

EFAST™ Network Controller Installation Instructions

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FCC Warning

This equipment has been tested and found compliant with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Attention

This product requires the use of external shielded cables in order to maintain compliance pursuant to Part 15 of the FCC Rules.

**EFAST Network Controller Installation Instructions
Document Number 108-0101-001**

**Silicon Graphics, Inc.
Mountain View, California**

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Contents

Introductionix

- 1. EFAST Board Jumpers1-1**
 - 1.1 JP1 on Mother Board1-4
 - 1.2 JP2 on Mother Board1-5
 - 1.3 JP3 on Mother Board1-5
 - 1.4 JP4 on Mother Board1-6
 - 1.5 JP6 on Mother Board1-7
 - 1.6 JP7 on Mother Board1-8
 - 1.7 JP8 on Mother Board1-9
 - 1.8 JP9 on Mother Board1-10
 - 1.9 JP10 on Mother Board1-11
 - 1.10 U1/U2 on Mother Board1-11
 - 1.11 JP1 on Daughter Board1-12
 - 1.12 JP3 on Daughter Board1-13
 - 1.13 JP4 on Daughter Board1-13

- 2. EFAST Installation2-1**
 - 2.1 Installation Procedure for POWERSeries and Professional Series2-1
 - 2.1.1 Prepare for Installation2-1
 - 2.1.2 Install and Configure Software2-2
 - 2.1.3 Configure the Board2-2
 - 2.1.4 Install the Hardware2-2
 - 2.2 Installation Procedure for IRIS Crimson2-9
 - 2.2.1 Prepare for Installation2-9
 - 2.2.2 Install and Configure Software2-9
 - 2.2.3 Configure the Board2-9
 - 2.2.4 Install the Hardware2-10

- 2.3 Installation Procedure for CHALLENGE L and XL2-10
 - 2.3.1 Prepare for Installation2-10
 - 2.3.2 Install and Configure Software2-10
 - 2.3.3 Configure the Board2-11
 - 2.3.4 Install the Hardware2-11
- 2.4 Installation Procedure for Onyx Supercomputers2-16
 - 2.4.1 Prepare for Installation2-16
 - 2.4.2 Install and Configure Software2-16
 - 2.4.3 Configure the Board2-16
 - 2.4.4 Install the Hardware2-16
- 2.5 Completing Board Installation2-22
- 2.6 VMEbus Option Slot Information2-23
 - 2.6.1 Backplane Considerations2-23
 - 2.6.2 Configuring VMEbus Addresses for Installation into Optional Backplanes2-24

Figures

- Figure 1-1** EFAST Jumper Block Locations1-1
- Figure 1-2** JP1 on Mother Board: Burst Size1-4
- Figure 1-3** JP2 on Mother Board: Ethernet Version1-5
- Figure 1-4** JP3 on Mother Board: Location for Ethernet Connection1-5
- Figure 1-5** Use of JP4 and JP7 in Combination with JP101-6
- Figure 1-6** JP4 on Mother Board: Unit Number for Standard Slave Operation1-6
- Figure 1-7** JP6 on Mother Board: IRQ Level1-7
- Figure 1-8** JP7 on Mother Board: Unit Number for Extended Slave Operation1-8
- Figure 1-9** JP8 on Mother Board: Interrupt Acknowledge Level1-9
- Figure 1-10** JP9 on Mother Board: Request/Grant Priority Level1-10
- Figure 1-11** JP10 on Mother Board: Slave Response1-11
- Figure 1-12** U1/U2 on Mother Board: Location for Ethernet Connection1-12
- Figure 1-13** JP1 on Daughter Board: Ethernet Version1-12
- Figure 1-14** JP3 on Daughter Board: Control of Instruction Cache1-13
- Figure 1-15** Jumper Block JP4 on Daughter Board: EPROM Select1-13
- Figure 2-1** Installing the Board2-3
- Figure 2-2** CHALLENGE L VMEbus Slot Locations2-12
- Figure 2-3** CHALLENGE XL VMEbus Slot Locations2-14
- Figure 2-4** Onyx Deskside VMEbus Slot Locations2-18
- Figure 2-5** Onyx Rackmount VMEbus Slot Locations2-21

Tables

Table 1-1	EFAST Jumper Block Descriptions for Mother Board1-2
Table 1-2	EFAST Jumper Block Descriptions for Daughter Board1-3
Table 1-3	JP1 Settings1-4
Table 1-4	JP6 Settings1-7
Table 1-5	JP7 Settings1-8
Table 1-6	JP8 Settings1-9
Table 1-7	JP4 Jumper Setting for Various EPROMs1-14
Table 2-1	Professional Series or Omni IRIS-4D/85GT (Diehard 1) VMEbus Slot Allocations2-4
Table 2-2	Single Tower (Diehard II) VMEbus Slot Allocations2-5
Table 2-3	Twin Tower VMEbus Slot Allocations2-5
Table 2-4	POWER Center (Predator) VMEbus Slot Allocations2-6
Table 2-5	R2-4D POWER Center (Predator 3) VMEbus Slot Allocations2-7
Table 2-6	SkyWriter VMEbus Slot Allocations2-8
Table 2-7	CHALLENGE L Board Slot Allocation2-13
Table 2-8	CHALLENGE XL Board Slot Allocations2-15
Table 2-9	Onyx Deskside Board Slot Allocations2-19
Table 2-10	Onyx Rackmount Board Slot Allocations2-20

Introduction

This manual provides installation information for the EFAST™ network option product for the following Silicon Graphics® platforms:

- POWERSeries™
- Professional Series
- IRIS Crimson™
- CHALLENGE™ L (deskside) and XL (rackmount)
- Onyx™ family

EFAST consists of hardware (network controller board) and software (link level *fxp* driver) that provides an additional Ethernet connection. Each EFAST board occupies one VMEbus™ option slot. Up to four EFAST boards can be installed into a system (assuming that the system has four VMEbus option slots available).

Note: The EFAST option is not customer installable. Installation of the EFAST option requires special training and technical knowledge. The information in this manual has been provided for use by Silicon Graphics System Support Engineers or other Silicon Graphics trained personnel only.

Chapter 1

EFAST Board Jumpers

This chapter explains how to configure the jumpers on the EFAST controller board. Jumpers must be configured before the board is installed.

The EFAST board's jumpers are described in Table 1-1 and Table 1-2; the jumper locations are illustrated in Figure 1-1.

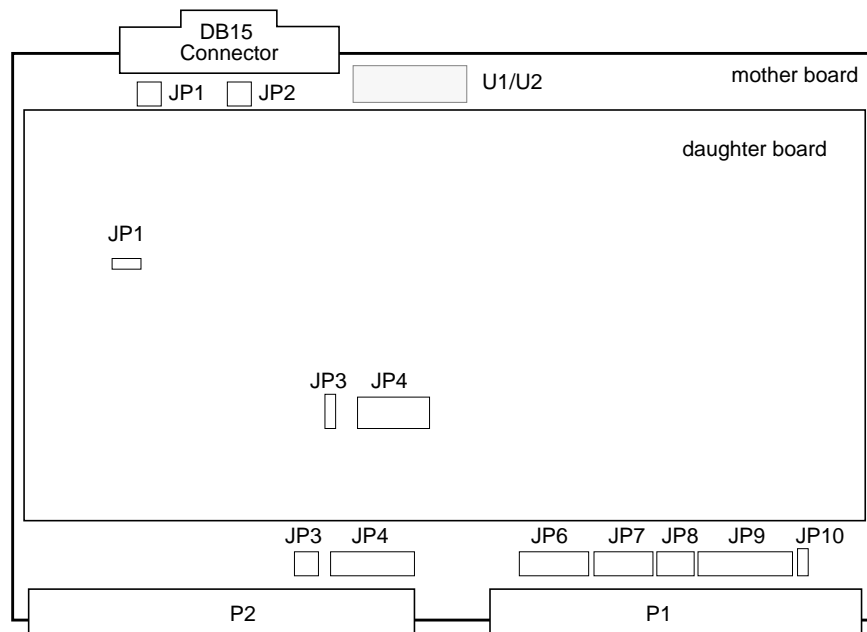


Figure 1-1 EFAST Jumper Block Locations

Jumper Block	Default Setting	Instructions	Description	Further Description
JP1	No jumper	No need to change default setting	No jumper = 8 longword bursts used by board's DMA controller. Can be set for 16, 32, and 64 longword bursts.	Section 1.1
JP2	No jumper	Only install jumpers if site uses version 1 Ethernet	No jumper = Ethernet 2.0/802.3. Can be set for Ethernet 1.0 protocol.	Section 1.2
JP3	No jumper	Only install jumpers required by site. Default setting is most common requirement	No jumper = Ethernet connected at DB15. Can be set so that Ethernet is connected at P2.	Section 1.3
JP4	Unit 0 Jumpers on pins 1-2, 3-4, 5-6, 11-12, and 13-14	Only change default, if JP10 is changed	Default = unit 0 for extended slave. All pins must be jumpered when JP10 is set for standard slave.	Section 1.4
JP6	IRQ level 4 Jumper on pins 7-8	No need to change default setting	Default setting = VMEbus interrupt request (IRQ) level 4. Can be set to IRQ levels 1, 2, 3, 4, 5, 6, or 7.	Section 1.5
JP7	Unit 0 Jumpers on pins 3-4, 5-6, and 7-8	Must be changed when 2 or more boards are installed into one system	Default setting = unit 0. Can be set to unit 1, 2, or 3. Each EFAST board in a system must have a unique setting.	Section 1.6
JP8	IACK level 4 Jumpers on pins 3-4 and 5-6	No need to change default setting	Default = VMEbus interrupt acknowledge (IACK) level 4. Can be set to IACK 1, 2, 3, 4, 5, 6, or 7.	Section 1.7
JP9	Req. priority level 3 Jumpers on pins 1-2, 5-6, 7-8, 9-11, 10-12, and 13-15.	No need to change default setting	Default = VMEbus request/grant priority level 3. Can be set to levels 0, 1, 2, or 3.	Section 1.8
JP10	Jumper	No need to change default setting	Jumper = extended (A32) slave. When jumper is removed, board operates as a standard (A24) slave.	Section 1.9

Table 1-1 EFAST Jumper Block Descriptions for Mother Board

Jumper Block	Default Setting	Instructions	Description	Further Description
U1/U2 (DIP)	U1 setting	Only move jumper if required by site. Default setting is most common requirement	U1 setting = Ethernet connected at DB15. Can be set so that Ethernet must be connected at P2.	Section 1.10

Table 1-1 (continued) EFAST Jumper Block Descriptions for Mother Board

Jumper Block	Default Setting	Instructions	Description	Further Description
JP1	No jumper	Only install jumper if site uses Ethernet 1.	No jumper = Ethernet 2.0/802.3. When a jumper is installed, board follows Ethernet 1.0.	Section 1.11
JP3	No jumper	Do not change default	No jumper = cache controlled by software. When a jumper is installed, board provides 64-longword instruction cache.	Section 1.12
JP4	Jumpers on pins 1-3 and 2-4	Do not change default unless you also install new EPROM	Selects EPROM.	Section 1.13

Table 1-2 EFAST Jumper Block Descriptions for Daughter Board

1.1 JP1 on Mother Board

Jumper block JP1 (illustrated in Figure 1-2) selects the burst size used on VMEbus master transfers. These transfers are done by the on-board DMA controller. A burst can be 8, 16, 32, or 64 longwords in length. Within a burst, the EFAST board does not relinquish VMEbus mastership, so, the larger the burst size, the longer time periods that the board can exclusively hold the VMEbus. Between bursts or when a transfer is complete, the board relinquishes bus mastership only if another potential master requests it (ROR, release on request).

The Silicon Graphics factory setting (illustrated in Figure 1-2) is for 8-word bursts (polite mode). There is no need to change the default setting, but you may change it, if desired. Selecting a larger burst size results in more efficient transfers over this network connection, but also results in slower performance for other devices using the VMEbus.

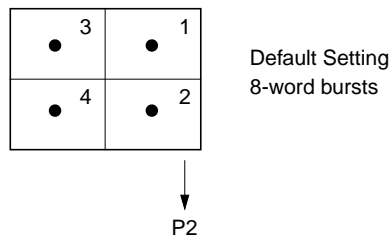


Figure 1-2 JP1 on Mother Board: Burst Size

Table 1-3 summarizes how to jumper JP1 for different burst sizes.

Burst Size	Pins to Jumper	
8 (default)	none	<input type="checkbox"/> <input type="checkbox"/>
16	1-2	<input type="checkbox"/> <input checked="" type="checkbox"/>
32	3-4	<input checked="" type="checkbox"/> <input type="checkbox"/>
64	1-2 and 3-4	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>

Table 1-3 JP1 Settings

1.2 JP2 on Mother Board

Jumper block JP2 (illustrated in Figure 1-3) selects the Ethernet version (1 or 2).

Note: The settings for JP2 on the mother board and JP1 on the daughter board must be for the same Ethernet version.

The Silicon Graphics factory (default) setting, as illustrated in Figure 1-3, is for Ethernet 2.0 / IEEE 802.3. Change this setting only if the attached Ethernet is version 1.0.

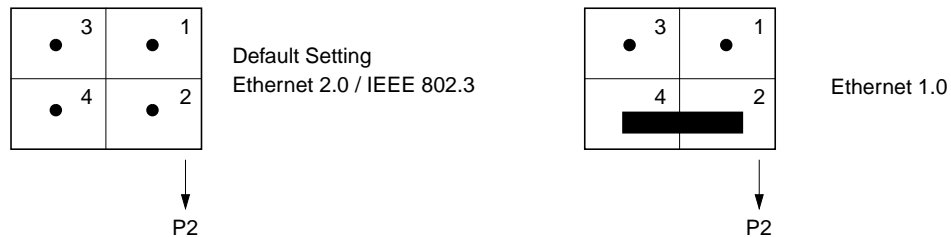


Figure 1-3 JP2 on Mother Board: Ethernet Version

1.3 JP3 on Mother Board

Jumper block JP3 (illustrated in Figure 1-4) selects the location for the Ethernet connection. The Ethernet transceiver connection to the EFAST board can be either through the DB15 connector or through the P2 VMEbus connector. When JP3 is jumpered for a P2 connection, the jumpers provide the power for the P2 transceiver.

The Silicon Graphics factory (default) setting (illustrated in Figure 1-4) is for DB15. Change this setting only if you wish to connect the Ethernet transceiver to P2.

Note: JP3 and U1/U2 must both select the same connection.

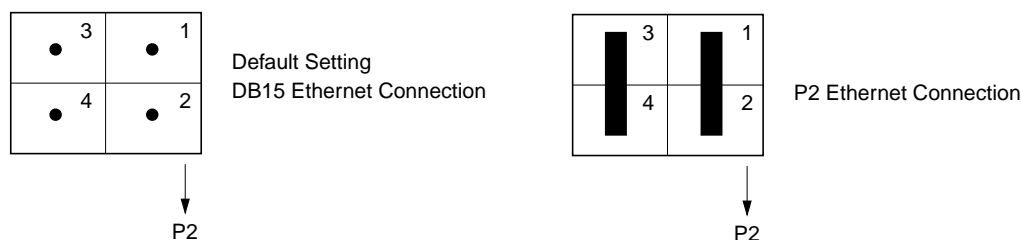


Figure 1-4 JP3 on Mother Board: Location for Ethernet Connection

1.4 JP4 on Mother Board

Jumper block JP4 (illustrated in Figure 1-6) sets a portion of the EFAST board's unit number. The "unit number" is the VMEbus slave response address. Jumper block JP4 sets bits AJ24 to AJ31 of the VMEbus slave response address; jumper block JP7 sets bits AJ18 to AJ23, as illustrated in Figure 1-5. During VMEbus cycles, jumper bits AJ18-AJ31 (on JP4) are compared with VMEbus address bits A18-A31 to determine if the cycle is within the slave response window. When a jumper is installed between two JP4 pins, the associated address bit is set to 0; when no jumper is installed, the bit is a 1. JP4 is also referred to as the XDEC jumper block.

Note: When JP10 is set for extended slave operation (the default),JP4 must be jumpered with the factory setting. When JP10 is altered for standard slave operation, all pins on JP4 must be jumpered, as illustrated in Figure 1-6.

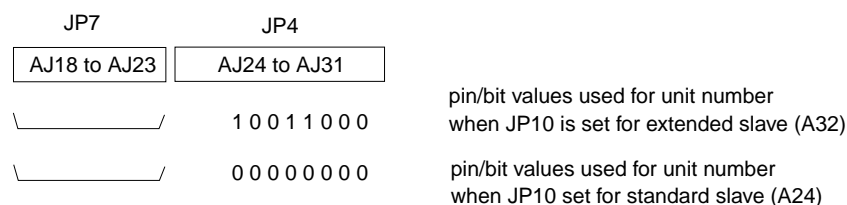


Figure 1-5 Use of JP4 and JP7 in Combination with JP10

The Silicon Graphics factory setting (illustrated in Figure 1-6) is for Unit 0 and assumes extended slave operation (the default setting on JP10). Do not change the default setting for JP4 when using extended slave operation. If JP10 is altered (for standard slave operation), jumper all the pins on JP4, as illustrated in Figure 1-6.

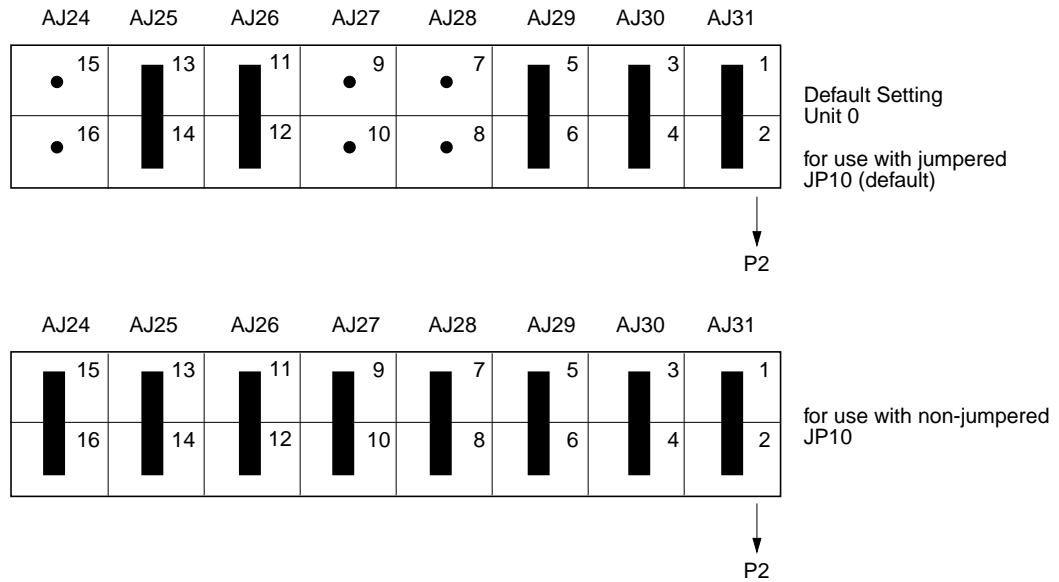


Figure 1-6 JP4 on Mother Board: Unit Number for Standard Slave Operation

1.5 JP6 on Mother Board

Jumper block JP6 (illustrated in Figure 1-7) routes the on-board interrupt request signal not-IRQ to one of the seven VMEbus interrupt request lines (not-IRQ1 through not-IRQ7).

Note: The IRQ level on JP6 must be the same as the IACK level on JP8.

The Silicon Graphics factory setting (illustrated in Figure 1-7) is for IRQ level 4. This setting can be changed if desired.

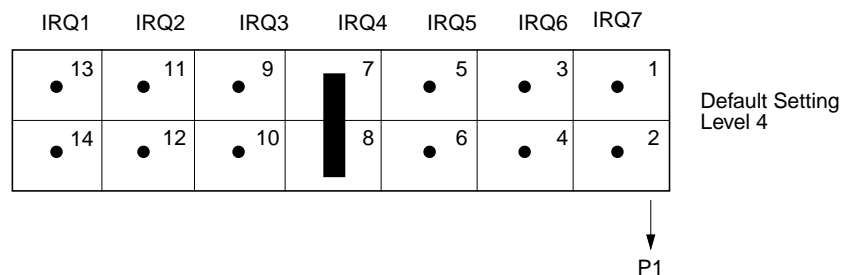


Figure 1-7 JP6 on Mother Board: IRQ Level

Table 1-4 summarizes the settings for JP6.

IRQ Level	Pins to Jumper	
1	13-14	■ □ □ □ □ □
2	11-12	□ ■ □ □ □ □
3	9-10	□ □ ■ □ □ □
4 (default)	7-8	□ □ □ ■ □ □
5	5-6	□ □ □ □ ■ □
6	3-4	□ □ □ □ □ ■
7	1-2	□ □ □ □ □ ■

Table 1-4 JP6 Settings

1.6 JP7 on Mother Board

Jumper block JP7 (illustrated in Figure 1-8) sets a portion of the EFAST board's unit number. The "unit number" is the VMEbus slave response address. Jumper block JP7 sets bits AJ18 to AJ23 and JP4 sets bits AJ24 to AJ31 of the VMEbus slave response address, as illustrated in Figure 1-5. During VMEbus cycles, jumper bits AJ18-AJ31 (on JP7 and JP4) are compared with VMEbus address bits A18-A31 to determine if the cycle is within the slave response window. When a jumper is installed between two JP7 pins, the associated address bit is set to 0; when no jumper is installed, the bit is a 1. JP7 is also referred to as the ADEC jumper block.

The Silicon Graphics factory setting (illustrated in Figure 1-8) is for Unit 0. When more than one EFAST board is installed on a system, the jumper settings for JP7 must be changed so that each EFAST board has a unique unit number.

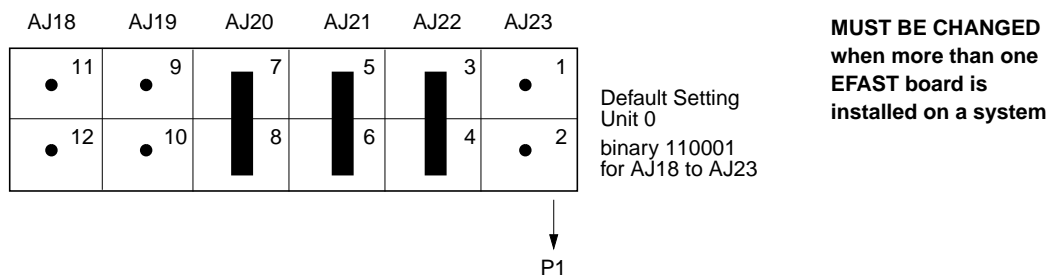


Figure 1-8 JP7 on Mother Board: Unit Number for Extended Slave Operation

Table 1-5 summarizes the jumper settings for different unit numbers,

Unit Number	Pins to Jumper		AJ18 - AJ23 (binary)
0 (default)	3-4, 5-6, and 7-8	<input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>	110001
1	3-4, 5-6, 7-8, and 11-12	<input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>	010001
2	3-4, 5-6, 7-8, and 9-10	<input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>	100001
3	3-4, 5-6, 7-8, 9-10, and 11-12	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>	000001

Table 1-5 JP7 Settings

1.7 JP8 on Mother Board

Jumper block JP8 (illustrated in Figure 1-9) selects the VMEbus interrupt acknowledge (IACK) level. During VMEbus interrupt acknowledge cycles, the value set by JP8 is compared with VMEbus address bits A3 to A1 to detect the interrupt acknowledge for the EFAST board. If an interrupt acknowledge is detected at the interrupt request level of the board and a request is pending, then the board drives the VMEbus with its interrupt vector. Installing a jumper selects binary 0, no jumper selects binary 1.

Note: The IACK level on JP8 must be the same as the IRQ level on JP6.

The Silicon Graphics factory setting (illustrated in Figure 1-9) is for IACK level 4. This setting can be changed if desired.

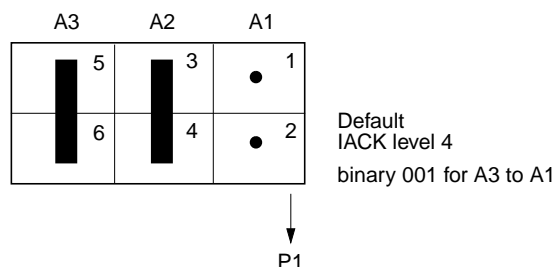


Figure 1-9 JP8 on Mother Board: Interrupt Acknowledge Level

Table 1-7 summarizes jumper settings for different IACK levels.

IACK Level	Pins to Jumper	
1	1-2 and 3-4	<input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
2	1-2 and 5-6	<input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/>
3	1-2	<input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/>
4 (default)	3-4 and 5-6	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>

Table 1-6 JP8 Settings




IACK Level	Pins to Jumper	
5	3-4	
6	5-6	
7	none	

Table 1-6 JP8 Settings

1.8 JP9 on Mother Board

Jumper block JP9 (illustrated in Figure 1-10) sets the VMEbus request priority, which can be 0, 1, 2, or 3.

The Silicon Graphics factory setting (illustrated in Figure 1-10) is for request/grant level 3. This setting can be changed if desired. Figure 1-10 illustrates the jumper settings required for the four levels.

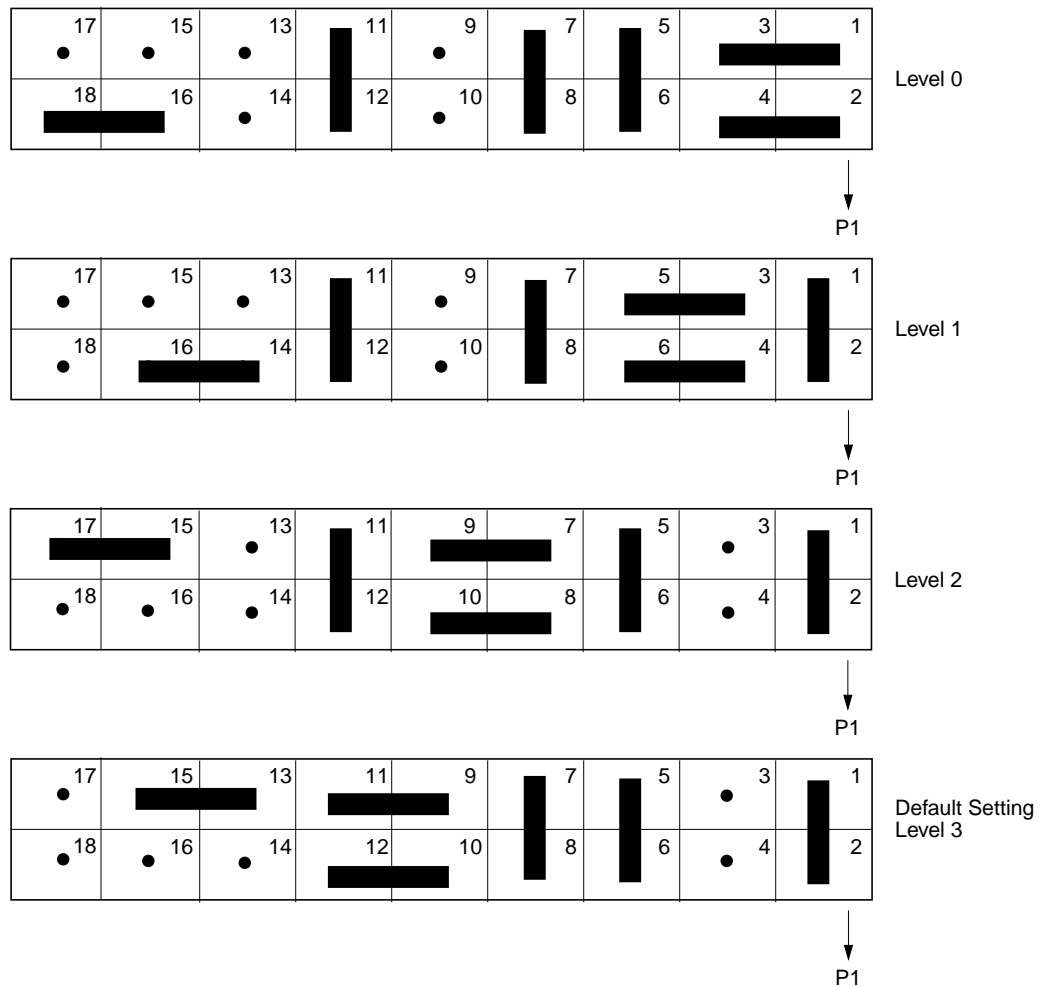


Figure 1-10 JP9 on Mother Board: Request/Grant Priority Level

1.9 JP10 on Mother Board

Jumper block JP10 (illustrated in Figure 1-11) sets the board's type of slave response. With the jumper installed, the board operates as an extended slave (A32). When no jumper is installed, the board operates as a standard slave (A24).

The Silicon Graphics factory setting (illustrated in Figure 1-11) is for extended slave response (A32). Remove the jumper to configure standard slave response.

Note: When JP10 is altered to standard slave response, the jumpers on JP4 must also be altered.

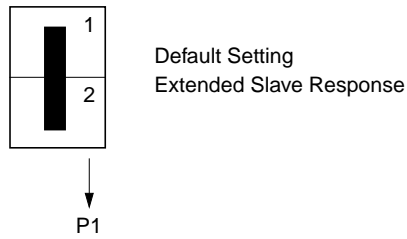


Figure 1-11 JP10 on Mother Board: Slave Response

1.10 U1/U2 on Mother Board

DIP U1/U2 (illustrated in Figure 1-12) selects the location on the EFAST board for the Ethernet connection: DB15 or VMEbus connector P2. When the 16-pin DIP shunt is placed at the U1 position, the Ethernet connection is at the DB15 connector. When the shunt is placed at the U2 position, the Ethernet connection must be at the P2 VMEbus connector.

The Silicon Graphics factory setting (illustrated in Figure 1-12) is at U1 for an Ethernet connection to the DB15 connector. Move the DIP shunt to the U2 position for a P2 connection.

Note: DIP U1/U2 and JP3 must both select the same location for the Ethernet connection.

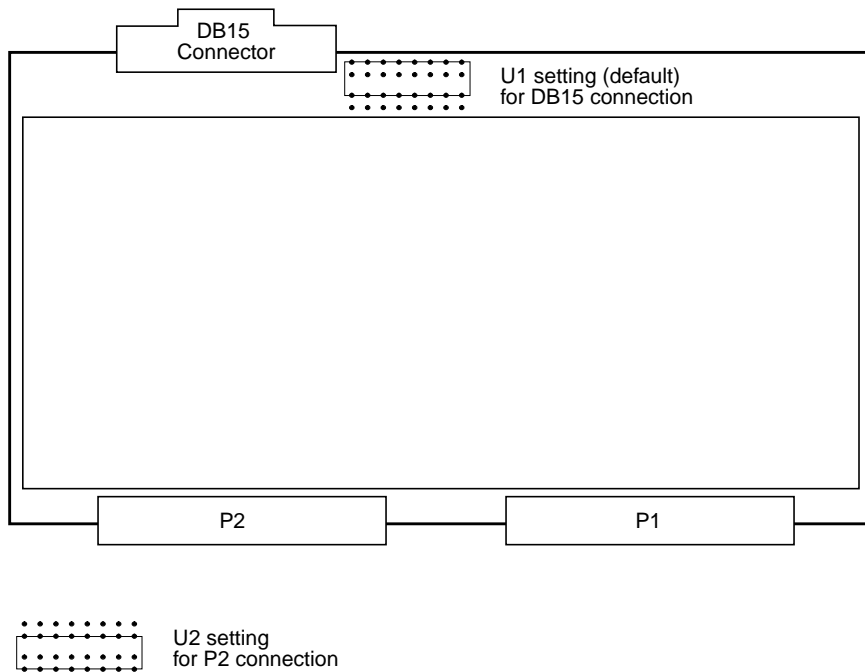


Figure 1-12 U1/U2 on Mother Board: Location for Ethernet Connection

1.11 JP1 on Daughter Board

Jumper block JP1 on the daughter board (illustrated in Figure 1-13) sets the Ethernet version. Without a jumper, the setting is for Ethernet 2.0/IEEE 802.3. When a jumper is installed, the setting is for Ethernet 1.0.

The Silicon Graphics factory setting (illustrated in Figure 1-13) is for Ethernet 2.0. Install a jumper if the attached Ethernet uses version 1.0.

Note: The setting of JP1 on the daughter board must select the same Ethernet version as that set by JP2 on the mother board.

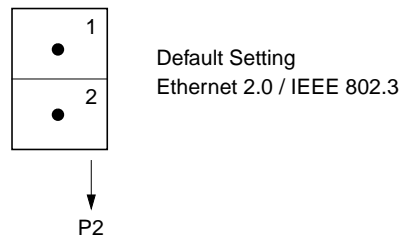


Figure 1-13 JP1 on Daughter Board: Ethernet Version

1.12 JP3 on Daughter Board

Jumper block JP3 on the daughter board (illustrated in Figure 1-14) enables/disables 64-longword instruction caching on the MC68020 chip and controlled by the MC68020. Without a jumper, caching is controlled by the software. With a jumper installed, MC68020 control of caching is enabled.

The Silicon Graphics factory setting disables MC68020 control of caching. Do not change this setting.

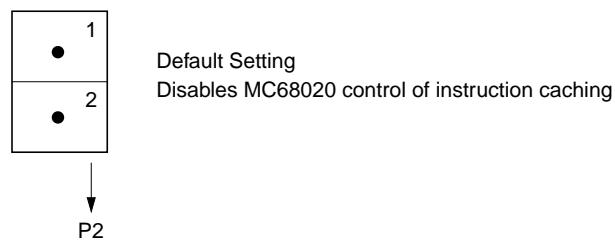


Figure 1-14 JP3 on Daughter Board: Control of Instruction Cache

1.13 JP4 on Daughter Board

Jumper block JP4 on the daughter board (illustrated in Figure 1-15) allows a variety of 28-pin and 32-pin EPROMs to be selected.

The Silicon Graphics factory setting (illustrated in Figure 1-15) is to select AM27512 or AM27010 (or pin equivalent) EPROMs. This setting should only be changed if the EPROM component on the board is replaced. Table 1-7 summarizes the jumper settings for different EPROM selections.

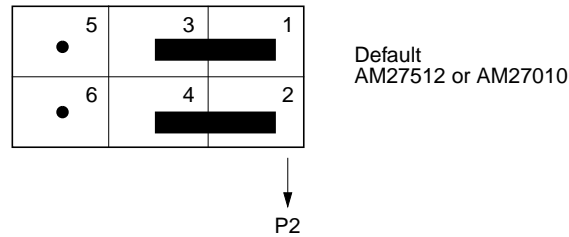


Figure 1-15 Jumper Block JP4 on Daughter Board: EPROM Select

EPROM Selected	Pins to Jumper	
AM2764	3-5 and 4-6	<input checked="" type="checkbox"/> <input type="checkbox"/>
AM27128	3-5 and 4-6	<input checked="" type="checkbox"/> <input type="checkbox"/>
AM27256	1-3 and 4-6	<input type="checkbox"/> <input checked="" type="checkbox"/>
AM27512 (default)	1-3 and 2-4	<input type="checkbox"/> <input checked="" type="checkbox"/>
AM27010 (default)	1-3 and 2-4	<input type="checkbox"/> <input checked="" type="checkbox"/>

Table 1-7 JP4 Jumper Setting for Various EPROMs

Chapter 2

EFAST Installation

This chapter describes how to install the EFAST controller board into a Silicon Graphics system. A separate section is dedicated to each platform. In addition, one section covers VMEbus option slot selection, backplane jumpering, and VMEbus address configuration.

Caution: This product is not customer installable.

Installation of this product requires specific training and technical knowledge. These instructions have been provided for use by Silicon Graphics, Inc., System Support Engineers or other Silicon Graphics trained personnel only. This installation requires the installer to handle internal electrical power that is hazardous if the equipment is improperly disassembled / reassembled.

2.1 Installation Procedure for POWERSeries and Professional Series

This section describes the steps for installing EFAST into a POWERSeries or Professional Series workstation or server. A maximum of four EFAST boards can be installed into these systems.

Note: If you are installing the EFAST board into the VMEbus-B of a Predator 3 (R2-4D POWER Center), you must have IRIX 4.0.1 or higher since this configuration is not supported in the earlier release.

2.1.1 Prepare for Installation

1. Verify that the system's operating system (IRIX or *ee1*) version matches the version of EFAST that you are going to install. Software compatibility information is located in the *EFAST Release Notes*. If necessary, upgrade the operating system.
2. Once the system is ready to install EFAST, perform a system backup and verify the saved files.

2.1.2 Install and Configure Software

1. Use this command to check if the EFAST software has been installed:

```
% /usr/sbin/versions efast
I efast date EFAST (Fast Ethernet Board), version
```

If the software is installed and the version is correct, proceed to the next step.

If the message `Nothing satisfies the selection criteria` is displayed or if the version is not correct, install the EFAST software using the IRIX installation method and the `inst` commands `install efast` and `go`.

2. Configure the new Ethernet network interface, as explained in the *EFAST Release Notes* or in *IRIX Advanced Site and Server Administration Guide*.

2.1.3 Configure the Board

1. Configure the board's jumpers, as explained in Chapter 1.
2. If installing more than one EFAST board, verify that each board's **JP7** jumpers are set to a unique unit number. Refer to Table 1-5 for details.
3. Attach the cable (shipped with the board) to the EFAST board's DB15 connector.

Note: If your EFAST package contained two cables, be sure to select the cable (PN 018-0088-001) with a mounting plate that fits the door of your system.

2.1.4 Install the Hardware

Caution: The components are extremely sensitive to ESD (electrostatic discharge). Use proper antistatic procedures while handling all components.

1. Shut down the system according to the operating system instructions.
2. Turn off the power switch and unplug the power cable.
3. Remove the keyboard, Ethernet, SMD, ESDI, monitor or RGB cables, and any other cables from the I/O door.
4. Open the I/O door on your system.

Caution: On a Twin Tower (POWER Station system) remove the bottom screw located on the I/O door between the hinges. If you do not remove this screw, the sheet metal could be damaged during disassembly.
5. Select a VMEbus slot for the EFAST board. It is recommended that you select the first available VMEbus slot. (If you leave any VMEbus slots empty, you must jumper the skipped slots.) Refer to Table 2-1 through Table 2-6 to help determine the proper slot.
6. Configure the jumper pins of backplane connector P1.
 - For 12-slot systems (4D/50GT, 60GT, 70GT, and 80GT) and 13-slot systems (4D85GT), remove all interrupt jumpers from pins at left of the slot that you have selected for the EFAST board.

- For 15-slot systems (W-4D/120GTX, 210GTX, 220GTX, 240GTX, 320GTX, and 340GTX), do not remove any interrupt jumpers from P1.
 - For 19-slot systems (R-4DxxxGTX), no interrupt jumpers are required.
7. Install the EFAST board and extender board into the selected VMEbus slot. See Figure 2-1 for an example of installing a network controller board into a system. Note that the component side of the board faces to your right.
 8. Attach the mounting panel plate to an opening in the I/O panel door.
 9. Close the I/O door.
 10. Finish the installation by following the instructions in Section 2.5, “Completing Board Installation.”

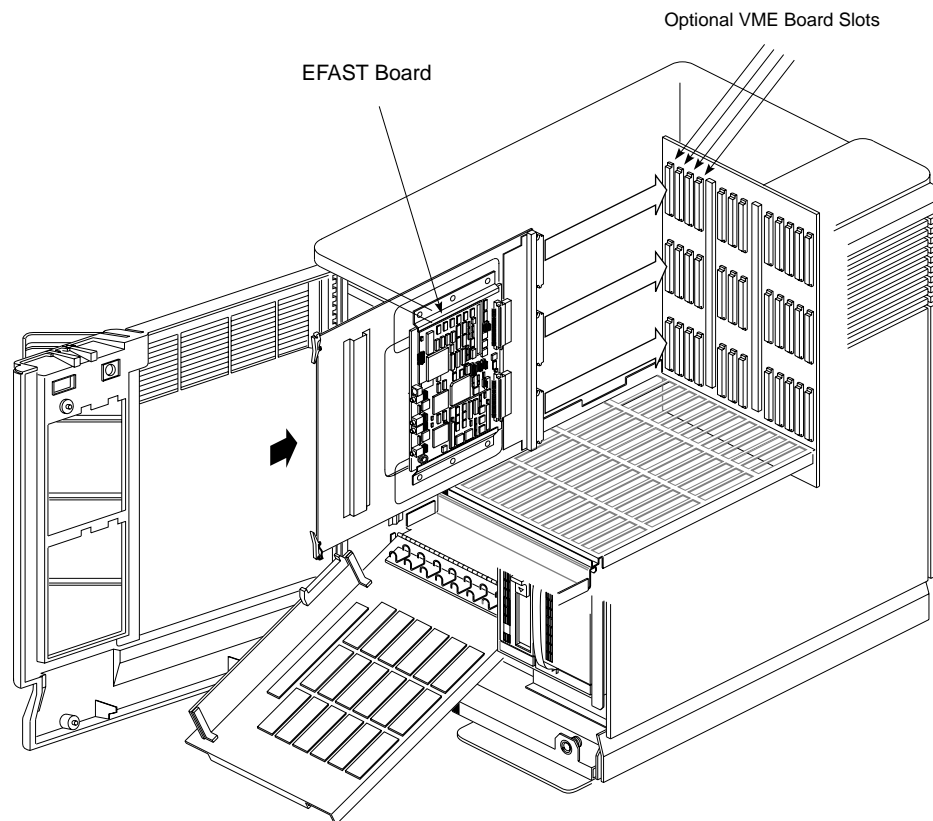


Figure 2-1 Installing the Board

Slot	IRIS-4D 60G 12-slot Multi-board Computer (MBC)	IRIS-4D 7/80 GT 12-slot Single-board Computer (SBC)	IRIS 4-D 85GT 13-slot Chassis
1	CPU board only	CPU board only	CPU board only
2	FPP board only	Memory board (pre-empted VMEbus slot)	Memory board (or optional VMEbus board)
3	Memory board only	Memory board (pre-empted VMEbus slot)	Memory board (or optional VMEbus board)
4	Memory board only	ESDI Controller board (pre-empted VMEbus slot)	ESDI Controller board
5	Memory board only	CMC Ethernet Controller (pre-empted VMEbus slot)	CMC Ethernet Controller
6	Optional VMEbus board	ISI tape controller (or optional VMEbus board)	ISI tape controller (or optional VMEbus board)
7	Optional VMEbus board	Optional VMEbus board	Optional VMEbus board
8	Optional VMEbus board	GE4	GE4
9	Optional VMEbus board	GM1	GM1
10	GF3	RM1	RM1
11	DE3	RV1	RM1
12	TB2	RM1	RV1.5
13	N/A	N/A	Optional Video Board (for example VP1)

Table 2-1 Professional Series or Omni IRIS-4D/85GT (Diehard 1) VMEbus Slot Allocations

Note: The Omni IRIS-4D/85GT backplane adheres to the same practice as prior Silicon Graphics' backplanes. All unused slots must have jumpers H71, HUB3, H7B2, H7B1 and H7BG pinned.

Slot Number	Slot Type
1	Optional VMEbus board
2	Optional VMEbus board
3	Optional VMEbus board
4	Optional VMEbus board
5	I/O board
6	CPU board
7	Optional CPU board
8	MC2 board
9	GM board
10	GE board
11	RM board
12	RM board
13	DG1 board
14	Optional video board

Table 2-2 Single Tower (Diehard II) VMEbus Slot Allocations

Slot Number	Slot Type
1	Optional VMEbus board
2	Optional VMEbus board
3	Optional VMEbus board
4	Optional VMEbus board
5	I/O board
6	CPU board
7	Optional CPU board
8	MC2 board
9	MC2 board
10	GM board
11	GE board
12	RM board
13	Optional RM board
14	DG1 board
15	Optional video board

Table 2-3 Twin Tower VMEbus Slot Allocations

Slot Number	Slot Type
1	Optional VMEbus board
2	Optional VMEbus board
3	Optional VMEbus board
4	Optional VMEbus board
5	Optional VMEbus board
6	Optional VMEbus board
7	I/O board
8	1st CPU board
9	2nd CPU board (if applicable)
10	3rd CPU board (if applicable)
11	4th CPU board (if applicable)
12	MC2 board
13	MC2 board
14	GM board
15	GE board
16	RM board
17	Optional RM board
18	DG1 board
19	Optional video board

Table 2-4 POWER Center (Predator) VMEbus Slot Allocations

Slot Number	Slot Type
1	Optional VMEbus-A board
2	Optional VMEbus-A board
3	Optional VMEbus-A board
4	Optional VMEbus-A board
5	Optional VMEbus-A board
6	Optional VMEbus-A board
7	1st IO3 board
8	1st CPU board
9	2nd CPU board (if applicable)
10	3rd CPU board (if applicable)
11	4th CPU board (if applicable)
12	1st MC2 board
13	2nd MC2 board (if applicable)
14	2nd IO3 board
15	Optional VMEbus-B board
16	Optional VMEbus-B board
17	Optional VMEbus-B board
18	Optional VMEbus-B board
19	Optional VMEbus-B board

Table 2-5 R2-4D POWER Center (Predator 3) VMEbus Slot Allocations

Slot Number	Board
1	Optional VMEbus board
2	Optional VMEbus board
3	Optional VMEbus board
4	Optional VMEbus board
5	Pipeline 1 optional video board
6	Pipeline 1 DG1 board (optional EV1 board)
7	Pipeline 1 RM3 board
8	Pipeline 1 RM3 board
9	Pipeline 1 GE6 board
10	Pipeline 1 GM3 board
11	IO2 or IO3 board
12	IP board
13	IP board
14	MC2 board
15	Pipeline 0 GM3 board
16	Pipeline 0 GE6 board
17	Pipeline 0 RM3 board
18	Pipeline 0 RM3 board
19	Pipeline 0 DG1 board with VX1 board
20	Pipeline 0 Optional video board

Table 2-6 SkyWriter VMEbus Slot Allocations

2.2 Installation Procedure for IRIS Crimson

This section describes the steps for installing EFAST into an IRIS Crimson workstation or server. A maximum of four EFAST boards can be installed into a Crimson chassis.

2.2.1 Prepare for Installation

1. Verify that the system's operating system (IRIX or *eoe1*) version matches the version of EFAST that you are going to install. Software compatibility information is located in the *EFAST Release Notes*. If necessary, upgrade the operating system.
2. Once the system is ready to install EFAST, perform a system backup and verify the saved files.

2.2.2 Install and Configure Software

1. Use this command to check if the EFAST software has been installed:

```
% /usr/sbin/versions efast
I efast date EFAST (Fast Ethernet Board), version
```

If the software is installed and the version is correct, proceed to the next step.

If the message `Nothing satisfies the selection criteria` is displayed or if the version is not correct, install EFAST software using the IRIX installation method and the *inst* commands `install EFAST` and `go`.

2. Configure the new Ethernet network interface, as explained in the *EFAST Release Notes* or in the *IRIX Advanced Site and Server Administration Guide*.

2.2.3 Configure the Board

1. Configure the board's jumpers, as explained in Chapter 1.
2. If installing more than one EFAST board, verify that each board's **JP7** jumpers are set to a unique unit number. Refer to Table 1-5 for details.
3. Attach the cable (shipped with the board) to the EFAST board's DB15 connector.

Note: If your EFAST package contained two cables, be sure to select the cable (PN 018-0088-001) with a mounting plate that fits the door of your system.

2.2.4 Install the Hardware

1. Shut down the system according to the operating system instructions.
2. Turn off the power switch and unplug the power cable.
3. Remove the keyboard, Ethernet, SMD, ESDI, monitor or RGB cables, and any other cables from the I/O door.
4. Open the I/O door on your system.

Caution: The components are extremely sensitive to ESD (electrostatic discharge). Use proper antistatic procedures while handling all components.

5. Select a VMEbus slot for the EFAST board. It is recommended that you select the first available VMEbus slot. (If you leave any VMEbus slots empty, you must jumper them as explained in Section 2.6.1, “Backplane Considerations.”)
6. Install the EFAST board and extender board into the VMEbus slot. See Figure 2-1 for an example of installing an EFAST board into a system. Note that the component side of the board faces to your right.
7. Attach the mounting panel plate to an opening in the I/O door.
8. Close the I/O door.
9. Finish the installation by following the instructions in Section 2.5, “Completing Board Installation.”

2.3 Installation Procedure for CHALLENGE L and XL

This section describes the steps for installing EFAST into a CHALLENGE L (also known as CHALLENGE deskside) or CHALLENGE XL (also known as CHALLENGE rackmount) system. A maximum of four EFAST boards can be installed into a CHALLENGE system.

2.3.1 Prepare for Installation

1. EFAST software is (in most cases) shipped with the operating system. EFAST software information is provided in the online *EFAST Release Notes*.
2. Once the system is ready to install EFAST, perform a system backup and verify the saved files.

2.3.2 Install and Configure Software

1. Use this command to verify that the EFAST software has been installed:

```
% /usr/sbin/versions efast
I efast date EFAST (Fast Ethernet Board), version
```

If the software is installed and the version is correct, proceed to the next step.

If the message `Nothing satisfies the selection criteria` is displayed or if the version is not correct, install the EFAST software, using the IRIX installation method and the *inst* commands `install EFAST` and `go`.

2. Configure the new Ethernet network interface, as explained in the *EFAST Release Notes* or in the *IRIX Advanced Site and Server Administration Guide*.

2.3.3 Configure the Board

1. Configure the board's jumpers, as explained in Chapter 1.
2. If installing more than one EFAST board, verify that each board's JP7 jumpers are set to a unique unit number. Refer to Table 1-5 for details.

3. Attach the cable (shipped with the board) to the EFAST board's DB15 connector.

Note: If your EFAST package contained two cables, be sure to select the cable (PN 018-0400-001) with a mounting plate that fits the door of your system.

2.3.4 Install the Hardware

1. Shut down the system according to the operating system instructions.
2. Turn off the power key/switch and unplug the power cable.
3. Remove all cables from the I/O door.
4. Open the I/O door on the system.

Caution: The components are extremely sensitive to ESD (electrostatic discharge). Use proper antistatic procedures while handling all components.

5. Select a VMEbus slot for the EFAST board. It is recommended that you use the first available VMEbus slot. For a CHALLENGE L (deskside) system, see Table 2-7 and Figure 2-2 for additional information. For a CHALLENGE XL (rackmount) system, see Table 2-8 and Figure 2-3.
6. Verify that a power supply board has been installed for the VMEbus slot(s) you have selected. On a CHALLENGE L (deskside) system, VMEbus power supply boards are installed at the back of the system, on the other side of the VMEbus connectors. On a CHALLENGE XL (rackmount) system, VMEbus power supply boards are installed in card cage 1.
7. Install the EFAST board and extender board into the VMEbus slot. The side of the board with the majority of the components faces to your right, as illustrated in Figure 2-1.
8. If you decide not to use the first available VMEbus slot, follow the instructions in the system's installation instruction manual to jumper the empty slots.
9. Attach the mounting panel plate to the I/O door.
10. Close the I/O door on the system.
11. Finish the installation following the instructions in Section 2.5, "Completing Board Installation."

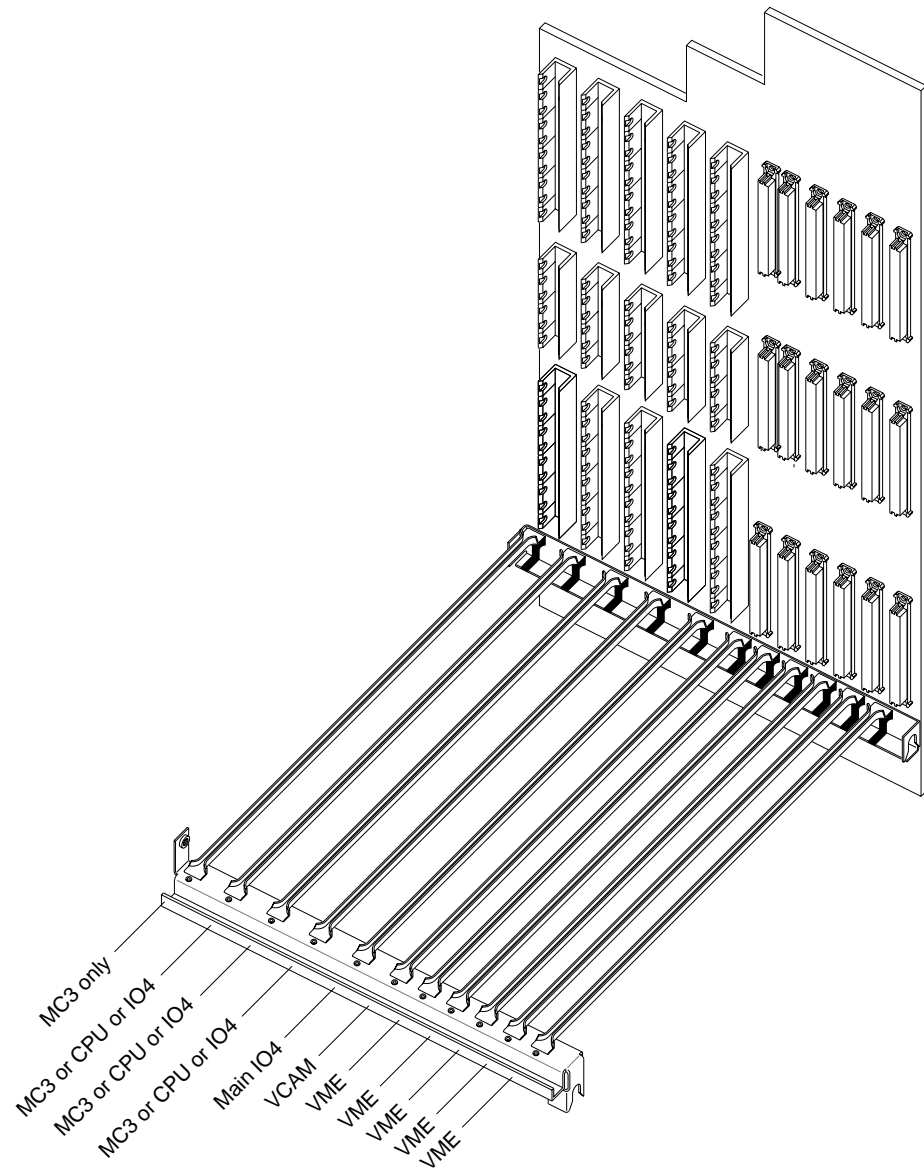


Figure 2-2 CHALLENGE L VMEbus Slot Locations

Slot Number	Board Type
1	not to be used for VMEbus boards
2	not to be used for VMEbus boards
3	not to be used for VMEbus boards
4	not to be used for VMEbus boards
5	not to be used for VMEbus boards
6	IO4 and VCAM (VMEbus Channel Adapter Module)
7	First VMEbus Board
8	Second VMEbus Board
9	Third VMEbus Board
10	Fourth VMEbus Board
11	Fifth VMEbus Board

Table 2-7 CHALLENGE L Board Slot Allocation

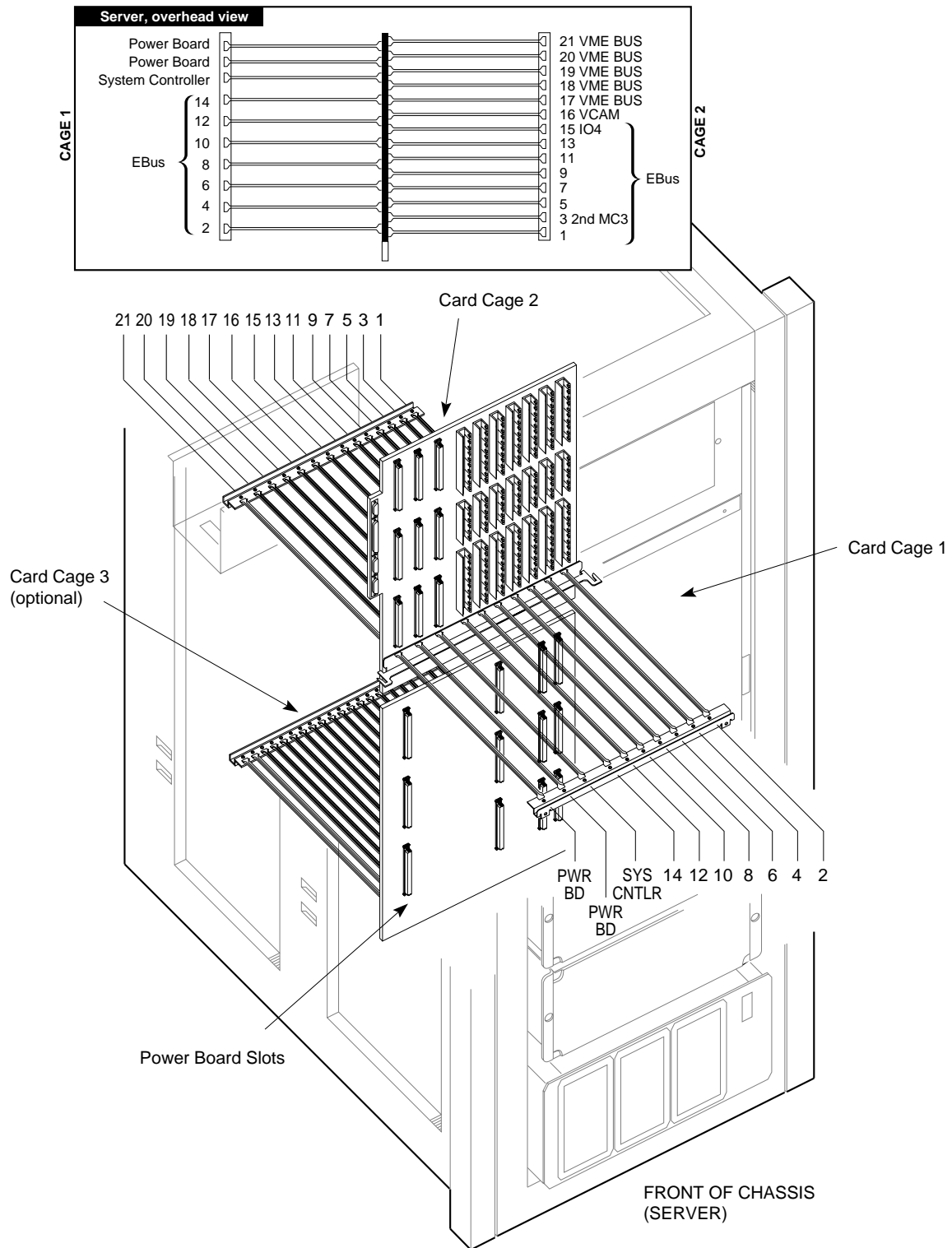


Figure 2-3 CHALLENGE XL VMEbus Slot Locations

Slot Number, Card Cage	Board Type
1, Card Cage 2	not to be used for VMEbus boards
2, Card Cage 1	not to be used for VMEbus boards
3, Card Cage 2	not to be used for VMEbus boards
4, Card Cage 1	not to be used for VMEbus boards
5, Card Cage 2	not to be used for VMEbus boards
6, Card Cage 1	not to be used for VMEbus boards
7, Card Cage 2	not to be used for VMEbus boards
8, Card Cage 1	not to be used for VMEbus boards
9, Card Cage 2	not to be used for VMEbus boards
10, Card Cage 1	not to be used for VMEbus boards
11, Card Cage 2	not to be used for VMEbus boards
12, Card Cage 2	not to be used for VMEbus boards
13, Card Cage 2	not to be used for VMEbus boards
14, Card Cage 2	not to be used for VMEbus boards
15, Card Cage 2	Main IO4
16, Card Cage 2	VCAM
17, Card Cage 2	First VMEbus board
18, Card Cage 2	Second VMEbus board
19, Card Cage 2	Third VMEbus board
20, Card Cage 2	Fourth VMEbus board
21, Card Cage 2	Fifth VMEbus board

Table 2-8 CHALLENGE XL Board Slot Allocations

2.4 Installation Procedure for Onyx Supercomputers

This section describes the steps for installing EFAST into an Onyx deskside or Onyx rackmount system. A maximum of three EFAST boards can be installed into an Onyx deskside system; a maximum of four EFAST boards can be installed into an Onyx rackmount system.

2.4.1 Prepare for Installation

1. EFAST software is (in most cases) shipped with the operating system. EFAST software information is provided in the online *EFAST Release Notes*.
2. Once the system is ready to install EFAST, perform a system backup and verify the saved files.

2.4.2 Install and Configure Software

1. Use this command to verify that the EFAST software has been installed:

```
% /usr/sbin/versions efast
I efast date EFAST (Fast Ethernet Board), version
```

If the software is installed and the version is correct, proceed to the next step.

If the message `Nothing satisfies the selection criteria` is displayed or if the version is not correct, install the EFAST software, using the IRIX installation method and the *inst* commands `install EFAST` and `go`.

2. Configure the new Ethernet network interface, as explained in the *EFAST Release Notes* or in the *IRIX Advanced Site and Server Administration Guide*.

2.4.3 Configure the Board

1. Configure the board's jumpers, as explained in Chapter 1.
2. If installing more than one EFAST board, verify that each board's **JP7** jumpers are set to a unique unit number. Refer to Table 1-5 for details.
3. Attach the cable (shipped with the board) to the EFAST board's DB15 connector.

Note: If your EFAST package contained two cables, be sure to select the cable (PN 018-0400-001) with a mounting plate that fits the door of your system.

2.4.4 Install the Hardware

1. Shut down the system according to the operating system instructions.
2. Turn off the power key/switch and unplug the power cable.
3. Remove all cables from the I/O door.

4. Open the I/O door on the system.

Caution: The components are extremely sensitive to ESD (electrostatic discharge). Use proper antistatic procedures while handling all components.

5. Select a VMEbus slot for the EFAST board. It is recommended that you use the first available VMEbus slot. For an Onyx deskside system, refer to Table 2-9 and Figure 2-4 for VMEbus slot information. For an Onyx rackmount system, refer to Table 2-10 and Figure 2-5.

6. Verify that a power supply board has been installed for the VMEbus slot(s) you have selected. On an Onyx deskside system, VMEbus power supply boards are installed at the back of the system, on the other side of the VMEbus connectors. On an Onyx rackmount system, VMEbus power supply boards are installed in card cage 1.
7. Install the EFAST board and extender board into the VMEbus slot. The side of the board with the majority of the components faces to your right, as illustrated in Figure 2-1.
8. If you decide not to use the first available VMEbus slot, follow the instructions in the system's installation instruction manual to jumper the empty slots.
9. Attach the mounting plate to the I/O door.
10. Close the I/O door on the system.
11. Finish the installation following the instructions in Section 2.5, "Completing Board Installation."

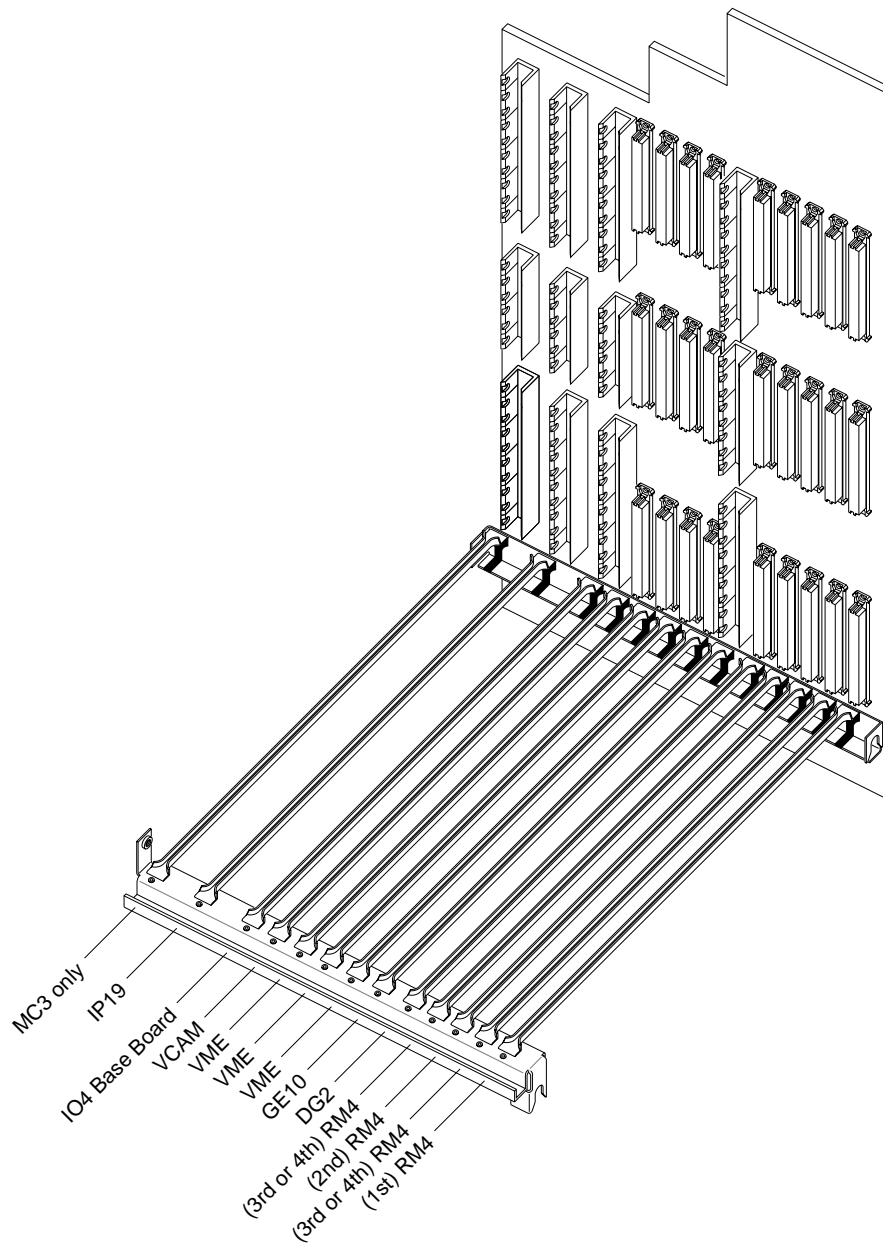


Figure 2-4 Onyx Deskside VMEbus Slot Locations

Slot Number	Board
1	not to be used for VMEbus boards
2	not to be used for VMEbus boards
3	not to be used for VMEbus boards
4	IO4 and VCAM (VMEbus Channel Adapter Module)
5	First VMEbus board
6	Second VMEbus board
7	Third VMEbus board
8	not to be used for VMEbus boards
9	not to be used for VMEbus boards
10	not to be used for VMEbus boards
11	not to be used for VMEbus boards
12	not to be used for VMEbus boards
13	not to be used for VMEbus boards

Table 2-9 Onyx Deskside Board Slot Allocations

Slot Number / Card Cage	Board
1 Card Cage 2	not to be used for VMEbus boards
2 Card Cage 1	not to be used for VMEbus boards
3 Card Cage 2	not to be used for VMEbus boards
4 Card Cage 1	not to be used for VMEbus boards
5 Card Cage 2	not to be used for VMEbus boards
6 Card Cage 1	not to be used for VMEbus boards
7 Card Cage 2	not to be used for VMEbus boards
8 Card Cage 1	not to be used for VMEbus boards
9 Card Cage 2	not to be used for VMEbus boards
10 Card Cage 1	not to be used for VMEbus boards
11 Card Cage 2	not to be used for VMEbus boards
12 Card Cage 2	IO4 and VCAM (VMEbus Channel Adapter Module)
13 Card Cage 2	First VMEbus option board

Table 2-10 Onyx Rackmount Board Slot Allocations

Slot Number / Card Cage	Board
14 Card Cage 2	Second VMEbus option board
15 Card Cage 2	Third VMEbus option board
16 Card Cage 2	not to be used for VMEbus boards
17 Card Cage 2	not to be used for VMEbus boards
18 Card Cage 2	not to be used for VMEbus boards
19 Card Cage 2	not to be used for VMEbus boards
20 Card Cage 2	not to be used for VMEbus boards
21 Card Cage 2	not to be used for VMEbus boards

Table 2-10 Onyx Rackmount Board Slot Allocations

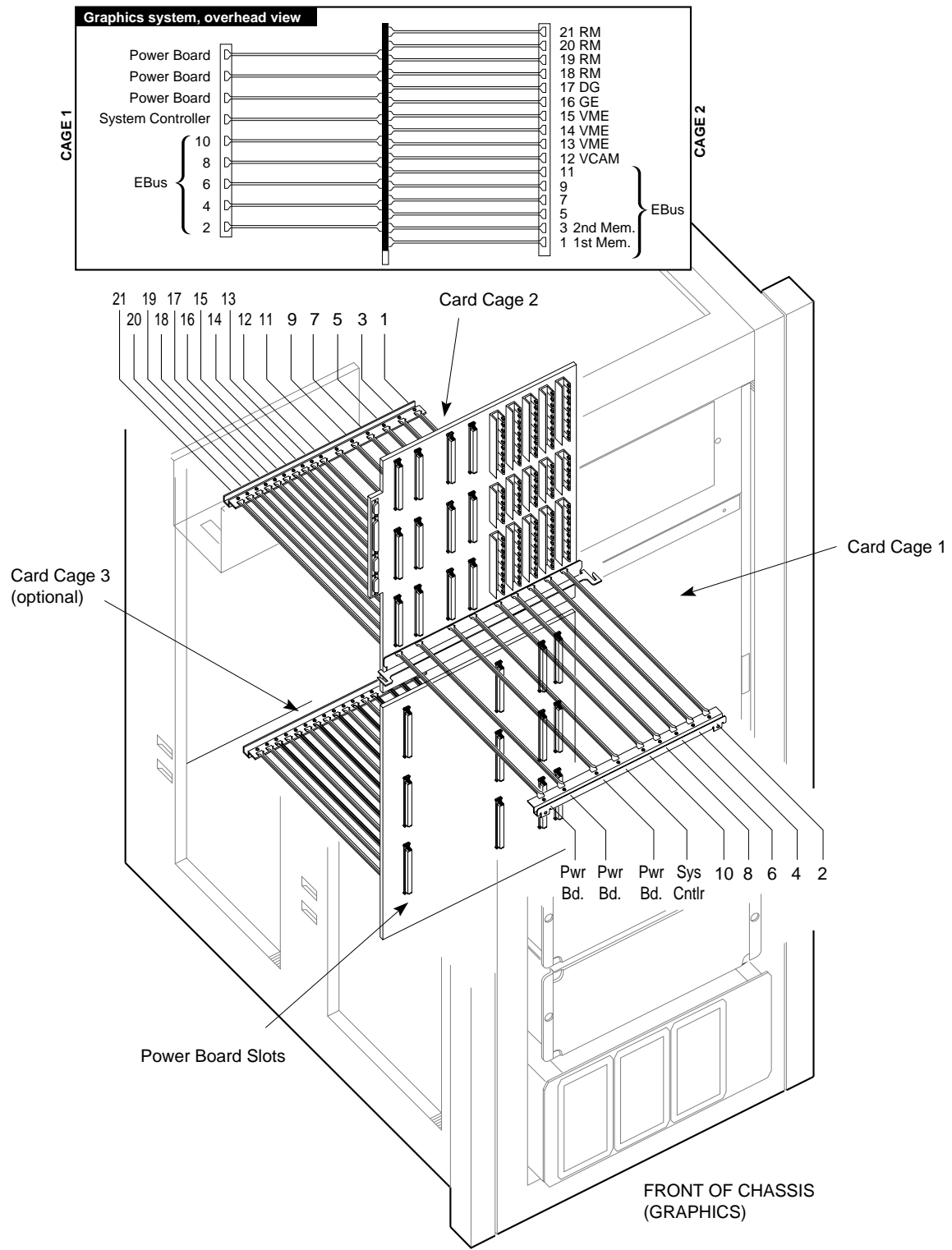


Figure 2-5 Onyx Rackmount VMEbus Slot Locations

2.5 Completing Board Installation

Once you have installed the board(s), follow these steps. It is important to verify that each board is working properly before connecting the new station to the site's ring.

1. Ensure that the I/O door is closed.
2. Connect the main power cord.
3. Attach all previously removed cables to the I/O panel and door.
4. Turn on the main power switch.
5. If the Power On tests pass, access the System Maintenance Menu; type **1** to start the operating system.
6. Respond **yes** when prompted with `Automatically rebuild the operating system?` This step builds the EFAST driver (*fxp* driver) into a new operating system (kernel) that is stored as `/unix.install`.
7. When the system comes up, log on.
8. Reboot (or shutdown) the system, and when the system comes up, access the System Maintenance Menu and again start the system. This step starts using (boots from) the newly built operating system.
9. Log on.
10. If you are using a graphical display monitor, open a shell window, then proceed to the next step. For nongraphics systems, go to the next step.
11. At the prompt, type `/bin/hinv`. You should get a display similar to the following example, where two EFAST boards are installed:

```
1 50 MHZ IP17 Processor
FPU: MIPS R4010 Floating Point Chip Revision: 0.0
CPU: MIPS R4000 Processor Chip Revision: 2.2
On-board serial ports: 4
Data cache size: 8 KBytes
Instruction cache size: 8 KBytes
Secondary unified instruction/data cache size: 1 MByte
Main memory size: 16 MBytes
I/O board, slot F: IO3B
Integral Ethernet: et0, IO3
EFAST FXP Controller; fxp0
EFAST FXP Controller; fxp1
Integral SCSI controller 1: Version WD33C93A, revision 9
Tape drive: unit 2 on SCSI controller 0: QIC 150
Disk drive: unit 1 on SCSI controller 0
Integral SCSI controller 0: Version WD33C93A, revision 9
```

Note: You must issue the `/bin/hinv` command from the operating system not the PROM monitor.

12. Verify that the `Efast FXP Controller` line is displayed.
13. Connect an Ethernet transceiver to the EFAST port on the I/O panel.
14. Use the `ping` and `netstat` commands to verify that the EFAST network connection is functional. Use of these commands is described in the *IRIX Advanced Site and Server Administration Guide* and in online man pages.

2.6 VMEbus Option Slot Information

This section contains information about special installations such as backplane considerations when you skip a VMEbus slot, configuration instructions when you install into a second card cage, and information specific for a particular platform.

2.6.1 Backplane Considerations

After you have inserted a VMEbus board into an empty VMEbus slot, you may need to add jumpers to the backplane, and/or reconfigure the `/usr/sysgen/system` file if you are installing the board into the VMEbus B channel (indicated as VMEbus-B) of a dual VMEbus R2-4D rackmount chassis.

When the POWER Series IRIS-4D boots up after power-up, it probes its I/O channels to identify the hardware that is plugged into each VMEbus slot. The power-up sequence probes each VMEbus slot sequentially until reaching the last used slot in each I/O channel. It must find either a VMEbus I/O controller or jumpers in each VMEbus slot location. If the slots aren't occupied or properly jumpered, the workstation or server will hang before booting or never enable the new hardware.

Whether or not you need to add jumpers to the backplane is determined by two factors. These factors are:

- the VMEbus slot chosen
- the backplane of the workstation or server

You only need to reconfigure the `/usr/sysgen/system` file if you are installing the network controller board into the VMEbus-B channel of a dual VMEbus R2-4D rackmount chassis.

When you are adding VMEbus boards into several chassis, keep the following general rules in mind:

1. For the IRIS-4D Professional Series (this includes the IRIS-4D 60, 70, 80 and 85 models), remove the existing VMEbus backplane jumpers from the slot when you add a VMEbus board. All unused slots must be jumpered.
2. For the IRIS-4D POWER Series (IRIS 120/GTX and later) and IRIS Crimson, add the VMEbus board into the first available VMEbus in numerical sequence without leaving any gaps. As long as there are no gaps, jumpering unused slots is unnecessary. However, if VMEbus boards are added out of numerical sequence (leaving gaps), you must add jumpers to the slots that were skipped.
3. For the R2-4D dual VMEbus model 19-slot rack mount chassis, the `/usr/sysgen/system` file must be reconfigured for new VMEbus boards.
4. For the CHALLENGE line and Onyx family, add the VMEbus board into the first available VMEbus in numerical sequence without leaving any gaps. As long as there are no gaps, jumpering unused slots is unnecessary. However, if VMEbus boards are added out of numerical sequence (leaving gaps), you must add jumpers to the slots that were skipped.

There is no prescribed sequence of VMEbus boards that is necessary. In the past, SSEs were advised to add disk controllers first, then add Ethernet controllers second. These sequences were designed for consistency, not electronic necessity. All VMEbus boards are serviced by the backplane according to the board's priority interrupt level, not by the slot order.

Note: If you need to skip a slot to fit oversized VMEbus boards, or to improve airflow in a chassis, you need to make sure that you jumper only the slots corresponding to empty slots, and don't jumper slots that actually house VMEbus boards!

2.6.2 Configuring VMEbus Addresses for Installation into Optional Backplanes

Some platforms offer VMEbus option slots in different backplanes. For example, when an R2-4D is configured with dual IO3s, the VMEbus boards can be added either to the VMEbus A or to VMEbus B backplane. In platforms with this setup, add VMEbus boards into any backplane starting at the lowest slot number. For example, on an R2-4D, slot 1 is the first slot location for VMEbus-A and slot 15 is the first slot location for VMEbus-B. If you are adding network controller boards into the VMEbus-A, you won't have to edit the system configuration file `/usr/sysgen/system` file; the default settings allow adding up to four of each type of network controller board into VMEbus-A. However, once you start adding boards into VMEbus-B, the base and probe addresses in the `/usr/sysgen/system` must be edited to specify those devices as residing on VMEbus-B. Once the file has been edited, a new kernel must be generated and booted. Information on how to do so is included in the comments in the `/usr/sysgen/system` file, and a summary of this information as it applies to an EFAST board installation follows.

The entries for the EFAST board appear in the `/usr/sysgen/system` file as `module=if_fxp`. Searching the file for this string of text locates the entry for each unit (EFAST board). The default entries for the EFAST board cover four EFAST boards on VMEbus-A. The file presents the fourth board first, designated as `unit=3`. The section of the unedited `system` file that configures EFAST boards is shown below:

```
* CMC FXP-130 Ethernet board

VECTOR: module=if_fxp vector=0xb9 ipl=4 unit=3 base=0xD9800000
probe=0xD9800000 probe_size=2

VECTOR: module=if_fxp vector=0xb8 ipl=4 unit=2 base=0xD9840000
probe=0xD9840000 probe_size=2

VECTOR: module=if_fxp vector=0xb7 ipl=4 unit=1 base=0xD9880000
probe=0xD9880000 probe_size=2

VECTOR: module=if_fxp vector=0xb6 ipl=4 unit=0 base=0xD98c0000
probe=0xD98c0000 probe_size=2
```

The lines shown above are for VMEbus-A EFAST boards. To install an EFAST board into VMEbus-B, the high order bits for the base and probe addresses must be changed for each board added into the VMEbus-B chassis. The edited strings are shown below in bold text:

- For unit 3, change `base=0xD9800000` to **`base=0xD1800000`**, and change `probe=0xD9800000` to **`probe=0xD1800000`**.
- For unit 2, change `base=0xD9840000` to **`base=0xD1840000`**, and change `probe=0xD9840000` to **`probe=0xD1840000`**.

- For unit 1, change `base=0xD9880000` to **`base=0xD1880000`**, and change `probe=0xD9880000` to **`probe=0xD1880000`**.
- For unit 0, change `base=0xD98c0000` to **`base=0xD18c0000`**, and change `probe=0xD98c0000` to **`probe=0xD18c0000`**.

Configuration Example

If you were adding three EFAST network controller boards into a dual VMEbus R2 rackmount (Predator 3) chassis, you would follow these steps:

1. After unpacking the network controller boards, check the board's "unit address" jumper(s) (JP7) on the first board to make sure that it has the correct jumper settings for unit 0.
2. Change the jumper settings on the second board to the unit 1 settings.
3. Change the jumper settings on the third board to the unit2 settings.
4. Add unit 0 into slot 1.
5. Add unit 1 into slot 15.
6. Add unit 2 into slot 16.
7. Become superuser and open the `/usr/sysgen/system` file under the `vi` screen editor. (Remember to make a copy of the file before making any changes.)

Caution: Always make a copy of files before making any line changes.

8. Locate the appropriate vector lines corresponding to the device (or board) name. Find this line for the unit 0 EFAST board:

```
VECTOR: module=if_fxp vector=0xb6 ipl=4 unit=0 base=0xD98c0000
probe=0xD98c0000 probe_size=2
```

Since the first board is going to be part of VMEbus-A bus, you don't have to change this line.

9. The entries for unit 1 and unit 2 must be changed for VMEbus-B. In the unit 1 and unit 2 lines, replace `0xD9` in the `base` address and `probe` address to `0xD1`. (The changed text is shown below in bold.)

```
VECTOR: module=if_fxp vector=0xb8 ipl=4 unit=2 base=0xD1840000
probe=0xD1840000 probe_size=2
```

```
VECTOR: module=if_fxp vector=0xb7 ipl=4 unit=1 base=0xD1880000
probe=0xD1880000 probe_size=2
```

10. Save your changes and exit the file.
11. Reboot to rebuild the kernel.

Note: If you update the operating system, a new `/usr/sysgen/system` file will be created and your edited file will be saved as a `.O` file. Before executing `autoconfig` to configure a new kernel, you will need to either edit the new file or merge your changes from `/usr/sysgen/system.O` into `/usr/sysgen/system`. Failure to do so will prevent the operating system from discovering at boot time any of the I/O devices on VMEbus-B.

