

7015 Models R30, R40, and R50

**CPU Enclosure
Installation and Service Guide**

Third Edition (April 1997)

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Table of Contents

Communications Statements	vii
Safety Notices	xi
About This Book	xiii
Chapter 1. Reference Information	1-1
Description	1-1
CPU Enclosure Locations	1-2
Front View with Bezel	1-2
Front View without Bezel	1-2
Front View without Front Access Plate	1-3
Operator Panel	1-3
Rear Connector Locations with Rear Access Plate Removed	1-4
Serial Ports	1-4
CPU Module (Top View with Top Cover Removed)	1-5
I/O Module (Top View with Rear Access Plate Removed)	1-6
Media Module	1-7
Power Supply or Cooling Unit	1-7
System Planar Connector Locations (Top View)	1-8
I/O Planars (Top View)	1-11
7015 Model R00 Rack with Power Distribution Bus (PDB)	1-12
Data Flow	1-13
Power Flow	1-15
Typical Rail Installation	1-16
Specifications	1-17
External AC Power Cables	1-18
Service Inspection Guide	1-19
Chapter 2 Using SystemGuard	2-1
Introduction	2-1
SystemGuard Power	2-2
SystemGuard Components	2-2
SystemGuard Bring-Up MicroProcessor Overview	2-2
The Operator Panel	2-3
SystemGuard Consoles	2-4
Physical and Electronic Key	2-4
SystemGuard Phases	2-4
Stand-By Phase	2-4
Init Phase	2-5
Maintenance Phase	2-5
Boot Phase	2-5
Run-Time Phase	2-5
SystemGuard Parameters and Flags	2-9
Working with SystemGuard	2-10
SystemGuard Menus	2-11

Maintenance Menu	2-21
Display Configuration	2-22
Display BUMP Error Log	2-25
Enable Service Console	2-25
Disable Service Console	2-25
Reset	2-25
Power-Off	2-25
System Boot	2-26
Off-Line Tests	2-28
Set Parameters	2-32
Set National Language	2-38
Some Common SystemGuard Tasks	2-39
Customizing SystemGuard For Your Needs	2-58
Reloading the Flash EEPROM	2-60
Chapter 3. Maintenance Analysis Procedures (MAPs)	3-1520-1
MAP 1520: 7015 CPU Enclosure – Power MAP	3-1520-1
MAP 1540: 7015 CPU Enclosure – Minimum Configuration	3-1540-1
Chapter 4. Removal and Replacement Procedures	4-1
Power-Off Procedure with a Power Distribution Bus	4-2
Power-On Procedure with a Power Distribution Bus	4-4
Power-Off Procedure with a Power Distribution Unit	4-5
Power-On Procedure with a Power Distribution Unit	4-7
Power-Off Procedure with a Power Distribution Panel	4-9
Power-On Procedure with Power Distribution Panel	4-11
Handling Static-Sensitive Devices	4-14
Front Bezel and Front Access Plate	4-15
Disk Drive	4-17
CD-ROM Drive or Optional Media Device	4-18
Operator Panel	4-20
Lithium Battery	4-21
3.5-Inch Diskette Drive	4-23
Operator Panel Bezel	4-25
Media Module	4-27
Media Module Fans	4-30
Media Module Cables and Docking Connector Cards	4-32
CPU Module	4-39
Interlock Cable	4-43
Memory Card, CPU Card, or I/O Card	4-45
Memory Modules	4-49
CPU Module Fans	4-50
System Planar	4-52
Lateral Planar 1 Card	4-56
CPU Module Flex Cables	4-57
Rear Access Plate	4-60
Power Supply or Cooling Unit for Systems	4-61
Power Supply Fan or Cooling Unit Fan	4-64
System Interface Board (SIB)	4-65
I/O Module	4-67
Lateral Planar 2 Card	4-71

Adapter Cable	4-73
Adapter	4-75
I/O Module Flex Cables	4-76
I/O Planar Power Cables	4-77
I/O Planars	4-78
Power Distribution Cables	4-79
Chapter 5. CPU Enclosure Installation Procedure	5-1
Chapter 6. Parts Information	6-1
Acronyms for FRU Parts	6-1
Detail 1. Front Bezel, Front Access Plate, and CPU Enclosure	6-2
Detail 2. Disk Drives, Media Devices, and Operator Panel	6-4
Detail 3. Media Module	6-6
Detail 4. CPU Module (1 of 3)	6-8
Detail 5. CPU Module (2 of 3)	6-10
Detail 6. CPU Module (3 of 3)	6-12
Detail 7. I/O Module	6-14
Detail 8. Rails for CPU Enclosure Installation	6-16
Power Cables	6-18
Appendix A. SystemGuard Test Groups	A-1
SystemGuard Test Groups Table	A-1
SystemGuard Test Group Descriptions	A-3
BUMP Quick I/O Tests Group	A-3
JTAG Test Group	A-8
Direct I/O Test Group	A-8
CPU Test Group	A-11
DCB and Memory Test Group	A-12
Interrupt Tests Group	A-19
CPU MultiProcessor Test Group	A-20
Appendix B. Modifying SystemGuard Parameters	B-1
Default Parameter Values	B-1
Changing Flags and Parameters Under AIX Service Aids	B-3
Modifying the Remote Authorization Flag	B-3
Modifying the Dial-Out Authorization Flag	B-4
Modifying Dial-In Phone Numbers	B-5
Modifying Dial-Out Phone Numbers	B-5
Modifying the Electronic Mode Switch from Service Line Flag	B-6
Reloading the Flash EEPROM	B-7
Appendix C. SystemGuard Remote Operation Configuration	C-1
Terminal Configuration	C-1
Flags and Parameters Settings	C-2
Modem Configuration Files	C-4
Initializing a Modem	C-6
Testing Dial-Out	C-6

Appendix D. Off Line Diagnostic Error Codes	D-1
Error Logging	D-26
Appendix E. System Power States	E-1
Power States	E-1
Glossary: Special Terms Used in SystemGuard	X-1
Index	X-3

Communications Statements

The following statement applies to this product. The statement for other products intended for use with this product appears in their accompanying manuals.

Federal Communications Commission (FCC) Statement

Note: This equipment has been tested and found to comply 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.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. Neither the provider nor the manufacturer are responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

United Kingdom Telecommunications Safety Requirements

This equipment is manufactured to the International Safety Standard EN60950 and as such is approved in the UK under the General Approval Number NS/G/1234/J/100003 for indirect connection to the public telecommunication network.

The network adapter interfaces housed within this equipment are approved separately, each one having its own independent approval number. These interface adapters, supplied by the manufacturer, do not use or contain excessive voltages. An excessive voltage is one which exceeds 70.7 V peak ac or 120 V dc. They interface with this equipment using Safe Extra Low Voltages only. In order to maintain the separate (independent) approval of the manufacturer's adapters, it is essential that other optional cards, not supplied by the manufacturer, do not use main voltages or any other excessive voltages. Seek advice from a competent engineer before installing other adapters not supplied by the manufacturer.

European Union (EU) Statement

This product is in conformity with the protection requirements of EU Council Directive 89/336/EEC on the approximation of the laws of the Member States relating to electromagnetic compatibility.

Neither the provider nor the manufacturer can accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended modification of the product, including the fitting of option cards not supplied by the manufacturer.

This product has been tested and found to comply with the limits for Class A Information Technology Equipment according to CISPR 22 / European Standard EN 55022. The limits

for Class A equipment were derived for commercial and industrial environments to provide reasonable protection against interference with licensed communication equipment.

Attention: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

International Electrotechnical Commission (IEC) Statement

This product has been designed and built to comply with IEC Standard 950.

Avis de conformité aux normes du ministère des Communications du Canada

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Canadian Department of Communications Compliance Statement

This Class A digital apparatus meets the requirements of the Canadian Interference-Causing Equipment Regulations.

VCCI Statement

電波障害自主規制 届出装置の記述

この装置は、第一種情報装置（商工業地域において使用されるべき情報装置）で商工業地域での電波障害防止を目的とした情報処理装置等電波障害自主規制協議会（VCCI）基準に適合しております。

従って、住宅地域またはその隣接した地域で使用すると、ラジオ、テレビジョン受信機等に受信障害を与えることがあります。

取扱説明書に従って正しい取り扱いをしてください。

The following is a summary of the VCCI Japanese statement in the box above.

This equipment is in the Class 1 category (information equipment to be used in commercial and/or industrial areas) and conforms to the standards set by the Voluntary Control Council For Interference by Data Processing Equipment and Electronic Office Machines aimed at preventing radio interference in commercial and/or industrial areas.

Consequently, when used in a residential area or in an adjacent area thereto, radio interference may be caused to radios and TV receivers, etc.

Read the instructions for correct handling. VCCI-1.

Radio Protection for Germany

Dieses Gerät ist berechtigt in Übereinstimmung mit dem deutschen EMVG vom 9.Nov.92 das EG-Konformitätszeichen zu führen.

Der Aussteller der Konformitätserklärung ist die IBM Germany.

Dieses Gerät erfüllt die Bedingungen der EN 55022 Klasse A. Für diese Klasse von Geräten gilt folgende Bestimmung nach dem EMVG:

Geräte dürfen an Orten, für die sie nicht ausreichend entstört sind, nur mit besonderer Genehmigung des Bundesministers für Post und Telekommunikation oder des Bundesamtes für Post und Telekommunikation betrieben werden. Die Genehmigung wird erteilt, wenn keine elektromagnetischen Störungen zu erwarten sind.

(Auszug aus dem EMVG vom 9.Nov.92, Para.3, Abs.4)

Hinweis:

Dieses Genehmigungsverfahren ist von der Deutschen Bundespost noch nicht veröffentlicht worden.

Safety Notices

Note: For a translation of danger and caution notices, see the *System Unit Safety Information* manual, form number SA23-2652.

Definitions of Safety Notices

A *danger* notice indicates the presence of a hazard that has the potential of causing death or serious personal injury. *Danger* notices appear on the following pages:

3-1520-1
4-3
4-4
4-6
4-7
4-10
4-12
4-73
5-2

A *caution* notice indicates the presence of a hazard that has the potential of causing moderate or minor personal injury. *Caution* notices appear on the following pages:

3-1520-1
4-4
4-7
4-10
4-12
4-18
4-21
5-1
5-2

An *attention* notice indicates an action that could cause damage to a program, device, system, or data.

Safety Notice for Servicing

For safety checks when servicing, refer to Chapter 4, "Removal and Replacement Procedures."

Laser Safety Information

The optical drive in this system unit is a laser product. The optical drive has a label that identifies its classification. The label, located on the drive, is shown below.



The optical drive in this system unit is certified in the U.S. to conform to the requirements of the Department of Health and Human Services 21 Code of Federal Regulations (DHHS 21 CFR) Subchapter J for Class 1 laser products. Elsewhere, the drive is certified to conform to the requirements of the International Electrotechnical Commission (IEC) 825 (1st edition 1984) and CENELEC EN 60 825:1991 for Class 1 laser products.



CAUTION:

A class 3 laser is contained in the device. Do not attempt to operate the drive while it is disassembled. Do not attempt to open the covers of the drive as it is not serviceable and is to be replaced as a unit.

Class 1 laser products are not considered to be hazardous. The optical drive contains internally a Class 3B gallium-arsenide laser that is nominally 30 milliwatts at 830 nanometers. The design incorporates a combination of enclosures, electronics, and redundant interlocks such that there is no exposure to laser radiation above a Class 1 level during normal operation, user maintenance, or servicing conditions.

About This Book

This book provides maintenance information that is specific to the 7015 Models R30, R40, and R50 CPU Enclosures. It also contains maintenance analysis procedures (MAPs) that are not common to other systems.

MAPs that are common to all systems are contained in the *Diagnostic Information For Micro Channel Bus Systems*.

This book is used by the service technician to repair system failures. It is assumed in this book that the service technician has had training on the 7015 systems.

ISO 9000

ISO 9000 registered quality systems were used in the development and manufacturing of this product.

Related Publications

The *Diagnostic Information For Micro Channel Bus Systems*, order number SA23-2765, contains reference information about adapters and devices, checkout procedures for problem determination, system verification, using the diagnostics, and cabling for the system units. This manual also contains the removal-and-replacement procedures for the logic boards on the disk drives and cabling information that can be used to isolate problems with customer cabling.

The *7015 Model R00 Rack Installation and Service Guide*, order number SA23-2744, contains information about installing the rack, servicing the power components within the rack, and switching the CPU drawer on and off.

The *7015 Model R30, R40, and R50 CPU Enclosure Operator Guide*, order number SA23-2742, contains information about the controls and features of the system unit.

The *System Unit Safety Information* manual, order number SA23-2652, contains translations of danger and caution notices.

The *7135 RAIDiant Array: Operator Guide*, order number GA33-3251, provides information about operator controls and features on the SCSI disk unit.

The *7135 RAIDiant Array: Installation and Service Guide*, order number SY33-0181, contains information on the SCSI disk unit.

Chapter 1. Reference Information

This chapter contains information about part locations; connector locations; slot locations on the system planar, I/O planars; data and power flow; and CPU enclosure specifications.

Description

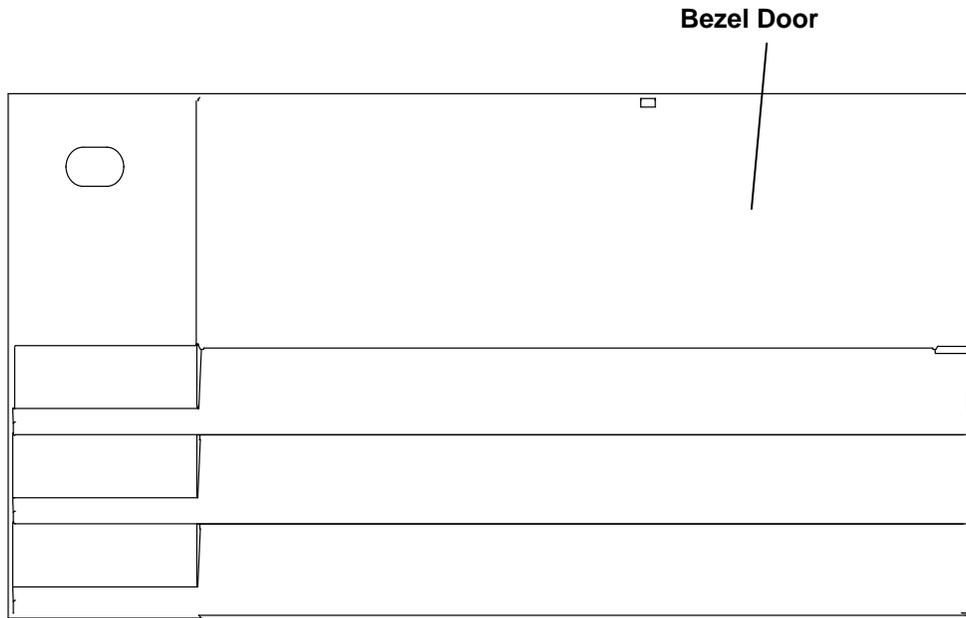
7015 CPU Enclosures equipped with a typical configuration contain the following:

- System planar containing memory cards, CPU cards, and an I/O card
- Two I/O planars containing 16 Micro Channel adapter slots
- System interface board containing a parallel port, three serial ports, and two RS485 ports, and one battery backup unit port
- Power supply
- Cooling unit or optional second power supply
- Operator panel with 1.44MB 3.5-inch diskette drive
- CD-ROM drive
- Media position for optional media devices: 5.0GB 8-mm tape drive, 4.0GB 4 mm tape drive, or 1/4-inch tape drive
- A SCSI Disk drive with a position for an optional second disk drive.

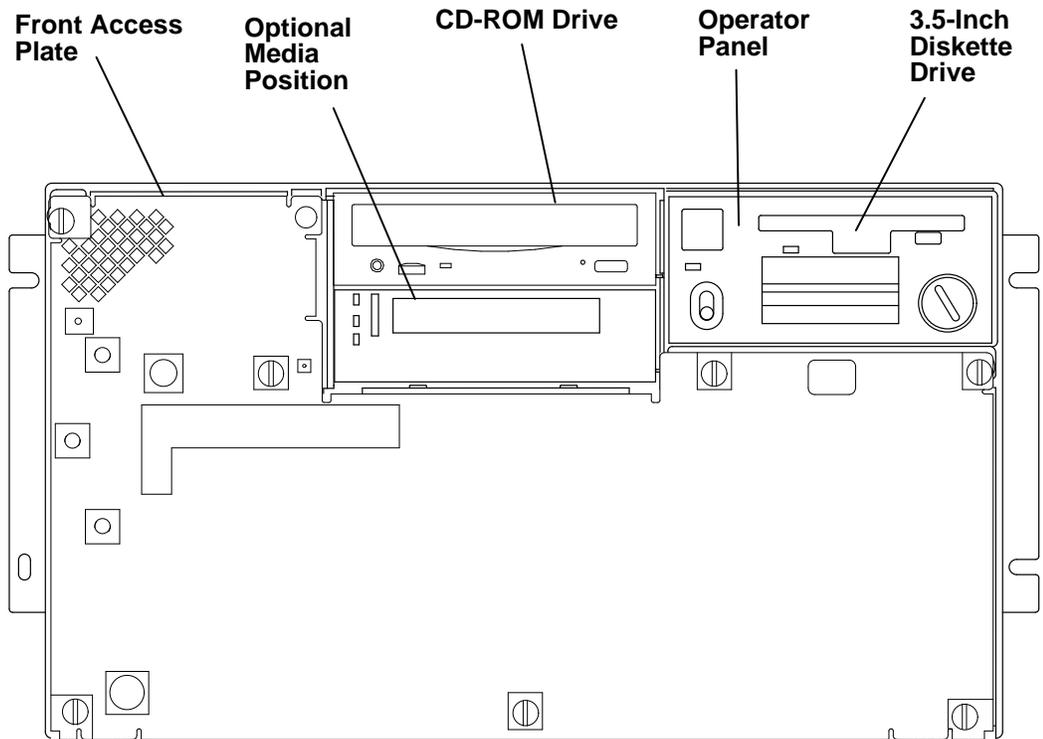
Other configurations of the CPU enclosure contain additional devices or adapters.

CPU Enclosure Locations

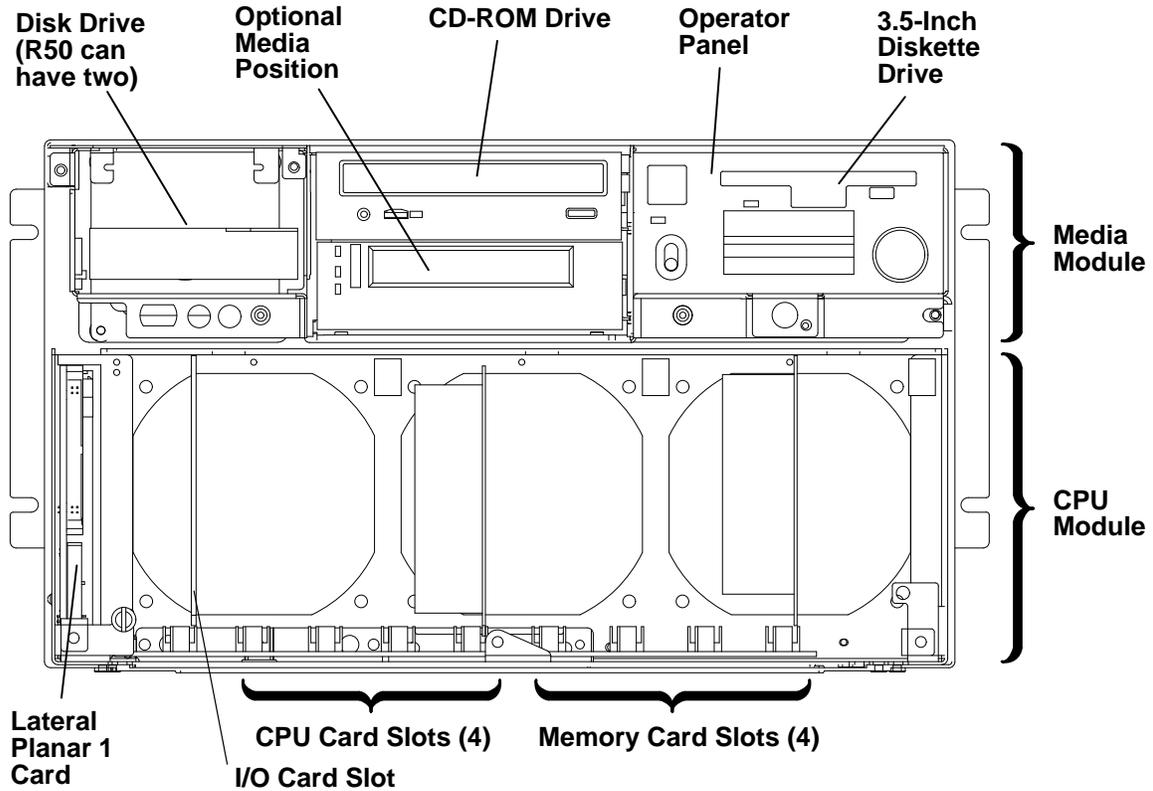
Front View with Bezel



Front View without Bezel

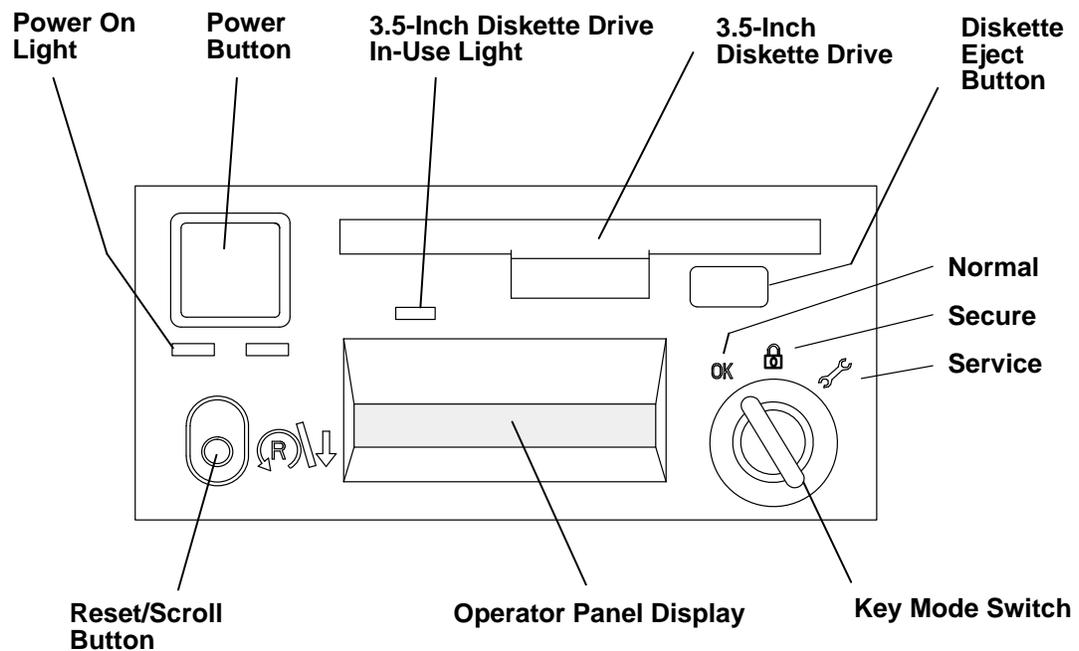


Front View without Front Access Plate

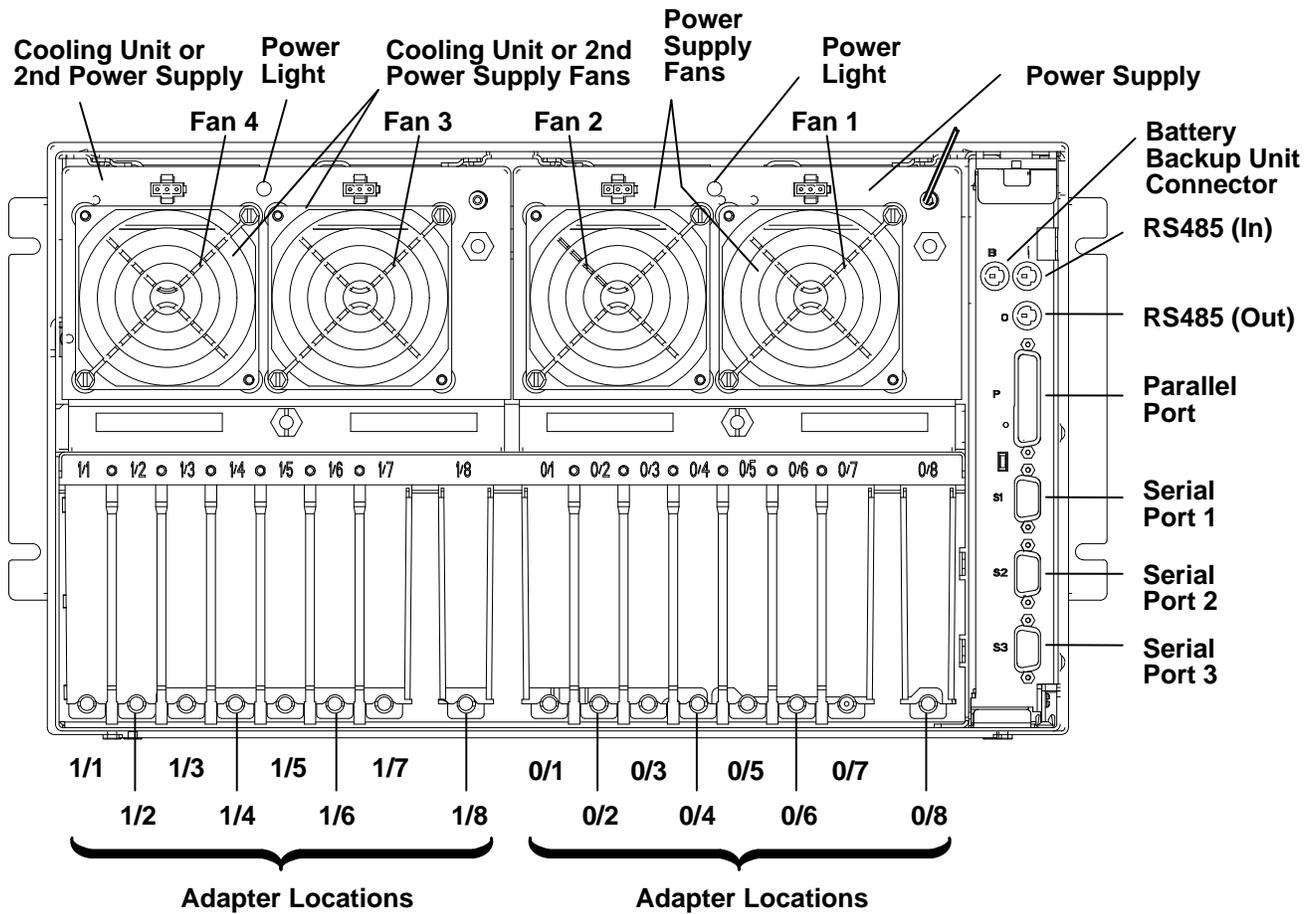


Note: The R50 CPU enclosure frame includes card guides not shown in the figure above.

Operator Panel



Rear Connector Locations with Rear Access Plate Removed

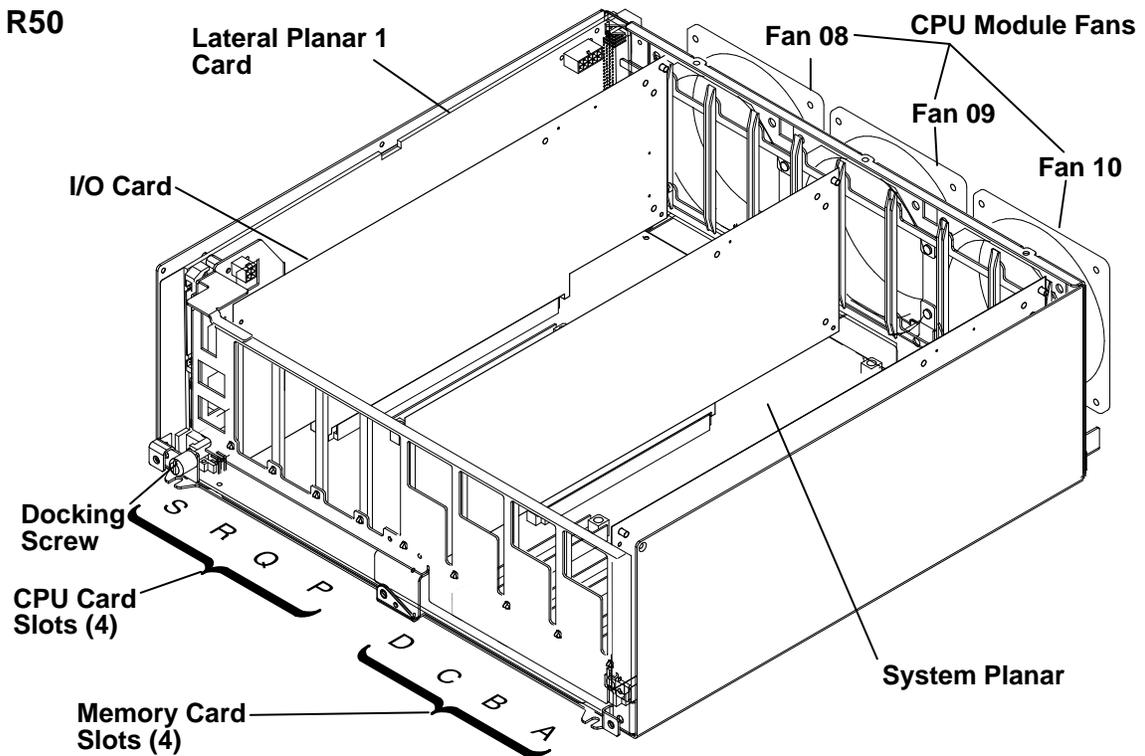
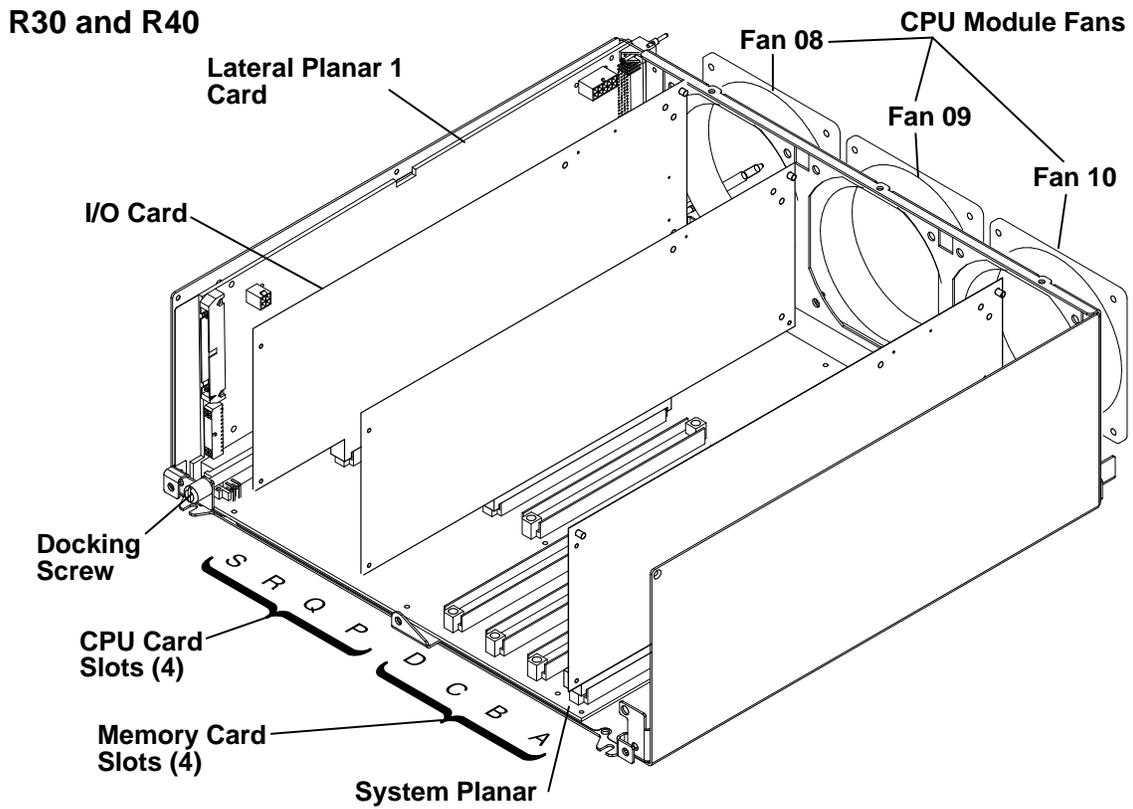


Note: Fans 3 and 4 above are in reversed positions if a cooling unit is installed instead of an optional power supply.

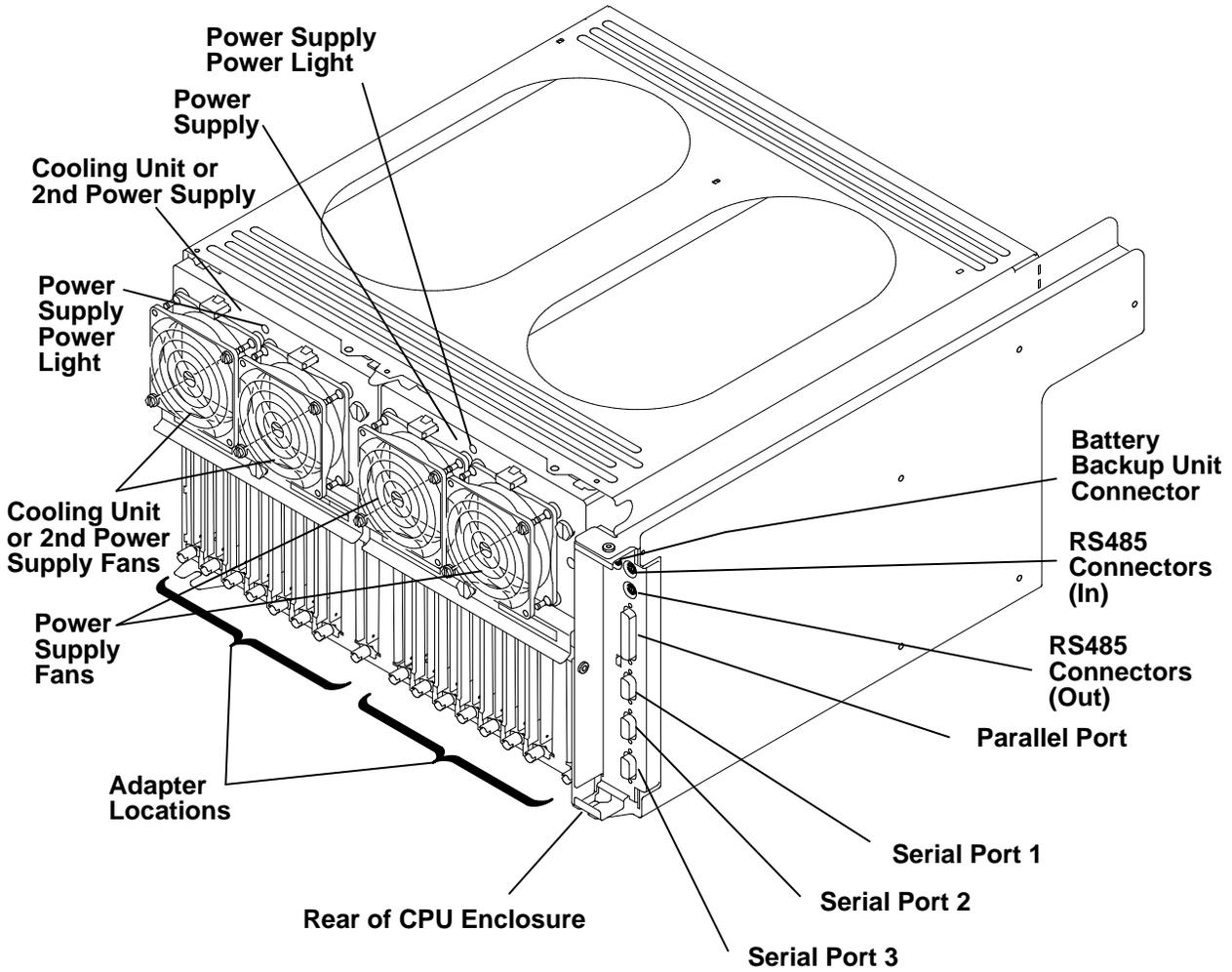
Serial Ports

Serial Ports 1 and 2 are reserved for maintenance purposes. Serial Port 3 is used to manage an optional external uninterruptible power supply (UPS). Serial Ports 1, 2 and 3 can also be used as async terminal lines.

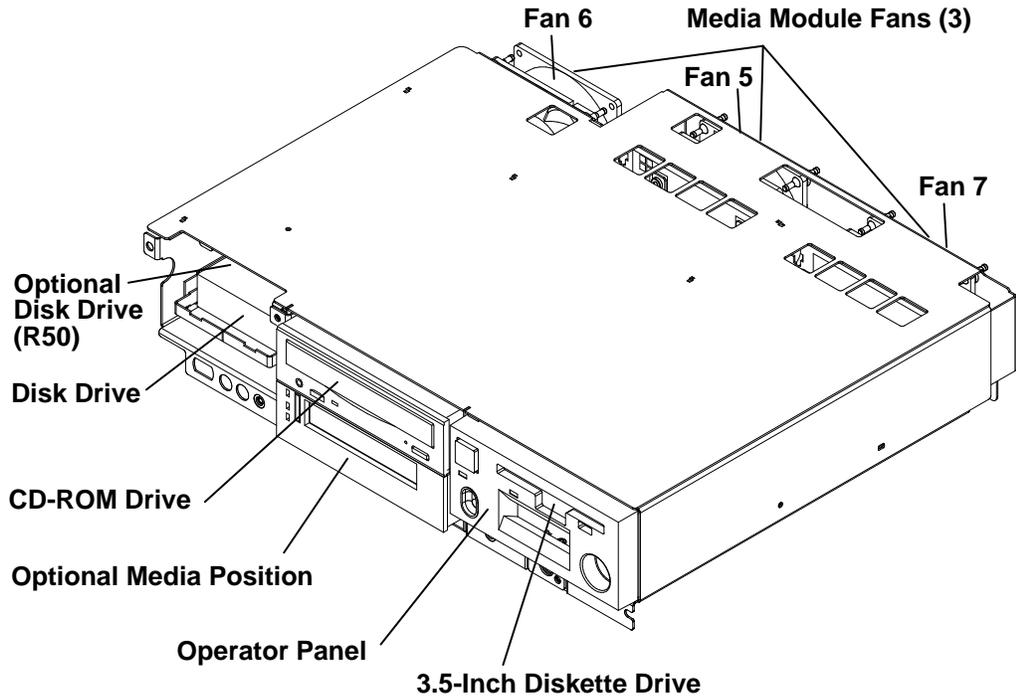
CPU Module (Top View with Top Cover Removed)



I/O Module (Top View with Rear Access Plate Removed)

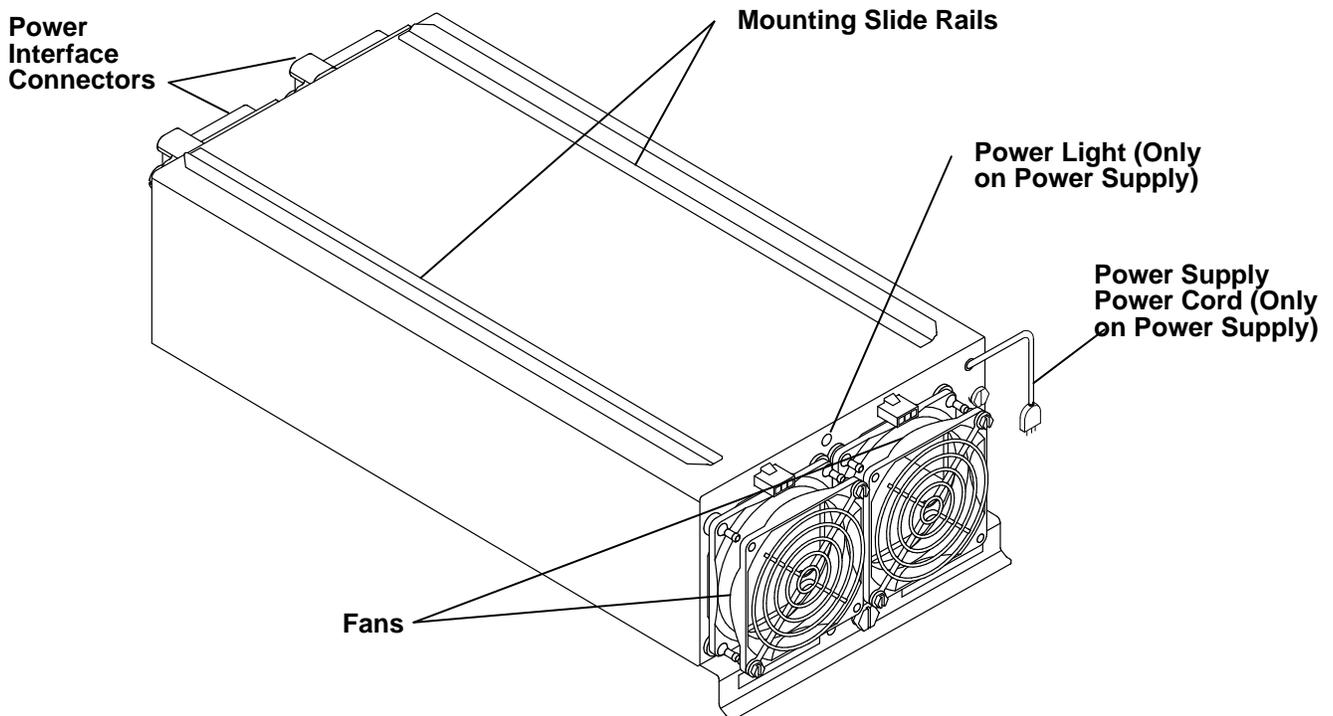


Media Module



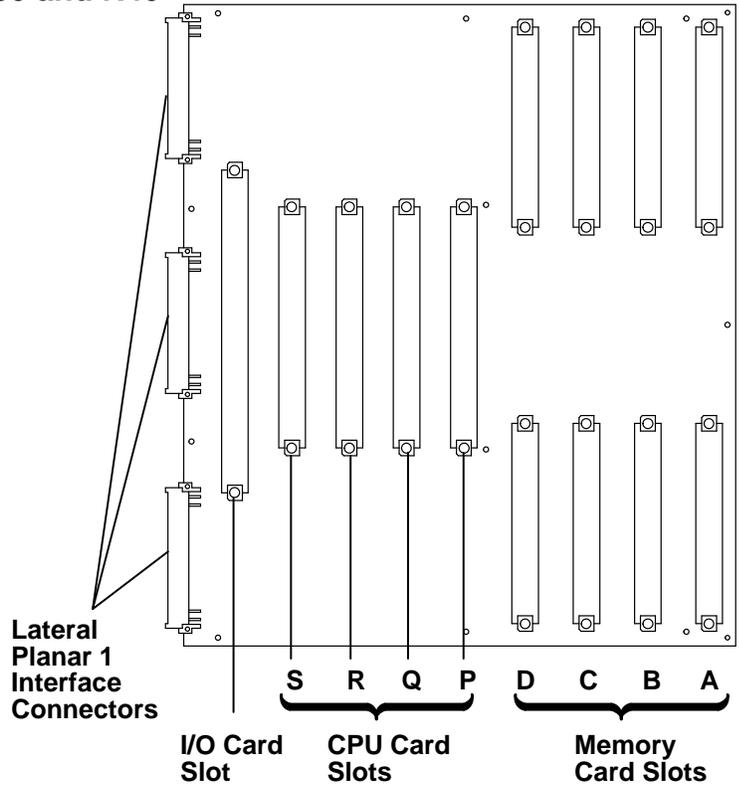
Note: The Model R50 CPU Enclosure has a bay for an optional disk drive located above the standard disk drive bay.

Power Supply or Cooling Unit

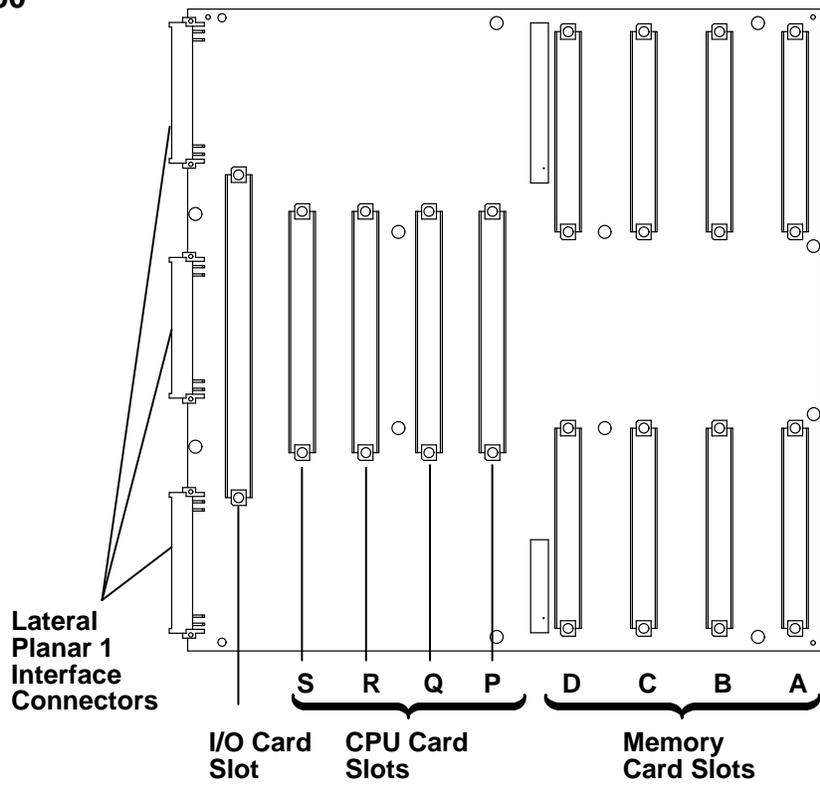


System Planar Connector Locations (Top View)

R30 and R40



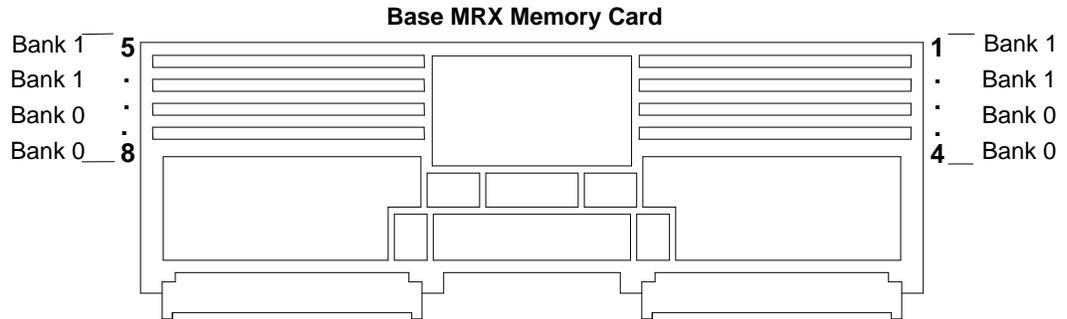
R50



Memory Cards

There are four types of memory card available for use with the R30, R40 or R50 systems. They are the MRX card, the RLX card, the NFX card, and the SF5 card.

The base MRX memory card looks like the following figure.



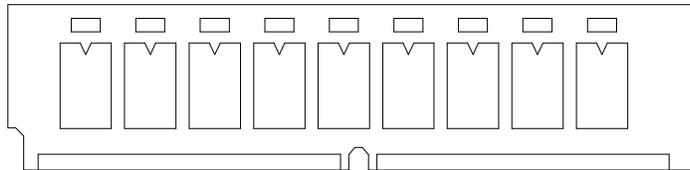
Memory cards must be installed starting from memory slot A. Additional memory cards must be installed using memory slot B first, then C then D.

The system can be upgraded by installing up to three additional memory cards.

Two kinds of memory modules can be installed on memory cards:

- 8MB memory modules which use 4Mb technology.
- 32MB memory modules which use 16Mb technology.

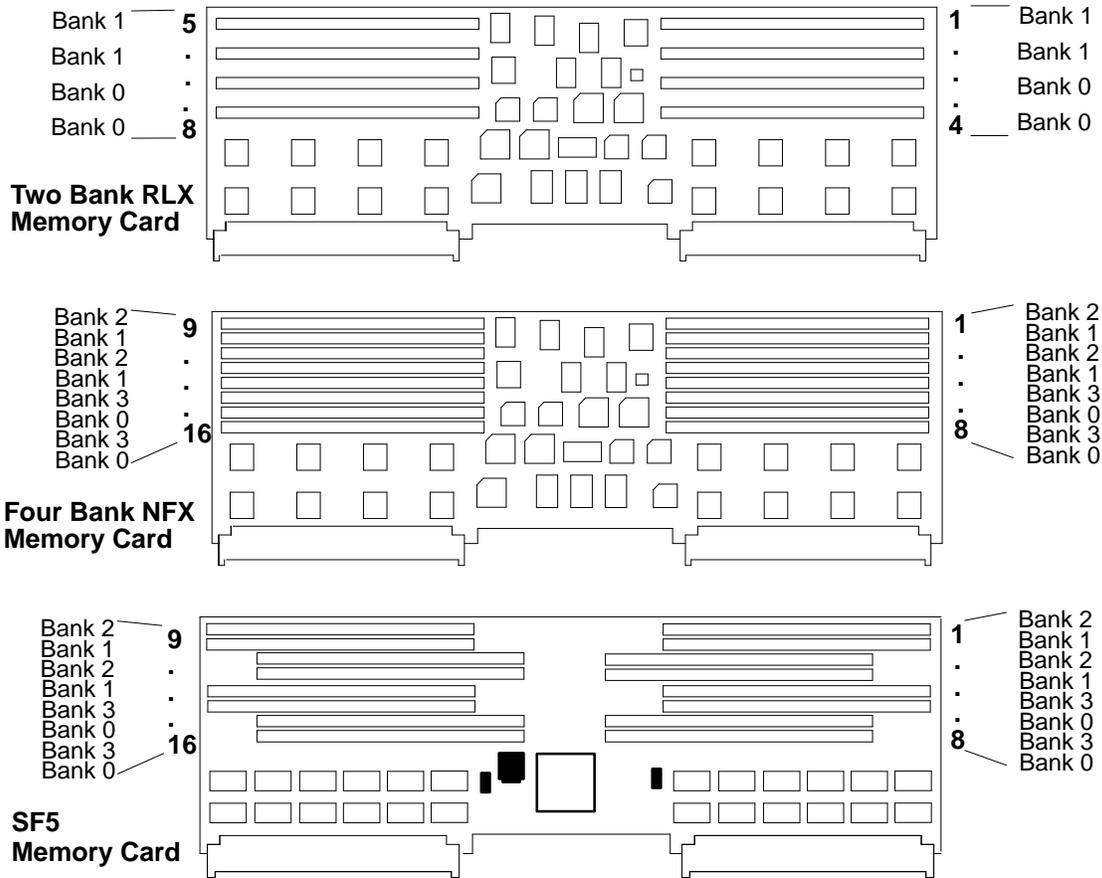
Each memory module looks like the following figure.



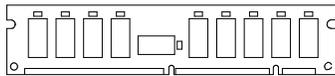
According to the type of memory modules installed, on the memory cards, the total memory size is:

- If it has eight 8MB memory modules, the memory card has 64MB memory.
- If it has eight 32MB memory modules, the memory card has 256MB memory.

The next three types of memory cards are shown below. A two bank (8 slots) RLX card, a four bank (16 slots) NFX card, and a four bank (16 slots) SF5 card. Each bank can house four memory module kits composed of four memory memory modules each, which comply with the JEDEC standard for 168 pin, ECC, 60 ns, 5 volt memory modules.



The figure below shows a standard memory module.



The following table indicates the memory module kits supported by RLX, NFX, and SF5 cards for R30, R40, or R50 systems, and it also shows the resulting memory capacity for each kit:

Name of the Kit	Description of the Kit	Resulting Memory Capacity
MM32	4 modules of 8MB each	32MB memory
MM64	4 modules of 16MB each	64MB memory
MM128	4 modules of 32MB each	128MB memory
MM256	4 modules of 64MB each	256MB memory

The maximum memory reachable with this kind of memory card is equal to 1024MB, due to the fact that up to four of the above indicated kits can be installed on the memory card.

It is not possible to install on the same RLX, NFX, or SF5 card memory modules belonging to different kits.

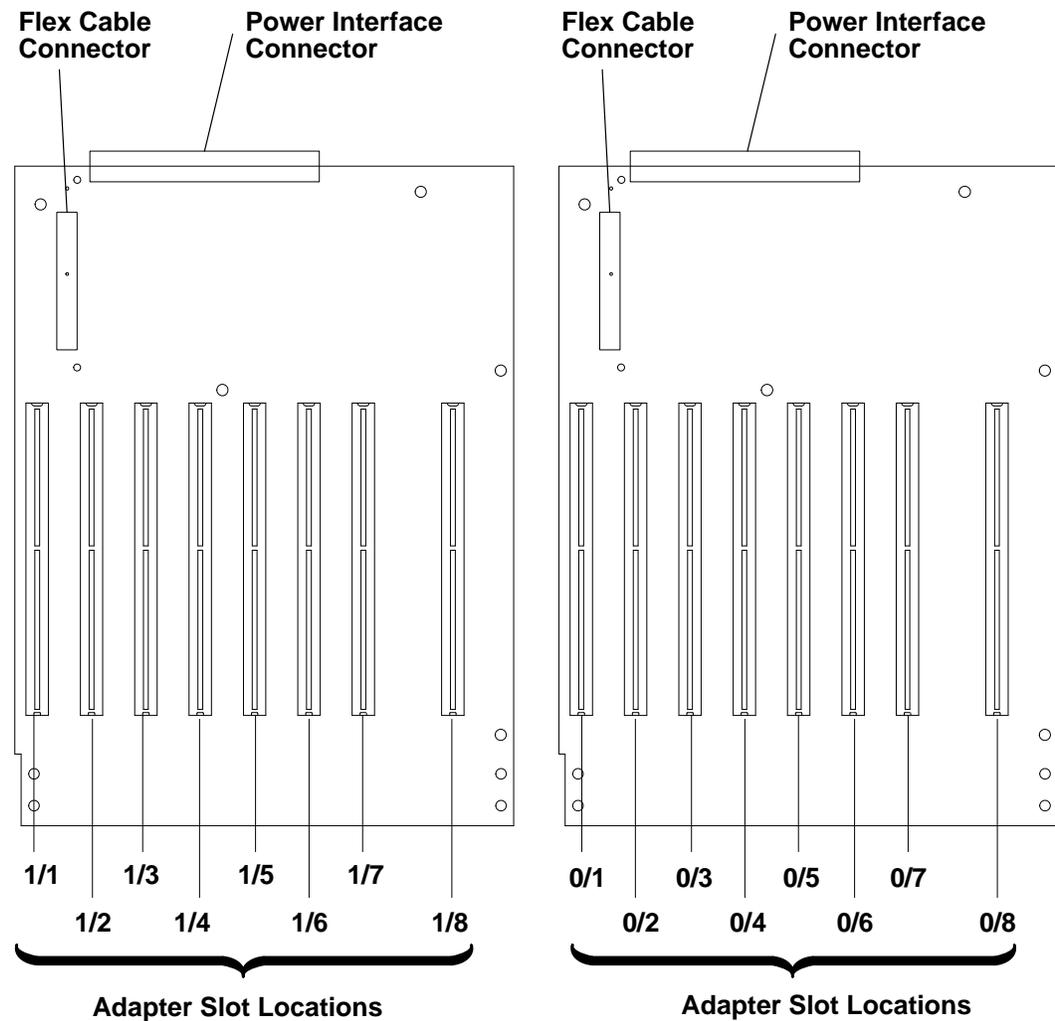
According to both the size and the number of memory module kits installed on the RLX, NFX, or SF5 cards, these can be divided into the following models:

- **NF64** board, based on 4M bit technology, which gives 64MB memory. It houses two MM32 memory module kits.
- **NF128** board, based on 4M bit technology, which gives 128MB memory. It houses two MM64 memory module kits.
- **NF256** board, based on 16M bit technology, which gives 256MB memory. It houses two MM128 memory module kits.
- **NF512** board, based on 16M bit technology, which gives 512MB memory. It houses four MM128 memory module kits.
- **NF1024** board, based on 16M bit technology, which gives 1024MB memory. It houses four MM256 memory module kits.

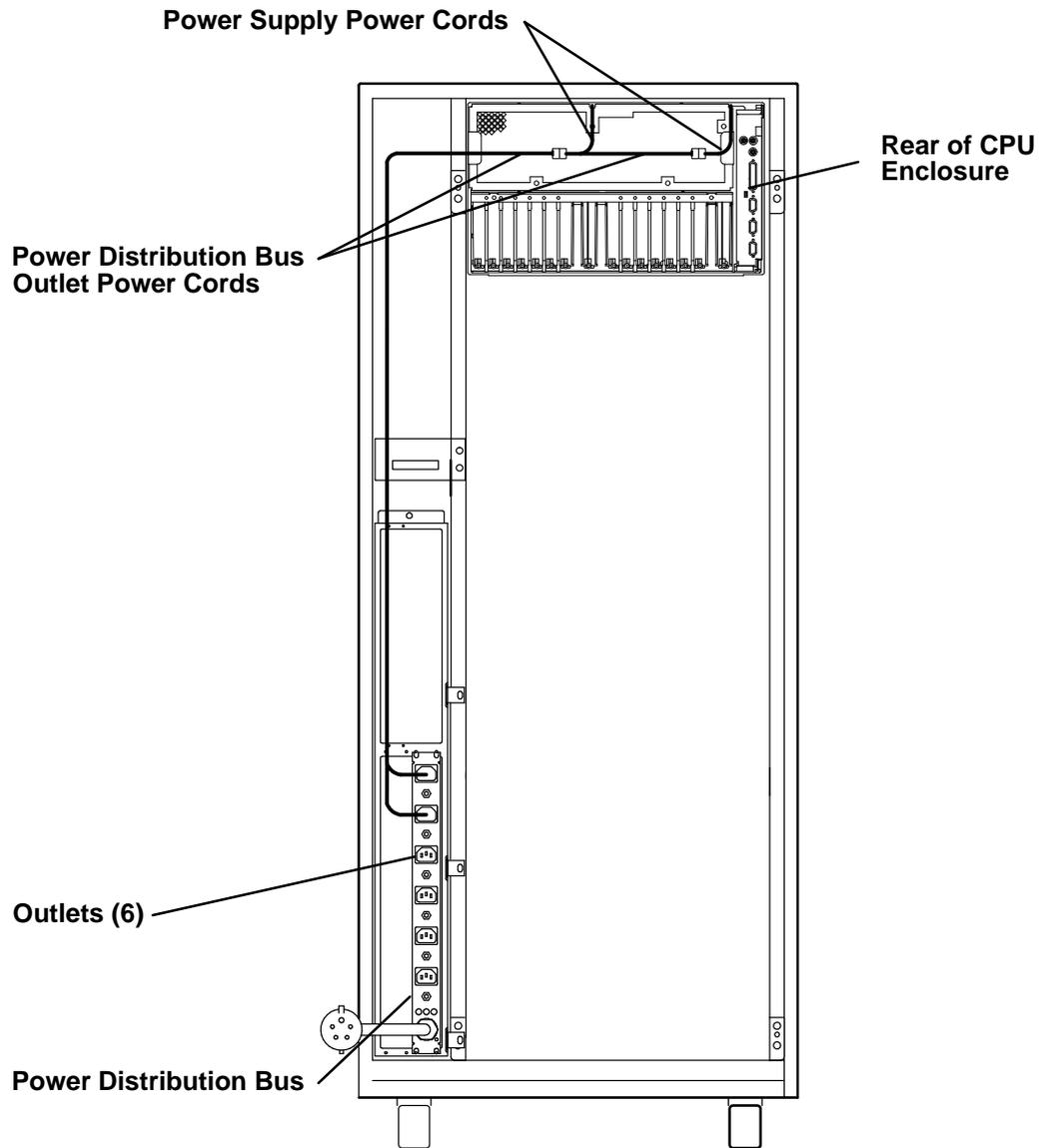
Note: The maximum memory configuration yields a system with:

- R30 and R40 - 2048MB (4 x 512MB)
- R50 - 4096MB (4 x 1024MB).

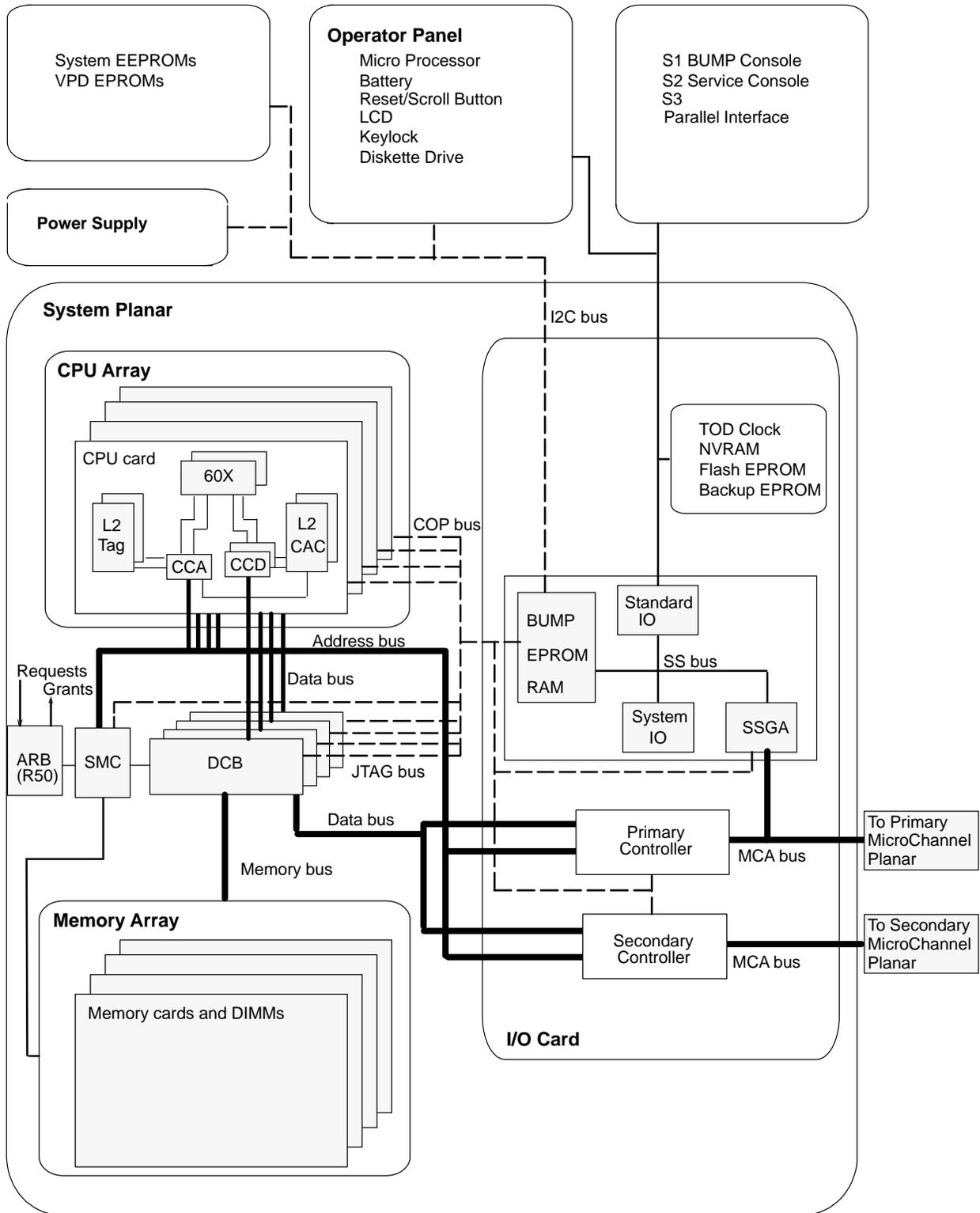
I/O Planars (Top View)

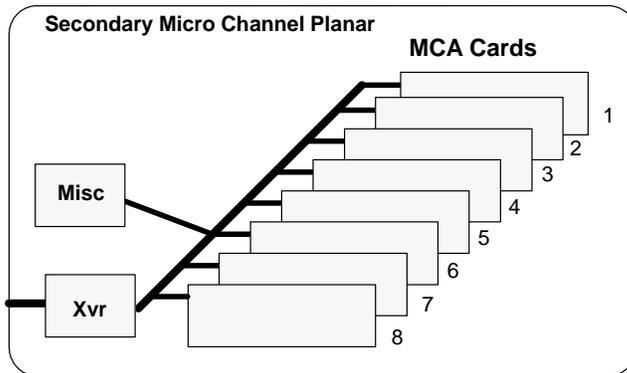
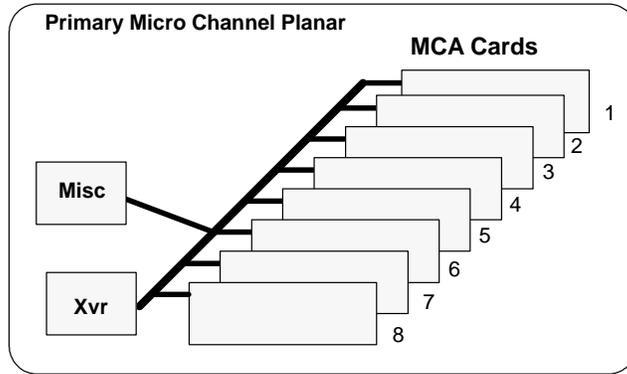


7015 Model R00 Rack with Power Distribution Bus (PDB)

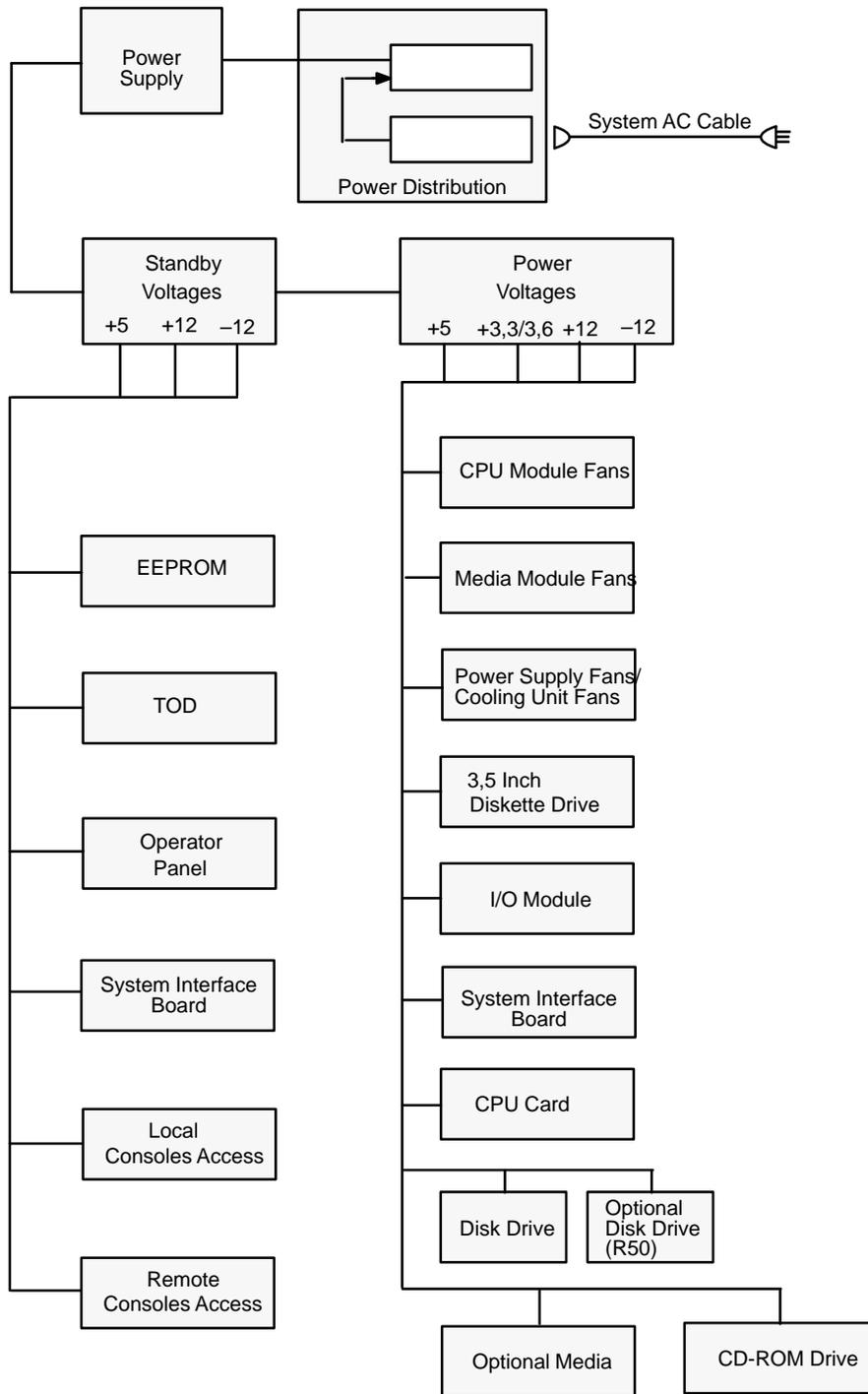


Data Flow

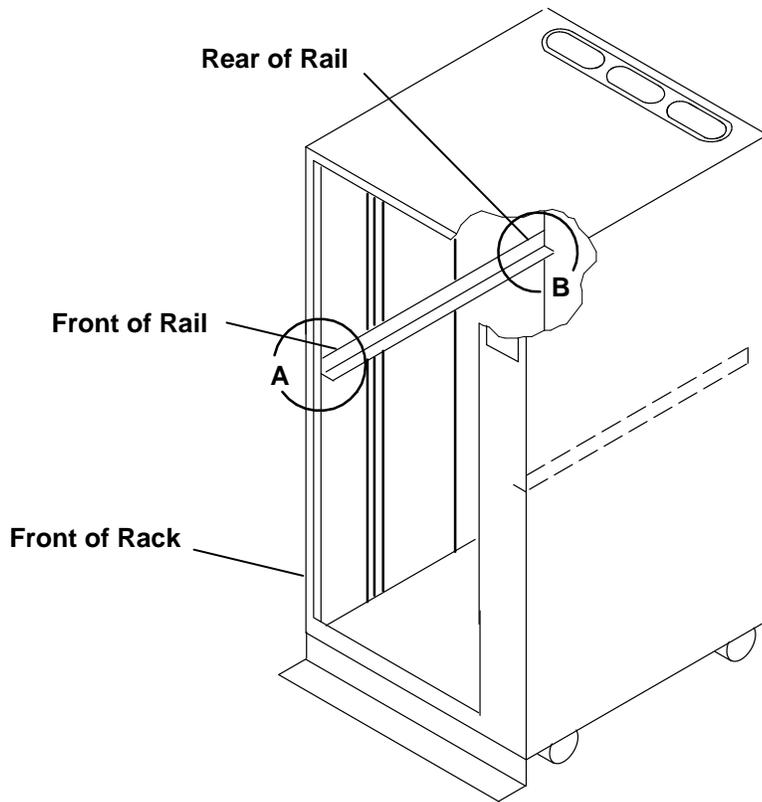




Power Flow

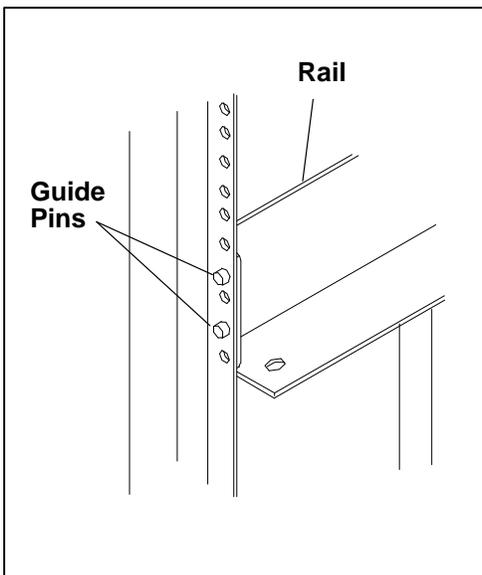


Typical Rail Installation

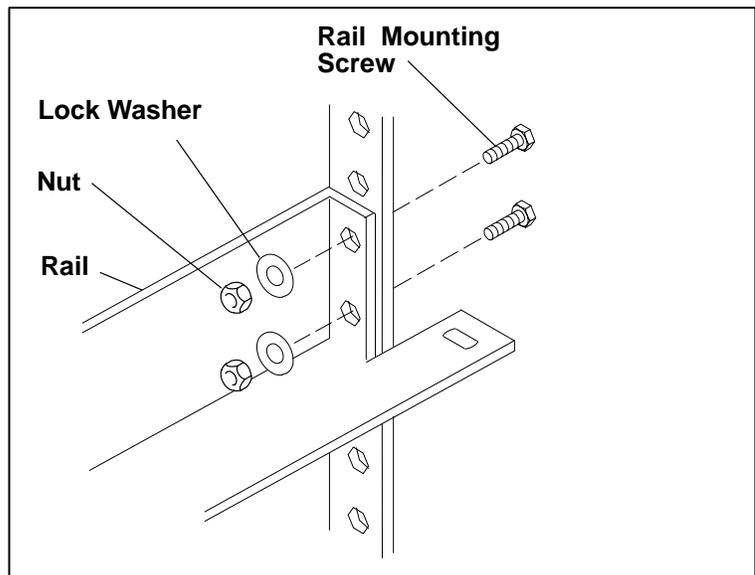


Mounting Hardware For CPU Enclosure

Detail A – Front of Rail



Detail B – Rear of Rail



Specifications

Dimensions

Height: 266.7 mm (10.5 inches)

Depth: 1041 mm (41 inches)

Width: 445 mm (17.5 inches)

AC Frequency

50 to 60 Hz

Heat Output

718 W (2450 BTU per hour) typical

Operating Environment

Class C: 10° to 40°C (50° to 104°F)

Wet bulb temperature: 27°C (80.6°F)

Operating Voltage

200 to 240 V ac (for AC system unit)

-48 V dc (for DC system unit)

Power

1.05 kVA (for fully-configured AC system unit)

Power Supply

680 W DC (for fully-configured AC system unit)

Weight

68.9 kg (152 pounds) maximum configuration

External AC Power Cables

To avoid electrical shock, the manufacturer provides a power cable with a grounded attachment plug. Use only properly grounded outlets.

Power cables used in the United States and Canada are listed by Underwriter's Laboratories (UL) and certified by the Canadian Standards Association (CSA). These power cords consist of the following:

- Electrical cables, type ST
- Attachment plugs complying with National Electrical Manufacturers Association (NEMA) L6-30P
- Appliance couplers complying with International Electrotechnical Commission (IEC) Standard 320, Sheets C13 and C14.

Power cables used in other countries consist of the following:

- Electrical cables, type HD21 or HD22
- Attachment plugs approved by the appropriate testing organization for the specific countries where they are used
- Appliance couplers complying with International Electrotechnical Commission (IEC) Standard 320, Sheet C13 and C14.

Refer to Chapter 6 in this book to find the power cables that are available.

Service Inspection Guide

Perform a service inspection on the system when:

- The system is inspected for a maintenance agreement.
- Service is requested and service was not recently performed.
- An alterations-and-attachments review is performed.
- Changes are made to the equipment that might affect the safe operation of the equipment.
- External devices with an attached power cord are connected to the system unit.

If the inspection indicates an unacceptable safety condition, the condition must be corrected before the machine is serviced.

Note: The correction of any unsafe condition is the responsibility of the owner of the system.

Do the following checks:

1. Check the covers for sharp edges and for damage or alterations that expose the internal parts of the system unit.
2. Check the covers for proper fit to the system unit. They should be in place and secure.
3. Ensure that the rack stabilizer is installed and securely attached to the rack.
4. Depending on the power distribution in your rack, do one of the following:
 - If your rack contains a power distribution bus, do the "Power-Off Procedure with a Power Distribution Bus" on page 4-2.
 - If your rack contains a power distribution unit, do the "Power-Off Procedure with a Power Distribution Unit" on page 4-5.
5. Check for alterations or attachments. If there are any, check for obvious safety hazards such as broken wires, sharp edges, or broken insulation.
6. Check the internal cables for damage.
7. Check for dirt, water, and any other contamination within the system unit.
8. Check the voltage label on the rear of the system unit to ensure that it matches the voltage at the outlet.
9. Check the external power cable for damage.
10. With the external power cable connected to the system unit, check for 0.1 ohm or less resistance between the ground lug on the external power cable plug and the metal frame.
11. Depending on the power distribution in your rack, do one of the following:
 - If your rack contains a power distribution bus, do the "Power-On Procedure with a Power Distribution Bus" on page 4-4.
 - If your rack contains a power distribution unit, do the "Power-On Procedure with a Power Distribution Unit" on page 4-7.

Chapter 2 Using SystemGuard

This chapter introduces the SystemGuard service processor which is included in all Symmetric Multiprocessor models.

Introduction

SMP servers include a service processor, called SystemGuard, as a standard feature.

SystemGuard continually monitors the hardware as well as the operating system. If, for instance, a CPU fails, the system detects this, reboots itself automatically and runs the built-in diagnostics on the hardware. If the CPU is detected as bad during the initial program load (IPL) or reIPL, the CPU is disabled. Likewise, if memory is detected as bad during IPL or reIPL, it is disabled.

SystemGuard allows diagnostics and maintenance to be performed either locally or remotely. The SystemGuard processor makes it possible for these remote systems to be managed from a central location. SMP servers can even be set up to automatically call a Service Center if they fail to boot successfully.

The main features of the SystemGuard are:

- Initialization process flow management
- Local as well as remote control of the system (turning power on or off, diagnostics, reconfiguration, maintenance)
- Console mirroring to make remote actions visible and controllable by the customer
- Dial-out to a support center in case of system boot failure
- Run-Time surveillance

SystemGuard Power

SystemGuard has its own DC power boundary. This means that even if the system power is off (power button of the system in the off position), SystemGuard is still powered on, as long as the CPU enclosure still has power. This allows control of the system even though the system is down. The only way to turn off the SystemGuard power is to remove the power from the CPU enclosure. When starting the entire system, remember to start the expansion cabinet first if one is connected.

SystemGuard Components

SystemGuard introduces new hardware and firmware components:

- a microprocessor called the Bring-Up MicroProcessor (BUMP)
- a Flash EEPROM
- a Backup EPROM that enables the system to boot in case of a Flash EEPROM failure.

Part of the SystemGuard firmware is stored in the BUMP EPROM; part is in the Flash EEPROM. The Backup EPROM contains a subset of the Flash EEPROM .

SystemGuard Bring-Up MicroProcessor Overview

The SystemGuard Bring-Up MicroProcessor (BUMP) controls the system when the power is off or the AIX operating system is stopped. SystemGuard performs the following:

- Controls the power-on (PON) tests, the power-on self tests (POST) and loading of the AIX operating system.
- Responds to local or remote BUMP console commands to set the mode or set system parameters.
- Runs the SystemGuard programs using the STANDBY MENU or the MAINTENANCE MENU.
- Monitors the “heartbeat” from AIX, if the feature is enabled and AIX is running.

SystemGuard releases control of the system to the AIX operating system after it is loaded. If the AIX operating system stops or is shutdown, SystemGuard again controls the system.

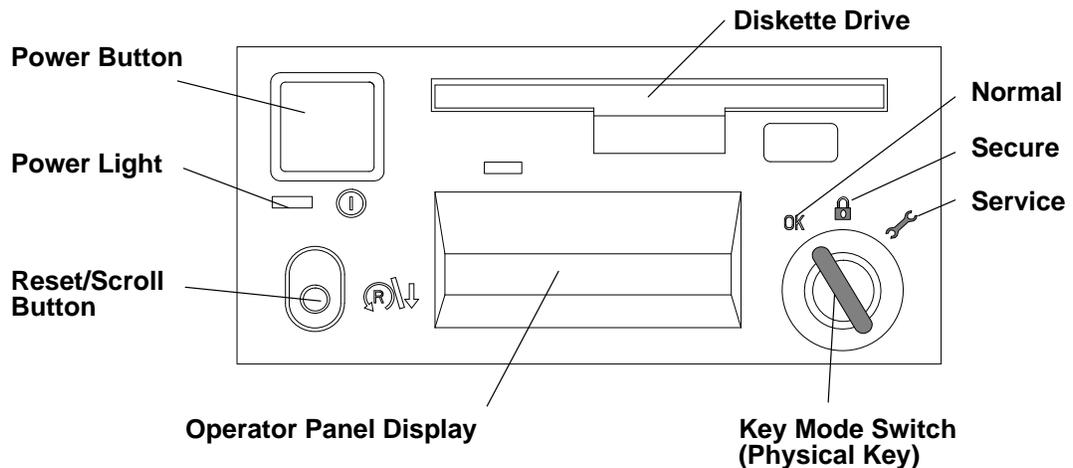
The BUMP console (attached to S1 port) provides the normal input. The service console (attached to S2 port) provides remote service access to the BUMP. Access to both of these consoles is controlled by flags.

The Operator Panel

The Operator Panel is the first level of user interface to SystemGuard.

The Operator Panel has the following features:

- Power button** It should generally stay pushed in all the time if you want to be able to power on or off the system remotely.
- Reset button** It resets SystemGuard to the Init phase and, depending on the key position, reboots the system to Maintenance or to AIX Multi-User.
- LCD display** It is made of two rows of sixteen characters. It displays the word *Stand-By* in the Stand-By phase, or it displays the usual three-digit boot up codes.
- Physical Key** It uses the international symbols for Normal, Secure and Service modes. This key should generally stay in the Normal position because the modes can be changed electronically when the physical key is in the Normal position.



In the 7015 R30, R40, and R50 CPU Enclosures the I/O card contains the NVRAM while the NVRAM battery and the TOD (Time-Of-Day) are located in the Operator Panel. You can drain NVRAM in the following ways:

- removing the I/O card
- disconnecting the operator panel
- removing the CPU module.

When NVRAM is drained it results in a reset of the TOD to 1969 which affects applications. Draining NVRAM also causes a loss of configuration data.

SystemGuard Consoles

SystemGuard works with two types of consoles:

- The *Bump Console*, which is an ASCII terminal attached to the S1 serial port. This console provides the normal input to the BUMP. It can be local or remote. The line speed for the BUMP console must be set to 9600 baud for either type of connection.
- The *Service Console*, which is an ASCII terminal attached to the S2 serial port. This console is usually remote and located in a customer support center or a service support center. This console enables the support center to work with SystemGuard and/or AIX. The support center needs specific authorization from the customer to access SystemGuard remotely.

Physical and Electronic Key

Normal, Secure, and Service modes can be set physically by turning the Physical Key or electronically by executing the electronic key command. The Physical Key and the Electronic Key together define a state called the *System Key*. The Electronic Key can only be turned if the Physical Key is in Normal position. Refer to "How to Set the Electronic Key" on page 2-39 for details on how to set the Electronic Key.

Following are various Electronic and Physical Key combinations and the resultant System Key position:

Physical Key	Electronic Key	System Key
normal	normal	normal
normal	service	service
normal	secure	secure
secure	not valid	secure
service	not valid	service

SystemGuard Phases

During boot up, SMP servers go through five different phases: Stand-By, Init, Maintenance, Boot, and Run-Time.

Stand-By Phase

The Stand-By phase is present anytime the system unit power is off, and the SystemGuard power is on.

At this phase, the AIX operating system is not yet loaded; the system unit power is not on, and the word `Stand-By` is displayed on the Operator Panel display.

The SystemGuard is active, and it can receive commands from the BUMP console or Service Console (either local or remote). You can enter the SystemGuard Stand-by menu from this phase.

The Stand-By phase ends when the power button on the Operator Panel is pressed and a power-on command entered.

Init Phase

Init phase is entered when the power button on the Operator Panel is pressed on or when the **power** command is entered on the BUMP Console or Service Console.

If the System Key is in Normal mode, the BUMP runs the built-in or resident power-on (PON)-tests on the CPU module hardware, IPLs on the first available processor, runs the functional power on self-tests (POST) on the I/O subsystem to check the system, and finally loads the AIX operating system.

If the System Key is in Service mode, and if several conditions are met, the system loads the SystemGuard MAINTENANCE MENU. These conditions are: the Autoservice IPL flag disabled, the BUMP console enabled, and a Valid Service Contract.

If the System Key is in Secure mode, the system enters the Stall state, and the LCD displays the three-digit code 200. The initialization of the system stops until the Physical Key is set to Normal or Service. The Stall state is exited, and control of the system is passed to AIX.

Maintenance Phase

The maintenance phase is entered from the Init phase if the system key is in service mode.

If the BUMP console present flag is set, the MAINTENANCE MENU is displayed on the BUMP console, and the system waits for an operator action. The maintenance menu choices are described on page 2-21. Various maintenance tasks can be performed from this menu. When maintenance tasks are complete, the system can be booted, powered down, or reset.

Boot Phase

SystemGuard enters the Boot phase from either the Init phase or the Maintenance phase. In this phase the system is initialized and control of the system is passed to the operating system. Control of the two serial ports is switched to the operating system and the Run-Time phase is entered. If a valid boot block is not found and the system key is set to Service, SystemGuard returns to the Maintenance phase.

Run-Time Phase

This is the phase where the AIX operating system is in control of the system. The Run-Time phase is entered once the AIX operating system is loaded and takes control of the consoles.

When AIX is stopped again, for example due to a shutdown, the system goes back to the Stand-By phase.

Phase Change (Stand-By to Init)

The phase change from Stand-By to Init is called Crossing The Power boundary. This is achieved by pushing the power button on the Operator Panel or by typing the keyword `power` at the Stand-By prompt (`>`). Note that if you type `power` while the power button is not pushed in, nothing happens until you press the power button. In this case, the `power` command has been taken into account by SystemGuard, and you don't have to reenter it. The `power` command is the default power on command sequence, which you can change from the maintenance menu or AIX service aids.

SystemGuard, checks for a special downloadable diskette (if in Service mode), checks the Flash EEPROM, and then produces an output. The following is an example of what appears:

```
BUMP FIRMWARE      - February 16, 1995
ID 07.01 - POWER_ON in EPROM
#
  FLOPPY NOT READY!
DO YOU WANT TO UPDATE FLASH FROM LINE S2[y/n]? n

BUMP FIRMWARE      - May 19, 1995
ID xx.xx - POWER_ON in FLASH PROM
```

The message `FLOPPY NOT READY!` means that there is no specific downloadable diskette in the diskette drive.

Note: This message is only displayed when IPLing in Service mode.

The special diskette could be:

- Code to be downloaded into Flash EPROM
- Code to change the VPD in the EEPROMs of the SMP system

Power-on (PON) Tests

PON tests are run by SystemGuard whenever the system power comes on. There are two types of tests:

- A comprehensive set of tests are performed on the processors, cache, memory and related hardware when the Fast-IPL flag is disabled.
- A minimum core set of tests are performed on the processors, cache, memory and related hardware during fast-IPL which cannot be turned off.

Following is an example of PON test output for the Fast-IPL type of test.

```
BUMP FIRMWARE    - February 16, 1995
ID 07.01 - POWER_ON in EPROM

BUMP FIRMWARE    - May 19, 1995
ID 07.04 - POWER_ON in FLASH PROM

- Low Interleaving -
Initial test on CPU 0 - * OK !
Initial test on CPU 1 - * OK !
Initial test on CPU 2 - * OK !
Initial test on CPU 3 - * OK !
Init 1024kb L2 cache by processor 0 - * OK !
Init 1024kb L2 cache by processor 1 - * OK !
Init 1024kb L2 cache by processor 2 - * OK !
Init 1024kb L2 cache by processor 3 - * OK !
Clearing 128 Mb by processor 0 -> **** OK !

CPU FIRMWARE     - August 4, 1994
Processor 0 on IPL INIT

{{ 216 }}
{{ 220 }}
{{ 288 }}
{{ 278 }}
{{ 292 }}
{{ 286 }}
{{ 292 }}

Processor 0 on IPL Start

{{223}}
{{299}}
```

A flashing 888 is displayed if PON tests cannot start. If the PON test hangs, a three-digit code corresponding to a failed component is displayed.

Note that the system IPLs on the first available physical processor. If for any reason processor 0 is not available, the system IPLs on processor 1, and then on 2 so on until a processor is available. If all the processors are disabled, the PON test fails, and SystemGuard treats this as a hardware component failure and goes into the MAINTENANCE MENU in Service mode. In Normal mode, the PON test initiates dial-out, if possible, and goes into Stall state afterward. No IPL proceeds. Processors can be manually enabled again in Service mode through the MAINTENANCE MENU. This can also be repaired locally by:

- Turning the system power off
- Moving the Physical Key into Service position

- Enabling at least one processor from the STAND-BY MENU

There are other resident PON tests to check other system resources. These tests are a subset of the SystemGuard maintenance offline tests, and reside within the flash EEPROM. These tests are divided into the following groups:

BUMP Quick I/O Test Group

These tests check the accessibility and the functions of the standard and direct I/O components from the BUMP: Async lines (S1, S2, and S3), EEPROMs, NVRAM, Flash EEPROM, and TOD (Time-Of-Day).

JTAG (Joint Tests Action Group) Test Group

These tests check the chip-to-chip connections using the JTAG features.

Direct I/O Test Group

These tests check the accessibility of the Standard and Direct I/O components from the CPUs: IONIAN, NVRAM access, EPROM access, TOD, and the diskette.

CPU Test Group

These tests are performed by all of the processors and check the status of the CPU cards: processor, address translation, L1 and L2 caches.

DCB (Data CrossBar) and Memory Test Group

These tests check the status of the system planar and memory cards: data/address lines accessibility, memory components, ECC, memory refresh (CPU checkstop).

Interrupt Test Group

These tests collectively check the interrupt system: BUMP-CPU, CPU-CPU (CPU checkstop).

MCA Test Group

Not applicable

CPU Multiprocessor Test Group

These tests check the multiprocessor mechanisms, atomic instructions, cache coherency, main memory sharing, and multi-resources sharing.

I²C Bus Test Group

The following is an example of the output when running these PON tests:

```

*****
*   PON TESTS   *
*****
.. Bump [01.01.00] DEBUG LINE TEST           OK
.. Bump [01.02.00] S1 ASL (BUMP) TEST        OK
.. Bump [01.03.01] S2 ASL (REM.) TEST        OK
.. Bump [01.04.00] S3 ASL (SPE.) TEST        OK
.. Bump [01.05.00] FLASH EP. CONTENT TEST    OK
.. Bump [01.06.00] NVRAM CONTENT TEST        OK
.. Bump [01.07.00] EPROM CONTENT TEST        OK
.. Bump [01.08.00] TOD TEST                   OK
.. Bump [01.09.00] FLOPPY-D CNT. TEST        OK
.. Bump [01.10.00] BPP REGISTERS TEST        OK
.. Bump [01.11.00] MISC. REGS TEST           OK
.. Bump [06.05.00] TOD-BUMP IT TEST          OK

```

Note that the PON test can be suppressed if the *fast IPL* flag is enabled through SystemGuard.

Phase Change (Init to Maint)

The maintenance phase is entered from the Init phase if the system key is in service mode.

If the BUMP console present flag is set, the MAINTENANCE MENU is displayed on the BUMP console, and the system waits for an operator action. The maintenance menu choices are described on page 2-21. Various maintenance tasks can be performed from this menu. When maintenance tasks are complete, the system can be booted, powered down, or reset.

Phase Change (Maint to Boot)

SystemGuard enters the Boot phase from either the Init phase or the Maintenance phase. In this phase the system is initialized and control of the system is passed to the operating system.

Phase Change (Boot to AIX Load and Run-Time)

Similar to the entry into the Init phase, there is a distinct line when entering this phase. At this line, SystemGuard gives up control of the system and passes it to the loaded code (AIX). This is indicated by the three-digit code 299 on the consoles and Operator Panel.

Since SystemGuard is also giving up control of the two serial lines, nothing can be displayed on the consoles. The usual three-digit boot indicators are still displayed on the Operator Panel. Note that the code 570 `virtual SCSI devices being configured` can take several minutes for each card in the SMP system.

When the boot indicators have reached c33, AIX has progressed enough to display its own boot messages on the system console. However, this is no longer the SystemGuard Console; it is the AIX console.

SystemGuard Parameters and Flags

A certain number of SystemGuard parameters and flags can be changed through different SystemGuard menus, from the Diagnostics interface and from AIX. Basically, there are four different groups of flags:

Service contract flags These flags enable Service Console usage, maintenance usage and determine if dial-out messages are sent to IBM or to a Customer Service Center. These flags are stored in the SID (System Identification) field of the System EEPROM.

Diagnostics flags These flags are used to control the service, diagnostics and maintenance from a customer point of view. For example, the customer can modify one of these flags to authorize setting the Electronic Key from the Service Console or to authorize the dial-out.

Modem and Site Configuration flags

These flags allow the customer to customize modem configuration for the Service Console.

Phone numbers flags These are the dial-in and dial-out phone numbers and the operator voice number.

Working with SystemGuard

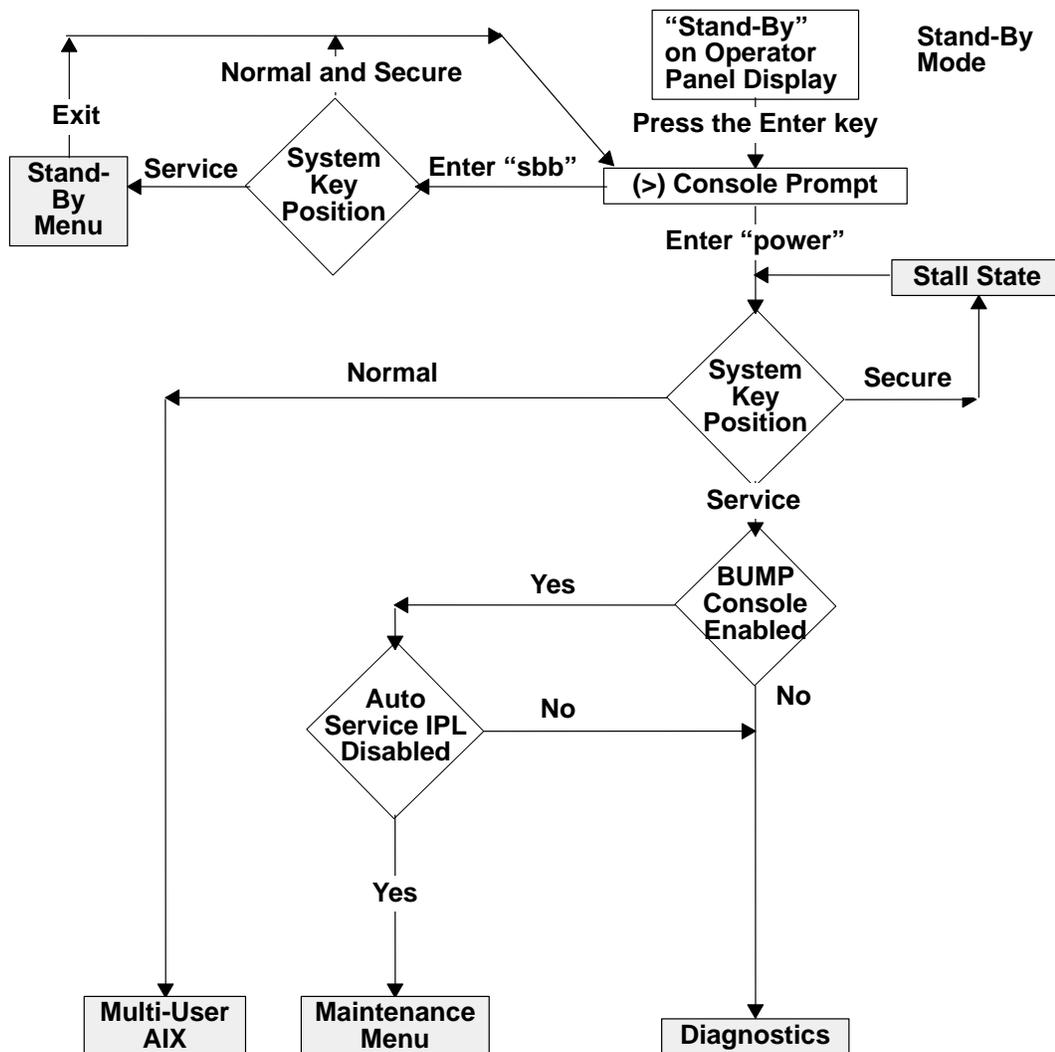
SystemGuard parameters and flags may be changed from different locations. They can be changed from the SystemGuard STAND-BY MENU, the SystemGuard MAINTENANCE MENU, the Diagnostics interface, and also from AIX.

When the key signal is received, SystemGuard clears the screen and displays the SystemGuard prompt. At this point, a keyword can be entered. The supported keywords are:

power This keyword starts the system, exactly as if the power button is pushed. You can change, disable or enable this keyword: see "Power-On Command Parameters" on page 2-33 for details. Turning the system power on makes the system enter the init phase. Thus, if the Key Mode Switch is in the Service position, and if the *AutoService IPL* flag is disabled, you enter the *Maintenance Menu*.

sbb This keyword displays the STAND-BY menu.

It is important to understand the following flowchart.



When the system is in Stand-By mode and the System Key (Physical or Electronic Key) is in Service mode, the STAND-BY MENU can be accessed and SystemGuard executed.

If you turn the system unit power on from Stand-By mode with the System Key in the Normal position, the system boots to AIX Multi-User.

If you turn the system unit power on with the System Key in the Service position, you can go to the MAINTENANCE MENU or to Diagnostics, depending on the state of three flags: SystemGuard Console Present, Autoservice IPL, and Service Contract Validity.

If you power on the system with the System Key in Secure, the system stalls.

Here is some information on the meaning of the different flags:

BUMP Console Present flag

When the BUMP console is enabled, the LED codes and System Guard messages are displayed on the console during the Init phase. If the BUMP console is not enabled, it is like a regular system; no codes and no messages are displayed on the console during the Init phase. Only AIX messages appear when the system starts loading AIX.

Note that if you are running the level 5 of the SystemGuard firmware, the BUMP Console is disabled by default, and if you enable it, it is disabled after every shutdown. If your system is in Service mode, you might go to Diagnostics instead of Maintenance due the SystemGuard Console being disabled by default.

If you are running level 7 or higher of the SystemGuard firmware, the BUMP Console is enabled by default and stays enabled after a shutdown.

Autoservice IPL flag

If enabled, this flag means that you want to go to Diagnostics when booting with the System Key in Service mode.

Service Contract flag

This flag is preset at the factory and is not variable. The Service Contract is always valid. This flag allows the service center to access the system and do some maintenance. The Service Contract is set by default to an unlimited number of days (exactly 32767 days).

SystemGuard Menus

SystemGuard menus are low-level menus; they make extensive use of abbreviations or acronyms. Refer to the glossary on page X-1 for a full list of these acronyms and abbreviations.

SystemGuard is menu-driven, and menu choices are usually numbered. Letters are sometimes used and can be entered in either lowercase or uppercase (SystemGuard is case insensitive). The letter *x* is often used to exit the current menu and return to the previous menu (or leave SystemGuard, if given from the main menu). Commands are only treated after you press the Enter key. Until you press the Enter key, you can use the Backspace key to edit a command. If you enter a command that does not match the available options, a beep signals that an invalid selection has been made.

Stand-By Menu

The STAND-BY MENU can only be entered when the system is in Stand-By mode (the word Stand-By must be displayed on the LCD display). Perform the following steps to bring up the STAND-BY MENU.

1. With Stand-By displayed on the LCD display press the Enter key on the BUMP console. The Stand-By prompt is the greater than (>) sign.
2. To enter the STAND-BY MENU from here, set the System Key into Service mode, either by setting the Physical Key to Service or the Electronic Key to Service. To set the Electronic Key to Service, follow the procedure on page 2-39.
3. Press the Enter key again.
4. Enter the keyword `sbb` to display the STAND-BY MENU.

The STAND-BY MENU appears with several options, as follows:

**For Details,
See the
Following
Pages**

STAND-BY MENU : rev xx.xx

2-13	0 Display Configuration
2-15	1 Set Flags
2-16	2 Set Unit Number
2-17	3 Set Configuration
2-18	4 SSbus Maintenance
2-19	5 I2C Maintenance

Select(x:exit): 0

Note: It is also possible to enter the STAND-BY MENU from the Service Console if the remote authorization flag is enabled. The Electronic Key can be set from the Service Console with the same escape sequence.

The STAND-BY MENU allows the system administrator to display the physical configuration of the system (CPUs, memory, I/O, and so on) and to set flags, such as the *Fast IPL* flag, and the *BUMP Console Present* flag. The *Fast IPL* flag causes the system to skip the second phase of the power-on tests. The *BUMP Console Present* flag allows the BUMP console to be enabled or disabled during boot up. This menu also enables the service representative to test the interconnection between the BUMP and different components through the I2C bus or the SSbus. For instance, it is possible to send a specific string of characters to the LCD and read the result on the Operator Panel display. Or, it is possible to turn on the LEDs on the Operator Panel, or to turn on the power supplies and fans without allowing the system to IPL.

How to Display the System Configuration

The system configuration can be displayed through the STAND-BY MENU or through the MAINTENANCE MENU.

Displaying Configuration through the Stand-By Menu

This option displays the system configuration table. This configuration can be viewed on the LCD of the Operator Panel if the console is not configured. This is done by pressing the reset button with the mode switch in the Service position.

To display the configuration of the system, enter the STAND-BY MENU, and from the Main menu, select `Display Configuration` (option 0). The first-level screen is displayed with features and devices that can be configured.

Here is an example of the display configuration screen for a 7013 J Series system. The screens for the 7015 R30, R40, and R50 are similar:

Display Configuration

```
SID TM          7013J30 45067          SID Y2          00045067
SID Y3 7ffffff003935303730370000      UNIT PAAAAAAA 40
CPU conf        CCCCCAAA             MM conf        CCAACCAAAAAA
FLASH_FW 0704   MM size 0080         OP_KEY  NRM     E_KEY  SRV
OPP  D78610     19H0494
SP   D78605     19H0471             IOC   E38030    96G4400
CPU0 D78605     19H6472             CPU1  D78605    19H6472
CPU2
MC0  D78605     19H0473             MC1   D78605    19H0473
MC2
SIB10 E38042    19H0310             PS0   D29655    11H5114
SIB11
SIB21
SIB12
SIB22
SIB13
SIB23
PS1
PS2
PS3
```

Hit Return

Display Configuration

```

SIB14                                     PS04
SIB24
SIB15                                     PS05
SIB25
SIB16                                     PS06
SIB26          fc8e000000000000
SIB17                                     PS07
SIB27
MP      D78605      19H0464      MPe      D78605
MCA 01 C          fc8e000000000000      MCAe 01 C      e1ff000000000000
MCA 02 C          f48e000000000000      MCAe 02 C      708f000000000000
MCA 03 C          fc8e000000000000      MCAe 03 C      ec8f000000000000
MCA 04 C          ffde000000000000      MCAe 04 C      fc8e000000000000
MCA 05 C          14e0000000000000      MCAe 05 C      f0ef000000000000
MCA 06 C          fc8e000000000000      MCAe 06 C      7f8f000000000000
MCA 07 C          fc8e000000000000      MCAe 07 C      fc8e000000000000
MCA 08 A          fc8e000000000000      MCAe 08 C      fc8e000000000000

```

Hit Return

The meanings of the configuration display fields are as follows:

- SID Y2: This is the system identification information. It is automatically updated when the lateral planar 2 is changed.
- SID TM: This indicates the type of the model.
- SID Y3: This parameter gives the maintenance contract information in order to enable service facilities.
- FLASH_FW: This is the Flash EEPROM firmware release number. The corresponding second column gives the memory size expressed in KB.
- CPU Conf: This gives the status information of the CPU module (present, absent, deconfigured, or temporarily deconfigured).
- MM Conf: This is the status information for the memory DIMM.
- UNIT ssssssss: This gives the unit status information. The corresponding second column displays the number of RDS devices present in each unit. Each unit is denoted by two hexadecimal digits (the first stands for RDS1 and the second for RDS2).
- SIBx EC: This indicates the system interface board (SIB) status information and the vital product data (VPD) identifier.
- PSx EC: The power supply status and the corresponding VPD identifier information is provided.
- SP EC+s: This parameter gives the status information and the VPD identifier of the system planar. The technical status information is also included.
- IOC EC+s: This parameter gives the status information and the VPD identifier of the I/O card (IOC).
- OP EC+s: This field gives the operator panel (OP) VPD values and the corresponding status information.

- CPUx EC+s: The agent status information of the CPU cards and the VPD information is given.
- MCx EC+s: This field gives the memory card VPD values.
- MCAx loc. code+status: This parameter contains the location code and the status information of the Micro Channel adapters (MCA). The contents of the 8 programmable option select (POS) registers are also displayed in the second column.
- MPx EC: This field displays the VPD identifier of the base unit MCA planars. This field does not appear on 7012 systems.
- MPex EC: This field displays the VPD identifier of the expansion unit MCA planars. This field does not appear on 7012 systems and appears on 7013 systems only if the system is attached to a 7013 J01. For 7015 systems, the second MCA planar in the CPU enclosure is identified in this field.
- OP_KEY xxx: This field gives the value of the physical operator panel key (Key Mode Switch). The second column shows the value of the electronic key (E_KEY).

Set Flags

Use this option to manage miscellaneous flags. The default values are listed in the following table:

Flag Parameter and Keyword Default Values	
Name	Default Value
Remote Authorization flag	Disabled
BUMP Console Present flag	Enabled
Autoservice IPL flag	Disabled
Extended Tests parameter	Disabled
Power-On Tests in Trace Mode flag	Disabled
Power-On Tests in Loop Mode flag	Disabled
Fast IPL flag	Disabled
Set Electronic Mode Switch to Normal	NRM

1. Enter 1 in the main menu to select this option. The following screen is displayed:

```

Set Flags

0 Remote Authorization           Disabled
1 Bump Console Present          Enabled
2 Autoservice IPL               Disabled
3 Extended Tests                Disabled
4 PowerOn Tests in Trace Mode   Disabled
5 PowerOn Tests in Loop Mode    Disabled
6 Fast IPL                      Disabled
7 Set Electronic Mode Switch to Normal  NRM

select(x:exit):

```

2. To set or reset a particular flag, enter its menu number.

The value set for all flags is permanent until a new change is performed (except for FAST IPL, which is automatically cleared at boot). For a complete list of default values for flags

and parameters (set during manufacturing), see the table in “Default Parameter Values” on page B-1 of the service guide for your system. The following flags can be managed:

- Remote Authorization: Only the local operator can enable this flag to enable remote maintenance to be performed. Both the local and remote operators can disable it.
- BUMP Console Present: If enabled, SystemGuard displays the MAINTENANCE MENU on the BUMP console (line S1). If disabled, the MAINTENANCE MENU is not available on the BUMP console.
- Autoservice IPL: When enabled, this flag enables an automatic IPL even if the Key Mode Switch is in the Service position, thus avoiding the display of the MAINTENANCE MENU.
- Extended Tests: This parameter determines under what conditions extended power on self-tests are run at IPL time, after the regular power on self-tests (POSTs). If the parameter is enabled, the extended tests are run. If the parameter is disabled, the extended tests are not run.
- Power-On Tests in Trace Mode: When enabled, supports the running of POST tests in *trace* mode, which gives extra information about how tests are conducted. A dedicated tty line is required, this is to be used only when directed by service support personnel.
- Power-On Tests in Loop Mode: When enabled, SystemGuard loops on the POST tests and does not IPL.
- Fast IPL: When enabled, the long POST tests are not run, shortening the INIT phase. This feature lets you start the machine quickly, when the test performance is not necessary. This flag is not permanent. It only remains set until the next IPL, at which point it is automatically cleared.
- Set Electronic Mode Switch to Normal: This command sets the Electronic Mode Switch to the Normal position. Keep in mind that the Electronic Mode Switch is only taken into account if the Key Mode Switch is in the Normal position. The Electronic Mode Switch is also set to Normal each time the Key Mode Switch is moved.

Set Unit Number

Use this option to assign logical numbers to units that you add to your system.

Whenever a new unit is added, this command must be run to update the unit configuration table.

Simply enter 2 in the main STAND-BY MENU to select this option. The process of assigning a unit number is automatic: there is no need to pick a number.

An RS-485 bus interconnects all system and expansion units, each being addressed using a logical number of 0 or 1. The base unit, where the SystemGuard and the operator panel are present is the master of the RS-485 bus, and is always given logical number 0. The first expansion unit is assigned the logical number 1.

Set Configuration

This menu option enables you to configure or unconfigure units and devices.

1. Enter 3 in the main menu to select this option.
2. You should then see a first-level screen similar to the following. It displays the units and devices that can be configured, along with their menu index number:

```
Set Configuration

00 CPU0                10 UNIT0 & dev
01 CPU1                11 UNIT1 & dev
02 CPU2                12 UNIT2 & dev
03 CPU3                13 UNIT3 & dev
04 MC0                 14 UNIT4 & dev
05 MC1                 15 UNIT5 & dev
06 MC2                 16 UNIT6 & dev
07 MC3                 17 UNIT7 & dev
08 base MCA
09 exp MCA .
```

```
select(x:exit):
```

3. Enter the menu number to select a particular object. For example, if you enter 10, then a second-level UNIT0 screen as shown below is displayed.

The second-level screen contains a status column and details about the unit.

UNIT0 Second-level Screen

UNIT0	Set	Status	Set	Status	
00 dev0A	C	C	10 dev5B	C	A
01 dev0A	D		11 dev5B	D	
02 dev1A	C	A	12 dev2A	C	C
03 dev1A	D		13 dev2A	D	
04 dev3A	C	C	14 dev2B	C	D
05 dev3A	D		15 dev2B	D	
06 dev4A	C	C	16 dev3B	C	C
07 dev4A	D		17 dev3B	D	
08 dev5A	C	C	18 dev4B	C	D
09 dev5A	D		19 dev4B	D	

```
select(x:exit):
```

4. Enter the object's menu number and then enter one of the following commands:
 - C: To configure the device.
 - D: To unconfigure the device.
 - T: To temporarily unconfigure the device. At the next power on or reset, the device is automatically reconfigured.
For example: 06 D unconfigures device 4A.

Note: Devices that do not appear in the above list, cannot be changed.

SSBus Maintenance

This option is used to investigate and check devices on the SSBUS and is meant only for trained service personnel.

Use this option to investigate and check devices on the SSBUS.

1. Enter 4 in the main menu to select this option. SystemGuard displays the following menu, which allows you to read the time of day (TOD) registers and to read or write the non-volatile random access memory (NVRAM) and lines S1 and S2.

```
SSBus Maintenance
```

Command	Feature	start-end address
00 Read	NVRAM	0x40000-0x7ffff
01 Write	NVRAM	
02 Read	Line S1	0x000207f0
03 Read	Line S2	0x000205f0
04 Read	TOD	0x38000-0x3803e
05 Read date	TOD	
06 Read alarm	TOD	

```
select(x:exit):
```

2. To read data:
 - a. Enter a read command number.
 - b. When requested, enter the start address (hexadecimal) and the length (in bytes).
 - c. The data at the given start address for the given length is displayed. Then the prompt for the start address and length is shown again.
 - d. You can continue the read operation by pressing the Enter key, in which case a new block of data is displayed.
 - e. Enter a . (dot) to end the read operation and redisplay the SSBUS MAINTENANCE MENU.
3. To write data:
 - a. Enter a write command number. The update is performed one byte at a time.
 - b. When requested, enter the start address.
 - c. The contents of the specified location are displayed followed by a blank. Enter a new value followed by the Enter key.
 - d. The new value is written at the given address and the contents of the next location are displayed.
 - e. Press the Enter key (without entering a value) to skip the current location and move to the next location. In this case, no write is performed and the next location is shown.
 - f. Enter a . (dot) to end the write operation and redisplay the SSBUS MAINTENANCE MENU.

I²C Maintenance

Use this option to do maintenance operations on the I²C buses of a selected unit, in order to investigate and check the connected devices. When exiting this menu, the previous status of the OP and SIB microcontrollers are restored (except for voltage margins).

1. Enter 5 in the main menu to select this option.
2. Some abbreviations used (with their meanings in parentheses) include: rd (read), wr (write), and OP (operator panel).

```
I2C Maintenance

00 rd OP status          05 wr LCD
01 rd UNIT status       06 rd I/O port SP0
02 rd EEPROM            07 fan speed
03 margins              08 powering
04 on/off OP LEDs
```

```
select(x:exit):
```

These options are explained in the following sections.

Read Operator Panel Status

Enter 00 to display the OP status table.

Read Unit Status

First enter 01 to view a unit status table. Then, when requested, enter a unit number to view its SIB table.

Read the EEPROM

Enter 02 to read the vital product data (VPD) in the EEPROM memory. Select an EEPROM and enter its menu number to display its contents. For the SIB, PS, SYSID, and MPe selections, enter a unit number when requested.

```
EEPROM list

00 SYSID/CABID          09 MC0
01 OPP                  10 MC1
02 MP                   11 MC2
03 SP                   12 MC3
04 IOC                  13 MPe
05 CPU0                 14 SIB1
06 CPU1                 15 PS
07 CPU2                 16 SIB2
08 CPU3
```

```
select(x:exit):
```

Set voltage margins

Note: This option can be only used for error analysis or factory test and must be used only by trained service personnel. Restore nominal voltage values before restarting other operations. Any data written on the disk in marginal mode must be removed before restarting normal operations. Ignore any disk errors when using this option, and retest the disk in nominal conditions.

Set or Reset Operator Panel LEDs

Enter 04 to set or reset the operator panel display. Select an option and enter its menu command number.

on/off LEDs	Status
00 powoff Green	off
01 powon Green	
02 powoff Yellow	off
03 powon Yellow	

select(x:exit):

Write on the Operator Panel Display

Enter 05 to write a given string on the operator panel Display. When requested, enter the string you want to display.

Read Input Output Ports

Enter 06 to read a given I/O port. The selected I/O port contents are displayed as shown below (the example contents are hexadecimal):

```
fe
Hit Return
```

Power-on or Power-off

Enter 08 to turn a unit's or device's power on or off. You can also turn the power of all units on or off using a broadcast command. Select an option and enter its menu number. These commands are used to test the power system. When you leave the I²C maintenance menu, the power of all devices will be turned off.

```
powering

00 broadcast ON
01 broadcast OFF
02 unit ON
03 unit OFF
04 device ON
05 device OFF
```

select(x:exit):

Maintenance Menu

The MAINTENANCE MENU also enables you to display the configuration of the system in a non-cryptic, easily understandable way, to perform various tests, to continue IPL either from network, a specific SCSI device or from the boot list, and to set flags concerning various system operation.

The MAINTENANCE MENU can only be entered by:

1. Enabling the BUMP Console from the STAND-BY MENU.
2. Setting the Autoservice IPL flag to disabled (the default value for this flag is disabled) from the STAND-BY MENU.
3. Having a Valid Service Contract.
4. Turning the System Key to the Service position.
5. Powering-on the system.

The MAINTENANCE MENU shown below should appear just after the 292 code is displayed on both the console and the LCD.

**For Details,
See the
Following
Pages**

MAINTENANCE MENU (Rev. XX)

2-22	0> DISPLAY CONFIGURATION
2-25	1> DISPLAY BUMP ERROR LOG
2-25	2> ENABLE SERVICE CONSOLE
2-25	3> DISABLE SERVICE CONSOLE
2-25	4> RESET
2-25	5> POWER OFF
2-26	6> SYSTEM BOOT
2-28	7> OFF-LINE TESTS
2-32	8> SET PARAMETERS
2-38	9> SET NATIONAL LANGUAGE

SELECT :

Display Configuration

Use this option to view the system hardware configuration. This option provides different screens with the following levels of information:

- System-level information
- Unit-level information
- Device-level information.

Enter 0 in the MAINTENANCE MENU to select the Display Configuration option.

Display Configuration – System Level

This screen displays general system information, such as:

- Firmware release number.
- Machine ID.
- Service Contract status.
- Total memory size, and other information.

```

                                     DISPLAY CONFIGURATION

MACHINE TYPE/MODEL: 7013/J30
FIRMWARE RELEASE:  Standby -> 1300
                   Backup eprom -> 0401
                   Flash eprom -> 0401
SERVICE CONTRACT: Last update (yyymmdd) -> 941105
                   Validity-> 360 Days
                   Remote service support -> Valid
                   Quick On Call service -> Not valid
AUTO DIAL:         Disable
CONSOLES:         BUMP Console -> Present
                   Service Console -> Disable - 1200 Baud
SYSTEM ID:         000ABCDE (Contains the serial
                       number of the unit)
NUMBER OF CPU:    2
MAIN MEMORY SIZE: 128 MByte
PRESENT UNITS:    #0 ,#1

SELECT [Unit# (0-7) or x:exit]:
```

To view information for a specific unit, enter a unit number. A unit level screen is displayed, as described on the following pages.

Note: If an expansion unit is not attached, the SELECT [Unit# (0-7) or x:exit] option does not appear, press Enter to continue to the next screen.

Display Configuration – Unit Level

This is the second screen in the configuration group. When selected, you see two different types of screens:

- Main Unit
- Expansion Unit.

The main unit screen, shown below, displays unit level parameters such as:

- Voltage Margins for CPUs, ASICs, and other components.
- Device status information.
- Options to select various types of devices.

DISPLAY CONFIGURATION - MAIN UNIT

```

MARGINS VALUE: +5 VOLT -> Normal
                CPU (3.65 VOLT) -> Normal
                ASIC (3.6 VOLT) -> Normal

SCSI DEVICES:  Present -> #0A,#3A,#4A,#5A,#2A,#2B,#3B,#4B
                Deconfigured -> #2B,#4B

PRESENT CPU:    #0

PRESENT MC:     #0

DETAILS: 0> IOC          4> OPP
         1> SP           5> PS
         2> CPU          6> SIB
         3> MC           7> MCA

```

SELECT [Details (0-7) or x:exit]:

1. To see device-level information, enter menu device type number. The device level screen for choice 0 (I/O card) is shown on page 2-24.

Note: If you select a device type and more than one device of the same type exists, you are asked to provide a device number. For example, if you enter 2 for CPU devices, and 2 such device boards exist, then you have to specify CPU0 or CPU1 when requested.

2. Enter x to return to the system-level display configuration screen.

An expansion unit screen for unit 1 is shown below. It displays:

- Unit serial number.
- Device status information.
- Options to select devices.

DISPLAY CONFIGURATION - UNIT 1

```

STATUS:          Configured

BP SERIAL Nr.:   000ABCDE (This field contains the serial
                    number of the expansion unit)

MARGINS VALUE:  +5 VOLT -> Normal

SCSI DEVICES:   Present -> #0A,#3A,#4A,#5A,#2A,#2B,#3B,#4B
                Deconfigured -> #2B,#4B

DETAILS: 0> PS
         1> SIB1
         2> SIB2

SELECT [Details (0-2) or x:exit]:

```

1. To see device-level information, enter the corresponding command number for the device. The device-level screen is displayed.
2. Enter *x* to return to the system-level configuration display screen.

Display Configuration – Device Level

This screen is shown when you select one of the devices of your choice from either the *Main Unit* or *Unit 1* screen. This option enables viewing of individual device information as shown in the following representative screen:

- Results of diagnostic tests, such as built-in or power on self-tests (PON or POST).
- Device specific vital product data (VPD) information such as:
 - Engineering change level.
 - Device field-replaceable unit (FRU) number.
 - Name of the manufacturer.
 - Processor component definition (related to the position of the ASICs).
 - Unit part number.

Note: The VPD information (restricted access) is stored in the embedded EEPROM and on board permanent memories.

```

                                DISPLAY CONFIGURATION - MAIN UNIT (IOC)
BIST/POST: 0x0000

IOC VPD:
*EC   002 D6
*FN IOC
*MN IBM97N
*PC 0001020500020004000101000001
*PN ABCDEFGH (Will contain the part number, depending on
              the system)
*RL 76971323-03276971316-031
*RM 176971331-03176706743-00104010406
*SN A0P0203400000000
*Y0 00          00ABCDE7013/J30 (CONTAINS THE SERIAL NUMBER
                                OF THE SYSTEM UNIT)

PRESS RETURN TO EXIT:
```

Enter the Enter key to exit and return to the previous screen.

System Boot

This command enables you to begin boot activity.

Enter 6 in the main menu to select this option. The following screen is displayed:

```
SYSTEM BOOT

0> BOOT FROM LIST

1> BOOT FROM NETWORK

2> BOOT FROM SCSI DEVICE
```

```
SELECT [x:exit]:
```

The menu enables you to boot in three different ways:

- Enter 0 to boot from the normal or service boot list, after completing all the maintenance activity. The normal or service boot list is used, depending on the key mode.
- Enter 1 to boot from a network. A network boot menu is shown.
- Enter 2 to boot from a SCSI device. A menu enables you to specify the SCSI device using the location code.
- At this point, a BOOT FROM SCSI DEVICE screen appears. This displays the PRESENT DEVICE LOCATION CODE. If it is not the device you want to boot from, go through each option, and change it to the desired BUS, SLOT, SCSI ID, and LUN ID. Option 4 allows you to change all these options at once. The BOOT FROM SCSI DEVICE screen is similar to the following:

```
BOOT FROM SCSI DEVICE

PRESENT DEVICE LOCATION CODE:
(Drawer - Bus#/Slot# - Connector - SCSI ID/LUN) 00070030

COMMANDS: 0> CHANGE BUS#
          1> CHANGE SLOT#
          2> CHANGE SCSI ID
          3> CHANGE LUN ID
          4> CHANGE DEVICE LOCATION CODE
          5> BOOT FROM SELECTED DEVICE

SELECT [x:exit]:
```

For the following, perform either steps 1-4 and 6 (commands 0-3 and 5) or steps 5 and 6 (commands 4 and 5):

1. Enter 0 to select the bus identification number. The system displays:

```
BUS# [0>Internal | 1>External or x: exit]
```

BUS 0 represents Micro Channel bus 0 in the 7015 R30, R40, and R50. BUS 1 represents Micro Channel bus 1 of the 7015 R30, R40, and R50.

Enter your choice. The displayed location code is updated.

2. Enter 1 to select the slot number. The system displays:

```
SLOT# [1-7 (Internal Bus) | 1-8 (External Bus) or x: exit]
```

Enter your choice. The displayed location code is updated.

3. Enter 2 to select the SCSI identification number. The system displays:

```
SCSI ID [0-F or x: exit]
```

Enter your choice. The displayed location code is updated.

4. Enter 3 to select the logical unit identification number (LUN ID). The system displays:

```
LUN ID [0-F (8 bit bus) | 00-1F (16 bit bus) or x: exit]
```

Enter your choice. The displayed location code is updated.

5. Enter 5 to begin the boot. The system leaves the maintenance environment and boots from the specified SCSI device.

Another method of changing the SCSI Boot Device location code is to select 4 from the BOOT FROM SCSI DEVICE menu. This method allows you to change the SLOT #, SCSI ID, and the LUN ID simultaneously. When you make this selection, the system displays:

```
ENTER LOCATION CODE  
(Drawer - Bus#/Slot# - Connector - SCSI ID/LUN):
```

Enter the new location code in the form *AA-BB-CC-DD*, where *AA* is the drawer number, *BB* is the bus and slot number, *CC* is the connector, and *DD* is the SCSI identifier and logical unit identifier.

Enter 5 to begin the boot. The system leaves the maintenance environment and boots from the specified SCSI device.

Off-Line Tests

Attention: These menus are only to be used when directed by service support personnel. Some of the tests described require test equipment or resources not available on your system.

This option under the MAINTENANCE MENU enables you to run the off-line tests in a controlled and interactive mode.

- Enter 7 in the MAINTENANCE MENU to select the Off Line Tests option. The following menu is displayed.

OFF-LINE TESTS Menu

The OFF-LINE TESTS main menu, that follows, uses an empty option list by default.

```
                                OFF-LINE TESTS
OPTION LIST:
PROCESSOR LIST: Test parameter value

COMMANDS: A> VERBOSE
          B> VERBOSE++
          C> HALT ON ERROR
          D> LOOP
          E> SCOPE
          F> PROCESSOR

          0> BUILD TEST LIST
          1> MODIFY/DISPLAY TEST LIST
          2> DELETE TEST LIST
          3> EXECUTE TEST LIST
          4> ERROR REPORT INSPECTION

SELECT [x:exit]:
```

You can modify the option list field by entering the command corresponding to a particular option. If you want to deselect a particular option (if you want to cancel the option after selecting it) press the same command once again. In other words, the options are toggled by the corresponding commands. The available commands are explained as follows:

- A** Sets the verbose option, which displays test execution messages. Without this option, only test titles and results are displayed.
- B** Sets the extra verbose option, which displays the verbose messages, plus detailed test execution messages. If this option is selected, the verbose option is redundant and is ignored.
- C** Sets the halt on error option, which forces test execution to stop when the first error is found. In this case, the error message and status are displayed.
- D** Sets the loop option, which continuously runs selected tests in a loop while displaying the test identifier and loop step counter. To stop the tests, press the Break key (Ctrl-x).
- E** Sets the scope option, which continuously runs the first test (in the list of selected tests) in a loop, without displaying messages. To stop the tests, press the Break key.
- F** Select the processor to run the tests.

- 0 Displays the build test menu, which enables you to specify the test list (see "Build Test List" below).
- 1 Displays and enables modification of the tests in the build list (see page 2-31).
- 2 Deletes the tests in the build list, after operator confirmation. Attempting to delete tests from an empty list causes an error message to be displayed.
- 3 Runs selected tests (see page 2-32).
- 4 Displays an error report.
- x Exits this menu and returns to the MAINTENANCE MENU.

Build Test List

This command is used to build a test list, which is a sequence of tests to be run. To build a test list, perform the following steps:

1. Enter 0 from the OFF-LINE TESTS menu to display the following menu.

```
BUILD TEST LIST
```

GROUP	DESCRIPTION	GROUP	DESCRIPTION
01	BUMP QUICK IO	03	DIRECT IO
04	CPU	05	DCB AND MEMORY
06	INTERRUPT	11	MCA
20	MULTIPROCESSOR		

```
COMMANDS: nn> SELECT GROUP
          * > ADD ALL AVAILABLE TEST TO TEST LIST
```

```
SELECT [x:exit]:
```

Note: For a description of the test groups, see page A-3.

2. Select a test group of your choice by entering the group ID. For example, to select the interrupt test group, enter 06.

Note: Use the slash (/) character to separate different test groups. For example, enter 01/03/11 specify the BUMP Quick IO, Direct IO, and MCA test groups with default parameter values.

- Once you have selected the test groups, you can specify individual tests within a group. For example, the following screen enables you to specify individual BUMP Quick IO tests:

```

                                BUILD TEST LIST
GROUP 01 BUMP QUICK IO

TEST      DESCRIPTION                TEST      DESCRIPTION
01        DEBUG LINE                  02        S1 ASL (BUMP)
03        S2 ASL (REMOTE)              04        S3 ASL (SPECIFIC)
05        FLASH EPROM CONTENT          06        NOVDRAM CONTENT
07        EPROM CONTENT                08        TOD
09        FLOPPY-DISK CONTROLLER       10        BPP REGISTERS
11        MISC REGISTERS                12        CPU ACCESS
13        VPD COHERENCY                 50        ASL EXTERNAL L-B
51        BPP EXTERNAL L-B FULL         52        PRINTER
53        AUTODIAL                      54        BPP EXTERNAL L-B

COMMANDS: nn> SELECT TEST
          * > ADD ALL TEST TO TEST LIST
SELECT [x:exit]:

```

Attention: Do not run tests from the above list on items that do not exist on your system, a failure indication results.

- Select a particular test by entering the test number. The selected test is included in the list with default parameters.

Notes:

- Use the slash (/) character to separate different tests. For example, enter 01/03 to specify tests 1 and 3 with default parameter values.
- Use the * (asterisk) character to select all available tests.
- Attempting to add tests to a full test list causes an error message to be displayed.

Modify/Display Test List

Once the test list is built, you can use this option to view or modify it. Each test is identified by a number *xyy*, where *xx* is the group number and *yy* is the test number.

1. Enter 2 in the OFF-LINE TESTS menu to view or modify the test list. The following menu is displayed:

MODIFY/DISPLAY TEST LIST

```
TEST LIST (xyy: xx = GROUP NUMBER yy = TEST NUMBER):
```

```
0101-0102-0103-0104-0105-0106-0107-0108-0109-0110-0111-0112-0150-  
0151-0152
```

```
COMMANDS: xyy> SELECT TEST
```

```
SELECT [x:exit]:
```

2. Select the test to be displayed or modified. For example, enter 0302 to select test 2 from group 3.
3. When a test is selected for modification, the following screen enables you to:
 - Display test parameters (both default and current values).
 - Modify parameter values (reserved for service people only).
 - Delete tests from the list.

```
TEST: 0101 (01/01) - GROUP 01 BUMP QUICK IO  
- TEST 01 DEBUG LINE
```

```
PARAMETER[1] = Sub test selection  
                DEFAULT VALUE = 0x00000000 - PRESENT VALUE =  
0x00000000  
PARAMETER[2] = Processor number  
                DEFAULT VALUE = 0x00000008 - PRESENT VALUE =  
0x00000008  
PARAMETER[3] = Part ID  
                DEFAULT VALUE = 0xffffffff - PRESENT VALUE =  
0xffffffff
```

```
COMMANDS: (+: forward test -: backward test)  
Pn> CHANGE PARAMETER  
D > DELETE TEST
```

```
SELECT [x:exit]:
```

4. The following commands are available:

Pn value [/ Pn value...] This command is reserved for customer service representatives.

D Deletes the selected test.

+ Scrolls forward in the test parameter list.

- Scrolls backward in the test parameter list.

x Exits this menu and returns to the previous menu.

Execute Test List

This command enables you to run the test list once it is built (and possibly modified). All the tests in the test list are run one at a time with the selected execution options.

- Enter 3 in the OFF-LINE TESTS main menu to run the selected tests.

The following screen displays the selected execution parameters for the test list.

```
EXECUTE TEST LIST

OPTION LIST:
PROCESSOR LIST: Test parameter value

>>> ENTER (CTRL_X) TO INTERRUPT TEST EXECUTION <<<

TEST 0101 Running
.. Bump [01.01.00] DEBUG LINE TEST
TEST 0103 Running
.. Bump [01.03.00] S2 ASL (REM.) TEST

PRESS RETURN TO EXIT:
```

- If the loop option is set, press the Break key to stop test execution. Otherwise, wait for the tests to finish, and then press the Enter key to exit and return to the previous menu.

Set Parameters

This option under the MAINTENANCE MENU enables you to modify user-settable flags and parameters.

1. Enter 8 in the MAINTENANCE MENU to select the Parameters Modification option.
2. The following screen is displayed:

```
SET PARAMETERS

0> POWER-ON COMMAND
1> VOLTAGE MARGINS
2> SET CONFIGURATION
3> PHONE NUMBERS
4> MISCELLANEOUS PARAMETERS

SELECT [x:exit] :
```

The following sections explain each of these options in detail.

Power-On Command Parameters

During the standby idle phase, the system power can be turned on (and the IPL started) by entering a BUMP console power-on string through line S1 or a service console power-on string through line S2 (see "Working with SystemGuard" on page 2-10 for a description of available keywords). These strings are especially useful to remotely turn on the system power, without having to press the power button. This option allows you to enable or disable the power-on command feature and to set the power-on strings. All specified changes only take effect during the next initialization.

1. Enter 0 in the SET PARAMETERS menu to select this option. The following screen displays the current settings and provides commands to change them.

```
POWER-ON COMMAND

PRESENT CONDITIONS: BUMP CONSOLE POWER-ON -> Enable
                   COMMAND STRING -> power
                   SERVICE CONSOLE POWER-ON -> Disable
                   COMMAND STRING -> power

COMMANDS: 0> ENABLE BUMP CONSOLE POWER-ON
          1> DISABLE BUMP CONSOLE POWER-ON
          2> CHANGE BUMP CONSOLE POWER-ON COMMAND STRING
          3> ENABLE SERVICE CONSOLE POWER-ON
          4> DISABLE SERVICE CONSOLE POWER-ON
          5> CHANGE SERVICE CONSOLE POWER-ON COMMAND STRING

SELECT [x:exit]:
```

2. Select an action and enter the corresponding number.

Note: The power on string is an ASCII string of 15 characters maximum.

Voltage Margins

This option enables the trained service person to set voltage margins for each unit.

Note: This option can only be used for error analysis or factory test and must be used only by trained service personnel. Restore nominal voltage values before restarting other operations. Any data written on the disk in marginal mode must be removed before restarting normal operations. Ignore any disk errors when using this option, and retest the disk in nominal conditions.

Set Configuration

This command is used to configure electronic boards like I/O cards or Micro Channel adapter (MCA) devices.

1. Enter 2 in the SET PARAMETERS menu to display the SET CONFIGURATION menu as shown below:

```
SET CONFIGURATION

0> CPU CARD

1> MEMORY CARD

2> BASIC MCA ADAPTER

3> EXPANSION MCA ADAPTER

SELECT [x:exit]:
```

2. Select the card or adapter of your choice by entering the appropriate command number. A second-level screen lists available devices. For example, enter 2 to select Micro Channel adapter (MCA) devices and display a screen listing available adapters, similar to the following:

```
BASIC MCA ADAPTER

0> BASIC MCA ADAPTER #0
1> BASIC MCA ADAPTER #4
2> BASIC MCA ADAPTER #5
3> BASIC MCA ADAPTER #6

SELECT [x:exit]:
```

3. Select the particular device which you want to configure. A third-level screen is displayed. For example, for adapter 0 (zero), you should see a screen similar to:

```
BASIC MCA ADAPTER #0

PRESENT CONDITIONS: Valid & Enable

COMMANDS: 0> BASIC MCA ADAPTER ENABLE
          1> BASIC MCA ADAPTER DISABLE
          2> BASIC MCA ADAPTER TEMPORARY DISABLE

SELECT [x:exit]:
```

4. Enter your choice in the SELECT field.

Phone Numbers

This command is used to set various service support phone numbers.

1. Enter 3 in the SET PARAMETERS menu to display the PHONE NUMBERS menu shown here:

PHONE NUMBERS

```
0> SERVICE CENTER DIAL-OUT (1) ->
1> SERVICE CENTER DIAL-OUT (2) ->
2> CUSTOMER HUB DIAL-OUT (1) ->
3> CUSTOMER HUB DIAL-OUT (2) ->
4> SYSTEM DIAL-IN ->
5> SYSTEM OPERATOR VOICE ->
```

SELECT [x:exit] :

2. Select the phone number you wish to modify. After you enter the number, the menu is redisplayed with the new value. The different phone numbers are explained here:

Service Center Dial-Out Phone Number

This phone number is used by the auto dial-out procedure to automatically report problems to a remote service center. The first phone number, marked (1), is the primary number, and the second is a backup number. By default, no numbers are set.

Customer Hub Dial-Out Phone Number

This phone number is used by the auto dial-out procedure to automatically report problems to an internal customer service center (customer hub). The first phone number, marked (1), is the primary number, and the second is a backup number. By default, no numbers are set.

System Dial-In Phone Number

This phone number is used by the dial-in procedure. This is the phone number used by a remote service center expert to connect to your machine by modem to perform maintenance actions. By default, no phone number is set.

System Operator Voice Phone Number

This phone number is the voice number of the customer's system operator or system administrator. By default, no phone number is set.

Miscellaneous Parameters

This option enables you to set various flags and parameters. Flags have just two values (enabled or disabled; or yes or no) and are toggled, while parameters can have many different values. For a complete list of default values for flags and parameters, see the table in "Default Parameter Values" on page B-1.

Note: There are some AIX commands which also enable you to view and modify service information related to diagnostic flags, remote maintenance modem configurations, and remote maintenance phone numbers. For further information, see the "Changing Flags and Parameters Under AIX" on page B-3.

- Enter 4 in the SET PARAMETERS menu to display the MISCELLANEOUS PARAMETERS menu. The value set for all the flags, except *Fast IPL*, is permanent until a new change is made.

MISCELLANEOUS PARAMETERS

```

0> BUMP CONSOLE -> Present
1> AUTOSERVICE IPL -> Disabled
2> DIAL_OUT AUTHORIZATION -> Disabled
3> FAST IPL -> Disabled
4> SET MODE TO NORMAL WHEN BOOTING -> Enabled
5> BOOT MULTI-USER AIX IN SERVICE -> Disabled
6> SERVICE LINE SPEED -> 1200 Line speed
7> MAINTENANCE PASSWORD
8> CUSTOMER MAINTENANCE PASSWORD
9> ELECTRONIC MODE SWITCH FROM SERVICE LINE -> Disabled

```

SELECT [x:exit]:

BUMP Console Flag Enables the use of a console on line S1 to display the MAINTENANCE MENU. When disabled, the MAINTENANCE MENU is not displayed on line S1.

1. Enter 0 to toggle this flag.
2. The new flag status (opposite of the previous state) immediately takes affect and the system continues to boot.

Autoservice IPL Flag Enables the automatic bootstrap capability, allowing a boot to occur even if the Mode Switch is in the Service position, thus avoiding the MAINTENANCE MENU. When disabled, the MAINTENANCE MENU is entered during the boot phase.

1. Enter 1 to toggle this flag.
2. The new flag status (opposite of the previous state) is displayed.

Dial-Out Authorization Flag

Enables automatic problem reporting to a remote service station (with line S2) using the auto dial-out procedure. You can set the dial-out phone numbers: see “Service Center Dial Out Phone Number” on page 2-35. When disabled, problems are not automatically reported to a remote service station.

1. Enter 2 to toggle this flag.
2. The new flag status (opposite of the previous state) is displayed.

Fast IPL Flag

Enables the bypass of the execution of extended POST at IPL time. This flag is not permanent, and when set, is valid for the next initialization only. It is automatically cleared during the next AIX boot phase.

- Enter 3 to enable this option.

Set Mode to Normal when Booting Flag

Enables the reset of the Electronic Mode Switch at boot time. When enabled, the position is forced to Normal during each successful boot.

1. Enter 4 to toggle this flag.

2. The new flag status (opposite of the previous state) is displayed.

Boot Multiuser AIX In Service Flag

Enables multiuser AIX boots to proceed even if the Mode Switch is in the Service position (when booting by selecting option 6 in the MAINTENANCE MENU). When the flag is enabled, the system boots using the bootlist defined for a Normal boot (as when the mode switch is set to Normal). When disabled and the mode switch is in the Service position, you cannot perform a multi-user AIX boot.

1. Enter 5 to toggle this flag.
2. The new flag status (opposite of the previous state) is displayed.

Service Line Speed Parameter

Defines the speed (baud rate) of the BUMP service line. The default is 1200.

1. Enter 6 to set this parameter. A menu showing possible line speeds is displayed.
2. Select a baud rate and enter the corresponding menu number.

Maintenance Password

This command sets the maintenance password, which restricts access to basic features. If you set this password, you should give it to service personnel when requested. By default, there is no password.

1. Enter 7 to set the maintenance password.
2. When requested, enter the password.

Customer Maintenance Password

This command sets the customer maintenance password, which restricts access to sensitive data such as: power on and power-off strings; general and customer passwords; and most dial-in and dial-out phone numbers (except for the remote service center phone number). If you set this password, you normally should not give it to service personnel. By default, there is no password.

1. Enter 8 to set the customer maintenance password.
2. When requested, enter the password.

Electronic Mode Switch from Service Line Flag

Enables the modification of the Electronic Mode Switch through line S2 (the remote maintenance line). When disabled, the Electronic Mode Switch can only be changed locally.

1. Enter 9 to toggle this flag.
2. The new flag status (opposite of the previous state) is displayed.

Set National Language

Use this option in the main menu to set the national language used for “SystemGuard”. Once selected, the effect is immediate and all the console messages are presented in the selected language.

1. Enter 9 in the MAINTENANCE MENU to select this option. The following menu is displayed:

```
          SET NATIONAL LANGUAGE
0> ENGLISH
1> GERMAN
2> FRENCH
3> ITALIAN
```

```
SELECT [x:exit]:
```

2. Select the language of your choice by entering the corresponding command number.

Some Common SystemGuard Tasks

The following tasks are done through the STAND-BY and MAINTENANCE MENUs that are part of SystemGuard. Note that these tasks can also be carried out from AIX diagnostics.

How to Set the Electronic Key

The key can be set electronically, making it easier to provide remote support without physically touching the machine. You can do this from the Stand-By mode or from AIX.

Setting the Electronic Key from Stand-By Mode

1. Go into Stand-By mode.
2. Press the Enter key to get the prompt displayed (>).
3. Press the Enter key again. The cursor (in block mode) is then superimposed on top of the prompt.
4. At this point, press the Escape key and then the s key. This turns the Electronic Key to Service even though the Physical Key is still in Normal position.
5. Press the Enter key again.
6. Enter the keyword, `sbb` (Stand-By BUMP). You should see the STAND-BY MENU appear; this is a way to check that the System Key is in Service.
7. Exit from the STAND-BY MENU.

At this step, if you want to go back to Normal, press the Enter key again; then press the ESC-n key. This puts the Electronic Key to Normal position.

Setting the Electronic Key from AIX

1. While AIX is running, log in as user `root`.
2. Type the following command to look at the current status of the Electronic Key:

```
keycfg -d
```

3. To change the key to Service, type the following command:

```
keycfg -c service
```

4. To change the key to Secure, type the following command:

```
keycfg -c secure
```

5. To change the key back to Normal, type the following command:

```
keycfg -c normal
```

Note that, each time, you can run the `keycfg -d` command to verify the status of the key.

Displaying Configuration through the Maintenance Menu

The system configuration can also be displayed through the MAINTENANCE MENU. You will find the same kind of information displayed previously, but in a different and more readable way.

To get the system configuration from the MAINTENANCE MENU, do the following:

1. Enter the MAINTENANCE MENU.
2. Enter 0 to select **DISPLAY CONFIGURATION**.

The configuration display is a good picture of the SystemGuard configuration on one screen. Here is an example:

DISPLAY CONFIGURATION

```
MACHINE TYPE/MODEL: 7013J30 45067
FIRMWARE RELEASE:   Standby -> 1600
                   Backup eprom -> 0701
                   Flash eprom -> 0704
SERVICE CONTRACT:  Last update (yyymmdd) -> 950707
                   Validity -> Unlimited contract
                   Remote service support -> Valid
                   Quick On Call service -> Not valid
AUTO DIAL:          Disabled
CONSOLES:           BUMP Consoles -> Present
                   Service Console -> Disabled - 1200 Baud
SYSTEM ID:           00045067
NUMBER OF CPU:       4
MAIN MEMORY SIZE:   128 MByte
PRESENT UNITS:       #0
```

```
SELECT [Unit #(0-7) or x:exit]:
```

This screen is self explanatory. The interesting feature here is that you can see the level of the firmware stored in the BUMP EPROM, the level of the firmware stored in the Flash EEPROM and the level stored in the Backup EPROM.

How to Set Fast IPL

If the Fast IPL flag is enabled, SystemGuard skips the extended POST. By default, the Fast IPL flag is disabled; enabling it only lasts one reboot.

There are three ways to enable it: through the STAND-BY MENU in Stand-By mode, through the MAINTENANCE MENU or by using AIX commands.

Setting Fast IPL from the Stand-By Menu

1. Set the System Key in Service.
2. Enter the STAND-BY MENU by entering `sbb`.
3. Enter `1` to select Set Flags.
4. Check the current status of the Fast IPL Flag. If it is disabled, enter `6` to toggle it to enabled.

The Fast IPL flag is now enabled; the extended POST is not run when the system boots. This saves several minutes.

The following information is contained on the SET FLAGS menu:

```
Set Flags

0 Remote Authorization      Disabled
1 Bump Console Present     Enabled
2 Autoservice IPL          Disabled
3 Extended Tests           Disabled
4 PowerOn Tests in Trace Mode Disabled
5 PowerOn Tests in Loop Mode Disabled
6 Fast IPL                  Disabled
7 Set Electronic Mode Switch to Normal NRM

select(x:exit):
```

Setting Fast IPL through the Maintenance Menu

1. Enter the MAINTENANCE MENU.
2. Enter 8 to select the SET PARAMETERS menu.
3. Enter 4 from the SET PARAMETERS menu to select the MISCELLANEOUS PARAMETERS Menu.
4. Option 3 in this menu should show the current status of the Fast IPL flag. If it is disabled, simply enter 3, and the flag changes to enabled.

Fast IPL is now enabled and lasts one reboot.

Setting Fast IPL through AIX

1. Log into AIX as user *root*.
2. Type in the following command to find the *index* of the Fast IPL flag and also the current flag value:

```
mpcfg -df
```

Following is the output of the command:

Index	Name	Value
1	Remote Authorization	0
2	Autoservice IPL	0
3	BUMP Console	1
4	Dial-Out Authorization	0
5	Set Mode to Normal When Booting	0
6	Electronic Mode Switch from Service Line	0
7	Boot Multi-User AIX in Service	0
8	Extended Tests	1
9	Power On Tests in Trace Mode	0
10	Power On Tests in Loop Mode	0
11	Fast IPL	0

3. The index is number 11, and, generally, the current value is zero (0), which means disabled.
4. Type the following command to change the status of the Fast IPL flag to enabled:

```
mpcfg -cf 11 1
```

Where 11 is the index and 1 the value itself; *c* is for change and *f* for diagnostics flags.

5. Type the following command just to verify the flag is changed:

```
mpcfg -df
```

How to Set the Service Line Speed

By default, the service line speed is 1200 baud or 2400 baud depending on the level of SystemGuard. This speed can be changed through the SystemGuard MAINTENANCE MENU. In order to use the Service Console properly, the terminal connected to the S2 connector has to be set to the same speed. This speed is not necessarily the same as the speed defined in AIX for tty1. To avoid changing the speed of the terminal itself when AIX is running, it is more convenient to have the same speed for the Service Console and tty1 defined in AIX.

Setting Line Speed through the Maintenance Menu

1. Enter the MAINTENANCE MENU.
2. Enter 8 in this menu to select the SET PARAMETERS menu.

```
SET PARAMETERS
```

```
0> POWER-ON COMMAND
1> VOLTAGE MARGINS
2> SET CONFIGURATION
3> PHONE NUMBERS
4> MISCELLANEOUS PARAMETERS
```

```
SELECT (x:exit):
```

3. Enter 4 in this menu to select the MISCELLANEOUS PARAMETERS menu.

```
MISCELLANEOUS PARAMETERS
```

```
0> BUMP CONSOLE -> Present
1> AUTOSERVICE IPL -> Disabled
2> DIAL_OUT AUTHORIZATION -> Disabled
3> FAST IPL -> Enabled
4> SET MODE TO NORMAL WHEN BOOTING -> Disabled
5> BOOT MULTI-USER AIX IN SERVICE -> Disabled
6> SERVICE LINE SPEED -> 1200 Baud
7> MAINTENANCE PASSWORD
8> CUSTOMER MAINTENANCE PASSWORD
9> ELECTRONIC MODE SWITCH FROM SERVICE LINE -> Disabled
```

```
SELECT (x:exit):
```

4. Enter 6 to set this parameter. A menu showing possible line speeds is displayed.
5. Select a baud rate, and enter the corresponding menu number.
6. Exit from the menu.

Setting Line Speed through AIX

1. With AIX up and running, log in as user *root*.
2. Type the following command to view current settings:

```
mpcfg -dm
```

The following is the output of the command:

Index	Name	Value
1	Modem Parameters File Name	
2	Service Line Speed	
3	Protocol Inter Data Block Delay	
4	Protocol Time Out	
5	Retry Number	
6	Customer ID	
7	Login ID	
8	Password ID	

3. Type the following command to change to desired baud rate:

```
mpcfg -cm 2 xxxx
```

where *c* stands for change, *m* for modem and site configuration, *2* for the Service Line Speed index, and *xxxx* for your desired baud rate (9600, for example).

4. The line speed is changed, but is not effective until a reboot of the system.

How to Authorize the Service Console

The Service Console must be authorized in order to work with SystemGuard. This allows remote support personnel to log in to SystemGuard. Service Console Authorization must also be activated to enable mirroring. There are three ways to do it:

Authorizing Service Console through the Stand-By Menu

1. Enter the STAND-BY MENU.
2. Enter 1 from the STAND-BY MENU to select the SET FLAGS menu.
3. Check the status of the Remote Authorization flag. If it is disabled, enter 0 to toggle it to enabled.
4. Exit from the STAND-BY MENU.

Authorizing Service Console through the Maintenance Menu

1. Enter the MAINTENANCE MENU.
2. Enter 2 to select ENABLE SERVICE CONSOLE.
3. Exit from the MAINTENANCE MENU.

Authorizing Service Console through AIX

1. With AIX running, log in as user *root*.
2. Type the following command to view the current setting

```
mpcfg -df
```

3. Type the following command to change the flag:

```
mpcfg -cf 1 1
```

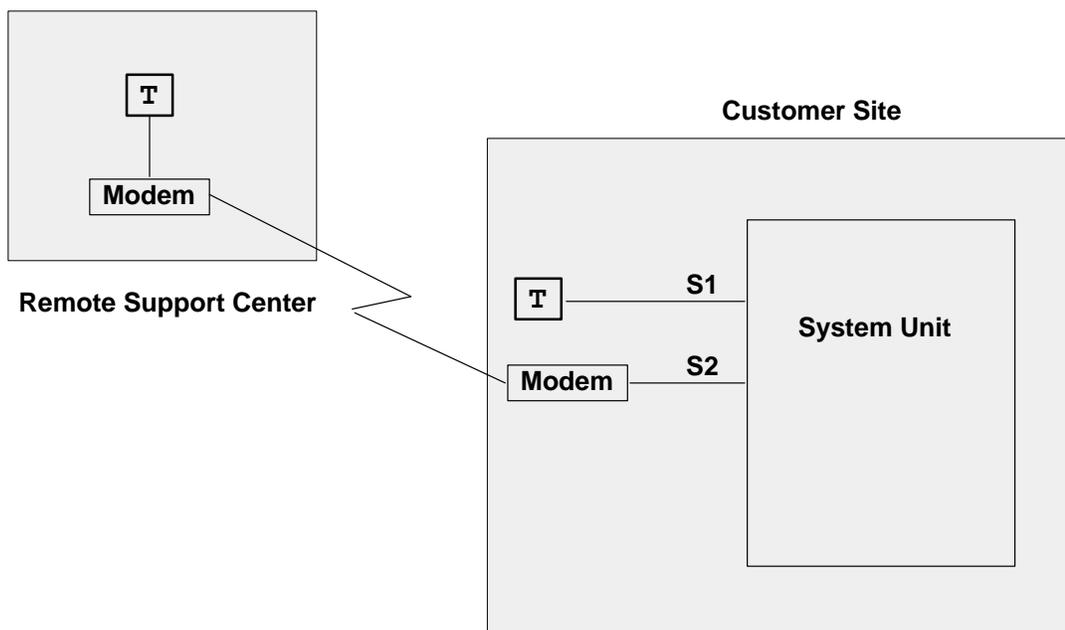
Where *-cf* is for change flag; *1* is for the index. The last number, *1*, is the value of the flag itself.

How to Set Up Console Mirroring

Console Mirroring Concepts

Console mirroring is a way to provide the customer a view of what the person working remotely from the Service Console is doing on the system. When mirroring is active, the Service Console and the BUMP Console are logically identical, and both are tty0 (tty1 is disabled when the mirroring starts).

Mirroring only works on the two serial ports, S1 and S2, and their respective ASCII consoles or terminal emulators. It does not work on the graphical devices. The BUMP Console can be either local (no modem connected) or remote (through a modem connection). Remote console connection must be established through dial-in (BUMP does not dial out). The Service Console is usually remote, connected through a Hayes-compatible modem on the S2 port; however a local, directly attached console at the S2 port can also be supported.



When mirroring is active, the customer on the BUMP Console and the support personnel on the Service Console both see the same output on their screens, and either one may enter characters. One person can even start typing and the other finish it. For example, the support personnel may log in as root on the Service Console, and the customer may enter the root password on the BUMP Console. Therefore, the remote support personnel do not need to know the root password.

Console mirroring is possible during the following SystemGuard phases: Stand-By, Init and Run-Time (AIX running).

The prerequisites for console mirroring are:

- Remote Service Support 1
- /usr/share/modems/mir_modem file present (for mirroring when AIX is up)

Setting Up Console Mirroring

In order to setup console mirroring, you need first to authorize the Service Console, and set up the right line speed. Refer to previous chapters on how to set up the service line speed and how to authorize the Service Console. Then do the following:

1. While AIX is running, log in as user `root`.
2. Type the following command to make sure that the Service Contract Validity is greater than or equal to 0:

```
mpcfg -dS
```

The command output is:

Index	Name	Value
1	Remote Service Support	1
2	Quick On Call Service	0
3	Service Contract Validity	32767
4	Service Support Type	

Note that `mirrord` cannot be started if the Service Contract Validity is `-1` (No Valid Service Contract).

3. Wake up the mirror daemon (`mirrord`) by either switching the Physical Key to Service or by typing the following command:

```
keycfg -c service
```

If `mirrord` is awakened successfully, you should see the following messages:

```
mirrord: Wait connection...
mirrord: Remote user connected, mirroring active
```

4. Type the following command to verify that `mirrord` is running:

```
ps -ef|grep mir
```

The command output is similar to the following:

```
root 2308      1  0 12:08:21  -  0:00 /usr/sbin/mirrord mir_modem
root 6212  4552  3 12:21:58  0  0:00 grep mir
```

5. Now, the support personnel should be able to work on the remote console, and the customer should be able to watch on the BUMP Console what the service personnel enter on the Service Console.

6. To turn mirroring off, either switch the Physical Key to Normal or type the command:

```
keycfg -c normal
```

You should see the following message:

```
mirrord: mirroring is stopped
```

If the prerequisite conditions are met, the `mirrord` daemon is started at boot time, but goes to sleep until the System Key is set to Service. When `mirrord` is awakened, it kills all processes on S2 and pushes the streams mirror module onto the S2 queue.

Since it is assumed that the Service Console is remote, `mirrord` requires a modem file that specifies the type and characteristics of the modem. This modem file is required even if the Service Console is connected locally without modem. Thus, a file with no modem must be provided. The default name of the modem file is `mir_modem`. Please refer to the appendix for supported modem files.

How to Enable Surveillance

Surveillance is implemented by the `survd` daemon. This daemon, when started, establishes a heartbeat between AIX and SystemGuard. In case of an AIX hang, SystemGuard detects it and reboots the system.

To implement the surveillance, do the following:

1. Enter:

```
survd -d {number of seconds}
```

This starts the `survd` daemon, thereby starting the surveillance. The `number of seconds` determines the heartbeat delay time, where ten seconds is the minimum, and the default is sixty seconds.

2. Carry out this step if you want a hardware reboot:

```
survd -h (-h flag sets hardware reboot)
```

3. To turn off the surveillance, type the following command:

```
survd -r
```

Attention: If you issue the command `kill -9 <survd_proc_id>`, the system reboots because SystemGuard thinks that AIX hung since it no longer receives a heartbeat.

How to Set Up the Dial-Out Feature

The dial-out feature can be implemented, either through SystemGuard or AIX.

Setting Up Dial-Out from SystemGuard

The dial-out feature is the automatic sending of certain errors to a service center. The customer must set the Dial-Out Authorization flag. When the Physical Key is in the Normal position, if a boot fails due to a POST error or boot device not found, a problem report is sent to the remote service center.

The prerequisites for the dial-out feature are:

- Remote Service Support flag enabled (1)
- Remote authorization enabled (1)
- Dial-out authorization enabled (1)

The dial-out feature uses the dial-out phone numbers listed in SystemGuard configuration. To add or change phone numbers, do the following:

1. Enter the SystemGuard MAINTENANCE MENU.
2. Enter 8 from this menu to select the SET PARAMETERS menu.
3. Enter 3 from the SET PARAMETERS menu to select the PHONE NUMBERS menu.
4. Select your option, and enter the dial-out number or numbers. There are two service center and customer hub numbers. These relate to primary (1) and secondary (2) numbers.

Modem Configuration

The modem on line S2 must be configured using an ASCII modem configuration file which describes various parameters using a specific syntax. AIX uses this file directly. SystemGuard uses the same information (in condensed form) stored in non-volatile memory (NVRAM).

The modem line speed must be correctly set, either by using SystemGuard (see "Miscellaneous Parameters" on page 2-35 or the **diag** command. The modem configuration is used by both the dial-out and dial-in services.

The following table lists the data that SystemGuard sends to the remote support center.

Parameter	Field Size	Generated By
Magic Number	4	SystemGuard
Routing Metric	4	SystemGuard
Login ID	12	AIX Utility
CSS ID	4	SystemGuard
RETAIN Account Number	12	AIX Utility
General Password	16	AIX Utility
Time Stamp	8	SystemGuard
Customer System Phone	20	AIX Utility
Customer Operator Phone	20	AIX Utility
Machine Serial Number	10	SystemGuard or AIX Utility
Machine Device Type	13	SystemGuard or AIX Utility
Primary Error Code	4	SystemGuard
Destination	1	SystemGuard, HUB, or Service Center
SRN LCD Code	64	SystemGuard
Text Problem Abstract	64	SystemGuard

How to Reboot AIX from the Remote Service Console

It is possible for the remote personnel connected via the Service Console to reboot AIX from the remote site.

Prerequisites

The following procedure must be carried out from the BUMP Console in order to allow AIX to boot remotely from the Service Console.

1. Get into the MAINTENANCE MENU (reboot the system with the key in Service mode).
2. Enter 8 in the MAINTENANCE MENU to select the SET PARAMETERS menu.
3. Enter 0 in the SET PARAMETERS menu to select the POWER-ON COMMAND menu.
4. Enter 3 and enable Service Console Power-On.
5. Enter 5 from the same menu, and enter the string `power`. This string is used for powering-on the system from the Service Console.
6. Now reboot the system in Normal mode, and log in as user `root`.
7. Type the following commands:

```
mpcfg -cf 1 1 to enable Remote Authorization
mpcfg -cf 2 1 to enable Autoservice IPL
mpcfg -cf 6 1 to enable Electronic Mode Switch from S2
mpcfg -cf 7 1 to enable Boot Multi-User AIX in Service
mpcfg -cf 11 1 to enable Fast IPL
```

8. Type the following command to start console mirroring:

```
keycfg -c service
```

Now the system is set up so that the S2 port or the remote console can activate a reboot. The system can be rebooted either in AIX Multi-User or in Diagnostics to run diagnostics on the hardware.

Rebooting to AIX Multi-User

1. While AIX is running, log in as user `root`.
2. Type the command:

```
shutdown -F -t
```

and press Enter, to shut down the system.
You can use the `-F` flag for a fast shutdown and/or a `-t` flag for a shutdown at a particular time.
3. Once the system has shut down press Enter, you should see the Stand-By prompt (`>`).
4. At this prompt, type `sbb` to get into the STAND-BY MENU.
5. Enter a 1 at the STAND-BY MENU to select the SET FLAGS menu.
6. Enter a 7 to select Set Electronic Mode Switch to Normal
7. Once the Electronic mode switch is set to Normal, exit out of the STAND-BY MENU until you have your prompt (`>`).
8. Type `power` at this prompt; the system should reboot.
9. You should get the AIX login prompt in about ten minutes.

Rebooting to Single-User and then to Multi-User

This allows the remote support personnel connected to the system via a modem to the S2 port to shut down and reboot the system in Diagnostics mode for hardware diagnostics purposes. After running diagnostics, the remote personnel can reboot the system in AIX Multi-User without having a need to physically touch the machine.

1. While AIX is running, type the command:

```
shutdown
```

and press Enter, to shut down the system.

2. Once the system is shutdown press Enter, you see the Stand-By mode prompt (>). Remember, at this point the Electronic switch is in Service mode. Leave it in Service mode.
3. At the Stand-By prompt, type the power on keyword for S2 that we had set earlier (power in our example).
4. The system reboots in Diagnostics. From here, diagnostic tasks can be run.
5. Once completed, activate single-user boot from the Diagnostic's main menu.
6. You are prompted for a password; enter the root password.
7. Type the following command to reboot in AIX Multi-User:

```
init 2
```

8. After about ten minutes, the system should have rebooted and loaded AIX.
9. If S2 was configured as a tty from AIX as well, an AIX login screen appears on this remote Service Console.

How to Boot from a SCSI Device

The SMP server can be booted in Service mode from a desired SCSI device, either from the MAINTENANCE MENU or through the bootlist.

Booting from an SCSI Device through the Maintenance Menu

When the system is booted with the system key in Service position, it either boots in the MAINTENANCE MENU, in Diagnostics or from a SCSI device, depending upon the various flag settings.

Note: To be able to boot from an SCSI device other than the boot disk such as a tape drive, the flag BOOT MULTI-USER AIX IN SERVICE must be disabled. This can be set through the MAINTENANCE MENU. To check or change this flag, do the following:

1. Enter the MAINTENANCE MENU; refer to the MAINTENANCE MENU section on page 2-21 for details.
2. From the MAINTENANCE MENU, enter 8 to select the SET PARAMETERS menu.

3. From this menu, enter 4. to select the MISCELLANEOUS PARAMETERS menu, which is similar to the following:

MISCELLANEOUS PARAMETERS

```
0> BUMP CONSOLE -> Present
1> AUTOSERVICE IPL -> Disabled
2> DIAL_OUT AUTHORIZATION -> Disabled
3> FAST IPL -> Enabled
4> SET MODE TO NORMAL WHEN BOOTING -> Disabled
5> BOOT MULTI-USER AIX IN SERVICE -> Disabled
6> SERVICE LINE SPEED -> 1200 Baud
7> MAINTENANCE PASSWORD
8> CUSTOMER MAINTENANCE PASSWORD
9> ELECTRONIC MODE SWITCH FROM SERVICE LINE -> Disabled
```

SELECT [x:exit]:

4. Check option 5 in this menu (BOOT MULTI-USER AIX IN SERVICE). If it is enabled, enter 5, and the flag should be changed to disabled.
5. Have another look at the option to make sure it is disabled. Now you are ready to boot off the SCSI device, off a tape drive for example.
6. Insert the bootable tape into the tape drive.
7. Exit back to the main MAINTENANCE MENU.
8. Enter 6 in the MAINTENANCE MENU to select the SYSTEM BOOT menu, which is similar to the following:

SYSTEM BOOT

```
0> BOOT FROM LIST
1> BOOT FROM NETWORK
2> BOOT FROM SCSI DEVICE
```

SELECT [x:exit]:

9. Enter 2 to boot from an SCSI device. The menu that appears enables you to specify the SCSI device by using the location code.

10. At this point, a BOOT FROM SCSI DEVICE screen appears. This displays the PRESENT DEVICE LOCATION CODE. If it is not the device you want to boot from, go through each option and change it to the desired BUS, SLOT, SCSI ID, and LUN ID. Option 4 allows you to change all these options at once. The BOOT FROM SCSI DEVICE screen is similar to the following:

```
BOOT FROM SCSI DEVICE

PRESENT DEVICE LOCATION CODE:
(Drawer - Bus#/Slot# - Connector - SCSI ID/LUN) 000600600

COMMANDS: 0> CHANGE BUS#
          1> CHANGE SLOT#
          2> CHANGE SCSI ID
          3> CHANGE LUN ID
          4> CHANGE DEVICE LOCATION CODE
          5> BOOT FROM SELECTED DEVICE

SELECT [x:exit]: 5
```

See page 2-26 for descriptions of these fields.

11. Enter 5 to begin the boot. The system leaves the maintenance environment and boots from the specified SCSI device.

Booting from an SCSI Device through the Bootlist

The system can be booted from an SCSI device, such as a tape drive, without going through the MAINTENANCE MENU. In this case, it uses the bootlist to determine the boot device while in Service mode. The bootlist can be updated through Service Aids in Diagnostics.

Following are the prerequisites for booting from an SCSI device (a tape drive for example) in Service mode:

- The Autoservice IPL flag must be enabled.
- The Service mode bootlist must be updated (this can be done in AIX Diagnostics by selecting Service Aids and Display/Alter Bootlist).
- A supported SCSI device, such as a tape drive.
- A bootable SCSI media, such as a bootable tape (install or mkysyb).

To boot off this SCSI device, do the following:

1. Switch the System Key to Service.
2. Insert the bootable media in the SCSI device.
3. Turn on the system power.

The system then boots up from this SCSI device. If the boot up is not successful, verify that the tape is bootable, or clean the media device.

How to Boot from the Network

The system can be booted from the network through the MAINTENANCE MENU. Network boot allows a system to be reinstalled via the network and also allows various maintenance tasks to be carried out on the local machine. Use the following procedure to boot from the network:

1. Enter the MAINTENANCE MENU.
2. From the MAINTENANCE MENU, enter 8 to select the SYSTEM BOOT menu, which is similar to the following:

```
SYSTEM BOOT
```

```
0> BOOT FROM LIST
```

```
1> BOOT FROM NETWORK
```

```
2> BOOT FROM SCSI DEVICE
```

```
SELECT [x:exit]: 1
```

3. From the SYSTEM BOOT menu, enter 1 to select BOOT FROM NETWORK, which is similar to the following:

```
MAIN MENU
```

1. Select BOOT (Startup) Device
2. Select Language for these Menus
3. Send Test Transmission (PING)
4. Exit Main Menu and Start System (BOOT)

Type the number for your selection, then press "ENTER"
(Use the "Backspace" key to correct errors)

4. From the NETWORK BOOT MAIN MENU, enter a 1 to select the Select BOOT (Startup) Device option.

5. The SELECT BOOT (STARTUP) DEVICE menu appears, which is similar to the following:

```
SELECT BOOT (STARTUP) DEVICE
```

Select the device to BOOT (Startup) this machine.

WARNING: If you are using Token-Ring, selection of an incorrect data rate can result in total disruption of the Token-Ring network.

"==>" Shows the selected BOOT (startup) device

- ```
==> 1. Use Default Boot (Startup) Device
 2. Token-Ring: Slot 3, 4 Mb data rate
 3. Token-Ring: Slot 3, 16 Mb data rate
 4. Ethernet: Slot 4, 15-pin connector
```

Page 1 of 2

88. Next Page of Select BOOT (Startup) Device Menu

99. Return to Main Menu

Type the number for your selection, then press "ENTER"  
(Use the "Backspace" key to correct errors)

6. Select the device to boot from. For example, choose 3 to boot from Token-Ring: slot 3, 16 Mb data rate. A screen similar to the following appears:

```
SET OR CHANGE NETWORK ADDRESSES
```

Select an address to change  
Currently selected BOOT (startup) device is:

Token-Ring: Slot 2, 16 Mb data rate

Hardware address ..... 10005AC97CF1

- |                                               |                 |
|-----------------------------------------------|-----------------|
| 1. Client address                             | 009.003.001.027 |
| (address of this machine)                     |                 |
| 2. BOOTP server address                       | 009.003.001.008 |
| (address of the remote machine you boot from) |                 |
| 3. Gateway address                            | 000.000.000.000 |
| (Optional, required if gateway used)          |                 |

97. Return to Select BOOT (Startup) Device Menu (SAVES addresses)

99. Return to Main Menu (SAVES addresses)

Type the number for your selection, then press "ENTER"  
(Use the "Backspace" key to correct errors)

7. Enter the appropriate IP addresses, and enter 99 to return to the MAIN MENU. A screen similar to the following appears:

MAIN MENU

1. Select BOOT (Startup) Device
2. Select Language for these Menus
3. Send Test Transmission (PING)
4. Exit Main Menu and Start System (BOOT)

Type the number for your selection, then press "ENTER"  
(Use the "Backspace" key to correct errors)

8. Enter 4 to exit from the menu, and start system boot.
9. A screen similar to the following appears as the system boots off the network:

STARTING SYSTEM (BOOT)

Booting . . . Please wait.

Token-Ring: Slot 2, 16 Mb data rate

Hardware address ..... 10005AC97CF1

|       | Packets Sent | Packets Received |
|-------|--------------|------------------|
| BOOTP | 00000        | 00000            |

To find out more information on NIM (Network Install Manager), refer to *AIX Version 4.1 Network Installation Management Guide and Reference*, order number, SC23-2627.

## How to Disable and Enable Processors

In the SMP servers, it is possible to disable/enable processors. A suspected faulty processor can be disabled so that the system can run without it. The processors can be disabled/enabled through the STAND-BY MENU, MAINTENANCE MENU, Diagnostics, or through AIX commands.

### Enabling/Disabling Processors through the Stand-By Menu

1. Enter the STAND-BY MENU; refer to the STAND-BY MENU section on page 2-12.
2. From the STAND-BY MENU, enter 3 to select the Set Configuration menu. A first-level screen similar to the following appears:

```
Set Configuration

00 CPU0 10 UNIT0 & dev
01 CPU1 11 UNIT1 & dev
02 CPU2 12 UNIT2 & dev
03 CPU3 13 UNIT3 & dev
04 MC0 14 UNIT4 & dev
05 MC1 15 UNIT5 & dev
06 MC2 16 UNIT6 & dev
07 MC3 17 UNIT7 & dev
08 basic MCA
09 exp MCA
Select(x:exit): 01
```

The Set Configuration screen displays the units and devices that can be configured, along with their menu index number. At this step, CPU0 stands for the CPU card 0, not processor 0.

3. Enter an index number for a CPU card to be looked at. If you select CPU1 (01), for example, the following screen appears:

```
CPU1 Set | Status

00 CPU0 C | C
01 CPU0 D |
02 CPU0 T |
03 CPU1 C | C
04 CPU1 D |
05 CPU1 T |

Select(x:exit): 04
```

4. All the CPUs and their statuses are displayed, where:

- C stands for configured
- D stands for disabled
- T stands for temporarily disabled. It means that at the next power on or reset, the device is automatically reconfigured.

5. Enter 04 to deconfigure CPU1. You should see the status changed to D, disabled.

```
CPU1 Set | Status
00 CPU0 C | C
01 CPU0 D |
02 CPU0 T |
03 CPU1 C | D
04 CPU1 D |
05 CPU1 T |
```

```
Select(x:exit):
```

6. Now, once the system is rebooted, it runs without processor 1.
7. To enable CPU1, follow the same procedure as above, except choose a status C (03 in this example).
8. Exit the STAND-BY MENU, and continue booting the machine.

#### **Enabling/Disabling Processors through the Maintenance Menu**

1. Enter the MAINTENANCE MENU. Refer to the MAINTENANCE MENU section on page 2-21 for details.
2. Enter 8 to select the SET PARAMETERS menu, which is similar to the following:

#### SET PARAMETERS

```
0> POWER-ON COMMAND
1> VOLTAGE MARGINS
2> SET CONFIGURATION
3> PHONE NUMBERS
4> MISCELLANEOUS PARAMETERS
```

```
SELECT [x:exit]: 2
```

3. Enter 2 from the SET PARAMETERS menu to select the SET CONFIGURATION menu, which is similar to the following:

#### SET CONFIGURATION

```
0> CPU CARD
1> MEMORY CARD
2> BASIC MCA ADAPTERS
```

```
SELECT [x:exit]: 0
```

```
CPU CARD [0> CPU0| 1> CPU1 or x:exit]: 1
```

4. Enter 0 from this menu to select the CPU CARD option.

5. The CPU CARD screen appears and looks similar to the following:

CPU CARD - (CPU1)

```
PRESENT CONDITIONS: PR #0 -> Valid & Enabled
 PR #1 -> Valid & Enabled
```

```
COMMANDS: 0> ENABLE
 1> DISABLE
 2> TEMPORARY DISABLE
```

```
SELECT [x:exit]:
```

6. From this screen, you can disable or enable a particular processor on the selected CPU card. Option 0 enables a CPU; option 1 disables a CPU, and option 2 temporarily disables a CPU until the next reboot.

### Enabling/Disabling Processors through AIX

The processors can be disabled/enabled through AIX as well. This is done through the `cpu_state` command. Following is the command with various options:

- To list the processors and view their statuses, type `cpu_state -l`. The output should look something like this:

| Name  | Cpu | Status  | Location    |
|-------|-----|---------|-------------|
| proc0 | 0   | enabled | 00-0P-00-00 |
| proc1 | 1   | enabled | 00-0P-00-01 |
| proc2 | 2   | enabled | 00-0Q-00-00 |
| proc3 | 3   | enabled | 00-0Q-00-01 |

- To disable a CPU, CPU1 for example, type `cpu_state -d 1`. Look at the result with `cpu_state -l`:

| Name  | Cpu | Status   | Location    |
|-------|-----|----------|-------------|
| proc0 | 0   | enabled  | 00-0P-00-00 |
| proc1 | 1   | disabled | 00-0P-00-01 |
| proc2 | 2   | enabled  | 00-0Q-00-00 |
| proc3 | 3   | enabled  | 00-0Q-00-01 |

**Note:** This change does not take effect until after a reboot. After a reboot, the `cpu_state -l` command shows:

| Name  | Cpu | Status   | Location    |
|-------|-----|----------|-------------|
| proc0 | 0   | enabled  | 00-0P-00-00 |
| proc1 | -   | disabled | 00-0P-00-01 |
| proc2 | 1   | enabled  | 00-0Q-00-00 |
| proc3 | 2   | enabled  | 00-0Q-00-01 |

## Customizing SystemGuard For Your Needs

SystemGuard is controlled by several flags. The flags consist of Contract Flags, Operational Flags, Remote Maintenance Flags, and Test Flags.

### Remote Service Flag

This flag is disabled at the factory and must be enabled for remote service

### Operational Flags

The Operational Flags are the *BUMP Console* flag, the *AutoService IPL* flag, and *Set Mode to Normal When Booting* flag, which are enabled at the factory, however, they can be customized for your needs.

The *BUMP Console* flag enables the SystemGuard Console attached to Serial Port 1. If enabled, the console attached to Serial Port 1 is shared with the operating system. It is recommended that this flag always be enabled if a console is attached to Serial Port 1. This flag can be set from the Set Flags menu, MISCELLANEOUS PARAMETERS menu, or the Service Aids.

The *AutoService IPL* flag instructs SystemGuard to bypass the MAINTENANCE MENU when the system is booted in Service Mode. This enables the system to be booted quicker when installing the operating system and when loading the diagnostics. It is recommended that this flag always be enabled unless there is a need to use the MAINTENANCE MENU. This flag can be set from the Set Flags menu, MISCELLANEOUS PARAMETERS menu, or the Service Aids.

The *Set Mode to Normal When Booting* flag instructs SystemGuard to reset the Electronic Key to Normal when booting. It is recommended that this flag always be enabled. This flag can be set from the MISCELLANEOUS PARAMETERS menu or the Service Aids.

### Test Flags

The Test Flags are the *Boot Multiuser AIX in Service* flag, *Fast IPL* flag, *Extended Tests* flag, *PowerOn Tests in Loop Mode* flag, and *PowerOn Tests in Trace Mode* flag. They are disabled at the factory. They are used during testing and do not need to be customized.

### Remote Maintenance Flags

The Remote Maintenance Flags are the *Remote Authorization* flag, *Dial-Out Authorization* flag, and *Electronic Mode Switch from Service Line* flag. They are disabled at the factory, however, they can be customized for your needs.

The *Remote Authorization* flag enables the SystemGuard Console to use Serial Port 2 for a Remote Console and to report problems to a remote site. If enabled, Serial Port 2 is shared with the operating system. The setting of this flag depends if you are using remote maintenance or not. This flag can be set from the Set Flags menu, MISCELLANEOUS PARAMETERS menu, or the Service Aids.

The *Dial-Out Authorization* flag enables the SystemGuard Console to report problems that prevent the system from booting to be reported to a remote site via Serial Port 2. The setting of this flag depends if you are using remote maintenance or not and if you want problems that prevent the system from booting to be reported to a remote site. This flag can be set from the Set Flags menu, MISCELLANEOUS PARAMETERS menu, or the Service Aids. If this flag is enabled, a Service Center Dial-Out phone number must be set.

The *Electronic Mode Switch from Service Line* flag enables the Electronic Mode Switch to be controlled from the Service Console. The setting of this flag depends if you want the Electronic Mode Switch to be controlled from the Service Line or not. This flag can be set from the MISCELLANEOUS PARAMETERS menu or the Service Aids.

## **Phone Numbers**

If remote maintenance is used, SystemGuard requires several phone numbers to be entered. Additional information is provided in "Phone Numbers" on page 2-34.

## **Service Line Speed Parameters**

If remote maintenance is used, SystemGuard requires that the line speed be configured. The default is 1200 baud. The speed can be set by MISCELLANEOUS PARAMETERS menu or the Service Aids.

## **Modem Parameters**

If remote maintenance is used, SystemGuard may require that the Modem Parameters file be updated. This file can be set by the Service Aids.

## **Passwords**

Passwords are used to protect access to SystemGuard. The passwords are the Maintenance Password and the Customer Maintenance Password. No passwords are set at the factory. However, they can be customized for your needs. The Maintenance Password restricts access to basic features of the MAINTENANCE MENU. If you set the password you should provide it to your service personnel when requested. The Customer Maintenance Password restricts access to sensitive customer data. If you set the password you normally should not provide it to your service personnel. The passwords can be set from the MISCELLANEOUS PARAMETERS menu.

## Reloading the Flash EEPROM

Follow this procedure to load a new version of SystemGuard into the flash EEPROM. Only system administrators should perform this procedure.

### Prerequisites

To install a new version of the EEPROM firmware, you need either a firmware diskette containing a binary firmware image, or a file containing the firmware.

You can also update the firmware using a file containing a new firmware version.

### Updating the Flash EEPROM (using a firmware diskette)

If the system is not yet powered on, simply insert the firmware diskette in the drive, place the Mode Switch in the Service position, and then power on the system. The firmware diskette is identified by a special header which distinguishes it from diskettes containing other data. The existing firmware recognizes the special header and automatically loads the new firmware version.

If AIX is already up and running (the run-time phase), reloading the firmware requires more steps, because you first have to shut down the system, then reboot the machine as described in the preceding paragraph.

### Updating the Flash EEPROM (using a file)

An administrator with root authority can use the AIX **diag** command to update the EEPROM firmware using a file. Because this procedure reboots the machine after the update, the root user who performs this procedure should be the only logged user. If the system is not yet powered on, power on the system, and log in as the root user without letting other users log in. Then follow the steps to use when the system is up and running.

If AIX is already up and running (the run-time phase), perform the following steps:

1. Make sure that no other users are logged in to the system (log them out if necessary).
2. Make sure that you have root authority (use the **su** command if necessary).
3. Enter the `diag` command or load diagnostics when the Key Mode switch is in the Service position.
4. Select Service Aids.
5. Select the *BUMP Service Aids* option.
6. Select the *Flash Eprom Download* option.
7. Enter the full path name for the file containing the new flash EEPROM image. The image file installed with the operating system is located in the **/usr/lpp/devices.base** directory.
8. The system is automatically rebooted.

---

## Chapter 3. Maintenance Analysis Procedures (MAPs)

---

### MAP 1520: 7015 CPU Enclosure – Power MAP

**Note:** This is not a start of call MAP. Use this Power MAP only if you have been directed here from a MAP step in the *Diagnostic Information For Micro Channel Bus Systems*.

This procedure is used to locate power problems in the CPU Enclosure. If a problem is detected, this procedure helps you to isolate the problem to the failing field-replaceable unit (FRU).

**Note:** If you need more detailed information about the Power/Keylock Status Register (PKSR) bit definitions when using this map, see Error Logging, on page D-26. A detailed description of the system power states can be found in “Appendix E. System Power States.”

Observe the following safety notice during service procedures.

**Note:** For a translation of these notices, see the *System Unit Safety Information* manual.

#### **DANGER**

**An electrical outlet that is not correctly wired could place hazardous voltage on metal parts of the system or the products that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock.**

**Before installing or removing signal cables, ensure that the unit main switch is set to off or the power cable is unplugged for the system unit and all attached devices are unplugged.**

**When adding or removing any additional external devices to or from the system, ensure that the power cables for those devices are unplugged before the signal cables are connected. If possible, disconnect all power cables from the existing system before you add a device.**

**Use one hand, when possible, to connect or disconnect signal cables to prevent a possible shock from touching two surfaces with different electrical potentials.**

**During an electrical storm, do not connect cables for display stations, printers, telephones, or station protectors for communication lines.**

#### **CAUTION:**

**This product is equipped with a 3-wire power cable and plug for the user’s safety. Use this power cable in conjunction with a properly grounded electrical outlet to avoid electrical shock.**

**Attention:** This unit may have more than one power supply cord. To completely remove power, you must disconnect all power supply cords.

## Power Supply Status

If the system detects a power supply failure in the CPU enclosure, it turns the power off and displays service-request number (SRN) 409- $A_{xy}$  or 409- $B_{xy}$ , where  $xy$  is the hexadecimal value of the power status register and gives some information about the power fault, as described in this MAP.

---

### Step 1

You may be directed to this MAP for several reasons:

1. SRN 409- $A_{xy}$  or 409- $B_{xy}$  appears on the operator panel display: a power fault has been detected on some unit and the entire system has been powered off.

Go to Step 10.

2. The power button has been pressed (set to on) but does not stay on; no information remains displayed on the operator panel display.

Go to step 2.

3. SRN 409-098 appears on the operator panel display. This SRN indicates that the front access plate is not correctly closed or that the interlock switch on the front access plate is defective. Check if the top cover is correctly closed and, if it is not, close it properly, following the procedure described earlier in this guide; otherwise, call your service support person for assistance.

---

### Step 2

(from Step 1)

1. Set the power button on the CPU Enclosure to Off.
2. Unplug both power supply power cords from both power distribution bus (PDB) outlet power cords.
3. Set the key mode switch to the Service position.
4. Plug both power supply power cords into both PDB outlet power cords.

**Is anything (even a blinking cursor) displayed in the operator panel display?**

**NO**                      Go to Step 3.

**YES**                      Go to Step 8.

---

## Step 3

(from Step 2)

**Is the operator panel display illuminated?**

**NO**            Go to Step 4.

**YES**            Go to Step 7.

---

## Step 4

(from Step 3)

Check the LED on the System Interface Board. If the LED is on, it means that the power supply unit is supplying the Stand-By voltages.

**Is the System Interface Board LED on?**

**NO**            Go to Step 5.

**YES**            Go to Step 7.

---

## Step 5

(from Step 4)

1. Unplug both power supply power cords from both PDB outlet power cords.
2. Be sure that the external power cable to the CPU Enclosure has continuity.
3. Be sure that the external power cable is plugged into both the CPU Enclosure and the power outlet.
4. Be sure that the power outlet has been wired correctly with the correct voltage.
5. Check if the power cable is correctly connected to the Power Supply.

**Did you find a problem?**

**NO**            Go to Step 6.

**YES**            Correct the problem. Go to "Map 0410: Repair Checkout" in the *Diagnostic Information For Micro Channel Bus Systems*

---

## Step 6

(from Step 5)

**Note:** Either the Power Supply or the power distribution cable cluster is defective.

1. Unplug both power supply power cords from both PDB outlet power cords.
2. Replace the power supply. Refer to the "Power Supply or Cooling Unit" removal procedure on page 4-61.
3. Plug both power supply power cords to both PDB outlet power cords.

### Has the symptom changed?

**NO** Reinstall the original Power Supply.

Repeat Step 6, exchanging the power distribution cable cluster. Refer to "Power Distribution Cable Cluster" on page 4-79.

If you exchanged both Power Supply and power distribution cable cluster, call your service support person for assistance.

**YES** Go to "Map 0410: Repair Checkout" in the *Diagnostic Information For Micro Channel Bus Systems*.

---

## Step 7

(from Steps 3 and 4)

**Note:** Either the operator panel or the power distribution cable cluster unit is defective.

1. Set the power button on the CPU Enclosure to Off.
2. Unplug both power supply power cords from both PDB outlet power cords.
3. Exchange the operator panel. Refer to "Operator Panel" on page 4-20.
4. Set the key mode switch to the Service position.
5. Plug both power supply power cords to both PDB outlet power cords.

### Has the symptom changed?

**NO** Reinstall the original operator panel.

Repeat Step 7, exchanging the power distribution cable cluster. Refer to "Power Distribution Cable Cluster" on page 4-79.

If you exchanged both operator panel and power distribution cable cluster, call your service support person for assistance.

**YES** Go to "Map 0410: Repair Checkout" in the *Diagnostic Information For Micro Channel Bus Systems*.

---

## Step 8

(from Step 2)

**Note:** Stand-By should appear on the Operator Panel Display.

**Is Stand-By displayed on the Operator Panel Display?**

**NO** If an SRN is displayed, go to “MAP 0210: General Problem Resolution” in the *Diagnostic Information For Micro Channel Bus Systems*. If only a blinking cursor is displayed, record SRN 409-083 and go to “MAP 0210: General Problem Resolution” in the *Diagnostic Information For Micro Channel Bus Systems*.

**YES** Go to Step 9.

---

## Step 9

(from Step 8)

1. Set the power switch on the CPU Enclosure to On, with the key mode switch set to Service.
2. Find your symptom in the following table; then follow the instructions given in the Action column.

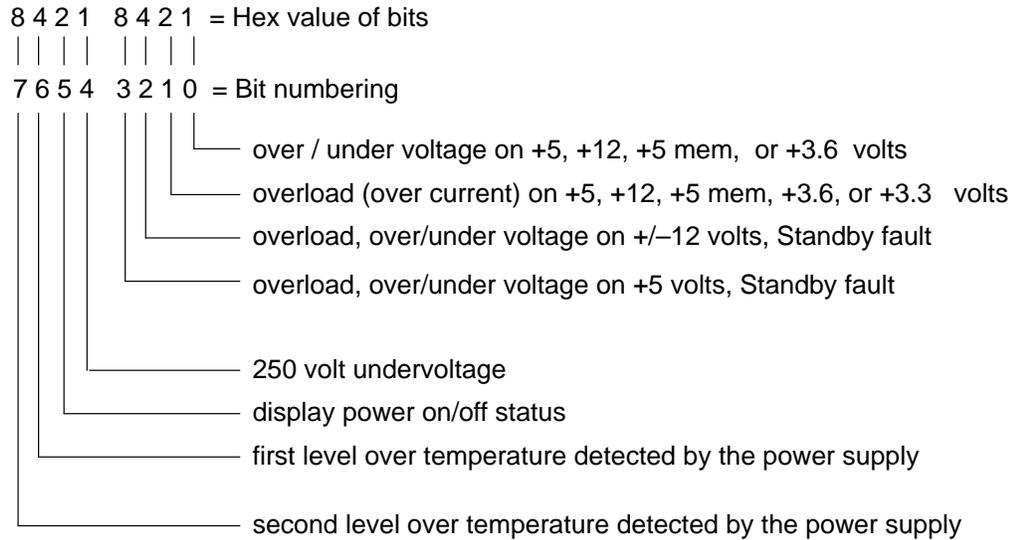
| Symptom                                                                                                                                                                                                                                                                                                                                                                                | Action                                                                                                                                                                                                                                                                                             |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The power light does not come on or comes on and does not stay on. An SRN is displayed on the operator panel display.<br><b>Note:</b> Some systems do not power on if the mode switch is in the Secure position. Ensure that the mode switch is in the Service position. If it is not, place the mode switch in the Service position, and start over at the beginning of this substep. | If SRN is 409-Axy or 409-Bxy, go to Step 10, otherwise find the SRN in the Service Request Number List in the <i>Diagnostic Information For Micro Channel Bus Systems</i> ; then do the listed action.                                                                                             |
| The power-on light comes and stays on.                                                                                                                                                                                                                                                                                                                                                 | <b>Note:</b> It is not a power supply error.<br><br>If there is an SRN displayed on the Operator Panel, Find the SRN in the Service Request Number List in the <i>Diagnostic Information For Micro Channel Bus Systems</i> ; then do the action listed.<br><br>If there is no SRN, Go to MAP 1540. |
| The power on light does not come on or comes on and does not stay on. Stand-By is displayed on in the Operator Panel Display.                                                                                                                                                                                                                                                          | The problem may be caused by a defective system interface board (80%), operator panel (10%), or power supply (10%). Use "MAP 0410" in <i>Diagnostic Information For Micro Channel Bus Systems</i> to check out the repair.                                                                         |
| Any other symptom.                                                                                                                                                                                                                                                                                                                                                                     | Call your service support person for assistance.                                                                                                                                                                                                                                                   |

---

## Step 10

(from Step 1 and 9)

The **xy** value in SRN 409-Axy or 409-Bxy is the hex value for the Power Status Register byte. Line 2 of the operator panel display identifies the unit that contains the error. The bits in the Power Status Register are defined as follows:



For example, 56 (0101 0110) represents bits 6, 4, 2, and 1. A zero indicates the active state.

**Is bit 6 or bit 7 a zero?**

**NO**            Go to Step 12.

**YES**            Go to Step 11.

---

## Step 11

(from Step 10)

An over temperature problem can be caused by an environmental problem (see Specifications in Chapter 1) or blocked air ducts. Check each of these items.

### Did you find the problem?

**NO** Go to Step 12.

**YES** Repair the problem. Go to "Map 0410: Repair Checkout" in the *Diagnostic Information For Micro Channel Bus Systems*.

---

## Step 12

(from Steps 10 and 11)

### Is bit 1 a zero?

**NO** If the SRN is 409-Axy, replace the main power supply. If the SRN is 409-Bxy, replace the backup power supply.

If the symptom did not change, reinstall the original power supply. Call your service support person for assistance.

Go to "Map 0410: Repair Checkout" in the *Diagnostic Information For Micro Channel Bus Systems*.

**YES** Go to "MAP 1540: CPU Enclosure - Minimum Configuration" on page 3-1540-1.

---

## MAP 1540: 7015 CPU Enclosure – Minimum Configuration

**Note:** This is not a start of call MAP. You should use this MAP only if you have been directed here from a MAP step in the *Diagnostic Information For Micro Channel Bus Systems*.

### Purpose of this MAP

This MAP is used to locate defective FRUs not found by normal diagnostics. For this procedure, diagnostics are run on a minimum-configured system. If a failure is detected on the minimum-configured system, the remaining FRUs are exchanged one at a time until the failing one is identified. If a failure is not detected, FRUs are added back until the failure occurs. The failure is then isolated to the failing FRU.

The MAP steps on the following pages instruct you to reduce the system to one or more of the following configurations:

#### Minimum Configurations for 7015 CPU Enclosures:

##### Notes:

Install the memory cards in a right-to-left sequence beginning with slot A, and then continuing with slots B, C, and D. Memory cards must be installed with no empty slots between installed memory cards.

Install the CPU cards in a right-to-left sequence beginning with slot P, and then continuing with slots Q, R, and S. CPU cards must be installed with no empty slots between installed CPU cards.

- Power distribution cable cluster, system planar (SP), I/O planars, I/O card (IOC), CPU module flex cables, I/O module flex cables, system interface board (SIB), operator panel , one CPU card (CPU), one memory card (MC), and power supply (PS).

If no failure is detected, the maintenance menu is displayed. Any other response means one of the remaining FRUs is failing.

- Power distribution cable cluster, system planar (SP), I/O planars, I/O card (IOC), CPU module flex cables, I/O module flex cables, system interface board (SIB), operator panel , one CPU card (CPU), one memory card (MC), power supply (PS), CD-ROM drive, SCSI adapter, and a system console attached to the S1 port.

If no failure is detected, the Diagnostic Operating Instructions frame is displayed when the diagnostics are loaded, and the system console is selected. Any other response means one of the remaining FRUs is failing.

---

## Step 1

(from Step 3, 6, 7, 9, 10, 17)

1. Ensure that the diagnostics and the operating system are shut down.
2. Turn the key mode switch to the Service Position.
3. Sometimes an SRN or Error Code will be logged in the BUMP Error Log. Before proceeding, check the BUMP Error Log for any SRNs or Error Codes. This is done as follows:
  - a. Power off
  - b. Enable the BUMP Console Flag and disable the Autoservice IPL flag. This is done as follows:
    - Press Enter
    - Type `sbb` and Press Enter
    - Select **Set Flags**

**Note:** Ensure BUMP console is enabled and Autoservice is disabled.

- Exit the Standby menu.
- c. Power on
  - d. When the **Maintenance Menu** appears, display the BUMP Error Log.
  - e. If an SRN is logged, record it and any location codes. Location Codes are separated by a blank. Perform the listed action. An SRN will be preceded by 888 103.
  - f. If no SRN is logged, check for an Error Code. If an Error Code is logged, record it and any location code. Location codes are separated by a blank. Perform the listed action. Look up the Error Code for possible FRUs.
  - g. If nothing is logged, proceed to the next substep.
4. Set the power button on the CPU Enclosure to Off.
  5. Unplug both PDB outlet power cords from both power supply power cords.
  6. Plug both PDB outlet power cords into both power supply power cords.
  7. Set the power button on the CPU Enclosure to On.
  8. Insert the diagnostic CD-ROM disc into the CD-ROM drive.
  9. Find the symptom in the following table that best matches the symptom on your system, and then perform the associated task.

**Note:** Before verifying any condition indicated in the following steps of this MAP (for example, a certain code displayed on the operator panel display), be sure that the system activity has stopped on that condition (same condition for more than 3 minutes except for 165, which may display up to ten minutes with no activity on the BUMP console).

| Information in operator panel display | Other conditions                                                                                                                                                 | Do this:                                                                                                                                                                                                                                                   |
|---------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Blank                                 | Diagnostic Operating Screen is displayed.                                                                                                                        | Go to Step 10.                                                                                                                                                                                                                                             |
| Blank                                 | Maintenance Menu is displayed.                                                                                                                                   | Select <code>System Boot</code> , then <code>Boot From List (CD-ROM)</code> . Wait for one of the other symptoms in this table to occur.                                                                                                                   |
| 888 flashing                          | With same SRN or a Crash Code                                                                                                                                    | Go to Step 2.                                                                                                                                                                                                                                              |
| 888 flashing                          | With new SRN                                                                                                                                                     | Record the SRN. Look up the SRN in the SRN Table and do the listed action.                                                                                                                                                                                 |
| 260                                   | Main Menu is Displayed                                                                                                                                           | Select <code>Exit Main Menu and Start System (Boot)</code> then press <code>Enter</code> .<br>When the <code>Starting System Boot</code> menu displays, press <code>Enter</code> .<br><b>Note:</b> Repeat this procedure each time these conditions occur. |
| 269 flashing                          |                                                                                                                                                                  | Go to Step 20.                                                                                                                                                                                                                                             |
| 269 solid                             |                                                                                                                                                                  | Go to Step 19.                                                                                                                                                                                                                                             |
| c31                                   | Instructions to select the system console are displayed on the screen.                                                                                           | Follow the instructions on the screen. Wait for one of the other symptoms in this table to occur.                                                                                                                                                          |
| 325 or less                           | Digits are on solid for more than 3 minutes, except for 165 which may display up to ten minutes with no activity on the BUMP console, and the Power light is on. | Go to Step 2.                                                                                                                                                                                                                                              |
| 326 or greater                        | Digits are on solid for more than 3 minutes, the Power light is on, and the diagnostic CD is loaded.                                                             | Go to Step 7.                                                                                                                                                                                                                                              |
| Any symptom not listed above.         |                                                                                                                                                                  | Go to Step 2.                                                                                                                                                                                                                                              |

---

## Step 2

(from Step 1)

1. Set the power button on the CPU Enclosure to Off.
2. Unplug both PDB outlet power cords from both power supply power cords.
3. Record the slot numbers of the adapters. Label and record the location of any cables attached to the adapters. Remove all the MCA adapters.
4. Record the slot numbers of the memory cards (MC), and then remove all the memory cards (MC), except the one in slot A.
5. Record the slot numbers of the CPU cards (CPU) and then remove all the CPU cards (CPU), except the one in slot P.
6. Plug both PDB outlet power cords into both power supply power cords.
7. Set the power button on the CPU Enclosure to On.
8. Wait for one of the following conditions to occur:
  - The Maintenance Menu is displayed.
  - The same three digit number is displayed in the operator panel display for longer than three minutes except for the number 165 which may display for up to ten minutes with no activity on the BUMP console.
  - The number 888 is flashing in the operator panel display.

### Is the maintenance menu displayed?

**NO** Go to Step 3.

**YES** If a CPU or memory card was removed, go to Step 4. Otherwise set the power button on the CPU Enclosure to Off and unplug both PDB outlet power cords from both power supply power cords. Do the following actions.

- Install the SCSI adapter.
- Connect the SCSI cable from the SCSI adapter to the SCSI connector located above the disk drive.
- Install the terminator on the connector DIFF. SCSI A on the system interface board (SIB).
- Go to Step 7, substep 5.

---

## Step 3

(from Step 2)

One of the FRUs remaining in the CPU Enclosure is defective.

To test each FRU, exchange the FRUs that have not already been exchanged in the following order:

1. I/O card (IOC)
2. CPU card (CPU)
3. Memory card (MC)
4. System planar (SP)
5. I/O planars
6. Power supply (PS)
7. CPU module flex cables
8. I/O module flex cables
9. System interface board (SIB)
10. Operator panel
11. Power distribution cable cluster

The system is working correctly if the maintenance menu is displayed. If this occurs, the last part you exchanged is defective.

1. Set the power button on the CPU Enclosure to Off.
2. Exchange one of the FRUs in the list.
3. Set the power button on the CPU Enclosure to On.
4. Wait for one of the following conditions to occur:
  - The Maintenance Menu is displayed.
  - The same three digit number is displayed in the operator panel display for longer than three minutes except for the number 165 which may display for up to ten minutes with no activity on the BUMP console.
  - The number 888 is flashing in the operator panel display.

### Is the maintenance menu displayed?

**NO** Repeat Step 3 until the defective FRU is identified or all the FRUs have been exchanged.

If the symptom did not change and all the FRUs have been exchanged, call your service support person for assistance.

If the symptom has changed, check for loose cards, cables, and obvious problems. If you do not find a problem, return to Step 1 in this MAP and follow the instructions for the new symptom.

**YES** The last FRU you exchanged is the defective one. Reinstall all the FRUs you have exchanged, except the last one and power on the system. Go to "Map 0410: Repair Checkout" in the *Diagnostic Information For Micro Channel Bus Systems*.

---

## Step 4

(from Step 2)

No failure was detected with this configuration.

1. Set the power button on the CPU Enclosure to Off.
2. Unplug both PDB outlet power cords from both power supply power cords.
3. Starting with the CPU cards, install one additional CPU card (CPU) or memory card (MC) (if any).
4. Plug both PDB outlet power cords into both power supply power cords.
5. Set the power button on the CPU Enclosure to On.
6. Wait for one of the following conditions to occur:
  - The Maintenance Menu is displayed.
  - The same three digit number is displayed in the operator panel display for longer than three minutes except for the number 165 which may display for up to ten minutes with no activity on the BUMP console.
  - The number 888 is flashing in the operator panel display.

### Is the maintenance menu displayed?

**NO** Go to Step 5.

**YES** Repeat Step 4 until all CPU cards (CPU) and all memory cards (MC) are installed and tested.

After all CPU cards (CPU) and all memory cards (MC) are installed and tested, set the power button on the CPU Enclosure to Off and unplug both PDB outlet power cords from both power supply power cords. Do the following actions.

- Install the SCSI adapter.
- Connect the SCSI cable from the SCSI adapter to the SCSI connector located above the disk drive.
- Install the terminator on the connector DIFF. SCSI A on the system interface board (SIB).
- Go to Step 7, substep 5.

---

## Step 5

(from Step 4)

The failure may be caused by the last CPU card (CPU) or memory card (MC) installed. To isolate the failing card, do the following:

1. Set the power button on the CPU Enclosure to Off.
2. Unplug both PDB outlet power cords from both power supply power cords.
3. Exchange the last card installed (CPU or memory).
4. Plug both PDB outlet power cords into both power supply power cords.
5. Set the power button on the CPU Enclosure to On.
6. Wait for one of the following conditions to occur:
  - The Maintenance Menu is displayed.
  - The same three digit number is displayed in the operator panel display for longer than three minutes except for the number 165 which may display for up to ten minutes with no activity on the BUMP console.
  - The number 888 is flashing in the operator panel display.

### Is the maintenance menu displayed?

**NO**                    Go to Step 6.

**YES**                    Go to "Map 0410: Repair Checkout" in the *Diagnostic Information For Micro Channel Bus Systems*.

---

## Step 6

(from Step 5)

One of the FRUs remaining in the CPU Enclosure is defective.

To test each FRU, exchange the FRUs in the following order:

- System planar (SP)
  - I/O card (IOC)
  - CPU cards (CPU)
  - Memory cards (MC)
  - I/O planars
  - CPU module flex cables
  - I/O module flex cables
1. Set the power button on the CPU Enclosure to Off.
  2. Unplug both PDB outlet power cords from both power supply power cords.
  3. Exchange one of the FRUs in the list.
  4. Plug both PDB outlet power cords into both power supply power cords.
  5. Set the power button on the CPU Enclosure to On.
  6. Wait for one of the following conditions to occur:
    - The Maintenance Menu is displayed.
    - The same three digit number is displayed in the operator panel display for longer than three minutes except for the number 165 which may display for up to ten minutes with no activity on the BUMP console.
    - The number 888 is flashing in the operator panel display.

### Is the maintenance menu displayed?

**NO** Reinstall the original FRU.

Repeat Step 6 until the defective FRU is identified or all the FRUs have been exchanged.

If the symptom did not change and all the FRUs have been exchanged, call your service support person for assistance.

If the symptom has changed, check for loose cards, cables, and obvious problems. If you do not find a problem, return to Step 1 in this MAP, and follow the instructions for the new symptom.

**YES** Go to "Map 0410: Repair Checkout" in the *Diagnostic Information For Micro Channel Bus Systems*.

---

## Step 7

(from Steps 1, 2, and 4)

1. Set the power button on the CPU Enclosure to Off.
2. Unplug both PDB outlet power cords from both power supply power cords.
3. Record the slot numbers of the adapters. Label and record the location of any cables attached to the adapters.
4. Remove all the MCA adapters except the SCSI adapter attached to the CD-ROM drive.
5. Remove all SCSI devices except the CD-ROM drive that is attached to the SCSI adapter that you left in the system.
6. Plug both PDB outlet power cords into both power supply power cords.
7. Set the power button on the CPU Enclosure to On.
8. If the Maintenance Menu is displayed, select `System Boot`, then `Boot From List`.
9. If the system stops with a `260` displayed, and the Main Menu is displayed, Select `Exit Main Menu` and `Start System (Boot)` and press Enter. When the "Starting System Boot" menu displays, press Enter. Repeat this procedure each time these conditions occur.
10. Wait for one of the following conditions to occur:
  - The system stops with `c31` displayed in the operator panel display.
  - The same three digit number is displayed in the operator panel display for longer than three minutes except for the number `165` which may display for up to ten minutes with no activity on the BUMP console.
  - The number `888` is flashing in the operator panel display.

### Is `c31` displayed in the operator panel display?

**NO**

One of the FRUs remaining in the CPU Enclosure is defective.

In the following order, exchange the FRUs that have not been exchanged:

1. SCSI adapter
2. CD-ROM drive
3. SCSI cable
4. I/O card (IOC)
5. I/O planars
6. CPU module flex cables
7. I/O module flex cables
8. System planar (SP)
9. System interface board (SIB)
10. Power distribution cable cluster
11. CPU cards (CPU) (one at a time)
12. Memory cards (MC) (one at a time)
13. Power supply (PS)

Repeat Step 7 until the defective FRU is identified or all the FRUs have been exchanged.

If the symptom did not change and all the FRUs have been exchanged call your service support person for assistance.

If the symptom has changed check for loose cards, cables, and obvious problems. If you do not find a problem return to Step 1 in this MAP and follow the instructions for the new symptom.

**YES**

Go to Step 8.

---

## Step 8

(from Steps 7 and 17)

The system is working correctly with this configuration. One of the adapters or devices that you removed is probably defective.

1. Set the power button on the CPU Enclosure to Off.
2. Unplug both PDB outlet power cords from both power supply power cords.
3. Install one adapter, and connect any cables and devices that were attached to it.
4. Plug both PDB outlet power cords into both power supply power cords.
5. Set the power button on the CPU Enclosure to On.
6. Insert the diagnostic CD-ROM disc into the CD-ROM drive (if not already inserted).
7. If the Maintenance Menu is displayed, select `System Boot`, then `Boot From List`.
8. If the system stops with a `260` displayed, and the Main Menu is displayed, Select `Exit Main Menu and Start System (Boot)` and press Enter. When the "Starting System Boot" menu displays, press Enter. Repeat this procedure each time these conditions occur.
9. Wait for one of the following conditions to occur:
  - The system stops with `c31` displayed in the operator panel display.
  - The same three digit number is displayed in the operator panel display for longer than three minutes except for the number `165` which may display for up to ten minutes with no activity on the BUMP console.
  - The number `888` is flashing in the operator panel display.

**Is `c31` displayed in the operator panel display?**

**NO**                    Go to Step 9.

**YES**                    Repeat Step 8 until all of the adapters are installed.

Go to "Map 0410: Repair Checkout" in the *Diagnostic Information For Micro Channel Bus Systems*.

---

## Step 9

(from Step 8)

1. Set the power button on the CPU Enclosure to Off.
2. Unplug both PDB outlet power cords from both power supply power cords.
3. Starting with the last installed adapter, disconnect one attached device and cable .
4. Insert the diagnostic CD-ROM disc into the CD-ROM drive.
5. Plug both PDB outlet power cords into both power supply power cords.
6. Set the power button on the CPU enclosure to On.
7. If the Maintenance Menu is displayed, select `System Boot`, then `Boot From List`.
8. If the system stops with a `260` displayed, and the Main Menu is displayed, Select `Exit Main Menu` and `Start System (Boot)` and press Enter. When the “Starting System Boot” menu displays, press Enter. Repeat this procedure each time these conditions occur.
9. Wait for one of the following conditions to occur:
  - The system stops with `c31` displayed in the operator panel display.
  - The same three digit number is displayed in the operator panel display for longer than three minutes except for the number `165` which may display for up to ten minutes with no activity on the BUMP console.
  - The number `888` is flashing in the operator panel display.

### Is `c31` displayed in the operator panel display?

**NO**

Repeat Step 9 until the defective device or cable is identified or all the devices and cables have been disconnected.

If all the devices and cables have been removed then, one of the FRUs remaining in the CPU Enclosure is defective.

To test each FRU, exchange the FRUs in the following order:

1. Adapter (last one installed)
2. I/O card (IOC)
3. I/O planars
4. CPU module flex cables
5. I/O module flex cables
6. System interface board (SIB)
7. Power supply (PS)

If the symptom did not change and all the FRUs have been exchanged, call your service support person for assistance.

If the symptom has changed, check for loose cards, cables, and obvious problems. If you do not find a problem, return to Step 1 in this MAP, and follow the instructions for the new symptom.

**YES**

The last device or cable you disconnected is defective.

Exchange the defective device or cable.

Go to “Map 0410: Repair Checkout” in the *Diagnostic Information For Micro Channel Bus Systems*.

---

## Step 10

(from Step 1)

1. Set the power button on the CPU Enclosure to Off.
2. Unplug both PDB outlet power cords from both power supply power cords.
3. Record the slot numbers of the adapters. Label and record the location of any cables attached to the adapters. Remove all the MCA adapters except the one that is attached to the CD-ROM drive that you will IPL from and the one that your console is attached to.

**Note:** If a system console is connected to the CPU Enclosure, do not disconnect it.

If a display attached to a display adapter will be the system console, do not disconnect the keyboard.

4. Plug both PDB outlet power cords into both power supply power cords.
5. Set the power button on the CPU Enclosure to On.
6. If the Maintenance Menu is displayed, select `System Boot`, then `Boot From List`.
7. If the system stops with a `260` displayed, and the Main Menu is displayed, Select `Exit Main Menu` and `Start System (Boot)` and press Enter. When the "Starting System Boot" menu displays, press Enter. Repeat this procedure each time these conditions occur.
8. Wait for one of the following conditions to occur:
  - The system stops with `c31` displayed in the operator panel display.
  - The system stops with a flashing or solid `269` displayed in the operator panel display.
  - The same three digit number is displayed in the operator panel display for longer than three minutes except for the number `165` which may display for up to ten minutes with no activity on the BUMP console.
  - The number `888` is flashing in the operator panel display.

### Is `c31` displayed in the operator panel display?

**NO** The symptom has changed. Check for loose cards, cables, and obvious problems. If you do not find a problem, return to Step 1 in this MAP, and follow the instructions for the new symptom.

**YES** Go to Step 11.

---

## Step 11

(from Step 10)

1. Follow the instructions on the display to select your console.
2. When the Diagnostics Operating Instructions display, press the Enter key.
3. If the terminal type has not been defined or you are IPLing from CD-ROM, you must use the Initialize Terminal option on the FUNCTION SELECTION menu to initialize the AIX operating system environment before you can continue with the diagnostics. This is a separate and different operation than selecting the console display.
4. Select Advanced Diagnostics Routines.
5. When the DIAGNOSTIC MODE SELECTION menu displays, select System Verification.
6. Run the diagnostics for each of the adapters and devices on the test list.

### Did you get an SRN?

- NO** One of the adapters or devices you removed is causing the problem. Install the adapters and devices one at a time to determine the failing adapter or device. Test the system after each adapter or device is installed. Go to "Map 0410: Repair Checkout" in the *Diagnostic Information For Micro Channel Bus Systems*.
- YES** Go to Step 12.

---

## Step 12

(from Step 11)

Look at the FRU part numbers associated with the SRN.

### Have you exchanged all the FRUs that correspond to the failing function codes?

- NO** Exchange the FRU with the highest failure percentage that has not been changed.
- Repeat Step 12 until all the FRUs associated with the SRN have been replaced or diagnostics run with no trouble found. Run the diagnostics after each FRU is exchanged.
- If the diagnostics run without error, go to "Map 0410: Repair Checkout" in the *Diagnostic Information For Micro Channel Bus Systems*.
- YES** One of the FRUs remaining in the CPU Enclosure is defective.
- In the following order, exchange the FRUs that have not been exchanged:
1. I/O card (IOC)
  2. I/O planars (MCA planars)
  3. CPU module flex cables
  4. I/O module flex cables
  5. System planar (SP)
  6. System interface board (SIB)
- Test the FRU by running the failing test.
- If the symptom did not change and all the FRUs have been exchanged, call your service support person for assistance.
- If the symptom has changed, check for loose cards, cables, and obvious problems. If you do not find a problem, return to Step 1 in this MAP and follow the instructions for the new symptom.

---

## Step 13

(from Steps 19, 20, 21, 22)

1. Set the power button on the CPU Enclosure to Off.
2. Unplug both PDB outlet power cords from both power supply power cords.
3. Record the location of all the internal SCSI devices attached to the SCSI bus you are attempting to IPL from.
4. If there are any external SCSI devices attached to the SIB bus you are attempting to IPL from, then unplug the cable and insert a terminator.
5. Remove all SCSI devices except the CD-ROM drive.
6. Plug both PDB outlet power cords into both power supply power cords.
7. Set the power button on the CPU Enclosure to On.
8. If the Maintenance Menu is displayed, select `System Boot`, `Boot From List`.
9. If the system stops with a `260` displayed, and the Main Menu is displayed, Select `Exit Main Menu and Start System (Boot)` and press Enter. When the "Starting System Boot" menu displays, press Enter. Repeat this procedure each time these conditions occur.
10. Wait for one of the following conditions to occur:
  - The system stops with a flashing or solid `269` displayed in the operator panel display.
  - The system stops with `c31` displayed in the operator panel display.

### Is `c31` displayed in the operator panel display?

- NO**                      One of the FRUs remaining in the CPU Enclosure is defective. Go to Step 14.
- YES**                      Go to Step 18.

---

## Step 14

(from Step 13)

This problem can be caused by:

- the CD-ROM pulling the bus down or opening the positive temperature coefficient (PTC) on the SCSI adapter
- a defective SCSI adapter
- a defective terminator
- a defective SIB
- a defective cable

If AIX is installed, the CD-ROM Drive can be eliminated by removing it, installing the disk that contains AIX, and trying to boot diagnostics from disk.

### Is AIX installed?

- |            |                                                                             |
|------------|-----------------------------------------------------------------------------|
| <b>NO</b>  | One of the FRUs remaining in the CPU Enclosure is defective. Go to Step 16. |
| <b>YES</b> | Go to Step 15.                                                              |

---

## Step 15

(from Step 14)

1. Set the power button on the CPU Enclosure to Off.
2. Unplug both PDB outlet power cords from both power supply power cords.
3. Remove the CD-ROM drive.
4. Install the disk required to boot diagnostics. This is normally hdisk0.
5. Plug both PDB outlet power cords into both power supply power cords.
6. Set the power button on the CPU Enclosure to On.
7. If the Maintenance Menu is displayed, select `System Boot`, then `Boot From List`.
8. If the system stops with a 260 displayed, and the Main Menu is displayed, Select `Exit Main Menu and Start System (Boot)` and press Enter. When the “Starting System Boot” menu displays, press Enter. Repeat this procedure each time these conditions occur.
9. Wait for one of the following conditions to occur:
  - The system stops with a flashing or solid 269 displayed in the operator panel display.
  - The system stops with c31 displayed in the operator panel display.
  - The Diagnostic Operating Instructions display.

### Is c31 displayed in the operator panel display or are the Diagnostic Operating Instructions displayed?

- |            |                                                                                                                                  |
|------------|----------------------------------------------------------------------------------------------------------------------------------|
| <b>NO</b>  | One of the FRUs remaining in the CPU Enclosure is defective. Go to Step 16.                                                      |
| <b>YES</b> | Replace the CD-ROM Drive. Go to “Map 0410: Repair Checkout” in the <i>Diagnostic Information For Micro Channel Bus Systems</i> . |

---

## Step 16

(from Steps 14 and 15)

In the following order, exchange the FRUs that have not been exchanged:

1. SCSI adapter
2. CD-ROM drive (if still in the system).
3. System interface board (SIB)
4. SCSI cable

Test each FRU by trying to load diagnostics from CD-ROM if installed or disk.

### Were you able to identify the failing FRU?

- NO** One of the FRUs remaining in the CPU Enclosure is defective. Go to Step 17.
- YES** Replace the failing FRU. Go to "Map 0410: Repair Checkout" in the *Diagnostic Information For Micro Channel Bus Systems*.

---

## Step 17

(from Step 16)

1. Set the power button on the CPU Enclosure to Off.
2. Unplug both PDB outlet power cords from both power supply power cords.
3. Record the slot numbers of the adapters. Label and record the location of any cables attached to the adapters.

Remove all the adapters from the I/O module except the SCSI.

4. Remove all devices except the CD-ROM drive (if the CD-ROM drive is not installed, install it).
5. Plug both PDB outlet power cords into both power supply power cords.
6. Set the power button on the CPU Enclosure to On.
7. Be sure that the diagnostic CD-ROM is inserted into the CD-ROM drive.
8. If the Maintenance Menu is displayed, select `System Boot`, then `Boot From List`.
9. If the system stops with a `260` displayed, and the Main Menu is displayed, Select `Exit Main Menu and Start System (Boot)` and press Enter. When the "Starting System Boot" menu displays, press Enter. Repeat this procedure each time these conditions occur.
10. Wait for one of the following conditions to occur:
  - The system stops with a flashing or solid `269` displayed in the operator panel display.
  - The system stops with `c31` displayed in the operator panel display.

### Is `c31` displayed in the operator panel display?

**NO**

One of the FRUs remaining in the CPU Enclosure is defective.

In the following order, exchange the FRUs that have not been exchanged:

1. I/O card (IOC)
2. I/O planars (MCA planars)
3. CPU module flex cables
4. I/O module flex cables
5. System planar (SP)
6. System interface board (SIB)

Repeat Step 17 until the defective FRU is identified or all the FRUs have been exchanged.

If the symptom did not change and all the FRUs have been exchanged, call your service support person for assistance.

If the symptom has changed, check for loose cards, cables, and obvious problems. If you do not find a problem, return to Step 1 in this MAP and follow the instructions for the new symptom.

**YES**

Go to Step 8.

---

## Step 18

(from Step 13)

The system is working correctly with this configuration. One of the devices that you removed is probably defective.

1. Set the power button on the CPU Enclosure to Off.
2. Unplug both PDB outlet power cords from both power supply power cords.
3. Install a device.
4. Plug both PDB outlet power cords into both power supply power cords.
5. Set the power button on the CPU Enclosure to On.
6. If the Maintenance Menu is displayed, select `System Boot`, `Boot From List`.
7. If the system stops with a `260` displayed, and the Main Menu is displayed, Select `Exit Main Menu` and `Start System (Boot)` and press Enter. When the "Starting System Boot" menu displays, press Enter. Repeat this procedure each time these conditions occur.
8. Wait for one of the following conditions to occur:
  - The system stops with a flashing or solid `269` displayed in the operator panel display.
  - The system stops with `c31` displayed in the operator panel display.

### Is `c31` displayed in the operator panel display?

- NO**                    The last device inserted is defective.
- Exchange the defective device or cable.
- Go to "Map 0410: Repair Checkout" in the *Diagnostic Information For Micro Channel Bus Systems*.
- YES**                    Repeat Step 18 until all of the devices are installed.

---

## Step 19

(from Step 1)

This problem can be caused by:

- a SCSI device pulling the bus down or opening the PTC on the SCSI adapter.
- a defective SCSI adapter
- a defective terminator
- a defective system interface board (SIB)
- a defective cable

The most likely problem is the SCSI adapter or a device pulling the bus down or opening the PTC. Always allow the system to cool for 5 minutes between power cycles so that the PTC can reset.

1. Set the power button on the CPU Enclosure to Off.
2. Unplug both PDB outlet power cords from both power supply power cords.
3. Remove all SCSI Adapters except the one you are trying to boot from.
4. Plug both PDB outlet power cords into both power supply power cords.
5. Set the power button on the CPU Enclosure to On.
6. Insert the diagnostic CD-ROM into the CD-ROM drive.
7. If the Maintenance Menu is displayed, select *System Boot*, *Boot From List*.
8. Wait for one of the following conditions to occur:
  - The system stops with a flashing or solid 269 displayed in the operator panel display.
  - The DIAGNOSTIC OPERATING INSTRUCTIONS screen is displayed.
9. If the system stops with a c31 in the operator panel display, follow the instructions on the display to select your console.

### Is a flashing or solid 269 displayed in the operator panel display?

**NO** If the DIAGNOSTIC OPERATING INSTRUCTIONS screen is displayed, the system is working correctly. It means that one of the SCSI adapters you removed was defective.

Reinstall the SCSI adapters one by one until you find the defective one.

Go to “Map 0410: Repair Checkout” in the *Diagnostic Information For Micro Channel Bus Systems*.

If you have a different symptom go to Step 1 and follow the procedure for the new symptom.

**YES** Go to Step 13.

---

## Step 20

(from Step 1)

A message should be displayed with the flashing 269. Find the message in the table and do the listed action.

| Message Displayed | Perform the Listed Action(s) |
|-------------------|------------------------------|
| 269 - NO BOOTABLE | Go to Step 21.               |
| 269 - NO DEVICE   | Go to Step 13.               |
| 269 - NO DEV TYPE | Go to Step 22.               |

---

## Step 21

(from Step 20)

In the following order, exchange the FRUs that have not been exchanged.

1. SCSI adapter
2. I/O Planar
3. I/O Card
4. Flex Cable

After each exchange try loading diagnostics from the CD-ROM to determine if the FRU fixed the problem.

### Were you able to identify the failing FRU?

**NO** Go to Step 13.

**YES** Replace the failing FRU. Go to "Map 0410: Repair Checkout" in the *Diagnostic Information For Micro Channel Bus Systems*.

---

## Step 22

(from Step 20)

In the following order, exchange the FRUs that have not been exchanged.

1. CD-ROM drive

After each exchange try loading diagnostics from the CD-ROM to determine if the FRU fixed the problem.

### Were you able to identify the failing FRU?

**NO** Go to Step 13.

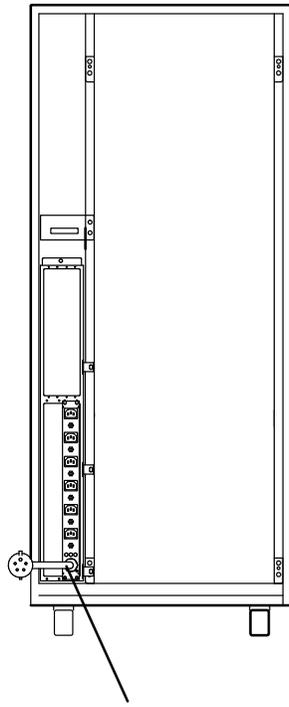
**YES** Replace the failing FRU. Go to "Map 0410: Repair Checkout" in the *Diagnostic Information For Micro Channel Bus Systems*.

# Chapter 4. Removal and Replacement Procedures

This chapter contains information about removing and replacing various field replaceable units (FRUs) and parts.

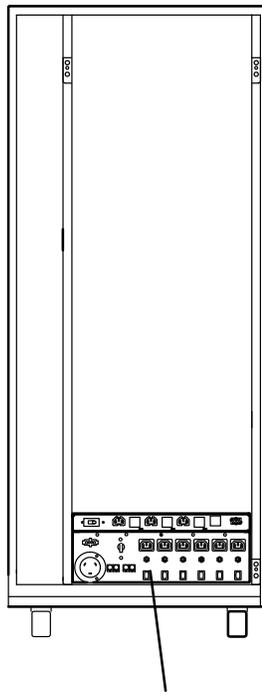
The following illustration shows the three types of power distribution systems available in the Model R00 rack. Use the correct power-on and power-off procedure for the power distribution system in your rack.

**Rear View of AC Rack with Power Distribution Bus and Cluster Power Control**



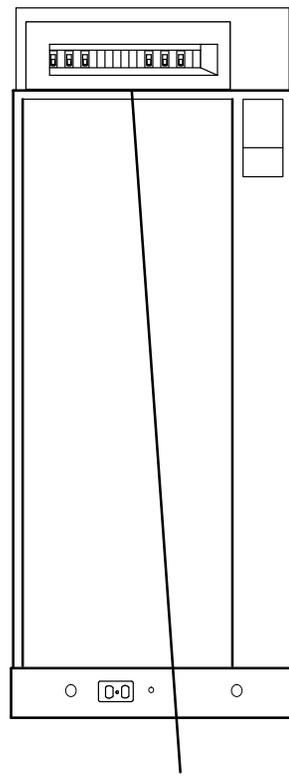
**Power Distribution Bus**

**Rear View of AC Rack with Power Distribution Unit and Battery Backup Unit**



**Power Distribution Unit**

**Front View of DC Rack with Power Distribution Panel**



**Power Distribution Panel (Only in DC Rack)**

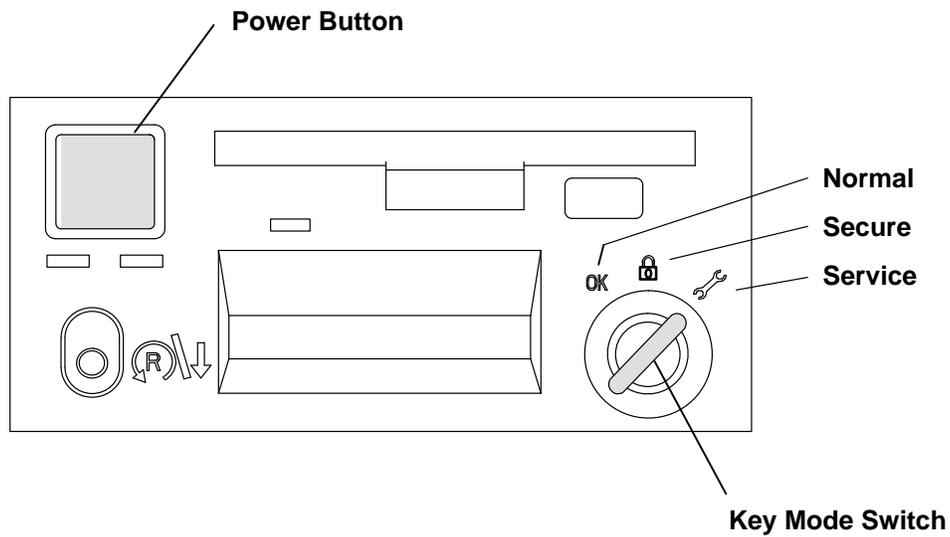
---

## Power-Off Procedure with a Power Distribution Bus

**Attention:** Use the appropriate **shutdown** command before you stop the system unit; failure to do so may result in the loss of data. See your operating system documentation for information about the **shutdown** command.

1. Set the key mode switch to the Service position.
2. Set the Power button to off (button pushed and released into the out position).

### Operator Panel



**Note:** For a translation of this notice, see the *System Unit Safety Information* manual.

**DANGER**

An electrical outlet that is not correctly wired could place hazardous voltage on metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock.

Before installing or removing any additional devices to or from the system, ensure that the power cables for those devices are unplugged before the signal cables are connected. If possible, disconnect all power cables from the existing system before you add a device.

Use one hand, when possible, to connect or disconnect signal cables to prevent a possible shock from touching two surfaces with different electrical potentials.

During an electrical storm, do not connect cables for display stations, printers, telephones, or station protectors for communications lines.

**Attention:** This unit may have more than one power supply cord. To completely remove power, you must disconnect all power supply cords.

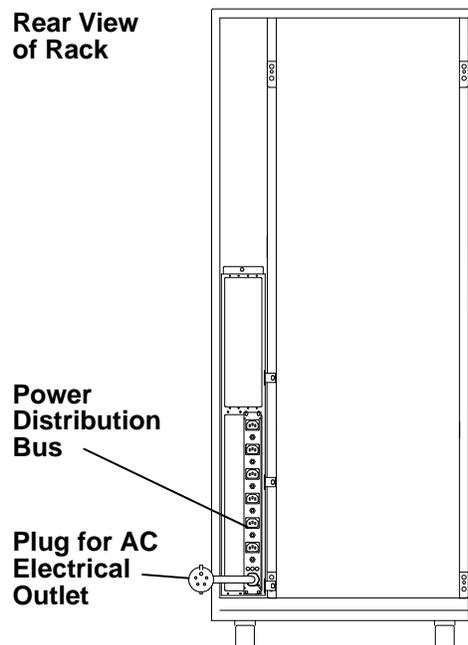
**Note:** Because many external devices can be connected to the system unit, it may be impractical for you to switch off power to all the devices and unplug their power cords.

3. Switch off power to all external devices attached to the system unit, and then unplug the device power cords from the electrical outlets.
4. Open the rear door of the rack.

**Note:** If you are servicing the system with signal cables and power cords connected to the system, do not unplug the power cord from the power distribution bus.

5. If you are servicing the system and signal cables, and power cords are *not* connected to the system, unplug the PDB power cord from the electrical outlet.

**Rear View  
of Rack**



---

## Power-On Procedure with a Power Distribution Bus

1. Set the key mode switch to the Service position.

**Note:** For a translation of this notice, see the *System Unit Safety Information* manual.

### DANGER

An electrical outlet that is not correctly wired could place hazardous voltage on metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock.

Before installing or removing any additional devices to or from the system, ensure that the power cables for those devices are unplugged before the signal cables are connected. If possible, disconnect all power cables from the existing system before you add a device.

Use one hand, when possible, to connect or disconnect signal cables to prevent a possible shock from touching two surfaces with different electrical potentials.

During an electrical storm, do not connect cables for display stations, printers, telephones, or station protectors for communications lines.

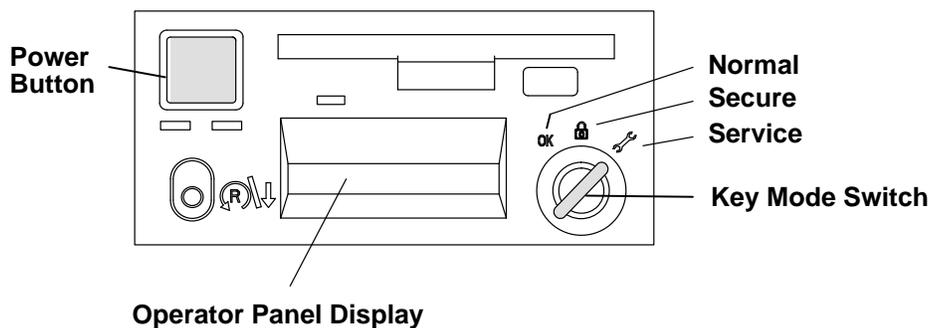
### CAUTION:

This product is equipped with a 3-wire power cable and plug for the user's safety. Use this power cable in conjunction with a properly grounded electrical outlet to avoid electrical shock.

2. Plug the system unit power cord into the electrical outlet.
3. Close the back door of the system unit.
4. Plug all external device power cords into the electrical outlets.
5. Switch on power to all external devices attached to the system unit.

**Note:** Before setting the Power button to on, wait for the operator panel display to display the word "Stand-By."

6. Set the Power button to on (button pushed in).



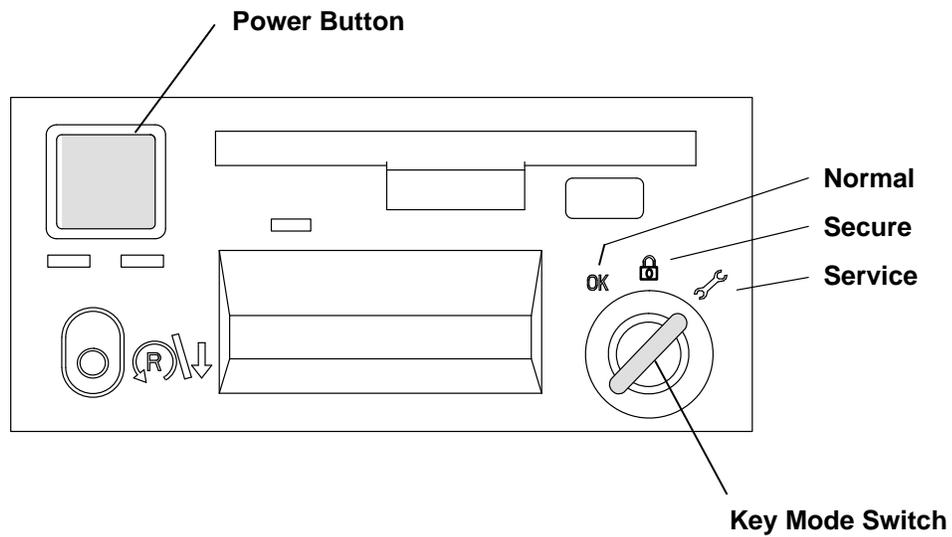
---

## Power-Off Procedure with a Power Distribution Unit

**Attention:** Use the appropriate **shutdown** command before you stop the system unit; failure to do so may result in the loss of data. See your operating system documentation for information about the **shutdown** command.

1. Set the key mode switch to the Service position.
2. Set the Power button to off (button pushed in and released in the out position).

### Operator Panel



**Note:** For a translation of this notice, see the *System Unit Safety Information* manual.

**DANGER**

An electrical outlet that is not correctly wired could place hazardous voltage on metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock.

Before installing or removing any additional devices to or from the system, ensure that the power cables for those devices are unplugged before the signal cables are connected. If possible, disconnect all power cables from the existing system before you add a device.

Use one hand, when possible, to connect or disconnect signal cables to prevent a possible shock from touching two surfaces with different electrical potentials.

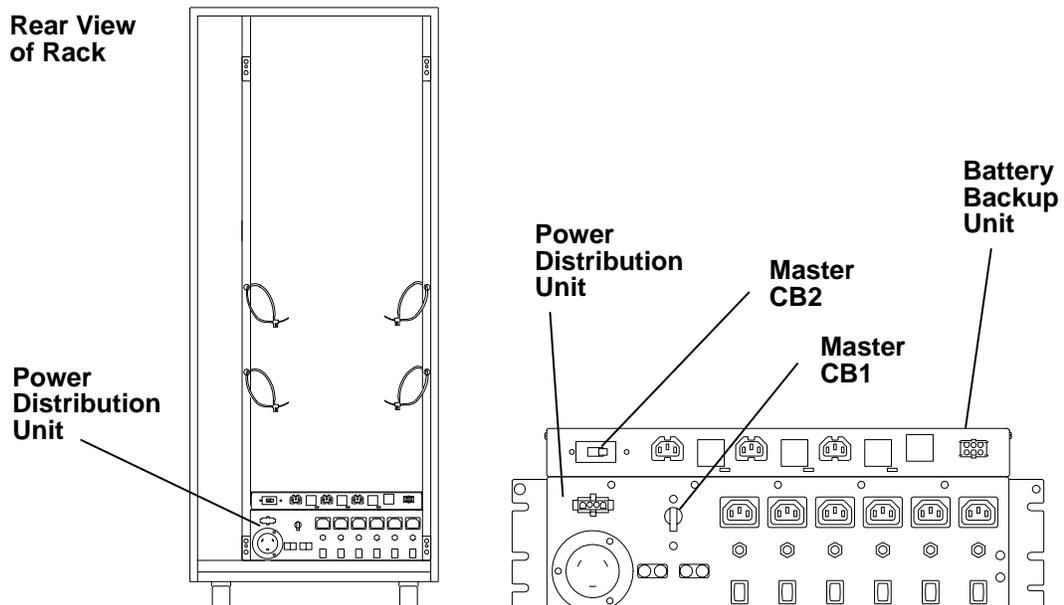
During an electrical storm, do not connect cables for display stations, printers, telephones, or station protectors for communications lines.

**Attention:** This unit may have more than one power supply cord. To completely remove power, you must disconnect all power supply cords.

3. Switch off power to all external devices attached to the system unit, and then unplug the device power cords from the electrical outlets.

**Note:** Because many external devices can be connected to the system unit, it may be impractical for you to switch off power to all the devices and unplug their power cords.

4. Open the back door of the rack.
5. Set the Master CB1 circuit breaker to Off.
6. If the battery backup unit is installed, set the Master CB2 circuit breaker to Off.
7. Unless you are servicing the system while signal cables or power cords are connected to external devices, unplug the system unit power cord from the electrical outlet.

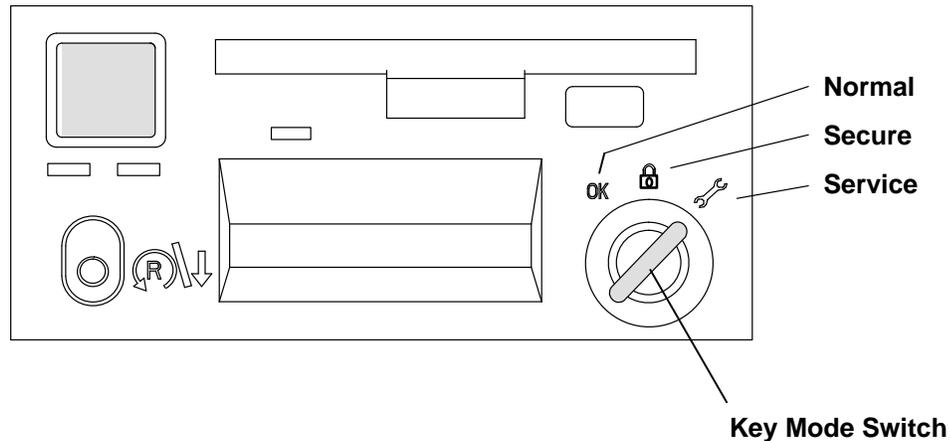


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## Power-On Procedure with a Power Distribution Unit

1. Set the key mode switch to the Service position.

### Operator Panel



**Note:** For a translation of this notice, see the *System Unit Safety Information* manual.

### DANGER

An electrical outlet that is not correctly wired could place hazardous voltage on metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock.

Before installing or removing any additional devices to or from the system, ensure that the power cables for those devices are unplugged before the signal cables are connected. If possible, disconnect all power cables from the existing system before you add a device.

Use one hand, when possible, to connect or disconnect signal cables to prevent a possible shock from touching two surfaces with different electrical potentials.

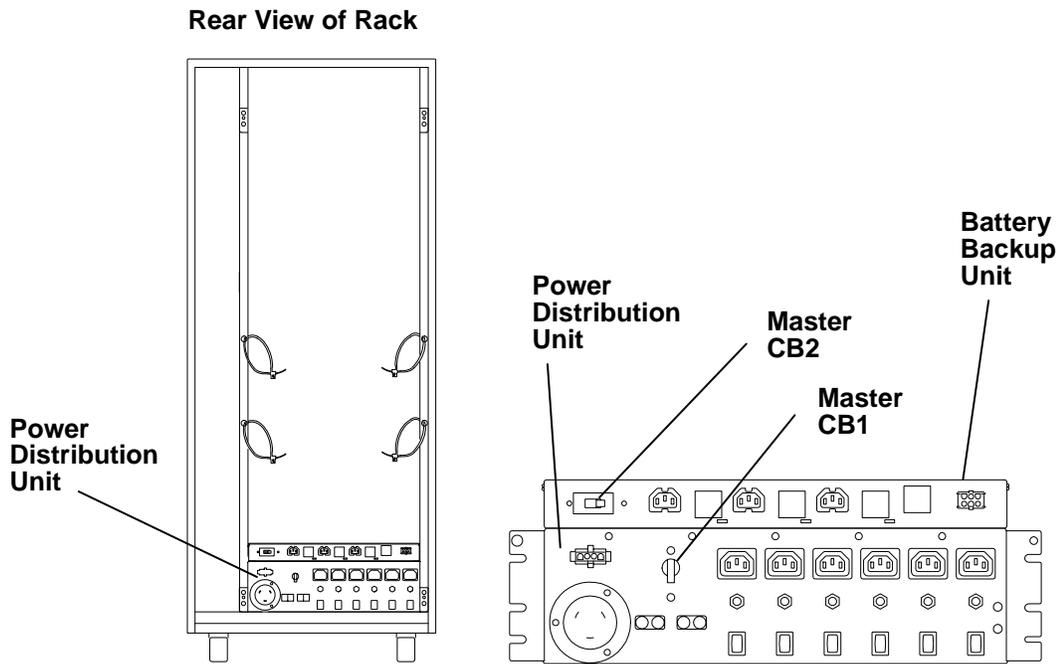
During an electrical storm, do not connect cables for display stations, printers, telephones, or station protectors for communications lines.

### CAUTION:

This product is equipped with a 3-wire power cable and plug for the user's safety. Use this power cable in conjunction with a properly grounded electrical outlet to avoid electrical shock.

2. Plug the system unit power cord into the electrical outlet.

3. If the battery backup unit is installed, set the Master CB2 circuit breaker to On.
4. Set the Master CB1 circuit breaker to On.

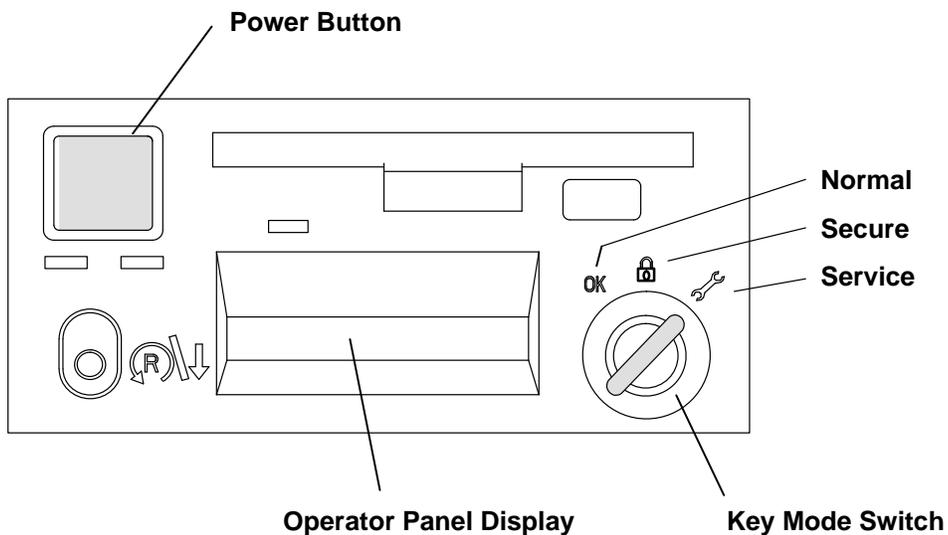


5. Close the back door of the system unit.
6. Plug all external device power cords into the electrical outlets.
7. Switch on power to all external devices attached to the system unit.

**Note:** Before setting the Power button to on, wait for the operator panel display to display the word “Stand-By.”

8. Set the Power button to on (button pushed in).

#### Operator Panel



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## Power-Off Procedure with a Power Distribution Panel

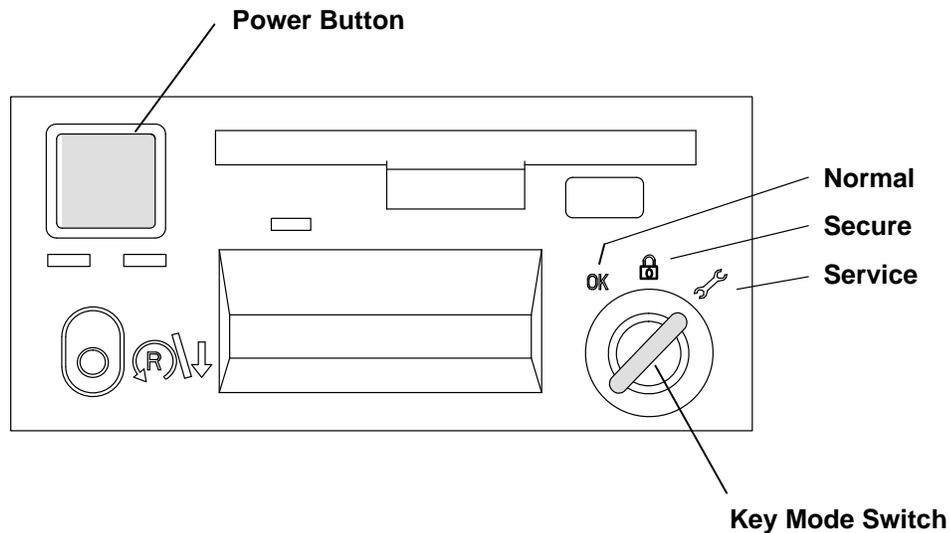
**Note:** Notify the customer that you are going to switch off power to the attached 7015 CPU-Media Enclosure and to all of the disk drive drawers in the rack. Notify the customer that other attached systems might be affected by this procedure.

**Note:** Before stopping the system unit, you must first shut down the operating system to prevent losing data.

**Attention:** Use the appropriate **shutdown** command before you stop the system unit; failure to do so may result in the loss of data. See your operating system documentation for information about the **shutdown** command.

1. Set the key mode switch to the Service position.
2. Set the Power button to off (button pushed in and released in the out position).

### Operator Panel



**Note:** For a translation of this notice, see the *System Unit Safety Information* manual.

**DANGER**

An electrical outlet that is not correctly wired could place hazardous voltage on metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock.

Before installing or removing any additional devices to or from the system, ensure that the power cables for those devices are unplugged before the signal cables are connected. If possible, disconnect all power cables from the existing system before you add a device.

Use one hand, when possible, to connect or disconnect signal cables to prevent a possible shock from touching two surfaces with different electrical potentials.

During an electrical storm, do not connect cables for display stations, printers, telephones, or stations protectors, for communications lines.

3. Switch off power on all disk drive drawers in the rack.
4. Switch off power to all external devices attached to the system unit, and then unplug the device power cords from the electrical outlets.
5. Except for any circuit breaker that is connected to an attached system unit, set all circuit breaker switches to the off position (down).

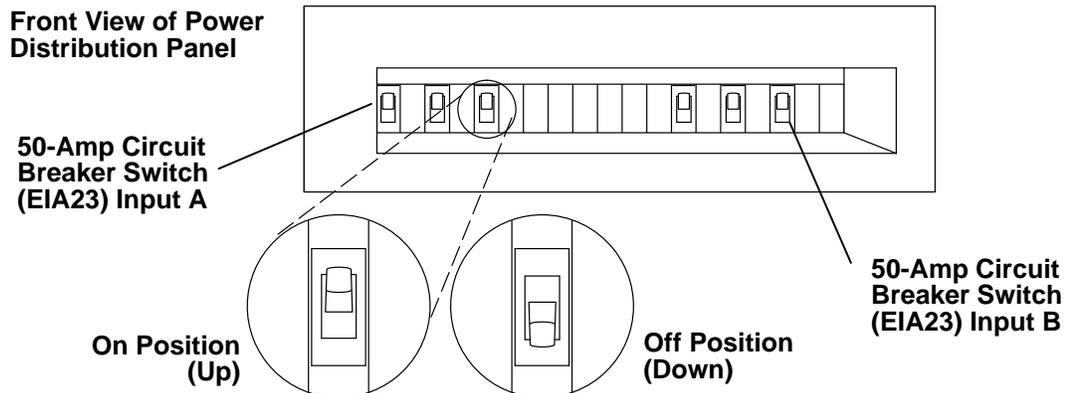
**Note:** For a translation of these notices, see the *System Unit Safety Information* manual.

**CAUTION:**

**Energy hazard, remove power before servicing. Disconnect two power supply cords.**

**Notes:**

1. An electrical hazard from an external -48 V dc power source exists in this unit. To prevent electrical shock, ensure that power to this unit is off before servicing.
2. Because many external devices can be connected to the system unit, it may be impractical for you to switch off power to all the devices and unplug their power cords.

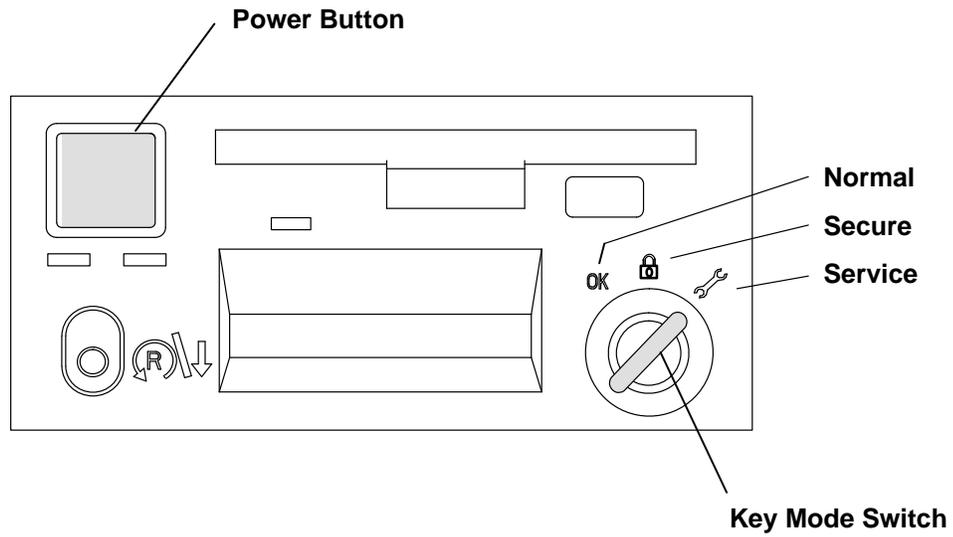


---

## Power-On Procedure with Power Distribution Panel

1. Set the key mode switch to the Service position.

### Operator Panel



**Note:** For a translation of this notice, see the *System Unit Safety Information* manual.

**DANGER**

An electrical outlet that is not correctly wired could place hazardous voltage on metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock.

Before installing or removing any additional devices to or from the system, ensure that the power cables for those devices are unplugged before the signal cables are connected. If possible, disconnect all power cables from the existing system before you add a device.

Use one hand, when possible, to connect or disconnect signal cables to prevent a possible shock from touching two surfaces with different electrical potentials.

During an electrical storm, do not connect cables for display stations, printers, telephones, or station protectors, for communications lines.

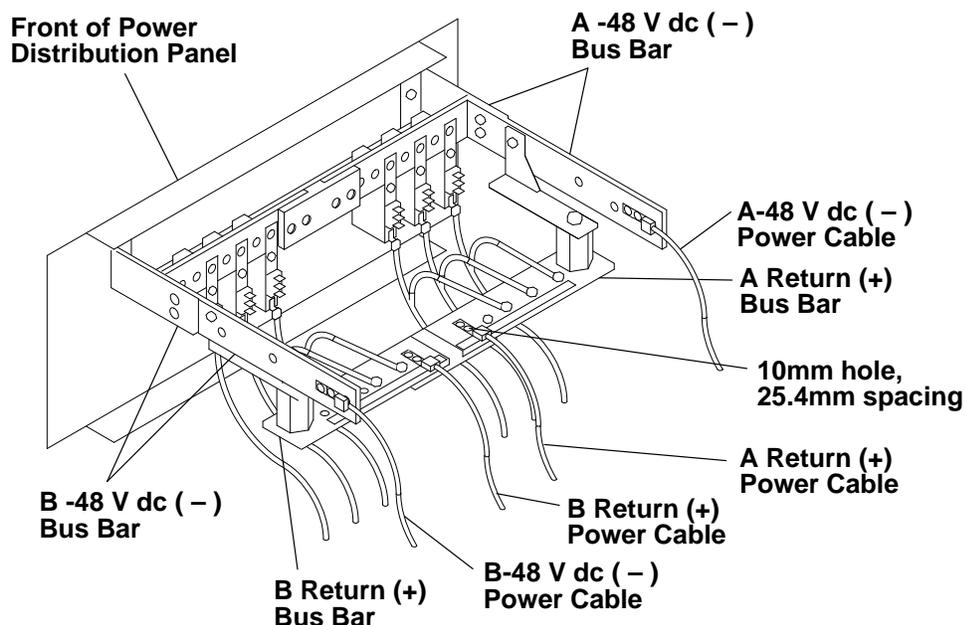
**CAUTION:**

Energy hazard, remove power before servicing. Disconnect two power supply cords.

2. Remove the six mounting screws attaching the top cover to the PDP, and then remove the top cover.
3. Ensure that the four power cables (-48 V dc (-) and return (+)) from each -48 V dc power source are connected to the power distribution panel.
4. Use a multimeter to ensure that -48 V dc power is entering the rack on both A & B side.

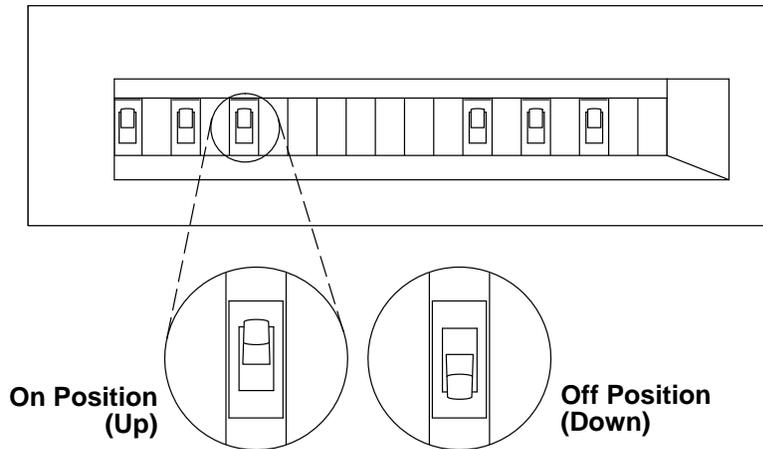
**Notes:**

1. An electrical hazard from an external -48 V dc power source exists in this unit. To prevent electrical shock, ensure that power to this unit is off before servicing.
2. The customer is responsible for providing and connecting power cables from the customer's -48 V dc power source to the power distribution panel.



5. Ensure that all circuit breakers are on (circuit breaker switches in the up position).

#### Front View of Power Distribution Panel

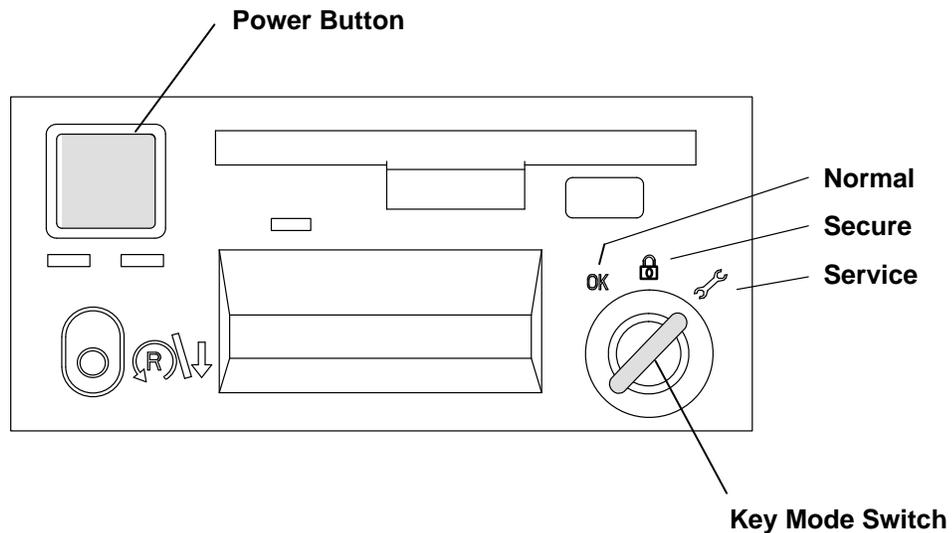


6. Plug all external device power cords into the electrical outlets.
7. Switch on power to all external devices attached to the system unit.
8. Switch on power on all of the disk drive drawers.

**Note:** Before setting the Power button to on, wait for the operator panel display to display the word "Stand-By."

9. Set the Power button to on (button pushed in).

#### Operator Panel



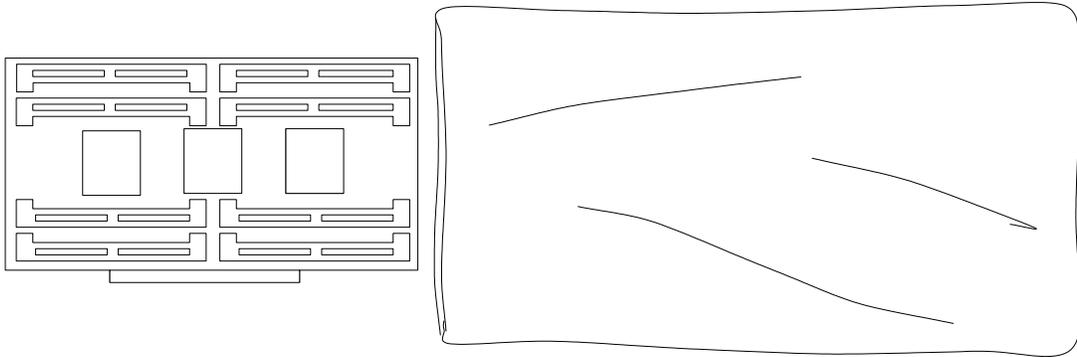
---

## Handling Static-Sensitive Devices

**Attention:** Adapters, boards, diskette drives, and disk drives can be damaged by electrostatic discharge. These devices are wrapped in antistatic bags to prevent this damage. Refer to the illustration.

Take the following precautions:

- Do not remove the device from the antistatic bag until you are ready to install the device.
- If you have an antistatic wrist strap available, use it while handling the device.
- With the device still in its antistatic bag, touch it to the metal frame of the system.
- Grasp cards and boards by the edges. Hold drives by the frame. Avoid touching the solder joints or pins.
- If you need to lay the device down while it is out of the antistatic bag, lay it on the antistatic bag. Before you pick up the device again, touch the antistatic bag and the metal frame of the system at the same time.
- Handle the devices carefully to prevent permanent damage.



**Antistatic Bag**

---

# Front Bezel and Front Access Plate

## Removal

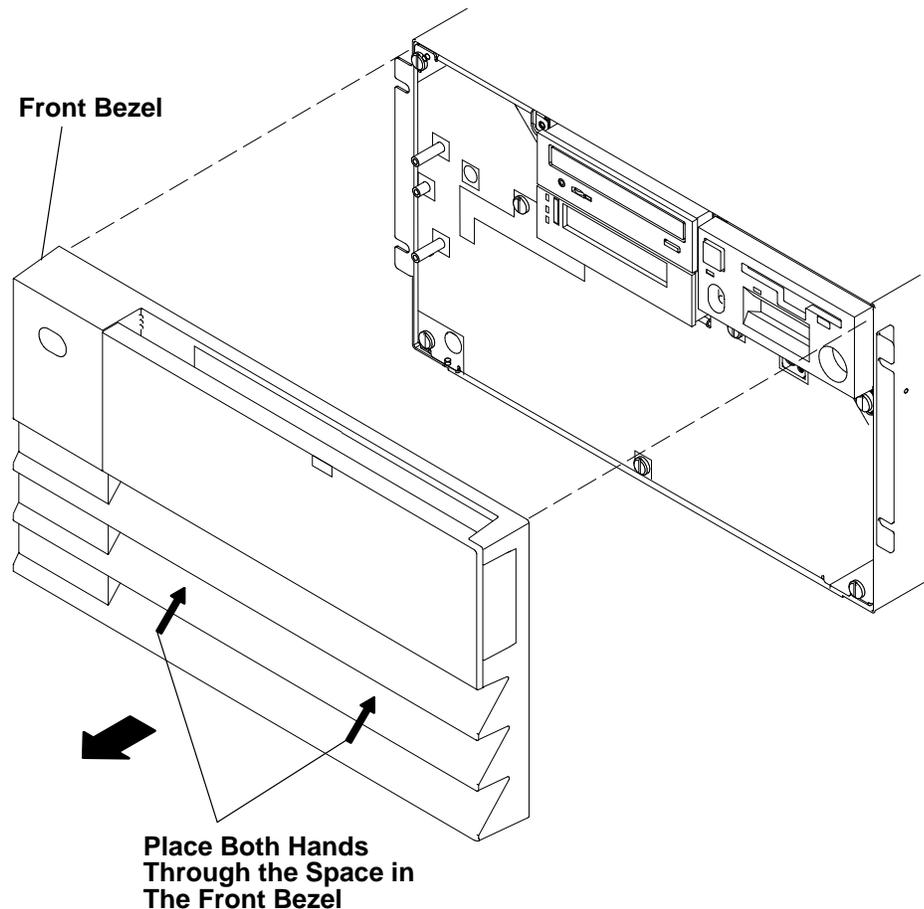
**Note:** For a translation of this notice, see the *System Unit Safety Information* manual, order number SA23-2652.

**CAUTION:**

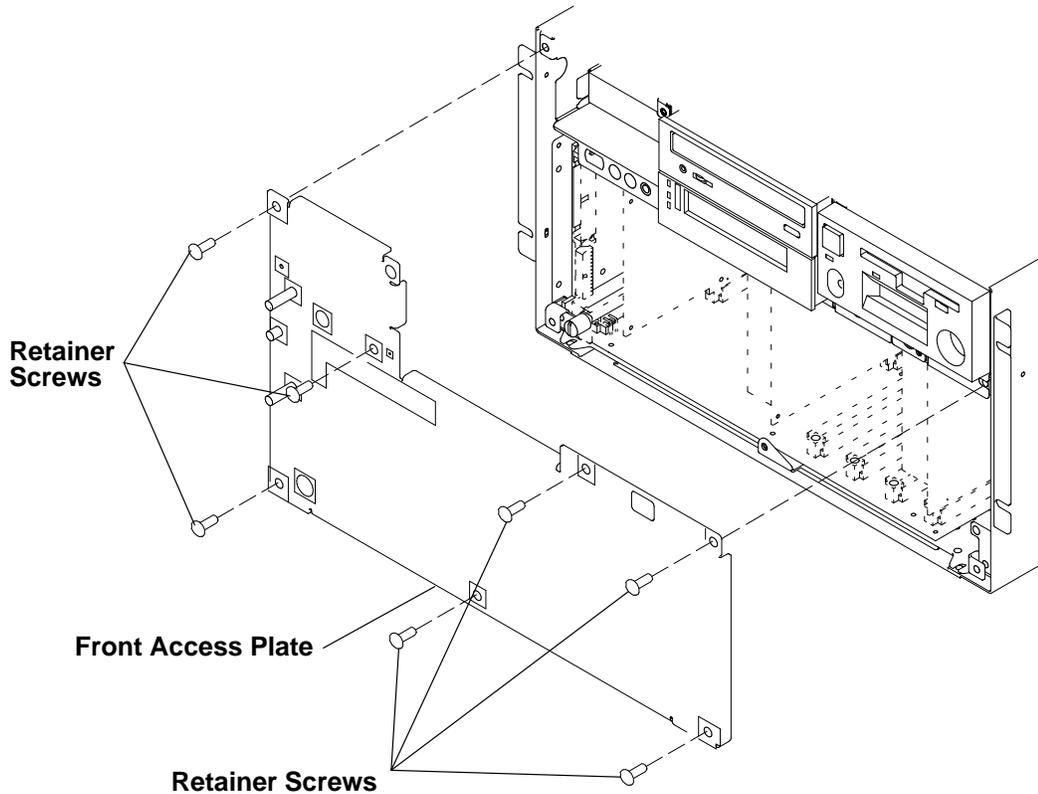
**This drawer is fixed and should not be moved for servicing. Attempting to move the drawer partially or completely out of the rack can turn over the rack or cause the drawer to fall out of the rack.**

1. If power is supplied to the drawer, then depending on the power distribution in your rack, do one of the following:
  - “Power-Off Procedure with a Power Distribution Bus” on page 4-2
  - “Power-Off Procedure with a Power Distribution Unit” on page 4-5
  - “Power-Off Procedure with a Power Distribution Panel” on page 4-9.
2. To remove the front bezel, place both hands (palms facing upward) through the space in the front bezel, and then pull the bezel quickly and firmly toward you.

### Front View of CPU Enclosure



3. To remove the front access plate, remove the seven retainer screws from the front of the CPU enclosure, and then remove the front access plate.



## Replacement

**Note:** Ensure that the grounding strips located around the edges of the front access plate are firmly attached and in place before replacing the front access plate.

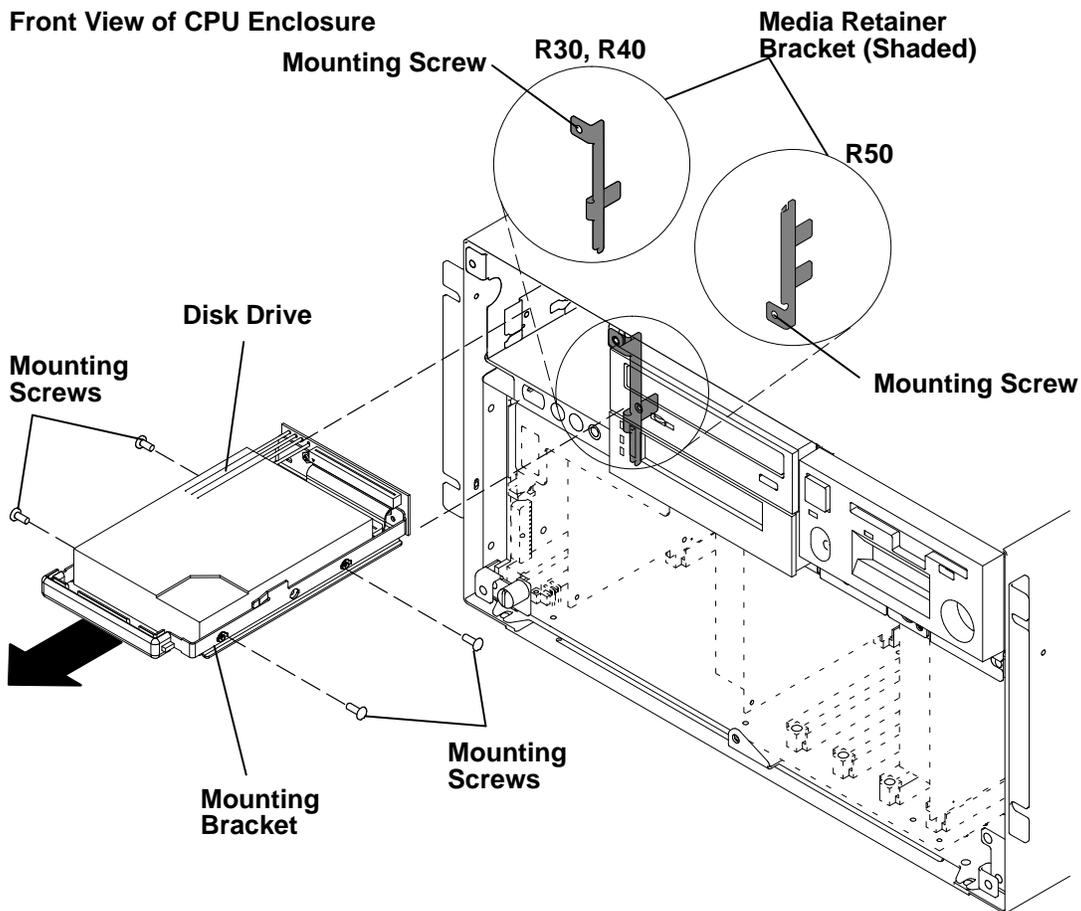
1. Replace in the reverse order.
2. Depending on the power distribution in your rack, do one of the following Power-On procedures:
  - “Power-On Procedure with a Power Distribution Bus” on page 4-4
  - “Power-On Procedure with a Power Distribution Unit” on page 4-7
  - “Power-On Procedure with a Power Distribution Panel” on page 4-11.

---

## Disk Drive

### Removal

1. Do the "Front Bezel and Front Access Plate" removal procedure on page 4-15.
2. Remove the mounting screw attaching the media retainer bracket to the CPU enclosure, and then remove the media retainer bracket.
3. Pull the disk drive toward you and out of the CPU enclosure.
4. If you are replacing only the disk drive and not the mounting bracket, disconnect the power, address (R50 only), and data connectors from the disk drive.
5. Remove the four mounting screws attaching the disk drive to the mounting bracket, and then remove the disk drive.



### Replacement

**Note:** If a new disk drive is being replaced, ensure that the SCSI address setting is the same as the disk drive you removed.

The R50 CPU Enclosure can have two, one-inch high drives installed into the disk drive bay or one disk drive that is more than one inch high.

Replace in the reverse order.

---

## CD-ROM Drive or Optional Media Device

### Removal

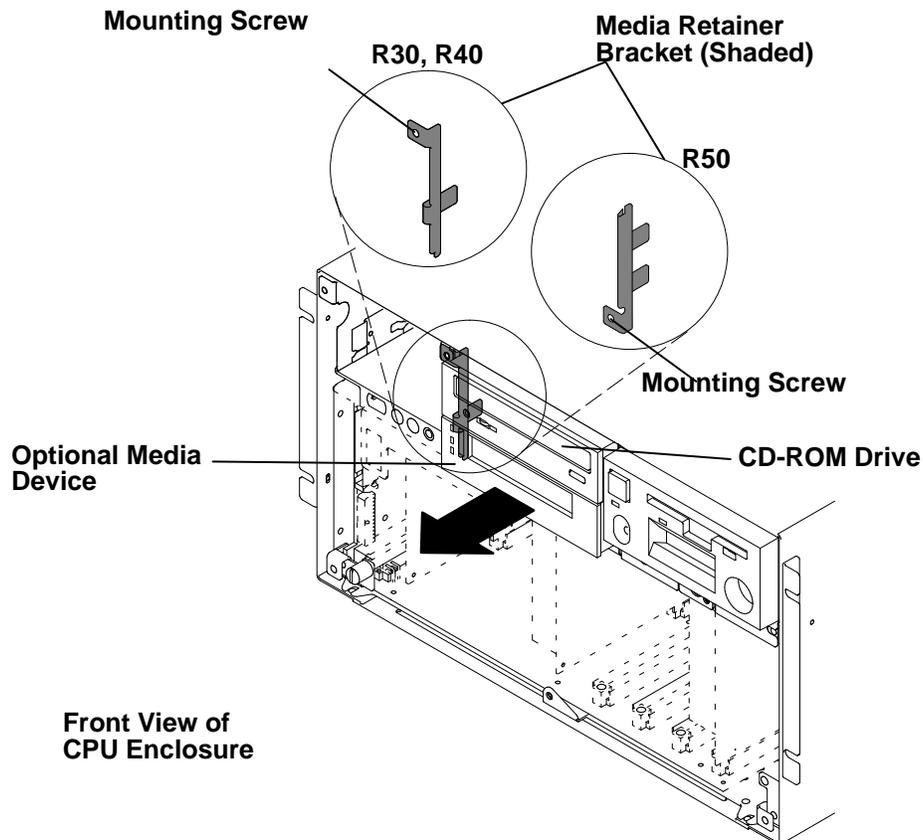
**Note:** Observe the following safety notice before removing the CD-ROM drive.

For a translation of this notice, see the *System Unit Safety Information* manual.

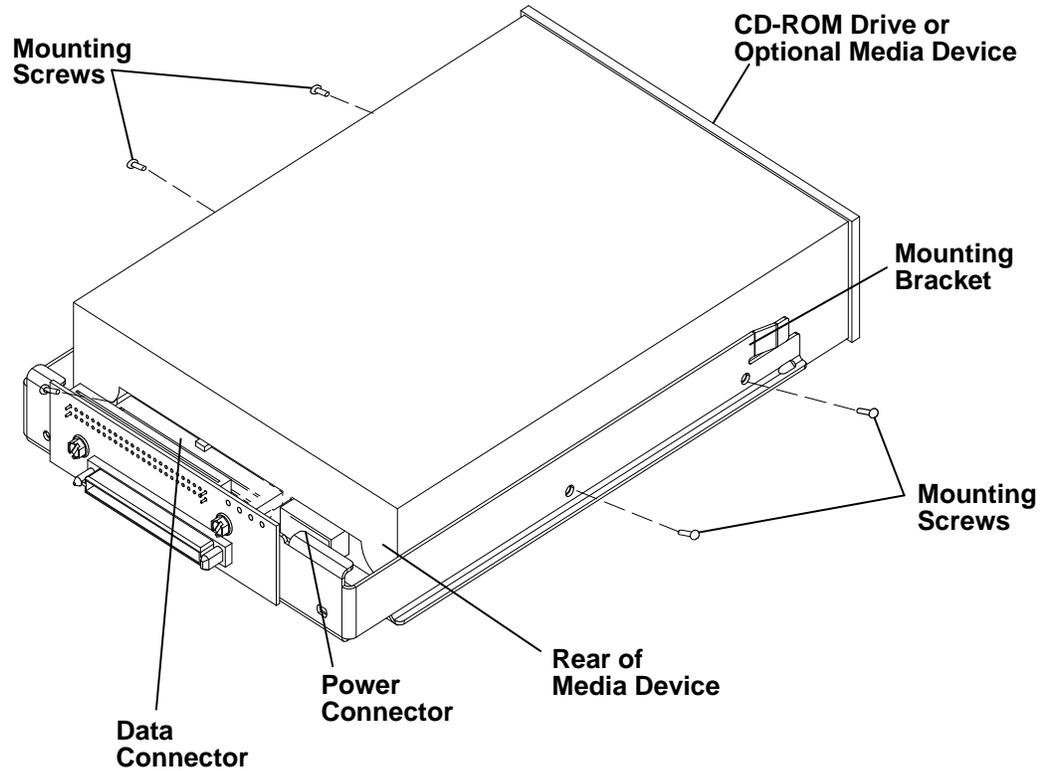
**CAUTION:**

**A class 3 laser is contained in the device. Do not attempt to operate the drive while it is disassembled. Do not attempt to open the covers of the drive as it is not serviceable and is to be replaced as a unit.**

1. Depending on the power distribution in your rack, do one of the following:
  - “Power-Off Procedure with a Power Distribution Bus” on page 4-2
  - “Power-Off Procedure with a Power Distribution Unit” on page 4-5
  - “Power-Off Procedure with a Power Distribution Panel” on page 4-9.
2. Do the “Front Bezel and Front Access Plate” removal procedure on page 4-15.
3. Remove the mounting screw attaching the media retainer bracket, and then remove the bracket.
4. Pull the CD-ROM drive or optional media device toward you, and then pull the CD-ROM drive or optional media device out of the media enclosure.



5. If you are replacing only the CD-ROM drive or the optional media device and not the mounting bracket, disconnect the power and data connectors.
6. Remove the four mounting screws attaching the CD-ROM or optional media device to the mounting bracket, and then remove the CD-ROM drive or optional media device.



## Replacement

**Note:** If a media device is being replaced, ensure that the SCSI address setting is the same as the media device you removed.

1. Replace in the reverse order.
2. Depending on the power distribution in your rack, do one of the following:
  - “Power-On Procedure with a Power Distribution Bus” on page 4-4
  - “Power-On Procedure with a Power Distribution Unit” on page 4-7
  - “Power-On Procedure with a Power Distribution Panel” on page 4-11.

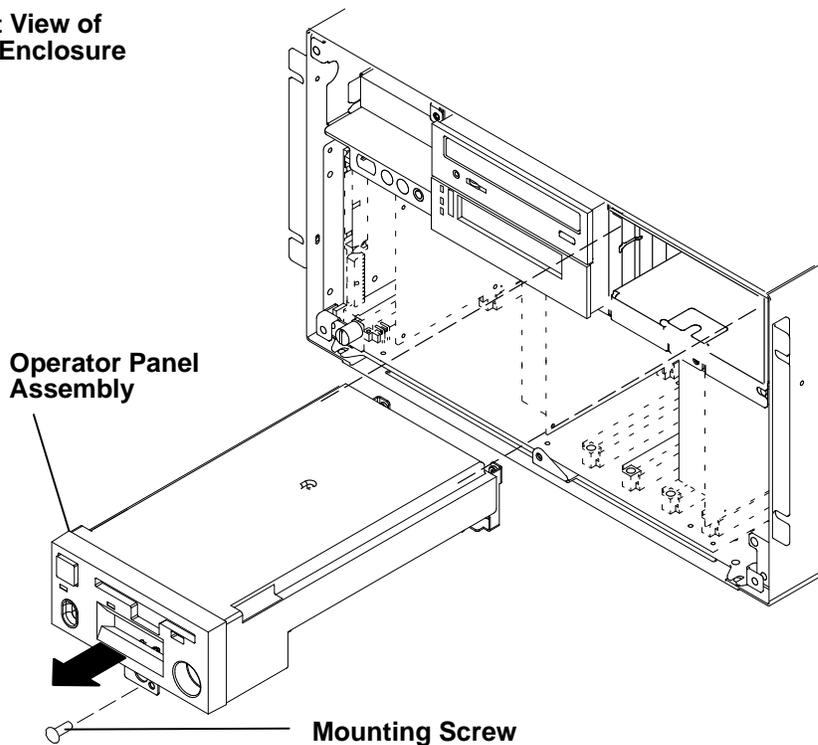
---

# Operator Panel

## Removal

1. Depending on the power distribution in your rack, do one of the following:
  - “Power-Off Procedure with a Power Distribution Bus” on page 4-2
  - “Power-Off Procedure with a Power Distribution Unit” on page 4-5
  - “Power-Off Procedure with a Power Distribution Panel” on page 4-9.
2. Do the “Front Bezel and Front Access Plate” removal procedure on page 4-15.
3. Remove the mounting screw attaching the operator panel to the CPU enclosure.
4. Pull the operator panel assembly toward you until it is out of the media module.

**Front View of  
CPU Enclosure**



## Replacement

1. Replace in the reverse order.
2. Depending on the power distribution in your rack, do one of the following Power-On procedures:
  - “Power-On Procedure with a Power Distribution Bus” on page 4-4.
  - “Power-On Procedure with a Power Distribution Unit” on page 4-7.
  - “Power-On Procedure with a Power Distribution Panel” on page 4-11.

---

# Lithium Battery

## Removal

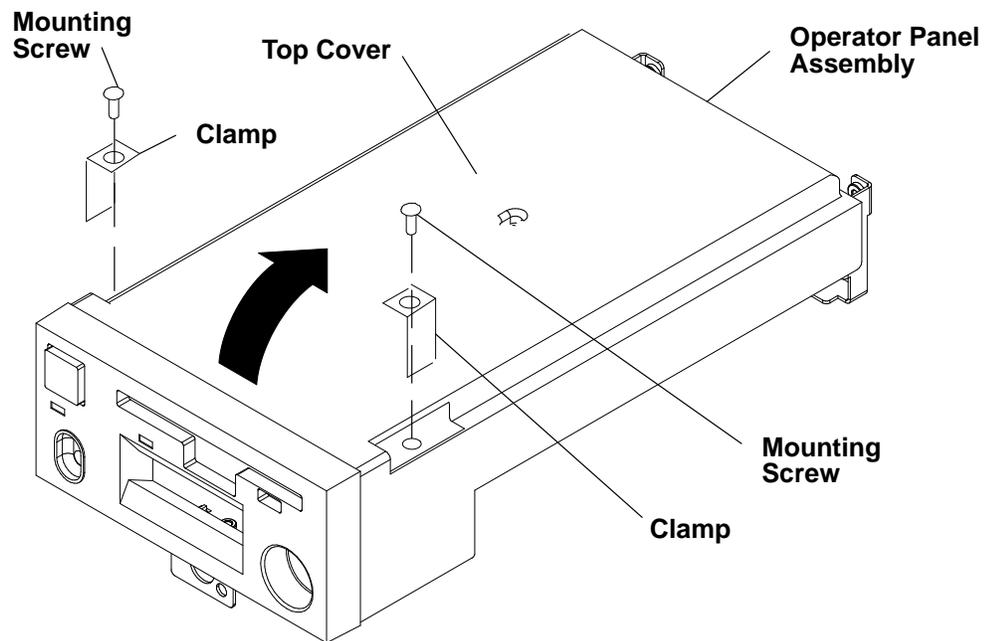
**CAUTION:**

A lithium battery can cause fire, explosion, or a severe burn. Do not recharge, disassemble, heat above 100°C (212°F), solder directly to the cell, incinerate, or expose cell contents to water. Keep away from children. Replace only with the part number specified for your system. Use of another battery may present a risk of fire or explosion.

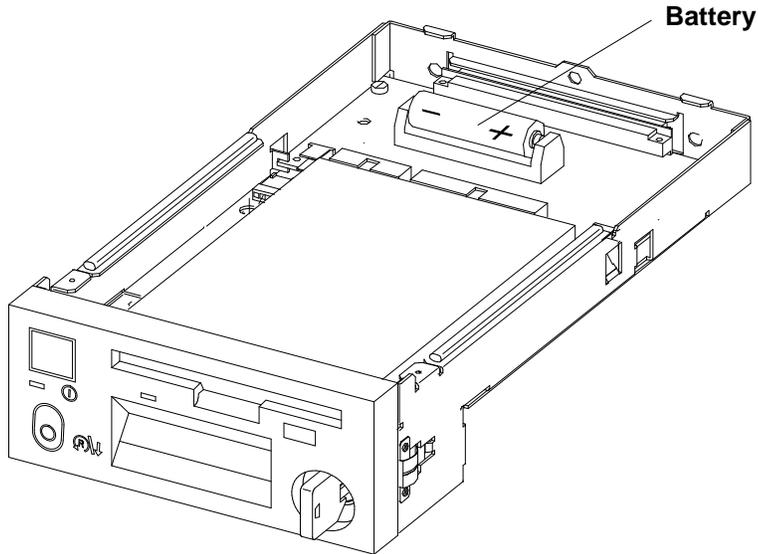
The battery connector is polarized; do not attempt to reverse the polarity.

Dispose of the battery according to local regulations.

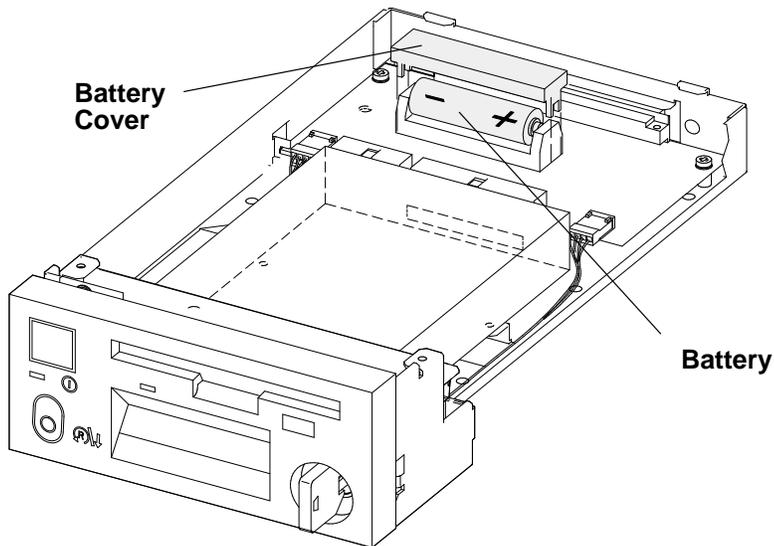
1. Do the steps detailed in the removal procedure in “Operator Panel” on page 4-20.
2. Remove the two mounting screws and clamps attaching the top cover to the operator panel assembly.
3. Rotate the front of the top cover upwards, and then remove the top cover.



4. If a cable tie is holding the battery in position, cut the tie. The cable tie is for the original shipment of the unit and does not need to be replaced.



5. If a battery cover is positioned over the battery, lift the battery cover off the battery.



6. Lift the battery out of the operator panel assembly.

## Replacement

**Note:** Ensure that the battery is replaced with the correct polarity (the positive pole should be to the right as viewed from the front of the operator panel).

Replace in the reverse order of the removal procedure.

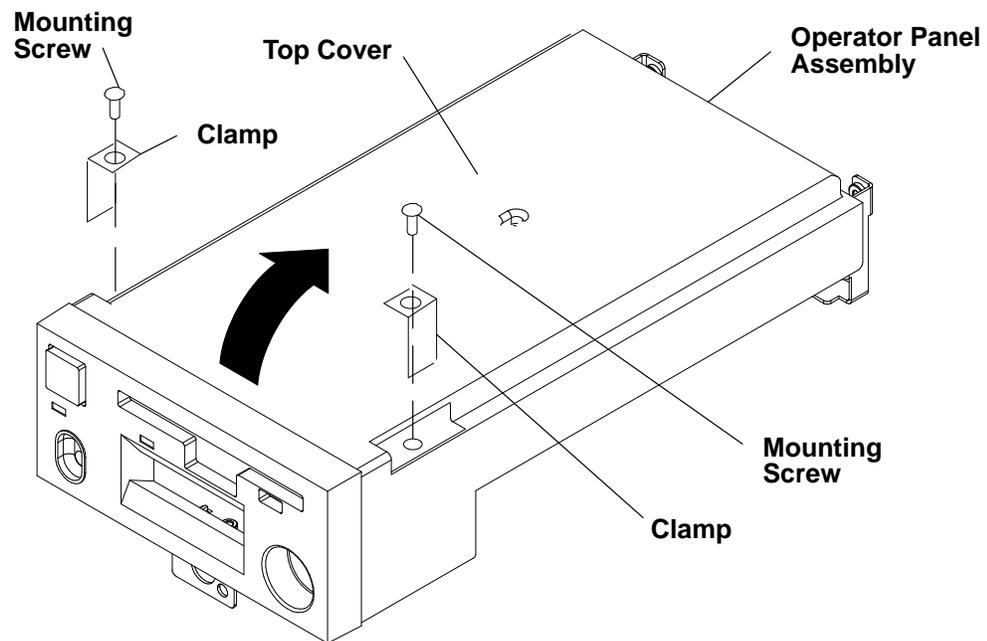
**Note:** When you have finished the removal and replacement procedure, tell the customer to set the system time and date, the alternate bootlist, and any other settings stored in NVRAM.

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## 3.5-Inch Diskette Drive

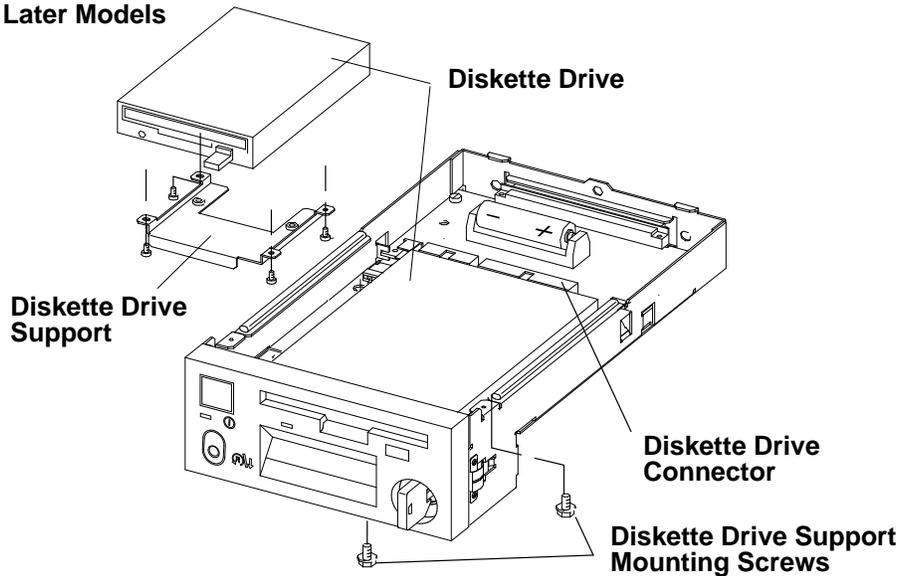
### Removal

1. The 3.5-inch diskette drive is part of the operator panel subassembly. It is accessible from the upper side of the operator panel, after having removed it from the base unit.  
Remove the operator panel from the base unit, as described in "Operator Panel" on page 4-20.
2. Remove the two mounting screws and clamps attaching the top cover to the operator panel assembly.
3. Rotate the front of the top cover upwards, and then remove the top cover.



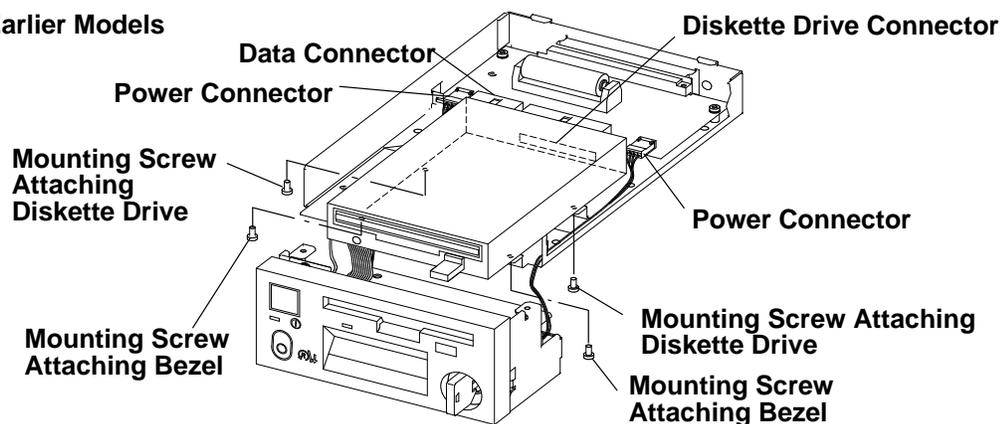
4. Disconnect the 3.5-inch diskette drive connector.
5. For later models, remove the two mounting screws attaching the diskette drive to the operator panel assembly, then remove the diskette drive from the operator panel assembly.
6. From the bottom of the diskette drive, remove the four mounting screws attaching the diskette drive to the diskette drive support.

#### Later Models



7. For earlier models, remove the two mounting screws attaching the bezel to the bottom of the operator panel assembly, and then remove the bezel.
8. For earlier models, remove the two mounting screws attaching the diskette drive to the bottom of the operator panel assembly.
9. Remove the diskette drive from the operator panel assembly.

#### Earlier Models



## Replacement

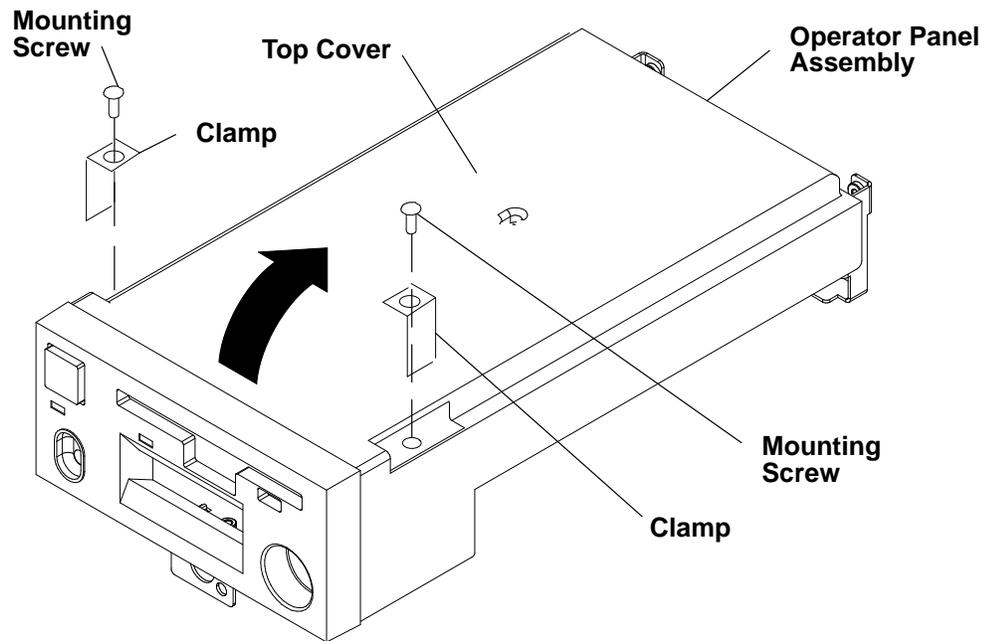
Replace in the reverse order of the removal procedure.

---

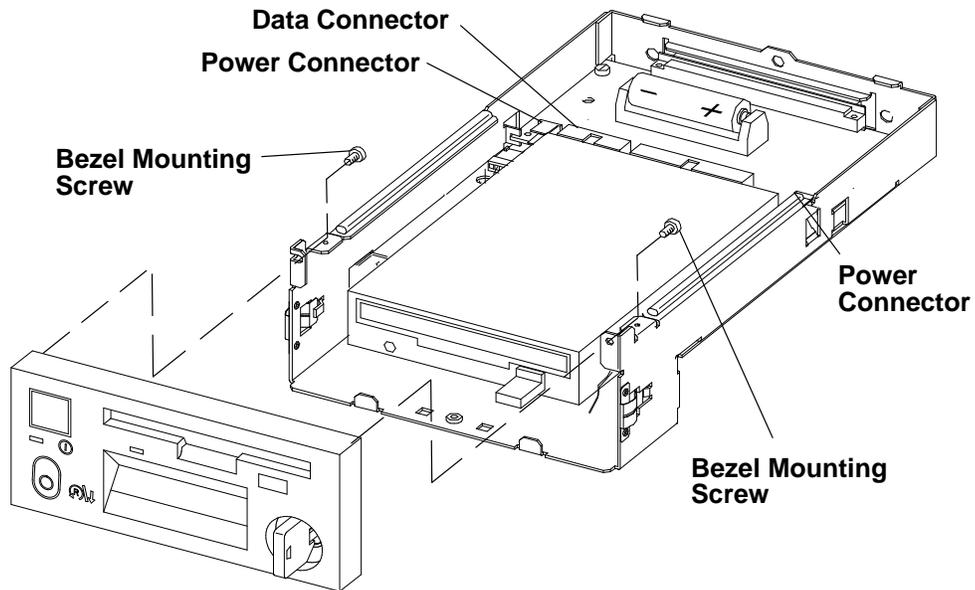
## Operator Panel Bezel

### Removal

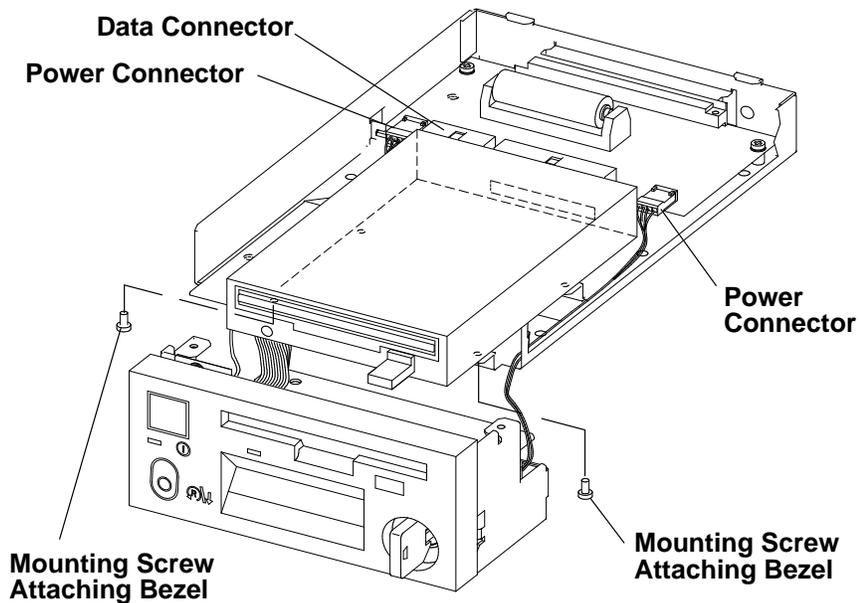
1. Do the steps detailed in the removal procedure in "Operator Panel" on page 4-20. The operator panel bezel is then accessible from the upper side of the operator panel.
2. Remove the two mounting screws and clamps attaching the top cover to the operator panel assembly.
3. Rotate the front of the top cover upwards, and then remove the top cover.



4. Disconnect the two power connectors and the data connector.
5. For later models, remove the two mounting screws attaching the bezel to the operator panel assembly at the top corners of the operator panel assembly, and then remove the bezel.



6. For earlier models, remove the two mounting screws attaching the bezel to the bottom of the operator panel assembly, and then remove the bezel.



## Replacement

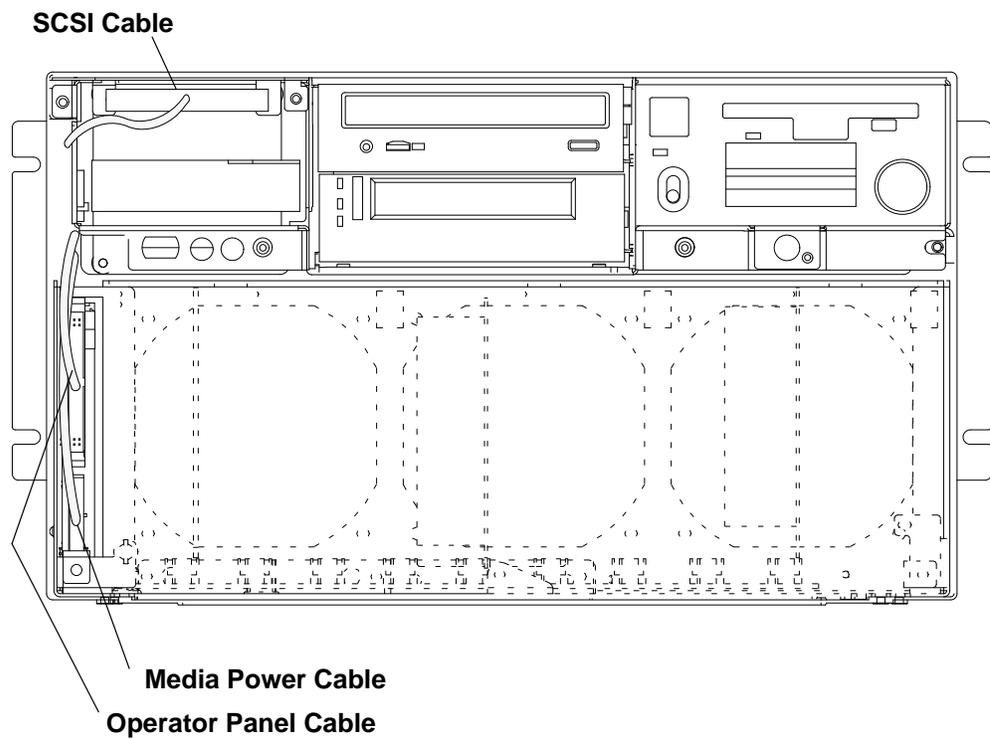
Replace in the reverse order of the removal procedure.

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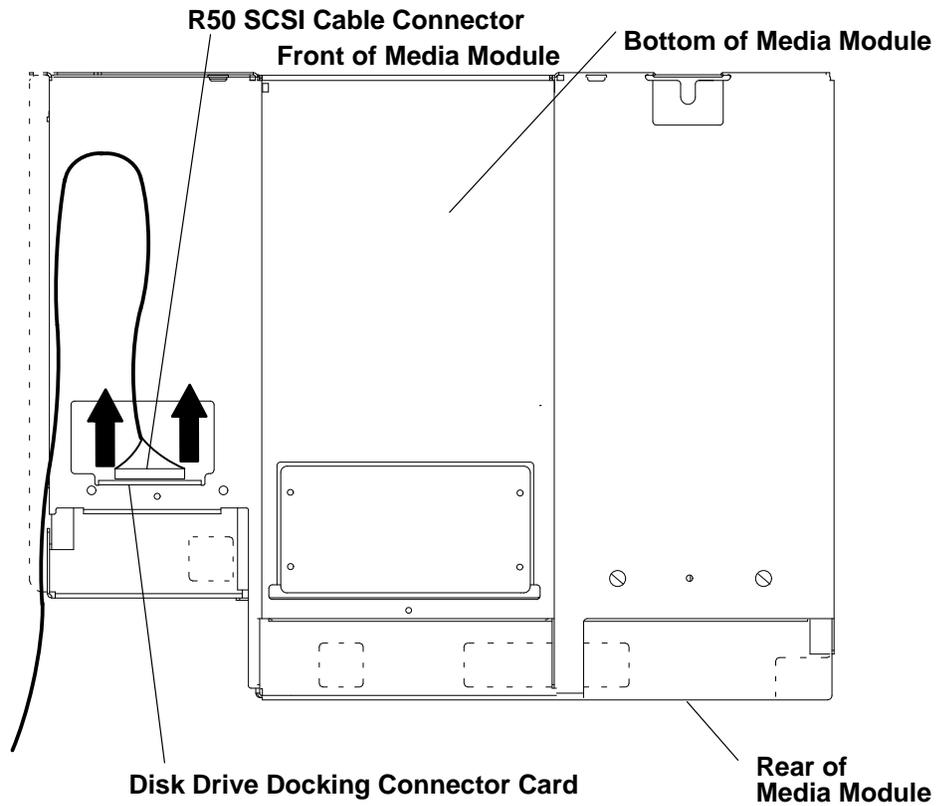
## Media Module

### Removal

1. Do the "Front Bezel and Front Access Plate" removal procedure on page 4-15.
2. Disconnect the following cables:
  - Operator panel cable (push connector tabs away from the center of the connector)
  - Media power cable.
3. Disconnect the SCSI cable:
  - R30 and R40 media modules

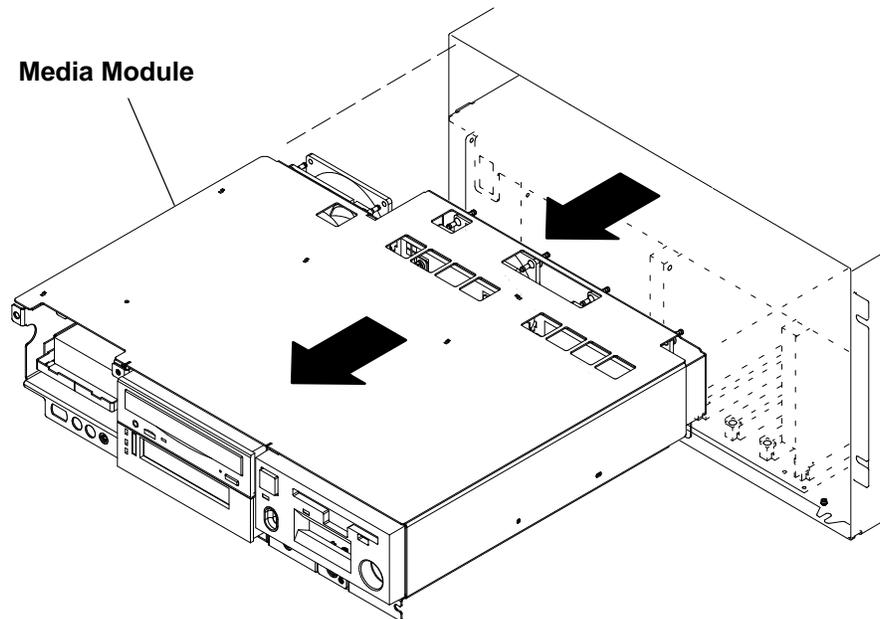


- R50 Media Module: Slide the media module toward you until you can access the bottom of the disk drive docking connector card, then remove the SCSI cable connector from the bottom of the docking connector card.



- Slide the media module toward you until you can place your hand under it, and then slide the media module out of the CPU enclosure.

#### Front View of CPU Enclosure



- Place the media module on a stable surface.

## Replacement

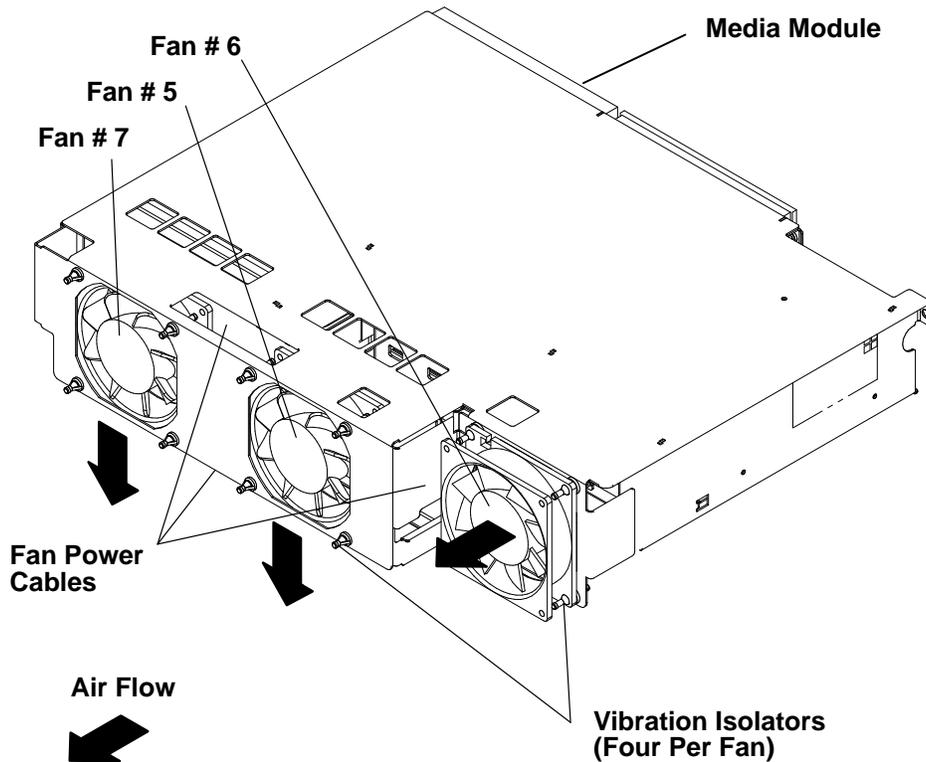
Replace in the reverse order.

---

## Media Module Fans

### Removal

1. Do the "Media Module" removal procedure on page 4-27.
2. Disconnect the fan power cable for the fan you are removing.
3. Remove all four vibration isolators by pulling the fan either downward or away from the media module until the vibration isolators disengage from either the fan or the media module.
4. Pull the fan out of or away from the media module.

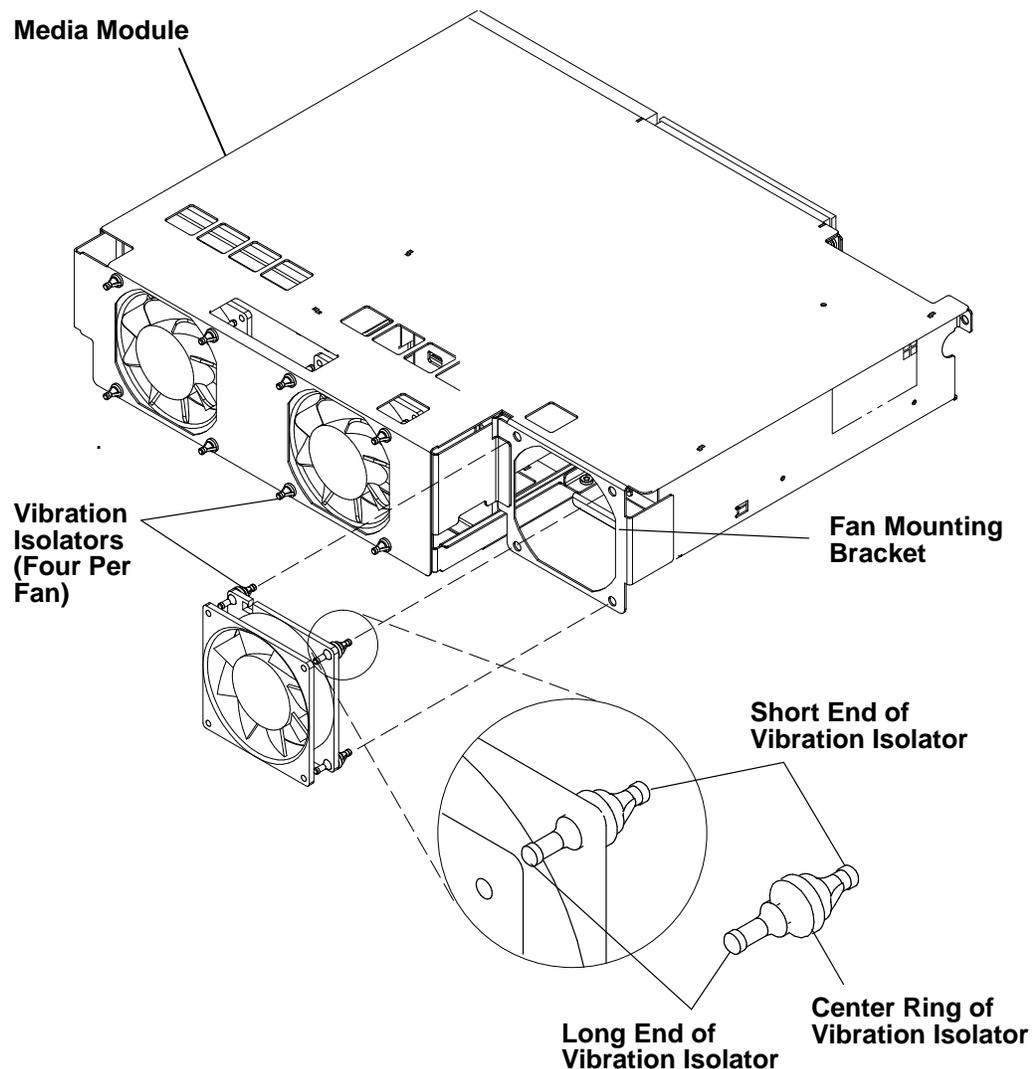


## Replacement

To replace the vibration isolators when replacing a fan, do the following:

1. Check the direction of the air flow marked on the fan, and then place the long end of the vibration isolator through the mounting hole of the fan.
2. Pull the long end of the vibration isolator through the mounting hole until the center ring of the vibration isolator is against the fan.
3. Repeat the two previous steps until all four vibration isolators are mounted on the fan.
4. After all four vibration isolators are mounted on the fan, place the short end of each vibration isolator through the mounting holes of the fan mounting bracket. If you are replacing a fan that mounts inside the media module, slide the fan inside the media module, and then pull each short end of the vibration isolators through the fan mounting bracket.
5. Pull the short end of each vibration isolator through the mounting holes of the fan mounting bracket until the center ring of the vibration isolator is against the bracket.

Replace in the reverse order.



---

# Media Module Cables and Docking Connector Cards

## Removal

### Notes:

If you are removing the *SCSI cable* connected to the disk drive and media docking cards, perform steps 1, 2, 4, 5, 6, 7, 8, 9, 10, 11, and 12.

If you are removing the *operator panel cable* that is *not* connected to a docking bracket, perform steps 2, 3, 4, 5, 7, 8, 9, 10, 11, and 18.

If you are removing the *operator panel cable* that is connected to a docking bracket, perform steps 2, 3, 4, 5, 7, 8, 9, 10, 11, 19, 20, 21, 22, and 23.

If you are removing the *disk drive docking connector card*, perform steps 1, 4, 5, 7, 8, 15, 16, and 17.

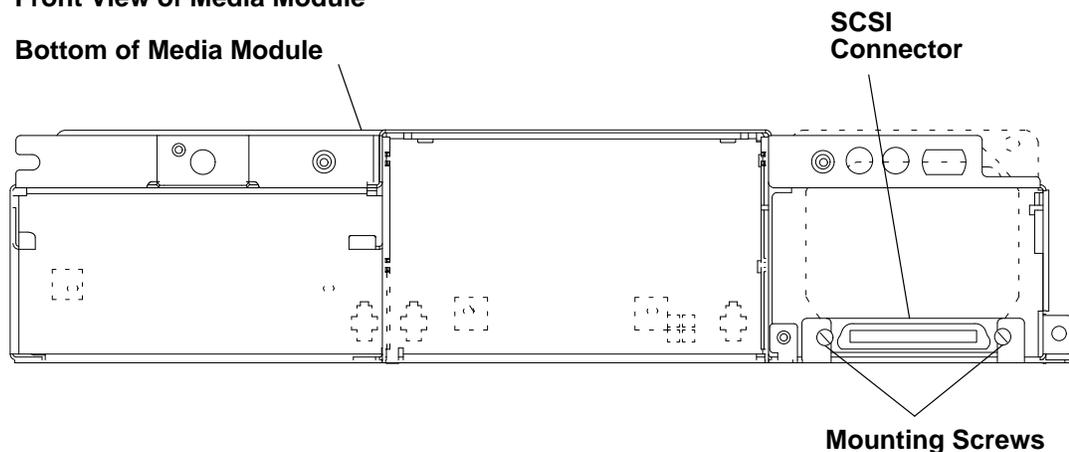
If you are removing the *media docking connector card*, perform steps 2, 4, 5, 7, 8, 9, 10, 11, 13, and 14.

If you are removing the *power cable cluster*, perform steps 1, 2, 4, 5, 6, 7, 8, 9, 10, 11, 13, 15, and 24.

1. Do the "Disk Drive" removal procedure on page 4-17.
2. Do the "CD-ROM Drive or Optional Media Device" removal procedure on page 4-18 to remove the CD-ROM drive and the optional media device.
3. Do the "Operator Panel" removal procedure on page 4-20.
4. Do the "Media Module" removal procedure on page 4-27.
5. Place the media module upside-down on a stable surface with the rear of the media module facing you.
6. If you are removing the SCSI cable connected to the media and disk drive docking cards, remove the two mounting screws attaching the SCSI connector in the front of the disk drive position. (R50 CPU Enclosures do not have this connector.)

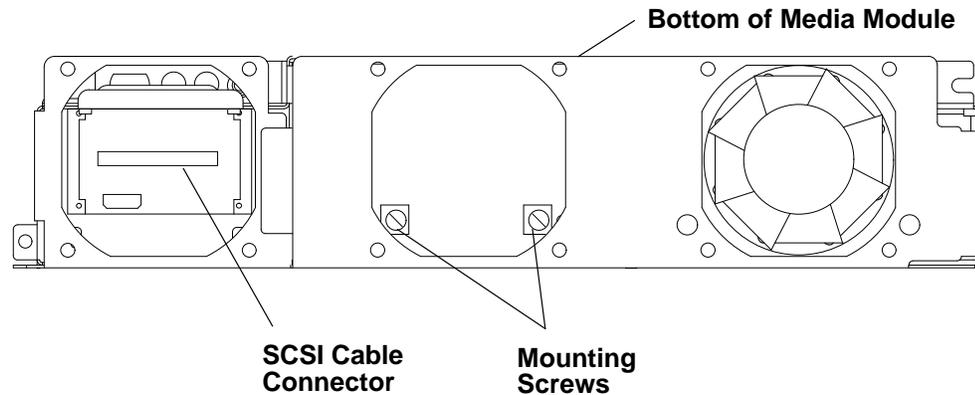
### Front View of Media Module

#### Bottom of Media Module

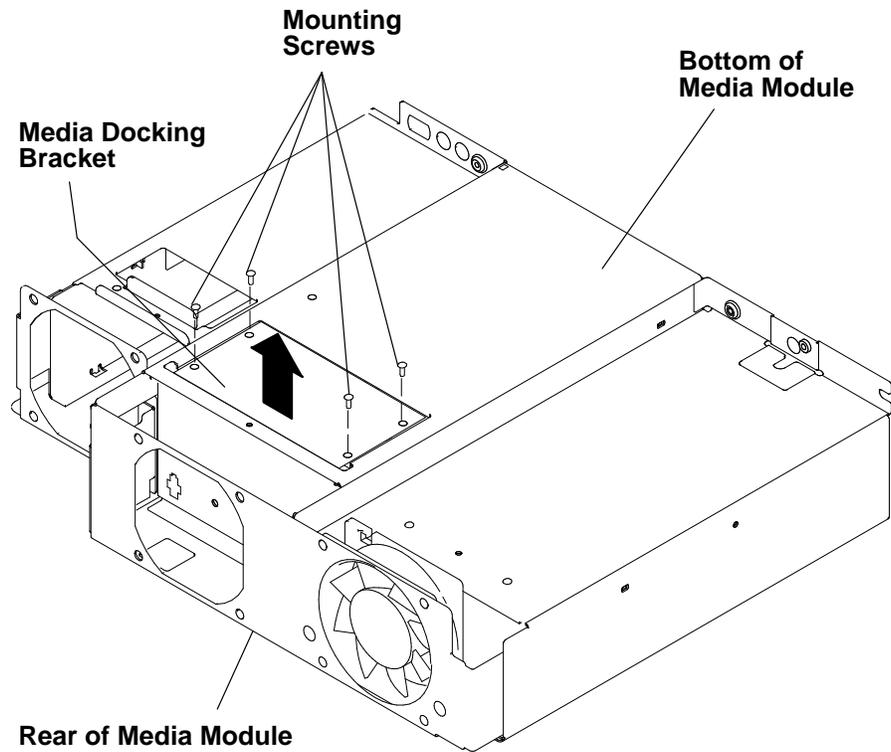


7. Remove the disk drive fan and media fan. Refer to the "Media Module Fans" removal procedure on page 4-30 for information about removing the two fans.
8. Disconnect the SCSI cable connector on the rear of the disk drive docking connector card.
9. Remove the two rear mounting screws attaching the media docking connector bracket to the rear of the media module (these screws are not present on all media modules).

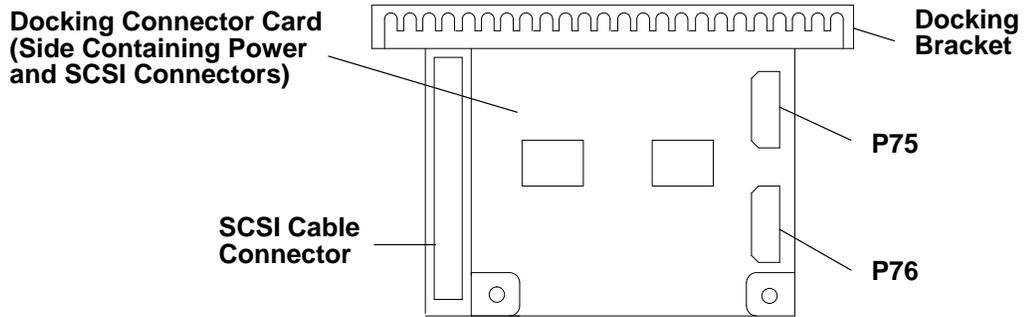
**Rear View of Media Module (upside down)**



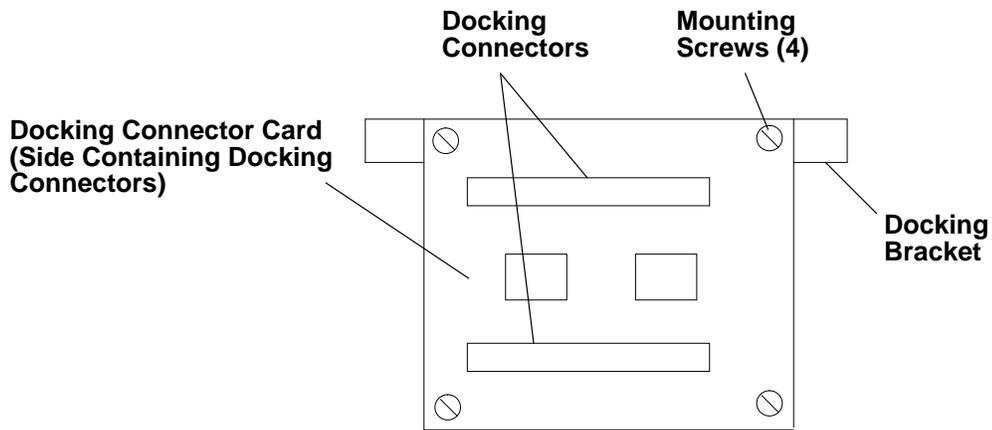
10. Remove the four mounting screws on the media docking bracket, and then lift the media docking bracket out of the media module to access the SCSI cable connector on the media docking connector card.



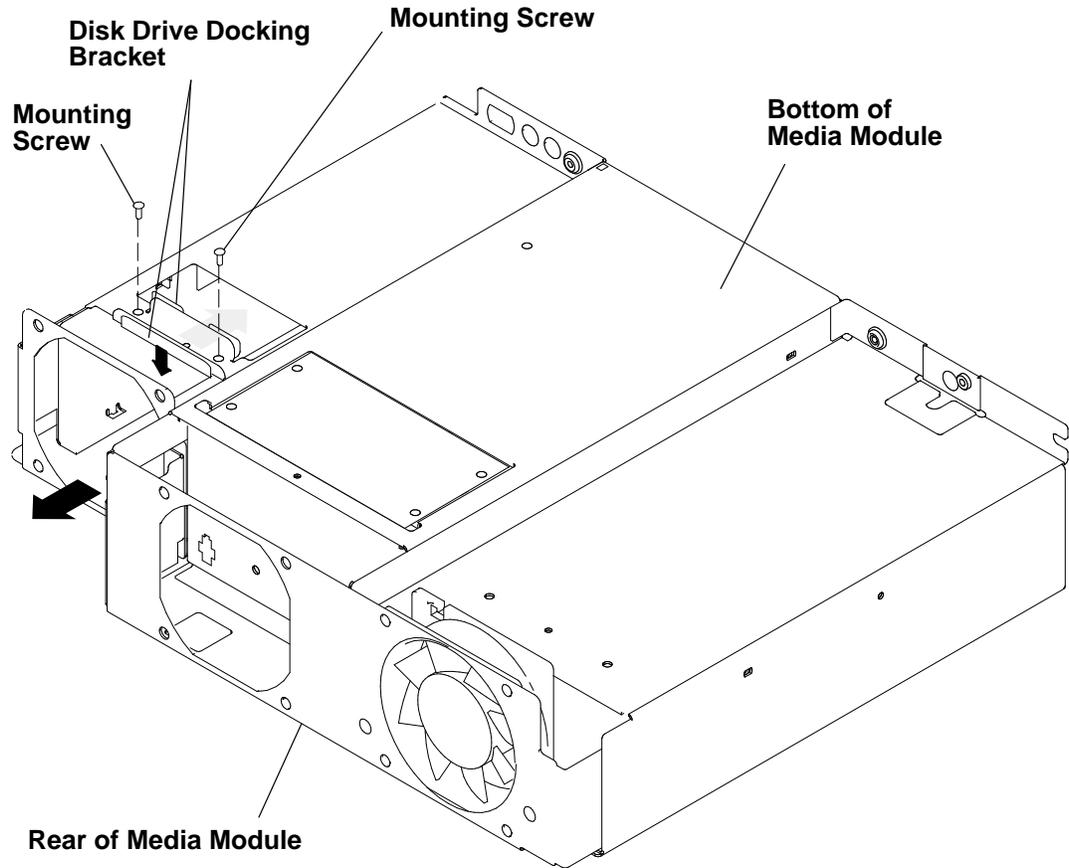
11. Disconnect the SCSI cable connector on the media docking connector card.
12. Guide the SCSI cable out of the media module through the disk drive opening.
13. If you are removing either the docking connector card or the power cable assembly, disconnect the two power cable connectors (P75 and P76) from the docking connector card.



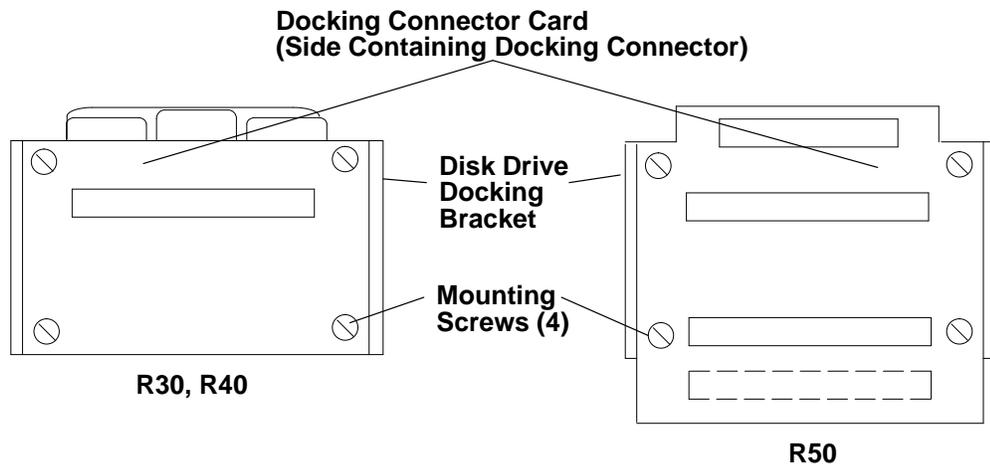
14. If you are removing the docking connector card on the media docking bracket, remove the four mounting screws, and then remove the card.



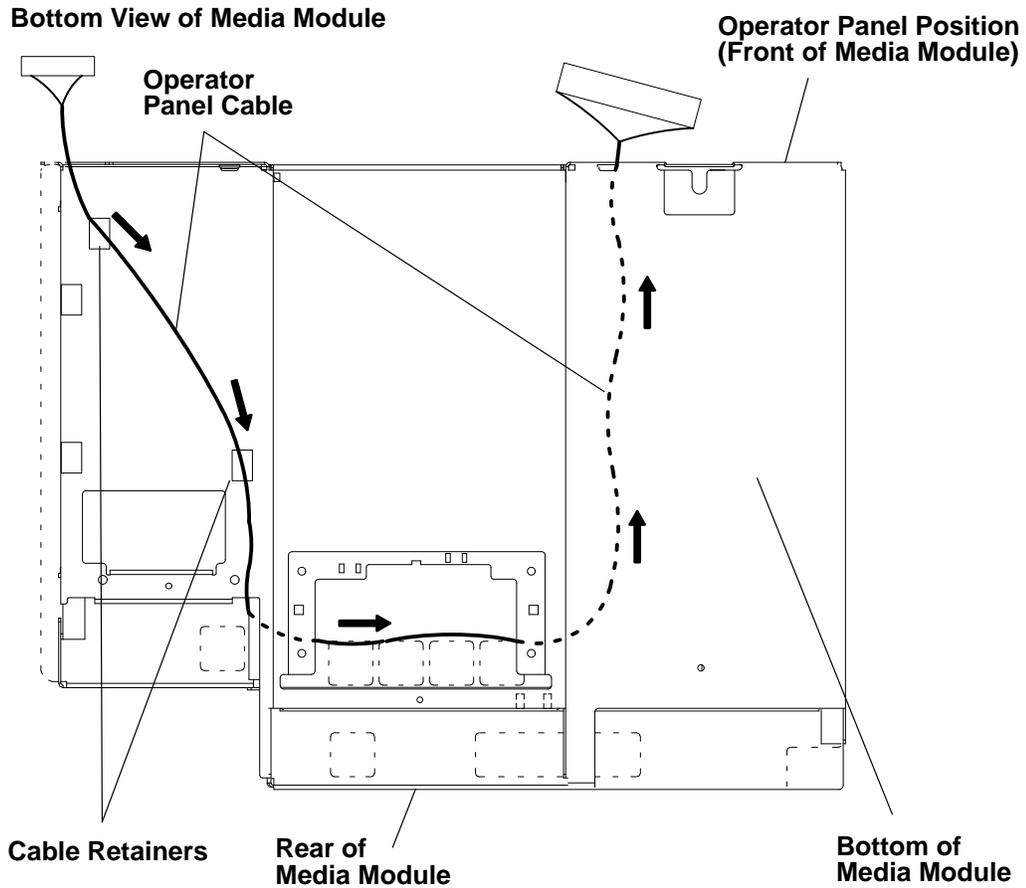
15. If you are removing the docking connector card on the disk drive docking bracket, disconnect the power cable connector on the docking connector card.
16. Remove the two mounting screws attaching the docking bracket, and then guide the bracket through the rear of the media module.



17. If you are removing the disk drive docking connector card from the docking bracket, remove the four mounting screws, and then remove the docking connector card.

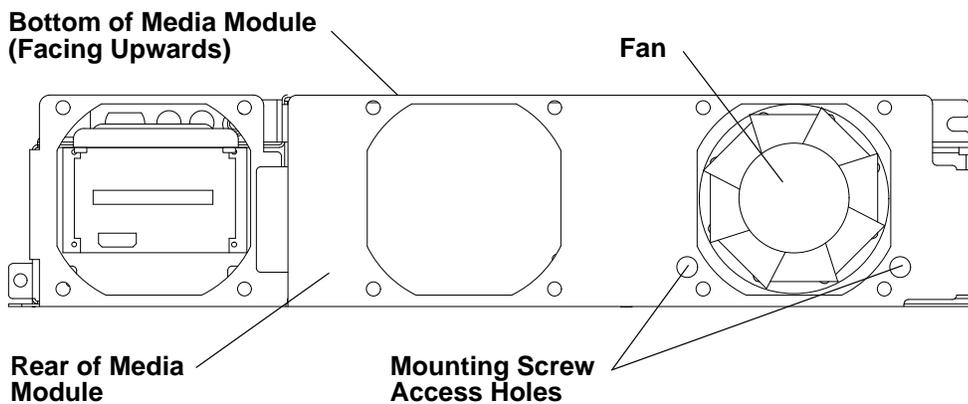


18.If you are removing the operator panel cable for a media module that does not contain a docking connector card and bracket, remove the cable from the plastic cable retainers, and then guide the cable out of the media module through the operator panel position.



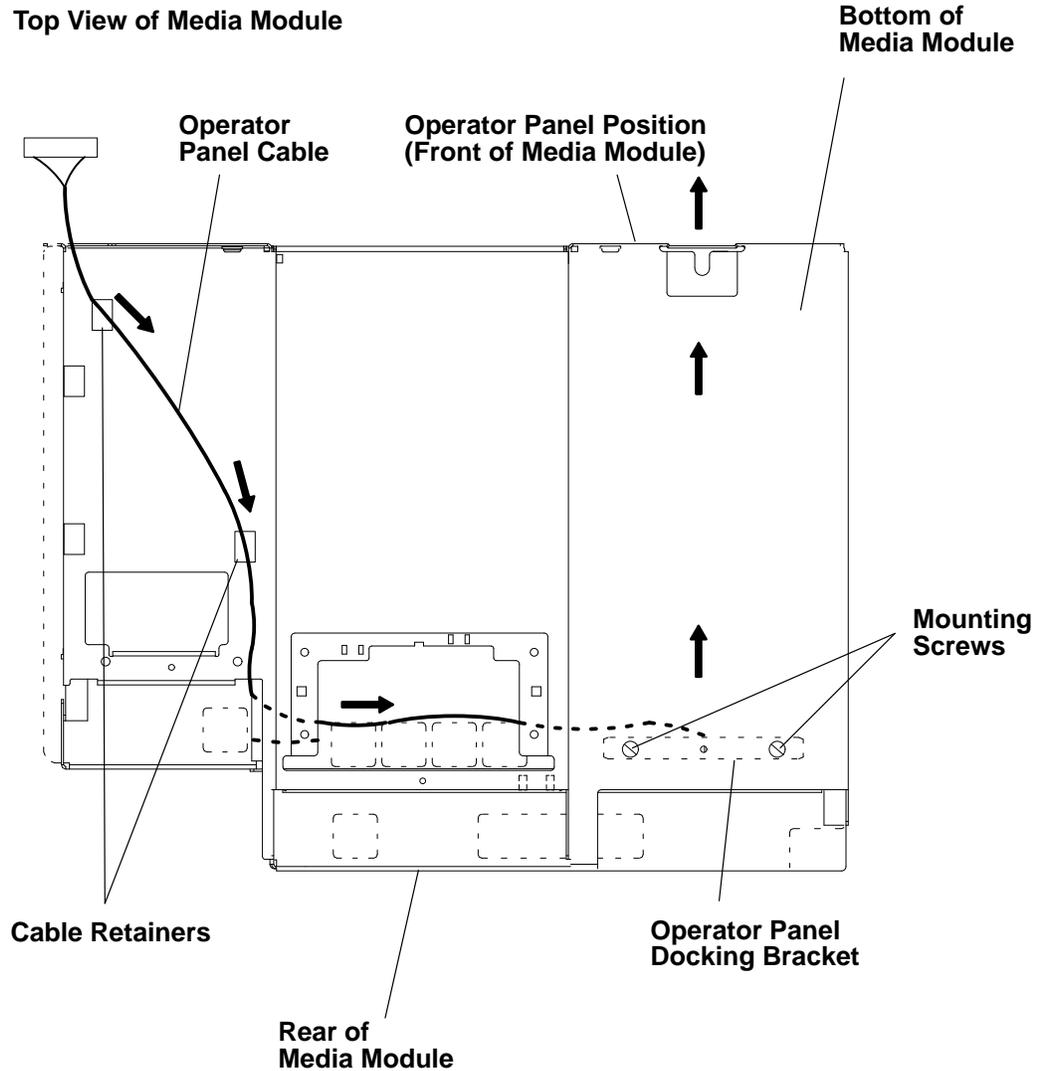
19.If you are removing the operator panel cable for a media module containing a operator panel docking card and bracket, first remove the operator panel fan. Refer to the “Media Module Fans” removal procedure on page 4-30 for information about removing the operator panel fan.

20.Using the two screw access holes, remove the two mounting screws attaching the docking connector bracket to the rear of the media module.

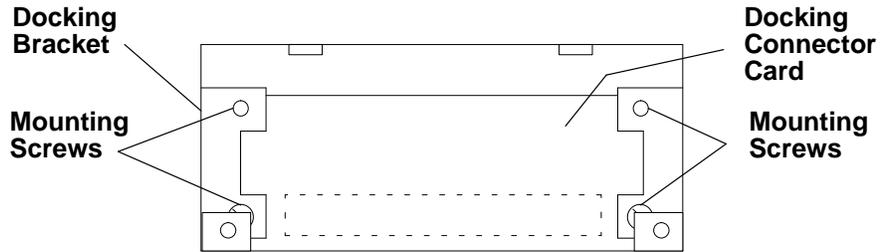


21. Remove the two mounting screws attaching the operator panel docking bracket to the bottom of the media module.

22. Remove the cable from the cable retainers, and then guide the cable out of the media module through the operator panel position.



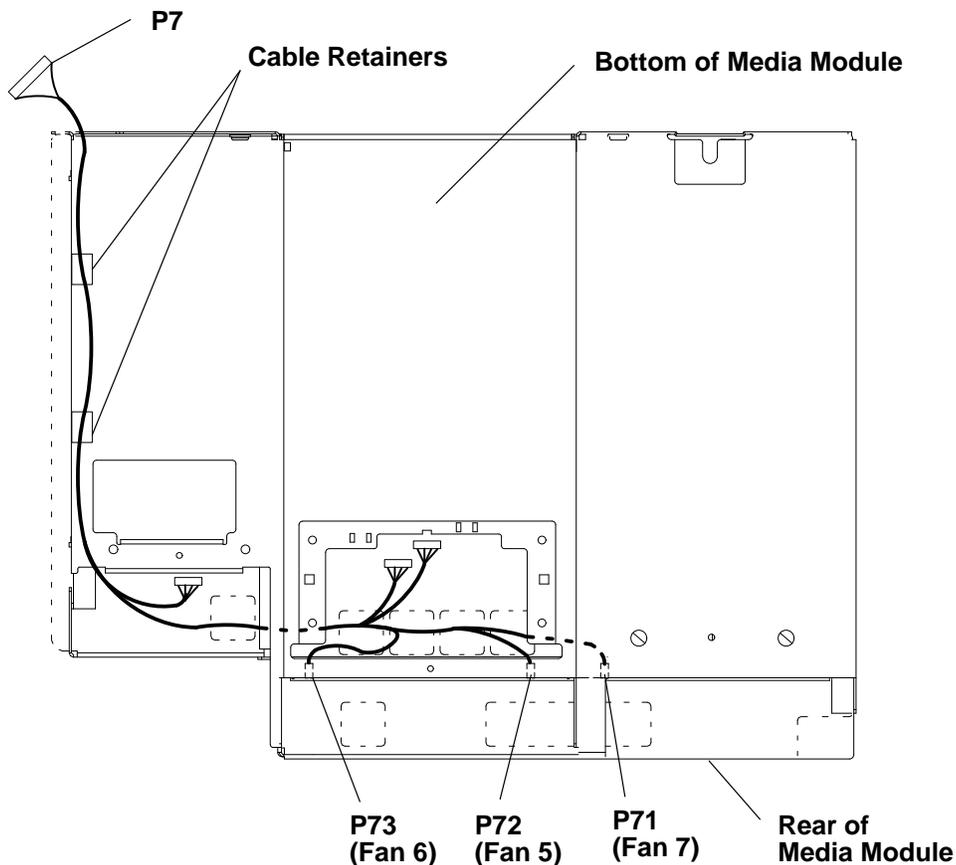
23. If you are removing the docking connector card and cable from the operator panel docking bracket, remove the four mounting screws, and then remove the card and cable.



24. If you are removing the power cable assembly, perform the following substeps:

- a. Using pliers, gently remove connectors P71, P72, and P73 from the rear of the media module.
- b. Remove the power cable from the plastic cable retainers, and then guide the power cable out of the media module.

#### Bottom View of Media Module



**Note:** If connector P71 on your cable is marked "Fan 4," disregard. This connector connects Fan 7, as shown in the figure above.

## Replacement

Replace in the reverse order.

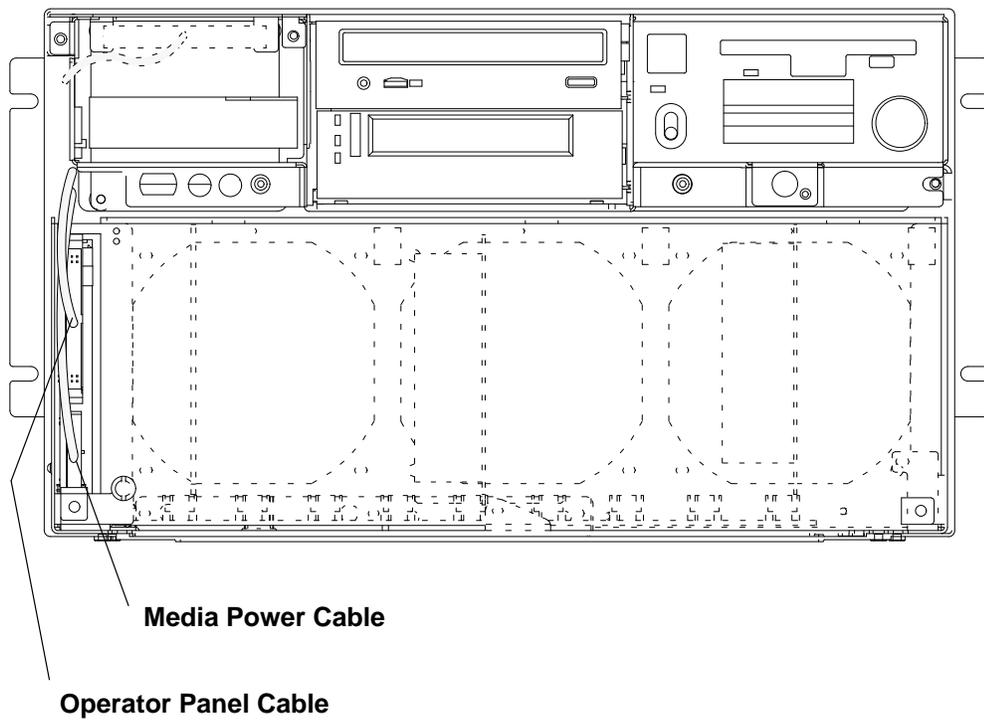
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## CPU Module

### Removal

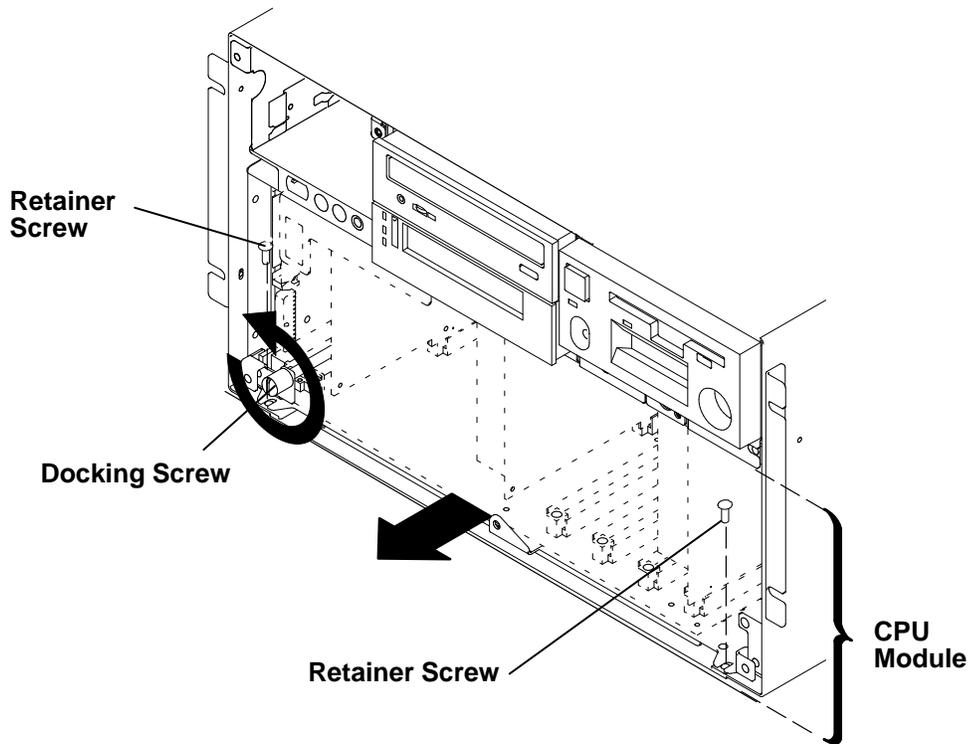
1. Do the "Front Bezel and Front Access Plate" removal procedure on page 4-15.
2. Disconnect the operator panel cable and the media power cable, and then move the cables away from the front of the CPU module.

#### Front View of CPU Enclosure



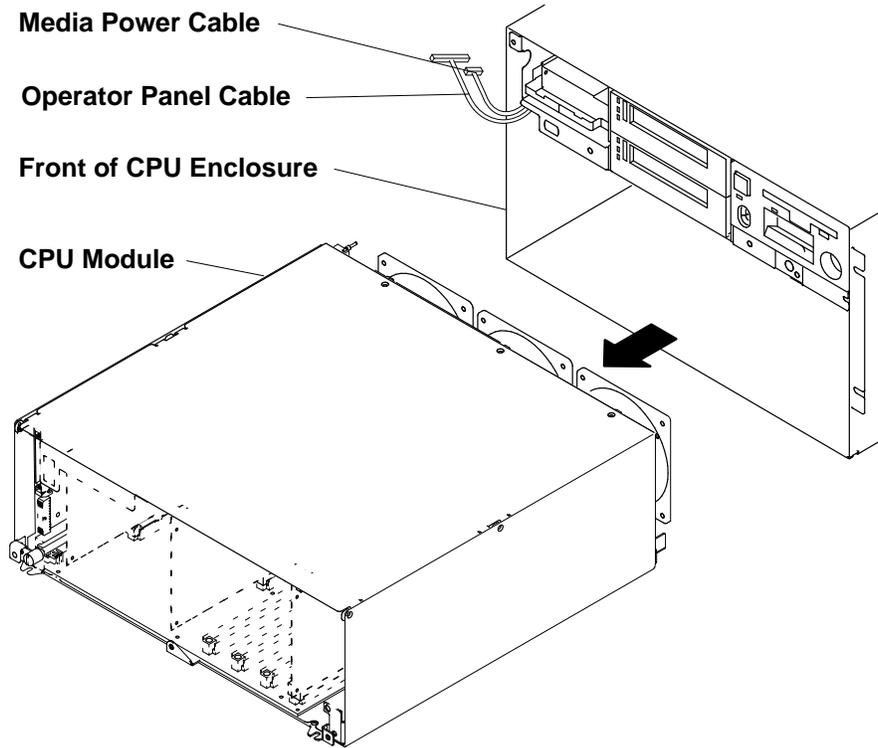
3. Remove the two retainer screws.
4. Loosen the docking screw until the CPU module is disengaged from the I/O planar interface connectors.
5. Grasp the front of the CPU module, and then pull the CPU module toward you until you can grasp the bottom of the CPU module on each side.

#### Front View of CPU Enclosure



**Note:** Make sure that the operator panel cable and the media power cable are placed out of the path of the CPU module.

6. While grasping the bottom of the CPU module on each side, pull the CPU module toward you until it is out of the CPU enclosure, and then place the CPU module on a stable surface.



## Replacement

**Note:** When placing the CPU module in the CPU enclosure, make sure that the operator panel cable and the media power cable are placed out of the path of the CPU module.

1. Grasp the bottom of the CPU module with both hands and slowly slide it into the CPU Enclosure until the threaded tip of the docking screw touches the nut in the I/O module.

**Note:** The CPU module should slide easily into the CPU enclosure until the docking screw touches the nut in the I/O module. At this point, the system planar edge should be approximately 2 mm inside the bottom front edge of the CPU enclosure.

2. Install the docking screw just until the CPU module is far enough into the CPU enclosure to install the two retaining screws.

**Note:** The docking screw should not be fully tightened at this point.

3. Install the two retaining screws but do not tighten them.
4. Tighten the docking screw.
5. Tighten the two retaining screws.

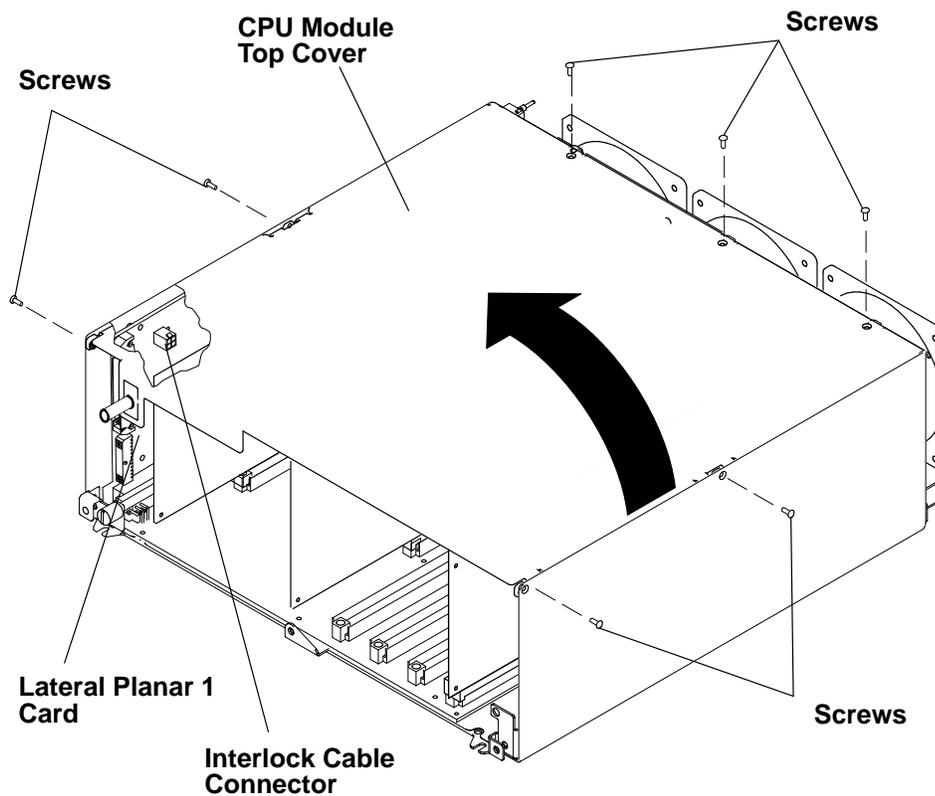
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## Interlock Cable

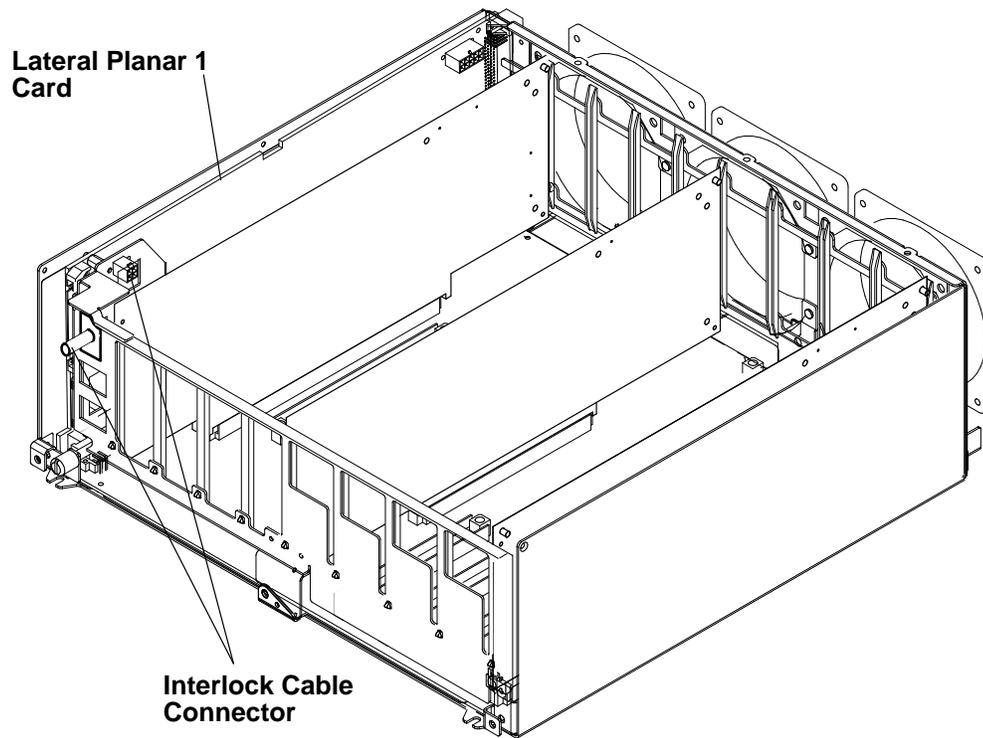
**Note:** Refer to “Handling Static-Sensitive Devices” on page 4-14 before removing or installing memory cards.

### Removal

1. Do the “CPU Module” removal procedure on page 4-39.
2. Remove the seven screws from the CPU module top cover, and then remove the top cover.
3. Disconnect the interlock cable connector:
  - R30 and R40 CPU enclosures: rotate the right side of the top cover upward until you can access the interlock cable connector, and then disconnect it from the lateral planar 1 card.



- R50 CPU Enclosure: disconnect the interlock cable connector from the lateral planar 1 card, and then remove the interlock cable connector from the CPU-module frame.



## Replacement

Replace in the reverse order.

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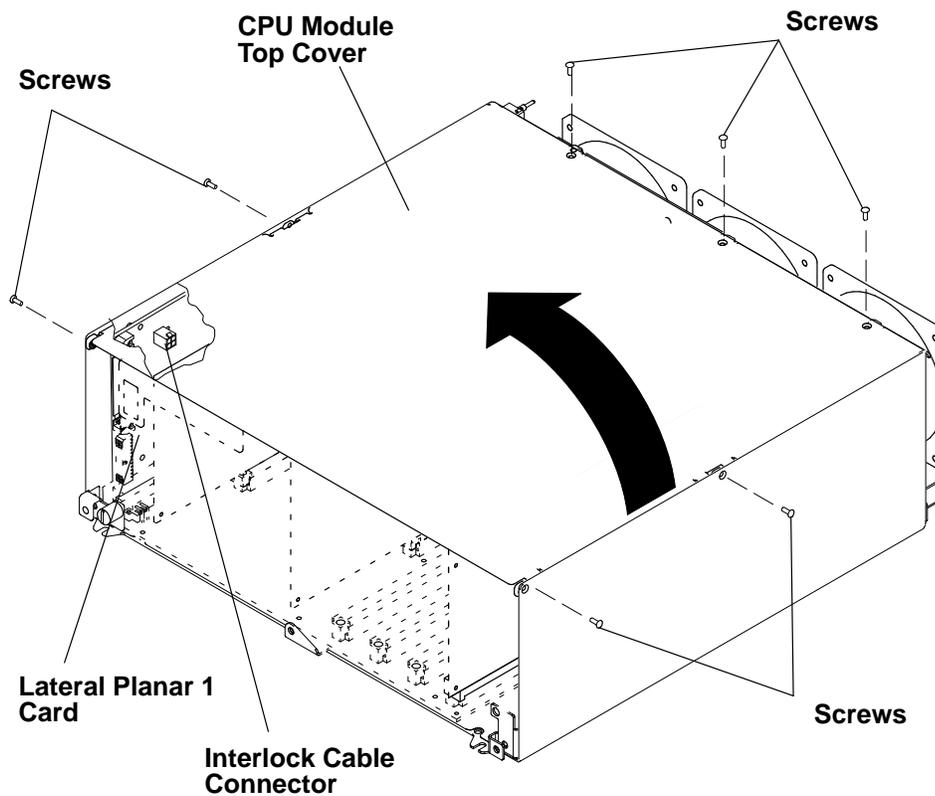
## Memory Card, CPU Card, or I/O Card

**Note:** Refer to “Handling Static-Sensitive Devices” on page 4-14 before removing or installing memory cards.

**Note:** Removing the memory card, CPU card, or I/O card requires using the extraction tools. The extraction tools are stored on the left side of the front access plate.

### Removal

1. Do the “CPU Module” removal procedure on page 4-39.
2. Remove the top cover:
  - R30 and R40 CPU Enclosures: do the “Interlock Cable” removal procedure on page 4-43.
  - R50 CPU Enclosure: remove the seven screws from the CPU module top cover, and then remove the top cover.

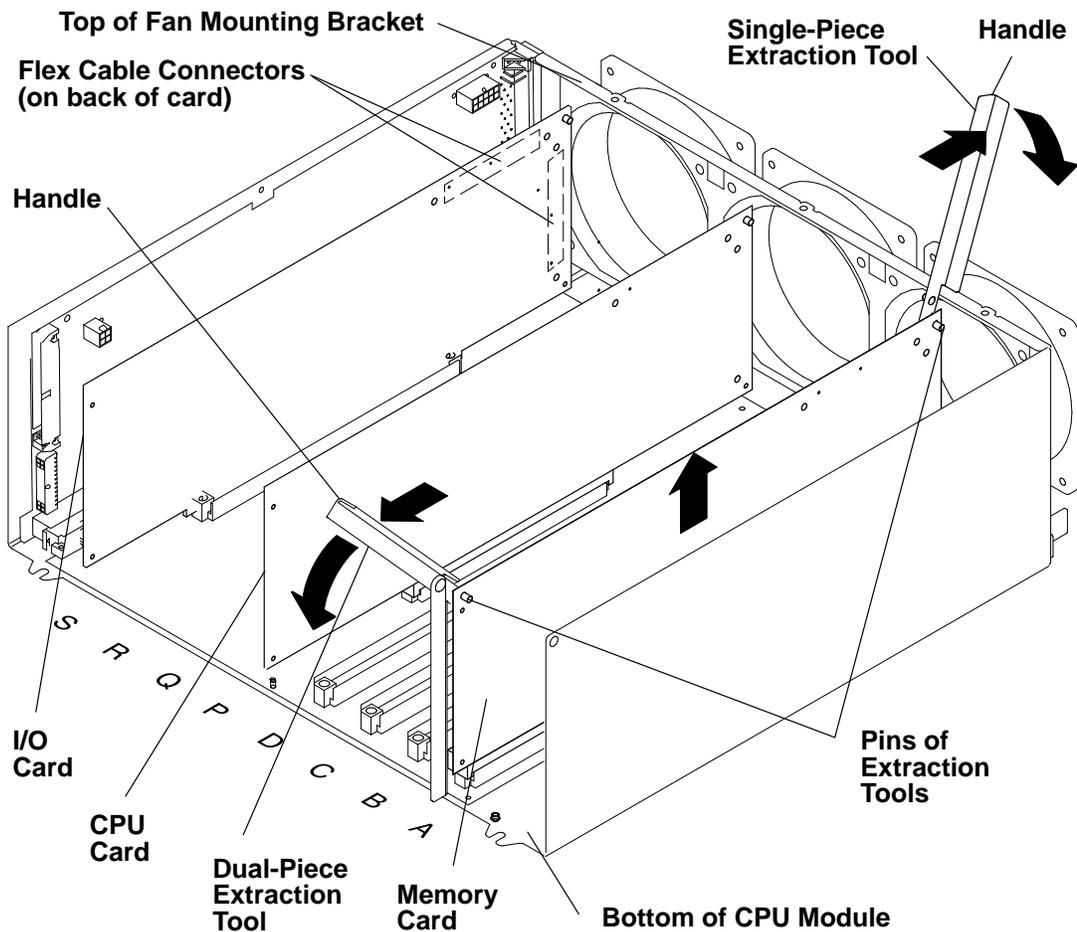


3. If you are removing the I/O card, disconnect both flex cables connected to the I/O card.
4. Locate the card you are removing and position the extraction tools:
  - R30 and R40 CPU enclosures: Position the single-piece extraction tool by placing the pin of the extraction tool through the hole in the top corner of the card you are removing.

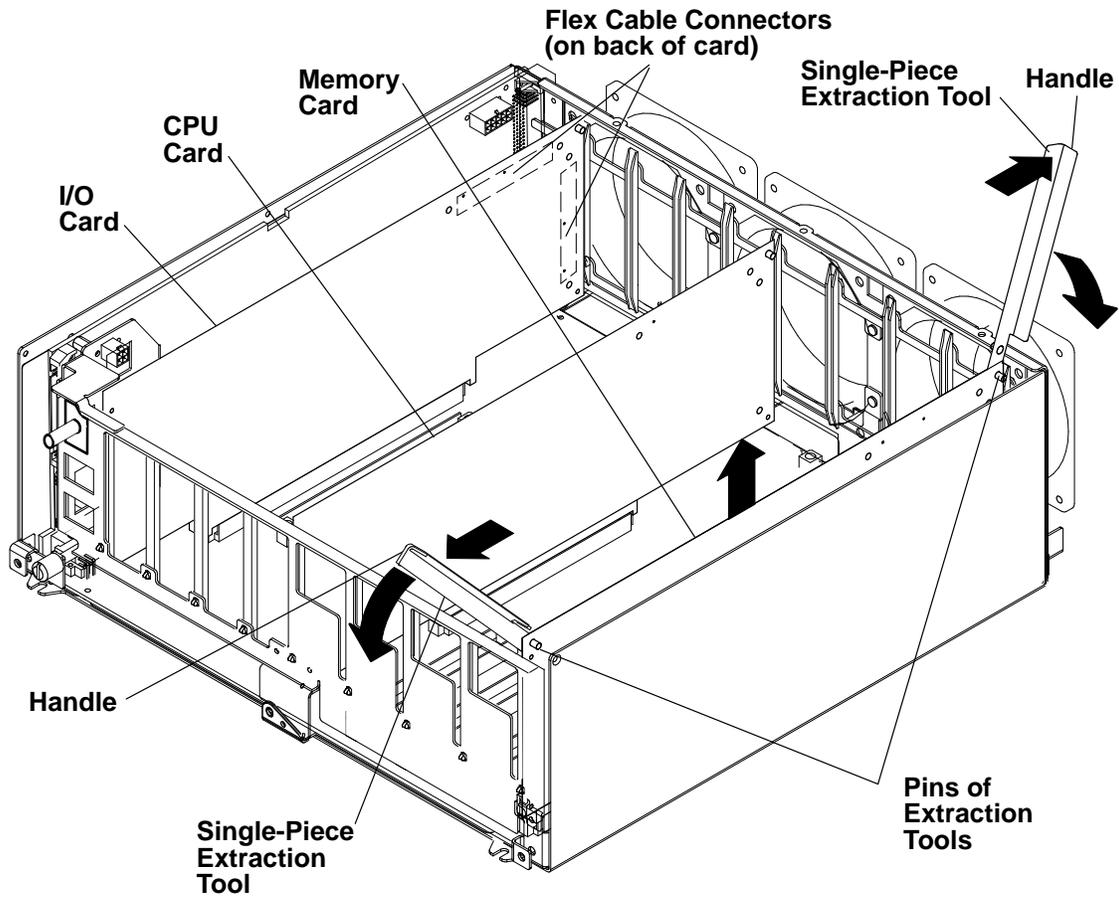
Position the dual-piece extraction tool as follows: Position the pin of the dual-piece extraction tool through the hole in the top corner of the card you are removing.

**Attention:** Ensure that the bottom of the dual-piece extraction tool is placed under the system planar before removing any of the cards. Placing the dual-piece extraction tool on the system planar while removing the cards can damage the system planar.

Place the bottom of the dual-piece extraction tool on the bottom of the CPU module.



- R50 CPU Enclosure: Position single-piece extraction tools on either end of the card you are removing by placing the pin of the extraction tool through the hole in the top corner of the card you are removing.



5. With both extraction tools positioned on the card, firmly rotate both handles of the extraction tools downward until the card disengages from the slot, and then remove the card.
6. If you are removing a single in-line memory module from a memory card, refer to the "Memory module" removal and replacement procedure on page 4-49.

## Replacement

### Notes:

Install the memory cards in a right-to-left sequence beginning with slot A, and then continuing with slots B, C, and D. Memory cards must be installed with no empty slots between installed memory cards.

Install the CPU cards in a right-to-left sequence beginning with slot P, and then continuing with slots Q, R, and S. CPU cards must be installed with no empty slots between installed CPU cards.

See "CPU Enclosure" on page 1-5 for card slot locations.

Replace in the reverse order.

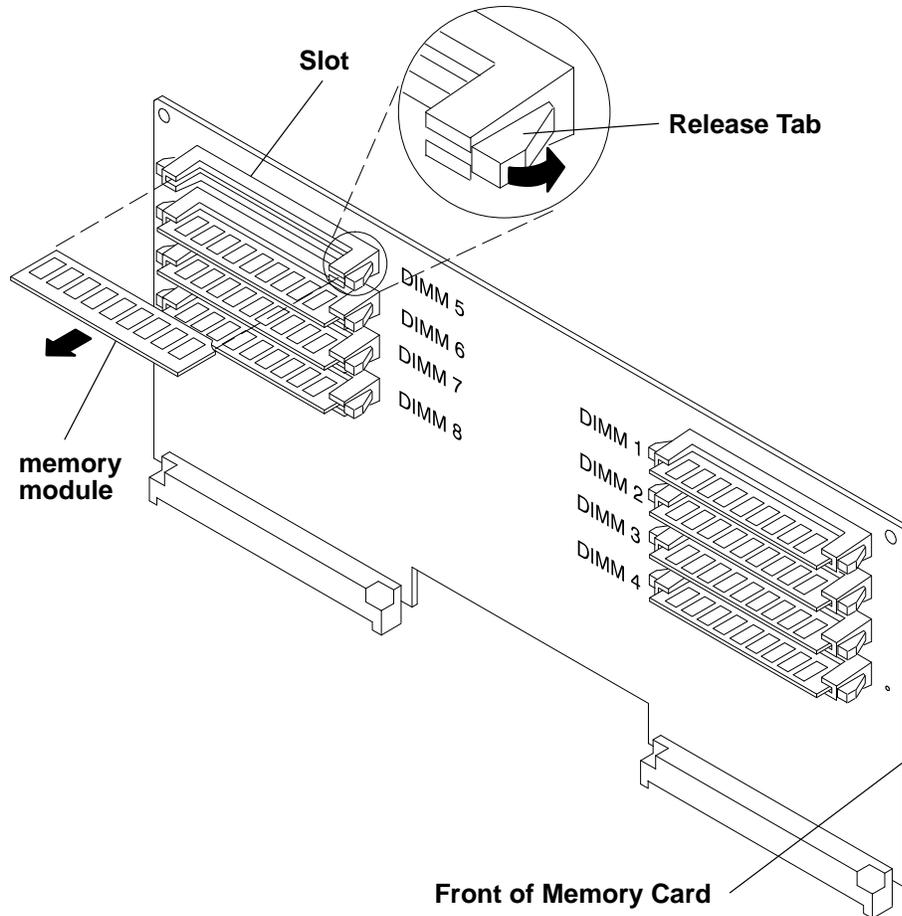
For more information about memory cards and memory types, refer to Appendix C in the *Diagnostic Information For Micro Channel Bus Systems*.

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# Memory Modules

## Removal

1. Remove the memory card from the CPU module, refer to the “Memory Card, CPU Card, or I/O Card” removal procedure on page 4-45.
2. Push the release tabs away from the memory module until the memory module disengages from the slot, and then remove the memory module.



## Replacement

1. Place the memory module in the slot on the memory card, and then press the memory module into the slot until the memory module is firmly seated.
2. Replace the memory card. Refer to the “Memory Card, CPU Card, or I/O Card” procedure on page 4-45.

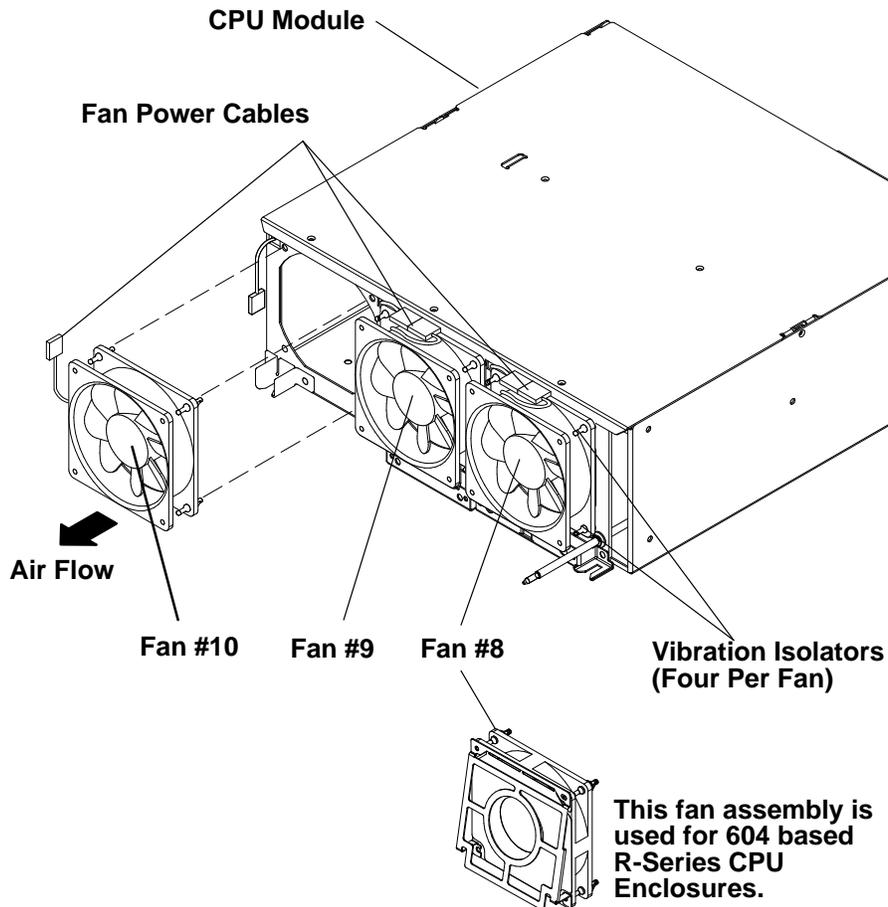
For information about memory type, memory module size, and memory module part numbers, refer to Appendix C in the *Diagnostic Information For Micro Channel Bus Systems*.

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# CPU Module Fans

## Removal

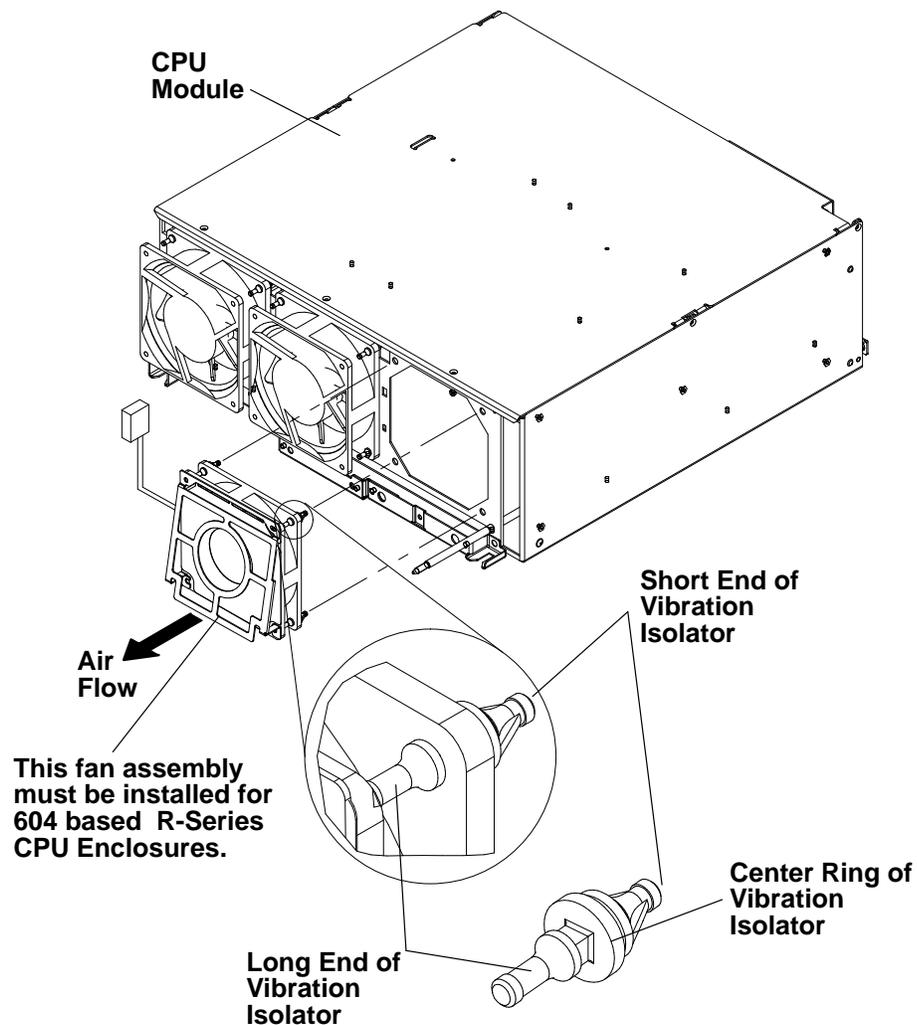
1. Do the "CPU Module" removal procedure on page 4-39.
2. Remove the cable tie holding the fan power cable connector.
3. Disconnect the fan power cable.
4. Remove all four vibration isolators by pulling the fan away from the media module until the vibration isolators disengage from either the fan or the media module.
5. After the four vibration isolators are removed, remove the fan.



## Replacement

To replace the vibration isolators when replacing a fan, do the following:

1. Remove the module top cover and the I/O card, refer to the “Memory Card, CPU Card, or I/O Card” removal procedure on page 4-45.
2. Check the direction of the air flow marked on the fan, and then place the long end of the vibration isolator through the mounting hole of the fan.
3. Pull the long end of the vibration isolator through the mounting hole until the center ring of the vibration isolator is against the fan.
4. Repeat the two previous steps until all four vibration isolators are mounted on the fan.
5. After all four vibration isolators are mounted on the fan, place the short end of each vibration isolator through the mounting holes of the fan mounting bracket.
6. Pull the short end of each vibration isolator through the mounting holes of the fan mounting bracket until the center ring of the vibration isolator is against the bracket.



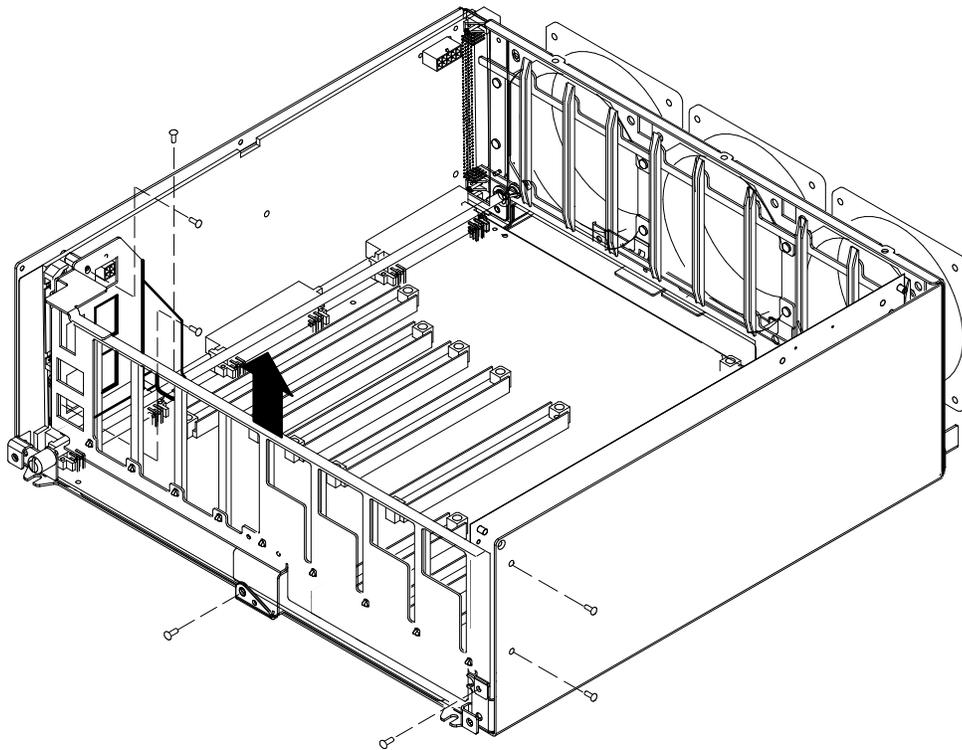
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## System Planar

**Note:** Refer to “Handling Static-Sensitive Devices” on page 4-14 before removing or installing memory cards.

### Removal

1. Do the “interlock Cable Connector” removal procedure on page 4-43.
2. Do the “Memory Card, CPU Card, and I/O Card” removal procedure on page 4-45 to remove all of the memory cards, CPU cards, and I/O card.
3. R50 CPU Enclosures: Remove the seven screws holding the front guide bracket, and then lift the bracket out of the CPU Module.

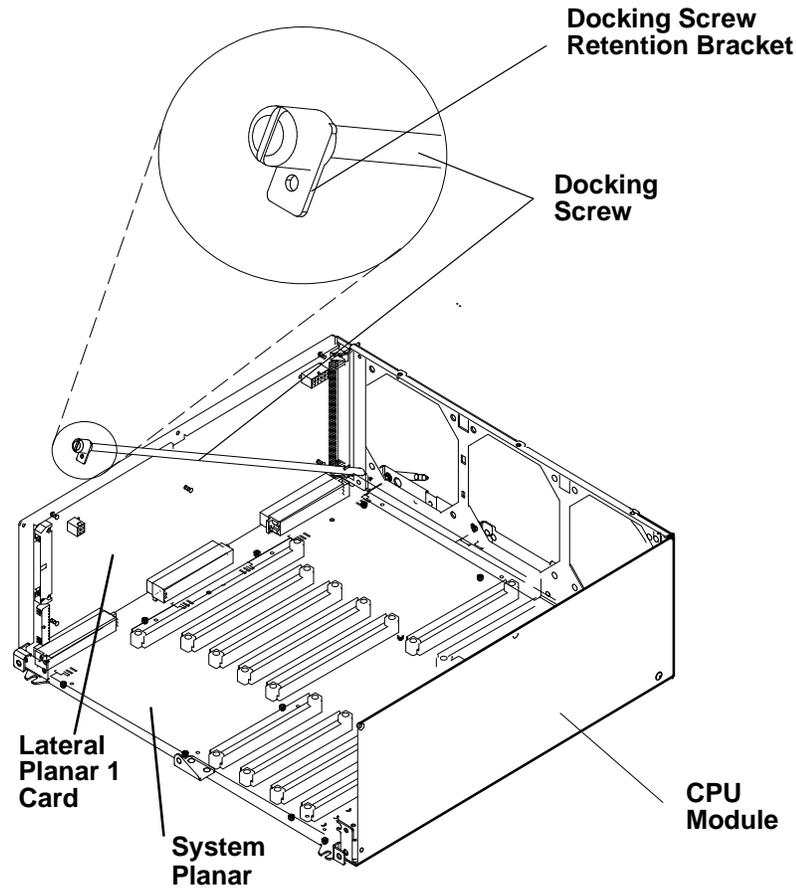


If the CPU enclosure has a docking screw retention bracket, perform the next two steps.

4. Remove the screw holding the docking screw retention bracket.

5. Move the docking screw aside to provide access to the system planar mounting screws.

Go to step 7.



If the CPU module does NOT have a docking screw retention bracket, perform the next step.

6. For earlier versions of the CPU module, remove the docking screw by removing the two retainer clips and the three washers, and then remove the docking screw.

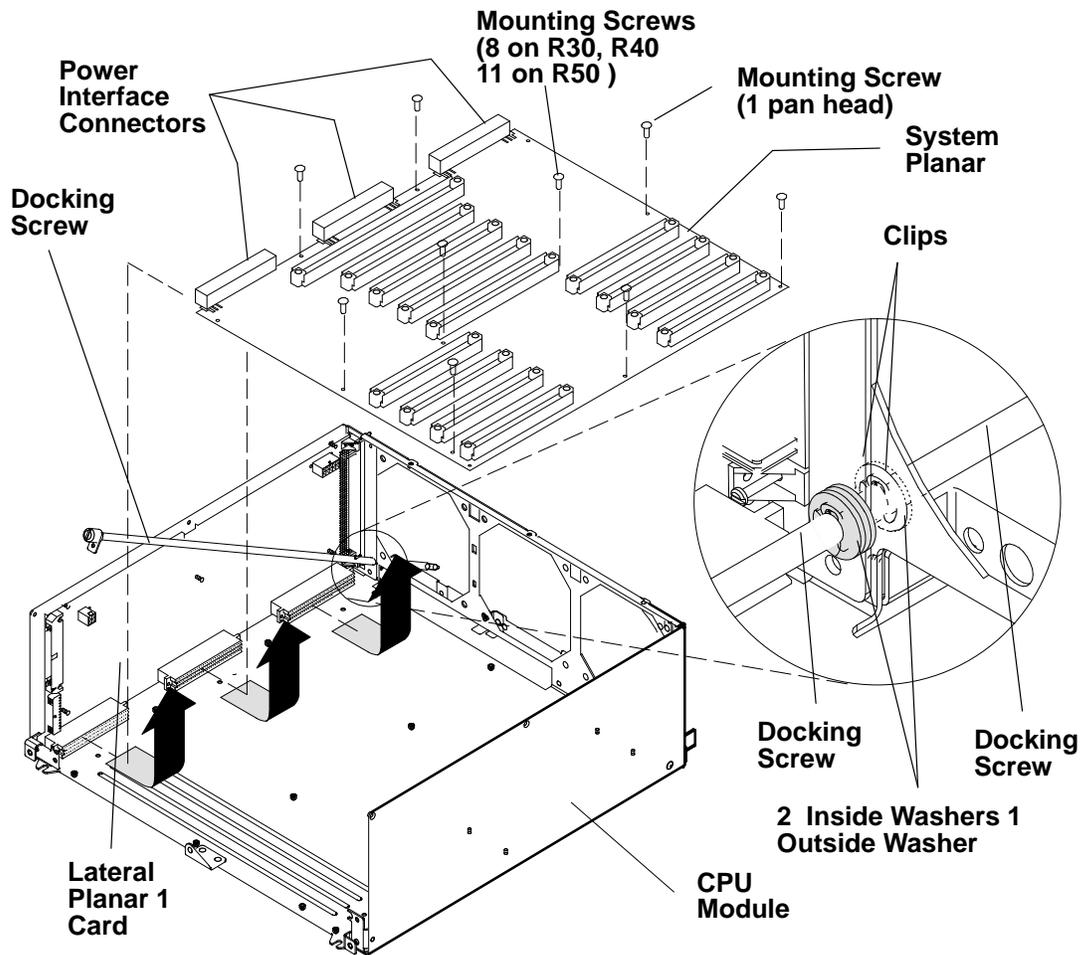
Go to step 7.

7. Remove the flex cable restraint bracket retainer screw and the flex cable restraint bracket from the CPU module.

8. Remove the nine mounting screws (R50 uses 12 screws) attaching the system planar to the CPU module.

9. Grasp the system planar near the three power interface connectors, and then pull the system planar away from the lateral planar 1 card until the system planar disconnects from the lateral planar 1 card; immediately lift the system planar out of the CPU module.

**Attention:** As soon as the system planar is disconnected from the lateral planar 1 card, lift the planar upward to avoid sliding the bottom of the system planar on the CPU module. Sliding the bottom of the system planar on the CPU module can damage the soldered connectors on the bottom of the system planar.



## Replacement

**Note:** Only nine mounting screws are required. If the system planar was installed with 11 mounting screws, two of them may be discarded.

1. Before replacing the system planar in the CPU module, perform the following:

- a. Thread all of the mounting screws into the system planar.
- b. Position the system planar over the mounting holes.

**Note:** Do not tighten any of the system planar mounting screws until all of the screws are installed and are started in the mounting holes.

- c. Thread all of the mounting screws through the system planar and into the mounting holes of the CPU module.
- d. After all of the mounting screws are inserted through the system planar and into the mounting holes, tighten all of the mounting screws.

Replace in the reverse order.

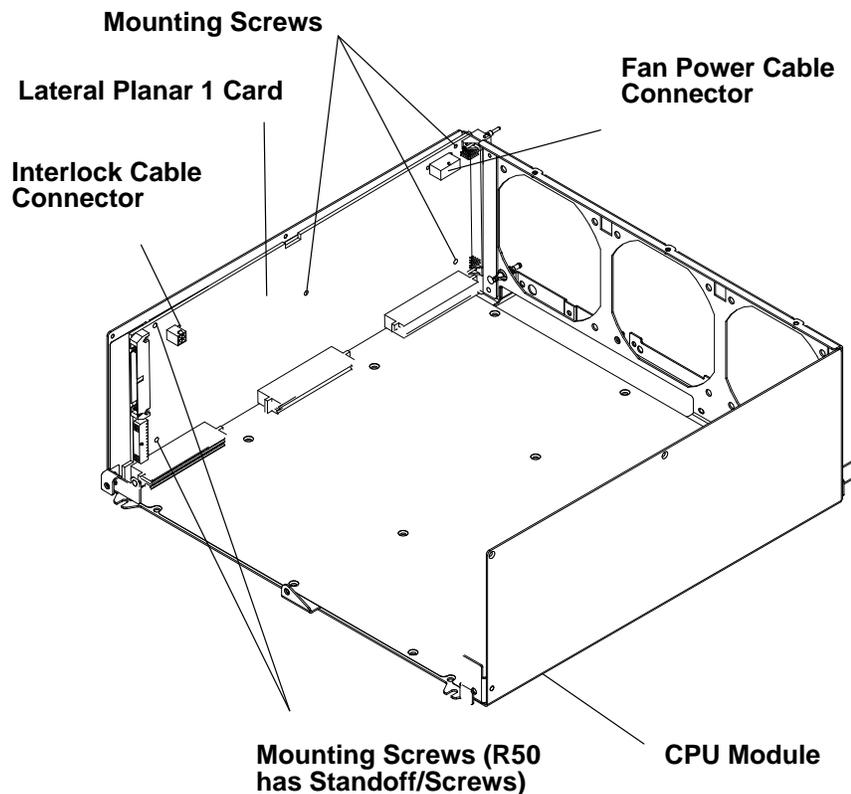
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## Lateral Planar 1 Card

**Note:** Refer to “Handling Static-Sensitive Devices” on page 4-14 before removing or installing memory cards.

### Removal

1. To remove the lateral planar 1 card, perform the following removal procedures:
  - a. The “CPU Module” removal procedure on page 4-39.
  - b. The “Memory Card, CPU Card, or I/O Card” removal procedure on page 4-45 to remove all of the memory cards, CPU cards, and I/O card.
  - c. The “System Planar” removal procedure on page 4-52.
2. Disconnect the fan power cable connector.
3. Remove the five mounting screws (R50 CPU enclosures have three screws, and two standoff/screws) attaching the lateral planar 1 card to the CPU module, and then remove the lateral planar 1 card.



### Replacement

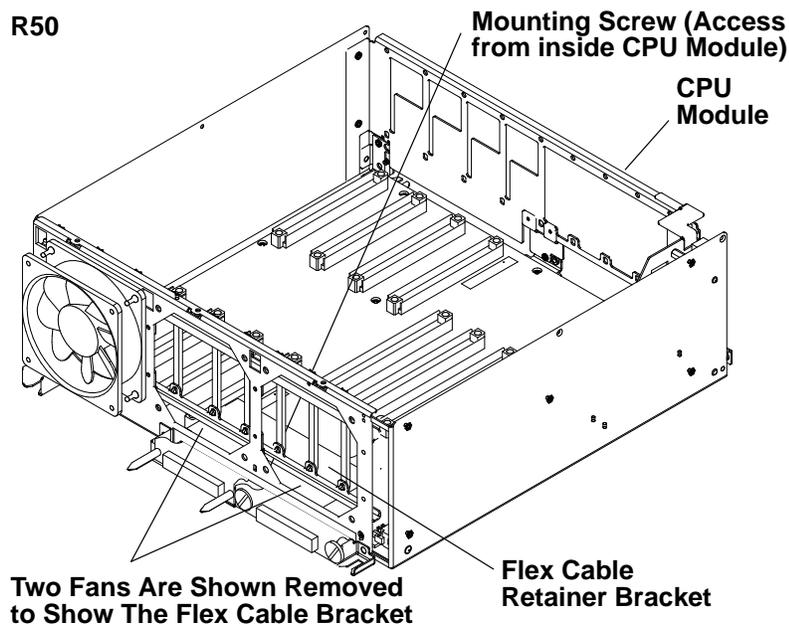
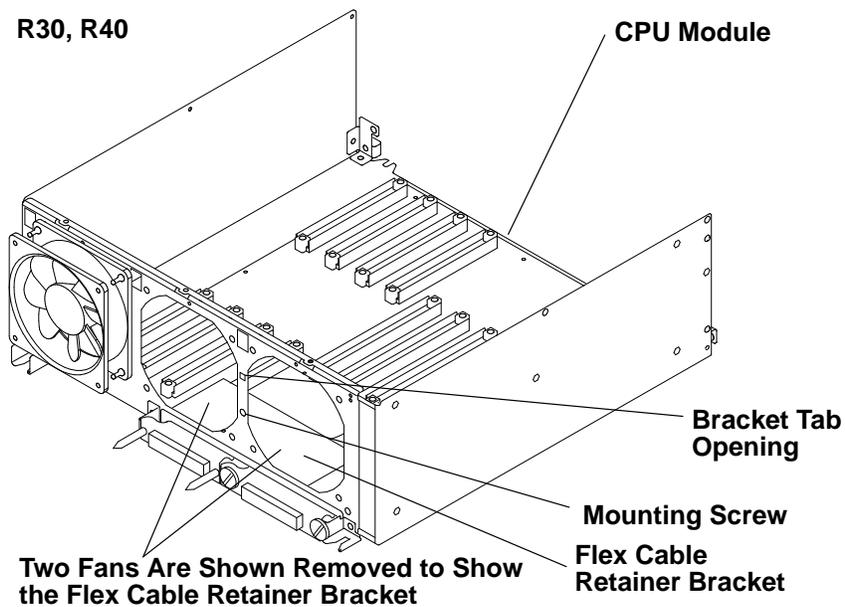
Replace in the reverse order.

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# CPU Module Flex Cables

## Removal

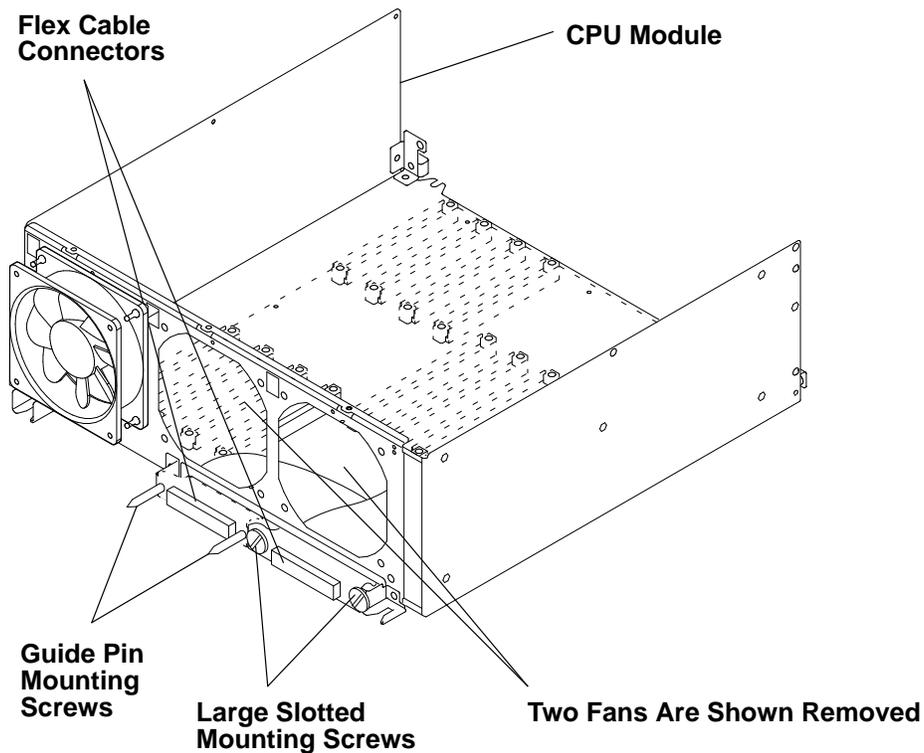
1. Do the "CPU Module" removal procedure on page 4-39.
2. Remove the I/O card and all of the CPU cards. Refer to the "Memory Card, CPU Card, or I/O Card" removal procedure on page 4-45 to remove the I/O card and all of the CPU cards.
3. Remove the mounting screw on the flex cable retainer bracket.
4. Rotate the retainer bracket upwards until you can pull the retainer bracket out of the retainer bracket tab opening, and then remove the retainer bracket.



5. Record the location of the flex cable connectors.
6. If you are removing the flex cable connected to the horizontal connector on the I/O card, remove the two large slotted mounting screws.  
  
If you are removing the flex cable connected to the vertical connector on the I/O card, remove the two guide pin mounting screws.

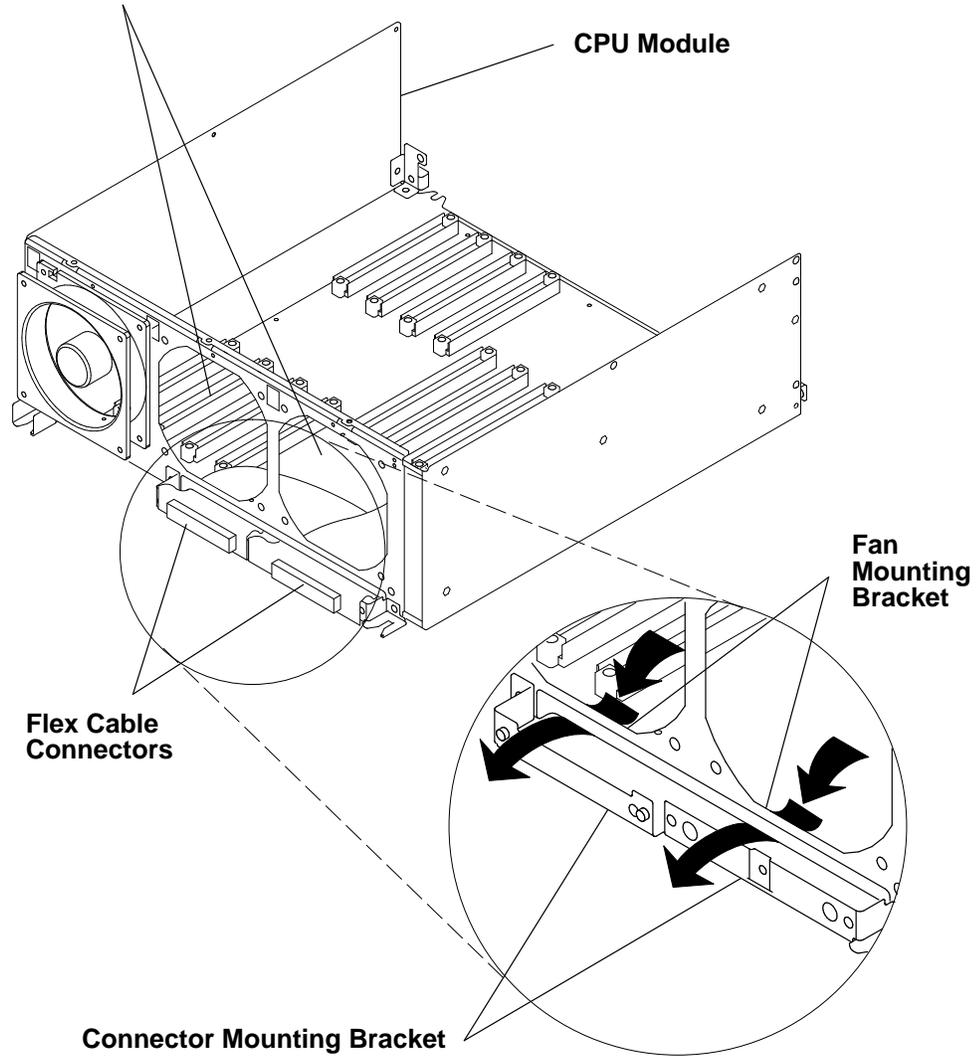
**Attention:** To prevent damage to the pins, do not use pliers to remove the two guide pin mounting screws, use an open-end wrench.

7. Remove the fan located above the flex cable connector you are removing. Refer to the "CPU Module Fans" removal procedure on page 4-50.



8. Guide the flex cable you are removing over the connector mounting bracket, and then guide the I/O card connector end under the fan mounting bracket; remove the flex cable.

### Two Fans Are Shown Removed



### Replacement

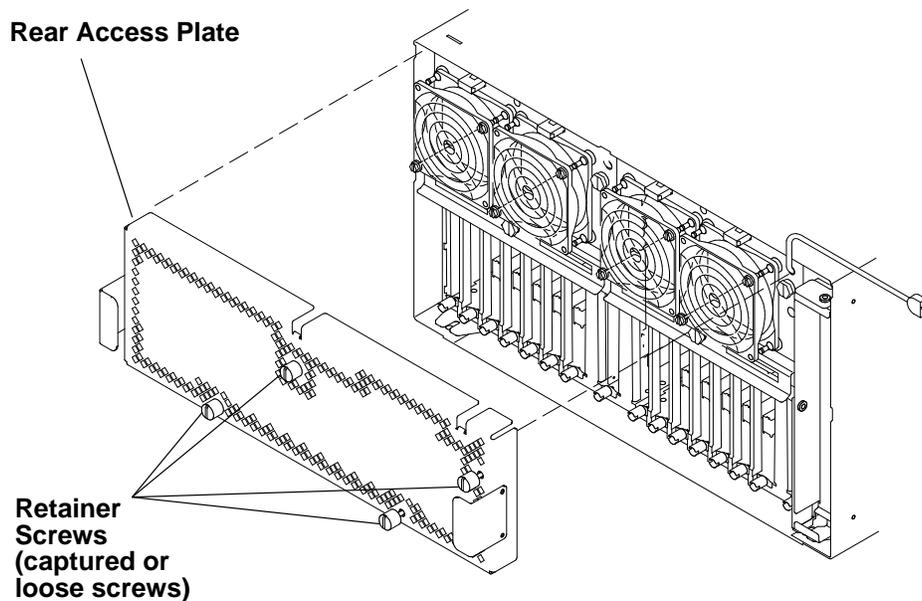
Replace in the reverse order.

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## Rear Access Plate

### Removal

1. Depending on the power distribution in your rack, do one of the following:
  - “Power-Off Procedure with a Power Distribution Bus” on page 4-2.
  - “Power-Off Procedure with a Power Distribution Unit” on page 4-5.
  - “Power-Off Procedure with a Power Distribution Panel” on page 4-9.
2. Loosen the four retainer screws until the screws disengage from the CPU enclosure, and then pull the rear access plate away from the CPU enclosure.



### Replacement

#### Notes:

1. Ensure that the grounding strips located around the edges of the rear access plate are firmly attached and in place before replacing the rear access plate.
  2. Do not over tighten the four retainer screws on the rear access plate.
1. Replace in the reverse order.
  2. Depending on the power distribution in your rack, do one of the following Power-On procedures:
    - “Power-On Procedure with a Power Distribution Bus” on page 4-4.
    - “Power-On Procedure with a Power Distribution Unit” on page 4-7.
    - “Power-On Procedure with a Power Distribution Panel” on page 4-11.

# Power Supply or Cooling Unit for Systems

**Attention:** If your system has the capability to change power supplies while the system power is applied (R40, R50), see “Removal and Replacement While System Power is Applied” on page 4-62.

## Removal While System Power is Removed

The power supply position farthest from the system interface board can contain either an optional power supply or a cooling unit.

### DANGER

**Do not attempt to open the covers of the power supply. The power supply is not serviceable and is to be replaced as a unit.**

**Notes:**For a translation of these notices, refer to the *System Unit Safety Information* manual, form number SA23-2652.

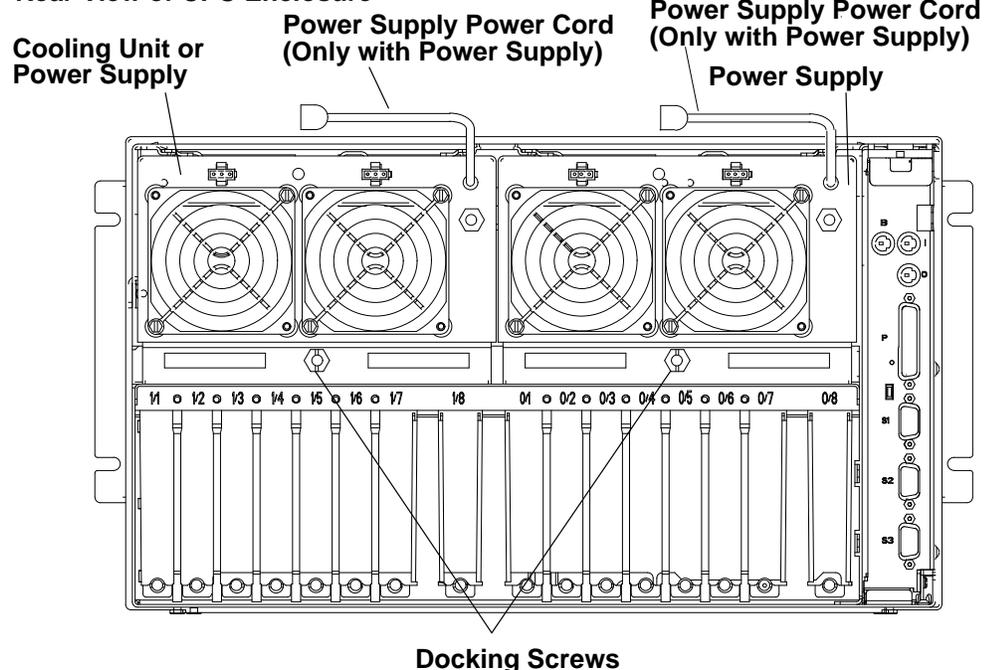
1. Perform the “Rear Access Plate” removal procedure on page 4-60.

**Note:** The power distribution system in the 7015 Model R00 rack can contain either a power distribution bus, power distribution unit, or a power distribution panel.

**Attention:** This unit may have more than one power supply cord. To completely remove power, you must disconnect all power supply cords.

2. If you are removing the power supply, disconnect the power supply power cord from the power distribution system installed in your rack.
3. Loosen the docking screw until the screw is disengaged.
4. Slowly pull the power supply or cooling unit toward you until you can place a hand under it for support, and then remove the power supply or cooling unit from the CPU enclosure.

### Rear View of CPU Enclosure



## Replacement

**Attention:** Ensure that you complete the replacement of the power supply before plugging in the power supply power cord. Plugging in the power cord before completing the power supply replacement can cause possible data loss.

Replace in the reverse order.

## Removal and Replacement While System Power is Applied

**Attention:** If system power must be removed before the power supply can be removed, see “Removal While System Power is Removed” on page 4-61.

### Replacing a Failed Power Supply

**Attention:** This procedure is for 7015 Models R40 or R50 only. The 7015 Model R30 CPU Enclosure does not have hot plug capability and must be powered off before adding or removing power supplies.

When you see the following message:

*Broadcast message from UNKNOWN@localhost (tty) at 16:55:22 ...*

*rc.powerfail: init has received a SIGPWR signal.*

*The system is now operating with a power problem. ...*

Inspect the LED for the power supplies. If an LED is out, then you should suspect a malfunctioning power supply.

1. Disconnect the AC line cord from the malfunctioning power supply.
2. Loosen the mounting screw of the disconnected power supply.

A shutdown timer starts once the power supply is disengaged. The power supply must be replaced within eight minutes. The timer is started or restarted each time the power supply is disengaged. The timer is stopped and reset when the power supply is engaged.

At this point the following messages appear:

*.Broadcast message from UNKNOWN@localhost (tty) at 16:56:25 ...*

*rc.powerfail: init has received a SIGPWR signal.*

*The system has no backup cooling .*

*The system will shut down in 8 minutes unless the problem is resolved before then. Execute rc.powerfail -h as the root user for more information. ....*

*Broadcast message from UNKNOWN@localhost (tty) at 16:56:30 ...*

*rc.powerfail: The system will shut down in 8 minutes.*

*The system will shut down because either a fan failure has occurred or the system is running on battery backup power. ....*

At the same time the fans of the remaining power supplies increase in speed.

3. Remove the disconnected power supply.
4. Insert the new power supply.

5. Tighten the mounting bolt of the new power supply.

As you tighten the bolt the SIB LED turns off. When the bolt is sufficiently tightened, the SIB LED lights, the fans return to normal speed and the following messages appear:

**Note:** These messages may take several minutes to appear.

*.Broadcast message from UNKNOWN@localhost (tty) at 16:58:29 ...*

*rc.powerfail: The power status has changed.  
The system shutdown has been canceled. ....*

*Broadcast message from UNKNOWN@localhost (tty) at 16:58:29 ...*

*rc.powerfail: init has received a SIGPWR signal.  
The system is now operating without backup power. ....*

6. Reconnect AC line of new power supply.

The LED of the new power supply comes on.  
SIB LED comes on.

**Note:** These messages may take several minutes to appear.

*.Broadcast message from UNKNOWN@localhost (tty) at 16:59:24 ...*

*rc.powerfail: init has received a SIGPWR signal.  
The power status is currently 0.  
The system may power down immediately.  
Execute rc.powerfail -h as the root user for more information. ....*

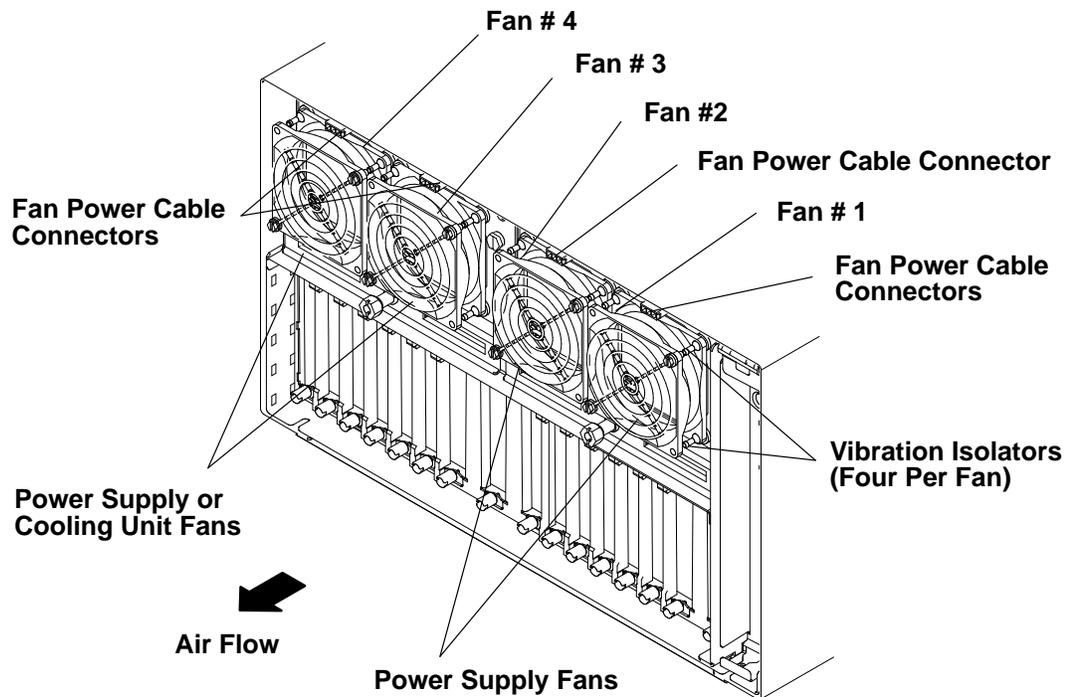
---

# Power Supply Fan or Cooling Unit Fan

## Removal

1. Do the "Rear Access Plate" removal procedure on page 4-60.
2. Disconnect the power cable connector for the power supply fan or the cooling unit fan you are removing.
3. Remove all four vibration isolators by pulling the fan away from the power supply or cooling unit until the vibration isolators disengage from either the fan, power supply, or cooling unit.

### Rear View of CPU Enclosure



**Note:** If a cooling unit is installed in the optional power supply position, Fan #4 and Fan #3 are reversed.

## Replacement

**Note:** Check the air flow direction on the fan before replacing the fan.  
Replace in the reverse order.

---

## System Interface Board (SIB)

**Attention:** Lateral planar 2 and system interface board (SIB) EEPROMs contain the SYSID of the system. When one of the two components is to be replaced (for example the Lateral Planar 2), the SYSID information is copied from SIB EEPROM into the lateral planar 2 EEPROM when you start the system.

To avoid losing this information, it is not possible to replace both components at the same time.

When both components are to be replaced, proceed as follows:

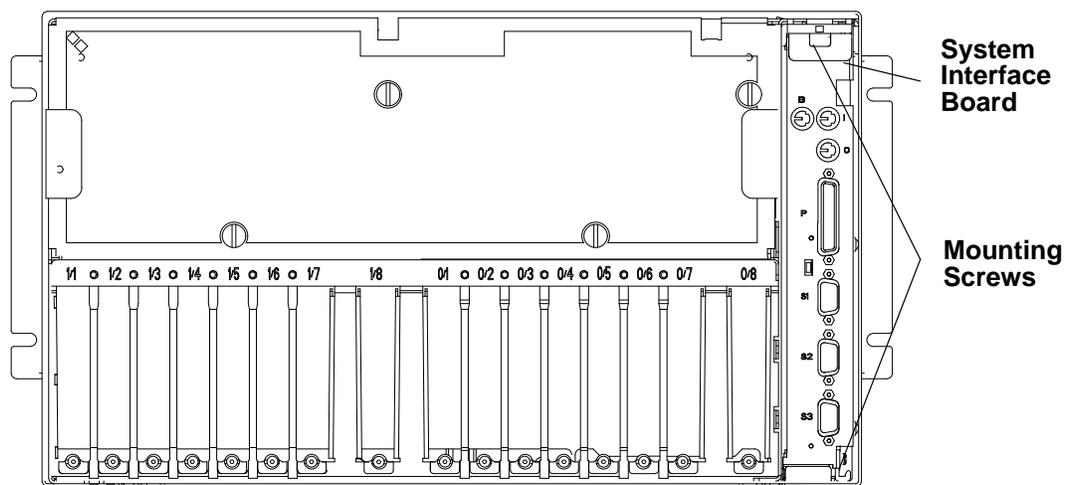
1. First substitute the SIB and start up the system: the SYSID information is copied from the lateral planar 2 EEPROM to the SIB EEPROM.
2. Substitute the lateral planar 2 and start up the system: the SYSID information is copied from SIB EEPROM to the Lateral Planar 2 EEPROM.

**Note:** Refer to “Handling Static-Sensitive Devices” on page 4-14 before removing or installing the SIB.

## Removal

1. Depending on the type of power distribution in your rack, do one of the following:
  - “Power-Off Procedure with a Power Distribution Bus” on page 4-2.
  - “Power-Off Procedure with a Power Distribution Unit” on page 4-5.
  - “Power-Off Procedure with a Power Distribution Panel” on page 4-9.
2. Remove the two mounting screws.
3. Pull the SIB toward you until the SIB disengages, and then remove it from the CPU enclosure.

### Rear View of CPU Enclosure



## Replacement

**Note:** Before replacing the SIB in the I/O module, make sure the SIB is placed correctly on the guide rails.

1. Replace in the reverse order.
2. Depending on the power distribution in your rack, do one of the following Power-On procedures:
  - “Power-On Procedure with a Power Distribution Bus” on page 4-4.
  - “Power-On Procedure with a Power Distribution Unit” on page 4-7.
  - “Power-On Procedure with a Power Distribution Panel” on page 4-11.

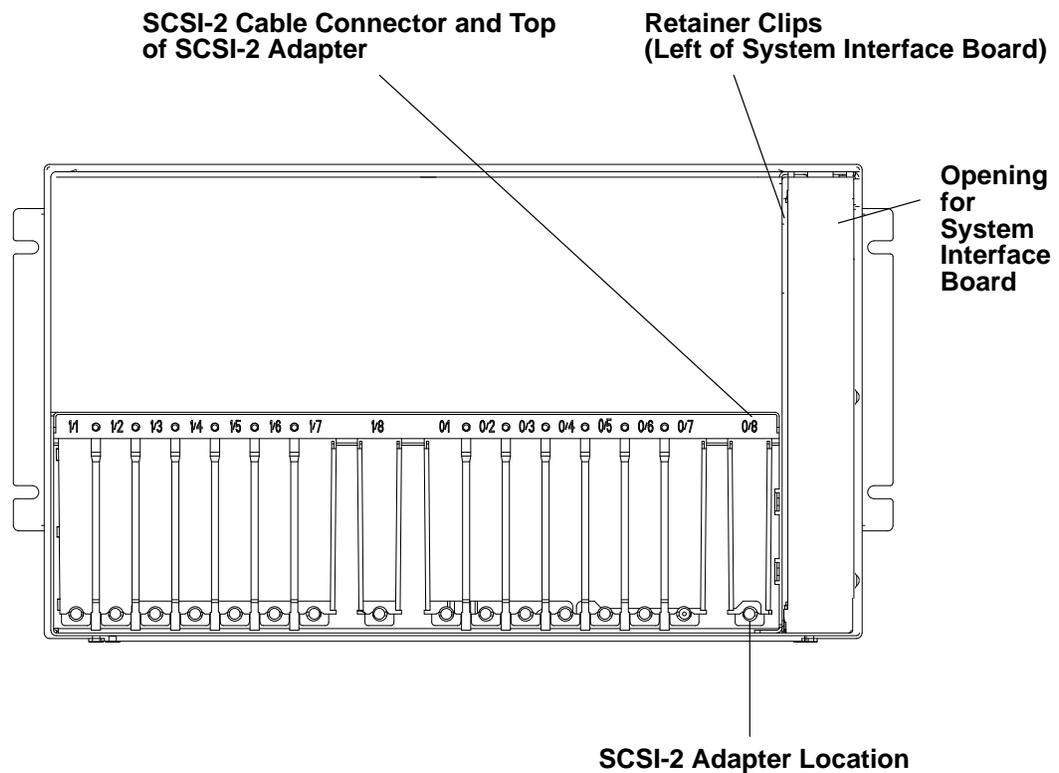
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## I/O Module

### Removal

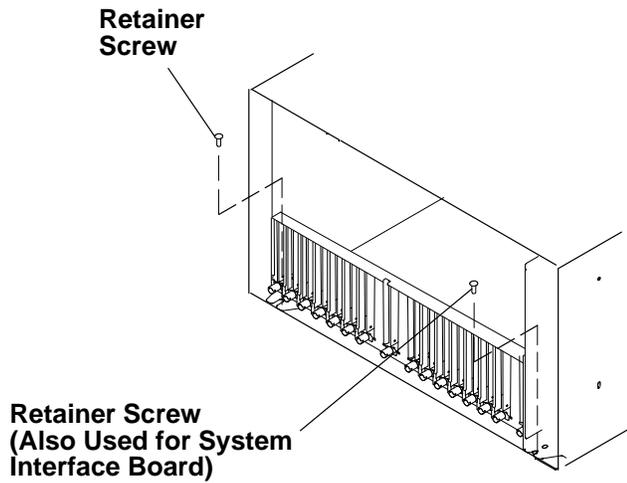
1. Depending on the type of power distribution in your rack, do one of the following:
  - “Power-Off Procedure with a Power Distribution Bus” on page 4-2.
  - “Power-Off Procedure with a Power Distribution Unit” on page 4-5.
  - “Power-Off Procedure with a Power Distribution Panel” on page 4-9.
2. Do the “Adapter Cable” removal procedure on page 4-73.
3. Remove the cooling unit and the power supply. Refer to the “Power Supply or Cooling Unit” removal procedure on page 4-61 for information about removing the cooling unit and the power supply.
4. Do the “System Interface Board” removal procedure on page 4-65.
5. Disconnect the SCSI-2 cable connector from the SCSI-2 adapter.
6. Remove the SCSI-2 cable from the retainer clips by pulling the cable downward, and then guide the SCSI cable through the opening for system interface board and out the I/O module.

#### Rear View of CPU Enclosure



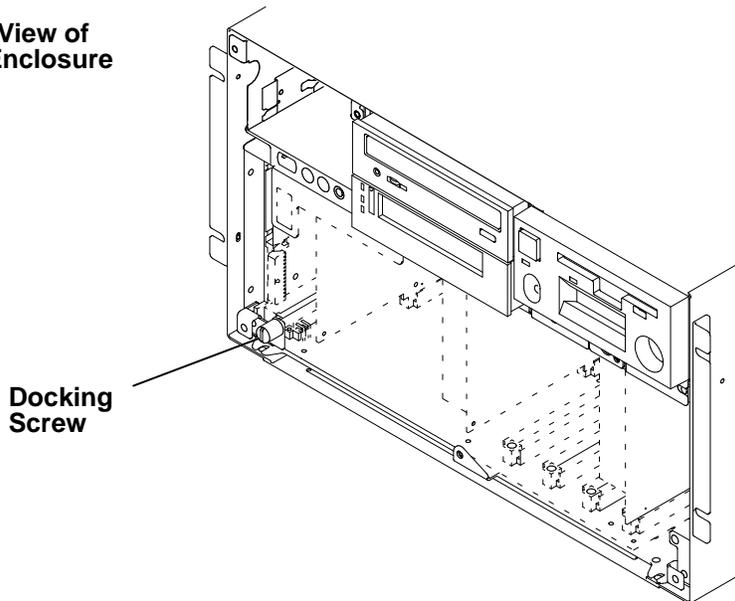
**Note:** The retainer screw on your right is also one of the retainer screws for attaching the system interface board in the I/O module.

7. Remove the remaining retainer screw.

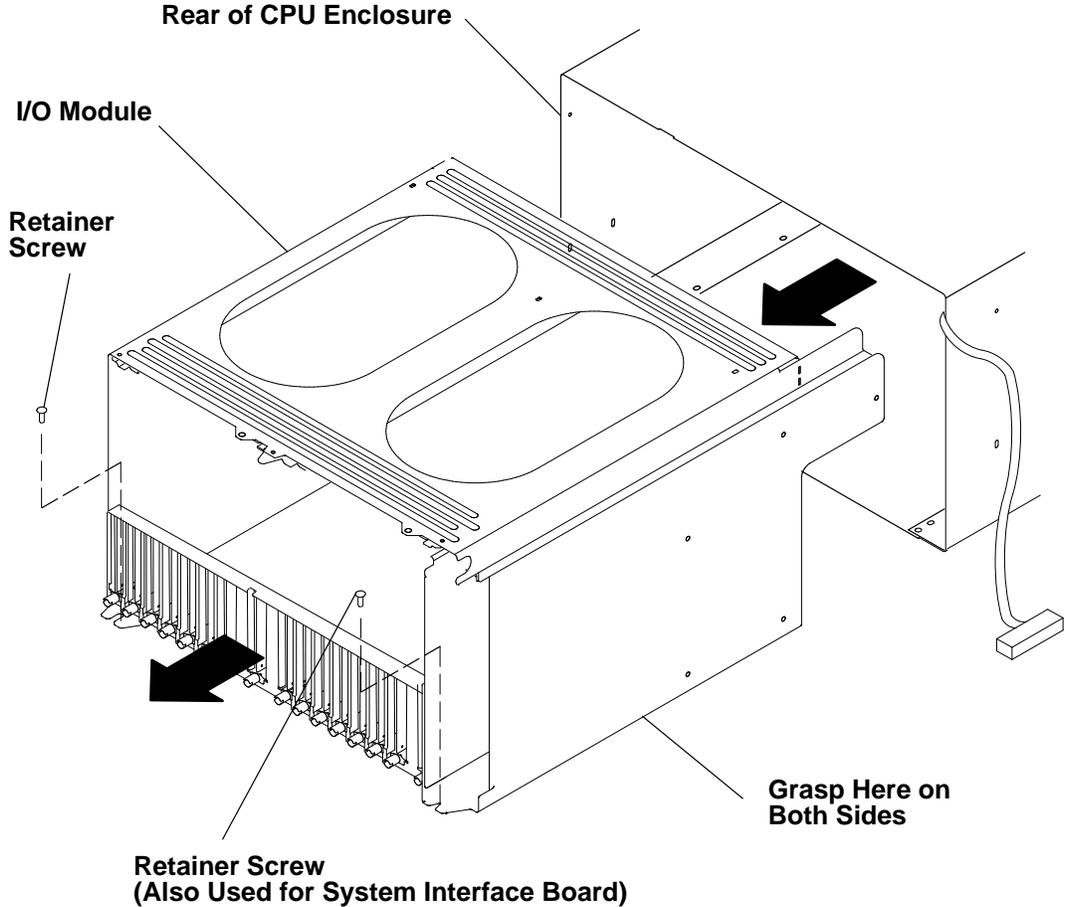


8. Do the "Front Bezel and Front Access Plate" removal procedure on page 4-15.
9. Loosen the docking screw on the front of the CPU module until the I/O module disengages.

**Front View of CPU Enclosure**



- 10. Slide the I/O module toward you until you can grasp the bottom of the I/O module on both sides, and then remove the I/O module from the CPU enclosure.
- 11. Place the I/O module on a stable surface.



## Replacement

1. Grasp the bottom of the I/O module with both hands and slowly slide it into the CPU enclosure until the nut on the I/O module touches the tip of the docking screw on the CPU module.

**Note:** The I/O module should easily slide into the CPU enclosure until it touches the docking screw. When this occurs, the bottom rear edge of the I/O module should be approximately 9mm outside the bottom rear edge of the CPU enclosure.

2. Turn the docking screw just until the I/O module is pulled far enough into the enclosure to install the two retaining screws.
3. Install the two retaining screws but do not tighten them.
4. Tighten the docking screw.
5. Tighten the two retaining screws.
6. Guide the SCSI-2 cable in the I/O module and through the opening for the system interface board.
7. Connect the SCSI-2 cable connector to the SCSI-2 adapter.
8. Do the "System Interface Board" replacement procedure on page 4-65.
9. Install the cooling unit and the power supply. Refer to the "Power Supply or Cooling Unit" replacement procedure on page 4-61 for information about replacing the cooling unit and the power supply.
10. Do the "Adapter Cable" replacement procedure on page 4-73.
11. Depending on the power distribution in your rack, do one of the following Power-On procedures:
  - "Power-On Procedure with a Power Distribution Bus" on page 4-4
  - "Power-On Procedure with a Power Distribution Unit" on page 4-7
  - "Power-On Procedure with a Power Distribution Panel" on page 4-11.

---

## Lateral Planar 2 Card

**Attention:** After the lateral planar 2 card is installed and the system is powered-up, the system ID is down-loaded to the lateral planar 2 card from a backup source within the system. This ID becomes permanent on the lateral planar 2 and cannot be altered without special tools. Therefore, the lateral planar 2 cannot be transferred to another system. It must be returned to the plant of manufacture as a new defective part.

**Attention:** Lateral planar 2 and SIB EEPROMs contain the SYSID of the system. When one of the two components is to be replaced (for example the lateral planar 2), the SYSID information is copied from SIB EEPROM into the lateral planar 2 EEPROM when you start the system.

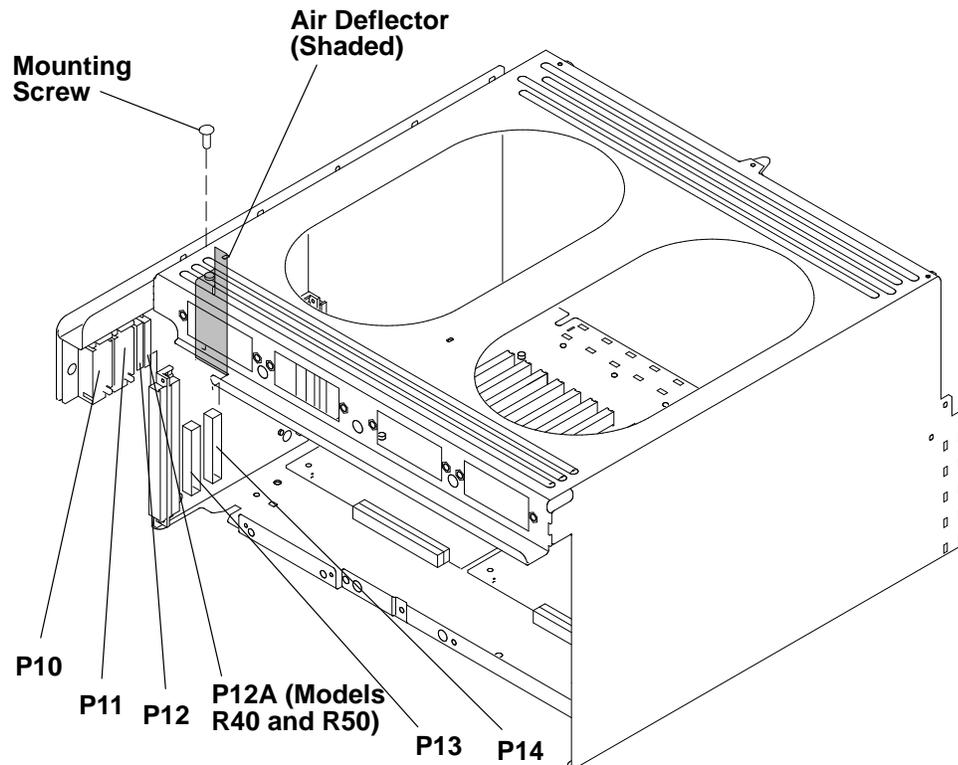
To avoid losing this information, it is not possible to replace both components at the same time.

When both components are to be replaced, proceed as follows:

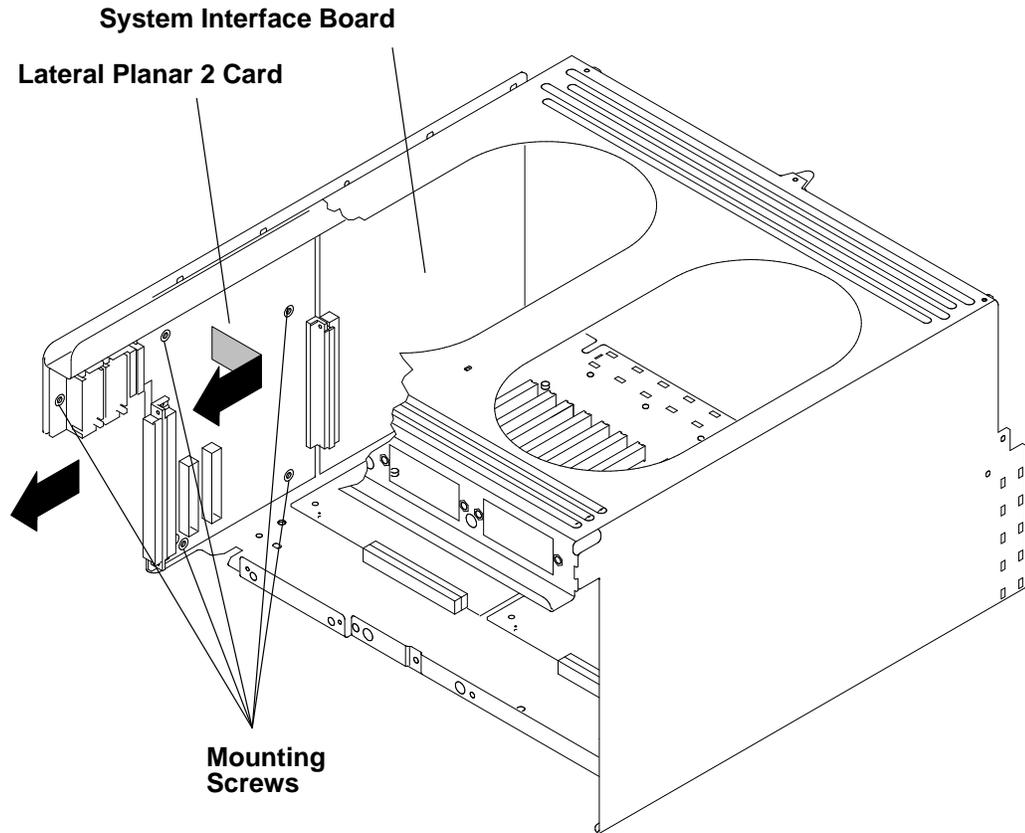
1. First substitute the SIB and start up the system: the SYSID information is copied from lateral planar 2 EEPROM to the SIB EEPROM.
2. Substitute the lateral planar 2 and start up the system: the SYSID information is copied from SIB EEPROM to the lateral planar 2 EEPROM.

## Removal

1. Perform the "I/O Module" removal procedure on page 4-67.
2. Disconnect connectors P10, P11, P12, P12A, P13, and P14.
3. Remove the mounting screw holding the air deflector, and then remove the air deflector.



4. Remove the system interface board. Refer to the "System Interface Board" removal procedure on page 4-65 for information about removing the system interface board.
5. Remove the five mounting screws.
6. Pull the lateral planar 2 card away from the side of the I/O module, and then remove the lateral planar 2 card from the I/O module.



## Replacement

Replace in the reverse order.

---

## Adapter Cable

**Note:** For a translation of this notice, see the *System Unit Safety Information* manual, form number SA23-2629.

### **DANGER**

**An electrical outlet that is not correctly wired could place hazardous voltage on metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock.**

**Before installing or removing signal cables, ensure that the power cables for the system unit and all attached devices are unplugged.**

**When adding or removing any additional devices to or from the system, ensure that the power cables for those devices are unplugged before the signal cables are connected. If possible, disconnect all power cables from the existing system before you add a device.**

**Use one hand, when possible, to connect or disconnect signal cables to prevent a possible shock from touching two surfaces with different electrical potentials.**

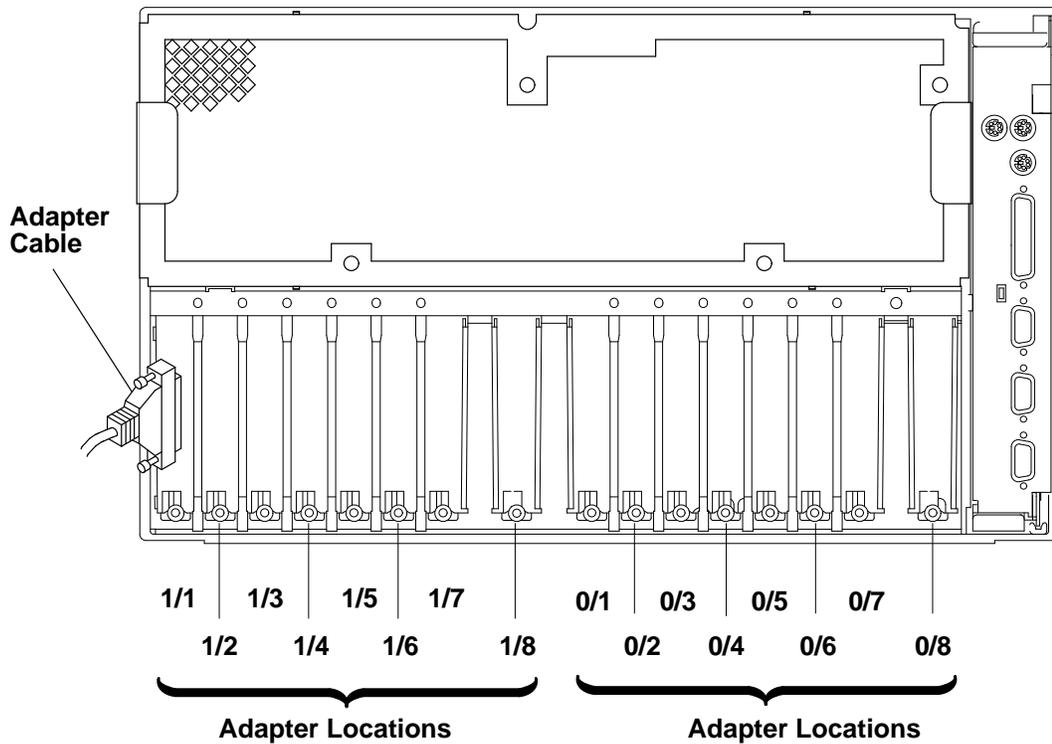
**During an electrical storm, do not connect cables for display stations, printers, telephones, or station protectors for communications lines.**

## Removal

1. Depending on the type of power distribution in your rack, do one of the following:
  - “Power-Off Procedure with a Power Distribution Bus” on page 4-2.
  - “Power-Off Procedure with a Power Distribution Unit” on page 4-5.
  - “Power-Off Procedure with a Power Distribution Panel” on page 4-9.

2. Record the location and label each adapter cable being removed.
3. To remove the adapter cable, do either of the following:
  - a. If screws are used to connect the adapter cable connector to the adapter, loosen the two screws, and then remove the cable.
  - b. If retainer clips are used to connect the adapter cable connector to the adapter, rotate the clips away from the cable connector, and then remove the cable.

### Rear View of CPU Enclosure



### Replacement

1. Replace in the reverse order.
2. Depending on the power distribution in your rack, do one of the following Power-On procedures:
  - “Power-On Procedure with a Power Distribution Bus” on page 4-4.
  - “Power-On Procedure with a Power Distribution Unit” on page 4-7.
  - “Power-On Procedure with a Power Distribution Panel” on page 4-11.

## Adapter

**Note:** Refer to “Handling Static-Sensitive Devices” on page 4-14 before removing or installing adapters.

## Removal

1. Remove the power supply or cooling unit located above the adapter you are removing. Refer to the “Power Supply or Cooling Unit” removal procedure on page 4-61.
2. Do the “Adapter Cable” removal procedure on page 4-73 for the adapter you are removing.
3. Loosen the thumbscrew on the adapter you are removing.

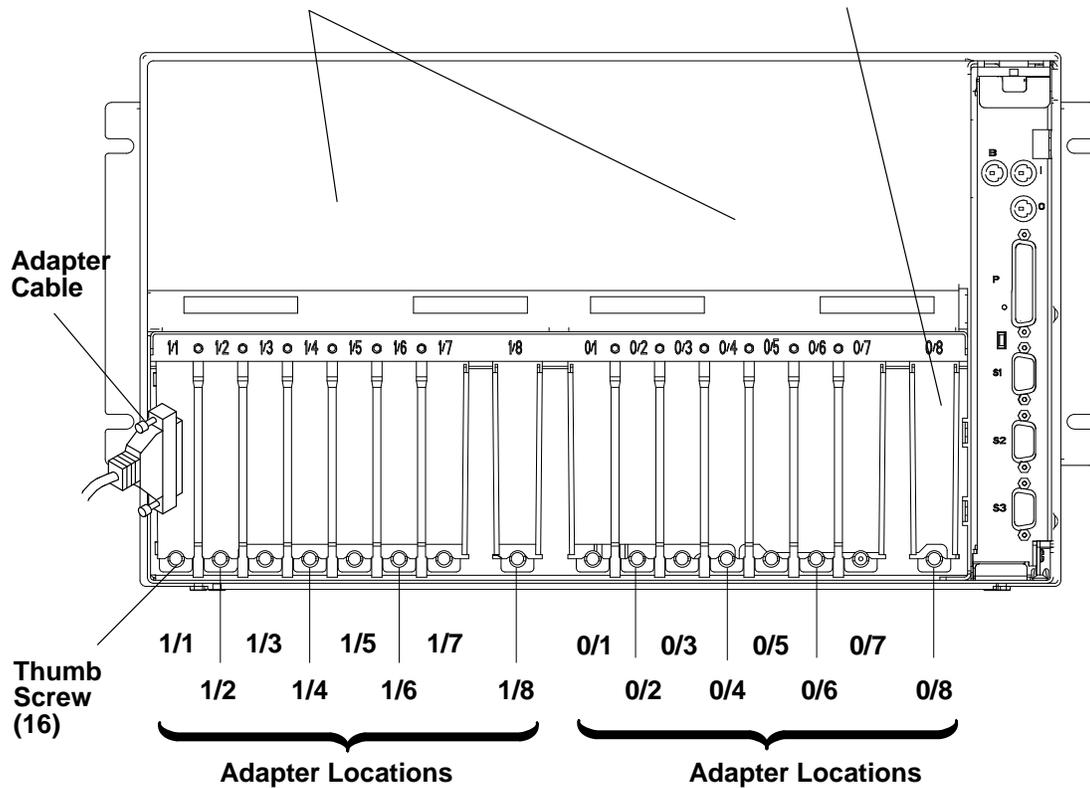
**Note:** If you are removing the SCSI-2 adapter, disconnect the SCSI-2 cable from the top of the SCSI-2 adapter.

4. Reach through the access opening above the adapters, and then lift both ends of the top of the adapter until the adapter disconnects from the slot.
5. Remove the adapter from the I/O module.

### Rear View of CPU Enclosure

Access Opening  
(Power Supply and Cooling Unit Removed)

SCSI-2 Adapter Location



## Replacement

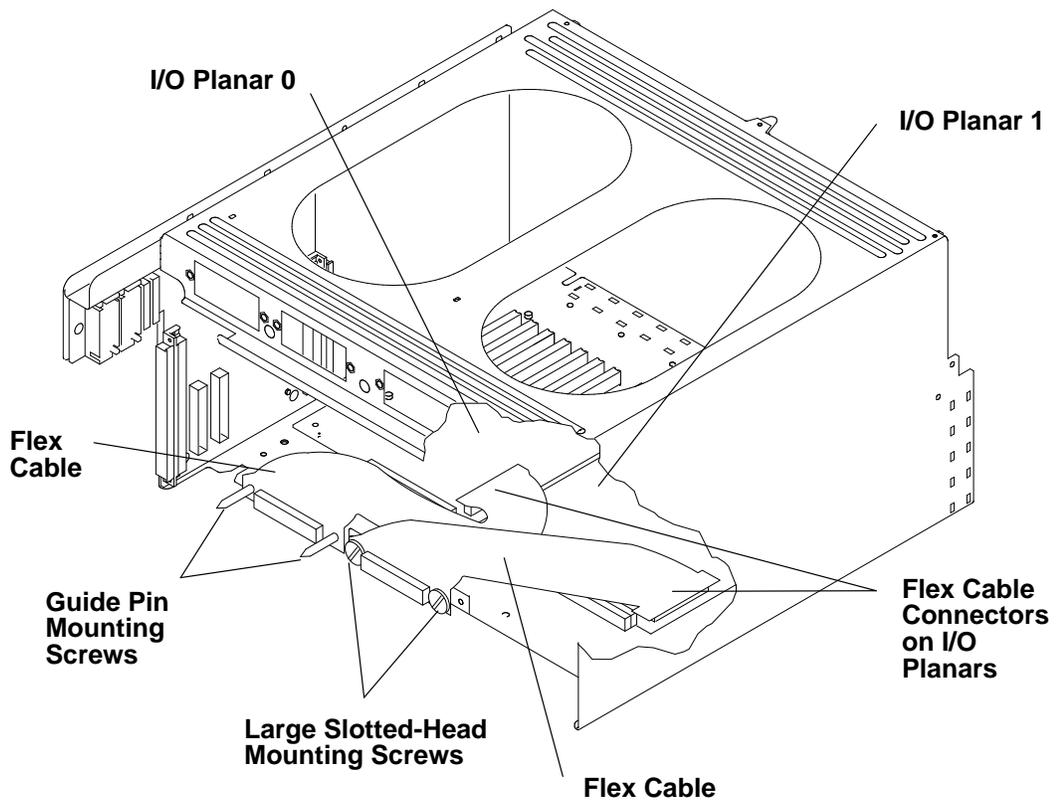
Replace in the reverse order.

---

## I/O Module Flex Cables

### Removal

1. Perform the "I/O Module" removal procedure on page 4-67.
2. If you are removing the flex cable attached to the I/O planar 0, then remove the two guide pin mounting screws.  
  
If you are removing the flex cable attached to the I/O planar 1, then remove the two large slotted-head mounting screws.
3. Disconnect the flex cable from the I/O planar, and then remove the flex cable.



### Replacement

Replace in the reverse order.

---

## I/O Planar Power Cables

### Removal

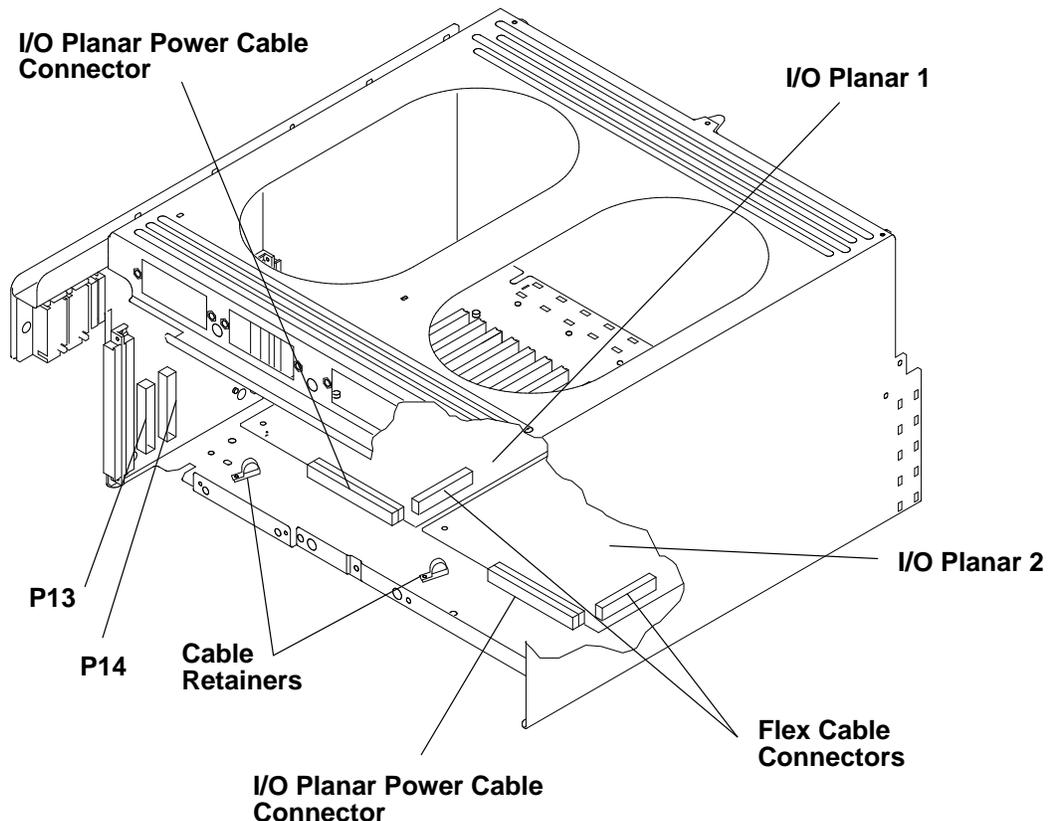
1. Perform the “I/O Module” removal procedure on page 4-67.
2. If any adapters are located over the I/O planar power cables, do the “Adapter” removal procedure on page 4-75 to remove the adapters.

**Attention:** To prevent damage to the flex cables it is important to remove the I/O Module Flex Cables before removing or replacing the I/O planar power cables.

3. To access the connectors for the I/O planar power cables, perform the “I/O Module Flex Cables” removal procedure on page 4-76.
4. Remove the mounting nut on each of the cable retainer.

**Note:** If you are removing both power cables, record the location of the connectors and note how the cables are positioned.

5. Remove the shipping tape from the top of the I/O planar power cable you are removing.
6. Disconnect the I/O planar power cable connector on the I/O planar.
7. Depending on the I/O planar power cable connector you are removing, disconnect either P13 or P14 on the lateral planar 2 card, and then remove the I/O planar power cable.



### Replacement

Replace in the reverse order.

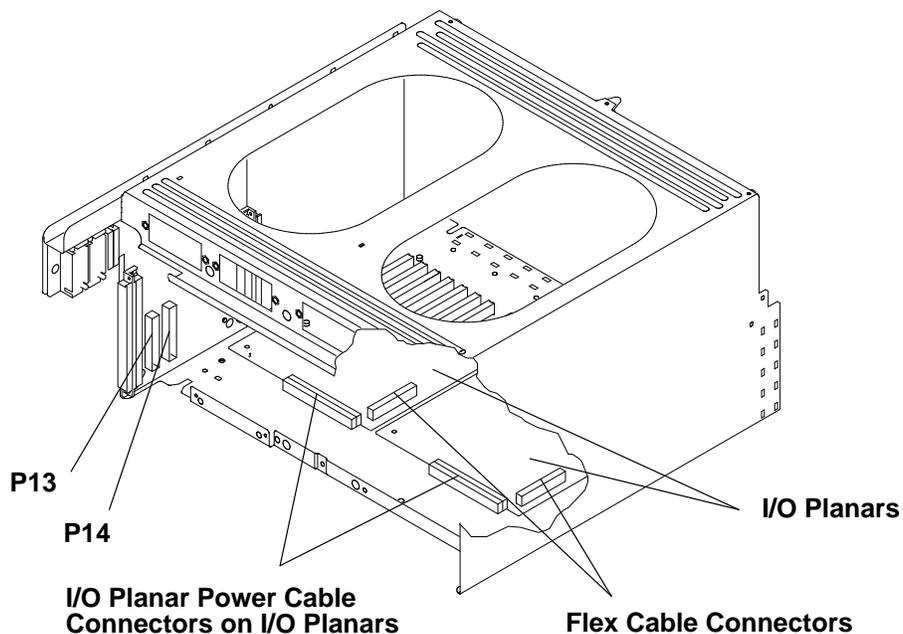
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## I/O Planars

**Note:** Refer to “Handling Static-Sensitive Devices” on page 4-14 before removing or installing the SIB.

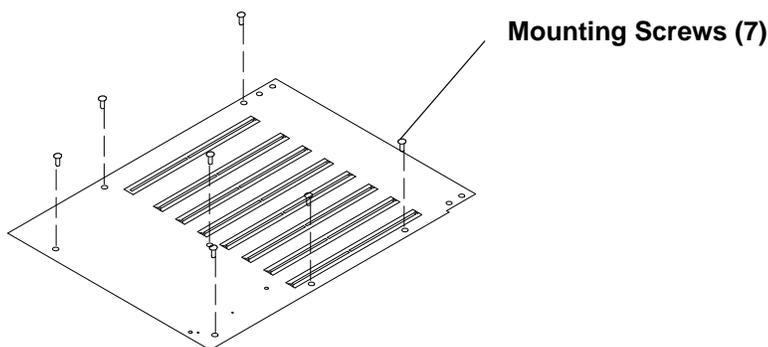
### Removal

1. Perform the “I/O Module” removal procedure on page 4-67.
2. Do the “Adapter” removal procedure on page 4-75 to remove all of the adapters installed on the I/O planar you are removing.
3. To access the mounting screws on the I/O planars, disconnect both flex cable connectors.
4. Disconnect the power cable connector from the rear of the I/O planar you are removing.



**Note:** Before removing the mounting screws, record the screw types and locations of all of the mounting screws.

5. Remove the seven mounting screws on the I/O planar you are removing, and then remove the I/O planar from the I/O module.



### Replacement

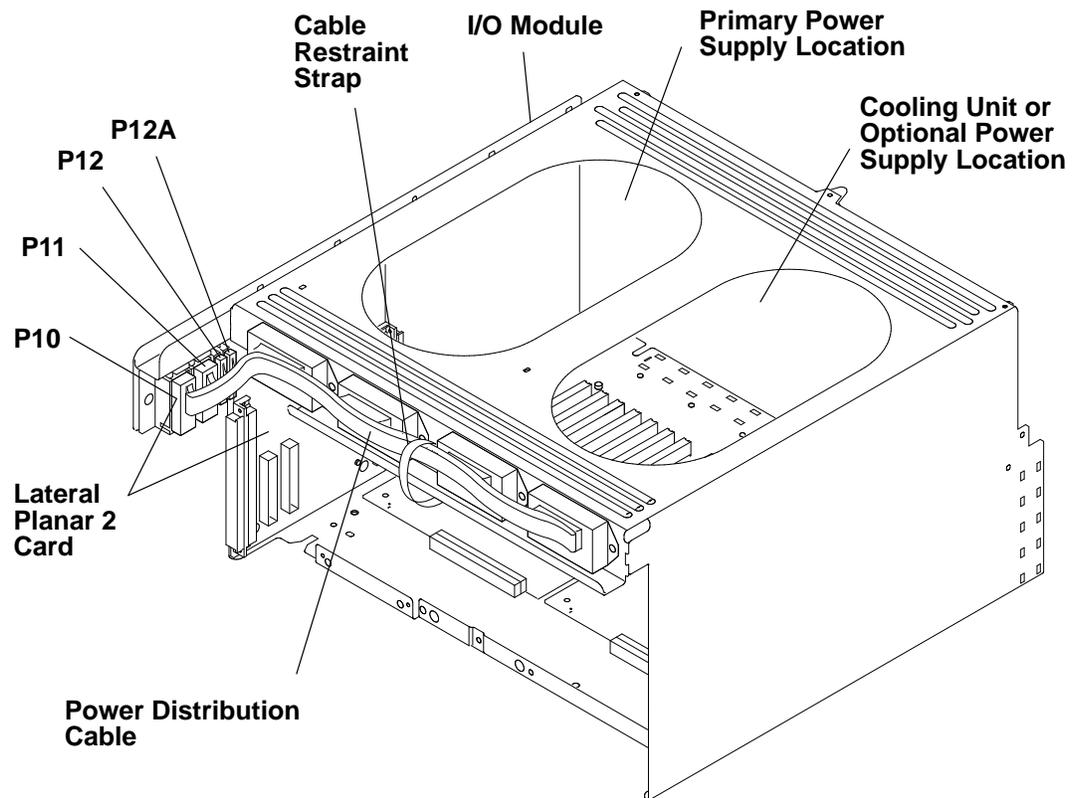
Replace in the reverse order.

---

## Power Distribution Cables

### Removal

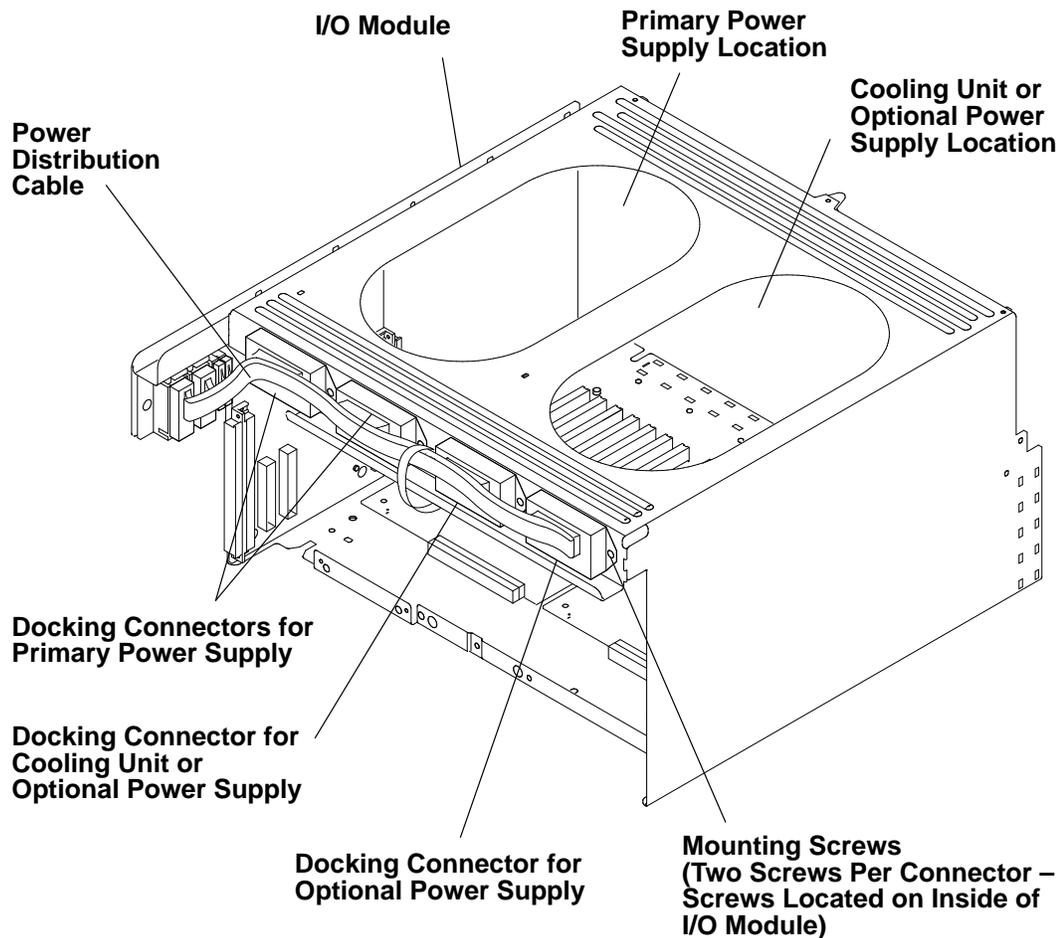
1. Perform the “Power Supply or Cooling Unit” removal procedure on page 4-61 to remove the power supply and either the cooling unit or optional power supply.
2. Perform the “I/O Module” removal procedure on page 4-67.
3. Carefully cut the cable restraint straps for the power distribution cable.
4. Disconnect connectors P10, P11, P12, and P12A located on the lateral planar 2 card.



**Note:** The docking connector mounting screws for the primary power supply, cooling unit, and optional power supply are located inside the I/O module.

5. If you are removing the power distribution cable for the optional power supply, remove the two mounting screws on the two optional power supply docking connectors, and then remove the power distribution cable.
6. If you are removing the power distribution cable for the primary power supply, remove the two mounting screws on the two power supply docking connectors, and then remove the power distribution cable.

**Note:** If you are removing the power distribution cable assembly from an R30 I/O module, it is all one piece and all the connectors must be removed at the same time.



## Replacement

**Note:** Ensure that a new cable restraint strap is installed around the power distribution cables before replacing the I/O module into the CPU enclosure.

Replace in the reverse order.

---

## Chapter 5. CPU Enclosure Installation Procedure

**Note:** The following statement applies to the CPU enclosure with power supplies or with a power supply and cooling unit installed.

**CAUTION:**

**This unit weighs more than 55 kg (121.2 pounds). Material handling systems such as levers, slings, or lifts are required to safely move it. When this is not possible, specially trained persons or services (such as riggers or movers) must be used.**

**Note:** The following statement applies to the CPU enclosure after the power supplies or after the power supply and cooling unit have been removed.

**CAUTION:**

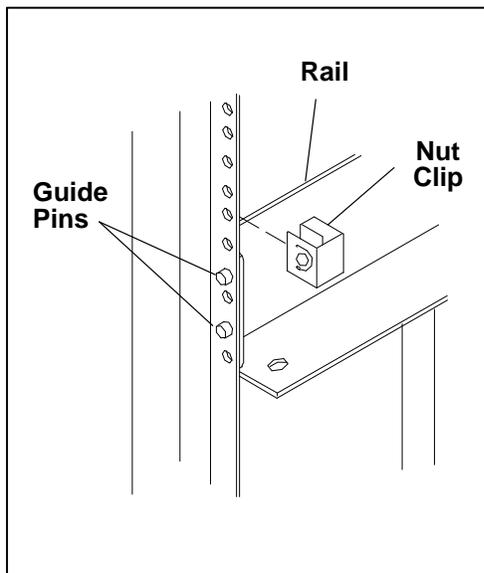
**The unit weighs between 32 kg (70 pounds) and 55 kg (121.2 pounds). Three persons are required to safely lift the unit. Using less than three persons to lift the unit can result in injury.**

1. Open the shipping box and take the rails out of the box.

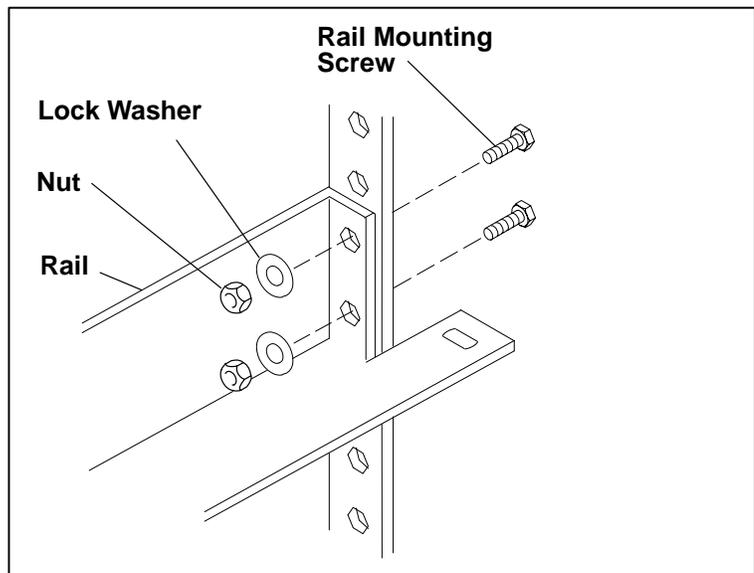
**Note:** The CPU enclosure requires 6 EIA positions. Be sure to leave enough space above the railings to include the enclosure.

2. Install the rails by attaching the nut clip and rail mounting screws for each rail. Ensure that the front and rear of each rail are installed at the same height, and ensure that both rails are installed at the same EIA slot.
3. Install the nut clips for the enclosure.

**Detail A – Front of Rail**



**Detail B – Rear of Rail**



4. Remove the power supply from the new enclosure. If you need more information to remove the power supply, refer to the "Power Supply or Cooling Unit" Removal procedure on page 4-61.

5. Remove the front bezel of the CPU enclosure. If you need more information to remove the front bezel, refer to the “Front Bezel and Front Access Plate” removal procedure on page 4-15.

**CAUTION:**

**The unit weighs between 32 kg (70 pounds) and 55 kg (121.2 pounds). Three persons are required to safely lift the unit. Using less than three persons to lift the unit can result in injury.**

6. Lift the CPU enclosure onto the support rails, and slide it slowly into the rack until the front of the CPU enclosure rests against the nut clips on the rack.

**Attention:** Do not lift the CPU enclosure by its front bezel.

**Note:** If the CPU enclosure cannot be easily slid completely into the rack, check to see if the enclosure is caught on the retainer brackets previously installed on the rack. If the retainer brackets are in the way, hold them away from the CPU enclosure while slowly pushing the enclosure into the rack.

7. Using four (4) M5 x 14 hex head screws supplied with the CPU enclosure, attach the CPU enclosure to the nut clips in the front of the rack at the sides.
8. Insert the retainer brackets into the slots in the CPU enclosure, then tighten the mounting screws of the retainer brackets.
9. Install the power supplies or cooling fans. If you need more information to reinstall the power supply, refer to the “Power Supply or Cooling Unit” Removal procedure on page 4-61 and reverse the procedure.

**DANGER**

**An electrical outlet that is not correctly wired could place hazardous voltage on metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock.**

**Before installing or removing any additional devices to or from the system, ensure that the power cables for those devices are unplugged before the signal cables are connected. If possible, disconnect all power cables from the existing system before you add a device.**

**Use one hand, when possible, to connect or disconnect signal cables to prevent a possible shock from touching two surfaces with different electrical potentials.**

**During an electrical storm, do not connect cables for display stations, printers, telephones, or station protectors for communications lines.**

**Attention:** Ensure that you complete the replacement of the power supply before plugging in the power supply power cord. Plugging in the power cord before completing the power supply replacement can cause possible data loss.

10. Attach the rear panel of the CPU enclosure.
11. Attach the front bezel of the CPU enclosure. If you need more information to reinstall the front bezel, refer to the “Front Bezel and Front Access Plate” removal procedure on page 4-15 and reverse the procedure.
12. Attach the power supply cord.

---

## Chapter 6. Parts Information

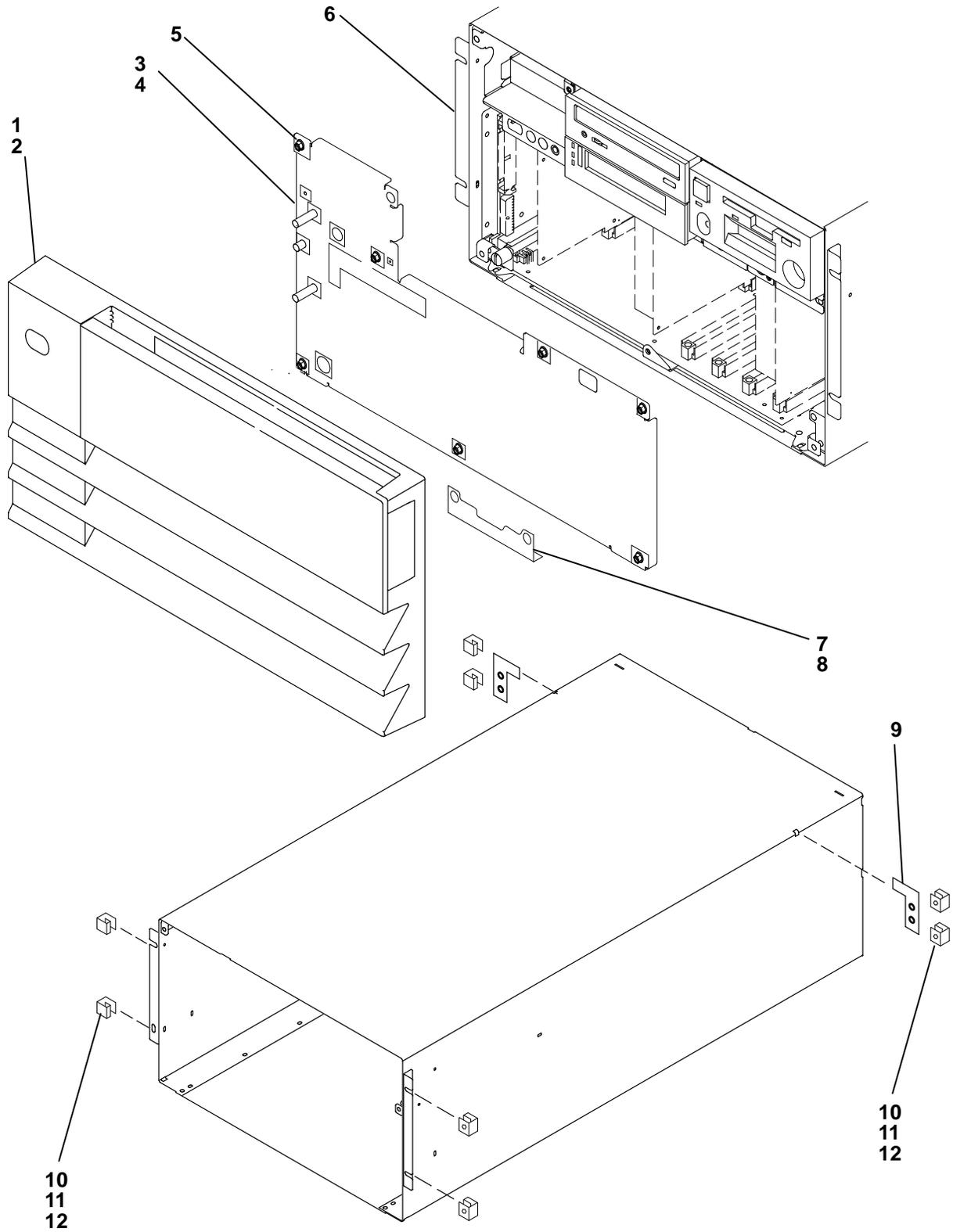
This chapter contains details showing all parts and the respective part numbers for each detail.

### Acronyms for FRU Parts

Occasionally, an acronym is displayed with an SRN or Error Code on the LCD display to identify a failing FRU. The listing below defines the FRUs associated with the acronyms displayed.

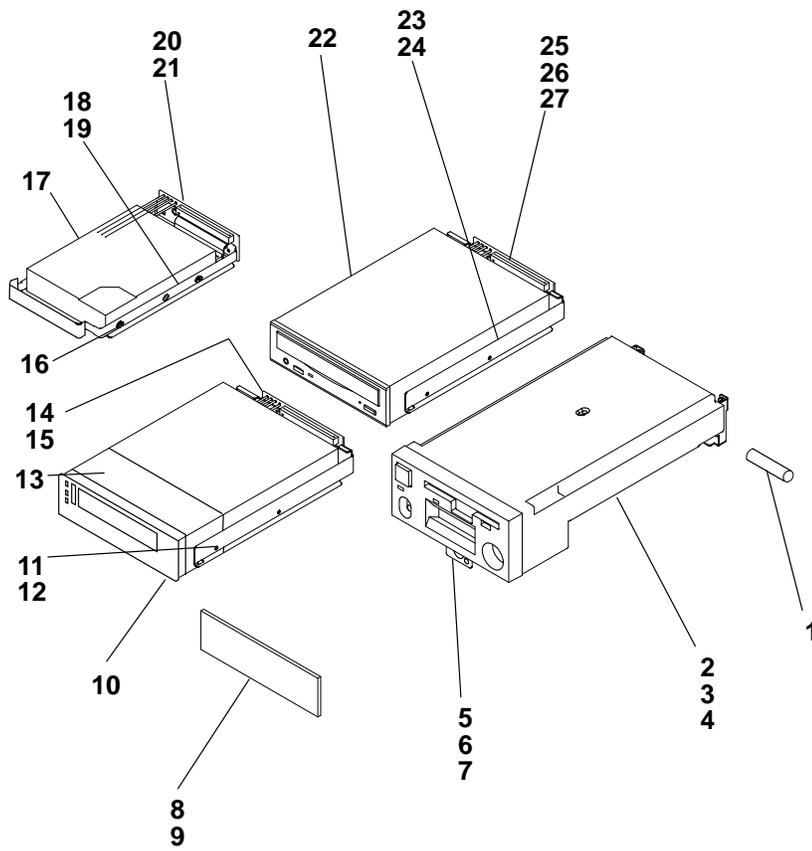
| <b>Acronym</b> | <b>Associated FRU</b>                                                                 |
|----------------|---------------------------------------------------------------------------------------|
| C1D            | 601 processor card                                                                    |
| C4D            | 604 processor card                                                                    |
| X4D            | 604E processor card                                                                   |
| MR2            | MR2 memory card                                                                       |
| MR4            | MR4 memory card                                                                       |
| MRE            | MRE memory card                                                                       |
| NFX            | NFX memory card                                                                       |
| SFX            | SFX memory card                                                                       |
| MPB            | System planar (R30, R40)                                                              |
| NMB            | System planar (R50)                                                                   |
| SIB X          | System interface board                                                                |
| PME 0          | 8 Slot Micro Channel I/O planar (on right when viewed from rear of CPU Enclosure).    |
| PME 1          | 8 Slot Micro Channel I/O planar (on left when viewed from rear of the CPU Enclosure). |
| IOD            | I/O card                                                                              |
| BIO            | I/O card                                                                              |
| OPP            | Operator panel                                                                        |

# Detail 1. Front Bezel, Front Access Plate, and CPU Enclosure



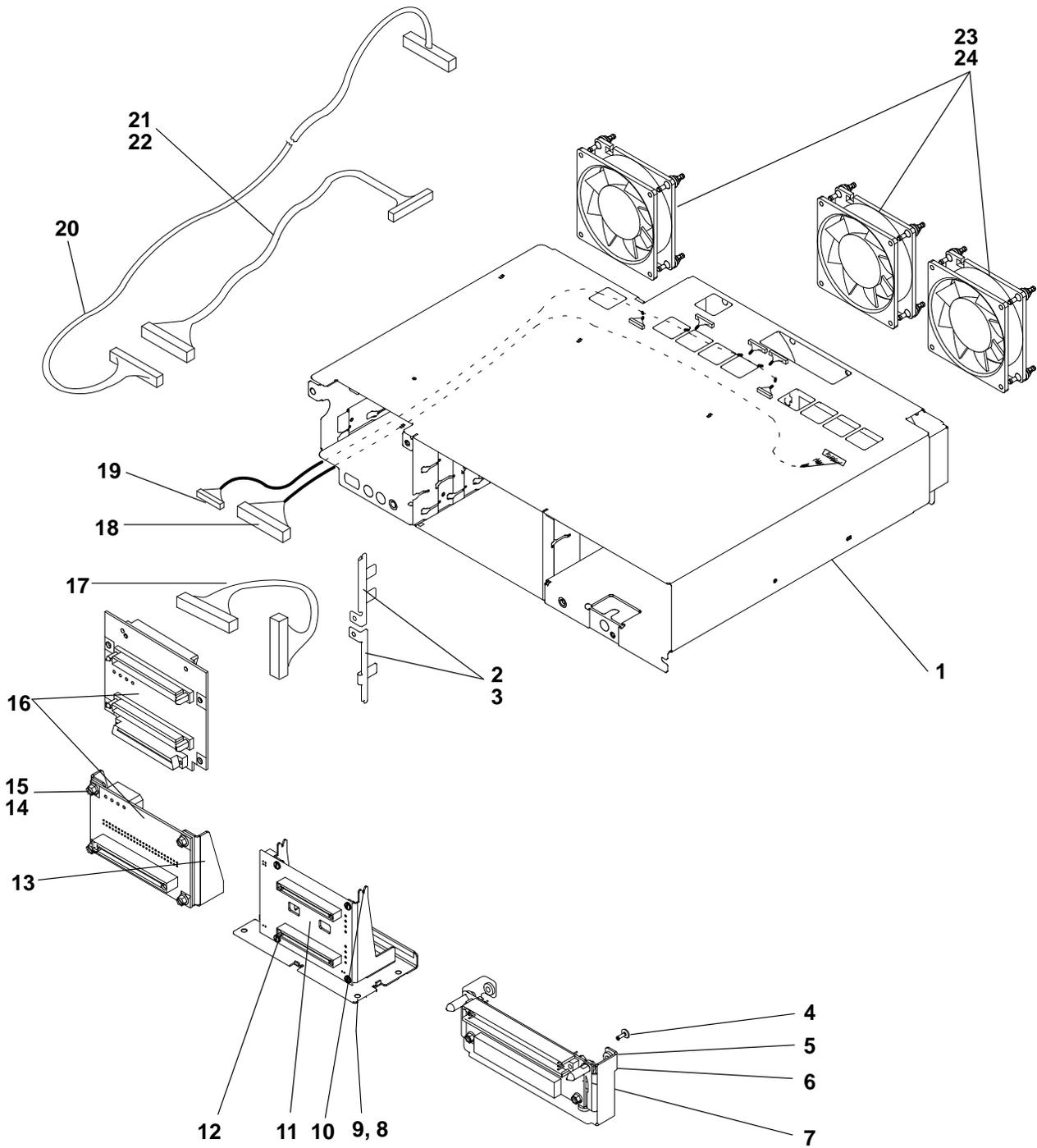
| <b>Index Number</b> | <b>Part Number</b> | <b>Units Per Assy</b> | <b>Description</b>                  |
|---------------------|--------------------|-----------------------|-------------------------------------|
| 1                   | 93H5056            | 1                     | Front bezel                         |
| 2                   | 11H3202            | 1                     | Logo                                |
|                     | 93H5078            | 1                     | Logo (R50)                          |
| 3                   | 11H7395            | 1                     | Front access plate (R30 and R40)    |
|                     | 93H7089            | 1                     | Front access plate (R50)            |
| 4                   | 11H3227            | 1                     | Warning label                       |
| 5                   | 00G1268            | 7                     | Screw, front cover mounting (M4x7)  |
| 6                   | 11H7397            | 1                     | CPU enclosure                       |
| 7                   | 40H0502            | 1                     | Front access plate retainer bracket |
| 8                   | 32G1547            | 2                     | Screw                               |
| 9                   | 40H7036            | 2                     | CPU Enclosure retainer bracket      |
| 10                  | 1624779            | 8                     | Screw                               |
| 11                  | 0375867            | 8                     | Nut clip                            |
| 12                  | 1622347            | 8                     | Lock washer                         |

## Detail 2. Disk Drives, Media Devices, and Operator Panel



| <b>Index Number</b>                                                                                                                                                    | <b>Part Number</b> | <b>Units Per Assy</b> | <b>Description</b>                                |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-----------------------|---------------------------------------------------|
| 1                                                                                                                                                                      | 96G4207            | 1                     | Lithium battery                                   |
| 2                                                                                                                                                                      | 94H9993            | 1                     | Operator panel assembly (1.44 MB with keylock)    |
| 3                                                                                                                                                                      | 88G4768            | 1                     | Diskette drive (1.44MB)                           |
| 4                                                                                                                                                                      | 1622530            | 2                     | Screw (mounting screw)                            |
| 5                                                                                                                                                                      | 11H3165            | 1                     | Retainer bracket                                  |
| 6                                                                                                                                                                      | 1621170            | 1                     | Screw (attaches to operator panel assembly)       |
| 7                                                                                                                                                                      | 00G1268            | 1                     | Screw (attaches to media module)                  |
| 8                                                                                                                                                                      | 11H3143            | 1                     | Blank bezel                                       |
| 9                                                                                                                                                                      | 1622670            | 2                     | Screw                                             |
| 10                                                                                                                                                                     | See Note           | 1                     | 8 mm tape drive                                   |
| 11                                                                                                                                                                     | 11H7317            | 1                     | Mounting bracket assembly                         |
| 12                                                                                                                                                                     | 1621170            | 4                     | Screw                                             |
| 13                                                                                                                                                                     | 52G0243            | 1                     | EMC Strap                                         |
| 14                                                                                                                                                                     | 40H7043            | 1                     | Docking connector board (8 mm tape drive)         |
| 15                                                                                                                                                                     | 04G1559            | 2                     | Screw                                             |
| 16                                                                                                                                                                     | 0038442            | 4                     | Screw, drive mounting 6–32                        |
| 17                                                                                                                                                                     | See Note           | 1                     | Disk drive                                        |
| 18                                                                                                                                                                     | 40H0847            | 1                     | Mounting bracket assembly                         |
| 19                                                                                                                                                                     | 11H2704            | 4                     | Isolator                                          |
| 20                                                                                                                                                                     | 04G1559            | 2                     | Screw                                             |
| 21                                                                                                                                                                     | 40H7043            | 1                     | Docking connector board, disk drive (R30 and R40) |
|                                                                                                                                                                        | 93H2482            | 1                     | Docking connector board, disk drive (R50)         |
| 22                                                                                                                                                                     | See Note           | 2                     | CD-ROM drive                                      |
| 23                                                                                                                                                                     | 04G1559            | 2                     | Screw                                             |
| 24                                                                                                                                                                     | 11H7317            | 1                     | Mounting bracket assembly                         |
| 25                                                                                                                                                                     | 1621187            | 4                     | Screw                                             |
| 26                                                                                                                                                                     | 40H7043            | 1                     | Docking connector board (CD-ROM drive)            |
| 27                                                                                                                                                                     | 04G1559            | 2                     | Screw                                             |
| <p>Note: See the "Failing Function Codes" and "FRU Cross-References" chapters in the <i>Diagnostic Information For Micro Channel Bus Systems</i> for part numbers.</p> |                    |                       |                                                   |

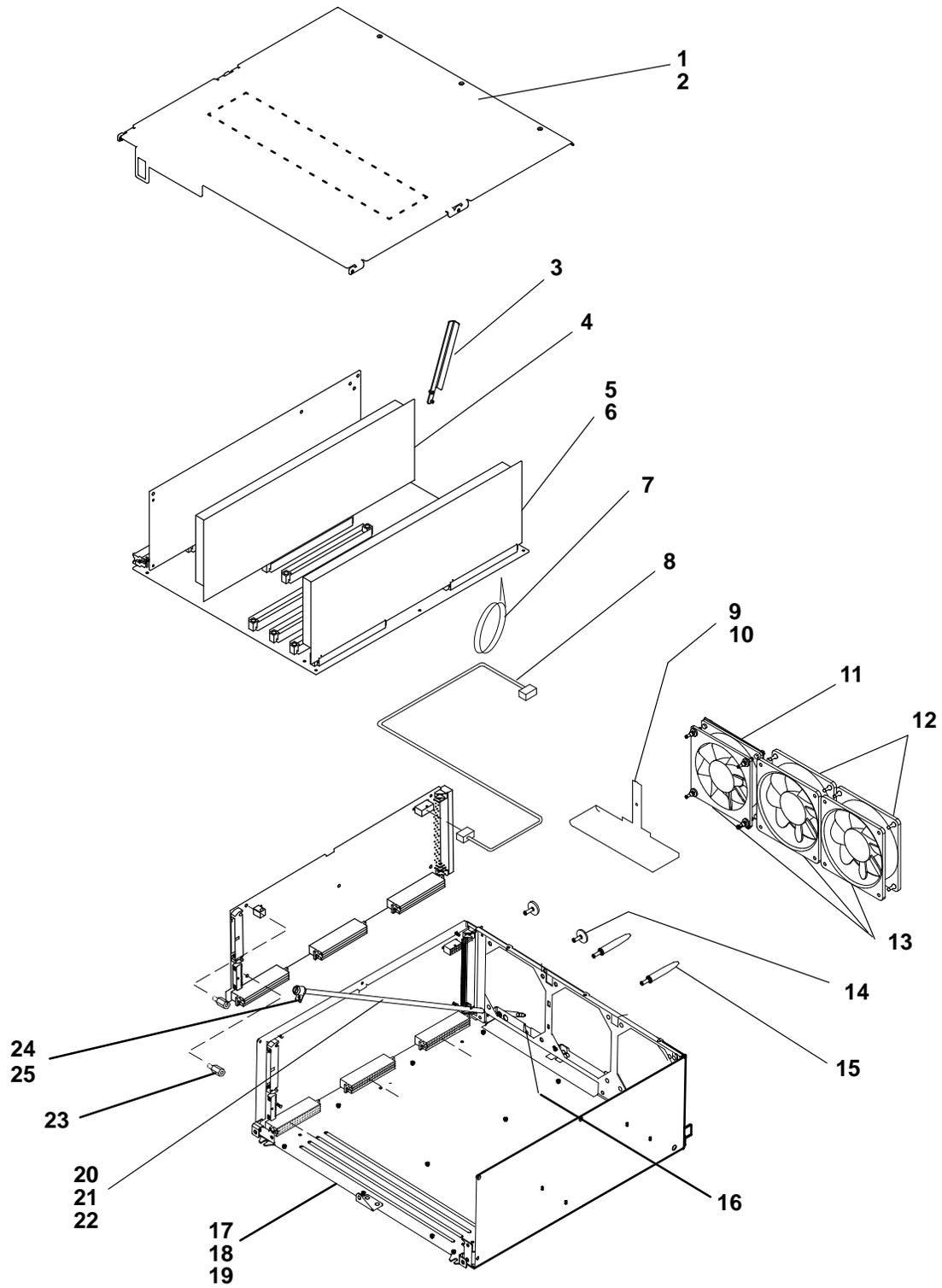
# Detail 3. Media Module



| <b>Index Number</b> | <b>Part Number</b> | <b>Units Per Assy</b> | <b>Description</b>                                                       |
|---------------------|--------------------|-----------------------|--------------------------------------------------------------------------|
| 1                   | 11H7394            | 1                     | Media module (R30 and R40)                                               |
|                     | 93H7119            | 1                     | Media module (R50)                                                       |
| 2                   | 11H3248            | 1                     | Retainer bracket (R30, R40)                                              |
|                     | 93H5065            | 1                     | Retainer bracket (R50)                                                   |
| 3                   | 00G1268            | 1                     | Screw                                                                    |
| 4                   | 78X8993            | 4                     | Screw                                                                    |
| 5                   | 00G1268            | 4                     | Screw – Autodocking receiver mounting (M4x7 hex head)                    |
| 6                   | 40H0738            | 1                     | Operator panel receiver bracket assembly                                 |
| 7                   | 11H8229            | 2                     | Stud                                                                     |
| 8                   | 1621170            | 4                     | Screw – Media receiver bottom mounting (M3x6 pan head)                   |
| 9                   | 11H3188            | 1                     | Media receiver bracket assembly                                          |
|                     | 40H0732            | 1                     | Media receiver bracket assembly (newer models)                           |
| 10                  | 00G1268            | 2                     | Screw (M4x7 hex head, installs from rear of CPU enclosure, older models) |
| 11                  | 11H3190            | 1                     | Media receiver board assembly                                            |
| 12                  | 1621170            | 4                     | Screw (M3x6 pan head)                                                    |
| 13                  | 11H8199            | 1                     | DASD receiver bracket assembly                                           |
|                     | 40H0737            | 1                     | DASD receiver bracket assembly (newer models)                            |
| 14                  | 04G1559            | 4                     | Screw (M3x6)                                                             |
| 15                  | 00G1269            | 2                     | Screw – DASD receiver mounting (M4x10)                                   |
| 16                  | 11H3189            | 1                     | DASD receiver board assembly (R30 and R40)                               |
|                     | 93H2483            | 1                     | DASD receiver board assembly (R50)                                       |
| 17                  | 93H5067            | 1                     | SCSI cable (DASD receiver board to Media receiver board (R50)            |
| 18                  | 40H7045            | 1                     | Operator panel cable/receiver assembly                                   |
| 19                  | 11H2676            | 1                     | Cable, power (to media and fans)                                         |
| 20                  | 40H0482            | 1                     | SCSI cable (to SCSI adapter, R30 and R40)                                |
|                     | 93H5066            | 1                     | SCSI cable (to SCSI adapter, R50)                                        |
| 21                  | 11H2681            | 1                     | SCSI cable (to media devices, R30 and R40)                               |
| 22                  | 04G1559            | 2                     | Screw (M3 hex head, SCSI cable mounting)                                 |
| 23                  | 11H2694            | 3                     | Fan                                                                      |
| 24                  | 81F7977            | 12                    | Vibration isolators                                                      |

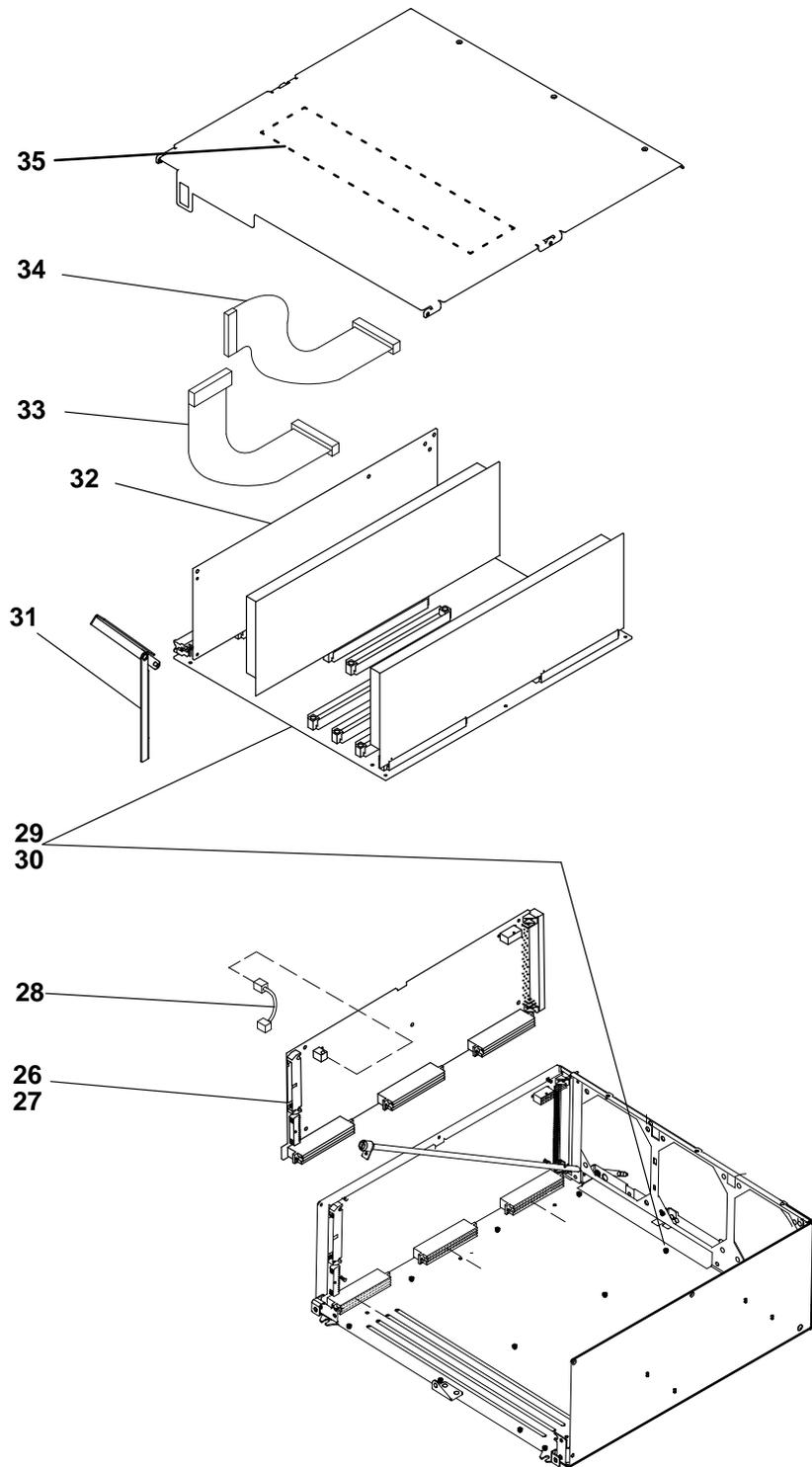
Note: See the “Failing Function Codes” and “FRU Cross-References” chapters in the *Diagnostic Information For Micro Channel Bus Systems* for part numbers.

## Detail 4. CPU Module (1 of 3)



| Index Number                                                                                                                                                    | Part Number | Units Per Assy | Description                                          |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|----------------|------------------------------------------------------|
| 1                                                                                                                                                               | 11H2653     | 1              | Top cover (part of CPU module assembly) (R30, R40)   |
|                                                                                                                                                                 | 93H5071     | 1              | Top cover (part of CPU module assembly) (R50)        |
| 2                                                                                                                                                               | 1621285     | 7              | Screw                                                |
| 3                                                                                                                                                               | 11H3280     | 1              | Extraction tool (single-piece, two required for R50) |
| 4                                                                                                                                                               | 35H8748     | 1              | CPU card, type C1D 601 processor (R30)               |
|                                                                                                                                                                 | 09J4712     | 1              | CPU card, type C4D 604 processor (R40)               |
|                                                                                                                                                                 | 93H6274     | 1              | CPU card, type X4D 604E processor (R50)              |
| 5                                                                                                                                                               | 19H0283     | 1-4            | MR2 memory card (64MB base) without memory modules   |
|                                                                                                                                                                 | 09J4779     | 1-4            | MR4 memory card (256MB base) without memory modules  |
| 6                                                                                                                                                               | 93H4357     | 1-4            | SF5 Memory card, base without memory modules         |
|                                                                                                                                                                 | 19H0240     | 8              | Memory module, 8MB (MR2)                             |
|                                                                                                                                                                 | 19H0271     | 8              | Memory module, 32MB (MR4)                            |
|                                                                                                                                                                 | 19H0287     | 4-16           | Memory module, 8MB (NFX, RLX, or SF5)                |
|                                                                                                                                                                 | 19H0288     | 4-16           | Memory module, 16MB (NFX, RLX, or SF5)               |
|                                                                                                                                                                 | 19H0289     | 4-16           | Memory module, 32MB (NFX, RLX, or SF5)               |
|                                                                                                                                                                 | 35H8751     | 4-16           | Memory module, 64MB (SF5)                            |
| 7                                                                                                                                                               | 1159913     | 4              | Cable tie for fan cable                              |
| 8                                                                                                                                                               | 11H2677     | 1              | Fan power cable                                      |
| 9                                                                                                                                                               | 11H8319     | 1              | Retainer bracket, CPU flex cables (R30, R40)         |
|                                                                                                                                                                 | 93H5061     | 1              | Retainer bracket, CPU flex cables (R50)              |
| 10                                                                                                                                                              | 04G1559     | 1              | Screw                                                |
| 11                                                                                                                                                              | 40H7070     | 1              | Fan assembly                                         |
| 12                                                                                                                                                              | 11H2686     | 2              | Fan (R30, R40)                                       |
|                                                                                                                                                                 | 93H5822     | 2              | Fan (R50)                                            |
| 13                                                                                                                                                              | 81F7977     | 12             | Vibration isolators                                  |
| 14                                                                                                                                                              | 11H2691     | 2              | Screw                                                |
| 15                                                                                                                                                              | 40H0854     | 2              | Guide pin screw (R30, R40)                           |
|                                                                                                                                                                 | 93H5064     | 2              | Guide pin screw (R50)                                |
| 16                                                                                                                                                              | 40H7000     | 1              | Mounting plate assembly (flex cable mounting)        |
| 17                                                                                                                                                              | 11H2655     | 1              | CPU module (R30, R40)                                |
|                                                                                                                                                                 | 93H5070     | 1              | CPU module (R50)                                     |
| 18                                                                                                                                                              | 32G1547     | 2              | Screw                                                |
| 19                                                                                                                                                              | 40H0483     | 1              | Insulator (system planar, R30, R40)                  |
|                                                                                                                                                                 | 93H5063     | 1              | Insulator (system planar, R50)                       |
| 20                                                                                                                                                              | 40H7074     | 1              | Docking screw (with clamp attached)                  |
| 21                                                                                                                                                              | 93H5466     | 3              | Washer                                               |
| 22                                                                                                                                                              | 1622977     | 1              | Retainer ring                                        |
| 23                                                                                                                                                              | 93H5062     | 2              | Standoff                                             |
| 24                                                                                                                                                              | 40H0477     | 1              | Docking screw clamp                                  |
| 25                                                                                                                                                              | 04G1559     | 1              | Screw (M3x6)                                         |
| Note: See the "Failing Function Codes" and "FRU Cross-References" chapters in the <i>Diagnostic Information For Micro Channel Bus Systems</i> for part numbers. |             |                |                                                      |

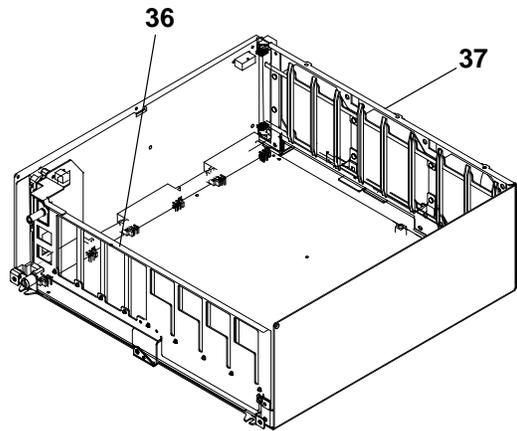
## Detail 5. CPU Module (2 of 3)



| <b>Index Number</b> | <b>Part Number</b> | <b>Units Per Assy</b> | <b>Description</b>                               |
|---------------------|--------------------|-----------------------|--------------------------------------------------|
| 26                  | 65G6068            | 1                     | Lateral planar 1 (R30)                           |
|                     | 40H7013            | 1                     | Lateral planar 1 (R40 and R50)                   |
| 27                  | 04G1559            | 4                     | Screw                                            |
| 28                  | 11H2678            | 1                     | Interlock cable                                  |
| 29                  | 19H0242            | 1                     | System planar for R30                            |
|                     | 35H8778            | 1                     | System planar for R40                            |
|                     | 19H0035            | 1                     | System planar for R50                            |
| 30                  | 04G1559            | 11                    | Screw, hex head                                  |
|                     | 1621187            | 1                     | Screw, pan head                                  |
| 31                  | 11H2697            | 1                     | Extraction tool (dual-piece, R30 and R40)        |
| 32                  | 35H8780            | 1                     | I/O card (R30, R40)                              |
|                     | 09J4760            | 1                     | I/O card (R50)                                   |
| 33                  | 40H0729            | 1                     | Flex cable (to horizontal connector on I/O card) |
| 34                  | 40H0725            | 1                     | Flex cable (to vertical connector on I/O card)   |
| 35                  | 11H8300            | 1                     | Card restraint (R30 and R40)                     |
|                     | 93H5074            | 1                     | Card restraint (R50)                             |

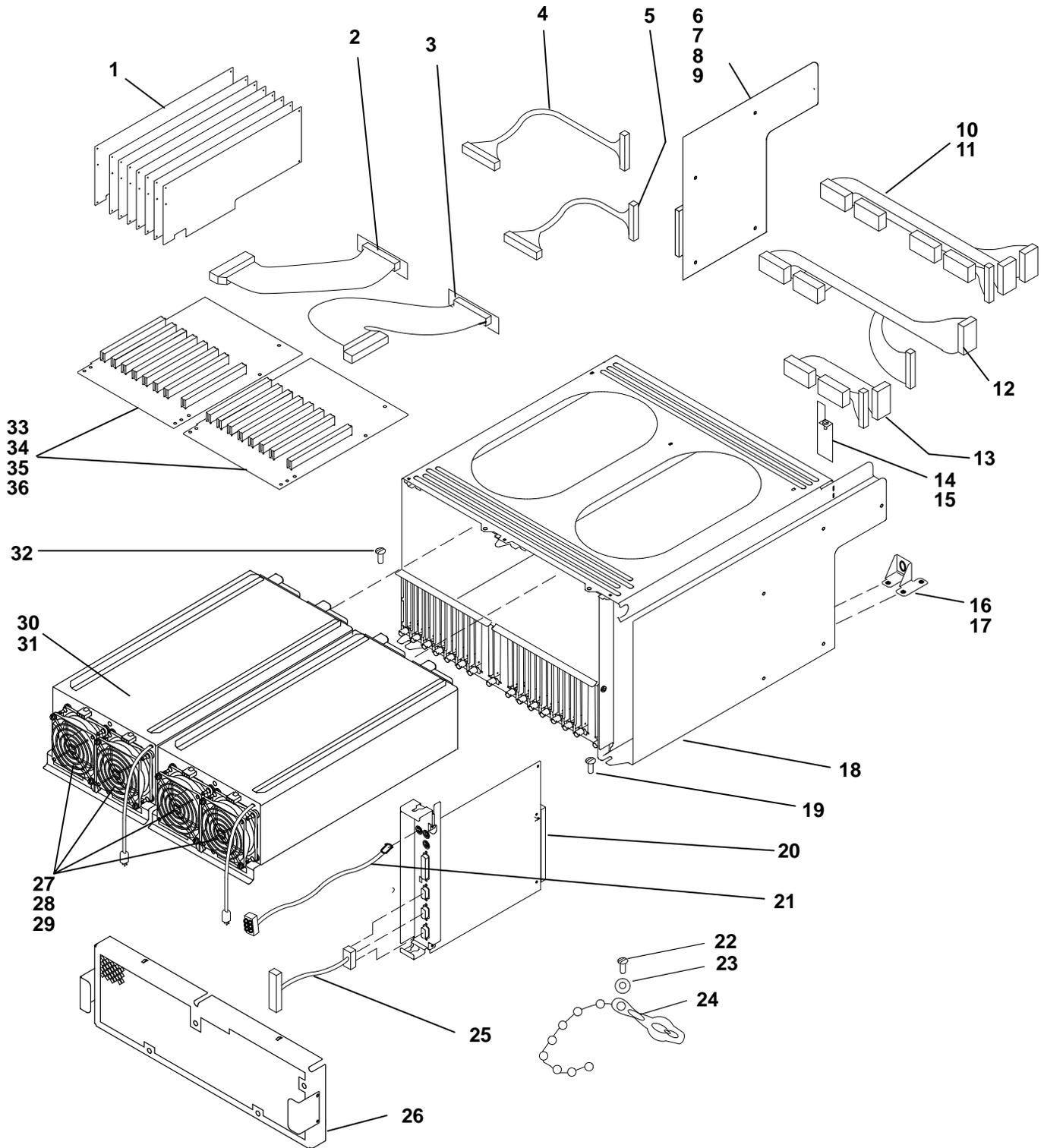
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## Detail 6. CPU Module (3 of 3)



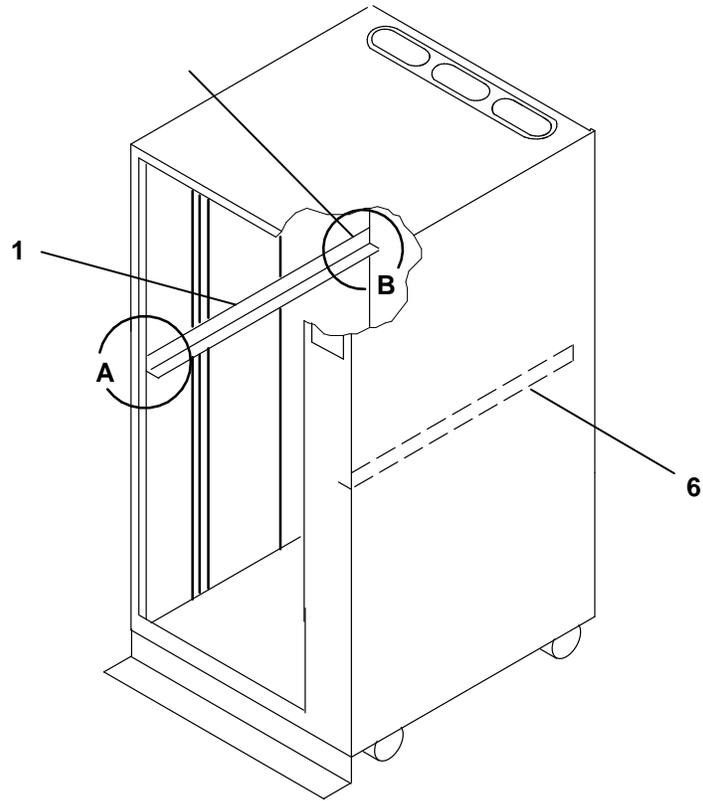
| <b>Index<br/>Number</b> | <b>Part<br/>Number</b> | <b>Units<br/>Per<br/>Assy</b> | <b>Description</b>                 |
|-------------------------|------------------------|-------------------------------|------------------------------------|
| 36                      | 93H7441                | 1                             | Front guide bracket assembly (R50) |
| 37                      | 93H7442                | 1                             | Rear guide bracket assembly (R50)  |

# Detail 7. I/O Module



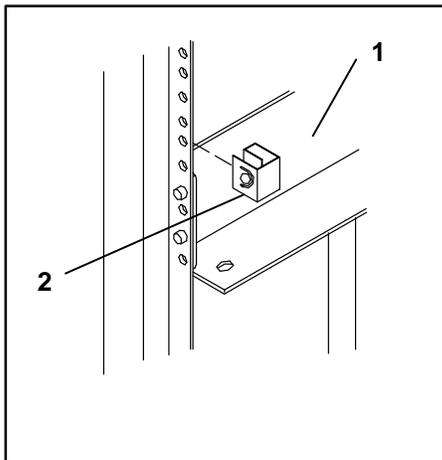
| <b>Index Number</b>                                                                                                                                                    | <b>Part Number</b> | <b>Units Per Assy</b> | <b>Description</b>                            |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-----------------------|-----------------------------------------------|
| 1                                                                                                                                                                      | See Note           | 16                    | Adapter                                       |
| 2                                                                                                                                                                      | 40H0723            | 1                     | Flex cable (For I/O planar 1)                 |
| 3                                                                                                                                                                      | 40H0727            | 1                     | Flex cable (For I/O planar 0)                 |
| 4                                                                                                                                                                      | 11H2684            | 1                     | Power cable (long – I/O planar to SIB card)   |
| 5                                                                                                                                                                      | 11H2683            | 1                     | Power cable (short – I/O planar to SIB card)  |
| 6                                                                                                                                                                      | 40H0743            | 1                     | Lateral planar 2 (R30)                        |
|                                                                                                                                                                        | 40H7014            | 1                     | Lateral planar 2 (R40, R50)                   |
| 7                                                                                                                                                                      | 11H2689            | 5                     | Grommet                                       |
| 8                                                                                                                                                                      | 04G1559            | 5                     | Screw                                         |
| 9                                                                                                                                                                      | 11H3158            | 1                     | Insulator (lateral planar 2 card)             |
| 10                                                                                                                                                                     | 11H2682            | 1                     | Power cable bundle (R30)                      |
| 11                                                                                                                                                                     | 11H2692            | 8                     | Screw                                         |
| 12                                                                                                                                                                     | 40H0875            | 1                     | Primary power supply cable bundle (R40, R50)  |
| 13                                                                                                                                                                     | 40H0876            | 1                     | Optional power supply cable bundle (R40, R50) |
| 14                                                                                                                                                                     | 11H3264            | 1                     | Air deflector                                 |
| 15                                                                                                                                                                     | 00G1268            | 1                     | Screw                                         |
| 16                                                                                                                                                                     | 93H7443            | 1                     | Docking screw bracket (R50)                   |
| 17                                                                                                                                                                     | 1622417            | 3                     | Locknut                                       |
| 18                                                                                                                                                                     | 11H7398            | 1                     | I/O module (R30, R40)                         |
|                                                                                                                                                                        | 93H7120            | 1                     | I/O module (R50)                              |
| 19                                                                                                                                                                     | 00G1268            | 1                     | Mounting screw, system interface board        |
| 20                                                                                                                                                                     | 40H7012            | 1                     | System interface board                        |
| 21                                                                                                                                                                     | 40H0476            | 1                     | Battery Backup Cable                          |
| 22                                                                                                                                                                     | 1621187            | 1                     | Screw (M3x6 pan head)                         |
| 23                                                                                                                                                                     | 1622288            | 1                     | Washer                                        |
| 24                                                                                                                                                                     | 52G5668            | 1                     | Cable clamp – I/O power cable                 |
| 25                                                                                                                                                                     | 11H8268            | 1                     | Cable (converter – 9 pin to 25 pin)           |
| 26                                                                                                                                                                     | 11H7396            | 1                     | Rear access plate                             |
| 27                                                                                                                                                                     | 11H2694            | 2                     | Fan                                           |
| 28                                                                                                                                                                     | 81F7977            | 12                    | Vibration isolator                            |
| 29                                                                                                                                                                     | 11H2691            | 2                     | Screw                                         |
| 30                                                                                                                                                                     | 11H2712            | 1                     | Cooling Unit                                  |
| 31                                                                                                                                                                     | 11H8275            | 1                     | Power supply (AC)                             |
|                                                                                                                                                                        | 11H2714            | 1                     | Power supply (-48 V dc)                       |
| 32                                                                                                                                                                     | 32G1547            | 1                     | Screw                                         |
| 33                                                                                                                                                                     | 35H8834            | 2                     | I/O planar                                    |
| 34                                                                                                                                                                     | 11H3347            | 10                    | I/O planar mounting screw                     |
| 35                                                                                                                                                                     | 11H7315            | 4                     | I/O shoulder mounting screw (M3)              |
| 36                                                                                                                                                                     | 11H3159            | 2                     | Insulator (I/O planars)                       |
| <p>Note: See the "Failing Function Codes" and "FRU Cross-References" chapters in the <i>Diagnostic Information For Micro Channel Bus Systems</i> for part numbers.</p> |                    |                       |                                               |

## Detail 8. Rails for CPU Enclosure Installation

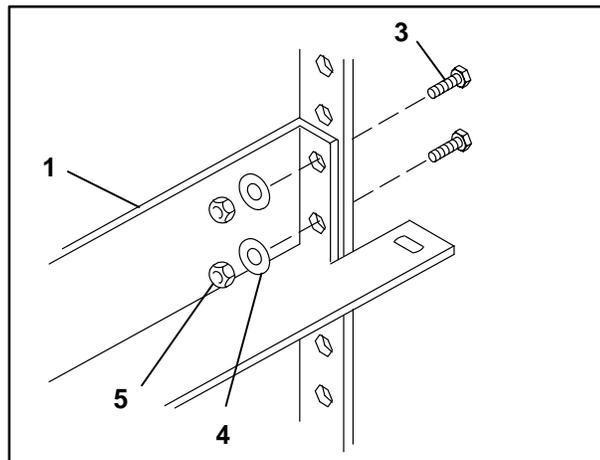


### Mounting Hardware For CPU Enclosure

Detail A – Front of Rail



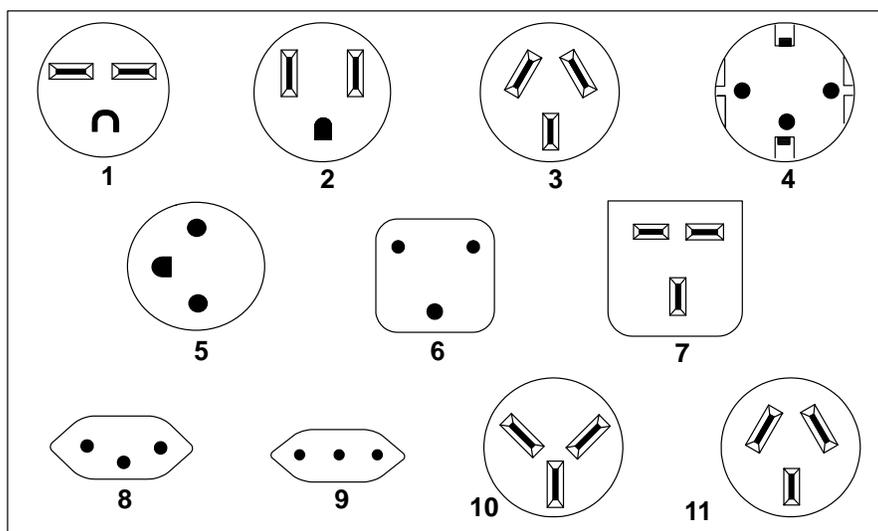
Detail B – Rear of Rail



| <b>Index Number</b> | <b>Part Number</b> | <b>Units Per Asm</b> | <b>Description</b>   |
|---------------------|--------------------|----------------------|----------------------|
| 1                   | 02G7232            | 1                    | Rail, left           |
| 2                   | 0375867            | 4                    | Nut clip             |
| 3                   | 02G7295            | 4                    | Screw, rail mounting |
| 4                   | 1622320            | 4                    | Lock washer          |
| 5                   | 1622405            | 4                    | Nut                  |
| 6                   | 02G7263            | 1                    | Rail, right          |

## Power Cables

**Note:** If you should need a different power cable, use this figure and the following table to assist you when ordering.



| Index | Part Number | Country                                                                                                                                                                                                                                                                                                                                                               |
|-------|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1     | 1838574     | Bahamas, Barbados, Bolivia, Brazil, Canada, Costa Rica, Dominican Republic, El Salvador, Ecuador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Japan, Netherlands Antilles, Panama, Peru, Philippines, Taiwan, Thailand, Trinidad, Tobago, U.S.A. (except Chicago), Venezuela                                                                                         |
| 2     | 6952300     | Bahamas, Barbados, Bermuda, Bolivia, Brazil, Canada, Cayman Islands, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Japan, Korea (South), Mexico, Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Puerto Rico, Saudi Arabia, Suriname, Trinidad, Taiwan, U.S.A. (except Chicago), Venezuela |
| 2     | 62X1045     | Chicago, U.S.A.                                                                                                                                                                                                                                                                                                                                                       |
| 3     | 6952311     | Argentina, Australia, New Zealand                                                                                                                                                                                                                                                                                                                                     |
| 4     | 13F9979     | Abu Dhabi, Austria, Belgium, Bulgaria, Botswana, Egypt, Finland, France, Germany, Greece, Iceland, Indonesia, Korea (South), Lebanon, Luxembourg, Macau, Netherlands, Norway, Portugal, Saudi Arabia, Spain, Sudan, Sweden, Turkey, Yugoslavia                                                                                                                        |
| 5     | 13F9997     | Denmark                                                                                                                                                                                                                                                                                                                                                               |
| 6     | 14F0015     | Bangladesh, Burma, Pakistan, South Africa, Sri Lanka                                                                                                                                                                                                                                                                                                                  |
| 7     | 14F0033     | Bahrain, Bermuda, Brunei, Channel Islands, Cyprus, Ghana, Hong Kong, India, Iraq, Ireland, Jordan, Kenya, Kuwait, Malawi, Malaysia, Nigeria, Oman, People's Republic of China, Qatar, Sierra Leone, Singapore, Tanzania, Uganda, United Arab Emirates (Dubai), United Kingdom, Zambia                                                                                 |
| 8     | 14F0051     | Liechtenstein, Switzerland                                                                                                                                                                                                                                                                                                                                            |
| 9     | 14F0069     | Chile, Ethiopia, Italy                                                                                                                                                                                                                                                                                                                                                |
| 10    | 14F0087     | Israel                                                                                                                                                                                                                                                                                                                                                                |
| 11    | 6952291     | Paraguay, Colombia, Uruguay                                                                                                                                                                                                                                                                                                                                           |

## Appendix A. SystemGuard Test Groups

### SystemGuard Test Groups Table

The following diagram shows the various test groups and their associated tests. To modify the test list, the tests have to be selected in the *xxyy* format, where *xx* is the group number and *yy* is the test number within the group. For example, enter 0106 to specify the NVRAM test in the BUMP Quick IO test group.

| GROUP NO | GROUP                       | TEST NO | TEST                        |
|----------|-----------------------------|---------|-----------------------------|
| 01       | BUMP quick IO test group    | 01      | Debug Line Test             |
|          |                             | 02      | S1 ASL (BUMP) Test          |
|          |                             | 03      | S2 ASL (REM.) Test          |
|          |                             | 04      | S3 ASL (SPE.) Test          |
|          |                             | 05      | Flash EPROM Content Test    |
|          |                             | 06      | NVRAM Content Test          |
|          |                             | 07      | Eprom Content Test          |
|          |                             | 08      | TOD Test                    |
|          |                             | 09      | Floppy Disk controller Test |
|          |                             | 10      | BPP Registers Test          |
|          |                             | 11      | Misc. register Test         |
|          |                             | 12      | CPU access Test             |
|          |                             | 13      | VPD Coherency Test          |
|          |                             | 50      | Asynch. lines L-B Test (*)  |
| 51       | BPP Ext. L-B Full Test (**) |         |                             |
| 52       | Printer Test                |         |                             |
| 53       | Dial-Out Test               |         |                             |
| 54       | BPP Ext. L-B Test (*)       |         |                             |
| 02       | JTAG test group             | 01      | JTAG Chain Integrity Test   |
| 03       | Direct IO test group        | 01      | IONIAN – SSGA reg. Test     |
|          |                             | 02      | NVRAM access Test           |
|          |                             | 03      | Super-IO access Test        |
|          |                             | 04      | Flash access Test           |
|          |                             | 05      | Eprom access Test           |
|          |                             | 06      | TOD access Test             |
|          |                             | 07      | IONIAN2 Regs. Test          |
|          |                             | 50      | Floppy Disk Ext. Test       |
| 04       | CPU test group              | 01      | CPU processor Test          |
|          |                             | 02      | Address translation Test    |
|          |                             | 03      | L1 cache Test               |
|          |                             | 04      | L2 cache Test               |
|          |                             | 05      | EEPROM coherency Test       |

| GROUP NO | GROUP                      | TEST NO | TEST                               |
|----------|----------------------------|---------|------------------------------------|
| 05       | DCB and Memory test group  | 01      | MM Data lines Test                 |
|          |                            | 02      | MM Address lines Test              |
|          |                            | 03      | MM board dec. Test                 |
|          |                            | 04      | MM Basic acc. Test                 |
|          |                            | 05      | MM components Test                 |
|          |                            | 06      | ECC component Test                 |
|          |                            | 07      | ECC mechanism Test                 |
|          |                            | 08      | Refresh mech. Test                 |
|          |                            | 09      | ECC Data lines access. Test        |
|          |                            | 50      | MM Full Test (K/H)                 |
| 06       | Interrupt test group       | 01      | BUMP to CPU interrupt Test         |
|          |                            | 02      | CPU to BUMP interrupt Test         |
|          |                            | 03      | UART to CPU interrupt Test         |
|          |                            | 04      | CPU to CPU interrupt Test          |
|          |                            | 05      | TOD to BUMP interrupt Test         |
|          |                            | 06      | MCA to CPU interrupt Test          |
| 11       | Disk Accessibility group   | 01      | LSA/WSA SCSI basic Test*           |
|          |                            | 02      | LSA LAN basic Test*                |
|          |                            | 50      | Disk accessibility                 |
|          |                            | 51      | LAN external*                      |
|          |                            | 52      | Mouse Keyboard                     |
|          |                            |         | *Test not available on all systems |
| 20       | Multi-processor test group | 01      | Atomic instructions Test           |
|          |                            | 02      | Caches coherencies Test            |
|          |                            | 03      | DCB ports arbitration Test         |
|          |                            | 04      | TLB Mechanism Test                 |
|          |                            | 05      | System IO share Test               |
|          |                            | 06      | Main memory share Test             |
|          |                            | 07      | Multi-resources sharing Test       |
|          |                            | 08      | Multi-processor full Test          |

**Notes:**

(\*) For Manufacturing people only.

(\*\*) For Field people only.

Some tests in this list are run only if an error is detected by the regular power-on self-tests (POST). They are run as extended POST tests and include:

1. Multi-Resources Full Tests.
2. Main Memory Full Tests.

Some tests are only available through the Off Line Test Monitor under the maintenance menu. **They are not available and not run during Power On.** They are as follows:

1. Asynch. lines L-B Test
2. BPP Ext. L-B Test
3. Printer Test
4. Dial-Out Test
5. Floppy Disk Ext. Test
6. MM Full Test
7. SCSI-D ext. Test.

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## SystemGuard Test Group Descriptions

The following is a description of the different test groups and the tests available under them. All of these tests are performed automatically at Power On with default parameters. They can also be performed selectively (selection of test group/subtest/parameter) with user configured parameters, under the control of the Off Line Test monitor. This is available as one of the options in the Maintenance Menu under SystemGuard.

### **BUMP Quick I/O Tests Group**

These tests are performed by the BUMP and are launched at Power-On under the control of Off Line Test monitor, under the Maintenance Menu. These tests check the accessibility and, the functions of the standard and direct I/O components from the BUMP. This group contains the following list of tests.

### **Debug Asynchronous Line Test**

This test checks the BUMP availability and access to the Flash EPROM. It consists of the following sub-test.

**Minimum Core Test** This test is performed at Power On. A specific text on the Debug console is printed. The operator is required to check the result.

## **BUMP, Remote, and Special Asynchronous Lines Test**

These tests are meant to check the Asynchronous lines of the Standard I/O and the Asynchronous Lines controller in the Super I/O. These tests contain sub-tests, which are described as follows. Each sub-test saves and restores the line parameters. When an error is detected, it is reported to the operator with a suitable error message.

### **Internal Registers Test**

This test is performed at Power On and does Read / Write operation of approved values, in the Asynchronous lines register of the Super I/O. The following registers are checked:

1. LCR
2. SCR
3. DLL
4. DLM
5. IER
6. MCR.

### **Buffers Exchange Test**

This test sends two ASCII characters in the following four configurations and checks the received characters. This test is in internal loop back mode and is performed at Power On. The following eight configurations are used:

1. 38400 bds 8 bits 2 stop Even parity
2. 19200 bds 8 bits 2 stop Even parity
3. 9600 bds 8 bits 2 stop Even parity
4. 4800 bds 8 bits 2 stop Even parity
5. 1200 bds 8 bits 2 stop Even parity
6. 300 bds 8 bits 2 stop Even parity
7. 150 bds 8 bits 2 stop Even parity
8. 75 bds 8 bits 2 stop Even parity.

### **Junction Signals Test**

This test is also conducted in internal loop back mode and is performed at Power On. The following loop backs are used:

1. RTS → CTS
2. DTR → DSR
3. OUT1 → R1
4. OUT2 → DCD.

## **Flash EPROM Test**

This test checks the content of the Flash EPROM. It contains one sub-test:

### **Check-Sum Test**

In this test Flash EPROM is divided into different areas and Area CRC is calculated. Then the Registered CRC is read and compared with the calculated CRC.

## **NVRAM Test**

This test checks the accessibility of NVRAM bytes. It contains the following sub-tests:

### **NVRAM Data Lines Access Test**

This test saves the first NVRAM byte. Then a read / write operation is done word by word. It restores the first NVRAM byte.

### **NVRAM Address Lines Access Test**

This test reads, writes and compares 2 NVRAM addresses. The NVRAM addresses involved in this test are saved before testing and restored after testing.

### **Stack Area Read / Write Test**

This test is for all stack area bytes. It saves the byte, conducts read/write operation and compares the written word with the read word. Then it restores the byte.

### **Permanent Data Areas Test**

This test is performed for all permanent data areas with an associated check sum. Data area check sum is calculated and is compared with the registered check sum.

## **EPROM Test**

This test is meant to check the EPROM contents. It contains the following sub-tests.

### **Check-Sum Test**

During this test, EPROM is divided in to different areas and CRC is found for each area. Then this calculated CRC is compared with the registered CRC.

## **TOD Test**

This test checks the access to the Time Of Day chip and it s functionalities. All values are saved and restored. It contains the following sub-tests:

### **MSR register test**

This test checks the PS and RS bits of the MSR registers by the way of write/read operations.

### **Internal RAM Test**

In this test MSR register is initialized and RAM content checking is done by the way of write / read operations.

### **Wake-up Mechanism Test**

This test includes “Seconds” register reading, wake-up mechanism activation, MSR reading.

## **Floppy Disk Controller Test**

This test checks the accessibility to the Super I/O chip and the Floppy Disk Controller embedded in the Super I/O chip. It contains the following sub-test.

### **DOR Register Test**

This test writes, reads and compares a 1 among the 0 bits in the DOR register.

## **BPP Controller Test**

This test checks the accessibility to the Super I/O chip and the Bi-directional Parallel Port embedded in the Super I/O chip. These tests don't access the hardware part related to BPP. It contains the following sub-tests:

### **Addressing Register Test**

This test writes, reads and compares different values in DTR and CTR registers. It saves and restores the CTR register value.

**DTR Register Test** This test writes, reads and compares a 1 among 0 bits in DTR registers.

**CTR Register Test** This test writes, reads and compares a 1 among 0 bits in CTR registers. It saves and restores the CTR register value.

### **Miscellaneous Registers Test**

This test checks accessibility to the MC68230 chip and its internal registers. It is made up of two sub-tests which don't access the hardware parts connected to MC68230. All the checked registers are saved and restored.

**Data Lines Test** This test writes, reads and compares a 1 among 0 bits in the PGCR register.

**DTR Register Test** In this test following registers are checked, by write, read, and compare operations.

0. PGCR
1. PSRR
2. PADDR
3. PBDDR
4. PCDDR
5. PACR
6. PBCR.

### **CPU accessibility Test**

This test checks the minimum dialog that must be available between the BUMP and the CPUs.

The BUMP puts a code in NVRAM. The launched CPU must modify this code in a specific way. The BUMP checks that this code has been correctly modified.

### **Asynchronous lines access test**

This test needs an external plug on the asynchronous lines connector; this plug loops the transmit line to the receive line and the same junction signals to the other ones. A set of characters is sent on the transmit line and must be read on the receive line. This is also true for the junction signals.

### **BPP lines access test**

This test needs an external plug on the bidirectional parallel port (BPP) connector; this plug allows visualization of the output pins of the BPP part on LEDs. The test program switches on and off these LEDs.

### **Printer test**

This test needs to connect a printer on the BPP port. The test writes a text on this printer. The control is made by the operator by verifying the printed text.

### **VPD Coherency Test**

This test checks the coherency of VPD data, that are stored in the configuration table.

### Entry Parameters

| Parameters  | Name       | Definition       | Possible Values | Default Value        |
|-------------|------------|------------------|-----------------|----------------------|
| Parameter 1 | Sub test # | Subtest Number   | 0 or 1          | 0 = All tests linked |
| Parameter 2 | Proc #     | Processor Number | 8               | 8 = BUMP             |

### Check-Sum Test

It checks the CRC value for all present VPDs; It checks the CRC value according to the configuration and it checks the coherency of the configuration.

## Asynchr. lines External Loopback Test (ASL EXT.L-B TEST)

**Note:** This test can only be performed by Field or Manufacturing people.

This test needs an external wrap plug on the asynchronous lines connector. This wrap plug is used to emulate the far-end async port. This plug loops the transmit line to the receive line, causing a test signal to loop through the plug from the transmit line to the receive line and back. In addition, it also loops the junction signals of the "response" category to the corresponding "request" signals from the async port under test (RTS to CTS and DTR to DSR). A set of characters is sent on the transmit line and must be read on the receive line. This is also true for the junction signals.

### Entry Parameters

| Parameters  | Name       | Definition       | Possible Values | Default Value        |
|-------------|------------|------------------|-----------------|----------------------|
| Parameter 1 | Sub test # | Subtest Number   | 0 to 2          | 0 = All tests linked |
| Parameter 2 | Proc #     | Processor Number | 8               | 8 = BUMP             |
| Parameter 3 | Line #     | Line number      | 1, 2, 3         | 0                    |

### Buffers Exchange Test

This test sends two ASCII characters in the following configuration and checks the received characters. This test is in external loop back mode and is not performed at Power On. Following configuration is used:

- 9600 bds 8 bits 2 stop No parity

### Junction Signals Test

This test is also performed in external loop back mode and is not performed at Power On. Following loop backs are used:

- RTS → CTS
- | → DCD
- DTR → DSR
- | → DCD

## BPP External LoopBack Test (BPP EXT L-B TEST)

**Note:** This test can only be performed by Field or Manufacturing people.

This test checks the accessibility of the Super-IO chip. It saves and restores used registers. This test is not performed at power on.

### Entry Parameters

| Parameters  | Name       | Definition       | Possible Values | Default Value        |
|-------------|------------|------------------|-----------------|----------------------|
| Parameter 1 | Sub test # | Subtest Number   | 0 or 1          | 0 = All tests linked |
| Parameter 2 | Proc #     | Processor Number | 8               | 8 = BUMP             |

## JTAG Test Group

These tests check the chip to chip connections using the JTAG features. These tests are run automatically by the BUMP.

The following three tests are available under this group:

### Nodes Detection Test

This test detects all the connections between the chips. These detected nodes can be stored on a Floppy diskette and loaded to NVRAM under the Maintenance menu, as soon as a JTAG test is to be performed.

This test uses the JTAG capabilities to read or set the pins of the chips. This test builds a node which is made up of set of pins which are linked, or pins which are not linked to a node but directly linked to Vcc or GND (pull-up or pull-down). The nodes are stored in the "nodes" file.

### Fast Test

This test processes all the nodes of the "nodes" file, in order to check the integrity of the links between the chips. This test checks if an error is present but doesn't localize the errors. When an error is detected, the test stops and the error is reported.

### Diagnosis Test

This test checks all the nodes of the "nodes" file, looking for any differences between what is read via JTAG and what has been memorized in the "nodes" file. If an error is detected, it is stored in the "faults" file. This test is slow but it localizes the problems.

When JTAG tests are selected under the Off Line Test Control, the JTAG Test Monitor menu is displayed. This menu performs the following main functions,

- Test Execution: Execution of the preceding tests in Normal or Trace mode (step by step).
- Display Nodes files / Faults Files: It is possible to view the entire nodes file / faults file.
- Display Configuration File: To view the hardware specific information (like the input pins, Tri-stated pins, number of boards, etc).

More information about JTAG tests is awaited.

## Direct I/O Test Group

These tests are performed by all processors at Power-On and are under control of the Off Line Test monitor. These tests check the accessibility of the Standard and Direct I/O components from the CPUs. The following tests are available under this group.

## **IONIAN-SSGA Registers Test**

This test is performed by all the processors and it checks the accessibility from the processor to the IONIAN and SSGA chips. Following hardware parts are checked.

1. DCB ASIC
2. IONIAN ASIC
3. SSGA ASIC.

The following sub-tests are included under the IONIAN-SSGA Registers Test:

**IONIAN Registers Test** This test operates on the DSC register, CONFIG register, Personalization register, Bus\_Status register. Specific values are written and read. Values are saved and restored in all the operations.

### **SSGA POS Register Test**

This test tries to read specific values from each of the POS registers. For POS 2 and POS 3 write operation is also conducted.

### **SSGA Interrupt Register Test**

This test writes and reads specific values from each of the interrupt registers. The values are then compared. Values are saved and restored in all the operations. The following registers are operated upon:

1. XVIR (BUC #0) register
2. XVIR (BUC #1) register
3. DSIER register
4. MFRR register
5. BUID register
6. APR register.

### **Initial Values Test**

This test checks the initial values of the IONIAN and SSGA ASICs. It is only run at PON time.

## **NVRAM Access and SSBUS Access Test**

This test is performed by all the processors and is meant to check the accessibility of the SS Bus from the processor, using NVRAM. This test doesn't check the NVRAM memory cells. Memory cells are checked by the BUMP directly. The following hardware parts are checked by this test:

1. DCB ASIC
2. IONIAN ASIC
3. SSGA ASIC
4. SS-Bus
5. NVRAM Decoding, addressing and reading.

This test has the following sub-tests. All the areas which are accessed, are saved at the beginning and restored at the end.

### **NVRAM Data Lines Access Test**

This test writes and reads four specific words in the working area. Written values are compared with the read values.

### **Walking 1 Address Test**

This test is used to find the address lines which are at level 0; address lines which are stuck to other address or data lines.

### **Walking 0 Address Test**

This test detects the address lines which are cut.

## Super I/O and UART Access Test

This test checks the accessibility of the Super I/O chip from the processors. They don't check the functional aspects of the Super I/O chip (this is done by the BUMP directly). The following sub-tests are available under this test:

### Super I/O UART 1 Access Test

Specific values are written and read in the data register scratch SCR. The read values are compared with the written values.

### Super I/O UART 2 Access Test

Specific values are written and read in the data register scratch SCR. The read values are compared with the written values.

### 16550 UART Access Test

This test writes and reads specific values. These operations are done on SCR register. Comparison is also done. The read values are compared with the written values.

### Floppy disk Controller Access Test

The data register scratch DOR, is written with specific values. Read and compare operations are conducted. The read values are compared with the written values.

### Bidirectional Parallel Port Access Test

This test writes and reads specific values. These operations are done on DTR register. Comparison is done. The read values are compared with the written values.

## Flash EPROM Access Test

This test calculates the checksum of the different parts of the Flash EPROM and compares the obtained result to the registered result.

## EPROM Access Test

This test calculates the checksum of the different parts of the EPROM and compares the obtained result to the registered result.

## TOD Access Test

This test is conducted to check the accessibility of the TOD chip from the processors. It has two sub-tests. All the registers which are used during the operation are saved in the beginning and are restored at the end.

**Embedded RAM Test** Specific values are written, read and compared in this test.

**TOD Registers Test** This test operates on SEC\_COMP\_RAM register. It writes and reads specific values. Values are compared and if a mismatch is detected, an error message is generated.

## ION-2 REGS TEST

This test is performed by all the processors and it checks the accessibility from the processor to the IONIAN2 and DMA slave chips. Following hardware parts are checked:

- DCB ASIC
- IONIAN 2 ASIC.

### Initial Values Test

This test checks the initial values of the IONIAN and SSGA ASICs. It is only run at PON time.

### **SSGA Interrupt Registers Test**

This test writes and reads specific values from each of the interrupt registers. The values are then compared. Values are saved and restored in all the operations.

### **Floppy Disk Access Test**

This test needs a formatted diskette in the diskette drive (the diskette content is erased by the test). The test writes and reads several sectors on the diskette.

## **CPU Test Group**

These tests are performed by all of the processors at Power-On under the control of Off Line Test Monitor. These tests check the status of the CPU cards. The following tests are available under this group.

### **CPU Processor Tests**

This test checks the main instructions of the CPU.

- Integer Logical Instructions
- Integer Arithmetic Instructions
- Floating Point Arithmetic Instructions (Single precision).

### **ADD. TRANSL. TEST**

This test checks all the address translation mechanisms available on the machine. This test is performed by the CPU.

- Block Address Translation
- Segmented Address Translation

### **Level 1 (primary cache) Test**

This test checks the validity of the primary cache, embedded in the processor. This test is performed automatically at each Power On by the processor internally. The test results are automatically put in H1D0 register. It contains the following sub-test.

**H1D0.31 Value Test** This test saves the H1D0 content, validates the machine check stop and cache parity check stop bits. Reads the H1D0 contents and restores the saved value.

### **Level 2 (secondary cache) Test**

This test checks the validity of the secondary cache and enables the checking of the following hardware parts.

1. CCA2 ASICs (partially)
2. CCD2 ASICs (partially)
3. Secondary cache components.

It contains the following three subtests which are destructive, that is values used are not restored and they are lost:

#### **Level 2 Cache Accessibility Test**

This test checks cache accessibility. First, it calculates the available memory address. It then validates Level 2 cache and writes 2 MB in memory and in cache. Then it reads the second MB from cache and first MB from the memory.

#### **Level 2 Cache Data Test**

This test checks the validity of the static memory RAMs forming the

Level 2 cache. It calculates the memory address available and then validates the Level 2 cache before writing 1 MB. Then a read operation is done in word mode and values are compared. Then a read is done in burst mode and comparison is done.

**TAG Data Test** This test checks the availability of the TAG chips of the L2 cache memory.

**Walking 1 TAG Test** This test verifies data integrity.

**Walking 0 TAG Test** This test verifies data integrity.

**Mini-Addressing TAG Test**  
This test checks L2 cache addresses.

## EEPROM Compatibility Test

This test is done primarily to check the compatibility of the EEPROM contents (VPD code) with the actual status of the machine. This results in checking of the information coherency. This test contains the following sub-test:

### EEPROM Compatibility Test

During this test, BUMP reads the CPU card VPD and puts the information in the parameter area. The processor then reads the PVR register and compares the parameter values with the PVR register values.

The 2 values are available in the temporary test result area, in NVRAM.

## DCB and Memory Test Group

All of these tests except the Memory Components Test, in this group are performed by all of the processors. The tests are launched at Power-On and under the control of the Off Line Test Monitor. This test group checks the status of the System Planar and Memory cards. The following tests are available in this group.

## Data Lines Accessibility Test

This test checks the accessibility for all the data lines to the memory, through DCB ASICs. The following hardware parts are checked by running this test.

1. DCB ASICs
2. SMC ASIC (partially)
3. Connection of data lines between CPU cards and System Planar ASICs
4. Connection of data lines between System Planar ASICs and memory chips.

This test consists of four sub-tests. Words manipulated / used are not restored at the end of the test. This test applies to one of the four memory cards. The following is a description of the sub-tests.

**Work Area Test** This sub-test is used to find a working area which is safe enough to perform other sub-tests. It first calculates the memory location and 0s will be written on the first long word and verified. Then 1s are written and verified. If the verification is OK, the sub-test is ended and the next sub-test is started.

**Walking 1 Data Test** This test basically identifies if any data lines are stuck at level 0 or to any other data line. This test writes "1s among 0s" pattern on the cache line. Then it is read and compared.

**Walking 0 Data Test** This test isolates the open lines among the data lines. It writes “0s among 1s” pattern on the cache line. Then it is read and compared.

**Transfer Modes On DCB Test**

This sub-test is used to check the transfer of 1 to 8 bytes to the memory. Initially the working area is written with 0s (blanked). Then a byte is written and placed in the 8 possible locations of the long word. This is read and compared with the written word for possible errors.

**Address Lines Accessibility Test**

This test checks all the address lines access to the main memory, through the SMC ASIC. The following hardware parts are checked by running this test.

1. SMC ASIC
2. Connection of address lines between CPU cards and System Planar ASICs
3. Connection of address lines between System Planar ASICs and memory chips.

This test consists of three sub-tests. Words manipulated / used are not restored at the end of the test. This test applies to one of the four memory cards. In case of errors, suitable error messages are displayed on the console. The following is a description of the sub-tests.

**Work Area Test**

This subtest is used to find the working area safe enough to perform the other tests. It first calculates the memory location and 0s are written on the first long word and verified. Then 1s are written and verified. If the verification is OK, the sub-test is ended and the next sub-test is started.

When the test is run automatically during Power On, the next sub-test are started, only if the results of this verification is OK.

**Walking 1 Address Test**

This test basically identifies if any address lines are stuck at level 0 or to any other address/data lines. This test writes two defined set of patterns and the same are read and verified. If it is OK, the process is repeated with the “1” bit shifted to the end of the working area. Then the patterns are interchanged and written. If there is any mismatch between the written word and the read word, suitable error message is displayed.

**Walking 0 Address Test**

This test isolates the open lines among the address lines. It writes two defined set of patterns and the same are read and verified. If it is OK, the process is repeated with the “0” bit shifted to the beginning of the working area. Then the patterns are interchanged and written. If there is any mismatch between the written word and the read word, suitable error message is displayed.

**Memory Boards Decoding Test (MM BOARDS DEC TEST)**

This test is performed by all the processors and checks the high order address line to the main memory, through the DCB ASICs. The following hardware parts are checked by running this test.

1. SMC ASIC (partially)
2. Connection of high order address lines between CPU cards and System Planar ASICs
3. Connection of high order address lines between System Planar ASICs and memory chips.

This test consists of two sub-tests. Words manipulated / used are not restored at the end of the test. This test is applied to all the memory cards which are present. In case of errors, suitable error messages are displayed on the console. The following is a description of the sub-tests.

**Work Area Test** This test calculates the memory address available on each board. Then the first memory card is accessed and read-write-compare operation is done for a memory location. If the comparison is OK, then the test proceeds to check the next board. Otherwise a fatal error message is displayed on the console.

**Main Memory Cards Accessibility Test**

This test checks whether the high order memory address lines are open, stuck to level 0, or shorted to any other data line. This is done in two phases:

First, in Write phase, different patterns are written on the four memory cards. This is verified to check the accessibility of the boards.

In the Read phase, the values are read and the interference between the boards is checked (if the value written for the first board, appears when the second board is accessed).

If there are any errors in the preceding operations, they are displayed with suitable error messages on the console.

## Basic Main Memory Test

This test is performed by all the processors and it checks the capability to access the main memory in all kinds of data formats. This test applies to one main memory location and the words used during the test are not restored.

This test partially checks the DCB ASICs. It consists of the 10 sub-tests that follow. If an error is detected in any of these tests, a suitable error message is displayed on the console.

**Byte Write Checking** A byte is written and verified. If there is mismatch between the read value and the written value, an error message is generated.

### **Aligned Half Word Write Checking**

This test writes a half word and checks for the possible errors in the read value.

### **Unaligned Half Word Write Checking**

This test writes a half word and checks the corrected value against the read value.

### **Aligned Word Write Checking**

It writes a full word and checks it against the read value. An error message is generated if a mismatch is detected between the read value and the written value.

### **Unaligned Word Write Checking**

This test writes an unaligned word and verifies it against the corrected value.

### **Aligned Double Word Write Checking**

This test checks the access by writing an aligned double word and does a read verification. If the verification fails, a console error message appears.

### **Unaligned Double Word Write Checking**

This test writes an unaligned double word and verifies it against the corrected value.

### **Multiple Individual Store Checking**

Access to the 1MB address is checked through writing. A comparison is made between written value and the read value.

### **Addressing tests in Work Mode Checking**

Access to the 1MB address is checked through writing. A comparison is made between written value and the read value.

### **Aligned Multiple Store Checking**

In this test multiple words are written and read back. If the verification fails, an Aligned Multiple store error is displayed.

### **Unaligned Multiple Store Checking**

This test writes multiple words and checks for misalignment interrupt. Error message is displayed if it is not set.

## **Main Memory Components Test**

This test is performed by all the processors to check all the main memory locations. From the hardware point of view, this test checks the memory chips mounted on the main memory cards. This test can be launched in two modes, as follows:

1. Bit Map Elaboration Mode: This is at Power On and performed with execution mode parameter set to 0.
2. Localization Mode: This is possible in the maintenance menu, under the control of Off Line Test Monitor. It is performed on a selected area with the execution mode parameter set to 1.

This test has two sub-tests, as follows:

### **Address in to Address Memory Test**

This test is done in two phases.

In the Write phase, the first address to be written is calculated and the BAT is initialized. Then the last address to be written in the 1MB block, is found and the writing loop is begun. This loop writes the address of the location as the data in to the memory location, and after each write operation the address is incremented. This loop continues until the working address is equal to the end address. If it is equal, Read and Compare phase begins.

In the Read and Compare phase, the first address to be read and compared is found and BATs initialization is done. Then the last address to read and compare in the 1MB block is calculated. Now, the Read and Compare loop is begun where each memory location is read and compared with the theoretical value. In case of no errors, the loop ends when all the locations have been verified. If an error is detected, a console message giving the details of the error is displayed.

### **Complemented Address in to Address Memory Test**

This test is conducted in the same manner as the previous test except that, the location address is complemented and written.

## ECC Data Lines Accessibility Test

This test checks the accessibility for all the data lines to the ECC memory banks, through SMC ASICs. The following hardware parts are checked by running this test.

- DCB ASICs
- SMC ASICs
- Connection of data lines between CPU daughter boards and MPB ASICs
- Connection of data lines between MPB ASICs and ECC memory chips.

Words manipulated / used are not restored at the end of the test. This test is applied to all present memory banks.

### Entry Parameters

| Parameters  | Name                          | Definition        | Possible Values                 | Default Value        |
|-------------|-------------------------------|-------------------|---------------------------------|----------------------|
| Parameter 1 | Sub test #                    | Subtest Number    | 0 to 2                          | 0 = All tests linked |
| Parameter 2 | Proc #                        | Processor Number  | 0 to 7                          | 0                    |
| Parameter 3 | ECC sel.                      | ECC Selection     | 0 to 5<br><b>See note 1</b>     | 2                    |
| Parameter 4 | 1 <sup>st</sup> Mem. Bnk Add. | Mem Address (Mb)  |                                 | 0                    |
| Parameter 5 | 2 <sup>nd</sup> Mem. Bnk Add. | Mem Address (Mb)  |                                 | 0xffffffff           |
| Parameter 6 | 3 <sup>rd</sup> Mem. Bnk Add. | Mem Address (Mb)  |                                 | 0xffffffff           |
| Parameter 7 | 4 <sup>th</sup> Mem. Bnk Add. | Mem Address (Mb)  |                                 | 0xffffffff           |
| Parameter 8 | SIMM/Bus mode                 | <b>See note 2</b> | 0=SIMM number<br>1=Value of Bus | 0                    |

### Notes:

1. The different values are:
  - . 0 → ECC invalidation,
  - . 1 → ECC validation and checkstop detection,
  - . 2 → ECC test,
  - . 3 → ECC validation and no checkstop detection,
  - . 4 → ECC generation checking,
  - . 5 → ECC correction checking.
2. If your answer is 0, you get the number of the default DIMM.  
If your answer is 1, you get the bus value which enables you to determine the failing bits.

### Work Area Checking

This program calculates the memory address available on each board to perform the sub tests. If no working area exists, a fatal error message is displayed on the console.

### Walking 1 Data Test

This test basically identifies if any ECC data lines are stuck at level 0 or to any other ECC data line. This test writes a pattern of a single 1 bit among 0 bits on the cache line. Then it is read and compared.

### Walking 0 Data Test

This test isolates an open line among the ECC data lines. It writes a pattern of a single 0 bit among 1 bits on the cache line. Then it is read and compared.

### **ECC Memory Component Test**

This test is identical to the main memory components test but it is applied to the ECC memory components.

### **Error Correction Mechanism Test**

This test checks the hardware mechanisms enabling the detection of and the correction of single bit errors when working with the main memory. It also detects double errors.

### **Memory Refresh Mechanism Test**

This test is performed by all the processors. It checks the mechanism embedded in the SMC ASIC enabling it to refresh the main memory. This test checks the SMC ASIC hardware partially. This test contains the following sub-test.

#### **Refresh Mechanism Test**

In this test, the memory address is calculated first. Then two complementary patterns are written in the work area. Then a read and compare operation is done. If an error is detected, a Memory read error is displayed. The refresh mechanism is checked in the following manner.

A read operation is done on another location (other than the one previously read) until the delay time is over. Then the previous location is once again read, to verify the presence of the same data (this is possible, only if the chip is refreshed periodically).

### **Main Memory full Test**

This test performs the most complete test on the main memory, using the Knaizuk-Hartmann algorithm.

This test is very long (about 20 minutes) when the memory capacity to be checked is large (2GB). So, it is performed only as an extended test or under the OFF line test monitor control.

## **Interrupt Tests Group**

These tests are performed by the BUMP as well as the processors. They are launched at Power On and under control of Off Line Test Monitor. They collectively check the interrupt system. The following tests are available under this group.

### **BUMP To CPU Interrupt Test**

This test is performed jointly by the BUMP and the processor. It contains one sub-test which checks the capability of the BUMP to generate an interrupt request to one CPU. The errors can be either detected by the BUMP or by the processor. They are suitably displayed on the console. This test also checks the following hardware parts:

1. Processor Interrupt Capability
2. Interrupt Management of SSGA
3. Control Logic PLD.

### **CPU To BUMP Interrupt Test**

This test is performed jointly by the BUMP and the processor. It contains one sub-test which checks the capability of the processor to generate an interrupt request to BUMP. The errors can be either detected by the BUMP or by the processor. They are suitably displayed on the console. This test also checks the following hardware parts:

1. BUMP Interrupt Capability
2. Interrupt Management of SSGA
3. Control Logic PLD.

### **UART To CPU Interrupt Test**

This test is performed by the processor. It has a sub-test which checks the capability of the Super-I/O Async line to generate an interrupt request to the CPU. The following hardware parts are checked by the test:

1. Processor Interrupt Capability
2. SSGA Interrupt Management
3. PLD Control Logic
4. Super-I/O Interrupt Mechanism.

Whenever an error is detected by the processor, an error message giving the details of the error is displayed.

### **CPU To CPU Interrupt Test**

This test checks the capability for a CPU to interrupt another CPU. The two CPUs of the same card are used (the capability for a CPU to interrupt a CPU located on another CPU card is not used in this test).

### **TOD To BUMP Interrupt Test**

This test is launched and performed by the BUMP. It has one sub-test to check the interrupt generating mechanism of the TOD chip.

This test checks the BUMP and TOD hardware during the process. TOD internal registers are not modified during the test. This test displays error messages during the test if an error is detected.

## CPU MultiProcessor Test Group

These tests are launched at Power-On and are also available under the control of the Off Line Tests monitor. These tests check the multi-processor mechanisms, atomic instructions, cache coherency, main memory sharing, and multi-resources sharing.

The following tests are available under this group.

### Atomic Instructions Test

This test checks the mechanisms enabling the protection of the content of the memory in case of use of some specific instructions, called “atomic instructions”.

### Cache Coherency Test

This test is performed by two processors on the same CPU card. It checks the capability of a CPU card to manage all the hardware systems, maintaining the coherency between all the caches. This test checks the following hardware parts:

1. CPU processors (partially)
2. CCA2 ASICs
3. CCD ASICs
4. L2 cache.

This test is made of 9 sub-tests, which are launched on two processors, Processor 0 and Processor 1. Processor 1 is often used to verify the operation started by Processor 0. These two processors concurrently access the same memory area, with various access modes enabled. The following is a brief description of the various sub-tests. Suitable error messages are generated by each test, whenever an error is detected.

#### Concurrent Coherent Write Access-Copy Back

In this test, both the processors are enabled in Global Copy Back mode. The snoop mechanism is activated to ensure cache coherency. Processor 0, writes a half word in memory (actually, data is in Processor 0 cache). Then Processor 1 writes another half word in memory (actually, data is in Processor 1 cache). When Processor 1 is writing, Processor 0 cache updates memory. When Processor 0 tries to read the full word, Processor 1 cache is erased.

#### Concurrent Not Coherent Write Access-Copy Back

This test puts both the processors in Local Copy Back Mode. Each processor does a write-read operation.

The global snoop mechanism is not enabled in this test and the caches are not coherent. So when Processor 0 is reading memory, Processor 1 cache is not erased.

#### Concurrent Coherent Write Access-DCBST from Line Owner

This test verifies the DCBST(update memory) instruction from the Processor 0. Processor 0 is set to Global Write Through mode and caching is enabled. The odd processor is uncached without coherency.

#### Concurrent Coherent Write Access-DCBF from Line Owner

In this test, Processor 0 is enabled for Write through and Memory coherency parameters. Processor 0 issues a DCBF (Data Cache Block Flush) instruction. Processor 1 cache is inhibited and memory coherency is absent.

#### Concurrent Coherent Write Access-DCBI from Line Owner

This test verifies the DCBI (Data Cache Block Invalidate)

instruction. This is issued by Processor 0 which is set to Global Copy Back mode. Caching is inhibited for Processor 1.

**Paradox Detection: DCBST not from Line Owner**

Here, Processor 1 is set to Local Copy Back mode. Memory coherency is enabled for Processor 0. This test verifies the incoherency introduced by the Local Copy Back. Execution of DCBST by Processor 1 is not verified.

**Paradox Detection: DCBF not from Line Owner**

This test enables the Processor 0 for memory coherency. Processor 1 is set to Local Copy Back mode. The DCBF instruction is run from Processor 1 and verified.

**Paradox Detection: DCBI not from Line Owner**

In this test, the DCBI instruction is run by Processor 1 when it is uncached. The even processor is set to Global Loop Back mode.

**Paradox Detection: DCBT not from Line Owner**

In this test, Processor 0 is made to verify the result of the DCBT (Data Cache Block Touch) instruction on the Processor 1 cache.

The odd processor cache is inhibited without coherency. Processor 0 is set to Global Copy Back mode, with memory coherency enabled.

## **DCB Ports Arbitration Test**

This test checks the different data flows through the DCB asics.

## **TLB Mechanism Test**

This test is performed by two processors on the same CPU card. It contains one sub-test called "TLB Invalidate in Multiprocessor environment Test". This test checks the TLB mechanism. The following hardware parts are also checked by this test:

1. Processors (partially).
2. CCA2 ASICs
3. CCD ASICs.

## **System I/O Sharing Test**

This test is performed by all the processors. It contains one sub-test which checks the capability of all the processors to simultaneously access the same Standard I/O resources. Here, it checks the Flash EPROM and NVRAM. It also checks the following hardware parts:

1. DCBs ASICs
2. IONIAN ASICs
3. SSGA ASIC.

The test is launched by the BUMP and performed by all the configured processors. The BUMP manages the test and reports the global test results.

## **Main Memory Sharing Test**

This test is launched by the BUMP and performed by all configured processors. It has a sub-test to check the capability of all the processors to access the main memory. The following hardware parts are checked during the process:

1. DCB ASICs
2. IONIAN ASICs
3. SSGA ASIC
4. SMC ASIC.

BUMP displays the overall test results.

## **Multi Resource Sharing Test**

BUMP launches and manages the test results. All configured processors perform this test. It has one sub-test, which checks the capability of all the processors to access the following I/O resources simultaneously:

1. Main Memory
2. NVRAM
3. Async Lines.

The following hardware parts are checked during the process:

1. DCB ASICs
2. IONIAN ASICs
3. SSGA ASIC
4. SMC ASIC.

## **Multi Resources Full Test**

This test is the hardest test performed by the machine. To be fully efficient, it must be:

- launched on three processors at least (one of them is used as a de-synchronize processor).
- performed during thirty seconds at least. Its main characteristic is to perform random accesses into main memory, with a very high implication of L1 and L2 caches.

---

## Appendix B. Modifying SystemGuard Parameters

Many SystemGuard parameters can be modified in several ways. Some can be modified using the SystemGuard Stand-By menu, others using the SystemGuard Maintenance menu, and others using the AIX **diag** or **mpcfg** commands or Diagnostic Service Aids. When you want to modify SystemGuard parameters, the method to use depends on the machine boot phase (stand-by, init, run-time). This chapter explains how to change some of the more important flags and parameters depending on the current machine state. For a complete list of default values for flags and parameters, see the table in “Default Parameter Values” on page B-1.

The Mode Switch must be in the Service position to use the SystemGuard menus. If the machine is in the stand-by phase, you must press the Enter key to get the SystemGuard prompt, and then enter the keyword **sbb** to display the stand-by menu. If you enter the power-on keyword (**power**), or if you turn the power on manually, the machine enters the init phase and displays the maintenance menu if the *AutoService IPL* flag is disabled. The *AutoService IPL* flag is normally enabled. If the *AutoService IPL* flag is enabled, then the flag must be disabled before the maintenance menu can be entered. The *AutoService IPL* flag can be disabled when the system is in stand-by phase by pressing the Enter key and then entering the keyword **sbb** to display the *Stand-by Menu*. Select the *Set Flags* option. The *AutoService IPL* flag can now be disabled. The *AutoService IPL* flag can also be disabled using the Service Aids.

When changing parameters under the AIX operating system, the Diagnostic Service Aids are recommended because its menu interface is better suited to interactive use. The **mpcfg** command requires the use of command line flags and is better suited for shell scripts. The command requires root authority. Also, the Service Aids require root authority if entered with the **diag** command. They display or change flag values using 0 (zero) for disabled and 1 (one) for enabled. The explanations that follow refer to the Diagnostic Service Aids.

---

### Default Parameter Values

The flags, parameters and keywords used by SystemGuard programs are stored in non-volatile memory (NVRAM). They are given default values before leaving the factory, as shown in the table on the following page.

| <b>Flag, Parameter and Keyword Default Values</b>      |                                                 |
|--------------------------------------------------------|-------------------------------------------------|
| <b>Name</b>                                            | <b>Default Value</b>                            |
| BUMP Console Power-On Command String                   | Power                                           |
| Service Console Power-On Command String                | Blank (not set)                                 |
| BUMP Console Power-On Command flag                     | Enabled                                         |
| Service Console Power-On Command flag                  | Disabled                                        |
| Remote Authorization flag                              | Disabled                                        |
| Autoservice IPL flag                                   | Disabled                                        |
| BUMP Console Present flag                              | Enabled                                         |
| BUMP Console Speed                                     | 1200                                            |
| Dial-Out Authorization flag                            | Disabled                                        |
| Set Electronic Mode Switch to Normal when Booting flag | NRM                                             |
| Electronic Mode Switch from Service Line flag          | Disabled                                        |
| Boot Multiuser AIX in Service flag                     | Disabled                                        |
| Fast IPL flag                                          | Disabled                                        |
| Power-On Tests in Loop Mode flag                       | Disabled                                        |
| Power-On Tests in Trace Mode flag                      | Disabled                                        |
| Power-On Test Message Mode parameter                   | 1 (verbose mode off: only error messages shown) |
| Extended Tests parameter                               | Disabled                                        |
| Maintenance Password                                   | Blank (no password set)                         |
| Customer Maintenance Password                          | Blank (no password set)                         |
| System Dial-In phone number                            | Blank (not set)                                 |
| Service Center Dial-Out phone number                   | Blank (not set)                                 |
| Customer Hub Dial-Out phone number                     | Blank (not set)                                 |
| System Operator Voice phone number                     | Blank (not set)                                 |
| Modem Parameters File Name                             | Blank                                           |
| Service Line Speed                                     | 1200                                            |
| Protocol Inter Data Bloc Delay                         | 15                                              |
| Protocol Time Out                                      | 30                                              |
| Retry Number                                           | 2                                               |
| Customer ID                                            | Blank                                           |
| Login ID                                               | Blank                                           |
| Password ID                                            | Blank                                           |
| Service Contract Validity                              | Enabled                                         |
| Remote Service Support                                 | Enabled                                         |
| Quick On-Call Service                                  | N                                               |
| Service Support Type                                   | F (ASCII byte x'46')                            |

---

## Changing Flags and Parameters Under AIX Service Aids

The Service Aids are recommended to change the flags. The Service Aids can be entered using the **diag** command or by booting diagnostics in service mode. They display or change flag values using 0 (zero) for disabled and 1 (one) for enabled. The explanations that follow refer to the Service Aids.

### Modifying Diagnostic Flags

Use this procedure to modify diagnostic flags such as the Remote Authorization flag or the Autoservice IPL flag. Starting from the Service Aids Selection menu:

1. Select the BUMP Service Aids option.
2. Select the Display or Change Flags and Configuration option.
3. Select the Change Diagnostic Flags option to display a menu of diagnostic flags.
4. Select a flag and enter its new value.

### Modifying the Modem and Site Configuration

Use this procedure to modify modem and site configuration parameters such as the modem configuration file name or the service line speed. Starting from the Service Aids Selection menu:

1. Select the BUMP Service Aids option.
2. Select the Display or Change Flags and Configuration option.
3. Select the Change Modem and Site Configuration option to display a menu.
4. Select a flag and enter its new value.

### Saving or Restoring Flags and Configuration Information

Use this procedure to save or to restore the configuration using a file. Starting from the Service Aids Selection menu:

1. Select the BUMP Service Aids option.
2. Select the Save or Restore Flags and Configuration option.
3. Select either the Save or the Restore option.

---

## Modifying the Remote Authorization Flag

This flag can be changed under SystemGuard using the stand-by or maintenance menus, or under AIX using the **diag** command.

### SystemGuard Stand-by Menu

Starting from the main stand-by menu:

1. Enter 1 (one) to set flags.
2. Enter 0 (zero) to change the Remote Authorization flag.

## SystemGuard Maintenance Menu

Starting from the main maintenance menu:

- Enter 2 to enable the flag.  
OR
- Enter 3 to disable the flag.

## AIX Diag Command

Starting from the Service Aids Selection menu:

1. Select the BUMP Service Aids option.
2. Select the Display or Change Flags and Configuration option.
3. Select the Change Diagnostic Flags option.
4. Select the Remote Authorization option.
5. Supply a new flag value (0 or 1).

---

## Modifying the Dial-Out Authorization Flag

This flag can be changed under SystemGuard using the maintenance menu, or under AIX using the **diag** command.

## SystemGuard Maintenance Menu

Starting from the main maintenance menu:

1. Enter 8 to set parameters.
2. Enter 4 for miscellaneous parameters.
3. Enter 2 to change the Dial-Out Authorization flag.

## AIX Diag Command

Starting from the Service Aids Selection menu:

1. Select the BUMP Service Aids option.
2. Select the Display or Change Flags and Configuration option.
3. Select the Change Diagnostic Flags option.
4. Select the Dial-Out Authorization option.
5. Supply a new flag value (0 or 1).

---

## Modifying Dial-In Phone Numbers

These parameters can be changed under SystemGuard using the maintenance menu, or under AIX using the **diag** command.

### SystemGuard Maintenance Menu

Starting from the main maintenance menu:

1. Enter 8 to set parameters.
2. Enter 3 for phone numbers.
3. Enter 4 for the dial-in phone number.
4. Supply a new phone number.

### AIX Diag Command

Starting from the Service Aids Selection menu:

1. Select the BUMP Service Aids option.
2. Select the Display or Change Flags and Configuration option.
3. Select the Change Remote Support Phone Numbers option.
4. Select the System Dial-In option.
5. Supply a new phone number.

---

## Modifying Dial-Out Phone Numbers

These parameters can be changed under SystemGuard using the maintenance menu, or under AIX using the **diag** command.

### SystemGuard Maintenance Menu

Starting from the main maintenance menu:

1. Enter 8 to set parameters.
2. Enter 3 for phone numbers.
3. Select the dial-out phone number to modify (service center or customer hub).
4. Supply a new phone number.

### AIX Diag Command

Starting from the Service Aids Selection menu:

1. Select the BUMP Service Aids option.
2. Select the Display or Change Flags and Configuration option.
3. Select the Change Remote Support Phone Numbers option.
4. Select the Service Center Dial-Out or Customer Hub Dial-Out option.
5. Supply a new phone number.

---

## Modifying the Electronic Mode Switch from Service Line Flag

This flag can be changed under SystemGuard using the maintenance menu, or under AIX using the **diag** command.

### SystemGuard Maintenance Menu

Starting from the main maintenance menu:

1. Enter 8 to set parameters.
2. Enter 4 for miscellaneous parameters.
3. Enter 9 to change the Electronic Mode Switch from Service Line flag.

### AIX Diag Command

Starting from the Service Aids Selection menu:

1. Select the BUMP Service Aids option.
2. Select the Display or Change Flags and Configuration option.
3. Select the Change Diagnostic Flags option.
4. Select the Electronic Mode Switch from Service Line option.
5. Supply a new flag value (0 or 1).

---

## Reloading the Flash EEPROM

Follow this procedure to load a new version of SystemGuard into the flash EEPROM, which may be necessary when you install a new version of AIX for example. Only system administrators should perform this procedure.

### Prerequisites

If the system is not yet booted, you need a firmware diskette containing the new version of the firmware to be loaded. If the system is already booted, you need the full path name of a file containing the new version of the firmware to be loaded.

### Reloading the Flash EEPROM (stand-by phase)

Insert the firmware diskette in the drive, place the Mode Switch in the Service position, and then turn the system power on. The firmware diskette is identified by a special header which distinguishes it from diskettes containing other data. The existing firmware recognizes the special header and automatically loads the new firmware version.

### Reloading the Flash EEPROM (run-time phase)

If AIX is already up and running (the run-time phase), reloading the firmware requires more steps, because the machine is rebooted after the firmware is reloaded. Therefore, the root user who performs this procedure should be the only logged user. To reload the flash EEPROM, one method is to shut down the system and reboot using the procedure "Reloading the Flash EEPROM (stand-by phase)" described above. The other method is:

1. Make sure that no other users are logged in to the system (log them out if necessary).
2. Make sure that you have root authority (use the **su** command if necessary).
3. Enter the **diag** command.
4. Select the BUMP Service Aids option.
5. Select the Flash Eprom Download option.
6. Enter the full path name for the file containing the new flash EEPROM.
7. The system is automatically rebooted



---

## Appendix C. SystemGuard Remote Operation Configuration

In order to utilize the remote operation capabilities of SystemGuard and also allow console mirroring, you need to have flags, parameters and tty configurations properly enabled. Below, are tty0 and tty1 settings, sample modem files and all the parameters that are necessary to allow remote operations.

---

### Terminal Configuration

The configuration of the tty0 for the S1 port looks similar to the following:

|                                            |                                                                                                                            |
|--------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|
| [TOP]                                      | [Entry Fields]                                                                                                             |
| TTY                                        | tty0                                                                                                                       |
| TTY type                                   | tty                                                                                                                        |
| TTY interface                              | rs232                                                                                                                      |
| Description                                | Asynchronous                                                                                                               |
| Terminal                                   |                                                                                                                            |
| Status                                     | Available                                                                                                                  |
| Location                                   | 00-00-S1-00                                                                                                                |
| Parent adapter                             | sa0                                                                                                                        |
| PORT number                                | [s1]                                                                                                                       |
| Enable LOGIN                               | disable                                                                                                                    |
| BAUD rate                                  | [9600]                                                                                                                     |
| PARITY                                     | [none]                                                                                                                     |
| BITS per character                         | [8]                                                                                                                        |
| Number of STOP BITS                        | [1]                                                                                                                        |
| TIME before advancing to next port setting | [0]                                                                                                                        |
| TERMINAL type                              | [dumb]                                                                                                                     |
| FLOW CONTROL to be used                    | [xon]                                                                                                                      |
| OPEN DISCIPLINE to be used                 | [dtropen]                                                                                                                  |
| STTY attributes for RUN time               | [hupcl,cread,brkint,<br>icrnl,opost,tab3,<br>onlcr,isig,icanon,<br>echo,echoe,echok,<br>echoctl,echoke,<br>imaxbel,iexten] |
| STTY attributes for LOGIN                  | [hupcl,cread,echoe,<br>cs8,ixon,ixoff]                                                                                     |
| LOGGER name                                | [ ]                                                                                                                        |
| STATUS of device at BOOT time              | [available]                                                                                                                |
| TRANSMIT buffer count                      | [16]                                                                                                                       |
| RECEIVE trigger level                      | [3]                                                                                                                        |
| STREAMS modules to be pushed at OPEN time  | [ldterm,tioc]                                                                                                              |
| INPUT map file                             | [none]                                                                                                                     |
| OUTPUT map file                            | [none]                                                                                                                     |
| CODESET map file                           | [sbcs]                                                                                                                     |

The configuration of the tty1 for the S2 port looks similar to the following:

```

[TOP] [Entry Fields]
TTY tty1
TTY type tty
TTY interface rs232
Description Asynchronous
Terminal
Status Available
Location 00-00-S2-00
Parent adapter sa1
PORT number [s2]
Enable LOGIN disable
BAUD rate [9600]
PARITY [none]
BITS per character [8]
Number of STOP BITS [1]
TIME before advancing to next port setting [0]
TERMINAL type [dumb]
FLOW CONTROL to be used [rts]
OPEN DISCIPLINE to be used [dtropen]
STTY attributes for RUN time [hupcl,cread,brkint,
 icrnl,opost,tab3,
 onlcr,isig,icanon,
 echo,echoe,echok,
 echoctl,echoke,
 imaxbel,iexten]

STTY attributes for LOGIN
[hupcl,cread,echoe,cs8,

LOGGER name []
STATUS of device at BOOT time [available]
TRANSMIT buffer count [16]
RECEIVE trigger level [3]
STREAMS modules to be pushed at OPEN time [ldterm,tioc]
INPUT map file [none]
OUTPUT map file [none]
CODESET map file [sbcs]

```

---

## Flags and Parameters Settings

These are the minimum SystemGuard parameters/flags settings required for remote support. These parameters can be displayed and changed with the **mpcfg** command.

- Modem configuration:

```
mpcfg -dm
```

| Index | Name                            | Value                  |
|-------|---------------------------------|------------------------|
| 1     | Modem Parameters File Name      | /usr/share/modems/7851 |
| 2     | Service Line Speed              | 9600                   |
| 3     | Protocol Inter Data Block Delay | 5                      |
| 4     | Protocol Time Out               | 60                     |
| 5     | Retry Number                    | 2                      |
| 6     | Customer ID                     |                        |
| 7     | Login ID                        |                        |
| 8     | Password ID                     |                        |

The Modem Parameters File Name Value should be set to the file name of your modem configuration file. The service line speed should be set to your modem and tty capabilities (9600 is recommended).

- Service flags:

```
mpcfg -dS
```

| Index | Name                      | Value |
|-------|---------------------------|-------|
| 1     | Remote Service Support    | 1     |
| 2     | Quick On Call Service     | 0     |
| 3     | Service Contract Validity | 32767 |
| 4     | Service Support Type      |       |

- Diagnostics flags:

```
mpcfg -df
```

| Index | Name                                     | Value |
|-------|------------------------------------------|-------|
| 1     | Remote Authorization                     | 1     |
| 2     | Autoservice IPL                          | 0     |
| 3     | BUMP Console                             | 1     |
| 4     | Dial-Out Authorization                   | 1     |
| 5     | Set Mode to Normal When Booting          | 0     |
| 6     | Electronic Mode Switch from Service Line | 0     |
| 7     | Boot Multi-user AIX in Service           | 0     |
| 8     | Extended Tests                           | 0     |
| 9     | Power On Tests in Trace Mode             | 0     |
| 10    | Power On Tests in Loop Mode              | 0     |
| 11    | Fast IPL                                 | 0     |

- Phone numbers:

```
mpcfg -dp
```

| Index | Name                        | Value        |
|-------|-----------------------------|--------------|
| 1     | Service Center Dial-Out (1) | 180083001041 |
| 2     | Service Center Dial-Out (2) |              |
| 3     | Customer Hub Dial-Out (1)   |              |
| 4     | Customer Hub Dial-Out (2)   |              |
| 5     | System Dial-In              |              |
| 6     | System Operator Voice       |              |

The phone number in the Service Center Dial-Out field represents the U.S IBM RETAIN number. It should be set as appropriate to the geography. Other phone numbers should be provided based on account-related information.

---

## Modem Configuration Files

If you want to attach a modem to the S2 port to allow automatic problem reporting from SystemGuard or dial-in access from a remote location, you have to provide a configuration file for the modem you are using. This file is also necessary to utilize the mirroring capabilities supported by the operating system mirrord daemon.

The configuration files for the IBM 7851 are shown below. This file has a very specific format. You can use this file as a template to build a configuration file for another model of modem. If you do not use any modem for connecting the Service Console, you need a modem file. An example of the modem file without a modem is provided below.

This is a sample /usr/share/modems/mir\_modem file for console mirroring without using modems.

```
ICDelay 1
DefaultTO 10
condout: done
connect: done
retry: done
disconnect: done
condin: done
condwait: done
waitcall: done
page: done
```

This is a sample /usr/share/modems/mir\_modem file for console mirroring using an IBM 7851 modem.

```
Tested at 9600bps.

ICDelay 5
DefaultTO 10
CallDelay 120
AT Attention Code Q0 Enable result codes to
screen
&F1 Set factory profile 1 Q1 Disable result codes to
screen
E0 Turn echo off S0=0 Automatic answer inhibit
V0 Use numeric responses S0=2 Answer on second ring
+++ Escape to command mode &W0 Save configuration to
profile 0
H0 Hang-up
17=38.4bps; 16=19.2bps; 12=9600bps; 11=4800bps; 10=2400bps;
7=busy
condout: send "AT&F1E0V0Q0S0=0\r"
 expect "0\r" or "OK\r"
 done

connect: send "ATDT%N\r" # Tone dialing command
 expect "17\r" or "16\r" or "12\r" or "11\r" or "10\r" busy "7\r"
 timeout 60
 done

retry: send "A/" # Redo command
 expect "17\r" or "16\r" or "12\r" or "11\r" or "10\r" busy "7\r"
 timeout 60
 done

disconnect: send "+++ATH0\r"
 delay 2
 send "ATQ1V0E0\r"
 delay 2
 done

condin: send "AT&F1E0V0Q0S0=2\r"
 expect "0\r" or "OK\r\n"
 send "ATQ1&W0\r" # (there can be no reply)
 done

condwait: send "AT&F1V0E0Q0S0=2&W0\r"
 expect "0\r" or "OK\r\n"
 done

waitcall: ignore "2\r" timeout none
 expect "2\r" timeout 10
 expect "17\r" or "16\r" or "12\r" or "11\r" or "10\r" busy "7\r"
 timeout 60
 done

page: send "ATDT%N;\r" # ; = go back to command mode
 expect "0\r" or "OK\r\n" timeout 60
 delay 2
 send "ATH0\r"
 expect "0\r" or "OK\r\n"
 done
```

---

## Initializing a Modem

Once flags, parameters and configurations have been enabled, the modem can be initialized to accept incoming calls. This can be done in the following manner:

- Place the System Key to Normal.
- Issue a **ps -ef|grep mirrord** command.
- Obtain mirrord process ID.
- Issue a **kill -9 <mirrord pid>**.
- Issue **/usr/sbin/mirrord modemfilename**.
- Place the System Key into the Service position.

This initiates the mirrord process. The disconnect and condin parameters are read from the appropriate modem file, and the modem is initialized for dial-in activity. After the mirrord daemon is activated, the System Key should be placed in the Normal position.

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## Testing Dial-Out

Dial-out or automatic problem reporting can be tested from the SystemGuard Maintenance Menu using the Offline Test for Dial-out. Successful connection and transmission of data results in an OK completion.

During the test, the modem configuration file is read, the modem initialized properly, and data transmitted. Comparing the modem configuration file to line activity shows disconnect, condout, connect, transmit of data, disconnect and condin. Thus the modem is initialized for dial-out, data is transmitted, and the modem is initialized to allow dial-in.

## Appendix D. Off Line Diagnostic Error Codes

**Note:** The Failure Percent value is calculated on a system model base. As some Failing Function Codes are system model specific but are associated the the same Error Number, it may happen that the sum of the Failure Percent values in one single box exceeds 100.

| Error Number | Source | Failing Function Codes | Failure Percent (%) | Description                                                                                                                                |
|--------------|--------|------------------------|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| 401-000      | K      | C59                    | 100                 | <b>Description</b> S1 asynchronous line internal registers error.<br><b>Action:</b> Use MAP 0210.                                          |
| 401-001      | K      | C59                    | 100                 | <b>Description:</b> S1 asynchronous line buffer exchange error.<br><b>Action:</b> Use MAP 0210.                                            |
| 401-002      | K      | C59                    | 100                 | <b>Description:</b> S1 asynchronous line junction signal error (initial test).<br><b>Action:</b> Use MAP 0210.                             |
| 401-003      | K      | C59                    | 100                 | <b>Description:</b> S1 asynchronous line junction signal error (DTR to DSR link).<br><b>Action:</b> Use MAP 0210.                          |
| 401-004      | K      | C59                    | 100                 | <b>Description:</b> S1 asynchronous line junction signal error (RTS to CTS link).<br><b>Action:</b> Use MAP 0210.                          |
| 401-005      | K      | C59                    | 100                 | <b>Description:</b> S1 asynchronous line junction signal error (OUT2 to DCD link).<br><b>Action:</b> Use MAP 0210.                         |
| 401-006      | K      | C59                    | 100                 | <b>Description:</b> S1 asynchronous line junction signal error (OUT1 to RI link).<br><b>Action:</b> Use MAP 0210.                          |
| 401-007      | K      | C59                    | 100                 | <b>Description:</b> S1 asynchronous line buffer exchange error. External loop-back mode.<br><b>Action:</b> Use MAP 0210.                   |
| 401-008      | K      | C59                    | 100                 | <b>Description:</b> S1 asynchronous line junction signal error (RTS to CTS link). External loop-back mode.<br><b>Action:</b> Use MAP 0210. |
| 401-009      | K      | C59                    | 100                 | <b>Description:</b> S1 asynchronous line junction signal error (DTR to DSR link). External loop-back mode.<br><b>Action:</b> Use MAP 0210. |
| 401-010      | K      | C59                    | 100                 | <b>Description:</b> S1 asynchronous line speed error. External loop-back mode.<br><b>Action:</b> Use MAP 0210.                             |
| 401-020      | K      | C59                    | 100                 | <b>Description:</b> S2 asynchronous line internal registers error.<br><b>Action:</b> Use MAP 0210.                                         |
| 401-021      | K      | C59                    | 100                 | <b>Description:</b> S2 asynchronous line buffer exchange error.<br><b>Action:</b> Use MAP 0210.                                            |
| 401-022      | K      | C59                    | 100                 | <b>Description:</b> S2 asynchronous line junction signal error (initial test).<br><b>Action:</b> Use MAP 0210.                             |

| Error Number | Source | Failing Function Codes | Failure Percent (%) | Description                                                                                                                                |
|--------------|--------|------------------------|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| 401-023      | K      | C59                    | 100                 | <b>Description:</b> S2 asynchronous line junction signal error (DTR to DSR link).<br><b>Action:</b> Use MAP 0210.                          |
| 401-024      | K      | C59                    | 100                 | <b>Description:</b> S2 asynchronous line junction signal error (RTS to CTS link).<br><b>Action:</b> Use MAP 0210.                          |
| 401-025      | K      | C59                    | 100                 | <b>Description:</b> S2 asynchronous line junction signal error (OUT2 to DCD link).<br><b>Action:</b> Use MAP 0210.                         |
| 401-026      | K      | C59                    | 100                 | <b>Description:</b> S2 asynchronous line junction signal error (OUT1 to RI link).<br><b>Action:</b> Use MAP 0210.                          |
| 401-027      | K      | C59                    | 100                 | <b>Description:</b> S2 asynchronous line buffer exchange error. External loop-back mode.<br><b>Action:</b> Use MAP 0210.                   |
| 401-028      | K      | C59                    | 100                 | <b>Description:</b> S2 asynchronous line junction signal error (RTS to CTS link). External loop-back mode.<br><b>Action:</b> Use MAP 0210. |
| 401-029      | K      | C59                    | 100                 | <b>Description:</b> S2 asynchronous line junction signal error (DTR to DSR link). External loop-back mode.<br><b>Action:</b> Use MAP 0210. |
| 401-030      | K      | C59                    | 100                 | <b>Description:</b> S2 asynchronous line speed error. External loop-back mode.<br><b>Action:</b> Use MAP 0210.                             |
| 401-040      | K      | C59                    | 100                 | <b>Description:</b> S3 asynchronous line internal registers error.<br><b>Action:</b> Use MAP 0210.                                         |
| 401-041      | K      | C59                    | 100                 | <b>Description:</b> S3 asynchronous line buffer exchange error.<br><b>Action:</b> Use MAP 0210.                                            |
| 401-042      | K      | C59                    | 100                 | <b>Description:</b> S3 asynchronous line junction signal error (initial test).<br><b>Action:</b> Use MAP 0210.                             |
| 401-043      | K      | C59                    | 100                 | <b>Description:</b> S3 asynchronous line junction signal error (DTR to DSR link).<br><b>Action:</b> Use MAP 0210.                          |
| 401-044      | K      | C59                    | 100                 | <b>Description:</b> S3 asynchronous line junction signal error (RTS to CTS link).<br><b>Action:</b> Use MAP 0210.                          |
| 401-045      | K      | C59                    | 100                 | <b>Description:</b> S3 asynchronous line junction signal error (OUT2 to DCD link).<br><b>Action:</b> Use MAP 0210.                         |
| 401-046      | K      | C59                    | 100                 | <b>Description:</b> S3 asynchronous line junction signal error (OUT1 to RI link).<br><b>Action:</b> Use MAP 0210.                          |
| 401-047      | K      | C59                    | 100                 | <b>Description:</b> S3 asynchronous line buffer exchange error. External loop-back mode.<br><b>Action:</b> Use MAP 0210.                   |
| 401-048      | K      | C59                    | 100                 | <b>Description:</b> S3 asynchronous line junction signal error (RTS to CTS link). External loop-back mode.<br><b>Action:</b> Use MAP 0210. |

| Error Number | Source | Failing Function Codes | Failure Percent (%) | Description                                                                                                                                |
|--------------|--------|------------------------|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| 401-049      | K      | C59                    | 100                 | <b>Description:</b> S3 asynchronous line junction signal error (DTR to DSR link). External loop-back mode.<br><b>Action:</b> Use MAP 0210. |
| 401-050      | K      | C59                    | 100                 | <b>Description:</b> S3 asynchronous line speed error. External loop-back mode.<br><b>Action:</b> Use MAP 0210.                             |
| 401-060      | K      | C59                    | 100                 | <b>Description:</b> Flash EPROM standard area checksum error.<br><b>Action:</b> Use MAP 0210.                                              |
| 401-061      | K      | C59                    | 100                 | <b>Description:</b> Flash EPROM IPL area checksum error.<br><b>Action:</b> Use MAP 0210.                                                   |
| 401-070      | K      | C59                    | 100                 | <b>Description:</b> NVRAM error 1.<br><b>Action:</b> Use MAP 0210.                                                                         |
| 401-071      | K      | C59                    | 100                 | <b>Description:</b> NVRAM error 2.<br><b>Action:</b> Use MAP 0210.                                                                         |
| 401-080      | K      | C59                    | 100                 | <b>Description:</b> EPROM standard area checksum error.<br><b>Action:</b> Use MAP 0210.                                                    |
| 401-081      | K      | C59                    | 100                 | <b>Description:</b> EPROM IPL area checksum error.<br><b>Action:</b> Use MAP 0210.                                                         |
| 401-090      | K      | C59                    | 100                 | <b>Description:</b> TOD MSR register error.<br><b>Action:</b> Use MAP 0210.                                                                |
| 401-091      | K      | C59                    | 100                 | <b>Description:</b> TOD internal RAM error.<br><b>Action:</b> Use MAP 0210.                                                                |
| 401-092      | K      | C59                    | 100                 | <b>Description:</b> TOD wake-up mechanism error.<br><b>Action:</b> Use MAP 0210.                                                           |
| 401-100      | K      | C59                    | 100                 | <b>Description:</b> Floppy disk controller DOR register error.<br><b>Action:</b> Use MAP 0210.                                             |
| 401-100      | K      | C59                    | 100                 | <b>Description:</b> Floppy disk controller DOR register error.<br><b>Action:</b> Use MAP 0210.                                             |
| 401-110      | K      | C59                    | 100                 | <b>Description:</b> BPP address register error.<br><b>Action:</b> Use MAP 0210.                                                            |
| 401-111      | K      | C59                    | 100                 | <b>Description:</b> BPP DTR register error.<br><b>Action:</b> Use MAP 0210.                                                                |
| 401-112      | K      | C59                    | 100                 | <b>Description:</b> BPP CTR register error.<br><b>Action:</b> Use MAP 0210.                                                                |
| 401-120      | K      | C59                    | 100                 | <b>Description:</b> Miscellaneous PGCR register error.<br><b>Action:</b> Use MAP 0210.                                                     |
| 401-121      | K      | C59                    | 100                 | <b>Description:</b> Miscellaneous DTR register error.<br><b>Action:</b> Use MAP 0210.                                                      |
| 401-130      | K      | C59<br>C61<br>C63      | 50<br>25<br>25      | <b>Description:</b> CPU accessibility.<br>Checkstop error.<br><b>Action:</b> Use MAP 0210.                                                 |
| 401-131      | K      | C59<br>C61<br>C63      | 50<br>25<br>25      | <b>Description:</b> CPU accessibility.<br>Single error.<br><b>Action:</b> Use MAP 0210.                                                    |
| 401-132      | K      | C59<br>C61<br>C63      | 50<br>25<br>25      | <b>Description:</b> CPU accessibility.<br>CPU not started.<br><b>Action:</b> Use MAP 0210.                                                 |

| Error Number | Source | Failing Function Codes   | Failure Percent (%)  | Description                                                                                                                |
|--------------|--------|--------------------------|----------------------|----------------------------------------------------------------------------------------------------------------------------|
| 401-140      | K      | all boards               |                      | <b>Description:</b> Bad VPD Board.                                                                                         |
| 401-141      | K      | all boards               |                      | <b>Description:</b> No Board present.                                                                                      |
| 401-142      | K      | all boards               |                      | <b>Description:</b> No coherent configuration on board.                                                                    |
| 401-150      | K      | C59<br>C61<br>C63<br>C88 | 40<br>20<br>20<br>20 | <b>Description:</b> Asynchronous lines access.<br>Line Sx: register error<br><b>Action:</b> Use MAP 0210.                  |
| 401-151      | K      | C59<br>C61<br>C63<br>C88 | 40<br>20<br>20<br>20 | <b>Description:</b> Asynchronous lines access.<br>Line Sx: status register error.<br><b>Action:</b> Use MAP 0210.          |
| 401-152      | K      | C59<br>C61<br>C63<br>C88 | 40<br>20<br>20<br>20 | <b>Description:</b> Asynchronous lines access.<br>Asynchronous line buffer exchange error.<br><b>Action:</b> Use MAP 0210. |
| 401-153      | K      | C59<br>C61<br>C63<br>C88 | 40<br>20<br>20<br>20 | <b>Description:</b> Asynchronous lines access.<br>Line Sx: register error on bit i.<br><b>Action:</b> Use MAP 0210.        |
| 401-160      | K      | C59<br>C61<br>C63<br>C88 | 40<br>20<br>20<br>20 | <b>Description:</b> BPP ext. Loop back. Status register error.<br><b>Action:</b> Use MAP 0210.                             |
| 401-161      | K      | C59<br>C61<br>C63<br>C88 | 40<br>20<br>20<br>20 | <b>Description:</b> BPP ext. Loop back. Error bit i#0.<br><b>Action:</b> Use MAP 0210.                                     |
| 401-162      | K      | C59<br>C61<br>C63<br>C88 | 40<br>20<br>20<br>20 | <b>Description:</b> BPP ext. Loop back. Error bit i#1.<br><b>Action:</b> Use MAP 0210.                                     |
| 401-170      | K      | C59<br>C61<br>C63<br>C88 | 40<br>20<br>20<br>20 | <b>Description:</b> Printer error: not selected.<br><b>Action:</b> Use MAP 0210.                                           |
| 401-171      | K      | C59<br>C61<br>C63<br>C88 | 40<br>20<br>20<br>20 | <b>Description:</b> Printer error: end of paper.<br><b>Action:</b> Use MAP 0210.                                           |
| 401-172      | K      | C59<br>C61<br>C63<br>C88 | 40<br>20<br>20<br>20 | <b>Description:</b> Printer on error.<br><b>Action:</b> Use MAP 0210.                                                      |
| 401-173      | K      | C59<br>C61<br>C63<br>C88 | 40<br>20<br>20<br>20 | <b>Description:</b> Printer time out, always busy.<br><b>Action:</b> Use MAP 0210.                                         |
| 401-180      | K      | C59<br>Modem             | 20<br>80             | <b>Description:</b> DIAL-OUT test. Dial out not authorized.                                                                |
| 401-181      | K      | C59<br>Modem             | 20<br>80             | <b>Description:</b> DIAL-OUT test. Quick on Call Service not subscribed.                                                   |

| Error Number | Source | Failing Function Codes | Failure Percent (%) | Description                                                                                                  |
|--------------|--------|------------------------|---------------------|--------------------------------------------------------------------------------------------------------------|
| 401-182      | K      | C59<br>Modem           | 20<br>80            | <b>Description:</b> DIAL-OUT test. No customer Hub or Service Center phone Dial-Out.                         |
| 401-183      | K      | C59<br>Modem           | 20<br>80            | <b>Description:</b> DIAL-OUT test. Modem parameters failed.                                                  |
| 401-184      | K      | C59<br>Modem           | 20<br>80            | <b>Description:</b> DIAL-OUT test. Line busy.                                                                |
| 401-185      | K      | C59<br>Modem           | 20<br>80            | <b>Description:</b> DIAL-OUT test. Connection Time out.                                                      |
| 401-186      | K      | C59<br>Modem           | 20<br>80            | <b>Description:</b> DIAL-OUT test. Modem answer failed.                                                      |
| 401-187      | K      | C59<br>Modem           | 20<br>80            | <b>Description:</b> DIAL-OUT test. Data Time out.                                                            |
| 401-188      | K      | C59<br>Modem           | 20<br>80            | <b>Description:</b> DIAL-OUT test. Data Carrier detect junction failed.                                      |
| 401-189      | K      | C59<br>Modem           | 20<br>80            | <b>Description:</b> DIAL-OUT test. No data acknowledge.                                                      |
| 401-190      | K      | C59                    | 100                 | <b>Description:</b> BPP external Loop back. Data register error.                                             |
| 401-191      | K      | C59                    | 100                 | <b>Description:</b> BPP external Loop back. Status register error.                                           |
| 401-400      | K      | C59                    | 100                 | <b>Description:</b> JTAG chain integrity. Read IR failed.                                                    |
| 401-401      | K      | C59                    | 100                 | <b>Description:</b> JTAG chain integrity. Read DR failed: chip #.                                            |
| 401-501      | K      | C59<br>C63<br>C61      | 50<br>25<br>25      | <b>Description:</b> Direct IO: IONIAN-SSGA.<br>Map register error<br><b>Action:</b> Use MAP 0210.            |
| 401-502      | K      | C59<br>C63<br>C61      | 50<br>25<br>25      | <b>Description:</b> Direct IO: IONIAN-SSGA.<br>CONFIGURATION register error.<br><b>Action:</b> Use MAP 0210. |
| 401-503      | K      | C59<br>C63<br>C61      | 50<br>25<br>25      | <b>Description:</b> Direct IO: IONIAN-SSGA.<br>PERSONALIZE register error.<br><b>Action:</b> Use MAP 0210.   |
| 401-509      | K      | C59<br>C63<br>C61      | 50<br>25<br>25      | <b>Description:</b> Direct IO: IONIAN-SSGA.<br>POS3 register error.<br><b>Action:</b> Use MAP 0210.          |
| 401-510      | K      | C59<br>C63<br>C61      | 50<br>25<br>25      | <b>Description:</b> Direct IO: IONIAN-SSGA.<br>XIVR register error.<br><b>Action:</b> Use MAP 0210.          |
| 401-511      | K      | C59<br>C63<br>C61      | 50<br>25<br>25      | <b>Description:</b> Direct IO: IONIAN-SSGA.<br>DSIER register error.<br><b>Action:</b> Use MAP 0210.         |
| 401-512      | K      | C59<br>C63<br>C61      | 50<br>25<br>25      | <b>Description:</b> Direct IO: IONIAN-SSGA.<br>MFRR register error.<br><b>Action:</b> Use MAP 0210.          |
| 401-513      | K      | C59<br>C63<br>C61      | 50<br>25<br>25      | <b>Description:</b> Direct IO: IONIAN-SSGA.<br>BUID register error.<br><b>Action:</b> Use MAP 0210.          |

| Error Number | Source | Failing Function Codes        | Failure Percent (%) | Description                                                                                                       |
|--------------|--------|-------------------------------|---------------------|-------------------------------------------------------------------------------------------------------------------|
| 401-514      | K      | C59<br>C63<br>C61             | 50<br>25<br>25      | <b>Description:</b> Direct IO: IONIAN-SSGA. APR register error.<br><b>Action:</b> Use MAP 0210.                   |
| 401-515      | K      | C59<br>C63<br>C61             | 50<br>25<br>25      | <b>Description:</b> Direct IO: IONIAN-SSGA. BSR init value.<br><b>Action:</b> Use MAP 0210.                       |
| 401-516      | K      | C59<br>C63<br>C61             | 50<br>25<br>25      | <b>Description:</b> Direct IO: IONIAN-SSGA. MD0 init value.<br><b>Action:</b> Use MAP 0210.                       |
| 401-517      | K      | C59<br>C63<br>C61             | 50<br>25<br>25      | <b>Description:</b> Direct IO: IONIAN-SSGA. MD1 init value.<br><b>Action:</b> Use MAP 0210.                       |
| 401-518      | K      | C59<br>C63<br>C61             | 50<br>25<br>25      | <b>Description:</b> Direct IO: IONIAN-SSGA. XIVR6 init value.<br><b>Action:</b> Use MAP 0210.                     |
| 401-519      | K      | C59<br>C63<br>C61             | 50<br>25<br>25      | <b>Description:</b> Direct IO: IONIAN-SSGA. DSIER init value.<br><b>Action:</b> Use MAP 0210.                     |
| 401-520      | K      | C59                           | 100                 | <b>Description:</b> Direct IO. IONIAN register access error.<br><b>Action:</b> Use MAP 0210.                      |
| 401-521      | K      | C59<br>C61                    | 80<br>20            | <b>Description:</b> Direct IO. SSGA POS register error.<br><b>Action:</b> Use MAP 0210.                           |
| 401-522      | K      | C59<br>C61                    | 80<br>20            | <b>Description:</b> Direct IO. SSGA interrupt register error.<br><b>Action:</b> Use MAP 0210.                     |
| 401-523      | K      | C59<br>C90<br>MCA<br>adapters | 25<br>25<br>50      | <b>Description:</b> Direct IO: IONIAN-SSGA. IER register error on Base Unit.<br><b>Action:</b> Use MAP 0210.      |
| 401-524      | K      | C59<br>C90<br>MCA<br>adapters | 25<br>25<br>50      | <b>Description:</b> Direct IO: IONIAN-SSGA. IER register error on Base Unit.<br><b>Action:</b> Use MAP 0210.      |
| 401-530      | K      | C59<br>C61                    | 80<br>20            | <b>Description:</b> Direct IO. NVRAM data lines access error.<br><b>Action:</b> Use MAP 0210.                     |
| 401-531      | K      | C59<br>C61                    | 80<br>20            | <b>Description:</b> Direct IO. NVRAM address lines access error. Walking 1 phase.<br><b>Action:</b> Use MAP 0210. |
| 401-532      | K      | C59<br>C61                    | 80<br>20            | <b>Description:</b> Direct IO. NVRAM address lines access error. Walking 0 phase.<br><b>Action:</b> Use MAP 0210. |
| 401-540      | K      | C59<br>C61                    | 80<br>20            | <b>Description:</b> Direct IO. Super IO UART1 access error.<br><b>Action:</b> Use MAP 0210.                       |
| 401-541      | K      | C59<br>C61                    | 80<br>20            | <b>Description:</b> Direct IO. Super IO UART2 access error.<br><b>Action:</b> Use MAP 0210.                       |
| 401-542      | K      | C59<br>C61                    | 80<br>20            | <b>Description:</b> Direct IO. 16550 UART access error.<br><b>Action:</b> Use MAP 0210.                           |
| 401-543      | K      | C59<br>C61                    | 80<br>20            | <b>Description:</b> Direct IO. Floppy disk access error.<br><b>Action:</b> Use MAP 0210.                          |
| 401-544      | K      | C59<br>C61                    | 80<br>20            | <b>Description:</b> Direct IO. BPP register access error.<br><b>Action:</b> Use MAP 0210.                         |

| Error Number | Source | Failing Function Codes        | Failure Percent (%)  | Description                                                                                                   |
|--------------|--------|-------------------------------|----------------------|---------------------------------------------------------------------------------------------------------------|
| 401-550      | K      | C59<br>C61<br>C90<br>C91      | 60<br>20<br>10<br>10 | <b>Description:</b> Direct IO. Flash Eprom access error.<br><b>Action:</b> Use MAP 0210.                      |
| 401-560      | K      | C59<br>C61                    | 80<br>20             | <b>Description:</b> Direct IO. Eprom access error.<br><b>Action:</b> Use MAP 0210.                            |
| 401-570      | K      | C59<br>C61                    | 80<br>20             | <b>Description:</b> Direct IO. TOD imbedded RAM access error.<br><b>Action:</b> Use MAP 0210.                 |
| 401-571      | K      | C59<br>C61                    | 80<br>20             | <b>Description:</b> Direct IO. TOD registers access error.<br><b>Action:</b> Use MAP 0210.                    |
| 401-58A      | K      | C59<br>C90<br>MCA<br>adapters | 25<br>25<br>50       | <b>Description:</b> Direct IO: IONIAN2. IER register error on Expansion Unit.<br><b>Action:</b> Use MAP 0210. |
| 401-58B      | K      | C59<br>C90<br>MCA<br>adapters | 25<br>25<br>50       | <b>Description:</b> Direct IO: IONIAN2. IER register error on Expansion Unit.<br><b>Action:</b> Use MAP 0210. |
| 401-580      | K      | C59<br>C63<br>C61             | 50<br>25<br>25       | <b>Description:</b> Direct IO: IONIAN2.<br>TCE register error.<br><b>Action:</b> Use MAP 0210.                |
| 401-581      | K      | C59<br>C63<br>C61             | 50<br>25<br>25       | <b>Description:</b> Direct IO: IONIAN2.<br>MAP register error.<br><b>Action:</b> Use MAP 0210.                |
| 401-582      | K      | C59<br>C63<br>C61             | 50<br>25<br>25       | <b>Description:</b> Direct IO: IONIAN2.<br>CONFIGURATION register error.<br><b>Action:</b> Use MAP 0210.      |
| 401-583      | K      | C59<br>C63<br>C61             | 50<br>25<br>25       | <b>Description:</b> Direct IO: IONIAN2.<br>PERSONALIZE register error.<br><b>Action:</b> Use MAP 0210.        |
| 401-584      | K      | C59<br>C63<br>C61             | 50<br>25<br>25       | <b>Description:</b> Direct IO: IONIAN2.<br>DSC register error.<br><b>Action:</b> Use MAP 0210.                |
| 401-585      | K      | C59<br>C63<br>C61             | 50<br>25<br>25       | <b>Description:</b> Direct IO: IONIAN2.<br>CSR register error.<br><b>Action:</b> Use MAP 0210.                |
| 401-586      | K      | C59<br>C63<br>C61             | 50<br>25<br>25       | <b>Description:</b> Direct IO: IONIAN2.<br>BSR init value.<br><b>Action:</b> Use MAP 0210.                    |
| 401-587      | K      | C59<br>C63<br>C61             | 50<br>25<br>25       | <b>Description:</b> Direct IO: IONIAN2.<br>MD0 init value.<br><b>Action:</b> Use MAP 0210.                    |
| 401-588      | K      | C59<br>C63<br>C61             | 50<br>25<br>25       | <b>Description:</b> Direct IO: IONIAN2.<br>MD1 init value.<br><b>Action:</b> Use MAP 0210.                    |
| 401-589      | K      | C59<br>C63<br>C61             | 50<br>25<br>25       | <b>Description:</b> Direct IO: IONIAN2.<br>Not present.<br><b>Action:</b> Use MAP 0210.                       |
| 401-590      | K      | C59<br>C63<br>C61             | 50<br>25<br>25       | <b>Description:</b> Diskette drive access.<br>Error on lock command.<br><b>Action:</b> Use MAP 0210.          |

| Error Number | Source | Failing Function Codes          | Failure Percent (%)        | Description                                                                                                     |
|--------------|--------|---------------------------------|----------------------------|-----------------------------------------------------------------------------------------------------------------|
| 401-591      | K      | C59<br>C63<br>C61               | 50<br>25<br>25             | <b>Description:</b> Diskette drive access.<br>Error on sense interrupt command.<br><b>Action:</b> Use MAP 0210. |
| 401-592      | K      | C59<br>C63<br>C61               | 50<br>25<br>25             | <b>Description:</b> Diskette drive access.<br>Error on write command.<br><b>Action:</b> Use MAP 0210.           |
| 401-593      | K      | C59<br>C63<br>C61               | 50<br>25<br>25             | <b>Description:</b> Diskette drive access.<br>Error on read command.<br><b>Action:</b> Use MAP 0210.            |
| 401-594      | K      | C59<br>C63<br>C61               | 50<br>25<br>25             | <b>Description:</b> Diskette drive access.<br>Buffer exchange error.<br><b>Action:</b> Use MAP 0210.            |
| 401-595      | K      | C59<br>C63<br>C61               | 50<br>25<br>25             | <b>Description:</b> Diskette drive access.<br>Time-out error.<br><b>Action:</b> Use MAP 0210.                   |
| 401-800      | K      | LSA<br>C59<br>C90<br>C61<br>C63 | 40<br>20<br>20<br>10<br>10 | <b>Description:</b> Channel reset and POS.<br>POS3 register error.<br><b>Action:</b> Use MAP 0210.              |
| 401-801      | K      | LSA<br>C59<br>C90<br>C61<br>C63 | 40<br>20<br>20<br>10<br>10 | <b>Description:</b> Channel reset and POS.<br>POS4 register error.<br><b>Action:</b> Use MAP 0210.              |
| 401-802      | K      | LSA<br>C59<br>C90<br>C61<br>C63 | 40<br>20<br>20<br>10<br>10 | <b>Description:</b> Channel reset and POS.<br>POS2 register error.<br><b>Action:</b> Use MAP 0210.              |
| 401-803      | K      | LSA<br>C59<br>C90<br>C61<br>C63 | 40<br>20<br>20<br>10<br>10 | <b>Description:</b> Channel reset and POS.<br>NCR SCRATCH A register error.<br><b>Action:</b> Use MAP 0210.     |
| 401-804      | K      | LSA<br>C59<br>C90<br>C61<br>C63 | 40<br>20<br>20<br>10<br>10 | <b>Description:</b> Channel reset and POS.<br>SCSI Bus control lines error.<br><b>Action:</b> Use MAP 0210.     |
| 401-805      | K      | LSA<br>C59<br>C90<br>C61<br>C63 | 40<br>20<br>20<br>10<br>10 | <b>Description:</b> Channel reset and POS.<br>Missing ACK signal error.<br><b>Action:</b> Use MAP 0210.         |
| 401-806      | K      | LSA<br>C59<br>C90<br>C61<br>C63 | 40<br>20<br>20<br>10<br>10 | <b>Description:</b> Channel reset and POS.<br>Pending ACK signal error.<br><b>Action:</b> Use MAP 0210.         |

| Error Number | Source | Failing Function Codes          | Failure Percent (%)        | Description                                                                                                                |
|--------------|--------|---------------------------------|----------------------------|----------------------------------------------------------------------------------------------------------------------------|
| 401-807      | K      | LSA<br>C59<br>C90<br>C61<br>C63 | 40<br>20<br>20<br>10<br>10 | <b>Description:</b> Channel reset and POS.<br>Missing DMA interrupt error during transfer.<br><b>Action:</b> Use MAP 0210. |
| 401-808      | K      | LSA<br>C59<br>C90<br>C61<br>C63 | 40<br>20<br>20<br>10<br>10 | <b>Description:</b> Channel reset and POS.<br>DMA status error.<br><b>Action:</b> Use MAP 0210.                            |
| 401-809      | K      | LSA<br>C59<br>C90<br>C61<br>C63 | 40<br>20<br>20<br>10<br>10 | <b>Description:</b> Channel reset and POS.<br>Missing DMA interrupt error after transfer.<br><b>Action:</b> Use MAP 0210.  |
| 401-810      | K      | LSA<br>C59<br>C90<br>C61<br>C63 | 40<br>20<br>20<br>10<br>10 | <b>Description:</b> Channel reset and POS.<br>DFE or SSI signal not asserted.<br><b>Action:</b> Use MAP 0210.              |
| 401-811      | K      | LSA<br>C59<br>C90<br>C61<br>C63 | 40<br>20<br>20<br>10<br>10 | <b>Description:</b> Channel reset and POS.<br>Buffer exchange error.<br><b>Action:</b> Use MAP 0210.                       |
| 401-812      | K      | LSA<br>C59<br>C90<br>C61<br>C63 | 40<br>20<br>20<br>10<br>10 | <b>Description:</b> Channel reset and POS.<br>LSA board not responding.<br><b>Action:</b> Use MAP 0210.                    |
| 401-820      | K      | LSA<br>C59<br>C90<br>C61<br>C63 | 40<br>20<br>20<br>10<br>10 | <b>Description:</b> Channel reset and POS.<br>POS3 register error.<br><b>Action:</b> Use MAP 0210.                         |
| 401-821      | K      | LSA<br>C59<br>C90<br>C61<br>C63 | 40<br>20<br>20<br>10<br>10 | <b>Description:</b> Channel reset and POS.<br>POS4 register error.<br><b>Action:</b> Use MAP 0210.                         |
| 401-822      | K      | LSA<br>C59<br>C90<br>C61<br>C63 | 40<br>20<br>20<br>10<br>10 | <b>Description:</b> Channel reset and POS.<br>POS2 register error.<br><b>Action:</b> Use MAP 0210.                         |
| 401-823      | K      | LSA<br>C59<br>C90<br>C61<br>C63 | 40<br>20<br>20<br>10<br>10 | <b>Description:</b> Channel reset and POS.<br>NCR SCRATCH A register error.<br><b>Action:</b> Use MAP 0210.                |

| Error Number | Source | Failing Function Codes          | Failure Percent (%)        | Description                                                                                                                |
|--------------|--------|---------------------------------|----------------------------|----------------------------------------------------------------------------------------------------------------------------|
| 401-824      | K      | LSA<br>C59<br>C90<br>C61<br>C63 | 40<br>20<br>20<br>10<br>10 | <b>Description:</b> Channel reset and POS.<br>SCSI Bus control lines error.<br><b>Action:</b> Use MAP 0210.                |
| 401-825      | K      | LSA<br>C59<br>C90<br>C61<br>C63 | 40<br>20<br>20<br>10<br>10 | <b>Description:</b> Channel reset and POS.<br>Missing ACK signal error.<br><b>Action:</b> Use MAP 0210.                    |
| 401-826      | K      | LSA<br>C59<br>C90<br>C61<br>C63 | 40<br>20<br>20<br>10<br>10 | <b>Description:</b> Channel reset and POS.<br>Pending ACK signal error.<br><b>Action:</b> Use MAP 0210.                    |
| 401-827      | K      | LSA<br>C59<br>C90<br>C61<br>C63 | 40<br>20<br>20<br>10<br>10 | <b>Description:</b> Channel reset and POS.<br>Missing DMA interrupt error during transfer.<br><b>Action:</b> Use MAP 0210. |
| 401-828      | K      | LSA<br>C59<br>C90<br>C61<br>C63 | 40<br>20<br>20<br>10<br>10 | <b>Description:</b> Channel reset and POS.<br>DMA status error.<br><b>Action:</b> Use MAP 0210.                            |
| 401-829      | K      | LSA<br>C59<br>C90<br>C61<br>C63 | 40<br>20<br>20<br>10<br>10 | <b>Description:</b> Channel reset and POS.<br>Missing DMA interrupt after transfer.<br><b>Action:</b> Use MAP 0210.        |
| 401-830      | K      | LSA<br>C59<br>C90<br>C61<br>C63 | 40<br>20<br>20<br>10<br>10 | <b>Description:</b> Channel reset and POS.<br>DFE or SSI signal not asserted.<br><b>Action:</b> Use MAP 0210.              |
| 401-831      | K      | LSA<br>C59<br>C90<br>C61<br>C63 | 40<br>20<br>20<br>10<br>10 | <b>Description:</b> Channel reset and POS.<br>Buffer exchange error.<br><b>Action:</b> Use MAP 0210.                       |
| 401-832      | K      | LSA<br>C59<br>C90<br>C61<br>C63 | 40<br>20<br>20<br>10<br>10 | <b>Description:</b> Channel reset and POS.<br>LSA board not responding.<br><b>Action:</b> Use MAP 0210.                    |
| 401-840      | K      | LSA<br>C59<br>C90<br>C61<br>C63 | 40<br>20<br>20<br>10<br>10 | <b>Description:</b> Channel reset and POS.<br>POS3 register error.<br><b>Action:</b> Use MAP 0210.                         |

| Error Number | Source | Failing Function Codes          | Failure Percent (%)        | Description                                                                                                                |
|--------------|--------|---------------------------------|----------------------------|----------------------------------------------------------------------------------------------------------------------------|
| 401-841      | K      | LSA<br>C59<br>C90<br>C61<br>C63 | 40<br>20<br>20<br>10<br>10 | <b>Description:</b> Channel reset and POS.<br>POS4 register error.<br><b>Action:</b> Use MAP 0210.                         |
| 401-842      | K      | LSA<br>C59<br>C90<br>C61<br>C63 | 40<br>20<br>20<br>10<br>10 | <b>Description:</b> Channel reset and POS.<br>POS2 register error.<br><b>Action:</b> Use MAP 0210.                         |
| 401-843      | K      | LSA<br>C59<br>C90<br>C61<br>C63 | 40<br>20<br>20<br>10<br>10 | <b>Description:</b> Channel reset and POS.<br>NCR SCRATCH A register error.<br><b>Action:</b> Use MAP 0210.                |
| 401-844      | K      | LSA<br>C59<br>C90<br>C61<br>C63 | 40<br>20<br>20<br>10<br>10 | <b>Description:</b> Channel reset and POS.<br>SCSI Bus control lines error.<br><b>Action:</b> Use MAP 0210.                |
| 401-845      | K      | LSA<br>C59<br>C90<br>C61<br>C63 | 40<br>20<br>20<br>10<br>10 | <b>Description:</b> Channel reset and POS.<br>Missing ACK signal error.<br><b>Action:</b> Use MAP 0210.                    |
| 401-846      | K      | LSA<br>C59<br>C90<br>C61<br>C63 | 40<br>20<br>20<br>10<br>10 | <b>Description:</b> Channel reset and POS.<br>Pending ACK signal error.<br><b>Action:</b> Use MAP 0210.                    |
| 401-847      | K      | LSA<br>C59<br>C90<br>C61<br>C63 | 40<br>20<br>20<br>10<br>10 | <b>Description:</b> Channel reset and POS.<br>Missing DMA interrupt error during transfer.<br><b>Action:</b> Use MAP 0210. |
| 401-848      | K      | LSA<br>C59<br>C90<br>C61<br>C63 | 40<br>20<br>20<br>10<br>10 | <b>Description:</b> Channel reset and POS.<br>DMA status error.<br><b>Action:</b> Use MAP 0210.                            |
| 401-849      | K      | LSA<br>C59<br>C90<br>C61<br>C63 | 40<br>20<br>20<br>10<br>10 | <b>Description:</b> Channel reset and POS.<br>Missing DMA interrupt after transfer.<br><b>Action:</b> Use MAP 0210.        |
| 401-850      | K      | LSA<br>C59<br>C90<br>C61<br>C63 | 40<br>20<br>20<br>10<br>10 | <b>Description:</b> Channel reset and POS.<br>DFE or SSI signal not asserted.<br><b>Action:</b> Use MAP 0210.              |

| Error Number | Source | Failing Function Codes          | Failure Percent (%)        | Description                                                                                                                    |
|--------------|--------|---------------------------------|----------------------------|--------------------------------------------------------------------------------------------------------------------------------|
| 401-851      | K      | LSA<br>C59<br>C90<br>C61<br>C63 | 40<br>20<br>20<br>10<br>10 | <b>Description:</b> Channel reset and POS.<br>Buffer exchange error.<br><b>Action:</b> Use MAP 0210.                           |
| 401-852      | K      | LSA<br>C59<br>C90<br>C61<br>C63 | 40<br>20<br>20<br>10<br>10 | <b>Description:</b> Channel reset and POS.<br>LSA board not responding.<br><b>Action:</b> Use MAP 0210.                        |
| 402-000      | K      | C63                             | 100                        | <b>Description:</b> CPU processor error.<br><b>Action:</b> Use MAP 0210.                                                       |
| 402-010      | K      | C63                             | 100                        | <b>Description:</b> Main memory addressing mechanism error.<br><b>Action:</b> Use MAP 0210.                                    |
| 402-011      | K      | C63                             | 100                        | <b>Description:</b> Main memory addressing mechanism.<br>BAT translation error.<br><b>Action:</b> Use MAP 0210.                |
| 402-012      | K      | C63                             | 100                        | <b>Description:</b> Main memory addressing mechanism.<br>Swap context PTE1 error.<br><b>Action:</b> Use MAP 0210.              |
| 402-013      | K      | C63                             | 100                        | <b>Description:</b> Main memory addressing mechanism.<br>Swap context PTE2 error.<br><b>Action:</b> Use MAP 0210.              |
| 402-020      | K      | C63                             | 100                        | <b>Description:</b> Level 1 cache. HID0.31 value error.<br><b>Action:</b> Use MAP 0210.                                        |
| 402-030      | K      | C63                             | 100                        | <b>Description:</b> Level 2 cache. Accessibility test error.<br><b>Action:</b> Use MAP 0210.                                   |
| 402-031      | K      | C63                             | 100                        | <b>Description:</b> Level 2 cache. Data test error<br><b>Action:</b> Use MAP 0210.                                             |
| 402-032      | K      | C63                             | 100                        | <b>Description:</b> Level 2 cache. TAG test error.<br><b>Action:</b> Use MAP 0210.                                             |
| 402-033      | K      | C63                             | 100                        | <b>Description:</b> Level 2 cache. Interrupt error.<br><b>Action:</b> Use MAP 0210.                                            |
| 402-040      | K      | C62<br>C63<br>C65               | 100<br>100<br>100          | <b>Description:</b> EEprom compatibility error.<br><b>Action:</b> Use MAP 0210.                                                |
| 402-100      | K      | C63<br>C61                      | 50<br>50                   | <b>Description:</b> Atomic instructions error.<br>Memory reservation by slave processor lack.<br><b>Action:</b> Use MAP 0210.  |
| 402-101      | K      | C63<br>C61                      | 50<br>50                   | <b>Description:</b> Atomic instructions error.<br>Memory reservation by master processor lack.<br><b>Action:</b> Use MAP 0210. |
| 402-102      | K      | C63<br>C61                      | 50<br>50                   | <b>Description:</b> Atomic instructions error.<br>Comparison error.<br><b>Action:</b> Use MAP 0210.                            |
| 402-103      | K      | C62<br>C63<br>C65               | 100<br>100<br>100          | <b>Description:</b> Atomic instructions error. Swap mechanism not available.<br><b>Action:</b> Use MAP 0210.                   |

| Error Number | Source | Failing Function Codes | Failure Percent (%) | Description                                                                                                                         |
|--------------|--------|------------------------|---------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| 402-110      | K      | C63<br>C61             | 50<br>50            | <b>Description:</b> Caches coherencies.<br>Concurrent coherent write accesses error.<br><b>Action:</b> Use MAP 0210.                |
| 402-111      | K      | C63<br>C61             | 50<br>50            | <b>Description:</b> Caches coherencies.<br>Concurrent not coherent write accesses error.<br><b>Action:</b> Use MAP 0210.            |
| 402-112      | K      | C63<br>C61             | 50<br>50            | <b>Description:</b> Caches coherencies.<br>DCBST from line owner error.<br><b>Action:</b> Use MAP 0210.                             |
| 402-113      | K      | C63<br>C61             | 50<br>50            | <b>Description:</b> Caches coherencies.<br>DCBF from line owner error.<br><b>Action:</b> Use MAP 0210.                              |
| 402-114      | K      | C63<br>C61             | 50<br>50            | <b>Description:</b> Caches coherencies.<br>DCBI from line owner error (Ph.1).<br><b>Action:</b> Use MAP 0210.                       |
| 402-115      | K      | C63<br>C61             | 50<br>50            | <b>Description:</b> Caches coherencies.<br>DCBI from line owner error (Ph.2).<br><b>Action:</b> Use MAP 0210.                       |
| 402-116      | K      | C63<br>C61             | 50<br>50            | <b>Description:</b> Paradox detection.<br>DCBST not from line owner.<br><b>Action:</b> Use MAP 0210.                                |
| 402-117      | K      | C63<br>C61             | 50<br>50            | <b>Description:</b> Paradox detection.<br>DCBF not from line owner.<br><b>Action:</b> Use MAP 0210.                                 |
| 402-118      | K      | C63<br>C61             | 50<br>50            | <b>Description:</b> Paradox detection.<br>DCBI not from line owner (Ph 1).<br><b>Action:</b> Use MAP 0210.                          |
| 402-119      | K      | C63<br>C61             | 50<br>50            | <b>Description:</b> Paradox detection.<br>DCBT not from line owner (Ph 2).<br><b>Action:</b> Use MAP 0210.                          |
| 402-120      | K      | C63<br>C61             | 50<br>50            | <b>Description:</b> Caches coherencies.<br>Test aborted by one CPU.<br><b>Action:</b> Use MAP 0210.                                 |
| 402-121      | K      | C63<br>C61             | 50<br>50            | <b>Description:</b> Caches coherencies.<br>CPUs dialogue Time Out.<br><b>Action:</b> Use MAP 0210.                                  |
| 402-130      | K      | C63<br>C61             | 50<br>50            | <b>Description:</b> DCB ports arbitration error. Memory not updated error.<br><b>Action:</b> Use MAP 0210.                          |
| 402-131      | K      | C63<br>C61             | 50<br>50            | <b>Description:</b> DCB ports arbitration error. Caches coherency or global memory coherency error.<br><b>Action:</b> Use MAP 0210. |

| Error Number | Source | Failing Function Codes | Failure Percent (%) | Description                                                                                                                       |
|--------------|--------|------------------------|---------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| 402-132      | K      | C63<br>C61             | 50<br>50            | <b>Description:</b> DCB ports arbitration error. Memory coherency error.<br><b>Action:</b> Use MAP 0210.                          |
| 402-133      | K      | C63<br>C61             | 50<br>50            | <b>Description:</b> DCB ports arbitration error. Odd processor DCBF or even processor read error.<br><b>Action:</b> Use MAP 0210. |
| 402-134      | K      | C63<br>C61             | 50<br>50            | <b>Description:</b> DCB ports arbitration error. Cache write/read error.<br><b>Action:</b> Use MAP 0210.                          |
| 402-135      | K      | C63<br>C61             | 50<br>50            | <b>Description:</b> DCB ports arbitration error. Test aborted by one CPU error.<br><b>Action:</b> Use MAP 0210.                   |
| 402-136      | K      | C63<br>C61             | 50<br>50            | <b>Description:</b> DCB ports arbitration error. CPUs dialog time out.<br><b>Action:</b> Use MAP 0210.                            |
| 402-140      | K      | C63<br>C61             | 50<br>50            | <b>Description:</b> System IO sharing. NVRAM access error.<br><b>Action:</b> Use MAP 0210.                                        |
| 402-150      | K      | C63<br>C61             | 50<br>50            | <b>Description:</b> Main memory sharing error. MM access error.<br><b>Action:</b> Use MAP 0210.                                   |
| 402-160      | K      | C63<br>C61             | 50<br>50            | <b>Description:</b> Multi-resource sharing error. NVRAM access error.<br><b>Action:</b> Use MAP 0210.                             |
| 402-161      | K      | C63<br>C61             | 50<br>50            | <b>Description:</b> Multi-resource sharing error. MM access error.<br><b>Action:</b> Use MAP 0210.                                |
| 402-170      | K      | C63<br>C61             | 50<br>50            | <b>Description:</b> Multi processor Full. Private counter error.<br><b>Action:</b> Use MAP 0210.                                  |
| 402-171      | K      | C63<br>C61             | 50<br>50            | <b>Description:</b> Multi processor Full. Shared counter error.<br><b>Action:</b> Use MAP 0210.                                   |
| 402-172      | K      | C63<br>C61             | 50<br>50            | <b>Description:</b> Multi processor Full. Lock mechanism error.<br><b>Action:</b> Use MAP 0210.                                   |
| 402-173      | K      | C63<br>C61             | 50<br>50            | <b>Description:</b> Multi processor Full. Reservation instruction error.<br><b>Action:</b> Use MAP 0210.                          |
| 402-174      | K      | C63<br>C61             | 50<br>50            | <b>Description:</b> Multi processor Full. Link coherency error.<br><b>Action:</b> Use MAP 0210.                                   |
| 402-500      | K      | C59<br>C61<br>???      | 50<br>25<br>25      | <b>Description:</b> BUMP to CPUs interrupt error.<br><b>Action:</b> Use MAP 0210.                                                 |
| 402-510      | K      | C59<br>C61<br>???      | 50<br>25<br>25      | <b>Description:</b> CPUs to BUMP interrupt error.<br><b>Action:</b> Use MAP 0210.                                                 |
| 402-520      | K      | C59<br>C61<br>???      | 50<br>25<br>25      | <b>Description:</b> UART to CPUs interrupt error.<br><b>Action:</b> Use MAP 0210.                                                 |

| Error Number | Source | Failing Function Codes | Failure Percent (%) | Description                                                                                                                               |
|--------------|--------|------------------------|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| 402-530      | K      | C59<br>C61<br>???      | 50<br>25<br>25      | <b>Description:</b> CPUs to CPUs interrupt error. Even processors auto interrupt.<br><b>Action:</b> Use MAP 0210.                         |
| 402-531      | K      | C59<br>C61<br>???      | 50<br>25<br>25      | <b>Description:</b> CPUs to CPUs interrupt error. Odd processors auto interrupt.<br><b>Action:</b> Use MAP 0210.                          |
| 402-532      | K      | C59<br>C61<br>???      | 50<br>25<br>25      | <b>Description:</b> CPUs to CPUs interrupt error. Even to Odd processors interrupt.<br><b>Action:</b> Use MAP 0210.                       |
| 402-533      | K      | C59<br>C61<br>???      | 50<br>25<br>25      | <b>Description:</b> CPUs to CPUs interrupt error. Odd to Even processors interrupt.<br><b>Action:</b> Use MAP 0210.                       |
| 402-540      | K      | C59                    | 100                 | <b>Description:</b> TOD to BUMP interrupt error.<br><b>Action:</b> Use MAP 0210.                                                          |
| 402-550      | K      | C59                    | 100                 | <b>Description:</b> Internal interrupt management error.<br><b>Action:</b> Use MAP 0210.                                                  |
| 402-560      | K      | C59                    | 100                 | <b>Description:</b> System error interrupt management.<br><b>Action:</b> Use MAP 0210.                                                    |
| 403-000      | K      | B94<br>C61<br>C63      | 40<br>30<br>30      | <b>Description:</b> Main Memory data lines accessibility error. Write all 0 and 1 error.<br><b>Action:</b> Use MAP 0210.                  |
| 403-001      | K      | B94<br>C61<br>C63      | 40<br>30<br>30      | <b>Description:</b> Main Memory data lines accessibility error. CPU bus error, walking 1 among 0.<br><b>Action:</b> Use MAP 0210.         |
| 403-002      | K      | B94<br>C61<br>C63      | 40<br>30<br>30      | <b>Description:</b> Main Memory data lines accessibility error. Main memory bus error, walking 1 among 0.<br><b>Action:</b> Use MAP 0210. |
| 403-003      | K      | C61<br>C63<br>C61      | 40<br>30<br>30      | <b>Description:</b> Main Memory data lines accessibility error. CPU bus error, walking 0 among 1.<br><b>Action:</b> Use MAP 0210.         |
| 403-004      | K      | B94<br>C61<br>C63      | 40<br>30<br>30      | <b>Description:</b> Main Memory data lines accessibility error. Main memory bus error, walking 0 among 1.<br><b>Action:</b> Use MAP 0210. |
| 403-005      | K      | B94<br>C61<br>C63      | 40<br>30<br>30      | <b>Description:</b> 1, 2 ... 8 bytes bus transfer error.<br><b>Action:</b> Use MAP 0210.                                                  |
| 403-010      | K      | B94<br>C61<br>C63      | 40<br>30<br>30      | <b>Description:</b> Main Memory address lines accessibility error. Write all 0 and 1 error.<br><b>Action:</b> Use MAP 0210.               |
| 403-011      | K      | B94<br>C61<br>C63      | 40<br>30<br>30      | <b>Description:</b> Main Memory address lines accessibility error. Walking 1 among 0 error.<br><b>Action:</b> Use MAP 0210.               |
| 403-012      | K      | B94<br>C61<br>C63      | 40<br>30<br>30      | <b>Description:</b> Main Memory address lines accessibility error. Walking 0 among 1 error.<br><b>Action:</b> Use MAP 0210.               |

| Error Number | Source | Failing Function Codes | Failure Percent (%) | Description                                                                                                                             |
|--------------|--------|------------------------|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| 403-013      | K      | B94<br>C61<br>C63      | 40<br>30<br>30      | <b>Description:</b> Main memory address lines accessibility error. Unexpected interrupt.<br><b>Action:</b> Use MAP 0210.                |
| 403-020      | K      | B94<br>C61<br>C63      | 40<br>30<br>30      | <b>Description:</b> Main memory board address accessibility error. Write all 0 and 1 error.<br><b>Action:</b> Use MAP 0210.             |
| 403-021      | K      | B94<br>C61<br>C63      | 40<br>30<br>30      | <b>Description:</b> Main memory board address accessibility error. Board Nb i. 1x decoding error.<br><b>Action:</b> Use MAP 0210.       |
| 403-022      | K      | B94<br>C61<br>C63      | 40<br>30<br>30      | <b>Description:</b> Main memory board address accessibility error. Data storage interrupt error.<br><b>Action:</b> Use MAP 0210.        |
| 403-030      | K      | B94<br>C61<br>C63      | 40<br>30<br>30      | <b>Description:</b> Main memory basic tests error. Byte write error.<br><b>Action:</b> Use MAP 0210.                                    |
| 403-031      | K      | B94<br>C61<br>C63      | 40<br>30<br>30      | <b>Description:</b> Main memory basic tests error. Aligned half-word write error.<br><b>Action:</b> Use MAP 0210.                       |
| 403-032      | K      | B94<br>C61<br>C63      | 40<br>30<br>30      | <b>Description:</b> Main memory basic tests error. Unaligned half-word write error.<br><b>Action:</b> Use MAP 0210.                     |
| 403-033      | K      | B94<br>C61<br>C63      | 40<br>30<br>30      | <b>Description:</b> Main memory basic tests error. Aligned word write error.<br><b>Action:</b> Use MAP 0210.                            |
| 403-034      | K      | B94<br>C61<br>C63      | 40<br>30<br>30      | <b>Description:</b> Main memory basic tests error. Unaligned word write error.<br><b>Action:</b> Use MAP 0210.                          |
| 403-035      | K      | B94<br>C61<br>C63      | 40<br>30<br>30      | <b>Description:</b> Main memory basic tests error. Aligned double-word write error. (floating double)<br><b>Action:</b> Use MAP 0210.   |
| 403-036      | K      | B94<br>C61<br>C63      | 40<br>30<br>30      | <b>Description:</b> Main memory basic tests error. Aligned double-word write error. (floating simple)<br><b>Action:</b> Use MAP 0210.   |
| 403-037      | K      | B94<br>C61<br>C63      | 40<br>30<br>30      | <b>Description:</b> Main memory basic tests error. Unaligned double-word write error. (floating double)<br><b>Action:</b> Use MAP 0210. |

| Error Number | Source | Failing Function Codes | Failure Percent (%) | Description                                                                                                                            |
|--------------|--------|------------------------|---------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| 403-038      | K      | B94<br>C61<br>C63      | 40<br>30<br>30      | <b>Description:</b> Main memory basic tests error.<br>Work mode main memory addressing error.<br><b>Action:</b> Use MAP 0210.          |
| 403-039      | K      | B94<br>C61<br>C63      | 40<br>30<br>30      | <b>Description:</b> Main memory basic tests error.<br>Aligned multi-store error.<br><b>Action:</b> Use MAP 0210.                       |
| 403-040      | K      | B94<br>C61<br>C63      | 40<br>30<br>30      | <b>Description:</b> Main memory basic tests error.<br>Aligned multi-load error.<br><b>Action:</b> Use MAP 0210.                        |
| 403-041      | K      | B94<br>C61<br>C63      | 40<br>30<br>30      | <b>Description:</b> Main memory basic tests error.<br>Unaligned multi-store or multi-load error.<br><b>Action:</b> Use MAP 0210.       |
| 403-050      | K      | B94<br>B96 or<br>B97   | 50<br>50            | <b>Description:</b> Main memory components error.<br>Address into address test error.<br><b>Action:</b> Use MAP 0210.                  |
| 403-051      | K      | B94<br>B96 or<br>B97   | 50<br>50            | <b>Description:</b> Main memory components error.<br>Invert address into address test error.<br><b>Action:</b> Use MAP 0210.           |
| 403-052      | K      | B94<br>B96 or<br>B97   | 50<br>50            | <b>Description:</b> Main memory components error.<br>Bitmap elaboration mode warnings<br><b>Action:</b> Use MAP 0210.                  |
| 403-060      | K      | B94<br>B96 or<br>B97   | 50<br>50            | <b>Description:</b> Main memory ECC components check error.<br>Address into address test error.<br><b>Action:</b> Use MAP 0210.        |
| 403-061      | K      | B94<br>B96 or<br>B97   | 50<br>50            | <b>Description:</b> Main memory ECC components check error.<br>Invert address into address test error.<br><b>Action:</b> Use MAP 0210. |
| 403-062      | K      | B94<br>B96 or<br>B97   | 50<br>50            | <b>Description:</b> Main memory ECC components check error.<br>Bitmap elaboration mode ECC warnings.<br><b>Action:</b> Use MAP 0210.   |
| 403-070      | K      | B94<br>B96 or<br>B97   | 50<br>50            | <b>Description:</b> Error correction code mechanism.<br>Syndrome generation error.<br><b>Action:</b> Use MAP 0210.                     |
| 403-071      | K      | B94<br>B96 or<br>B97   | 50<br>50            | <b>Description:</b> Error correction code mechanism.<br>BUMP time out.<br><b>Action:</b> Use MAP 0210.                                 |
| 403-072      | K      | B94<br>B96 or<br>B97   | 50<br>50            | <b>Description:</b> Error correction code mechanism.<br>CPU time out.<br><b>Action:</b> Use MAP 0210.                                  |
| 403-073      | K      | B94<br>B96 or<br>B97   | 50<br>50            | <b>Description:</b> Error correction code mechanism.<br>Single Error generation error.<br><b>Action:</b> Use MAP 0210.                 |

| Error Number | Source | Failing Function Codes                 | Failure Percent (%)              | Description                                                                                                              |
|--------------|--------|----------------------------------------|----------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| 403-074      | K      | B94<br>B96 or<br>B97                   | 50<br>50                         | <b>Description:</b> Error correction code mechanism.<br>Multiple Error generation error.<br><b>Action:</b> Use MAP 0210. |
| 403-075      | K      | B94<br>C64<br>D28<br>B96<br>B97<br>D33 | 50<br>50<br>50<br>50<br>50<br>50 | <b>Description:</b> DCB or SMC error.<br>Multiple Error generation error.<br><b>Action:</b> Use MAP 0210.                |
| 403-080      | K      | B94<br>B96 or<br>B97                   | 50<br>50                         | <b>Description:</b> Main Memory refresh mechanism.<br>Main memory read error.<br><b>Action:</b> Use MAP 0210.            |
| 403-081      | K      | B94<br>B96 or<br>B97                   | 50<br>50                         | <b>Description:</b> Main Memory refresh mechanism.<br>Main memory refresh error.<br><b>Action:</b> Use MAP 0210.         |
| 403-090      | K      | B94<br>B96 or<br>B97                   | 50<br>50                         | <b>Description:</b> Main Memory Full test.<br>Phase number i error.<br><b>Action:</b> Use MAP 0210.                      |
| 403-100      | K      | B48<br>C61<br>C62<br>C63<br>C65        | 40<br>30<br>30<br>30<br>30       | <b>Description:</b> ECC Data lines accessibility error. Write all 0 and 1 error.<br><b>Action:</b> Use MAP 0210.         |
| 403-101      | K      | B48<br>C61<br>C62<br>C63<br>C65        | 40<br>30<br>30<br>30<br>30       | <b>Description:</b> ECC Data lines accessibility error. Walking 1 among 0 error.<br><b>Action:</b> Use MAP 0210.         |
| 403-102      | K      | B48<br>C61<br>C62<br>C63<br>C65        | 40<br>30<br>30<br>30<br>30       | <b>Description:</b> ECC Data lines accessibility error. Walking 0 among 1 error.<br><b>Action:</b> Use MAP 0210.         |
| 403-103      | K      | B48<br>C61<br>C62<br>C63<br>C65        | 40<br>30<br>30<br>30<br>30       | <b>Description:</b> ECC Data lines accessibility error. RAM bus error.<br><b>Action:</b> Use MAP 0210.                   |
| 403-500      | K      | C59<br>C61<br>C63                      | 50<br>25<br>25                   | <b>Description:</b> BUMP to CPU interrupt error.<br>IOD-HW-STS error, bit i#1.<br><b>Action:</b> Use MAP 0210.           |
| 403-501      | K      | C59<br>C61<br>C63                      | 50<br>25<br>25                   | <b>Description:</b> BUMP to CPU interrupt error.<br>IOD-HW-STS error, bit i#0.<br><b>Action:</b> Use MAP 0210.           |
| 403-502      | K      | C59<br>C61<br>C63                      | 50<br>25<br>25                   | <b>Description:</b> BUMP to CPU interrupt error.<br>CPU error.<br><b>Action:</b> Use MAP 0210.                           |
| 403-505      | K      | C59<br>C61<br>C63                      | 50<br>25<br>25                   | <b>Description:</b> BUMP to CPU interrupt error.<br>MIR register error.<br><b>Action:</b> Use MAP 0210.                  |

| Error Number | Source | Failing Function Codes          | Failure Percent (%)        | Description                                                                                                          |
|--------------|--------|---------------------------------|----------------------------|----------------------------------------------------------------------------------------------------------------------|
| 403-506      | K      | C59<br>C61<br>C63               | 50<br>25<br>25             | <b>Description:</b> BUMP to CPU interrupt error.<br>IOD-HW-STS register error.<br><b>Action:</b> Use MAP 0210.       |
| 403-507      | K      | C59<br>C61<br>C63               | 50<br>25<br>25             | <b>Description:</b> BUMP to CPU interrupt error.<br>IRR register error.<br><b>Action:</b> Use MAP 0210.              |
| 403-508      | K      | C59<br>C61<br>C63               | 50<br>25<br>25             | <b>Description:</b> BUMP to CPU interrupt error.<br>No external interrupt.<br><b>Action:</b> Use MAP 0210.           |
| 403-509      | K      | C59<br>C61<br>C63               | 50<br>25<br>25             | <b>Description:</b> BUMP to CPU interrupt error.<br>External interrupt return error.<br><b>Action:</b> Use MAP 0210. |
| 403-510      | K      | C59<br>C61<br>C63               | 50<br>25<br>25             | <b>Description:</b> BUMP to CPU interrupt error.<br>Target processor error.<br><b>Action:</b> Use MAP 0210.          |
| 403-511      | K      | C59<br>169<br>C62<br>C63        | 50<br>25<br>25<br>25       | <b>Description:</b> BUMP to CPU interrupt error.<br>Not responding BUMP error.<br><b>Action:</b> Use MAP 0210.       |
| 403-512      | K      | C59<br>C61<br>C63               | 50<br>25<br>25             | <b>Description:</b> BUMP to CPU interrupt error.<br>IRR4 register error.<br><b>Action:</b> Use MAP 0210.             |
| 403-513      | K      | C59<br>C61<br>C63               | 50<br>25<br>25             | <b>Description:</b> BUMP to CPU interrupt error.<br>IOD-HW-STS register error.<br><b>Action:</b> Use MAP 0210.       |
| 403-514      | K      | C59<br>C61<br>C63               | 50<br>25<br>25             | <b>Description:</b> BUMP to CPU interrupt error.<br>XIRR0 register error.<br><b>Action:</b> Use MAP 0210.            |
| 403-515      | K      | C59<br>C61<br>C63               | 50<br>25<br>25             | <b>Description:</b> BUMP to CPU interrupt error.<br>XIRR4 register error.<br><b>Action:</b> Use MAP 0210.            |
| 403-516      | K      | C59<br>C61<br>C63               | 50<br>25<br>25             | <b>Description:</b> BUMP to CPU interrupt error.<br>IRR register error.<br><b>Action:</b> Use MAP 0210.              |
| 403-520      | K      | C59<br>C61<br>C63               | 50<br>25<br>25             | <b>Description:</b> CPU to BUMP interrupt.<br>IOD-HW-STS register error, bit i#1.<br><b>Action:</b> Use MAP 0210.    |
| 403-521      | K      | C59<br>C61<br>C63               | 50<br>25<br>25             | <b>Description:</b> CPU to BUMP interrupt.<br>IOD-HW-STS register error, bit i#0.<br><b>Action:</b> Use MAP 0210.    |
| 403-522      | K      | C59<br>C61<br>C63               | 50<br>25<br>25             | <b>Description:</b> CPU to BUMP interrupt.<br>CPU not responding.<br><b>Action:</b> Use MAP 0210.                    |
| 403-523      | K      | C59<br>C61<br>C62<br>C63<br>C65 | 50<br>25<br>25<br>25<br>25 | <b>Description:</b> CPU to BUMP interrupt.<br>No External Interrupt.<br><b>Action:</b> Use MAP 0210.                 |
| 403-525      | K      | C59<br>C61<br>C63               | 50<br>25<br>25             | <b>Description:</b> CPU to BUMP interrupt.<br>IOD-HW-STS register error.<br><b>Action:</b> Use MAP 0210.             |

| Error Number | Source | Failing Function Codes | Failure Percent (%) | Description                                                                                                 |
|--------------|--------|------------------------|---------------------|-------------------------------------------------------------------------------------------------------------|
| 403-527      | K      | C59<br>C61<br>C63      | 50<br>25<br>25      | <b>Description:</b> CPU to BUMP interrupt. XIRR4 register error.<br><b>Action:</b> Use MAP 0210.            |
| 403-528      | K      | C59<br>C61<br>C63      | 50<br>25<br>25      | <b>Description:</b> CPU to BUMP interrupt. IOD-HW-STS register error.<br><b>Action:</b> Use MAP 0210.       |
| 403-529      | K      | C59<br>C61<br>C63      | 50<br>25<br>25      | <b>Description:</b> CPU to BUMP interrupt. XIRR0 register error.<br><b>Action:</b> Use MAP 0210.            |
| 403-530      | K      | C59<br>C61<br>C63      | 50<br>25<br>25      | <b>Description:</b> CPU to BUMP interrupt. XIRR4 register error.<br><b>Action:</b> Use MAP 0210.            |
| 403-531      | K      | C59<br>C61<br>C63      | 50<br>25<br>25      | <b>Description:</b> CPU to BUMP interrupt. IRR register error.<br><b>Action:</b> Use MAP 0210.              |
| 403-540      | K      | C59<br>C61<br>C63      | 50<br>25<br>25      | <b>Description:</b> UART to CPU interrupt. IRR register error, bit i#1.<br><b>Action:</b> Use MAP 0210.     |
| 403-541      | K      | C59<br>C61<br>C63      | 50<br>25<br>25      | <b>Description:</b> UART to CPU interrupt. IRR register error, bit i#0.<br><b>Action:</b> Use MAP 0210.     |
| 403-542      | K      | C59<br>C61<br>C63      | 50<br>25<br>25      | <b>Description:</b> UART to CPU interrupt. No External interrupt.<br><b>Action:</b> Use MAP 0210.           |
| 403-543      | K      | C59<br>C61<br>C63      | 50<br>25<br>25      | <b>Description:</b> UART to CPU interrupt. External interrupt return error.<br><b>Action:</b> Use MAP 0210. |
| 403-544      | K      | not available resource |                     | <b>Description:</b> UART to CPU interrupt. Target processor error.<br><b>Action:</b> Use MAP 0210.          |
| 403-545      | K      | C59<br>C61<br>C63      | 50<br>25<br>25      | <b>Description:</b> UART to CPU interrupt. XIRR4 register error.<br><b>Action:</b> Use MAP 0210.            |
| 403-546      | K      | C59<br>C61<br>C63      | 50<br>25<br>25      | <b>Description:</b> UART to CPU interrupt. IRR register error.<br><b>Action:</b> Use MAP 0210.              |
| 403-550      | K      | C59<br>C61<br>C63      | 50<br>25<br>25      | <b>Description:</b> CPU to CPU interrupt. MFRR register error.<br><b>Action:</b> Use MAP 0210.              |
| 403-551      | K      | C59<br>C61<br>C63      | 50<br>25<br>25      | <b>Description:</b> CPU to CPU interrupt. External interrupt return error.<br><b>Action:</b> Use MAP 0210.  |
| 403-552      | K      | C59<br>C61<br>C63      | 50<br>25<br>25      | <b>Description:</b> CPU to CPU interrupt. No external interrupt.<br><b>Action:</b> Use MAP 0210.            |
| 403-553      | K      | C59<br>C61<br>C63      | 50<br>25<br>25      | <b>Description:</b> CPU to CPU interrupt. Target processor error.<br><b>Action:</b> Use MAP 0210.           |

| Error Number | Source | Failing Function Codes          | Failure Percent (%)        | Description                                                                                                                                               |
|--------------|--------|---------------------------------|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| 403-555      | K      | C59<br>C61<br>C63               | 50<br>25<br>25             | <b>Description:</b> CPU to CPU interrupt.<br>XIRR register error.<br><b>Action:</b> Use MAP 0210.                                                         |
| 403-560      | K      | C59<br>C61<br>C63               | 50<br>25<br>25             | <b>Description:</b> TOD to BUMP interrupt.<br>Unexpected interrupt error.<br><b>Action:</b> Use MAP 0210.                                                 |
| 403-561      | K      | C59<br>C61<br>C63               | 50<br>25<br>25             | <b>Description:</b> TOD to BUMP interrupt.<br>No trap interrupt.<br><b>Action:</b> Use MAP 0210.                                                          |
| 403-563      | K      | C59<br>C61<br>C62<br>C63<br>C65 | 50<br>25<br>25<br>25<br>25 | <b>Description:</b> TOD to BUMP interrupt.<br>MSR register error. BUMP interrupt management.<br><b>Action:</b> Use MAP 0210.                              |
| 403-565      | K      |                                 |                            | <b>Description:</b> MCA to CPU interrupt.<br>All slots plugged with MCA boards.<br><b>Action:</b> Use MAP 0210.                                           |
| 403-566      | K      | 909                             | 100                        | <b>Description:</b> MCA to CPU interrupt. LSA board not responding.<br>No interrupt on a PIO STORE with buid # on slot #.<br><b>Action:</b> Use MAP 0210. |
| 403-567      | K      | 909                             | 100                        | <b>Description:</b> MCA to CPU interrupt. LSA board not responding.<br>No interrupt on a PIO STORE with buid # on slot #.<br><b>Action:</b> Use MAP 0210. |
| 404-000      | K      | C63<br>C61                      | 80<br>20                   | <b>Description:</b> Atomic instructions error.<br><b>Action:</b> Use MAP 0210.                                                                            |
| 404-010      | K      | C63<br>C61                      | 80<br>20                   | <b>Description:</b> Caches coherencies.<br>Concurrent coherent write accesses error.<br><b>Action:</b> Use MAP 0210.                                      |
| 404-011      | K      | C63<br>C61                      | 80<br>20                   | <b>Description:</b> Caches coherencies.<br>Concurrent not coherent write accesses error.<br><b>Action:</b> Use MAP 0210.                                  |
| 404-012      | K      | C63<br>C61                      | 80<br>20                   | <b>Description:</b> Caches coherencies.<br>DCBST from line owner error.<br><b>Action:</b> Use MAP 0210.                                                   |
| 404-013      | K      | C63<br>C61                      | 80<br>20                   | <b>Description:</b> Caches coherencies.<br>DCBF from line owner error.<br><b>Action:</b> Use MAP 0210.                                                    |
| 404-014      | K      | C63<br>C61                      | 80<br>20                   | <b>Description:</b> Caches coherencies.<br>DCBI from line owner error.<br><b>Action:</b> Use MAP 0210.                                                    |
| 404-015      | K      | C63<br>C61                      | 80<br>20                   | <b>Description:</b> Caches coherencies.<br>Concurrent not coherent write accesses error.<br><b>Action:</b> Use MAP 0210.                                  |
| 404-016      | K      | C63<br>C61                      | 80<br>20                   | <b>Description:</b> Caches coherencies.<br>DCBST not from line owner error.<br><b>Action:</b> Use MAP 0210.                                               |
| 404-017      | K      | C63<br>C61                      | 80<br>20                   | <b>Description:</b> Caches coherencies.<br>DCBF not from line owner error.<br><b>Action:</b> Use MAP 0210.                                                |

| Error Number | Source | Failing Function Codes          | Failure Percent (%)        | Description                                                                                                   |
|--------------|--------|---------------------------------|----------------------------|---------------------------------------------------------------------------------------------------------------|
| 404-018      | K      | C63<br>C61                      | 80<br>20                   | <b>Description:</b> Caches coherencies.<br>DCBI not from line owner error.<br><b>Action:</b> Use MAP 0210.    |
| 404-019      | K      | C63<br>C61                      | 80<br>20                   | <b>Description:</b> Caches coherencies.<br>DCBT not from line owner error.<br><b>Action:</b> Use MAP 0210.    |
| 404-020      | K      | C63<br>C61                      | 80<br>20                   | <b>Description:</b> DCB arbitration mechanism error.<br><b>Action:</b> Use MAP 0210.                          |
| 404-030      | K      | C63<br>C61                      | 80<br>20                   | <b>Description:</b> TLB mechanism error.<br><b>Action:</b> Use MAP 0210.                                      |
| 404-040      | K      | C63<br>C61                      | 80<br>20                   | <b>Description:</b> Direct IO sharing error.<br><b>Action:</b> Use MAP 0210.                                  |
| 404-050      | K      | C63<br>B96 or B97<br>C61        | 50<br>30<br>20             | <b>Description:</b> Main memory sharing error.<br><b>Action:</b> Use MAP 0210.                                |
| 404-060      | K      | C63<br>C61<br>C59<br>B96 or B97 | 30<br>30<br>20<br>20       | <b>Description:</b> Multi resources sharing error.<br><b>Action:</b> Use MAP 0210.                            |
| 407-000      | K      | C59<br>C61<br>C63               | 40<br>30<br>30             | <b>Description:</b> No active processor.<br><b>Action:</b> Use MAP 0210.                                      |
| 407-001      | K      | C59<br>C61<br>C63               | 40<br>30<br>30             | <b>Description:</b> BUMP and one processor active.<br><b>Action:</b> Use MAP 0210.                            |
| 407-002      | K      | C59<br>C61<br>C63               | 40<br>30<br>30             | <b>Description:</b> More than one active processor for a mono-processor test.<br><b>Action:</b> Use MAP 0210. |
| 407-003      | K      | C59<br>C61<br>C63               | 40<br>30<br>30             | <b>Description:</b> Un-coherent test parameters.<br><b>Action:</b> Use MAP 0210.                              |
| 407-004      | K      | C59<br>C61<br>C63               | 40<br>30<br>30             | <b>Description:</b> [Gx.Tx] test: not defined<br><b>Action:</b> Use MAP 0210.                                 |
| 407-011      | K      | C59<br>C61<br>C63               | 40<br>30<br>30             | <b>Description:</b> General test manager launching T-O.<br><b>Action:</b> Use MAP 0210.                       |
| 407-012      | K      | C59<br>C61<br>C62<br>C63<br>C65 | 40<br>30<br>30<br>30<br>30 | <b>Description:</b> CPU/LSA test manager launching T-O.<br><b>Action:</b> Use MAP 0210.                       |
| 407-013      | K      | C59<br>C61<br>C62<br>C63<br>C65 | 40<br>30<br>30<br>30<br>30 | <b>Description:</b> CPU/LSA test manager stopping T-O.<br><b>Action:</b> Use MAP 0210.                        |
| 407-014      | K      | C59<br>C61<br>C63               | 40<br>30<br>30             | <b>Description:</b> CPU interrupt test manager launching T-O.<br><b>Action:</b> Use MAP 0210.                 |

| Error Number | Source | Failing Function Codes          | Failure Percent (%)        | Description                                                                                         |
|--------------|--------|---------------------------------|----------------------------|-----------------------------------------------------------------------------------------------------|
| 407-015      | K      | C59<br>C61<br>C63               | 40<br>30<br>30             | <b>Description:</b> CPU interrupt test manager stopping T-O.<br><b>Action:</b> Use MAP 0210.        |
| 407-016      | K      | C59<br>C61<br>C63               | 40<br>30<br>30             | <b>Description:</b> CPU multi-processor test manager launching T-O.<br><b>Action:</b> Use MAP 0210. |
| 407-017      | K      | C59<br>C61<br>C63               | 40<br>30<br>30             | <b>Description:</b> CPU multi-processor test manager stopping T-O.<br><b>Action:</b> Use MAP 0210.  |
| 407-018      | K      | C59<br>C61<br>C62<br>C63<br>C65 | 40<br>30<br>30<br>30<br>30 | <b>Description:</b> CPU test performing T-O.<br><b>Action:</b> Use MAP 0210.                        |
| 407-019      | K      | C59<br>C61<br>C63               | 40<br>30<br>30             | <b>Description:</b> Operator test abort.<br><b>Action:</b> Use MAP 0210.                            |
| 407-020      | K      | C59<br>C61<br>C62<br>C63<br>C65 | 40<br>30<br>30<br>30<br>30 | <b>Description:</b> Checkstop error.<br><b>Action:</b> Use MAP 0210.                                |
| 407-021      | K      | C59<br>C61<br>C62<br>C63<br>C65 | 40<br>30<br>30<br>30<br>30 | <b>Description:</b> Checkstop error, reset failing.<br><b>Action:</b> Use MAP 0210.                 |
| 407-022      | K      | B48<br>C59<br>C61               | 60<br>20<br>20             | <b>Description:</b> Single error.<br><b>Action:</b> Use MAP 0210.                                   |
| 407-023      | K      | C59<br>C61<br>C62<br>C63<br>C65 | 40<br>30<br>30<br>30<br>30 | <b>Description:</b> CPU-NVRAM dialogue not OK.<br><b>Action:</b> Use MAP 0210.                      |
| 407-024      | K      | C59<br>C61<br>C62<br>C63<br>C65 | 40<br>30<br>30<br>30<br>30 | <b>Description:</b> No CPUi program code.<br><b>Action:</b> Use MAP 0210.                           |
| 407-025      | K      | C59<br>C61<br>C62<br>C63<br>C65 | 40<br>30<br>30<br>30<br>30 | <b>Description:</b> CPUi launching not OK.<br><b>Action:</b> Use MAP 0210.                          |
| 407-030      | K      |                                 |                            | <b>Description:</b> Not defined parameter.<br><b>Action:</b> Use MAP 0210.                          |
| 408-000      | K      | C59<br>C60<br>C61<br>C63        | 60<br>20<br>10<br>10       | <b>Description:</b> Floppy disk peripheral accesses error.<br><b>Action:</b> Use MAP 0210.          |

| Error Number | Source | Failing Function Codes   | Failure Percent (%) | Description                                                                                                                                                            |
|--------------|--------|--------------------------|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 408-060      | K      | B94<br>B96 or<br>B97     | 50<br>50            | <b>Description:</b> Main memory Knaizuk-Hartmann test error.<br><b>Action:</b> Use MAP 0210.                                                                           |
| 408-080      | K      | C63<br>C61               | 90<br>10            | <b>Description:</b> Multi resources full test error.<br><b>Action:</b> Use MAP 0210.                                                                                   |
| 409-000      | K      | ???                      | 100                 | <b>Description:</b> Planar vital part FATAL ERROR.<br><b>Action:</b> Use MAP 0210.                                                                                     |
| 409-008      | K      | B94 or C64<br>or D28     | 100                 | <b>Description:</b> No 2MB available in MM. All memory banks FATAL ERROR.<br><b>Action:</b> Use MAP 0210.                                                              |
| 409-050      | K      | None                     | None                | <b>Description:</b> This is not an error. This code indicates a change in configuration, that NV-RAM has been reset, etc. No parts should be replaced for this code.   |
| 409-051      | K      | None                     | None                | <b>Description:</b> This is not an error. This code indicates a change in configuration, that NV-RAM has been reset, etc. No parts should be replaced for this code.   |
| 409-052 T1 x | K      | Firmware                 | 100                 | <b>Description:</b> -12 stand-by VOLT error. <b>x</b> is the unit number.                                                                                              |
| 409-052 T2 x | K      | Firmware                 | 100                 | <b>Description:</b> +12 stand-by VOLT error. <b>x</b> is the unit number.                                                                                              |
| 409-053 T1 x | K      | Firmware                 | 100                 | <b>Description:</b> 485RX protocol error (lengths). <b>x</b> is the unit number.                                                                                       |
| 409-053 T2 x | K      | Firmware                 | 100                 | <b>Description:</b> 485RX protocol error (time-out). <b>x</b> is the unit number.                                                                                      |
| 409-053 T3 x | K      | Firmware                 | 100                 | <b>Description:</b> 485RX protocol error (checksum error). <b>x</b> is the unit number.                                                                                |
| 409-054 T1   | K      | Firmware                 | 100                 | <b>Description:</b> Marginature error (ASIC VOLT).                                                                                                                     |
| 409-054 T2   | K      | Firmware                 | 100                 | <b>Description:</b> Marginature error (CPU VOLT).                                                                                                                      |
| 409-054 T3 x | K      | Firmware                 | 100                 | <b>Description:</b> Marginature error (+5 VOLT). <b>x</b> is the unit number.                                                                                          |
| 409-055 T1   | K      | Firmware                 | 100                 | <b>Description:</b> VPD command error (read VPD).                                                                                                                      |
| 409-055 T2   | K      | Firmware                 | 100                 | <b>Description:</b> VPD command error (write VPD).                                                                                                                     |
| 409-056      | K      | Firmware                 | 100                 | <b>Description:</b> Marginature command error.                                                                                                                         |
| 409-057      | K      | Firmware                 | 100                 | <b>Description:</b> Checksum logging not valid.                                                                                                                        |
| 409-058      | K      | Firmware                 | 100                 | <b>Description:</b> Environment over temperature.                                                                                                                      |
| 409-059 T1   | K      | Firmware                 | 100                 | <b>Description:</b> I2C bus error (wrong interrupt frame).                                                                                                             |
| 409-059 T2 x | K      | Firmware                 | 100                 | <b>Description:</b> I2C bus error ( unknown SIB interrupt). <b>x</b> is the unit number.                                                                               |
| 409-059 T3 x | K      | Firmware                 | 100                 | <b>Description:</b> I2C bus error ( unknown interrupt source). <b>x</b> is the unit number.                                                                            |
| 409-059 T4 x | K      | Firmware                 | 100                 | <b>Description:</b> I2C bus error ( unknown operator panel interrupt). <b>x</b> is the unit number.                                                                    |
| 409-080      | K      | C59<br>C60<br>C88 or C89 | 33<br>33<br>33      | <b>Description:</b> BUMP access to OPP or OPP access to SIF failed.<br><b>Action:</b> Use MAP 0210.                                                                    |
| 409-081      | K      | C59<br>C88 or C89        | 50<br>50            | <b>Description:</b> BUMP access to SIF failed.<br><b>Action:</b> Use MAP 0210.                                                                                         |
| 409-082      | K      | C59<br>C60               | 80<br>20            | <b>Description:</b> Operator panel cannot access the BUMP.<br><b>Action:</b> Use MAP 0210.<br><b>Note:</b> This problem can be caused by an incorrectly installed CEC. |

| <b>Error Number</b>    | <b>Source</b> | <b>Failing Function Codes</b> | <b>Failure Percent (%)</b> | <b>Description</b>                                                                                       |
|------------------------|---------------|-------------------------------|----------------------------|----------------------------------------------------------------------------------------------------------|
| <b>409-083</b>         | B             | C60                           | 100                        | <b>Description:</b> OP microcontroller not working.<br><b>Action:</b> Use MAP 0210.                      |
| <b>409-087</b>         | K             | C63                           | 100                        | <b>Description:</b> MVR not compatible with the CPU boards.<br><b>Action:</b> Use MAP 0210.              |
| <b>409-088</b>         | K             | C63                           | 100                        | <b>Description:</b> Different cycle time between the present CPU boards.<br><b>Action:</b> Use MAP 0210. |
| <b>409-089</b>         | K             | C63                           | 100                        | <b>Description:</b> Different cycle time between CPU boards and MPB.<br><b>Action:</b> Use MAP 0210.     |
| <b>409-090</b>         | K             | C88 or C89                    | 100                        | <b>Description:</b> No SIF reply on power-on command.<br><b>Action:</b> Use MAP 0210.                    |
| <b>409-091</b>         | K             | C88 or C89                    | 100                        | <b>Description:</b> SIF failure status on power-on command.<br><b>Action:</b> Use MAP 0210.              |
| <b>409-092</b>         | K             | C59                           | 100                        | <b>Description:</b> No valid Flash EPROM/EPROM.<br><b>Action:</b> Use MAP 0210.                          |
| <b>409-093</b>         | E             | D19                           | 100                        | <b>Description:</b> MVR Fan failed.<br><b>Action:</b> Use MAP 0210.                                      |
| <b>409-094</b>         | E             | D16                           | 100                        | <b>Description:</b> CPU Fan failed.<br><b>Action:</b> Use MAP 0210.                                      |
| <b>409-095</b>         | E             | ???                           | 100                        | <b>Description:</b> Disk Fan failed.<br><b>Action:</b> Use MAP 0210.                                     |
| <b>409-096</b>         | E             | D17                           | 100                        | <b>Description:</b> MCA Fan failed.<br><b>Action:</b> Use MAP 0210.                                      |
| <b>409-097</b>         | E             | C92                           | 100                        | <b>Description:</b> Power Supply failed.<br><b>Action:</b> Use MAP 0210.                                 |
| <b>409-098</b>         | K             | 152                           | 100                        | <b>Description:</b> Power supply hot.<br><b>Action:</b> Use MAP 1540.                                    |
| <b>409-Axy</b>         | K             | 152                           | 100                        | <b>Description:</b> Power supply internal failure.<br><b>Action:</b> Use MAP 1520.                       |
| <b>F/W FATAL ERROR</b> | K             | Firmware                      | 100                        | <b>Description:</b> Firmware Panic: System restart from PON.                                             |

## Error Logging

When a failure occurs on a fan or on a power supply, the system produces a logging report for this event. The logging report can be viewed using *errpt*.

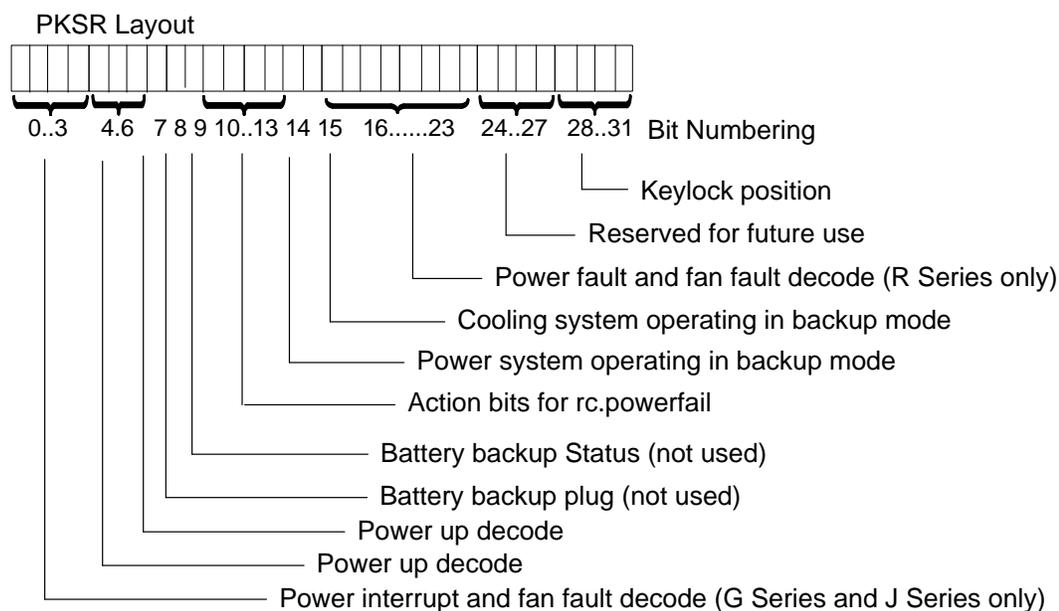
An *errpt* report about power and fan is the following:

```

LABEL: EPOW_SUS
Description: LOSS OF ELECTRICAL POWER
Probable Causes: POWER SUBSYSTEM
 INTERNAL POWER UNIT
Failure Causes: POWER SUBSYSTEM
RECOMMENDED ACTIONS: CHECK POWER
POWER STATUS REGISTER:
9005 0007

```

The Power/Keylock Status Register has the following format:



### Power Interrupt and Fan Fault (G Series and J Series only)

| Bits 0–3 values | Description                   |
|-----------------|-------------------------------|
| 0000            | No Interrupt                  |
| 0001            | Running on battery            |
| 0010            | Programmed Power Off          |
| 0011            | manual switch off             |
| 0100            | Remote power off              |
| 0101            | Over temperature level 1      |
| 0110            | Internal power supply failure |
| 0111            | Power supply overload         |
| 1000            | Loss of Primary power (EPOW)  |
| 1001            | Fan 1 fault                   |

|      |             |
|------|-------------|
| 1010 | Fan 2 fault |
| 1011 | Fan 3 fault |
| 1100 | Fan 4 fault |
| 1100 | Fan 5 fault |
| 1100 | Fan 6 fault |
| 1111 | Reserved    |

### Power Up

| Bits 4–6 Values | Description                                   |
|-----------------|-----------------------------------------------|
| 000             | Manual On button pushed                       |
| 001             | Remote On signal from external                |
| 010             | Timed power on from TOD clock                 |
| 011             | Remote on signal from power control interface |
| 100             | Automatic restart                             |

### Power Up

| Bit 7 Values | Description        |
|--------------|--------------------|
| 0            | No thermal warning |
| 1            | Thermal warning    |

### Battery Status

| Bit 8 Values | Description                  |
|--------------|------------------------------|
| 0            | Backup battery not installed |
| 1            | Backup battery installed     |

### Battery Status

| Bit 9 Values | Description                          |
|--------------|--------------------------------------|
| 0            | Backup battery OK (if installed)     |
| 1            | Backup battery discharged or failing |

### Power Interrupt (Action for rc.powerfail)

| Bits 10–13 values | Description                                                   |
|-------------------|---------------------------------------------------------------|
| 0000              | No action                                                     |
| 0001              | WARN_COOLING no reaction                                      |
| 0010              | WARN_POWER error logging                                      |
| 0011              | Severe cooling problem, SLOW_SHUTDOWN 10 minutes to shutdown  |
| 0100              | Very severe cooling problem, FAST_SHUTDOWN 20 sec to shutdown |
| 0101              | IMMED_SHUTDOWN immediate power down                           |

### Power System Operating in Backup Mode

| Bit 14 Values | Description                                   |
|---------------|-----------------------------------------------|
| 0             | No power warning                              |
| 1             | Power system operating in backup mode warning |

### Cooling System Operating in Backup Mode

| Bit 15 Values | Description                                     |
|---------------|-------------------------------------------------|
| 0             | No cooling warning                              |
| 1             | Cooling system operating in backup mode warning |

### Power Fault and Fan Fault (R30, R40, and R50)

| Bits 16–23 values | Description                                      |
|-------------------|--------------------------------------------------|
| 00000000          | No Interrupt                                     |
| 00000001          | Over temperature level 1 on power supply #1      |
| 00000010          | Over temperature level 2 on power supply #1      |
| 00000011          | Internal power supply failure on power supply #1 |
| 00000100          | Power supply #1 overload                         |
| 00000101          | Loss of primary power on power supply #1         |
| 00000110          | Over temperature level 1 on power supply #2      |
| 00000111          | Over temperature level 2 on power supply #2      |
| 00001000          | Internal power supply failure on power supply #2 |
| 00001001          | Power supply #2 overload                         |
| 00001010          | Loss of Primary power on power supply #2         |
| 00010000          | Fan 1 fault                                      |
| 00100000          | Fan 2 fault                                      |
| 00110000          | Fan 3 fault                                      |
| 01000000          | Fan 4 fault                                      |
| 01010000          | Fan 5 fault                                      |
| 01100000          | Fan 6 fault                                      |
| 01110000          | Fan 7 fault                                      |
| 10000000          | Fan 8 fault                                      |
| 10010000          | Fan 9 fault                                      |
| 10100000          | Fan 10 fault                                     |

### Keylock Position

| Bits 28–31 values | Description |
|-------------------|-------------|
| 0101              | Secure      |
| 0110              | Service     |
| 0111              | Normal      |

## Understanding PKSR

The PKSR status is logged in hexadecimal value: 8 digits are logged. Each hexadecimal digit must be converted in 4 binary digits: 32 bits are obtained. Divide the bits as indicated in the PKSR layout and check the bit values to understand the meaning of the register.

### Example

Suppose you receive an error message whose PKSR content in hex is:

9005 0007

converted to binary:

1001 000 0 0 0 0001 0 1 00000000 0000 0111

0 3 4 6 7 8 9 10 13 16 23 24 28 31 = Bit Numbering

This means that the following events occurred:

- fan1 fault
- a warning cooling message is displayed on the console
- the cooling system is operating in backup mode
- the key is in normal position



---

## Appendix E. System Power States

The state of the system is dependant on the condition of four variable conditions that effect how the system IPLs or shuts down. The four conditions are:

- the position of the Power-on button  
This button has two positions. It can be pressed in to the On position (position for turning the power on), or it can be in the out or Off position.
- the position of the system key (physical key mode or electronic key mode)  
The system key represents the condition (Normal, Secure, or Service) that the system is set to by the physical key mode switch or the electronic key mode switch.
- the `was_shutdown` status  
The system keeps a record when it has been shutdown using the **shutdown -F** command since the last IPL.
- the `power_fault` status  
The system keeps a record when it receives a power fault condition since the last IPL.

---

### Power States

The state of the system depends on how the variables were set either when the power was applied to the system, or when the power was removed.

#### MAIN\_STANDBY

This is the initial state of the system when power is first applied (by plugging a 7012 G Series into an electrical outlet, or by setting the main power switch of the 7013 J Series to the On position for example). When in this state, the BUMP console displays `STANDBY`, unless the console is set to display the operator panel display error messages.

The Power-on button and the BUMP console Enter key are polled by the system continuously for a change in status. The system remains in this state until one of the following occurs:

- If the Power-on button is initially detected to be in the On position, and the `was_shutdown` status is false, the system goes to the `WAIT_POWER_ON` state.
- If the Power-on button is pressed and changes from the Off position to the On position, the system goes to the `WAIT_POWER_ON` state.
- If the Power-on button is pressed and changes from the On position to the Off position, the system sets the `was_shutdown` status to false.
- If the BUMP console Enter button is pressed, the system goes to the `SBB_GATEWAY` state.

#### SBB\_GATEWAY

In this state the `>` character is displayed on the BUMP console and the cursor is located two spaces to the right of the `>` prompt (`> _`).

- If the command `sbb` is entered on the BUMP console, and the system key is in the Service position, the system goes to the `SBB_MENU` state.

If the command `sbb` is entered on the BUMP console, and the system key is in the Normal position, the system goes to the SBB\_ECMD state.

- If the Power-on button is pressed and changes from the On position to the Off position, the system sets the `was_shutdown` status to false.
- If the Enter key is pressed on the BUMP console, the system goes to the SBB\_ECMD state.
- If the `power` command is entered on the BUMP console, the system goes to the SBB\_PCMD state.

## SBB\_ECMD

In this state the `>` character is displayed on the BUMP console but the cursor is located in the same position as the `>` prompt ( `>` ).

This state allows electronic key mode switching to be performed as well as power functions. The power functions follow below:

- If the Power-on button is initially detected in the On position, and the `was_shutdown` status is false, the system goes to the WAIT\_POWER\_ON state.
- If the Power-on button is pressed and changes from the Off position to the On position, the system goes to the WAIT\_POWER\_ON state.
- If the Power-on button is pressed and changes from the On position to the Off position, the system sets the `was_shutdown` status to false.
- If the Enter key is pressed on the BUMP console, the system goes to the SBB\_GATEWAY state.

## SBB\_PCMD

In this state the `>` character is displayed on the BUMP console but the cursor is located in the same position as the `>` prompt ( `>` ).

- If the Power-on button is initially detected in the On position, the system goes to the WAIT\_POWER\_ON state.
- If the Power-on button is pressed and changes from the Off position to the On position, the system goes to the WAIT\_POWER\_ON state.
- If the Power-on button is pressed and changes from the On position to the Off position, the system sets the `was_shutdown` status to false.
- If the Enter key is pressed on the BUMP console, the system goes to the SBB\_GATEWAY state.

## SBB\_MENU

This is where the Stand-by (`sbb`) menu items are displayed. This menu is exited by entering “x” repeatedly until the menu is exited. When the menu is exited, the system goes to the MAIN\_STANDBY state.

## WAIT\_POWER\_ON

This state displays the message `Wait power on....`

- If the `power_fault` status is true (a previously detected fault), the system goes to the MAIN\_STANDBY state.

- If the `power_fault` status is false, the system attempts to power on. If the system then detects a power fault, the `power_fault` status is set to true. The system displays an operator panel LCD error message, and the system goes to the MAIN\_STANDBY status. If no power fault is detected, the system goes to the IPL state.

**Note:** When the system is in this state, the Power-on button should not be pressed.

## IPL

- If the Power-on button is pressed and changes from the On position to the Off position, the system goes to the WAIT\_REBUILDING state.
- If the IPL is successfully completed, the system goes to the Maintenance Menu or to AIX.

## AIX

- If the Power-on button is pressed and changes from the On position to the Off position, the system goes to the WAIT\_REBUILDING state.
- If the `shutdown -F` command is run, the `was_shutdown` status is set to true and the system goes to the WAIT\_REBUILDING state.
- If the `shutdown -Fr` command is run, the `was_shutdown` status remains false, and the system goes to the WAIT\_REBUILDING state.

## WAIT\_REBUILDING

In this state, the SystemGuard displays the `WAIT REBUILDING` message on the operator panel display.

The system monitors the conditions to which the variables are set and does one of the following:

- If the Power-on button is in the On position, and the `was_shutdown` status is false, the system goes to the WAIT\_POWER\_ON state.
- If the Power-on button is in the On position, and the `was_shutdown` status is true, or if the Power-on button is in the Off position, the system goes to the MAIN\_STANDBY state.

**Note:** When the system is in this state, the Power-on button should not be pressed.

## How to Turn System Power On from the BUMP Console

This procedure helps get the system power to turn on from the BUMP Console in the event that your system does not seem to be responding to normal power operations.

From the SystemGuard BUMP console:

1. Check the BUMP console display, then check the list below and go to the appropriate step.
  - If you see a `>` with the cursor two spaces to the right, go to step 2.
  - If you see a `≥`, press the Enter key on the bump console and go to step 2.
  - If you see any sbb type menu, type `x` and then press Enter repeatedly until you exit all menus, then go to the beginning of step 1.
  - If you see nothing on the BUMP console, press the Enter key, then go to the beginning of step 1.
2. Type `power`, then press Enter.

If the system power does not turn on, the Power-on button may be in the off position. Go to the system unit and press the Power-on button (only press the button once),

If the system power still does not turn on there may be an earlier fault condition. Remove main power from the system unit, wait 30 seconds, and restore main power.

The system should IPL if the Power-on button is in the On position. If the button is not in the On position, wait until `standby` is displayed on the LCD then press the Power-on button one more time.

## How to Turn System Power On Using the Power-on Button

This procedure helps to get the system power to turn on using the Power-on button in the event that your system does not seem to be responding to normal power operations.

From the SystemGuard BUMP console:

1. Check the BUMP console display, then check the list below and go to the appropriate step.
  - If you see a `>` with the cursor two spaces to the right, press Enter on the BUMP console, go to the beginning of step 1.
  - If you see a `≥`, go to step 2.
  - If you see any `sbb` type menu, type `x` and then press Enter repeatedly until you exit all menus, then go to step 1.
  - If you see nothing on the BUMP console, go to step 2.
2. Press the Power-on button to the On position (pushed in).

If the system power does not turn on, the Power-on button may have been in the on position already, wait five seconds and press the Power-on button again.

If the system power still does not turn on there may be an earlier fault condition. Remove main power from the system unit, wait 30 seconds, and restore main power.

The system should IPL if the Power-on button is in the On position. If the button is not in the On position, wait until `standby` is displayed on the LCD then press the Power-on button one more time.

---

## Glossary: Special Terms Used in SystemGuard

**BP (back plane).** A panel located in the system unit and used to interconnect boards and devices.

**BIST (built in self-test).** Tests performed during the standby phase of the IPL process. The BIST phase comes ahead of the POST phase.

**BUMP (bring-up microprocessor).** A microprocessor which monitors the system, especially during the various IPL phases before AIX is loaded.

**C1D card.** See CPU card.

**CPU card.** A card containing the central processor unit (CPU). **CPU $n$**  is used to designate the  $n$ th CPU card. For example, CPU2 designates the second CPU card.

**CPU (central processor unit).** A primary processor for general calculations.

**DIMM (dual in-line memory module).** See memory module.

**Electronic Mode Switch** (also known as **E\_KEY**). A flag which enables the Key Mode Switch to be changed without actually moving the physical key.

**EEPROM (electronically erasable programmable read-only memory).** A type of non-volatile memory used to store firmware maintenance programs (like SSF) or boot programs.

**FEPRM (flash electronically erasable programmable read-only memory).** A type of non-volatile memory used to store firmware maintenance programs (like SystemGuard) or IPL programs.

**E\_KEY.** See **Electronic Mode Switch**.

**ELM.** See I/O planar

**FFC (failing function code).**

**FRU (field replaceable unit).**

**I2C (inter integrated circuit).** Special circuits used to connect devices to a high-speed bus called the I2C bus.

**IOD.** See I/O card.

**I/O: Input /Output.**

**I/O card.** A card which handles system I/O and directly connects to the system planar.

**IPL (initial program load).** The first phase of the system program loading.

**JTAG (join test action group).**

**LCD (liquid crystal display).** A low power display screen. There is a small LCD screen on the operator panel.

**MCA (Micro Channel adapter).** An adapter for the micro channel bus.

**MCA Planar.** A card with connectors for Micro Channel adapter cards.

**Memory Module.** A card containing one (SIMM) or two (DIMM) rows of memory chips.

**MPE.** A type of memory card.

**MR2.** A memory card with 8 8MB memory modules.

**MR4.** A memory card with 8 32MB memory modules.

**MVR (multivoltage regulator).** A power supply unit which regulates several voltage levels for various system parts (disks, CPUs, memory chips).

**NFx.** A type of memory card.

**NVRAM (non volatile random access memory).**

**MP.** The MCA planar located in the base unit.

**MPB.** See System planar.

**MPe.** The MCA planar located in the expansion unit.

**PMA.** See MP.

**PME.** See MPe.

**POS (programmable option select).** POS registers are used to specify MCA board options.

**POST (power-on self-test).** Tests performed during the initial phase of the program load process. The BIST phase comes ahead of the POST phase.

**RDS (removable disk status).** The status information for a removable disk drive (a disk drive

which can be removed without turning the power off to the entire system).

**ROS (read-only storage).** Storage which does not support writing.

**SCSI (small computer system interface).** A standard bus interface used to connect peripherals such as disk drives or tape drives.

**SIB (system interface board).** The SIB is a system board which controls the power supply and the RS-485 interconnect bus.

**SIMM (single in-line memory module).** See memory module.

**SMP.** Symmetric multiprocessor.

**SRN (service request number).**

**SSBus (subsystem bus).** A special bus used to interconnect the BUMP and some local resources

such as the EEPROM, the flash EEPROM, and the non-volatile RAM.

**SSF (system service facility).** See SystemGuard.

**SYSID (system identification).** Identifies part of the EEPROM containing important data such as the system serial number, remote access rights, dial-out phone numbers, and other information.

**SystemGuard.** The firmware maintenance programs which run on the bring-up microprocessor (BUMP). It enables an operator to manage power supplies, check system hardware status, update various configuration parameters, investigate problems, and perform tests.

**VPD (vital product data).** Certain vital product data (VPD), such as the product serial number and status information, is stored on each board.

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# Index

## Numbers

-48 V dc power supply  
power-off procedure with power distribution panel, 4-9  
power-on procedure, 4-11

## A

about this book, xiii  
adapter, 4-75  
adapter cable, 4-73  
AutoserviceIPL Flag, 2-36

## B

Boot Multiuser AIX in Service Flag, 2-37  
BUMP Console Flag, 2-36

## C

CD-ROM drive, 4-18  
CD-ROM drive or optional media device, 4-18  
communication statements, vii  
cooling unit, 1-7  
CPU card, 4-45  
CPU enclosure, 6-2  
cooling unit, 1-7  
CPU module, 1-5  
data flow, 1-13  
description, 1-1  
front view, 1-2  
front view without front access plate, 1-3  
I/O module, 1-6  
I/O planars, 1-11  
locations, 1-2  
operator panel, 1-3  
power flow, 1-15  
power supply, 1-7  
rails, 6-16  
rear connector locations, 1-4  
service inspection guide, 1-19  
specifications, 1-17  
system planar connector locations, 1-8

typical rail installation, 1-16  
CPU enclosure – minimum configuration, 3-1540-1  
CPU enclosure – power MAP, 3-1520-1  
cpu installation, 5–1  
CPU module fans, 4-50  
CPU module, 1-5, 4-39, 6-8, 6-10, 6-12  
media module, 1-7  
CPU module flex cables, 4-57  
Customer Maintenance Password, 2-37

## D

data flow, 1-13  
description, 1-1  
Dial-Out Authorization Flag, 2-36  
disk drive, 4-17

## E

Electronic Mode Switch from Service Line Flag, 2-37  
enclosure installation, 5–1  
error codes, off line diagnostics, D-1  
error logging, PKSR register, D-26

## F

Fast IPL Flag, 2-36  
flash EEPROM, reloading, B-7  
front access plate, 4-15, 6-2  
front bezel, 4-15, 6-2  
front bezel and front access plate, 4-15, 6-2  
front view with bezel, 1-2  
front view without bezel, 1-2  
front view without front access plate, 1-3

## H

handling static-sensitive devices, 4-14  
hardware components, CPU module, memory cards, 1-9

## I

I/O card, 4-45  
I/O module, 1-6, 4-67, 6-14  
I/O module flex cables, 4-76  
I/O planar power cables, 4-77  
I/O planars, 1-11, 4-78  
installation, rails, 1-16  
installation, cpu enclosure, 5–1  
interlock cable, 4-43

## L

lateral planar 1 card, 4-56  
lateral planar 2 card, 4-71  
locations, 1-2  
    cooling unit, 1-7  
    CPU module, 1-5  
    front view with bezel, 1-2  
    front view without bezel, 1-2  
    front view without front access plate, 1-3  
    I/O module, 1-6  
    I/O planars, 1-11  
    media module, 1-7  
    operator panel, 1-3  
    power supply, 1-7  
    rear connector locations with rear access plate removed, 1-4  
    system planar connectors, 1-8

## M

Maintenance Password, 2-37  
MAP 1520, 3-1520-1  
MAP 1520: CPU enclosure – power MAP, 3-1520-1  
MAP 1540, 3-1540-1  
MAP 1540: CPU enclosure – minimum configuration, 3-1540-1  
media devices, 6-4  
media module, 1-7, 4-27, 6-6

media module internal cables, 4-32  
memory card, 4-45  
memory card, CPU card, I/O card, 4-45  
memory SIMM, 4-49  
minimum configuration MAP, 3-1540-1  
modifying SystemGuard parameters, B-1

## O

off line diagnostics, error codes, D-1  
operator panel, 1-3, 2-3, 4-20  
optional media device, 4-18

## P

parts information, 6-1  
    CPU module, 6-8, 6-10, 6-12  
    disk drives, 6-4  
    front bezel, front access plate, and CPU enclosure, 6-2  
    I/O module, 6-14  
    media devices, 6-4  
    media module, 6-6  
    operator panel, 6-4  
    rails, CPU enclosure, 6-16  
    rails for CPU enclosure, 6-16  
power cable  
    part number and country, 6-18  
    type, 6-18  
power cables, 1-18  
power distribution cables, 4-79  
power flow, 1-15  
power MAP, 3-1520-1  
power states  
    AIX, E-3  
    IPL, E-3  
    MAIN\_STANDBY, E-1  
    SBB\_ECMD, E-2  
    SBB\_GATEWAY, E-1  
    SBB\_MENU, E-2  
    SBB\_PCMD, E-2  
    WAIT\_POWER\_ON, E-2  
    WAIT\_REBUILDING, E-3  
power states, system, E-1  
power supply, 1-7, 4-61  
power-off procedure with power distribution panel, 4-9

- power-off with a power distribution bus, 4-2
- power-on from BUMP console, E-3
- power-on procedure with power distribution panel, 4-11
- power-on using the power-on button, E-4
- power-on with a power distribution bus, 4-4
- power-off procedure with a power distribution unit, 4-5
- power-on procedure a power distribution unit, 4-7

## R

- rail, 1-16
- rail installation, 1-16
- rails, CPU enclosure, 6-16
- rear access plate, 4-60
- rear connector locations with rear access plate removed, 1-4
- reference information, 1-1
- related publications, xiii
- removal and replacement procedures, 4-1
  - 3.5-inch diskette drive, 4-23
  - adapter, 4-75
  - adapter cable, 4-73
  - CD-ROM drive or optional media device, 4-18
  - CPU module, 4-39
  - CPU module fans, 4-50
  - CPU module flex cables, 4-57
  - disk drive, 4-17
  - front bezel and front access plate, 4-15
  - handling static-sensitive devices, 4-14
  - I/O module, 4-67
  - I/O module flex cables, 4-76
  - I/O planar power cables, 4-77
  - I/O planars, 4-78
  - interlock cable, 4-43
  - lateral planar 1 card, 4-56
  - lateral planar 2 card, 4-71
  - lithium battery, 4-21
  - media module, 4-27
  - media module fans, 4-30
  - media module internal cables, 4-32
  - memory card, CPU card, or I/O card, 4-45
  - memory SIMM, 4-49
  - operator panel, 4-20
  - operator panel bezel, 4-25
  - power distribution cables, 4-79
  - power supply, 4-61
  - power supply fan, 4-64

- power-off procedure with a power distribution panel, 4-9
- power-off with a power distribution bus, 4-2
- power-on procedure with a power distribution unit, 4-7
- power-on procedure with power distribution panel, 4-11
- power-on with a power distribution bus, 4-4
- power-off procedure with a power distribution unit, 4-5
- rear access plate, 4-60
- system interface board (SIB), 4-65
- system planar, 4-52

## S

- safety notices, xi
- service inspection guide, 1-19
- Service Line Speed Parameter, 2-37
- Set Mode to Normal when Booting Flag, 2-36
- setting voltage margins, 2-20, 2-33
- SIB (system interface board), 4-65
- specifications, 1-17
- system interface board (SIB), 4-65
- system planar, 4-52
- system planar connector locations, 1-8
- system power states, E-1
- SystemGuard
  - BUMP overview, 2-2
  - common tasks, 2-39
    - authorize the service console, 2-43
    - boot from network, 2-52
    - boot from SCSI device, 2-49
    - disable processors, 2-55
    - enable processors, 2-55
    - enable surveillance, 2-46
    - reboot AIX from remote service console, 2-48
    - set fast IPL, 2-40
    - set the electronic key, 2-39
    - set the service line speed, 2-42
    - set up console mirroring, 2-44
    - set up dial-out feature, 2-46
  - components, 2-2
  - console mirroring, 2-44
  - consoles, 2-4
    - dial-in phone numbers, modifying, B-5
    - dial-out authorization flag, modifying, B-4
    - dial-out phone numbers, modifying, B-5
    - electronic key, 2-4

- electronic mode switch, modifying, B-6
- flags, 2-9
- flash EEPROM, reloading, B-7
- maintenance menu, 2-21
  - disable service console, 2-25
  - display BUMP error log, 2-25
  - display configuration, 2-22
    - device level, 2-24
    - system level, 2-22
    - unit level, 2-22
  - enable service console, 2-25
- off-line tests, 2-28
  - build test list, 2-29
  - execute test list, 2-32
  - modify/display test list, 2-31
- power off, 2-25
- reset, 2-25
- set national language, 2-38
- set parameters, 2-32
  - phone numbers, 2-34
  - power-on command parameters, 2-33
  - set configuration, 2-34
  - voltage margins, 2-33
- system boot, 2-26
- menus, 2-11
  - maintenance menu, 2-21
  - stand-by menu, 2-12
- modem configuration, 2-47
- modifying service support parameters, B-1
- parameters, 2-9
- phases, 2-4
  - boot, 2-5
  - Boot to AIX load and run-time, 2-9
  - init, 2-5
  - init to Boot, 2-9

- Maint to Boot, 2-9
- maintenance, 2-5
- run-time, 2-5
- stand-by, 2-4
  - stand-by to init, 2-6
- physical key, 2-4
- power, 2-2
- remote authorization flag, modifying, B-3
- remote operation configuration, C-1
- service support parameters
  - changing flags and parameters, B-3
  - default values, B-1
- stand-by menu, 2-12
  - display configuration, 2-13
  - I2C maintenance, 2-19
  - set configuration, 2-17
  - set flags, 2-15
  - set unit number, 2-16
  - SSbus maintenance, 2-18
- test groups, A-1
  - descriptions, A-3
  - using, 2-1
  - working with, 2-10
- SystemGuard parameters, modifying, B-1

## T

- typical rail installation, 1-16

## V

- voltage margins, setting, 2-20, 2-33

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