IP25 Upgrade Installation Instructions

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Document Number 108-0142-001

Silicon Graphics, Inc.
Mountain View, California

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Introduction

This guide describes how to install an IP25 board in a CHALLENGE™, POWER CHALLENGE™, Onyx®, POWER Onyx™, or Reality Station™ system. It contains the following chapters:

- Chapter 1, “Overview,” provides a description of the IP25 board, including features, allowable configurations, and software compatibility.
- Chapter 2, “Installation Instructions,” describes how to install the IP25 board in the customer’s system.
- Chapter 3, “Returning the Old CPU Board,” provides brief instructions for returning the old CPU boards.

Chapter 1

Overview

This chapter provides an overview of the IP25 CPU board.

1.1 Description

The IP25 CPU board is similar to the IP19 CPU boards in several ways:

- support for 1, 2, and 4 processors
- bus interface using the same A and D chip set as on the IP19
- bus tags for coherency checking

1.1.1 IP25 Features

The IP25 board contains the following features that are different from the IP19:

- the CPU is mounted on a separate circuit board assembly, called a processor-integrated memory module (PIMM)
- the PIMM uses a solderless land-grid array (LGA) connector
- the cache RAM is mounted directly onto the PIMM (as opposed to the IP19 SIMMs)
- the MIPS® R10000™ processor
- a 1 MB or 2 MB secondary cache per CPU, 2-way set associative, clocked at 133 MHz
- a system interface running at 80 MHz
- synchronous SRAMs for bus tags (as opposed to the IP19 asynchronous SRAMs)
- a new cache-coherency controller, the SCC, to support 2-way cache and other R10000 features; the SCC is mounted directly to the IP25 using ball-grid array (BGA) technology

Figure 1-1 shows the IP25 board.

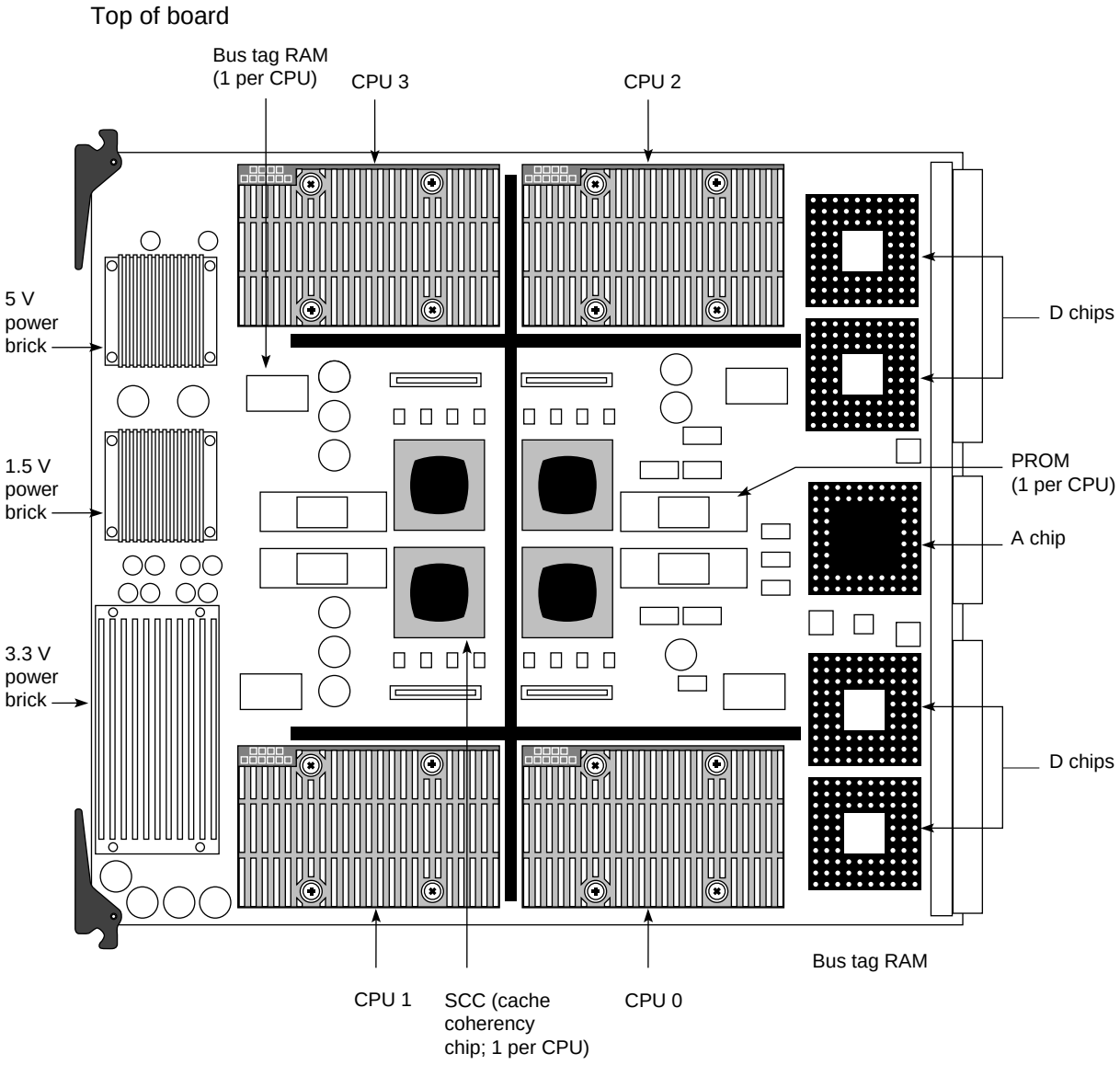

Figure 1-1 The IP25 CPU Board

1.1.2 Power Consumption

Power consumption is approximately 40 watts per PIMM. Each CPU consumes approximately 30 watts, and the secondary cache consumes about 10 watts. Thus, a four-CPU IP25 consumes approximately 160 watts.

No additional power bricks (power boards) and off-line switchers are required for systems that are being upgraded from previous CPU boards. Also, there are no additional site power requirements as a result of the upgrade.

1.1.3 Environmental

Operating and non-operating conditions (humidity, temperature, and altitude) are identical to other Challenge and Onyx CPU boards (IP19, IP21).

1.2 Hardware Compatibility

You cannot mix the IP25 CPU board in a system with other IP boards (IP19 and IP21). You must remove those boards before installing an IP25 CPU board.

The IP25 CPU board can be installed in any CHALLENGE and Onyx rackmount and deskside system, including the Reality Station. It is compatible with all current graphics options, including InfiniteReality™.

1.3 Supported Configurations

The IP25 CPU board can be used in all CHALLENGE and Onyx deskside and rackmount systems, including Reality Station. The following sections describe configurations and limitations.

1.3.1 Supported Graphics Types

Supported graphics configurations are:

- InfiniteReality
- Reality Engine^{2}™
- Extreme™ graphics
- VTX™ graphics

1.3.2 IP25 Compatibility–Mixing Different CPU Board Types

You cannot mix IP25 boards in systems with other CPU board types (such as IP19 and IP21). In order to use IP25 boards in a CHALLENGE and Onyx system you must remove any other type of CPU board.

1.4 System Software and Patch Requirements

The IP25 board requires IRIX 6.2 MR, or later. Beta versions of IRIX 6.2 must be upgraded, since they do not contain support for the IP25.

As of this writing, several patches are required:

- Patch 1295 for IRIX 5.3, 6.0, 6.0.1, and 6.1 systems
- Patch 1296 for IRIX 5.2 systems.
- Patch 1353 (or 1243)

Check the server *patches.csd* or the Web URL *http://bits.csd.sgi.com/digest/patches/recommended/* for the latest patch information.

1.5 IO4 PROM Version Requirements

When you install patch 1295 or 1296, the IO4 PROM is automatically brought up to revision level 4.XX (the latest revision was 4.19 at the time of this writing).

Chapter 2

Installation Instructions

This chapter describes how to install an IP25 CPU board in an existing CHALLENGE or Onyx system.

2.1 Overview

Figure 2-1 provides an overview of the upgrade.

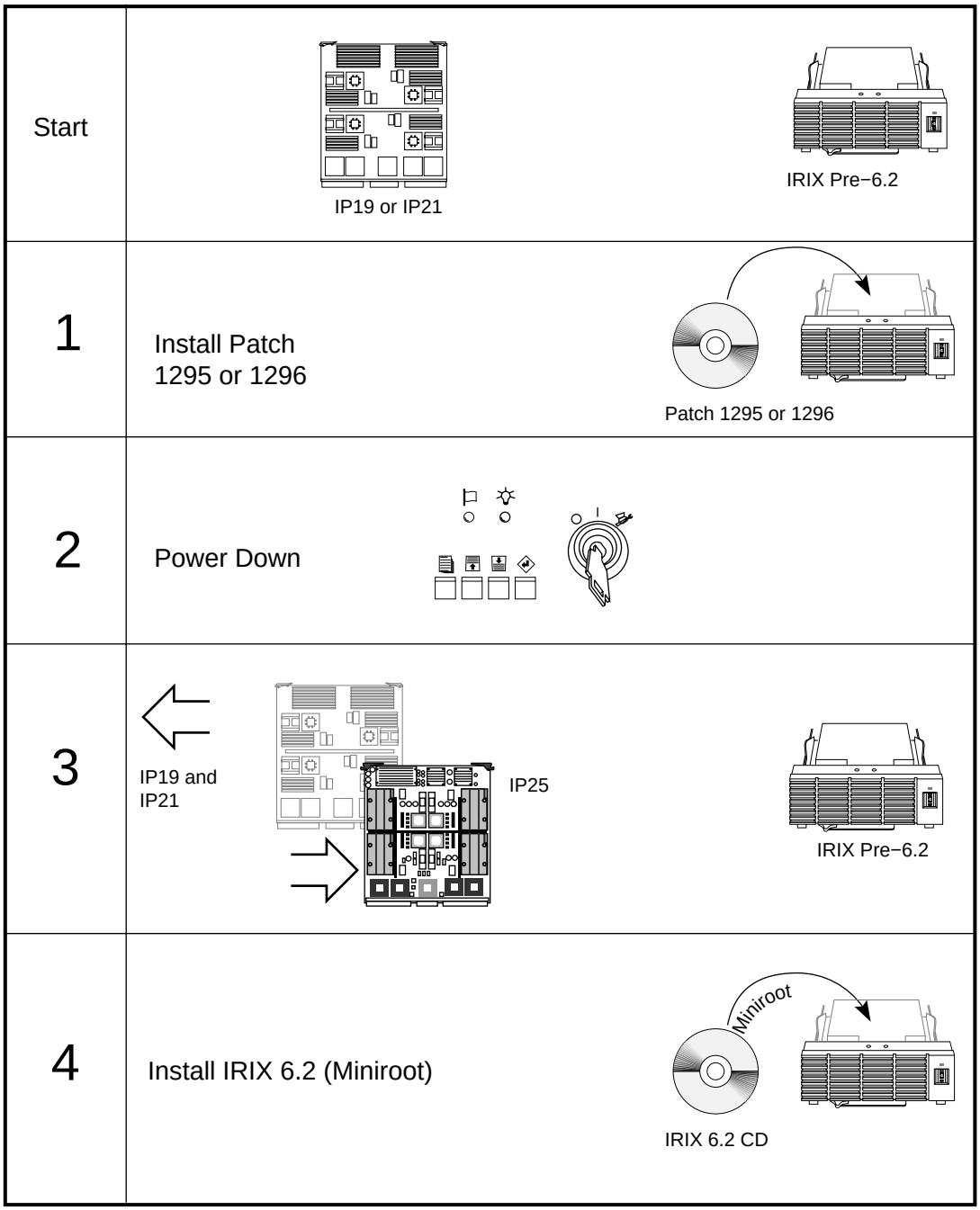

Figure 2-1 Overview of the IP25 Upgrade (Part 1 of 2)

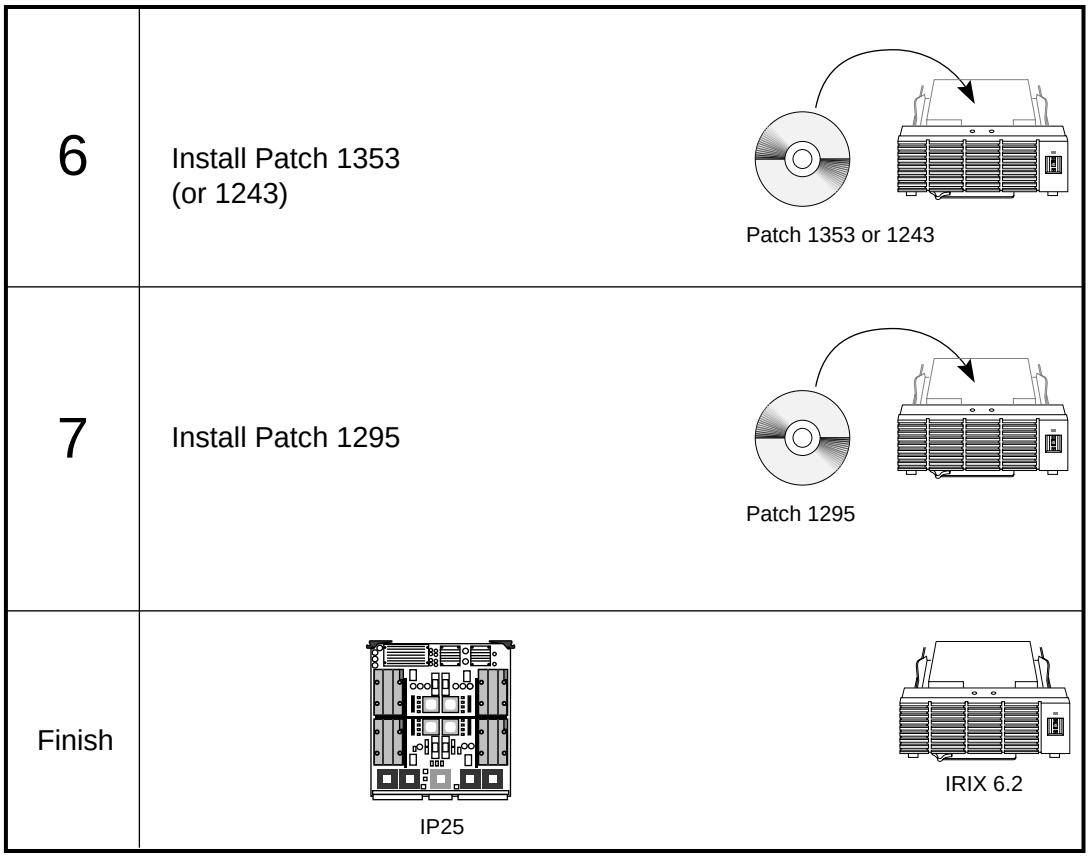

Figure 2-2 Overview of the IP25 Upgrade (Part 2 of 2)

The steps to upgrade the system are:

1. Ensure that the system is stable.
2. Verify that you have all the required components before proceeding with the installation. See Section 2.2, “Checking the Kit Contents.”
3. Verify that the customer’s system has been backed up.
4. Install patch 1295 (for IRIX 5.3, 6.0, 6.1, and 6.0.1 systems) or patch 1296 (for IRIX 5.2 systems.) See Section 2.3, “Installing Patch 1295 or Patch 1296.”
5. Power off the system, remove all other types of CPU boards, and check the card guides for excessive flex. Afterwards, install new IP25 boards. See Section 2.4, “Installing the IP25.”
6. Check the new configuration using the PROM *hinv* command. See Section 2.5, “Verifying the System Configuration.”

7. Install IRIX 6.2. See Section 2.6, “Installing IRIX 6.2.”
8. Install patch 1353. Section 2.7, “Installing Patch 1353 (or 1243) and Patch 1295 on IRIX 6.2.”
9. Install patch 1295. You must do this even if you installed patch 1295 earlier.
10. Pack and return the old CPU boards with their SRAM SIMMs in place. See Chapter 3, “Returning the Old CPU 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 and the chassis 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 Checking the Kit Contents

The major contents of the IP25 upgrade kit are:

- IP25 CPU board
- Shipping box in which to pack the old CPU boards.
- RMA form that the customer should return with the old CPU board.

Note: The RMA procedure has changed from prior upgrades. Be sure to read Chapter 3, "Returning the Old CPU Board" for new instructions.

You will also need to have the following patches available:

- Patch 1295
- Patch 1296
- Patch 1353 (or 1243 if 1353 is not available)

The above list is accurate as of this writing. However, you may wish to check the server *patches.csd* or the Web URL *http://bits.csd.sgi.com/digest/patches/recommended* to see if there are newer patches.

2.3 Installing Patch 1295 or Patch 1296

Patches 1295 and 1296 correct a potential problem with the IO4 PROM code and the *flashio* binary that can affect the IO4 boards in any CHALLENGE or Onyx deskside or rackmount system. The problem is that in rare cases, the version of the *flashio* binary that is on the system disk incorrectly flashes the main IO4 board when upgrading to IRIX 6.2. The result is that the system cannot be booted until you replace the main IO4 board.

The solution is to install these patches both *before* you install the IRIX 6.2 upgrade and *after* you install 6.2. The patches contain new firmware code for the IO4 PROMs and a new *flashio* binary. Table 2-1 describes which patches to install and which installation method to use (miniroot or live installation).

Table 2-1 Summary of Installation Methods for Patches 1295 and 1296

IRIX Version	Install Patch	Miniroot Installation?	Live Installation?
6.2 (after upgrading)	*dist/patchSG0001295.eoe_sw.unix* (Patch 1295 for 6.2)	No	Yes
5.3, 6.0, 6.0.1, 6.1	*dist/patchSG0001295.eoe1_sw.unix* (Patch 1295)	No	Yes
5.2	*dist-5.2/patchSG0001296.eoe1_sw.unix* (Patch 1296)	Yes	No

2.3.1 Installing Patch 1295

The procedure to install the patch on an IRIX 5.3, 6.0, 6.0.1, or 6.1 system is as follows:

1. Start Software Manager (*swmgr*) or Inst (*inst*).

   Note: You *must* perform a live installation. You *cannot* install this patch from the miniroot.

2. Use the CD containing patch 1295 and 1296 as the distribution source. The CD can be in a local CD-ROM drive or a remote CD-ROM drive.
3. Select *dist/patchSG0001295.eoe1_sw.unix* for installation.
   - With Software Manager, check the box for patchSG0001295.eoe1_sw.unix.
   - With Inst, type **`install dist/patchSG0001295.eoe_sw.unix`** and press <**`Enter`**>.
4. Start the installation.
   - With Software Manager, click the Start button.
   - With Inst, type **`go`** and press <**`Enter`**>.
5. When the patch is installed, quit from the installation program.
   - With Software Manager, pull down the File menu and select Quit.
   - With Inst, type **`quit`** and press <**`Enter`**>.

You are now ready to install the IP25 CPU board. Proceed with Section 2.4, “Installing the IP25.”

2.3.2 Installing Patch 1296

The procedure to install the patch 1296 for an IRIX 5.2 system is as follows:

1. Before upgrading, shut the system down.
2. Load the patch CD containing patch 1295 and 1296 into a CD-ROM drive. The CD can be in a local CD-ROM drive or a remote CD-ROM drive.
3. From the System Maintenance menu, select the option to install system software.

   Note: You *must* perform a miniroot installation You *cannot* perform a live installation.

4. When prompted, indicate the location of the CD-ROM drive that contains the patch CD. The miniroot loads, during which time you see a variety of messages, and finally the `Inst>` prompt.
5. Type **`install dist-5.2/patchSG0001296.eoe1_sw.unix`** and press <**`Enter`**>.
6. Type **`go`** and press <**`Enter`**>.
7. When the installation is complete, type **`quit`** and press <**`Enter`**>. Inst displays some messages, then the system reboots.

You are now ready to install the IP25 CPU board. Proceed with Section 2.4, “Installing the IP25.”

2.4 Installing the IP25

To install IP25 CPU board, you

- verify the existing IRIX / (root) and */usr* filesystem layout
- shut down the system and remove the old CPU boards
- check the chassis card guides for excessive flex.
- install the IP25 board

2.4.1 Verifying the Existing IRIX Filesystem Layout

Starting with IRIX 5.2, customers had the option of combining the / (root) and */usr* filesystems into a single, large root filesystem. However, not all installations may be configured this way. Some may have separate / (root) and */usr* filesystems and some may have a single, large root filesystem.

With IRIX 6.2, a single, large root filesystem is the standard configuration. This difference may require extra steps during the IRIX upgrade process to work around possible problems.

Verify the layout of the existing IRIX filesystems:

1. Log in as *root*.
2. Enter the following command at a shell prompt:

   ```
   df -kl
   ```

3. Check the output of the *df* command to see if there are separate or combined root and */usr* filesystems.

   If there are separate / (root) and */usr* filesystem, you see output similar to this:

   ```
   Filesystem    Type   kbytes   use     avail   %use   Mounted on
   /dev/root     efs     15365     9472    5893  62%    /
   /dev/usr      efs    954492   748822  205670  78%    /usr
   ```

   If there is a single, large root filesystem, you see output similar to this:

   ```
   Filesystem    Type   kbytes   use     avail   %use   Mounted on
   /dev/root     efs    969857   871720  98137   90%    /
   ```

4. Make a note of which type of layout is on the customer's system, and how much space is available. You will need this information when you reach Section 2.6, "Installing IRIX 6.2."

If the customer has separate / (root) and */usr* filesystems, you will have to work around this constraint during the IRIX 6.2 upgrade.

2.4.2 Shutting Down the System and Removing Existing CPU Boards

Follow these steps to shut down the system:

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 the existing (non-IP25) CPU boards.

You are now ready to check the chassis card guides for excessive flex.

2.4.3 Checking the Chassis Card-Guides for Excessive Flex

Some earlier models of CHALLENGE and Onyx systems use card guide supports that may flex excessively under the added weight of the IP25 board. Problems that can occur as a result of this flex include the following:

- If the system is moved with the logic boards installed, electrical contacts between the midplane and various system boards can become loose, leading to POKA failures at startup and general system failures.
- The connectors between a heavy board (such as the IP25) and the midplane may not line up correctly during installation, which can cause the connector pins to become crushed when you attempt to lock the board in place
- A heavy board can disengage from the top card guide during installation, and fall over onto a neighboring board, potentially damaging both boards.

If the card guide supports flex excessively, advise the customer of the following:

- Their system uses older style card guide supports that cannot be upgraded in the field.
- Transporting this chassis with new, heaver logic boards (such as the IP25) installed is not a supported configuration.
- The system will function normally as long as the customer does not move it and otherwise subject it to jostling and other physical stress.
- The system can be moved without damage if
  - the logic boards (such as the CPU, memory, and IO4 boards) are first removed by a trained service technician
  - they are transported in proper containers
  - they are reinstalled into the chassis after transport
- The customer may wish to purchase a new chassis if he or she expects to move the chassis often.
- Reiterate that the system will function properly as long as it is not moved with the logic boards installed.

2.4.4 Installing the New CPU Board

To install the new CPU board, follow these steps:

1. *Recommended:* Remove the blower assembly above the card cage.

   Removing the blower assembly above the card cage allows you to visually inspect the connectors between the board and the midplane to be sure the board is properly aligned before you lock it in place.

   Also, you can grasp the top of the board through the opening at the top of the card cage to help stabilize, support, and guide the board into place.
2. Install any IP25 boards that are part of this upgrade. They slide into the chassis the same way as other CPU boards (such as the IP19).
3. If you removed the blower assembly, reinstall it now.
4. Close the I/O door(s).
5. Close the chassis doors.

You are now ready to verify the hardware installation.

2.5 Verifying the System Configuration

Follow these steps to verify that the system recognizes the IP25 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 IP25 board is correctly recognized:

   ```
   >> hinv
   ```

   You should see a listing similar to the following:

   ```
   4 200 MHZ IP25 Processors
   CPU: MIPS R10000 Processor Chip Revision: 2.5
   FPU: MIPS R10010 Floating Point Chip Revision: 0.0
   Data cache size: 32 Kbytes
   Instruction cache size: 32 Kbytes
   Secondary unified instruction/data cachesize: 1 Mbyte
   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
   CC synchronization join counter
   VME bus: adapter 0 mapped to adapter 45
   VME bus: adapter 45
   ```

   The above listing shows a board with 4 CPUs.

6. If the IP25 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 IP25.
7. If the board is recognized, exit from the Command Monitor with the following command:

   ```
   >> quit
   ```

You are ready to install IRIX 6.2.

2.6 Installing IRIX 6.2

The IP25 CPU board requires IRIX 6.2 MR, or later. Prior releases of IRIX, including beta versions of IRIX 6.2, do not contain the necessary operating system code to support the IP25.

You must install IRIX 6.2 through the miniroot.

1. If you have not done so already, make sure a CD-ROM drive is either attached to the system or available via the network, and insert the IRIX 6.2 CD provided with the upgrade package into the drive.
2. At the System Maintenance Menu, enter option 2, Install System Software.
3. When prompted, enter the location of the CD-ROM drive that contains the IRIX 6.2 CD. The software begins loading and eventually you see the Inst prompt.
4. At the Inst prompt, enter:

   ```
   install defaults
   go
   ```

5. Once all the patches are installed, enter **quit** to exit from Inst. You are returned to the System Maintenance Menu.
6. Reboot the system to multiuser mode.

If you are not familiar with using Silicon Graphics software installation tools, see the *Software Installation Administrator's Guide* for more information about using Inst. (Once the system is running IRIX 6.2, refer to the newer guide *IRIX Admin: Software Installation and Licensing*, which is specific to IRIX 6.2.)

You are now ready to install more patches. Proceed with Section 2.7, "Installing Patch 1353 (or 1243) and Patch 1295 on IRIX 6.2."

2.7 Installing Patch 1353 (or 1243) and Patch 1295 on IRIX 6.2

After upgrading the operating system to IRIX 6.2, you must install the following patches:

- patch 1353 (or 1243, if 1353 is not available)
- patch 1295 (you must do this even if you installed patch 1295 earlier; the process of upgrading to 6.2 installs and older version of the *flashio* binary)

Use either Inst (*inst*) or Software Manager (*swmgr*) to install these patches in multiuser mode (a live installation.)

2.7.1 Installing Patch 1353 (or1243)

Follow these steps to install patch 1353. (If you are installing patch 1243 instead, use "1243" in place of "1353" in the commands below.)

1. Start Software Manager (*swmgr*) or Inst (*inst*).

   Note: You *must* perform a live installation. You *cannot* install this patch from the miniroot.

2. Use the CD containing patch 1353 as the distribution source. The CD can be in a local CD-ROM drive or a remote CD-ROM drive.
3. Select *dist/patchSG0001353.eoe_sw.unix* for installation.
   - With Software Manager, check the box for patchSG0001353.eoe_sw.unix.
   - With Inst, type **`install dist/patchSG0001353.eoe_sw.unix`** and press <**`Enter`**>.
4. Start the installation.
   - With Software Manager, click the Start button.
   - With Inst, type **`go`** and press <**`Enter`**>.
5. When the patch is installed, eject the patch CD from the CD-ROM drive.

You are now ready to install patch 1295. Proceed with Section 2.7.2, "Installing Patch 1295."

2.7.2 Installing Patch 1295

You should already have either Software Manager or Inst running. Follow these steps to install patch 1295:

1. Insert the CD containing patch 1295 into the CD-ROM drive.
2. Select the CD containing patch 1353 as the distribution source. The CD can be in a local CD-ROM drive or a remote CD-ROM drive.
3. Select *dist/patchSG0001353.eoe_sw.unix* for installation.
   - With Software Manager, check the box for patchSG0001353.eoe_sw.unix.
   - With Inst, type **`install dist/patchSG0001353.eoe_sw.unix`** and press <**`Enter`**>.
4. Start the installation.
   - With Software Manager, click the Start button.
   - With Inst, type **`go`** and press <**`Enter`**>.
5. When the patch is installed, quit from the installation program.
   - With Software Manager, pull down the File menu and select Quit.
   - With Inst, type **`quit`** and press <**`Enter`**>.

You are finished installing the IP25 board. You are now ready to repack the old CPU board and send it back to the factory. See Chapter 3, "Returning the Old CPU Board."

2.8 Before You Leave the Customer Site

Although you are now finished installing the required hardware and software for the upgrade, this is a good time to verify with the customer that any software he or she ordered is installed on the system. This might include optional packages as compilers, NFS, and so forth.

Chapter 3

Returning the Old CPU Board

All CPU 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 CPU 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 Filling Out the RMA Form and Returning the CPU Board

An RMA form (p/n 011-0346-001) is provided with each upgrade. Field engineers should help customers fill out the RMA form. The customer keeps this form and takes one of the following steps:

- International customers should call the closest Silicon Graphics subsidiary to receive instructions on how to return the CPU board. Refer to the list of contacts in Section 3.3, “International Sites and RMA Contacts.”
- Domestic and Canadian customers should call (800) 627-1075. They will receive an RMA number and make arrangements for the hardware to be picked up.

3.3 International Sites and RMA Contacts

ARGENTINA

Buenos Aires

Gutavo Palombo

Tel: 54 1 328 8150

Fax: 54 1 328 7900

AUSTRALIA

Sydney

Sue Barlow or Peter Miles

Tel: 61 2 879 95 00

Fax: 61 2 879 60 26

AUSTRIA

Vienna

Andrea Lazar

Tel: 43 1 798 68 48

Fax: 43 1 798 68 48 11

BELGIUM

Brussels

Sonja Lauwers

Tel: 32 2 679 00 50

Fax: 32 2 675 14 57

BRAZIL

Sao Paulo

Edson Maciel

Tel: 55 11 851 17 11

Fax 55 11 881 26 92

DENMARK

Copenhagen

Martin Bjerre

Tel: 45 43 43 86 00

Fax: 45 43 43 86 06

EUROPEAN / MIDDLE EAST

Distribution Territory

Gland, Switzerland

Anouch Pittet

Tel: 41 22 999 92 9

Fax: 41 22 364 83 65

FINLAND

Helsinki

Raija Veihola

Tel: 358 0 61 33 24 33

Fax: 358 0 61 33 24 50

FRANCE

Paris

Herve Bernardin

Tel: 33 1 34 88 80 00

Fax: 33 1 34 65 96 19

GERMANY

Munich

Werner Link

Tel: 49 89 461 08 0

Fax: 49 89 461 08 222

HONG KONG / CHINA

Beijing

C.M. Choi

Tel: 852 2784 31 11

Fax: 852 2778 91 00

INDIA

New Delhi

Sabina Suri

Tel: 91 11 621 1354 and

91 11 621 6324

Fax: 91 11 621 0752 and

91 11 646 4646

ISRAEL

Tel Aviv

Miki Cohn

Tel: 972 3 49 21 91

Fax: 972 3 49 21 94

ITALY

Milan

Vivian Rusineti

Tel: 39 2 57 56 11

Fax: 39 2 57 56 13 50

JAPAN

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CZECH REPUBLIC

Brno

Jiri Urvalec

Tel: 42 5 432 125 42 / 28

Fax: 42 5 432 123 17

MEXICO

Mexico City

Laura Miriranda or
Salvador Blasco

Tel: 52 5 662 03 22

Fax: 52 5 662 69 42

RUSSIA

Moscow

Pertra Zattler

Tel: 095 246 1444

Fax: 095 246? 2667

SPAIN

Madrid

Maria Jose Ruiz

Tel: 34 1 442 90 77

Fax: 34 1 442 01 50

TAIWAN

Taipei

Tery Fu or Christine Chen

Tel: 886 2 560 5668

Fax: 886 2 523 3881

HOLLAND

De Meern

Sylvia Ravensbergen

Tel: 31 34 06 21 711

Fax: 31 34 06 21 454

NEW ZEALAND

Auchland

Sheryl Innes or Mike Hayes

Tel: 64 9 302 94 50

Fax: 64 9 302 94 55

SINGAPORE

Shrilyn Zattler

Simon Lim

Tel: 65 777 30 88

Fax: 65 779 36 50

SWEDEN

Stockholm

Gunilla Henriksson

Tel: 46 8 601 2660

Fax: 46 8 601 9565

UNITED KINGDOM

Reading

Dilly Thirkill or Phil Cane

Tel: 44 1734 25 75 00

Fax: 44 1734 25 75 05

KOREA

Seoul

S.H. Jung

Tel: 82 2 514 81 11 16

Fax: 82 2 514 81 17

NORWAY

Oslo

Torunn Berger

Tel: 47 22 73 20 15

Fax: 47 22 73 22 11

SOUTH AFRICA

Johannesburg

Astrid Bakenhorst

Tel: 27 11 884 41 47

Fax: 27 11 884 54 09

SWITZERLAND

Gland (Subsidiary Only)

Yves Odlbert or John R.

Tel: 41 22 999 92 60

Fax: 41 22 364 83 66