IBM

RS/6000 7317 Models F3L and D10
SSA Supplement (11/97)
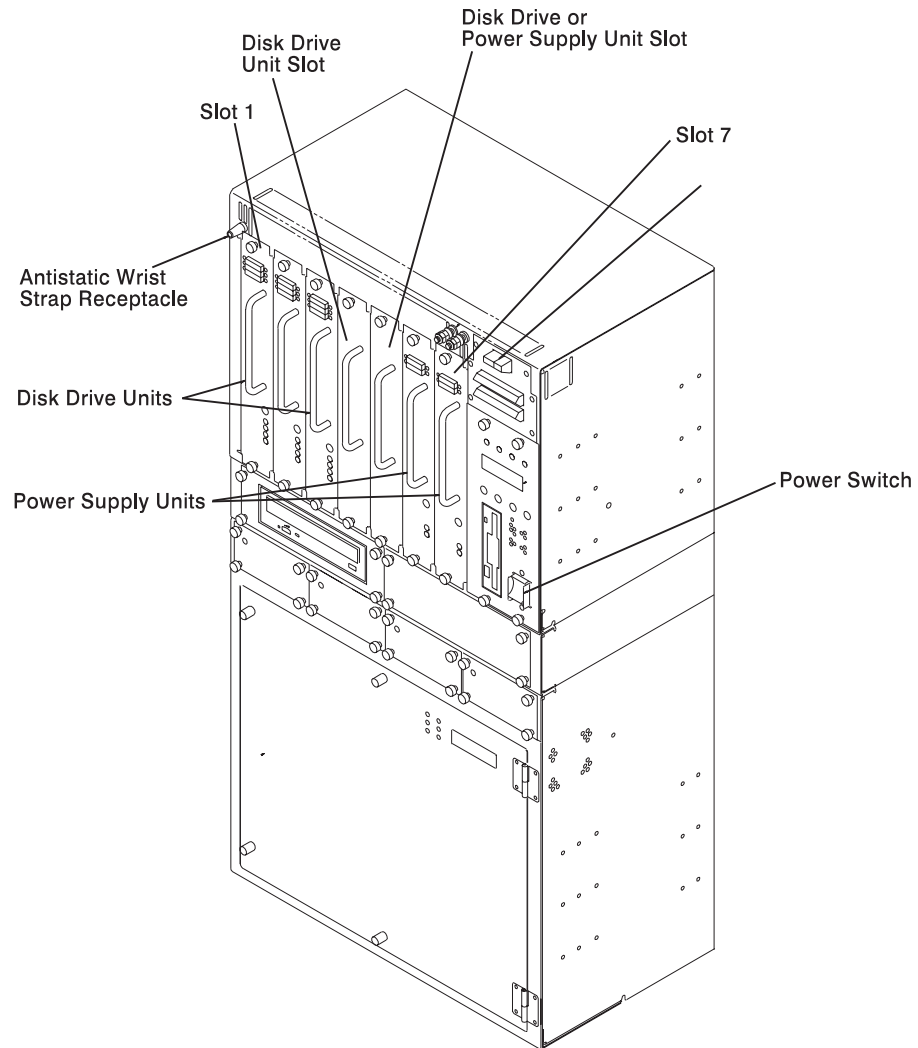
Use this with SA38-0536-01 and SA38-0537-01.

Chapter 1. Reference Information

7317 Model F3L System Unit Locations

System Unit with Optional Media Module (Front View)

Note: The operator panel display shown above, may be mounted above the electronics module door of your system.

Slot Configuration Examples

5 Slot SSA

Slot 1	Slot 2	Slot 3	Slot 4	Slot 5	Slot 6	Slot 7
SSA HD	SSA HD	SSA HD	SSA HD	SSA HD, Power Supply, or Blank	Power Supply	Power Supply

SCSI Boot Disk (in Systems Electronics Module)

5 Slot SSA + 2 Slot SSA

5 Slot SSA Bus					2 Slot SSA Bus	
Slot 1	Slot 2	Slot 3	Slot 4	Slot 5	Slot 6	Slot 7
SSA HD, Power Supply, or Blank	SSA HD, Power Supply, or Blank	SSA HD, Power Supply, or Blank	SSA HD, Power Supply, or Blank	SSA HD, Power Supply, or Blank	SSA HD, Power Supply, or Blank	SSA HD, Power Supply, or Blank

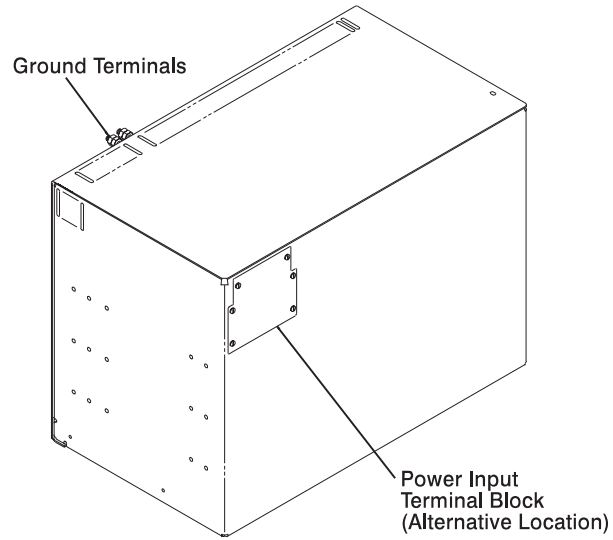| SCSI Boot Disk (in Systems Electronics Module) |
|---|

*** 2 Power Supplies Minimum

5 Slot SCSI + 2 Slot SSA

5 Slot SCSI Bus					2 Slot SSA Bus	
Slot 1	Slot 2	Slot 3	Slot 4	Slot 5	Slot 6	Slot 7
SCSI HD	SCSI HD, or Blank	SCSI HD, Power Supply, or Blank	Power Supply	Power Supply	SSA HD or Blank	SSA HD or Blank

System Electronics Module (Rear View)

Ground Terminals

Power Input
Terminal Block
(Alternative Location)

System Electronics Module (Bottom View)

C-Feed Power
Supply Connector

2-Slot SSA
Connector

Serial Port
Connector

5-Slot SSA
Connector

Bottom when
installed in
a rack

Adapter Slots

Serial Connector (S1)

Parallel Connector

Serial Connector (S2)

Mouse Connector

Keyboard Connector
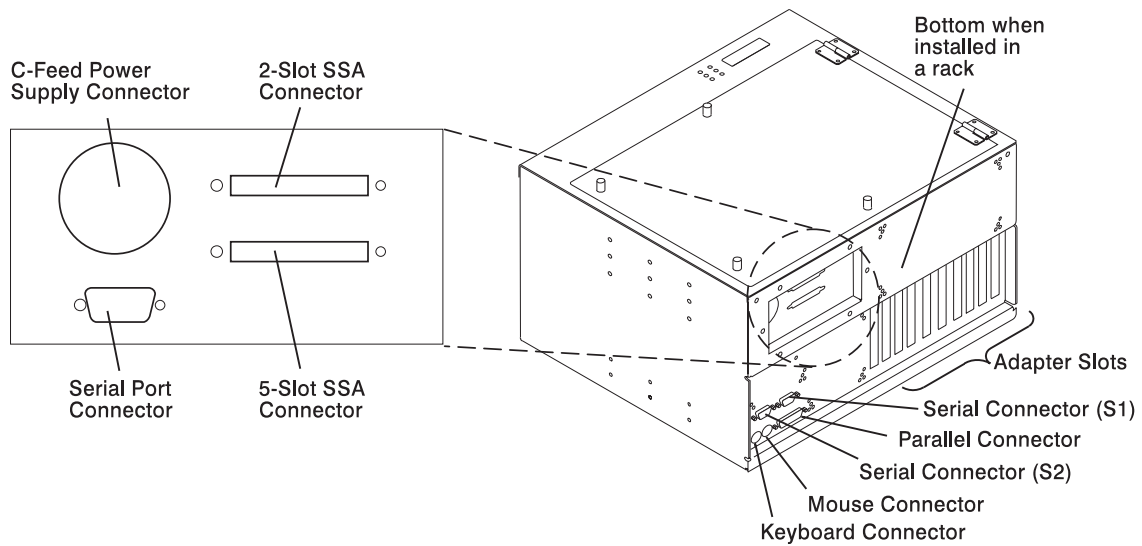
7317 Model D10 DASD Expansion Unit Locations

DASD Expansion Unit (Front View)

Slot 1

Power Switch

Ground Terminals

Power Input
Terminal Block

Slot 10

Antistatic Wrist
Strap Receptical

Disk Drive Units

SSA Connectors
for Slots 1 thru 5

Power Supply Unit
for Slots 1 to 5

Power Supply Unit
for Slots 6 to 10

SSA Connectors
for Slots 6 to 10
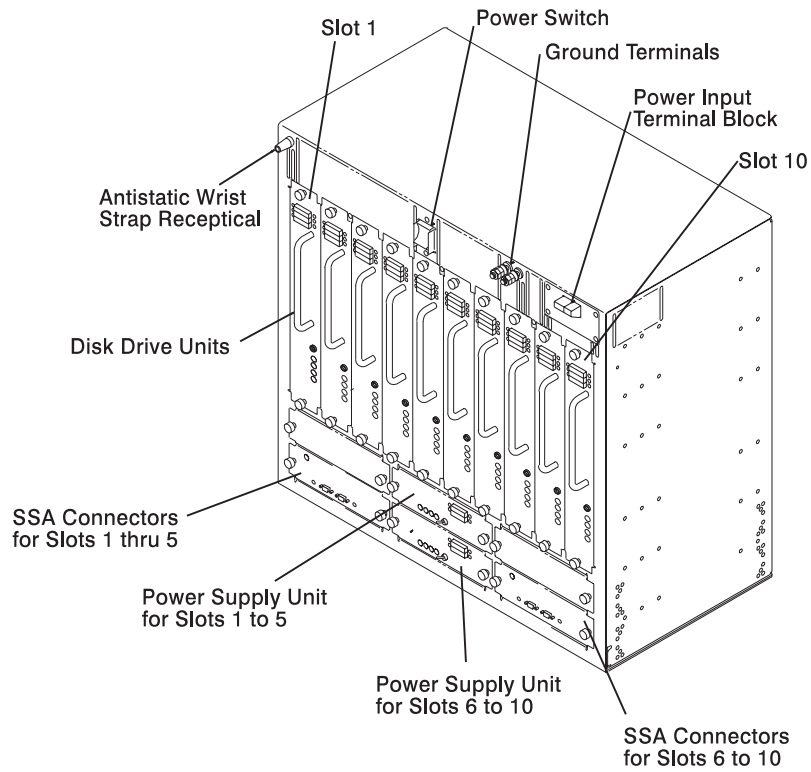
Chapter 2. SSA Installation Updates

This chapter highlights special Serial Storage Architecture (SSA) installation considerations.

Attention: This equipment is intended for installation in a restricted access location over a concrete floor or other noncombustible surface only.

Setting Up your SSA Disk Drive Expansion Unit

Step 1. Installing the Disk Drive Expansion Unit in the Rack

1. Before removing the cabinet from its shipping packaging, remove all disk drive units and blank covers by loosening the two thumb screws on each and then pulling them out using the individual handle. Note the location of each unit for later re-installation.

   CAUTION:
   This unit weighs betweem 18kg (39.7 pounds) and 32 kg (70.5 pounds). Two persons are required to safely move it. Using less than two persons to move it can result in injury.

   ATTENTION:
   The handles are designed to support the weight of the individual units only, and should not be used to lift or guide the entire cabinet.
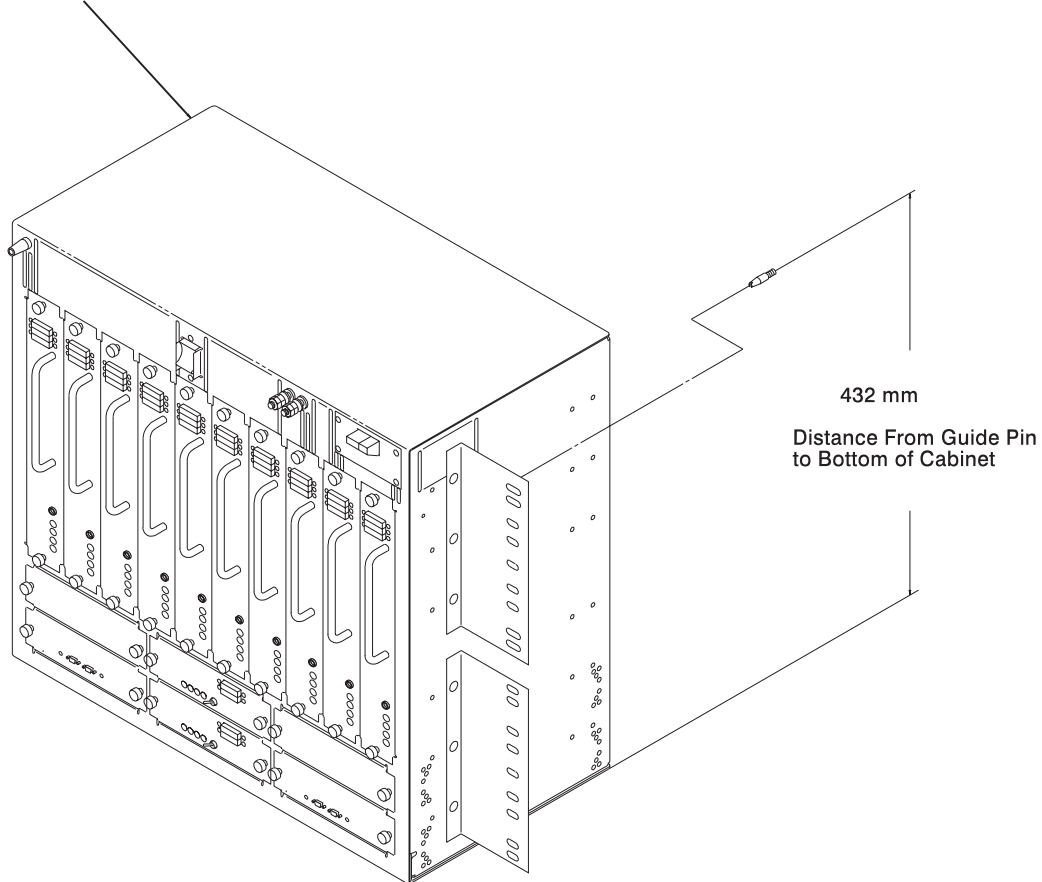
2. Attach the side brackets to the cabinet.

Cabinet

Rail

Guide Pin

Rail Bracket (23 inch)
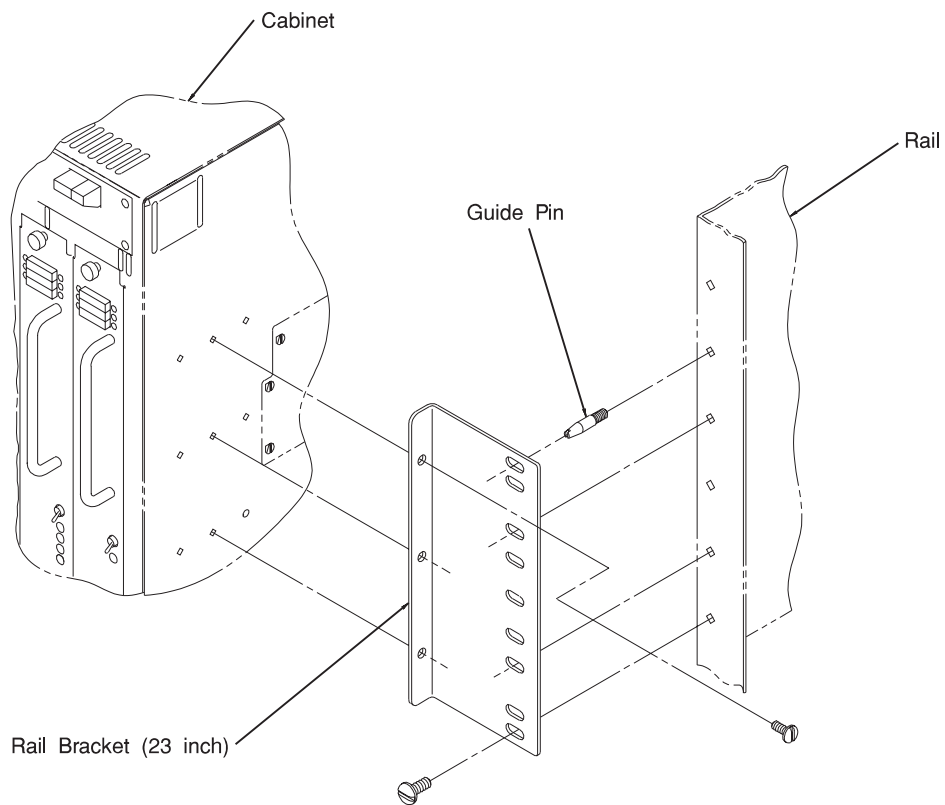
3. Put the guide pins in the rack at the desired height position.

   Note: The distance from the upper most hole for the guide pins to the bottom of the cabinet is 432 mm (17 inches).

System Cabinet

432 mm

Distance From Guide Pin to Bottom of Cabinet

4. Lift the cabinet onto the guide pins in the rack.

5. Holding the cabinet on the pins and against the rack, install at least one screw on each side of the cabinet near the bottom.

6. Install at least four more screws on each side of the cabinet.

7. Reinstall all disk drive units and blank covers into their original locations.

Step 2. Observe this Safety Notice during Installation

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

DANGER

> **An electrical outlet that is not correctly wired could place hazardous voltage on metal parts of the system or the devices that the outlet is correctly wired and grounded to prevent an electrical shock.**
>
> **Before installing or removing signal cables, ensure that the power cables for the system unit and all attached devices are unplugged.**
>
> **When adding or removing any additional devices to or from the system, ensure that the power cables for those devices are unplugged before the signal cables are connected. If possible, disconnect all power cables from the existing system before you add a device.**
>
> **Use one hand, when possible, to connect or disconnect signal cables to prevent a possible shock from touching two surfaces with different electrical potentials.**
>
> **During an electrical storm, do not connect cables for display stations, printers, telephones, or station protectors for communications lines.**

CAUTION:
This product is designed to support dual -48 V dc feeds. Care must be exercised when removing power from the system to ensure both -48 V dc feeds are de-energized.

This product is designed with two ground points. Both may be used, but, at least one must be connected to earth ground.

DANGER

> **To prevent shock hazard, disconnect the power source at the TELCO fuse panel.**

Step 3. Restricted Access Area Notice

The 7317 Model D10 disk drive expansion unit must be installed only in restricted access areas such as dedicated equipment rooms or equipment closets in accordance with Articles 110-16, 110-17, and 110-18 of the National Electrical Code, ANSI/NFPA No. 70.

Step 4. Setting Up the Disk Drive Expansion Unit

1. Be sure the power cables to the system unit and disk drive expansion unit are disconnected and the power switch is set to the "off" position.

2. Ensure power supply units, disk drive units, and blank covers are fully seated and thumb screws are finger tight.

3. Record the positions of the devices attached to the SSA controllers in Chapter 7, "Device Records" on page 7-1. If needed, use the customer planning information, *RS/6000 Adapter, Device, and Cable Information for Multiple Bus Systems*, or other information supplied by the customer to determine the positions of the drives.

4. Connect the power cables to the power input terminal blocks on the disk drive expansion unit. For additional information, go to terminal block definitions in your installation and service guide.

5. Using the D-shell connectors on the 7317 Model D10 SSA inputs as keys, connect the appropriate 1.5 or 3.0 meter SSA cables between the 7317 Model D10 connnectors and the 7317 Model F3L SSA adapters. Route cables outward and then along side and back of the cabinet mounting brackets.

6. Arrange the cables to the side of the system unit.

7. Turn power switch "on."

SSA Maintenance Analysis Procedures (MAPs)

These maintenance analysis procedures (MAPs) describe how to analyze a continuous failure that has occurred in a system that contains two or more disk drive modules. Failing field-replaceable units (FRUs) of the system unit can be isolated with these MAPs.
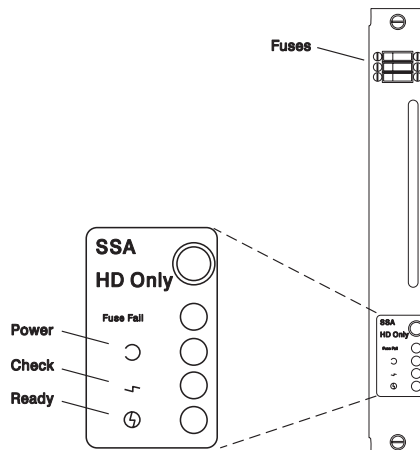
How to Use These MAPs

Attention: Switching off the power to an SSA Hot-Swap Disk Drive can cause a system fault unless you first make the SSA Hot-Swap Disk Drive modules unavailable to the system unit. To do this:

1. Use the system-management task menus to make the disk drive modules unavailable.

2. If the system unit has more than one SSA adapter, make the SSA Hot-Swap Disk Drive modules unavailable to the system for each of the paths to the SSA Hot-Swap Disk Drive.

3. If more than one system is on the ring, it is necessary to make the disk unavailable to all systems.

Attention: Unless the system unit needs to be switched off for some other reason, do not switch off the power to the system unit when servicing an SSA Hot-Swap Disk Drive or the external SSA cable.

- To isolate the FRUs associated with in the failing SSA Hot-Swap Disk Drive, perform the actions and answer the questions given in this MAP.

- 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 (see the using-system service procedures).

    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. Perform the next action indicated by the MAP.

- The following table explains the meaning of the Power, Ready and Check status LEDs.

Status LEDs		
LED	**Status**	**Definition**
Power (Green)	On	Power On
	Off	Power Off
Check (Amber)	On	Disk drive failure
		Self-test running
		Drive in service mode
	Blinking	Disk drive selected
Ready (Green)	On	Both SSA connections good and drive is ready
	Blinking	Only one SSA connection good
	Flickering	Drive is executing a command
Fuse Fail (Red)	On	1 or >1 Fuses Blown
	Off	Normal

MAP 2010: SSA Hot-Swap Disk Drive–Start

This MAP is the entry point to the MAPs for the SSA Hot-Swap Disk Drive. If you are not familiar with these MAPs, read "How to Use These MAPs" on page 2-6 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 an SSA Hot-Swap Disk Drive module.
- Another MAP sent you here.
- A customer observed a problem that was not detected by the system problem determination procedures.

Step 2010-1

Have you been sent to this MAP from the Configuration Verification service aid?

NO   Go to "Step 2010-3" on page 2-10.

YES   Go to "Step 2010-2" on page 2-9.

Step 2010-2

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

1. You have an hdisk that has no associated pdisk.

   a. Issue the system **cfgmgr** command.

   b. Retry the Configuration Verification service aid.

   c. If the problem remains, a software error has probably occurred. Call your support center for assistance.

2. You have a pdisk that has no associated hdisk.

   a. Run diagnostics (using system verification mode) to the pdisk.

   b. If you get an SRN, go to *SSA Adapters: User's Guide and Maintenance Information*.

   If you do not get an SRN, the disk formatting may be incompatible with the system (the disk was formatted on a different type of using system).

      1) Format the pdisk.

      2) Issue the system **cfgmgr** command

      3) Retry the Configuration Verification service aid.

3. If the problem remains, a software error has probably occurred. Call your support center for assistance.

Step 2010-3

Have the system diagnostics or problem determination procedures given you an SRN for the SSA Hot-Swap Disk Drive?

NO   Go to "Step 2010-4."

YES   Go to *Diagnostics Information for Multiple Bus Systems*.

Step 2010-4

If the system diagnostics are available, go to "Step 2010-5."

If the stand-alone diagnostics are available, but the system diagnostics are not available, run them, then go to "Step 2010-5."

If the system diagnostics and stand-alone diagnostics are not available, go to "Step 2010-1" on page 2-8.

Step 2010-5

Run the diagnostics in the problem determination mode.

Note: Do not run the advanced diagnostics, because errors are logged on other using systems that share the same loop.

Did the diagnostics give you an SRN for the SSA Hot-Swap Disk Drive?

NO   Go to "Step 2010-6" on page 2-11.

YES   Go to *Diagnostics Information for Multiple Bus Systems*.

Step 2010-6

Are all LED's on the drives in a 5 pack off?

NO   Go to step "Step 2010-9."

YES   Go to "Step 2010-7."

Step 2010-7

Are any power cables loose or in need of replacement? Are any failed fuses' lamps on? Is the D10 power switch on? Are the power supply units on? (See "7317 Model D10 DASD Expansion Unit Locations" on page 1-4.)

NO   Go to "Step 2010-8."

YES   Fix or replace the power cables' fuses and power supplies as required. Go to "MAP 410: Repair Checkout" in *RS/6000 Diagnostic Information for Multiple Bus Systems* to verify the repair. (If fuse fails again, replace the book.)

Step 2010-8

Replace the backplane.* Go to "MAP 410: Repair Checkout" in *RS/6000 Diagnostic Information for Multiple Bus Systems* to verify the repair.

Note: *If this is a D10, verify that the power supplies are on.

Step 2010-9

Is there only one drive with no LED's on?

NO   Go to step "Step 2010-10" on page 2-12.

YES   Replace the the following FRU's:

   1. Backplane

   2. Disk drive assembly

   Go to "MAP 410: Repair Checkout" in *RS/6000 Diagnostic Information for Multiple Bus Systems* to verify the repair.

Step 2010-10

Is the Power LED (on one or more disk drives, on a backplane) off?

NO   Go to step "Step 2010-11."

YES   Replace the Backplane FRU. Go to "MAP 410: Repair Checkout" in *RS/6000 Diagnostic Information for Multiple Bus Systems* to verify the repair..

Step 2010-11

Is the Ready LED in the drive at the end of the backplane flashing?

NO   Go to step "Step 2010-8" on page 2-11.

YES   Go to step "Step 2010-12."

Step 2010-12

Replace the SSA link cable closest to the flashing LED. Did the LED stop flashing?

NO   Go to step "Step 2010-13."

YES   Go to "MAP 410: Repair Checkout" in *RS/6000 Diagnostic Information for Multiple Bus Systems* to verify the repair.

Step 2010-13

Replace the following:

1. Backplane
2. Disk drive with the Ready LED flashing

Go to "MAP 410: Repair Checkout" in *RS/6000 Diagnostic Information for Multiple Bus Systems* to verify the repair.

Chapter 3. Removal and Replacement Procedures

Handling Static–Sensitive Devices

> **Safety**
>
> **Be sure to read "Step 2. Observe this Safety Notice during Installation" on page 2-4 before you begin the removal and replacement procedures.**

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

Take the following precautions:

* If you have an antistatic wrist strap available, use it while handling the device.

* Do not remove the device from the antistatic bag until you are ready to install the device in the system unit.

* With the device still in its antistatic bag, touch it to a metal frame of the system.

* Grasp cards and boards by the edges. Hold drives by the frame. Avoid touching the solder joints or pins.

* If you need to lay the device down while it is out of the antistatic bag, lay it on the antistatic bag. Before picking it up again, touch the antistatic bag and the metal frame of the system unit at the same time.

* Handle the devices carefully in order to prevent permanent damage.
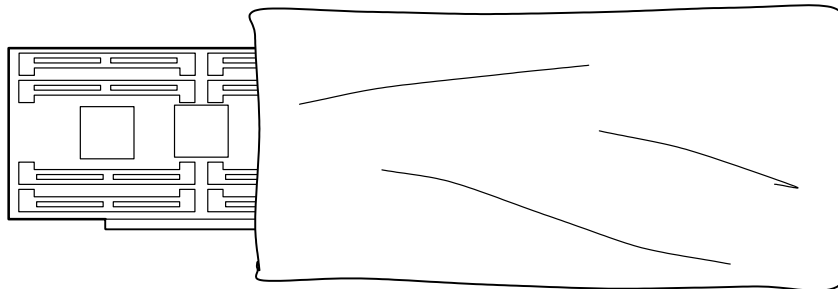
SSA Disk Drive Unit (7317 Model F3L)

Note: Each disk drive unit has four status lights indicating the following:

Status LEDs		
LED	**Status**	**Definition**
Power (Green)	On	Power On
	Off	Power Off
Check (Amber)	On	Disk drive failure
		Self-test running
		Drive in service mode
	Blinking	Disk drive selected
Ready (Green)	On	Both SSA connections good and drive is ready
	Blinking	Only one SSA connection good
	Flickering	Drive is executing a command
Fuse Fail (Red)	On	1 or >1 Fuses Blown
	Off	Normal

Removal

Attention

An application procedure unique to your operating system must be followed which logically removes the drive from the system and spins it down. If you remove a drive while it is in use, you may lose valuable data.

Caution should be used when handling all hard disk drives. Drives are more likely to be damaged during installation and service. Bumping or handling drives roughly causes latent failures. Do not stack drives and always use appropriate ESD practices. A drop of as little as 6.5 mm (.25 inches) can cause latent failures. Media can take 30 seconds to spin down. Ensure at least a 30 second delay has passed after switching off hot-swappable drives for removal.

1. Locate the drive (the check light should be on). The bottom green status light is off. This indicates the drive is off and the unit is safe to remove. If this is not the case, use diagnostics to shut the drive down.

   Note: It is not necessary to turn the system power switch off.

2. Unscrew the thumb screws at the top and bottom of the disk drive unit.

3. Grasp the handle and pull the disk drive unit out of the disk drive module.

> **Attention**
>
> SSA backplanes must be fully populated. Each backplane connector must have a disk drive or a jumper installed at all times. If you remove a disk drive from a slot and do not replace it, install a jumper on the SSA backplane connector and install a blank cover in the empty slot.

Replacement

1. Grasp handle, align the disk drive unit on the plastic guide rails, and slide it into the disk drive module until fully seated.

2. Tighten top and bottom thumb screws.

3. The bottom green light should be on continuously.

Fuse (Power Supply Unit or Disk Drive Unit - 7317 Model F3L)

Notes:

1. A fuse failure is electrically indicated by the fuse status light on.

2. Individual fuse failure is mechanically indicated by the plastic tipped spring swung to the side.

Removal

1. Do not power the system or the unit down.

2. Grasp the plastic body of the failed fuse only and pull directly outward.

3. Note the fuse amperage painted on the side of the fuse.

   Note: The fuse amperage is also indicated on the label next to the fuse block.
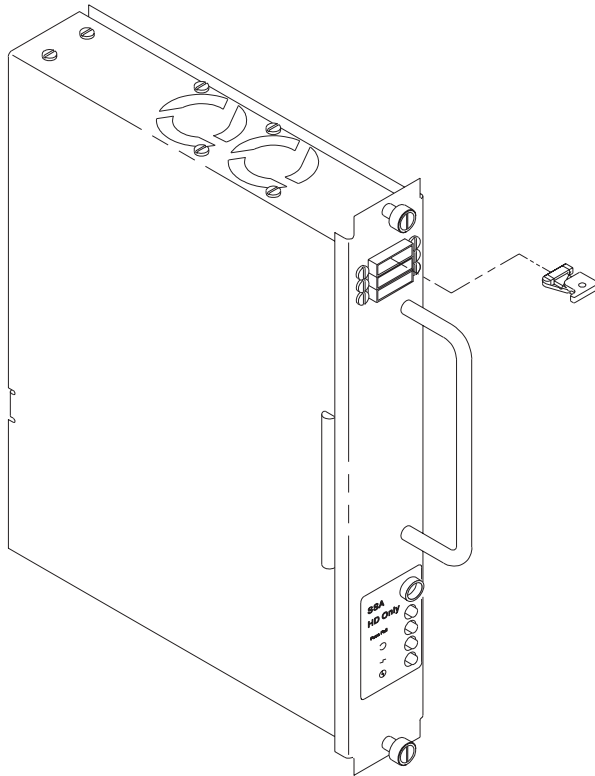
Replacement

1. Obtain replacement fuse of same amperage as failed fuse. (System power supply unit fuses are 10 amp. Disk drive unit fuses are 2 amp. D10 power supply unit fuses are 3 amp.) A good fuse does not have its plastic tipped spring swung out to the side.

2. Grasp the plastic fuse body and insert it into the same slot holder from which the failed fuse was removed. The fuse is keyed to be inserted only one way.

3. Press fuse in until fully seated. Fuse failure light does not turn on. Light goes out when failed fuse is removed.

SSA Backplane - Two Slot (7317 Model F3L)

┌─ **Attention** ──

You MUST connect or disconnect the **C Feed cable** when you perform the procedures listed in this attention box for the **two slot SSA backplane**. Please note that your system unit Installation and Service Guide does not include either the connect or disconnect C Feed cable step. (This is **only** required for two slot backplane procedures.)

When you are performing either removal procedure listed in this box, disconnect the C Feed cable right after you complete step 1. When you are performing either replacement procedure listed in this box, connect the C Feed cable right after you complete step 4.

- Alarm LCD Display Panel and Switch Card (7317 Model F3L) - **Removal**
- Alarm LCD Display Panel and Switch Card (7317 Model F3L) - **Replacement**
- Power-In Backplane (7317 Model F3L) - **Removal**
- Power-In Backplane (7317 Model F3L) - **Replacement**
- Power-Out Backplane (7317 Model F3L) - **Removal**
- Power-Out Backplane (7317 Model F3L) - **Replacement**

Removal

1. Turn system power switch off. Disconnect optional C Feed cable from the bottom of the box.

2. Connect antistatic wrist strap to ground terminal.

3. Remove all seven disk drive and power supply units or blank covers from the disk drive module. Note the locations from which they were removed. (See appropriate removal procedure.)

4. Remove the Nomex[1] safety shield.

5. The SSA backplane is the middle-right backplane. Remove all four fastening screws and support the card in your hand.

6. Disconnect the SSA data cables from J13 and J11. Disconnect the power cables on J17 and J16. Remove the backplane.

Replacement

1. Connect the SSA data cable (to J13 and J11). Connect the power cables to J17 and J16.

2. Align the card on the tapped holes in the chassis and fasten with four M3 x 6 mm screws.

3. Reinstall the Nomex safety shield.

4. Reinstall the disk drive units and blank covers into the locations from which they were removed.

5. Connect the optional C Feed cable at the bottom of the box.

6. Remove the antistatic wrist strap from the ground terminal.

7. Turn appropriate power supply unit on.

8. Go to the *Unconfiguring or Configuring a Disk Drive* section of your system unit User's Guide. Configure the disk drive units that are connected to the backplane that you replaced.

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[1] Nomex is a registered trademark of E. I. DuPont deNemours and Company.

SSA Backplane - Five Slot without Optional Two Slot Backplane (7317 Model F3L)

Removal

Attention

Use this procedure if you only have a five slot SSA backplane and no two slot backplane, OR if you have a five slot backplane and a two slot backplane but the C Feed is NOT USED.

---

1. Turn system power switch off.

2. Connect antistatic wrist strap to ground terminal.

3. Remove all seven disk drive and power supply units, or blank covers from the disk drive module noting locations from which they were removed. (See appropriate removal procedure.)

4. Remove the Nomex safety shield.

5. The SSA backplane is the middle-left backplane. Remove all eight fastening screws and support the card in your hand.

6. Disconnect the SSA data cables from J14, J13, J12 and J11. Disconnect the power cables on J17 and J16. Remove the backplane.

Power-In Backplane

5-Slot SSA Backplane

2-Slot SSA Backplane (Optional)

Power-Out Backplane
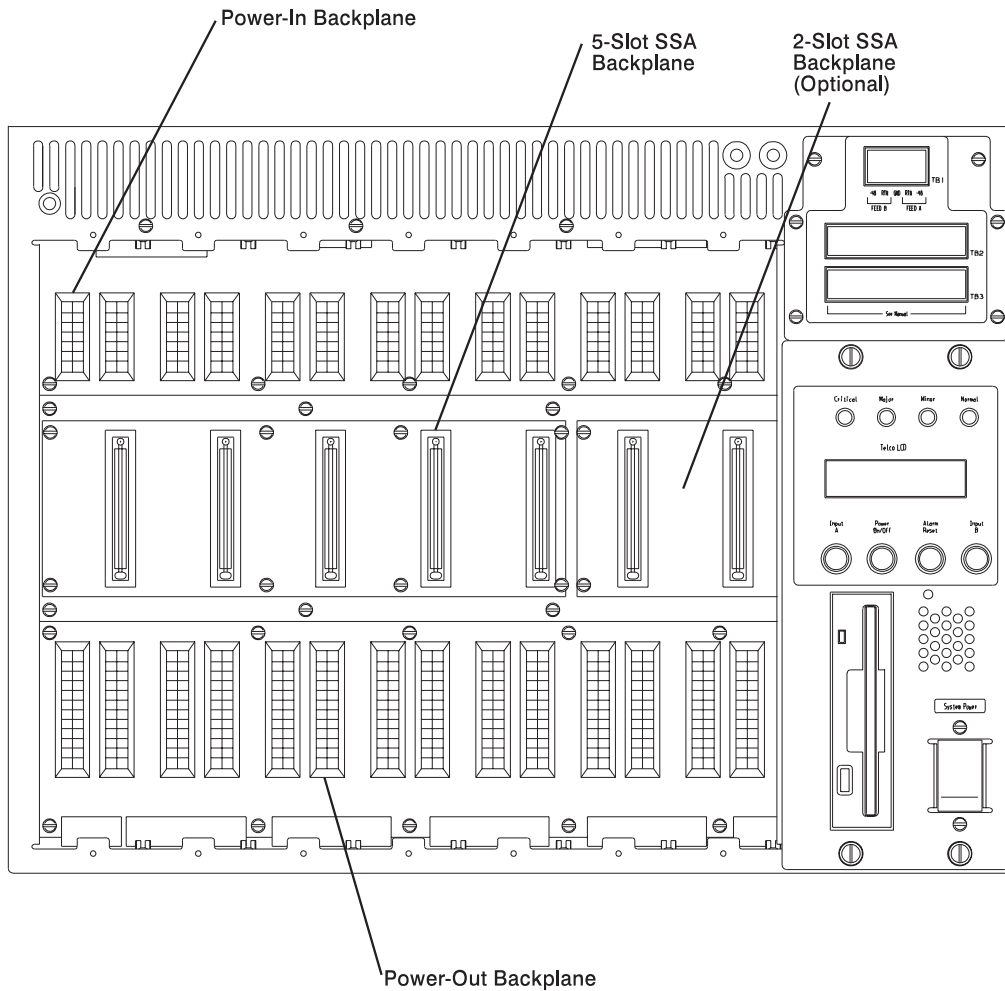
Replacement

1. Connect the SSA data cables at J14, J13, J12, and J11. Connect the the power cable, P11A, into J16 (the SSA socket) on the back of the replacement card.

2. Align card to tapped holes in chassis and fasten with eight M3 X 6 mm screws.

3. Reinstall the Nomex safety shield.

4. Reinstall disk drive units, power supply units, and blank covers into the locations from which they were removed.

5. Remove antistatic wrist strap from ground terminal.

6. Turn system power switch on.

SSA Backplane (7317 Model D10)

Removal

1. Leave the 7317 Model D10 System power switch on.

2. Go to *Unconfiguring or Configuring a Disk Drive* in your system unit User's Guide. Unconfigure the disk drive units that you are removing.

3. Turn the appropriate power supply unit switch off.

   Note: The upper power supply unit powers the left five disk drive unit locations, and the lower power supply unit powers the right five locations.

4. Connect antistatic wrist strap to ground terminal.

5. Remove the five disk drive units and blank covers that reside over the backplane to be removed, noting locations from which they were removed.

6. Remove the Nomex safety shield.

7. The backplanes are the two lower backplanes. Remove all eight fastening screws of the backplane to be removed and support it in your hand.

8. Disconnect the SSA data cables from J14, J13, J12 and J11. Disconnect the power cables on J17 and J16. Remove the backplane.

Power-In Backplane   SSA Backplanes
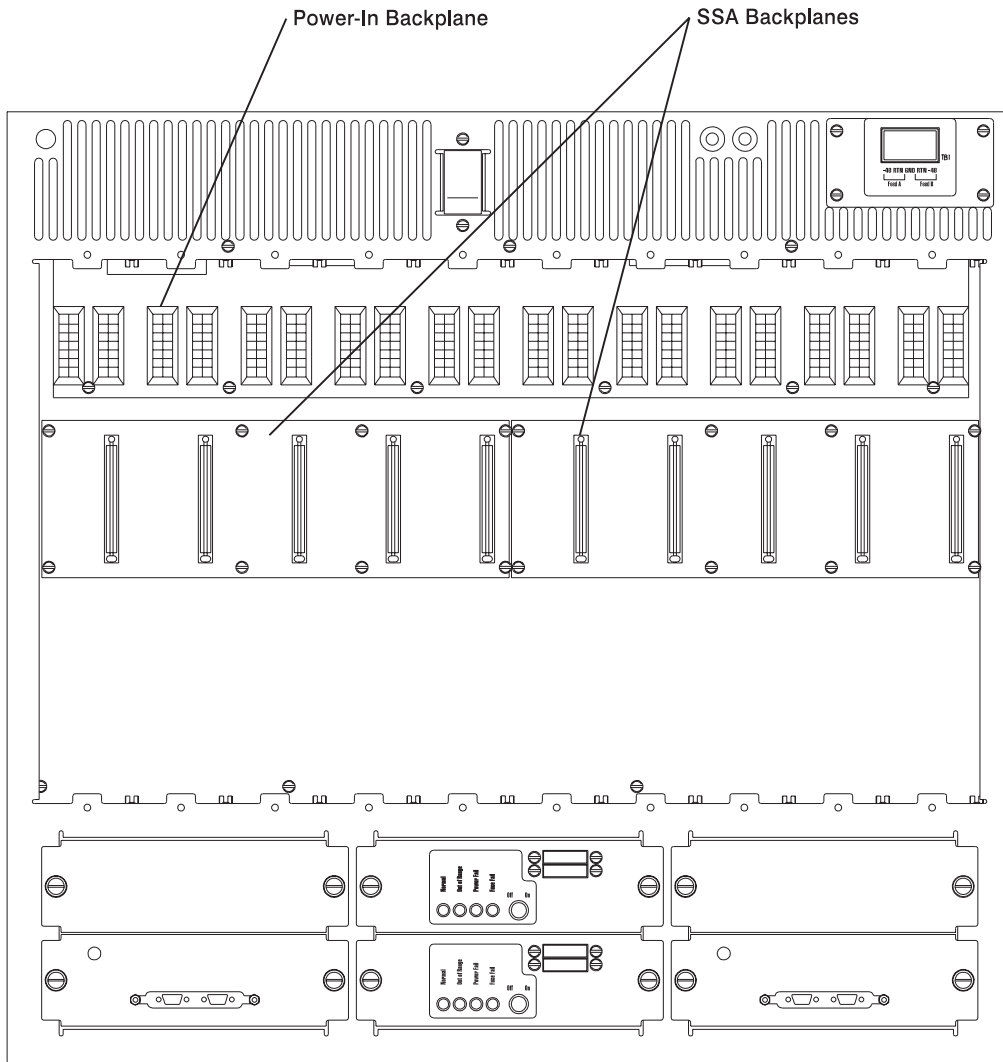
Replacement

1. Connect the data cables J14, J13, J12 and J11. Connect power cables J17 and J16.

2. Align the card on the tapped holes in the chassis and fasten with eight M3 x 6 mm screws.

3. Reinstall the Nomex safety shield.

4. Reinstall the disk drive units and blank covers into the locations from which they were removed.

5. Remove the antistatic wrist strap from the ground terminal.

6. Turn appropriate power supply unit on.

7. Go to the *Unconfiguring or Congifuring a Disk Drive* section of your system unit User's Guide. Configure the disk drive units that are connected to the backplane that you replaced.

SSA Backplane (7317 Model F3L with 2 Slot Backplane)

Attention

Use this procedure ONLY if a two slot backplane is being used in a shared environment with the C Feed Cable attached.

The two slot SSA Backplane is designed as a mini-HA (High Availability) option for small solutions. The C Feed (from the C Feed cable, see "System Electronics Module (Bottom View)" on page 1-3) provides -48 Volt and +12 Volt to an 7317 Model F3L from another 7317 Model F3L that shares the same SSA files.
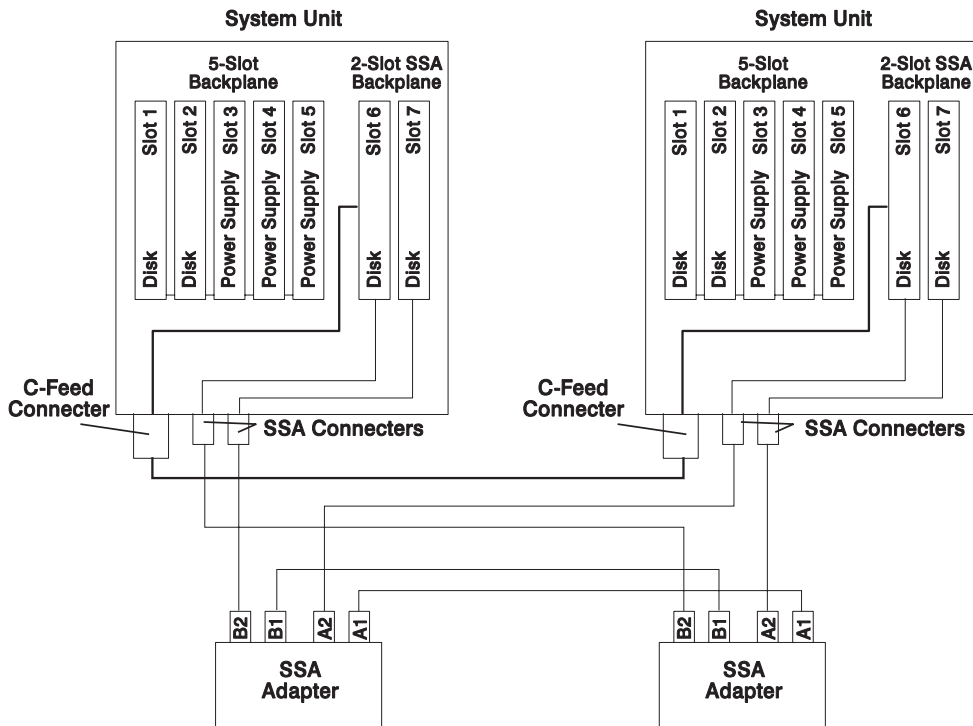
The -48 Volts is fed to the Power-In Backplane and the +12 Volts is provided to the Two Slot Backplane. Both voltages are fused at four amps or less. (See figure on 3-7.)

The Nomex shield must be trimmed between the five slot and the two slot backplanes. This permits access to the five slot backplane while the two slot is still active.

Follow the procedures in this suppliment for removal of the five slot SCSI or of the SSA Backplane with the two slot SSA and a C Feed cable. Notice that once the main switch is turned off, there is no power on the five slot backplane. Voltage is only present in the Power-In, the two slot backplane, and the filter card.

Chapter 4. SSA Location Code Format

Location codes identify the locations of adapters and devices in the using system and their attached subsystems and devices. These codes are displayed when the diagnostic programs isolate a problem. For information about the location codes that are used by the using system, see the operator guide for the using system.

```
A B - C D - E F - G H
│ │   │ │   │ │   │ └──────── Always 0
│ │   │ │   │ │   └────────── Always 0
│ │   │ │   │ └────────────── Always 0
│ │   │ │   └──────────────── P = Physical disk drive module
│ │   │ │                     L = Logical disk drive
│ │   │ └──────────────────── Adapter position (number of the slot, 1 through 8, containing
│ │   │                       the SSA adapter)
│ │   └────────────────────── System I/O bus identifier
│ └────────────────────────── Always 0
└──────────────────────────── Always 0
```
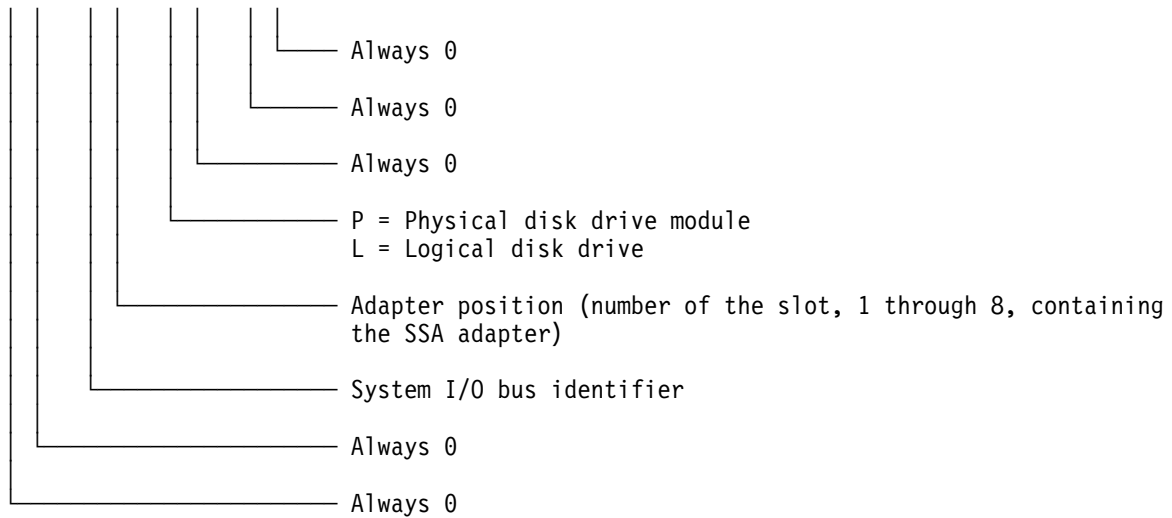
The location code shows only the position of the SSA adapter in the using system and the type of device that is attached. Use a service aid to find the location of the device (disk drive module). For more information, see "SSA Service Aids" on page 4-7.

SSA Loops and Links

The disk drive modules of the system unit are connected through two SSA links to an SSA adapter that is located in the using system. The disk drive modules, 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 disk drive modules. The path continues through the disk drive modules, then returns through another link to a second connector on the SSA adapter.

The SSA Adapter

The system unit can be attached to an SSA adapter. The adapter card has four SSA connectors that are arranged in two pairs. Connectors A1 and A2 are one pair; connectors B1 and B2 are the other pair on 7317 Model F3L

Connector B2
Green Light
Connector B1

Connector A2
Green Light
Connector A1

Type-Number Label   5006861P
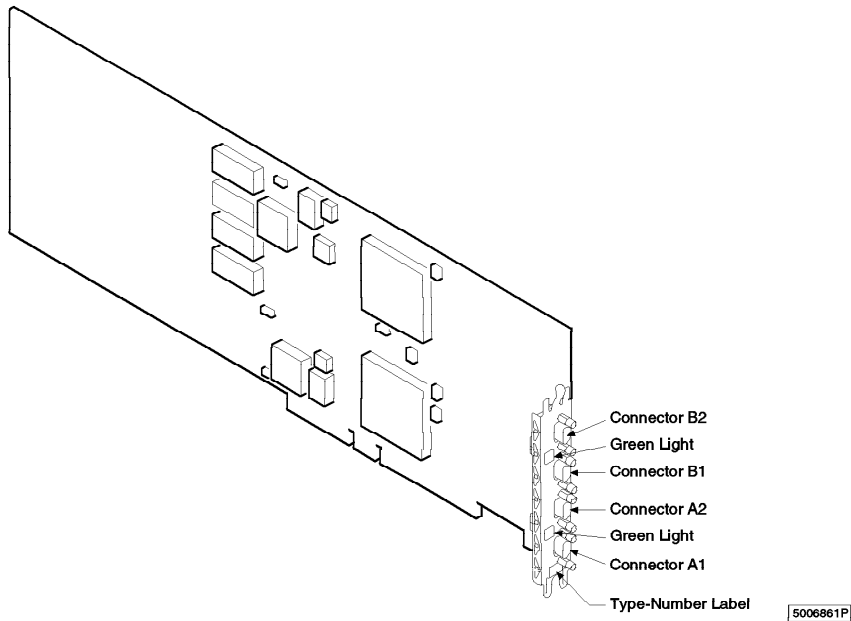
The SSA links must be configured as loops. The loop is connected to the internal connectors at the SSA adapter card. These connectors *must* be a valid pair (that is, A1 and A2, or B1 and B2); otherwise, the disk drive modules on the loop are not fully configured, and the diagnostics fail. Operations to all the disk drive modules on a particular loop can continue if that loop breaks at any one point.

Each pair of connectors has a green light that indicates the operational status of its related loop:

Status of Light	Meaning
Off	Both SSA connectors are inactive. If disk drive modules are connected to these connectors, either those modules are failing, or their SSA links have not been enabled.
Permanently on	Both SSA links are active (normal operating condition).
Slow Flash	This loop is open.

Disk Drive Module Strings

In the system unit, the disk drive modules are arranged in a string of two to five disk drive modules. This string has its own two SSA connectors. This string is connected to an external bulkhead and must be cabled to the adapter through an internal SSA cable to a pair of connectors on the SSA adapter to make an SSA loop. See "System Electronics Module (Bottom View)" on page 1-3. (The SSA cables provide the SSA links.)

The next diagram shows the relationships between the SSA connectors and the disk drive module string in a system unit. (This also represents half a D10 Model.)

Pdisks, Hdisks, and Disk Drive Module Identification

The *physical disk drives* (**pdisks**) in an SSA subsystem can be configured as logical units (LUNs). A LUN is also known as an **hdisk**, and can consist of one or more physical disk drives. An hdisk in an SSA subsystem might, therefore, consist of one pdisk or several pdisks.

The configuration software also allocates an identification (hdisk and pdisk number) to each disk drive module during the configuration of the SSA link. The disk drive modules do not have fixed physical addresses.

The configuration software first recognizes the disk drive module by the machine-readable serial number that is written on the disk. Then, it assigns an identification that is related to the position of the disk drive-module in the SSA string. After configuration, the disk drive module always has the same identification. It can be moved to any position on the SSA link, but can always be found by the software.

Service actions are always related to physical disk drives. For this reason, errors that occur on SSA disk drives are always logged against the physical disk drive (pdisk).

The numeric identifier of pdisks, hdisks, and disk drive module slots of the system unit are not related to each other. For example, pdisk1 is not necessarily installed in slot 1 of the 5-pack.

The disk drive module serial number, on the label on the front of the carrier, is also displayed by the service aids. It is the last eight digits of the drives IEEE SSA unique ID, which is stored on the drives electronics card.

Rules for SSA Loops

The following are rules for SSA loops.

- The SSA loop must be connected to the internal pair of connectors on the SSA adapter.
- Only one pair of adapter connectors can be connected to a particular SSA loop.
- A maximum of three dummy disk drive modules can be connected next to each other in a particular SSA loop.

Loops and Data Paths

All devices that are attached to an SSA adapter card are connected through SSA links. 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 around a loop. The adapter can, therefore, access the disk drive modules through two data paths. The using system cannot detect which data path is being used.

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

The following diagram shows that the disk drive module in slot 3 has failed. The disk drive modules in slots 1 and 2 can communicate with the using system only through connector A1 of the SSA adapter. The disk drive modules in slots 4, and 5 can communicate only through connector A2 of the SSA adapter.

If two or more disk drive modules are turned off, fail, or are removed from the loop, some modules might become isolated from the SSA adapter.

The following diagram shows that disk drive modules in slots 2 and 4 have failed. The disk drive module in slot 1 can communicate with the using system only through connector A1 of the SSA adapter. The disk drive module in slot 5 can communicate with the using system only through connector A2 of the SSA adapter. The disk drive module in slot 3 is isolated from the SSA adapter.
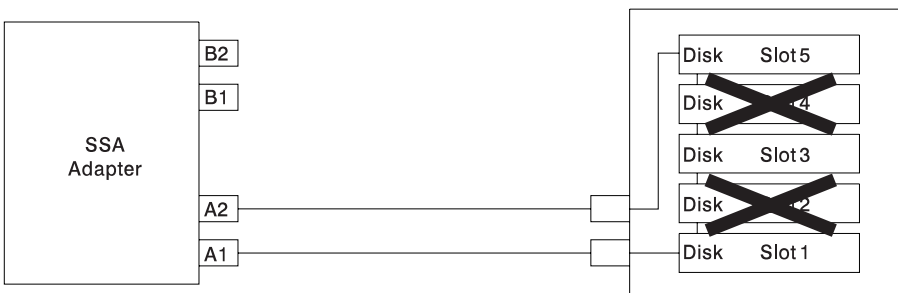
SSA Service Aids

This section describes SSA service aids and tells how to use them.

Attention: Do not run the service aids from more than one using system at a time; otherwise, unexpected results might occur.

The SSA service aids are:

Set Service Mode This service aid enables you to determine the location of a particular disk drive module on the SSA link and to remove that module from the link.

Link Verification This service aid tells you the operational status of an SSA link.

Configuration Verification This service aid lets you determine the relationship between physical and logical disk drives.

Format Disk This service aid formats an SSA disk drive module.

Certify Disk This service aid verifies that all the data on a disk drive can be read correctly.

Before you use the service aids, ensure that you are familiar with the principles of SSA links and physical disk drives (pdisks). If you are not familiar with these principles, first read "SSA Loops and Links" on page 4-2.

The Identify Function

The identify function can be accessed from any of the service aids.

This function enables you to determine the location of a particular disk drive module that you want to identify but do not want to remove from the system unit. The identify function causes the check light of the disk drive module to flash for identification (1 second on, 1 second off), but has no effect on the normal operation of the disk drive module. You can use the identify function on any number of disk drive modules at the same time.

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

Note: You cannot use the identify function on a device that is in reserved status.

Starting the SSA Service Aids

To start the SSA service aids:

1. Start the using-system diagnostics (see the *Common Diagnostics Information Manual*), and go to DIAGNOSTIC OPERATING INSTRUCTIONS.

2. Follow the instructions to select FUNCTION SELECTION.

3. Select SERVICE AIDS from the Function Select menu.

4.

Select SSA SERVICE AIDS from the Service Aids menu.

The SSA Service Aids menu is displayed.

```
┌─────────────────────────────────────────────────────────────────────┐
│ SSA SERVICE AIDS                                             802380    │
│                                                                       │
│ Move cursor onto selection, then press Enter.                         │
│                                                                       │
│                                                                       │
│         Set Service Mode                                              │
│         Link Verification                                             │
│         Configuration Verification                                    │
│         Format Disk                                                   │
│         Certify Disk                                                  │
│                                                                       │
│                                                                       │
│                                                                       │
│                                                                       │
│                                                                       │
│                                                                       │
│                                                                       │
│                                                                       │
│                                                                       │
│                                                                       │
│   F3=Cancel       F10=Exit                                            │
│                                                                       │
└─────────────────────────────────────────────────────────────────────┘
```

Note: In some configurations of the using-system console:

> **Esc** and **0** = Exit
> **Esc** and **3** = Cancel

> In such configurations, however, the displayed instructions for the function keys remain the same as those shown in the screen above.

5. Select the service aid that you require, then go to the relevant instructions in this chapter:

"Set Service Mode Service Aid" on page 4-10

"Link Verification Service Aid" on page 4-15

"Configuration Verification Service Aid" on page 4-19

"Format Disk Service Aid" on page 4-21

"Certify Disk Service Aid" on page 4-23

Set Service Mode Service Aid

The Set Service Mode service aid enables you to determine the location of a particular disk drive module and to remove that module from the system unit. It causes the check light of that disk drive module to come on for identification, and it stops all SSA link activity through the module. Only one disk drive module at a time can be in the service mode.

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

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

If a disk drive module does *not* have its check light on, the SSA link that passes through it might still be active, even though the disk drive module itself might not be working. You must put that module into the service mode before you remove it from the SSA link.

If you leave the Set Service Mode service aid, the service mode is reset.

To use the Set Service Mode service aid:

1. Select SET SERVICE MODE from the SSA Service Aids menu (see "Starting the SSA Service Aids" on page 4-8). A list of physical disk drives (pdisks) is displayed:

```
  SSA SERVICE AIDS                                                 802380


  SET SERVICE MODE                                                 802381

  Move cursor onto selection, then press Enter.

     {TOP}

     pdisk0    11111111     00-04-P        2 GB SSA F Physical Disk Drive
     pdisk1    22222222     00-04-P        2 GB SSA F Physical Disk Drive
     pdisk2    33333333     00-04-P        2 GB SSA F Physical Disk Drive
     pdisk3    44444444     00-04-P        2 GB SSA F Physical Disk Drive
     pdisk4    55555555     00-04-P        2 GB SSA F Physical Disk Drive
     pdisk5    66666666     00-04-P        2 GB SSA F Physical Disk Drive
     pdisk6    77777777     00-04-P        2 GB SSA F Physical Disk Drive
     pdisk7    88888888     00-04-P        2 GB SSA F Physical Disk Drive
     pdisk8    99999999     00-04-P        2 GB SSA F Physical Disk Drive


     {BOTTOM}

   F3=Cancel        F10=Exit
```

The columns of information displayed on the screen have the following meanings:

pdisk0 through pdisk8   Physical disk drive resource identifiers.

11111111 through 99999999   Serial numbers of the physical disk drive modules. The actual serial number of a disk drive module is shown on the front of the disk drive module.

00-04-P   See Chapter 4, "SSA Location Code Format" on page 4-1.

2 GB SSA F Physical Disk Drive   Descriptions of the disk drive modules.

2. Select the pdisk that you want to identify or put into Service Mode (for example, pdisk3). The following display appears with details of the disk drive module that you have just selected.

```
┌─────────────────────────────────────────────────────────────────┐
│ SSA SERVICE AIDS                                          802380  │
│ ┌─────────────────────────────────────────────────────────────┐ │
│ │ SET SERVICE MODE                                      802381  │ │
│ │ ┌───────────────────────────────────────────────────────────┐│ │
│ │ │ SET SERVICE MODE                                  802382   ││ │
│ │ │                                                            ││ │
│ │ │ pdisk3    44444444    00-04-P      2 GB SSA F Physical Disk Drive ││ │
│ │ │                                                            ││ │
│ │ │ Move cursor onto selection, then press Enter.              ││ │
│ │ │                                                            ││ │
│ │ │ + Set or Reset Identify.                                   ││ │
│ │ │     Select this option to set or reset the Identify indicator ││ │
│ │ │     on the disk drive.                                     ││ │
│ │ │ > Set or Reset Service Mode.                               ││ │
│ │ │     Select this option to set or reset Service Mode        ││ │
│ │ │     on the disk drive.                                     ││ │
│ │ │                                                            ││ │
│ │ │                                                            ││ │
│ │ │                                                            ││ │
│ │ │  F3=Cancel       F10=Exit                                  ││ │
│ │ └───────────────────────────────────────────────────────────┘│ │
└─────────────────────────────────────────────────────────────────┘
```

3. Select either the service mode or the identify function. (For this example, assume that you have selected the service mode function.) The list of pdisks is displayed again, and the disk drive module that you selected is marked by a >, which shows that the module is in the service mode.

```
 SSA SERVICE AIDS                                              802380


 SET SERVICE MODE                                             802381


 SET SERVICE MODE                                             802382


 SET SERVICE MODE                                             802381

 Move cursor onto selection, then press Enter.

   {TOP}

   pdisk0    11111111    00-04-P       2 GB SSA F Physical Disk Drive
   pdisk1    22222222    00-04-P       2 GB SSA F Physical Disk Drive
   pdisk2    33333333    00-04-P       2 GB SSA F Physical Disk Drive
 > pdisk3    44444444    00-04-P       2 GB SSA F Physical Disk Drive
   pdisk4    55555555    00-04-P       2 GB SSA F Physical Disk Drive
   pdisk5    66666666    00-04-P       2 GB SSA F Physical Disk Drive
   pdisk6    77777777    00-04-P       2 GB SSA F Physical Disk Drive
   pdisk7    88888888    00-04-P       2 GB SSA F Physical Disk Drive
   pdisk8    99999999    00-04-P       2 GB SSA F Physical Disk Drive



   {BOTTOM}

  F3=Cancel        F10=Exit
```

Notes:

   a. You can select only one disk drive module at a time.

   b. If you select the service mode function, and the selected disk drive module is not in a closed loop (see "SSA Loops and Links" on page 4-2), your selection fails and an error message is displayed. Use the Link Verification service aid to identify any open-link problems before trying to reselect the service mode function.

   c. If you select the service mode function, and a file system is mounted on the selected disk drive module, your selection fails. Use the Configuration Verification service aid to determine which hdisk must have its file system unmounted before you can select the service mode function.

   d. If the check light of the disk drive module that you have put into the service mode does not come on, and if you are not sure of the location of that module, use the identify function to help you find the disk drive module (see "The Identify Function" on page 4-8).

4. Select a second disk drive module, if required (for example, pdisk5). The
   following display appears:

```
SSA SERVICE AIDS                                                        802380
```

```
SET SERVICE MODE                                                       802381
```

```
SET SERVICE MODE                                                       802382
```

```
SET SERVICE MODE                                                       802381
```

```
SET SERVICE MODE                                                       802382

> pdisk5     66666666    00-04-P    2 GB SSA F Physical Disk Drive


Move cursor onto selection, then press Enter.

+ Set or Reset Identify.
    Select this option to set or reset the Identify indicator
    on the disk drive.
> Set or Reset Service Mode.
    Select this option to set or reset Service Mode
    on the disk drive.


 F3=Cancel        F10=Exit
```

5. Select either the service mode or the identify function. If the original disk drive module is to remain in service mode, you can select only the identify function now. (Only one disk drive module at a time can be in the service mode.) The list of pdisks appears again. The pdisk that is in identify mode is identified by a +.

```
┌─────────────────────────────────────────────────────────────────────┐
│ SSA SERVICE AIDS                                             802380   │
└─────────────────────────────────────────────────────────────────────┘

┌─────────────────────────────────────────────────────────────────────┐
│ SET SERVICE MODE                                            802381    │
└─────────────────────────────────────────────────────────────────────┘

┌─────────────────────────────────────────────────────────────────────┐
│ SET SERVICE MODE                                            802382    │
└─────────────────────────────────────────────────────────────────────┘

┌─────────────────────────────────────────────────────────────────────┐
│ SET SERVICE MODE                                            802381    │
└─────────────────────────────────────────────────────────────────────┘

┌─────────────────────────────────────────────────────────────────────┐
│ SET SERVICE MODE                                            802382    │
└─────────────────────────────────────────────────────────────────────┘

┌─────────────────────────────────────────────────────────────────────┐
│ SET SERVICE MODE                                            802381    │
│                                                                       │
│ Move cursor onto selection, then press Enter.                         │
│                                                                       │
│    {TOP}                                                              │
│                                                                       │
│    pdisk0   11111111   00-04-P   2 GB SSA F Physical Disk Drive       │
│    pdisk1   22222222   00-04-P   2 GB SSA F Physical Disk Drive       │
│    pdisk2   33333333   00-04-P   2 GB SSA F Physical Disk Drive       │
│  > pdisk3   44444444   00-04-P   2 GB SSA F Physical Disk Drive       │
│    pdisk4   55555555   00-04-P   2 GB SSA F Physical Disk Drive       │
│  + pdisk5   66666666   00-04-P   2 GB SSA F Physical Disk Drive       │
│    pdisk6   77777777   00-04-P   2 GB SSA F Physical Disk Drive       │
│    pdisk7   88888888   00-04-P   2 GB SSA F Physical Disk Drive       │
│    pdisk8   99999999   00-04-P   2 GB SSA F Physical Disk Drive       │
│                                                                       │
│                                                                       │
│                                                                       │
│                                                                       │
│    {BOTTOM}                                                           │
│                                                                       │
│   F3=Cancel        F10=Exit                                           │
│                                                                       │
└─────────────────────────────────────────────────────────────────────┘
```

6. Identify other disk drive modules in the same way, if required.

Link Verification Service Aid

The Link Verification service aid helps you determine:

- Where an SSA link has been broken
- The status of the disk drive modules on that SSA link
- The location of a power fault that has been detected by the disk drive modules on that SSA link

To use the Link Verification service aid:

1. Select Link Verification from the SSA Service Aids menu (see "Starting the SSA Service Aids" on page 4-8). The Link Verification adapter menu is displayed:

```
┌─────────────────────────────────────────────────────────────────┐
│ SSA SERVICE AIDS                                         802380   │
│ ┌─────────────────────────────────────────────────────────────┐ │
│ │ LINK VERIFICATION                                    802385   │ │
│ │                                                              │ │
│ │ Move cursor onto selection, then press Enter.                │ │
│ │                                                              │ │
│ │   ssa0    00-03    SSA Adapter                               │ │
│ │   ssa1    00-05    SSA Adapter                               │ │
│ │   ssa2    00-06    SSA Adapter                               │ │
│ │   ssa3    00-07    SSA Adapter                               │ │
│ │                                                              │ │
│ │                                                              │ │
│ │                                                              │ │
│ │                                                              │ │
│ │                                                              │ │
│ │                                                              │ │
│ │                                                              │ │
│ │                                                              │ │
│ │                                                              │ │
│ │   F3=Cancel       F10=Exit                                   │ │
│ │                                                              │ │
│ └─────────────────────────────────────────────────────────────┘ │
└─────────────────────────────────────────────────────────────────┘
```

2. Select the adapter that you want to test.

   The columns of information displayed on the screen have the following meanings:

   ssa0 through ssa3 Adapter resource identifiers.

   00-03 through 00-07 Adapter location codes. These codes specify the location of the SSA adapter in the using system.

   SSA Adapter Descriptions of the adapters.

3. When you have selected an adapter, a list is displayed showing the status of all the disk drive modules that are attached to the adapter:

```
┌─────────────────────────────────────────────────────────────────────────┐
│ SSA SERVICE AIDS                                              802380       │
└─────────────────────────────────────────────────────────────────────────┘
┌─────────────────────────────────────────────────────────────────────────┐
│ LINK VERIFICATION                                            802385       │
└─────────────────────────────────────────────────────────────────────────┘
┌─────────────────────────────────────────────────────────────────────────┐
│ LINK VERIFICATION                                            802386       │
│                                                                           │
│ SSA Link Verification for:                                                │
│   ssa1    00-05    SSA Adapter                                            │
│                                                                           │
│ To set or reset Identify, move cursor onto selection, then press Enter.   │
│                                                                           │
│   Physical   Serial#       Adapter Port                                   │
│                                                                           │
│                          A1  A2  B1  B2              Status               │
│   {TOP}                                                                    │
│   pdisk0    11111111      0   7                      Good                  │
│   pdisk1    22222222      1   6                      Good                  │
│   pdisk2    33333333      2   5                      Good                  │
│   pdisk3    44444444      3   4                      Good                  │
│   pdisk4    55555555      4   3                      Good                  │
│   pdisk5    66666666      5   2                      Good                  │
│   pdisk6    77777777      6   1                      Good                  │
│   pdisk7    88888888      7   0                      Good                  │
│   pdisk8    99999999              0   10             Good                  │
│   pdisk9    nnnnnnnn              1    9             Good                  │
│   {MORE}                                                                   │
│                                                                           │
│   F3=Cancel       F10=Exit                                                 │
│                                                                           │
└─────────────────────────────────────────────────────────────────────────┘
```

The columns of information displayed on the screen have the following meanings:

pdisk0 through pdisk9	Physical disk drive resource identifiers.
11111111 through 99999999	Serial numbers of the physical disk drive modules. The actual serial number of a disk drive module is shown on the front of the disk drive module.
A1 A2 B1 B2	Adapter connector number (see "The SSA Adapter" on page 4-2).
Status	Statuses are:

	Good	The disk drive module is working correctly.
	Failed	The disk drive module has failed.
	Power	The disk drive module has detected a loss of power.
	Reserved	The disk drive module is used by another using system.

An SSA link must be configured in a loop around which data can travel in either direction. The loop is broken if a cable fails or is removed, or if a disk drive module fails. Because each disk drive module on the loop can be accessed

from either direction, the broken loop does not prevent access to any data, unless that data is on the failed disk drive module. If the loop is broken between two disk drive modules, the ready lights on those modules flash to show that only one SSA path is active. Also, the Link Verification service aid shows that only one path is available to each disk drive module on the broken loop.

You can find the physical location of any disk drive module on the link by using the identify function (see "The Identify Function" on page 4-8).

Notes:

a. In the lists of physical disk drives (pdisks) that are displayed by the service aids, you might see:

????? Question marks show where an SSA loop is broken. No information is available about any devices that are beyond this point.

Asterisks indicate an unconfigured device. That device might be:

- Another SSA adapter that is in the same using system or in a different using system.

- An SSA device that is in the SSA network, but whose type is not known. Such a condition can occur if, for example, devices are added to the network, but the **cfgmgr** command is not run to configure those devices into the using system.

For example:

```
LINK VERIFICATION                                                   802386

SSA Link Verification for:
  ssa1    00-05    SSA ADAPTER

To set or reset Identify, move cursor onto selection, then press Enter.

  Physical    Serial#        Adapter Port

                            A1  A2  B1  B2              Status
  {TOP}
  pdisk0    11111111      0                             Good
  pdisk1    22222222      1                             Good
  ?????
  pdisk3    44444444          4                         Good
  pdisk4    55555555          3                         Good
  pdisk5    66666666          2                         Good
  pdisk6    77777777          1                         Good
  pdisk7    88888888          0                         Good
  pdisk8    99999999              0   3                 Good
  pdisk9    10000000              1   2                 Good
  {MORE}

  F3=Cancel        F10=Exit
```

Note that the missing disk drive module (pdisk2) is represented by a line of
question marks.

   b. If you have just made changes to or have just turned on the system unit, you
      might need to wait up to 30 seconds before detailed information about the
      SSA network becomes available to the service aids.

4. When you have solved a problem, press **F3** (**Esc** and **3** on some consoles) to
   leave the display; then press Enter to reselect it. The display shows the new
   status of the SSA links.

Configuration Verification Service Aid

The Configuration Verification service aid enables you to determine the relationship between SSA logical units (hdisks) and SSA physical disk drives (pdisks). It also displays the connection information and operational status of the disk drives.

Note: User applications communicate with the hdisks; error data is logged against the pdisks.

To use the Configuration Verification service aid:

1. Select Configuration Verification from the SSA Service Aids menu to display a list of pdisks and hdisks (see "Starting the SSA Service Aids" on page 4-8).

```
┌──────────────────────────────────────────────────────────────────────────┐
│ SSA SERVICE AIDS                                                    802380  │
├──────────────────────────────────────────────────────────────────────────┤
│                                                                            │
│  CONFIGURATION VERIFICATION                                       802390    │
│                                                                            │
│  Move cursor onto selection, then press Enter.                             │
│                                                                            │
│    {TOP}                                                                    │
│    pdisk0    22222222    00-03-P      2 GB SSA F Physical Disk Drive       │
│    pdisk1    33333333    00-05-P      2 GB SSA F Physical Disk Drive       │
│    pdisk2    44444444    00-07-P      2 GB SSA F Physical Disk Drive       │
│    hdisk3    22222222    00-03-L      SSA Logical Disk Drive               │
│    hdisk4    33333333    00-05-L      SSA Logical Disk Drive               │
│    hdisk5    44444444    00-07-L      SSA Logical Disk Drive               │
│                                                                            │
│                                                                            │
│                                                                            │
│                                                                            │
│                                                                            │
│                                                                            │
│    {BOTTOM}                                                                 │
│                                                                            │
│    F3=Cancel       F10=Exit                                                 │
│                                                                            │
└──────────────────────────────────────────────────────────────────────────┘
```

2. Select the hdisk or pdisk that you want to test.

3. If you select an hdisk, a list of pdisks is displayed:

```
┌─────────────────────────────────────────────────────────────────────────┐
│ SSA SERVICE AIDS                                                  802380  │
├─────────────────────────────────────────────────────────────────────────┤
│ CONFIGURATION VERIFICATION                                       802390  │
├─────────────────────────────────────────────────────────────────────────┤
│ CONFIGURATION VERIFICATION                                       802391  │
│                                                                           │
│   hdisk3    22222222   00-03-L    SSA Logical Disk Drive                  │
│                                                                           │
│ To set or reset Identify, move cursor onto selection, then press enter.   │
│                                                                           │
│   Physical     Serial#    Adapter     Port     SSA_Addr     Status        │
│                                                                           │
│   {TOP}                                                                    │
│   pdisk0      22222222     00-02       A1         5         Good           │
│                            00-02       A2         5         Good           │
│                            00-03       A1        10         Good           │
│                            00-03       A2         0         Good           │
│                                                                           │
│                                                                           │
│                                                                           │
│                                                                           │
│                                                                           │
│                                                                           │
│   {BOTTOM}                                                                 │
│                                                                           │
│  F3=Cancel        F10=Exit                                                 │
└─────────────────────────────────────────────────────────────────────────┘
```

If you select a pdisk, a list of hdisks is displayed:

```
┌─────────────────────────────────────────────────────────────────────────┐
│ SSA SERVICE AIDS                                                  802380  │
├─────────────────────────────────────────────────────────────────────────┤
│ CONFIGURATION VERIFICATION                                       802390  │
├─────────────────────────────────────────────────────────────────────────┤
│ CONFIGURATION VERIFICATION                                       802392  │
│                                                                           │
│   pdisk0    22222222   00-03-P    2 GB SSA F Physical Disk Drive          │
│                                                                           │
│                                                                           │
│ Move cursor onto selection, then press Enter.                             │
│                                                                           │
│                                                                           │
│   hdisk3    22222222   00-03-L    SSA Logical Disk Drive                  │
│                                                                           │
│                                                                           │
│   {BOTTOM}                                                                 │
│                                                                           │
│  F3=Cancel        F10=Exit                                                 │
└─────────────────────────────────────────────────────────────────────────┘
```

Note: If you select the hdisk from this screen, the hdisk configuration is displayed.

Format Disk Service Aid

The Format Disk service aid formats SSA disk drive modules.

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

To use the Format Disk service aid:

1. Select Format Disk from the SSA Service Aids menu (see "Starting the SSA Service Aids" on page 4-8). A list of pdisks is displayed:

```
┌─────────────────────────────────────────────────────────────────────┐
│ SSA SERVICE AIDS                                             802380 │
│ ┌─────────────────────────────────────────────────────────────────┐ │
│ │ FORMAT DISK                                            802395    │ │
│ │                                                                 │ │
│ │ Move cursor onto selection, then press Enter.                   │ │
│ │                                                                 │ │
│ │   {TOP}                                                         │ │
│ │   pdisk0    11111111    00-04-P       2 GB SSA F Physical Disk Drive │ │
│ │   pdisk1    22222222    00-04-P       2 GB SSA F Physical Disk Drive │ │
│ │   pdisk2    33333333    00-04-P       2 GB SSA F Physical Disk Drive │ │
│ │   pdisk3    44444444    00-04-P       2 GB SSA F Physical Disk Drive │ │
│ │   pdisk4    55555555    00-04-P       2 GB SSA F Physical Disk Drive │ │
│ │   pdisk5    66666666    00-04-P       2 GB SSA F Physical Disk Drive │ │
│ │   pdisk6    77777777    00-04-P       2 GB SSA F Physical Disk Drive │ │
│ │   pdisk7    88888888    00-04-P       2 GB SSA F Physical Disk Drive │ │
│ │   pdisk8    99999999    00-04-P       2 GB SSA F Physical Disk Drive │ │
│ │                                                                 │ │
│ │                                                                 │ │
│ │                                                                 │ │
│ │                                                                 │ │
│ │   {BOTTOM}                                                      │ │
│ │                                                                 │ │
│ │   F3=Cancel       F10=Exit                                      │ │
│ └─────────────────────────────────────────────────────────────────┘ │
└─────────────────────────────────────────────────────────────────────┘
```

2. Select the pdisk that you want to format. The following instructions are displayed:

```
┌─────────────────────────────────────────────────────────────────────────────┐
│ SSA SERVICE AIDS                                                     802380   │
└─────────────────────────────────────────────────────────────────────────────┘
┌─────────────────────────────────────────────────────────────────────────────┐
│ FORMAT DISK                                                         802395    │
└─────────────────────────────────────────────────────────────────────────────┘
┌─────────────────────────────────────────────────────────────────────────────┐
│ FORMAT DISK                                                         802396    │
│                                                                               │
│   pdisk1    22222222    00-04-P       2 GB SSA F Physical Disk Drive          │
│                                                                               │
│   Set or Reset Identify.                                                      │
│       Select this option to set or reset the Identify indicator               │
│       on the disk drive.                                                      │
│   Format.                                                                     │
│       Select this option only if you are sure that you have selected          │
│       the correct disk drive.                                                 │
│       FORMATTING DESTROYS ALL DATA ON THE DISK DRIVE.                         │
│                                                                               │
│                                                                               │
│                                                                               │
│                                                                               │
│                                                                               │
│                                                                               │
│                                                                               │
│                                                                               │
│                                                                               │
│   F3=Cancel        F10=Exit                                                   │
│                                                                               │
└─────────────────────────────────────────────────────────────────────────────┘
```

3. If you are not sure of the identification (pdisk number) of the disk drive module that you want to format, use the identify function to get a positive physical identification of the module (see "The Identify Function" on page 4-8). You can further ensure that you have selected the correct disk drive module by verifying that the serial number on the front of the disk drive module is the same as the serial number that is displayed on the screen.

4. When you are sure that you have selected the correct disk drive module, select Format.

Certify Disk Service Aid
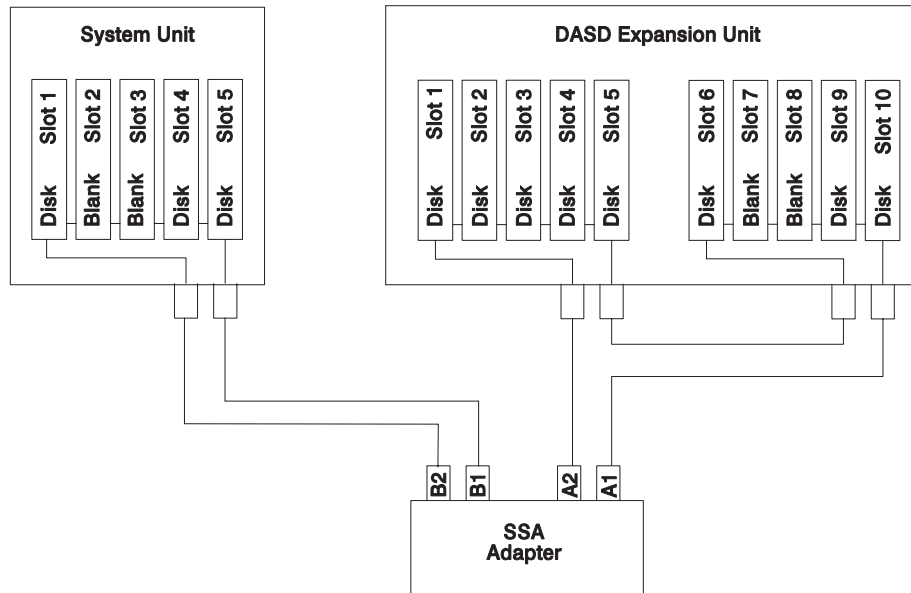
The Certify Disk service aid verifies that all the data on a disk drive module can be read correctly. Instruction given elsewhere in this book tell you when you need to run this service aid.

To use the Certify Disk service aid:

1. Select Certify Disk from the SSA Service Aids menu (see "Starting the SSA Service Aids" on page 4-8). A list of pdisks is displayed:

```
SSA SERVICE AIDS                                                     802380

CERTIFY DISK                                                         802404

Move cursor onto selection, then press Enter.

   {TOP}
   pdisk0    11111111    00-04-P       2 GB SSA F Physical Disk Drive
   pdisk1    22222222    00-04-P       2 GB SSA F Physical Disk Drive
   pdisk2    33333333    00-04-P       2 GB SSA F Physical Disk Drive
   pdisk3    44444444    00-04-P       2 GB SSA F Physical Disk Drive
   pdisk4    55555555    00-04-P       2 GB SSA F Physical Disk Drive
   pdisk5    66666666    00-04-P       2 GB SSA F Physical Disk Drive
   pdisk6    77777777    00-04-P       2 GB SSA F Physical Disk Drive
   pdisk7    88888888    00-04-P       2 GB SSA F Physical Disk Drive
   pdisk8    99999999    00-04-P       2 GB SSA F Physical Disk Drive




   {BOTTOM}

   F3=Cancel       F10=Exit
```

2. Select the pdisk that you want to certify. The following instructions are displayed:

```
SSA SERVICE AIDS                                              802380

CERTIFY DISK                                                  802404

CERTIFY DISK                                                  802405

  pdisk1    22222222    00-04-P       2 GB SSA F Physical Disk Drive

Move cursor onto selection, then press Enter.

 Set or Reset Identify.
     Select this option to set or reset the Identify indicator
     on the disk drive.
 Certify.
     Select this option to start the Certify operation.




   F3=Cancel       F10=Exit
```

3. If you are not sure of the identification (pdisk number) of the disk drive module that you want to format, use the identify function to get a positive physical identification of the module (see "The Identify Function" on page 4-8). You can further ensure that you have selected the correct disk drive module by verifying that the serial number on the front of the disk drive module is the same as the serial number that is displayed on the screen.

4. When you are sure that you have selected the correct disk drive module, select Certify

Service Aid Error Codes

If the SSA service aids detect an unrecoverable error and are unable to continue, one of the following error codes might occur.

SSA01   Not enough using-system memory is available for this service aid to continue. Take one of the actions described here:

- This problem might be caused by a failed application program. Ask the user to end any failed application program, then try to run the service aid again.
- Run diagnostics in the problem determination mode on the system unit. If you find any problems, solve them; then try to run the service aid again.
- Close down and reboot the using system; then try to run the service aid again.
- Run diagnostics from diskette or CD-ROM to isolate the problem. If you do not find a problem, the operating system might have failed.

SSA02   An unknown error has occurred. Take one of the actions described here:

- Run diagnostics in the problem determination mode to the system unit. If you find any problems, solve them; then try to run the service aid again.
- If diagnostics fail or if the same problem occurs when you try the service aid again, run the diagnostics from diskette or CD-ROM to isolate the problem. If you do not find a problem, the operating system might have failed.

SSA03   The service aid was unable to open an hdisk. This problem might have occurred because a disk drive module has failed or has been removed from the system. Take the actions described here:

1. Use the Configuration Verification service aid (see "Configuration Verification Service Aid" on page 4-19) to determine the location code of the SSA adapter to which the hdisk is attached. (For example, if the location code of the hdisk is 00-03-L, the location code of the SSA adapter is 00-03.)
2. Run the Link Verification service aid (see "Link Verification Service Aid" on page 4-15) to the SSA adapter.
3. If a link failure is indicated by the service aid, go to "SSA Maintenance Analysis Procedures (MAPS)" in &sgtitle..
4. If no link failures are indicated, run the diagnostics in the system verification mode to each pdisk that is attached to the SSA adapter.

Using the Service Aids for SSA-Link Problem Determination

If you have a problem with an SSA link, use the Link Verification service aid (see "Link Verification Service Aid" on page 4-15). The following examples show various loops and the associated information that is displayed by the Link Verification service aid.

Example 1. Normal Loops In the following diagram, eight disk drive modules are connected to connectors A1 and A2 of the SSA adapter. Three disk drive modules are connected to connectors B1 and B2 of the same SSA adapter.

System Unit

| Disk — Slot 1 | Blank — Slot 2 | Blank — Slot 3 | Disk — Slot 4 | Disk — Slot 5 |

DASD Expansion Unit

| Disk — Slot 1 | Disk — Slot 2 | Disk — Slot 3 | Disk — Slot 4 | Disk — Slot 5 | Disk — Slot 6 | Blank — Slot 7 | Blank — Slot 8 | Disk — Slot 9 | Disk — Slot 10 |

B2 B1   A2 A1

SSA Adapter

For this example, the Link Verification service aid displays the following information:

```
┌─────────────────────────────────────────────────────────────────────┐
│ LINK VERIFICATION                                            802386    │
│                                                                       │
│ SSA Link Verification for:                                            │
│   ssa1    00-05    SSA ADAPTER                                         │
│                                                                       │
│ To set or reset Identify, move cursor onto selection, then press Enter.│
│                                                                       │
│   Physical   Serial#       Adapter Port                               │
│                                                                       │
│                          A1  A2  B1  B2              Status            │
│   {TOP}                                                               │
│   pdisk0    nnnnnnnn      0   7                      Good             │
│   pdisk1    nnnnnnnn      1   6                      Good             │
│   pdisk2    nnnnnnnn      2   5                      Good             │
│   pdisk3    nnnnnnnn      3   4                      Good             │
│   pdisk4    nnnnnnnn      4   3                      Good             │
│   pdisk5    nnnnnnnn      5   2                      Good             │
│   pdisk6    nnnnnnnn      6   1                      Good             │
│   pdisk7    nnnnnnnn      7   0                      Good             │
│   pdisk8    nnnnnnnn              0   3              Good             │
│   pdisk9    nnnnnnnn              1   2              Good             │
│   {MORE}                                                             │
│                                                                       │
│  F3=Cancel        F10=Exit                                            │
│                                                                       │
└─────────────────────────────────────────────────────────────────────┘
```

Note: Scroll the display to see all the connected disk drive modules.

Example 2. Broken Loop (Cable Removed): Each disk drive module normally communicates with the adapter through one data path. Because data can pass around the loop in either direction, however, the adapter automatically reconfigures the loop to enable communication to continue to each disk drive if the loop becomes broken.

In the following diagram, eight disk drive modules should be connected to connectors A1 and A2 of the SSA adapter. However, the loop is broken because the SSA cable has been disconnected from connector A2. Four disk drive modules are connected to connectors B1 and B2 of the same SSA adapter.

Although the broken loop is reported as an error, all the disk drive modules can still communicate with the using system. The eight disk drive modules can communicate through connector A1 of the SSA adapter . The five disk drive modules can communicate through connectors B1 and B2 of the same SSA adapter (normal loop).

For this example, the Link Verification service aid displays the following information:

```
LINK VERIFICATION                                            802386

SSA Link Verification for:
  ssa1    00-05    SSA ADAPTER

To set or reset Identify, move cursor onto selection, then press Enter.

  Physical    Serial#      Adapter Port

                          A1  A2  B1  B2              Status
  {TOP}
  pdisk0    nnnnnnnn      0                           Good
  pdisk1    nnnnnnnn      1                           Good
  pdisk2    nnnnnnnn      2                           Good
  pdisk3    nnnnnnnn      3                           Good
  pdisk4    nnnnnnnn      4                           Good
  pdisk5    nnnnnnnn      5                           Good
  pdisk6    nnnnnnnn      6                           Good
  pdisk7    nnnnnnnn      7                           Good
  pdisk8    nnnnnnnn              0   3               Good
  pdisk9    nnnnnnnn              1   2               Good
  {MORE}

 F3=Cancel       F10=Exit
```

Note that the column for adapter connector A2 shows no connections.

Example 3. Broken Loop (Disk Drive Module Removed): The following diagram shows eight disk drive modules connected to connectors A1 and A2 of the SSA adapter, but the loop is broken because disk drive module in slot 3 has been removed. Four disk drive modules are connected to connectors B1 and B2 of the same SSA adapter.

Although the missing disk drive module is reported as an error, all the remaining disk drive modules can still communicate with the using system. Two disk drive modules can communicate through connector A1 of the SSA adapter. Five disk drive modules can communicate through connector A2 of the SSA adapter. Five disk drive modules can communicate through connectors B1 and B2 of the same SSA adapter (normal loop).

For this example, the Link Verification service aid displays the following information:

```
LINK VERIFICATION                                              802386

SSA Link Verification for:
  ssa1    00-05    SSA ADAPTER

To set or reset Identify, move cursor onto selection, then press Enter.

  Physical    Serial#      Adapter Port

                          A1  A2  B1  B2              Status
  {TOP}
  pdisk0    nnnnnnnn       0                          Good
  pdisk1    nnnnnnnn       1                          Good
  ?????
  pdisk3    nnnnnnnn           4                      Good
  pdisk4    nnnnnnnn           3                      Good
  pdisk5    nnnnnnnn           2                      Good
  pdisk6    nnnnnnnn           1                      Good
  pdisk7    nnnnnnnn           0                      Good
  pdisk8    nnnnnnnn               0   3              Good
  pdisk9    nnnnnnnn               1   2              Good
  {MORE}

 F3=Cancel        F10=Exit
```

Note that the missing disk drive module (pdisk2) is represented by a line of question marks.

Finding the Physical Location of a Device

The physical location of a device (for example, a disk drive module or an SSA adapter) cannot be reported directly by the using 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

To help you to find the correct physical disk drive, the SSA service aids include an identify function. This function, when selected, causes the check light of the selected disk drive module to flash. For more details, see "SSA Service Aids" on page 4-7.

Some devices (for example, adapters) do not have check lights. To find such a device, you can either use the identify function to identify devices that are next to the SSA 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 43nnn, 44nnn, and 45nnn, where nnn represents the PAA values.

The port (P) value can be a number from 0 to 3, which 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 link).

Use the port value to locate the relevant connector on the SSA adapter, then follow the SSA cable to the first disk drive module or adapter in the same SSA loop. Do not include dummy disk drive modules.

The first disk drive module or adapter that you reach represents SSA-address count 0. Continue to follow the SSA link from disk drive module or adapter, increasing the

SSA-address count by 1 for each device, until you reach the disk drive module or adapter that is indicated in the SRN.

Microcode Maintenance

Updates to the microcode are loaded into the using system from diskettes. If the level of the microcode that is stored in the using system is higher than the level of the microcode that is installed on the SSA adapter or the disk drive modules, the higher-level microcode is automatically downloaded to the adapter and disk drive modules when the using system runs the device configuration method.

For some problems, the service request number (SRN) might ask you to check the microcode package ID before you exchange any field-replaceable units (FRUs). You can determine the package ID for the adapter in either of the following two ways:

- On the command line, type the following command and press Enter:

    lsattr -E -l <adapter> **-a ucode**

  where *adapter* is the ID of the adapter that you want to check; for example, ssa0.

  The response to this command is:

    ucode 8F97.00.nn **Name of adapter download False**

  where *nn* is the adapter code package ID.

- Use the Display or Change Configuration or Vital Product Data (VPD) service aid to display the VPD for the adapter. The first two characters of the ROS Level field contain the adapter code package ID.

To determine the ID of the microcode package that is being used on a disk drive module, use the Display or Change Configuration or Vital Product Data (VPD) service aid to display the VPD for the disk drive module. The first two characters of the ROS Level field contain the ID of the microcode package for the disk drive module.

Note: During the configuration of the complete system, all the VPD files in the system are updated *before* any microcode is downloaded from the using system to the 6-pack. If the using system later downloads a new level of microcode to the subsystem, the VPD for the adapter or disk drive module will not show the ID of the new microcode package until the next time the configuration manager command (**cfgmgr**) is run.

Vital Product Data (VPD)

The vital product data (VPD) for the system unit and for the SSA adapter can be displayed by using the using-system service aids. This section shows the types of information that are contained in the VPD.

Abbreviations used in this section are:

DRAM   Dynamic random-access memory

FRU   Field-replaceable unit

RAM   Random-access memory

ROM   Read-only memory

ROS   Read-only storage

SSA   Serial storage architecture

4.5 GB, and 9.1 GB SSA Disk Drives

Part number   Disk drive module part number

EC level   Disk enclosure engineering change level

Serial number   Disk enclosure serial number

Machine type and model   Type and model

Manufacturer   Manufacturer and plant code

ROS level and ID   ROM and RAM code revision levels

Device specific Z2   RAM code load part number

Device specific Z3   Electronics card assembly part number

Device specific Z4   Disk enclosure date of manufacture

SSA Adapter

Part number   Adapter card FRU part number

Serial number   Adapter card serial number

Engineering change level Adapter card engineering change level

Manufacturing location   Manufacturer and plant code

ROS level and ID   Version of ROS code loaded on the adapter

Loadable microcode level Version of loadable code needed for the satisfactory
                              operation of this card

Device driver level   Minimum level of device driver needed for this level of card

Description of function   SSA adapter

Device specific (Z0)   If the adapter contains additional DRAM modules, Z0 indicates the total DRAM size in megabytes

Device specific (Z1)   If the adapter contains a pluggable fast-write cache module, Z1 indicates the cache size in megabytes

Chapter 5. SSA Problem Determination Procedures

Problem determination procedures are provided by power-on self-tests (POSTs), service request numbers (SRNs), and maintenance analysis procedures (MAPs). Some of these procedures use the using system service aids that are described in "SSA Service Aids" on page 4-7.

Disk Drive Module Power-On Self-Tests (POSTs)

Attention: Disk drive modules are fragile. Handle them with care. Follow all ESD-sensitive parts procedures when handling disk drive modules. For ESD information, see "Handling Static–Sensitive Devices" on page 3-1.

The disk drive module POSTs start each time the module is switched on or when a **Send Diagnostic** command is received from the SSA adapter. They check whether the disk drive module is working correctly. The POSTs also help verify a repair after a FRU has been exchanged.

There are two power-on self-tests: POST-1 and POST-2.

POST-1 runs immediately after the 'power-on reset' line goes inactive, and before the disk drive module motor starts. POST-1 includes tests of the:

- Microprocessor
- ROM
- Safety circuits

If POST-1 completes successfully, POST-2 is enabled.

If POST-1 fails, the disk drive module check light stays on, and the disk drive module is not configured into the SSA network.

POST-2 runs after the disk drive module motor has started. POST-2 includes tests of:

- Motor control
- Servo control
- Read and write on the diagnostic cylinder (repeated for all heads)
- Error checking and correction (ECC)

If POST-2 completes successfully, the disk drive module is ready for use by the using system.

Adapter Power-On Self-Tests (POSTs)

Two power-on self-tests (POSTs) are resident in the SSA adapter. The tests are POST-1 and POST-2.

POST-1 tests all the functions that are necessary to enable the adapter to communicate with the Micro Channel. POST-1 can fail for either of two reasons:

- A hardware error has been detected. In such instances, the POST code enters a tight loop, and does not put the identification of the SSA adapter into the programmable option select (POS) registers. If this error occurs, the SSA adapter must be exchanged for a new one.

- The flash erasable programmable read-only memory (EPROM) has a check sum that is not valid. This error can be caused if the power fails while microcode is being downloaded. In such instances, the POST checks all the hardware that is needed to download the microcode. If all the hardware is correct, the POST sets the ROS level to zero, puts the identification of the SSA adapter into POS 0-1, and puts error data into the adapter status register.

  To recover from this type of error, microcode must be downloaded to the SSA adapter. If the using system can have an initial program load (IPL) without the adapter, the configuration code detects the down-level ROS code and downloads the latest level of code. The configuration code then uses control register bit 7 to reset the adapter and restart POST-1.

If no error is detected during POST-1, the identification of the SSA adapter is put into the POS registers, and POST-2 is started.

POST-2 tests the remaining hardware on the SSA adapter card and tests the other FRUs that are attached to the adapter. If this test fails, an error code is saved and sent to the using-system error log when the error logger becomes available. An internal health check continues to send the error code at regular intervals.

Chapter 6. Parts Information

SSA Module Parts

6

5
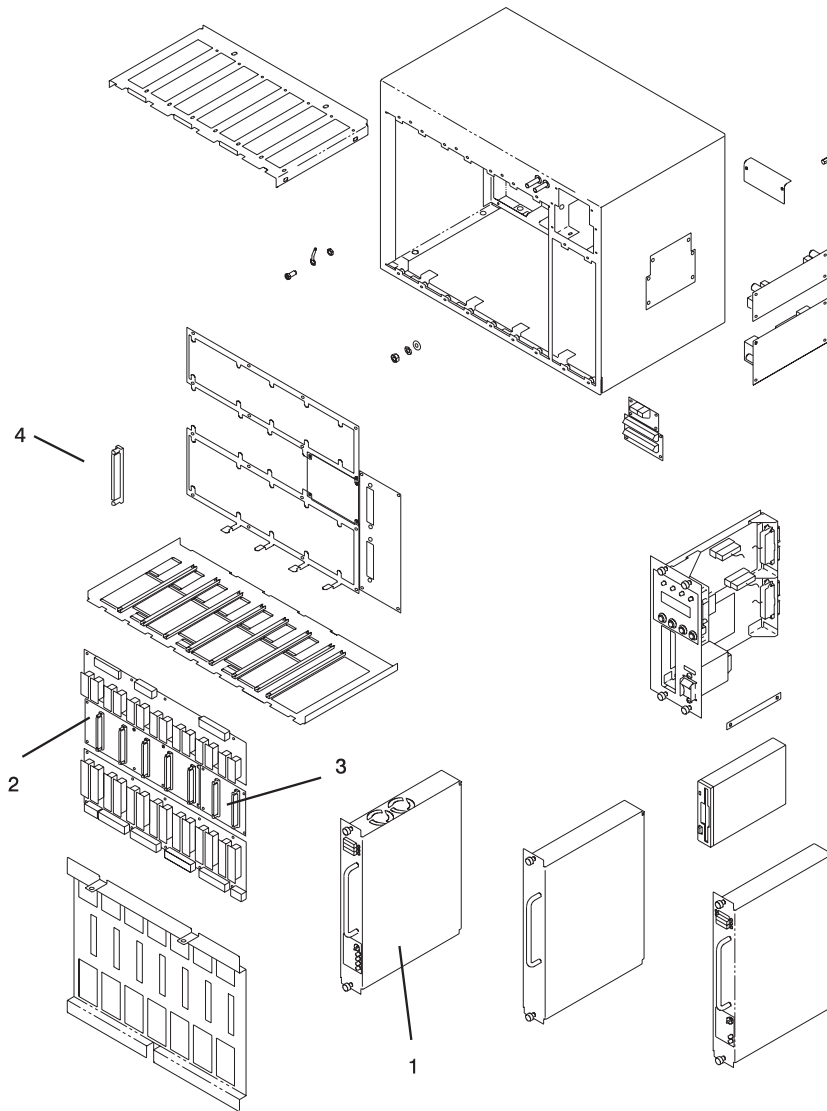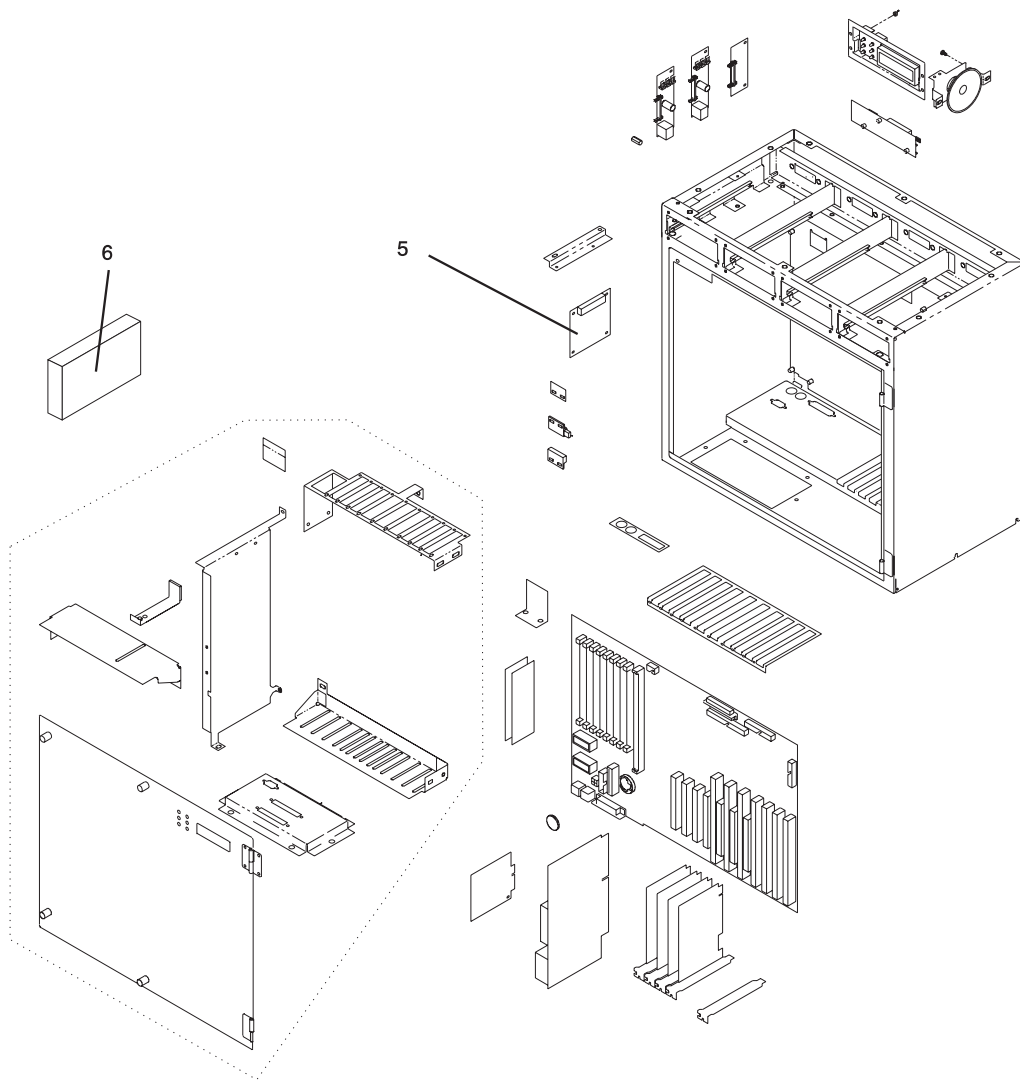
Index Number	Part Number	Units Per Assy	Description
1	93H9006	2-5 (F3L) 2-10 (D10)	4.5GB SSA Dasd Book
2	93H9008	1 (F3L) 2 (D10)	5 Slot SSA Backplane (select)
3	07L7282	1 (F3L)	2 Slot SSA Backplane (select)
4	93H9009	3 (F3L) 8 (D10)	SSA Jumper Card
5	94H0818	1 (F3L)	Voting Card (for 2 slot backplane)
6	76H2697	1 (F3L)	4.5GB SCSI Boot Drive
	07H8985		SSA Interconnect Cable (1.0M)
	32H1465		SSA Interconnect Cable (2.5M)
	93H4339	1 (F3L) 1 (D10)	SSA Backplane to Bulkhead Cable
	93H4340	2 (F3L)	SSA Bulkhead to SSA Adapter Cable
	93H8217	1 (F3L)	SCSI 3-Drop
	93H8218	1 (F3L)	Boot Drive Power Cable
	94H0808	1 (F3L)	48V Internal Input Cable
	94H0809	1 (F3L)	Voting Cable (for 2 slot backplane)
	94H0810		HA System Interconnect Power (select)
	93H8972		4-Drop SCSI Cable

*See *RS/6000 Diagnostic Information for Multiple Bus Systems* for part numbers.

Chapter 7. Device Records

Refer to the following diagram of the system's slots when completing the table on the following page.
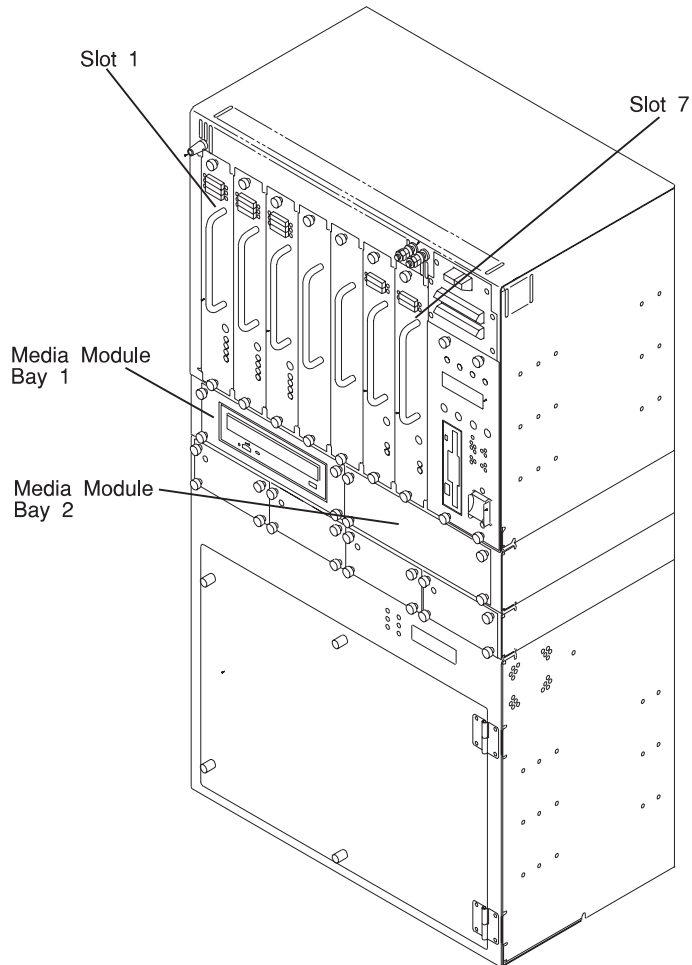
Installed Disk Drive and Power Supply Units - 7317 Model F3L

Location	Drive Description
Slot 1	____MB Disk Drive Unit □ SSA □ SCSI □ Power Supply Unit □
Slot 2	____MB Disk Drive Unit □ SSA □ SCSI □ Power Supply Unit □
Slot 3	____MB Disk Drive Unit □ SSA □ SCSI □ Power Supply Unit □
Slot 4	____MB Disk Drive Unit □ SSA □ SCSI □ Power Supply Unit □
Slot 5	____MB Disk Drive Unit □ SSA □ SCSI □ Power Supply Unit □
Slot 6	____MB Disk Drive Unit □ SSA □ SCSI □ Power Supply Unit □
Slot 7	____MB Disk Drive Unit □ SSA □ SCSI □ Power Supply Unit □
Media Module Bay 1	_____
Media Module Bay 2	_____

Refer to the following diagram of the 7317 Model D10 expansion unit's slots when completing the table below.
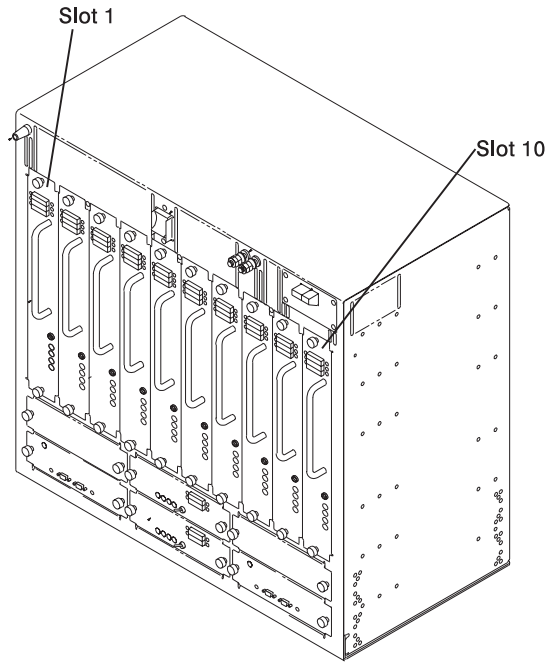
Slot 1

Slot 10

Installed Disk Drive and Power Supply Units - 7317 Model D10

Location	Drive Description
Slot 1 (Bus 1)	_____
Slot 2 (Bus 1)	_____
Slot 3 (Bus 1)	_____
Slot 4 (Bus 1)	_____
Slot 5 (Bus 1)	_____
Slot 6 (Bus 2)	_____
Slot 7 (Bus 2)	_____
Slot 8 (Bus 2)	_____
Slot 9 (Bus 2)	_____
Slot 10 (Bus 2)	_____

Reader's Comments — We'd Like to Hear From You

RS/6000 7317 Models F3L and D10 SSA Supplement (11/97)

Part Number: 07L6963

Overall how satisfied are you with the information in this book?

	Very Satisfied	Satisfied	Neutral	Dissatisfied	Very Dissatisfied
Overall Satisfaction	☐	☐	☐	☐	☐

How satisfied are you that the information in this book is:

	Very Satisfied	Satisfied	Neutral	Dissatisfied	Very Dissatisfied
Accurate	☐	☐	☐	☐	☐
Complete	☐	☐	☐	☐	☐
Easy to find	☐	☐	☐	☐	☐
Easy to understand	☐	☐	☐	☐	☐
Well organized	☐	☐	☐	☐	☐
Applicable to your tasks	☐	☐	☐	☐	☐

Please tell us how we can improve this book:

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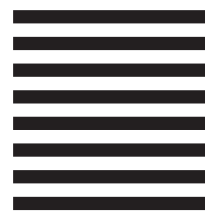UNITED STATES

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