

7133 SSA Disk Subsystems
for Open Attachment



Service Guide

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for Open Attachment



Service Guide

First Edition (March 1997)

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Contents

Safety Notices	vii
Definitions of Safety Notices	vii
Safety Notice for Installing, Relocating, or Servicing	vii
Laser Safety Information	viii
About This Book	ix
Numbering Convention	ix
Related Publications	x
Chapter 1. Reference Information	1-1
SSA Loops and Links	1-2
SSA Connectors of Models 010 and 500	1-2
SSA Connectors of Models 020 and 600	1-2
SSA Fibre-Optic Extender Feature	1-2
Lights and Power Switch	1-3
Subsystem Lights and Power Switch	1-3
Disk Drive Module Lights	1-8
Parts Locations	1-10
Parts Locations (Models 010 and 020)	1-10
Parts Locations (Models 500 and 600)	1-11
Hardware Configurations	1-12
Models 010 and 500	1-12
Models 020 and 600	1-12
SSA Fibre-Optic Extenders and Fiber Optic Cables	1-13
Fibre-Optic Extender Lights	1-14
Connectors	1-15
Back Connectors (Models 010 and 020)	1-15
Internal Connections (Models 010 and 020)	1-16
Back Connectors (Models 500 and 600)	1-18
Internal Connections (Models 500 and 600)	1-19
Mainline-Power Connector (220 V ac and 300 V dc)	1-21
Front Connectors (Models 010 and 020)	1-21
Front Connectors (Models 500 and 600)	1-22
Power Distribution Schematic	1-23
Labels	1-24
Labels (Models 010 and 020)	1-24
Labels (Models 500 and 600)	1-25
Labels (Disk Drive Modules and Dummy Disk Drive Modules)	1-26
Labels (Dummy Fan-and-Power-Supply Assembly)	1-27
Product Characteristics	1-28
Dimensions and Weight (Models 010 and 020)	1-28
Dimensions and Weight (Models 500 and 600)	1-29
AC and DC Input-Voltage Requirements	1-30
Environment (Models 010 and 020)	1-30
Environment (Models 500 and 600)	1-31
Altitude from Sea Level	1-31
Heat Output (Maximum)	1-31
Capacities of Disk Drive Modules	1-32
Power Sequencing	1-32
Disk Drive Acclimation	1-32

SSA Signal Cards (Models 010 and 500)	1-33
SSA Bypass Cards (Models 020 and 600)	1-33
Bypass Mode	1-33
Forced Inline Mode	1-34
Bypass Card Jumpers	1-35
SSA Subsystem Configurations	1-37
Rules for SSA Loops	1-37
SSA Cables	1-38
Cable Configurations for Models 010 and 500	1-39
Larger Configurations for Models 010 and 500	1-40
Cable Configurations for Models 020 and 600	1-44
Larger Configurations for Models 020 and 600	1-45
Finding the Physical Location of a Device	1-49
Finding the Device When the SSA Service Functions Are Available	1-49
Finding the Device When the SSA Service Functions Are Not Available	1-49
Service Inspection Guide	1-50
Inspection Checklist	1-50
Checking the Grounding of the 7133	1-51
Grounding Check (Models 010 and 020)	1-51
Grounding Check (Models 500 and 600)	1-52
Chapter 2. Problem Determination Procedures	2-1
Disk Drive Module Power-On Self-Tests (POSTs)	2-1
Service Request Numbers (SRNs)	2-2
The SRN Table	2-2
Using the SRN Table	2-2
FRU Names Used in the SRN Table	2-3
The SRNs	2-4
Software and Microcode Errors	2-7
Maintenance Analysis Procedures (MAPs)	2-8
How to Use these MAPs	2-8
MAP 2010: 7133 – START	2-2010-1
MAP 2020: 7133 – Power	2-2020-1
MAP 2021: 7133 – Redundant Power	2-2021-1
MAP 2022: 7133 – Power-On	2-2022-1
MAP 2330: 7133 – Fibre-Optic Extender	2-2330-1
MAP 2410: 7133 – Repair Verification	2-2410-1
SSA Link Errors	2-9
SSA Link Error Problem Determination	2-9
Link Status (Ready) Lights	2-11
Fibre-Optic Extender Lights	2-12
SSA Service Functions	2-13
Chapter 3. Removal and Replacement Procedures	3-1
Concurrent Maintenance	3-1
Covers	3-3
Front Cover – (Early Type)	3-4
Front Cover (Late Type)	3-5
Front Cover (Models 500 and 600)	3-6
Back Cover (Models 500 and 600 Only)	3-7
All Power	3-8
Power (Models 010 and 020)	3-8
Power (Models 500 and 600)	3-10
Disk Drive Modules	3-12

Removing a Module	3-12
Installing a Module	3-15
Dummy Disk Drive Modules	3-18
Fan-and-Power-Supply Assemblies	3-22
Dummy Fan-and-Power-Supply Assembly (Models 010 and 500 Only)	3-24
Control Panel Assembly	3-26
Control Panel Assembly (Models 010 and 020)	3-26
Control Panel Assembly (Models 500 and 600)	3-27
Power-Distribution Tray Assemblies	3-28
Back-Power Cards	3-31
Signal Cards and Bypass Cards	3-33
Front Backplane Assembly	3-37
Back Backplane Assembly	3-41
Removing a 7133 from a Rack	3-44
Support Rails	3-47
Chapter 4. Parts Catalog	4-1
Conventions	4-1
Assembly 1: 7133 Models 010 and 020 SSA Disk Subsystems	4-2
Assembly 2: 7133 Models 500 and 600 SSA Disk Subsystems	4-6
Power Cables	4-10
Index	X-1

Safety Notices

This book contains safety notices.

Definitions of Safety Notices

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

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

An *attention* notice indicates an action that could cause damage to a program, device, system, or data.

Safety Notice for Installing, Relocating, or Servicing

Before connecting or removing any cables to or from connectors at the using system, be sure to follow the steps in the installation or relocation checklist specified in the manuals for your using system.

For safety checks when servicing, refer to “Service Inspection Guide” on page 1-50.

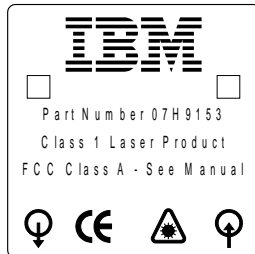
Laser Safety Information

Notes:

1. The information given here applies only to 7133s that have the SSA Fibre-Optic Extender feature.
2. The SSA Fibre-Optic Extender referred to in this information is part of the serial optic converter assembly.

This system contains a laser product called the SSA Fibre-Optic Extender. In the United States, the SSA Fibre-Optic Extender is certified as a Class 1 laser product that conforms to the requirements contained in the Department of Health and Human Services (DHHS) regulation 21 CFR Subchapter J. Internationally, the SSA Fibre-Optic Extender is certified as a Class 1 laser product that conforms to the requirements contained in the International Electrotechnical Commission (IEC) standard 825-1 (1993).

Class 1 laser products are not considered to be hazardous. The SSA Fibre-Optic Extender internally contains an indium gallium arsenide / indium phosphide (InGaAs/InP) semiconductor laser diode emitting in the wavelength range of 1280 to 1340 nanometers. This laser diode is a Class 1 laser that is rated at 5.0 milliwatts. The design of the SSA Fibre-Optic Extender is such that access to laser radiation above a Class 1 level during operation, user maintenance, or service conditions is prevented.



CLASS 1 LASER PRODUCT
APPAREIL A LASER DE CLASSE 1
LUOKAN 1 LASERLAITE

TO IEC 825-1:1993

About This Book

This book provides service information for service representatives who service a 7133 Serial Storage Architecture (SSA) Disk Subsystem that is attached to open systems using-system SSA attachment hardware (for example, an IBM 7190 Model 100 SSA to SCSI Interface Converter). This information is organized as follows:

- Chapter 1 briefly introduces the 7133, and gives useful reference information.
- Chapter 2 gives problem determination procedures.
- Chapter 3 gives removal and replacement procedures.
- Chapter 4 is the parts catalog.

An index is provided at the back of the book.

Important

Before servicing this product, be sure to review the safety information in this manual (see "Safety Notices" on page vii), and in the manuals for your system.

Numbering Convention

In this book, one gigabyte (GB) equals 1 000 000 000 bytes.

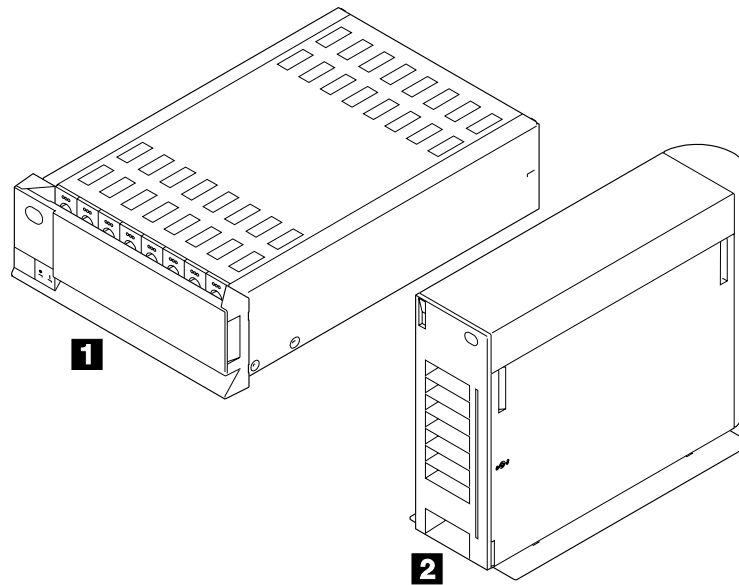
Related Publications

7133 SSA Disk Subsystems for Open Attachment: Installation and User's Guide, SA33-3273

Installation and User's Guide for the using-system SSA attachment hardware (for example, the IBM 7190 Model 100 SSA to SCSI Interface Converter).

Chapter 1. Reference Information

IBM 7133 Serial Storage Architecture (SSA) Disk Subsystems can be attached to various using systems through using-system SSA attachment hardware, such as an IBM 7190 Model 100 SSA to SCSI Interface Converter. IBM 7133 Models 010 and 020 **1** are rack-mounted units that can be installed in a standard Electrical Industries Association (EIA) 19-inch rack. Models 500 and 600 **2** are deskside units.



The 7133 can contain up to 16 SSA disk drive modules (eight at the front and eight at the back).

The 7133 has fan-and-power-supply assemblies that provide all the power and cooling for the 7133. Models 010 and 500 have two or three fan-and-power-supply assemblies, subject to configuration requirements. Models 020 and 600 always have three fan-and-power-supply assemblies.

The disk drive modules are connected to each other in strings of four modules (two strings at the front of the 7133, and two strings at the back). These strings can be connected to each other, to strings in other 7133s, or to the using-system SSA attachment hardware.

The 7133 can be disconnected from its related using-system SSA attachment hardware while the using system is running. Also, most of the field-replaceable units (FRUs) of the 7133 can be removed and replaced while the 7133 and the using system are running. For a list of those FRUs, see "Concurrent Maintenance" on page 3-1.

The customer's preinstallation planning information contains information about the system and its configuration.

SSA Loops and Links

The disk drive modules of the 7133 are connected through two or more SSA links to the using-system SSA attachment hardware. The disk drive modules, SSA links, and using-system SSA attachment hardware are configured in loops. Each loop provides a data path that starts at one connector of the using-system SSA attachment hardware, and passes through a link (external SSA cable) to the disk drive modules. The loop continues through the disk drive modules, then returns through another link to a second connector on the using-system SSA attachment hardware.

SSA Connectors of Models 010 and 500

At the back of the 7133 are eight SSA connectors for the external SSA cables. Each pair of connectors is on a signal card that provides direct connection to a backplane assembly in the 7133.

SSA Connectors of Models 020 and 600

At the back of the 7133 are eight SSA connectors for the external SSA cables. Each pair of connectors is on a bypass card that provides connections to the backplane assemblies of the 7133. (On Models 020 and 600, bypass cards are used instead of the signal cards that are used on Models 010 and 500.) If a bypass card loses both its external SSA connections, it automatically reconfigures the SSA loop so that the loop remains complete. This capability can be disabled if required.

For full details about the operation and configuration of bypass cards, see also "SSA Bypass Cards (Models 020 and 600)" on page 1-33.

SSA Fibre-Optic Extender Feature

The SSA Fibre-Optic Extender feature permits the 7133 to be connected to another 7133 through pairs of fiber optic cables. Each end of a pair of fiber optic cables is connected to a Fibre-Optic Extender. The Fibre-Optic Extender can be plugged into an SSA connector of a 7133. See also "SSA Fibre-Optic Extenders and Fiber Optic Cables" on page 1-13.

Note: Not all SSA devices provide support for the Fibre-Optic Extender feature. Ensure that the devices that you want to connect to each other through Fibre-Optic Extenders all provide support for such a connection.

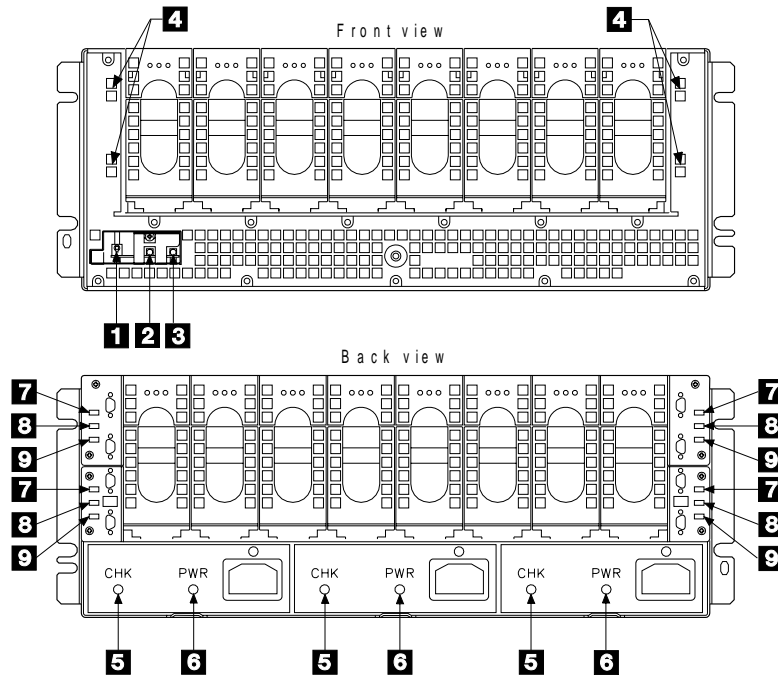
Lights and Power Switch

The 7133 has lights that show the status of the subsystem. It also has a power switch. Each disk drive module has lights that show the status of that module.

Subsystem Lights and Power Switch

Unless otherwise stated, the lights described in this section remain visible when the covers of the 7133 are installed. The lights at the back of Models 010 and 020 are not visible when the back door of the rack is closed. The diagrams in this section show the 7133 with covers removed.

Lights and Power Switch (Models 010 and 020)



1 Power switch (I/O): This switch controls the internal dc power that is supplied to the 7133 by the fan-and-power-supply assemblies.

Note: The diagram shows the Power switch of Model 010. The Power switch of Model 020 is slightly different.

To turn on the dc power on Model 010, press the switch, and hold it pressed for two seconds. To turn on the power on Model 020, press and release the switch.

Repeat the action to turn off the dc power. When the dc power is turned off, mainline power is still present in the fan-and-power-supply assemblies if the 7133 is connected to the mainline-power source.

The front cover includes a flap that covers the Power switch to prevent accidental operation. On Model 010, the flap pivots upward to open. On Model 020, the flap pivots to the right to open.

2 Subsystem Power light (Ⓢ): This green light is on when the power switch has been pressed to turn on the dc voltage, and the dc voltage is present in the 7133.

3 Subsystem Check light (I): This amber light comes on if a failure occurs in the 7133 subsystem. The subsystem might be able to continue operating satisfactorily although the failure of a particular part has been detected.

4 Power Card light: This green light is on when electrical power is present on the card. The light is not visible when the front cover is installed.

5 Fan-and-Power Check light: This amber light comes on and stays on if dc output from the power supply part of the fan-and-power-supply assembly fails or is disabled.

If the power supply fails completely, the light is turned on by power from one of the other fan-and-power-supply assemblies in the 7133. The light flashes if the fan fails.

6 Power light: This green light is on when mainline electrical power is present in the fan-and-power-supply assembly.

7 Link Status (Ready) light (Model 020 only): This green light shows the status of the port (for example, port 1) through which the bypass card is connected to the using-system SSA attachment hardware:

Status of Light	Meaning
Permanently on	The interface through the bypass card is fully operational.
Flashing (two seconds on, two seconds off)	The interface through the bypass card is not operational.
Off	The card is in Bypass state or in Forced Inline mode.

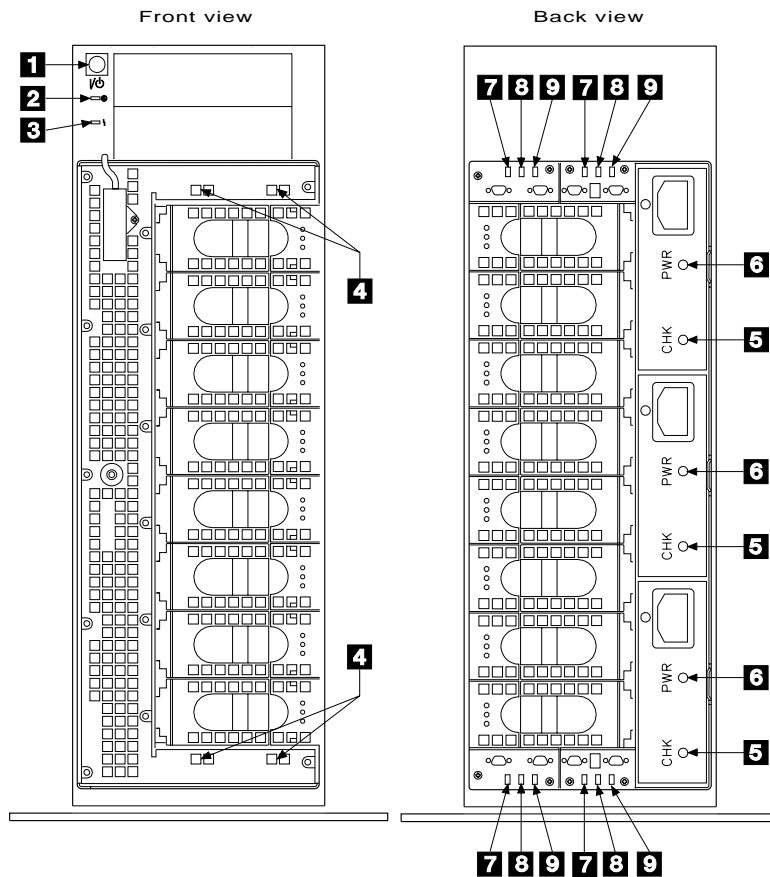
8 Mode light (Model 020 only): This light shows in which mode the bypass card is operating:

Status of Light	Meaning
Permanently on (Amber)	The bypass card is switched to Bypass state.
Permanently on (Green)	The bypass card is jumpered for Forced Inline mode.
Off	The bypass card is switched to Inline state.

9 Link Status (Ready) light (Model 020 only): This green light shows the status of the port (for example, port 2) through which the bypass card is connected to the using-system SSA attachment hardware:

Status of Light	Meaning
Permanently on	The interface through the bypass card is fully operational.
Flashing (two seconds on, two seconds off)	The interface through the bypass card is not operational.
Off	The card is in Bypass state or in Forced Inline mode.

Lights and Power Switch (Models 500 and 600)



1 Power switch (I/O): This switch controls the internal dc power that is supplied to the 7133 by the fan-and-power-supply assemblies. To turn on the dc power on Model 500, press the switch, and hold it pressed for two seconds. To turn on the power on Model 600, press and release the switch.

Repeat the action to turn off the dc power. When the dc power is turned off, mainline power is still present in the fan-and-power-supply assemblies if the 7133 is connected to the mainline-power source.

2 Subsystem Power light (Ⓢ): This green light is on when the power switch has been pressed to turn on the dc voltage, and the dc voltage is present in the 7133.

3 Subsystem Check light (Ⓢ): This amber light comes on if a failure occurs in the 7133 subsystem. The subsystem might be able to continue operating satisfactorily although the failure of a particular part has been detected.

4 Power Card light: This green light is on when electrical power is present on the card. The light is not visible when the front cover is closed.

5 Fan-and-Power Check light: This amber light comes on and stays on if dc output from the power supply part of the fan-and-power-supply assembly fails or is disabled.

If the power supply fails completely, the light is turned on by power from one of the other fan-and-power-supply assemblies in the 7133. The light flashes if the fan fails. It is not visible when the back cover is closed.

6 Power light: This green light is on when mainline electrical power is present in the fan-and-power-supply assembly. It is not visible when the back cover is closed.

7 Link Status (Ready) light (Model 600 only): This green light shows the status of the port (for example, port 1) through which the bypass card is connected to the using-system SSA attachment hardware:

Status of Light	Meaning
Permanently on	The interface through the bypass card is fully operational.
Flashing (two seconds on, two seconds off)	The interface through the bypass card is not operational.
Off	The card is in Bypass state or in Forced Inline mode.

8 Mode light (Model 600 only): This light shows in which mode the bypass card is operating:

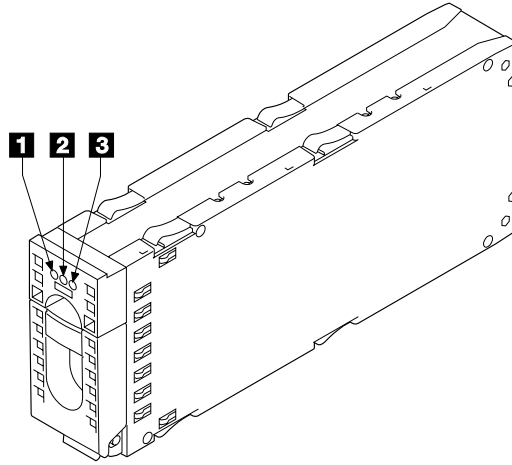
Status of Light	Meaning
Permanently on (Amber)	The bypass card is switched to Bypass state.
Permanently on (Green)	The bypass card is jumpered for Forced Inline mode.
Off	The bypass card is switched to Inline state.

9 Link Status (Ready) light (Model 600 only): This green light shows the status of the port (for example, port 2) through which the bypass card is connected to the using-system SSA attachment hardware:

Status of Light	Meaning
Permanently on	The interface through the bypass card is fully operational.
Flashing (two seconds on, two seconds off)	The interface through the bypass card is not operational.
Off	The card is in Bypass state or in Forced Inline mode.

Disk Drive Module Lights

The disk drive module lights at the front of a 7133 are always visible. The disk drive module lights at the back of Models 010 and 020 are not visible when the back door of the rack is closed; those at the back of a Models 500 and 600 are not visible when the back cover of the 7133 is closed.



1 Power light (⊕): This green light is on when dc voltage is present and inside the specified limits.

2 Ready light (⊔): This green light shows the following conditions:

Status of Light

Meaning

Off

Both SSA links are inactive because one of the following conditions exists:

- The disk drive modules, dummy disk drive modules, or module and using-system SSA attachment hardware that are logically on each side of, and next to, this module are not connected or are missing.
- The disk drive modules or module and using-system SSA attachment hardware that are logically on each side of, and next to, this module are inactive.
- The using-system SSA attachment hardware 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
(two seconds on,
two seconds off)

Only one SSA link is active.

Fast flash
(five times per
second)

The disk drive module is active with a command in progress.

3 Check light (I): This amber light shows the following conditions:

Status of Light	Meaning
Off	Normal operating condition.
Permanently on	One of the following conditions exists: <ul style="list-style-type: none">• 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 goes off when the POSTs are complete. If the light remains on for longer than one 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 7133.
Flashing	The Check light has been set by a service aid to identify the position of a particular disk drive module.

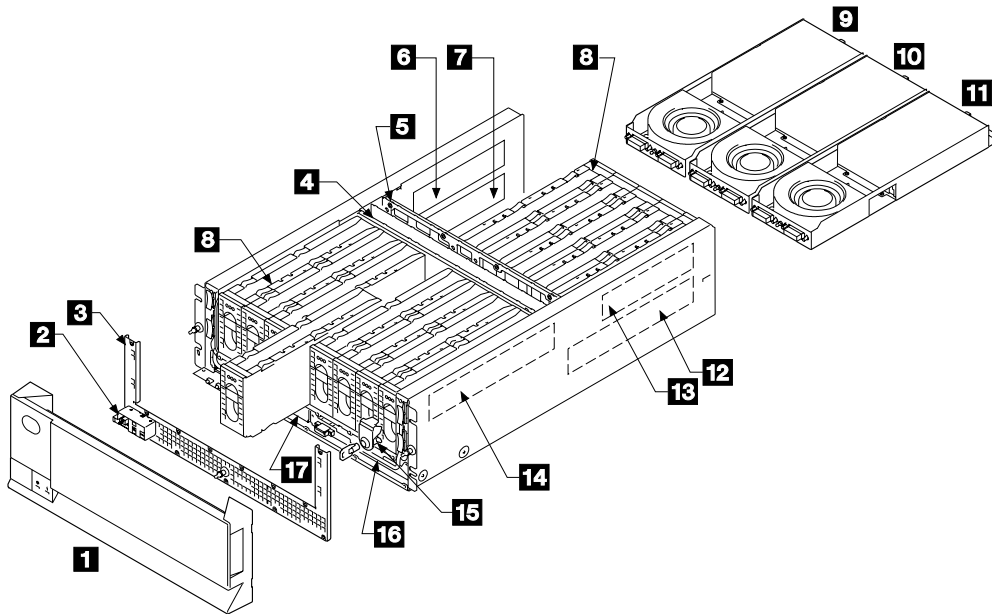
Parts Locations

This section has two subsections; one is for Models 010 and 020, the other is for Models 500 and 600. Go to the appropriate subsection.

Parts Locations (Models 010 and 020)

This subsection shows the locations of various parts of the 7133 Models 010 and 020.

- | | | | |
|----------|--|-----------|--|
| 1 | Front cover (early type shown) | 10 | Fan-and-power-supply asm (position 2) |
| 2 | Control panel assembly | 11 | Fan-and-power-supply asm (position 1) |
| 3 | RFI shield | 12 | Front-signal card, left (Model 010)
Bypass card, lower left (Model 020) |
| 4 | Front backplane assembly | 13 | Back-signal card, left (Model 010)
Bypass card, upper left (Model 020) |
| 5 | Back backplane assembly | 14 | Back-power card (on both sides) |
| 6 | Back-signal card, right (Model 010)
Bypass card, upper right (Model 020) | 15 | Disk drive module lock (optional) |
| 7 | Front-signal card, right (Model 010)
Bypass card, lower right (Model 020) | 16 | Right-hand power-distribution tray asm |
| 8 | Disk drive modules | 17 | Left-hand power-distribution tray asm |
| 9 | Fan-and-power-supply asm (position 3) | | |



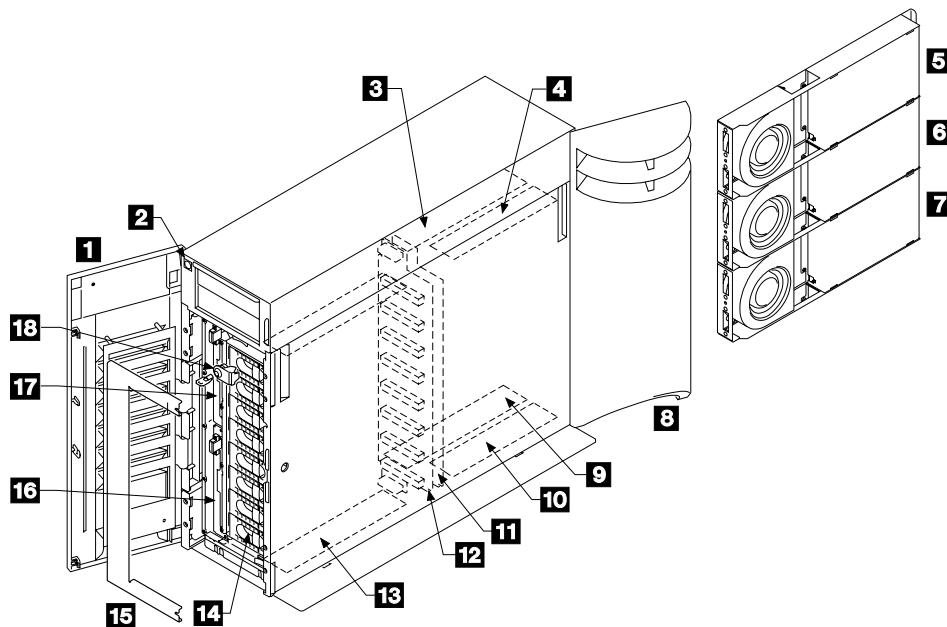
Notes:

1. On Model 010, the number of fan-and-power-supply assemblies that are present is subject to configuration requirements (see "Hardware Configurations" on page 1-12). Model 020 always has three fan-and-power-supply assemblies.
2. The front disk drive modules are numbered 1 through 8 from left to right (viewed from the front of the 7133). The back disk drive modules are numbered 9 through 16 from left to right (viewed from the back of the 7133).

Parts Locations (Models 500 and 600)

This subsection shows the locations of various parts of the 7133 Models 500 and 600.

- | | | | |
|----------|--|-----------|--|
| 1 | Front cover | 10 | Back-signal card, lower (Model 500)
Bypass card, lower left (Model 600) |
| 2 | Control panel assembly | 11 | Back backplane assembly |
| 3 | Front-signal card, upper (Model 500)
Bypass card, upper right (Model 600) | 12 | Front backplane assembly |
| 4 | Back-signal card, upper (Model 500)
Bypass card, upper left (Model 600) | 13 | Back-power card (at top and bottom) |
| 5 | Fan-and-power-supply asm (position 3) | 14 | Disk drive modules |
| 6 | Fan-and-power-supply asm (position 2) | 15 | RFI shield |
| 7 | Fan-and-power-supply asm (position 1) | 16 | Lower power-distribution tray assembly |
| 8 | Back cover | 17 | Upper power-distribution tray assembly |
| 9 | Front-signal card, lower (Model 500)
Bypass card, lower right (Model 600) | 18 | Disk drive module lock (optional) |



Notes:

1. On Model 500, the number of fan-and-power-supply assemblies that are present is subject to configuration requirements (see "Hardware Configurations" on page 1-12). Model 600 always has three fan-and-power-supply assemblies.
2. The front disk drive modules are numbered 1 through 8 from top to bottom. The back disk drive modules are numbered 9 through 16 from bottom to top.

Hardware Configurations

This section shows the relationship between the number of disk drive modules and the number of fan-and-power-supply assemblies that are present in a 7133.

Models 010 and 500

The table in this section shows the possible configurations for Models 010 and 500.

Configuration	Number of Disk Drive Modules	Without Redundant Power and Cooling: Must Have:	With Redundant Power and Cooling: Must Have:
Base	4	Base configuration always has redundant power and cooling.	<ul style="list-style-type: none">• 2 fan-and-power-supply assemblies in positions 3 and 2• Dummy fan-and-power-supply assembly in position 1• Dummy disk drive modules in <i>all</i> slots that do not contain disk drive modules
Expanded	5–8	<ul style="list-style-type: none">• 2 fan-and-power-supply assemblies in positions 3 and 2• Dummy fan-and-power-supply assembly in position 1• Dummy disk drive modules in <i>all</i> slots that do not contain disk drive modules	<ul style="list-style-type: none">• 3 fan-and-power-supply assemblies• Dummy disk drive modules in <i>all</i> slots that do not contain disk drive modules
Maximum	9–16	Maximum configuration always has redundant power and cooling.	<ul style="list-style-type: none">• 3 fan-and-power-supply assemblies• Dummy disk drive modules in <i>all</i> slots that do not contain disk drive modules

Attention: Errors occur if a dummy fan-and-power-supply assembly or a real fan-and-power-supply assembly is not present in position 1.

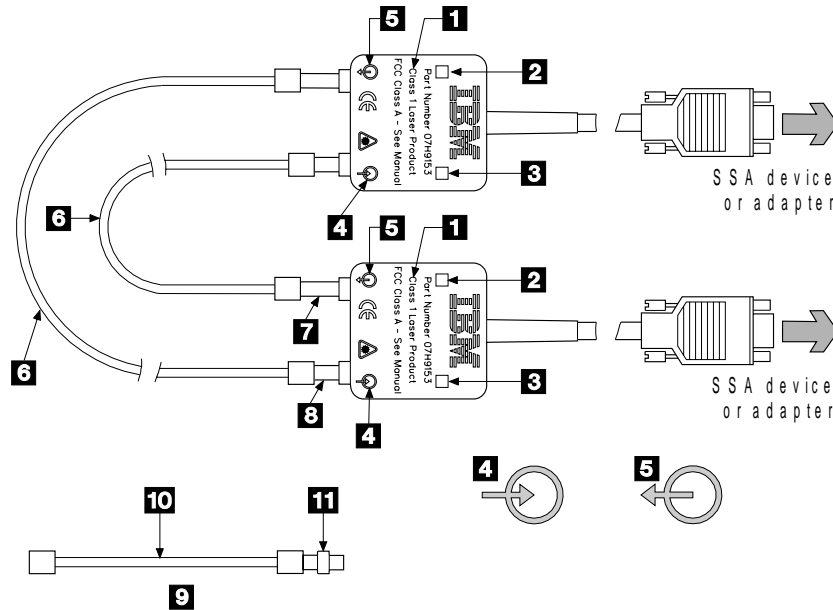
If a 7133 is in base or expanded configuration, and does not need a fan-and-power-supply assembly in position 1, it *must* have a dummy fan-and-power-supply assembly installed at that position. The dummy fan-and-power-supply assembly contains the necessary jumpers to provide power to the redundant power paths of the disk drive modules, and to provide fan status for the missing fan. A dummy fan-and-power-supply assembly can be present only in position 1.

Models 020 and 600

Models 020 and 600 always have three fan-and-power-supply assemblies.

SSA Fibre-Optic Extenders and Fiber Optic Cables

- | | | | |
|----------|----------------------|-----------|---------------------------------|
| 1 | Fibre-Optic Extender | 7 | Bayonet connector (Transmit) |
| 2 | Power light | 8 | Bayonet connector (Receive) |
| 3 | Receive light | 9 | Wrap cable and adapter assembly |
| 4 | Receive symbol | 10 | Fiber optic wrap cable |
| 5 | Transmit symbol | 11 | Fiber optic wrap adapter |
| 6 | Fiber optic cable | | |



The two connectors **7** and **8** are of different lengths. Each fiber optic cable must be connected between the shorter (Receive) connector of one Fibre-Optic Extender and the longer (Transmit) connector of the other Fibre-Optic Extender.

At the Receive connector, the Fibre-Optic Extender receives data *from* a using system or device through the fiber optic cable. At the Transmit connector, the Fibre-Optic Extender sends data *to* a using system or device through the fiber optic cable.

A wrap cable and adapter assembly **9** is provided with each Fibre-Optic Extender. This assembly consists of a fiber optic wrap cable **10** and a fiber optic wrap adapter **11**. The two parts of the assembly are used during diagnostic procedures. The wrap cable connects the connectors of the Fibre-Optic Extender to each other; the fiber optic wrap adapter connects the two fiber optic cables to each other.

Attention:

- Before fiber optic cables are connected, they must be checked to ensure that their end faces are clean.
- When the wrap cable and adapter assembly is not in use, the ends of the wrap cable must be protected as follows:
 - If the wrap cable is 400 mm (15 in.) long, each of its ends is connected to the wrap adapter to make a closed loop.

- If the wrap cable is 150 mm (6 in.) long, one end of the cable is connected to the wrap adapter, and protective covers are placed over each end of the complete wrap cable and adapter assembly.

The wrap cable and adapter assembly must be kept in its plastic bag in a safe place that is as close to the Fibre-Optic Extender as possible. At least one wrap cable and adapter assembly must be kept at each end of the link.

All the connectors for the fiber optic cables are bayonet (push-and-twist) connectors. The installation and repair of fiber optic cables must be done by a fiber optics specialist.

The fiber optic cables must be to specification 62.5/125 with ST-ST connectors.

Fibre-Optic Extender Lights

Power light: This light is on when the +5-volt input is present.

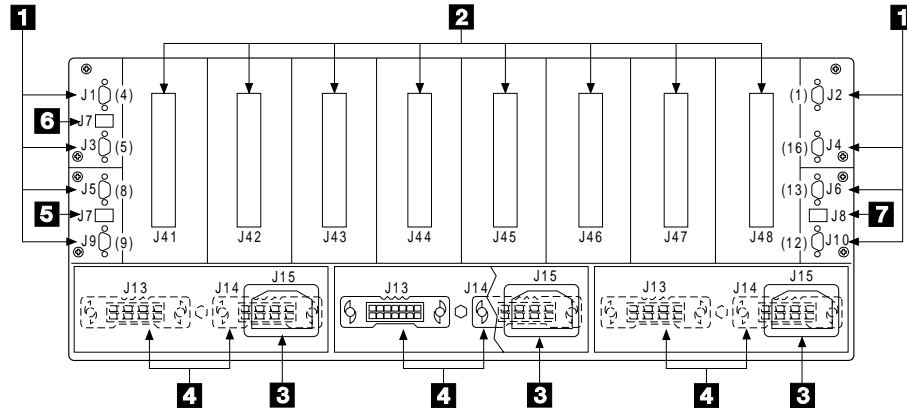
Receive light: This light shows that light is being received at the input connector of the Fibre-Optic Extender. The received light might not be a valid SSA signal.

Connectors

This section shows the locations of all the connectors in the 7133.

Back Connectors (Models 010 and 020)

- | | | | |
|----------|--|----------|---|
| 1 | SSA connectors | 4 | Fan-and-power-supply asm connectors
(behind each assembly) |
| 2 | Disk drive module connectors
(behind the modules) | 5 | Not used |
| 3 | Mainline power connectors | 6 | Not used |
| | | 7 | Not used |



In the diagram, each SSA connector **1** has two identification numbers. The number that is preceded by a J (for example, J1) is used on Model 010; the number that is in parentheses (for example, (4)) is used on Model 020.

On Models 010 and 020, the SSA connectors **1** are related to the disk drive modules as follows:

Table 1-1. Relationship between Strings and Connectors of Models 010 and 020

Model 010 Connectors	Disk Drive Modules	Model 020 Connectors
J1 and J2	Back modules 13 through 16	13 and 16
J3 and J4	Back modules 9 through 12	9 and 12
J5 and J6	Front modules 5 through 8	5 and 8
J9 and J10	Front modules 1 through 4	1 and 4

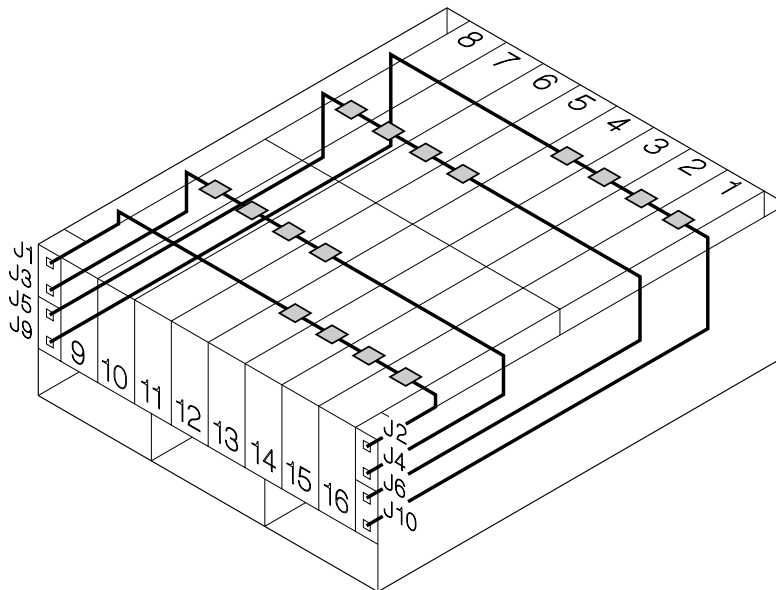
Internal Connections (Models 010 and 020)

Inside the 7133, the disk drive modules are connected in strings of four modules. These strings are connected to the external SSA connectors at the back of the 7133.

The following diagrams show the relationships between the disk drive module strings and the external SSA connectors at the back of the 7133 Model 010 and the 7133 Model 020.

Model 010 Internal Connections

Table 1-1 summarizes the relationship between the disk drive module strings and the external SSA connectors.

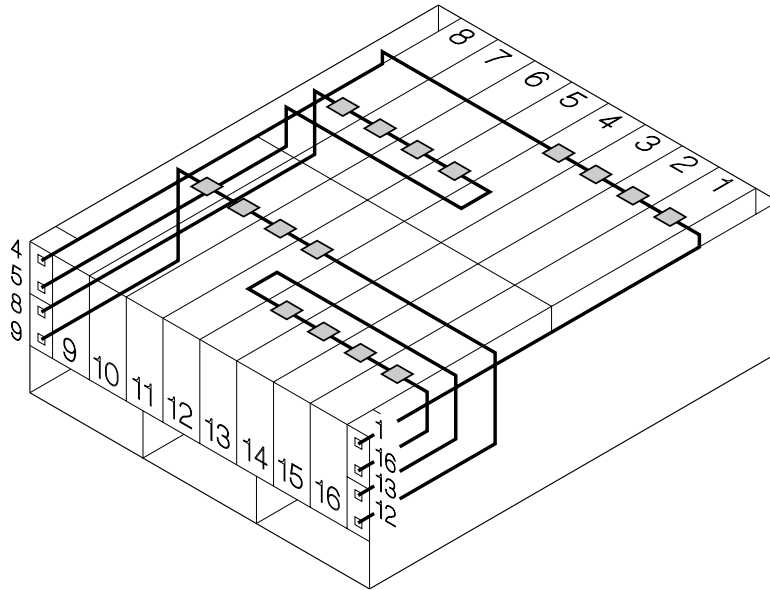


Important: If you are connecting strings of disk drive modules to each other on a Model 010, ensure that you connect the disk drive modules in the correct (numeric) sequence on the loop or loops. For example, if you are connecting disk drive modules 1 through 4 to disk drive modules 5 through 8, connect an SSA cable from connector J9 to connector J6 (see the diagram on this page). That cable connects disk drive module number 4 to disk drive module number 5. Disk drive modules 1 through 8 are now connected in numeric sequence.

The connecting of disk drive modules in the correct sequence is important for the operation and maintenance of the subsystem; it enables operators and service representatives to identify disk drive modules more easily.

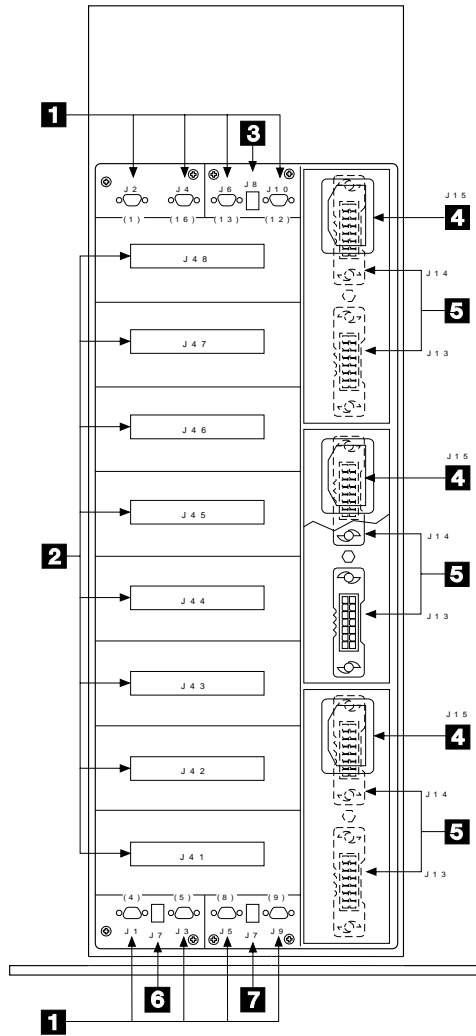
Model 020 Internal Connections

Table 1-1 on page 1-16 summarizes the relationship between the disk drive module strings and the external SSA connectors.



Back Connectors (Models 500 and 600)

- | | |
|--|---|
| <ul style="list-style-type: none"> 1 SSA connectors 2 Disk drive module connectors (behind the modules) 3 Not used | <ul style="list-style-type: none"> 4 Mainline power connectors 5 Fan-and power-supply asm connectors (behind each assembly) 6 Not used 7 Not used |
|--|---|



In the diagram, each SSA connector **1** has two identification numbers. The number that is preceded by a J (for example, J1) is used on Model 500; the number that is in parentheses (for example, (4)) is used on Model 600.

On Models 500 and 600, the SSA connectors **1** are related to the disk drive modules as follows:

Table 1-2. Relationship between Strings and Connectors of Models 500 and 600

Model 500 Connectors	Disk Drive Modules	Model 600 Connectors
J1 and J2	Back modules 13 through 16	13 and 16
J3 and J4	Back modules 9 through 12	9 and 12
J5 and J6	Front modules 5 through 8	5 and 8
J9 and J10	Front modules 1 through 4	1 and 4

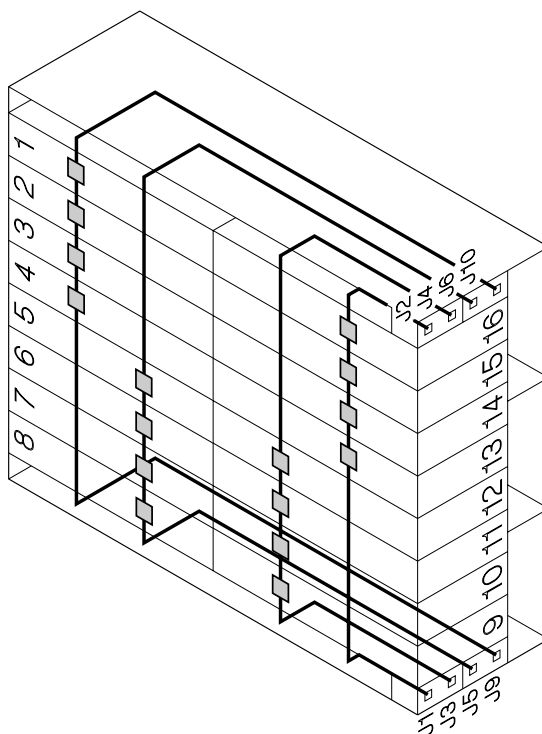
Internal Connections (Models 500 and 600)

Inside the 7133, the disk drive modules are connected in strings of four modules. These strings are connected to the external SSA connectors at the back of the 7133.

The following diagrams show the relationships between the disk drive module strings and the external SSA connectors at the back of the 7133 Model 500 and the 7133 Model 600.

Model 500 Internal Connections

Table 1-2 summarizes the relationship between the disk drive module strings and the external SSA connectors.

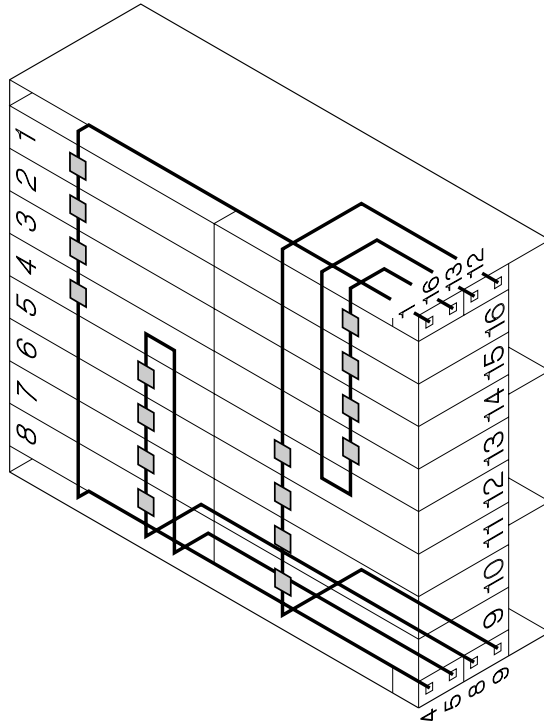


Important: If you are connecting strings of disk drive modules to each other on a Model 500, ensure that you connect the disk drive modules in the correct (numeric) sequence on the loop or loops. For example, if you are connecting disk drive modules 1 through 4 to disk drive modules 5 through 8, connect an SSA cable from connector J9 to connector J6 (see the diagram on this page). That cable connects disk drive module number 4 to disk drive module number 5. Disk drive modules 1 through 8 are now connected in numeric sequence.

The connecting of disk drive modules in the correct sequence is important for the operation and maintenance of the subsystem; it enables operators and service representatives to identify disk drive modules more easily.

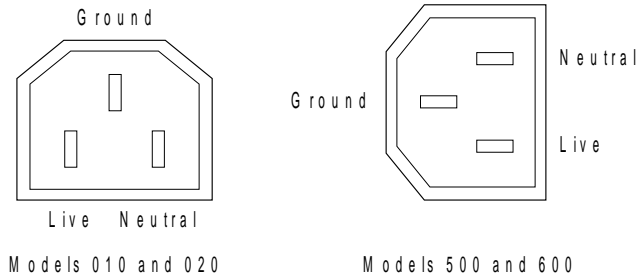
Model 600 Internal Connections

Table 1-2 on page 1-19 summarizes the relationship between the disk drive module strings and the external SSA connectors.



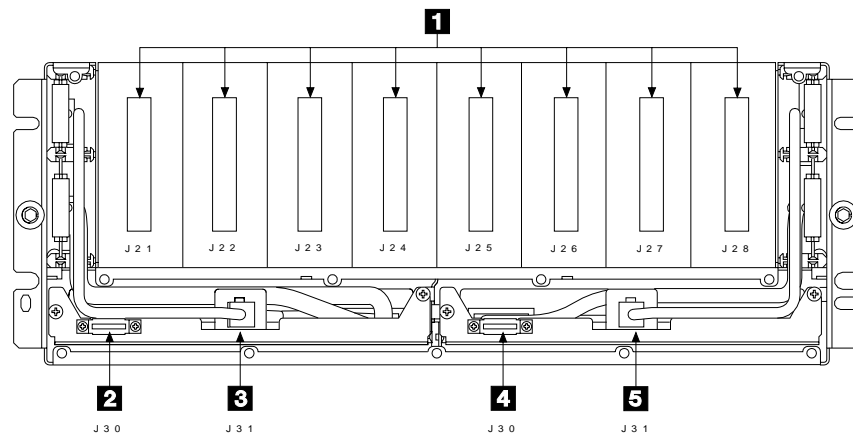
Mainline-Power Connector (220 V ac and 300 V dc)

This type of connector is on each 220 V fan-and-power-supply assembly. It permits the 7133 to be connected to a 220 V ac or a 300 V dc power source.



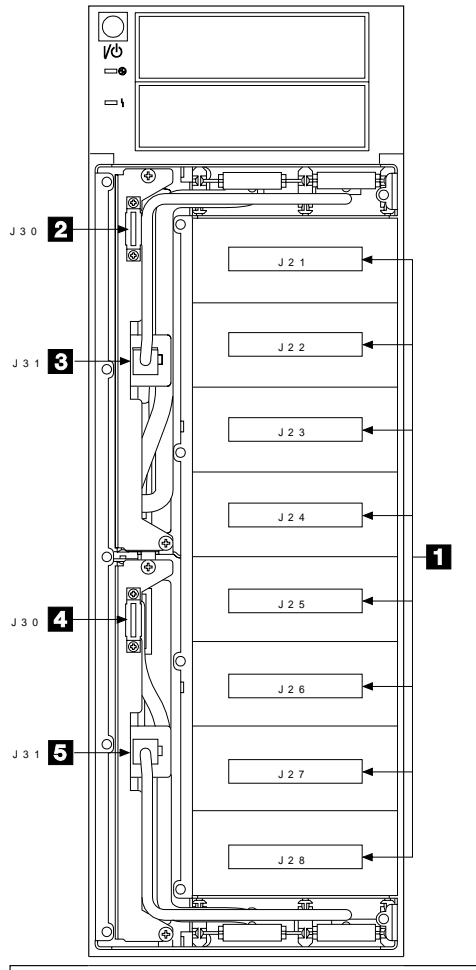
Front Connectors (Models 010 and 020)

- 1** Disk drive module connectors (behind the modules)
- 2** Control panel assembly connector
- 3** Back-power card connector (left-hand)
- 4** Not used
- 5** Back-power card connector (right-hand)

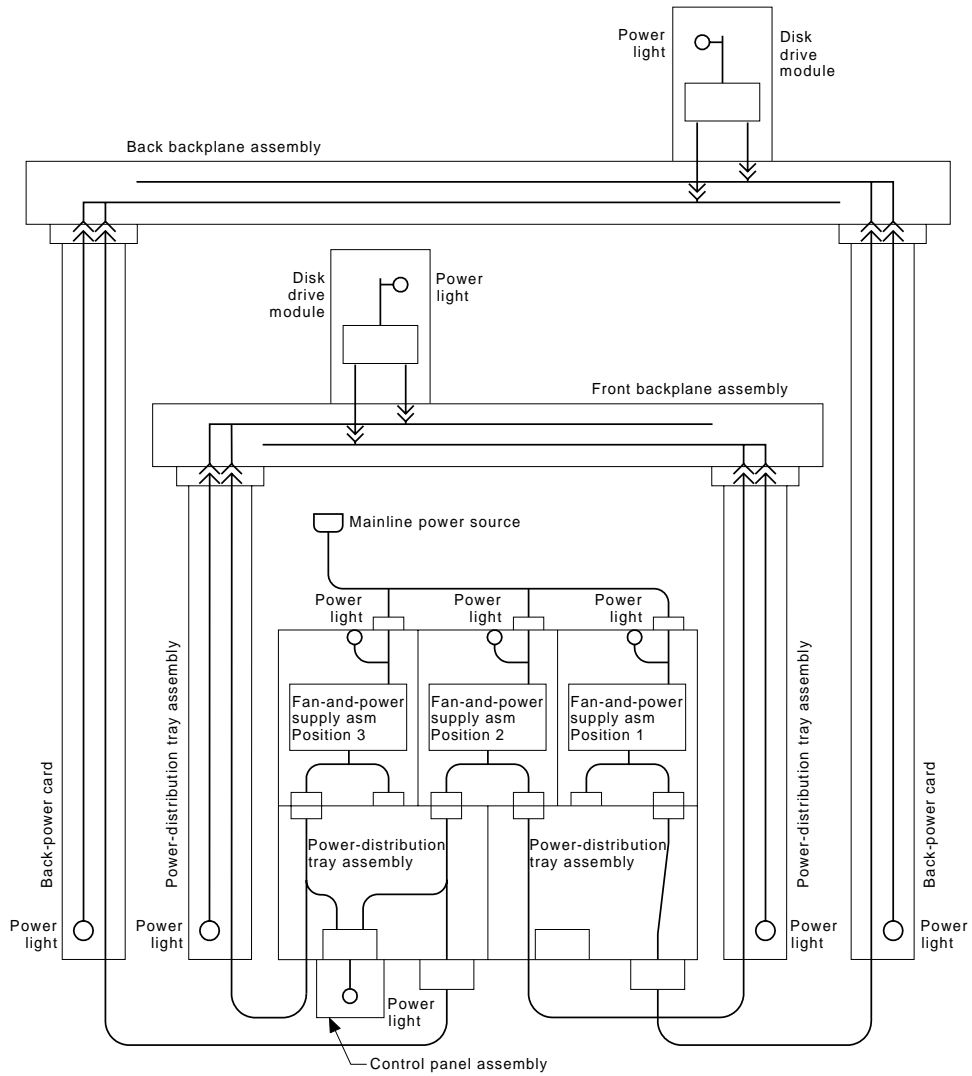


Front Connectors (Models 500 and 600)

- 1** Disk drive module connectors (behind the modules)
- 2** Control panel assembly connector
- 3** Back-power card connector (upper)
- 4** Not used
- 5** Back-power card connector (lower)



Power Distribution Schematic

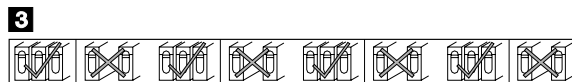
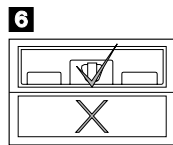
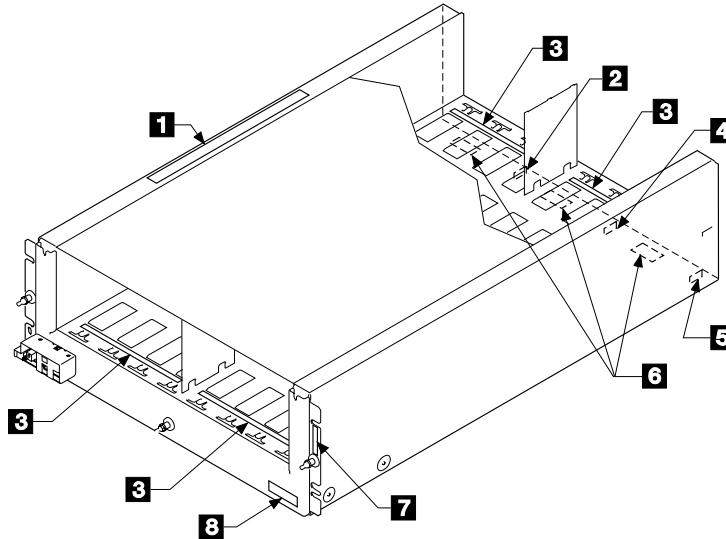


Labels

This section shows all the labels that are attached to the 7133 during manufacture.

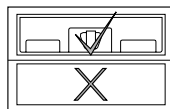
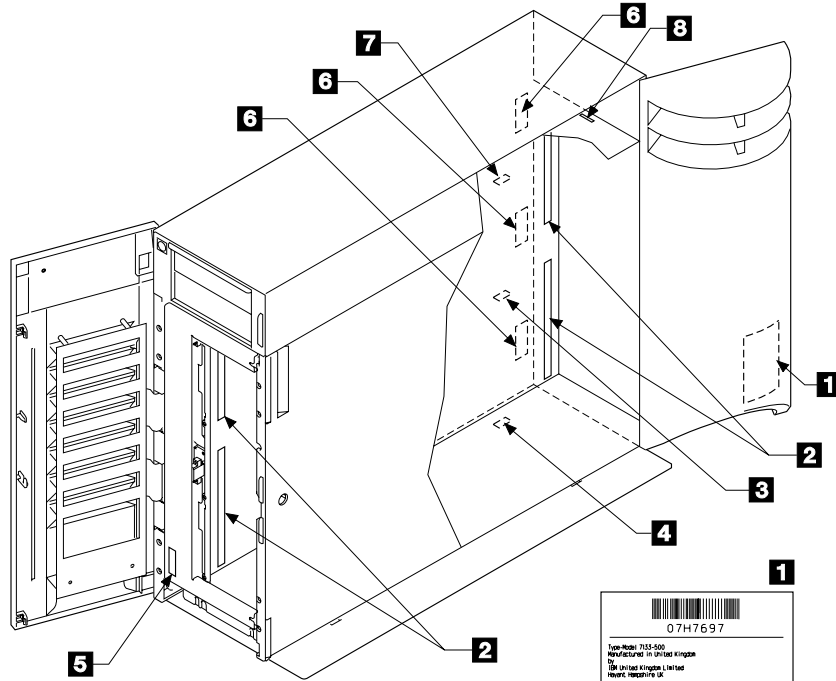
Labels (Models 010 and 020)

- | | | | |
|----------|--|----------|--------------------------------------|
| 1 | Weight-warning and product-information label | 5 | Fan 1 label |
| 2 | Fan 3 label | 6 | Empty-position (fan) warning label |
| 3 | Empty-slot (disk) warning label | 7 | 7133 serial number label |
| 4 | Fan 2 label | 8 | Machine-type and serial number label |

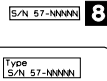


Labels (Models 500 and 600)

- 1** Weight-warning and product-information label
- 2** Empty-slot (disk) warning label
- 3** Fan 2 label
- 4** Fan 1 label
- 5** Machine-type and serial number label
- 6** Empty-position (fan) warning label
- 7** Fan 3 label
- 8** 7133 serial number label



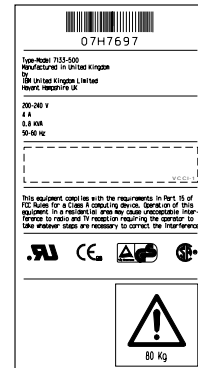
6



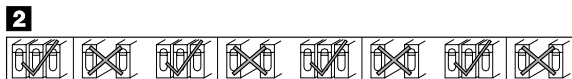
5



4
3
7



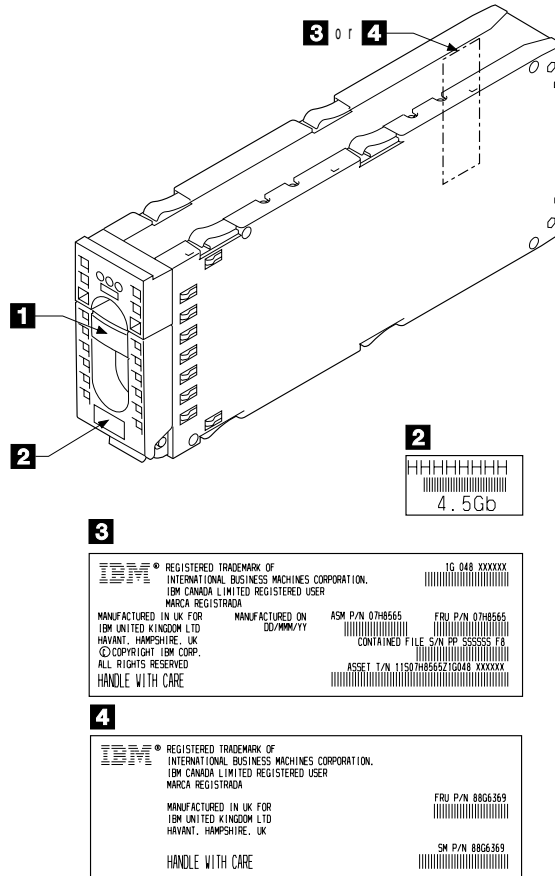
1



2

Labels (Disk Drive Modules and Dummy Disk Drive Modules)

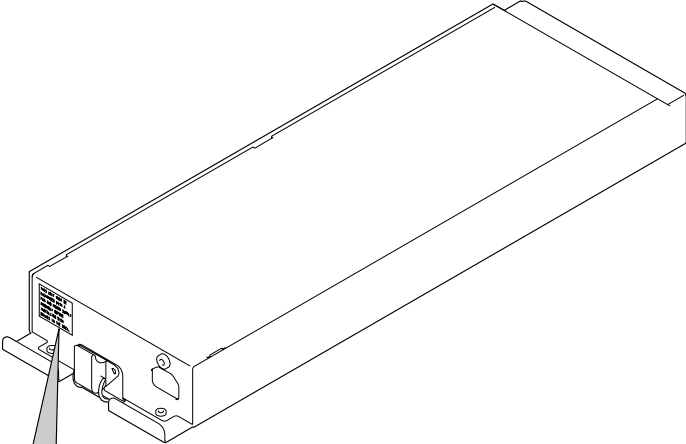
- 1** Red panel (see Note 1)
- 2** Serial number (see Note 2)
- 3** Product-information (disk drive module)
- 4** Product-information (dummy disk drive module)



Notes:

1. Only disk drive modules and dummy disk drive modules that have a **red** panel can be used in a 7133.
2. Dummy disk drive modules do not have a serial-number label.

Labels (Dummy Fan-and-Power-Supply Assembly)



THIS UNIT MUST BE EXCHANGED WITH A FAN AND POWER SUPPLY ASSEMBLY BEFORE INSTALLING DISK DRIVES IN THE BACK.

Product Characteristics

Dimensions and Weight (Models 010 and 020)

Height	Width	Depth	Approximate Minimum Weight	Approximate Maximum Weight
171 mm (6.7 in.)	444 mm (17.5 in.)	665 mm (26.2 in.)	36.0 kg (79 lb)	50.0 kg (110 lb)

Note: The maximum and minimum weights of the 7133 Models 010 and 020 vary with configuration. The three main configurations and their approximate weights are shown in the following table.

Configuration	Quantities			Approximate Minimum Weight	Approximate Maximum Weight
	Fan-and-Power-Supply Assemblies	Dummy Fan-and-Power-Supply Assemblies	Disk Drive Modules		
Base (Model 010)	2	1	4	36.0 kg (79 lb)	37.5 kg (83 lb)
Base (Model 020)	3	–	4	36.0 kg (79 lb)	37.5 kg (83 lb)
Expanded (Model 010)	2–3	0–1	5–8	37.0 kg (81 lb)	43.0 kg (95 lb)
Expanded (Model 020)	3	–	5–8	37.0 kg (81 lb)	43.0 kg (95 lb)
Maximum (Model 010)	3	0	9–16	44.0 kg (96 lb)	50.0 kg (110 lb)
Maximum (Model 020)	3	–	9–16	44.0 kg (96 lb)	50.0 kg (110 lb)

Dimensions and Weight (Models 500 and 600)

Height	Width	Depth	Approximate Minimum Weight	Approximate Maximum Weight
610 mm (24 in.)	210 mm (8.3 in.)	820 mm (32.3 in.)	58.5 kg (129 lb)	72.5 kg (160 lb)

Note: The maximum and minimum weights of the 7133 Models 500 and 600 vary with configuration. The three main configurations and their approximate weights are shown in the following table.

Configuration	Quantities			Approximate Minimum Weight	Approximate Maximum Weight
	Fan-and-Power-Supply Assemblies	Dummy Fan-and-Power-Supply Assemblies	Disk Drive Modules		
Base (Model 500)	2	1	4	58.5 kg (129 lb)	60.0 kg (132 lb)
Base (Model 600)	3	–	4	58.5 kg (129 lb)	60.0 kg (132 lb)
Expanded (Model 500)	2–3	0–1	5–8	59.5 kg (131 lb)	65.0 kg (143 lb)
Expanded (Model 600)	3	–	5–8	59.5 kg (131 lb)	65.0 kg (143 lb)
Maximum (Model 500)	3	0	9–16	66.5 kg (146 lb)	72.5 kg (160 lb)
Maximum (Model 600)	3	–	9–16	66.5 kg (146 lb)	72.5 kg (160 lb)

AC and DC Input-Voltage Requirements

Fan-and-Power-Supply Assembly Type	Voltage	Frequency
220 V	90 to 260 V ac or 240 to 375 V dc	47 to 64 Hz –

Environment (Models 010 and 020)

Air Temperature

Operating Environment	Nonoperating Environment	Storing Environment	Shipping Environment
10°C to 40°C (50°F to 104°F)	10°C to 52°C (50°F to 125°F)	1°C to 60°C (34°F to 140°F)	–40°C to 60°C (–40°F to 140°F)

Relative Humidity

Operating Environment	Nonoperating Environment	Storing Environment	Shipping Environment
8% to 80% noncondensing	8% to 80% noncondensing	5% to 80% noncondensing	5% to 100% condensing but not precipitating

Maximum Wet Bulb

Operating Environment	Nonoperating Environment	Storing Environment	Shipping Environment
27°C (80°F)	27°C (80°F)	29°C (84°F)	29°C (84°F)

Notes:

- Each 7133 rack-mounted unit requires an airflow of 2.46 cubic meters per minute (87 cubic feet per minute). When racks containing many 7133 units are to be installed together, the following requirements must be met to ensure that the 7133 units are adequately cooled:
 - The airflow enters at the front of the rack and leaves at the back. To prevent the air that is leaving the rack from entering the intake of another piece of equipment, racks should be positioned in alternate rows, back-to-back and front-to-front.
 - The front of racks should be positioned on floor-tile seams, with a full line of perforated tiles immediately in front of the racks. Each perforated tile should have an air flow of at least 11.34 cubic meters per minute (400 cubic feet per minute). The underfloor temperature must be at most 15°C (60°F).
 - Where racks are in rows front-to-front or back-to-back, a gap of at least 1220 mm (48 in) should exist between the rows.
 - To ensure proper air flow within each rack, the rack filler plates must be installed in unused positions. Also, all the gaps in the front of the racks must be sealed, including the gaps between the 7133 units.

2. The recommended operating temperature is 22°C (72°F) or lower. At lower temperatures, the risk of failure in the unit is reduced. If the operating temperature is above 22°C (72°F) for long periods of time, the unit is exposed to a greater risk of failure from external causes.

Environment (Models 500 and 600)

Air Temperature

Operating Environment	Nonoperating Environment	Storing Environment	Shipping Environment
16°C to 32°C (61°F to 90°F)	10°C to 43°C (50°F to 109°F)	1°C to 60°C (34°F to 140°F)	-40°C to 60°C (-40°F to 140°F)

Relative Humidity

Operating Environment	Nonoperating Environment	Storing Environment	Shipping Environment
8% to 80% noncondensing	8% to 80% noncondensing	5% to 80% noncondensing	5% to 100% condensing but not precipitating

Maximum Wet Bulb

Operating Environment	Nonoperating Environment	Storing Environment	Shipping Environment
23°C (73°F)	27°C (80°F)	29°C (84°F)	29°C (84°F)

Altitude from Sea Level

Operating Environment	Nonoperating Environment	Storing Environment	Shipping Environment
0 to 2133 m (0 to 7000 ft)	-305 to 12 192 m (-1000 to 40 000 ft)	-305 to 12 192 m (-1000 to 40 000 ft)	-305 to 12 192 m (-1000 to 40 000 ft)

Heat Output (Maximum)

Base configuration	140 watts (478 Btu per hour)
Expanded configuration	275 watts (938 Btu per hour)
Maximum configuration	480 watts (1638 Btu per hour)

Capacities of Disk Drive Modules

The capacities that are given here for the different types of disk drive module apply when data is stored in 512-byte logical blocks.

Disk Drive Module Type	Actual Formatted Capacity
1.1 GB	1 126 337 536 bytes
2.2 GB	2 255 098 368 bytes
4.5 GB	4 512 701 440 bytes
9.1 GB	9 100 191 744 bytes

Power Sequencing

All the disk drive modules start their power sequence when the input voltage is inside the specified limits. Their motors are started under control of the adapters in the using system. To prevent the need for excessive electrical current, the disk drive module motors are not all started together. A maximum of four motors in the front of the 7133 and four motors in the back of the 7133 can be started together. At least 10 seconds must elapse before the next group of motors is started. Normally, all the disk drive module motors are running in less than 30 seconds from the time when the 7133 is turned on.

Disk Drive Acclimation

If you bring a disk drive module into the operating environment from an environment where the temperature is outside the specified operating range (see “Environment (Models 010 and 020)” or “Environment (Models 500 and 600)” on page 1-31), allow the disk drive module time to acclimate to the operating environment. Remove the disk drive module from any shipping packaging, but leave it in its sealed plastic bag (if present) to prevent condensation forming.

SSA Signal Cards (Models 010 and 500)

The four signal cards that are at the back of the 7133 Models 010 and 500 provide the connections between the external SSA cables and the disk drive module strings. Each signal card has two external SSA connectors. Through these connectors, the signal cards and, therefore, the disk drive module strings, can be connected to each other or to the using system.

SSA Bypass Cards (Models 020 and 600)

The four bypass cards that are at the back of the 7133 Models 020 and 600 provide the connections between the external SSA cables and the disk drive module strings. Each bypass card has two external SSA connectors. Through these connectors, the bypass cards and, therefore, the disk drive module strings, can be connected to each other or to the using system.

The bypass cards can operate in Bypass mode or in Forced Inline mode. The mode can be changed by swapping the positions of the jumpers (see "Bypass Card Jumpers" on page 1-35).

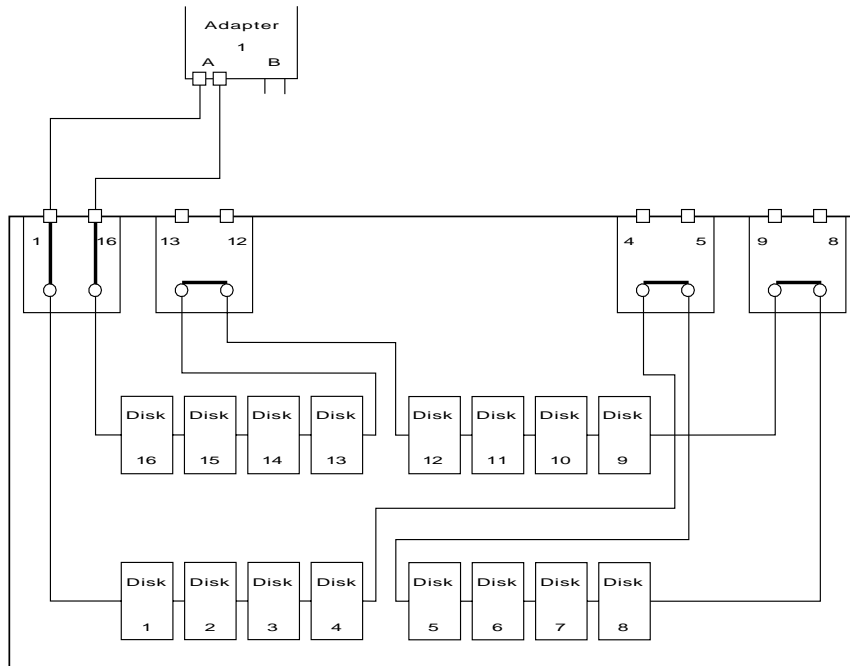
Note: The cards need not all be in the same mode.

Bypass Mode

When a bypass card is jumpered to operate in Bypass mode, it monitors both of its external connectors. If it detects that one of its connectors is connected to powered-on using-system SSA attachment hardware, it switches to *Inline state*; that is, it connects the internal SSA links to the external connector.

If the bypass card detects that neither of its connectors is connected to powered-on using-system SSA attachment hardware, it switches into *Bypass state*; that is, it connects the internal strings together, and disconnects them from the external connectors. Therefore, when a 7133 that has all its bypass cards jumpered for Bypass mode is not connected externally, all 16 disk drive module slots are connected in one internal SSA loop.

The following diagram shows a string of 16 disk drive modules in a 7133 Model 020 or 600. No external cables are needed to connect the internal parts of the loop.



Forced Inline Mode

When a bypass card is jumpered to operate in Forced Inline mode, it behaves as a signal card of Models 010 and 500; that is, none of its electronic switching circuits are in use. When a bypass card is in Forced Inline mode, its Mode light is green, and its two Interface Ready lights are off.

Forced Inline mode is used to disable the switching ability of selected bypass cards in particular types of subsystem configuration. The types of configuration that might require Forced Inline mode are those in which:

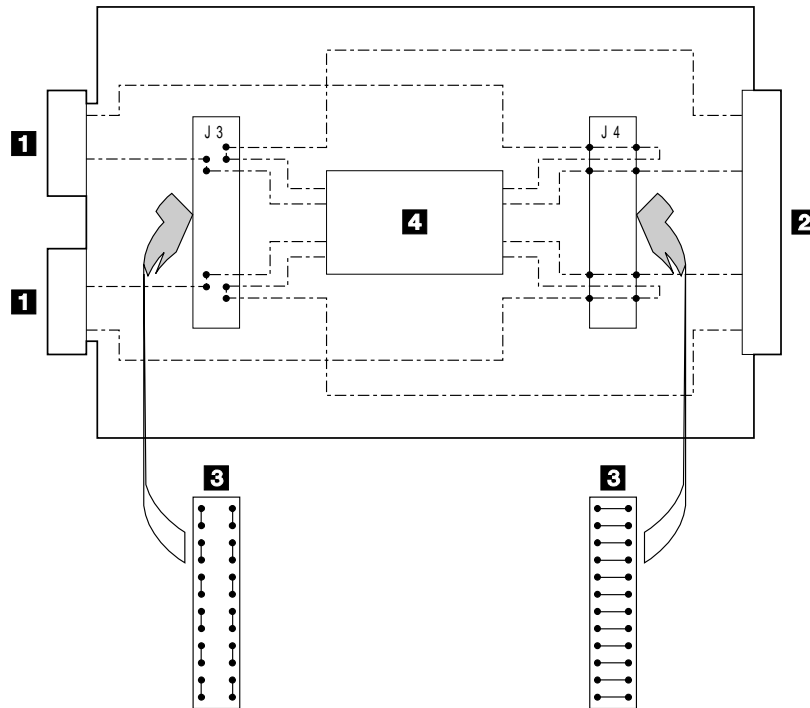
- Two Model 020 or Model 600 7133s are connected to each other. In this type of configuration, Forced Inline mode removes the risk that a fault condition might break the connection between the two 7133s.
- The disk drive modules in one 7133 Model 020 or Model 600 are not all connected to the same SSA loop. In this type of configuration, Forced Inline mode removes the risk that a fault condition might cause the disk drive modules of different loops to be connected to each other.

Bypass Card Jumpers

The mode in which the bypass card operates is set by two jumpers. One jumper has links between neighboring pins across its width; the other jumper has links between neighboring pins along its length. The default setting is for Bypass mode. The mode can be changed by swapping the positions of the jumpers. For instructions on how to remove a bypass card and change its mode, see “Signal Cards and Bypass Cards” on page 3-33.

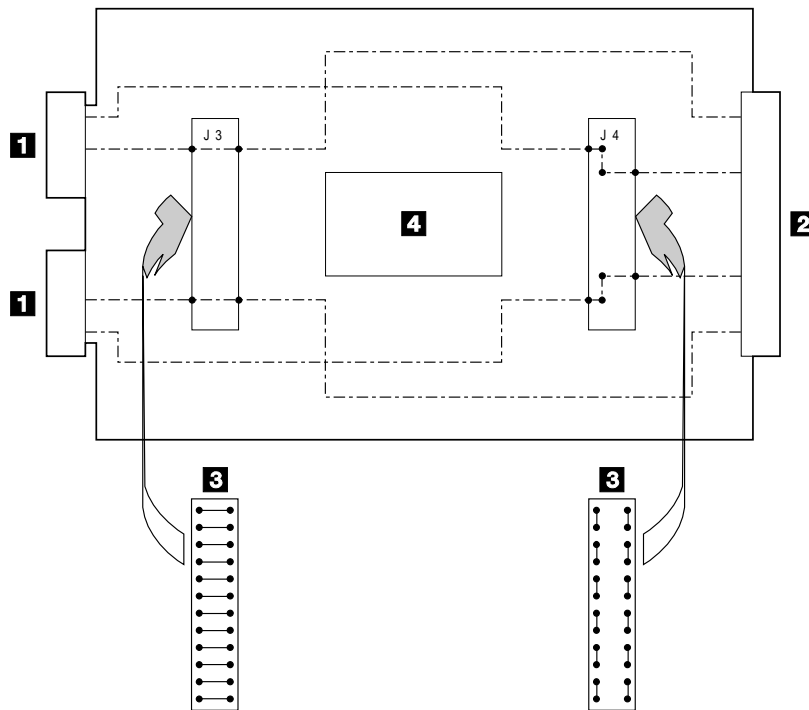
Jumpers Set for Bypass Mode

- | | | | |
|----------|----------------------|----------|-----------------|
| 1 | SSA connectors | 3 | Jumpers |
| 2 | Backplane connectors | 4 | Bypass circuits |



Jumpers Set for Forced Inline Mode

- 1** SSA connectors
- 2** Backplane connectors
- 3** Jumpers
- 4** Bypass circuits



SSA Subsystem Configurations

The diagrams in this section show some sample configurations for the 7133 Models 010 and 500, and for the 7133 Models 020 and 600. All the configurations that are shown here are the **simplest** and provide the best ease of use. If performance or availability are particularly important to the customer, however, **more complex cabling might provide a better solution**; consult your marketing representative for more details.

Rules for SSA Loops

Each type of using-system SSA attachment hardware might have its own rules for SSA loops. For further information, see the manuals for the attachment hardware.

SSA loops that include disk drives that are installed in a 7133 must also follow these additional rules:

- A maximum of three dummy disk drive modules can be connected to each other in a particular SSA loop.
- The maximum permitted length for an external SSA cable that connects two SSA nodes (for example, disk drives) is 25 meters (82 feet).
- The maximum permitted length for a fiber optic cable that connects two SSA nodes (for example, disk drives) is 2.4 kilometers (7874 feet).

SSA Cables

Table 1-3 shows the part numbers of the cables that are shown in the sample configurations.

Item	Part	Description
1	–	Using-system SSA attachment hardware For information about the SSA attachment hardware, see the manuals for that hardware.
2	07H8985 32H1465 88G6404 32H1466 88G6406	External SSA copper cable, 1.0 m (3.3 ft) External SSA copper cable, 2.5 m (8.2 ft) External SSA copper cable, 5.0 m (16.4 ft) External SSA copper cable, 10 m (32.8 ft) External SSA copper cable, 25 m (82.0 ft)
3	31H7960 07H8985 32H1465 88G6404	(See also Notes 2 and 3.) External SSA copper cable, 0.6 m (2.0 ft) External SSA copper cable, 1.0 m (3.3 ft) External SSA copper cable, 2.5 m (8.2 ft) External SSA copper cable, 5.0 m (16.4 ft)
4	07H9163	External SSA copper cable, 0.18 m (0.6 ft)

Notes:

1. If the 7133 has the SSA Fibre-Optic Extender feature, fiber optic cables can be used instead of the standard SSA copper cables.
2. For **Model 010**, do not use an 0.6-meter cable between connectors on the same 7133 (items **3** in the cable configuration diagrams), because it obstructs the removal and replacement of disk drive modules or fan-and-power-supply assemblies at the back of the 7133. (The 0.6-meter cable is for Model 500 only.)
3. For **Model 500**, always use an 0.6-meter cable between connectors on the same 7133 (items **3** in the cable configuration diagrams). The back of a Model 500 does not have enough space to house longer cables. Longer cables can obstruct the removal and replacement of the disk drive modules.

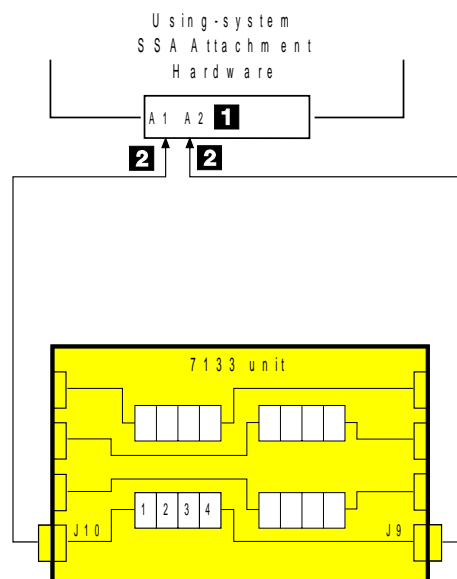
Cable Configurations for Models 010 and 500

In the diagrams, the SSA connectors are numbered. These connector numbers match those shown in “Model 010 Internal Connections” on page 1-16 and “Model 500 Internal Connections” on page 1-19.

Simplest Configuration for Models 010 and 500

A 7133 Model 010 or Model 500 that is in base configuration includes four disk drive modules. These modules are installed in the left-hand four slots at the front of the 7133. The other 12 disk drive slots contain dummy disk drive modules. The disk drive modules are linked in groups of four. Each group of four modules is linked to two external SSA connectors.

In the simplest configuration, the SSA loop is completed by connecting these two SSA connectors to the using-system SSA attachment hardware:



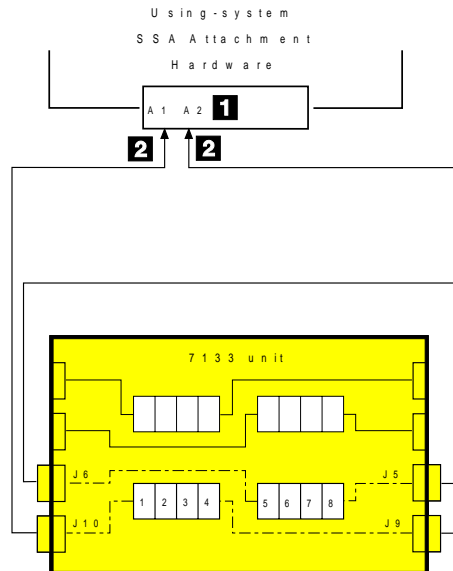
When a Model 010 or Model 500 is in this configuration, the two fan-and-power supply assemblies in the 7133 provide redundant power and cooling to the disk drive modules.

The cables are described in “SSA Cables” on page 1-38. The internal connections of Model 010 are shown in “Model 010 Internal Connections” on page 1-16; those of Model 500 are shown in “Model 500 Internal Connections” on page 1-19.

For information about the rules for SSA loops, see the “Rules for SSA Loops” on page 1-37.

Larger Configurations for Models 010 and 500

Four more disk drive modules can be added to the base configuration in one loop:



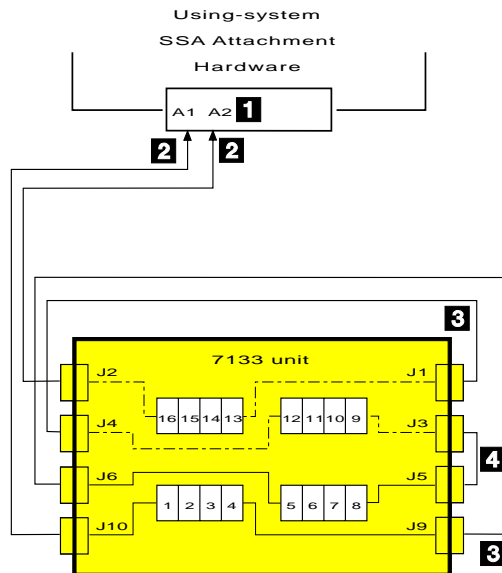
For this, and all larger configurations of Models 010 and 500, three fan-and-power supply assemblies must be present in the 7133 if redundant power and cooling for all the disk drive modules is required.

The cables are described in "SSA Cables" on page 1-38. The internal connections of Model 010 are shown in "Model 010 Internal Connections" on page 1-16; those of Model 500 are shown in "Model 500 Internal Connections" on page 1-19.

For information about the rules for SSA loops, see the "Rules for SSA Loops" on page 1-37.

Largest Configurations with One 7133 for Models 010 and 500

All 16 disk drive modules in a full 7133 can be connected in one loop:



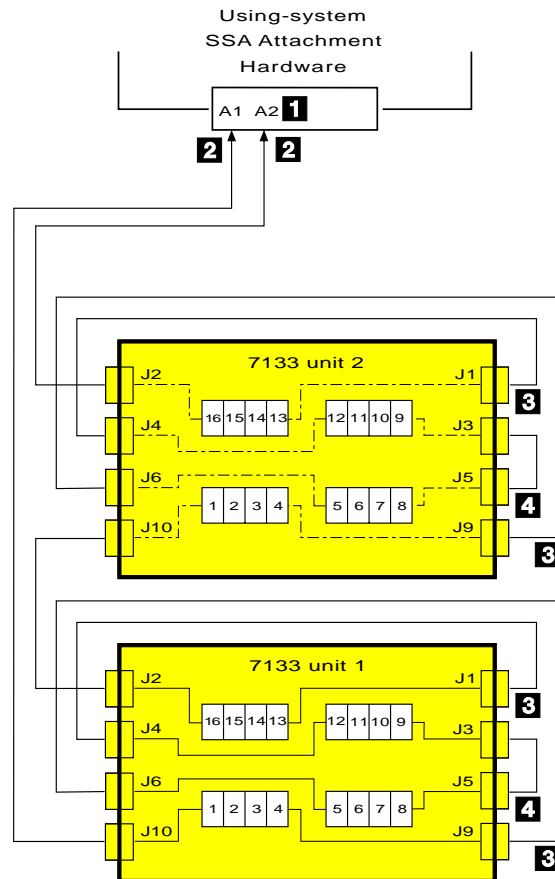
For this configuration, three fan-and-power supply assemblies must be present in the 7133.

The cables are described in "SSA Cables" on page 1-38. The internal connections of Model 010 are shown in "Model 010 Internal Connections" on page 1-16; those of Model 500 are shown in "Model 500 Internal Connections" on page 1-19.

For information about the rules for SSA loops, see the "Rules for SSA Loops" on page 1-37.

Multiple-Unit Configurations for Models 010 and 500

An SSA subsystem can include disk drive modules that are installed in more than one 7133:

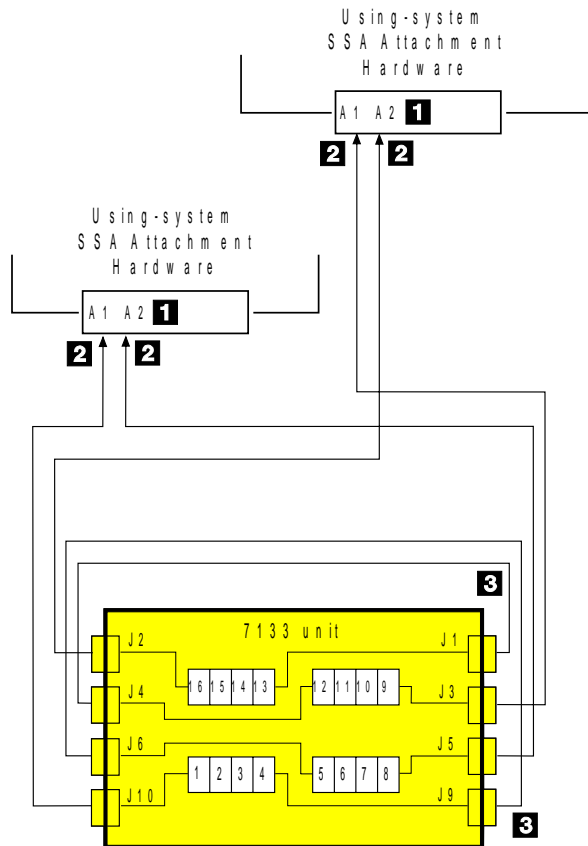


The cables are described in “SSA Cables” on page 1-38. The internal connections of Model 010 are shown in “Model 010 Internal Connections” on page 1-16; those of Model 500 are shown in “Model 500 Internal Connections” on page 1-19.

For information about the rules for SSA loops, see the “Rules for SSA Loops” on page 1-37.

Multiple Subsystems for Models 010 and 500

One 7133 can contain the disk drive modules for more than one logical subsystem. The example shows disk drive modules 1 through 8 connected to the using-system SSA attachment hardware for a particular logical subsystem, and disk drives modules 9 through 16 connected to the using-system SSA attachment hardware for a different logical subsystem:



Cable Configurations for Models 020 and 600

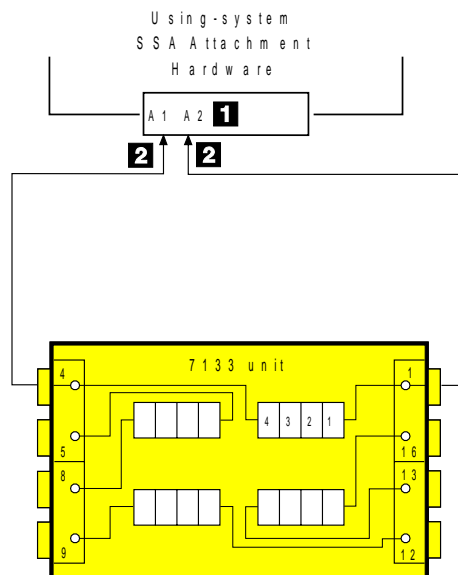
In the diagrams, the SSA connectors are numbered. These connector numbers match those shown in “Model 020 Internal Connections” on page 1-17 and “Model 600 Internal Connections” on page 1-20.

For information about the rules for SSA loops, see the “Rules for SSA Loops” on page 1-37.

Simplest Configuration for Models 020 and 600

A 7133 Model 020 or Model 600 that is in base configuration includes four disk drive modules. These modules are installed in the left-hand four slots at the front of the 7133. The other 12 disk drive slots contain dummy disk drive modules. The disk drive modules are linked in groups of four. Each group of four modules is linked to two external SSA connectors.

The SSA loop is completed by connecting these two SSA connectors to the using-system SSA attachment hardware:



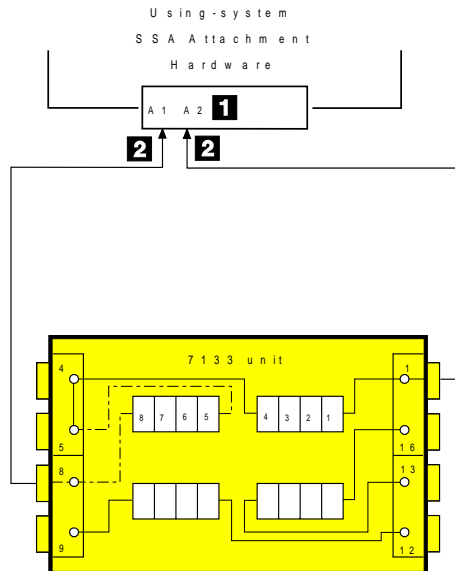
All Models 020 and 600 have three fan-and-power supply assemblies, which provide redundant power and cooling to all the disk drive modules.

The cables are described in “SSA Cables” on page 1-38. The internal connections of Model 020 are shown in “Model 020 Internal Connections” on page 1-17; those of Model 600 are shown in “Model 600 Internal Connections” on page 1-20.

For information about the rules for SSA loops, see the “Rules for SSA Loops” on page 1-37.

Larger Configurations for Models 020 and 600

Four more disk drive modules can be added to the base configuration in one loop:



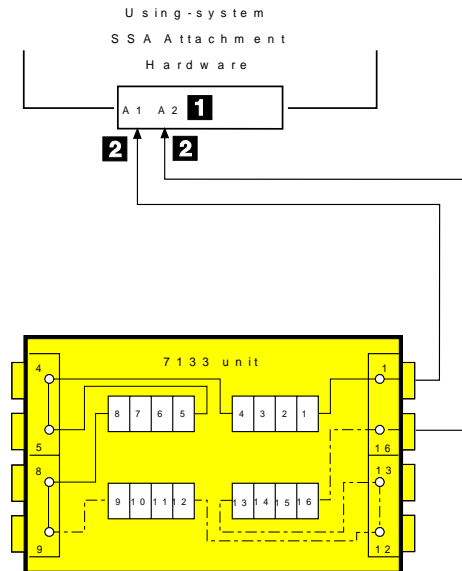
All Models 020 and 600 have three fan-and-power supply assemblies, which provide redundant power and cooling to all the disk drive modules.

The cables are described in "SSA Cables" on page 1-38. The internal connections of Model 020 are shown in "Model 020 Internal Connections" on page 1-17; those of Model 600 are shown in "Model 600 Internal Connections" on page 1-20.

For information about the rules for SSA loops, see the "Rules for SSA Loops" on page 1-37.

Largest Configurations with One 7133 for Models 020 and 600

All 16 disk drive modules in a full 7133 can be connected in one loop:



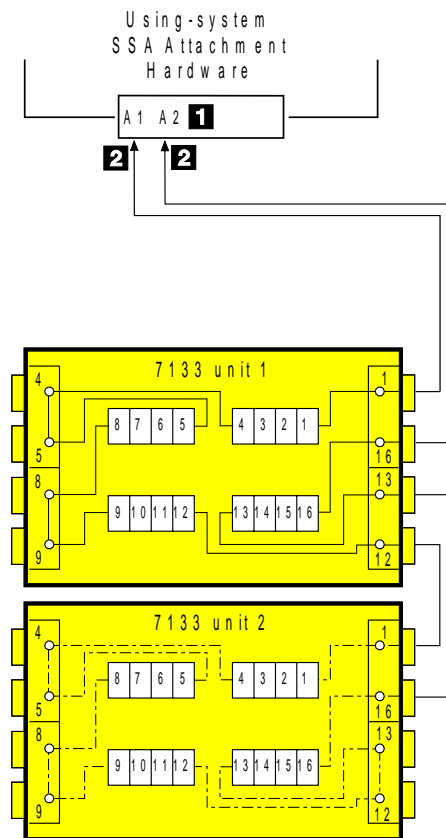
All Models 020 and 600 have three fan-and-power supply assemblies, which provide redundant power and cooling to all the disk drive modules.

The cables are described in "SSA Cables" on page 1-38. The internal connections of Model 020 are shown in "Model 020 Internal Connections" on page 1-17; those of Model 600 are shown in "Model 600 Internal Connections" on page 1-20.

For information about the rules for SSA loops, see the "Rules for SSA Loops" on page 1-37.

Multiple-Unit Configurations for Models 020 and 600

An SSA subsystem can include disk drive modules that are installed in more than one 7133:

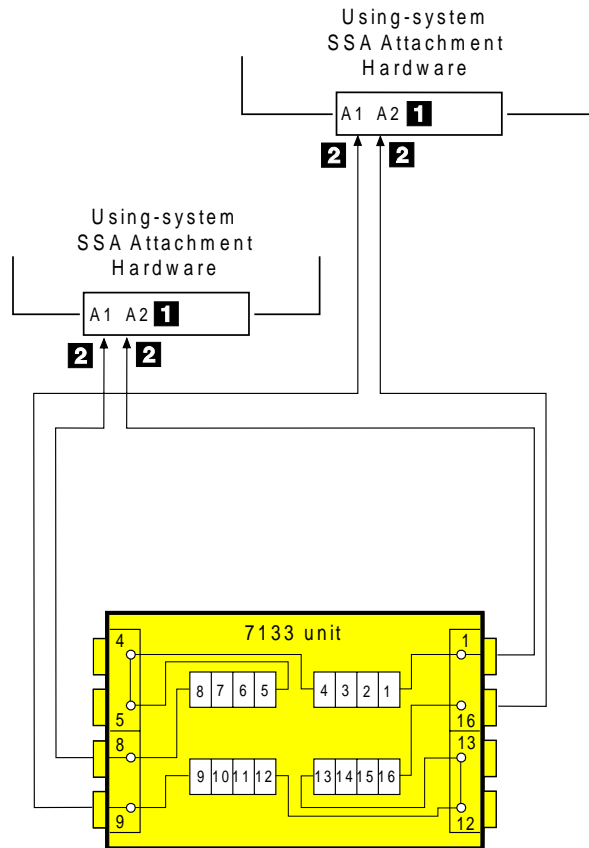


The cables are described in "SSA Cables" on page 1-38. The internal connections of Model 020 are shown in "Model 020 Internal Connections" on page 1-17; those of Model 600 are shown in "Model 600 Internal Connections" on page 1-20.

For information about the rules for SSA loops, see the "Rules for SSA Loops" on page 1-37.

Multiple Subsystems for Models 020 and 600

One 7133 can contain the disk drive modules for more than one logical subsystem. The example shows disk drive modules 1 through 8 connected to the using-system SSA attachment hardware for a particular logical subsystem, and disk drives modules 9 through 16 connected to the using-system SSA attachment hardware for a different logical subsystem:



Finding the Physical Location of a Device

The physical location of a device (for example, a disk drive module) 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 the SSA Service Functions Are Available

To help you to find the correct physical disk drive, the SSA service functions include an Identify function. This function, when selected, causes the Check light of the selected disk drive module to flash. It also causes the Subsystem Check light of the 7133 containing the selected module to flash. For more details, see the *Installation and User's Guide* for the using-system SSA attachment hardware.

Finding the Device When the SSA Service Functions Are Not Available

When the SSA service functions are not available, you must find the device by using the Port (P) and SSA-address (AA) values that are provided by some service request numbers (SRNs). Examples of these SRNs are 43PAA, 44PAA, and 45PAA.

The Port (P) value can be a number 0 through 3. It indicates the SSA port connector on the using-system SSA attachment hardware:

0 = Connector A1

1 = Connector A2

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

Use the PORT value to locate the relevant connector on the using-system SSA attachment hardware, then follow the SSA cable to the first *real* device. Do not include dummy devices or bypass cards.

The first device that you reach (possibly a device in a 7133) represents SSA-address count 0. Continue to follow the SSA loop from device to device, increasing the SSA-address count by 1 for each device, until you reach the device that is indicated in the SRN.

Note: Refer to the diagrams in “SSA Subsystem Configurations” on page 1-37 to ensure that you follow the SSA loop and count, in the correct sequence, the devices that are contained in 7133s.

Service Inspection Guide

This inspection guide helps you to identify possible unsafe conditions on the 7133. Each 7133 has the necessary safety items installed to protect users and service personnel from injury. This guide addresses only those items. You should use your good judgment, however, to identify possible safety hazards that are not covered by this guide.

If any unsafe conditions are present, you must determine how serious the possible hazard could be, and whether you should continue without first correcting the problem.

Consider the following conditions and the safety hazards they present:

- **Electrical hazards (especially primary power):** Primary voltage on the frame can cause serious or lethal electrical shock.
- **Explosive hazards:** A bulging capacitor can cause serious injury.
- **Mechanical hazards:** Loose or missing items (for example, nuts and screws) can cause serious injury.

Using the following inspection checklist as a guide, inspect the 7133 for unsafe conditions. See, if necessary, any suitable safety publications.

Inspection Checklist

1. Remove all power from the 7133 (see "All Power" on page 3-8).
2. Check the frame for damage (loose, broken, or sharp edges).
3. Check the power cable and ensure that:
 - a. The third-wire ground connector is in good condition. Use a meter to check that the third-wire ground continuity is 0.1 ohm or less between the external ground pin and the frame ground.
 - b. The insulation is not worn or damaged.
4. Check for any obvious nonstandard changes. Use good judgment about the safety of any such changes.
5. Check inside the 7133 for any obvious unsafe conditions, such as metal particles, water or other fluids, or marks of overheating, fire, or smoke damage.
6. Check for worn, damaged, or pinched cables.
7. Ensure that the voltage specified on the product-information label matches the specified voltage of the electrical power outlet. If necessary, verify the voltage.
8. Inspect the fan-and-power-supply assembly and check that the fasteners in the cover of the power-supply unit (screws or rivets) have not been removed or disturbed.
9. Before connecting the 7133 to the using system, check the grounding as described in "Checking the Grounding of the 7133" on page 1-51.

Checking the Grounding of the 7133

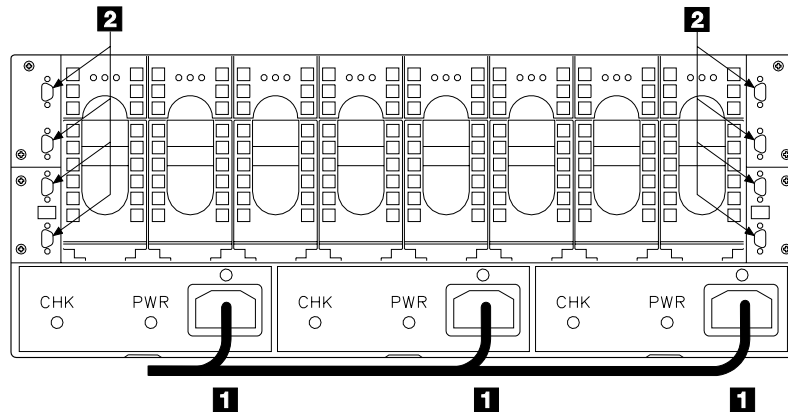
This section has two parts:

- “Grounding Check (Models 010 and 020)”
- “Grounding Check (Models 500 and 600)” on page 1-52.

Go to the part that is relevant to the 7133 you are servicing.

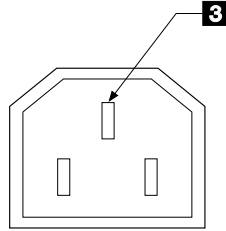
Grounding Check (Models 010 and 020)

- 1** Ensure that all power is removed from the rack (see the *Installation and Service Guide* for the rack).
- 2** Ensure that the power cable **1** is plugged into each fan-and-power-supply assembly. Ensure also that the other end of the power cable is plugged into the power distribution unit or battery-backup unit in the rack (see the *Installation and Service Guide* for the rack).



- 3 Attention:** Some electrical circuits could be damaged if the external SSA cables are present at the 7133 while the grounding check is being done. Ensure that no external SSA cables are present at the eight connectors **2**.
- 4** Follow your local procedures and check the grounding of the 7133. Any test equipment must be connected to the frame of the 7133.
If the grounding is not correct, unplug the power cable from all the fan-and-power-supply assemblies in the 7133, and continue with step 5 on page 1-52.

- 5** Check for continuity between the frame of the 7133 and the ground pin **3** of the mainline-power connector.



- 6** If any fan-and-power-supply assembly has no continuity, exchange that fan-and-power-supply assembly for a new one (see “Fan-and-Power-Supply Assemblies” on page 3-22), then do the complete grounding check again.

If each fan-and-power-supply assembly has continuity, you might have a problem with the power cable or with the grounding of the using system.

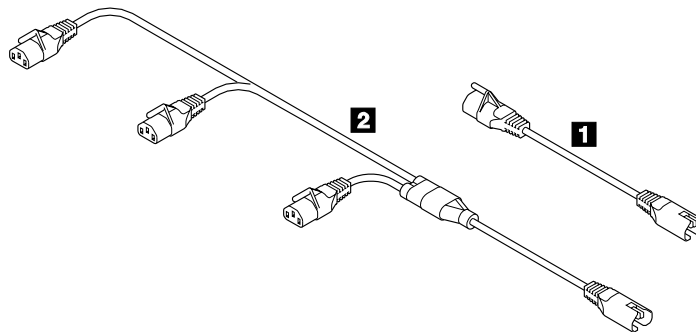
- 7** Check the power cable for continuity.

If the power cable does not have continuity, exchange it for a new one, then do the complete grounding check again.

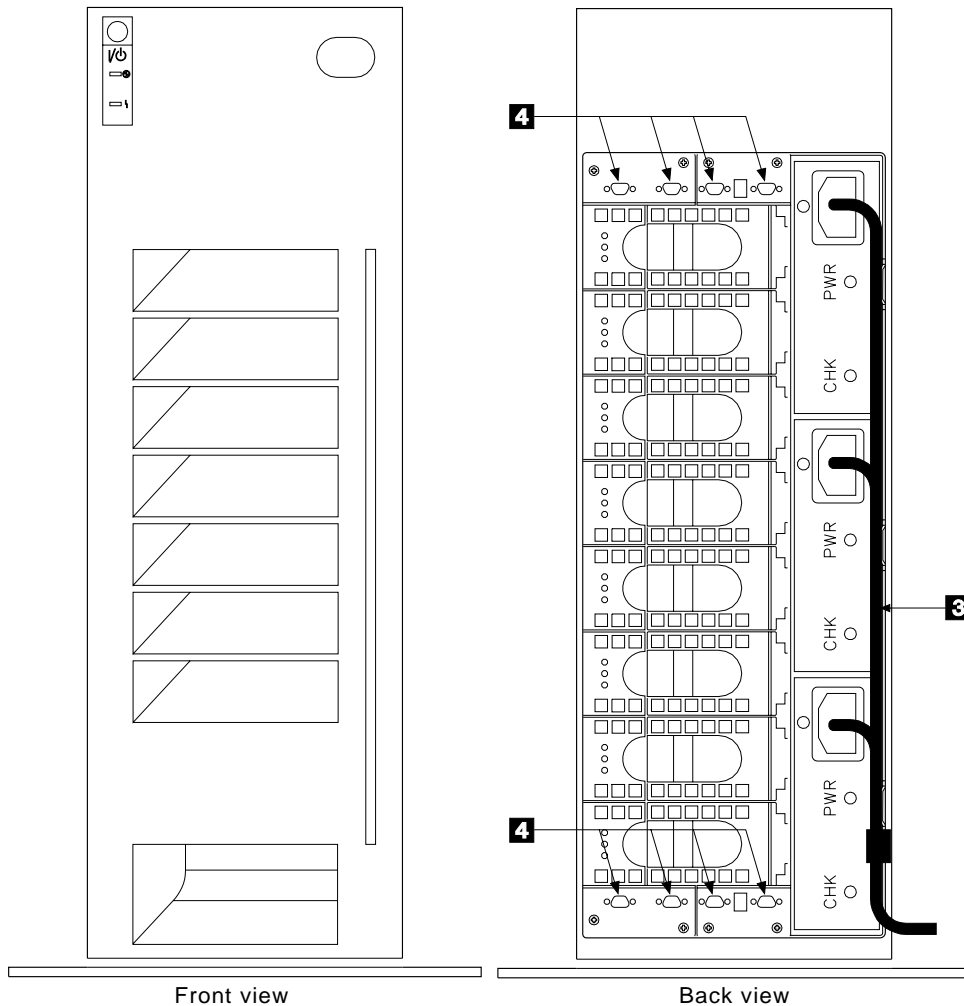
If the power cable does have continuity, see the *Installation and Service Guide* for the rack to isolate the fault.

Grounding Check (Models 500 and 600)

- 1** A 7133 Model 500 or Model 600 has a three-way power cable that consists of the standard one-way power cable for your country **1** and a three-way converter cable **2**.

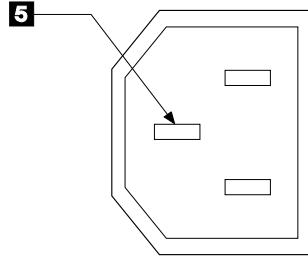


Ensure that the two parts of the power cable are connected before you start the grounding check.



- 2** At the back of the 7133, ensure that the power cable **3** is plugged into each fan-and-power-supply assembly.
- 3** Ensure that the other end of the power cable is *not* plugged into an electrical power outlet. Unplug the cable if necessary.
- 4 Attention:** Some electrical circuits could be damaged if the external SSA cables are present at the 7133 while the grounding check is being done. Ensure that no external SSA cables are present at the eight connectors **4**.
- 5** Check for continuity between the frame of the 7133 and the ground pin of the power-cable assembly.
- 6** If the continuity is good, the grounding of the 7133 is correct.
- 7** If the grounding is not correct, unplug the power-cable assembly from each fan-and-power-supply assembly, and continue with step 8.

- 8** Check for continuity between the frame of the 7133 and the ground pin **5** of the power connector on each fan-and-power-supply assembly.



- 9** If any fan-and-power-supply assembly does not have continuity, exchange that fan-and-power-supply assembly for a new one (see “Fan-and-Power-Supply Assemblies” on page 3-22), then do the complete grounding check again.

If each fan-and-power-supply assembly does have continuity, the power cable is failing. Exchange the power-cable assembly for a new one, then do the complete grounding check again.

Chapter 2. Problem Determination Procedures

Problem determination procedures are provided by power-on self-tests (POSTs), service request numbers, and maintenance analysis procedures (MAPs). Some of these procedures use the service functions that are described in the *Installation and User's Guide* for the using-system SSA attachment hardware.

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

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

The tests are 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:

- 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 with the system.

Service Request Numbers (SRNs)

Service request numbers (SRNs) are generated for the 7133 by the SSA service functions error-log analysis and diagnostics. SRNs help you to identify the cause of a problem, the failing field-replaceable units (FRUs), and the service actions that might be needed to solve the problem.

The SRN Table

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

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 2-3), and 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
PAA	P = Port number on the using-system SSA attachment hardware AA = SSA address (see also “Finding the Device When the SSA Service Functions Are Not Available” on page 1-49)
POST	Power-On Self-Test

Using the SRN Table

Important: You should have been sent here from “MAP 2010: 7133 – START.” Do not start problem determination from the SRN table; always go to “MAP 2010: 7133 – START” on page 2-2010-1 first.

1. Locate the SRN in the table. ***If you cannot find a particular SRN in the table***, 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 do 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 when exchanging FRUs; a page reference is given with each FRU in the FRU list. After each FRU is exchanged, go to “MAP 2410: 7133 – Repair Verification” on page 2-2410-1 to verify the repair.

FRU Names Used in the SRN Table

This section provides a glossary of the FRU names used.

FRU Name in Table	Definition
Backplane assembly	<i>Either of two vertically-oriented circuit boards that are located at the center of the 7133. The 7133 has a front backplane assembly and a back backplane assembly. The disk drive modules, power cards, power-distribution tray assemblies, and signal cards, or bypass cards, are plugged into the two backplane assemblies.</i>
Back-power card	<i>Either of the two power cards at the front of the 7133. Each card is plugged into the back backplane assembly and is connected (through a cable) to one of the power-distribution tray assemblies.</i>
Bypass card	<i>One of the four cards at the back of a 7133 Model 020 or Model 600. The cards are plugged into the backplane assemblies. Each bypass card has two SSA connectors for the external SSA cables, and a switch that automatically connects or disconnects the disk drive module strings internally when external SSA cables are connected or disconnected.</i>
Disk drive module	<i>A disk drive attached to a carrier that plugs into one of the backplane assemblies in the 7133.</i>
External SSA cable	<i>A cable that connects the 7133 to the using-system SSA attachment hardware or to another device (for example, another 7133).</i>
Fan-and-power-supply assembly	<i>An assembly that consists of a power supply unit and a fan. The 7133 Models 010 and 500 can have two fan-and-power-supply assemblies and one dummy fan-and-power-supply assembly, or three fan-and-power-supply assemblies, whichever is suitable for the required configuration. Models 020 and 600 always have three fan-and-power-supply assemblies.</i>
Fiber optic cables	<i>Cables that use light to transmit data.</i>
Fibre-Optic Extender	<i>An assembly that allows 7133s to be connected through fiber optic cables. Fibre-Optic Extenders can be plugged into the external SSA connectors of the 7133 and of some other SSA devices.</i>
Power-distribution tray assembly	<i>Either of two assemblies that are located in the front of the 7133. Each power-distribution tray assembly consists of a connector tray and a power card.</i>
Signal card	<i>One of the four cards at the back of a 7133 Model 010 or Model 500. The cards are plugged into the backplane assemblies of the 7133. Each signal card has two SSA connectors for the external SSA cables.</i>
Using-system SSA attachment hardware	<i>The hardware that connects the using system to the SSA loop.</i>

The SRNs

SRN	FRU List	Problem
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.
1XXXX	Disk drive module (100%) (“Disk Drive Modules” on page 3-12).	Description: Disk drive module error. Action: Exchange the FRU for a new FRU. Note: In this SRN, an X represents a digit 0 through F.
20PAA	Disk drive module (45%) (“Disk Drive Modules” on page 3-12). Using-system SSA attachment hardware (45%) (service information for the attachment hardware). External SSA cables, Fibre-Optic Extenders or fiber optic cables (6%). Backplane assembly (2%) (“Front Backplane Assembly” on page 3-37 or “Back Backplane Assembly” on page 3-41). Signal card or bypass card (2%) (“Signal Cards and Bypass Cards” on page 3-33).	Description: An open SSA loop has been detected. Action: Use the SSA service functions to isolate the failure (see the <i>Installation and User's Guide</i> for the using-system SSA attachment hardware). If the SSA service functions are not available: <ul style="list-style-type: none"> • When the failing device is in a 7133, go to Step 013 in “MAP 2010: 7133 – START.” • When the failing device is not in a 7133, go to the service information for that device.
21PAA to 29PAA	Disk drive module (45%) (“Disk Drive Modules” on page 3-12). Using-system SSA attachment hardware (45%) (service information for the attachment hardware). External SSA cables, Fibre-Optic Extenders or fiber optic cables (6%). Backplane assembly (2%) (“Front Backplane Assembly” on page 3-37 or “Back Backplane Assembly” on page 3-41). Signal card or bypass card (2%) (“Signal Cards and Bypass Cards” on page 3-33).	Description: An SSA ‘Threshold exceeded’ link error has been detected. Action: To find the failing device, use the PAA part of the SRN or the address (for example, the ID/LUN) that is provided by the error log.
2A002	Disk drive module (50%) (“Disk Drive Modules” on page 3-12). Using-system SSA attachment hardware (50%) (service information for the attachment hardware).	Description: Async code 02 has been received. Probably, a software error has occurred. Action: Go to “Software and Microcode Errors” on page 2-7 before exchanging any FRUs.
2A003	Disk drive module (50%) (“Disk Drive Modules” on page 3-12). Using-system SSA attachment hardware (50%) (service information for the attachment hardware).	Description: Async code 03 has been received. Probably, a software error has occurred. Action: Go to “Software and Microcode Errors” on page 2-7 before exchanging any FRUs.
2A004	Disk drive module (50%) (“Disk Drive Modules” on page 3-12). Using-system SSA attachment hardware (50%) (service information for the attachment hardware).	Description: Async code 04 has been received. Probably, a software error has occurred. Action: Go to “Software and Microcode Errors” on page 2-7 before exchanging any FRUs.

SRN	FRU List	Problem
2A005	None	Description: Async code 05 has been received. This code indicates that a disk drive module has detected the loss of redundant power or cooling. Action: Use the SSA service functions (see the <i>Installation and User's Guide</i> for the using-system SSA attachment hardware) to determine whether any devices are missing from the SSA loop. If a device is missing, go to "MAP 2010: 7133 – START" on page 2-2010-1 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 7133.
2A006	Disk drive module (90%) ("Disk Drive Modules" on page 3-12). Backplane assembly (10%) ("Front Backplane Assembly" on page 3-37 or "Back Backplane Assembly" on page 3-41).	Description: Async code 06 has been received. This code indicates that a disk drive module has detected the loss of redundant power or cooling. Action: Go to "MAP 2021: 7133 – Redundant Power" on page 2-2021-1 to further isolate the problem.
2A106	Fan-and-power-supply assembly (90%) ("Fan-and-Power-Supply Assemblies" on page 3-22). Power-distribution tray assembly (6%) ("Power-Distribution Tray Assemblies" on page 3-28). Back-power card (2%) ("Back-Power Cards" on page 3-31). Backplane assembly (2%) ("Front Backplane Assembly" on page 3-37 or "Back Backplane Assembly" on page 3-41).	Description: Async code 06 has been received. This code indicates that multiple disk drive modules have detected the loss of redundant power or cooling. Action: Go to "MAP 2010: 7133 – START" on page 2-2010-1 to further isolate the problem.
2A206	Disk drive module (100%) ("Disk Drive Modules" on page 3-12).	Description: A disk drive module has detected that one of its SSA links has failed the POSTs. Action: Use the SSA service functions (see the <i>Installation and User's Guide</i> for the using-system SSA attachment hardware) to determine where the SSA link is broken. Run diagnostics from the SSA service functions 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 2-7.
300C0	Disk drive module (90%) ("Disk Drive Modules" on page 3-12). Backplane assembly (10%) ("Front Backplane Asm" on page 3-37 or "Back Backplane Asm" on page 3-41).	Description: A disk drive module has detected the loss of redundant power or cooling. Action: Go to "MAP 2021: 7133 – Redundant Power" on page 2-2021-1 to further isolate the problem.
301C0	Fan-and-power-supply assembly (90%) ("Fan-and-Power-Supply Assemblies" on page 3-22). Power-distribution tray assembly (6%) ("Power-Distribution Tray Assemblies" on page 3-28). Back-power card (2%) ("Back-Power Cards" on page 3-31). Backplane assembly (2%) ("Front Backplane Asm" on page 3-37 or "Back Backplane Asm" on page 3-41).	Description: Multiple disk drive modules have detected the loss of redundant power or cooling. Action: Go to "MAP 2010: 7133 – START" on page 2-2010-1 to further isolate the problem.
303FF	Disk drive module (100%) ("Disk Drive Modules" on page 3-12).	Description: An SCSI status that is not valid has been received. Action: Go to "Software and Microcode Errors" on page 2-7 before exchanging any FRUs.

SRN	FRU List	Problem
31000	Disk drive module (100%) (“Disk Drive Modules” on page 3-12).	<p>Description: The disk drive has been reset by the adapter. The disk drive might be going to fail.</p> <p>Action: If the disk drive can still be accessed, the user should create a backup of all the data from this disk drive, then remove the disk drive from the system configuration. Exchange the FRU for a new FRU.</p>
43PAA	<p>Disk drive module (40%) (“Disk Drive Modules” on page 3-12). Using-system SSA attachment hardware (40%) (service information for the attachment hardware). External SSA cables, Fibre-Optic Extenders, fiber optic cables, or internal SSA connections of the 7133 (20%)</p>	<p>Description: An SSA device on the loop is preventing the completion of the loop configuration.</p> <p>A particular connection, disconnection, or failure of an SSA link might have caused the link (and, possibly, an SSA device that is attached to the link) to become locked out and no longer available to the using system.</p> <p>Action: If the SSA service functions are available, run the Show SSA Topology function to determine where the loop is broken (see the <i>Installation and User's Guide</i> for the using-system SSA attachment hardware). The device or link that is causing the problem is the one beyond the last-configured device, in either direction round the loop.</p> <p>Take one of the following actions:</p> <ul style="list-style-type: none"> • If the failing link, or a link that is next to the failing link, is a Fibre-Optic Extender, go to “SSA Link Error Problem Determination” on page 2-9 to verify the operation of the link. • If the failing link, or a link that is next to the failing link, is not a Fibre-Optic Extender, exchange, for a new device, the device that is attached to the failing link. If more than one device is attached, exchange all those devices. • If the link that is reported as failing is not actually failing, exchange, for a new device, the device that is attached to that link. If more than one device is attached, exchange all those devices. <p>When the problem has been corrected, use the Clear Check Mode service function to unlock the link.</p> <p>If the SSA service functions are not available, note the value of PAA in this SRN, and go to “Finding the Physical Location of a Device” on page 1-49.</p>
44PAA	Disk drive module (100%) (“Disk Drive Modules” on page 3-12).	<p>Description: A disk drive module has a ‘Failed’ status.</p> <p>Action: If the SSA service functions are available, use them (see the <i>Installation and User's Guide</i> for the using-system SSA attachment hardware) to find the failing disk drive module. Use the PAA part of the SRN to determine which device is failing. Before you exchange the failing device, run the disk diagnostics from the SSA service functions to that device to determine the cause of the problem.</p> <p>If the SSA service functions are not available, note the value of PAA in this SRN, and go to “Finding the Physical Location of a Device” on page 1-49. Exchange the failing FRU for a new FRU.</p>
45PAA	<p>Disk drive module (40%) (“Disk Drive Modules” on page 3-12). Using-system SSA attachment hardware (40%) (service information for the attachment hardware). External SSA cables, Fibre-Optic Extenders, fiber optic cables, or internal SSA connections of the 7133 (20%)</p>	<p>Description: The using-system SSA attachment hardware has detected an open SSA loop.</p> <p>Action: If the SSA service functions are available, run them (see the <i>Installation and User's Guide</i> for the using-system SSA attachment hardware) to determine which part of the loop is failing.</p> <p>If the SSA service functions are not available, note the value of PAA in this SRN, and go to “Finding the Physical Location of a Device” on page 1-49. Then go to “SSA Link Errors” on page 2-9 to solve the problem.</p>

Software and Microcode Errors

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

1. Make a note of the contents of the error log for the device that has the problem.
2. Use the using-system service facilities to get the adapter VPD.
3. Use the Display VPD service function (see the *Installation and User's Guide* for the using-system SSA attachment hardware) to get the VPD for the using-system SSA attachment hardware and for the disk drive modules.
4. 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.

Maintenance Analysis Procedures (MAPs)

These maintenance analysis procedures (MAPs) describe how to analyze a continuous failure that has occurred in a 7133 containing one or more disk drive modules. Failing field-replaceable units (FRUs) of the 7133 can be isolated with these MAPs.

How to Use these MAPs

Attention: Unless the using system needs to be turned off for some other reason, *do not turn off the using system when servicing the 7133 or an SSA link*. Power cables and external SSA cables that connect the 7133 to the using system can be disconnected while that system is running.

- To isolate the FRUs in the failing 7133, do 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 diagnostics.
 3. If the problem remains:
 - a. Reinstall the original FRU.
 - b. Exchange the next FRU in the list for a new one.
 4. Repeat steps 2 and 3 until either the problem is solved, or all the related FRUs have been exchanged.
 5. Do the next action indicated by the MAP.
- See “Lights and Power Switch” on page 1-3 for locations and descriptions of the lights and switches.

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

MAP 2010: 7133 – START

This MAP is the entry point to the MAPs for the 7133. If you are not familiar with these MAPs, read “How to Use these MAPs” on page 2-8 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 7133 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 turned off for some other reason, *do not turn off the using system when servicing the 7133 or an SSA link.* Power cables and external SSA cables that connect the 7133 to the using system can be disconnected while that system is running.

001

(From step 035)

IS THE 7133 EMITTING SMOKE OR A SMELL OF BURNING?

Yes No

002

Go to Step 004 on page 2-2010-2.

003

- If the 7133 is turned on, turn it off:
 - On Models 010 and 500, press the power switch, and hold it pressed for two seconds.
 - On Models 020 and 600, press and release the power switch.
- At the back of the 7133, unplug the three-way power cable from the fan-and-power-supply assemblies.
- Allow the 7133 to cool.

Go to “MAP 2022: 7133 – Power-On” on page 2-2022-1.

004

(From step 002)

HAVE YOU BEEN SENT TO THIS MAP FROM AN SRN?

Yes No

|
|
|
|
|
|
|

005

Go to Step 007.

006

Go to Step 013 on page 2-2010-3.

007

(From step 005)

ARE THE SSA SERVICE FUNCTIONS AVAILABLE?

Yes No

|
|
|
|
|
|
|

008

See the *Installation and User's Guide* for the using-system SSA attachment hardware for information about the SSA service functions.

If the SSA service functions are not available, go to Step 013 on page 2-2010-3.

009

– Run the Error Log Analysis service aid (see the *Installation and User's Guide* for the using-system SSA attachment hardware).

Go to Step 010 on page 2-2010-3.

010

(From MAP 2022 step 022 on page 2-2022-4)

(From step 009)

DID THE ERROR LOG ANALYSIS GIVE YOU AN SRN FOR THE 7133?

Yes No

011

Go to Step 013.

012

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

013

(From steps 006, 008, and 011)

DOES ANY 7133 HAVE ITS SUBSYSTEM CHECK LIGHT ON OR FLASHING?

Yes No

014

Go to Step 025 on page 2-2010-5.

015

Go to Step 016.

016

(From step 015)

DOES ANY FAN-AND-POWER-SUPPLY ASSEMBLY IN THE 7133 HAVE ITS FAN-AND-POWER CHECK LIGHT ON OR FLASHING?

Yes No

017

Go to Step 019 on page 2-2010-4.

018

If the Fan-and-Power Check light is permanently on, go to Step 022 on page 2-2010-4.

If the Fan-and-Power Check light is flashing:

Exchange the fan-and-power-supply assembly for a new one (see "Fan-and-Power-Supply Assemblies" on page 3-22).

Go to "MAP 2410: 7133 – Repair Verification" on page 2-2410-1 to verify the repair.

019

(From step 017)

DOES ANY DISK DRIVE MODULE HAVE ITS CHECK LIGHT ON OR FLASHING?

Yes No

020

Go to "MAP 2021: 7133 – Redundant Power" on page 2-2021-1.

021

- If the Check light is permanently on, check whether the disk drive module is in Service Mode. (Service Mode might have been set from another using system.)
 - If the disk drive module is in Service Mode, reset it when possible.
 - If the disk drive module is *not* in Service Mode:
 1. Exchange the disk drive module for a new one (see "Disk Drive Modules" on page 3-12).
 2. Go to "MAP 2410: 7133 – Repair Verification" on page 2-2410-1 to verify the repair.
 - 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.
-

022

(From step 018)

DOES ANY FAN-AND-POWER-SUPPLY ASSEMBLY WHOSE FAN-AND-POWER CHECK LIGHT IS ON HAVE ITS POWER LIGHT ON?:

Yes No

023

- Check whether mainline power is available.

024

Exchange, for new assemblies, all fan-and-power-supply assemblies whose Power lights are on (see "Fan-and-Power-Supply Assemblies" on page 3-22).

Go to "MAP 2410: 7133 – Repair Verification" on page 2-2410-1 to verify the repair.

025

(From step 014)

DOES ANY 7133 HAVE ITS SUBSYSTEM POWER LIGHT OFF?

Yes No

026

Go to Step 028.

027

Go to Step 034 on page 2-2010-6.

028

(From step 026)

DO YOU HAVE AN SRN?

Yes No

029

Go to "SSA Link Errors" on page 2-9 to isolate the problem.

030

Go to Step 031 on page 2-2010-6.

031

(From step 030)

DO YOU HAVE SRN 45nnn (WHERE n IS A CHARACTER 0 THROUGH F)?

Yes No

032

Go to "MAP 2021: 7133 – Redundant Power" on page 2-2021-1.

033

Go to "SSA Link Errors" on page 2-9 to isolate the problem.

034

(From step 027)

IS THE 7133 TURNED ON (CHECK WHETHER ANY DISK DRIVE MODULES HAVE LIGHTS THAT ARE ON)?

Yes No

035

– Turn on the 7133:

- On Models 010 and 500, press the power switch, and hold it pressed for two seconds.
- On Models 020 and 600, press and release the power switch.

Go to Step 001 on page 2-2010-1.

036

Go to "MAP 2020: 7133 – Power" on page 2-2020-1.

MAP 2020: 7133 – Power

This MAP helps you to isolate FRUs that are causing a power problem on a 7133.

Attention: Unless the using system needs to be turned off for some other reason, *do not turn off the using system when servicing the 7133 or an SSA link*. Power cables and external SSA cables that connect the 7133 to the using system can be disconnected while that system is running.

You are here because of one or more of the following:

- A fan-and-power-supply assembly has its Fan-and-Power Check light on.
- An SRN has sent you here.

001

DOES THE FAN-AND-POWER-SUPPLY ASSEMBLY IN EITHER POSITION 2 OR POSITION 3 HAVE ITS POWER LIGHT ON?

Yes No

002

Go to Step 004.

003

Go to Step 007 on page 2-2020-2.

004

(From step 002)

IS POWER PRESENT AT THE MAINLINE POWER SOURCE?

Yes No

005

For Models 010 and 020, go to the rack *Installation and Service Guide* for further isolation.

For Models 500 and 600, contact the site maintenance engineer or the electricity supplier.

006

Exchange the three-way power cable for a new one.

Note: On Models 500 and 600 in some countries, the mainline power plug contains a fuse. Check the fuse before exchanging the power cable.

007

(From step 003)

DOES ANY FAN-AND-POWER-SUPPLY ASSEMBLY IN THIS 7133 HAVE ITS FAN-AND-POWER CHECK LIGHT ON?:

Yes No

008

In the sequence shown, exchange the following FRUs for new FRUs. Ensure that for *each* FRU exchange, you go to “MAP 2410: 7133 – Repair Verification” on page 2-2410-1 to verify the repair.

1. Control panel assembly (see “Control Panel Assembly” on page 3-26)
2. Left-hand (Models 010 and 020) or upper (Models 500 and 600) power-distribution tray assembly (see “Power-Distribution Tray Assemblies” on page 3-28).

009

Exchange, for a new one, the fan-and-power-supply assembly whose Fan-and-Power Check light is on.

Go to “MAP 2410: 7133 – Repair Verification” on page 2-2410-1 to verify the repair.

MAP 2021: 7133 – Redundant Power

This MAP helps you to isolate FRUs that are causing a power problem on a 7133.

Use the SSA service functions (see the *Installation and User's Guide* for the using-system SSA attachment hardware) to determine which disk drive module has 'Power' status. Although one of its power inputs is missing, the disk drive module continues to work normally.

Attention: Unless the using system needs to be turned off for some other reason, *do not turn off the using system when servicing the 7133 or an SSA link*. Power cables and external SSA cables that connect the 7133 to the using system can be disconnected while that system is running.

001

- Use the Show SSA Topology service function (see the *Installation and User's Guide* for the using-system SSA attachment hardware) to identify the disk drive modules that are detecting a loss of redundant power or cooling. On the SSA Topology screen, disk drives that have detected a loss of redundant power or cooling are displayed with a status of PC (power or cooling). Use the Identify function, if necessary, to identify the physical disk drive module.

IS ANY DISK DRIVE MODULE IN THE 7133 DETECTING A LOSS OF REDUNDANT POWER OR COOLING?

Yes No

002

In the sequence shown, exchange the following FRUs for new FRUs. Ensure that for *each* FRU exchange, you go to “MAP 2410: 7133 – Repair Verification” on page 2-2410-1 to verify the repair.

1. Control panel assembly (see “Control Panel Assembly” on page 3-26)
2. Left-hand (Models 010 and 020) or upper (Models 500 and 600) power-distribution tray assembly (see “Power-Distribution Tray Assemblies” on page 3-28).

003

Go to Step 004.

004

(From step 003)

IS ONLY ONE DISK DRIVE MODULE IN THE 7133 DETECTING A LOSS OF REDUNDANT POWER OR COOLING?

Yes No

005

Go to Step 007 on page 2-2021-3.

006

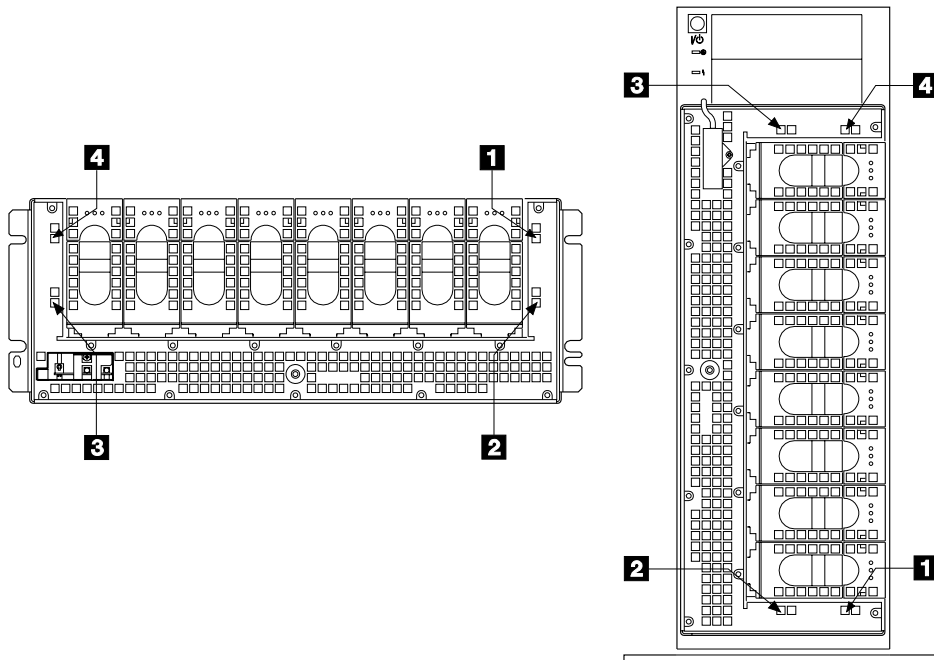
In the sequence shown, exchange the following FRUs for new FRUs. Ensure that for *each* FRU exchange, you go to “MAP 2410: 7133 – Repair Verification” on page 2-2410-1 to verify the repair.

1. Disk drive module (see “Disk Drive Modules” on page 3-12)
2. The front backplane assembly if the disk drive module is at the front of the 7133 (see “Front Backplane Assembly” on page 3-37)

The back backplane assembly if the disk drive module is at the back of the 7133 (see “Back Backplane Assembly” on page 3-41).

007

(From step 005)



- Observe the Power Card lights **1**, **2**, **3**, and **4**. Note which lights are on, and which lights are off.

Go to Step 008.

008

(From step 007)

- In Table 2-1 on page 2-2021-4, find the row whose pattern of Power Card lights matches the pattern of the Power Card lights of the 7133.

In the sequence given in that row, exchange the FRUs for new FRUs. Ensure that for *each* FRU exchange, you go to “MAP 2410: 7133 – Repair Verification” on page 2-2410-1 to verify the repair.

Note: Patterns of lights other than those given in the table indicate multiple problems. In such instances, solve those problems one at a time.

Table 2-1. Power Card Light Patterns				
Pwr Card Light 1	Pwr Card Light 2	Pwr Card Light 3	Pwr Card Light 4	FRUs
Off	On	On	On	<p>On 7133s that do not have a fan-and-power-supply assembly in position 1, this pattern of lights is normal; do not exchange any FRUs. Otherwise, exchange:</p> <ol style="list-style-type: none"> 1. Fan-and-power-supply assembly in position 1 ("Fan-and-Power-Supply Assemblies" on page 3-22) 2. Right-hand (Models 010 and 020) or lower (Models 500 and 600) back-power card ("Back-Power Cards" on page 3-31) 3. Right-hand (Models 010 and 020) or lower (Models 500 and 600) power-distribution tray assembly ("Power-Distribution Tray Assemblies" on page 3-28).
On	Off	On	On	<p>Right-hand (Models 010 and 020) or lower (Models 500 and 600) power-distribution tray assembly ("Power-Distribution Tray Assemblies" on page 3-28).</p>
On	On	Off	On	<ol style="list-style-type: none"> 1. Fan-and-power-supply assembly in position 3 ("Fan-and-Power-Supply Assemblies" on page 3-22) 2. Left-hand (Models 010 and 020) or upper (Models 500 and 600) power-distribution tray assembly ("Power-Distribution Tray Assemblies" on page 3-28).
On	On	On	Off	<ol style="list-style-type: none"> 1. Left-hand (Models 010 and 020) or upper (Models 500 and 600) back-power card ("Back-Power Cards" on page 3-31) 2. Left-hand (Models 010 and 020) or upper (Models 500 and 600) power-distribution tray assembly ("Power-Distribution Tray Assemblies" on page 3-28).
On	Off	On	Off	<p>Fan-and-power-supply assembly in position 2 ("Fan-and-Power-Supply Assemblies" on page 3-22).</p>
On	On	On	On	<p>The front backplane assembly if the disk drive module is at the front of the 7133 (see "Front Backplane Assembly" on page 3-37)</p> <p>The back backplane assembly if the disk drive module is at the back of the 7133 (see "Back Backplane Assembly" on page 3-41).</p>

MAP 2022: 7133 – Power-On

This MAP helps you to isolate FRUs that are causing a power problem on a 7133.

Attention: Unless the using system needs to be turned off for some other reason, *do not turn off the using system when servicing the 7133 or an SSA link.* Power cables and external SSA cables that connect the 7133 to the using system can be disconnected while that system is running.

001

- Remove all power from the 7133 (see “All Power” on page 3-8).
- Remove all the fan-and-power-supply assemblies from the 7133 (see “Fan-and-Power-Supply Assemblies” on page 3-22).
- Remove the dummy fan-and-power-supply assembly, if present, from the 7133 (see “Dummy Fan-and-Power-Supply Assembly (Models 010 and 500 Only)” on page 3-24).
- Remove all the disk drive modules from the 7133 (see “Disk Drive Modules” on page 3-12).

Go to Step 002.

002

(From step 001)

- Reinstall a fan-and-power-supply assembly into position 3. (When viewed from the back of the 7133, position 3 is the right-hand slot on Models 010 and 020, and the top slot on Models 500 and 600.)
- Connect the three-way power cable to the fan-and-power-supply assembly.

Note: Leave the 7133 turned on for the remainder of this MAP.

DOES THE 7133 EMIT SMOKE OR A SMELL OF BURNING?

Yes No

003

Go to Step 005 on page 2-2022-2.

004

- Exchange the fan-and-power-supply assembly for a new one.

Go to Step 005 on page 2-2022-2.

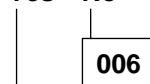
005

(From steps 003 and 004)

- Reinstall a fan-and-power-supply assembly into position 2.
- Connect the three-way power cable to the fan-and-power-supply assembly that is in position 2.

DOES THE 7133 EMIT SMOKE OR A SMELL OF BURNING?

Yes No



006

Go to Step 008.

007

- Exchange, for a new one, the fan-and-power-supply assembly that is in position 2.
 - Connect the three-way power cable to the new fan-and-power-supply assembly, Go to Step 008.
-

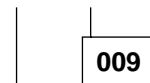
008

(From steps 006 and 007)

- Reinstall the fan-and-power-supply assembly or dummy fan-and-power-supply assembly into position 1.
- If reinstalling a fan-and-power supply assembly, connect the three-way power cable to that assembly.

DOES THE 7133 EMIT SMOKE OR A SMELL OF BURNING?

Yes No



009

- If the 7133 has a dummy fan-and-power-supply assembly, insert the spare power-cable plug into the hole in that assembly.

Go to Step 011 on page 2-2022-3.

010

- Exchange, for a new one, the fan-and-power-supply assembly, or dummy fan-and-power-supply assembly, that is in position 1.

Go to Step 011 on page 2-2022-3.

011

(From steps 009 and 010)

- Reinstall a disk drive module *into the slot from which it was originally removed* (see “Installing a Module” on page 3-15).

DOES THE 7133 EMIT SMOKE OR A SMELL OF BURNING?

Yes No

012

Go to Step 014.

013

- Exchange the disk drive module for a new one.

Go to Step 014.

014

(From steps 012, 013, and 018)

- Reinstall the next disk drive module *into the slot from which it was originally removed*.

DOES THE 7133 EMIT SMOKE OR A SMELL OF BURNING?

Yes No

015

Go to Step 017 on page 2-2022-4.

016

- Exchange the disk drive module for a new one.

Go to Step 017 on page 2-2022-4.

017

(From steps 015 and 016)

HAVE YOU REINSTALLED ALL THE DISK DRIVE MODULES?

Yes No

018

Return to Step 014 on page 2-2022-3.

019

Go to Step 020.

020

(From step 019)

HAVE YOU SOLVED THE PROBLEM?

Yes No

021

– Remove all power from the 7133, and call for assistance.

022

Go to MAP 2010 step 010 on page 2-2010-3 of “MAP 2010: 7133 – START.”

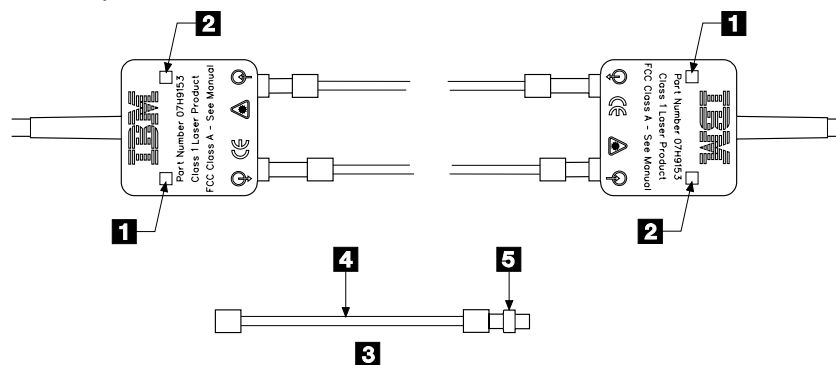
MAP 2330: 7133 – Fibre-Optic Extender

This maintenance analysis procedure (MAP) describes how to analyze a failure that has occurred in the optical link.

Note: Not all SSA devices provide support for the Fibre-Optic Extender feature. Ensure that the devices that you want to connect to each other through Fibre-Optic Extenders all provide support for such a connection.

Attention: Unless the using system needs to be turned off for some other reason, *do not turn off the using system when servicing the 7133 or an SSA link*. Power cables and external SSA cables that connect the 7133 to the using system can be disconnected while that system is running.

Diagnostic aid is provided by two lights on each Fibre-Optic Extender: a Power light **1** and a Receive light **2**. During normal operations, both lights of each Fibre-Optic Extender are on.



A wrap cable and adapter assembly **3** is provided with each Fibre-Optic Extender. This assembly consists of a fiber optic wrap cable **4** and a fiber optic wrap adapter **5**. The two parts of the assembly are used during diagnostic procedures. The wrap cable connects the connectors of the Fibre-Optic Extender to each other; the wrap adapter connects the two fiber optic cables to each other.

Important Notes:

1. The two bayonet connectors of a Fibre-Optic Extender are of different lengths. Ensure that each fiber optic cable is connected between the shorter (Receive) connector of one Fibre-Optic Extender and the longer (Transmit) connector of the other Fibre-Optic Extender.
2. Before connecting fiber optic cables and devices, ensure that the end faces of the cables are clean.
3. When the wrap cable and adapter assembly is not in use, the ends of the wrap cable must be protected as follows:
 - If the wrap cable is 400 mm (15 in.) long, each of its ends is connected to the wrap adapter to make a closed loop.
 - If the wrap cable is 150 mm (6 in.) long, one end of the cable is connected to the wrap adapter, and protective covers are placed over each end of the complete wrap cable and adapter assembly.

The wrap cable and adapter assembly must be kept in its plastic bag in a safe place that is as close to the Fibre-Optic Extender as possible. At least one wrap cable and adapter assembly must be kept at each end of the link.

001

You are here because the optical link might not be working correctly.

– Ensure that:

- The Fibre-Optic Extender at each end of the optical link is correctly plugged in.
- The fiber optic cables are correctly connected to the Fibre-Optic Extenders.
- The using system and the 7133 (or any other device into which Fibre-Optic Extenders are plugged) are turned on.

DOES THE PROBLEM REMAIN?

Yes No

002

Go to “MAP 2410: 7133 – Repair Verification” on page 2-2410-1 to verify the repair.

003

Go to Step 004.

004

(From steps 003, 030, and 045)

- If you are at this step for the first time, observe the lights on either of the two Fibre-Optic Extenders of the link.
- If you have come to this step from any step in this MAP other than Step 003, observe the lights on the Fibre-Optic Extender at the other end of the link.

IS THE POWER LIGHT OFF?

Yes No

005

Go to Step 007 on page 2-2330-4.

006

Go to Step 013 on page 2-2330-4.

007

(From step 005)

IS THE RECEIVE LIGHT OFF?

Yes No



008

Go to Step 026 on page 2-2330-10.

009

Go to Step 010.

010

(From step 009)

IS THE RECEIVE LIGHT OFF AT EACH END OF THE OPTICAL LINK?

Yes No



011

Go to Step 017 on page 2-2330-6.

012

- Check whether the fiber optic cables are crossed over; that is, one cable is connected to a Receive connector at each end, and the other cable is connected to a Transmit connector at each end.

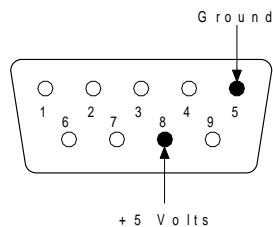
If the cables are crossed over, reconnect them correctly.

If the cables are **not** crossed over, go to Step 017 on page 2-2330-6.

013

(From step 006)

- Unplug from the 7133, or other device, the Fibre-Optic Extender whose Power light is off.
- At the connector from which you have unplugged the Fibre-Optic Extender, check the voltage between pins 5 and 8; it should be +5 volts.



(Step **013** continues)

013 (continued)

IS THE VOLTAGE CORRECT?

Yes No

014

If the connector that you have just checked is on a 7133, exchange, in the sequence shown, the following FRUs for new FRUs. Ensure that for *each* FRU exchange, you go to “MAP 2410: 7133 – Repair Verification” on page 2-2410-1 to verify the repair.

1. The first disk drive module in the string whose connector you have just checked (see “Disk Drive Modules” on page 3-12).

For information about disk drive module strings, see “Internal Connections (Models 010 and 020)” on page 1-16 or “Internal Connections (Models 500 and 600)” on page 1-19.

2. If present, the dummy disk drive modules that are between the connector and the first disk drive module of the string (see “Dummy Disk Drive Modules” on page 3-18).
3. The card containing the connector that you have just checked (see “Signal Cards and Bypass Cards” on page 3-33).

– or –

If the connector that you have just checked is on some other device, exchange, for new FRUs, the appropriate FRUs of the device (see the service information for the device).

Check also the power source of the device.

015

Exchange the Fibre-Optic Extender for a new one.

Go to “MAP 2410: 7133 – Repair Verification” on page 2-2410-1 to verify the repair.

If the problem remains, go to Step 016.

016

(From step 015)

If the new Fibre-Optic Extender that you have just installed is plugged into a 7133, exchange, in the sequence shown, the following FRUs for new FRUs. Ensure that for *each* FRU exchange, you go to “MAP 2410: 7133 – Repair Verification” on page 2-2410-1 to verify the repair.

1. The first disk drive module in the string whose connector you have just checked (see “Disk Drive Modules” on page 3-12).

For information about disk drive module strings, see “Internal Connections (Models 010 and 020)” on page 1-16 or “Internal Connections (Models 500 and 600)” on page 1-19.

2. If present, the dummy disk drive modules that are between the connector and the first disk drive module of the string (see “Dummy Disk Drive Modules” on page 3-18).

3. The card into which the new Fibre-Optic Extender is plugged (see “Signal Cards and Bypass Cards” on page 3-33).

– or –

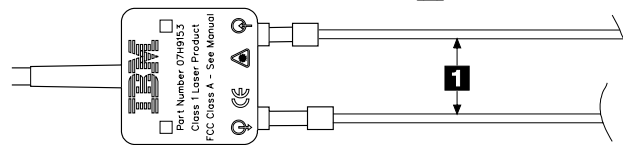
If the new Fibre-Optic Extender that you have just installed is plugged into some other device, exchange, for new FRUs, the appropriate FRUs of the device (see the service information for the device).

017

(From steps 011 and 012)

In the next step, you are going to disconnect the fiber optic cables. Before you do so, note the identifications of the fiber optic cables to ensure that you reconnect them correctly later.

– Disconnect the fiber optic cables **1** from the Fibre-Optic Extender.

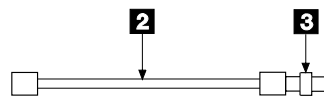


– Find the wrap cable and adapter assembly that is provided with the Fibre-Optic Extender.

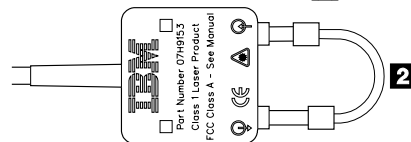
– Remove the wrap cable and adapter assembly from its plastic bag.

– If the wrap cable and adapter assembly has a protective cover at each end, remove those covers.

– Disconnect the wrap cable **2** from the wrap adapter **3**.



– Connect the wrap cable **2** to the connectors of the Fibre-Optic Extender.



DOES THE RECEIVE LIGHT OF THE FIBRE-OPTIC EXTENDER COME ON?

Yes No

018

– Remove the wrap cable from the Fibre-Optic Extender, and do whichever of the two following actions is appropriate:

- If the wrap cable is 400 mm (15 in.) long, connect each of its ends to the wrap adapter to make a closed loop.
- If the wrap cable is 150 mm (6 in.) long, connect one end to the wrap adapter, then install a protective cover at each end of the complete wrap cable and adapter assembly.

(Step **018** continues)

018 (continued)

- Place the wrap cable and adapter assembly into its plastic bag, and return it to the place where it is normally kept.

Exchange the Fibre-Optic Extender for a new one.

- Observing the identifications of the fiber optic cables, connect the cables to the new Fibre-Optic Extender.

Go to “MAP 2410: 7133 – Repair Verification” on page 2-2410-1 to verify the repair.

Note: If the problem remains, find another wrap cable and adapter assembly, and repeat this step. The original wrap cable might have failed.

019

- Remove the wrap cable from the Fibre-Optic Extender, and do whichever of the two following actions is appropriate:
 - If the wrap cable is 400 mm (15 in.) long, connect each of its ends to the wrap adapter to make a closed loop.
 - If the wrap cable is 150 mm (6 in.) long, connect one end to the wrap adapter, then install a protective cover at each end of the complete wrap cable and adapter assembly.
- Place the wrap cable and adapter assembly into its plastic bag, and return it to the place where it is normally kept.
- Observing the identifications of the fiber optic cables, reconnect the cables to the Fibre-Optic Extender.

Go to Step 020.

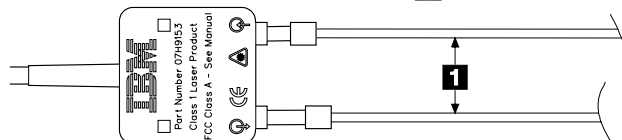
020

(From step 019)

- Find the Fibre-Optic Extender at the other end of the link.

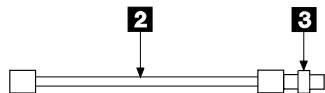
In the next step, you are going to disconnect the fiber optic cables. Before you do so, note the identifications of the fiber optic cables to ensure that you reconnect them correctly later.

- Disconnect the fiber optic cables **1** from the Fibre-Optic Extender.

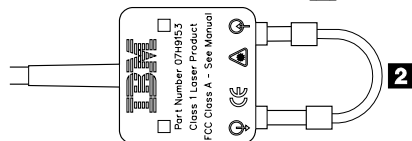


- Find the wrap cable and adapter assembly that is provided with the Fibre-Optic Extender.
- Remove the wrap cable and adapter assembly from its plastic bag.
- If the wrap cable and adapter assembly has a protective cover at each end, remove those covers.

- Disconnect the wrap cable **2** from the wrap adapter **3**.



- Connect the wrap cable **2** to the connectors of the Fibre-Optic Extender.



DOES THE RECEIVE LIGHT OF THE FIBRE-OPTIC EXTENDER COME ON?

Yes No

021

- Remove the wrap cable from the Fibre-Optic Extender, and do whichever of the two following actions is appropriate:
 - If the wrap cable is 400 mm (15 in.) long, connect each of its ends to the wrap adapter to make a closed loop.
 - If the wrap cable is 150 mm (6 in.) long, connect one end to the wrap adapter, then install a protective cover at each end of the complete wrap cable and adapter assembly.
 - Place the wrap cable and adapter assembly into its plastic bag, and return it to the place where it is normally kept.
- Exchange the Fibre-Optic Extender for a new one.
- Observing the identifications of the fiber optic cables, connect the cables to the new Fibre-Optic Extender.

Go to “MAP 2410: 7133 – Repair Verification” on page 2-2410-1 to verify the repair.

Note: If the problem remains, find another wrap cable and adapter assembly, and repeat this step. The original wrap cable might have failed.

022

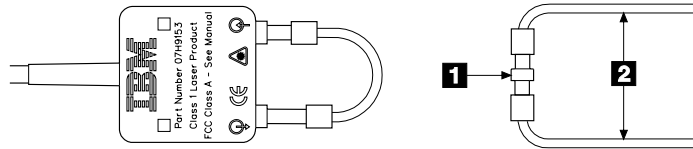
Go to Step 023 on page 2-2330-9.

023

(From step 022)

One of the following conditions exists:

- The light output from this Fibre-Optic Extender is low.
 - The fiber optic cables are failing.
- Use the wrap adapter **1** to wrap (connect) the two fiber optic cables **2** together.



- Check the Receive light of the Fibre-Optic Extender that is at the other end of the optical link.

IS THE RECEIVE LIGHT ON?

Yes No

024

A fiber optic cable has failed. Tell the customer.

025

The Fibre-Optic Extender that is disconnected from the fiber optic cables has failed.

- Remove the wrap cable from the Fibre-Optic Extender, and do whichever of the two following actions is appropriate:
- If the wrap cable is 400 mm (15 in.) long, connect each of its ends to the wrap adapter to make a closed loop.
 - If the wrap cable is 150 mm (6 in.) long, connect one end to the wrap adapter, then install a protective cover at each end of the complete wrap cable and adapter assembly.
- Place the wrap cable and adapter assembly into its plastic bag, and return it to the place where it is normally kept.

Exchange the Fibre-Optic Extender for a new one.

- Observing the identifications of the fiber optic cables, connect the cables to the new Fibre-Optic Extender.

Go to “MAP 2410: 7133 – Repair Verification” on page 2-2410-1 to verify the repair.

026

(From step 008)

- Observe the Ready light of the first disk drive module on the string to which the Fibre-Optic Extender is connected.

IS THE READY LIGHT ON CONTINUOUSLY?

Yes No

027

Go to Step 032.

028

Go to Step 029.

029

(From step 028)

The device is receiving SSA signals correctly.

HAVE YOU CHECKED BOTH ENDS OF THE OPTICAL LINK?

Yes No

030

- Find the Fibre-Optic Extender that is at the other end of the link.
Go to Step 004 on page 2-2330-3.

031

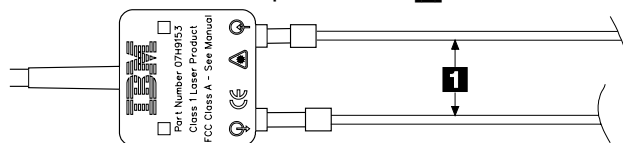
No trouble found with this link.

032

(From step 027)

In the next step, you are going to disconnect the fiber optic cables. Before you do so, note the identifications of the fiber optic cables to ensure that you reconnect them correctly later.

- Disconnect the fiber optic cables **1** from the Fibre-Optic Extender.

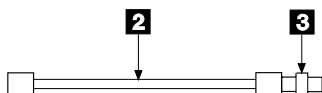


- Find the wrap cable and adapter assembly that is provided with the Fibre-Optic Extender.
- Remove the wrap cable and adapter assembly from its plastic bag.
- If the wrap cable and adapter assembly has a protective cover at each end, remove those covers.

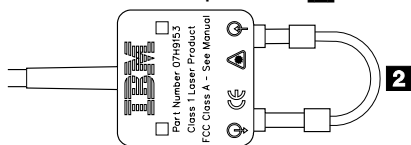
(Step **032** continues)

032 (continued)

- Disconnect the wrap cable **2** from the wrap adapter **3**.



- Connect the wrap cable **2** to the connectors of the Fibre-Optic Extender.



DOES THE RECEIVE LIGHT OF THE FIBRE-OPTIC EXTENDER COME ON?

Yes No

033

- Remove the wrap cable from the Fibre-Optic Extender, and do whichever of the two following actions is appropriate:
 - If the wrap cable is 400 mm (15 in.) long, connect each of its ends to the wrap adapter to make a closed loop.
 - If the wrap cable is 150 mm (6 in.) long, connect one end to the wrap adapter, then install a protective cover at each end of the complete wrap cable and adapter assembly.
- Place the wrap cable and adapter assembly into its plastic bag, and return it to the place where it is normally kept.

Exchange the Fibre-Optic Extender for a new one.

- Observing the identifications of the fiber optic cables, connect the cables to the new Fibre-Optic Extender.

Go to “MAP 2410: 7133 – Repair Verification” on page 2-2410-1 to verify the repair.

Note: If the problem remains, find another wrap cable and adapter assembly, and repeat this step. The original wrap cable might have failed.

034

Go to Step 035.

035

(From step 034)

- Observe the Ready light of the first disk drive module on the string to which the Fibre-Optic Extender is connected.

IS THE READY LIGHT ON CONTINUOUSLY?

Yes No

036

(Step 036 continues)

036 (continued)

Go to Step 038.

037

Go to Step 044 on page 2-2330-13.

038

(From step 036)

IS THE READY LIGHT FLASHING?

Yes No

039

- Remove the wrap cable from the Fibre-Optic Extender, and do whichever of the two following actions is appropriate:
 - If the wrap cable is 400 mm (15 in.) long, connect each of its ends to the wrap adapter to make a closed loop.
 - If the wrap cable is 150 mm (6 in.) long, connect one end to the wrap adapter, then install a protective cover at each end of the complete wrap cable and adapter assembly.
- Place the wrap cable and adapter assembly into its plastic bag, and return it to the place where it is normally kept.
- Observing the identifications of the fiber optic cables, reconnect the cables to the Fibre-Optic Extender.

Exchange, in the sequence shown, the following FRUs for new FRUs. Ensure that for *each* FRU exchange, you go to “MAP 2410: 7133 – Repair Verification” on page 2-2410-1 to verify the repair.

1. The disk drive module (see “Disk Drive Modules” on page 3-12).
2. If present, the dummy disk drive modules that are between the connector and the first disk drive module of the string (see “Dummy Disk Drive Modules” on page 3-18).
3. If present, any other card that is installed between the Fibre-Optic Extender and the first disk drive module.

040

Go to Step 041.

041

(From step 040)

- Remove the wrap cable from the Fibre-Optic Extender, and do whichever of the two following actions is appropriate:
 - If the wrap cable is 400 mm (15 in.) long, connect each of its ends to the wrap adapter to make a closed loop.

(Step 041 continues)

041 (continued)

- If the wrap cable is 150 mm (6 in.) long, connect one end to the wrap adapter, then install a protective cover at each end of the complete wrap cable and adapter assembly.
- Place the wrap cable and adapter assembly into its plastic bag, and return it to the place where it is normally kept.
- Observing the identifications of the fiber optic cables, reconnect the cables to the Fibre-Optic Extender.

IS THE READY LIGHT FLASHING?

Yes **No**

042

The problem is in the 7133. Go to “MAP 2010: 7133 – START” on page 2-2010-1.

043

- Disconnect the fiber optic cables from the Fibre-Optic Extender.

Exchange the Fibre-Optic Extender for a new one.

- Observing the identifications of the fiber optic cables, connect the cables to the new Fibre-Optic Extender.

Go to “MAP 2410: 7133 – Repair Verification” on page 2-2410-1 to verify the repair.

044

(From step 037)

The disk drive module is receiving SSA signals correctly.

HAVE YOU CHECKED BOTH ENDS OF THE OPTICAL LINK?

Yes **No**

045

- Remove the wrap cable from the Fibre-Optic Extender, and do whichever of the two following actions is appropriate:
 - If the wrap cable is 400 mm (15 in.) long, connect each of its ends to the wrap adapter to make a closed loop.
 - If the wrap cable is 150 mm (6 in.) long, connect one end to the wrap adapter, then install a protective cover at each end of the complete wrap cable and adapter assembly.
- Place the wrap cable and adapter assembly into its plastic bag, and return it to the place where it is normally kept.
- Observing the identifications of the fiber optic cables, reconnect the cables to the Fibre-Optic Extender.

(Step **045** continues)

045 (continued)

- Find the Fibre-Optic Extender that is at the other end of the link.
- Go to Step 004 on page 2-2330-3.

046

- Remove the wrap cable from the Fibre-Optic Extender, and do whichever of the two following actions is appropriate:
 - If the wrap cable is 400 mm (15 in.) long, connect each of its ends to the wrap adapter to make a closed loop.
 - If the wrap cable is 150 mm (6 in.) long, connect one end to the wrap adapter, then install a protective cover at each end of the complete wrap cable and adapter assembly.
- Place the wrap cable and adapter assembly into its plastic bag, and return it to the place where it is normally kept.

Exchange the Fibre-Optic Extender for a new one.

- Observing the identifications of the fiber optic cables, reconnect the cables to the Fibre-Optic Extender.

Go to “MAP 2410: 7133 – Repair Verification” on page 2-2410-1 to verify the repair.

MAP 2410: 7133 – Repair Verification

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

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

001

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

– Check whether all those Power lights are on.

DO ALL THE FRUS YOU HAVE EXCHANGED HAVE THEIR POWER LIGHTS ON (WHERE APPLICABLE)?

Yes No

002

– Exchange, for a new one, the FRU whose Power light is off.

Go to Step 004.

003

Go to Step 004.

004

(From steps 002 and 003)

ARE ALL CHECK LIGHTS OFF?

Yes No

005

Go to the START MAP for the unit in which the device with its Check light on is installed.

006

- Run diagnostics to the device that reported the problem.
- Run the Clear Check Mode service function (see the *Installation and User's Guide* for the using-system SSA attachment hardware).

Note: If you do not run this service function, the error log analysis might create an SRN for a problem that has already been solved.

SSA Link Errors

SSA link errors can be caused if:

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

Such errors might be indicated by:

- SRN 45PAA
- A flashing link status (or Ready) light on the SSA device at each end of the failing link
- The indication of an open link by the Disk service aid.

SSA Link Error Problem Determination

Instead of using the normal MAPs to solve a link error problem, you can refer directly to the link status lights to isolate the failing FRU. The descriptions given here show you how to do this.

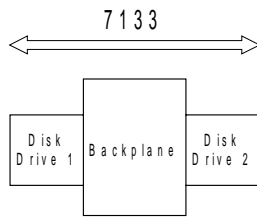
In an SSA loop, SSA devices are connected through two or more SSA links to the using-system SSA attachment hardware. Each SSA link is the connection between two SSA nodes; for example, disk drive module to disk drive module, or SSA attachment hardware to disk drive module.

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

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

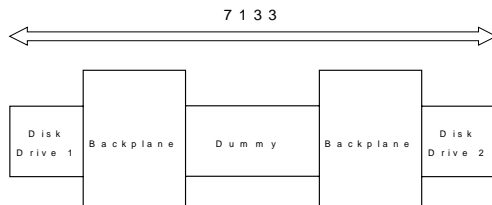
Example 1

This link is between two disk drive modules that are in the same 7133. It has three parts.



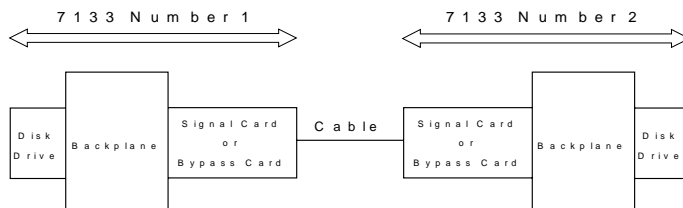
Example 2

This link is between two disk drive modules that are in the same 7133. It has five parts, although the two backplane parts are on the same backplane assembly of the 7133.



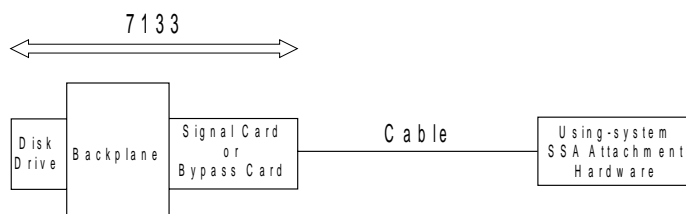
Example 3

This link is between two disk drive modules that are not in the same 7133. It has seven parts.



Example 4

This link is between a disk drive module and the using-system SSA attachment hardware. It has five parts.



Link Status (Ready) Lights

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

You can find the failing link by looking for the flashing green status light at each end of the affected link. Some configurations have other indicators along the link (for example, on bypass cards or Fibre-Optic Extenders) to help with FRU isolation.

The meanings of the lights are summarized here. If you need more information about the lights, see:

- “Lights and Power Switch” on page 1-3
- The manuals for the using-system SSA attachment hardware.

Summary of Disk Drive Lights

Link Status (Ready) Light

Status of Light	Meaning
Off	Both SSA links are inactive. For more information, see “Disk Drive Module Lights” on page 1-8.
Permanently on	Both SSA links are active.
Slow flash (two seconds on, two seconds off)	Only one SSA link is active.

Summary of Bypass Card Lights

For a description of the functions of the bypass card, see “SSA Bypass Cards (Models 020 and 600)” on page 1-33.

Link Status (Ready) Light (one for each port)

Status of Light	Meaning
Off	The card is switched into Bypass state or is jumpered for Forced Inline mode.
Permanently on	The path through this port is operational.
Flashing	The path through this port is not operational.

Mode Light (two-colored LED)

Status of Light	Meaning
Permanently on (Amber)	The bypass card is switched to Bypass state.
Permanently on (Green)	The bypass card is jumpered for Forced Inline mode.
Off	The bypass card is switched to Inline state.

Fibre-Optic Extender Lights

Power light: This light is on when the +5-volt input is present.

Receive light: This light, when on, shows that light is being received at the input connector of the Fibre-Optic Extender. The received light might not be a valid SSA signal.

If you have problems with the Fibre-Optic Extender go to “MAP 2330: 7133 – Fibre-Optic Extender” on page 2-2330-1.

SSA Service Functions

If the SSA service functions are available, you can use the Show SSA Topology function to show that the SSA loop is broken (see the *Installation and User's Guide* for the using-system SSA attachment hardware). The Show SSA Topology function displays a list of devices that are attached to the loop. If a gap is shown in the list, the loop is broken at that place.

If the loop is broken, the Ready lights flash on the disk drive modules that are on each side of the broken part of the loop.

To help locate these disk drives modules, use the Identify function. The Check light flashes on the selected disk drive. This action does not affect the customer's operations.

Chapter 3. Removal and Replacement Procedures

This chapter describes how to remove field-replaceable units (FRUs) from a 7133.

Each FRU has its own removal procedure, for example, "Fan-and-Power-Supply Assembly". Where a *step* in a specific procedure represents a complete *procedure* that is described separately, a reference to that procedure is given. For example:

1. Remove the front cover (see "Covers" on page 3-3).
2. Remove all the disk drive modules (see "Removing a Module" on page 3-12).
3.

The references show you where to find more detail, if you need it.

Note: Because these instructions relate to all models of the 7133, some diagrams might not specifically show the model that you are servicing.

Concurrent Maintenance

Subject to the configuration of the 7133, most FRUs can be removed, replaced, and tested while the subsystem and using system are powered on and doing productive work. This ability is called 'concurrent maintenance'. Unless you have a particular reason to do so, do not remove the power unless these instructions tell you to do so.

The following FRUs *can* be maintained concurrently in a fully-configured subsystem:

- Fan-and-power-supply assembly
- Dummy fan-and-power-supply assembly (Models 010 and 500 only)
- Disk drive module
- Dummy disk drive module
- Power card
- Power-distribution tray assembly
- Control panel assembly
- External SSA cable.

The following FRUs *cannot* be maintained concurrently:

- Backplane assembly

Note for Models 010 and 500 only: Although full concurrent maintenance is not available, this FRU can be removed and replaced while the other backplane assembly remains operational.

- Signal card (Models 010 and 500 only), because it contains two separate SSA interfaces.

Note: Although full concurrent maintenance is not available, this FRU can be removed and replaced subject to the configuration of the second SSA interface on the card.

- Bypass card (Models 020 and 600 only), because it contains two separate SSA interfaces.

Covers

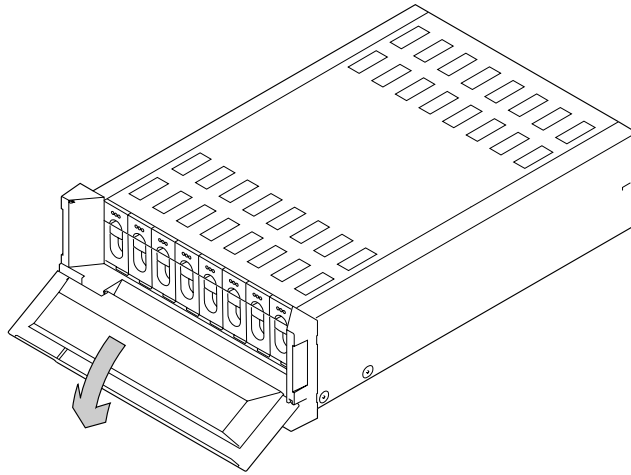
This section describes how to:

- Open or remove the front cover of a Model 010 or Model 020
- Open the front cover of a Model 500 or Model 600
- Open the back cover of a Model 500 or Model 600 (Models 010 and 020 have no back cover).

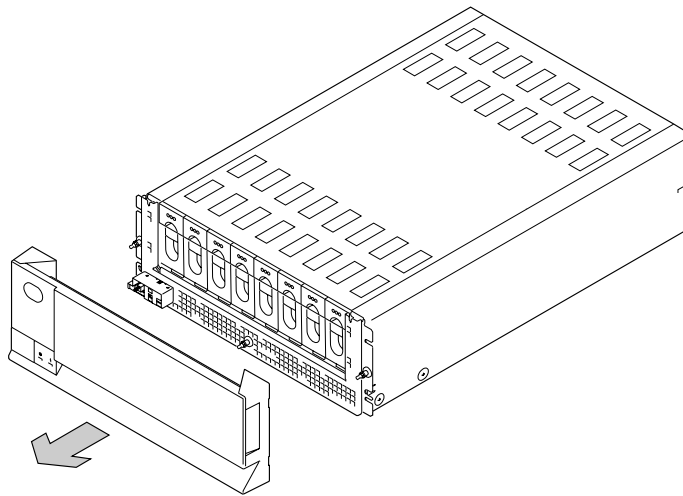
Note: Unless you have a particular reason to do so, do not turn off the using system or the 7133 when removing, opening, installing, or closing the covers of the 7133.

Front Cover – (Early Type)

- 1 To open the front cover, pull down the transparent flap.



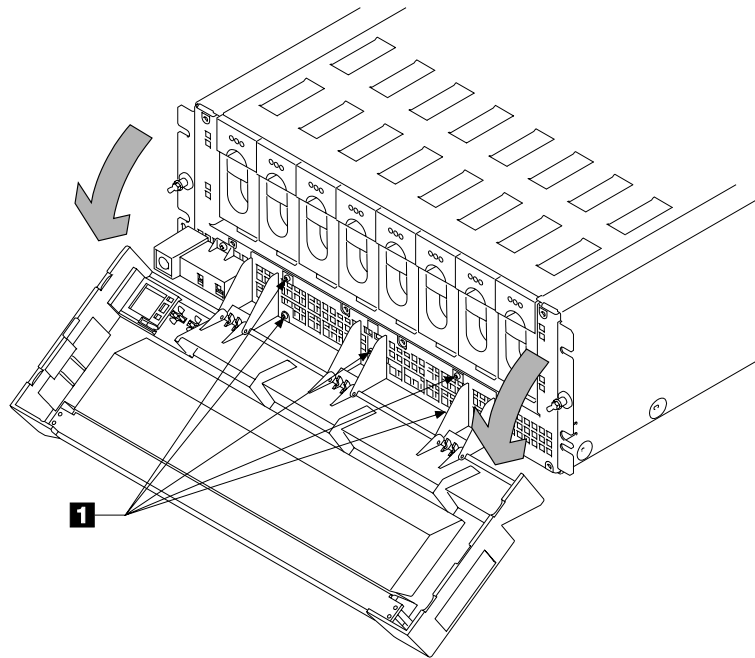
- 2 To remove the front cover, grip the bottom of the cover, and pull the cover forward.



- 3 When installing the front cover, ensure that the pins on the cover are correctly aligned with the clips on the frame of the 7133. Press both ends and the center of the lower edge of the cover until the cover clicks into position.

Front Cover (Late Type)

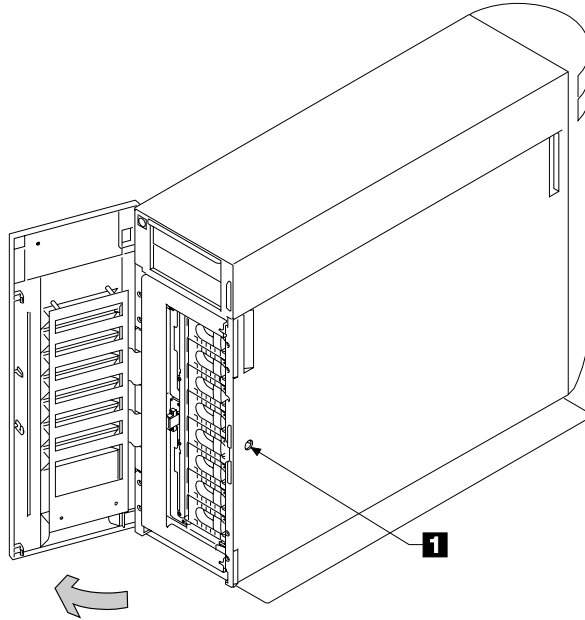
- 1** To open the front cover, hold it at the sides, and pivot it downward.



- 2** To remove the front cover assembly, unscrew the five captive screws **1**, and remove the front cover assembly.
- 3** Replace parts in the reverse order.

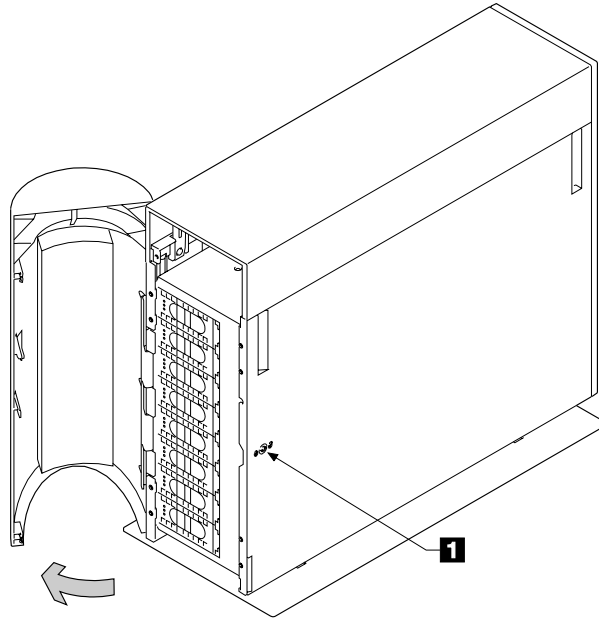
Front Cover (Models 500 and 600)

- 1** Ask the customer for the key to the covers.
- 2** Insert the key into the lock **1**, and turn the key counterclockwise.
- 3** The cover is pivoted on its left-hand side, and is held closed by clips. Pull strongly on the right-hand side of the cover to release it from the clips.



Back Cover (Models 500 and 600 Only)

- 1** Ask the customer for the key to the covers.
- 2** Insert the key into the lock **1**, and turn the key counterclockwise.
- 3** The cover is pivoted on its left-hand side, and is held closed by clips. Pull strongly on the right-hand side of the cover to release it from the clips.



All Power

Note: Unless you have a particular reason to do so, *do not remove power from the using system or from the 7133 unless the instructions that you are following tell you to.*

This section has two parts:

- “Power (Models 010 and 020)”
- “Power (Models 500 and 600)” on page 3-10.

Go to the part that is relevant to the 7133 you are servicing.

Power (Models 010 and 020)

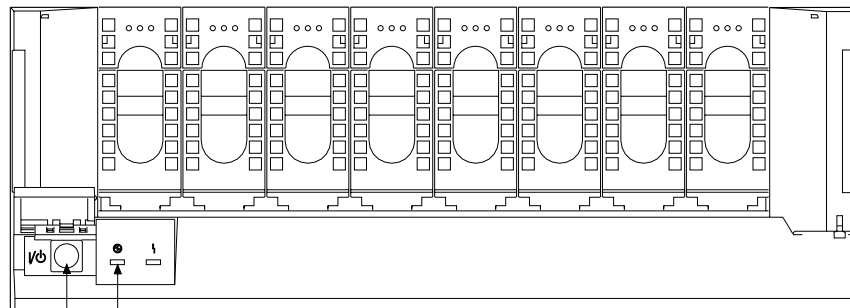
1 Ensure that the using system is no longer using the disk drive modules in the 7133.

2 Observe the Subsystem Power light **2**. If the light is on, open the flap that protects the power switch **1**. On Model 010, the flap pivots upward; on Model 020, it pivots to the right.

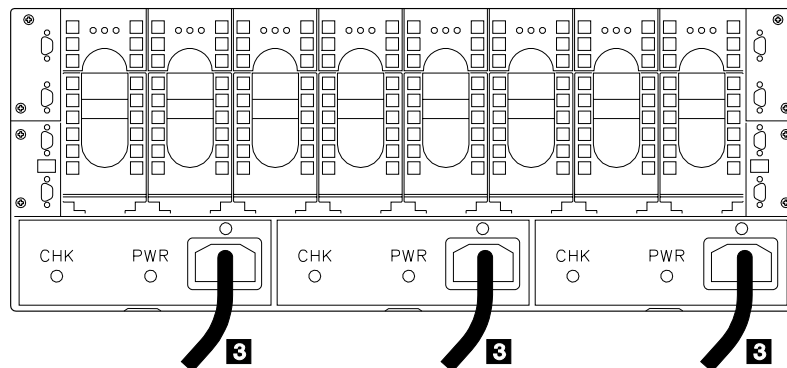
3 On Model 010, press the Power switch **1**, and hold it pressed for two seconds.

On Model 020, press and release the Power switch **1**.

The Subsystem Power light goes off.



1 **2**



3

3

3

DANGER

In the following step you are going to remove the power cable. This cable is live if the rack power distribution unit is still turned on.

4 Remove the power cable **3** from the back of the 7133.

5 To return power to the 7133, reinstall the power cable.

Note: All the disk drive modules start their power sequence when the input voltage is inside the specified limits. Their motors are started under control of the adapters in the using system. To prevent the need for excessive electrical current, the disk drive modules are not all started together. A maximum of four disk drive modules in the front of the 7133 and four disk drive modules in the back of the 7133 can be started together. At least 10 seconds must elapse before the next group of disk drive modules is started. Normally, all the disk drive modules are running in less than 30 seconds from the time when the 7133 is turned on.

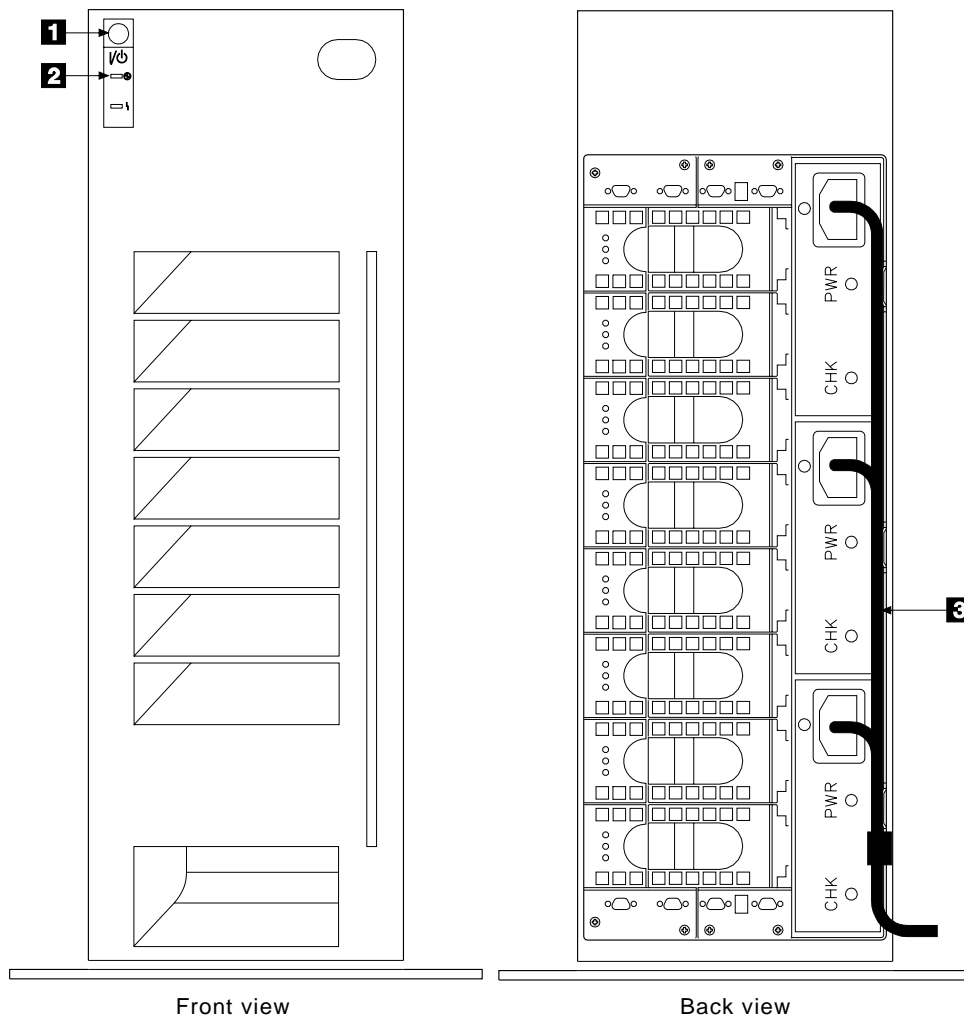
Power (Models 500 and 600)

1 Ensure that the using system is no longer using the disk drive modules in the 7133.

2 Observe the Subsystem Power light **2**. If the light is on:

- On Model 500, press the Power switch **1**, and hold it pressed for two seconds.
- On Model 600, press and release the Power switch **2**.

The Subsystem Power light goes off.



3 Open the back cover if not already open (see “Covers” on page 3-3).

4 Remove the power cable **3** from the electrical power outlet and from the back of the 7133.

5 To return power to the 7133, reinstall the power cable.

Note: All the disk drive modules start their power sequence when the input voltage is inside the specified limits. Their motors are started under control of the adapters in the using system. To prevent the need for excessive

electrical current, the disk drive modules are not all started together. A maximum of four disk drive modules in the front of the 7133 and four disk drive modules in the back of the 7133 can be started together. At least 10 seconds must elapse before the next group of disk drive modules is started. Normally, all the disk drive modules are running in less than 30 seconds from the time when the 7133 is turned on.

Disk Drive Modules

Note: A disk drive module is one FRU. Always exchange it as a complete FRU.

Removing a Module

Attention:

- Disk drive modules are fragile. Handle them with care, and keep them well away from strong magnetic fields.
- Any slot that has no disk drive module installed *must* contain a dummy disk drive module. The dummy module provides continuity of the SSA string, and ensures that the correct airflow is maintained around the disk drive modules in the other slots.

Notes:

1. Unless you have a particular reason to do so, do not turn off the using system or the 7133 when removing disk drive modules.
2. The diagrams in these instructions show a 7133 Model 010. The procedure for Models 020, 500, and 600 is the same, except that for Models 500 and 600, everything is turned through 90 degrees.

1 If you are removing the disk drive module under concurrent maintenance (see “Concurrent Maintenance” on page 3-1), first ensure that the using system is not using the disk drive module that you want to remove.

2 Use the Set/Reset Service Mode function of the SSA service functions to put into Service Mode the disk drive module that you are removing (see the *Installation and User's Guide* for the using-system SSA attachment hardware).

Note: You can put into Service Mode only disk drive modules that are in a closed SSA loop or at the end of an SSA string. Only one disk drive module at a time can be in Service Mode.

If you are removing several disk drive modules; for example, because you are going to remove a backplane assembly:

- a. Carefully make a note of the locations of the disk drive modules and (if present) dummy disk drive modules before you start to remove them. This action ensures that you reinstall the modules into their original slots. (They might not all be connected to the same SSA loop.) Attach identifying labels to the modules if you want to.
- b. Choose any one disk drive module that is attached to the backplane assembly that you are removing.
- c. Put that disk drive module into Service Mode.
- d. Remove the disk drive module, as described in steps 3 through 7.
- e. Reset Service Mode.
- f. **Attention:** When you remove the remainder of the disk drive modules, remove each module only when the slot that is next to it becomes empty.

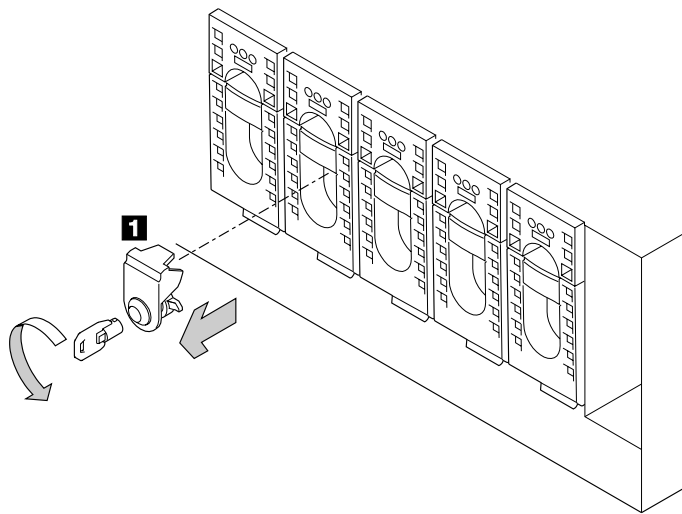
Repeat this procedure for one disk drive module at a time, ensuring that you always remove a module that is next to an empty slot.

3 If not already done:

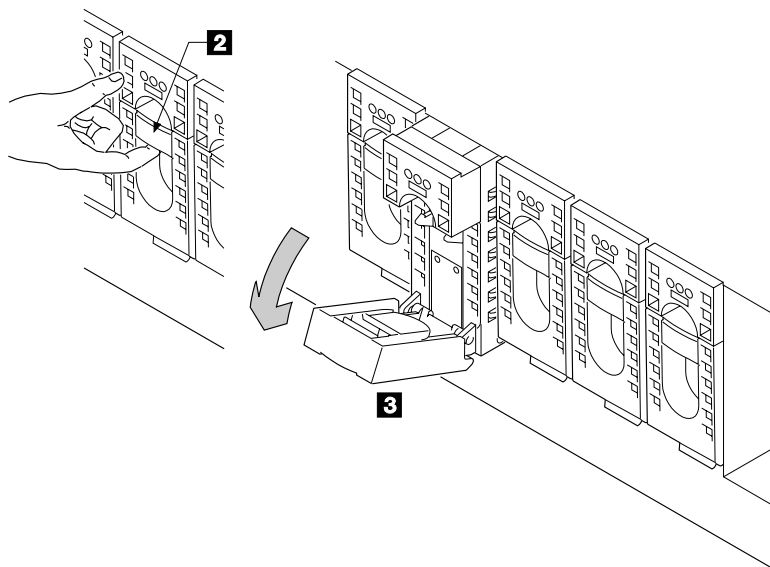
- Open the front cover (see “Covers” on page 3-3) if you are removing a disk drive module from the front of the 7133.
- Open the back cover (see “Covers” on page 3-3) if you are removing a disk drive module from the back of a Model 500 or Model 600.

4 If the disk drive module has a lock **1**, ask the customer for the key.

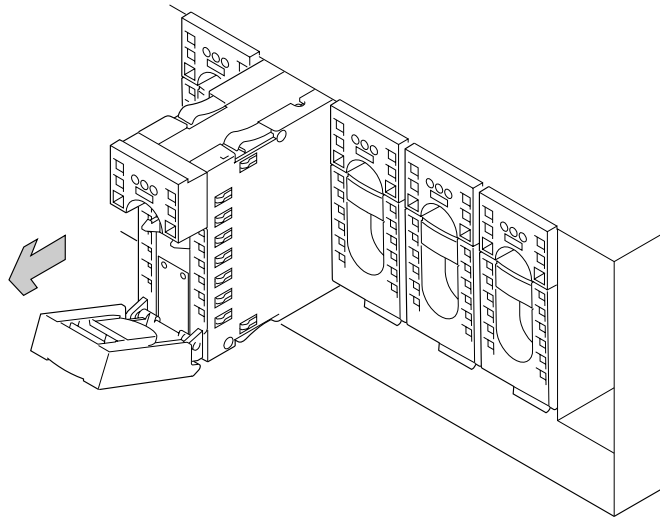
5 Insert the key into the lock, turn it counterclockwise, and remove the lock.



6 Press upward behind the red panel **2**, and open the handle **3**. This action pulls the disk drive module partially out of its slot.



- 7** Carefully pull out the disk drive module. As the module comes out, put one hand under its base to prevent it from falling.



- 8 Attention:** Any slot that has no disk drive module installed *must* contain a dummy disk drive module. The dummy module provides continuity of the SSA string, and ensures that the correct airflow is maintained around the disk drive modules in the other slots.

If you are not going to install a disk drive module into the empty slot, go to step 7 on page 3-20 in “Dummy Disk Drive Modules,” and install a dummy disk drive module.

- 9** If you exchanging the disk drive module for another, go to “Installing a Module” on page 3-15.

If you exchanging the disk drive module for a dummy disk drive module, go to step 7 on page 3-20.

Installing a Module

Attention:

- Disk drive modules are fragile. Handle them with care, and keep them well away from strong magnetic fields.
- Any slot that has no disk drive module installed *must* contain a dummy disk drive module. The dummy module provides continuity of the SSA string, and ensures that the correct airflow is maintained around the disk drive modules in the other slots.

Notes:

1. Unless you have a particular reason to do so, do not turn off the using system or the 7133 when installing disk drive modules.
2. The diagrams in these instructions show a 7133 Model 010. The procedure for Models 020, 500, and 600 is the same, except that for Models 500 and 600, everything is turned through 90 degrees.

1 If you are *reinstalling* a disk drive module and the covers of the 7133 have not been reinstalled since you removed that module, or if you are installing an exchange disk drive module, go to step 4 on page 3-16. Otherwise, go to step 2.

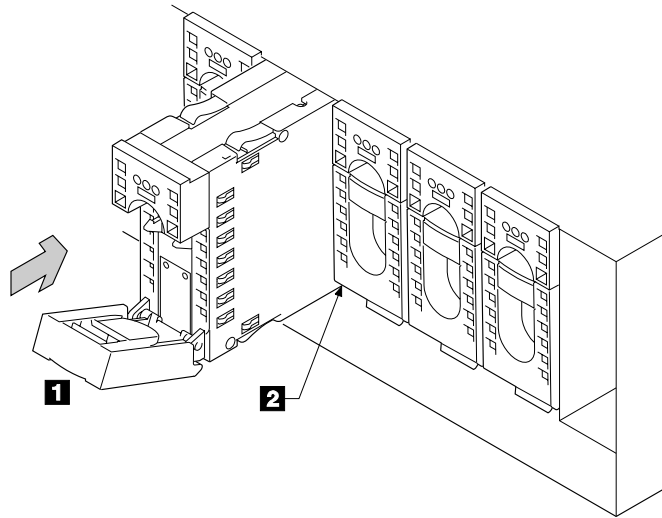
If you installing a disk drive module into a spare slot, go to step 2.

2 If not already done:

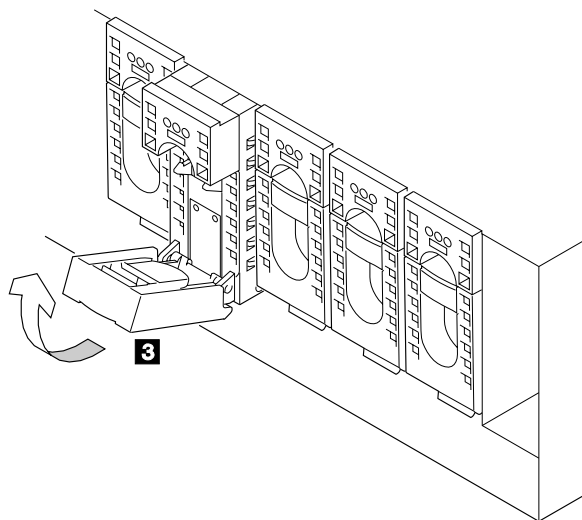
- Open the front cover (see “Covers” on page 3-3) if you are installing a disk drive module into the front of the 7133.
- Open the back cover (see “Covers” on page 3-3) if you are installing a disk drive module into the back of a Model 500 or Model 600.

3 If you are installing a disk drive module into a spare slot, first remove the dummy disk drive module from the slot (see “Dummy Disk Drive Modules” on page 3-18).

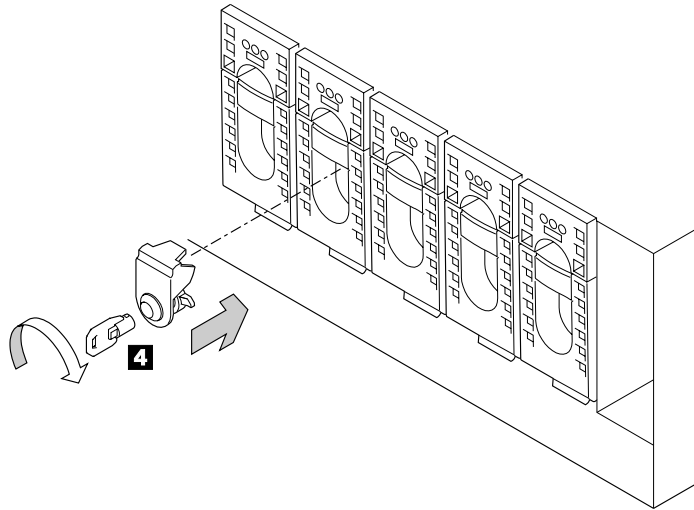
- 4 Ensure that the handle **1** on the disk drive module that you are installing is fully open.
- 5 With one hand giving support to the base of the module, engage the module in the groove **2**, and push it into its slot. The module stops before it is fully home.



- 6 Close the handle **3**. Press it in until you hear a click. This action pushes the module fully home.



- 7** If the disk drive module has a lock, install the lock **4** and turn the key clockwise. Return the key to the customer.



- 8** Replace other parts in the reverse order.
- 9** If the disk drive module is in Service Mode, reset Service Mode (see the *Installation and User's Guide* for the using-system SSA attachment hardware).
- 10** Use the Display VPD function of the SSA service functions to check the level of microcode that is present on the disk drive module that you have just installed. The microcode level of this disk drive module must be the same as, or higher than, the microcode level of the other disk drive modules.
- If necessary, use the Download Microcode function of the SSA service functions to download the latest level of microcode to the disk drive module.

Dummy Disk Drive Modules

Attention: Any slot that has no disk drive module installed *must* contain a dummy disk drive module. The dummy module provides continuity of the SSA string, and ensures that the correct airflow is maintained around the disk drive modules in the other slots.

Notes:

1. Unless you have a particular reason to do so, do not turn off the using system or the 7133 when removing dummy disk drive modules.
2. The diagrams in these instructions show a 7133 Model 010. The procedure for Models 020, 500, and 600 is the same, except that for Models 500 and 600, everything is turned through 90 degrees.

1 If not already done:

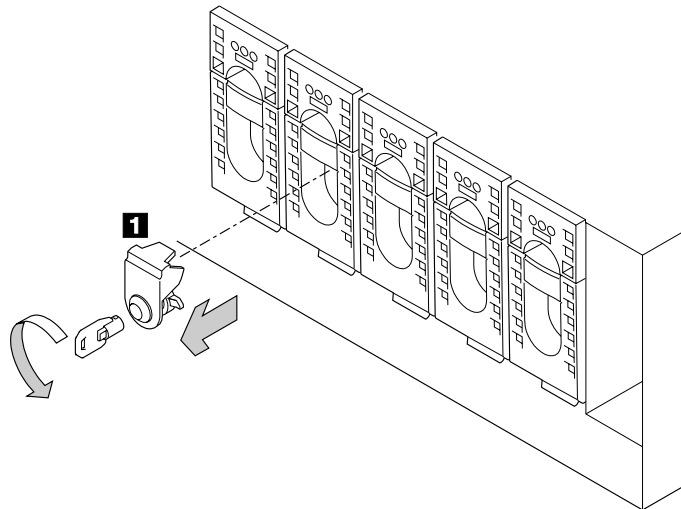
- Open the front cover (see “Covers” on page 3-3) if you are removing a dummy disk drive module from the front of the 7133.
- Open the back cover (see “Covers” on page 3-3) if you are removing a dummy disk drive module from the back of a Model 500 or Model 600.

2 Before you start to remove the dummy disk drive module, use the Show SSA Topology function of the SSA service functions to verify that the loop containing the module is complete (see the *Installation and User's Guide* for the using-system SSA attachment hardware).

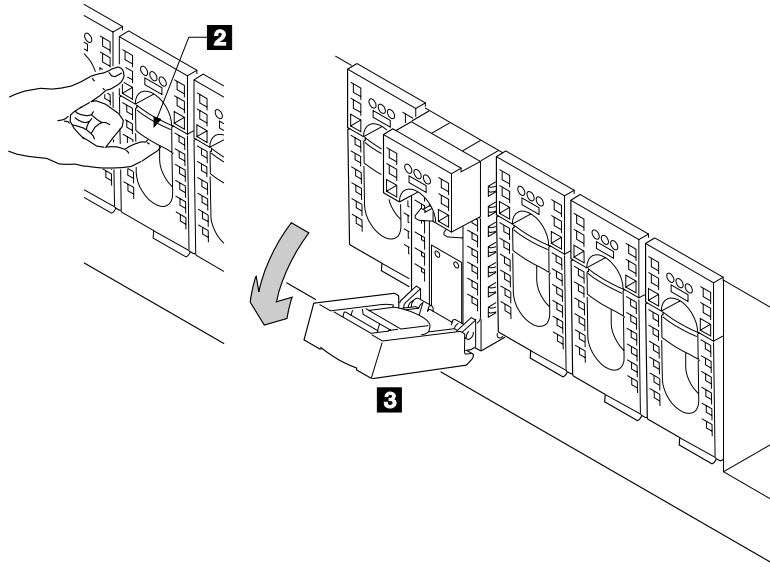
If the loop is broken, repair it before you continue with these instructions.

3 If the dummy disk drive module has a lock **1**, ask the customer for the key.

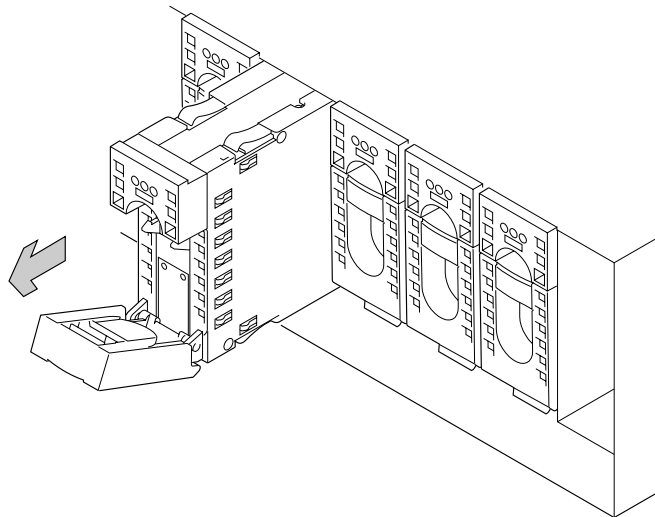
4 Insert the key into the lock, turn it counterclockwise, and remove the lock.



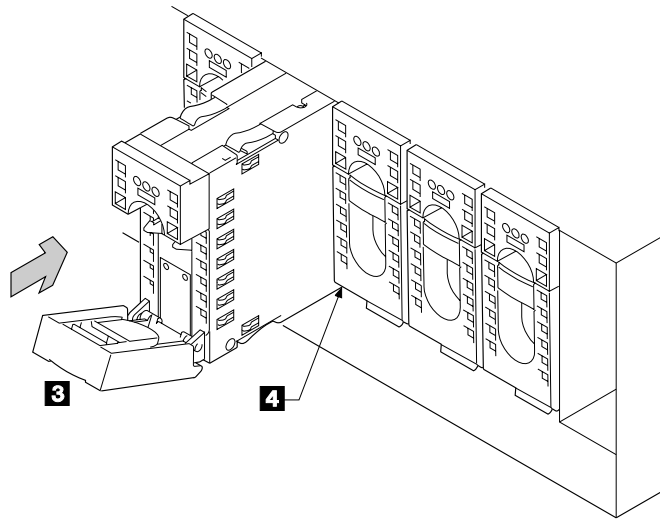
- 5** Press upward behind the red panel **2**, and open the handle **3**. This action pulls the dummy disk drive module partially out of its slot.



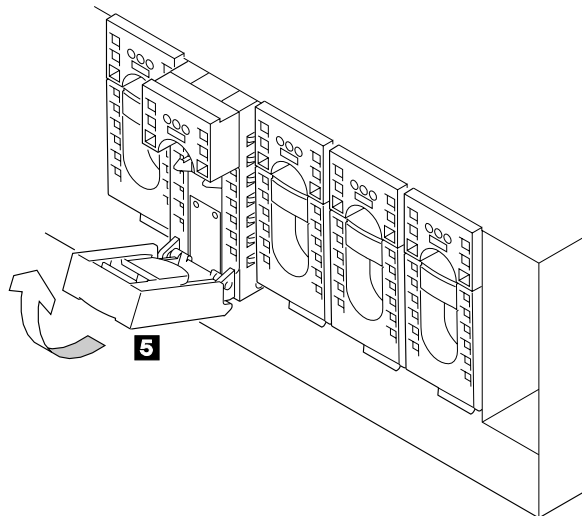
- 6** Carefully pull out the dummy disk drive module. As the module comes out, put one hand under its base to prevent it from falling.



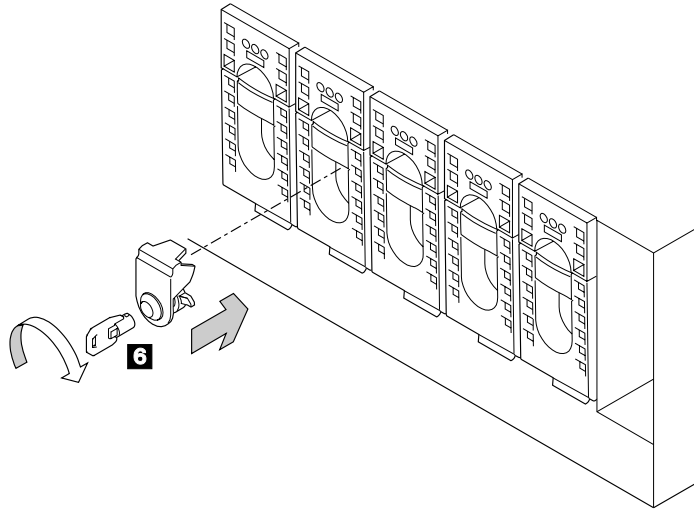
- 7** To install a dummy disk drive module:
- Ensure that the handle **3** on the dummy disk drive module is fully open.
 - With one hand giving support to the base of the module, engage the module in the groove **4**, and push it into its slot. The module stops before it is fully home.



- Close the handle **5**. Press it in until you hear a click. This action pushes the module fully home.



- d. If the module has a lock, install the lock **6** and turn the key clockwise. Return the key to the customer.



- 8** Replace other parts in the reverse order.

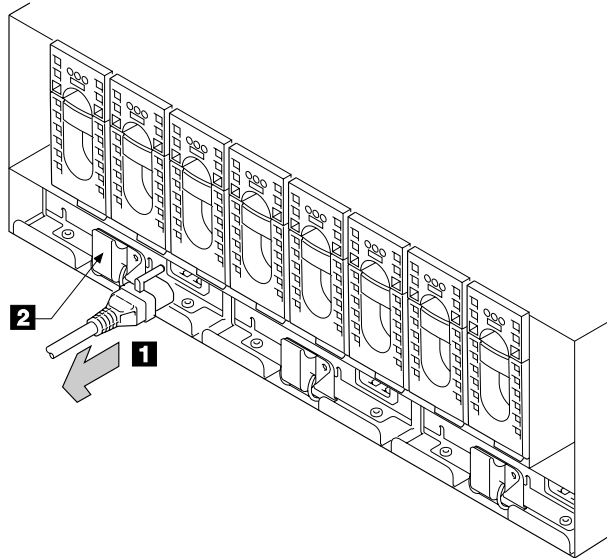
Fan-and-Power-Supply Assemblies

Attention: If you are servicing the 7133 under concurrent maintenance (see “Concurrent Maintenance” on page 3-1), ensure that you have only one fan-and-power-supply assembly removed from the 7133 at any time.

Notes:

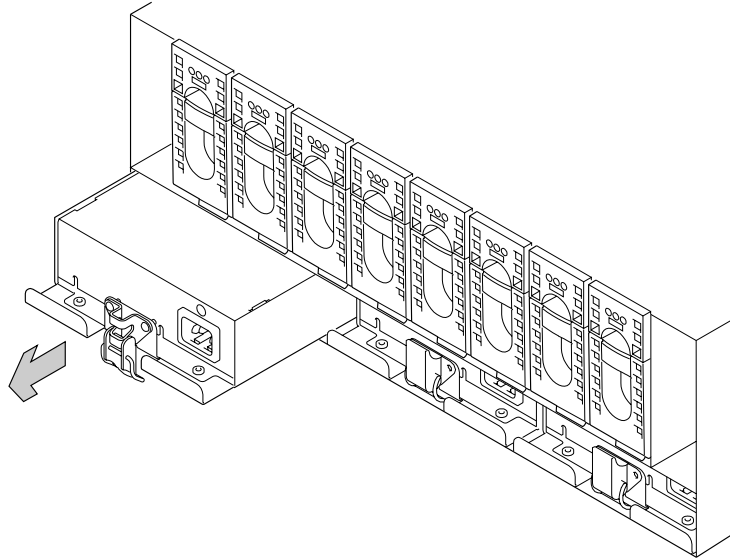
1. Unless you have a particular reason to do so, do not turn off the using system or the 7133 when removing or installing fan-and-power-supply assemblies.
2. The diagrams in these instructions show a 7133 Model 010. The procedure for Models 020, 500, and 600 is the same, except that for Models 500 and 600, everything is turned through 90 degrees.

- 1** At the back of the 7133, unplug the power cable **1** from the fan-and-power-supply assembly that you are going to remove.



- 2** Open the latch **2** on the assembly you are going to remove.

3 Pull out the assembly.



The fan-and-power-supply assembly is a complete FRU. Do not try to repair or exchange any part of it.

DANGER

Do not try to open the covers of the power-supply component.

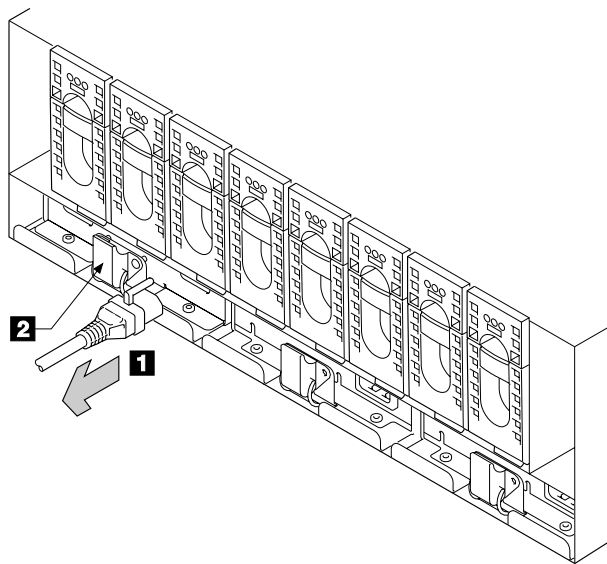
4 Replace parts in the reverse order.

Dummy Fan-and-Power-Supply Assembly (Models 010 and 500 Only)

Notes:

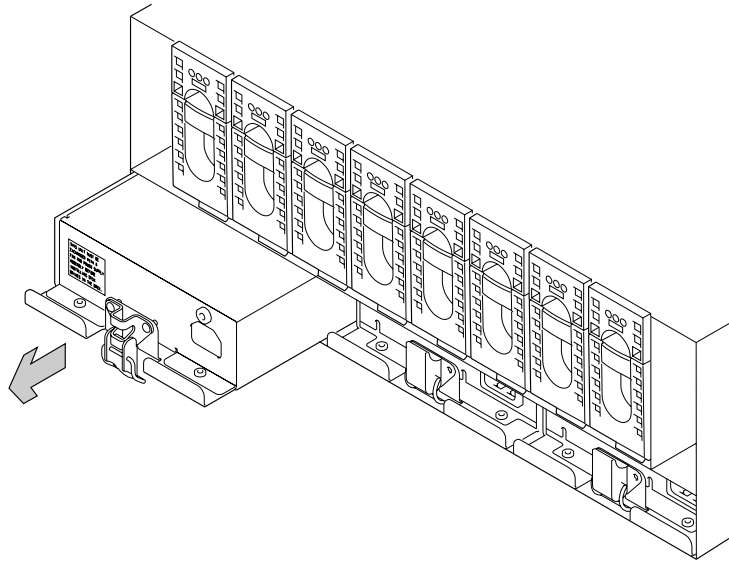
1. Unless you have a particular reason to do so, do not turn off the using system or the 7133 when removing or installing the dummy fan-and-power-supply assembly.
2. The diagrams in these instructions show a 7133 Model 010. The procedure for Model 500 is the same, except that everything is turned through 90 degrees.
3. The dummy fan-and-power-supply assembly can be present only in position 1 (as shown in the diagram).

1 At the back of the 7133, remove the power cable **1** from the hole in the dummy fan-and-power-supply assembly.



2 Open the latch **2** on the assembly.

3 Pull out the assembly.



The dummy fan-and-power-supply assembly is a complete FRU. Do not try to repair or exchange any part of it.

4 Attention: Errors occur if a dummy fan-and-power-supply assembly is not present in a 7133 that is in base or expanded configuration (see “Hardware Configurations” on page 1-12).

Replace parts in the reverse order. If you are installing a dummy fan-and-power-supply assembly, ensure that you install it into position 1.

Control Panel Assembly

Note: Unless you have a particular reason to do so, do not turn off the using system or the 7133 when removing or installing the control panel assembly.

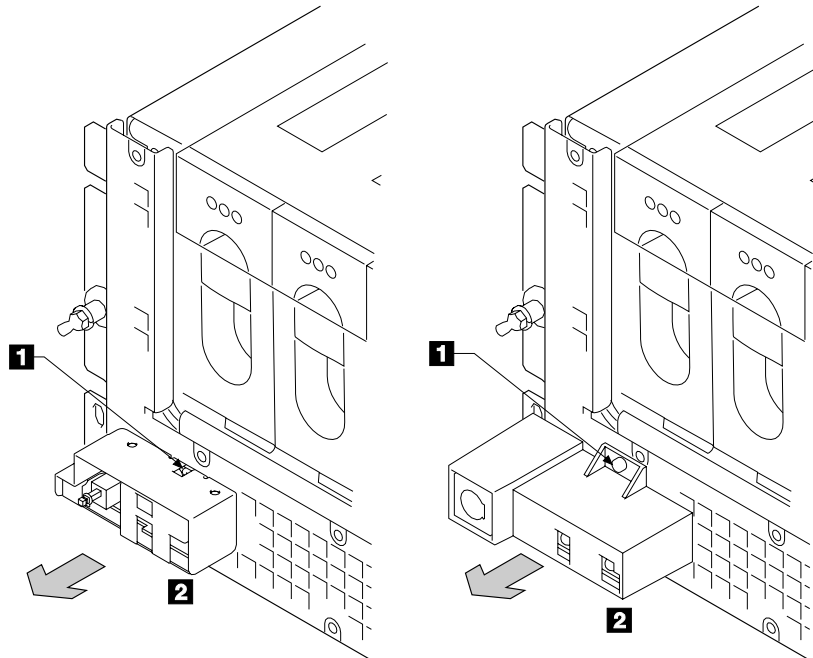
This section has two subsections; one is for Models 010 and 020, the other is for Models 500 and 600. Go to the appropriate subsection.

Control Panel Assembly (Models 010 and 020)

1 If not already done, remove (if an early type) or open (if a late type) the front cover (see “Covers” on page 3-3).

2 Unscrew the captive screw **1**.

Note: The control panel assembly shown on the left-hand side of the diagram is present on 7133s that have the early type of front cover. The control panel assembly shown on the right-hand side of the diagram is present on 7133s that have the late type of front cover.



3 Pull off the control panel assembly **2**.

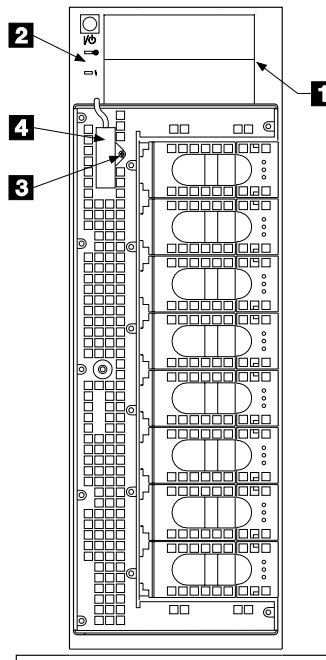
Note: If mainline electrical power is present in the 7133, the internal dc power turns on (if previously turned off) when the control panel assembly is removed. The dc power remains turned on when the control panel assembly is reinstalled.

4 Replace parts in the reverse order.

Control Panel Assembly (Models 500 and 600)

- 1 Open the front cover if not already done (see “Covers” on page 3-3).
- 2 Remove the bezel **1** by lifting it and disengaging it from the top cover of the 7133.
- 3 Slide the control panel assembly **2** out of its runners.
- 4 Unscrew the captive screw **3**.
- 5 Pull off the control panel assembly **4**.

Note: If mainline electrical power is present in the 7133, the internal dc power turns on (if previously turned off) when the control panel assembly is removed. The dc power remains turned on when the control panel assembly is reinstalled.



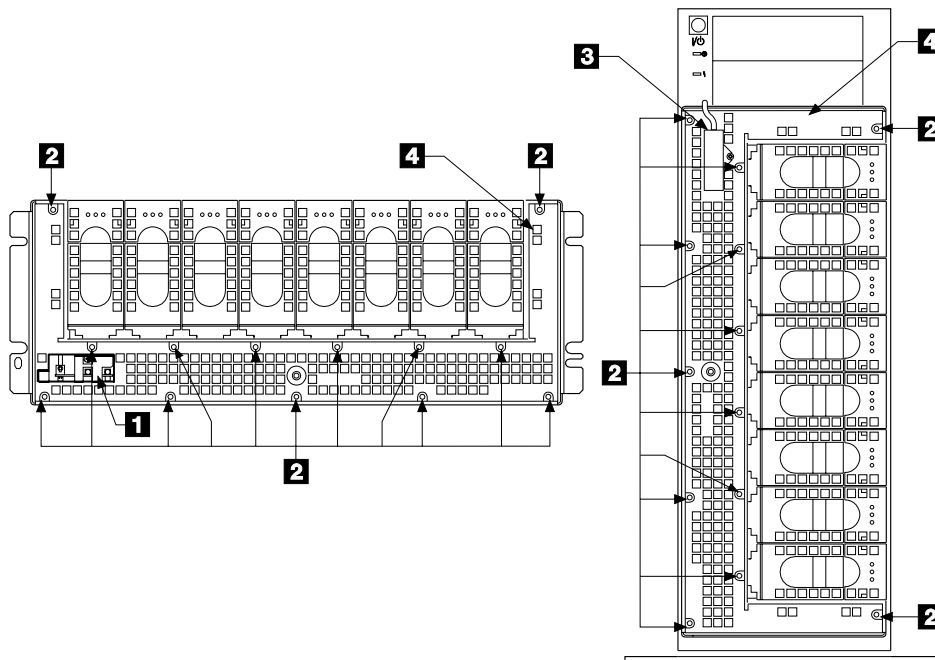
- 6 Replace parts in the reverse order.

Power-Distribution Tray Assemblies

Attention: If you are servicing the 7133 under concurrent maintenance (see “Concurrent Maintenance” on page 3-1), ensure that you have only one power-distribution tray assembly removed from the 7133 at any time.

Note: Unless you have a particular reason to do so, do not turn off the using system or the 7133 when removing or installing a power-distribution tray assembly.

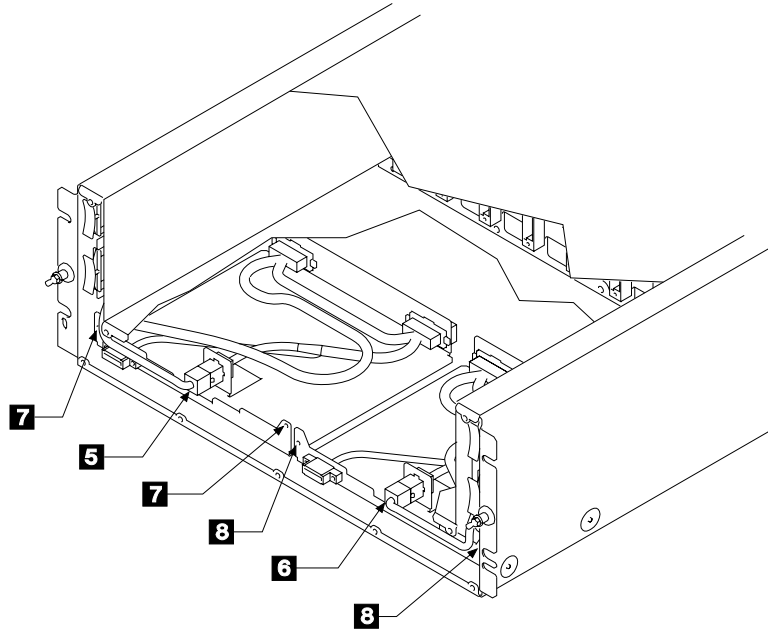
- 1** If not already done, remove (Models 010 and 020) or open (Models 500 and 600) the front cover (see “Covers” on page 3-3).
- 2** On Models 010 and 020, remove the control panel assembly **1** (see “Control Panel Assembly” on page 3-26).
On Models 500 and 600, disconnect the control panel connector **3**.
- 3** Unscrew the captive screws **2**, and remove the RFI shield **4**.



4 Attention: Errors can occur if you disconnect both back-power card cables while the 7133 is running. Never disconnect both back-power card cables unless the job you are doing needs you to do so (for example, the removal of a backplane assembly).

Disconnect the relevant back-power card cable **5** or **6** from the power-distribution tray assembly that you are removing.

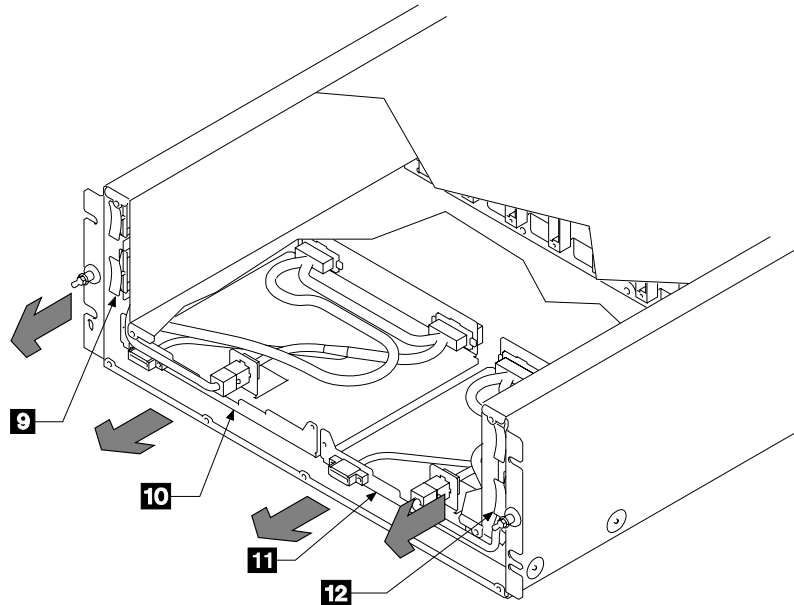
Note: The diagram shows a 7133 Model 010. The procedure for Models 020, 500, and 600 is the same, except that for Models 500 and 600, everything is turned through 90 degrees.



5 Unscrew the two captive screws **7** or **8** on the power-distribution tray assembly that you are removing.

- 6** Each power-distribution tray assembly consists of a connector tray **10** or **11** and a power card **9** or **12**. Pull the relevant power card forward until you feel it release from the backplane connector.

Note: The diagram shows a 7133 Model 010. The procedure for Models 020, 500, and 600 is the same, except that for Models 500 and 600, everything is turned through 90 degrees.



- 7** Carefully pull the complete power-distribution tray assembly out from the 7133.

- 8** Replace parts in the reverse order.

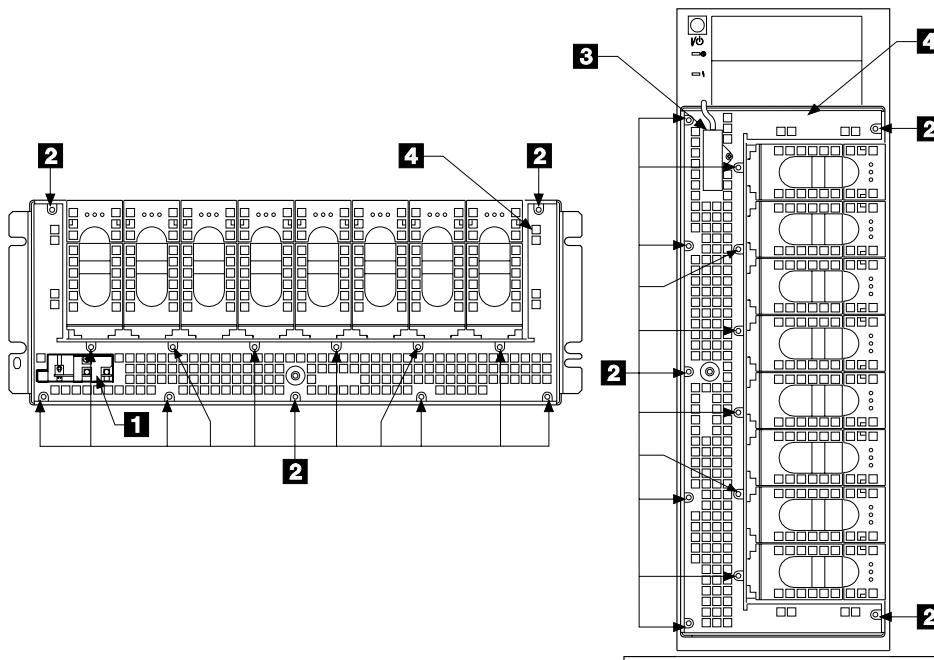
Note: When installing the power-distribution tray assembly, ensure that you push both the connector tray and the power card fully home.

Back-Power Cards

Attention: If you are servicing the 7133 under concurrent maintenance (see “Concurrent Maintenance” on page 3-1), ensure that you have only one back-power card removed from the 7133 at any time.

Note: Unless you have a particular reason to do so, do not turn off the using system or the 7133 when removing or installing a back-power card.

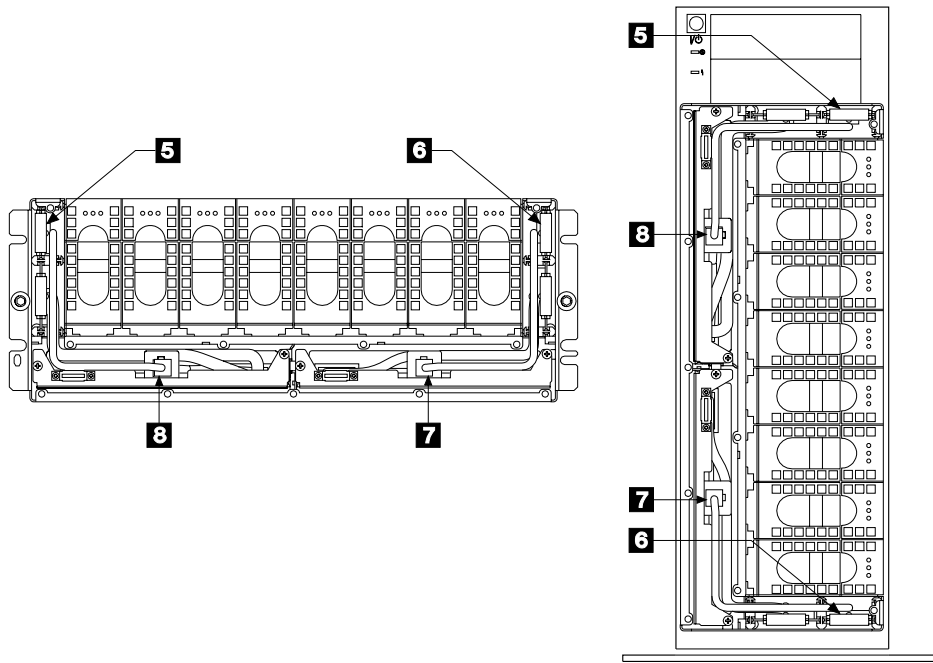
- 1** If not already done, remove (Models 010 and 020) or open (Models 500 and 600) the front cover (see “Covers” on page 3-3).
- 2** On Models 010 and 020, remove the control panel assembly **1** (see “Control Panel Assembly” on page 3-26).
On Models 500 and 600, disconnect the control panel connector **3**.
- 3** Unscrew the captive screws **2**, and remove the RFI shield **4**.



4 Attention: Errors can occur if you disconnect both back-power card cables while the 7133 is running. Never disconnect both back-power card cables unless the job you are doing needs you to do so (for example, the removal of a backplane assembly).

Disconnect the cable **8** or **7** for the back-power card that you are removing.

5 Pull out the relevant back-power card **5** or **6**.



6 Replace parts in the reverse order. Ensure that you push the power cards fully home.

Signal Cards and Bypass Cards

Attention:

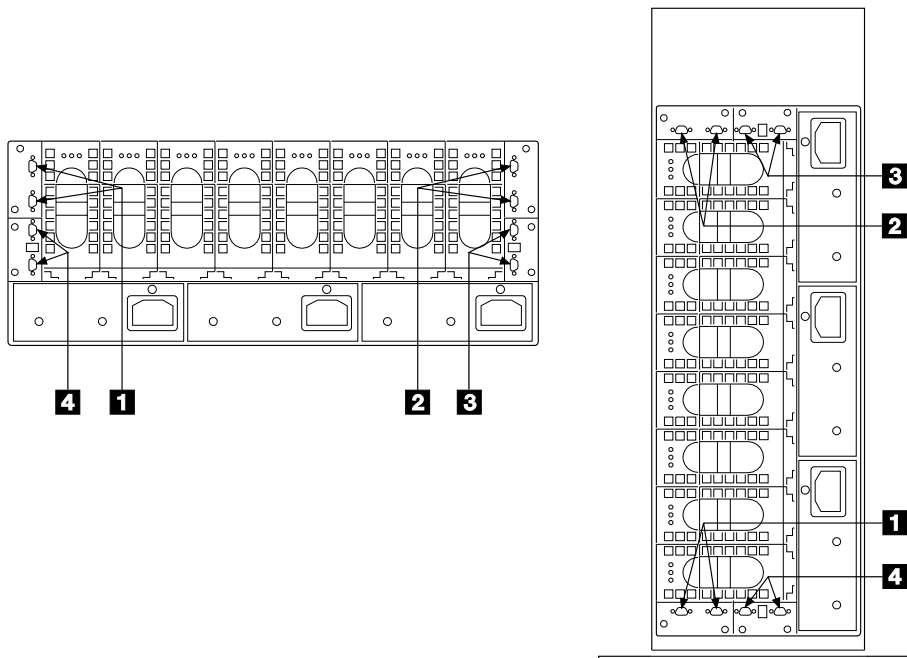
- If you are removing a back-signal card from a **Model 010 or Model 500**, ensure that all the disk drive modules in the back of the 7133 are not being used by the using system.
- If you are removing a front-signal card from a **Model 010 or Model 500**, ensure that all the disk drive modules in the front of the 7133 are not being used by the using system.
- If you are removing a bypass card from a **Model 020 or Model 600**, check the configuration of the 7133 to find out which disk drive modules are affected by the removal of this particular bypass card. Ensure that all disk drive modules so affected are not being used by the using system.

Note: Unless you have a particular reason to do so, do not turn off the using system or the 7133 when removing or installing a signal card or bypass card.

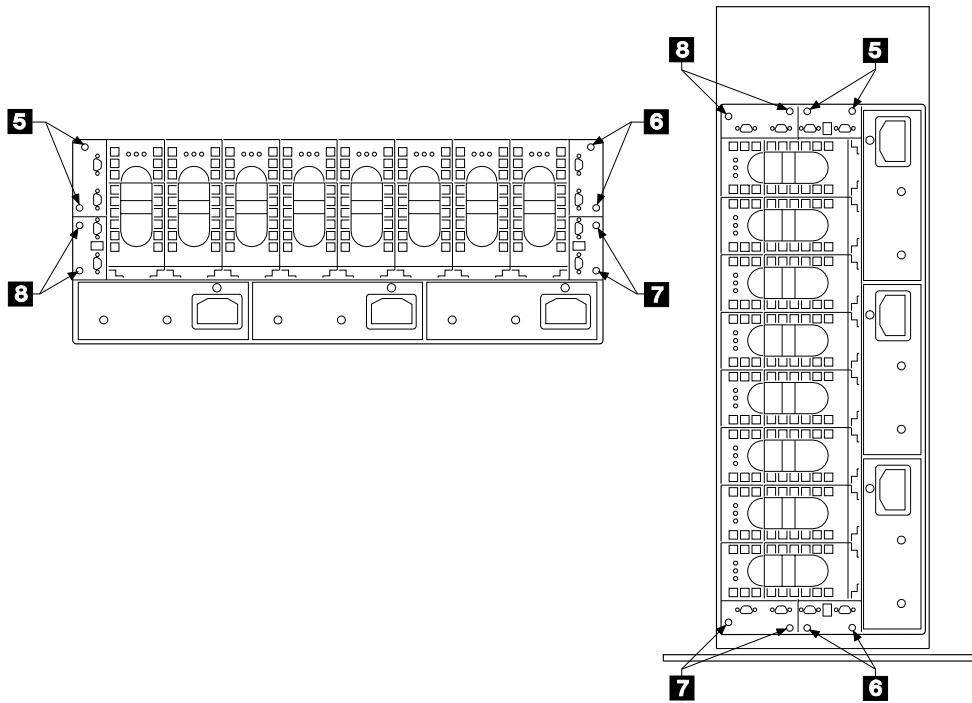
- 1** Disconnect the external SSA cables (if present) from the card that you are going to remove. To prevent damage to the SSA connector screws, ensure that you use the special screwdriver (SSA tool, part 32H7059) to unscrew them. The screwdriver is supplied with the 7133.

Note: On Models 010 and 500, SSA connectors **1** and **2** are on the back-signal cards. SSA connectors **3** and **4** are on the front-signal cards.

On Models 020 and 600, the bypass cards are not defined as front or back cards.



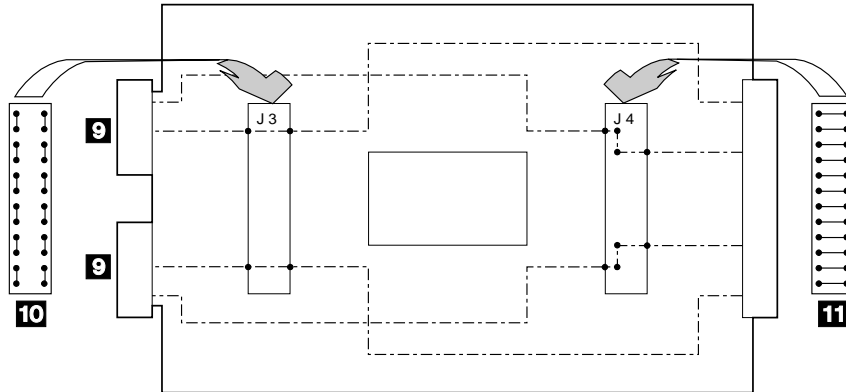
- 2** Unscrew the captive screws **5**, **6**, **7**, or **8** on the card that you are going to remove.



- 3** Pull out the card.
- 4** If you are now going to install a new signal card, (Model 010 or Model 500), go to step 10 on page 3-36.
- If you are now going to install a new bypass card, or change the jumper settings on the card that you have just removed (Model 020 or Model 600), go to step 5 on page 3-35.

5 Observe the following two diagrams. They represent a bypass card that is lying flat with its electronic components upward and its SSA connectors **9** to the left.

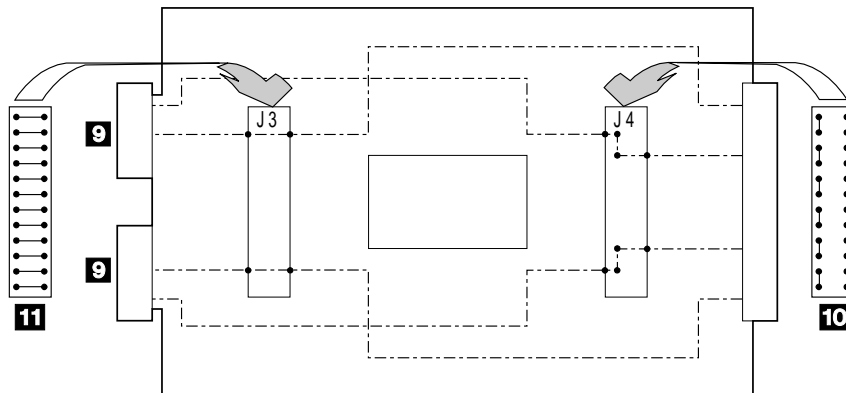
a. This diagram shows the jumpers set for **Bypass mode**.



For Bypass mode, the jumper **10** that has links between neighboring pins along its length is plugged into connector J3. The jumper **11** that has links between neighboring pins across its width is plugged into connector J4.

Note: The default setting of all new bypass cards is for Bypass mode.

b. This diagram shows the jumpers set for **Forced Inline mode**.



For Forced Inline mode, the jumper **10** that has links between neighboring pins along its length is plugged into connector J4. The jumper **11** that has links between neighboring pins across its width is plugged into connector J3.

6 If you are installing a new bypass card, go to step 7.

If you are changing the jumper settings of the card that you have just removed, go to step 8 on page 3-36.

7 Check whether the jumpers on the new card are set for the same mode as are the jumpers on the card that you have just removed.

If they are set for the same mode, you can now install the new bypass card. Go to step 10 on page 3-36.

If they are **not** set for the same mode, you must swap the positions of the jumpers on the new card. Go to step 8.

8 Unplug the jumpers from their connectors.

9 Swap the positions of the jumpers to change to the other mode (see steps 5a and 5b), then go to step 10.

10 Replace parts in the reverse order. Ensure that you push the cards fully home.

Note: When you reinstall the external SSA cables, ensure that you use the special screwdriver (SSA tool, part 32H7059) to tighten the SSA connector screws.

Front Backplane Assembly

Note for Models 010 and 500: The front backplane assembly can be removed while the disk drive modules at the back of the 7133 remain operational. Unless you have a particular reason to do so, do not turn off the using system or the 7133 when removing or installing the front backplane assembly.

- 1** Use the Show SSA Topology function of the SSA service functions (see the *Installation and User's Guide* for the using-system SSA attachment hardware) to ensure that all SSA loops that pass through the front backplane assembly are not broken. (For example, all external SSA cables are connected correctly; all disk drive modules and, if required, dummy disk drive modules are installed correctly.)

If a loop is broken, repair it, then check whether you have solved the original problem. If the problem remains, go to step 2.

- 2** If not already done, remove (Models 010 and 020) or open (Models 500 and 600) the front cover (see "Covers" on page 3-3).

- 3** On Models 010 and 500, ensure that the disk drive modules at the front of the 7133 are not being used by the using system.

On Models 020 and 600, stop all operations on the 7133, then remove power from the 7133 (see "All Power" on page 3-8).

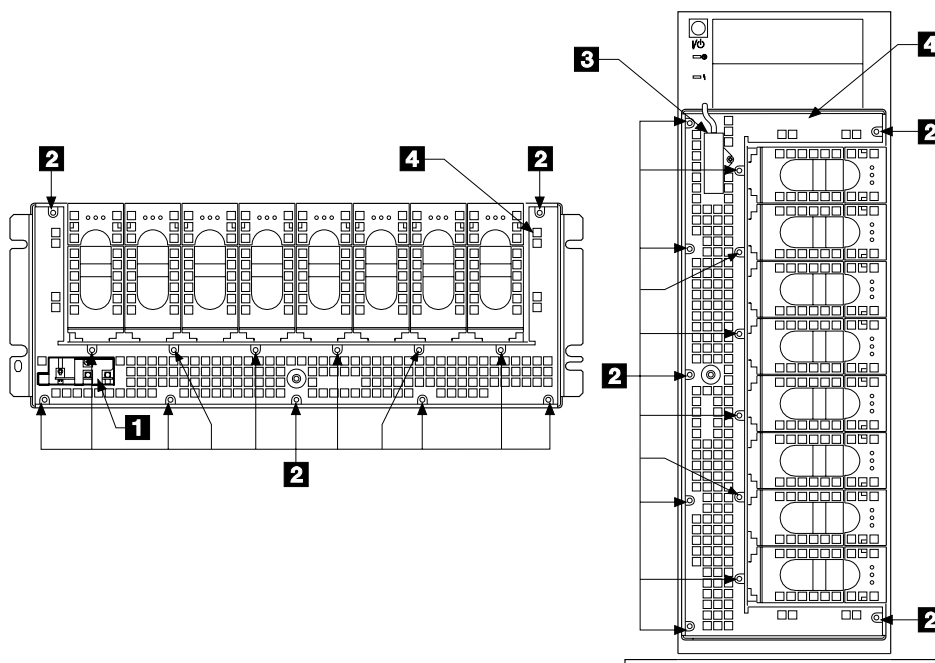
- 4** Carefully make a note of the locations of the disk drive modules and (if present) dummy disk drive modules that are at the front of the 7133. This action ensures that you reinstall the modules into their original slots. (They might not all be connected to the same SSA loop.) Attach identifying labels to the modules if you want to.

- 5** Remove all the disk drive modules and dummy disk drive modules from the front of the 7133 (see "Removing a Module" on page 3-12).

6 On Models 010 and 020, remove the control panel assembly **1** (see “Control Panel Assembly” on page 3-26).

On Models 500 and 600, disconnect the control panel connector **3**.

7 Unscrew the captive screws **2**, and remove the RFI shield **4**.



8 On Models 500 and 600, open the back cover (see “Back Cover (Models 500 and 600 Only)” on page 3-7).

9 At the back of the 7133, do the following actions:

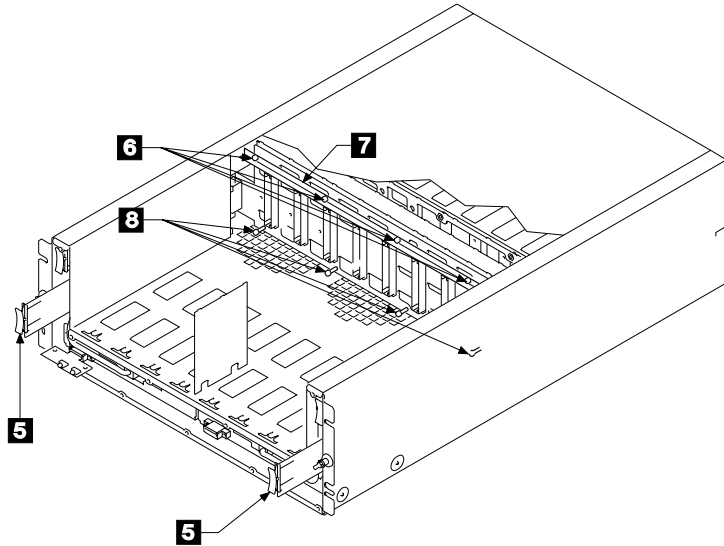
- For Models 010 and 500:
 - a. Disconnect the external SSA cables (if present) from the two front-signal cards. To prevent damage to the SSA connector screws, ensure that you use the special screwdriver (SSA tool, part 32H7059) to unscrew them. The screwdriver is supplied with the 7133.
 - b. Remove the two front-signal cards (see “Signal Cards and Bypass Cards” on page 3-33).
- For Models 020 and 600:
 - a. Disconnect the external SSA cables (if present) from all four bypass cards. To prevent damage to the SSA connector screws, ensure that you use the special screwdriver (SSA tool, part 32H7059) to unscrew them. The screwdriver is supplied with the 7133.
 - b. Remove the four bypass cards (see “Signal Cards and Bypass Cards” on page 3-33).

10 At the front of the 7133, pull out the two front-power cards **5** as far as their cables allow.

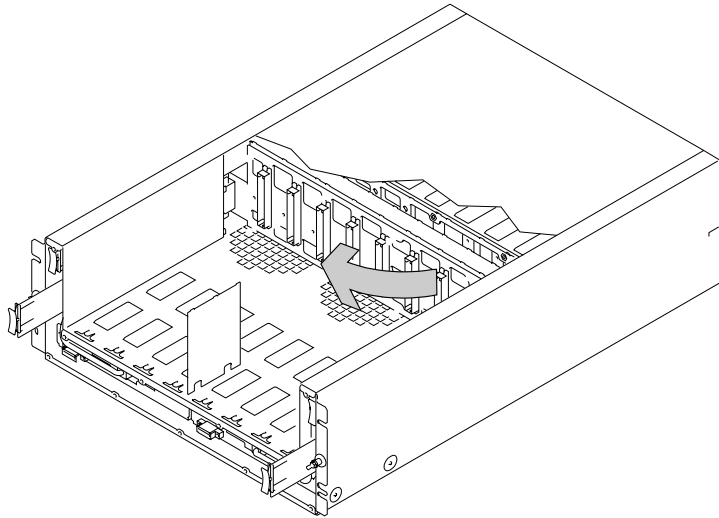
11 Reach into the front of the 7133. Unscrew the four captive screws **6**, and remove the bracket assembly **7**.

12 Unscrew the four captive screws **8**.

Note: The diagrams in these instructions show a 7133 Model 010. The procedure for Models 020, 500, and 600 is the same, except that for Models 500 and 600, everything is turned through 90 degrees.



- 13** Pull the right-hand side (Models 010 and 020) or lower end (Models 500 and 600) of the backplane assembly toward you, then pull the backplane assembly out through the front of the 7133.



- 14** Replace parts in the reverse order.

Notes:

- a. When you install the backplane assembly, do not tighten the four captive screws in the bracket assembly and the four captive screws in the backplane assembly until **after** you have reinstalled the power cards and signal or bypass cards. The cards can be plugged in more easily if the backplane assembly is free to move slightly.
- b. When you reinstall the external SSA cables, ensure that you use the special screwdriver (SSA tool, part 32H7059) to tighten the SSA connector screws.

Back Backplane Assembly

Note for Models 010 and 500: The back backplane assembly can be removed while the disk drive modules at the front of the 7133 remain operational. Unless you have a particular reason to do so, do not turn off the using system or the 7133 when removing or installing the back backplane assembly.

- 1** Use the Show SSA Topology function of the SSA service functions (see the *Installation and User's Guide* for the using-system SSA attachment hardware) to ensure that all SSA loops that pass through the back backplane assembly are not broken. (For example, all external SSA cables are connected correctly; all disk drive modules and, if required, dummy disk drive modules are installed correctly.)

If a loop is broken, repair it, then check whether you have solved the original problem. If the problem remains, go to step 2.

- 2** If not already done, remove (Models 010 and 020) or open (Models 500 and 600) the front cover (see "Covers" on page 3-3).
- 3** On Models 010 and 500, ensure that the disk drive modules in the back of the 7133 are not being used by the using system.
On Models 020 and 600, stop all operations on the 7133, then remove all power from the 7133 (see "All Power" on page 3-8).
- 4** Remove the two back-power cards from the front of the 7133 (see "Back-Power Cards" on page 3-31).
- 5** On Models 500 and 600, open the back cover (see "Back Cover (Models 500 and 600 Only)" on page 3-7).
- 6** Carefully make a note of the locations of the disk drive modules and (if present) dummy disk drive modules that are at the back of the 7133. This action ensures that you reinstall the modules into their original slots. (They might not all be connected to the same SSA loop.) Attach identifying labels to the modules if you want to.
- 7** Remove all the disk drive modules and dummy disk drive modules from the back of the 7133 (see "Removing a Module" on page 3-12).

- 8** At the back of the 7133, do the following actions:

- For Models 010 and 500:
 - a. Disconnect the external SSA cables (if present) from the two back-signal cards. To prevent damage to the SSA connector screws, ensure that you use the special screwdriver (SSA tool, part 32H7059) to unscrew them. The screwdriver is supplied with the 7133.
 - b. Remove the two back-signal cards (see "Signal Cards and Bypass Cards" on page 3-33).
- For Models 020 and 600:
 - a. Disconnect the external SSA cables (if present) from all four bypass cards. To prevent damage to the SSA connector screws, ensure that

you use the special screwdriver (SSA tool, part 32H7059) to unscrew them. The screwdriver is supplied with the 7133.

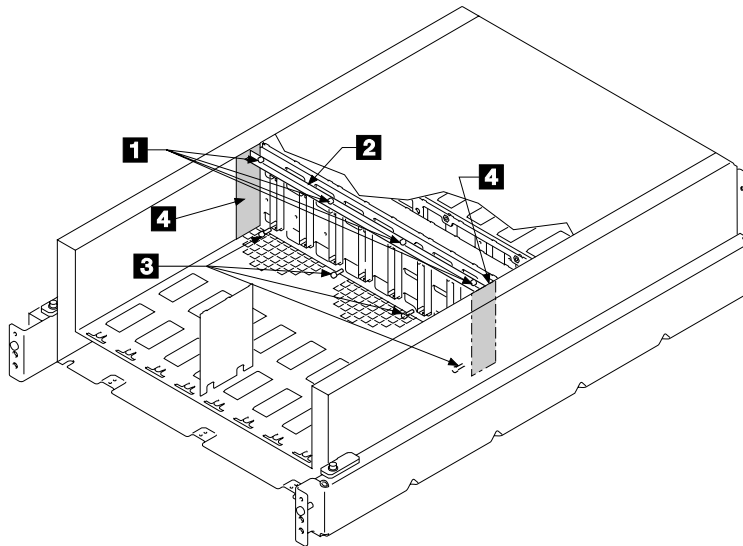
- b. Remove the four bypass cards (see “Signal Cards and Bypass Cards” on page 3-33).

- 9** Reach into the back of the 7133. Unscrew the four captive screws **1**, and remove the bracket assembly **2**.

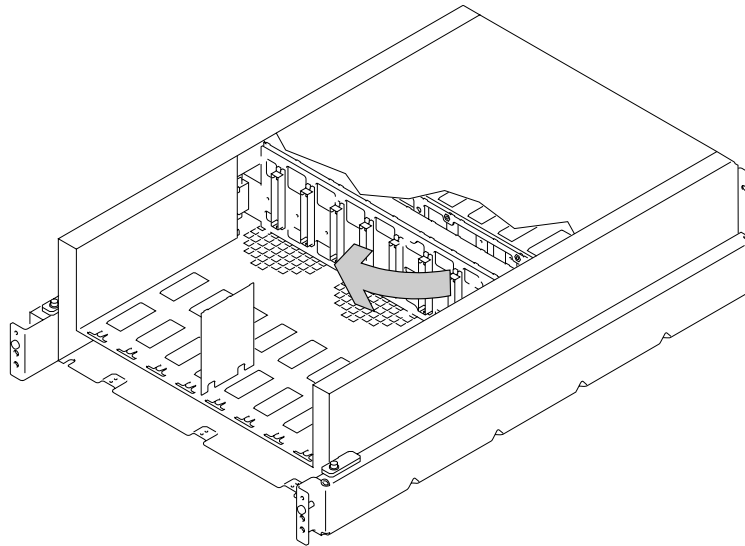
Note: The diagrams in these instructions represent 7133 Models 010 and 020. The procedure for Models 500 and 600 is the same, except that everything is turned through 90 degrees.

- 10** If you are servicing a Model 020 or Model 600, remove the two self-adhesive plastic air baffles **4**. You will need to install two new plastic air baffles (part 31H8722) after you have replaced the backplane assembly.

- 11** Unscrew the four captive screws **3**.



- 12** Pull the right-hand side (Models 010 and 020) or upper end (Models 500 and 600) of the backplane assembly toward you, then pull the backplane assembly out through the back of the 7133.



- 13** Replace parts in the reverse order.

Notes:

- a. When you install the backplane assembly, do not tighten the four captive screws in the bracket assembly and the four captive screws in the backplane assembly until **after** you have reinstalled the power cards and signal or bypass cards. The cards can be plugged in more easily if the backplane assembly is free to move slightly.
- b. If you are servicing a Model 020 or Model 600, ensure that you install two new plastic air baffles **4** (part 31H8722). The baffles are self-adhesive. Pull off the protective cover, and attach the baffles
- c. When you reinstall the external SSA cables, ensure that you use the special screwdriver (SSA tool, part 32H7059) to tighten the SSA connector screws.

Removing a 7133 from a Rack

Notes:

1. This procedure applies only to Models 010 and 020.
2. You will need another service representative to help you remove the 7133 from the rack.

Attention: Unless the using system needs to be turned off for some other reason, *do not turn off the using system when servicing the 7133.* Power cables and external SSA cables that connect the 7133 to the using system can be disconnected while that system is running.

- 1** If this 7133 is connected to an operational SSA network, use the Show SSA Topology function of the SSA service functions (see the *Installation and User's Guide* for the using-system SSA attachment hardware) to ensure that all SSA loops that pass through the internal strings of this 7133 are not broken. (For example, all external SSA cables are connected correctly; all disk drive modules and, if required, dummy disk drive modules are installed correctly.)

If a loop is broken, repair it before you start to remove the 7133 from the rack; otherwise, the network might fail when you disconnect the 7133.

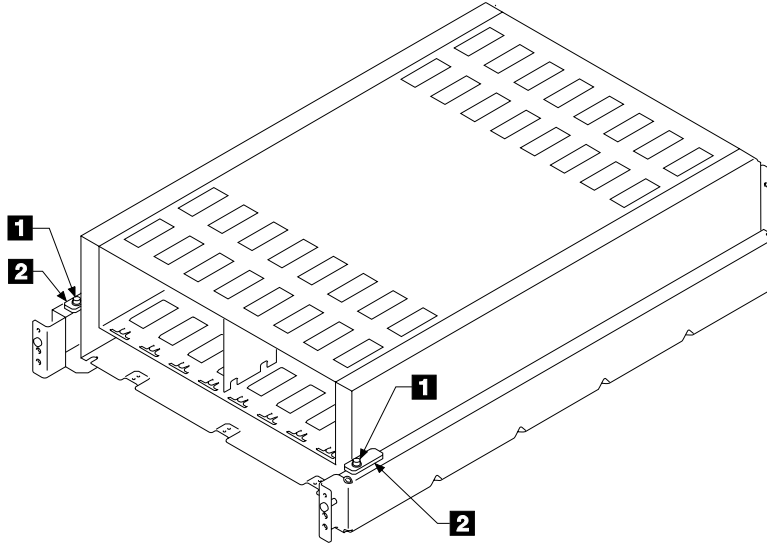
- 2** If not already done:
 - a. Ensure that all the disk drive modules in the 7133 are not being used by the using system.
 - b. Disconnect all the external SSA cables from the back of the 7133. To prevent damage to the SSA connector screws, ensure that you use the special screwdriver (SSA tool, part 32H7059) to unscrew them. The screwdriver is supplied with the 7133.
 - c. Remove all power from the 7133 (see "All Power" on page 3-8).
 - d. Remove (if an early type) or open (if a late type) the front cover (see "Covers" on page 3-3).

3 CAUTION:

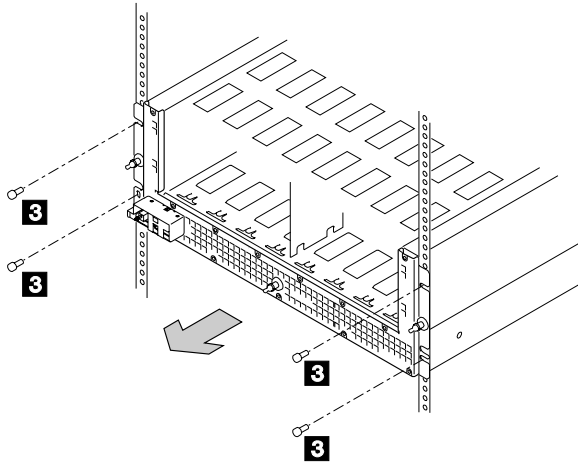
- **The stabilizer must be correctly attached to the bottom front of the rack to prevent the rack from tipping forward while the units are being removed from the rack. Do not pull out or install any unit if the stabilizer is not attached to the rack.**
- **A 7133 weighs up to 50.0 kg (110 lb) with disk drive modules installed. Do not attempt to remove the 7133 from the rack unless all the disk drive modules have been removed.**

You are now going to remove all the disk drive modules and (if present) dummy disk drive modules from the 7133. If the 7133 is to be used later with its disk drive modules configured as they are now, carefully make a note of the locations of the disk drive modules and dummy disk drive modules before you start to remove them. This action ensures that you reinstall the modules into their original slots. (They might not all be connected to the same SSA loop.) Attach identifying labels to the modules if you want to.

- 4 Remove the all the disk drive modules (see “Disk Drive Modules” on page 3-12).
- 5 Loosen the two screws **1** and pivot the two clamp plates **2** away from the slots at the back of the 7133.



6 Remove the four screws **3** from the front of the 7133.



7 CAUTION:

Do not attempt to lift the 7133 by yourself. Ask another service representative for aid.

With aid from another service representative, pull the 7133 forward and remove it from the rack.

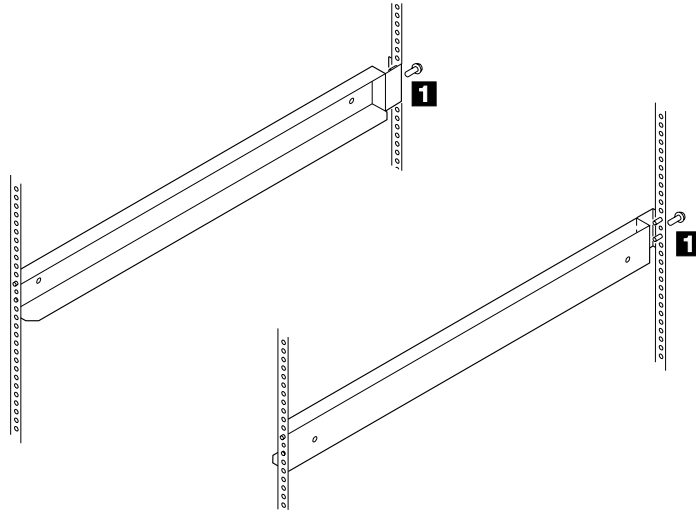
8 Reinstall the 7133 in the reverse order.

Note: When you reinstall the external SSA cables, ensure that you use the special screwdriver (SSA tool, part 32H7059) to tighten the SSA connector screws.

Support Rails

Note: This procedure applies only to Models 010 and 020.

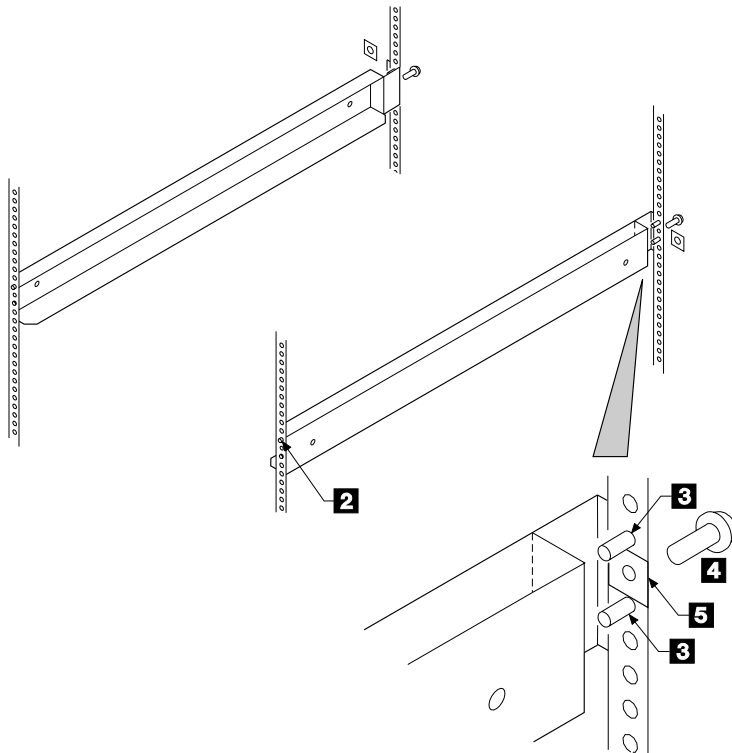
- 1** To remove the support rails, remove the screws **1**, then remove the rails.



- 2** If you need to reinstall the support rails (for example, because you are relocating the 7133), or you need to install replacement rails, go to step 3.
- 3** The 7133 is four EIA¹ units high. Using the preinstallation planning information, or other information supplied by the customer, determine where you are going to locate the 7133 in the rack.
- 4** Refer to the EIA markings on the rack and decide where you are going to install the support rails. If appropriate, allow for possible future installation of other subsystems.

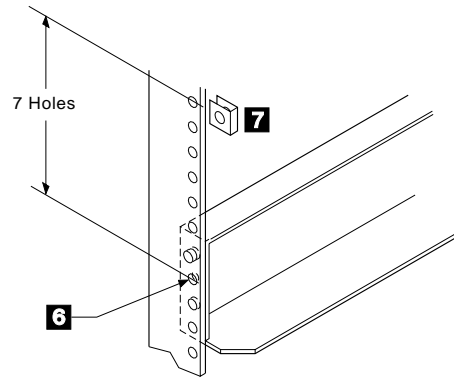
¹ Electronics Industries Association.

- 5** For each support rail:
- Attach a nut clip **5** at the selected hole in the back of the rack.
 - Insert the two studs **3** of the support rail into the back of the rack. Hold the support rail so that it is horizontal, and push it forward so that the stud **2** enters the matching hole in the front of the rack.
 - Check whether the support rail is horizontal (a spirit level might be useful here). If the rail is not horizontal, remove it from the rack, then repeat step 5b.
 - Insert the rail screw **4** into the nut clip **5** and tighten it.



6 At the front of the rack, observe the threaded hole **6** in each of the support rails that you have just installed.

7 Count seven holes upward from each threaded hole, and install a nut clip **7**.



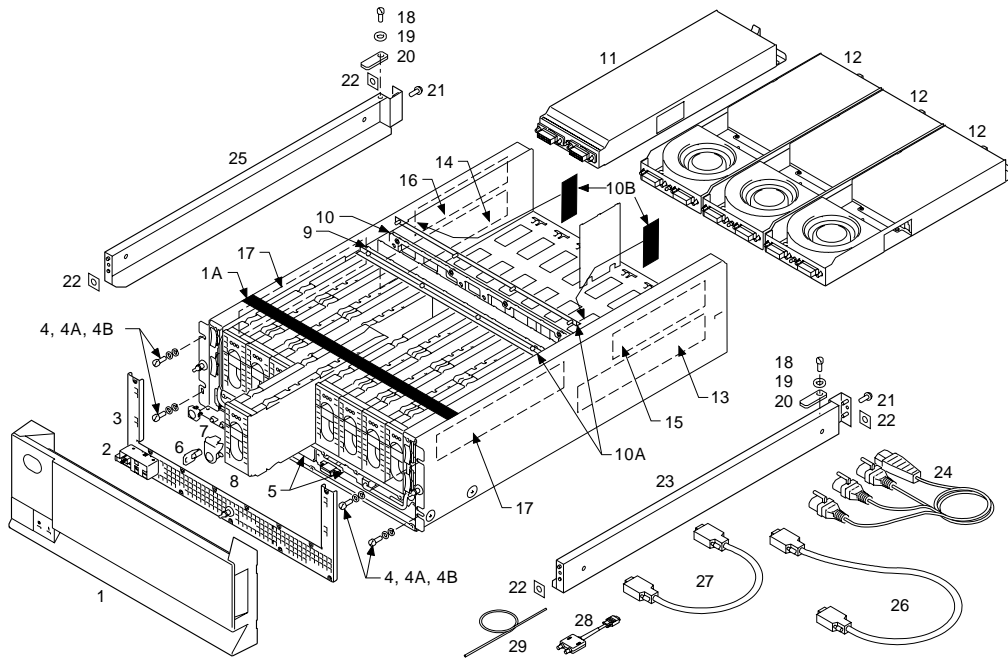
Chapter 4. Parts Catalog

This chapter lists, and gives part numbers for, the parts and FRUs of the 7133 Models 010, 020, 500, and 600.

Conventions

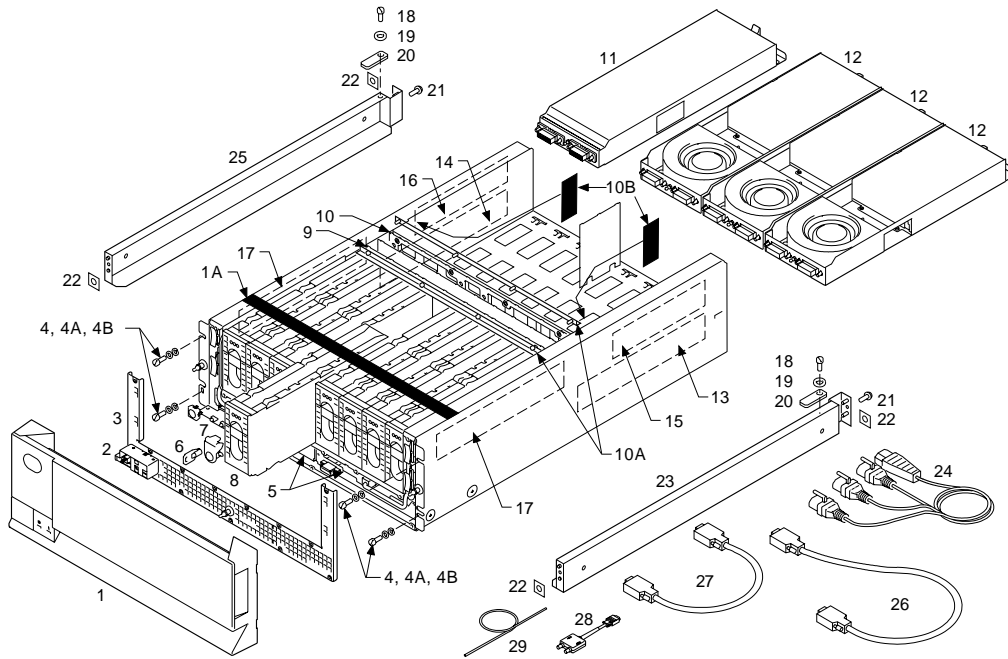
AR in the units column of the parts list denotes that the quantity used is as required.

Assembly 1: 7133 Models 010 and 020 SSA Disk Subsystems



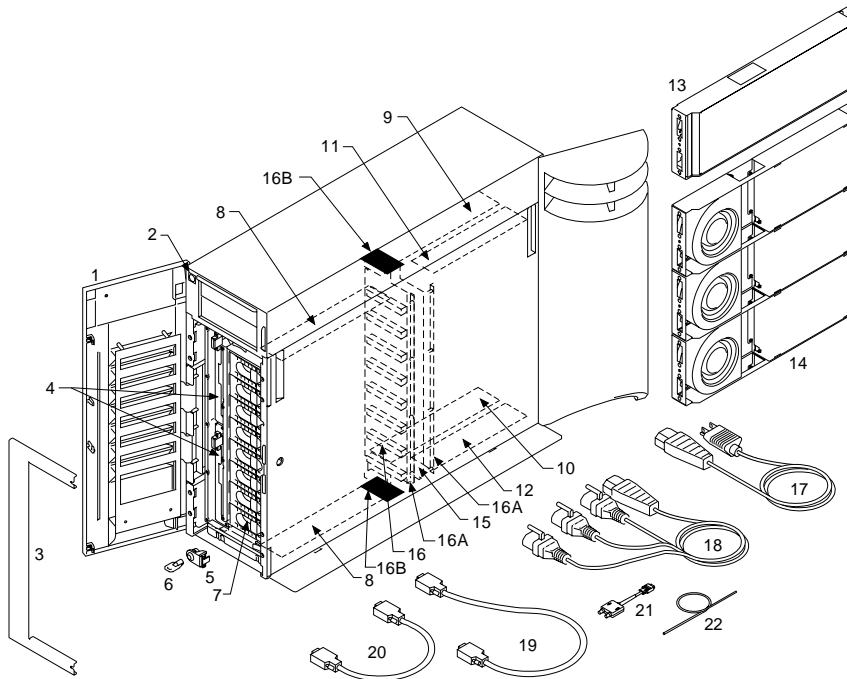
Asm- Index	Part Number	Units	Description
1-1	88G6397	1	Front cover assembly, early type
-1	32H5669	1	Front cover assembly, late type
-1A	32H7060	1	Baffle foam (Model 020 only)
-2	32H1452	1	Control panel assembly for 7133s with an early type of front cover
-2	32H5675	1	Control panel assembly for 7133s with a late type of front cover
-3	88G6323	1	RFI shield for 7133s with serial numbers 114 through 138
-3	32H0118	1	RFI shield for 7133s with serial numbers 139 and above and with an early type of front cover
-3	32H5684	1	RFI shield for 7133s with a late type of front cover
-4	1624779	4	Front mounting screw, Hex/Washer Head, M5 x 14 mm long
-4A	1622260	4	Lock washer
-4B	1622276	4	Washer
-5	07H8989	2	Power-distribution tray assembly
-6	07H8238	AR	Key
-7	31H7969	AR	Lock assembly for disk drive module
-8	07H8230	AR	1.1 GB, 3.5-inch, SSA disk drive module
-8	88G6400	AR	2.2 GB, 3.5-inch, SSA disk drive module
-8	88G6401	AR	4.5 GB, 3.5-inch, SSA disk drive module
-8	89H4940	AR	9.1 GB, 3.5-inch, SSA disk drive module (Model 020 only)
-8	88G6369	AR	Dummy disk drive module
-9	07H8987	1	Front backplane assembly (Model 010)
-9	32H7072	1	Front backplane assembly (Model 020)
-10	07H8988	1	Back backplane assembly (Model 010)
-10	97H0429	1	Back backplane assembly (Model 020)
-10A	32H1464	2	Bracket assembly
-10B	31H8722	2	Air baffle (Model 020 only)
-11	07H8936	1	Dummy fan-and-power-supply assembly (Model 010)
-12	88G6364	AR	Fan-and-power-supply assembly (Model 010)
-12	32H1698	3	Fan-and-power-supply assembly (Model 020)
-13	07H8966	1	Front-signal card (long), left-hand (Model 010)
-13	32H5688	1	Bypass card, lower left-hand (Model 020)
-14	07H8967	1	Front-signal card (long), right-hand (Model 010)
-14	32H5690	1	Bypass card, lower right-hand (Model 020)
-15	07H9137	1	Back-signal card (short), left-hand (Model 010)
-15	32H5727	1	Bypass card, upper left-hand (Model 020)
-16	07H9138	1	Back-signal card (short), right-hand (Model 010)
-16	32H5692	1	Bypass card, upper right-hand (Model 020)
-17	88G6485	2	Back-power card

Assembly 1: (continued)



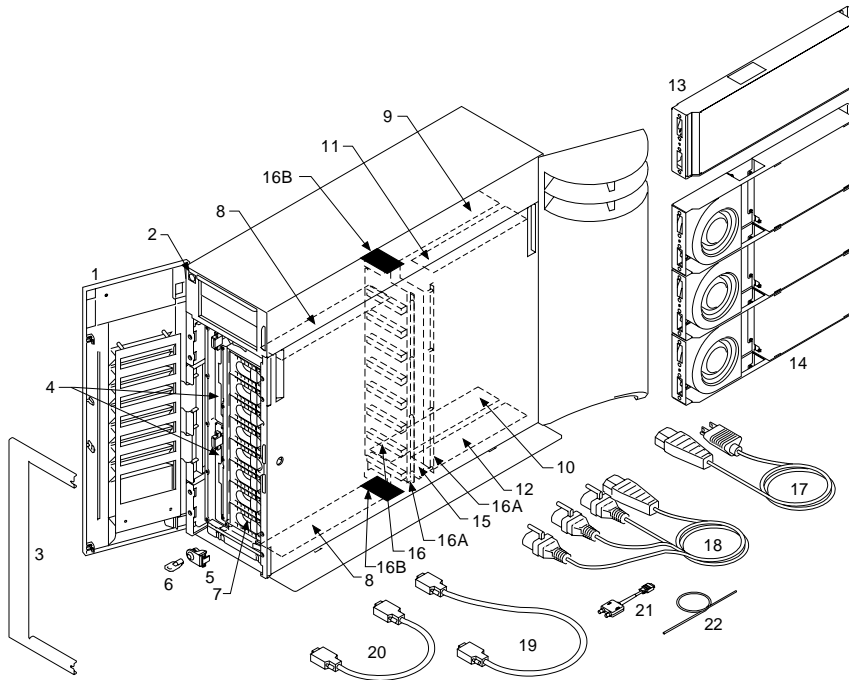
Asm- Index	Part Number	Units	Description
1-18	1624779	2	Back mounting screw, Socket Head, M5 x 14 mm long
-19	1622305	2	Washer
-20	07H8896	2	Back clamp plate
-21	1624779	2	Screw, Hex/Washer Head, M5 x 14 mm long
-22	0375867	4	Nut, clip
-23	07H8605	1	Support rail, right, for full-height rack
-24	67G1246	1	Three-way power cable (220 V)
-25	07H8604	1	Support rail, left, for full-height rack
-26	07H8985	AR	External SSA copper cable, 1.0 m (3.3 ft)
-26	32H1465	AR	External SSA copper cable, 2.5 m (8.2 ft)
-26	88G6404	AR	External SSA copper cable, 5.0 m (16.4 ft)
-26	32H1466	AR	External SSA copper cable, 10.0 m (32.8 ft)
-26	88G6406	AR	External SSA copper cable, 25.0 m (82.0 ft)
-27	07H9163	AR	External SSA copper cable, 0.18 m (0.6 ft) (Model 010 only)
-28	32H7048	AR	SSA Fibre-Optic Extender
-29	32H7049	AR	Wrap cable and adapter assembly for SSA Fibre-Optic Extender

Assembly 2: 7133 Models 500 and 600 SSA Disk Subsystems



Asm- Index	Part Number	Units	Description
2-1	07H7680	1	Complete set of covers (Model 500)
-1	32H5696	1	Complete set of covers (Model 600)
			Note: Covers are available only as a complete set, which consists of:
			<ul style="list-style-type: none"> • Front cover • Back cover • Top cover • Left-hand side cover • Right-hand side cover • Foot
-2	32H1489	1	Control panel assembly, includes cable (Model 500)
-2	32H5703	1	Control panel assembly, includes cable (Model 600)
-3	32H0118	1	RFI shield
-4	07H8989	2	Power-distribution tray assembly
-5	31H7969	AR	Lock assembly for disk drive module
-6	07H8238	AR	Key
-7	07H8230	AR	1.1 GB, 3.5-inch, SSA disk drive module
-7	88G6400	AR	2.2 GB, 3.5-inch, SSA disk drive module
-7	88G6401	AR	4.5 GB, 3.5-inch, SSA disk drive module
-7	89H4940	AR	9.1 GB, 3.5-inch, SSA disk drive module (Model 600 only)
-7	88G6369	AR	Dummy disk drive module
-8	88G6485	2	Back-power card
-9	07H8967	1	Front-signal card (long), upper (Model 500)
-9	32H5690	1	Bypass card, upper right-hand (Model 600)
-10	07H8966	1	Front-signal card (long), lower (Model 500)
-10	32H5688	1	Bypass card, lower right-hand (Model 600)
-11	07H9138	1	Back-signal card (short), upper (Model 500)
-11	32H5692	1	Bypass card, upper left-hand (Model 600)
-12	07H9137	1	Back-signal card (short), lower (Model 500)
-12	32H5727	1	Bypass card, lower left-hand (Model 600)
-13	07H8936	1	Dummy fan-and-power-supply assembly (Model 500)
-14	88G6364	AR	Fan-and-power-supply assembly, (Model 500)
-14	32H1698	3	Fan-and-power-supply assembly, (Model 600)
-15	07H8988	1	Back backplane assembly (Model 500)
-15	97H0429	1	Back backplane assembly (Model 600)
-16	07H8987	1	Front backplane assembly (Model 500)
-16	32H7072	1	Front backplane assembly (Model 600)
-16A	32H1464	2	Bracket assembly
-16B	31H8722	2	Air baffle (Model 600 only)
-17	6952300	AR	Power cable for United States (110 volts only), except Chicago, 2.2 m (7 ft). For other power cables, see "Power Cables" on page 4-10.

Assembly 2: (continued)



Asm- Index	Part Number	Units	Description
2-18	67G1245	1	Three-way converter cable, 0.5 m (1.6 ft) Note: The three-way converter cable cannot be used alone; it must be connected to the normal power cable
-19	31H7960	AR	External SSA copper cable, 0.6 m (2.0 ft) (Model 500 only)
-19	07H8985	AR	External SSA copper cable, 1.0 m (3.3 ft)
-19	32H1465	AR	External SSA copper cable, 2.5 m (8.2 ft)
-19	88G6404	AR	External SSA copper cable, 5.0 m (16.4 ft)
-19	32H1466	AR	External SSA copper cable, 10.0 m (32.8 ft)
-19	88G6406	AR	External SSA copper cable, 25.0 m (82.0 ft)
-20	07H9163	AR	External SSA copper cable, 0.18 m (0.6 ft) (Model 500 only)
-21	32H7048	AR	SSA Fibre-Optic Extender
-22	32H7049	AR	Wrap cable and adapter assembly for Fibre-Optic Extender

Power Cables

Country or City	Part
Bahamas Barbados Bermuda Bolivia Canada Colombia Costa Rica Dominican Republic El Salvador Equador Guatemala Guyana Honduras Jamaica Japan Japan (PDS) Korea Mexico Netherlands Antilles Panama Phillipines Saudi Arabia Suriname Taiwan Trinidad United States (except Chicago) Venezuela	6952300
Chicago	6952301
Bahrain (NEO) Brunei China Ghana Hong Kong Iraq Ireland Jordan Kenya Kuwait Malaysia Nigeria Oman (Sult) Qatar Singapore Tanzania Uganda United Arab Emirates United Kingdom Zambia	14F0033
Chile Ethiopia Italy	14F0069
Denmark	13F9997

Country or City	Part
Albania Armenia Austria Belarus Belgium Bosnia Botswana Bulgaria Croatia Czech Republic Egypt Finland France Georgia Germany, West Germany, West (PDS) Greece Hungary Iceland Indonesia Kazakhstan Lebanon FYR Macedonia Moldavia Netherlands Norway Portugal Romania Russia Serbia Slovakia Slovenia Spain Sudan Sweden Turkey Ukraine	13F9979
Israel	14F0087
Switzerland	14F0051
Bangladesh Burma India Pakistan South Africa Sri Lanka	14F0015
Argentina Australia New Zealand	13F9940
Uruguay	6952291
Peru Thailand United States (240 volts)	1838574

Index

Numerics

- 7133 serial number location
 - Models 010 and 020 1-24
 - Models 500 and 600 1-25

A

- ac/dc voltage requirements 1-30
- acclimation of disk drives 1-32
- air temperature
 - Models 010 and 020 1-30
 - Models 500 and 600 1-31
- altitude 1-31
- Attention notices
 - concurrent maintenance
 - back-power cards 3-31
 - fan-and-power-supply assemblies 3-22
 - power-distribution tray assemblies 3-28
 - do not switch off the using system 3-15
 - dummy fan-and-power-supply assembly 1-12, 3-25
 - fragility of disk drive modules 2-8, 3-12, 3-15
 - grounding of 7133 1-51, 1-53
 - removal of signal or bypass cards 3-33

B

- back cover
 - removal and replacement
 - Models 500 and 600 3-7
- back-power cards
 - location
 - Models 010 and 020 1-10
 - Models 500 and 600 1-11
 - removal and replacement 3-31
- back-signal cards
 - location
 - Model 010 1-10
 - Model 500 1-11
 - removal and replacement 3-33
- backplane assembly, back
 - location
 - Models 010 and 020 1-10
 - Models 500 and 600 1-11
 - removal and replacement 3-41
 - back 3-41
- backplane assembly, front
 - location
 - Models 010 and 020 1-10
 - Models 500 and 600 1-11
 - removal and replacement 3-37
- books, related x

- bypass card jumpers
 - description 1-35
 - swapping positions 3-35
- bypass cards 1-2
 - description 1-33
 - lights
 - Model 020 1-4, 1-5
 - Model 600 1-7
 - location
 - Model 020 1-10
 - Model 600 1-11
 - removal and replacement 3-33
- Bypass mode 1-33

C

- cable configurations for Models 010 and 500 1-39
- cable configurations for Models 020 and 600 1-44
- capacities of disk drive modules 1-32
- capacity label, disk drive modules 1-26
- catalog of parts 4-1
- Caution notices
 - rack stabilizer 3-44
 - weight of 7133 3-44
- Check light
 - disk drive module 1-9
- Check light, Fan-and-Power
 - Models 010 and 020 1-4
 - Models 500 and 600 1-6
- Check light, Subsystem
 - Models 010 and 020 1-4
 - Models 500 and 600 1-6
- checking the grounding 1-51
 - Models 010 and 020 1-51
 - Models 500 and 600 1-52
- checklist, inspection 1-50
- concurrent maintenance 3-1
- configurations 1-12
 - cable
 - Models 010 and 500 1-39
 - Models 020 and 600 1-44
 - hardware
 - Models 010 and 500 1-12
 - Models 020 and 600 1-12
- configurations, system 1-37
- connectors 1-15
 - mainline-power connector
 - 220 V ac and 300 V dc 1-21
 - Models 010 and 020
 - back view 1-15
 - front view 1-21
 - Models 500 and 600
 - back view 1-18

- connectors (*continued*)
 - Models 500 and 600 (*continued*)
 - front view 1-22
- control panel assembly
 - Models 010 and 020
 - location 1-10
 - Models 500 and 600
 - location 1-11
 - removal and replacement 3-26
- controls
 - power switch
 - Models 010 and 020 1-4
 - Models 500 and 600 1-6

D

- Danger notices
 - power-supply unit 3-23
- dc/ac voltage requirements 1-30
- definition of FRU names used in SRN table 2-3
- devices, finding the physical location 1-49
- diagnostic aids
 - disk drive module POSTs (power-on self-tests) 2-1
 - SRNs (service request numbers) 2-2
 - FRU names used in table 2-3
- dimensions and weight
 - Models 010 and 020 1-28
 - Models 500 and 600 1-29
- disk drive modules
 - acclimation 1-32
 - capacities 1-32
 - Check light 1-9
 - finding the physical location 1-49
 - how to recognize from a dummy module 1-26
 - installing 3-15
 - Models 010 and 020
 - location 1-10
 - locks 1-10
 - Models 500 and 600
 - location 1-11
 - locks 1-11
 - numbering
 - Models 010 and 020 1-10
 - Models 500 and 600 1-11
 - POSTs (power-on self-tests) 2-1
 - Power light 1-8
 - power sequencing 1-32
 - product-information label 1-26
 - Ready light 1-8
 - red panel 1-26
 - removing 3-12
 - removing a dummy 3-18
 - serial number and capacity label 1-26
- dummy disk drive modules, how to recognize 1-26
- dummy fan-and-power-supply assembly
 - removal and replacement 3-24

- dummy-fan-and-power-supply assembly
 - label 1-27

E

- electrical hazards 1-50
- electrical requirements 1-30
- empty-position warning label
 - Models 500 and 600 1-25
- empty-position warning labels
 - Models 010 and 020 1-24
- empty-slot warning label
 - Models 500 and 600 1-25
- empty-slot warning labels
 - Models 010 and 020 1-24
- environmental characteristics
 - Models 010 and 020 1-30
 - Models 500 and 600 1-31
- explosive hazards 1-50

F

- Fan-and-Power Check light
 - Models 010 and 020 1-4
 - Models 500 and 600 1-6
- fan-and-power-supply assemblies
 - Fan-and-Power Check light
 - Models 010 and 020 1-4
 - Models 500 and 600 1-6
 - location
 - Models 010 and 020 1-10
 - Models 500 and 600 1-11
 - Power light
 - Models 010 and 020 1-4
 - Models 500 and 600 1-7
 - removal and replacement 3-22
- fiber optic cables 1-13
- fiber optic wrap adapter (Fibre-Optic Extenders) 1-13
- fiber optic wrap cable (Fibre-Optic Extenders) 1-13
- Fibre-Optic Extender feature
 - description 1-2
 - parts and lights locations 1-13
- finding the physical location of a device 1-49
- Forced Inline mode 1-34
- frequency (voltage) 1-30
- front backplane assembly
 - location
 - Models 010 and 020 1-10
 - Models 500 and 600 1-11
 - removal and replacement 3-37
- front cover
 - location
 - Models 010 and 020 1-10
 - Models 500 and 600 1-11
 - removal and replacement
 - Models 500 and 600 3-6

- front cover (early type)
 - removal and replacement 3-4
- front cover (late type)
 - removal and replacement 3-5
- front-signal cards
 - location
 - Model 010 1-10
 - Model 500 1-11
 - removal and replacement 3-33
- FRU names used in SRN table 2-3

G

- glossary of FRU names used in SRN table 2-3
- grounding check 1-51
 - Models 010 and 020 1-51
 - Models 500 and 600 1-52

H

- hardware configurations for Models 010 and 500 1-12
- hardware configurations for Models 020 and 600 1-12
- hazards, safety 1-50
- heat output 1-31
- how to recognize a dummy disk drive module 1-26
- humidity
 - Models 010 and 020 1-30
 - Models 500 and 600 1-31

I

- indicators 1-3
 - disk drive module Check light 1-9
 - disk drive module Power light 1-8
 - disk drive module Ready light 1-8
- Fan-and-Power Check
 - Models 010 and 020 1-4
 - Models 500 and 600 1-6
- Link Status (Ready)
 - Model 020 1-4, 1-5
 - Model 600 1-7
- Mode
 - Model 020 1-5
 - Model 600 1-7
- Power
 - Models 010 and 020 1-4
 - Models 500 and 600 1-7
- Power (Fibre-Optic Extenders) 1-13
- Power Card
 - Models 010 and 020 1-4
 - Models 500 and 600 1-6
- Receive (Fibre-Optic Extenders) 1-13
- Subsystem Check
 - Models 010 and 020 1-4
 - Models 500 and 600 1-6
- Subsystem Power
 - Models 010 and 020 1-4

- indicators (*continued*)
 - Subsystem Power (*continued*)
 - Models 500 and 600 1-6
- inspection guide 1-50
 - checklist 1-50
- internal connections, Models 010 and 020 1-16
- internal connections, Models 500 and 600 1-19

J

- jumpers, bypass cards
 - description 1-35
 - swapping positions 3-35

L

- labels
 - 7133 serial number
 - Models 010 and 020 1-24
 - Models 500 and 600 1-25
 - disk drive module product information 1-26
 - disk drive module red panel 1-26
 - disk drive module serial number and capacity 1-26
 - dummy disk drive module product information 1-26
 - dummy-fan-and-power-supply assembly 1-27
 - empty-position warning
 - Models 010 and 020 1-24
 - empty-slot warning
 - Models 010 and 020 1-24
 - Models 500 and 600 1-25
 - product information
 - checking 1-50
 - Models 010 and 020 1-24
 - Models 500 and 600 1-25
 - weight warning
 - Models 010 and 020 1-24
 - Models 500 and 600 1-25
- lights 1-3
 - disk drive module Check 1-9
 - disk drive module Power 1-8
 - disk drive module Ready 1-8
- Fan-and-Power Check
 - Models 010 and 020 1-4
 - Models 500 and 600 1-6
- Link Status (Ready)
 - Model 020 1-4, 1-5
 - Model 600 1-7
- Mode
 - Model 020 1-5
 - Model 600 1-7
- Power
 - Models 010 and 020 1-4
 - Models 500 and 600 1-7
- Power (Fibre-Optic Extenders) 1-13
- Power Card
 - Models 010 and 020 1-4
 - Models 500 and 600 1-6

lights (*continued*)

- Receive (Fibre-Optic Extenders) 1-13
- Subsystem Check
 - Models 010 and 020 1-4
 - Models 500 and 600 1-6
- Subsystem Power
 - Models 010 and 020 1-4
 - Models 500 and 600 1-6
- link errors 2-9
- link problem determination 2-9
- Link Status (Ready) light
 - Model 020 1-4, 1-5
 - Model 600 1-7

M

- mainline-power connector
 - 220 V ac and 300 V dc 1-21
- maintenance analysis procedures (MAPs) 2-8
- manuals, related x
- MAP 2010: 7133 – START 2-2010-1
- MAP 2020: 7133 – Power 2-2020-1
- MAP 2021: 7133 – Redundant Power 2-2021-1
- MAP 2022: 7133 – Power-On 2-2022-1
- MAP 2330: 7133 – Fibre-Optic Extender 2-2330-1
- MAP 2410: 7133 – Repair Verification 2-2410-1
- mechanical hazards 1-50
- microcode and software errors 2-7
- Mode light
 - Model 020 1-5
 - Model 600 1-7

N

- numbering convention ix
- numbering of disk drive modules
 - Models 010 and 020 1-10
 - Models 500 and 600 1-11

P

- parts catalog 4-1
- parts locations
 - 7133 serial number
 - Models 010 and 020 1-24
 - Models 500 and 600 1-25
 - connectors 1-15
 - fiber optic wrap adapter (Fibre-Optic Extenders) 1-13
 - fiber optic wrap cable (Fibre-Optic Extenders) 1-13
 - Fibre-Optic Extenders 1-13
 - Model 010
 - signal cards 1-10
 - Model 020
 - bypass cards 1-10
 - Model 500
 - signal cards 1-11

parts locations (*continued*)

- Model 600
 - bypass cards 1-11
- Models 010 and 020
 - control panel assembly 1-10
 - disk drive module 1-10
 - disk drive module locks 1-10
 - fan-and-power-supply assembly 1-10
 - front cover 1-10
 - power cards 1-10
 - power-distribution tray assemblies 1-10
 - RFI shield 1-10
- Models 500 and 600
 - control panel assembly 1-11
 - disk drive module 1-11
 - disk drive module locks 1-11
 - fan-and-power-supply assembly 1-11
 - front cover 1-11
 - power cards 1-11
 - power-distribution tray assemblies 1-11
- product-information label
 - Models 010 and 020 1-24
 - Models 500 and 600 1-25
- voltage-warning label
 - Models 010 and 020 1-24
 - Models 500 and 600 1-25
- POSTs (power-on self-tests)
 - disk drive module 2-1
- Power Card light
 - Models 010 and 020 1-4
 - Models 500 and 600 1-6
- power cards, back
 - location
 - Model 010 1-10
 - Models 500 and 600 1-11
 - removal and replacement 3-31
- Power light
 - disk drive module 1-8
 - Models 010 and 020 1-4
 - Models 500 and 600 1-7
- Power light (Fibre-Optic Extenders) 1-13
- Power light, Subsystem
 - Models 010 and 020 1-4
 - Models 500 and 600 1-6
- power requirements 1-30
- power sequencing 1-32
- power supply (and fan) assemblies
 - location
 - Models 010 and 020 1-10
 - Models 500 and 600 1-11
 - removal and replacement 3-22
- power switch 1-3
 - Models 010 and 020 1-4
 - Models 500 and 600 1-6
- power-distribution tray assemblies
 - location
 - Models 010 and 020 1-10

- power-distribution tray assemblies (*continued*)
 - location (*continued*)
 - Models 500 and 600 1-11
 - removal and replacement 3-28
- powering on and powering off
 - Models 010 and 020 3-8
 - Models 500 and 600 3-10
- problem determination
 - POSTs, disk drive module (power-on self-tests) 2-1
 - procedures 2-1
 - SRNs (service request numbers) 2-2
 - FRU names used in table 2-3
 - SSA link 2-9
 - SSA link error 2-12
- product characteristics 1-28
- product-information label 1-50
 - Models 010 and 020 1-24
 - Models 500 and 600 1-25
- publications, related x

R

- Ready light
 - disk drive module 1-8
- Receive light (Fibre-Optic Extenders) 1-13
- red panel on disk drive modules 1-26
- reference information 1-1
- related publications x
- removal and replacement procedures 3-1
 - 7133 3-44
 - back backplane assembly 3-41
 - back cover
 - Models 500 and 600 3-7
 - back-power cards 3-31
 - control panel assembly 3-26
 - disk drive modules
 - installing 3-15
 - removing 3-12
 - dummy disk drive modules 3-18
 - dummy fan-and-power-supply assembly 3-24
 - fan-and-power-supply assemblies 3-22
 - front backplane assembly 3-37
 - front cover
 - Models 500 and 600 3-6
 - front cover (early type) 3-4
 - front cover (late type) 3-5
 - power
 - Models 010 and 020 3-8
 - Models 500 and 600 3-10
 - power-distribution tray assemblies 3-28
 - signal or bypass cards 3-33
 - support rails 3-47
- RFI shield
 - location
 - Models 010 and 020 1-10
 - Models 500 and 600 1-11

- rules for SSA loops 1-37

S

- safety hazards 1-50
- safety notices vii
 - definition of vii
 - for installing, relocating, or servicing vii
- serial number location
 - disk drive module 1-26
 - Models 010 and 020 1-24
 - Models 500 and 600 1-25
- service inspection guide 1-50
 - checklist 1-50
- signal cards
 - description
 - Models 010 and 500 1-33
 - location
 - Model 010 1-10
 - Model 500 1-11
 - removal and replacement 3-33
- software and microcode errors 2-7
- specification for fiber optic cables 1-14
- specifications 1-28
- SRNs (service request numbers) 2-2
 - FRU names used in table 2-3
 - software and microcode errors 2-7
- SSA Fibre-Optic Extender feature
 - description 1-2
 - parts and lights locations 1-13
- SSA link error problem determination 2-9
- SSA link errors 2-9
- SSA loops
 - finding the physical location of a device 1-49
- SSA loops and links 1-2
- SSA system configurations 1-37
- startup sequence for modules 1-32
- Subsystem Check light
 - Models 010 and 020 1-4
 - Models 500 and 600 1-6
- Subsystem Power light
 - Models 010 and 020 1-4
 - Models 500 and 600 1-6
- support rails
 - removal and replacement procedures 3-47
- swapping positions of bypass card jumpers 3-35
- switch, power
 - Models 010 and 020 1-4
 - Models 500 and 600 1-6
- system configurations 1-37

T

- temperature, air
 - Models 010 and 020 1-30
 - Models 500 and 600 1-31

V

voltage and frequency 1-30

W

weight and dimensions

Models 010 and 020 1-28

Models 500 and 600 1-29



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