

7013 J Series

Service Guide

Third Edition (April 1997)

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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.

International Electrotechnical Commission (IEC) Statement

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

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.

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 these notices, see *System Unit Safety Information*.

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:

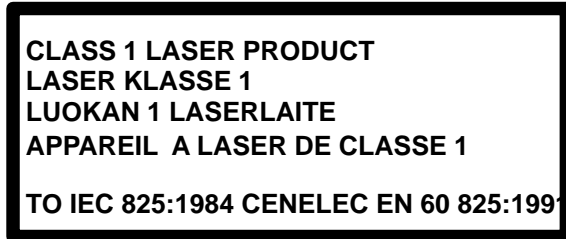
3-1520-1
4-1
4-51

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
4-1
4-30

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 applies only to the 7013 J Series system units. For other 7013 models see *7013 500 Series Installation and Service Guide*.

How to Use This Book

This book is used by the service technician to repair system failures. This book assumes that the service technician is trained on the 7013 J Series system unit.

This book contains Maintenance Analysis Procedures (MAPs) that are not common to other systems. MAPs that are common to all systems are contained in *Diagnostic Information For Micro Channel Bus 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*, form number SA23-2765, contains the maintenance information and procedures that are common to all systems. The information and procedures in this section apply to any system unit that uses the Diagnostic Programs.

Adapters, Devices, and Cable Information, form number SA23-2764, contains reference information about adapters, devices, and cabling for the system units. This section also contains the removal and replacement procedures for the logic boards on the disk drives and provides the service representative pin-out lists and cabling information to use in isolating problems with customer cabling.

System Unit Safety Information, form number SA23-2652, contains translated versions of the danger and caution notices.

The *7013 J Series Operator Guide*, form number SA23-2724, provides information about the controls and features of the system unit.

The *7013 J Series Base Unit Hardware Setup Procedure*, form number SA23-2723, and *7013 J Series Expansion Unit Hardware Setup Procedure*, form number SA23-2726 contain information about setting up your 7013 J Series system unit.

Chapter 1. 7013 J Series Unit Descriptions

The 7013 J Series system consists of one or two units according to the configuration. The units that can be installed are:

- The base unit
- One optional expansion unit.

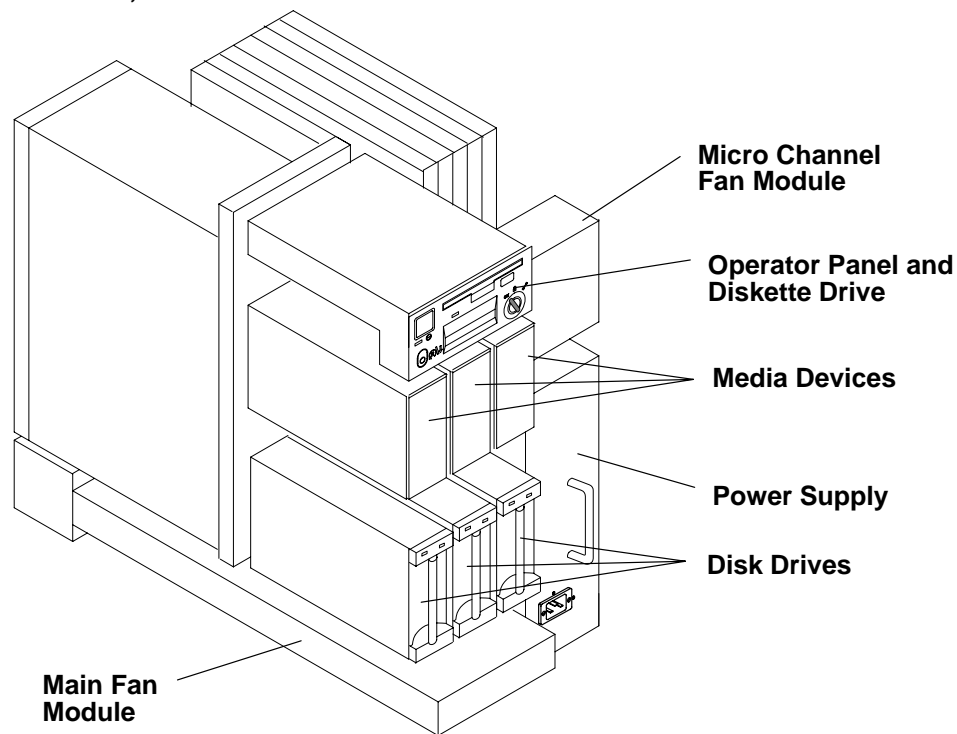
The minimum configuration consists of the base unit only.

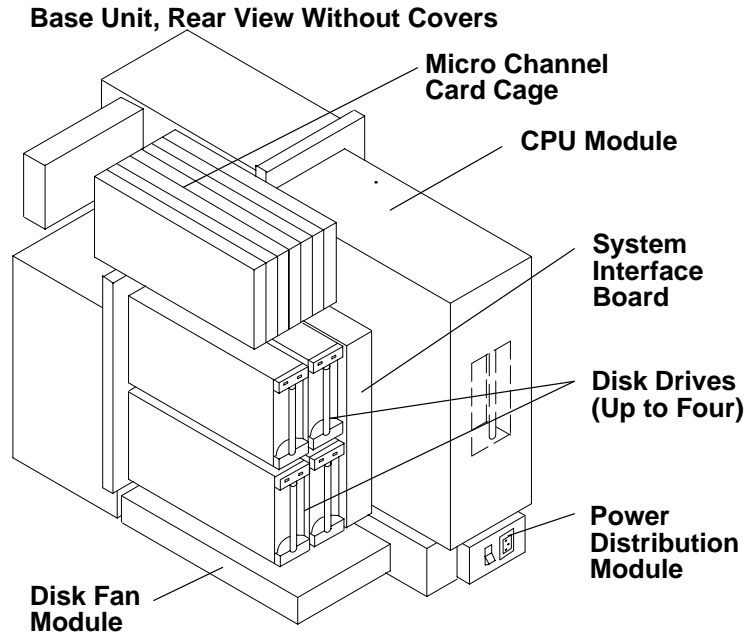
The maximum configuration consists of the base unit and the expansion unit.

The 7013 J Series Base Unit

The base unit can function without having any other unit connected to it. The base unit contains all the modules needed by the system to operate correctly.

Base Unit, Front View Without Covers





Base Unit SCSI Buses

The base unit is equipped with up to two SCSI buses (A and B). Each SCSI bus is driven by means of a SCSI-2 Differential Fast/Wide Adapter/A controller through an internal connection and is terminated with a SCSI terminator installed on the designated connector on the system interface board.

Each SCSI bus features the following characteristics:

- SCSI-2 differential
- 16-bit wide data bus
- 8- and 16-bit SCSI-2 differential devices mixable on the same bus
- Fast data transfer (10MB per second for 8-bit devices, 20MB per second for 16-bit devices)
- Synchronous/asynchronous data interchange
- Hot removability capability support (SCSI hard drives and media devices can be installed or removed when the bus is operating)

The two SCSI buses of the base unit are two different entities which cannot be connected in series in the unit.

SCSI Terminators

Each internal SCSI bus *used* in the base unit (that means a SCSI bus to which at least one SCSI hard disk or device is connected), must be terminated with a SCSI terminator. This terminator must be installed on the system interface board, observing the following guidelines:

- The first SCSI bus (A) must be terminated with a SCSI terminator installed on the "DIFFERENTIAL SCSI A" connector of the system interface board.
- The second SCSI bus (B) must be terminated with a SCSI terminator installed on the "DIFFERENTIAL SCSI B" connector of the system interface board.
- The connectors on the system interface board are for terminators only. No external devices can be attached to these connectors.

Micro Channel Adapter (MCA) Card Cage

The MCA card cage is a sub-assembly structure placed in the rear side of both the base and the expansion unit. It can have up to seven Micro Channel adapters in the base unit and up to eight adapters in the expansion unit.

An MCA planar is located at the bottom of the MCA card cage. This planar is called MCA Planar (MP) on the base unit, and MCA Expansion Planar (MPe) on the expansion units.

When an MCA slot is not occupied by an adapter, a dummy plate is installed to provide EMC shielding and to protect it from dust or debris. When a new adapter is installed in an available slot, the dummy plate must be removed.

On the base unit, the seven slots can be used to install:

- One required SCSI-2 Differential Fast/Wide Adapter/A controller in slot 7
- Up to six supported MCA adapters, which can be installed in any of the remaining slots.

Adapters

7013 J Series systems support a variety of MCA adapters (including the SCSI-2 Differential Fast/Wide Adapter/A controllers). For a full description of each MCA adapter, refer to the *Diagnostic Information For Micro Channel Bus Systems* delivered with your system.

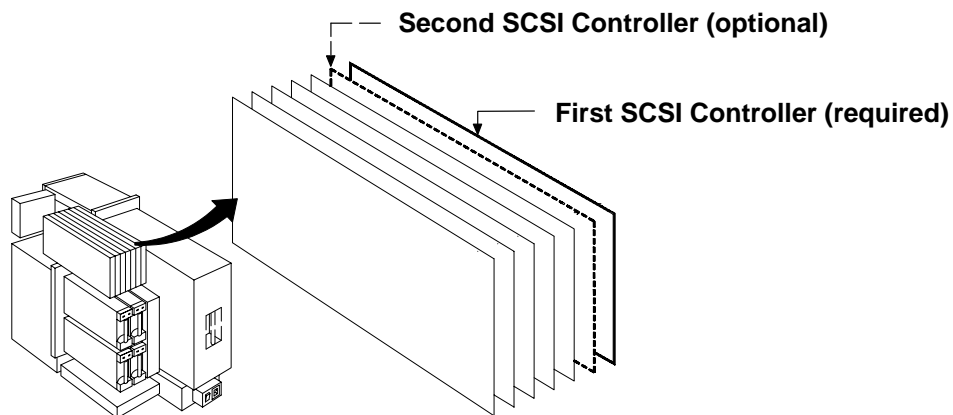
SCSI Overview

SCSI Controllers

Each SCSI controller manages one SCSI bus. For each SCSI bus used in each unit (that means a SCSI bus to which at least one SCSI disk drive or device is connected), a dedicated SCSI controller is required.

The SCSI controller(s) managing the SCSI bus(es) of the base unit must be installed in the base unit.

The slots dedicated to the SCSI controllers installation in the base unit are shown in the following figure (the first controller in slot 7, the second in slot 6).



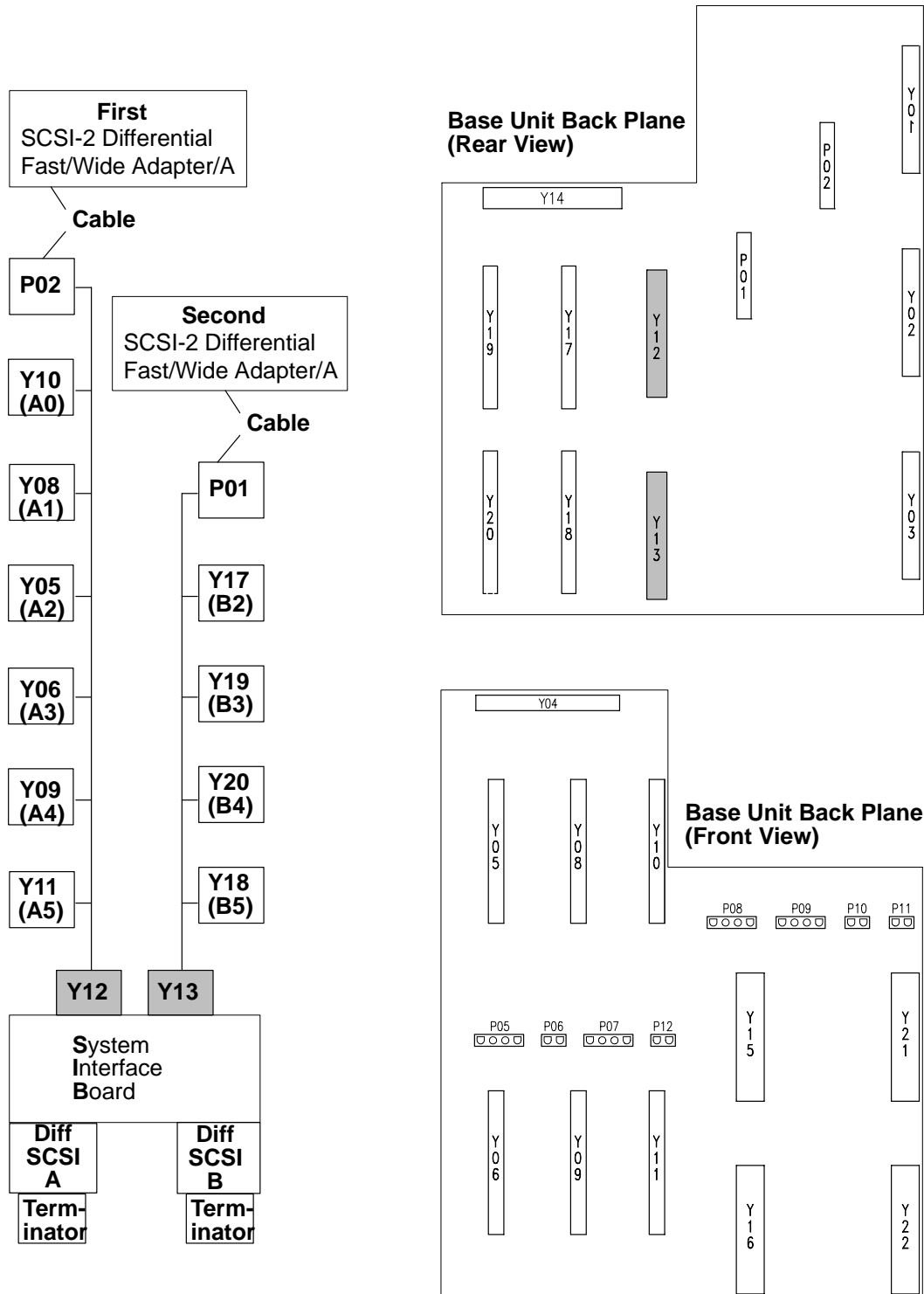
If a second SCSI controller is required on a unit, this must be installed in slot next to the one occupied by the first SCSI controller.

If more than two SCSI controllers are needed in the unit, they can be installed in any free slot.

System Interface Board

One system interface board is required on both the base and expansion units. See page 1-22 for more information regarding the system interface board.

SCSI Data and Power Flow

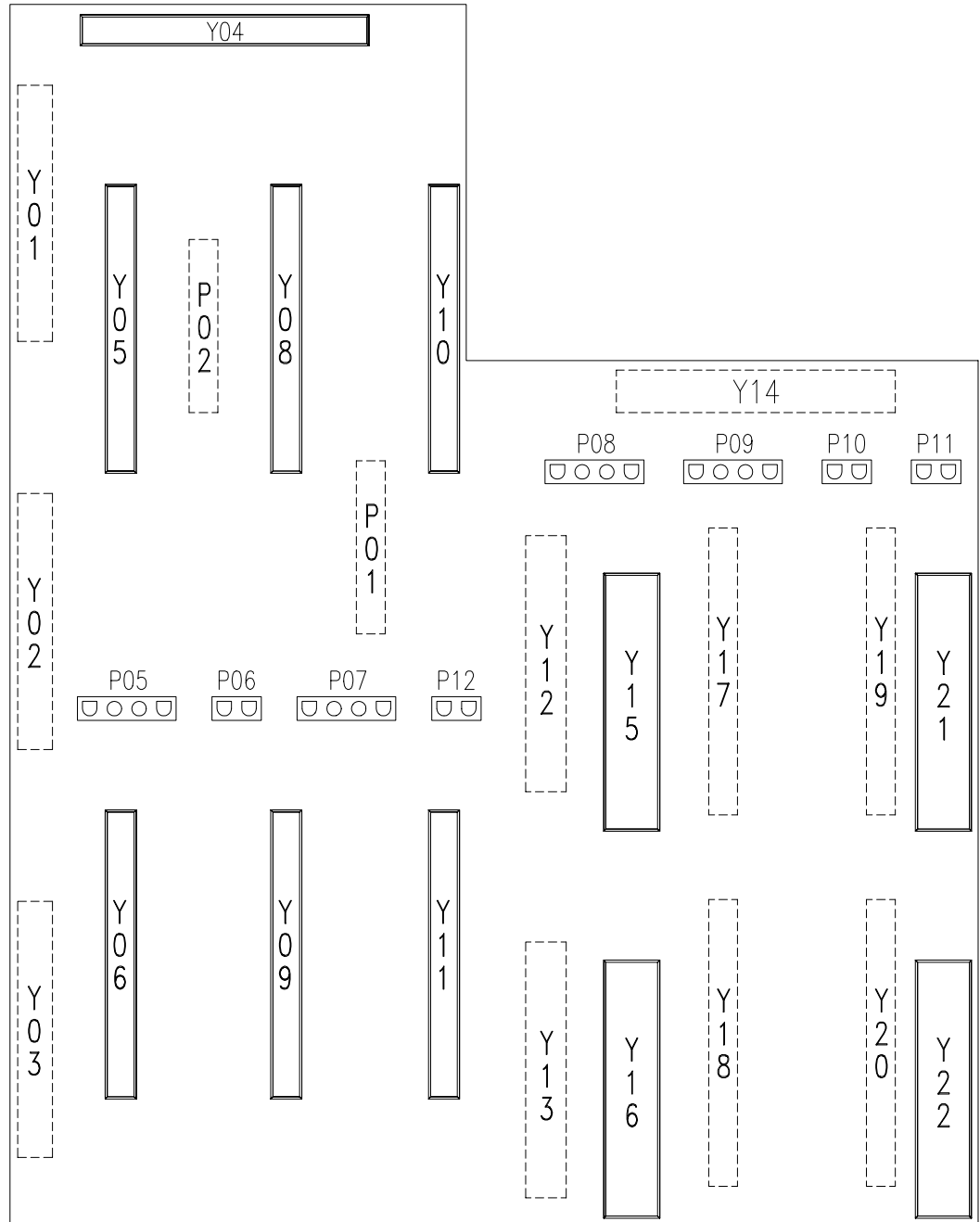


Internal Connectors

This section illustrates all internal connectors, giving information about where they are located in the unit, and giving a brief description of each.

Base Unit Back Plane

The following figure shows all connectors present on the back plane of the base unit. The dashed connectors are accessed from the unit rear, while the others are accessed from the front.



The following table lists each connector shown in the previous figure, giving information about the type of connector and about which functions it performs in the system. It also indicates the bus on which each connector resides. Bus **A** means the first SCSI bus inside the unit, bus **B** means the second SCSI bus.

Reference in the Figure	Type of Connector	Function	SCSI Bus / ID
Y01	48 contacts	System planar interconnection	
Y02	48 contacts	System planar interconnection	
Y03	48 contacts	System planar interconnection	
Y04	96 contacts	Operator panel interconnection	
Y05	96 contacts	Media device interconnection (CD-ROM)	A / 2
Y06	96 contacts	Highly removable disk drive interconnection	A / 3
Y08	96 contacts	Media device interconnection	A / 1
Y09	96 contacts	Highly removable disk drive interconnection	A / 4
Y10	96 contacts	Media device interconnection	A / 0
Y11	96 contacts	Highly removable disk drive interconnection	A / 5
Y12	160 contacts	System interface board interconnection	
Y13	160 contacts	System interface board interconnection	
Y14	48 contacts	Micro Channel adapter board (base unit) interconnection	
Y15	64 contacts	Power supply interconnection	
Y16	64 contacts	Power supply interconnection	
Y17	96 contacts	Disk drive interconnection	B / 2
Y18	96 contacts	Disk drive interconnection	B / 5
Y19	96 contacts	Disk drive interconnection	B / 3
Y20	96 contacts	Disk drive interconnection	B / 4
Y21	64 contacts	Power supply interconnection	
Y22	64 contacts	Power supply interconnection	
P01	68 contacts	Input to SCSI bus B	
P02	68 contacts	Input to SCSI bus A	
P05	4 contacts	Main fan module	
P06	2 contacts	Main fan module	
P07	4 contacts	Power connector, not used	
P08	4 contacts	Disks fan module	
P09	4 contacts	Micro Channel adapters fan module	
P10	2 contacts	External sensor	
P11	2 contacts	Switch cover interlock	
P12	2 contacts	Not Used	

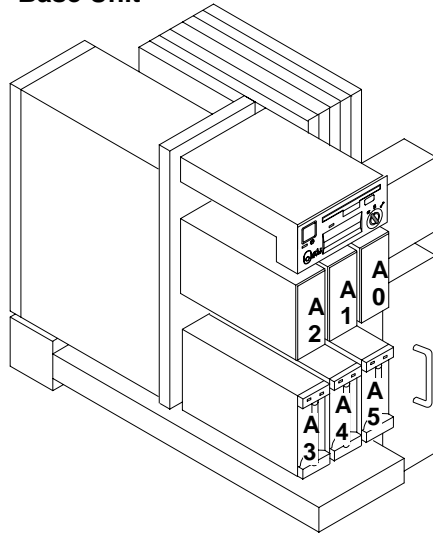
SCSI Device Locations

The following diagram shows the locations of the various SCSI devices that can be installed in the 7013 J Series system.

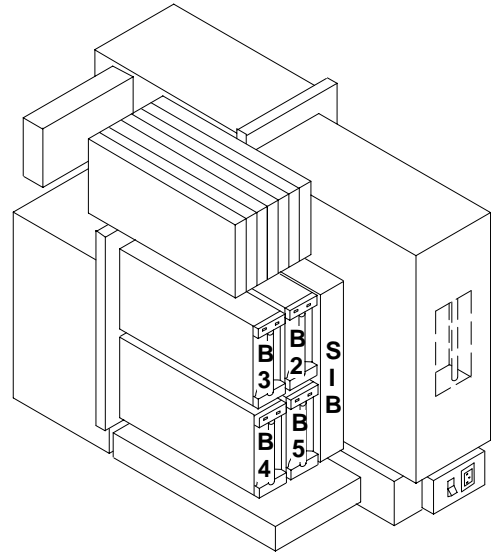
Attention: The 9.1GB Disk Drive can only be installed in positions on the front of the unit. Positions B2 and B3 in model J50 base unit cannot be used for new disk drives. If the system is upgraded to a model J50, drives moved during the model upgrade can be used in these positions.

SCSI Device Locations Physical Representation

Base Unit

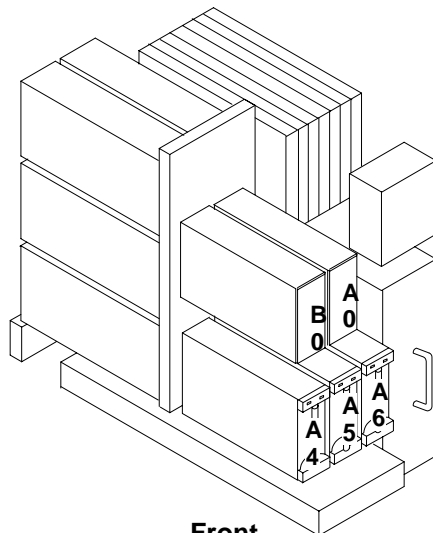


Front



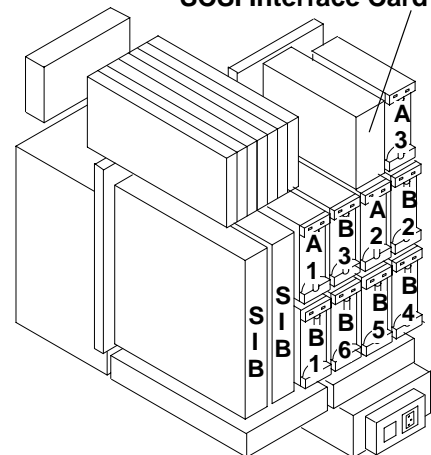
Rear

Expansion Unit



Front

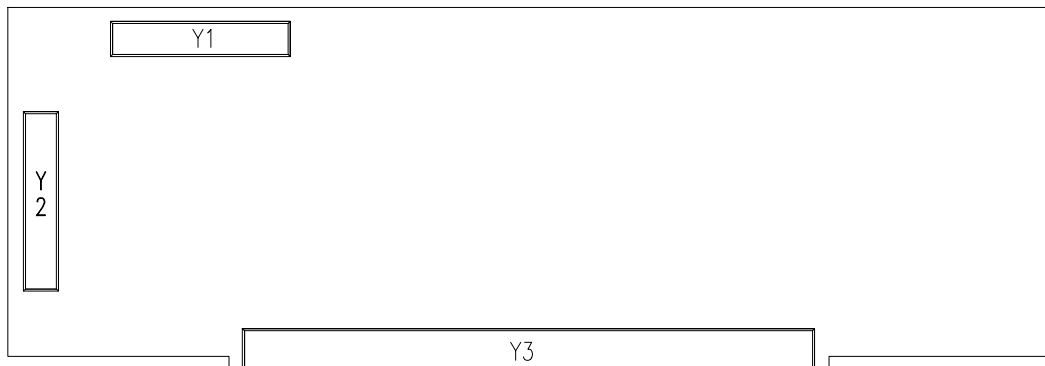
SCSI Interface Card



Rear

I/O Card

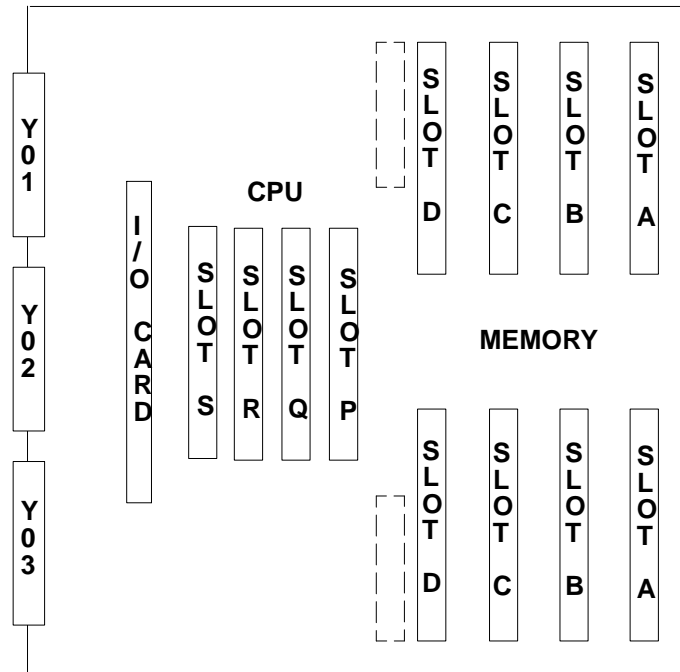
This card is installed on the system planar, in the CPU module.



Reference in the Figure	Type of Connector	Function
Y1	200 contacts,	Link internal cable to base unit MCA planar (to U126)
Y2 (may not be present)	200 contacts,	Link internal cable to optional expansion unit MCA expansion planar (to U126)
Y3	300 contacts	System planar interconnection

System Planar

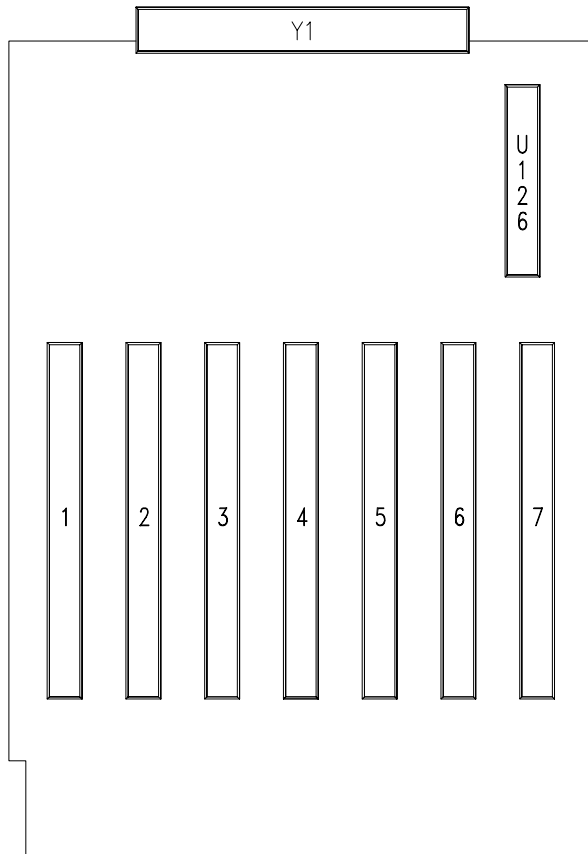
The following illustration shows all connectors present on the system planar. The system planar is installed in the CPU module, and houses one I/O card, up to four CPU cards, and up to four memory cards.



Reference in the Figure	Type of Connector	Function
Y01	48 contacts	Base unit back plane interconnection
Y02	48 contacts	Base unit back plane interconnection
Y03	48 contacts	Base unit back plane interconnection
I/O CARD	300 contacts	I/O card interconnection
CPU SLOT S	220 contacts	CPU card interconnection
CPU SLOT R	220 contacts	CPU card interconnection
CPU SLOT Q	220 contacts	CPU card interconnection
CPU SLOT P	220 contacts	CPU card interconnection
MEMORY SLOT D	Two connectors, 180 contacts each	Main memory interconnection
MEMORY SLOT C	Two connectors, 180 contacts each	Main memory interconnection
MEMORY SLOT B	Two connectors, 180 contacts each	Main memory interconnection
MEMORY SLOT A	Two connectors, 180 contacts each	Main memory interconnection

MCA Planar (Base Unit)

The MCA planar (MP) is installed in the base unit Micro Channel adapter card cage, where it houses up to seven Micro Channel adapters.



Reference in the Figure	Type of Connector	Function
Y1	48 contacts	Base unit back plane interconnection
U126	200 contacts	Flex cable I/O board interconnection (to Y1)
1	2x91 contacts	Micro Channel adapter interconnection
2	2x91 contacts	Micro Channel adapter interconnection
3	2x91 contacts	Micro Channel adapter interconnection
4	2x91 contacts	Micro Channel adapter interconnection
5	2x91 contacts	Micro Channel adapter interconnection
6	2x91 contacts	SCSI controller interconnection; otherwise, Micro Channel adapter interconnection
7	2x91 contacts	SCSI controller interconnection

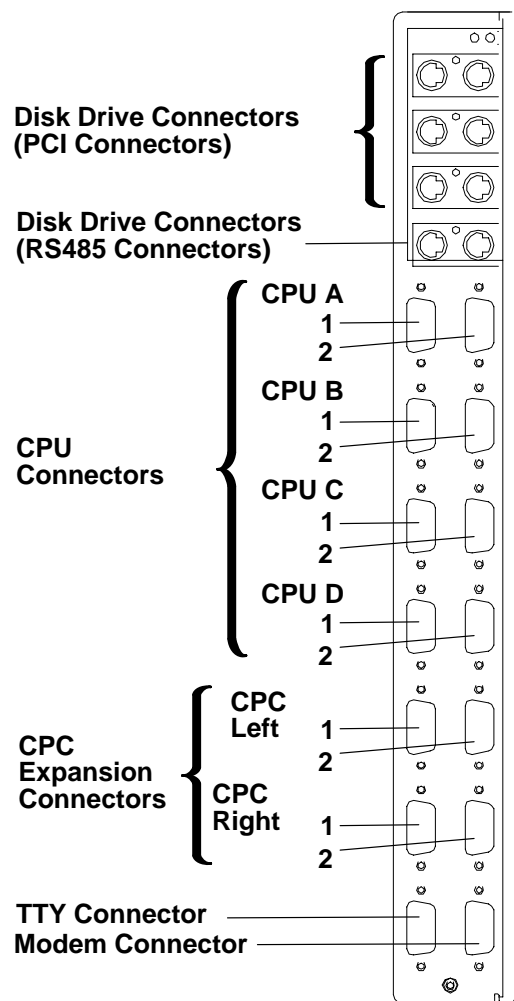
Cluster Power Control

The cluster power controller (CPC) is an external option which provides:

- Connectivity between a remote support facility and multiple CPUs through a modem
- Connectivity from any attached CPU to any disk drive drawer
- Central power-on and power-off through the TTY.

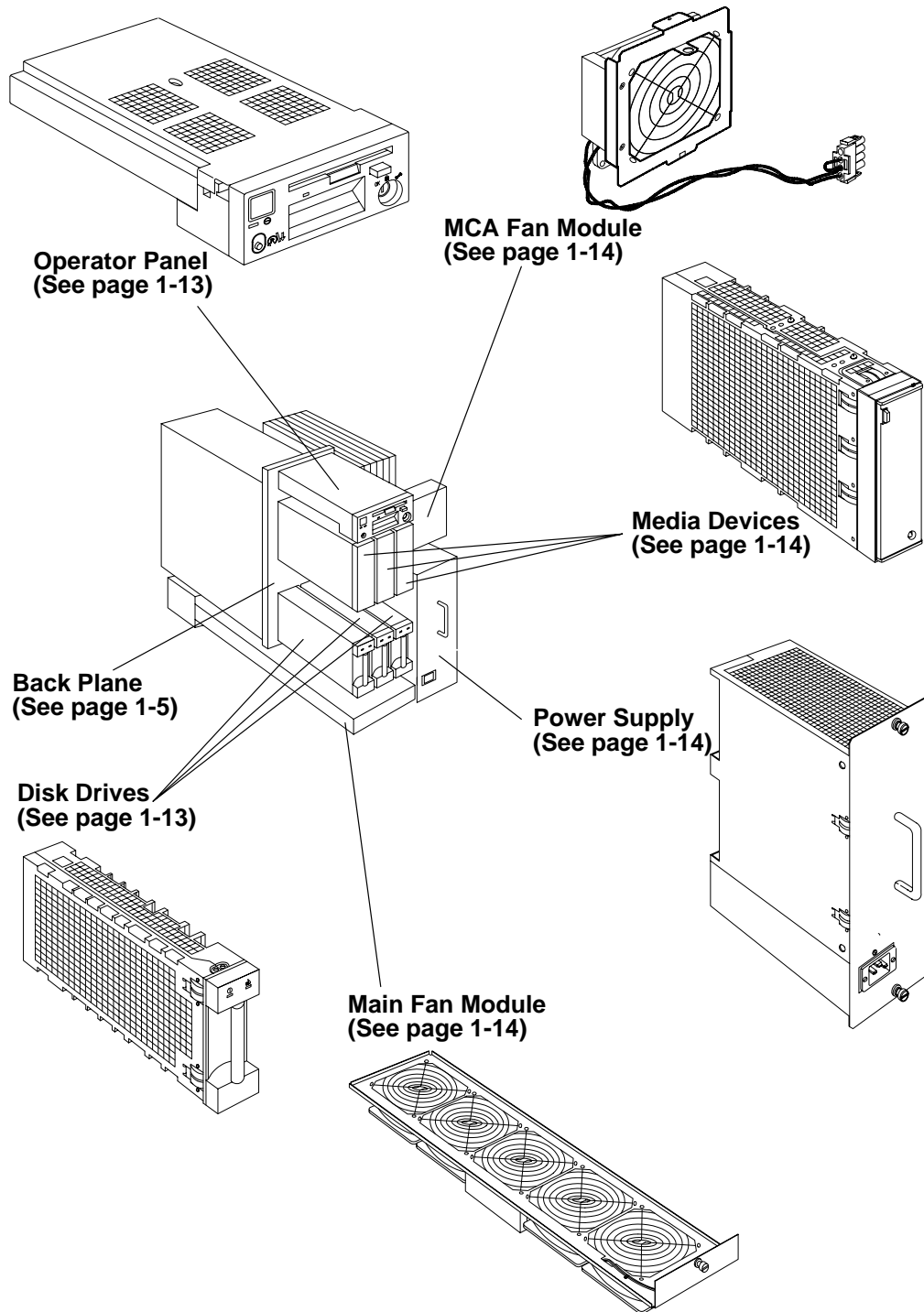
The CPC provides ports for connection of multiple 7012 G Series system units, 7013 J Series system units, and 7015 Model R30, R40, and R50 CPU enclosures for interface connection of CPUs and disk drive drawers. The CPC also contains ports for connection of a modem and TTY.

For more information about the CPC, refer to *Cluster Power Control Operator and Service Guide*, order number SA23-2766.



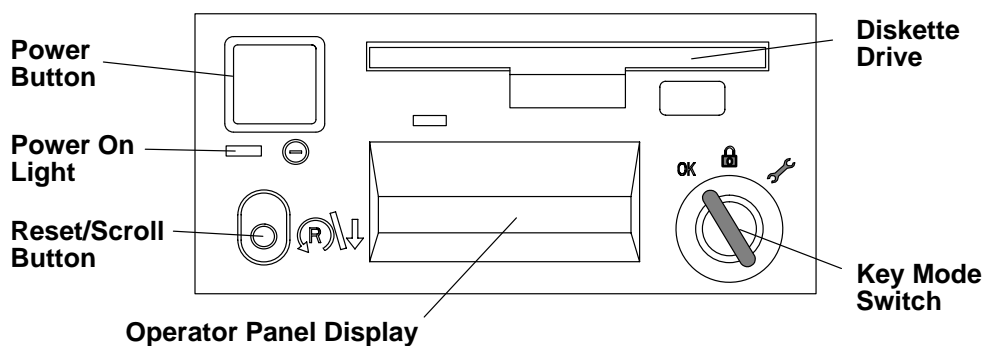
Description of the Base Unit Hardware Components

Base Unit Front



Operator Panel

The operator panel enables you to receive from and pass information to the system. It includes a built-in 3.5-inch 1.44MB diskette drive.



The operator panel consists of the following components:

- The 3.5-inch diskette drive (1.44MB)
 - A Key Mode Switch driven by a key, which can assume three different positions:
 - NORMAL (OK)
 - SERVICE (🔧)
 - SECURE (🔒)
 - The operator panel display (2x16 LCDs), on which system messages are displayed
 - The RESET/SCROLL button, used to restart the machine, or scroll configuration information in “standby” state
 - One POWER ON light, indicating the presence of primary DC power in the machine
- Attention:** Standby power may be on even though the POWER ON light is off.
- The POWER button, used to turn the system unit on and off.

Disk Drives

7013 J Series systems support 3.5-inch, internal disk drives. Each disk drive is installed in a carrier which is designed for ease of removal and installation.

Disk drives can be installed in any empty drive position in the base unit, or the expansion unit. This means that there are no restrictions relative to the drive position in which each disk drive can be installed.

All disk drives can also be removed from or inserted into the appropriate drive position if the system is operating, thanks to a special feature named *hot removability*.

The three lower drive positions on the front side of the base and expansion units are not only designed for hot removability, but are also reserved for the *high removability* feature. A drive position with the high removability feature is equipped with a special connector that makes it possible to remove and to insert a disk drive many times.

A disk drive which has been previously installed in a normal slot can be installed in a slot featuring the high removability, and vice-versa.

You should install the disk drives which need to be removed frequently in these positions, and install disk drives which need to be removed only periodically in any other position.

Media Devices

7013 J Series system supports the following internal devices:

- QIC 1/4-Inch Cartridge Tape Drive
 - Media data transfer of up to 300KB/sec
 - Half high 5.25 inch form factor.
- 8mm Tape Drive
 - Media data transfer of up to 500KB per second
 - Half high 5.25 inch form factor.
- 4mm Tape Drive
 - Primarily used for save/restore operations, archiving, and software and documentation distribution
 - Standard DDS (Digital Data Storage) recording format extended to support data compression (DDS-DC)
 - Media data transfer of up to 732KB per second
 - Half high 5.25 inch form factor.
- CD-ROM Drive
 - Media: Standard CD-ROM disk (type C bezel, drawer loading)
 - Operation: Random Access – Read only
 - Media data transfer of up to 330KB per second
 - Half high 5.25 inch form factor.

Each media device is installed in a carrier which is designed for ease of removal and installation.

The three upper slots in the front side of the base unit and the two upper slots in the front side of the first expansion unit are dedicated to the internal media devices.

The leftmost upper slot located in the front side of the base unit is reserved for the CD-ROM drive.

All the other upper slots can be used for installing 3.5 inch form factor disk drives, but first you must install a metallic wedge in these slots. This wedge is needed to reduce the height of the designated slot, making it able to house 3.5-inch form factor hard disks instead of 5.25-inch form factor media devices.

Power Supply

Each unit must be equipped with one power supply. The power supply provides power and power regulation to the unit. It is able to power the maximum devices or machines in the unit.

Main Fan Module

This fan module is composed of five fans. It is used only in the base unit to provide air flow for the disk drives on the front side and to cool the CPU complex.

Micro Channel Adapters (MCA) Fan Module

This fan module is composed of one fan. The base and the expansion units each require a module to cool the Micro Channel Adapters card cage.

Fan Screens

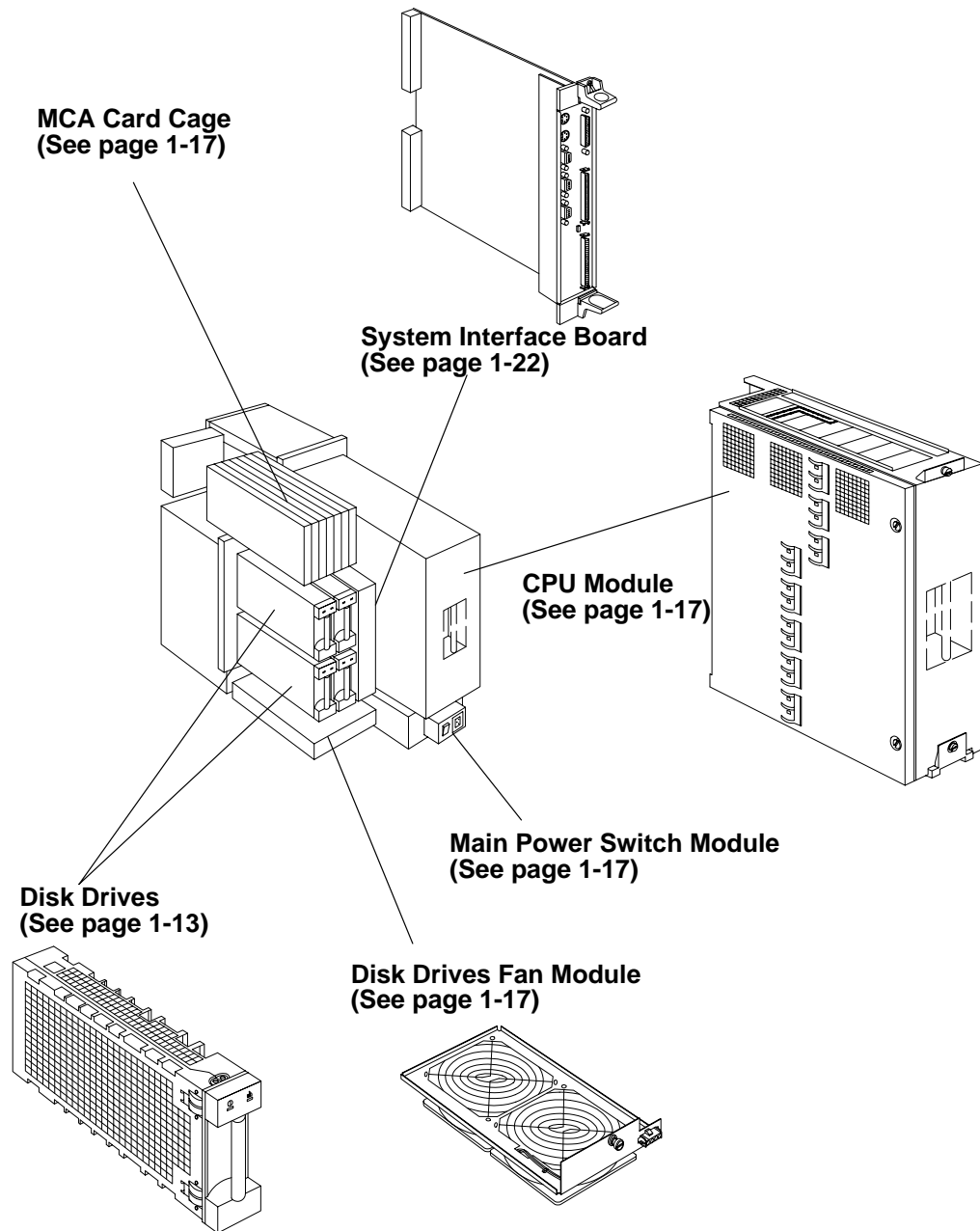
Early J30 system units are equipped with two fan screens.

One screen is installed under the main fan module in the base unit or under the expansion fan module in the expansion unit.

The shorter screen is installed under the disk drives fan module, even if the fan module is not present.

To guarantee that your system functions adequately, when the screens become dirty, the screens should be discarded.

Base Unit Rear



Main Power Switch Module

Contains the switch for general AC power On and Off control, and the AC power cable connector.

Micro Channel Adapters (MCA) Card Cage

- The MCA card cage contains up to 6 adapters (optional) and one SCSI controller (required)

Disk Drives Fan Module

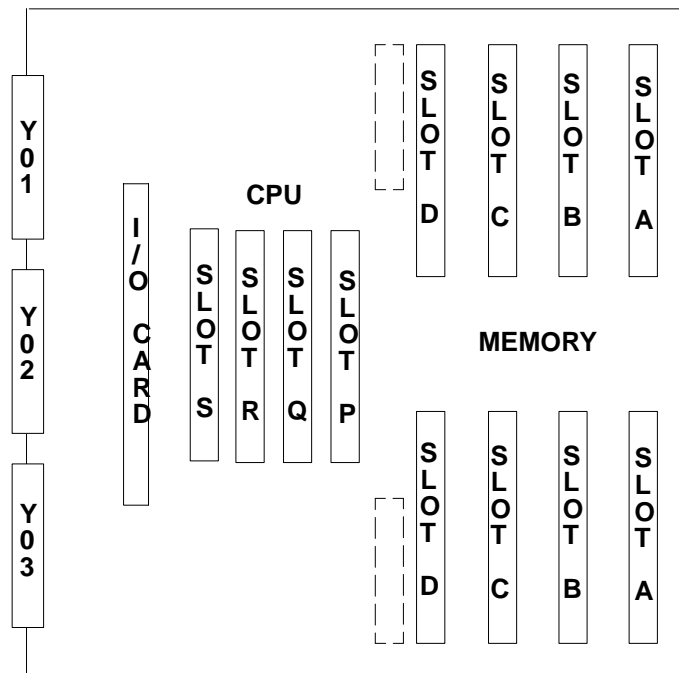
This fan module, composed of two fans is installed only in units with two SCSI buses. It is used in both the base and expansion units to cool the system interface board(s) and the disk drives placed in the left rear side.

CPU Module

The CPU module is the heart of the system. Internally it houses the system planar, which connects to the base unit back plane. The system planar contains the I/O card, up to four CPU cards, and up to four memory cards.

System Planar

Internally, the CPU module contains the system planar, which has a dedicated connector for the I/O card, connectors for up to 4 CPU cards, and connectors for up to 4 memory cards.



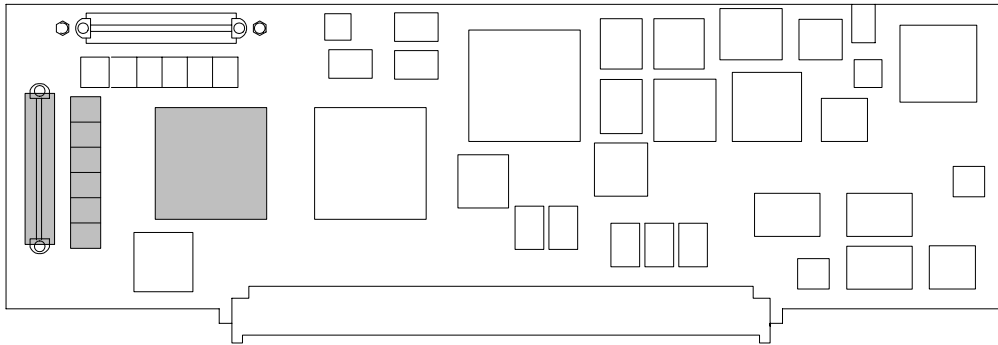
I/O Card

See page 1-17 for the location of the I/O card on the system planar, and page 1-8 for connector definitions.

The I/O card passes information between the system planar and the micro channel adapter board. The I/O card has two MCA interfaces, one for the base unit and one for the expansion unit.

The I/O card manages the 3.5-inch diskette drive on the operator panel, and supports the following ports, which are made available through the system interface board.

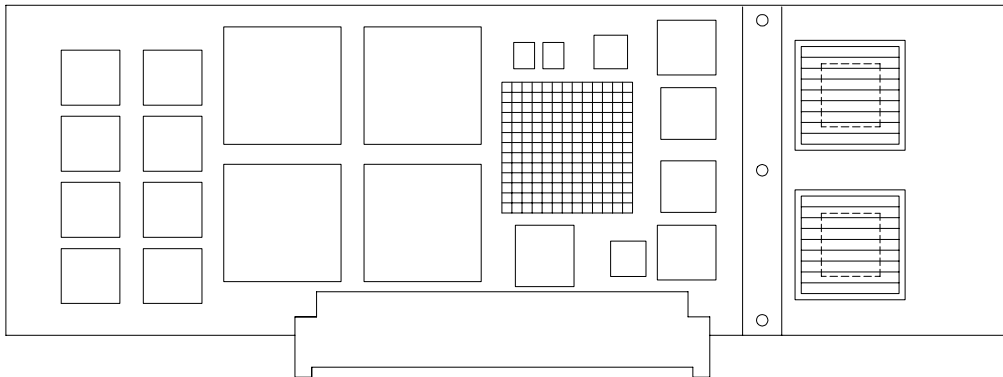
- Three RS-232 ports
- One bi-directional parallel port supporting the Centronics interface.



Note: The items in the shaded areas support MCA planars in the expansion unit.

CPU Card

The CPU card is a CPU module based on the PowerPC microprocessor, and includes two microprocessors.



Each system is equipped with at least one CPU card and it can be upgraded by installing up to three additional CPU cards.

The CPU cards must be installed starting from the CPU slot P. Additional CPU cards must be installed using the next higher available consecutive slot.

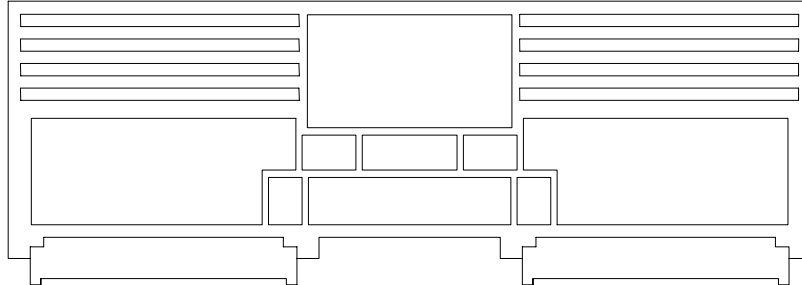
Note: All CPU cards installed in one system unit must be of the same type.

See page 1-17 for the location of the CPU cards on the system planar.

Memory Cards

There are four types of memory card available for use with the 7013 J Series 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.



See page 1-17 for the location of the memory cards on the system planar.

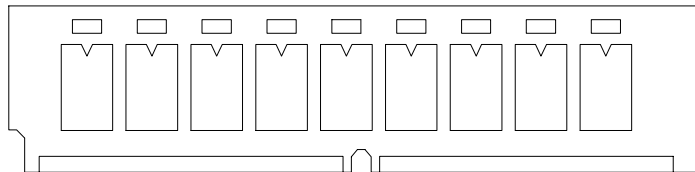
Memory cards must be installed starting from memory slot A. Additional memory cards must be installed using memory slot B first, then C then D.

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.

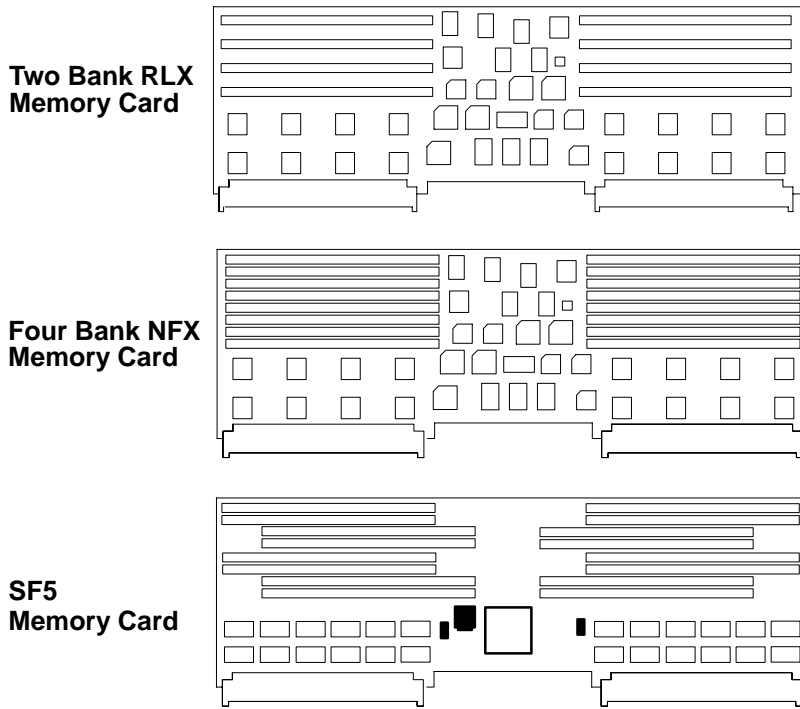
Each memory memory module looks like the following figure.



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 7013 J Series 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 (can only be installed on an SF5 memory card)	256MB memory

The maximum memory reachable 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:

- 2048MB for J30 and J40
- 4096MB for J50.

System Interface Board

One system interface board is required on both the base and expansion units. In addition, a second system interface board is required on the expansion unit if any device is placed on the B bus of the expansion unit. This is the only reason for the second system interface board on the expansion unit, it is not involved in the power supply management.

The system interface board provides four functions:

Power Microcontroller

The power microcontroller helps the Bringup Microprocessor (BUMP) to monitor each unit and its power supply, and to guarantee the units communication.

Removable disks switch

This function enables you to remove one or more SCSI devices (disk drives and media devices) while the machine is still powered on and operational.

The system interface board controls the power domains for all of the internal SCSI devices. The removable disks switch (RDS) removes both the +5 and the +12 volts from the SCSI devices selected by the RDS function in SMIT.

System basic lines physical interface

It checks the asynchronous lines drivers and receivers (S1, S2, S3) and is the asynchronous lines bulkhead.

The system interface board also is the bulkhead for the parallel port. The signals come from the I/O card through the unit back plane, and reach the dedicated connector on the system interface board.

SCSI bulkhead

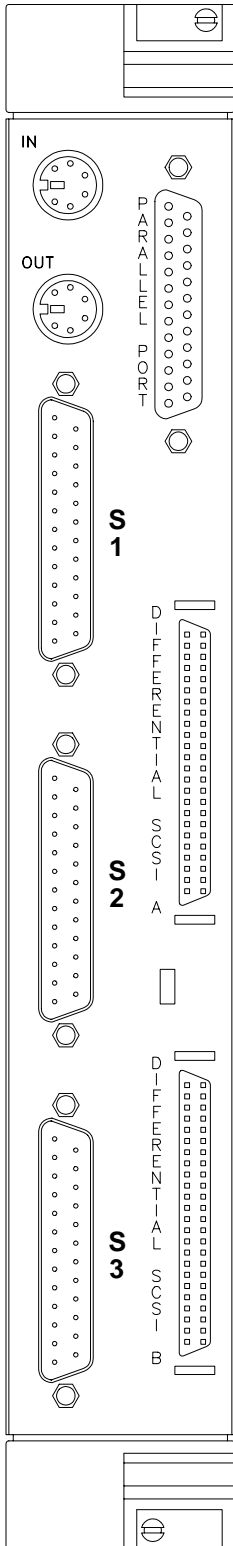
The system interface board is a bulkhead for the first (A) and second (B) SCSI buses, for terminator or the second external SCSI controller connection (dual initiator). The signals come from the SCSI controller through the unit back plane, and reach the dedicated connector on the system interface board.

Attention: The back plane and system interface board EEPROMs contain the SYSID of the system. When one of the two components is to be replaced (for example the back plane), the SYSID information will be copied from the system interface board EEPROM into the back plane 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 system interface board and start up the system: the SYSID information will be copied from back plane EEPROM to the system interface board EEPROM.
2. Substitute the back plane and start up the system: the SYSID information will be copied from the system interface board EEPROM to the back plane EEPROM.



The system interface board provides the following connectors:

- Two 68-pin SCSI-2 Differential Fast/Wide Adapter/A connectors. The upper connector, marked "DIFFERENTIAL SCSI A", is used to terminate the first SCSI bus in the unit. The lower connector, marked "DIFFERENTIAL SCSI B", is used to terminate the second SCSI bus.
- Two 6-pin mini connectors provide a communication link among the system units. The upper mini connector, marked "IN", is an input connector. The lower, marked "OUT", is an output connector. Two cables located on the system interface board are connected, from unit to unit, in a daisy chain fashion. An RS-485 interface, with an asynchronous protocol, is used on this link. The RS-485 signals on the two connectors are pin for pin connected inside the system interface board, so that the link looks like a multipoint network. The link also supports the CONF signal used for the unit number assignment.

- One 25-pin connector, which is a parallel port.

Note: This connector is active only on the system interface board installed in the base unit.

- Three 25-pin connectors (ports for RS-232 asynchronous lines).

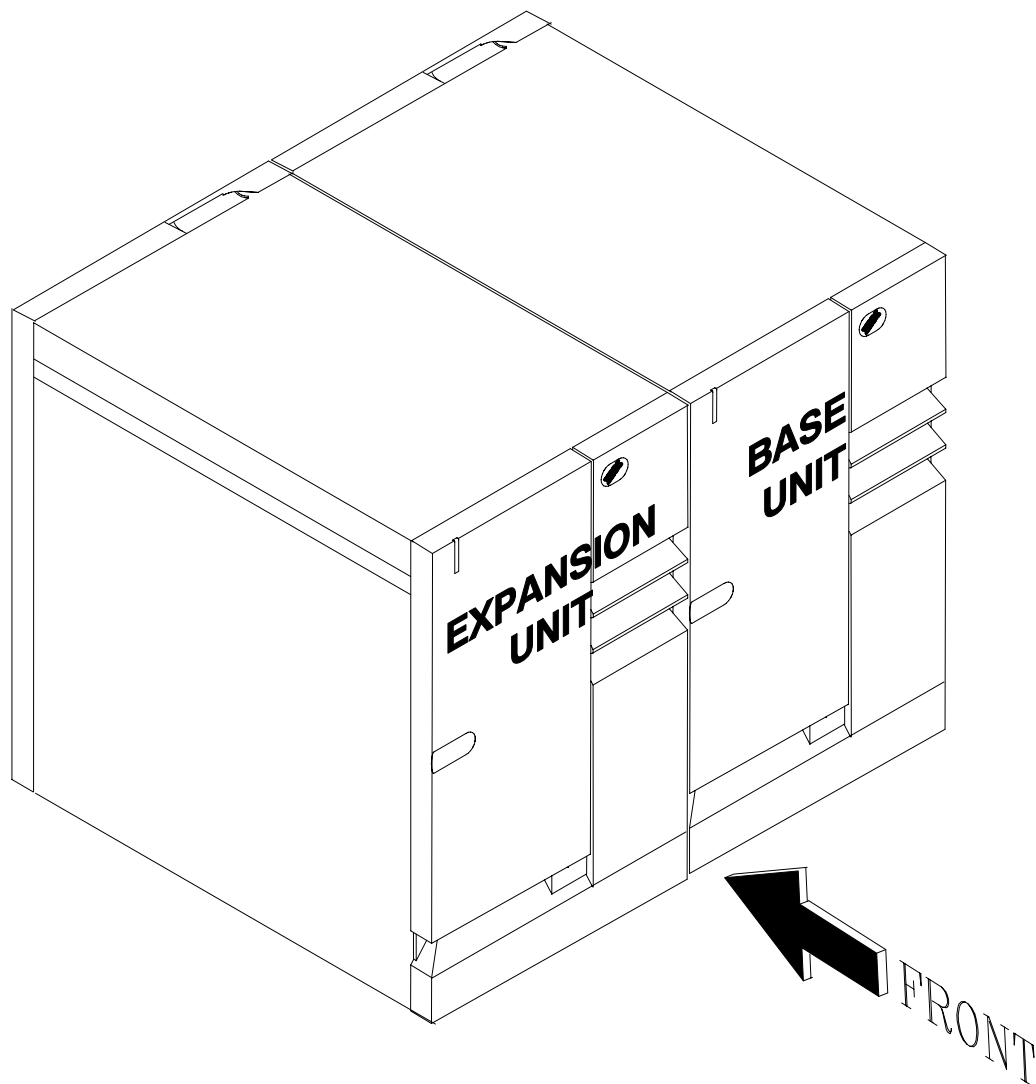
Two of these lines (S1 and S2) are reserved for maintenance purposes. The other line (S3) is used to manage an optional external uninterruptible power supply (UPS). If not used for these purposes, the three RS-232 lines can be used as normal async terminal lines.

Note: These connectors are active only on the system interface board installed in the base unit.

Description of the 7013 J Series Expansion Unit

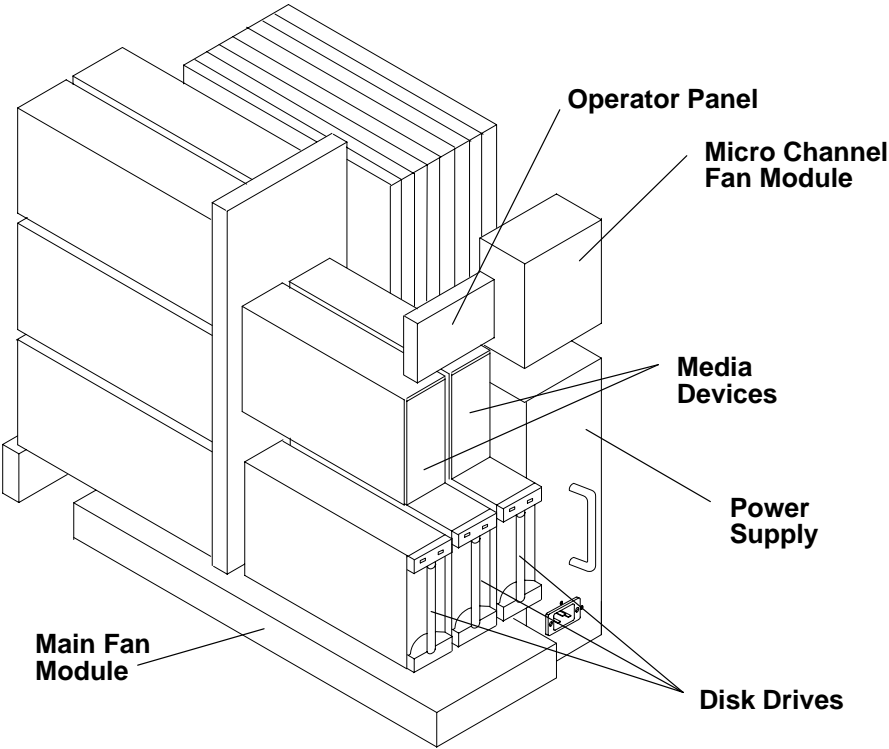
The Model J01 Expansion Unit is used to increase the number of disk drives and Micro Channel adapters.

Looking at the units from the front, the expansion unit must be installed to the left of the base unit.

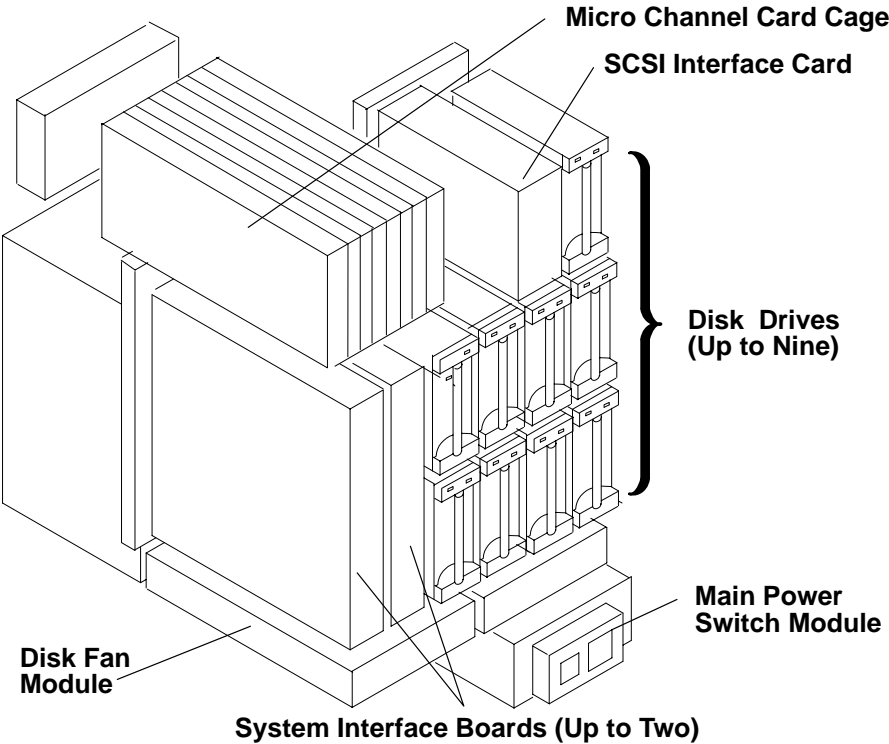


The operator panel on the expansion unit houses only a green LED which is lit when DC power is present in the unit.

Front View Without Covers



Rear View Without Covers



Expansion Unit SCSI Buses

The expansion unit is equipped with one or two active SCSI buses.

Each SCSI bus in the expansion unit is driven by a SCSI-2 Differential Fast/Wide Adapter/A controller connected to the SCSI interface card.

Each SCSI bus is terminated with SCSI terminators installed in the designated connector on the required system interface board.

A dedicated SCSI interface board supports the SCSI input from the controller to the back plane.

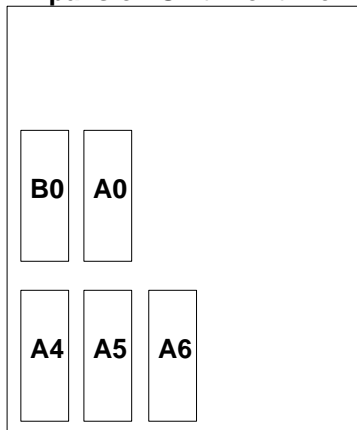
The two SCSI buses of the expansion unit are two different entities which cannot be connected in series in the unit.

If the expansion unit has more than seven SCSI devices, it needs a second system interface board to support the additional devices.

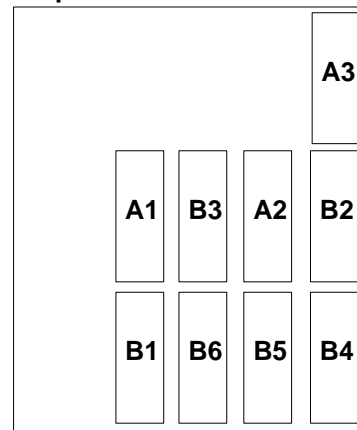
Location of disk drives in the Expansion Unit

The letter of each drive indicates which SCSI bus controls the drive. The number is the SCSI address of the drive.

Expansion Unit Front View



Expansion Unit Rear View



SCSI Terminators

Each internal SCSI bus *used* in the expansion unit (that means a SCSI bus to which at least one SCSI disk drive or media device is connected), must be terminated with a SCSI terminator. This terminator must be installed on the required system interface board, observing the following guidelines:

- The first SCSI bus (A) must be terminated with a SCSI terminator installed on the "DIFFERENTIAL SCSI A" connector of the required system interface board.
- The second SCSI bus (B) must be terminated with a SCSI terminator installed on the "DIFFERENTIAL SCSI B" connector of the required system interface board.
- The connectors on the system interface board are for terminators only. No external devices can be attached to these connectors.

Micro Channel Adapter (MCA) Card Cage

The MCA card cage is in the rear of the expansion unit. It can house up to eight adapter cards.

An MCA planar is located at the bottom of the MCA card cage. This planar is called the MCA Expansion Planar (MPE) on the expansion unit.

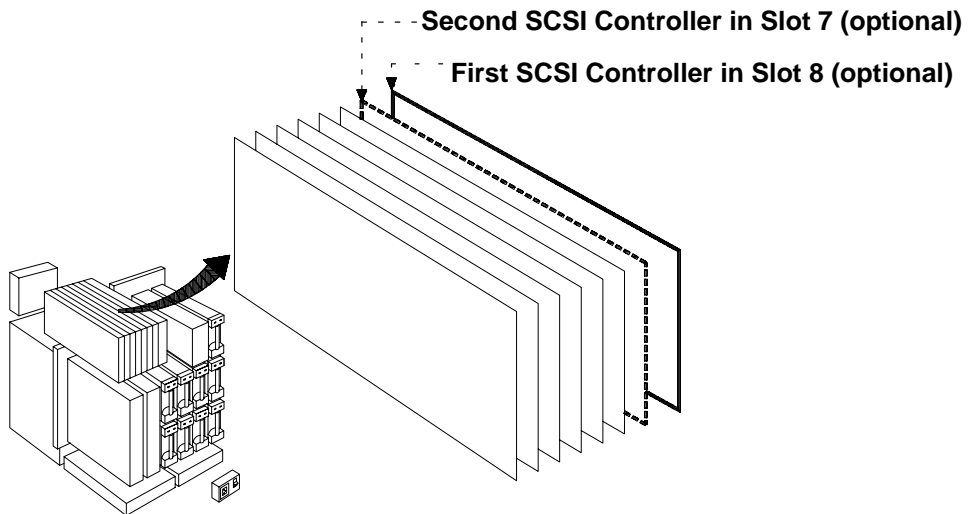
When an MCA slot is not occupied, a dummy plate must be installed for EMC shielding and to protect it from dust or debris. When an adapter is to be installed, the dummy plate must be removed.

On the expansion unit, the eight connectors can be used to install:

- One optional SCSI-2 Differential Fast/Wide Adapter/A controller in slot 8
- Up to seven supported MCA adapters, which can be installed in any of the remaining slots.

SCSI Controllers

The slots dedicated to the SCSI controllers in the expansion unit are shown in the following figure.

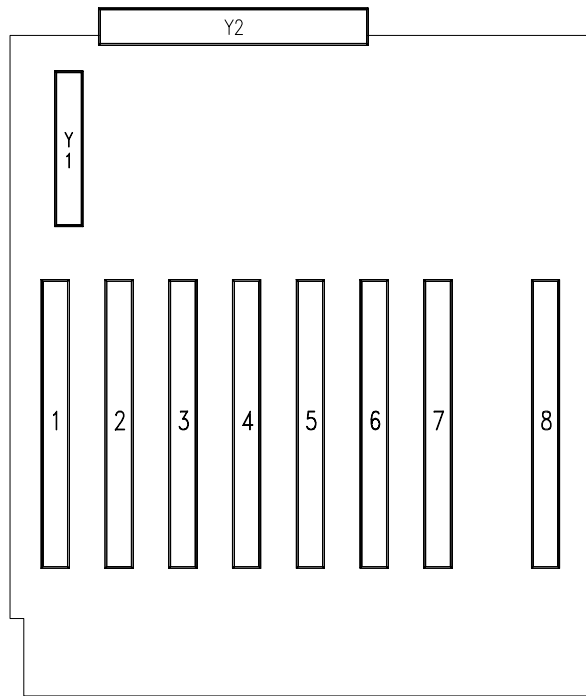


If more than two SCSI controllers are needed in the expansion unit, these can be installed in any free slot.

If no SCSI controllers are installed in the expansion unit MCA card cage, the dedicated slots can be used to install any other MCA adapters.

MCA Expansion Planar (MPe)

The following figure illustrates the MCA planar for the expansion unit.

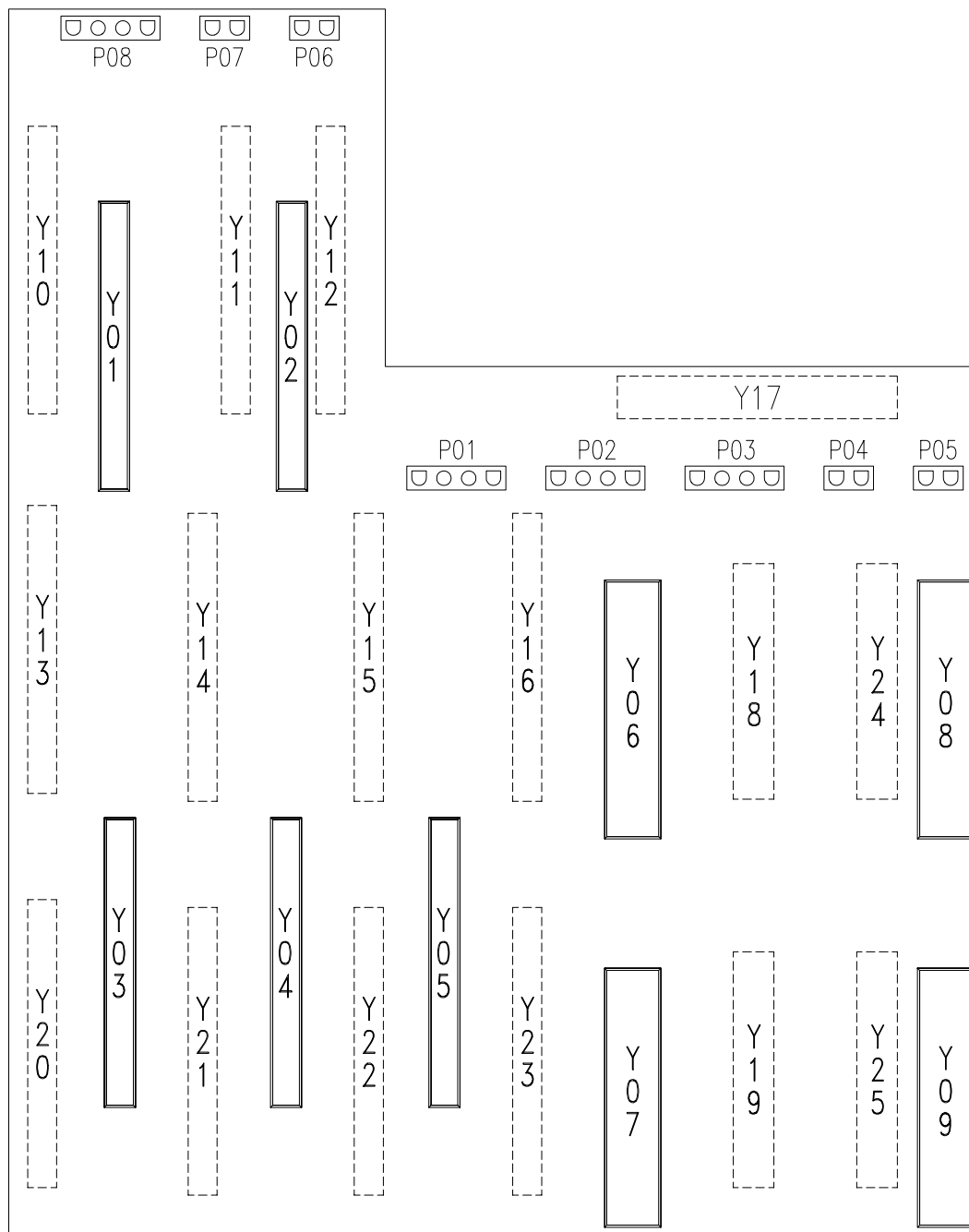


The following table details each connector shown in the previous figure, giving information about the type of connector, and about which function(s) it performs into the system.

Reference in the Figure	Type of Connector	Function
Y2	48 contacts	Expansion unit back plane interconnection
Y1	200 contacts	Flex cable I/O card interconnection
1	2x91 contacts	Micro Channel adapter interconnection
2	2x91 contacts	Micro Channel adapter interconnection
3	2x91 contacts	Micro Channel adapter interconnection
4	2x91 contacts	Micro Channel adapter interconnection
5	2x91 contacts	Micro Channel adapter interconnection
6	2x91 contacts	Micro Channel adapter interconnection
7	2x91 contacts	Optional second SCSI controller, otherwise MCA adapter interconnection
8	2x91 contacts	Optional first SCSI controller, otherwise MCA adapter interconnection

Expansion Unit Back Plane

The following figure shows all connectors present on the back plane. The dashed lines represent connectors that are located in the unit rear side, while the solid lines represent connectors located in the unit front side.

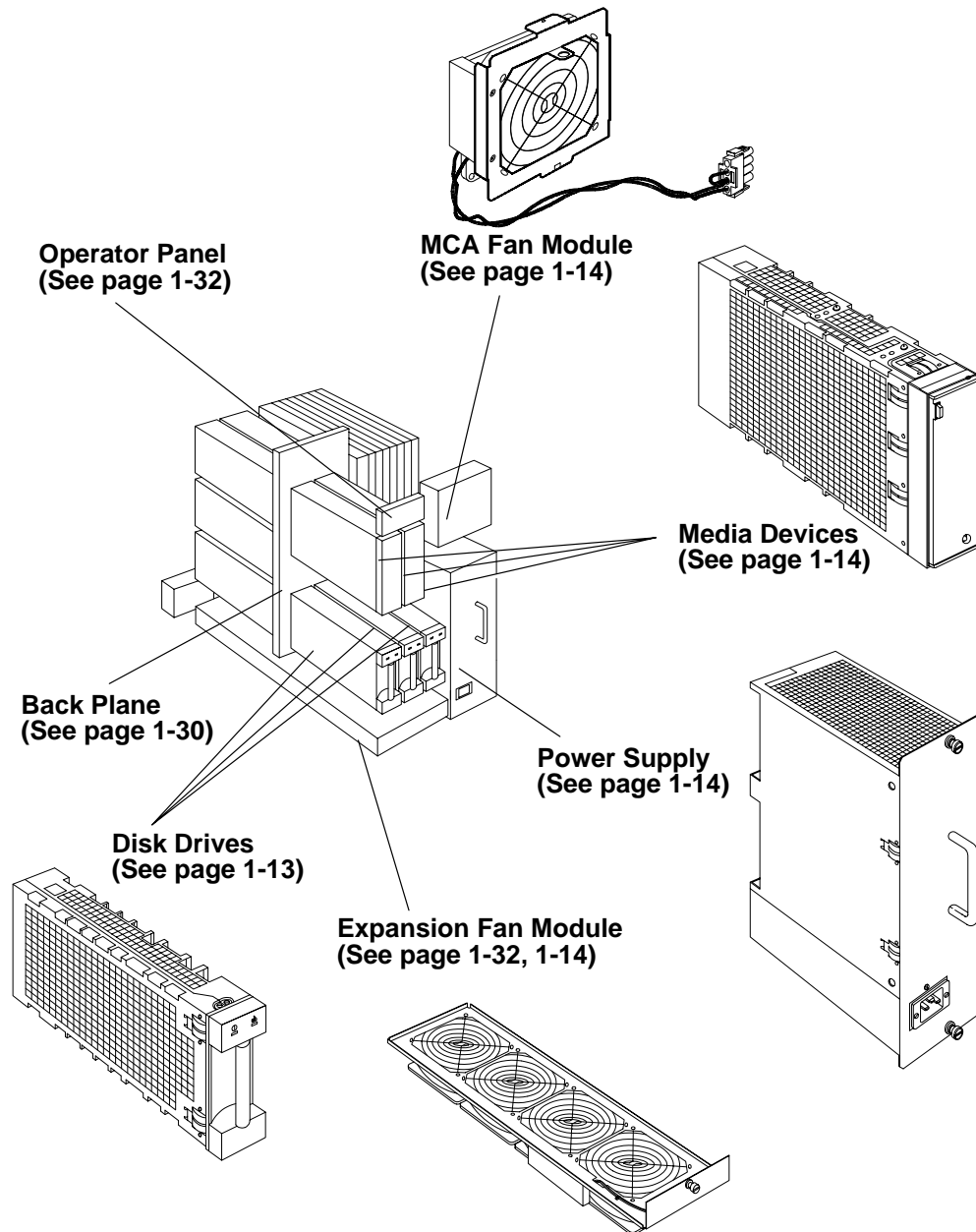


The following table details each connector shown in the above figure, giving information about the type of connector and about which functions it performs into the system. It also indicates the bus on which each connector resides. Bus **A** means the first bus inside the unit, bus **B** means the second one.

Reference in the Figure	Type of Connector	Function	SCSI Bus / ID
Y01	96 contacts	Media device interconnection	B / 0
Y02	96 contacts	Media device interconnection	A / 0
Y03	96 contacts	Highly removable disk drive interconnection	A / 4
Y04	96 contacts	Highly removable disk drive interconnection	A / 5
Y05	96 contacts	Highly removable disk drive interconnection	A / 6
Y06	64 contacts	Power supply interconnection	
Y07	64 contacts	Power supply interconnection	
Y08	64 contacts	Power supply interconnection	
Y09	64 contacts	Power supply interconnection	
Y10	96 contacts	Disk drive interconnection	A / 3
Y11	96 contacts	SCSI interface card interconnection (SCSI Bus A)	
Y12	96 contacts	SCSI interface card interconnection (SCSI Bus B)	
Y13	96 contacts	Disk drive interconnection	B / 2
Y14	96 contacts	Disk drive interconnection	A / 2
Y15	96 contacts	Disk drive interconnection	B / 3
Y16	96 contacts	Disk drive interconnection	A / 1
Y17	48 contacts	Micro Channel adapter board interconnection	
Y18	160 contacts	System interface board interconnection (required)	
Y19	160 contacts	System interface board interconnection (required)	
Y20	96 contacts	Disk drive interconnection	B / 4
Y21	96 contacts	Disk drive interconnection	B / 5
Y22	96 contacts	Disk drive interconnection	B / 6
Y23	96 contacts	Disk drive interconnection	B / 1
Y24	160 contacts	System interface board interconnection (optional)	
Y25	160 contacts	System interface board interconnection (optional)	
P01	4 contacts	Micro Channel adapters fan module	
P02	4 contacts	Disks fan module	
P03	4 contacts	Main fan module	
P04	2 contacts	Main fan module	
P05	2 contacts	Not used	
P06	2 contacts	Switch cover interlock	
P07	2 contacts	Spare connector, dedicated to power on LED	
P08	4 contacts	Not used	

Description of the Expansion Unit Hardware Components

Expansion Unit Front



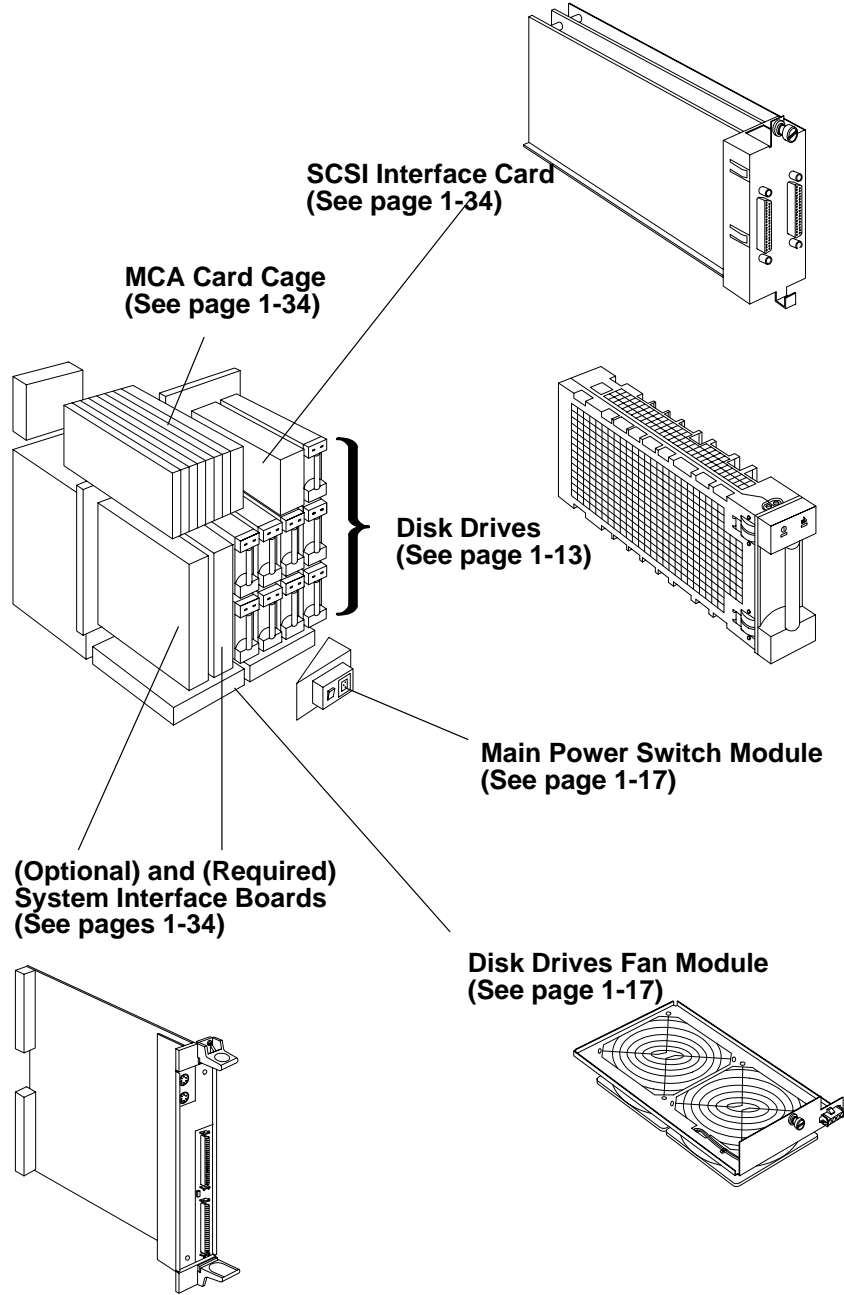
Expansion Unit Main Fan Module

This fan module is composed of four fans. It is used only in the expansion unit to provide air flow for the disk drives on the front side and to cool the disk drives on the right rear side.

Operator Panel

Contains only a power-on light, which indicates that all voltages in the power supply are present and within limits and that the fans are running. The power-on light is used to help analyze power and cooling problems.

Expansion Unit Rear

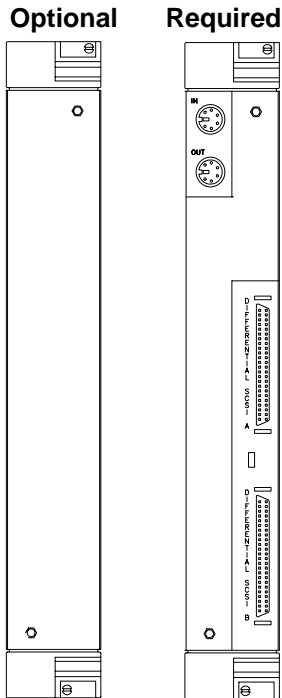


Micro Channel Adapters (MCA) Card Cage

- The MCA card cage contains up to 8 adapters.

System Interface Board (SIB)

One system interface board is required on expansion unit. In addition, a second system interface board is required on the expansion unit if any device is placed on the B bus of the expansion unit. This is the only reason for the second system interface board on the expansion unit, it is not involved in the power supply management. The required system interface board is located toward the center of the unit and provides the following:

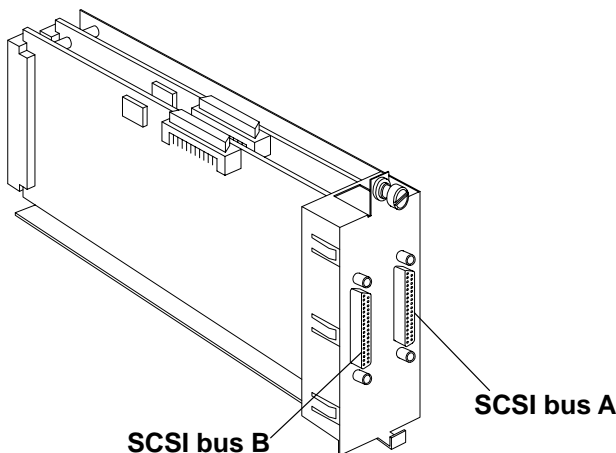


- Two 6-pin mini connectors provide a communication link among the system units. The upper mini connector, marked “IN”, is an input connector. The lower, marked “OUT”, is an output connector. Two cables located on the system interface board are connected, from unit to unit, in a daisy chain fashion. An RS-485 interface, with an asynchronous protocol, is used on this link. The RS-485 signals on the two connectors are pin for pin connected inside the system interface board, so that the link looks like a multipoint network. The link also supports the CONF signal used for the unit number assignment.
- Two 68-pin SCSI-2 Differential Fast/Wide Adapter/A connectors. The upper connector, marked “DIFFERENTIAL SCSI A”, is used to terminate the first SCSI bus in the unit. The lower connector, marked “DIFFERENTIAL SCSI B”, is used to terminate the second SCSI bus.

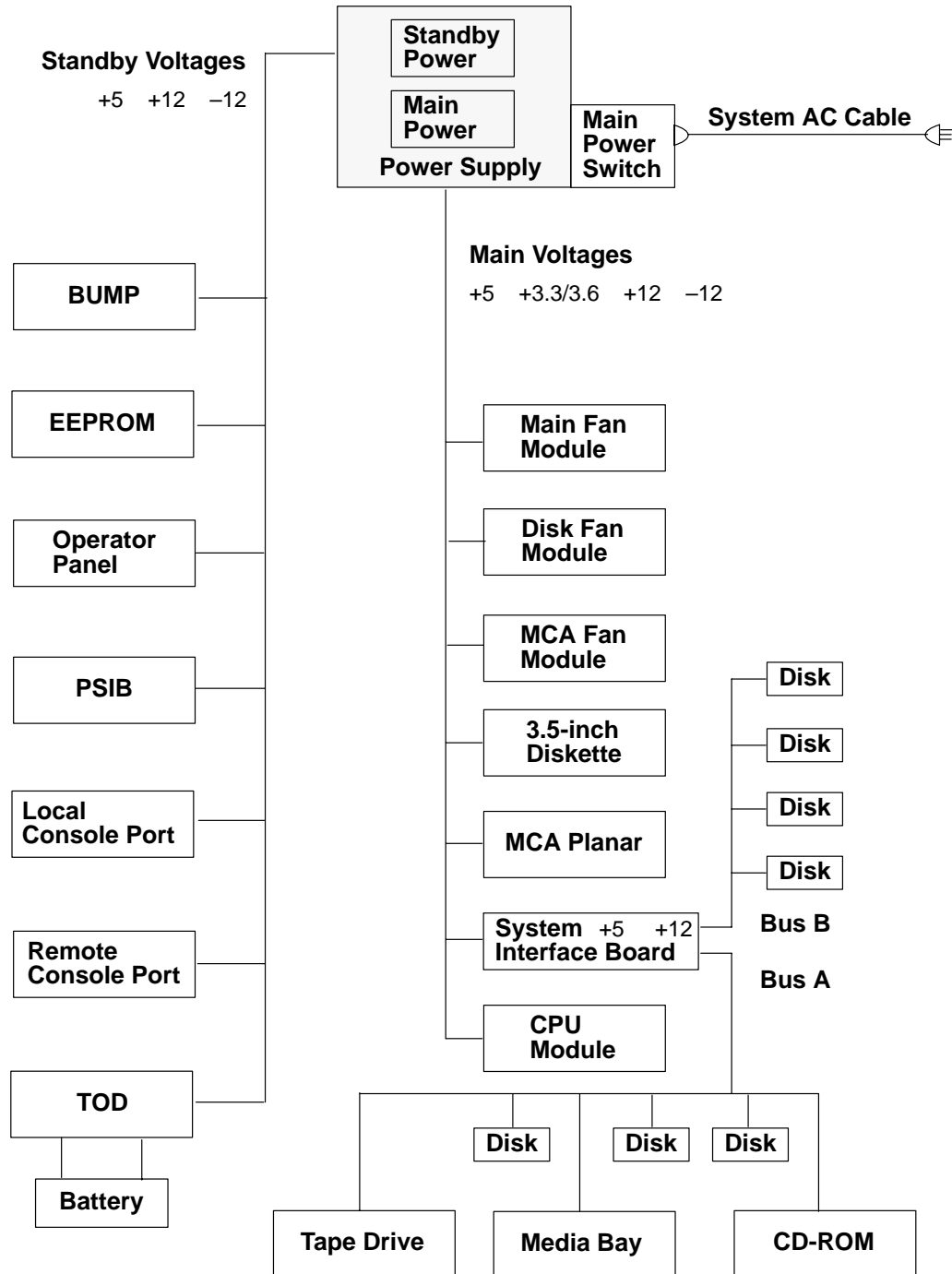
SCSI Interface Card

The SCSI interface card is installed only on the expansion unit, and provides the input to the SCSI buses in the expansion unit.

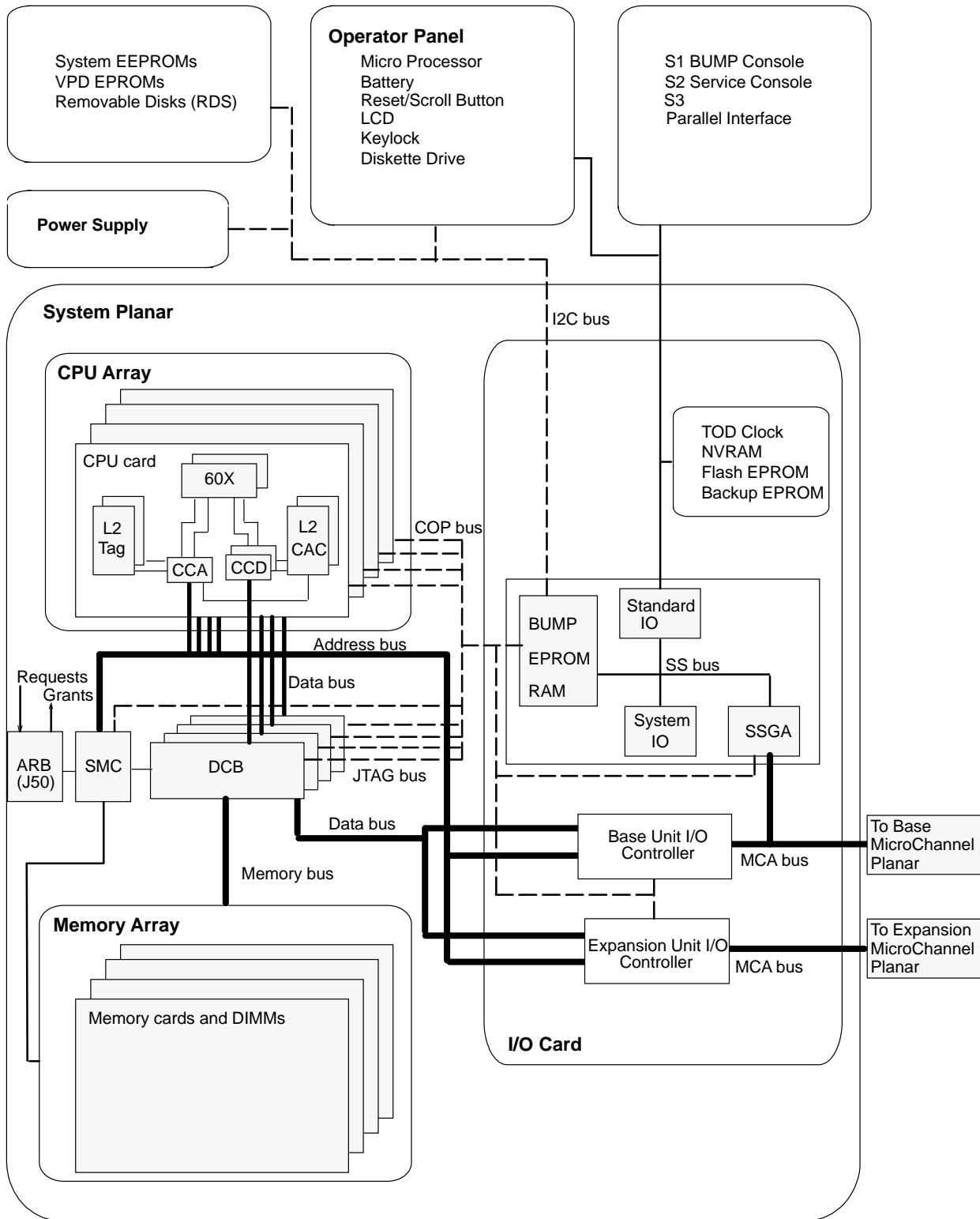
Two connectors are present on the SCSI interface card, connected to the first SCSI bus (A) and to the second SCSI bus (B).

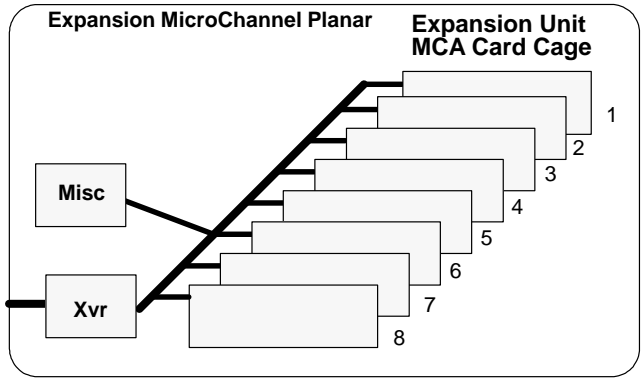
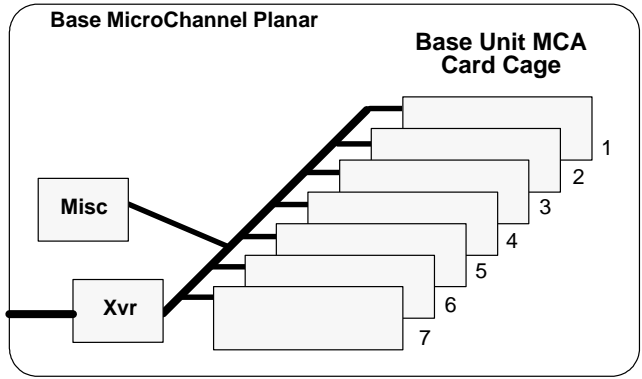


7013 J Series Power Flow



7013 J Series Data Flow





Specifications

Dimensions

Height	610 mm (24.02 inches)
Depth	750 mm (29.53 inches)
Width	360 mm (14.17 inches)

Weight

Base Unit

Minimum	67 Kg
Maximum	84 Kg

Expansion Unit

Minimum	67 Kg
Maximum	92 Kg

Relative Humidity

Operating limits

Relative humidity: 20 to 80 percent, non-condensing (magnetic tapes may not work below 20 percent)

Gradient: 10 percent/h

Max wet bulb temperature: +24 C degrees

Moisture content: 0.019 Kg water/Kg dry air

Non-operating limits

Relative humidity: 5 to 95 percent, non-condensing

Gradient: 30 percent/h

Max wet bulb temperature: +28 C degrees

Moisture content: 0.024 Kg water/Kg dry air

Environment Temperature

Operating limits

Dry bulb temperature: +10 to +32 C degrees

Gradient: 10 C degrees/h

Non-operating limits

Dry bulb temperature: +5 to +50 C degrees

Gradient: 25 C degrees/h

Input Power

International standard: IEC 555-2

The following values have been calculated considering the maximum power load.

Base Unit	1.2 kVA – 1.2KW
Expansion Unit	0.7 kVA – 0.7KW

Power Supply Output Power

780 W

Power Supply Output Load

Base Unit 780 W

Expansion Unit 455 W

Operating Voltage (Auto ranging)

Voltage 100 V to 127 V Nominal

200 V to 240 V Nominal

Frequency range 49 Hz to 51 Hz

58.8 Hz to 61.2 Hz

Heat Output

Base Unit 1032 Kcal per hour

Expansion Unit 604 Kcal per hour

Acoustic Noise

References: ISO 7779

ISO 9596

Acoustic power

Base Unit

Idle mode L_{WAu} : 5.5 Bels.

Operating mode L_{WAu} : 5.8 Bels.

Expansion Unit

Idle mode L_{WAu} : 5.5 Bels.

Operating mode L_{WAu} : 5.8 Bels.

Safety Standards

International standards

IEC 950

EN 60950

National standards

UL 1950

CSA C22.2 N 950-M89

ECM/EMI Standards

International standards

CISPR 22 Class A

EN 55022 Class A

National standards

VDE 871-2 Class A

FCC CFR47 Class A

CSA C108.8 Class A

VCCI Class 1

Power Cables

To avoid electrical shock, a power cable with a grounded attachment plug is provided. Use only properly grounded outlets.

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

- Electrical cables, Type SVT or SJT.
- Attachment plugs complying with National Electrical Manufacturers Association (NEMA) 5-15P. That is:

“For 115 V operation, use a UL-listed cable set consisting of a minimum 16 AWG, Type SVT or SJT three-conductor cord a maximum of 15 feet in length and a parallel blade, grounding type attachment plug rated at 15 A, 125 V.”

“For 230 V operation in the U.S.A. use a UL-listed cable set consisting of a minimum 16 AWG, Type SVT or SJT three-conductor cable a maximum of 15 feet in length, and a tandem blade, grounding type attachment plug rated at 15 A, 250 V.”

- Appliance couplers complying with International Electrotechnical Commission (IEC) Standard 320, Sheet C13.

Power cables used in other countries consist of the following:

- Electrical cables, type HD21.
- Attachment plugs approved by the appropriate testing organization for the specific countries where they are used.

“For units set at 230 V (outside U.S.A.): use a cable set consisting of a minimum 16 AWG cable and grounding type attachment plug rated 15 A, 250 V. The cable set should have the appropriate safety approvals for the country in which the equipment will be installed and should be marked 'HAR'.”

Refer to the Parts Information section of this publication to find the power cables that are available.

Checking Customer Outlets

Note: For a translation of the following notices, see *System Unit Safety Information*, Order Number SA23-2652.

CAUTION:

Do not touch the receptacle or the receptacle faceplate with anything other than your test probes before you have met the requirement in step 8.

1. Have the customer locate and turn off the branch circuit CB (circuit breaker). (Attach tag S229-0237, which reads "Do Not Operate.")

Note: All measurements are made with the receptacle faceplate in its normal installed position.

2. Some receptacles are enclosed in metal housings. On receptacles of this type, perform the following steps:
 - a. Check for less than 1 volt from the receptacle case to any grounded metal structure in the building, such as a raised floor metal structure, water pipe, building steel, or similar structure.
 - b. Check for less than 1 volt from receptacle ground pin to a grounded point in the building.

Note: If the receptacle case or faceplate is painted, be sure the probe tip penetrates the paint and makes good electrical contact with the metal.

- c. Check the resistance from ground pin of the receptacle to the receptacle case. Check resistance from ground pin to building ground. The reading should be less than 1.0 ohm, which indicates the presence of a continuous grounding conductor.
3. If any of the three checks made in step 2 are not correct, ask the customer to remove the power from the branch circuit and make the wiring corrections; then check the receptacle again.

Note: Do not use the digital multimeter to measure grounding resistance.

4. Check for infinite resistance between the ground pin of the receptacle and each of the phase pins. This is a check for a wiring short to ground or a wiring reversal.
5. Check for infinite resistance between phase pins. This is a check for a wiring short.

CAUTION:

If the reading is other than infinity, do not proceed. Have the customer make necessary wiring corrections before continuing. Do not turn on the branch circuit CB until all the above steps are satisfactorily completed.

6. Have the customer turn on the branch circuit CB. Measure for appropriate voltages between phases. If no voltage is present on the receptacle case or grounded pin, the receptacle is safe to touch.
7. With an appropriate meter, verify that the voltage at the outlet is correct.
8. Verify that the grounding impedance is correct by using the ECOS 1020, 1023, B7106, C7106, or an appropriately approved ground impedance tester.

Note: Do not use the 120-volt convenience outlets inside a machine to power the tester.

Service Inspection Guide

Perform a service inspection on the system when:

- The system is inspected for a maintenance agreement.
- Service is requested and service has not recently been performed.
- An alterations and attachments review is performed.
- Changes have been made to the equipment that may affect the safe operation of the equipment.
- External devices that have their own power cable are attached.

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.

Perform 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. Gently rock the system unit from side to side to determine if it is steady.
4. Set the power switch of the system unit to Off.
5. Remove the covers.
6. Check for alterations or attachments. If there are any, check for obvious safety hazards such as broken wires, sharp edges, or broken insulation.
7. Check the internal cables for damage.
8. Check for dirt, water, and any other contamination within the system unit.
9. Check for dirt in fans.
10. Check the voltage label on the back of the system unit to ensure that it matches the voltage at the outlet.
11. Check the external power cable for damage.
12. 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.
13. Install the covers.
14. Check each external device that has its own power cable:
 - a. For damage to the power cord.
 - b. For the correct grounded power cable.
 - c. With the external power cable connected to the device, check for 0.1 ohm or less resistance between the ground lug on the external power cable plug and the metal frame of the device.
15. Check error log for recent activity.

The "Installation Checkout" that follows is new to this book. It has been taken from chapter 5 of *7012 G Series Service Guide*, order number SA23-2741

Installation Checkout

Installation Checkout Procedure

The installation checkout procedure is used to check out the system after initial installation or after a system upgrading kit is installed. NO TAGGo to Step 1.

Notes:

1. The following procedure can be followed only if the AUTOSERVICEIPL flag (this flag can be set in the STAND BY menu) is set to 1.
2. For details about the MAP's mentioned in this section, please refer to the Common Diagnostic and Service Guide delivered with your system.

Step 1. Doing a Visual Check

Do the following for initial installation and after altering the system:

1. Be sure the system unit power ON/OFF button is set to Off.
2. Be sure the power switches on all of the attached devices are set to Off.
3. Visually check the system unit and attached devices for:
 - All power cables are securely attached to the system unit or devices
 - All signal cables are connected at both ends
 - All power cables are plugged into the customer's outlet
 - All covers are installed and the fan openings are not obstructed
 - All ribbons, guides, and other attachments are in place.
4. Go to Step 2.

Step 2. Checking the TTY Terminal Attributes

Checking the TTY Terminal Attributes usually needs to be accomplished only during the initial installation.

If you have trouble selecting the console display and you are using an attached terminal, check the TTY Terminal Attributes again.

When you run the diagnostic programs from an attached TTY terminal, the attributes for the terminal must be set to match the defaults of the diagnostic programs. The TTY terminal must be attached to the S1 or S2 port on the system unit.

Are you going to run this procedure on an attached TTY terminal?

NO Go to Step 3.

YES Go to "Running the Diagnostic Programs from a TTY Terminal" in *Using On Line Diagnostics* in Chapter 7 of *Common Diagnostic and Service Guide*, and check the terminal attributes. Return to Step 3 when you finish checking the attributes.

Step 3. Loading the Diagnostics

The diagnostics can be run from a CD ROM disk, from a locally attached disk, or from a server if Version 4.1 (or higher) of the operating system is installed on the system.

If you are not sure whether Version 4.1 (or higher) of the operating system is installed, you can check by setting the mode switch to the Service position and turning the system unit on. If the system stops with two or more numbers between 221 and 296 alternating in the LCD display, Version 4.1 (or higher) of the operating system is not installed.

If Version 4.1 (or higher) of the operating system is installed, the diagnostic programs should load from a locally attached disk or from a server.

If Version 4.1 (or higher) of the operating system is not used, the diagnostics can be loaded from the diskettes or from the diagnostic CD ROM disk.

The following procedure will attempt to load the diagnostics from a disk or from a server. If they cannot be loaded from a disk or server, the diagnostic CD ROM disk will be used to load and run the checkout.

1. Set the mode switch to the Service position.
2. Set the power switches on all of the attached devices to On.
3. Set the power switch on the system unit to On.
4. Watch the operator panel LCD display.

If the system stops with two or more numbers between 221 and 296 alternating in the LCD display, Version 4.1 (or higher) of the operating system is not installed. Do the following:

- a. Insert the first diagnostic diskette in the diskette drive, or insert the diagnostic CD ROM disk into the CD ROM drive.

Note: For more information on using diagnostic diskettes, please refer to the "Service Hints" section in this manual.

- b. When c07 displays, insert the next diskette until the diagnostics are loaded. If c31 displays, follow the displayed instructions to select the console display.

If the system stops for at least three minutes with a steady number or a flashing 888 displayed in the LCD display, a problem was detected during IPL of the diagnostics. Check for loose cables or cards. If you do not find a problem, go to MAP 0020.

5. When the diagnostic programs load correctly the DIAGNOSTIC OPERATING INSTRUCTIONS display.

Did the DIAGNOSTIC OPERATING INSTRUCTIONS display?

- | | |
|------------|-----------------|
| NO | Go to MAP 0020. |
| YES | Go to Step 4. |

Step 4. Checking for the Correct Resources

Use the “Display or Change Configuration or VPD” service aid to check the resources that are present (memory cards, SCSI devices, adapters, diskette drives, disk drives, and input devices).

Note: If the terminal type has not been defined, it will need to be defined before you can select the service aids. Use the `Initialize Terminal` option on the `FUNCTION SELECTION` menu to define the terminal.

If the Dials and LPFK are attached to serial ports S1 or S2, they will not be listed by the service aid unless they have been configured by the user. Refer to operating system documentation to configure these devices.

Were all the resources listed by the service aid?

NO Check for loose cables or cards. If you do not find a problem, go to MAP 0020.

YES Go to Step 5.

Step 5. Checking the Hardware

If you are running from disk, the system can be checked by running the System Exerciser or by running diagnostics.

To run the System Exerciser:

1. Select `System Exerciser` from the `Function Selection` Menu.
2. Follow the on-screen instructions.

To run diagnostics:

1. Select `Advanced Diagnostics` on the `FUNCTION SELECTION` menu.
2. Select `System Verification` on the `DIAGNOSTIC MODE SELECTION` menu.

All resources can be checked out by selecting `System Checkout` on the `ADVANCED DIAGNOSTIC SELECTION` menu, or you can select each resource individually.

3. Check each resource.

Did all of resources check out good?

NO Record the SRN; then go to MAP 0010.

YES Go to Step 6.

Step 6. Completing the Installation

Some of the following steps only apply to an initial installation. These steps are provided as reminders in completing the installation or finishing a system upgrading activity.

1. If present, remove the CD-ROM diagnostic disk from the appropriate drive, and store it in the binder with the operator guides.
2. Set the mode switch to Secure.
3. Give the keys to the customer and explain the importance of keeping the reorder tag for the keys in a safe place.
4. File a copy of the following items in the Account Management Planning Guide, form number Z-ZZ9-0417:
 - Cable Planning Charts
 - SCSI Address Record from the *Installation and Service Guide*
 - Machine History Card for each system unit and device.
5. Microcode must be installed during system installation or after the operating system is installed. If the system is using Version 4.1 (or higher) of the operating system, all microcode is preinstalled on the boot disk for all adapters and devices that were shipped with the system.

Microcode is shipped on microcode diskettes, option diskettes and on the boot disk. For the operating system, runtime microcode maintenance can be selected from the SMIT INSTALLATION AND MAINTENANCE MENU or from the Diagnostic Service Aid.

adfutil -m (command and flag) is normally used to install microcode shipped on option diskettes.

If the system is using another type of operating system, that operating system should include microcode installation instructions.

If you have the X.25 Interface Co-Processor or the 5080 Attachment Adapter, the microcode for them is normally not shipped with the operating system. The microcode for these adapters must be installed before the adapters can be used. The 5080 Attachment Adapter Microcode is shipped on a microcode diskette. The X.25 Interface Co-Processor microcode is shipped on an option diskette.

6. Contact the person that is going to install the software or turn the system to the customer. If needed, go to the operating system *Installation Kit* to install and configure the operating system.

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 unit is still plugged into an outlet and the main power switch on the back of the system unit is on. This allows control of the system even though the system is down. The only way to turn off the SystemGuard power is to turn off the main power switch at the back of the system unit or unplug the power cord.

A more detailed description of the system power states can be found in “Appendix F. System Power States.”

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.

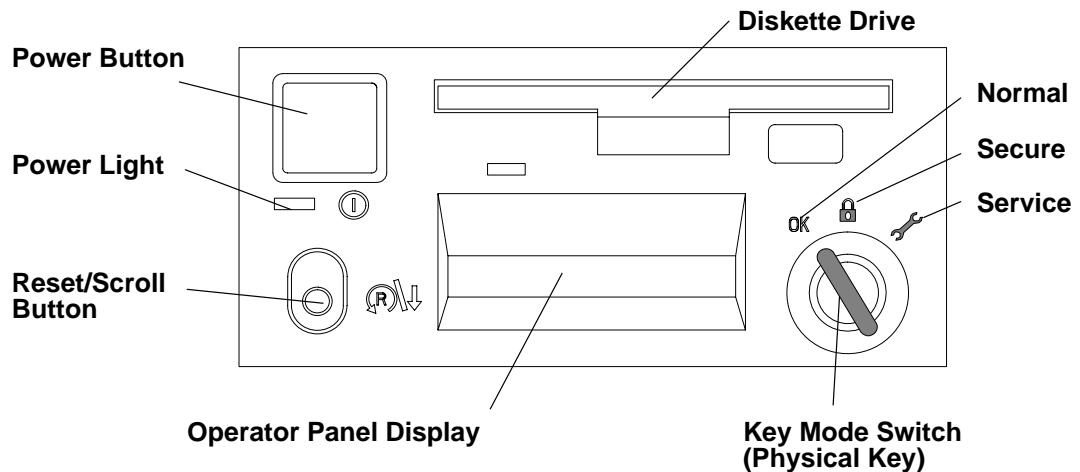
The BUMP console (attached to S1 port) provides the normal input. The service console (attached to S2 port) provides remote service access to the BUMP. Access to both of these consoles is controlled by flags.

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 7013 J Series 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 CEC enclosure

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 or the **power-on** command is entered on the BUMP Console or Service Console.

Init Phase

Init phase is entered when the power button on the Operator Panel is pressed on or when the power on 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 EEPROM
- 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 will be 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 Boot)

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 (Init 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

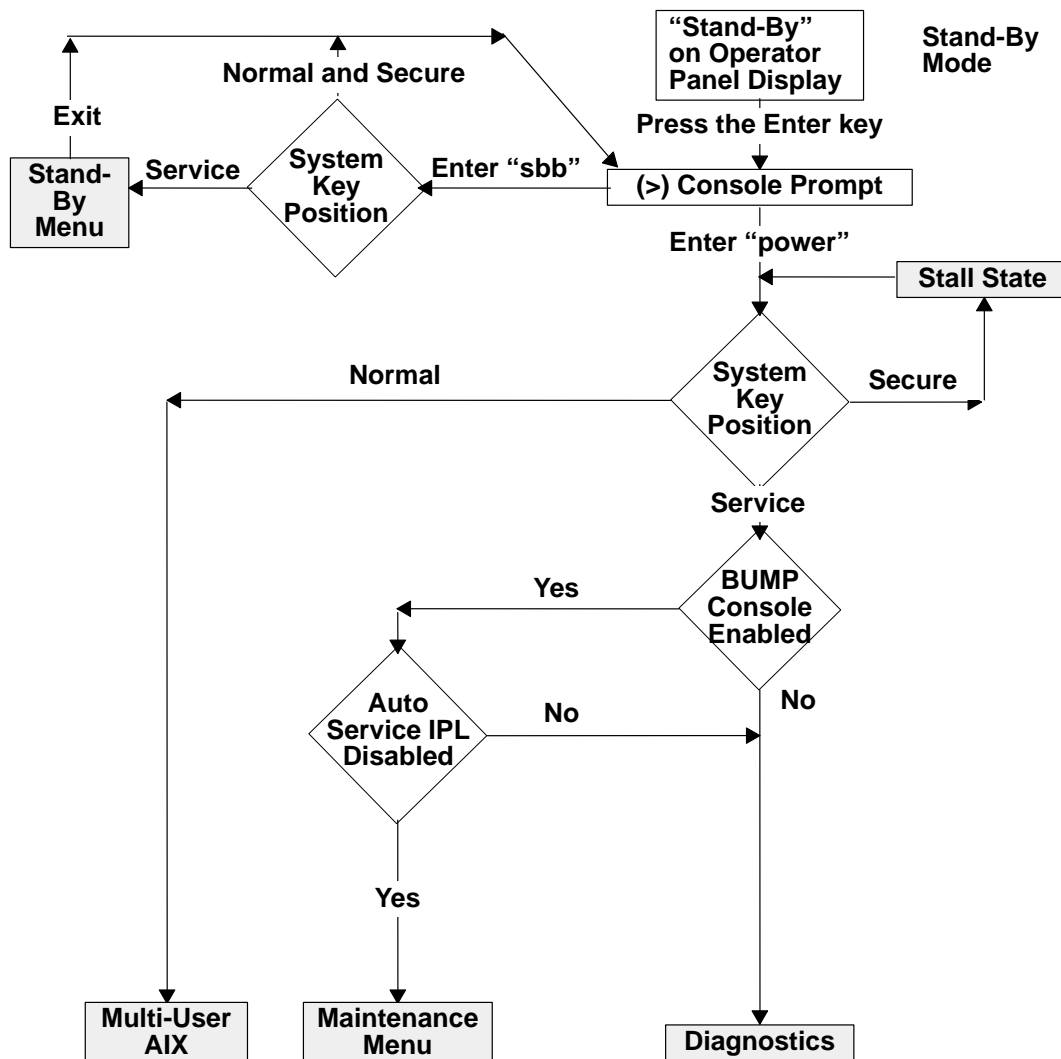
SystemGuard parameters and flags may be changed from different locations. They can be changed from the SystemGuard STAND-BY MENU, the SystemGuard MAINTENANCE MENU, the Diagnostics interface, and also from AIX.

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:

Display Configuration

```
SID TM          7013J30 45067          SID Y2          00045067
SID Y3 7ffffff003935303730370000      UNIT PAAAAAAA 40
CPU conf       CCCCAAAA              MM conf       CCAACCAAAAAAA
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              CPU3
MC2
SIB10 E38042   19H0310              MC1   D78605   19H0473
SIB11
SIB21
SIB12
SIB22
SIB13
SIB23              MC3
PS0   D29655   11H5114
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 back plane 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 (yymmdd) -> 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 the Micro Channel in the base unit of the 7013 J Series. BUS 1 represents the Micro Channel bus in the expansion unit of the 7013 J Series

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.

Note: Bus choice is not available on 7012 systems.

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.

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
```

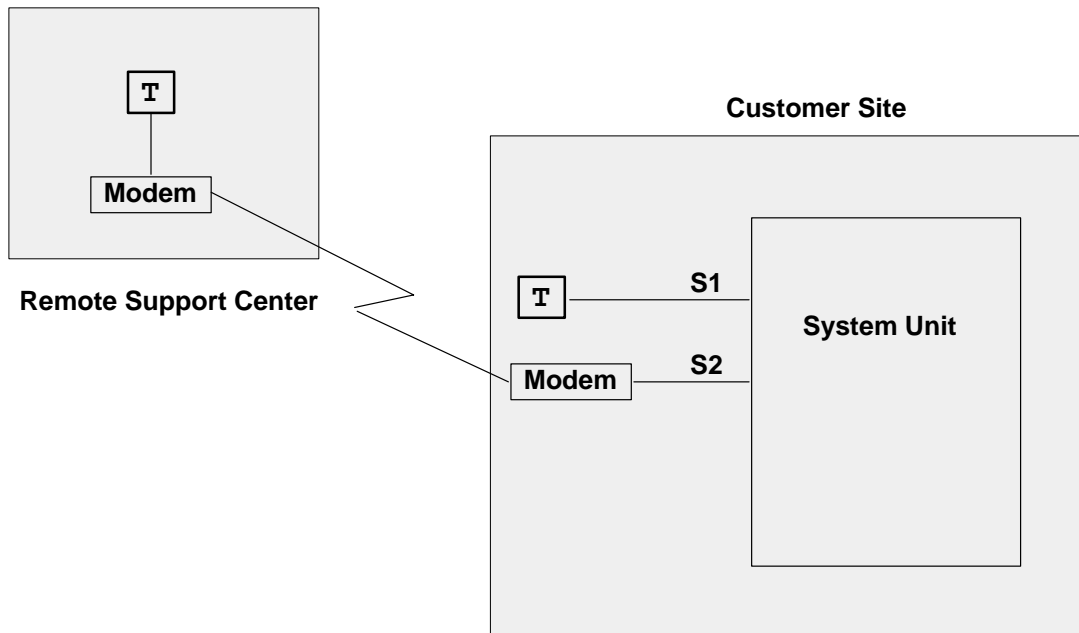
Where *-cf* is for change flag; *1* is for the index. The last number, *1*, is the value of the flag itself.

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 NO TAG.
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: 7013 J Series 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 7013 J Series. If a problem is detected, this procedure helps you to isolate the problem to the failing unit, which can be replaced with a 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 F. System Power States."

Observe the following safety notice during service procedures.

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

#### **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.**

## Power Supply Status

In 7013 J Series models, if the system detects a power supply failure on the base unit or MCA expansion unit, it turns the power off and displays service-request number (SRN) 409- $\text{Axy}$ , where  $\text{xy}$  is the hexadecimal value of the power status register and gives some information on the power fault, as described in this MAP.

If the power fault condition occurs on the disk expansion unit, while the system is running, the system may detect the fault and log the error; however, if a reboot is launched, the system will recognize the power fault and display 409- $\text{Axy}$  SRN.

Line two of the operator panel display identifies the unit that contains the error. Units are numbered as:

|   |                  |
|---|------------------|
| 0 | Base System unit |
| 1 | Expansion unit   |

---

## Step 1

You may be directed to this MAP for several reasons:

1. SRN 409- $\text{Axy}$  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 the power 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 unit top cover is not correctly closed or that the top cover switch 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 system unit to Off.
2. Set the system unit main switch to Off.
3. Set the key mode switch to the Service position.
4. Set the system unit main switch to On.

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

|            |              |
|------------|--------------|
| <b>NO</b>  | Go to Step 3 |
| <b>YES</b> | Go to Step 8 |

---

## Step 3

(from Step 2)

### Is the operator panel display illuminated?

- |            |              |
|------------|--------------|
| <b>NO</b>  | Go to Step 4 |
| <b>YES</b> | Go to Step 7 |

---

## Step 4

(from Step 3)

1. Follow the removal procedure under “Rear Cover” on page 4-4 in *7013 J Series Service Guide*.
2. Check the LED on the System Interface Board. If the LED is on, it means that the power supply unit supplies the Stand-By voltages.

### Is the System Interface Board LED on?

- |            |              |
|------------|--------------|
| <b>NO</b>  | Go to Step 5 |
| <b>YES</b> | Go to Step 7 |

---

## Step 5

(from Step 4)

1. Set the system unit main switch to Off.
2. Be sure that the external power cable to the system unit has continuity.
3. Be sure that the external power cable is plugged into both the system unit 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. Follow the removal procedure under “Front Cover” on page 4-7 in *7013 J Series Service Guide*.

### Did you find a problem?

- |            |                                                                                                                           |
|------------|---------------------------------------------------------------------------------------------------------------------------|
| <b>NO</b>  | Go to Step 6.                                                                                                             |
| <b>YES</b> | Correct the problem. Go to “Map 0410: Repair Checkout” in the <i>Diagnostic Information For Micro Channel Bus Systems</i> |

---

## Step 6

(from Step 5)

**Note:** Either the Power Supply module (90 % failure probability) or the Back Plane (10 % failure probability) is defective.

1. Set the system unit main switch to Off.
2. Replace the power supply. Refer to "Power Supply" on page 4-50 in *7013 J Series Service Guide*.
3. Set the system unit main switch to On.

### Has the symptom changed?

- NO** Reinstall the original Power Supply.
- Repeat Step 6, exchanging the back plane. Refer to "Back Plane" on page 4-95 in *7013 J Series Service Guide*.
- If you exchanged both Power Supply and Back Plane, 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 (99 % failure probability) or the back plane (1 % failure probability) unit is defective.

1. Set the power button on the system unit to Off.
2. Set the system unit main switch to Off.
3. Exchange the operator panel. Refer to "Operator Panel" on page 4-26 in *7013 J Series Service Guide*.
4. Set the key mode switch to the Service position.
5. Set the system unit main switch on the system unit to On.

### Has the symptom changed?

- NO** Reinstall the original operator panel.
- Repeat Step 7, exchanging the back plane. Refer to "Back Plane" on page 4-95 in *7013 J Series Service Guide*.
- If you exchanged both operator panel and back plane, 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 button on the system unit 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.

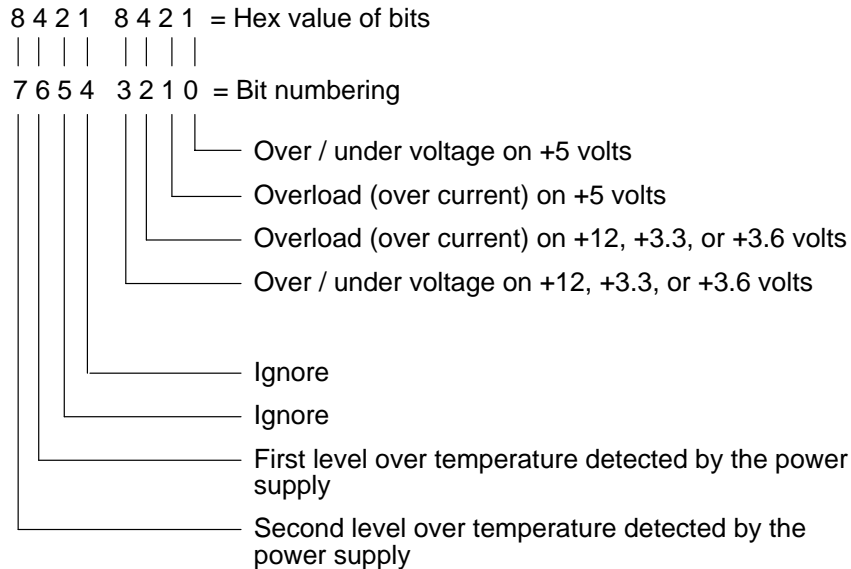
| Symptom                                                                                                                                                                                                                                                                                                                                                                                | 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, 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 or operator panel. 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 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 on page 1-41 in *7013 J Series Service Guide*), blocked air ducts, or a clogged air filter. 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 or bit 2 a zero?

**NO**                      Replace the 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: 7013 J Series System Unit – Minimum Configuration” on page 3-1540-1.





---

## MAP 1540: 7013 J Series System Unit - 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:

#### 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.

- Back Plane, system planar (SP), MCA planar (MP), I/O card (IOC), FXB/FXE flex cable, 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.

- Back Plane, system planar (SP), MCA planar (MP), I/O card (IOC), FXB/FXE flex cable, 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 Steps 3, 6, 7, 9, 10, 11)

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 system unit to Off.
  5. Set the main power switch on the system unit to Off.
  6. Set the main power switch on the system unit to On.
  7. Set the power button on the system unit 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 <i>System Boot</i> , then <i>Boot From List</i> . 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 <i>Exit Main Menu and Start System (Boot)</i> then press <i>Enter</i> .<br>When the <i>Starting System Boot</i> menu displays, press <i>Enter</i> .<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 system unit to Off.
2. Set the main power switch on the back of the system unit to Off.
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. Set the main power switch on the back of the system unit to On.
7. Set the power button on the system unit 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 165, which may display 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, power off the system, unplug the power cable and 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.
- Go to Step 7, substep 5.

---

## Step 3

(from Step 2)

One of the FRUs remaining in the system unit 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. MCA planar (MP)
6. Power supply (PS)
7. FXB/FXE flex cable
8. System interface board (SIB)
9. Operator panel
10. Back plane

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 system unit to Off.
2. Exchange one of the FRUs in the list.
3. Set the power button on the system unit 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 165, which may display 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 part.

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 system unit to Off.
2. Set the main power switch on the system unit to Off.
3. Starting with the CPU cards, install one additional CPU card (CPU) or memory card (MC) (if any).
4. Set the main power switch on the system unit to On.
5. Set the power button on the system unit 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 165, which may display 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 system unit to Off and the main power switch to Off. Do the following actions.

- Install the SCSI adapter.
- Connect the signal cable from the adapter to P02 on the back panel.
- 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 system unit to Off.
2. Set the main power switch on the system unit to Off.
3. Exchange the last card installed (CPU or memory).
4. Set the main power switch on the system unit to On.
5. Set the power button on the system unit 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 165, which may display up to ten minutes with no activity on the BUMP console.
  - The number 888 is flashing in the operator panel display.

### **Does the system stop with 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 system unit 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)
  - MCA planar (MP)
  - FXB/FXE flex cable
1. Set the power button on the system unit to Off.
  2. Set the main power switch on the system unit to Off.
  3. Exchange one of the FRUs in the list.
  4. Set the main power switch on the system unit to On.
  5. Set the power button on the system unit 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 165, which may display 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 system unit to Off.
2. Set the main power switch on the back of the system unit to Off.
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. Set the main power switch on the back of the system unit to On.
7. Set the power button on the system unit 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 165, which may display 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 system unit 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. MCA planar (MP)
6. FXB/FXE flex cable
7. System planar (SP)
8. System interface board (SIB)
9. Back plane
10. CPU cards (CPU) (one at a time)
11. Memory cards (MC) (one at a time)
12. 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 system unit to Off.
2. Set the main power switch on the back of the system unit to Off.
3. Install one adapter, and connect any cables and devices that were attached to it.
4. Set the main power switch on the back of the system unit to On.
5. Set the power button on the system unit to On.
6. Insert the diagnostic CD-ROM disc into the CD-ROM drive.
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 `165`, which may display 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 system unit to Off.
2. Set the main power switch on the back of the system unit to Off.
3. Starting with the last installed adapter, disconnect one attached device and cable.
4. Set the main power switch on the back of the system unit to On.
5. Set the power button on the system unit 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 same three digit number is displayed in the operator panel display for longer than three minutes except for `165`, which may display 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 system unit is defective.

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

1. Adapter (last one installed)
2. I/O card (IOC)
3. MCA planar (MP)
4. FXB/FXE flex cable
5. System interface board (SIB)
6. 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 system unit to Off.
2. Set the main power switch on the system unit to Off.
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 to the system unit, do not disconnect it.

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

4. Set the main power switch on the system unit to On.
5. Set the power button on the system unit 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 `165`, which may display 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 this procedure 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 system unit is defective.
- In the following order, exchange the FRUs that have not been exchanged:
1. I/O card (IOC)
  2. MCA planar (MP)
  3. FXB/FXE flex cable
  4. System planar (SP)
  5. 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 Step 19, 20, 21, 22)

1. Set the power button on the system unit to Off.
2. Set the main power switch on the system unit to Off.
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. Set the main power switch on the system unit to On.
7. Set the power button on the system unit 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 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 system unit 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 PTC.
- 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?

- NO**                    One of the FRUs remaining in the system unit is defective. Go to Step 16.
- YES**                    Go to Step 15.

---

## Step 15

(from Step 14)

1. Set the power button on the system unit to Off.
2. Set the main power switch on the system unit to Off.
3. Remove the CD-ROM drive.
4. Install the disk required to boot diagnostics. This is normally hdisk0.
5. Set the main power switch on the system unit to On.
6. Set the power button on the system unit 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?

- NO**                    One of the FRUs remaining in the system unit is defective. Go to Step 16.
- YES**                    Replace the CD-ROM Drive. Go to "Map 0410: Repair Checkout" in the *Diagnostic Information For Micro Channel Bus Systems*.

---

## 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 system unit 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 system unit to Off.
2. Set the main power switch on the system unit to Off.
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 MCA box except the SCSI.

4. Remove all devices except the CD-ROM drive (if the CD-ROM drive is not installed, install it).
5. Set the main power switch on the system unit to On.
6. Set the power button on the system unit to On.
7. Insert the diagnostic CD-ROM 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 system unit is defective.

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

1. I/O card (IOC)
2. MCA planar (MP)
3. FXB/FXE flex cable
4. System planar (SP)
5. 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 system unit to Off.
2. Set the main power switch on the system unit to Off.
3. Install a device.
4. Set the main power switch on the system unit to On.
5. Set the power button on the system unit 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 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.
- 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 system unit to Off.
2. Set the main power switch on the system unit to Off.
3. Remove all SCSI Adapters except the one you are trying to boot from.
4. Set the main power switch on the system unit to On.
5. Set the power button on the system unit to On.
6. If the Maintenance Menu is displayed, select `System Boot`, then `Boot From List`.
7. 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.
8. 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 describes the removal and replacement procedures for a service person to remove and replace all the field-replaceable units (FRUs) used on this product.

### Notes:

1. Unless otherwise noted, the procedures described in the following pages are applicable to both the base and expansion units.
2. After you replace any FRU, you should test it. Refer to the *Diagnostic Information For Micro Channel Bus Systems* for any detailed information.
3. For information about attaching a J Series expansion unit to a J Series base unit, see the 7013 J Series Operator Guide.
4. For a translation of the following notices, see *System Unit Safety Information*.

### 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.**

### CAUTION:

**This product is equipped with a three-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.**

---

## Tools Needed for Service

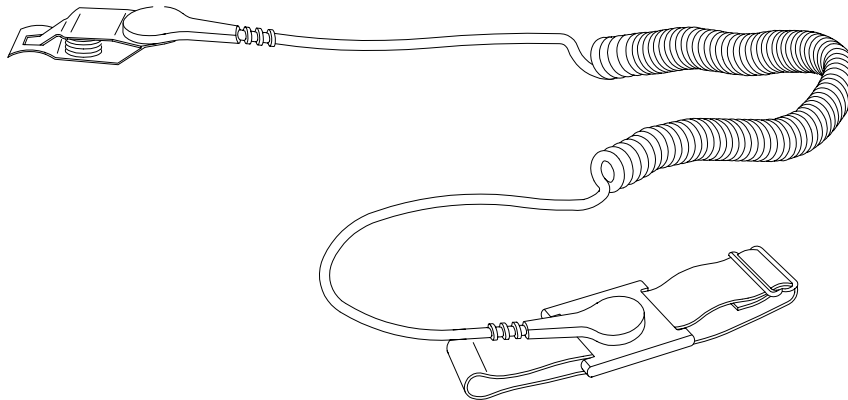
You should have the following tools available before you start maintenance procedures on this system:

- A large flat blade screwdriver
- An antistatic envelope, if you need to remove or replace cards or boards
- The card extractor (stored inside the rear cover), if you need to remove any card from the CPU module
- An antistatic wrist strap, if you need to remove or replace any cards or boards.

### How to Use an Antistatic Wrist Strap

An antistatic wrist strap must be used each time you need to handle any adapters or boards that can be installed into the system, because these are sensitive to electrostatic discharge.

A typical model of antistatic wrist strap is shown in the following figure.



Before installing or removing any adapters, cards, or boards, use the antistatic wrist strap as detailed in the following procedure.

1. Wear the antistatic wrist strap and bind it fast to your wrist.
2. Attach the other end of the cable of the antistatic wrist strap to the metallic frame of the system unit.

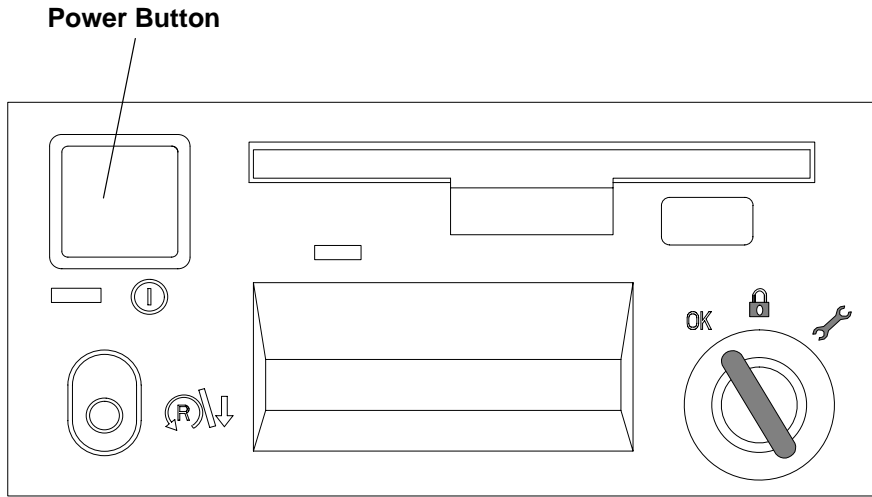
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## Preliminary Operations

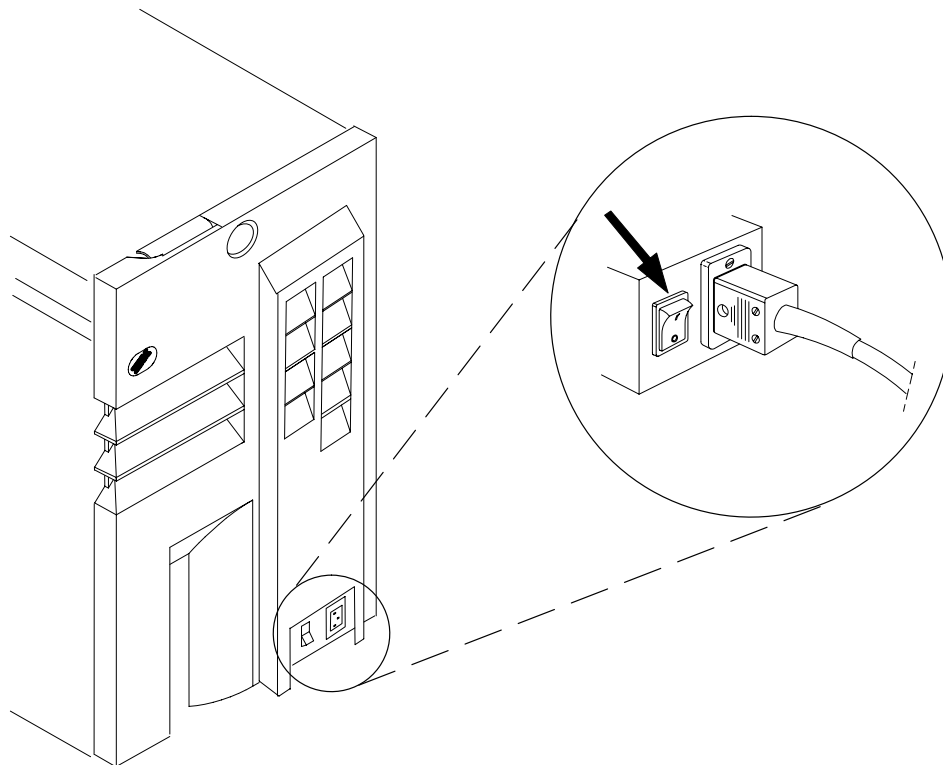
Before replacing any FRU, perform the following preliminary operations:

1. If the operating system is running, perform a system shutdown first. For further information about the shutdown procedure, please refer to the **shutdown** command in the commands reference book for your operation system.

2. Power off the unit by pushing the power button on the operator panel.



3. For each unit, turn the toggle switch located on the main power switch module to off, switching it to the **O** position.



4. Make sure the power switches for all external devices connected to the system unit, if any, are set to OFF.
5. Unplug the power cable to all external devices connected to the system unit, if any.
6. Unplug the power cable to all system units.

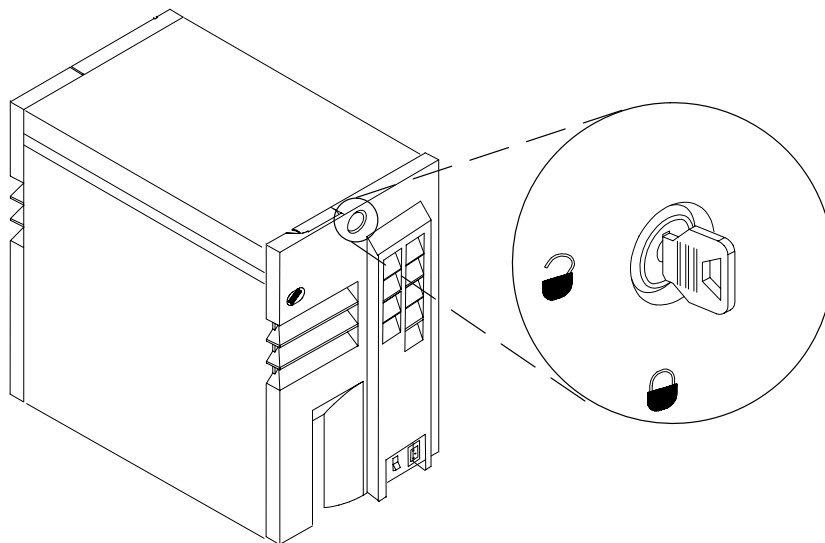
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## Rear Cover

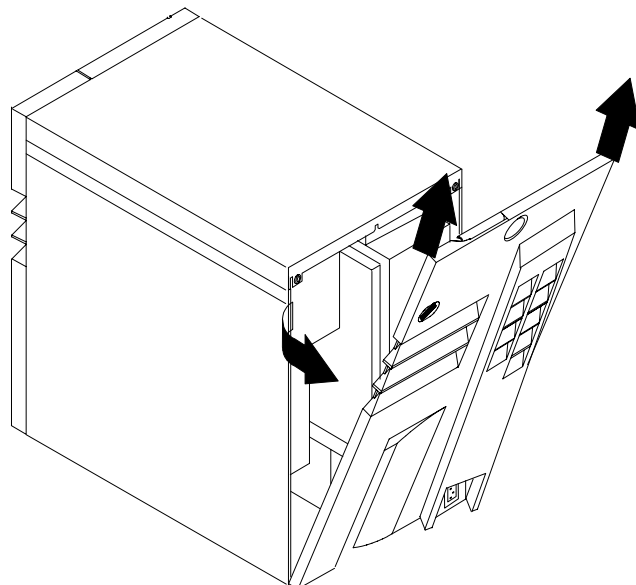
**Attention:** Do not operate the system unit for a long time with the covers removed. Operating with the covers on ensures adequate cooling of the components. Remove the covers only when required by the removal and replacement procedures illustrated in this guide.

### Removal

1. Do the steps detailed in "Preliminary Operations" on page 4-2.
2. Turn the rear cover key clockwise to unlock the rear cover. The rear cover key is the same as the one used on the operator panel.



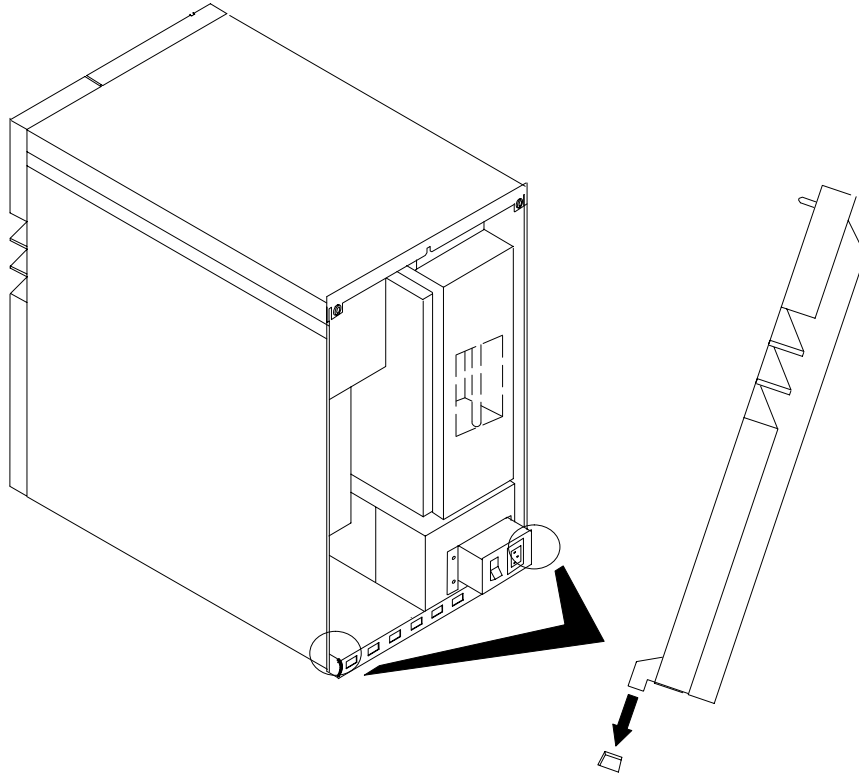
3. With a firm grip on the cover, tilt it towards you and pull it upward as shown to remove it from the unit.



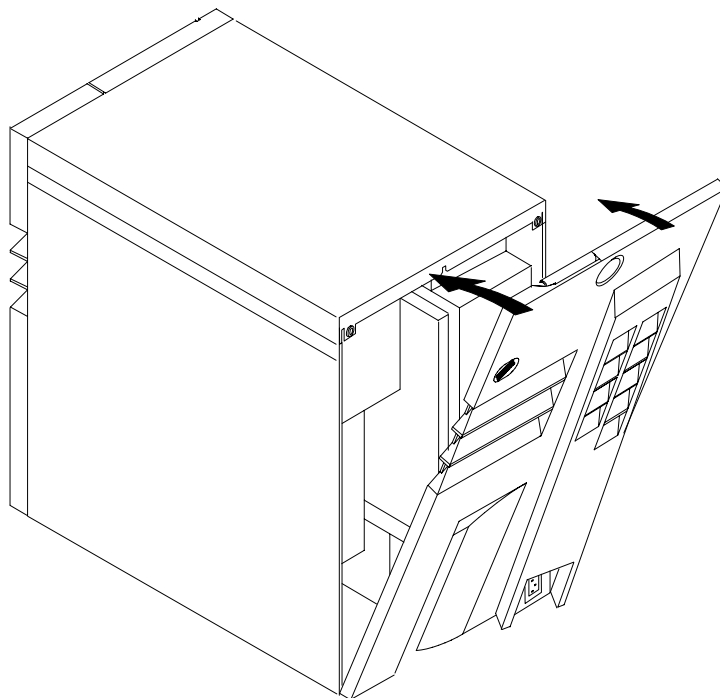


## Replacement

1. Insert the two positioning pins located on the lower edge of the rear cover into the corresponding holes of the unit.



2. When the pins are in place, close and lock the rear cover.



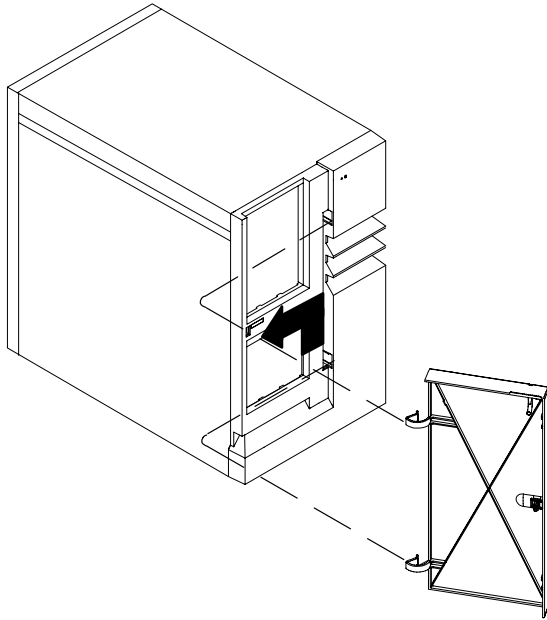
3. In reverse order, do the steps listed in "Preliminary Operations" on page 4-2.

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## Front Door

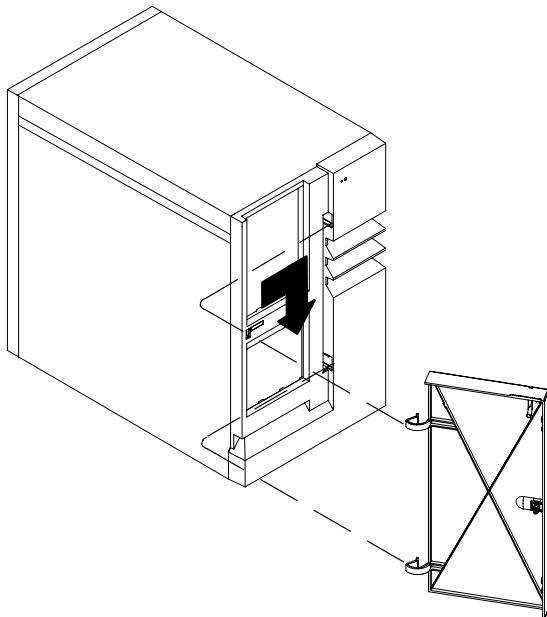
### Removal

1. Swing the door open 140 degrees.
2. Grasp door and lift upward and pull away from the cover.



### Replacement

1. Holding the door in the same 140 degree position, place hinges in the slots and press down to reseat the door hinges.
2. Press door shut until it latches to close.

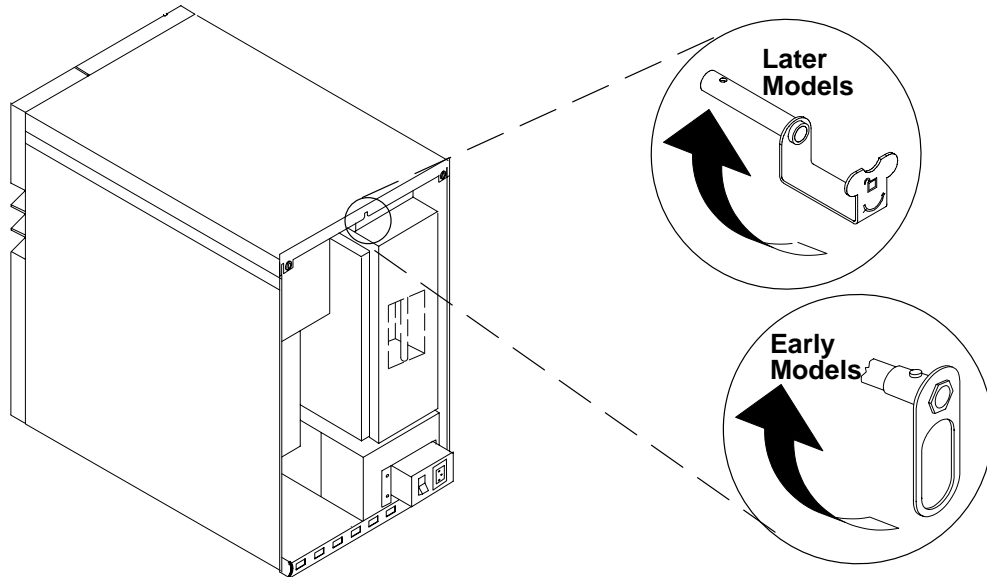


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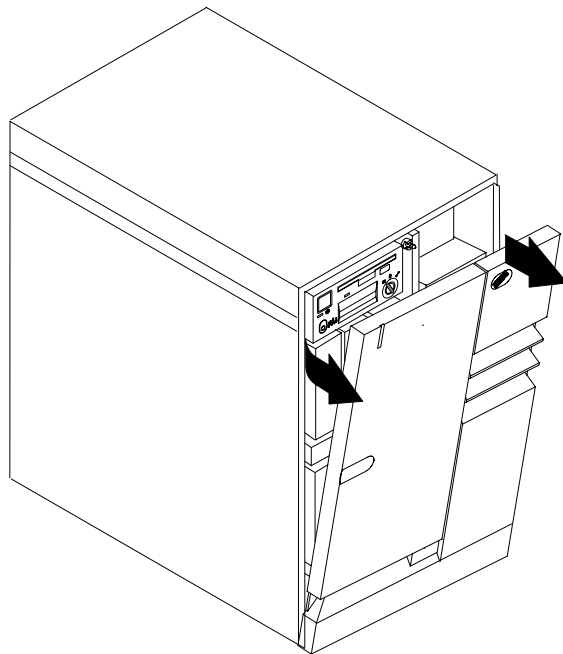
## Front Cover

### Removal

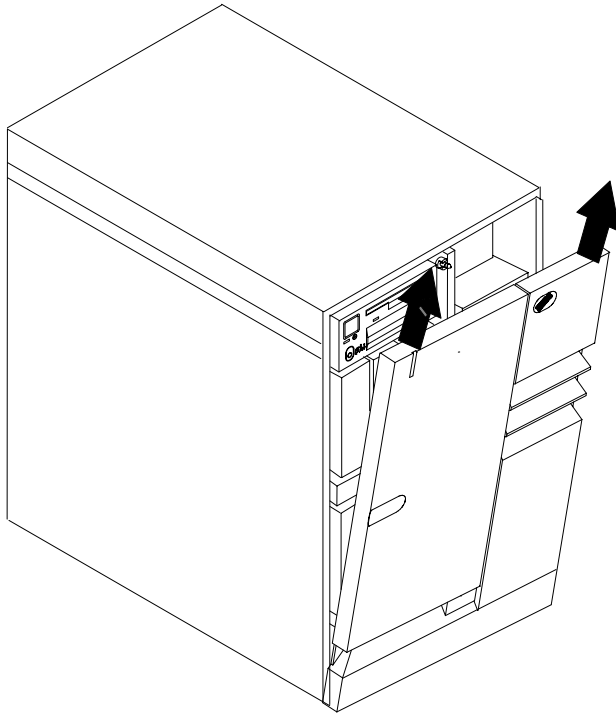
1. Before removing the front cover, be sure to remove the rear cover. Follow the removal procedure described in "Rear Cover" on page 4-4.
2. On the rear side of the unit, turn the locking handle clockwise 90 degrees to unlock the front cover.



3. Tilt the front cover towards you as shown in the figure.

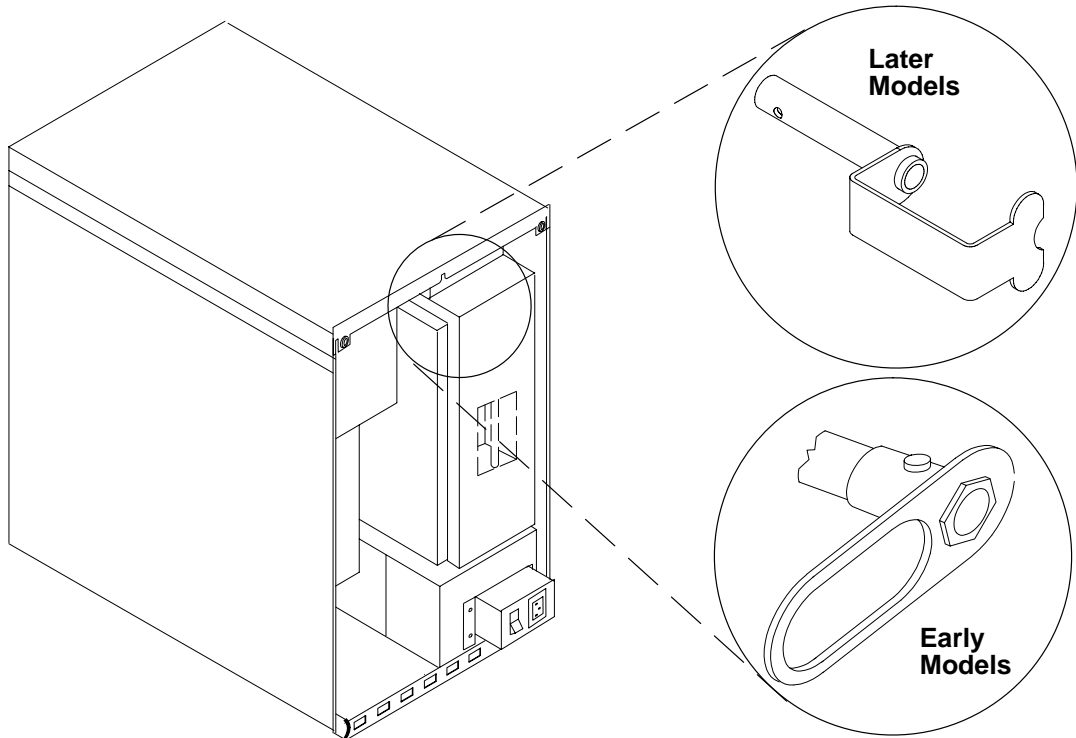


4. Pull the cover up to remove it from the unit.

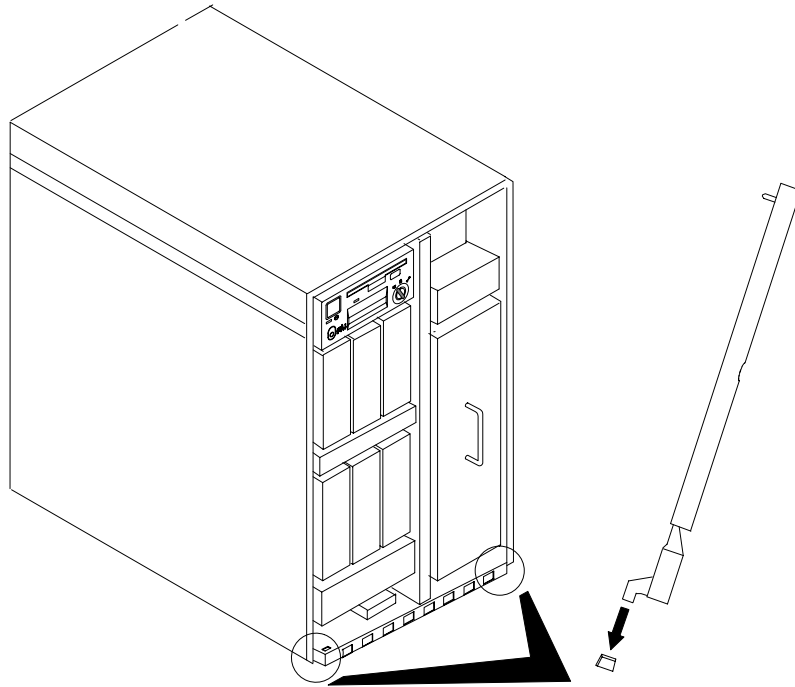


## Replacement

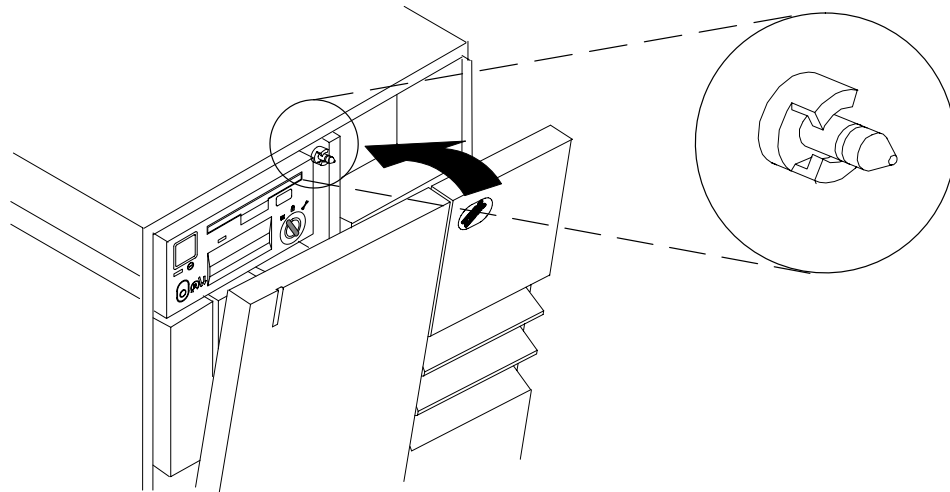
1. Before replacing the front cover, be sure that the locking handle in the rear side of the unit is in the position shown in the figure. If not, turn it in that position.



2. Insert the two positioning pins located on the lower edge of the front cover into the corresponding holes of the unit.



3. When the pins are in place, push the cover closed until the retaining clip catches the locking pin. The locking pin must be in the position shown in the figure.



4. On the rear of the unit, turn the locking handle counterclockwise 90 degrees to lock the front cover.
5. Replace the rear cover after having performed all needed operations.
6. In reverse order, do the steps listed in "Preliminary Operations" on page 4-2.

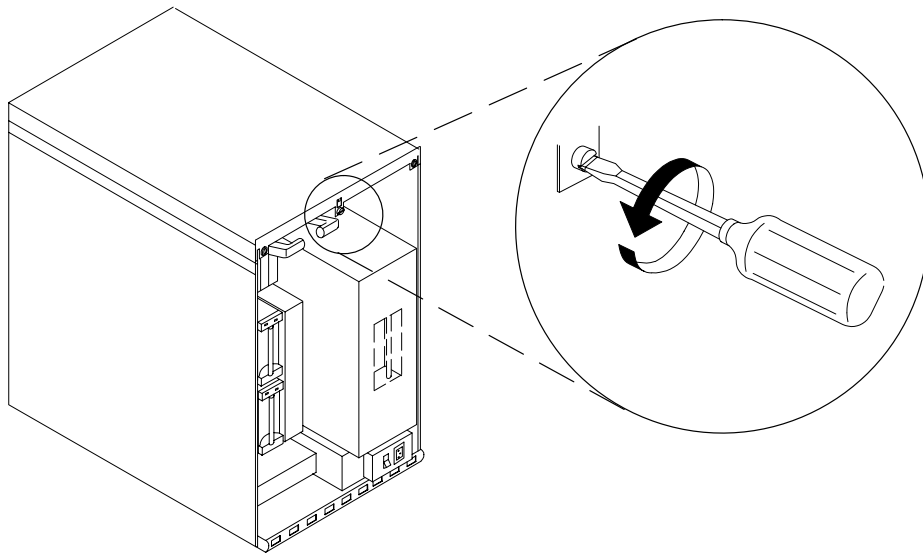
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## Top Cover

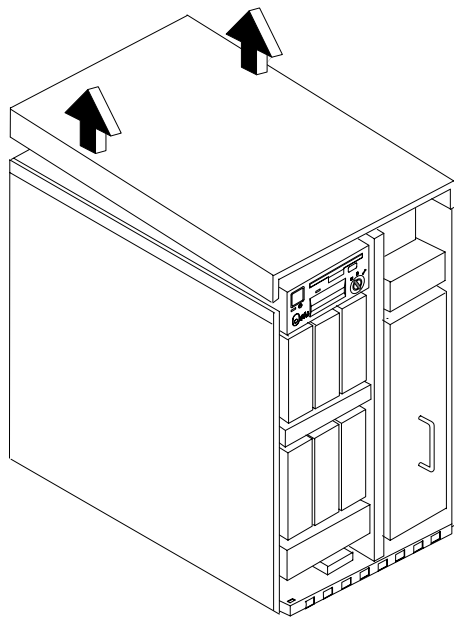
### Removal

**Attention:** If you try to remove the top cover without having performed this step, the machine will stop automatically, and file system integrity may be affected.

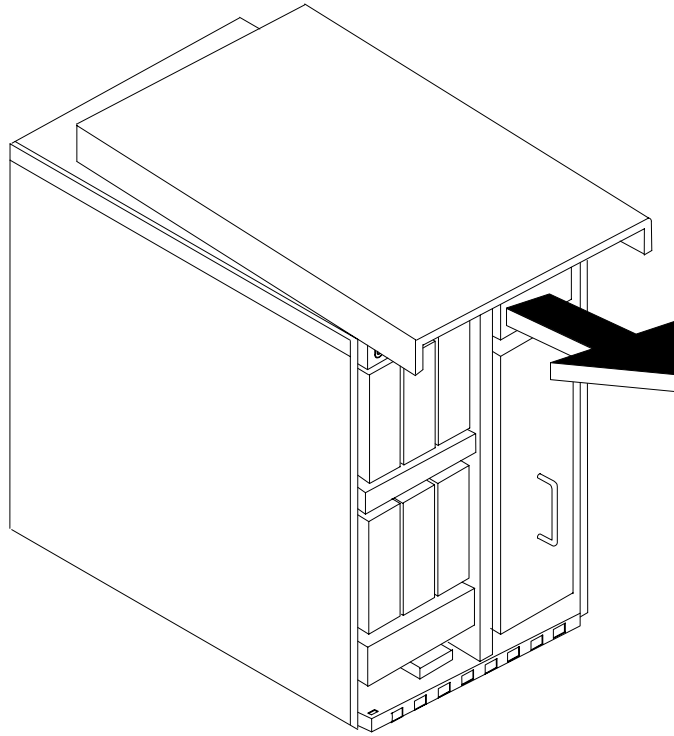
1. Do the steps listed in "Preliminary Operations" on page 4-2.
2. Before removing the top cover, be sure to remove the rear cover and the front cover. If you have not, follow the removal procedures described in "Rear Cover" on page 4-4 and in "Front Cover" on page 4-7.
3. Remove the top cover retaining screw, which is located in the unit rear side.



4. Firmly grip the top cover with your hands. Pull it up, inclining it as illustrated in the figure.

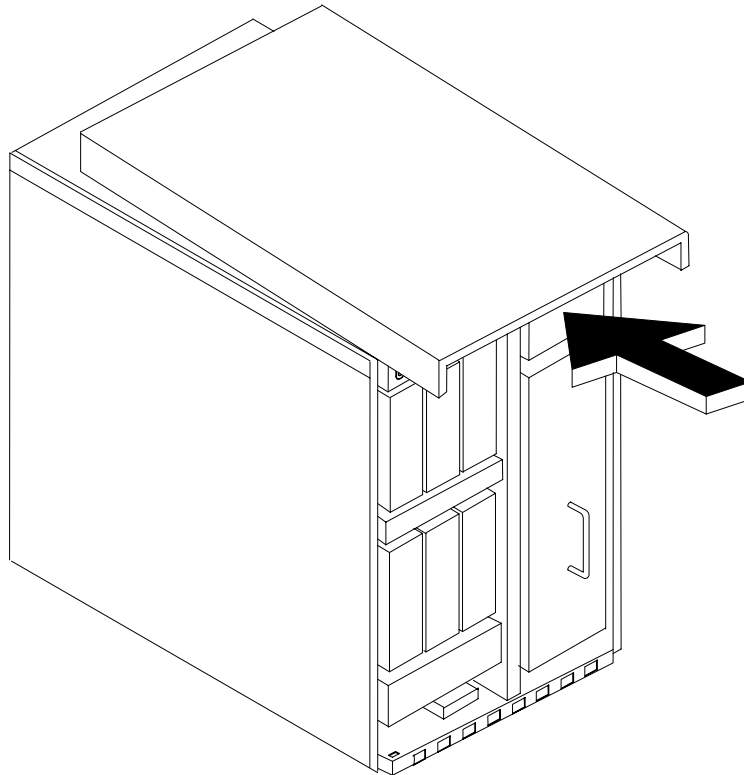


5. Pull the cover forward to remove it from the unit.

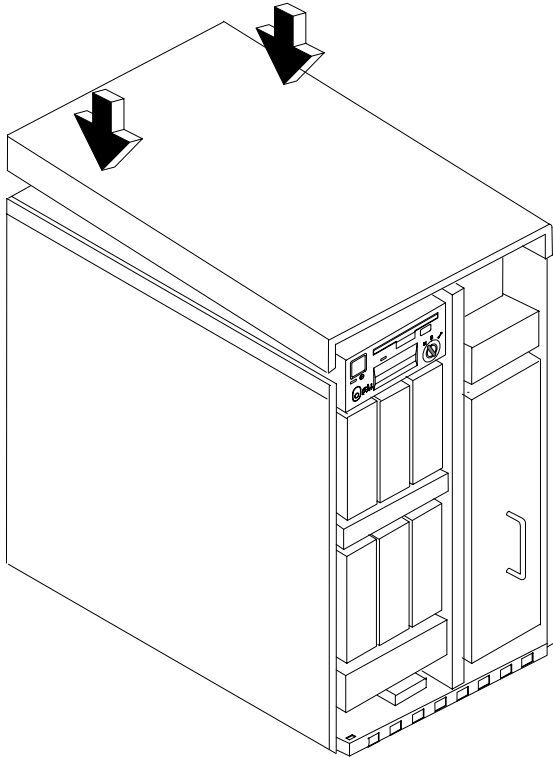


## Replacement

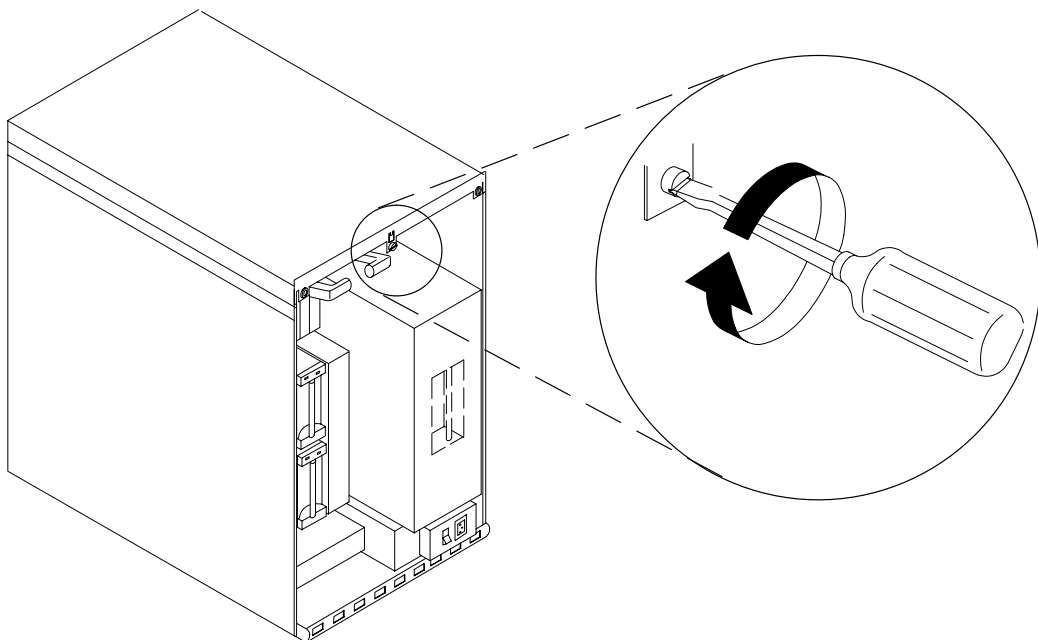
1. Put the top cover on the unit, keeping it inclined as illustrated in the figure. Then slide it back until it catches the locking bar on the unit.



2. Push the cover down.



3. Tighten the top cover retaining screw, which is located in the unit rear side.



4. Replace the front and rear covers.

5. In reverse order, do the steps listed in "Preliminary Operations" on page 4-2.



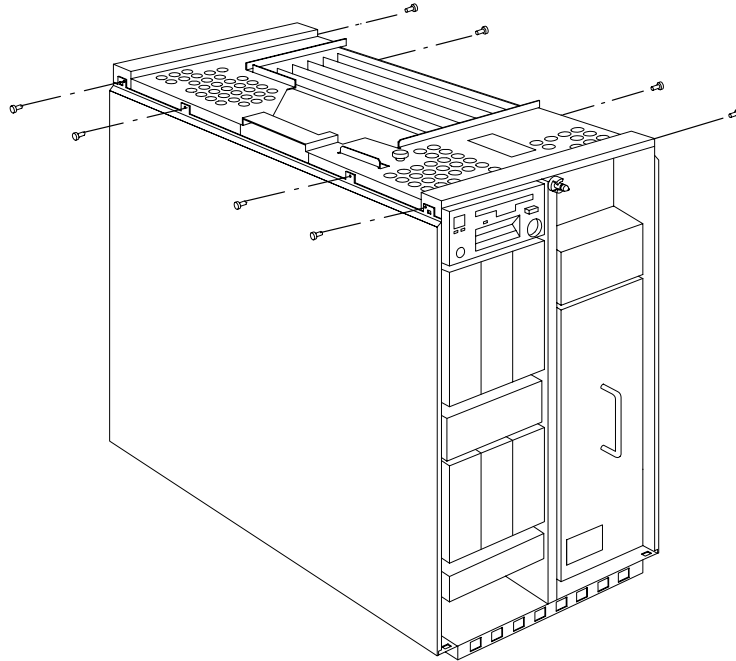
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## Side Covers

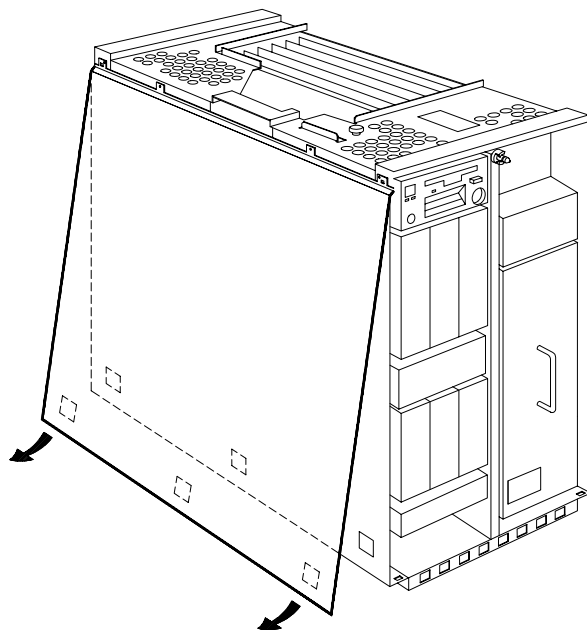
### Removal

The following steps apply to each side cover:

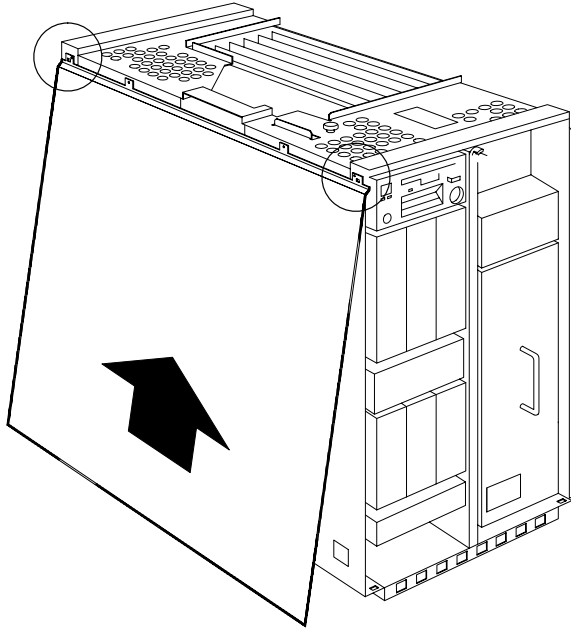
1. Remove the rear cover, the front cover, and the top cover of the unit following the procedures described respectively on pages 4-4, 4-7, and 4-10.
2. Unscrew the retaining screws indicated in the figure.



3. With a firm grip on the cover, tilt it towards you as shown.



4. Pull the cover upward to remove it from the unit, unlocking the holes highlighted in the figure from the retaining clips on the unit.



## Replacement

The following steps apply to each side cover:

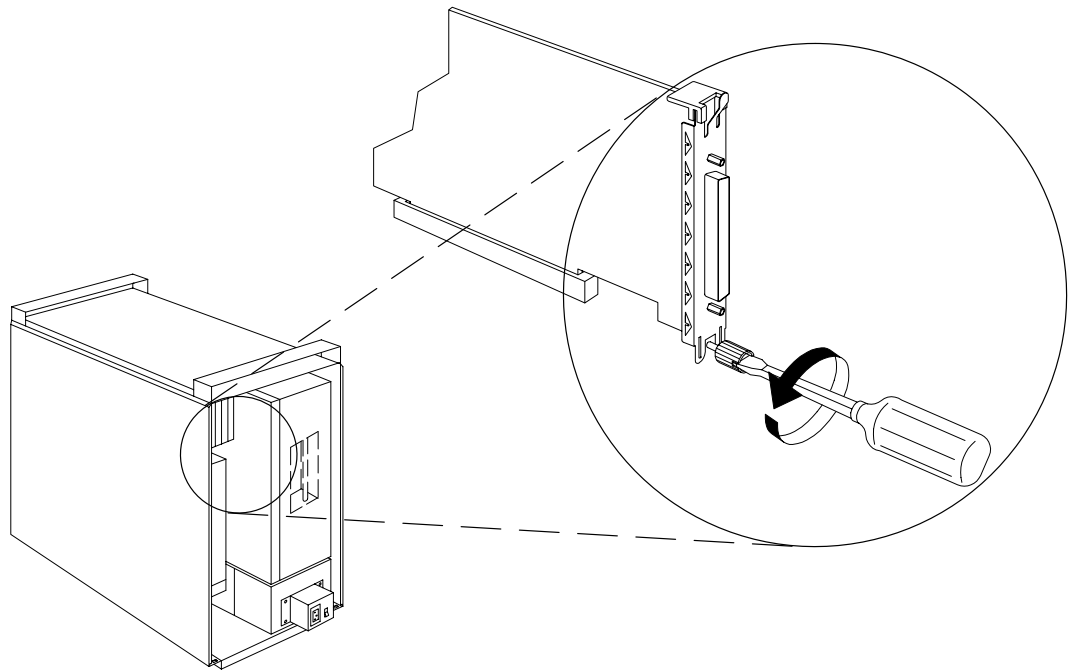
1. Center the holes on the top of the side cover with the corresponding retaining clips on the unit.
2. Push the cover against the unit.
3. Using a screwdriver, tighten the cover retaining screws.
4. Replace the front, rear, and top covers.

---

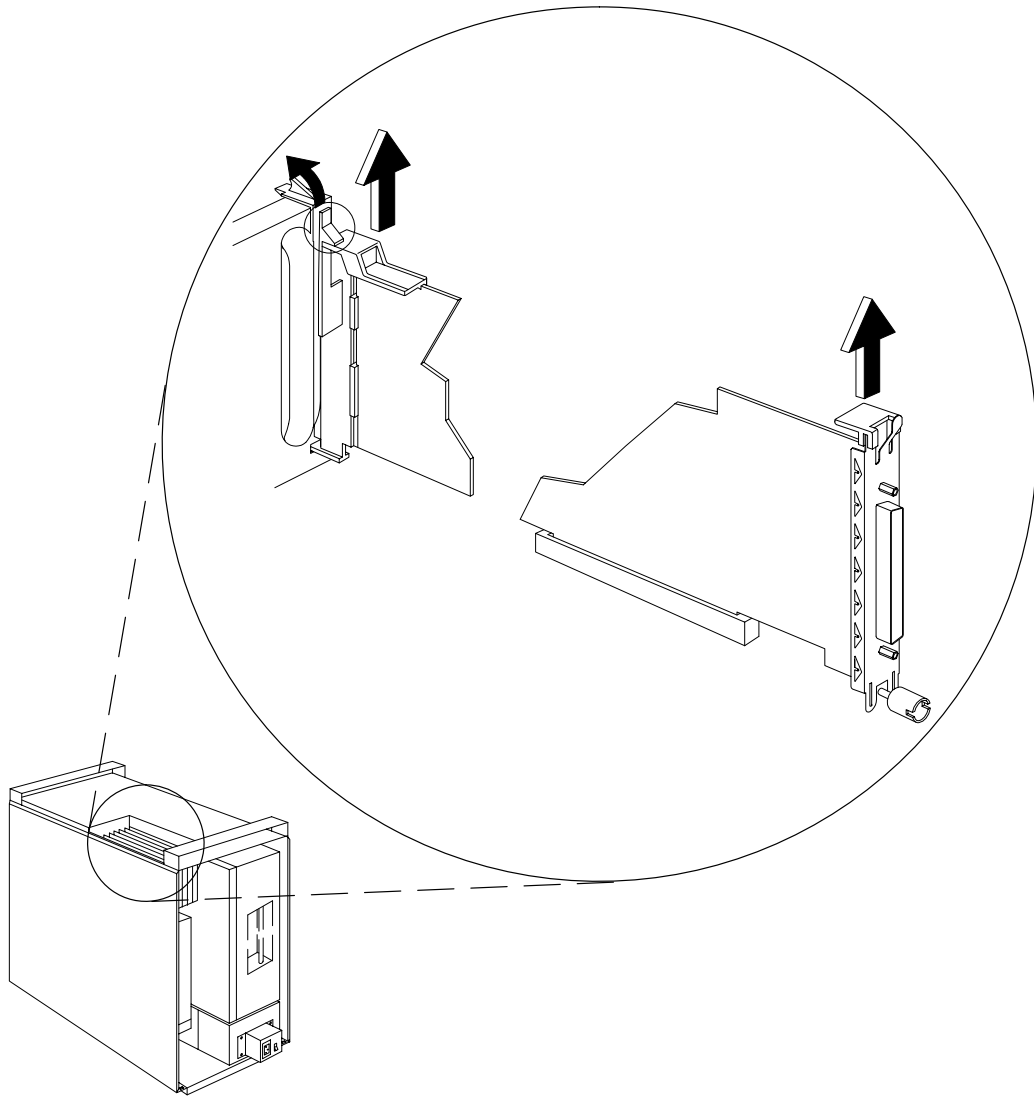
## Adapters

### Removal

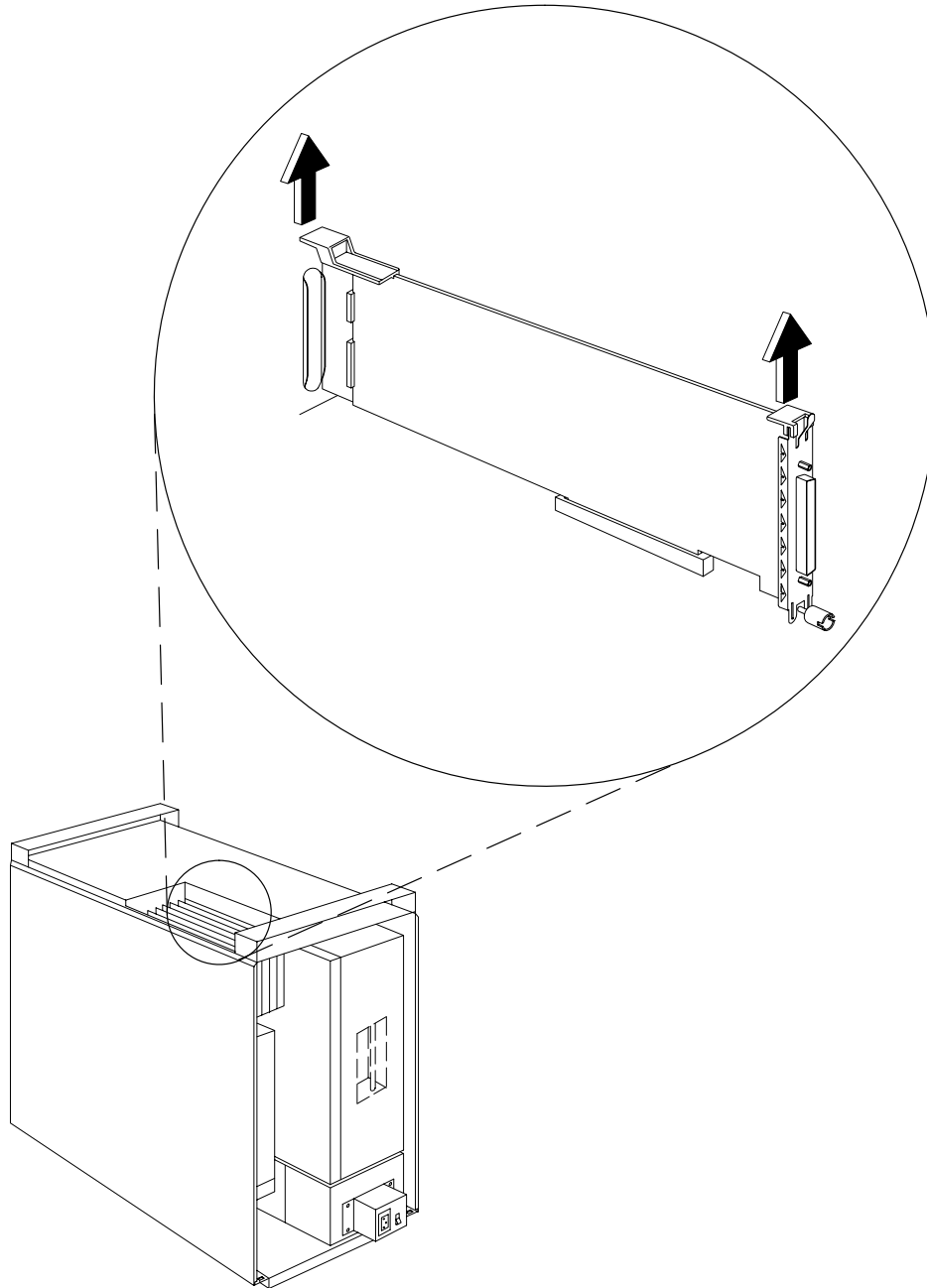
1. Do the steps detailed in "Preliminary Operations" on page 4-2.
2. To access the MCA card cage, remove the rear, front, and top covers of the unit following the procedures described respectively on pages 4-4, 4-7, and 4-10.
3. Record the location and type of the adapter. Disconnect any cables from the adapter. If you are removing more than one adapter at a time, record which cable attaches to each adapter.
4. Loosen the retaining screw shown in the figure.



5. Use the antistatic wrist strap. See page 4-2 for details.
  6. If you are removing a Type 3 adapter, move the tongue of the plastic frame as illustrated in the figure. Using pullers, firmly grip the adapter, pull it up and slide it out of the slot.
- Note:** If the adapter is a Type 3, there will be a plastic spacer installed to hold the adapter in position.



If you are removing a Type 5 adapter, using pullers, firmly grip the adapter, pull it up and then slide it out of the slot.



7. Check the adapter just removed, and record the settings of any jumpers or switches that are present. Store the adapter in an antistatic envelope.
8. If the adapter will not be replaced with another one, you must install a dummy plate in the free slot to provide EMC shielding, protect the cage from dust or any debris, and to guide cooling air to the top side of the unit.

Position the dummy plate in the free slot, then secure it using the retaining screw on the MCA card cage.

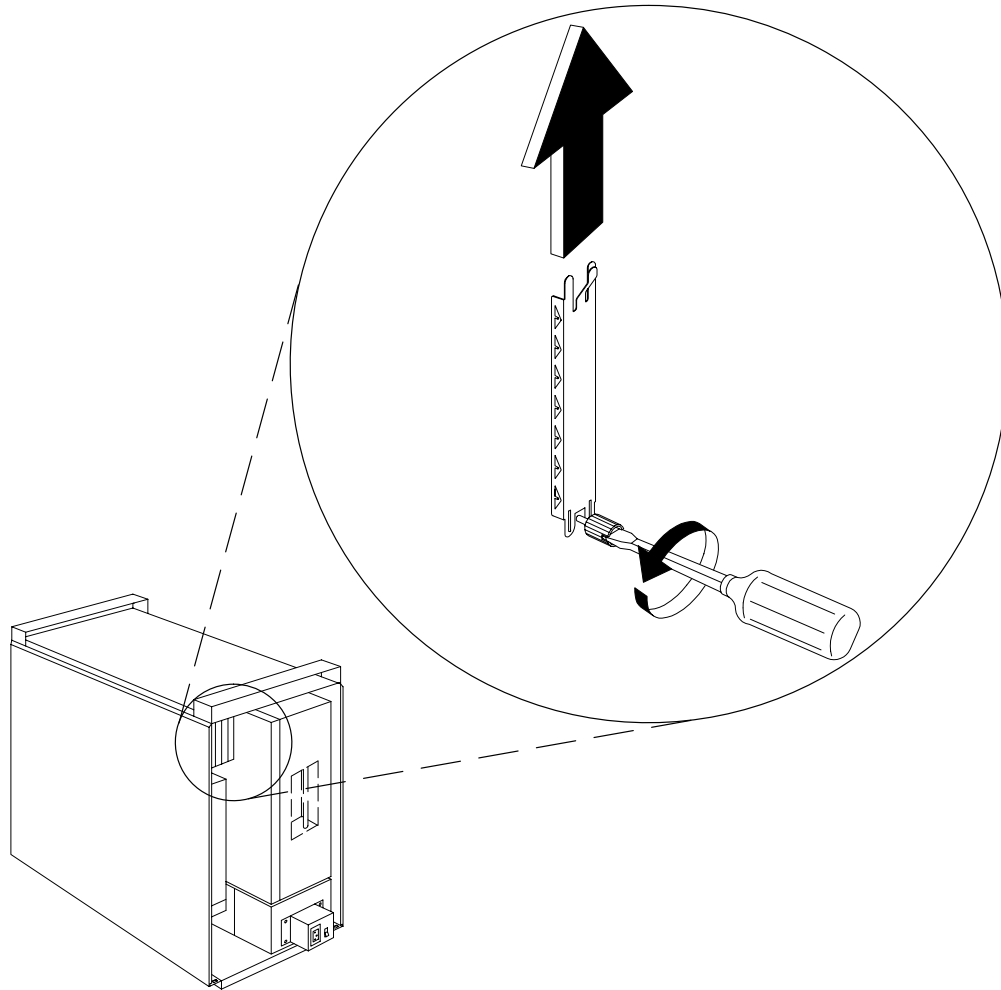
## Replacement

**Attention:** It is strongly recommended that you keep the adapter in the antistatic envelope until you are ready to insert it in the required MCA card cage slot. This will protect it against electrostatic discharge. Be careful in handling the adapter: use the adapter pullers and do not touch the adapter components.

1. If you are replacing an existing adapter, set the jumpers or switches on the replacement adapter to match the settings you recorded from the adapter previously removed. Continue with step 3 of this procedure.

If you are installing the adapter for the first time, that means this adapter does not replace another one. Set the jumpers or switches according to your configuration requirements. Continue with next step.

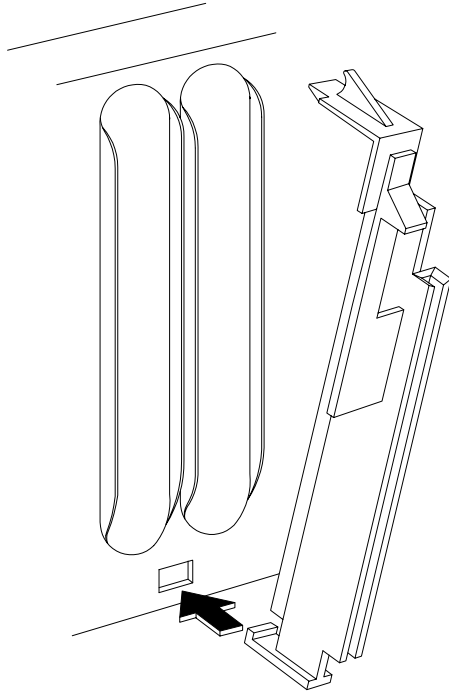
2. Remove the dummy plate that covers the designated slot:
  - a. Loosen the retaining screw on the MCA card cage. Then slide the dummy plate out of the slot as indicated in the figure. Store this dummy plate for possible future use.



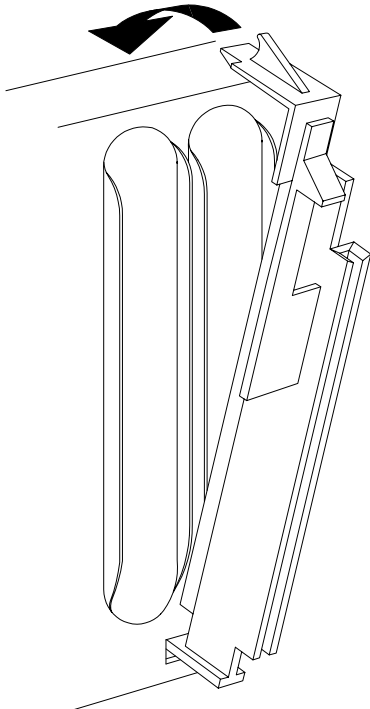
3. Identify the type of the adapter you are installing. Continue with this step if you are installing a Type 3 adapter; otherwise proceed to Step 4.

If required, install the plastic frame used to adapt the slot to the Type 3 adapter:

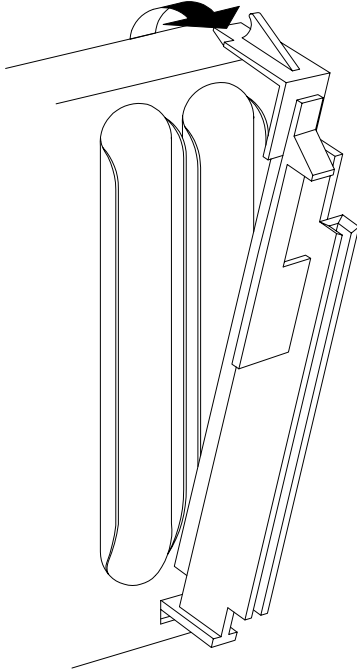
- a. Insert the pin located on the bottom of the plastic frame into the corresponding hole of the required slot.



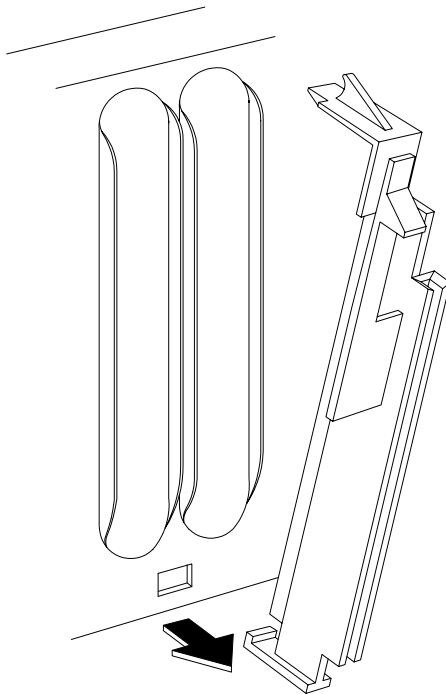
- b. When the pin is in place push the top of the plastic frame to the MCA card cage. Proceed to Step 5 of this procedure.



4. If you are installing a Type 5 adapter, the plastic frame is not required.  
If a plastic frame is present in the free slot, remove it if installing a Type 5 adapter.
  - a. Pull the plastic frame out as illustrated in the figure.



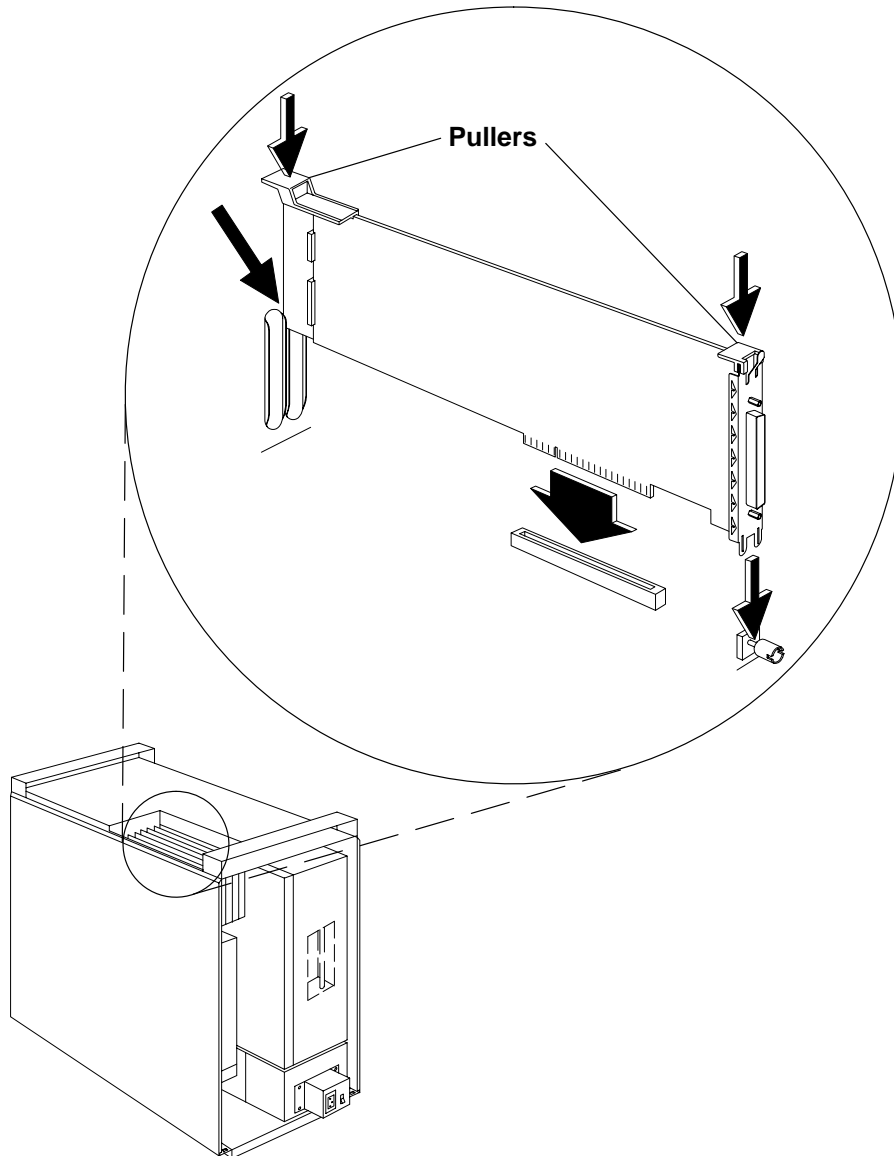
- b. To remove the plastic frame from the MCA card cage, slide the pin out of the corresponding hole.



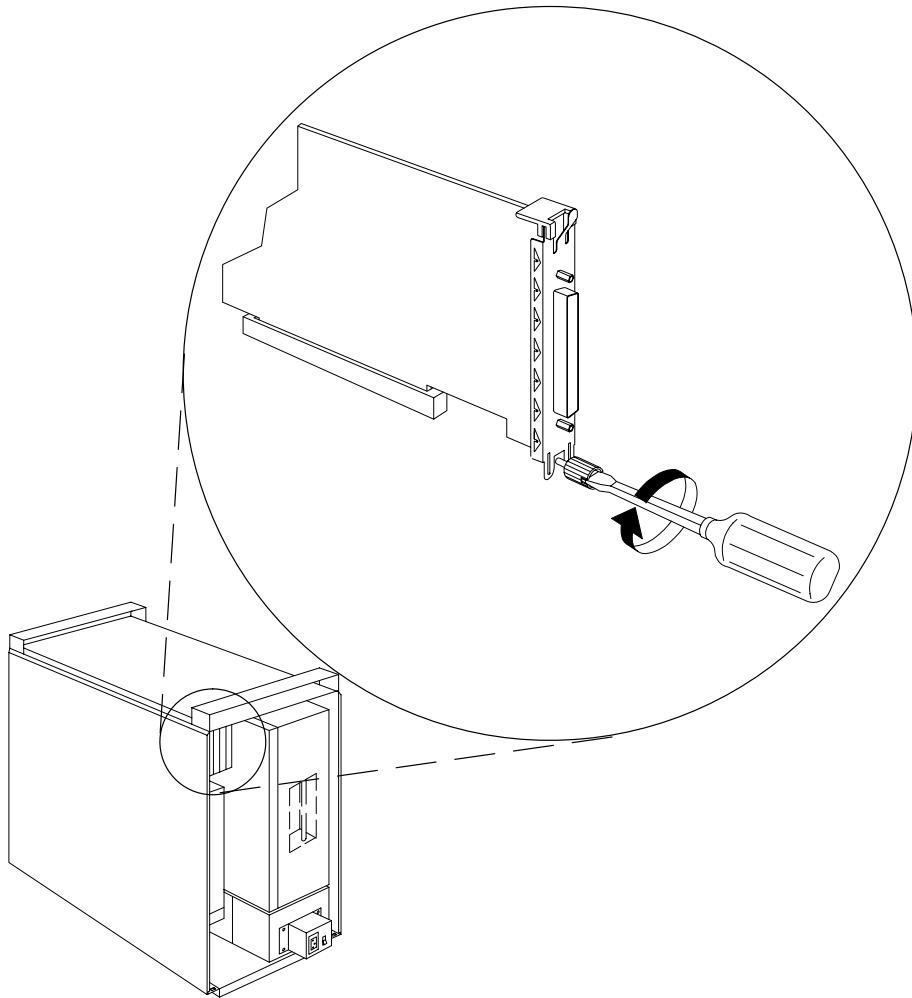
It is recommended to store this plastic frame for possible future use.



5. Align the adapter with the designated slot and insert the adapter into the card cage. Press down on the pullers of the adapter to firmly seat the adapter in the slot.



6. Tighten the retaining screw on the MCA card cage to secure the adapter in the slot.



7. Connect any connector cables to the adapter just installed.
8. Replace the top, front, and rear covers.
9. In reverse, do order the steps listed in "Preliminary Operations" on page 4-2.

---

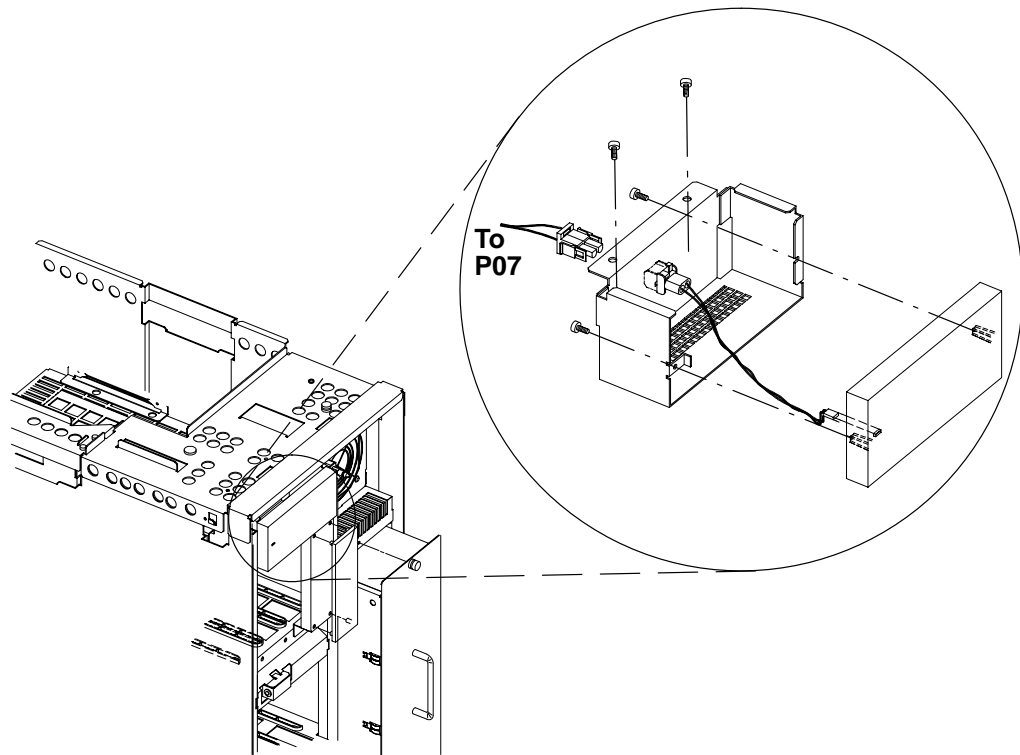
# Expansion Unit Operator Panel and Power-on Light

## Removal

1. Do the steps detailed in "Preliminary Operations" on page 4-2.
2. To access the expansion unit operator panel and power-on light, remove the rear, front, and top covers of the unit following the procedures described, respectively, on pages 4-4, 4-7, and 4-10.
3. Loosen the screws that secure the operator panel to the top of the expansion unit chassis.
4. Pull the operator panel out until you can access the rear of the panel, and loosen the screws that secure the bezel to the operator panel.
5. Disconnect both ends of the power-on light cable and remove from the operator panel.

## Replacement

1. Connect both ends of the power-on light cable to the appropriate connectors in the operator panel.
2. Tighten the screws holding the bezel to the operator panel.
3. Hold the operator panel in position and tighten the screws that secure the operator panel to the top of the expansion unit chassis.
4. Replace the top, front, and rear covers.
5. In reverse order, do the steps listed in "Preliminary Operations" on page 4-2.



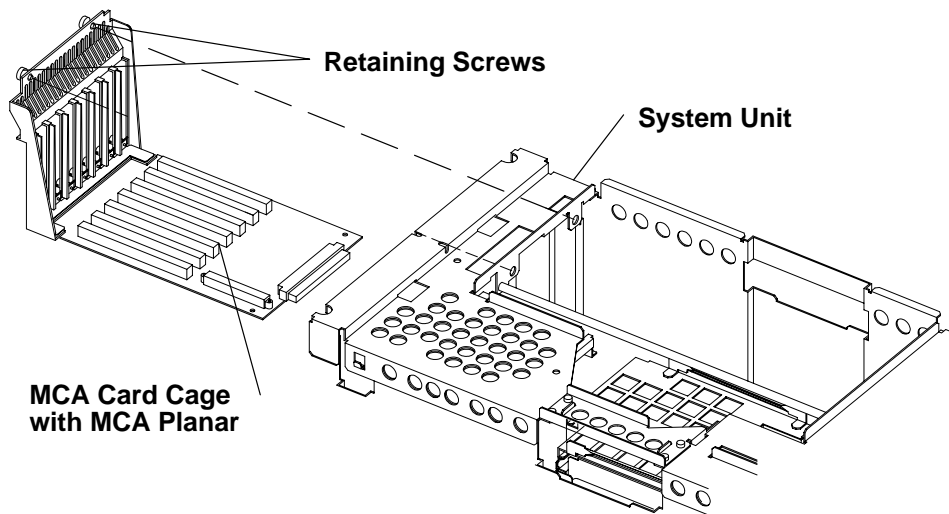
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## MCA Planar

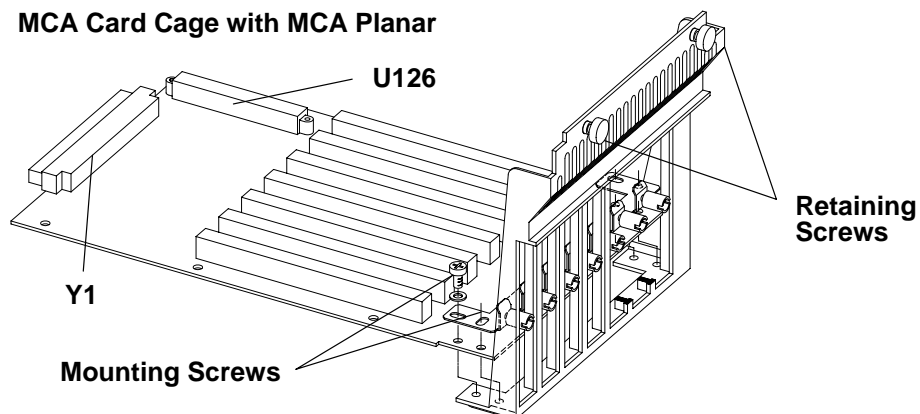
**Note:** This procedure can be used for the base unit or expansion unit MCA planar.

### Removal

1. Do the steps detailed in "Preliminary Operations" on page 4-2.
2. To access the MCA planar in the MCA card cage, remove the rear cover, front cover, and top cover, following the procedures described on pages 4-4, 4-7, and 4-10, respectively.
3. Remove all adapters, following the procedure in "Adapters" on page 4-15.
4. Remove any dummy plate installed on the MCA card cage. This step is needed only if you want to exchange the MCA planar.
5. Disconnect the FXB/FXE cable from the U126/Y1 connector on the MCA planar.
6. Loosen the retaining screws which secure the MCA card cage to the unit.



7. Remove the MCA planar mounting screws.
8. Rotate the handle of the bar used to lock the front cover until you are able to slide the MCA card cage out of the unit, then remove the MCA card cage from the unit.



9. Remove the MCA planar from the MCA card cage.

## Replacement

1. Position the MCA planar into the MCA card cage.
2. Secure the MCA planar to the MCA card cage tightening the mounting screws.
3. Replace the MCA card cage into the unit, then rotate the handle of the bar used to lock the front cover.
4. Replace the retaining screws which secure the MCA card cage to the unit.
5. Reconnect the FXB/FXE cable to the U126/Y1 connector on the MCA planar.
6. Replace any dummy plate that was removed from the MCA card cage.
7. Replace all adapters removed from the MCA card cage, following the procedure in "Adapters" on page 4-15.
8. Replace the top, front, and rear covers after having performed all needed operations.
9. In reverse order do the steps listed in "Preliminary Operations" on page 4-2.

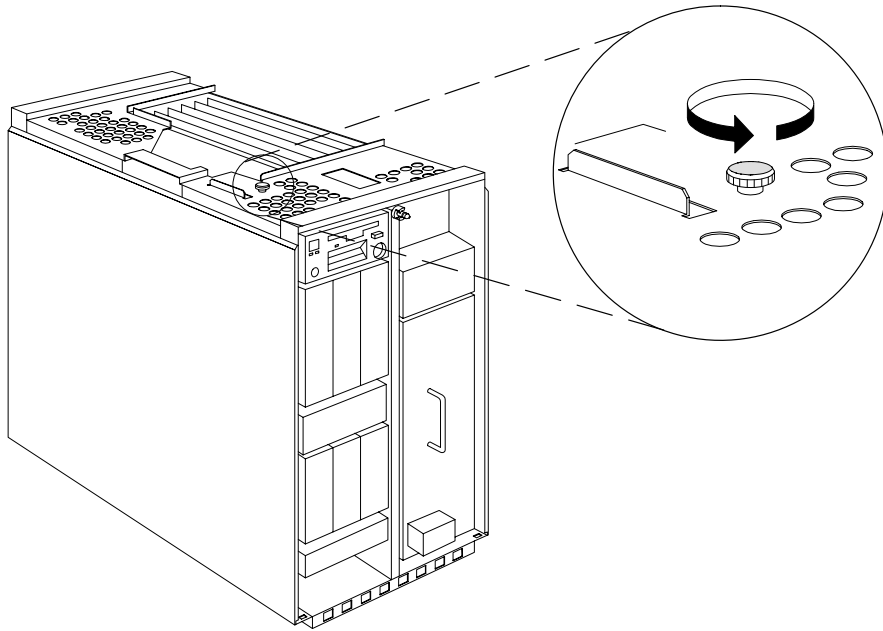
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## Base Unit Operator Panel

This procedure describes removing and replacing the operator panel in the base unit.

### Removal

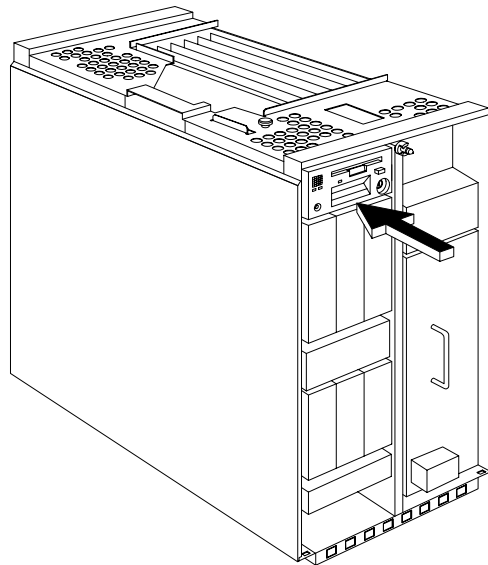
1. Do the steps detailed in "Preliminary Operations" on page 4-2.
2. To access the operator panel, remove the rear, front, and top covers of the unit following the procedures described respectively on pages 4-4, 4-7, and 4-10.
3. With your fingers, loosen the retaining screw on the top of the operator panel until it stops.



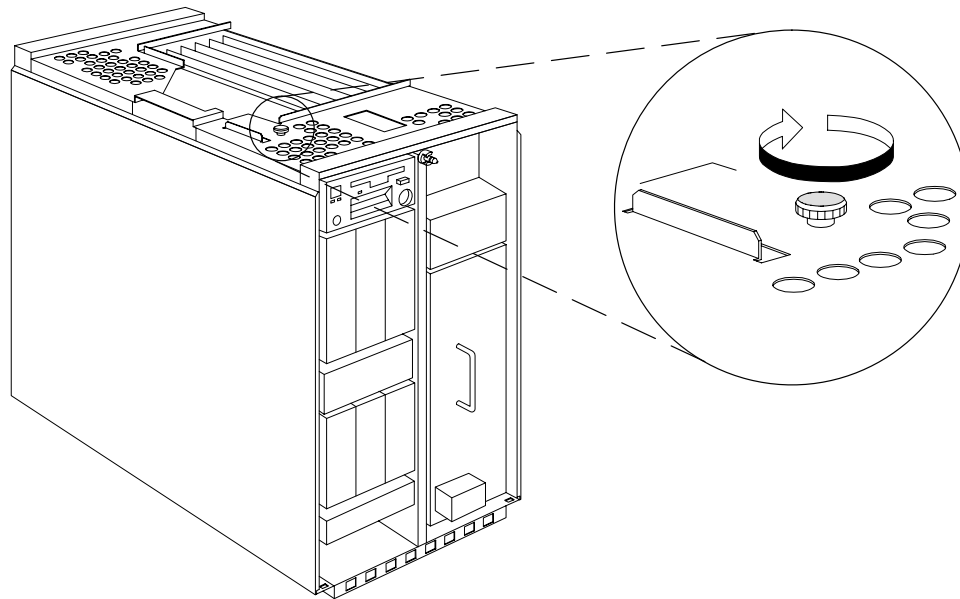
4. Gently pull out the operator panel from the front of the base unit to remove it.

## Replacement

1. Align the operator panel with the guides and slide it into the base unit.



2. When the operator panel is in place, secure it with the retaining screw. To connect the operator panel securely and firmly to the back plane of the unit, turn this screw clockwise until it stops.



3. Replace the top, front, and rear covers.
4. In reverse order, do the steps listed in "Preliminary Operations" on page 4-2.

**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.

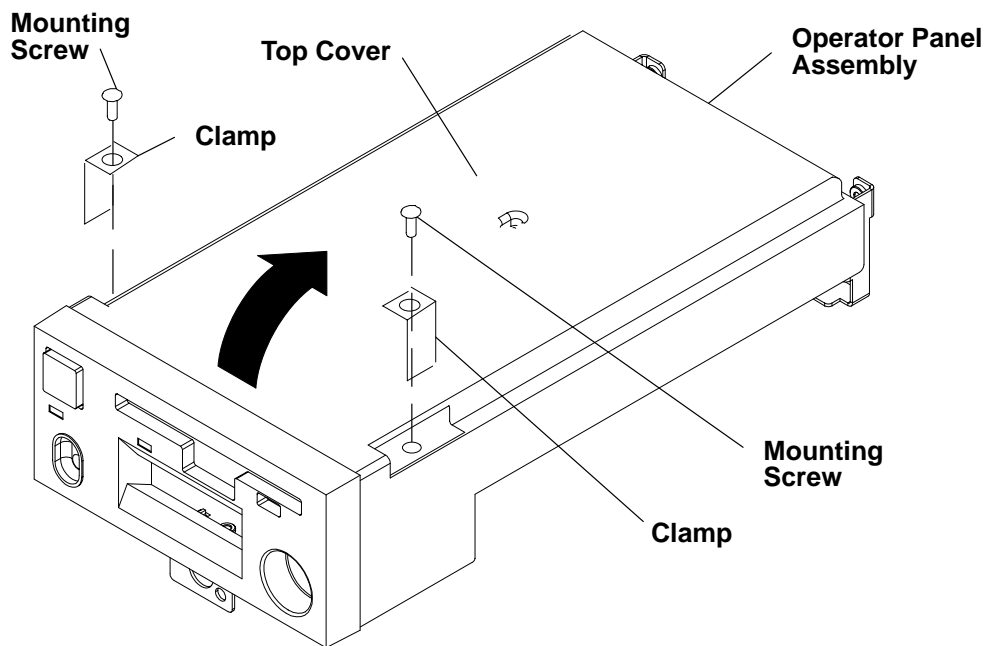
**Attention:** Go to page 2-12 for instructions to Set Unit Number for any attached expansion unit. If the unit number is not set, the system will not boot.

---

## 3.5-Inch Diskette Drive

### Removal

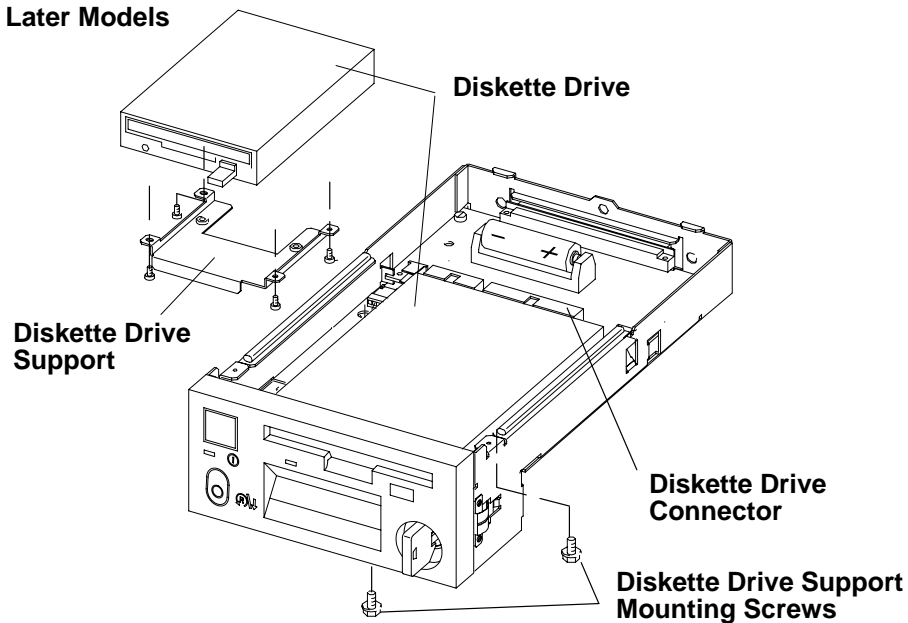
1. The 3.5-inch diskette drive is part of the operator panel subassembly. It is accessible from the upper side of the operator panel, after having removed it from the base unit.  
Remove the operator panel from the base unit, as described in "Operator Panel" on page 4-26.
2. Remove the two mounting screws 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.





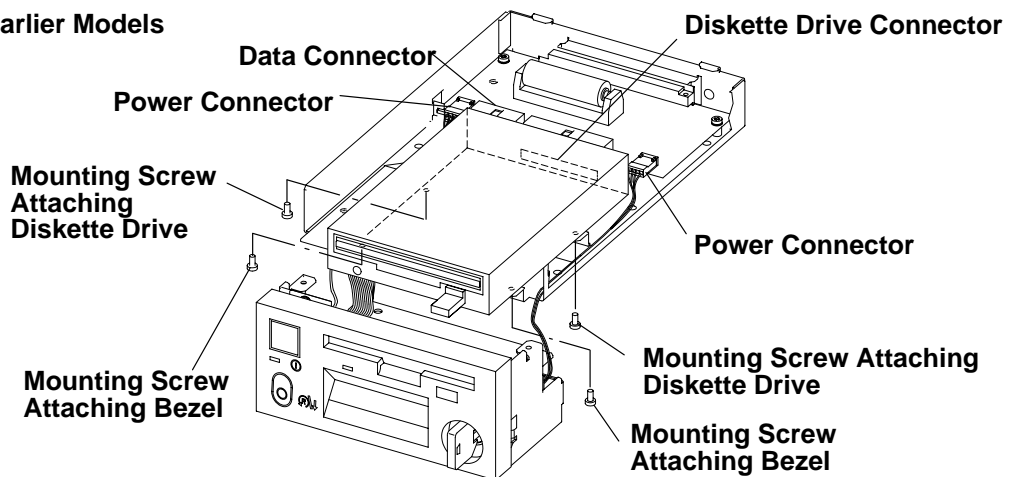
4. Disconnect the 3.5-inch diskette drive connector.
5. For later models, remove the two mounting screws attaching the diskette drive to the operator panel assembly, then remove the diskette drive from the operator panel assembly.
6. From the bottom of the diskette drive, remove the four mounting screws 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.

---

# Lithium Battery

## Removal

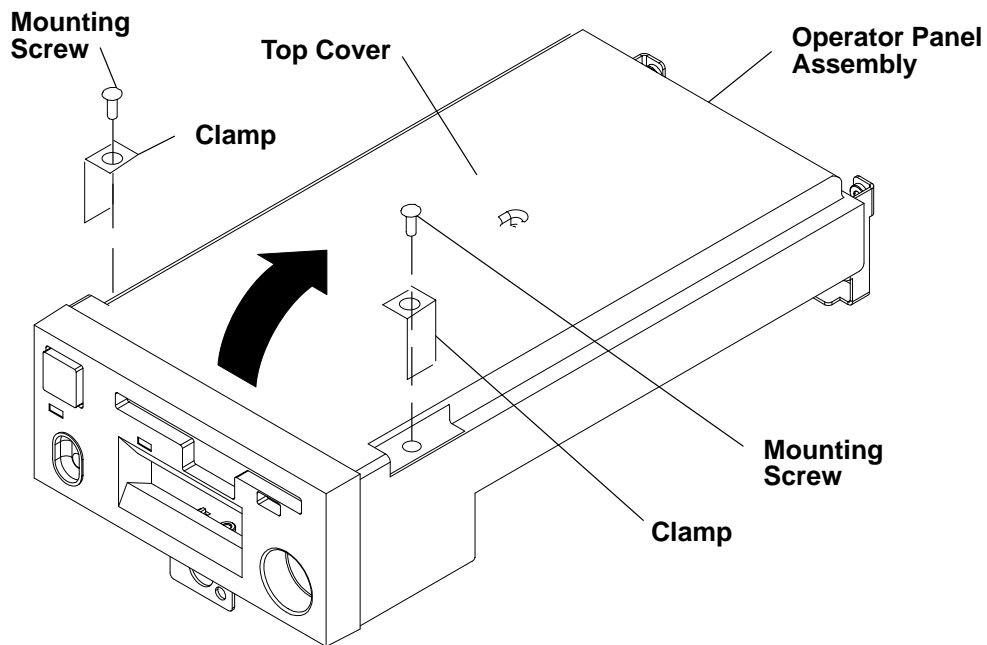
**CAUTION:**

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.

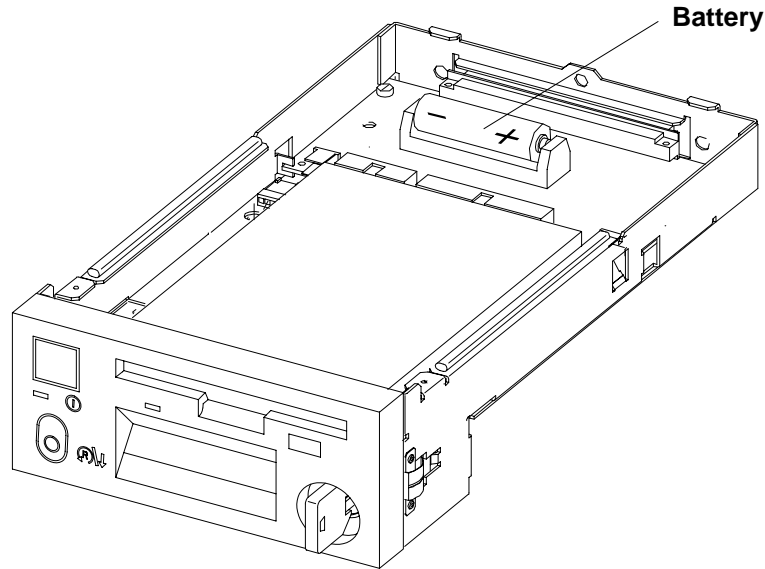
The battery connector is polarized; do not attempt to reverse the polarity.

Dispose of the battery according to local regulations.

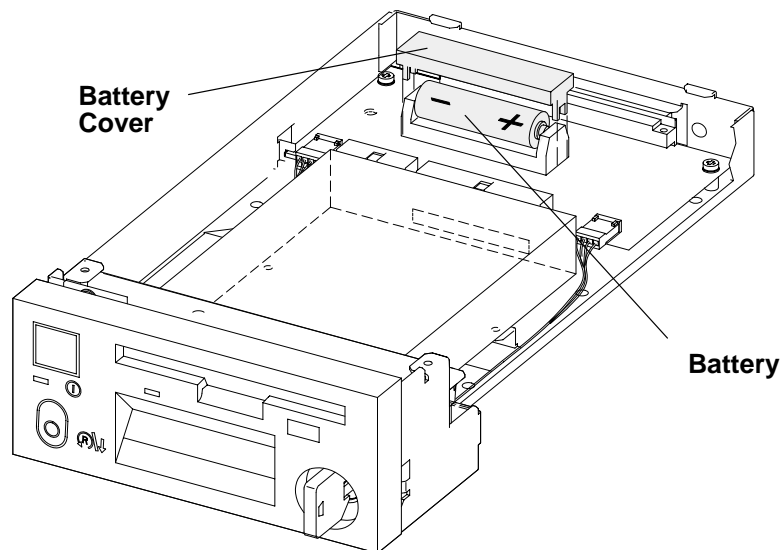
1. Do the steps detailed in the removal procedure in “Operator Panel” on page 4-26.
2. Remove the two mounting screws and clamps attaching the top cover to the operator panel assembly.
3. Rotate the front of the top cover upwards, and then remove the top cover.



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.

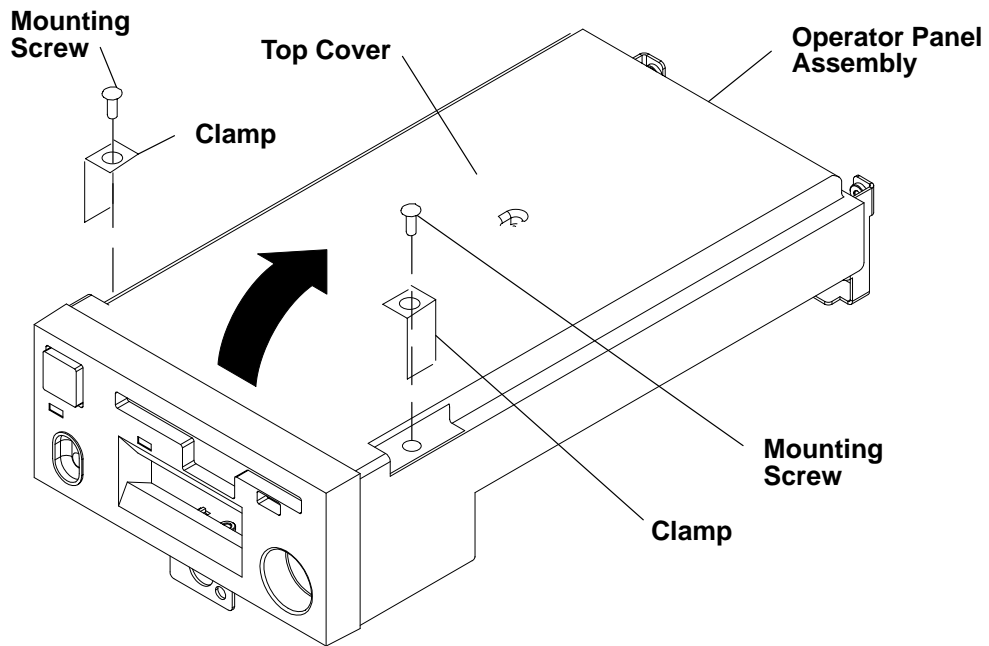
**Attention:** Go to page 2-12 for instructions to Set Unit Number for any attached expansion unit. If the unit number is not set, the system will not boot.

---

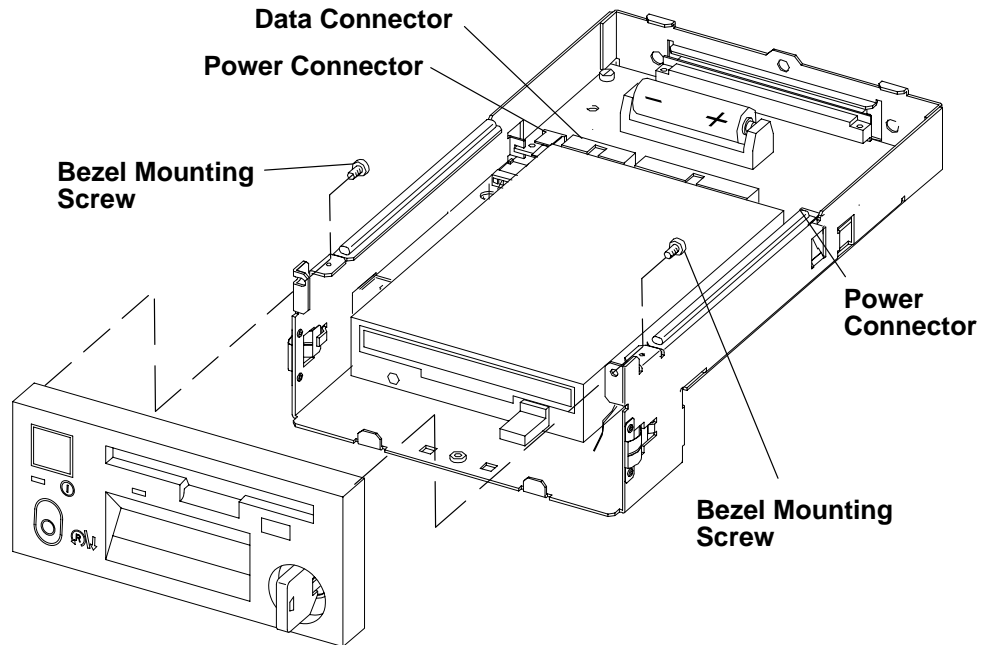
## Operator Panel Bezel

### Removal

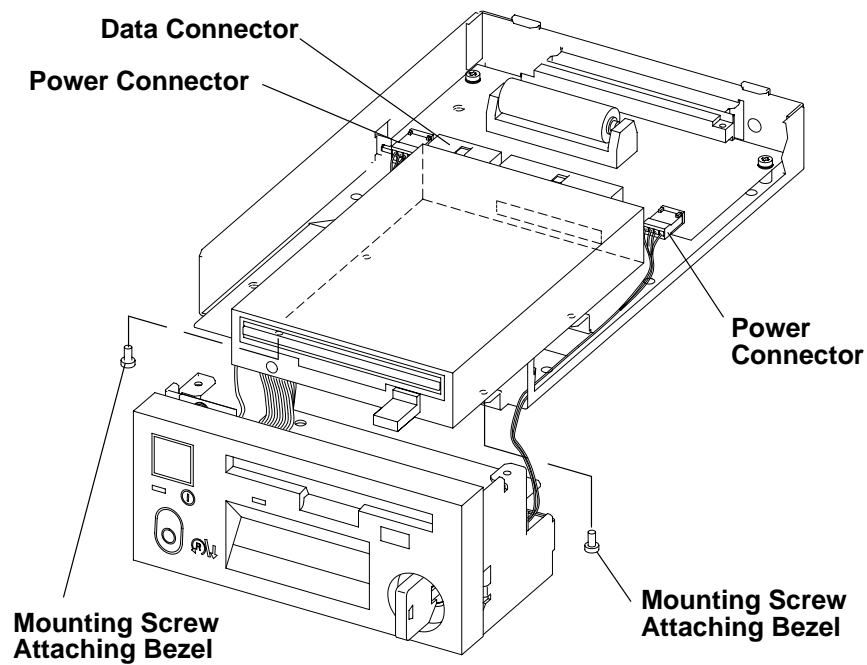
1. Do the steps detailed in the removal procedure in "Operator Panel" on page 4-26. The operator panel bezel is then accessible from the upper side of the operator panel.
2. Remove the two mounting screws and clamps attaching the top cover to the operator panel assembly.
3. Rotate the front of the top 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.

---

## Media Drives

The following removal and installation procedures apply to all media drives that are supported and available for 7013 J Series systems.

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

**CAUTION:**

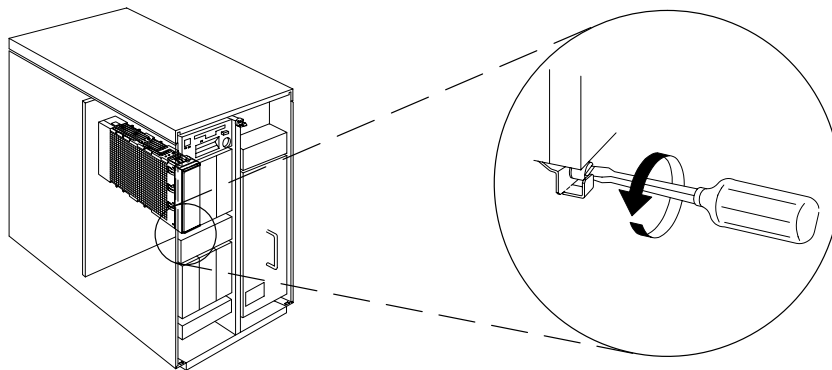
**A class 3 laser may be contained in the device. Do not attempt to operate the drive while it is disassembled. Do not attempt to open the covers of the drive as it is not serviceable and is to be replaced as a unit.**

## Removal

1. The media drives replacement and installation procedures do not require powering off the machine.
2. Before removing the drive from the unit, ensure that it does not contain any media.

**Attention:** When you remove a drive, you must remove it from the system configuration. Failure to do so may result in the significant loss of data.

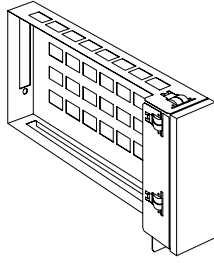
3. Remove the drive from the system configuration as described on page 4-36.
4. If the machine is running, ensure that the OK indicator (yellow LED) of the drive you want to remove is not lit (powered off).
5. To remove or install the media drives, remove the front cover of the unit following the procedure described in "Front Cover" on page 4-7.
6. Unscrew the retaining screw indicated in the figure using a screwdriver. Firmly grip the device and pull it out of the unit.



7. If you do not replace the device just removed with any other device or hard disk, insert the plug shown in the following figure into the designated slot.

This plug was shipped with the system unit and must be inserted with its locking flange in the lower side of the slot.

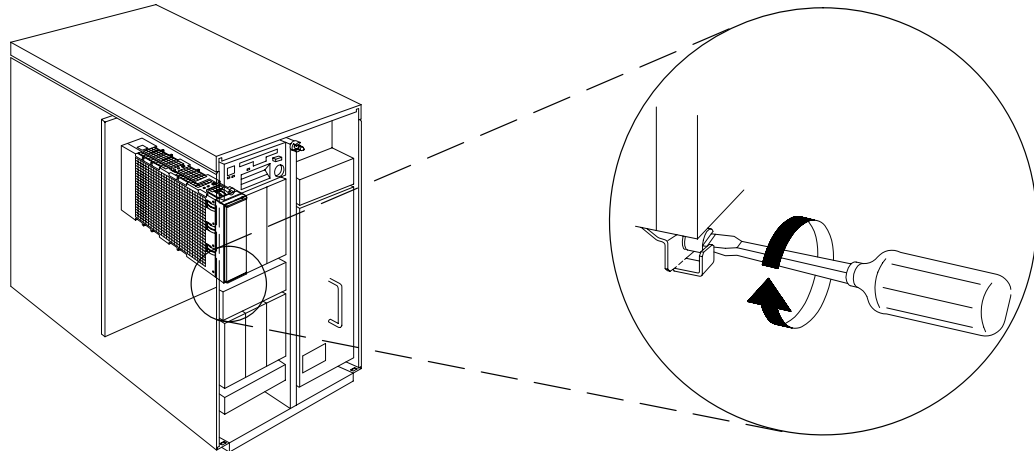
Then secure the plug to the unit, tightening the retaining screw.



## Replacement

**Note:** The media drives are auto-configured, which means that no operations are needed to attribute a physical SCSI address to the media devices that you are installing.

1. If a plug is inserted into the slot in which you are installing the device, remove it first unscrewing its retaining screw in the lower side of the slot, and then sliding it out.
2. Align the drive with its guides in the desired slot and then slide it inside the unit. The drive must be inserted with the locking hook in the lower side of the slot. Tighten the retaining screw.



3. If the system is running, configure the drive using the procedure described on page 4-36.
4. Replace the front and rear covers after having performed all needed operations.
5. Attach the power cable to all system units.
6. Attach the power cable to all external devices connected to the system unit, if any.
7. Make sure the power switches for all external devices connected to the system unit, if any, are set to ON.
8. Starting with the expansion unit, if any, turn the toggle switch located on the main power switch module to ON, switching it to the I position.
9. Starting with the expansion unit, power on the unit by pushing the power button on the operator panel.

---

## Unconfiguring or Configuring a Drive

There are three conditions where you need to use these procedures:

- You are removing or installing a drive while the system power is turned on. This is called Hot Removability Capability.
- You are installing a new drive.
- You are removing a drive from the system.

In each case you do the same procedure. The procedure removes the drive completely from the system configuration or adds a drive to the system configuration.

### Unconfiguring

**Attention:** If you try to remove the top cover without having performed this step, the machine will stop automatically, and file system integrity may be affected.

To unconfigure and power off a disk drive:

1. Login as **root**.
2. Enter the **smit** command.
3. Select Devices.
4. Determine the type of drive you want to unconfigure; then select that type drive. When you get to the Keep Definition option, select **yes**. This retains the details of the drive in the device configuration database.
5. Select the **Do** option to unconfigure and power off the drive. Ensure that the OK indicator (yellow LED) of the drive you want to remove is not lit (powered off).
6. Go to the front or rear drive removal procedure.

### Configuring

1. After you have finished the drive installation procedure do the following:
2. Login as **root**.
3. Enter the **smit** command.
4. Select Devices.
5. Select the type of drive you want to configure.
6. Select Add for the type drive you are configuring, then select the type of drive you are adding.



---

## Media Drives (Carrier, Drive)

### Notes:

1. The following procedures apply to any type of media drive supported by the system. For each media drive, refer to *Adapters, Devices, and Cable Information*, order number SA23-2764, for details regarding the jumper settings for the specific drive in your carrier.
2. If your drive is different from the drawing, carefully note the positions of the cable and jumpers during the removal steps for reference during the replacement steps.

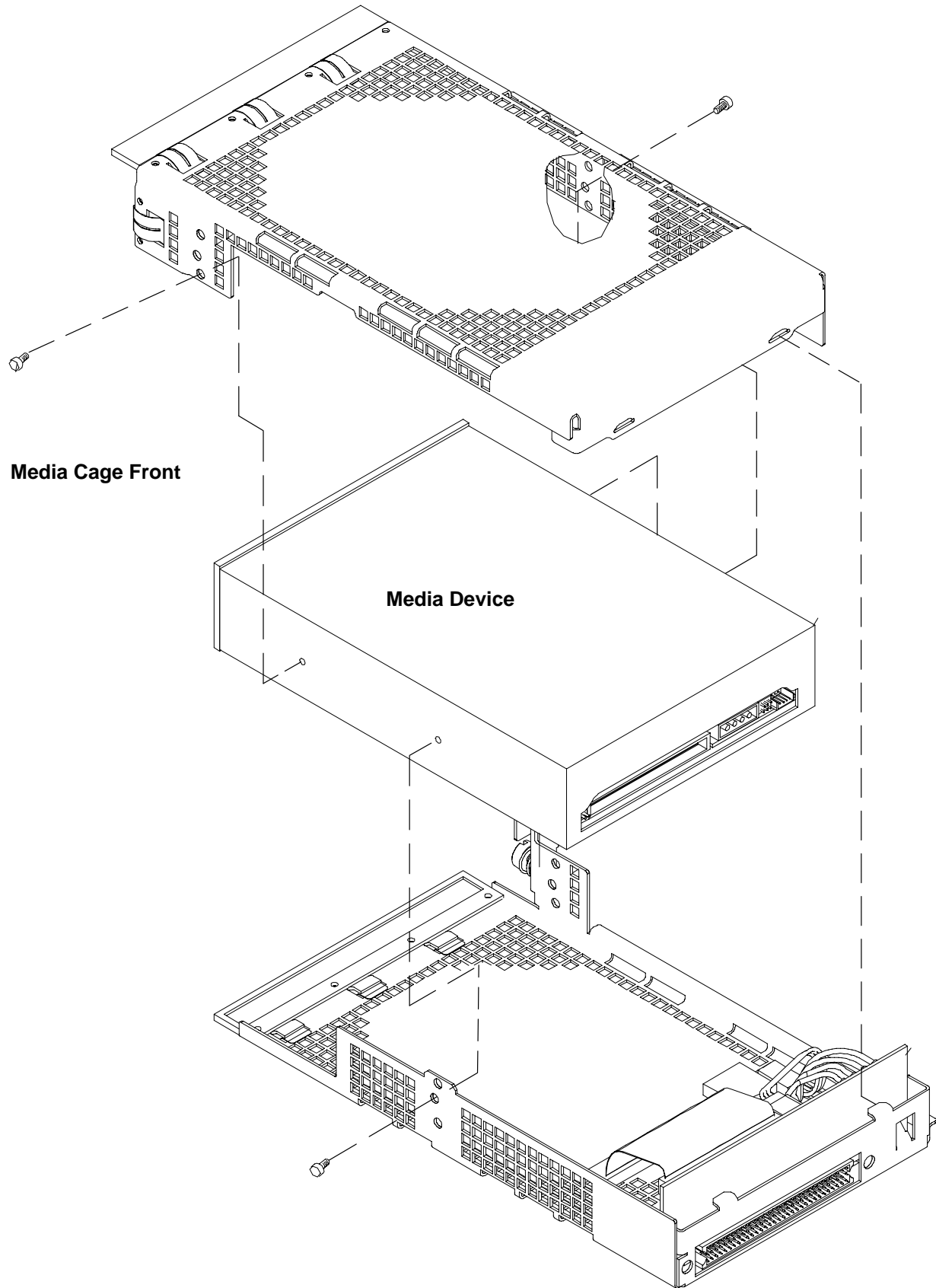
## Carrier and Drive

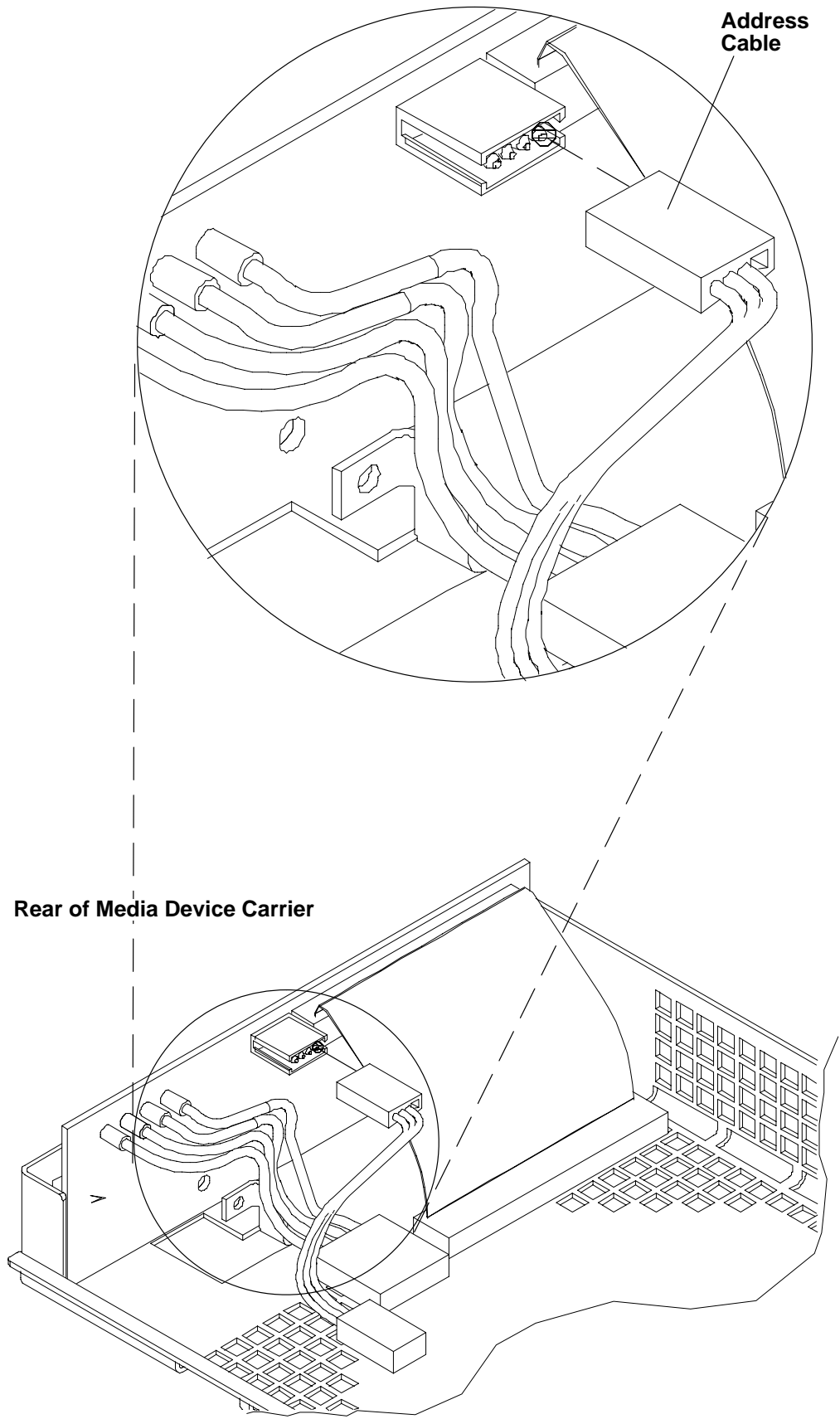
### Removal

1. Remove the media drive from the unit, as described in "Media Drives" on page 4-34.
2. Cut the warranty label.
3. Loosen the carrier mounting screws used to hold the device in the carrier.
4. Remove the carrier cover.
5. Disconnect any cable connected to any connector on the device.
6. Lift the device out of the carrier.

### Replacement

1. Position the device on the bottom support of the carrier.
2. Connect any cable to the dedicated connector on the device.
3. Install the carrier cover. Then secure the device and the carrier tightening the appropriate carrier mounting screws with a torque of 1 Newton/Meter  $\pm$  0.1 Newton/Meter.





---

## Disk Drives

### Notes:

1. Use caution when handling all disk drives. Drives are more likely to be damaged during installation and service. Bumping or handling drives roughly causes latent failures. Do not stack drives and always use appropriate ESD practices. A drop of as little as 1/4-inch can cause latent failures. Because drives can take 30 seconds to spin down, allow at least a 30 second delay after switching a drive off before removing it from the system unit.
2. It is not necessary to power down the system to remove or install the disk drives.
3. The procedures for removal and replacement of the disk drives described in the following pages are applicable to each disk drive removed from or installed in either the base unit or the expansion unit, both in the front and in the rear side. The two figures related respectively to the removal of the disk drive from the unit, and to the replacement of the disk drive in the unit, show the base unit front side, but these must be considered in any case.

**Attention:** The 9.1GB Disk Drive can only be installed in positions on the front of the unit. Positions B2 and B3 in model J50 base unit cannot be used for new disk drives. If the system is upgraded to a model J50, drives moved during the model upgrade can be used in these positions.

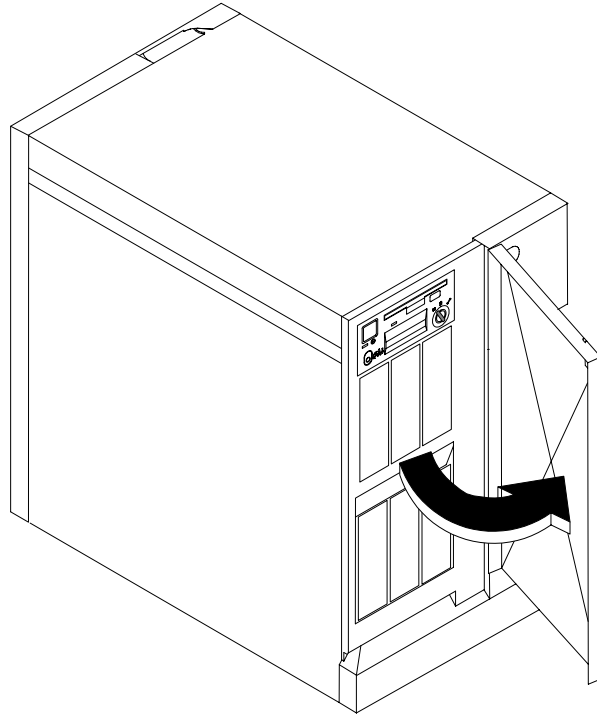
## Removal

1. If the system is running, unconfigure the disk drive you are removing by following the "Unconfigure" procedure on page 4-36.
2. If the system is running and you are removing:
  - a. a disk drive subject to the high removability feature (lower front), go to step 3.
  - b. a disk drive from the rear of the unit, go to step 7.
  - c. a disk drive from the upper front of the unit, go to step 11.

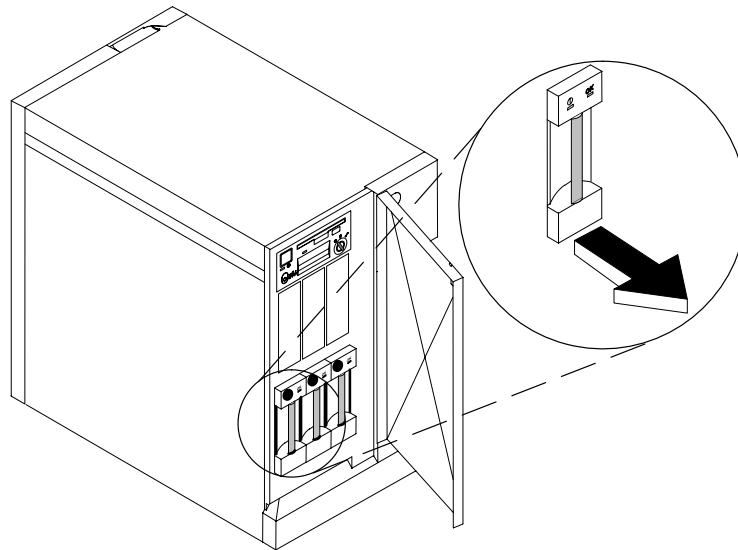
## Lower Front Disk Drives

**Note:** If High Security is installed (installed on all systems at the factory), the front cover must be removed before a disk drive can be removed. See “Front Cover” on page 4-7.

3. Open the front door of the unit.



4. Be sure the yellow indicator on the drive you are removing is off (powered off); firmly grip the handle of the disk drive you are removing and pull the disk drive out of the unit.



5. If you are not replacing the disk drive that you just removed, close the door that was opened in step 3 of this procedure.
6. If you are replacing the disk drive, go to page 4-42

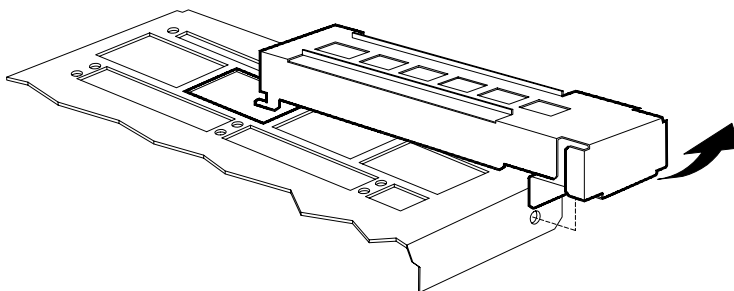
## Rear Disk Drives

7. To remove any disk drive located in the rear of any unit, remove the rear cover, following the procedure described in “Rear Cover” on page 4-4.
8. Be sure the yellow indicator on the drive you are removing is off (powered off); firmly grip the handle of the disk drive you are removing and pull the disk drive out of the unit.
9. If you are not replacing the disk drive that you just removed, replace the rear cover that was removed in step 7, following the procedure described in the “Rear Cover” on page 4-4, or “Front Cover” on page 4-7, as applicable, go to page 4-42.
10. If you are replacing the disk drive, go to page 4-42.

## Upper Front Disk Drives (In Media Positions)

11. If you are removing the disk drive from a slot normally dedicated to the media devices (upper front), remove the the rear and the front covers, following the procedure described in the “Rear Cover” on page 4-4 and “Front Cover” on page 4-7.
12. Be sure the yellow indicator on the drive you are removing is off (powered off); firmly grip the handle of the disk drive you are removing and pull the disk drive out of the unit.
13. If you do not plan to insert any other disk into this slot, remove the metallic wedge installed in it, and replace it with the plug used to protect the free slot. Refer to “Media Drives” on page 4-34, for more detailed information about the plug replacement.

Remove the metallic wedge from the designated slot, as illustrated in the following figure. Then continue with step 3.



14. If you are not replacing the disk drive that you just removed, replace the covers that were removed in step 11, following the procedures described in “Rear Cover” on page 4-4 and “Front Cover” on page 4-7.
15. If you are replacing the disk drive, continue reading.

## Replacement

A disk drive can be installed in any free slot in the base unit or in the expansion units, according to the system configuration. With the following exception:

**Attention:** The 9.1GB Disk Drive can only be installed in positions on the front of the unit. Positions B2 and B3 in model J50 base unit cannot be used for new disk drives. If the system is upgraded to a model J50, drives moved during the model upgrade can be used in these positions.

Note that the three lower slots in the front side of the base and expansion units are dedicated to the high removability feature, because disks located in these slots are easily accessed for removal. Install disk drives in these slots if they will be removed frequently.

Install disk drives in the other dedicated slots if they are rarely removed, typically for maintenance purposes.

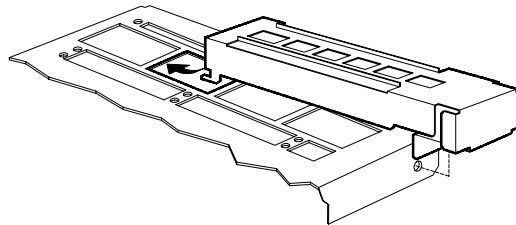
**Note:** Disk drives are auto-configured, which means that no operations are needed to assign a physical SCSI address to the disk drives that you are installing.

1. Locate the unit and the slot into which you will install the disk drive.
  - a. If you are installing a disk drive located in one of the lower front slots, go to Step 3.
  - b. If you are installing a disk drive into one of the upper front slots, that is, the slots normally used for the media devices, go to Step 2.
  - c. If you are installing a disk drive at locations in the rear of the unit, go to Step 6.

### Upper Front Disk Drives (In Media Positions)

2. If you are installing a disk drive in a slot normally dedicated to the media devices (upper front), first you must insert a special metallic wedge, following the steps listed below, then go to step 3.

- a. Insert the metallic wedge in the designated slot, as illustrated in the figure.



- b. After having opened the door located on the front cover of the unit, pull the retaining clip corresponding to the designated slot out of the shutter.
    - c. Insert the same retaining clip in the dedicated slit located in the rear of the lower shutter, as indicated in the figure.
3. Align the disk drive with its guides in the desired slot and slide it into the unit until its connector plugs into the connector on the back plane of the unit.
4. If the system is running, configure the drive using the procedure for “Configuring” on page 4-36.
5. Replace the front and rear covers following the procedure described in “Front Cover” on page 4-8 and “Rear Cover” on page 4-5.

### Rear Disk Drives

6. Align the disk drive with its guides in the desired slot and slide it into the unit until its connector plugs into the connector on the back plane of the unit.
7. If the system is running, configure the drive using the procedure for “Configuring” on page 4-36.
8. Replace the rear cover following the procedure described in “Rear Cover” on page 4-5.

### Lower Front Disk Drives

9. Align the disk drive with its guides in the desired slot and slide it into the unit until its connector plugs into the connector on the back plane of the unit.
10. If the system is running, configure the drive using the procedure for “Configuring” on page 4-36.
11. Close the front door.

---

## Disk Drives, (Carrier, 8 bit Disk Drive)

**Note:** The following procedures apply to 8 bit disk drives supported by the system. If the drive is not a 1GB type 0662 or a 2GB type 0664, carefully note the positions of the cable and jumpers during the removal steps for reference during the replacement steps.

### Carrier and Disk Drive

#### Removal

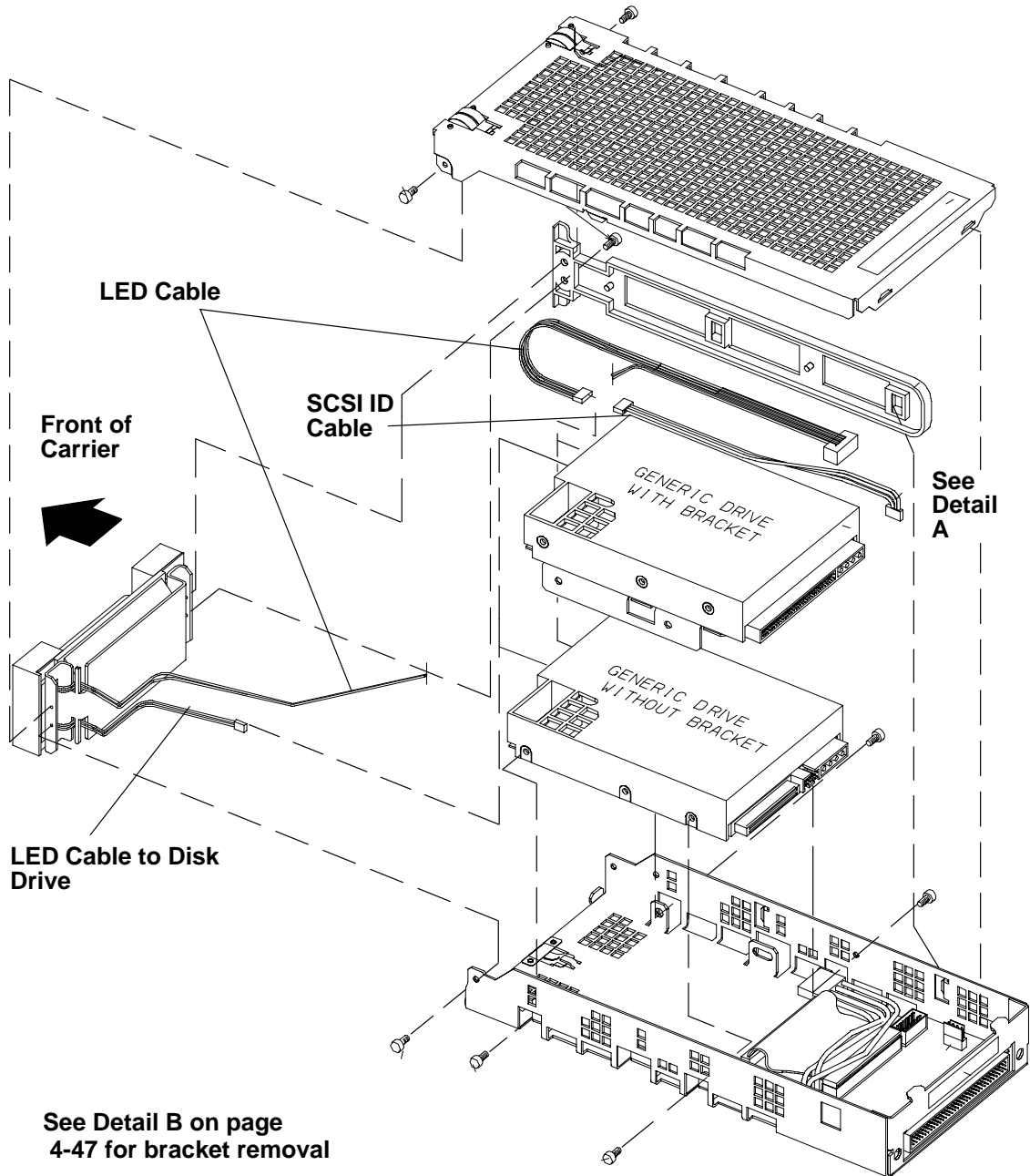
1. Remove the disk drive from the unit, as described in the removal procedure in "Disk Drives" on page 4-40.
2. Cut the warranty label.
3. Loosen the mounting screws used to secure the carrier cover, using a screwdriver.
4. Remove the carrier cover.
5. Disconnect all cables connected to the disk drive, both on the front and on the rear.
6. Loosen the mounting screws holding the carrier guide.
7. Pull the guide out of the carrier.
8. Loosen the mounting screws holding the disk drive in the carrier, using a screwdriver.
9. Lift the disk drive out of the carrier.

#### Installation

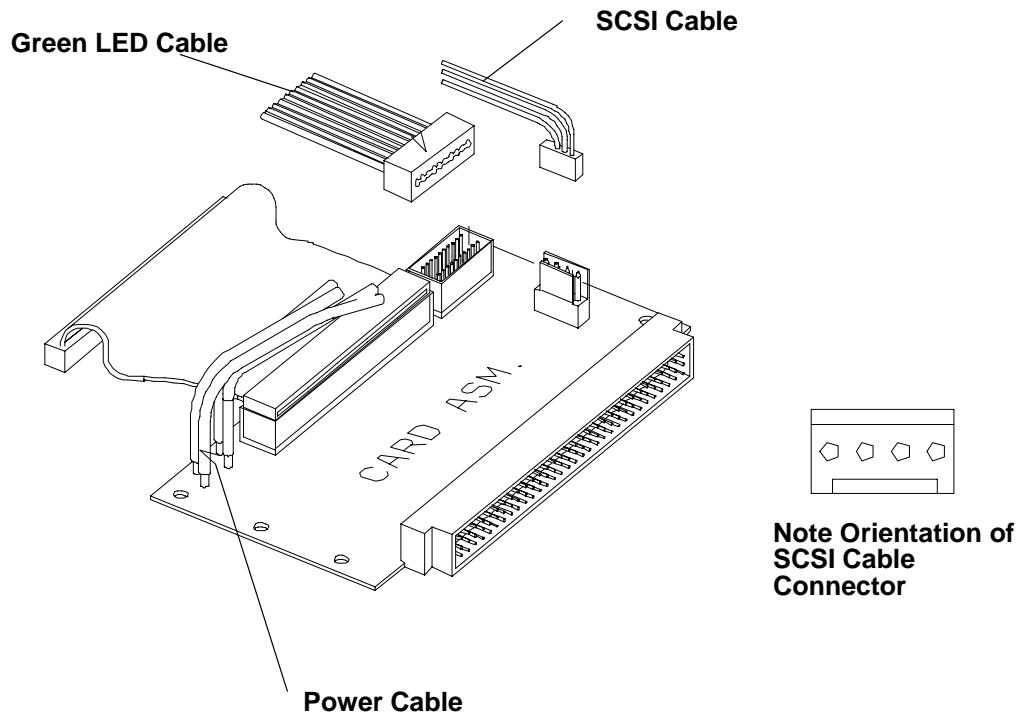
1. Connect all cables to the corresponding connectors at the front of the disk drive, as shown on page 4-45.
2. Position the disk drive on the bottom support of the carrier. Tighten the screws to secure the disk drive to the carrier.
3. Place the carrier guide in position, then secure it with the mounting screws.
4. Connect the 68 pin flex cable to the drive first, with the blue edge to the center of the carrier. Connect other end to converter card.
5. Connect both ends of the DC power cable.
6. Install the carrier cover. Tighten the appropriate mounting screws to secure the disk drive to the carrier cover.
7. Replace the carrier unit to the system, as described in the replacement procedure in "Disk Drives" on page 4-40.



# 540MB, 1.0GB, 2.0GB SCSI-2 SE 8 bit Disk Drives



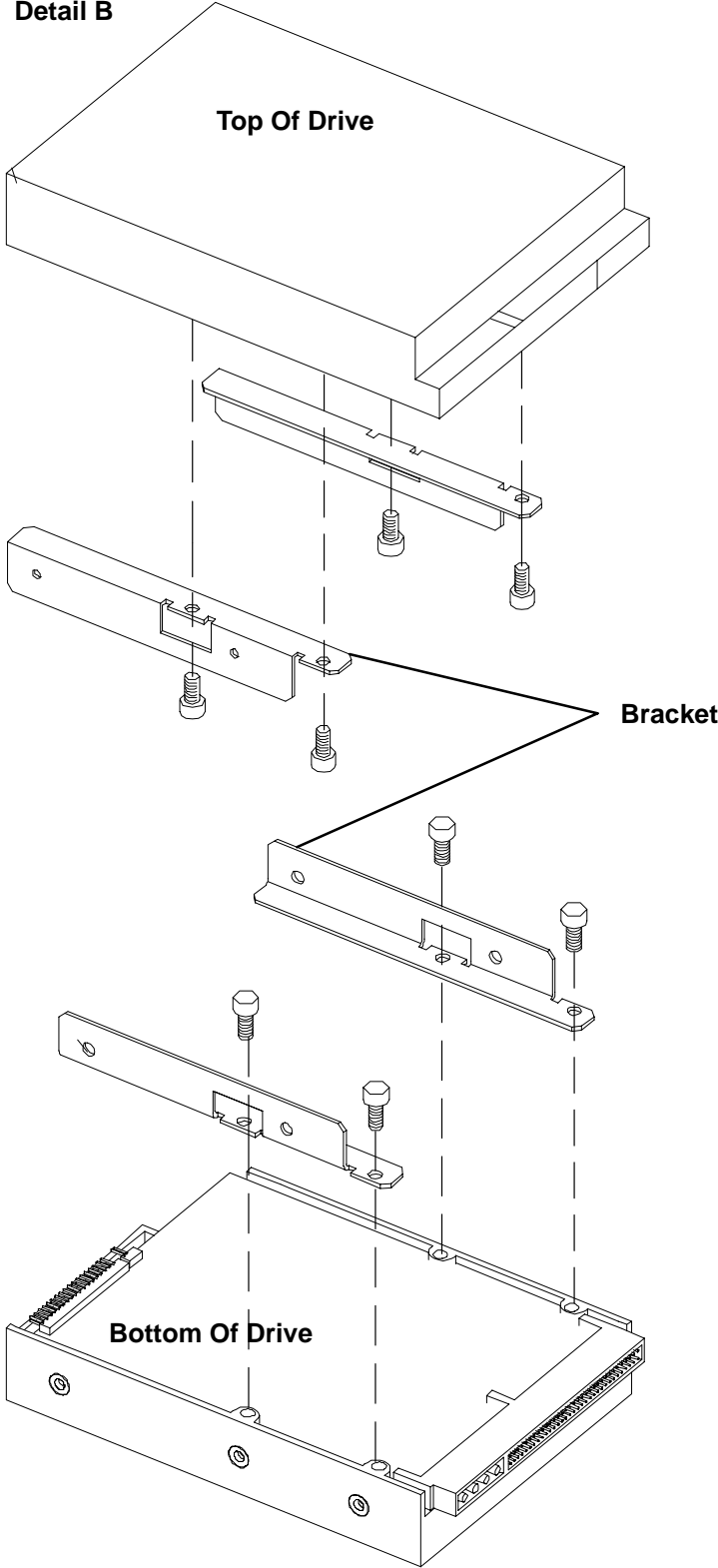
**Detail A**



# Bracket Removal

If you are replacing a disk drive that is attached to the carrier with a bracket, you need to move the bracket from the old drive to the new drive.

Detail B



---

## Disk Drives (Carrier, 16 bit Disk Drive)

**Note:** The following procedures apply to 16 bit disk drives supported by the system. If the drive is not a 1.1GB, 2.2GB, 4.5GB, 2.0GB, or 9.1GB disk drive, carefully note the positions of the cable and jumpers during the removal steps for reference during the replacement steps.

**Attention:** The 9.1GB Disk Drive can only be installed in positions on the front of the unit.

### Carrier and Disk Drive

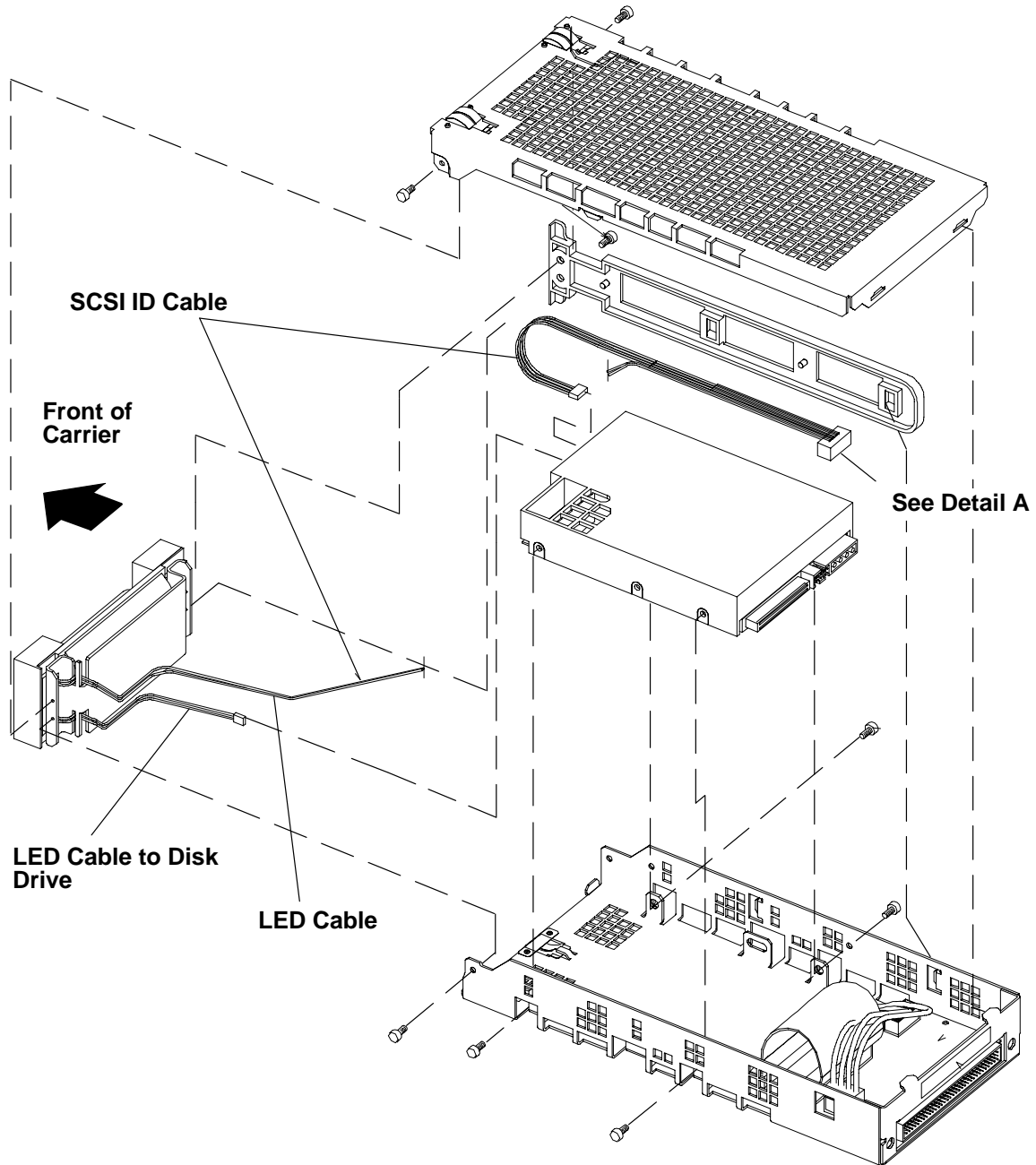
#### Removal

1. Remove the disk drive from the unit, as described in the removal procedure in "Disk Drives" on page 4-40.
2. Cut the warranty label.
3. Loosen the mounting screws used to secure the carrier cover, using a screwdriver.
4. Remove the carrier cover.
5. Disconnect all cables connected to the disk drive, both on the front and on the rear.
6. Loosen the mounting screws holding the guide on the carrier.
7. Pull the guide out of the carrier.
8. Loosen the mounting screws holding the disk drive in the carrier, using a screwdriver.
9. Lift the disk drive out of the carrier.

#### Installation

1. Connect all cables to the corresponding connectors at the front of the disk drive, as shown on page 4-49 and 4-50.
2. Position the disk drive on the bottom support of the carrier. Tighten the screws to secure the disk drive to the carrier.
3. Place the guide of the carrier in position, then secure it with the mounting screws.
4. Connect the 68 pin flex cable to the drive first, with the blue edge to the center of the carrier. Connect other end to converter card.
5. Connect both ends of the DC power cable.
6. Install the carrier cover. Then secure the disk drive and the carrier tightening the appropriate mounting screws.
7. Replace the carrier unit to the system, as described in the replacement procedure in "Disk Drives" on page 4-40.

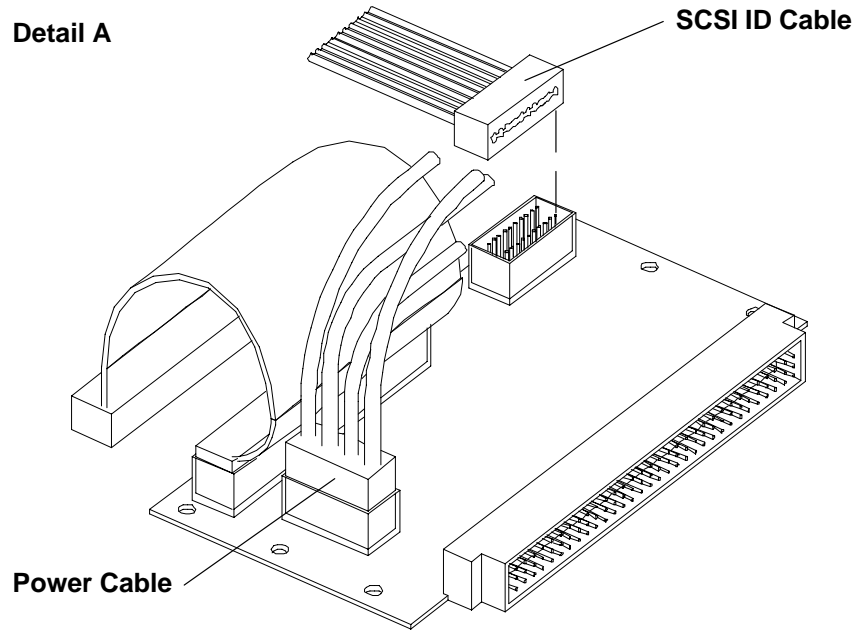
## 1.1GB, 2.0GB, 2.2GB, 4.5GB, 9.1GB SCSI-2 SE 16 bit Disk Drives



See *Adapters, Devices, and Cable Information*, order number SA23-2764, for details regarding the jumper settings for the specific drive in your carrier.

See Detail A on page 4-50 for proper connector orientation to the card assembly.

**Detail A**



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## Power Supply

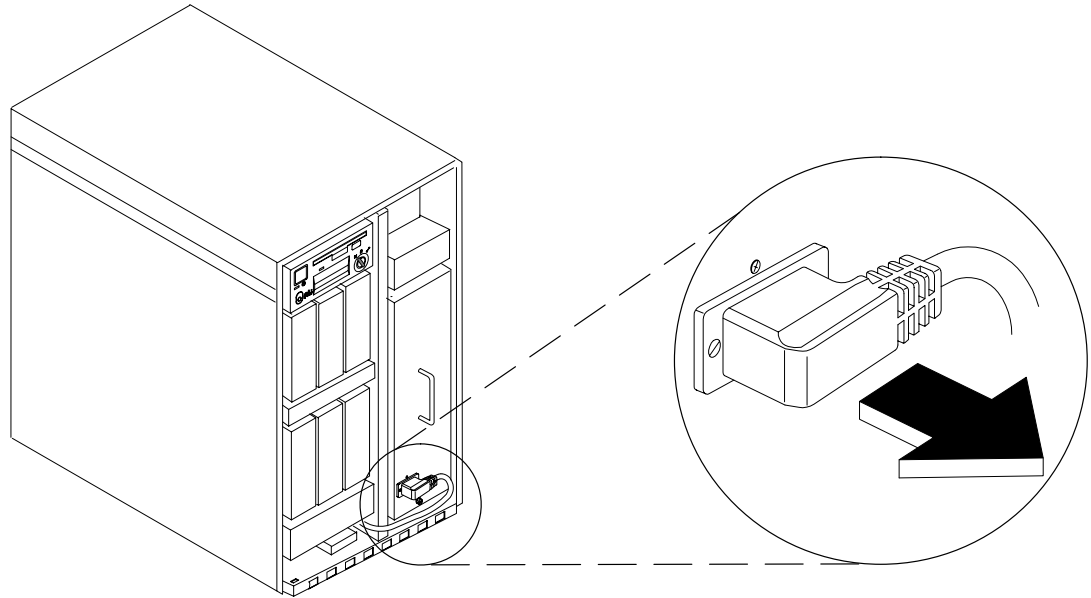
**Note:** For a translation of the following notice, see *System Unit Safety Information*.

### **DANGER**

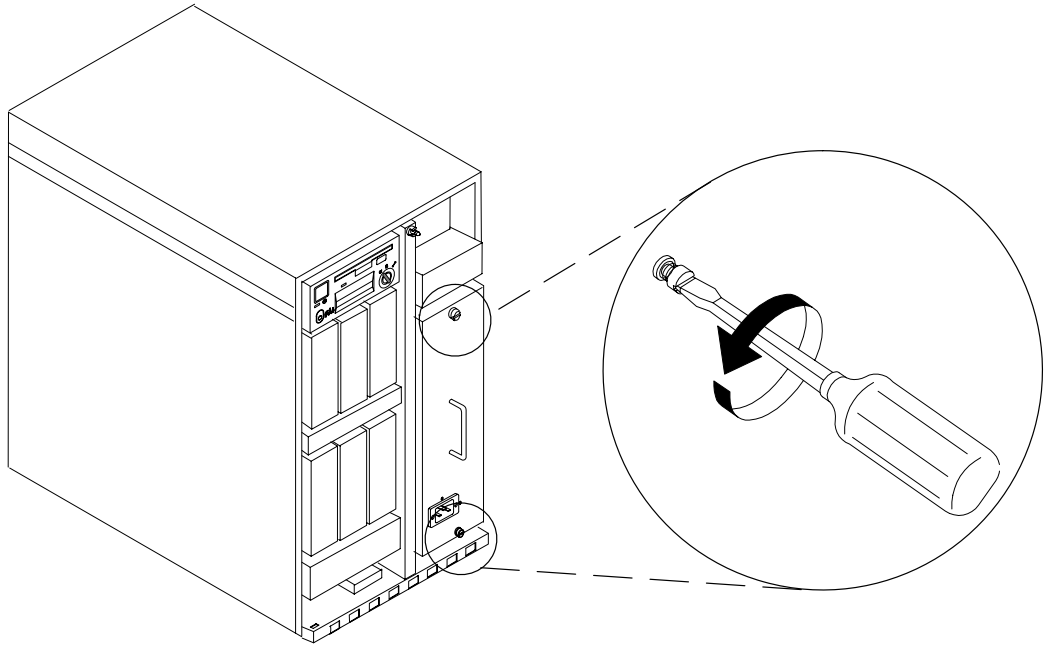
**Do not attempt to open the covers of the power supply. The power supply is not serviceable and is to be replaced as a unit.**

## Removal

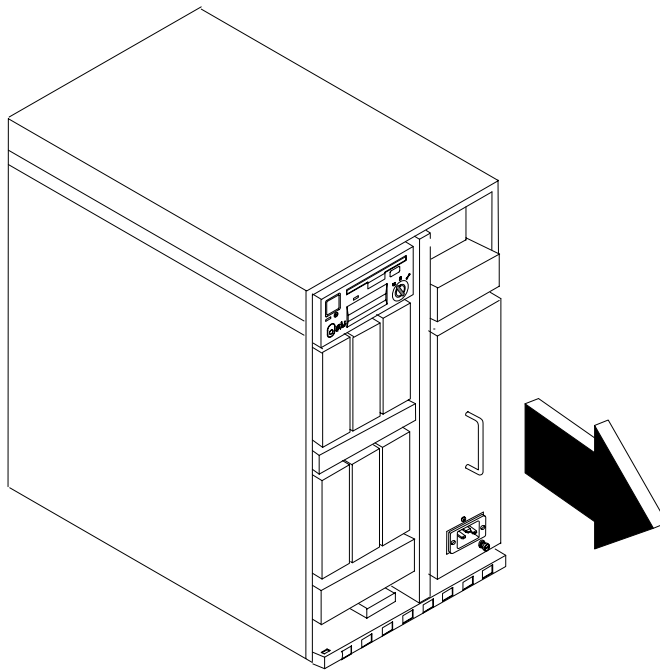
1. Do the steps detailed in "Preliminary Operations" on page 4-2.
2. To access the power supply, remove the front panel of the cabinet, following the procedure described in "Front Panel" on page 4-7.
3. Unplug the power supply cable connector.



4. Unscrew the retaining screws, using a screwdriver.



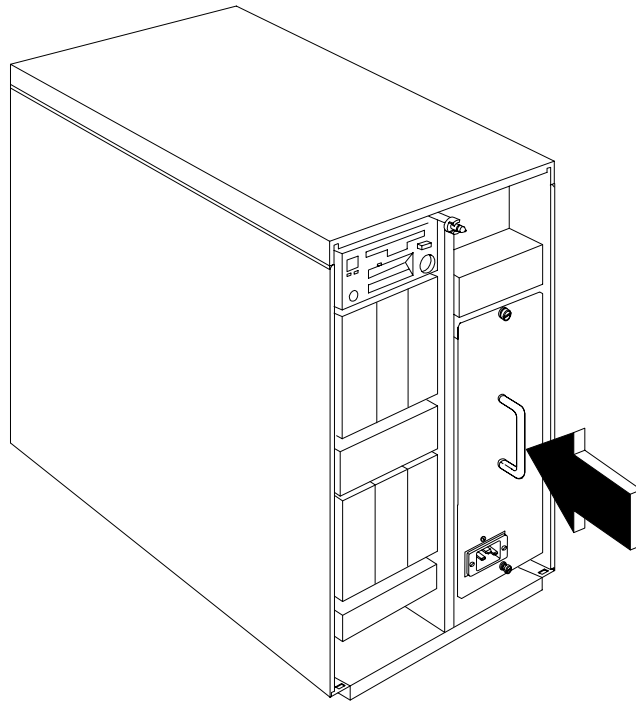
5. Grip the handle on the power supply. Gently pull the power supply out of the cabinet to remove it.



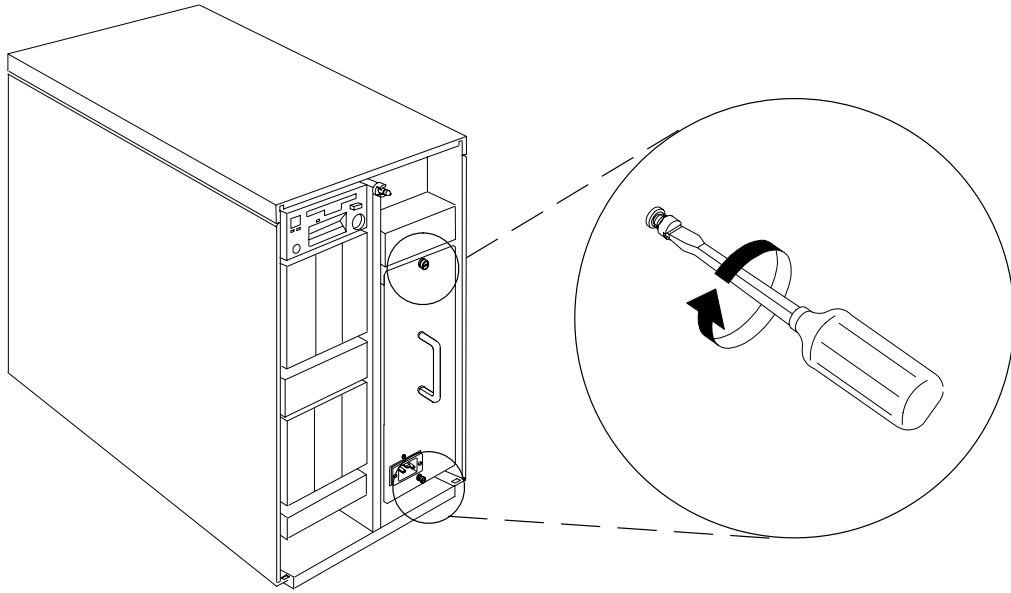


## Replacement

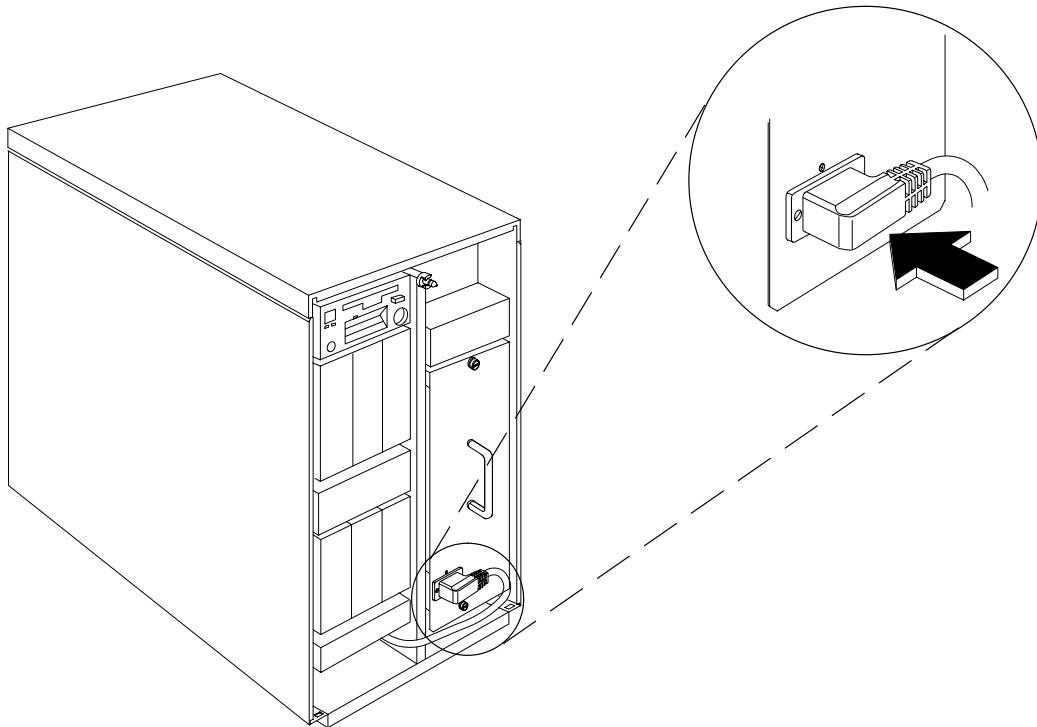
1. Align the power supply to the guides and then slide it inside the cabinet.



2. When the power supply is in place, secure it by tightening the screws indicated in the figure.



3. Plug in the power supply cable connector.



4. Replace the front cover.
5. In reverse order, do the steps listed in "Preliminary Operations" on page 4-2.

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## Fan Screens

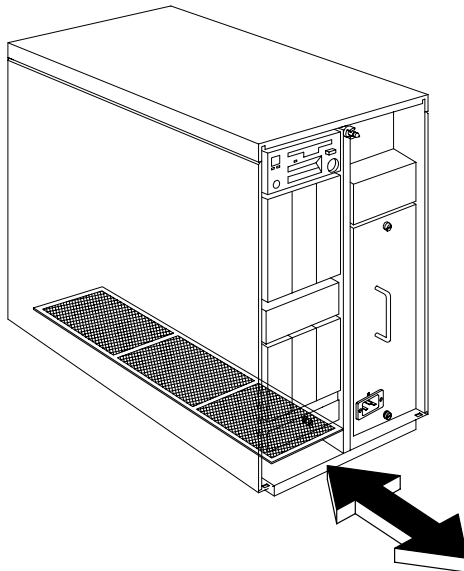
**Note:** The fan screens discussed here are found only on early J30 systems.

The fan screens can be removed at any time.

**Note:** The figures indicate the removal of the fan screen situated under the main fan module in the base unit. The procedures related to the expansion fan module are identical. For the fan screen located under the disk fan module, you must follow the same procedure accessing the system unit from the rear side.

### Removal Procedures

1. The fan screens removal procedures do not require that you power off the system.
2. To remove the fan screens, remove the rear and front covers of the unit, as applicable, following the procedures described respectively on pages 4-4 and 4-7.
3. Slide the fan screen out by hand and remove it from the unit.



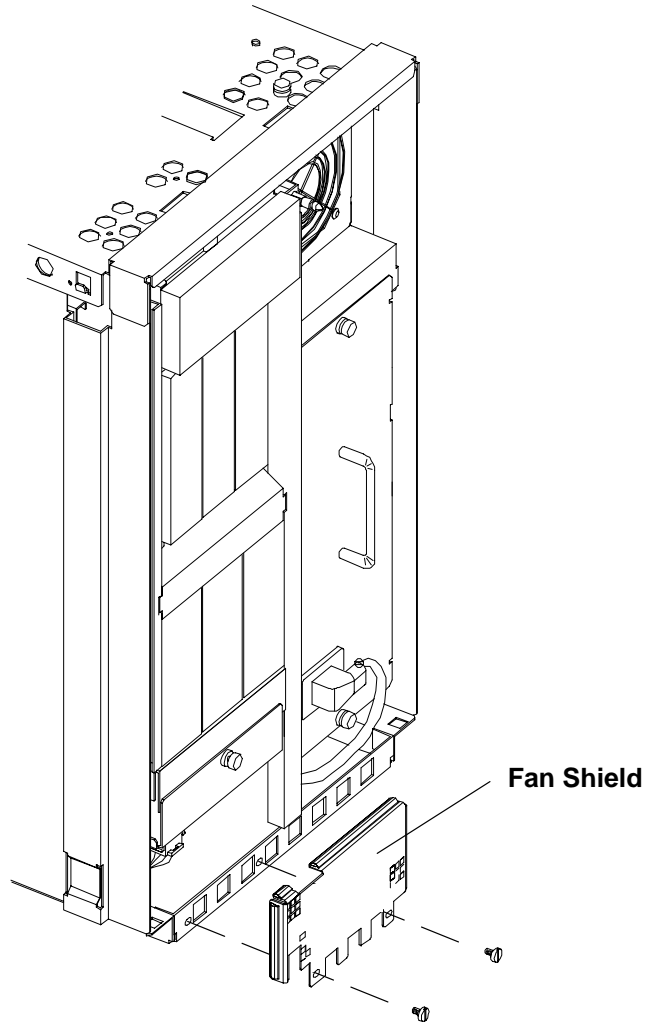
4. Discard the fan screen. No replacement is necessary. Fan screens are no longer needed on the systems.

---

# Main Fan Module

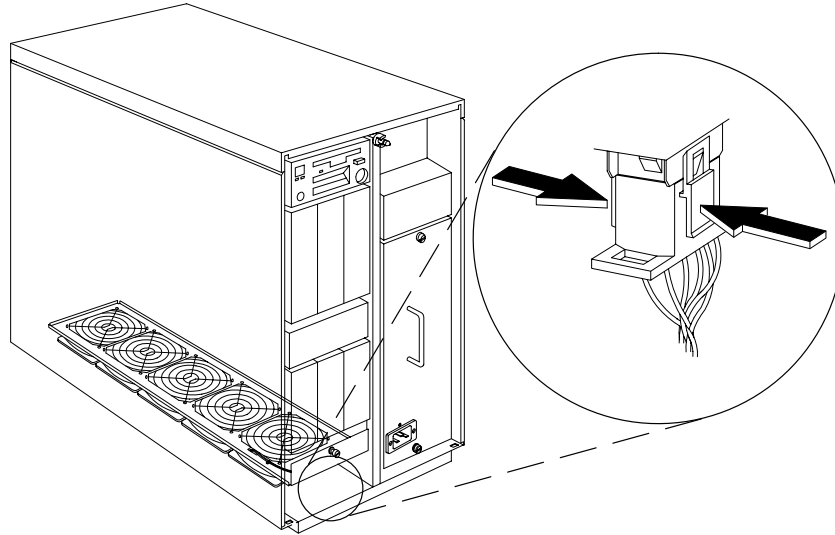
## Removal

1. Do the steps detailed in "Preliminary Operations" on page 4-2.
2. To access the main fan module, remove the front cover of the unit following the procedures described on page 4-7.
3. Remove the fan shield to enable access to the power connector.

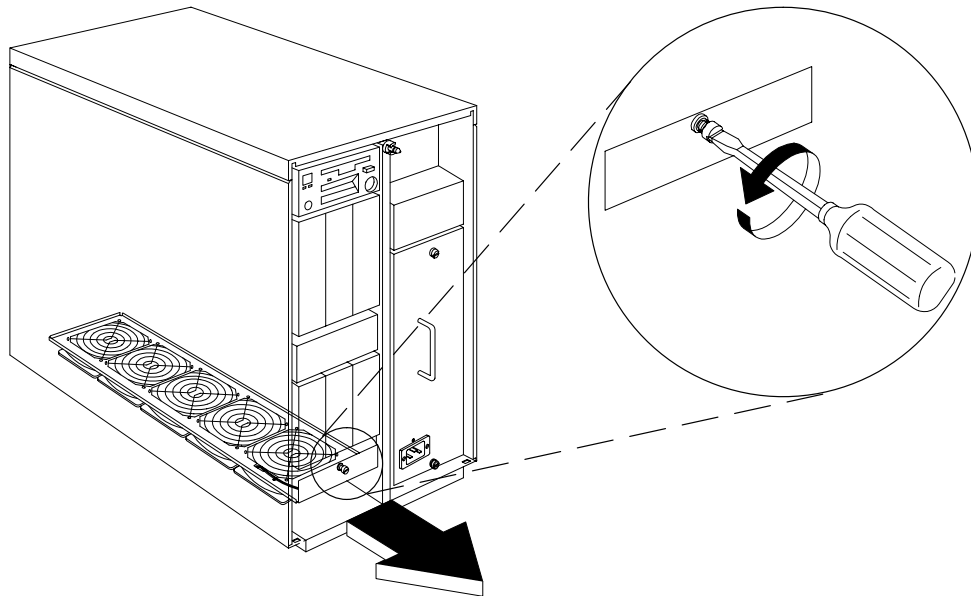


**Attention:** If, for any reason, the machine was still running, it stops automatically when you disconnect the fan power connector, and file system integrity may be affected.

4. Disconnect the fan power connector, by pressing and pulling the connector to unplug it.



5. Loosen the retaining screw, then pull the fan module out of the unit.



6. To exchange an individual fan, see “Individual Fan” on page 4-64.

## Replacement

Do in reverse order the steps listed in “Removal”.

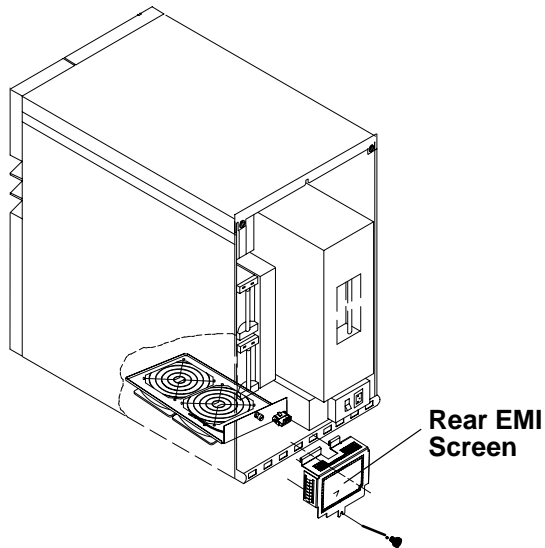
**Note:** If the fan power connector is not properly connected, and you try to start the system, it will not run.

---

## Disks Fan Module

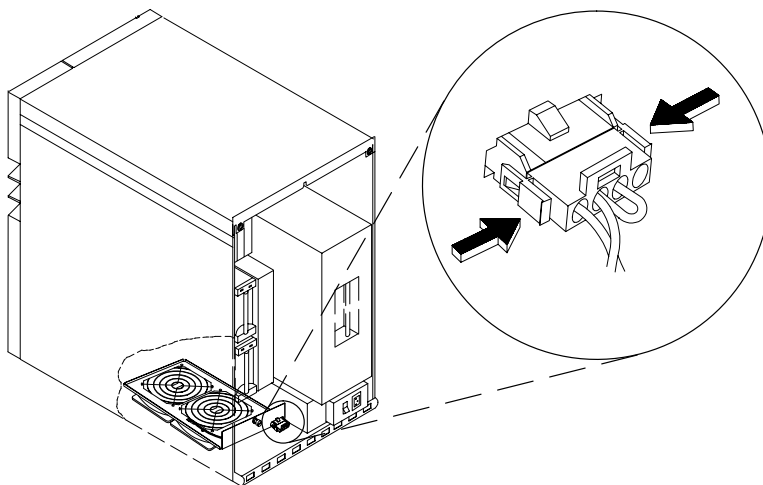
### Removal

1. Do the steps detailed in "Preliminary Operations" on page 4-2.
2. To access the disks fan module, remove the rear cover of the unit following the procedures described on page 4-4.
3. Remove the rear EMI screen.

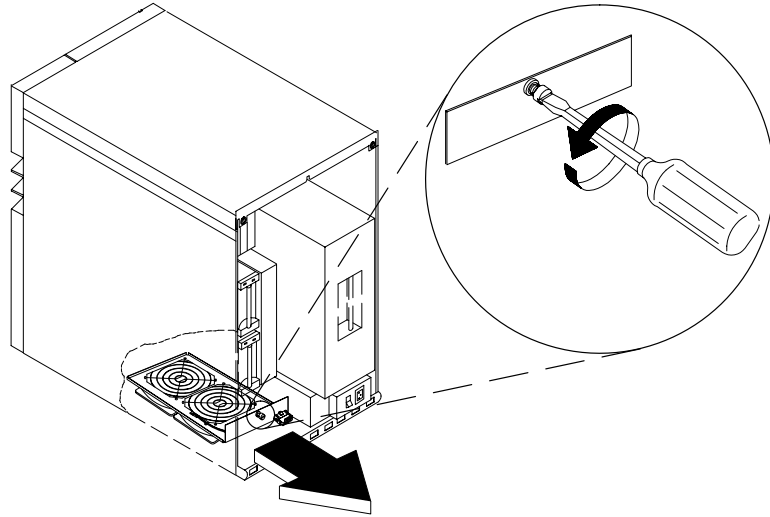


4. Remove the fan power connector, by pressing its locking edges as illustrated in the figure and then pulling the connector to unplug it.

**Note:** If, for any reason, the machine was still running, it stops automatically when you remove the fan power connector.



5. Loosen the retaining screw indicated in the figure and pull the fan module out of the unit.



## Replacement

Do in reverse order the steps listed in "Removal".

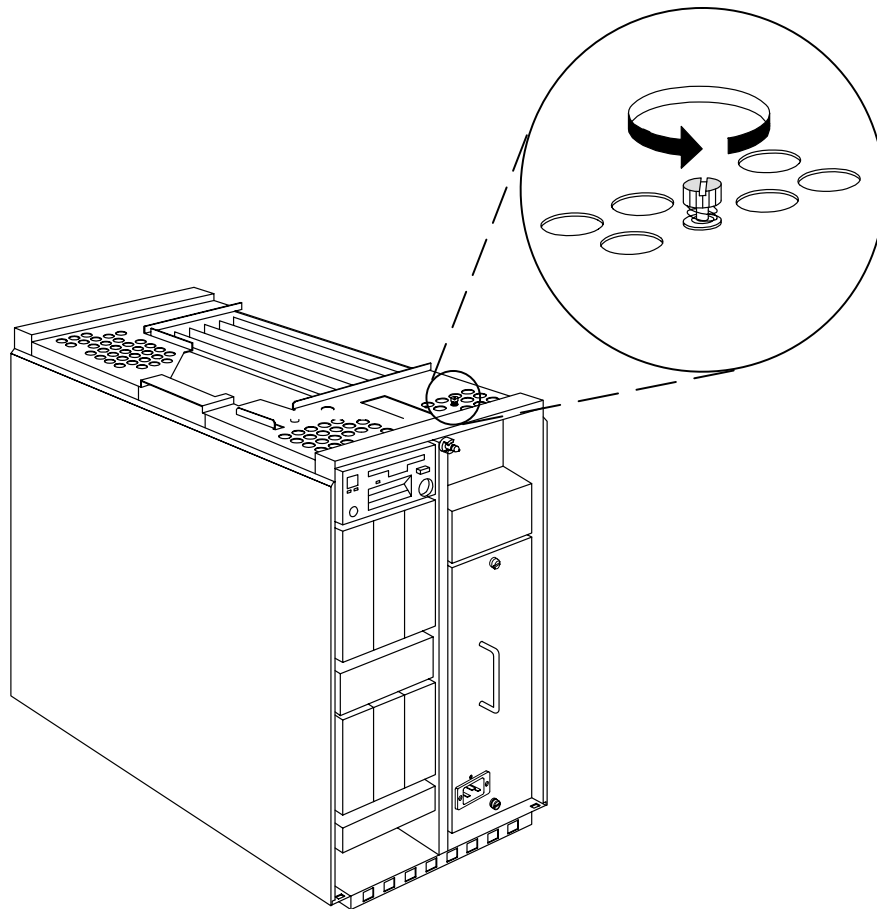
**Note:** If you do not connect the fan power connector properly, and then you try to start the machine, it will not run.

---

## MCA Fan Module

### Removal

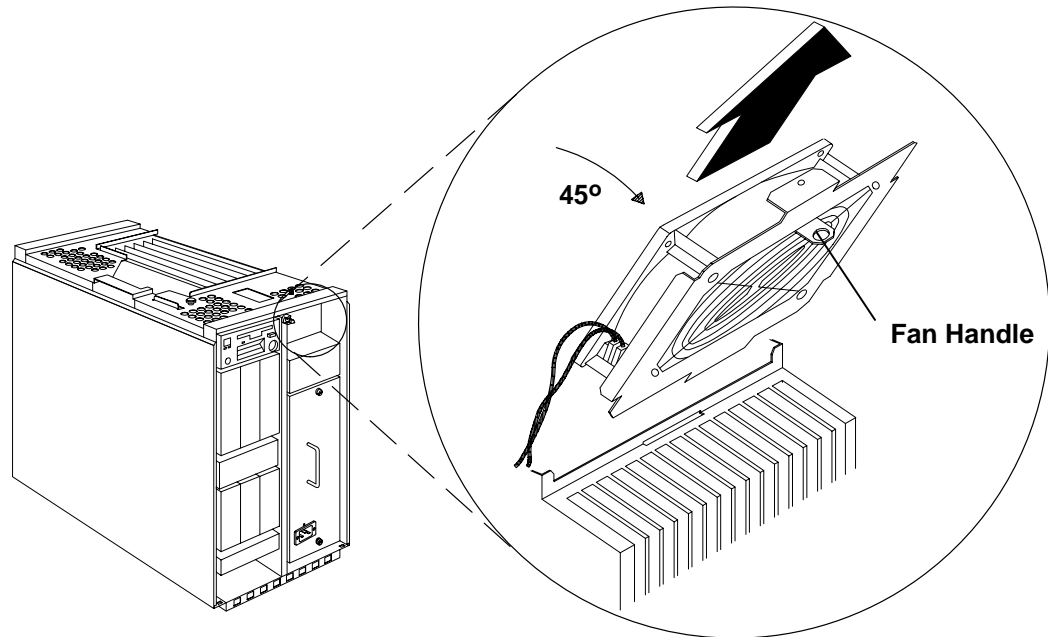
1. Do the steps detailed in "Preliminary Operations" on page 4-2.
2. If a fan screen is present, perform the removal procedure for "Fan Screens" on page 4-55.
3. To access the MCA fan module, remove the rear, front, and top covers of the unit following the procedures described respectively on pages 4-4, 4-7, and 4-10.
4. Loosen the retaining screw indicated in the figure until it stops.





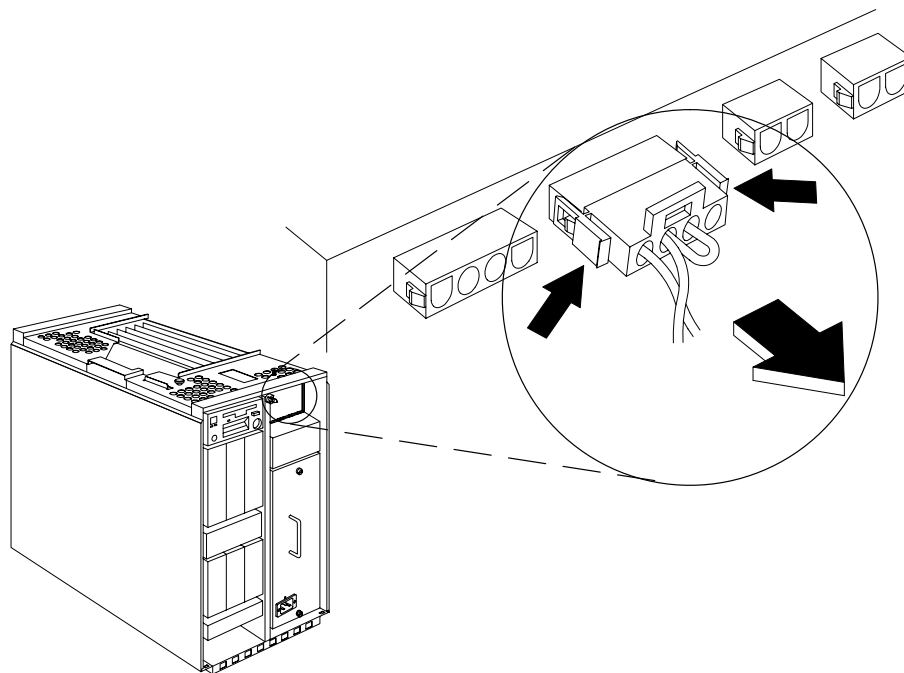
5. Gently grip the fan handle and pull to tilt the fan to about 45 degrees. Then gently pull the fan out of the unit.

Be careful in removing the fan from the unit, as it is still connected to the unit back plane and it could be damaged if you remove the fan too suddenly. Keep the fan near the unit.



**Note:** If, for any reason, the machine was still running, it stops automatically when you disconnect the fan power connector, and file system integrity may be affected.

6. Disconnect the fan power connector, by pressing its locking edges as illustrated in the figure and pulling the connector to disconnect it.

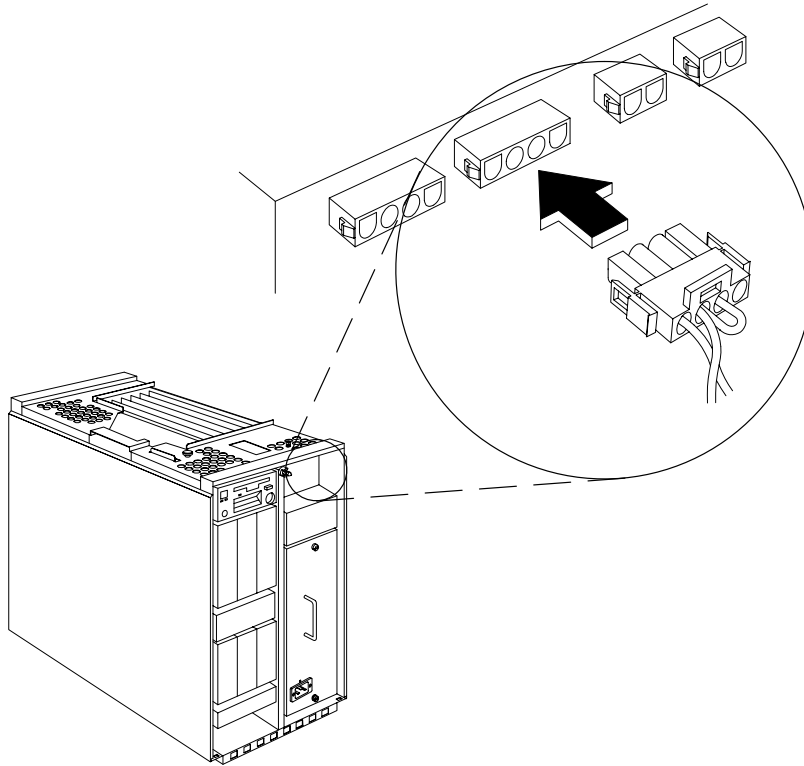


## Replacement–

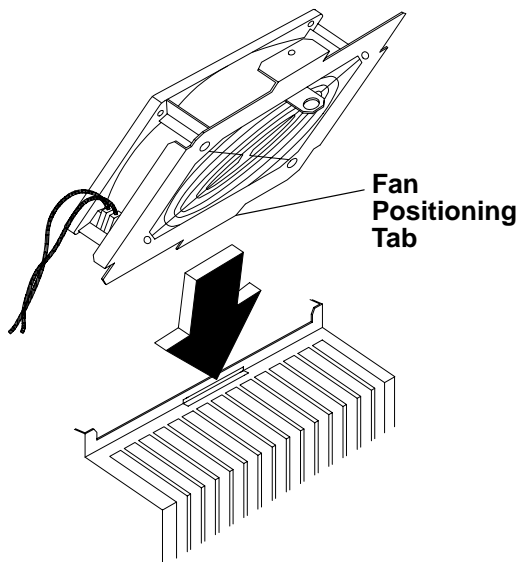
1. Connect the fan power connector, being sure that it is locked properly.

The fan connector must be inserted in the second connector on the unit back plane, as illustrated in the figure.

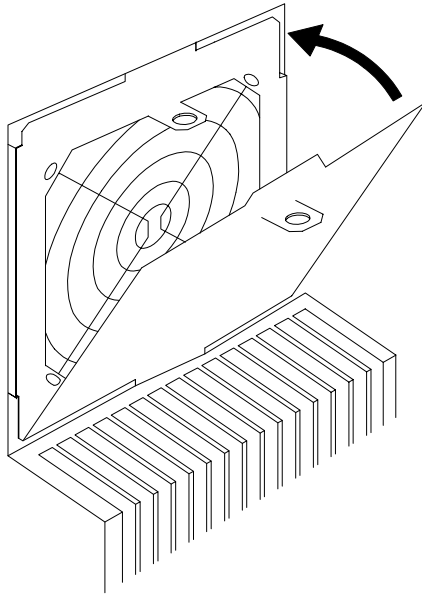
**Note:** If you do not do the following step, and you try to startup the machine, it will not run.



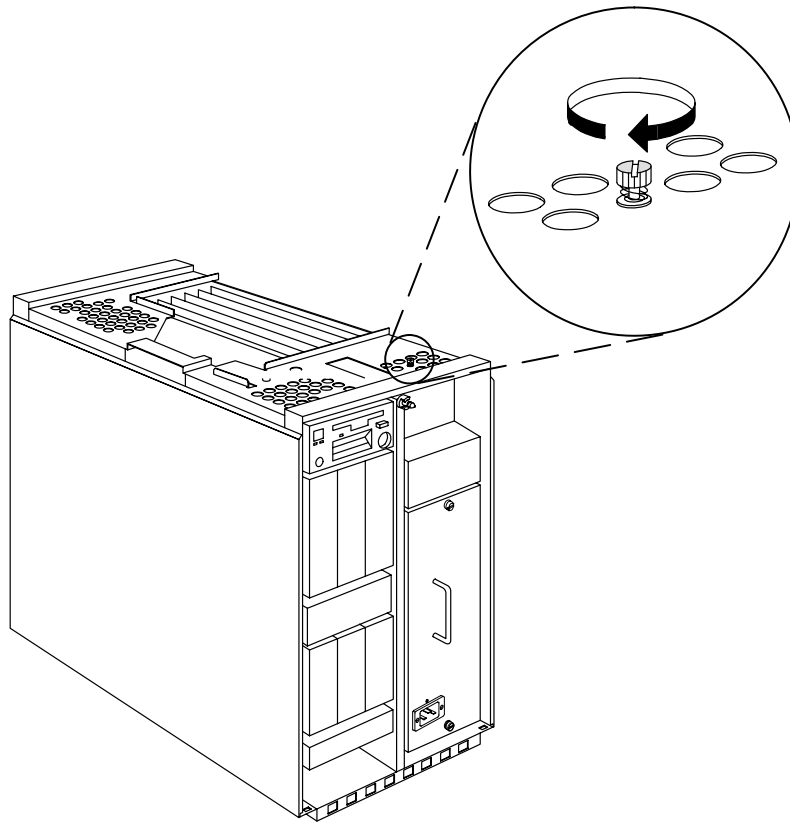
2. Tilt the fan to an angle of about 45 degrees and insert the fan positioning tab into the unit slot as indicated in the figure.



3. Push the fan as indicated in the figure to position it in the unit.



4. When the fan is in place, secure it to the unit by tightening the retaining screw.



5. Replace the top, front, and rear covers after having performed all needed operations.

6. In reverse order, do the steps listed in "Preliminary Operations" on page 4-2.

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## Individual Fans

**Note:** The procedures detailed below apply to all fans mounted on the following fan modules:

- Base unit main fan module
- Expansion unit main fan module
- Disks fan module.

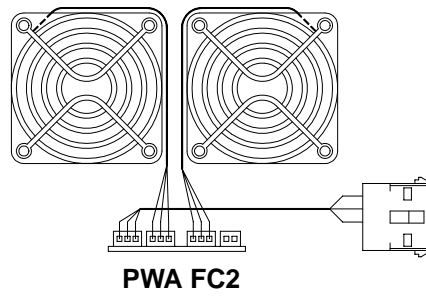
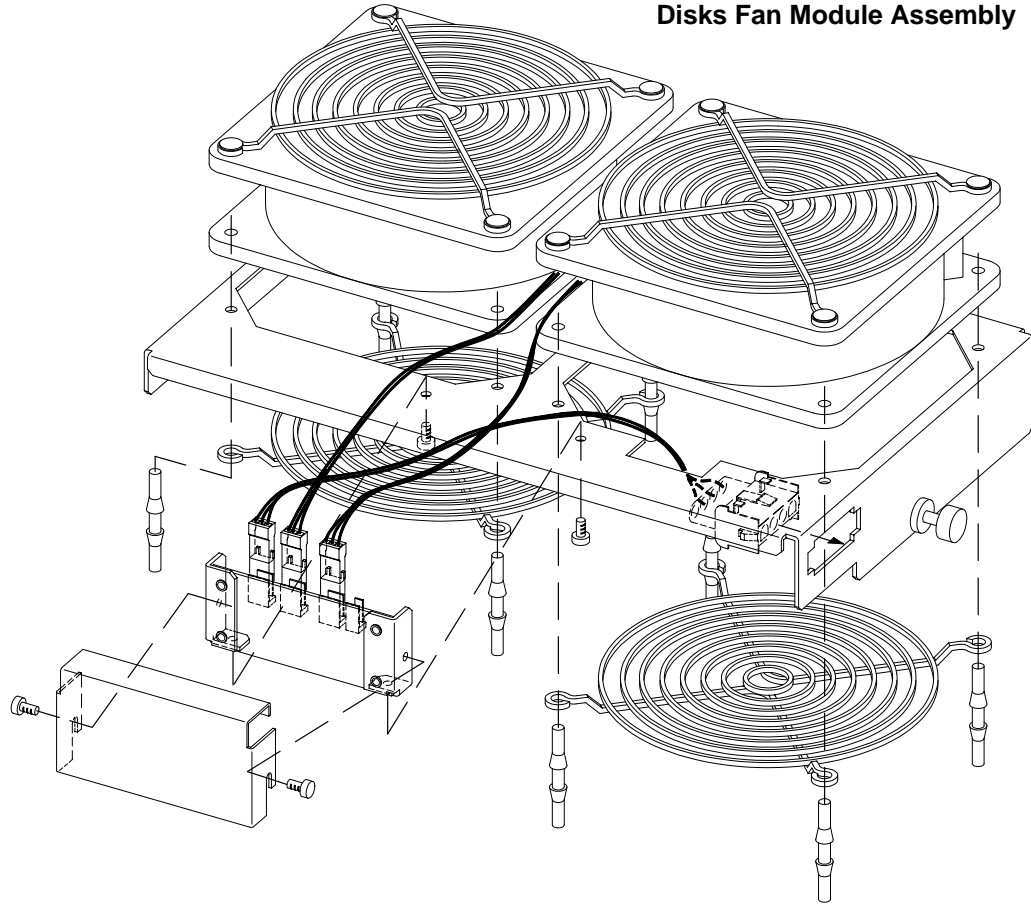
## Removal

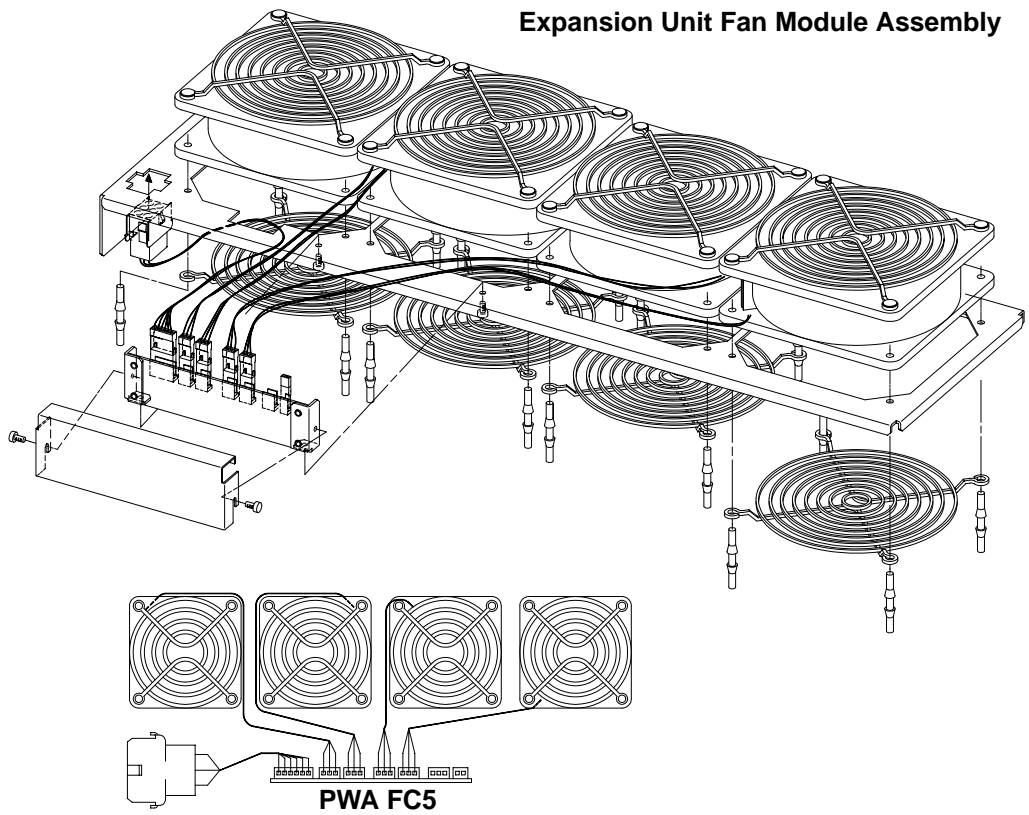
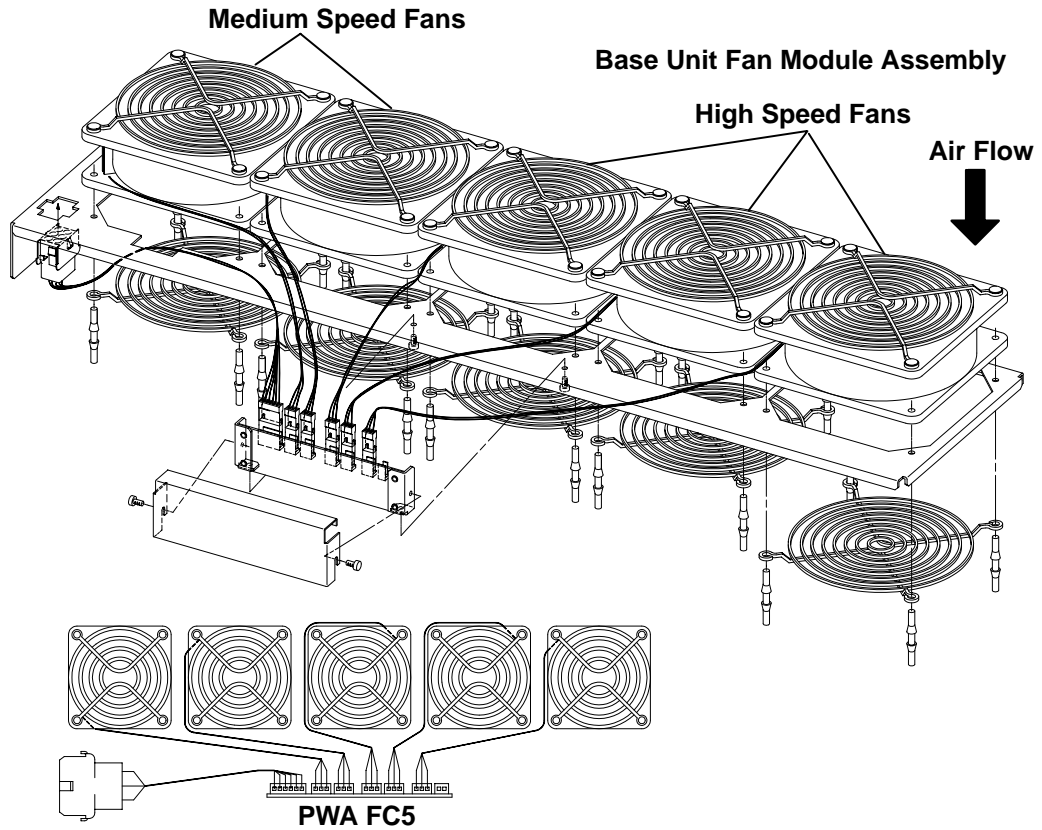
1. Do the steps detailed in “Preliminary Operations” on page 4-2.
2. Remove the defective fan module from the unit, as described either in “Main Fan Module” on page 4-56 or in “Disks Fan Module” on page 4-58, as applicable.
3. Identify the defective fan, performing the following steps.
  - a. After you have completely removed the designated fan module from the unit, plug the fan module power connector into the corresponding connector in the unit.
  - b. Power on the system
  - c. Check the fan module to determine fan which is not running.
  - d. Shut down and power down the system again.
  - e. Unplug the fan module power connector.
4. Cut the four rubber fasteners used to lock the defective fan to the module.
5. Disconnect the power cable for the defective fan.
6. Loosen the retaining screws from the defective fan.
7. Remove the defective fan from the module.

## Replacement

1. Insert four new rubber fasteners into the corresponding holes on the fan module.
2. Position the new fan, and insert the four rubber fasteners installed in the previous step into the corresponding holes on the new fan.
3. Connect the power cable for the new fan.
4. Secure the new fan to the fan module by tightening its retaining screws.
5. Replace the fan module in the unit, as described either in “Main Fan Module” on page 4-56 or in “Disks Fan Module” on page 4-58, as applicable.
6. In reverse order, do the steps listed in “Preliminary Operations” on page 4-2.

## Disks Fan Module Assembly





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## System Interface Board

**Attention:** The back plane and system interface board EEPROMs contain the SYSID of the system. When one of the two components is to be replaced (for example the back plane), the SYSID information will be copied from the system interface board EEPROM into the back plane EEPROM when you start the system.

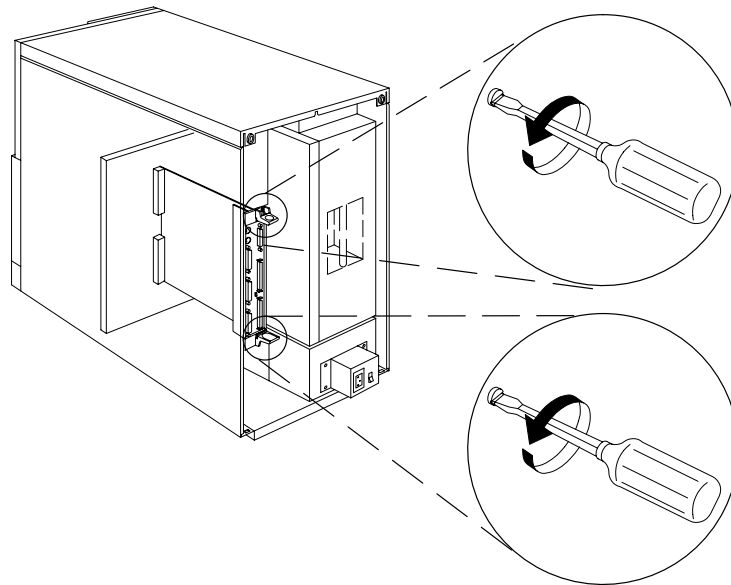
To avoid losing this information, it is not possible to replace both components at the same time.

When both components are to be replaced, proceed as follows:

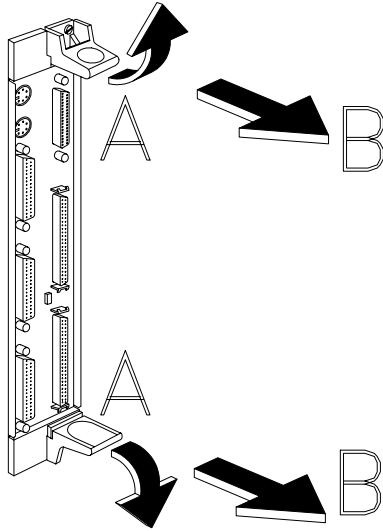
1. First substitute the system interface board and start up the system: the SYSID information will be copied from back plane EEPROM to the system interface board EEPROM.
2. Substitute the back plane and start up the system: the SYSID information will be copied from the system interface board EEPROM to the back plane EEPROM.

### Removal

1. Do the steps detailed in "Preliminary Operations" on page 4-2.
2. To access the system interface board, remove the rear and front covers of the unit following the procedures described respectively on pages 4-4 and 4-7.
3. Disconnect any connector from the system interface board being removed.
4. Loosen the retaining screws as shown in the figure using a screwdriver.



5. Use the board pullers to:
  - a. Unplug the system interface board connectors from those on the back plane
  - b. Then slide the system interface board out of the unit and place the board in an antistatic envelope.

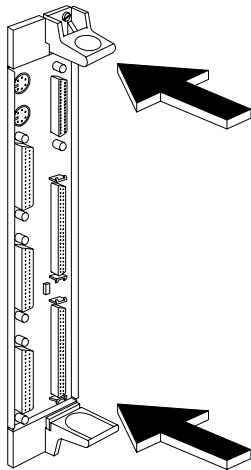


## Replacement

**Attention:** It is strongly recommended that you keep the board in the antistatic envelope until you are ready to insert it in the unit. This will protect it against electrostatic discharge. Be careful in handling the board: use the board puller and do not touch the board connectors.

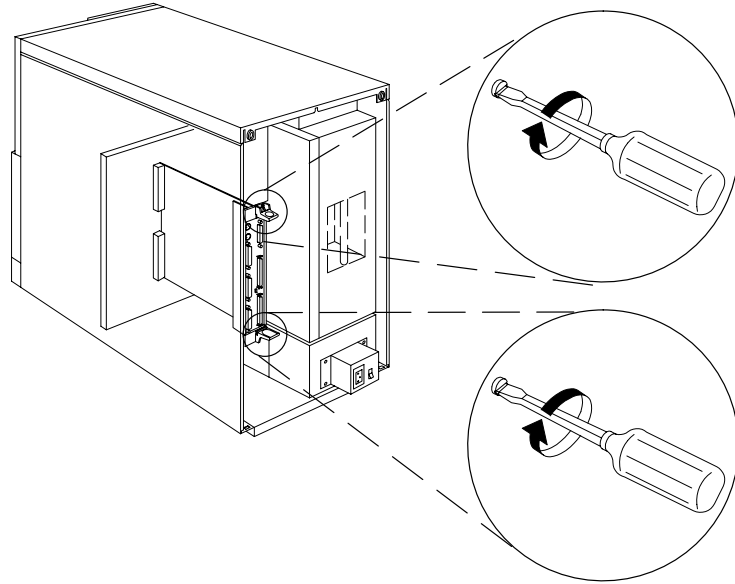
1. Align the system interface board with the guides in the unit. The board must be inserted with the labeled board puller in the lower part of the unit.

Slide the system interface board into the unit. Press the edges of the board frame to plug the data connectors.



2. Secure the system interface board, tightening the screws with a screwdriver as indicated in the figure.





3. Connect all connectors to the system interface board just installed.
4. Replace the front and rear covers after having performed all needed operations.
5. In reverse order, do the steps listed in "Preliminary Operations" on page 4-2.

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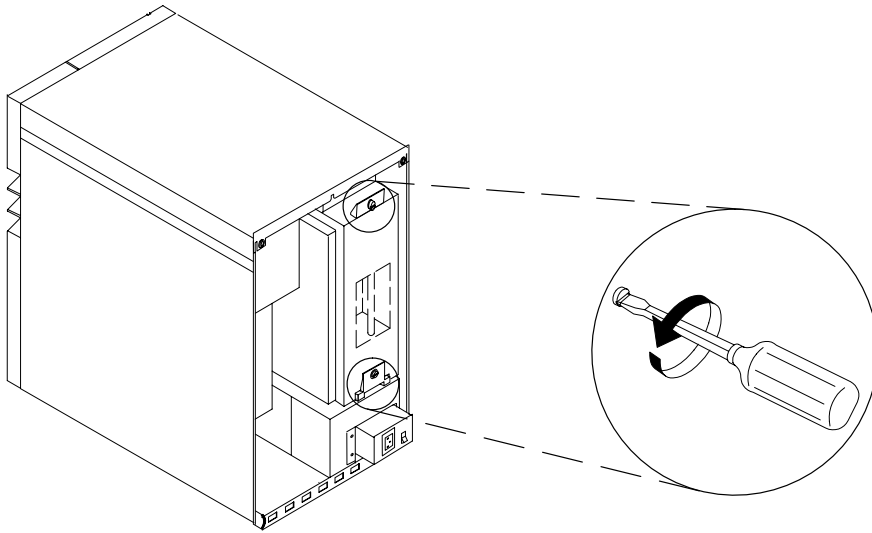
## Base Unit CPU Module

This procedure describes removing and replacing the CPU Module in the base unit.

### Removal

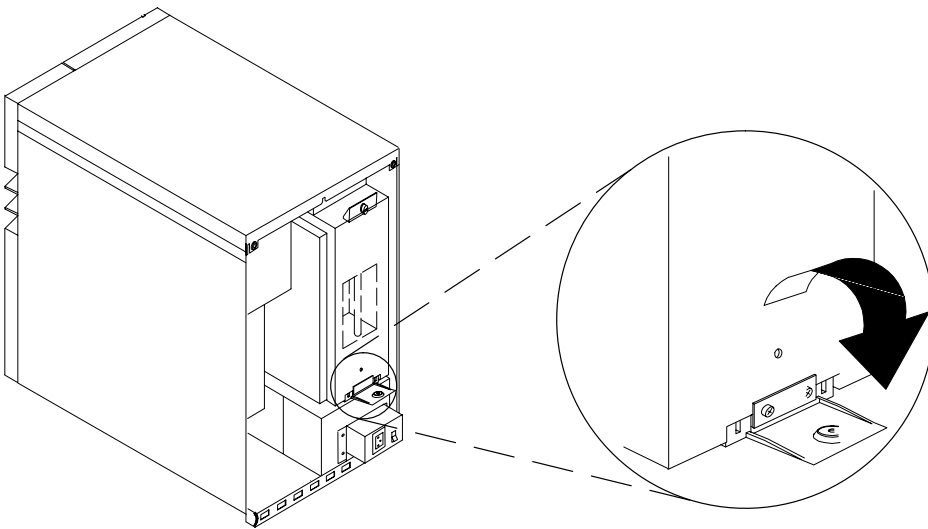
1. Do the steps detailed in "Preliminary Operations" on page 4-2.
2. To access the CPU module, remove the rear cover from the unit, following the procedures described on page 4-4.
1. Loosen the retaining screws shown in the figure using a screwdriver.

#### Base Unit, Rear



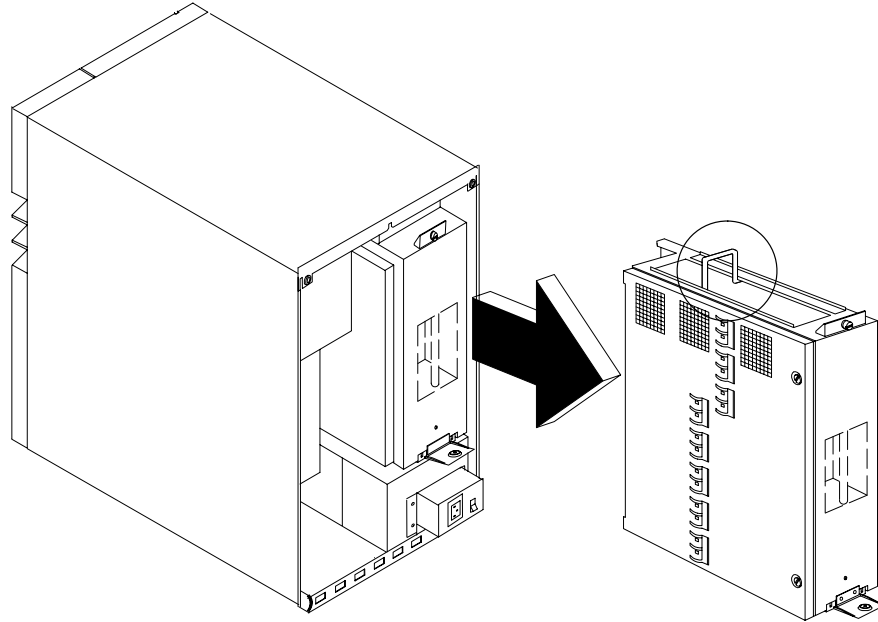
2. Using the CPU module puller as indicated in the following figure, unlock the CPU module from the base unit.

#### Base Unit, Rear



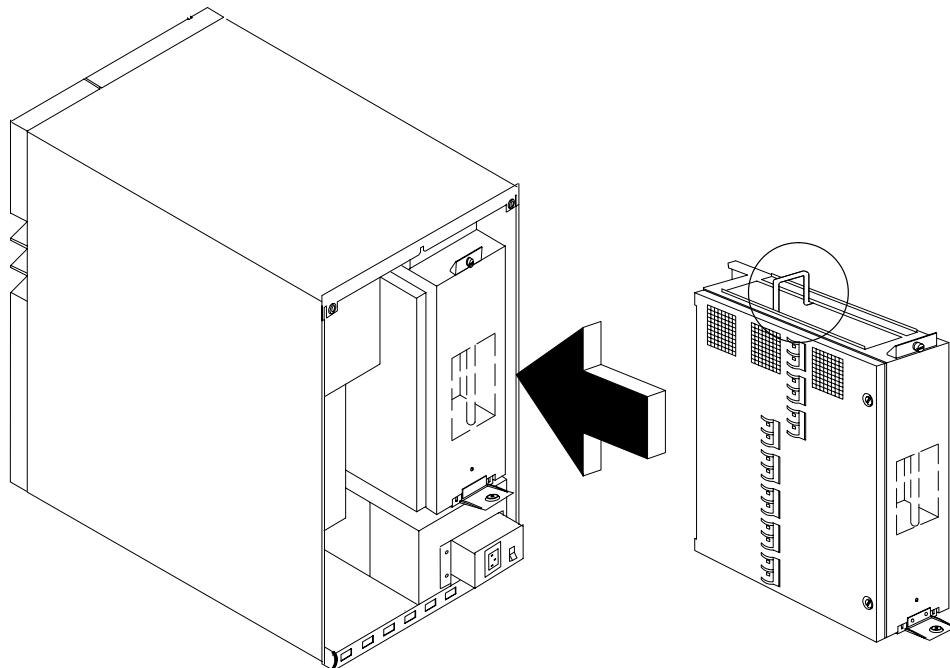
3. Firmly grip the front handle on the CPU module. Then slide the CPU module out of the base unit until the handle on the top is visible. Gripping both the top and the front handles, slide the CPU module out of the unit.

**Attention:** Take care in removing the CPU module from the unit, since it is quite heavy. Grip both handles firmly while you are sliding it out of the cabinet, to prevent it from incidental fall, and to avoid injury to yourself.

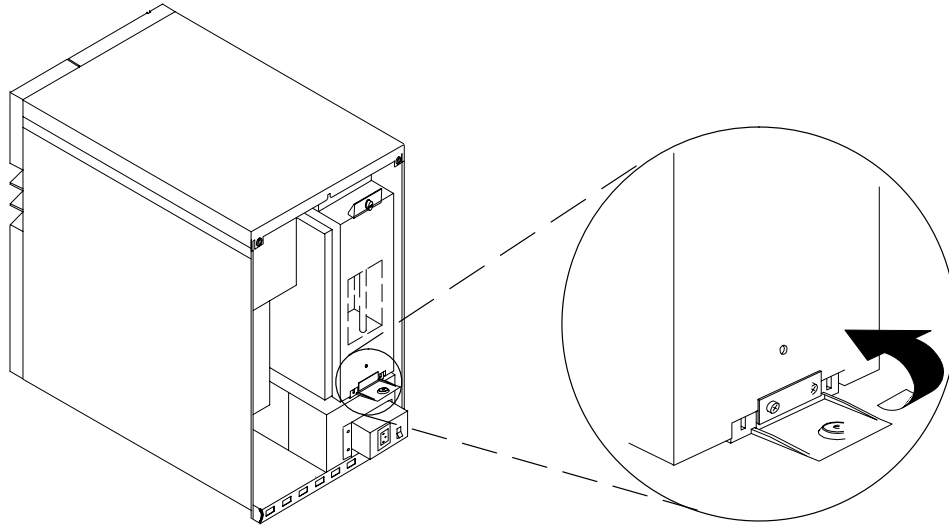


## Replacement

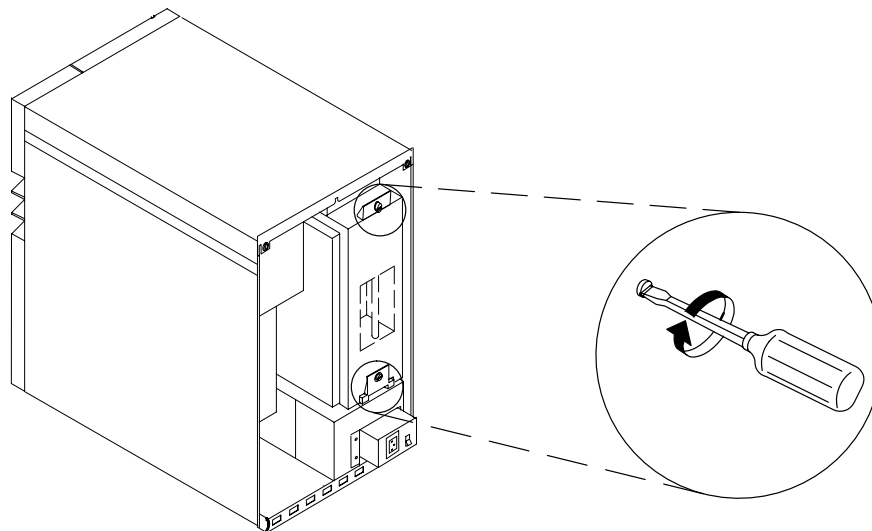
1. Gripping both the top and the front handles, align the CPU module with its guides and then slide it into the base unit.



2. Press the CPU module pullers as indicated in the figure to lock the CPU module into the base unit.



3. Secure the CPU module, tightening the screws indicated in the figure.



4. Replace the rear cover.
5. In reverse order, do the steps listed in "Preliminary Operations" on page 4-2.
6. Turn the system on.

**Attention:** Failure to perform the following step will result in a system suspension.

7. When `Stand-by` is displayed on the top line of the operator panel display, enter `sbb` on the system console. When The Stand-by menu is displayed on the system console, enter the number `2` on the system console to select `Set Unit Number`. The returned message should identify the base unit as `0` and the expansion unit as `1`.

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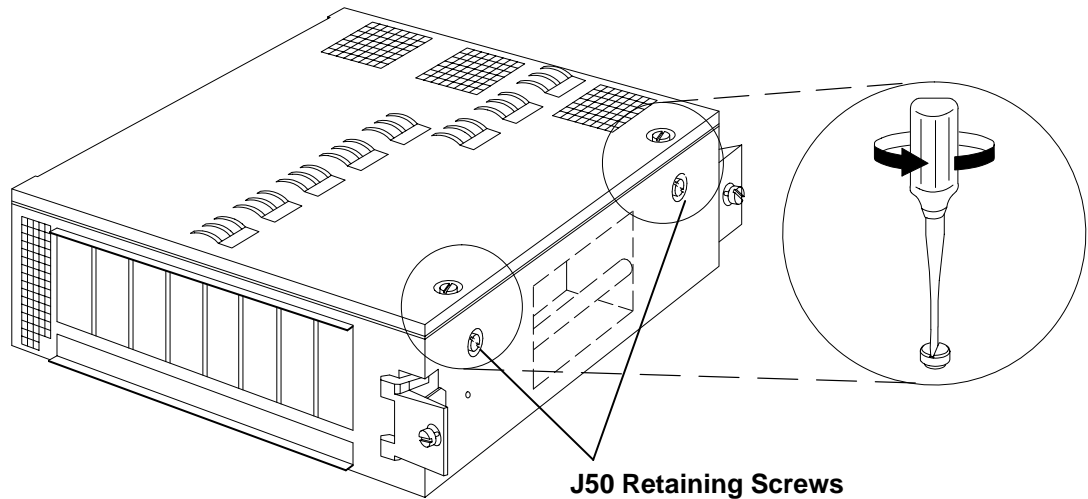
## Base Unit I/O, CPU and Memory Cards

This procedure describes removing and replacing the I/O, CPU and Memory cards in the CPU module once it is removed from the base unit.

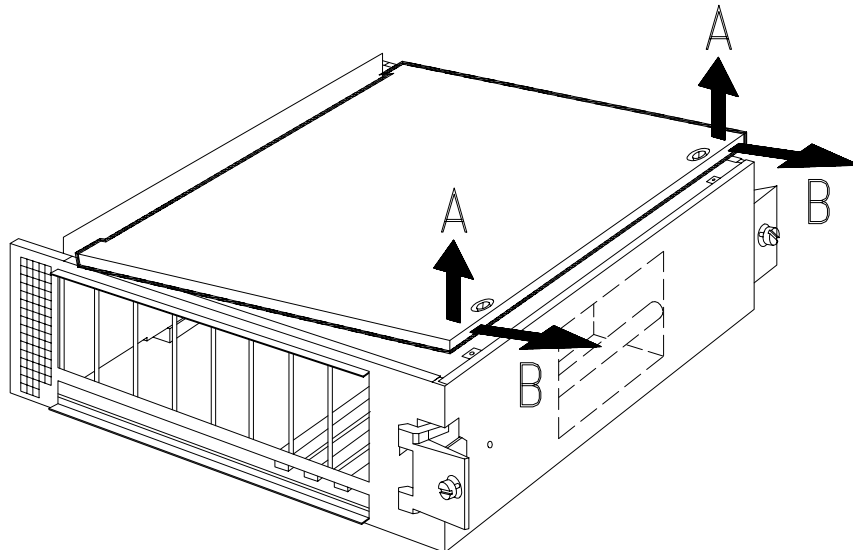
**Note:** It is strongly recommended that only experienced people remove the I/O, CPU, and memory cards from the CPU module.

### Removal

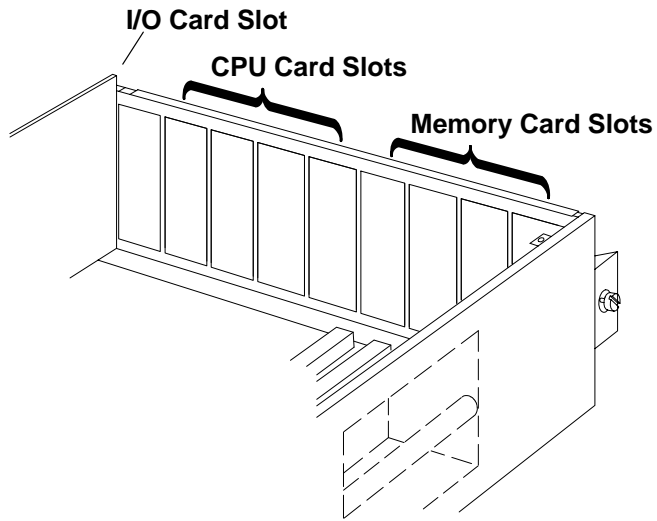
1. Do the steps detailed in "Preliminary Operations" on page 4-2.
2. Remove the CPU module from the base unit, following the procedure described on page 4-70.
3. Position the CPU module as illustrated in the following figure. Loosen the two retaining screws used to lock the cover.



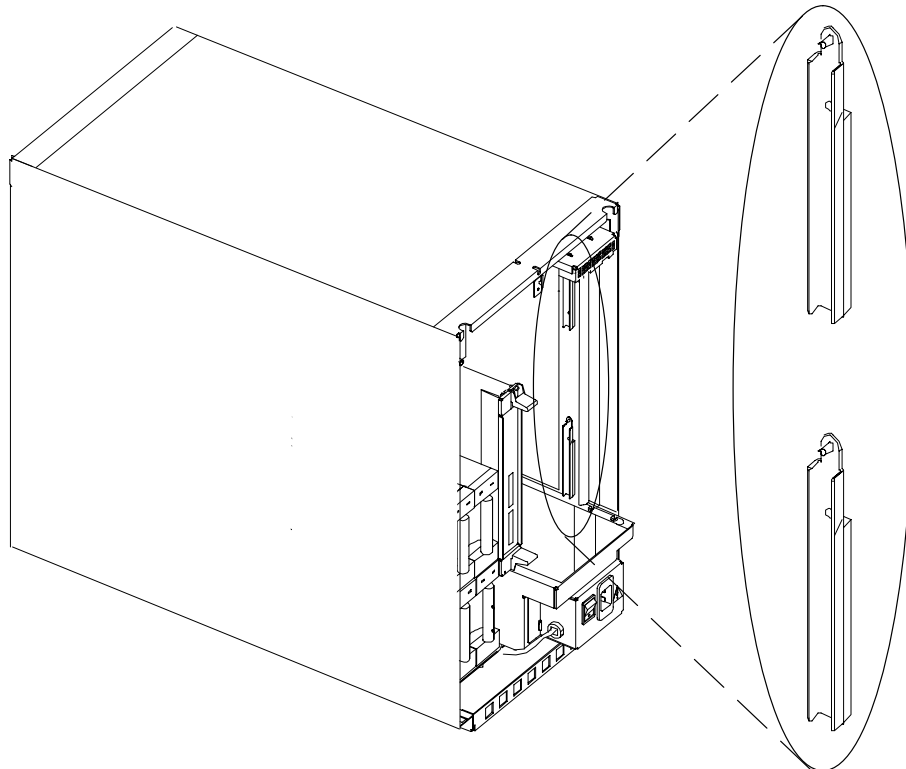
4. Pull the CPU module cover up, inclining it as illustrated in the figure (A). Then pull the cover out of the CPU box (B).



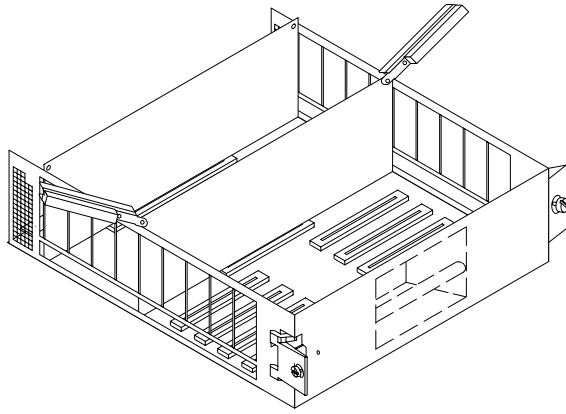
5. The cards are installed observing the positions indicated in the figure below. See page 1-17 for an explanation of these positions.



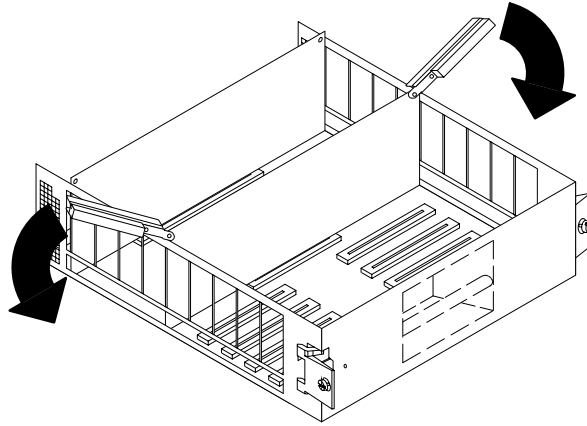
6. Remove the I/O, CPU and memory cards from the CPU module using the extractor tools, which are located on the inside of the side cover and accessible after the CPU module is removed from the system unit, as shown in the following figure.



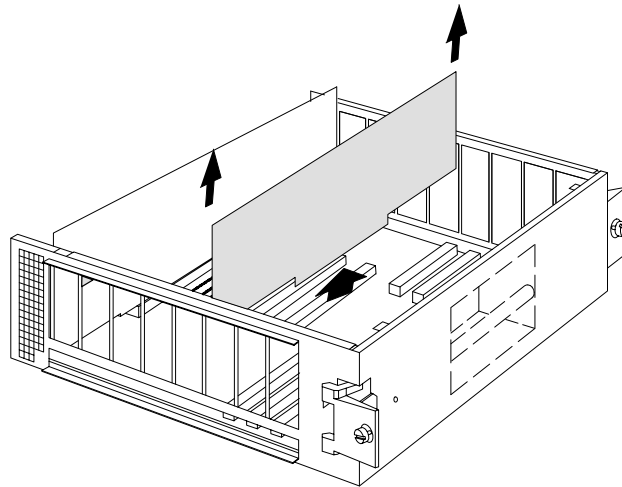
7. Insert the pin located at the end of each extractor tool into the holes on each top corner of the card that you need to remove. *Do not insert the extractor pins on the board component side.*



8. Firmly grasp the extractors and press downward to unlock the board or card connectors.



9. Then remove the extractor pins from the holes on the board or card and firmly grip the edges of the board or card to be removed. Pull it up and then slide it out of the slot.



## Replacement

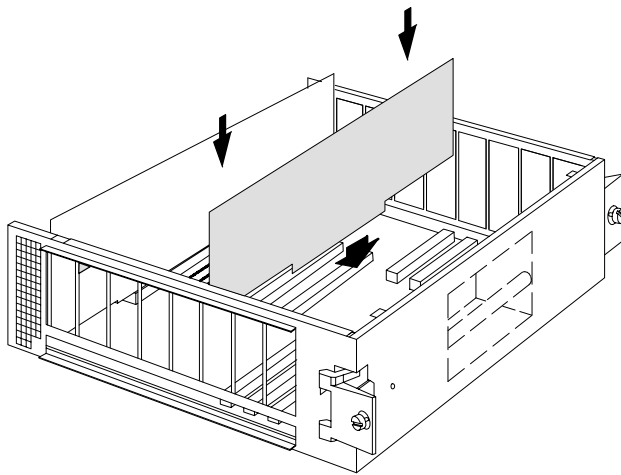
### Notes:

While only one CPU card is shown, this step applies to all cards which can be installed in the CPU module.

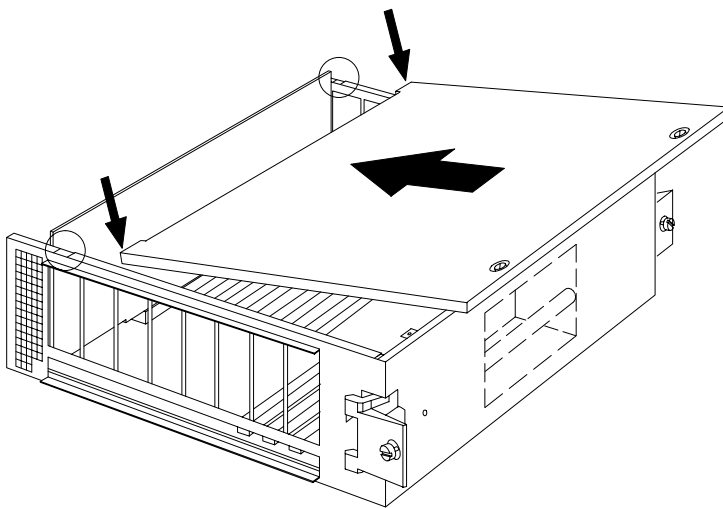
Install the memory cards in a right-to-left sequence beginning with slot A, and then continuing with slots B, C, and D. Memory cards must be installed with no empty slots between installed memory cards.

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.

1. Align the card in the required slot. Press the edges of the card straight down, as indicated in the figure to lock the connectors in position.

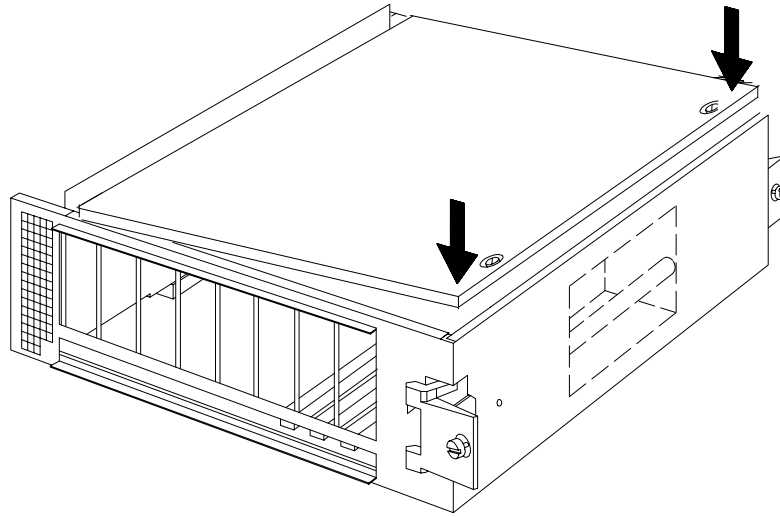


2. After the required cards are installed, insert the two positioning pins of the CPU module cover into the corresponding holes on the CPU module.

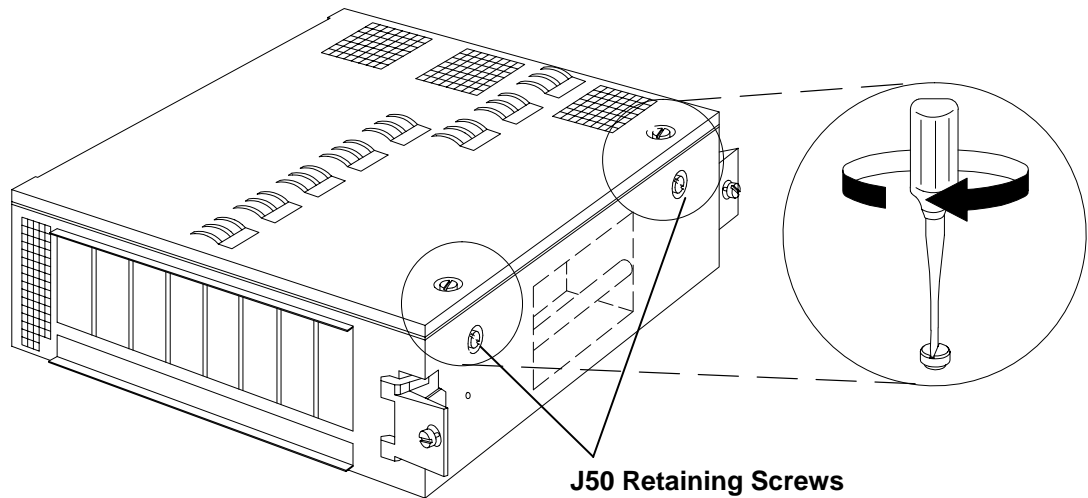




3. Push the cover down.



4. Secure the cover, tightening the retaining screws indicated in the figure.



**Attention:** Before inserting the CPU module into the base unit, and before re-starting the system, make sure you have securely closed the cover of the CPU module.

5. Replace the CPU module in the base unit, following the procedure described on page 4-71.
6. In reverse order, do the steps listed in "Preliminary Operations" on page 4-2.
7. Turn the system on.

**Attention:** Failure to perform the following step will result in a system suspension.

8. When *Stand-by* is displayed on the top line of the operator panel display, enter *sbb* on the system console. When The *Stand-by* menu is displayed on the system console, enter the number 2 on the system console to select *Set Unit Number*. The returned message should identify the base unit as 0 and the expansion unit as 1.

# Memory Modules

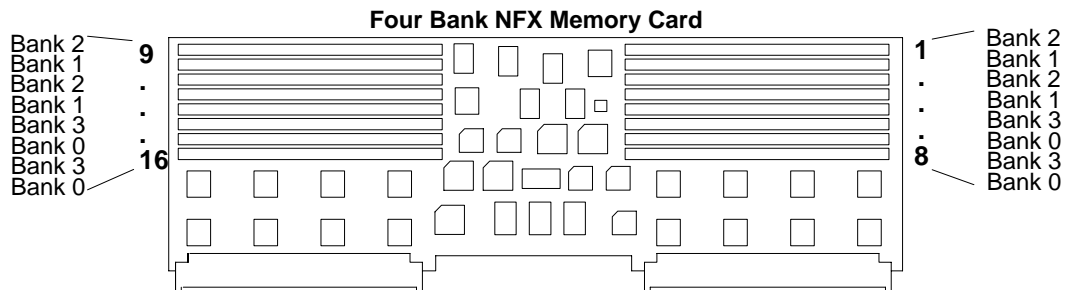
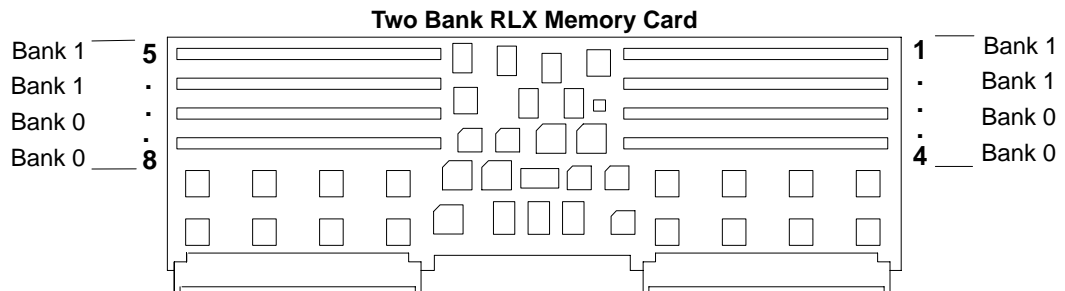
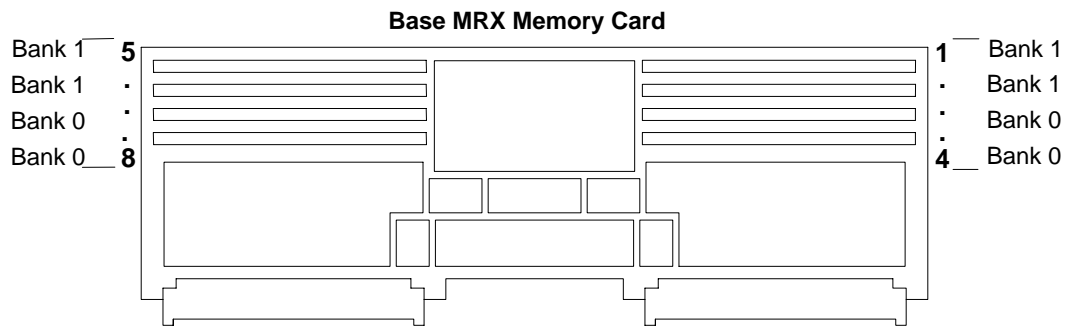
This procedure describes removing and replacing memory modules from memory cards in the CPU module once it is removed from the base unit.

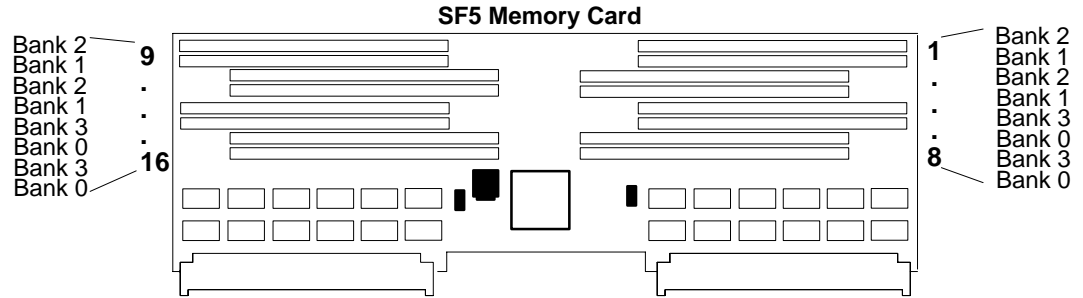
**Note:** There are four types of memory cards as shown below

## Removal

1. Do the steps detailed in "Preliminary Operations" on page 4-2.
2. Remove the CPU module from the base unit, following the procedure described on page 4-70.
3. Remove the appropriate memory card from the CPU module, as described in "I/O, CPU and Memory Cards" on page 4-73.

Memory card memory module positions vary and are numbered as follows:

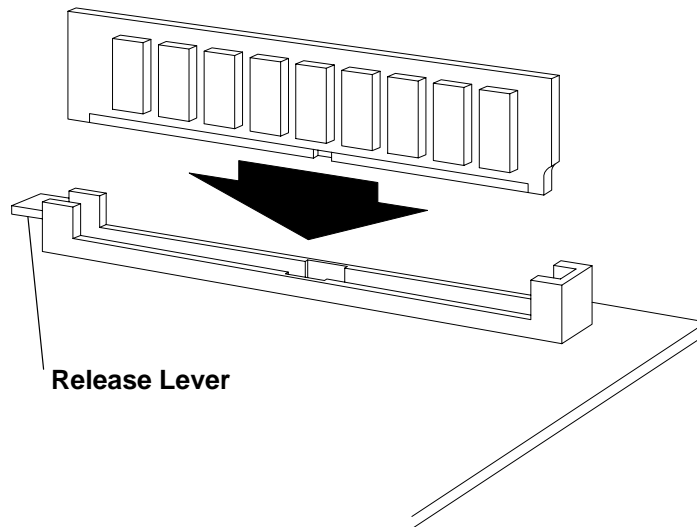




4. Press the release lever on the connector to unseat the memory module.
5. Grip the edges of the memory module and firmly pull it out of the memory card.

## Replacement

1. Place the memory module on the appropriate connector on the memory card; then firmly press the memory module into this connector.



2. In reverse order, do the steps listed in "Removal" on page 4-78.

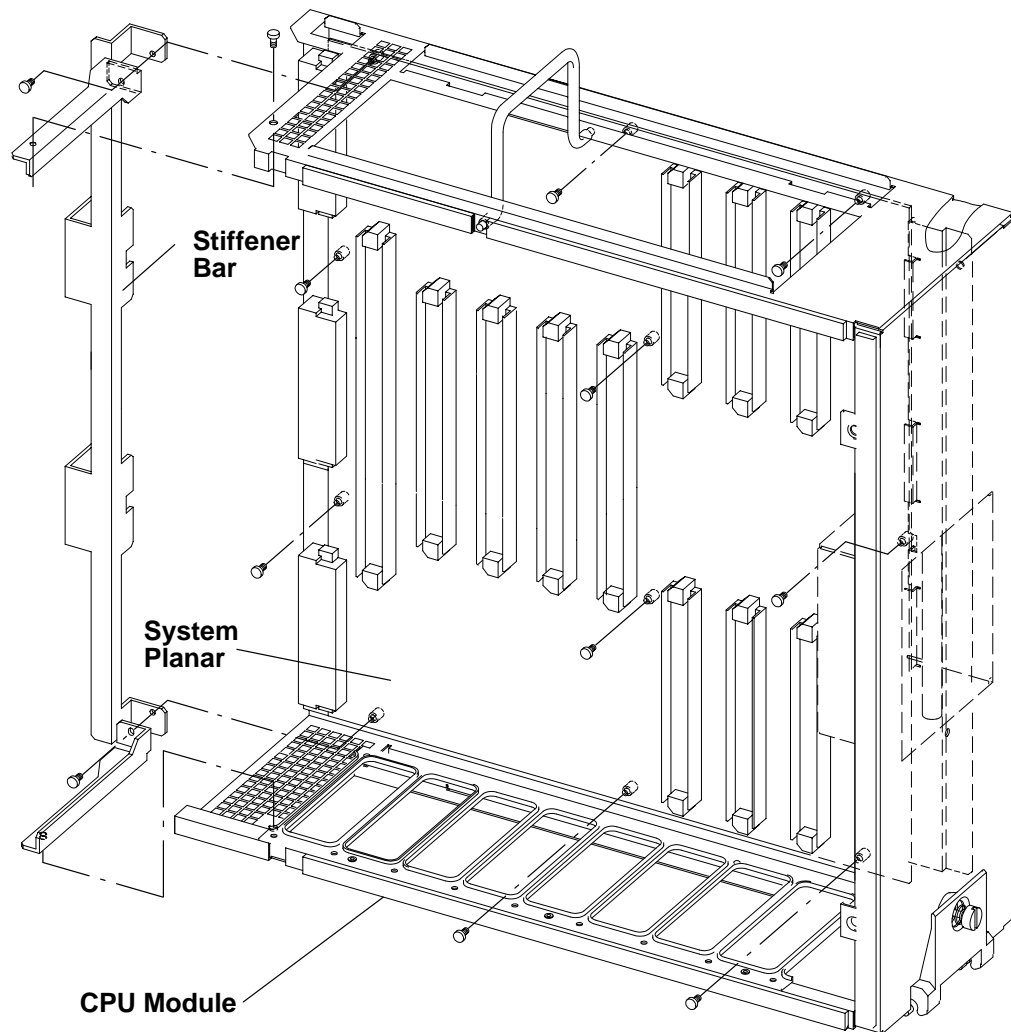
---

## System Planar

This procedure describes removing and replacing the system planar in the CPU module once it is removed from the base unit.

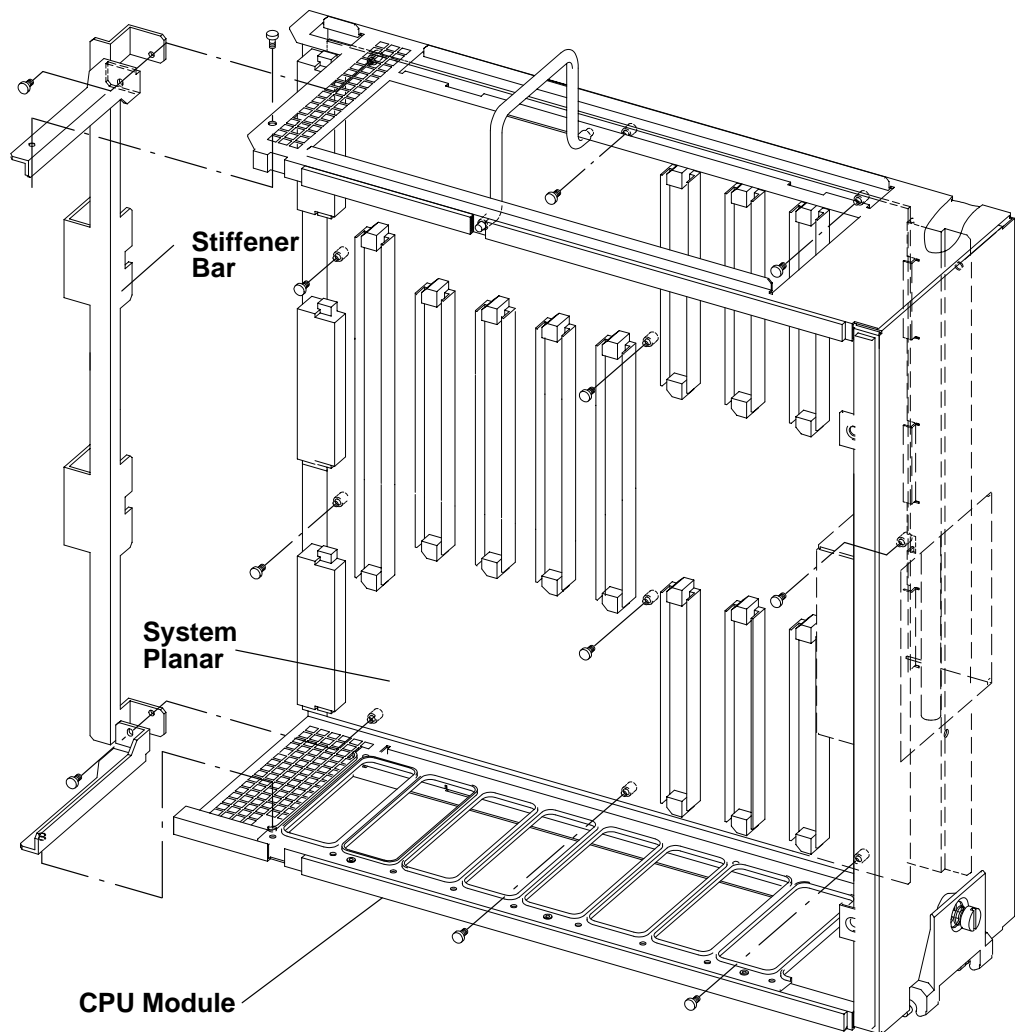
### Removal

1. Do the steps detailed in "Preliminary Operations" on page 4-2.
2. Remove the CPU module from the base unit, following the procedure described on page 4-70.
3. Remove all cards installed on the system planar, as described in "I/O, CPU and Memory Cards" on page 4-73.
4. Remove the stiffener bar of the system planar unscrewing the retaining screws shown in the figure.
5. Unscrew the retaining screws used to secure the system planar to the CPU module, as shown in the figure.
6. Pull the system planar out of the CPU module.



## Replacement

1. Position the system planar into the CPU module.
2. Secure the system planar, tightening the retaining screws shown in the figure.
3. Secure the stiffener bar of the system planar, tightening the retaining screws.
4. Install the I/O, CPU and memory cards. Refer to the installation procedure in "I/O, CPU and Memory Cards" on page 4-73.
5. Replace the CPU module in the base unit, following the procedure described on page 4-70.
6. Do in reverse order the steps listed in "Preliminary Operations" on page 4-2.



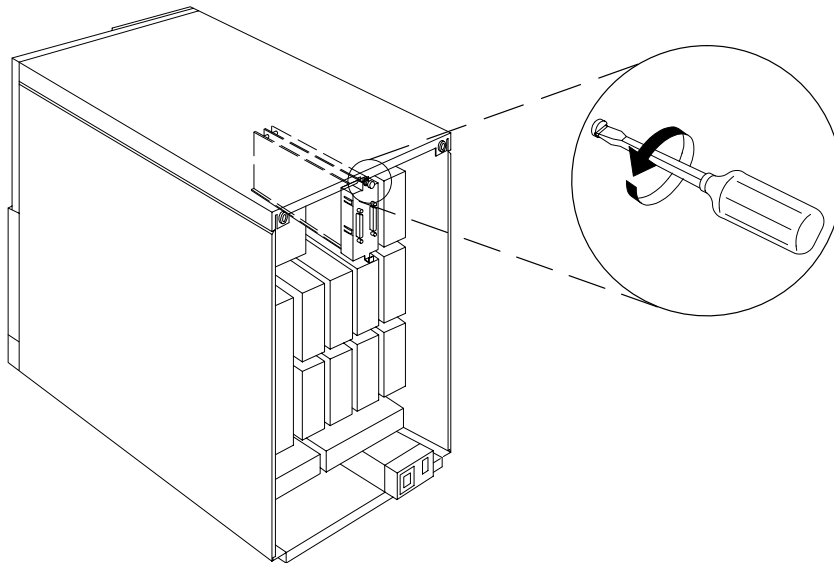
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## Expansion Unit SCSI Interface Card

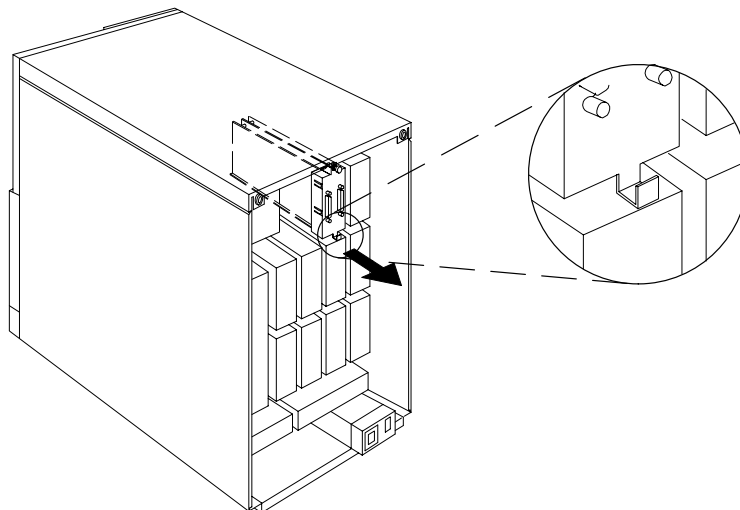
This procedure describes removing and replacing the SCSI Interface Card from the expansion unit.

### Removal

1. Do the steps detailed in "Preliminary Operations" on page 4-2.
2. To remove the SCSI interface card, remove the rear cover of the expansion unit following the procedures described on page 4-4.
3. Disconnect any SCSI cables from the SCSI interface card. Record which cable attaches to which connector on the SCSI interface card.
4. Loosen the retaining screw indicated in the figure using a screwdriver.

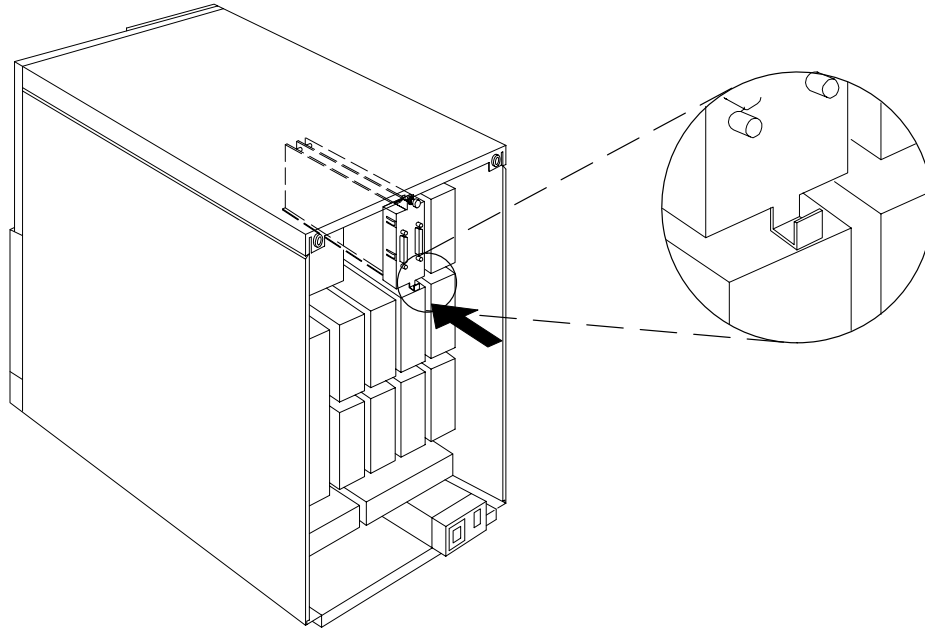


5. Firmly grip the SCSI interface card using the locking hook indicated in the figure, and then pull it out of the expansion unit.

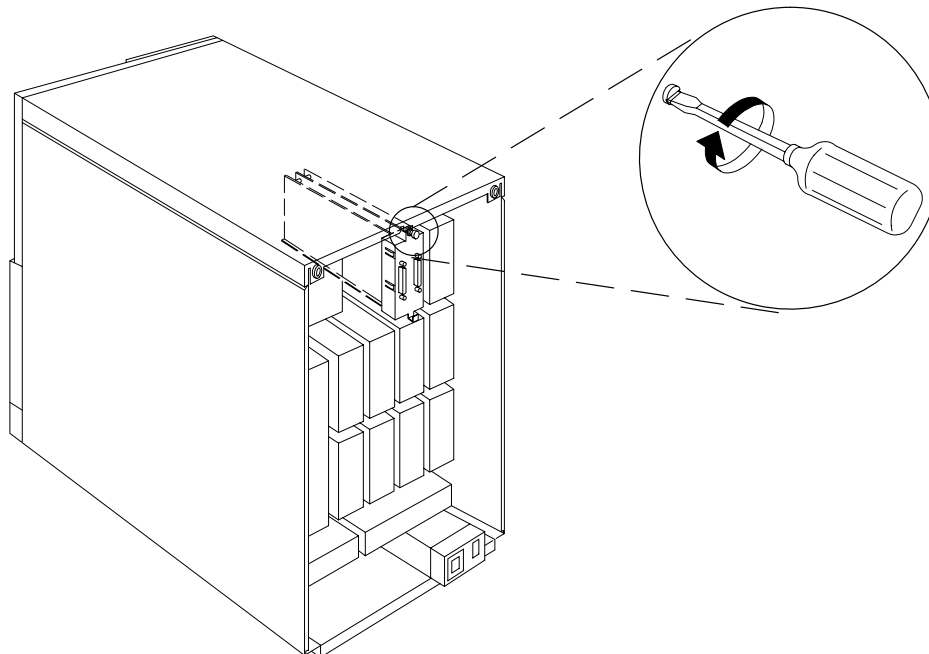


## Replacement

1. Align the SCSI interface card with its guides in the dedicated slot, and then slide it inside the expansion unit. The SCSI interface card must be inserted with the locking hook in the lower side of the slot.



2. Tighten the retaining screw indicated in the figure using a screwdriver.
3. Reconnect the SCSI cables to the SCSI interface card. Be sure that each cable attaches to the correct connector on the SCSI interface card.



4. Replace the rear cover after having performed all needed operations.
5. In reverse order, do the steps listed in "Preliminary Operations" on page 4-2.

---

## Base Unit First SCSI Bus Connection

### Disconnection

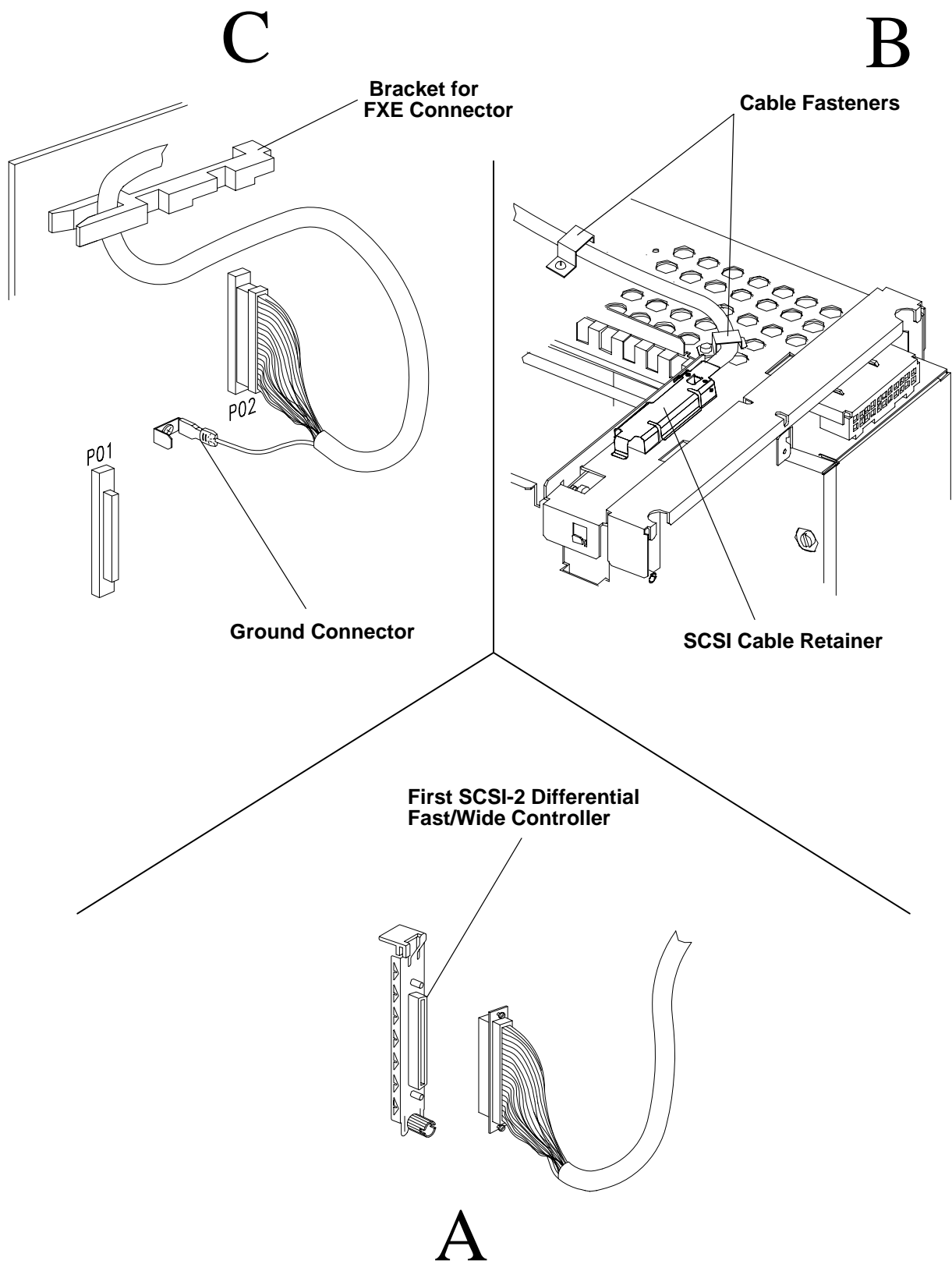
1. Do the steps detailed in "Preliminary Operations" on page 4-2.
2. Remove the rear, front, and top covers of the unit following the procedures described respectively on pages 4-4, 4-7, and 4-10.
3. Remove the CPU module from the base unit, following the procedure in "CPU Module" on page 4-70.
4. Ensure that each SCSI controller is installed in the correct position in the MCA card cage. For detailed information, see "SCSI Controllers" on page 1-28.
5. Disconnect the SCSI cable from the first SCSI-2 differential fast/wide controller installed in the base unit MCA card cage.
6. Disconnect the other end of the SCSI cable from the P02 connector on the base unit back plane. Also, disconnect the ground cable from the back plane, as shown in section **C** of the diagram on page 4-84.
7. Pry the SCSI cable retainer from the top of the unit.
8. Remove the SCSI cable, taking it out of the cable fasteners located at the top of the unit, and sliding it out of the unit.

### Connection

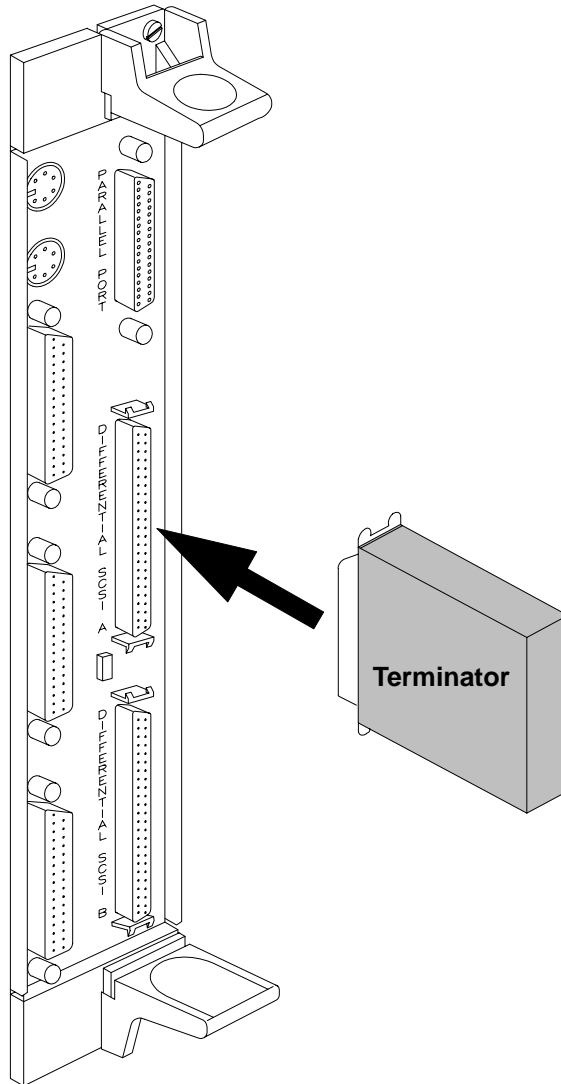
To activate the first SCSI bus in the base unit using the SCSI cable, part number 19H0398.

1. Connect the ribbon connector of the SCSI cable to the first SCSI-2 differential fast/wide controller installed in the base unit MCA card cage. Using a screwdriver, secure this connector by tightening the designated screws. (See section **A** of the diagram on page 4-84).
2. Route the SCSI cable the same as the one just removed, securing it to the unit using the cable fasteners located on the top of the unit. (See section **B** of the diagram on page 4-84).
3. Replace the SCSI cable retainer to the top of the unit.
4. Connect the other end of the SCSI cable to the connector marked P02 on the base unit back plane, and do the ground connection, as shown in section **C** of the diagram on page 4-84. Be sure that the SCSI cable route does not interfere with the FXE cable connection on the back plane.





5. Close the first SCSI bus, by plugging the SCSI terminator into the connector marked "DIFFERENTIAL SCSI A" on the system interface board.



6. Ensure that each SCSI controller is installed in the correct position in the MCA card cage. For detailed information, see "SCSI Controllers" on page 1-28.
7. Replace the CPU module in the base unit, following the procedure in "CPU Module" on page 4-70.
8. Replace the top, front, and rear covers of the unit following the procedures described respectively on pages 4-11, 4-8, and 4-5.
9. In reverse order, do the steps detailed in "Preliminary Operations" on page 4-2.

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## Base Unit Second SCSI Bus Connection

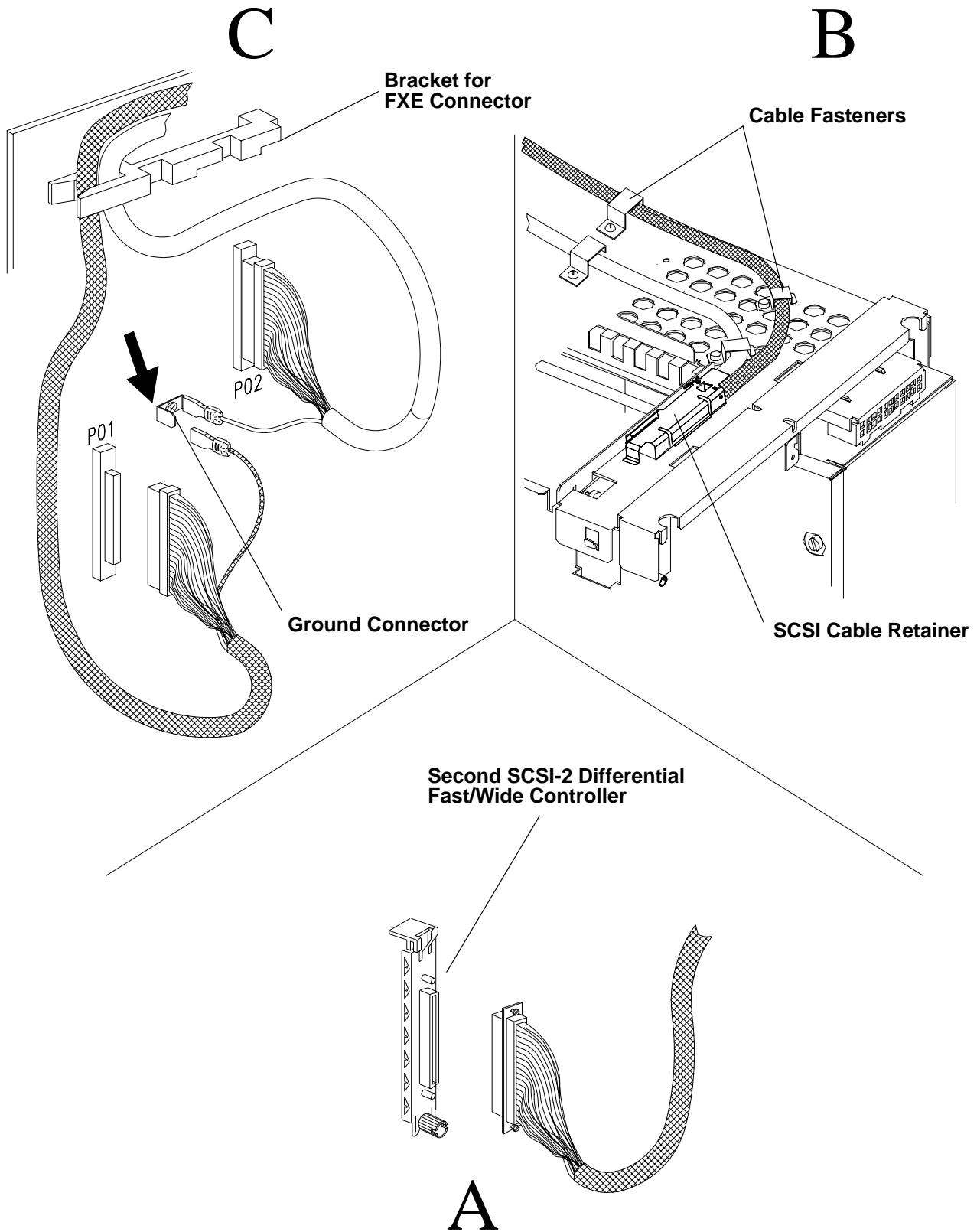
### Disconnection

1. Do the steps detailed in "Preliminary Operations" on page 4-2.
2. Remove the rear, front, and top covers of the unit following the procedures described respectively on pages 4-4, 4-7, and 4-10.
3. Remove the CPU module from the base unit, following the procedure in "CPU Module" on page 4-70.
4. Ensure that each SCSI controller is installed in the correct position in the MCA card cage. For detailed information, see "SCSI Controllers" on page 1-28.
5. Pry the SCSI cable retainer from the top of the base unit.
6. Disconnect the SCSI cable from the second SCSI-2 differential fast/wide controller installed in the base unit MCA card cage.
7. Disconnect the other end of the SCSI cable from the P01 connector on the base unit back plane. Also, disconnect the ground cable from the back plane, as shown in section **C** of the diagram on page 4-88.
8. Remove the SCSI cable, taking it out of the cable fasteners located at the top of the unit, and sliding it out of the unit.
9. If you do not replace the SCSI cable with another one, you will not need to connect the second SCSI bus. That is, remove the SCSI terminator from the connector marked "DIFFERENTIAL SCSI B" on the system interface board.

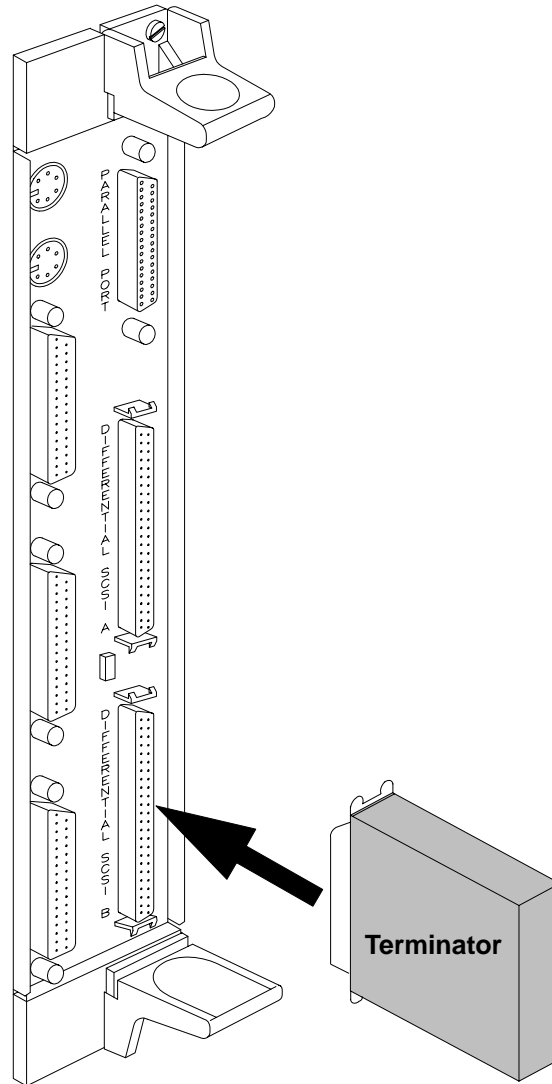
### Connection

The activation of the second SCSI bus in the base unit is made by means of the SCSI cable having part number 19H0398.

1. Connect the ribbon connector of the SCSI cable to the second SCSI-2 differential fast/wide controller installed in the base unit MCA card cage. Using a screwdriver, secure this connector by tightening the designated screws. (See section **A** of the diagram on page 4-88).
2. Route the SCSI cable beside the one already installed for the first SCSI bus, following exactly the same way. Secure it to the unit using the same cable fasteners used for the first SCSI cable. (See section **B** of the diagram on page 4-88).
3. Connect the other end of the SCSI cable to the connector marked P01 on the base unit back plane, and do the grounded connection, as shown in section **C** of the diagram on page 4-88.
4. Replace the SCSI cable retainer to the top of the base unit.



5. Close the second SCSI bus, by plugging the SCSI terminator into the connector marked "DIFFERENTIAL SCSI B" on the system interface board.



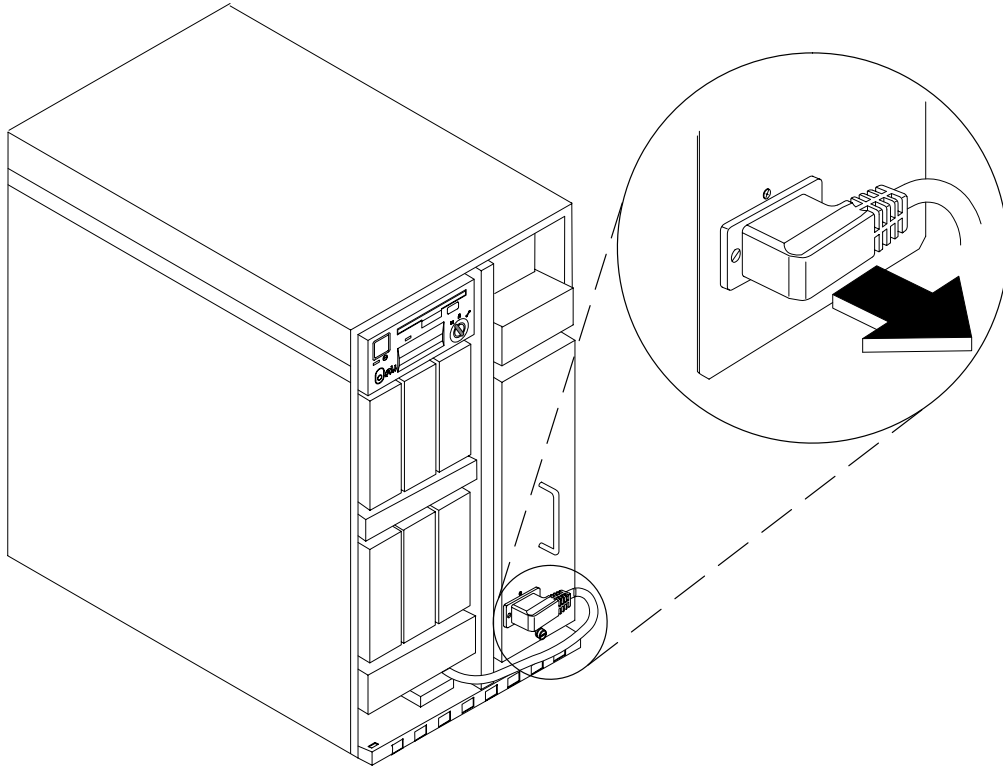
6. Ensure that each SCSI controller is installed in the correct position in the MCA card cage. For detailed information, see "SCSI Controllers" on page 1-28.
7. Replace the CPU module in the base unit, following the procedure in "CPU Module" on page 4-70.
8. Replace the top, front, and rear covers of the unit following the procedures described respectively on pages 4-11, 4-8, and 4-5.
9. In reverse order, do the steps detailed in "Preliminary Operations" on page 4-2.

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## Main Power Switch

### Removal

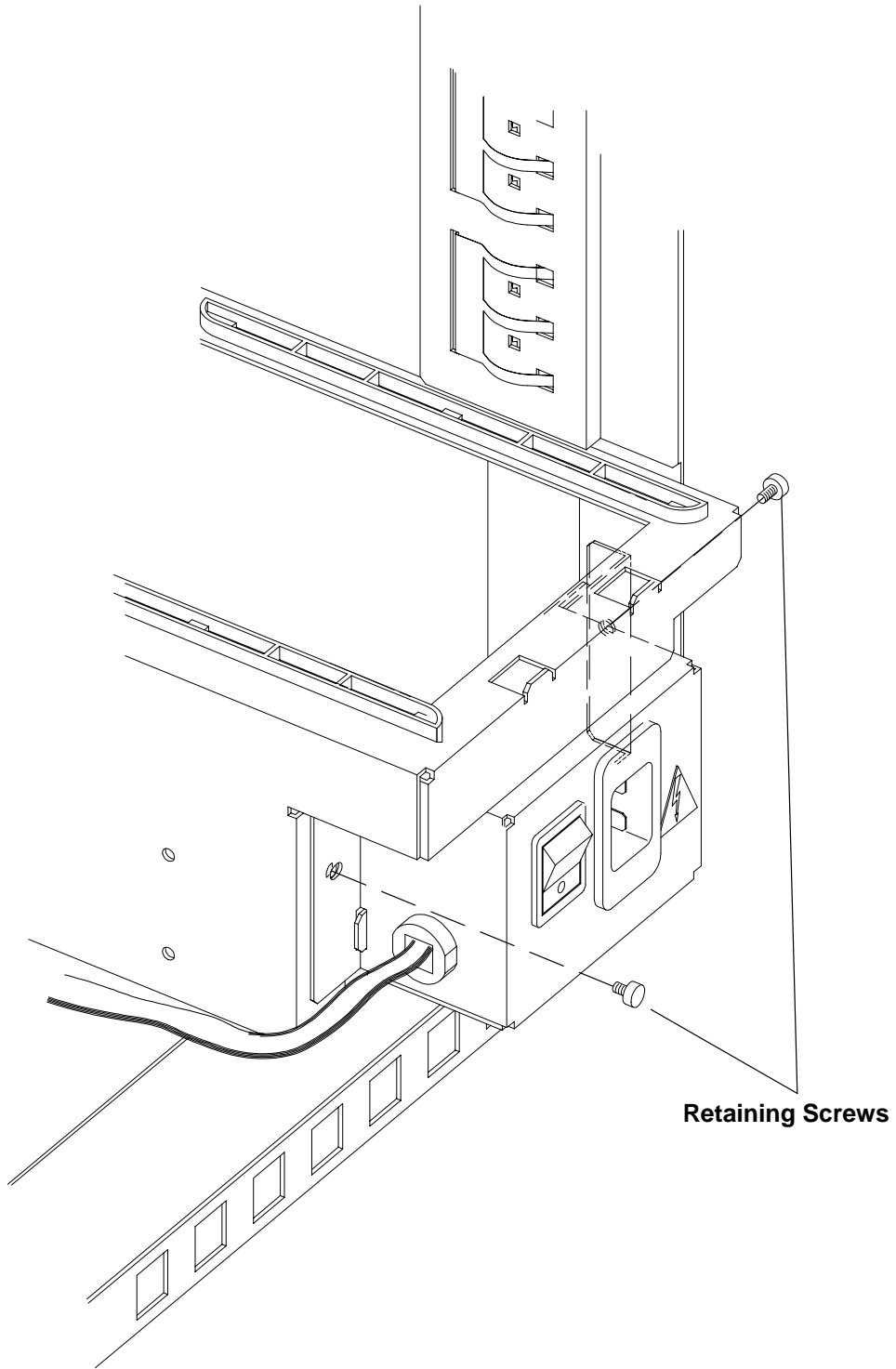
1. Do the steps detailed in "Preliminary Operations" on page 4-2.
2. Remove the rear and front covers of the unit following the procedures described respectively on pages 4-4 and 4-7.
3. Unplug the power supply cable connector from the power supply at the front of the unit.



4. Loosen the retaining screws at the back of the unit, as shown in on page 4-90.
5. Remove the main power switch from the unit. Be careful in handling the main power switch: the cable connected to it passes through to the front of the unit. Gently slide the cable out of the unit. Note the path followed by this cable through the unit.

### Installation

1. Position the main power switch, and gently insert its cable into the unit, following the original path to the front.
2. Secure the main power switch to the unit by tightening the retaining screws shown on page 4-90.
3. Plug the cable into the power supply connector.
4. Replace the front and rear covers of the unit following the procedures described respectively on pages 4-5 and 4-8.
5. Do the steps detailed in "Preliminary Operations" on page 4-2.



Retaining Screws

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## Base Unit FXB Flex Cable

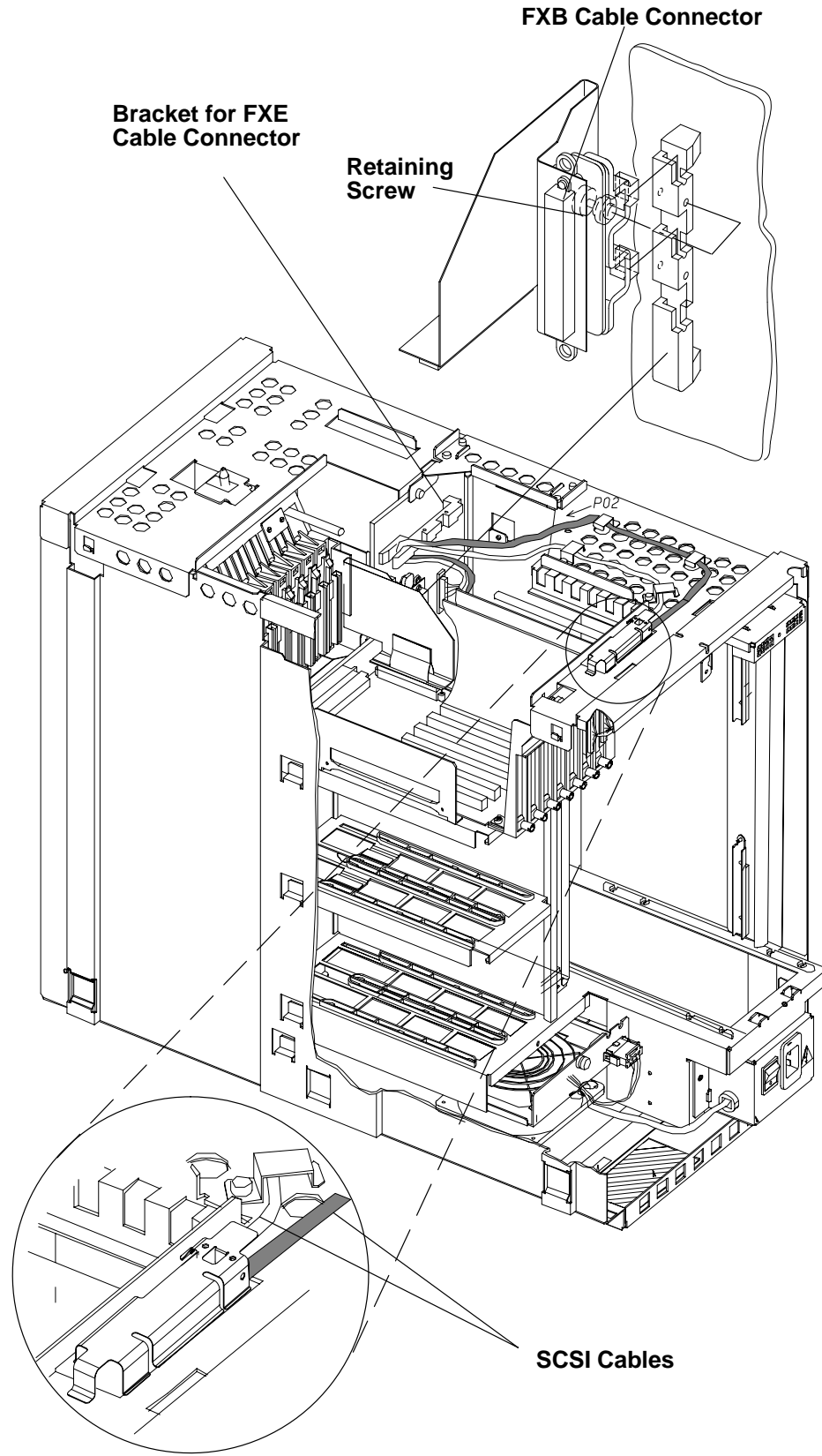
This procedure describes how to remove and replace the FXB flex cable located inside the base unit.

### Removal

1. Do the steps detailed in "Preliminary Operations" on page 4-2.
2. To access the FXB flex cable, remove the rear, front, and top covers of the base unit following the procedures described respectively on pages 4-4, 4-7, and 4-10.
3. Pull the CPU module out about six inches, following the procedures described on page 4-70.
4. Disconnect the FXB cable MICROPAX connector from the connector marked **U126/Y1** on the PMA board in the base unit MCA card cage.
5. Loosen the retaining screw locking the connector of the FXB cable to the base unit back plane mechanical support.
6. Slide the connector of the FXB cable in the appropriate direction, then remove it from the unit.

**Note:** The diagram on page 4-93 shows the location of the FXB cable connector in the base unit





## Replacement

1. Insert the connector of the FXB cable into the vertical mechanical support located in the rear of the back plane.
2. Slide the connector of the FXB cable, then secure it to the back plane connector support by tightening the retaining screw.
3. Connect the FXB cable MICROPAX connector to the connector marked **U126/Y1** on the PMA board in the base unit MCA card cage.
4. Adjust the slack from the SCSI cables that are routed over the top of the base unit. This will make replacement of the CPU module easier.
5. Replace the CPU module, reverse the procedure found on page 4-70.
6. Replace the top, front, and rear covers following the procedures described respectively on pages 4-10, 4-7, and 4-4.
7. In reverse order, do the steps listed in "Preliminary Operations" on page 4-2.

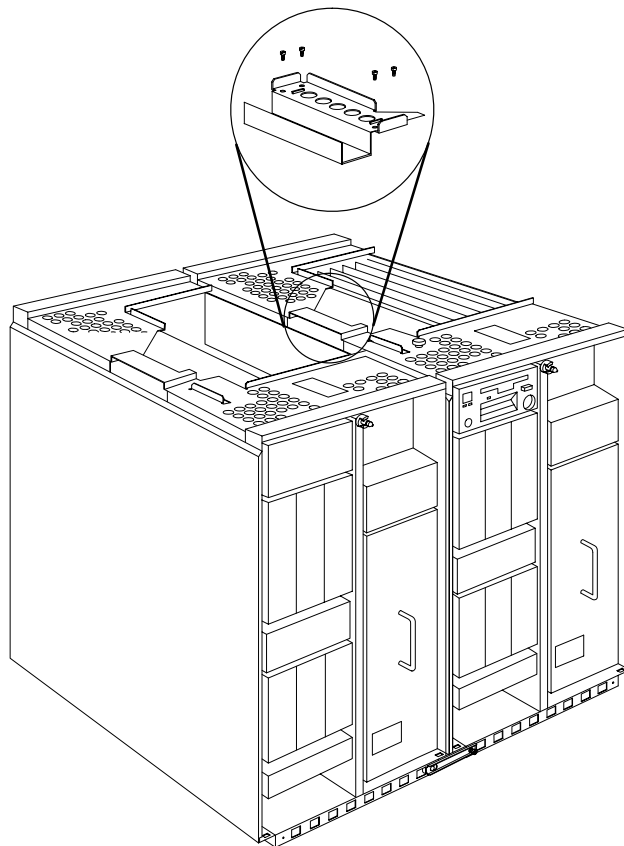
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## FXE Flex Cable

This procedure describes how to remove and replace the FXE flex cable which connects between the base unit and the expansion unit.

### Removal

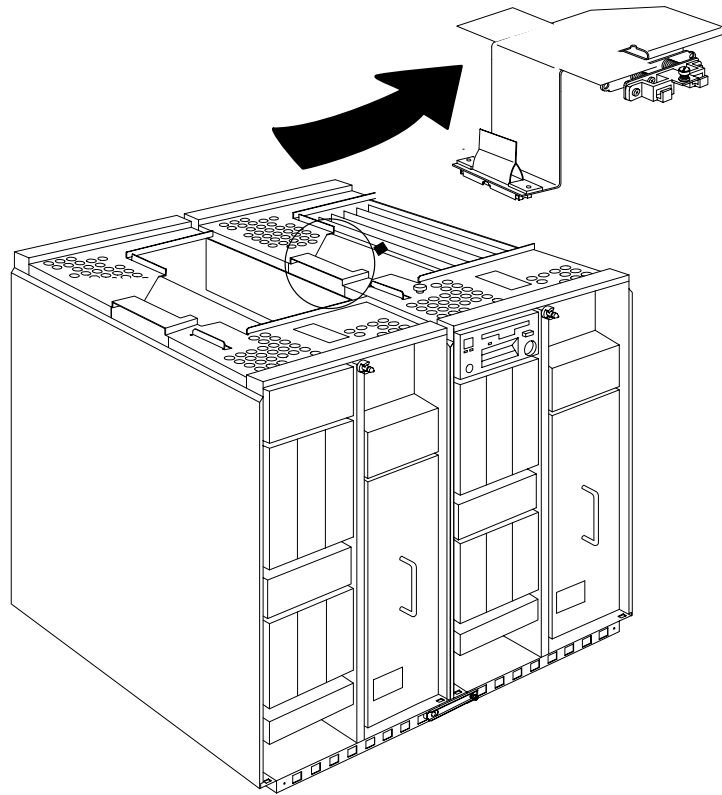
1. Do the steps detailed in "Preliminary Operations" on page 4-2.
2. To access the FXE flex cable, remove the rear, front, and top covers of the base unit and expansion unit following the procedures described respectively on pages 4-4, 4-7, and 4-10.
3. Pull the CPU module out about six inches, following the procedures described on page 4-70.
4. Remove the metal bridge from the base unit as shown below.



5. Remove the adapter cards nearest the outside of the expansion unit. See "Adapters" on page 4-15. This will enable easier access to the FXE cable connector.
6. Disconnect the FXE cable MICROPAX connector from the connector on the PMe board in the expansion unit MCA card cage.
7. Loosen the retaining screw locking the connector of the FXE cable to the base unit back plane mechanical support.

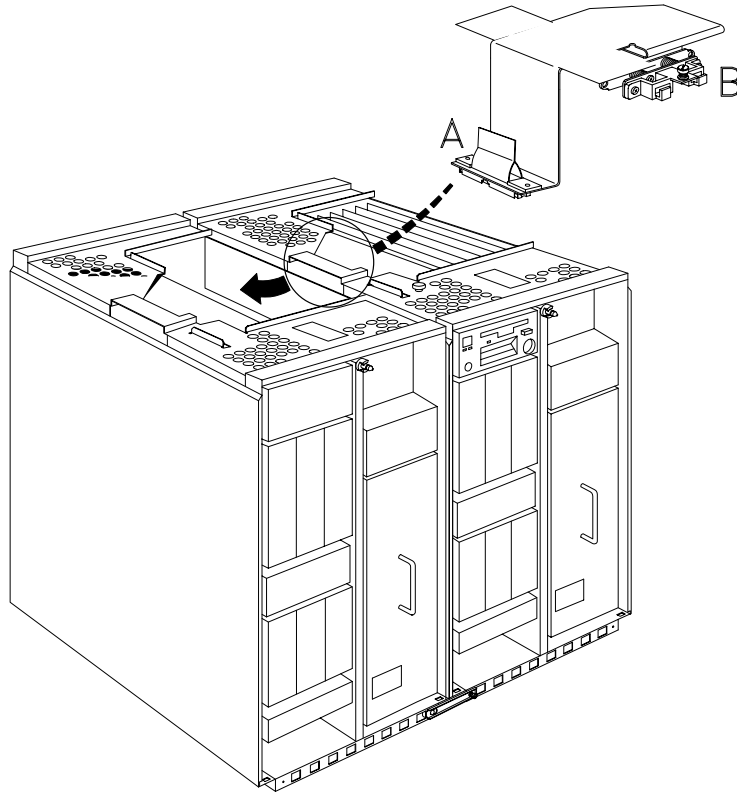
**Note:** The diagram on page 4-93 shows the location of FXE cable connector in the base unit.

8. Slide the connector of the FXE cable as shown and remove it through the slit highlighted with a circle below.

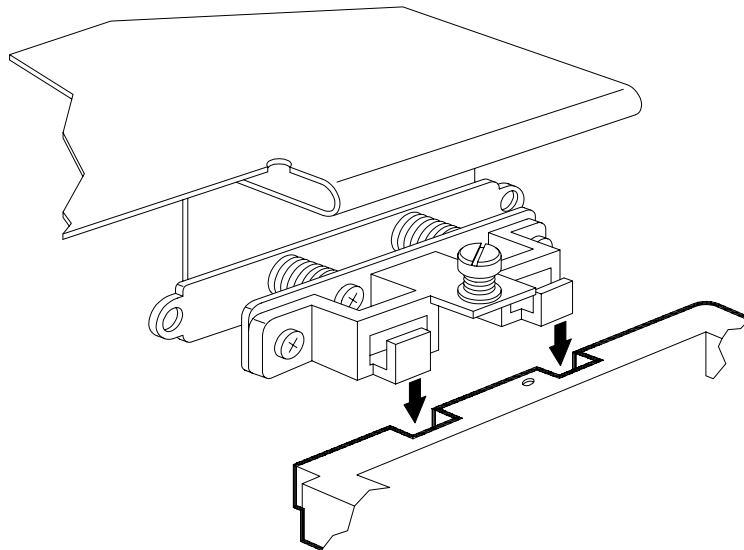


## Replacement

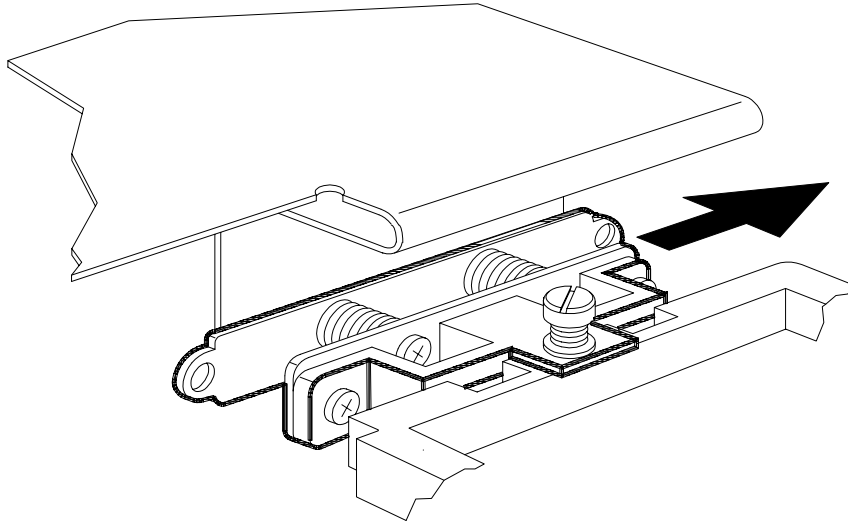
1. Insert the FXE cable edge, marked **A** in the figure, through the slit highlighted with a circle in the figure.



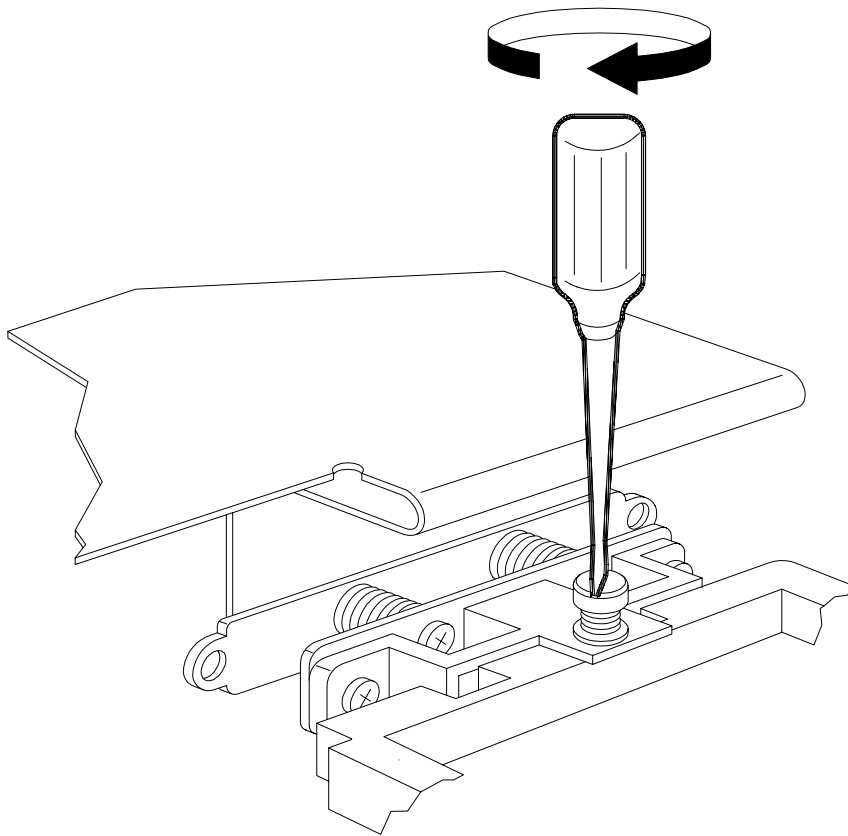
2. Insert the mechanics of the FXE cable into the horizontal mechanical support located in the rear of the base unit back plane.



3. Slide the mechanics of the FXE cable following the direction shown in the figure.

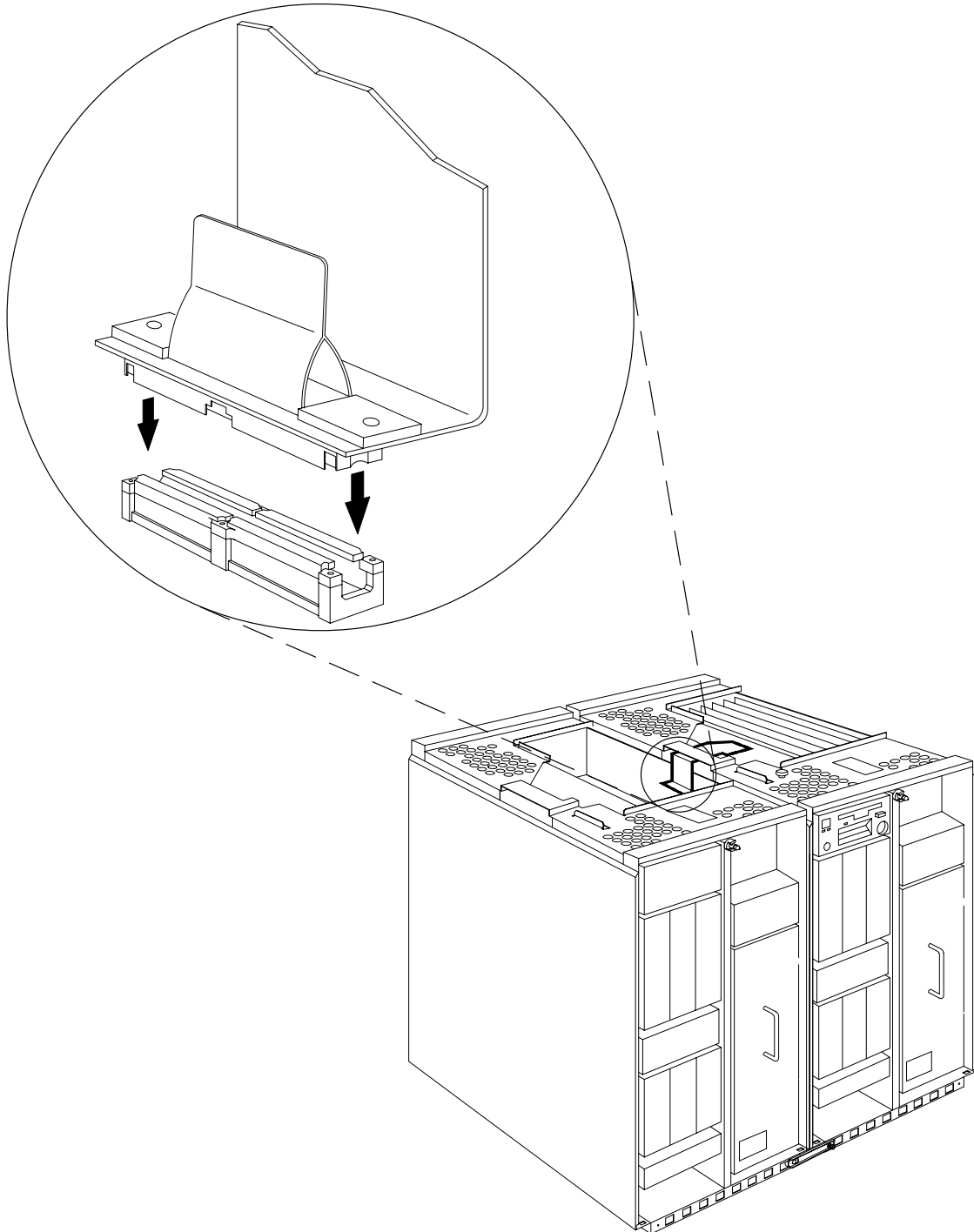


4. Secure the mechanics of the FXE cable to the base unit back plane mechanical support tightening clockwise the screw illustrated in the figure.

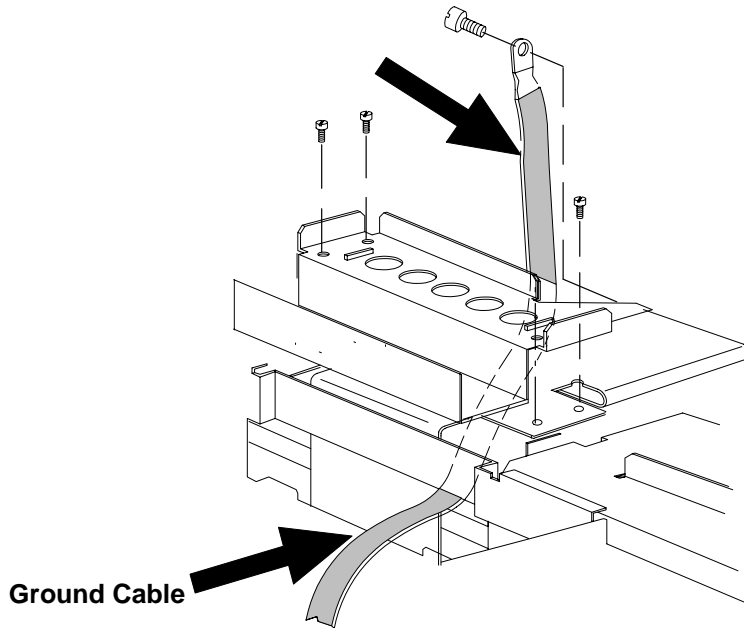


5. Connect the FXE cable connector to the connector on the MPE board in the expansion unit MCA card cage.

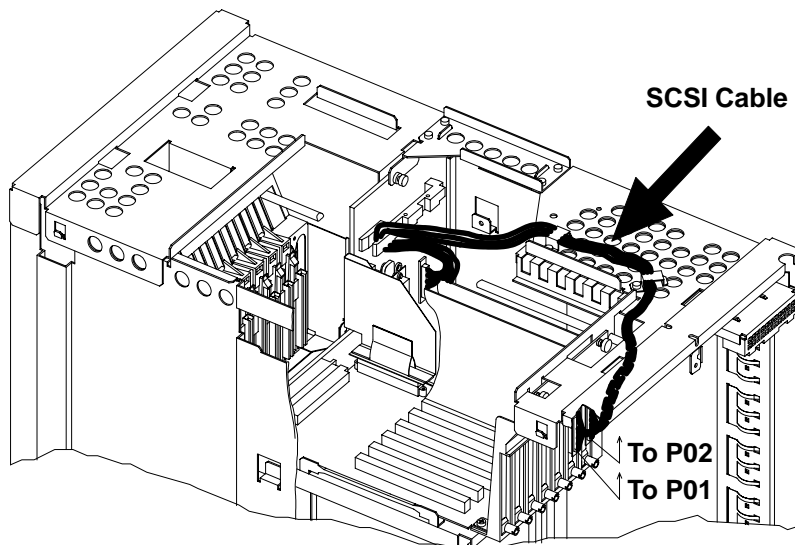
**Note:** Before attempting to connect the FXE cable, remove the dust covers from connectors on the FXE cable and the MPE board.



6. Replace the metal bridge as shown here. Be sure to attach the ground cable from the expansion unit to the base unit.



7. Adjust the slack in the SCSI cable on the top of the base unit. This will make the replacement of the CPU module easier.



8. Replace the adapter cards that you removed earlier.
9. Replace the CPU module, reverse the procedure found on page 4-70.
10. Replace the top, front, and rear covers following the procedures described respectively on pages 4-10, 4-7, and 4-4.
11. In reverse order, do the steps listed in "Preliminary Operations" on page 4-2.

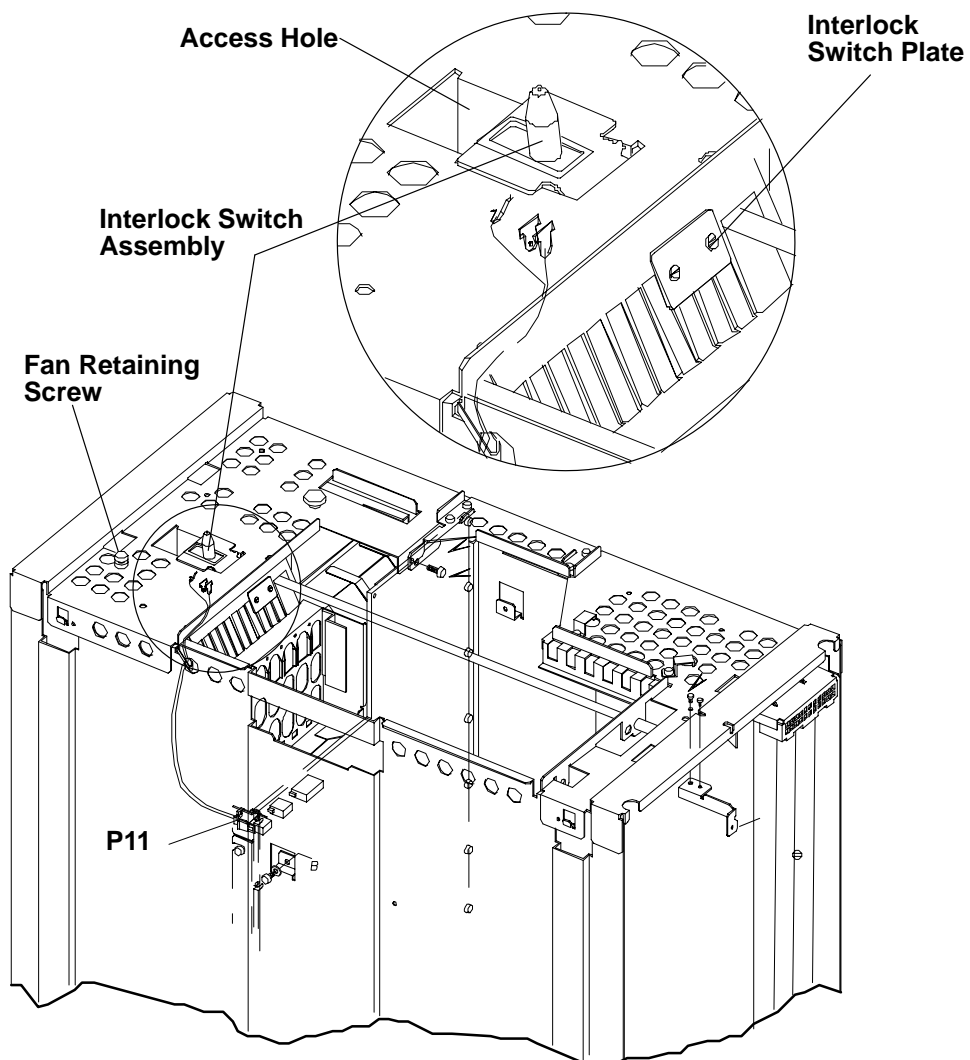


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# Top Cover Interlock Switch

## Removal

1. Do the steps detailed in "Preliminary Operations" on page 4-2.
2. To access the top cover interlock switch, remove the rear, front, and top covers of the unit following the procedures described respectively on pages 4-4, 4-7, and 4-10
3. Loosen the retaining screw that secures the MCA fan module, as described on page 4-60, and move the fan to allow access behind it.
4. Unplug the connector at P11 on the back plane.
5. Loosen the two screws used to secure the interlock switch plate to the MCA cage, then remove the plate.
6. Carefully remove the switch and cable assembly through the access hole.



## Replacement

Do in reverse order the steps listed in "Removal".

---

## Back Plane

**Attention:** After the back plane is installed and the system is powered-up, the system ID is down-loaded to the back plane from a backup source within the system. This ID becomes permanent on the back plane and cannot be altered without special tools. Therefore, the back plane cannot be transferred to another system. It must be returned to the plant of manufacture as a new defective.

**Attention:** The back plane and system interface board EEPROMs contain the SYSID of the system. When one of the two components is to be replaced (for example the back plane), the SYSID information will be copied from operator panel EEPROMs into the back plane EEPROMs 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:

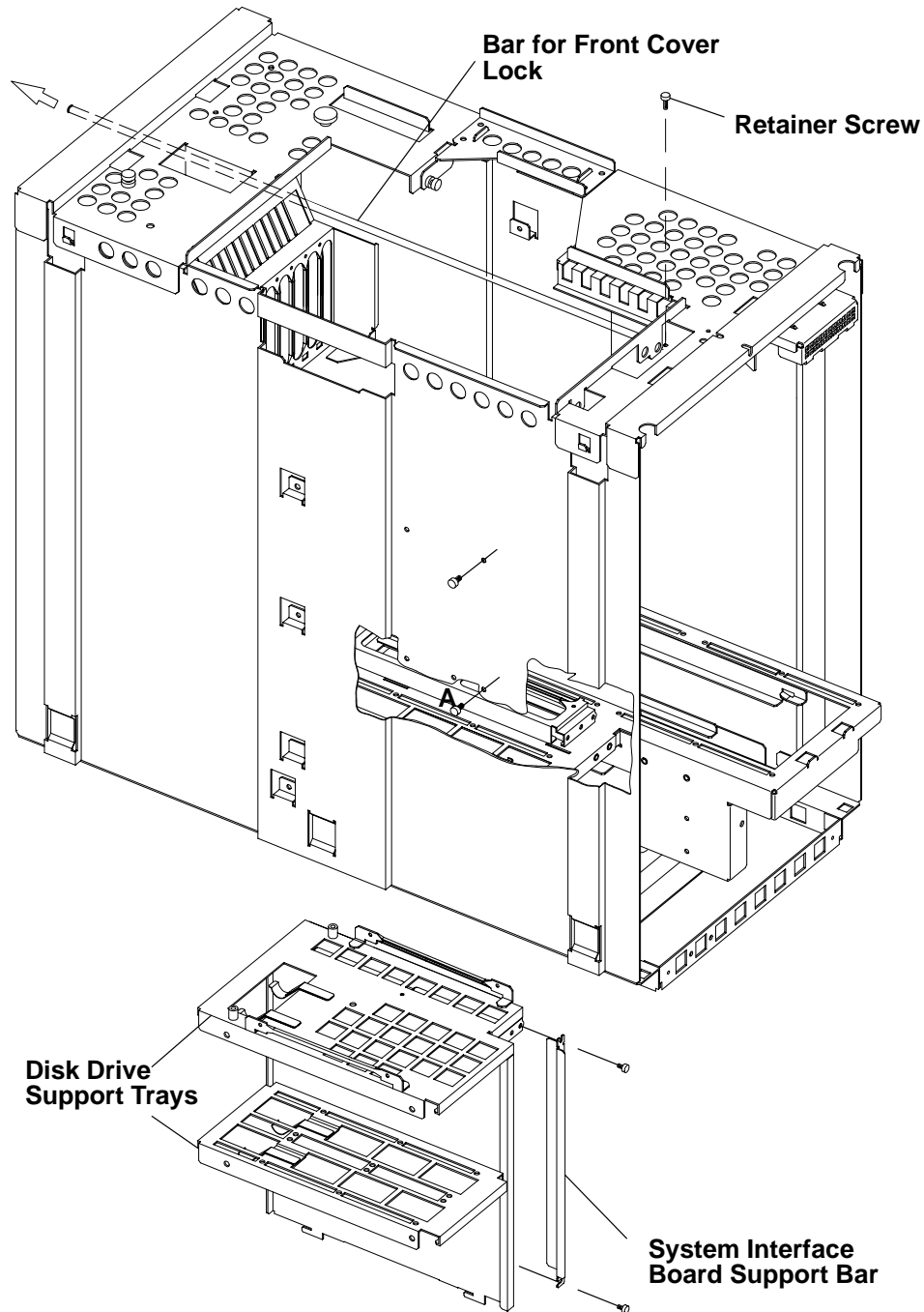
1. First substitute the system interface board and start up the system: the SYSID information will be copied from back plane EEPROM to the system interface board EEPROM.
2. Substitute the back plane and start up the system: the SYSID information will be copied from the system interface board EEPROM to the back plane EEPROM.

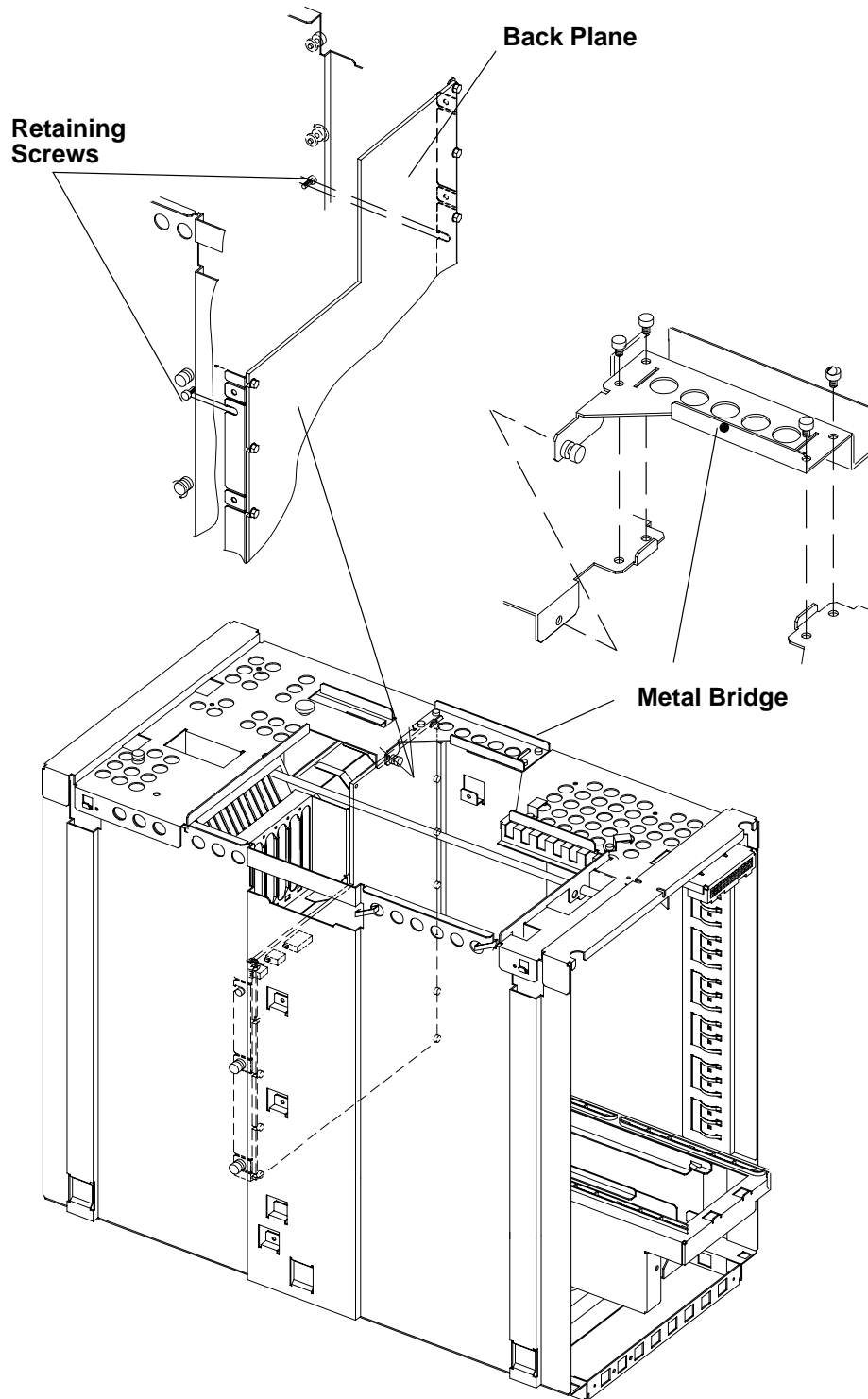
## Removal

1. Do the steps detailed in "Preliminary Operations" on page 4-2.
2. Remove the rear, front, and top covers of the cabinet following the procedures described respectively on pages 4-4, 4-7 and 4-10.
3. Remove both the left and the right side covers, as shown on page 4-13.
4. Remove the operator panel, as shown on page 4-26.
5. Remove any internal media device, as shown on page 4-34.
6. Remove any internal disk drive located in the front of the unit, as shown on page 4-39.
7. Remove the power supply, as shown on page 4-50.
8. To access the unit from the front, disconnect any internal cable connected to the front or rear side of the back plane.
9. Remove the CPU module, as shown on page 4-67.
10. Remove the bar used to lock the front cover to the unit, unscrewing the retaining screw, as shown on page 4-103, and sliding it out of the unit from the front.  

This step is needed only if you decide to remove the back plane sliding it out of the top side of the unit.
11. Remove the MCA card cage, following the procedure described on page 4-24.
12. Remove any internal disk drive located in the rear of the unit, as shown on page 4-39.
13. Remove the system interface board, as shown on page 4-65.
14. Remove the support bar of the system interface board, unscrewing the designated screws as shown on page 4-103.

15. Remove the metallic grid that is housing the disk drives placed in the rear of the unit, as shown on page 4-103.
16. Remove the metallic bridge on the top of the unit, unscrewing the corresponding screws, as shown on page 4-104.
17. To access the unit both from the left and the right, unscrew the back plane retaining screws as shown on page 4-104.
18. Pull the back plane up and then pull it towards the rear of the unit to unlock it from the unit frame. Then slide it out of the unit.





## Replacement

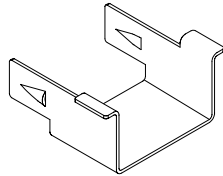
1. To replace the back plane, follow the removal procedure on page 4-102 in the reverse order.
2. If the maintenance contract is signed and still valid, after having replaced the new back plane remember to reset the appropriate flags to enable the maintenance features.

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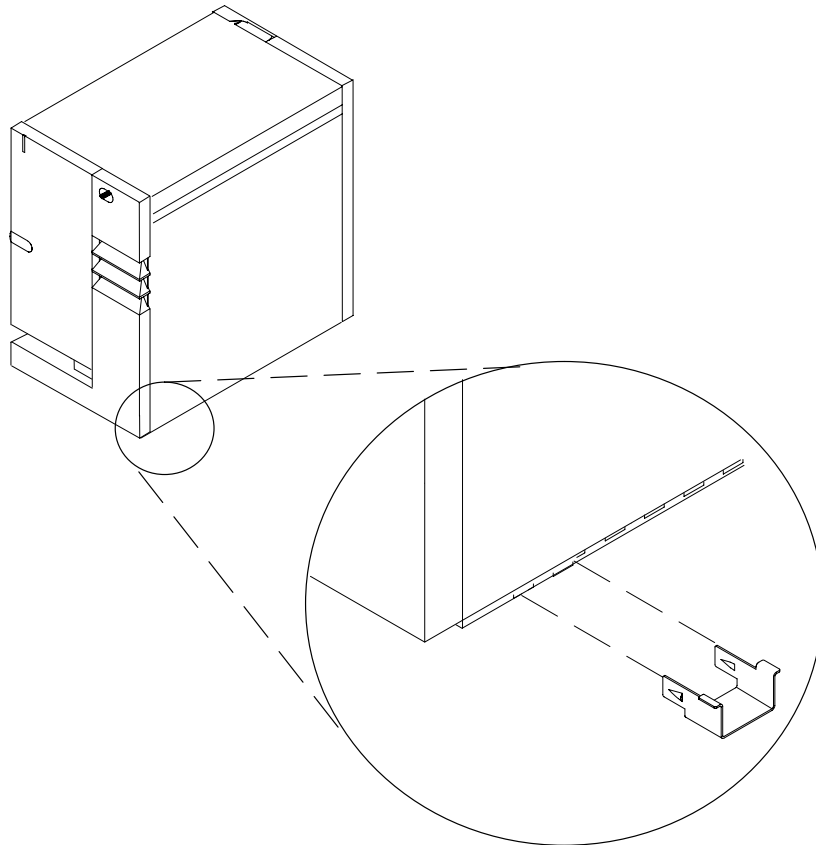
## Stability Support

The following information describes how to install the stability supports shipped with your system unit.

**Attention:** If your system configuration does not include an expansion unit, the stability supports *must* be installed on the base unit before set-up and use.



1. Move the base unit to its designated location. Once the supports are installed you cannot move the system.
2. Insert the tabs of each support into the first two holes at each corner of the base of the unit, and push in until they lock into position.



3. Continue with the *Hardware Setup Procedure*.



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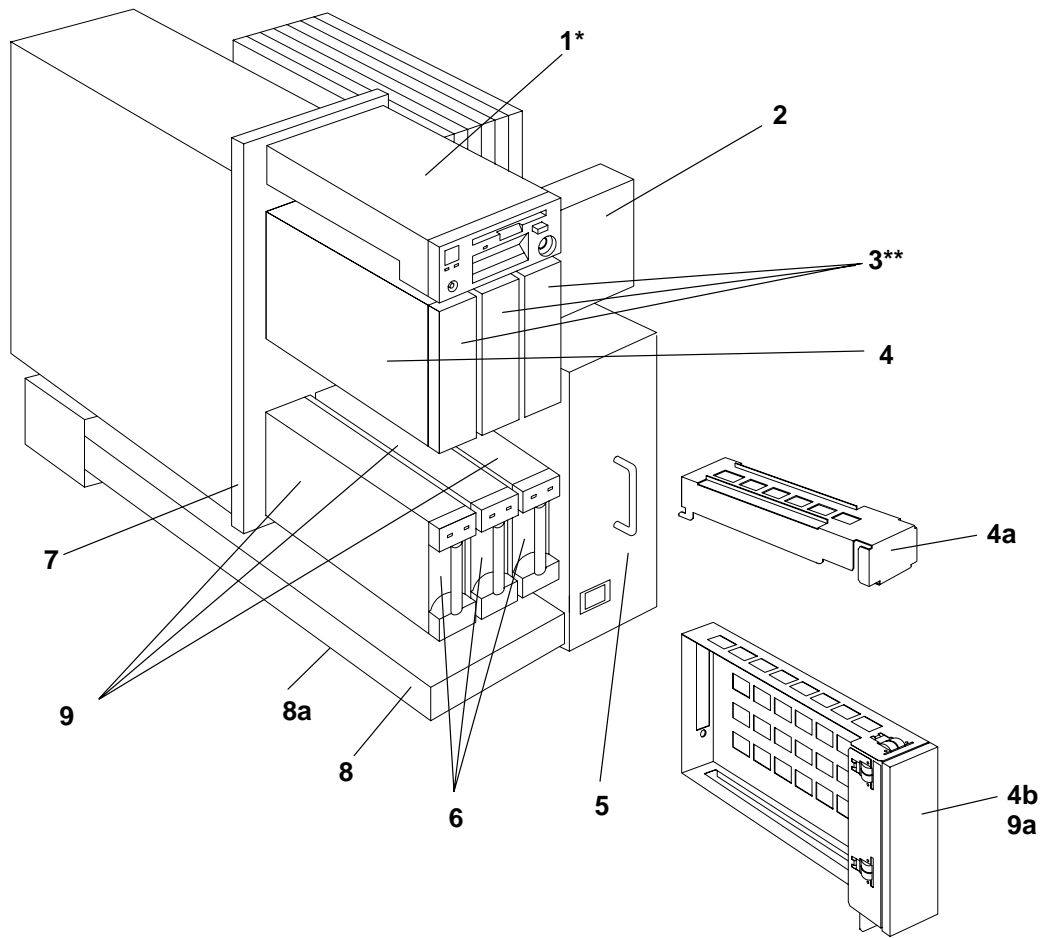
## Chapter 5. Parts Information

### 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 (J30, J40)                       |
| NMB            | System planar (J50)                            |
| SIF X          | System interface board                         |
| PMA            | 7 Slot Micro Channel adapter planar, base      |
| PME            | 8 Slot Micro Channel adapter planar, expansion |
| IOD            | I/O card                                       |
| BIO            | I/O card                                       |
| OPP            | Operator panel                                 |

## Base Unit and Expansion Unit Front View (without covers)



**Note:** \* This figure shows only the base unit operator panel, the expansion unit operator is listed under the same index number in the table on the following page.

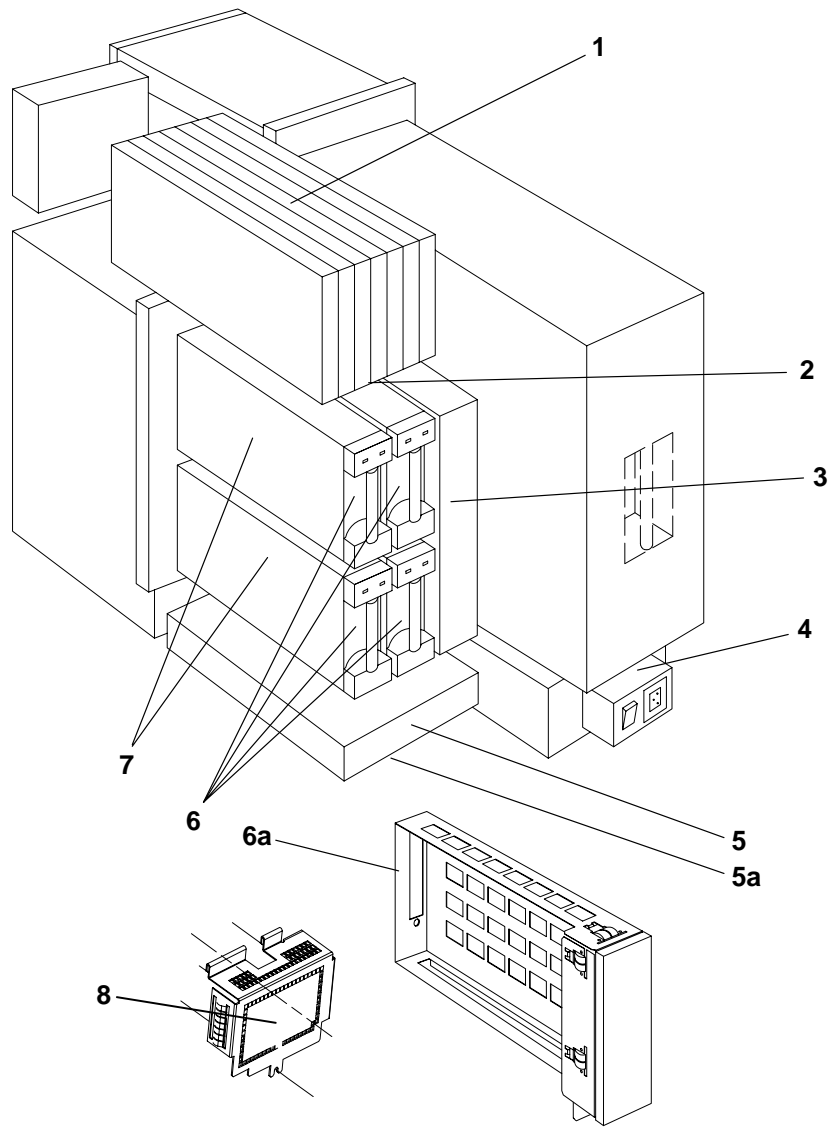
\*\*The expansion unit has only two media expansion bays.



**Note:** Except where listed separately, part numbers in this list are for both the base unit and the expansion unit.

| Index Number                                                                                                                                                    | Part Number | Units Per Asm | Description                                           |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|---------------|-------------------------------------------------------|
| 1                                                                                                                                                               | 94H9992     | 1             | Base unit operator panel assembly                     |
|                                                                                                                                                                 | 65G6565     | 1             | • Operator panel bezel                                |
|                                                                                                                                                                 | 96G4207     | 1             | • Battery                                             |
|                                                                                                                                                                 | 88G4768     | 1             | • 3.5-inch diskette drive                             |
| 1                                                                                                                                                               | 96G4313     | 1             | Expansion unit operator panel LED cable               |
| 2                                                                                                                                                               | 19H0222     | 1             | Micro channel adapter fan module                      |
| 3                                                                                                                                                               | 19H0206     | 3             | CD-ROM drive, type c bezel, (with carrier)            |
|                                                                                                                                                                 | 19H0212     | 3             | CD-ROM drive, type b bezel, (with carrier)            |
|                                                                                                                                                                 | 19H0204     | 2             | 8mm tape drive (with carrier)                         |
|                                                                                                                                                                 | 19H0210     | 2             | 1/4-inch tape drive (with carrier)                    |
|                                                                                                                                                                 | 19H0213     | 2             | 4-mm tape drive (with carrier)                        |
| 4                                                                                                                                                               | 19H0266     | 2             | Media devices carrier with converter board (no drive) |
| 4a                                                                                                                                                              | 96G4365     | 2             | Disk drive adapter for media bay                      |
| 4b                                                                                                                                                              | 96G4320     | 1             | Plug for unused media bay                             |
| 5                                                                                                                                                               | 39H9222     | 1             | Power supply                                          |
| 6                                                                                                                                                               | 19H0202     | 1             | 1.0GB disk drive, 8 bit, (with carrier)               |
|                                                                                                                                                                 | 19H0201     | 1             | 2.0GB disk drive, 8 bit, (with carrier)               |
|                                                                                                                                                                 | 19H0207     | 1             | 1.1GB disk drive, 16 bit, (with carrier)              |
|                                                                                                                                                                 | 19H0203     | 1             | 2.2GB disk drive, 16 bit, (with carrier)              |
|                                                                                                                                                                 | 19H0208     | 1             | 4.5GB disk drive, 16 bit, (with carrier)              |
|                                                                                                                                                                 | 96G4409     | 1             | 9.1GB disk drive, 16 bit, (with carrier)              |
|                                                                                                                                                                 | 96G4321     | 1             | Plug for unused disk drive bay                        |
| 7                                                                                                                                                               | 19H0500     | 1             | Base unit back plane                                  |
|                                                                                                                                                                 | 19H0325     | 1             | Expansion unit back plane                             |
| 8                                                                                                                                                               | 19H0219     | 1             | Base unit main fan module (J30, J40)                  |
|                                                                                                                                                                 | 19H0270     | 5             | • Fan assembly only                                   |
| 8                                                                                                                                                               | 09J4751     | 1             | Base unit main fan module, (J50)                      |
|                                                                                                                                                                 | 19H0270     | 2             | • Medium-speed fan assembly only                      |
|                                                                                                                                                                 | 09J4752     | 3             | • High-speed fan assembly only                        |
| 8                                                                                                                                                               | 19H0221     | 1             | Expansion unit main fan module                        |
|                                                                                                                                                                 | 19H0270     | 4             | • Fan assembly only                                   |
| 8a                                                                                                                                                              | 67G3548     | 1             | Base unit main fan filter                             |
| 8a                                                                                                                                                              | 67G3549     | 1             | Expansion unit main fan filter                        |
| 9                                                                                                                                                               | 19H0265     | 1             | 8 bit disk drive carrier (no drive)                   |
|                                                                                                                                                                 | 19H0209     | 1             | 16 bit disk drive carrier (no drive)                  |
| 9a                                                                                                                                                              | 96G4321     | 0–2           | Plug for unused disk drive bay                        |
| 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. |             |               |                                                       |

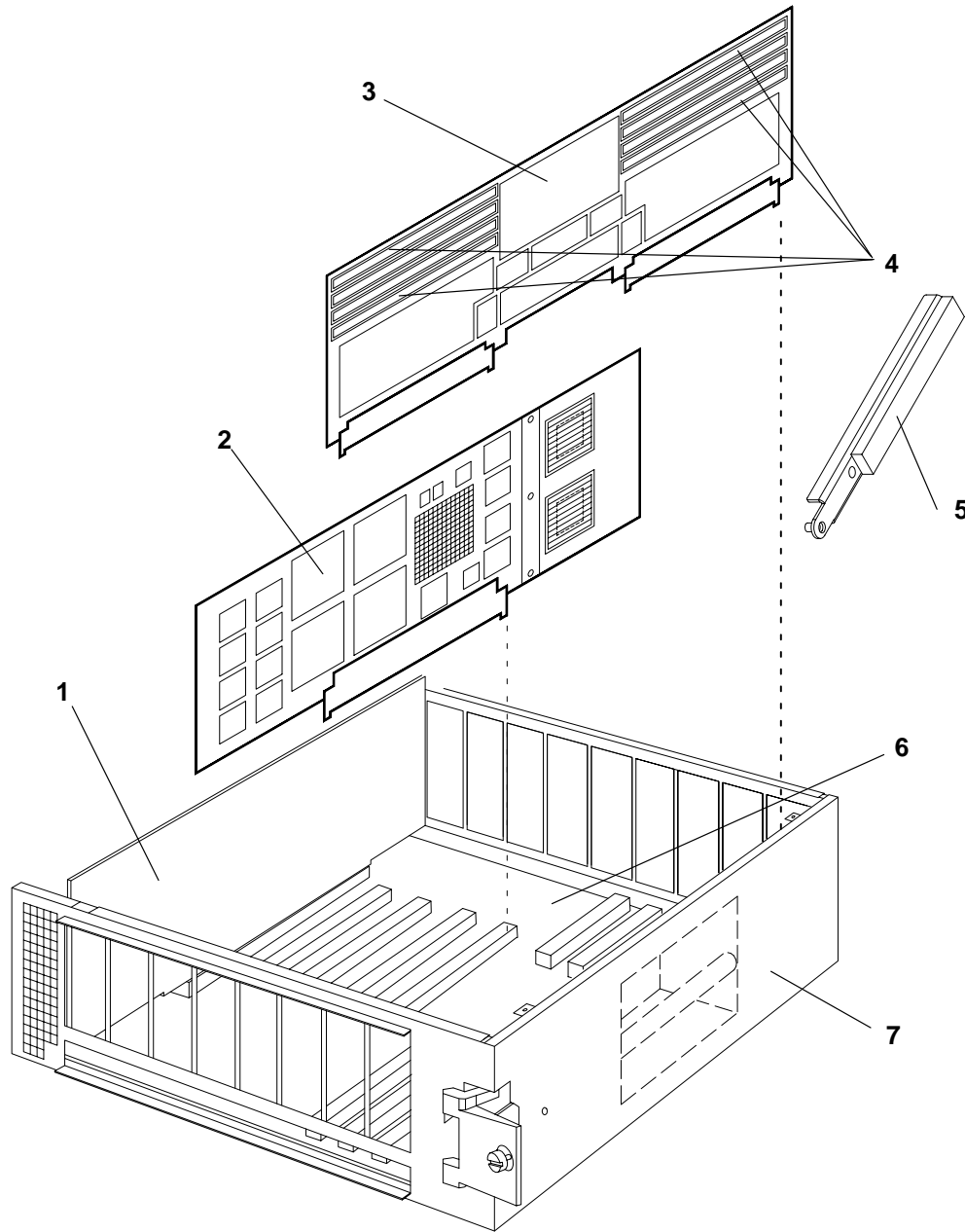
## Base Unit Rear View (without covers)



**Note:** For expansion unit only part numbers, see page 5-8.

| <b>Index Number</b>                                                                                                                                                    | <b>Part Number</b> | <b>Units Per Asm</b> | <b>Description</b>                           |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|----------------------|----------------------------------------------|
| 1                                                                                                                                                                      | See Note           | 7                    | Micro Channel adapters                       |
| 2                                                                                                                                                                      | 95H0010            | 1                    | Base unit Micro Channel adapter planar (PMA) |
| 3                                                                                                                                                                      | 35H8668            | 1                    | System interface board (J30)                 |
| 3                                                                                                                                                                      | 35H8779            | 1                    | System interface board (J40, J50)            |
| 4                                                                                                                                                                      | 19H0413            | 1                    | Main power switch module                     |
| 5                                                                                                                                                                      | 19H0224            | 1                    | Disks fan module                             |
|                                                                                                                                                                        | 19H0270            | 2                    | • Fan assembly only                          |
| 5a                                                                                                                                                                     | 19H0227            | 2                    | Disks fan module filter                      |
| 6                                                                                                                                                                      | 19H0202            | 1                    | 1.0GB disk drive, 8 bit, (with carrier)      |
|                                                                                                                                                                        | 19H0201            | 1                    | 2.0GB disk drive, 8 bit, (with carrier)      |
|                                                                                                                                                                        | 19H0207            | 1                    | 1.1GB disk drive, 16 bit, (with carrier)     |
|                                                                                                                                                                        | 19H0203            | 1                    | 2.2GB disk drive, 16 bit, (with carrier)     |
|                                                                                                                                                                        | 19H0208            | 1                    | 4.5GB disk drive, 16 bit, (with carrier)     |
| 6a                                                                                                                                                                     | 96G4321            | 0-4                  | Plug for unused disk drive bay               |
| 7                                                                                                                                                                      | 19H0265            | 1                    | 8 bit disk drive carrier (no drive)          |
|                                                                                                                                                                        | 19H0209            | 1                    | 16 bit disk drive carrier (no drive)         |
| 8                                                                                                                                                                      | 35H8797            | 1                    | Rear EMI Screen                              |
| <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> |                    |                      |                                              |

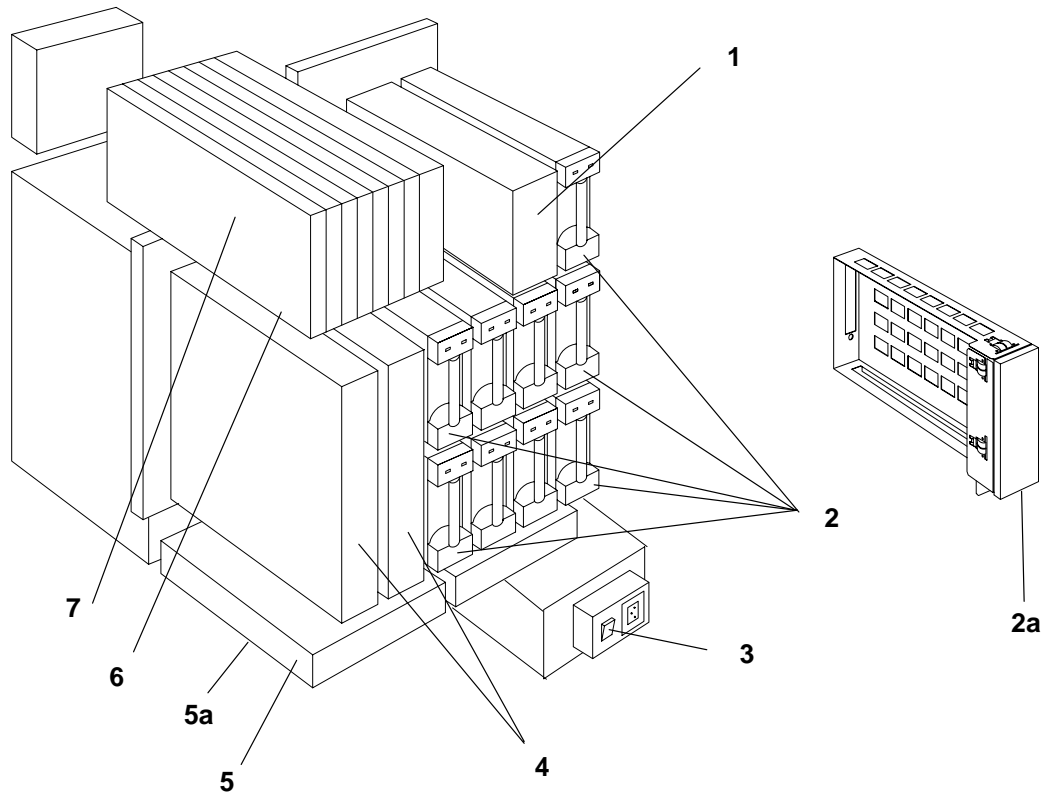
## Base Unit CPU Module (without the cover)



| Index Number | Part Number | Units Per Asm | Description                                       |
|--------------|-------------|---------------|---------------------------------------------------|
| 1            | 35H8780     | 1             | I/O Card (J30, J40)                               |
|              | 09J4760     | 1             | I/O Card (J50)                                    |
| 2            | 35H8748     | 1-4           | CPU card, type C1D 601 processor (J30)            |
|              | 09J4712     | 1-4           | CPU card, type C4D 604 processor (J40)            |
| 3            | 93H6274     | 1-4           | CPU card, type X4D 604E processor (J50)           |
|              | 19H0283     | 1-4           | MR2 memory card (64 base) without memory modules  |
|              | 09J4779     | 1-4           | MR4 memory card (256 base) without memory modules |
|              | 93H4357     | 1-4           | SF5 Memory card, base without memory modules      |
| 4            | 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)            |
| 5            | 19H0289     | 4-16          | Memory module, 32MB (NFX, RLX, or SF5)            |
|              | 35H8751     | 4-16          | Memory module, 64MB (SF5)                         |
| 5            | 96G4195     | 2             | Card removal tool                                 |
| 6            | 19H0242     | 1             | System planar MPB (J30)                           |
|              | 35H8778     | 1             | System planar MPB (J40)                           |
| 7            | 19H0035     | 1             | System planar NMB (J50)                           |
|              | 19H0148     | 1             | CPU module enclosure with cover (J30, J40)        |
|              | 67G3897     | 1             | CPU module enclosure with cover (J50)             |

**Note:** The 7013 J Series systems can contain 601 based CPU cards, or 604 based CPU cards. CPU cards of different types cannot be mixed in the same system unit. Ensure any replacement processor card is compatible with the card that was removed.

## Expansion Unit Rear View (without covers)



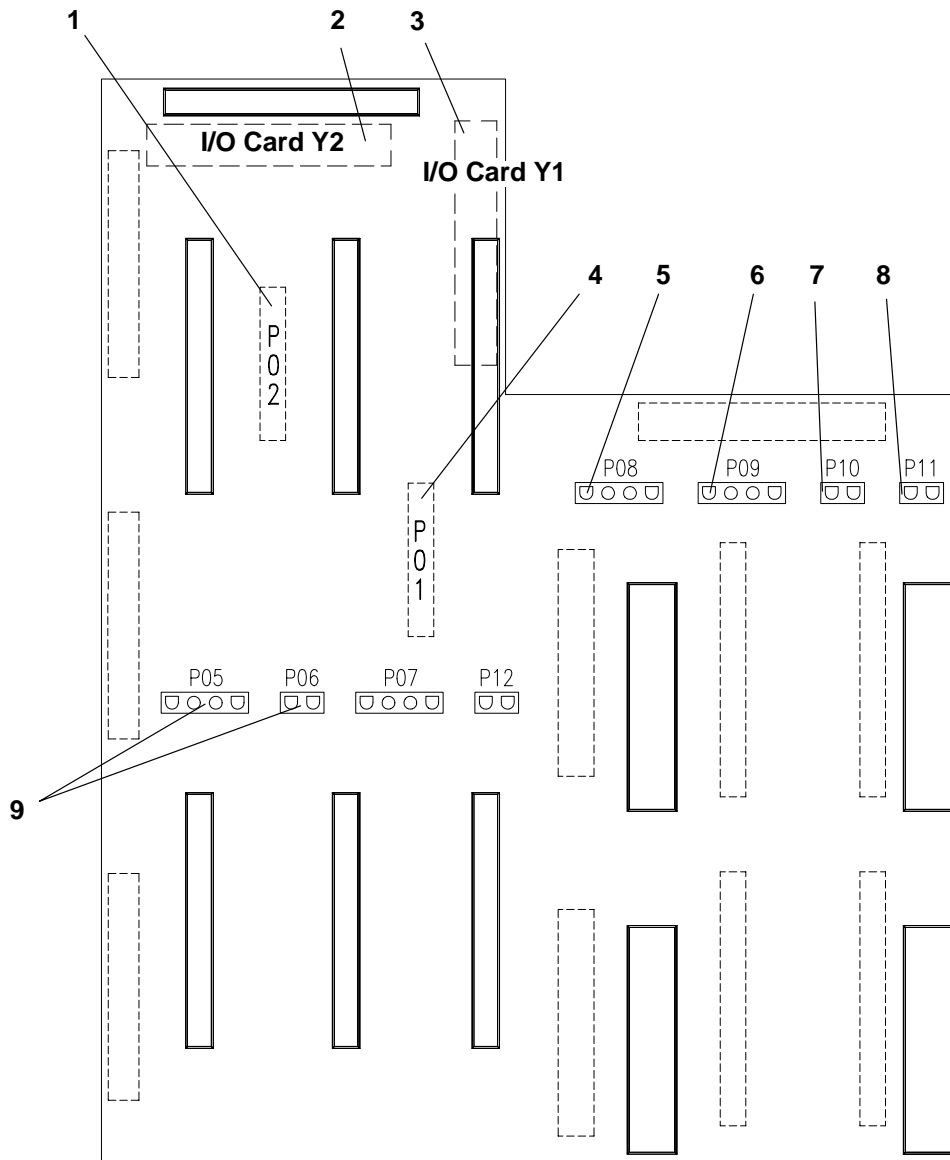
**Note:** For base unit only part numbers, see page 5-4.

| <b>Index Number</b> | <b>Part Number</b> | <b>Units Per Asm</b> | <b>Description</b>                                |
|---------------------|--------------------|----------------------|---------------------------------------------------|
| 1                   | 19H0230            | 1                    | SCSI interface card                               |
| 2                   | 19H0202            | 1                    | 1.0GB disk drive, 8 bit, (with carrier)           |
|                     | 19H0201            | 1                    | 2.0GB disk drive, 8 bit, (with carrier)           |
|                     | 19H0207            | 1                    | 1.1GB disk drive, 16 bit, (with carrier)          |
|                     | 19H0203            | 1                    | 2.2GB disk drive, 16 bit, (with carrier)          |
|                     | 19H0208            | 1                    | 4.5GB disk drive, 16 bit, (with carrier)          |
| 2a                  | 96G4321            | 0–8                  | Plug for unused disk drive bay                    |
| 3                   | 19H0413            | 1                    | Main power switch module                          |
| 4                   | 35H8779            | 2                    | System interface board                            |
| 5                   | 19H0224            | 1                    | Disks fan module                                  |
|                     | 19H0270            | 2                    | • Fan assembly only                               |
| 5a                  | 67G3549            | 1                    | Disks fan module filter                           |
| 6                   | 35H8834            | 1                    | Expansion unit Micro Channel adapter planar (PME) |
| 7                   | See note 1 below   | 8                    | Micro Channel adapters                            |

**Notes:**

1. For Micro Channel adapter part numbers, see “FRU Cross References” in *Diagnostic Information For Micro Channel Bus Systems*.
2. For disk drive part numbers, see “FRU Cross References” in *Diagnostic Information For Micro Channel Bus Systems*.

# Base Unit Internal Cables

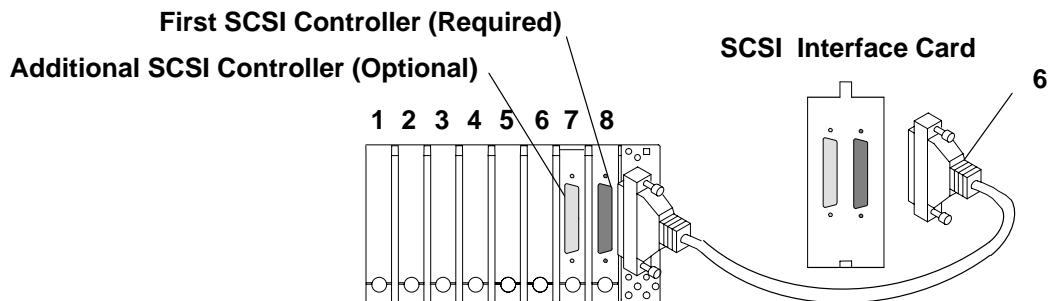
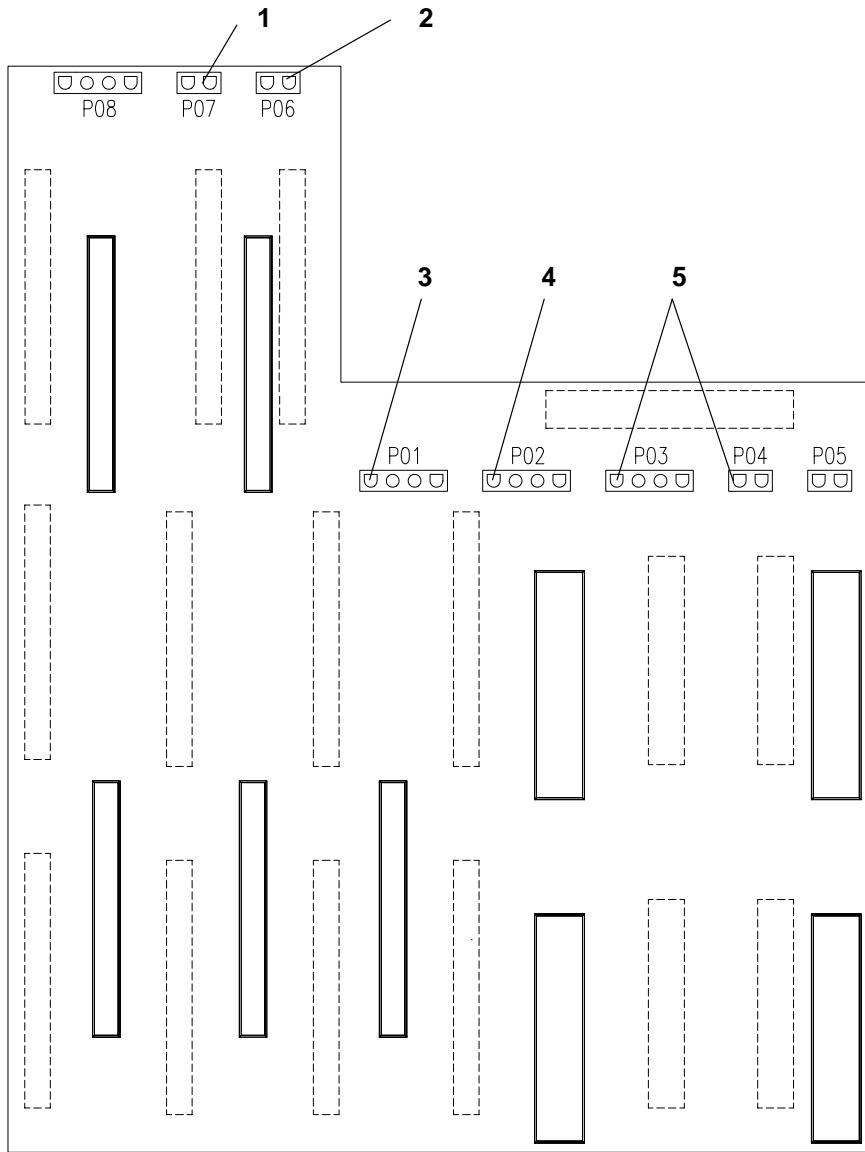




**Note:** For expansion unit part numbers, see page 5-12.

| <b>Index Number</b> | <b>Part Number</b> | <b>Units Per Asm</b> | <b>Description</b>                           |
|---------------------|--------------------|----------------------|----------------------------------------------|
| 1                   | 19H0398            | 1                    | SCSI bus A input cable (P02, MCA slot 7)     |
| 2                   | 19H0232            | 1                    | Expansion unit micro channel bus cable (FXE) |
| 3                   | 19H0231            | 1                    | Base unit micro channel bus cable (FXB)      |
| 4                   | 19H0398            | 1                    | SCSI bus B input cable (P01, MCA slot 6)     |
| 5                   | 67G3591            | 1                    | Disks fan module cable (P08)                 |
| 6                   | 96G4064            | 1                    | Micro channel adapter fan module cable (P09) |
| 7                   | 19H0365            | 1                    | Thermal sensor cable (P10)                   |
| 8                   | 67G3588            | 1                    | Top cover interlock switch cable (P11)       |
| 9                   | 67G3592            | 1                    | Base unit fan cable (P05 and P06)            |

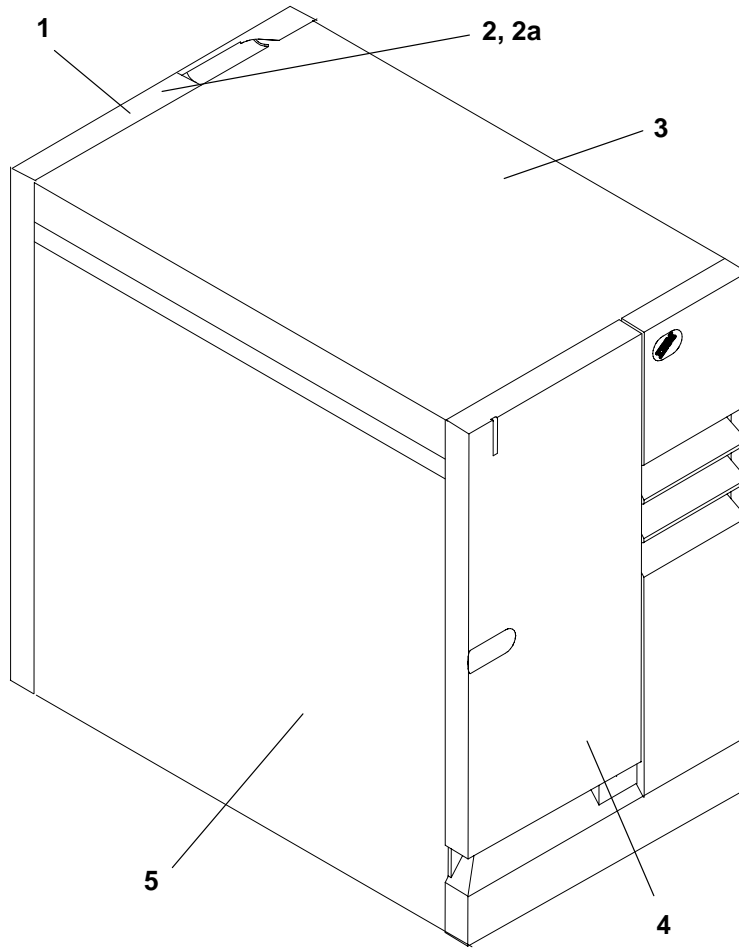
# Expansion Unit Internal Cables



**Note:** For base unit part numbers, see page 5-10.

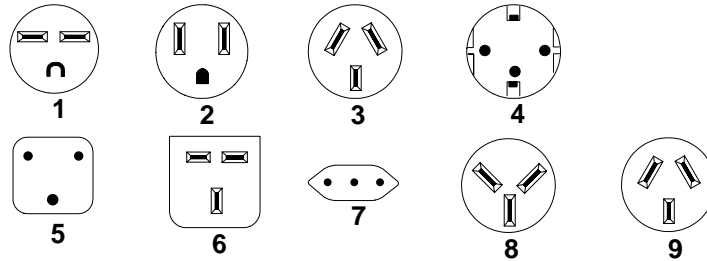
| <b>Index Number</b> | <b>Part Number</b> | <b>Units Per Asm</b> | <b>Description</b>                            |
|---------------------|--------------------|----------------------|-----------------------------------------------|
| 1                   | 96G4312            | 1                    | Power on light cable (P07)                    |
| 2                   | 67G3588            | 1                    | Top cover interlock switch cable (P06)        |
| 3                   | 96G4064            | 1                    | Micro channel adapter fan module cable (P01)  |
| 4                   | 67G3591            | 1                    | Disks fan module cable (P02)                  |
| 5                   | 67G3592            | 1                    | Expansion unit fan cable (P03 and P04)        |
| 6                   | 96G4261            | 1-2                  | SCSI-2 controller card to SCSI interface card |

## Covers



| Index Number | Part Number | Units Per Asm | Description                                         |
|--------------|-------------|---------------|-----------------------------------------------------|
| 1            | 8184701     | 1             | Rear cover                                          |
| 2            | 19H0205     | 1             | Replacement lockset (operator panel and rear cover) |
| 2a           | 35H8650     | 1             | Top cover interlock switch (inside the unit)        |
| 3            | 19H0439     | 1             | Top cover                                           |
| 4            | 39H8919     | 1             | Front cover (Includes front door)                   |
| 5            | 67G3581     | 2             | Side cover                                          |

## Power Cables and Plugs



| Index | Part Number | Country                                                                                                                                                                                                                                                                                                                                      |
|-------|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1     | 14F1548     | 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     | 6427171     | U.S.A. (Including Chicago)                                                                                                                                                                                                                                                                                                                   |
| 2     | 6427168     | 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, Venezuela |
| 3     | 14F1559     | Argentina, Australia, New Zealand,                                                                                                                                                                                                                                                                                                           |
| 4     | 14F1554     | Abu Dhabi, Austria, Belgium, Bulgaria, Botswana, Denmark, Egypt, Finland, France, Germany, Greece, Iceland, Indonesia, Korea (South), Lebanon, Liechtenstein, Luxembourg, Macau, Netherlands, Norway, Portugal, Saudi Arabia, Spain, Sudan, Sweden, Switzerland, Turkey, Yugoslavia                                                          |
| 5     | 14F1557     | Bangladesh, Burma, Pakistan, South Africa, Sri Lanka                                                                                                                                                                                                                                                                                         |
| 6     | 11H5086     | 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                                                        |
| 7     | 14F1560     | Chile, Ethiopia, Italy                                                                                                                                                                                                                                                                                                                       |
| 8     | 14F1561     | Israel                                                                                                                                                                                                                                                                                                                                       |
| 9     | 14F1559     | 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.



---

## 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 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.

**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 is 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 is 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 is 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. 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. The operating system and some operating system updates come with firmware diskettes. Using a diskette is quicker than using a file.

You can also update the firmware using a file containing a new firmware version. Although this method takes longer because you have to reboot the system, it is useful in certain cases. For example, you may not have a diskette, or you may electronically receive a more recent firmware version from customer service personnel.

### 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.
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.
8. 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 through AIX 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.

---

## 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.<br>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.<br>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.<br>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.<br>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.<br>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.<br>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.<br>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.<br>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      | 80<br>20            | <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.                                       |
| 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.                                                                            |
| 404-002      | K      | C88                             | 100                        | <b>Description:</b> EPROM Checksum values error.                                                                                                          |
| 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.                            |
| 404-200      | K      | C88                             | 100                        | <b>Description:</b> I <sup>2</sup> C Bus test launch. Error on entering maintenance.                          |
| 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 #1 internal failure.<br><b>Action:</b> Use MAP 1520.                    |
| <b>409-Bxy</b>         | K             | 152                           | 100                        | <b>Description:</b> Power supply #2 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*.

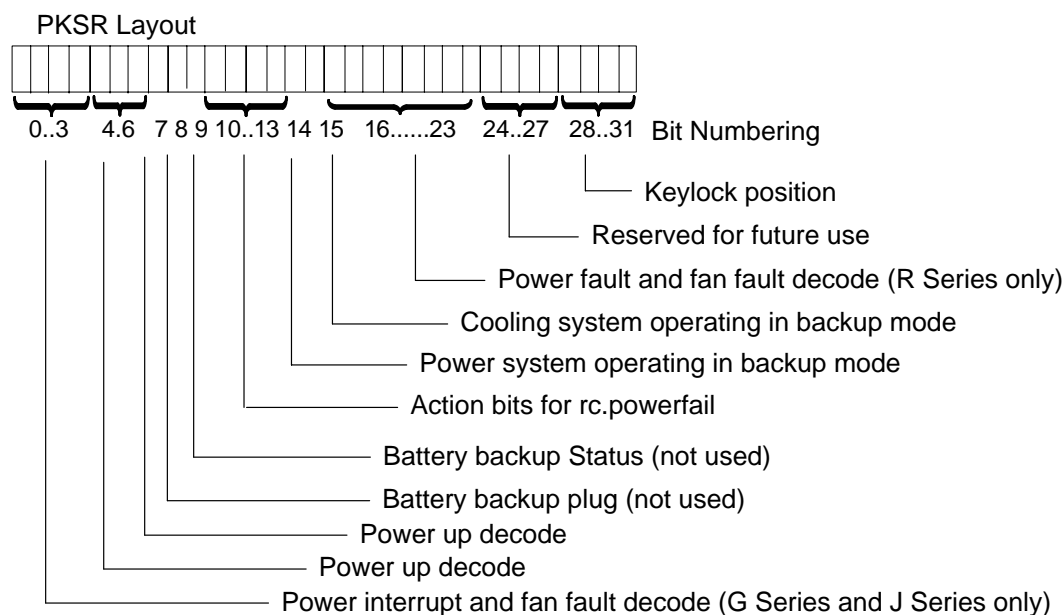
An *errpt* report about power and fan is the following:

```

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. SRN 409-098 Cover Interlock Diagnosing

Because the cover interlock circuitry is routed through several boards and cables in the system unit, if an SRN 409-098 is received by the service representative, the following procedures should be performed to further diagnose the problem.

The primary purpose of the cover interlock switch is to sense when the top cover has been lifted with main power turned on, and if this occurs the system logic turns main power off. The logic also shuts off the main power if the CPU module is not fully seated.

If the cover is opened with the main power turned on, the main power is turned off and 888 103 409 098 appears on the operator panel display. If the system is already in standby mode (main power off), there may be no obvious indication on the operator panel display but the system power will not come on.

The only way to return power to the system once the cover interlock switch has caused the main power to be turned off is to close the top cover (making sure that the cover interlock switch is closed), then turn the system power off using the main power switch on the rear of the system unit, wait several seconds, and then using the main power switch on the rear of the system unit turn the main power on.

---

### Further Diagnosis

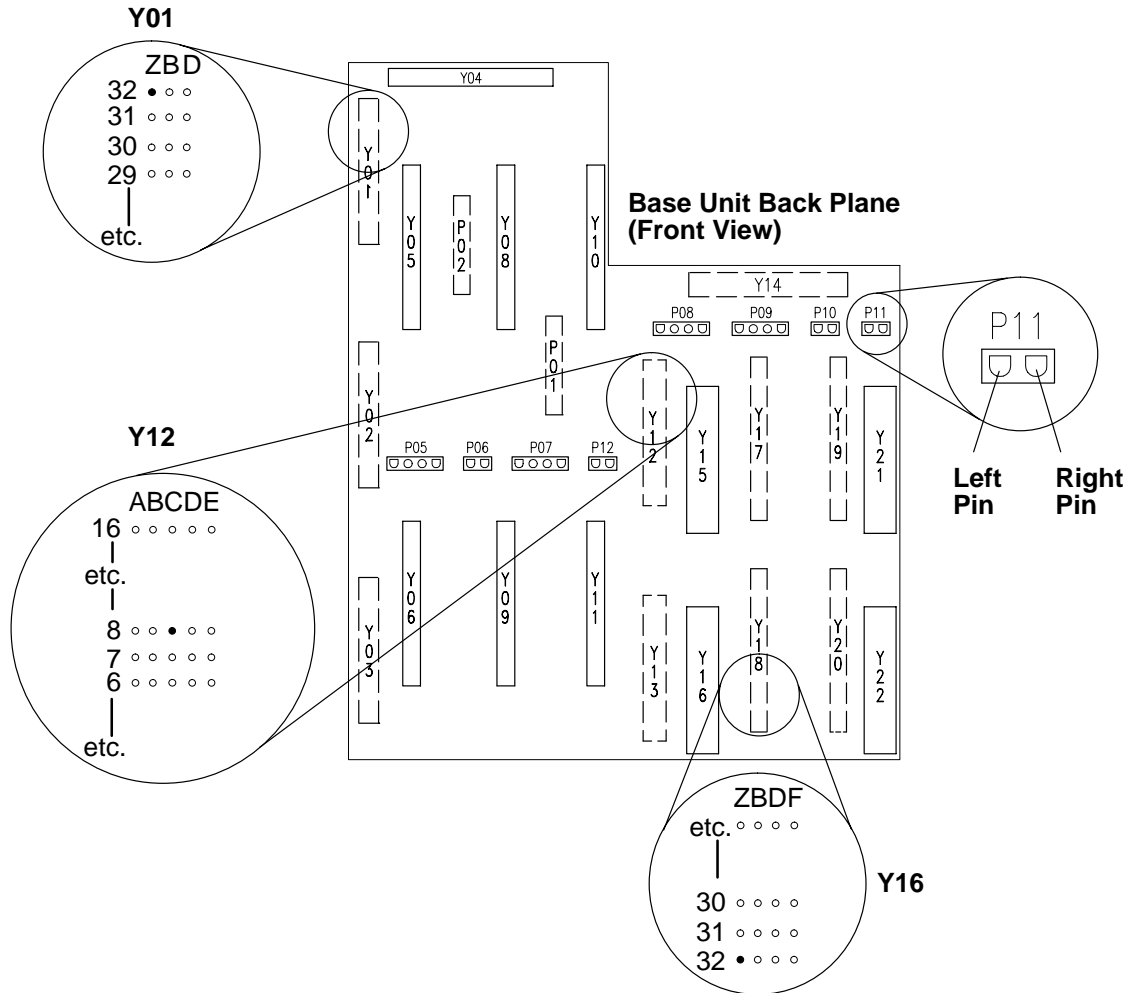
If you are diagnosing a problem that causes SRN 409–098, do the following checks to further diagnose the problem:

**Attention:** Before doing the following checks, observe safety notices in the “Removal and Replacement Procedures” chapter of this book.

- Check the interlock switch. The switch may be located at the rear or the front of the system unit depending on when your system unit was assembled. Check the cover for correct fit and correct actuation of the switch. If the switch is actuating correctly, you can verify that it is functioning correctly by replacing it.
- Check the continuity of the switch through the backplane to verify the backplane:
  - Remove the power supply and the CPU module. These parts must be removed to prevent false readings.

- The interlock switch is connected to the backplane through connector P11. You can see this with the power supply removed.

**Note:** In the figure below, connectors shown with dotted lines are on the rear side of the back plane, however the pins for these connectors are accessible from the front side of the back plane.



The left pin of connector P11 connects to the system interface board connector Y12 pin C08. Check for continuity between these pins.

The left pin of connector P11 also connects to the power supply connector Y16 pin Z32. Check for continuity between these pins.

The right pin of connector P11 connects to the system planar board connector Y01 pin Z32. Check for continuity between these pins.

If you don't have continuity at the points listed above, replace the backplane. Otherwise, continue below.

Check the system planar board, system interface board, power supply and backplane for loose connections or damage. If you do not find a problem, replace the parts in the order listed.

---

## Appendix F. 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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