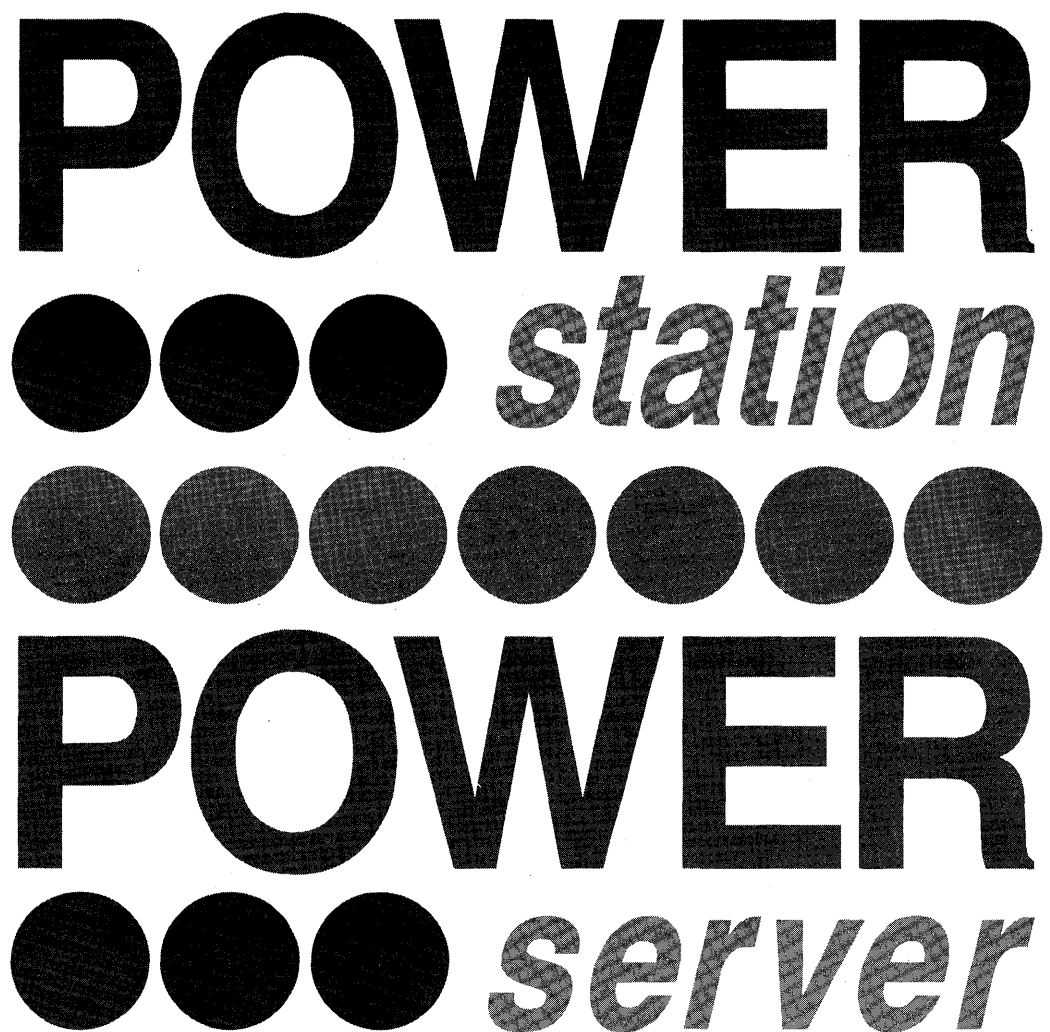


POWERstation and POWERserver

Diagnostic Programs: Operator Guide

Version 2.1



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Seventh Edition (April 1992)

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About this Book

Note: Information in this book is common to all system units. Any information or diagnostic procedure that is specific to a certain system unit or attached device is in the operator guide or service guide for that system unit or device.

This book contains the operating instructions for the hardware diagnostic programs. The diagnostic programs are included in Version 3 (or higher) of the Operating System. The diagnostic programs are also on diskettes that are shipped with the system unit. Always use the version of this operator guide that matches the first two digits of your diagnostic diskette version. For example, if your diskette version is 2.1 or 2.15, use Version 2.1 of this guide.

How to Use This Book

This book is used by the person needing to do hardware problem determination on a system unit.

Service representatives should start all calls in “MAP 0010: Start of Call” in the *Diagnostic Programs: Service Guide*.

Use Chapter 1 to learn about the diagnostic features of the system.

Use the “System Verification Procedure” in Chapter 5 to check out the system after a repair or any time you want to check for correct operation of the system.

Use Chapter 6 to analyze a hardware problem with the system unit. The “Hardware Problem Determination Procedure” in Chapter 6 produces a service request number (SRN) to report to the service organization.

Use Chapter 7 to understand how your system is connected to other systems in a multiple systems network. This chapter gives an overview of starting and stopping communications and running diagnostics.

Related Publications

The *POWERstation and POWERserver Diagnostic Programs: Service Guide*, Form Number SA23-2632, contains the diagnostic procedures that are common to all system units. These procedures are for the service representative.

The *POWERstation and POWERserver Common Service Information*, Form Number SA23-2678, contains specific service information about adapters, memory cards, devices, and cables for the system.

The *Problem Solving Guide*, Form Number SC23-2204, contains the problem analysis procedures used to determine if a problem needs operator action, software problem analysis, or hardware problem analysis. This is the first book the customer should use for problem solving.

The *Planning for Your System Installation*, Form Number GC23-2407, is a planning and site preparation guide.

The operating system *Version 3.2 for RISC System/6000 Installation Guide*, Form Number SC23-2341, contains the instructions for installing the operating system.

An operator guide is shipped with each system unit or attached device. These operator guides provide information about the controls and use of that device.

A service guide is shipped with each system unit or attached device. These service guides provide reference information, maintenance analysis procedures, removal and replacement procedures, and parts information. These guides are used by the service representative.

The *5080 Graphics System Installation, Operation, and Problem Determination* manual, Form Number GA23-2063, contains the information needed to attach a system unit to a 5085, 5086, or 5088. The systems are installed and checked out separately, then attached together and checked for proper operation.

The *Block Multiplexer Channel User's Guide and Programming Reference*, Form Number SC23-2427, contains the operating instructions, the configuration information, the programming considerations, and the diagnostic considerations for the system unit that is directly attached to a system-370/390-type block multiplexer channel.

The operating system *Version 3.2 Fiber Distributed Data Interface User's Guide and Programming Reference*, Form Number SC23-2426, contains the programming considerations and error log information for the system unit connected to a FDDI network.

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Chapter 1. Introduction to Diagnostics

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General Information about the Diagnostics

Information in this book is common to all system units. Any service information or diagnostic procedure that is specific to a certain system unit or device is in the operator guide or service guide for that system unit or device.

Operating System Message Files

The operating system message files must be installed on the system for proper operation of the diagnostic programs from the disk. If these files are not installed, the diagnostic programs will display in English only. To install the Message Files, use the **installp** command.

Base System Locale Program

The base system locale Program must be installed on systems running the diagnostic programs from the disk. If this program is not installed, `Catalog Error` messages will display when the diagnostic programs run. To install the base system locale program, use the **installp** command.

Microcode

There are two types of hardware microcode used in system units. The first type is the microcode stored on disk and used by the built-in disk drive controller. The second type is the microcode used by an adapter.

The first type of microcode is written on the disk before the original or replacement disk drive is shipped. This type microcode only needs updating when there is an applicable Engineering Change (EC) or Miscellaneous Equipment Specification (MES). Use the Microcode Download service aid in Chapter 4 to load this type microcode from diskettes to disk.

The second type of microcode is stored on the disk by the operating system during installation of the operating system. This type microcode loads to the adapter during the system IPL and must be installed before the diagnostics can be run from disk.

If you are using Version 3 (or higher) of the Operating System, the **installp** and **adftutil** commands are used to load any microcode not shipped on the disk with the operating system. All of the microcode stored on the disk for use with Version 3 (or higher) of the Operating System is in either the **/etc/microcode** or the **/usr/lib/microcode** directory.

If you are using another operating system, refer to the documentation for that operating system to install microcode.

The diagnostic diskettes contain all of the required microcode for diagnostic purposes.

Microcode for the X.25 Interface Co-Processor is shipped on an option diskette.

CEREADME File

There is a **CEREADME** (CE read me) file both on the diagnostic diskettes and in the diagnostic programs that are part of Version 3 (or higher) of the Operating System. This file contains diagnostic and system unit errata not covered in the publications.

The **CEREADME** file can be displayed by using the Service Hints service aid after the diagnostics are loaded. Also, the file can be read directly from the disk using the Version 3 **pg** command to display **/usr/lpp/diagnostics/CEREADME**. The **CEREADME** file can be copied or printed using the normal commands. For information about using the Service Hints service aid, see Chapter 4.

Printing the CEREADME File from Disk

The **CEREADME** file that is on disk may be printed using the **cat** command. The path to this file is as follows:

```
/usr/lpp/diagnostics/CEREADME.
```

A copy of this file should be printed and put into the Service Information Binder.

lp0 is normally the printer attached to the parallel port. If a printer is attached to the parallel port and is considered as **lp0**, the command for printing the file is as follows:

```
cat /usr/lpp/diagnostics/CEREADME > /dev/lp0.
```

Printing the CEREADME File from Diskette

The **CEREADME** file on diskette cannot be printed when running diagnostics from diskette. The file can be printed on a system when the operating system is running in a normal user environment. The procedure involves copying the file from diskette to a temporary file on disk, printing the file and then deleting the file from disk. Check for directory **/tmp/diag**. To determine if this directory already exists, enter:

```
cd /tmp/diag.
```

If the directory does not exist, the message **/tmp/diag: not found** will display; then use the following commands (On Diagnostics Diskette Version 2.1, the **CEREADME** file is on Diagnostics 8. Insert Diagnostics 8 into the diskette drive before entering the following commands):

```
mkdir /tmp/diag
cd /tmp/diag
cpio -iudC36    usr/lpp/diagnostics/CEREADME.Z < /dev/fd0
uncompress /tmp/diag/etc/lpp/diagnostics/CEREADME
cat /tmp/diag/usr/lpp/diagnostics/CEREADME > /dev/lp0
cd
rm -rf /tmp/diag.
```

The preceding commands will print the file on **lp0**, which is the printer normally attached to the parallel port. If this file is not the same as the **CEREADME** file on disk, a copy of this file should be printed and put into the Service Information Binder.

System Unit Error Isolation Features

All system units have the following features to detect and correct errors:

- Parity checking on the processor bus
- Parity checking on the microchannel bus
- Error checking and correction (ECC) on the memory
- Bit steering on memory
- ECC on all of the media devices
- Parity checking on the SCSI bus
- Parity checking on the internal buses of most of the adapters
- Processor complex internal error detection on the buses and cache memory.

The ECC function on the memory and media is able to detect and correct single-bit errors; it can detect multiple bit errors but does not correct them.

The bit steering feature on the memory allows use of an extra bit position in the memory word to replace a failing bit position. The memory is checked after initial power-on, and any failing bit positions are assigned to the alternate bit.

The processor complex is checked during Built-In Self-Test (BIST) after initial power-on and is constantly monitored for error detection during normal system operation. When possible, the following types of errors are detected and logged in the error log:

- **Check stops** are detected by the processor. When a check stop occurs, the system unit is reset, and an initial program load (IPL) is begun. If another check stop occurs during this IPL, the system stops and displays 113.
- **Machine checks** are caused by uncorrectable memory errors or by certain privileged software sequences. The system stops and displays a flashing 888.
- **Data storage interrupts** are caused by uncorrectable memory errors during a load or store operations to an I/O device. The system stops and displays a flashing 888.
- **External checks** are caused by memory addressing errors that occurred during direct memory access (DMA) operations. The system stops and displays a flashing 888.
- **Instruction storage interrupt checks** are caused by memory addressing errors that occurred during instruction fetch operations. The system may stop and display a flashing 888.
- **Program interrupt checks** can be caused by floating-point operation errors, invalid program operations, invalid privileged operations, or software error traps. The system may stop and display a flashing 888.
- **Floating-point unavailable interrupt checks** are caused by attempted floating-point operations while the floating-point processor is not available. The system may stop and display a flashing 888.
- **Alignment interrupt checks** are caused by instructions on the wrong memory boundary.

Operator Panel Features

The following operator panel features are used during hardware problem determination.

Power-On Light

The power-on light located on system unit and CPU drawer operator panels is used to help analyze power problems. When the power-on light is on, it indicates that all voltages in the power supply are present and within limits and that the fans are running. If a fan that is sensed by the power supply does not start to turn or stops turning, the power supply turns the system unit off.

Key Mode Switch

The key mode switch has three positions:

- The Secure position prevents the system from performing an initial program load (IPL). This position does not lock the keyboard or block system network communication. When the key mode switch is in the Secure position, the Reset button is disabled to prevent resetting the system unit. If an IPL is attempted with the key mode switch in the Secure position, the number 200 is displayed in the three-digit display.
- In the Normal position, the operating system loads from a disk after the Power-On Self-Test (POST) and configuration programs run.
- In the Service position, the diagnostic controller program loads. On the CPU drawer, the key mode switch must be in the Service position to turn off the system unit. The load program searches for the diagnostic programs on the load devices in the following order:
 1. From any diskette drive
 2. From a non-disk SCSI load device
 3. From the disk drives
 4. From the server (using the network).

The load program then repeats the search of the above load devices looking for the diagnostic programs.

- The key mode switch is also used to indicate to the diagnostic program that there is no console available. The 3-digit display is used to communicate the error.

Reset Button

The Reset button located on the system unit operator panel has several purposes:

- Reset the system unit and cause an IPL of the following:
 - Operating system when the mode switch is in the Normal position
 - Diagnostic controller program when the mode switch is in the Service position.
- Read out a crash message or a diagnostic message after a flashing 888 is displayed.
- Start the dump program when a dump is needed.

Three-Digit Display

The three-digit display performs the following functions:

- Tracks and controls the progress of the BIST, POST, and configuration programs
- Displays a crash message when the system control program comes to an abnormal end
- Displays a diagnostic program message when there is no console display present.

When a flashing 888 is displayed in the three-digit display, a crash message or a diagnostic message is waiting to be read. Refer to “Reading Flashing 888 Numbers” in Chapter 3 for the reading procedure.

Automatic Diagnostic Tests

All of the automatic diagnostic tests run after the system unit is turned on and before the operating system is loaded. The automatic diagnostic tests also run when the system is reset after a check stop.

The automatic diagnostic tests display numbers in the three-digit display to track test progress. If a test stops, the number for that test remains displayed to identify the unsuccessful test.

Built-In Self-Test

The built-in self-test (BIST) programs run first after the system unit is turned on. These programs test the 32-bit processor and memory addressing, displaying numbers between 100 and 199 in the three-digit display. Refer to Appendix C for a list of tests associated with displayed numbers .

Power-On Self-Test

The Power-On Self-Test (POST) programs load from Read-Only Memory (ROM) and check the devices needed to accomplish an initial program load. The POST also checks the memory, common interrupt handler, and the direct memory access (DMA) handler.

The POST programs display numbers between 200 and 299 in the three-digit display. The POST programs are not the same for all system units so, depending on which system unit you are using, you may see a different sequence of numbers displayed. Refer to Appendix C for a list of tests associated with displayed numbers .

Configuration Program

When the POST programs complete, the configuration program determines what features, adapters, and devices are present on the system. The configuration program also builds a configuration list that is used by the diagnostic programs to control which tests are run during system checkout.

The configuration program displays numbers between 500 and 550 and between 700 and 999 in the three-digit display.

Devices attached to serial and parallel ports are not configured. The Dials and Lighted Program Function Keys (LPFKs) can be tested from disk after they are manually configured. No other device attached to the serial and parallel ports are supported by the diagnostics.

Features of the Diagnostic Programs

The following topics provide an overview of the diagnostic programs.

Where the Diagnostic Programs are Located

The diagnostic programs are shipped as part of Version 3 (or higher) of the Operating System. The diagnostic controller loads and runs under control of the operating system like an application program. The diagnostic controller calls and controls the test units.

The diagnostic programs are also shipped with the system unit on diskettes. They contain a special reduced-function edition of Version 3 (or higher) of the Operating System and only run in standalone mode.

Some system units have built-in user diagnostic programs. These programs are stored in read-only memory (ROM) and can be used when the system is not equipped with a diskette drive, and the diagnostics that are part of the operating system are not available. They also contain network configuration procedures to prepare the system unit for communications on a network.

Modes for Running the Diagnostic Programs

The diagnostic programs run in the following modes:

Standalone Mode

To run the diagnostics in standalone mode, the diagnostic controller must be loaded during an initial program load (IPL) with the key mode switch set to the Service position. An IPL of the diagnostic controller is performed by setting the system power switch to On or pressing the Reset button while the key mode switch is set to the Service position. Refer to "Running the Diagnostics in Standalone Mode" and "Diagnostic Modes of Operation" in Chapter 3 for additional information and instructions.

When the diagnostic programs are operating in standalone mode, no other programs can be loaded since all system resources are available for testing.

Maintenance Mode

To run the diagnostic programs in maintenance mode, Version 3 (or higher) of the Operating System must be loaded and running. The IPL must be performed with the key mode switch in the Normal position.

When the diagnostic programs are run in maintenance mode, normal operation of the operating system is stopped using the **shutdown -m** command. Refer to "Running the Diagnostics in Maintenance Mode" and "Diagnostic Modes of Operation" in Chapter 3 for additional information and instructions.

Maintenance mode allows testing of all system resources except the SCSI adapters and the disk drives needed to do paging for the operating system.

Concurrent Mode

To run the diagnostic programs in concurrent mode, Version 3 (or higher) of the Operating System must be loaded and running. The IPL must be performed with the key mode switch in the Normal position.

When the diagnostic programs are run in concurrent mode, the normal operation of the system continues under control of Version 3 (or higher) of the Operating System. Refer to

“Running the Diagnostics in Concurrent Mode” and “Diagnostic Modes of Operation” in Chapter 3 for additional information and instructions.

The only resources that can be tested using concurrent mode are:

- Those that can be shared with other programs
- Those that are not assigned to any other program.

Diagnostic Controller

The diagnostic controller runs as an application program on Version 3 (or higher) of the Operating System. The diagnostic controller performs the following functions:

- Displays diagnostic menus
- Checks availability of needed resources
- Checks error log entries under certain conditions
- Loads diagnostic application programs
- Loads service aid programs
- Displays test results.

When the diagnostic controller is loaded in standalone mode, it tests the keyboard adapter and keyboard, the built-in S1 serial port, and the display adapter (if present) before displaying any information. If a problem is detected during the testing of these functions, the diagnostic controller displays a diagnostic message in the three-digit display.

The preceding functions are not tested when the diagnostic controller is loaded during maintenance mode or concurrent mode.

Diagnostic Applications Programs

To test an adapter or device, select the device or adapter from the Diagnostic Selection menu. The diagnostic controller then loads the diagnostic application program for the selected device or adapter.

The diagnostic application program loads and runs test units to check the functions of the device or adapter.

The diagnostic controller checks the results of the tests done by the diagnostic application and determines the action needed to continue the testing.

The amount of testing the diagnostic application does depends on the mode (standalone, maintenance, or concurrent) under which the diagnostic programs are running.

Error Log Analysis during Diagnostics

When you select **Diagnostics** or **Advanced Diagnostics** from the **Function Selection** menu, the **Diagnostic Selection** menu is displayed (other menus may be displayed before this menu). This menu allows you to select the purpose for running the diagnostics.

When you select the **Problem Determination** option, the diagnostic programs read and analyze the contents of the error log.

If the error log contains recent errors (approximately the last 48 hours), the diagnostic programs automatically select the diagnostic application program to test the logged function.

If there are no recent errors logged or the diagnostic application program runs without detecting an error, the **Diagnostic Selection** menu is displayed. This menu allows you to select a resource for testing.

If an error is detected while the diagnostic application program is running, the **A PROBLEM WAS DETECTED** screen displays a Service Request Number (SRN).

Enhanced FRU Isolation during Diagnostics

The diagnostics provide enhanced Field Replaceable Unit (FRU) isolation by automatically selecting associated resources. The normal way diagnostics select a resource is to present a list of system resources and then ask you to select one. Diagnostics begin with that same type of selection.

If the diagnostic application for the selected resource detects a problem with that resource, the diagnostic controller checks for an associated resource. For example, if the test of a disk drive detects a problem, the diagnostic controller will test another disk drive on the same controller to determine if the drive or the controller is failing. This extra FRU isolation is apparent when you test a resource and notice that the diagnostic controller continues to test another resource that you did not select.

Advanced Diagnostics Function

The advanced diagnostics function is normally used by a service representative. These diagnostics may ask you to disconnect a cable and install a wrap plug.

The advanced diagnostics run in the same modes as the diagnostics used for normal hardware problem determination. The advanced diagnostics provide additional testing by allowing the service representative to do the following:

- Use wrap plugs for testing
- Loop on a test (not available in concurrent mode) and display the results of the testing.

Service Aids Function

The service aids function is selected from the Function Selection menu. The service aids provide a means to display data, check media, and check functions without being directed by the hardware problem determination procedure. Refer to Chapter 4 for information and procedures about service aids.

System Checkout

The system checkout option can only be run in standalone mode. This program uses the configuration list generated by the configuration procedure to determine which devices and features to test. These tests run without operator interaction. Refer to Chapter 6 for normal problem determination and to Chapter 5 for system checkout when problem determination is not needed.

Service Request Number

The service request number (SRN) is the method used to communicate information about a hardware problem to the service organization.

The SRN is generated by the diagnostic programs, given in the "Hardware Problem Determination Procedure" in Chapter 6, or given in the procedures in the *Problem Solving Guide*. The SRN is reported to the service organization to allow the service representative to bring the correct field replaceable units (FRUs) when he or she comes to repair the system.

See the table in Chapter 2 of the *Diagnostic Programs: Service Guide* for a list of the SRNs and their descriptions.

System Exerciser

The System Exerciser tests and exercises devices in an overlap mode and can only be run from disk in standalone mode. The Exerciser can be used to check out the system following repairs and to identify intermittent problems. Devices that use media (tape drives, CD ROM, and diskette drives) can be tested with or without the media installed in the device.

Diagnostic Features of Version 3 (or Higher) of the Operating System

Version 3 (or higher) of the Operating System contains several diagnostic features. The following topics provide an overview of features contained in the operating system. See the *Problem Solving Guide* for descriptions and uses of each feature.

The Error Log

The error log is part of Version 3 (or higher) of the Operating System. The error log provides a means of logging important data about any abnormal condition the operating system finds. The data in the error log is analyzed by the diagnostic programs and it can be used by the service representative to analyze the cause of a problem that does not fail every time the function is used.

The Trace Log

The trace log is used to track system events while a program is running. Tracing the conditions, actions, and path a program used can help the service representative to isolate the problem.

The Dump Program

The dump program provides a means to copy selected contents of memory to a dump device when a software failure occurs.

The Diagnostic Programs

The diagnostic programs are shipped as part of Version 3 (or higher) of the Operating System. They are also shipped on diskettes with the system unit.

Diagnostic Documentation

The following books are used to isolate a problem in the system.

Problem Solving Guide

The *Problem Solving Guide* is the first book used by the customer personnel when a problem occurs during normal operation of the system. This book is used to isolate problems with the operating system, the application program, improper operator procedures, and hardware failures.

If the problem is a hardware failure, the *Problem Solving Guide* sends the user to the "Hardware Problem Determination Procedure" in Chapter 6 of this book.

The *Problem Solving Guide* is common to all system units.

Diagnostic Programs: Operator Guide (this book)

The *Diagnostic Programs: Operator Guide* contains the procedures used to verify correct operation of the system and do hardware problem determination when a hardware problem is encountered. The “System Verification Procedure” is in Chapter 5 and the “Hardware Problem Determination Procedure” is in Chapter 6.

Note: The first two digits of the version number printed on the book cover should match the first two digits of the diagnostic diskette version number.

The *Diagnostic Programs: Operator Guide* is common to all system units.

Service Request Number Cross-Reference

The *Service Request Number Cross-Reference* is a pocket quick-reference booklet for the service representative. This booklet contains an SRN to failing function code cross-reference list, a failing function code to FRU cross-reference list, and a list of the three-digit display numbers.

Note: The first two digits of the version number printed on the book cover should match the first two digits of the diagnostic diskette version number.

Diagnostic Programs: Service Guide

The *Diagnostic Programs: Service Guide* is used by the service representative to isolate the failure of a field replaceable unit (FRU). This book contains all of the common MAPs.

Note: The first two digits of the version number printed on the book cover should match the first two digits of the diagnostic diskette version number.

The *Diagnostic Programs: Service Guide* is common to all system units.

Common Service Information

The *Common Service Information* book contains specific service information about adapters, devices, and cables that can be added to the system unit. Included is a “Memory Cards and SIMMs Cross Reference List”.

Note: The first two digits of the version number printed on the book cover should match the first two digits of the diagnostic diskette version number.

The System Unit or Device Installation and Service Guide

The installation and service guide for the system units or devices contain the installation instructions and the service procedures that are specific to that device or system unit. The service guide contains the following:

- Reference information such as data flow, cable diagrams, and specifications
- System unit or device specific Maintenance Analysis Procedures (MAPs) such as the power MAP
- Removal and replacement procedures
- The system unit or device installation procedures
- Parts diagrams and parts lists.

Product Topology

Note: Product topology is not supported on systems that do not have a diskette drive.

The purpose of product topology is to track the quality of individual parts as well as the system as a whole. This will help improve quality in Miscellaneous Engineering Specification (MES) and Engineering Change (EC) activity and help ensure that ordered alterations fit the system.

The plant-of-control maintains a product topology data base of all the parts in the tracking selection that were included in the initial system unit. If an EC becomes necessary, the database provides the information to be sure the correct system units get the change.

Two types of product topology diskettes are shipped with the system. The product topology information is also recorded on the disk if the system unit has the Version 3 (or higher) of the Operating System preloaded at the plant-of-manufacture. The two types of diskettes shipped are as follows:

- Product Topology System Diskette
- Product Topology Update Diskette (there may be several of these).

The product topology system diskette is written at the plant-of-manufacture. This diskette will be updated during the installation process. This diskette remains with the system to become a record of the system level.

A product topology update diskette is written at system installation, MES installation, EC installation, and at each service call. The machine configuration and error log are written to the update diskette. The product topology update diskette is mailed to the plant-of-control to update the data base after any of the activities. A blank, formatted 2MB diskette can be used in place of the update diskette.

A product topology update diskette is shipped with MES and EC parts.

At each service call, one of the product topology update diskettes with the system is updated and returned to the plant-of-control. At the completion of each service call the service representative runs the Product Topology service aid.

For detailed Product Topology information, refer to Chapter 4. Service Aids.

Chapter 2. Vital Product Data and Location Codes

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Vital Product Data

After the power-on self-tests (POST) complete and the configuration program runs, the program builds a configuration list. The data in the configuration list is read from the vital product data (VPD) for each device, adapter, or planar.

Some of the devices, adapters, and planars have part of their VPD in machine-readable codes built into the component. The other data is recorded by the plant of manufacture. If the disk drive containing the VPD records is exchanged, you should use the Machine Level Record service aid to restore the vital product data.

The VPD is updated then copied to the Machine Level Record Master diskette and Machine Level Record Duplicate diskette when the Machine Level Record service aid is run. The service aid is run any time a component that has special tracking is exchanged or any time an MES is installed to change the configuration of the system unit. See Chapter 4 for information about the service aids.

The following table lists the data recorded for each device or component and how that data is entered into the configuration record. All data that can be read by the system is updated when a device or adapter is exchanged. Other data should be updated manually to be sure the VPD record is accurate.

Note: In some situations, the following descriptions can vary with a product.

Unit Name	Name of Data Field	How Data is Recorded
System unit	Location code and description	Determined by software
	Type and model	Manually entered
	Serial number	Manually entered
	Manufacturer and location	Manually entered
	System unit name	Manually entered
Drawers for the rack type system unit	User data	Manually entered
	Location code and description	Determined by software
	Drawer unit number	Manually entered
	Serial number	Manually entered
	Drawer level (EIA location)	Manually entered
I/O planar	Manufacturer and location	Manually entered
	User data	Manually entered
	Location code and description	Determined by software
	Engineering change level	Machine readable
	User data	Manually entered

Unit Name	Name of Data Field	How Data is Recorded
System planar	Location code and description Part number Engineering change level Processor ID number IPL ROS data OCS ROS data SEEDS ROS data Processor module data Z0 (FPA data) Z1 (FX data) Z2 (IC data) Z3 (SC data) Z4 (C1 data) Z5 (C2 data) Z6 (DC1 data) Z7 (DC2 data) Z8 (DC3 data) Z9 (DC4 data) User data	Determined by software Machine readable Machine readable Machine readable Machine readable Machine readable Machine readable Machine readable Machine readable Machine readable Machine readable Machine readable Machine readable Machine readable Machine readable Machine readable Machine readable Manually entered
Memory card	Location code and description Engineering change level Z0 (Left buffer module EC level) Z1 (Right buffer module EC level) Z2 (Memory control module EC level) User data	Determined by software Machine readable Machine readable Machine readable Machine readable Manually entered
Adapter cards and standard I/O planar	Location code and description Part number Engineering change level FRU part number Serial number Manufacturer and location Device driver level (optional) Diagnostic EC level (optional) ROS level and ID (optional) Loadable microcode level (optional) Network address (optional) ROS code on adapter ptr Read/Write register ptr Loadable microcode ptr (optional) User data	Determined by software Machine readable Machine readable Machine readable Machine readable Machine readable Machine readable Machine readable Machine readable Machine readable Machine readable Machine readable Machine readable Machine readable Machine readable Manually entered

Unit Name	Name of Data Field	How Data is Recorded
SCSI device	Location code and description	Determined by software
	Machine type and model	Machine readable (if possible)
	Serial number	Machine readable (if possible)
	Manufacturer and location	Machine readable (if possible)
	Assembly part number	Machine readable (if possible)
	Card assembly part number	Machine readable (if possible)
	Assembly EC level	Machine readable (if possible)
	User data	Manually entered
Other devices	Location code and Description	Determined by software
	Part number	Manually entered
	Engineering change level	Manually entered
	Serial number	Manually entered
	Manufacturer and location	Manually entered
User data	Manually entered	

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 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.

The rack-type system unit has several labels on the drawers and devices. These help the operator and service person identify various drawers and devices. The drawer ID should match the slot location of the adapter that drives it. The SCSI devices may be labeled with a number that identifies the SCSI address the device is set to. See Appendix A of the *Installation and Service Guide* to determine the physical location of a device.

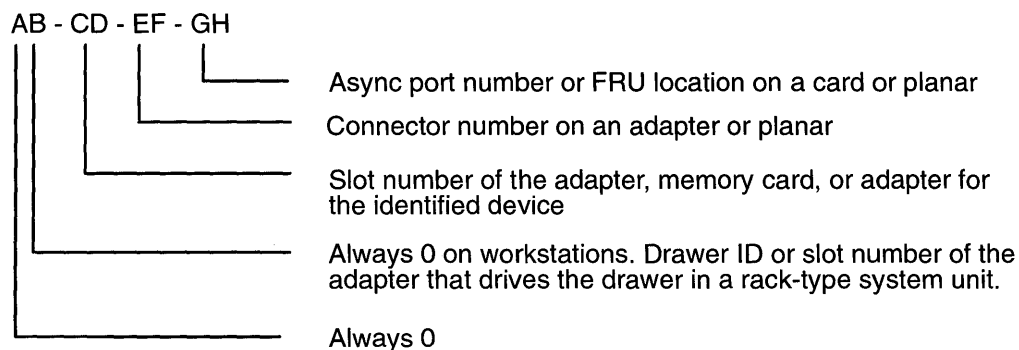
Location Code Format for 9333 and 9334

The location code formats for the 9333 and 9334 are described in the publications for the 9333 and 9334.

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.

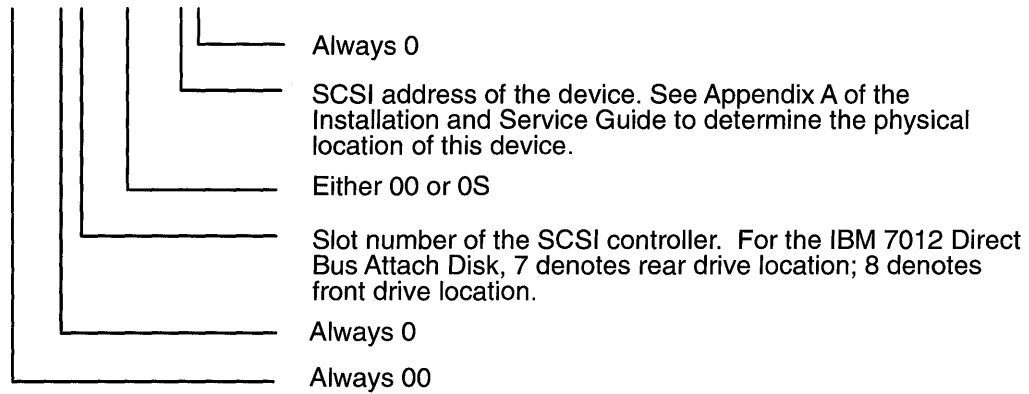


Location Code Format for SCSI Devices

Use Appendix A of the *Installation and Service Guide* to determine the physical location of a device.

The following example is for SCSI devices. These include disk drives, tape drives, and CD-ROM drives.

AB - CD - EF - GH



Location Code Table

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

Note: The location code format for 9333 devices is described in the 9333 documentation.

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

AB-CD-EF-GH

Pair	Value	Description
AB	00	Workstation-type system unit
	00	CPU drawer in a rack-type system unit
	00	SCSI device drawer in a rack-type system unit
	00	SCSI disk drawer in a rack-type system unit
	01	Async expansion adapter in slot 1 of CPU drawer
	02	Async expansion adapter in slot 2 of CPU drawer
	03	Async expansion adapter in slot 3 of CPU drawer
	04	Async expansion adapter in slot 4 of CPU drawer
	05	Async expansion adapter in slot 5 of CPU drawer
	06	Async expansion adapter in slot 6 of CPU drawer
07	Async expansion adapter in slot 7 of CPU drawer	
	08	This is not an invalid number. Slot 8 contains a standard SCSI adapter.
CD	00	CPU planar
	00	Standard I/O planar
	00	A device attached to the standard I/O planar
	01	Adapter in slot 1 of the I/O planar
	02	Adapter in slot 2 of the I/O planar
	03	Adapter in slot 3 of the I/O planar
	04	Adapter in slot 4 of the I/O planar
	05	Adapter in slot 5 of the I/O planar
	06	Adapter in slot 6 of the I/O planar
	07	Adapter in slot 7 of the I/O planar
	08	Adapter in slot 8 of the I/O planar
	07	Rear Direct-Bus-Attach Disk Drive (7012)
	08	Front Direct-Bus-Attach Disk Drive (7012)
	10	Second I/O planar
	11	Adapter in Slot 1 of the second I/O planar
	12	Adapter in Slot 2 of the second I/O planar
	13	Adapter in Slot 3 of the second I/O planar
	14	Adapter in Slot 4 of the second I/O planar
	15	Adapter in Slot 5 of the second I/O planar
	16	Adapter in Slot 6 of the second I/O planar
17	Adapter in Slot 7 of the second I/O planar	
18	Adapter in Slot 8 of the second I/O planar	
0J	Graphics adapter slot	
0A	Memory SIMM/card in slot A on the system/CPU planar	
0B	Memory SIMM/card in slot B on the system/CPU planar	
0C	Memory SIMM/card in slot C on the system/CPU planar	
0D	Memory SIMM/card in slot D on the system/CPU planar	
0E	Memory SIMM/card in slot E on the system/CPU planar	
0F	Memory SIMM/card in slot F on the system/CPU planar	
0G	Memory SIMM/card in slot G on the system/CPU planar	
0H	Memory SIMM/card in slot H on the system/CPU planar	

Pair	Value	Description
CD	AA	Serial Optic Converter in slot AA of system/CPU planar
	AB	Serial Optic Converter in slot AB of system/CPU planar
EF	00	Does not have a connector or software was not able to identify the connector number
	01 02 03 04	The number of the connector on an adapter card, distribution box, or planar. If needed, see Chapter 6 in the <i>Diagnostic Programs: Service Guide</i> for the connector numbering on your adapter.
	0D	Internal diskette connector on the standard I/O planar
	0E	Built-in Ethernet adapter
	0K	Keyboard connector on the standard I/O planar
	0M	Mouse connector on the standard I/O planar
	0P	Parallel printer connector on the standard I/O planar
	0S	Built-in SCSI adapter
	0T	Tablet connector on the standard I/O planar
	S1 S2	Serial port 1 connector on the standard I/O planar Serial port 2 connector on the standard I/O planar
1A 1B 2A 2B	Port A of the Serial Optic Converter in slot AA of the CPU planar. Port B of the Serial Optic Converter in slot AA of the CPU planar. Port A of the Serial Optic Converter in slot AB of the CPU planar. Port B of the Serial Optic Converter in slot AB of the CPU planar.	
GH	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 02	Diskette drive 1 attached to the standard I/O planar Diskette drive 2 attached to the standard I/O planar
	01 02 03 04 05 06 07 08	Memory SIMM in location 1 on the memory card Memory SIMM in location 2 on the memory card Memory SIMM in location 3 on the memory card Memory SIMM in location 4 on the memory card Memory SIMM in location 5 on the memory card Memory SIMM in location 6 on the memory card Memory SIMM in location 7 on the memory card Memory SIMM in location 8 on the memory card

Pair	Value	Description
GH		Note: See Appendix of the <i>Installation and Service Guide</i> to determine physical location.
	00	SCSI device set to address 0
	10	SCSI device set to address 1
	20	SCSI device set to address 2
	30	SCSI device set to address 3
	40	SCSI device set to address 4
	50	SCSI device set to address 5
	60	SCSI device set to address 6
	0A	Video RAM in slot A of the graphics adapter
	0B	Video RAM in slot B of the graphics adapter
	0C	Video RAM in slot C of the graphics adapter
	0D	Video RAM in slot D of the graphics adapter
	0E	Video RAM in slot E of the graphics adapter
	0F	Video RAM in slot F of the graphics adapter
	0G	Video RAM in slot G of the graphics adapter
	0H	Video RAM in slot H of the graphics adapter
	0J	Video RAM in slot J of the graphics adapter
0K	Video RAM in slot K of the graphics adapter	

Chapter 3. Using the Diagnostics

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Sources for the Diagnostic Programs

The diagnostic programs are shipped on two sources. The first source is as part of Version 3 (or later) of the Operating System. The diagnostic programs, included as part of Version 3 (or later) of the Operating System, are installed along with the operating system. These diagnostic programs are also updated with the operating system.

The second source is on diskettes shipped with the system unit. The diagnostic diskettes shipped with the system unit contain diagnostic programs that can be run in *standalone mode* only. These diagnostic programs contain a special version of Version 3 (or later) of the Operating System. The special version of the operating system only supports the diagnostic programs and cannot be used for normal system activity.

The diagnostic diskettes are the only diagnostic programs available to a system that does not have Version 3 (or later) of the Operating System installed and the system does not have built-in ROM diagnostics.

Diagnostic Programs Operating Considerations

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

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 Chapter 7 before running any diagnostic procedures.

Selecting a Console Display

When you run diagnostics from diskettes and under some conditions when you run them from disk, you need to select the console display. The diagnostic programs display `c31` in the three-digit display and display instructions on any direct-attached displays and 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 three-digit display for instructions.

Identifying the Terminal Type to the Operating System

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

When you run diagnostics, the 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 you select a terminal. Use the `INITIALIZE TERMINAL` option menu to select the terminal type. Select `hft` for adapter-attached displays. This option sets the `TERM` environment variable in the operating system.

Running the Diagnostic Programs from Diskettes

Consider the following when you run the diagnostic programs from diskettes:

- The diagnostic diskettes are labeled as to the devices and functions the diskettes contain. The following diskettes must be inserted in the order shown before the `DIAGNOSTIC OPERATING INSTRUCTIONS` will be displayed.

1. Boot diskette
2. Configuration diskette
3. Graphics diskette (optional if the system does not contain a graphics adapter)
4. Console Definition diskette.

- There are two different Boot diskettes, one for use in systems containing only 8MB of memory and one for use in systems containing a minimum of 16MB of memory. Only one diskette can be loaded.

- There are several different graphics diskettes for configuring and testing graphics adapters. Use only the graphics diskettes for the type of graphics adapters installed in the system. For each type of graphics adapter installed in a system, you must load the graphics diskette which supports that adapter in order to test it.

The diskette containing the graphics adapter that will be used as the console for running diagnostics should be loaded first. If there are other graphics adapter types installed in the system, load the diskette supporting those adapters immediately following the first graphics diskette.

- If a device installed in a system is not supported by one of the diskettes shipped with the system, check for the existence of a supplemental diagnostic diskette shipped with the device.
- After the `DIAGNOSTIC OPERATING INSTRUCTIONS` are displayed, follow the displayed instructions in order to test the device or to run a Service Aid.
- The diagnostic programs shipped on diskettes with the system unit have a version number on the label. The *Diagnostic Programs: Operator Guide* and *Diagnostic Programs: Service Guide* also have a version number on the cover. The first two digits of these version numbers should match in order for diagnostics to work correctly. You can check the version of the diagnostic programs on the `Diagnostic Operating Instructions`.
- When you load the diagnostic programs from diskettes, you may get the following messages on the three-digit display or on the console display:

- c01 Insert the first diagnostic diskette
- c02 Diskettes inserted out of sequence
- c03 The wrong diskette is in the diskette drive
- c05 A diskette error occurred
- c07 Insert the next diagnostic diskette
- c09 Diskette is being read or written
- c31 Select the console display.

Running the Diskette Diagnostics From a Non-RS232 Terminal

Version 1.3 and later versions of the Diagnostic Diskette package allows a terminal attached to any RS232 or RS-422 adapter to be selected as a console device. The default device is an RS232 tty attached to the first standard serial port (S1). However, the console device may be changed by editing the `/etc/consdef` file that is provided on Diagnostic Diskette 4. The file format follows:

```
#
# This is the console definition file used to describe the terminal
# device to be used as the console. It is in the form
# attribute=value, one per line. The location is the location code
# seen when listing devices using lsdev. Spaces must not be entered
# around the = sign.
#
# Remove the # signs from the first column of each line to take
# effect. The location must be specified for any attribute in
# this file to be processed.
#
# For example, to define the console device as an rs232 terminal on
# port S1:
#
#connection=rs232
#location=00-00-S1
#speed=9600
#bpc=8
#stops=1
#xon=yes
#parity=non#term=3163
```

To change this file, take the following steps:

1. Enter:

```
cd /tmp
mkdir diag4
cd diag4
```

2. Insert Diagnostics Diskette 4 into the diskette drive.

3. Enter the following:

```
cpio -iuvmdC36 </dev/rfd0
cd etc
```

4. To edit the file, do the following:

- a. Enter `uncompress consdef`
- b. Edit the `consdef` file to work with your configuration
- c. Enter `compress consdef`.

5. Enter the following:

```
cd /tmp/diag4
find . -type f -print | cpio -ouvmC36 > /dev/rfd0
```

6. Use the new Diagnostics Diskette 4 with the new configuration.

Running the Diagnostic Programs from Disk

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

- The diagnostics cannot be loaded and run from a disk until Version 3 (or later) of the Operating System has been installed and configured. After the **installp** command is used to install and configure the operating system, all three modes of operation are available.
- When the diagnostics were loaded from disk, you must shutdown the operating system before powering the system unit off to prevent possible damage to disk data. 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 shutdown the 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 three-digit display, with instructions displayed on attached displays and 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 with a 5080 Attached

Consider the following when you run the diagnostic programs on a system attached to a 5080 system:

- When the system unit is attached to a 5085 or 5086 system, the `DIAGNOSTIC OPERATING INSTRUCTIONS` *do not* display on the display attached to the 5085 or 5086. See the *5080 Graphics System Installation, Operation, and Problem Determination* manual for information about operating the combination system.
- At power-on, the keyboard belongs to the graphics processor. Keyboard control can be switched to the system within two minutes of the system power-on by pressing and holding the Alt key and then pressing the Sw Keybd key.

Warning: Do not attach the 5085 or 5086 keyboard to the system unit without the special diagnostic cable.

- There is a special diagnostic cable available with the combination system to attach the 5085/86 keyboard directly to the system unit. See the *5080 Graphics System Installation, Operation, and Problem Determination* manual for information about setting the combination system up.

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*, form number GA18-2633. For the 3164, refer to the *3164 ASCII Color Display Station Description*, form number GA18-2317.
- 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.

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.

General Setup Attributes	3151 (models 11, 31, 41) settings	3161/3164 settings	Description
Machine mode	3151	3161 or 3164	The diagnostic programs are set to emulate use of the 3161 ASCII Display Terminal. If your terminal can emulate a 3151, 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.
Screen	Normal		Uses the EIA-232 interface protocol.
Row and Column	24 x 80		Uses the EIA-232 interface protocol.
Scroll	Jump	Jump	When the last character on the bottom line is entered, the screen moves down one line.
Auto LF	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	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	Off	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		
Tab	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 500 ms 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 Keyboard Attributes

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

Keyboard Setup Attributes	3151 (models 11, 31, 41) settings	3161/3164 settings	Description
Enter	Return	Return	The Enter key functions as the Return key.
Return	New line	New line	The cursor moves to the next line when the Return key is pressed.
New line	CR	CR	The Return key generates the carriage return (CR) and the line feed (LF) characters. The line turnaround occurs after the CR and LF characters are generated.
Send	Page	Page	The contents of the current page are sent to the system unit when the Send key is pressed.
Insert character	Space	Space	A blank character is inserted when the Insert key is pressed.

Additional Printer Attributes

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

Printer Setup Attributes	3151 (models 11, 31, 41) settings	3161/3164 settings	Description
Line speed	9600	9600	Uses 19200 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 3 (or later) of the Operating System. This mode requires that all activity on Version 3 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 3 (or later) 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 3 (or later) 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 (get help if needed).
2. Log onto Version 3 (or later) 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.

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 while the system is running 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 *sub-test 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 3 (or later) of the Operating System and have proper authority to issue the commands (if needed, get help).

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 3 (or later) 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 diskettes or other removable load media. This method is the only method available for those systems that do not have Version 3 (or later) of the Operating System installed.
- From a disk within the system unit. This loads the diagnostic programs that are a part of Version 3 of the operating system. Version 3 (or later) 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 3 (or later) of the Operating System diagnostic programs. The tests provided by the built-in diagnostic programs are not as complete as Version 3 (or later) of the Operating System diagnostic programs.

Running the Diagnostics in Standalone Mode

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

1. Stop all programs including the operating system (get help if needed).
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 diskettes, the diagnostics *do not* check the error log entries.

4. If you want to load the standalone diagnostics from diskettes, insert the first diagnostic diskette into the diskette drive.
5. If you want to load the diagnostics from the disk, leave the diskette 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.

Note: If while the diagnostics are loading, some system units stop with `260`, `261`, or `262` displayed in the three-digit display and the console display is blank, press the 1 (one) key on the console keyboard to cause the diagnostics to continue to load.

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 three-digit display. See "Reading Flashing 888 Numbers" in this chapter 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 to shutdown the diagnostics before turning off the system unit.

If you loaded the diagnostics from diskettes, turn off the system unit.

System Exerciser

The System Exerciser tests and exercises devices in an overlap mode and can only be run from disk in a standalone mode.

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 number of times a device is tested under the System Exerciser may be one or more.

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

Display Screens

If the console is a graphics display, normal test patterns are displayed during the tests. After the graphics adapter test is finished, the standby screen is displayed.

If the console is an async terminal, the standby screen will be displayed during testing. The time-of-day will be 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 will be displayed until either the Enter key is pressed to restart the System Exerciser or the 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 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.

Using the System Exerciser to Check Out Repairs and Intermittent Problems

The System Exerciser can be used to check out the system following repairs and to identify intermittent problems.

When the System Exerciser is running, most built-in error recovery procedures are turned off. This can cause occasional errors to be reported that normally have no effect on system operation. Parts should only be replaced when:

- A high number of errors are reported in relation to the number of times the device was tested.
- Errors reported by the System Exerciser are in the same area as that reported by the customer.

Running the Built-In Diagnostics

To run the built-in diagnostics, take the following steps:

1. Stop all programs including the operating system (get help if needed).
2. Set the power switch on the system unit to Off.
3. Set the key mode switch to the Secure position.
4. Set the power switch on the system unit to On; then wait until the number 200 displays in the three-digit display.
5. Set the key mode switch to the Service position and immediately press the Reset button.
6. When the MAIN MENU displays, select the Perform Diagnostics option.
7. Follow the displayed instructions to checkout the desired resources.
8. When testing is complete; select option 99 (Return to main menu).
9. Make the appropriate selection from the MAIN MENU or turn off the system unit if you do not want to check out any other areas.

Reading Flashing 888 Numbers

A flashing 888 number indicates the diagnostic programs detected an error.

The diagnostic programs display a flashing 888 to indicate a crash message or a diagnostic message is ready to be read.

Use the following procedure to read out a flashing 888 message:

Step 1. Determine the Type of Message

The 3-digit display should be flashing 888.

1. Get a "Problem Report Form" from the *Problem Solving Guide* or a blank sheet of paper to record the numbers from in the 3-digit display.

2. Be sure the mode switch is set to Normal or Service.

Note: Every time you press the Reset button, hold it for about one second to allow the program to sense the change.

3. Press the Reset button once. Record the number in the 3-digit display. This is the message type.

4. Go to the step listed for your message type:

Type 102 Go to Step 2.

Type 103 Go to Step 3.

Type 105 Go to Step 4.

Other Go to Step 5.

Step 2. Reading the Type 102 Message

Use the following steps and information to determine the content of the type 102 message. See Appendix C for a description of the crash code and dump status.

102 = Message type
RRR = Crash code
SSS = Dump status code
888 or 103 or 105

1. Press the Reset button once and record the crash code.
2. Press the Reset button again and record the dump status code.
3. Press the Reset button again. Look at the number in the 3-digit display to answer the following question.

Is 888 flashing in the 3-digit display?

- NO** The message has a type 103 or type 105 message included in it. Go to Step 3 to read out the SRN and FRU information about Type 103 messages. Go to Step 4 to read out the SRN and FRU information about Type 105 messages.
- YES** This completes the read out of this message. You can repeat the message by pressing the Reset button. You must turn off the system unit to recover from this halt.

Step 3. Reading the Type 103 Message

Use the following steps and information to determine the content of the type 103 message (You may have come here from a type 102 message. If so, use the same procedure).

1. Press the Reset button and record the first three digits of the 6-digit SRN.
2. Press the Reset button and record the second three digits of the six-digit SRN.
3. Each time the Reset button is pressed, three digits of a FRU location code display. When all FRU location codes are read out, the 3-digit display returns to the flashing 888 or, if another Type 103 message is waiting to be displayed, a ccc. If a ccc is displayed, repeat this step to receive the next message. Try the first SRN listed; if it does not resolve the problem, try following SRNs in the order listed. If the message contains more than four FRUs, not all FRU location codes will be present.

Press the Reset button and record the 3-digit numbers until a flashing 888 displays. Use the following to identify the numbers being read.

103 = Message type
XXX-XXX = SRN
c01 1xx 2xx 3xx 4xx 5xx 6xx 7xx 8xx = First FRU location code
c02 1xx 2xx 3xx 4xx 5xx 6xx 7xx 8xx = Second FRU location code
c03 1xx 2xx 3xx 4xx 5xx 6xx 7xx 8xx = Third FRU location code
c04 1xx 2xx 3xx 4xx 5xx 6xx 7xx 8xx = Fourth FRU location code.

4. Identify the SRN in the message and report the SRN to the service organization. Keep the paper or form you recorded all of the numbers on for the service representative. You can cycle through the numbers again by pressing the Reset button.

5. The FRU location codes translate into an eight-digit location code (AB-CD-EF-GH). Each digit of the eight-digit location code is presented as a 3-digit number in the 3-digit display.

A B C D E F G H = Eight-digit location code
 c01 1xx 2xx 3xx 4xx 5xx 6xx 7xx 8xx = First FRU location code
 c02 1xx 2xx 3xx 4xx 5xx 6xx 7xx 8xx = Second FRU location code
 c03 1xx 2xx 3xx 4xx 5xx 6xx 7xx 8xx = Third FRU location code
 c04 1xx 2xx 3xx 4xx 5xx 6xx 7xx 8xx = Fourth FRU location code.

To identify each digit of the location code (AB-CD-EF-GH), translate the right-most two digits using the following table. See "Location Codes" in Chapter 2 to determine the physical location of the resource.

Note: If a ccx (x can be any digit from 2 through 9) is encountered as part of the location code, only the part of the code that is different from the location code of the previous FRU is shown. To form the complete location code of the "next" FRU, substitute the information following the ccx into the location code of the previous FRU.

For example, if the previous FRU location is:

c01 100 200 300 401 500 601 700 800,

and the "next" FRU location is listed as:

cc2 602,

the complete location code of the "next FRU" is:

cc2 100 200 300 401 500 602 700 800.

xx Value	xx Value	xx Value	xx Value
00 = 0	11 = A	21 = K	31 = U
01 = 1	12 = B	22 = L	32 = V
02 = 2	13 = C	23 = M	33 = W
03 = 3	14 = D	24 = N	34 = X
04 = 4	15 = E	25 = O	35 = Y
05 = 5	16 = F	26 = P	36 = Z
06 = 6	17 = G	27 = Q	
07 = 7	18 = H	28 = R	
08 = 8	19 = I	29 = S	
09 = 9	20 = J	30 = T	

6. The only way to recover from an 888 type of halt is to turn off the system unit.

Step 4. Reading the Type 105 Message

Use the following steps and information to determine the content of the type 105 message (You may have come here from a type 102 message. If so, use the same procedure).

1. Press the Reset button and record the first three digits of the SRN.
2. Press the Reset button and record the next three digits of the six-digit SRN.
3. Repeat this step until c01 is displayed.
4. Each time the Reset button is pressed, three digits of a FRU location code display. When all FRU location codes are read out, the 3-digit display returns to the flashing 888 or, if another message is waiting to be displayed, a ccc. If a ccc is displayed, repeat this step to receive the next message. Try the first SRN listed; if it does not resolve the problem, try following SRNs in the order listed. If the message contains more than four FRUs, not all FRU location codes will be present.

Press the Reset button and record the 3-digit numbers until a flashing 888 displays. Use the following to identify the numbers being read.

105 = Message type
1xx 2xx 3xx 4xx = encoded SRN

c01 1xx 2xx 3xx 4xx 5xx 6xx 7xx 8xx = First FRU location code
c02 1xx 2xx 3xx 4xx 5xx 6xx 7xx 8xx = Second FRU location code
c03 1xx 2xx 3xx 4xx 5xx 6xx 7xx 8xx = Third FRU location code
c04 1xx 2xx 3xx 4xx 5xx 6xx 7xx 8xx = Fourth FRU location code.

5. Determine the SRN by translating the right-most two digits of each position within the encoded SRN (1xx 2xx 3xx 4xx) using the table on page 3-18. Report the SRN to the service organization. Keep the paper or form on which you recorded all of the numbers for the service representative. You can cycle through the numbers again by pressing the Reset button.

6. The FRU location codes translate into an eight-digit location code (AB-CD-EF-GH). Each digit of the eight-digit location code is presented as a 3-digit number in the 3-digit display.

A B C D E F G H = Eight-digit location code
 c01 1xx 2xx 3xx 4xx 5xx 6xx 7xx 8xx = First FRU location code
 c02 1xx 2xx 3xx 4xx 5xx 6xx 7xx 8xx = Second FRU location code
 c03 1xx 2xx 3xx 4xx 5xx 6xx 7xx 8xx = Third FRU location code
 c04 1xx 2xx 3xx 4xx 5xx 6xx 7xx 8xx = Fourth FRU location code.

To identify each digit of the location code (AB-CD-EF-GH), translate the right-most two digits of each position within the encoded SRN using the following table. See "Location Codes" in Chapter 2 to determine the physical location of the resource.

Note: If a ccx (x can be any digit from 2 through 9) is encountered as part of the location code, only the part of the code that is different from the location code of the previous FRU is shown. To form the complete location code of the "next" FRU, substitute the information following the ccx into the location code of the previous FRU.

For example, if the previous FRU location is:
 c01 100 200 300 401 500 601 700 800,
 and the "next" FRU location is listed as:
 cc2 602,
 the complete location code of the "next FRU" is:
 cc2 100 200 300 401 500 602 700 800.

xx	Value	xx	Value	xx	Value	xx	Value
00	= 0	11	= A	21	= K	31	= U
01	= 1	12	= B	22	= L	32	= V
02	= 2	13	= C	23	= M	33	= W
03	= 3	14	= D	24	= N	34	= X
04	= 4	15	= E	25	= O	35	= Y
05	= 5	16	= F	26	= P	36	= Z
06	= 6	17	= G	27	= Q		
07	= 7	18	= H	28	= R		
08	= 8	19	= I	29	= S		
09	= 9	20	= J	30	= T		

7. The only way to recover from an 888 type of halt is to turn off the system unit.

Step 5. Other Numbers

If the message type is a type 104, it contains information that is not used by the service organization. Disregard this information. If you have another number displayed for the message type, do the following:

1. Press the Reset button again and again until a flashing 888 is displayed in the 3-digit display. If you do not get a flashing 888 in the display, you should consider the numbers as steady numbers. Go to the *Problem Solving Guide* and follow the procedures for analyzing 3-digit display codes.
2. When the flashing 888 displays, go to Step 1.

Chapter 4. Using the Service Aids

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Introduction to Service Aids

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

The following service aids are provided:

- Display previous diagnostic results
- Display or change diagnostic test list
- Display or change configuration or vital product data
- Display or alter bootlist
- Trace service aid
- Create diagnostic diskette package
- Disk-based diagnostic update
- Dials and LPFK configuration service aid
- Diskette media
- Disk media
- Service aids for use with ethernet
- SCSI bus
- Display test patterns
- Microcode download
- Service hints
- M-multimedia video capture adapter
- Product topology.

These service aids are described in the following topics.

Display Previous Diagnostic Results

Note: This service aid is not available when you load the standalone diagnostics from diskettes.

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 what 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 Version 3 (or higher) of the Operating System. This information is stored in the `/etc/lpp/diagnostics/data/*.dat` file.

Display or Change Diagnostic Test List

During power-on self-test, the diagnostic controller uses the diagnostic test list to determine which resources to check.

This service aid provides a way to delete a resource from the diagnostic test list and a way to add a deleted resource back into the diagnostic test list. This service aid also provides a way to display the diagnostic test list.

Display or Change Configuration or Vital Product Data

Note: The following Version 3 (or higher) of the Operating System commands are not available for use when you load this service aid from diskettes.

This service aid allows you to display and change configuration data and VPD.

Use the **lscfg** command to copy the contents of the configuration and VPD files to another file or to a printer. This command identifies the resources that have diagnostic support. For more information about the **lscfg** command, see the Version 3 (or higher) of the Operating System information.

In the following examples, the first example copies the configuration data and VPD to a file named **/u/mine/VPD**. The second example prints the configuration list. The third example displays the VPD on the screen.

```
lscfg -v > /u/mine/VPD
lscfg | enq
lscfg -v | pg
```

Display Configuration

This service aid displays a list of the resources installed on this system.

Display Vital Product Data (VPD)

This service aid displays the VPD for all of the resources installed on this system. Use the Page Down and Page Up keys to see the data for all resources. See Chapter 2 for information about what data is read from the resource and what data is entered manually.

Display or Alter VPD

Warning: If this service aid was loaded from diskettes, any changes or additions you make to the VPD data will be lost when you shut down.

This service aid allows you to display and alter the VPD for any resource. When you select this service aid, a menu allows you to select the desired resource.

Change Configuration

Warning: If this service aid was loaded from diskettes, any changes or additions you make to the configuration data will be lost when you set the power switch to Off.

This service aid allows you to add or delete data for the drawer data from the configuration list. This service aid is used to add non-machine readable data to the configuration list.

Display or Alter Bootlist

This service aid allows you to display, alter, or erase the list of the IPL devices from which the system will attempt to load either Version 3 (or higher) of the Operating System or the diagnostic programs.

The system will attempt 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 will proceed in turn to the other devices in the list to attempt an IPL.

Note: This service aid does not support additional network adapters as IPL devices.

Trace Service Aid

The Trace service aid is used as a tool to correct problems with microcode on either a serial disk adapter or a serial disk controller. This service aid is intended for use by trained service representatives.

Create Diagnostic Diskette Package

The create diagnostic diskette package service aid requires at least 10000 blocks of free space in the **root** directory and 8800 blocks of free space in the **/tmp** directory. If you do not have enough free space in these directories, an error message displays when you run this service aid.

Note: If you receive any messages about missing files when you run this service aid, the diskettes created by this service aid may not work properly. The files identified by the messages may be necessary for these diskettes to work properly.

This service aid creates diagnostic diskettes that are customized to the system they were created on. The diskettes created by this service aid contain only the diagnostics for the devices on the system the service aid is run on.

Disk-Based Diagnostic Update

This service aid is used to update to the most current level, the Version 3 (or higher) diagnostic programs stored on the disk. The update is performed by inserting a diskette with the current diagnostic programs into the diskette drive when the service aid prompts you to do so.

Dials and LPFK Configuration Service Aid

This service aid configures Dials or LPFK devices to be used on the S1 or S2 serial port. Until these devices are configured, they can not be tested by the diagnostic programs. If Dials or LPFK devices attached to the S1 or S2 serial port do not show on the diagnostic test list, use this service aid first to configure the device.

Diskette Media

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.

Disk Media

This service aid provides a format disk service aid and a certify disk service aid.

Format Disk

There are two options available to format a disk.

Format

The format option writes all of the ID fields and writes a bit pattern in all of the data fields. This option *does not* reassign data blocks that are bad.

Format and Certify

The format and certify option writes all of the ID fields and writes a bit pattern in all of the data fields. It also reassigns any data blocks found to be bad during formatting. If there are too many bad data blocks, a message is sent to alert you.

This service aid should be used to completely erase the existing data on a disk. The diagnostic programs may instruct you to use this service aid when data on a disk is found to be badly damaged.

Certify Disk

The certify disk service aid reads all of the ID and data fields. It checks for bad data in the ID and data fields. If there are too many bad data blocks, a message is sent to alert you.

Service Aids For Use With Ethernet

This service aid provides additional testing for an Ethernet network. This test should be used only after the normal diagnostic test programs do not find a problem.

This test sends a data block addressed to itself, then it looks for the data block to be received. This test works with the wrap plug installed on the adapter or with the regular network operation.

To analyze a problem with the network you can wrap the signal back at the adapter by using the wrap plug; then test a minimum configuration network. If the minimum configuration works, add more to the network until the problem is identified.

SCSI Bus

This service aid provides additional testing for SCSI bus problems and should be used only after the normal diagnostic test programs do not find a problem.

A **SCSI Test Unit Ready** command is sent to a SCSI device you select from the `SCSI BUS ADDRESS SELECTION` Menu; test results are then displayed. To analyze a SCSI bus problem, start with only one device attached; then add one device at a time until you identify the failing device. *Always* use a terminator at the end of the SCSI bus.

Display Test Patterns

This service aid provides a way to display the test patterns needed to adjust the 5081, 6091, and 8517 displays. Select the pattern you need from the menu.

Note: This service aid should not be run in a multi-window environment such as Windows.

Microcode Download

Microcode Download is a service aid that provides a way to copy microcode from diskettes to a disk. This procedure is used to update disk drive controller microcode, and may be needed after exchanging a disk drive.

This service aid presents you with a list of the disk drives that use microcode. Select the type drive on which you are installing the code, and follow the displayed instructions.

Service Hints

The service hints service aid reads and displays the information in the CEREAADME file from the source the diagnostics were loaded from (diskettes, disk).

Use this service aid to display the information in the CEREAADME (CE read me) file. 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 – and Enter keys (dash and Enter) to page backwards through the file.

M-Multimedia Video Capture Adapter

The multimedia video capture adapter service aid provides a selection of patterns to be used for adjusting the multimedia video capture adapter. Select the appropriate pattern from the choices listed on the multimedia video service aid menu.

Product Topology

Note: Product topology is not supported on systems that do not have a diskette drive.

The Product Topology Data System has been created to enhance product and order quality within this system family.

Introduction

The Product Topology system records and maintains the following data:

- Machine configuration, including both Feature Code and Manufacturing Feature Bill of Material nomenclature
- Machine contents, including part numbers and EC levels
- History of actions taken with machine hardware

Data collection and recording for a machine begins with the initial order and continues through the manufacturing process into field service. This physical history, combined with the current configuration, is a valuable resource in managing product quality. Additionally, current machine configurations as reported from the field via Update Diskettes are used as a

database for developing and improving Miscellaneous Engineering Specification (MES) upgrade orders and their installability.

The entire process supports a quality focus.

How the Product Topology System Works

The fundamental operation within the Product Topology system is the transfer of data from the plant of manufacture to the machine and back to the plant of manufacture.

Initial Installation

The machines leave the plant of manufacture with a Product Topology System Diskette which contains accumulated machine configuration and history. This data is installed on the machine in the customer's environment.

For machines having a disk drive with Version 3 (or higher) of the Operating System installed, the Product Topology data is installed by using the Product Topology Service Aid from Version 3 (or higher) of the Operating System based diagnostics on the disk drive. Standalone diskette-based diagnostics should be used only on machines which do not have, or plan to have, Version 3 (or higher) of the Operating System installed. Even in the case of a disk drive failure, when the standalone diskette diagnostics package is used, the Product Topology Service Aid should be run from the disk drive *after* the machine is restored to normal operation.

The Product Topology installation process transfers all prior configuration data from the System Diskette to a set of files on the disk drive. Any changes made to the machine during installation will also be recorded (the Service Aid may ask some questions during the Product Topology installation). The new machine configuration, including the history of the changes just recorded, is then written to both the System and Update diskettes. The System Diskette is written as a backup of the disk drive data in case of failure. When Version 3 (or higher) of the Operating System is not resident on the machine and standalone diskette diagnostics are used, the System Diskette is the only record of Product Topology data kept with the machine.

Note: It is critical that the System Diskette remain with the machine and be available during upgrade or service action. The data written on the Update Diskette is the data which is used to update the plant of manufacture Product Topology Data System. Any time an Update Diskette is written, it must be returned to the plant of manufacture because this is the only mechanism available for recording field actions.

MES and Other Field Action

As with initial orders, data for MES action and for other devices added to machines in the field comes with an Update Diskette which contains additional data about a resource. The diskette data is applied to the system by using the Service Aid. The data is read in and then merged with the current machine configuration. The data then is written to the System and Update Diskettes. The System Diskette provides a Product Topology record which must remain with the machine, and the Update Diskette is returned to the plant of manufacture to update the Product Topology Data System.

Note: Always be sure that the correct diskette is used when performing the actions required by the Product Topology Service Aid. The recorded data on the System Diskette is different from that stored on the Update Diskette. At no time should the System Diskette be returned to the plant of manufacture. The System Diskette must remain with the machine.

Missing or New Resources

Occasionally, when the Product Topology Service Aid is run during machine or MES installation, a screen may be presented which indicates that a resource has either been added or removed. This situation is normal and occurs whenever resources have been added to the machine after completion of the manufacturing test process. The most likely resources to be added are "TTY" (ASCII terminals), "kbd" (keyboards), and "mous" (mouse). Screens displayed for the detection of added resources come in pairs. The first is a series of fields for adding data about the newly detected resource; if the added resource data is available, enter it in the appropriate field. If the data is not available, or if the added resource cannot be identified, select `Commit`, and continue. In all cases, select `Commit` to proceed. Once the data is committed, a list of options will be presented to define where the resource originated. Select the appropriate option based on available information.

A similar scenario should be employed for resources detecting as missing. Again, select the appropriate information based on available information. If the information is not known, select the option that removes the resource permanently.

Installing Multiple Engineering Changes (ECs)

When adding or removing several MESs or resources, complete all hardware changes, verify the installation, and checkout the resources before using the Service Aid to update the Product Topology. When running the Product Topology Service Aid, several questions will be presented which refer only to reading in data from the new resource Update Diskettes, *not* to the Update Diskettes shipped with the original machine which are used for recording subsequent repair actions.

The Product Topology Service Aid will ask for all the Update Diskettes shipped with the multiple resources. After all these diskettes have been read into the system, an Update Diskette will be needed to record the new overall system configuration. This diskette will then be shipped to the plant of manufacture to update the Product Topology Data System. Also, be sure to return all individual diskettes which were shipped with the new resources.

Using the Create (Rebuild) Function

The Create, or Rebuild, function is included in the Product Topology Service Aid for use *only* when the service person is specifically instructed to do so by the Support Center or by written instructions. *Use of this function can result in the total loss of Product Topology data stored on the system.*

Completing the Product Topology Process

The final step of the Product Topology process is to write the new system configuration on the System and Update Diskettes. When the diskette-writing procedure is finished, the Product Topology Service Aid menu automatically returns to the screen.

Note: Do not remove a diskette from the drive until:

- the diskette drive light has turned off
- prompted to do so by the software
- prompted by the software to insert the next diskette
- the Product Topology Service Aid procedure terminates, and the Product Topology Service Aid menu is displayed.

Installation of EC A90783B

EC A90783B corrects a problem with the Product Topology Service Aid, Version 1.0, which was shipped with early machines. Since Version 1.0 may have corrupted the original data, this EC is crucial to reestablish Product Topology data on the machine and to create an Update Diskette for return to the plant of manufacture Product Topology Data System.

Instructions shipped with the EC completely describe how to determine the necessity of installing the new Product Topology Service Aid level. If you have already acquired a higher level than 1.0, only a reinstallation of the Product Topology data is required. Instructions for this procedure are also included.

Machines Without Product Topology

Some disk drive machines do not have Product Topology data installed because the Product Topology Service Aid has not been run from disk. When the Product Topology Service Aid is run from the Diskette Diagnostics Package, the system does not record Product Topology data onto the disk drive. When the Product Topology Service Aid is eventually run from the disk drive following an MES installation or repair action, the program will ask for the System Diskette. The System Diskette configuration data is then written onto the disk drive, and the result is then the same as if Diagnostics had been used from the disk drive during the initial installation.

Note: It is extremely important to provide the System Diskette when it is requested. Do not use the Create (Rebuild) function in lieu of using the System Diskette.

Chapter 5. Using the System Verification Procedure

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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" in Chapter 6.

Step 1. Considerations Before Running This Procedure

Notes:

1. 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 7 for more information about multiple system attachments.
 2. 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.
- This procedure requires a direct-attached display or a TTY terminal attached to the S1 port.
 - Before starting this procedure, you should stop all programs and the operating system.
 - This procedure runs the diagnostic programs in standalone mode from disk or diskette. If the diagnostic programs are installed on disk, these procedures should be run from disk. See the operator manual for your type TTY terminal to find the key sequences you need in order to respond to the diagnostic programs.

If you need more information about standalone mode, see "Diagnostic Modes of Operation" in Chapter 3.

Note: If while the diagnostics are loading, the 7011 stops with 260, 261, or 262 displayed in the three-digit display and the console display is blank, press the 1 (one) key on the console keyboard to cause the diagnostics to continue to load.

- If a console display is not selected, the diagnostics stop with c31 in the three-digit display. The instructions for selecting a console display are displayed on all of the direct-attached displays and any terminal attached to the S1 port. Follow the displayed instructions to select a console display.
- If the system unit is attached to a 5085 or 5086, the DIAGNOSTIC OPERATING INSTRUCTIONS Menu *does not* display on the display attached to the 5085 or 5086.
- 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 (get help if needed).
3. Set the power switch on the system unit to Off.
4. Set the key mode switch to the Service position.
5. If you are loading the diagnostics from diskettes and running them from a TTY terminal:
 - The TTY 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.
 - If you need to change any settings, record the normal settings, and be sure the terminal attributes are set to work with the diagnostic programs. If needed, see “Running the Diagnostic Programs from a TTY Terminal” in Chapter 3.
 - Return to substep 6 when you finish checking the attributes.
6. Set the power switch on the system unit to On.
 - If `c07` is displayed, insert the next diagnostic diskette.
 - 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.

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; they 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. When you have checked all of the resources you need to check, go to Step 5.

Step 5. Stopping the Diagnostics

1. If diagnostics are being run from disk, the system first should be shutdown using the following procedure:
 - a. Press F3 again and again until you get to the DIAGNOSTIC OPERATING INSTRUCTIONS.
 - b. Press F3 once to shut down Version 3 (or higher) 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 6. Hardware Problem Determination

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Hardware Problem Determination Procedure

Use this procedure to obtain a service request number (SRN). You report the SRN to the service organization. The service organization uses the SRN to determine what field replaceable units (FRUs) are needed to restore the system to correct operation.

Step 1. Considerations Before Running This Procedure

Note: See the operator manual for your type TTY terminal to find the key sequences you need to respond to the diagnostic programs.

- The diagnostic programs can use direct-attached displays or a TTY terminal attached to the S1 port.
- This procedure asks you to select the mode you want run the diagnostic programs in (standalone, maintenance, concurrent). If you need more information about the modes, see "Diagnostic Modes of Operation" in Chapter 3.
- If the system unit is attached to a 5085 or 5086, the `DIAGNOSTIC OPERATING INSTRUCTIONS` *do not* display on the display attached to the 5085 or 86.
- If the procedure instructs you to stop the operating system, refer to Chapter 7 for additional information.
- Go to Step 2.

Step 2

(From Step 1)

Version 3 (or higher) of the Operating System contains the diagnostic programs. Other operating systems may not contain diagnostic programs.

Is Version 3 (or higher) of the Operating System used on this system?

NO Go to Step 21.
YES Go to Step 3.

Step 3

(From Step 2)

Determine if Version 3 (or higher) of the Operating System is accepting commands.

Is Version 3 (or higher) of the Operating System accepting commands?

NO Try the following:
 1. Stop the operating system (get help if needed).
 2. If you can not 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 standalone mode.

Do you want to run the diagnostics in standalone mode?

- NO** Go to Step 5.
- YES** Do the following to shut down your system:
1. At the system prompt, stop the operating system (get help if needed).
 2. After the operating system is stopped, set the power switch of 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 `DIAGNOSTIC OPERATING INSTRUCTIONS` are displayed, or 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 (get help if needed).
 2. After the operating system is stopped, set the power switch of 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 standalone diagnostics.

1. Set the key 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. 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 Normal and back to Service to indicate to the diagnostics there is no console display. If you cannot select a console display, go to Step 20.
4. Wait until one of the following conditions occurs, then go to the next substep:
 - The power-on light does not come on or comes on and does not stay on.
 - The same number is displayed in the 3-digit display for longer than three minutes.
 - The number `888` is flashing in the 3-digit display.
 - The 3-digit display is blank.

- The system stops with two or more numbers between 221 and 296 alternating in the 3-digit display.
 - The DIAGNOSTIC OPERATING INSTRUCTIONS display.
5. 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 3-digit display and the DIAGNOSTIC OPERATING INSTRUCTIONS is displayed with no obvious problem on the console display (for example, it is not distorted or blurred).	Go to Step 10.
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 on the "Problem Summary Form" and report the problem to the service organization.</p> <p>STOP. You have completed these procedures.</p>
The system stops with a steady (not flashing) number displayed in the 3-digit display.	<p>The number must be other than c31. See substep 3 above for this number.</p> <p>Go to Step 7.</p>
The system stops with 888 flashing in the 3-digit display.	Go to Step 8.
The system stops with a blank 3-digit display, and the DIAGNOSTIC OPERATING INSTRUCTIONS is not displayed correctly.	Go to Step 9.
The 3-digit display is blank and the normal system log-in screen is displayed.	<p>Be sure the key mode switch is set to the Service position.</p> <p>If the key 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 key mode switch was in the Service position, record and report SRN 111-102.</p> <p>STOP. You have completed these procedures.</p>
The system stops with two or more numbers between 221 and 296 alternating in the 3-digit display.	Go to Step 16.

Step 7

(From Steps 6, 18)

The following steps analyze a steady (not flashing) number displayed in the 3-digit display while attempting to load the diagnostics.

3-Digit Display Number	Action
200	<p>Be sure the key mode switch is set to the Service position.</p> <p>If the key mode switch was not in the Service position, set it and press the Reset button, and then go to Step 6.</p> <p>If the key mode switch was in the Service position, record and report SRN 111-200.</p> <p>STOP. You have completed these procedures.</p>
260, 261, 262	Go to Step 23.
Any other number	<p>Record and report SRN 101-xxx (where xxx is the number displayed in the 3-digit display).</p> <p>STOP. You have completed these procedures.</p>

Step 8

(From Steps 6, 18)

A flashing 888 in the 3-digit display indicates that a crash message or a diagnostic message is ready to be read.

1. Use the steps in the "Reading Flashing 888 Numbers" in Chapter 3 to:
 - Read out 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 other numbers read out on the Problem Report Form.
4. Report the SRN to the service organization. Keep the other numbers you read out for the service representative to use 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, 12, 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
101-key keyboard. Identify by the type of Enter key used. The Enter key is within one horizontal row of keys.	Record and report service request number 111-921. STOP. You have completed these procedures.
102-key keyboard. Identify by the type of Enter key used. The Enter key extends into two horizontal rows of keys.	Record and report service request number 111-922. STOP. You have completed these procedures.
Kanji keyboard. Identify by the Japanese characters.	Record and report service request number 111-923. STOP. You have completed these procedures.
122-key keyboard. Identify by the double row of function keys.	Record service request number 111-938. STOP. You have completed these procedures.
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 `Diagnostics`.
3. Press the Enter key.
4. In the table on the following page, find the menu or system response you received when you selected `Diagnostics`; then follow the instructions given in the Action column.

System Response	Action
The system does not respond to selecting Diagnostics.	Go to Step 11.
The DIAGNOSTIC SELECTION menu is displayed.	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 Step13.</p> <p>If you get an SRN, record it, and go to Step15.</p> <p>If you get a number in the 3-digit 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 will not appear on the NEW RESOURCE menu.</p> <p>If the DIAGNOSTIC SELECTION menu is displayed, go to Step13.</p> <p>If you get an SRN, record it, and go to Step 15.</p> <p>If you <i>do not</i> get an SRN, go to Step 19 .</p>
<p>The diagnostics begin testing a resource.</p> <p>Note: If Problem Determination was selected selected from the DIAGNOSTIC MODE SELECTION menu, and if a recent error has been logged in the error log, the diagnostics will 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.

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 take the Action for it.

Diagnostic Response	Action
An SRN is displayed.	Go to Step 15.
The system stopped with a number displayed in the 3-digit display.	Go to Step 14.
The TESTING COMPLETE menu and the No trouble was found message is displayed, and you <i>have 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. 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. If the Dials and LPFKs are attached to serial ports S1 or S2, you must configure them using the Dials and LPFKs Configuration service aid before they can be tested from diskette.

Step 14

(From Steps 12, 13)

A flashing 888 in the 3-digit display indicates that a crash message or a diagnostic message is ready to be read.

1. Use the steps in the "Reading Flashing 888 Numbers" in Chapter 3 to:
 - Read out all of the message
 - Identify the SRN
 - Record the remaining numbers for the service representative.
2. Record the SRN on the Problem Report Form.
3. Report the SRN to the service organization. Keep the other numbers you read out for the service representative to use 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 other numbers read out on the Problem Summary Form.
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 3-digit display. This indicates the diagnostics could not load from disk, so the load program is looking for the diagnostic programs on the diskettes or some other load device.

Are you trying to load the diagnostic programs from diskettes?

- 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 diskettes 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 diskettes 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" in Chapter 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 system unit power switch to Off.
2. Get the diagnostics diskettes for your system unit.
3. Insert the first diagnostic diskette into the diskette drive.

4. Set the system unit power switch to On. If c07 is displayed in the 3-digit display, insert the next diagnostic diskette. 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 Normal then back to Service to indicate to the diagnostics that there is no console display. If you cannot select a console display, go to Step 20.

5. Wait until one of the following conditions occur, then go to the next substep:

Note: If while the diagnostics are loading; the 7011 stops with 260, 261, or 262 displayed in the three-digit display and the console display is blank; press the 1 (one) key on the console keyboard to cause the diagnostics to continue to load.

- The system stops with two or more numbers between 221 and 296 alternating in the 3-digit display.
- The same number is displayed in the 3-digit display for longer than three minutes.
- The number 888 is flashing in the 3-digit display.
- The 3-digit display is blank.
- The DIAGNOSTIC OPERATING INSTRUCTIONS display.

6. Starting at the top of the following table, find your symptom; then follow the instructions given in the Action column.

Symptom	Action
The system stops with a blank 3-digit display, and the 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 3-digit display, and the DIAGNOSTIC OPERATING INSTRUCTIONS are <i>not</i> displayed correctly.	Go to Step 9.
The system stops with 260, 261, or 262 displayed in the 3-digit display.	Record and report SRN 111-101. STOP. You have completed these procedures.
The system stops with a steady (not flashing) number displayed in the 3-digit display.	The number must be other than c07 or c31. See substep 4 above for these numbers. Go to Step 7.
The system stops with 888 flashing in the 3-digit display.	Go to Step 8.
The system stops with two or more numbers between 221 and 296 alternating in the 3-digit display.	Record and report SRN 111-101. STOP. 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 Chapter 7 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 11.

YES Go to Step 9.

Step 21

(From Step 2)

An English-only version of diagnostics are provided on diskette.

Do you want to run diagnostics from diskette?

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 diskette.

Do you want to run diagnostics from diskette?

NO Record and report SRN 111-103. **Stop.** You have completed these procedures.

YES Go to Step 17.

Step 23

(From Step 7)

3-Digit Display Number	Action
260	If the console display is directly attached to the system unit using a graphics adapter, go to Step 24. Otherwise, press the 1 (one) key on the ASCII terminal keyboard, then go to Step 24.
261	Press the 1 (one) key on the ASCII terminal keyboard, then go to Step 24.
262	A keyboard was not detected. If a keyboard is attached to the keyboard connector (K) on the system unit, record and report SRN 101-262; then go to Step 15. Otherwise, press the 1 (one) key on the ASCII terminal keyboard, then go to Step 24.

Step 24

(From Step 23)

Find your symptom in the following table; then follow the instructions in the Action column.

Symptom	Action
Information is not displayed correctly on the console display (for example, the information is distorted, blurred, or not readable).	Go to Step 9.
An SRN is displayed on the console display.	Record and report the SRN. STOP. You have completed these procedures.
The MAIN MENU is displayed on the console display.	Go to Step 21.
Neither an SRN nor the MAIN MENU is displayed on the console display.	Go to Step 21.

Chapter 7. Multiple Systems Guidelines

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General Information About Multiple Systems

This chapter presents guideline information for anyone needing to run the diagnostic programs on a system unit that is attached to another system. These guidelines are intended for both the operator of the system and the service representative.

This guideline is presented by adapter type or by system configuration type.

These considerations and actions *are not* detailed step-by-step instructions, but are used to be sure you have considered the attached system before you run diagnostics on this system unit.

You are directed to the detailed procedures for the various activities as needed.

These guidelines generally present considerations for:

- Starting and stopping the communications with the other system
- Considerations before running diagnostics on the system
- Analyzing the error log information
- Using the wrap plugs with the diagnostics.

When this system unit is attached to another system, be sure you isolate this system unit 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 making the cabling changes on this system.

Block Multiplexer Channel Adapter

The Block Multiplexer Channel Adapter allows the system unit to directly attach to a system-370/390-type block multiplexer channel.

The block multiplexer channel adapter responds to channel commands similar to a 3088 Channel-to-Channel Adapter. However, this adapter does not support full emulation of a 3088.

The block multiplexer channel adapter may also be attached to a host system using the 3044 Model 2 Channel Extender or the 9034 Model 1 ESCON Converter.

Up to two block multiplexer channel adapters may be installed in a system unit.

Since the system is directly attached to the bus and tag cables of the block multiplexer channel of the host system, careful consideration must be made before:

- Powering the system unit off
- Loading and running the diagnostic programs
- Changing position of the *bypass* switch on the interface cable
- Connecting or disconnecting any of the cables to the adapter or interface assembly.

Use the following guidelines to understand the actions needed.

Starting or Stopping Communications With the Host System

An operator console for the system is required. The console may be a direct-attached display and keyboard or an ASCII terminal.

Changes to the *on-line* or *off-line* status of the block multiplexer channel adapter is made using the System Management Interface Tool (SMIT). If there are two block multiplexer channel adapters installed in this system unit, the status of each adapter must be changed individually.

Stopping Communications

Use the following steps as a guideline for stopping communications with a host block multiplexer channel:

1. Have the operator of the host system stop any communications with this block multiplexer channel adapter.
2. Stop all application programs on this system that use this block multiplexer channel adapter.
3. Use SMIT to change the status of this adapter to *offline*. If needed, see the *Block Multiplexer Channel User's Guide and Programming Reference* for procedures.

If you have another block multiplexer channel adapter in this system unit, you must use this same procedure to stop it.

Starting Communications

Use the following steps as a guideline for starting communications with a host block multiplexer channel:

1. Use SMIT to change the status of this adapter to *online*. If needed, see the *Block Multiplexer Channel User's Guide and Programming Reference* for procedures.
2. Start the application programs that need to use this block multiplexer channel adapter.
3. Have the operator of the host system start communications with this block multiplexer channel adapter.

If you have another block multiplexer channel adapter in this system unit, you must use this same procedure to start it.

Running the System Diagnostics

Since the system is directly attached to the bus and tag cables of the block multiplexer channel of the host system, the communications between the host system and all of the block multiplexer channel adapters must be stopped before diagnostics are run on any block multiplexer channel adapter. See "Stopping Communications" for this adapter information for general guidelines, or see the *Block Multiplexer Channel User's Guide and Programming Reference* for detailed procedures.

Before disconnecting *any* cables from the adapter or interface assembly, the host system block multiplexer channel must be stopped. Get the host system operator to do this for you.

The system diagnostics allow wrap testing at the adapter and at the bus and tag cable connectors. See the *Block Multiplexer Channel User's Guide and Programming Reference* for detailed procedures.

Error Log Entries

Both the error log in the Version 3 Operating System and the host system error log may provide valuable information for problem solving.

For a description of the system error logging and the error log entries representing this adapter, see the following manuals:

- *Problem Solving Guide*, form number SC23-2204
- *Version 3.2 General Concepts and Procedures*, form number GC23-2202
- *Block Multiplexer Channel User's Guide and Programming Reference*, form number SC23-2427.

Solving System to Host System Communication Problems

Use the *Block Multiplexer Channel User's Guide and Programming Reference* and the *Problem Solving Guide* to solve operational problems after initial installation.

For installation problems, use the *Block Multiplexer Channel User's Guide and Programming Reference* to be sure the software is installed, the channel is cabled correctly, and the host system and operating system are configured correctly.

Installing the Block Multiplexer Channel Adapter

The following list of actions provide an overview of the sequence that *must* be followed to install this adapter and start communications with the host system. The details of the required actions are in the *Block Multiplexer Channel User's Guide and Programming Reference* and in the host system operating procedures.

Warning: Since the system is directly attached to the bus and tag cables of the block multiplexer channel of the host system, connection of this adapter to the host system must be done in a given sequence.

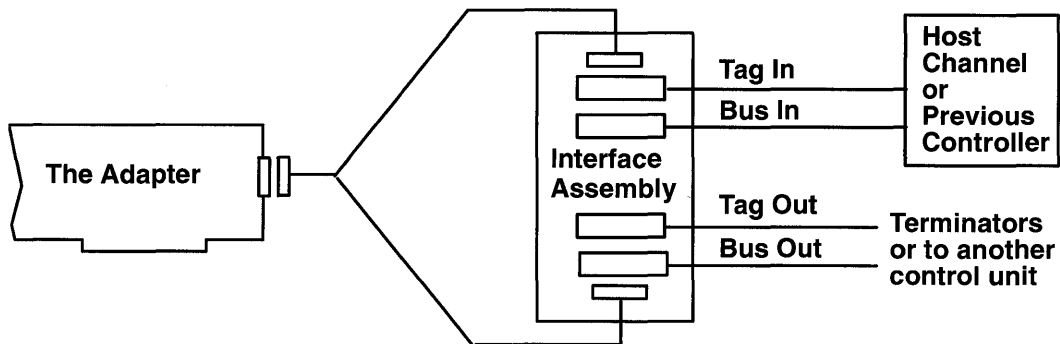
1. Install the adapter. Installation of the adapter within the system unit was done when the system unit was manufactured or it was installed using MES instructions shipped with the adapter.

The interface cable and interface assembly should be attached to the adapter, but *do not* cable the adapter to the bus and tag cables now.

2. Check the adapter out using the system diagnostics (The block multiplexer channel adapter diagnostics may be on a supplemental diagnostic diskette).
3. Configure the operating system for the block multiplexer channel adapter. See the *Block Multiplexer Channel User's Guide and Programming Reference* for detailed procedures.
4. Configure the host system for the block multiplexer channel adapter. See the *Block Multiplexer Channel User's Guide and Programming Reference* for detailed procedures.
5. Go to "Cabling the System Unit to the Host System."

Cabling the System Unit to the Host System

Use the drawing below (not to scale) to understand how the Block Multiplexer Channel Adapter (Identified as *The Adapter* in this drawing) is cabled to a host system.



Note: Refer to *System/370, 4300, and 9370 Processors Input/Output Equipment Installation Manual – Physical Planning, GC22-7064*, for details and restrictions regarding channel cabling. The Interface Assembly is wired for “high” channel priority.

The following list of actions provide an overview of the sequence for cabling the Block Multiplexer Channel Adapter to a host system. See the *Block Multiplexer Channel User's Guide and Programming Reference* for detailed procedures.

1. Be sure the host system is configured properly.
2. Be sure the operating system and the block multiplexer channel adapter are configured properly.
3. Using SMIT, set the status of the block multiplexer channel adapter to *offline*.
4. Stop the operating system (**shutdown -F**); then set the system unit power switch to Off.
5. Stop the host block multiplexer channel temporarily while you attach the bus and tag cables to the interface assembly.
6. Set the system unit power switch to On; then use the steps in “Starting Communications” on page 7-4.

Fiber Distributed Data Interface (FDDI) Adapter

The Fiber Distributed Data Interface (FDDI) Adapter attaches the system unit to a FDDI network. There are two types of FDDI adapters:

- The fiber distribution data interface (FDDI) single ring adapter (Type 2-6)
- The fiber distribution data interface (FDDI) dual ring upgrade kit adapter (Type 2-7).

The communications link with the FDDI ring is established during workstation initialization; thus no special operator action is required to start using the ring.

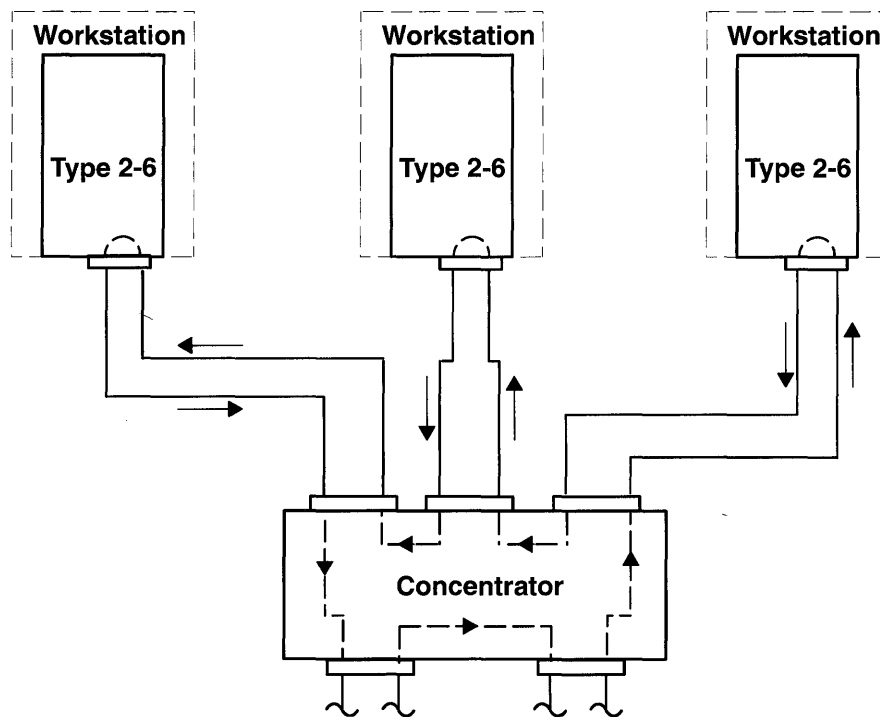
For more information about this FDDI adapter and software, see *Version 3.2 for Fiber Distributed Data Interface User's Guide and Programming Reference*, form number SC23-2426. This manual is shipped with the FDDI adapter.

FDDI Single Ring Adapter Service Considerations

The single ring adapter provides a communication link to the concentrator. The concentrator links the workstations together to form a ring. The number of workstations that attach to a single concentrator is determined by the capacity of the concentrator. The concentrator may also have other concentrators attached to it to increase the number of workstations in the ring. Each workstation can communicate directly with any other workstation in the ring.

If any workstation in the ring has a failure that prevents the signal from being passed back to the concentrator, the concentrator automatically bypasses that workstation to allow communications to continue on the ring.

When you set the system power to Off or disconnect it from the concentrator, the concentrator will bypass that connection to keep communications connection good.



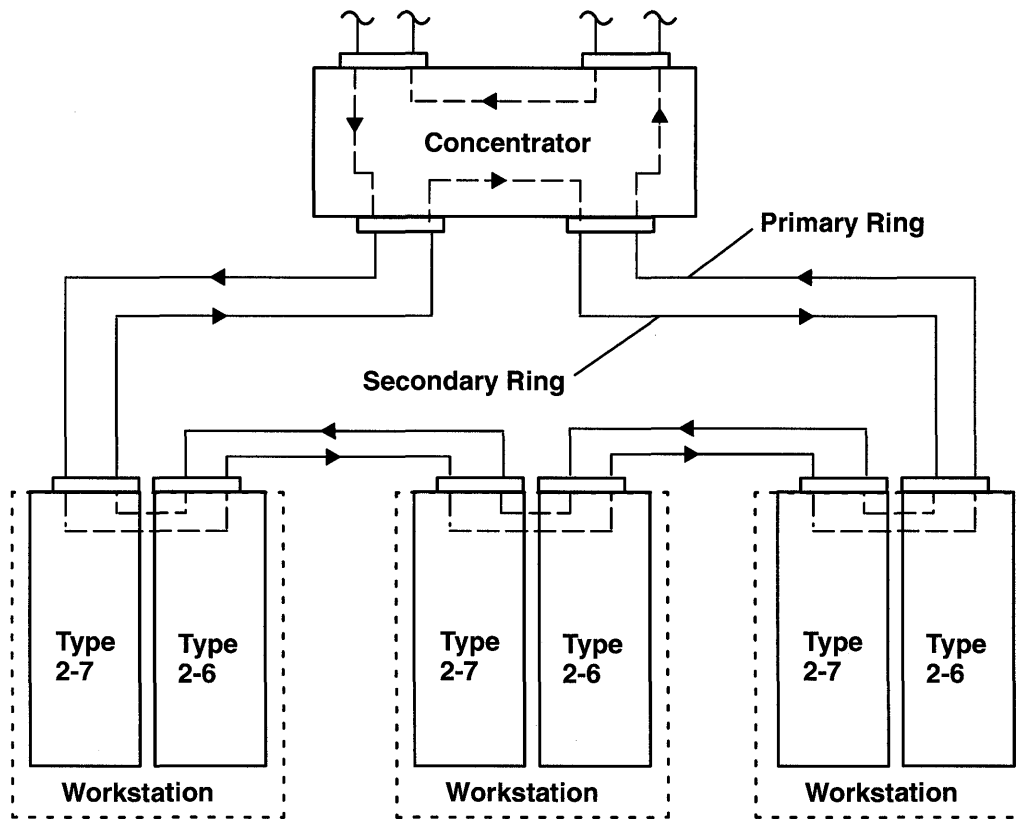
FDDI Dual Ring Adapter Service Considerations

The dual ring adapter provides a dual path for communication between the workstations on the ring. The purpose of the dual path is to provide increased communication availability. The dual ring may also have more than one concentrator in the ring to provide connections to other FDDI rings.

If any workstation in the ring has a failure that prevents the signal from being passed on to the next workstation or concentrator, the FDDI adapter or concentrator does a *loop back* on the secondary ring to allow communications to continue on the ring.

In the event two workstations or concentrators fail at the same time the ring could become *segmented*. That would mean part of the ring would act like a ring within itself, but could not communicate with the other parts of the ring. Returning either failing workstation or concentrator to correct working order will restore communications on the complete ring.

When you set the system unit power to Off or disconnect one of the FDDI cables, the workstations or concentrators on each side of the system unit will loop the signal back on the secondary ring. This will allow continued communications between each workstation on the ring, except the one that is powered off.



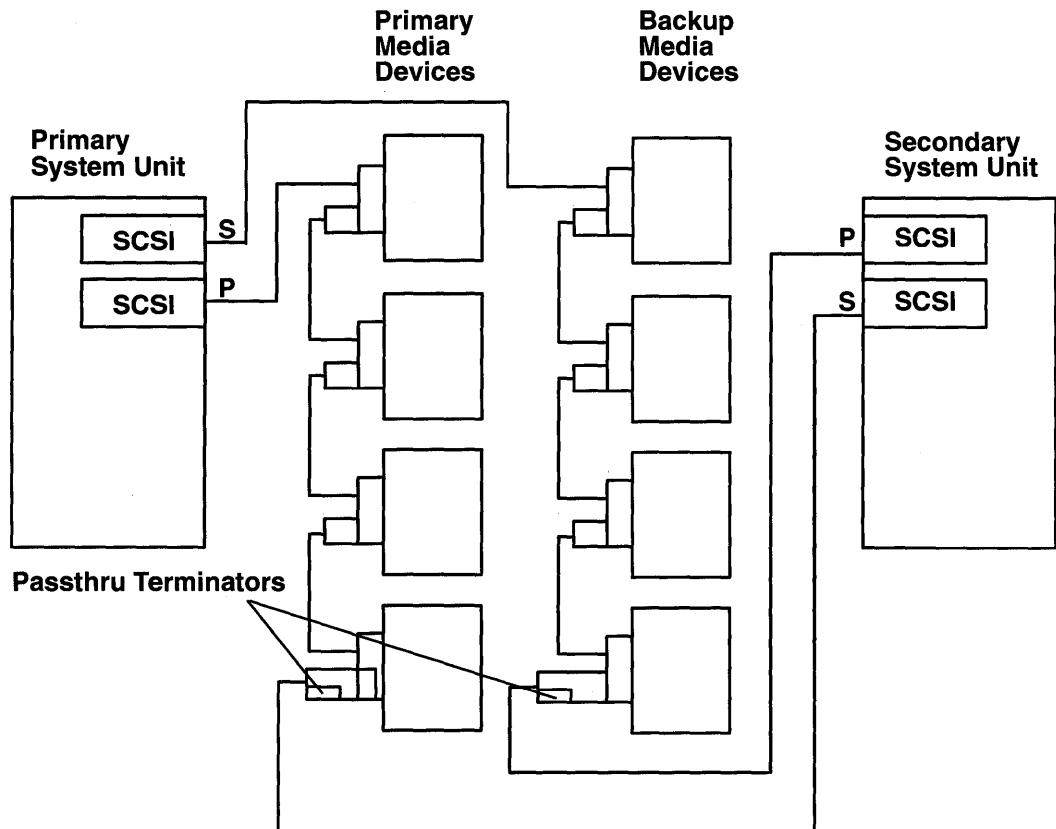
Increased Availability SCSI

An increased availability SCSI configuration consists of two system units or CPU drawers connected to a common set of SCSI devices. The configuration provides increased availability because either system unit or CPU drawer can continue to access the common devices while the other system is unavailable.

This configuration requires a passthru terminator cable at each end of the SCSI bus. The passthru terminator cable connects between the SCSI controller and the first device. The purpose of the passthru terminator cable is to keep the SCSI bus from the other system unit terminated while the SCSI cable is disconnected from the SCSI controller in this system unit.

The actions needed to isolate a particular system unit or device from the configuration depends on the software controlling the systems and devices. Therefore, be sure you use the documentation with the software to prepare the configuration before powering a system unit or device off.

The following diagram presents *one possible* configuration of an increased availability SCSI configuration. Your configuration *may not* be connected like this example.



Appendix A. Wrap Plugs

Adapter Name	Connector Type, Port Name, or Cable	Part Number
4-Port Multiprotocol Communications Adapter	Adapter, 78-pin	40F9902
	X.21 port	40F9904
	V.35 port	40F9900
	V.35 cable	71F0163
	EIA-232 port	40F9903
	EIA-422A port	53F3886
8-Port Async Adapters	Adapter, 78-pin 25-pin D-shell	22F9694 6298964
16-Port Async Adapters	Adapter, 78-pin 25-pin D-shell	53F3312 6298964
64-Port Async Controller	Adapter, RJ-45 type connector	53F3623*
16-Port Async Concentrator	Input cable wrap, RJ-45	53F3205*
	Output connector, RJ-45	53F3624*
	25-pin D-shell	6298964
Block Multiplexer Channel Adapter	78-pin D-shell	71F1184
Block Multiplexer Channel Adapter	Serpentine, bus	8575337
Block Multiplexer Channel Adapter	Serpentine, tag	8575338
Built-in parallel printer adapter	Parallel printer port	71F0690
Built-in serial adapter	Serial ports S1 and S2	6298966
	25-pin D-shell	6298964
Ethernet Adapter (thick)	15-pin D-shell	71F1167
Ethernet Adapter (thin)	BNC with 25-Ohm terminator	71F1168
FDDI Adapter	Two-port, fiber optic, MIC	81F9016
Graphics Input Device Adapter	Adapter 8-pin DIN	22F9689
M-Video Capture Adapter (NTSC version)	Wrap test cable, 20-pin D-shell (incl. in cable set)	92F3713 (cable set)
M-Video Capture Adapter (PAL version)	Wrap test cable, 37-pin D-shell (incl. in cable set)	92F3714 (cable set)
Serial Optical Channel Converter	Two-port, optic	56F0203**
Fiber optical cable Feed-through connector	Fiber optic	46F2438
	Fiber optic	99F0489

* Available only as part of wrap plug kit, Part Number 53F3662.

** Shipped with converter.

Continued on the following page.

Continued from the previous page.

Adapter Name	Connector Type, Port Name, or Cable	Part Number
Tablet adapter	Tablet connector	22F9689
X.25 Communications Adapter	Adapter, 37-pin	07F3132
	X.21 Cable (07F3151)	07F3153
	V.24 Cable (07F3161)	07F3163
	V.35 Cable (07F3171)	07F3173

Appendix B. Test Media

Device	Media or Supplies	Part Number
2.3 GB 8 mm tape drive	Tape/media kit	59F3907
	Kit includes:	
	- 8mm Cleaning tape cartridge	21F8593
	- 8mm Blank data tape cartridge	21F8575
	- 8mm Test tape cartridge	21F8577
Package of five 8mm blank tapes	21F8595	
1/2-inch 9-track tape drive	Tape/media kit	21F3108
	Kit includes:	
	- Cleaning kit	0352465
	- Crank	6200972
- CE tape assembly	6201953	
1/4-inch cartridge tape drive	1/4 inch head cleaning kit	21F8570
	1/4 inch test tape cartridge	92X7510
	Tape cleaning solution	13F5647
	Package of five blank tapes	21F8588
5-1/4 inch diskette drive	5-1/4 inch 360K byte blank diskette	6023450
	5-1/4 inch 1.2M byte blank diskette	6109660
3-1/2 inch diskette drive	3-1/2 inch 1.0M byte blank diskette	6404095
	3-1/2 inch 1.0M byte diagnostic diskette	71F1247
	3-1/2 inch 2.0M byte blank diskette	6404078
	3-1/2 inch 2.0M byte diagnostic diskette	71F1248
	3-1/2 inch 4.0M byte diagnostic diskette	00G3352
CD-ROM drive, bezel type A	Media kit for bezel type A	59F3562
	Kit includes:	
	- Test disc	53F3088
	- Caddy	22F9419
	- Lens cleaner	59F3563
Audio test device (headset)	53F3610	
CD-ROM drive, bezel type B	Media kit for bezel type B	31F4232
	Kit includes:	
	- Test disc	81F8902
	- Caddy	22F9419
	Audio test device (headset)	53F3610
RISC System/6000 diagnostic package	Diagnostic and test diskettes	10G8800

Appendix C. Three-Digit Display Numbers

This appendix contains lists of the various numbers and characters that may display in the three-digit display. Determine the type of operation being performed, then use the list for that type operation.

Built-In Self-Test (BIST) Indicators

100	BIST completed successfully; control was passed to IPL ROS.
101	BIST started following Reset.
102	BIST started following Power-on Reset.
103	BIST could not determine the system model number.
104	Equipment conflict; BIST could not find the CBA.
105	BIST could not read from the OCS EPROM
106	BIST detected a module error.
111	OCS stopped; BIST detected a module error.
112	A checkstop occurred during BIST; checkstop results could not be logged out.
113	BIST checkstop count is greater than 1.
120	BIST starting a CRC check on the 8752 EPROM.
121	BIST detected a bad CRC in the first 32K of the OCS EPROM.
122	BIST started a CRC check on the first 32K of the OCS EPROM.
123	BIST detected a bad CRC on the OCS area of NVRAM.
124	BIST started a CRC check on the OCS area of NVRAM.
125	BIST detected a bad CRC on the time-of-day area of NVRAM.
126	BIST started a CRC check on the time-of-day area of NVRAM.
127	BIST detected a bad CRC on the 8752 EPROM.
130	BIST presence test started.
140	BIST failed; procedure error.
142	BIST failed; procedure error.
144	BIST failed; procedure error.
151	BIST started AIPGM test code.
152	BIST started DCLST test code.
153	BIST started ACLST test code.
154	BIST started AST test code.
180	BIST logout failed.
185	A checkstop condition occurred during the BIST.
195	BIST logout completed.
888	BIST did not start.

Power-On Self-Test (POST) Indicators

200	IPL attempted with keylock in the Secure position.
201	IPL ROM test failed or checkstop occurred (irrecoverable).
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 1M 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 restart 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 restart from Ethernet specified in NVRAM IPL Devices List.

227 Attempting a Normal mode restart 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 restart from adapter feature ROM specified in IPL ROM Device List.

231 Attempting a Normal mode restart 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 restart 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 restart from Ethernet specified in IPL ROM Default Device List.

237 Attempting a Normal mode restart from Token Ring specified in IPL ROM Default Device List.

238 Attempting a Normal mode restart from Token Ring specified by the operator.

239 System failed to restart from the device chosen by the operator.

240 Attempting a Service Mode restart 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 restart 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 restart from Ethernet specified in NVRAM IPL Devices List.

247 Attempting a Service mode restart 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 restart from adapter feature ROM specified in IPL ROM Device List.

251 Attempting a Service mode restart 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 restart 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 restart from Ethernet specified in IPL ROM Devices List.

257 Attempting a Service mode restart from Token Ring specified in IPL ROM Devices List.

258 Attempting a Service mode restart from Token Ring specified by the operator.

260 Information is being displayed on the display console.

261 Information will be displayed on the TTY terminal when the "1" key is pressed on the TTY terminal keyboard.

262 A keyboard was not detected as being connected to the system's keyboard port.

263 Attempting a Normal mode restart from adapter feature ROM specified in NVRAM Device List.

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.

290 IOCC POST error (irrecoverable)

291 Standard I/O POST running.

292 SCSI POST running.

293 7012 DBA disk POST running.

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.

500 Querying Native 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.
520 Bus configuration running.
521 **/etc/init** invoked **cfmgr** with invalid options; **/etc/init** 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).
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.
558 There is not enough memory to continue the IPL.
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).

591 Configuring an LVM device driver.
 592 Configuring an HFT device driver.
 593 Configuring SNA device drivers.
 711 Unknown adapter being identified or 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 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.
 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.
 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.
 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.
 852 Ethernet adapter being identified or configured.
 854 3270 connection being identified or configured.
 855 4-port multiprotocol adapter being identified or configured.
 857 FSLA adapter being identified or configured.
 858 5085/86/88 adapter being identified or configured.
 859 FDDI adapter being identified or configured.
 862 Block multiplexer channel 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 Model 933X subsystem 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.
876 8-bit color graphics processor being identified or configured.
877 POWER Gt3/Gt4 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.
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.
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.
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.
951 670 MB SCSI disk drive being identified or configured.
952 355 MB SCSI disk drive being identified or configured.
953 320 MB SCSI disk drive being identified or configured.
954 400 MB SCSI disk drive being identified or configured.
955 857 MB SCSI disk drive being identified or configured.
956 670 MB SCSI disk drive electronics card being identified or configured.
957 DBA disk drive being identified or configured.
970 Half-inch, 9-track tape drive being identified or configured.
971 150 MB quarter-inch tape drive being identified or configured.
972 8 mm SCSI tape drive being identified or configured.
974 CDROM drive being identified or configured.
977 M-Audio capture and playback adapter being identified or configured.

Dump Progress Indicators

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 user-requested dump has started.
0c3	The dump is inhibited.
0c4	The dump did not complete. A partial dump may be present.
0c5	Dump failed to start; the dump program could not write to the dump device.
0c6	A dump to the secondary dump device was requested. Make the secondary dump device ready; then press the Ctrl-Alt-Numpad2 key sequence.
0c7	Reserved.
0c8	The dump function is disabled; no primary device is configured.
0c9	A dump is in progress.

Diagnostic Load Progress Indicators

Note: When a lowercase `c` is listed, it displays in the lower half of the seven-segment character position.

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.
c09	The diskette drive is reading or writing a diskette.
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.
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. The following information describes both Crash and Diagnostic Messages.

Type 102 Message

The message type 102 contains information about a dump. See “Reading Flashing 888 Numbers” in Chapter 3 for information about reading the message out.

Crash Codes

000	Unexpected system interrupt
200	Machine check because of a memory bus error (RAS/CAS parity)
201	Machine check because of a memory timeout
202	Machine check because of a memory card failure
203	Machine check because of an 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
300	Data storage interrupt from the processor
32x	Data storage interrupt because of an I/O exception from IOCC; x represents the BUID.
38x	Data storage interrupt because of an I/O exception from SLA; x represents the BUID.
400	Instruction storage interrupt
500	External interrupt because of a scrub memory bus error (RAS/CAS parity)
501	External interrupt because of an unidentified error
51x	External interrupt because of a DMA memory bus error (RAS/CAS parity); x represents the IOCC number.
52x	External interrupt because of an IOCC channel check; x represents the IOCC number.
53x	External interrupt because of an IOCC bus timeout; x represents the IOCC number.
54x	External interrupt because of an IOCC keyboard check; x represents the IOCC number.
558	There is not enough space to continue the program load
700	Program interrupt
800	Floating point is not available.

Dump Status Codes

This field contains the dump progress indicator value. See “Dump Progress Indicators” in this appendix.

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 Flashing 888 Numbers” in Chapter 3 for information about the diagnostic information contained within this message.

Appendix D. Testing a Line Printer

The steps outlined in this appendix provide a simple procedure for determining if a printer attached to your system is responding correctly. The operating system should be up and running in your normal environment.

To determine what printers are available, enter the following:

```
lsdev -C -c printer
```

This command will display a list of printers currently defined on the system. Only those printers that are in the *available* state can be used (for example, those printers marked as *defined* can *not* be used). Ensure that a printer is actually connected at the location specified in the output of the command.

To begin printing, enter the following:

```
cat /usr/lpp/diagnostics/CEREADME > /dev/lpx
```

Note: In the above step, you must substitute for *x* the value obtained from the `lsdev` command.

After the command is entered, the contents of the `CEREADME` file should print.

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