2.6, “Installing the New IP19 Board.”

2.6 Installing the New IP19 Board

To install the new, 200/250 MHz IP19 board, follow these steps:

1. Verify that the system has been backed up and that the backups are good.

2. Log in as *root*, then shut down IRIX using the *shutdown* command:

   shutdown -g0

3. Turn the keyswitch on the System Controller Panel to **Off**.

4. Turn off the breaker on the back of the chassis.
5. Open the doors to the system.
6. Open the front card cage I/O door (deskside) or the door to the first card cage (rackmount).
7. Locate and remove all IP19 boards.
8. Install any 200 or 250 MHz IP19 boards that are part of this upgrade.
9. Close the I/O door(s).
10. Close the chassis doors.

You are now ready to verify the hardware installation.

2.7 Installing the S/W Patch CD

The IP19/250 MHz upgrade requires patch 900 and patch 676 as of the date of this publication. You may be required to install additional software patches from the patch CD.

Note: For the additional patch information, consult the product release notes and check the patch distribution server, *patches.csd*. This server provides up-to-date patch information when you log on to the system.

The patch software installs through the miniroot. Follow these steps to select a patch for installation:

1. At the Inst prompt, enter:

   `Inst> install patchSG`*xxxxxxx*

   where *xxxxxxx* is the number of the patch you wish to install.

   Caution: You must specify each required patch, since you cannot install all the patches at one time. For example, if you give the command *install default*, you see the error `desktop_tools.sw.tools requires desktop_eoe.sw.fam 1019999999`.

   Select the desired patches for installation.

2. Once all the patches are installed, enter **`quit`** to exit from Inst.

2.8 Verifying the System Configuration

Follow these steps to verify that the system recognizes the new, 200 or 250 MHz IP19 board that you installed:

1. Turn on the circuit breaker at the rear of the system chassis.
2. Turn the keyswitch on the System Controller Panel to **On**.
3. Bring the system up to the System Maintenance Menu.
4. At the System Maintenance Menu, select option 5, Command Monitor.

5. At the Command Monitor prompt (>>), use the *hinv* command to verify that the IP19 board is correctly recognized:

   ```
   >> hinv
   ```

   You should see a listing similar to the following:

   ```
   4 200 <or> 250 MHZ IP19 Processors
   CPU: MIPS R4400 Processor Chip Revision: 6.0
   FPU: MIPS R4010 Floating Point Chip Revision: 0.0
   Data cache size: 16 Kbytes
   Instruction cache size: 16 Kbytes
   Secondary unified instruction/data cache size: 4 Mbytes
   Main memory size: 256 Mbytes, 2-way interleaved
   I/O board, Ebus slot 11: IO4 revision 1
   Integral EPC serial ports: 4
   Integral Ethernet controller: et0, Ebus slot 11
   Integral SCSI controller 1: Version WD33C95A
   Disk drive: unit 2 on SCSI controller 1
   Integral SCSI controller 0: Version WD33C95A
   Disk drive: unit 1 on SCSI controller 0
   Integral EPC parallel port: Ebus slot 11
   VME bus: adapter 0 mapped to adapter 45
   VME bus: adapter 45
   ```

   The above listing shows a board with 4 CPUs.

   Note: If you are mixing IP19 boards with different cache sizes (for example 1 MB with 4 MB), be aware that IRIX 5.3 *hinv* shows only the cache size of the master CPU board (that is, the CPU in the lowest numbered slot).

6. If the IP19 board is not recognized, shut down the system and reseat the board. If it is still not recognized, the board may be bad. Obtain a replacement IP19.

7. If the board is recognized, exit from the Command Monitor with the following command:

   ```
   >> quit
   ```

   You are ready to start the system and finish the installation.

2.9 Finishing the Installation

The final step to installing a 200/250 MHz IP19 board is to reboot the system.

1. At the System Maintenance Menu, enter option 1, Start System.
2. The system boots to multiuser mode.

You are finished installing the IP19 board. You are now ready to repack the old IP19 board and send it back to the factory. For RMA instructions, see Chapter 3, “Returning the Old IP19 Board.”

Chapter 3

Returning the Old IP19 Board

All IP19 boards that have been replaced must be returned. This procedure is not optional. Shipping boxes are included in the upgrade kit; if you need more board boxes, you may have to order them before all of the boards can be returned.

3.1 Packing the Board

Pack the old IP19 board in the box and antistatic bag provided. Ensure that the board is packed to withstand the rigors of surface and air freight transportation.

Caution: Boards must be shipped in antistatic bags.

3.2 Labeling

Label the boxes with the RMA labels provided. Make sure that the following address and the RMA numbers are clearly marked on each label:

Silicon Graphics, Inc.
Receiving Department
Building 11, Dock B
2081 N. Shoreline Blvd.
Mountain View, CA 94043

RMA number

3.3 U.S. Shipping Instructions

Use the following instructions to return the old IP19 in the U.S. only:

1. Call Federal Express at their toll-free number: (800) 238-5355.
2. Provide the carrier with the following information:
   - RMA number
   - Sales order number

- Number of pieces to ship
- Total weight
- Silicon Graphics destination address

3. If you need further assistance, call the Silicon Graphics Traffic Department at (415) 390-1243.

3.4 Canada Shipping Instructions

Use the following instructions to ship the old IP19 board in Canada:

1. Call CanPack International at their toll-free number: (800) 661-5117.
2. Request voice-mail box 261.
3. At the appropriate voicemail prompt, please provide the following information:
   - Identify yourself as a Silicon Graphics RMA customer.
   - Your company name.
   - Address, suite number (if applicable), province, and postal code.
   - Your name or alternate contact name and telephone number.
   - Approximate weight of boxes to be returned.
   - Valid Silicon Graphics Return Authorization Number (RMA).
4. If you have any questions or need further assistance, contact Van Dremmel at (415) 390-1641

3.5 International Shipping Instructions

Use the directions described in this section to ship the old IP19 board from an international site (not the U.S. or Canada). The general shipping instructions are as follows:

- Pack the board in the shipping container provided.
- Complete the shipment documentation as follows:
- Contact the applicable SkyNet branch in your region (see Table 3-1). SkyNet is the required shipping vendor.
- Give the package to SkyNet and retain the gold copy (last sheet) of the airway bill as your receipt.

3.5.1 Shipping Documentation

You must provide three types of shipping documents to the SkyNet shipper:

- a Commercial Invoice
- an International SkyNet Airway Bill

- a Declaration of Free Entry of Returned American Goods

Note: This declaration should already be completed for you.

The following sections describe how to complete each of the three types of shipping documents.

3.5.1.1 Commercial Invoice

Complete the following information:

1. Fill in the "Shipper/Exporter" section of the commercial invoice with the following information:
   - company name
   - address
   - city
   - country
2. Indicate the desired shipping date.
3. Check the appropriate box in the field "CHK ITEM RETURNING."
4. Indicate the quantity being returned, the appropriate extended value, and the total invoice amount.
5. List the total number of boxes for shipment and their approximate total weight.
6. Sign your name in the signature section of the invoice.

3.5.1.2 International SkyNet Airway Bill

Complete the form as follows:

1. Fill in the date.
2. Provide the following information:
   - company name
   - address
   - city and country
3. Provide your telephone number.
4. List the total number of boxes for shipment and their approximate total weight.
5. Sign the airway bill in the "Shipper's Signature" section.

Afterwards, insert the three documents into the packing slip envelope and be sure to keep the gold copy (last sheet) of the airway bill.

Note: Do not seal the envelope.

3.5.2 SkyNet International Directory

See Table 3-1 to find the applicable SkyNet branch and phone number for your country.

Note: If you cannot find an appropriate SkyNet branch office, or if you have difficulty reaching the SkyNet group, use the following phone number and information: (415) 692-9500 in Burlingame, California. Contact person—Charlene

Table 3-1 International SkyNet Branch Offices and Phone Numbers

City, Country	Company Name	Phone Number
Asuncion		59521443785
Athens, Greece		3016472212
Auckland, New Zealand		93782106
Bogota, Columbia		5712131679
Bangkok, Thailand		662541308
Berlin, Germany	Die Expressboten	4930850088
Bombay, India	Sky Couriers	91226349747
Brussels, Belgium		3232426360
Buenos Aires, Argentina		5413949190
Caracas, Venezuela	Sky Courier Int'l	5827818210
Copenhagen, Denmark		4532523555
Dublin, Ireland		35318426211
Dusseldorf, Germany	SkyNet	49211370136
Frankfurt, Germany	West Air Courier	4969780087
Geneva, Switzerland	Schneider's	41227984468
Guatemala		5022310805
Hamburg, Germany	Der Courier / SkyNet	4940291917
Hong Kong		8527731997
Istanbul, Turkey		9012522774
Jakarta, Indonesia		6221712855
Johannesburg, South Africa		27113922596
Kuala Lumpur, Malaysia		6037336257
Lima, Peru		5114331717
Lisbon, Spain		35119425732
London, England	Sky International	44895445580
Madrid, Spain	Sky Courier Int'l	3417263007

Table 3-1 (continued) International SkyNet Branch Offices and Phone Numbers

City, Country	Company Name	Phone Number
Manila, Philippines		6327351
Mexico City, Mexico	SkyNet de Mexico	5256892944
Milan, Italy	Intl Cargo Systems	392702000004
Montivideo, Uruguay		5982960505
Montreal, Canada		5143933464
Munich, Germany	SkyNet	498958045
Oslo, Norway		472120020
Paris, France		33142941363
Rio de Janiero, Brazil		55213933977
Rome, Italy	Intl Cargo Systems	03965506008
San Jose		506315859
San Juan, Puerto Rico		8097581670
Santiago, Chile		5626985289
Sao Paulo, Brazil	Fex Express	55112410344
Seoul, Korea	Air Couriers, Int'l	8227113030
Singapore		652849946
Stockholm, Sweden	Spedman / Courex	4687978940
Sydney, Australia	SkyNet	6123164855
Taipei, Taiwan	Zip Express	88627603729
Tel Aviv, Israel		9723373972
Tokyo, Japan	Nissin Air Cargo	81476326506
Toronto, Canada	Elite Link	4168471072
Vancouver, Canada		6046889915
Vienna, Austria	ASAP / SkyNet	432227129652
Zurich, Switzerland	Schneider's	41181463699