7012 G Series

Service Guide

Third Edition (April 1997)

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Table of Contents

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 Réglement 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*, order number SA23-2652.

Definitions of Safety Notices

A *danger* notice indicates the presence of a hazard that has the potential of causing death or serious personal injury.

A danger notice appears on the following pages:

    3-1520-1
    4-1
    4-44
    5-2

A *caution* notice indicates the presence of a hazard that has the potential of causing moderate or minor personal injury.

A caution notice appears on the following pages:

    xi
    3-1520-1
    4-1
    4-30
    4-42
    5-2
    5-3

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

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 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.

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.

CLASS 1 LASER PRODUCT
LASER KLASSE 1
LUOKAN 1 LASERLAITE
APPAREIL A LASER DE CLASSE 1

TO IEC 825:1984 CENELEC EN 60 825:1991

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

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

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

About This Book

This book provides maintenance information that is specific to the 7012 G Series system unit, adapters, and attached devices that do not have their own service information. It also 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*.

This book is used by the service technician for initial installation and to repair system failures. This book assumes that the service technician has had training on the *7012 G Series* system unit.

ISO 9000

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

Related Information

The *Diagnostic Information For Micro Channel Bus Systems*, order number SA23-2765, contains the maintenance information and procedures that are common to all systems. The information and procedures in this book apply to any system unit that uses the diagnostic programs.

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

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

The *7012 G Series Setup Procedure,* order number SA23-2739, provides information about the hardware setup of the base unit.

The *7012 G Series Expansion Unit Setup Procedure,* order number SA23-2754, provides information about the hardware setup of the expansion unit.

The *7012 G Series Operator Guide,* order number SA23-2740, provides information about the controls and features of the system unit.

Each attached device has a *Setup and Operator Guide* and a *Service Guide* that provides the information needed for that device.

Chapter 1. Reference Information

Use the following views of the system unit to locate the feature positions, connectors, and system board slot positions.

Base Unit System Unit Locations

Front Door

Rear Cover

Media Bays

3.5-Inch Diskette Drive

Left Side Cover

Key Mode Switch

Reset Button

Operator Panel

Operator Panel Display

Power Button

Front Cover

Base

Rear View without Cover

Power Cord Receptacle

Keyboard

Mouse

Power Control Port (RS-485)

Adapters

9-Pin Serial Port (S3)

Rear Fan

25-Pin Serial Port (S1/S2)

Parallel Port (P1)
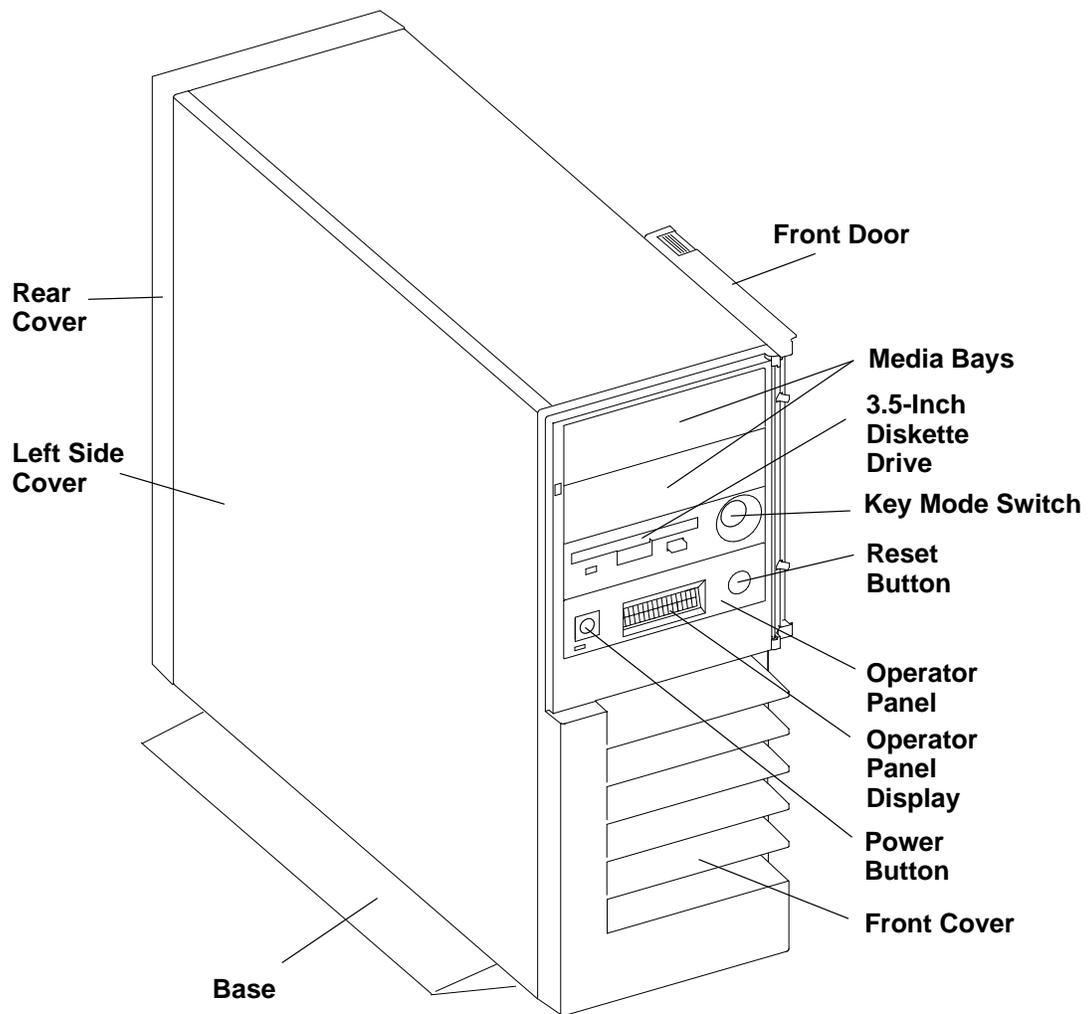
Side View without Covers

Power Supply

Media Drive Position A

Media Drive Position B

Micro Channel Adapter Cards

1

6

Key Mode Switch

Diskette Drive Position C

RS-485 Card

Operator Panel

Rear Fan

Front Fan

First CPU Card Position 1

Optional Second CPU Card Position 0 or Two Disk Drives Positions F and G (G30 only)

Disk Drive Positions D and E

System Planar

Memory Card Position A
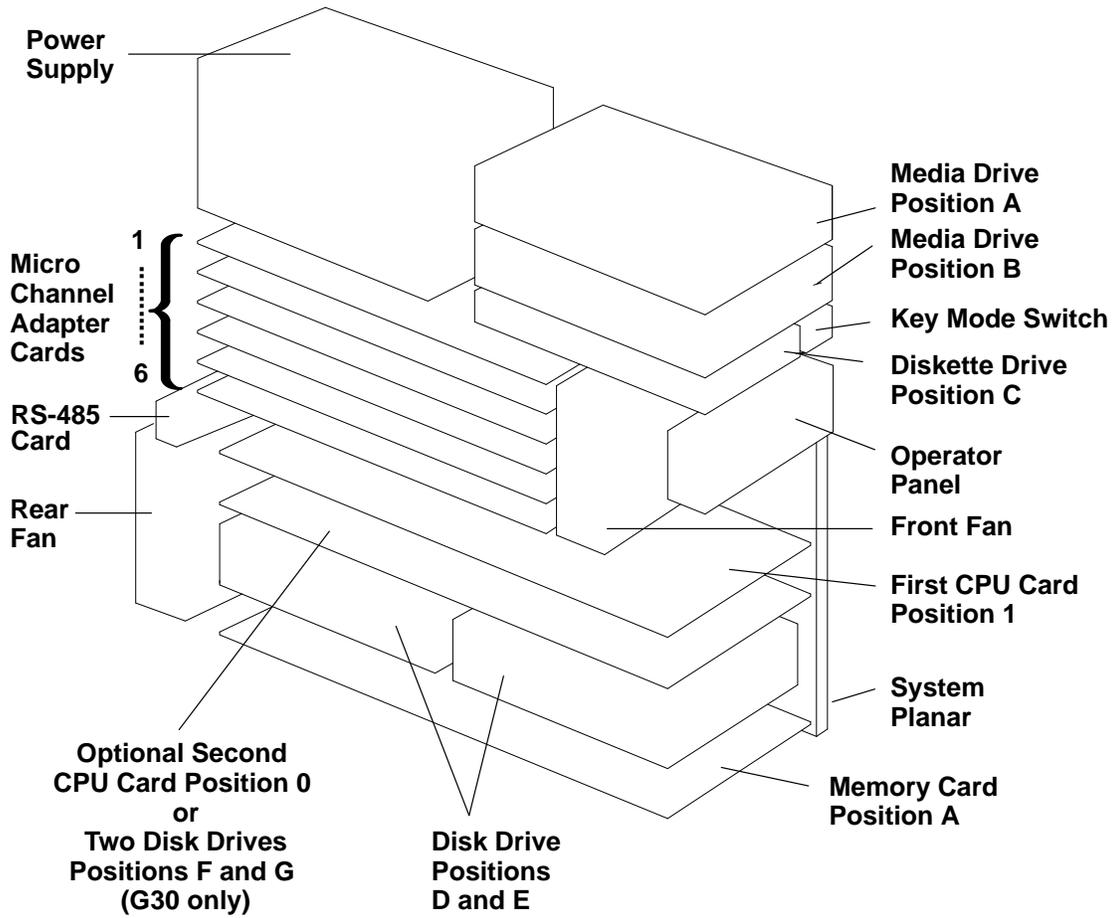
Memory Cards

There are four types of memory cards as shown below. Memory cards can house from one to four memory module kits composed of four memory modules each, which comply with the JEDEC standard for 68 pin, ECC, 60 ns, 5 volt memory modules. The figure below illustrates the types of memory cards.

MRE Memory Card

Two Bank RLX Memory Card

Four Bank NFX Memory Card
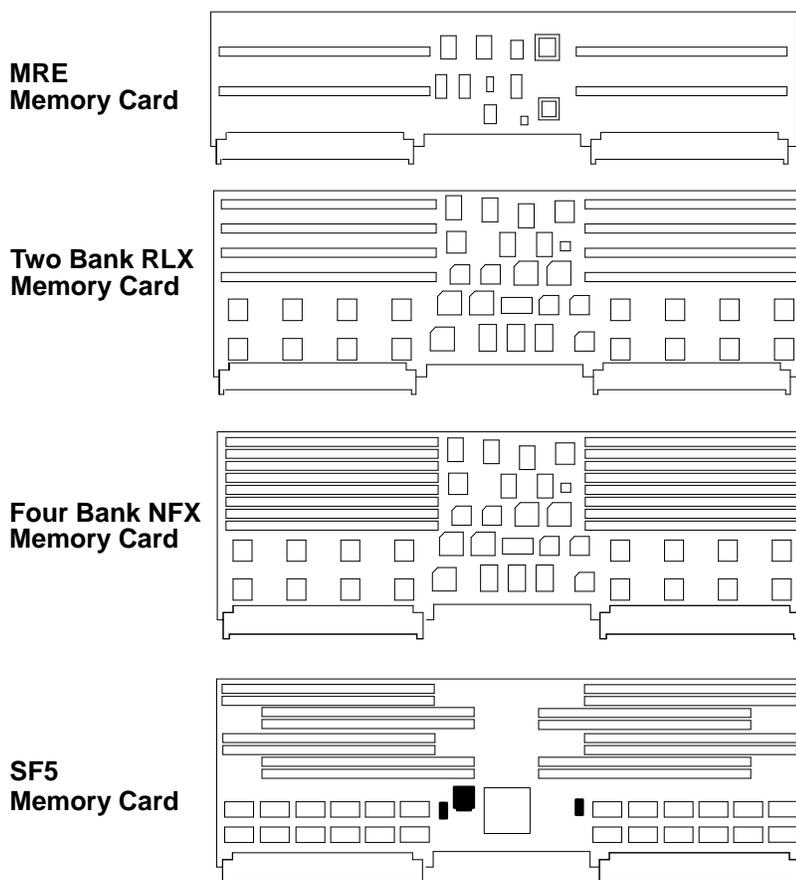
SF5 Memory Card

See page 4-38 for the location of the memory cards on the system planar.

The figure below shows a standard memory module.
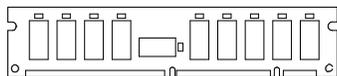
The maximum memory reachable with this kind of memory module is 1024MB, because up to four memory module kits can be installed on the memory card.

Modules from different size kits cannot be mixed on the same memory card.

According to both the kind and the number of memory module kits installed on the memory cards, these can be divided into the following configurations:

- **MM32**, which gives 32MB memory contains four 8MB memory modules.
- **MM64**, which gives 64MB memory contains four 16MB memory modules.
- **MM128**, which gives 128MB memory contains four 32MB memory modules.
- **MM256**, which gives 256MB memory contains four 64MB memory modules.

- **NF256** board, based on 16M bit technology, which gives 256MB memory. It contains two MM128 memory module kits.

- **NF512** board, based on 16M bit technology, which gives 512MB memory. It contains four MM128 memory module kits.

- **NF1024** board, based on 16M bit technology, which gives 1024MB memory. It contains four MM256 memory module kits.

Serial Port Splitter Cable

The splitter cable is used to generate two 25-pin serial ports (S1 and S2 ports).

It is installed in the 25-pin serial port located in the rear of the base unit.
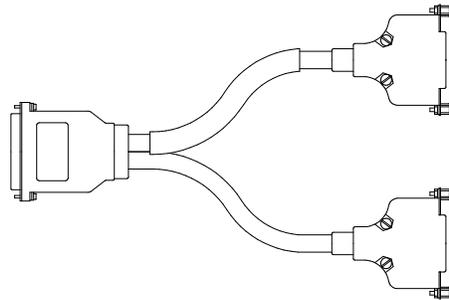
Keyboard / Mouse Card (KBD)

The KBD card is used to manage the connectors dedicated to the keyboard, mouse and speaker capability, but not a key click option on the base unit. It must be placed on the dedicated connector of the system planar (Y10 connector), but interfaces with the system through the Micro Channel bus, which sees the card as occupying a Micro Channel slot.
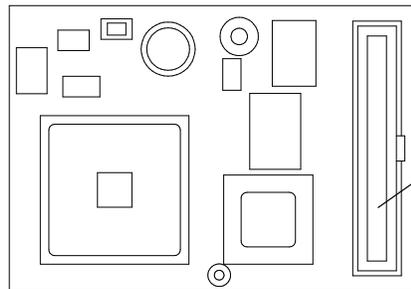
Connector used to place the KBD card on the system planar

Expansion Unit System Unit Locations

Description of the Disk Expansion Unit

The disk expansion unit is used to increase the number of media devices and/or disk drives.

All hardware components inside the disk expansion unit are accessible from the left side after having removed the unit covers.
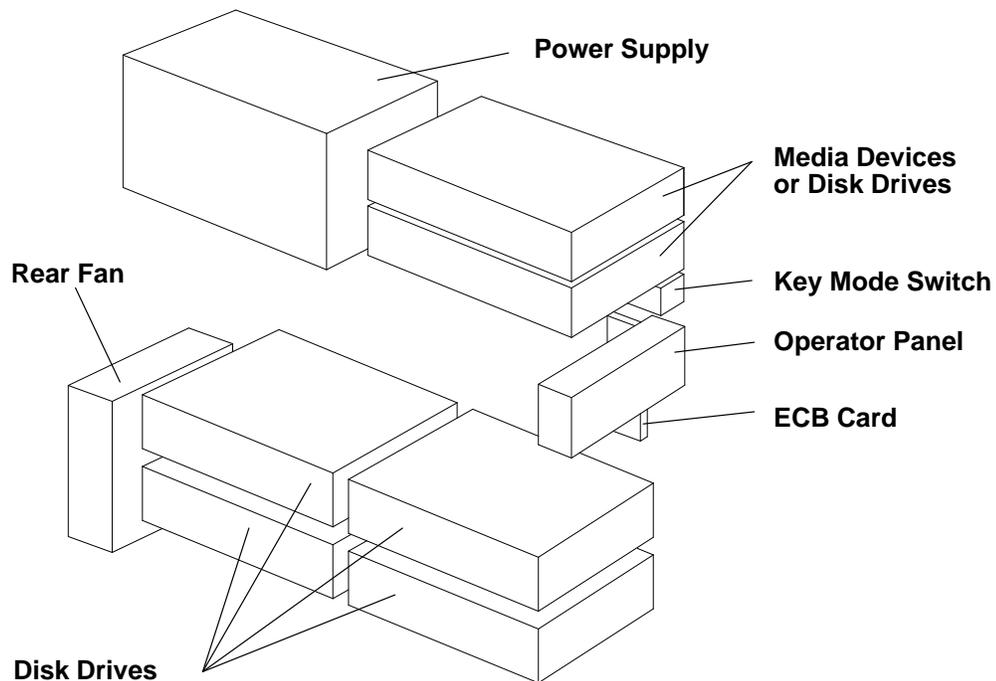
From the left side of the disk expansion unit, the following modules are accessible:

- Up to two 5.25-inch half height media devices (optional). Up to two 3.5-inch half height disk drive can be installed instead.
- The operator panel (mandatory)
- The key mode switch (mandatory)
- The ECB card (mandatory)
- Up to two disk drives (optional) in the bottom tray
- Up to two disk drives (optional) in the upper tray
- One external cooling fan (mandatory)
- The power supply (mandatory).

Rear Side

The following figure shows the rear side of the disk expansion unit.

Power Cord Connector

**SCSI Connector
To Base Unit**

RS-485 In Port

RS-485 Out Port

Rear Fan
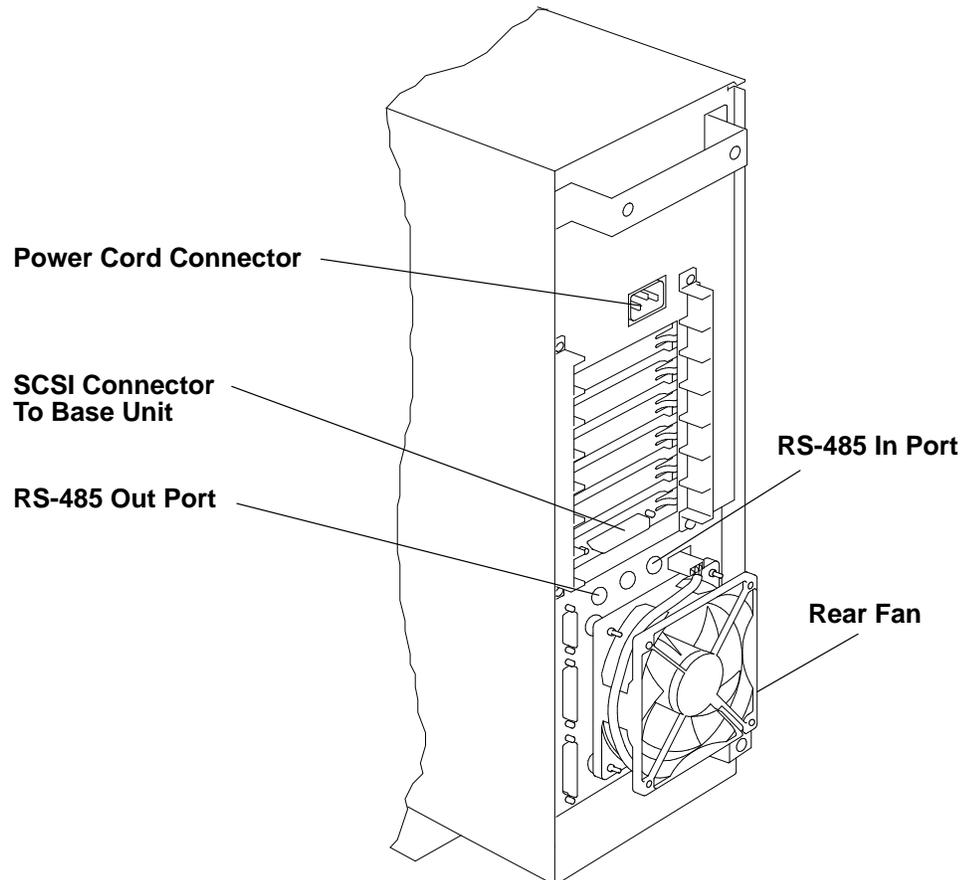
Disk Expansion Unit SCSI Bus

The disk expansion unit is equipped with one internal SCSI bus. It is driven by means of a SCSI-2 single-ended controller via an external connection.

The SCSI bus features the following characteristics:

- SCSI-2 single-ended
- 16-bit wide data bus
- Support for single-ended devices (8/16 bits)
- 8bits and 16bits SCSI devices mixable on the same bus
- Fast data transfer (10MB per second for 8bits, 20MB per second for 16bits)
- Synchronous/Asynchronous data interchange.

RS-485 Card

The RS-485 card is installed in the rear of both the base and the disk expansion units.

It is provided with a variety of connectors, whose functions are explained in the following figures.

**Power Connector
(Coming From the Power Supply**

**Power/Signal Connector
(Coming From the Operator Panel)**

INTERNAL VIEW

EXTERNAL VIEW (BASE UNIT)
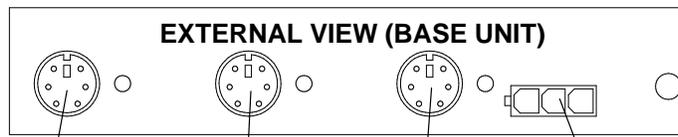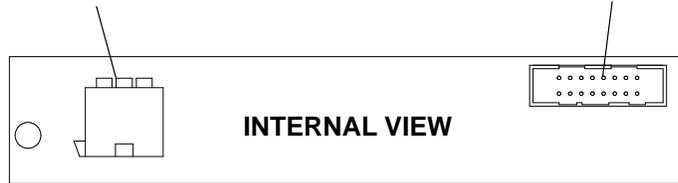
RS-485   **Mouse**   **Keyboard**   **External Fan**

EXTERNAL VIEW (DISK EXPANSION UNIT)
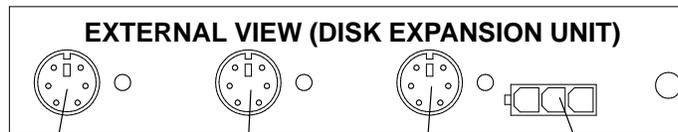
RS-485 Out   **Not Used**   **RS-485 In**   **External Fan**

Cluster Power Control

The cluster power controller (CPC) provides:

- Connectivity between the remote support facility and multiple CPUs through the 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.

**Disk Drive Connectors
(PCI Connectors)**

**Disk Drive Connectors
(RS485 Connectors)**

CPU A
1
2

CPU B
1
2

**CPU
Connectors**

CPU C
1
2

CPU D
1
2

**CPC
Expansion
Connectors**

**CPC
Left**
1
2

**CPC
Right**
1
2

TTY Connector
Modem Connector
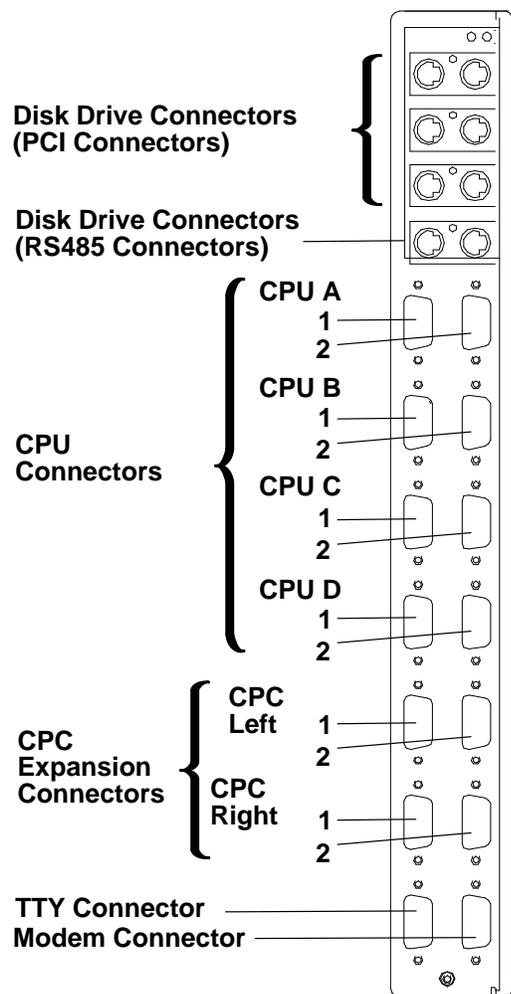
System Planar Connector Locations

Serial Ports 1 and 2
(with splitter)

Parallel
Port

Serial Port 3

RS-485 Connector

Keyboard/Mouse
Card Connector

6 5 4 3 2 1

Micro Channel
Adapter Slots

Memory
Card

CPU Card
Position 1
(Optional)

CPU Card
Position 0

P   Q

Diskette Drive
Connector

Power Supply
Signal Cable
Connector

Memory
Card

Battery
Connector

Operator
Panel
Connector

Power Supply
Power Cable
Connector

Data Flow

Power Supply

Operator Panel
Micro Processor
Battery
Reset/Scroll Button
LCD
Keylock
Diskette Drive

S1 BUMP Console
S2 Service Console
S3
Parallel Interface

System Planar

System EEPROMs
VPD EPROMs

TOD Clock
NVRAM
Flash EPROM
Backup EPROM

CPU Array

CPU card

60X

L2
Tag

L2
CAC

CCA   CCD

COP bus

I2C bus

Address bus

Data bus

BUMP

EPROM

RAM

Standard
IO

SS bus

System
IO

SSGA

SMC   DCB

JTAG bus

Data bus

Base Unit I/O
Controller

MCA bus

To
MicroChannel
Slots

Memory bus

Expansion Unit I/O
Controller

MCA bus

To Expansion
MicroChannel
Planar

Memory Array

Memory card and DIMMs

Power Flow

```
                    ┌──────────┐
                    │  Power   │◁── System AC Cable ──◁═
                    │  Supply  │
                    └──────────┘
         ┌───────────────┘
         │
    ┌──────────┐              ┌──────────┐
    │ Standby  │──────────────│  Power   │
    │ Voltages │              │ Voltages │
    │          │              │          │
    │+5 +12 −12│              │+5 +3,3/3,6 +12 −12│
    └──────────┘              └──────────┘
         │                          │
                                ┌──────────────┐
                                │  Rear Fan    │
                                │  Module      │
                                └──────────────┘
                                ┌──────────────┐
                                │  Front Fan   │
                                │  Module      │
                                └──────────────┘
    ┌──────────────┐            ┌──────────────┐
    │   EEPROM     │            │  3.5-inch    │
    │              │            │  Diskette    │
    └──────────────┘            └──────────────┘
    ┌──────────────┐            ┌──────────────┐
    │    TOD       │            │  Memory      │
    │              │            │  Card        │
    └──────────────┘            └──────────────┘
    ┌──────────────┐            ┌──────────────┐
    │  Operator    │            │  System      │
    │  Panel       │            │  Planar      │
    └──────────────┘            └──────────────┘
    ┌──────────────┐            ┌──────────────┐
    │ System Guard │            │  CPU Cards   │
    │ Processor    │            │              │
    └──────────────┘            └──────────────┘
    ┌──────────────┐      ┌────────┐     ┌────────┐
    │ Local Console│      │  Disk  │     │  Disk  │
    │ Access       │      └────────┘     └────────┘
    └──────────────┘
    ┌──────────────┐      ┌──────────────┐  ┌──────────────┐
    │ Remote       │      │  Media       │  │  Media       │
    │ Console Access│     │  Position A  │  │  Position B  │
    └──────────────┘      └──────────────┘  └──────────────┘
```

SCSI Cable Routing

6-Position SCSI Cable

SCSI controller

(4)
Upper dev.

(5)
Lower dev.

Terminator

F (2)
3rd disk

G (3)
4th disk

D (0)
1st disk

E (1)
2nd disk

4-Position SCSI Cable

(4)
Upper dev.

(5)
Lower dev.

Terminator

SCSI controller

D (0)
1st disk

E (1)
2nd disk
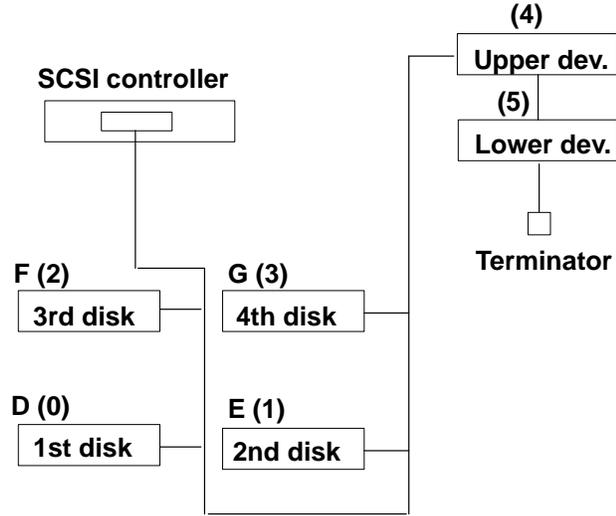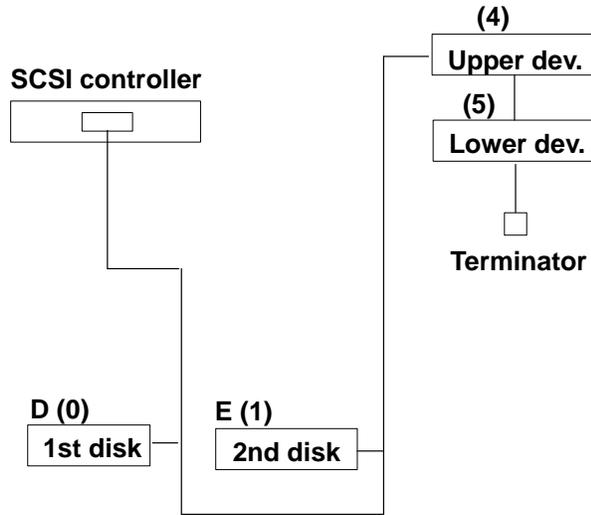
Specifications

Dimensions (Vertical Position)

Height: 450mm (17.5 inches)

Depth: 613mm (28.2 inches)

Width: 173mm (6.9 inches)

Weight (Maximum)

19 kg to 25 kg (43 to 55 pounds)

Operating Environment – Class B

Temperature: 16° to 32° C (60° to 90° F)

Humidity: 8% to 80%

Maximum Wet Bulb: 23° C (60° F)

Maximum Altitude: 2133 m (7000 feet)

Power Source Loading

0.34 kVA

Power Supply

275 watts

Operating Voltage

100 V ac to 125 V ac; 50 to 60 Hz

200 V ac to 240 V ac; 50 to 60 Hz

Heat Output

1380 BTU per hour

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 18 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 18 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 18 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.

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 added.

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

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

Do the following:

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 with the screws tight.
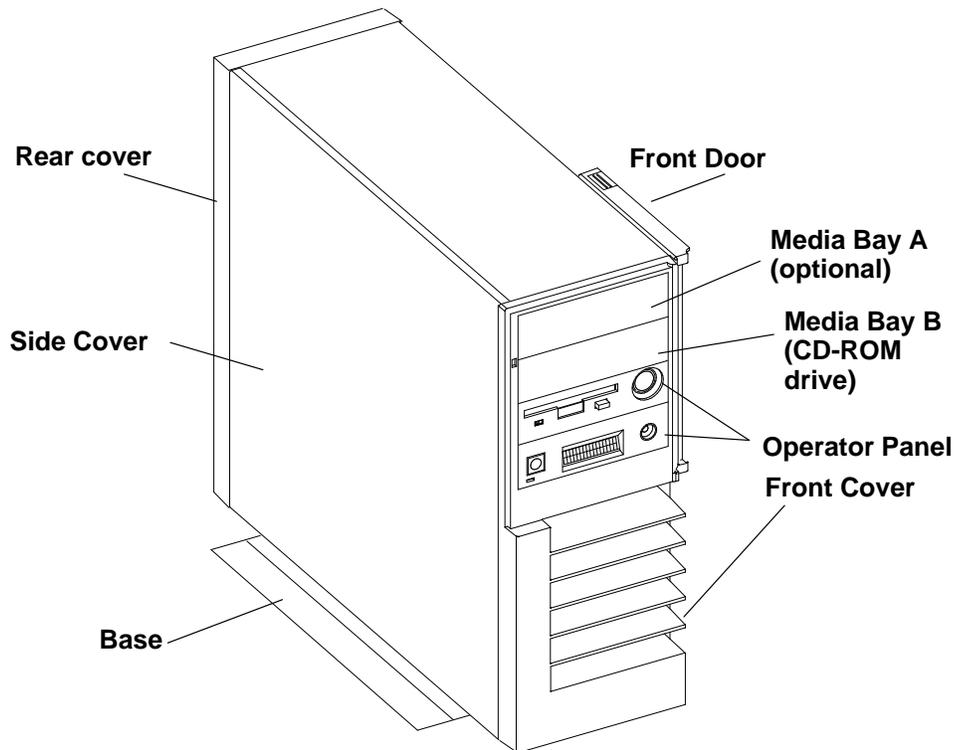
3. Power down the system.

4. Set the power switch of the system unit to Off.

5. Unplug the power cord.

6. Remove the covers.

7. Check for alterations or attachments. If there are any, check for obvious safety hazards such as broken wires, sharp edges, or broken insulation.

8. Check the internal cables for damage.

9. Check for dirt, water, and any other contamination within the system unit.

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 a jack screw on the parallel port connector.
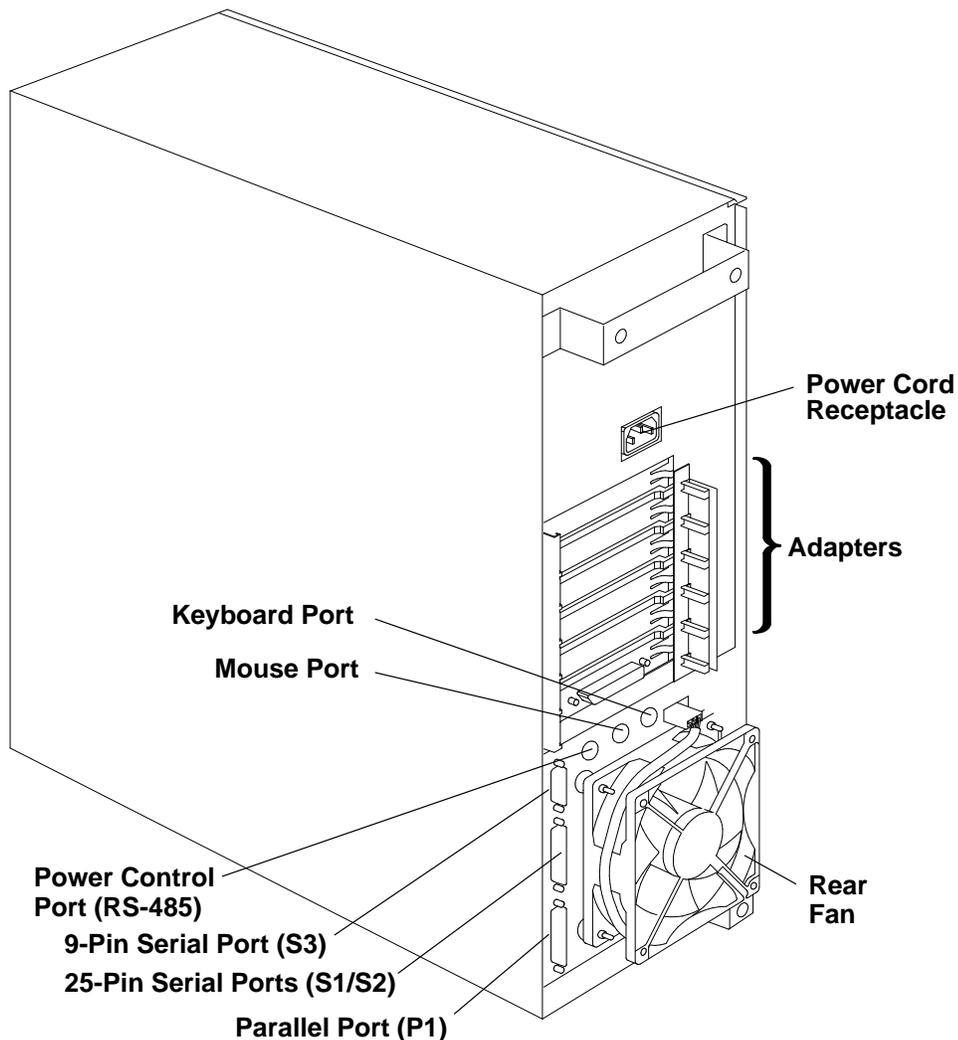
13. If the system unit passes the test in the previous step, install the covers.

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.

Chapter 2. Using System Guard

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 a power outlet. This allows control of the system even though the system is down. The only way to turn off the SystemGuard power is to unplug the AC power cord.

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.

Diskette Eject Button **Key Mode Switch**

3.5-inch Diskette Drive

OK

Power-on Button

Power-on Light

R

Operator Panel Display **Reset Button**
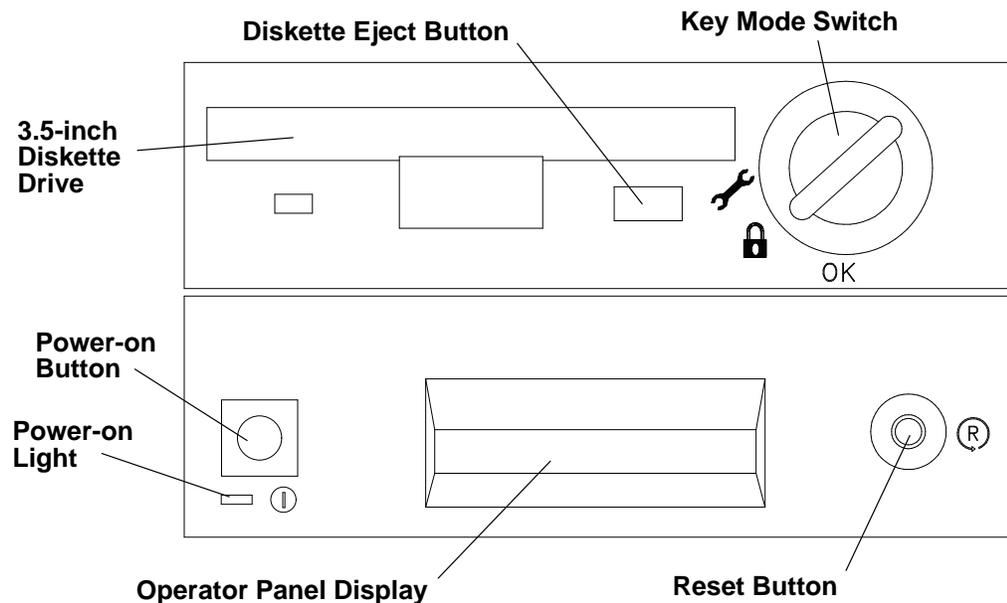
Note: In the 7012 G Series the system board contains the NVRAM, the NVRAM battery, and the TOD. You can drain NVRAM by disconnecting the NVRAM battery.

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, 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 NO TAG 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 system 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 Stage)

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 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.

I^{2}C 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 (Boot to AIX Load and Run-Time)

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

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

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

SystemGuard Parameters and Flags

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

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

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

Modem and Site Configuration flags
These flags allow the customer to customize modem configuration for the Service Console.

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

Working with SystemGuard

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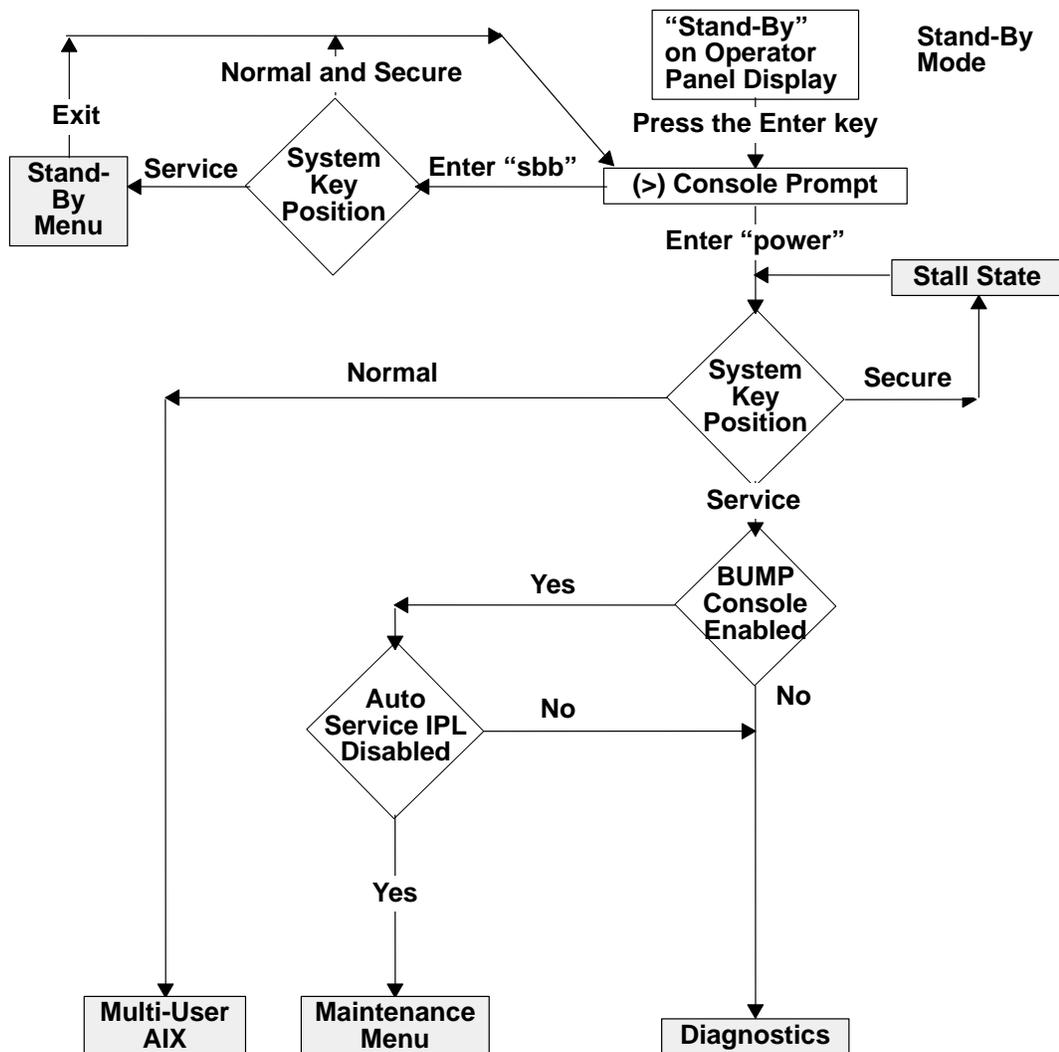
When the system is in Stand-By mode and the System Key (Physical or Electronic Key) is in Service mode, the STAND-BY MENU can be accessed and SystemGuard executed.

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              STAND-BY MENU :   rev xx.xx
Pages


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

               Select(x:exit): 0
```

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

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

How to Display the System Configuration

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

Displaying Configuration through the Stand-By Menu

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

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

Here is an example of the display configuration screen for a 7013 J Series system. The screens for the 7012 G Series are similar:

```
                   Display Configuration

 SID TM           7013J30 45067        SID Y2             00045067
 SID Y3   7fffff003935303730370000         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                                CPU3
 MC0   D78605     19H0473            MC1    D78605    19H0473
 MC2                                 MC3
 SIB10 E38042     19H0310            PS0    D29655    11H5114
 SIB11                               PS1
 SIB21
 SIB12                               PS2
 SIB22
 SIB13                               PS3
 SIB23

 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 operator panel 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 from 0, 1, 2 and so on. 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, the second 2 and so on.

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.

I^{2}C Maintenance

Use this option to do maintenance operations on the I^{2}C 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 I^{2}C 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,              MAINTENANCE MENU (Rev. XX)
See the
Following
Pages
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 and 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 00010205000200004000101000001
*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.

Display BUMP Error Log

Use this option to view the BUMP firmware error log.

1. Enter 1 in the MAINTENANCE MENU to select this option. The contents of the logging buffer are displayed as shown in the following screen:

```
                        DISPLAY BUMP ERROR LOG

EVENT # 1:

401401000000000000000000000000000000000000000000000000000000000
000000000000000000000000000000000000000000000000000000000000000
000000000000000000000000000000000000000000000000000000000000000
000000000000000000000000000000000000000000000000000000000000000
000000000000000000000000000000000000000000000000000000000000000
000000000000000000000000000000000000000000000000000000000000000

SELECT [+:forward event or x:exit]:
```

2. Use the + and – keys to scroll events on the screen forward and backward, respectively.

3. Press x to exit and return to the main menu.

Enable Service Console

Use this command to enable remote service support on the S2 line by setting the *Remote Authorization* flag. Only the local operator can perform this command.

When this flag is enabled, remote service support is possible and all characters sent on line S1 or line S2 are also sent on the other line.

• Enter 2 in the MAINTENANCE MENU to enable the *Remote Authorization* flag.

Disable Service Console

Use this command to prevent remote service support by disabling the *Remote Authorization* flag. This can be performed as a security measure, for example.

• Enter 3 in the MAINTENANCE MENU to disable the *Remote Authorization* flag.

Reset

This command simulates the reset action. You can use this command instead of pressing the Reset button on the operator panel (OP).

1. Enter 4 in the MAINTENANCE MENU.

2. Confirm your action, when requested. The system is restarted from scratch, meaning that a new initial program load (IPL) is run.

Power-Off

This command forces an immediate system power off. It is run only after the operator confirms the action.

1. Enter 5 in the MAINTENANCE MENU.

2. Confirm your action when requested. The system powers off immediately.

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 bus in the 7012 G Series, The Change Bus option is not available on the 7012 G Series because the Micro Channel bus is not extended beyond the system board.

    Enter your choice. The displayed location code is updated.

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

    ```
    SLOT# [1-6 (Internal 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.

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

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

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

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

Note: Bus choice is not available on 7012 systems.

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.

3. 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       NOVRAM 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.

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

Notes:
  1. Use the slash (/) character to separate different tests. For example, enter `01/03`
     to specify tests 1 and 3 with default parameter values.

  2. Use the * (asterisk) character to select all available tests.

  3. 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 *xxyy*, 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 (xxyy: xx = GROUP NUMBER yy = TEST NUMBER):

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


COMMANDS: xxyy> 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:

P*n value* [/ **P***n 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 (yymmdd) -> 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.
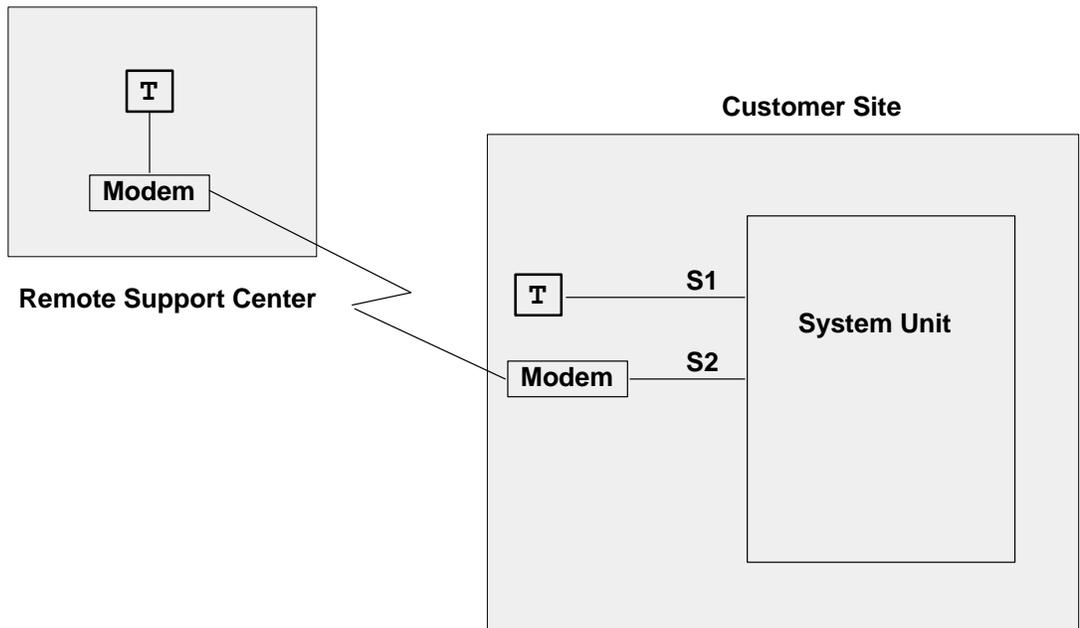
When mirroring is active, the customer on the BUMP Console and the support personnel on the Service Console both see the same output on their screens, and either one may enter characters. One person can even start typing and the other finish it. For example, the support personnel may log in as root on 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
- Service Contract Validity   0 – 32767
- /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
   ```

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 mksysb).

To boot off this SCSI device, do the following:

1. Switch the System Key to Service.

2. Insert the bootable media in the SCSI device.

3. Turn on the system power.

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

How to Boot from the Network

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

1. Enter the MAINTENANCE MENU.

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

```
                            SYSTEM BOOT


                    0> BOOT FROM LIST

                    1> BOOT FROM NETWORK

                    2> BOOT FROM SCSI DEVICE

        SELECT [x:exit]: 1
```

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

```
        MAIN MENU

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

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

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

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

```
SELECT BOOT (STARTUP) DEVICE


Select the device to BOOT (Startup) this machine.


WARNING:  If you are using Token-Ring, selection of an
incorrect data rate can result in total disruption of the
Token-Ring network.
"==>" Shows the selected BOOT (startup) device

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

88. Next Page of Select BOOT (Startup) Device Menu
99. Return to Main Menu

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

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

```
SET OR CHANGE NETWORK ADDRESSES

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

Token-Ring:  Slot 2, 16 Mb data rate
Hardware address ............................... 10005AC97CF1

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

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


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

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

```
MAIN MENU


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


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

8. Enter `4` to exit from the menu, and start system boot.

9. A screen similar to the following appears as the system boots off the network:

```
STARTING SYSTEM (BOOT)


Booting . . .  Please wait.


Token-Ring:  Slot 2, 16 Mb data rate


Hardware address ................................. 10005AC97CF1


          Packets Sent        Packets Received

BOOTP           00000               00000
```

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

How to Disable and Enable Processors

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

Enabling/Disabling Processors through the Stand-By Menu

1. Enter the STAND-BY MENU; refer to the STAND-BY MENU section on page 2-12.

2. From the STAND-BY MENU, enter 3 to select the Set Configuration menu. A first-level screen similar to the following appears:

```
    Set Configuration

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

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

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

```
CPU1  Set           | Status


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


Select(x:exit): 04
```

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

- C   stands for configured

- D   stands for disabled

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

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

```
CPU1  Set           | Status

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


Select(x:exit):
```

6. Now, once the system is rebooted, it runs without processor 1.

7. To enable CPU1, follow the same procedure as above, except choose a status C (03 in this example).

8. Exit the STAND-BY MENU, and continue booting the machine.

Enabling/Disabling Processors through the Maintenance Menu

1. Enter the MAINTENANCE MENU. Refer to the MAINTENANCE MENU section on page 2-21 for details.

2. Enter 8 to select the SET PARAMETERS menu, which is similar to the following:

```
                    SET PARAMETERS

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

   SELECT [x:exit]: 2
```

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

```
                   SET CONFIGURATION

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


   SELECT [x:exit]: 0

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

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

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

```
                              CPU CARD - (CPU1)


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


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

  SELECT [x:exit]:
```

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

Enabling/Disabling Processors through AIX

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

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

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

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

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

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

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

Customizing SystemGuard For Your Needs

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

Remote Service Flag

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

Operational Flags

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

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

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

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

Test Flags

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

Remote Maintenance Flags

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

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

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

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

Phone Numbers

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

Service Line Speed Parameters

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

Modem Parameters

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

Passwords

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

Reloading the Flash EEPROM

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

Prerequisites

To install a new version of the FLASH 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: 7012 G Series System Unit - 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 7012 G Series system units. If a problem is detected, this procedure helps you isolate the problem to a failing unit.

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

Observe the following safety notice during service procedures.

Note: For a translation of these notices, see *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 power cables 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 7012 G 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 SRN `409-Axy`, where **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-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-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 9.

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.

Step 2

(from Step 1)

1. Set the power button on the system unit to Off.

2. Unplug the system from the electrical outlet.

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

4. Plug the system into the electrical outlet.

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

NO   Go to Step 3

YES   Go to Step 7

Step 3

(from Step 2)

Is the operator panel display illuminated?

NO Go to Step 4

YES Go to Step 6

Step 4

(from Step 3)

1. Check that the external power cable to the system unit has continuity.

2. Check that the external power cable is plugged into both the system unit and the power outlet. To check the power cable on the system side you must unmount the unit rear panel. See "Rear Cover", on page 4-8.

3. Check that the power outlet has been wired correctly with the correct voltage.

Did you find a problem?

NO Go to Step 5.

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

Step 5

(from Step 4)

Note: Either the Power Supply (99 % failure probability) or the system planar (1 % failure probability) is defective.

1. Unplug the system unit power cable from the wall outlet.

2. Replace the Power Supply. See "Power Supply" on page 4-44.

3. Connect the system unit power cable to the wall outlet.

Has the symptom changed?

NO Reinstall the original Power Supply.

Repeat Step 5 exchanging the system planar. See "Base Unit System Planar" on page 4-46.

If you exchanged both Power Supply and system planar with no results, call your service support person for assistance.

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

Step 6

(from Step 3)

> **Note:** Either the Operator Panel (99 % failure probability) or the system planar (1 % failure probability) is defective.

1. Unplug the system unit power cable from the wall outlet.

2. Exchange the operator panel. See "Operator Panel" on page 4-11.

3. Connect the system unit power cable to the wall outlet.

4. Be sure that the key mode switch is set to the Service position.

Has the symptom changed?

NO   Reinstall the original Operator Panel.

Repeat Step 6 exchanging the system planar. See "Base Unit System Planar" on page 4-46.

If you exchanged both operator panel and system planar with no results, 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 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 8.

Step 8

(from Step 7)

1. Power on the system unit, 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-on light does not come on or comes on and does not stay on. An SRN is displayed on the Operator Panel. **Note:** 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 9, otherwise find the SRN in the Service Request Number List in the *Diagnostic Information For Micro Channel Bus Systems*; then do the listed action.
The power-on light comes and stays on.	**Note:** It is not a Power Supply fault. If there is an SRN displayed on the Operator Panel, Find the SRN in the Service Request Number List in the *Diagnostic Information For Micro Channel Bus Systems*; then do the listed actions. 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 planar or operator panel. Use "MAP 0410" in *Diagnostic Information For Micro Channel Bus Systems* to check out the repair.
Any other symptom.	Call your service support person for assistance.

Step 9

(from Step 1 and 8)

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:

```
8 4 2 1   8 4 2 1  = Hex value of bits
| | | |   | | | |
7 6 5 4   3 2 1 0  = Bit numbering
                └────── Over / under voltage on +5 volts
              └──────── Overload (over current) on +5 volts
            └────────── Overload (over current) on +12, +3.3, or +3.6 volts
          └──────────── Over / under voltage on +12, +3.3, or +3.6 volts

        └────────────── Ignore
      └──────────────── Ignore
    └──────────────────  First level over temperature detected by the power
                         supply
  └────────────────────  Second level over temperature detected by the
                         power supply
```
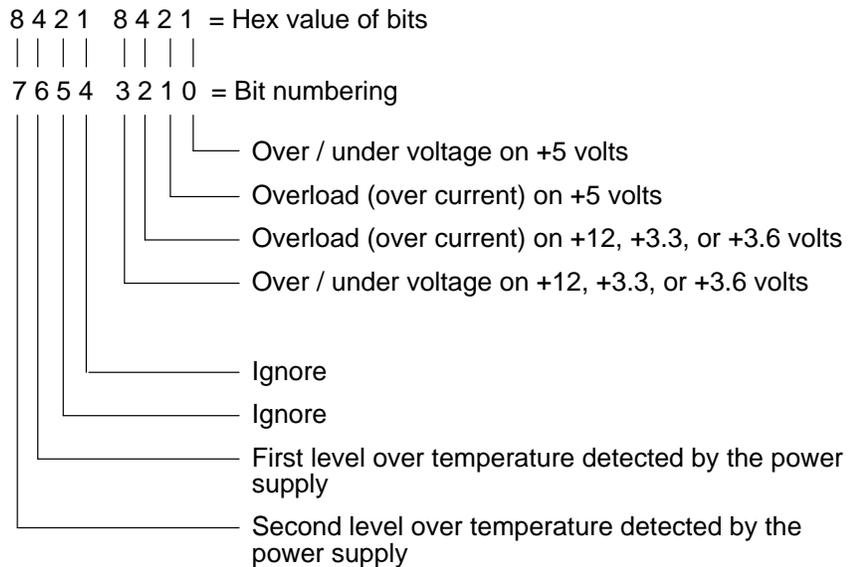
For example, 56 (0101 0110) represents bits 6, 4, 2, and 1. A zero indicates the active state.

Is bit 6 or bit 7 a zero?

NO   Go to Step 11.

YES   Go to Step 10.

Step 10

(from Step 9)

An over temperature problem can be caused by an environmental problem (see Specifications on page 1-15 in *7012 G Series Service Guide*) or blocked air ducts. Check each of these items.

Did you find the problem?

NO   Go to Step 11.

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

Step 11

(from Steps 9, 10)

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: 7012 G Series System Unit - Minimum Configuration" on page 3-1540-1.

MAP 1540:7012 G Series Minimum Configuration

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

Purpose of this MAP

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

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

Minimum Configurations for the 7012 G Series Systems:

– System planar, operator panel, CPU card, and memory card.

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

– System planar, operator panel, CPU card, memory card, and a BUMP console attached to the S1 port.

– System planar, operator panel, CPU card, memory card, CD-ROM drive, SCSI adapter and a BUMP 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 that one of the remaining parts is failing.

Step 1

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

1. Ensure that the diagnostics and the operating system are shut down.

2. Turn the key mode switch to the Service position.

3. Sometimes an SRN or Error Code will be logged in the BUMP Error Log. Before proceeding, check the BUMP Error Log for any SRNs or Error Codes. This is done as follows:

   a. Power off

   b. Enable the BUMP Console Flag and disable the Autoservice IPL flag. This is done as follows:

      – Press Enter.

      – Type sbb and press Enter.

      – Select **Se**t **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-on button on the system unit to Off.

5. Unplug the power cord.

6. Connect the power cord.

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 `System Boot,` then `Boot From List` (CD-ROM). 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 `Exit Main Menu and Start System (Boot)` then press `Enter.` When the `Starting System Boot` menu displays, press `Enter.` **Note:** 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. Power off the system.

2. Unplug the system unit power cord from the wall outlet.

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 area.

4. Record the slot numbers of the CPU cards, and then remove all the CPU cards except the one in slot P.

5. Connect the system unit power cable to the wall outlet.

6. Set the power button on the system unit to On.

7. Wait for one of the following conditions to occur:

   - The Maintenance Menu is displayed.

   - The same three digit number is displayed in the operator panel display for longer than three minutes except for the number `165` which may display for up to ten minutes with no activity on the BUMP console.

   - The number `888` is flashing in the operator panel display.

Is the maintenance menu displayed?

NO   Go to Step 3.

YES   If a CPU or memory card was removed, go to Step 4. Otherwise, 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 parts installed into the system unit is defective.

To test each part, exchange them in the following order:

1. System planar

2. CPU card

3. Memory card

4. Power supply

5. Operator panel

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

1. Power off the system.

2. Unplug the power cord.

3. Exchange one of the parts in the list.

4. Plug the power cord in.

5. Power on the system.

6. Wait for one of the following conditions to occur:

   - The Maintenance Menu is displayed.

   - The same three digit number is displayed in the operator panel display for longer than three minutes except for the number`165` which may display for up to ten minutes with no activity on the BUMP console.

   - The number `888` is flashing in the operator panel display.

Is the maintenance menu displayed?

NO   Reinstall the original 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. Power off the system unit.

2. Unplug the system unit power cord from the wall outlet.

3. If any CPU cards were removed, install a CPU card and continue with substep 4. If there are no additional CPU cards, perform the steps under the **YES** answer below.

4. Connect the system unit power cable to the wall outlet.

5. Power on the system unit.

6. Wait for one of the following conditions to occur:

   - The Maintenance Menu is displayed.

   - The same three digit number is displayed in the operator panel display for longer than three minutes except for the number `165` which may display for up to ten minutes with no activity on the BUMP console.

   - The number `888` is flashing in the operator panel display.

Is the maintenance menu displayed?

NO   Go to Step 5.

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

              After all CPU cards (CPU) and all memory cards (MC) are installed and tested, 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 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. Power off the system unit.

2. Unplug the system unit power cord from the wall outlet.

3. Exchange the last installed part (CPU or memory).

4. Connect the system unit power cable to the wall outlet.

5. Power on the system unit.

6. Wait for one of the following conditions to occur:

   - The Maintenance Menu is displayed.

   - The same three digit number is displayed in the operator panel display for longer than three minutes except for the number 165 which may display for up to ten minutes with no activity on the BUMP console.

   - The number 888 is flashing in the operator panel display.

Is the maintenance menu displayed?

NO   Go to Step 6.

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

Step 6

(from Step 5)

One of the installed parts is defective.

To test each part, exchange them in the following order:

- System planar
- CPU card
- Memory card
- Power supply

The system is working correctly if it stops with `269` displayed in the operator panel display or if the Maintenance Menu displays. If this does not occur, the last part you installed is defective.

1. Power off the system unit.
2. Unplug the system unit power cord from the wall outlet.
3. Exchange one of the parts in the list.
4. Connect the system unit power cable to the wall outlet.
5. Power on the system unit.
6. Wait for one of the following conditions to occur:

   - The Maintenance Menu is displayed.
   - The same three digit number is displayed in the operator panel display for longer than three minutes except for the number `165` which may display for up to ten minutes with no activity on the BUMP console.
   - The number `888` is flashing in the operator panel display.

Is the maintenance menu displayed?

NO   Reinstall the original FRU.

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

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

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

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

Step 7

(from Steps 1, 2, and 4)

1. Power off the system unit.

2. Unplug the system unit power cord from the wall outlet.

3. Record the slot numbers of the adapters. Label and record the location of any cables attached to the adapters.

4. Remove all the adapters from the MCA area, except the SCSI adapter to which the CD–ROM drive is connected.

5. Remove all SCSI devices except the CD-ROM drive.

6. Connect the system unit power cable to the wall outlet.

7. Power on the system unit.

8. If the Maintenance Menu is displayed, select `System Boot`, then `Boot From List`.

9. If the system stops with a `260` displayed, and the Main Menu is displayed, Select `Exit Main Menu and Start System (Boot)` and press Enter. When the "Starting System Boot" menu displays, press Enter. Repeat this procedure each time these conditions occur.

10. Wait for one of the following conditions to occur:

    - The system stops with `c31` displayed in the operator panel display.
    - The same three digit number is displayed in the operator panel display for longer than three minutes except for the number `165` which may display for up to ten minutes with no activity on the BUMP console.
    - The number `888` is flashing in the operator panel display.

Is `c31` displayed in the operator panel display?

NO   One of the FRUs remaining in the CPU Enclosure is defective.

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

1. SCSI adapter
2. CD-ROM drive
3. SCSI cable
4. System planar
5. CPU card
6. Memory card
7. Power supply

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. Power off the system unit.

2. Unplug the system unit power cord from the wall outlet.

3. Install one adapter, and connect any cables and devices that were attached to it.

4. Connect the system unit power cable to the wall outlet.

5. Power on the system unit.

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 the number `165` which may display for up to ten minutes with no activity on the BUMP console.
   - The number `888` is flashing in the operator panel display.

Is `c31` displayed in the operator panel display?

NO   Go to Step 9.

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

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

Step 9

(from Step 8)

1. Power off the system unit.

2. Unplug the system unit power cord from the wall outlet.

3. Starting with the last installed adapter, disconnect one attached device and cable.

4. Insert the diagnostic CD-ROM disc into the CD-ROM drive.

5. Connect the system unit power cable to the wall outlet.

6. Power on the system unit.

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 for up to ten minutes with no activity on the BUMP console.
   - The number `888` is flashing in the operator panel display.

Is `c31` displayed in the operator panel display?

NO   Repeat Step 9 until the defective device or cable is identified or all the devices and cables have been disconnected.

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

                  To test each part, exchange the parts in the following order:

                  1. Adapter (last one installed)

                  2. System planar

                  3. Power supply

                  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. Unplug the system from the electrical outlet.

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 CPU Enclosure, do not disconnect it.

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

4. Plug the system into the electrical outlet.

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 for up to ten minutes with no activity on the BUMP console.
    - The number `888` is flashing in the operator panel display.

Is `c31` displayed in the operator panel display?

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

YES   Go to Step 11.

Step 11

(from Step 10)

1. Follow the instructions on the display to select your console.

2. When the Diagnostics Operating Instructions display, press the Enter key.

3. If the terminal type has not been defined or you are IPLing from CD-ROM, you must use the Initialize Terminal option on the FUNCTION SELECTION menu to initialize the AIX operating system environment before you can continue with the diagnostics. This is a separate and different operation than selecting the console display.

4. Select Advanced Diagnostics Routines.

5. When the DIAGNOSTIC MODE SELECTION menu displays, select System Verification.

6. Run the diagnostics for each of the adapters and devices on the test list.

Did you get an SRN?

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

YES   Go to Step 12.

Step 12

(from Step 11)

Look at the FRU part numbers associated with the SRN.

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

NO   Exchange the FRU with the highest failure percentage that has not been changed.

Repeat Step 12 until all the FRUs associated with the SRN have been replaced or the 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. System planar (SP)

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. Unplug the system from the electrical outlet.

3. Record the location of all the internal SCSI devices attached to the SCSI bus you are attempting to IPL from.

4. If there are any external SCSI devices attached to the SIB bus you are attempting to IPL from, then unplug the cable and insert a terminator.

5. Remove all SCSI devices except the CD-ROM drive.

6. Plug the system into the electrical outlet.

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 CPU Enclosure is defective. Go to Step 14.

YES   Go to Step 18.

Step 14

(from Step 13)

This problem can be caused by:

- – the CD-ROM pulling the bus down or opening the positive temperature coefficient (PTC) on the SCSI adapter
- – a defective SCSI adapter
- – a defective terminator
- – a defective System Board (ELM)
- – 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. Unplug the system from the electrical outlet.

3. Remove the CD-ROM drive.

4. Install the disk required to boot diagnostics. This is normally hdisk0.

5. Plug the system into the electrical outlet.

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 Board (ELM)
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. Unplug the system from the electrical outlet.

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. Plug the system into the electrical outlet.

6. Set the power button on the system unit to On.

7. Be sure that the diagnostic CD-ROM is inserted into the CD-ROM drive.

8. If the Maintenance Menu is displayed, select `System Boot`, then `Boot From List`.

9. If the system stops with a `260` displayed, and the Main Menu is displayed, Select `Exit Main Menu and Start System (Boot)` and press Enter. When the "Starting System Boot" menu displays, press Enter. Repeat this procedure each time these conditions occur.

10. Wait for one of the following conditions to occur:
    - The system stops with a flashing or solid `269` displayed in the operator panel display.
    - The system stops with `c31` displayed in the operator panel display.

Is `c31` displayed in the operator panel display?

NO   One of the FRUs remaining in the CPU Enclosure is defective.

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

1. System planar (SP)

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

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. Unplug the system from the electrical outlet.

3. Install a device.

4. Plug the system into the electrical outlet.

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 on the SCSI adapter.

- – a defective SCSI adapter

- – a defective terminator

- – a defective system board (ELM)

- – 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-on button on the system unit to Off.

2. Set the breaker switch on the system unit to Off.

3. Remove all SCSI Adapters except the one you are trying to boot from.

4. Set the breaker switch on the system unit to On.

5. Set the power-on button on the system unit to On.

6. Insert the diagnostic CD-ROM into the CD-ROM drive.

7. If the Maintenance Menu is displayed, select `System Boot,` then `Boot From List.`

8. Wait for one of the following conditions to occur:

   - The system stops with a flashing or solid `269` displayed in the operator panel display.
   - The DIAGNOSTIC OPERATING INSTRUCTIONS screen is displayed.

9. If the system stops with a `c31` in the operator panel display, follow the instructions on the display to select your console.

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

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

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

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

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

YES   Go to Step 13.

Step 20

(from Step 1)

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

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

Step 21

(from Step 20)

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

1. SCSI adapter

2. System Planar

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 all replaceable units installable into the system, and for other hardware components, such as the system unit covers.

Note: Unless otherwise noted, the procedures described in the following pages are applicable to both the base and expansion units.

Electrical Safety

Observe the following safety instructions any time you are connecting or disconnecting devices attached to the workstation.

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 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.

DANGER

> **To prevent electrical shock hazard, disconnect the power cable from the electrical outlet before relocating the system.**

Handling Static-Sensitive Devices

Attention: Adapters, planars, diskette drives, and disk drives are sensitive to static electricity discharge. These devices are wrapped in antistatic bags, as shown in this illustration, to prevent this damage.

Take the following precautions:

- Do not remove the device from the antistatic bag until you are ready to install the device in the system unit.
- If you have an antistatic wrist strap available, use it while handling the device.
- With the device still in its antistatic bag, touch it to a metal frame of the system.
- Grasp cards and boards by the edges. Hold drives by the frame. Avoid touching the solder joints or pins.
- If you need to lay the device down while it is out of the antistatic bag, lay it on the antistatic bag. Before you pick it up again, touch the antistatic bag and the metal frame of the system at the same time.
- Handle the devices carefully in order to prevent permanent damage.

Antistatic Bag
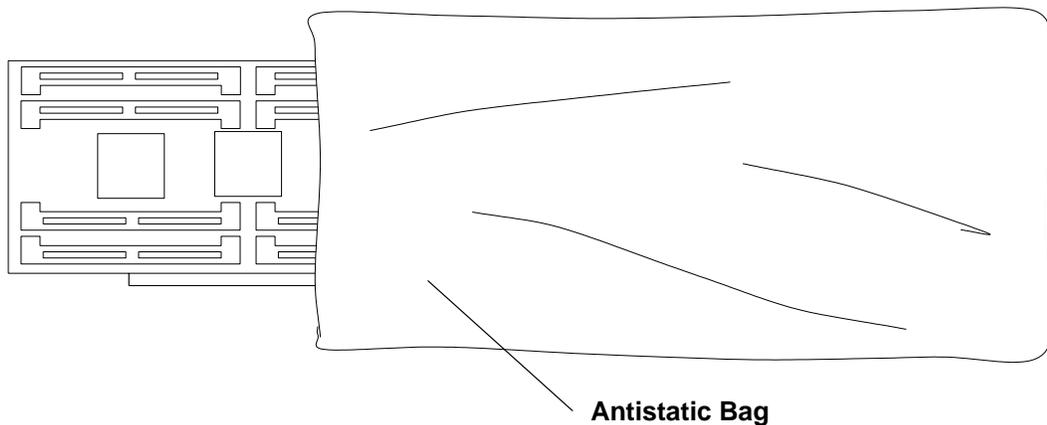
Front Cover

Attention: Do no operate the system unit with the covers removed. Operating with the covers on ensures adequate cooling of the components.

Removal

1. Set the power switches of the attached devices to Off.

2. Set the power switch of the system unit to Off.

3. Disconnect the power cable from the wall outlet.

4. Set the mode switch to the service position (🔧).

5. Remove the key from the mode switch, if present, to unlock the front cover.

6. Firmly grip the front cover and pull forward from the bottom first, then the middle, and then lift the cover to remove it from the unit.
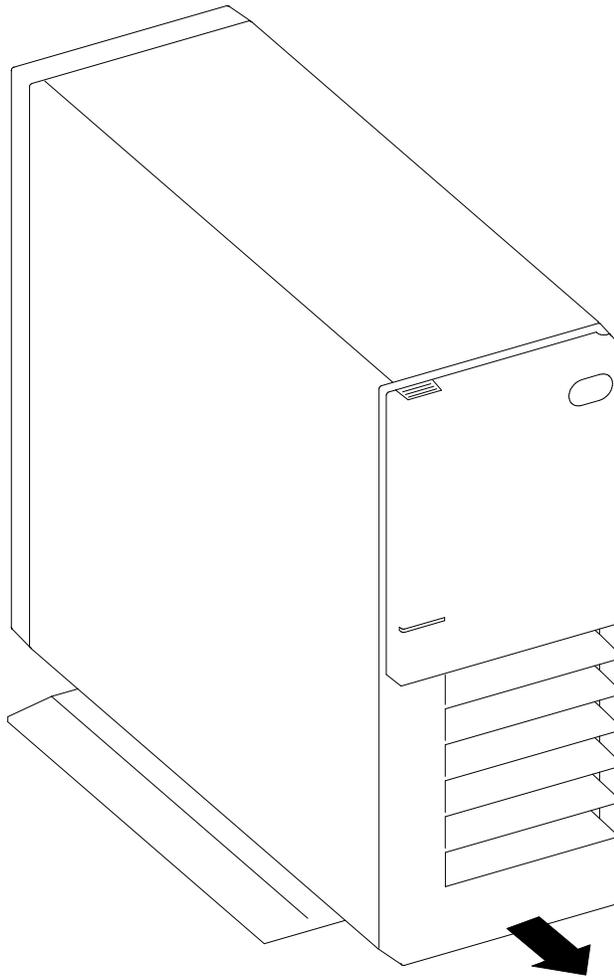
Note: Pull tools, for ease in removing CPU and Memory cards, are located on the inside of the front cover.

Pull Tools
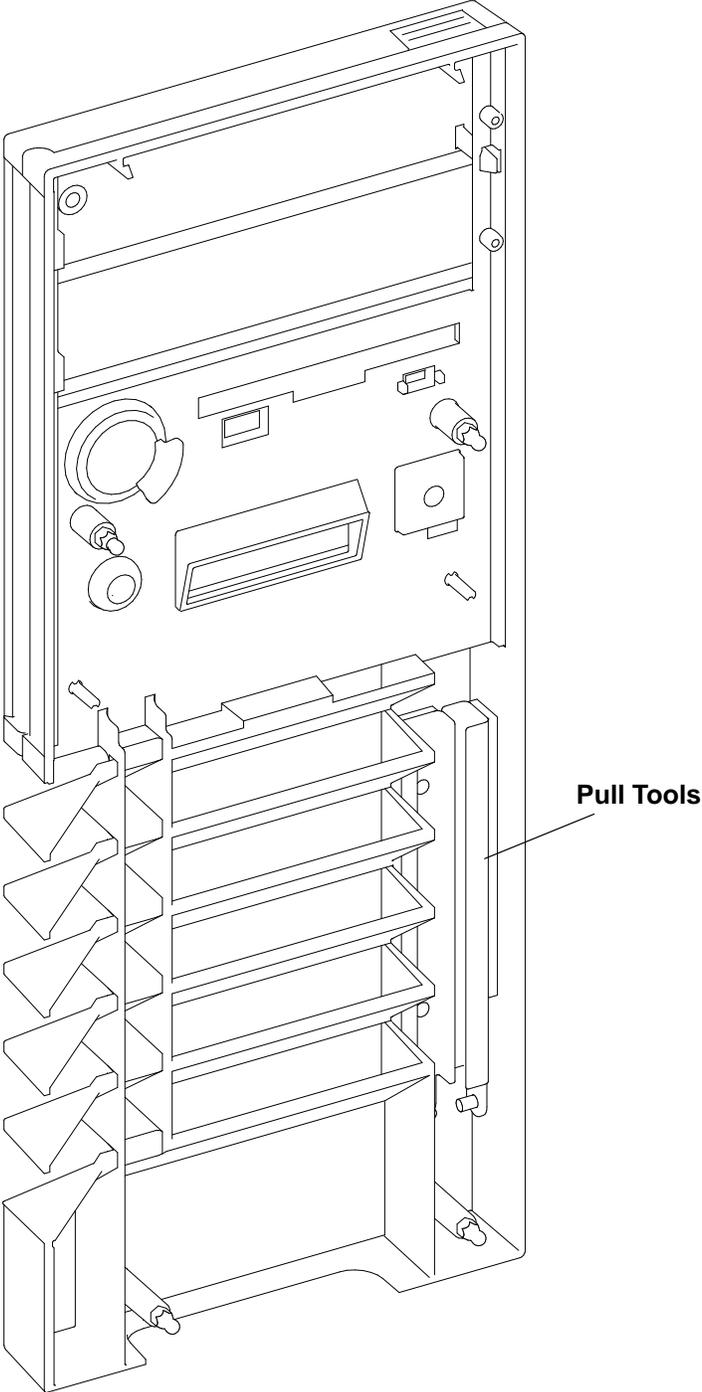
Replacement

1. Hook the top of the front cover into the top of the unit frame and Insert the positioning pins located on the inside of the cover in the corresponding holes on the unit frame. P

2. ush the middle of the cover toward the frame and then push the bottom toward the frame to snap the cover into place.

**Hole for
Positioning Pin**

Hooks

**Hole for
Positioning Pin**
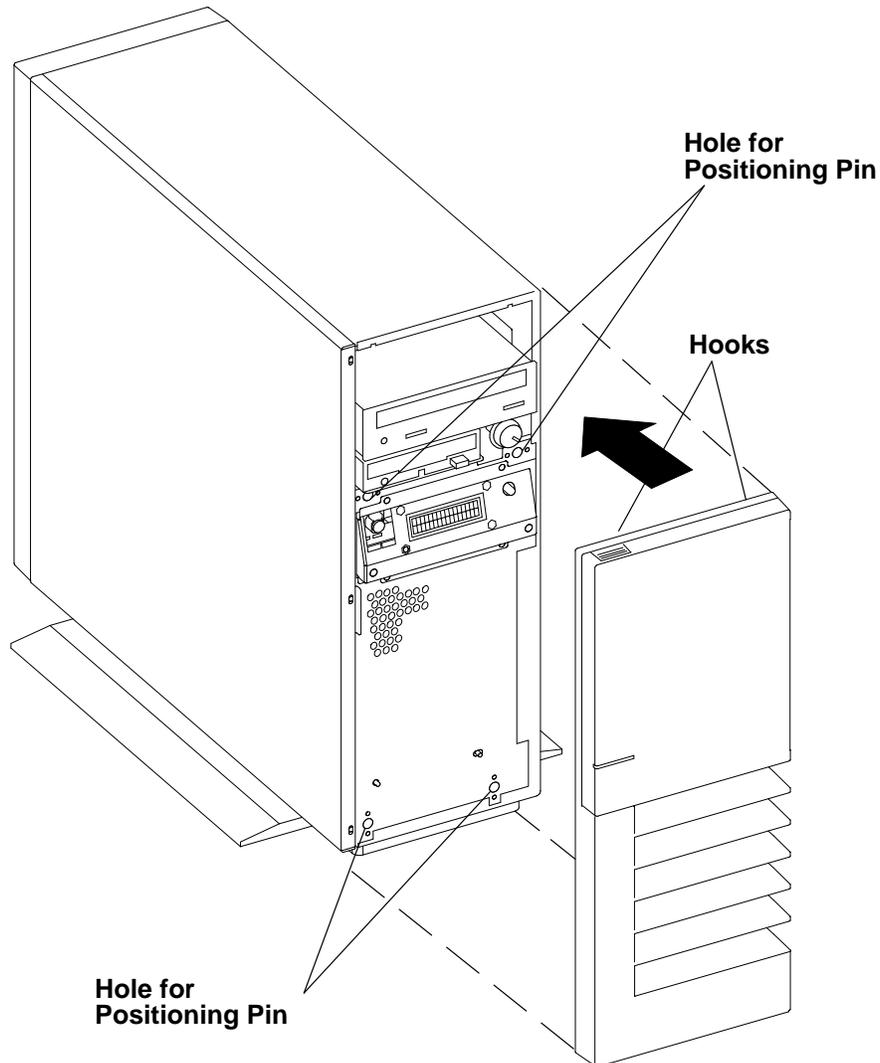
3. If there was a key in the mode switch, insert the system key into the mode switch to lock the front cover.

4. Connect the power cable.

5. Set the power switch of the system unit to On.

6. Set the power switches of the attached devices to On.

Side Cover

Removal

1. Remove the front cover following the procedure on page 4-3.

2. Remove the three retaining screws located on the front of the side cover.

Screws
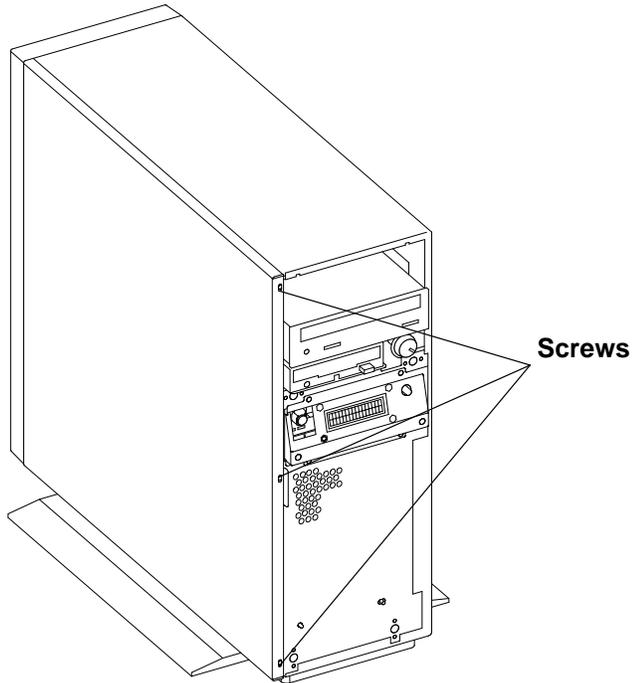
3. With a firm grip on the panel, rotate it slightly to the left while pulling it forward.
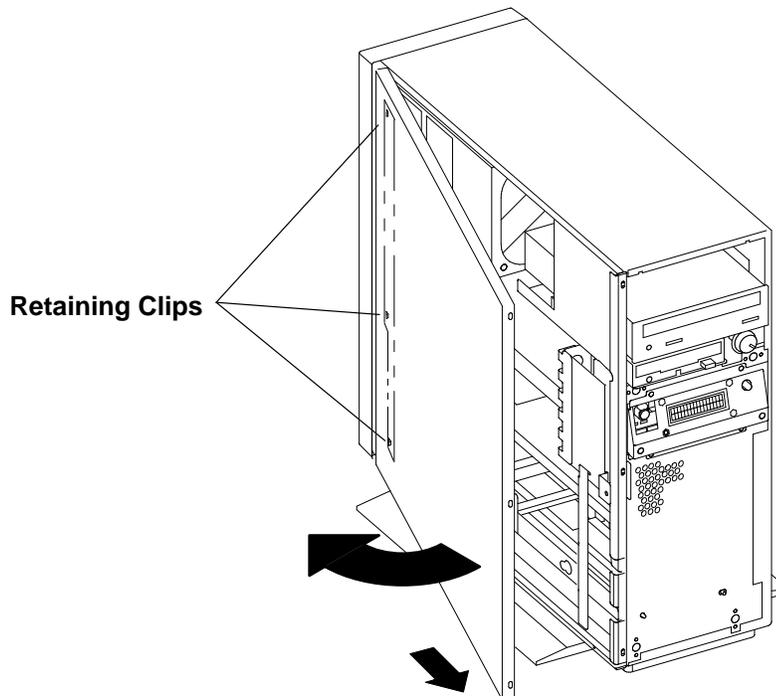
Retaining Clips

Replacement

1. Center the holes on the left of the side cover with the corresponding retaining clips on the unit.
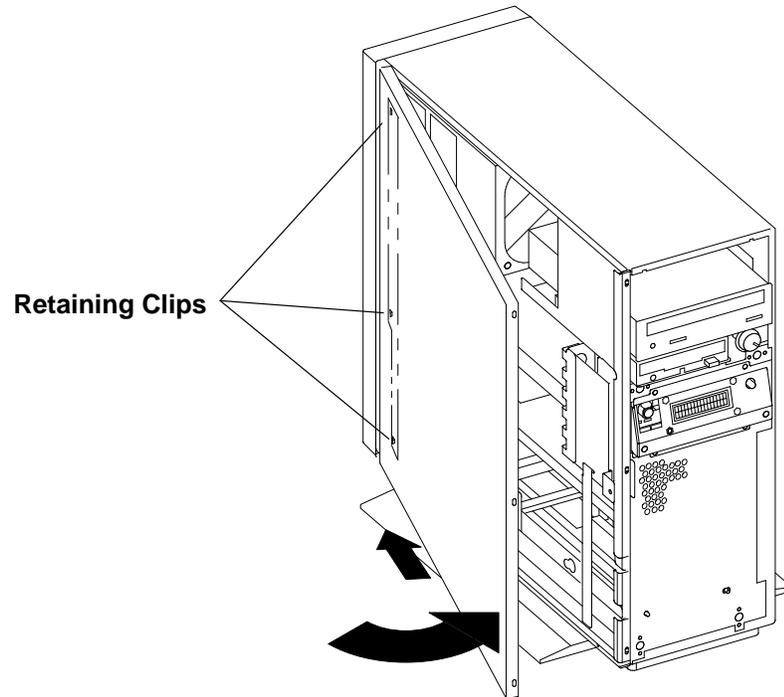
2. Push the cover against the unit.

3. Install and tighten the retaining screws.
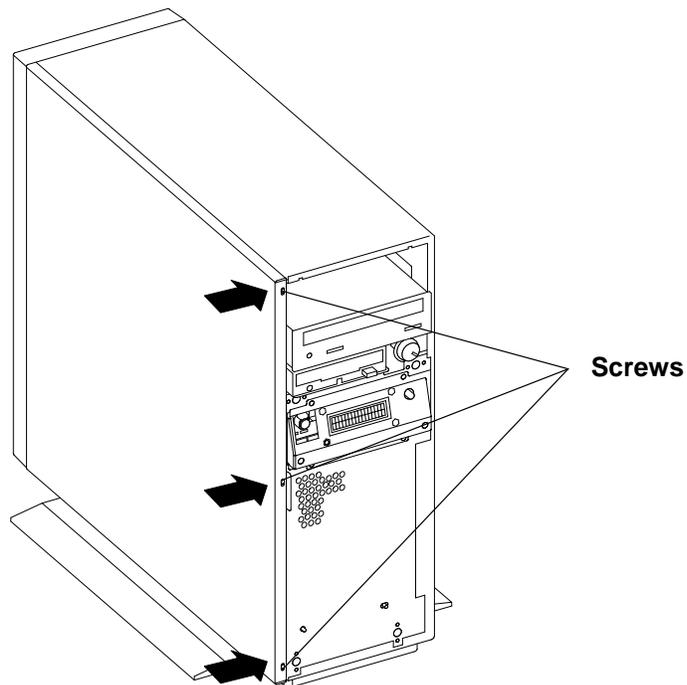
4. Replace the front cover following the procedure on page 4-3.

Rear Cover

Removal

1. Remove the front cover following the procedure on page 4-3.

2. Remove the side cover following the procedure on page 4-6.

3. There may be a retaining screw securing the rear cover, if so, loosen the retaining screw of the rear cover. This screw is located inside the unit in the rear.

Retaining Screw
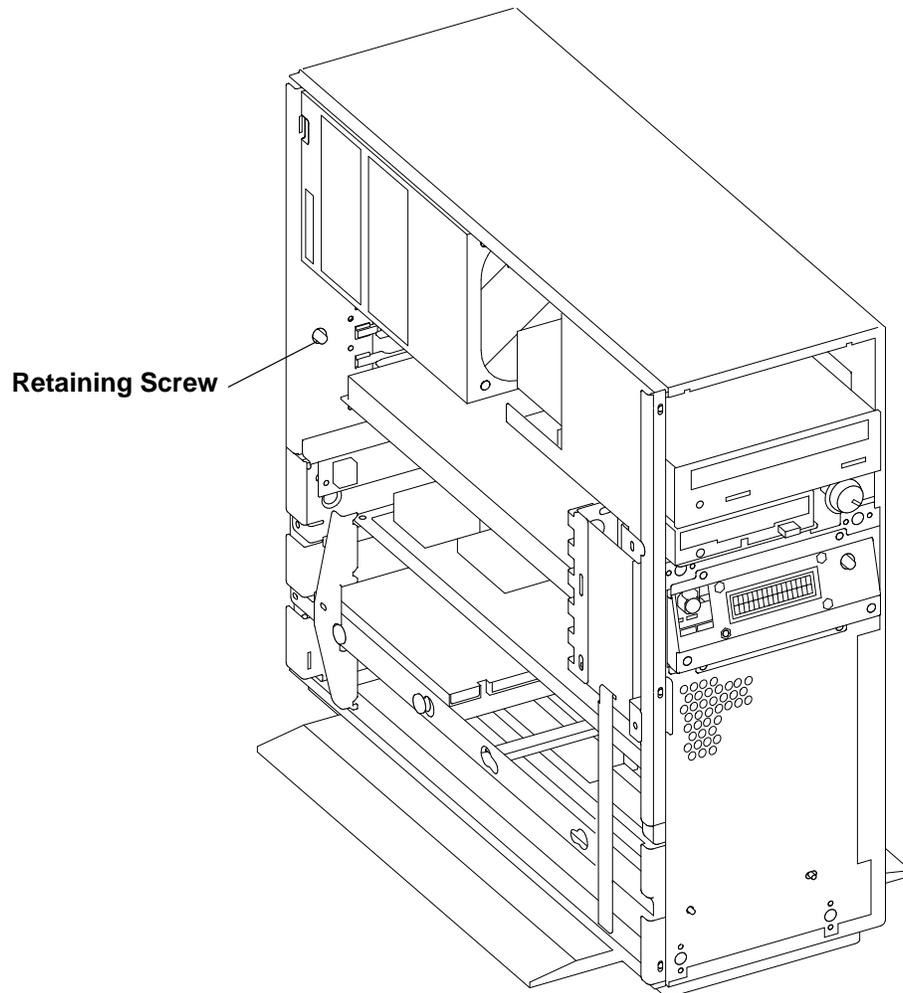
4. Firmly grip the rear cover and remove it from the unit.

Note: Be careful when removing the rear cover from the unit. Removing it too roughly can cause accidental disconnection of the cables coming from the rear of the unit.
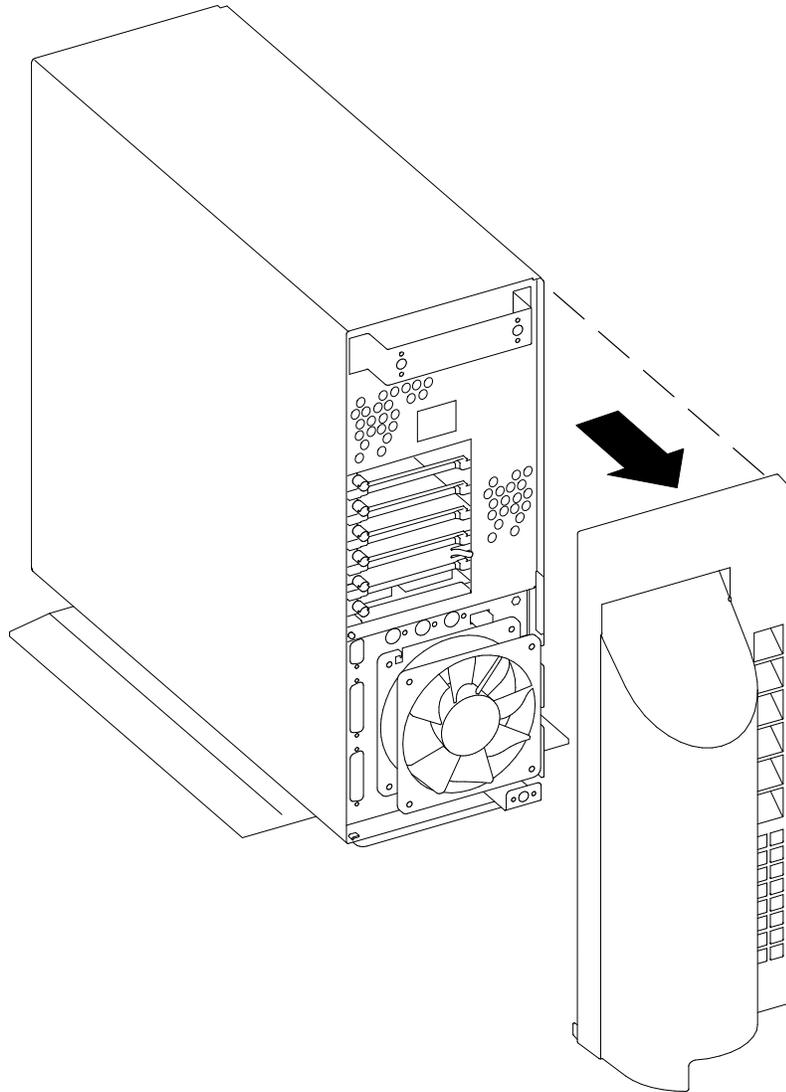

Replacement

Note: Before replacing the cover, ensure that all cables are properly connected, and not entangled. All cables coming from the rear of the unit should be held between the unit frame and the cover.

1. Insert the positioning pins located in the rear of the panel in the corresponding holes on the unit frame, then snap the rear cover to the unit.

2. If there was a retaining screw securing the rear cover to the unit, tighten the retaining screw.

3. Replace the side cover following the procedure on page 4-6.

4. Replace the front cover following the procedure on page 4-3.

System Unit Base

Removal

1. Set the power switches on the attached devices to Off.
2. Set the power switch on the system unit to Off.
3. Unplug the power cable from the wall outlet.
4. Put the system unit in horizontal position.
5. Loosen the retaining screws used to lock the base to the unit.
6. Remove the base from the unit.
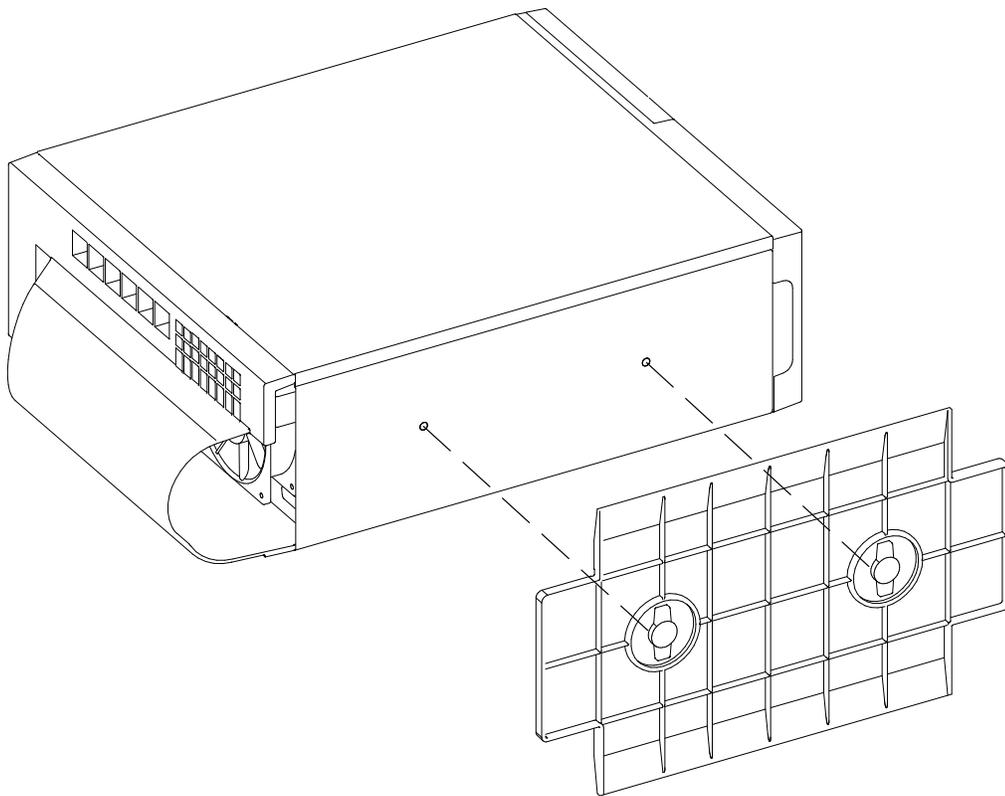
Replacement

1. Align the base with the system unit frame.

   – If you are installing the base on the base system unit, install it with its lateral tongues towards the rear of the unit.
2. Secure the base to the system unit by tightening the retaining screws.
3. Plug in the power cable.
4. Set the power switch on the system unit to On.
5. Set the power switches on the attached devices to On.

Operator Panel

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

Attention: System Planar and operator panel EEPROMs contain the SYSID of the system. When one of the two components is to be replaced (for example the System Planar), the SYSID information will be copied from the operator panel EEPROM into the System Planar EEPROM when you start the system.

To avoid loosing 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 operator panel and start up the system: the SYSID information will be copied from System Planar EEPROM to the operator panel EEPROM.

2. Substitute the System Planar and start up the system: the SYSID information will be copied from operator panel EEPROM to the System Planar EEPROM.

Removal

1. Remove the front cover, following the procedure described on page 4-3.

2. Remove the operator panel retaining screws located on the front of the operator panel.
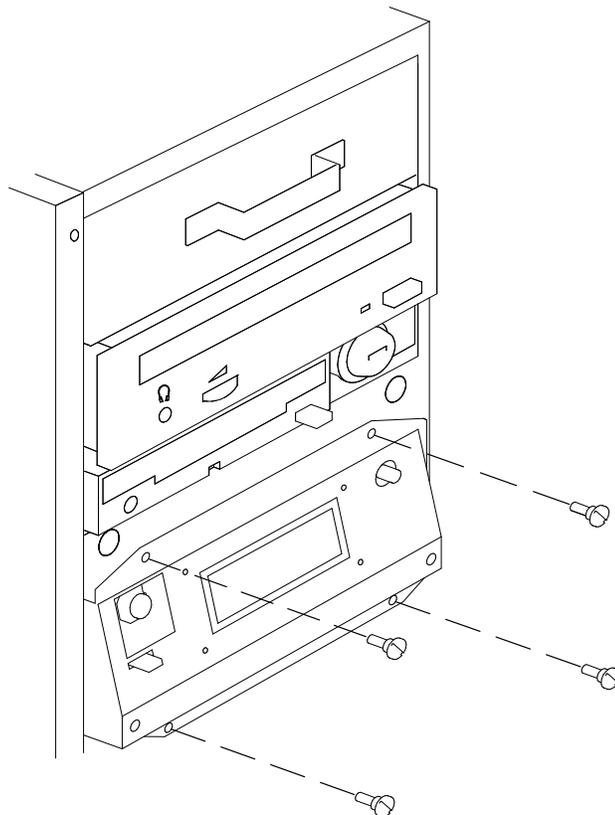
3. Move the operator panel from left to right to help remove it from its slot.

Be careful in handling the operator panel. The cables are still connected and these could be damaged. Keep the operator panel near the unit.
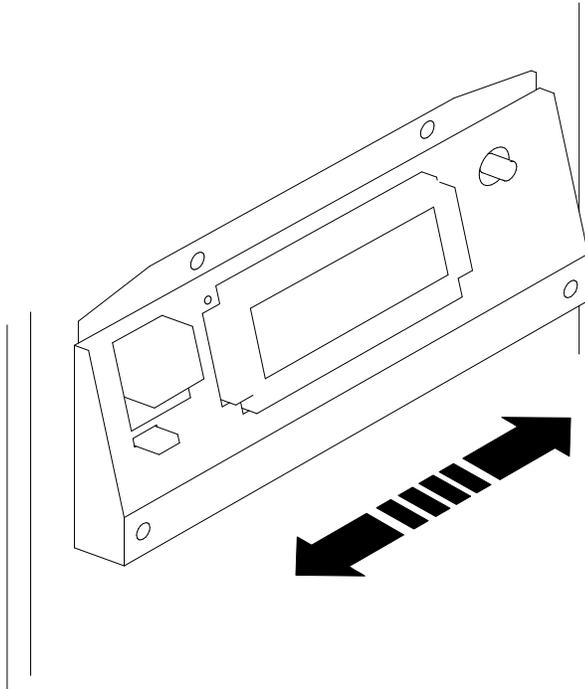
4. For the base unit, disconnect the cables connected to the operator panel, in the following order:

   a. The cable coming from the key mode switch.

   b. The operator cable going to the system planar.

Operator Panel Cable (Goes To The System Planar)

Mode Switch Cable
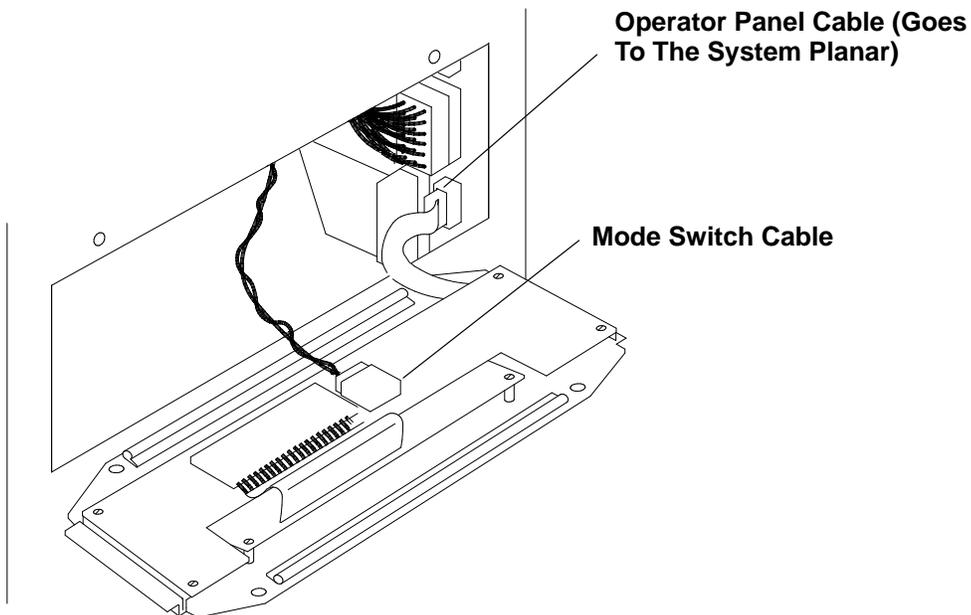
5. For the expansion unit, disconnect the cables in the following order:

    a. the cable coming from the RS-485 card, which is connected to the operator panel.

    b. the cable going to the ECB card, which is connected to the ECB card itself.

RS-485 Cable

**Operator Panel Cable
(Goes To The Expan-
sion Control Board)**
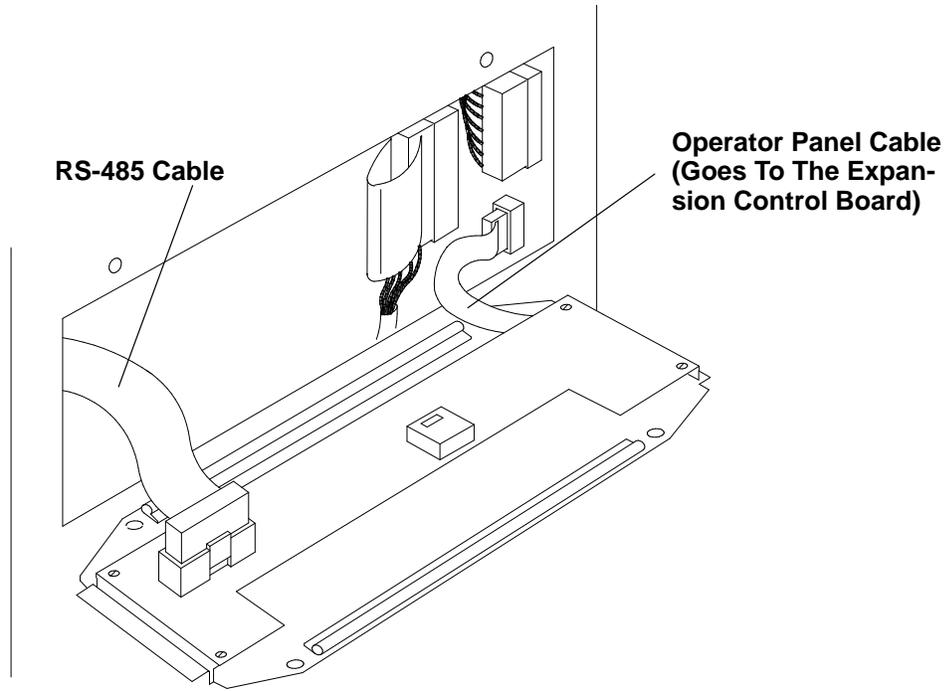
Replacement

Replace in the reverse order.

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 2-16 for instructions to Set Unit Number for any attached expansion unit. If the unit number is not set, the system will not boot.

Base Unit Adapters

Note: Refer to "Handling Static-Sensitive Devices" on page 4-2 before removing or installing adapters in this system.

Removal

1. Remove the front cover following the procedures on page 4-3.

2. Remove the side cover following the procedures on page 4-6.

3. Remove the rear cover following the procedure on page 4-8.

4. Facing the rear of the system unit, place it in horizontal position with the right side down.

5. Record the location and type of the adapter.

6. Disconnect any attached devices and internal cables from the adapter.

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

7. Loosen the retaining screw which locks the adapter on the rear side of the system unit.

Retaining Screw
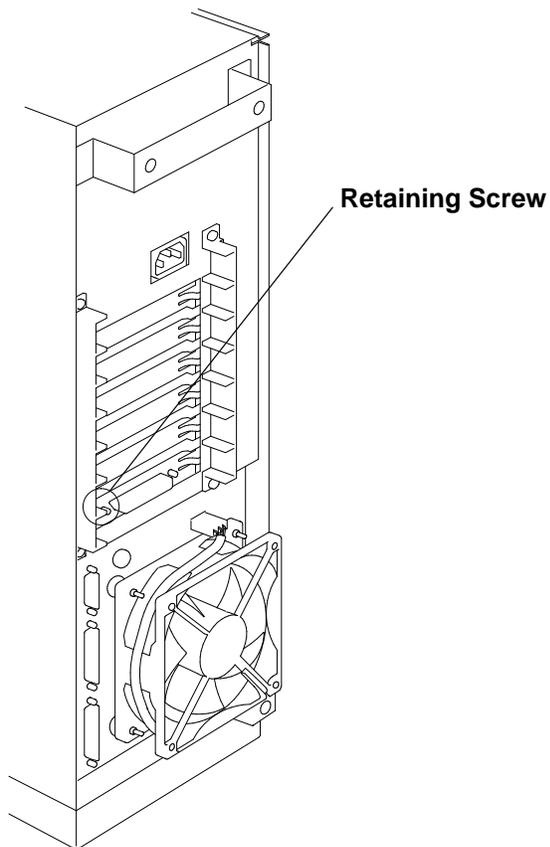
8. On the front fan cage, loosen the retainer screw which locks the adapters.

Retaining Screw
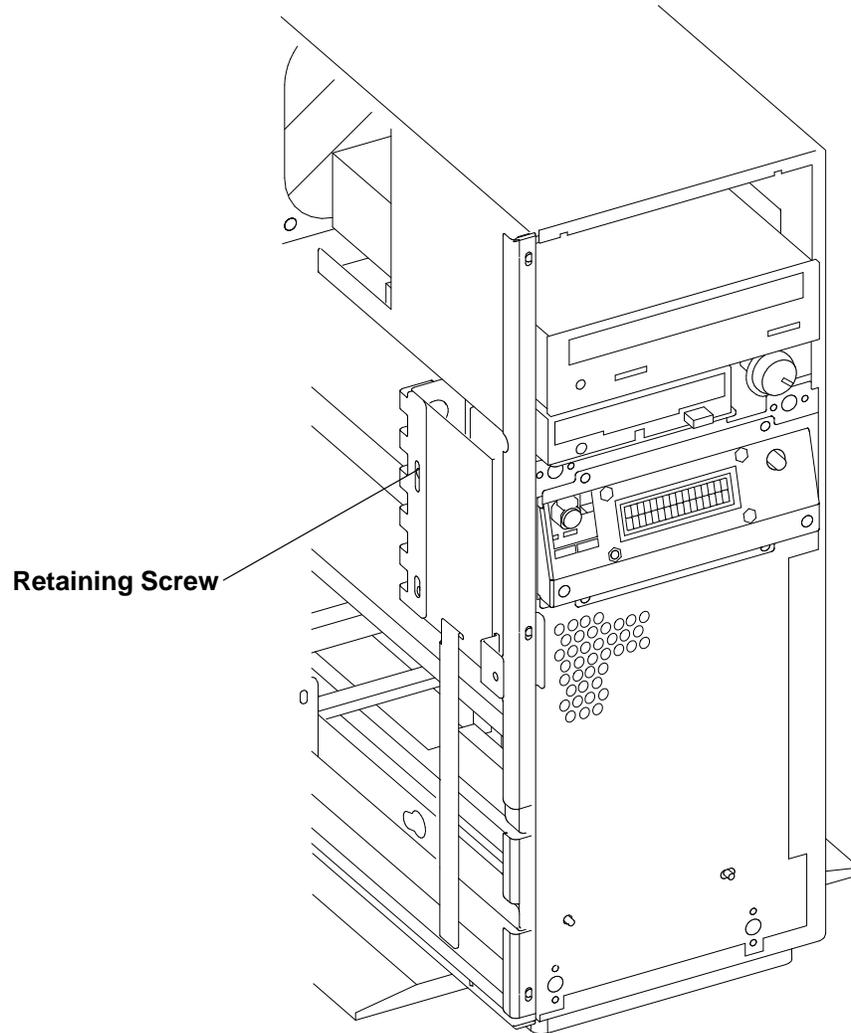
9. Slide the retainer down until the adapters are unlocked.

Retainer
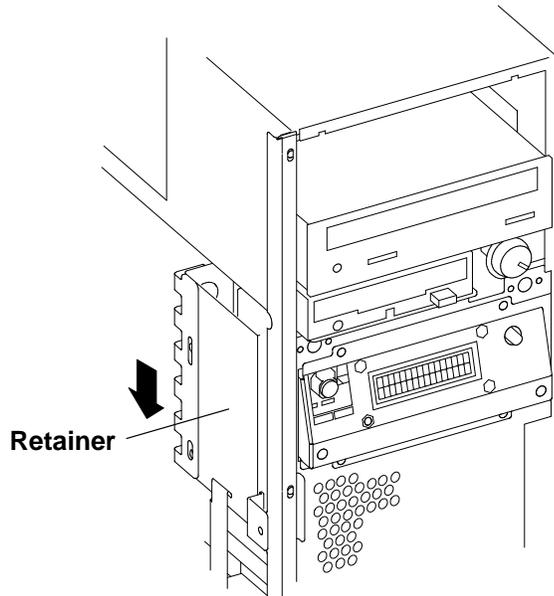
10. Slide the adapter out of the slot.

    If you are removing a Type 3 adapter, move the tongue of the plastic frame. Using the tabs on the adapter card, firmly grip the adapter, pull it up and slide it out of the slot.

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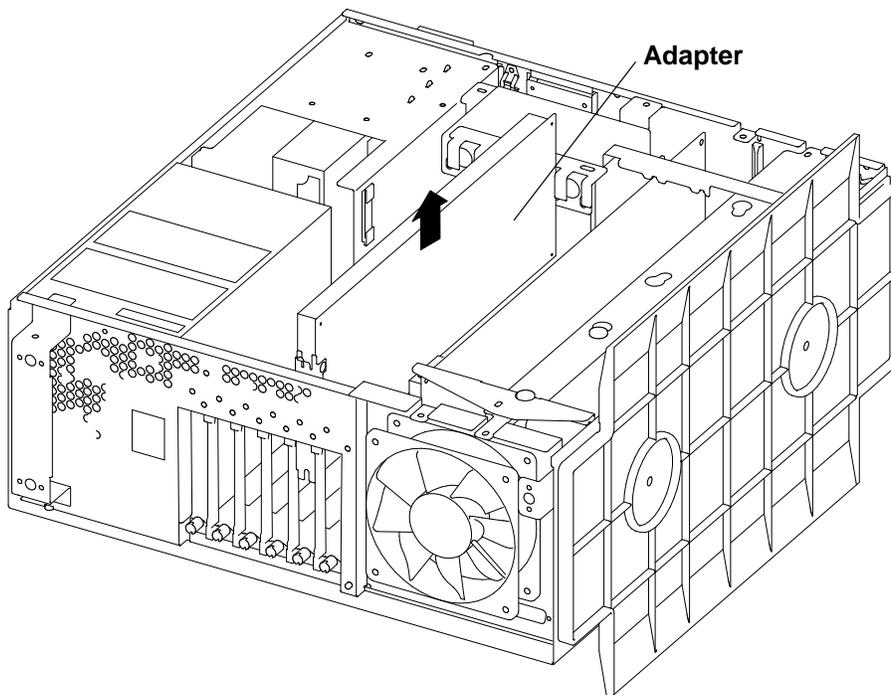
Adapter

11. Record the settings of any jumpers or switches that are present on the adapter card.

12. Remove the plastic frame at the rear side of the adapter.

13. Store the adapter in an antistatic envelope.

Replacement

Note: If the adapter removed will not be replaced with another one, **you must install a dummy blank in the free slot** to protect the unit from dust or any debris, and to guide cooling air.

- Position the dummy plate in the free slot, inserting it from the internal side of the unit. Pull the tongue of the dummy plate down to fasten it to the slot.

- Secure the dummy plate by tightening the retaining screw on the slot.

Note: If you are installing the adapter for the first time, this adapter does not replace another one, set the jumpers or switches according to the configuration requirements.

Remove the dummy blank that covers the designated slot, if present, performing the following steps:

a. Loosen the retaining screw on the rear of the system unit.

b. Remove the dummy blank from the slot, sliding it out toward the internal part of the system unit.

1. Set the switches on the replacement adapter.

2. Verify the type of adapter being installed.

3. Align the adapter with the designated slot and insert the adapter into the slot.

Adapter
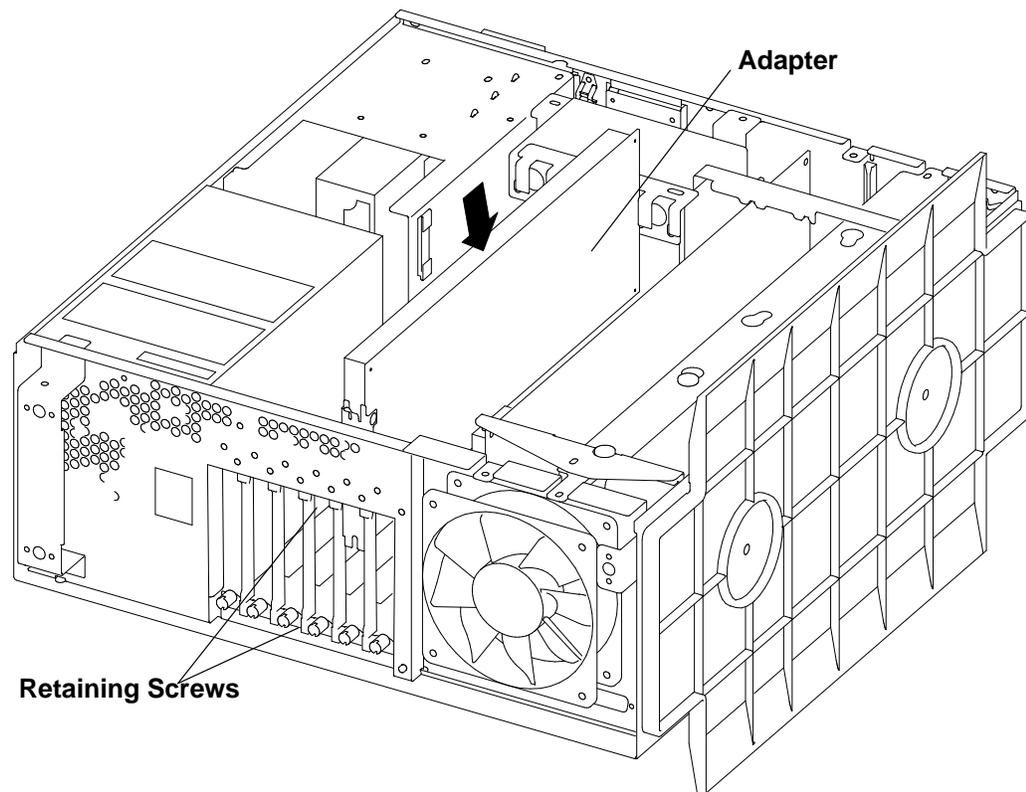
Retaining Screws

4. Secure the adapter in the slot by tightening the retaining screws on the rear side of the system unit.

5. Slide the retainer to lock the adapters and tighten the retaining screws.

Retainer
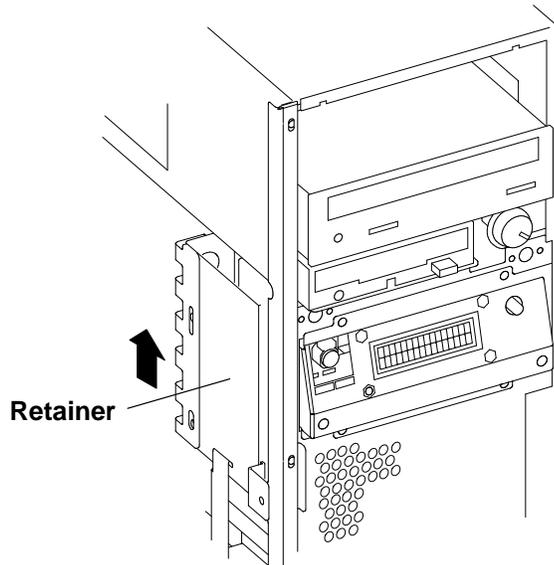
6. Connect any attached devices and internal cables to the adapter.

    Attention: Before re-starting the system, make sure of any free slot has been protected by inserting an appropriate dummy plate.

7. Place the system unit back to a vertical position.

8. Replace the rear cover following the procedure on page 4-8.

9. Replace the side cover following the procedures on page 4-6.

10. Replace the front cover following the procedures on page 4-3.

Rear Fan

Note: Before removing the rear fan, make a note of the air flow direction of the fan.

Removal

1. Remove the rear cover of the unit following the procedure described on page 4-8.

2. Put the system unit in a horizontal position.

Note: Be careful when laying the system unit in the horizontal position, the cables connected to it could be damaged.

3. Unplug the fan power connector located above the fan.

Fan Power Connector

Screws for Safety Grid
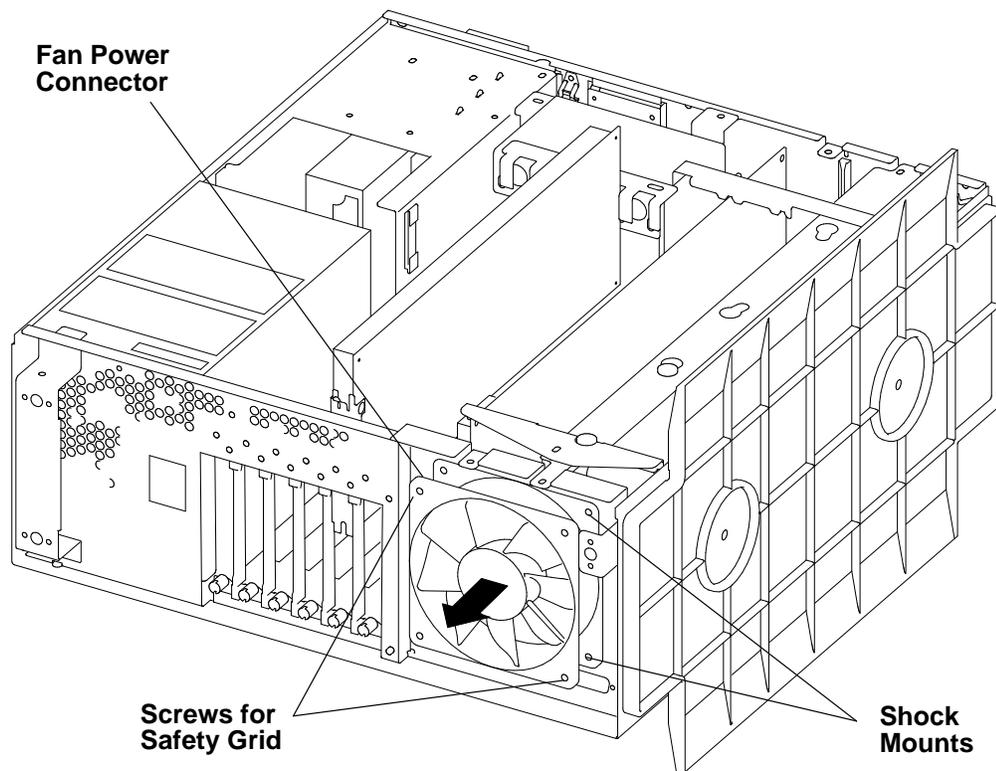
Shock Mounts

4. Firmly grip the fan accessing it from the rear of the unit. Then pull it out of the unit.

5. Pull the four shock mounts out of their mounting holes in the frame.

6. Remove the screws that hold the safety grid to the fan.

Replacement

1. Replace the safety grid to the fan.

2. Insert the shock mounts in the fan.

3. Place the fan in position to allow the shock mounts to protrude through their mounting holes in the system unit.

4. Pull the shock mounts, from inside the frame, into their installed position.

5. Plug in the fan power connector.

6. Replace the rear cover following the procedure on page 4-8.

Base Unit Front Fan

Notes: Before removing the front fan, record the following:

- The routing of all cables involved in the Replacement procedure of this fan.

- The air flow direction of the fan.

Removal

1. Remove the front cover using the procedure on page 4-3.

2. Remove the side cover using the procedure on page 4-6.

3. Put the system unit in horizontal position.

4. Disconnect all of the cables connected to the Micro Channel adapters.

5. Record which cable attaches to which adapter.

6. Disconnect the internal SCSI cable from the SCSI controller.

7. Remove all of the Micro Channel adapters in the unit using the procedure on page 4-14. (This step applies to base units only.)

8. Unplug the fan power connector.

9. Remove the CPU/memory cards retainer using the procedure on page 4-34. (This step applies to base units only.)

10. Remove the retaining screw used to anchor the fan support to the frame.

Retaining Screw
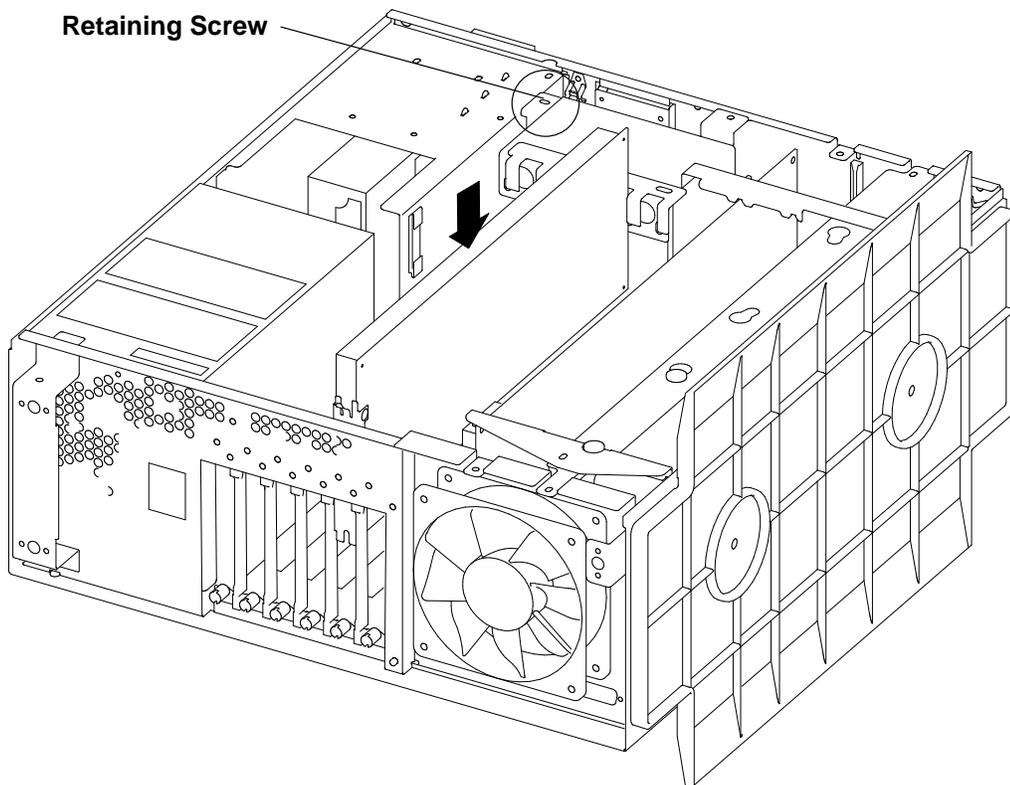
11. Lift the fan and bracket assembly from the system.

12. Remove the four rubber shock mounts from the fan mounting holes.

Shock Mounts

Shock Mounts
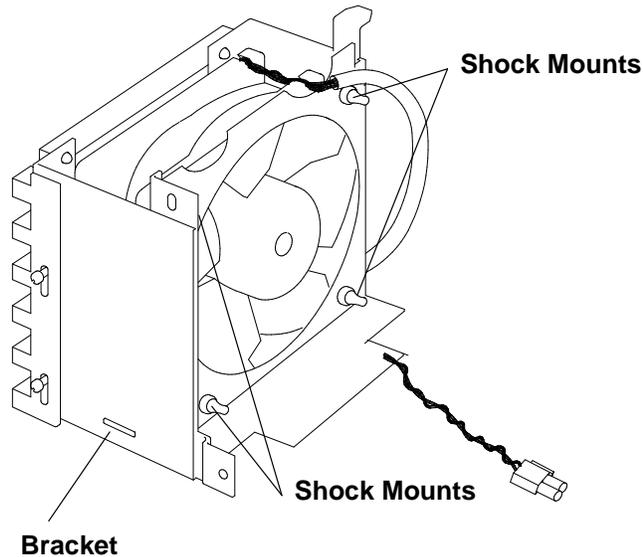
Bracket

13. Lift up and remove the fan module from the bracket.

Replacement

1. Replace the four rubber shock mounts in the fan mounting holes.

2. Place the fan back into position and pull the rubber shock mounts through the holes.

3. Replace fan and bracket assembly inside the system unit.

4. Replace the CPU/memory card retainer using the procedure on page 4-34.

5. Replace the retaining screw used to anchor the fan support to the frame.

6. Plug in the fan power connector.

7. Replace the Micro Channel adapters using the procedure on page 4-14.

8. Connect the internal SCSI cable to the SCSI controller.

9. Place the system unit back in a vertical position.

10. Connect the cables to the Micro Channel adapters.

11. Replace the side cover using the procedure on page 4-6.

12. Replace the front cover using the procedure on page 4-3.

Base Unit CPU/Memory Card Retainers

Note: There are two types of card retainers. One is used when only one CPU card is installed into the system; the other one must be used when two CPU cards are installed. Model G40 uses the card retainers for two CPU boards only.

Front Card Retainer for one CPU board (G30 only)

Front Card Retainer for two CPU boards (G30 and G40)

Note The Difference
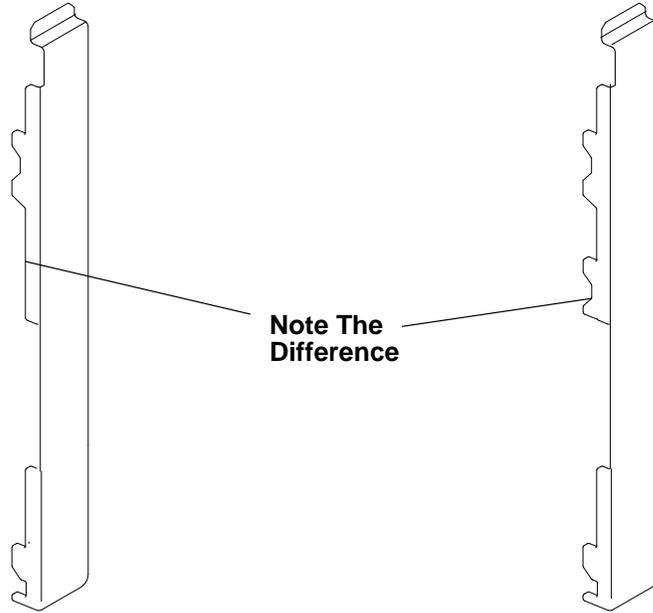
Rear Card Retainer for one CPU board (G30 only)

Rear Card Retainer for two CPU boards (G30 and G40)

Note The Difference
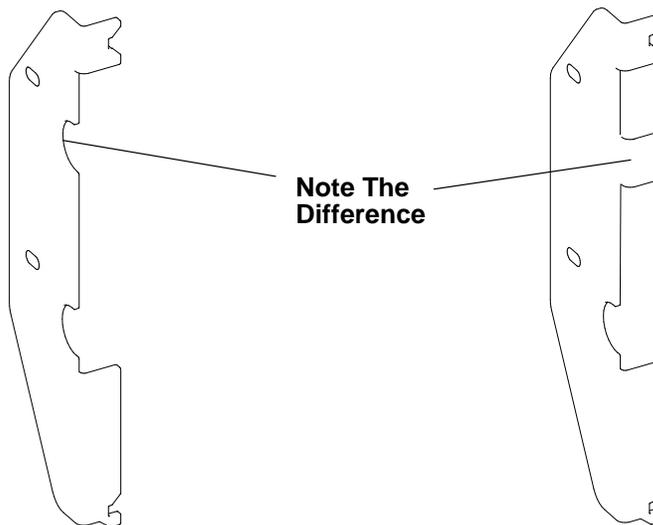
Removal

1. Remove the screws used to secure the CPU/memory cards retainers to the lower support tray for the hard disks (at the front and rear of the system).

Retainer Screw

Retainer Screw
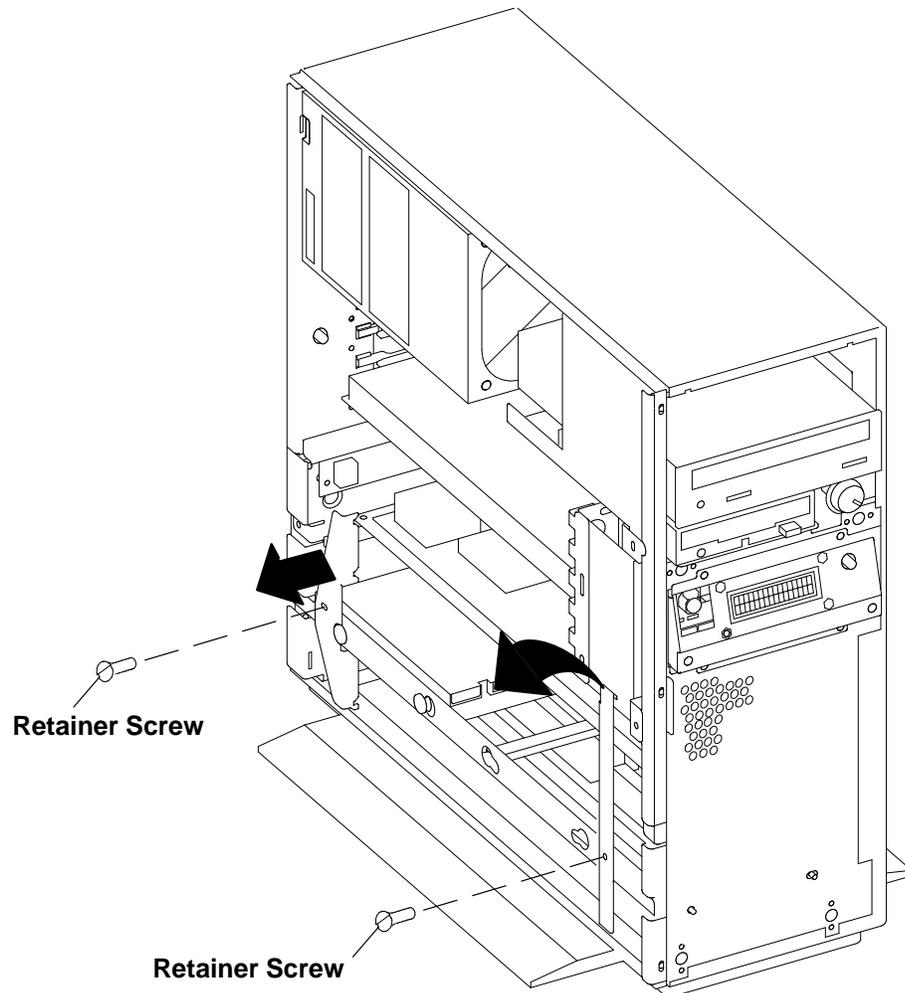
2. Slide the upper tongue of the CPU/memory cards retainer out of the slit located on the front fan support.

Replacement

Replace in reverse order.

Disk Drive

References to the small computer systems interface (SCSI) input/output controller is abbreviated as SCSI controller in this publication.

Note: Refer to "Handling Static-Sensitive Devices" on page 4-2.

Removal

1. Keep the system unit in vertical position.

2. Remove the front cover following the procedure on page 4-3.

3. Remove the side cover following the procedure on page 4-6.

4. Remove the CPU/Memory retainers using the procedure on page 4-22.

5. Remove the two retaining screws that mount the disk drive support tray to the system unit frame and remove the support tray.
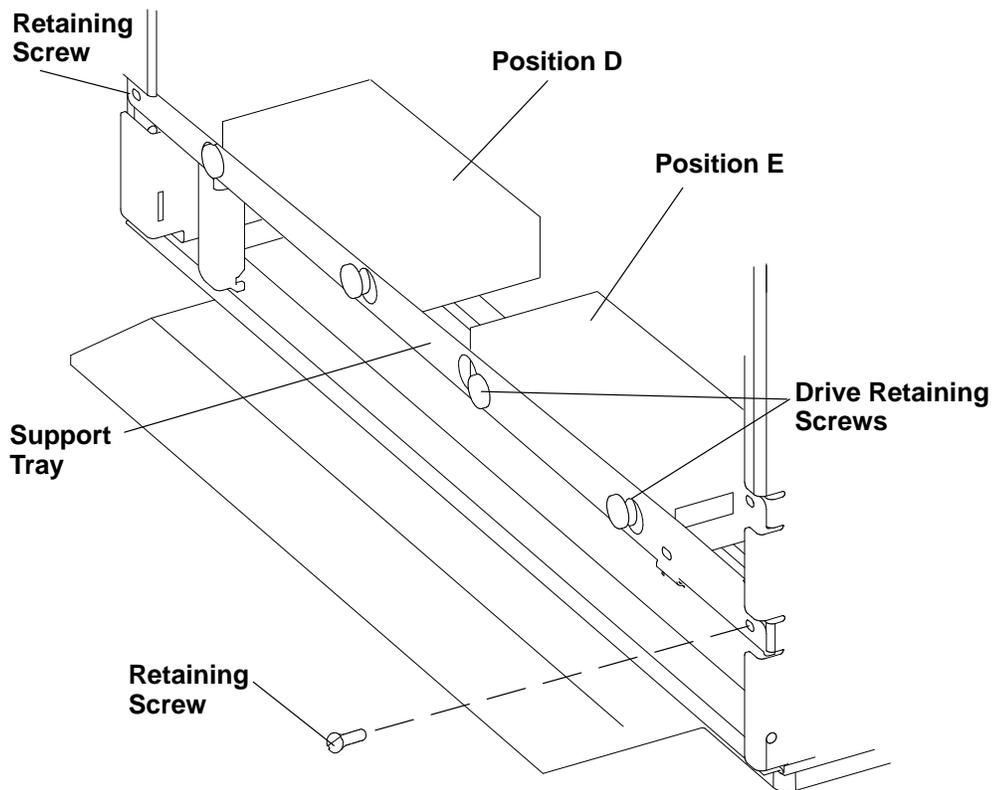
6. Disconnect the power supply connectors and the SCSI cable from the drives.

7. Disconnect the internal SCSI cable from the SCSI controller, if necessary.

8. Gently slide the support tray out of the system unit.

9. To remove the drives from the support tray, remove the four retaining screws holding the drives to the support tray.

Retaining Screws

Retaining Screws
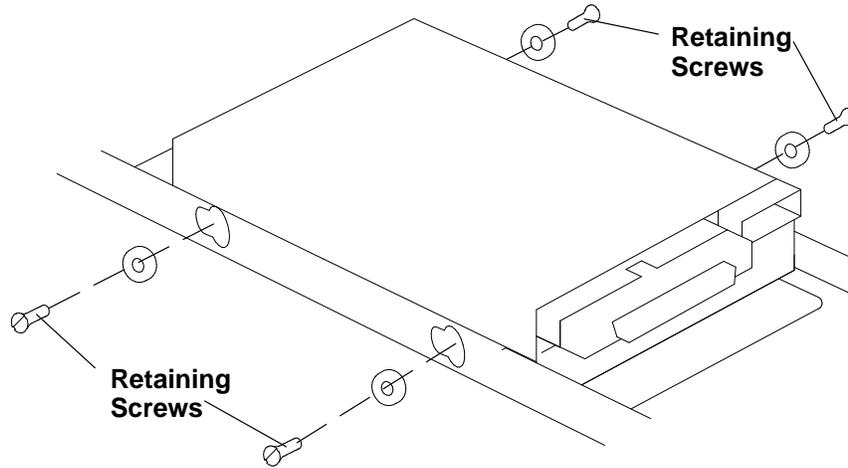
10. Lift the disk drive out of the support tray.

11. Record the settings of any jumpers and/or switches that are present on it.

12. If equipped with an adapter, remove the adapter from the disk drives SCSI cable connector.

Adapter
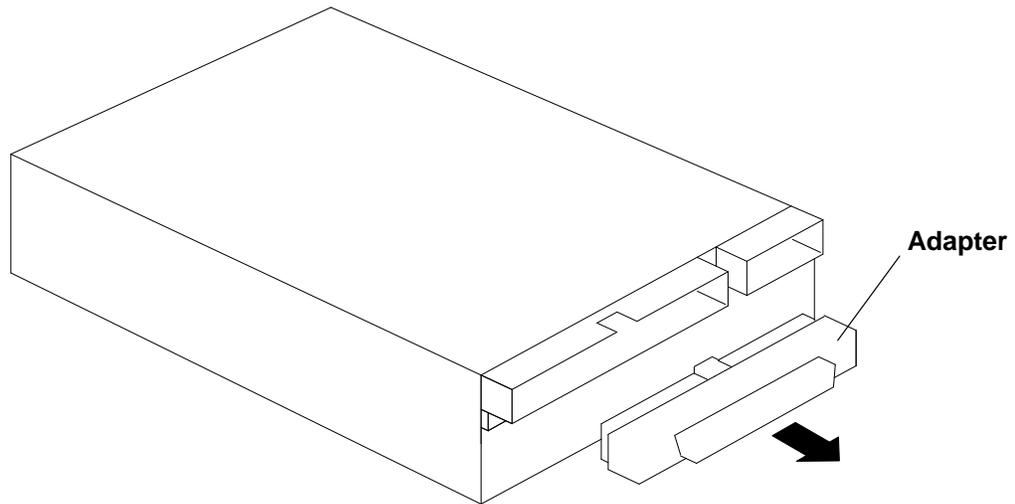
Replacement

Notes: It is important to remember the following facts when installing or replacing optional disk drives in positions F and G (G30, and G02 only):

- The third and fourth disk drives, positions F and G, must be installed on the upper support tray.
- The third disk drive, position F, must be installed on the left.
- The fourth disk drive, position G, must be installed on the right.
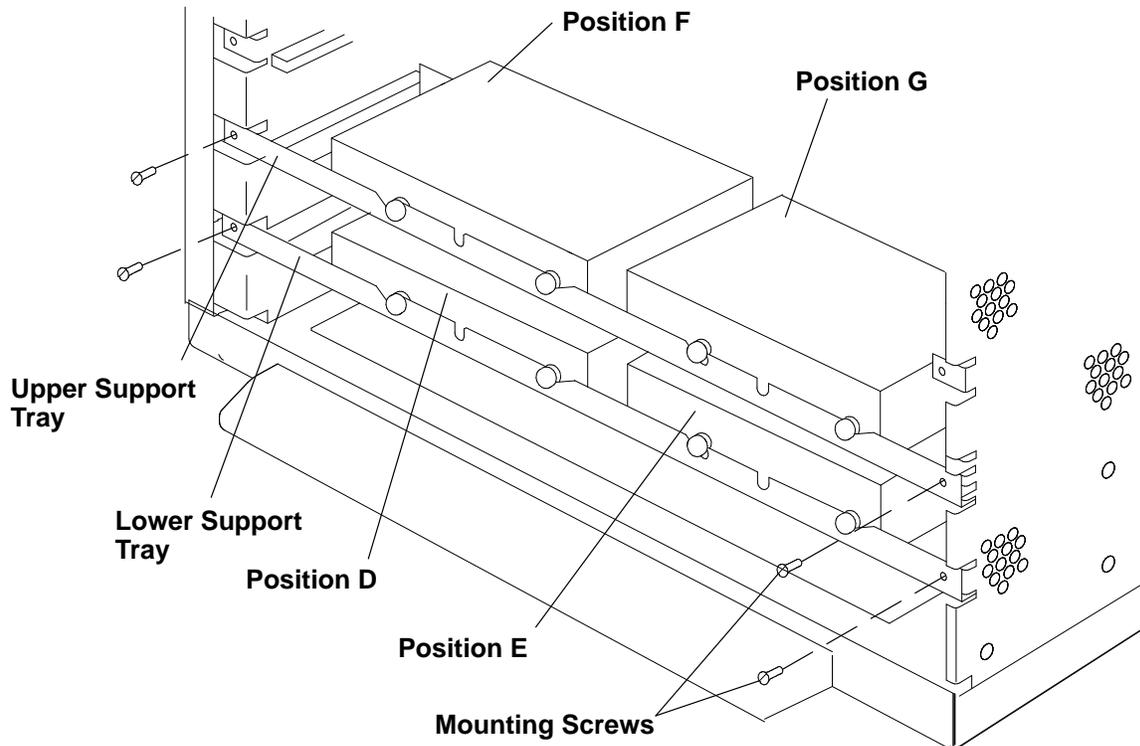
1. If required, replace the adapter on the SCSI cable connector on the disk drive that you are installing or replacing.
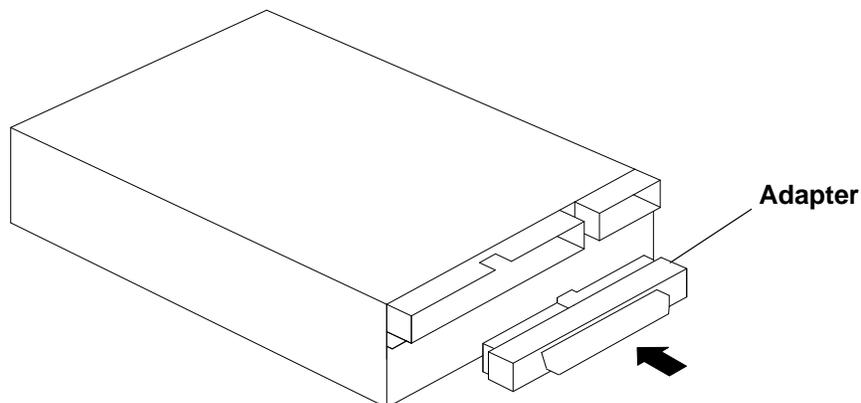
2. Set the address settings of the new disk drive the same as the settings of the old drive. For more information, refer to the *Diagnostic Information For Micro Channel Bus Systems*.

3. Install the required grommets in the grooves located on the support tray.

Grommets
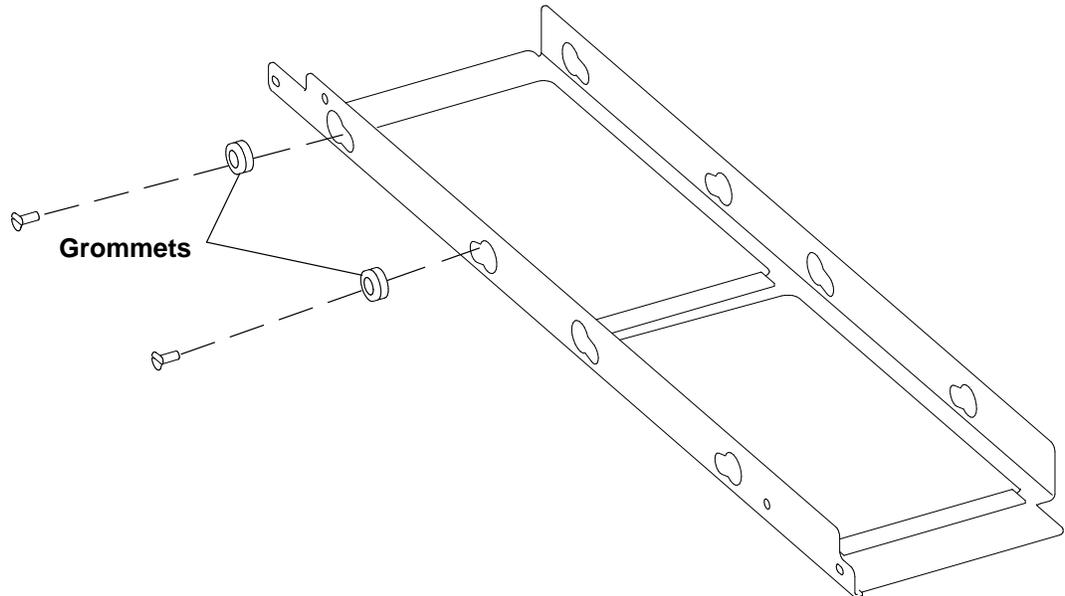
4. Lay the disk drive, that you are installing, on the support tray in the dedicated position. The power connectors of the disk must be kept on the right, that means the disk must be installed with the power connectors toward the front of the unit.

5. Replace the four retaining screws holding the drives to the support tray.

Retaining Screws

Retaining Screws
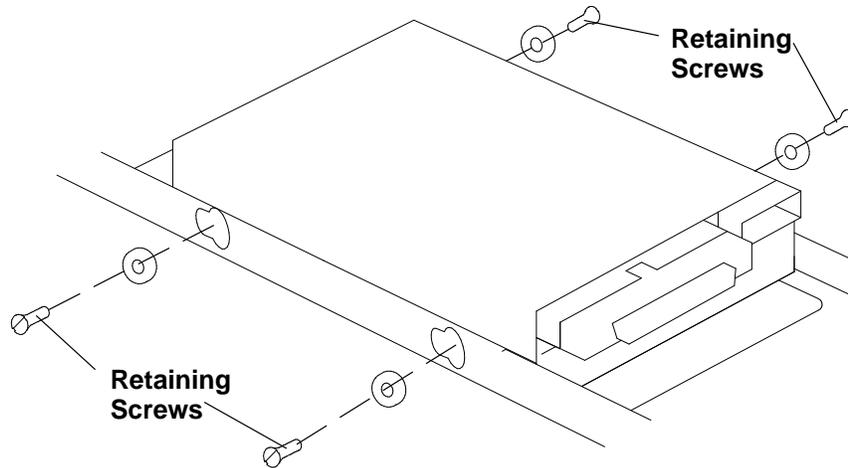
6. Align the support tray with its guides and slide it inside the system unit.

7. Connect the internal SCSI cable to the SCSI controller, if necessary.

8. Connect the power supply connectors and the signal cable to the drives.

9. Replace the retaining screws that anchor the disk drive support tray to the system unit frame.

Upper Support Tray

Lower Support Tray

Mounting Screws
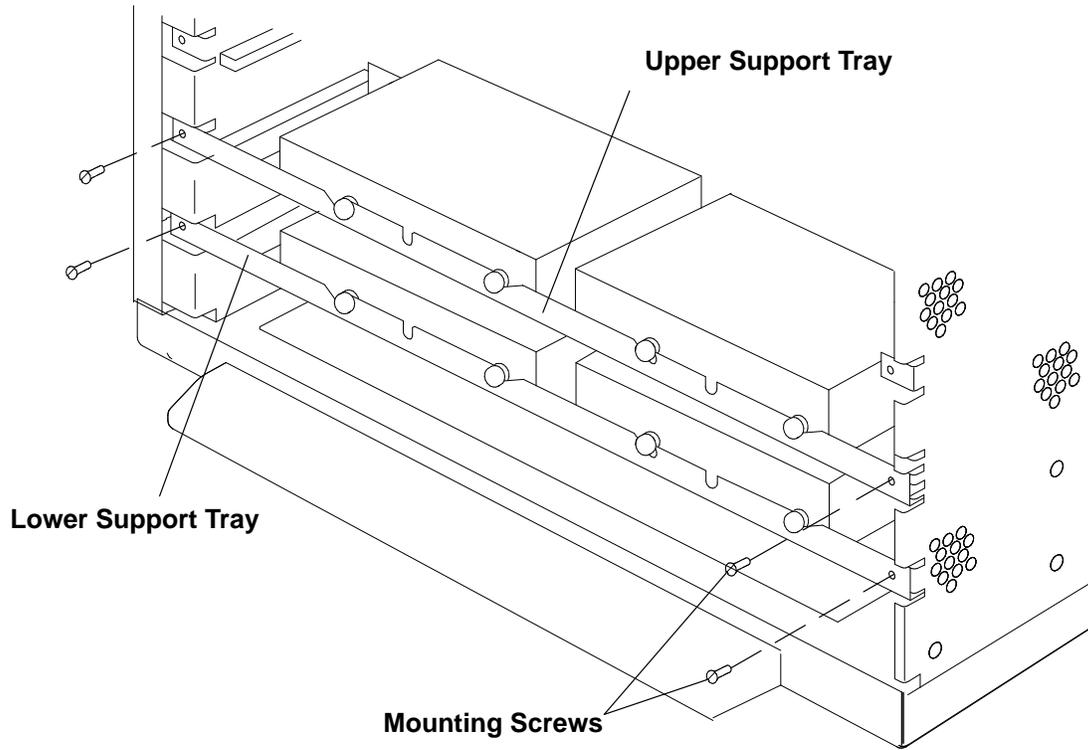
10. Replace the CPU/Memory board retainers.

11. Replace the side cover following the procedure on page 4-6.

12. Replace the front cover following the procedure on page 4-3.

Base Unit Diskette Drive

Removal

1. Remove the front cover following the procedure on page 4-3.

2. Remove the side cover following the procedure on page 4-6.

3. Remove the diskette drive retaining screws located in the left side of the system unit.

Retaining Screws
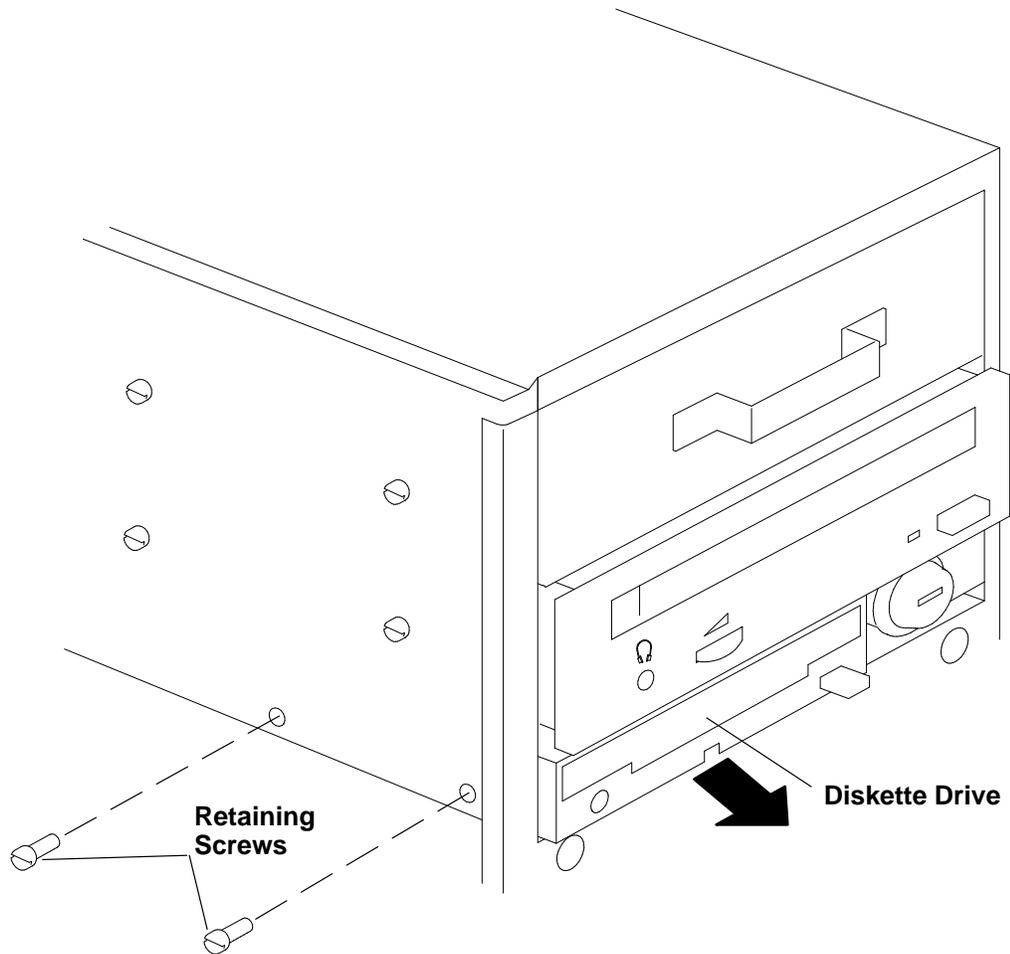
Diskette Drive

4. Gently slide the diskette drive out of the unit.

5. Disconnect the cables connected to the diskette drive.

Replacement

1. Connect the cables to the diskette drive.

2. Slide the diskette drive inside the unit.

3. Replace the retaining screws and tighten.

4. Replace the side cover following the procedure on page 4-6.

5. Replace the front cover following the procedure on page 4-3 .

Media Devices

Notes:

1. For a translation of this notice, see *System Unit Safety Information*.

2. This caution only applies to the CD-ROM drive.

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.

Note: Before removing the device from the unit, make sure that it does not contain any removable media.

This procedure also applies to the 3.5-inch disk drives in the slots dedicated to the media devices in the expansion units.

Removal

1. Remove the front cover using the procedure on page 4-3.

2. Remove the side cover using the procedure on page 4-6.

3. Disconnect the power cable and the SCSI cable from the media device.

4. Remove the retaining screws, located on the left side of the system, from the device, then gently pull it out of the slot.

Retaining Screws

Media Device
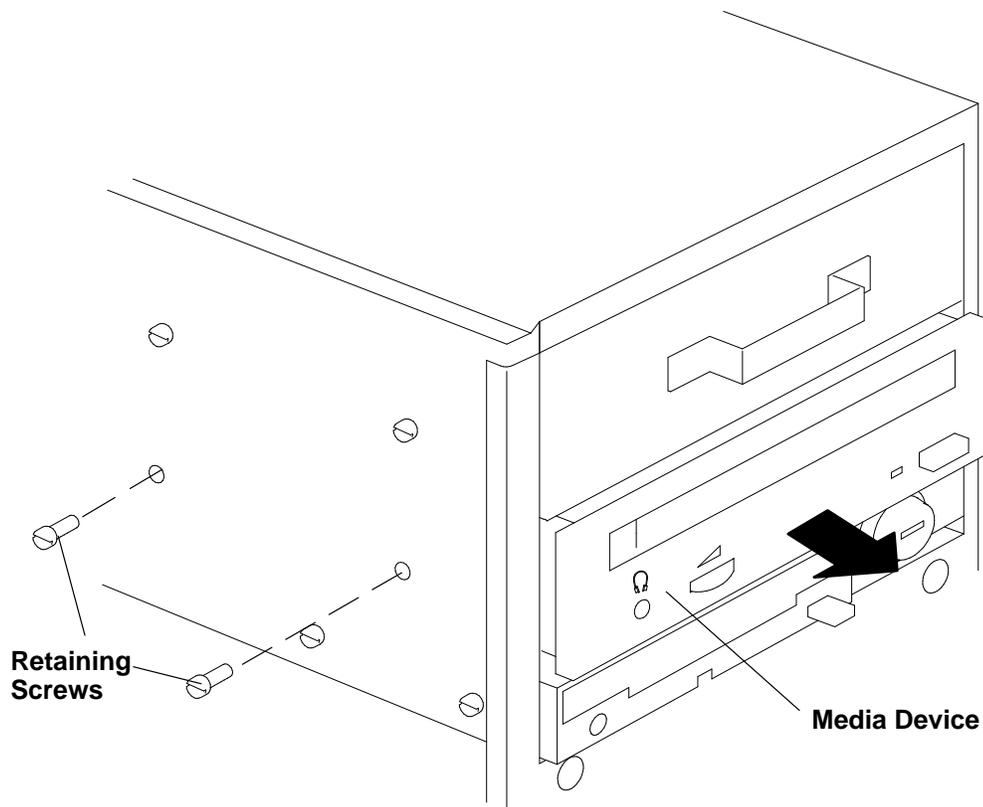
5. Record the settings of any jumpers and/or switches.

6. Remove the retaining screws for the guide from the device.

EMC Band

Guide
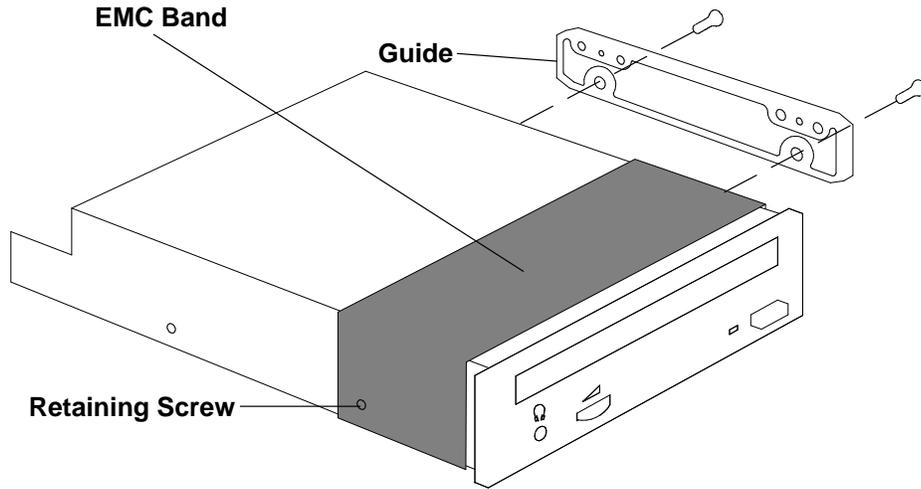
Retaining Screw

7. Remove the EMC band, if installed, from the device. (The EMC band will be installed on the new device using the same retaining screws as the guide.)

8. Remove the SCSI cable interposer from the SCSI connector of the device.

Replacement

1. If you do not replace the device just removed with any other device;

   a. Install the EMC blank in the area corresponding to the empty slot.
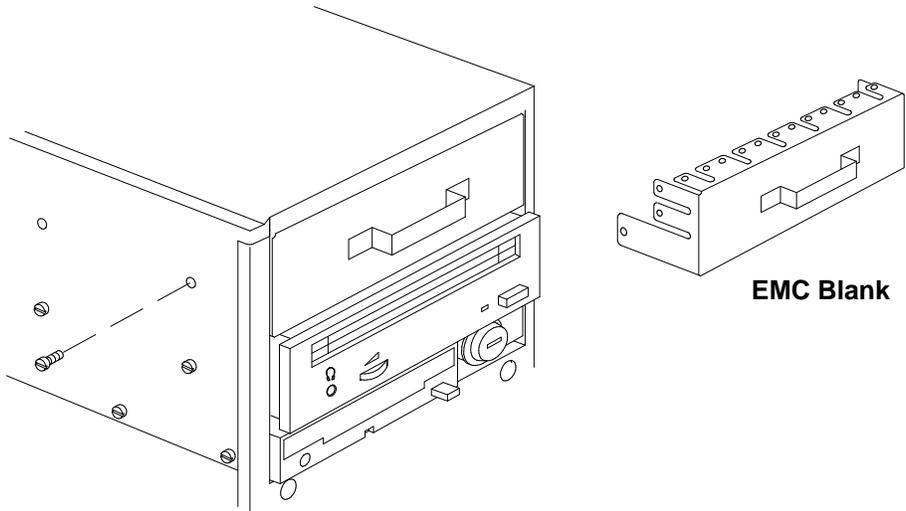
EMC Blank

   b. Install the plastic blank in the area corresponding to the empty slot. Access the front panel from its internal side and keeping the plastic blank front side facing forward, insert the left tongue of the blank in the dedicated slit on the panel. Secure the plastic blank to the panel tightening the retaining screw located on the right.
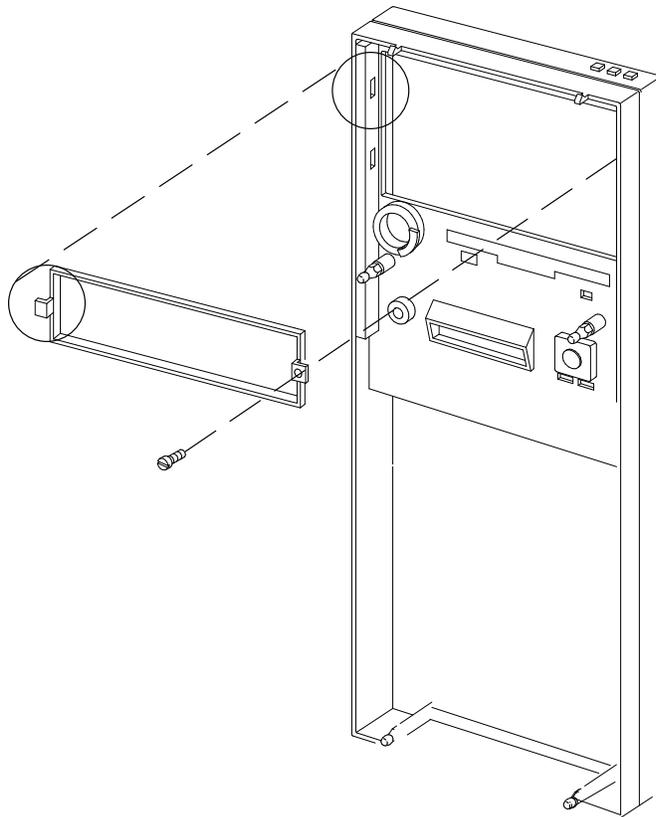
2. Replace the SCSI adapter in the SCSI connector of the device.

3. Install the EMC band on the device.

4. Install the plastic guide.

5. Adjust the setting of any jumper and/or switches to match the device you are replacing.

6. Gently push the device into the appropriate slot and secure it in place with the retaining screws.

7. Connect the power cable and the SCSI cable to the media device.

8. Replace the side cover using the procedure on page 4-6.

9. Replace the front cover using the procedure on page 4-3.

Base Unit CPU Card

Note: Refer to "Handling Static-Sensitive Devices" on page 4-2 before removing or installing the CPU card in this system.

Removal

1. Remove the front cover following the procedure on page 4-3.

2. Remove the side cover following the procedure on page 4-6.

3. Put the system unit in horizontal position with the right side down.

4. Disconnect the SCSI cable from the SCSI controller.

5. Remove the CPU/Memory card retainers using the procedure on page 4-22.

6. Make a note of the CPU card position.

7. Unplug the CPU card from the system planar. (There are card extractors which must be used to pull out the card. The extractors are located on the inside of the front cover. Insert the extractors in the holes placed at the edges of the card.)

Card Support Bracket

CPU Card Retainer

Card Extractor Tool

Card Extractor Tool

Note the use of the card extractor tools being inserted into the holes located on each end of the adapter.
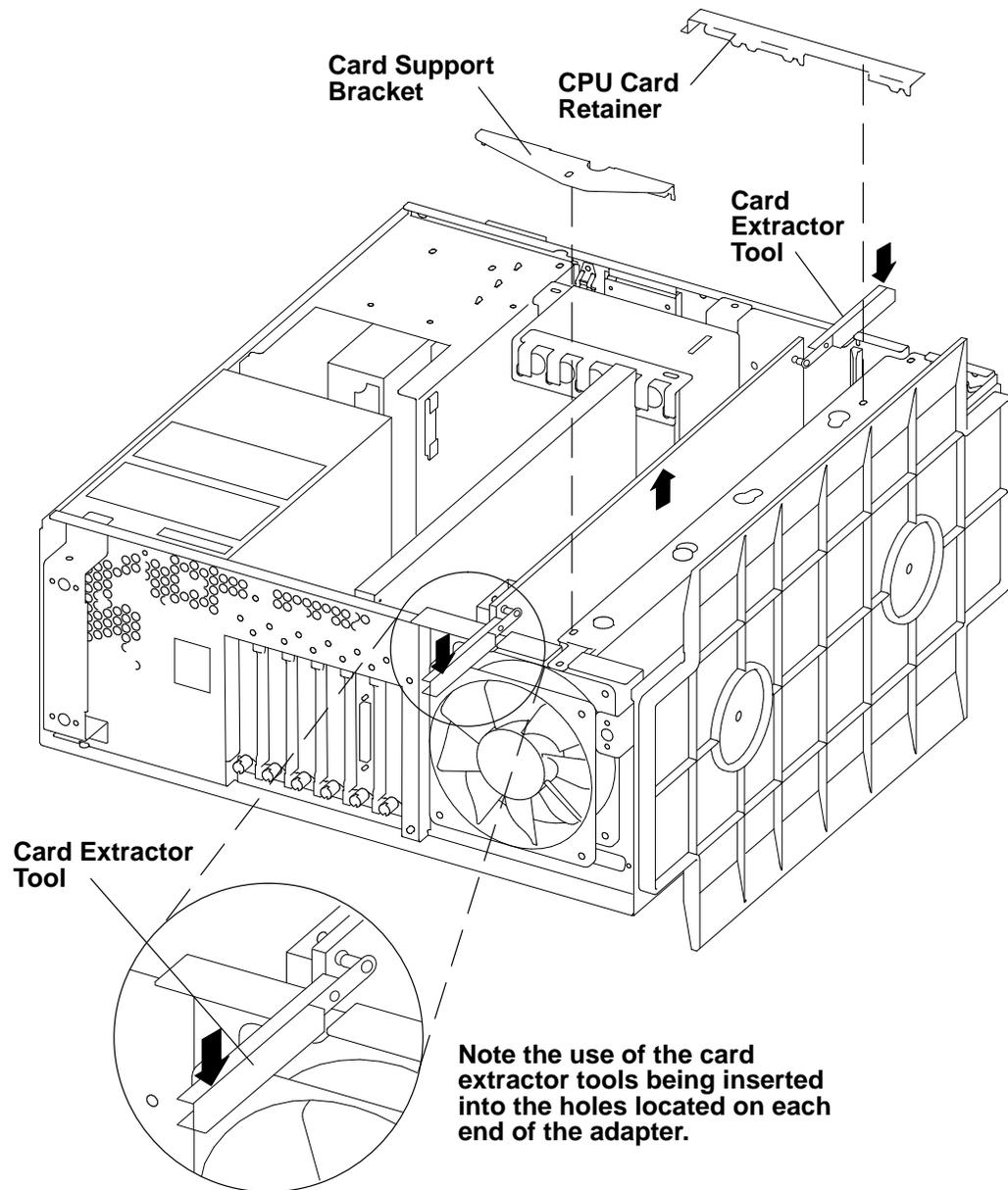
8. Slide the board out of the slot by pressing the extractors toward the system unit frame.

Replacement

1. Align the CPU card with the correct slot position and press the edges of the board to lock the connector to the system planar.

2. Replace the CPU/Memory card retainers using the procedure on page 4-22.

3. Connect the SCSI cable to the SCSI controller.

4. Put the system unit back to a vertical position.

5. Replace the side cover following the procedure on page 4-6.

6. Replace the front cover following the procedure on page 4-3.

Base Unit Memory Card

Note: Refer to "Handling Static-Sensitive Devices" on page 4-2 before removing or installing the CPU card in this system.

Removal

1. Remove the front cover following the procedure on page 4-3.

2. Remove the side cover following the procedure on page 4-6.

3. Put the system unit in a horizontal position.

4. Remove the CPU/Memory cards retainer using the procedure on page 4-22.

5. Unplug the memory card from the system planar. (There are card extractors which must be used to pull out the card. The extractors are located on the inside of the front cover. Insert the extractors in the holes placed at the edges of the card.)

Card Support Bracket

Card Extractor Tool

Card Extractor Tool

Note the use of the card extractor tools being inserted into the holes located on each end of the adapter.
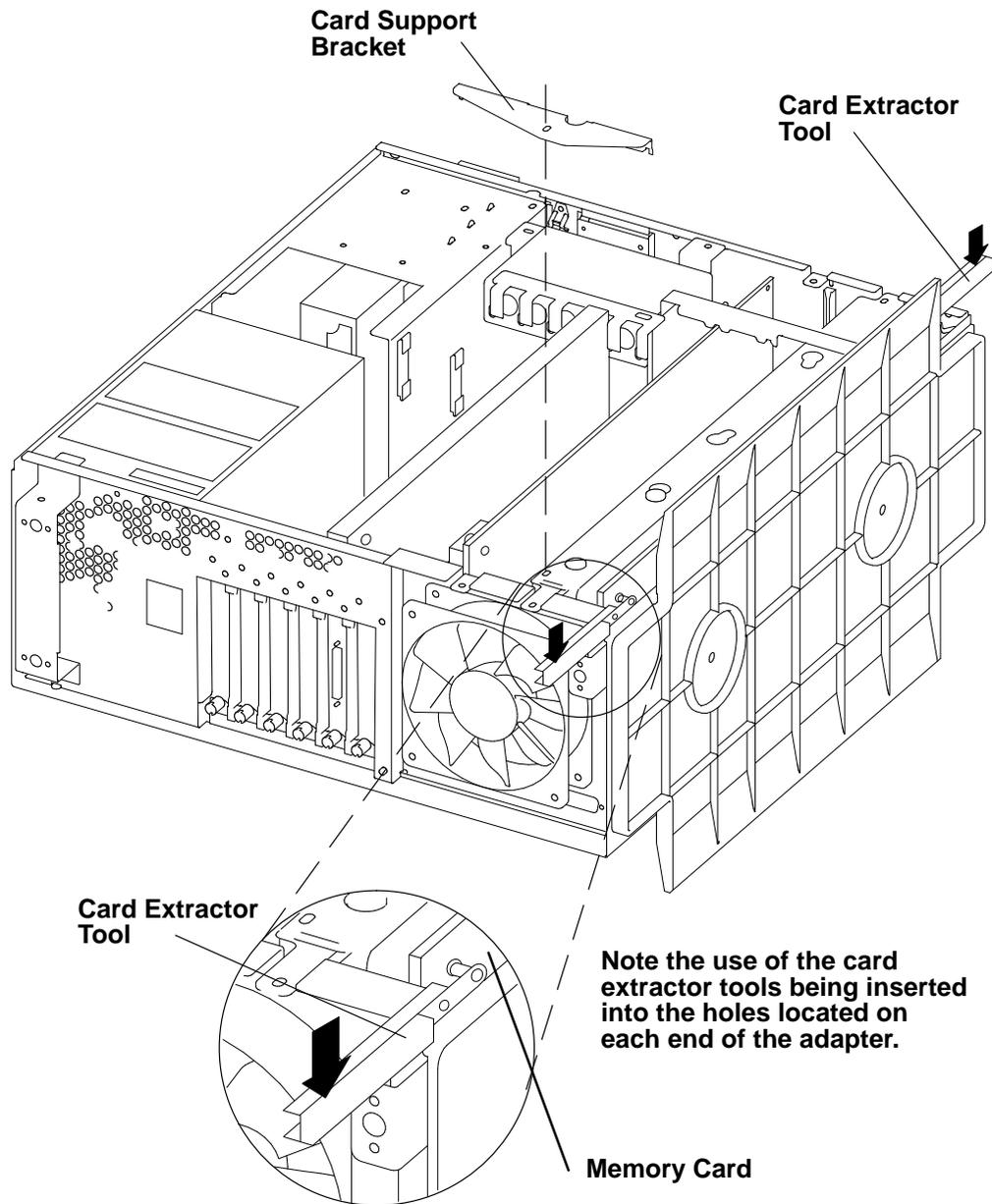
Memory Card

6. Slide the board out of the slot by pressing the extractors toward the system unit frame.

Replacement

1. Align the memory card into the slot.

2. Slide the memory card into place and press the edges of the card to lock the connector to the system planar.

3. Replace the CPU/Memory cards retainer following the procedure on page 4-22.

4. Replace the side cover following the procedure on page 4-6.

5. Replace the front cover following the procedure on page 4-3.

Memory Modules

Note: There are four types of memory cards; an MRE card, a two bank (8 slots) RLX card, a four bank (16 slots) NFX card, and an SF5 memory card.

Removal

1. Remove the front cover using the procedure on page 4-3.

2. Remove the side cover using the procedure on page 4-6.

3. Remove the memory card from the system unit using the procedure on page 4-36.

4. Press the white release lever to unseat the memory module.

5. Grip the edges of the memory module, and firmly pull it out of the memory card.

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

MRE Memory Card

Bank 0 **3**   **1** Bank 0
Bank 0 **4**   **2** Bank 0

Two Bank RLX Memory Card

Bank 1 **5**   **1** Bank 1
Bank 1 **.**   **.** Bank 1
Bank 0 **.**   **.** Bank 0
Bank 0 **8**   **4** Bank 0

Four Bank NFX Memory Card

Bank 2 **9**   **1** Bank 2
Bank 1   Bank 1
Bank 2 **.**   **.** Bank 2
Bank 1   Bank 1
Bank 3 **.**   **.** Bank 3
Bank 0   Bank 0
Bank 3 **16**   **8** Bank 3
Bank 0   Bank 0

SF5 Memory Card

Bank 2 **9**   **1** Bank 2
Bank 1   Bank 1
Bank 2 **.**   **.** Bank 2
Bank 1   Bank 1
Bank 3 **.**   **.** Bank 3
Bank 0   Bank 0
Bank 3 **16**   **8** Bank 3
Bank 0   Bank 0

Replacement

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

White Release Lever
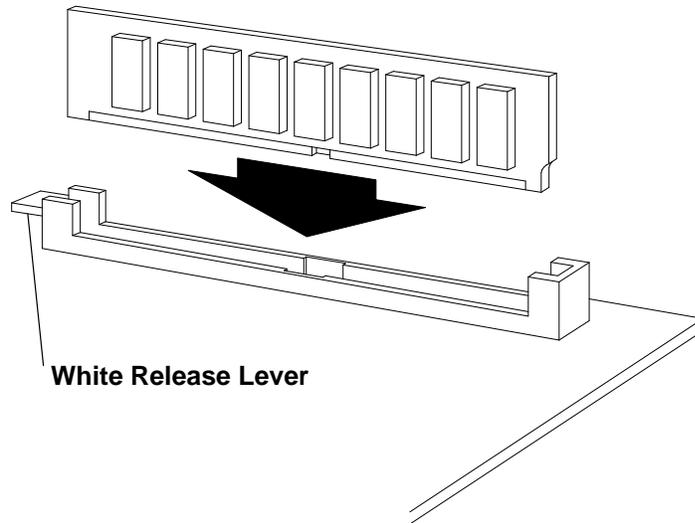
2. In reverse order, do the steps listed in "Removal" on page 4-38.

RS-485 Card

Note: Before attempting to handle the RS-485 card, read "Handling Static Sensitive Devices*"*, on page 4-1.

Removal

1. Remove the front cover using the procedure on page4-3.

2. Remove the side cover using the procedure on page 4-6.

3. Remove the rear cover using the procedure on page 4-8.

4. Unplug any external Micro Channel cable and the external fan power connector.

5. Put the system unit in a horizontal position.

6. Unscrew the three RS-485 card back connector retaining screws on the back of the system.

7. Unplug any external and internal RS-485 card connector.

8. Unscrew the RS-485 card retaining screw on the inside of the system and slide the card out of the unit by gripping its edges. It is strongly recommended that you do not touch the board components. Handle the card gripping it by its edges.

RS-485 Card
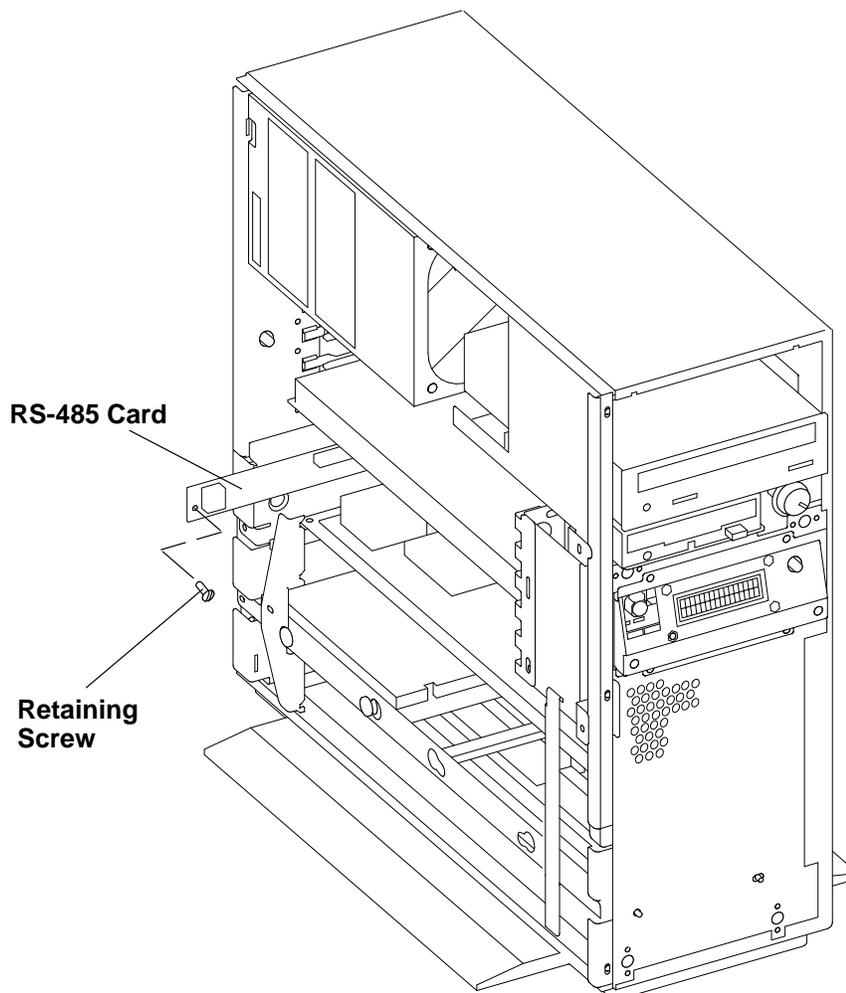
Retaining Screw

Replacement

1. Position the RS-485 card and slide it into the system unit.

2. Secure the card, tightening the retaining screw.

3. Replace the three RS-485 card back connector retaining screws.

4. Connect any external and internal RS-485 card connections.

5. Put the system unit back to a vertical position.

6. Plug in any external Micro Channel cable and the external fan power connector.

7. Replace the rear cover using the procedure on page 4-8.

8. Replace the side cover using the procedure on page 4-6.

9. Replace the front cover using the procedure on page 4-3.

Base Unit Battery

Note: For a translation of this safety notice, refer to the *System Unit Safety Information*, Order Number SA23-2652.

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 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.

Removal

1. Remove the front cover using the procedure on page 4-3.

2. Remove the operator panel using the procedure on page 4-11.

3. Disconnect the power cable of the battery from the system planar connector.

4. Remove the battery, pulling it off the loop and hook strip attached to the chassis below the operator panel.

Battery Power Cable Connector (mounted on the system planar)

Battery (loop and hook mounted)

Operator Panel
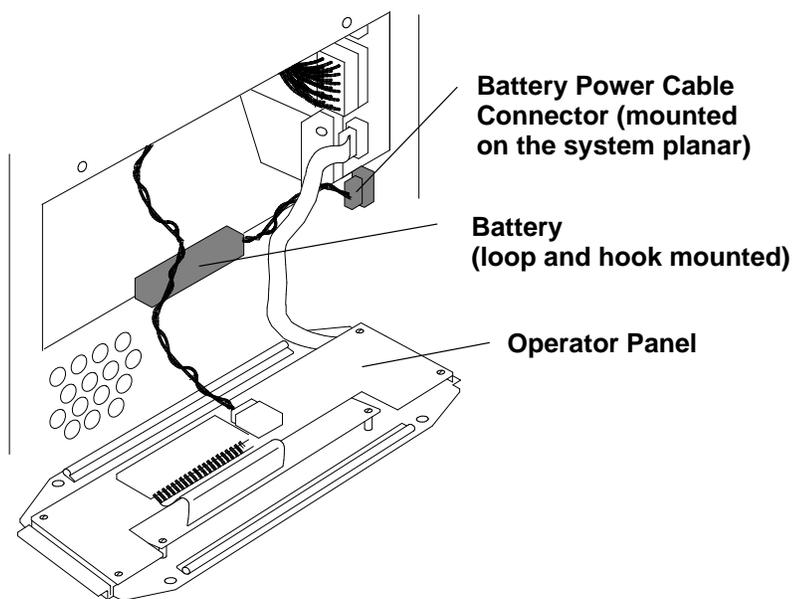
Replacement

1. Attach a piece of loop and hook strip to the new battery. (The loop and hook strip is furnished with the battery.)

2. Position the new battery in the same position as the previous one.

3. Connect the battery cable to the connector on the system planar.

4. Replace the operator panel using the procedure on page 4-11.

5. Replace the front cover using the procedure on page 4-3.

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 2-16 for instructions to Set Unit Number for any attached expansion unit. If the unit number is not set, the system will not boot.

Power Supply

Note: For a translation of this safety notice, refer to the *System Unit Safety Information*, Order Number SA23-2652.

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. Remove the front cover using the procedure on page 4-3.
2. Remove the side cover using the procedure on page 4-6.
3. Remove the rear cover using the procedure on page 4-8.
4. Place the system unit in a horizontal position.
5. Disconnect any cable connected to the Micro Channel adapters. Record which cable attaches to which adapter.
6. Disconnect the SCSI cable from both the SCSI controller and the devices located in the front of the system unit.
7. Remove any Micro Channel adapter installed in the system unit using the procedure on page 4-14.
8. Remove the CPU and memory card retainers using the procedure on page 4-22.
9. Remove the front fan using the procedure on page 4-20.
10. Unplug any power connector from any components in the system unit and from the system planar.
11. Remove the retaining screw used to anchor the power supply to the unit (This screw is located in the rear.)
12. Loosen the captive screw located at the front right side of the power supply. Then slightly incline the power supply until you are able to remove it from the unit.
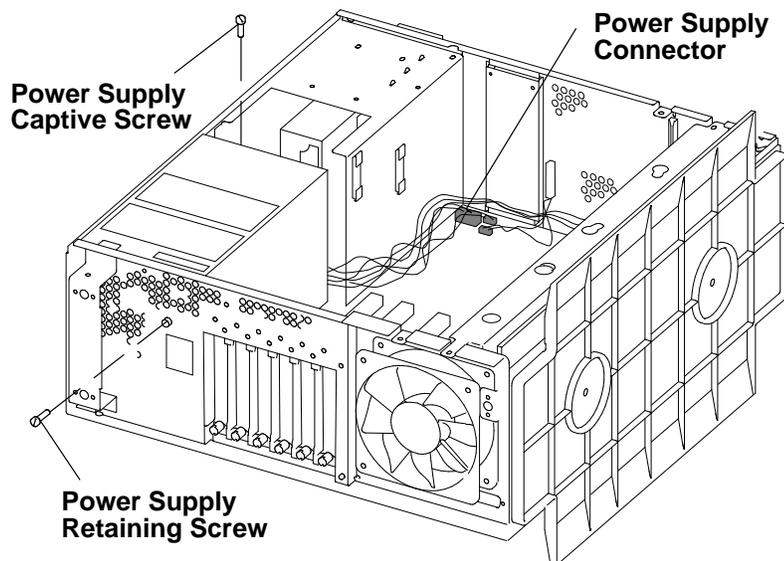
Replacement

1. Position the power supply in the system unit. (The side with the power cables for the designated components in the unit must be kept toward the front of the system unit.)

2. Replace the retaining screw used to anchor the tongue located at the back of the power supply to the unit.

3. Tighten the retaining screw located at the front right side of the power supply.

4. Tighten the retaining screw located in the rear of the system unit.

5. Plug in any power connector in the system unit.

6. Plug the power supply power connectors to the system planar.

7. Replace the front fan using the procedure on page 4-20.

8. Replace the CPU and memory card retainers using the procedure on page 4-22.

9. Replace any Micro Channel adapter using the procedure on page 4-14.

10. Connect the SCSI cable to the SCSI controller and the devices located in the front of the system unit.

11. Connect any cable connected to the Micro Channel adapters.

12. Place the system unit back in a vertical position.

13. Replace the rear cover using the procedure on page 4-8.

14. Replace the side cover using the procedure on page 4-6.

15. Replace the front cover using the procedure on page 4-3.

Base Unit System Planar

The system planar and operator panel EEPROMs contain the SYSID of the system. When one of the two components is to be replaced (for example the system planar), the SYSID information will be copied from operator panel EEPROM into the system planar EEPROM when you at 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 operator panel and start up the system: the SYSID information will be copied from system planar EEPROM to the operator panel EEPROM.

2. Substitute the system planar and start up the system: the SYSID information will be copied from operator panel EEPROM to the system planar EEPROM.

Removal

Note: Removal and replacement procedure of the system planar requires that most system components are removed. All the procedures are illustrated earlier in this chapter. Remove all the system items in the following order; then reinstall them in reverse order.

1. Remove the front cover, the side cover, and the rear cover of the unit following the procedures described in "Front Cover" on page 4-3, "Side Cover" on page 4-6, and "Rear Cover" on page 4-8.

2. Disconnect any cable connected to the Micro Channel adapters installed in the base unit. Record which cable attaches to which adapter.

3. Put the system unit in horizontal position.

4. Remove any Micro Channel adapter installed in the unit using the procedure on page 4-14.

5. Remove the cards retainers using the procedure on page 4-22.

6. Disconnect both the SCSI cable and the power cable from each disk drive installed in the unit.

7. Remove the disk drive support tray(s), using the procedure on page 4-24.

8. Remove the CPU card(s) using the procedure on page 4-34.

9. Remove the memory card using the procedure on page 4-36.

10. Remove the front fan using the procedure on page 4-20.

11. Remove the battery using the procedure on page 4-42.

12. Note the location and disconnect any cable connected to the system planar.

13. Remove the retaining screws used to secure the planar to the unit.

14. Remove the standoff screws used to secure the planar serial/parallel connectors to the rear of the unit.
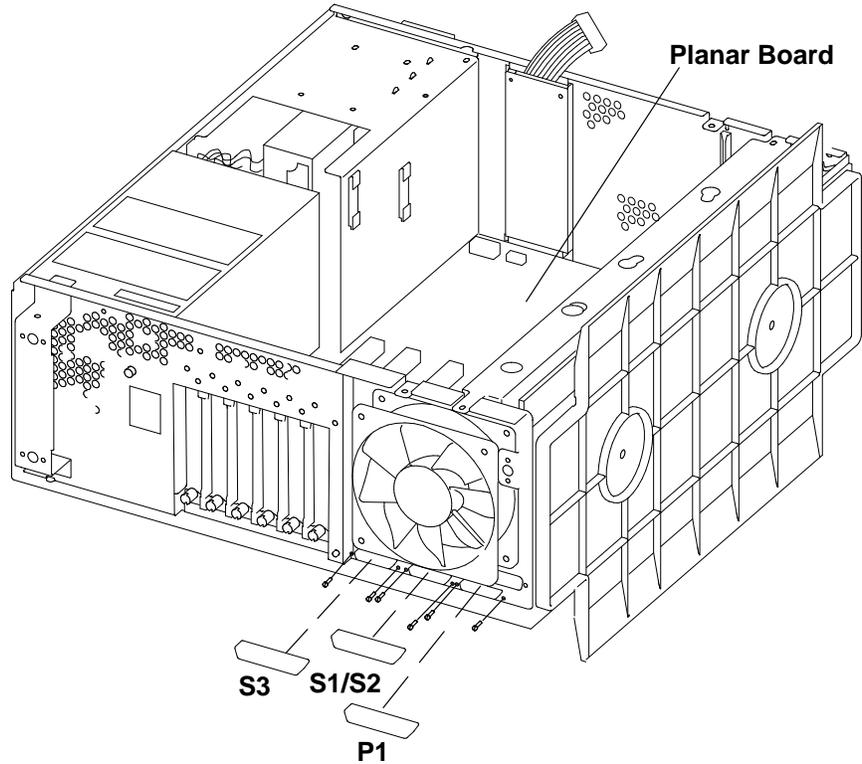
15. Gently lift the system planar right side (the side towards the front of the system) **(A)**.

16. Once the planar is lifted, take both edges with your hands, and pull it again toward the front of the unit, until the serial/parallel connectors are removed from their holes **(B)**.

17. Remove the planar from the unit sliding it upwards (**C**).

   Do not touch the components on the board. Handle the board holding it by its edges.

18. Carefully remove the EMC gasket from around the serial and parallel connectors.
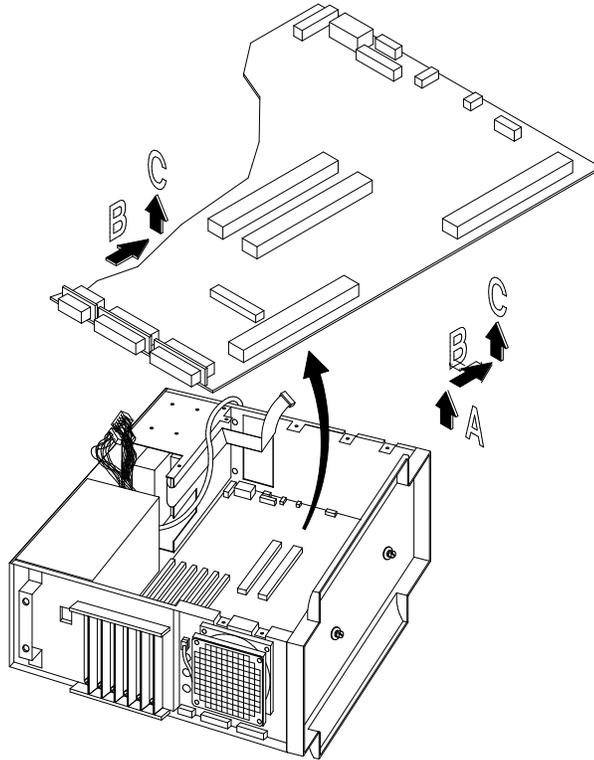
Replacement

Note: Before installing the new planar in the system unit, test the memory card by placing it in position on the memory connectors of the system board (do not plug the memory board completely at this time). If you find that guide pins on the memory connectors of the system board interfere with the memory card connectors, remove the pins, nuts and washers from the system board. Give the removed parts to the customer to save for any future upgrades.

1. Position the system planar in the unit. The connector side must be kept towards the internal side of the unit. Ensure that you place the EMC gasket correctly around the serial and parallel connectors and then insert it into the designated holes in the rear of the unit.

2. Ensure that the planar locating pins properly engage the locating holes (one to the front and one to the back).

3. Secure the system planar to the unit tightening its retaining screws.

4. Secure the standoff screws used to fix the planar serial/parallel connectors to the rear of the unit.

5. Connect any cables to the designated connectors on the system planar.

6. Replace all parts removed earlier in this procedure in reverse sequence.

7. Replace the rear cover, the side cover, and the front cover of the unit following the procedures described in "Rear Cover" on page 4-8, "Side Cover" on page 4-6, and "Front Cover" on page 4-3.

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 2-16 for instructions to Set Unit Number for any attached expansion unit. If the unit number is not set, the system will not boot.

Key Lock

Removal

1. Remove the front cover, the side cover, and the rear cover of the unit following the procedures described in "Front Cover" on page 4-3, "Side Cover" on page 4-6, and "Rear Cover" on page 4-8.

2. Disconnect any cable connected to the Micro Channel (MCA) adapters installed in the system unit. Record which cable attaches to which adapter.

3. Put the system unit in horizontal position.

4. Remove any MCA adapter installed using the procedure on page 4-14.

5. Remove the card retainers using the procedure on page 4-22.

6. Disconnect both the SCSI cable and the power cable from each disk drive installed in the system unit.

7. Remove the disk trays using the procedure on pages 4-24.

8. Remove the CPU boards using the procedure on page 4-34.

9. Remove the memory card using the procedure on page 4-36.

10. Remove the front fan using the procedure on page 4-20.

11. Remove the system planar (ELM) using the procedure on page 4-46.

12. Remove the operator panel using the procedure on page 4-11.

13. Unscrew the retaining screw used to secure the key lock to the unit. The screw is positioned under the key lock.

14. Remove the key lock, by pulling it out from the front side of the unit.
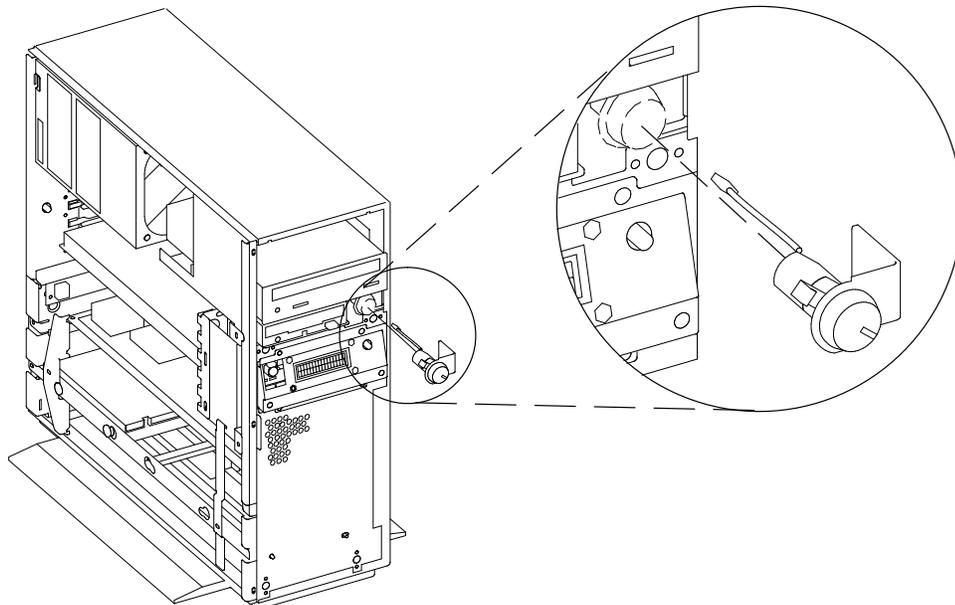
Replacement

1. Replace in reverse sequence.

Expansion Unit ECB Card

Note: Before attempting to handle the ECB card, please read the "How to Use the Antistatic Envelope" section at the beginning of this chapter.

Removal

1. Remove the front cover, the side cover, and the rear cover of the unit following the procedures described in "Front Cover" on page 4-3 and "Side Cover" on page 4-6.

2. Unplug any cable connectors from the ECB card.

3. Loosen the two ECB card retaining screws, using a screwdriver, then hold the ECB card by its edges and pull it out of the disk expansion unit.
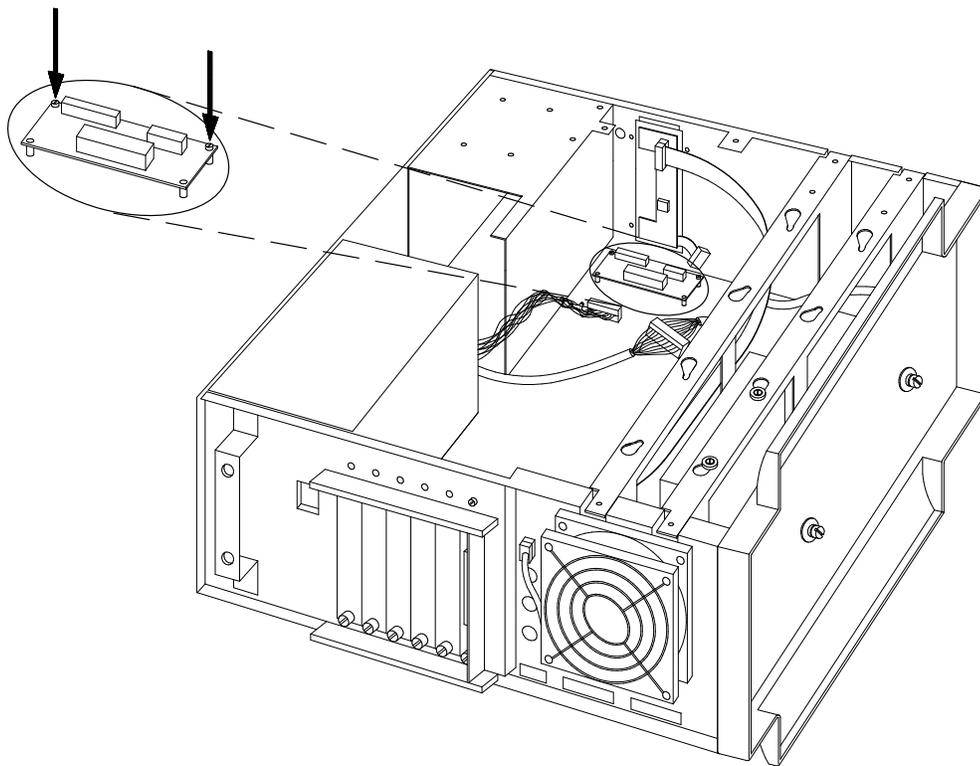
Installation

1. Position the ECB card into the appropriate disk expansion unit.

2. Secure the card by tightening its retaining screws.

3. Connect any cables to the ECB card connectors.

4. Replace the the side cover and the front cover of the unit following the procedures described in "Side Cover" on page 4-6 and "Front Cover" on page 4-3.

Expansion Unit SCSI Cable

Removal

Note: Before removing the SCSI cable from the expansion unit, note how it is routed.

1. Remove the front cover, the side cover, and the rear cover of the unit following the procedures described in "Front Cover" on page 4-3, "Side Cover" on page 4-6, and "Rear Cover" on page 4-8.

2. Loosen the two screws shown in the figure to unlock the SCSI connector from the unit.

3. Disconnect the SCSI cable connectors from any hard disks, from any media device, and from the ECB card.

4. Remove the bracket which holds the SCSI cable to the unit structure.

5. Remove the SCSI cable from the unit.
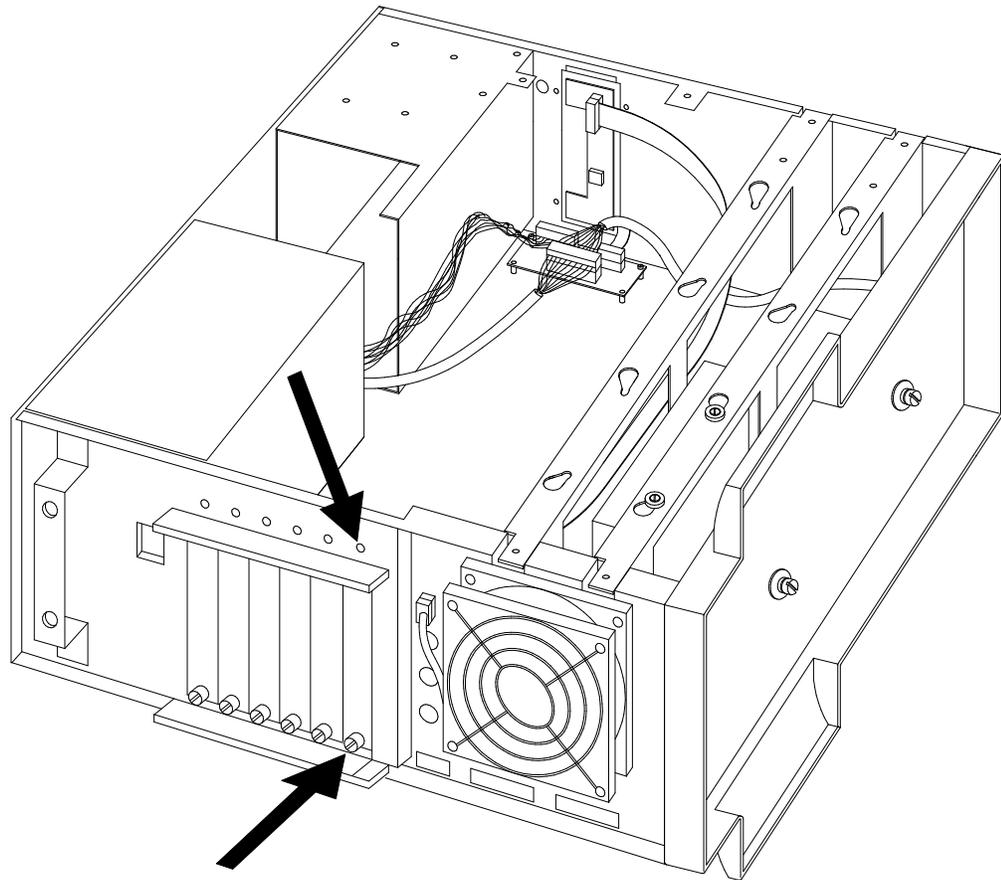
Installation

1. Position the SCSI cable in the unit, making it follow the correct routing. Then connect any SCSI cable connector to the designated disk drives and/or media devices in the unit, and to the ECB card. See the following SCSI Cable Routing scheme.

SCSI Cable Routing
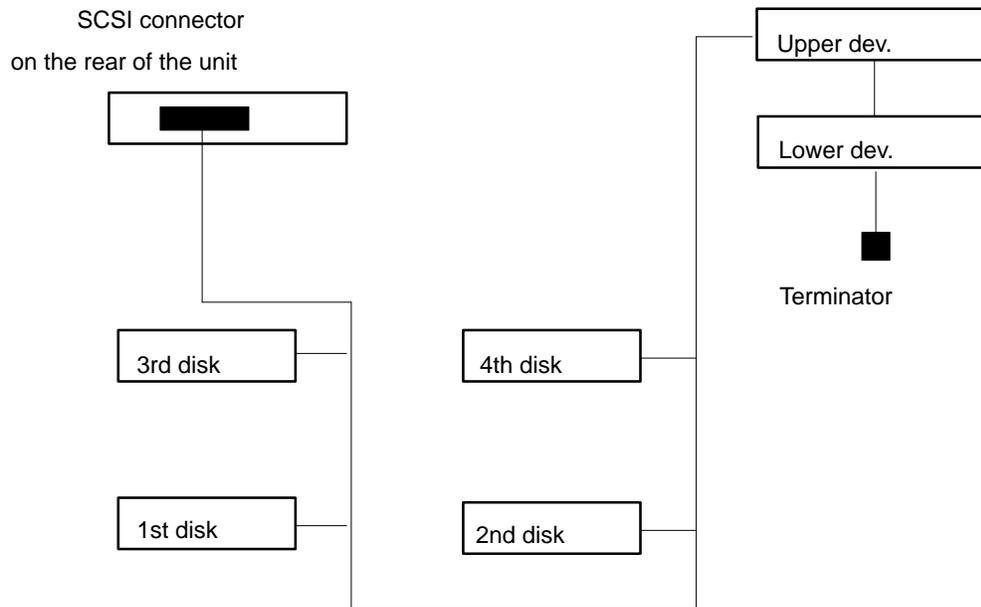
2. Secure the SCSI cable in the unit frame using the appropriate bracket and screws.

3. Secure the SCSI connector to the appropriate slot in the rear of the unit, tightening its two retaining screws.

4. Replace the rear cover, the side cover, and the front cover of the unit following the procedures described in "Rear Cover" on page 4-8, "Side Cover" on page 4-6, and "Front Cover" on page 4-3.

Chapter 5. System Installation

Step 1. Inventory

Documentation

☐ The *About Your Machine* document
(In the plastic bag on the outside of the box)

☐ Hardware Setup Publications
7012 G Series Setup Procedure
7012 G Series Expansion Unit Setup Procedure

☐ Operator Publications
7012 G Series Operator Guide

☐ Service Publications
7012 G Series Service Guide

Miscellaneous Hardware and Diskettes

☐ Diagnostic removable media   ☐ Microcode diskettes
(quantity shipped may vary)

☐ Cable labeling kit   ☐ Wrap plugs and container
(quantity shipped may vary)

☐ System unit keys   ☐ System unit power cable

Optional Items (Check off if present)

☐

Step 2. Observe this Safety Notice during Installation

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

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 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.

DANGER

To prevent shock hazard, disconnect the power cable from the electrical outlet before relocating the system.

Step 3. 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 substep 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.

Step 4. Setting Up the System Unit

1. Be sure the power cable on the system unit is unplugged and the power switch is set to the Off position.

2. Remove the packing material from all of the media devices installed in the front panel.

3. Remove the rear cover and top cover.

4. Look at the memory cards, adapters, and internally installed drives to be sure they are not loose and are in their proper positions.

5. Ensure that the cards are completely seated in the connectors by pushing down on each card.

6. Fill out the "SCSI Device Address Record" in Appendix A of this book.

7. Ensure that the SCSI terminator is installed.

8. Install the top cover.

Step 5. Set Up Each Device Being Attached

Note: During the setup of each device, connect only the device end of the signal cable. Do *not* connect the device signal cables to the system unit now.

Do the setup instructions provided in the documentation with each device being attached to this system unit; then return to step 6 of these instructions.

Step 6. Connecting Devices to Standard I/O Ports

Using the customer planning information, or other information supplied by the customer, connect the cables to the standard I/O ports. Start at the left connector and move to the right to make cabling easier.

As needed, use the cable labels included in the ship group to label the cables.
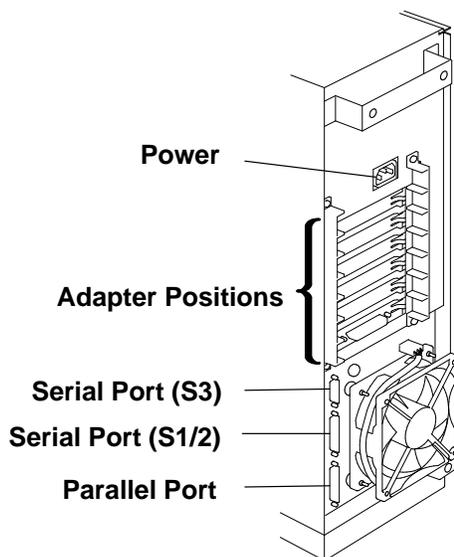
Step 7. Connecting Devices to the Adapters

Refer to the "About Your Machine" document to determine which adapters are installed.

1. Using the customer planning information, or other information supplied by the customer, connect the cables to the adapter connectors.

2. Record the SCSI addresses of the devices attached to the SCSI I/O controllers in Appendix A of this book. If needed, use the customer planning information, or other information supplied by the customer to determine the SCSI addresses.

3. As needed, use the cable labels included in the ship group to label the cables.

Step 8. Arranging the System Unit and Devices

Note: If you are attaching a 4869 external 5.25-inch diskette drive, do not place it closer than 155 mm (6 inches) to any display.

If you are attaching a -48V dc power supply, refer to the instructions included in the -48V dc power cord package.

1. Connect the system unit power cable to the system unit (do not plug it into the outlet at this time).

2. Arrange the cables at the back of the system unit.

3. Using the customer's planning information, arrange the system unit and devices.

4. Go to Chapter 7 of *7012 G Series Operator Guide* to check out the system.

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.

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 *Diagnostic Information For Micro Channel Bus Systems* 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 27 of *Diagnostic Information For Micro Channel Bus Systems,* 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 AIX operating system is installed on the system.

If you are not sure whether Version 4.1 (or higher) of the AIX 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 AIX operating system is not installed.

If Version 4.1 (or higher) of the AIX 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 AIX 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 AIX 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 AIX 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 AIX operating system is installed. If the system is using Version 4.1 (or higher) of the AIX 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 AIX 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 AIX 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 AIX operating system *Installation Kit* to install and configure the AIX operating system.

Chapter 6. Expansion Installation

This chapter describes how to connect one or more additional expansion units to the existing system configuration. In addition it illustrates briefly the general rules to disconnect a unit from the system configuration.

For details about setting the system up, refer to *7012 G Series Expansion Unit Setup Procedure*, order number SA23-2754.

Installation

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

The expansion units must be connected using appropriate cables, according to the system configuration. Follow the procedures below to interconnect the expansion units.

RS-485 Cable Interconnection

The RS-485 cable interconnection must be performed from unit to unit, in a daisy chain fashion.

1. Connect one of the two connectors of the RS-485 cable (it is not important which one) to the RS-485 connector on the rear side of the base unit.

2. Connect the other connector of the RS-485 cable used in the previous step to the RS-485 IN connector located on the expansion unit.

3. If no other expansion units are to be installed, insert an RS-485 terminator plug in the RS-485 OUT connector located on the expansion unit. Otherwise, connect the other expansion units using the same criteria used for the base expansion unit connection. Remember to install a terminator plug in the RS-485 OUT connector located in the rear side of the last expansion unit that you are installing.

SCSI Cable Connection

Each disk unit must be connected to the base unit through a dedicated SCSI cable.

1. Connect the SCSI cable to the appropriate base unit connector.

Recognizing the New Unit

Use the appropriate software procedure to make the system able to recognize the units that you are connecting. Refer to your *7012 G Series Expansion Unit Setup Procedure* or your operating system documentation for detailed information.

Disconnecting Expansion Units

Before disconnecting any units, perform the following steps:

1. If the machine is running, perform a system shutdown first. For further information about the shutdown procedure, refer to the **shutdown** command in your operating system documentation.

2. Turn off the system by pushing the power On/Off button on the operator panel.

Power On/Off Button
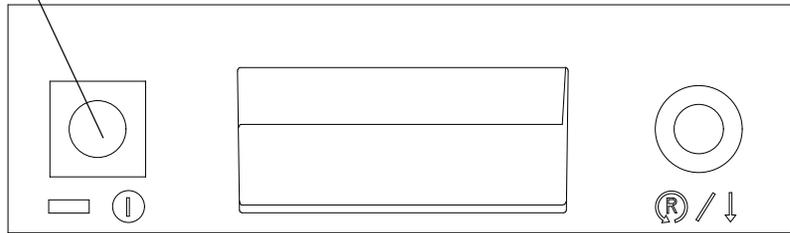
3. Make sure the power switches for all external devices connected to the system unit are set to Off.

4. Unplug the power cord to all external devices connected to the system unit.

5. Unplug the power cord to all system units.

Note: For a translation of the following notice, see *System Unit Safety Information*, order number SA23-2652.

CAUTION:
Before attempting to disconnect the units, ensure that the preliminary operations detailed above have been performed correctly to prevent a possible hazard.

6. Ensure that the outlets needed to connect the designated units are near the system and quite visible.

7. For each unit that you are disconnecting, remove the rear cover following the procedure on page 4-8.

8. Disconnect the RS-485 cable from the expansion unit. Disconnect the cable from the base unit. Refer to the procedure for the RS-485 card on page 4-40.

9. Disconnect the SCSI cable from the disk unit and then from the base unit.

10. Move the expansion unit.

Chapter 7. Parts

All parts shown pertain to both the base and the expansion units, unless otherwise noted.

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.

Acronym	Associated FRU
E1D	601 Processor Card
E4M	604 Processor Card (one way)
E4D	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
ELM	system planar
SIB X	system planar
OPE	operator panel
380-1	power supply

Covers and Chassis
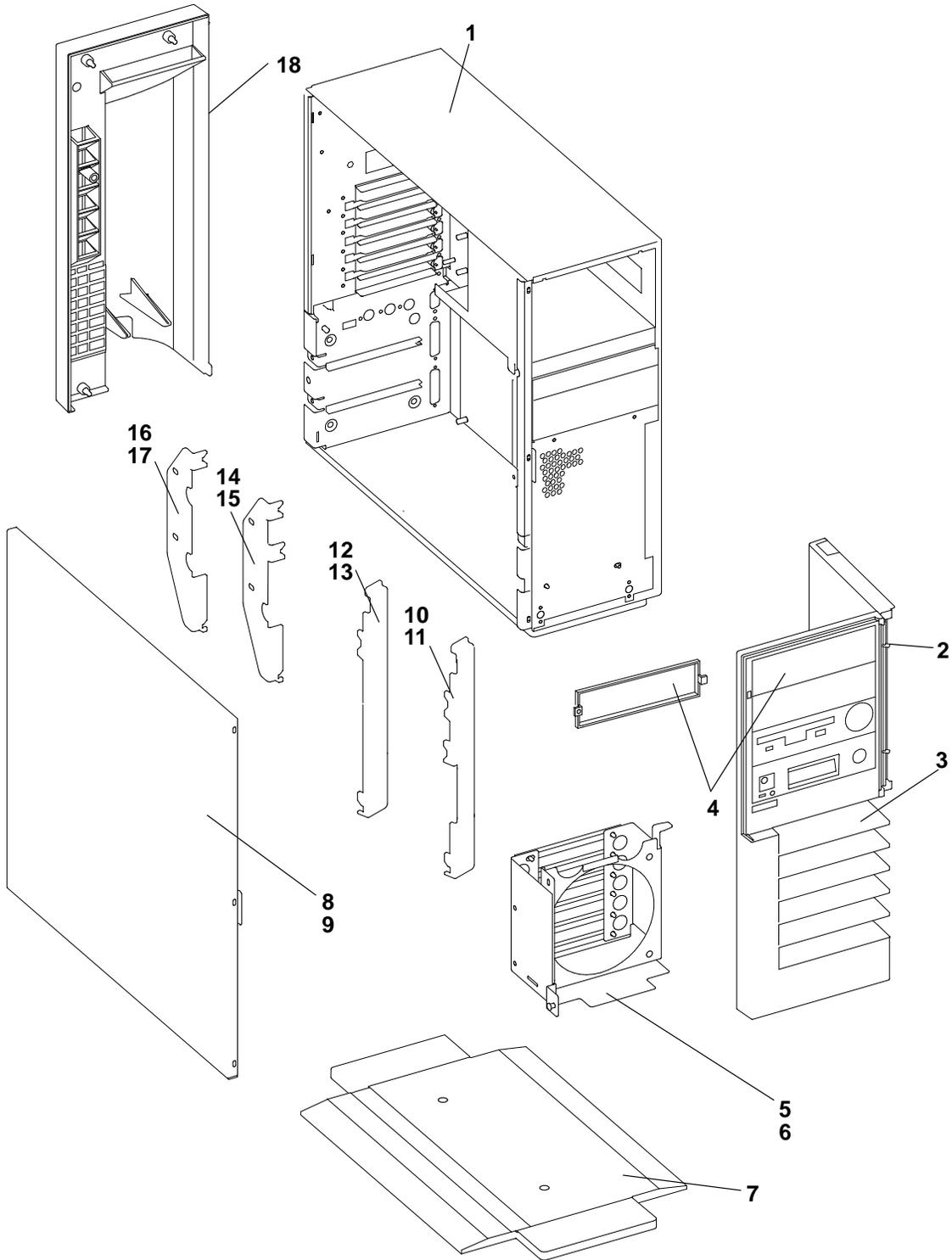
Index Number	Part Number	Units per Asm	Description
1	40H2841	1	Chassis assembly
2	40H2873	1	Hinge
3	40H2690	1	Front cover, base unit
	40H2691	1	Front cover, expansion unit
4	52G0284	1	Bezel blank
5	52G0231	1	Fan Bracket
6	78X8993	1	Mounting screw
7	52G0249	1	Base Stand
8	52G0241	1	Side cover
9	78X8993	1	Mounting screw
10	93H1645	1	Front card support bracket for 2 CPUs and 1 disk drive tray
11	78X8993	1	Mounting screw
12	93H1646	1	Front card support bracket for 1 CPU and 2 disk drive trays (G30 only)
13	78X8993	1	Mounting screw
14	40H6710	1	Rear card support bracket for 2 CPUs and 1 disk drive tray
15	78X8993	1	Mounting screw
16	40H6712	1	Rear card support bracket for 1 CPU board and 2 disk drive trays (G30 only)
17	78X8993	1	Mounting screw
18	52G0220	1	Rear cover

Electronics, Drives, and Power (1 of 2)

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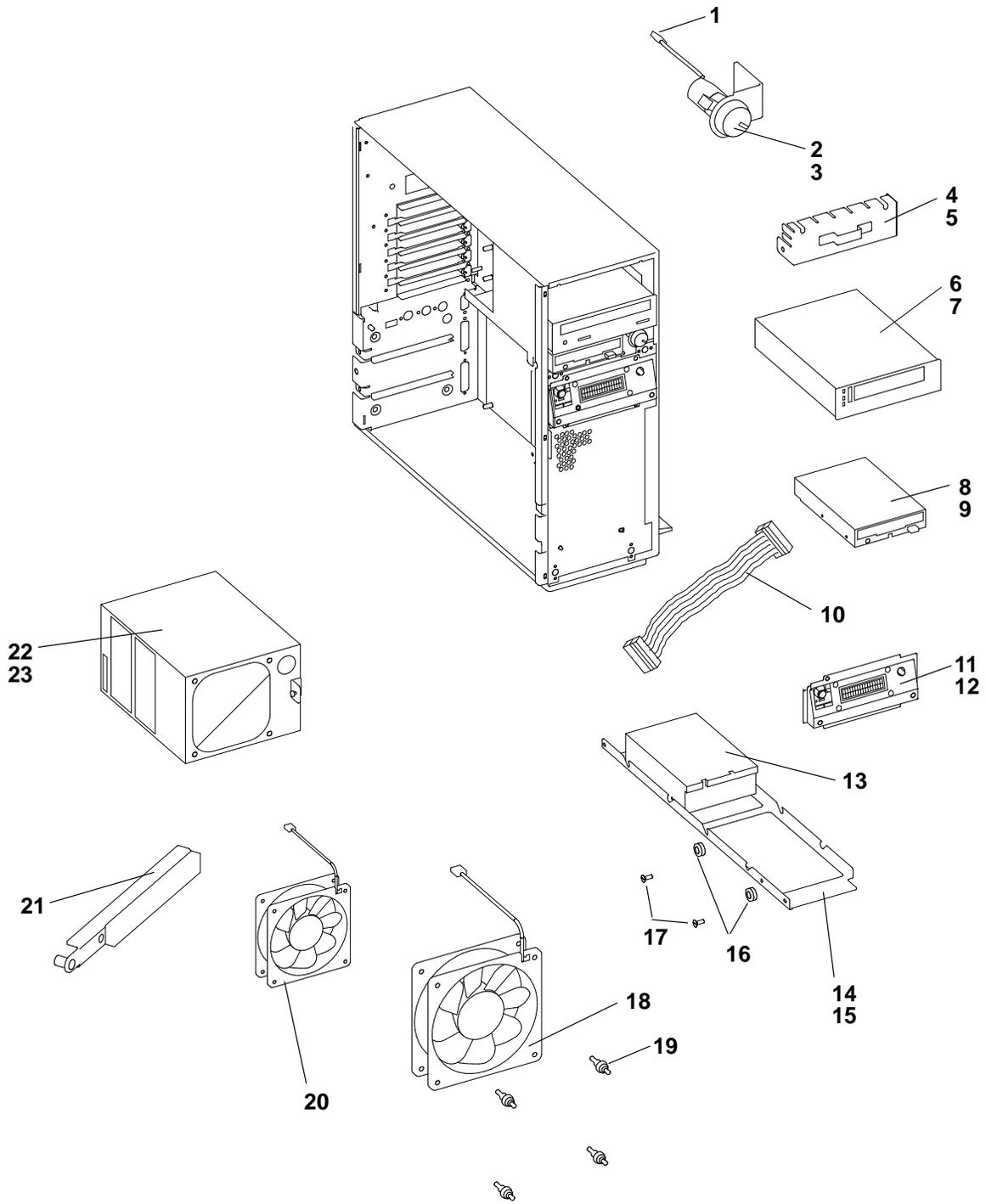
Index Number	Part Number	Units per Asm	Description
1	11H7687	1	Mode switch and cable
2	52G0254	1	Non lock mode keylock
2	52G0252	1	Locking mode keylock
3	78X8993	1	Mounting screw
4	52G0292	1	Bracket
5	78X8993	1	Mounting screw
6	See Note	1	CD-ROM drive
7	78X8993	4	Mounting screw
8	See Note	1	Diskette drive (1.44MB)
9	78X8993	2	Mounting screw
10	11H3757	1	Diskette drive cable
11	40H2671	1	Operator panel, base unit
	11H3904	1	Operator panel, expansion unit
12	52G0259	4	Mounting screw
13	See Note	1	Drive assembly, disk
14	11H7658	1	Bracket, DASD support tray (G30)
	40H6708	1	Bracket, DASD support tray (G40)
15	78X8993	2	Mounting screw
16	00G3272	4	Bushing
17	0316807	4	Screw
18	71F1128	1	Fan, front (MCA)
19	81F7977	4/fan	Shock mounts
20	11H3884	1	Fan, rear (CPU, memory, DASD)
21	11H3713	2	CPU tool
22	52G4020	1	Power supply
23	78X8993	2	Mounting screw

Note: See the "Failing Function Codes" and "FRU Cross-References" chapters in the *Diagnostic Information For Micro Channel Bus Systems* for part numbers.

Index Number	Part Number	Units per Asm	Description
23	19H0287	1	Memory module, 8MB (MRE, NFX, RTX, or SF5)
	19H0288	1	Memory module 16MB (MRE, NFX, RTX, or SF5)
	19H0289	1	Memory module 32MB (MRE, NFX, RTX, or SF5)
	35H8751		Memory module, 64MB (NFX or SF5)
24	35H8694	1	MRE memory card, base without memory modules
	93H4357	1	SF5 Memory card, base without memory modules
25	35H8750	1	CPU card with 601 – two way (G30)
	09J4714	1	CPU card with 604 – one way (G40)
	09J4713	1	CPU card with 604 – two way (G40)
	93H6274	1	CPU card with 604E – two way (G40)
26	11H3890	1	Keyboard/mouse card assembly
27	78X8993	2	Mounting screw
28	35H8832	1	System planar (ELM) (G30)
	09J4774	1	System planar (ELM) (G40)
29	11H3846		Mounting screw
30	See Note	1	Micro Channel adapters
31	11H3837	1	Serial cable, splitter
32	88G4461	1	RS-485 interface card
33	0251970	3	Mounting screw, connector support
34	78X8993	1	Mounting screw
35	88G3997	1	SCSI Terminator
36	11H3928	1	4-drop SCSI cable (not shown)
	11H3929	1	6-drop SCSI cable

Note: See the "Failing Function Codes" and "FRU Cross-References" chapters in the *Diagnostic Information For Micro Channel Bus Systems* for part numbers.

7012 G Series Expansion Unit Unique Parts
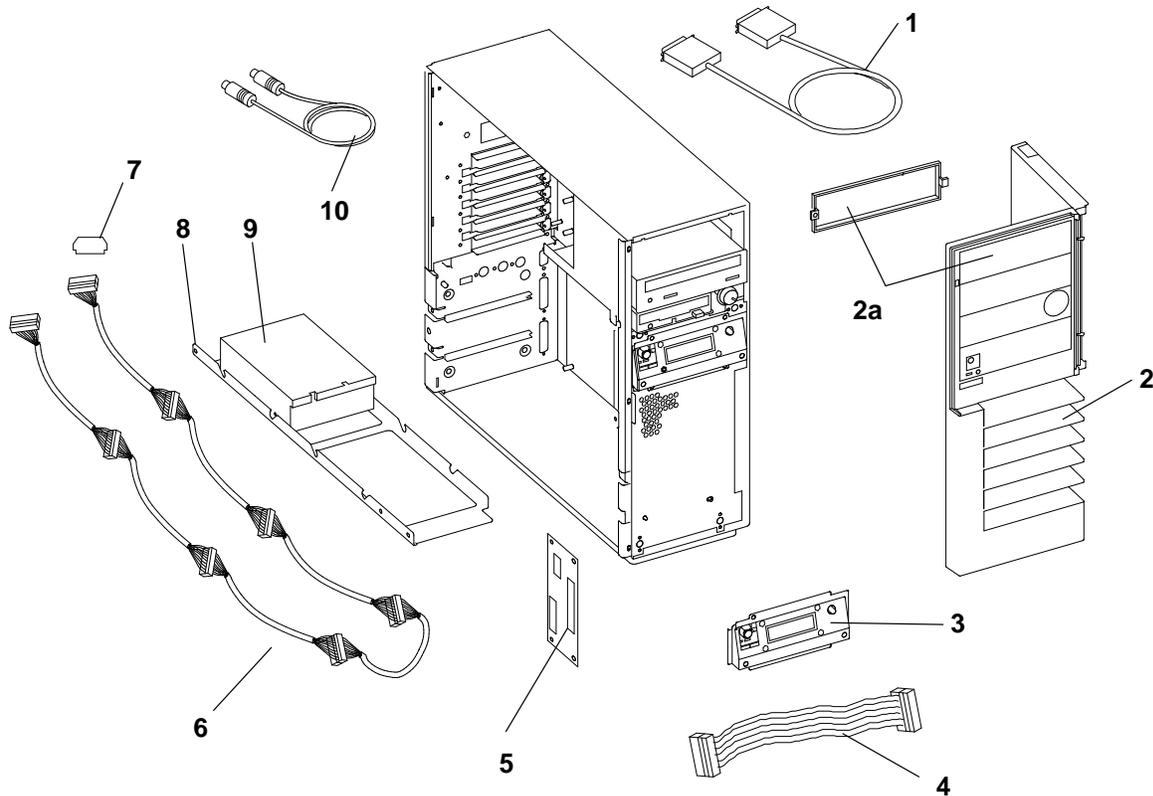
Index Number	Part Number	Units per Asm	Description
1	52G9501	1	External SCSI cable
2	40H2691	1	Front cover assembly
2a	52G0284	1	Bezel blank
3	11H3904	1	Operator panel
4	11H3629	1	Internal RS485 cable
5	11H7538	1	ECB card assembly
6	11H3930	1	Internal SCSI cable
7	88G3997	1	SCSI Terminator
8	11H7658	1	Bracket, DASD support tray
9	See Note	1	Drive assembly, disk
10	96G4259	1	External RS485 cable
Note: See the "Failing Function Codes" and "FRU Cross-References" chapters in the *Diagnostic Information For Micro Channel Bus Systems* for part numbers.			

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 HID0 register. It contains the following sub-test.

HID0.31 Value Test   This test saves the HID0 content, validates the machine check stop and cache parity check stop bits. Reads the HID0 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 **See note 1**	2
Parameter 4	1st Mem. Bnk Add.	Mem Address (Mb)		0
Parameter 5	2nd Mem. Bnk Add.	Mem Address (Mb)		0xffffffff
Parameter 6	3rd Mem. Bnk Add.	Mem Address (Mb)		0xffffffff
Parameter 7	4th Mem. Bnk Add.	Mem Address (Mb)		0xffffffff
Parameter 8	SIMM/Bus mode	**See note 2**	0=SIMM number 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 single1 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 an 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.

Flag, Parameter and Keyword Default Values	
Name	**Default Value**
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,
                                                   icrnl,opost,tab3,
                                                   onlcr,isig,icanon,
                                                   echo,echoe,echok,
                                                   echoctl,echoke,
                                                   imaxbel,iexten]
  STTY attributes for LOGIN                      [hupcl,cread,echoe,
                                                   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,
                                                   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]
```

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	**Description** S1 asynchronous line internal registers error. **Action:** Use MAP 0210.
401-001	K	C59	100	**Description:** S1 asynchronous line buffer exchange error. **Action:** Use MAP 0210.
401-002	K	C59	100	**Description:** S1 asynchronous line junction signal error (initial test). **Action:** Use MAP 0210.
401-003	K	C59	100	**Description:** S1 asynchronous line junction signal error (DTR to DSR link). **Action:** Use MAP 0210.
401-004	K	C59	100	**Description:** S1 asynchronous line junction signal error (RTS to CTS link). **Action:** Use MAP 0210.
401-005	K	C59	100	**Description:** S1 asynchronous line junction signal error (OUT2 to DCD link). **Action:** Use MAP 0210.
401-006	K	C59	100	**Description:** S1 asynchronous line junction signal error (OUT1 to RI link). **Action:** Use MAP 0210.
401-007	K	C59	100	**Description:** S1 asynchronous line buffer exchange error. External loop-back mode. **Action:** Use MAP 0210.
401-008	K	C59	100	**Description:** S1 asynchronous line junction signal error (RTS to CTS link). External loop-back mode. **Action:** Use MAP 0210.
401-009	K	C59	100	**Description:** S1 asynchronous line junction signal error (DTR to DSR link). External loop-back mode. **Action:** Use MAP 0210.
401-010	K	C59	100	**Description:** S1 asynchronous line speed error. External loop-back mode. **Action:** Use MAP 0210.
401-020	K	C59	100	**Description:** S2 asynchronous line internal registers error. **Action:** Use MAP 0210.
401-021	K	C59	100	**Description:** S2 asynchronous line buffer exchange error. **Action:** Use MAP 0210.
401-022	K	C59	100	**Description:** S2 asynchronous line junction signal error (initial test). **Action:** Use MAP 0210.

Error Number	Source	Failing Function Codes	Failure Percent (%)	Description
401-023	K	C59	100	**Description:** S2 asynchronous line junction signal error (DTR to DSR link). **Action:** Use MAP 0210.
401-024	K	C59	100	**Description:** S2 asynchronous line junction signal error (RTS to CTS link). **Action:** Use MAP 0210.
401-025	K	C59	100	**Description:** S2 asynchronous line junction signal error (OUT2 to DCD link). **Action:** Use MAP 0210.
401-026	K	C59	100	**Description:** S2 asynchronous line junction signal error (OUT1 to RI link). **Action:** Use MAP 0210.
401-027	K	C59	100	**Description:** S2 asynchronous line buffer exchange error. External loop-back mode. **Action:** Use MAP 0210.
401-028	K	C59	100	**Description:** S2 asynchronous line junction signal error (RTS to CTS link). External loop-back mode. **Action:** Use MAP 0210.
401-029	K	C59	100	**Description:** S2 asynchronous line junction signal error (DTR to DSR link). External loop-back mode. **Action:** Use MAP 0210.
401-030	K	C59	100	**Description:** S2 asynchronous line speed error. External loop-back mode. **Action:** Use MAP 0210.
401-040	K	C59	100	**Description:** S3 asynchronous line internal registers error. **Action:** Use MAP 0210.
401-041	K	C59	100	**Description:** S3 asynchronous line buffer exchange error. **Action:** Use MAP 0210.
401-042	K	C59	100	**Description:** S3 asynchronous line junction signal error (initial test). **Action:** Use MAP 0210.
401-043	K	C59	100	**Description:** S3 asynchronous line junction signal error (DTR to DSR link). **Action:** Use MAP 0210.
401-044	K	C59	100	**Description:** S3 asynchronous line junction signal error (RTS to CTS link). **Action:** Use MAP 0210.
401-045	K	C59	100	**Description:** S3 asynchronous line junction signal error (OUT2 to DCD link). **Action:** Use MAP 0210.
401-046	K	C59	100	**Description:** S3 asynchronous line junction signal error (OUT1 to RI link). **Action:** Use MAP 0210.
401-047	K	C59	100	**Description:** S3 asynchronous line buffer exchange error. External loop-back mode. **Action:** Use MAP 0210.
401-048	K	C59	100	**Description:** S3 asynchronous line junction signal error (RTS to CTS link). External loop-back mode. **Action:** Use MAP 0210.

Error Number	Source	Failing Function Codes	Failure Percent (%)	Description
401-049	K	C59	100	**Description:** S3 asynchronous line junction signal error (DTR to DSR link). External loop-back mode. **Action:** Use MAP 0210.
401-050	K	C59	100	**Description:** S3 asynchronous line speed error. External loop-back mode. **Action:** Use MAP 0210.
401-060	K	C59	100	**Description:** Flash EPROM standard area checksum error. **Action:** Use MAP 0210.
401-061	K	C59	100	**Description:** Flash EPROM IPL area checksum error. **Action:** Use MAP 0210.
401-070	K	C59	100	**Description:** NVRAM error 1. **Action:** Use MAP 0210.
401-071	K	C59	100	**Description:** NVRAM error 2. **Action:** Use MAP 0210.
401-080	K	C59	100	**Description:** EPROM standard area checksum error. **Action:** Use MAP 0210.
401-081	K	C59	100	**Description:** EPROM IPL area checksum error. **Action:** Use MAP 0210.
401-090	K	C59	100	**Description:** TOD MSR register error. **Action:** Use MAP 0210.
401-091	K	C59	100	**Description:** TOD internal RAM error. **Action:** Use MAP 0210.
401-092	K	C59	100	**Description:** TOD wake-up mechanism error. **Action:** Use MAP 0210.
401-100	K	C59	100	**Description:** Floppy disk controller DOR register error. **Action:** Use MAP 0210.
401-100	K	C59	100	**Description:** Floppy disk controller DOR register error. **Action:** Use MAP 0210.
401-110	K	C59	100	**Description:** BPP address register error. **Action:** Use MAP 0210.
401-111	K	C59	100	**Description:** BPP DTR register error. **Action:** Use MAP 0210.
401-112	K	C59	100	**Description:** BPP CTR register error. **Action:** Use MAP 0210.
401-120	K	C59	100	**Description:** Miscellaneous PGCR register error. **Action:** Use MAP 0210.
401-121	K	C59	100	**Description:** Miscellaneous DTR register error. **Action:** Use MAP 0210.
401-130	K	C59 C61 C63	50 25 25	**Description:** CPU accessibility. Checkstop error. **Action:** Use MAP 0210.
401-131	K	C59 C61 C63	50 25 25	**Description:** CPU accessibility. Single error. **Action:** Use MAP 0210.
401-132	K	C59 C61 C63	50 25 25	**Description:** CPU accessibility. CPU not started. **Action:** Use MAP 0210.

Error Number	Source	Failing Function Codes	Failure Percent (%)	Description
401-140	K	all boards		**Description:** Bad VPD Board.
401-141	K	all boards		**Description:** No Board present.
401-142	K	all boards		**Description:** No coherent configuration on board.
401-150	K	C59 C61 C63 C88	40 20 20 20	**Description:** Asynchronous lines access. Line Sx: register error **Action:** Use MAP 0210.
401-151	K	C59 C61 C63 C88	40 20 20 20	**Description:** Asynchronous lines access. Line Sx: status register error. **Action:** Use MAP 0210.
401-152	K	C59 C61 C63 C88	40 20 20 20	**Description:** Asynchronous lines access. Asynchronous line buffer exchange error. **Action:** Use MAP 0210.
401-153	K	C59 C61 C63 C88	40 20 20 20	**Description:** Asynchronous lines access. Line Sx: register error on bit i. **Action:** Use MAP 0210.
401-160	K	C59 C61 C63 C88	40 20 20 20	**Description:** BPP ext. Loop back. Status register error. **Action:** Use MAP 0210.
401-161	K	C59 C61 C63 C88	40 20 20 20	**Description:** BPP ext. Loop back. Error bit i#0. **Action:** Use MAP 0210.
401-162	K	C59 C61 C63 C88	40 20 20 20	**Description:** BPP ext. Loop back. Error bit i#1. **Action:** Use MAP 0210.
401-170	K	C59 C61 C63 C88	40 20 20 20	**Description:** Printer error: not selected. **Action:** Use MAP 0210.
401-171	K	C59 C61 C63 C88	40 20 20 20	**Description:** Printer error: end of paper. **Action:** Use MAP 0210.
401-172	K	C59 C61 C63 C88	40 20 20 20	**Description:** Printer on error. **Action:** Use MAP 0210.
401-173	K	C59 C61 C63 C88	40 20 20 20	**Description:** Printer time out, always busy. **Action:** Use MAP 0210.
401-180	K	C59 Modem	20 80	**Description:** DIAL-OUT test. Dial out not authorized.
401-181	K	C59 Modem	20 80	**Description:** DIAL-OUT test. Quick on Call Service not subscribed.

Error Number	Source	Failing Function Codes	Failure Percent (%)	Description
401-182	K	C59 Modem	20 80	**Description:** DIAL-OUT test. No customer Hub or Service Center phone Dial-Out.
401-183	K	C59 Modem	20 80	**Description:** DIAL-OUT test. Modem parameters failed.
401-184	K	C59 Modem	20 80	**Description:** DIAL-OUT test. Line busy.
401-185	K	C59 Modem	20 80	**Description:** DIAL-OUT test. Connection Time out.
401-186	K	C59 Modem	20 80	**Description:** DIAL-OUT test. Modem answer failed.
401-187	K	C59 Modem	20 80	**Description:** DIAL-OUT test. Data Time out.
401-188	K	C59 Modem	20 80	**Description:** DIAL-OUT test. Data Carrier detect junction failed.
401-189	K	C59 Modem	20 80	**Description:** DIAL-OUT test. No data acknowledge.
401-190	K	C59	100	**Description:** BPP external Loop back. Data register error.
401-191	K	C59	100	**Description:** BPP external Loop back. Status register error.
401-400	K	C59	100	**Description:** JTAG chain integrity. Read IR failed.
401-401	K	C59	100	**Description:** JTAG chain integrity. Read DR failed: chip #.
401-501	K	C59 C63 C61	50 25 25	**Description:** Direct IO: IONIAN-SSGA. Map register error **Action:** Use MAP 0210.
401-502	K	C59 C63 C61	50 25 25	**Description:** Direct IO: IONIAN-SSGA. CONFIGURATION register error. **Action:** Use MAP 0210.
401-503	K	C59 C63 C61	50 25 25	**Description:** Direct IO: IONIAN-SSGA. PERSONALIZE register error. **Action:** Use MAP 0210.
401-509	K	C59 C63 C61	50 25 25	**Description:** Direct IO: IONIAN-SSGA. POS3 register error. **Action:** Use MAP 0210.
401-510	K	C59 C63 C61	50 25 25	**Description:** Direct IO: IONIAN-SSGA. XIVR register error. **Action:** Use MAP 0210.
401-511	K	C59 C63 C61	50 25 25	**Description:** Direct IO: IONIAN-SSGA. DSIER register error. **Action:** Use MAP 0210.
401-512	K	C59 C63 C61	50 25 25	**Description:** Direct IO: IONIAN-SSGA. MFRR register error. **Action:** Use MAP 0210.
401-513	K	C59 C63 C61	50 25 25	**Description:** Direct IO: IONIAN-SSGA. BUID register error. **Action:** Use MAP 0210.

Error Number	Source	Failing Function Codes	Failure Percent (%)	Description
401-514	K	C59 C63 C61	50 25 25	**Description:** Direct IO: IONIAN-SSGA. APR register error. **Action:** Use MAP 0210.
401-515	K	C59 C63 C61	50 25 25	**Description:** Direct IO: IONIAN-SSGA. BSR init value. **Action:** Use MAP 0210.
401-516	K	C59 C63 C61	50 25 25	**Description:** Direct IO: IONIAN-SSGA. MD0 init value. **Action:** Use MAP 0210.
401-517	K	C59 C63 C61	50 25 25	**Description:** Direct IO: IONIAN-SSGA. MD1 init value. **Action:** Use MAP 0210.
401-518	K	C59 C63 C61	50 25 25	**Description:** Direct IO: IONIAN-SSGA. XIVR6 init value. **Action:** Use MAP 0210.
401-519	K	C59 C63 C61	50 25 25	**Description:** Direct IO: IONIAN-SSGA. DSIER init value. **Action:** Use MAP 0210.
401-520	K	C59	100	**Description:** Direct IO. IONIAN register access error. **Action:** Use MAP 0210.
401-521	K	C59 C61	80 20	**Description:** Direct IO. SSGA POS register error. **Action:** Use MAP 0210.
401-522	K	C59 C61	80 20	**Description:** Direct IO. SSGA interrupt register error. **Action:** Use MAP 0210.
401-523	K	C59 C90 MCA adapters	25 25 50	**Description:** Direct IO: IONIAN-SSGA. IER register error on Base Unit. **Action:** Use MAP 0210.
401-524	K	C59 C90 MCA adapters	25 25 50	**Description:** Direct IO: IONIAN-SSGA. IER register error on Base Unit. **Action:** Use MAP 0210.
401-530	K	C59 C61	80 20	**Description:** Direct IO. NVRAM data lines access error. **Action:** Use MAP 0210.
401-531	K	C59 C61	80 20	**Description:** Direct IO. NVRAM address lines access error. Walking 1 phase. **Action:** Use MAP 0210.
401-532	K	C59 C61	80 20	**Description:** Direct IO. NVRAM address lines access error. Walking 0 phase. **Action:** Use MAP 0210.
401-540	K	C59 C61	80 20	**Description:** Direct IO. Super IO UART1 access error. **Action:** Use MAP 0210.
401-541	K	C59 C61	80 20	**Description:** Direct IO. Super IO UART2 access error. **Action:** Use MAP 0210.
401-542	K	C59 C61	80 20	**Description:** Direct IO. 16550 UART access error. **Action:** Use MAP 0210.
401-543	K	C59 C61	80 20	**Description:** Direct IO. Floppy disk access error. **Action:** Use MAP 0210.
401-544	K	C59 C61	80 20	**Description:** Direct IO. BPP register access error. **Action:** Use MAP 0210.

Error Number	Source	Failing Function Codes	Failure Percent (%)	Description
401-550	K	C59 C61	80 20	**Description:** Direct IO. Flash Eprom access error. **Action:** Use MAP 0210.
401-560	K	C59 C61	80 20	**Description:** Direct IO. Eprom access error. **Action:** Use MAP 0210.
401-570	K	C59 C61	80 20	**Description:** Direct IO. TOD imbedded RAM access error. **Action:** Use MAP 0210.
401-571	K	C59 C61	80 20	**Description:** Direct IO. TOD registers access error. **Action:** Use MAP 0210.
401-58A	K	C59 C90 MCA adapters	25 25 50	**Description:** Direct IO: IONIAN2. IER register error on Expansion Unit. **Action:** Use MAP 0210.
401-58B	K	C59 C90 MCA adapters	25 25 50	**Description:** Direct IO: IONIAN2. IER register error on Expansion Unit. **Action:** Use MAP 0210.
401-580	K	C59 C63 C61	50 25 25	**Description:** Direct IO: IONIAN2. TCE register error. **Action:** Use MAP 0210.
401-581	K	C59 C63 C61	50 25 25	**Description:** Direct IO: IONIAN2. MAP register error. **Action:** Use MAP 0210.
401-582	K	C59 C63 C61	50 25 25	**Description:** Direct IO: IONIAN2. CONFIGURATION register error. **Action:** Use MAP 0210.
401-583	K	C59 C63 C61	50 25 25	**Description:** Direct IO: IONIAN2. PERSONALIZE register error. **Action:** Use MAP 0210.
401-584	K	C59 C63 C61	50 25 25	**Description:** Direct IO: IONIAN2. DSC register error. **Action:** Use MAP 0210.
401-585	K	C59 C63 C61	50 25 25	**Description:** Direct IO: IONIAN2. CSR register error. **Action:** Use MAP 0210.
401-586	K	C59 C63 C61	50 25 25	**Description:** Direct IO: IONIAN2. BSR init value. **Action:** Use MAP 0210.
401-587	K	C59 C63 C61	50 25 25	**Description:** Direct IO: IONIAN2. MD0 init value. **Action:** Use MAP 0210.
401-588	K	C59 C63 C61	50 25 25	**Description:** Direct IO: IONIAN2. MD1 init value. **Action:** Use MAP 0210.
401-589	K	C59 C63 C61	50 25 25	**Description:** Direct IO: IONIAN2. Not present. **Action:** Use MAP 0210.
401-590	K	C59 C63 C61	50 25 25	**Description:** Diskette drive access. Error on lock command. **Action:** Use MAP 0210.

Error Number	Source	Failing Function Codes	Failure Percent (%)	Description
401-591	K	C59 C63 C61	50 25 25	**Description:** Diskette drive access. Error on sense interrupt command. **Action:** Use MAP 0210.
401-592	K	C59 C63 C61	50 25 25	**Description:** Diskette drive access. Error on write command. **Action:** Use MAP 0210.
401-593	K	C59 C63 C61	50 25 25	**Description:** Diskette drive access. Error on read command. **Action:** Use MAP 0210.
401-594	K	C59 C63 C61	50 25 25	**Description:** Diskette drive access. Buffer exchange error. **Action:** Use MAP 0210.
401-595	K	C59 C63 C61	50 25 25	**Description:** Diskette drive access. Time-out error. **Action:** Use MAP 0210.
401-800	K	LSA C59 C90 C61 C63	40 20 20 10 10	**Description:** Channel reset and POS. POS3 register error. **Action:** Use MAP 0210.
401-801	K	LSA C59 C90 C61 C63	40 20 20 10 10	**Description:** Channel reset and POS. POS4 register error. **Action:** Use MAP 0210.
401-802	K	LSA C59 C90 C61 C63	40 20 20 10 10	**Description:** Channel reset and POS. POS2 register error. **Action:** Use MAP 0210.
401-803	K	LSA C59 C90 C61 C63	40 20 20 10 10	**Description:** Channel reset and POS. NCR SCRATCH A register error. **Action:** Use MAP 0210.
401-804	K	LSA C59 C90 C61 C63	40 20 20 10 10	**Description:** Channel reset and POS. SCSI Bus control lines error. **Action:** Use MAP 0210.
401-805	K	LSA C59 C90 C61 C63	40 20 20 10 10	**Description:** Channel reset and POS. Missing ACK signal error. **Action:** Use MAP 0210.
401-806	K	LSA C59 C90 C61 C63	40 20 20 10 10	**Description:** Channel reset and POS. Pending ACK signal error. **Action:** Use MAP 0210.

Error Number	Source	Failing Function Codes	Failure Percent (%)	Description
401-807	K	LSA C59 C90 C61 C63	40 20 20 10 10	**Description:** Channel reset and POS. Missing DMA interrupt error during transfer. **Action:** Use MAP 0210.
401-808	K	LSA C59 C90 C61 C63	40 20 20 10 10	**Description:** Channel reset and POS. DMA status error. **Action:** Use MAP 0210.
401-809	K	LSA C59 C90 C61 C63	40 20 20 10 10	**Description:** Channel reset and POS. Missing DMA interrupt error after transfer. **Action:** Use MAP 0210.
401-810	K	LSA C59 C90 C61 C63	40 20 20 10 10	**Description:** Channel reset and POS. DFE or SSI signal not asserted. **Action:** Use MAP 0210.
401-811	K	LSA C59 C90 C61 C63	40 20 20 10 10	**Description:** Channel reset and POS. Buffer exchange error. **Action:** Use MAP 0210.
401-812	K	LSA C59 C90 C61 C63	40 20 20 10 10	**Description:** Channel reset and POS. LSA board not responding. **Action:** Use MAP 0210.
401-820	K	LSA C59 C90 C61 C63	40 20 20 10 10	**Description:** Channel reset and POS. POS3 register error. **Action:** Use MAP 0210.
401-821	K	LSA C59 C90 C61 C63	40 20 20 10 10	**Description:** Channel reset and POS. POS4 register error. **Action:** Use MAP 0210.
401-822	K	LSA C59 C90 C61 C63	40 20 20 10 10	**Description:** Channel reset and POS. POS2 register error. **Action:** Use MAP 0210.
401-823	K	LSA C59 C90 C61 C63	40 20 20 10 10	**Description:** Channel reset and POS. NCR SCRATCH A register error. **Action:** Use MAP 0210.

Error Number	Source	Failing Function Codes	Failure Percent (%)	Description
401-824	K	LSA C59 C90 C61 C63	40 20 20 10 10	**Description:** Channel reset and POS. SCSI Bus control lines error. **Action:** Use MAP 0210.
401-825	K	LSA C59 C90 C61 C63	40 20 20 10 10	**Description:** Channel reset and POS. Missing ACK signal error. **Action:** Use MAP 0210.
401-826	K	LSA C59 C90 C61 C63	40 20 20 10 10	**Description:** Channel reset and POS. Pending ACK signal error. **Action:** Use MAP 0210.
401-827	K	LSA C59 C90 C61 C63	40 20 20 10 10	**Description:** Channel reset and POS. Missing DMA interrupt error during transfer. **Action:** Use MAP 0210.
401-828	K	LSA C59 C90 C61 C63	40 20 20 10 10	**Description:** Channel reset and POS. DMA status error. **Action:** Use MAP 0210.
401-829	K	LSA C59 C90 C61 C63	40 20 20 10 10	**Description:** Channel reset and POS. Missing DMA interrupt after transfer. **Action:** Use MAP 0210.
401-830	K	LSA C59 C90 C61 C63	40 20 20 10 10	**Description:** Channel reset and POS. DFE or SSI signal not asserted. **Action:** Use MAP 0210.
401-831	K	LSA C59 C90 C61 C63	40 20 20 10 10	**Description:** Channel reset and POS. Buffer exchange error. **Action:** Use MAP 0210.
401-832	K	LSA C59 C90 C61 C63	40 20 20 10 10	**Description:** Channel reset and POS. LSA board not responding. **Action:** Use MAP 0210.
401-840	K	LSA C59 C90 C61 C63	40 20 20 10 10	**Description:** Channel reset and POS. POS3 register error. **Action:** Use MAP 0210.

Error Number	Source	Failing Function Codes	Failure Percent (%)	Description
401-841	K	LSA C59 C90 C61 C63	40 20 20 10 10	**Description:** Channel reset and POS. POS4 register error. **Action:** Use MAP 0210.
401-842	K	LSA C59 C90 C61 C63	40 20 20 10 10	**Description:** Channel reset and POS. POS2 register error. **Action:** Use MAP 0210.
401-843	K	LSA C59 C90 C61 C63	40 20 20 10 10	**Description:** Channel reset and POS. NCR SCRATCH A register error. **Action:** Use MAP 0210.
401-844	K	LSA C59 C90 C61 C63	40 20 20 10 10	**Description:** Channel reset and POS. SCSI Bus control lines error. **Action:** Use MAP 0210.
401-845	K	LSA C59 C90 C61 C63	40 20 20 10 10	**Description:** Channel reset and POS. Missing ACK signal error. **Action:** Use MAP 0210.
401-846	K	LSA C59 C90 C61 C63	40 20 20 10 10	**Description:** Channel reset and POS. Pending ACK signal error. **Action:** Use MAP 0210.
401-847	K	LSA C59 C90 C61 C63	40 20 20 10 10	**Description:** Channel reset and POS. Missing DMA interrupt error during transfer. **Action:** Use MAP 0210.
401-848	K	LSA C59 C90 C61 C63	40 20 20 10 10	**Description:** Channel reset and POS. DMA status error. **Action:** Use MAP 0210.
401-849	K	LSA C59 C90 C61 C63	40 20 20 10 10	**Description:** Channel reset and POS. Missing DMA interrupt after transfer. **Action:** Use MAP 0210.
401-850	K	LSA C59 C90 C61 C63	40 20 20 10 10	**Description:** Channel reset and POS. DFE or SSI signal not asserted. **Action:** Use MAP 0210.

Error Number	Source	Failing Function Codes	Failure Percent (%)	Description
401-851	K	LSA C59 C90 C61 C63	40 20 20 10 10	**Description:** Channel reset and POS. Buffer exchange error. **Action:** Use MAP 0210.
401-852	K	LSA C59 C90 C61 C63	40 20 20 10 10	**Description:** Channel reset and POS. LSA board not responding. **Action:** Use MAP 0210.
402-000	K	C63	100	**Description:** CPU processor error. **Action:** Use MAP 0210.
402-010	K	C63	100	**Description:** Main memory addressing mechanism error. **Action:** Use MAP 0210.
402-011	K	C63	100	**Description:** Main memory addressing mechanism. BAT translation error. **Action:** Use MAP 0210.
402-012	K	C63	100	**Description:** Main memory addressing mechanism. Swap context PTE1 error. **Action:** Use MAP 0210.
402-013	K	C63	100	**Description:** Main memory addressing mechanism. Swap context PTE2 error. **Action:** Use MAP 0210.
402-020	K	C63	100	**Description:** Level 1 cache. HID0.31 value error. **Action:** Use MAP 0210.
402-030	K	C63	100	**Description:** Level 2 cache. Accessibility test error. **Action:** Use MAP 0210.
402-031	K	C63	100	**Description:** Level 2 cache. Data test error **Action:** Use MAP 0210.
402-032	K	C63	100	**Description:** Level 2 cache. TAG test error. **Action:** Use MAP 0210.
402-033	K	C63	100	**Description:** Level 2 cache. Interrupt error. **Action:** Use MAP 0210.
402-040	K	C62 C63 C65	100 100 100	**Description:** EEprom compatibility error. **Action:** Use MAP 0210.
402-100	K	C63 C61	50 50	**Description:** Atomic instructions error. Memory reservation by slave processor lack. **Action:** Use MAP 0210.
402-101	K	C63 C61	50 50	**Description:** Atomic instructions error. Memory reservation by master processor lack. **Action:** Use MAP 0210.
402-102	K	C63 C61	50 50	**Description:** Atomic instructions error. Comparison error. **Action:** Use MAP 0210.
402-103	K	C62 C63 C65	100 100 100	**Description:** Atomic instructions error. Swap mechanism not available. **Action:** Use MAP 0210.

Error Number	Source	Failing Function Codes	Failure Percent (%)	Description
402-110	K	C63 C61	50 50	**Description:** Caches coherencies. Concurrent coherent write accesses error. **Action:** Use MAP 0210.
402-111	K	C63 C61	50 50	**Description:** Caches coherencies. Concurrent not coherent write accesses error. **Action:** Use MAP 0210.
402-112	K	C63 C61	50 50	**Description:** Caches coherencies. DCBST from line owner error. **Action:** Use MAP 0210.
402-113	K	C63 C61	50 50	**Description:** Caches coherencies. DCBF from line owner error. **Action:** Use MAP 0210.
402-114	K	C63 C61	50 50	**Description:** Caches coherencies. DCBI from line owner error (Ph.1). **Action:** Use MAP 0210.
402-115	K	C63 C61	50 50	**Description:** Caches coherencies. DCBI from line owner error (Ph.2). **Action:** Use MAP 0210.
402-116	K	C63 C61	50 50	**Description:** Paradox detection. DCBST not from line owner. **Action:** Use MAP 0210.
402-117	K	C63 C61	50 50	**Description:** Paradox detection. DCBF not from line owner. **Action:** Use MAP 0210.
402-118	K	C63 C61	50 50	**Description:** Paradox detection. DCBI not from line owner (Ph 1). **Action:** Use MAP 0210.
402-119	K	C63 C61	50 50	**Description:** Paradox detection. DCBT not from line owner (Ph 2). **Action:** Use MAP 0210.
402-120	K	C63 C61	50 50	**Description:** Caches coherencies. Test aborted by one CPU. **Action:** Use MAP 0210.
402-121	K	C63 C61	50 50	**Description:** Caches coherencies. CPUs dialogue Time Out. **Action:** Use MAP 0210.
402-130	K	C63 C61	50 50	**Description:** DCB ports arbitration error. Memory not updated error. **Action:** Use MAP 0210.
402-131	K	C63 C61	50 50	**Description:** DCB ports arbitration error. Caches coherency or global memory coherency error. **Action:** Use MAP 0210.

Error Number	Source	Failing Function Codes	Failure Percent (%)	Description
402-132	K	C63 C61	50 50	**Description:** DCB ports arbitration error. Memory coherency error. **Action:** Use MAP 0210.
402-133	K	C63 C61	50 50	**Description:** DCB ports arbitration error. Odd processor DCBF or even processor read error. **Action:** Use MAP 0210.
402-134	K	C63 C61	50 50	**Description:** DCB ports arbitration error. Cache write/read error. **Action:** Use MAP 0210.
402-135	K	C63 C61	50 50	**Description:** DCB ports arbitration error. Test aborted by one CPU error. **Action:** Use MAP 0210.
402-136	K	C63 C61	50 50	**Description:** DCB ports arbitration error. CPUs dialog time out. **Action:** Use MAP 0210.
402-140	K	C63 C61	50 50	**Description:** System IO sharing. NVRAM access error. **Action:** Use MAP 0210.
402-150	K	C63 C61	50 50	**Description:** Main memory sharing error. MM access error. **Action:** Use MAP 0210.
402-160	K	C63 C61	50 50	**Description:** Multi-resource sharing error. NVRAM access error. **Action:** Use MAP 0210.
402-161	K	C63 C61	50 50	**Description:** Multi-resource sharing error. MM access error. **Action:** Use MAP 0210.
402-170	K	C63 C61	50 50	**Description:** Multi processor Full. Private counter error. **Action:** Use MAP 0210.
402-171	K	C63 C61	50 50	**Description:** Multi processor Full. Shared counter error. **Action:** Use MAP 0210.
402-172	K	C63 C61	50 50	**Description:** Multi processor Full. Lock mechanism error. **Action:** Use MAP 0210.
402-173	K	C63 C61	50 50	**Description:** Multi processor Full. Reservation instruction error. **Action:** Use MAP 0210.
402-174	K	C63 C61	50 50	**Description:** Multi processor Full. Link coherency error. **Action:** Use MAP 0210.
402-500	K	C59 C61 ???	50 25 25	**Description:** BUMP to CPUs interrupt error. **Action:** Use MAP 0210.
402-510	K	C59 C61 ???	50 25 25	**Description:** CPUs to BUMP interrupt error. **Action:** Use MAP 0210.
402-520	K	C59 C61 ???	50 25 25	**Description:** UART to CPUs interrupt error. **Action:** Use MAP 0210.

Error Number	Source	Failing Function Codes	Failure Percent (%)	Description
402-530	K	C59 C61 ???	50 25 25	**Description:** CPUs to CPUs interrupt error. Even processors auto interrupt. **Action:** Use MAP 0210.
402-531	K	C59 C61 ???	50 25 25	**Description:** CPUs to CPUs interrupt error. Odd processors auto interrupt. **Action:** Use MAP 0210.
402-532	K	C59 C61 ???	50 25 25	**Description:** CPUs to CPUs interrupt error. Even to Odd processors interrupt. **Action:** Use MAP 0210.
402-533	K	C59 C61 ???	50 25 25	**Description:** CPUs to CPUs interrupt error. Odd to Even processors interrupt. **Action:** Use MAP 0210.
402-540	K	C59	100	**Description:** TOD to BUMP interrupt error. **Action:** Use MAP 0210.
402-550	K	C59	100	**Description:** Internal interrupt management error. **Action:** Use MAP 0210.
402-560	K	C59	100	**Description:** System error interrupt management. **Action:** Use MAP 0210.
403-000	K	B94 C61 C63	40 30 30	**Description:** Main Memory data lines accessibility error. Write all 0 and 1 error. **Action:** Use MAP 0210.
403-001	K	B94 C61 C63	40 30 30	**Description:** Main Memory data lines accessibility error. CPU bus error, walking 1 among 0. **Action:** Use MAP 0210.
403-002	K	B94 C61 C63	40 30 30	**Description:**Main Memory data lines accessibility error. Main memory bus error, walking 1 among 0. **Action:** Use MAP 0210.
403-003	K	C61 C63 C61	40 30 30	**Description:** Main Memory data lines accessibility error. CPU bus error, walking 0 among 1. **Action:** Use MAP 0210.
403-004	K	B94 C61 C63	40 30 30	**Description:** Main Memory data lines accessibility error. Main memory bus error, walking 0 among 1. **Action:** Use MAP 0210.
403-005	K	B94 C61 C63	40 30 30	**Description:** 1, 2 ... 8 bytes bus transfer error. **Action:** Use MAP 0210.
403-010	K	B94 C61 C63	40 30 30	**Description:** Main Memory address lines accessibility error. Write all 0 and 1 error. **Action:** Use MAP 0210.
403-011	K	B94 C61 C63	40 30 30	**Description:** Main Memory address lines accessibility error. Walking 1 among 0 error. **Action:** Use MAP 0210.
403-012	K	B94 C61 C63	40 30 30	**Description:** Main Memory address lines accessibility error. Walking 0 among 1 error. **Action:** Use MAP 0210.

Error Number	Source	Failing Function Codes	Failure Percent (%)	Description
403-013	K	B94 C61 C63	40 30 30	**Description:** Main Memory address lines accessibility error. Unexpected interrupt. **Action:** Use MAP 0210.
403-020	K	B94 C61 C63	40 30 30	**Description:** Main memory board address accessibility error. Write all 0 and 1 error. **Action:** Use MAP 0210.
403-021	K	B94 C61 C63	40 30 30	**Description:** Main memory board address accessibility error. Board Nb i. 1x decoding error. **Action:** Use MAP 0210.
403-022	K	B94 C61 C63	40 30 30	**Description:** Main memory board address accessibility error. Data storage interrupt error. **Action:** Use MAP 0210.
403-030	K	B94 C61 C63	40 30 30	**Description:** Main memory basic tests error. Byte write error. **Action:** Use MAP 0210.
403-031	K	B94 C61 C63	40 30 30	**Description:** Main memory basic tests error. Aligned half-word write error. **Action:** Use MAP 0210.
403-032	K	B94 C61 C63	40 30 30	**Description:** Main memory basic tests error. Unaligned half-word write error. **Action:** Use MAP 0210.
403-033	K	B94 C61 C63	40 30 30	**Description:** Main memory basic tests error. Aligned word write error. **Action:** Use MAP 0210.
403-034	K	B94 C61 C63	40 30 30	**Description:** Main memory basic tests error. Unaligned word write error. **Action:** Use MAP 0210.
403-035	K	B94 C61 C63	40 30 30	**Description:** Main memory basic tests error. Aligned double-word write error. (floating double) **Action:** Use MAP 0210.
403-036	K	B94 C61 C63	40 30 30	**Description:** Main memory basic tests error. Aligned double-word write error. (floating simple) **Action:** Use MAP 0210.
403-037	K	B94 C61 C63	40 30 30	**Description:** Main memory basic tests error. Unaligned double-word write error. (floating double) **Action:** Use MAP 0210.

Error Number	Source	Failing Function Codes	Failure Percent (%)	Description
403-038	K	B94 C61 C63	40 30 30	**Description:** Main memory basic tests error. Work mode main memory addressing error. **Action:** Use MAP 0210.
403-039	K	B94 C61 C63	40 30 30	**Description:** Main memory basic tests error. Aligned multi-store error. **Action:** Use MAP 0210.
403-040	K	B94 C61 C63	40 30 30	**Description:** Main memory basic tests error. Aligned multi-load error. **Action:** Use MAP 0210.
403-041	K	B94 C61 C63	40 30 30	**Description:** Main memory basic tests error. Unaligned multi-store or multi-load error. **Action:** Use MAP 0210.
403-050	K	B94 B96 or B97	50 50	**Description:** Main memory components error. Address into address test error. **Action:** Use MAP 0210.
403-051	K	B94 B96 or B97	50 50	**Description:** Main memory components error. Invert address into address test error. **Action:** Use MAP 0210.
403-052	K	B94 B96 or B97	50 50	**Description:** Main memory components error. Bitmap elaboration mode warnings **Action:** Use MAP 0210.
403-060	K	B94 B96 or B97	50 50	**Description:** Main memory ECC components check error. Address into address test error. **Action:** Use MAP 0210.
403-061	K	B94 B96 or B97	50 50	**Description:** Main memory ECC components check error. Invert address into address test error. **Action:** Use MAP 0210.
403-062	K	B94 B96 or B97	50 50	**Description:** Main memory ECC components check error. Bitmap elaboration mode ECC warnings. **Action:** Use MAP 0210.
403-070	K	B94 B96 or B97	50 50	**Description:** Error correction code mechanism. Syndrome generation error. **Action:** Use MAP 0210.
403-071	K	B94 B96 or B97	50 50	**Description:** Error correction code mechanism. BUMP time out. **Action:** Use MAP 0210.
403-072	K	B94 B96 or B97	50 50	**Description:** Error correction code mechanism. CPU time out. **Action:** Use MAP 0210.
403-073	K	B94 B96 or B97	50 50	**Description:** Error correction code mechanism. Single Error generation error. **Action:** Use MAP 0210.

Error Number	Source	Failing Function Codes	Failure Percent (%)	Description
403-074	K	B94 B96 or B97	50 50	**Description:** Error correction code mechanism. Multiple Error generation error. **Action:** Use MAP 0210.
403–075	K	B94 C64 D28 B96 B97 D33	50 50 50 50 50 50	**Description**: DCB or SMC error. Multiple Error generation error. **Action:** Use MAP 0210.
403-080	K	B94 B96 or B97	50 50	**Description:** Main Memory refresh mechanism. Main memory read error. **Action:** Use MAP 0210.
403-081	K	B94 B96 or B97	50 50	**Description:** Main Memory refresh mechanism. Main memory refresh error. **Action:** Use MAP 0210.
403-090	K	B94 B96 or B97	50 50	**Description:** Main Memory Full test. Phase number i error. **Action:** Use MAP 0210.
403-100	K	B48 C61 C62 C63 C65	40 30 30 30 30	**Description:** ECC Data lines accessibility error. Write all 0 and 1 error. **Action:** Use MAP 0210.
403-101	K	B48 C61 C62 C63 C65	40 30 30 30 30	**Description:** ECC Data lines accessibility error. Walking 1 among 0 error. **Action:** Use MAP 0210.
403-102	K	B48 C61 C62 C63 C65	40 30 30 30 30	**Description:** ECC Data lines accessibility error. Walking 0 among 1 error. **Action:** Use MAP 0210.
403-103	K	B48 C61 C62 C63 C65	40 30 30 30 30	**Description:** ECC Data lines accessibility error. RAM bus error. **Action:** Use MAP 0210.
403-500	K	C59 C61 C63	50 25 25	**Description:** BUMP to CPU interrupt error. IOD-HW-STS error, bit i#1. **Action:** Use MAP 0210.
403-501	K	C59 C61 C63	50 25 25	**Description:** BUMP to CPU interrupt error. IOD-HW-STS error, bit i#0. **Action:** Use MAP 0210.
403-502	K	C59 C61 C63	50 25 25	**Description:** BUMP to CPU interrupt error. CPU error. **Action:** Use MAP 0210.
403-505	K	C59 C61 C63	50 25 25	**Description:** BUMP to CPU interrupt error. MIR register error. **Action:** Use MAP 0210.

Error Number	Source	Failing Function Codes	Failure Percent (%)	Description
403-506	K	C59 C61 C63	50 25 25	**Description:** BUMP to CPU interrupt error. IOD-HW-STS register error. **Action:** Use MAP 0210.
403-507	K	C59 C61 C63	50 25 25	**Description:** BUMP to CPU interrupt error. IRR register error. **Action:** Use MAP 0210.
403-508	K	C59 C61 C63	50 25 25	**Description:** BUMP to CPU interrupt error. No external interrupt. **Action:** Use MAP 0210.
403-509	K	C59 C61 C63	50 25 25	**Description:** BUMP to CPU interrupt error. External interrupt return error. **Action:** Use MAP 0210.
403-510	K	C59 C61 C63	50 25 25	**Description:** BUMP to CPU interrupt error. Target processor error. **Action:** Use MAP 0210.
403–511	K	C59 169 C62 C63	50 25 25 25	**Description**: BUMP to CPU interrupt error. Not responding BUMP error. **Action:** Use MAP 0210.
403-512	K	C59 C61 C63	50 25 25	**Description:** BUMP to CPU interrupt error. IRR4 register error. **Action:** Use MAP 0210.
403-513	K	C59 C61 C63	50 25 25	**Description:** BUMP to CPU interrupt error. IOD-HW-STS register error. **Action:** Use MAP 0210.
403-514	K	C59 C61 C63	50 25 25	**Description:** BUMP to CPU interrupt error. XIRR0 register error. **Action:** Use MAP 0210.
403-515	K	C59 C61 C63	50 25 25	**Description:** BUMP to CPU interrupt error. XIRR4 register error. **Action:** Use MAP 0210.
403-516	K	C59 C61 C63	50 25 25	**Description:** BUMP to CPU interrupt error. IRR register error. **Action:** Use MAP 0210.
403-520	K	C59 C61 C63	50 25 25	**Description:** CPU to BUMP interrupt. IOD-HW-STS register error, bit i#1. **Action:** Use MAP 0210.
403-521	K	C59 C61 C63	50 25 25	**Description:** CPU to BUMP interrupt. IOD-HW-STS register error, bit i#0. **Action:** Use MAP 0210.
403-522	K	C59 C61 C63	50 25 25	**Description:** CPU to BUMP interrupt. CPU not responding. **Action:** Use MAP 0210.
403-523	K	C59 C61 C62 C63 C65	50 25 25 25 25	**Description:** CPU to BUMP interrupt. No External Interrupt. **Action:** Use MAP 0210.
403-525	K	C59 C61 C63	50 25 25	**Description:** CPU to BUMP interrupt. IOD-HW-STS register error. **Action:** Use MAP 0210.

Error Number	Source	Failing Function Codes	Failure Percent (%)	Description
403-527	K	C59 C61 C63	50 25 25	**Description:** CPU to BUMP interrupt. XIRR4 register error. **Action:** Use MAP 0210.
403-528	K	C59 C61 C63	50 25 25	**Description:** CPU to BUMP interrupt. IOD-HW-STS register error. **Action:** Use MAP 0210.
403-529	K	C59 C61 C63	50 25 25	**Description:** CPU to BUMP interrupt. XIRR0 register error. **Action:** Use MAP 0210.
403-530	K	C59 C61 C63	50 25 25	**Description:** CPU to BUMP interrupt. XIRR4 register error. **Action:** Use MAP 0210.
403-531	K	C59 C61 C63	50 25 25	**Description:** CPU to BUMP interrupt. IRR register error. **Action:** Use MAP 0210.
403-540	K	C59 C61 C63	50 25 25	**Description:** UART to CPU interrupt. IRR register error, bit i#1. **Action:** Use MAP 0210.
403-541	K	C59 C61 C63	50 25 25	**Description:** UART to CPU interrupt. IRR register error, bit i#0. **Action:** Use MAP 0210.
403-542	K	C59 C61 C63	50 25 25	**Description:** UART to CPU interrupt. No External interrupt. **Action:** Use MAP 0210.
403-543	K	C59 C61 C63	50 25 25	**Description:** UART to CPU interrupt. External interrupt return error. **Action:** Use MAP 0210.
403-544	K	not available resource		**Description:** UART to CPU interrupt. Target processor error. **Action:** Use MAP 0210.
403-545	K	C59 C61 C63	50 25 25	**Description:** UART to CPU interrupt. XIRR4 register error. **Action:** Use MAP 0210.
403-546	K	C59 C61 C63	50 25 25	**Description:** UART to CPU interrupt. IRR register error. **Action:** Use MAP 0210.
403-550	K	C59 C61 C63	50 25 25	**Description:** CPU to CPU interrupt. MFRR register error. **Action:** Use MAP 0210.
403-551	K	C59 C61 C63	50 25 25	**Description:** CPU to CPU interrupt. External interrupt return error. **Action:** Use MAP 0210.
403-552	K	C59 C61 C63	50 25 25	**Description:** CPU to CPU interrupt. No external interrupt. **Action:** Use MAP 0210.
403-553	K	C59 C61 C63	50 25 25	**Description:** CPU to CPU interrupt. Target processor error. **Action:** Use MAP 0210.

Error Number	Source	Failing Function Codes	Failure Percent (%)	Description
403-555	K	C59 C61 C63	50 25 25	**Description:** CPU to CPU interrupt. XIRR register error. **Action:** Use MAP 0210.
403-560	K	C59 C61 C63	50 25 25	**Description:** TOD to BUMP interrupt. Unexpected interrupt error. **Action:** Use MAP 0210.
403-561	K	C59 C61 C63	50 25 25	**Description:** TOD to BUMP interrupt. No trap interrupt. **Action:** Use MAP 0210.
403-563	K	C59 C61 C62 C63 C65	50 25 25 25 25	**Description:** TOD to BUMP interrupt. MSR register error. BUMP interrupt management. **Action:** Use MAP 0210.
403-565	K			**Description:** MCA to CPU interrupt. All slots plugged with MCA boards. **Action:** Use MAP 0210.
403-566	K	909	100	**Description:** MCA to CPU interrupt. LSA board not responding. No interrupt on a PIO STORE with buid # on slot #. **Action:** Use MAP 0210.
403-567	K	C62 C63 C65 C68	100	**Description:** MCA to CPU interrupt. No interrupt on a PIO STORE with buid # on slot #. **Action:** Use MAP 0210.
404-000	K	C63 C61	80 20	**Description:** Atomic instructions error. **Action:** Use MAP 0210.
404-010	K	C63 C61	80 20	**Description:** Caches coherencies. Concurrent coherent write accesses error. **Action:** Use MAP 0210.
404-011	K	C63 C61	80 20	**Description:** Caches coherencies. Concurrent not coherent write accesses error. **Action:** Use MAP 0210.
404-012	K	C63 C61	80 20	**Description:** Caches coherencies. DCBST from line owner error. **Action:** Use MAP 0210.
404-013	K	C63 C61	80 20	**Description:** Caches coherencies. DCBF from line owner error. **Action:** Use MAP 0210.
404-014	K	C63 C61	80 20	**Description:** Caches coherencies. DCBI from line owner error. **Action:** Use MAP 0210.
404-015	K	C63 C61	80 20	**Description:** Caches coherencies. Concurrent not coherent write accesses error. **Action:** Use MAP 0210.
404-016	K	C63 C61	80 20	**Description:** Caches coherencies. DCBST not from line owner error. **Action:** Use MAP 0210.
404-017	K	C63 C61	80 20	**Description:** Caches coherencies. DCBF not from line owner error. **Action:** Use MAP 0210.

Error Number	Source	Failing Function Codes	Failure Percent (%)	Description
404-018	K	C63 C61	80 20	**Description:** Caches coherencies. DCBI not from line owner error. **Action:** Use MAP 0210.
404-019	K	C63 C61	80 20	**Description:** Caches coherencies. DCBT not from line owner error. **Action:** Use MAP 0210.
404-020	K	C63 C61	80 20	**Description:** DCB arbitration mechanism error. **Action:** Use MAP 0210.
404-030	K	C63 C61	80 20	**Description:** TLB mechanism error. **Action:** Use MAP 0210.
404-040	K	C63 C61	80 20	**Description:** Direct IO sharing error. **Action:** Use MAP 0210.
404-050	K	C63 B96 or B97 C61	50 30 20	**Description:** Main memory sharing error. **Action:** Use MAP 0210.
404-060	K	C63 C61 C59 B96 or B97	30 30 20 20	**Description:** Multi resources sharing error. **Action:** Use MAP 0210.
407-000	K	C59 C61 C63	40 30 30	**Description:** No active processor. **Action:** Use MAP 0210.
407-001	K	C59 C61 C63	40 30 30	**Description:** BUMP and one processor active. **Action:** Use MAP 0210.
407-002	K	C59 C61 C63	40 30 30	**Description:** More than one active processor for a mono-processor test. **Action:** Use MAP 0210.
407-003	K	C59 C61 C63	40 30 30	**Description:** Un-coherent test parameters. **Action:** Use MAP 0210.
407-004	K	C59 C61 C63	40 30 30	**Description:** [Gx.Tx] test: not defined **Action:** Use MAP 0210.
407-011	K	C59 C61 C63	40 30 30	**Description:** General test manager launching T-O. **Action:** Use MAP 0210.
407-012	K	C59 C61 C62 C63 C65	40 30 30 30 30	**Description:** CPU/LSA test manager launching T-O. **Action:** Use MAP 0210.
407-013	K	C59 C61 C62 C63 C65	40 30 30 30 30	**Description:** CPU/LSA test manager stopping T-O. **Action:** Use MAP 0210.
407-014	K	C59 C61 C63	40 30 30	**Description:** CPU interrupt test manager launching T-O. **Action:** Use MAP 0210.

Error Number	Source	Failing Function Codes	Failure Percent (%)	Description
407-015	K	C59 C61 C63	40 30 30	**Description:** CPU interrupt test manager stopping T-O. **Action:** Use MAP 0210.
407-016	K	C59 C61 C63	40 30 30	**Description:** CPU multi-processor test manager launching T-O. **Action:** Use MAP 0210.
407-017	K	C59 C61 C63	40 30 30	**Description:** CPU multi-processor test manager stopping T-O. **Action:** Use MAP 0210.
407-018	K	C59 C61 C62 C63 C65	40 30 30 30 30	**Description:** CPU test performing T-O. **Action:** Use MAP 0210.
407-019	K	C59 C61 C63	40 30 30	**Description:** Operator test abort. **Action:** Use MAP 0210.
407-020	K	C59 C61 C62 C63 C65	40 30 30 30 30	**Description:** Checkstop error. **Action:** Use MAP 0210.
407-021	K	C59 C61 C62 C63 C65	40 30 30 30 30	**Description:** Checkstop error, reset failing. **Action:** Use MAP 0210.
407-022	K	B48 C59 C61	60 20 20	**Description:** Single error. **Action:** Use MAP 0210.
407-023	K	C59 C61 C62 C63 C65	40 30 30 30 30	**Description:** CPU-NVRAM dialogue not OK. **Action:** Use MAP 0210.
407-024	K	C59 C61 C62 C63 C65	40 30 30 30 30	**Description:** No CPUi program code. **Action:** Use MAP 0210.
407-025	K	C59 C61 C62 C63 C65	40 30 30 30 30	**Description:** CPUi launching not OK. **Action:** Use MAP 0210.
407-030	K			**Description:** Not defined parameter. **Action:** Use MAP 0210.
408-000	K	C59 C60 C61 C63	60 20 10 10	**Description:** Floppy disk peripheral accesses error. **Action:** Use MAP 0210.

Error Number	Source	Failing Function Codes	Failure Percent (%)	Description
408-060	K	B94 B96 or B97	50 50	**Description:** Main memory Knaizuk-Hartmann test error. **Action:** Use MAP 0210.
408-080	K	C63 C61	90 10	**Description:** Multi resources full test error. **Action:** Use MAP 0210.
409-000	K	???	100	**Description:** Planar vital part FATAL ERROR. **Action:** Use MAP 0210.
409-008	K	B94 or C64 or D28	100	**Description:** No 2MB available in MM. All memory banks FATAL ERROR. **Action:** Use MAP 0210.
409–050	K	None	None	**Description**: 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	**Description**: 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	**Description**: –12 stand–by VOLT error. **x** is the unit number.
409–052 T2 **x**	K	Firmware	100	**Description**: +12 stand–by VOLT error. **x** is the unit number.
409–053 T1 **x**	K	Firmware	100	**Description**: 485RX protocol error (lengths). **x** is the unit number.
409–053 T2 **x**	K	Firmware	100	**Description**: 485RX protocol error (time–out). **x** is the unit number.
409–053 T3 **x**	K	Firmware	100	**Description**: 485RX protocol error (checksum error). **x** is the unit number.
409–054 T1	K	Firmware	100	**Description**: Marginature error (ASIC VOLT).
409–054 T2	K	Firmware	100	**Description**: Marginature error (CPU VOLT).
409–054 T3 **x**	K	Firmware	100	**Description**: Marginature error (+5 VOLT). **x** is the unit number.
409–055 T1	K	Firmware	100	**Description**: VPD command error (read VPD).
409–055 T2	K	Firmware	100	**Description**: VPD command error (write VPD).
409–056	K	Firmware	100	**Description**: Marginature command error.
409–057	K	Firmware	100	**Description**: Checksum logging not valid.
409–058	K	Firmware	100	**Description**: Environment over temperature.
409–059 T1	K	Firmware	100	**Description**: I2C bus error (wrong interrupt frame).
409–059 T2 **x**	K	Firmware	100	**Description**: I2C bus error (unknown SIB interrupt). **x** is the unit number.
409–059 T3 **x**	K	Firmware	100	**Description**: I2C bus error (unknown interrupt source). **x** is the unit number.
409–059 T4 **x**	K	Firmware	100	**Description**: I2C bus error (unknown operator panel interrupt). **x** is the unit number.
409-080	K	C59 C60 C88 or C89	33 33 33	**Description:** BUMP access to OPP or OPP access to SIF failed. **Action:** Use MAP 0210.
409-081	K	C59 C88 or C89	50 50	**Description:** BUMP access to SIF failed. **Action:** Use MAP 0210.
409-082	K	C59 C60	80 20	**Description:** Operator panel cannot access the BUMP. **Action:** Use MAP 0210. **Note:** This problem can be caused by an incorrectly installed CEC.

Error Number	Source	Failing Function Codes	Failure Percent (%)	Description
409-083	B	C60	100	**Description:** OP microcontroller not working. **Action:** Use MAP 0210.
409-087	K	C63	100	**Description:** MVR not compatible with the CPU boards. **Action:** Use MAP 0210.
409-088	K	C63	100	**Description:** Different cycle time between the present CPU boards. **Action:** Use MAP 0210.
409-089	K	C63	100	**Description:** Different cycle time between CPU boards and MPB. **Action:** Use MAP 0210.
409-090	K	C88 or C89	100	**Description:** No SIF reply on power-on command. **Action:** Use MAP 0210.
409-091	K	C88 or C89	100	**Description:** SIF failure status on power-on command. **Action:** Use MAP 0210.
409-092	K	C59	100	**Description:** No valid Flash EPROM/EPROM. **Action:** Use MAP 0210.
409-093	E	D19	100	**Description:** MVR Fan failed. **Action:** Use MAP 0210.
409-094	E	D16	100	**Description:** CPU Fan failed. **Action:** Use MAP 0210.
409-095	E	???	100	**Description:** Disk Fan failed. **Action:** Use MAP 0210.
409-096	E	D17	100	**Description:** MCA Fan failed. **Action:** Use MAP 0210.
409-097	E	C92	100	**Description:** Power Supply failed. **Action:** Use MAP 0210.
409-098	K	152	100	**Description:** Power supply hot**.** **Action:** Use MAP 1540.
409-Axy	K	152	100	**Description:** Power supply internal failure. **Action:** Use MAP 1520.
F/W FATAL ERROR	K	Firmware	100	**Description**: 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:

PKSR Layout

0..3 4..6 7 8 9 10..13 14 15 16......23 24..27 28..31 Bit Numbering

- Keylock position
- Reserved for future use
- Power fault and fan fault decode (R Series only)
- Cooling system operating in backup mode
- Power system operating in backup mode
- Action bits for rc.powerfail
- Battery backup Status (not used)
- Battery backup plug (not used)
- Power up decode
- Power up decode
- Power interrupt and fan fault decode (G Series and J Series only)

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 in operating in backup mode
- the key is in normal position

Appendix E. System Power States

The state of the system is dependant on the condition of four variable conditions that effect how the system IPLs or shuts down. The four conditions are:

- the position of the Power-on button

  This button has two positions. It can be pressed in to the On position (position for turning the power on), or it can be in the out or Off position.

- the position of the system key (physical key mode or electronic key mode)

  The system key represents the condition (Normal, Secure, or Service) that the system is set to by the physical key mode switch or the electronic key mode switch.

- the `was_shutdown` status

  The system keeps a record when it has been shutdown using the **shutdown –F** command since the last IPL.

- the `power_fault` status

  The system keeps a record when it receives a power fault condition since the last IPL.

Power States

The state of the system depends on how the variables were set either when the power was applied to the system, or when the power was removed.

MAIN_STANDBY

This is the initial state of the system when power is first applied (by plugging a 7012 G Series into an electrical outlet, or by setting the main power switch of the 7013 J Series to the On position for example). When in this state, the BUMP console displays `STANDBY`, unless the console is set to display the operator panel display error messages.

The Power-on button and the BUMP console Enter key are polled by the system continuously for a change in status. The system remains in this state until one of the following occurs:

- If the Power-on button is initially detected to be in the On position, and the `was_shutdown` status is false, the system goes to the WAIT_POWER_ON state.

- If the Power-on button is pressed and changes from the Off position to the On position, the system goes to the WAIT_POWER_ON state.

- If the Power-on button is pressed and changes from the On position to the Off position, the system sets the `was_shutdown` status to false.

- If the BUMP console Enter button is pressed, the system goes to the SBB_GATEWAY state.

SBB_GATEWAY

In this state the > character is displayed on the BUMP console and the cursor is located two spaces to the right of the > prompt (> _).

- If the command `sbb` is entered on the BUMP console, and the system key is in the Service position, the system goes to the SBB_MENU state.

If the command sbb is entered on the BUMP console, and the system key is in the Normal position, the system goes to the SBB_ECMD state.

- If the Power-on button is pressed and changes from the On position to the Off position, the system sets the was_shutdown status to false.

- If the Enter key is pressed on the BUMP console, the system goes to the 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 $\geq$, go to step 2.

   – If you see any sbb type menu, type `x` and then press Enter repeatedly until 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 *nth* 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.

FEPROM (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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Printed in the U.S.A.

93H4875

SA23–2741–02