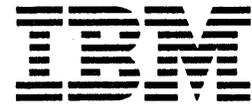


IBM S/390® Integrated Server 3006

# Service Guide

*Model B01*

IBM S/390® Integrated Server 3006



# Service Guide

*Model B01*

**Note!**

Before using this information and the product it supports, be sure to read the general information under "Notices" on page xi.

**Second Edition (May 1999)**

This edition, SY24-6161-01, applies to the IBM System/390® Integrated Server version 3.0 and licensed internal code version 2.10 and to all subsequent releases of this product until otherwise indicated in new editions or Technical Newsletters.

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Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. IBM is not responsible for any radio or television interference caused by using other than recommended cables and connectors, by

installation or use of this equipment other than as specified in the installation manual, or by any other unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

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**Machine:** System 390 Integrated Server

**Warranty Period\*:** One Year

*\*Elements and accessories are warranted for three months. Contact your place of purchase for warranty service information.*

### Production Status

Each Machine is manufactured from new parts, or new and serviceable used parts (which perform like new parts). In some cases, the Machine may not be new and may have been previously installed. Regardless of the Machine's production status, IBM's warranty terms apply.

### The IBM Warranty

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### **Warranty Service**

To obtain warranty service for the Machine, you should contact your reseller or call IBM. In the United States, call IBM at **1-800-IBM-SERV (426-7378)**. In Canada, call IBM at **1-800-465-6666**. You may be required to present proof of purchase.

Depending on the Machine, the service may be 1) a "Repair" service at your location (called "On-site") or at one of IBM's or a reseller's service locations (called "Carry-in") or 2) an "Exchange" service, either On-site or Carry-in.

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It is your responsibility to:

1. obtain authorization from the owner (for example, your lessor) to have IBM or your reseller service a Machine that you do not own;
2. where applicable, before service is provided —
  - a. follow the problem determination, problem analysis, and service request procedures that IBM or your reseller provide,
  - b. secure all programs, data, and funds contained in a Machine,
  - c. inform IBM or your reseller of changes in a Machine's location, and
  - d. for a Machine with exchange service, remove all features, parts, options, alterations, and attachments not under warranty service. Also, the Machine must be free of any legal obligations or restrictions that prevent its exchange; and
3. be responsible for loss of, or damage to, a Machine in transit when you are responsible for the transportation charges.

### **Extent of Warranty**

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2. loss of, or damage to, your records or data; or
3. economic consequential damages (including lost profits or savings) or incidental damages, even if IBM is informed of their possibility.

Some jurisdictions do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

This warranty gives you specific legal rights and you may also have other rights which vary from jurisdiction to jurisdiction.



# Safety

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## Safety Notices

Safety notices are printed throughout this service guide. **DANGER** notices warn you of conditions or procedures that can result in death or severe personal injury. **CAUTION** notices warn you of conditions or procedures that can cause personal injury that is neither lethal nor extremely hazardous. Attention notices warn you of conditions or procedures that can cause damage to machines, equipment, or programs.

The following **DANGER** notice appears on pages 167 and 172.

### DANGER

**Service of any subassemblies under power outside of their machine frame mounts is strictly prohibited.**

---

## Laser Safety Information

### CAUTION:

The coupling facility, ESCON, FICON, and OSA channel laser ports are designed and certified for use only with optical fiber and connectors having characteristics specified by IBM. The use of any other connectors or fiber may result in emission of laser power levels capable of producing injury to the eye if directly viewed. Use of non-specified connectors or fiber could violate the class 1 certification.

### CAUTION:

Data processing environments can contain equipment transmitting on system links with laser modules operating at greater than class 1 power levels. For this reason, it is advised never to look into the end of an optical fiber cable or open receptacle. The inspection or repair of optical fiber cable assemblies and receptacles should be performed by trained service personnel only.

## Laser Compliance

The laser modules are certified in the U.S. to conform to the requirements of DHHS 21 CFR Subchapter J for Class 1 laser products. Elsewhere, they are certified to be in compliance with IEC 825 (first edition 1984) and CENELEC HD 482 S1 as a Class 1 laser product. The coupling facility channel modules have also been tested and approved to comply with international Class 1 laser product certifications. Consult the label on each part for laser certification numbers and approval information.

Class 1 laser products are not considered to be hazardous. Internally, the laser modules operating on multimode fiber contain a Class 3b laser that is nominally a 5.0 milliwatt source operating in the wavelength region of 780-850 nm. Internally, the laser modules operating on single-mode fiber contain a class 3b laser that is nominally a 5.0 milliwatt source operating in the wavelength region of 1270-1340

nanometers. All laser modules are designed so that there is never any human access to laser radiation above a Class 1 level during normal operation, user maintenance, or prescribed service conditions.

**CAUTION:**

**Although the IBM module is safe, there may be other Laser modules in the system link that may not be safe under all conditions. For this reason it is advised to never view the end of the optical fiber cable or open receptacle. However, some repair activities of optical fiber cable assemblies may require the use of special viewing devices. In such cases, disconnecting both ends of the fiber is mandatory. As an additional precaution, viewing equipment with the proper Laser viewing protection filters must be used.**

The OSA fiber optic modules are certified in the U.S. to conform to the requirements of DHHS 21 CFR subchapter J for Class 1 laser products. Elsewhere, they are certified to be in compliance with IEC 825 (first edition 1994) and CENELEC HD 482 S1 as a Class 1 laser product. These modules have been tested and approved to comply with International Class 1 laser product certifications. Consult the label on each transceiver for laser certification numbers and approval information.

Observe the following caution notice when handling ESCON, coupling facility, or OSA2 fiber optic channel cables.

**CAUTION:**

**Data processing environments may contain equipment transmitting on system links, with Laser modules operating at greater than Class 1 power levels. For this reason, it is advised never to look into the end of an optical fiber cable or open receptacle. The inspection and/or repair of optical fiber cable assemblies and receptacles should be performed by trained service personnel only.**

## World Trade Safety Information

Several countries require the safety information contained in product publications to be presented in their national languages. If this requirement applies to your country, a safety information booklet is included in the publications package shipped with the product. The booklet contains the safety information in your national language with references to the US English source publications. Before using a US English publication to install, operate, or service this IBM\* product, you must first become familiar with the related safety information in the booklet. You should also refer to the booklet any time you do not clearly understand any safety information in the US English publications.

---

## Preface

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### Who Should Use This Guide

This guide is for service representatives who perform problem isolation and repair actions on the System 390 Integrated Server. The service representative should have a good understanding of the OS/2 operating system.

---

### How This Book Is Organized

This book contains the following chapters:

- **Start**  
This is a list of problem symptoms and the chapter or section to reference to resolve the problem.
- **System Bring-Up Sequence**  
Contains a flowchart of the sequence of events during power up, and details steps to follow if an abnormal condition occurs.
- **Processor Unit**  
This includes a list of diagnostic procedures and a list of error codes and messages that can result from running the diagnostics.
- **PCI/ISA BUS**  
Describes the PCI/ISA Local Bus, and has descriptions of each PCI interface adapter.
- **IOSP**  
Describes the IOSP, the data flow, diagrams, and a description of the BIOS operation.
- **SSA Dasd**  
Contains service information for the SSA adapter and attached storage devices.
- **Power**  
Includes a layout and description of the MSA, MDA, OCA, and IBF. A power map is included as a starting point for analyzing a system power failure.
- **Service Procedures**  
Explains the use of P/390 I/O Traces, P/390 Snap Shot Dumps, FixPack and Patch application.
- **OS/2 Utilities**  
Describes all the OS/2 Utilities applicable to the System 390 Integrated Server.
- **Parts Catalog Lists** each part and order number for the System 390 Integrated Server.
- **Overview**  
Gives a 3D detailed picture of the System 390 Integrated Server and describes each element.



## Chapter 1. START

This is the starting point for all service calls.

### Problem / Service Activity Start List

Problem	Instructions
Customer reports a failing Symptom (i.e. System Hang, wait), or the Display is blank and system beeps, or the Display is blank, or the Display is blank with no power indication, or the machine fails to boot up correctly, or the problem is unknown	Go to Chapter 2, "Solving Problems" on page 3
OS/2 Trap Errors 0000-0010	Go To Application Software error and contact the next level of support.
Reports of an error message (see the appropriate chapter) <ul style="list-style-type: none"> <li>• AWSxxxxxx - P/390</li> <li>• Communication Error Message - PCI/ISA</li> <li>• BIOS error messages - Single Board Computer</li> <li>• System Power Status - Power</li> <li>• SRNxxxxx - SSA RAID</li> </ul> or need Procedures for running diagnostics	Select the appropriate section: <ul style="list-style-type: none"> <li>• Go to Chapter 3, "P/390 Processor Card" on page 7</li> <li>• Go to Chapter 4, "PCI/ISA BUS and Adapters" on page 13</li> <li>• Go to Chapter 6, "Single Board Computer and Attached I/O" on page 51</li> <li>• Go to Chapter 9, "Power" on page 167</li> <li>• Go to Chapter 7, "SSA RAID Adapter, SSA, and RAID" on page 73</li> </ul>
Customer reports a failure on the Disk Subsystem	Go to Chapter 7, "SSA RAID Adapter, SSA, and RAID" on page 73
Customer reports a failure on a communication Adapter or network	Go to Chapter 4, "PCI/ISA BUS and Adapters" on page 13
Customer reports a power problem	Go to Chapter 9, "Power" on page 167
Customer reported problem with Single Board Computer (i.e. mouse, keyboard, monitor, floppy disk, CDROM, 4MM DAT Tape)	Go to Chapter 6, "Single Board Computer and Attached I/O" on page 51
For information on Licensed internal code changes Installing traps (fixes) for Licensed internal code changes Backup the customer configuration information (critical data) Log and Trace Information and Procedures	Go to Chapter 10, "Service Procedures" on page 215
For information on FRU Removal and Replacement Procedures	Go to Chapter 8, "Removal and Replacement Procedures" on page 141

Start

---

## Chapter 2. Solving Problems

The S/390 Integrated Server uses many of the IOSP adapters and devices. These faults can be diagnosed using the standard S/390 Integrated Server maintenance package.

1. Verify the correct operation of the S/390 Integrated Server using the appropriate procedures. This includes:
  - Visual checks
  - Examine Error Logs
  - Running Diagnostics.
2. If the customer has a reported problem with a specific component, run its diagnostics first.
3. If no problems are found, run the P/390 diagnostics. Refer to "Diagnostics" on page 8 for the procedures.
4. If the P/390 diagnostics do not detect a problem, view the P/390 error log. Refer to "P/390 Error Logs" on page 218 for the procedures.

The IOSP can detect FRU errors and notify the customer that the machine requires service. The identification of failing power FRUs will be by service lights, as well as the Power Monitoring application. Isolation of PCI devices will be by error messages and FRU replacement. All Service will be via hardcopy procedures.

---

### OS/2 Problems

The S/390 Integrated Server I/O subsystem is based on a customized OS/2. If any programs are added to OS/2 that are not part of the Integrated Server product, these applications can affect both the performance and reliability of your S/390 I/O.

If you have added new applications and then experience any problems, first stop running the applications while the P/390 is IPLed, to see if the problems cease. If the problems persist, then try uninstalling the applications. If you still have problems, then contact your IBM Business Partner; your C: drive may have to be formatted and reloaded.

---

### Sequence of events from a power up

The following MAP is the sequence of events with visual indicator of what happens in each step and if abnormal condition a 'Go to' within the Service Guide that would aid in the problem solving process.

Power up sequence is:

- Power On, and Hardware Resets
- Phase 1 POST tests.
- Phase 2 POST tests.
- Adapter BIOS Loads (bottom to top)
- Search for bootable device, floppy then CD-ROM then SSA Disk.

Should find OS/2 on SSA Disk.

- Load OS/2 device drives from config.sys.
-

## Solving Problems

1

Power on the Monitor.

Does the Monitor power on correctly?

**YES NO**

- ↓ Go to "Resolving Keyboard, Monitor, and Mouse Problems" on page 71

Light will be Amber at first.

Light will change to Green when the SBC starts running the Power On Self Test (POST).

2

Verify that the power cables are properly connected.

Power on the system.

Are either of the OCA "PWR OUT" indicators on ?

**YES NO**

- ↓ Go to "Power Failures" on page 172

This step takes approximately 20 seconds.

Check the power indicators for both OCAs.

3

Are there BEEP codes during Power-on-self Test?

**NO YES**

- ↓ Go to "BIOS Beep Codes" on page 64

When you turn on the server, it performs a series of tests to check the operation of the S/390 Integrated Server components and features. This series is called the power-on-self test or POST.

Phase 1 POST generates beep codes to indicate fatal error that will not allow the system to continue the bootup process.

4

Was BIOS logo displayed?

**YES NO**

- ↓ Go to "PCI Bus Isolation" on page 18

Phase 2 of the POST tests will display the BIOS logo.

American Megtrends AMIBIOS (C)  
TRENTON Technology Inc.

Failure to see the logo usually indicates a hung PCI bus.

5

Are there Error Messages during Power-on-self Test?

**NO YES**

- ↓ Go to "BIOS Error Messages" on page 65

If POST detects a problem, an error message appears on your screen. A single problem can cause several error messages to appear. When this occurs, work to correct the cause of the first error message.

If memory tests complete, POST test completed successfully.

6

Do any PCI adapters initialize?

If no PCI adapters initialize this indicates a problem on the PCI bus.

**YES NO**

↓ Go to "PCI Bus Isolation" on page 18

7

Has the SBC SCSI BIOS Initialization completed (used to access the CD-ROM and 4mm Tape drive), and device list displayed correctly?

When the SBC SCSI device driver starts to load the following is displayed, and the adapter is tested.

```
Adaptec AIC-7880 Ultra/Ultra W BIOS
(c) 1996 Adaptec, Inc. All Rights Reserved.
```

**YES NO**

↓ Go to "Start of Repair for SCSI Bus and SCSI Devices" on page 45

```
<<< Press <CTRL><A> for SCSISelect(TM) Utility! >>
```

A device list will be displayed.

```
SCSI ID:LUN NUMBER #:# 3:0 - ARCHIVE Python
SCSI ID:LUN NUMBER #:# 4:0 - IBM CDRM00203
```

The **BIOS not installed** message indicates the device driver has completed loading.

8

Has the SSA Adapter BIOS Initialization completed?

When the SSA device driver starts to load the following is displayed:

```
IBM SSA CBIOS (C) v1.07 -- currently enabled
Press TAB key to disable the CBIOS
```

**YES NO**

↓ Go to Chapter 7, "SSA RAID Adapter, SSA, and RAID" on page 73

When the SSA driver completes loading the following is displayed:

```
IBM SSA CBIOS Extension (C) v1.07 6350
```

**Note:** Do not disable the CBIOS option.

9

Does OS/2 boot up complete and the OS/2 Desktop appear?

**NO YES**

↓ Check Chapter 1, "START" on page 1 for another possible entry point, or call next level support for help.

10

Do the SCSI or SCSI3480 device drivers fail to load or produce error messages?

**NO YES**

↓ Go to "Start of Repair for SCSI Bus and SCSI Devices" on page 45

## Solving Problems

---

**11**

Do the ARTIC960 device drivers fail to load or produce error messages?

**NO YES**

↓ Go to "Channel Diagnostics" on page 43

---

The ARTIC960 adapters are the S/390 Parallel or Serial Channel Cards.

**Note:** There may be more than one channel card installed in the system. The RIC010 message should identify the failing channel card number

**12**

Check Chapter 1, "START" on page 1 for another possible entry point, or call next level support for help.

## Chapter 3. P/390 Processor Card

### Processor Unit Problem/Action List

Problem Area Reported	Reference Section
P/390 Install	"Installing P/390 Hardware and Software" on page 8
Error message received	"P/390 Error Messages" on page 11
Maintenance	"Diagnostics" on page 8 Chapter 10, "Service Procedures" on page 215 see "P/390 Error Logs" on page 218
The SAD display says "STOPPED" or "DOWN"	"STOPPED and DOWN Displayed on the System/390™ Activity Display" on page 10
Removal / Replacement Procedures	"P/390 Card Removal and Replacement" on page 144 for the removal and replacement of the P390 card

### Description

The S/390 Integrated Server consists of a P/390 processor card with 256MB of integrated S/390 memory. The P/390 is supported in the S/390 Integrated Server Model B01.

The P/390 runs standard S/390 operating systems, such as VM/ESA, VSE/ESA, MVS/ESA, and OS/390. The P/390 microcode is loaded automatically during the start up of OS/2. Because the S/390 operating system is not usually loaded and started automatically, it may require a manual IPL.

The P/390 processor card is located in a PCI adapter slot. The card is an individual FRU and can be replaced separately. No cables are used, and no jumpers or adjustments are required during a replacement.

P/390 diagnostics are provided as part of the P/390 Licensed Internal Code. These diagnostics reside on the P/390E Advanced Diagnostics and LIC diskette. The diagnostics provide a complete checkout of the P/390 card and can isolate most faults to a single FRU. The P/390 diagnostics are invoked by booting the diskette. The results are displayed on the screen.

The P/390 running one of the S/390 operating systems utilizes standard PC adapters and devices as I/O for the P/390. In most cases, hardware failures are indicated by the standard OS/2 device drivers and are logged in various OS/2 error logs (IE: LANTRAN.LOG, POPUPLOG.OS2). The standard S/390 Integrated Server diagnostics and maintenance package is used for hardware fault isolation and repair. In addition, any faults detected by the P/390 device managers are shown in a special P/390 pop-up window and are logged in a P/390 unique error log. (AWSERROR.LOG)

S/390 operating systems include problem determination tools such as dumps, traces message displays, logs, and so on. In addition, the P/390 I/O code running under OS/2 provides channel, device manager and manops traces. Selected device managers also support a snap-dump capability. All of these tools can be used by support personnel to resolve P/390 processor and I/O subsystem software problems.

---

## Installing P/390 Hardware and Software

See "Power and Cooling Requirements" on page 210 for power and cooling requirements.

See "Specifications" on page 212 for physical and environmental specifications.

See Chapter 8, "Removal and Replacement Procedures" on page 141 for installing each piece of hardware.

Plug in all the SSA disk drives that you are going to use. Adding more drives later is possible, but you will have to configure an additional array each time, which reduces the usable disk space due to the RAID-5 parity drive (i.e.  $n$   $m$  MB drives yields  $(n-1)m$  MB of usable space).

Cable all the drives (from 3 to 16 drives) into ONE SSA loop. Use the **A** ports of the SSA adapter card only.

If you have eight or fewer drives, plug them into the first two columns, under the Left Extender Card, and use two SSA cables:

- See Figure 33 on page 111

If you have nine to sixteen drives, plug them into the first two columns, under the Left Extender card; then into the third and fourth columns, under the Middle Extender card, and use three SSA cables:

- See Figure 34 on page 112

Remember that if you do not have exactly eight or sixteen drives then SSA Dummy Drive Modules must be plugged into the unused slots in any column pair that is partially filled. This is because the SSA cabling MUST complete a *loop* from adapter port **A1** back to port **A2** without breaks.

See "Installing S/390 Integrated Server Software" on page 232 for installing the S/390 Server software.

---

## Diagnostics

The testing of the P/390 card begins at the PCI channel connector and penetrates progressively into the processor and memory. A specific functional area is tested before it is used to test a subsequent area. The diagnostic proceeds in five phases until an error is detected or the P/390 has passed all the tests.

1. Phase 1 examines the environment.
  - Checks for the presence of the P/390.
  - Initializes the P/390 to a known state.
2. Phase 2 tests the interface between the PCI and the P/390 before loading any P/390 microcode.
  - PCI Channel interface
  - Control store tests
  - Program control and status register tests
3. Phase 3 loads microcode and starts initial interactive testing.
  - Timer tests
  - COMBUF tests
  - Storage nucleus
  - Interrupts
  - Alerts
4. Phase 4 completes the testing of the processor and static storage testing.

5. Phase 5 completes the testing of the key array and interactive storage testing.

## Procedure

To run diagnostics for the P/390, do the following:

1. With the customer's help, stop all S/390 programs and shut down the S/390 operating system if it is actively running on the P/390.
2. Using the S/390 Integrated Server CD-ROM you must create a diagnostic diskette. Using the procedure described in "Creating Diagnostic Diskettes" on page 230 make a diskette for the P/390 Diagnostics.
3. Shut down OS/2.
4. Insert the diskette in the diskette drive.
5. Press **CTRL-ALT-DEL** or press the RESET switch.
6. Follow the directions on the menu to run the diagnostics.
7. The P/390 Diagnostic Selection screen appears.

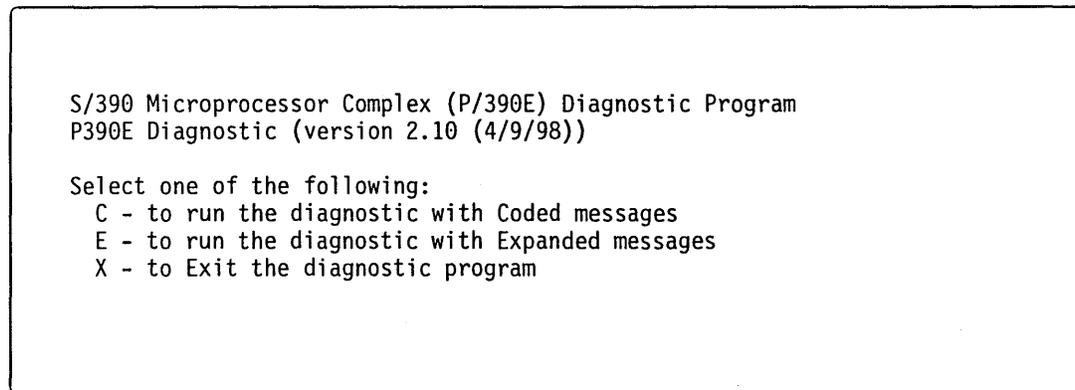


Figure 1. P/390 Diagnostic Selection

8. To start the diagnostics, type C or E.
  - C runs with reduced test information messages.
  - E runs the same tests as C but provides an expanded set of test information messages. These messages are primarily used by support personnel.
  - X exits this screen without starting the diagnostics.

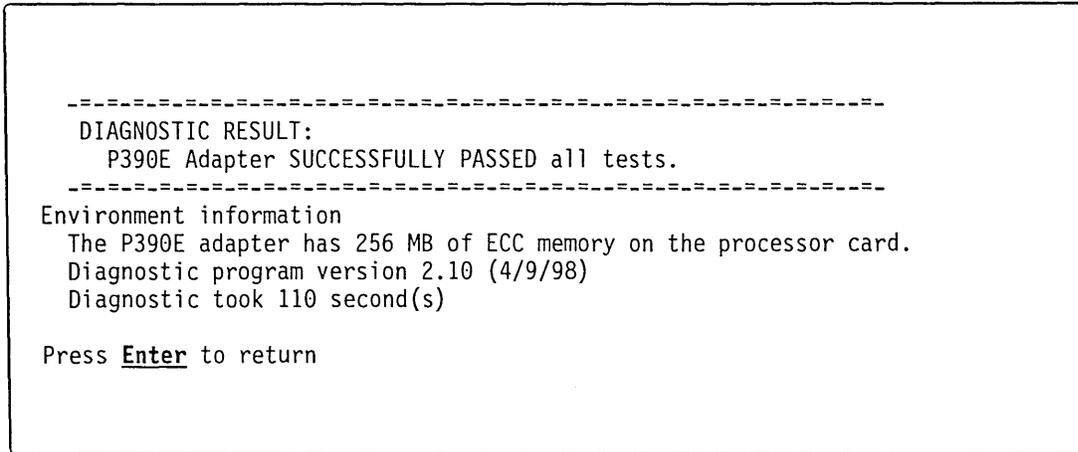


Figure 2. P/390 Diagnostic Screen

9. The diagnostic completes with a screen similar to Figure 2. If the tests were successful, the P/390 is ready to IPL the S/390 operating system. If the test found a problem, the diagnostic indicates a repair action.

If you receive any messages about hardware failures, replace the P/390 adapter. See "P/390 Card Removal and Replacement" on page 144.

10. When testing is complete, remove the diagnostic diskette and the CD disc and reboot the system by pressing **CTRL-ALT-DEL** (or by press the RESET switch).

---

## STOPPED and DOWN Displayed on the System/390™ Activity Display

Your P/390 may appear to be malfunctioning while the P/390 System/390 Activity display displays STOPPED or DOWN.

STOPPED signals that the P/390 Processor is in the stopped state. The execution of S/390 instructions has been interrupted. This state occurs when:

- You click on **STOP** from the **P/390 MANUAL OPERATIONS** session.
- or if the ADDR COMPARE function in the P/390 MANUAL OPERATIONS session has stopped the processor because of a S/390 address compare match.
- or because the C:\P390\CHAN.TRC contains an I/O address with a "S" or "I" suffix. This causes the processor to stop every time I/O is done to that address.

To start the P/390 again, click on **START** from the **P/390 MANUAL OPERATIONS** session.

The STOPPED state can also occur while S/390 operating systems is IPLing, and after the S/390 operating system has been shut down. If the S/390 operating system was shut down, clicking **START** from the **P/390 MANUAL OPERATIONS** session will *not* start up the P/390 Processor again. You must IPL the P/390 by either clicking **IPL** from the **P/390 Manual Operations** Session or by double-clicking on the **IPL P/390** icon.

The DOWN indicator signals that an error has occurred in the P/390 Processor or its I/O subsystem. The P/390 Processor is no longer operational.

Check the System Operator session and the P/390 MANUAL OPERATIONS session for any messages that may indicate the reason for the failure of the P/390. Refer to online message file by typing VIEW C:\P390\IP390MSG.INF to determine how to proceed.

If there are no messages indicating the reason for the failure, run P/390 diagnostics.

---

## P/390 Error Messages

This chapter explains the meaning of the various messages you can receive while using the components of your P/390.

- The S/390 Operating Systems, VM/ESA, MVS/ESA, VSE/ESA, and OS/390 generate many types of messages. These are the same messages and error codes that occur when running on a S/390 mainframe system. When you receive these messages in a P/390 VSE/ESA or VM/ESA session, refer to either the *VSE/ESA Messages and Codes* manual or the *VM/ESA System Messages and Codes* manual. For MVS/ESA messages, refer to the *Library Guide* for the version of MVS/ESA you are running. For OS/390 messages, see the *OS/390 Information Roadmap*.

Your P/390 generates two kinds of messages:

- Configurator messages, which you see only when you are running the P/390 Configurator
- P/390 messages, which can be identified by the letters *AWS* at the beginning of each message identifier. All *AWS* messages are described in this chapter. Note that some messages are related to a particular S/390 operating system and may not apply to your system.

## AWS Message Format

Messages generated by the S/390 Integrated Server are written in the following format:

<code>AWSzzznnnx text . . . .</code>
--------------------------------------

Where:

**zzz** is a 3-character identifier. See Figure 3 on page 12 for an explanation of these identifiers.

**nnn** is a 3-digit message identifier number

**X** is one of the following:

**I** for informational messages

**W** for warning messages

**E** for error messages

**S** for severe error messages

**T** for terminating or ABEND messages

S/390 Integrated Server messages appear in one of two places:

- In a pop-up window that overlays the main display area of any one of your sessions. The messages appearing here are generated by the session managers and do not directly result in an ABEND in the system. Usually, you press **ENTER** to continue processing.
- As a CP or CMS message in a S/390 Integrated Server VM or host VM session.

If you missed a message when it appeared on the screen, the message is logged in an OS/2 file residing in the current C:\P390 subdirectory called *AWSERROR.LOG*. The file is not overwritten at each IPL of the

## P/390 Error Messages

system. You can save the file from the previous session for review by renaming it before you IPL the system again.

To view this file, select the OS/2 session and do *one* of the following:

- Use the TEDIT command.
- Print the file on your S/390 Integrated Server-attached printer, if available.

Help is available for each message. It provides the same information that appears in this document.

zzz	Program Name	Function
ABN	AWSABEND.CMD	Abnormal Termination handler.
CHN	AWSCHAN.EXE	P/390 channel emulator
CKD	AWSCKD.EXE	Count Key Data (CKD) DASD emulator
CMD	OS2 EXEC	Execute OS/2 commands from CMS
CML	AWS3274.EXE	3270 emulation over LAN
DDX	AWS370DD.SYS	P/390 device driver
DEV	AWSDEV.EXE	Interface for device driver emulation of S/390 devices
DFT	AWS3274.EXE	3274 Control Unit emulation
DIE	AWSINTF.EXE	Disabled wait-state for S/390
DIW	AWSINTF.EXE	Disabled wait-state codes for S/370
DMI	AWSDM.DLL	Device manager interface
DSK	AWSFBA.EXE	Fixed-block (FBA) DASD emulator
ICA	AWSICA.EXE	SDLC/BSC Integrated Communication Adapter (ICA) support
ICE	AWSICE.EXE	S/390 Parallel or Escon Channel Adapter
KRN	AWSMAIN.EXE	P/390 I/O subsystem
LCS	LCS3172.EXE	3172 LAN Channel Station for TCP/IP ✓
MNT	AWSMOUNT.EXE	Associates an OS/2 file with an emulated tape drive
OMA	AWSOMA.EXE	Optical Media Attach
PCS	AWSPCSR.V.EXE	Provides communication path between P/390 and OS/2
PCY	PCOPY EXEC	CMS command to copy files between CMS and OS/2
PRT	AWS2821.EXE	AWS2821 line printer emulation (1403)
POS	AWSPOSDD.SYS	POSPower device driver
RPU	AWS2540.EXE	2540 card reader emulation
TAP	AWSTAPE.EXE	3803/3420 tape emulation
TCP	AWS3274.EXE	3270 TELNET sessions
TOD	AWSMAIN.EXE	Time-of-day prompt
TRC	AWSTRCSP.EXE	Trace spooling support
XCA	LAN3172.EXE	3172 LAN Gateway (SNA) emulation

Figure 3. AWS Message Format

## Chapter 4. PCI/ISA BUS and Adapters

### Start of Repair for PCI-ISA Bus and Adapters

Problem Area Reported	Reference Section
PCI Bus Isolation	"PCI Bus Isolation" on page 18
Token Ring Information and Diagnostics	"Token-Ring Adapter" on page 19
Ethernet Information and Diagnostics	"EtherJet PCI Adapter" on page 30
RS422 Information and Diagnostics	"RS422 Adapter" on page 33
MultiPort 2 Information and Diagnostics	"Multiport Model 2 Adapter" on page 36
Wide Area Connector Information and Diagnostics	"Wide Area Connector (WAC) Adapter" on page 38
Channel Adapters Information and Diagnostics	"S/390 PCI Channel Adapters" on page 43
SCSI Adapter Information and Diagnostics	"Start of Repair for SCSI Bus and SCSI Devices" on page 45
Adapters and Cage Assembly Removal and Replacement Procedures	Chapter 8, "Removal and Replacement Procedures" on page 141

### Description of the PCI/ISA BUS

The Peripheral Component Interconnect (PCI) Local Bus is a 32-bit bus with multiplexed address and data lines. It is intended for use as an interconnect mechanism between integrated peripheral controller components, peripheral add-in boards and processor/memory systems.

### Maximum Configurations

A total of four Parallel Channel Adapter (PCA) or two ESCON Channel Adapter (ECA) in any combination.

Up to three WAC Adapter (WAC) cards if no Multiport Model 2 Adapter (MPM2) cards are present. This gives a total of 6 SDLC or Bisync lines.

Up to two Multiport Model 2 Adapter (MPM2) cards if no more than one WAC Adapter (WAC) card is present. Each Multiport Model 2 Adapter (MPM2) supports 8 SDLC lines (dial-in or leased line, no dial-out) for a total of 16 lines.

A total of 4 LAN cards of either Token Ring (TR) or Ethernet (ETH). The first Ethernet is built into the I/O and Service Processor so there will never be more than three Ethernet cards present.

## Adapter Plugging Rules for PCI/ISA slots

The slots are numbered 1 through 21 (LG 01 to LG 21) with 1 being the top most slot and 21 the closest to the floor.

*Figure 4. Adapter and Slot Number*

Slot	Adapter	Purpose	Req/Opt	Order
1	2944UW SCSI Adapter	3490-F01 Tape	Optional	
2	RS422	Power Control	Required	
3	SSA Adapter	DASD Controller	Required	
4	Reserved			
5	PCA or ECA	S/390 Channel (ARTIC960)	Optional	4th PCA or ECA (note 3)
6	PCA or ECA	S/390 Channel (ARTIC960)	Optional	3rd PCA or ECA (note 3)
7	PCA or ECA	S/390 Channel (ARTIC960)	Optional	2nd PCA or ECA (note 3)
8	PCA or ECA	S/390 Channel (ARTIC960)	Optional	1st PCA or ECA (note 3)
9	Reserved			
10	Reserved			
11	Reserved			
12	P/390 256Meg	Processor	Required	
13	TR	LAN	Optional	4th TR
14	TR or ETH	LAN	Optional	3rd TR or 4th ETH
15	TR or ETH	LAN	Optional	2nd TR or 3rd ETH
16	TR or ETH	LAN	Optional	1st TR or 2nd ETH
17	Serial 1, Parallel 1, USB, Serial 2, Speaker	Control Panel	Required	
18	SBC	I/O and Service Processor Video Connection 1st ETH Keyboard Connection Mouse Connection	Required	
19	WAC	SDLC/Bisync	Optional	1st WAC (note 1)
20	WAC or MPM2	SDLC/Bisync	Optional	2nd WAC or 2nd MPM2 (note 1,2)
21	WAC or MPM2	SDLC/Bisync	Optional	3rd WAC or 1st MPM2 (note 1,2)

**Note:**

- Each Wide Area Connector (WAC) card has two ports. Each port can be either RS-232, V.35, or X.21. All WAC cards in the system must be either ICA (AWSICA for VM™ or VSE™) or XCA (WAN3172 for VM, VSE, or OS/390™). ICA can be SDLC or Bisync, while XCA is only SDLC. The WAC is an ISA bus adapter and has switches on the card that must be set.
- Each MPM2 card supports up to 8 SDLC lines. MPM2 is XCA only. MPM2 is an ISA bus adapter that has switches on the card that must be set.
- A total of four Parallel Channel Adapter (PCA) or two ESCON™ Channel Adapter (ECA) in any combination. The card installed in the highest slot number (first slot from the bottom) will be channel card 0.

PCI/ISA Slots

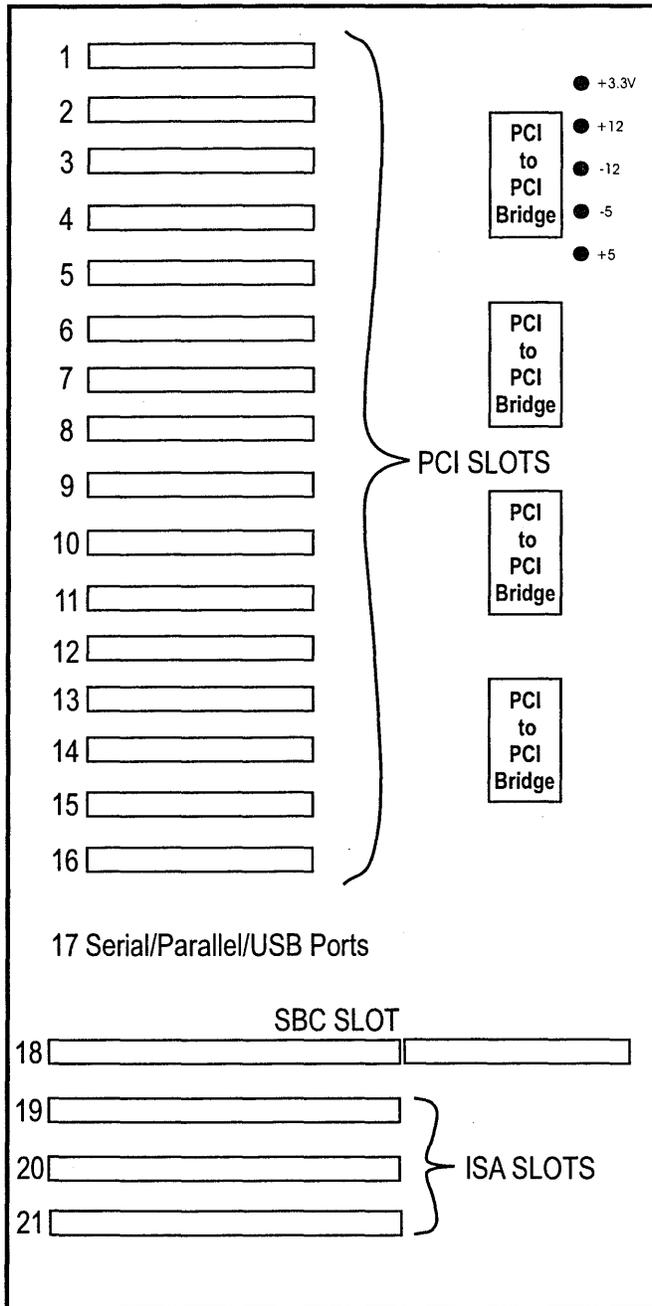


Figure 5. Location layout of the board and slots

**Note:** minus 5 volts isn't provided. Its LED will remain off.

### SBC/PCI/ISA Bus Structure - Logical View

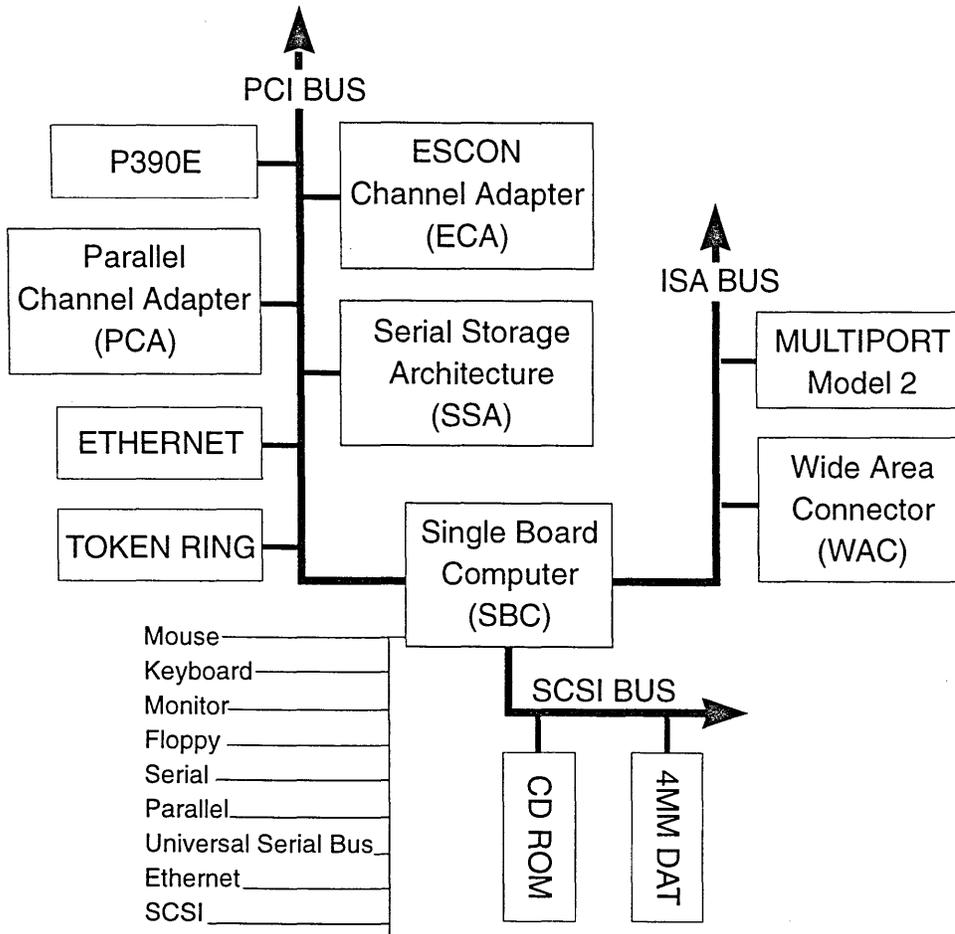


Figure 6. Logical Bus Structure Diagram

**SBC/PCI/ISA Bus Structure - Physical View**

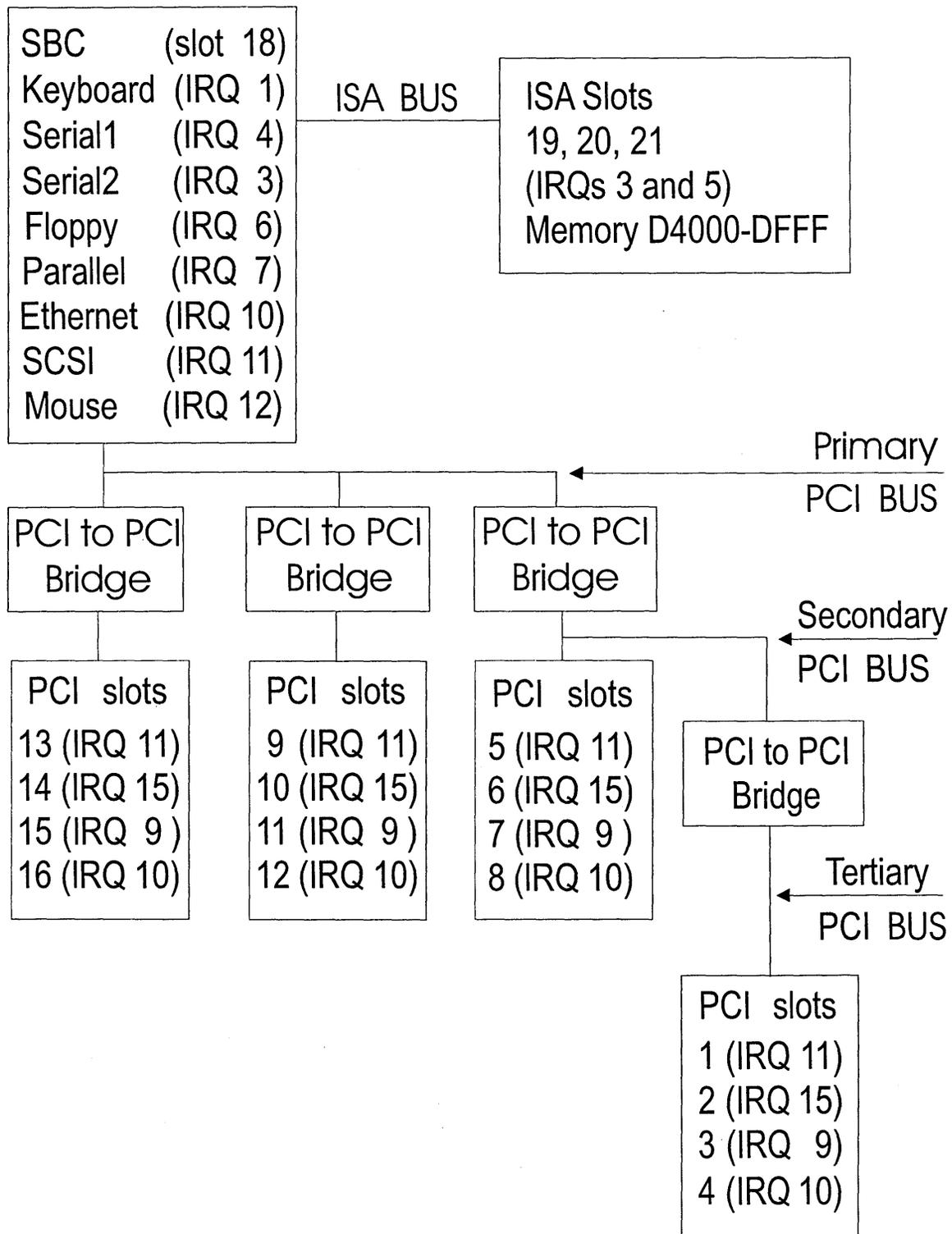


Figure 7. Physical Bus Structure Diagram

---

### Solving Adapter Problems

If the customer reports a problem with a specific adapter:

1. Use the error message to isolate failure
2. Run diagnostics
3. If no problems are found run the application to recreate the failure
4. If you cannot recreate or resolve the problem contact the next level of support

---

### PCI Bus Isolation

During bring up if the lights on the monitor remain Amber and there have not been any beep codes signaled by the SBC card, you may have a bad PCI or ISA adapter that is affecting the operation of the I/O and Service Processor. To isolate the problem:

1. Power down the system.
2. Remove all adapters from the PCI and ISA slots.
3. Leave the SBC card seated.
4. Disconnect the SCSI cable and Diskette cable from the Single Board Computer
5. Power up the system.
6. Refer to "Sequence of events from a power up" on page 3 to verify the power sequence.
7. If the initial power on screen now displays:

American Megtrends AMIBIOS (C)  
TRENTON Technology Inc.

Then one of the adapters is bad.

8. Power down the system.
9. Plug the cables and adapters in the following sequence one at a time, powering up and down each time to verify if the initiate power on screen displays. This will help to locate which adapter is bad.
  - SCSI cable and Diskette cable
  - SSA Adapter
  - RS422 Adapter
  - Communication Adapters
  - PCA and ECA adapters

## Token-Ring Adapter

The IBM PCI Token-Ring Adapter is a 32-bit, bus-master, Token-Ring adapter for the PCI bus architecture. Its unique, high-quality filter design supports connection to a token-ring network that is wired with shielded twisted-pair (STP) or unshielded twisted-pair (UTP) cabling.

### Adapter LEDs and Labels

Figure 8 and Figure 9 on page 20 describe the LEDs and labels located on the bracket of the IBM PCI Token-Ring Adapter.

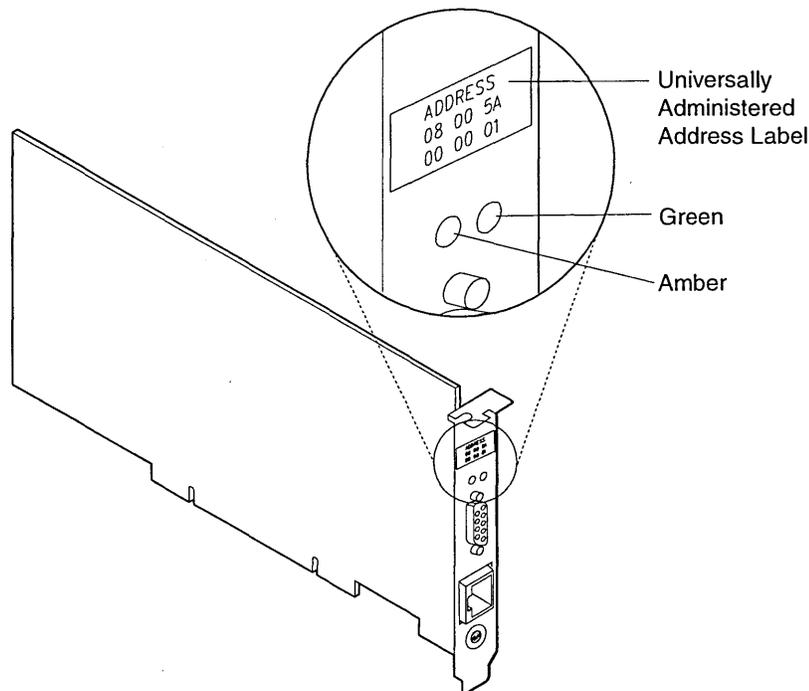


Figure 8. The Adapter LEDs and Labels

The LEDs provide information useful for monitoring the status of the adapter and for problem solving. If the green LED is on and the amber LED is off, the adapter is operating correctly. If the amber LED is blinking and the green LED is on, a problem with the adapter has been detected. Figure 9 on page 20 indicates the sequence that will be displayed when the computer is started and the adapter reaches the open state successfully. Some of those states might be too brief to observe.

### Labels

The *green dot label* indicates that the adapter can communicate at 4 Mbps or 16 Mbps over a token ring. (Similar labels appear on token-ring network adapter cables manufactured by IBM.)

The *universally administered address label* contains the adapter's universally administered address. This is the MAC address that was encoded in the adapter memory at the factory. This 12-digit, hexadecimal address is recorded on the label in 2-digit increments from left to right, starting on the first row. In the illustration, the universally administered address is X'08 00 5A 00 00 01' in non-canonical format, with the most significant bit (MSB) first. The universally administered address is unique and is used by network software to distinguish the adapter from others on the network. If you would prefer the adapter to be

## PCI/ISA BUS Isolation

known on the network by a locally administered address, you must configure the device driver or protocol driver to use a locally administered address.

## LEDs

Figure 10 lists LED states that indicate problems.

<i>Figure 9. Startup Sequence of LED States</i>		
Amber	Green	Explanation
Blinking	Blinking	<p>Slow blink</p> <p>The adapter is waiting for initialization.</p> <p>Fast blink (Wake on LAN only)</p> <p>The adapter has detected a wake-up frame and is attempting to wake up the system. If this state persists, it indicates one of the following problems:</p> <ul style="list-style-type: none"> <li>The attached System 390 Integrated Server does not have Wake on LAN enabled.</li> </ul> <p>To correct this problem, power on the System 390 Integrated Server and enable the Wake on LAN feature from the power management system configuration menu.</p> <ul style="list-style-type: none"> <li>The Wake on LAN cable is not attached correctly.</li> </ul> <p>To correct this problem, ensure that the Wake on LAN cable is properly attached.</p>
Off	Off	The adapter initialization is in progress, or the computer is powered off.
Off	Blinking	<p>The adapter did not detect any problems during its self-diagnostic tests and is waiting to open.</p> <p>If this LED state occurs after the adapter has been opened, this state indicates that the adapter has been closed under software control.</p>
Off	On	The adapter is open and operating correctly.

<i>Figure 10. Problems Shown by Adapter LED States</i>		
Amber	Green	Explanation and Action
On	Off	<p>The adapter self-diagnostic tests failed or there is a problem with the adapter.</p> <p><b>Action:</b> Go to "Diagnostics" on page 28 to test the adapter.</p>
Blinking	Off	<p>The adapter is closed due to an undetected error. One of the following conditions exists:</p> <ul style="list-style-type: none"> <li>The adapter open failed.</li> <li>The adapter detected a wire fault.</li> <li>The adapter failed the auto-removal test.</li> </ul> <p><b>Action:</b> Perform the following procedures, as appropriate:</p> <ol style="list-style-type: none"> <li>Perform "Adapter Communication Problems" on page 21.</li> <li>Verify that the adapter is configured correctly.</li> <li>If other stations on the network are having problems communicating, contact your network administrator.</li> </ol>
Blinking	On	<p>The adapter has detected beaconing or a hard error.</p> <p><b>Action:</b> Go to "Adapter Communication Problems" on page 21.</p>
On	On	<p>The adapter has failed before running the self-diagnostic tests.</p> <p><b>Action:</b> Go to "Diagnostics" on page 28 to test the adapter.</p>

The following definitions are of terms referred to in the table:

<b>Auto-removal</b>	The state in which a token-ring adapter port removes itself from the network to perform self-tests to verify that it is not the cause of a hard error. If the tests are successful, the port will reattach itself to the network.
<b>Beaconing</b>	The state that a token-ring adapter port enters after it has detected a hard error. The error condition is reported to the other devices on the network. Beaconing can result in the port removing itself from the network (auto-removal) to determine whether it is the cause of the hard error.
<b>Hard error</b>	An error condition on a network that requires removing the source of the error or reconfiguring the network before the network can resume reliable operation.
<b>Initialization</b>	The first step taken to prepare an adapter port for use after the computer has been booted. During initialization, the adapter port runs a series of internal self-diagnostic tests.
<b>Open</b>	The state in which the adapter port has established connection with other devices on the ring.
<b>Wire fault</b>	An error condition caused by a break or a short circuit in the cable segment that connects the adapter port to its access unit, such as an IBM 8230 Token-Ring Network Controlled Access Unit.

## Adapter Communication Problems

Check the following list of possible causes if the adapter is unable to communicate on the network but other stations on the network are able to communicate.

- Verify that the appropriate adapter cable is connected to the adapter and to the network. See “Adapter Cable” for a description of compatible adapter cables.
- Verify that the adapter is firmly seated in the expansion slot.
- Verify that the setting for the adapter's Data Rate option matches the data rate of the network, or that the data rate has been set to AutoSense if yours is not the first station on the ring.
- Run the adapter diagnostics. If the tests are completed successfully, and the adapter is still not communicating, contact your network administrator.
- Replace the adapter cable with one that is known to be good.
- Check C:IBMCOM\LANTRAN.LOG for errors.

## Adapter Cable

To connect the IBM Token-Ring Adapter to a Token-Ring Network, you will need one of the cables illustrated in Figure 11 on page 22. Cables are not included in the adapter package. The network end of the cable must be compatible with the network faceplate or other device to which the adapter will be connected.

**Note:** No more than one data cable may be connected to the PCI Token-Ring Adapter at a time.

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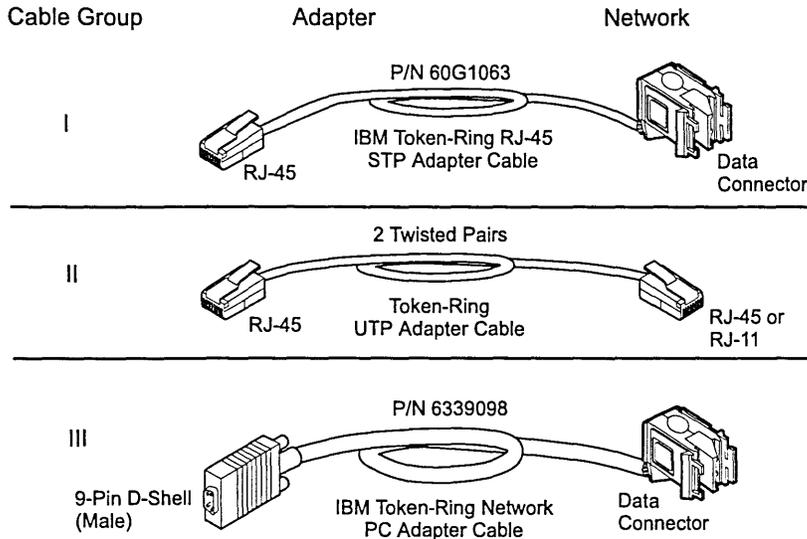


Figure 11. STP and UTP Adapter Cables

## Configuration Settings

Although the IBM PCI Token-Ring Adapter has no switches and jumpers on the card, there are several configuration settings that must be made using the LANAI DC configuration program.

Anytime a Token-Ring adapter is installed or replaced in the S/390 Integrated Server, the following configuration steps **must** be performed:

- Before powering up the system, insert the IBM PCI Token-Ring Adapter Diagnostic and LANAI DC diskette into drive A:

An image of this diskette is located in the AWSDIAG subdirectory of the S/390 Integrated Server CD-ROM. See `f:\AWSDIAG\AWSDIAG.DOC` (where *f*: is the drive letter of your CD-ROM) for instructions on how to create a diskette from this image. You will need a blank, formatted, 1.44MB diskette.

- Power on the system (or press the "reset" button if the system is already powered up).
- When the DOS 7.0 Startup Menu appears, select LANAI DC.
- At the LANAI DC prompt, type `/VIEW` and press ENTER.

This will display the configuration data for each Token-Ring adapter in the system. Make a note of the adapter numbers, and the settings for:

Remote IPL:  
Expansion ROM:

- Press ENTER until the LANAI DC prompt reappears.
- Type the following for *each* adapter number, pressing ENTER after each line. For example, for three adapters (numbered 1, 2 & 3):

```
/ADAPTER=1 /RIPL=N /EXPROM=N  
/ADAPTER=2 /RIPL=N /EXPROM=N  
/ADAPTER=3 /RIPL=N /EXPROM=N
```

These settings will ensure that the Token-Ring adapter does not use the C0000 and D0000 memory areas for BIOS, as these areas are at a premium in the IOSP.

## NDIS 2 Device Driver Messages

This section contains messages that can be received from the NDIS device driver. These messages can come from DOS and NDIS 2 files. The messages are either displayed or logged to a file.

The term *Port nnnnnnnn* appears in several messages. It is used to identify the adapter's instance and bears *no* relationship to the physical slots in the computer. If this is the only PCI Token-Ring Adapter, the number will be 00000000.

- 
- LA10001** IBM PCI Token-Ring Adapter, Version *xx*  
**Explanation:** Information only.  
**User Action:** None.
- 
- LA10002** The IBM PCI Token-Ring Adapter UAA (BIA) is *xx*.  
**Explanation:** Information only.  
**User Action:** None.
- 
- LA10003** The IBM PCI Token-Ring Adapter is using an LAA of *xx*.  
**Explanation:** Information only.  
**User Action:** None.
- 
- LA10004** Revision level *xx* of the PCI Token-Ring Adapter is incompatible with this driver version.  
**Explanation:** The Revision ID of the PCI Token-Ring Adapter is not one that is supported by this version of the device driver. This correlation is enforced to ensure an appropriate match between the adapter hardware and the device driver software.  
**User Action:** You probably need to upgrade your PCI Token-Ring Adapter, use a different version of the device driver, or do both.
- 
- LA10005** A device driver initialization error occurred (failure code *xx*).  
**Explanation:** An unexpected error occurred during initialization of the device driver.  
**User Action:** Shut down the computer correctly and switch OFF the power to the machine. Restart the computer by switching it ON again.
- 
- LA10006** The configuration parameter *xx* was specified incorrectly. Its default value will be used.  
**Explanation:** The value of a configuration parameter was incorrectly specified.  
**User Action:** Edit the configuration file (or rerun the configuration program) to specify a value that is of the correct type and within the allowed range. Check the adapter installation instructions for
- 
- LA10007** The configuration parameter values have forced the internal data blocks to exceed the allowed limit.  
**Explanation:** The combination of configuration parameters being used requires more than the 64-KB memory area that is available for this adapter instance to hold its internal control information.  
**User Action:** Lower the value of the MaxTransmits or MinRcvBufs parameters from their current setting to reduce the amount of control block storage required by the device driver. Shut down and restart the computer to activate this configuration change.
- 
- LA10008** Unable to register interrupt level *xx* for this adapter.  
**Explanation:** The hardware interrupt level assigned to this adapter was not able to be registered (*hooked*) by the device driver.  
**User Action:** Check the configuration of your computer, looking for other devices that are assigned the same interrupt level as this adapter. Try removing the conflicting device from the machine and restart the computer to see if the problem goes away. If so, determine whether the conflicting device can be left out of the machine, or whether the machine can be reconfigured to resolve the conflict. Note that in most PCI machines, the PCI BIOS assigns certain system resources to the devices found in the computer, including the interrupt level.

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- 
- LA10010**    **A hardware failure occurred while attempting to open the adapter.**  
**Explanation:** An adapter hardware error was detected when opening the adapter for network operation.  
**User Action:** Run the adapter diagnostics program to isolate the problem. If no problem was identified by the diagnostics, check that the cable is attached securely to both the adapter and the network interface (wall plate). Switch the computer OFF and then ON again to restart the machine.
- 
- LA10011**    **A possible lobe wire failure was detected while attempting to insert into the network.**  
**Explanation:** The adapter is not correctly connected to the token-ring network.  
**User Action:** Check that the cable is securely attached to both the adapter and to the token-ring network. You may need to contact your local network administrator to ensure that the cabling in the building is intact and that the network concentrator to which you are attached is operational. If the error persists, try using a different cable.
- 
- LA10012**    **A signal loss condition was detected while attempting to insert into the network.**  
**Explanation:** The token-ring network is not functioning correctly.  
**User Action:** Contact your local network administrator to determine the status of your network, or try connecting again at a later time.
- 
- LA10013**    **The lobe wire connected to the adapter is not attached to the network.**  
**Explanation:** The adapter is not correctly connected to the token-ring network.  
**User Action:** Check that the cable is securely attached to both the adapter and to the token-ring network. You might need to contact your local administrator to ensure that the cabling in the building is intact and that the network concentrator to which you are attached is operational. If the error persists, try using a different cable.
- 
- LA10014**    **The configured data rate for the adapter does not match that of the network.**  
**Explanation:** The operational speed of the token-ring network does not match the configured speed of the adapter.  
**User Action:** Change the setting of the DataRate configuration parameter to match the speed of the network to which the adapter is attached. Your local network administrator should be able to tell you which speed to use.  
Setting the DataRate parameter value to Auto will allow the adapter to automatically determine the correct speed setting to use when connecting to the network, provided that this is not the only adapter active on the token ring.  
Consult the adapter installation instructions for additional information on setting the DataRate parameter.
- 
- LA10015**    **An adapter timeout occurred while attempting to insert into the network.**  
**Explanation:** The token-ring network is not functioning correctly.  
**User Action:** Contact your local network administrator to determine the status of your network, or try connecting again at a later time.
- 
- LA10016**    **A ring failure condition was detected while attempting to insert into the network.**  
**Explanation:** The token-ring network is not functioning correctly.  
**User Action:** Contact your local network administrator to determine the status of your network, or try connecting again at a later time.
- 
- LA10017**    **A ring beaconing condition was detected while attempting to insert into the network.**  
**Explanation:** The token-ring network is not functioning correctly.  
**User Action:** Contact your local network administrator to determine the status of your network, or try connecting again at a later time.
- 
- LA10018**    **A duplicate network address was detected while attempting to insert into the network.**  
**Explanation:** The address specified for the NetAddress configuration parameter is being used by another adapter (or ring station) on the network.  
**User Action:** Modify the configuration file to change the NetAddress parameter value being used for this adapter, or remove the NetAddress parameter to allow the adapter's universally administered address to be used.  
Contact your local network administrator for assistance with choosing a new NetAddress parameter value, or to possibly have the conflicting adapter removed from the same token-ring network as this adapter.

- 
- LA10019**    **A ring parameter failure occurred while attempting to insert into the network.**  
**Explanation:** The token-ring network is not functioning correctly.  
**User Action:** Contact your local network administrator to determine the status of your network, or try connecting again at a later time.
- 
- LA10020**    **The adapter was forced to remove itself while attempting to insert into the network.**  
**Explanation:** The token-ring network rejected the attempt by this adapter to connect to it.  
**User Action:** Contact your local network administrator to determine the status of your network, or try connecting again at a later time.
- 
- LA10021**    **A hardware failure occurred while attempting to open the adapter.**  
**Explanation:** An adapter hardware error was detected when opening the adapter for network operation.  
**User Action:** Run the adapter diagnostics program to isolate the problem. If no problem was identified by the diagnostics, check that the cable is attached securely to both the adapter and the network interface (wall plate). Switch the computer OFF and then ON again to restart the machine.
- 
- LA10022**    **A hardware failure occurred while attempting to open the adapter.**  
**Explanation:** An adapter hardware error was detected when opening the adapter for network operation.  
**User Action:** Run the adapter diagnostics program to isolate the problem. If no problem was identified by the diagnostics, check that the cable is attached securely to both the adapter and the network interface (wall plate). Switch the computer OFF and then ON again to restart the machine.
- 
- LA10023**    **The adapter cannot be opened in AutoSense mode if it is the only active station on the network.**  
**Explanation:** The adapter DataRate configuration parameter is set to Auto (which is also the default value if the parameter is not specified), but the adapter is the first station to open on the token-ring network.  
**User Action:** This adapter is designed to not open onto the attached token-ring network if it is configured to use AutoSense detection and if it would have been the first active ring station.  
 The possible remedies are to try to connecting again at a later time when at least one other ring station is active on the network (such as a network server), or to change the configuration value so that the DataRate parameter is set to a specific ring-speed value of M16 or M4 and restart the computer.  
 Note that setting a specific value of M16 or M4 for the DataRate parameter will cause this adapter to establish the operational speed of the token-ring network if it is still the first active ring station, so consult your local network administrator if necessary.  
 Check the adapter installation instructions for additional information on setting the DataRate parameter.
- 
- LA10024**    **The adapter attempted to perform a Remote Program Load but failed monitor contention.**  
**Explanation:** The adapter was opened as a Remote Program Load (RPL) client, but was unable to locate an RPL server on the network.  
**User Action:** Make sure that there is an active Remote Program Load server on the network and that it is configured to recognize this adapter's address.
- 
- LA10025**    **A network protocol error occurred while attempting to operate the adapter in full duplex mode.**  
**Explanation:** The adapter was unable to successfully communicate with a token-ring switch when attempting to open for full-duplex operation.  
**User Action:** Check that your full-duplex switch is functioning correctly and that the adapter is correctly connected to it.
- 
- LA10027**    **The PCI Token-Ring Adapter opened for token ring, xx Mbps., half duplex.**  
**Explanation:** Information only.  
**User Action:** None.

## PCI/ISA BUS Isolation

- 
- LA10028** The PCI Token-Ring Adapter opened for token ring, xx Mbps., full duplex.  
**Explanation:** Information only.  
**User Action:** None.
- 
- LA10033** Adapter analysis code is xx.  
**Explanation:** Information only.  
**User Action:** None.
- 
- LA10034** Adapter full-duplex operation has now been activated.  
**Explanation:** Information only.  
**User Action:** None.
- 
- LA10042** A device driver initialization error occurred (failure code xx).  
**Explanation:** An unexpected error occurred during initialization of the device driver.  
**User Action:** Shut down the computer correctly and switch OFF the power to the machine. Restart the computer by switching it ON again.
- 
- LA10043** No adapter instances recognized by this device driver were found in PROTOCOL.INI.  
**Explanation:** The PROTOCOL.INI file does not have a section defined by the correct DriverName = line anywhere within it.  
**User Action:** If you intend to run this device driver, make sure to define a valid network configuration in the PROTOCOL.INI file. If you do not intend to run this device driver, remove its DEVICE= statement from the CONFIG.SYS file.
- 
- LA10044** The NDIS 2.0 Protocol Manager could not be opened.  
**Explanation:** An unexpected error occurred when the program attempted to open the Protocol Manager.  
**User Action:** Check the drive and directory to ensure that the Protocol Manager is located in the path specified in the CONFIG.SYS file. If this error persists, consider reinstalling the NDIS 2.0 network support software.
- 
- LA10045** Could not find the PROTOCOL.INI file image.  
**Explanation:** An unexpected error occurred when the program attempted to read the PROTOCOL.INI file image through interaction with the Protocol Manager.  
**User Action:** Check the drive and directory to ensure that the Protocol Manager is located in the path specified in the CONFIG.SYS file. Verify that a valid PROTOCOL.INI file exists in the proper location. If this error persists, consider reinstalling the NDIS 2.0 network support software.
- 
- LA10046** The required DRIVENAME parameter was not found in PROTOCOL.INI.  
**Explanation:** The parameter specifying the driver name (DRIVENAME) was not found in the PROTOCOL.INI file. This parameter is required.  
**User Action:** Change PROTOCOL.INI to specify the proper information.
- 
- LA10047** The NetAddress value in PROTOCOL.INI is invalid and will be ignored.  
**Explanation:** The value specified for the network address parameter in PROTOCOL.INI is not valid for one of the following reasons:
- Invalid local station address
  - Too long
  - Too short
  - Contains non-hexadecimal characters
  - Not enclosed in double quotation marks
- User Action:** Remove or correct the NetAddress configuration parameter value. A valid value for this parameter is 12 characters long and must be enclosed in double quotation marks. For token-ring adapters, the locally administered address must be within the hex range 400000000000 to 7FFFFFFF.
- Make sure not to set the corresponding group address bit, which is the high-order bit in token-ring addressing notation.

---

**LA10048 An unrecognized parameter xx was found in PROTOCOL.INI.**

**Explanation:** An unrecognized parameter was found while processing a section of the PROTOCOL.INI file defined for this device driver.

**User Action:** Correct the parameter name or remove it from PROTOCOL.INI. Refer to the installation manual that came with your adapter for more information on the configuration parameters.

---

**LA10049 The configuration parameter xx was specified incorrectly. Its default value will be used.**

**Explanation:** An invalid value was specified for an adapter configuration parameter in the PROTOCOL.INI file. A default value has been substituted.

**User Action:** Change the PROTOCOL.INI file to specify a valid value for the configuration parameter that is in error. Refer to the installation manual that came with the adapter for more information on the allowable settings for this particular parameter.

The device driver has proceeded with its initialization using a predetermined default value for this parameter.

---

**LA10050 The NDIS 2.0 device driver was not able to register with the Protocol Manager.**

**Explanation:** An unexpected error occurred when the program attempted to register an adapter with the Protocol Manager.

**User Action:** Check the drive and directory to ensure that the Protocol Manager is located in the path specified in the CONFIG.SYS file. If this error persists, consider reinstalling the NDIS 2.0 network support software.

---

**LA10051 The configuration parameter values have forced the internal data blocks to exceed the allowed limit.**

**Explanation:** The combination of configuration parameters being used requires more than the 64-KB memory area that is available for this adapter instance to hold its internal control information.

**User Action:** Lower the value of the MaxTransmits or MinRcvBufs parameters in the PROTOCOL.INI file to reduce the amount of control block storage required by the device driver. Shut down and restart the computer to activate this configuration change.

### Diagnostics

Use the following procedure to test the IBM PCI Token-Ring Adapter:

- 1 With the customer's help, stop all S/390 programs and shut down the S/390 operating system if it is actively running on the P/390.
- 2 Create the Token-Ring Adapter diagnostic diskette. See "Creating Diagnostic Diskettes" on page 230 for instructions on how to create the diskette, using the System/390 Integrated Server Install CD.
- 3 Shut down OS/2.
- 4 Insert the Token-Ring Diagnostic diskette into the floppy drive.
- 5 Press **CTRL-ALT-DEL** or press the RESET switch.

If the system will not boot with the PCI Token-Ring Adapter installed, remove the adapter and retry. If it will boot with the adapter removed, skip to step 9.

- 6 At the DOS 7.0 Boot Menu select option 2, **IBM PCI Token-Ring Extended Diagnostics**.

Option 2 must be selected as soon as the screen appears. If not the diagnostics default to running option 1.

If there is more than one IBM PCI Token-Ring Adapter installed in your computer, select the specific adapter to be tested. A selection menu is listed identifying each adapter by its universally administered address. Use the cursor keys or the mouse to select the adapter for test.

- 7 Connect the adapter to the network and press the **Test** (Enter) key. There are two test options: wrap test and on-ring test.

The wrap test tests the adapter and cable through the hub or concentrator, or through a wrap plug attached to the cable.

The on-ring test requires that the adapter is connected to a network with other adapters, so the ring speed of the network can be automatically sensed. If the adapter is the only one in the network, the on-ring test will fail.

- 8 Run the default option first. If error is detected then run the wrap test to isolate the TR adapter.

- 9 If the test indicates there is no adapter in the system, or that diagnostics cannot be run:

- Check that the adapter is correctly seated in the slot.
- Make sure that the LEDs blink alternately amber and green after you power up your computer.
- See Figure 9 on page 20 for LED states.
- If the tests are completed successfully, and your computer still is not communicating, contact your network administrator.

- 10 If the wrap test and on-ring test run without errors, the adapter is ready for use. Exit the diagnostic program, and follow the directions for reactivating the computer.

If an error occurs, record any messages that appear, record the LED sequences, and contact your network administrator.

This procedure does not verify that the data rate of the device driver setting matches the data rate of the LAN segment.

If more than one PCI Token-Ring Adapter is in your machine, and you have not run this diagnostic disk already, the diagnostic will reboot your computer, after updating the disk for the correct number of PCI Token-Ring Adapters.

- 11 When testing is complete, remove the diagnostic diskette and the System/390 Integrated Server Install CD and reboot the system by pressing **CTRL-ALT-DEL** (or by press the RESET switch).

## EtherJet PCI Adapter

The IBM EtherJet PCI Adapters are Busmaster adapters that run at 10 Mbps or 100 Mbps in full or half-duplex mode to support a variety of network configurations, ranging from conventional 10BASE-T to Fast Ethernet environments. These are optional adapters that make up the 2nd, 3rd or 4th ethernet adapter, the first ethernet adapter is on the SBC card.

The adapters:

- Operate in shared 10BASE-T or 100BASE-TX environments as well as in switched 10 Mbps and 100 Mbps Ethernet networks
- Run at either 10 Mbps or 100 Mbps in full-duplex mode, yielding 20-Mbps and 200-Mbps capacity, respectively
- Attach to 10-Mbps and 100-Mbps LANs with a single RJ-45 connector
- Display the status of link, activity, and 100-Mbps operation via LEDs

### Diagnostic LEDs

There are three LEDs on the 100/10 EtherJet PCI Adapters:

- LNK for link  
 Indicates the adapter is connected to a hub or switch and is receiving link pulses. If the LNK light is not on, check all connections at the adapter and the hub. Make sure the hub is transmitting at the correct speed and the drivers are loaded. Also, make sure you have the correct wiring configuration for the adapter to the hub connection. Some hubs require a crossover cable rather than a straight-through cable.
- ACT for activity  
 Indicates read/write activity on the network. It does not always mean there is activity on this adapter. If the ACT light is not on, make sure the hub and network are operating and the drivers are loaded.
- 100 for the 100 Mbps models  
 Indicates 100 Mbit/s when on, and 10 Mbit/s when off. This LED may stay on if the link is broken during activity.

### Common Problems and Solutions

*Figure 12 (Page 1 of 2). Common Problems and Solutions*

Problem	Action
The diagnostics are completed successfully, but the connection fails.	<ul style="list-style-type: none"> <li>• Ensure that the network cable is securely attached.</li> <li>• Ensure that you are using category 5 cabling when operating at 100 Mbps.</li> </ul>
LNK LED does not light.	<ul style="list-style-type: none"> <li>• Ensure that you have loaded the network drivers.</li> <li>• Check all connections at the adapter and the hub.</li> <li>• Try another port on the hub.</li> <li>• If you forced duplex mode, ensure that you also force the speed to either 10 or 100 Mbps.</li> <li>• Ensure that the hub port is configured for the correct speed, 10 or 100 Mbps.</li> </ul>

2550  
08L2549  
86H2423

Figure 12 (Page 2 of 2). Common Problems and Solutions

Problem	Action
ACT LED does not light.	<ul style="list-style-type: none"> <li>• Ensure that you have loaded the network drivers.</li> <li>• If you suspect that the network might be idle, try sending data from the workstation.</li> <li>• Try another adapter if the adapter is not transmitting or receiving data.</li> </ul>
Data is corrupted or sporadic.	<ul style="list-style-type: none"> <li>• Ensure that you are using category 5 cabling when operating at 100 Mbps.</li> </ul>
The adapter stopped working when another adapter was added to the PC.	<ul style="list-style-type: none"> <li>• Ensure that the cable is connected to the 100/10 EtherJet PCI Adapter.</li> <li>• Ensure that your PCI system BIOS is current.</li> <li>• Try reseating the adapter.</li> </ul>
The adapter stopped working without apparent cause.	<ul style="list-style-type: none"> <li>• Try reseating the adapter or try a different slot.</li> <li>• If the network driver files are missing or might be corrupted, reinstall the drivers.</li> <li>• Try a different 100/10 EtherJet PCI Adapter.</li> </ul>

## Diagnostics

Complete the following steps to run the diagnostics for the EtherJet PCI Adapter.

1. With the customer's help, stop all S/390 programs and shut down the S/390 operating system if it is actively running on the P/390.
  2. Create the Etherjet Adapter diagnostic diskette. See "Creating Diagnostic Diskettes" on page 230 for instructions on how to create the diskette, using the System/390 Integrated Server Install CD.
  3. Shut down OS/2.
  4. Insert the Etherjet diagnostic diskette in the floppy drive. Make sure it is not write protected.
  5. Press **CTRL-ALT-DEL** or press the RESET switch.
  6. Follow instructions on screen to test the Etherjet Adapter.
- Note:** If you perform a network test ensure that the wrap plug is installed.
7. When testing is complete, remove the diagnostic diskette and the System/390 Integrated Server Install CD and reboot the system by pressing **CTRL-ALT-DEL** (or by press the RESET switch).

## Adapter Address

When more than two Etherjet card are installed the MPTS driver requires the card slot number the Etherjet card is installed in.

The adapter Ethernet address is printed on a sticker on the edge of the adapter as shown in Figure 13 on page 32. The Ethernet address is sometimes called the *Node address* or the *MAC address*. This unique, 12-digit hexadecimal address was stored in the adapter memory at the factory.

You can use this address to match the adapter to the slot number when configuring multiple adapters.

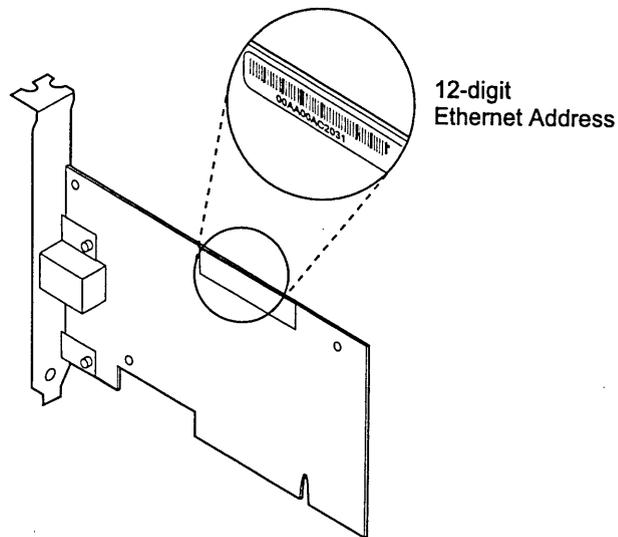


Figure 13. Ethernet Address Location

## Fast Ethernet Cabling

The 100BASE-TX specification supports 100-Mbps transmission over two or four pairs of twisted-pair Ethernet cabling. In two-pair cabling, one pair of cables is used for transmission, and the other is used for reception and collision detection.

Because a 125-MHz frequency is used on the wire, 100BASE-TX requires category 5 cabling.

Segment lengths are limited to 100 m (328 ft) with 100BASE-TX for signal-timing reasons.

**Note:** All cabling must be tested and certified.

## RS422 Adapter

The RS422 Adapter provides a PCI interface adapter with 4 RS-422 asynchronous serial ports used as the interface between the power subsystem and the I/O and Service Processor (IOSP).

### Connector Pin Assignment

Signal	Name	Pin #	Mode
GND	Ground	5	
TX+	Transmit Data Positive	4	Output
TX-	Transmit Dat Negative	3	Output
RTS+	Request To Send Positive	6	Output
RTS-	Request To Send Negative	7	Output
RX+	Receive Data Positive	1	Input
RX-	Receive Data Negative	2	Input
CTS+	Clear To Send Positive	9	Input
CTS-	Clear to Send Negative	8	Input

### Setup Jumpers

The following jumpers are required to setup the termination, modes, and clocking requirements of the RS422 card. Each interface (1-4) is individually set.

- Jumpers J1A-J4A are used to setup the termination required for the RS422 interface.
  - P's have jumpers ON
  - T and L's have jumpers OFF
- Jumpers J1B-J4B are used to control the mode functions for the driver circuits.
  - ALL jumpers OFF
- Jumpers J1C-J4C are used to setup the clocking modes for the card.
  - ALL DIV4 have jumpers.



Figure 14. Headers J1A - J4A, Line Termination

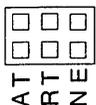


Figure 15. Headers J1B - J4B, Enablement Mode

## PCI/ISA BUS Isolation

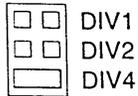


Figure 16. Headers J1C - J4C, Clocking Mode

**RS422 Adapter Card Layout:** The following diagram shows the card layout, with the location of the switches:

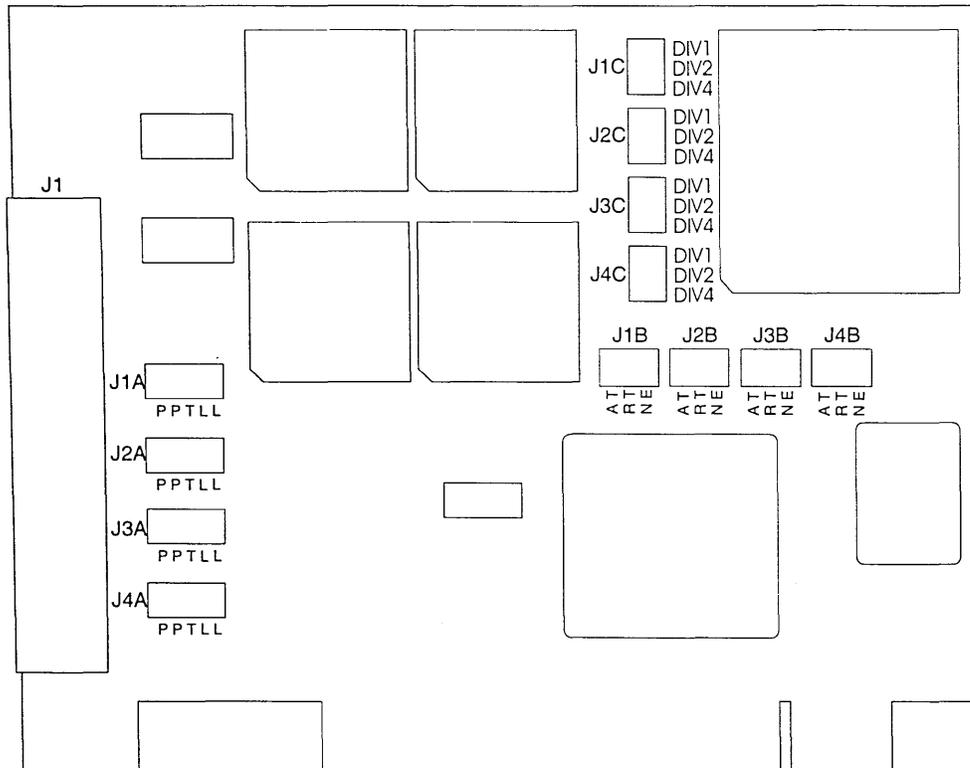


Figure 17. The RS422 Adapter Card Layout

## RS422 Diagnostics

A Serial Utility Diskette contains the diagnostics for the adapter and will be used in the troubleshooting procedures.

- 1 With the customer's help, stop all S/390 programs and shut down the S/390 operating system if it is actively running on the P/390.
- 2 Create the RS422 Adapter diagnostic diskette. See "Creating Diagnostic Diskettes" on page 230 for instructions on how to create the diskette, using the System/390 Integrated Server Install CD.
- 3 Shut down OS/2.
- 4 Insert the RS422 Adapter diagnostic diskette in the floppy drive. Make sure it is not write protected.
- 5 Press **CTRL-ALT-DEL** or press the RESET switch.  
Prior to pressing ENTER to continue, record the four port addresses. These are to be used later to run the diagnostics.
- 6 Follow the instructions on the screen to run diagnostics.

- 7** Enter the base address for Port 1.
- 8** Select **9** to Re-initialize UART with test parameters
- 9** Select **2** to run loopback tests
- 10** Select **1** to run internal loopback tests
- 11** If all addresses have been tested go to step 12, if not do the following:
  - Select **5** to change I/O address.
  - Press **ESC**
  - Repeat Steps 7 through 11.
- 12** Select **3** for IRQ tests
- 13** Select **1** for Verify IRQ
- 14** Enter the interrupt you wrote down
- 15** Select **3** for Stream Data with interrupts
- 16** Press **ESC** after a few seconds, if no errors are reported
- 17** Press **ESC** twice to exit
- 18** Replace the adapter if any errors are found
- 19** When testing is complete, remove the diagnostic diskette and the System/390 Integrated Server Install CD and reboot the system by pressing **CTRL-ALT-DEL** (or by press the RESET switch).

## Multiport Model 2 Adapter

The Multiport Model 2 Adapter consists of the following:

- Realtime Interface Co-Processor Multiport Adapter
- Interface board option installation
- Problem Determination Procedures (PDPs)

### Overview

Tests may be performed when there is a problem with a system unit containing the Multiport Model 2 adapter. If you suspect you have a problem, do the following:

- Check electrical connections (that is, cable connections between devices, cable connections between devices and wall outlets, and wall outlet condition).

### Setting the Option Switch SW1

The Multiport Model 2 Adapter has a 10-position option switch, which is shown below. Use this figure for reference as you configure the Multiport Model 2 Adapter functions.

Set the switches to match the failing card you are replacing. There are only two valid switch configurations, one for the first adapter card, and another for the second adapter card, if present.

**Note:** The switch position "OPEN" on SW1 denotes "OFF" in the following figure.

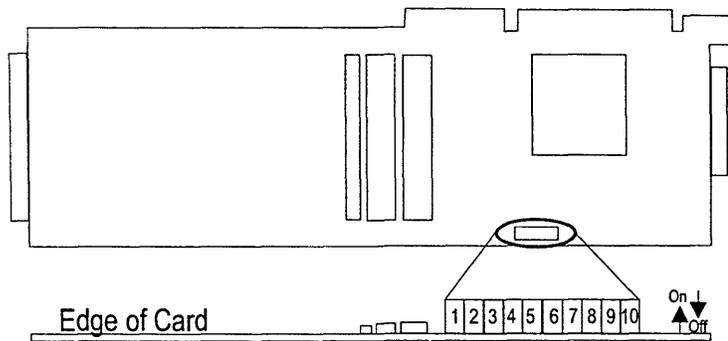


Figure 18. Location of Option Switch SW1

Set option switch SW1 to one of the following two settings, depending on whether the Multiport adapter is the first card or the second card:

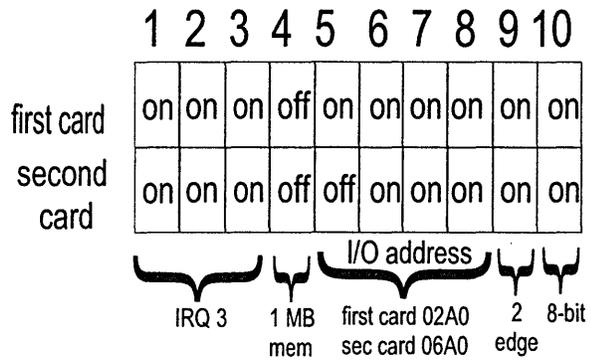


Figure 19. Switch Settings

## Wide Area Connector (WAC) Adapter

The Wide Area Connector/PCI adapter (WAC) is a general-purpose, protocol-independent, synchronous communications adapter for workstations and servers with ISA bus slots. It provides high-speed switched and leased network connections and supports the growing need for increased WAN bandwidth. This adapter is used by many SDLC and BISYNC customers for leased and switched-line connections over 56-Kbps and 64-Kbps lines.

The Wide Area Connector (WAC) is a dual-port, high-speed communications adapter card. The WAC adapter card provides independence for various synchronous, bit-oriented protocols. You can independently configure the two ports, labeled *link A* and *link B*, on the WAC adapter by installing an electrical interface board (EIB) that supports one of the following electrical interfaces:

- CCITT<sup>1</sup> V.35, up to 2.048 Mbps
- CCITT X.21, up to 2.048 Mbps
- EIA RS-232D (CCITT V.24/V.28), up to 19.2 kbps

## Electrical Interface Board (EIB) Cable Connections

Each EIB is shipped with a cable specific to the interface it supports. Figure 20 shows the three types of EIBs and the cable specifications for each one.

**Attention:** Incorrectly matching a specific cable to an EIB link connection may cause damage to the WAC adapter card.

*Figure 20. EIB-Specific Cable Connections*

EIB (Feature No.)	Connector Type	Length	Electrical Specification
RS-232D (33G8461)	25 pin D-shell ISO 2110	5 meters	EIA RS-232D CCITT V.28
X.21 (33G8463)	15 pin D-shell ISO 4903	5 meters	CCITT V.11 CCITT X.27
V.35 (33G8462)	34 pin ISO 2593	5 meters	CCITT V.35

## Diagnostics

You should run the diagnostics program if you:

- Have installed the WAC adapter card for the first time
- Find that the WAC adapter card does not perform as expected
- Suspect a problem with the network link

Complete the following steps to run the diagnostics for the WAC adapter card:

- 1 With the customer's help, stop all S/390 programs and shut down the S/390 operating system if it is actively running on the P/390.

<sup>1</sup> International Telegraph and Telephone Consultative Committee

<sup>2</sup> Electronics Industries Association

- 2 Create the WAC card diagnostic diskette. See "Creating Diagnostic Diskettes" on page 230 for instructions on how to create the diskette, using the System/390 Integrated Server Install CD.
- 3 Shut down OS/2.
- 4 Turn Off the power to the S/390 Integrated Server.
- 5 Disconnect the EIB-specific cable from other equipment and install the diagnostic wrap plug in the end of the cable. Wrap part numbers:
  - 33G8474 - RS-232
  - 33G8475 - V.35
  - 33G8476 - X.21

The WAC adapter card diagnostics *require* that you complete this step before you start the diagnostics for your integrated server.

See "Adapter Plugging Rules for PCI/ISA slots" on page 14 for card location assignments.

- 6 Insert the diagnostic diskette in the floppy drive.
- 7 Turn On the power to the S/390 Integrated Server
- 8 On "Wide Area Connector Test Control" panel, select **Run tests one time** and hit **ENTER**.
- 9 A warning regarding the need for the proper EIB cable and wrap plug is issued. Either or both WAC ports can be tested. Install the cable (if not already in place) and attach the wrap plug for each port to be tested. Hit **ENTER** to continue.
- 10 The diagnostics determine how many WAC cards are present and what EIBs (electrical interface boards) are installed. The diagnostics also pick a memory window address for the WAC to use for the tests. This memory window may or may not match the normal window address used by AWSWACDD. The only requirement is that the memory window address chosen be available and not in use by other adapters. To assist in identifying each card, the IRQ level and I/O addresses (which are read from the card's DIP switches) are displayed.

The diagnostics will list the cards in order of ascending base I/O address, one at a time. Use the following to help identify each card:

Slot	Configurator	I/O range	Diagnostics order and identification
19	S=Fx	0120-013F	First, "Slot = 1"
20	S=Ex	0140-015F	Second, "Slot = 2"
21	S=Dx	0180-019F	Third, "Slot = 3"

- 11 Respond **Y** or **N**, depending on whether the listed card is the card to be tested.

Answer **N** if the diagnostics-assigned memory address is wrong or to have the program list the next available card to test. An **Adapter Select & Test Control** panel will allow selecting another WAC card or changing the memory address.

After a **Y** response, the card to test has been identified. Now the user must identify the port or ports of that card to test. If both EIBs are present, and each is to be tested, respond **Y** to **Run (ALL) Tests for Links (A&B)**. Respond **N** to have the program provide a **Change Test Parameters Menu**. This panel allows the user to specify that only Link A, only Link B, or only a subset of the tests are to be run. Normally, one will either select (ALL) tests for (A&B) (if both ports are to be tested) or use the Change Menu to select running (ALL) tests for (A) or running (ALL) tests for (B), assuming only one port is to be tested.

A number of informational messages relating to the tests being performed will be displayed. Any errors found will result in a red error box identifying the error, card, and port which failed. Note that the card is identified as "Slot = n". This is \*not\* the slot number (19, 20, or 21) listed above. Instead

it really is just the diagnostics' instance number for this card. That is, if the diagnostics find three cards present, it just numbers them 1, 2, or 3, in the order listed above. See "Error Messages" on page 40 to find the error code in the list. The list breaks the problem into one of three categories.

If all selected tests are passed, an informational message is briefly displayed **All Tests Complete**. The screen is then automatically switched back to the initial **Wide Area Connector Test Control panel**. The tests can be re-run, modified, or a different card selected by repeating the above procedure.

- 12** When testing is complete, return to the first screen and select **F3** to exit the diagnostics program.
- 13** When testing is complete, remove the diagnostic diskette and the CD disc and reboot the system by pressing **CTRL-ALT-DEL** (or by press the **RESET** switch).

## Error Messages

If a problem exists with the WAC Adapter or the EIB, an error code in one of the following ranges appears to indicate what action should be taken: Format is '00xxxx'.

Figure 21. Error Messages

Error No. or Range	Explanation	Action to Take
6501-6537	There is an EIB, cable, or wrap plug failure on link A.	Replace the EIB, cable, and wrap plug for link A.
6541-6577	There is an EIB, cable, or wrap plug failure on link B.	Replace the EIB, cable, and wrap plug for link B.
6578-6599	The WAC adapter card is not working as expected.	Take the following actions: <ol style="list-style-type: none"> <li>1. An EIB may not be installed properly. Check to be sure the EIB is in place and the EIB-specific cable is connected securely.</li> <li>2. There may be a configuration error. Verify that the configuration parameters are correct.</li> <li>3. If the problem still exists after these actions are taken, replace the WAC adapter card.</li> <li>4. If the problem persists, run the diagnostics again for your server system to identify the problem.</li> </ol>

Online help is available if you have questions about any of the options. Select **F1** from any screen to receive an explanation or instructions for that screen.

## Installing the EIB

Complete the following steps to install the EIB on the WAC adapter card:

- 1** If the WAC adapter card has already been installed in your integrated server, you must remove the adapter to install an EIB.
- 2** Place the adapter on a flat surface.
- 3** Orient the keyed EIB above the two rows of sockets for the selected link. Avoid touching the pins of the EIB. Match up the guide arrows on the EIB and the WAC adapter card as shown in Figure 22.

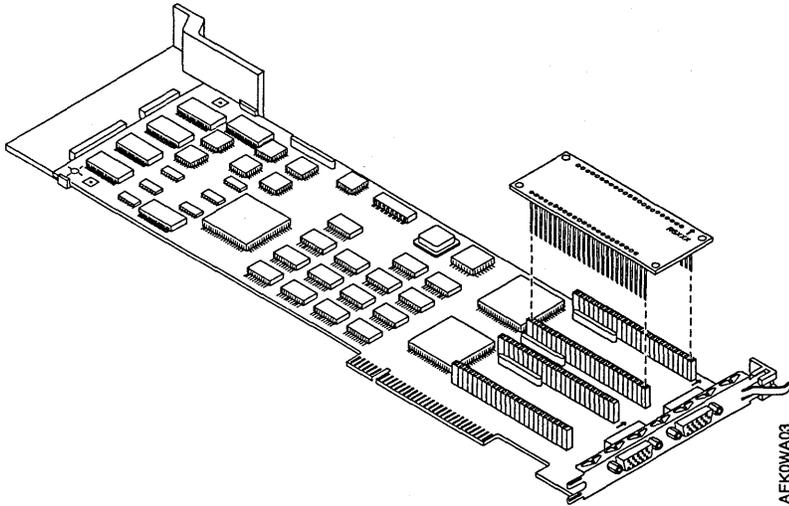


Figure 22. Installing an EIB in a WAC Adapter Card

- 4 Apply pressure evenly to the edges of the EIB until it has been inserted firmly on the WAC adapter card. Be careful not to bend the pins of the EIB.
- 5 Affix a label identifying each link connector on the end plate next to the corresponding link connector. See Figure 23.

**Attention:** Incorrectly matching a specific cable to an EIB link connection may cause damage to the WAC adapter card.

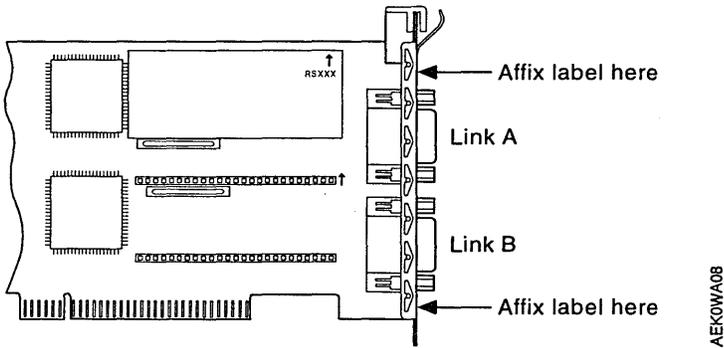


Figure 23. Identifying Link Connectors on a WAC Adapter Card

## WAC Switch Settings

Make sure that the switches on the card are set properly. Set the switches to match the failing card you are replacing. The switch assembly contains seven switches (see Figure 24) that are used to set I/O address ranges and interrupt levels. Set the option switches to one of three settings, depending on whether this is a first, second, or third WAC card.

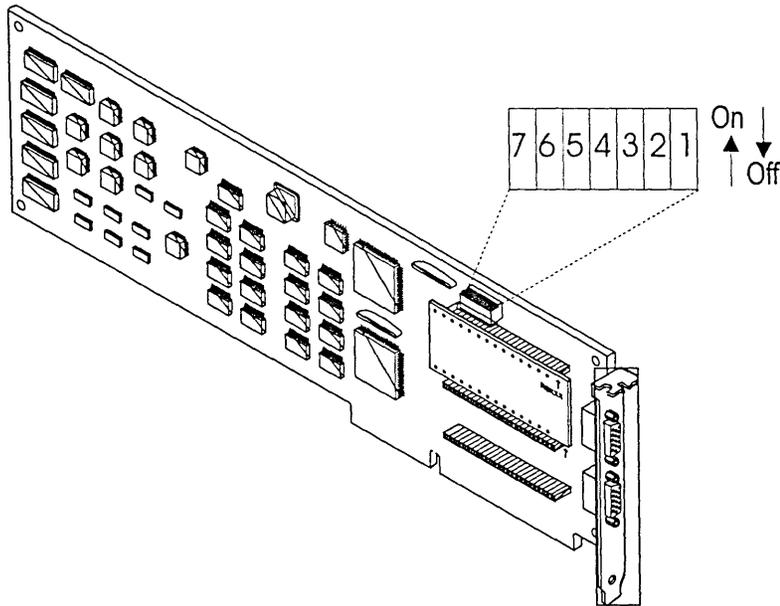


Figure 24. Location of Option Switches on the ISA WAC Adapter Card

	7	6	5	4	3	2	1	AWSICA S=	I/O Address
first card	on	on	on	on	on	on	off	S=F	120-13F
second card	on	on	on	off	on	on	off	S=E	140-15F
third card	on	on	off	on	on	on	off	S=D	180-19F

I/O Address
IRQ 5

Figure 25. Switch Settings

---

## S/390 PCI Channel Adapters

The S/390 Parallel Channel Adapter (PCA) attaches standard bus and tag devices to the P/390. It is the only way to attach mainframe bus and tag devices to the PCI version of the P/390 adapter.

The S/390 ESCON Channel Adapter attaches ESCON link devices to the P/390. It is the only way to attach mainframe ESCON devices to the PCI version of the P/390.

These adapters were designed exclusively for the P/390 and are optimized to produce the top I/O performance for select legacy S/370™ and S/390™ control units and devices. Utilizing these adapters in conjunction with the P/390 the older systems can be brought up-to-date while retaining certain legacy I/O sub systems. This capability allows for a migration of the I/O sub system over time. This, in turn, reduces the risk and complexity of a complete system conversion.

Physically the Parallel Channel Adapter and ESCON Channel Adapter hardware are made up from the following hardware components:

- Base card (ARTIC960)
- Daughter card that plugs onto the base card
- Memory that plugs into the base card
- **Parallel Channel Adapter only** An interface cable that attaches the standard bus and tag cables to the back of the Parallel Channel adapter.
- **Parallel Channel Adapter only** A terminator block which can attach to the back of the Parallel Channel adapter.

The base adapter is a standard PCI version IBM ARCTIC960 card, which has memory and a 25MHz Intel 960 processor on it. The ARCTIC960 adapter does nothing by itself. It must have an Adapter Interface Board (AIB) plugged into it to perform its intended functions.

The Parallel Channel AIB (Adapter Interface Board), which embodies hardware, unique to the S/390 Parallel Channel Adapter function, is plugged on to the ARCTIC960 card. The Parallel Channel AIB has a 78-pin D-shell connector on the back for attaching to bus and tag cables. A special cable is used to attach the standard bus and tag to the 78 pin D-shell connector. This cable is a Y cable with one connector on the D-shell and two standard bus and tag connectors at the other end.

The ESCON Channel AIB (Adapter Interface Board), which embodies hardware, unique to the S/390 ESCON Channel Adapter function, is plugged on to the ARCTIC960 card.

## Channel Diagnostics

There are four diagnostics that can be run from an OS/2 window.

- RICDIAG - This diagnostic tests the ARTIC960 adapter and the connection to the AIB.
- ICEINIT - This diagnostic initializes the channel card and starts an internal self-test.
- ICEWRAP - This diagnostic (for parallel channels only) performs wrap test which test the card, and can be used to test the cables.

This test cannot be used to wrap the ECA card and will fail with wraps already installed in the ECA cards.

- ICEDEV - This diagnostic test scans the entire channel address range for devices connected to either the PCA or ECA cards.

**Invoking Channel Diagnostics:** Use the following procedures to invoke the channel diagnostics.

1. With the customer's help, stop all S/390 programs and shut down the S/390 operating system if it is actively running on the P/390.
2. Open an OS/2 Window
3. Run basic channel diags (RICDIAG).
  - Enter **RICDIAG** to invoke the test. You will be prompted which card(s) to test and which test(s) to run, run all tests.  
**Note:** You may see a RIC436 message which means there are no test for the AIB card, this is **not** an error.
  - For additional information about this test, including possible return codes/messages see file c:\ric\read.me.
4. Initialize the channel card for functional test (ICEINIT).
  - Enter **ICEINIT card\_num** to invoke the test.
  - Replace the entire channel card if these test fail.
5. Run the channel wrap tests (ICEWRAP)

**Warning**

Wraps cannot be run on the Serial Channel card, and the Serial Channel card will fail to initialize if the serial wrap plug is installed on the card.

- Install External wrap block at the card P/N 6473024.
  - Enter **ICEWRAP card\_num** to invoke the test, ICEINIT must be run before this test can be run.
  - Install External wrap block at the end of the cable P/N 5547283.
  - Enter **ICEWRAP card\_num** to invoke the test, ICEINIT must be run before this test can be run.
6. Ripple I/O to devices (ICEDEV).
    - Enter **ICEDEV card\_num** to invoke the test. ICEINIT must be run before this test can be run.
    - Additional options can be displayed by entering ICEDEV ?.

**Note**

The card installed in the highest slot number (first slot from the bottom) will be channel card 0 (i.e. card\_num 0).

## Chapter 5. SCSI BUS and Devices

### Start of Repair for SCSI Bus and SCSI Devices

Problem Area Reported	Reference Section
SBC SCSI Adapter	"SBC SCSI Interface" on page 46
Adaptec Differential SCSI Adapter	"Differential SCSI Adapter" on page 46
CD-ROM Drive Problems	"CD-ROM" on page 48
4MM Dat Tape Problems	"4MM DAT Tape" on page 48

### Description of the SCSI Bus

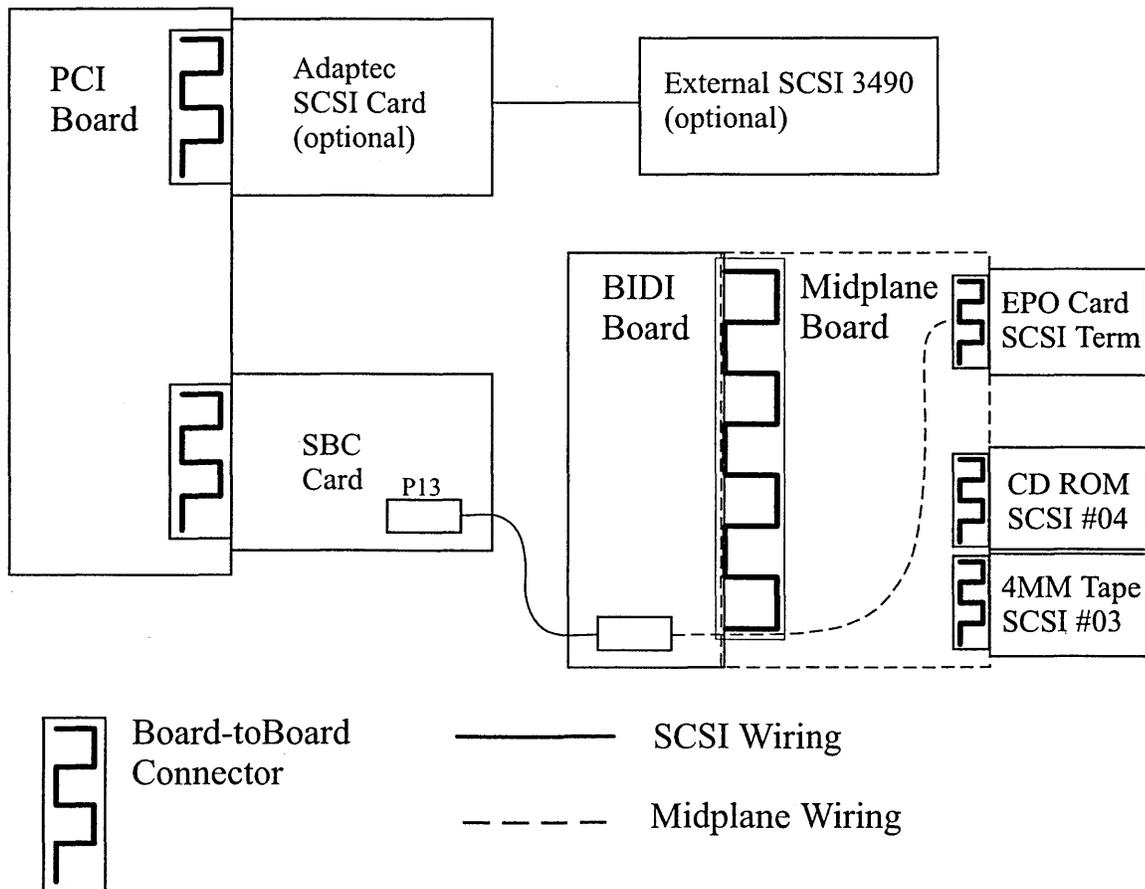


Figure 26. SCSI Bus

There can be two SCSI adapters installed. The SCSI adapter which connects the CD-ROM and 4MM Tape is located on the SBC card. The second SCSI adapter (which is optional) is a Differential SCSI adapter that is installed in PCI Slot 1 (at the top of the machine) and is used to connect external SCSI 3490 Tape drives.

---

### SBC SCSI Interface

The SCSI interface is a PCI Bus Master device which supports Ultra Wide SCSI data transfer up to 40MB per second and bursts data to the host at full PCI speeds. The interface starts at the SBC to drive the CD-ROM and 4MM Tape drive.

### Terminating the SBC SCSI Interface

The SBC SCSI Bus is terminated on the EPO card. A jumper is provided to disable on board active termination.

### Attached Devices

The SCSI interface feeds the following devices:

- I • 4MM Tape set to SCSI ID 03
- I • CD-ROM set to SCSI ID 04

### Service Tips

If the adapter fails to initialize remove the CD-ROM and 4MM Tape drive from the interface by removing the drives from the S/390 Integrated Server

Run SCSI diagnostics see "Diagnostics" on page 47.

---

### Differential SCSI Adapter

The Adaptec AHA-2944UW PCI to Ultra Wide Differential SCSI Host Adapter provides a multitasking interface between the system's PCI bus and differential SCSI devices. This is an optional feature and is used only for the external attachment of an IBM 3490-F01 tape device.

### Terminating the AHA-2944UW

Termination on the AHA-2944UW itself is controlled by software commands via the SCSISelect utility. The default setting is Automatic. If the AHA-2944UW detects that a cable is attached to one SCSI connector, it enables the terminators (the AHA-2944UW is at the end of the SCSI bus).

We recommend that you leave the AHA-2944UW set to its default setting of Automatic.

**Note:** The Adaptec SCSISelect utility is usually entered by pressing CTRL-A from the keyboard while the Adaptec 2944UW BIOS message is displayed on the screen. Depending on the configuration the BIOS message may not appear. If you need to run the utility it is necessary to disable the Memory Window, normally set to 64K, in the SBC BIOS setting menu, PCI/Plug and Play Setup. This setting **must** be restored after your are finished diagnosing the SCSI problem, or else the ISA adapter cards will not function correctly.

### Service Tips

If you have a problem during installation, check these items first:

- Is the IBM 3490-F01 powered?
- Is the external cable properly connected?
- Is there a differential wide SCSI Terminator on the SCSI output of the tape drive?
- Run SCSI diagnostics see "Diagnostics" on page 47.

---

## Diagnostics

- 1 With the customer's help, stop all S/390 programs and shut down the S/390 operating system if it is actively running on the P/390.
- 2 Create the Differential SCSI Adapter or SBC SCSI Adapter diagnostic diskette. See "Creating Diagnostic Diskettes" on page 230 for instructions on how to create the diskette, using the System/390 Integrated Server Install CD.
- 3 Shut down OS/2.
- 4 Insert the SCSI adapter diagnostics diskette into the floppy drive.
- 5 Press **CTRL-ALT-DEL** or press the RESET switch.
- 6 The SCSI test Menu will start.
- 7 Select **SCSI** tests (standard mode), press enter key.
- 8 The "select a SCSI controller" menu should contain one or two controllers. If an AHA-2944UW adapter is installed in PCI slot 1, then it will be controller 1. The SBC will always be controller 0.

**Note**

If the adapter is not listed, the adapter is most likely defective and should be replaced. To replace the SBC card see "SBC Card Removal and Replacement" on page 152, to replace the differential SCSI Adapter see "Differential SCSI Adapter Removal and Replacement" on page 146.

- 9 Select the controller to test.
- 10 The attached devices should be listed.

**Note**

If a no devices are listed, most likely a bus problem or one of the attached adapters hanging the bus. Suspect the cable, one of the devices or a SCSI ID conflict.  
If one device is not listed it is most likely defective.

- 11 Select the device to be tested  
**Note:** A blank CD or Tape will be required to run the tests.
- 12 Follow instructions on screen to test SCSI devices.
- 13 Press the **ESC** key to back out of the menu.
- 14 Press **ESC** key to quit.
- 15 Select **EXIT** and press the **ENTER** key.
- 16 When testing is complete, remove the diagnostic diskette and the CD disc and reboot the system by pressing **CTRL-ALT-DEL** (or by press the RESET switch).

---

## CD-ROM

### CDROM Drive LED Descriptions

The CDROM Drive has 2 indicators which indicate power and fault.

1. POWER (GREEN)- indicating voltage present on the unit.
2. FAULT (YELLOW)- indicates a fault detected within the unit.

### CD-ROM Drive Problems

If the CD does not work properly follow this step:

- Clean the CD by wiping it with a soft, lint-free cloth, from the center of the CD to the outer edge. Do not clean in a circular pattern.

If the CD-ROM drive tray does not work properly follow this step:

- Make sure the system is turned on. If the system is on and the tray does not eject, insert the end of a paper clip into the manual tray release opening to open the tray.

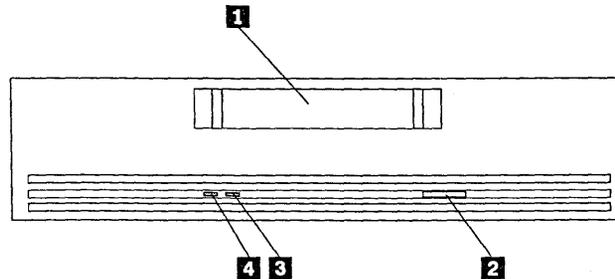
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## 4MM DAT Tape

The 12/24 GB DDS/3 4 mm Internal Tape Drive is a Fast SCSI-2 tape drive for restoring data. Tape cartridges can each store 12 GB of data. If you use data compression, you might store up to 24 GB on a cartridge at a transfer rate of up to 7 GB an hour, depending on the data content.

### Using the Drive

This illustration shows the drive front panel:



- 1** Tape drive door
- 2** Unload button
- 3** Right indicator light
- 4** Left indicator light

### 4MM DAT Tape LED Descriptions

The indicator lights **3** **4** are:

- **Left (green):** This light indicates cartridge status. When this light is on, the cartridge is inserted and ready for use. When this light is flashing, it indicates that the tape drive needs cleaning or that the cartridge needs to be replaced.
- **Right (amber):** This light indicates drive status. When this light is on, the tape drive is reading or

writing to tape. When this light is flashing, it indicates that a hardware fault has occurred. If this happens, the tape drive might need to be replaced. Refer to your product warranty, or contact your IBM reseller.

The following table describes the indicator light combinations that occur during tape operation.

LED	Action	Meaning
Amber	On	The tape drive is reading or writing to tape.
Amber	Flashing rapidly	A hardware fault occurred.
Green	On	A cartridge is inserted and does not generate errors.
Green	Flashing slowly	A cartridge is inserted and generates errors beyond a predefined error threshold. Use your enclosed cleaning cartridge to clean the heads. If the problem persists, replace the data cartridge.
Green	Flashing rapidly	The drive could not write to tape correctly. Use your enclosed cleaning cartridge to clean the heads. If the problem persists, replace the data cartridge.

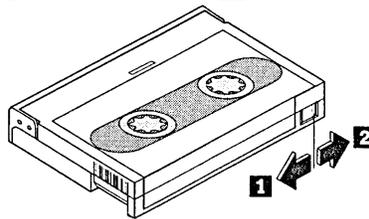
## Loading and Unloading Data Cartridges

Use only IBM 59H3465 data cartridges or other equivalent IBM approved data cartridges.

When the indicator lights are off, the tape drive is ready to accept a cartridge. Do not insert a data cartridge if the tape drive is still performing its power-on self-test.

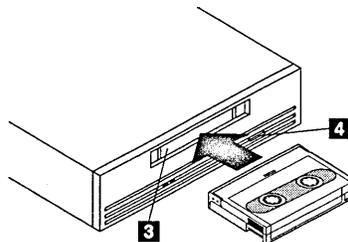
To load a cartridge:

1. Set the cartridge for write-protect **1** or write-enable **2**.



*4mm  
DAT  
P/N*

2. Insert the cartridge into the door **3**, as shown in the following illustration.



The tape drive loads the tape in approximately 20 seconds. When the green indicator light is on, the tape drive is ready for read and write operations.

To unload a cartridge, press the **unload button 4**.

The time between pressing the unload button and cartridge ejection might be several seconds. Do not turn off your computer during this time.

## Cleaning the Drive

When the left (green) indicator light is flashing slowly the tape drive requires cleaning. Clean the drive as soon as possible after the indicator light turns on. Clean the tape drive more often if you are using a lot of new tapes or if you are operating in an environment which contains a lot of dust or other particulate matter that could contaminate the magnetic tape.

To clean the tape drive, insert a cleaning cartridge (IBM 59H3090). When the cleaning is finished, the tape drive turns off the green indicator light and ejects the cleaning cartridge.

## Chapter 6. Single Board Computer and Attached I/O

### Start of Repair for I/O and Service Processor (IOSP)

Problem Area Reported	Reference Section
I/O and Service Processor (Single Board Computer) Information	"Description and Layout of the Single Board Computer (SBC)"
I/O and Service Processor (Single Board Computer) Diagnostics	"Single Board Computer Diagnostics" on page 69
SBC Attached I/O Information and Diagnostics	<p>"Resolving Keyboard, Monitor, and Mouse Problems" on page 71</p> <p>"Diskette Drive" on page 70</p> <p>"SBC SCSI Interface" on page 46</p> <p>"4MM DAT Tape" on page 48</p> <p>"CD-ROM" on page 48</p> <p>Chapter 4, "PCI/ISA BUS and Adapters" on page 13</p> <p>Chapter 7, "SSA RAID Adapter, SSA, and RAID" on page 73</p>
BEEPS during Power-On Self Test (POST)	"BIOS Beep Codes" on page 64
Configuration Jumpers	"Configuration Jumpers" on page 54
BIOS Operations	"BIOS Operation" on page 55
OS/2 Trap Error 0000-0010	Go To Application Software error and contact the next Support Level
SBC and Attached I/O Removal and Replacement procedures	Chapter 8, "Removal and Replacement Procedures" on page 141

### Description and Layout of the Single Board Computer (SBC)

The SBC is based on an Intel Pentium processor. The SBC has PCI, ISA, Ethernet, display, keyboard, mouse, and other standard interfaces. The SBC is the engine part of the IOSP that performs I/O emulation for all communications and storage operations.

The IOSP can interface with a customer LAN to facilitate system management functions via LAN adapter, and can interface with a customer's analog phone line to facilitate remote service operations via a serial port attached modem. A display, keyboard and mouse are also attached.

A layout of the SBC Card follows:

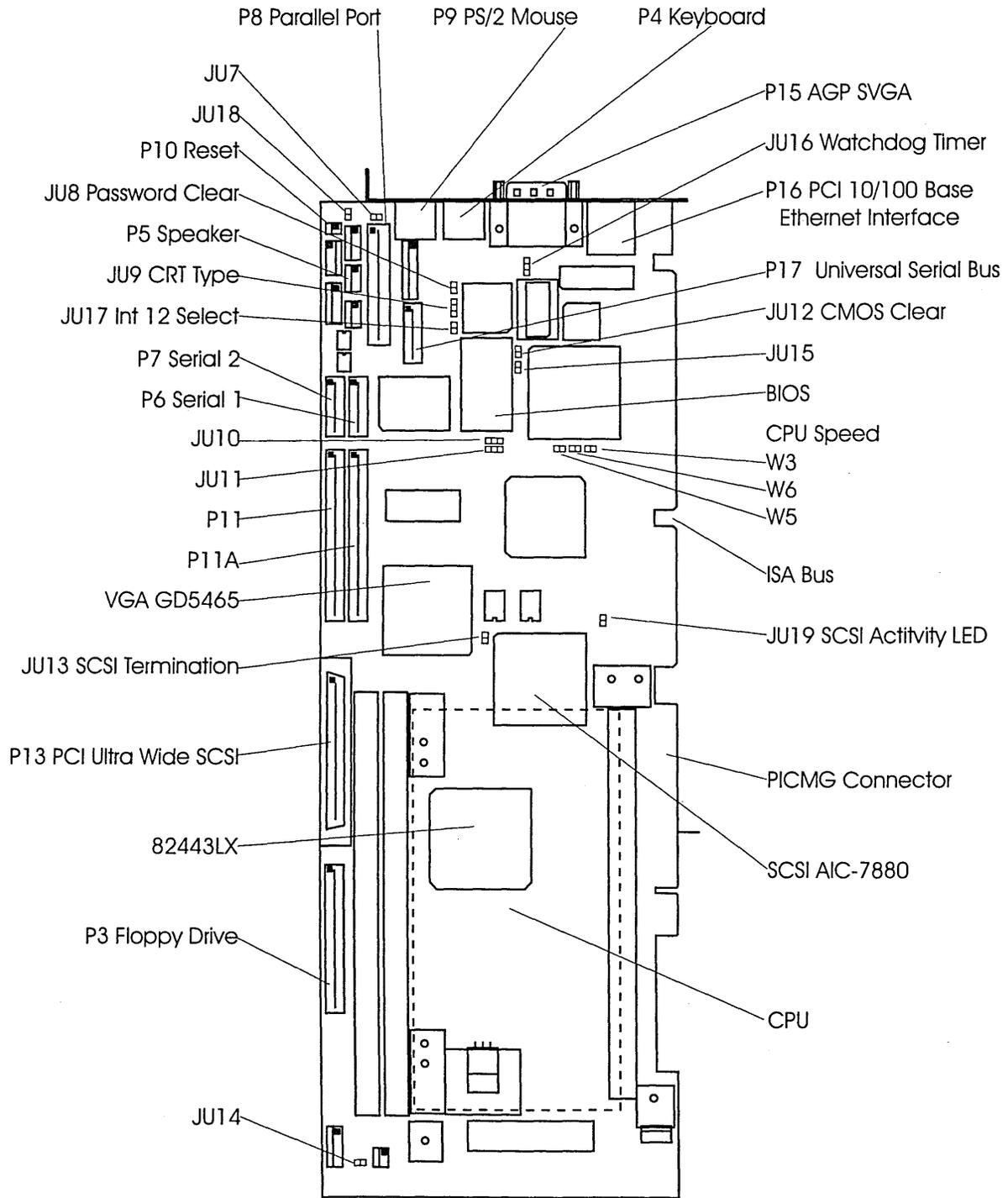


Figure 27. SBC Card Layout

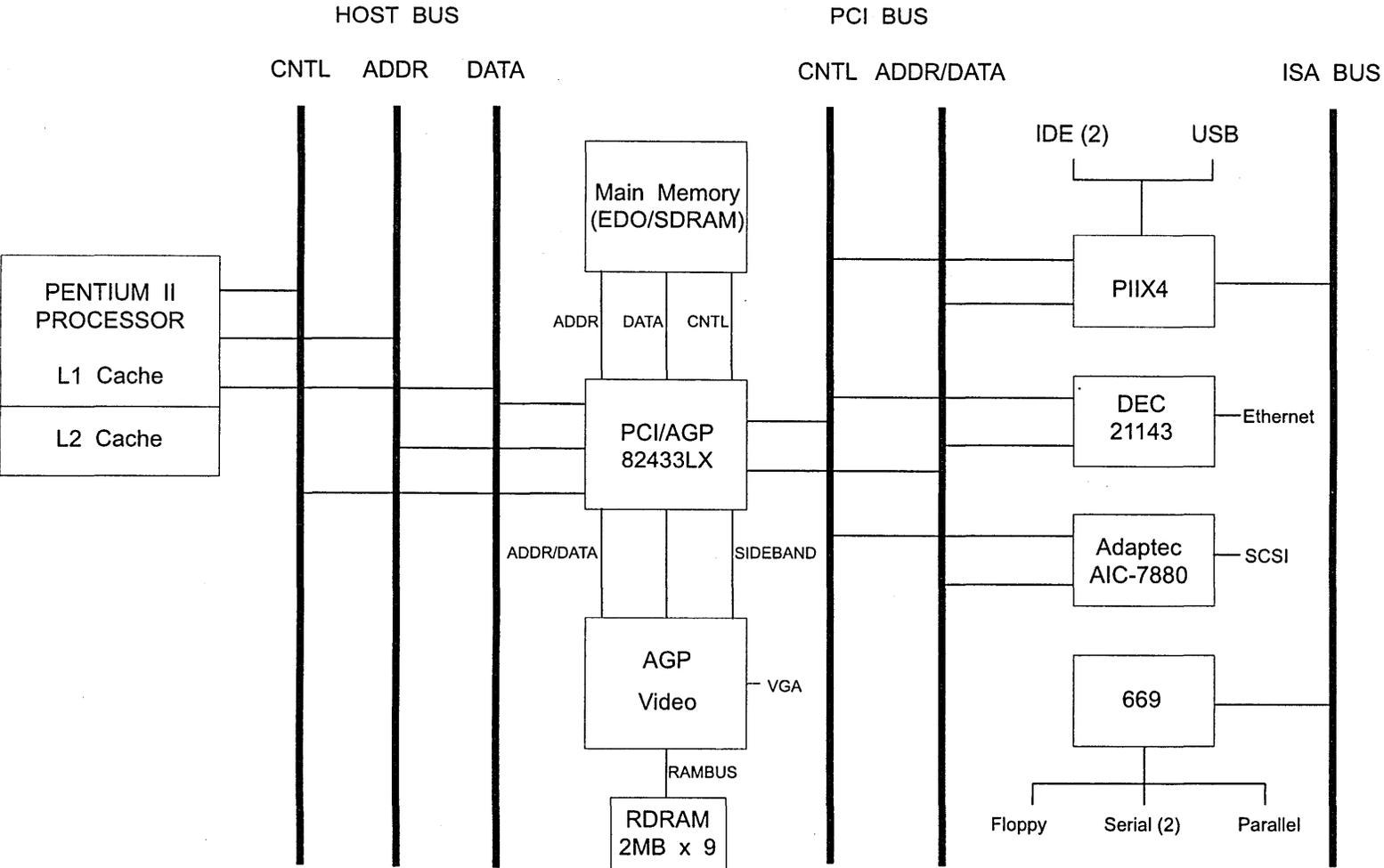


Figure 28. IOSP Bus Structure

## Configuration Jumpers

The setup of the configuration jumpers on the processor is described below. Always set the jumpers as indicated.

**Note:** For two-position jumpers (3-post), "RIGHT" is toward the bracket end of the board; "LEFT" is toward the memory sockets.

JUMPER	DESCRIPTION	JUMPER SETTING
JU8	Password Clear	Jumper OFF
JU9	CRT Type Select	Jumper on RIGHT
JU10/JU11	System Flash ROM Operational Modes	Jumper 11 should be installed in the "up" position Jumper 10 should be installed in the "down" position

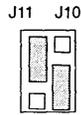


Figure 29. JU10/JU11 Settings

JU12	CMOS Clear	Jumper OFF
JU13	SCSI Termination Disable	Jumper ON
JU14	Fan Speed Monitor	Jumper OFF
JU15	3.3V Monitor Enable	Jumper ON
JU16	Watchdog Timer	Jumper on LEFT
JU17	Interrupt 12 (IRQ 12) Select	Jumper ON
JU19	SCSI Activity LED Enable	Jumper ON

## CPU Speed Jumpers

There are three jumpers (W3, W5 and W6) that set the speed of the Pentium CPU. These jumpers must be set as specified below.

CPU Speed	Synthesizer Frequency	W3	Jumpers	
			W5	W6
333MHz	66MHz	ON	OFF	OFF

---

## BIOS Operation

- SBC Test & Initialization
- SBC Configuration & Verification
- BIOS Beep Codes
- BIOS Handler Messages

This section describes the operation of the AMIBIOS Setup Utility. Refer to "Running AMIBIOS Setup" on page 58 for standard Setup screens, options and defaults.

When the system is powered on, AMIBIOS performs the Power-On Self Test (POST) routines. These routines are divided into two phases:

1. **System Test and Initialization.** Test and initialize system boards for normal operations.
2. **System Configuration Verification.** Compare defined configuration with hardware actually installed.

If an error is encountered during the diagnostic tests, the error is reported in one of two different ways. If the error occurs before the display device is initialized, a series of beeps is transmitted. If the error occurs after the display device is initialized, the error message is displayed on the screen. See "BIOS Errors" on page 56 for more information on error handling.

The following are some of the Power-On Self Tests (POSTs) which are performed when the system is powered on:

- CMOS Checksum Calculation
- Keyboard Controller Test
- CMOS Shutdown Register Test
- 8254 Timer Test
- Memory Refresh Test
- Display Memory Read/Write Test
- Display Type Verification
- Entering Protected Mode
- Memory Size Calculation
- Conventional and Extended Memory Test
- DMA Controller Tests
- Keyboard Test
- System Configuration Verification and Setup

AMIBIOS checks all system and cache memory and reports them on both the initial AMIBIOS screen and the AMIBIOS System Configuration screen which appears after POST is completed. AMIBIOS attempts to initialize the peripheral devices by verifying the validity of the system setup information stored in the system CMOS RAM. (See "Running AMIBIOS Setup" on page 58.) If AMIBIOS detects a fault, the screen displays the error condition(s) which has/have been detected. If no errors are detected, AMIBIOS attempts to load the system from any bootable device, such as a floppy disk or hard disk.

Normally, the only POST routine visible on the screen is the memory test. The following screen displays when the system is powered on:

```

AMIBIOS (C)1996 American Megatrends Inc.
TRENTON Technology Inc.
BIOS Version IBMLX003 10/5/98 3:39:00 PM
Checking NVRAM..
xxxxxKB OK

Hit DEL if you want to run SETUP

(C) American Megatrends Inc.

xx-xxxx-xxxxxx-xxxxxxxx-xxxxxx-440LX-0AANY001-H

```

*Figure 30. Initial Power-On Screen*

You have two options:

1. Press **<Del>** immediately to access the AMIBIOS Setup Utility.

This option allows you to change various system parameters such as date and time, disk drives, etc. The "Running AMIBIOS Setup" on page 58 section of this manual describes the options available.

2. Allow the bootup process to continue without invoking the AMIBIOS Setup Utility.

Once the POST routines complete successfully, a screen displays showing the current configuration of your system, including processor type, base and extended memory amounts, floppy and hard drive types, display type and peripheral ports.

## BIOS Errors

If an error is encountered during the diagnostic checks performed when the system is powered on, the error is reported in one of two different ways:

1. If the error occurs before the display device is initialized, a series of beeps is transmitted.
2. If the error occurs after the display device is initialized, the screen displays the error message. In the case of a non-fatal error, a prompt to press the **<F1>** key may also appear on the screen.

If certain non-fatal error conditions occur, you are requested to run the AMIBIOS Setup Utility. The error messages are followed by this screen:

AMIBIOS (C)1996 American Megatrends Inc.  
TRENTON Technology Inc.  
BIOS Version IBMLX003 10/5/98 3:39:00 PM

< error message here >  
Press F1 to run SETUP  
Press F2 to load default values and continue

Press <F1>. to run AMIBIOS Setup Utility.

**Note:** Normally, only the following three options are required:

1. "Auto Configuration with Optimal Settings" to autoconfigure.
2. "Standard CMOS Setup" to set Date and Time
3. "Save Settings and Exit" to save and exit

---

## Running AMIBIOS Setup

AMIBIOS Setup keeps a record of system parameters, such as date and time, disk drives, display type and other user-defined parameters. The Setup parameters reside in the Read Only Memory Basic Input/Output System (ROM BIOS) so that they are available each time the system is turned on. AMIBIOS Setup stores the information in the complementary metal oxide semiconductor (CMOS) memory. When the system is turned off, a backup battery retains system parameters in the CMOS memory.

Each time the system is powered on, it is configured with these values, unless the CMOS has been corrupted or is faulty. The AMIBIOS Setup Utility is resident in the ROM BIOS (Read Only Memory Basic Input/Output System) so that it is available each time the computer is turned on. If, for some reason, the CMOS becomes corrupted, the system is configured with the default values stored in this ROM file.

As soon as the system is turned on, the power-on diagnostic routines check memory, attempt to prepare peripheral devices for action, and offer you the option of pressing <Del> to run AMIBIOS Setup.

If certain non-fatal errors occur during the Power-On Self Test (POST) routines which are run when the system is turned on, you may be prompted to run AMIBIOS Setup by pressing <F1>.

## AMIBIOS Setup Main Menu

When you press <F1> in response to an error message received during the POST routines or when you press the <Del> key to enter the AMIBIOS Setup Program, the following screen displays:

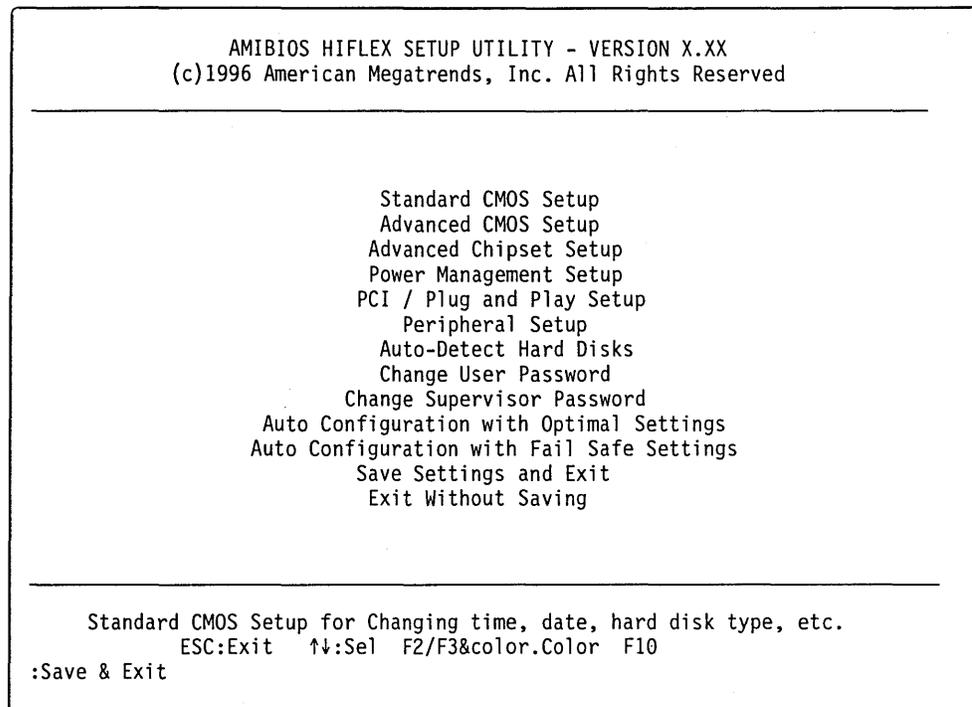


Figure 31. AMIBIOS Setup Main Menu

Use the **Down Arrow** key to highlight the desired option and press **<Enter>**.

- Select **Standard CMOS Setup** to make changes to Standard CMOS Setup parameters.
- Select **Advanced CMOS Setup** to make changes to Advanced CMOS Setup parameters.
- Select **Advanced Chipset Setup** to make changes to Advanced Chipset Setup parameters.
- Select **Power Management Setup** to make changes to Power Management Setup parameters.
- Select **PCI/Plug and Play Setup** to make changes to PCI/Plug and Play Setup parameters.
- Select **Peripheral Setup** to make changes to the Peripheral Setup parameters.
- Select **Auto-Detect Hard Disks** to have AMIBIOS automatically detect the type and parameters of each hard drive if you have IDE drive(s). This option is described later in this section.
- Select **Change User Password** to establish or change the password for the user. This function is described later in this section.
- Select **Change Supervisor Password** to establish or change the password for the supervisor. This function is described later in this section.
- Select **Auto Configuration with Optimal Settings** to load the Optimal default settings. These settings are best-case values which should provide the best performance characteristics. This function is described later in this section.
- Select **Auto Configuration with Fail Safe Settings** to load the Fail Safe default settings. These settings are more likely to configure a workable

computer, but they may not provide optimal performance. This function is described later in this section.

- Select **Save Settings and Exit** to store your changes in the CMOS. The CMOS checksum is calculated and written to the CMOS. Control is then passed back to AMIBIOS and the booting process continues, using the new CMOS values. This function is described later in this section.
- Select **Exit Without Saving** to pass control back to the AMIBIOS *without* writing any changes to the CMOS. AMIBIOS continues with the booting process. This function is described later in this section.

## Default P/390 Settings for SBC BIOS Setup

1. Power-on or reboot the system (Ctl-Alt-Del).
2. Press DEL immediately when memory is counting.
3. The AMIBIOS Setup Utility menu will be displayed.
4. Choose "Auto Configuration with Optimal Settings".  
Answer the High Performance question as **Yes**.
5. Under "Advanced CMOS Setup", verify the following only:
  - 1ST Boot Device = FLOPPY
  - 2ND Boot Device = CDROM
  - 3RD Boot Device = DISABLED
  - Try other Boot Devices = YES
  - Boot NumLock = OFF
  - Boot to OS/2 = .YES
  - C000, 16K shadow = CACHED
  - C400, 16K shadow = CACHED
  - C800, 16K shadow = CACHED
  - CC00, 16K shadow = CACHED
  - D000, 16K shadow = CACHED
  - D400, 16K shadow = DISABLED
  - D800, 16K shadow = DISABLED
  - DC00, 16K shadow = DISABLED
6. Under "Advanced Chipset Setup", change the following:
  - USB = DISABLED
  - DRAM Integrity Mode = ECC
  - IRQ 12 = MOUSE
7. Under "PCI/Plug and Play Setup", change the following:
  - IRQ3 = ISA/EISA
  - IRQ5 = ISA/EISA
8. Under "Peripheral Setup", change the following:
  - OnBoard FDC = ENABLED

- OnBoard Serial Port 1 = 3F8h
- OnBoard Serial Port 2 = DISABLED
- OnBoard Parallel Port = 3BC
- Parallel Port Mode = ECP
- OnBoard IDE = DISABLED

9. If any settings were changed see "Save Settings and Exit" on page 63.

---

## Auto Configuration Options

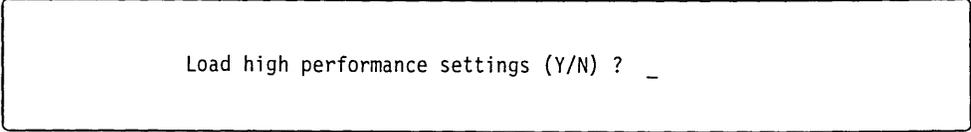
Each AMIBIOS Setup option has two default settings (Optimal and Fail Safe). These settings can be applied to all AMIBIOS Setup options when you select the appropriate auto configuration option from the AMIBIOS Setup Main Menu.

You can use these auto configuration options to quickly set the system configuration parameters which should provide the best performance characteristics, or you can select a group of settings which have a better chance of working when the system is having configuration-related problems.

### Auto Configuration with Optimal Settings

This option allows you to load the Optimal default settings. These settings are best-case values which should provide the best performance characteristics. If CMOS RAM is corrupted, the Optimal settings are loaded automatically.

If you select the **Auto Configuration with Optimal Settings** option, the following window displays:



Load high performance settings (Y/N) ? \_

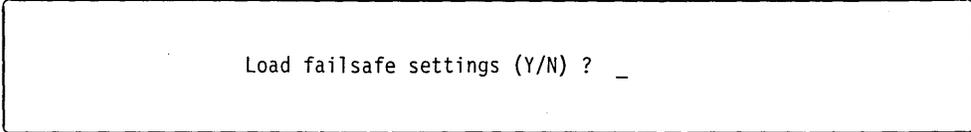
You have two options:

- Press 'N' and <Enter> to leave the current values in effect.
- Press 'Y' and <Enter> to load the Optimal default settings.

### Auto Configuration with Fail Safe Settings

This option allows you to load the Fail Safe default settings when you cannot boot your computer successfully. These settings are more likely to configure a workable computer. They may not provide optimal performance, but are the most stable settings. You may use this option as a diagnostic aid if your system is behaving erratically. Load the Fail Safe settings and then try to diagnose the problem after the computer boots.

If you select the **Auto Configuration with Fail Safe Settings** the following window displays:



Load failsafe settings (Y/N) ? \_

You have two options:

- Press 'N' and <Enter> to leave the current values in effect.
- Press 'Y' and <Enter> to load the Fail Safe default settings.

## Save Settings and Exit

The features selected and configured in the Setup screens are stored in the CMOS when this option is selected. The CMOS checksum is calculate and written to the CMOS. Control is then passed back to the AMIBIOS and the booting process continues, using the new CMOS values.

If you select the **SAVE SETTINGS AND EXIT** option, the following window displays:

Save current settings and exit (Y/N) ? \_

You have two options:

- Press '**N**' and <Enter> to return to the AMIBIOS Setup Main Menu.
- Press '**Y**' and <Enter> to save the system parameters and continue with the booting process.

## Exit without Saving

This option passes control back to AMIBIOS *without* writing any changes to the CMOS.

If you select the **EXIT WITHOUT SAVING** option, the following window displays:

Quit without saving the current settings (Y/N) ? \_

You have two options:

- Press '**N**' and <Enter> to return to the AMIBIOS Setup Main Menu.
- Press '**Y**' and <<Enter> to continue with the booting process *without* saving any system parameters.

---

## Key Conventions

Listed below is an explanation of the keys you may use for navigation and selection in the AMIBIOS Setup Utility:

Key	Task
<Esc>	Close the current operation and return to the previous level.
<Tab>	Move to the next field.
Arrow keys	Move to the next field in the desired direction.
<Enter>	Select the current item.
<F2>/<F3>	Change background and foreground colors.
<F10>	Save all changes made to the Setup and exit from the AMIBIOS Setup Utility.
Plus key (+),<PgUp>	Increment a value.
Minus key (-),<PgDn>	Decrement a value.

## BIOS Beep Codes

Errors may occur during the POST (Power-On Self Test) routines which are performed each time the system is powered on.

**Non-fatal errors** are those which, in most cases, allow the system to continue the bootup process. The error message normally appears on the screen. See "BIOS Error Messages" on page 65 for descriptions of these messages.

**Fatal errors** are those which will not allow the system to continue the bootup procedure.

These fatal errors are usually communicated through a series of audible beeps. Each error message has its own specific beep code, defined by the number of beeps following the error detection. The following table lists the errors which are communicated audibly.

All errors listed, *with the exception of #8*, are fatal errors.

Beep Count	Message	Description
1	Refresh Failure	The memory refresh circuitry of the processor board is faulty.
2	Parity Error	A parity error was detected in the base memory (the first block of 64KB) of the system.
3	Base 64KB Memory Failure	A memory failure occurred within the first 64KB of memory.
4	Timer Not Operational	A memory failure occurred within the first 64KB of memory, or Timer #1 on the processor board has failed to function properly.
5	Processor Error	The CPU (Central Processing Unit) on the processor board has generated an error.

Beep Count	Message	Description
6	8042 - Gate A20 Failure	The keyboard controller (8042) contains the Gate A20 switch which allows the CPU to operate in protected mode. This error message means that the BIOS is not able to switch the CPU into protected mode.
7	Processor Exception Interrupt Error	The CPU on the processor board has generated an exception interrupt.
8	Display Memory Read/Write Error	The system video adaptor is either missing or its memory is faulty. <b>Note:</b> This is <i>not</i> a fatal error.
9	ROM Checksum Error	The ROM checksum value does not match the value encoded in the BIOS.
10	CMOS Shutdown Register Read/Write Error	The shutdown register for the CMOS RAM has failed.
11	Cache Memory Bad; Do Not Enable Cache	The cache memory test failed. Cache memory is disabled. <i>Do not press &lt;Ctrl&gt;&lt;Alt&gt;&lt;Shift&gt;&lt;+&gt; enable cache memory.</i>

## BIOS Error Messages

If a non-fatal error occurs during the POST routines performed each time the system is powered on, the error message will appear on the screen in the following format:

```

ERROR Message Line 1
ERROR Message Line 2
Press F1 to Resume

```

Note the error message and press the **<F1>** key to continue with the bootup procedure.

**Note:** If the "Wait for 'F1' If Any Error" option in the Advanced Setup portion of the BIOS Setup Program has been set to **Disabled**, the "Press F1 to Resume" prompt will not appear on the third line.

For most of the error messages, there is no ERROR Message Line 2. Generally, for those messages containing an ERROR Message Line 2, the text will be "RUN SETUP UTILITY." Pressing the **<F1>** key will invoke the BIOS Setup Utility.

A description of each error message appears below. The errors are listed in alphabetical order, not in the order in which they may occur.

Message	Description
8042 Gate-A20 Error	The gate-A20 portion of the keyboard controller (8042) has failed to operate correctly.
Address Line Short!	An error has occurred in the address decoding circuitry of the processor board.

Message	Description
C: Drive Error	The BIOS is not receiving any response from hard disk drive C:. Check Standard Setup using the BIOS Setup Utility, reference "Running AMIBIOS Setup" on page 58 ,to see if the correct hard disk drive has been selected.
C: Drive Failure	The BIOS cannot get <i>any</i> response from hard disk drive C:. It may be necessary to replace the hard disk.
Cache Memory Bad, Do Not Enable Cache!	Cache memory is defective.
CH-2 Timer Error	Most AT standard system boards include two timers. An error with Timer #1 is a fatal error, explained in "BIOS Beep Codes" on page 64. If an error occurs with Timer #2, this error message appears.
CMOS Battery State Low	There is a battery in the system which is used for storing the CMOS values. This battery appears to be low in power and needs to be replaced.
CMOS Checksum Failure	After the CMOS values are saved, a checksum value is generated to provide for error checking. If the previous value is different from the value currently read, this error message appears. To correct the error, run the BIOS Setup Utility.
CMOS Display Type Mismatch	The type of video stored in CMOS does not match the type detected by the BIOS. Run the BIOS Setup Utility to correct the error.
CMOS Memory Size Mismatch	If the BIOS finds the amount of memory on the system board to be different from the amount stored in CMOS, this error message is generated. Run the BIOS Setup Utility to correct the error.
CMOS System Options Not Set	The values stored in the CMOS are either corrupt or nonexistent. Run the BIOS Setup Utility to correct the error.
CMOS Time & Date Not Set	Use Standard Setup in the BIOS Setup Utility to set the date and time of the CMOS.
D: Drive Error	The BIOS is not receiving any response from hard disk drive D:. Check Standard Setup using the BIOS Setup Utility to see if the correct hard disk drive has been selected.
D: Drive Failure	The BIOS cannot get <i>any</i> response from hard disk drive D:. It may be necessary to replace the hard disk.
Diskette Boot Failure	The disk used to boot up in diskette drive A: is corrupt, which means it cannot be used to boot up the system. Use another boot disk and follow the instructions on the screen.
Display Switch Not Proper	Some systems require that a video switch on the processor be set to either color or monochrome, depending upon the type of video being used. To correct this situation, set the switch properly after the system is powered off.
DMA Error	An error has occurred in the DMA controller on the processor board.

Message	Description
DMA #1 Error	An error has occurred in the first DMA channel on the processor board.
DMA #2 Error	An error has occurred in the second DMA channel on the processor board.
FDD Controller Failure	The BIOS is not able to communicate with the diskette disk drive controller. Check all appropriate connections after the system is powered off.
HDD Controller Failure	The BIOS is not able to communicate with the hard disk drive controller. Check all appropriate connections after the system is powered off.
INTR #1 Error	Interrupt channel #1 has failed the POST routine.
INTR #2 Error	Interrupt channel #2 has failed the POST routine.
Invalid Boot Diskette	The BIOS can read the disk in diskette drive A:, but it <i>cannot</i> boot up the system with it. Use another boot disk and follow the instructions on the screen.
KB/Interface Error	The BIOS has found an error with the keyboard connector on the processor board.
Keyboard Error	The BIOS has encountered a timing problem with the keyboard. The Keyboard option in the Standard Setup portion of the BIOS Setup Utility may be set to <b>Not Installed</b> , which will cause the BIOS to skip the keyboard POST routines.
Keyboard Is Locked... Unlock It	The keyboard lock on the system is engaged. It must be unlocked to continue the bootup procedure.
No ROM BASIC	This error occurs when a proper bootable sector cannot be found on either diskette disk drive A: or hard disk drive C:. The BIOS will try at this point to run ROM Basic, and the error message is generated when the BIOS does not find it.
Off Board Parity Error	<p>The BIOS has encountered a parity error in memory installed on an adapter card in an I/O (Bus) expansion slot. The message appears as follows:</p> <p style="text-align: center;">OFF BOARD PARITY ERROR ADDR (HEX) = (XXXX)</p> <p>where XXXX is the address (in hexadecimal) at which the error has occurred. "Off Board" means that it is part of the memory installed via an expansion card in an I/O (Bus) slot, as opposed to memory attached directly to the processor board.</p>
On Board Parity Error	<p>The BIOS has encountered a parity error in memory installed on the processor board. The message appears as follows:</p> <p style="text-align: center;">ON BOARD PARITY ERROR ADDR (HEX) = (XXXX)</p> <p>where XXXX is the address (in hexadecimal) at which the error has occurred. "On Board" means that it is part of the memory attached directly to the processor board, as opposed to memory installed via an expansion card in an I/O (Bus) slot.</p>

Message	Description
Parity Error ????	The BIOS has encountered a parity error with some memory in the system, but it is not able to determine the address of the error.

## ISA BIOS NMI Handler Messages

The ISA NMI (non-maskable interrupt) messages are described below.

Message	Description
Memory Parity Error	Memory failed. The message appears as follows:  MEMORY PARITY ERROR AT XXXXX  where XXXXX is the address (in hexadecimal) at which the error has occurred. If the memory location cannot be determined, the message is "Memory Parity Error ????"
I/O Card Parity Error	An expansion card failed. The message appears as follows:  I/O PARITY ERROR AT XXXXX  where XXXXX is the address (in hexadecimal) at which the error has occurred. If the address cannot be determined, the message is "I/O Card Parity Error ????"
DMA Bus Time-Out	A device has driven the bus signal for more than 7.8 microseconds.

---

## Single Board Computer Diagnostics

- 1 With the customer's help, stop all S/390 programs and shut down the S/390 operating system if it is actively running on the P/390.
- 2 Create the SBC card diagnostic diskette. See "Creating Diagnostic Diskettes" on page 230 for instructions on how to create the diskette, using the System/390 Integrated Server Install CD.
- 3 Shut down OS/2.
- 4 Insert the Single Board Computer diagnostics diskette into the floppy drive.
- 5 Press **CTRL-ALT-DEL** or press the RESET switch.
- 6 The Single Board Computer test will start running automatically.
- 7 The test will either stop at a failure, or complete with no failed steps.
- 8 If a failure is noted, replace the Single Board Computer.

If nothing failed, do the following:

- 1 Select **QUIT**, and press the **ENTER** key
- 2 Press **ESC** key
- 3 Press **F10** key
- 4 Remove the diagnostic diskette and press the **ENTER** key.

If a failure is known and not tested contact the next level of support.

## Diskette Drive

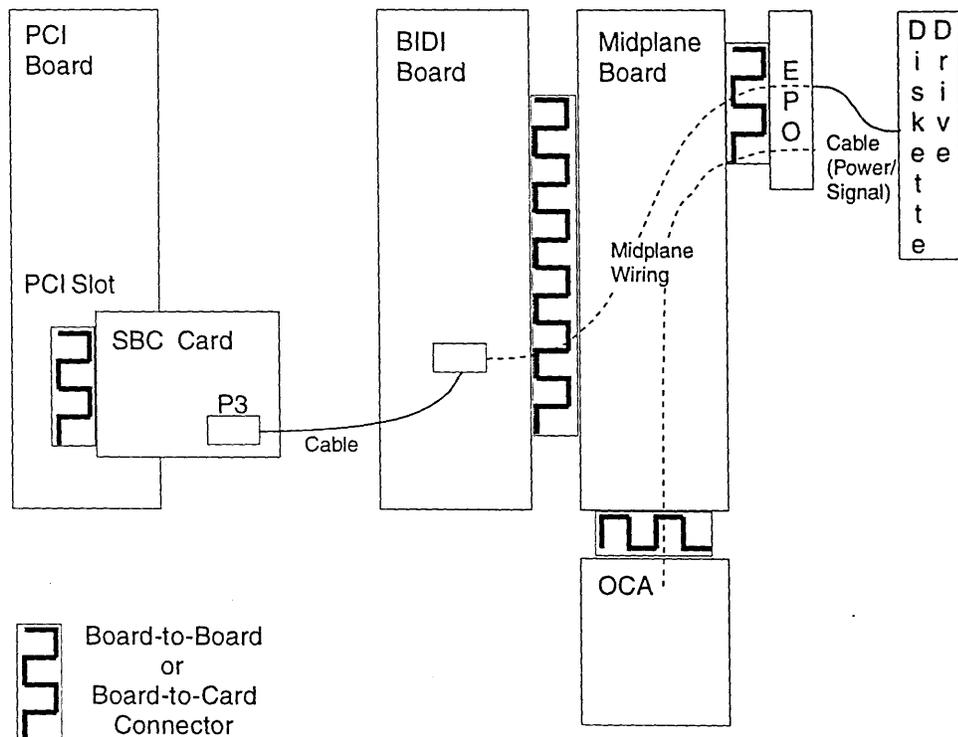


Figure 32. Diskette Drive Interface

## Diskette Drive LED Descriptions

The Diskette Drive has the standard device activity LED

## Diskette Drive Problems

If the diskette drive in-use light stays on follow these steps:

- Verify that the diskette is good and not damaged (Try another diskette if you have one).
- Verify that the diskette is inserted correctly in the drive.
- Verify that the diskette has the necessary files.
- Verify that the diskette cable is plugged in correctly.

---

## Resolving Keyboard, Monitor, and Mouse Problems

All or some keys on the keyboard do not work:

- Verify that the keyboard cable is properly connected to the system, and installed on the correct port (closest to the monitor connection).
- Make sure that the system and the monitor are powered on.

The mouse does not work:

- Verify that the mouse is securely connected to the system.

The monitor screen is blank:

- Verify that the system is powered on.
- Verify that the monitor signal cable is connected to the correct connector on the system, and installed on the correct port.
- Verify that the monitor is turned on and the brightness and contrast controls are adjusted correctly.

The monitor screen has cursor only or wrong characters appear.

- Verify that the SBC is working properly.

Some monitors have their own self-tests.

- If you suspect a problem with the monitor, refer to the information that comes with the monitor for adjusting and testing instructions.

The monitor screen flickers:

- Verify that the SBC is working properly.



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## Chapter 7. SSA RAID Adapter, SSA, and RAID

This section contains service information for the SSA adapter and attached storage devices.

For Information On	Go To
Maintenance Procedures (MAPs)	"SSA Maintenance Procedures (MAPs)" on page 74
SSA and RAID	"General Information About the SSA RAID Adapter, SSA, and RAID" on page 110
Link Errors	"SSA Link" on page 117
Link Status Indicators	"Link Status Lights" on page 118
Disk Drive Assembly Exchange Procedures	"Disk Drive Assembly (HDA) Removal and Replacement" on page 164
Service aids and other maintenance tools	"Using the SSA Service Tools" on page 119
SSA configurator	"Using the SSA Configurator Functions" on page 128

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## SSA Maintenance Procedures (MAPs)

The maintenance analysis procedures (MAPs) describe how to analyze a failure that has occurred in an SSA loop.

### How to Use the MAPs

**Attention:** Unless the system unit needs to be turned off for some other reason, *do not turn off the system when servicing an SSA loop.* Unit power cables and external SSA cables that connect the devices to the system can be disconnected while that system is running.

- To isolate the FRUs, do the actions and answer the questions given in the MAPs.
- When instructed to exchange two or more FRUs in sequence:
  1. Exchange the first FRU in the list for a new one.
  2. Verify that the problem is solved. For some problems, verification means running the diagnostic programs.
  3. If the problem remains:
    - a. Reinstall the original FRU.
    - b. Exchange the next FRU in the list for a new one.
  4. Repeat steps 2 and 3 until either the problem is solved, or all the related FRUs have been exchanged.
  5. Do the next action indicated by the MAP.

**Attention:** Disk drives are fragile. Handle them with care, and keep them well away from strong magnetic fields.

---

## SSA START

This MAP is the entry point to the MAPs for the SSA RAID Adapter. If you are not familiar with these MAPs, read "How to Use the MAPs" on page 74 first.

You might have been sent here because:

- The system problem determination procedures sent you here.
- Action from an SRN list sent you here.
- A problem occurred during the installation of a disk subsystem or a disk drive.
- Another MAP sent you here.
- A customer observed a problem that was not detected by the system problem determination procedures.

**Attention:** Unless the system unit needs to be turned off for some other reason, *do not turn off the system when servicing the SSA loop.* Unit power cables and external SSA cables that connect the devices to the system can be disconnected while that system is running.

---

### 1

Have you been sent here from the SRN list in this chapter?

**NO YES**

↓ Go to step 4.

---

### 2

Do you have an SRN?

**NO YES**

↓ Go to "Service Request Numbers (SRNs)" on page 77.

---

### 3

- Start the SSA Configurator and Service Aids Utility (see **step 1** of "Running the SSA Configurator" on page 129).
- From the Main menu, select **SSA Adapter List**.
- Select the adapter from the SSA Adapter List.
- Select **Run Concurrent Diagnostics**.

If no adapters are listed, do the following:

- Verify C-BIOS is enabled (at system power on)
- Verify device drivers loaded (at OS/2 boot-up)
- Replace the adapter.

If an SRN is produced, go to "Service Request Numbers (SRNs)" on page 77.

If no SRN is produced, go to "SSA – Repair Verification" on page 109.

---

## SSA RAID Adapter, SSA, and RAID

4

Is the SRN 45PAA?

NO YES

↓ Go to "SSA – LINK ERRORS" on page 83.

---

P = is the SSA adapter port number (0 through 4)

AA - is the decimal SSA-address value (0 through 15)

5

Is the SRN in the range 21000 through 29FFF?

NO YES

↓ Go to "SSA – Intermittent Link Error" on page 88.

---

6

Is the SRN 46000, 47000, 47500, 49000, 49100, 49500, OR 49700?

NO YES

↓ Go to "SSA – RAID ERRORS" on page 90.

---

7

You are in the wrong chapter of this manual. Go to the correct service information for your problem.

**End of procedure**

---

## Service Request Numbers (SRNs)

Service request numbers (SRNs) are generated by the system error-log analysis, system configuration code, diagnostics, and customer problem-determination procedures. SRNs help you to identify the cause of a problem, the failing field-replaceable units (FRUs), and the service actions that might be needed to solve the problem.

### The SRN Table

The table in this section lists the SRNs and describes the actions you should do. The table columns are:

<b>SRN</b>	The service reference number.
<b>FRU list</b>	The FRU or FRUs that might be causing the problem, and how likely it is (by percentage) that the FRU is causing the problem.
<b>Problem</b>	A description of the problem and the action you must take.

Abbreviations used in the table are:

<b>DMA</b>	Direct memory access
<b>FRU</b>	Field-replaceable unit
<b>PAA</b>	P = Adapter port number AA = SSA address (see also "Finding the Device When No Service Aids Are Available" on page 125)
<b>PCI</b>	Peripheral Component Interconnect
<b>POST</b>	Power-On Self-Test

### Using the SRN Table

**Important:** You should have been sent here from either diagnostics or a START MAP. Do not start problem determination from the SRN table; always go to the START MAP for the unit in which the device is installed.

1. Locate the SRN in the table. **If you do not have an SRN**, go to "SSA START" on page 75.
2. Read carefully the "Action" you must do for the problem. *Do not exchange adapters unless you are instructed to do so.*
3. Normally exchange only one adapter at a time. Always use instructions provided with the system unit when exchanging adapters. After each adapter is exchanged, go to "SSA – Repair Verification" on page 109 to verify the repair.

SRN	FRU List	Problem
10104	None	Description: Format in progress. Action: Wait for the formatting operation to end, then go to step 3 of "SSA START" on page 75 to run concurrent diagnostics.
10112	None	Description: Format degraded. A format operation has been ended before it has completed. Action: Use the Format service aid to format the disk drive module.
102FF	Disk Drive Module (100%) ("Disk Drive Assembly (HDA) Removal and Replacement" on page 164).	Description: Critical over-temperature has been detected. Action: Exchange the FRU if the ambient temperature is within specification, otherwise, correct the ambient temperature.

## SSA RAID Adapter, SSA, and RAID

SRN	FRU List	Problem
1nnnn	<b>Device (100%)</b> ("Disk Drive Assembly (HDA) Removal and Replacement" on page 164).	Description: Disk Drive module error. Action: Exchange the FRU
20PAA	<b>Device (45%)</b> ("Disk Drive Assembly (HDA) Removal and Replacement" on page 164). <b>SSA adapter card (45%)</b> <b>External SSA cables (6%)</b> <b>Internal SSA connections (4%)</b>	Description: An open SSA link has been detected. Action: Run the Disk service aid to isolate the failure (see "Using the SSA Service Tools" on page 119).
21PAA to 29PAA	<b>Device (45%)</b> ("Disk Drive Assembly (HDA) Removal and Replacement" on page 164). <b>SSA adapter card (45%)</b> <b>External SSA cables (6%)</b> <b>Internal SSA connections (4%)</b>	Description: An SSA 'Threshold exceeded' link error has been detected. Action: Go to "SSA START" on page 75.
2A002	<b>Device (50%)</b> ("Disk Drive Assembly (HDA) Removal and Replacement" on page 164). <b>SSA adapter card (50%)</b>	Description: Async code 02 has been received. Probably, a software error has occurred. Action: Go to "Software and Microcode Errors" on page 81 before exchanging any FRUs.
2A003	<b>Device (50%)</b> ("Disk Drive Assembly (HDA) Removal and Replacement" on page 164). <b>SSA adapter card (50%)</b>	Description: Async code 03 has been received. Probably, a software error has occurred. Action: Go to "Software and Microcode Errors" on page 81 before exchanging any FRUs.
2A004	<b>Device (50%)</b> ("Disk Drive Assembly (HDA) Removal and Replacement" on page 164). <b>SSA adapter card (50%)</b>	Description: Async code 04 has been received. Probably, a software error has occurred. Action: Go to "Software and Microcode Errors" on page 81 before exchanging any FRUs.
2FFFF	<b>None</b>	Description: An async code that is not valid has been received. Action: Go to "Software and Microcode Errors" on page 81.
303FF	<b>Device (100%)</b> ("Disk Drive Assembly (HDA) Removal and Replacement" on page 164).	Description: ASCII status that is not valid has been reached. Action: Go to "Software and Microcode Errors" on page 81.
31000	<b>Device (100%)</b> ("Disk Drive Assembly (HDA) Removal and Replacement" on page 164).	Description: Disk Drive error. Action: Exchange the FRU
33PAA	<b>Device (45%)</b> ("Disk Drive Assembly (HDA) Removal and Replacement" on page 164). <b>SSA adapter card (45%)</b> <b>External SSA cables (6%)</b> <b>Internal SSA connections (4%)</b>	Description: An SSA link has repeated errors. Action: Go to "SSA - Intermittent Link Error" on page 88.
40000	<b>SSA adapter card (100%)</b>	Description: The SSA adapter card has failed. Action: Exchange the FRU.
40004	<b>4 MB DRAM module 0 (100%)</b>	Description: A 4 MB DRAM in adapter card module 0 has failed. Action: Exchange the FRU.
40008	<b>8 MB DRAM module 0 (100%)</b>	Description: An 8 MB DRAM in adapter card module 0 has failed. Action: Exchange the FRU.
40016	<b>16 MB DRAM module 0 (100%)</b>	Description: A 16 MB DRAM in adapter card module 0 has failed. Action: Exchange the FRU.
40032	<b>32 MB DRAM module 0 (100%)</b>	Description: A 32 MB DRAM in adapter card module 0 has failed. Action: Exchange the FRU.
40064	<b>64 MB DRAM module 0 (100%)</b>	Description: A 64 MB DRAM in adapter card module 0 has failed. Action: Exchange the FRU.

SRN	FRU List	Problem
40128	128 MB DRAM module 0 (100%)	Description: A 128 MB DRAM in adapter card module 0 has failed. Action: Exchange the FRU.
41004	4 MB DRAM module 1 (100%)	Description: A 4 MB DRAM in adapter card module 1 has failed. Action: Exchange the FRU.
41008	8 MB DRAM module 1 (100%)	Description: An 8 MB DRAM in adapter card module 1 has failed. Action: Exchange the FRU.
41016	16 MB DRAM module 1 (100%)	Description: A 16 MB DRAM in adapter card module 1 has failed. Action: Exchange the FRU.
41032	32 MB DRAM module 1 (100%)	Description: A 32 MB DRAM in adapter card module 1 has failed. Action: Exchange the FRU.
41064	64 MB DRAM module 1 (100%)	Description: A 64 MB DRAM in adapter card module 1 has failed. Action: Exchange the FRU.
41128	128 MB DRAM module 1 (100%)	Description: A 128 MB DRAM in adapter card module 1 has failed. Action: Exchange the FRU.
42000	SSA adapter card (50%) DRAM modules (50%)	Description: The SSA adapter has detected that both DRAM modules are failing. Action: <ol style="list-style-type: none"> <li>1. Check whether both DRAM modules are correctly installed on the adapter card. Make any necessary corrections.</li> <li>2. If this problem has occurred immediately after an upgrade to the adapter card, check whether the correct type of DRAM modules have been installed. Make any necessary corrections.</li> <li>3. If the problem remains, exchange the adapter card FRU for a new one. <i>Do not exchange any DRAM modules yet.</i></li> <li>4. Install the DRAM modules from the original adapter card onto the new adapter card, then install the new adapter card.</li> <li>5. If the problem remains, exchange the DRAM modules for new modules.</li> <li>6. Install the new DRAM modules onto the original adapter card. Reinstall the original adapter card.</li> </ol>
43PAA	Device (90%) ("Disk Drive Assembly (HDA) Removal and Replacement" on page 164). SSA adapter card (10%)	Description: An SSA device on the link is preventing the completion of the loop configuration. Action: Go to "SSA START" on page 75.
44PAA	Device (100%) ("Disk Drive Assembly (HDA) Removal and Replacement" on page 164).	Description: An SSA device has a 'Failed' status. Action: If the SSA service aids are available, run the Disk service aid (see "Using the SSA Service Tools" on page 119) to find the failing device. If no device is listed as Rejected, use the PAA part of the SRN to determine which device is failing. Before you exchange the failing device, run nonconcurrent diagnostics to that device to determine the cause of the problem. If the SSA service aids are not available, note the value of PAA in this SRN, and go to "Finding the Physical Location of a Device" on page 125. Exchange the failing FRU for a new FRU.

## SSA RAID Adapter, SSA, and RAID

SRN	FRU List	Problem
45PAA	<b>Device (40%)</b> ("Disk Drive Assembly (HDA) Removal and Replacement" on page 164). <b>SSA Adapter card (40%)</b> <b>SSA cables, or other SSA connections in the device enclosure (20%).</b>	Description: The SSA adapter has detected an open SSA loop. Action: If the SSA service aids are available, run the Disk service aid (see "Using the SSA Service Tools" on page 119) to determine which part of the loop is failing. If the SSA service aids are not available, note the value of PAA in this SRN, and go to "Finding the Physical Location of a Device" on page 125.
46000	<b>None</b>	Description: An array is the Offline state because more than one disk drive is not available. At least one member disk drive of the array is present, but more than one member disk drive is missing. Action: Go to "SSA START" on page 75.
47000	<b>None</b>	Description: An attempt has been made to store in the SSA adapter the details of more than 32 arrays. Action: Go to "SSA START" on page 75.
47500	<b>None</b>	Description: Part of the array data might have been lost. Action: Go to "SSA START" on page 75.
48000	<b>None</b>	Description: The SSA adapter has detected a link configuration that is not valid. Action: See "SSA Loop Configurations that Are Not Valid" on page 81.
49000	<b>None</b>	Description: An array is in the Degraded state because a disk drive is not available to the array, and a write command has been sent to that array. Action: A disk drive might not be available for one of the following reasons: <ul style="list-style-type: none"> <li>• The disk drive has failed.</li> <li>• The disk drive has been removed from the subsystem.</li> <li>• An SSA link has failed.</li> <li>• A power failure has occurred.</li> </ul> Go to "SSA START" on page 75.
49100	<b>None</b>	Description: An array is in the Exposed state because a disk drive is not available to the array. Action: A disk drive can become not available for several reasons: <ul style="list-style-type: none"> <li>• The disk drive has failed.</li> <li>• The disk drive has been removed from the subsystem.</li> <li>• An SSA link has failed.</li> <li>• A power failure has occurred.</li> </ul> Go to "SSA START" on page 75.
49500	<b>None</b>	Description: No hot spare disk drives are available for an array that is configured for hot spare disk drives. Action: Go to "SSA START" on page 75.
49700	<b>None</b>	Description: The parity for the array is not complete. Action: Go to "SSA START" on page 75.
50000	<b>SSA adapter card (100%)</b>	Description: The SSA adapter failed to respond to the device driver. Action: Exchange the FRU.
50001	<b>SSA adapter card (100%)</b>	Description: A data parity error has occurred. Action: Exchange the FRU.
50002	<b>SSA adapter card (100%)</b>	Description: An SSA adapter DMA error has occurred. Action: Exchange the FRU.
50004	<b>SSA adapter card (100%)</b>	Description: Channel check. Action: Exchange the FRU.
50005	<b>SSA adapter card (100%)</b>	Description: A software error has occurred. Action: Go to "Software and Microcode Errors" on page 81 before exchanging the FRU.

SRN	FRU List	Problem
50006	SSA adapter card (100%)	Description: A channel check has occurred. Action: Exchange the FRU.
50008	SSA adapter card (100%)	Description: Unable to read or write the PCI registers. Action: Exchange the FRU.
50010	SSA adapter card (100%)	Description: An SSA adapter or device drive protocol error has occurred. Action: Go to "Software and Microcode Errors" on page 81 before exchanging the FRU.
50012	SSA adapter card (100%)	Description: The SSA adapter microcode has hung. Action: Run nonconcurrent diagnostics to the SSA adapter. If the diagnostics fail, exchange the FRU. If the diagnostics do not fail, go to "Software and Microcode Errors" on page 81 before exchanging the FRU.
D4000	SSA adapter card (100%)	Description: The diagnostics cannot configure the SSA adapter. Action: Exchange the FRU.
D4100	SSA adapter card (100%)	Description: The diagnostics cannot open the SSA adapter. Action: Exchange the FRU.
D4300	SSA adapter card (100%)	Description: The diagnostics have detected an SSA adapter POST failure. Action: Exchange the FRU.
DFFFF	SSA adapter card (100%)	Description: A command or parameter that has been sent or received is not valid. This problem is caused either by the SSA adapter, or by an error in the microcode. Action: Go to "Software and Microcode Errors" on page 81 before exchanging the FRU.

## Software and Microcode Errors

Some SRNs indicate that a problem might have been caused by a software error or by a microcode error. If you have one of these SRNs, do the following actions:

1. Make a note of the contents of the error log for the device that has the problem.
2. Go to the system service aids and select **Display Vital Product Data** to display the VPD of the failing system. Make a note of the VPD for all the SSA adapters and disk drives.
3. Report the problem to your support center. The center can tell you whether you have a known problem, and can, if necessary, provide you with a correction for the software or microcode.

## SSA Loop Configurations that Are Not Valid

**Note:** This section is related to SRN 48000.

SRN 48000 shows that the SSA loop contains more devices or adapters than are allowed. The maximum numbers allowed depend on the adapter; "Rules for SSA Loops" on page 114 describes these details for each adapter.

If the SRN occurred when you, or the customer, turned on the system:

1. Turn off the system.
2. Review the configuration that you are trying to make, and determine why that configuration is not valid.

## SSA RAID Adapter, SSA, and RAID

3. Correct your configuration by reconfiguring the SSA cables or by removing the excess devices or adapters from the loop.
4. Turn on the system.

If the SRN occurred because additional devices or adapters were added to a working SSA loop:

1. Remove the additional devices or adapters that are causing the problem, and put the loop back into its original, working configuration.

**Note:** *It is important that you do these actions, because they enable the configuration code to reset itself from the effects of the error.*

2. Review the configuration that you are trying to make, and determine why that configuration is not valid.
3. Correct your configuration by reconfiguring the SSA cables or by removing the excess devices or adapters from the loop.

---

## SSA – LINK ERRORS

This MAP helps you to isolate FRUs that are causing an SSA loop problem between a device and the SSA RAID Adapter, or between two devices. If you are not familiar with SSA loops, read the section “SSA Loops and Links” on page 113 before using this MAP.

SSA link errors can be caused if:

- Power is removed from an SSA device
- An SSA device is failing
- An SSA device is removed
- A cable is disconnected.

Such errors might be indicated by:

- SRN 45PAA
- A flashing link status (Ready) light on the SSA device at each end of the failing link (For additional information on link status lights, refer to “Link Status Lights” on page 118.)
- The indication of an open link by the Disk Service Aid.

For additional information on link errors, refer to “SSA Link” on page 117.

**Attention:** Unless the system unit needs to be turned off for some other reason, *do not turn off the system when servicing the SSA loop.* Unit power cables and external SSA cables that connect the devices to the system can be disconnected while that system is running.

---

1

Are the SSA service aids available?

**NO YES**

↓ Go to step 4.

---

2

Are any link status (ready) lights flashing on this SSA loop?

**NO YES**

↓ Go to “SSA Link” on page 117.

---

3

Note the PAA (that is, the last three digits) of the SRN.

Go to “Finding the Physical Location of a Device” on page 125.

---

## SSA RAID Adapter, SSA, and RAID

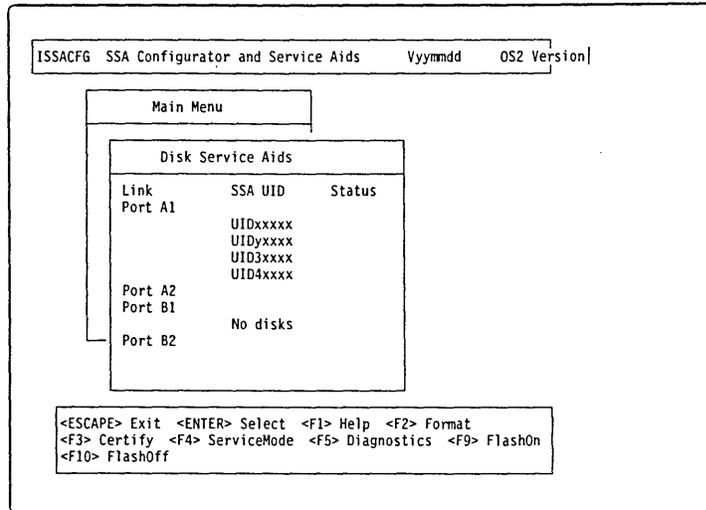
4

- Start the SSA Configurator and Service Aids Utility (see step 1 of “Running the SSA Configurator” on page 129).
- From the Main menu, select **SSA Adapter List**.
- Select the required adapter from the SSA Adapter List.
- Select **Disk Service Aids** from the Adapter menu. The Disk Service Aids window displays.

Are any disk drives listed for the selected SSA adapter?

**YES NO**

↓ Go to step 10.



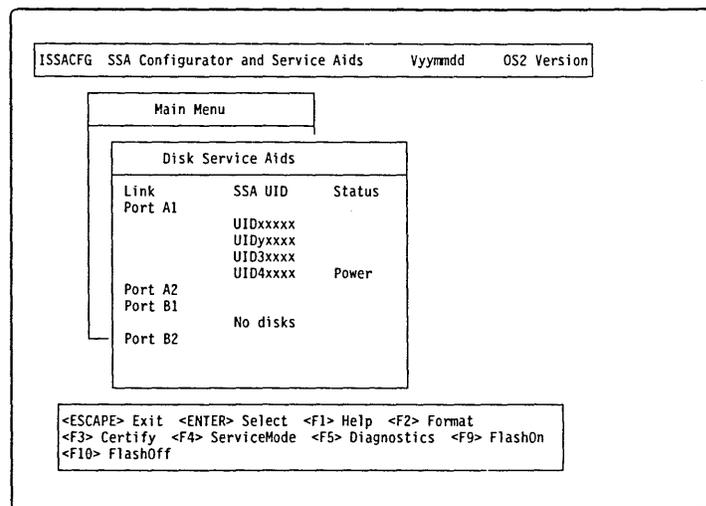
5

Observe the Status column on the screen. If the status of any disk drive is 'Power', that disk drive has detected a loss of redundant power or cooling. In the example shown here, the fourth disk drive has detected such a loss.

Do one or more disk drives have a 'POWER' status?

**NO YES**

↓ Go to START for the unit in which the disk drive is installed.



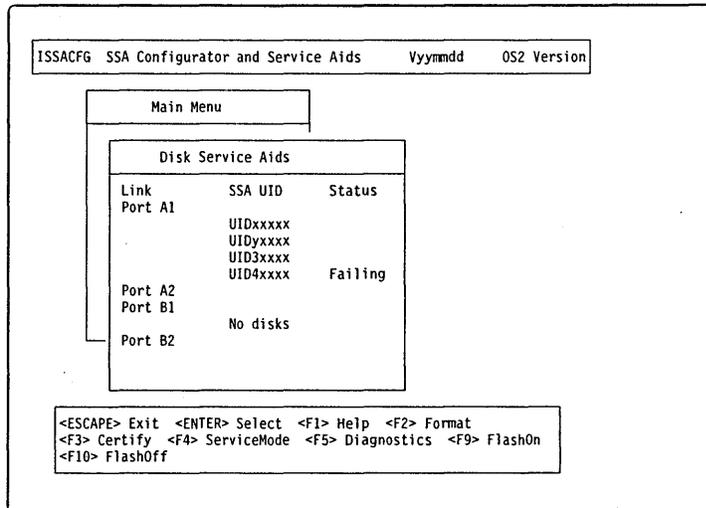
6

Observe the Status column on the screen. If the status of any disk drive is 'Failed', that disk drive is failing. In the example shown here, the fourth disk drive is failing.

Is one of the disk drives failing?

**YES NO**

↓ Go to step 8.



7

- Use the Identify function (as instructed on the screen) to find the failing disk drive. See “Finding the Physical Location of a Device” on page 125 if you need more information about finding the disk drive.
- Exchange the disk drive for a new one (see “Disk Drive Assembly (HDA) Removal and Replacement” on page 164).

Go to “SSA – Repair Verification” on page 109 to verify the repair.

## SSA RAID Adapter, SSA, and RAID

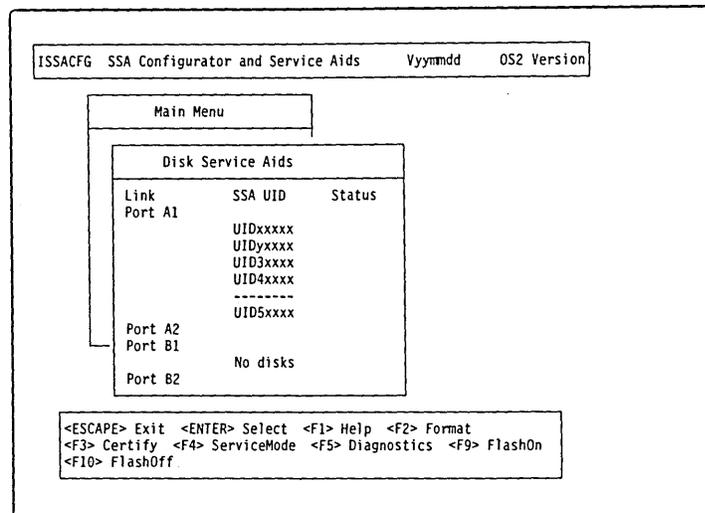
8

Observe the list of disk drives on the screen. A dotted line (-----) shows that a link in one of the loops is broken. If two dotted lines are displayed, two links are broken, one in each loop. In the example shown here, a break has occurred between the fourth and the fifth disk drive.

Is a link broken between two disk drives?

**YES NO**

- ↓ The disk drive may be defective and should be replaced. Exchange the disk drive using "Disk Drive Assembly (HDA) Removal and Replacement" on page 164. **End of procedure**



9

Use the Identify function (as instructed on the screen) to find the devices (disk drives or adapters) that are on each side of the broken link. See "Finding the Physical Location of a Device" on page 125 if you need more information about finding the disk drive.

Go to "SSA Link" on page 117. The information that is provided there can help you solve the problem. If necessary, refer to the service information for the unit that contains the device.

**End of procedure**

---

10

One of the following conditions exists. Take the action described.

- No physical disks are connected to this SSA RAID Adapter:

1. Ensure that the external SSA cables are correctly connected to the units in which the devices are installed and to the SSA RAID Adapter.

2. Go to "SSA – Repair Verification" on page 109 to verify the repair.

- All the disk drives are turned off:

Go to the START MAP for the unit in which the SSA devices are installed.

- The SSA RAID Adapter is failing:

1. Exchange the SSA RAID Adapter for a new one.

2. Go to "SSA – Repair Verification" on page 109 to verify the repair.

**End of procedure**

---

## SSA – Intermittent Link Error

This procedure helps you to isolate FRUs that are causing an intermittent SSA link problem. You are here because you have an SRN from the series 21PAA through 29PAA or 33PAA (where P=port and AA=device address).

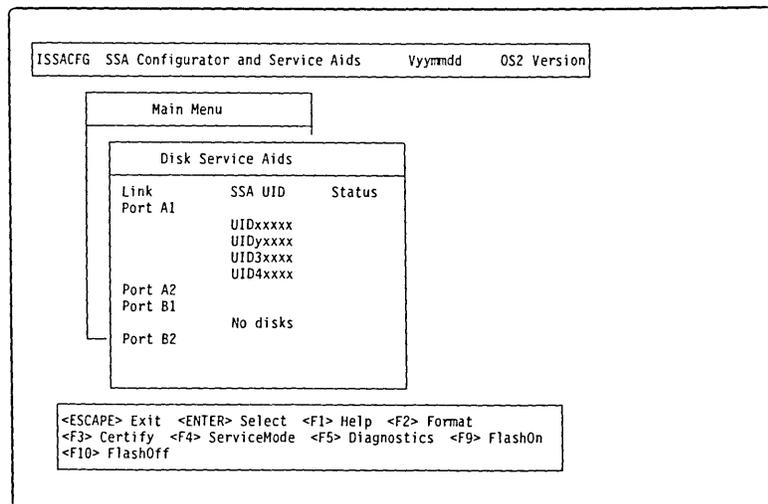
If you are not familiar with the SSA link, read the section “SSA Loops and Links” on page 113 before using this MAP. “SSA Loops and Links” explains SSA links, strings, and loops.

**Attention:** Unless the system unit needs to be turned off for some other reason, *do not turn off the system when servicing an SSA loop.* Power cables and external SSA cables can be disconnected while that system is running.

1

- Start the SSA Configurator and Service Aids Utility (see step 1 of “Running the SSA Configurator” on page 129).
- From the Main menu, select **SSA Adapter List**.
- Select the required adapter from the SSA Adapter List.
- Select **Disk Service Aids** from the Adapter menu.

Go to step 2.



**Note:** On the Disk Service Aids screen, each adapter port is identified by the number of its related connector on the adapter card:

- Adapter port 0 is identified as A1
- Adapter port 1 is identified as A2
- Adapter port 2 is identified as B1(see note below)
- Adapter port 3 is identified as B2(see note below)

SRNs 21000 through 29000 include the adapter port number (0–3).

**Note:** The System 390 Integrated Server never uses ports B1 and B2.

## 2

Observe the SRN that sent you to this MAP. It is in the series 21PAA through 29PAA (where P is the number of the adapter port, and AA is the SSA address of the device).

Note the value of PAA in the SRN. For example:

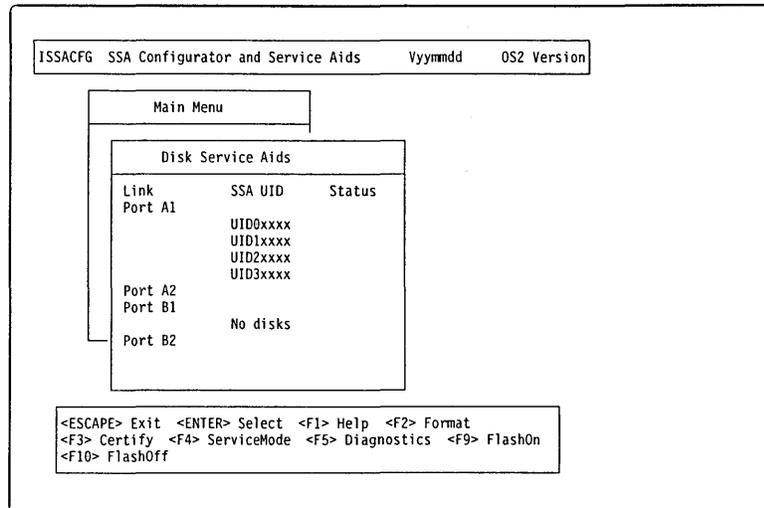
If the SRN is 24002, PAA = 002.

If the SRN is 24104, PAA = 104.

Observe the screen, and identify the physical device that is represented by PAA in the SRN.

**Note:** If the SSA address (AA) in the SRN is higher than the highest SSA address that is displayed for the adapter port (P), that address is the address of the SSA RAID Adapter.

If you need help in identifying the device, read through the examples at the right, then go to step 3. Otherwise, go directly to step 3.

**Example 1**

If the SRN is 24002, the device is connected to adapter port 0 (shown as A1 on the screen), and has an SSA address of 02 (shown as 2 on the screen). In the example screen, that device is the third disk drive.

**Example 2**

If the SRN is 24104, the device (in theory) is connected to adapter port 1 (shown as A2 on the screen). The device, however, has an SSA address of 04. That address is higher than the highest address that is displayed for adapter port 1. The device is, therefore, the SSA RAID Adapter.

## 3

The problem is in the SSA link between the device that you identified in step 2 and the device that is on the same adapter port (P), but whose SSA address has a value of 1 less than AA (AA - 1).

Exchange, in the sequence shown, the following FRUs for new FRUs. Ensure that for **each** FRU exchange, you go to "SSA - Repair Verification" on page 109 to verify the repair.

1. One of the two devices that are identified by the SRN (see "Disk Drive Assembly (HDA) Removal and Replacement" on page 164).
2. The other of the two devices.
3. The internal SSA connections of the unit or units in which the devices are installed.
4. The external SSA cable.

**End of procedure**

**Example:** In step 2, SRN 24002 identified pdisk3. The SSA address of the third disk drive is 02; the address (AA - 1) of the other device on the link is, therefore, 01. SSA address 01 is the address of the second disk drive. SRN 24002 indicates, therefore, that link errors have been detected between the second and third disk drives.

Similarly, SRN 24104 identified the SSA RAID adapter. The SSA address of the adapter is 04. The address of the other device is, therefore, 03. SSA address 03 is the address of the first disk drive. SRN 24104 indicates, therefore, that link errors have been detected between adapter port A2 and the first disk drive.

## SSA – RAID ERRORS

This MAP helps you to solve problems that have occurred in SSA RAID arrays.

**Attention:** Unless the system unit needs to be turned off for some other reason, *do not turn off the system when servicing an SSA link or a unit in which SSA devices are installed.* Unit power cables and external SSA cables that connect devices to the system can be disconnected while that system is running.

Some of the steps in this procedure ask you to change the configuration of the array, or to change the use of an SSA disk drive. Do not do those steps unless you have the user's permission.

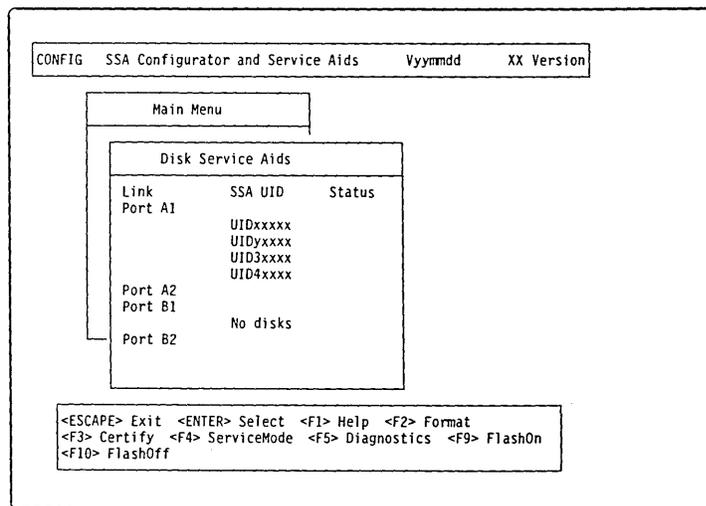
### 1

Ensure that all the disk drives are working correctly:

- Start the SSA Configurator and Service Aids Utility (see **step 1** of “Running the SSA Configurator” on page 129).
- From the Main menu, select **SSA Adapter List**.
- Select the required adapter from the SSA Adapter List.
- Select **Disk Service Aids** from the Adapter menu.
- Check the Status column to find any drives with power problems, failed conditions, link failures, or all dashes.
- Select **Run Concurrent Diagnostics** to identify any disk drive problems that have occurred.

If any drives have bad status or if concurrent diagnostics identified a 45xxx SRN, resolve them using “SSA – LINK ERRORS” on page 83.

- continue on step 2.



2

Do you have SRN 49500?

NO YES



No hot spare disk drives are available. Go to step 28.

You have been sent to this step either from another step in this MAP, or because you have one of the following Service Request Numbers (SRNs):

46000, 47000, 47500, 49000, 49100, 49500, 49700

3

Run concurrent diagnostics to the SSA RAID Adapters.

Did the diagnostics give you SRN 46000, 47000, 47500, 49000, 49100, or 49700?

NO YES



Go to step 6.

4

Did the diagnostics give you any other SRN?

YES NO



Go to step 37.

5

Return to step 2 and solve the problems that caused the SRN.

6

Find your SRN in the following table, then do the appropriate actions.

**Note:** If you still do not have any of these SRNs, you are in the wrong procedure.

SRN	Cause	Action
46000	An array is in the Offline state.	Go to step 7
47000	You have more than the maximum number of arrays allowed.	Go to step 11
47500	A partial loss of data has occurred.	Go to step 12
49000	An array is in the Degraded state.	Go to step 17
49100	An array is in the Exposed state.	Go to step 23
49700	The parity on an array is not complete.	Go to step 30

### 7

An array is in the Offline state if at least one member disk drive of the array is present, but more than one member disk drive is missing. Such a condition can occur if at least two disk drives in the array have failed, or are not available to the array at this time.

Are any disk drives missing or without power, or have any disk drives been recabled (not necessarily by you)?

**NO YES**

↓

You must now restore the original configuration. Follow the instructions at the right.

Start the SSA Configurator and Service Aids Utility (see "Using the SSA Configurator Functions" on page 128).

- From the Main menu, select **SSA Adapter List**.
- Select the SSA Adapter from the list.
- From the SSA Adapter menu select **System Resources**.

The status of the array changes to Good when the adapter can find all the member disk drives of the array. If the status does not change, call for assistance.

---

### 8

Either more than one disk drive has failed, or an array that is not complete has been connected to the SSA RAID Adapter.

**If no disk drives have been added to this system, go to step 9.**

If one or more disk drives have been added to this system, and those disk drives were previously members of an array on this system or on another system, you must do the following:

- Go to "Running the SSA Configurator" on page 129 and follow the procedure for **Deleting a Resource**.
- Select the array that is in the Offline state, and delete it. That array is now a free resource.
- Go to "Running the SSA Configurator" on page 129, follow the procedure to **Delete a resource** and remove all the disk drives from the array. You can now use those disk drives as free resources.
- Locate and repair all failed disk drives, and make those disk drives available for the creation of a new array.

Go to step 9.

---

9

- Start the SSA Configurator and Service Aids Utility (see step 1 of “Running the SSA Configurator” on page 129).
- From the Main menu, select **SSA Adapter List**.
- Select the adapter from the SSA Adapter List.
- Select **Rejected Resources**.

Are any disk drives listed?

**NO YES**

↓

Go to step 38.

---

10

Ask the user to delete and recreate the array that is in the Offline state. If this does not correct the problem, call for assistance.

**End of procedure**

---

11

Go to “Running the SSA Configurator” on page 129 and follow the procedure to delete records of old (dormant) arrays from NVRAM.

An attempt has been made to create a new array, but the adapter already has the maximum number of arrays defined.

---

12

- Start the SSA Configurator and Service Aids Utility (see step 1 of "Running the SSA Configurator" on page 129).
- From the Main menu, select **SSA Adapter List**.
- Select the SSA Adapter from the list.
- From the SSA Adapter menu select **System Resources**.
- Select the arrays, one at a time, and check whether any array has one or more invalid data strips.

Does any array have one or more invalid data strips?

**YES NO**

↓

Review the symptoms.

Go to "SSA – LINK ERRORS" on page 83, and start the problem determination procedure again.

---

**Attention:** Part of the data that is on the array has been damaged and cannot be recovered. **Before** any other action is taken, the user must recover all the data that is not damaged, and create a backup of that data.

**13**

- Note the name of the failing array from step 12.
- Start the SSA Configurator and Service Aids Utility (see step 1 of “Running the SSA Configurator” on page 129).
- From the Main menu, select **SSA Adapter List**.
- Select the SSA Adapter from the list.
- From the SSA Adapter menu select **System Resources**.
- Select the failing array.
- Select **View Members**.
- Select the failing disk drive, and note the UID numbers of the disk drives that are members of the array.
- Ask the user create a backup of all the data from this array. Some data might not be accessible.
- When the backup has been created, ask the user to delete the array.
- Run nonconcurrent diagnostics to each of the disk drives that you noted previously.

Do the diagnostics fail when they are run to a particular disk drive?

**NO YES**

- ↓ Exchange the failing disk drive for a new one (see “Disk Drive Assembly (HDA) Removal and Replacement” on page 164).

Go to step 45 to add the disk drive to the group of disk drives that are available for use by the RAID manager.

**14**

Run the Certify service aid (see “Certify Disk Service Aid” on page 120) to each of the disk drives that you noted previously.

Did the certify service aid fail when it was run to a particular disk drive?

**YES NO**

↓

Ask the user to recreate the array.

When complete, go to step 37.

### 15

- Run the Format service aid (see “Format Disk Service Aid” on page 120) to the disk drive.
- Run the Certify service aid again to the disk drive.

Did the Certify service aid fail again?

**YES NO**



Ask the user to recreate the array.

When complete, go to step 37.

---

### 16

Exchange the failing disk drive for a new one (see “Disk Drive Assembly (HDA) Removal and Replacement” on page 164).

Go to step 45 to add the disk drive to the group of disk drives that are available for use by the RAID manager.

---

### 17

An array is in the Degraded state if one member disk drive of the array is missing, and a write command has been sent to that array. When an array is in the Degraded state, its data is not protected.

- Start the SSA Configurator and Service Aids Utility (see step 1 of “Running the SSA Configurator” on page 129).
- From the Main menu, select **SSA Adapter List**.
- Select the adapter from the SSA Adapter List.
- Select **Rejected Resources**.

Are any disk drives listed?

**YES NO**



A disk drive has not been detected by the adapter.

Go to step 20.

---

**18**

- From Service Aids run diagnostics to all the disk drives that are listed as rejected.
- Run the Certify service aid (see "Certify Disk Service Aid" on page 120) to all the disk drives that are listed as rejected.

If no problems occur on any disk drive, go to step 19. Otherwise, continue with this procedure.

- Go to "Disk Drive Assembly (HDA) Removal and Replacement" on page 164 to exchange a disk drive.
- Referring to the displayed instructions, select a disk from the list of array candidate disk drives, and add that disk drive to the array that is in the Degraded state. The array changes its state to the Good state, and parity is rebuilt.

**End of procedure****19**

Go to step 45 to add the disk drives to the group of disk drives that are available for use by the RAID manager.

**Note:** A disk drive that is listed as rejected is not necessarily failing. For example, the array might have rejected the disk drive because a power problem, or an SSA link problem, caused that drive to become temporarily unavailable. Under such conditions, the disk drive can be reused.

**20**

Does the Disk service aid indicate an open loop?

**NO YES**

↓ Go to "SSA – LINK ERRORS" on page 83.

**21**

Does any SSA disk drive have its check light on?

**NO YES**

↓ Exchange the failed disk drive for a new one (see "Disk Drive Assembly (HDA) Removal and Replacement" on page 164).

Go to step 45.

## SSA RAID Adapter, SSA, and RAID

### 22

The disk drive might have been removed from the subsystem.

- Reinstall the removed drive, or select a new disk drive for addition to the array.
- Go to “Disk Drive Assembly (HDA) Removal and Replacement” on page 164 to exchange a disk drive.
- Referring to the displayed instructions, select a disk from the list of array candidate disk drives, and add that disk drive to the array that is in the Degraded state.

The array changes its state to the Good state, and parity is rebuilt.

#### End of procedure

---

### 23

- Start the SSA Configurator and Service Aids Utility (see step 1 of “Running the SSA Configurator” on page 129).
- From the Main menu, select **SSA Adapter List**.
- Select the adapter from the SSA Adapter List.
- Select **Rejected Resources**.

An array is in the Exposed state when one member disk drive of the array is not available. When an array is in the Exposed state, its data is not protected. A command line parameter is available to prevent write operations to an array that is in the Exposed state. See “Array States” on page 115 for more information.

Are any disk drives listed?

**YES NO**

- ↓ A disk drive has not been detected by the adapter. Go to step 26.
-

**24**

- From Service Aids run diagnostics to all the disk drives that are listed as rejected.
- Run the Certify service aid (see “Certify Disk Service Aid” on page 120) to all the disk drives that are listed as rejected.

If no problems occur on any disk drive, go to step 25. Otherwise, continue with this procedure.

- Go to “Disk Drive Assembly (HDA) Removal and Replacement” on page 164 to exchange the disk drive.
- Referring to the displayed instructions, select a disk from the list of array candidate disk drives, and add that disk drive to the array that is in the Exposed state.

The array changes its state from the Exposed state, and parity is rebuilt.

**End of procedure****25**

Go to step 45 to add the disk drives to the group of disk drives that are available for use by the RAID manager.

**Note:** A disk drive that is listed as rejected is not necessarily defective. For example, the array might have rejected the disk drive because a power problem, or an SSA link problem, caused that drive to become temporarily unavailable. Under such conditions, the disk drive can be reused.

**26**

Does the current diagnostics or disk service aid indicate an open loop

**YES NO**

↓ Go to back to step 21.

The dotted line (-----) in disk service aids indicates that a link in one of the loops is broken.

**27**

Go to “SSA – LINK ERRORS” on page 83.

**End of procedure**

## SSA RAID Adapter, SSA, and RAID

28

- If the subsystem contains disk drives that have failed, repair those disk drives, or exchange them for new disk drives (see “Disk Drive Assembly (HDA) Removal and Replacement” on page 164).
- Start the SSA Configurator and Service Aids Utility (see step 1 of “Running the SSA Configurator” on page 129).
- From the Main menu, select **SSA Adapter List**.
- From the SSA Adapter List, select the adapter against which SRN 49500 was logged.
- Select **FREE Resources** to list spare disk drives.

Are any spare disk drives listed?

**YES NO**

- ↓ Review with the user the requirement for hot spare disk drives. If the customer wants hot spare disk drives, one or more disk drives must have their use changed to **Hot-spare Resources**.

If the customer does not want hot spare disk drives:

- Go to “Running the SSA Configurator” on page 129 and follow the procedure to **Modify the attributes of a resource**.
- Change the **Enable Use of Hot Spares** attribute to **No**.

No spare disk drives are available for an array that is configured for hot spare disk drives.

**Note:** Verify that all drives are in good status using the **Disk Service Aids**.

29

Go to "Running the SSA Configurator" on page 129 and follow the procedure to **Create a hot spare disk drive** from one of the listed candidate disk drives.

You have solved the problem.

**Note:** Because this problem has occurred, an error log is generated when the system runs the health check program. To verify that the availability of hot spare disk drives has solved the problem:

- Run concurrent diagnostics to the adapter.
- Verify that error code 049500 is *not* returned.

**Note:** Verify that all drives are in good status using the **Disk Service Aids**.

**End of procedure.**

---

30

- Start the SSA Configurator and Service Aids Utility (see step 1 of "Running the SSA Configurator" on page 129).
- From the Main menu, select **SSA Adapter List**.
- Select the required adapter from the SSA Adapter List.
- Check whether a rebuild operation is running on any array.

The RAID Manager cannot fully create parity for this array. All read and write operations can complete normally, but the failure of one disk drive can cause the loss of some data.

The problem might be caused by a rebuild operation that is running on a array. You must first check whether a rebuild operation is running. If a rebuild operation is not the cause, the user must delete the array, then recreate it.

Is a rebuild operation running on any array?

**YES NO**

↓ Go to step 32.

---

31

Wait for the rebuild to complete.

Rerun concurrent diagnostics to the adapter.

Is the problem resolved?

**NO YES**

↓ No further action is required.

**End of procedure.**

---

## SSA RAID Adapter, SSA, and RAID

32

- Start the SSA Configurator and Service Aids Utility (see step 1 of "Running the SSA Configurator" on page 129).
- From the Main menu, select **SSA Adapter List**.
- Select the SSA Adapter from the list.
- From the SSA Adapter menu select **System Resources**.
- Select the arrays, one at a time, and check whether any array has one or more unbuilt parity strides, or one or more unbuilt component strides.

Does any array have one or more unbuilt parity strides, OR one or more unbuilt component strides?

**YES NO**

- ↓ The error might have occurred because a hot spare drive was being started and rebuilt.

Check whether any failed disk drives are present in the array.

**End of procedure**

---

## 33

- Note the array name of the failing array.
- Start the SSA Configurator and Service Aids Utility (see step 1 of “Running the SSA Configurator” on page 129).
- From the Main menu, select **SSA Adapter List**.
- Select the SSA Adapter from the list.
- From the SSA Adapter menu select **System Resources**.
- Select the failing array.
- Select **View Members**.
- Select the failing disk drive.
- Note the all the UID numbers that are in the array.
- Ask the user to create a backup of all the data that is contained in this array. (All the data should be accessible without error.)
- Ask the user to delete the array.
- Run nonconcurrent diagnostics to each of the disk drives that you noted previously.

Do the diagnostics fail when run to any particular disk drive?

**NO YES**

- ↓ Exchange the failing disk drive for a new one (see “Disk Drive Assembly (HDA) Removal and Replacement” on page 164).

Go to step 45 to add the disk drive to the group of disk drives that are available for use by the RAID manager.

---

## 34

Run the Certify service aid (see “Certify Disk Service Aid” on page 120) to the disk drives that you noted previously.

Did the Certify service aid fail when run to any particular disk drive?

**YES NO**

- ↓ Ask the user to recreate the array.

Go to step 37.

---

## SSA RAID Adapter, SSA, and RAID

### 35

- Run the Format service aid (see “Format Disk Service Aid” on page 120) to the disk drive.
- Run the Certify service aid to the disk drive again.

Did the Certify service aid fail again?

**YES NO**

- ↓ Ask the user to recreate the array.  
Go to step 37.
- 

### 36

Exchange the failing disk drive for a new one (see “Disk Drive Assembly (HDA) Removal and Replacement” on page 164).

Go to step 45 to add the disk drive to the group of disk drives that are available for use by the RAID manager.

---

### 37 RAID Checkout

- Start the SSA Configurator and Service Aids Utility (see step 1 of “Running the SSA Configurator” on page 129).
- From the Main menu, select **SSA Adapter List**.
- Select the adapter from the SSA Adapter List.
- Select **Rejected Resources**.

You are now starting the RAID checkout procedure

Are any disk drives listed?

**YES NO**

- ↓ Go to step 39.
-

38

- From Service Aids run diagnostics to all the disk drives that are listed as rejected.
- Run the Certify service aid (see “Certify Disk Service Aid” on page 120) to all the rejected disk drives.

**Note:** A disk drive that is listed as rejected is not necessarily failing. For example, the array might have rejected the disk drive because a power problem, or an SSA link problem, caused that drive to become temporarily unavailable. Under such conditions, the disk drive can be reused.

Is any disk drive failing?

**NO YES**

- ↓ Exchange the failing disk drive for a new one (see “Disk Drive Assembly (HDA) Removal and Replacement” on page 164).

Go to step 45 to add the disk drive to the group of disk drives that are available for use by the RAID manager.

---

39

- Start the SSA Configurator and Service Aids Utility (see step 1 of “Running the SSA Configurator” on page 129).
- From the Main menu, select **SSA Adapter List**.
- Select the adapter from the SSA Adapter List.
- Select each array type in turn.

Are any arrays listed with a status other than good or rebuilding?

**NO YES**

- ↓ Return to step 1 of this procedure.
-

## SSA RAID Adapter, SSA, and RAID

40

- Start the SSA Configurator and Service Aids Utility (see step 1 of "Running the SSA Configurator" on page 129).
- From the Main menu, select **SSA Adapter List**.
- Select the SSA Adapter from the list.
- From the SSA Adapter menu select **System Resources**.
- Select the arrays, one at a time, and check whether any array has one or more invalid data strips, one or more unbuilt parity strides, or one or more unbuilt component strides.

Does any array have one or more invalid data strips, one or more unbuilt parity strides, OR one or more unbuilt component strides?

**NO YES**

↓ Return to step 1 of this procedure.

---

41

Have disk drives been going to the rejected state with no other failure indications?

**NO YES**

↓ This problem can occur if an array is accessed before all the member disk drives are available.

Ensure that the power system turns on power to all the disk drives before, or when, it turns on the power to the system unit.

**End of procedure**

---

42

Was SRN 46000 logged, but no error found, when concurrent diagnostics were run?

**NO YES**

↓ An array was in the Offline state, but is now available.

Ensure that the power system turns on power to all the disk drives before, or when, it turns on the power to the system unit.

**End of procedure**

---

43

Was SRN 49100 logged, but no error found, when concurrent diagnostics were run?

**YES NO**

↓ You have solved all the array problems.

**End of procedure**

---

44

An array was in the Exposed state, but is now in the Good state.

This problem might have occurred because a disk drive was temporarily removed from the system.

Ensure that the power system turns on power to all the disk drives before, or when, it turns on the power to the system unit.

**End of procedure**

---

45

Has a failed disk drive been exchanged for a new disk drive?

**NO YES**

↓ If you exchanged the disk drive by using the procedure that is described in "Disk Drive Assembly (HDA) Removal and Replacement" on page 164, the new disk drive is configured as a new disk drive.

- Go to "Running the SSA Configurator" on page 129 and do the procedure to **Convert a new drive to a free resource**.
- Change the new disk drive to a free resource.
- Ask the customer to choose how the disk drive is to be configured:
  - Hot spare disk drive
  - Attached resource
  - Remain as a free resource.

**End of procedure**

46

If you have repaired a power or cabling fault that caused the disk drive to be missing from the system, the drive might now be in a rejected state. You must change that disk drive into a usable disk drive:

- From the Main menu, select **SSA Adapter List**.
- Select the adapter from the SSA Adapter List.
- Select **Rejected Resources**.
- Delete the disk drive that has been restored to the system. This action changes the disk drive to a free resource.
- Ask the customer to choose how the disk drive is to be configured:
  - Hot spare disk drive
  - Attached resource
  - Remain as a free resource.

**End of procedure**

---

---

## SSA – Repair Verification

This procedure helps you to verify a repair after a FRU has been exchanged for a new one.

**Attention:** Unless the system unit needs to be turned off for some other reason, *do not turn off the system when servicing an SSA link or a unit in which SSA devices are installed.* Unit power cables and external SSA cables that connect devices to the system can be disconnected while that system is running.

---

### 1

Before you arrived at this procedure, you might have exchanged one or more FRUs for new FRUs. Some of those FRUs (for example, disk drives) have Power lights.

Check whether all those Power lights are on.

Do all the FRUs you exchanged have their power lights on (where applicable)?

**YES NO**

↓ Exchange, for a new one, the FRU whose Power light is off. Then, go to step 2.

---

### 2

Are all check lights off?

**YES NO**

↓ Go to START for the device with its Check light on.

---

### 3

Run concurrent diagnostics to the device that reported the problem.

- If the original problem was not reported by a device, run diagnostics to each SSA RAID Adapter in the system unit.
- Run the Fix procedure (see “The Event/Error Logger Utility” on page 126).

If you have a RAID array, and the problem remains, go to **RAID Checkout** at step 37 of “SSA – RAID ERRORS” on page 90.

**End of procedure**

**Note:** If you do not run this service aid, the diagnostics might create an SRN for a problem that has already been solved.

Do not run nonconcurrent diagnostics; otherwise, errors are logged on other systems that share the same loop.

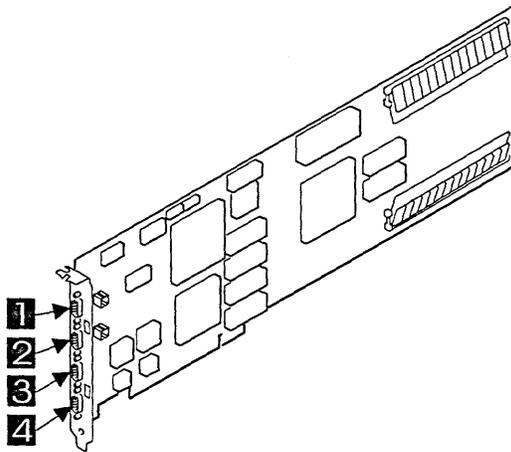
If you have just exchanged a disk drive or an SSA RAID Adapter, you must use the configurator to restore the device to the system.

### General Information About the SSA RAID Adapter, SSA, and RAID

The IBM SSA RAID Adapter is a Peripheral Component Interconnect (PCI) bus-master adapter that is the interface between the PCI architecture, and devices that use the Serial Storage Architecture (SSA).

The adapter provides four SSA ports for the attachment of storage devices such as hard disk drives. Each port operates at 20MB/s full-duplex, and uses point-to-point copper cables that can be up to 25 meters long. SSA uses the SCSI-2 commands, queuing model, status, and sense bytes; it is an industry-standard interface.

- |          |                   |          |                   |
|----------|-------------------|----------|-------------------|
| <b>1</b> | SSA Loop B Port 2 | <b>3</b> | SSA Loop A Port 2 |
| <b>2</b> | SSA Loop B Port 1 | <b>4</b> | SSA Loop A Port 1 |



The adapter card has two pairs of SSA connectors, one pair (port 1 and port 2) for each SSA loop.<sup>3</sup> Next to each pair of connectors is a light that functions as follows:

- The light is on continuously when power is turned on to the adapter and both ports for that loop are operational; that is, the devices connected next to the adapter in the loop have power turned on to them, are connected correctly to the adapter, and are operational.
- The light flashes continuously if one of the ports is not operational. Such a condition occurs if the cable to that port is not connected correctly, or if the device that is connected next to the adapter in the loop is not operational.
- The light is off if both ports are not operational.

<sup>3</sup> The S/390 Integrated Server does not use Loop B, port 1 and port 2.

## SSA Interfaces for Eight or Less Drives

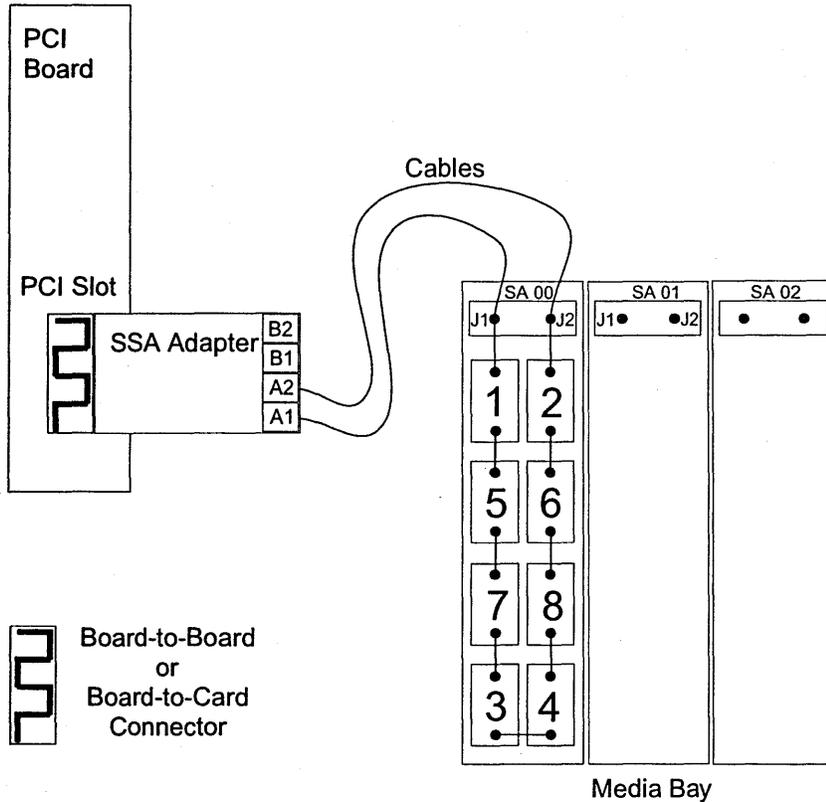


Figure 33. SSA Interfaces for Eight or Less Drives

SA 00, SA 01, and SA 02 are Extender cards used to connect the external cables from the adapter to the MidPlane SSA Bus. SA 02 is reserved for future use and **must not** be used.

In the drawing above only the first eight drive slots are used, the SSA cabling is connected from SSA card A1 to SA00 J1 and SSA card A2 to SA00 J2.

## SSA Plugging Rules for Eight or Less Disk Drives

If you have between three and eight drives, you will use two long SSA cables to connect the Left Extender Card to the SSA adapter card ports A1 and A2. The drive slots must be populated in the order indicated by the numbers 1 through 8.

If you have fewer than eight drives, then SSA Dummy Drive must be plugged into the unused slots. However, you must **NOT** plug more than **THREE** dummy modules in a row **AND** you may **NOT** have any dummy modules in the top row that directly connect to the SSA adapter ports (A1 and A2).

## SSA Interfaces for Greater Than Eight Drives

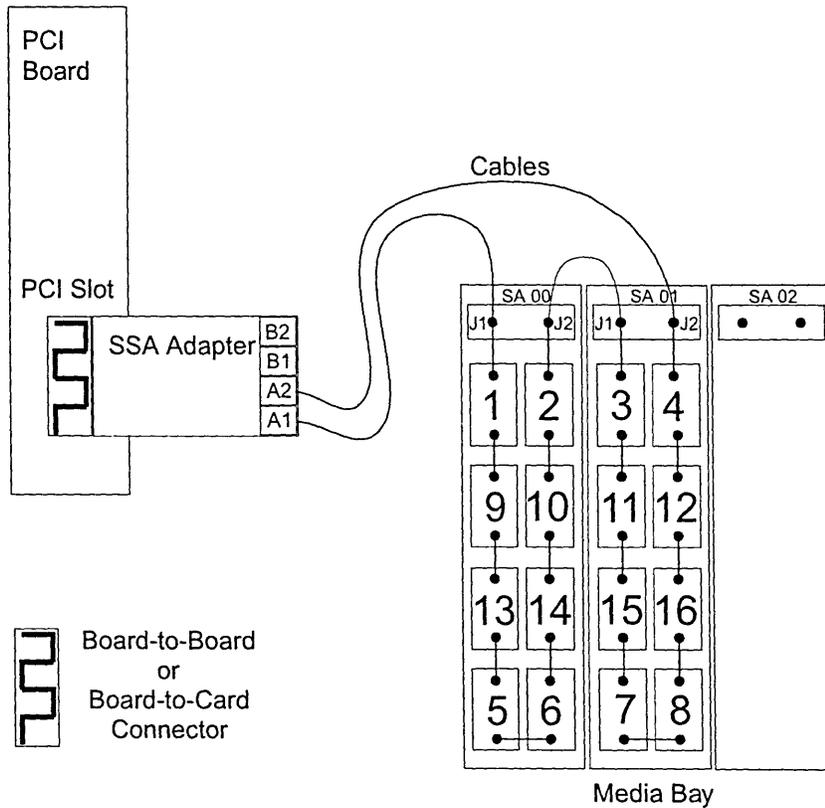


Figure 34. SSA Interfaces for Greater Than Eight Drives

SA 00, SA 01, and SA 02 are extender cards used to connect the external cables from the adapter to the MidPlane SSA Bus. SA 02 is reserved for future use and **must not** be used.

In the drawing above all sixteen drive slots are used, the SSA cabling uses two cables, the first cable connects from SSA card A1 to SA00 J1, with a jumper from SA00 J2 to SA01 J1, The second cable connects SSA card A2 to SA01 J2.

## SSA Plugging Rules for Greater than Eight Disk Drives

If you have nine to sixteen drives, then you will be using, three SSA cables to connect both the left extender card and the middle extender card to the SSA adapter, ports A1 and A2. The drive slots must be populated in the order indicated by the numbers 1 through 16.

If you have fewer than sixteen drives, then SSA Dummy Drive must be plugged into the unused slots. However, you must NOT plug more than TWO dummy modules in a row AND you may NOT have any dummy modules in the top row that directly connect to the SSA adapter ports (A1 and A2).

**Note:** If you are expanding an existing installation from eight or less drives to nine or more drives, then you must REPLUG all the drives to obey the sixteen-drive rules.

## SSA Loops and Links

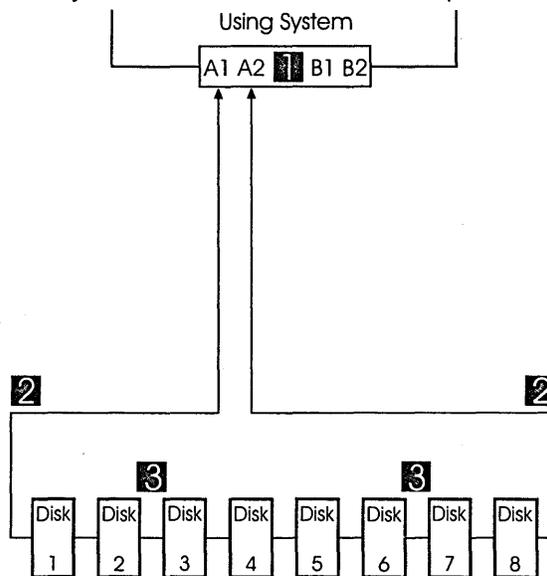
In the simplest SSA configuration, SSA devices are connected through two SSA links to an SSA adapter that is located in the system unit. The devices, SSA links, and SSA adapter are configured in loops. Each loop provides a data path that starts at one connector of the SSA adapter and passes through a link (SSA cable) to the devices. The loop continues through the devices, then returns through another link to a second connector on the SSA RAID Adapter.

Details of the rules for configuring SSA loops are given for each SSA RAID Adapter in "Rules for SSA Loops" on page 114.

## Loops and Data Paths

All devices that are attached to an SSA RAID Adapter card **1** are connected through SSA links **2**. The SSA links are configured as loops. Data and commands to a particular device pass through all other devices on the link between the adapter and the target device.

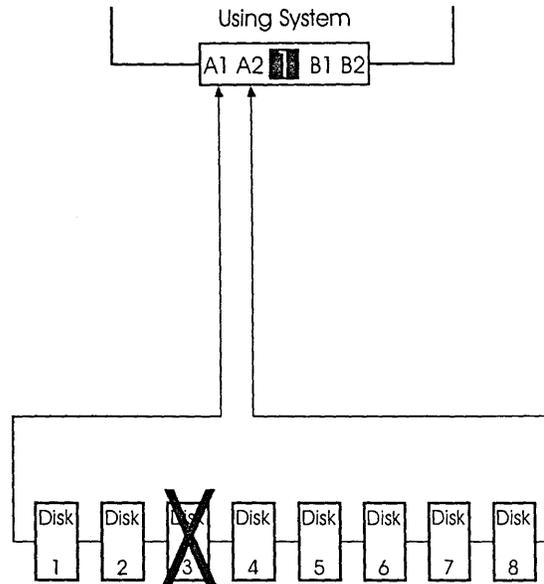
Data can travel in either direction round a loop. The adapter can, therefore, get access to the devices **3** (disk drives in this example) through two data paths. The system cannot detect which data path is being used.



If a disk drive fails, or is turned off, the loop is broken, and one of the data paths to a particular disk drive is no longer available. The disk drives on the remains of the loop continue to work, but an error is reported to the system.

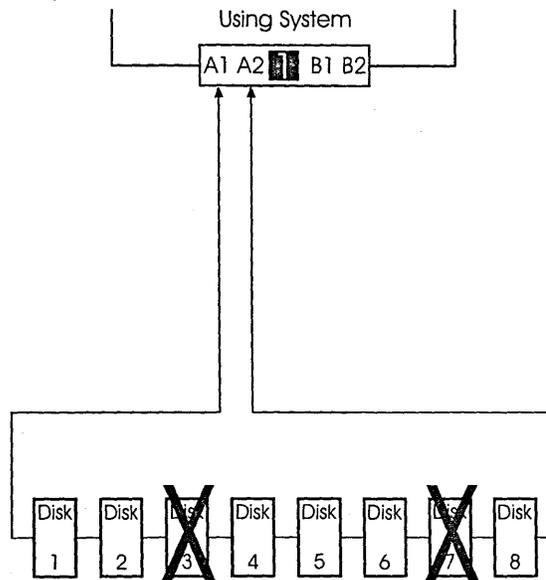
In the diagram, disk drive number 3 has failed. Disk drives 1 and 2 can communicate with the system only through connector A1 of the SSA RAID Adapter. Disk drives 4 through 8 can communicate only through connector A2 of the SSA RAID Adapter.

## SSA RAID Adapter, SSA, and RAID



If two or more disk drives are turned off, fail, or are removed from the loop, some disk drives might become isolated from the SSA RAID Adapter.

In the diagram, disk drives 3 and 7 have been removed. Disk drives 1 and 2 can communicate with the system only through connector A1 of the SSA RAID Adapter. Disk drive number 8 can communicate with the system only through connector A2 of the SSA RAID Adapter. Disk drives 4, 5, and 6 are isolated from the SSA RAID Adapter.



### Rules for SSA Loops

For SSA loops that include the SSA RAID Adapter, the following rules apply:

- Each SSA loop must be connected to a valid pair of connectors on the SSA adapter (that is, connectors A1 and A2).
- A maximum of 16 devices can be connected in a particular SSA loop.

- Only one pair of adapter connectors can be connected in a particular SSA loop.

## RAID Functions

Redundant Array of Independent Disks (RAID) technology gives you:

- Larger disk capacity
- Immediate availability and recovery of data
- Redundancy of data at a level that you can choose.

RAID technology stores data across groups of disk drives that are known as *arrays*. Subject to the level of RAID that you are using, this method of data storage provides the data redundancy that is needed for a secure system, and can allow faster retrieval of data through multiple channel access. Also, if a disk drive fails, you can normally exchange that disk drive without interruption of normal system operation.

The arrays can provide data redundancy that ensures that no data is lost if one disk drive in the array fails. The method that is used to write data to an array is related to the level of RAID that you are using. Arrays are contained in array subsystems. You can configure your subsystem with one or more arrays.

## Hot Spares

A hot spare disk drive is a disk drive that is defined for automatic use if a disk drive in an array fails. The hot spare must have a storage capacity that is greater than, or equal to, that of the smallest member of an array. You can define as many hot spares as you want. RAID-5 arrays can use hot spare disk drives.

If a disk drive in an array fails, the adapter automatically uses a hot spare instead of the failed disk drive, and rebuilds the data from the failed disk on the hot spare.

## RAID-5

RAID-5 arrays write strips of data across all but one members of the array. Parity for the other strips is written on the last member. The members of the array are used in rotation for the parity data.

RAID-5 arrays offer both data protection and increased throughput.

## Array States

An array can be in one of several states. The state of an array is shown in the status column of some of the SSA configurator menus. Those states are described here.

### Good State

An array is in the Good state when all the member disk drives of that array are present.

### Exposed State

An array enters the Exposed state when a member disk drive becomes missing (logically or physically) from that array. When an array is in the Exposed state, you can reintroduce the missing disk drive, or exchange it for a new one. If necessary, the array management software rebuilds the data that was on the original disk drive before it became missing, then writes that rebuilt data to the reintroduced, or

replacement, disk drive. When the data is correct, the array management software returns the array to the Good state.

**read operations while in the Exposed State:** When a read operation is performed on an array that is in the Exposed state, the array management software recreates (rebuilds) the data that was contained on the missing disk drive.

**Write Operations while in the Exposed State:** When a write command is sent to an array that is in the Exposed state, the array management software does the following:

- If a hot spare disk drive is enabled and available when the write command is sent, the array management software immediately exchanges the missing disk drive for the hot spare disk drive, and returns the disk array to the Good state.
- If no hot spare disk drive is enabled and available, the first write operation causes the array to enter the Degraded state. The written data is not protected. If another disk drive in the array fails, or the power fails during a write operation, data might be lost.

### Degraded State

An array enters the Degraded state if, while in the Exposed state, it receives a write command. If no hot spare disk drive is available, and a write operation is performed on the array, the array remains in the Degraded state until you take action to return that array to the Good state.

While in Degraded state, an array is not protected. If another disk drive in the array fails, or the power fails during a write operation, data might be lost.

You can return the disk drive to the array, or install another disk drive. The array management software starts a rebuild operation to synchronize the new disk drive with the data that is contained in the other disk drives of the array. This action returns the array to the Good state.

**Attention:** In this mode of operation, one data check can cause the loss of a large amount of data (more than 64 KB). The array management software must do a complete rebuild of the array to recover the data.

### Rebuilding State

An array enters Rebuilding state after a missing disk has been replaced. When the array is in this state, all the member disk drives are present, but the data and parity are being rebuilt on the replaced disk drive. The array management software allows read and write operations on a disk drive that is in Rebuilding state. If the power fails before the rebuilding is complete, the array management software restarts the complete rebuilding operation when the power returns.

### Offline State

An array enters Offline state when two or more disk drives become missing. Read and write operations are not allowed.

## SSA Link

In an SSA loop, SSA devices are connected through two or more SSA links to an SSA RAID Adapter. Each SSA link is the connection between two SSA nodes (devices or adapters); for example:

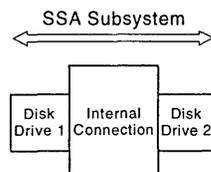
- Disk drive to disk drive
- Adapter to disk drive module

An SSA link can contain several parts. When doing problem determination, think of the link and all its parts as one complete item.

Here are some examples of SSA links. Each link contains more than one part.

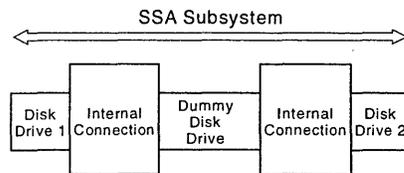
### Example 1

This link is between two disk drives that are in the same subsystem. It has three parts.



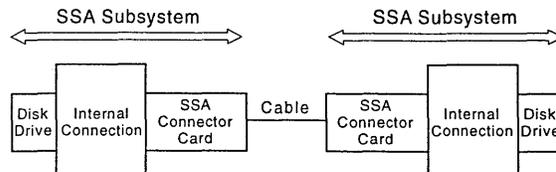
### Example 2

This link is between two disk drives that are in the same subsystem. It has five parts.



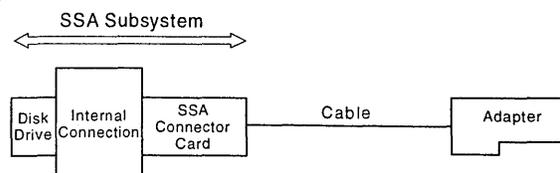
### Example 3

This link is between two disk drives that are not in the same subsystem. It has seven parts.



### Example 4

This link is between a disk drive and an SSA RAID Adapter. It has five parts.



## SSA RAID Adapter, SSA, and RAID

The disk drives and SSA adapters have status lights that can assist in determining what part of the link is broken. Refer to "Link Status Lights" on page 118.

The Disk Service Aid also assists in problem determination. For an example, refer to step 2 of the procedure "Running the SSA Service Aids" on page 121.

### Link Status Lights

If a fault occurs that prevents the operation of a particular link, the link status lights of the various parts of the complete link show that the error has occurred.

You can find the failing link by looking for the flashing green status light at each end of the affected link. Some configurations might have other indicators along the link (for example, SSA connector cards) to help with FRU isolation.

The meanings of the disk drive and adapter lights are summarized here.

Status of Light	Meaning
Off	Both SSA links are inactive.
Permanently on	Both SSA links are active.
Slow flash (two seconds on, two seconds off)	Only one SSA link is active.

## Using the SSA Service Tools

The SSA service aids and other tools help you to service SSA systems. This section describes:

- The SSA service aids (see “SSA Service Aids”)
- How to find the physical location of a device (see “Finding the Physical Location of a Device” on page 125)
- The Event/Error Log utility (see “The Event/Error Logger Utility” on page 126)

## SSA Service Aids

SSA service aids are included in the SSA Configurator and Service Aids Utility. The SSA service aids are:

- **Set Service Mode:**
- **Format Disk:**
- **Certify Disk:**
- **Identify Function:**

Before you use the service aids, ensure that you are familiar with the principles of SSA loops. If you are not familiar with these principles, first read “SSA Loops and Links” on page 113.

These service aids are available only from the Disk Service Aids menu. To run the service aids, follow the procedure in “Running the SSA Service Aids” on page 121.

### Set Service Mode Service Aid

The Set Service Mode service aid enables you to determine the location of a particular disk drive, and to remove that disk drive from the unit in which it is installed. When the Set Service Mode service aid runs:

- The Check light of the disk drive comes on for identification.
- All SSA loop activity through the disk drive stops.
- The disk drive motor stops.
- The Check light (if present) of the unit that contains the selected disk drive comes on.

Only one disk drive at a time can be in Service Mode. No communication to the disk drive is possible, and the SSA loop is broken.

Before using this service aid, you must make the selected disk drive unavailable to the system; otherwise, an error occurs.

SSA devices can be maintained concurrently; that is, they can be removed, installed, and tested on an SSA loop while the other devices on the loop continue to work normally. If a disk drive has its Check light on, you can remove that disk drive from the SSA loop without taking any special actions.

If a disk drive does *not* have its Check light on, the SSA loop that passes through it might still be active, although the disk drive itself might not be working. You must put that disk drive into Service Mode before you remove it from the SSA loop.

If you leave the Disk Service Aids window, Service Mode is reset.

### **Format Disk Service Aid**

The Format Disk service aid formats SSA disk drives.

**Attention:** Formatting a disk drive destroys all the data on that disk drive. Use this procedure only when instructed to do so by the service procedures.

### **Certify Disk Service Aid**

The Certify Disk service aid verifies that all the data on a disk drive can be read correctly. Other maintenance procedures tell you when you need to run this service aid.

### **The Identify Function**

The Identify function can be accessed from most of the SSA Configurator and Service Aids Utility displays.

This function enables you to determine the location of a particular disk drive that you want to identify, but do not want to remove. Identify causes the Check light of the disk drive to flash for identification (two seconds on, two seconds off), but has no effect on the normal operation of the disk drive. You can use the Identify function on any number of disk drives at the same time.

Instructions displayed by the service aids tell you when you can select the Identify function.

The service aids display the UIDs of the devices. By checking the UID on the serial-number label on the device, you can verify that the correct device has its Check light flashing.

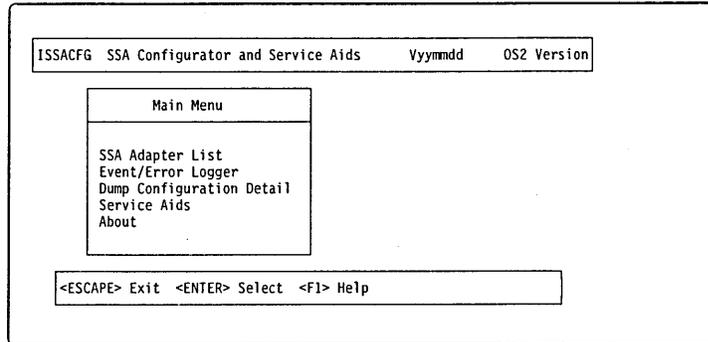
## Running the SSA Service Aids

1

Start the SSA Configurator and Service Aids Utility by selecting the icon(SSA) from the OS/2 desktop, or by opening an OS/2 session and typing the following:

- **ISSACFG**

The Main menu for the SSA Configurator and Service Aids displays.

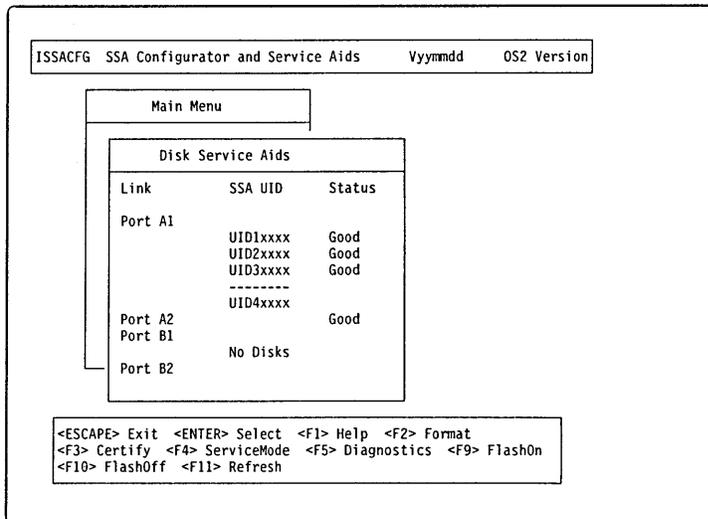


2

From the Main menu, select:

- **SSA Adapter List.**
- Select the SSA adapter.
- Select **Disk Service Aids.**

The Disk Service Aids window displays.



**Note:** The Link column shows the connectors of the SSA RAID Adapter to which the loop is connected.

The SSA UID column shows the unique identifier of each disk drive.

A dashed line in the SSA UID column shows that the SSA loop is broken. On the screen shown here, the loop is broken between the third and fourth disk drives.

The Status column shows the status of the disk drive; for example, **Power** and **Failed**.

## 3

Find the service aid you want to run from the list at the right, then go to the step indicated.

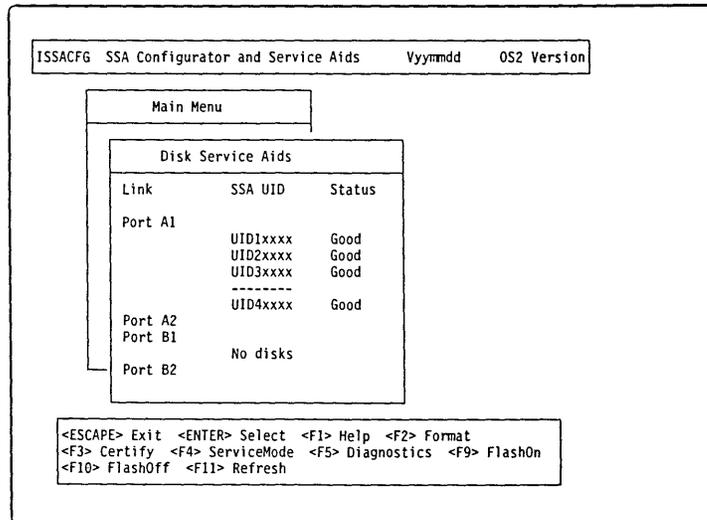
- Set service Mode - go to step 4.
- Format Disk - go to step 5.
- Certify Disk - go to step 7.
- Identify Function - go to step 8.

## 4 Set Service Mode

To use the Set Service Mode service aid:

- From the Disk Service Aids window, select the disk drive that you want to put into Service Mode.
- Press F4 to set Service Mode. Confirmation information displays.
- To reset Service Mode, press Esc.

**End of procedure**



**Note:** You can select only one disk drive at time.

If you select Service Mode, and the selected disk drive is not in a closed loop or at the end of a string (see "SSA Loops and Links" on page 113), your selection fails and an error message is displayed.

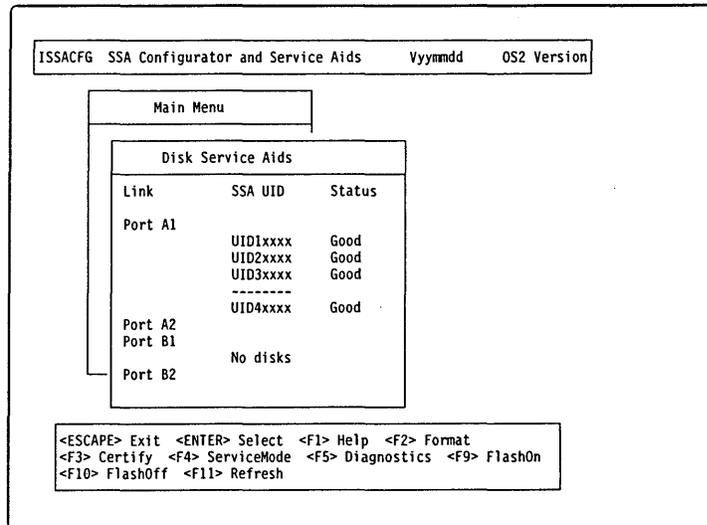
If the Check light of the disk drive that you have put into Service Mode does not come on, and you are not sure of the location of that disk drive, use the Identify function to help you find it (see step 8). If necessary, you can identify the disk drives that are on each side of the one that you are trying to find.

## 5 Format Disk

To use the format disk service aid:

- On the Disk Service Aids window select the disk drive that you want to format (see **Notes**).
- When you are sure that you have selected the correct disk drive, press F2 (Format). A prompt for confirmation displays.

Continue on step 6.



**Note:** If you are not sure of the identification of the disk drive that you want to format, use the Identify function to get a positive physical identification of the disk drive (see step 8).

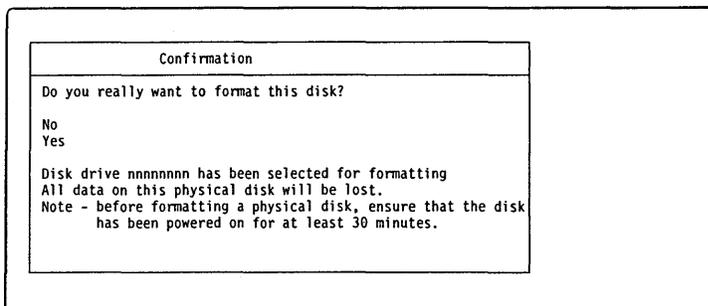
You can further ensure that you have selected the correct disk drive by verifying that the serial number on the disk drive is the same as the serial number that is displayed on the screen.

## 6

On the Confirmation screen:

- Answer the prompt **Yes**.
- If you want to find out how the format operation is progressing, go to "Running the SSA Configurator" on page 129 and use the procedure to **View/Modify Attributes**.

End of procedure

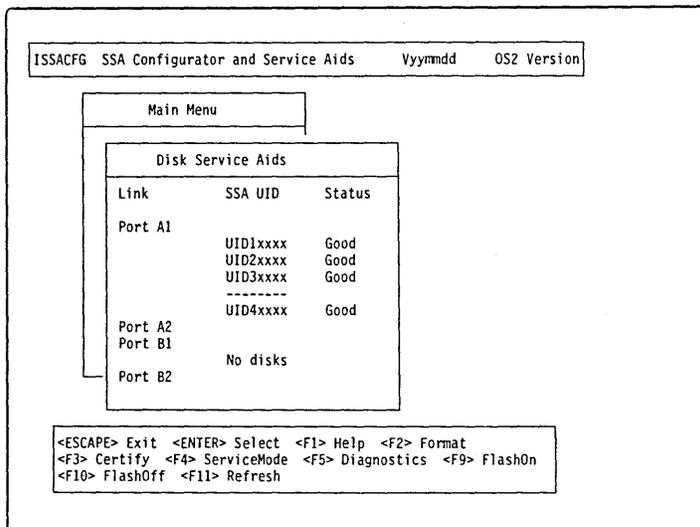


## 7 Certify Disk

To use the Certify Disk service aid:

- On the Disk Service Aids window, select the disk drive that you want to certify.
- When you are sure that you have selected the correct disk drive (see **Note**, press **F3** (Certify).
- If you want to find out how the certify operation is progressing, go to "Running the SSA Configurator" on page 129 and use the procedure to **View/Modify Attributes**.

**End of procedure**



**Note:** If you are not sure of the identification of the disk drive that you want to certify use the Identify function to get a positive physical identification of the disk drive (see step 8).

You can further ensure that you have selected the correct disk drive by verifying that the serial number on the front of the disk drive is the same as the serial number that is displayed on the screen.

## 8 Identify Function

To start the Identify function:

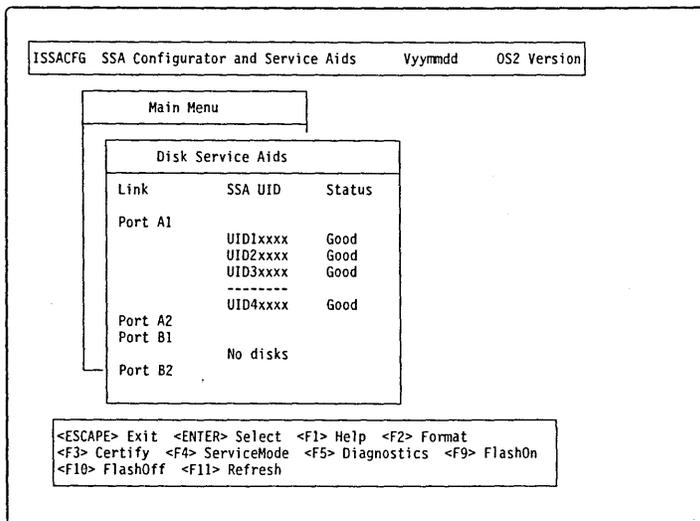
- On the Disk Service Aids window, press F9 (FlashOn).

This causes the Check light on the drive to blink (two seconds on, two seconds off).

To end the Identify function:

- Press F10 (FlashOff).

**End of procedure**



## Finding the Physical Location of a Device

The physical location of a device (for example, a disk drive or an SSA RAID Adapter) cannot be reported directly by the system because of the way in which the SSA interface works. The address of an SSA device is related to the position of that device on the SSA loop. The address can, therefore, change if the configuration is changed.

### Finding the Device When Service Aids Are Available

When the service aids are available, use the Identify function to find the correct disk drive (see "Using the SSA Service Tools" on page 119). If you want to find a device that does not have a Check light (for example, an adapter), you can either use the Identify function to identify devices that are next to the SSA RAID Adapter on the SSA link, or use the procedure described in "Finding the Device When No Service Aids Are Available."

### Finding the Device When No Service Aids Are Available

When no service aids are available, you must find the device by using the port (P) and SSA-address (AA) values that are provided by some service request numbers (SRNs). Examples of these SRNs are 43PAA, 44PAA, and 45PAA.

The port (P) value can be a number 0 through 3. It indicates the port connector on the SSA adapter:

- 0 = Connector A1
- 1 = Connector A2
- 2 = Connector B1
- 3 = Connector B2

The AA value is the decimal SSA-address value. It indicates the position of the device that you are trying to find (counted *along* the SSA loop).

Use the port value to locate the relevant connector on the SSA RAID Adapter, then follow the SSA cable to the first *real* device. Include other adapters as real devices if they are in the same SSA link. Do not include dummy devices.

The first device that you reach represents SSA-address count 0. Continue to follow the SSA links from device to device, increasing the SSA-address count by 1 for each device, until you reach the device that is indicated in the SRN.

## The Event/Error Logger Utility

The adapter software includes an Event/Error Logger utility. This utility is automatically loaded into the system during the installation of the adapter software, and afterward, at each power-on operation. It collects information about SSA errors, and tells you when an error occurs that need a service action.

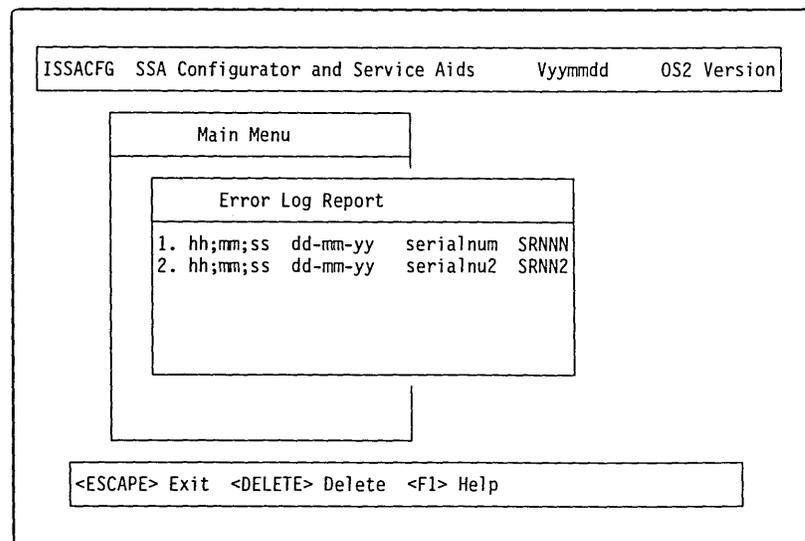
The format in which the Event/Error Logger reports errors is controlled by the file xxxxxx.yyy in zzzzzz. Details of the settings and how to change them are contained in the header of the control file.

The SSA Configurator and Service Aids Utility provides functions that allow you to use the logged information. These functions are:

- Analyze SSA Event Log
- Dump SSA Event Log
- Terminate SSA Event Log
- Modify SSA Event Logger Time Out.

### Analyze SSA Event Log

This function checks the log information that has been collected over the previous twenty-four hours, and displays information about errors that require service actions to be done.



Service Actions are indicated by service request numbers (SRNs): see "Service Request Numbers (SRNs)" on page 77.

**Note:** The Analyze Log function does not recommend a service action for every log entry. Not all log entries require a service action. In some conditions, some errors might be related to operational procedures. Such errors do not require service actions.

**Attention:** If you need to do any service actions, always go first to "SSA START" on page 75.

### **Dump SSA Event Log**

This function translates, and writes to a text file, the contents of the Event/Error Log. You can use any text display to look at the text file.

**Note:** Not all log entries require a service action. In some conditions, some errors might be related to operational procedures. Such errors do not require service actions.

### **Terminate SSA Event Log**

This function ends the operations of the event/error logger.

To restart the logger, either use the icon that is normally in the STARTUP group folder, or go to the directory that contains the ISSAELOG.EXE file.

### **Modify Event Logger Time Out**

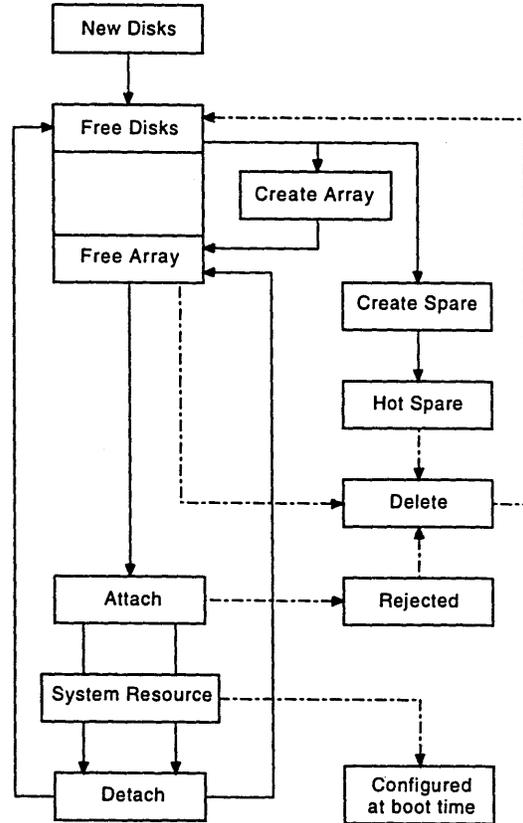
This function enables you to set a longer time for the event logger to perform the analyze and dump functions. A heavily-loaded system might cause a time out to occur if the time setting is too short.

## Using the SSA Configurator Functions

The functions of the SSA configurator are included in the SSA Configurator and Service Aids Utility that is provided on the SSA RAID Adapter diskette for your system.

You must use the SSA configurator to configure and attach SSA disk drives; otherwise, the operating system cannot use those disk drives. You do not need to run this configurator if you are configuring and attaching other types of device.

The diagram summarizes functions of the SSA configurator.



**Note:** The state of an array is shown in the status column of some of the SSA configurator menus. Those states are described in "Array States" on page 115.

## Running the SSA Configurator

This procedure shows you how to use the SSA configurator to do the following tasks:

- Convert a new drive to a free resource
- Create an array
- Create a hot spare disk drive
- View a resource
- Remove a drive from an array
- Add a drive to an array
- Attach a resource
- Delete a resource
- View or Modify the attributes of a resource
- List or delete records of old arrays in the NVRAM

### 1

Start the SSA Configurator and Service Aids Utility by:

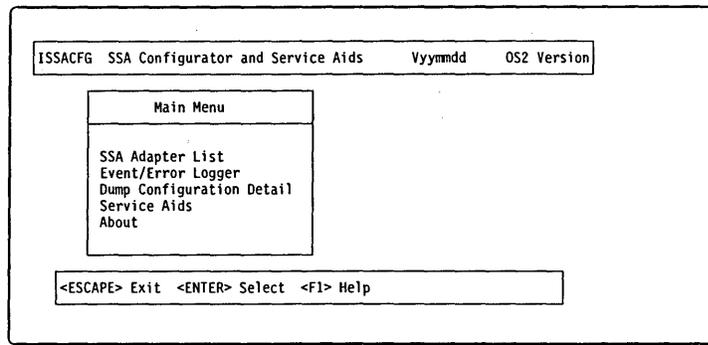
- If the operating system is running, start the SSA Configurator and Service Aids Utility by selecting the SSA Configurator icon, or by opening an OS/2 session and typing the following:

– ISSACFG

- If the operating system is not running, run the stand-alone SSA Configuration Utility (ISSACFG) that is available by booting the S/390 Integrated Server OS/2 Utility diskettes. See "Booting the OS/2 Utility diskettes" on page 233.

**Note:** ISSACFG is on diskette 1.

The Main menu displays.



**Note:** Under some adapter error conditions, the configurator is not loaded, and an error message is displayed.

## 2

Find the configurator function you want in the list at the right, then go to the step indicated.

- Convert a new drive to a free resource - go to step 3.
- Create an array or hot spare - go to step 4.
- View a resource OR delete a drive from an array OR add a drive to an array - go to step 13.
- Attach a resource - go to step 18.
- Delete a resource - go to step 20.
- Modify the attributes of a resource - go to step 21.
- List or delete records of old arrays in the NVRAM - go to step 22.

## 3

### Converting a New Disk Drive to a Free Resource

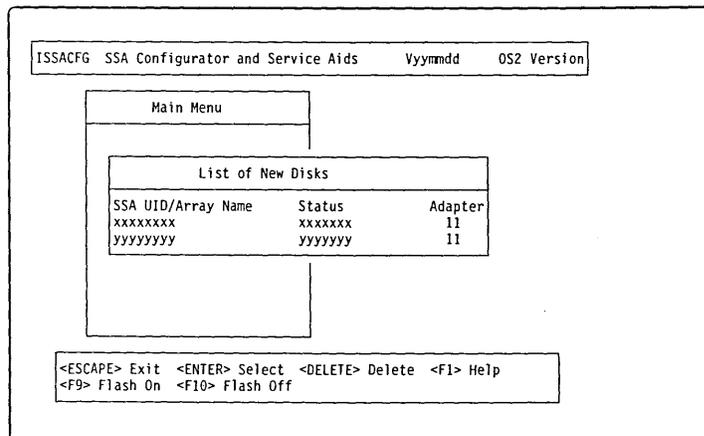
- From the Main menu, select **SSA Adapter List**.
- Select the SSA Adapter from the list.
- From the SSA Adapter menu select **New Resources**.
- A list of new disk drives displays. For each disk drive that you want to attach to your system, put the cursor against its name and press Delete. Its name disappears from the list. That disk drive is now in the **free** state.

**Note:** If no list displays, Return to the Main menu by pressing Esc.

- If you want to display a list of disk drives that are in the free state, Select **Free Resources** from the Main menu. A list of disk drives that are in the free state is displayed.

**End of procedure**

A new disk drive is one that has not been used previously by the same type of system as that in which it is now installed. Before a new disk can be attached to the system, it must be in the free state.

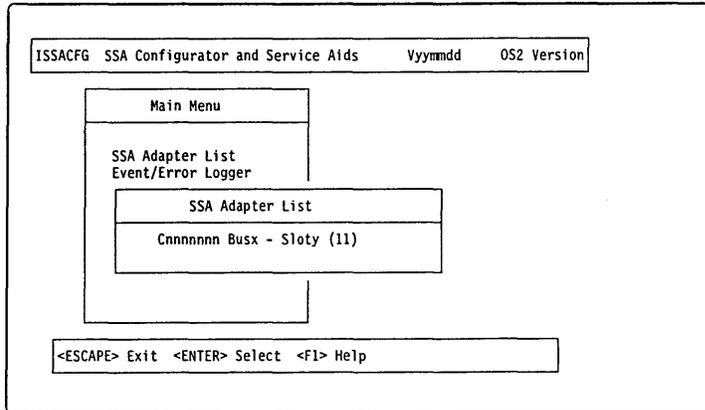


4

**Creating an Array or a Hot Spare Disk Drive**

To create an array or a hot spare disk drive:

- From the Main menu, select **SSA Adapter List**.
- The SSA Adapter List window displays.
- Select the adapter that is to control the array and hot spare disk drives.

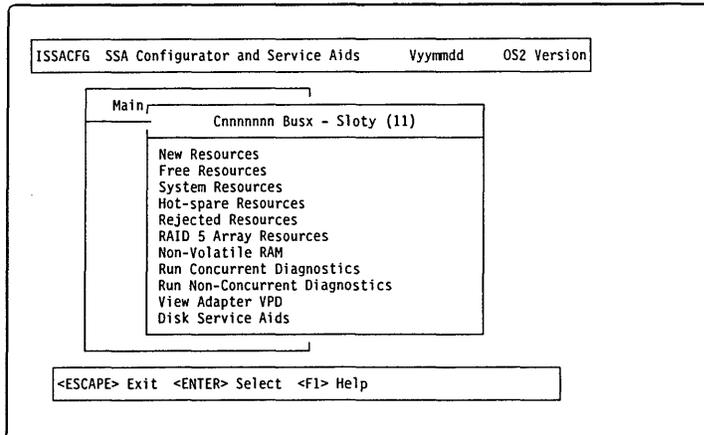


Continue on step 5.

5

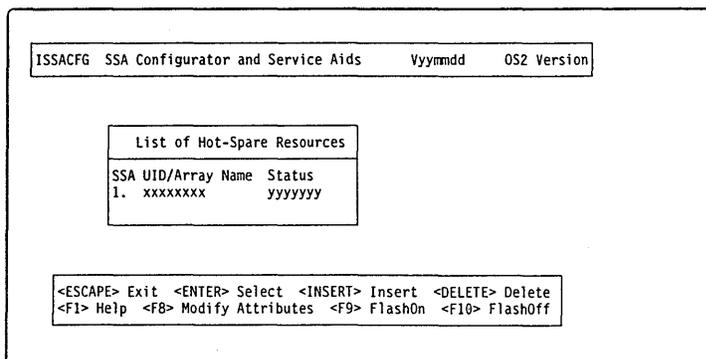
The Adapter Menu window displays.

- To creating an array, go to step 7.
- To creating a hot spare disk drive or list currently available hot spares, go to step 6.



**6 Listing Hot Spare Disk Drives**

- From the Main menu, select **SSA Adapter List**.
- Select the SSA Adapter from the list.
- From the SSA Adapter menu select **Hot Spare Resources**. A list of hot spare disk drives displays
- To creating a hot spare, go to step 11.

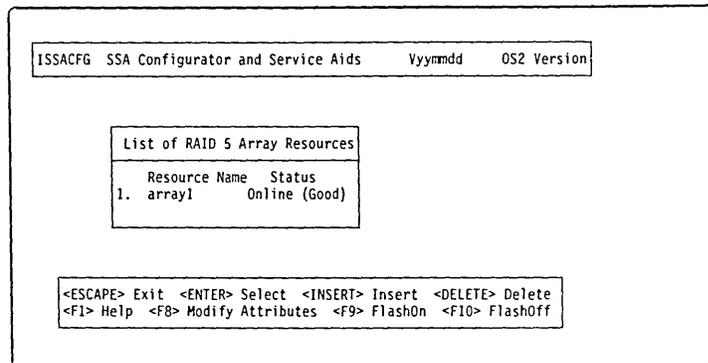


**End of procedure**

## SSA RAID Adapter, SSA, and RAID

### 7 Creating the Array

- From the Main menu, select **SSA Adapter List**.
- Select the SSA Adapter from the list.
- From the SSA Adapter menu select **RAID 5 Array Resources**. A list of the arrays is displayed.
- To add the new array, press Insert.

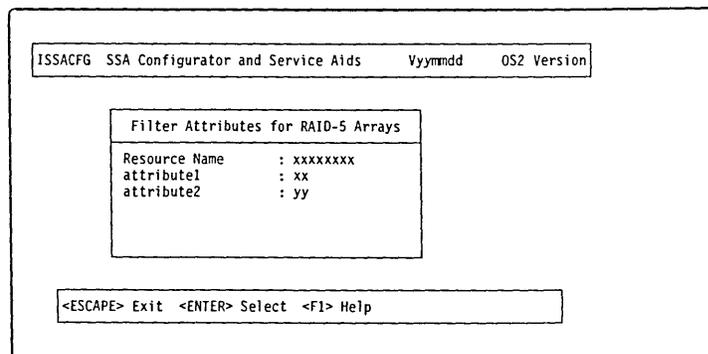


Continue on step 8.

### 8

A window opens showing the attributes for the type of array selected.

- Type an Array Name for the new array. The default values for the attributes are shown. You can change these values by overtyping them. (The Help screen provides details of the values that are allowed.)
- Use the arrow keys to scroll the contents of the window, if necessary, to ensure that you check all the attributes.
- Press **Enter** (Select) to set the attributes.



Continue on step 9.

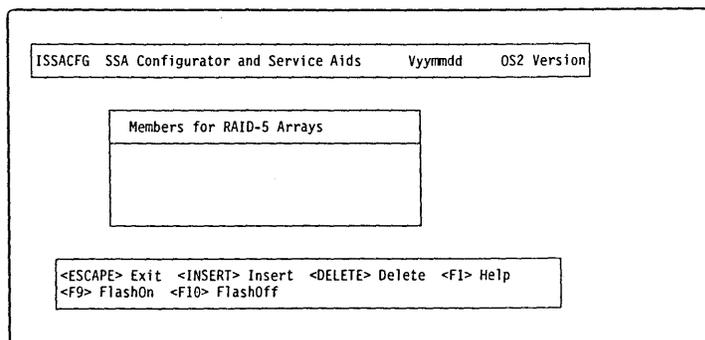
### 9

When you set the attributes, the list (initially blank) of members of the array appears in a new window.

To select the disk drives for the array:

- Press **Insert**

Continue on step 10.



**10**

A list of candidate disk drives displays.

- Select the disk drive that is to be included in the array.

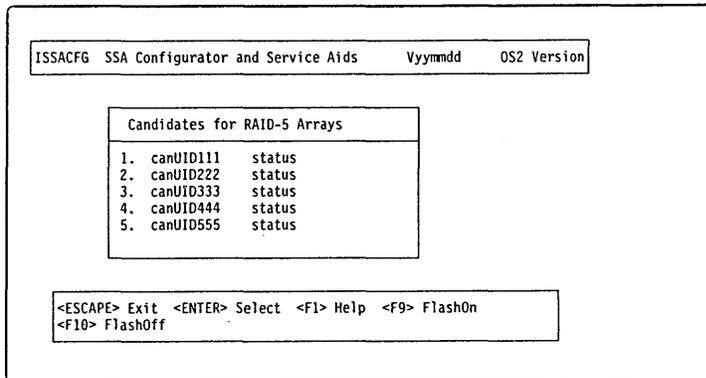
The window from step 9 reappears now showing the selected disk drive as a member of the array.

- Repeat steps 9 and 10 for each disk drive that you want to attach.
- When you have selected all the disk drives required, create the array by pressing **Esc** and following the prompt to confirm the creation of the array.

The screen shown in step 7 reappears showing the new array in the list. If the new array is a RAID-5 array, it is shown with **rebuilding** status while the adapter is initializing the array and its member disk drives.

**Note:** The array that you have created is in the **free** state. You must now to attach the array to your system. Go to step 18.

You can return to the Main menu by repeatedly pressing **Esc**.

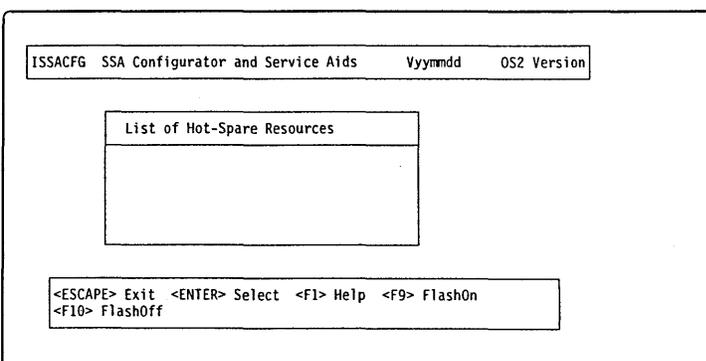
**End of procedure****11 Creating the Hot Spare Disk Drive**

A list of the hot spare disk drives that are controlled by the adapter displays.

**Note:** The list might not contain any hot spare disk drives.

- Press Insert to add the new hot spare disk drive.
- When asked to specify block size, accept the default size.

Continue on step 12.



## SSA RAID Adapter, SSA, and RAID

### 12

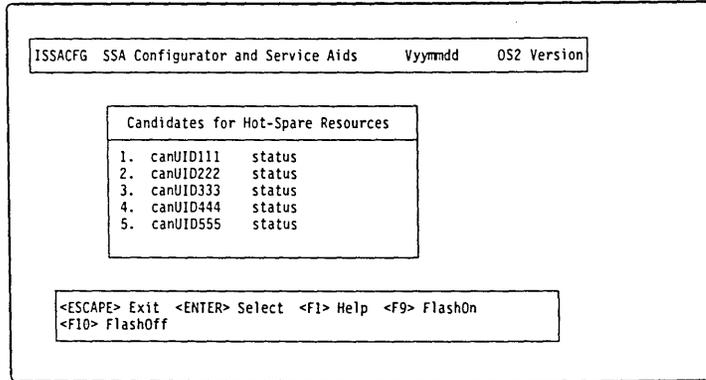
A list of candidate disk drives displays.

- Select the hot spare disk drive.

The new hot spare disk drive is added to the list.

Press **Esc** repeatedly to return to the Main Menu.

#### End of procedure

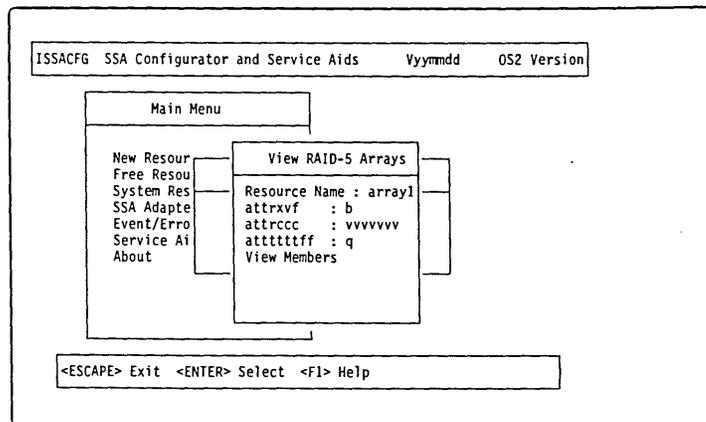


### 13 Viewing a Resource

- From the Main menu, select **SSA Adapter List**.
- Select the SSA Adapter from the list.
- From the SSA Adapter menu select **System Resources**.
- Select the resource that you want to view.

This step shows the result of selecting an array. The attributes of the selected array display.

Continue step 14.

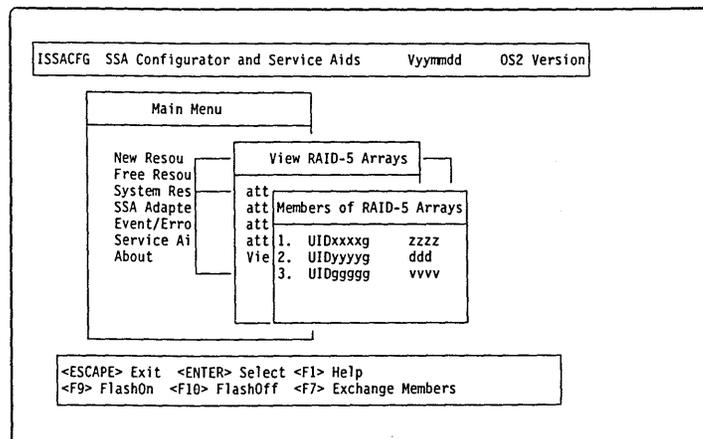


You can scroll through the attributes using the arrow keys.

### 14 View Members

Select **View Members**, a list of member disk drives displays.

- To display the attributes of a member disk drive, select the drive. The results are shown in step 15.
- To delete a disk drive from an array, go to step 16.
- To add a disk drive to an array, go to step 17.

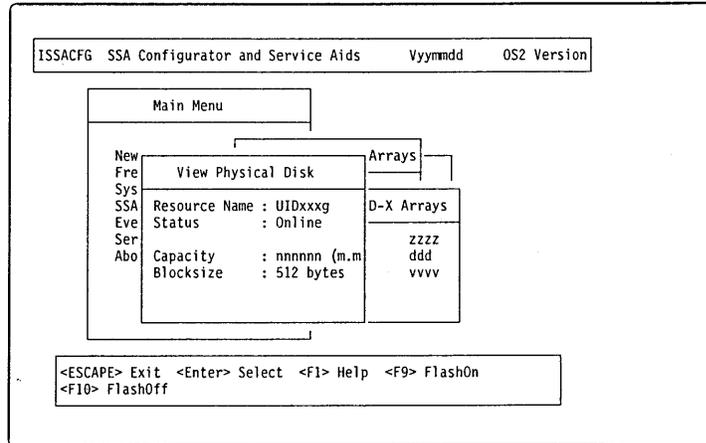


### 15 Attributes of a Drive

If you select a member disk drive, the attributes of that member disk drive display.

**Note:** If you select a disk drive that is not a member of an array, the View Physical Disk window appears immediately.

**End of procedure**



### 16 Deleting a Drive from an Array

- Select the drive you want to remove from the list.
- If you want to see the physical location, press F9 (FlashOn) to flash the drive's Check light. Press F10 to end the Identity function.
- Press F7 (Exchange Members).
- Select **Blank Reserved**.

This procedure allows you to remove a disk drive from an array so you can exchange it. Use this procedure when you do not have an available online disk or a spare slot for a replacement drive.

The selected drive is removed from the array and replaced by a blank virtual disk.

Go to step 17 if you are now adding a drive to an array.

**End of procedure**

### 17 Adding a Drive to an Array

On the list of array members:

- Select **Not Present (Blank Slot)**.
- Press F7 (Exchange Members). A list of candidate disk drives displays.
- Select the drive you want to add to the array.
- Press **Enter**, the drive is added to the array.

This procedure allows you to install a replacement drive in an array that is running in the Exposed or Degraded state because you removed a drive. When you install the replacement, all the data contained on the original drive is automatically rewritten on the new drive.

**End of procedure**

## 18 Attaching a Resource to the System

- From the Main menu, select **SSA Adapter List**.
- Select the SSA Adapter from the list.
- From the SSA Adapter menu select **System Resources**.
- For the first resource, press **Insert**; otherwise, put the cursor against the name of the resource that is immediately below where you want the new resource to be added and Press **Insert**.

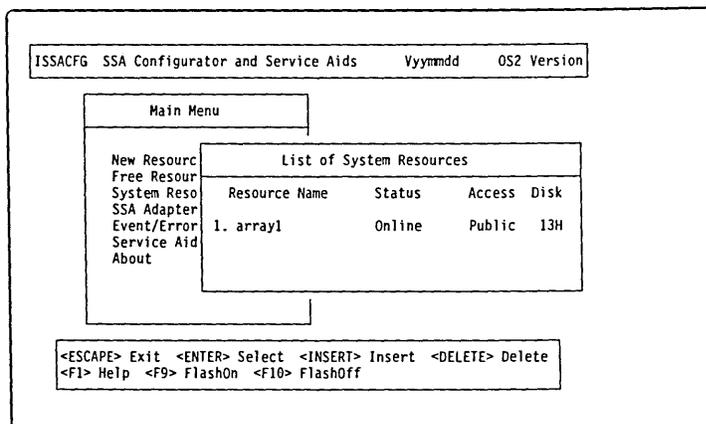
To add a resource to the end of the list, put the cursor below the current end of the list and press **Insert**.

Continue on step 19.

A resource is a device that is to be accessed as a disk drive, a hot spare disk drive, or an array of disk drives.

A list, initially blank, of the resources that are attached to the system is displayed. The list can contain disk drives, arrays, and hot spare disk drives.

The resources are listed in the sequence of the disk drive addresses. (The configurator assigns disk drive addresses that are directly related to the positions, in the resource list, that you have selected for the attachment of the disk drives.) The system configures the disk drives in drive-address sequence when the system is booted. Only resources that are *attached* can be accessed by the operating system.



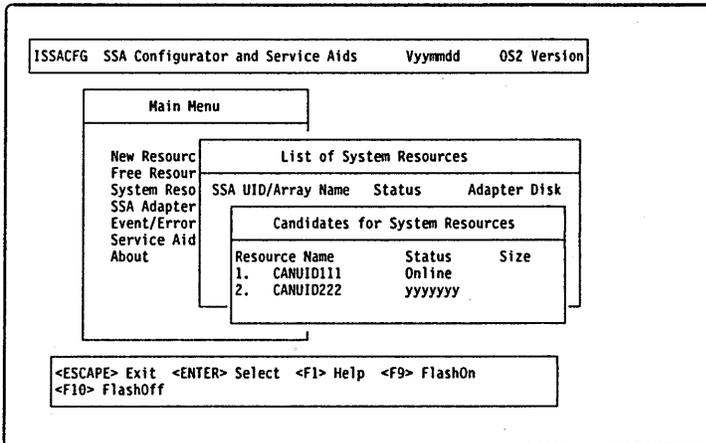
19

A list of candidate resources displays. These are the resources that are in the free state.

- Select the resource that you want to attach. Its name disappears from this list.
- The System Resources window reappears, and shows the new resource added with the appropriate drive address assigned.
- Exit the configurator, shutdown your system, and reboot. The reboot enables the system to recognize the devices that you have added to the list of system resources. The SSA subsystem is now ready for use with your system.
- Ensure that the event/error logger has been started.

If you need to start the event/error logger, either use the icon that is normally in the STARTUP group folder, or go to the directory that contains the ERRORLOG.EXE file.

**End of procedure**



## SSA RAID Adapter, SSA, and RAID

### 20 Deleting a Resource

**Note:** Only resources that are listed in the system resource list are configured when you next boot the system.

- From the Main menu, select **SSA Adapter List**.
- Select the SSA Adapter from the list.
- From the SSA Adapter menu select **System Resources**.
- Select the resource that you want to remove from the system resource list.

**Note:** A resource can be a disk drive, an array, or a hot spare disk drive.

If you are removing a disk drive from an array, you must first remove the array from the system resource list.

- Press **Delete**. This moves the resource to the list of free resources. You have removed the resource from the system resource list. If you are removing a disk drive from an array, continue with the next step.
- From the Main menu, select **SSA Adapter List**.
- Select the SSA Adapter from the list.
- From the SSA Adapter menu select **Free Resources**.
- Select the array from which you are removing the disk drive.
- Select **View Members**.
- Select the disk drive from the list of member disk drives.
- Press **Delete**. The disk drive is removed from the array, and becomes a free disk.
- Reboot the system to bring the changes into effect.

**End of procedure**

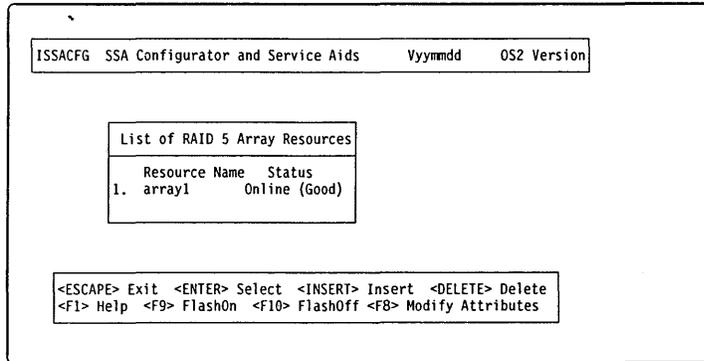
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## 21 Viewing or Modifying the Attributes of a Resource

- From the Main menu, select **SSA Adapter List**.
- Select the SSA Adapter from the list.
- From the SSA Adapter menu select **RAID 5 Array Resources**.
- Select the array whose attributes you want to view or change.

If you want to change the values, Press F8 (Modify Attributes).

### End of procedure



This screen allows you to modify the attributes for the array. When you press Enter, the cursor moves to the next changeable attribute in the list. When you press Enter on the final changeable attribute, a list of components for the array displays.

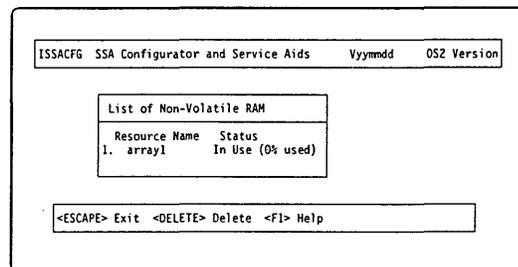
If you need information about the attributes, press F1 for a detailed description of each attribute.

## 22 Listing or Deleting Array Records

If an array becomes disconnected from a RAID manager by some method other than the method described in the **Deleting a Resource** procedure (step 20), a record of that array remains in the nonvolatile random access memory (NVRAM). The record must be deleted manually. This option allows you to list the names of such arrays, and to delete the records of those arrays.

- From the Main menu, select **SSA Adapter List**.
- Select the adapter whose records you are checking.
- Select **Non-Volatile RAM**. A list of arrays displays.
- An array name that has a status of **Dormant**, is a record of an array that is no longer present, and is not recognized by the adapter.
- Press the Delete key to remove the record from the NVRAM.

### End of procedure





## Chapter 8. Removal and Replacement Procedures

FRU Type	Go To
Logic Adapter FRUs <b>Note:</b> Before replacing an adapter card, verify that all current Licensed Internal Code (LIC) fixes have been applied.	"P/390 Card Removal and Replacement" on page 144 "RS422 Adapter Removal and Replacement" on page 145 "Differential SCSI Adapter Removal and Replacement" on page 146 "Communication Adapters Removal and Replacement" on page 147 "Channel Adapter Removal and Replacement" on page 149 "SSA RAID Adapter Removal and Replacement" on page 150 "Extender Card (SSA Loop) Removal and Replacement" on page 151
Single Board Computer Subsystem FRUs	"SBC Card Removal and Replacement" on page 152 "CDROM Drive Removal and Replacement" on page 154 "Diskette Drive Removal and Replacement" on page 154 "4MM DAT Tape Drive Removal and Replacement" on page 154
Power and Mechanical FRUs	"OCA (Offline Converter Assembly) Removal and Replacement" on page 156 "MDA/MSA (Motor Drive Assembly / Motor Scroll Assembly) Removal and Replacement" on page 158 "IBF (Integrated Battery Feature) Removal and Replacement" on page 160 "EPO (Emergency Power Off) Removal and Replacement" on page 161 "Adapter I/O Cage Assembly Removal and Replacement" on page 162 "Midplane Removal and Replacement" on page 163
DASD Subsystem FRUs	"Disk Drive Assembly (HDA) Removal and Replacement" on page 164

## Removal and Replacement Procedures

### S/390 Integrated Server FRU Types

All power FRUs are N+1. They will be concurrently replaceable. DASD devices are concurrently replaceable. EPO panel is concurrently replaceable using a special EPO bypass switch on each OCA. PCI devices are not concurrently replaceable. To replace a PCI device, the machine must be powered off using the EPO switch.

Power FRUs repair is verified when the replacement FRU is activated and the corresponding Fault LED is no longer lit. Other FRU may require running the diagnostic or the system to IML without an error indicated to verify the fix.

Type	Function	#/box	Concurrent
P/390 Card	Processor Unit	1	No
SBC Card	Single Board Computer	1	No
OCA	Main Power Supply	2	Yes
MDA/MSA	Blower and Motor Drive	2	Yes
IBF-P	Battery Unit	2	Yes
EPO Card	Emergency Off switch, SCSI Bus terminator, IOSP reset switch	1	Yes
HDA	DASD drive	16	Yes
SSA Adapter	SSA bus extender	1	No
CDROM	Compact Disk Drive	2	Yes
4mmDAT tape drive	Tape Drive	2	Yes
Floppy Drive	Diskette drive reader	1	Yes
PCI/ISA Adapters	System and I/O functions	21 slots	No
PCI Assembly	Cage for PCI cards	1	No
Midplane	Back plane connector board	1	No
Keyboard	Input	1	No
Mouse	Directional cursor movement	1	No
Video Display	Monitor	1	Yes

### Power Off Procedures

Before powering down the system, make sure the S/390 operating system is shutdown. Also shutdown the OS/2 system by typing "shutdown" from an OS/2 window and answering all the prompts. **DO NOT** shut off power until you see the message indicating it is OK to do so.

The primary means of powering off the system is to turn off the EPO switch. The EPO switch is located at the upper right of the front cover. The plastic slide window is lifted to expose the switch and the switch is placed in the off (down) position.

- **VERIFICATION OF POWER OFF**

When the machine is powered off, the display will lose all system information. LEDs on the media devices will become unlit and the fans inside of the machine will stop running.

- **IF THE MACHINE HAS NOT POWERED OFF AFTER THE ABOVE**

Open the rear cover of the machine. Check the switches labelled UEPO BYPASS on both OCAs. They must BOTH be placed in the NORM position (down).

- **IF THE MACHINE HAS NOT POWERED OFF AFTER THE ABOVE**

Place the switches labelled PWR on BOTH OCAs in the SVC position.

- **IF THE MACHINE HAS NOT POWERED OFF AFTER THE ABOVE**

Open the front door of the machine. If IBFs are installed, place the circuit breaker of EACH installed IBF into the OFF (down) position. Then slide the line cord retention bracket on EACH OCA to the right and remove BOTH line cords by unplugging each from the OCAs.

### Logic Adapter FRUs

#### P/390 Card Removal and Replacement

The P/390 card must be installed in PCI slot 12. Use the steps below as a general procedure for removing and replacing the P/390 card.

##### Removing the P/390 card

- 1 Turn OFF the S/390 Integrated Server power and disconnect the power cord. Verify that power is off. (See "Power Off Procedures" on page 142)
- 2 Open both front and rear door of frame.
- 3 Remove the left (viewed from the front of the machine) side cover by pulling the top of the side cover away from the machine until the posts on the cover are fully disengaged from the holes in the side. The adapter cards are accessed through the side opening.
- 4 Locate PCI slot 12 to remove the P/390 card.
- 5 Remove the card retention plate which is fastened to the right rear wall of the I/O Cage.
- 6 Unscrew the fastener at the left card edge and unplug the card. Lift the adapter card from the system unit.

##### Replacing the P/390 Card

- 1 Hold the new P/390 adapter by the top and firmly press it into the PCI slot, while guiding the handle into the card support bracket.
- 2 Tighten the fastener at left card edge.
- 3 Reinstall the card retention plate.
- 4 Plug all power cords into the electrical outlets.
- 5 Align side cover with slots in bottom of frame and push top of cover into the frame until the posts are fully engaged.
- 6 Turn ON the S/390 Integrated Server power.
- 7 Run Diagnostics to Verify Installation.

## RS422 Adapter Removal and Replacement

The RS422 adapter must be installed in PCI slot 2 and contains several jumper straps for each port that must be set for proper operation. Use the steps below as a general procedure for removing and replacing the RS422 adapter.

### Removing the RS422 Adapter

- 1 Turn OFF the S/390 Integrated Server power and disconnect the power cord. Verify that power is off. (See "Power Off Procedures" on page 142)
- 2 Open both front and rear door of frame.
- 3 Remove the left (viewed from the front of the machine) side cover by pulling the top of the side cover away from the machine until the posts on the cover are fully disengaged from the holes in the side. The adapter cards are accessed through the side opening.
- 4 Locate the adapter card in PCI slot 2 and unplug any cables plugged to this card at the face of the I/O cage.
- 5 Remove the card retention plate which is fastened to the right rear wall of the I/O Cage.
- 6 Unscrew the fastener at the left card edge and unplug the card.
- 7 Compare the jumper strap settings between the old RS422 card and the new one. Unless instructed differently, the jumpers on the new card should be set as described in section "RS422 Adapter" on page 33.

### Replacing the RS422 Adapter

- 1 Hold the new RS422 adapter by the top and firmly press it into the PCI slot, while guiding the handle into the card support bracket.
- 2 Tighten the fastener at left card edge.
- 3 Reinstall the card retention plate.
- 4 Reconnect all cables previously removed from the system unit.
- 5 Plug all power cords into the electrical outlets.
- 6 Align side cover with slots in bottom of frame and push top of cover into the frame until the posts are fully engaged.
- 7 Turn ON the S/390 Integrated Server power.
- 8 Run Diagnostics to Verify Installation.

## Removal and Replacement Procedures

### Differential SCSI Adapter Removal and Replacement

The SCSI adapter must be installed in PCI slot 1. Use the steps below as a general procedure for removing and replacing the SCSI adapter card.

#### Removing the SCSI Adapter

- 1 Turn OFF the S/390 Integrated Server power and disconnect the power cord. Verify that power is off. (See "Power Off Procedures" on page 142)
- 2 Open both front and rear door of frame.
- 3 Remove the left (viewed from the front of the machine) side cover by pulling the top of the side cover away from the machine until the posts on the cover are fully disengaged from the holes in the side. The adapter cards are accessed through the side opening.
- 4 Locate the adapter card in PCI slot 1 and unplug any cables plugged to this card at the face of the I/O cage.
- 5 Remove the card retention plate which is fastened to the right rear wall of the I/O Cage.
- 6 Unscrew the fastener at the left card edge and unplug the card.

#### Replacing the SCSI Adapter

- 1 Hold the new SCSI adapter by the top and firmly press it into the PCI slot, while guiding the handle into the card support bracket.
- 2 Tighten the fastener at left card edge.
- 3 Reinstall the card retention plate.
- 4 Reconnect all cables previously removed from the system unit.
- 5 Plug all power cords into the electrical outlets.
- 6 Align side cover with slots in bottom of frame and push top of cover into the frame until the posts are fully engaged.
- 7 Turn ON the S/390 Integrated Server power.
- 8 Run Diagnostics to Verify Installation.

## Communication Adapters Removal and Replacement

Use the steps below as a general procedure for removing and replacing the communication adapters.

### Removing the Communication Adapters

- 1 Turn OFF the S/390 Integrated Server power and disconnect the power cord. Verify that power is off. (See "Power Off Procedures" on page 142)
- 2 **WAC and EtherJet only** If there are any devices connected to these adapters set the power switches to Off and disconnect the cables.
- 3 Open both front and rear door of frame.
- 4 Remove the left (viewed from the front of the machine) side cover by pulling the top of the side cover away from the machine until the posts on the cover are fully disengaged from the holes in the side. The adapter cards are accessed through the side opening.
- 5 Locate the adapter card to be removed and unplug any cables plugged to this card at the face of the I/O cage.
- 6 Remove the card retention plate which is fastened to the right rear wall of the I/O Cage.
- 7 Unscrew the fastener at the left card edge and unplug the card. Lift the adapter card from the system unit.

### Replacing the Communication Adapters

- 1 **Multiport Model 2 Adapter only** For this adapter it is necessary to set the option switch SW1 (see "Setting the Option Switch SW1" on page 36) on the new card.
- 2 **WAC adapter only** Make sure that the switches on the card are set properly. Set the switches to match the failing card you are replacing. The switch assembly contains seven switches (See "WAC Switch Settings" on page 42) that are used to set I/O address ranges and interrupt levels. Set the option switches to one of three settings, depending if this is a first, second, or third WAC card.
- 3 **WAC adapter and Multiport Model 2 Adapter only** Reserve interrupts (IRQs) or memory addresses or both for ISA adapters (See "BIOS Operation" on page 55).
- 4 **WAC adapter only** If it is necessary to install the EIB card on the WAC adapter (See "Installing the EIB" on page 40).
- 5 **EtherJet adapter only** See "Adapter Address" on page 31 for addressing information.
- 6 Plug the new card and tighten the fastener at left card edge.
- 7 Reinstall the card retention plate.
- 8 **WAC adapter only** Install the EIB-specific cable to the correct link connector on the back of the WAC adapter card.
- 9 **Token Ring adapter only** Only one data cable can be connected to the PCI Token-Ring Adapter at a time.
- 10 After installing the adapter and before switching your S/390 Integrated Server on connect the adapter cable to the connector on the adapter and to the network or to the connected devices.
- 11 Plug all power cords into the electrical outlets.

## Removal and Replacement Procedures

- 12 Align side cover with slots in bottom of frame and push top of cover into the frame until the posts are fully engaged.
- 13 Turn ON the S/390 Integrated Server power.
- 14 Run Diagnostics to Verify Installation.

## Channel Adapter Removal and Replacement

Use the steps below as a general procedure for removing and replacing your Parallel Channel Adapter or ESCON Channel Adapter.

### Removing the Channel Adapter

- 1 Turn OFF the S/390 Integrated Server power and disconnect the power cord. Verify that power is off. (See "Power Off Procedures" on page 142)
- 2 Open both front and rear door of frame.
- 3 Remove the left (viewed from the front of the machine) side cover by pulling the top of the side cover away from the machine until the posts on the cover are fully disengaged from the holes in the side. The adapter cards are accessed through the side opening.
- 4 Locate the adapter card to be removed and unplug any cables plugged to this card at the face of the I/O cage.
- 5 Remove the card retention plate which is fastened to the right rear wall of the I/O Cage. left card edge.
- 6 Unscrew the fastener at the left card edge.
- 7 Unplug the card. Lift the adapter card from the system unit.

### Replacing the Channel Adapter

- 1 Plug the new card and tighten the fastener at left card edge.
- 2 Reinstall the card retention plate.
- 3 Reconnect all cables previously removed from the system unit.
- 4 Plug all power cords into the electrical outlets.
- 5 Align side cover with slots in bottom of frame and push top of cover into the frame until the posts are fully engaged.
- 6 Turn ON the S/390 Integrated Server power.
- 7 Run Diagnostics to Verify Installation.

### SSA RAID Adapter Removal and Replacement

The SSA RAID Adapter card must be installed in PCI slot 3. Use the steps below as a general procedure for removing and replacing the adapter card.

#### Removing the SSA RAID Adapter

- 1 Turn OFF the S/390 Integrated Server power and disconnect the power cord. Verify that power is off. (See "Power Off Procedures" on page 142)
- 2 Open both front and rear door of frame.
- 3 Remove the left (viewed from the front of the machine) side cover by pulling the top of the side cover away from the machine until the posts on the cover are fully disengaged from the holes in the side. The adapter cards are accessed through the side opening.
- 4 Locate the adapter card in PCI slot 3 and unplug the link cables plugged into this card at the face of the I/O cage.  
**Note:** It is important to label every link cable
- 5 Remove the card retention plate which is fastened to the right rear wall of the I/O Cage.
- 6 Unscrew the fastener at the left card edge and unplug the card. Lift the adapter card from the system unit.

#### Replacing the SSA RAID Adapter

- 1 Plug the new card and tighten the fastener at left card edge.
- 2 Reinstall the card retention plate.
- 3 Reconnect the link cables previously removed from the adapter.
- 4 Plug all power cords into the electrical outlets.
- 5 Align side cover with slots in bottom of frame and push top of cover into the frame until the posts are fully engaged.
- 6 Turn ON the S/390 Integrated Server power.
- 7 Ensure that the CBIOS is enabled, it may come up disabled when a new card is installed. Instructions are given on the screen during boot up of the SSA adapter. For example  
IBM SSA CBIOS (C) v1.07 -- currently disabled  
Press TAB key to enable the CBIOS
- 8 Check the level number displayed in the CBIOS message. It should be 6350 or higher. If it is not then contact the next level of support. For example  
IBM SSA CBIOS Extension (C) v1.07 6350

### Extender Card (SSA Loop) Removal and Replacement

There are 2 (max) SSA Extender cards located in the I/O cage. Extender cards are located in row 0 on the front of the cage directly over the HDAs. The minimum configuration contains 1 adapter card. These cards are oriented horizontally in the cage.

#### I Removing the Extender Card (SSA Loop)

- 1 Turn OFF the S/390 Integrated Server power and disconnect the power cord. Verify that power is off. (See "Power Off Procedures" on page 142)
- 2 Open the front of the frame.
- 3 Locate the Extender Card to be replaced.
- 4 Disconnect cables from front of card. Label if necessary.
- 5 Loosen two captive fasteners on the front of the Extender Card.
- 6 Pull the Extender Card from the slot.

#### Replacing the Extender Card (SSA Loop)

- 1 Carefully slide the card into slot until resistance is felt and plug to the backplane.
- 2 Tighten fasteners on the front of the card.
- 3 Reconnect the link cables previously removed from the extender card.
- 4 Plug all power cords into the electrical outlets.
- 5 Run Diagnostics to Verify Installation.

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### Single Board Computer Subsystem FRUs

#### SBC Card Removal and Replacement

The SBC card must be installed in slot 17 and 18. Use the steps below as a general procedure for removing and replacing the SBC card.

##### Removing the SBC Card

- 1 Turn OFF the S/390 Integrated Server power and disconnect the power cord. Verify that power is off. (See "Power Off Procedures" on page 142)
- 2 Open both front and rear door of frame.
- 3 Remove the left (viewed from the front of the machine) side cover by pulling the top of the side cover away from the machine until the posts on the cover are fully disengaged from the holes in the side. The adapter cards are accessed through the side opening.
- 4 Locate the adapter card to be removed and unplug any cables plugged to this card at the face of the I/O cage and internal on the card.
- 5 Remove the three cables which connect the SBC card to the BIDI board from the SBC.
- 6 Locate the adapter card in PCI slots 17 and 18.
- 7 Remove the card retention plate which is fastened to the right rear wall of the I/O Cage.
- 8 Unscrew the fasteners at the left card edge and unplug the card. Lift the adapter card from the system unit.

##### Replacing the SBC Card

- 1 Make sure that the jumpers on the new card are set properly. Set the configuration jumpers (see "Configuration Jumpers" on page 54) and the CPU speed jumpers (see "CPU Speed Jumpers" on page 54) to the default values.
- 2 Hold the new SBC adapter by the top and firmly press it into the PCI slot, while guiding the handle into the card support bracket.
- 3 Tighten the fastener at left card edge.
- 4 Reinstall the card retention plate.
- 5 Reconnect the three cables which connect the SBC card to the BIDI board.
- 6 Reconnect all cables previously removed from the system unit.
- 7 Align side cover with slots in bottom of frame and push top of cover into the frame until the posts are fully engaged.
- 8 Turn ON the S/390 Integrated Server power.
- 9 Verify the BIOS version. The version number should be IBMLX003 or higher, if not contact the next level of support. For example  
BIOS Version IBMLX003 10/5/98 3:39:00 PM
- 10 Verify the BIOS version settings, see "Default P/390 Settings for SBC BIOS Setup" on page 60

11 Run Diagnostics to Verify Installation.

## Removal and Replacement Procedures

### CDROM Drive Removal and Replacement

These devices are fragile. Handle them with care and keep them away from strong magnetic fields.

#### Removing the CDROM Drive

- 1 Locate the device to be replaced.
- 2 Using torque tool PN 6422789, loosen two captive fasteners on the front of the device. Note that the fasteners are on the upper left and lower right corners of the device.
- 3 Pull the device from the enclosure. Handle the device carefully.

#### Replacing the CDROM Drive

- 1 Replace by carefully sliding the device into slot until resistance is felt and plug to the backplane.
- 2 Tighten fasteners on the front of the device using torque tool PN 6422789.

### Diskette Drive Removal and Replacement

The Diskette Drive is located alongside the EPO card in the right front of the frame. These devices are fragile. Handle them with care and keep them away from strong magnetic fields.

**Removing the Diskette Drive:** The Diskette Drive is located alongside the EPO card in the right front of the frame.

- 1 Remove EPO bezel from the right front by loosening two M4 hex nuts and sliding bracket off. The screws must only be slightly loosened and should not be removed.
- 2 Loosen the fasteners on the Diskette drive. **IMPORTANT** - These are the inner pair of fasteners. The outer pair of fasteners release the EPO card.
- 3 Carefully pull the Diskette Drive assembly from the cage until the two cable connectors are visible. Unplug these cables. Do not unplug this cable from the EPO card assembly.

#### Replacing the Diskette Drive

- 1 Plug the cable connector and slide the Diskette Drive into the cage. The disc activity LED is up when the drive is oriented correctly.
- 2 Tighten fasteners.
- 3 Slide the EPO bezel onto the screws and tighten.

### 4MM DAT Tape Drive Removal and Replacement

These devices are fragile. Handle them with care and keep them away from strong magnetic fields.

#### Removing the 4MM DAT Tape Drive

- 1 Locate the device to be replaced.
- 2 Using torque tool PN 6422789, loosen two captive fasteners on the front of the device. Note that the fasteners are on the upper left and lower right corners of the device.
- 3 Pull the device from the enclosure. Handle the device carefully.

### Replacing the 4MM DAT Tape Drive

- 1 Replace by carefully sliding the device into slot until resistance is felt and plug to the backplane.
- 2 Tighten fasteners on the front of the device using torque tool PN 6422789.

---

### Power and Mechanical FRUs

#### OCA (Offline Converter Assembly) Removal and Replacement

The OCAs are two in number and are plugged into the extreme left of the rear side of the System 390 Integrated Server frame.

##### Removing the OCA

- 1 In order to avoid unexpected disruption during a concurrent repair, a concurrency check must be made to first determine that the redundancy of the system has enough function still intact so that the repair can be made. If the redundancy check fails for a given FRU, the machine must be taken off line in order to perform the service.

**Check on other OCA for:** PWR OUT LED LIT, All Fault LEDs UNLIT.

- 2 Locate the OCA to be removed. The OCA FAULT LED will be lit. (or no LEDs will be lit)
- 3 If there is an IBF connected to this OCA, set the breaker on the IBF to the Off down position.
- 4 Set the switch labelled PWR to the SVC(up) position.
- 5 Slide line cord retention bracket to the right. This will free the appliance coupler and expose the lower OCA fastener.
- 6 Unplug cables from OCA. (Be sure they are labelled) Line cord, fan cable, IBF cable (if installed), RS422 cable.
- 7 Loosen upper and lower fasteners using PN 6422789 torque tool alternating between fasteners. Slide unit out of the slot.

##### Replacing the OCA

- 1 Ensure that the switch labelled PWR on the new OCA is in the SVC position before installing it.
- 2 Carefully slide the OCA into slot as far as it will go (the back edge of the top of the OCA approximately 0.25" from cage bracket). NOTE THAT IN NO CASE SHOULD THE UNIT BE SLAMMED OR PUSHED VIGOROUSLY AGAINST THE BACKPLANE AS THIS MAY DAMAGE THE CONNECTOR.
- 3 Hold the UPPER PART of the OCA against the backplane and using torque tool PN 6422789, start the UPPER fastener into mating hole in cage bracket (2 turns).
- 4 Start lower fastener (2 turns).
- 5 Fully tighten upper then lower fastener (alternately between).
- 6 Go back to top fastener and ensure it is fully torqued.
- 7 Plug all cables to the OCA insuring correspondence of plug locations and cable labelling.
- 8 Ensure that the switch labelled UEPO BYPASS is in the NORM position.
- 9 If there is an IBF connected to this OCA, set the circuit breaker on the IBF to the On position.
- 10 Slide the line cord retention bracket to the left as far as it will go so it covers the appliance coupler and lower OCA fastener.
- 11 Set the switch labelled PWR to the NORM position.

12 Press the button labelled PWR RESET.

### MDA/MSA (Motor Drive Assembly / Motor Scroll Assembly) Removal and Replacement

The MSAs are two in number and located in the lower rear of the S/390 Integrated Server frame. The MDAs are mounted on the face of each MSA and are separately removable without removing the MSA.

#### Removing the MDA

- 1 In order to avoid unexpected disruption during a concurrent repair, a concurrency check must be made to first determine that the redundancy of the system has enough function still intact so that the repair can be made. If the redundancy check fails for a given FRU, the machine must be taken off line in order to perform the service.

**Verify that the other OCA is working correctly** by verifying the PWR OUT LED is on and all FAULT LEDs are off.

- 2 Be sure that you are working with the MDA which corresponds to the AMD FLT LED on the OCA. The left OCA corresponds to the left MDA, etc. The MDA LED may or may not be lit.
- 3 If there is an IBF connected to the OCA with the AMD FLT LED on, set the breaker on the IBF to the OFF(down) position.  
Set the switch labelled PWR on the OCA with the AMD FLT LED on to the SVC(up) position.
- 4 Verify that all cables are labelled for plug location and then unplug cables from MDA.
- 5 Loosen captive fasteners on the MDA and unplug MDA from the face of MSA.

#### Replacing the MDA

- 1 Plug MDA onto face of MSA, aligning two metal clips on the face of the MSA with the slots in the MDA. Push gently to seat blind mate connector
- 2 Plug all cables to the MDA insuring correspondence of plug locations and cable labelling.
- 3 Reset the IBF breaker to the on position if required.
- 4 Set the switch labelled PWR on the OCA back to the NORM position.
- 5 Press the button labelled PWR RESET on the OCA.

#### Removing the MSA

- 1 In order to avoid unexpected disruption during a concurrent repair, a concurrency check must be made to first determine that the redundancy of the system has enough function still intact so that the repair can be made. If the redundancy check fails for a given FRU, the machine must be taken off line in order to perform the service.

**Verify that the other OCA is working correctly** by verifying the PWR OUT LED is on and all FAULT LEDs are off.

- 2 Remove MDA from face of MSA (See MDA procedure above).
- 3 Loosen upper and lower captive fasteners on the MSA and slide MSA from enclosure opening. The System 390 Integrated Server MSA contains an 8.5" diameter blower. Upper and lower spring loaded internal doors will close automatically when the MSA is removed preventing loss of air flow while MSA is out of enclosure.

**Replacing the MSA**

- 1 Position MSA in front of opening.
- 2 Slide MSA into enclosure opening and tighten upper and lower fasteners.
- 3 Replace MDA onto face of MSA (See MDA procedure above.)

### IBF (Integrated Battery Feature) Removal and Replacement

#### Removing the IBF

- 1 In order to avoid unexpected disruption during a concurrent repair, a concurrency check must be made to first determine that the redundancy of the system has enough function still intact so that the repair can be made. If the redundancy check fails for a given FRU, the machine must be taken off line in order to perform the service.

#### *No check required for IBF replacement*

- 2 Locate the IBF to be removed. The IBF flt LED will be lit on the corresponding OCA. OCA1 (left) corresponds to IBF1 (top), and OCA2 corresponds to IBF2 (bottom). The LED on the IBF to be removed may or may not be lit.
- 3 Set the circuit breaker on the IBF to the Off position.
- 4 Unplug the battery cable from the front of the IBF.
- 5 Loosen upper and lower fasteners using PN 6422789 torque tool and slide the unit out of the frame.

#### Replacing the IBF

- 1 Be sure that the breaker on the front of the replacement IBF is in the Off position.
- 2 Slide the IBF into the frame and tighten the fasteners using torque tool PN 6444789. Note that the IBF must go into the frame with its circuit breaker above its center.
- 3 Plug the battery cable into the IBF.
- 4 Set the breaker on the front of the IBF to the On position.
- 5 Press the button labelled PWR RESET on the OCA.

## EPO (Emergency Power Off) Removal and Replacement

The EPO Card is located in the right front of the frame. It contains the emergency power off switch.

### Removing the EPO Card

- 1 In order to avoid unexpected disruption during a concurrent repair, a concurrency check must be made to first determine that the redundancy of the system has enough function still intact so that the repair can be made. If the redundancy check fails for a given FRU, the machine must be taken off line in order to perform the service.

**Check either OCA for:** PWR LED LIT, All Fault LEDs unlit on at least one OCA.

**Ensure that the SCSI media is:** Not in use and are varied offline to the Operating System.

- 2 Remove the Floppy Drive and set the drive aside. Handle the drive carefully. See the remove and replace procedure for this FRU.
- 3 Place the UEPO Bypass switch located on each OCA into the service position (SVC). Note that this must be done on both OCAs.
- 4 Unplug the Room EPO cable from the EPO Card if this cable is installed.
- 5 Loosen the two fasteners at the top and bottom of the EPO Card and slide it out of the cage.

### Replacing the EPO Card

- 1 Slide EPO Card into cage and plug it to the backplane. Tighten the two fasteners.
- 2 Install the Diskette Drive. See the instructions for this FRU.
- 3 Plug the Room EPO cable if one is installed. The ROOM EPO switch must be in the ACTIVE position in order to be able to plug this cable. The switch is spring loaded and is moved by pulling up on the switch stem.
- 4 If there is no Room EPO cable, the ROOM EPO switch MUST be set into the BYPASS position.
- 5 Be sure that the EPO switch is in the on (up) position.
- 6 Double check that both the following are true:
  - The Room EPO cable is plugged, or the ROOM EPO switch is in the BYPASS position
  - The EPO switch is on (up).
- 7 Set the UEPO BYPASS switches on the face of BOTH OCAs to the NORM position.

### Adapter I/O Cage Assembly Removal and Replacement

The I/O Cage is located at the right rear of the frame. Use the steps below as a general procedure for removing and replacing your PCI/ISA/BIDI I/O Cage assembly. See "Rear View Locations" on page 269 for the location of the Adapter I/O cage.

#### Removing the Adapter I/O Cage

- 1 Turn OFF the S/390 Integrated Server power and disconnect the power cord. Verify that power is off. (See "Power Off Procedures" on page 142)
- 2 Open both front and rear door of frame.
- 3 Remove the left (viewed from the front of the machine) side cover by pulling the top of the side cover away from the machine until the posts on the cover are fully disengaged from the holes in the side.
- 4 Unplug all cable from the face of the I/O cage. Label if necessary to restore to original positions.
- 5 Unplug all the PCI cards. See the procedure for removing PCI cards in order to do this. Label the cards if necessary to restore to original positions.  
**SBC Card only** The three cables connected between the SBC card (Slot 18) and the BIDI board must be retained to use with the replacement cage.
- 6 Loosen completely the upper right fastener and then the lower right fastener.
- 7 Loosen the left fasteners, alternating several turns between the upper and lower fasteners until both are completely loosened.
- 8 Slide the cage out of the frame.

#### Replacing the Adapter I/O Cage

- 1 Replace the cage assembly by sliding the cage into the frame and plug it into the backplane.
- 2 Tighten upper and lower left hand fasteners using PN 6422789 torque tool alternating between fasteners.
- 3 Tighten the right hand fasteners.
- 4 Reinstall all PCI cards.  
**SBC Card only** Reconnect the three cables between the SBC card (Slot 18) and the BIDI board.
- 5 Reconnect all cables previously removed from the system unit.
- 6 Plug all power cords into the electrical outlets.
- 7 Turn ON the S/390 Integrated Server power.
- 8 Run Diagnostics to Verify Installation.

## Midplane Removal and Replacement

The Mid Plane Board is attached to the mid plane board stiffener inside the frame. See "Top View Locations" on page 265 for the location of the Mid Plane Board.

### Removing the Mid Plane Board

- 1 Turn OFF the S/390 Integrated Server power and disconnect the power cord. Verify that power is off. (See "Power Off Procedures" on page 142)
- 2 Unfasten rear side FRUs (OCAs, I/O cage, PU book if installed), unplug and draw away from the frame about "1" inch for each FRU. Do not remove these FRUs.
- 3 ALL OF THE REMAINING REMOVAL STEPS ARE PERFORMED AT THE FRONT OF THE FRAME.
- 4 Remove front door from the frame.
- 5 Remove EPO bracket from the right front by loosening two 5.5 mm socket hex nuts and sliding bracket off. The screws must only be slightly loosened and should not be removed.
- 6 Unplug and remove all FRUs from the front side of the machine (all HDAs, all media, Floppy disk, Epo card, SSA Extender cards). Label if necessary to insure reinstall to correct locations.
- 7 Remove any slot covers from unused HDA and media slots. Set aside.
- 8 Remove upper plenum bracket by loosening five 5.5 mm socket hexhead screws. Set aside.
- 9 Remove lower plenum bracket by loosening seven 5.5 mm socket hexhead screws. Set aside.
- 10 The HDA/Media cage must be removed. Remove the twelve 8mm socket hexhead screws located on bridge lances. Slide the cage out of the frame. The board is now fully exposed.
- 11 Remove four 8mm socket hex screws which fasten the board to the mid plane stiffener. Remove the board from the frame.

### Replacing the Mid Plane Board

- 1 Insert the board into the frame and mount to the locator pins on the mid plane stiffener. Be sure the HDA connectors are facing out. Secure with the four 8mm socket hex heads.
- 2 Slide cage into the frame locating the cage on the same locator pins as above. Secure with twelve 5.5 mm socket hex head screws.
- 3 Reinstall the upper and lower plenum plates.
- 4 Reinstall all front side FRUs. Be the EPO switch is in the Off position. Reinstall all slot covers. At this time, the rear side slots will all contain FRUs or will have a slot cover.
- 5 Slide the EPO bracket onto the screws and tighten.
- 6 Reinstall the rear side FRUs. Be sure that the UEPO BYPASS switch on the front of each OCA is in the NORM position.
- 7 Reinstall the front door.
- 8 Turn ON the S/390 Integrated Server power.

---

### DASD Subsystem FRUs

#### Disk Drive Assembly (HDA) Removal and Replacement

There are 16 (max) HDAs plugged into the front side of the machine. The minimum configuration contains 3 installed HDAs. HDA slots are located in rows 1-4 and columns 0-3, in the front side of the S/390 Integrated Server.

DISK DRIVE MODULES ARE FRAGILE. HANDLE THEM WITH CARE AND KEEP THEM WELL AWAY FROM STRONG MAGNETIC FIELDS. ANY SLOTS WITH NO DISK DRIVE MODULE INSTALLED MUST BE COVERED WITH AN AIR FLOW IMPEDANCE PLATE.

#### Removing Array Disk Assembly (HDA)

- 1 Start the SSA Configurator and Service Aids Utility by:
  - If the OS/2 system is running, start the SSA Configurator and Service Aids Utility by selecting the icon that was generated when the software was installed, or by opening an OS/2 session and typing the following:  
C:  
CD /ISSA  
ISSACFG
  - If the OS/2 system is not running, run the stand-alone OS/2 SSA Configuration Utility (ISSACFG) contained on the two OS/2 Utility diskettes.
- 2 The Main menu will display.
  - Select **SSA ADAPTER LIST**
  - Select **ADAPTER**
- 3 From the Main menu, select **System Resources**.
- 4 Select the array from which you want to remove a disk drive.
- 5 Select **View Members**.
- 6 Select the disk drive that you want to remove, and use the Identify function to find the disk drive. To start the Identify function, press F9 (FlashOn); the Check light flashes on the selected disk drive. To end the Identify function, press F10 (FlashOff).
- 7 Press F7 (Exchange Members).
- 8 Select **Blank Reserved**. The selected disk drive has now been removed from the array, and replaced by a blank virtual disk).
- 9 Locate the HDA to be replaced.
- 10 Using torque tool PN 6422789, loosen two captive fasteners on the front of the HDA. Note that the fasteners are on the upper left and lower right corners of the HDA.
- 11 Pull the HDA from the enclosure using the handle on the face of the HDA. Handle the drive carefully.

### Replacing the Array Disk Assembly (HDA)

- 1 Carefully slide the HDA into slot until resistance is felt and plug to the backplane.
- 2 Tighten fasteners on the front of the HDA using torque tool PN 6422789.
- 3 Convert the New Disk Drive to a Free Resource.
- 4 Press **Esc** until the Main Menu displays.
- 5 A list of new disk drives displays. Put the cursor against the name for the new drive and press **Delete**. Its name disappears from the list. That disk drive is now in the **free** state.
- 6 Add the New Disk Drive to the Array
- 7 Press **Esc** until the Main Menu displays.
- 8 From the Main menu, select **System Resources**.
- 9 Select the array.
- 10 Select **View Members**.
- 11 Select the disk drive that you are going to exchange; for example, the hot spare disk drive that was originally exchanged with the rejected disk drive.
- 12 Press F7 (Exchange Members).
- 13 A list of candidate disk drives is displayed.
- 14 Select the disk drive that you want to become the new member of the array.

## Removal and Replacement Procedures

## Chapter 9. Power

### DANGER

**Service of any subassemblies under power outside of their machine frame mounts is strictly prohibited.**

<b>Problem Area</b>	<b>Reference Section</b>
Power Status Indicator Information	"System Power Status Window" on page 169
Power Failure Map	"Power Failures" on page 172
Overcurrent Isolation Map	"Over Current Isolation" on page 190
OCA Information	"Diagram of the OCA" on page 203
MDA/MSA Information	"Diagram of the MDA" on page 204
IBF Information	"Diagram of the IBF" on page 205
EPO Information	"Diagram of the EPO Card" on page 207
Power and Cooling Requirements	"Power and Cooling Requirements" on page 210
Specifications	"Specifications" on page 212
FRU Removal and Replacement Procedures	Chapter 8, "Removal and Replacement Procedures" on page 141

## 1ST Level Diagram of the Power Sub-System

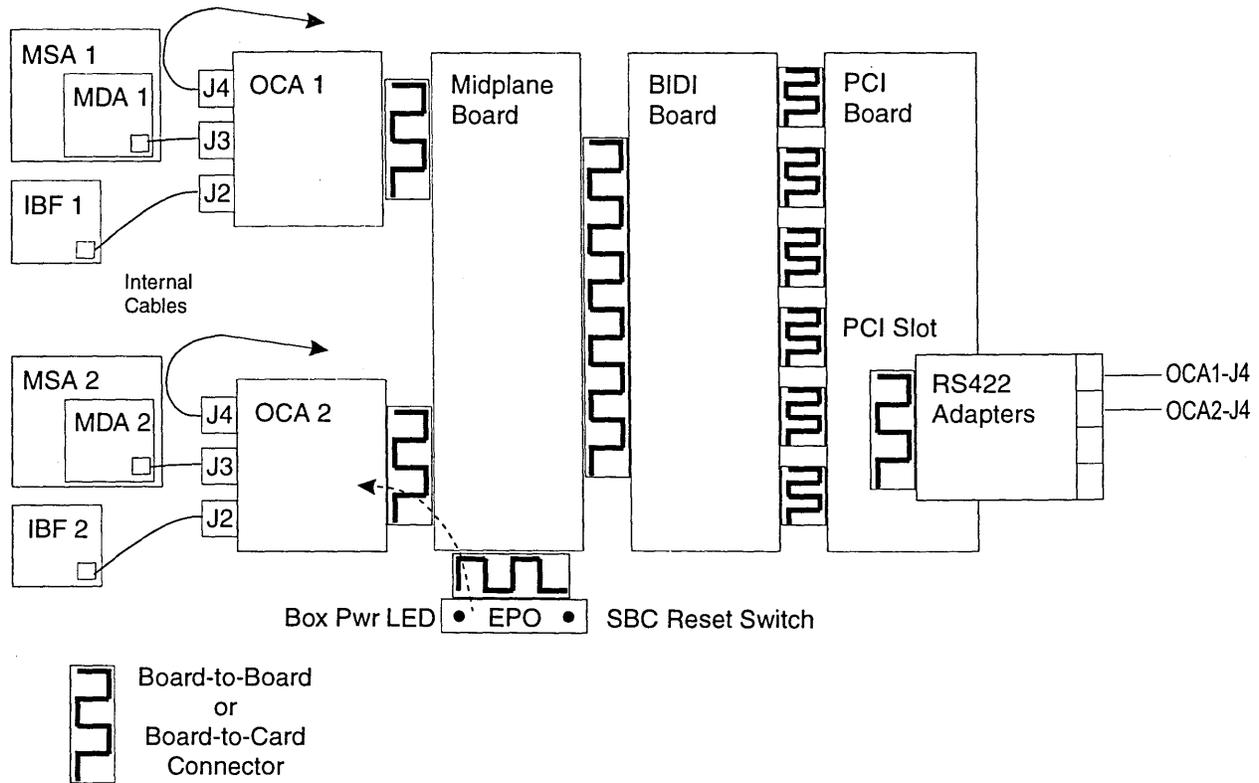


Figure 35. Diagram of Power Sub-System

## General Power Terminology

<b>IBF</b>	Integrated Battery Feature
<b>EPO</b>	Emergency Power Off
<b>OCA</b>	Offline Converter Assembly
<b>MDA</b>	Motor Drive Assembly
<b>MSA</b>	Motor Scroll Assembly

## FRU Types

For the System 390 Integrated Server FRU Types see "S/390 Integrated Server FRU Types" on page 142

## System Power Status Window

The System Power Status Window displays problem status for the System 390 Integrated Server power system on the system display console.

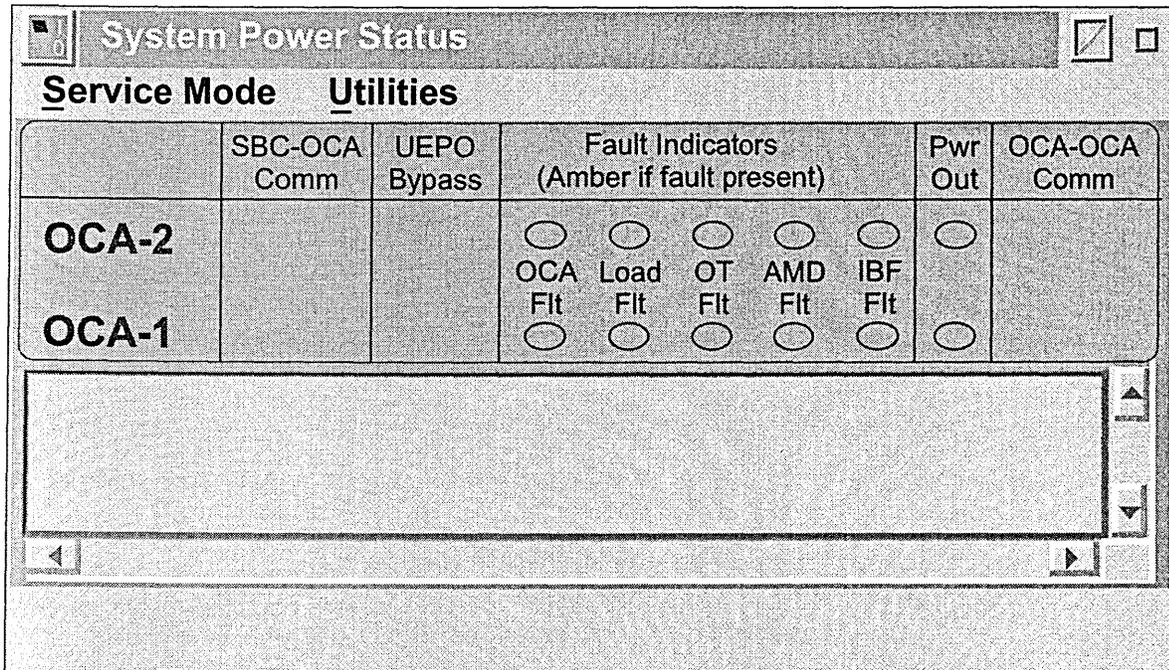


Figure 36. Power Status Indicator

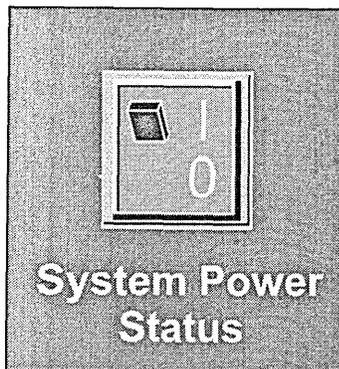


Figure 37. Power Norm/Fault Icon

## Opening the System Power Status Window

The System Power Status window opens:

- Automatically when a power fault is detected.
- When the window icon is clicked.

**Note:** This icon is always present on an active display console, independent of the state of the System Power Status window (open, closed or minimized)

## Power

- The window can be minimized by clicking either square in the upper right corner. See below for closing the window.

**Note:** The window icon goes from BLUE to YELLOW when a fault is detected and remains yellow until the fault is cleared.

## Menu Bar

### SERVICE MODE:

Enter SERVICE MODE by clicking SERVICE MODE located on the TOOL BAR of the System Power Status Window. then clicking ENTER SERVICE MODE PASSWORD (PE MODE). SERVICE MODE must be active to use UTILITIES.

When SERVICE MODE is active, the POWER/THERMAL SERVICE console is opened. The only service use of this menu bar is to exit the System Power Status program (EXIT). This is specifically instructed in certain cases when executing a service map.

### UTILITIES:

\***ACDL window** opens the ACDL window which permits an Auto Code Down Load to be run on demand.

\***CLEAR WINDOW LOG** clears all messages.

\***SUSPEND POLLING and RESUME POLLING** functions used during service maps.

## Display Information

The window contains a 'console display' for each OCA and a message area:

### 1. OCA Console Display for each OCA

- Status of communication between OCA and SBC (IOSP)
  - GOOD (green)
  - BAD (amber)
- Status of the UEPO BYPASS switch
  - BYPASSED (UP shaded amber)
  - NORMAL (DOWN shaded green)
- Status of FAULT LEDs. These are images of the state of the FLT LEDs on the OCA front panels
  - No fault - Blank
  - Fault condition set - Amber
- Status of the PWR OUT LED
  - No power from this OCA on a level - Blank
  - Normal power - Green
- Status of OCA to OCA communications
  - GOOD (green)
  - BAD (amber)

**Note:** This fault does not open the window.

### 2. Message Area

Message text is posted in the lower half of the window which indicates the type and detail of each fault detected. Note time and date is included which each message. OCA-N is the OCA reporting the fault.

Message Texts:

**OCA-N: PWR FLT** Output voltage level missing or disabled. Service is required.

**OCA-N: OCA FLT** Defective OCA. Service is required.

**OCA-N: LOAD FLT** Overcurrent detected at OCA output;OCA outputs disabled. Service is required.

**OCA-N: OT FLT** Overtemperature condition detected;OCA outputs disabled. Service is required.

**OCA-N: AMD FLT** Fault detected at fan connected to this OCA. Service is required.

**OCA-N: IBF FLT** Fault detected at battery unit connected to this OCA. Service is required.

**OCA-N: SBC-OCA COM** port is closed. Service is required.

**OCA-N: SBC-OCA COM** port is busy. Service is required.

**OCA-N: SBC-OCA** communication error (OCA timeout). Service is required.

**OCA-N: SBC-OCA** communication error (RS-422 transmit error). Service is required.

**OCA-N: SBC-OCA** communication error (LIC error). Service is required.

Example of a complete message.

<11Aug1998@11:44:37:160> OCA-N: OCA COM port is closed. Service is required.

---

### Power Failures

This is the starting point for analyzing a system power failure. The symptoms are:

- A failure detected in one of the system power functions.
- No system power
- System not operating
- No display function

This problem can be caused by:

- Missing customer power.
- Defective customer Room EPO circuit.
- Insufficient or missing air flow.
- Switches are in the wrong position.
- Any defective Off Line Converter (OCA).
- Any defective Air Moving Device (AMD).
- Any missing, unplugged or defective power cable.
- Any defective Integrated Battery Feature (IBF) unit.
- A load fault on any OCA output level.
- Any defective printed circuit board.
- Defective EPO card assembly
- Defective IOSP or RS422 card.
- Defective Display or display cable.

Note the following instructions which apply to this procedure:

1. When instructed to exchange FRUs as A **OR** B **OR** C, exchange the FRUs one at a time in the order given.
2. When instructed to exchange FRUs A **AND** B **AND** C, exchange all the FRUs at one time.
3. To exchange a FRU, see the Removal/Replacement Procedure for that FRU contained Chapter 8, "Removal and Replacement Procedures" on page 141.
4. To verify a repair, press the button labelled **PWR RESET** on the OCA and wait 2 minutes. The repair is verified if after 2 minutes all OCA fault (FLT) indicators are off and PWR IN and PWR OUT are on.
5. If the fault is not cleared and you were directed to exchange the FRUs one at a time, restore the last FRU exchanged before going to the next FRU in the list.
6. If the FRU list is exhausted and the fault is not cleared, call for assistance.

#### **DANGER**

**Service of any subassemblies under power outside of their machine frame mounts is strictly prohibited.**

---

1

Is the system display inactive?

Inactive indicates blank screen or missing system information.

**YES NO**

↓

Go to step 25.

---

**2**

Does the system display have power?

Check the power on indicator for the display.

**NO YES**

↓ Go to step 5.

---

**3**

Check the following:

If outlet power is missing, notify the customer.

- The display is plugged in and display power is turned on.
- The outlet used for the display has power.

Are all of the above correct?

**YES NO**↓ Correct any problems found.  
When complete, go to step 59.

---

**4**

Exchange the following FRU:

- Display unit

When complete, go to step 59.

---

**5**

Check the display cable for damage and ensure it is plugged correctly at both ends.

The display cable plugs into connector P15 on the IOISP card (Slot18).

Is the display cable plugged correctly?

**YES NO**↓ Correct any problems found.  
When complete, go to step 59.

---

**6**Press the **RESET SBC** button on the EPO card assembly and wait 30 seconds.

Is the display still blank or missing system information?

**YES NO**↓  
Continue at step 59.

## Power Failures

---

7

Is the **amber** display power indicator on?

**YES NO**

↓ Exchange the following FRU:

- Display unit
- IOSP card (Slot 18)

When complete, go to step 59 to verify the repair.

For FRU exchange procedures, refer to Chapter 8, "Removal and Replacement Procedures" on page 141.

---

8

Check the following:

- The AC line cords are not damaged and are plugged into the OCAs.
- The Emergency Power Off (EPO) switch is in the On (up) position.
- The switches labelled **PWR** are in the **NORM** position on both OCAs.
- The switches labelled **UEPO BYPASS** are in the **NORM** position on both OCAs.

Are all of the above conditions correct?

**YES NO**

↓ Correct any problem found.  
When complete, go to step 59.

---

9

Check the **PWR IN** indicator for both OCAs

Does either OCA have this indicator on?

**YES NO**

↓ Customer power is missing and must be checked.

**End of procedure**

---

Notify the customer that correct power must be provided.

---

10

Check the **PWR OUT** indicator for both OCAs

Does either of the OCAs have this indicator on?

**YES NO**

↓ Go to step 14.

---

**11**

- Open the side cover to get access to the PCI cards.
- Check the 5 power indicators on the PCI backplane. The indicators are in a vertical line in the upper center of the board.

**Note:** The indicators may be blocked by the PCI adapter cards.

Can you see all 5 power indicators?

**YES NO**

- ↓ Do the following:
- Set the EPO switch to Off.
  - Remove the PCI cards in slots 1 to 5.
  - Set the EPO switch to On and wait 2 minutes.

Continue on step 12.

To access the PCI adapter cards:

- Open both front and rear door of frame.
- Remove the left (viewed from the front of the machine) side cover by pulling the top of the side cover away from the machine until the posts on the cover are fully disengaged from the holes in the side. The adapter cards are accessed through the side opening.

To remove the PCI cards, refer to the removal/replacement procedures for the adapter type you are removing. (Refer to Chapter 8, "Removal and Replacement Procedures" on page 141.).

---

**12**

Are all 5 power indicators on?

**YES NO**

- ↓ Exchange the following FRUs:
- PCI cage.
  - - OR -
  - Midplane board.

When complete, continue on step 59.

For removal replacement instructions, refer to:

- "Adapter I/O Cage Assembly Removal and Replacement" on page 162
- - OR -
- "Midplane Removal and Replacement" on page 163

To verify the repair, press **PWR RESET** on the OCA. Correct operation is indicated by the following indicators for both OCAs:

- **PWR IN** on
- **PWR OUT** on
- **All others off**

## Power Failures

### 13

Exchange the following FRUs:

- Display cable
- - OR -
- IOSP card (slot 18 in the PCI cage)
- - OR -
- Display unit
- - OR -
- PCI Cage

When complete, continue on step 59.

---

For exchange instructions, refer to Chapter 8, "Removal and Replacement Procedures" on page 141.

To verify the repair, press **PWR RESET** on the OCA. Correct operation is indicated by the following indicators for both OCAs:

- **PWR IN** on
- **PWR OUT** on
- **All** others off

### 14

Check the amber fault (FLT) indicators for both OCAs

Does either OCA have a fault indicator on?

**NO YES**

↓ Go to step 20.

---

The fault indicators are:

- OCA FLT
- LOAD FLT
- OT FLT
- AMD FLT
- IBF FLT

### 15

Check the EPO card assembly.

Is the Room EPO cable plugged into the connector on this card?

**NO YES**

↓ Go to step 18.

---

### 16

Is the red plunger switch set to **Bypass** (toward the connector)?

**YES NO**

↓ Set the switch to **Bypass** as follows:

- Pull out the red knob and hold it out.
- Move the switch down and release the knob.

Continue on step 59.

---

## 17

Exchange the following FRUs:

- EPO card assembly
- -OR -
- Midplane board
- -OR -
- **Both OCAs**

When complete, go to step 59 to verify the repair.

For FRU exchange procedures, refer to Chapter 8, "Removal and Replacement Procedures" on page 141

To verify the repair, press **PWR RESET** on the OCA. Correct operation is indicated by the following indicators for both OCAs:

- **PWR IN** on
- **PWR OUT** on
- **All others off**

## 18

- Unplug the room EPO cable from the EPO card.
- Put the red switch in the **Bypass** position. (Pull up on the knob and hold it, then move the switch down toward the connector.)
- Wait at least 2 minutes.

Is power restored (the **Power Out** indicator on) and the machine booting up?

**NO YES**

↓ Have the customer repair the room EPO.

**End of procedure**

## 19

Exchange the following FRUs:

- EPO card assembly
- -OR -
- Midplane board
- -OR -
- **Both OCAs**

When complete, go to step 59 to verify the repair.

For FRU exchange procedures, refer to Chapter 8, "Removal and Replacement Procedures" on page 141

To verify the repair, press **PWR RESET** on the OCA. Correct operation is indicated by the following indicators for both OCAs:

- **PWR IN** on
- **PWR OUT** on
- **All others off**

## 20

Check the **LOAD FLT** indicator for both OCAs

Does **either** OCA have this indicator on?

**NO YES**

↓ There is a short circuit which must be isolated. Go to "Over Current Isolation" on page 190.

For a description of the indicators, refer to "OCA LED Descriptions" on page 203.

## Power Failures

---

21

Check the **OT FLT** indicator for both OCAs.

Do **both** OCAs have this indicator on?

**YES NO**

↓ Go to step 24.

---

22

Check the air inlets to the OCAs and around the system to ensure that air flow is not blocked.

Is the air flow blocked?

**NO YES**

↓ Correct the problem, When complete, go to step 59.

---

23

A high temperature in the room caused the system to prevent damage by shutting down.

Notify the customer of the problem. When the problem is resolved, continue on step 59.

---

24

For any OCA with the **OCA FLT** indicator on, exchange the following:

- OCA

When complete, continue on step 59.

---

For exchange procedures, refer to "OCA (Offline Converter Assembly) Removal and Replacement" on page 156.

25

Is the System Power Status window displayed (on the system display)?

**YES NO**

↓ Open the System Power Status window by double-clicking on the icon.

When the System Power Status window displays, continue on step 26.

---

26

On the System Power Status window:

- Select **Service Mode** from the menu bar.
- Select **Enter Service Mode Password** from the pull-down.
- Type **PEMODE** and press **Enter**

Check the System Power Status window for the state of SBC-OCA communications for both OCAs.

Is **SBC-OCA COMM** set to **BAD** for either OCA?

**YES NO**

↓

Continue on step 45.

---

This procedure sets service mode on and displays the Power/Thermal Service Console on the system display.

27

Check the System Power Status window for the state of SBC-OCA communications for both OCAs.

Is **SBC-OCA COMM** set to **BAD** for one OCA and to **GOOD** for the other OCA?

**NO YES**

↓

Continue on step 32.

---

28

Check Y-cable between the OCAs and the RS422 card where it plugs into the front of the PCI Cage (Slot 2).

Is the cable plugged at both ends and without damage?

**YES NO**

↓

Correct the problem by plugging or exchanging the cable. When complete, continue on step 59.

---

## Power Failures

29

Do the following:

This procedure restarts the power status program.

- Select **Exit** on the Power/Thermal Service Console window.
- Select **Quit System Power Status**
- Wait 15 seconds.
- Open an OS/2 window.
- On the command line type: **cd/P390**, then press **Enter**.
- On the command line type: **awsadpup**, then press **Enter**.
- Wait 1 minute.

Does the System Power Status icon go yellow and the System Power Status window open?

**YES NO**

- ↓ You corrected a software error by restarting the power status program.

**End of procedure**

---

30

Do the following:

This procedure does a system power-on reset.

- Press the **SBC Reset** button on the EPO card assembly.
- Wait for OS/2 to boot.
- After the System Power Status icon displays, wait one minute.

Does the System Power Status icon go yellow and the System Power Status window open?

**YES NO**

- ↓ You corrected a software problem by restarting the power status program.

**End of procedure**

---

## 31

Exchange the following FRUs one at a time:

- RS422 card (Slot 2)
- - OR -
- IOSP card (Slot 18)
- - OR -
- PCI cage

When complete, go to step 59.

For FRU exchange procedures, refer to Chapter 8, "Removal and Replacement Procedures" on page 141.

To verify the repair, press **PWR RESET** on the OCA. Correct operation is indicated by the following indicators for both OCAs:

- **PWR IN** on
- **PWR OUT** on
- **All others off**

## 32

In the lower part of the System Power Status window, check the last message posted for the OCA which has bad communications to the IOSP card.

Does the message say **SBC-OCA communications error (OCA timeout)**?

**YES NO**

↓ Go back to step 29.

## 33

For the OCA indicating SBC-OCA communication as BAD, check the indicator labelled **OCA FLT.**

Is the indicator off?

**YES NO**

↓ Exchange the following FRU:

- OCA

When complete, continue on step 59.

For exchange instructions, refer to "OCA (Offline Converter Assembly) Removal and Replacement" on page 156.

The indicator is on the OCA front panel.

## Power Failures

### 34

For the OCA indicating SBC-OCA communication as BAD, check the following:

- The AC line cord is plugged into the OCA and has no sign of damage.
- The SBC-OCA communication cable is plugged at J4 of the OCA and has no sign of damage.
- The switch labelled **PWR** is set to the **NORM** position.
- The switch labelled **EPO BYPASS** is set to the **NORM** position.

Are all of the conditions true?

**YES NO**

- ↓ Correct any problems found.  
When complete, go to step 59.

---

### 35

For the OCA indicating SBC-OCA communication as BAD, check the indicator labelled **PWR IN**.

Is the indicator on?

**NO YES**

- ↓ Go to step 40.

---

### 36

Customer power to the OCA is missing. Check the customer's circuit breaker (see **Note**).

Can the circuit breaker be reset without tripping?

**YES NO**

- ↓ For the OCA with the fault, exchange the following FRUs:
  - OCA
  - - OR -
  - Line cord

When complete, go to step 59.

**Note:** If the customer circuit breaker is tripped:

The IBM system must be on a dedicated circuit to avoid potential problems. If other equipment is connected it may have a fault or the total current required is greater than the circuit breaker rating.

Have any other equipment removed before the circuit breaker is reset.

For FRU exchange procedures, refer to Chapter 8, "Removal and Replacement Procedures" on page 141.

To verify the repair, press **PWR RESET** on the OCA. Correct operation is indicated by the following indicators for both OCAs:

- **PWR IN** on
- **PWR OUT** on
- **All** others off

37

Check the indicators labelled **PWR IN** and **PWR OUT** on the OCA.

For exchange instructions, refer to "OCA (Offline Converter Assembly) Removal and Replacement" on page 156.

Are both of the indicators on?

**YES NO**

↓ Exchange the following:

- OCA

When complete, go to step 59.

---

38

Was any other equipment removed before the breaker was reset?

For exchange instructions, refer to "OCA (Offline Converter Assembly) Removal and Replacement" on page 156.

**YES NO**

↓ Exchange the following:

- OCA

When complete, go to step 59.

---

39

The problem was due to the other equipment sharing the circuit.

**End of procedure**

---

40

Check the **PWR OUT** indicator for the OCA showing SBC-OCA communications as BAD.

For a description of the indicators, refer to "OCA LED Descriptions" on page 203.

Is this indicator on?

**YES NO**

↓ Go to step 43.

---

## Power Failures

### 41

- On the System Power Status window select **Utilities**.
- Select **Suspend Polling** and wait one minute.
- Swap the cables plugged to the J4 connectors between OCA-1 and OCA-2.
- Select **Resume Polling** and wait one minute.

For exchange instructions, refer to "OCA (Offline Converter Assembly) Removal and Replacement" on page 156.

Did the communication problem move to the other OCA?

**YES NO**

↓ Exchange the following:

- OCA

When complete, go to step 59.

---

### 42

Exchange the following FRUs:

- SBC-OCA communications Y-cable.
- - OR -
- RS422 card (Slot 2)
- - OR -
- IOSP card (Slot 18)
- - OR -
- PCI cage

For exchange instructions, refer to Chapter 8, "Removal and Replacement Procedures" on page 141.

To verify the repair, press **PWR RESET** on the OCA. Correct operation is indicated by the following indicators for both OCAs:

- **PWR IN** on
- **PWR OUT** on
- **All others off**

When complete, go to step 59.

---

### 43

Check the circuit breaker on the IBF connected to this OCA.

For exchange instructions, refer to Chapter 8, "Removal and Replacement Procedures" on page 141.

Is this circuit breaker tripped?

To verify the repair, press **PWR RESET** on the OCA. Correct operation is indicated by the following indicators for both OCAs:

**YES NO**

↓ Exchange the following:

- OCA
- - OR -
- EPO card assembly
- - OR -
- Midplane board

- **PWR IN** on
- **PWR OUT** on
- **All others off**

When complete, go to step 59.

---

## 44

Exchange the following:

- OCA and IBF and IBF cable

When complete, go to step 59.

For exchange instructions, refer to Chapter 8, "Removal and Replacement Procedures" on page 141.

## 45

On the System Power Status window check the image for the **UEPO BYPASS** switch for OCA-1 and OCA-2.

Does the switch icon display **NORM** (Green) for both OCAs?

**YES NO**

- ↓ For any OCA which shows the UEPO Bypass switch in the SVC (amber) position, go to the front panel of the OCA and set this switch to the **NORM** position.

When complete, go to step 59.

**Note:** For the rest of this procedure the term "image" refers to the value of the indicator displayed in the System Power Status window.

## 46

On the System Power Status window, check the image of the **OCA FLT** indicator for each OCA.

Is this indicator off for both OCAs?

**YES NO**

- ↓ For any OCA with the **OCA FLT** image on, exchange the following:
- OCA

When complete, go to step 59.

For a description of the indicators, refer to "OCA LED Descriptions" on page 203.

## 47

On the System Power Status window, check the image of the **AMD FLT** indicator for each OCA.

Is this indicator off for both OCAs?

**NO YES**

- ↓ Go to step 50.

For a description of the indicators, refer to "OCA LED Descriptions" on page 203.

## Power Failures

48

For any OCA with the image of the **AMD FLT** indicator on, check the cable connecting the OCA with the AMD.

Is this cable plugged at both ends and without damage?

**YES NO**

- ↓ Correct the problem by plugging or exchanging the cable. When complete, go to step 59.
- 

For a description of the indicators, refer to "OCA LED Descriptions" on page 203.

49

For the OCA with the **AMD FLT** indicator image on, exchange the following:

- MDA
- - OR -
- MSA
- - OR -
- OCA
- - OR -
- MDA cable

When complete, go to step 59.

---

For FRU exchange procedures, refer to Chapter 8, "Removal and Replacement Procedures" on page 141.

To verify the repair, press **PWR RESET** on the OCA. Correct operation is indicated by the following indicators for both OCAs:

- **PWR IN** on
  - **PWR OUT** on
  - **All others** off
- 

50

On the System Power Status window, check the image of the **IBF FLT** indicator for each OCA.

Is this indicator off for both OCAs?

**NO YES**

- ↓ Go to step 55.
- 

For a description of the indicators, refer to "OCA LED Descriptions" on page 203.

51

For any OCA with the image of the **IBF FLT** indicator on, check the cable connecting the OCA with the IBF.

Is this cable plugged at both ends and without damage?

**YES NO**

- ↓ Correct the problem by plugging or exchanging the cable. When complete, go to step 59.

For a description of the indicators, refer to "OCA LED Descriptions" on page 203.

---

**52**

For any OCA with the image of the **IBF FLT** indicator on, check the circuit breaker on the IBF associated with the OCA.

Is the circuit breaker tripped?

**YES NO**

↓ For the OCA with the **IBF FLT** on, exchange the following:

- IBF
- - OR -
- OCA
- - OR -
- IBF cable

When complete, go to step 59.

For FRU exchange procedures, refer to Chapter 8, "Removal and Replacement Procedures" on page 141.

To verify the repair, press **PWR RESET** on the OCA. Correct operation is indicated by the following indicators for both OCAs:

- **PWR IN** on
- **PWR OUT** on
- **All** others off

---

**53**

Set the circuit breaker to the On position and wait 10 seconds.

Did the circuit breaker trip?

**YES NO**

↓ Go to step 59.

---

**54**

Exchange the following:

- IBF

When complete, go to step 59.

For exchange instructions, refer to "IBF (Integrated Battery Feature) Removal and Replacement" on page 160.

---

**55**

On the System Power Status window, check the image of the **LOAD FLT** indicator for each OCA.

Is this indicator off for both OCAs?

**YES NO**

↓ There is a short circuit that must be isolated. Go to "Over Current Isolation" on page 190.

For a description of the indicators, refer to "OCA LED Descriptions" on page 203.

## Power Failures

56

On the System Power Status window, check the image of the **OT FLT** indicator for each OCA.

For a description of the indicators, refer to "OCA LED Descriptions" on page 203.

Is this indicator off for both OCAs?

**NO YES**

↓ Go to step 59.

---

57

For any OCA with the image of the **OT FLT** indicator on, check the cooling air flow to the OCA.

For a description of the indicators, refer to "OCA LED Descriptions" on page 203.

Is the air flow to the OCA obstructed?

**NO YES**

↓ Correct the problem by clearing the obstruction. When complete, go to step 59.

---

58

For the OCA with the **OT FLT** indication, exchange the following:

- OCA

When complete, go to step 59.

---

## 59 Checkout procedure

This step is the final checkout procedure after you exchange FRUs or correct a fault condition.

**Note:** If you go through this procedure more than two times without resolving the problem, call for assistance.

To verify the repair:

- Press **PWR RESET** on any OCA with indicators NOT in the following condition:
  - **PWR IN** on
  - **PWR OUT** on
  - **All** others off
- Wait two minutes and check for the following correct condition of the indicators:
  - **PWR IN** on
  - **PWR OUT** on
  - **All** others off

If the indicators are not correct, go back to the beginning of this procedure. (See **Note**).

If the indicators are correct, do the following:

- Ensure that all parts you removed have been replaced and all cables you removed are now plugged correctly.
- On the System Power Status window, select **Service Mode** then select **Exit Service Mode**.
- The call is complete.

**End of procedure.**

---

---

### Over Current Isolation

You are here because:

- An overcurrent condition has occurred on an output of one or both OCAs.
- You have been directed here by another Map (Map120).

This problem can be caused by any of the following:

- Any defective Off Line Converter (OCA).
- Any defective logic card.
- Any defective media device.
- Any defective logic board.
- Defective EPO Card Assembly.
- Any defective cable connecting the SBC card to the bidi Board.
- Defective cable connecting Floppy Drive to EPO Card Assembly.

#### DANGER

**Service of any subassemblies under power outside of their machine frame mounts is strictly prohibited.**

1

Check the indicators labelled **LOAD FLT** on both OCAs

Are the LOAD FLT indicators ON for BOTH OCAs?

**NO YES**

↓

Go to step 4.

---

2

On the OCA with the LOAD FLT **off**:

- Check the green indicator labelled **PWR OUT**.

Is the PWR OUT indicator on?

**YES NO**

↓

For the OCA with the LOAD FLT indicator **OFF**, exchange the following FRU:

- OCA

When complete, continue on step 37.

For exchange procedures, see "OCA (Offline Converter Assembly) Removal and Replacement" on page 156.

3

For the OCA that has the LOAD FLT indicator **ON**, exchange the following FRU:

- OCA

For exchange procedures, see "OCA (Offline Converter Assembly) Removal and Replacement" on page 156.

When complete, continue on step 37.

---

4

- Set the EPO switch on the front of the machine to the off (down) position. Wait 10 seconds.
- Set the EPO switch back to the on position. Wait 2 minutes.

Did the OCA indicators labelled LOAD FLT go **ON** again?

**YES NO**

↓

A short circuit has cleared and is no longer present on the machine. A defective FRU may indicate a logic fault. Wait for the display panel to boot and check for errors. Otherwise, call for assistance.

**End of procedure**

---

5

- Unfasten the PCI cage from the frame and back the cage out about 7.5 mm (3 in.). Do not unplug completely or remove any cables at this point.
- Push the button labelled PWR RESET on **BOTH** OCAs
- Wait 2 minutes.

For cage removal procedure, refer to "Adapter I/O Cage Assembly Removal and Replacement" on page 162.

Is the fault cleared (LOAD FLT indicator **OFF** for both OCAs)?

**YES NO**

↓

Continue on step 18.

---

## Over Current Isolation

6

The fault is in the PCI cage and must be isolated.

- Set the EPO switch to Off.
- Reinstall the PCI cage.

Continue on step 7.

---

For cage replacement procedure, refer to "Adapter I/O Cage Assembly Removal and Replacement" on page 162.

7

- Start at uppermost card of the cards in the working set (see **Note**) which are still plugged and work down.
- Unplug half of the cards still plugged in the working set. If the number of cards is odd, unplug the next integer number up. (E.G. if the number in the working set is 21, unplug 11 cards. If the number in the working set is 1, unplug 1 card)
- Set the EPO switch to On and wait 2 minutes.

Continue on step 8.

---

For card removal/replacement procedures, refer to Chapter 8, "Removal and Replacement Procedures" on page 141 and locate the procedure for the card type you are working with.

**Note:** THE WORKING SET OF CARDS IS DEFINED AS THE CARDS WHICH CAN CONTAIN THE FAULT. THE INITIAL WORKING SET IS COMPOSED OF ALL THE CARDS IN THE PCI CAGE.

THE WORKING SET WILL CHANGE AS CARDS ARE UNPLUGGED AND PLUGGED DURING THIS ISOLATION.

---

8

Did the error occur again (LOAD FLT indicators for the OCAs go **On**)?

**NO YES**

↓

Continue on step 15.

---

9

The cards (or card) you just unplugged has the defect.

**Note:** This group of cards is the new working set.

Did the last group of cards you unplugged consist of **MORE THAN ONE** card?

**YES NO**

↓

The last PCI card you unplugged is the defective FRU.

Exchange the following FRU:

- the PCI card

Continue at step 37.

---

For card removal/replacement procedures, refer to Chapter 8, "Removal and Replacement Procedures" on page 141 and locate the procedure for the card type you are working with.

---

**10**

- Set the EPO switch to Off.
- Start at uppermost card in the working set and work down.
- Plug half of the cards in the working set which are still unplugged. If the number of cards is odd, plug the next higher number. (Example: if the number in the working set is 11, then plug 6 cards. If the number in the working set is 1, plug 1 card)
- Set the EPO switch to On and wait 2 minutes.

For card removal/replacement procedures, refer to Chapter 8, "Removal and Replacement Procedures" on page 141 and locate the procedure for the card type you are working with.

Does the error occur again (LOAD FLT indicators for the OCAs go on)?

**NO YES**

↓

Go to step 13.

---

**11**

Is the number of cards left unplugged in the working set equal to 1?

**YES NO**

↓

Go back to step 10.

---

**12**

The single PCI card left in the working set which is still unplugged is the defective FRU.

Exchange the following FRU:

- the PCI card

Continue on step 37.

---

For card removal/replacement procedures, refer to Chapter 8, "Removal and Replacement Procedures" on page 141 and locate the procedure for the card type you are working with.

## Over Current Isolation

13

The group of cards you just plugged contains the defective FRU.

**NOTE: THIS GROUP OF CARDS IS THE NEW WORKING SET.**

Is the number of cards you just plugged in greater than one?

**NO YES**

↓

Go back to step 7.

---

14

The last PCI card that you plugged in is the defective FRU.

Exchange the following FRU:

- the PCI card

When complete, continue at step 37.

---

For card removal/replacement procedures, refer to Chapter 8, "Removal and Replacement Procedures" on page 141 and locate the procedure for the card type you are working with.

15

Have all the cards in the last defined Working Set been unplugged?

**YES NO**

↓

Set the EPO switch to Off and go back to step 7.

---

16

- Unplug the three cables from the Bidi board which plug into the SBC card (slot 17).
- Push the button labelled PWR RESET on **BOTH** OCAs
- Wait 2 minutes.

Is the fault cleared (LOAD FLT indicator on both OCAs off)?

**YES NO**

↓

Exchange the following FRU:

- the PCI cage

Continue at step 37.

---

**17**

Exchange the following FRUs:

- the three cables just unplugged.

Continue at step 37.

---

**18**

- Set the EPO switch to Off.
- Plug the PCI cage back in and fasten
- Unplug OCA1 and draw the OCA away from the cage approximately 7.5 mm (3 in.). Do not unplug any cables from the OCA at this point. (See the removal procedure for the OCA).
- EPO ON the machine and wait 2 minutes.

For cage instructions, refer to "Adapter I/O Cage Assembly Removal and Replacement" on page 162.

For OCA instructions, refer to "OCA (Offline Converter Assembly) Removal and Replacement" on page 156.

Is the LOAD FLT indicator for **OCA2** on?

**YES NO**

↓

The OCA that you unplugged is the defective FRU.

Exchange the following FRU:

- OCA1

Continue at step 37.

---

**19**

- Set the EPO switch to Off.
- Plug OCA1 back in and fasten
- Unplug OCA2 and draw the OCA away from the cage approximately 7.5 mm (3 in.). Do not unplug any cables from the OCA at this point.
- Set the EPO switch to On and wait 2 minutes.

For OCA instructions, refer to "OCA (Offline Converter Assembly) Removal and Replacement" on page 156.

Is the LOAD FLT indicator for **OCA1** on?

**YES NO**

↓

The OCA that you unplugged is the defective FRU.

Exchange the following FRU:

- OCA2

Continue at step 37.

---

## Over Current Isolation

20

- Set the EPO switch to Off.
- Plug OCA2 back in and fasten.

For OCA instructions, refer to "OCA (Offline Converter Assembly) Removal and Replacement" on page 156.

Does this machine contain a Processor/Memory Book next to OCA2?

YES NO

↓

Continue at step 23.

---

21

- Unplug PU book and draw it away from the cage approximately 7.5 mm (3 in.). Do not unplug any cables from the PU book at this time.
- Set the EPO switch to On and wait 2 minutes.

Are the LOAD FLT indicators for the OCAs on?

YES NO

↓

Exchange the following FRU:

- PU/Memory Book

Continue at step 37.

---

22

- Set the EPO switch to Off.
- Plug the PU/MEMORY Book back in and fasten.

Continue at step 23.

---

## 23

- Unplug the leftmost SSA extender card not yet checked. These cards are located in Row 0 on the front side. Pull out approximately 7.5 mm (3 in.). Do not unplug any cables from the SSA card at this time.
- Set the EPO switch to On and wait 2 minutes.

For instructions, refer to "Extender Card (SSA Loop) Removal and Replacement" on page 151.

Are the LOAD FLT indicators for the OCAs on?

**YES NO**

↓

The SSA card that you unplugged is the defective FRU.

Exchange the following FRU:

- SSA Extender card

Continue at step 37.

---

## 24

- Set the EPO switch to Off.
- Plug the SSA card back in and fasten.

For instructions, refer to "Extender Card (SSA Loop) Removal and Replacement" on page 151.

Are there any more SSA Extender Cards (Adapter Cards) to check?

**NO YES**

↓

Go back to step 23.

---

## 25

- Unplug lowest CDROM drive not yet checked (these devices are located in column 5 on the front side) and draw it away from the cage approximately 7.5 mm (3 in.).
- Set the EPO to On and wait 2 minutes.

For instructions, refer to "CDROM Drive Removal and Replacement" on page 154.

Are the LOAD FLT indicators for the OCAs on?

**YES NO**

↓

The CDROM Drive that you unplugged is the defective FRU.

Exchange the following FRU:

- CDROM drive

Continue at step 37.

---

## Over Current Isolation

26

- Set the EPO switch to Off.
- Plug the CDROM drive back in and fasten

For instructions, refer to "CDROM Drive Removal and Replacement" on page 154.

Are there any more CDROM Drives to check?

**NO YES**

↓

Go back to step 25.

---

27

- Unplug lowest Tape Drive not yet checked (these devices are located in column 4 on the front side) and draw it away from the cage approximately 7.5 mm (3 in.). (See the removal procedure for this device).
- Set the EPO switch to On and wait 2 minutes..

For instructions, refer to "4MM DAT Tape Drive Removal and Replacement" on page 154.

Are the LOAD FLT indicators for the OCAs on?

**YES NO**

↓ The Tape Drive that you unplugged is the defective FRU.

Exchange the following FRU:

- Tape Drive

Continue at step 37.

---

28

- Set the EPO switch to Off.
- Plug the tape drive back in and fasten.

For instructions, refer to "4MM DAT Tape Drive Removal and Replacement" on page 154.

Are there any more tape drives to check?

**NO YES**

↓

Go back to step 27.

---

29

- Unplug the floppy drive and remove it from the EPO card assembly.
- Set the EPO switch to On and wait 2 minutes.

For instructions, refer to “Diskette Drive Removal and Replacement” on page 154.

Are the LOAD FLT indicators for the OCAs on?

**YES NO**

↓

Exchange the following FRU:

- Floppy Drive.

Continue at step 37.

---

30

- Set the EPO switch to Off.
- Unplug all HDDs from the leftmost column of HDDs not yet checked. (This will start at column 0, hard drive group 0). Pull them from the cage approximately 7.5 mm (3 in.). (See the removal procedure for this device).

For instructions, refer to “Disk Drive Assembly (HDA) Removal and Replacement” on page 164.

**Note:** THE COLUMN OF DASDs UNPLUGGED IS THE **CURRENT COLUMN**

- Set the EPO switch to On and wait 2 minutes.

Are the LOAD FLT indicators for the OCAs on?

**NO YES**

↓

Continue at step 33.

---

31

- Plug in the uppermost HDD still unplugged in the **CURRENT COLUMN**
- Wait 30 seconds.

For instructions, refer to “Disk Drive Assembly (HDA) Removal and Replacement” on page 164.

Are the LOAD FLT indicators for the OCAs on?

**YES NO**

↓

Repeat this step until the LOAD FLT indicator comes on to identify the failing HDD.

---

## Over Current Isolation

32

The HDD that you just plugged is the defective FRU.

For instructions, refer to "Disk Drive Assembly (HDA) Removal and Replacement" on page 164.

Exchange the following FRU:

- HDD

Continue at step 37.

---

33

Have all columns of HDDs been checked?

**YES NO**

↓

Go back to step 30.

---

34

- Place the switches labelled **UEPO BYPASS** on **BOTH** OCAs to the **SVC** position.
- Unplug the EPO card and draw it away approximately 7.5 mm (3 in.). The switch bracket must be removed to do this. See the removal procedure for the EPO card.
- Push the button labelled **PWR RESET** on **BOTH** OCAs
- Wait 2 minutes.

For the EPO assembly, refer to "EPO (Emergency Power Off) Removal and Replacement" on page 161.

For the midplane assembly, refer to "Midplane Removal and Replacement" on page 163.

Are the **LOAD FLT** indicators for the OCAs on?

**NO YES**

↓

Exchange the following FRU:

- Midplane Board

Continue at step 37.

---

35

- Place the switches labelled **UEPO BYPASS** on **BOTH** OCAs to the **NORM** position.
- Remove the flex cable that connects the Floppy drive to the EPO card from the EPO card.
- Plug the EPO card in. Do not replace the EPO switch bracket at this time.
- Set the EPO switch to On.
- Wait 2 minutes.

For the EPO assembly, refer to "EPO (Emergency Power Off) Removal and Replacement" on page 161.

Are the LOAD FLT indicators for the OCAs on?

**YES NO**



Exchange the following FRU:

- Flex Cable just removed from EPO card assembly.

Continue at step 37.

---

36

Exchange the following FRU:

- EPO Card Assembly

Continue at step 37.

For the EPO assembly, refer to "EPO (Emergency Power Off) Removal and Replacement" on page 161.

## Over Current Isolation

---

37

This step is the final checkout procedure. You have replaced parts or corrected a fault condition. Do the following:

- Set the EPO switch to Off.
- Any FRUs that were left unplugged or parts left removed during this isolation must be re-installed before proceeding.
- The switches labelled PWR and UEPO BYPASS must BOTH be in the NORM position on BOTH OCAs.
- Set the EPO switch to On and wait 2 minutes.

The indicators on both OCAs must be as follows:  
**'PWR IN' and PWR OUT** are on, all others are off.

- If the indicators are not correct, you have a different power problem, go to "Power Failures" on page 172.
  - If the indicators are correct: **procedure is complete.**
-

## Diagram of the OCA

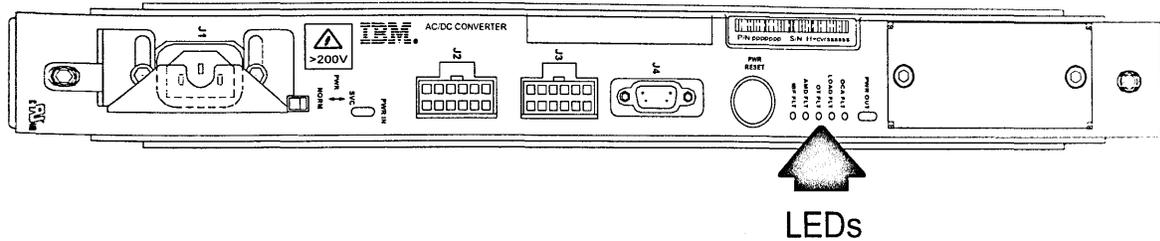


Figure 38. OCA diagram front view

## OCA Location

The OCAs are two in number and are plugged into the extreme left of the rear side of the System 390 Integrated Server frame.

## OCA LED Descriptions

The OCA has 7 indicators

- PWR IN (GREEN)- indicating AC voltage present
- PWR OUT (GREEN)- indicates that all voltages are sensed and all levels enables.
- OCA FLT (ORANGE)- OCA fault sensed on OCA.
- LOAD FLT (ORANGE)- OC present on any level.
- OT FLT (ORANGE)- Any thermostat over temperature sensed on OCA.
- AMD FLT (ORANGE)- Any AMD fault sensed either on the MDA or the OCA.
- IBF FLT (ORANGE)- Any battery fault.

## OCA Switch Descriptions

The OCA has 3 switches.

- PWR Switch (Slide)
  - SVC position turns off the OCA. It also turns off the voltage to the MDA and opens the IBF contactor to those FRUs connected to that OCA.
  - NORM position turns on the OCA and activates MDA voltage and the IBF contactor.
- UEPO BYPASS Switch (Slide)
  - SVC position disables the front panel EPO. The OCA can still be disabled with the PWR switch placed in SVC mode. The SVC position permits concurrent replacement of the EPO card assembly.
  - NORM position is the position for normal system operation. EPO is enabled.
- PWR RESET Switch (Pushbutton)
  - Momentary actuation by pushing the switch in will cause the OCA code to reset. This will clear fault lights when the cause of the fault is removed or regenerate the fault light when the fault is still present.

## Diagram of the MDA

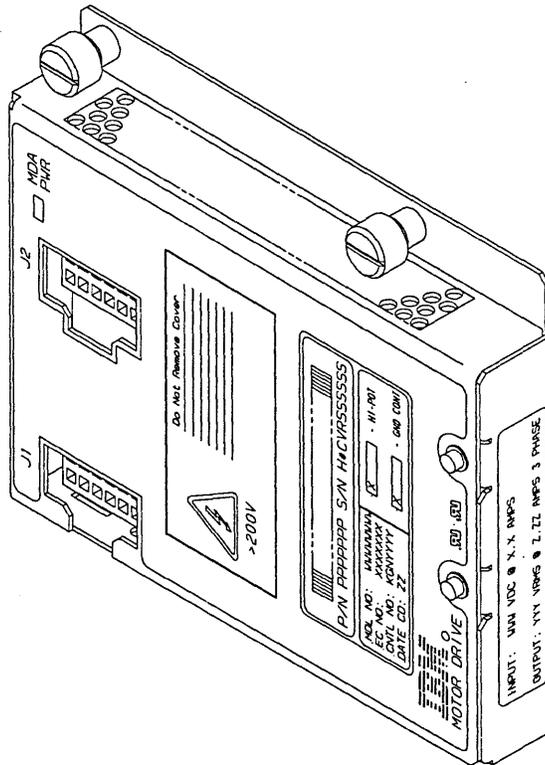


Figure 39. MDA diagram

## General Thermal FRU Terminology

**Air Moving Enclosure (AME)** The sheet metal housing containing the blowers, recirculation flaps, ducts, etc.

**Air Moving Device (AMD)** The combination of the Motor Scroll Assembly and Motor Drive Assembly (See below). It slides as a unit into a slot in the AME.

**Motor Scroll Assembly (MSA)** A sheet metal housing containing blower impeller and motor. The MSA is a FRU.

**Motor Drive Assembly (MDA)** A sheet metal assembly containing the motor drive circuits. It mounts on the face of the MSA. The MDA is a FRU.

## MSA/MDA Locations

The MSAs are two in number and located in the AME in the lower rear of the System 390 Integrated Server frame. The MDAs are mounted on the face of each MSA and are separately removable without removing the MSA.

## MDA/MSA LED Descriptions

The MDA has one LED.

- PWR (GREEN) indicates 400V present on the MDA input.

---

## Diagram of the IBF

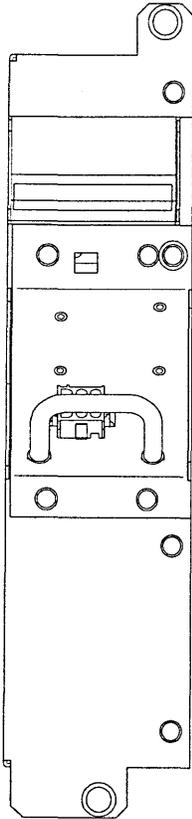


Figure 40. Front diagram of the IBF

## Internal Battery Feature (IBF)

The IBF feature is capable of delivering 5kw of power. The IBF enables between 3 and 20 minutes of full power holdup. Hold up time is configuration dependent. The IBF is self-testing and is integrated into the machine diagnostics.

## IBF Locations

The IBFs are located in the front side of the System 390 Integrated Server frame to the left of the HDD array. There is space for two units, and there can be 0, 1 or 2 units installed. If 1 unit is installed, it will be the top unit (IBF1). The bottom unit is IBF2.

## IBF LED Description

The IBF has one LED.

- BATTERY ENBLD (GREEN) indicates that the IBF contact has been actuated.

## Integrated Battery Feature

### IBF Switch Descriptions

The IBF has one switch.

- Circuit Breaker

Disconnects the battery voltage from the cable connector on the IBF unit.

## Diagram of the EPO Card

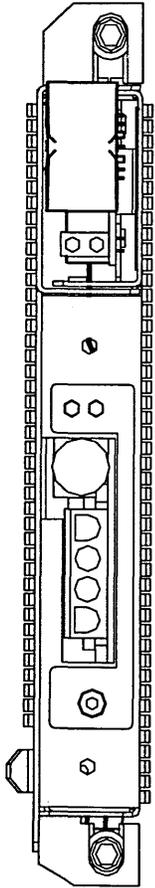


Figure 41. Front Diagram of the EPO Card

### Machine Emergency Power Off (EPO)

There is an emergency power off switch on the front of the frame. When activated, the system EPO switch will immediately disconnect utility and battery power from the machine functional unit. Utility power is confined to the machine power compartment. All volatile data will be lost.

**Computer Room Emergency Power Off (EPO):** When the internal battery backup feature is installed and the room EPO is activated the batteries will engage and the computer will continue to run. It is possible to attach the computer room EPO system to the machine EPO. When this is done, activating the room EPO will disconnect all power from the line cords and internal battery backup unit. In this event, all volatile data will be lost.

To incorporate the IBF into the room Emergency Power Off systems (EPO) a cable must be made to connect to the front of the system EPO panel. The following diagram illustrates how this connection is made.

## Emergency Power Off

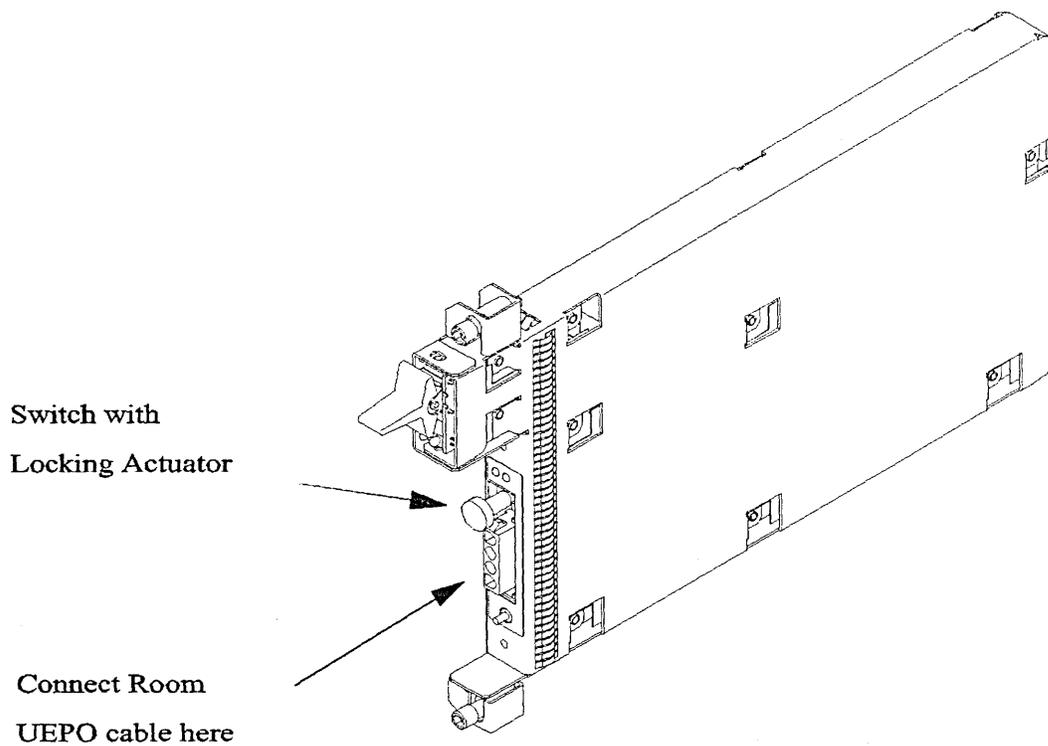
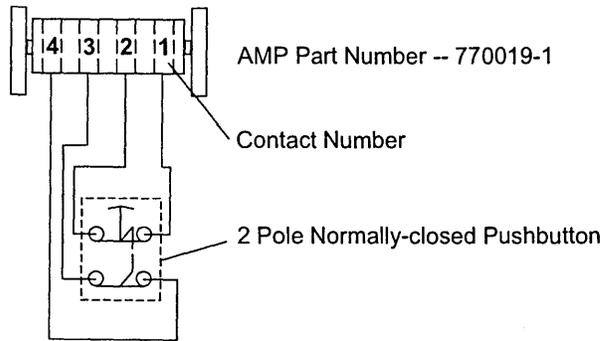


Figure 42. View of the System EPO Panel

This figure illustrates the front of the machine EPO panel with the connector for the room EPO cable. Notice the switch actuator. Once moved to make the cable connection possible the room EPO cable must be installed for the machine to power on.



Room UEPO Switch Schematic

Figure 43. Customer-Supplied EPO Cable Wiring Diagram

In this figure an AMP connector 350779-1 is needed to connect to the system EPO panel. For room EPO cables using wire sizes #20 AWG to #24 AWG use AMP pins part number 770010-4.

## EPO Card Location

The EPO Card is located in the right front of the frame. It contains the emergency power off switch.

## EPO LED Descriptions

The EPO Card has 2 LEDs

- 5V STBY (GREEN) indicates the presence of standby voltage.
- DEVICE ACTIVITY (YELLOW) indicates activity to the SEEPROM. May blink when frame needs service.

**EPO Switch Description:** The EPO Card has 3 switches.

- Main Switch (Rocker)
 

Removes power from all FRUs if placed in the off (down) position when the UEPO BYPASS switches on both OCAs are in the NORM position.
- ROOM EPO BYPASS Switch (Rocker with pull out interlock)
 

ACTIVE position is used when a room EPO cable is installed. This cable ties the machine EPO into the room EPO. The cable can be plugged only if the switch is in the ACTIVE position.

BYPASS position must be used when there is no room EPO cable installed.
- RESET IOSP Switch (Pushbutton)
 

Momentary actuation by pushing the switch down resets the I/O and Service Processor.

## Power and Cooling Requirements

The S/390 Integrated Server Model B01 requires a total of 4 customer power feeds:

1. Two identical (redundant) feeds for the processor frame enclosure
2. One feed for the display
3. One feed for customer supplied service outlets

All four customer power feeds require standard 100V to 130V or 200V to 240V, 50/60Hz single-phase power.

## Power Enclosure Power Connection

The S/390 Integrated Server Model B01 operates from two fully redundant line cords. The power load is shared equally between the two cords under normal operating conditions. These redundant line cords allow the computer to survive the loss of customer power to either line cord. If power is interrupted to one of the line cords, the other cord will pick-up the entire load and the computer will continue to operate. Therefore each line cord must be wired to support the entire power load of the computer.

The power supplies use active resistive load synthesis. Harmonic distortion of the current waveform is small enough that it need not be considered in planning the installation. The power factor is close to unity.

**Power and Cooling Specifications:** The following tables provide input and heat output for the S/390 Integrated Server Model B01 models.

Figure 44. Power Supply Ranges and Tolerances

Feature	Supply Type	Nominal Voltage Range (V)	Frequency Range (Hz)
Model B01	two redundant single-phase line cords	100-240	50-60

Figure 45. Nominal Power and Cooling Specifications

Model	Feature Code	Line Cords	Total Nominal Input Power (kVA)	Total Nominal Heat Output (kW)	Total Nominal Heat Output (kBTU/hr)	Total Air Flow (m <sup>3</sup> /min)	Total Air Flow (cfm)
B01		2	0.9 - 1.32	0.8 - 2.0	2.7 - 6.8	14.1	500

**Customer Circuit breaker (CB):** It is recommended that a 15 Amp time delayed CB be used for both system power feeds. This does not imply "Motor Start Characteristics". Should a fault occur within the IBM equipment, the system CB will open and not the customer CB. This will improve problem determination in the event of a malfunction.

**Line Physical Protection:** In US installations the line cord must meet National Electric Code (NEC) requirements. When line cords are run on the surface of the floor, they must be protected against physical damage (See NEC 645-5). For other countries, local codes apply.

Feature Code	Country	Length	Plug Fig.	Rating	P/N
2550	US/Can 110V	1800mm/5.9ft	4	13A/125V	31L7061
2551	US/Can 110V	4300mm/14.1ft	4	13A/125V	31L7062
2552	US/Can 220V	1800mm/5.9ft	5	13A/125V	31L7064
2553	US/Can 220V	4300mm/14.1ft	5	13A/125V	31L7065
2554	US/Can 110V	1800mm/5.9ft	Twist-Lock	13A/125V	31L7067
2555	US/Can 110V	4300mm/14.1ft	Twist-Lock	13A/125V	31L7068
2556	US/Can 220V	1800mm/5.9ft	Twist-Lock	13A/125V	31L7070
2557	US/Can 220V	4300mm/14.1ft	Twist-Lock	13A/125V	31L7071
2558	China	4300mm/14.1ft	62	6A/250V	31L7072
2559	Europe	4300mm/14.1ft	18	10A/250V	31L7073
2560	Denmark	4300mm/14.1ft	19	10A/250V	31L7074
2561	Australia	4300mm/14.1ft	6	10A/250V	31L7075
2562	South Africa	4300mm/14.1ft	22	10A/250V	31L7076
2563	United Kingdom	4300mm/14.1ft	23	10A/250V	31L7077
2564	Japan	4300mm/14.1ft	59	15A/125V	31L7078
2565	Switzerland	4300mm/14.1ft	24	10A/250V	31L7079
2566	Italy	4300mm/14.1ft	25	10A/250V	31L7080
2567	Israel	4300mm/14.1ft	32	10A/250V	31L7081
<b>Note:</b>					
1. The machine connector is a IEC 320, C13 In-Line ....					
2. each MFI has a qty. of (2) Power Cords....					

**Grounding Specifications:** Every three-phase circuit must contain three phase conductors and an insulated equipment-grounding conductor. Every single-phase branch circuit must contain two phase conductors and an insulated equipment-grounding conductor.

For 208 V ac through 240 V ac installations in the United States, the equipment-grounding conductor must be identical in size, insulation material, and gauge to the branch circuit phase conductors, except that it must be green with or without one or more yellow stripes on the insulation. For installations outside the United States, the size of the grounding conductor must be in accordance with local codes.

Conduit must not be used as the only grounding means. However, any conduit or cable shield must be connected at both ends in such a way that it is included in the grounding path in parallel with the grounding conductor it contains. Most electrical codes require that branch circuit wiring be located in metallic conduit or be made from shielded cable, if located under a raised floor. Even when not required by local regulations, some form of shield around the branch circuit wiring is strongly recommended as a means of reducing coupling of high-frequency electrical noise into signal and control cables.

See Chapter 5 of *IBM General Information Manual: Installation Manual-Physical Planning*, GC22-7072, for additional recommendations and requirements for equipment grounding.

## Specifications

## Specifications

### Shipping Specifications

Figure 46. Frame Shipping Specifications

Packaging	Width (mm)	Depth (mm)	Height (mm)	Weight (kg)		Width (in)	Depth (in)	Height (in)	Weight (lb)
Machine	521	1,016	800	235 *		20.5	40	31	516 *
Packaged Machine	660	1,067	1,346	251 *		26	42	53	553 *

\* Weight is maximum.

### Service Clearance and Weight Distribution

Under typical conditions, service clearances of adjacent products may be overlapped but weight distribution areas should not be overlapped. If weight distribution clearances are overlapped, the customer should obtain the services of a qualified consultant or structural engineer to determine floor loading.

Using the following table, the customer can estimate the average floor loading with a load shedding distance from 457 mm (18 in.) to 914 mm (36 in.). When an S/390 Integrated Server Model B01 is stored with frames unassembled and no spaces between frames, the floor load rating should be at least 1000 kg/m<sup>2</sup> (200 lb/ft<sup>2</sup>).

Figure 47. Table - Weight Distribution and Floor Loading

Load shedding distance from edge of frame (dimension "a") <sup>1</sup> in Kg/sq m (Lbs/sq ft)	457 mm (18 in.)	533 mm (21 in.)	610 mm (24 in.)	686 mm (27 in.)	762 mm (30 in.)	838 mm (33 in.)	914 mm (36 in.)
Average floor loading Kg/sq m (Lbs/sq ft)	183 (37.5)	173 (35.5)	166 (33.9)	160 (32.7)	153 (31.7)	151 (30.9)	147 (30.2)

**Note:**

- The load shedding distance from the edge of the frame is represented as dimension "a" on the following figure.
  - All measurements are taken from the outside edge of the machine frame (without covers).
  - Service clearances may be overlapped, but weight distribution areas must not overlap weight distribution areas of adjacent units.
  - The dimensions are required for correct weight distribution and servicing. If the dimensions are altered, or clearances are overlapped, the customer should obtain the services of a qualified consultant or structural engineer to determine floor loading.
  - If the review of the floor loading does not require a weight distribution area as shown, the following minimum service clearances must be observed: Front dimension is 762 mm (30 in.). Back dimension is 762 mm (30 in.) and side dimension is 762 mm (30 in.), as shown in figure.

frame=box rules=yes rotate=0 dwidth=100 split=yes.

Figure 48. Table - Machine Area and Service Clearance

Machine Area (M <sup>2</sup> ) <sup>1</sup>	Machine Area (ft <sup>2</sup> ) <sup>1</sup>	Service Clearance Area (M <sup>2</sup> ) <sup>2</sup>	Service Clearance Area (ft <sup>2</sup> ) <sup>2</sup>
0.6	6.0	3.4	35.8

**Note:**

1. Machine area includes installed covers.
2. Service clearance area must be free of all obstacles. Units must be placed in a way that all service areas are accessible. The weight distribution clearance area extending beyond the service clearance area, such as the area at the outside corners of the units, may contain support walls and columns.

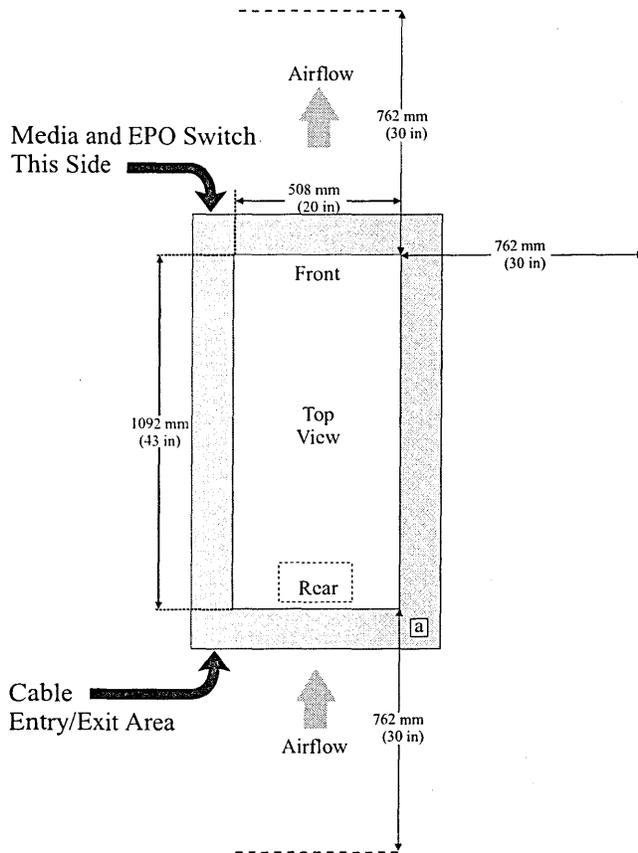


Figure 49. Weight Distribution and Service Clearance

## Environmental Specifications

Unless otherwise noted on individual specification pages, the following environmental specifications, based on an altitude from sea level to 2134 meters (7000 feet), apply:

Environment	Operating	Nonoperating
Temperature	10°C–40°C (50°F–104°F)	10°C–52°C (50°F–125°F)
Rel Humidity	8%–80%	8%–80%
Max Wet Bulb	27°C (80°F) (Class C)	27°C (80°F)

## Specifications

### Acoustical Noise Emission Levels

*Figure 50. Declared Acoustical Noise Emission Values for Typical Customer Configurations*

Functional Unit	$L_{WA_d}$		$L_{pA_m}$		$\langle L_{pA} \rangle_m$	
	Operating (B)	Idling (B)	Operating (dB)	Idling (dB)	Operating (dB)	Idling (dB)
Standard Configuration (16 DASD)	6.6	6.5	N/A	N/A	49	49

**Note:**

$L_{WA_d}$  The declared (upper limit) sound power level for a random sample of machines.

$L_{pA_m}$  The mean value of the A-weighted sound pressure levels at the operator position (if any) for a random sample of machines.

$\langle L_{pA} \rangle_m$  The mean value of the A-weighted sound pressure levels at the one-meter (bystander) positions for a random sample of machines.

**N/A** Not applicable (no operator position).

**B, dB** Abbreviations for bels and decibels, respectively.

All measurements made in accordance with ISO 7779, and reported in conformance with ISO 9296.

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## Chapter 10. Service Procedures

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### Service Procedures Problem/Action List

Problem Area Reported	Go To
P/390 Logs	Go to "P/390 Error Logs" on page 218
P/390 I/O Traces	Go to "P/390 I/O Trace (AWSTRACE.LST)" on page 219
P/390 Snap Shot Dump	Go to "Snap Shot Dump" on page 217
Sending Traces and Logs	Go to "Sending traces and logs to IBM service (SENDLOG.CMD)" on page 222
Integrated Server FTP site	Go to "System 390 Integrated Server FTP Site" on page 223
FixPack and Patch Apply	Go to "Change Management Tools" on page 223
Creating Diagnostic Diskettes	Go to "Creating Diagnostic Diskettes" on page 230
Configuration Backup Procedures	Go to "Configuration Save/Restore Procedures" on page 231
Internet Connection via Modem	Go to "Setting up an Internet Connection via Modem" on page 224
Install IOSP Software	Go to "Installing S/390 Integrated Server Software" on page 232

## Service Procedures

You access the P/390 from the OS/2 desktop by double-clicking on the P/390 folder. The P/390 Icon View window appears:

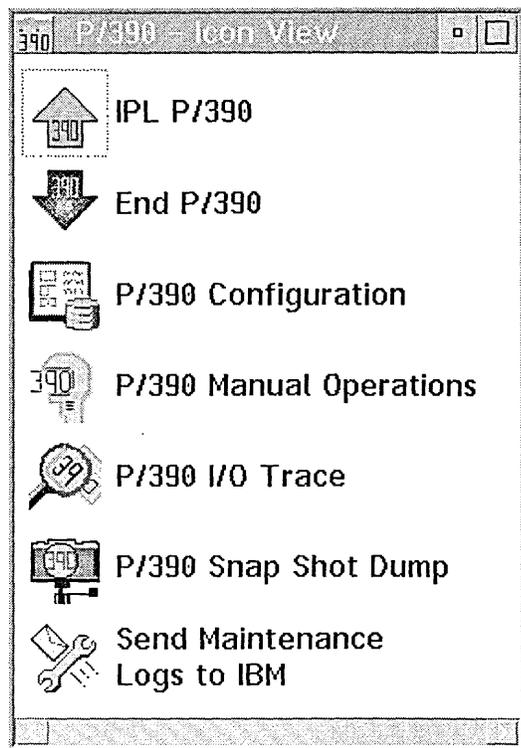


Figure 51. P/390 Icon View Window

### P/390 I/O Trace

Use this selection to view the contents of the I/O trace buffer and create an I/O trace file.

The information contained in the I/O trace file is created for use by experienced S/390 system programmers and personnel in the P/390 Support Center. Because the trace table wraps and irrelevant data could overlay the beginning of the true problem, it is important to limit the scope of the I/O trace. See "P/390 I/O Trace (AWSTRACE.LST)" on page 219 for information about how to set up an I/O trace.

### P/390 Snap Shot Dump

Use this selection to create a dump file.

The P/390 Snap Shot Dump facility creates a dump of the P/390 I/O subsystem, including control blocks and device manager data. This information is created for use by personnel in the P/390 Support Center during problem determination. Use this selection only when directed to do so by P/390 Support Center personnel.

### P/390 Send Maintenance Logs to IBM

Use this selection when instructed by IBM Support Center to send logs and traces to IBM via the internet for problem analysis.

---

## Collecting I/O Traces and Logs

Traces and logs will be collected automatically when a P/390 component abnormally terminates (SYS3173 or SYS3175) or they can be manually collected via the Snap Shot Dump icon in the P/390 folder. You might want to manually collect a trace in order to debug a I/O subsystem problem that does not result in an abend.

The AWSABEND component is called to collect data when a P/390 component abends. Not all errors are intercepted by AWSABEND, but it is called on many SYS3175 or SYS3173 abends. It cannot handle "black screen" traps -- for example, a trap D in a device driver. AWSABEND is called automatically, it should not be invoked directly from the command line or from an icon.

AWSABEND automates some of this data collection so that when something goes wrong, IBM will be more likely to have the data required to determine the problem. It reduces the chance that the customer will have to reproduce the problem because some of the data was lost and not available to IBM service. AWSABEND cannot trap all the errors, so manual data collection still may be required in some cases.

The file AWSABEND.LST is created at IPL time. Components that have specific trace or debug files that should be collected during an abend can add the name and paths of the files to be collected to this file. At a minimum, the file contains "customer.dat" which identifies the customer name and contact. AWSSNAP and AWSTRCSP also add their names to the file when they are invoked and/or stopped.

### Summary of operation (AWSABEND.CMD)

During IPL, the AWSERROR routine sets up a thread to watch for an abend. During component initialization, DMINIT sets up an exit list which OS/2 runs when a component terminates. During termination, the exit list checks to see if it was abnormally terminated, and if so, it clears the semaphore on which AWSERROR abend-watch thread was waiting.

Abend-watch invokes the AWSABEND.CMD program. This program, does the data collection. Currently, it takes these actions:

1. Stops trace spooling.
2. Takes a snap dump.
3. Collects ICE traces.
4. Uses AWSSRAM2 to collect all the data pointed to by AWSABEND.LST into a AWSSNAPx.RAM file
5. Renames/erases Process dumps. (PDUMPs).
6. Exit and allows the abend-watch thread to resume execution.

### Snap Shot Dump

Selecting the **Snap Shot Dump** icon from the P/390 icon folder not only performs a snap dump of the I/O subsystem, it also collects the same traces and logs as AWSABEND (based on the items specified in AWSABEND.LST). A pop-up message box will tell you the name of the file that was created. It is of the form AWSSNAPn.RAM. This file can be sent to IBM via the internet by the SENDLOG command (See "Sending traces and logs to IBM service (SENDLOG.CMD)" on page 222)

This function should be used under the direction of support personnel for problem determination. Not all problems result in abends, for instance poor I/O performance. You may be asked by the next level of support to turn on tracing for certain I/O devices. When the I/O event of interest occurs, click on the Snap Shot Dump icon to capture the I/O trace information.

---

### P/390 Error Logs

P/390 provides several logs that can be useful if you experience problems during installation and configuration.

- C:\P390\AWSERROR.LOG
- C:\OS2\POPOP.LOG

The following logs are for the 3172 SDLC Gateway and 3172 LAN Gateway only.

- C:\IBMCOM\LANTRAN.LOG
- C:\P390\AWS3172.LOG
- C:\P390\AWS3172.ERR

### AWSERROR.LOG

This is where all IOSPP error messages with prefix "AWS" are logged. There is one message per line. The format is:

```
<mm/dd/yy hh:mm:ss> AWSzzznnnx Error message text ...
```

This message format is thoroughly described in the on-line message help file. AWSERROR.LOG is cumulative over time and is never erased.

P/390 messages are logged in AWSERROR.LOG in the P390 subdirectory. The messages have a time and date stamp so you can see a history of messages. Portions of the file or the complete file can be deleted to eliminate unneeded entries. See online message help file C:\P390\P390MSG.INF for message descriptions and actions. Use the OS/2 VIEW command to view this command.

### POPOPLOG.OS2

This is where OS/2 abend error messages are logged. Each message takes up multiple lines in the file and are separated from subsequent messages by a row of dashes. The format is:

```
hh:mm:ss mm-dd-yy, Type of Abend, Process ID, Taskid  
Name of Abending Module (if known)  
Register Information (multiple lines)
```

POPOPLOG.OS2 is cumulative over time and is never erased.

### LANTRAN.LOG

This is where MPTS (LAN adapter support program) puts initialization messages and error messages. There is one message per line. This file gets created anew every time OS/2 is booted, and so only contains the history from the most recent OS/2 boot.

This file is a record of the initialization process as executed by CONFIG.SYS. It is located in the IBMCOM subdirectory. The information in this file relates to:

- Starting each adapter device driver including all messages generated during initialization
  - Loading the driver, version loaded, and related information
  - Opening an adapter, and whether it was successful or unsuccessful

- Data rate used
- Addresses
- Loading the communication protocols
  - Success or failure
  - Version loaded
- Binding the protocols to the adapters
  - Which protocols are bound to which adapter
  - When and if connectivity is established

## AWS3172.LOG

This log records the initialization messages of the SNA Communications Managers. It resides in the C:\P390 subdirectory. The information in this log describes:

- Starting the LAN3172 and WAN3172 managers and all of the messages generated during initialization; for example, listings of all:
  - LAN adapters found
  - Subchannels claimed
- Messages related to the dynamic tracing status. These reflect changes in the tracing status requested through the Status Monitor.

## AWS3172.ERR

This file is a record for error messages. It resides in the C:\P390 subdirectory. The information in this file describes:

- The error condition detected during operation
- Any unusual status changes in any local or remote link stations

---

## P/390 I/O Trace (AWSTRACE.LST)

The P/390 I/O trace is a powerful tool for finding problems in the device manager and channel code. This facility provides two ways to set up and limit the scope of the trace:

- Editing the CHAN.TRC file—must set up before IPL. You must select the ICON 'End P/390' to be able to change the CHAN.TRC settings. Then re-IPL to activate.
- Using the device debug facility in P/390 MANUAL OPERATIONS—can set up for individual addresses while running

The trace entries are stored in a wrap-around buffer large enough to hold 2044 entries. If you use the trace spooling facility, you are limited only by your available disk space. It is important to limit the scope of the trace, because the trace table wraps and irrelevant data could overlay data relevant to the true problem.

## Setting up I/O Tracing by editing the CHAN.TRC File

I/O trace data is primarily controlled by editing the file "CHAN.TRC" in the C:\P390 subdirectory. You can edit this file using TEDIT. List the device addresses to be traced, followed by the word "END".

To edit the CHAN.TRC file, first stop the P/390 by double-clicking on the **End P/390** icon. Then use TEDIT to edit the file. CHAN.TRC is located in the C:\P390 subdirectory from which the P/390 is IPLed.

## Service Procedures

After you have saved the file, click on the **IPL P/390** icon and re-IPL the P/390 to put the changes into effect.

The CHAN.TRC file lists the devices to be traced. The following example of CHAN.TRC starts the trace for three devices:

```
200 201 202 END
```

**Note:** The word END in uppercase is required and must be at the end of the line.

If only END is specified in the CHAN.TRC file, only some startup trace entries and the most severe errors are traced. To specify a trace for a specific device, add its address to CHAN.TRC. For example, to set up a trace on the device at address 580, make your CHAN.TRC file look like this:

```
580 END
```

You can also specify multiple address and wild cards. The following example sets up a trace for the device at address 300 and any devices at addresses beginning with 2:

```
300 2XX END
```

The following example traces every address and the kernel:

```
XXX KRN END
```

## Modifying defaults for P/390 Trace Spooling

In addition to specifying the data to trace, in some cases you may need to override the defaults controlling how big the trace files can grow and the priority of the tracing routine AWSTRCSP. These options can be placed on the second line of CHAN.TRC. Current defaults are /S=256 /B=4. Refer to "P/390 Trace Spooling (AWSTRSP.nnn)" on page 221 for an explanation of the options.

## Specifying Options for I/O Trace

There are several stop options that you can specify for a device address and one option that can be used to an adapter trace of AWSICE devices. You specify these options using suffixes. The ability to specify stop options is useful when the trace might be overlaid by more activity, or if it needs to be examined to determine if the error has occurred. The following table shows how to use the SIE I/O trace options:

Use this option . . .	to specify . . .
S	Stop on any instruction for this device.
I	Stop on an interrupt for this device.
E	Stop on error interrupt for this device. (Error interrupts are defined as any status but ATTN, CE, DE, or PCI.)
P	S/390 Parallel or ESCON Channel adapter trace of AWSICE devices

You can specify up to three of these four conditions on any device address. (You cannot specify both I and E, since I includes E).

The following example causes the P/390 to stop just after an SIO is issued to the device at address 580, or whenever the device at address 581 tries to present an interrupt.

```
580S 581I END
```

To restart the processor after it stops, click on **START** from the **P/390 MANUAL OPERATIONS** session.

To display a trace, click on the **P/390 I/O Trace** icon. The program behind the icon is AWSTRACE.EXE. It displays and decodes the trace. The trace decode file is CHANTR.SCR.

To write the trace to disk, click on *FILE* from the **I/O TRACE** menu. The trace is written to AWSTRACE.LST in the C:\P390 subdirectory. Copy and rename this file before doing another trace; otherwise, the new file overlays it. The trace is written to disk in ASCII, and should be uploaded that way (unlike the snap dumps, which are in binary, and should be uploaded in binary).

## Using the Device Debug Facility

The Device Debug facility allows you to specify I/O trace options dynamically. This is useful if you want to change either the devices to be traced or the stop options for a device.

To set up an I/O trace, click on **Control** from the **P/390 MANUAL OPERATIONS** menu bar. Then click on **DEVICE DEBUG** and specify the address of the device you want to trace. Click the desired trace options (at least check "Trace I/O Operations") and "ENTER" to activate.

For large trace requirements activate the P/390 Trace Spooling (AWSTRSP.nnn) option. (SEE BELOW)

## Kernel Trace

The kernel trace is a lower level trace that is not device specific. It traces low level interaction between the P/390 and the channel. Because kernel trace is not device specific, it should not normally be used. Once you've determined the area of the problem and have taken a few traces, it may be useful to take a kernel trace to look for some refinement on the error, but often the useful data in the kernel trace is overwhelmed by data from other devices.

To turn the kernel trace on or off, click on **Control** from the **P/390 MANUAL OPERATIONS** main menu. If the kernel trace is currently ON, then the menu item reads STOP KERNEL TRACE indicating that if you select it, the kernel trace is turned off. If the menu item reads START KERNAL TRACE, then when you select it the kernel trace is turned on.

## P/390 Trace Spooling (AWSTRSP.nnn)

This is the P/390 trace spooling facility. It consists of a device driver (AWSPOSDD.SYS) and a spooling application (AWSTRCSP.EXE). It will write the P/390 trace data to a file as it is created, thereby allowing a much greater "trace memory" than previously available.

## Syntax

```
AWSTRCSP </S=nnnnnnnn>
          </B=bbb>
          </PL>
          </PN>
          </PH>
```

## Optional Parameters

**/S=nnnnnnnn** Limit output file to nnnnnnnn (decimal) 4K blocks. Two output files, AWSTRCSP.001 and AWSTRCSP.002 will be created, with maximum size of nnnnnnnn 4K blocks. In absence of this parameter, a single file, AWSTRCSP.DMP, will be created which will indefinitely grow in size.

## Service Procedures

/B=bbb	Use bbb (decimal) 64K segments as an intermediate buffer. bbb can range from 1 to 128 (64K to 8MB).
/PL	Run at "low" priority.
/PN	Run at "normal" priority.
/PH	Run at "high" priority.

If no parameters are specified, the defaults are /B=1 /PN.

---

## Sending traces and logs to IBM service (SENDLOG.CMD)

SENDLOG is a utility to transmit the logs and traces to IBM. It assumes the machine has an active internet connection so it can FTP the trace to IBM.

You will be prompted for a problem number. Enter the problem number or PMH number that was assigned by the support group requesting the log data.

Traces and logs are sent to IBM via FTP over the Internet. The SENDLOG command, issued either from an OS/2 window or from the icon "Send Maintenance Logs to IBM" in the P/390 folder is used to transmit this data. It will list the files currently waiting to be transmitted, and prompt you for a problem number, problem description, etc.. It will also list previously transmitted files and allow you to resend or delete them.

For SENDLOG to be successful, you must have established an Internet connection. This can be either a permanent LAN connection, or a dial-up SLIP connection established before invoking SENDLOG. If SENDLOG cannot connect to IBM, it will exit and you will need to establish the Internet connection before proceeding.

## Summary of Operation (SENDLOG.CMD)

The SENDLOG command prepares a captured trace/log file for transmission to IBM. It prompts the user for description of the problem (which is then saved in DESCRIBE.LOG) and the IBM problem number. This description is appended to the AWSSNAPn.RAM file by AWSSRAM2.EXE. The trace/log file is then renamed to **prob\_num.RAM**.

SENDLOG uses the TCP/IP **FTP** command to establish a File Transfer Protocol connection between the IOSP and the FTP site **P390.IBM.COM**.

It automatically logs in as user **ANONYMOUS** and passes the e-mail address found in C:\CUSTOMER.DAT as the password (this helps IBM Engineering to identify the origin of the uploaded trace/log file).

The files that are usually uploaded to the FTP site are from the C:\P390 subdirectory with a file extension of RAM. These contain multiple files that were packed by AWSABEND or AWSSNAP.

The files are uploaded in BINARY into the \INCOMING subdirectory of the FTP site using the FTP **PUT** subcommand. These files are automatically processed by the P/390 server that runs the FTP site and are removed from INCOMING after processing.

If the PUT completes successfully, then the trace/log file is renamed to **prob\_num.SNT**, denoting that it has been sent.

**Be sure** to inform the person requesting the traces that they have been sent.

---

## System 390 Integrated Server FTP Site

IBM has two FTP sites based on the P/390. One is on the Internet (accessible to customers and IBM Business Partners) and the other is on the IBM Intranet (accessible to IBM CEs and IBM internals).

The Internet FTP site is:

`ftp://P390.IBM.COM`

The IBM Intranet FTP site is:

`ftp://S390IS.POK.IBM.COM`

Read the **README.HTM** file or **README.TXT** file for instructions and a description of what is currently available on this site. As of this printing, the subdirectories include:

- INCOMING - to put your traces into
- DOC - HTM browsable and PostScript printable information on System 390 Integrated Server
- System 390 Integrated Server
  - S390IS/SFIXPACK - the latest System 390 Integrated Server fixpacks
  - S390IS/STEST - temporary workarounds or debugging versions (don't download unless instructed by IBM).

---

## Change Management Tools

This is the procedure to follow to download and apply IOSP fixpacks or patches.

### Download Fixpacks

Fixpacks and patches are available as ZIP files from either the Internet or IBM Intranet FTP sites listed above.

1. Verify with the customer that the S/390 Integrated Server is connected to the Internet. If it isn't the S/390 Integrated Server can be connected to the IBM Intranet by a modem (if a modem and phone line are available) using the procedure "Setting up an Internet Connection via Modem" on page 224.
2. Open an OS/2 window.
3. Create a temp directory to download the fixpacks to by entering **MD FIXES**.  
**Note:** This may fail if the directory already exists, this not an error.
4. Switch to the directory where the fixpacks are to be downloaded to by entering **CD FIXES**.
5. Establish a FTP connection to the P390 FTP site by entering **FTP P390.IBM.COM** or if connected to the IBM Intranet enter **FTP S390IS.POK.IBM.COM**.
6. Enter **anonymous** when prompted for a name.
7. Enter your internet address or your lastname followed by **@IBMCE** for the password. For example enter **my\_name@ibmce**.
8. At the FTP> prompt enter **bin** to transfer files in binary mode.

## Service Procedures

9. At the FTP> prompt enter **CD S390IS** to switch to the System 390 Integrated Server subdirectory.
10. At the FTP> prompt enter **CD SFIXPACK** to switch to the fixpack subdirectory.
11. At the FTP> prompt enter **dir** to list the available fixpacks. Note the filename of the fixpack you want to download.
12. At the FTP> prompt enter **get filename** to download the required fixpack.
13. Repeat the previous step to download any additional fixpacks.
14. At the FTP> prompt enter **quit** to end the FTP session.

## Unpacking Fixpacks

Fixpacks are shipped (downloaded) as zip files, and need to be unpacked (unzipped) before they can be installed.

1. Open an OS/2 window.
2. Enter **CD FIXES** to switch to the subdirectory where the fixpacks were downloaded.
3. Enter **dir \*.zip** to list the downloaded fixpacks.
4. Enter **PKUNZIP2 filename.zip -d -o** to unpack the fixpack.

## Installing Fixpacks

Application of service cannot be concurrent with normal operations. The customer must quiesce and shutdown his S/390 operating system, and then you must shutdown the P/390 I/O subsystem by clicking on "END P/390".

Follow the instructions in the **readme file** to run the **S390FIX** command that handles both the installation and removal (regression) of fixes. Instructions on the screen or in the **readme file** will inform you about any other actions which may be required to make the fix take effect, e.g. rebooting OS/2.

When a fixpack or patch is applied, an entry is made into INSTALL.LOG. An entry is also made if a fix is regressed. INSTALL.LOG can be viewed with the OS/2 command **TEDIT C:\P390\INSTALL.LOG**.

---

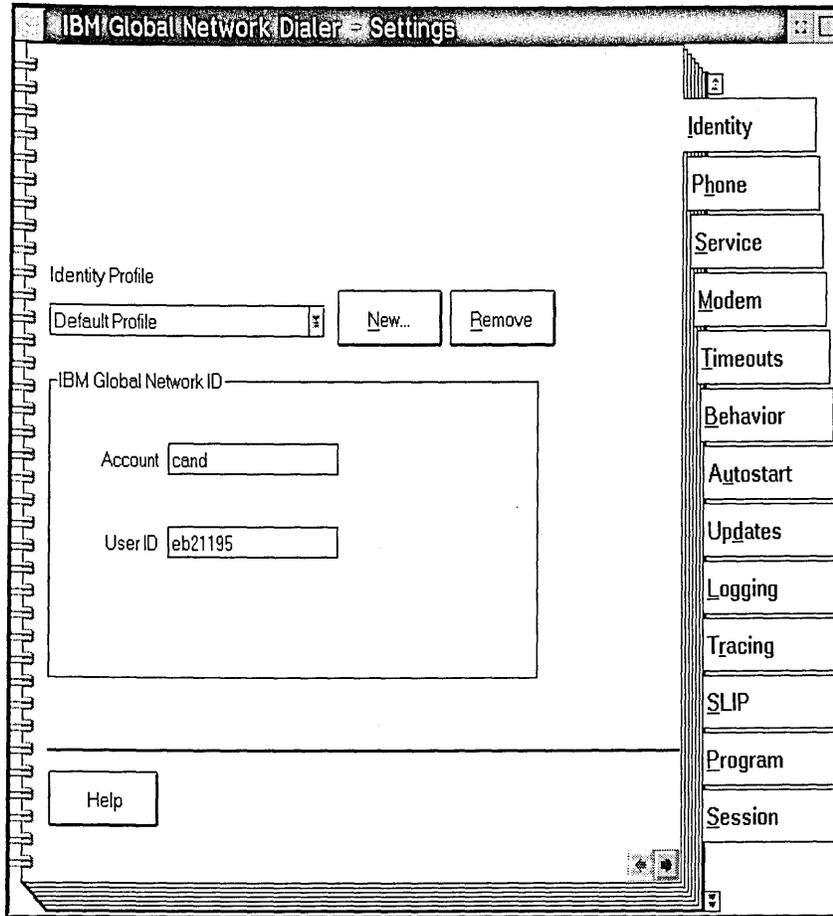
## Setting up an Internet Connection via Modem

The S/390 Integrated Server needs a connection to the Internet in order to upload traces and logs, and to download IOSF fixes and patches. Usually, this is a LAN connection (Token-Ring or Ethernet) via TCP/IP. If LAN attachment to the Internet is not possible, then an alternative is modem attachment to the IBM Intranet.

This procedure describes how to configure the IBM Global Network Dialer (supplied with the IOSF software) to establish an Internet connection using the IBM 7858-336 modem. This is the modem that has been tested with the S/390 Integrated Server. Other modems may work just as well, but only external modems are supported.

These are the steps that must be followed:

1. Double click with the left mouse button on the *IBM Global Network Dialer* icon on the OS/2 desktop.  
The "Settings Notebook" should appear, if not then the dialer has already been configured. Goto step 9 on page 229.
2. From the **Identity** page, update the default identity profile.



- enter your Advantis Account name in the **Account:** entry field.
- enter your Advantis Userid in the **User ID** entry field.

3. Press the **Phone** tab to display the current location page.

**Current Location**

Country List Date: 1998-03.30

Where I am

I am dialing from

The area code is

The Country I am in

How I dial from this location

To access an outside line, first dial:  for local  for long distance.

Checking the Call waiting disables the local and long-distance prefix fields.

This location has call waiting. To disable it, dial:

The phone system at this location uses  Tone  Pulse  Manual

- enter your area code in the **area code** field.
- enter the country name by selecting your country from the pull down tab on the **Country I am in** drop down list.
- if required enter the number to access an outside line or long distance line in the **access an outside line** entry fields.
- select the type of phone service (tone, pulse etc) by pressing the corresponding radio button.
- press the **OK** push button.

4. From the **Select a phone number to call** panel

Select the closest phone number to minimize your phone charges.

Number List Date: 1998-05.19  
Country List Date: 1998-03.30

Country: United States

State: New York

City:

914-334-2601	Kingston
315-793-2921	New Hartford
212-824-2401	New York
716-625-7301	Pendleton
914-431-1281	Poughkeepsie
716-246-4001	Rochester
718-354-3921	Staten Island
914-759-7281	Sterling Forest
315-448-1101	Syracuse
315-793-2921	Utica
315-786-3281	Watertown
914-467-7261	White Plains

Protocol:

SLIP

PPP

Phone number to be dialed: 914-431-1281 Poughkeepsie

Number of times to re-try: 1

OK Cancel Help Add to custom phone list..

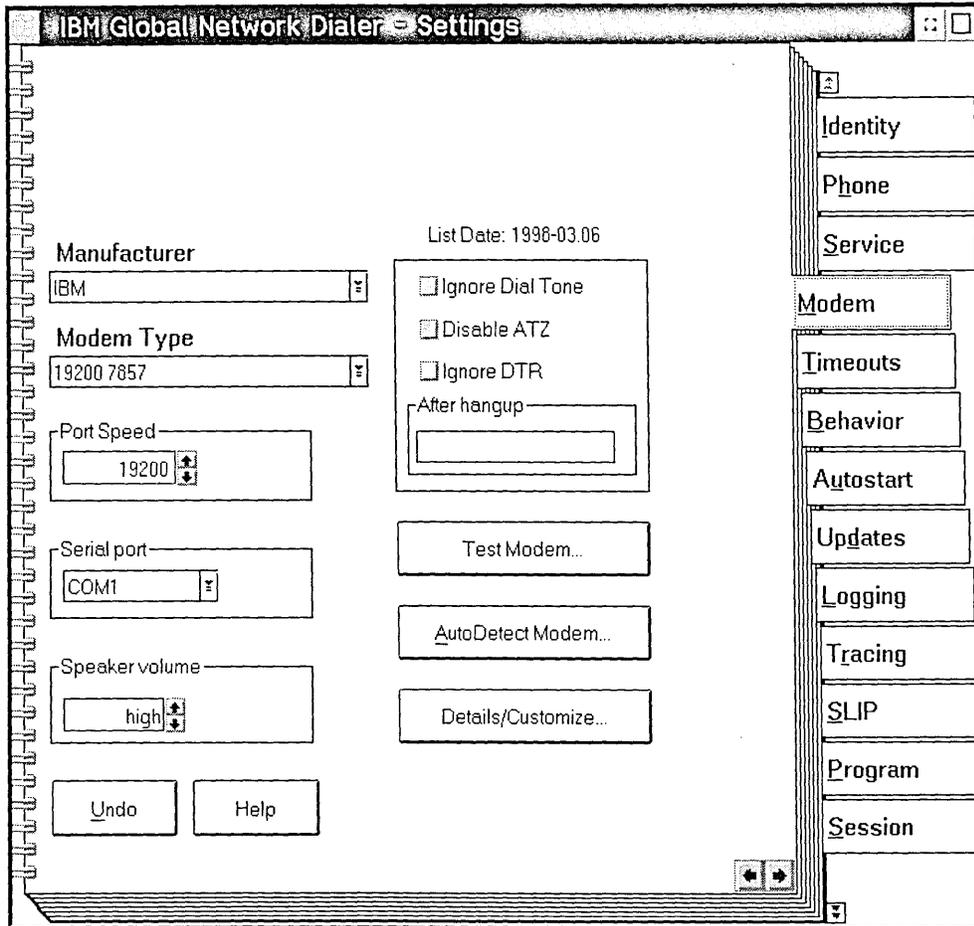
- Select the country you are currently at by selecting the country from the pull down tab on the **Country** drop down list.
- Select the province or state you are in by selecting the province or state from the pull down tab on the **State** drop down list.
- Select the closest city possible from the **City** selection box.
- press the **SLIP** radio button in the protocol section.
- press the **OK** push button.

5. press the **Service** tab to display the service settings page.

- press the **SecureIP (Intranet)** radio button.

## Service Procedures

6. Press the **Modem** tab to display the modem settings page.



- select **IBM** from the Manufacture drop down list, or select the manufacture of the modem you are using.
- select **19200 7857** from the Modem Type drop down list, or select the modem type of the modem you are using.
- select **COM1** from the Serial Port drop down list.
- select **high** for the speaker volume.
- press the **Test Modem** push button to test the modem settings.
  - Press the **Test Setup** push button to run the modem test.

### Note

If the modem test fails, the modem is not setup correctly, defective, or the wrong modem type was selected on the previous panel.

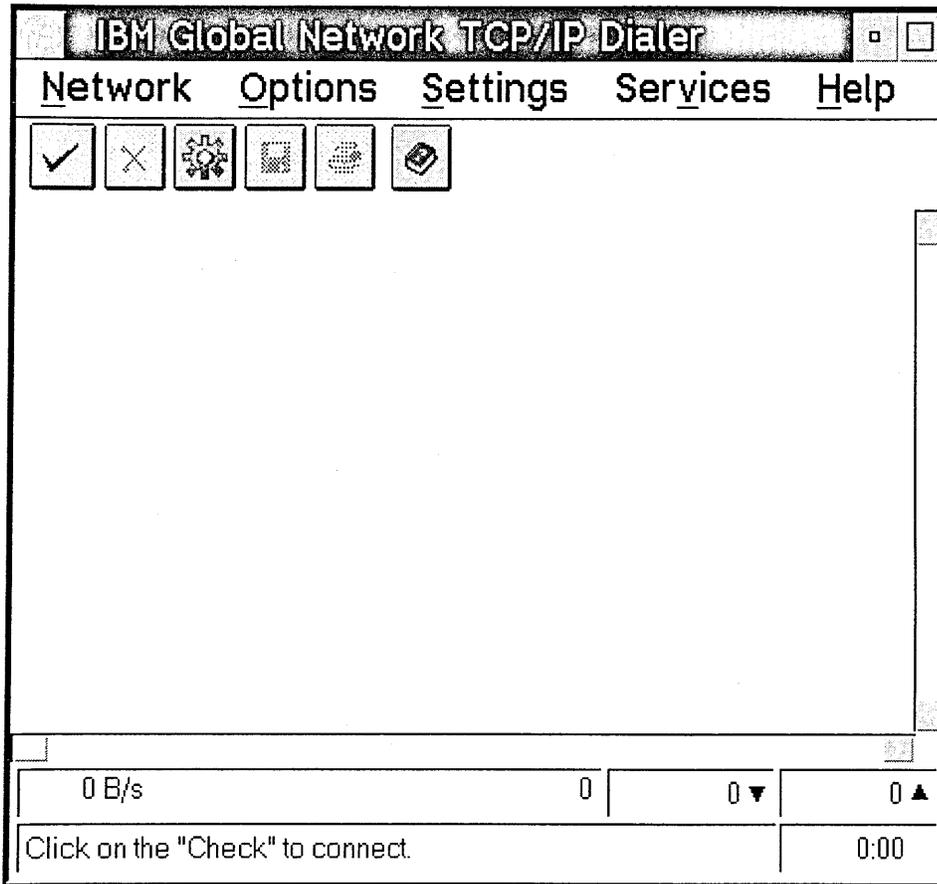
- Press the **Close** to return

7. Close the IBM Global Dialer settings notebook by double-clicking the upper left hand corner.

8. Open an OS/2 window and type **TEDIT C:\MPT\MTC\RESOLV2**

- Add **nameserver 9.14.1.30** to the resolv2 file, just after the line containing the domain name and before any other nameserver entries.
- Press PF4 to save and leave the editor.

9. Start the IBM Global Network TCP/IP Dialer by double clicking on the icon.



**Note:** To verify which Advantis userid will be used press the yellow settings icon, and update the userid as required.

- Click on the green **check icon** to start the connection.
- Enter your Advantis password in the **password** entry field.
- Press the **OK** push button.

## Creating Diagnostic Diskettes

All diagnostic programs for the S/390 Integrated Server are contained on the System/390 Integrated Server Install CD that is shipped with each system. A directory on the CD called \AWSDIAG is the top level directory for all diagnostics programs and instructions. Each adapter or system component that has a diagnostic will have a subdirectory under \AWSDIAG named by the FRU part number, e.g. \AWSDIAG\30L6829 contains Token Ring adapter diagnostics.

**AWSDIAG.PAC** contains the names (part numbers) of all the diagnostics that are shipped with the System/390 Integrated Server Install CD. To view this file enter **TEDIT d:\AWSDIAG\AWSDIAG.PAC**.

**Note:** d: is the drive letter of the CD-ROM drive.

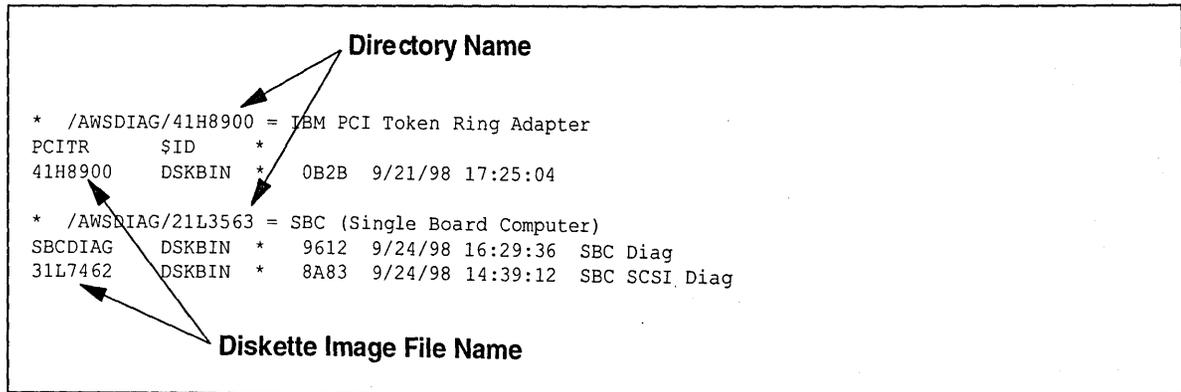


Figure 52. AWSDIAG.PAC

## Procedures

Diagnostics are shipped as diskette image files and must be restored to blank 1.44MB diskettes using the LOADDISK utility.

1. Determine the filename and directory of the diskette to be created.

**TEDIT d:\AWSDIAG\AWSDIAG.PAC**

2. Create the diskette using the LOADDISK command as follows:

**d:\AWSDIAG\LOADDISK d:\AWSDIAG\dirname\filename.DSK a: /F** where:

- **d:** is the driver letter of the CD-ROM
- **dirname** is the directory name containing the diskette image (follows: the \AWSDIAG\ in the pack file).
- **filename** is the name of the diskette image file (name just before the DSKBIN in the pac file). Each DSKBIN represents one diskette.
- **a:** is the drive letter of the diskette drive.
- **/F** forces the diskette to be reformatted.

To create the SBC Diagnostic diskette the command would be:

**d:\AWSDIAG\LOADDISK d:\AWSDIAG\31L7421\SBCDIAG.DSK a: /F**

3. Label the diskette with the diagnostic name that is on it.

---

## Configuration Save/Restore Procedures

CFGSR saves or restores parts of the OS/2 configuration to diskette. The purpose is to restore the configuration when OS/2 needs to be re-installed because of a disk failure that affects the "C" drive, or when a new software level is installed that requires OS/2 to be reinstalled from CD.

When to use CFGSR:

1. After a new install to save the configuration. (A blank diskette is included for saving the configuration.)
2. After changing the OS/2 configuration (e.g. installing new hardware, changing 3270 session defaults, changing TCP/IP addresses, etc.)
3. Before changing the hard-disk configuration if that would require OS/2 to be re-installed
4. After re-installing OS/2 to restore the previous configuration.

CFGSR only saves data from the "C" drive. Saving and restoring data on other drives is a customer responsibility.

CFGSR does not save the desktop configuration (folders, etc.) or business partner add-ons (like printers).

It does save such items as:

- CONFIG.SYS
- PC 3270 customization
- TCP/IP customization such as IP addresses, etc.

## Configuration Save/Restore Steps

### Save Configuration data

1. To ensure a good backup, you should shutdown OS/2 and reboot the system before proceeding.
2. Open an OS/2 window.
3. Insert a blank, formatted 1.44MB diskette into the diskette drive.
4. Type **CFGSR SAVE**
5. When you see the message, **Configuration backup complete** remove the diskette and set the write protect tab to the open position.

### Restore Configuration data

1. Open an OS/2 window.
2. Insert the configuration backup diskette in the diskette drive.
3. Type **CFGSR RESTORE**
4. After restoring a configuration, be sure and **reboot the system** so the restored files are active.

### Notes:

1. A confirmation message will be displayed before any existing files will be overlaid.
2. Error messages may displayed if some optional files cannot be found. This can happen on a save or on a restore.

### Method

The data was put on the diskette by using the COPY command or the AWSSRAM2 command and was restored with COPY or with LOADRAM2. If a saved diskette was damaged, you might be able to retrieve and restore parts of the configuration by using these commands.

---

## Installing S/390 Integrated Server Software

The IOSP Software is made up of the OS/2 operating system, S/390 code and device drivers, and is installed on the C: drive which resides on the SSA DASD. To install the software the SSA dasd must be configured and arrays built and made available to OS/2.

### Note

The most up-to-date version of these instructions is always contained on the latest S/390 Integrated Server Install CD as file README.CDI.

Depending on what your current configuration is and what activity you plan on doing you will be required to follow different parts of this procedure.

- **New Integrated Server with blank disks**

This also applies if you want to start totally from scratch, thereby destroying any data that is contained on the SSA drives. For example, A system may come from IBM manufacturing with a single RAID-5 array of three SSA drives. Since no customization has been done yet, the array can be safely deleted and recreated using the full set of drives that the customer has purchased.

- \_\_\_ 1. "Booting the OS/2 Utility diskettes" on page 233
- \_\_\_ 2. "Configuring the SSA RAID-5 DASD" on page 233
- \_\_\_ 3. "Rebooting OS/2 and enabling CBIOS" on page 235
- \_\_\_ 4. "Partitioning the DASD with FDISK" on page 235
- \_\_\_ 5. "Installing IOSP Software" on page 236
- \_\_\_ 6. "Booting OS/2 from SSA and formatting HPFS partitions" on page 237

- **Integrated Server with customer configuration and data**

If you are expanding a system with additional drives and need to keep the data that is on the current SSA array, then you should follow ONLY these steps to configure an additional RAID 5 array.

Note that you should not dedicate more than one hot spare disk per machine; a single hot spare disk can be shared between multiple arrays.

First you must back up the current customer configuration.

- \_\_\_ 1. "Configuration Save/Restore Procedures" on page 231
- \_\_\_ 2. "Configuring the SSA RAID-5 DASD" on page 233
- \_\_\_ 3. "Installing IOSP Software" on page 236

- **Install of a code upgrade only on Integrated Server with customer configuration and data**

First you must back up the current customer configuration.

- \_\_\_ 1. "Configuration Save/Restore Procedures" on page 231
- \_\_\_ 2. "Configuring the SSA RAID-5 DASD" on page 233

\_\_\_ 3. "Installing IOSP Software" on page 236

## Booting the OS/2 Utility diskettes

1. Locate the two S/390 Integrated Server OS/2 Utility diskettes. These are provided with the System/390 Integrated Server Install CD. If you have misplaced these diskettes, or they have been damaged, please read the instructions contained in the README.CDI that is in the root directory of the CD. These instructions will tell you how to create new diskettes on another PC system using OS/2, DOS, or WINDOWS.
2. Insert the first diskette in the floppy diskette drive of the S/390 Integrated Server.
3. Turn on the system power (or press the reset switch, if the system is already powered up).
4. Insert the CD into the CD-ROM drive.
5. A blue OS/2 screen will appear instructing you to remove the first diskette, insert the second diskette and press **ENTER**.  
You will see an OS/2 WARP logo screen and then several messages as the diskettes continue to boot. Ignore any error messages for now.
6. When you see the OS/2 command prompt [A:\] remove the second diskette and **reinsert** the first diskette. This diskette contains all the OS/2 commands you will be using.

## Configuring the SSA RAID-5 DASD

1. Type **ISSACFG** and press **ENTER**. This will start the SSA Configuration program.  
If the diskette in the A: drive is write-protected, then an error message will be displayed. Slide the write tab on the diskette to the enabled position and then respond, "Retry command or operation".  
If the system cannot find the SSA adaptor, the SSA configurator will show an error message and terminate: You must then fix the problem and reboot before you can proceed. Check to see if:
  - The SSA adapter card is completely seated in the PCI bus socket.
  - All of the SSA cables are firmly plugged.
2. From the Main Menu, select **SSA ADAPTER LIST**.  
In the SSA configuration steps, select will always mean, "Move the cursor up or down to highlight the selection, and then press **ENTER**".  
The SSA Adapter List will show the adapter ID in a form similar to this:  
Cnnnnnn Busx - Sloty (11)
3. Press **ENTER**.  
The SSA Adapter menu is now displayed with the adapter ID at the top. All other SSA configuration steps will be performed by selecting items from this menu.
4. Select **NEW DISKS**.  
If the List of New Disks contains all the disks, then skip to step 5.  
If the disks you are configuring were previously used, you may not see any disks listed; instead the List of New Disks will say **No resources**. If so, then do the following:
  - Press **ESC** to return to the SSA adapter menu.
  - Select **FREE RESOURCES**.
 If all the disks are shown in the List of Free Resources, then skip to step 9.  
If the disks are not in this list, then

## Service Procedures

- Press **ESC** to return to the SSA adapter menu.
- Select **SYSTEM RESOURCES**.

If there is anything listed here, then it is probably an active, online RAID-5 array. **Make sure any customer data present in the array has been backed up before deleting this array.**

To delete an array:

- Highlight the array line in this list and press **DEL**.
  - Press **ENTER** to answer YES, you want to detach this.
  - Press **ESC** to return to the previous menu.
  - Select **RAID 5 Arrays**.
  - Highlight the array line in this list and press **DEL**.
  - Press **ENTER** to answer YES, you want to detach this.
  - Press **ESC** to return to the previous menu.
  - Skip to step 6.
5. Delete all disks from the List of New Disks one by one, using the **DEL** key.
  6. Press **ESC** to return to the previous menu.
  7. Select **FREE RESOURCES**.

All of the disks deleted in the above step should now be listed. These are now free disks that can be placed into an array.
  8. Press **ESC** to return to the previous menu.
  9. Select **RAID 5 ARRAYS** There should be nothing listed.
    - Press **INSERT** to create the array. Enter the Filter Attributes for the RAID 5 Array
    - Give the array a name (e.g. ARRAY1)
    - Change HOT SPARE to 0 if the array contains three disks. If you have more disks and want to dedicate a drive to be a hot spare, then leave it set to 1.
    - Change REBUILD PRIORITY to 100%.
    - Press **ENTER** twice.
  10. Under the MEMBERS window, there should be no members.
    - Press **INSERT** to bring up the list of possible candidates.
    - Select a member with the up/down arrows, then press **ENTER**.
    - Press **INSERT** for the next, then **ENTER**, etc. until all members have been added. In almost all cases, you will add all of the disks to the array (all candidates).
  11. Press **ESC** to continue.
  12. Press **ENTER** to answer YES to start the re-build process.

This will happen in the background as long as the system is powered up. You can power down at any time and it will start where it left off. You go to the next steps as well without waiting for the re-build to complete. (The percentage will *not* change unless you leave this screen and then come back again).
  13. Press **ESC** three times to get back to the Main Menu.
  14. Select **SYSTEM RESOURCES**.
  15. Press **INSERT**

16. Select the **RAID 5** array just created.
17. When asked for Disk number(hex)==> take the default by pressing **ENTER** to activate and bring the array just created to an **ONLINE** status.  
For previously used disks you may be asked to confirm the initialization of a suspected MBR. If so, select **YES**.
18. Press **ESC** to return to the SSA Adapter menu.
19. If you are configuring a disk as a hot spare, then do the following:
  - Select **HOT-SPARE RESOURCES**.  
The List of Hot-spare Resources should say **No resources**.
  - Press **INSERT**.
  - When asked to specify block size, accept the default size.
  - A list of Candidates for Hot-spare will appear. Select a disk from the list.
  - The List of Hot-spare Resources should now show the selected hot spare disk as **ONLINE**.
20. Press **ESC** four times to exit the configurator.
21. Press **ENTER** to answer YES to exit.

This ends the array configuration. You can continue immediately with the rest of the OS/2 installation.

## Rebooting OS/2 and enabling CBIOS

1. Reboot the machine by pressing **CTRL-ALT-DEL** (or press the reset switch). Diskette 1 should already be in drive A:  
**Note: IMPORTANT** information follows in the next step!
2. At this reboot, the SSA CBIOS on the adaptor **MAY** be **DISABLED**. It must be **ENABLED**. Watch the screen for that message. When it appears press **TAB** right away to enable the CBIOS for SSA.  
If you miss this, then you must reboot again to enable the SSA CBIOS.
3. When you are prompted, remove the first diskette, insert the second diskette and press **ENTER**.
4. When you see the OS/2 command prompt [A:\] remove the second diskette and **reinsert** the first diskette.

## Partitioning the DASD with FDISK

1. Type **FDISK** and press **ENTER**. This will start the OS/2 disk partitioning program. The partitions that you create will depend on how many SSA drives are installed (three to sixteen).

At the top of the screen there will be only one physical disk shown (Disk 1) because RAID-5 combines all the individual SSA drives into a single array that appears to OS/2 as a single logical drive of 36 to 255 GB.

In the body of the screen initially look like this:

Partition Information				
Name	Status	Access	FS Type	MBytes
-----				
	None	:Pri/Log	FreeSpace	nnnnnnn

2. Make sure the FreeSpace line is highlighted. Use the **TAB** key to move the black bar between the top of the screen and the body, and the arrow keys to move the bar.
3. Press **ENTER** to get the **OPTIONS** menu.

## Service Procedures

4. Type **c**. to Create a partition
5. For Size of Partition, enter **2000** and press **ENTER**.
6. Select **Primary** partition type.
7. For Location of Partition, select **Create at Start of FreeSpace**. A C: partition will be created and the rest of the array will be listed as FreeSpace.
8. Highlight the new FreeSpace line and press **ENTER**.
9. Type **c** to create partition.
10. Enter **512** for the size of partition and press **ENTER**.
11. Select **Extended Logical Drive**.
12. For Location of Partition, select **Create at Start of FreeSpace**. A D: partition will be created and the rest of the array will be listed as FreeSpace.
13. Highlight the new FreeSpace line and press **ENTER**
14. Type **c** to create partition
15. Enter **60000** for the size of partition and press **ENTER**. WARNING do not enter a number greater than 60000. OS/2 is not able to format a partition greater than 60 GB. You will be dividing the rest of the FreeSpace up into multiple partitions, each equal to 60000 or less.
16. Select **Extended Logical Drive** for this and the rest of the partitions.
17. For Location of Partition, select **Create at Start of FreeSpace**. A E: partition will be created and the rest of the array will be listed as FreeSpace.
18. Repeat steps 13 to 15 for all remaining disk space. The last partition may be smaller than 60000 MB.  
==> Please make a note of the last partition letter!

The screen may look something like this when you are done:

Partition Information				
Name	Status	Access	FS Type	MBytes
	Startable	C: Primary	unformatted	2000
	none	D: Logical	unformatted	512
	none	E: Logical	unformatted	60000
	none	F: Logical	unformatted	32232

19. Press **F3** key twice to save and end.

You will see the message:

```
Drive Letter Changed
Press Ctrl-Alt-Del
```

## Installing IOSP Software

The IOSP Software is made up of the OS/2 operating system, S/390 code and device drivers, and is installed on the C: drive. The D: drive is used for dump collection and swapper space. The C: and D: drives must be formatted before the IOSP code is loaded.

### Note

If this is not an new install (customer configuration data already exists) make sure the configuration data has been backed. See "Configuration Save/Restore Steps" on page 231.

1. Boot from the OS/2 utility diskettes, see "Booting the OS/2 Utility diskettes" on page 233.

**Note:** Remember to reinsert diskette 1 when the command prompt appears.

2. Type **DIR A: /P C:** to determine the current volume label of the C: drive.
3. Type **FORMAT C:**
  - When prompted for the current Volume Label, type the volume label determined above.
  - When prompted for the new Volume Label, type **S390IS C**.
4. Type **FORMAT D:**
  - When prompted for the current Volume Label, type **SADUMP**.
  - When prompted for the new Volume Label, type **SADUMP**.

**Note:** Only format C: and D: at this time - no other drives.
5. Determine what drive letter is assigned to the CD-ROM drive.
 

It should be one higher in the alphabet than the last partition you FDISKed above.  
Let's say you think it is G:. Type **DIR G:** to see the files on the System/390 Integrated Server Install CD You should see files like BACKUP.001, CONTROL.001, etc.
6. To install IOSP Software to the C: drive, enter: **INSTALL G:** (G: is the CD ROM drive letter).
7. When prompted to insert the "Backup Diskette 1" (that's the CD), just press **ENTER**.  
This will install the entire IOSP system plus put an OS/2 boot record on drive C:.
8. You will see a message saying the system has been transferred. Then additional files will be copied into the C:\P390 subdirectory.  
This step is completed when the [A:\] OS/2 prompt is displayed.
9. Remove the diskette and CD disc and reboot the system by pressing **CTRL-ALT-DEL** (or press the reset switch).
10. After OS/2 starts you will be prompted if this is a **New Install** or to **Restore saved customer configuration**.
  - If a new install select option 1 and enter customer name and location.
  - If restoring a saved configuration select option 2 and follow instructions on screen.
  - After restoring a configuration, be sure and **reboot the system** so the restored files are active.

## Booting OS/2 from SSA and formatting HPFS partitions

1. When the OS/2 desktop appears, select an OS/2 command window from the **LaunchPad** (the vertical rectangle of icons at the left edge of the screen) by pointing at the lowest icon and clicking once with the left mouse button.
2. Format the E: partition by typing: **FORMAT E: /fs:hpfs**.
3. Repeat for the rest of the partitions up to the last drive letter you noted above.

You are now ready to load the S/390 Operating System (OS/390, VM/ESA, or VSE/ESA) onto E:



## Chapter 11. OS/2 Utilities

The S/390 Integrated Server provides several OS/2 utility programs as part of the software. These are located in the \P390 subdirectory. You can use these when you are writing your own device manager or if you want to accomplish a task without using one of the System 390 Integrated Server interactive interfaces. These utilities are:

OS/2 Utility	Use to . . .	Information on page . . .
ALC.EXE	Allocate and initialize files as FBA DASD	239
AWSCFG.CMD	Invoke the P/390 Configurator	240
AWSSEND.CMD	Stops the P/390 if it is running	241
AWSMOUNT.EXE	Change the DASD or the tape configuration dynamically	241
AWSPROF.EXE	Record the location of DEVMAP in the OS2.INI file	242
AWSSTART.EXE	Start P/390 device managers	242
AWSSTAT.EXE	Display or change the status of the I/O subsystem	243
CKDALC.EXE	Allocate files as CKD DASD	244
DEV2NAME.CMD	Create an ASCII file from a DEVMAP file	244
ICEDEV.EXE	Standalone scan of the Parallel or ESCON channels for devices	246
ICEINIT.CMD	Initializes and loads the Parallel or ESCON channel adapters	246
ICEMAP.EXE	Displays the devices claimed by AWSICE and their settings	246
ICETRACE.CMD	Gets an internal Parallel or ESCON trace dump	246
IPL.CMD	Start P/390 I/O subsystem if it is not running	246
RDEVMAP.CMD	Reconfigure a DEVMAP	247
SENDLOG.CMD	Transmits Logs and Traces to IBM via the internet for problem analysis	248

### ALC.EXE OS/2 Utility

ALC allocates and initializes files for use by the P/390 as FBA DASD. ALC can also display information about an existing volume, and it can change a volume label. ALC can be used to allocate files such as paging, spooling, or TDISK as part of an installation process, instead of using the interactive process with the P/390 Configurator.

The ability to change a volume label is useful when you are moving volumes between systems or reconfiguring a system. It is especially useful when the volume must have a specific name, such as VM CP-owned volumes, which may require you to change the CP configuration if the name changed.

See "CKDALC.EXE OS/2 Utility" on page 244 for a utility to allocate count-key-data DASD files.

#### Syntax

```
ALC filename /Ssize /Vvolume /Ttype /Z /R /C /Q /ESA
```

## AWSCFG.CMD OS/2 Utility

### Required Parameters

filename Fully qualified OS/2 file name

/Ssize (decimal) Usable file size in bytes (K, M) or blocks (B) allowed—where K=1024 bytes, M=1,048,576 bytes, B=512 bytes

/Vvolume A DASD volume label (6 characters)

### Optional Parameters

/Ttype Space allocation type (either PERM, TDSK, PAGE, TEMP, PARM, SPOL, DRCT, VSE). PERM is the default. For a list of valid allocation types on each mode (370 or ESA), enter ALC ?

/Z (no operands) Write zeroes to file.

/R (no operands) Read (display) file attributes.

/C (no operands) Change DASD volume name.

/Q (no operands) Quiet—no messages displayed.

/ESA Must be specified when the files will be used with VM/ESA Release 1.2.1 or higher. The default is 370.

### Examples

```
ALC d:\VMESA\PAGING.302 /vPAGING /s10M /tPAGE /ESA
ALC d:\VMESA\SYSRES.300 /R
```

## AWSCFG.CMD OS/2 Utility

AWSCFG is the program behind the P/390 I/O Configuration icon. It invokes the P/390 Configurator (AWSCNF.EXE) after checking parameters and supplying defaults.

### Syntax

```
AWSCFG [devmap] [S=0|1|2|3] [L=nn]
        [devmap /NEW]
```

### Optional Parameters

devmap If the DEVMAP location is not specified, the current DEVMAP (as kept by AWSPROF) is used. If a DEVMAP is specified, it becomes the new current DEVMAP and is used the next time the P/390 is IPLed.

S Causes the P/390 Configurator to skip either zero (0), the first (1), or the first two (2) or the first (3) frames and go directly to the password, MAIN menu, or UPDATE SYSTEM DEVICES menu. Zero is the default.

L=nn Specifies the number of lines in the OS/2 window for the Configurator menus. The default and minimum number of lines is 27. The maximum number of lines is 95. For larger values, scroll bars appear on the right side of the screen. To avoid this and to see all the lines at one time, set a different font size for the OS/2 window.

/NEW A DEVMAP comes with the preconfigured operating system (for example, DEVMAP.1VM, DEVMAP.VSE, and DEVMAP.MVS). If you do not have one and need to create a DEVMAP, use the /NEW option. This makes a DEVMAP containing a

single 3278 device at address 200. Use the P/390 Configurator to add additional devices.

## AWSSEND.CMD OS/2 Utility

AWSSEND checks the P/390 I/O subsystem. If it is running, AWSSEND stops it.

### Syntax

```
AWSSEND    [ASK|NOASK|KILL ]
```

**Optional Parameters:** AWSSEND is used to terminate the operating system being run by the P/390. It is called by the END P/390 icon on the P/390 Main Menu.

**ASK**                    Prompt for confirmation before terminating  
**NOASK**                Do not prompt for confirmation before terminating  
**KILL**                 Do not try to shutdown the operating system

## AWSMOUNT.EXE OS/2 Utility

AWSMOUNT supports the AWSOMA, AWSFBA, and AWSTAPE device managers. AWSMOUNT changes the P/390 DASD configuration while the P/390 is running. The effect on the P/390 is the same as if an operator physically removed one volume and put in a new one. Just as in a mainframe system, this change must be coordinated with the operating system. In general, you should vary the device address offline before using AWSMOUNT to change the assignment.

AWSMOUNT can also be used to change a volume address from R/W to R/O (or vice versa). AWSMOUNT does not change the actual PC attributes, but it does make the volume appear R/O to the P/390. The device manager rejects any write requests.

AWSMOUNT can also be used to query the status of a designated device.

### Syntax

```
AWSMOUNT dev_addr file_name [options]
```

### Required Parameter

**dev\_addr**            A three-character hexadecimal device address.

### Optional Parameters

**file\_name**          A fully qualified OS/2 file name (optional).  
**/O**                    Old file is replaced (file name required).  
**/R**                    Make allocated file read-only (file name optional).

## AWSSTART.EXE OS/2 Utility

`/W` Make allocated file read/write (file name optional).  
`/Q` Query file allocated to dev\_addr (file name not used).  
`/D` Demount file allocated to dev\_addr (file name not used).  
`?` Display help text.

Additional options for emulated tape devices:

`/REW` Rewind – reposition the file to the beginning of the tape.  
`/RUN` Rewind unload – close and disassociate file from dev\_addr.  
`/C` Create a file, if necessary

### Example

```
AWSMOUNT 300 /q  
Device allocated to D:\VMESA\SYSRES.300 (r/w)
```

## AWSPROF.EXE OS/2 Utility

AWSPROF records the location of DEVMAP in the OS2.INI file. If you have multiple DEVMAPs, you need to issue AWSPROF to deactivate one and activate another. (The AWSCFG.CMD file uses AWSPROF to determine the default DEVMAP to edit, and IPL uses it to determine which DEVMAP to use during IPL.)

### Syntax

```
AWSPROF drive:\path\devmap.lvm  
[ /Q /C ]
```

### Required Parameters

`devmap` The DEVMAP location should be fully qualified with the drive and path included in the specification as well as the file name.

`/Q` Query current profile values

`/C` Clear current profile values

`?` Display help text

## AWSSTART.EXE OS/2 Utility

AWSSTART is used to start P/390 device managers. It is called from IPL.CMD.

### Syntax

```
AWSSTART manager.EXE N|P|T managerparms
```

### Optional Parameters

`manager` The name of the P/390 device manager, for example, AWSTFA, AWS3274

- N Start with a null session. Most device managers are started with a null session. An exception is AWS3215, which starts with a Presentation Manager session. AWSSAD is another exception.
- P Start with a Presentation Manager session.
- T Start with a text session.
- managerparms See the online help (\*.DOC) for each of the device managers.

## AWSSTAT.EXE OS/2 Utility

AWSSTAT displays or changes the status of the P/390 I/O subsystem. Three of the main uses for AWSSTAT are to stop an individual device manager that is malfunctioning, to list the device managers that are currently started, or to cancel the whole I/O subsystem.

### Syntax

```
AWSSTAT manager_name /Q /C /W /Ttimeout /D /L /K
```

### Optional Parameters

- manager\_name Name of the manager to be stopped.
- /Q Query the status of the P/390
- /C Force clear of all "manager waiting" semaphores.
- /W Wait for all managers to initialize (wait forever).
- /Ttimeout Wait for all managers to initialize but give up after *timeout* seconds.
- /D Display managers that are still being initialized.
- /L List all active managers.
- /K Cancel all active managers and the P/390 I/O subsystem. This is the same as selecting the **End P/390** icon.

### Example

```
AWSSTAT AWSTFA
```

stops the Transparent File Access (TFA) manager.

**Return Codes:** Return codes for the query (Q) option are as follows:

- 0 The P/390 I/O subsystem is running.
- 1 The P/390 adapter card is not installed or the wrong device driver is installed.
- 2 The 7437 is not powered-on.
- 3 The P/390 device driver is not in CONFIG.SYS.
- 4 The P/390 I/O subsystem is not running.

## DEV2NAME.CMD OS/2 Utility

## CKDALC.EXE OS/2 Utility

CKDALC allocates and initializes files for use by the P/390 as CKD DASD. CKDALC can also display information about an existing volume, and it can change a volume label. CKDALC can be used to allocate files such as paging, spooling, or TDISK as part of an installation process, instead of using the interactive process with the P/390 Configurator.

Notice that all CKDALC volumes require an extra step to format and allocate them using the ICKDSF facility.

### Syntax

```
CKDALC filename /Ssize /Vvolume /Ddevice /Z /R /C /Q
```

### Required Parameters

filename	Fully qualified OS/2 file name
Ssize (decimal)	File size in cylinders (3380 cylinders=737,280 bytes, 3375 cylinders=430,080 bytes)
Vvolume	A DASD volume label (6 characters)
Ddevice	Device type is 3375 or 3380 (default)

### Optional Parameters

- /Z (no operands) Write zeroes to file.
- /R (no operands) Read (display) file attributes.
- /C (no operands) Change DASD volume name.
- /Q (no operands) Quiet—no messages displayed.

You can allocate a PAGING volume as a 3380 CKD device.

### Example

```
CKDALC d:\VMESA\PAGING.302 /vPAGING /s200 /d3380
```

## DEV2NAME.CMD OS/2 Utility

Use DEV2NAME to create an ASCII file from a DEVMAP file suitable for reading or processing by a subsequent REXX program. The output file has the same name and path as the input file, but with the extension .NME.

There are many uses for DEV2NAME. For example:

- To quickly compare two DEVMAPs to look for differences.
- To write a REXX program to read the DEVMAP.NME, read the 3088 definitions, and automatically generate the RSCS and PVM control files.

The following is a sample of some of the output of DEV2NAME:

```
:nick.ENV1 :ipl.0300 :gmt.0000 :cpuid.001970 :cache.00 :font.
```

```
:nick.ENV2 :node.CRB
```

```
:nick.0100 :dmgr.AWS3880 :dtype.0671 :ctype.3880 :label.USER01 :ro.NO
:parm.E:\VM\MAINT.191
```

```
:nick.0101 :dmgr.AWS3880 :dtype.3370 :ctype.3880 :label.USER02 :ro.NO
:parm.E:\VM\OPERATOR.191
```

```
:nick.0440 :dmgr.LAN3088 :dtype.3088 :ctype.3088
:parm.CHUCK.NET
```

```
:nick.0441 :dmgr.LAN3088 :dtype.3088 :ctype.3088
:parm.CHUCK.PVM
```

## Explanation of Tags

<b>nick</b>	If the value is a valid hexadecimal string, the entry is a device address. Otherwise, it is a special record like ENV1 or ENV2 that describes some other non-device-specific characteristic.
<b>dmgr</b>	Device manager type.
<b>dtype</b>	Device type.
<b>ctype</b>	Control unit type.
<b>label</b>	Appears only on DASD volumes. This is the label the P/390 Configurator last saw on the volume. (It is possible a CP or CMS program, or the ALC utility, was used to change the volume label since the DEVMAP file was last saved.)
<b>RO</b>	Does the P/390 Configurator have the volume marked read-only?
<b>parm</b>	The parameter/filename field.
<b>exclude</b>	If the value YES appears for the <b>exclude</b> parameter, the record is excluded from DEVMAP. That is, if the tag doesn't appear, the record is not excluded.
<b>node</b>	The Local Area Network NetID from DEVMAP.
<b>IPL</b>	The default IPL address from DEVMAP.
<b>gmt</b>	The GMT offset.
<b>cpuid</b>	The CPU ID from DEVMAP.
<b>cache</b>	The cache size.
<b>font</b>	The font for 3215 sessions.
<b>loadparm</b>	The system IPL PARM
<b>sysmode</b>	The P/390 IML mode: 370 or ESA
<b>xstore</b>	Expanded store size

## Syntax

## IPL.CMD OS/2 Utility

```
DEV2NAME devmap_filespec
```

### Required Parameters

**devmap\_filespec** The name of the input DEVMAP file.

## AWSICE OS/2 Utilities

You can get help on these commands by specifying ? after the name of the command at the OS/2 prompt.

<b>ICEDEV</b>	Standalone scan of the channel for devices
<b>ICEINIT</b>	Initializes and loads the ARTIC960 and S/390 Parallel Channel adapters
<b>ICEMAP</b>	Displays the devices claimed by AWSICE and their settings
<b>ICETRACE</b>	Gets an internal S/390 Parallel Channel card trace dump

### Example

```
iceinit ?
```

---

## IPL.CMD OS/2 Utility

IPL checks the P/390 I/O subsystem, and if it is not running, starts it. After the channel and devices have been initialized, the command IPLs the P/390. The WARM and CKPT options work only in VM/ESA.

### Syntax

```
IPL [ipladdr] [CLEAR|NOCLEAR|NOIPL] [WARM|CKPT|NOAUTO]
    [/MAP devmap] [/MODE mode] [/PARM loadparm]
    [/NOCLKGET] [/NOCLKSET] [/NOCLKCLR]
```

**Optional Parameters:** All the options on the IPL command can be specified on the UPDATE SYSTEM ENVIRONMENT (F4) menu of the P/390 Configurator. If they are not specified on the IPL command, the P/390 Configurator defaults prevail, that is, the options contained in the active DEVMAP.

<b>ipladdr</b>	The device address to be IPLed. This is a three- or four-digit hexadecimal address.
<b>ipltype</b>	The type of IPL.
<b>CLEAR</b>	Clear storage before IPLing.
<b>NOCLEAR</b>	Do not clear storage before IPLing. This is the default.
<b>NOIPL</b>	Start the I/O subsystem, but do not IPL. NOIPL is useful if you want to start the channel subsystem and do some testing from the P/390 Manual Operations session, or try to recover from a system crash without IPLing the operating system.

The following options are used to start VM and can be used only with VM/ESA:<sup>4</sup>

**WARM** Only try to warm-start the VM system.

**CKPT** Try a warm start, but try a CKPT if warm fails. This is the default.

**Note:** For VM/ESA (ESA Feature), WARM and CKPT options are identical.

**NOAUTO** Do not automatically answer VM questions during IPL.

**/MAP devmap** This option issues the AWSPROF command to switch to this DEVMAP before starting the P/390 I/O subsystem. This option has no effect if the P/390 I/O subsystem is already running. First stop the P/390 I/O subsystem by selecting the **END P/390** icon. Then issue the IPL command.

**/MODE mode** The architectural mode, either 370 or ESA.

**/PARM loadparm** The load parameter specifies a 1- to 8-character load parameter. If fewer than eight characters are specified, the load parameter is left-justified and padded with blanks. The load parameter can be retrieved by the operating system during its IPL sequence. Its use is determined by the operating system, such as indicating the nucleus to be loaded during the IPL sequence.

**/NOCLKGET** This parameter stops the OS/2 clock from being read and leaves the S/390 clock as UNSET. This parameter is useful for testing year 2000 solutions.

**/NOCLKSET** This parameter specifies that the S/390 TOD clock is set, it should not write to the OS/2. This parameter is useful for testing year 2000 solutions.

**/NOCLKCLR** This parameter specifies that the S/390 TOD clock will not reset on a CLEAR-RESET. This parameter is useful for testing year 2000 solutions.

### Example

```
IPL 300 CLEAR /MAP D:\VMESA\DEVMAP.1VM /MODE ESA /PARM 0200
```

This command IPLs device 300 (as defined in the specified DEVMAP) in ESA/390 mode and passes the IPL console address 0200 to VM. Specifying the /PARM option to VM/ESA causes the VM/ESA Stand Alone Loader (SALIPL) screen to be displayed and it allows you to specify which CP nucleus file you want to IPL.

## RDEVMAP.CMD OS/2 Utility

RDEVMAP reconfigures a DEVMAP. It is used during installation of the Starter System, but can also be used when reconfiguring a system. Instead of using the P/390 Configurator to change DASD volume locations interactively, you can use RDEVMAP to make mass changes to the volumes.

4

- For VM/ESA (370 Feature), the operator console must be defined as a 3215 to use these options. If these options are specified, they automatically answer NO to the TOD clock question and then answer the WARM, CKPT, FORCE, COLD message as either WARM or CKPT.
- For VM/ESA (ESA Feature), the operator console must be a TCP/IP attached 3270 to use these options. If these options are specified, they automatically press ENTER for the TOD clock question and also press ENTER for the WARM, FORCE, COLD message (which implies "warm"). If a FORCE start is necessary, then one will be performed unless the NOAUTO option was specified.

## SENDLOG.CMD OS/2 Utility

### Syntax

```
RDEVMAP [c:\path\DEVMAP.1vm] [ D=d ] n ]  
[ D=d:\old\ n:\new\ ]
```

### Optional Parameters

- devmap** If the DEVMAP location is not specified, the current DEVMAP (as kept by AWSPROF) is used. If a DEVMAP is specified, that DEVMAP is modified and made the current DEVMAP. The old DEVMAP file is saved as:  
c:\path\devmap.2VM
- D=d** Used during installation to globally change the drive letter of all DASD devices and DMKRIO.ASM, USER.DIR, and DEVMAP.1VM in DEVMAP.
- D=d n** Used to change only drive letter *d* to drive letter *n* every time it occurs. Use this form if you have, for example, added a hard disk and need to change all the subdirectories on a given drive.
- D=d:\old\ n:\new\** If two paths are specified, a selective replacement occurs:  
d:\old the drive and path to be searched for and changed.  
n:\new the drive and path that replaces d:\old\

## SENDLOG.CMD OS/2 Utility

Use the SENDLOG.CMD utility to collect and transmit logs and traces to IBM via the Internet for problem analysis.

### Syntax

```
SENDLOG (ICON)
```

### Optional Parameters

- ICON** This parameter is used for the "Send Maintenance Logs to IBM" icon in the P/390 folder to cause the utility to pause when completed so the messages can be read.

## Chapter 12. Parts Catalog

FRU Name	Option PN	FRU PN	Sub PN	Sub PN
Logic FRUs				
P390E 256M		11J4299		
PCA Card (ARTIC960)		31L7086		
ECA Card (ARTIC960)		31L7087		
SSA Adapter Card		09L5526		
Differential SCSI Adapter		31L7462		
SBC Card		31L7421	31L7711	31L7968
RS422 Adapter		21L3561	31L7703	
Communication Adapter FRUs				
Etherjet PCI Adapter	08L2549	86H2423	08L2550	34L0801
PCI Token Ring Adapter	34L0601	41H8874	30L6829	31L3521
WAC ISA Adapter Board (RS232)	33G8469	33G8454		
EIA RS 232D Conn & Cable	33G8469	33G8455		
WAC ISA Adapter Board (V.35)	33G8470	33G8454		
V.35 Conn & Cable	33G8470	33G8456		
WAC ISA Adapter Board (V.21)	33G8471	33G8454		
EIA X.21 Conn & Cable	33G8471	33G8457		
CCITT V.24/V.28 EIB Accessory	33G8461	33G8455		
CCITT V.35 EIB Accessory	33G8462	33G8456		
CCITT X.21 EIB Accessory	33G8463	33G8457		
MultiPort Model2 ISA Adapter	33F8791	33F8967		
1MB Memory for MultiPort Model2	33F8791	53F2662		
Artic Portmaster 8 Port RS-232 cable	33F2610	53F2612		
8 Port RS-232-C EIB for MultiPort Mod2	33F2610	91F7974		
Cable FRUs				
PCA Bus/Tag		08J5933		
RS422 Cable		21L3794		
UPIC Cable		21L3558		
UPIC Cable		21L3559		
SBC/BIDI (Floppy)		31L7662		
SBC/BIDI (SCSI)		31L7663		
SSA 1.4 meter		21L3797		
SSA .2 meter		31L7092		
2.98 Signal		31L7665		
OCA to IBF		21L3870		
Video Extender Cable		33G9688		

# Parts Catalog

FRU Name	Option PN	FRU PN	Sub PN	Sub PN
Attachment FRUs				
Keyboard		01K1260	04K0051	
Mouse		12J3615	12J3617	
Monitor 6557-43N 19"		60H9963		
Monitor 6557-43S 19"		60H9965		
Monitor 6557-43N 21"		60H9967		
Monitor 6557-43S 21"		60H9969		
Other FRUs				
Torque Tool		6422789		
Parallel Wrap Block for cable		5547283		
Parallel Wrap Block for card		6473024		
Code Group		31L7659	31L7980	
Clean 4mm DAT Cart.		21F8763		
Parallel Terminator		2282675		
Parallel Terminator		2282676		
Token Ring D-shell connector wrap		6165899		
Ethernet RJ45 wrap plug		00G2380		
Token-Ring RJ45 wrap plug		08J5792		

09/02/2000 PC2 Ethernet Replaced.

adapter type → IBM 10016.

Part# → 714375-002

Network Addr → 0004AC3349EF

Interface → 10

✓ BWA → PC2 bus 1

slot → 39 → { Slot = 0x27 }

oth device → ~~0710x~~ { 1600 = }

Primary dev. dev → 1

display → half.

Adapter Capable:

100 base TX F/h

10 base T F/h

Deliver:

INDIA IBMFE.DOS  
INDIA IBMFE.OS2

Supplier file:

INDIA IBMFE.DOS  
O2.NEFV

IBMFEOS2.DOS  
IBMFEOS1.NEF  
IBMFEOS2.NEF

OEMCOMP.INI

MANAGER.DAT

PLANS.INI

INDIA IBMFE.DOS  
OS2.NEF

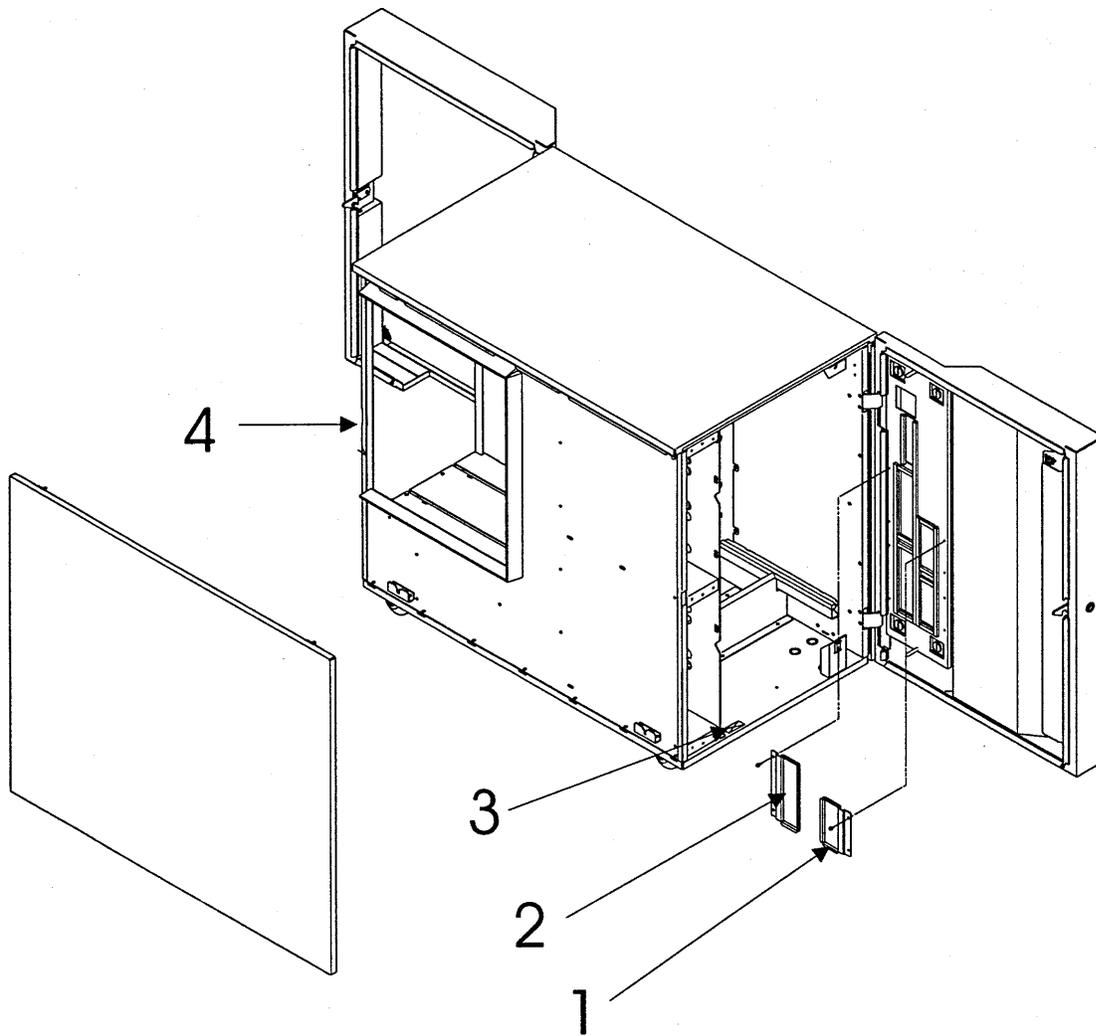
Costing:

$$DA(10) = \frac{\text{Planner.Dat}}{\text{IBMFE.OS2}}$$

Planner.ini

### Assembly 1: Covers

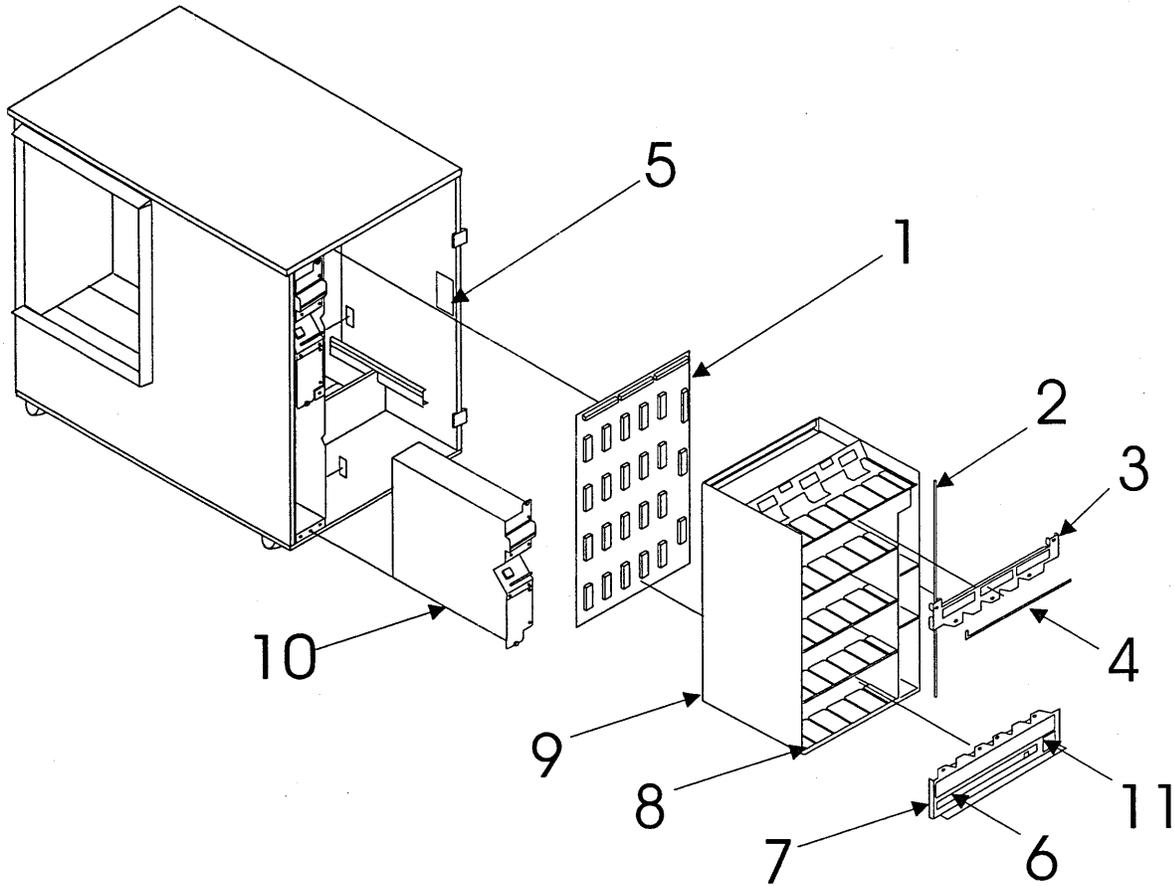
Assembly view, front and side



Asm- Index	Part Number	Units	Description
1-		1	Covers
-1	31L7642	1	• DAT Decorative Cover Plate Use 1624764, screw
-2	21L3847	1	• CDROM Decorative Cover Plate Use 1624764, screw
-3	11J4643	1	• Label Blank (TYPE/MODEL AND S/N)
-4	31L7693	1	• Frame Assembly

### Assembly 2: Cage Assembly

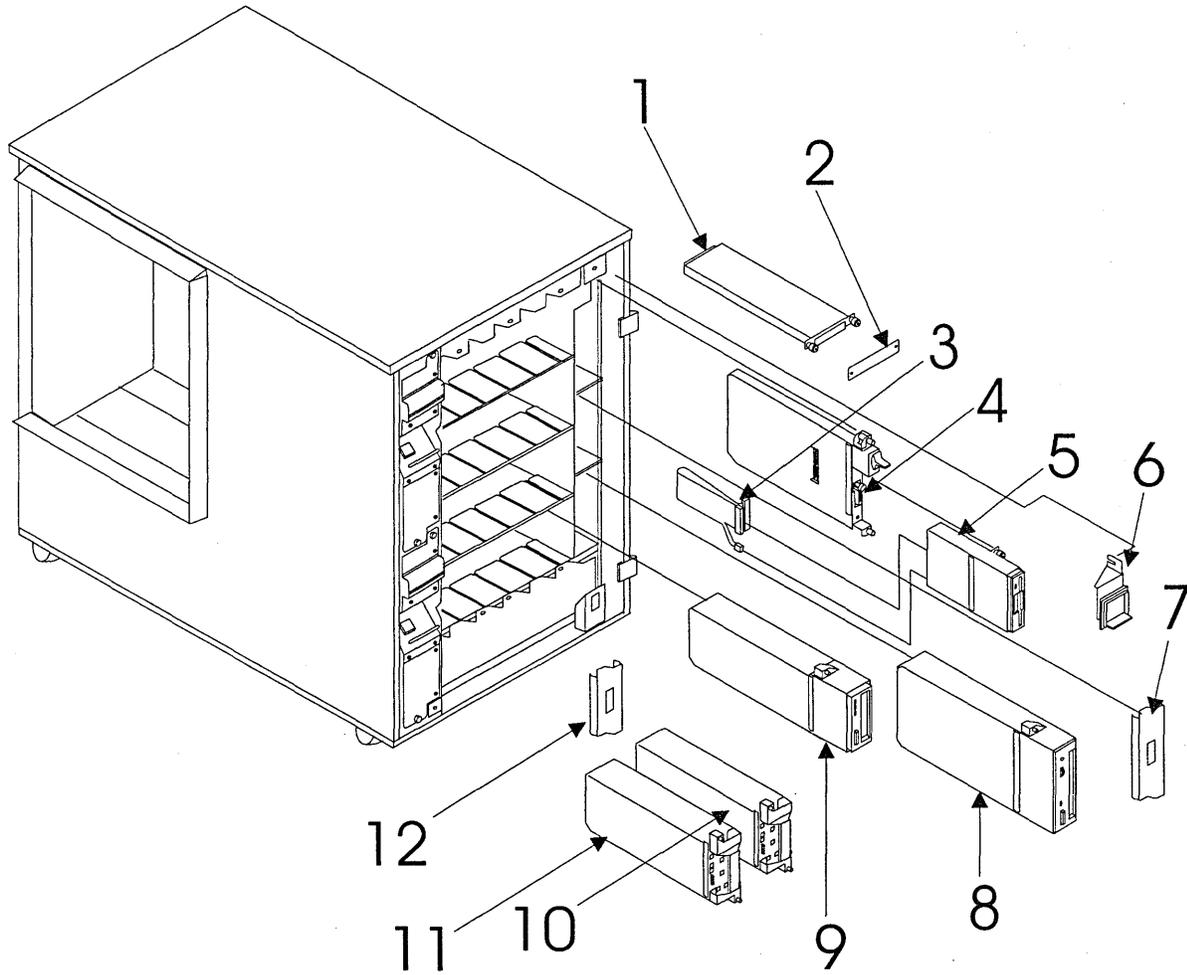
Cage Assembly , Front and side



Asm- Index	Part Number	Units	Description
2-1	60H1108	1	Midplane Board Assembly Use 4236316, (4) screws Use 1622347, (4) lock washers
I -2	31L7463	1	Label Set Reference
I -3	31L7638	1	Plate Use 1624764, (5) screws
I -4	31L7463	1	Label Set Reference
I -5	31L7632	1	Hazardous Energy Label
I -6	21L3843	1	Information Plate
I -7	31L7463	1	Label Set
I -8	31L7463	1	Label Set Reference
I -9	31L7640	1	Cage Assembly Use 5462882, (12) screws
I -10	44H2792	2	Battery
I -11	31L7702	1	BCIQ (Taiwan only) Label

### Assembly 3: I/O Assembly

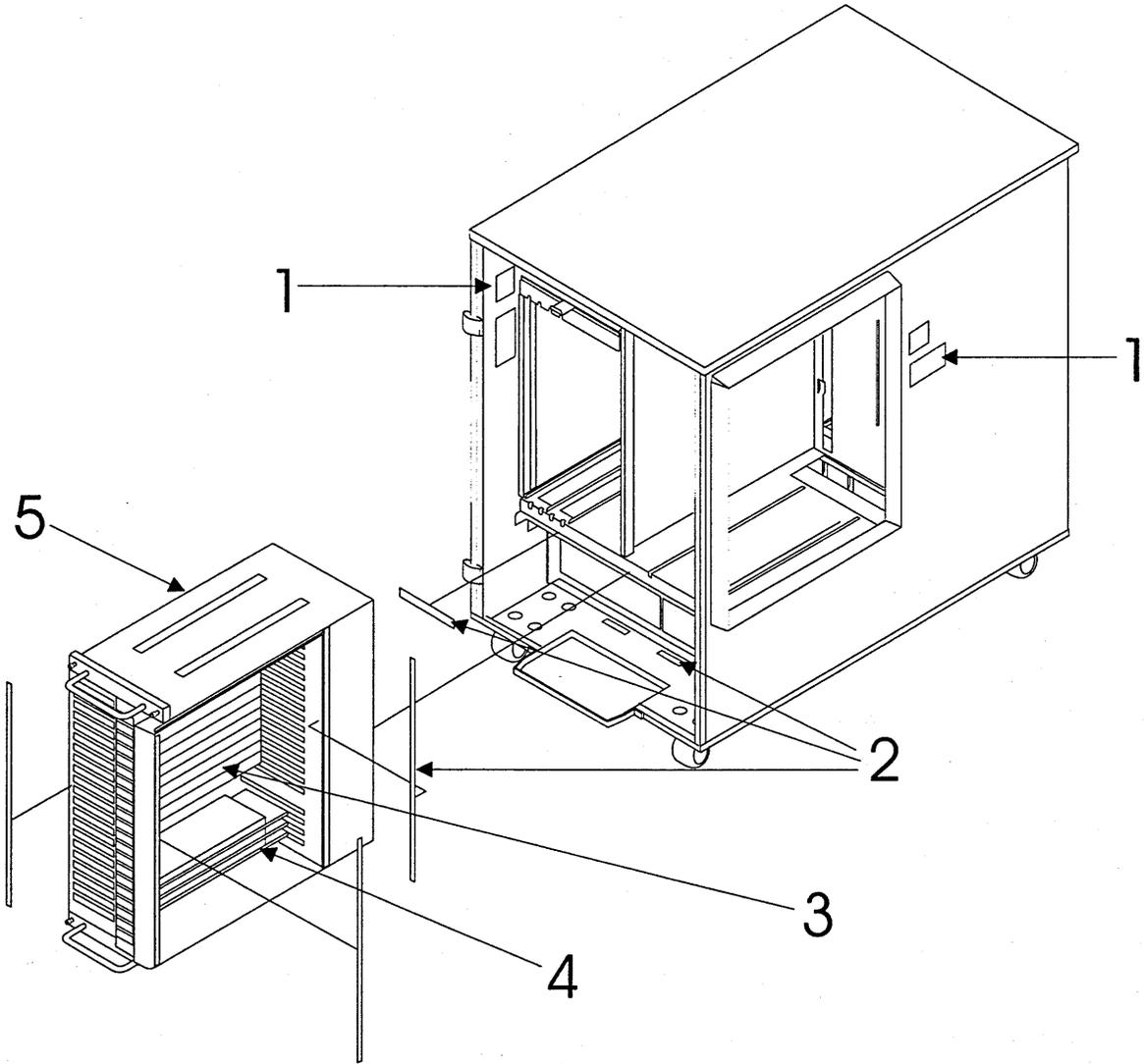
Assembly view, side and front



Asm- Index	Part Number	Units	Description
I 3-1	31L7723	1	SSA Extender Card
-2	47H0216	1	Dummy Extender Cover Use 1624764, (2) screws
-3	21L3816	1	Cable
I -4	31L7709	1	EPO Card
I -5	31L7643	1	Floppy Drive Assembly
I -6	31L7625	1	Switch Bezel Assembly Use 1624764, (2) screws
-7	21L3515	1	CDROM Dummy Cover
-8	21L3498	1	CDROM Assembly Use 1624764, (2) screws
-9	21L3502	1	DAT Assembly
-10	21L3856	1	HDD Jumper ASMPASS
-11	21L3335	1	18.2GB SSA HDD
-12	11J3570	1	HDD Dummy Cover Use 1624764, (2) screws

### Assembly 4: PCI Cage Assembly

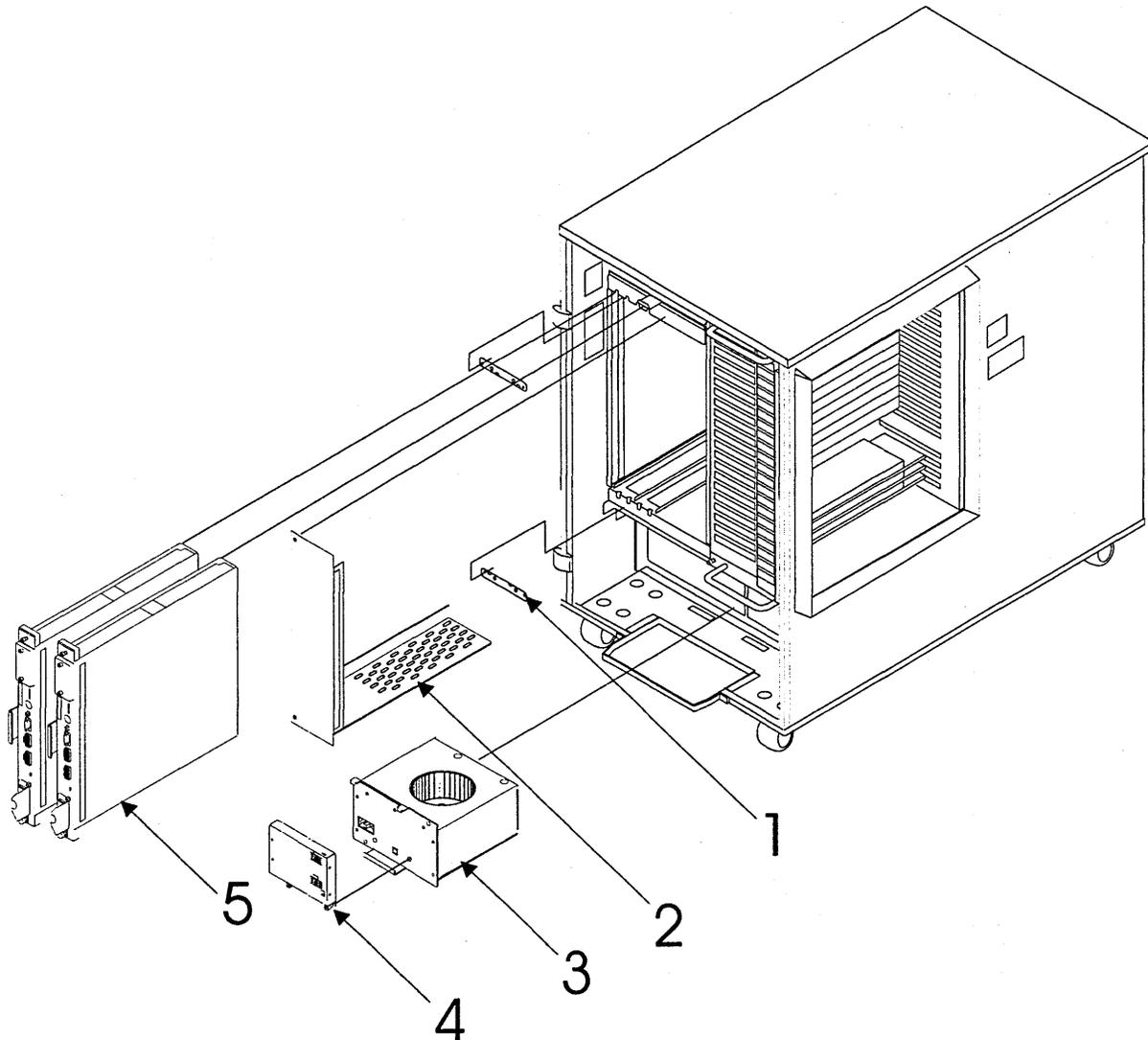
Assembly view, side and rear



Asm- Index	Part Number	Units	Description
4-1	31L7632	2	Hazardous Energy Label The 02G7521 Laser Label is part of this Label
-2	31L7641	2	Label Set Reference (AMD 0 LEFT), (AMD 1 RIGHT)
-3	21L3781	17	1-16 Filler Reference 92F1294 (1-16 screw reference)
-4	21L3783	17	0-31 ISA Filler Reference 92F1294 (0-31 screw reference)
-5	31L7991	1	I/O Cage Assembly

### Assembly 5: Power Assemblies

Assembly view, side and rear



Asm- Index	Part Number	Units	Description
5-1	21L3790	2	Keying Plate Use 21F9002, (4) screws
-2	31L7637	1	PMI Airflow Bracket Use 1624764, (2) screws
-3	31L7030	2	MSA (Blower)
-4	31L7627	2	MDA
-5	31L7661	2	OCA



## Chapter 13. Overview

### Description

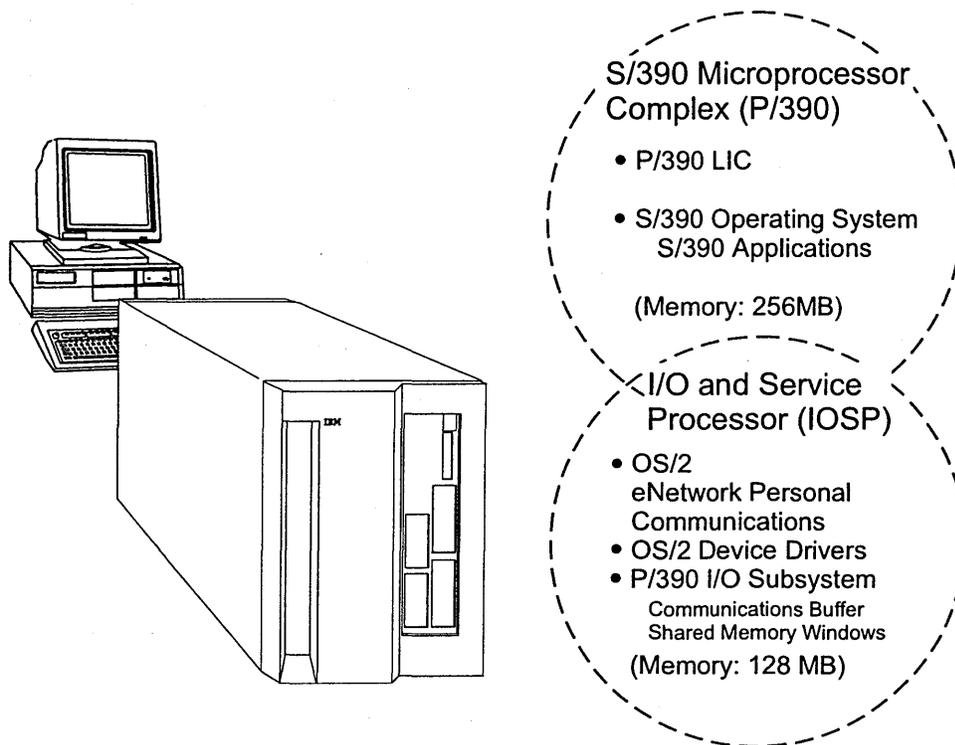


Figure 53. S/390 Integrated Server

The System 390 Integrated Server is a S/390 processor capable of taking advantage of the full range of the ESA architecture. It is capable of attaching to ESCON or Parallel S/390 devices natively through adapters or it can emulate S/390 devices including DASD, tape, communication and display controllers.

The IBM S/390 Integrated Server includes the P/390 adapter (generally referred to in this document as the P/390) which provides a CMOS processor and 256MB of S/390 memory which provides S/390 functionality. All supported OS/390, VM, and VSE operating systems as well as S/390 applications run on the IBM S/390 Integrated Server. The IBM S/390 Integrated Server makes use of an I/O and Service Processor providing an environment for running device managers and emulating S/390 I/O.

The System 390 Integrated Server is made up of two key processing components. An Enhanced S/390 Microprocessor (P/390 complex) provides the S/390 ESA instruction set and runs the VM/ESA, VSE/ESA, and OS/390 operating systems unmodified. Most S/390 applications run unmodified on the System 390 Integrated Server. The second component is an I/O and Service Processor (IOSP) utilizing a high-performance Pentium II processor. This IOSP provides an execution environment for the programs which provide the S/390 I/O emulation.

---

### Hardware

Here are some of the highlights of the System 390 Integrated Server:

- Enhanced S/390 Microprocessor (P/390)
  - Enhanced S/390 Microprocessor with 256MB ECC standard S/390 memory
  - Can use IOSP memory to emulate S/390 expanded storage.
- SBC with an on board high performance Intel Pentium II processor –L1 cache is 32KB and L2 cache is 512KB, memory of 128MB.
- Internal Serial Storage Architecture (SSA) RAID-5 DASD controller
- Sixteen hot-swap DASD bays
- Fifteen available expansion slots: Twelve Peripheral Component Interconnect (PCI) I/O slots and three Industry Standard (ISA) slots
- AGP On Board Video with 2MB memory
- Integrated 10/100Mbps PCI Ethernet controller
- Two high-speed serial ports and one parallel port
- Enhanced 101-keyboard
- IBM PS/2™ mouse
- 1.44MB diskette drive
- CD-ROM drive
- 4mm DDS/3 digital audio tape (DAT).
- Flexible disk configuration
- N+1 Power Redundancy

---

### Software

All currently marketed VM/ESA, VSE/ESA, and OS/390 operating systems and their associated S/390 products are available for the System 390 Integrated Server.

For all System/390 software orders, the distribution is on currently supported media, including the 4mm DAT tape media (digital audio tape) cartridge for most current products. (Base VM/ESA is available today on OMA CD-ROM media.)

As part of the S/390 software order, the customer can request the appropriate preconfigured CD-ROM. The preconfigured CD-ROMs contain S/390 system images that provide a “load and go” system. Included on the CD-ROMs are I/O device maps to help the customer get started and a set of unique tools to take advantage of the dual operating system environment. The preconfigured CD-ROM consists of the base operating system and one or more utility programs.

Internet access will be required for service and support, therefore an additional LAN adapter card or modem will be necessary. The internet connection itself can be provided by an Internet Service Provider (ISP).

### Top View Locations

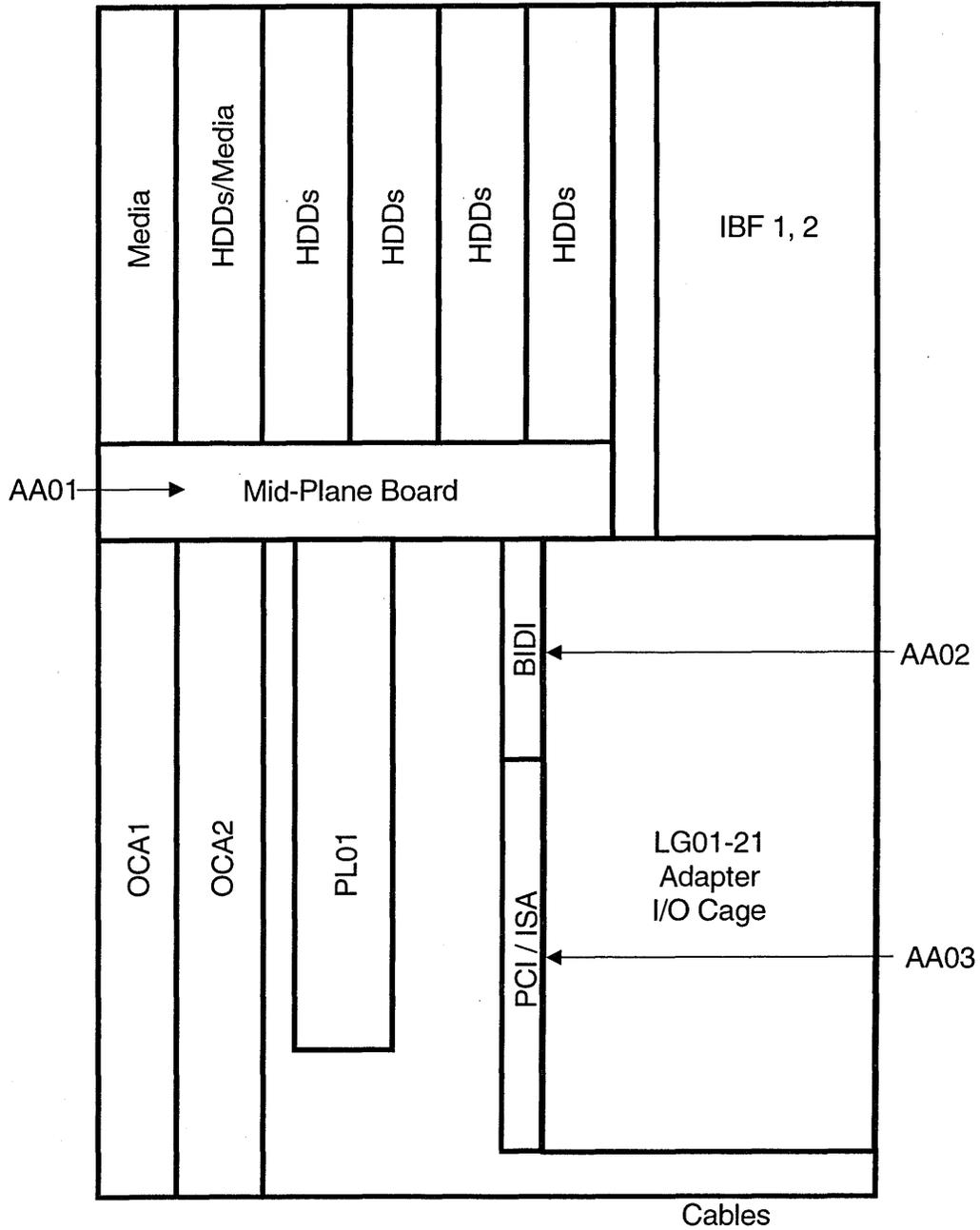


Figure 54. Top locations of the System 390 Integrated Server

Front View

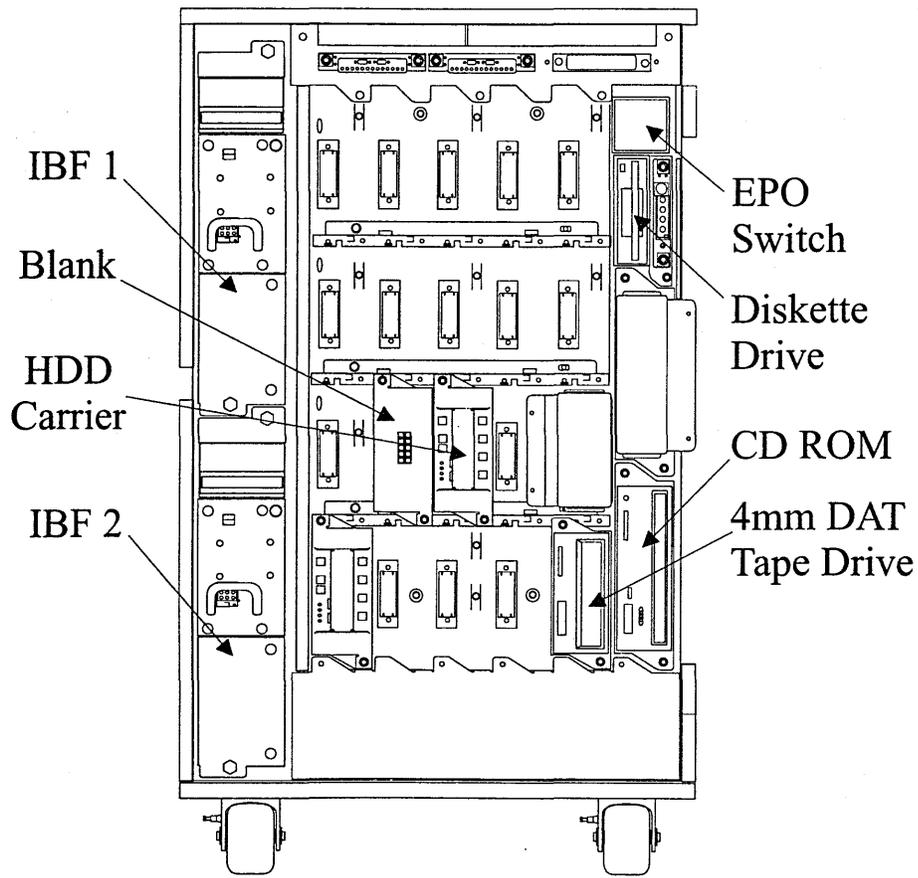


Figure 55. Front View of the System 390 Integrated Server

### Front View Locations

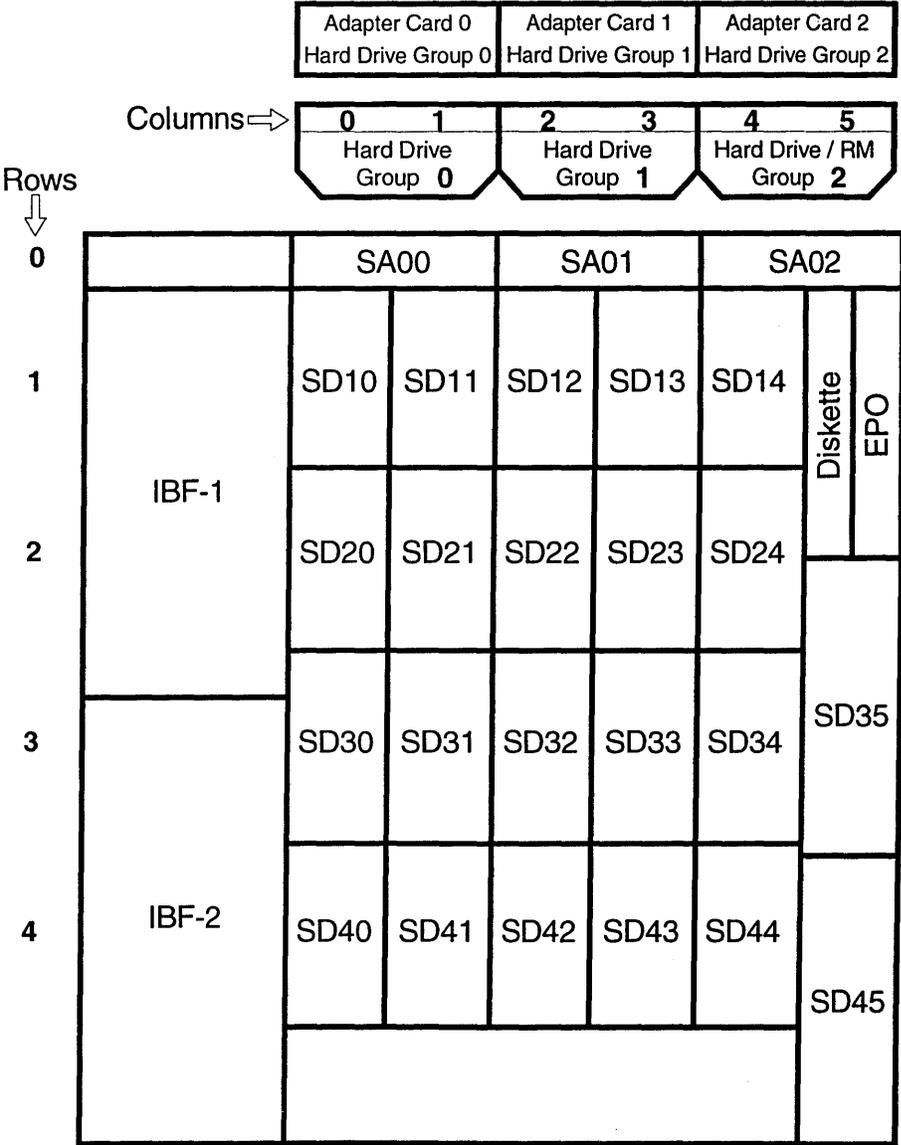


Figure 56. Front locations of the System 390 Integrated Server

Rear View

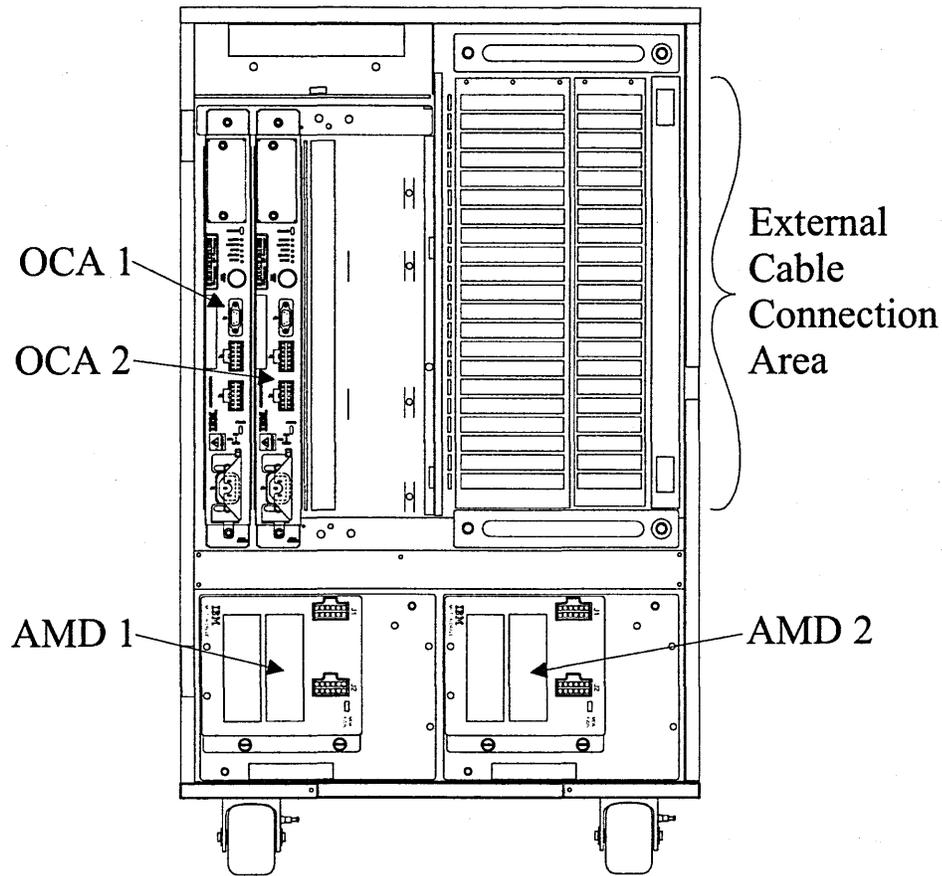


Figure 57. Rear View of the System 390 Integrated Server

Rear View Locations

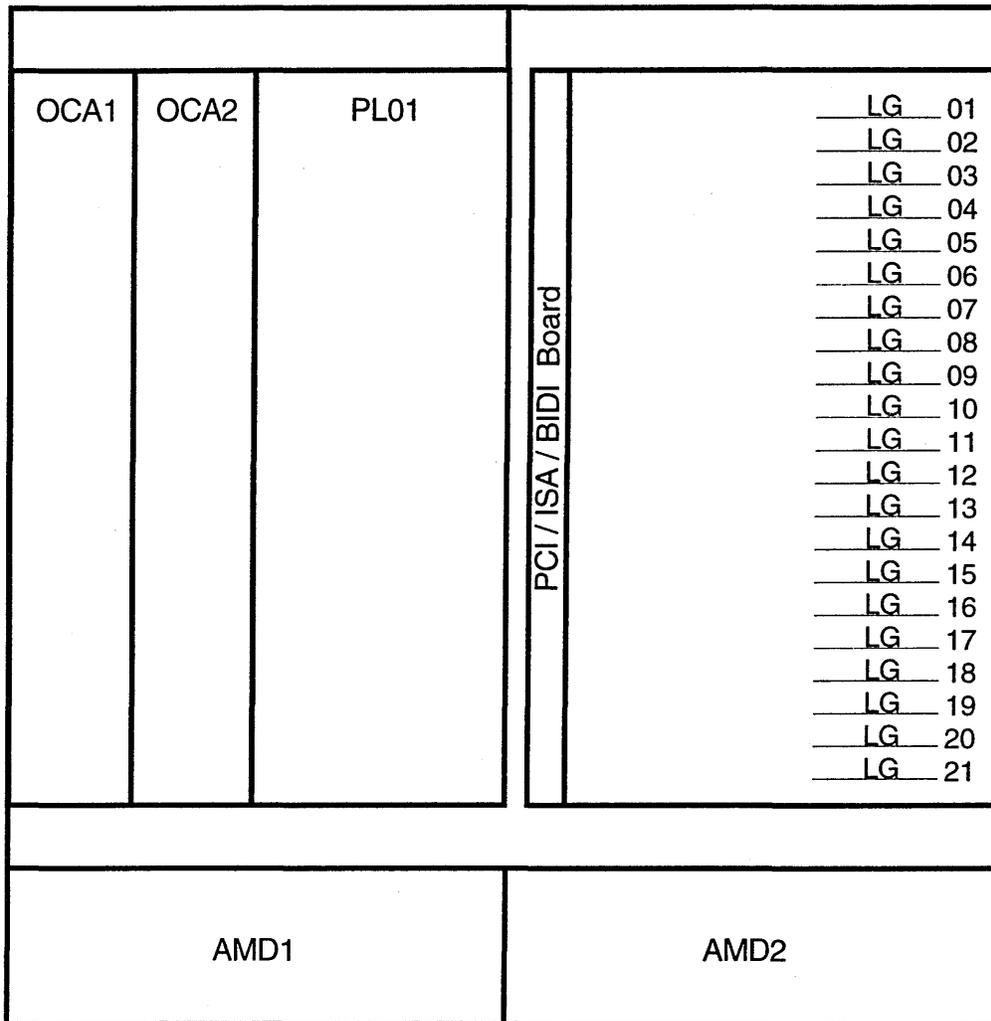


Figure 58. Rear locations of the System 390 Integrated Server

Side View

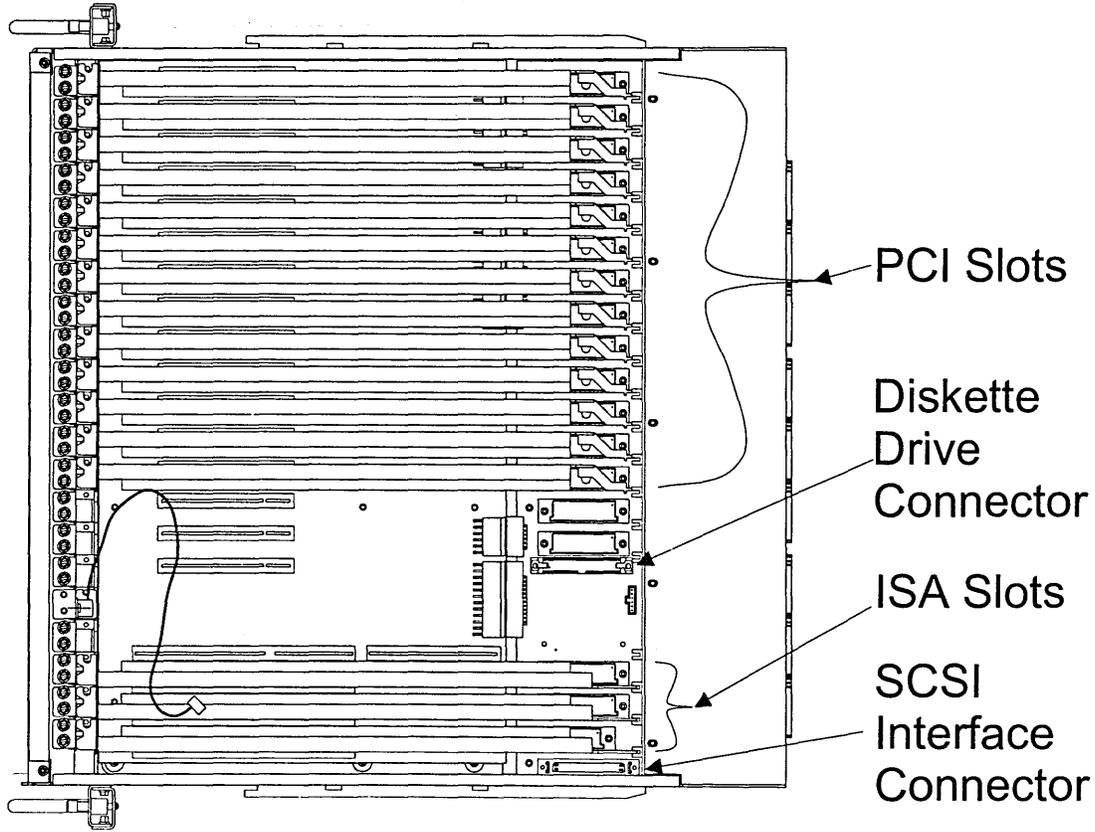


Figure 59. Side View of the System 390 Integrated Server





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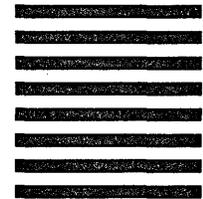
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