7131 Model 405
SSA Multi-Storage Tower

IBM

Service Guide

7131 Model 405
SSA Multi-Storage Tower

IBM

Service Guide

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┌─ Take Note! ──────────────────────────────────────────────────────────────────────┐
│                                                                                     │
│  Before using this information and the product it supports, be sure to read the general information under "Notices" on page vii. │
│                                                                                     │
└─────────────────────────────────────────────────────────────────────────────────────┘
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Third Edition (April 1997)

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Danger Notices

A danger notice calls attention to a situation that is potentially lethal or extremely hazardous to people.

DANGER

> **To prevent a possible electrical shock during an electrical storm, do not connect or disconnect cables or station protectors for communications lines, display stations, printers, or telephones.** *(RSFTD003)*

DANGER

> To prevent a possible electrical shock from touching two surfaces with different electrical grounds, use one hand, when possible, to connect or disconnect signal cables. *(RSFTD004)*

DANGER

> An electrical outlet that is not correctly wired could place hazardous voltage on metal parts of the system or the products that attach to the system. It is the customer's responsibility to ensure that the outlet is correctly wired and grounded to prevent an electrical shock.
>
> *(RSFTD201)*

DANGER

> To prevent a possible electrical shock when adding or removing any devices to or from the system, ensure that the power cords for those devices are unplugged before the signal cables are connected or disconnected. If possible, disconnect all power cords from the existing system before you add or remove a device. *(RSFTD203)*

DANGER

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About This Guide

This publication contains information to aid the service representative when installing the 7131 Storage Tower, analyzing problems, or exchanging failing parts. The following information is contained in this publication:

Descriptions of the location and function of the specific parts of the 7131 Storage Tower.

Specifications of the 7131 Storage Tower.

A description of the loops and links used with the SSA adapter.

A description of the SSA service aids.

Procedures for analyzing and diagnosing problems with the 7131 Storage Tower.

Procedures for removing and replacing the parts of the 7131 Storage Tower.

Procedures for inspecting the 7131 Storage Tower for safety concerns.

A parts diagram and list.

Power distribution diagrams and line cord descriptions.

Who Should Use This Guide

This publication is intended for use by service representatives who are trained to repair the 7131 SSA Multi-Storage Tower. Store this guide with your system unit maintenance publications.

Related Publications

For additional information, see:

7131 SSA Multi-Storage Tower Model 405 User's Guide, GC26-7096

The safety information manual shipped with your 7131 SSA Multi-Storage Tower either the *External Devices Safety Information*, SA26-7003 or the *Translated Safety Notices for External Storage Devices*, SA26-7197. The safety information manual contains a translation of the safety notices used in this publication in to various languages. Use the reference numbers in parentheses, for example (RSFTD201), at the end of each danger notice to refer to the translated notice.

Electrical Safety for IBM Customer Engineers, S229-8124

Common Diagnostics Information Manual, SA23-2765

Adapters, Devices, and Cables Information, SA23-2764

Chapter 1. Reference Information

This chapter provides information about the connector locations, field replaceable units (FRUs), indicator lights, system configurations, and specifications for the 7131 SSA Multi-Storage Tower.

7131 Storage Tower

Figure 1-1 shows the 7131 SSA Multi-Storage Tower.
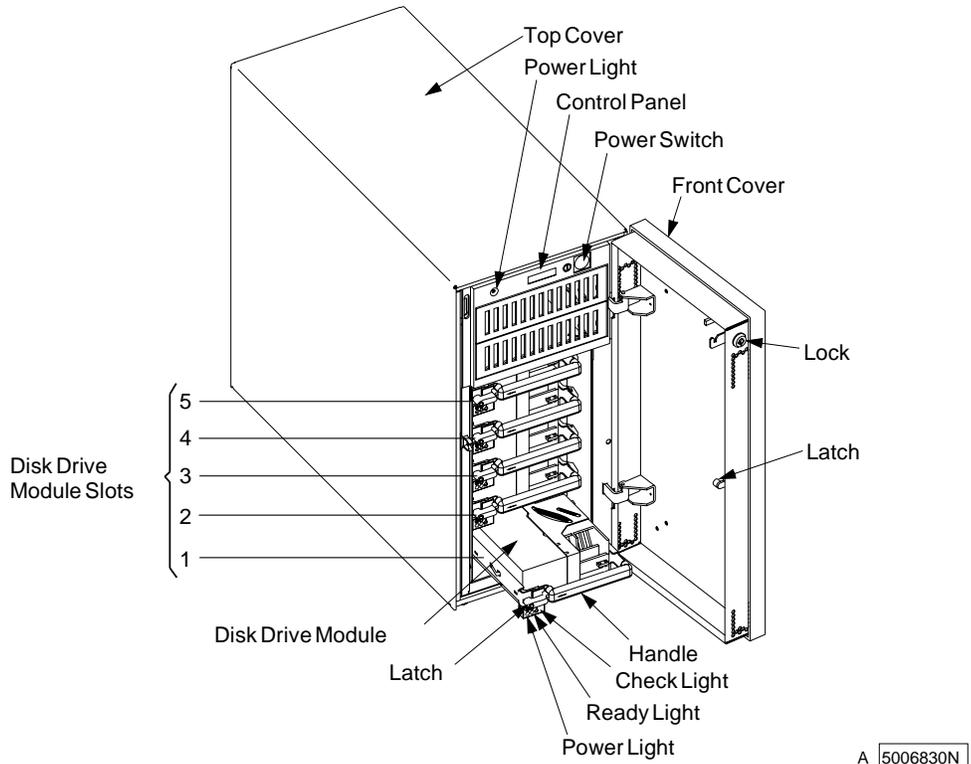
Figure 1-1. 7131 SSA Multi-Storage Tower

Connector Locations

The internal and external connector locations for the 7131 Storage Tower are shown in Figure 1-2.
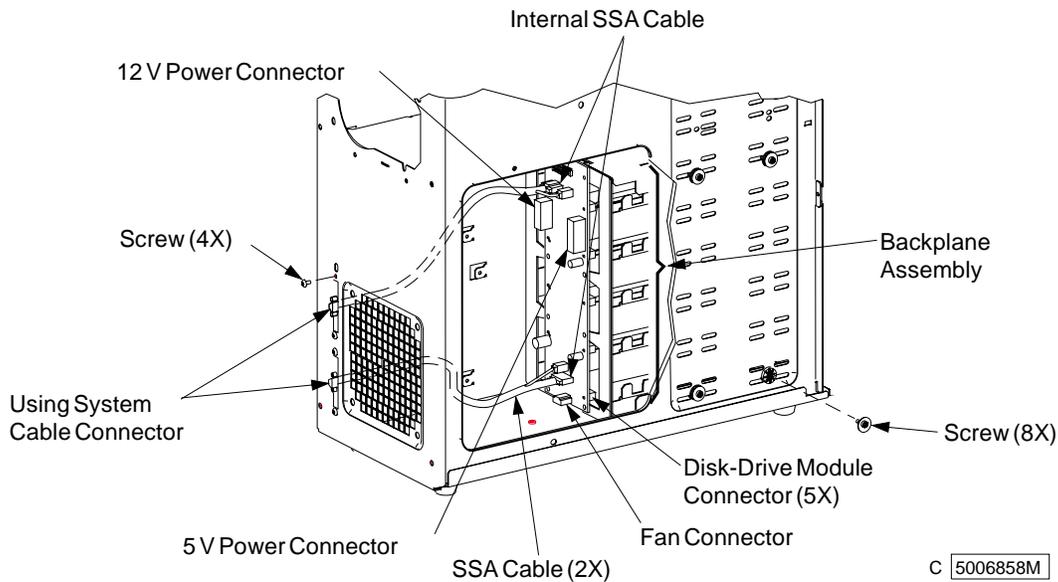
Figure 1-2. Internal and External Connector Locations

Power Switch and Power Light

The 7131 Storage Tower has one operator control, the power switch, which is a pushbutton switch located on the front panel behind the front cover. See Figure 1-3 on page 1-3.

Power switch   A pushbutton switch used to set the power On or Off.

Power light   The power light on the control panel is on when the power switch is set to On and the power supply is providing power.
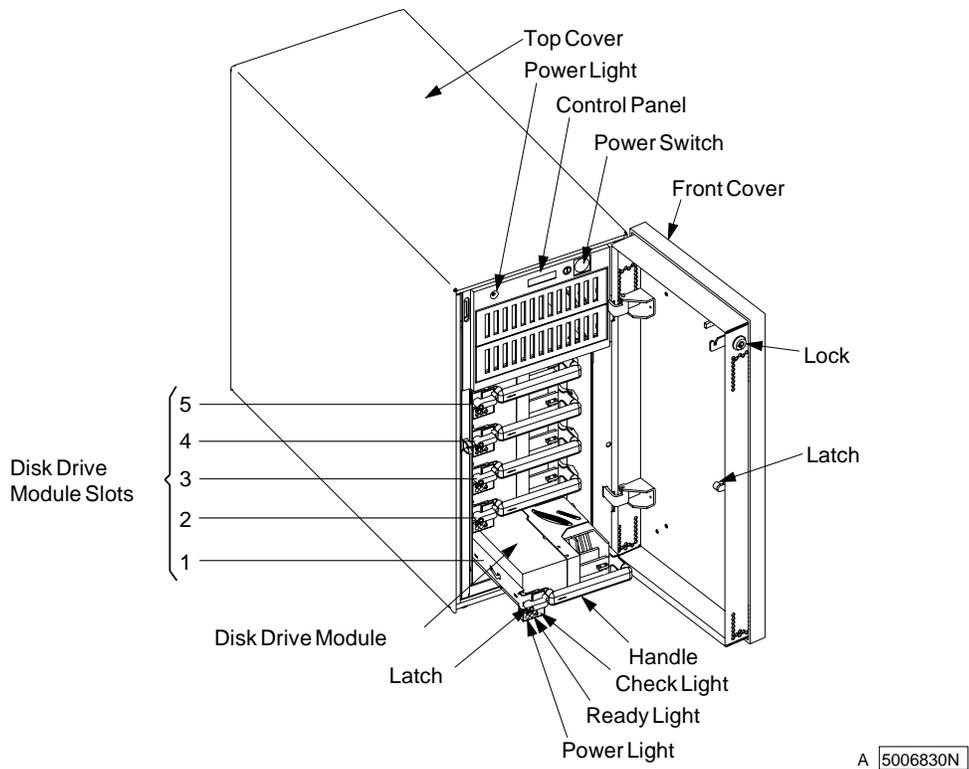
Figure 1-3. Power Switch on the 7131 Storage Tower

Slots

There are five slots that can contain either disk drive modules or dummy disk drive modules. Slot 1 and slot 5 must always contain a disk drive module. Slots 2, 3, and 4 can contain either disk drive modules or dummy disk drive modules. See Figure 1-3.

Disk Drive Module

The disk drive module allows disk drives to be easily installed into or removed from a slot. The disk drive module is available in 1.1 GB, 2.2 GB, 4.5 GB, and 9.1 GB.

The latch locks the disk drive module into the slot to maintain connection with the backplane. See Figure 1-3. The carrier is locked into the backplane when the latch is in the horizontal position. The disk drive module is unlocked when the latch is pointing down.

Dummy Disk Drive Module

A dummy disk drive module must be installed in a slot that does not contain a disk drive module. This maintains the SSA loop through the 7131 Storage Tower.

Disk Drive Module Lights and Latch

Figure 1-4 on page 1-5 shows the location of the lights and the latch on the disk drive module.

Power light   This light (green) is on when dc voltage is present and within the specified limits.

Ready light   This light (green)indicates the following conditions:

Status of Light	Meaning
Off	The SSA loop is open or inactive on both sides of this disk drive module. Possible causes are: The SSA loop is open on both sides of this disk drive module due to missing or disconnected disk drive modules, dummy disk drive modules, or SSA adapters. The SSA loop is open on both sides of this disk drive module due to inactive disk drive modules, or SSA aadapters. An SSA adapter that is in the loop is inactive. A power-on self-test (POST) is running on this disk drive module.
Permanently on	Both SSA links are active, and the disk drive module is ready to accept commands from the using system. The ready light does not show that the motor of the disk drive module is spinning. The module might be waiting for a **Motor Start** command or might have received a **Motor Stop** command.
Slow flash (2 seconds on, 2 seconds off)	Only one SSA link is active.
Fast flash (5 times per second)	The disk drive module is active with a command in progress.

Check light   This light (amber) indicates the following conditions:

Status of Light	Meaning
Off	Normal operating condition.
Permanently on	One of the following conditions exists: An unrecoverable error that prevents the normal operation of the SSA link has been detected. The power-on self-tests (POSTs) are running or have failed. The light comes on as soon as the disk drive module is turned on, and it goes off when the POSTs are complete. If the light remains on for longer than 1 minute after the disk drive module is turned on, the POSTs have failed. Neither SSA link is active. The disk drive module is in Service Mode, and can be removed from the 7131 Storage Tower.
Flashing	The check light has been set by a service aid to identify the position of a particular disk drive module.
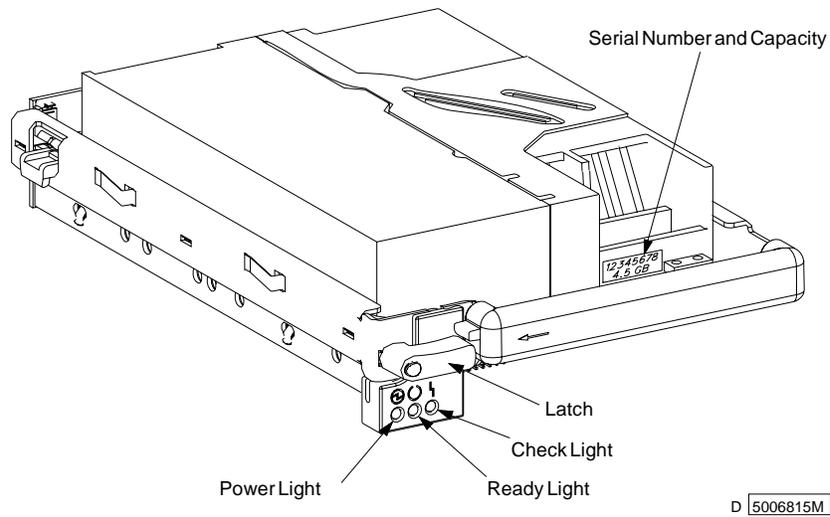
Figure   1-4. Lights and Latch on the Disk Drive Module

Power Supply

The power supply is mounted at the top in the back of the 7131 Storage Tower. See Figure 1-5. The power supply in the 7131 Storage Tower is not auto-ranging.
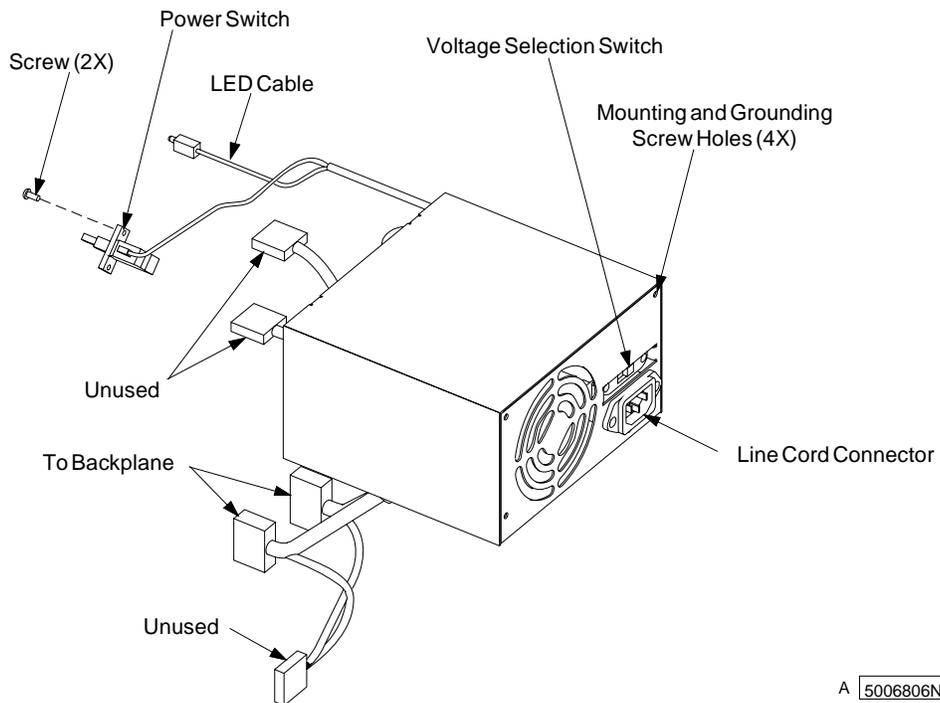
Figure   1-5. Power Supply

Voltage Selection Switch

DANGER

An electrical outlet that is not correctly wired could place hazardous voltage on metal parts of the system or the products that attach to the system. It is the customer's responsibility to ensure that the outlet is correctly wired and grounded to prevent an electrical shock.

(RSFTD201)

The voltage selection switch is a two-position switch on the power supply. See Figure 1-6. The two settings are 115 V ac or 230 V ac. The voltage selection switch must be set to match the input voltage at the power source before connecting the line cord. The 7131 Storage Tower will not operate if the voltage selection switch does not match the wall power source. See "7131 Storage Tower Specifications" on page 1-10 for the supported voltage ranges for each switch setting. Power supply damage may occur if the 7131 Storage Tower is connected to the wrong voltage.
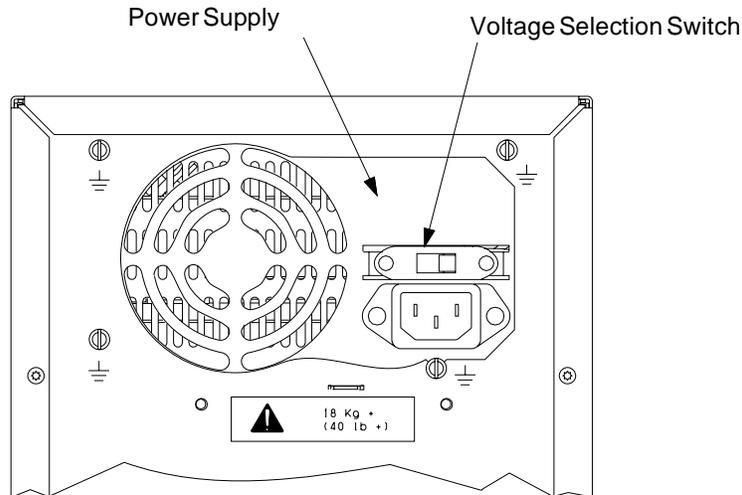
5006807M

Figure 1-6. Voltage Selection Switch

Line Cord

The line cord connects directly to the power supply.

Fan

Cooling is provided by a fan mounted at the lower back of the 7131 Storage Tower (behind the grill in Figure 1-7).
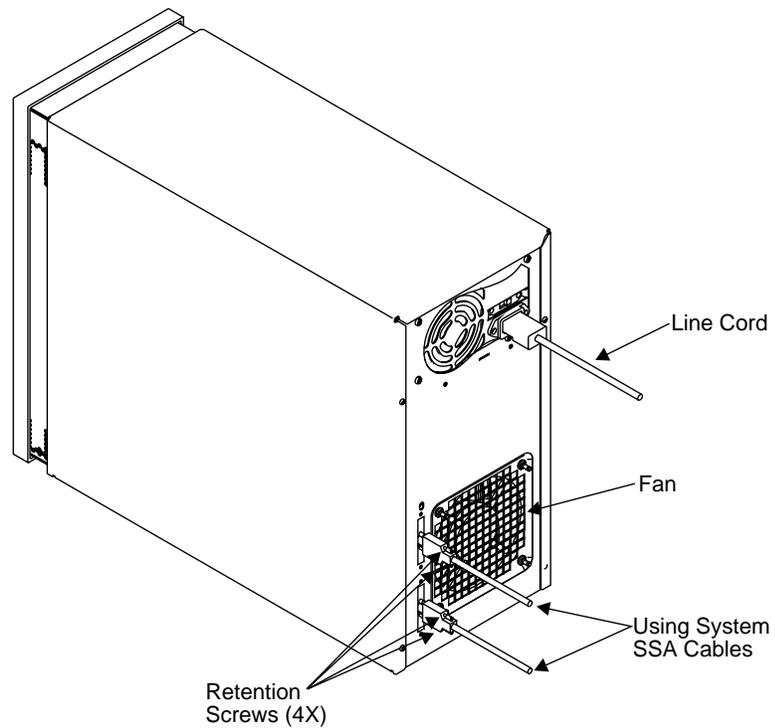
B 5006834N

Figure 1-7. Rear of the 7131 Storage Tower

Internal SSA Cables

The internal serial storage architecture (SSA) cables are mounted to the rear frame. See Figure 1-8. The internal SSA cables connect the external SSA cables to the backplane assembly.

The 7131 Storage Tower attaches to the host system SSA cabling.
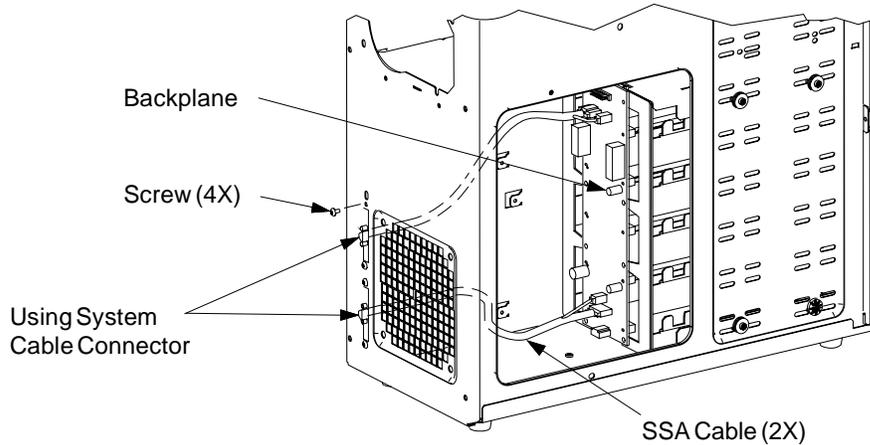
A 5006809M

Figure 1-8. Internal SSA Cable

Backplane Assembly

The backplane card assembly is a distribution board that connects the power supply cables and internal SSA cable to the 5 disk drive module slots. See Figure 1-9.
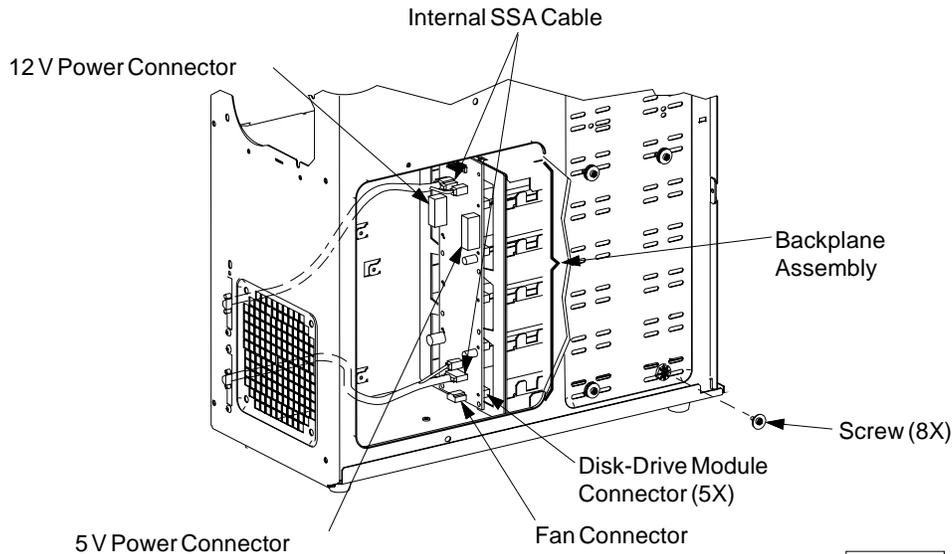
C 5006812M

Figure 1-9. Backplane Assembly

7131 Storage Tower Configurations

The minimum 7131 Storage Tower configuration consists of two disk drive modules. A disk drive module must always be installed in slot 1 and slot 5. See Figure 1-10.

In its minimum configuration, slots 2, 3, and 4 each contain a dummy disk drive module.

In its maximum configuration, all five slots contain disk drive modules. In all configurations, slots 1 and 5 must contain a disk drive module, and slots 2, 3, and 4 must contain a disk drive module or dummy disk drive module in order to complete the SSA loop through the 7131 Storage Tower.
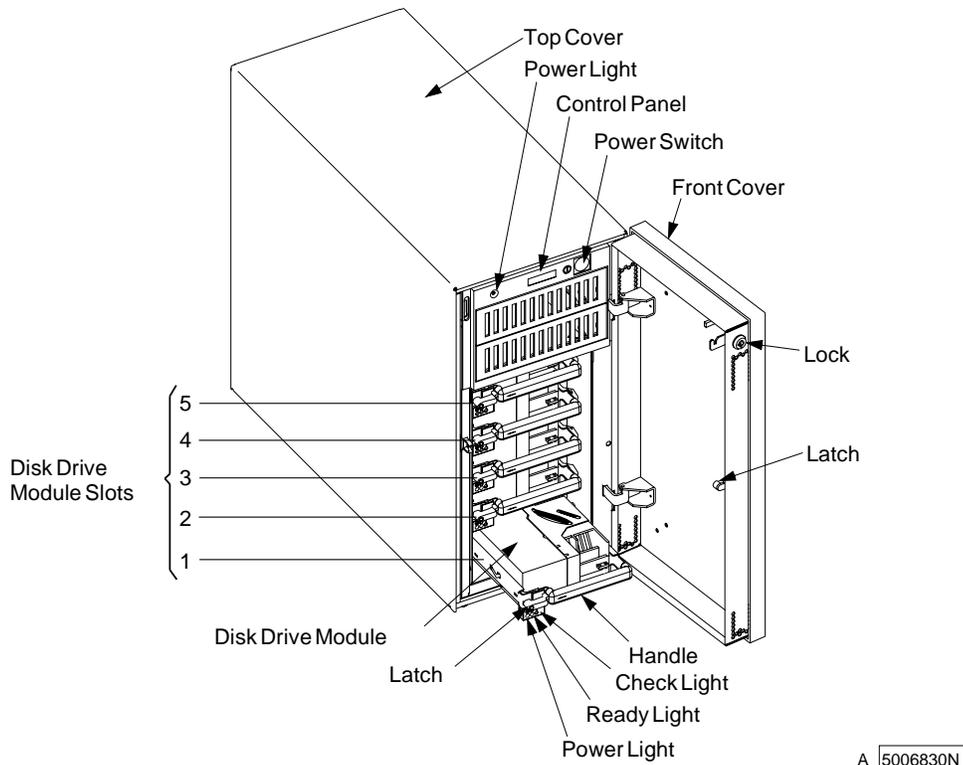
Figure   1-10. 7131 Storage Tower Configuration

7131 Storage Tower Specifications

This section provides the physical specifications for the 7131 Storage Tower and the requirements for its operating environment.

Physical Specifications

When installing more than one 7131 Storage Tower, a clearance of 2.5 cm (1 in.) is required between the 7131 Storage Towers to meet cooling requirements. When installing one 7131 Storage Tower, a clearance of 2.5 cm (1 in.) is required on the hinge side to lift the cover.

Dimensions

Height	407 mm (16 in.)
Depth	483 mm (19 in.)
Width	197 mm (7.75 in.)
Weight	20 kg (44 lb)

Power

	115 V ac	230 V ac
kV-A	0.76	0.96
Range V ac	90–137	180–265
Frequency	47 to 63 Hz	47 to 63 Hz
Watts	378	480
Power factor	0.5 minimum	0.5 minimum
Maximum altitude	2135 m (7000 ft)	2135 m (7000 ft)

Japan Energy Saving Law Data: The machine type and model is 7131 Model 405. Maximum usable storage capacity is 45.5 GB.

Energy consumption	115 V ac	230 V ac
Watts	378	480
Watts per MB	.008	.010

Temperature Requirements

Operating	16–32°C (60.8–89.6°F)

Relative Humidity Requirements

Operating	20–80%

Wet Bulb Temperature Requirements

Operating	23°C (73.4°F maximum)

Noise Level

LwAu (idling)	5.6 bels
LwAu (operating with 5 drives)	6.0 bels

Location Code Format

Location codes identify the locations of adapters and devices in the using system and their attached sub-systems 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

            Always

            Always

           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

            Always

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 1-16.

SSA Loops and Links

The disk drive modules of the 7131 Storage Tower 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.

Disk Drive Module Strings

In the 7131 Storage Tower, the disk drive modules are arranged in a string of 2, 3, 4, or 5 disk drive modules. This string has its own two SSA connectors. This string can be connected through external SSA cables to a pair of connectors on the SSA adapter to make an SSA loop. (The SSA cables provide the SSA links.) A 7131 Storage Tower can also be connected to other 7131 Storage Towers to make bigger loops.

Figure 1-11 shows the relationships between the SSA connectors and the disk drive module string in a 7131 Storage Tower.
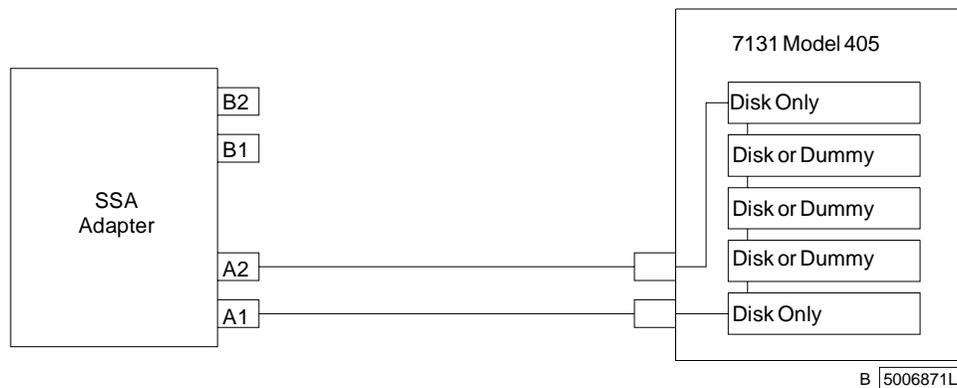
Figure   1-11. A String of Disk Drive Modules

The SSA Adapter

The 7131 Storage Tower can be attached to an SSA adapter. See Figure 1-12. 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.

The SSA links must be configured as loops. Each loop is connected to a pair of 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	Only one SSA link is active.
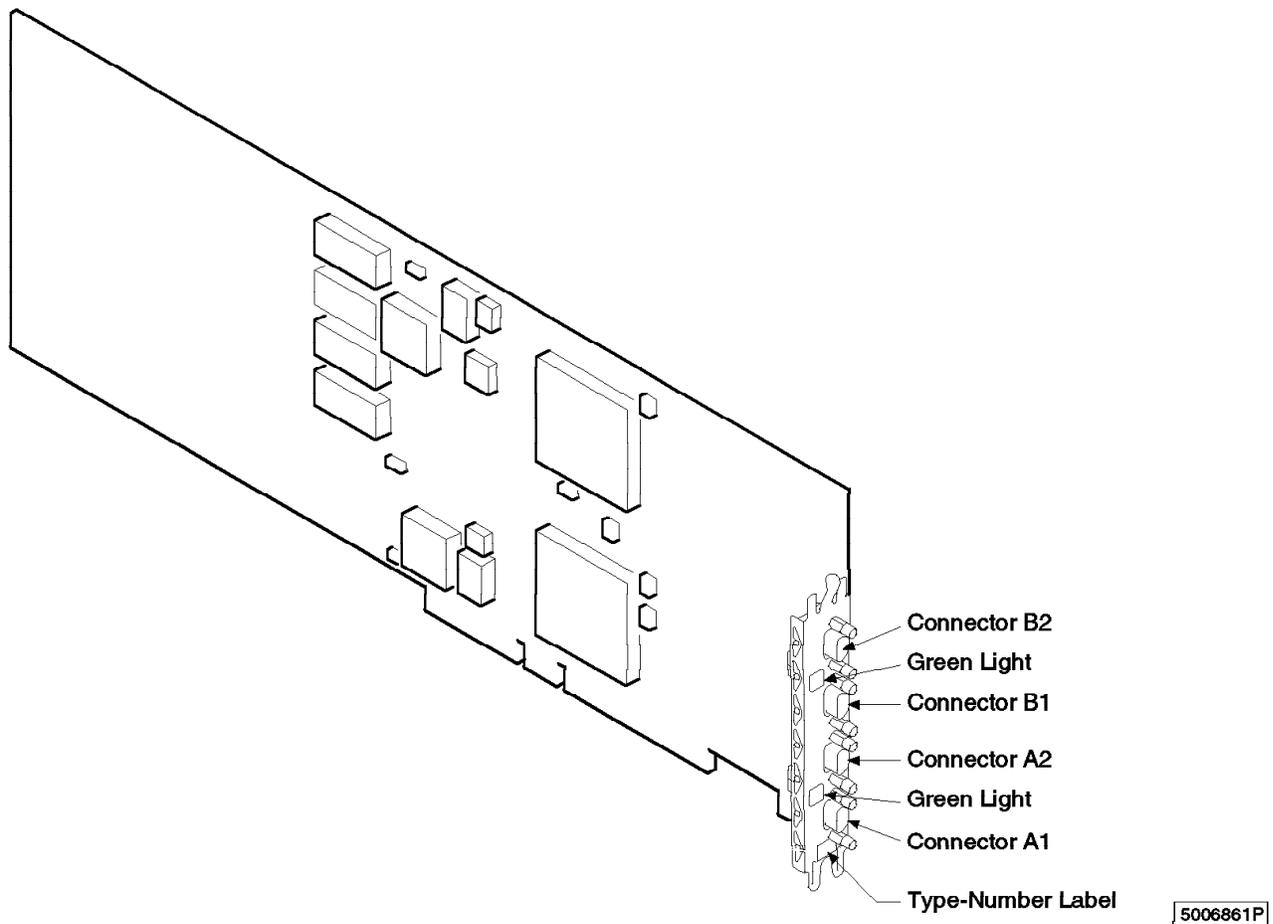
Figure 1-12. SSA Adapter Card

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.

For the 7131 Storage Tower, 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 7131 Storage Tower are not related to each other. For example, pdisk1 is not necessarily installed in slot 1 of the 7131 Storage Tower.

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.

   Each SSA loop must be connected to a valid pair of connectors on the SSA adapter (that is, either connectors A1 and A2, or connectors B1 and B2).

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

   A maximum of 48 disk drive modules can be connected in a particular SSA loop.

   A maximum of three dummy disk drive modules can be connected next to each other in a particular SSA loop.

   A maximum of two adapter-connector pairs can be connected in a particular SSA loop.

   A using system can have a maximum of two SSA adapters connected in a particular SSA loop.

Loops and Data Paths

All devices that are attached to an SSA adapter card are connected through SSA links. See Figure 1-11 on page 1-12. 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.

Figure 1-13 shows that 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.
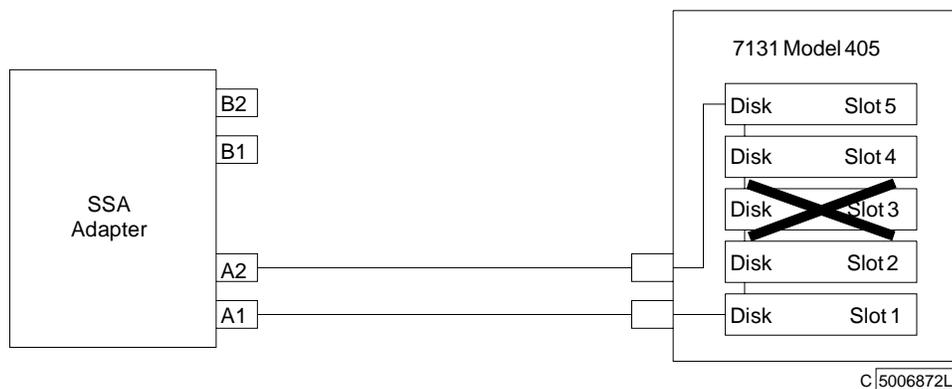
Figure 1-13. Disk Drive Module in Slot 3 Has Failed

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.

Figure 1-14 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.
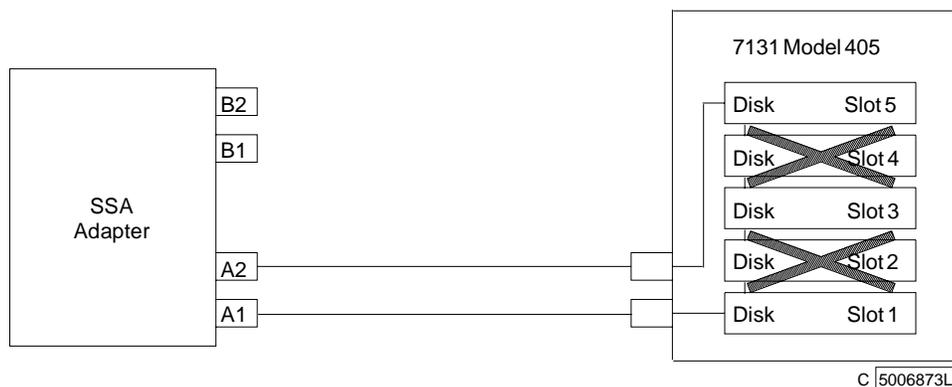
Figure 1-14. Disk Drive Modules in Slots 2 and 4 Have Failed

SSA Service Aids

SSA service aids reside in the using system and help you service the 7131 Storage Tower. This section describes those 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 1-12.

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 7131 Storage Tower. 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                                        8 238

 Move cursor onto selection, then press Enter.


         Set Service Mode
         Link Verification
         Configuration Verification
         Format Disk
         Certify Disk


  F3=Cancel      F1 =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 1-18

"Link Verification Service Aid" on page 1-21

"Configuration Verification Service Aid" on page 1-24

"Format Disk Service Aid" on page 1-26

"Certify Disk Service Aid" on page 1-27

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 7131 Storage Tower. 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 1-17). A list of physical disk drives (pdisks) is displayed:

```
  SSA SERVICE AIDS                                    8 238


  SET SERVICE MODE                                    8 2381

  Move cursor onto selection, then press Enter.

   {TOP}

   pdisk    11111111     - 4-P      2 GB SSA F Physical Disk Drive
   pdisk1   22222222     - 4-P      2 GB SSA F Physical Disk Drive
   pdisk2   33333333     - 4-P      2 GB SSA F Physical Disk Drive
   pdisk3   44444444     - 4-P      2 GB SSA F Physical Disk Drive
   pdisk4   55555555     - 4-P      2 GB SSA F Physical Disk Drive
   pdisk5   66666666     - 4-P      2 GB SSA F Physical Disk Drive
   pdisk6   77777777     - 4-P      2 GB SSA F Physical Disk Drive
   pdisk7   88888888     - 4-P      2 GB SSA F Physical Disk Drive
   pdisk8   99999999     - 4-P      2 GB SSA F Physical Disk Drive


   {BOTTOM}

   F3=Cancel      F1 =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 "Location Code Format" on page 1-11.
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                                           8 238


SET SERVICE MODE                                           8 2381


SET SERVICE MODE                                           8 2382

pdisk3    44444444     - 4-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       F1 =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                                           8 238


SET SERVICE MODE                                           8 2381


SET SERVICE MODE                                           8 2382


SET SERVICE MODE                                           8 2381

Move cursor onto selection, then press Enter.
 {TOP}

 pdisk    11111111     - 4-P      2 GB SSA F Physical Disk Drive
 pdisk1   22222222     - 4-P      2 GB SSA F Physical Disk Drive
 pdisk2   33333333     - 4-P      2 GB SSA F Physical Disk Drive
> pdisk3   44444444     - 4-P      2 GB SSA F Physical Disk Drive
 pdisk4   55555555     - 4-P      2 GB SSA F Physical Disk Drive
 pdisk5   66666666     - 4-P      2 GB SSA F Physical Disk Drive
 pdisk6   77777777     - 4-P      2 GB SSA F Physical Disk Drive
 pdisk7   88888888     - 4-P      2 GB SSA F Physical Disk Drive
 pdisk8   99999999     - 4-P      2 GB SSA F Physical Disk Drive

 {BOTTOM}
 F3=Cancel       F1 =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 1-12), 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 1-16).

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

```
   SSA SERVICE AIDS                                           8 238


   SET SERVICE MODE                                           8 2381


   SET SERVICE MODE                                           8 2382


   SET SERVICE MODE                                           8 2381


   SET SERVICE MODE                                           8 2382

 > pdisk5   66666666      - 4-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       F1 =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                                           8 238


   SET SERVICE MODE                                           8 2381


   SET SERVICE MODE                                           8 2382


   SET SERVICE MODE                                           8 2381


   SET SERVICE MODE                                           8 2382


   SET SERVICE MODE                                           8 2381

   Move cursor onto selection, then press Enter.

    {TOP}

    pdisk    11111111     - 4-P   2 GB SSA F Physical Disk Drive
    pdisk1   22222222     - 4-P   2 GB SSA F Physical Disk Drive
    pdisk2   33333333     - 4-P   2 GB SSA F Physical Disk Drive
  > pdisk3   44444444     - 4-P   2 GB SSA F Physical Disk Drive
    pdisk4   55555555     - 4-P   2 GB SSA F Physical Disk Drive
  + pdisk5   66666666     - 4-P   2 GB SSA F Physical Disk Drive
    pdisk6   77777777     - 4-P   2 GB SSA F Physical Disk Drive
    pdisk7   88888888     - 4-P   2 GB SSA F Physical Disk Drive
    pdisk8   99999999     - 4-P   2 GB SSA F Physical Disk Drive


    {BOTTOM}

  F3=Cancel       F1 =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 1-17). The Link Verification adapter menu is displayed:

```
SSA SERVICE AIDS                                       8 238


LINK VERIFICATION                                      8 2385

Move cursor onto selection, then press Enter.

 ssa      - 3   SSA Adapter
 ssa1     - 5   SSA Adapter
 ssa2     - 6   SSA Adapter
 ssa3     - 7   SSA Adapter


 F3=Cancel      F1 =Exit
```

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.

2 Select the adapter that you want to test.

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                                                  8 238


LINK VERIFICATION                                                 8 2385


LINK VERIFICATION                                                 8 2386

SSA Link Verification for:
 ssa1     - 5   SSA Adapter

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

  Physical   Serial#       Adapter Port

                     A1  A2  B1  B2            Status
 {TOP}
 pdisk      11111111          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                     Good
 pdisk8     99999999             1             Good
 pdisk9     nnnnnnnn         1   9             Good
 {MORE}

 F3=Cancel       F1 =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 1-13).
Status	**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 1-16).

Note:

If you have just made changes to or have just turned on the 7131 Storage Tower, you might need to wait up to 30 seconds before detailed information about the SSA network becomes available to the service aids.

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:

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

b. 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                                          8 2386

 SSA Link Verification for:
   ssa1     - 5   SSA ADAPTER

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

   Physical   Serial#      Adapter Port

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

   F3=Cancel       F1 =Exit
```

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

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 1-17).

```
 SSA SERVICE AIDS                                              8 238


 CONFIGURATION VERIFICATION                                    8 239

 Move cursor onto selection, then press Enter.

  {TOP}
  pdisk      22222222      - 3-P     2 GB SSA F Physical Disk Drive
  pdisk1     33333333      - 5-P     2 GB SSA F Physical Disk Drive
  pdisk2     44444444      - 7-P     2 GB SSA F Physical Disk Drive
  hdisk3     22222222      - 3-L     SSA Logical Disk Drive
  hdisk4     33333333      - 5-L     SSA Logical Disk Drive
  hdisk5     44444444      - 7-L     SSA Logical Disk Drive


  {BOTTOM}

 F3=Cancel       F1 =Exit
```

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

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

```
  SSA SERVICE AIDS                                              8 238


  CONFIGURATION VERIFICATION                                    8 239


  CONFIGURATION VERIFICATION                                    8 2391

   hdisk3    22222222     - 3-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}
   pdisk        22222222      - 2      A1        5        Good
                              - 2      A2        5        Good
                              - 3      A1        1        Good
                              - 3      A2                 Good


   {BOTTOM}

   F3=Cancel       F1 =Exit
```

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

```
SSA SERVICE AIDS                                                 8 238

CONFIGURATION VERIFICATION                                       8 239

CONFIGURATION VERIFICATION                                       8 2392
 pdisk     22222222    - 3-P   2 GB SSA F Physical Disk Drive

Move cursor onto selection, then press Enter.

 hdisk3    22222222    - 3-L    SSA Logical Disk Drive

 {BOTTOM}
 F3=Cancel       F1 =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 1-17). A list of pdisks is displayed:

```
SSA SERVICE AIDS                                          8 238


FORMAT DISK                                               8 2395

Move cursor onto selection, then press Enter.

 {TOP}
 pdisk    11111111    - 4-P       2 GB SSA F Physical Disk Drive
 pdisk1   22222222    - 4-P       2 GB SSA F Physical Disk Drive
 pdisk2   33333333    - 4-P       2 GB SSA F Physical Disk Drive
 pdisk3   44444444    - 4-P       2 GB SSA F Physical Disk Drive
 pdisk4   55555555    - 4-P       2 GB SSA F Physical Disk Drive
 pdisk5   66666666    - 4-P       2 GB SSA F Physical Disk Drive
 pdisk6   77777777    - 4-P       2 GB SSA F Physical Disk Drive
 pdisk7   88888888    - 4-P       2 GB SSA F Physical Disk Drive
 pdisk8   99999999    - 4-P       2 GB SSA F Physical Disk Drive


 {BOTTOM}

 F3=Cancel       F1 =Exit
```

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

```
SSA SERVICE AIDS                                          8 238


FORMAT DISK                                               8 2395


FORMAT DISK                                               8 2396

 pdisk1   22222222      - 4-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       F1 =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 1-16). 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 1-17). A list of pdisks is displayed:

```
SSA SERVICE AIDS                                          8 238


CERTIFY DISK                                              8 24 4

Move cursor onto selection, then press Enter.

  {TOP}
  pdisk     11111111    - 4-P      2 GB SSA F Physical Disk Drive
  pdisk1    22222222    - 4-P      2 GB SSA F Physical Disk Drive
  pdisk2    33333333    - 4-P      2 GB SSA F Physical Disk Drive
  pdisk3    44444444    - 4-P      2 GB SSA F Physical Disk Drive
  pdisk4    55555555    - 4-P      2 GB SSA F Physical Disk Drive
  pdisk5    66666666    - 4-P      2 GB SSA F Physical Disk Drive
  pdisk6    77777777    - 4-P      2 GB SSA F Physical Disk Drive
  pdisk7    88888888    - 4-P      2 GB SSA F Physical Disk Drive
  pdisk8    99999999    - 4-P      2 GB SSA F Physical Disk Drive


  {BOTTOM}

 F3=Cancel       F1 =Exit
```

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

```
SSA SERVICE AIDS                                          8 238


CERTIFY DISK                                              8 24 4


CERTIFY DISK                                              8 24 5

 pdisk1    22222222      - 4-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       F1 =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 1-16). 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:

1. 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.

2. 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.

3. Close down and reboot the using system; then try to run the service aid again.

4. 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:

1. 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.

2. 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 1-24) 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 1-21) to the SSA adapter.

3. If a link failure is indicated by the service aid, go to "MAP 2010: 7131 Storage Tower–Start" on page 2-12.

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 1-21). The following examples show various loops and the associated information that is displayed by the Link Verification service aid.

Example 1 Normal Loops: In Figure 1-15, eight disk drive modules are connected to connectors A1 and A2 of the SSA adapter. Four disk drive modules are connected to connectors B1 and B2 of the same SSA adapter.
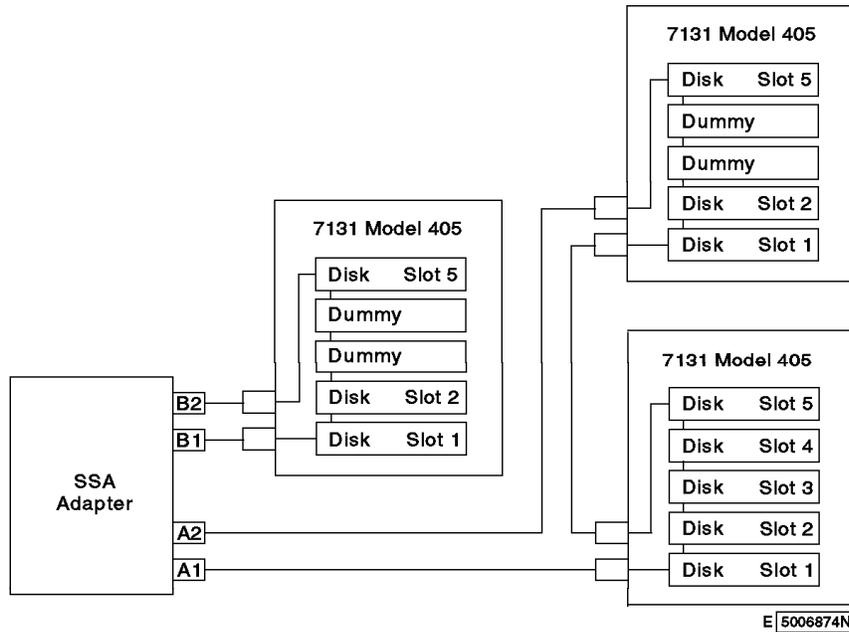

Figure 1-15. Normal Loops

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

```
LINK VERIFICATION                                        8 2386

SSA Link Verification for:
  ssa1     - 5    SSA ADAPTER

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

  Physical    Serial#     Adapter Port

                     A1  A2  B1  B2              Status
  {TOP}
  pdisk    nnnnnnnn         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                         Good
  pdisk8   nnnnnnnn               3             Good
  pdisk9   nnnnnnnn           1    2             Good
  {MORE}

  F3=Cancel       F1 =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 Figure 1-16, 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 four disk drive modules can communicate through connectors B1 and B2 of the same SSA adapter (normal loop).
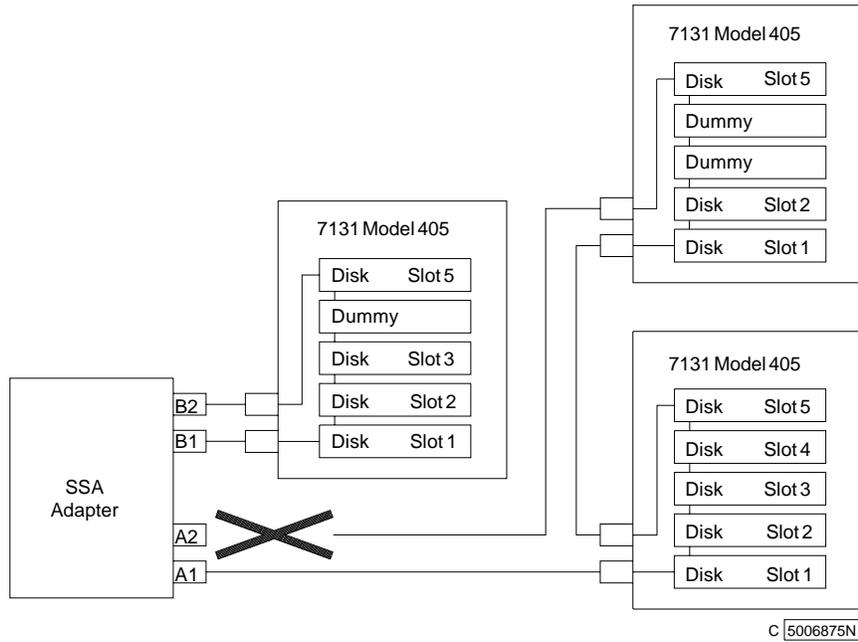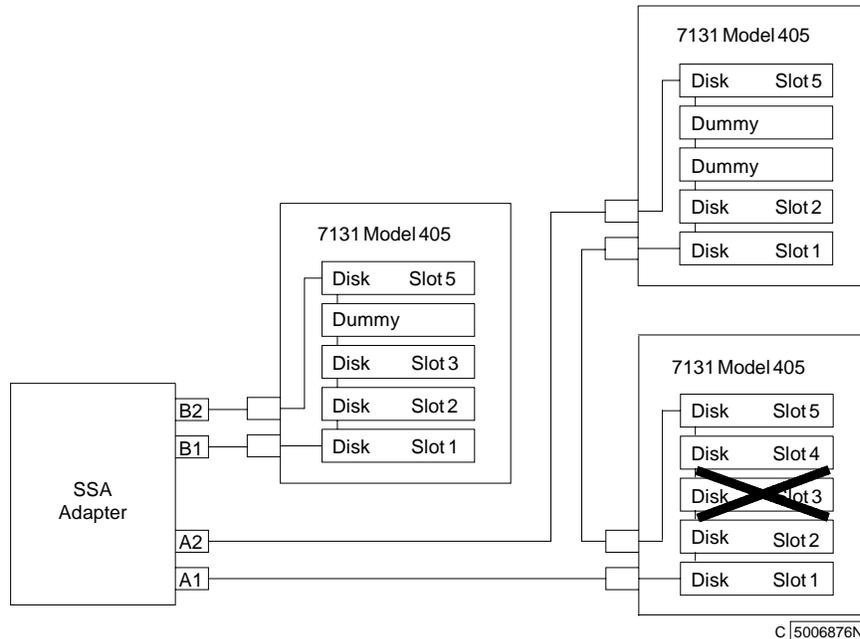

Figure   1-16. Broken Loop

For this example, the Link Verification service aid displays the following: Note that the column for adapter connector A2 shows no connections.

```
LINK VERIFICATION                                              8 2386

SSA Link Verification for:
  ssa1     - 5   SSA ADAPTER

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

  Physical   Serial#      Adapter Port

                    A1  A2  B1  B2           Status
  {TOP}
  pdisk    nnnnnnnn                          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            3             Good
  pdisk9   nnnnnnnn        1   2             Good
  {MORE}

  F3=Cancel       F1 =Exit
```

Example 3 Broken Loop (Disk Drive Module Removed): Figure 1-17 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. Four disk drive modules can communicate through connectors B1 and B2 of the same SSA adapter (normal loop).

Figure   1-17. Broken Loop (Disk Drive Module Removed)

For this example, the Link Verification service aid displays the following: Note that the missing disk drive module (pdisk2) is represented by a line of question marks.

```
LINK VERIFICATION                                        8 2386

SSA Link Verification for:
  ssa1     - 5    SSA ADAPTER

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

  Physical   Serial#      Adapter Port

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

  F3=Cancel       F1 =Exit
```

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 1-16.

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.  .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 7131 Storage Tower. 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 7131 Storage Tower 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

1.1 GB, 2.2 GB, 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 2. 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 1-16.

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 ESD-Sensitive Parts" on page 3-2.

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-processor. 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.

Service Request Numbers (SRNs)

Service request numbers (SRNs) are generated for the 7131 Storage Tower by the system error-log analysis, system configuration code, diagnostics, and customer problem-determination procedures. SRNs help you to identify the cause of a problem, the failing field-replaceable units (FRUs), and the service actions that might be needed to solve the problem.

The SRN Table

Table 2-1 on page 2-5 lists the SRNs and describes the actions you should perform. The table columns are:

SRN   The service reference number

FRU list   The FRU or FRUs that might be causing the problem (see also "FRU Names Used in the SRN Table" on page 2-4)

%   How likely it is (by percentage) that the FRU is causing the problem

Problem   A description of the problem and the action you must take

Abbreviations used in the table are:

DMA   Direct memory access

FRU   Field-replaceable unit

IOCC   Input/output channel controller

POS   Programmable option select (POS registers)

POST   Power-on self-test

PAA   P = adapter port number
               AA = SSA address
               See also "Finding the Device When No Service Aids Are Available" on page 1-32.

Using the SRN Table

Important: You should have been sent here from "MAP 2010: 7131 Storage Tower–Start." Do not start problem determination from the SRN table; always go to "MAP 2010: 7131 Storage Tower–Start" on page 2-12 first.

1 Locate the SRN in the table. If you cannot find the SRN, you have a problem with the diagnostics, the microcode, or the documentation. Call your support center for assistance.

2 Read carefully the "Action" you must perform for the problem. *Do not exchange FRUs unless you are instructed to do so*.

3 Normally exchange only one FRU at a time, starting from the top of the FRU list for that SRN. Always use instructions given in Chapter 3, "Removal and Replacement Procedures" when exchanging FRUs; a page reference is given with each FRU in the FRU list. After each FRU is exchanged, go to "MAP 2410: 7131 Storage Tower–Repair Verification" on page 2-26 to verify the repair.

Software and Microcode Errors

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

1 Make a note of the contents of the error log for the device that has the problem.

2 Go to the using-system service aids and select Display Vital Product Data to display the VPD of the failing system. Make a note of the VPD for all the SSA adapters and disk drive modules.

3 Report the problem to your support center. The center can tell you whether you have a known problem and can, if necessary, provide you with a correction for the software or microcode.

FRU Names Used in the SRN Table

This section provides a glossary of the FRU names used.

FRU Name in Table	Definition
Backplane assembly	The disk drive modules, dummy disk drive modules, internal SSA cables, power supply, and fan are connected to the backplane assembly.
Disk drive module	A disk drive attached to a carrier that plugs into the backplane in the 7131 Storage Tower.
Dummy Disk drive module	This module must be installed in a slot that does not contain a disk drive module. This completes the SSA loop through the 7131 Storage Tower.
External SSA cable	A cable that connects the 7131 Storage Tower to an SSA adapter or to another 7131 Storage Tower.
Fan assembly	A fan that provides cooling in the 7131 Storage Tower.
Internal SSA cable	Either of two SSA cables in the 7131 Storage Tower. They attach the backplane to the external SSA connectors at the back of the 7131 Storage Tower.
SSA adapter card	The SSA adapter card, which is located in the using system.
Disk Drive Carrier	The carriers that hold the disk drive assemblies. This includes the flex card and attached LED cable.

Table 2-1 (Page 1 of 5). Service Request Numbers

SRN	FRU List	%	Problem
10101	**Fan** (See "Fan" on page 3-22.) **Disk drive module** (See "Disk Drive Module" on page 3-12.)	80 20	**Description:** Disk drive motor stopped. Either the fan or the disk drive module is bad. **Action:** If this SRN has been received by all disk drive modules in a 7131 Storage Tower, then the fan is bad. Exchange the FRU for a new FRU. If this SRN was received by one disk drive module only, then exchange the disk drive module.
10112	None	–	**Description:** Format degraded. A format operation has been ended before it has completed. **Action:** Use the Format service aid to format the disk drive module.
1*xxxx*	**Disk drive module** (See "Disk Drive Module" on page 3-12.)	100	**Description:** Disk drive module error. **Action:** Exchange the FRU for a new FRU. **Note:** In this SRN, an *x* represents a digit from 0 to F.
20PAA	**Disk drive module** (See "Disk Drive Module" on page 3-12.) **SSA adapter card** (See the installation and service guide for the using system.) **External SSA Cables** **Backplane assembly** (See "Backplane Assembly" on page 3-16.) **Internal SSA Cable** (See "Internal SSA Cable" on page 3-9.)	45 45 6 2 2	**Description:** An open SSA link has been detected. **Action:** Run the Link Verification service aid to isolate the failure. See "Link Verification Service Aid" on page 1-21. If the SSA service aids are not available: When the failing device is in a 7131 Storage Tower, go to step 31 on page 2-15 in MAP 2010: 7131 Storage Tower–Start. When the failing device is not in a 7131 Storage Tower, go to the service information for that device.
21PAA to 29PAA	**Disk drive module** (See "Disk Drive Module" on page 3-12.) **SSA adapter card** (See the installation and service guide for the using system.) **External SSA Cables** **Backplane assembly** (See "Backplane Assembly" on page 3-16.) **Internal SSA Cable** (See "Internal SSA Cable" on page 3-9.)	45 45 6 2 2	**Description:** An SSA threshold-exceeded-link error has been detected. **Action:** Run the Link Verification service aid to isolate the failure. See "Link Verification Service Aid" on page 1-21. If the SSA service aids are not available: When the failing device is in a 7131 Storage Tower, go to "MAP 2323: 7131 Storage Tower–Intermittent Link Error" on page 2-24. When the failing device is not in a 7131 Storage Tower, go to the service information for that device.
2A002	**Disk drive module** (See "Disk Drive Module" on page 3-12.) **SSA adapter card** (See the installation and service guide for the using system.)	50 50	**Description:** Async code 02 has been received. A software error has probably occurred. **Action:** Go to "Software and Microcode Errors" on page 2-4 before exchanging any FRUs.
2A003	**Disk drive module** (See "Disk Drive Module" on page 3-12.) **SSA adapter card** (See the installation and service guide for the using system.)	50 50	**Description:** Async code 03 has been received. A software error has probably occurred. **Action:** Go to "Software and Microcode Errors" on page 2-4 before exchanging any FRUs.
2A004	**Disk drive module** (See "Disk Drive Module" on page 3-12.) **SSA adapter card** (See the installation and service guide for the using system.)	50 50	**Description:** Async code 04 has been received. A software error has probably occurred. **Action:** Go to "Software and Microcode Errors" on page 2-4 before exchanging any FRUs.

Table 2-1 (Page 2 of 5). Service Request Numbers

SRN	FRU List	%	Problem
2A005	None	–	**Description:** Async code 05 has been received. This code indicates that a disk drive module has detected a loss of power. **Action:** Use the Link Verification service aid (see "Link Verification Service Aid" on page 1-21) to determine if any devices are missing from the SSA link. If a device is missing, go to "MAP 2010: 7131 Storage Tower–Start" on page 2-12 to isolate the problem. If no device is missing, the problem might have been caused by a temporary, or partial, loss of power to the 7131 Storage Tower.
2A006	**Disk drive module** (See "Disk Drive Module" on page 3-12.)	100	**Description:** Async code 06 has been received. This code indicates that a disk drive module has detected the loss of one of its power inputs. **Action:** If the failing device is in a 7131 Storage Tower, exchange the disk drive module. If the failing device is not in a 7131 Storage Tower, go to the service information for that device.
2A106	**Backplane assembly** (See "Backplane Assembly" on page 3-16.)	100	**Description:** Async code 06 has been received. This code indicates that multiple disk drive modules have detected the loss of one of its their power inputs. **Action:** If the failing devices are in a 7131 Storage Tower, exchange the backplane. If the failing devices are not in a 7131 Storage Tower, go to the service information for those devices.
2A206	**Disk drive module** (See "Disk Drive Module" on page 3-12.)	100	**Description:** A disk drive module has detected that one of its SSA links has failed the POSTs. **Action:** 1. Use the Link Verification service aid (see "Link Verification Service Aid" on page 1-21) to determine where the SSA link is broken. 2. Run diagnostics in the system verification mode to the two disk drive modules that are nearest to, and on each side of, the place where the link is broken. The diagnostics show which disk drive module detected the problem.
2FFFF	None	–	**Description:** An async code that is not valid has been received. **Action:** Go to "Software and Microcode Errors" on page 2-4.
300C0	**Disk drive module** (See "Disk Drive Module" on page 3-12.)	100	**Description:** A disk drive module has detected the loss of one of its power inputs. **Action:** If the failing device is in a 7131 Storage Tower, exchange the disk drive module. If the failing device is not in a 7131 Storage Tower, go to the service information for that device.
301C0	**Backplane assembly** (See "Backplane Assembly" on page 3-16.)	100	**Description:** Multiple disk drive modules have detected the loss of one of their power inputs. **Action:** If the failing devices are in a 7131 Storage Tower, exchange the backplane. If the failing devices are not in a 7131 Storage Tower, go to the service information for those devices.

Table 2-1 (Page 3 of 5). Service Request Numbers

SRN	FRU List	%	Problem
303FF	**Disk drive module** (See "Disk Drive Module" on page 3-12.)	100	**Description:** An SCSI status that is not valid has been received. **Action:** Go to "Software and Microcode Errors" on page 2-4 before exchanging any FRUs.
40000	**SSA adapter card** (See the installation and service guide for the using system.)	100	**Description:** The SSA adapter card has failed. **Action:** Exchange the FRU for a new FRU.
43PAA	**Disk drive module** (See "Disk Drive Module" on page 3-12.) **SSA adapter card** (See the installation and service guide for the using system.)	90 10	**Description:** An SSA device on the link is preventing the completion of the link configuration. **Action:** If the SSA service aids are available, run the Link Verification service aid (see "Link Verification Service Aid" on page 1-21) to determine which device is preventing configuration. (That device is the one beyond the last-configured device on an open SSA link.) If the SSA service aids are not available, note the value of PAA in this SRN, and go to "Finding the Physical Location of a Device" on page 1-32.
44PAA	**Disk drive module** (See "Disk Drive Module" on page 3-12.)	100	**Description:** A disk drive module has failed. **Action:** If the SSA service aids are available, run the Link Verification service aid (see "Link Verification Service Aid" on page 1-21) to find the failing disk drive module. Before you exchange the failing disk drive module, run diagnostics in the system verification mode to that module to determine the cause of the problem. If the SSA service aids are not available, note the value of PAA in this SRN, and go to "Finding the Physical Location of a Device" on page 1-32. Exchange the failing FRU for a new FRU.
45PAA	**Disk drive module** (See "Disk Drive Module" on page 3-12.) **External SSA Cables** (See "External SSA Cable" on page 3-5.) **Backplane assembly** (See "Backplane Assembly" on page 3-16.)	40 40 20	**Description:** The SSA adapter has detected an open SSA link. This problem is caused either by a disk drive module that is failing, or by a disk drive module that has been switched off from another using system on the same SSA link. (That using system has itself been switched off.) **Action:** If the SSA service aids are available, run the Link Verification service aid (see "Link Verification Service Aid" on page 1-21) to determine which device is preventing configuration. (That device is the one beyond the last-configured device on an open SSA link.) If the SSA service aids are not available, note the value of the PAA in this SRN, and go to "Finding the Physical Location of a Device" on page 1-32.
48000	None	–	**Description:** The SSA adapter has detected a link configuration resource that is not valid. **Action:** See "SSA Loop Configurations That Are Not Valid" on page 2-10.
50000	**SSA adapter card** (See the installation and service guide for the using system.)	100	**Description:** The SSA adapter failed to respond to the device driver. **Action:** Exchange the FRU for a new FRU.
50001	**SSA adapter card** (See the installation and service guide for the using system.)	100	**Description:** A data parity error has occurred. **Action:** Exchange the FRU for a new FRU.
50002	**SSA adapter card** (See the installation and service guide for the using system.)	100	**Description:** An SSA adapter direct memory access (DMA) error has occurred. **Action:** Exchange the FRU for a new FRU.

Table 2-1 (Page 4 of 5). Service Request Numbers

SRN	FRU List	%	Problem
50004	**SSA adapter card** (See the installation and service guide for the using system.)	100	**Description:** A channel check has occurred. **Action:** Exchange the FRU for a new FRU.
50005	**SSA adapter card** (See the installation and service guide for the using system.)	100	**Description:** A software error has occurred. **Action:** Go to "Software and Microcode Errors" on page 2-4 before exchanging the FRU.
50006	**SSA adapter card** (See the installation and service guide for the using system.)	100	**Description:** A channel check has occurred. **Action:** Exchange the FRU for a new FRU.
50007	**SSA adapter card** (See the installation and service guide for the using system.)	100	**Description:** The input/output channel controller (IOCC) detected an internal error. **Action:** Exchange the FRU for a new FRU.
50008	**SSA adapter card** (See the installation and service guide for the using system.)	100	**Description:** Unable to read or write the POS registers. **Action:** Exchange the FRU for a new FRU.
50010	**SSA adapter card** (See the installation and service guide for the using system.)	100	**Description:** An SSA adapter or device drive protocol error has occurred. **Action:** Go to "Software and Microcode Errors" on page 2-4 before exchanging the FRU.
50012	**SSA adapter card** (See the installation and service guide for the using system.)	100	**Description:** The SSA adapter microcode is in a suspended state. **Action:** Run diagnostics in System Verification mode to the SSA adapter. If the diagnostics fail, exchange the FRU for a new FRU. If the diagnostics do not fail, go to "Software and Microcode Errors" on page 2-4 before exchanging the FRU.
50100	None	–	**Description:** An attempt was made to log an error against a pdisk that is not available to the using system. **Action:** This problem has occurred for one of the following reasons: A user has deleted a pdisk from the system configuration. In such an instance, the hdisk that is related to the pdisk continues to operate normally. If the disk drive module tries to log an error, however, this SRN (50100) is produced. Enter the **cfgmgr** command to return the pdisk to the system configuration. A disk drive module has tried to log an error during system configuration. To find the failing disk drive module, run diagnostics to the disk drive modules that are connected to this SSA adapter.
60000	**SSA adapter card** (See the installation and service guide for the using system.)	100	**Description:** The SSA adapter is missing from the expected configuration. **Action:** Verify that the SSA adapter card is installed in the expected slot of the using-system. If it is in the expected slot, exchange the FRU for a new FRU. If it is not in the expected slot, enter the **diag -a** command, and answer the questions that are displayed.
7*xxxx*	None	–	**Description:** An SSA disk drive module is missing from the expected configuration of the SSA loop. **Action:** The missing disk drive module is not associated with a 7131 Storage Tower. Go to the service information for another device that is in the same SSA loop. **Note:** In this SRN, an *x* represents a digit from 0 to F.

Table 2-1 (Page 5 of 5). Service Request Numbers

SRN	FRU List	%	Problem

D0000	**Disk drive module**
	(See "Disk Drive Module" on page 3-12.)
		100	**Description:** The using system cannot configure the disk drive module. This is probably a software problem.
			Action:
			  1. Try again to configure the disk drive module.
			  2. If the problem remains, go to "Software and Microcode Errors" on page 2-4 before exchanging the FRU.

D0100	**Disk drive module** (See "Disk Drive Module" on page 3-12.)	100	**Description:** Unable to clear a disk drive module reservation. **Action:** Exchange the FRU for a new FRU.
D0101	**Disk drive module** (See "Disk Drive Module" on page 3-12.)	100	**Description:** The disk drive module has been reserved since the diagnostics started. The disk drive module is in use. **Action:** Release the disk drive module, and run the diagnostics again.
D0200	**Disk drive module** (See "Disk Drive Module" on page 3-12.)	100	**Description:** The disk drive module timed out while the diagnostics were running. **Action:** Rerun the diagnostics. If the problem remains, exchange the FRU for a new FRU.
D0300	**Disk drive module** (See "Disk Drive Module" on page 3-12.)	100	**Description:** The disk drive module failed the diagnostic test. **Action:** Exchange the FRU for a new FRU.
D0400	**Disk drive module** (See "Disk Drive Module" on page 3-12.)	100	**Description:** The disk drive module is not ready while the diagnostics are running. **Action:** Rerun the diagnostics. If the problem remains, exchange the FRU for a new FRU.
D0450	None	–	**Description:** A format operation is in progress. The format operation that was started on this disk drive module has not yet finished. A format operation can take up to 30 minutes to run. **Action:** Wait for the format operation to finish before you run the diagnostics again. You can observe the progress of the Format operation by running the Format service aid again on this disk drive module.
D0460	None	–	**Description:** A format operation has been degraded. The format operation that was started on this disk drive module did not finish. Possibly, the disk drive module was switched off while the format operation was running. **Action:** Run the Format service aid to format this disk drive module.
D4000	**SSA adapter card** (See the installation and service guide for the using system.).	100	**Description:** The diagnostics cannot configure the SSA adapter. **Action:** Exchange the FRU for a new FRU.
D4100	**SSA adapter card** (See the installation and service guide for the using system.)	100	**Description:** The diagnostics cannot open the SSA adapter. **Action:** Exchange the FRU for a new FRU.
D4300	**SSA adapter card** (See the installation and service guide for the using system.)	100	**Description:** The diagnostics have detected an SSA adapter POST failure. **Action:** Exchange the FRU for a new FRU.
D44xx	**SSA adapter card** (See the installation and service guide for the using system.)	100	**Description:** The diagnostics have detected that the SSA adapter has corrupted the microcode, but cannot download a new version of the microcode. **Action:** Exchange the FRU for a new FRU. **Note:** In this SRN, an x represents a digit 0 through F.
DFFFF	**SSA adapter card** (See the installation and service guide for the using system.)	100	**Description:** A command or parameter that has been sent or received is not valid. This problem is caused either by the SSA adapter or by an error in the microcode. **Action:** Go to "Software and Microcode Errors" on page 2-4 before exchanging the FRU.

SSA Loop Configurations That Are Not Valid

Note: This section is related to SRN 48000.

SRN 48000 shows that the SSA loop contains more devices or adapters than are allowed. The following condition exist: the loop contains more than 48 devices.

If the SRN occurred when either you or the customer switched on the using system:

1 Switch off the using system.

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

3 Review "Rules for SSA Loops" on page 1-14.

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

5 Switch on the using system.

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

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

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

2 Review "Rules for SSA Loops" on page 1-14.

3 Review the configuration that you are trying to make, and determine why that configuration is not valid.

4 Correct your system to a valid configuration.

Maintenance Analysis Procedures (MAPs)

These maintenance analysis procedures (MAPs) describe how to analyze a continuous failure that has occurred in a 7131 Storage Tower that contains two or more disk drive modules. Failing field-replaceable units (FRUs) of the 7131 Storage Tower can be isolated with these MAPs.

How to Use These MAPs

Attention: Switching off the power to the 7131 Storage Tower can cause a system fault unless you first make the disk drive modules within the 7131 Storage Tower unavailable to the host system. To do this:

a. Use the system-management task menus of the host system to make the disk drive modules unavailable.

b. If the 7131 Storage Tower is connected to more than one adapter, make the disk drive modules unavailable to the host system or to the host systems for each of the paths to the 7131 Storage Tower.

Attention: Unless the using system needs to be switched off for some other reason, do not switch off the power to the using system when servicing the 7131 Storage Tower or the external SSA cable.

To isolate the FRUs in the failing 7131 Storage Tower, perform the actions and answer the questions given in these MAPs.

When instructed to exchange two or more FRUs in sequence:

1 Exchange the first FRU in the list for a new one.

2 Verify that the problem is solved. For some problems, verification means running the diagnostic programs (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.

See "Power Switch and Power Light" on page 1-2 and "Disk Drive Module Lights and Latch" on page 1-4 for locations and descriptions of the lights and switches.

MAP 2010: 7131 Storage Tower–Start

This MAP is the entry point to the MAPs for the 7131 Storage Tower. If you are not familiar with these MAPs, read "How to Use These MAPs" on page 2-11 first.

You might have been sent here because:

The system problem determination procedures sent you here.

Action from an SRN list sent you here.

A problem occurred during the installation of a 7131 Storage Tower or a disk drive module.

Another MAP sent you here.

A customer observed a problem that was not detected by the system problem determination procedures.

Attention: Unless the using system needs to be switched off for some other reason, *do not switch off the using system when servicing the 7131 Storage Tower or an SSA link*. Power cables and external SSA cables that connect the 7131 Storage Tower to the using system can be disconnected while the using system is running.

Perform the following procedure to analyze the problem:

1 **Do you see smoke or smell a burning odor coming from the 7131 Storage Tower?**

   Yes   **No**

         Go to step 5.

2 If the 7131 Storage Tower is switched on, switch it off by pressing the power switch.

3 At the back of the 7131 Storage Tower, disconnect the line cord.

4 Call your support center for assistance.

5 **Have you been sent to this MAP from the SRN list in this book?**

   No   **Yes**

         Go to step 12 on page 2-13.

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

   Yes   **No**

         Go to step 8 on page 2-13.

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

You have an hdisk that has no associated pdisk.

    1) Issue the system **cfgmgr** command.

    2) Retry the Configuration Verification service aid.

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

You have a pdisk that has no associated hdisk.

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

      – If you get an SRN, go to Table 2-1 on page 2-5 and follow the actions described.

      – 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, that is, not an RS 6000).

      a) Format the pdisk.

      b) Issue the system **cfgmgr** command

      c) Retry the Configuration Verification service aid.

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

8 **Have the system diagnostics or problem determination procedures given you an SRN for the 7131 Storage Tower?**

No   **Yes**

    Go to "Service Request Numbers (SRNs)" on page 2-3.

9 If the system diagnostics are available, go to step 10.

If the stand-alone diagnostics are available, but the system diagnostics are not available, run them, then go to step 10.

If the system diagnostics and stand-alone diagnostics are not available, go to step 12.

10 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.

11 **Did the diagnostics give you an SRN for the 7131 Storage Tower?**

No   **Yes**

    Go to "Service Request Numbers (SRNs)" on page 2-3.

12 **Does any 7131 Storage Tower have its power light off?**

Yes   **No**

    Go to step 18 on page 2-14.

13 **Do any disk drive modules in the 7131 Storage Tower have their power light on?**

> **No** **Yes**
>
> > Replace the power supply because the power supply light is bad. Go to "MAP 2410: 7131 Storage Tower–Repair Verification" on page 2-26 to verify the repair.

14 Check that the power source is supplying proper voltage.

15 Check that the voltage selection switch on the back of the power supply is set to the proper voltage.

16 Check that the 7131 Storage Tower power is switched on, by pressing the power switch.

17 If the problem is not solved, exchange the power supply for a new power supply. Go to "MAP 2410: 7131 Storage Tower–Repair Verification" on page 2-26 to verify the repair.

18 **Does any 7131 Storage Tower have a disk drive module power light off?**

> **Yes** **No**
>
> > Go to step 31 on page 2-15.

19 **Is there more than one disk drive module with its power lights off in the 7131 Storage Tower?**

> **Yes** **No**
>
> > Go to step 23.

20 Disconnect, but do not remove, all of the disk drive modules. Do not disconnect the dummy disk drive modules.

21 Install a disk drive module in slot 1.

22 Go to step 25.

23 **Remove the disk drive module that has its power light off. Install a different disk drive module into the same slot. Did the disk drive module power light go on?**

> **No** **Yes**
>
> > Replace the original disk drive module. Go to "MAP 2410: 7131 Storage Tower–Repair Verification" on page 2-26.

24 Exchange the backplane. Go to "MAP 2410: 7131 Storage Tower–Repair Verification" on page 2-26.

25 **Did the disk drive module power light go on?**

> **No** **Yes**
>
> > Go to step 28 on page 2-15.

26 Install a different disk drive module into the same slot.

Did the disk drive module power light go on?

Yes   No

> Check the power connection on the backplane. Exchange the backplane.
> Go to "MAP 2410: 7131 Storage Tower–Repair Verification" on page 2-26 to verify the repair.

27 Exchange the disk drive module that was exchanged in step 19 on page 2-14 or step 28.

Is this is the last disk drive module?

No   Yes

> Go to "MAP 2410: 7131 Storage Tower–Repair Verification" on page 2-26 to verify the repair.

28 Install the next disk drive module.

Did the disk drive module power light go on?

Yes   No

> Return to step 26.

29 **Is this the last disk drive module?**

No   Yes

> No problems were found.

30 Repeat step 28.

31 **Are any disk drive module check lights on or flashing?**

Yes   No

> Go to "MAP 2320: 7131 Storage Tower–SSA Link" on page 2-16.

32 **Is the check light on continuously?**

Yes   No

> If the check light is flashing, it has been set by a service aid. Check the other using systems to find out which service aid is being used.

33 **Is the disk drive module is in the service mode (The service mode might have been set from another using system).**

No   Yes

> Reset the disk drive module when possible.

34 Exchange the disk drive module for a new one. See "Disk Drive Module" on page 3-12.

35 Go to "MAP 2410: 7131 Storage Tower–Repair Verification" on page 2-26 to verify the repair.

MAP 2320: 7131 Storage Tower–SSA Link

This MAP helps you to isolate FRUs that are causing an SSA link problem between a 7131 Storage Tower and the SSA adapter, or between a 7131 Storage Tower and other devices. If you are not familiar with the SSA link, read the section "SSA Loops and Links" on page 1-12 before using this MAP. "SSA Loops and Links" explains SSA links, strings, loops, and the meanings of the disk drive module ready lights.

Attention: Unless the using system needs to be switched off for some other reason, *do not switch off the using system when servicing the 7131 Storage Tower or an SSA link*. Power cables and external SSA cables that connect the 7131 Storage Tower to the using system can be disconnected while the using system is running.

Perform the following procedure to analyze the problem:

1 **Are the system service aids available?**

> **No**   **Yes**
>
>> Go to step 8 on page 2-17.

2 **Does any disk drive module in a 7131 Storage Tower, or elsewhere in the using system, have its ready light off or flashing (2 seconds on, 2 seconds off)?**

> **No**   **Yes**
>
>> Go to step 6.

3 Observe the lights on the SSA adapters in the using systems.

> **Does any SSA adapter have either, or both, of its lights off or flashing?**
>
> **Yes**   **No**
>
>> No trouble found.

4 **Is the SSA adapter in a different using system from the one to which the 7131 Storage Tower is connected?**

> **No**   **Yes**
>
>> Go to the using system that contains the SSA adapter, and return to step 1 of this MAP.

5 Exchange the following FRUs in the sequence shown. Go to "MAP 2410: 7131 Storage Tower–Repair Verification" on page 2-26 to verify the repair for *each* FRU exchanged.

> **1)** If present, the external SSA cables that are attached to the connectors on each side of the light that is flashing (or off) on the SSA adapter (see "The SSA Adapter" on page 1-13).
>
> **2)** The devices at the other end of these external SSA cables. Refer to the user's guide of the other device.
>
> **3)** The adapter whose light is off or flashing (see the installation and service guide for the using system)

6 **Is the disk drive module whose ready light is off or flashing installed in the 7131 Storage Tower?**

> **No**   **Yes**
>
>> Go to step 4 on page 2-22 of "MAP 2321: 7131 Storage Tower–Internal Link."

7 Go to the service information for that device.

8 Run the Link Verification service aid (see "Link Verification Service Aid" on page 1-21), and select the appropriate SSA adapter from the displayed Link Verification adapter menu.

If the service aid detects pdisks for the adapter you have selected, a list of pdisks is displayed. The diagram shows an example list.

```
LINK VERIFICATION                                              8 2386

SSA Link Verification for:
 ssa1     - 5   SSA ADAPTER

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

  Physical   Serial#      Adapter Port

                       A1  A2  B1  B2          Status
  {TOP}
  pdisk     nnnnnnnn         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                      Good
  pdisk8    nnnnnnnn              3             Good
  pdisk9    nnnnnnnn          1   2             Good
  {MORE}

  F3=Cancel      F1 =Exit
```

If the service aid cannot detect any pdisks, a message is displayed.

```
LINK VERIFICATION                                              8 2385

Move cursor onto selection, then press Enter.

 ssa      - 3   SSA Adapter
 ssa1     - 5   SSA Adapter
 ssa2     - 6   SSA Adapter
 ssa3     - 7   SSA Adapter




          No 'Available' pdisks have been detected for this
          adapter.

          If pdisks have been added to this adapter run
          'cfgmgr' to configure the new devices before
          re-selecting this option.

          If pdisks cannot be configured go to the START
          page in the Installation and Service Guide.

          F3=Cancel      F1 =Exit
  F3=Cancel                                                  +
```

9 **Are any pdisks listed for the selected SSA adapter?**

   No   Yes

10 Continue with step 11 on page 2-18

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

No physical disks are connected to this SSA adapter:

1) Ensure that the external SSA cables are correctly connected to the 7131 Storage Tower and to the SSA adapter.

2) Go to "MAP 2410: 7131 Storage Tower–Repair Verification" on page 2-26 to verify the repair.

All the disk drive modules are switched off. Go to "MAP 2010: 7131 Storage Tower–Start" on page 2-12.

The SSA adapter is failing:

1) Exchange the SSA adapter for a new one (see the installation and service guide for the using system).

2) Go to "MAP 2410: 7131 Storage Tower–Repair Verification" on page 2-26 to verify the repair.

12 Observe the Status column on the screen. If the status of any pdisk is `failed`, that pdisk is failing. In the example shown here, pdisk4 is failing.

```
LINK VERIFICATION                                        8 2386

SSA Link Verification for:
 ssa1     - 5   SSA ADAPTER

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

 Physical   Serial#      Adapter Port

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

 F3=Cancel      F1 =Exit
```

Are any of the pdisks failing?

Yes   No

Go to step 20 on page 2-19.

13 **Is only one pdisk failing?**

Yes   No

Go to step 17 on page 2-19.

14 Use the identify function (as instructed on the screen) to find the failing pdisk. See "Finding the Physical Location of a Device" on page 1-32 if you need more information about finding the disk drive module.

15 Exchange the disk drive module for a new one (see "Disk Drive Module" on page 3-12).

16 Go to "MAP 2410: 7131 Storage Tower–Repair Verification" on page 2-26 to verify the repair.

17 More than one pdisk is failing.

Use the Identify function to locate all of the failing pdisks. For more information, see "Finding the Physical Location of a Device" on page 1-32.

18 If all disk drive modules identified are in the same 7131 Storage Tower, then the fan is bad. Exchange the fan.

19 Go to "MAP 2410: 7131 Storage Tower–Repair Verification" on page 2-26 to verify the repair.

20 Observe the list of pdisks on the screen. A row of question marks (?????) shows that a link in one of the loops is broken. If two rows of question marks are displayed, two links are broken, one in each loop. In the example shown here, pdisk2 is missing.

```
LINK VERIFICATION                                          8 2386

SSA Link Verification for:
 ssa1     - 5    SSA ADAPTER

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

  Physical   Serial#      Adapter Port

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

 F3=Cancel      F1 =Exit
```

21 Is a link broken between two pdisks?

Yes   No

> Go to step 25 on page 2-20.

22 Use the identify function (as instructed on the screen) to find the pdisks that are on each side of the broken link. See "Finding the Physical Location of a Device" on page 1-32 if you need more information about finding the disk drive module.

23 Is either of the disk drive modules in the 7131 Storage Tower?

No   Yes

> Go to "MAP 2321: 7131 Storage Tower–Internal Link" on page 2-22.

24 If the failing device is not in a 7131 Storage Tower, go to the service information for that device.

25 Observe the list of pdisks on the screen. A row of question marks (?????) indicates that a configured pdisk is not present for a particular SSA address. A row of asterisks (*****) indicates an unconfigured device.

```
LINK VERIFICATION                                        8 2386

SSA Link Verification for:
 ssa1      - 5    SSA ADAPTER

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

 Physical   Serial#      Adapter Port

                   A1  A2  B1  B2              Status
 {TOP}
 pdisk     nnnnnnnn                            Good
 pdisk1    nnnnnnnn    1                        Good
 pdisk2    nnnnnnnn    2                        Good
 pdisk3    nnnnnnnn    3                        Good
 ?????
                       3                        Good
 pdisk5    nnnnnnnn     2                       Good
 pdisk6    nnnnnnnn     1                       Good
 pdisk7    nnnnnnnn                             Good
 pdisk8    nnnnnnnn             3               Good
 pdisk9    nnnnnnnn          1   2              Good
 {MORE}

 F3=Cancel      F1 =Exit
```

26 Is a link broken between a pdisk and an unconfigured device?

Yes   No

> Go to step 31 on page 2-21.

27 Use the Identify function (as instructed on the screen) to find the pdisk that is next to the broken link.

28 Is the pdisk in a 7131 Storage Tower?

No   Yes

> Go to "MAP 2321: 7131 Storage Tower–Internal Link" on page 2-22.

29 Find the unconfigured device by following the cable.

30 Exchange the following FRUs in the sequence shown. Go to "MAP 2410: 7131 Storage Tower–Repair Verification" on page 2-26 to verify the repair for *each* FRU exchanged.

> **1)** Disk drive module. If the failing device is not in a 7131 Storage Tower, go to the service information for that device.
>
> **2)** The appropriate external SSA cable.
>
> **3)** Unconfigured device.

31 Observe the adapter port columns on the screen. In the example, the column that represents the A2 connector of the SSA adapter is blank. The link is, therefore, broken between connector A2 and the pdisks.

```
LINK VERIFICATION                                             8 2386

SSA Link Verification for:
 ssa1      - 5    SSA ADAPTER

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

  Physical    Serial#      Adapter Port

                         A1  A2  B1  B2              Status
  {TOP}
  pdisk     nnnnnnnn                                 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              3                   Good
  pdisk9    nnnnnnnn          1   2                   Good
  {MORE}

  F3=Cancel      F1 =Exit
```

32 **Is the link broken between the selected SSA adapter and a pdisk?**

No   Yes

Go to step 36.

33 The link is broken between two unconfigured devices.

Find one of the unconfigured devices (probably an SSA adapter), which can be identified by its flashing light.

34 To further isolate the problem, run the service aids on the using system in which that device is installed.

35 Go to step 1 on page 2-16 of this MAP.

36 Exchange the following FRUs in the sequence shown. Go to "MAP 2410: 7131 Storage Tower–Repair Verification" on page 2-26 to verify the repair for *each* FRU exchanged.

At the using-system:

1) The appropriate external SSA cable

If the external SSA cable is attached to a 7131 Storage Tower, also exchange:

Disk drive modules or dummy disk drive modules (see "Disk Drive Module" on page 3-12).

Internal SSA cable (see "Internal SSA Cable" on page 3-9).

2) The SSA adapter (see the installation and service guide for the using system).

MAP 2321: 7131 Storage Tower–Internal Link

This MAP helps you to isolate FRUs that are causing an internal SSA link problem in a 7131 Storage Tower. If you are not familiar with the SSA link, read the section "SSA Loops and Links" on page 1-12 before using this MAP. "SSA Loops and Links" explains SSA links, strings, loops, and the meanings of the disk drive module ready lights.

Attention: Unless the using system needs to be switched off for some other reason, *do not switch off the using system when servicing the 7131 Storage Tower or an SSA link*. Power cables and external SSA cables that connect the 7131 Storage Tower to the using system can be disconnected while the using system is running.

Note: In this MAP, some steps refer to the slot numbers of the disk drive modules in the 7131 Storage Tower. The slots are sequential, starting with slot 1 in the bottom through slot 5 in the top.

Perform the following procedure to analyze the problem:

1 In "MAP 2320: 7131 Storage Tower–SSA Link," the identify function was used to find one or more pdisks. On each pdisk that you selected, the ready light, check light, or both lights should be flashing. You can refer to either light to identify the position of the disk drive module.

   Does any disk drive module have *all three* of its lights switched off?

   Yes   No

   Go to step 4.

2 Exchange the disk drive module that has all lights off.

3 Go to "MAP 2410: 7131 Storage Tower–Repair Verification" on page 2-26 to verify the repair.

4 Observe the disk drive modules, and check whether the ready lights, check lights, or both lights are flashing on two disk drive modules that are in the same 7131 Storage Tower (see "Disk Drive Module Strings" on page 1-12).

   Note: If lights are flashing on more than two disk drive modules that are in the same 7131 Storage Tower, work with two modules at a time. The modules must be sequential. For example, if lights are flashing on modules 1, 4, and 5, work with modules 1 and 4, or 4 and 5. Do not work with modules 1 and 5. If the problem remains, return to this step, and work with the modules whose lights are still flashing.

   Do two or more disk drive modules that are in the same 7131 Storage Tower have their ready lights, check lights, or both lights flashing?

   Yes   No

   Go to step 6 on page 2-23.

5 Exchange the following FRUs in the sequence shown. Go to "MAP 2410: 7131 Storage Tower–Repair Verification" on page 2-26 to verify the repair for *each* FRU exchanged.

   1) Either of the two disk drive modules (see "Disk Drive Module" on page 3-12).

   2) The other of the two disk drive modules.

   3) Dummy disk drive modules (if present between the two disk drive modules).

   4) The backplane assembly (see "Backplane Assembly" on page 3-16).

6 **Does disk drive module in slot 5 (top) have its ready light, check light, or both lights flashing?**

Yes   No

        Go to step 8.

7 Exchange the following FRUs in the sequence shown. Go to "MAP 2410: 7131 Storage Tower–Repair Verification" on page 2-26 to verify the repair for *each* FRU exchanged.

        1) The upper external SSA cable (see "External SSA Cable" on page 3-5).

        2) The disk drive modules in slot 5 (top) (see "Disk Drive Module" on page 3-12).

        3) The upper internal SSA cable (see "Internal SSA Cable" on page 3-9).

        4) The backplane assembly (see "Backplane Assembly" on page 3-16).

8 **Does disk drive module in slot 1 (bottom) have its ready light, check light, or both lights flashing?**

Yes   No

        Go to "MAP 2010: 7131 Storage Tower–Start" on page 2-12.

9 Exchange the following FRUs in the sequence shown. Go to "MAP 2410: 7131 Storage Tower–Repair Verification" on page 2-26 to verify the repair for *each* FRU exchanged.

        1) The lower external SSA cable (see "External SSA Cable" on page 3-5).

        2) The disk drive modules in slot 1 (bottom) (see "Disk Drive Module" on page 3-12).

        3) The lower internal SSA cable.

        4) The backplane assembly (see "Backplane Assembly" on page 3-16).

MAP 2323: 7131 Storage Tower–Intermittent Link Error

This MAP helps you to isolate FRUs that are causing an intermittent SSA link problem. You are here because you have a service request number (SRN) from 21000 through 29000.

If you are not familiar with the SSA link, read the section "SSA Loops and Links" on page 1-12 before using this MAP. "SSA Loops and Links" explains SSA links, strings, loops, and the meanings of the disk drive module ready lights.

Attention: Unless the using system needs to be switched off for some other reason, *do not switch off the using system when servicing the 7131 Storage Tower or an SSA link*. Power cables and external SSA cables that connect the 7131 Storage Tower to the using system can be disconnected while the using system is running.

1 Run the Link Verification service aid to the SSA adapter for which this error has been logged (see "Link Verification Service Aid" on page 1-21). A list of pdisks, similar to the following example, is displayed.

```
LINK VERIFICATION                                         8 2386

SSA Link Verification for:
 ssa      - 4   SSA ADAPTER

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

 Physical   Serial#      Adapter Port

                    A1  A2  B1  B2          Status
{TOP}
 pdisk1   5AEA8 89        3                 Good
 pdisk2   5AEA  35     1   2                Good
 pdisk3   5AEA1  1     2   1                Good
 pdisk4   5AEA172     3                     Good


{BOTTOM}

F3=Cancel      F1 =Exit
```

Note: On the Link Verification screen, each adapter port is identified by the number of its related connector on the adapter card:

Adapter port 0 is identified as A1

Adapter port 1 is identified as A2

Adapter port 2 is identified as B1

Adapter port 3 is identified as B2

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

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

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

If the SRN is 24002, PAA = 002.
If the SRN is 24104, PAA = 104.

3 The following examples use the Link Verification screen displayed on page 2-24 to illustrate how to identify the adapter port and the physical device that is represented by PAA in the SRN. This information is required to isolate the possible FRUs causing the intermittent failures.

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

EXAMPLE 1 SRN = 24002 (24PAA)

P = 0   indicates the device is connected to adapter port 0 (shown as A1 on the example screen).

AA = 02   indicates the device has an SSA address of 02 (shown as 2 on the example screen). In this example, that device is pdisk3.

SRN 24002 indicates the problem is occurring in the SSA link between the pdisk3 (AA = 02), and the device on the same adapter port (P = 0), whose SSA address has a value of one less than AA (AA minus 1).
In this example, SRN 24002 identified pdisk3 (AA = 02). The address of the other device on the link equals 01 (02 minus 1). SSA address 01 is the address of pdisk2.
Therefore, SRN 24002 indicates that the link errors were detected between pdisk2 and pdisk3.

EXAMPLE 2 SRN = 24104 (24PAA)

P = 1   indicates the device is connected to adapter port 1 (shown as A2 on the example screen).

AA = 04   indicates the device has an SSA address of 04. Address 04 is higher than the highest address that is displayed for adapter port 1. Therefore, the device in this example is the SSA adapter.

SRN 24104 indicates the problem is occurring in the SSA link between the SSA adapter (AA = 04), and the device on the same adapter port (P = 1), whose SSA address has a value of one less than AA (AA minus 1).
In this example, SRN 24104 identified the SSA adapter (AA = 04). The address of the other device on the link equals 03 (04 minus 1). SSA address 03 is the address of pdisk1.
Therefore, SRN 24104 indicates that the link errors were detected between SSA adapter port A2 and pdisk1.

4 Exchange the following FRUs in the sequence shown. Go to "MAP 2410: 7131 Storage Tower–Repair Verification" on page 2-26 to verify the repair for *each* FRU exchanged.

1) One of the two devices that are identified by the SRN. (If the device is a pdisk, see "Disk Drive Module" on page 3-12; if the device is an adapter, see the installation and service guide for the using system.

2) The other of the two devices.

3) The backplane (see "Backplane Assembly" on page 3-16).

4) The external SSA cable.

MAP 2410: 7131 Storage Tower–Repair Verification

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

Attention: Unless the using system needs to be switched off for some other reason, *do not switch off the using system when servicing the 7131 Storage Tower or an SSA link.* Power cables and external SSA cables that connect the 7131 Storage Tower to the using system can be disconnected while the using system is running.

> Before you arrived at this MAP, you exchanged one or more FRUs. Some of those FRUs have power lights (for example, the disk drive modules and the power supply). Check whether the power lights are on.
>
> **Do all the FRUs you have exchanged have their power lights on (where applicable)?**
>
> **Yes   No**
>
> > Exchange the FRU that has a power light that is off, and then go to step 1.

1 **Are all disk drive module check lights off?**

> **Yes   No**
>
> > Go to "MAP 2010: 7131 Storage Tower–Start."

2 Run the diagnostics in the system verification mode to the device that reported the problem.

> **Notes:**
>
> a. Do not run the advanced diagnostics; otherwise, errors are logged on other using systems that share the same loop.
>
> b. If you have just exchanged a disk drive module or an SSA adapter, you might need to run the **cfgmgr** command to restore the device to the system configuration.

> If the original problem was not reported by a device, run the diagnostics to each SSA adapter in the using system.

3 Run the Product Topology service aid.

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

Chapter 3. Removal and Replacement Procedures

This chapter contains procedures for removing, replacing, and installing 7131 Storage Tower field replace-able units (FRUs).

Refer to "Safety and Environmental Notices" on page vii before removing and replacing any FRUs.

Refer to "Handling ESD-Sensitive Parts" on page 3-2 before you work with any logic cards or cables that are connected to FRUs that are sensitive to electrostatic discharge (ESD).

CAUTION:
The weight of this part or unit is between 18 and 32 kilograms (39.7 and 70.5 pounds). It takes two persons to safely lift this part or unit. *(RSFTC204)*

If it is necessary to move the 7131 Storage Tower, ensure that two people are available to move it.

Handling ESD-Sensitive Parts

Attention: The disk drive modules and the backplane are sensitive to electrostatic discharge. They are wrapped in ESD-sensitive bags to prevent damage. Handle the ESD-sensitive parts carefully to prevent permanent damage.

Take the following precautions:

1 Do not remove the ESD-sensitive part from the ESD-sensitive bag until you are ready to install it. See Figure 3-1.

2 Just before touching the ESD-sensitive part, discharge any static electricity in your body by touching the metal frame of the machine. If possible, keep one hand on the frame when you are installing or exchanging an ESD-sensitive part.

3 Do not put any ESD-sensitive parts on the machine cover or on a metal table because large metal objects can become discharge paths if they are not grounded. If you must set aside an ESD-sensitive part, first put it into the special ESD bag.

4 Be very careful when you work with ESD-sensitive parts in cold weather. Low humidity and heating increase static electricity.

5 When either end of a SSA cable is not connected to a device, the pins on the external SSA cable are exposed and must not be touched.

Antistatic Bag

5006813M
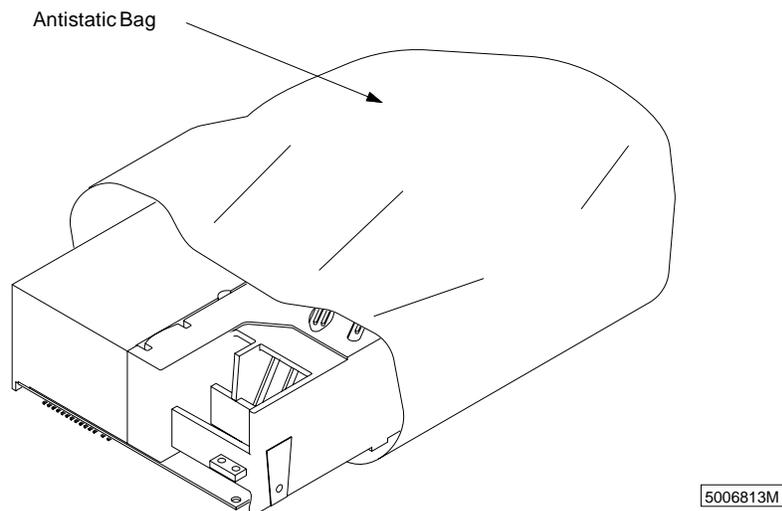
Figure 3-1. ESD-Sensitive Part in Antistatic Bag

Front Cover

This procedure describes how to remove and replace the front cover.

Front Cover Removal

1 Open the front cover beyond a 90° angle. See Figure 3-2.

2 Hold the top and bottom of the cover, and lift it straight up to remove it.
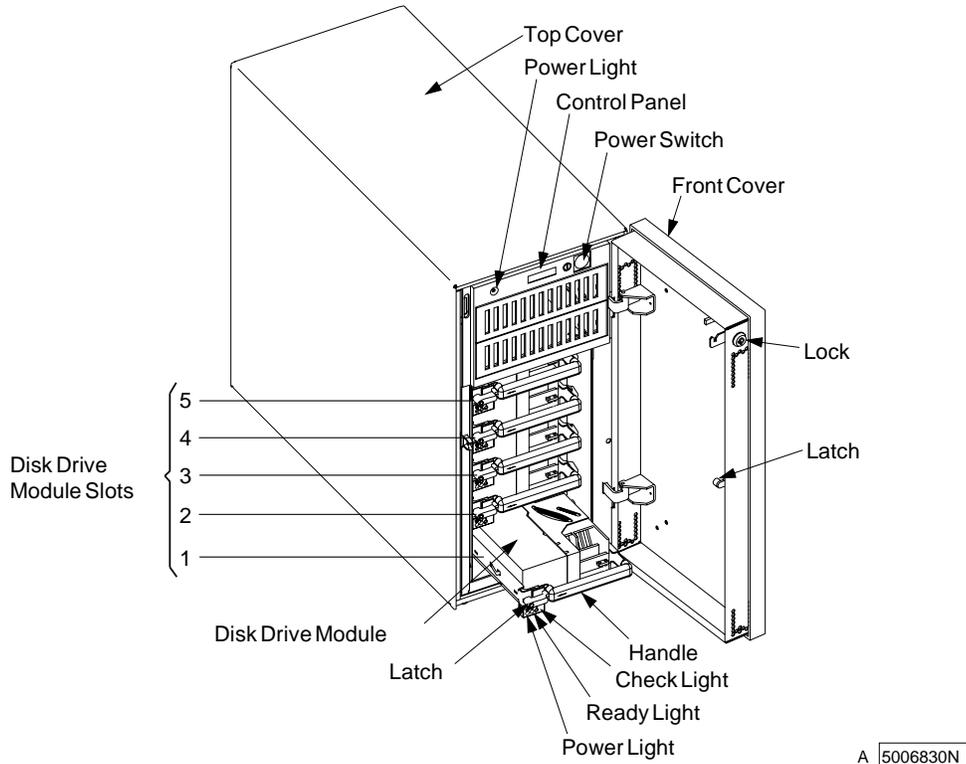
Figure 3-2. Front Cover

Front Cover Replacement

1 Align the top of the cover (at a 90° angle) with the hinges, and press it down.

2 Close the front cover.

Top Cover

This procedure describes how to remove and replace the top cover.

Top Cover Removal

1 Open the front cover. See Figure 3-2 on page 3-3.

2 At the back of the 7131 Storage Tower, remove the four screws that fasten the top cover to the 7131 Storage Tower. See Figure 3-3.

3 Lift and remove the top cover from the 7131 Storage Tower.
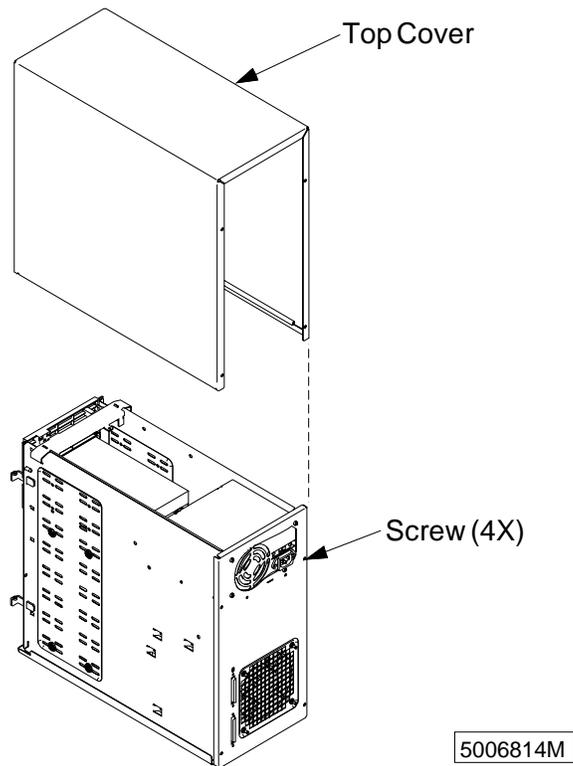
Figure 3-3. Top Cover

Top Cover Replacement

1 Put the top cover on the 7131 Storage Tower.

2 Install and tighten the four screws to fasten the top cover to the 7131 Storage Tower.

3 Close the front cover.

External SSA Cable

This procedure describes how to remove and replace the external SSA cable.

External SSA Cable Removal

1 **DANGER**

> **To prevent a possible electrical shock during an electrical storm, do not connect or disconnect cables or station protectors for communications lines, display stations, printers, or telephones.** *(RSFTD003)*

DANGER

> **To prevent a possible electrical shock from touching two surfaces with different electrical grounds, use one hand, when possible, to connect or disconnect signal cables.**
> *(RSFTD004)*

2 Loosen the two retention screws on the external SSA cable connector on the 7131 Storage Tower. and disconnect the external SSA cable from the rear of the 7131 Storage Tower. See Figure 3-4.

3 Loosen the two retention screws on the external SSA cable connector on the host system. and disconnect the external SSA cable from the host system.
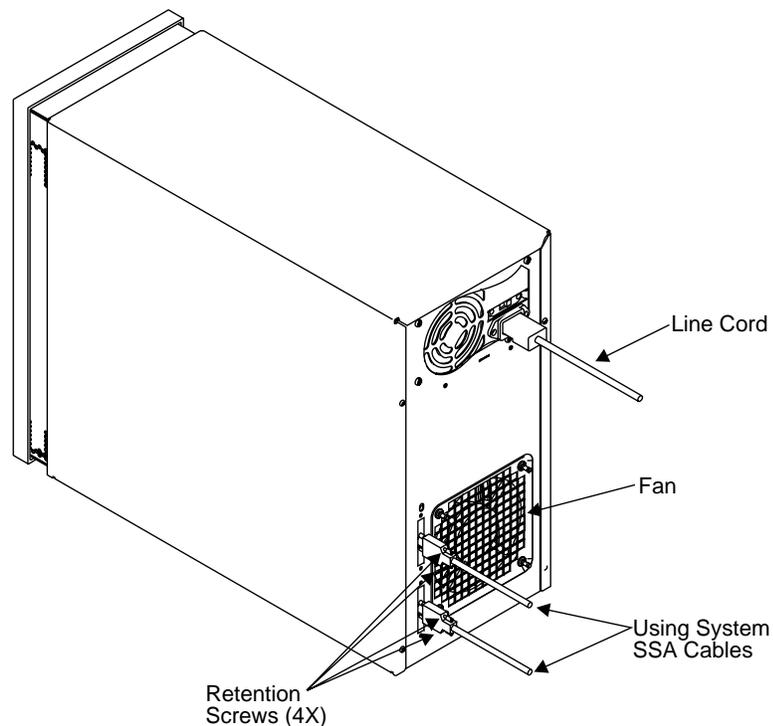
B 5006834N

Figure 3-4. External SSA Cable

External SSA Cable Replacement

1 DANGER

> **To prevent a possible electrical shock when adding or removing any devices to or from the system, ensure that the power cords for those devices are unplugged before the signal cables are connected or disconnected. If possible, disconnect all power cords from the existing system before you add or remove a device.** *(RSFTD203)*

DANGER

> **To prevent a possible electrical shock when installing the device, ensure that the power cord for that device is unplugged before installing signal cables.** *(RSFTD204)*

2 Connect the new external SSA cable to the back of the 7131 Storage Tower.

3 Tighten the two retention screws to the external SSA cable.

4 Connect the external SSA cable to the host system.

5 Tighten the two retention screws to the host system.
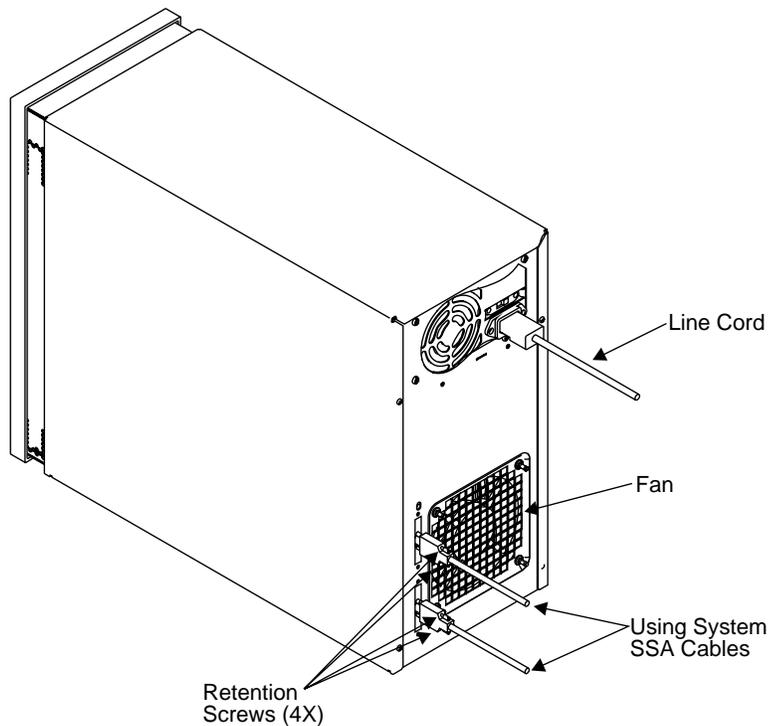
B 5006834N

Figure   3-5. External SSA Cable

Line Cord

This procedure describes how to remove and replace the line cord.

Line Cord Removal

1 Open the front cover. See Figure 3-2 on page 3-3.

2 **Attention:** Switching off the power to the 7131 Storage Tower can cause a system fault unless you first make the disk drive modules within the 7131 Storage Tower unavailable to the host system. To do this:

  a. Use the system-management task menus of the host system to make the disk drive modules unavailable.
  b. If the 7131 Storage Tower is connected to more than one adapter, make the disk drive modules unavailable to the host system or to the host systems for each of the paths to the 7131 Storage Tower.

3 Set the power switch to Off.

4 Disconnect the line cord from the power source and from the 7131 Storage Tower. See Figure 3-6.
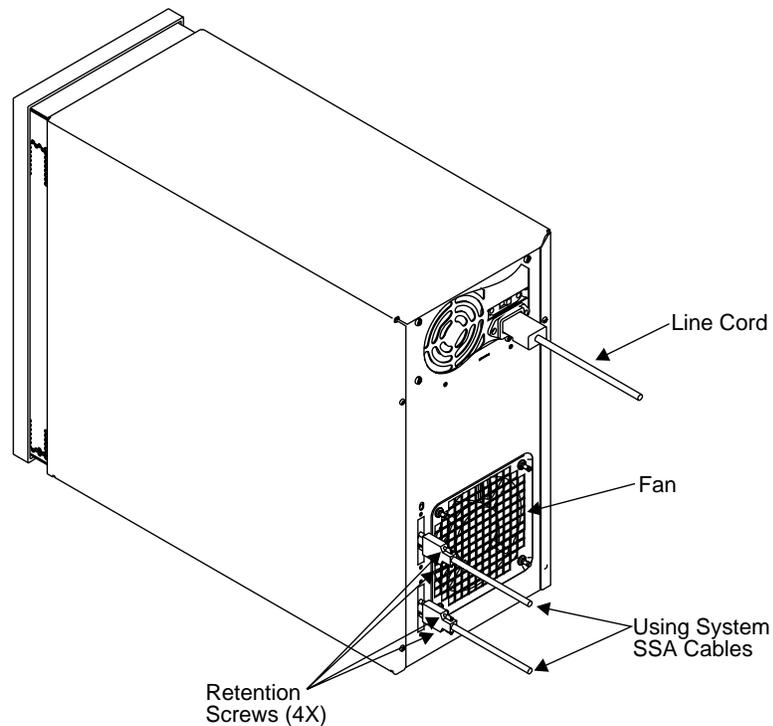
B 5006834N

Figure   3-6. Line Cord on 7131 Storage Tower

Line Cord Replacement

1 Connect the line cord to the 7131 Storage Tower.

2 **DANGER**

> **An electrical outlet that is not correctly wired could place hazardous voltage on metal parts of the system or the products that attach to the system. It is the customer's responsibility to ensure that the outlet is correctly wired and grounded to prevent an electrical shock.** *(RSFTD201)*

3 Connect the line cord to the power source.

4 Set the power switch to on.

5 Close the front cover.
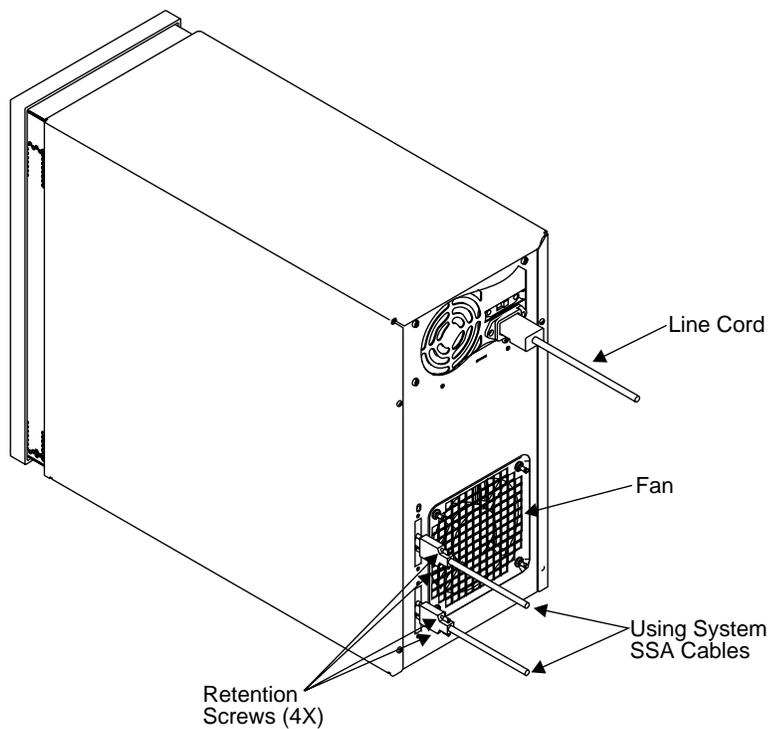
B 5006834N

Figure   3-7. Line Cord on 7131 Storage Tower

Internal SSA Cable

Attention: Follow all ESD-sensitive parts procedures while performing this procedure. For ESD information, see "Handling ESD-Sensitive Parts" on page 3-2.

This procedure describes how to remove and replace the internal SSA cable.

Internal SSA Cable Removal

1 Open the front cover. See Figure 3-2 on page 3-3.

2 **Attention:** Switching off the power to the 7131 Storage Tower can cause a system fault unless you first make the disk drive modules within the 7131 Storage Tower unavailable to the host system. To do this:

    a. Use the system-management task menus of the host system to make the disk drive modules unavailable.

    b. If the 7131 Storage Tower is connected to more than one adapter, make the disk drive modules unavailable to the host system or to the host systems for each of the paths to the 7131 Storage Tower.

3 Set the power switch to Off, if it is On.

4 Disconnect the line cord from the power source.

5 Loosen the two retention screws on the external SSA cable. See Figure 3-8

6 Disconnect the external SSA cable.

7 Remove the top cover from the 7131 Storage Tower. See Figure 3-3 on page 3-4.

8 Disconnect the SSA cable from the backplane. See Figure 3-8.
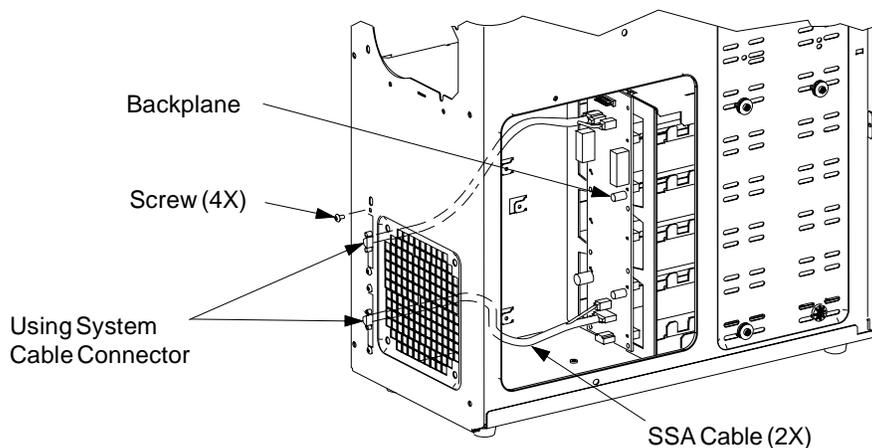
A 5006820M

Figure 3-8. Internal SSA Cable

9 Remove the two screws from the bracket that holds the SSA cable to the rear of the 7131.

Internal SSA Cable Replacement

1 Connect the SSA cable as follows:

    a. Install and tighten the 2 screws on the SSA cable bracket on the back of the 7131 Storage Tower.

    b. Connect the SSA cable connectors to the backplane.
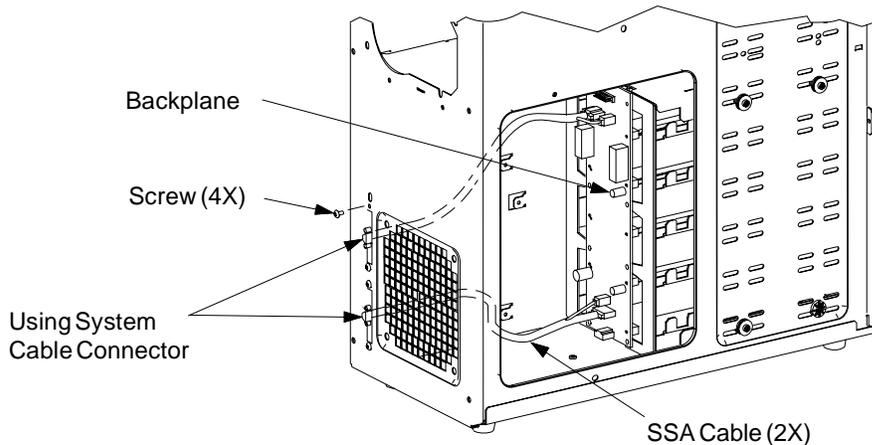
A   5006820M

Figure   3-9. Internal SSA Cable

2 Put the top cover on the 7131 Storage Tower.

3 Install and tighten the four screws to fasten the top cover to the 7131 Storage Tower.

4 Connect the external SSA cable to the back of the 7131 Storage Tower.

5 Tighten the two retention screws on the external SSA cable.

6 **DANGER**

> **An electrical outlet that is not correctly wired could place hazardous voltage on metal parts of the system or the products that attach to the system. It is the customer's responsibility to ensure that the outlet is correctly wired and grounded to prevent an electrical shock.** *(RSFTD201)*

7 Connect the line cord to the power source.

8 Set the power switch to on.
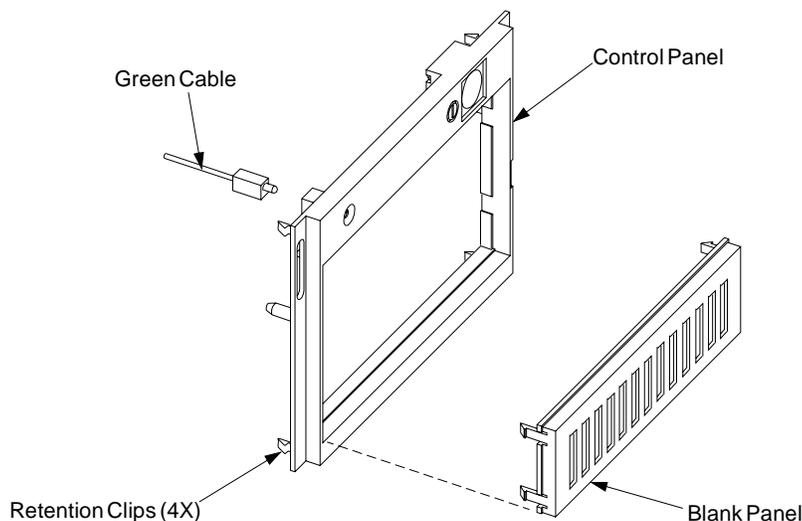
9 Close the front cover.

Dummy Disk Drive Module

This procedure describes how to remove and replace a dummy disk drive module. A dummy disk drive module must be installed in any slot that does not contain a disk drive module to complete the SSA loop through the 7131 Storage Tower.

Note: Dummy disk drive modules should never be used in slot 1 or slot 5.

Dummy Disk Drive Module Removal

1 Open the front cover. See Figure 3-10.

2 Move the latch down on the dummy disk drive module

3 Pull the dummy disk drive module out, keeping it straight to prevent damage.
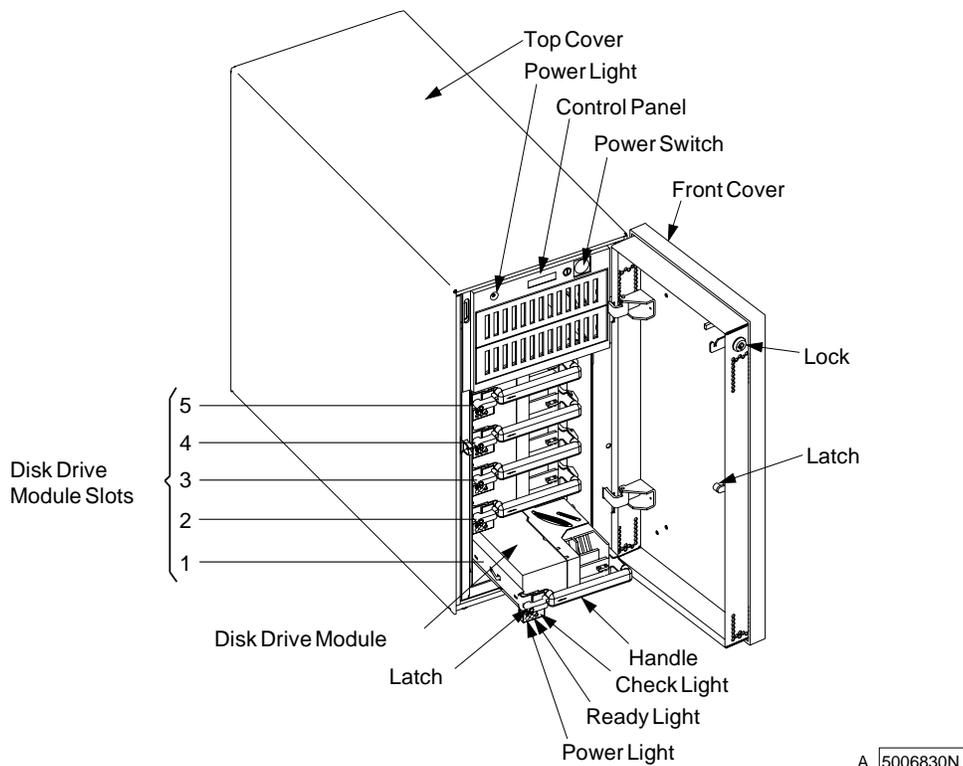
Figure 3-10. Disk Drive Modules in the 7131 Storage Tower

Dummy Disk Drive Module Replacement

1 Move the latch down on the dummy disk drive module, then slide it into the slot.

2 Press the dummy disk drive module firmly to seat it to the backplane.

3 Move the latch up on the dummy disk drive module.

4 Close the front cover.

Disk Drive Module

Attention: Follow all ESD-sensitive parts procedures while performing this procedure. For ESD information, see "Handling ESD-Sensitive Parts" on page 3-2.

This procedure describes how to remove and replace a disk drive module when the power to both the host system and the 7131 Storage Tower is on or when the power to the 7131 Storage Tower is either On or Off. The disk drive module is installed in any of the five slots. See Figure 3-11.

Disk Drive Module Removal

1 Open the front cover.

2 **Attention:** The following procedure can cause a system fault unless you first make the disk drive module unavailable to the using system. To do this:

   a. Use the system-management task menus of the using system to make the disk drive module unavailable.

   b. If the 7131 Storage Tower is connected to more than one adapter, make the disk drive module unavailable to the using system or to the using systems for each of the paths to the 7131 Storage Tower.

3 Open the front cover.
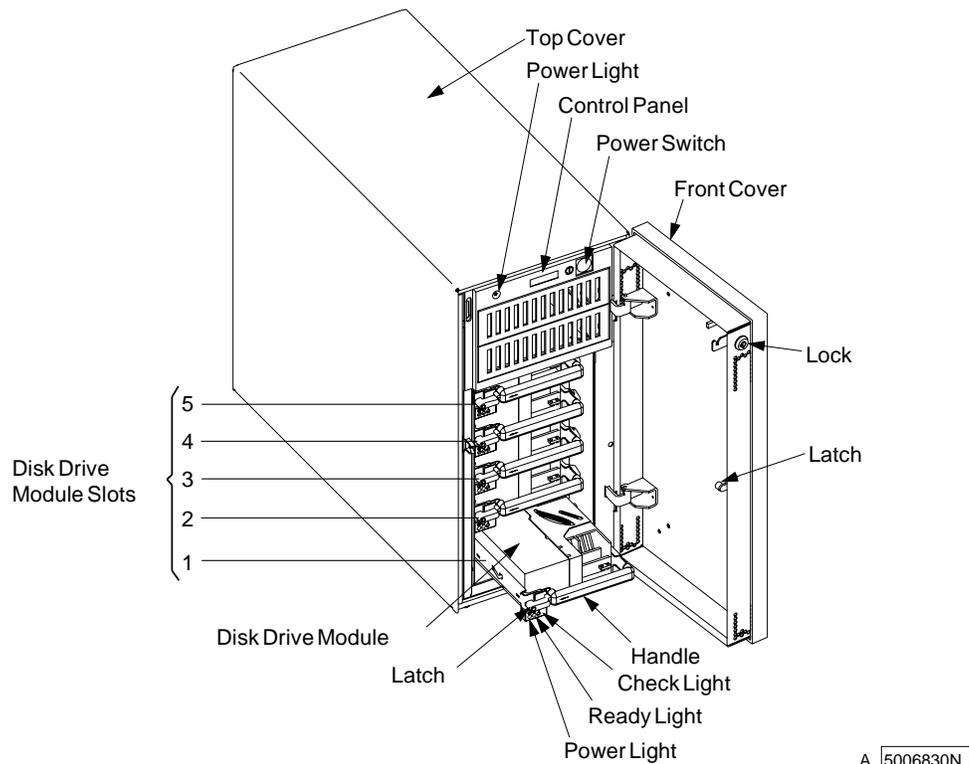
Figure   3-11. Disk Drive Modules in the 7131 Storage Tower

4 If you are here because of a disk drive failure, then attempt to resolve the problem by reseating the disk drive module. Move the latch down on the disk drive module and slide it out slightly and then firmly seat it on the backplane.

   If reseating the disk drive module resolves the problem, then return the 7131 Storage Tower to the customer and verify proper operation

   If reseating the disk drive module does not resolve the problem, then continue with step 5 to remove the disk drive.

5 Pull the disk drive module out, keeping it straight to prevent damage.

6 If you are not removing the hard-disk drive from the carrier, continue with step 7.

   If you are removing the hard-disk drive from the carrier: See Figure 3-12.

   a. Remove the four screws.
   b. Disconnect the cable from the hard-disk drive.
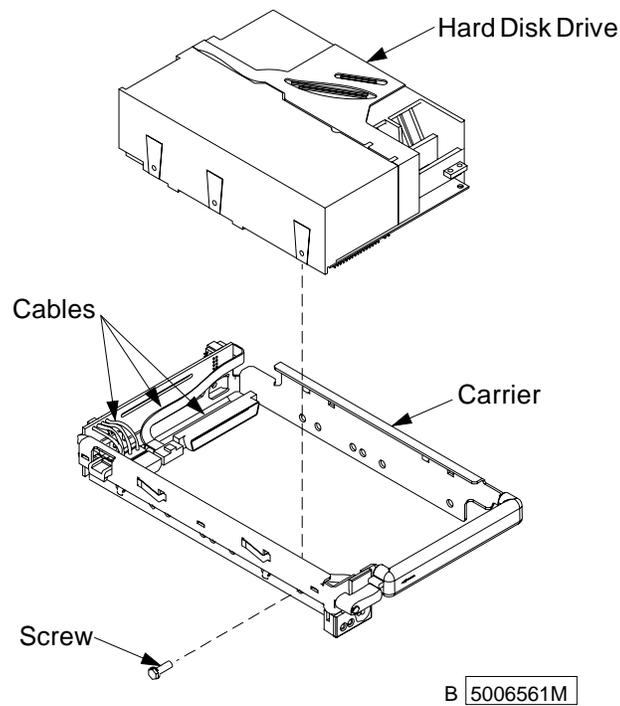
Figure   3-12. Hard-Disk Drive

7 Place the disk drive module or disk drive on the ESD mat.

8 Place the disk drive module in an antistatic bag if you are going to reuse it.

9 **Attention:** Any slot without a disk drive module must contain a dummy disk drive module to provide continuity of the SSA loop.

10 Close the front cover.

Disk Drive Module Replacement

Attention: Follow all ESD-sensitive parts procedures while performing this procedure. For ESD information, see "Handling ESD-Sensitive Parts" on page 3-2.

1 If you did not remove the disk drive from the carrier, continue with 2.

If you removed the disk drive from the carrier, put new disk drive on the carrier. See Figure 3-13.

   a. Connect the cable to the disk drive.
   b. Install and tighten the 4 screws.
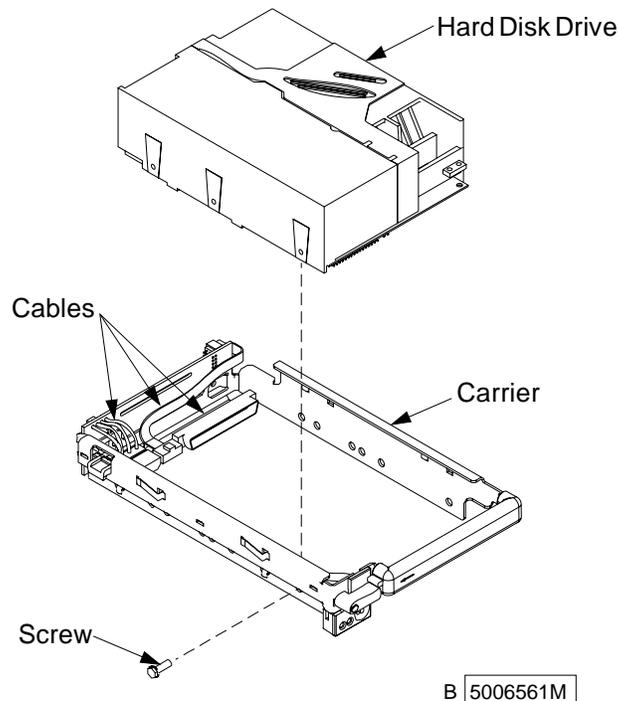
Figure   3-13. Hard-Disk Drive

2 Move the latch down on the disk drive module, then slide it into the slot.

3 Press the disk drive module firmly to seat it on the backplane.

4 Move the latch up on the disk drive module.

5 Verify that the front of all the disk drive modules are aligned.

6 Verify that the ready light to the disk drive module is on; light is steady, not flashing (Figure 3-14 on page 3-15).

   a. If the ready light is not steady, then attempt to resolve the problem by reseating the disk drive module. Move the latch down on the disk drive module and slide it out slightly and then firmly seat it on the backplane.
   b. If the ready light is not steady after reseating the disk drive module, then go to "MAP 2010: 7131 Storage Tower–Start" on page 2-12 to analyze the fault.

7 If the check light on the disk drive module is on steady (Figure 3-14), the disk drive module is in service mode. Take the disk drive module out of service mode (reset the service mode).

8 Configure the device on the host system if necessary, refer to your host system publications for additional information.
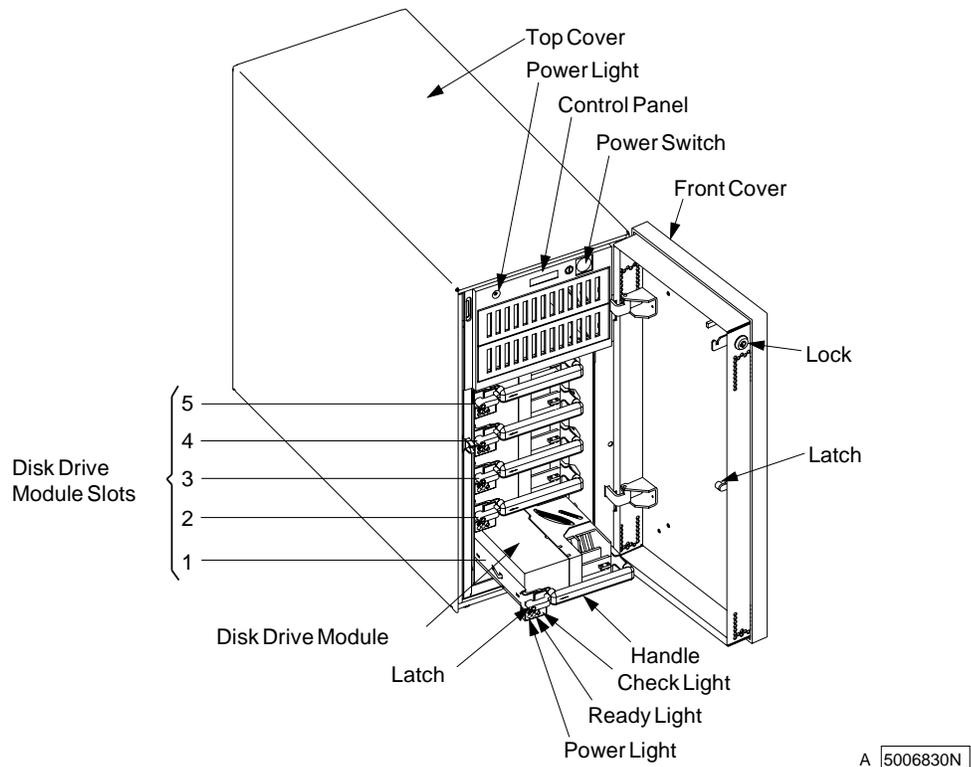
Figure 3-14. Disk Drive Modules in the 7131 Storage Tower

9 Close the front cover.

Backplane Assembly

Attention: Follow all ESD-sensitive parts procedures while performing this procedure. For ESD information, see "Handling ESD-Sensitive Parts" on page 3-2.

This procedure describes how to remove and replace the backplane.

Backplane Removal

1 Remove the front cover. See Figure 3-2 on page 3-3.

2 **Attention**: Switching off the power to the 7131 Storage Tower can cause a system fault unless you first make the disk drive modules within the 7131 Storage Tower unavailable to the host system. To do this:

  a. Use the system-management task menus of the host system to make the disk drive modules unavailable.

  b. If the 7131 Storage Tower is connected to more than one adapter, make the disk drive modules unavailable to the host system or to the host systems for each of the paths to the 7131 Storage Tower.

3 Set the power switch to Off, if it is On.

4 Disconnect the line cord from the power source.

5 Remove the top cover from the 7131 Storage Tower. See Figure 3-3 on page 3-4.

6 Disconnect the power supply cables (2), the SSA cables (2), and the fan power cable from the backplane (see Figure 3-15 on page 3-17).

7 Move the latch down on each disk drive module or dummy disk drive module.

8 Pull each disk drive module out, keeping it straight to prevent damage (note the slot position of each disk drive and/or dummy disk drive module, as they will be reinstalled in the same slot positions later in this procedure). See Figure 3-11 on page 3-12.

9 Place each disk drive module on the ESD mat to prevent damage.

10 Place each dummy disk drive module in a safe place to prevent damage.

11 Remove the eight screws securing the 5 pack enclosure to the chassis (see Figure 3-15 on page 3-17).

12 Pull the 5 pack enclosure out the front of the 7131 Storage Tower.

13 Remove the eight screws securing the Backplane card to the rear of the 5 pack enclosure.

Backplane Replacement

1 Use the eight screws removed earlier to secure the new Backplane card to the 5 pack enclosure.

2 Install the new 5 pack enclosure in the 7131 Storage Tower.

> **Note:** Ensure the 5 pack enclosure is installed with the correct end up (the bottom is marked with the word *bottom*).

3 Secure the 5 pack enclosure to the chassis using the eight screws removed earlier.

4 Install each disk drive module or dummy disk drive module into the same slot position from which it was removed earlier in this procedure. Keep the disk drive module or dummy disk drive module straight when inserting to prevent damage (slots 1 and 5 must contain a disk drive module).

5 Press each disk drive module and/or dummy disk drive module firmly in place to seat it on the backplane before attempting to move the latch up on each assembly to lock it in place.

6 Connect the power supply cables (2), the SSA cables (2), and the fan power cable to the backplane (see Figure 3-15).

7 Install the top cover on the 7131 Storage Tower (see Figure 3-3 on page 3-4).

8 DANGER

> **An electrical outlet that is not correctly wired could place hazardous voltage on metal parts of the system or the products that attach to the system. It is the customer's responsibility to ensure that the outlet is correctly wired and grounded to prevent an electrical shock.** *(RSFTD201)*

9 Connect the line cord to the power source.

10 Set the power switch to on.

11 Replace the front cover (see Figure 3-2 on page 3-3).
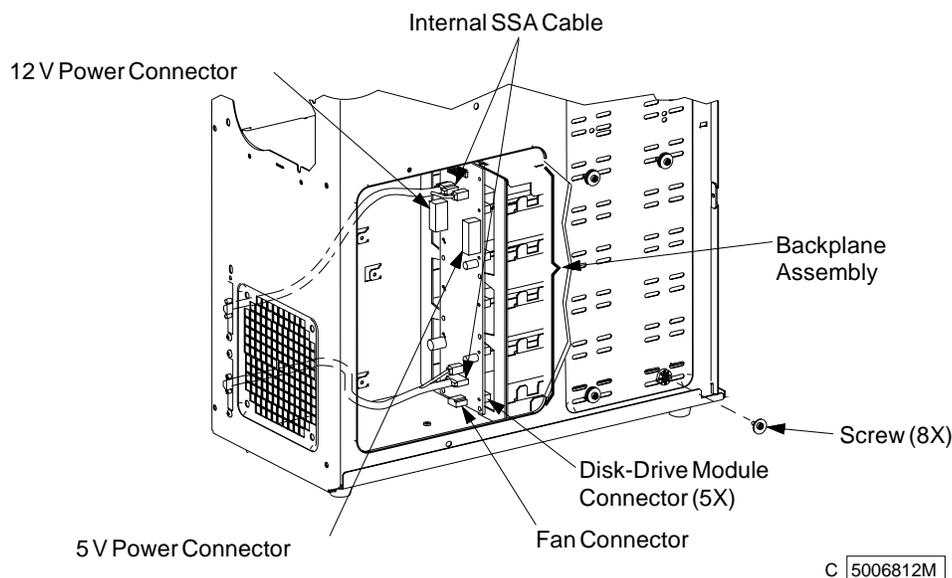
Figure 3-15. Backplane Assembly

Power Supply and Power Switch

Attention: Follow all ESD-sensitive parts procedures while performing this procedure. For ESD information, see "Handling ESD-Sensitive Parts" on page 3-2.

Attention: Do not attempt to open the covers of the power supply. Power supplies are not serviceable and are to be replaced as a unit.

This procedure describes how to remove and replace the power supply and power switch.

Power Supply and Power Switch Removal

1 Open the front cover. See Figure 3-2 on page 3-3.

2 **Attention:** Switching off the power to the 7131 Storage Tower can cause a system fault unless you first make the disk drive modules within the 7131 Storage Tower unavailable to the host system. To do this:

   a. Use the system-management task menus of the host system to make the disk drive modules unavailable.
   b. If the 7131 Storage Tower is connected to more than one adapter, make the disk drive modules unavailable to the host system or to the host systems for each of the paths to the 7131 Storage Tower.

3 Set the power switch to Off, if it is On.

4 Disconnect the line cord from the 7131 Storage Tower.

5 Remove the top cover from the 7131 Storage Tower. See Figure 3-3 on page 3-4.

6 Disconnect the power supply cables from the backplane. See Figure 3-16 on page 3-19.

7 Disconnect the power supply connector attached to the cable with the single black wire providing frame ground.

8 Disconnect the LED cable from the control panel. See Figure 3-16 on page 3-19 and Figure 3-17 on page 3-20.

9 Remove the two screws holding the power switch to the chassis. See Figure 3-16 on page 3-19.

10 Remove the cable ties (3) from the power supply cable and power cable.

11 Hold the power supply, and remove the four screws and their washers.

Power Supply and Power Switch Replacement

1 Align the power supply with the four holes on the chassis. and install and tighten the four screws with their washers.

2 Install and tighten the two screws on the power switch to fasten the power switch to the chassis (ensure the terminals are facing up).
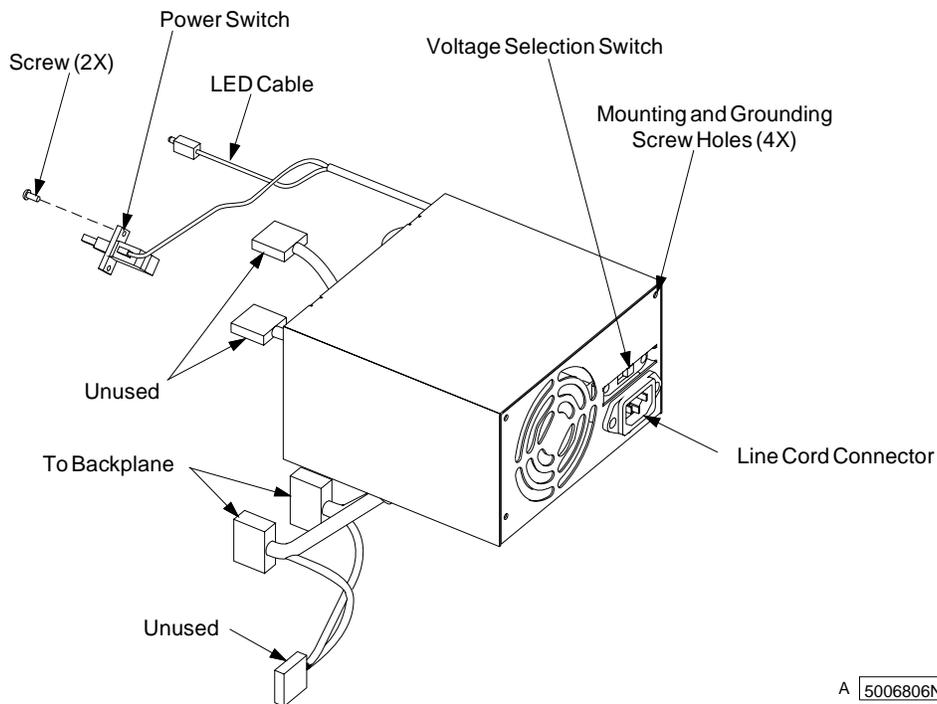
Figure   3-16. Power Supply

3 Connect the LED cable to the control panel (ensure the track is facing up).

4 Connect the power supply cables (2) to the backplane.

5 Connect the power supply connector P5 to the cable with the single black wire providing frame ground.

6 Secure the power cable and the power supply cable with cable ties. Cut the excess from cable ties (3).

7 Install and secure the top cover with the four screws. See Figure 3-3 on page 3-4.

8 Move the voltage selection switch to the correct voltage setting for your power source.
Attention: Do not connect the line cord until the voltage selection switch is correctly set because the power supply could be damaged.

9 **DANGER**

> **An electrical outlet that is not correctly wired could place hazardous voltage on metal parts of the system or the products that attach to the system. It is the customer's responsibility to ensure that the outlet is correctly wired and grounded to prevent an electrical shock.** *(RSFTD201)*

10 Connect the line cord to the power source.

11 Set the power switch to on.

12 Close the front cover.

Control Panel

Attention: Follow all ESD-sensitive parts procedures while performing this procedure. For ESD information, see "Handling ESD-Sensitive Parts" on page 3-2.

This procedure describes how to remove and replace the control panel.

Control Panel Removal

1 Open the front cover. See Figure 3-2 on page 3-3.

2 **Attention:** Switching off the power to the 7131 Storage Tower can cause a system fault unless you first make the disk drive modules within the 7131 Storage Tower unavailable to the host system. To do this:

    a. Use the system-management task menus of the host system to make the disk drive modules unavailable.
    b. If the 7131 Storage Tower is connected to more than one adapter, make the disk drive modules unavailable to the host system or to the host systems for each of the paths to the 7131 Storage Tower.

3 Set the power switch to Off, if it is On.

4 Disconnect the line cord from the power source.

5 Remove the top cover from the 7131 Storage Tower. See Figure 3-3 on page 3-4.

6 Disconnect the LED cable from the control panel. See Figure 3-17.

Figure 3-17. Control Panel

7 Remove the control panel by pressing the four retention clips inward while pulling the panel out.

8 If one or more blank panels were installed, remove them from the control panel.

Control Panel Replacement

Attention: Follow all ESD-sensitive parts procedures while performing this procedure. For ESD information, see "Handling ESD-Sensitive Parts" on page 3-2.

1 If one or more blank panels were removed, press them on the new control panel until they snap in place.

2 Connect the LED cable to the control panel (ensure the track is facing up).
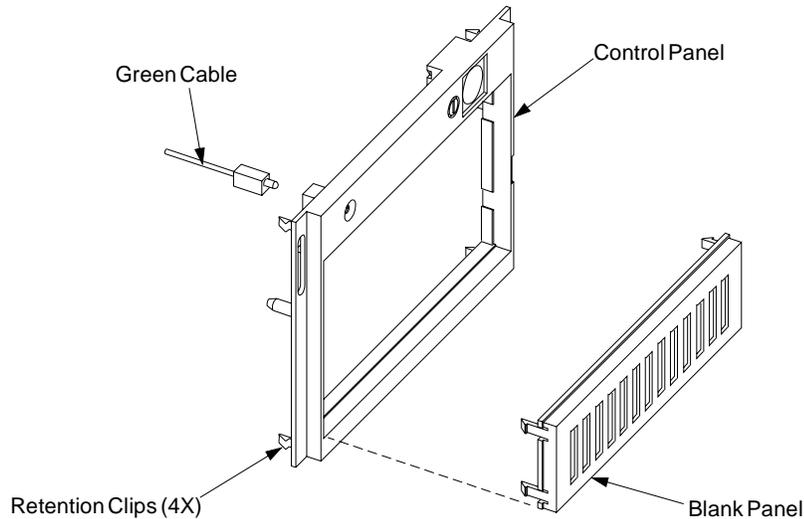
Figure 3-18. Control Panel

3 Place the control panel on the chassis, and press until it snaps into place.

4 Put the top cover on the 7131 Storage Tower.

5 Install and tighten the four screws to fasten the top cover to the 7131 Storage Tower.

6 DANGER

> **An electrical outlet that is not correctly wired could place hazardous voltage on metal parts of the system or the products that attach to the system. It is the customer's responsibility to ensure that the outlet is correctly wired and grounded to prevent an electrical shock.** *(RSFTD201)*

7 Connect the line cord to the power source.

8 Set the power switch to on.

9 Close the front cover.

Fan

Attention: Follow all ESD-sensitive parts procedures while performing this procedure. For ESD information, see "Handling ESD-Sensitive Parts" on page 3-2.

Fan Removal

1 Open the front cover. See Figure 3-2 on page 3-3.

2 **Attention:** Switching off the power to the 7131 Storage Tower can cause a system fault unless you first make the disk drive modules unavailable to the host system. To do this:

Use the system-management task menus of the host system to make the disk drive modules unavailable. If the 7131 is connected to more than one adapter, make the disk drive modules unavailable to the host system or host systems for each of the paths to the 7131.

3 Set the power switch to Off, if it is On.

4 Disconnect the line cord from the power source.

5 Remove the top cover from the 7131 Storage Tower. See Figure 3-3 on page 3-4.

6 Disconnect the fan cable from the backplane. See Figure 3-19 on page 3-23.

7 To remove the fan, support the fan with one hand:

If the fan is mounted with the black rubber isolators, then pull each of the four black rubber isolators through the holes on the chassis to remove the fan (**refer to Figure 3-19 on page 3-23**).

If the fan is mounted with screws, then remove the four screws mounting the fan to the chassis (**refer to Figure 3-20 on page 3-23**).

Fan Replacement

1 Align the fan with the four holes on the chassis ensuring that the fan cable exit is located at the bottom left of the fan as shown in figures.

2 To install the fan, support the fan with one hand:

If the fan is mounted with the black rubber isolators, then pull each of the four black rubber isolators through the holes on the chassis to correctly seat the fan (**refer to Figure 3-19 on page 3-23**).

If the fan is mounted with screws, then install the four screws mounting the fan to the chassis (**refer to Figure 3-20 on page 3-23**).

3 Connect the fan cable to the backplane.

4 Install the top cover on the 7131 Storage Tower. See Figure 3-3 on page 3-4.

5 **DANGER**

> **An electrical outlet that is not correctly wired could place hazardous voltage on metal parts of the system or the products that attach to the system. It is the customer's responsibility to ensure that the outlet is correctly wired and grounded to prevent an electrical shock.** *(RSFTD201)*

Fan Cable Connector

Fan Cable Exit
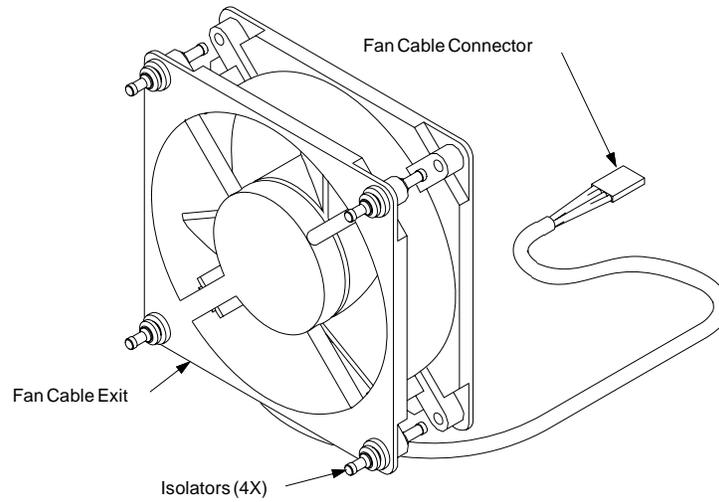
Isolators (4X)

5006819N

Figure   3-19. Fan (Isolator Mounted)

Fan Cable Connector

Screw (4X)

Fan Cable Exit
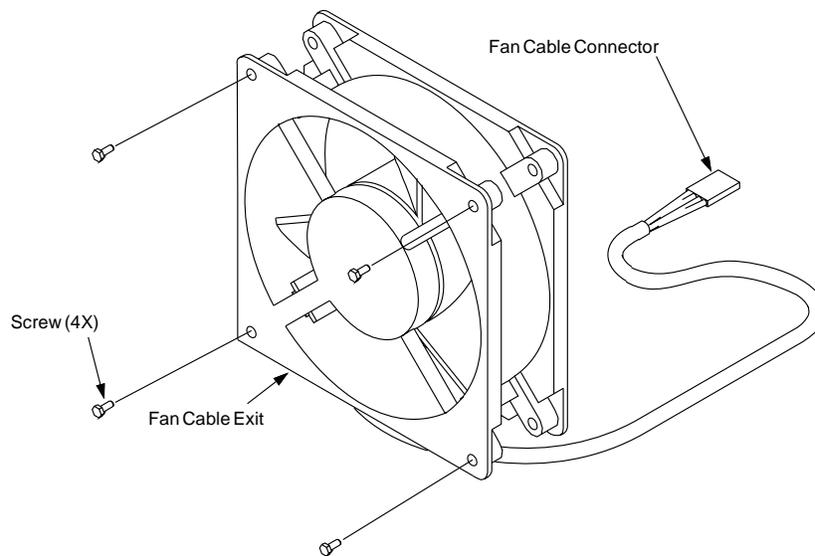
5006819P

Figure   3-20. Fan (Screw mounted)

6 Connect the line cord to the power source.

7 Set the power switch to On and close the front cover.

8 Verify that the fan is operating.

Chapter 4. Safety Inspection

Use the safety inspection procedures to verify the safe condition of a 7131 SSA Multi-Storage Tower. Do not service a 7131 Storage Tower with unsafe conditions.

For safety checks when setting up or relocating, refer to 7131 SSA Multi-Storage Tower Model 405 User's Guide.

Unsafe Conditions

When first assembled, each 7131 Storage Tower has safety equipment installed to protect the operators and service personnel from injury. This inspection checklist ensures that all safety equipment and safety labels are installed on the 7131 Storage Tower.

Perform a safety inspection:

When IBM receives a request for a service agreement for a 7131 Storage Tower.

As part of an alteration-and-attachments review on any 7131 Storage Tower that is on lease, under a service agreement, or on a per-call service.

Special Tools

Always use an analog meter, never a digital meter, to perform the ground check of the customer's outlet. A digital meter can give the wrong readings if ground current is present.

External Machine Check

Perform the following external machine check.

Verify that all external covers are present and are not damaged.

Ensure that all latches and hinges are in good operating condition.

Check the 7131 Storage Tower for loose or broken feet.

Correct any problems that you find.

Continue with "Remove AC Power."

Remove AC Power

Perform the following steps to remove ac power.

1 Open the front cover. See Figure 4-1.

2 **Attention:** Switching off the power to the 7131 Storage Tower can cause a system fault unless you first make the disk drive modules within the 7131 Storage Tower unavailable to the host system. To do this:

  a. Use the system-management task menus of the host system to make the disk drive modules unavailable.

  b. If the SSA loop is connected to a host system through more than one set of &adptbox. (an expanded configuration), make the disk drive modules unavailable to the host system for each of the paths to the &tempst..

3 Set the power switch to off, if it is on. The green light goes off.
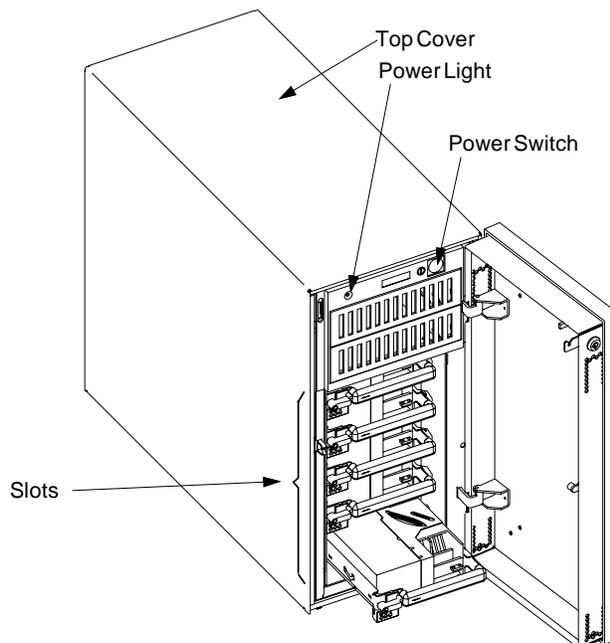
A 5006821N

Figure 4-1. Power Switch

4 **DANGER**

An electrical outlet that is not correctly wired could place hazardous voltage on metal parts of the system or the products that attach to the system. It is the customer's responsibility to ensure that the outlet is correctly wired and grounded to prevent an electrical shock. *(RSFTD201)*

5 Disconnect the line cord from the 7131 Storage Tower. See Figure 4-2.

6 Disconnect the line cord from the power source.

7 Continue with "Internal Machine Check" on page 4-4.

Line Cord

Fan

Using System
SSA Cables

Retention
Screws (4X)
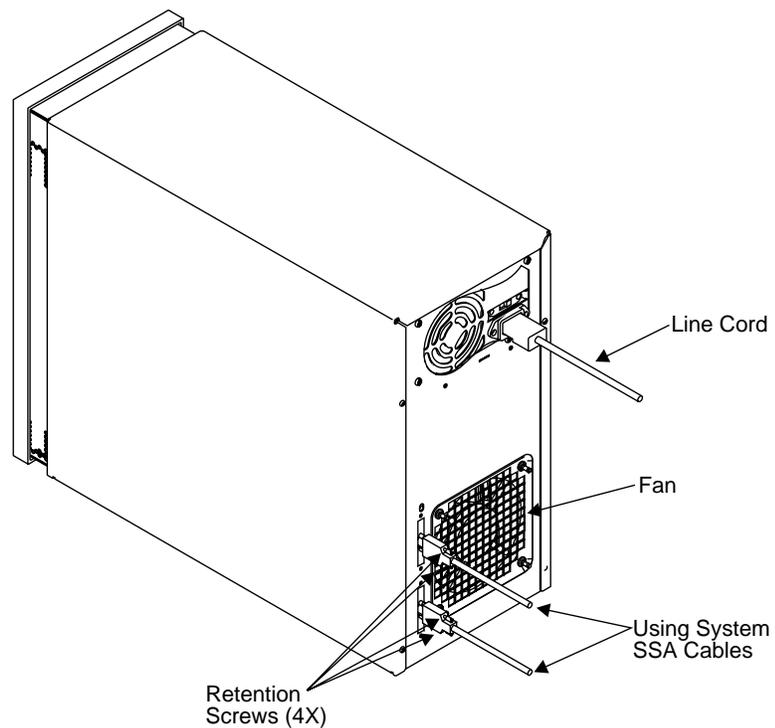
B 5006834N

Figure   4-2. Line Cord

Internal Machine Check

Perform the internal machine check.

1 Check for any non-IBM changes that may have been made to the 7131 Storage Tower. If any are present, obtain the Non-IBM Alteration Attachment Survey form, number R009, from the IBM branch office. Complete the form and return it to the branch office.

2 At the back of the 7131 Storage Tower, remove the four screws that fasten the top cover to the 7131 Storage Tower. See Figure 4-3.
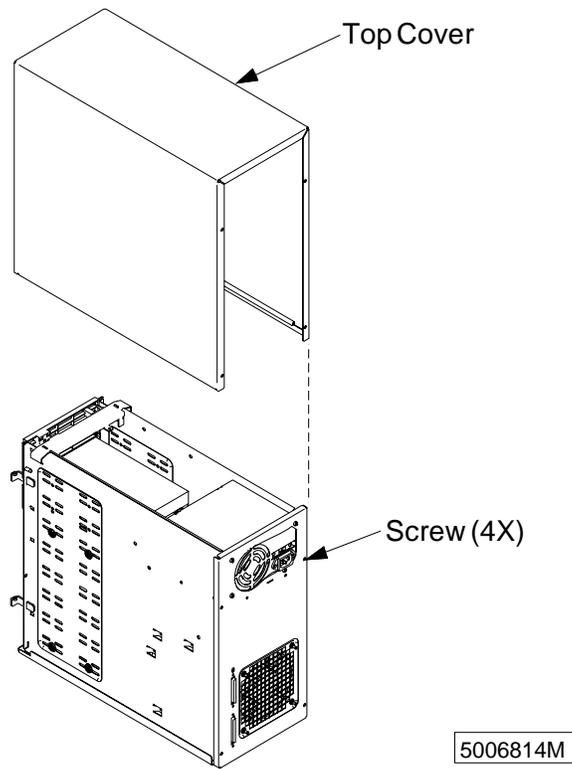
Figure 4-3. Top Cover

3 Lift and remove the top cover from the 7131 Storage Tower.

4 Check inside the 7131 Storage Tower for any obvious unsafe conditions, such as metal particles, water or other fluids, or marks of overheating, fire, or smoke damage.

5 Check for any obvious mechanical problems, such as loose components,

6 Inspect the power supply and check that the fasteners screws, or rivets in the cover of the power supply unit have not been removed or disturbed.

7 Verify that the four power supply mounting screws are tight. See Figure 4-4 on page 4-5. The mounting screws connect the power supply frame ground to the 7131 Storage Tower frame ground.

Line Cord AC Ground

Power
Supply

XXXX

ZZZZ

Frame Ground

XXXX − Screw with starwasher
ZZZZ − Screw without starwasher
—————— − AC safety ground (green/yellow wire)
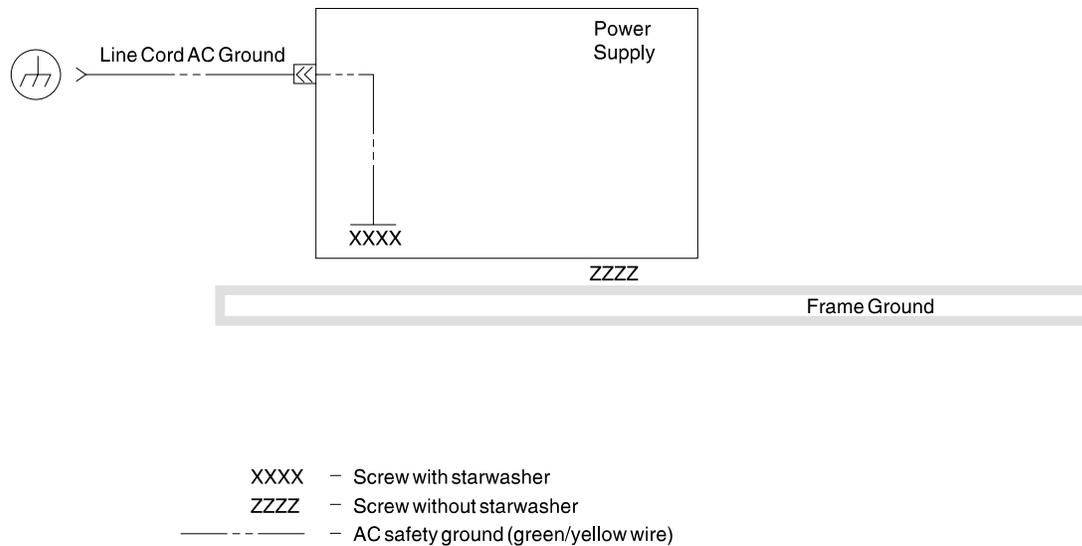
B 5006472N 8

Figure   4-4. Frame Ground Diagram

8 Verify that the voltage shown on the power supply label and on the voltage selection switch matches the voltage of the power source. See Figure 4-6 on page 4-7.

9 Check any exposed cables and connectors for wear, cracks, or pinching.

10 Check the line cord to ensure that

  a. A third-wire ground connector is in good condition. Use a ground tester to check that the third-wire ground continuity is 0.1 ohm or less between the external ground pin and the 7131 Storage Tower frame ground.

  b. The insulation is good (not damaged or worn).

11 Check for any obvious nonstandard changes. Use good judgment about the safety of any such changes.

12 Continue with "Safety Label Check" on page 4-6.

Safety Label Check

Perform the following safety label check.

1 Verify that all safety labels shown in the following steps are installed on the 7131 Storage Tower. If any safety labels are missing, order and install them.

2 Verify that the power supply label is installed on the power supply. See Figure 4-5.
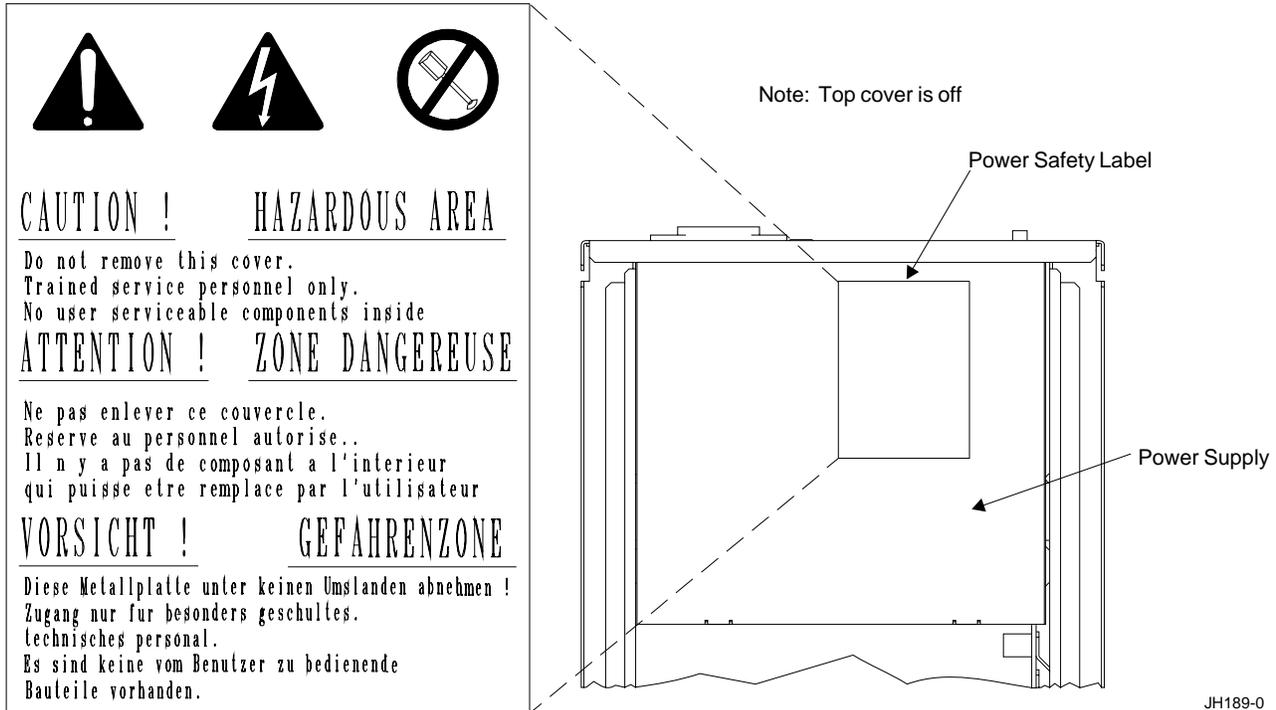
Figure 4-5. Power Supply Label (Top View)

3 Verify that the weight label is installed on the 7131 Storage Tower. See Figure 4-6.

Power Supply

Voltage Selection Switch
(Move the switch to show the voltage required:
115 V for USA, 230 V in some other countries.)

Mounting Screws (4X)
(These screws are power
supply ground points.)

18 Kg +
(40 lb +)

Weight Label

18 Kg +
(40 lb +)

B 5006825N
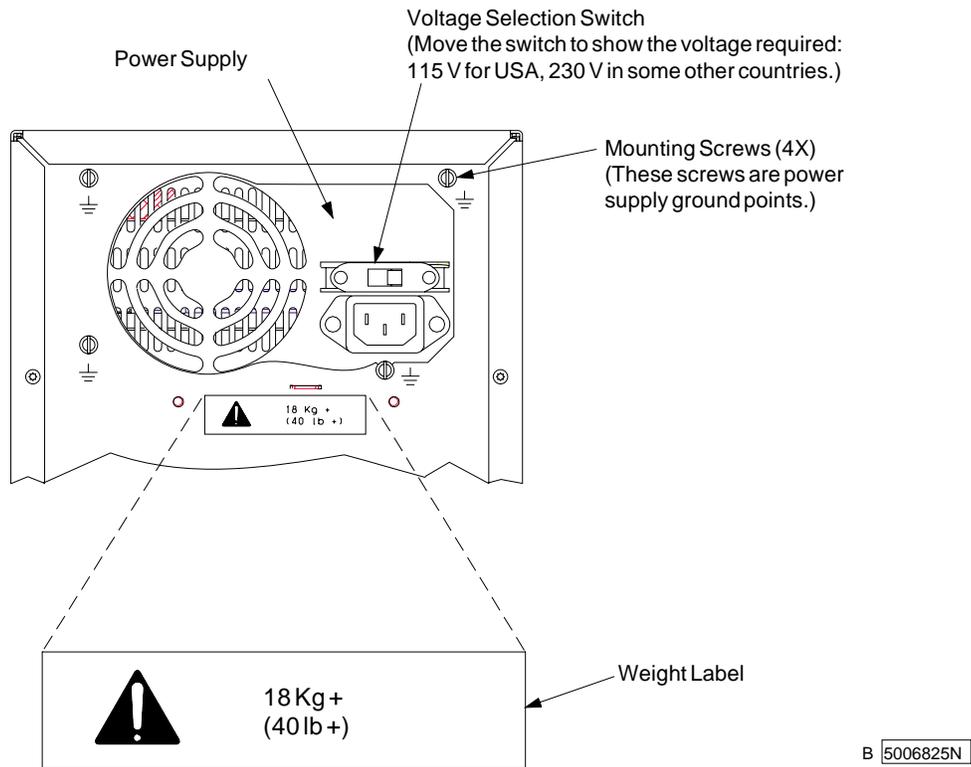
Figure   4-6. Weight Label (Back View)

4 Continue with "Complete the Machine Safety Check."

Complete the Machine Safety Check

1 Put the top cover on the 7131 Storage Tower. See Figure 4-3 on page 4-4.

2 Install and tighten the four screws to fasten the top cover to the 7131 Storage Tower.

3 **DANGER**

> **An electrical outlet that is not correctly wired could place hazardous voltage on metal parts of the system or the products that attach to the system. It is the customer's responsibility to ensure that the outlet is correctly wired and grounded to prevent an electrical shock.** *(RSFTD201)*

4 Connect the line cord to the customer's outlet.

This completes the visual mechanical safety inspection procedure with the power off.

Chapter 5. Parts Diagrams and Parts List

This chapter provides a parts diagram and parts list required to service the 7131 Storage Tower.

How To Use This Parts Listing

AR	(As Required) in the *Units* column indicates that the quantity is not the same for all machines.
NP	(Non-Procurable) in the *Part Number* column indicates that the part is non-procurable and that the individual parts or the next higher assembly should be ordered.
NR	(Not Recommended) in the *Units* column indicates that the part is procurable but not recommended for field replacement, and that the next higher assembly should be ordered.
NS	(Not Shown) in the *Asm- Index* column indicates that the part is either not shown or not referenced in the illustration.
R	(Restricted) in the *Units* column indicates that the part has a restricted availability.
Indenture	The indenture is marked by a series of dots located before the parts description. The indenture indicates the relationship of a part to the next higher assembly. For example:

Indenture	Relationship of Parts
(No dot)	MAIN ASSEMBLY
(One dot)	Detail parts of a main assembly
(One dot)	Sub assembly of the main assembly
(Two dots)	Detail part of a one-dot sub assembly
(Two dots)	Sub assembly of a one-dot sub assembly
(Three dots)	Detail part of a two-dot sub assembly

Example of Parts Listing

Asm- Index	Part Number	Units	Description
3-	2512667	1	Cover Asm, Rear, Red
	2513714	1	Cover Asm, Rear, White
			For Next Higher Asm, see Assembly 1-2.
-1	5373637	1	Seal, Top
-2	5356429	2	Clip, Retaining
-3	1847630	1	Finger Stock Asm
-4	1847602	NR	Channel, Finger Stock
-5	5373639	AR	Seal, Bottom
-6	5356429	2	Clip, Retaining
-7	NP	1	Cover, Rear, Without Paint
-5	0416629	R	Screw, Panel

Parts Diagram

18

9, 9A

19, 19A, 19B, 19C

25

17

4

13

16

15

5, 5A

3

14, 14A, 14B, 14C

24, 24A

22

10, 10A, 10B

1

2

B 5006826N
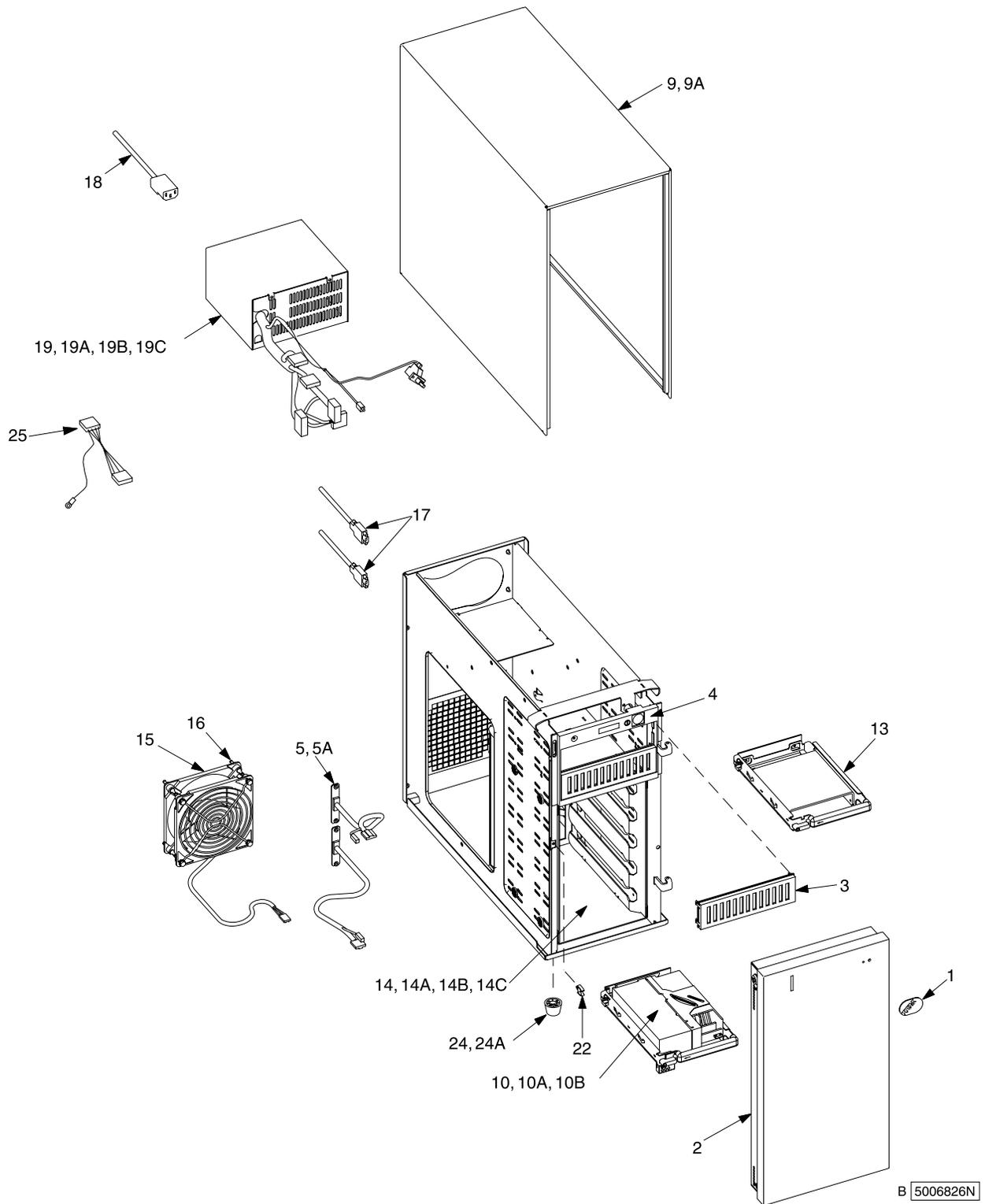
Asm-Index	Part Number	Units	Description
1	27H1020	1	Logo
2	26H9206	1	Front Cover Assembly
3	06H2187	2	Blank Panel
4	26H9191	1	Control Panel Assembly
5	27H1044	2	SSA Cable Assembly
5A	34H8186	4	Screw, SSA Cable Assembly
9	05H4680	1	Top Cover Assembly
9A	27H2338	4	Screw, M3 x 6 (Top Cover)
10	99F7896	AR	1.1 GB Disk Drive Module
10	99F7897	AR	2.2 GB Disk Drive Module
10	99F7898	AR	4.5 GB Disk Drive Module
10	21H8734	AR	9.1 GB Disk Drive Module
10A	1147429	4	Screw, Disk Drive Module
10B	27H1047	1	SSA Carrier Assembly
13	27H1023	AR	Dummy Disk Drive Module
14	21H8757	NR	Enclosure, 5 Pack
14A	27H0840	8	Screws, 5 Pack Enclosure mounting
14B	34H8190	1	Card, Backplane
14C	34H8186	8	Screws, Backplane mounting
15	21H8740	1	Fan Assembly, (Mounting Screws Included)
16	21H8725	4	Screw, Fan Mounting
17	07H8985	2	1.0 m External SSA Cable
17	32H1465	2	2.5 m External SSA Cable
17	88G6404	2	5.0 m External SSA Cable
17	32H1466	2	10.0 m External SSA Cable
17	88G6406	2	25.0 m External SSA Cable
18		1	See Appendix A, "Line Cords" on page A-1.
19	26H9205	1	Power Supply
19A	34H8186	4	Screws, Power Supply
19B	34H8186	2	Screws, Power Switch
19C	1159519	3	Cable Tie, PS
22	21H8746	1	Latch
24	26H9234	4	Feet
24A	49G5445	4	Screws, Feet
25	21H8762	1	Cable, Power Supply Frame Ground

Chapter 6. Power Distribution Diagrams

The following illustrations are the ground diagrams for the 7131 Storage Tower.

7131 Storage Tower Ground Diagram

Backplane	J3		
	1	+12 V to Fan	
	2	Ground	
	3	Ground	Fan
	4	Fan Sense	
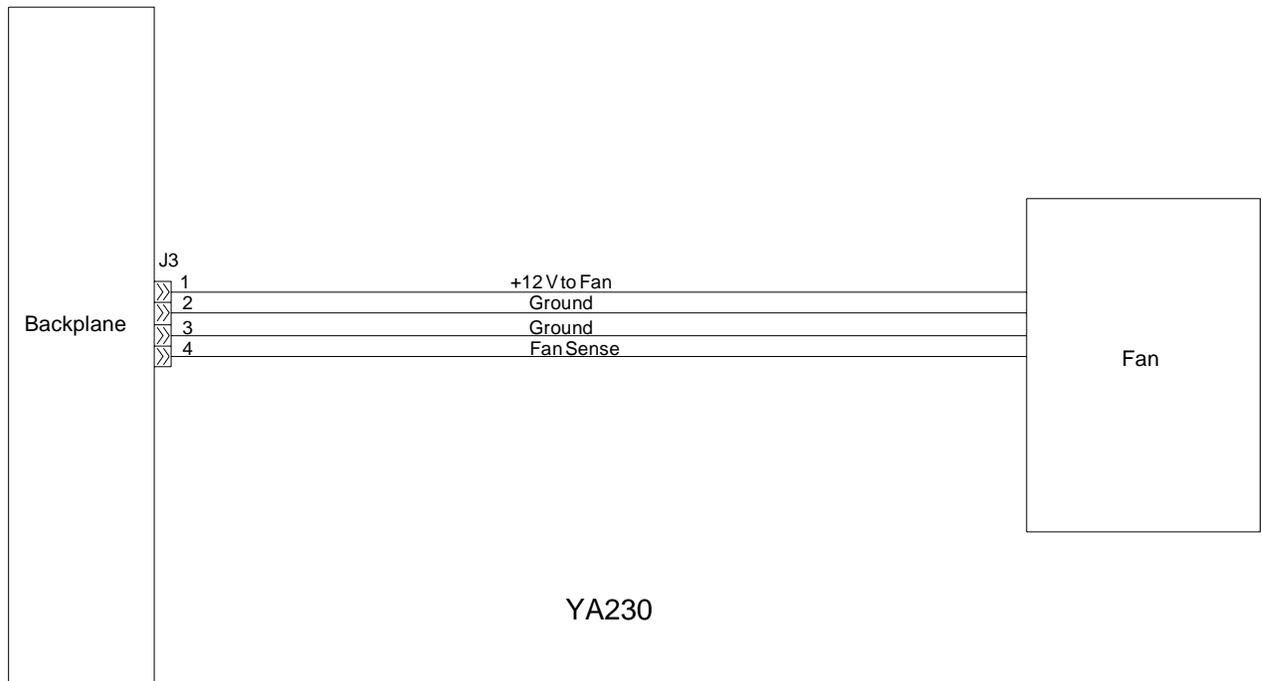
YA230

5006827N 8

Figure   6-1. 7131 Storage Tower Ground Diagram–Backplane to Fan
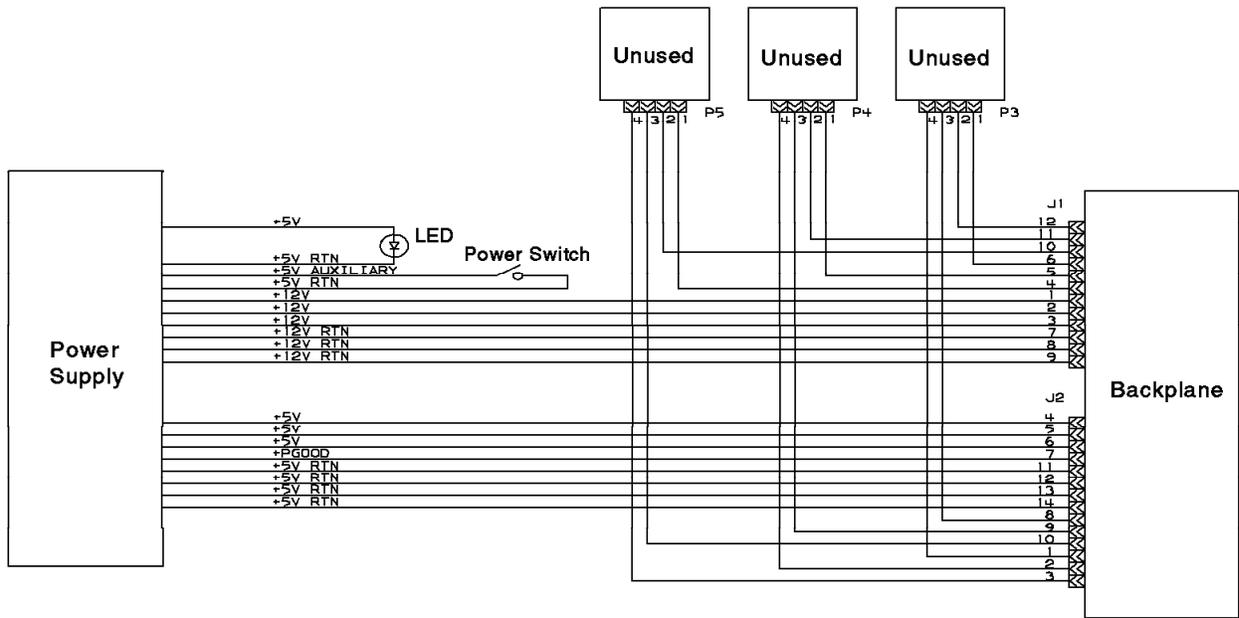
Figure   6-2. 7131 Storage Tower Ground Diagram–Power Supply to Backplane

Note: On 7131 Storage Towers shipped after December 13, 1996 (S/N 09211 or greater) one of the unused power supply connectors (P5) has a pigtail connector (P/N 21H8762) inserted into it that is used to provide an additional chassis ground for the power supply.

Appendix A. Line Cords

To avoid electrical shock, a line cord with a grounded attachment plug is provided. Use only properly grounded outlets.

Line cords used in the United States and Canada are listed by Underwriter's Laboratories (UL**) and certified by the Canadian Standards Association (CSA). These line cords consist of:

   Electrical line cords, type SVT or SJT

   Attachment plugs complying with National Electrical Manufacturers Association (NEMA) 5-15P.

   For 115 V operation, use a UL-listed cable set consisting of a minimum 18 AWG, type SVT or SJT 3 conductor cable that is a maximum of 15 feet in length, and a parallel blade, grounding-type attachment plug rated at 15 A, 125 V.

   For 230 V operation in the United States, use a UL-listed cable set consisting of a minimum 18 AWG, type SVT or SJT 3 conductor cable that is a maximum of 15 feet in length, and a tandem blade, grounding-type attachment plug rated at 15 A, 250 B.

   Appliance couplets complying with International Electrotechnical Commission (IEC) Standard 320, Sheet C13

Line cords used in other countries consist of:

   Electrical line cord, type HD21

   Attachment plugs approved by the appropriate testing organization for the specific countries where they are used

   For units set at 230 V (outside of the United States), use a cable set consisting of a minimum 18 AWG cable and a grounding-type attachment plug rated at 15A, 250 V. The cable set should have the appropriate safety approvals for the country in which the equipment will be installed and should be marked "HAR".

Table A-1 on page A-2 lists the line cord part number, the country where the line cord can be used, and an index number to be matched with the receptacle illustrations shown in Figure A-1 on page A-3. Contact your local service representative if your 7131 Storage Tower disk drive line cord does not match this information.

Table A-1. Line Cord and Country Matrix

Feature Code	Part Number	Specifications and Country	Index
9800	6952300	2.7-m (9 ft) line cord, United States and Canada; 110 V to 127 V at 60 Hz Antilles, Balarrus, Barbados, Bermuda, Bolivia, Brazil, Canada, Cayman Islands, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Japan, Korea (South), Liberia, Mexico, Netherlands, Nicaragua, Panama, Peru, Philippines, Saudi Arabia, Suriname, Taiwan, Trinidad (West Indies), United States, 110 V	1
9820	13F9979	2.9-m (9 ft) line cord, France, 220 V to 240 V at 50 Hz Afghanistan, Algeria, Andorra, Angola, Austria, Belgium, Benin, Bulgaria, Burkina Faso, Burundi, Cameroon, Central African Rep, Chad, Czech Republic, Egypt, Finland, France, French Guiana, Germany, Greece, Guinea, Hungary, Iceland, Indonesia, Iran, Ivory Coast, Jordan, Lebanon, Luxembourg, Macau, Malagasy, Mali, Martinique, Mauritania, Mauritanian, Monaco, Morocco, Mozambique, Netherlands, New Caledonia, Niger, Norway, Poland, Portugal, Romania, Senegal, Slovakia, Spain, Sudan, Sweden, Syria, Togo, Tunisia, Turkey, former USSR, Vietnam, former Yugoslavia, Zaire, Zimbabwe	2
9821	13F9997	2.7-m (9 ft) line cord, Denmark, 220 V to 250 V at 60 Hz	3
9825	14F0033	2.7-m (9 ft) line cord, United Kingdom, 220 V to 240 V at 60 Hz Antigua, Bahrain, Brunei, Channel Islands, Cyprus, Dubai, Fiji, Ghana, Hong Kong, India, Iraq, Ireland, Kenya, Kuwait, Malawi, Malaysia, Malta, Nepal, Nigeria, Polynesia, Qatar, Sierra Leone, Singapore, Tanzania, Uganda, United Kingdom, Yemen, Zambia	4
9827	14F0087	2.7-m (9 ft) line cord, Israel, 230 V to 240 V at 50 Hz	5
9828	14F0051	2.7-m (9 ft) line cord, Switzerland, 200 V to 220 V at 50 Hz Liechtenstein, Switzerland	6
9829	14F0015	2.7-m (9 ft) line cord, South Africa, 220 V to 240 V at 50 Hz Bangladesh, Burma, Pakistan, South Africa, Sri Lanka	7
9830	14F0069	2.7-m (9 ft) line cord, Italy, 200 V to 250 V at 50 Hz Chile, Ethiopia, Italy, Libya, Somalia	8
9831	13F9940	2.7-m (9 ft) line cord, Australia, 200 V to 240 V at 50 Hz Argentina, Australia, China (PRC), New Zealand, Papua New Guinea, Paraguay, Western Samoa	9
9834	6952291	2.7-m (9 ft) line cord, Uruguay, 200 V to 220 V at 50 Hz	10
9933	1838574	2.7-m (9 ft) line cord, United States and Canada, 220 V to 240 V at 60 Hz Antilles, Balarrus, Barbados, Bermuda, Bolivia, Brazil, Canada, Cayman Islands, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Japan, Korea (South), Liberia, Mexico, Netherlands, Nicaragua, Panama, Peru, Philippines, Saudi Arabia, Suriname, Taiwan, Trinidad (West Indies), United States: 220 V	11
9986	6952301	1.8-m, (6 ft) line cord, United States and Canada, 115 V to 127 V at 60 Hz	12
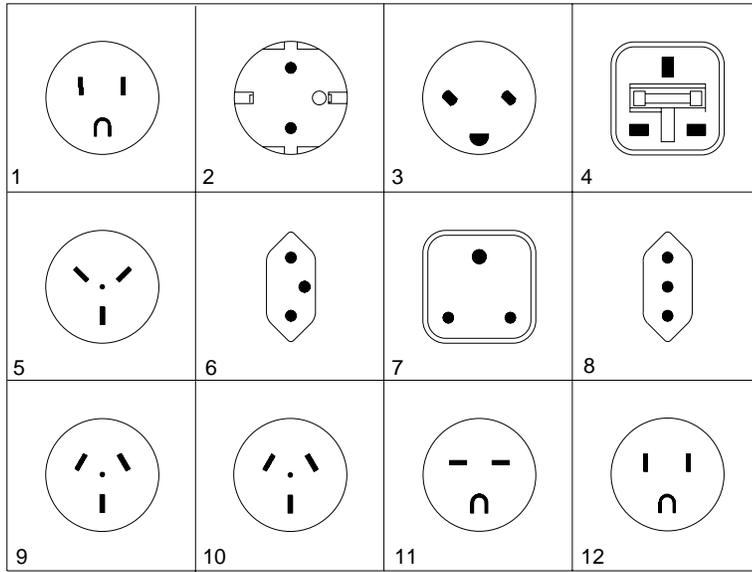
Figure A-1. Receptacles

Index

Numerics

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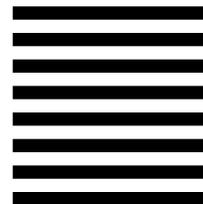
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