

7012 G Series

Operator Guide

Third Edition (April 1997)

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Communications Statements

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

Federal Communications Commission (FCC) Statement

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

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

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

United Kingdom Telecommunications Safety Requirements

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

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

European Union (EU) Statement

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

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

This product has been tested and found to comply with the limits for Class A Information Technology Equipment according to CISPR 22 / European Standard EN 55022. The limits for Class A equipment were derived for commercial and industrial environments to provide reasonable protection against interference with licensed communication equipment.

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

International Electrotechnical Commission (IEC) Statement

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

Avis de conformité aux normes du ministère des Communications du Canada

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

Canadian Department of Communications Compliance Statement

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

VCCI Statement

電波障害自主規制 届出装置の記述

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

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

取扱説明書に従って正しい取り扱いをしてください。

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

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

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

Read the instructions for correct handling. VCCI-1.

Radio Protection for Germany

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

Der Aussteller der Konformitätserklärung ist die IBM Germany.

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

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

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

Hinweis:

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

Safety Notices

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

Danger notices appear on the following pages:

xiv
xiv
1-7
4-1
10-1

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

Caution notices appear on the following pages:

xiii
xiv
1-7
4-1
10-1

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

For safety checks when relocating, refer to the Chapter on “Moving the System Unit.”

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

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.

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 communications lines.

CAUTION:

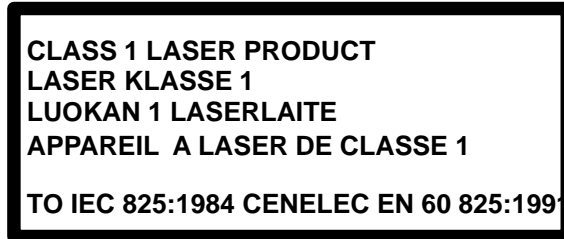
This product is equipped with a three-wire power cable and plug for the user's safety. Use this power cable in conjunction with a properly grounded electrical outlet to avoid electrical shock.

DANGER

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

Laser Safety Information

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



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



CAUTION:

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

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

About This Book

This book contains information on system operations for the 7012 G Series and describes tasks the operator can perform to do removal and replacements, system verification, and diagnostics. It provides information about the operator controls and devices of the 7012 G Series system unit.

The information in this book is arranged to first acquaint you with the system unit and its features and then to provide assistance with problem determination, system verification, and the service aids available to you.

Use chapters 1, 2, and 8 for system description and feature locations. Use chapters 4 through 7 to review system diagnostics and service aids. To remove and replace features, refer to chapter 3. Chapter 9 provides help to use when moving the system.

ISO 9000

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

Related Information

The *Problem Solving Guide and Reference*, order number SC23-2606, is the first book you should use when you have a problem with the system unit. It contains procedures for determining if the problem is hardware or software related.

The *Adapters, Devices, and Cable Information*, order number SA23-2764, contains information about various hardware and software offerings.

The *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 *3151 ASCII Display Station Guide to Operations*, order number GA18-2633, contains information about the 3151 terminal.

The *3164 ASCII Color Display Station Description*, order number GA18-2617, contains information about the 3164 terminal.

Chapter 1. System Unit Description

This chapter contains information to help you become familiar with the 7012 G Series system unit and disk expansion unit.

The 7012 G Series is a minitower unit.

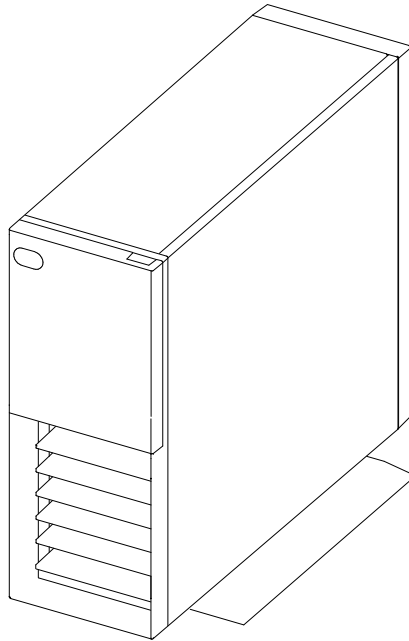
System Unit

This system is a one, two, or four way symmetric multiprocessor (SMP) based on the PowerPC architecture.

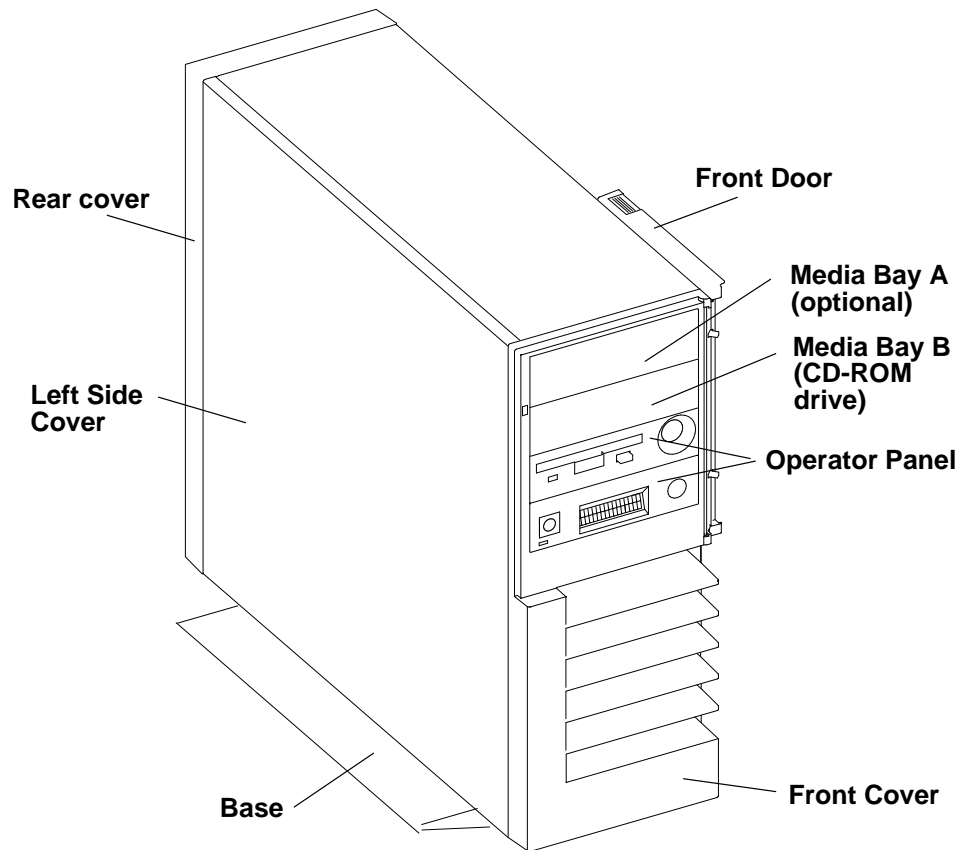
The system unit processes data (input) from the disk drives, diskettes, tape drives, and communications connections. It contains up to four 32-bit processors, up to six Micro Channel adapters, memory, up to five disk drives (G30) or two disk drives (G40), a 3.5-inch diskette drive, and up to two media devices. The system unit also has three serial ports, one parallel port, and optional mouse and keyboard ports. The hardware is controlled by the operating system.

For a complete list of features for different configurations, see *Adapters, Devices, and Cable Information*, order number SA23-2764, for details.

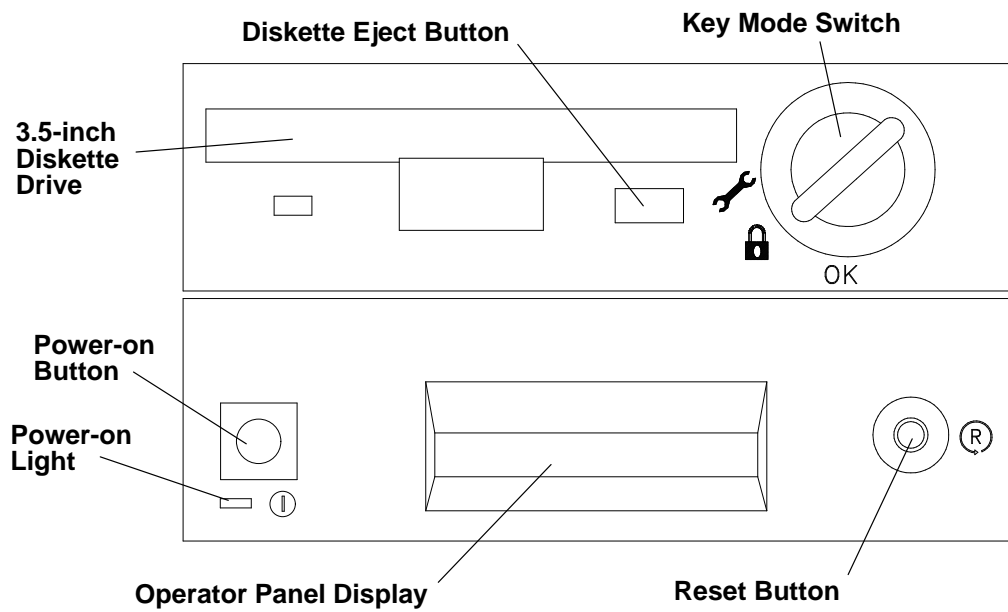
The system unit has a front cover with an operator-accessible front panel.



Front View with Front Door Opened



Operator Panel



System Unit Features

Mode Switch

Is a key-controlled mode switch with three positions labeled:

OK (Normal)

 **(Service)**

 **(Secure)**

Reset Button

Resets the system unit, depending on the position of the mode switch.

Attention: Pressing the Reset button with the key mode switch in the Normal or Service position, and the operating system running can result in damaged or lost data.

Operator Panel Display Displays status indications of the system.

Power Light Indicates, when the green LED is lit, that all voltages in the power supply are present and within limits, and that the fans are running. The power light is used to help analyze power and cooling problems.

Power Button Turns the system power on and off. The system power can also be controlled by the SystemGuard. Power to the SystemGuard is always present as long as the system unit power cord is plugged into an electrical outlet.

Diskette Drive Contains a 1.44MB 3.5-inch diskette drive that has an in-use light and an eject button.

Rear Fan Provides cooling for the electronics.

Front Door Provides access to the operator panel, and can be opened or removed.

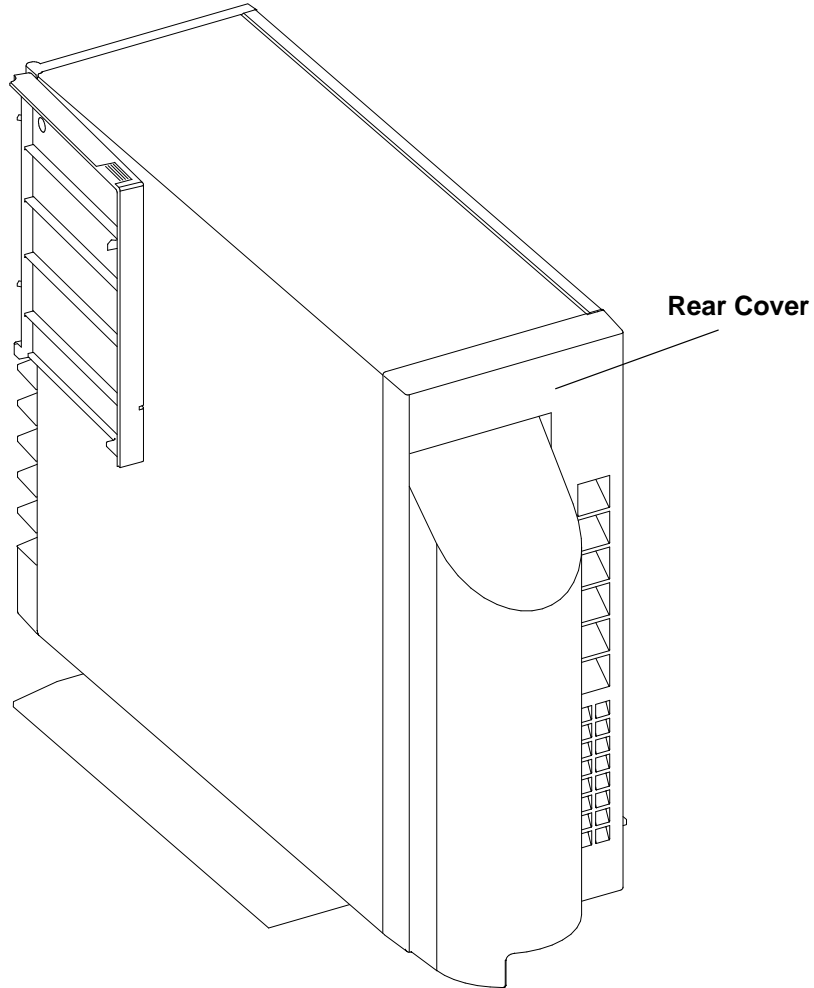
Front Cover Can be removed.

Left Side Cover Provides access to system unit internal devices, and is removable.

Rear Cover Can be removed.

Refer to "The Operator Panel" on page 3-3 for a more information about the operator panel.

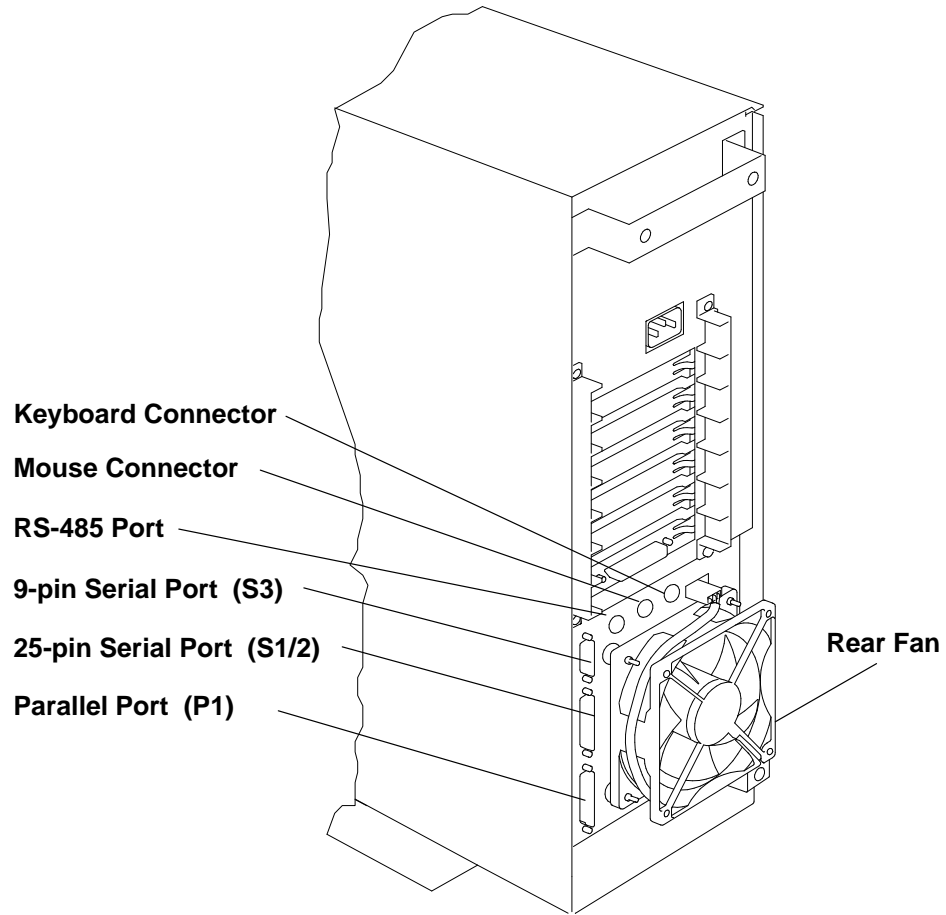
Rear View with Cover



For the external connections, the system provides:

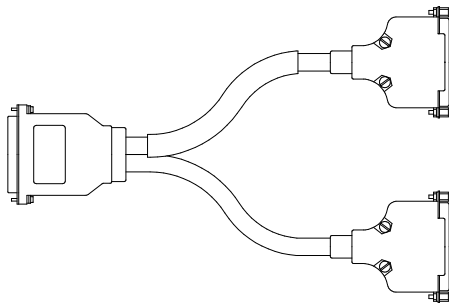
- One 9-Pin RS-232 Serial Port, which provides line *S3*, normally used for uninterrupted power source (UPS) connection or as normal serial port
- One 25-Pin EIA-232 Serial Port, *S1*; using a splitter cable, this port provides port *S1* and port *S2*, which can be reserved for maintenance diagnostics or can be addressed as serial ports.
- 1 parallel port.
- 1 RS-485 port for power control of expansion unit.

Rear View without Cover



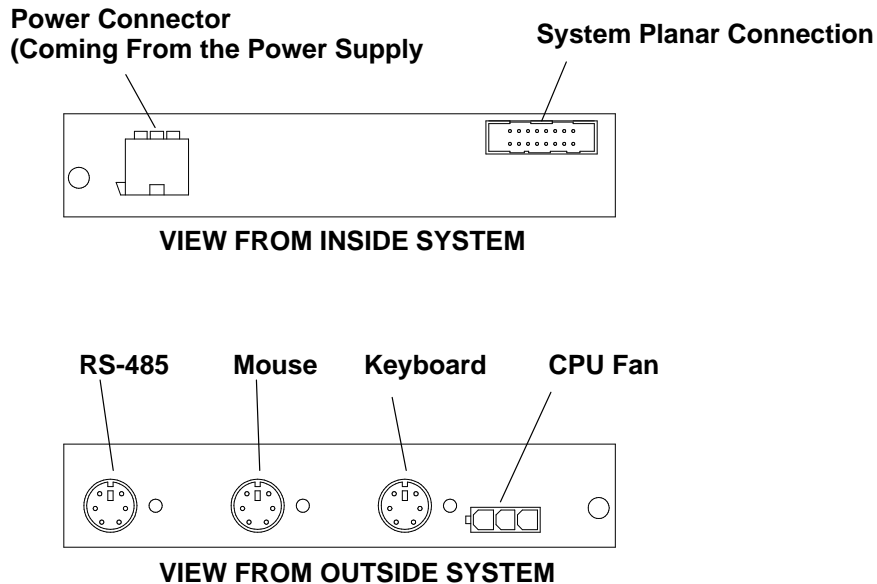
Serial Port Splitter Cable

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 (S1/2) located in the rear of the base unit.



RS-485 Card Base Unit

The RS-485 card is installed in the rear of both the base and the disk expansion units. The figure below shows the connectors as they are used for the base system unit.



Micro-Channel Adapters

7012 G Series systems support a variety of MCA adapters. For a full description of each MCA adapter, please refer to the *Adapters, Devices, and Cable Information* delivered with your system.

The MCA adapters can be installed in any free slot on the base unit. The only restriction is that the first SCSI controller must be installed in the lowest MCA slot (slot #6). See the *SCSI Controllers* section below for detailed information about the rules to be observed when installing a SCSI controller on your system.

SCSI Controllers

The installation of the SCSI controllers on 7012 G Series systems implies some rules.

- The first SCSI controller must be installed in slot #6, that means the lowest MCA slot in the unit.
- The next SCSI controllers must be installed in sequential order, one after the other, starting from the first free slot closest to the first SCSI controller.
- Each free slot can be used to install any other MCA adapter.

External Device Connectors

When the rear cover is removed, the system unit connectors and ports are accessible. These connectors and ports are used to attach external devices.

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

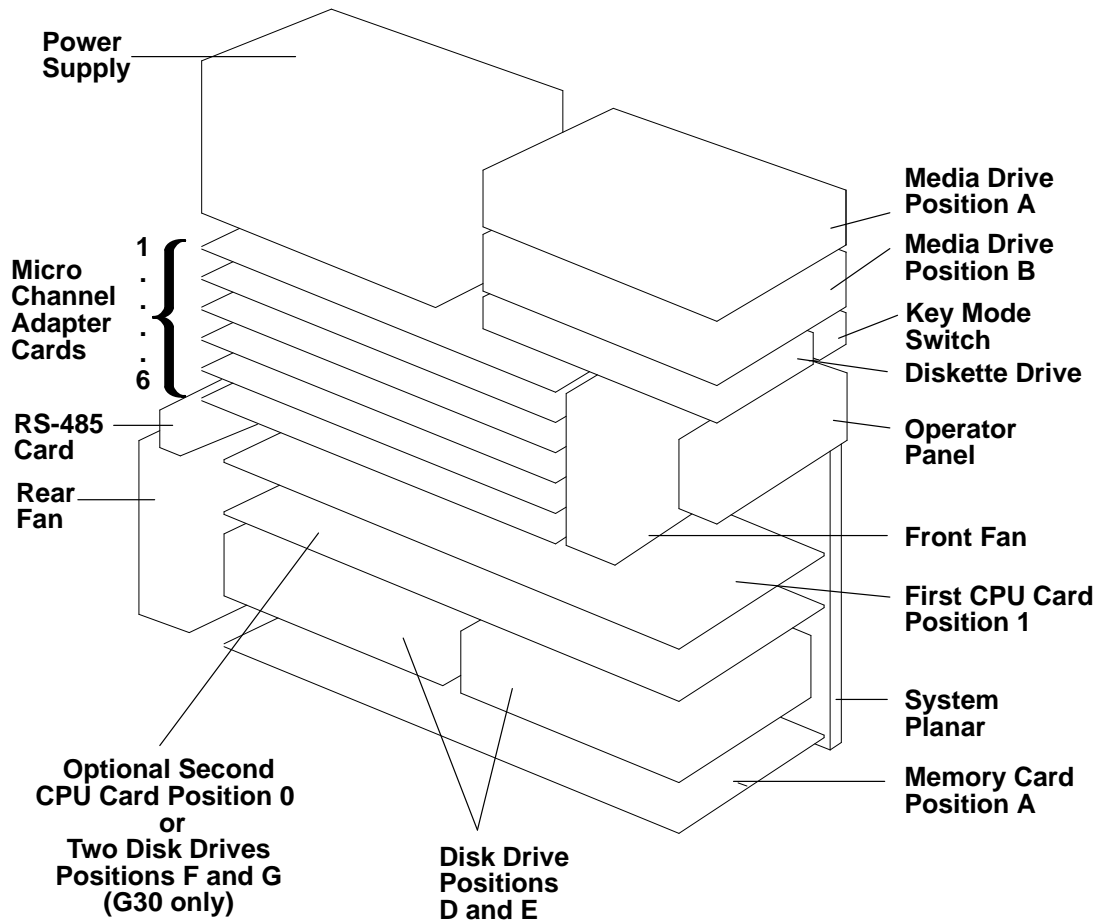
To prevent shock hazard, disconnect the power cable from the electrical outlet before relocating the system.

Internal Devices

The internal devices include two media drives in the front panel positions. Position A can have a disk drive if not used for a media drive.

The system unit also has positions for four (G30) or two (G40) internal disk drives as shown below, up to five (G30) or three (G40) disk drives can be installed inside the system unit. There are no operator controls on the internal disk drives.

Note: The lower CPU card slot can have a second CPU card or two additional disk drives.



Rules for Installation of Disk Drives

Disk drives must be installed inside the units observing the following specific rules.

- **Base Unit**

The base unit comes from the factory with the first disk drive already installed on the appropriate bottom tray, in the position on the left. The first disk drive must be always in that position. The second disk drive must be installed near the first one on the same tray, in the position on the right.

If it has been chosen to introduce the optional upper tray (G30 only) to contain two other disk drives inside the base unit, the third disk drive must be installed on it in the left side position. The fourth one must be installed near the third one on the same support, in the position on the right. The optional upper tray supports only 3.5-inch form factor disk drives that are 1-inch tall.

- **Disk Expansion Unit**

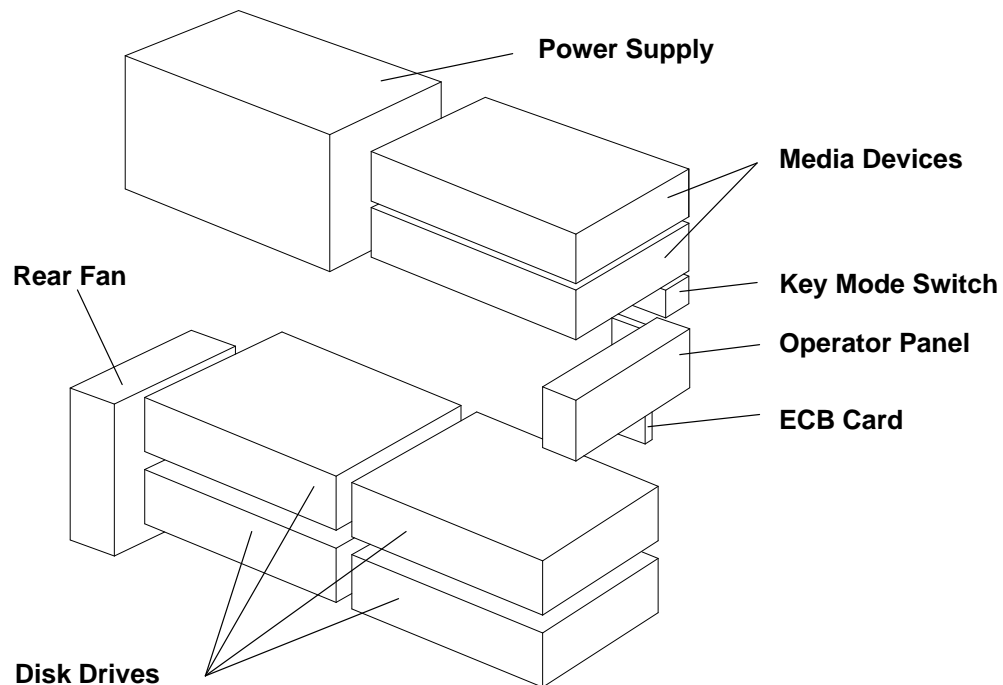
The positions and rules for disk drive in the base unit applies also to the disk expansion unit. In addition, there is also the possibility to install 3.5-inch form factor disk drives into a free slot dedicated to the media devices, after having arranged this slot with an appropriate frame. This frame is needed to reduce the size of the designated slot, making it able to house 3.5-inch form factor disk drives instead of 5.25-inch form factor media devices.

It is recommended to use these slots only after having used all the slots dedicated exclusively to the disk drives.

Description of the Disk Expansion Unit

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

After you remove the unit covers all hardware components inside the disk expansion unit are accessible from the left side.



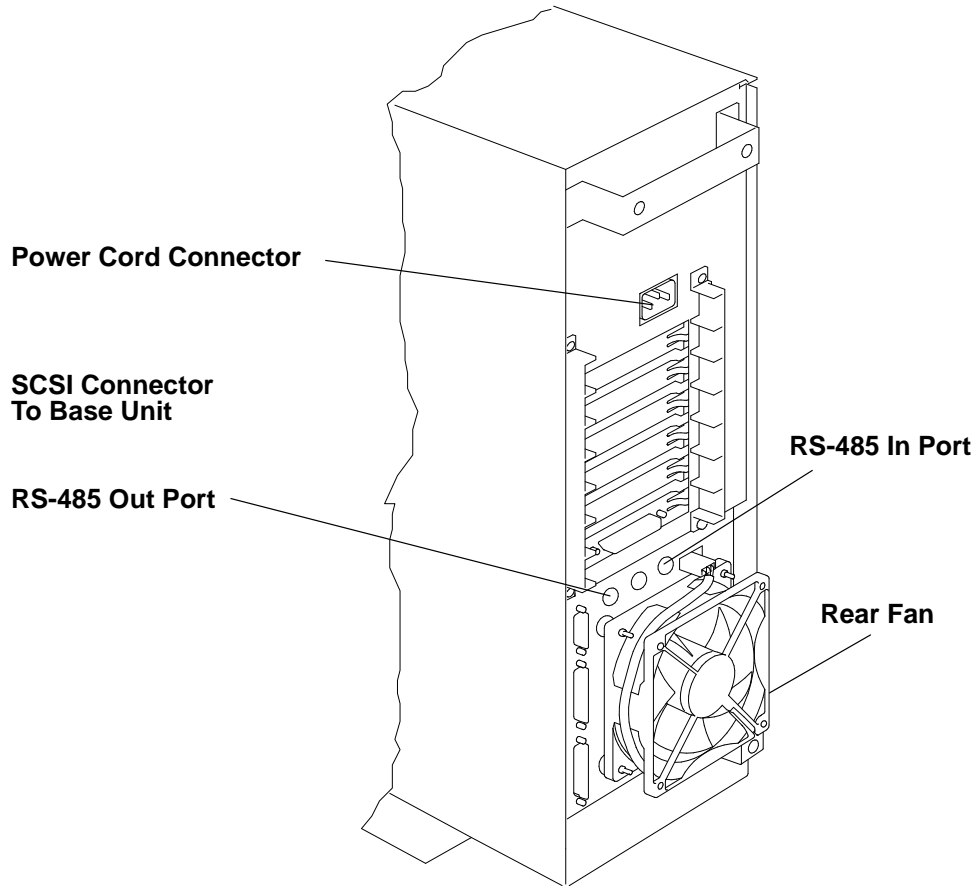
From the left side of the disk expansion unit, the following modules are accessible:

- Up to two 5.25-inch half height media devices (optional). Up to two 3.5-inch half height disk drives can be installed instead.
- The operator panel (mandatory)
- The key mode switch (mandatory)
- The ECB card (mandatory)
- A maximum of two disk drives (optional) in the bottom tray
- A maximum of 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.



Disk Expansion Unit SCSI Bus

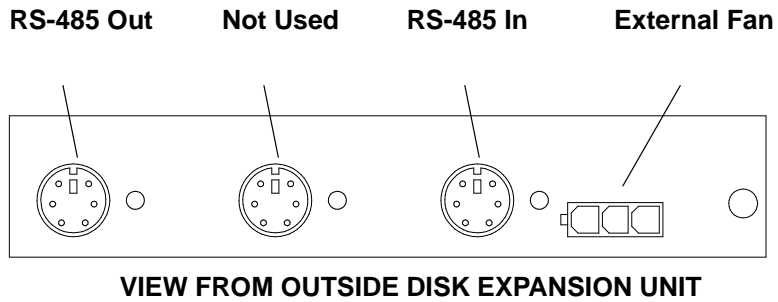
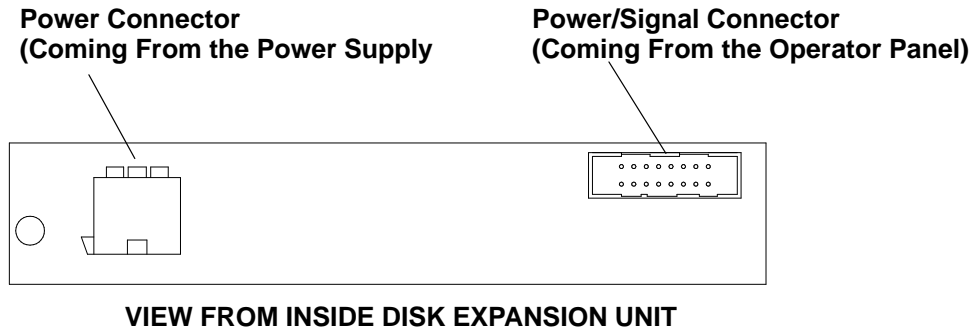
The disk expansion unit is equipped with one internal SCSI bus. It is driven by means of a SCSI-2 single-ended controller via an external connection.

The SCSI bus features the following characteristics:

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

RS-485 Card Expansion Unit

The RS-485 card is installed in the rear of both the base and the disk expansion units. The figure below shows the connectors as they are used for the disk expansion unit.

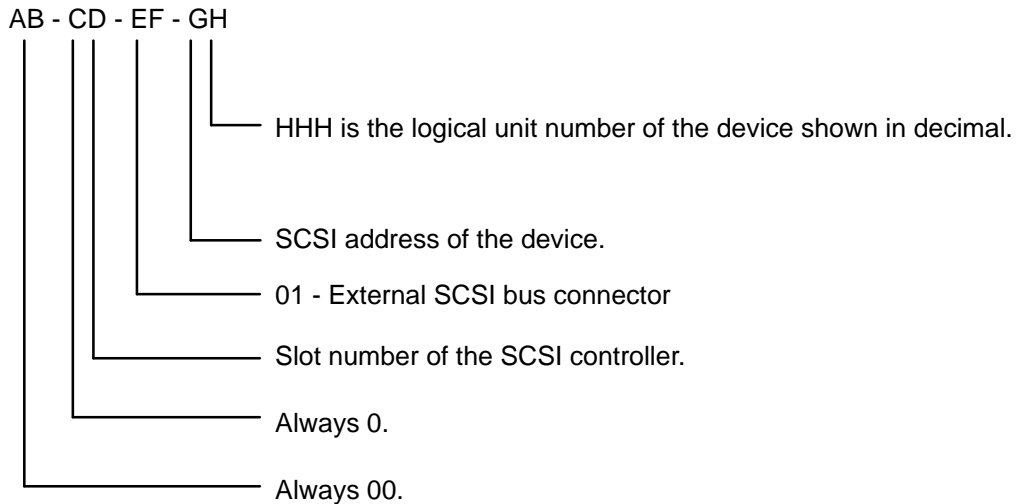


Location Codes

Because the same diagnostic programs are used on all of the system units, a location code is used to physically locate a failing device or unit. The location code is displayed along with the service request number (SRN) when the diagnostic programs isolate a failure. If the location code is not known, you can run the Display Previous Diagnostic Results service aid to display the results of the last time the diagnostic programs were run.

Location Code Format for SCSI Devices

Use Appendix F to determine the physical location of a SCSI device.

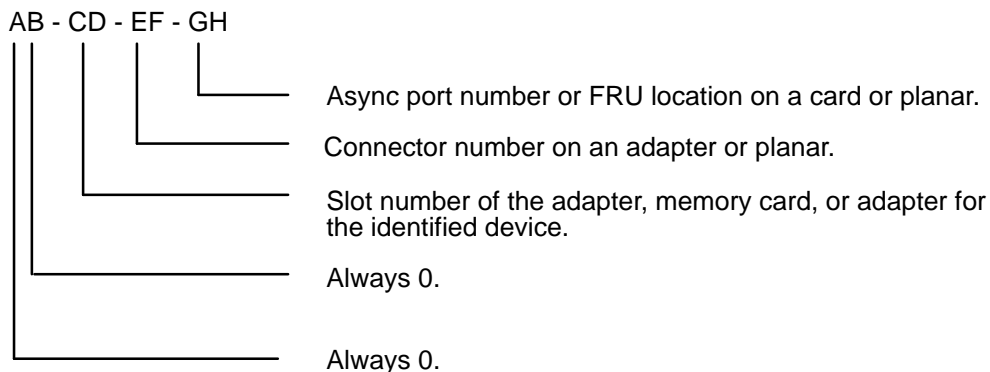


Location Code Format for Non-SCSI Devices

The following example is for non-SCSI devices. These include planars, memory cards, adapters, and async distribution boxes.

Use the example to determine the physical location of a device.

Note: The G and H fields each can contain one, two, or three characters.



Location Code Format for 7135, 9333, and 9334 Expansion Units

The location code formats for the 7135, 9333, and 9334 expansion units are described in the publications for the 7135, 9333, and 9334 expansion units.

Location Code Table

Use the following table to determine the physical location of a device or unit.

Use the following example to identify the two-character pairs.

AB-CD-EF-GH

Pair	Value	Description
AB	00	Workstation-type system unit
CD	00	A device attached to the planar
	01	Adapter in slot 1 of the system planar
	02	Adapter in slot 2 of the system planar
	03	Adapter in slot 3 of the system planar
	04	Adapter in slot 4 of the system planar
	05	Adapter in slot 5 of the system planar
	06	Adapter in slot 6 of the system planar
	0A	Memory Card in slot A on the system planar
	0P	CPU Card in slot P on the system planar (upper)
	0Q	CPU Card in slot Q on the system planar (lower)
EF	00	Does not have a connector or software was not able to identify the connector number
	01	The number of the connector on an adapter card, distribution box, or planar
	02	
	03	
	04	
	0D	Internal diskette connector on the system planar
S1	Serial port 1 connector on the system planar	
S2	Serial port 2 connector on the system planar	
S3	Serial port 3 connector on the system planar	
P1	Parallel port 1 connector on the system planar	

Pair	Value	Description
G,HHH	00	For devices other than those listed here
	00 thru 15	Port addresses for 8-port async, 16-port async, and 16-port concentrator distribution boxes
	01	Diskette drive 1
	01	Memory SIMM or DIMM in location 1 on the memory card.
	02	Memory SIMM or DIMM in location 2 on the memory card.
	03	Memory SIMM or DIMM in location 3 on the memory card.
	04	Memory SIMM or DIMM in location 4 on the memory card.
	05	Memory SIMM or DIMM in location 5 on the memory card.
	06	Memory SIMM or DIMM in location 6 on the memory card.
	07	Memory SIMM or DIMM in location 7 on the memory card.
	08	Memory SIMM or DIMM in location 8 on the memory card.
	09	Memory SIMM or DIMM in location 9 on the memory card.
	10	Memory SIMM or DIMM in location 10 on the memory card.
	11	Memory SIMM or DIMM in location 11 on the memory card.
	12	Memory SIMM or DIMM in location 12 on the memory card.
13	Memory SIMM or DIMM in location 13 on the memory card.	
14	Memory SIMM or DIMM in location 14 on the memory card.	
15	Memory SIMM or DIMM in location 15 on the memory card.	
16	Memory SIMM or DIMM in location 16 on the memory card.	
00 thru FF	SCSI address and logical unit number of the device	
000 thru FFF	SCSI address and logical unit number of the device shown in hexadecimal	
0,000 thru F,255	SCSI address and logical unit number of the device shown in decimal Note: When a comma appears between the G and H, digits appearing to the right of the comma are represented in decimal.	

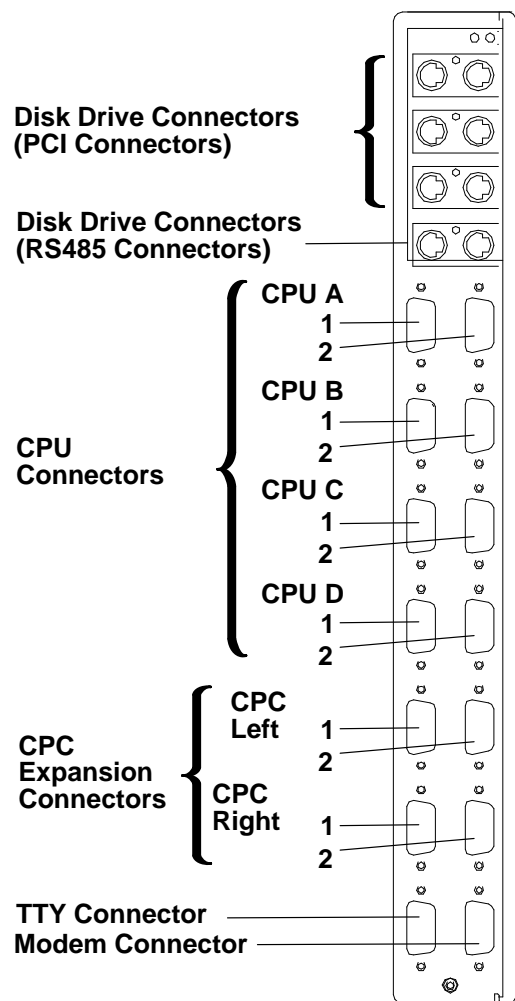
Cluster Power Control

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.



Chapter 2. Using the System Unit

This chapter explains how to use the operator panel and other devices for control, input, display, and data storage for the 7012 G Series system unit.

Setting the Mode Switch

The mode switch has three positions:

OK (Normal)

 (Service)

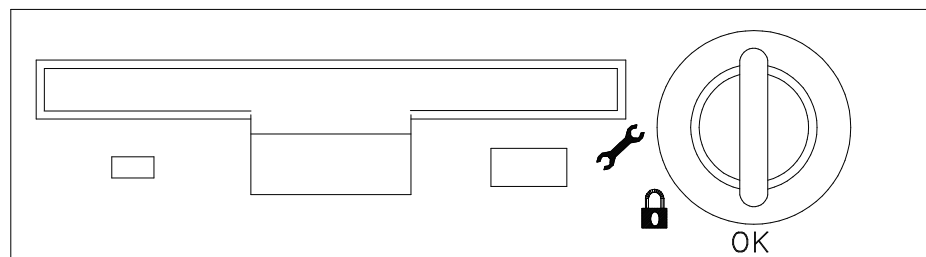
 (Secure)

The switch is used to establish the initial program load (IPL) path. The IPL loads the system programs, checks the system hardware, and prepares the system for user operation.

Before starting the system unit for normal day-to-day operation, set the mode switch to the Normal position. This permits the operating system to load after the power has been turned on and the system has completed tests to ensure it is operating correctly. See “Chapter 3, Using System Guard” for more detailed information about controlling the system as it IPLs.

Note: It is possible to set the **Electronic Mode Switch (E-Key)** through SystemGuard firmware from the local or remote SystemGuard BUMP console. In Normal mode an electronic key may be used to set Normal, Secure and Service modes. For remote maintenance, see “Electronic Mode Switch” on page 2-3. In Secure and Service modes, the physical key setting prevails.

Mode Switch Shown in the Normal Position



The following table summarizes the possible operations for each mode switch position:

Operation	Mode Switch Position		
	Normal	Secure	Service
Reset	Enabled	Disabled	Enabled
SystemGuard BUMP Console Active	Enabled	Enabled	Enabled
Dump	Disabled	Disabled	Enabled
Normal IPL	Enabled	Disabled	Disabled
Service IPL	Disabled	Disabled	Enabled

- The Normal position is used for attended operation, which is the usual or normal placement of the mode switch when an operator is present and in control of the operation of the system unit. The Reset button is active when the key mode switch is in the Normal position. The IPL proceeds according to the Normal Mode Bootlist.

Attention: Pressing the Reset button when the mode switch is in the Normal position can cause data to be damaged or lost if the operating system is running.

- The Secure position prevents the system from booting. If the system is already booted, this position does not lock the system console or block system network communication.

When booting the system with the mode switch in the Secure position, 200 is displayed. If the Reset button is pressed at this point, the system resets and goes through another boot process until 200 is displayed again.

When the operating system is up, turning the key to the Secure position disables the Reset button. With the key mode switch in this position, a passerby cannot accidentally press the Reset button and cause a loss of data.

- The Service position is used for attended operation when hardware or software service is conducted. The Service position activates operating system console sequences that support error determination (debug) and storage printout (dump). The IPL proceeds according to the Service Mode Bootlist.

Attention: The Reset button is active when the mode switch is in the Normal or Service position. Pressing the Reset button can cause data to be damaged or lost if the operating system is still running.

The key mode switch is also used for the following:

- **To indicate to the diagnostic programs that there is no console available:** This is done by setting the mode switch from Service to Normal and then back to Service when c31 is displayed on the operator panel display.
- **To start a dump:** If the system is booted in Normal mode, a manual dump is started by setting the mode switch to Service and pressing the Reset button. If the system is booted with the mode switch set to Service mode, a dump is started by setting the key to Normal and pressing the Reset button. If the Reset button is pressed twice, the system reboots.

If there is a problem with the system unit, refer to the *Problem Solving Guide* before setting the mode switch to the Service position or pressing the Reset button.

Attention: Do not set the key mode switch from Normal (OK) to Service while the system is booting. Instead, wait until the boot is completed and then change the mode switch setting.

Electronic Mode Switch

The electronic mode switch enables you to remotely change the status of the mode switch. The electronic mode switch is able to:

- Change the system from Normal to Service mode for maintenance or debug purposes without a person physically being present near the system to change the mode switch position.
- Facilitate remote access and service of a customer-installed machine from a customer hub or a service center, and run offline and online diagnostics from the remote location to isolate faults.
- Activate, by a software command (from an enabled terminal) the use of the maintenance features on the remote line.
- Break a remote maintenance session, if some intrusion attempt is suspected.
- Prevent nonauthorized access to the system by setting the system to Secure mode.

The following functions cannot be performed remotely by setting the electronic mode switch:

- Indicate to diagnostic program that no console is available.
- Starting a manual dump by switching the mode switch and resetting the system.

The physical mode switch set to Service or Secure position overrides the electronic mode switch. The electronic mode switch overrides the physical mode switch, only when the latter is set to Normal position.

The electronic mode switch allows an electronic change to the state of the mode switch, in the following way:

Physical Mode Switch	Electronic Mode Switch	Status of the System (see note)
Normal	Normal	Normal
	Service	Service
	Secure	Secure
Secure	Set to any mode	Secure
Service	Set to any mode	Service

Note: The key mode status matters only during IPL and in offline maintenance mode. Once the operating system is up and running, the key mode status is ignored (except by maintenance application software and diagnostic aids).

The following functions of the key mode switch cannot be performed remotely by setting the E-Key:

- Indicate to the diagnostic program that no console is available
- Start a manual dump.

See the *AIX Version 4 System Management Guide: Communications and Networks* and the **keycfg** command for detailed information on the electronic mode switch.

Setting the Electronic Mode Switch

See “How to Set the Electronic Key” on page 3-39 for information about setting the electronic key mode switch.

Starting and Stopping the System Unit

The four methods of starting the system are:

- Manual:

The power is switched on manually, and the system unit does a normal or a service IPL.

- Remote:

The power is switched on from another location, and the system unit does a normal IPL. (To use this method, a modem or an equivalent device must be attached to the system.)

- Programmed by date and time:

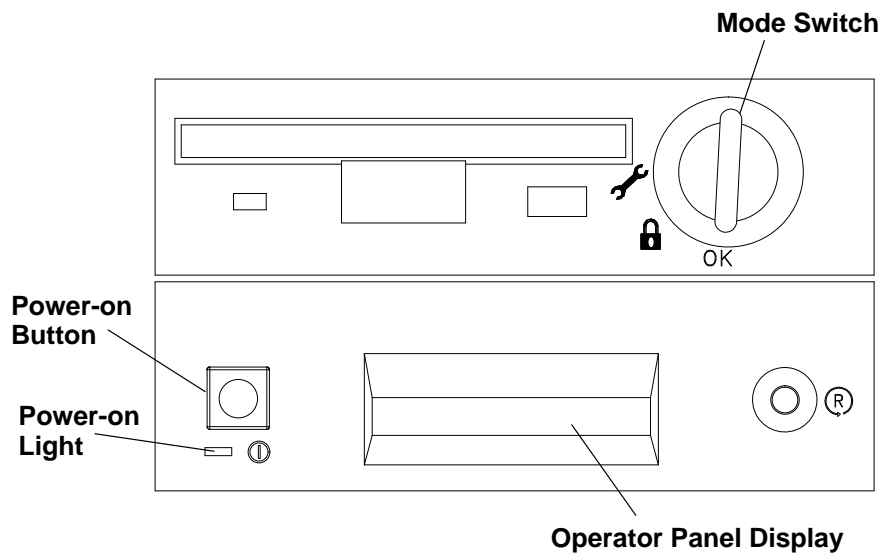
On a specific day and time, the power is switched on and the system unit does a normal IPL.

- Recovery after a power failure:

When the power is restored, the power is switched on and the system unit does a normal IPL.

The examples used in this section describe a manual start up procedure. Refer to the *AIX Version 4 System Management Guide: Operating System and Devices*, for more information on all start up and shut down procedures. Also refer to “Chapter 3. Using System Guard” and “Appendix G. System Power States” for additional start up and shut down procedures.

Manually Starting the System Unit



1. Plug the power cord into an electrical outlet, the LCD display will display the message “Stand-By”, indicating that stand-by power is on.
2. Set the mode switch to the Normal (OK) or Service (🔧) position. This position prevents an autoboot in case of a system crash or checkstop condition.
3. Set the power switches of the attached devices to On.
4. Start the system unit by pressing the power-on button.

Note: If the power button is already pushed in, you must press it once to reset the button, and then press it again to turn the power on.

The power-on (PON) tests may run for several minutes with 165 showing on the operator panel display. If you have the SystemGuard console enabled, you can monitor the progress of the PON test portion of the IPL process.

Wait until the `Login` message appears on the terminal; at this point, the system is ready to work.

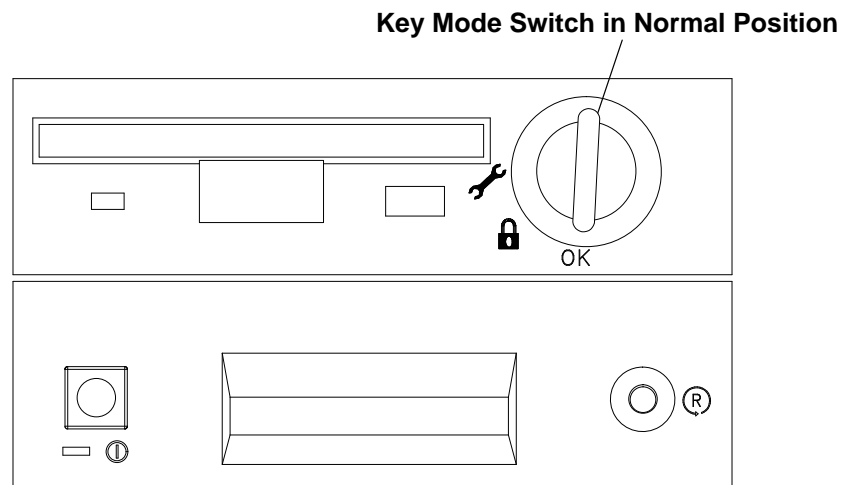
Note: If the green led does not light up and the power does not come on, ensure that the power cord at the back of the system is plugged into a grounded electrical wall outlet and that the system unit main switch is in the On position. Refer to “Appendix G. System Power States” for a more detailed description of the system power states. If this does not solve the problem, refer to the *Problem Solving Guide and Reference*.

Manually Stopping the System Unit

Attention: Use the `shutdown` command to stop the system unit; loss of data can occur if this command is not used.

1. Ensure that the Key Mode switch is in Normal or Service Position.

Note: It is possible to run the shutdown procedure from the system console (local or remote line) with the key mode switch set to the Secure position. Set the key mode switch to Normal or Service position before rebooting the system.



2. Perform the following Power Down procedure.

Power Down Procedure

The system should not be powered down before the operating system has stopped. The following three steps must be followed to shut down the system.

Note: It is possible to run the shutdown procedure from the system console (local or remote line) with the key mode switch set to the Secure position. Set the key mode switch to Normal or Service position before rebooting the system.

1. Ensure that the key mode switch is in Normal or Service position

Note: You can run the `shutdown` command only if you are logged onto the system as root user.

2. Run the `shutdown` command.

When the shutdown program is run, a warning message will be sent to all connected terminals. The user can specify the time period between the sending of the warning message and the system shutdown. This time is given with a default of 60 seconds.

```
shutdown -h +5
```

represents a period of 5 minutes

Attention: This period should allow enough time to finish your session and save your data. The amount of time can vary from a few seconds, enabling the user to exit the vi editor, for example, to several minutes, allowing you to properly finish the update of a database. If you are updating a database, if the system is shut down before you have properly finished your update session, the integrity of the database can be negatively affected and there can be loss of important data.

The display of the message `halt completed` indicates the procedure is ended.

Note: In Standby-mode you can prevent unauthorized access to the system by turning the key mode switch to the Secure position.

3. To complete the power-off procedure, turn the key mode switch to the Secure position; set the power switch (located both on the system console and on the other terminals) to Off, and push the Power button on the system unit operator panel to set it to the off position..

To Turn Power Completely Off

Attention: Unpredictable results can occur that effect your data files if you use this method to stop the system unit.

1. To remove power completely from the system, unplug the power cord for each unit (base and expansion) from the electrical outlet.
2. Set the power switches of the external devices to Off.

General Information about Multiple Systems

When you are operating a system that is attached to one or more other systems, consider how actions you take with your system can affect the attached systems, and how other systems can affect yours. Consult with the operator of an attached system whenever you think your operations might affect each other.

The following actions can affect or be affected by the operation of an attached system:

- Starting and stopping communication with the other system
- Running diagnostics on the system
- Using wrap plugs with diagnostic programs
- Installing adapters or devices on one of the systems
- Analyzing error log information.

Isolate a system unit from any attached systems before stopping the operating system or running diagnostic programs. Some system cabling changes (such as installing wrap plugs or removing a device from the configuration) may require action by the operator of the attached system before you make the cabling changes on your system.

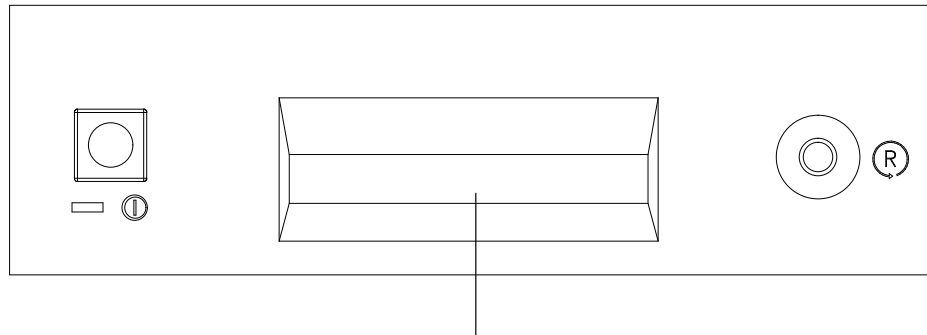
Reading the Operator Panel Display

The operator panel display is used for:

- Event indications and problem reporting during power-on self-tests (POST) and configuration methods.
- Progress and command indications when loading diagnostics.
- Event indications during diagnostics when a console display is not available.
- Problem reporting during diagnostics when a console display is not available.
- Check stop indications when the machine cannot recover from a check stop.
- Crash reporting when the machine cannot recover from a crash.
- Dump progress and command indications during dump.
- Problem reporting when there is a power problem.
- Problem reporting if a fault is detected at run time.

During the POST, the numbers displayed indicate the progress of the testing. If an error that requires attention is detected, the system unit stops and a flashing 888 is displayed on the display to identify the error.

When the self-tests and configuration methods complete without error, the display is blank.



Operator Panel Display

Please refer to the *Problem Solving Guide and Reference* and Appendix E of this book for descriptions of what is displayed on the operator panel display.

Using the Reset Button

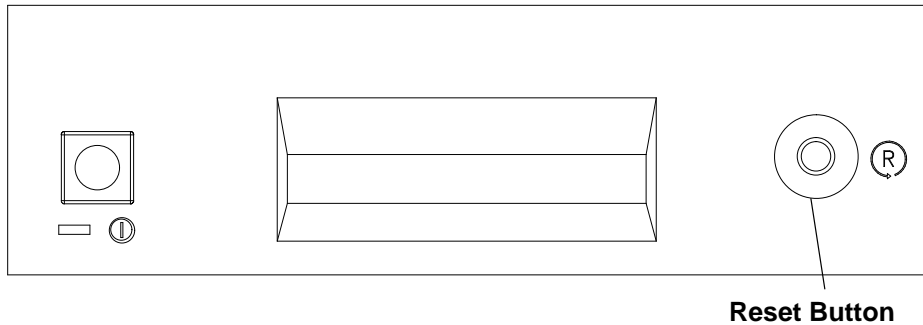
Attention: When the mode switch is in the Normal or Service position, pressing the Reset button causes the unit to reset and do an Initial Program Load (IPL). Pressing the Reset button while the operating system is running can result in damaged or lost data.

The Reset button is used to:

- Reset the system unit and cause a boot when the mode switch is set to the Normal or Service position.
- Read out messages (scroll) after a flashing 888 is displayed.
- Start the dump program when a manual dump is needed.
- Sequentially read system configuration in standby mode and with the mode switch in Service position.

Pushing the Reset button once causes an incomplete reset and the system may not restart. Therefore it is recommended that you push it twice for a complete reset.

When the mode switch is in the Secure position, the Reset button is disabled.



Disk Expansion Unit

Operator Panel

The 7012 G Series disk expansion unit operator panel is divided into two sections.

The upper section consists only of the key mode switch, which has the same positions as the base unit:

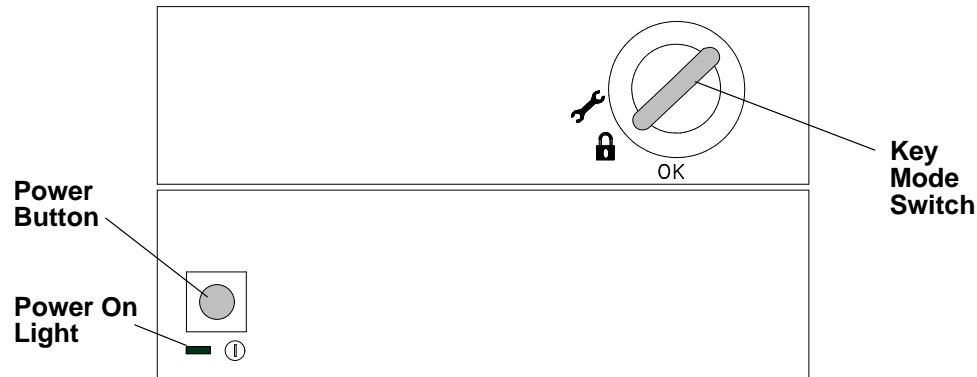
NORMAL (OK), SERVICE (🔧), and SECURE (🔒).

The lower section consists of the following components:

- The POWER ON/OFF button
- One green LED indicating the presence of DC power in the machine.

The key mode switch on the disk expansion unit is used to set the disk expansion unit power control for Stand-alone mode (power button controls disk expansion unit power) or RS-485 mode (base unit controls disk expansion unit power). For Stand-alone mode, the key mode switch should be set to the Secure position. For RS-485 Mode the key mode switch should be set to the Normal position.

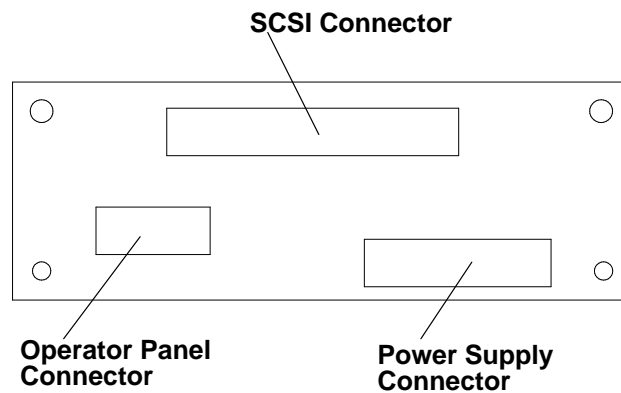
See the 7012 G Series Expansion Unit *Hardware Setup Procedure* for details on how to configure the Disk Expansion Unit to run in RS-485 mode or in Stand-alone mode.



ECB Card

The ECB card is installed in the disk expansion units only.

Each disk expansion unit is equipped with one ECB card provided with three connectors performing specific functions. These functions are illustrated in the following figure.



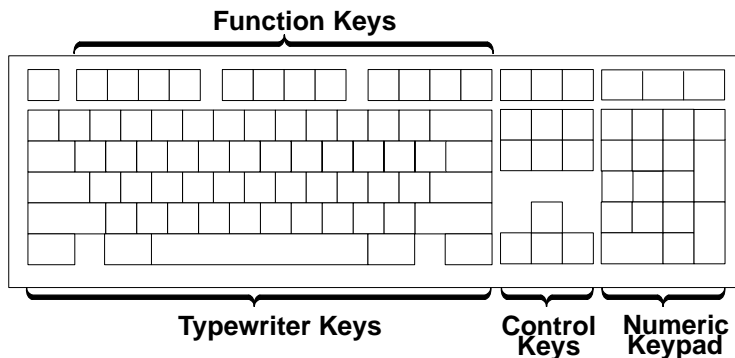
Keyboard/Mouse Card

The keyboard/mouse card provides the system with keyboard, mouse and speaker capability, but not a key click option. The card interfaces with the system through the Micro Channel, which sees the card as occupying a Micro Channel slot.

Using the Keyboards

There are several keyboards available with the system unit. The keyboards have various keys that enter data and control the cursor location. The keyboards can be engraved for the languages of different countries.

The functions of each keyboard depend on the software used. The character sets for the keyboards are contained and explained in the information for your operating system.

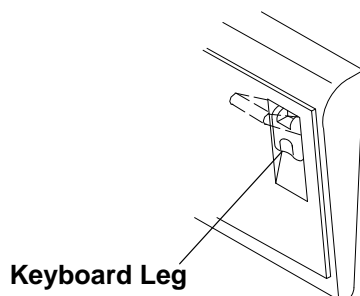


The keyboard is divided into four sections:

- The function keys are multipurpose keys and their function is controlled by the operating system.
- The typewriter keys are similar to a standard typewriter. Their function is controlled by the software.
- The control keys move the cursor on the screen and do programmed control functions. The movement and functions depend upon the application used.
- The numeric keypad is arranged like a calculator to help when typing numbers.

On all of the keyboards, you can adjust the tilt position for typing comfort. To tilt the keyboard, pull out on the keyboard legs. The legs snap into position. To decrease the tilt of the keyboard, rotate the keyboard legs until they snap into the bottom of the keyboard case.

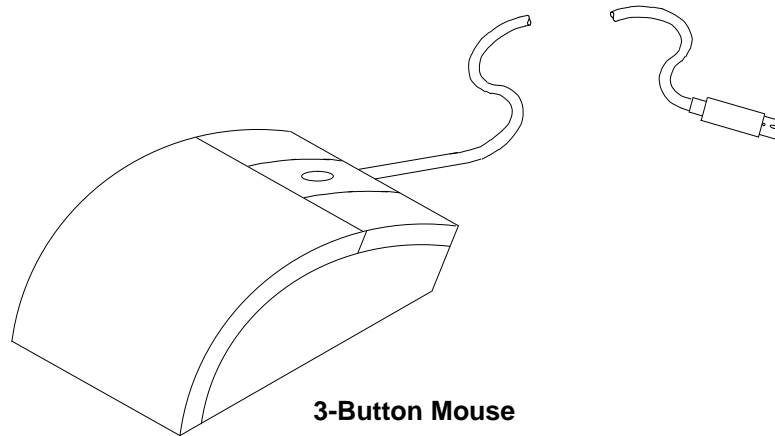
The keyboard cable plugs into the connector, labeled "K" or "Keyboard," at the rear of the system unit.



Using the 3-Button Mouse

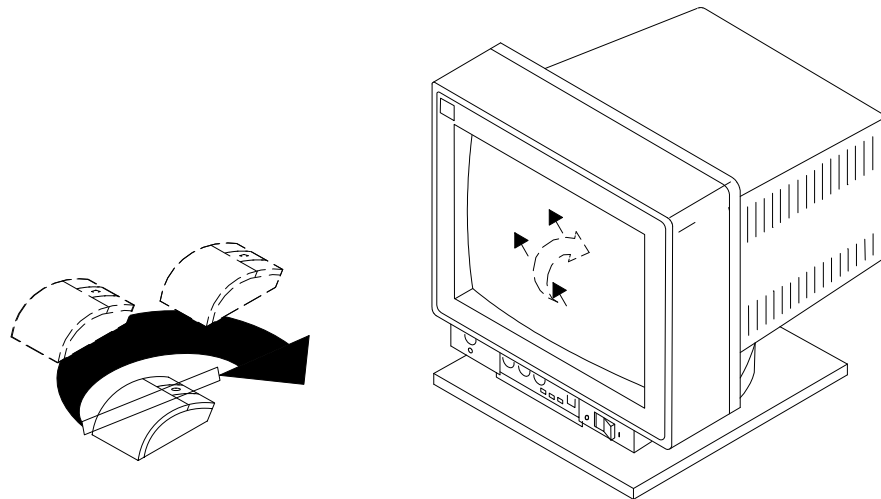
The mouse is a hand-operated locating device. A 3-button mouse is available for use with the system unit.

Consult your application publication for the exact use of the 3-button mouse.



You can use the mouse to perform such functions as positioning a cursor, selecting items from a menu, or moving around in your document much easier and faster than if you used only the keyboard. The cursor moves exactly as you move the mouse on a flat surface, such as a desktop.

When you move the mouse around on a flat surface as shown in the following illustration, the cursor moves on the display screen; the movement changes the position of the cursor.



With the mouse buttons, you can perform functions such as selecting and deselecting options, extending your selection, or choosing a command. The precise function of your mouse depends on the software you are using.

The mouse has a cable that plugs into a connector, labeled M or Mouse, at the rear of the system unit.

Handling the Mouse Correctly

For best operation, handle the mouse with care. Incorrect handling can damage the mouse.

Do not:

- Operate the mouse on cloth, unfinished wood, newspaper, or carpet.
- Drop or hit the mouse.
- Carry the mouse by holding onto the cable.
- Expose the mouse to extreme temperatures or direct sunlight.
- Place the mouse in liquid spills.

Care of the Mouse

The operating surface for the mouse should be smooth, clean, and flat. For example, you can operate the mouse on the following surfaces:

- Finished wood
- Glass
- Enamel
- Plastic
- Paper (except newspaper)
- Metal.

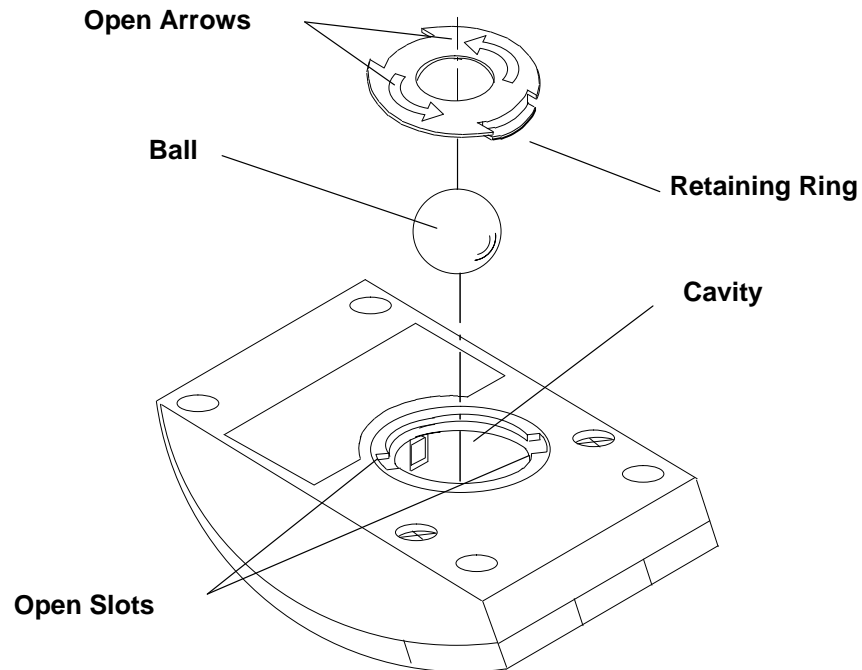
Rough surfaces collect contaminants that can be transferred to the interior of the mouse by the ball. The surface you use should be free from spills, dirt, dust, lint, wax, eraser dust, and other foreign matter. Rough surfaces can also cause the felt pads located on the bottom of the mouse to prematurely wear. A deeply pitted surface could cause erratic operation of the mouse.

Remember to:

- Inspect the work surface for spills or other contaminants.
- Dust the work surface.
- If you are using a paper pad, inspect it for wear and replace it if necessary.

Cleaning the Mouse

1. Remove the retaining ring by turning it counterclockwise, in the direction of the arrows as shown in the following illustration:



2. Remove the ball.
3. Inspect the ball for contaminants. Wipe it clean with a dry, lint-free cloth.
4. If the ball is dirty, wash it in warm, soapy water. Rinse and wipe the ball with a lint-free cloth until dry.
5. Inspect the ball cavity in the mouse for foreign materials. If there are any foreign materials, remove them.
6. Replace the ball.
7. Replace the retaining ring on the mouse and align it with the open slots in the ball cavity.
8. Turn the retaining ring clockwise until the open slots are covered and you hear the ring snap into place.

System Consoles

The 7012 G Series has three ports located in the back. The 25-pin serial port can provide two EIA RS-232 ports by installing a splitter cable.

These two EIA RS-232 ports can be reserved for the maintenance environment. The connection from the service console to the system can be done:

- directly (local line) or,
- with a remote line using a modem and a dedicated leased line or a dial-up switched phone line.

If the maintenance feature is enabled, the two system consoles are defined, depending on which port on the system interface board the console is connected to, as follows:

- BUMP Console** refers to the terminal connected to the S1 port of the system interface board and is normally used as system console. This console can be a local terminal or a remote terminal or terminal emulator in the customer hub center. If the related flag to control the maintenance environment is properly set, the BUMP console allows the use of off-line maintenance features.
- Service Console** is connected to the S2 port of the system interface board. When the related flags to control the maintenance environment are properly set, it enables the remote operator (IBM service center) to perform maintenance and AIX commands in every system condition (stand-by, init-time and run-time) as well as the local operator does from the BUMP Console.

If there is a system problem, the S2 line is able to perform a dial-out function, which sends an error message to the service center, enabling the remote operator to isolate the system problem.

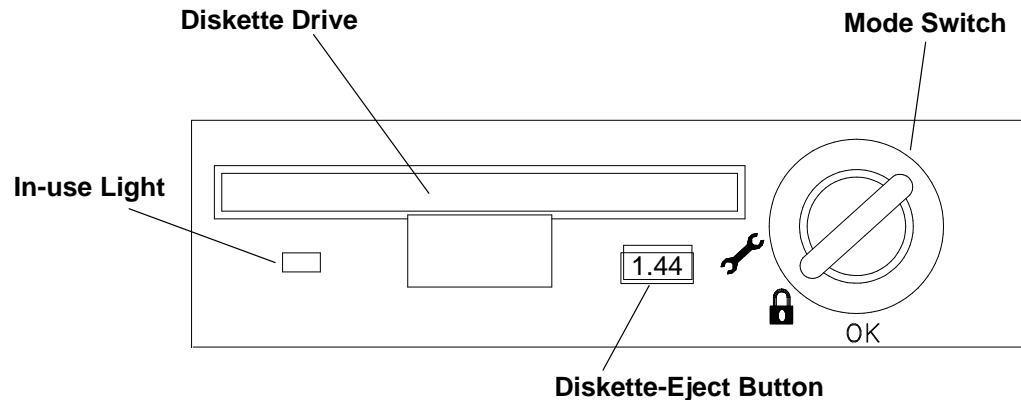
During a remote connection both the BUMP console and the service console have control of the system, each one becoming an echo copier of the other. This condition permits the local operator to control the remote operator for security reasons. The local operator (customer) can interrupt the connection established by the remote operator either locally by setting the key mode switch to Normal or Secure, or remotely through an escape sequence to change the state of the E-key (if the key mode switch is set to Normal and the E-key is set to Service).

If neither the S1 nor the S2 line are configured as BUMP lines, the Maintenance menu is not available on these lines. In this case a limited maintenance menu is provided in Stand-by phase (main power off, only BUMP is alive). This menu is protected by a keyword and is available only to service people.

Using the 3.5-Inch Diskette Drive

The in-use light is on when the system is accessing the drive. The number 1.44 is printed on the diskette-eject button, as shown in the following illustration.

Do not stop the system unit or remove a diskette when the in-use light is on, or you may lose some of the data on the diskette.



Handling Your Diskettes

Be careful with your diskettes. Because each piece of information occupies such a small area on the diskette, small scratches, dust, food, or tobacco particles can make the information unusable. Be sure to remember the following:

- Do not touch the recording surfaces.
- Keep diskettes away from magnets and magnetic field sources such as telephones, dictation equipment, and electronic calculators.
- Keep diskettes away from extreme heat and cold. The recommended temperature range is 10°C to 60°C (50°F to 140°F).
- Proper care helps prevent loss of information.
- Make backup copies of your diskettes regularly.

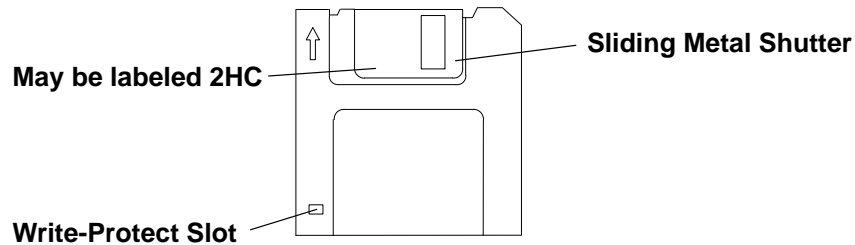
Types of 3.5-Inch Diskettes

Attention: Diskette drives and diskettes must be the correct type to store data successfully. If you use the wrong diskette in your 3.5-inch diskette drive, the data on the diskette may be destroyed.

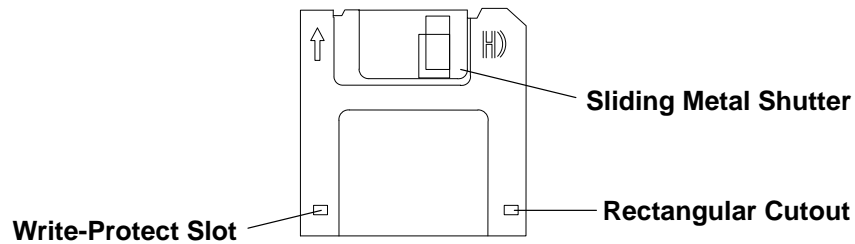
The diskette drive uses the following 3.5-inch diskettes:

- 1.0MB capacity, which stores approximately 720KB of data.
- 2.0MB capacity, which stores approximately 1.44M bytes of data.

A 1MB diskette looks like this:



A 2MB diskette looks like this:



Note: Some computers operate with 720KB diskette drives (no printing on the diskette-eject button) that use only 1.0MB capacity diskettes. If you are going to be transferring work between computers that have different diskette drives, be certain the diskettes are compatible and are formatted correctly. For more information, refer to your operating system information.

Write-Protecting 3.5-Inch Diskettes

Write-protecting diskettes is necessary so that important information is not accidentally lost.

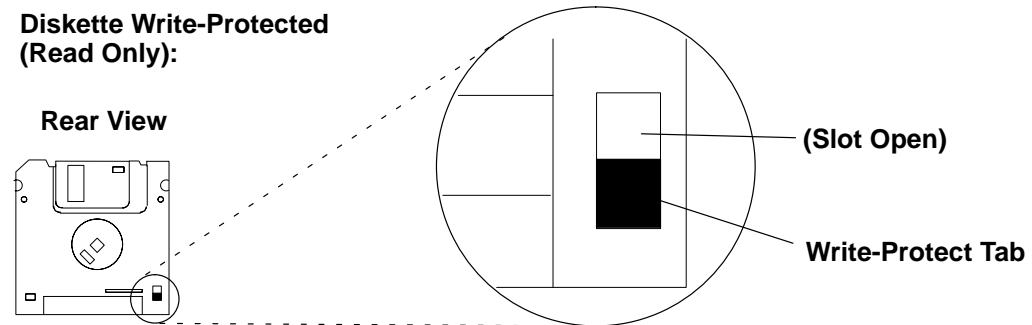
When diskettes are write-protected, you can read information from the diskettes, but you cannot write information on to them.

There is a write-protect tab on the 3.5-inch diskette.

To locate the write-protect tab, turn the diskette over with the label facing down.

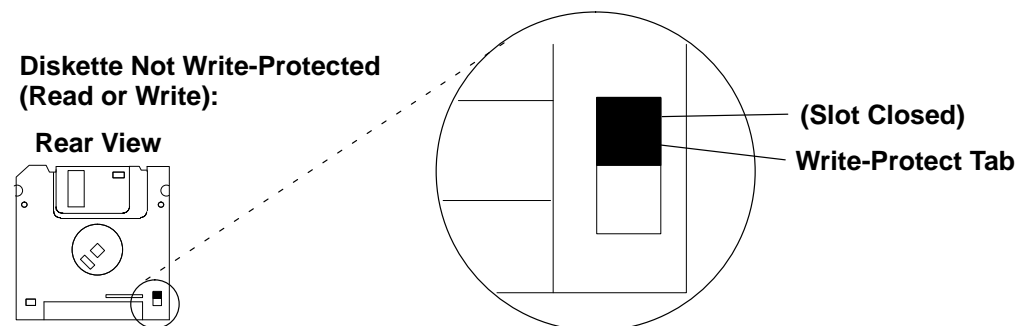
- To *prevent* writing onto a diskette, slide the write-protect tab to *open* the protect slot. See the illustration.

Diskette Write-Protected (Read Only):



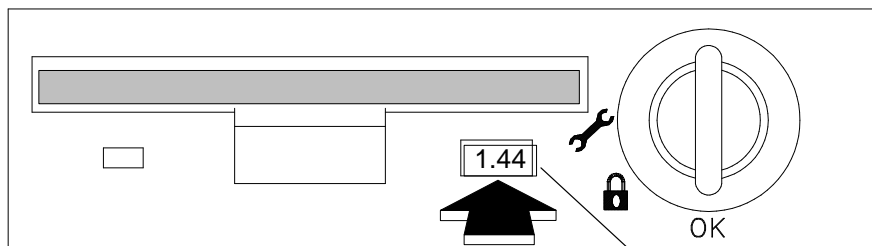
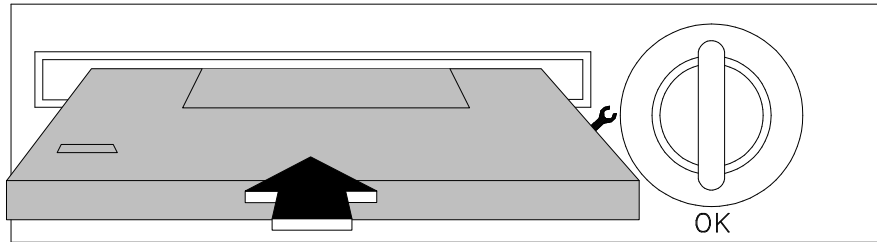
- To *allow* writing onto a diskette, slide the write-protect tab to *cover* the protect slot. See the illustration.

Diskette Not Write-Protected (Read or Write):



Loading and Unloading the 3.5-Inch Diskette

To load a diskette into the drive, insert the diskette in the diskette drive with the labeled metal shutter first, as shown in the following illustration. Push the diskette into the drive until you hear a click. The click indicates that the diskette is securely in position in the drive.



Diskette Eject Button

To unload the diskette, push the diskette-unload button. The diskette unloads partially from the drive. Pull the diskette out.

General Information for 2.3GB and 5.0GB 8-mm Tape Drives

Recommendations

- Use only data grade 8-mm tape cartridges. These cartridges are identified by either a Data, D, or D8 marking on the data cartridge. Use of video grade cartridges can damage the 8-mm tape drive and can void the warranty of your 8-mm tape drive.
- Remove the tape cartridge from the tape drive when it is not in use, and store the cartridge in the cartridge case.
- Do not open the door on the data tape cartridge. This door covers and protects the magnetic tape material from dirt, dust, and damage.
- Avoid touching the tape because this can cause loss of data.
- Keep the tape drive door closed on the 2.3GB 8-mm tape drive except when loading or unloading a tape cartridge.
- Back up and then discard any tape cartridge that repeatedly produces error messages. The error information is in the system error log.
- Clean the tape path regularly according to the cleaning procedure of the 8-mm tape drive. Use only recommended cleaning cartridges; other cleaning cartridges can permanently damage your 8-mm tape drive.

Attention: Do not use video grade cartridges in the 8-mm tape drive. Video grade tapes may be unreliable and may cause permanent damage to the 8-mm tape drive.

Types of 8-mm Tape Cartridges

Refer to Appendix A for tape cartridge part numbers.

- *Test Tape Cartridge:* This is a specially labeled tape cartridge that is in the media kit with the 8-mm tape drive. Use this cartridge only when checking the operation of the drive or running diagnostics; do not use it to save programs or data.
- *Data Tape Cartridge:* This is a nonlabeled blank tape cartridge that is in the media kit. Use this cartridge for saving your programs or data. The same data tape cartridge can be used in either a 2.3GB 8-mm tape drive or a 5.0GB 8-mm tape drive.
- *Cleaning Tape Cartridge:* Use this cartridge for cleaning the 8-mm tape path. For more information, see “Cleaning the Tape Path on the 5.0GB 8-mm Tape Drive” on page 2-24.

Tape Cartridge Compatibility

The 8-mm tape drive is compatible with existing 8-mm tape subsystems that comply to the American National Standard (ANSI) X3B5/89-136, Helical-scan Digital Computer Tape Cartridge, 8-mm for Information Exchange. Data compression effectively increases the cartridge capacity and data transfer rate for the 5.0GB tape cartridges.

8-mm Tape Drive	Format Modes (C = compression mode)			
	2.3GB	2.3GB (C)	5.0GB	5.0GB (C)
2.3B	Read/Write			
5.0GB	Read/Write	Read only	Read/Write	Read/Write

Environment Considerations for 8-mm Data Cartridges

Information in this section describes operating and storage conditions including temperature, relative humidity, and maximum wet bulb data.

Attention: The manufacturer has specified a set of temperature and humidity ranges in which the 8-mm data cartridge can operate with ease. Only regular cleaning procedures are required when operating the cartridge within this range. The risk of possible data loss is increased if 8-mm tape cartridges are operated, stored, or shipped outside the temperature or humidity ranges shown in the following table.

Before using a cartridge, always let it adjust (acclimate) to the operating environment. Do this by placing the cartridge with its container in the operating environment for as long as it has been away from this environment or for 24 hours, whichever is less.

Acclimation is necessary for any data cartridge that has been exposed to a different humidity environment or a temperature change of 11°C or 20°F or more.

	Operating Ranges	Storage	Shipping
Temperature	16°C to 32°C (60°F to 90°F)	5°C to 32°C (40°F to 90°F)	-40°C to 52°C (-40°F to 125°F)
Relative Humidity (noncondensing)	20 to 80%	20 to 80%	20 to 80%
Maximum Wet Bulb	26°C (79°F)	26°C (79°F)	26° C (79°F)

Operating in Harsh Environments

The 8-mm tape drive is ideally suited to streaming operations, as opposed to tape movement operations involving multiple stop/starts and random searches. When the tape is used for frequent stop and start operations, streaming movement is beneficial and should be used whenever possible. This can be accomplished by ensuring that any save or restore operation is the only active operation performed by a device connected to this SCSI I/O controller.

Any tape that has been used outside the ranges specified in the table on page 2-20 for an extended period of time (50 passes in 40 hours of nonstop operation) should not be used as an archival tape. Exposure to the environment will deteriorate the magnetic and physical strength of the tape. Do not store important data on a tape that has been used outside the specified ranges; transfer the data to a new tape for reliable archiving.

8-mm Data Cartridge Erasure

Most bulk eraser devices do not have the capability to erase 8-mm data cartridges. To properly erase an 8-mm data cartridge with a bulk eraser device, the erasure rating must be at least 1500 oersted.

The 2.3GB and the 5.0GB 8-mm tape drives erase residual data before writing new data on the data tape.

Tape Cartridge Data Efficiency

The 8-mm tape cartridge efficiency is defined as the amount of data that can be stored on the cartridge. The following variables affect the amount of data that can be stored on a tape cartridge:

- Size of the data file
- Number of file marks per file
- File mark size used
- Compatibility mode (2.3GB or 5.0GB)
- Media rewrites.




The effects of some of these variables are listed in the charts on the following page.

Using the 8-mm Tape Drive

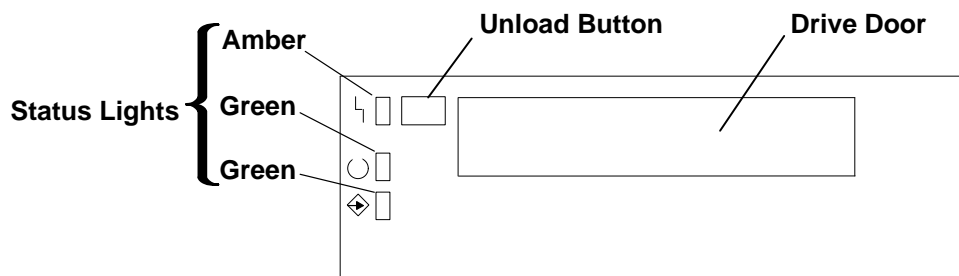
The 5.0GB 8-mm tape drive has two green status lights and one amber status light. The on/off combinations of the status light indicate the conditions of the 8-mm tape drive.

Internal magnetic tape drives are typically used as backup drives.

Each of the International Organization for Standards (ISO) symbols located next to a status light indicates a specific condition of the tape drive as follows:

-  Disturbance (amber status light)
-  Ready (green status light)
-  Busy (green status light)

8-mm Tape Drive Operator controls



Status Lights

The following table explains the meaning of the green and amber status lights.

Disturbance	Ready	Busy	What has occurred:
On	On	On	The power-on self test (POST) is running or the system has issued a Reset to the drive.
Off	Off	Off	One of the following has occurred: <ul style="list-style-type: none"> • The power is off. • The POST has completed successfully, but no tape cartridge has been inserted.
Off	Off	Flashing	A tape cartridge has been inserted and the 8-mm tape drive is performing a tape load/unload operation.
Off	On	Off	A tape cartridge has been inserted and the 8-mm tape drive is ready to receive commands
Off	On	Flashing	The tape is in motion and the 8-mm tape drive is busy running a device operation
Flashing	Off	Off	The 8-mm tape drive has detected an internal fault that requires corrective action.
On	Off or On	Off or Flashing	The tape path requires cleaning.

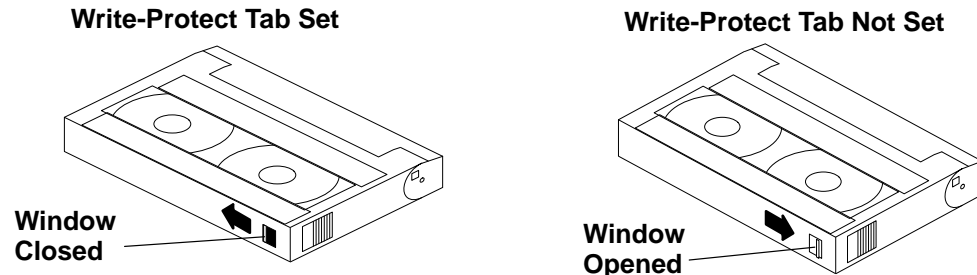
Note: If a fault or an error condition occurs, first try to recover by pressing the unload button. If the condition continues, call your service representative.

Write-Protecting 8-mm Tape Cartridges

Setting the write-protect tab on a tape cartridge is necessary so that information is not accidentally lost.

When the write-protect tab of a tape cartridge is set (window closed), information can be read from the tape, but cannot be written to it.

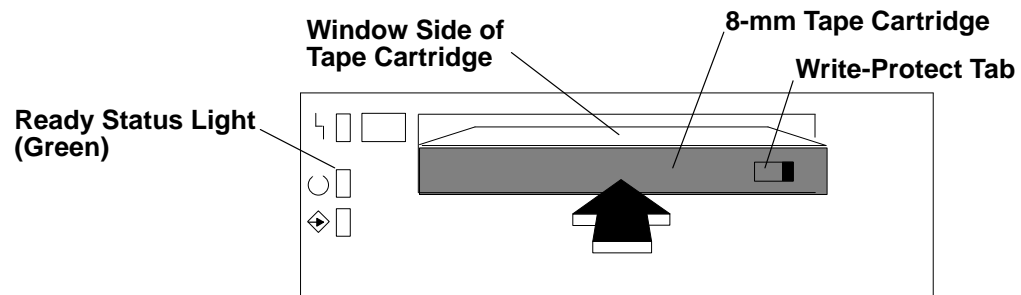
The window on the tape cartridge controls write-protection as follows:



Loading and Unloading the 8-mm Tape Cartridge

To load an 8-mm tape cartridge, grasp the edges of the 8-mm tape cartridge with the write-protect switch toward you and the window side of the cartridge toward your left.

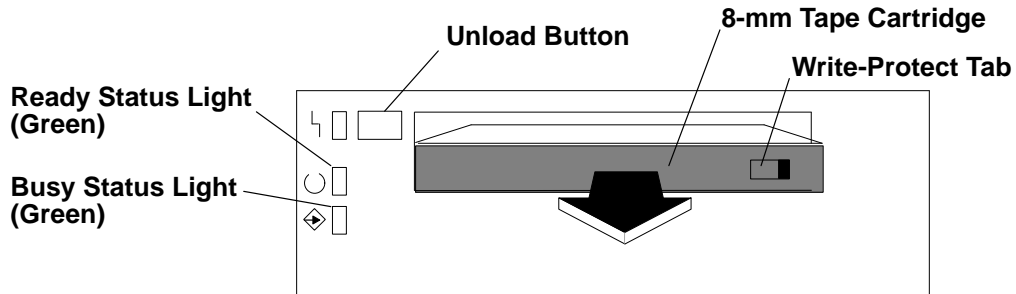
Slide the tape cartridge into the opening on the front of the 8-mm tape drive until the loading mechanism pulls the cartridge into the drive and the drive door closes. The ready status light (green) will come on if the load operation was successful.



When the green light comes on, the drive is ready for data operation.

Note: Commands can be entered while the tape is loading. Any commands to the tape drive start running once the tape has finished loading. Commands not requiring the tape cartridge run immediately.

To unload the 8-mm tape cartridge, push the unload button. The drive rewinds the tape within the cartridge and ejects the cartridge from the drive opening.



If the tape cartridge cannot unload and has to be removed manually from the drive, contact your service representative.

Cleaning the Tape Path on the 5.0GB 8-mm Tape Drive

Attention: Do not use video cleaning cartridges in the 8-mm tape drive. Video cleaning cartridges can damage the 8-mm tape drive.

The 8-mm tape path should be cleaned either approximately every 30 hours of tape motion or once a month, whichever occurs first. The 5.0GB 8-mm tape drive counts the number of hours of tape motion and indicates when the tape path requires cleaning when the lighted disturbance status light (amber) is on.

More frequent cleaning may be required if the drive is operated in a dusty environment or in humid conditions. If the dust is allowed to accumulate, the drive has to perform more reads and writes. This can cause data loss, and may be prevented by regularly scheduled cleaning of the drive.

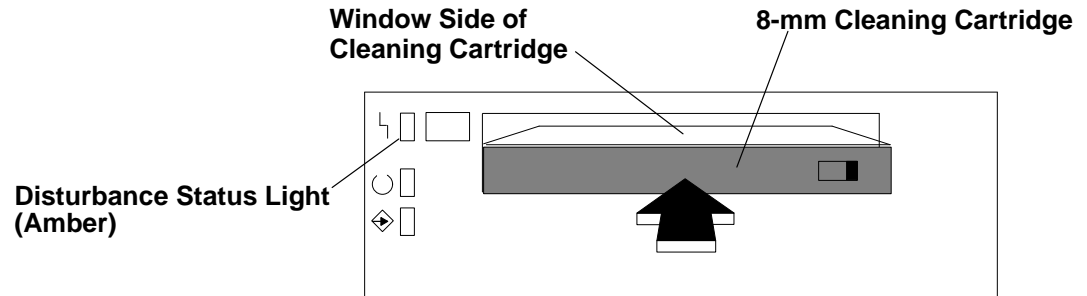
The cleaning cartridge cleans the 8-mm tape drive 12 times before it needs to be discarded. If you attempt to use an 8-mm cleaning cartridge more than 12 times, the tape drive automatically detects the error and ejects the cleaning cartridge with the disturbance status light (amber) remaining on.

Some video cleaning cartridges are extremely abrasive. An 8-mm tape drive may be permanently damaged after only a few cleaning operations using an abrasive-type cleaning cartridge.

Before loading the cleaning cartridge, make sure the power to the 8-mm tape drive is on.

To load the 8-mm cleaning cartridge, do the following:

1. Grasp the edges of the 8-mm cleaning cartridge with the window side of the cartridge facing up.
2. Slide the cleaning cartridge into the opening on the front of the 8-mm tape drive until the loading mechanism pulls the cartridge into the drive.



After the 8-mm cleaning cartridge has been fully inserted into the 8-mm tape drive, the following cleaning operations are performed automatically:

1. The cleaning tape is loaded into the tape path.
2. The drive is cleaned by moving the cleaning tape forward for approximately two minutes.
3. The tape is unloaded and the cleaning cartridge is ejected from the tape drive when the cleaning operation is complete.
4. A successful cleaning operation is indicated when the disturbance status light (amber) goes off.

General Information for 4.0GB 4-mm Tape Drive

The 4.0GB 4-mm tape drive is an internal streaming tape drive that is used to:

- Save and restore system data files.
- Archive important records.
- Distribute operating system software upgrades.

The 4-mm tape drive is designed to be attached to any system using a single-ended interface meeting the Small Computer System Interface II (SCSI-II) Standard ANSI X3.131-199X Rev. 10h.

The 4-mm tape drive has the following features:

- Capacity of 4.0 GB per cartridge. 8 GB is typical with data compression and with DDS2 data cartridges.

The actual capacity per cartridge varies depending on the application and the type of data cartridge being used.

- Data transfer rate is 400 KBps. 800 KBps is typical with data compression.

Note: Data compression activated is the default setting from the factory. Data compression is usually controlled by the application software.

- Read and write of DDS|||| tape cartridges in 2.0 GB per cartridge format.
- A status light that indicates when it is time to clean the tape path.
- Internal diagnostics that are activated when the 4-mm Diagnostic Cartridge is inserted and loaded into the drive.
- Media recognition system: only *data grade* media can be used with this tape drive.

The 4-mm tape drive uses a 4-mm data cartridge for saving and restoring your system data. The 4-mm tape drive is designed to use only 4-mm Digital Data Storage (DDS) cartridges. These cartridges are identified by the DDS symbols (shown below) somewhere on the data cartridge.



Recommendations

Attention: Tape cartridges that do not carry the proper DDS symbol cannot be written to and their use will cause the 4-mm tape drive to report an error.

- Use only 4-mm Digital Data Storage (DDS) cartridges.

Attention: Use of other than recommended cleaning cartridges can damage your tape drive and will void the drive warranty.

- Clean the tape path by using the recommended cleaning cartridge. Follow the instructions on the cartridge.
- Back up and then discard any tape cartridge that repeatedly produces error messages. The error information is in the system error log.
- Do *not* open the door on the data cartridge that covers the tape. This door protects the magnetic tape material from dirt, dust, and damage.
- Do *not* operate in a dusty environment.
- Do *not* touch the tape material. Any substance transferred to the tape by touching it could cause loss of data.

Types of 4-mm Tape Cartridges

The 4-mm tape drive is shipped with three 4-mm cartridges to help start your tape operations immediately. Refer to Appendix A for tape cartridge part numbers.

- 4-mm Data Cartridge:* Use this non-labeled cartridge for saving or restoring your programs or data. Additional data cartridges can be ordered.
- 4-mm Diagnostic Cartridge:* Use this specially labeled cartridge to perform diagnostics on the drive. Do *not* use it to save or restore programs or data.
- Cleaning Cartridge:* Use this cartridge for cleaning the 4-mm tape path. For more information, see “Cleaning the Tape Path on the 4.0GB 4-mm Tape Drive” on page 2-34.

Tape Cartridge Compatibility

The 4-mm Tape Drive is compatible with existing 4-mm tape subsystems that are designed to operate with Digital Data Storage approved media, which meet the following standards:

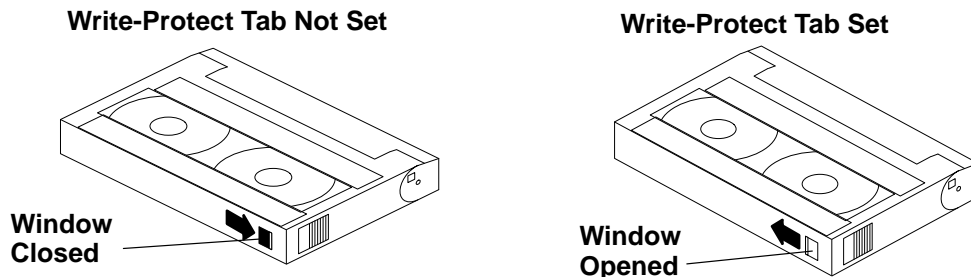
- For DDS||||
 - American National Standard (ANSI) standard, X3.203-191, *Helical-scan Digital Computer Tape Cartridge, 3.81mm*.
 - European Computer Manufacturers Association (EMCA) standard, EMCA-150, *3.81mm Wide Magnetic Tape Cartridge and DDS|||| format*.
- For DDS2
 - European Computer Manufacturers Association (EMCA) standard, EMCA/TC17/93/20, *3.81mm Wide Magnetic Tape Cartridge for Information Interchange Helical Scan Recording, DDS2 format*.

You cannot change the density setting of the drive, as the device reconfigures itself automatically, depending on the media type installed, as follows:

Media Type	Device Configuration
DDS	Read-only
DDS	Read/write in 2.0GB mode only.
DDS2	Read in either density; write in 4.0GB mode only.
Non-DDS	Not supported. The cartridge will eject.

Setting the Write-Protect Tab on 4-mm Tape Cartridges

The window on the tape cartridge controls write-protection. When the write-protect tab of a tape cartridge is set (window open), information can be read from the tape, but cannot be written to it. When the write-protect tab of a tape cartridge is not set (window closed), information can be both written to and read from the tape. Trying to write to a 4-mm data cartridge with the window open causes an error.



Environmental Considerations for 4-mm Data Cartridges

Information in this section describes operating and storage conditions including temperature, relative humidity, and maximum wet bulb data.

Attention: The manufacturer has specified a set of temperature and humidity ranges in which the 4-mm data cartridge can operate with ease. Only regular cleaning procedures, as described in “Cleaning the Tape Path on the 4.0GB 4-mm Tape Drive” on page 2-34, are required when operating the cartridge within this range. The risk of possible data loss is increased if 4-mm tape cartridges are operated, stored, or shipped outside the temperature or humidity ranges shown in the following table.

Before using a cartridge, always let it adjust (acclimate) to the operating environment. Do this by placing the cartridge with its container in the operating environment for as long as it has been away from this environment or for 24 hours, whichever is less.

Acclimation is necessary for any data cartridge that has been exposed to a different humidity environment or a temperature change of 11°C or 20°F or more.

	Operating Ranges	Storage	Shipping
Temperature	16°C to 32°C (60°F to 90°F)	5°C to 32°C (40°F to 90°F)	-40°C to 52°C (-40°F to 125°F)
Relative Humidity (non-condensing)	20 to 80%	20 to 80%	5 to 80%
Maximum Wet Bulb	26°C (79°F)	26°C (79°F)	26° C (79°F)

Operating in Harsh Environments

The 4-mm tape drive is ideally suited to streaming operations, as opposed to tape movement operations involving multiple stop/starts and random searches. When the tape is used for frequent stop and start operations, streaming movement is beneficial and should be used whenever possible. This can be accomplished by ensuring that any save or restore operation is the only active operation performed by a device connected to this SCSI I/O controller.

Any tape that has been used outside the ranges specified in the previous table for an extended period of time (50 passes in 40 hours of nonstop operation) should not be used as an archival tape. Exposure to the environment will deteriorate the magnetic and physical strength of the tape. Do not store important data on a tape that has been used outside the specified ranges; transfer the data to a new tape for reliable archiving.

4-mm Data Cartridge Erasure

Most bulk eraser devices do not have the capability to erase 4-mm data cartridges. To properly erase an 4-mm data cartridge with a bulk eraser device, the erasure rating must be at least 2000 oersted.

The 4-mm tape drive erases residual data before writing new data on the data tape.

Tape Cartridge Data Capacity

The 4-mm tape cartridge capacity is defined as the amount of data that can be stored on the cartridge. The following variables affect the amount of data that can be stored on a tape cartridge:

- Size of the data file
- Number of file marks per file
- Compatibility mode (2GB or 4GB)
- Media rewrites.

Using the 4.0GB 4-mm Tape Drive

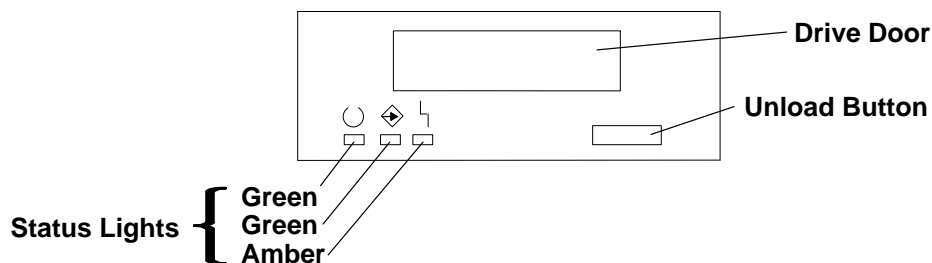
The optional 4.0GB 4-mm tape drive is a half-height device that occupies drive position A or B only.

Status Lights

The 4.0GB 4-mm tape drive has two green status lights and one amber status light. The on and off combinations of the status lights indicate the conditions of the 4-mm tape drive.

Each of the International Organization for Standards (ISO) symbols located next to a status light indicates a specific condition of the tape drive as follows:












- Ready (green status light)
- ◊ Read-Write (green status light)
- ⚡ Disturbance (amber status light)



Status Light States

The following tables explain the meaning of the green and amber status lights.

	○ Ready (green)	◊ Read-Write (green)	⚡ Disturbance (amber)
Off	No cartridge installed or fault condition	No cartridge or no activity	No fault condition
Steady	Cartridge installed or loading/unloading		Cleaning required or worn media
Flashing	Power-on self-test in progress	Cartridge activity	Fault condition

Status Lights on the 4.0GB 4-mm Tape Drive			
Status	 Ready (green)	 Read-Write (green)	 Disturbance (amber)
LED test.	On 2 seconds at power on	On 2 seconds at power on	On 2 seconds at power on
The power-on self-test (POST) is running or the Diagnostic Cartridge is running.	 Flashing	<input type="checkbox"/> Off	<input type="checkbox"/> Off
One of the following has occurred: <ul style="list-style-type: none"> The power is off. The POST has completed successfully, but no tape cartridge has been loaded. 	<input type="checkbox"/> Off	<input type="checkbox"/> Off	<input type="checkbox"/> Off
A tape cartridge has been inserted and the 4-mm Tape Drive is Ready to receive commands from the system.	 On	<input type="checkbox"/> Off	<input type="checkbox"/> Off
The tape is in motion and the 4-mm Tape Drive is running a device operation or cleaning.	 On	 Flashing	<input type="checkbox"/> Off
The 4-mm Tape Drive has detected an internal fault that requires corrective action such as tape cartridge failure, high humidity, or no SCSI terminator. Refer to the service guide or contact your service representative. (See note below)	<input type="checkbox"/> Off	<input type="checkbox"/> Off	 Flashing
The tape path requires cleaning or a poor quality tape cartridge is being used. See "Cleaning the Tape Path on the 4.0GB 4-mm Tape Drive" on page 2-34	<input type="checkbox"/> Off or  On	<input type="checkbox"/> Off or  Flashing	 On

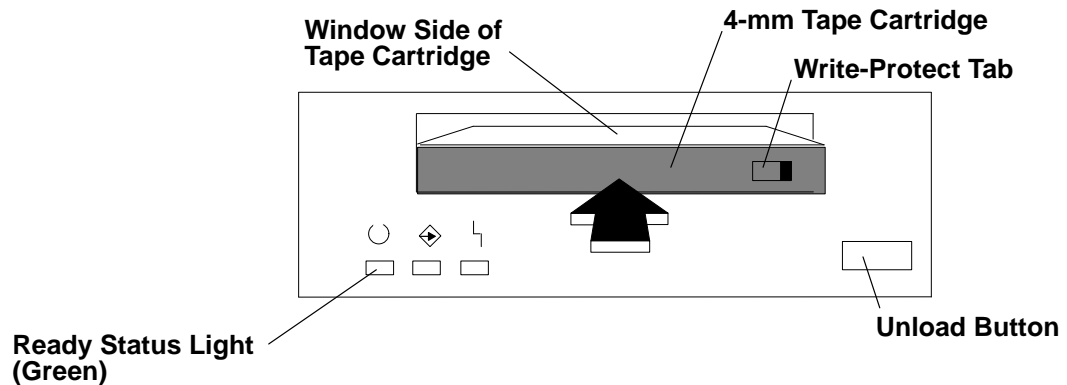
Note: If a fault or an error condition occurs, first try to recover by pressing the unload button. If this does not correct the fault, switch off the power to the 4-mm tape drive and then switch on the power to the drive. If the condition continues, call your service representative.

Loading the 4-mm Tape Cartridge

Before loading the tape cartridge, make sure the power is on and the write-protect switch on the tape cartridge is properly set. Refer to “Setting the Write-Protect Tab on 4-mm Tape Cartridges” on page 2-28. The tape drive loads the tape from the cartridge and prepares it for reading and writing.

To load the 4-mm tape cartridge, do the following:

1. Grasp the edges of the 4-mm tape cartridge with the write-protect tab towards you and the window side of the cartridge facing up.
2. Slide the tape cartridge into the opening on the front of the 4-mm tape drive until the loading mechanism pulls the cartridge into the drive and the drive door closes. The ready status light (green) will come on if the load operation was successful.






The 4-mm tape drive is ready for data operations when the tape cartridge is inserted. After the cartridge is inserted into the tape drive, the tape takes about 15 seconds to load.

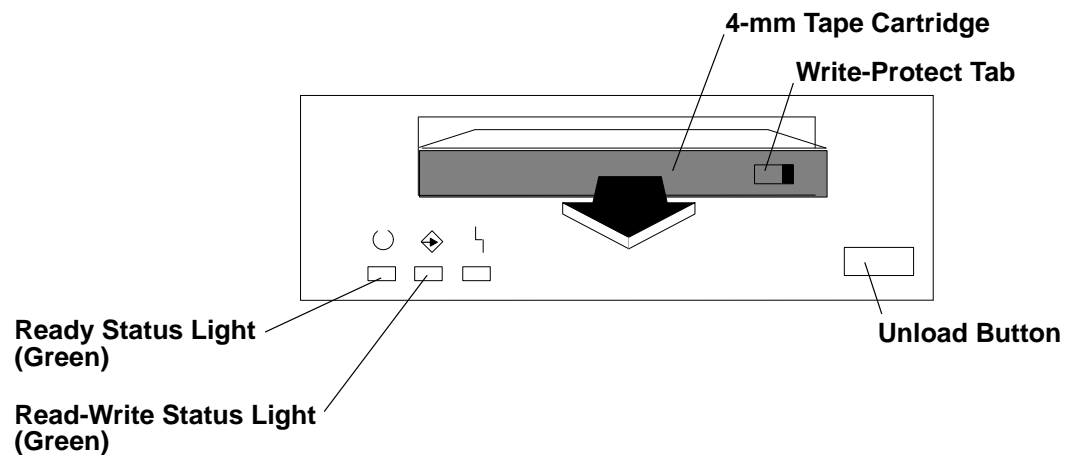
Unloading the 4-mm Tape Cartridge

Before performing the unload operation, make sure the power to the 4-mm tape drive is on.

To unload and eject the tape cartridge, press the unload button. The 4-mm tape drive rewinds the tape and then ejects the tape cartridge from the tape drive.

After pressing the unload button, the following will occur:

1. The Read-Write  status light will flash during the unload operation.
2. The Ready  status light and the Read-Write  status light will turn off when the cartridge is ejected from the tape drive.



The time required for a tape to rewind and unload is between 10 seconds and 1.5 minutes, depending on the position of the tape when the unload button is pushed.

If the tape cartridge cannot unload and has to be removed manually from the drive, see "Manually Removing the Tape Cartridge" in *Diagnostic Information For Micro Channel Bus Systems*.

Cleaning the Tape Path on the 4.0GB 4-mm Tape Drive

The 4-mm tape path should be cleaned either approximately every 30 hours of tape motion or once a month, whichever occurs first. The 4-mm tape drive monitors the recording quality of the tape cartridge and indicates that the tape path requires cleaning when the disturbance status light (amber) is on.

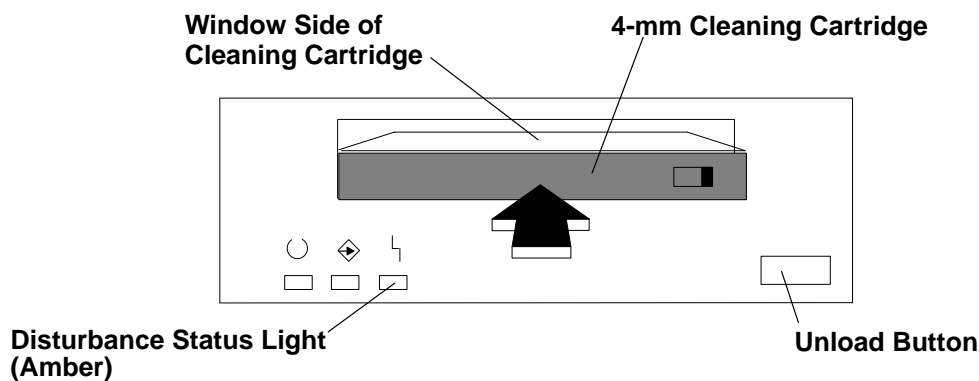
More frequent cleaning may be required if the drive is operated in a dusty environment or in humid conditions. If the dust is allowed to accumulate, the drive has to perform more reads and writes. This can cause data loss, and may be prevented by regularly scheduled cleaning of the drive.

The cleaning cartridge cleans the 4-mm tape drive 50 times before it needs to be discarded. If you attempt to use a 4-mm cleaning cartridge more than 50 times, the tape drive automatically detects the error and ejects the cleaning cartridge with the disturbance status light (amber) remaining on.

Before loading the cleaning cartridge, make sure the power to the 4-mm tape drive is on.

To load the 4-mm cleaning cartridge, do the following:

1. Grasp the edges of the 4-mm cleaning cartridge with the window side of the cartridge facing up.
2. Slide the cleaning cartridge into the opening on the front of the 4-mm tape drive until the loading mechanism pulls the cartridge into the drive.



After the 4-mm cleaning cartridge has been fully inserted into the 4-mm tape drive, the following cleaning operations are performed automatically:

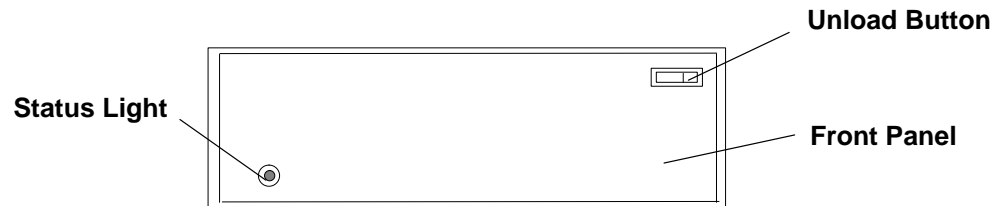
1. The cleaning tape is loaded into the tape path.
2. The drive is cleaned by moving the cleaning tape forward for approximately 30 seconds.
3. The tape is unloaded and the cleaning cartridge is ejected from the tape drive when the cleaning operation is complete.
4. A successful cleaning operation is indicated when the disturbance status light (amber) goes off (if it was activated before the cleaning operation).

Using the 1/4-inch Tape Drive

The QIC tape has the following characteristics:

- Capacity 1.2GB
- Media data transfer 300KB/sec
- Form factor 5-1/4 inch
- Read and write compatibility with QIC 120, 150, 525, and 1000 media

Functions



The status light has no color when it is off. When the status light is on, it may be either green or red. The colors indicate the status of the drive as follows.

Status light

A green light indicates the drive is in normal operation.

A red light indicates there is a problem with the drive.

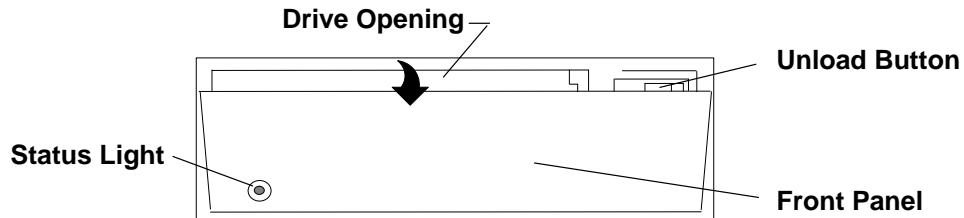
When the light is off, the drive is waiting in standby mode.

Unload button

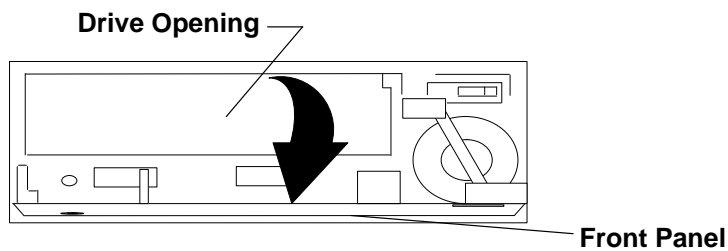
Press to unload the tape from the drive.

Loading the Tape

A diagram inside the drive door shows how to load a tape. To load a tape cartridge, push the unload button. When the button is pushed, the front panel of the drive partially opens toward the front of the system unit.



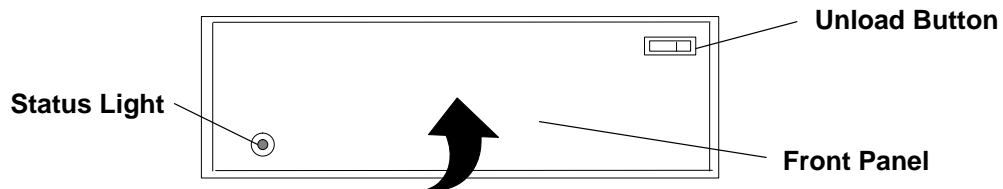
1. Pull the front panel open all the way to the flat position, where it will stay without having to be held open.



2. Insert the cartridge into the drive opening as shown. Gently push the cartridge into the drive opening until the cartridge stops.



3. Close the front panel until you hear an audible click.



The drive loads the tape from the cartridge and prepares it for reading and writing.

Once the cartridge has been inserted and the front panel closed, it will automatically rewind to the beginning of the tape.

Unloading the Tape

To unload the tape, use the same procedure as you did for loading except pull the cartridge from the drive opening.

1. Push the unload button.
2. Pull the front panel open (flat).
3. Pull the tape cartridge out of the drive.
4. Push the front panel closed.

Tape Cartridge Data Efficiency

Note: For maximum efficiency, operate the 1/4 inch tape drive in the streaming mode whenever possible.

The 1/4 inch tape cartridge efficiency is defined as the amount of data that can be stored on the cartridge and the data rate at which the data can be read from the tape cartridge. When in use, the tape in the cartridge moves at a constant speed of 72 inches per second.

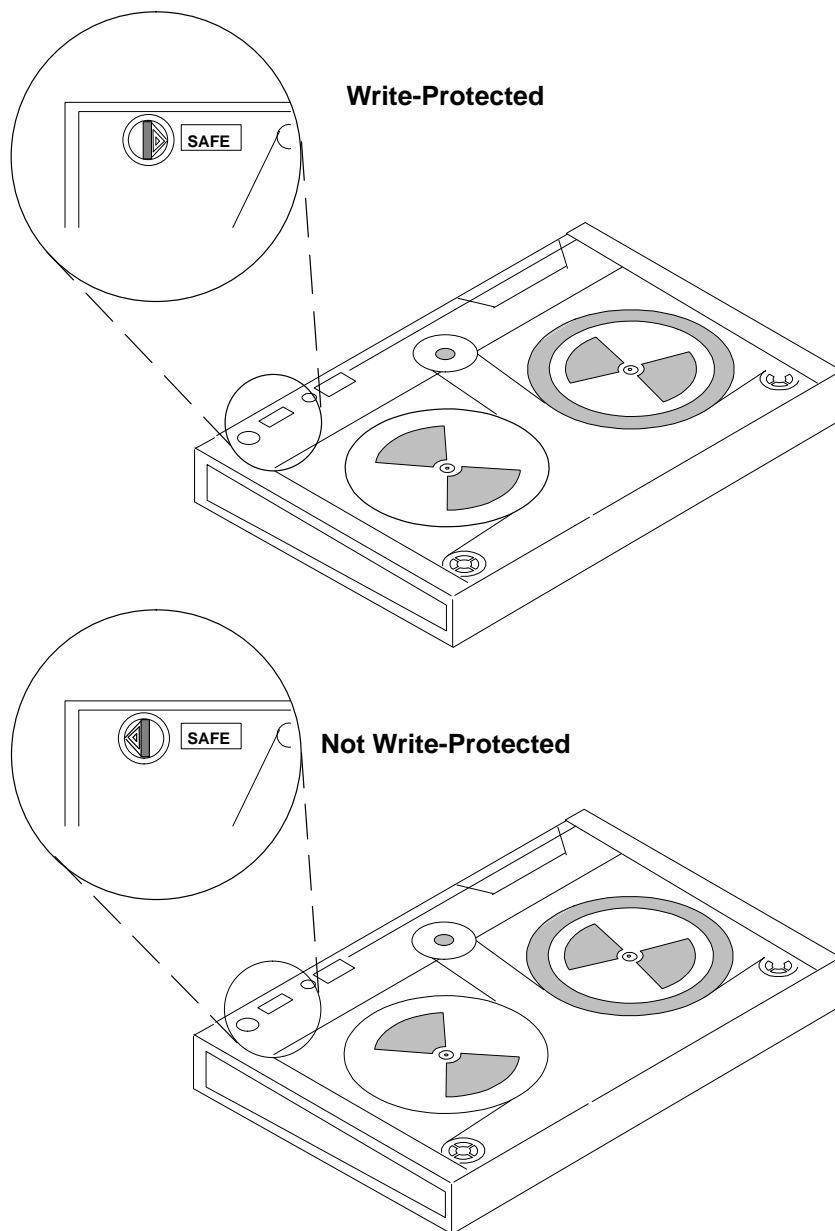
The following variables affect the amount of data that can be stored on a tape cartridge:

- Streaming mode or nonstreaming mode
- Size of the data file
- Number of file marks per file
- Tape length
- Variable post/preamble
- Compatibility Mode (QIC120/QIC150/QIC525/QIC1000).

Setting the Write-Protect Tab on 1/4 Inch Tape Cartridges

Setting the write-protect tab on a tape cartridge is necessary so that information is not accidentally lost. When the write-protect tab of a tape cartridge is set (pointing to SAFE), information can be read from the tape, but cannot be written to it.

The write-protect tab positions for a typical cartridge are shown in the following illustration. Use a small screwdriver to turn the arrow to the desired position. The arrow must be pointing in one of the two directions shown in the illustration.



Retensioning

The tape drive works best when it is operated as a streaming tape. If the tape cartridge has been operated in the streaming mode, it is not necessary to retension the tape. If the tape is used in a nonstreaming mode (many start and stop operations), retension the tape after approximately every 30 minutes.

If the tape drive is on when a tape cartridge is inserted, the drive immediately retensions the tape. Operating system commands may be used to change this default setting. Refer to the operating system commands manual for your system for more information.

Cleaning the 1/4 Inch Cartridge Drive

It is recommended to clean the read/write heads:

- After any period of 8 hours use
- After the first use of a new cartridge.

The frequency of cleaning depends on the number of hours of daily use, on average, once a week.

For effective cleaning, use a 1/4 inch tape unit cleaning cartridge.

Whenever a new tape unit is brought into service, the following operations should be performed:

- A complete cycle of winding and rewinding, which has two results:
 - Tightens the magnetic tapes
 - Cleans the magnetic medium.
- The tape unit should be cleaned with the cleaning kit.

It is also necessary to carry out a winding and rewinding cycle on any tape unit that has not been used recently.

Environment Considerations for 1/4 Inch Tape Cartridges

Information in this section describes operating and storage conditions including temperature, relative humidity, and maximum wet bulb data.

Attention: The manufacturer has specified a set of temperature and humidity ranges in which the 1/4 inch data cartridge can operate with ease. Only regular cleaning procedures are required when operating the cartridge within this range. The risk of possible data loss is increased if 1/4 inch tape cartridges are operated, stored, or shipped outside the temperature or humidity ranges shown in the following table.

Before using a cartridge, always let it adjust (acclimate) to the operating environment. Do this by placing the cartridge with its container in the operating environment for as long as it has been away from this environment or for 24 hours, whichever is less.

Acclimation is necessary for any data cartridge that has been exposed to a different humidity environment or a temperature change of 11°C or 20°F, or more.

Environment Operating Ranges		
	Operating Ranges	Nonoperating Ranges
Temperature Requirements	16 to 32°C (60 to 90°F)	10 to 43° C (50 to 110°F)
Relative Humidity Requirements (noncondensing)	20 to 80%	20 to 80%
Maximum Wet Bulb Limits	26°C (79°F)	27° C (80°F)

Tape Cartridge Compatibility

The 1/4 inch tape drive is a medium-capacity small computer system interface (SCSI) tape drive. This drive is compatible with existing 1/4 inch streaming tape subsystems, which use the Quarter-Inch Cartridge Drive Standards, Inc. (QIC) formats.

Using the CD-ROM Drives

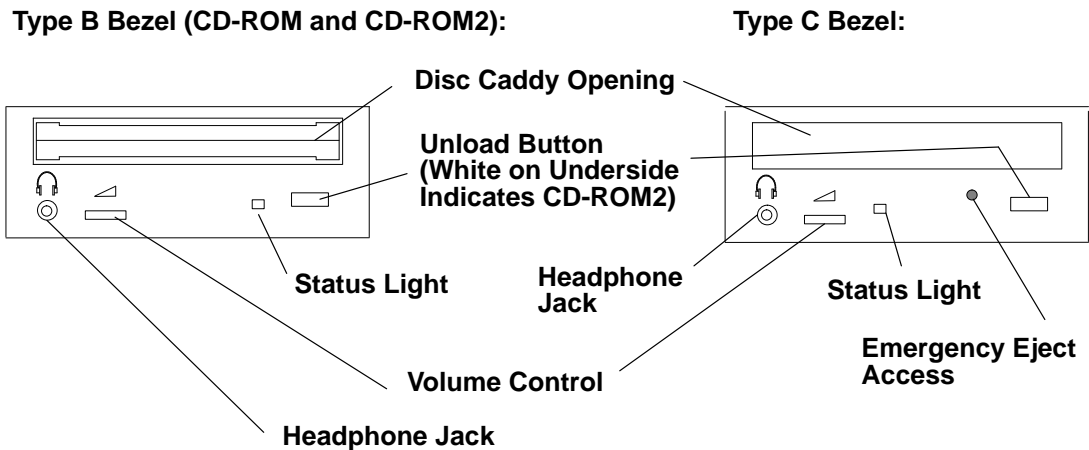
Notes:

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

The CD-ROM drive, an optional feature (standard on some models), is a half-height device. It can occupy only media position C. Your CD-ROM drive looks like one of the two in the illustration, and the controls are located as indicated.



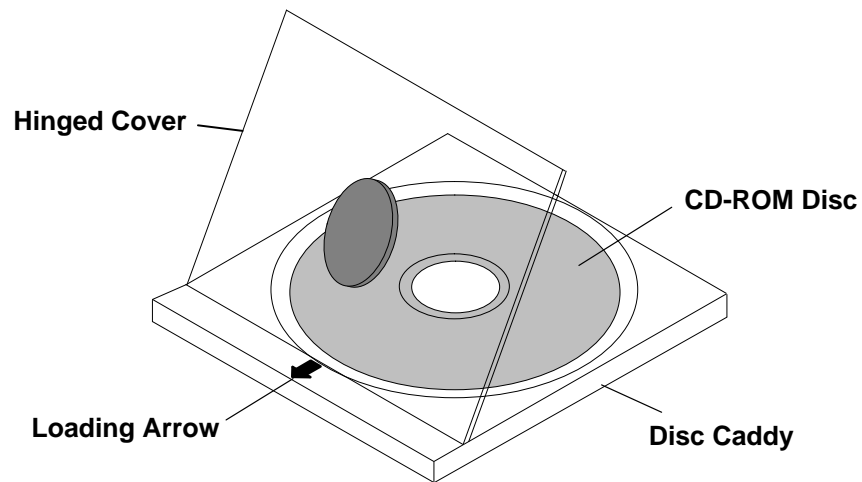
The Type B Bezel front panel has an unload button, status light, volume control, headphone jack, and disc caddy opening.

When the system unit is set to On, the CD-ROM status light is in one of several conditions. The meanings of the various conditions are as follows:

- Off during standby with the caddy loaded or unloaded.
- Blinks from insertion of the caddy to completion of initialization.
- Blinks slowly when either the lens or disc is dusty (lens should be cleaned by running the cleaning disc).
- Blinks fast when in the audio mode.
- Lights during data transfer operations.
- Lights steady when:
 - No disc is in the caddy.
 - The disc is in the caddy upside down.
 - Some condition exists that should be checked. If this occurs, contact your service representative.

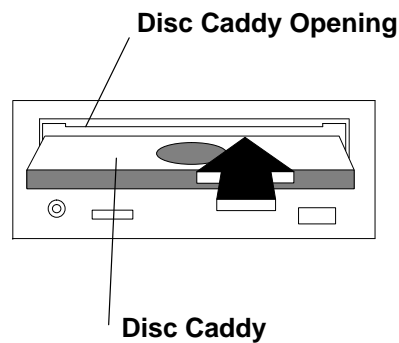
Loading the CD-ROM Disc Caddy (Type B Bezel Only)

The CD-ROM media kit contains a CD-ROM diagnostic disc and a disc caddy. Open the disc caddy and place the CD-ROM disc in the caddy with the printed side up.



With the loading arrow toward the drive and the printed side of the disc up, insert the caddy in the disc caddy opening. Push gently on the caddy. The drive automatically pulls the caddy into the drive and prepares the disc for reading.

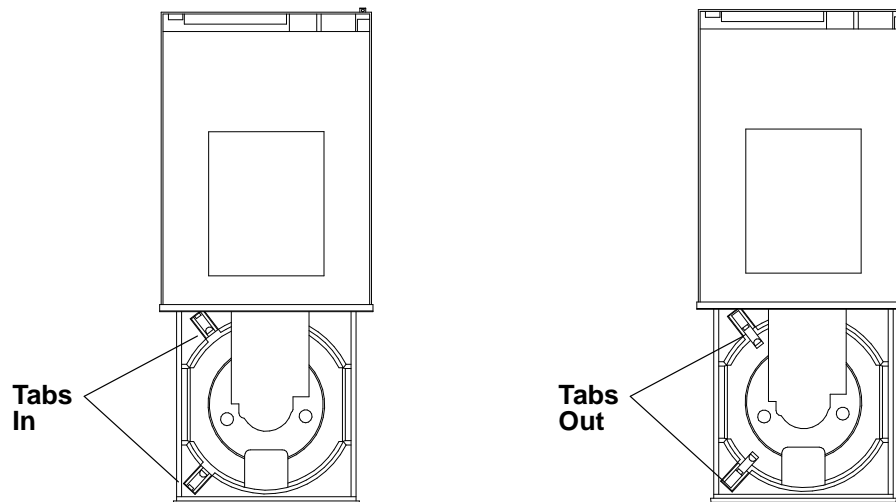
Type B Bezel (CD-ROM and CD-ROM2):



Loading the CD-ROM Drive (Type C Bezel Only)

Press the unload button to open the tray. Place the disc, with the printed side away from the tray, into the tray. If the CD-ROM drive is in the vertical position, slip out the tabs the first time to hold the disc in place. Push gently on the load/unload button. The drive automatically pulls the tray into the drive and prepares the disc for reading.

If the CD-ROM drive is to be used in the vertical position, the tabs need to be pulled out to hold the CD-ROM disc in place while loading and unloading. These tabs should be pushed back in when the CD-ROM drive is to be used in the horizontal position.



If the disc caddy cannot unload and has to be removed manually from the drive, contact your service representative.

Unloading the CD-ROM Drive (Type C Bezel Only)

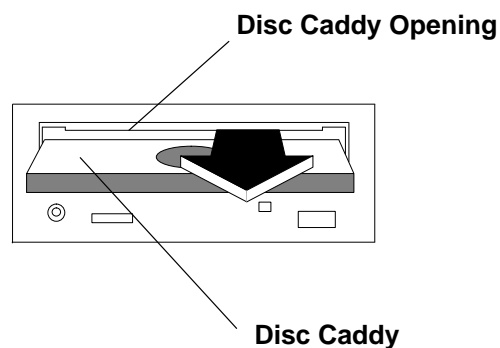
Push and hold the unload button until the tray comes out and then remove the disc.

Unloading the CD-ROM Disc Caddy

Push and hold the unload button until the caddy unloads. The drive partially ejects the caddy from the drive opening. Pull the caddy out of the drive.

Note: The unload button must be pushed and held for a minimum of two seconds before the caddy unloads.

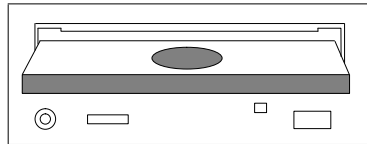
Type B Bezel (CD-ROM and CD-ROM2):



Cleaning the CD-ROM Drive

Note: Always handle discs by the edges to avoid leaving fingerprints. Discs can be wiped with a soft, lint-free cloth or lens tissue. Always wipe in a straight line from the inner hub to the outer rim.

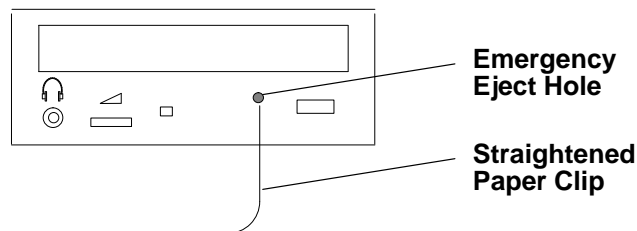
This CD-ROM drive has an internal head-cleaning mechanism and, therefore, does not require an external cleaning device. The internal cleaning mechanism cleans the head every time a caddy is inserted into the disc caddy opening.



Emergency Eject (Type C Bezel Only)

Note: Execute the following procedure only in an emergency (caddy does not eject although pressing the unload button).

1. Remove the power from the CD-ROM drive.
2. Insert a small diameter rod, such as a paper clip that has been straightened, into the emergency eject hole as shown in the figure.
3. Pull the drawer out.



Chapter 3. 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 power cord.

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

SystemGuard Components

SystemGuard introduces new hardware and firmware components:

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

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

SystemGuard Bring-Up MicroProcessor Overview

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

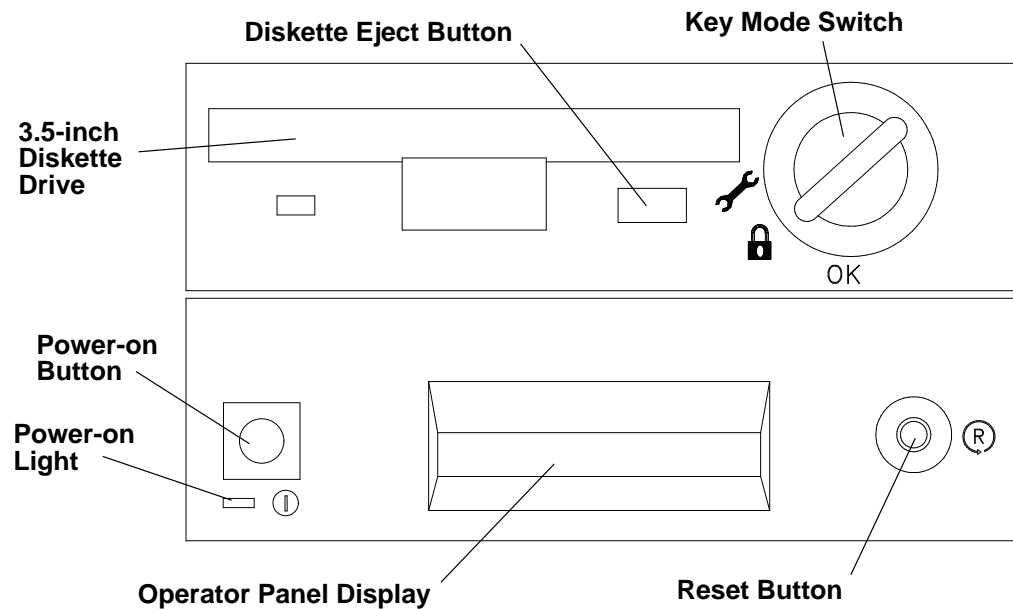
The BUMP console (attached to S1 port) provides the normal input. The service console (attached to S2 port) provides remote service access to the BUMP. Access to both of these consoles is controlled by flags.

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.



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, and Service modes can be set physically by turning the Physical Key or electronically by executing the electronic key command. The Physical Key and the Electronic Key together define a state called the *System Key*. The Electronic Key can only be turned if the Physical Key is in Normal position. Refer to "How to Set the Electronic Key" on page 3-39 for details on how to set the Electronic Key.

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

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

SystemGuard Phases

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

Stand-By Phase

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

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

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

The Stand-By phase ends when the power button on the Operator Panel is pressed or a 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 3-21. 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 is displayed.

Note that the system IPLs on the first available physical processor. If for any reason processor 0 is not available, the system IPLs on processor 1, and then on 2 so on until a processor is available. If all the processors are disabled, the PON test fails, and SystemGuard treats this as a hardware component failure and go into the MAINTENANCE MENU in Service mode. In Normal mode, the PON test initiates dial-out, if possible, and go into Stall state afterward. No IPL will proceed. 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 multiresources sharing.

I²C Bus Test Group

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

```

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

```

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

Phase Change (Init to Maint)

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

If the BUMP console present flag is set, the MAINTENANCE MENU is displayed on the BUMP console, and the system waits for an operator action. The maintenance menu choices are described on page 3-21. Various maintenance tasks can be performed from this menu. When maintenance tasks are complete, the system can be booted, powered down, or reset.

Phase Change (Maint to Boot)

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

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

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

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

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

SystemGuard Parameters and Flags

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

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

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

Modem and Site Configuration flags

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

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

Working with SystemGuard

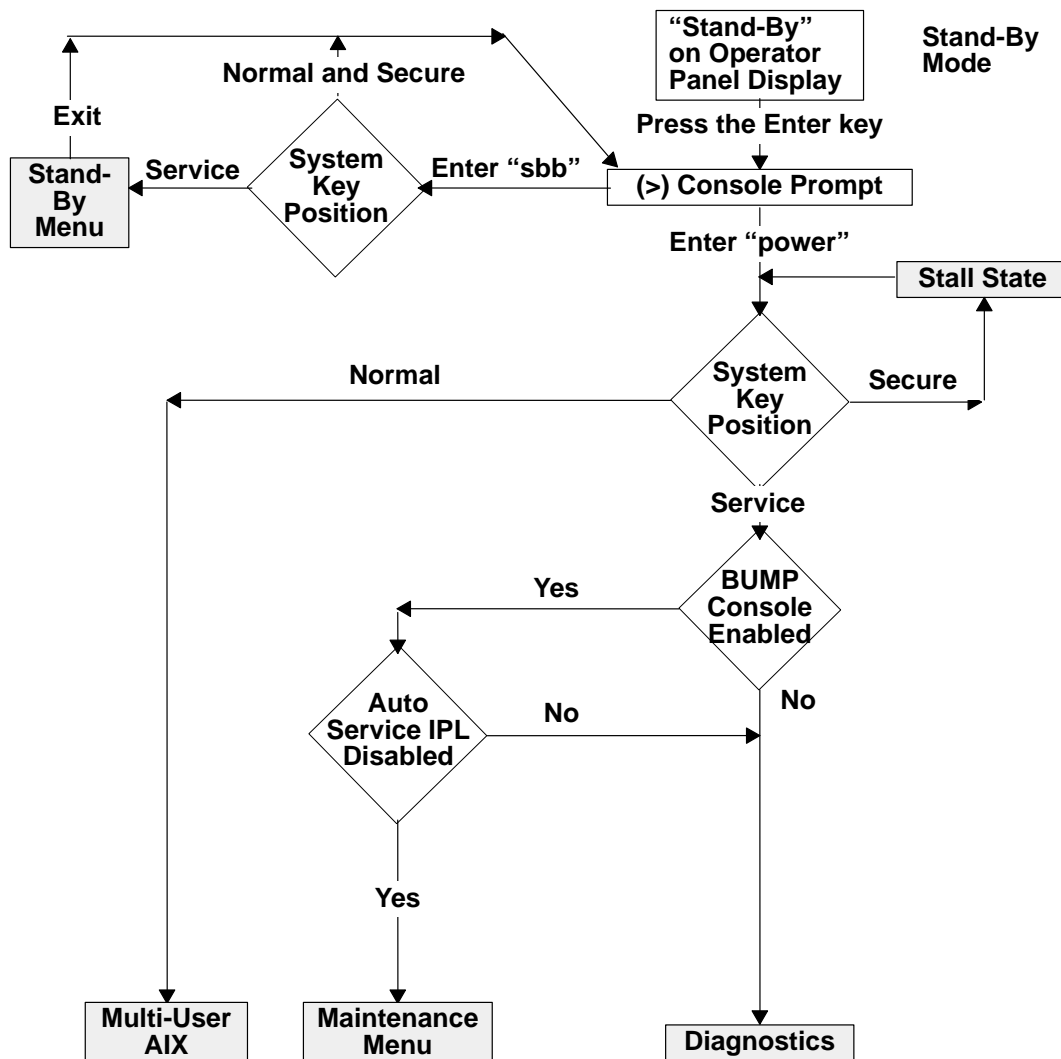
SystemGuard parameters and flags may be changed from different locations. They can be changed from the SystemGuard STAND-BY MENU, the SystemGuard MAINTENANCE MENU, the Diagnostics interface, and also from AIX.

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

power This keyword starts the system, exactly as if the power button is pushed. You can change, disable or enable this keyword: see “Power-On Command Parameters” on page 3-33 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 3-39.
3. Press the Enter key again.
4. Enter the keyword `sbb` to display the STAND-BY MENU.

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

**For Details,
See the
Following
Pages**

STAND-BY MENU : rev xx.xx

3-13	0 Display Configuration
3-15	1 Set Flags
3-16	2 Set Unit Number
3-17	3 Set Configuration
3-18	4 SSbus Maintenance
3-19	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 described on page 3-39.

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 7ffffff003935303730370000      UNIT PAAAAAAA 40
CPU conf        CCCCAAAA              MM conf        CCAACCAAAAAAA
FLASH_FW 0704   MM size 0080          OP_KEY NRM     E_KEY  SRV
OPP  D78610     19H0494
SP   D78605     19H0471              IOC   E38030   96G4400
CPU0 D78605     19H6472              CPU1  D78605   19H6472
CPU2
MC0  D78605     19H0473              CPU3
MC2
SIB10 E38042    19H0310              MC1   D78605   19H0473
SIB11
SIB21
SIB12
SIB22
SIB13
SIB23              MC3
PS0   D29655   11H5114
PS1
PS2
PS3
```

Hit Return

Display Configuration

```

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

```

Hit Return

The meanings of the configuration display fields are as follows:

- SID Y2: This is the system identification information. It is automatically updated when the 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.

I²C Maintenance

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

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

```
I2C Maintenance

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

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

These options are explained in the following sections.

Read Operator Panel Status

Enter 00 to display the OP status table.

Read Unit Status

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

Read the EEPROM

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

```
EEPROM list

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

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

Set voltage margins

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

Set or Reset Operator Panel LEDs

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

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

select(x:exit):

Write on the Operator Panel Display

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

Read Input Output Ports

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

```
fe
Hit Return
```

Power-on or Power-off

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

```
powering

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

select(x:exit):

Maintenance Menu

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

The MAINTENANCE MENU can only be entered by:

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

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

**For Details,
See the
Following
Pages**

MAINTENANCE MENU (Rev. XX)

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

SELECT :

Display Configuration

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

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

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

Display Configuration – System Level

This screen displays general system information, such as:

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

```

                                     DISPLAY CONFIGURATION

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

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

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

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

Display Configuration – Unit Level

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

- Main Unit
- Expansion Unit.

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

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

DISPLAY CONFIGURATION - MAIN UNIT

```

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

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

PRESENT CPU:    #0

PRESENT MC:     #0

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

```

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

1. To see device-level information, enter menu device type number. The device level screen for choice 0 (I/O card) is shown on page 3-24.

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 (BIST 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.

```

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

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

PRESS RETURN TO EXIT:
```

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

System Boot

This command enables you to begin boot activity.

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

```
SYSTEM BOOT

0> BOOT FROM LIST

1> BOOT FROM NETWORK

2> BOOT FROM SCSI DEVICE
```

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

The menu enables you to boot in three different ways:

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

```
BOOT FROM SCSI DEVICE

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

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

SELECT [x:exit]:
```

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

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

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

BUS 0 represents the Micro Channel 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 page 3-29). |

- 1 Displays and enables modification of the tests in the build list (see page 3-31).
- 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 3-32).
- 4 Displays an error report.
- x Exits this menu and returns to the MAINTENANCE MENU.

Build Test List

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

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

BUILD TEST LIST

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

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

SELECT [x:exit]:

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

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

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

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

```

                                BUILD TEST LIST
GROUP 01 BUMP QUICK IO

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

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

```

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

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

Notes:

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

Modify/Display Test List

Once the test list is built, you can use this option to view or modify it. Each test is identified by a number *xyyy*, 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 (xyyy: xx = GROUP NUMBER yy = TEST NUMBER):
```

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

```
COMMANDS: xyyy> SELECT TEST
```

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

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

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

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

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

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

4. The following commands are available:

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

D Deletes the selected test.

+ Scrolls forward in the test parameter list.

- Scrolls backward in the test parameter list.

x Exits this menu and returns to the previous menu.

Execute Test List

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

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

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

```
EXECUTE TEST LIST

OPTION LIST:
PROCESSOR LIST: Test parameter value

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

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

PRESS RETURN TO EXIT:
```

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

Set Parameters

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

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

```
SET PARAMETERS

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

SELECT [x:exit] :
```

The following sections explain each of these options in detail.

Power-On Command Parameters

During the standby idle phase, the system power can be turned on (and the IPL started) by entering a BUMP console power-on string through line S1 or a service console power-on string through line S2 (see "Working with SystemGuard" on page 3-10 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 of the service guide for your system.

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 of the service guide for your system.

- 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 3-35. 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 multiuser AIX boot.

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

Service Line Speed Parameter

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

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

Maintenance Password

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

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

Customer Maintenance Password

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

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

Electronic Mode Switch from Service Line Flag

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

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

Set National Language

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

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

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

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

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

Some Common SystemGuard Tasks

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

How to Set the Electronic Key

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

Setting the Electronic Key from Stand-By Mode

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

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

Setting the Electronic Key from AIX

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

```
keycfg -d
```

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

```
keycfg -c service
```

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

```
keycfg -c secure
```

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

```
keycfg -c normal
```

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

Displaying Configuration through the Maintenance Menu

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

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

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

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

```
DISPLAY CONFIGURATION

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

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

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

How to Set Fast IPL

If the Fast IPL flag is enabled, SystemGuard will skip 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 will last one reboot.

Setting Fast IPL through AIX

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

```
mpcfg -df
```

Following is the output of the command:

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

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

```
mpcfg -cf 11 1
```

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

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

```
mpcfg -df
```

How to Set the Service Line Speed

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

Setting Line Speed through the Maintenance Menu

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

```
SET PARAMETERS
```

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

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

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

```
MISCELLANEOUS PARAMETERS
```

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

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

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

Setting Line Speed through AIX

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

```
mpcfg -dm
```

The following is the output of the command:

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

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

```
mpcfg -cm 2 xxxx
```

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

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

How to Authorize the Service Console

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

Authorizing Service Console through the Stand-By Menu

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

Authorizing Service Console through the Maintenance Menu

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

Authorizing Service Console through AIX

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

```
mpcfg -df
```

3. Type the following command to change the flag:

```
mpcfg -cf 1 1
```

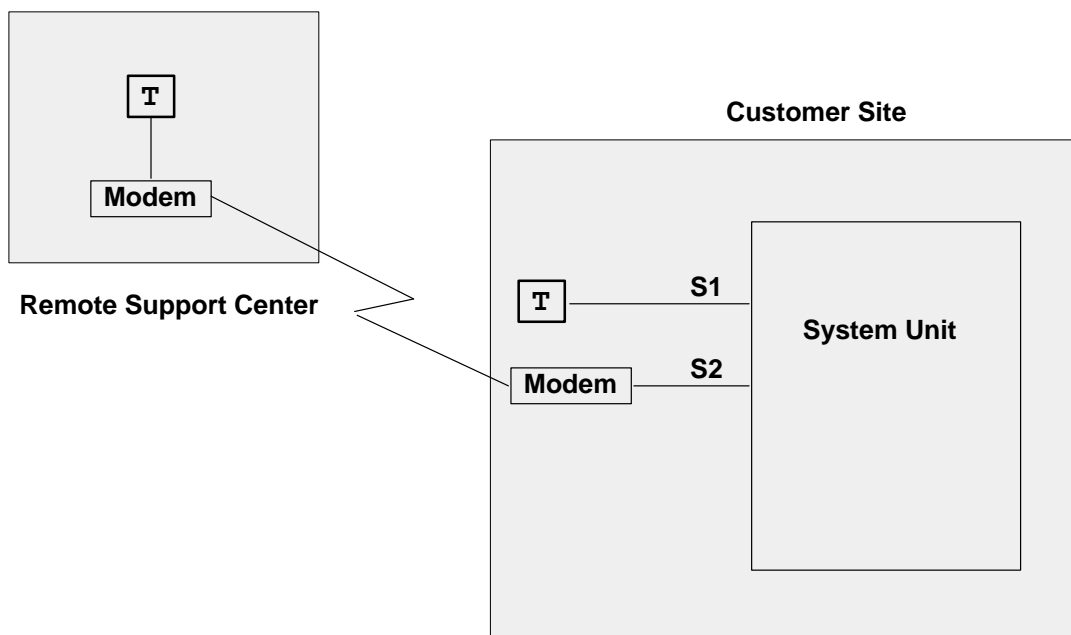
Where *-cf* is for change flag; *1* is for the index. The last number, *1*, is the value of the flag itself.

How to Set Up Console Mirroring

Console Mirroring Concepts

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

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



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

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

The prerequisites for console mirroring are:

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

Setting Up Console Mirroring

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

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

```
mpcfg -dS
```

The command output is:

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

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 the event of an AIX hang, SystemGuard detects the hang condition, 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. The BUMP 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 1–39 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 BUMP sends to the remote support center.

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

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 should appear 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 3-21 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 3-26 for descriptions of these fields.

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

Booting from an SCSI Device through the Bootlist

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

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

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

To boot off this SCSI device, do the following:

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

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

How to Boot from the Network

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

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

```
SYSTEM BOOT
```

```
0> BOOT FROM LIST
```

```
1> BOOT FROM NETWORK
```

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

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

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

```
MAIN MENU
```

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

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

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

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

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

Select the device to BOOT (Startup) this machine.

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

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

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

Page 1 of 2

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

99. Return to Main Menu

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

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

```
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 3-12.
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 3-21 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 3-35.

## **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 4. Installing Optional Features

This chapter contains instructions for installing or removing optional features for the 7012 G Series system unit.

---

### Step 1: Safety Considerations

Observe the following safety precautions any time you work with this system unit.

**Note:** For a translation of the safety notices, refer to the *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 three-wire power cable and plug for the user's safety. Use this power cable with a properly grounded electrical outlet to avoid electrical shock.**

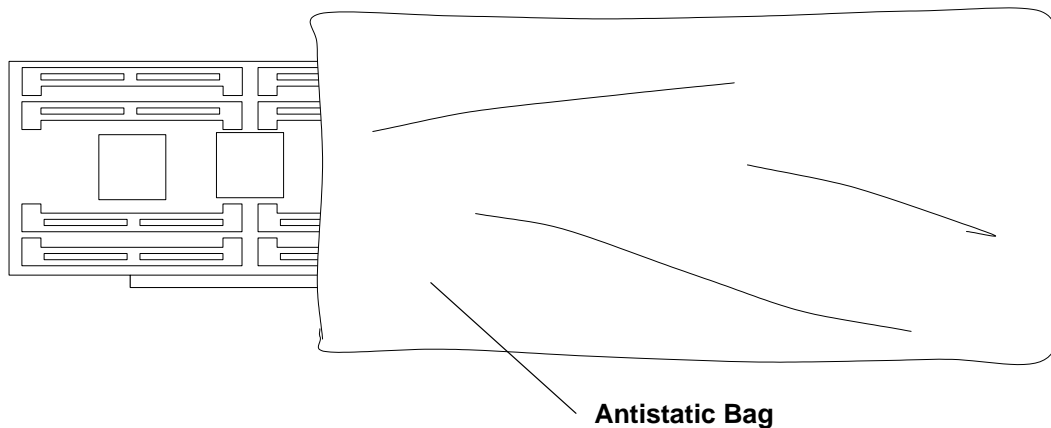
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## Step 2: Handling Static-Sensitive Devices

**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:

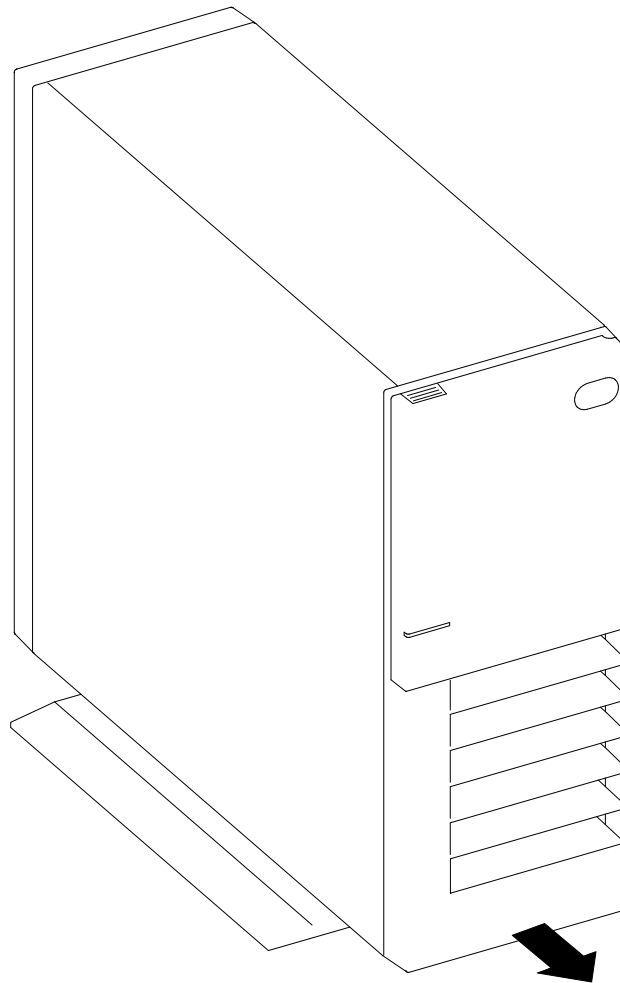
- Do not remove the device from the antistatic bag until you are ready to install the device in the system unit.
- If you have an antistatic wrist strap available, use it while handling the device.
- With the device still in its antistatic bag, touch it to a metal frame of the system.
- Grasp cards and 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.

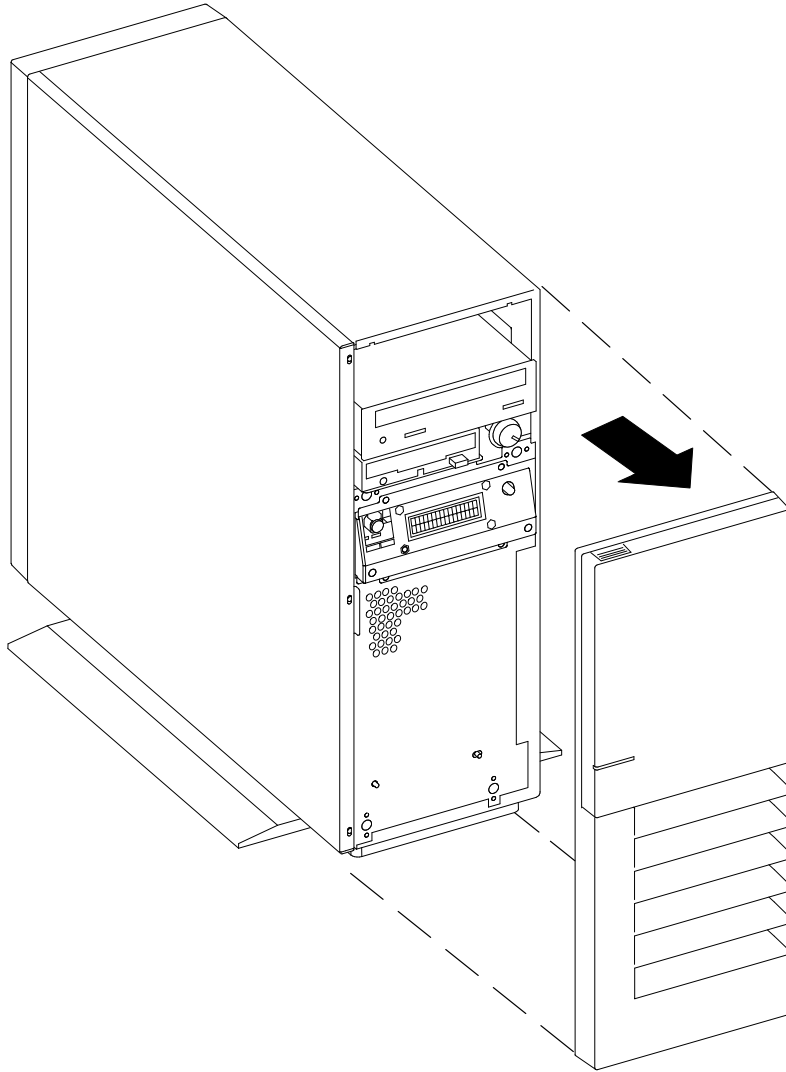


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## Step 3: Removing the Front Cover

1. Follow local procedures to shut down the operating system. For more information on system shut down refer to “Starting and Stopping the System Unit” on page 2-4 in this guide.
2. Set the power switches of the attached devices to Off.
3. Set the power switch of the system unit to Off.
4. Disconnect the power cable from the wall outlet.
5. Set the key mode switch to the service mode position to unlock the front cover.
6. Remove the key from the key mode switch.
7. Firmly grip the front cover at the bottom and remove it from the unit.



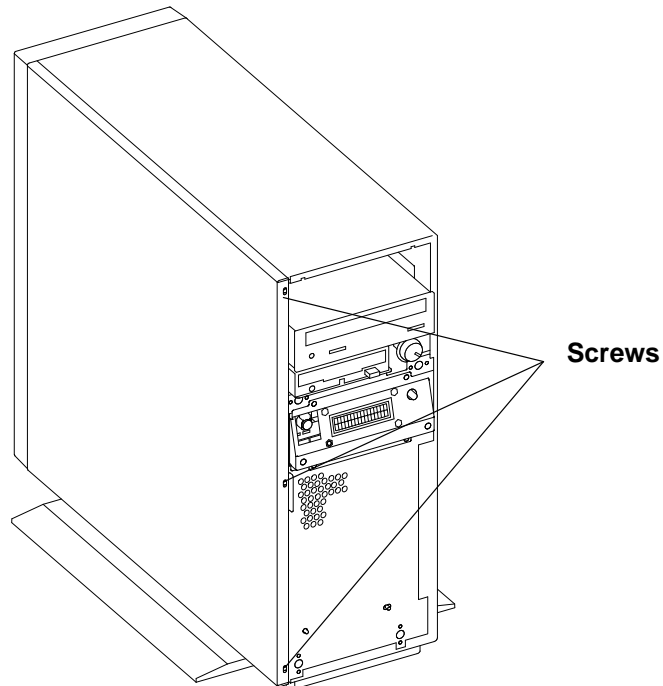


**Attention:** Do not operate the system unit with the covers removed. Operating with the covers on ensures adequate cooling of the components.

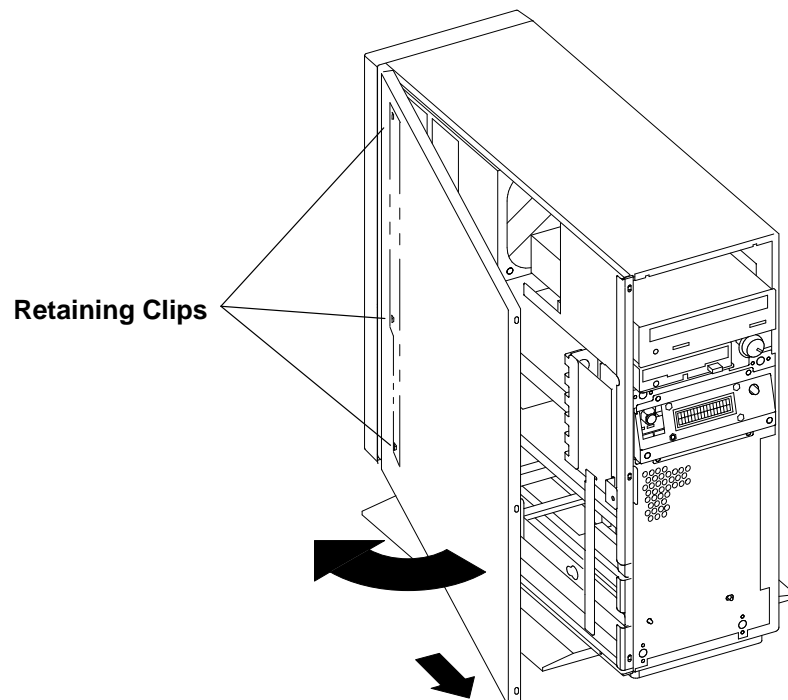
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## Step 4: Removing the Side Cover

1. Unscrew the three retaining screws located on the front side of the unit.



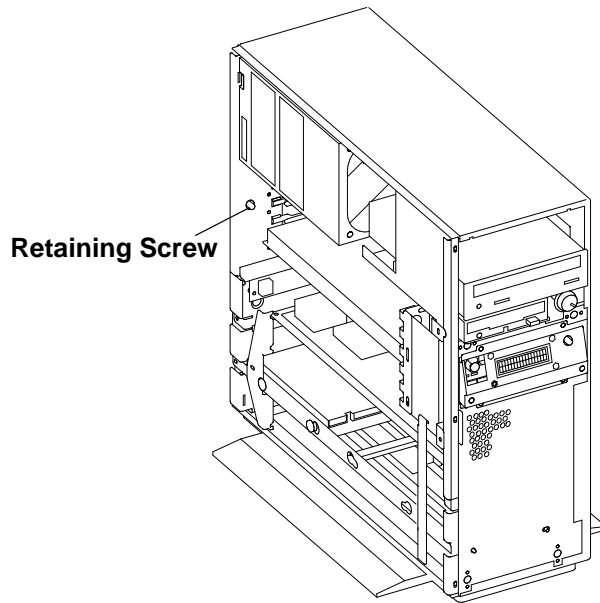
2. With a firm grip, pivot the cover to the left, away from the system.
3. Pull the cover forward to remove it from the unit, unlocking it from the retaining clips on the unit.



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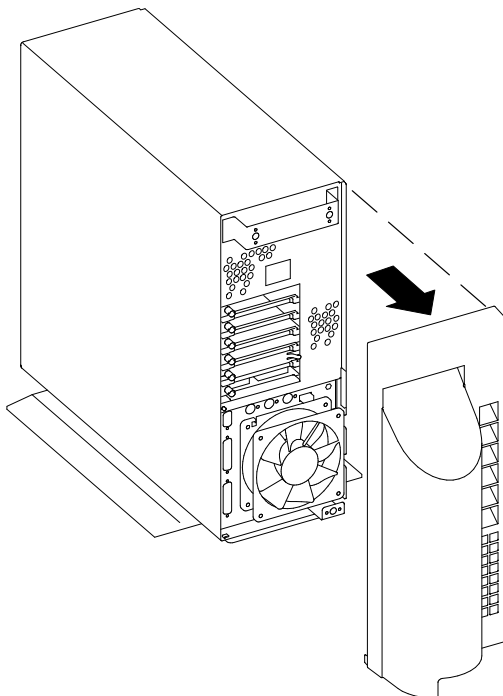
## Step 5: Removing the Rear Cover

1. Remove the retaining screw of the rear cover. This screw is located inside the unit in the rear. (This screw may not be present. It is used for increased security purposes only.)



2. 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 violently can cause accidental disconnection of the cables coming from the rear of the unit.





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## **Step 6: Determine What You Are Installing**

Determine exactly what you will be installing or removing. Make sure that the feature to be installed or removed is a customer replaceable feature.

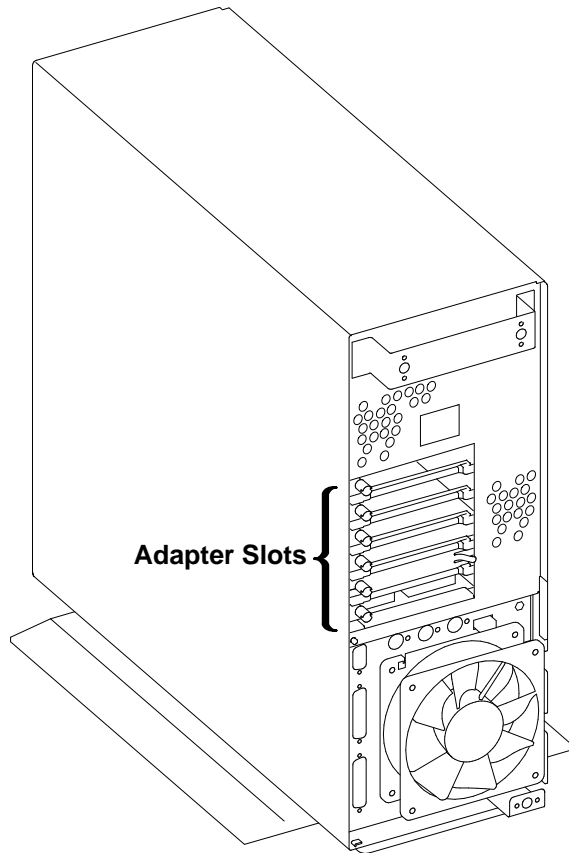
1. If you are removing an adapter, proceed to page 4-13 and follow the procedure for removing an adapter.
2. If you are installing an adapter, proceed to page 4-8 and follow the procedure for installing an adapter.

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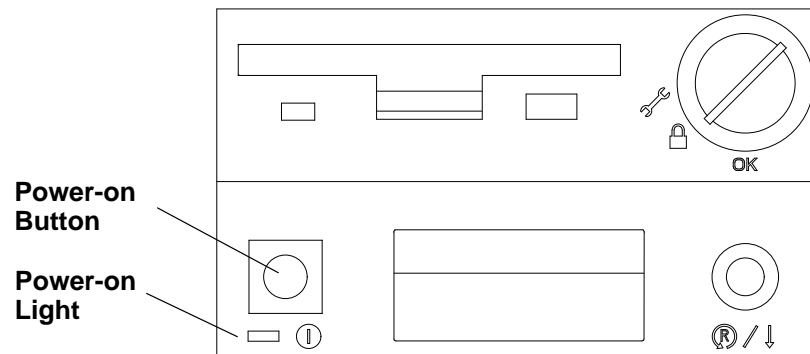
## Adapters

### Installation

The 7012 G Series system unit contains six slots for Micro Channel Type 3 or Type 5 adapters.



1. If the machine is running, perform a system shutdown.
2. Turn off the machine by pushing the power ON/OFF button on the operator panel.



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

**CAUTION:**

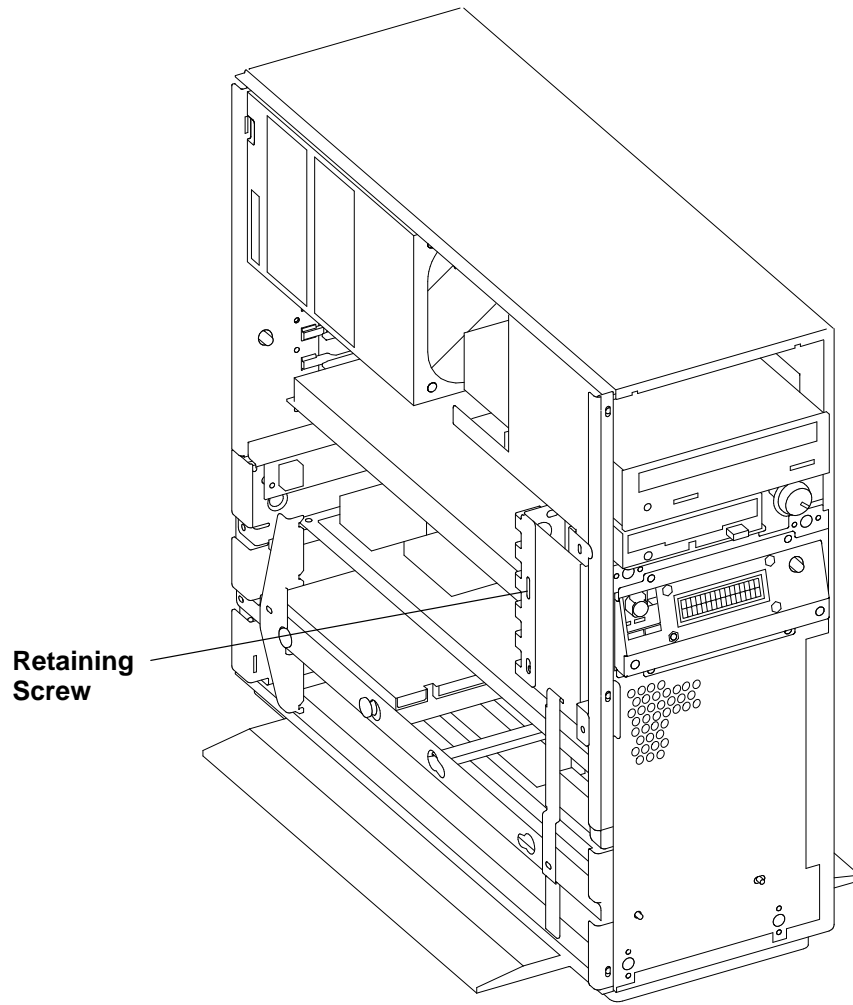
**Before attempting to remove or install any hardware component, ensure that the preliminary operations detailed above have been performed correctly to prevent a possible shock from touching surfaces with high electrical voltage.**

**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.

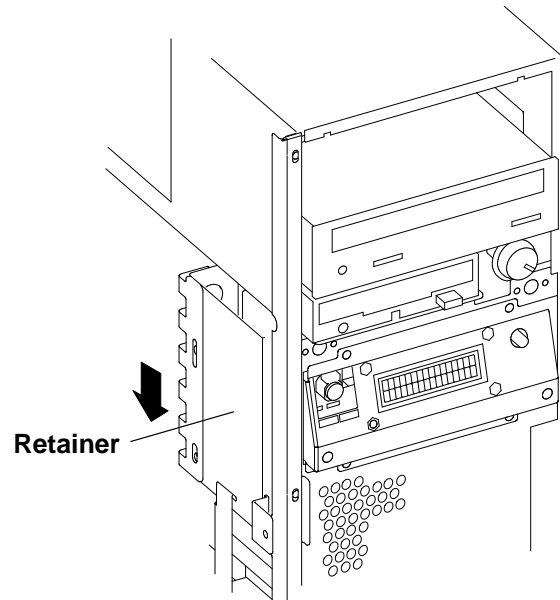
Remove the dummy blank that covers the designated slot, if present, performing the following steps:

- 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. Store the dummy blank for future use.

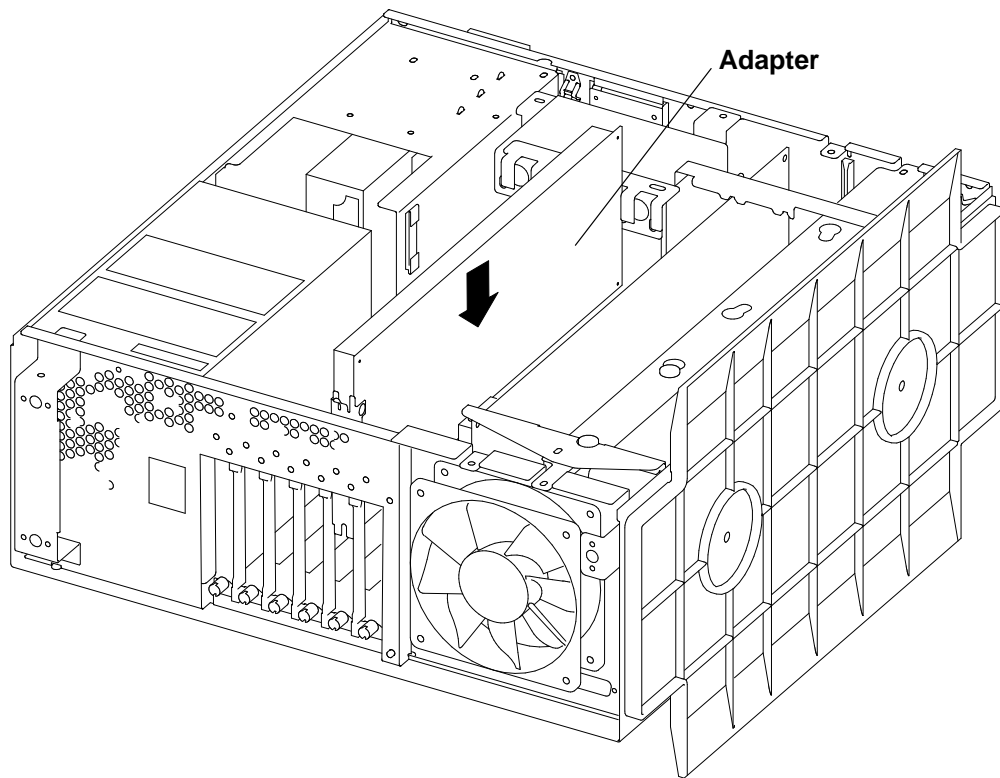
6. Loosen the retaining screw located on the front fan cage.



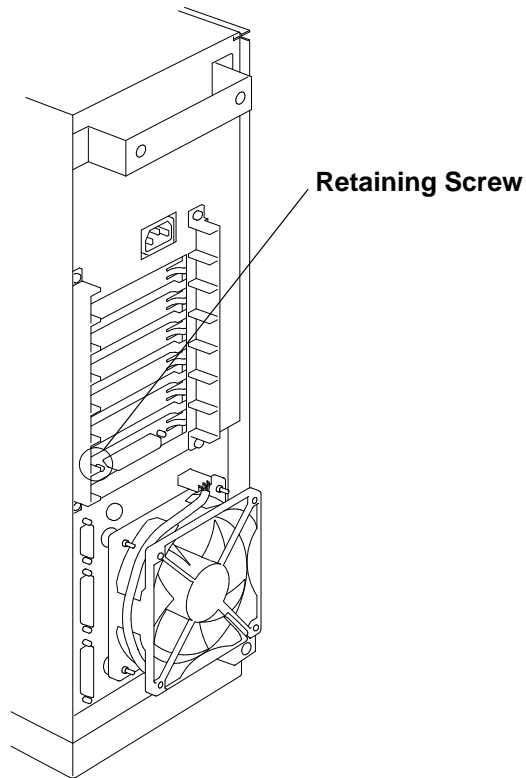
7. Slide the retainer down until the adapters are unlocked.



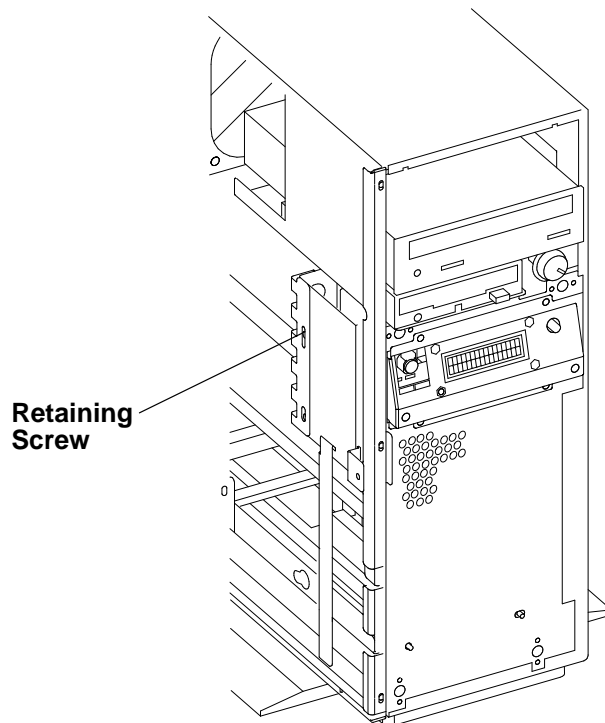
8. Check the adapter to be installed: if it does not match the slot length, install the proper extender on the adapter.
9. Place the system unit in a horizontal position.
10. Align the adapter with the designated slot and insert it by sliding it into the slot.



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



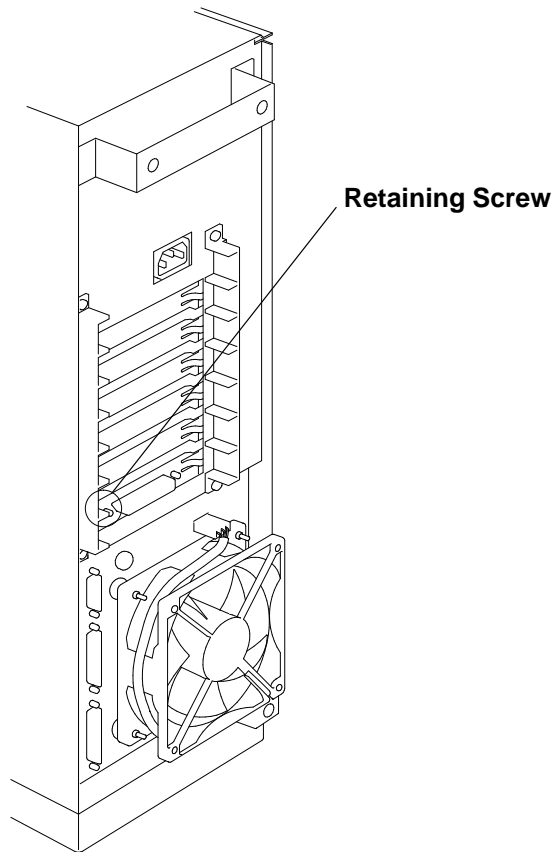
12. Slide the retainer to lock the adapters and tighten the retaining screw.



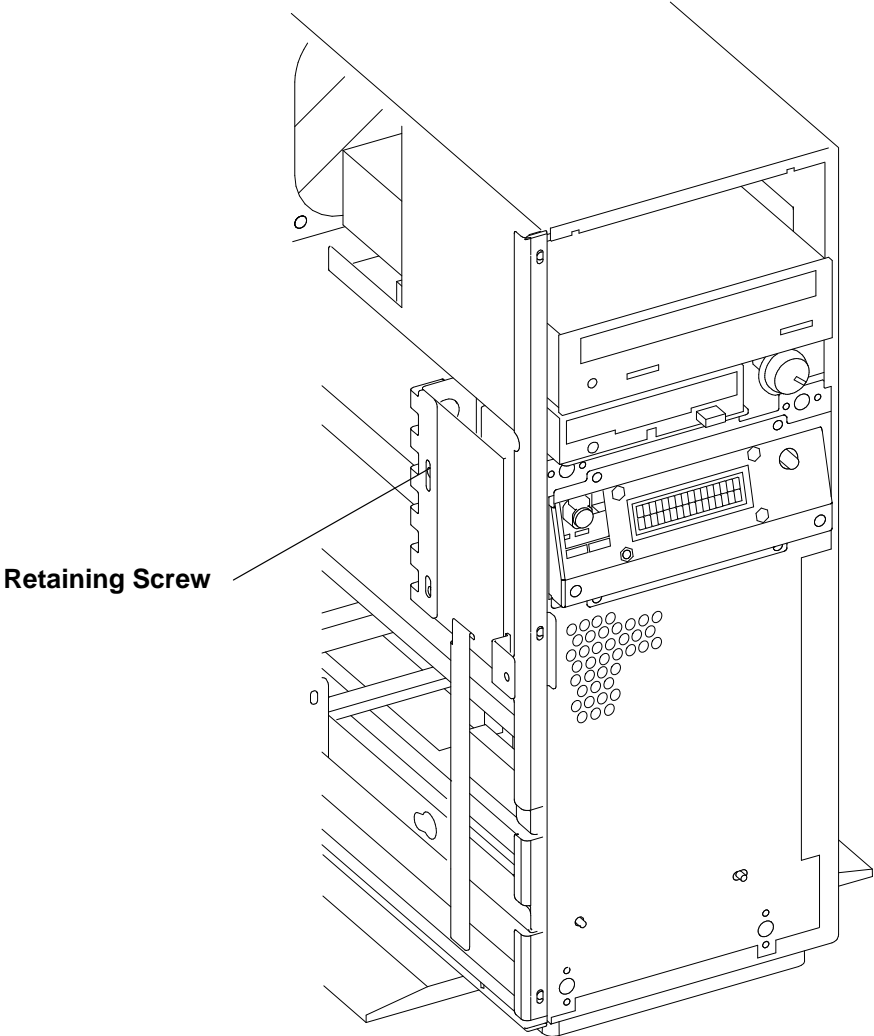
13. Connect any connector (internal or external) cable(s) to the adapter just installed.

## Removal

1. Remove the front cover following the procedures on page 4-3.
2. Remove the side cover following the procedures on page 4-5.
3. Remove the rear cover following the procedure on page 4-6.
4. Place the system unit in horizontal position, right side down.
5. Record the location and type of the adapter.
6. Disconnect any attached devices and internal cables from the adapter.
7. Loosen the retaining screw which locks the adapter on the rear side of the system unit.

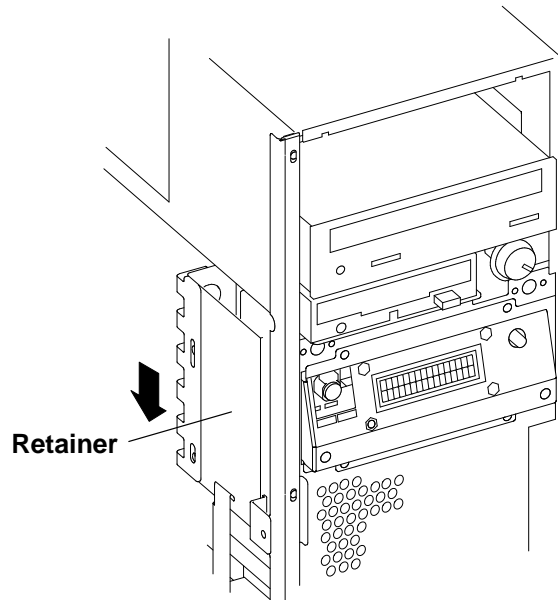


8. On the front fan cage, remove the retaining screw which locks the adapters.





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

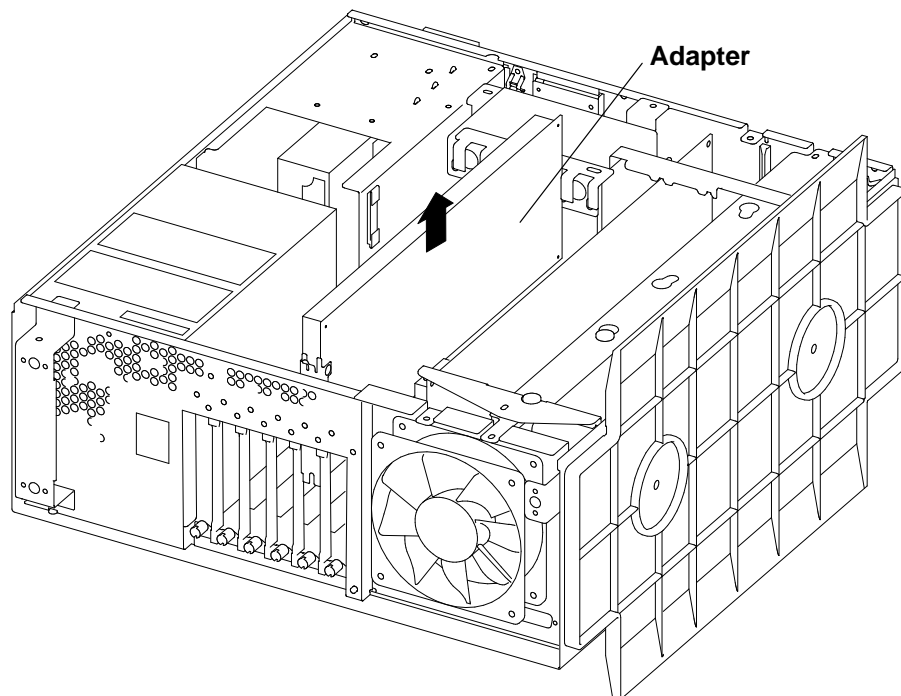


**Attention:** Be careful in handling the adapter: use the adapter pullers and do not touch the adapter components

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.



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.

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

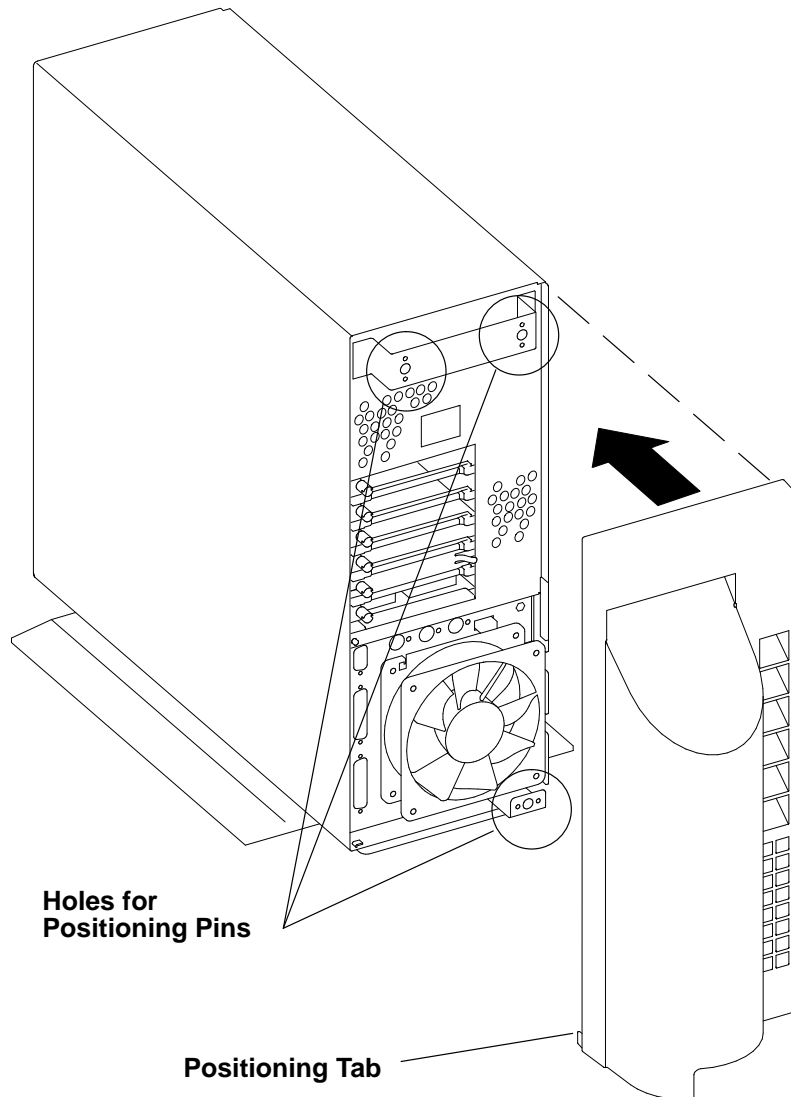
- Position the dummy plate in the free slot inserting it from the internal side of the unit. Pull the tongue of the dummy plate down to fasten it to the slot.
- Secure the dummy plate tightening clockwise the retaining screw on the slot.

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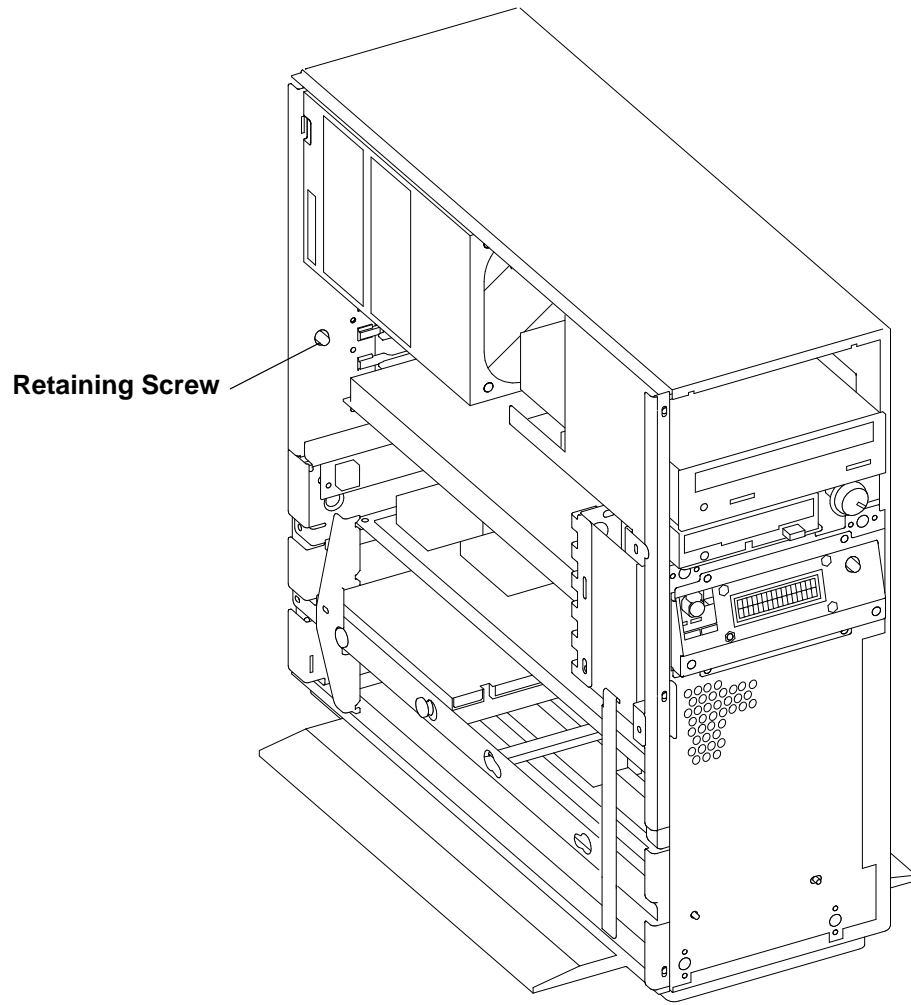
## Step 7: Replacing the Rear Cover

**Note:** Be careful when replacing the rear cover. Before replacing the cover, make sure that all cables are properly connected, and not entangled. All cables coming from the back of the system should be held between the system frame and the cover.

1. Insert the positioning pins located on the back of the cover in the corresponding holes on the system frame. Be careful when centering the positioning tab located at the bottom left corner of the cover.



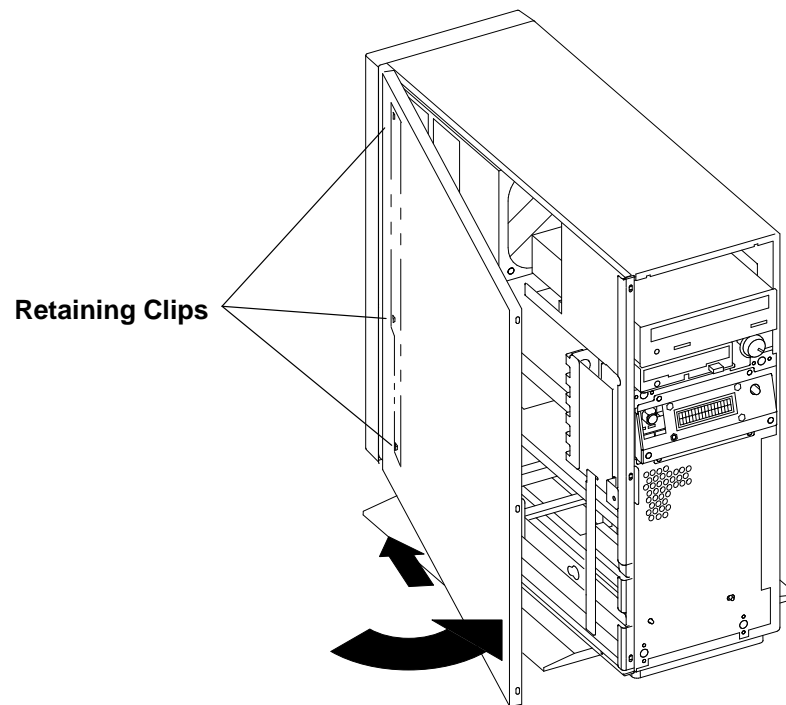
2. Secure the rear panel to the system by tightening the retaining screw.



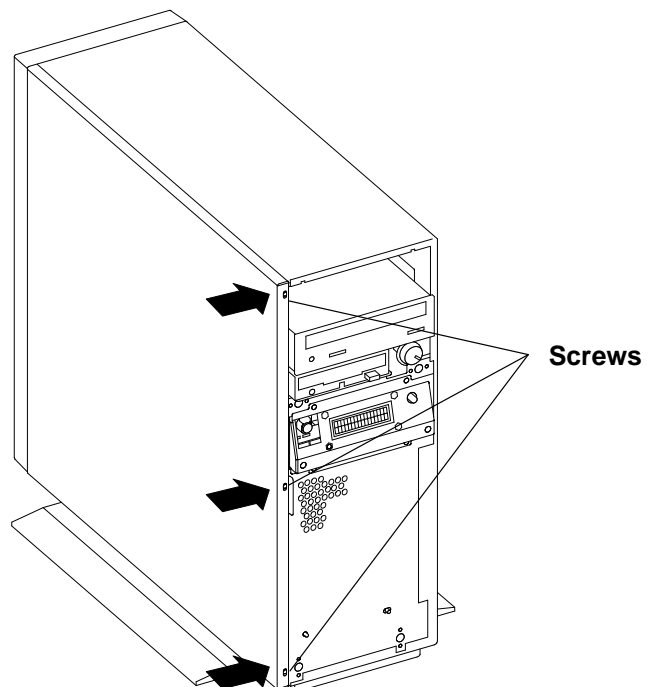
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## Step 8: Replacing the Side Cover

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



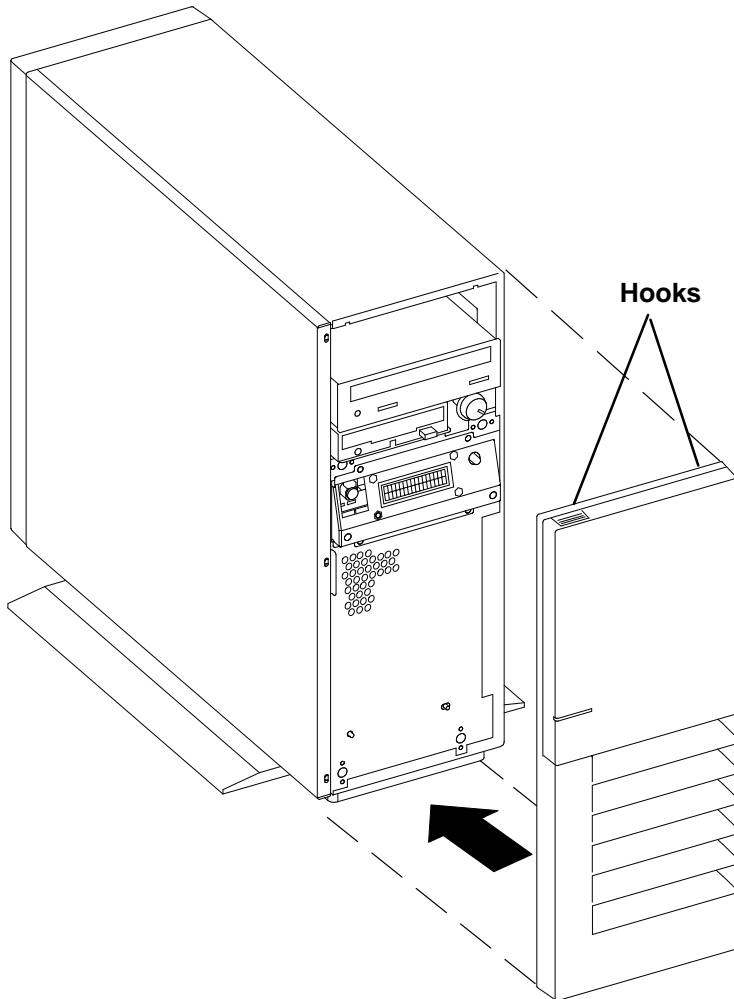
2. Push the cover against the unit.
3. Using a screwdriver, tighten retaining screws.



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## Step 9: Replacing the Front Cover

1. Hook the top of the cover into the top of the system frame.
2. Insert the positioning pins located in the back of the cover in the corresponding holes on the system frame.
3. Push the middle of the cover toward the system frame.
4. Push the bottom of the cover toward the system frame.



5. Insert the system key into the key mode switch to lock the front panel.

**Attention:** Before restarting the system, make sure any free slot has been protected by inserting the appropriate dummy plate.

6. Plug in the power cable to the wall outlet for all system units.
7. Plug in the power cable to all external devices connected to the system unit.
8. Set the power switches for all external devices connected to the system to On.
9. Turn on the machine by pushing the power ON/OFF button on the operator panel.

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## Chapter 5. Using the Diagnostics

This chapter contains information about using and interpreting the diagnostics used on the system unit.

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### Diagnostic Programs Operating Considerations

The following items identify some things to consider before using the diagnostic programs.

**Note:** When possible, run the Online Diagnostics in Service Mode. Online Diagnostics perform additional functions, compared to Standalone Diagnostics.

### Diagnostics on a System Unit Attached to Another System

If your system unit is attached to another system using a network or directly attached to the channel of another system, see “Operating with Multiple Attached Systems” on page 2-6 in this manual before running any diagnostic procedures.

### Selecting a Console Display

When you run diagnostics from removable media, and under some conditions when you run them from disk, you need to select the console display. The diagnostic programs display `c31` in the operator panel display; and the programs display instructions on the terminal attached to the S1 port.

If `c31` is displayed, follow the instructions to select the console display. If you do not have a console display, set the key mode switch to Normal, and then back to Service. This signals the diagnostic programs to use the operator panel display for instructions.

### Identifying the Terminal Type to the AIX Operating System

**Note:** This is a different function than selecting a console display.

When you run diagnostics, the AIX operating system must know what type of terminal you are using. If the terminal type is not known when the `FUNCTION SELECTION` menu is displayed, the diagnostics do not allow you to continue until a terminal is selected from the `DEFINE TERMINAL` option menu.

### Undefined Terminal Types

If an undefined terminal type from the `DEFINE TERMINAL` option menu is entered, the menu prompts the user to enter a valid terminal type, and the menu is redisplayed until either a valid type is entered or the user exits the `DEFINE TERMINAL` option.

#### Resetting the Terminal

If the user enters a terminal type that is valid (according to the `DEFINE TERMINAL` option menu) but is not the correct type for the ASCII terminal being used, reading the screen, using the function keys, or using the Enter key may be difficult. These difficulties can be bypassed by pressing `Ctrl-C` to reset the terminal. The screen display that results from this resetting action varies with the mode in which the system is being run:

- Normal or Maintenance mode – The command prompt appears.
- Service mode – The terminal type is reset to “dumb,” the Diagnostic Operating Instruction panel is displayed, and the user is required to go through the `DEFINE TERMINAL` process again.

## Running the Diagnostic Programs from Disk or from a Server

Consider the following when you run the diagnostic programs from a disk:

- The diagnostics cannot be loaded and run from a disk until Version 4 of the AIX operating system has been installed and configured. (At AIX Version 4.1, Diagnostics are an installable feature.) After the **installp** command is used to install and configure the AIX operating system, all three modes of operation are available.
- Diagnostics can be run on a client system that has been properly set up to run from a server. The server must also be set up for the client. When the system is set up to IPL from a server, the diagnostics are executed in the same manner as they were from disk.
- If the diagnostics were loaded from disk or a server, you must shut down the AIX operating system before turning the system unit off to prevent possible damage to disk data. If running from a server, then server data could also be damaged. This is done in one of two ways:
  - If the diagnostic programs were loaded in Standalone mode, press the F3 key until DIAGNOSTIC OPERATING INSTRUCTIONS displays; then press the F3 key once again to shut down the AIX operating system.
  - If the diagnostic programs were loaded in Maintenance or Concurrent mode, enter the **shutdown -F** command.
- Under some conditions `c31` may appear in the operator panel display with instructions displayed on attached terminals. Follow the instructions to select a console display or set the key mode switch to Normal and back to Service if you do not have a console display.

## Running the Diagnostic Programs from CD-ROM

Consider the following when you run diagnostic programs from the CD-ROM disc:

- The diagnostic disc must remain in the CD-ROM drive for the entire time that diagnostics are running.
- The CD-ROM drive from which diagnostics were loaded cannot be tested.
- The SCSI adapter (or circuitry) controlling the CD-ROM drive from which diagnostics were loaded cannot be tested.
- Diagnostics from CD-ROM are not supported on systems with less than 16MB of installed memory.

To run diagnostics from a CD-ROM drive:

1. Remove any diskette from the diskette drive.
2. Turn on the CD-ROM drive if it is an externally attached device.
3. Insert the diagnostic disc into the CD-ROM drive.
4. Set the mode switch to the Service position.
5. Turn on the system.

## Running the Diagnostic Programs from the Network

Consider the following when you run the diagnostic programs from a network:

- Diagnostics cannot be loaded and run from the network until AIX Version 4.2 or higher has been installed and configured on the server.
- Your system unit must be configured to receive initial program load (IPL) over the network.



- The server must be set up properly so that the client can IPL from it.

To run the diagnostic programs from the network:

- Enter the **shutdown -F** command to shut down the operating system.
- Turn the key mode switch to the Service position.
- Turn off the system unit, wait 30 seconds, then power on the system unit.

## Running the Diagnostic Programs from a tty Terminal

Consider the following when you run diagnostic programs using a tty-type terminal as the console display:

- See the operator manual for your type of tty terminal to find the key sequences you need to respond to the diagnostic programs. For the 3151, refer to the *3151 ASCII Display Station Guide to Operations*, order number GA18-2633. For the 3164, refer to the *3164 ASCII Color Display Station Description*, order number GA18-2617.
- When the diagnostic programs present display information through the S1 port, certain attributes are used. These attributes are set as if the diagnostic programs were using a 3161 display terminal. The following tables list attributes for the 3161 ASCII Display Terminal and for two other ASCII display terminals commonly used with the system.
- If you have a tty terminal other than a 3151, 3161, or 3164 attached to the S1 port, your terminal may have different names for the attributes. Use the attribute descriptions in the following tables to determine the settings for your terminal.

## Running Diagnostic Programs From Tape Drives

To load and execute diagnostics from a tape drive perform the following:

1. Power-on externally attached tape drive. (if applicable)
2. Set the key mode switch to the Service position, and then power-on the system unit.
3. Remove any tape currently in the tape drive.
4. Insert the diagnostic programs tape into the tape drive. Close the tape drive's door if applicable.

## General Attributes Always Required

The following general attributes are the default settings for the diagnostic programs. Be sure your terminal is set to these attributes.

**Note:** These attributes should be set before the diagnostic programs are loaded.

| <b>General Attributes Always Required</b> |                                 |                             |                           |                                                                                                                                                                                                                                                                                                                                                  |
|-------------------------------------------|---------------------------------|-----------------------------|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>General Setup Attributes</b>           | <b>3151 /11/31 /41 Settings</b> | <b>3151 /51/61 Settings</b> | <b>3161/3164 Settings</b> | <b>Description</b>                                                                                                                                                                                                                                                                                                                               |
| Machine mode                              | IBM 3151                        | IBM 3151 PC                 | IBM 3161 or IBM 3164      | The diagnostic programs are set to emulate use of the 3161 ASCII Display Terminal. If your terminal can emulate a 5085, 3161, or 3164 terminal, use the following attribute settings. Otherwise, refer to your operator's manual, compare the following attribute descriptions with those of your terminal, and set your attributes accordingly. |
| Generated Code Set                        |                                 | ASCII                       |                           |                                                                                                                                                                                                                                                                                                                                                  |
| Screen                                    | Normal                          | Normal                      |                           | Uses the EIA-232 interface protocol.                                                                                                                                                                                                                                                                                                             |
| Row and Column                            | 24 x 80                         | 24 x 80                     |                           | Uses the EIA-232 interface protocol.                                                                                                                                                                                                                                                                                                             |
| Scroll                                    | Jump                            | Jump                        | Jump                      | When the last character on the bottom line is entered, the screen moves down one line.                                                                                                                                                                                                                                                           |
| Auto LF                                   | Off                             | Off                         | Off                       | For the On setting, pressing the Return key moves the cursor to the first character position of the next line. For the Off setting, pressing the Return key moves the cursor to the first character position of the current line. The CR and LF characters are generated by the New line setting.                                                |
| CRT saver                                 | Off                             | Off                         | 10                        | The 10 setting causes the display screen to go blank if there is no activity for 10 minutes. When the system unit sends data or a key is pressed, the display screen contents are displayed again.                                                                                                                                               |
| Line wrap                                 | On                              | On                          | On                        | The cursor moves to the first character position of the next line in the page after it reaches the last character position of the current line in the page.                                                                                                                                                                                      |
| Forcing insert                            | Off                             | Off                         |                           |                                                                                                                                                                                                                                                                                                                                                  |

| <b>General Attributes Always Required</b> |                                 |                             |                           |                                                                                                                                                                                                                                                    |
|-------------------------------------------|---------------------------------|-----------------------------|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>General Setup Attributes</b>           | <b>3151 /11/31 /41 Settings</b> | <b>3151 /51/61 Settings</b> | <b>3161/3164 Settings</b> | <b>Description</b>                                                                                                                                                                                                                                 |
| Tab                                       | Field                           | Field                       | Field                     | The column tab stops are ignored, and the tab operation depends on the field attribute character positions.                                                                                                                                        |
| Trace                                     |                                 |                             | All                       | Both inbound data (data to the system unit) and outbound data (data from the system unit) to and from the main port can be transferred to the auxiliary port without disturbing communications with the system unit when the Trace key is pressed. |

## Additional Communication Attributes

The following communication attributes are for the 3151, 3161, and 3164 terminals.

| Communication Setup Attributes | 3151 (models 11, 31, 41) settings | 3161/3164 settings | Description                                                                                                                                                               |
|--------------------------------|-----------------------------------|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Operating mode                 | Echo                              | Echo               | Data entered from the keyboard on the terminal is sent to the system unit for translation and then sent back to the display screen. Sometimes called conversational mode. |
| Line speed                     | 9600 bps                          | 9600 bps           | Uses the 9600 bps (bits per second) line speed to communicate with the system unit.                                                                                       |
| Word length (bits)             | 8                                 | 8                  | Selects eight bits as a data word length (byte).                                                                                                                          |
| Parity                         | No                                | No                 | Does not add a parity bit, and is used together with the word length attribute to form the 8-bit data word (byte).                                                        |
| Stop bit                       | 1                                 | 1                  | Places a bit after a data word (byte).                                                                                                                                    |
| Turnaround character           | CR                                | CR                 | Selects the carriage return (CR) character as the line turnaround character.                                                                                              |
| Interface                      | EIA-232C                          | EIA-232C           | Uses the EIA-232 interface protocol.                                                                                                                                      |
| Line control                   | IPRTS                             | IPRTS              | Uses the 'permanent request to send' (IPRTS) signal to communicate with system unit.                                                                                      |
| Break signal (ms)              | 500                               | 500                | The terminal sends a 'break signal' to the system unit within 500ms after the Break key is pressed.                                                                       |
| Send null suppress             | On                                |                    | Trailing null characters are not sent to the system unit.                                                                                                                 |
| Send null                      |                                   | On                 | Trailing null characters are sent to the system unit.                                                                                                                     |
| Response delay (ms)            | 100                               | 100                | The terminal waits for 100ms for the system unit to respond.                                                                                                              |

## Additional Printer Attributes

The following printer attributes are for a printer attached to the 3151, 3161, and 3164 terminals.

| Additional Printer Attributes |                                   |                    |                                                                                           |
|-------------------------------|-----------------------------------|--------------------|-------------------------------------------------------------------------------------------|
| Printer Setup Attributes      | 3151 (models 11, 31, 41) settings | 3161/3164 settings | Description                                                                               |
| Line speed                    | 9600                              | 9600               | Uses 19,200 or 9600 bps (bits per second) line speed to communicate with the system unit. |
| Word length (bits)            | 8                                 | 8                  | Selects eight bits as a data word length (byte).                                          |
| Parity                        | Even                              | No                 |                                                                                           |
| Stop bit                      | 1                                 | 1                  | Places a bit after a data word (byte).                                                    |
| Characters                    | ALL                               |                    |                                                                                           |
| Line end                      |                                   | CR-LF              |                                                                                           |
| Print                         |                                   | Viewport           |                                                                                           |
| Print EOL                     |                                   | Off                |                                                                                           |
| Print null                    |                                   | Off                |                                                                                           |

---

## Diagnostic Modes of Operation

The diagnostics can be run in three modes:

- Maintenance mode allows checking of most system resources.
- Concurrent mode allows the normal system functions to continue while selected resources are being checked.
- Standalone mode allows checking of all the system devices and features.

### Maintenance Mode

Maintenance mode runs the diagnostics using the customer's Version 4 of the operating system. This mode requires that all activity on Version 4 of the operating system be stopped so the diagnostics have most of the resources available to check. All of the system resources except the SCSI adapters and the disk drive used for paging can be checked.

Error log analysis is done in maintenance mode when you select the **Problem Determination** option on the DIAGNOSTIC MODE SELECTION menu.

The **shutdown -m** command is used to stop all activity on Version 4 of the operating system and put the operating system into maintenance mode. Then the **diag** command is used to load the diagnostic controller so you can run the diagnostic programs from the menus. After the diagnostic controller is loaded, follow the normal diagnostic instructions.

### Running the Diagnostics in Maintenance Mode

To run the diagnostics in maintenance mode you must be logged on to the customer's Version 4 of the operating system as `root` or `superuser` and use the **shutdown -m** and **diag** commands. Use the following steps to run the diagnostics in maintenance mode:

1. Stop all programs except the operating system.
2. Log onto Version 4 of the operating system as `root` or `superuser`.
3. Enter the **shutdown -m** command.
4. When a message indicates the system is in maintenance mode, enter the **diag** command. (Message on the system will say Standalone mode.)

**Note:** It may be necessary to set `TERM` type again.

5. When DIAGNOSTIC OPERATING INSTRUCTIONS is displayed, follow the displayed instructions to checkout the desired resources.
6. When testing is complete; use the F3 key to return to DIAGNOSTIC OPERATING INSTRUCTIONS. Then press the F3 key again to return to the operating system prompt.
7. Press Ctrl-D to log off from `root` or `superuser`.

## Concurrent Mode

Concurrent mode provides a way to run diagnostics on some of the system resources during normal system activity. Because the system is running in normal operation, some of the resources cannot be tested in concurrent mode. The following resources *cannot* be tested in Concurrent mode:

- SCSI adapters connected to paging devices
- The disk drive used for paging
- Some display adapters.

There are three levels of testing in concurrent mode:

- The *share-test level* tests a resource while the resource is being shared by programs running in the normal operation. This testing is mostly limited to normal commands that test for the presence of a device or adapter.
- The *subtest level* tests a portion of a resource while the remaining part of the resource is being used in normal operation. For example, this test could test one port of a multiport device while the other ports are being used in normal operation.
- The *full-test level* requires the device not be assigned to or used by any other operation. This level of testing on a disk drive may require the use of the **varyoff** command. The diagnostics display menus to allow you to vary off the needed resource.

The diagnostics also display a menu to assign a resource if another resource is needed.

Error log analysis is done in concurrent mode when you select the **Problem Determination** option on the DIAGNOSTIC MODE SELECTION menu.

To run the diagnostics in concurrent mode, you must be logged onto Version 4 of the AIX operating system and have proper authority to issue the commands.

The **diag** command loads the diagnostic controller and displays the diagnostic menus.

## Running the Diagnostics in Concurrent Mode

To run diagnostics in concurrent mode, take the following steps:

1. Log on to Version 4 of the operating system as `root` or `superuser`.
2. Enter the **diag** command.
3. When the DIAGNOSTIC OPERATING INSTRUCTIONS are displayed, follow the instructions to check out the desired resources.
4. When testing is complete; use the F3 key to return to the DIAGNOSTIC OPERATING INSTRUCTIONS. Then press the F3 key again to return to the operating system prompt. Be sure to *vary on* any disk drives you had varied to off.
5. Press the Ctrl-D key sequence to log off from `root` or `superuser`.

## Standalone Mode

Standalone mode provides the most complete checkout of the system resources. This mode also requires that no other programs be running on the system.

Standalone mode can be loaded in three ways:

- From removable media. This method is the only method available for those systems that do not have Version 4 of the AIX operating system installed.
- From a disk within the system unit. This loads the diagnostic programs that are a part of Version 4 of the operating system. Version 4 of the operating system must be installed and configured before the diagnostics can run from it.
- On some system units, built-in diagnostics can be run from read-only memory (ROM). These diagnostics are intended to be used when it is not possible to use Version 4 of the AIX operating system diagnostic programs. The tests provided by the built-in diagnostic programs are not as complete as Version 4 of the AIX operating system diagnostic programs.

## Running the Diagnostics in Standalone Mode

To run diagnostics in standalone mode:

1. Stop all programs including the AIX operating system.
2. Set the power switch on the system unit to Off.
3. Set the key mode switch to the Service position.

**Note:** When the diagnostic programs are run from removable media, the diagnostics do *not* check the error log entries.

4. To load the standalone diagnostics from a CD-ROM disc, insert the CD-ROM diagnostic disc into the CD-ROM drive.
5. To load the diagnostics from the disk, leave the CD-ROM drive empty.
6. Set the power switch on the system unit to On.
  - If `c07` is displayed, insert the appropriate diagnostic diskette. If necessary, refer to the CERADME file for additional information.
  - If `c31` is displayed, follow the instructions to select a console display.
7. After the diagnostic controller loads, DIAGNOSTIC OPERATING INSTRUCTIONS appear on the console display.

If the system unit does *not* have a console display, the diagnostics run automatically and loop on the diagnostic test until the system unit power switch is set to Off.

When the diagnostics are run from disk, a `c99` is displayed when the tests have completed.

When the diagnostics are run from diskette, a `c07` is displayed when the tests have completed.

8. If a problem is detected while the diagnostics are loading, a flashing `888` displays in the operator panel display. See "Reading a Flashing 888 Message on an Multi-Line Operator Panel Display" on page 5-13 for instructions on reading the message.
9. Follow the displayed instructions to checkout the desired resources.



10. When testing is complete, use the F3 key to return to the DIAGNOSTIC OPERATING INSTRUCTIONS.

11. If you loaded the diagnostics from the disk, press the F3 key (from a defined terminal) or press 99 (for an undefined terminal) to shut down the diagnostics before turning off the system unit.

**Note:** Pressing the F3 key (from a defined terminal) produces a "Confirm Exit" popup menu which offers two options: continuing with the shutdown by pressing F3; or returning to diagnostics by pressing Enter.

For undefined terminals, pressing 99 produces a full screen menu which offers two options: continuing with the shutdown by pressing 99 and then Enter; or returning to diagnostics by pressing Enter.

12. If you loaded the diagnostics from a CD-ROM disc, turn off the system unit after the shutdown is complete.

## System Exerciser

The System Exerciser tests and exercises devices in an overlap mode and can be run from disk in standalone or maintenance mode and from the network.

### Starting the System Exerciser

When the System Exerciser is selected from the FUNCTION SELECTION menu, another menu displays all devices to be tested. Pressing the Enter key starts tests for all of the devices.

The time required to test all of the devices depends on the number of devices to be tested and can range from several minutes to approximately one hour for a fully loaded system. Because some devices require less time to test than others, the System Exerciser may test a device one or more times.

**Note:** If the system contains tape devices, CD-ROM, or diskette drives, you are asked whether you want to use media in the devices when you are testing.

### Display Screens

If the console is an async terminal, the standby screen is displayed during testing. The time-of-day is displayed at the top of the screen and is updated approximately every minute.

After all devices have been tested at least once, a results screen is displayed until either the Enter key is pressed to restart the System Exerciser or the System Exerciser is stopped. If no errors were detected, the results screen displays the `No trouble found` message; if errors have been detected, the results screen displays a list of devices with corresponding errors.

### Stopping the System Exerciser

Although the System Exerciser can be stopped at any time, it is best to stop it while the results screen is displayed. Stopping the System Exerciser at other times can cause the loss of test information.

When the System Exerciser is stopped, the screen displays all tested devices with errors flagged. Selecting a device that has an error flag provides details such as SRN, location code, number of times the device was tested, and the number of times an error was detected.

---

## CPU and Memory Testing and Error Log Analysis

With the exception of the floating-point tests, all CPU and memory testing on the system units are done by PON and POST. The PON and POST provide an error-free memory map. If POST cannot find at least 2MB of good memory, it halts and displays an SRN in the LEDs identifying the problem. If POST finds at least 2MB of good memory, the memory problems is recorded in the the IPL Control Block and the system continues to boot.

If any memory errors were recorded in the IPL Control Block, they are reported by the Base System Diagnostics, which must be run to analyze the IPL Control Block. Normally, most memory problems that are detected by the POST are isolated to a single FRU.

The CPU and memory cannot be tested after the AIX based diagnostics are loaded; however, they are monitored for correct operation by various checkers such as Checkstop, Machine Check, Data Storage Interrupt, etc. The checkers may vary by processor type. If one of these checks intermittently occurs it is logged into the error log. To analyze these errors the Base System Diagnostics must be run in the Problem Determination Mode.

Single-bit memory errors are corrected by ECC (Error Checking and Correction).

Machine Checks occur when there is a double bit error. Machine Check problems are isolated to memory cards and DIMMs that were addressed when the error occurred.

Although Checkstops can be caused by many things, the diagnostics always callout the system board when there is a Checkstop. Machine Checks can cause Checkstops.

**Note:** Normally, the Base System Diagnostics do not analyze any error more than four days old.

---

## Reading a Flashing 888 Message on a Multi-Line Operator Panel Display

An 888 flashing in the first line of the operator panel display indicates that a hardware or software error has been detected and that an error message is being displayed. For additional information about flashing 888 numbers, refer to "System Unit Error Isolation Features" in *Diagnostic Information For Micro Channel Bus Systems*.

---

### Step 1. Determine the Type of Message

The first line of the operator panel display should be displaying a line with 888 flashing in it.

1. Get a problem summary form from the *Problem Solving Guide and Reference* or a blank sheet of paper to record the characters appearing in the operator panel display.
2. Be sure the key mode switch is set to Normal or Service.
3. Record the three digits following the flashing 888 in the first line of the operator panel display. This is the message type.
4. In the following list, go to the step for your message type.

**Type 102**      Go to Step 2.

**Type 103**      Go to Step 3.

**Type 105**      Go to Step 3.

**Other**          Go to Step 4.

---

## Step 2. Reading the Type 102 Message

A 102 message is generated when a software or hardware error occurs during system execution of an application. Use the following steps and information to determine the contents of the type 102 message. Refer to the “Crash Codes” and “Dump Progress Indicators (Dump Status Codes)” on page 5-14.

The following is an example of the first line of the multiline operator panel display;

```
888 102 RRR SSS
```

where:

```
102 = Message type
RRR = Crash code
SSS = Dump status code
```

1. Record the three digits following the 102 in the first line of the operator panel display, this is the crash code. Record the three digits immediately following the crash code, this is the dump status.
2. Look at the second line of the operator panel display and then answer the following question.

### Is the second line of the operator panel display blank?

- NO** The message has a type 103 or 105 message included in it. Press the Reset button once, then go to Step 3. Read out the SRN and FRU information for these message types.
- YES** This completes the read-out of this message. You must power-off the system unit to recover from this halt. There are no SRNs associated with this message type. Go to “Hardware Problem Determination” on page 8-1.

## Crash Codes

The following crash codes are part of a Type 102 message.

|     |                                                                             |
|-----|-----------------------------------------------------------------------------|
| 000 | Unexpected system interrupt.                                                |
| 200 | Machine check because of a memory bus error.                                |
| 201 | Machine check because of a memory time-out.                                 |
| 202 | Machine check because of a memory card failure.                             |
| 203 | Machine check because of a out of range address.                            |
| 204 | Machine check because of an attempt to write to ROS.                        |
| 205 | Machine check because of an uncorrectable address parity.                   |
| 206 | Machine check because of an uncorrectable ECC error.                        |
| 207 | Machine check because of an unidentified error.                             |
| 208 | Machine check due to an L2 uncorrectable ECC.                               |
| 300 | Data storage interrupt from the processor.                                  |
| 32x | Data storage interrupt because of an I/O exception from IOCC.               |
| 38x | Data storage interrupt because of an I/O exception from SLA.                |
| 400 | Instruction storage interrupt.                                              |
| 500 | External interrupt because of a scrub memory bus error.                     |
| 501 | External interrupt because of an unidentified error.                        |
| 51x | External interrupt because of a DMA memory bus error.                       |
| 52x | External interrupt because of an IOCC channel check.                        |
| 53x | External interrupt from an IOCC bus time-out; x represents the IOCC number. |
| 54x | External interrupt because of an IOCC keyboard check.                       |

|     |                                                 |
|-----|-------------------------------------------------|
| 558 | There is not enough memory to continue the IPL. |
| 700 | Program interrupt.                              |
| 800 | Floating point is not available.                |

## Dump Progress Indicators (Dump Status Codes)

The following dump progress indicators, or dump status codes, are part of a Type 102 message.

**Note:** When a lowercase `c` is listed, it displays in the lower half of the seven-segment character position. The leftmost position is blank on the following codes.

|     |                                                                                                                       |
|-----|-----------------------------------------------------------------------------------------------------------------------|
| 0c0 | The dump completed successfully.                                                                                      |
| 0c2 | A dump, requested by the user, is started.                                                                            |
| 0c3 | The dump is inhibited.                                                                                                |
| 0c4 | The dump did not complete. A partial dump may be present.                                                             |
| 0c5 | The dump program could not access the dump device.                                                                    |
| 0c6 | A dump to the secondary dump device was requested. Make the secondary dump device ready; then press Ctrl-Alt-Numpad2. |
| 0c7 | Reserved.                                                                                                             |
| 0c8 | The dump function is disabled.                                                                                        |
| 0c9 | A dump is in progress.                                                                                                |

---

## Step 3. Reading the Type 103 and 105 Message

A type 103 and 105 message is generated when a hardware error is detected. Use the following steps and information to record SRN and FRU location code information.

1. Record all characters following the first 103 or 105 in the first line of the operator panel display. This is the SRN.
2. Record all characters following the number in the first position on the second line, this is the location code information for the first FRU.
3. Each time the reset button is pressed the operator panel display scrolls upwards one line. When all the information has been displayed, the bottom line of the operator panel display contains a line with 888 flashing. This indicates that the message is being repeated.

Press the reset button and record the information in the bottom line of the operator panel display. Continue this exercise until a line with a flashing 888 is displayed. Use the following information to help identify the information in each line.

**Note:** X represents any character.

| Displayed Information | Meaning                                                     |
|-----------------------|-------------------------------------------------------------|
| 103 XXX-XXX           | SRN being displayed, XXX-XXX is the SRN.                    |
| 105 XXXX              | SRN being displayed, XXXX is the SRN.                       |
| 1 XX-XX-XX-XX         | First FRU location code, XX-XX-XX-XX is the location code.  |
| 2 XX-XX-XX-XX         | Second FRU location code, XX-XX-XX-XX is the location code. |
| 3 XX-XX-XX-XX         | Third FRU location code, XX-XX-XX-XX is the location code.  |
| 4 XX-XX-XX-XX         | Fourth FRU location code, XX-XX-XX-XX is the location code. |

**Note:** All eleven characters of the location code may not be displayed.

4. If multiple SRNs were recorded start with the SRN recorded first. If that does not fix the problem try the remaining SRNs in the order recorded until the problem is fixed.
5. When the system halts with a flashing 888 you must power-off the system unit to recover. Go to "Hardware Problem Determination" on page 8-1.

---

## Step 4. Other Numbers

The only valid message types are types 102, 103, 104, and 105. Type 104 messages are used by the manufacturing plant and should be ignored. If you have any other number displayed, take the following actions:

1. Press the Reset button again and again until a flashing 888 appears in the first line of the operator panel display. If you do not get a flashing 888 in the display, you should consider the numbers as *steady* numbers. Go to "Hardware Problem Determination" on page 8-1.
2. When the flashing 888 is displayed, go to Step 1 on page 5-13.

---

## Chapter 6. Introduction to Tasks and Service Aids

Beginning with version 4.2 there are two top level menus seen by the user – Tasks and Resources. Once a Task has been selected, then a list of resources will be displayed for selection to run the Task on. Or after selecting a Resource, a set of Tasks is displayed for selection.

---

### Tasks

Service Aids are invoked via a task selection from the following list:

**Note:** Refer to page 6-3 for a listing of service aids.

- Add Resource to Resource List
- AIX Shell Prompt
- Backup and Restore Media
- Bit Error Rate Service Aid
- Certify Media
- Change Hardware Vital Product Data
- Configure Dials and LPFKs
- Create Customized Diagnostic Configuration Diskette
- Delete Resource from Resource List
- Disk Maintenance
- Display Configuration and Resource List
- Display Hardware Error Report
- Display Hardware Vital Product Data
- Display or Change Bootlist
- Display or Change BUMP Configuration
- Display or Change Diagnostic Run Time Options
- Display or Change Electronic Mode Switch
- Display or Change Multi-processor Configuration
- Display Previous Diagnostic Results
- Display Service Hints
- Display Software Product Data
- Display Test Patterns
- Download Microcode
- Format Media
- Generic Download Microcode
- Periodic Diagnostics
- Process Supplemental Media
- Product Topology
- Run Diagnostics
- Run Error Log Analysis
- SCSI Bus Analyzer
- SSA Service Aids
- Update Disk Based Diagnostics
- 7318 Serial Communications Network Server

## Run Diagnostics Task

The Run Diagnostics task invokes the Resource Selection List menu. When the commit key is pressed, Diagnostics is run on all selected resources.

The procedures for running the diagnostics depends on the states of the Diagnostics Run Time Options. The run time options are:

- Display Diagnostic Mode Selection Menus

If this option is on, the Diagnostic Mode Selection Menu is displayed when the commit key is pressed.

- Include Advanced Diagnostics

If this option is on, Advanced Diagnostics is included.

- Include Error Log Analysis

If this option is on, Error Log Analysis will be included. When running Standalone Diagnostics with Include Error Log Analysis set to Yes, ELA is only done on the error that is logged in NVRAM.

- Run Tests Multiple Times

If this option is on, diagnostic is run in loop mode. This option is only valid when running Online Diagnostics in Service Mode.

## Run Error Log Analysis Task

The Run Error Log Analysis task invokes the Resource Selection List menu. When the commit key is pressed, Error Log Analysis will be run on all selected resources.

## Display or Change Diagnostic Run Time Options Task

The Display or Change Diagnostic Run Time Options task allows the diagnostic run time options to be set.

**Note:** The run time options are used only when running the Run Diagnostic task.

The run time options are:

- Display Diagnostic Mode Selection Menus

This option allows the user to select whether the DIAGNOSTIC MODE SELECTION MENU is displayed or not (the default is yes).

- Include Advanced Diagnostics

This option allows the user to select if the Advanced Diagnostics should be included or not (the default is no).

- Include Error Log Analysis

This option allows the user to select if the Error Log Analysis (ELA) should be included or not (the default is no).

**Note:** When running Standalone Diagnostics with Include Error Log Analysis set to Yes, ELA will only be done on the error that is logged in NVRAM.



- Run Tests Multiple Times

This option allows the user to select if the diagnostic should be run in loop mode or not (the default is no).

**Note:** This option is only displayed when running Online Diagnostics in Service Mode.

## Process Supplemental Media Task

This prompts for either diskette or tape media, reads in media using cpio, and executes **diagstart** shell script.

## Service Aids

The diagnostic contain programs called service aids. The service aids are used to display data and additional testing.

Options for the service aids are available when the software package for that option is installed.

Prior to Release version 4.2 the service aids were selected via the Service Aids Selection Menu. Beginning with version 4.2 the service aids are selected via the Task Selection Menu.

The following service aids are provided:

| Service Aid                                                                    | Page Reference |
|--------------------------------------------------------------------------------|----------------|
| AIX Shell Prompt Service Aid                                                   | 6-4            |
| Backup/Restore Media Service Aid                                               | 6-4            |
| Bit Error Rate Service Aid                                                     | 6-4            |
| BUMP Service Aid                                                               | 6-4            |
| Diagnostic Package Utility Service Aid                                         | 6-5            |
| Dials and LPFK Configuration Service Aid                                       | 6-5            |
| Disk Based Diagnostic Update Service Aid and Update Disk Based Diagnostic Task | 6-6            |
| Disk Maintenance Service Aid                                                   | 6-6            |
| Disk Media Service Aid                                                         | 6-7            |
| Disk to Disk Copy Service Aid                                                  | 6-6            |
| Diskette Media Service Aid                                                     | 6-9            |
| Display/Alter Bootlist Service Aid                                             | 6-9            |
| Display/Alter Sector Service Aid                                               | 6-7            |
| Display or Change Configuration or Vital Product Data (VPD) Service Aid        | 6-9            |
| Display and Change Diagnostic Test List Service Aid                            | 6-10           |
| Display or Change Key Modes Service Aid                                        | 6-11           |
| Display Previous Diagnostic Results Service Aid                                | 6-11           |
| Display Test Patterns Service Aid                                              | 6-11           |
| Generic Microcode Download Service Aid                                         | 6-11           |
| Hardware Error Report Service Aid and Display Hardware Error Log Task          | 6-12           |
| Local Area Network Service Aid and Local Area Network Analyzer Task            | 6-12           |
| Microcode Download Service Aid                                                 | 6-12           |
| Multiprocessor Service Aid                                                     | 6-12           |

|                                                       |      |
|-------------------------------------------------------|------|
| Periodic Diagnostics Service Aid                      | 6-13 |
| Product Topology Service Aid                          | 6-13 |
| SCSI Bus Service Aid and SCSI Bus Analyzer Task       | 6-13 |
| SCSI Tape Utilities Service Aid                       | 6-14 |
| Service Aids for use with Ethernet                    | 6-14 |
| Service Hints Service Aid                             | 6-15 |
| SSA Service Aid                                       | 6-15 |
| Trace Service Aid                                     | 6-15 |
| 7318 Serial Communications Network Server Service Aid | 6-16 |

These service aids are described in the following topics.

---

## AIX Shell Prompt Service Aid

This service aid allows access to the AIX command line. In order to use this service aid the user must know the root password (when a root password has been established).

---

## Backup/Restore Media Service Aid

This service aid allows verification of backup media and devices. It presents a menu of tape and diskette devices available for testing and prompts for selection of the desired device. It then presents a menu of available backup formats and prompts for selection of the desired format. The supported formats are tar, backup, and cpio. After the device and format are selected, the service aid backs up a known file to the selected device, restores that file to /tmp, and compares the original file to the restored file. The restored file is also left in /tmp to allow for visual comparison. All errors are reported.

---

## Bit Error Rate Service Aid

This service aid is used to check the bit error rate for an ESCON adapter to assure that the link to the host system is functioning properly. To run the ESCON Bit Error Rate Service Aid, the adapter must be connected, configured, and on-line. If the adapter is not configured properly, the service aid will not be able to check the bit error rate.

---

## BUMP (Bringup Micro-Processor) Service Aids (Display or Change BUMP Configuration Task)

This service aid is unique to the SMP system units and provides the following functions:

- Display or Change Remote Support Phone Number

This function allows the remote support phone number to be displayed and altered.

- Display or Change Diagnostics Modes

This function displays a dialog screen that lists the states of all the BUMP (Bringup Micro-Processor) Diagnostic Flags. The states can be changed via the dialog screen.

- Save or Restore Diagnostics Modes and Remote Support Phone Number

This function allows the diagnostics modes and remote support phone number to be saved and restored. The location of the save area is to be defined.

- Flash EPROM Download

This function updates the Flash EPROM.

---

## Diagnostic Package Utility Service Aid

The Diagnostic Package Utility Service Aid allows the user to perform the following actions:

- Format a 1, 2, or 4MB diskette

This function was moved to the Format Media Task at version 4.2.

- Create a Standalone Diagnostic Package Configuration Diskette

The Standalone Diagnostic Package Configuration Diskette allows the following to be changed from the console:

- Default refresh rate for a LFT

The refresh rate used by the standalone diagnostic package is 60Hz. If the display's refresh rate is 77Hz, then set the refresh rate to 77.

- Different async terminal console

A console configuration file that allows a terminal attached to any RS232 or RS422 adapter to be selected as a console device can be created using this service aid. The default device is an RS232 tty attached to the first standard serial port (S1).

---

## Dials and LPFK Configuration Service Aid

This service aid provides a tool for configuring and removing dials/LPFKs to the standard serial ports.

Since 4.1.3 a tty must be defined on the async port before the Dials and LPFKs can be configured on the port. Before version 4.2 the Dials and LPFKs could only be configured on the standard serial ports. At version 4.2 the Dials and LPFKs can be configured on any async port.

### Dials and LPFKs Configuration Service Aid Before Version 4.2

The Dials and LPFKs Configuration Service Aid provides a tool for configuring and removing dials/LPFKs to the native serial ports.

### Configure Dials and LPFKs Task Version 4.2+

This service aid has been replaced by the Dials and LPFK Configuration smit task. The Dials and LPFKs can be configured on any async port. A tty must be in the available state on the async port before the Dials and LPFKs can be configured on the port. The task allows an async adapter to be configured, then a tty port defined on the adapter, and then Dials and LPFKs can be defined on the port. Additional information is documented under smit.

---

## Disk Based Diagnostic Update Service Aid and Update Disk Based Diagnostic Task

This service aid allows fixes (APARs) to be applied.

### Disk Based Diagnostic Update Service Aid Before Version 4.2

Prior to version 4.2 this service aid is used to update the diagnostics on the disk drive. The updates may be new diagnostics or an update to the existing diagnostics. It uses the **installp** command to do this.

### Update Disk Based Diagnostic Task Version 4.2

Beginning with version 4.2 this service aid is replaced by the Update Disk Based Diagnostics task. The task invokes the smit Update Software by Fix (APAR) task. The task allows the input device and APARs to be selected. Any APAR can be installed using this task. Additional information is documented under smit.

---

## Disk Maintenance Service Aid

This service aid consist of the following:

- Disk to Disk Copy Service Aid
- Display/Alter Sector Service Aid

---

## Disk to Disk Copy Service Aid

**Note:** To access this service aid refer to the Disk Maintenance Service Aid.

The service aid allows you to recover data from an old drive when replacing it with a new drive. The service aid only supports copying from a drive to another drive of similar size. This service aid cannot be used to update to a different size drive. The **migratepv** command should be used when updating drives. The service aid recovers all LVM software reassigned blocks. To prevent corrupted data from being copied to the new drive, the service aid aborts if an unrecoverable read error is detected. To help prevent possible problems with the new drive, the service aid aborts if the number of bad blocks being reassigned reaches a threshold.

The procedure for using this service aid requires that both the old and new disks be installed in or attached to the system with unique SCSI addresses. This requires that the new disk drive SCSI address must be set to an address that is not currently in use and the drive be installed in an empty location. If there are no empty locations, then one of the other drives has to be removed. Once the copy is complete, only one drive may remain installed. Either remove the target drive to return to the original configuration, or perform the following procedure to complete the replacement of the old drive with the new drive.

1. Remove both drives.
2. Set the SCSI address of the new drive to the SCSI address of the old drive.
3. Install the new drive in the old drive's location.
4. Install any other drives that were removed into their original location.

To prevent problems that may occur when running this service aid from disk, it is suggested that this service aid be run from the diagnostics that are loaded from removable media when possible.

---

## Display/Alter Sector Service Aid

**Note:** To access this service aid refer to the Disk Maintenance Service Aid.

This service aid allows you to display and alter information on a disk sector. Care must be used when using this service aid because inappropriate modification to some disk sectors may result in total loss of all data on the disk. Sectors are addressed by their decimal sector number. Data is displayed both in hex and in ASCII. To prevent corrupted data from being incorrectly corrected, the service aid does not display information that cannot be read correctly.

---

## Disk Media Service Aids

This service aid consists of a Format, Certify, and Erase service aid for each type of hard disk supported, and Optical Disk service aid for supported optical disks.

- Certify

Certify reads all of the ID and data fields. It checks for bad data and counts all errors encountered. If more than 10 hard data errors or more than 1 hard equipment error is found, the user is prompted to replace the drive. One or less recovered data errors per megabyte is normal. More than one recoverable data error per megabyte indicates that the disk should be formatted and certified. Disk errors are not logged during certify.

- Format

Format writes all the disk. The pattern put on the disk is device dependent, i.e. some drives may put all 0s, while some may put hexadecimal number 5F. No bad block reassignment occurs

- Format and Certify

Format and Certify does the same as format does. After the Format is completed, Certify is run. This Certify reassigns all bad blocks encountered.

- Erase Disk

This option can be used to overwrite (remove) all data currently stored in user-accessible blocks of the disk. The Erase Disk option writes one or more patterns to the disk. An additional option allows data in a selectable block to be read and displayed on the system console.

To use the Erase Disk option, specify the number (0–3) of patterns to be written. Select the patterns to be written; the patterns are written serially. That is, the first pattern is written to all blocks. Then the next pattern is written to all blocks, overlaying the previous pattern. A random pattern is written by selecting the "Write random pattern?" option.

The Erase Disk service aid has not been certified as meeting the Department of Defense or any other organizations security guidelines. The following steps should be followed if the data on the drive is to be overwritten:

1. Run the "Erase Disk" Service Aid to overwrite the data on the drive.

2. Do a format without certify.
3. Run a second pass of the erase service aid.

For a newly installed drive, you can insure that all blocks on the drive is overwritten with your pattern if you use the following procedure:

1. Format the drive.
2. Check the defect map by running the Erase Disk Service Aid.

**Note:** If you use the "Format and Certify" option, there may be some blocks which get placed into the grown defect map.

3. If there are bad blocks in the defect map, record the information presented and ensure that this information is kept with the drive. This data is used later when the drive is to be overwritten.
4. Use the drive as you would normally.
5. When the drive is no longer needed and is to be erased, run the same version of the Erase Disk Service Aid which was used in step 2.

**Note:** Using the same version of the service aid is only critical if there were any bad blocks found in step 3.

6. Compare the bad blocks which were recorded with the drive in step 3 with those which now appear in the grown defect map.

**Note:** If there are differences between the saved data and the newly obtained data, then all of the sectors on this drive cannot be overwritten. The new bad blocks are not overwritten.

7. If the bad block list is the same, continue running the service aid to overwrite the disk with the chosen pattern(s).

Before version 4.2 the Disk Media Service Aid is entered via the Disk Media selection from the Service Aid Selection Menu. At version 4.2+ the Disk Media service aid is entered via the Format Media or Certify Media options from the Task Selection Menu.

## Optical Disk Service Aids

The Optical Disk Service Aids consist of Initialize, Format and Certify, and Spare Sector Availability service aids.

- Initialize

This service aid is used to format the optical disk without certifying it. This option does not reassign the defective sectors; however, it is a quick way of formatting after cleaning the disk.

- Format and Certify

This service aid is used to format the optical disk and certify it. The certification process is drive specific and performs the surface analysis of all user data and spare sectors. The defective sectors are reassigned.

- Spare Sector Availability

This service aid checks the number of spare sectors available on the optical disk. The spare sectors are used to reassign when defective sectors are encountered during normal usage or during a format and certify operation. Low availability of spare sectors

indicates that the disk needs to be backed up and replaced. Formatting the disk does not improve the availability of spare sectors.

---

## Diskette Media Service Aid

This service aid provides a way to verify the data written on a diskette. When this service aid is selected, a menu asks you to select the type of diskette being verified. The program then reads all of the ID and data fields on the diskette one time and displays the total number of bad sectors found. Diskette format support was added in version 4.2.

Prior to version 4.2 the Diskette Media Service Aid was entered via the Diskette Media selection from the Service Aid Selection Menu. At version 4.2 and later the Diskette Media Service Aid is entered via the Format Media or Certify Media options from the Task Selection Menu.

---

## Display/Alter Bootlist Service Aid

This service aid allows the bootlists to be displayed, altered, or erased.

The system attempts to perform an IPL from the first device in the list. If the device is not a valid IPL device or if the IPL fails, the system proceeds in turn to the other devices in the list to attempt an IPL.

---

## Display or Change Configuration or Vital Product Data (VPD) Service Aid

This service aid allows you to display and change configuration data and vital product data (VPD).

Prior to version 4.2 this service aid was entered via the Service Aid Selection Menu. From version 4.2 on, this service aid is entered via the Task Selection Menu.

The following are the task selections which appear on the Task Selection Menu:

- Display Configuration and Resource List
- Display Hardware Vital Product Data
- Change Hardware Vital Product Data
- Add or Delete Drawer configuration

## Display Vital Product Data (VPD) Service Aid and Display Hardware Vital Product Data Task

This service aid displays all installed resources along with any VPD for those resources. Use this service aid when you want to look at the VPD for a specific resource.

## Display Software Product Data Pre-version 4.2

This service aid displays information about the installed software.

## Display Software Product Data Beginning with Version 4.2

This service aid displays information about the installed software and provides the following functions:

- List Installed Software
- List Applied but Not Committed Software Updates
- Show Software Installation History
- Show Fix (APAR) Installation Status
- List Fileset Requisites
- List Fileset Dependents
- List Files Included in a Fileset
- List File Owner by Fileset

## Display Configuration Service Aid and Display Configuration and Resource List Task

This service aid displays the item header only for all installed resources. Use this service aid when there is no need of seeing the VPD. (No VPD is displayed.)

## Change Hardware Vital Product Data Task

Use this service aid to display the Display/Alter VPD Selection Menu. The menu lists all resources installed on the system. When a resource is selected a menu is displayed that lists all the VPD for that resource.

**Note:** The user cannot alter the VPD for a specific resource unless it is not machine readable.

---

## Display and Change Diagnostic Test List Service Aid

**Note:** Beginning with version 4.2 this service aid is no longer supported. The Display Configuration and Resource List, Add Resource to Resource List, and Delete Resource from Resource List Tasks have replaced it.

This service aid provides a way to:

- Display the Diagnostic Test List

This selection lists all of the resources tested by the diagnostics.

- Add a resource to the Diagnostic Test List

This selection allows resources to be added back to the Diagnostic Test List. The Diagnostic Test List Menu lists all resources that can be added back to the Diagnostic Test List.

**Note:** Only resources that were previously detected by the diagnostics and deleted from the Diagnostic Test List is listed. If no resources are available to be added, then none are listed.

- Delete a resource from the Diagnostic Test List

This selection allows resources to be deleted from the Diagnostic Test List. The



Diagnostic Test List Menu lists all resources that can be deleted from the Diagnostic Test List.

**Note:** Only resources that were previously detected by the diagnostics and have not been deleted from the Diagnostic Test List is listed. If no resources are available to be deleted, then none are listed.

---

## Display or Change Key Modes (Display or Change Electronic Mode Switch Task)

This service aid is unique to the SMP system units and displays the states of the Physical and Electronic Keys. It also allows the electronic keys to be set.

---

## Display Previous Diagnostic Results Service Aid

**Note:** This service aid is not available when you load the diagnostics from a source other than a disk drive or from a network.

Each time the diagnostics produce a service request number (SRN) to report a problem, information about that problem is logged. The service representative can look at this log to see which SRNs are recorded. This log also records the results of diagnostic tests that are run in loop mode.

When this service aid is selected, information on the last problem logged is displayed. The Page Down and Page Up keys can be used to look at information about previous problems.

This information is not from the error log maintained by the AIX operating system. This information is stored in the `/etc/lpp/diagnostics/data/*.dat` file.

---

## Display Test Patterns Service Aid

This service aid provides a means of making adjustments to system display units by providing displayable test patterns. Through a series of menus the user selects the display type and test pattern. After the selections are made the test pattern is displayed.

---

## Generic Microcode Download Service Aid

This service aid provides a means of restoring a diskette (or other media) and executing a restored program. This program does whatever is required to download the microcode onto the adapter or device.

This service aid is supported in both concurrent and standalone modes from disk, LAN, or loadable media.

When entered, this service aid displays information about what it does, it then asks for a microcode diskette to be inserted into the diskette drive. The diskette will be in backup format. The service aid restores the diskette to the `/tmp` directory and execute a program called **diagucode**. Once **diagucode** has completed, it returns you to the service aid.

---

## Hardware Error Report Service Aid and Display Hardware Error Log Task

This service aid provides a tool for viewing the hardware error log and performing error log analysis. It uses the **errpt** command to do this.

The Display Error Summary and Display Error Detail selection provide the same type of report as the **errpt** command. The Display Error Analysis Summary and Display Error Analysis Detail selection provide additional analysis. The Error Analysis and Error Analysis Detail options were removed at 4.1.3.

---

## Local Area Network Service Aid and Local Area Network Analyzer Task

This service aid and task are used to exercise the LAN communications adapters (Token–Ring, Ethernet, and Fiber Distributed Data Interface (FDDI)). The following services are available:

- Connectivity testing between two network stations. Data is transferred between the two stations. This requires the user to input the Internet Addresses of both stations.
- Monitoring ring (Token–Ring only). The ring is monitored for a period of time. Soft and hard errors are analyzed.

Additional information about this service aid can be found in the Local Area Network Service Aids CIS.

Prior to version 4.2 this service aid was accessed via the Local Area Network Service Aids selection of the Service Aid Selection Menu. Beginning with version 4.2 this service aid is accessed via the Local Area Network Analyzer options from the Task Selection Menu.

---

## Microcode Download Service Aid

This service aid provides a way to copy device microcode to a device. It is used to update the microcode on a device. It presents a list of devices that use microcode. The device on which the microcode is to be installed is selected. The service aid instructs the user on its use.

---

## Multiprocessor Service Aid (Display or Change Multiprocessor Configuration Task)

- This service aids is unique to the SMP system units and provides the following functions:
- Display or Change Processor States

This function displays or changes the state of available processors.

- Bind Process

This function provides a tool for binding a process and all its threads to a specified processor.

---

## Periodic Diagnostics Service Aid

This service aid provides a tool for configuring periodic diagnostics and automatic error log analysis. A hardware resource can be chosen to be tested once a day, at a user specified time. If the resource cannot be tested because it is busy, error log analysis is performed. Hardware errors logged against a resource can also be monitored by enabling Automatic Error Log Analysis. This allows error log analysis to be performed every time a hardware error is put into the error log. If a problem is detected, a message is posted to the system console and a mail message sent to the user(s) belonging to the system group with information about the failure such as Service Request Number.

The service aid provides the following functions:

- Add or delete a resource to the periodic test list
- Modify the time to test a resource
- Display the periodic test list
- Modify the error notification mailing list
- Disable Automatic Error Log Analysis.

---

## Product Topology Service Aid

This service aid provides enhanced product and order quality.

---

## SCSI Bus Service Aid and SCSI Bus Analyzer Task

This service aid provides a means to diagnose a SCSI Bus problem in a free-lance mode.

Prior to version 4.2 the SCSI Bus Service Aid was accessed via the SCSI Bus selection from the Service Aid Selection Menu. Beginning with version 4.2 the SCSI Bus Service Aid is accessed via the SCSI Bus Analyzer option from the Task Selection Menu.

To use this service aid, the user should have an understanding of how a SCSI Bus works. This service aid should be used when the diagnostics cannot communicate with anything on the SCSI Bus and cannot isolate the problem. Normally the procedure for finding a problem on the SCSI Bus with this service aid is to start with a single device attached, ensure that it is working, then start adding additional devices and cables to the bus ensuring that each one works. This service aid works with any valid SCSI Bus configuration.

The SCSI Bus Service Aid transmits a SCSI Inquiry command to a selectable SCSI Address. The service aid then waits for a response. If no response is received within a defined amount of time, the service aid displays a timeout message. If an error occurs or a response is received, the service aid then displays one of the following messages:

- The service aid transmitted a SCSI Inquiry Command and received a valid response back without any errors being detected.
- The service aid transmitted a SCSI Inquiry Command and did not receive any response or error status back.
- The service aid transmitted a SCSI Inquiry Command and the adapter indicated a SCSI bus error.
- The service aid transmitted a SCSI Inquiry Command and an adapter error occurred.
- The service aid transmitted a SCSI Inquiry Command and a check condition occur.

When the SCSI Bus Service Aid is entered a description of the service aid is displayed.

Pressing the Enter key displays the Adapter Selection menu. This menu allows the user to enter which address to transmit the SCSI Inquiry Command.

When the adapter is selected the SCSI Bus Address Selection menu is displayed. This menu allows the user to enter which address to transmit the SCSI Inquiry Command.

Once the address is selected the SCSI Bus Test Run menu is displayed. This menu allows the user to transmit the SCSI Inquiry Command by pressing the Enter key. The Service Aid then indicates the status of the transmission. When the transmission is completed, the results of the transmission is displayed.

**Notes:**

1. A Check Condition can be returned when there is nothing wrong with the bus or device.
2. AIX does not allow the command to be sent if the device is in use by another process.

---

## SCSI Tape Utilities Service Aid

This service aid provides a means to obtain the status or maintenance information from a SCSI tape drive. Only some models of SCSI tape drive are supported.

The service aid provides the following options:

- Display time since a tape drive was last cleaned.

The time since the drive was last cleaned is displayed onto the screen. In addition, a message indicating whether the drive is recommended to be cleaned is also displayed.

- Copy a tape drive's trace table.

The trace table of the tape drive is written to diskettes.

The required diskettes must be formatted for DOS. Writing the trace table may require several diskettes. The actual number of required diskettes is determined by the service aid based on the size of the trace table. The names of the data files are of the following format:

'TRACE<X>.DAT' where 'X' the sequential diskette number. The complete trace table consists of the sequential concatenation of all the diskette data files.

- Display or copy a tape drive's log sense information.

The service aid provides options to display the log sense information to screen, to copy it to a DOS formatted diskette or to copy it to a file. The file name "LOGSENSE.DAT" is used when the log sense data is written on the diskette. The service aid prompts for a file name when the log sense data is to be copied to a file.

---

## Service Aids for use with Ethernet

This selection provides a tool for diagnosing Ethernet problems. This service aid is used to exercise the Ethernet adapter and parts of the Ethernet network. The service aid works by transmitting a data block to itself. This service aid works with a wrap plug or with any valid Ethernet network and can be used as a tool to diagnose Ethernet network problems.

When the Ethernet service aid is executed, one of the following messages is returned:

- No errors occurred.
- An adapter error occurred.
- A transmit time-out occurred.
- A transmit error occurred.
- A receive time-out occurred.
- A receive error occurred.
- A system error occurred.
- Receive and transmit data did not match.
- An error occurred that could not be identified.
- The configuration indicates that there are no Ethernet adapters in this system unit.
- Another application is currently using the adapter.
- The resource could not be configured.

---

## Service Hints Service Aid

This service aid reads and displays the information in the CEREA.DME file from the diagnostics source (diskettes, disk, or CD-ROM). This file contains information that is not in the publications for this version of the diagnostics. It also contains information about using this particular version of diagnostics.

Use the Enter key to page forward through the information or the – (dash) and Enter keys to page backward through the file.

---

## SSA Service Aid

This service aid provides tools for diagnosing and resolving problems on SSA attached devices. The following tools are provided:

- Set Service Mode
- Link Verification
- Configuration Verification
- Format and Certify Disk

---

## Trace Service Aid

This service aid provides a tool for doing a Trace Dump on the Serial Disk subsystem. It provides a means of doing a trace and a means to look at the trace data. The service aid is only supported in 2.x version of diagnostics.

---

## **7318 Serial Communications Network Server Service Aid**

This service aid provides a tool for diagnosing terminal server problems.

---

## Chapter 7. Using the System Verification Procedure

This chapter contains information about pre-procedure considerations and running the system verification.

---

### System Verification Procedure

The system verification procedure is used to check the system for correct operation.

When you are analyzing a hardware problem, you should use the “Hardware Problem Determination Procedure” on page 8-1.

---

### Step 1. Considerations before Running This Procedure

- This procedure requires use of all of the system resources. No other activity can be running on the system while you are doing this procedure. Before starting this procedure, you should stop all programs and the operating system.

If this system unit is directly attached to another system unit or attached to a network, be sure communications with the other system unit is stopped. If needed, see Chapter 2 for more information about multiple system attachments.

- This procedure requires a console terminal attached to the S1 port.
- This procedure runs the diagnostic programs in standalone mode from either your normal IPL source or from removable media (if installed). If the diagnostic programs are installed on disk or LAN, these procedures should be run from disk or LAN. (See the operator manual for your type tty terminal to find the key sequences you need to respond to the diagnostic programs.)

If you need more information about standalone mode, see “Diagnostic Modes of Operation” on page 5-8.

- If a console is not selected, the diagnostics stop with `c31` in the operator panel display. The instructions for selecting a console are displayed on any terminal attached to the S1 port. Follow the displayed instructions to select a console display.
- This procedure assumes that the AutoService IPL is enabled. If this flag is disabled, then the system displays the MAINTENANCE MENU when booting. Refer “Modifying SystemGuard Parameters” on page B-1 to determine how to verify and change this flag’s setting; or, when the MAINTENANCE MENU is displayed select `System Boot`, then `Boot From List`, and continue.
- Go to Step 2.

---

## Step 2. Loading the Diagnostic Programs

1. Stop all application programs running on the operating system.
2. Stop the operating system. (If help is needed, call your 800 support number.)
3. Turn off the system.
4. Set the mode switch to the Service position.
5. If you want to run the diagnostics with removable media, and are running the diagnostics from a terminal attached to an S1 port, continue with this substep. If not, go to substep 6.
  - The console terminal must be attached to the S1 port on the system unit.
  - The attributes for the terminal must be set to match the defaults of the diagnostic programs. (For more information regarding attributes, refer to Chapter 5 “Using the Diagnostics.”)
  - Before changing any settings, record the normal settings, and be sure the terminal attributes are set to work with the diagnostic programs.
6. Power the system on.

If `c31` is displayed, select the console display using the displayed instructions.
7. When the DIAGNOSTIC OPERATING INSTRUCTIONS display, go to Step 3.

---

## Step 3. Running System Verification

The DIAGNOSTIC OPERATING INSTRUCTIONS should be displayed.

1. Press the Enter key.
2. If the terminal type has not been defined, you must use the **Initialize Terminal** option on the FUNCTION SELECTION menu to initialize the operating system environment before you can continue with the diagnostics. This is a separate and different operation than selecting the console display.
3. If you want to do a general checkout without much operator action, select the **Diagnostic Routines** option on the FUNCTION SELECTION menu.

**Note:** If you want to do a more complete checkout including the use of wrap plugs, select the *Advanced Diagnostics* option on the FUNCTION SELECTION menu. The advanced diagnostics are primarily for the service representative; the service representative may instruct you to install wrap plugs to better isolate a problem.
4. Select the **System Verification** option on the DIAGNOSTIC MODE SELECTION menu.
5. If you want to run a general checkout of all installed resources, select the *System Checkout* option on the DIAGNOSTIC SELECTION menu.

If you want to check one particular resource, select that resource on the DIAGNOSTIC SELECTION menu.
6. Go to Step 4.



---

## Step 4. Additional System Verification

The checkout programs end with either the TESTING COMPLETE menu and a message stating `No trouble was found` or the `A PROBLEM WAS DETECTED ON (Time stamp)` menu with an SRN.

1. Press Enter to return to the DIAGNOSTIC SELECTION menu.
2. If you want to check other resources, select the resource from the list displayed on your terminal. When you have checked all of the resources you need to check, go to Step 5.

---

## Step 5. Stopping the Diagnostics

1. If you are running the diagnostics from removable media, go to substep 2. If diagnostics are being run from disk or LAN, the system first should be shut down using the following procedure:
  - a. Continue to press F3 until you get to the DIAGNOSTIC OPERATING INSTRUCTIONS.
  - b. Press F3 once and follow the displayed instructions to shut down Version 4 of the operating system.
2. Set the key mode switch to the Normal position.
3. If you changed any attributes on your tty terminal to run the diagnostic programs, change the settings back to normal.
4. This completes the system verification. Report the SRN to the service organization if you received one. To do a normal IPL, turn off the system unit and wait 30 seconds; then, set the power switch of the system unit to On.



---

## Chapter 8. Hardware Problem Determination

If you have an error or failure on your system, this chapter contains steps for obtaining a service request number (SRN). You report the SRN to the service organization. The service organization uses the SRN to determine which field replaceable units (FRUs) are needed to restore the system to correct operation.

---

### Step 1. Considerations before Performing This Procedure

**Note:** See the operator manual for your type of tty terminal to find the key sequences you need to respond to the diagnostic programs.

- The diagnostic programs use the console terminal attached to the S1 port.
- This procedure asks you to select the mode you want to run the diagnostic programs in (standalone, maintenance, or concurrent). If you need more information about the modes, see “Diagnostic Modes of Operation” on page 5-8.
- If the procedure instructs you to stop the operating system, refer to Chapter 2 for additional information.
- This procedure assumes that the AutoService IPL is enabled. If this flag is disabled, then the system displays the MAINTENANCE MENU when booting. Refer to Appendix B, “Modifying Service Support Parameters”, to determine how to verify and change this flag’s setting; or, when the MAINTENANCE MENU is displayed select `System Boot`, then `Boot From List`, and continue.
- Go to Step 2.

---

### Step 2

(From Step 1)

The AIX operating system contains the diagnostic programs. Other operating systems may not contain diagnostic programs.

**Is the AIX operating system used on this system?**

**NO**                      Go to Step 21.  
**YES**                     Go to Step 3.

---

### Step 3

(From Step 2)

Determine if Version 4 of the AIX operating system is accepting commands.

**Is the AIX operating system accepting commands?**

**NO**                      Try the following:  
                              1. Stop the operating system.  
                              2. If you cannot stop the operating system, set the power switch on the system unit to Off; then, go to Step 6.

**YES**                     Go to Step 4.

---

## Step 4

(From Step 3)

Diagnostic tests can be run on many resources while the operating system is running. However, problem isolation is obtained by running diagnostics in service mode.

### Do you want to run the diagnostics in service mode?

**NO** Go to Step 5.

**YES** Do the following to shut down your system:

1. At the system prompt, stop the operating system.
2. After the operating system is stopped, set the power switch on the system unit to Off.
3. Go to Step 6.

---

## Step 5

(From Step 4)

This step loads concurrent diagnostics.

1. Log on as `root` or as `superuser`.
2. Enter the **diag** command.
3. Wait until the words `DIAGNOSTIC OPERATING INSTRUCTIONS` are displayed, or wait for three minutes.

### Are the `DIAGNOSTIC OPERATING INSTRUCTIONS` displayed without any obvious console display problems?

**NO** Do the following to shut down your system:

1. At the system prompt, stop the operating system.
2. After the operating system is stopped, set the power switch on the system unit to Off.
3. Go to Step 6.

**YES** Go to Step 10.

---

## Step 6

(From Steps 3, 4, 5, 7)

This step loads the diagnostics.

1. Set the mode switch to the Service position.
2. Be sure the power switches of the attached devices are set to On.
3. Set the power switch on the system unit to On.
4. If `c31` is displayed, follow the displayed instructions to select a console display. If you do not have a console display, set the key mode switch to the Normal position and then set it to the Service position to indicate to the diagnostics there is no console display.

If you cannot select a console display, go to Step 20. Otherwise, continue to the next substep.

5. Wait until one of the following conditions occurs, then go to the next substep:
  - The power-on light does not come on, or it comes on and does not stay on.
  - The same number is displayed in the operator panel display for longer than three minutes, and the power-on light is on.
  - The number 888 is flashing in the operator panel display.
  - The operator panel display is blank.
  - The system stops with two or more numbers between 221 and 296 alternating in the operator panel display.
  - The words `DIAGNOSTIC OPERATING INSTRUCTIONS` are displayed.

6. Starting at the top of the following table, find your symptom and follow the instructions given in the Action column.

| Symptom                                                                                                                                                                                                                       | Action                                                                                                                                                                                                                                                                                                                                                                      |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The system stops with a blank operator panel display and the words <code>DIAGNOSTIC OPERATING INSTRUCTIONS</code> are displayed with no obvious problem on the console display (for example, it is not distorted or blurred). | Go to Step 10.                                                                                                                                                                                                                                                                                                                                                              |
| The system stops with a blank operator display and the <code>MAINTENANCE MENU</code> is displayed.                                                                                                                            | Select System Boot, then Boot From List, and continue with this step.                                                                                                                                                                                                                                                                                                       |
| The power-on light does not come on or comes on and does not stay on.                                                                                                                                                         | <p>Check the power cable to the outlet. Check the circuit breakers and check for power at the outlet.</p> <p>If you do not find a problem, record SRN 111-152 and report the problem to the service organization.</p> <p><b>STOP.</b> You have completed these procedures.</p>                                                                                              |
| The system stops with a steady (not flashing) number displayed in the operator panel display, and the power-on light is on.                                                                                                   | <p>The number must be other than <code>c31</code>. See substep 3 above for this number.</p> <p>Go to Step 7.</p>                                                                                                                                                                                                                                                            |
| The system stops with <code>888</code> flashing in the operator panel display.                                                                                                                                                | Go to Step 8.                                                                                                                                                                                                                                                                                                                                                               |
| The system stops with a blank operator panel display, and the words <code>DIAGNOSTIC OPERATING INSTRUCTIONS</code> are <i>not</i> displayed correctly.                                                                        | Go to Step 9.                                                                                                                                                                                                                                                                                                                                                               |
| The operator panel display is blank and the normal system log-in screen is displayed.                                                                                                                                         | <p>Be sure the mode switch is set to the Service position.</p> <p>If the mode switch was not in the Service position, stop the operating system, set it to the Service position, and press Reset. Then repeat this step.</p> <p>If the mode switch was in the Service position, record and report SRN 111-102.</p> <p><b>STOP.</b> You have completed these procedures.</p> |
| The system stops with two or more numbers between <code>221</code> and <code>296</code> alternating in the operator panel display.                                                                                            | Go to Step 16.                                                                                                                                                                                                                                                                                                                                                              |

---

## Step 7

(From Step 6, 18)

The following steps analyze a steady (not flashing) number displayed in the operator panel display while attempting to load the diagnostics.

| operator panel Display Number | Action                                                                                                                                                                                                                                                                                                                                       |
|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 200                           | Be sure the key mode switch is set to the Service position.<br><br>If the key mode switch was not in the Service position, set it to the Service position; then, go to Step 6, substep 4.<br><br>If the key mode switch was in the Service position, record and report SRN 111-200.<br><br><b>STOP.</b> You have completed these procedures. |
| 260, 261, 262                 | Go to Step 21.                                                                                                                                                                                                                                                                                                                               |
| Any other number              | Record and report SRN 101-xxx (where xxx is the number displayed in the operator panel display).<br><br><b>STOP.</b> You have completed these procedures.                                                                                                                                                                                    |

---

## Step 8

(From Steps 6, 18)

A flashing 888 in the operator panel display indicates that a crash message or a diagnostic message is ready to be read.

1. Use the steps in the "Reading a Flashing 888 Message on an Multi-Line Operator Panel Display" on page 5-13 to:
  - Read all of the message.
  - Identify the SRN if applicable.
  - Record the remaining numbers for the service representative.
2. If you identified an SRN, go to substep 3. Otherwise, go to substep 5.
3. Record the SRN and any other numbers.
4. Report the SRN to the service organization. Report any other numbers read to the service representative to determine the location of the failing FRU.
5. **STOP.** You have completed these procedures.

---

## Step 9

(From Steps 6, 18, 20)

The following steps analyze a console display problem.

Find your type of console display in the following table; then, follow the instructions given in the Action column.

| Console Display | Action                                                                       |
|-----------------|------------------------------------------------------------------------------|
| Display Device  | Go to the your display documentation for problem determination.              |
| tty terminal    | Go to the documentation for problem determination for this type of terminal. |

---

## Step 10

(From Steps 5, 6, 12, 18)

The diagnostic control program loaded correctly.

Press the Enter key.

**Is the FUNCTION SELECTION menu displayed?**

**NO**            Go to Step 11.

**YES**            Go to Step 12.

---

## Step 11

(From Steps 10, 20)

There is a problem with the keyboard.

Find the type of keyboard you are using in the following table; then follow the instructions given in the Action column.

| Keyboard Type                                                  | Action                                                                    |
|----------------------------------------------------------------|---------------------------------------------------------------------------|
| tty-terminal keyboard. This applies to all attached terminals. | Go to the documentation for problem determination for this type terminal. |

---

## Step 12

(From Step 10)

1. If the terminal type has not been defined, you must use the **Initialize Terminal** option on the **FUNCTION SELECTION** menu to initialize the operating system environment before you can continue with the diagnostics. This is a separate and different operation than selecting the console display.
2. Select Diagnostic Routines.



3. Press the Enter key.
4. In the following table, find the menu or system response you received when you selected Diagnostic Routines; then follow the instructions given in the Action column.

| System Response                                                                                                                                                                                                                                                              | Action                                                                                                                                                                                                                                                                                                                       |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The DIAGNOSTIC MODE SELECTION menu is displayed.                                                                                                                                                                                                                             | Select <b>Problem Determination</b> , and then go to Step 13.                                                                                                                                                                                                                                                                |
| The MISSING RESOURCE menu is displayed.                                                                                                                                                                                                                                      | <p>Follow the displayed instructions until either the DIAGNOSTIC SELECTION menu or an SRN is displayed.</p> <p>If the DIAGNOSTIC SELECTION menu is displayed, go to Step 13.</p> <p>If you get an SRN, record it, and go to Step 15.</p> <p>If you get a number in the operator panel display, go to Step 14.</p>            |
| The NEW RESOURCE menu is displayed.                                                                                                                                                                                                                                          | <p>Follow the displayed instructions.</p> <p>Note: Devices attached to serial ports S1 or S2 do not appear on the NEW RESOURCE menu.</p> <p>If the DIAGNOSTIC SELECTION menu is displayed, go to Step 13.</p> <p>If you get an SRN, record it, and go to Step 15.</p> <p>If you do <i>not</i> get an SRN, go to Step 19.</p> |
| <p>The diagnostics begin testing a resource.</p> <p><b>Note:</b> If <b>Problem Determination</b> was selected from the DIAGNOSTIC MODE SELECTION menu, and if a recent error has been logged in the error log, the diagnostics automatically begin testing the resource.</p> | <p>Follow the displayed instructions.</p> <p>If the No Trouble Found screen is displayed, press Enter.</p> <p>If another resource is tested, repeat this step.</p> <p>If the ADVANCED DIAGNOSTIC SELECTION menu is displayed, go to Step 10.</p> <p>If an SRN is displayed, record it, and go to Step 15.</p>                |

---

## Step 13

(From Step 12)

The system checkout option checks all of the resources (available in standalone mode only).

Select and run the diagnostic tests on the resources you are having problems with or run system checkout to check all of the configured resources. Find the response in the following table and perform the specific action.

| Diagnostic Response                                                                                                               | Action                                                                                                                                                                                                                                                                                                                          |
|-----------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| An SRN is displayed.                                                                                                              | Go to Step 15.                                                                                                                                                                                                                                                                                                                  |
| The system stopped with a number displayed in the operator panel display.                                                         | Go to Step 14.                                                                                                                                                                                                                                                                                                                  |
| The TESTING COMPLETE menu and the No trouble was found message is displayed, and you have <i>not</i> tested all of the resources. | Press Enter and continue with the testing.                                                                                                                                                                                                                                                                                      |
| The TESTING COMPLETE menu and the No trouble was found message displayed and you <i>have</i> tested all of the resources.         | Go to Step 19.<br><br>Notes: If dials and LPFKs are attached to serial ports S1 or S2 and you are running diagnostics from disk or server, the dials and LPFKs will only appear on the selection screen if they have been configured by the user. Use the Dials and LPFKs Configuration service aid to configure these devices. |

---

## Step 14

(From Steps 12, 13)

A flashing 888 in the operator panel display indicates that a crash message or a diagnostic message is ready to be read.

1. Use the steps in the “Reading a Flashing 888 Message on an Multi-Line Operator Panel Display” on page 5-12 to:
  - Read all of the message.
  - Identify the SRN.
  - Record the remaining numbers for the service representative.
2. Record the SRN.
3. Report the SRN to the service organization. Report any other numbers to the service representative to determine the location of the failing FRU.
4. **STOP.** You have completed these procedures.

---

## Step 15

(From Steps 12, 13)

The diagnostic programs produced an SRN for this problem.

1. Record the SRN and any other numbers.
2. Report the SRN to the service organization.
3. **STOP.** You have completed these procedures.

---

## Step 16

(From Step 6)

The system stopped with two or more numbers between 221 and 296 alternating in the operator panel display. This indicates the diagnostics could not load from disk, so the load program is looking for the diagnostic programs on removable media or some other load device.

### **Are you trying to load the diagnostic programs from removable media?**

- NO** Go to Step 22.
- YES** Record and report SRN 111-101.
- STOP.** You have completed these procedures.

---

## Step 17

(From Steps 21, 22)

When you load the diagnostics from a CD-ROM disc and run them from a 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 port S1 on the system unit.

### **Are you going to load the diagnostics from a CD-ROM disc and run them from a tty terminal attached to port S1?**

- NO** Go to Step 18.
- YES** Go to "Running the Diagnostic Programs from a tty Terminal" on page 5-3 and be sure your terminal attributes are set to work with the diagnostic programs.
- Return to Step 18 when you finish checking the attributes. Record any settings that are changed.

---

## Step 18

(From Step 17)

The following steps analyze a failure to load the diagnostic programs from a disk, or a failure to determine whether the diagnostic programs are on a disk.

1. Set the power switch on the system unit to Off.
2. Set the key mode switch to the Service position.
3. Insert the diagnostic CD-ROM disc into the CD-ROM drive.
4. Set the power switch on the system unit to On.
5. If `c31` is displayed, follow the displayed instructions to select the console display. If no console display is available, set the key mode switch to the Normal position, and then set it to the Service position to indicate to the diagnostics that there is no console display.

If you cannot select a console display, to Step 20. Otherwise, continue to the next substep.

6. Wait until one of the following conditions occur; then, go to the next substep:
  - The system stops with two or more numbers between 221 and 296 alternating in the operator panel display.
  - The same number is displayed in the operator panel display for longer than three minutes, and the power-on light is on.
  - The number 888 is flashing in the operator panel display.
  - The operator panel display is blank.
  - The words `DIAGNOSTIC OPERATING INSTRUCTIONS` are displayed.

7. Starting at the top of the following table, find your symptom; then perform the specific action.

| Symptom                                                                                                                                                                                                                         | Action                                                                                                   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|
| The system stops with a blank operator panel display, and the words DIAGNOSTIC OPERATING INSTRUCTIONS are displayed with <i>no</i> obvious problem on the console display (for example, it is <i>not</i> distorted or blurred). | Go to Step 10.                                                                                           |
| The system stops with a blank operator display and the MAINTENANCE MENU is displayed.                                                                                                                                           | Select System boot, then Boot From List, and continue with this step.                                    |
| The system stops with a blank operator panel display, and the words DIAGNOSTIC OPERATING INSTRUCTIONS are <i>not</i> displayed correctly.                                                                                       | Go to Step 9.                                                                                            |
| The system stops with 260, 261, or 262 displayed in the operator panel display.                                                                                                                                                 | Record and report SRN 111-101.<br><br><b>STOP.</b> You have completed these procedures.                  |
| The system stops with a steady (not flashing) number displayed in the operator panel display, and the power-on light is on.                                                                                                     | The number must be other than c07 or c31. See previous substep 4 for these numbers.<br><br>Go to Step 7. |
| The system stops with 888 flashing in the operator panel display.                                                                                                                                                               | Go to Step 8.                                                                                            |
| The system stops with two or more numbers between 221 and 296 alternating in the operator panel display.                                                                                                                        | Record and report SRN 111-101.<br><br><b>STOP.</b> You have completed these procedures.                  |

---

## Step 19

(From Steps 12, 13)

The diagnostics did not find a hardware problem. If you still have a problem, contact your software support center. If you are attached to another system, refer to “General Information about Multiple Systems” on page 2-6 and check your configuration before calling the software support center.

---

## Step 20

(From Steps 6, 18)

**When the c31 halt was present, were the instructions to select a console display readable with no obvious problems with the display?**

**NO**                      Go to Step 9.

**YES**                      Go to Step 11.

---

## Step 21

(From Steps 2 and 7)

An English-only version of diagnostics are provided on CD-ROM disc.

**Do you want to run diagnostics from CD-ROM disc?**

**NO**                    If you have a problem, call for service, and report the problem.

**YES**                    Go to Step 17.

---

## Step 22

(From Step 16)

An English-only version of diagnostics are provided on CD-ROM disc.

**Do you want to run diagnostics from CD-ROM disc?**

**NO**                    Record and report SRN 111-103. **Stop.** You have completed these procedures.

**YES**                    Go to Step 17.

---

## Chapter 9. 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 expansion unit covers.

The expansion unit has the following features:

- Power On/Off button
- Power On light
- Up to 6 SCSI devices (Two of them can be media devices.)
- Keylock for locking covers

---

### System Configurations

The basic configuration consists of a minimal set of hardware components always present.

| HARDWARE COMPONENT         | CONFIGURATION |                                                |
|----------------------------|---------------|------------------------------------------------|
|                            | Minimum       | Maximum                                        |
| Disk Drives                | 1             | 6 (including 2 disks in the media slots)       |
| Internal media devices     | 0             | 2 (if no disks are present in the media slots) |
| Active internal SCSI buses | 1             | 1                                              |
| Rear cooling fan           | 1             | 1                                              |
| Power supply               | 1             | 1                                              |
| Operator Panel             | 1             | 1                                              |
| Interface Board            | 1             | 1                                              |

### Device Types

Device types are:

- Disk Drives:
  - FH Full Height: 41.3 mm, 3.5 inch
  - HH Half Height: 25.3 mm, 3.5 inch
- Media:
  - HH Half Height: 41.3 mm, 5.25 inch

Device types can be installed as follows.

## Disk Locations

| <i>Bay</i> | <i>Description</i>                        | <i>Device Type</i>        |
|------------|-------------------------------------------|---------------------------|
| A          | Upper Media Bay                           | HH Disk Drive or HH Media |
| B          | Middle Media Bay                          | HH Disk Drive or HH Media |
| C          | Lower Media Bay                           | Not Supported             |
| D          | Base Disk Drive tray (Rear Location)      | FH or HH Disk Drive       |
| E          | Base Disk Drive tray (Front Location)     | FH or HH Disk Drive       |
| F          | Optional Disk Drive tray (Rear Location)  | FH or HH Disk Drive       |
| G          | Optional Disk Drive tray (Front Location) | FH or HH Disk Drive       |

Disk drives and media devices should be installed in the units observing specific positions.

This section summarizes these mandatory and recommended positions both in the base and in the disk expansion unit.

Each disk expansion unit can house up to 6 SCSI devices. The Media Bays (A, B) may contain either HH Media (41.3 mm, 5.25 inch) or HH Disk Drive (25.3 mm, 3.5 inch) devices. Bays D through G may accept the FH (41.3 mm) or HH (25.3 mm) 3.5 inch Disk Drive devices. The lower Media Bay (C) does not support any device.

The following table gives the positions of the disk drives and media devices in the disk expansion units.

| <i>SCSI Address</i> | <i>Device</i>                                 | <i>Bay</i> |
|---------------------|-----------------------------------------------|------------|
| 0                   | 1 <sup>st</sup> Disk Drive                    | D          |
| 1                   | 2 <sup>nd</sup> Disk Drive                    | E          |
| 2                   | 3 <sup>rd</sup> Disk Drive                    | F          |
| 3                   | 4 <sup>th</sup> Disk Drive                    | G          |
| 4                   | 5 <sup>th</sup> Disk Drive if no Media Device | A          |
| 5                   | 5 <sup>th</sup> Media Device                  | A          |
| 6                   | 6 <sup>th</sup> Disk Drive or Media Device    | B          |
| 7                   | N.A.                                          | N.A.       |

It is suggested to install disk drives in the free slots dedicated to the media devices only after having used all the other slots. The priorities are the same as the ones for the media devices.



---

## Chapter 10. Moving the System Unit

This chapter provides important information about moving the system unit.

---

### Moving the System Unit

**Attention:** Damage as a result of improper handling may void your equipment warranty. Contact your local service representative to obtain packing materials or assistance to prepare your system for moving.

A trained service representative should be contacted to move your system. The following danger and caution notices should be observed if you decide to move the unit yourself.

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

1. If the operating system is running, perform a system shutdown.
2. Set the power switches on the attached devices and the system unit to Off.
3. Unplug all attached devices and the system unit from power outlets.
4. Be sure to label all of the cables and cords connected to the rear of the system unit as you disconnect them.
5. In the location you are moving to, the power outlets should be checked for correct wiring, voltage, and grounding before attaching any of the devices or the system unit.
6. Connect all signal cables to the devices before connecting any device or the system unit to the power outlets.

## 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 *xyy* 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 will be 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 h/w 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 h/w parts connected to MC68230. All the checked registers will be 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 h/w 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 h/w 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 will also be 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 H/W 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 will be 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 h/w 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 will be saved and restored in all the operations.

## **Floppy Disk Access Test**

This test needs a formatted diskette in the diskette drive (the diskette content will be 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 h/w 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 h/w parts are checked by running this test.

1. DCB ASICs
2. SMC ASIC (partially)
3. Connection of data lines between CPU cards and System Planar ASICs
4. Connection of data lines between System Planar ASICs and memory chips.

This test consists of four sub-tests. Words manipulated / used are not restored at the end of the test. This test applies to one of the four memory cards. The following is a description of the sub-tests.

#### **Work Area Test**

This sub-test is used to find a working area which is safe enough to perform other sub-tests. It first calculates the memory location and 0s will be written on the first long word and verified. Then 1s will be 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 will be 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 will be 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 will be written with 0s (blanked). Then a byte is written and placed in the 8 possible locations of the long word. This will be 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 h/w 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 will be written on the first long word and verified. Then 1s will be 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 will be 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 will be 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 will be 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 will be 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 will be 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 h/w 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 will be 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 will be 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 will be written on the four memory cards. This will be verified to check the accessibility of the boards.

In the Read phase, the values will be read and the interference between the boards will be 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 will be 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 will be displayed on the console.

**Byte Write Checking** A byte will be written and verified. If there is mismatch between the read value and the written value, an error message will be 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 will be 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 will appear.

### **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 will be checked through writing. A comparison will be made between written value and the read value.

### **Addressing tests in Work Mode Checking**

Access to the 1MB address will be checked through writing. A comparison will be made between written value and the read value.

### **Aligned Multiple Store Checking**

In this test multiple words will be written and read back. If the verification fails, an Aligned Multiple store error will be displayed.

### **Unaligned Multiple Store Checking**

This test writes multiple words and checks for misalignment interrupt. Error message will be 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 h/w 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 will continue till the working address is equal to the end address. If it is equal, Read and Compare phase will begin.

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 will end when all the locations have been verified. If an error is detected, a console message giving the details of the error will be 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 h/w parts are checked by running this test.

- DCB ASICs
- SMC ASICs
- Connection of data lines between CPU daughter boards and MPB ASICs
- Connection of data lines between MPB ASICs and ECC memory chips.

Words manipulated / used are not restored at the end of the test. This test is applied to all present memory banks.

### Entry Parameters

| Parameters  | Name                          | Definition        | Possible Values                 | Default Value        |
|-------------|-------------------------------|-------------------|---------------------------------|----------------------|
| Parameter 1 | Sub test #                    | Subtest Number    | 0 to 2                          | 0 = All tests linked |
| Parameter 2 | Proc #                        | Processor Number  | 0 to 7                          | 0                    |
| Parameter 3 | ECC sel.                      | ECC Selection     | 0 to 5<br><b>See note 1</b>     | 2                    |
| Parameter 4 | 1 <sup>st</sup> Mem. Bnk Add. | Mem Address (Mb)  |                                 | 0                    |
| Parameter 5 | 2 <sup>nd</sup> Mem. Bnk Add. | Mem Address (Mb)  |                                 | 0xffffffff           |
| Parameter 6 | 3 <sup>rd</sup> Mem. Bnk Add. | Mem Address (Mb)  |                                 | 0xffffffff           |
| Parameter 7 | 4 <sup>th</sup> Mem. Bnk Add. | Mem Address (Mb)  |                                 | 0xffffffff           |
| Parameter 8 | SIMM/Bus mode                 | <b>See note 2</b> | 0=SIMM number<br>1=Value of Bus | 0                    |

### Notes:

1. The different values are:
  - . 0 → ECC invalidation,
  - . 1 → ECC validation and checkstop detection,
  - . 2 → ECC test,
  - . 3 → ECC validation and no checkstop detection,
  - . 4 → ECC generation checking,
  - . 5 → ECC correction checking.
2. If your answer is 0, you will get the number of the default DIMM.  
If your answer is 1, you will 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 will be displayed on the console.

### Walking 1 Data Test

This test basically identifies if any ECC data lines are stuck at level 0 or to any other ECC data line. This test writes a pattern of a single 1 bit among 0 bits on the cache line. Then it will be 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 will be 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 h/w 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 will be displayed. The refresh mechanism is checked in the following manner.

A read operation is done on another location (other than the one previously read) till 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 h/w 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 h/w 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 h/w parts are checked by the test:

1. Processor Interrupt Capability
2. SSGA Interrupt Management
3. PLD Control Logic
4. Super-I/O Interrupt Mechanism

Whenever an error is detected by the processor, an error message giving the details of the error is displayed.

### **CPU To CPU Interrupt Test**

This test checks the capability for a CPU to interrupt another CPU. The two CPUs of the same card are used (the capability for a CPU to interrupt a CPU located on another CPU card is not used in this test).

### **TOD To BUMP Interrupt Test**

This test is launched and performed by the BUMP. It has one sub-test to check the interrupt generating mechanism of the TOD chip.

This test checks the BUMP and TOD h/w 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 H/W systems, maintaining the coherency between all the caches. This test checks the following H/W 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 will not be 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 h/w 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 h/w 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 h/w 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 h/w 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.



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## Appendix B. Modifying SystemGuard Parameters

Many SystemGuard parameters can be modified in several ways. Some can be modified using the SystemGuard Stand-By menu, others using the SystemGuard Maintenance menu, and others using the AIX **diag** or **mpcfg** commands or Diagnostic Service Aids. When you want to modify SystemGuard parameters, the method to use depends on the machine boot phase (stand-by, init, run-time). This chapter explains how to change some of the more important flags and parameters depending on the current machine state. For a complete list of default values for flags and parameters, see the table in “Default Parameter Values” on page B-1.

The Mode Switch must be in the Service position to use the SystemGuard menus. If the machine is in the stand-by phase, you must press the Enter key to get the SystemGuard prompt, and then enter the keyword **sbb** to display the stand-by menu. If you enter the power-on keyword (**power**), or if you turn the power on manually, the machine enters the init phase and displays the maintenance menu if the *AutoService IPL* flag is disabled. The *AutoService IPL* flag is normally enabled. If the *AutoService IPL* flag is enabled, then the flag must be disabled before the maintenance menu can be entered. The *AutoService IPL* flag can be disabled when the system is in stand-by phase by pressing the Enter key and then entering the keyword **sbb** to display the *Stand-by Menu*. Select the *Set Flags* option. The *AutoService IPL* flag can now be disabled. The *AutoService IPL* flag can also be disabled using the Service Aids.

When changing parameters under the AIX operating system, the Diagnostic Service Aids are recommended because its menu interface is better suited to interactive use. The **mpcfg** command requires the use of command line flags and is better suited for shell scripts. The command requires root authority. Also, the Service Aids require root authority if entered with the **diag** command. They display or change flag values using 0 (zero) for disabled and 1 (one) for enabled. The explanations that follow refer to the Diagnostic Service Aids.

---

### Default Parameter Values

The flags, parameters and keywords used by SystemGuard programs are stored in non-volatile memory (NVRAM). They are given default values before leaving the factory, as shown in the table on the following page.

| <b>Flag, Parameter and Keyword Default Values</b>      |                                                 |
|--------------------------------------------------------|-------------------------------------------------|
| <b>Name</b>                                            | <b>Default Value</b>                            |
| BUMP Console Power-On Command String                   | Power                                           |
| Service Console Power-On Command String                | Blank (not set)                                 |
| BUMP Console Power-On Command flag                     | Enabled                                         |
| Service Console Power-On Command flag                  | Disabled                                        |
| Remote Authorization flag                              | Disabled                                        |
| Autoservice IPL flag                                   | Disabled                                        |
| BUMP Console Present flag                              | Enabled                                         |
| BUMP Console Speed                                     | 1200                                            |
| Dial-Out Authorization flag                            | Disabled                                        |
| Set Electronic Mode Switch to Normal when Booting flag | NRM                                             |
| Electronic Mode Switch from Service Line flag          | Disabled                                        |
| Boot Multiuser AIX in Service flag                     | Disabled                                        |
| Fast IPL flag                                          | Disabled                                        |
| Power-On Tests in Loop Mode flag                       | Disabled                                        |
| Power-On Tests in Trace Mode flag                      | Disabled                                        |
| Power-On Test Message Mode parameter                   | 1 (verbose mode off: only error messages shown) |
| Extended Tests parameter                               | Disabled                                        |
| Maintenance Password                                   | Blank (no password set)                         |
| Customer Maintenance Password                          | Blank (no password set)                         |
| System Dial-In phone number                            | Blank (not set)                                 |
| Service Center Dial-Out phone number                   | Blank (not set)                                 |
| Customer Hub Dial-Out phone number                     | Blank (not set)                                 |
| System Operator Voice phone number                     | Blank (not set)                                 |
| Modem Parameters File Name                             | Blank                                           |
| Service Line Speed                                     | 1200                                            |
| Protocol Inter Data Bloc Delay                         | 15                                              |
| Protocol Time Out                                      | 30                                              |
| Retry Number                                           | 2                                               |
| Customer ID                                            | Blank                                           |
| Login ID                                               | Blank                                           |
| Password ID                                            | Blank                                           |
| Service Contract Validity                              | Enabled                                         |
| Remote Service Support                                 | Enabled                                         |
| Quick On-Call Service                                  | N                                               |
| Service Support Type                                   | F (ASCII byte x'46')                            |

---

## Changing Flags and Parameters Under AIX Service Aids

The Service Aids are recommended to change the flags. The Service Aids can be entered using the **diag** command or by booting diagnostics in service mode. They display or change flag values using 0 (zero) for disabled and 1 (one) for enabled. The explanations that follow refer to the Service Aids.

### Modifying Diagnostic Flags

Use this procedure to modify diagnostic flags such as the Remote Authorization flag or the Autoservice IPL flag. Starting from the Service Aids Selection menu:

1. Select the BUMP Service Aids option.
2. Select the Display or Change Flags and Configuration option.
3. Select the Change Diagnostic Flags option to display a menu of diagnostic flags.
4. Select a flag and enter its new value.

### Modifying the Modem and Site Configuration

Use this procedure to modify modem and site configuration parameters such as the modem configuration file name or the service line speed. Starting from the Service Aids Selection menu:

1. Select the BUMP Service Aids option.
2. Select the Display or Change Flags and Configuration option.
3. Select the Change Modem and Site Configuration option to display a menu.
4. Select a flag and enter its new value.

### Saving or Restoring Flags and Configuration Information

Use this procedure to save or to restore the configuration using a file. Starting from the Service Aids Selection menu:

1. Select the BUMP Service Aids option.
2. Select the Save or Restore Flags and Configuration option.
3. Select either the Save or the Restore option.

---

## Modifying the Remote Authorization Flag

This flag can be changed under SystemGuard using the stand-by or maintenance menus, or under AIX using the **diag** command.

### SystemGuard Stand-by Menu

Starting from the main stand-by menu:

1. Enter 1 (one) to set flags.
2. Enter 0 (zero) to change the Remote Authorization flag.

## SystemGuard Maintenance Menu

Starting from the main maintenance menu:

- Enter 2 to enable the flag.  
OR
- Enter 3 to disable the flag.

## AIX Diag Command

Starting from the Service Aids Selection menu:

1. Select the BUMP Service Aids option.
2. Select the Display or Change Flags and Configuration option.
3. Select the Change Diagnostic Flags option.
4. Select the Remote Authorization option.
5. Supply a new flag value (0 or 1).

---

## Modifying the Dial-Out Authorization Flag

This flag can be changed under SystemGuard using the maintenance menu, or under AIX using the **diag** command.

## SystemGuard Maintenance Menu

Starting from the main maintenance menu:

1. Enter 8 to set parameters.
2. Enter 4 for miscellaneous parameters.
3. Enter 2 to change the Dial-Out Authorization flag.

## AIX Diag Command

Starting from the Service Aids Selection menu:

1. Select the BUMP Service Aids option.
2. Select the Display or Change Flags and Configuration option.
3. Select the Change Diagnostic Flags option.
4. Select the Dial-Out Authorization option.
5. Supply a new flag value (0 or 1).

---

## Modifying Dial-In Phone Numbers

These parameters can be changed under SystemGuard using the maintenance menu, or under AIX using the **diag** command.

### SystemGuard Maintenance Menu

Starting from the main maintenance menu:

1. Enter 8 to set parameters.
2. Enter 3 for phone numbers.
3. Enter 4 for the dial-in phone number.
4. Supply a new phone number.

### AIX Diag Command

Starting from the Service Aids Selection menu:

1. Select the BUMP Service Aids option.
2. Select the Display or Change Flags and Configuration option.
3. Select the Change Remote Support Phone Numbers option.
4. Select the System Dial-In option.
5. Supply a new phone number.

---

## Modifying Dial-Out Phone Numbers

These parameters can be changed under SystemGuard using the maintenance menu, or under AIX using the **diag** command.

### SystemGuard Maintenance Menu

Starting from the main maintenance menu:

1. Enter 8 to set parameters.
2. Enter 3 for phone numbers.
3. Select the dial-out phone number to modify (service center or customer hub).
4. Supply a new phone number.

### AIX Diag Command

Starting from the Service Aids Selection menu:

1. Select the BUMP Service Aids option.
2. Select the Display or Change Flags and Configuration option.
3. Select the Change Remote Support Phone Numbers option.
4. Select the Service Center Dial-Out or Customer Hub Dial-Out option.
5. Supply a new phone number.

---

## Modifying the Electronic Mode Switch from Service Line Flag

This flag can be changed under SystemGuard using the maintenance menu, or under AIX using the **diag** command.

### SystemGuard Maintenance Menu

Starting from the main maintenance menu:

1. Enter 8 to set parameters.
2. Enter 4 for miscellaneous parameters.
3. Enter 9 to change the Electronic Mode Switch from Service Line flag.

### AIX Diag Command

Starting from the Service Aids Selection menu:

1. Select the BUMP Service Aids option.
2. Select the Display or Change Flags and Configuration option.
3. Select the Change Diagnostic Flags option.
4. Select the Electronic Mode Switch from Service Line option.
5. Supply a new flag value (0 or 1).

---

## Reloading the Flash EEPROM

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

### Prerequisites

To install a new version of the EEPROM firmware, you need either a firmware diskette containing a binary firmware image, or a file containing the firmware. The operating system and some operating system updates come with firmware diskettes. Using a diskette is quicker than using a file.

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

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

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

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

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

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

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

1. Make sure that no other users are logged in to the system (log them out if necessary).
2. Make sure that you have root authority (use the **su** command if necessary).
3. Enter the **diag** command.
4. Select *Service Aids*.
5. Select the *BUMP Service Aids* option.
6. Select the *Flash Eprom Download* option.
7. Enter the full path name for the file containing the new flash EEPROM.
8. The system is automatically rebooted





---

## Appendix C. SystemGuard Remote Operation Configuration

In order to utilize the remote operation capabilities of SystemGuard and also allow console mirroring, you need to have flags, parameters and tty configurations properly enabled. Below, you will find tty0 and tty1 settings, sample modem files and all the parameters that are necessary to allow remote operations.

---

### Terminal Configuration

The configuration of the tty0 for the S1 port looks similar to the following:

|                                            |                                                                                                                            |
|--------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|
| [TOP]                                      | [Entry Fields]                                                                                                             |
| TTY                                        | tty0                                                                                                                       |
| TTY type                                   | tty                                                                                                                        |
| TTY interface                              | rs232                                                                                                                      |
| Description                                | Asynchronous                                                                                                               |
| Terminal                                   |                                                                                                                            |
| Status                                     | Available                                                                                                                  |
| Location                                   | 00-00-S1-00                                                                                                                |
| Parent adapter                             | sa0                                                                                                                        |
| PORT number                                | [s1]                                                                                                                       |
| Enable LOGIN                               | disable                                                                                                                    |
| BAUD rate                                  | [9600]                                                                                                                     |
| PARITY                                     | [none]                                                                                                                     |
| BITS per character                         | [8]                                                                                                                        |
| Number of STOP BITS                        | [1]                                                                                                                        |
| TIME before advancing to next port setting | [0]                                                                                                                        |
| TERMINAL type                              | [dumb]                                                                                                                     |
| FLOW CONTROL to be used                    | [xon]                                                                                                                      |
| OPEN DISCIPLINE to be used                 | [dtropen]                                                                                                                  |
| STTY attributes for RUN time               | [hupcl,cread,brkint,<br>icrnl,opost,tab3,<br>onlcr,isig,icanon,<br>echo,echoe,echok,<br>echoctl,echoke,<br>imaxbel,iexten] |
| STTY attributes for LOGIN                  | [hupcl,cread,echoe,<br>cs8,ixon,ixoff]                                                                                     |
| LOGGER name                                | [ ]                                                                                                                        |
| STATUS of device at BOOT time              | [available]                                                                                                                |
| TRANSMIT buffer count                      | [16]                                                                                                                       |
| RECEIVE trigger level                      | [3]                                                                                                                        |
| STREAMS modules to be pushed at OPEN time  | [ldterm,tioc]                                                                                                              |
| INPUT map file                             | [none]                                                                                                                     |
| OUTPUT map file                            | [none]                                                                                                                     |
| CODESET map file                           | [sbcs]                                                                                                                     |

The configuration of the tty1 for the S2 port looks similar to the following:

```

[TOP] [Entry Fields]
TTY tty1
TTY type tty
TTY interface rs232
Description Asynchronous
Terminal
Status Available
Location 00-00-S2-00
Parent adapter sa1
PORT number [s2]
Enable LOGIN disable
BAUD rate [9600]
PARITY [none]
BITS per character [8]
Number of STOP BITS [1]
TIME before advancing to next port setting [0]
TERMINAL type [dumb]
FLOW CONTROL to be used [rts]
OPEN DISCIPLINE to be used [dtropen]
STTY attributes for RUN time [hupcl,cread,brkint,
 icrnl,opost,tab3,
 onlcr,isig,icanon,
 echo,echoe,echok,
 echoctl,echoke,
 imaxbel,iexten]

 STTY attributes for LOGIN
[hupcl,cread,echoe,cs8,

 ixon,ixoff]
LOGGERS 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 will have to provide a configuration file for the modem you will be using. This file is also necessary to utilize the mirroring capabilities supported by the AIX mirrord daemon.

You will find the configuration files for the IBM 7851 below. You will see that 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 will 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 will initiate the mirrord process. The disconnect and condin parameters will be read from the appropriate modem file, and the modem will be 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 will result in an OK completion.

During the test, the modem configuration file will be read, the modem initialized properly, and data transmitted. Comparing the modem configuration file to line activity will show 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. Supplies

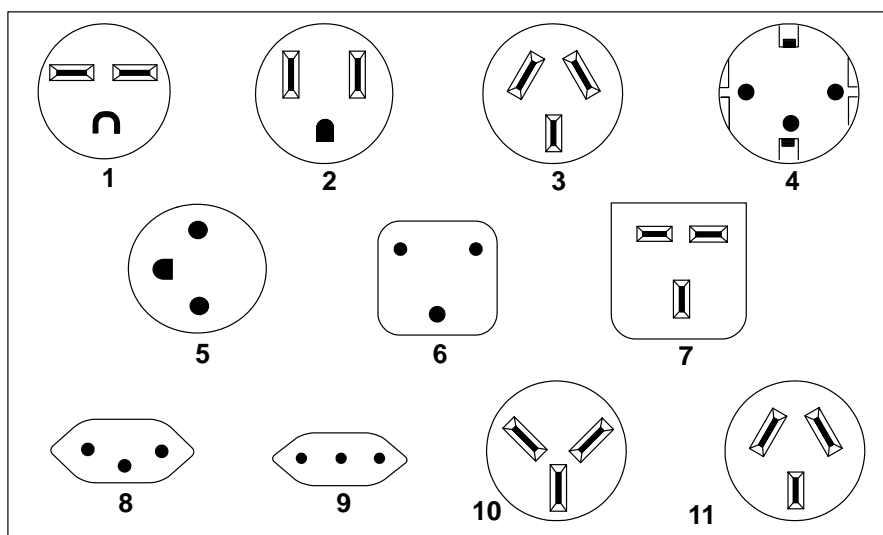
This appendix contains a list of supplies and the part numbers to order.

| <b>Part Number</b> | <b>Description</b>                            |
|--------------------|-----------------------------------------------|
| 6404088            | 3.5-Inch 1MB Blank Diskette (box of 10)       |
| 6404083            | 3.5-Inch 2MB Blank Diskette (box of 10).      |
| 72X6111            | 3.5-Inch 4.0MB Blank Diskette (Box of 10)     |
| 21F8763            | 4-mm Data Tape Cartridge (5-pack)             |
| 21F8758            | 4-mm DDS IIII Data Tape Cartridge (5-pack)    |
| 21F8762            | 4-mm DDS IIII Diagnostic Cartridge            |
| 8191160            | 4-mm DDS 2 Data Cartridge (5-pack)            |
| 8191146            | 4-mm DDS 2 Diagnostic Cartridge               |
| 21F8732            | 1/4-Inch, 1.2 GB Data Tape Cartridge (5-pack) |
| 21F8587            | 1/4-Inch, 525 MB Data Tape Cartridge (5-pack) |
| 21F8588            | 1/4-Inch, 150 MB Data Tape Cartridge (5-pack) |
| 21F8570            | 1/4-Inch, Cartridge Head Cleaning Kit         |
| 21F8595            | 8-mm Data Tape Cartridge (5-pack)             |
| 21F8593            | 8-mm Cleaning Tape Cartridge                  |
| 0352465            | 1/2-Inch, Head Cleaning Kit                   |
| 13F5647            | Tape Cleaning Solution                        |
| 33F8354            | Lithium Battery                               |

In the United States, you can order these supplies by calling toll-free **1-800-438-2468**, or you can FAX your inquiry to **1-800-522-3422**.

## Power Cables

**Note:** If you should need a different power cable, use this figure and the following table to assist you when ordering.



| Index | Part Number | Country                                                                                                                                                                                                                                                                                                                                                               |
|-------|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1     | 1838574     | Bahamas, Barbados, Bolivia, Brazil, Canada, Costa Rica, Dominican Republic, El Salvador, Ecuador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Japan, Netherlands Antilles, Panama, Peru, Philippines, Taiwan, Thailand, Trinidad, Tobago, U.S.A. (except Chicago), Venezuela                                                                                         |
| 2     | 6952300     | Bahamas, Barbados, Bermuda, Bolivia, Brazil, Canada, Cayman Islands, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Japan, Korea (South), Mexico, Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Puerto Rico, Saudi Arabia, Suriname, Trinidad, Taiwan, U.S.A. (except Chicago), Venezuela |
| 2     | 62X1045     | Chicago, U.S.A.                                                                                                                                                                                                                                                                                                                                                       |
| 3     | 6952311     | Argentina, Australia, New Zealand                                                                                                                                                                                                                                                                                                                                     |
| 4     | 13F9979     | Abu Dhabi, Austria, Belgium, Bulgaria, Botswana, Egypt, Finland, France, Germany, Greece, Iceland, Indonesia, Korea (South), Lebanon, Luxembourg, Macau, Netherlands, Norway, Portugal, Saudi Arabia, Spain, Sudan, Sweden, Turkey, Yugoslavia                                                                                                                        |
| 5     | 13F9997     | Denmark                                                                                                                                                                                                                                                                                                                                                               |
| 6     | 14F0015     | Bangladesh, Burma, Pakistan, South Africa, Sri Lanka                                                                                                                                                                                                                                                                                                                  |
| 7     | 14F0033     | Bahrain, Bermuda, Brunei, Channel Islands, Cyprus, Ghana, Hong Kong, India, Iraq, Ireland, Jordan, Kenya, Kuwait, Malawi, Malaysia, Nigeria, Oman, People's Republic of China, Qatar, Sierra Leone, Singapore, Tanzania, Uganda, United Arab Emirates (Dubai), United Kingdom, Zambia                                                                                 |
| 8     | 14F0051     | Liechtenstein, Switzerland                                                                                                                                                                                                                                                                                                                                            |
| 9     | 14F0069     | Chile, Ethiopia, Italy                                                                                                                                                                                                                                                                                                                                                |
| 10    | 14F0087     | Israel                                                                                                                                                                                                                                                                                                                                                                |
| 11    | 6952291     | Paraguay, Colombia, Uruguay                                                                                                                                                                                                                                                                                                                                           |

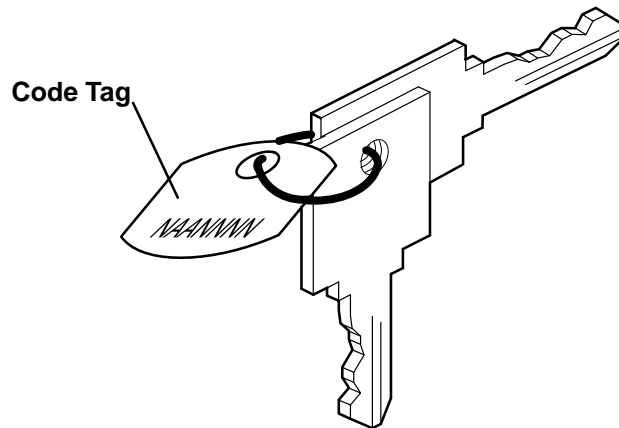


---

## Ordering Keys

For protection against unauthorized key duplication, the key mode switch is equipped with a Medeco® high-security lock. Keys for this lock are a factory restricted series, and duplicate keys are *not* available through normal commercial channels. The metal code tag supplied with your original keys authorizes you to purchase additional keys direct from the Medeco factory. The additional key supplied and the metal tag should be stored in a secured area.

To obtain information or replacement keys, use the list below to contact the Medeco distributor most convenient to you. Complete a copy of the order form and mail it to the distributor. As a safety precaution, Medeco will not honor orders that do not include both the code tag and the official order form.



Medeco  
Department KLC  
P.O. Box 3075  
Salem, VA 24153  
United States of America

Claus Clausen  
89a Authur Road  
Wimbledon Park, London  
SW 19 7DP England  
Tel: 011-44-81-946-2823  
Fax: 011-44-81-946-2286

Y.S. Chae  
Geoho Corporation  
2nd Fl. Kyung Bldg.  
244-7 Poi-Dong  
Gangnam-Ku  
Seoul, Korea  
Tel: 011-82-02-579-1280  
FAX: 011-82-02-579-1282

ATM Lock A Safe Co. Pty. Ltd.  
11/44 Ourimbah Road, P. O. Box 300  
Tweed Head, N.S.W. 2485  
Australia  
Tel: 011-61-075-36-7600  
FAX: 011-61-075-36-7605

Ricardo DeCastro  
Calle 22 No 3-30, Ofc. 201  
P. O. Box A.A. No. 39955  
Bogota, Colombia Sur America  
Tel: 011-57-1-268-5827 or 6180  
Fax: 011-57-1-268-2628

Moshe Rotner  
R.M. Rotan Marketing  
34 Nordau Street, Herzlia B  
P.O. Box 5138, Herzlia  
Israel  
Tel: 011-972-9-545640  
FAX: 011-972-9-584275

## Key Reorder Form

A copy of this form, when accompanied by the metal code tag supplied with the original keys, represents an authorized order for additional factory keys.

Please indicate the quantity required and enclose a check or money order for the appropriate amount.

Number of keys required\_\_\_\_\_

### Please Type or Print Your Return Address

Name\_\_\_\_\_

Address\_\_\_\_\_

City\_\_\_\_\_

State\_\_\_\_\_ Zip\_\_\_\_\_

Country\_\_\_\_\_

Select an address from the list provided on the previous page, and mail a copy of this form to that location.

Your key code tag will be returned with your new keys.

**Note:** No orders will be processed without both the key tag and a copy of this form.

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## Appendix E. Three-Digit Display Numbers

This appendix contains lists of the various numbers and characters that may display in the three-digit operator panel display. Determine the type of operation being performed, then use the list for that type operation.

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### Power-On (PON) Test Indicators

|     |                                                                             |
|-----|-----------------------------------------------------------------------------|
| 100 | PON completed successfully; control was passed to IPL ROS.                  |
| 101 | PON started following reset.                                                |
| 102 | PON started following power-on reset.                                       |
| 103 | PON could not determine the system model number.                            |
| 104 | Equipment conflict; PON could not find the CBA.                             |
| 105 | PON could not read from the OCS EPROM                                       |
| 106 | PON detected a module error.                                                |
| 111 | OCS stopped; PON detected a module error.                                   |
| 112 | A checkstop occurred during PON; checkstop results could not be logged out. |
| 113 | PON checkstop count is greater than 1.                                      |
| 120 | PON starting a CRC check on the 8752 EPROM.                                 |
| 121 | PON detected a bad CRC in the first 32K-bytes of the OCS EPROM.             |
| 122 | PON started a CRC check on the first 32K-bytes of the OCS EPROM.            |
| 123 | PON detected a bad CRC on the OCS area of NVRAM.                            |
| 124 | PON started a CRC check on the OCS area of NVRAM.                           |
| 125 | PON detected a bad CRC on the time-of-day area of NVRAM.                    |
| 126 | PON started a CRC check on the time-of-day area of NVRAM.                   |
| 127 | PON detected a bad CRC on the 8752 EPROM.                                   |
| 130 | PON presence test started.                                                  |
| 140 | PON failed; procedure error.                                                |
| 142 | PON failed; procedure error.                                                |
| 143 | Invalid memory configuration.                                               |
| 144 | PON failed; procedure error.                                                |
| 151 | PON started AIPGM test code.                                                |
| 152 | PON started DCLST test code.                                                |
| 153 | PON started ACLST test code.                                                |
| 154 | PON started AST test code.                                                  |
| 160 | Bad EPOW Signal/Power status signal.                                        |
| 161 | PON being conducted on BUMP I/O.                                            |
| 162 | PON being conducted on JTAG.                                                |
| 163 | PON being conducted on Direct I/O.                                          |
| 164 | PON being conducted on CPU.                                                 |
| 165 | PON being conducted on DCB and Memory.                                      |
| 166 | PON being conducted on Interrupts.                                          |
| 170 | PON being conducted on Multi-Processors.                                    |
| 180 | PON logout failed.                                                          |
| 185 | A checkstop condition occurred during the PON.                              |
| 186 | System logic-generated checkstop (Model 250 only).                          |
| 187 | Graphics-generated checkstop (Model 250).                                   |
| 195 | PON completed.                                                              |
| 888 | PON did not start.                                                          |

---

## Power-On Self-Test (POST) Indicators

|     |                                                                                                                                                                                                                                                                                                     |
|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 20c | L2 cache POST error. (The display shows a solid 20c for 5 seconds.)                                                                                                                                                                                                                                 |
| 21c | L2 cache is not detected. (The display shows a solid 21c for 2 seconds.)                                                                                                                                                                                                                            |
| 22c | Attempting a normal mode IPL from FDDI specified in NVRAM IPL device list.                                                                                                                                                                                                                          |
| 23c | Attempting a normal mode IPL from FDDI specified in IPL ROM device list.                                                                                                                                                                                                                            |
| 24c | Attempting a service mode IPL from FDDI specified in NVRAM IPL device list.                                                                                                                                                                                                                         |
| 25c | Attempting a service mode IPL from FDDI specified in IPL ROM device list.                                                                                                                                                                                                                           |
| 200 | IPL attempted with keylock in the Secure position.                                                                                                                                                                                                                                                  |
| 201 | IPL ROM test failed or checkstop occurred (irrecoverable).                                                                                                                                                                                                                                          |
| 202 | Unexpected machine check interrupt.                                                                                                                                                                                                                                                                 |
| 203 | Unexpected data storage interrupt.                                                                                                                                                                                                                                                                  |
| 204 | Unexpected instruction storage interrupt.                                                                                                                                                                                                                                                           |
| 205 | Unexpected external interrupt.                                                                                                                                                                                                                                                                      |
| 206 | Unexpected alignment interrupt.                                                                                                                                                                                                                                                                     |
| 207 | Unexpected program interrupt.                                                                                                                                                                                                                                                                       |
| 208 | Unexpected floating point unavailable interrupt.                                                                                                                                                                                                                                                    |
| 209 | Unexpected SVC interrupt.                                                                                                                                                                                                                                                                           |
| 210 | Unexpected SVC interrupt.                                                                                                                                                                                                                                                                           |
| 211 | IPL ROM CRC comparison error (irrecoverable)                                                                                                                                                                                                                                                        |
| 212 | RAM POST memory configuration error or no memory found (irrecoverable).                                                                                                                                                                                                                             |
| 213 | RAM POST failure (irrecoverable)                                                                                                                                                                                                                                                                    |
| 214 | Power status register failed (irrecoverable).                                                                                                                                                                                                                                                       |
| 215 | A low-voltage condition is present (irrecoverable).                                                                                                                                                                                                                                                 |
| 216 | IPL ROM code being uncompressed into memory.                                                                                                                                                                                                                                                        |
| 217 | End of boot list encountered.                                                                                                                                                                                                                                                                       |
| 218 | RAM POST is looking for 2M bytes of good memory.                                                                                                                                                                                                                                                    |
| 219 | RAM POST bit map is being generated.                                                                                                                                                                                                                                                                |
| 220 | IPL control block is being initialized.                                                                                                                                                                                                                                                             |
| 221 | NVRAM CRC comparison error during AIX IPL(key mode switch in Normal mode). Reset NVRAM by reaccomplishing IPL in Service mode. For systems with an internal, direct-bus-attached (DBA) disk, IPL ROM attempted to perform an IPL from that disk before halting with this three-digit display value. |
| 222 | Attempting a Normal mode IPL from Standard I/O planar-attached devices specified in NVRAM IPL Devices List.                                                                                                                                                                                         |
| 223 | Attempting a Normal mode IPL from SCSI-attached devices specified in NVRAM IPL Devices List.                                                                                                                                                                                                        |
| 224 | Attempting a Normal mode IPL from 9333 subsystem device specified in NVRAM IPL Devices List.                                                                                                                                                                                                        |
| 225 | Attempting a Normal mode IPL from 7012 DBA disk-attached devices specified in NVRAM IPL Devices List.                                                                                                                                                                                               |
| 226 | Attempting a Normal mode IPL from Ethernet specified in NVRAM IPL Devices List.                                                                                                                                                                                                                     |
| 227 | Attempting a Normal mode IPL from Token Ring specified in NVRAM IPL Devices List.                                                                                                                                                                                                                   |
| 228 | Attempting a Normal mode IPL from NVRAM expansion code.                                                                                                                                                                                                                                             |
| 229 | Attempting a Normal mode IPL from NVRAM IPL Devices List; cannot IPL from any of the listed devices, or there are no valid entries in the Devices List.                                                                                                                                             |

- 230 Attempting a Normal mode IPL from adapter feature ROM specified in IPL ROM Device List.
- 231 Attempting a Normal mode IPL from Ethernet specified in IPL ROM Device List.
- 232 Attempting a Normal mode IPL from Standard I/O planar attached devices specified in ROM Default Device List.
- 233 Attempting a Normal mode IPL from SCSI attached devices specified in IPL ROM Default Device List.
- 234 Attempting a Normal mode IPL from 9333 subsystem device specified in IPL ROM Device List.
- 235 Attempting a Normal mode IPL from 7012 DBA disk attached devices specified in IPL ROM Default Device List.
- 236 Attempting a Normal mode IPL from Ethernet specified in IPL ROM Default Device List.
- 237 Attempting a Normal mode IPL from Token Ring specified in IPL ROM Default Device List.
- 238 Attempting a Normal mode IPL from Token Ring specified by the operator.
- 239 System failed to IPL from the device chosen by the operator.
- 240 Attempting a Service mode IPL from adapter feature ROM.
- 241 Attempting a Normal mode IPL from devices specified in the NVRAM IPL Devices List.
- 242 Attempting a Service mode IPL from Standard I/O planar attached devices specified in NVRAM IPL Devices List.
- 243 Attempting a Service mode IPL from SCSI attached devices specified in NVRAM IPL Devices List.
- 244 Attempting a Service mode IPL from 9333 subsystem device specified in NVRAM IPL Devices List.
- 245 Attempting a Service mode IPL from 7012 DBA disk-attached devices specified in NVRAM IPL Devices List.
- 246 Attempting a Service mode IPL from Ethernet specified in NVRAM IPL Devices List.
- 247 Attempting a Service mode IPL from Token Ring specified in NVRAM Device List.
- 248 Attempting a Service mode IPL from NVRAM expansion code.
- 249 Attempting a Service mode IPL from NVRAM IPL Devices List; cannot IPL from any of the listed devices, or there are no valid entries in the Devices List.
- 250 Attempting a Service mode IPL from adapter feature ROM specified in IPL ROM Device List.
- 251 Attempting a Service mode IPL from Ethernet specified in IPL ROM Default Device List.
- 252 Attempting a Service mode IPL from Standard I/O planar attached devices specified in ROM Default Device List.
- 253 Attempting a Service mode IPL from SCSI-attached devices specified in IPL ROM Default Device List.
- 254 Attempting a Service mode IPL from 9333 subsystem device specified in IPL ROM Devices List.
- 255 Attempting a Service mode IPL from 7012 DBA disk-attached devices specified in IPL ROM Default Device List.
- 256 Attempting a Service mode IPL from Ethernet specified in IPL ROM Devices List.
- 257 Attempting a Service mode IPL from Token Ring specified in IPL ROM Devices List.
- 258 Attempting a Service mode IPL from Token Ring specified by the operator.

259 Attempting a Service mode IPL from FDDI specified by the operator.  
 260 Information is being displayed on the display console.  
 261 No supported local system display adapter was found.  
 262 Keyboard not detected as being connected to the system's keyboard port.  
 263 Attempting a Normal mode IPL from adapter feature ROM specified in  
 NVRAM Device List.  
 269 Stalled state - the system is unable to IPL.  
 271 Mouse and Mouse port POST.  
 272 Tablet Port POST.  
 277 Auto Token-Ring LANstreamer MC 32 Adapter  
 278 Video ROM scan POST.  
 279 FDDI POST.  
 280 3com Ethernet POST.  
 281 Keyboard POST executing.  
 282 Parallel port POST executing.  
 283 Serial port POST executing.  
 284 POWER Gt1 graphics adapter POST executing.  
 285 POWER Gt3 graphics adapter POST executing.  
 286 Token-Ring adapter POST executing.  
 287 Ethernet adapter POST executing.  
 288 Adapter card slots being queried.  
 289 POWER GT0 Display Adapter POST.  
 290 IOCC POST error (irrecoverable)  
 291 Standard I/O POST running.  
 292 SCSI POST running.  
 293 7012 DBA disk POST running.  
 294 IOCC bad TCW SIMM in slot location J being tested.  
 295 Graphics Display adapter POST, color or grayscale.  
 296 ROM scan POST.  
 297 System model number does not compare between OCS and ROS  
 (irrecoverable).  
 298 Attempting a software IPL.  
 299 IPL ROM passed control to the loaded program code.  
 301 Flash Utility ROM test failed or checkstop occurred (irrecoverable).  
 302 Flash Utility ROM: User prompt, move the key to the service position in  
 order to perform an optional Flash Update. LED 302 will only appear if the  
 key switch is in the secure position. This signals the user that a Flash  
 Update may be initiated by moving the key switch to the service position. If  
 the key is moved to the service position then LED 303 will be displayed, this  
 signals the user to press the reset button and select optional Flash Update.  
 303 Flash Utility ROM: User prompt, press the reset button in order to perform  
 an optional Flash Update. LED 302 will only appear if the key switch is in  
 the secure position. This signals the user that a Flash Update may be  
 initiated by moving the key switch to the service position. If the key is moved  
 to the service position LED 303 will be displayed, this signals the user to  
 press the reset button and select optional Flash Update.  
 304 Flash Utility ROM IOCC POST error (irrecoverable).  
 305 Flash Utility ROM standard I/O POST running.  
 306 Flash Utility ROM is attempting IPL from Flash Update media device.  
 307 Flash Utility ROM system model number does not compare between OCS  
 and ROM (irrecoverable).  
 308 Flash Utility ROM: IOCC TCW memory is being tested.  
 309 Flash Utility ROM passed control to a Flash Update Boot Image.  
 311 Flash Utility ROM CRC comparison error (irrecoverable).

|     |                                                                                           |
|-----|-------------------------------------------------------------------------------------------|
| 312 | Flash Utility ROM RAM POST memory configuration error or no memory found (irrecoverable). |
| 313 | Flash Utility ROM RAM POST failure (irrecoverable).                                       |
| 314 | Flash Utility ROM Power status register failed (irrecoverable).                           |
| 315 | Flash Utility ROM detected a low voltage condition.                                       |
| 318 | Flash Utility ROM RAM POST is looking for good memory.                                    |
| 319 | Flash Utility ROM RAM POST bit map is being generated.                                    |
| 322 | CRC error on media Flash Image. No Flash Update performed.                                |
| 323 | Current Flash Image is being erased.                                                      |
| 324 | CRC error on new Flash Image after Update was performed. (Flash Image is corrupted.)      |
| 325 | Flash Update successful and complete.                                                     |

## Configuration Program Indicators

|     |                                                                                                                                                 |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------|
| 5c0 | Streams-based hardware drive being configured.                                                                                                  |
| 5c1 | Streams-based X.25 protocol being configured.                                                                                                   |
| 5c2 | Streams-based X.25 COMIO emulator driver being configured.                                                                                      |
| 5c3 | Streams-based X.25 TCP/IP interface driver being configured.                                                                                    |
| 5c4 | FCS adapter device driver being configured.                                                                                                     |
| 5c5 | SCB network device driver for FCS is being configured.                                                                                          |
| 5c6 | AIX SNA channel being configured.                                                                                                               |
| 500 | Querying Standard I/O slot.                                                                                                                     |
| 501 | Querying card in Slot 1.                                                                                                                        |
| 502 | Querying card in Slot 2.                                                                                                                        |
| 503 | Querying card in Slot 3.                                                                                                                        |
| 504 | Querying card in Slot 4.                                                                                                                        |
| 505 | Querying card in Slot 5.                                                                                                                        |
| 506 | Querying card in Slot 6.                                                                                                                        |
| 507 | Querying card in Slot 7.                                                                                                                        |
| 508 | Querying card in Slot 8.                                                                                                                        |
| 510 | Starting device configuration.                                                                                                                  |
| 511 | Device configuration completed.                                                                                                                 |
| 512 | Restoring device configuration files from media.                                                                                                |
| 513 | Restoring basic operating system installation files from media.                                                                                 |
| 516 | Contacting server during network boot.                                                                                                          |
| 517 | Mounting client remote file system during network IPL.                                                                                          |
| 518 | Remote mount of the root and /usr file systems failed during network boot.                                                                      |
| 520 | Bus configuration running.                                                                                                                      |
| 521 | <b>/etc/init</b> invoked <b>cfgmgr</b> with invalid options; <b>/etc/init</b> has been corrupted or incorrectly modified (irrecoverable error). |
| 522 | The configuration manager has been invoked with conflicting options (irrecoverable error).                                                      |
| 523 | The configuration manager is unable to access the ODM database (irrecoverable error).                                                           |
| 524 | The configuration manager is unable to access the config rules object in the ODM database (irrecoverable error).                                |
| 525 | The configuration manager is unable to get data from a customized device object in the ODM database (irrecoverable error).                      |
| 526 | The configuration manager is unable to get data from a customized device driver object in the ODM database (irrecoverable error).               |
| 527 | The configuration manager was invoked with the phase 1 flag; running phase 1 at this point is not permitted (irrecoverable error).              |
| 528 | The configuration manager cannot find sequence rule, or no program name was specified in the ODM database (irrecoverable error).                |

529 The configuration manager is unable to update ODM data (irrecoverable error).

530 The program **savebase** returned an error.

531 The configuration manager is unable to access the PdAt object class (irrecoverable error).

532 There is not enough memory to continue (malloc failure); irrecoverable error.

533 The configuration manager could not find a configure method for a device.

534 The configuration manager is unable to acquire database lock (irrecoverable error).

535 HIPPI diagnostics interface driver being configured.

536 The configuration manager encountered more than one sequence rule specified in the same phase (irrecoverable error).

537 The configuration manager encountered an error when invoking the program in the sequence rule.

538 The configuration manager is going to invoke a configuration method.

539 The configuration method has terminated, and control has returned to the configuration manager.

551 IPL Varyon is running.

552 IPL Varyon failed.

553 IPL phase 1 is complete.

554 Unable to define NFS swap device during network boot.

555 Unable to create NFS swap device during network boot.

556 Logical Volume Manager encountered error during IPL varyon.

557 The root filesystem will not mount.

558 There is not enough memory to continue the IPL.

559 Less than 2 M bytes of good memory are available to load the AIX kernel.

570 Virtual SCSI devices being configured.

571 HIPPI common function device driver being configured.

572 HIPPI IPI-3 master transport driver being configured.

573 HIPPI IPI-3 slave transport driver being configured.

574 HIPPI IPI-3 transport services user interface device driver being configured.

575 A 9570 disk-array driver is being configured.

576 Generic async device driver being configured.

577 Generic SCSI device driver being configured.

578 Generic commo device driver being configured.

579 Device driver being configured for a generic device.

580 HIPPI TCPIP network interface driver being configured.

581 Configuring TCPIP.

582 Configuring Token-Ring data link control.

583 Configuring an Ethernet data link control.

584 Configuring an IEEE ethernet data link control.

585 Configuring an SDLC MPQP data link control.

586 Configuring a QLLC X.25 data link control.

587 Configuring a NETBIOS.

588 Configuring a Bisync Read-Write (BSCRW).

589 SCSI target mode device being configured.

590 Diskless remote paging device being configured.

591 Configuring an LVM device driver.

592 Configuring an HFT device driver.

593 Configuring SNA device drivers.

594 Asynchronous I/O being defined or configured.

595 X.31 pseudo device being configured.

596 SNA DLC/LAPE pseudo device being configured.



597 OCS software being configured.  
 598 OCS hosts being configured during system reboot.  
 599 Configuring FDDI data link control.  
 600 Starting network boot portion of **/sbin/rc.boot**  
 602 Configuring network parent devices.  
 603 **/usr/lib/methods/defsys**, **/usr/lib/methods/cfgsys**, or  
**/usr/lib/methods/cfgbus** failed.  
 604 Configuring physical network boot device.  
 605 Configuration of physical network boot device failed.  
 606 Running **/usr/sbin/ifconfig** on logical network boot device.  
 607 **/usr/sbin/ifconfig** failed.  
 608 Attempting to retrieve the **client.info** file with **ttftp**. Note that a flashing 608  
 indicates multiple attempt(s) to retrieve the **client\_info** file are occurring.  
 609 The **client.info** file does not exist or it is zero length.  
 610 Attempting remote mount of NFS file system.  
 611 Remote mount of the NFS file system failed.  
 612 Accessing remote files; unconfiguring network boot device.  
 614 Configuring local paging devices.  
 615 Configuration of a local paging device failed.  
 616 Converting from diskless to dataless configuration.  
 617 Diskless to dataless configuration failed.  
 618 Configuring remote (NFS) paging devices.  
 619 Configuration of a remote (NFS) paging device failed.  
 620 Updating special device files and ODM in permanent filesystem with data  
 from boot RAM filesystem.  
 622 Boot process configuring for operating system installation.  
 77c Progress indicator. A 1.0 GB 16-bit SCSI disk drive being identified or  
 configured.  
 700 Progress indicator. A 1.1 GB 8-bit SCSI disk drive being identified or  
 configured.  
 701 Progress indicator. A 1.1 GB 16-bit SCSI disk drive is being identified or  
 configured.  
 702 Progress indicator. A 1.1 GB 16-bit differential SCSI disk drive is being  
 identified or configured.  
 703 Progress indicator. A 2.2 GB 8-bit SCSI disk drive is being identified or  
 configured.  
 704 Progress indicator. A 2.2 GB 16-bit SCSI disk drive is being identified or  
 configured.  
 705 The configuration method for the 2.2 GB 16-bit differential SCSI disk drive is  
 being run. If an irrecoverable error occurs, the system halts.  
 706 Progress indicator. A 4.5 GB 16-bit SCSI disk drive is being identified or  
 configured.  
 707 Progress indicator. A 4.5 GB 16-bit differential SCSI disk drive is being  
 identified or configured.  
 708 Progress indicator. A L2 cache is being identified or configured.  
 710 POWER GXT150M graphics adapter being identified or configured.  
 711 Unknown adapter being identified or configured.  
 712 Graphics slot bus configuration is executing.  
 713 The IBM ARTIC960 device is being configured.  
 714 A video capture adapter is being configured.  
 715 The Ultimedia Services audio adapter is being configured. This LED  
 displays briefly on the panel.  
 720 Unknown read/write optical drive type being configured.  
 721 Unknown disk or SCSI device being identified or configured.

722 Unknown disk being identified or configured.  
723 Unknown CDROM being identified or configured.  
724 Unknown tape drive being identified or configured.  
725 Unknown display device being identified or configured.  
726 Unknown input device being identified or configured.  
727 Unknown async device being identified or configured.  
728 Parallel printer being identified or configured.  
729 Unknown parallel device being identified or configured.  
730 Unknown diskette drive being identified or configured.  
731 pty being identified or configured.  
732 Unknown SCSI initiator type being configured.  
733 7GB 8mm tape drive being configured.  
85c Progress indicator. Token-Ring High-Performance LAN adapter is being identified or configured.  
89c Progress indicator. A multimedia SCSI CD-ROM is being identified or configured.  
811 Processor complex being identified or configured.  
812 Memory being identified or configured.  
813 Battery for time-of-day, NVRAM, and so on being identified or configured, or system I/O Control Logic being identified or configured.  
814 NVRAM being identified or configured.  
815 Floating-point processor test  
816 Operator panel logic being identified or configured.  
817 Time-of-day logic being identified or configured.  
819 Graphics input device adapter being identified or configured.  
821 Standard keyboard adapter being identified or configured.  
823 Standard mouse adapter being identified or configured.  
824 Standard tablet adapter being identified or configured.  
825 Standard speaker adapter being identified or configured.  
826 Serial Port 1 adapter being identified or configured.  
827 Parallel port adapter being identified or configured.  
828 Standard diskette adapter being identified or configured.  
831 3151 adapter being identified or configured, or Serial Port 2 being identified or configured.  
834 64-port async controller being identified or configured.  
835 16-port async concentrator being identified or configured.  
836 128-port async controller being identified or configured.  
837 128-port remote async controller being identified or configured.  
838 Network Terminal Accelerator Adapter being identified or configured.  
839 7318 Serial Communications Server being configured.  
841 8-port async adapter (EIA-232) being identified or configured.  
842 8-port async adapter (EIA-422A) being identified or configured.  
843 8-port async adapter (MIL-STD 188) being identified or configured.  
844 7135 RADiant Array disk drive subsystem controller being identified or configured.  
845 7135 RADiant Array disk drive subsystem drawer being identified or configured.  
847 16-port serial adapter (EIA-232) being identified or configured.  
848 16-port serial adapter (EIA-422) being identified or configured.  
849 X.25 communications adapter being identified or configured.  
850 Token-Ring network adapter being identified or configured.  
851 T1/J1 Portmaster adapter being identified or configured.  
852 Ethernet adapter being identified or configured.

854 3270 Host Connection Program/6000 connection being identified or configured.

855 4-port multiprotocol adapter being identified or configured.

857 FSLA adapter being identified or configured.

858 5085/5086/5088 adapter being identified or configured.

859 FDDI adapter being identified or configured.

861 Optical adapter being identified or configured.

862 Block multiplexer channel adapter being identified or configured.

865 370 serial channel adapter being identified or configured.

866 SCSI adapter being identified or configured.

867 Async expansion adapter being identified or configured.

868 SCSI adapter being identified or configured.

869 SCSI adapter being identified or configured.

870 Serial disk drive adapter being identified or configured.

871 Graphics subsystem adapter being identified or configured.

872 Grayscale graphics adapter being identified or configured.

874 Color graphics adapter being identified or configured.

875 Vendor generic communication adapter being configured.

876 8-bit color graphics processor being identified or configured.

877 POWER Gt3/POWER Gt4 being identified or configured.

878 POWER Gt4 graphics processor card being configured.

880 POWER Gt1 being identified or configured.

887 Integrated Ethernet adapter being identified or configured.

889 SCSI adapter being identified or configured.

890 SCSI-2 Fast/Wide Adapter/A being identified or configured.

891 Vendor SCSI adapter being identified or configured.

892 Vendor display adapter being identified or configured.

893 Vendor LAN adapter being identified or configured.

894 Vendor async communications adapter being identified or configured.

895 Vendor IEEE 488 adapter being identified or configured.

896 Vendor VME bus adapter being identified or configured.

897 S/370 channel emulator adapter being identified or configured.

898 POWER Gt1x graphics adapter being identified or configured.

899 3490 attached tape drive being identified or configured.

901 Vendor SCSI device being identified or configured.

902 Vendor display device being identified or configured.

903 Vendor async device being identified or configured.

904 Vendor parallel device being identified or configured.

905 Vendor other device being identified or configured.

908 POWER GXT1000 Graphics subsystem being identified or configured.

912 2.0G-byte SCSI-2 differential disk drive being identified or configured.

913 1.0G-byte differential disk drive being identified or configured.

914 5G-byte 8 mm differential tape drive being identified or configured.

915 4 G-byte 4 mm tape drive being identified or configured.

916 Non-SCSI vendor tape adapter being identified or configured.

917 Progress indicator. 2.0GB 16-bit differential SCSI disk drive is being identified or configured.

918 Progress indicator. 2GB 16-bit single-ended SCSI disk drive is being identified or configured.

920 Bridge box being identified or configured.

921 101 keyboard being identified or configured.

922 102 keyboard being identified or configured.

923 Kanji keyboard being identified or configured.

924 Two-button mouse being identified or configured.

925 Three-button mouse being identified or configured.  
926 Tablet Model 21 being identified or configured.  
927 Tablet Model 22 being identified or configured.  
928 Standard speaker being identified or configured.  
929 Dials being identified or configured.  
930 Lighted Program Function Keys (LPFK) being identified or configured.  
931 IP router being identified or configured.  
933 Async planar being identified or configured.  
934 Async expansion drawer being identified or configured.  
935 3.5-inch diskette drive being identified or configured.  
936 5.25-inch diskette drive being identified or configured.  
937 An HIPPI adapter is being configured.  
942 POWER GXT graphics adapter being identified or configured.  
943 Progress indicator. 3480 and 3490 control units attached to a System/370 Channel Emulator/A adapter are being identified or configured.  
945 1.0GB SCSI differential disk drive being identified or configured.  
946 Serial port 3 adapter is being identified or configured.  
947 Progress indicator. A 730MB SCSI disk drive is being configured.  
948 Portable disk drive being identified or configured.  
949 Unknown direct bus-attach device being identified or configured.  
950 Missing SCSI device being identified or configured.  
951 670M-byte SCSI disk drive being identified or configured.  
952 355M-byte SCSI disk drive being identified or configured.  
953 320M-byte SCSI disk drive being identified or configured.  
954 400M-byte SCSI disk drive being identified or configured.  
955 857M-byte SCSI disk drive being identified or configured.  
956 670M-byte SCSI disk drive electronics card being identified or configured.  
957 120M-byte DBA disk drive being identified or configured.  
958 160M-byte DBA disk drive being identified or configured.  
959 160M-byte SCSI disk drive being identified or configured.  
960 1.37G-byte SCSI disk drive being identified or configured.  
968 1.0G-byte SCSI disk drive being identified or configured.  
970 Half-inch, 9-track tape drive being identified or configured.  
971 150M-byte quarter-inch tape drive being identified or configured.  
972 2.3G-byte 8-mm SCSI tape drive being identified or configured.  
973 Other SCSI tape drive being identified or configured.  
974 CD-ROM drive being identified or configured.  
975 Progress indicator. An optical disk drive is being identified or configured.  
977 M-Audio capture and playback adapter being identified or configured.  
981 540M-byte SCSI-2 single-ended disk drive being identified or configured.  
985 M-Video capture and playback adapter being identified or configured.  
986 2.4G-byte SCSI disk drive being identified or configured.  
987 Progress indicator. Enhanced SCSI CD-ROM drive is being identified or configured.  
989 200M-byte SCSI disk drive being identified or configured.  
990 2.0G-byte SCSI-2 single-ended disk drive being identified or configured.  
991 525M-byte 1/4-inch cartridge tape drive being identified or configured.  
994 5G-byte 8 mm tape drive being identified or configured.  
995 1.2G-byte 1/4-inch tape drive being identified or configured.  
996 1.0G-byte SCSI disk drive being identified or configured.  
997 FDDI adapter being identified or configured.  
998 2.0G-byte 4 mm tape drive being identified or configured.  
999 Data compression adapter being identified or configured.

---

## Diagnostic Load Progress Indicators

**Note:** When a lowercase *c* is listed, it displays in the lower half of the seven-segment character position.

|     |                                                                                                                                                                                                                  |
|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| c00 | AIX Install/Maintenance loaded successfully.                                                                                                                                                                     |
| c01 | Insert the first diagnostic diskette.                                                                                                                                                                            |
| c02 | Diskettes inserted out of sequence                                                                                                                                                                               |
| c03 | The wrong diskette is in diskette drive.                                                                                                                                                                         |
| c04 | The loading stopped with an a non-recoverable error.                                                                                                                                                             |
| c05 | A diskette error occurred.                                                                                                                                                                                       |
| c07 | Insert the next diagnostic diskette.                                                                                                                                                                             |
| c08 | RAM file system started incorrectly.                                                                                                                                                                             |
| c09 | The diskette drive is reading or writing a diskette.                                                                                                                                                             |
| c20 | An unexpected halt occurred, and the system is configured to enter the kernel debug program instead of entering a system dump.                                                                                   |
| c21 | The <b>lfconfig</b> command was unable to configure the network for the client network host.                                                                                                                     |
| c22 | The <b>ttp</b> command was unable to read client's <i>ClientHostName.Info</i> file during a client network boot.                                                                                                 |
| c24 | Unable to read client's <i>ClientHostName.Info</i> file during a client network boot.                                                                                                                            |
| c25 | Client did not mount remote miniroot during network install.                                                                                                                                                     |
| c26 | Client did not mount the <b>/usr</b> file system during the network boot.                                                                                                                                        |
| c29 | The system was unable to configure the network device.                                                                                                                                                           |
| c31 | Select the console display for the diagnostics. To select "No console display," set the key mode switch to Normal then to Service. The diagnostic programs will then load and run the diagnostics automatically. |
| c32 | A direct-attached display (HFT) was selected.                                                                                                                                                                    |
| c33 | A tty terminal attached to serial ports S1 or S2 was selected.                                                                                                                                                   |
| c34 | A file was selected. The console messages store in a file.                                                                                                                                                       |
| c40 | Configuration files are being restored.                                                                                                                                                                          |
| c41 | Could not determine the boot type or device.                                                                                                                                                                     |
| c42 | Extracting data files from diskette.                                                                                                                                                                             |
| c43 | Cannot access the boot/install tape.                                                                                                                                                                             |
| c44 | Initializing installation database with target disk information.                                                                                                                                                 |
| c45 | Cannot configure the console.                                                                                                                                                                                    |
| c46 | Normal installation processing.                                                                                                                                                                                  |
| c47 | Could not create a physical volume identifier (PVID) on disk.                                                                                                                                                    |
| c48 | Prompting you for input.                                                                                                                                                                                         |
| c49 | Could not create or form the JFS log.                                                                                                                                                                            |
| c50 | Creating root volume group on target disks.                                                                                                                                                                      |
| c51 | No paging devices were found.                                                                                                                                                                                    |
| c52 | Changing from RAM environment to disk environment.                                                                                                                                                               |
| c53 | Not enough space in the <b>/tmp</b> directory to do a preservation installation.                                                                                                                                 |
| c54 | Installing either BOS or additional packages.                                                                                                                                                                    |
| c55 | Could not remove the specified logical volume in a preservation installation.                                                                                                                                    |
| c56 | Running user-defined customization.                                                                                                                                                                              |
| c57 | Failure to restore BOS.                                                                                                                                                                                          |
| c58 | Displaying message to turn the key.                                                                                                                                                                              |
| c59 | Could not copy either device special files, device ODM, or volume group information from RAM to disk.                                                                                                            |
| c61 | Failed to create the boot image.                                                                                                                                                                                 |

c99

Diagnostics have completed. This code is only used when there is no console.

---

## Debugger Progress Indicators

c20

The kernel debugger has started due to an unexpected system halt.

---

## Flashing 888 Message Descriptions

A crash message (Type 102) can occur at any time. See “Reading the Type 102 Message” on page 5-14 for information about reading the message.

### Type 102 Message

The message type 102 contains information about a dump. See “Reading a Flashing 888 Message on an Multi-Line Operator Panel Display” on page 5-13 for information about reading the message.

### Dump Status Codes

This field contains the dump progress indicator value. See “Dump Progress Indicators” on page 5-15.

### Type 103 and 105 Messages

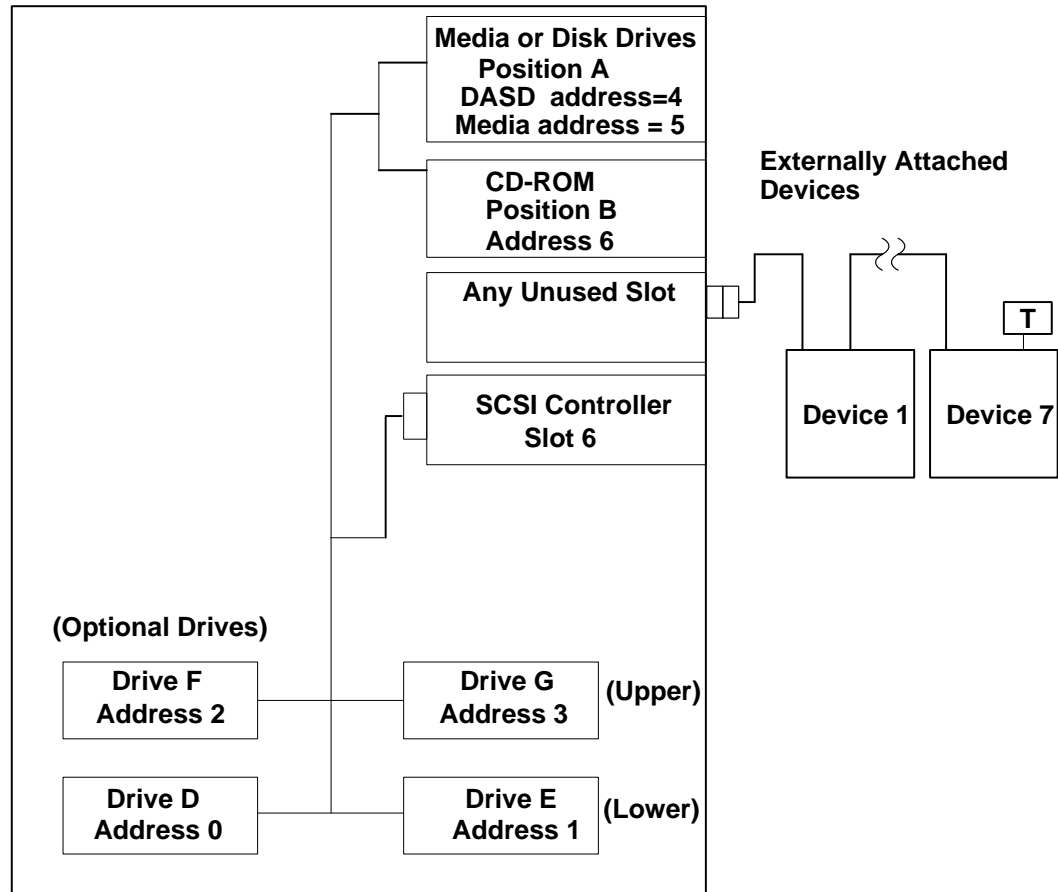
Message types 103 and 105 contain service information. The information should be recorded on the Problem Summary Form or on a blank sheet of paper.

This message contains the SRN and the location codes for up to four FRUs. The SRN is reported to the service organization and the location codes are needed by the service representative. See “Reading a Flashing 888 Message on an Multi-Line Operator Panel Display” on page 5-13 for information about the diagnostic information contained within this message.

# Appendix F. SCSI Address Record

## Internally Installed SCSI Device Record

### 7012 G Series



**Note:** Refer to *Diagnostic Information For Micro Channel Bus Systems* for addressing scheme.

1. Media position C can have two 1/2 high disk drives.
2. T = Terminator

## Attached SCSI Device Record

Refer to the illustration and record the adapter slot number, the device type, and the SCSI address for each externally attached SCSI device.

**SCSI I/O Controller**  
Slot \_\_\_\_\_

**Note:** Fill out a separate sheet for each SCSI I/O controller that has externally attached devices.

Device \_\_\_\_\_  
Address \_\_\_\_\_

Device \_\_\_\_\_  
Address \_\_\_\_\_

Device \_\_\_\_\_  
Address \_\_\_\_\_

Device \_\_\_\_\_  
Address \_\_\_\_\_

Device \_\_\_\_\_  
Address \_\_\_\_\_

Device \_\_\_\_\_  
Address \_\_\_\_\_

Device \_\_\_\_\_  
Address \_\_\_\_\_



---

## Appendix G. System Power States

The state of the system is dependant on the condition of four variable conditions that effect how the system IPLs or shutdown. 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 sytem when power is first applied (by plugging a 7012 G Series into an electrical outlet, or by setting the main power switch of the 7013 J Series to the On position for example). When in this state, the BUMP console displays `STANDBY`, unless the console is set to display the operator panel display error messages.

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

- If the Power-on button is initially detected to be in the On position, and the `was_shutdown` status is false, the system goes to the `WAIT_POWER_ON` state.
- If the Power-on button is pressed and changes from the Off position to the On position, the system goes to the `WAIT_POWER_ON` state.
- If the Power-on button is pressed and changes from the On position to the Off position, the system sets the `was_shutdown` status to false.
- If the BUMP console Enter button is pressed, the system goes to the `SBB_GATEWAY` state.

#### SBB\_GATEWAY

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

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

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

- If the Power-on button is pressed and changes from the On position to the Off position, the system sets the `was_shutdown` status to false.
- If the Enter key is pressed on the BUMP console, the system goes to the `SBB_ECMD` state.
- If the `power` command is entered on the BUMP console, the system goes to the `SBB_PCMD` state.

## SBB\_ECMD

In this state the `>` character is displayed on the BUMP console but the cursor is located in the same position as the `>` prompt ( `>` ).

This state allows electronic key mode switching to be performed as well as power functions. The power functions follow below:

- If the Power-on button is initially detected in the On position, and the `was_shutdown` status is false, the system goes to the `WAIT_POWER_ON` state.
- If the Power-on button is pressed and changes from the Off position to the On position, the system goes to the `WAIT_POWER_ON` state.
- If the Power-on button is pressed and changes from the On position to the Off position, the system sets the `was_shutdown` status to false.
- If the Enter key is pressed on the BUMP console, the system goes to the `SBB_GATEWAY` state.

## SBB\_PCMD

In this state the `>` character is displayed on the BUMP console but the cursor is located in the same position as the `>` prompt ( `>` ).

- If the Power-on button is initially detected in the On position, the system goes to the `WAIT_POWER_ON` state.
- If the Power-on button is pressed and changes from the Off position to the On position, the system goes to the `WAIT_POWER_ON` state.
- If the Power-on button is pressed and changes from the On position to the Off position, the system sets the `was_shutdown` status to false.
- If the Enter key is pressed on the BUMP console, the system goes to the `SBB_GATEWAY` state.

## SBB\_MENU

This is where the Stand-by (`sbb`) menu items are displayed. This menu is exited by entering “x” repeatedly until the menu is exited. When the menu is exited, the system goes to the `MAIN_STANDBY` state.

## WAIT\_POWER\_ON

This state displays the message `Wait power on....`

- If the `power_fault` status is true (a previously detected fault), the system goes to the `MAIN_STANDBY` state.
- If the `power_fault` status is false, the system attempts to power on. If the system then detects a power fault, the `power_fault` status will be set to true. The system displays

an operator panel LCD error message, and the system goes to the MAIN\_STANDBY status.

If no power fault is detected, the system goes to the IPL state.

**Note:** When the system is in this state, the Power-on button should not be pressed.

## IPL

- If the Power-on button is pressed and changes from the On position to the Off position, the system goes to the WAIT\_REBUILDING state.
- If the IPL is successfully completed, the system goes to the Maintenance Menu or to AIX.

## AIX

- If the Power-on button is pressed and changes from the On position to the Off position, the system goes to the WAIT\_REBUILDING state.
- If the `shutdown -F` command is run, the `was_shutdown` status is set to true and the system goes to the WAIT\_REBUILDING state.
- If the `shutdown -Fr` command is run, the `was_shutdown` status remains false, and the system goes to the WAIT\_REBUILDING state.

## WAIT\_REBUILDING

In this state, the SystemGuard displays the `WAIT_REBUILDING` message on the operator panel display.

The system monitors the conditions to which the variables are set and does one of the following:

- If the Power-on button is in the On position, and the `was_shutdown` status is false, the system goes to the WAIT\_POWER\_ON state.
- If the Power-on button is in the On position, and the `was_shutdown` status is true, or if the Power-on button is in the Off position, the system goes to the MAIN\_STANDBY state.

**Note:** When the system is in this state, the Power-on button should not be pressed.

## How to Turn System Power On from the BUMP Console

This procedure helps get the system power to turn on from the BUMP Console in the event that your system does not seem to be responding to normal power operations.

From the SystemGuard BUMP console:

1. Check the BUMP console display, then check the list below and go to the appropriate step.
  - If you see a `>` with the cursor two spaces to the right, go to step 2.
  - If you see a `≥`, press the Enter key on the bump console and go to step 2.
  - If you see any sbb type menu, type `x` and then press Enter repeatedly until you exit all menus, then go to the beginning of step 1.
  - If you see nothing on the BUMP console, press the Enter key, then go to the beginning of step 1.
2. Type `power`, then press Enter.

If the system power does not turn on, the Power-on button may be in the off position. Go to the system unit and press the Power-on button (only press the button once),

If the system power still does not turn on there may be an earlier fault condition. Remove main power from the system unit, wait 30 seconds, and restore main power.

The system should IPL if the Power-on button is in the On position. If the button is not in the On position, wait until *standby* is displayed on the LCD then press the Power-on button one more time

## How to Turn System Power On Using the Power-on Button

This procedure helps to get the system power to turn on using the Power-on button in the event that your system does not seem to be responding to normal power operations.

From the SystemGuard BUMP console:

1. Check the BUMP console display, then check the list below and go to the appropriate step.
  - If you see a > with the cursor two spaces to the right, press Enter on the BUMP console, go to the beginning of step 1.
  - If you see a ≥ , go to step 2.
  - If you see any sbb type menu, type x and then press Enter repeatedly until until you exit all menus, then go to step 1.
  - If you see nothing on the BUMP console, go to step 2.
2. Press the Power-on button to the On position (pushed in).

If the system power does not turn on, the Power-on button may have been in the on position already, wait five seconds and press the Power-on button again.

If the system power still does not turn on there may be an earlier fault condition. Remove main power from the system unit, wait 30 seconds, and restore main power.

The system should IPL if the Power-on button is in the On position. If the button is not in the On position, wait until *standby* is displayed on the LCD then press the Power-on button one more time.

---

## Glossary: Special Terms Used in SystemGuard

**BP (back plane).** A panel located in the system unit and used to interconnect boards and devices.

**BIST (built in self-test).** Tests performed during the standby phase of the IPL process. The BIST phase comes ahead of the POST phase.

**BUMP (bring-up microprocessor).** A microprocessor which monitors the system, especially during the various IPL phases before AIX is loaded.

**C1D card.** See CPU card.

**CPU card.** A card containing the central processor unit (CPU). **CPU $n$**  is used to designate the  $n$ th CPU card. For example, CPU2 designates the second CPU card.

**CPU (central processor unit).** A primary processor for general calculations.

**DIMM (dual in-line memory module).** See memory module.

**Electronic Mode Switch** (also known as **E\_KEY**). A flag which enables the Key Mode Switch to be changed without actually moving the physical key.

**EEPROM (electronically erasable programmable read-only memory).** A type of non-volatile memory used to store firmware maintenance programs (like SSF) or boot programs.

**FEPRM (flash electronically erasable programmable read-only memory).** A type of non-volatile memory used to store firmware maintenance programs (like SystemGuard) or IPL programs.

**E\_KEY.** See **Electronic Mode Switch**.

**ELM.** See I/O planar

**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.

**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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