7133 Model D40 Serial Disk System

Installation Guide

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Contents

Communications Statements

The following statements apply to this product. The statements for other products intended for use with this product appear in their accompanying manuals.

Federal Communications Commission (FCC) Statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. Neither the provider nor the manufacturer is responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

This device complies with Part 15 of FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Japanese Voluntary Control Council for Interference (VCCI) Statement

This product is a Class A Information Technology Equipment and conforms to the standards set by the Voluntary Control Council for Interference by Information Technology Equipment (VCCI). In a domestic environment, this product might cause radio interference, in which event the user might be required to take adequate measures.

Korean Government Ministry of Communication (MOC) Statement

Please note that this device has been approved for business purposes with regard to electromagnetic interference. If you find that this device is not suitable for your use, you can exchange it for one that is approved for non-business purposes.

New Zealand Compliance Statement

This is a Class A product. In a domestic environment this product might cause radio interference, in which event the user might be required to take adequate measures.

International Electrotechnical Commission (IEC) Statement

This product has been designed and built to comply with (IEC) Standard 950.

Avis de conformité à la réglementation d'Industrie Canada

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

Industry Canada Compliance Statement

This Class A digital apparatus complies with IECS-003.

United Kingdom Telecommunications Requirements

This apparatus is manufactured to the International Safety Standard EN60950 and as such is approved in the U.K. under approval number NS/G/1234/J/100003 for indirect connection to public telecommunications systems in the United Kingdom.

European Union (EU) Statement

This product is in conformity with the protection requirements of EU council directive 89/336/EEC on the approximation of the laws of the Member States relating to electromagnetic compatibility. Neither the provider nor the manufacturer can accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended modification of the product, including the fitting of option cards not supplied by the manufacturer.

This product is in conformity with the EU council directive 73/23/EEC (and the Complementary Markings Directive, 93/68/EEC) on the approximation of the laws of the Member States relating to electrical equipment designed for use with certain voltage limits. This conformity is based on compliance with the following harmonized standard: EN60950.

Radio Protection for Germany

Zulassungsbescheinigung laut Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG) vom 30, August 1995.

Dieses Gerät ist berechtigt in Übereinstimmung mit dem deutschen EMVG das EG–Konformitätszeichen zu führen.

Der Aussteller der Konformitätserklärung ist die IBM Deutschland.

Informationen in Hinsicht EMVG Paragraph 3 Abs. (2):

Das Gerät erfüllt die Schutzanforderungen nach EN 50082-1 und EN 55022 Klasse A.

EN55022 Klasse A Geräte bedürfen folgender Hinweise:

Nach dem EMVG: "Geräte dürfen an Orten, für die sie nicht ausreichend entstört sind, nur mit besonderer Genehmigung des Bundesministeriums für Post und Telekommunikation oder des Bundesamtes für Post und Telekommunikation betrieben werden. Die Genehmigung wird erteilt, wenn keine elektromagnetischen Störungen zu erwarten sind." (Auszug aus dem EMVG, Para.3, Abs.4). Dieses Genehmigungsverfahren ist nach Paragraph 9 EMVG in Verbindung mit der entsprechenden Kostenverordnung (Amtsblatt 14/93) kostenpflichtig.

Nach der EN 55022: "Dies ist eine Einrichtung der Klasse A. Diese Einrichtung kann im Wohnbereich Funkstörungen verursachen; in diesem Fall kann vom Betreiber verlangt werden, angemessene Massnahmen durchzuführen und dafür aufzukommen."

Anmerkung: Um die Einhaltung des EMVG sicherzustellen, sind die Geräte wie in den Handbüchern angegeben zu installieren und zu betreiben.

Taiwan Class A Compliance Statement

警告使用者:
這是甲類的資訊產品,在居住的環境中使用
時,可能會造成射頻干擾,在這種情況下,
使用者會被要求採取某些適當的對策。

Safety Notices

For a translation of the *danger* and *caution* notices contained in this book, see the *7133 Serial Disk Systems and SSA Adapters: Translated Safety Notices* manual, SA33-3274.

Definitions of Safety Notices

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

This book contains no *danger* notices.

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

This book contains a *caution* notice on pages 18, 25, 26, 30, and 31.

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 *Installation and Service Guide*, or equivalent, for your using system.

For safety checks when servicing the 7133, refer to "Service Inspection Guide" in the *7133 Models D40 and T40 Serial Disk Systems: Service Guide*, GY33-0192.

Laser Safety Information

Notes:

1. The information given here applies only to 7133s that have the Advanced SSA Optical Extender (Pair) feature.
2. The Advanced SSA Optical Extender, referred to in this information as an optical extender, is part of the serial optic channel converter assembly.

This system contains a laser product called the optical extender. In the United States, the optical 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 optical 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 optical 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 optical extender is such that access to laser radiation above a Class 1 level during operation, user maintenance, or service conditions is prevented.

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        IBM
  ■               ■
    Part Number nnnnnnn
    Class 1 Laser Product
  FCC Class A - See Manual

   ♀  C E   ⚠   ♀
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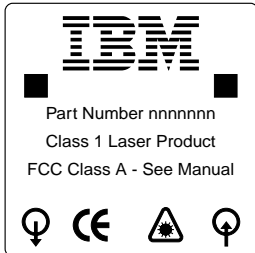
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CLASS 1 LASER PRODUCT
APPAREIL A LASER DE CLASSE 1
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TO IEC 825-1:1993
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About This Book

This book provides installation instructions for any person who is required to install a 7133 Model D40 Serial Disk System, which is a Serial Storage Architecture (SSA) disk subsystem. That person could be a technically-qualified employee of the owner of the subsystem, a service representative, or an installation engineer.

Important: *This book does not include installation information for 7133 Models 010 and 020 SSA Disk Subsystems.* For those models, see Related Publications in the "Additional Information" appendix (in this book) for your using system.

Numbering Convention

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

Trademarks

The following items are trademarks of International Business Machines Corporation in the United States, or other countries, or both.
   AIX
   IBM
   RS/6000
   Netfinity

Related Publications

This section lists the publications that are related to the 7133 Model D40. For publications that are related to your using system, see the "Additional Information" appendix (in this book) for your using system.

7133 Models D40 and T40 Serial Disk Systems: Operator Guide, SA33-3278

7133 Models D40 and T40 Serial Disk Systems: Service Guide, GY33-0192

7133 Models D40 and T40 Serial Disk Systems: Hardware Technical Information, SA33-3281

7133 Serial Disk Systems and SSA Adapters: Translated Safety Notices, SA33-3274

For the latest information about SSA, SSA microcode levels, and SSA publications, see the web support page:

http://www.hursley.ibm.com/ssa/

Installing a 7133 Model D40

Are You Using the Correct Book? *Do not use this book if you are installing a 7133 Model 010 or Model 020 SSA Disk Subsystem.* For the correct book, see Related Publications in the "Additional Information" appendix (in this book) for your using system.

These instructions describe how to:

- Install a 7133 Model D40 into an RS/6000® rack (system rack or expansion rack) or into a Netfinity® rack.
- Connect the 7133 Model D40 to a power source
- Connect the 7133 Model D40 to the using system
- Switch on and test the installation.

The instructions assume that:

- The rack has already been set up.

  Full information about cooling requirements for the 7133 Model D40 is given in the *7133 Models D40 and T40 Serial Disk Systems: Hardware Technical Information.* A summary of that information is given here.

  – The recommended operating temperature is 22°C (72°F) or lower. At lower temperatures, the risk of failure in the 7133 is reduced. If the operating temperature is above 22°C (72°F) for long periods, the 7133 is exposed to a greater risk of failure from external causes.

  – Each rack-mounted 7133 Model D40 requires an airflow of 2.5 m³ per minute (87 ft³ per minute). The input air temperature to all racks is recommended to be in the range 20 through 25°C (68 through 77°F).

  When racks containing many 7133s are to be installed together, the following requirements must be met to ensure that the 7133s are suitably cooled:

  - Air 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 must be positioned in alternate rows, back-to-back and front-to-front. This arrangement is known as "Cold Aisle / Hot Aisle."

  - Where racks are in rows, each rack must touch the rack that is next to it to reduce the amount of hot air that can flow round from the back of the rack into the intakes of the 7133s that are in that rack. It is recommended that Suite Attach Kits be used to completely seal any gaps that remain between the racks. For details of Suite Attach Kits, contact your marketing representative.

  - Where racks are in rows front-to-front or back-to-back, a gap of at least 1220 mm (48 in) must separate the rows across the cold aisle.

  - Where cold air is supplied through perforated tiles or gratings in the floor, it is recommended that the front of racks be located on floor-tile seams. A full line of perforated tiles or gratings must be immediately in front of the racks. The underfloor temperature must not exceed 15°C (60°F).

  Air conditioners must be located where they can take their input from the hot aisle, and supply cooled air to the underside of the cold aisle perforated tiles or

gratings. It is recommended that the air conditioners be located at the ends of the hot aisles. This requirement ensures that hot exhaust air cannot flow over the top of the racks and reenter at the front.

The perforated tiles or gratings must be able to supply a suitable airflow for all the 7133s that are present in a rack. For example, if a T42 rack contains ten 7133s, and the air conditioners are located at the ends at the ends of the hot aisles, the airflow required is 19.8 m³ per minute (700 ft³ per minute). If the air conditioners are located in front of, or behind the racks, the airflow required for the example T42 rack is now 25.5 m³ per minute (900³ per minute).

- To ensure correct airflow in 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 7133s.

- A stabilizer has been correctly attached to the bottom front of the rack, or the rack has been firmly fastened to the floor, to prevent the rack from tipping forward while the 7133 is being installed into the rack. (If necessary, see the *Installation and Service Guide*, or equivalent, for the rack.)
- You have access to:
  - Preinstallation planning information for the system.
  - The subsystem configuration information.

If the 7133 Model D40 was already installed in the rack when it arrived at the customer's premises:

- Go to "Installing the Remote-Power-On Control Unit (if Present)" on page 38 if a remote-power-on control unit is required, but not yet installed.
- Go to "Connecting the 7133 Model D40 to a 220-Volt Power Source" on page 41 or to "Connecting the 7133 Model D40 to a −48 Volt Power Source" on page 42 if the power cables for the 7133 are not yet installed.
- Go to "Connecting the 7133 Model D40 to the Using System" on page 46 if the 7133 is fully installed with all its related cables. (Although the 7133 has been connected to the using system, you must check that the configuration is correct.)

Attention:

1. No more than **six** 7133s can be present in any of these racks:
   - 7015 Model R00 Rack
   - 7014 Model S00 Rack
   - Netfinity 9306 Model 900 PC Server Rack Enclosure
2. No more than **nine** 7133s can be present in a 7014 Model T00 Rack
3. No more than **ten** 7133s can be present in a 7014 Model T42 Rack

If you are using any other type of rack, see the documentation for that rack.

Installing a 7133 Model D40 into a Rack

A detailed list of items is shipped with the 7133 Model D40. Ensure that you have all the items that are shown on the list.

- If you are installing the 7133 into an RS/6000 rack, go to "Checking the Items" on page 4 to identify the items.
- If you are installing the 7133 into a Netfinity rack, go to "Checking the Items" on page 4 to identify the items, then go to "Checking Items that Are Specific to a Netfinity Rack" on page 7 to identify the items that are specific to Netfinity racks.

Checking the Items

Step 1. Refer to Figure 2 on page 5.

1	Front mounting screws (x4)	**9**	Using-system power-control cables (optional)
2	Nut clips (x4)	**10**	Support rail, right (x1)
3	Support rail, left (x1)	**11**	Power cable (x2)
4	Rail screws (x2)	**12**	SSA cables
5	Back clamp plates (x2) and back mounting screws (x2); see Note 1b	**13**	7133 Model D40 power-control cable (optional)
6	Back bracket, left hand (x1) and back mounting screws (x3); see Note 1b	**14**	Disk drive module locks (optional)
7	Back bracket, right hand (x1) and back mounting screws (x3); see Note 1b	**15**	Advanced SSA Optical Extender (Pair) (optional)
8	Remote-power-on control unit (optional)	**16**	Advanced Multi-Mode Conditioner (Pair) (optional)

Notes:

a. Figure 2 on page 5 shows support rails, screws, and nut clips for RS/6000 racks. If you are installing the 7133 into a Netfinity rack, refer to "Checking Items that Are Specific to a Netfinity Rack" on page 7 for the equivalent items.

b. Early-type support rails for RS/6000 racks use back clamp plates **5**. Later-type support rails use back brackets **6** and **7**. Normally, a bracket has two holes in its back flange, as shown in item **6**. If, however, you are going to install a remote-power-on control unit **8**, you need a special right-hand back bracket **7** that has an extra hole and a slot in its back flange (see Figure 1).
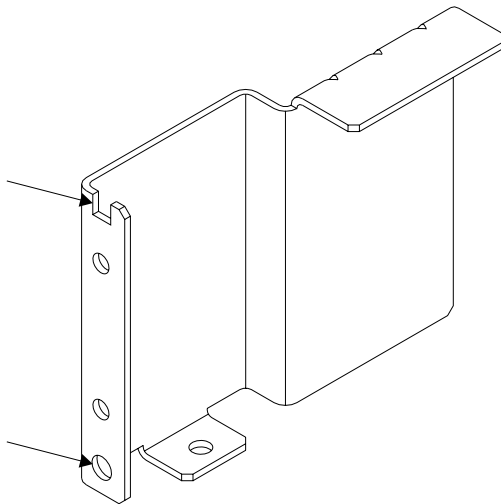

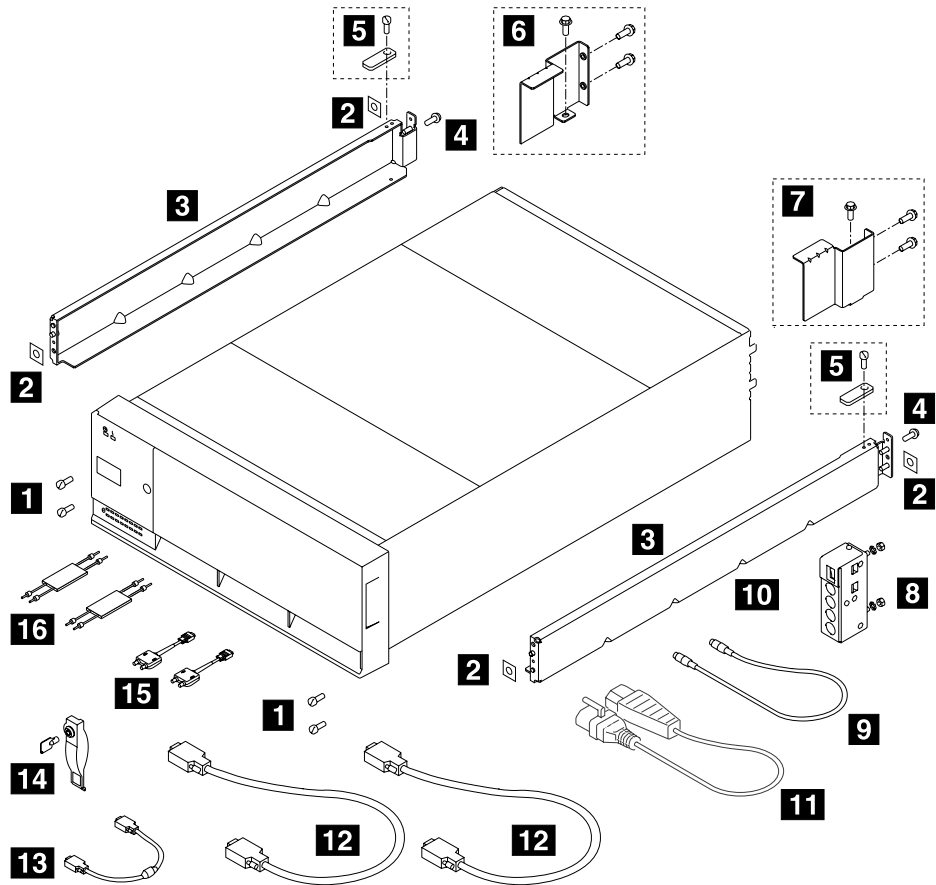*Figure 1. Special Right-Hand Bracket for Remote-Power-On Control Unit*

Figure 2. Items for the 7133 Model D40 in an RS/6000 Rack

Step 2. Check whether all the items that you need are present. If any item is missing, contact your marketing representative.

Step 3. If the 7133 has the Advanced SSA Optical Extender (Pair) feature, an Advanced SSA Optical Extender (Pair) **15** is provided. For multi-mode configurations, an Advanced Multi-Mode Conditioner (Pair) **16** is also provided.

> **Note:** In the remainder of this book, the term "optical extender" is generally used for the Advanced SSA Optical Extender, and the term "multi-mode conditioner" is generally used for the Advanced Multi-Mode Conditioner.

A wrap cable and adapter assembly is provided with each pair of optical extenders. This assembly is used during diagnostic procedures. It consists of a fibre optic wrap cable and a fibre optic wrap adapter. The complete assembly

is contained in a plastic bag. When not in use, the wrap cable and adapter assembly must be kept in its plastic bag in a safe place that is as close to the installed optical extender as possible.

Because the fibre optic cables that connect the 7133 to an SSA adapter, or to another device, can be up to 10 kilometers (32800 feet) long, ensure that at least one wrap cable and adapter assembly is available at each end of the fibre optic cables.

Step 4. Ensure that the using-system software is at the correct level for the 7133, and that the correct level of microcode for the using-system SSA attachment hardware (for example, an SSA adapter) and disk drive modules has been loaded. CD-ROMs and instructions are supplied with the 7133 and with all SSA adapters.

For more information about the latest levels of SSA microcode for the using system, SSA attachment, and SSA subsystem, see Web Support Pages in the "Additional Information" appendix (in this book) for your using system.

Step 5. If you are installing the 7133 into an RS/6000 rack, go to "Preparing the RS/6000 Rack (System or Expansion)" on page 8.

If you are installing the 7133 into a Netfinity rack, go to "Checking Items that Are Specific to a Netfinity Rack" on page 7.

Checking Items that Are Specific to a Netfinity Rack

Step 1.   Refer to Figure 3.

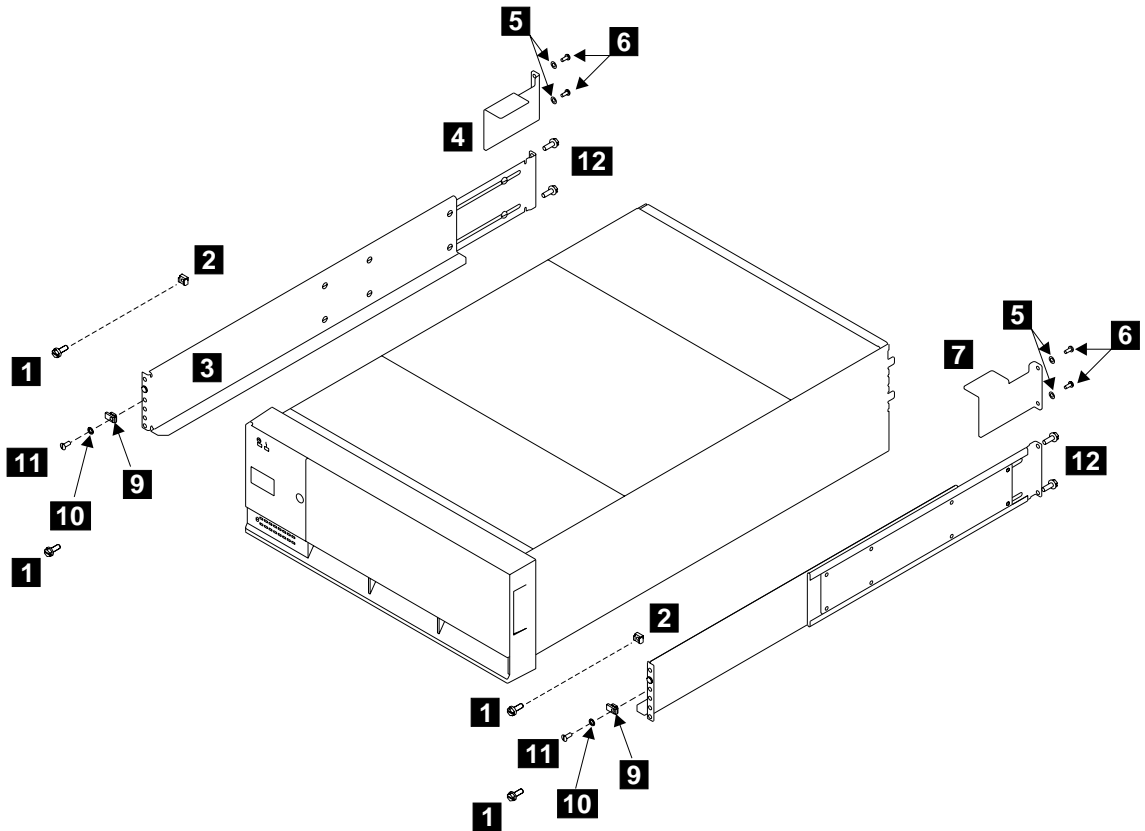|			
1	Front M5 mounting screws (x4)	**8**	Adjustable support rail, right-hand (x1)
2	Nut clips (x2)	**9**	Rail retainers (x2)
3	Adjustable support rail, left-hand (x1)	**10**	Lock washers (x2)
4	Back bracket, left-hand (x1)	**11**	M4 retainer screws (x2)
5	Back bracket washers (x4)	**12**	Back M6 mounting screws (x4)
6	Back bracket M4 screws (x4)	**13**	Cable tie
7	Back bracket, right hand (x1)		

Figure 3. Items for Installation into a Netfinity Rack

Step 2.   Check whether all the items that you need are present. If any item is missing, contact your marketing representative.

Step 3.   Go to "Preparing the Netfinity Rack" on page 13.

Preparing the RS/6000 Rack (System or Expansion)

Note: If you are installing the 7133 into an empty rack, install it into the lowest position so that the rack does not become unstable. You might need to remove the rack power distribution unit before you install the support rails (see the *Installation and Service Guide*, or equivalent, for the rack). If you are installing two or more 7133s into the rack, start at the lowest available position, and work upward.

Step 1. The 7133 is four Electronics Industries Association (EIA) units high. Using the preinstallation planning information, or other relevant information, determine where you are going to locate the 7133 in the rack.

Step 2. 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.
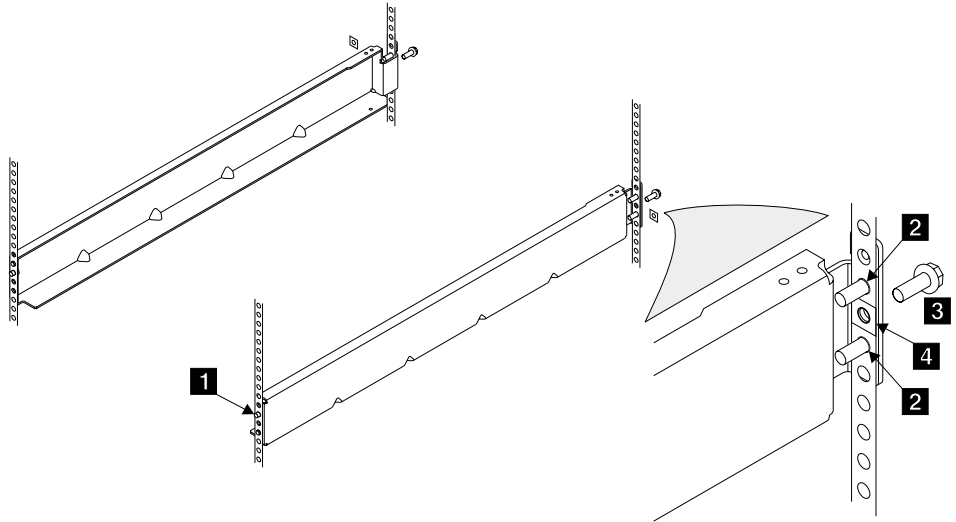
Step   3.   Refer to Figure 4.

Figure 4. Installing the Support Rails

For each support rail:

a. Attach a nut clip **4** at the selected hole in the back of the rack.

b. Insert the two studs **2** 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 **1** enters the matching hole in the front of the rack.

c. 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 3b.

d. Insert the rail screw **3** into the nut clip **4** and tighten it.

Step 4. Refer to Figure 5.

Step 5. At the front of the rack, observe the threaded hole **1** in each of the support rails that you have just installed.

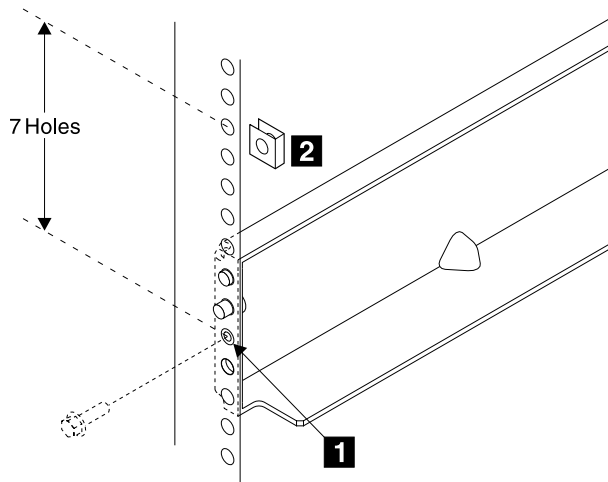Step 6. Count seven holes upward from each threaded hole, and install a nut clip **2** .

Figure 5. Installing Nut Clips

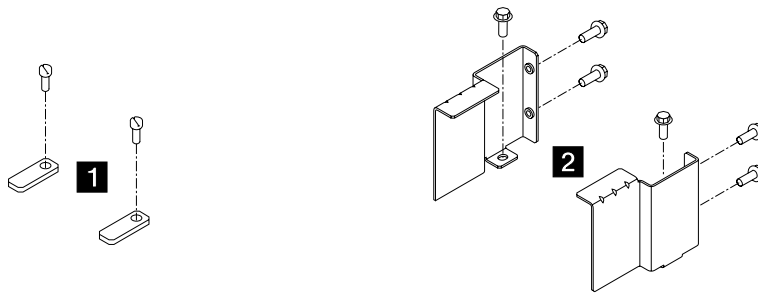Step 7. Go to the back of the rack.

Step 8. Refer to Figure 6.

Figure 6. Clamp Plates and Back Brackets

Step 9. If clamp plates **1** are provided with the support rails, go to step 10 on page 11.

If back brackets **2** are provided, go to step 14 on page 12.
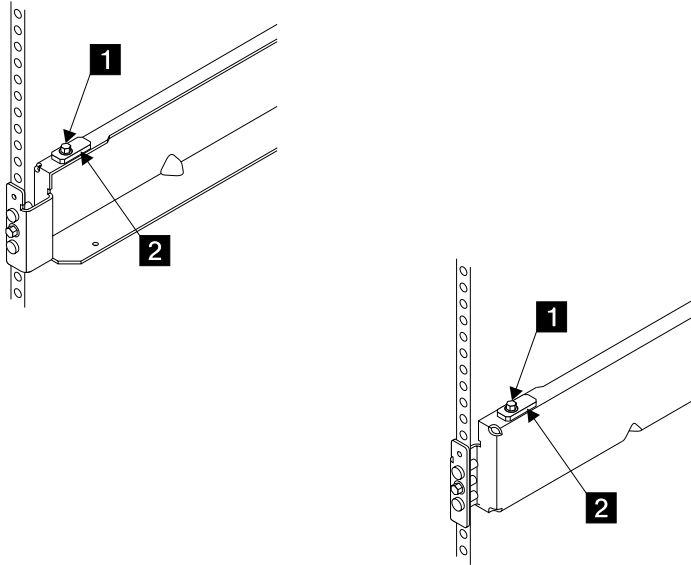
Step 10. Refer to Figure 7.

Figure 7. Installing the Clamp Plates onto an RS/6000 Rack

Step 11. Onto each support rail, install a clamp plate **1** and a screw **2**. Ensure that the clamp plates are oriented as shown in Figure 7.

Step 12. Tighten the screws just enough to prevent the clamp plates from moving.

Step 13. Go to "Removing the Disk Drive Modules and Dummy Disk Drive Modules" on page 18.
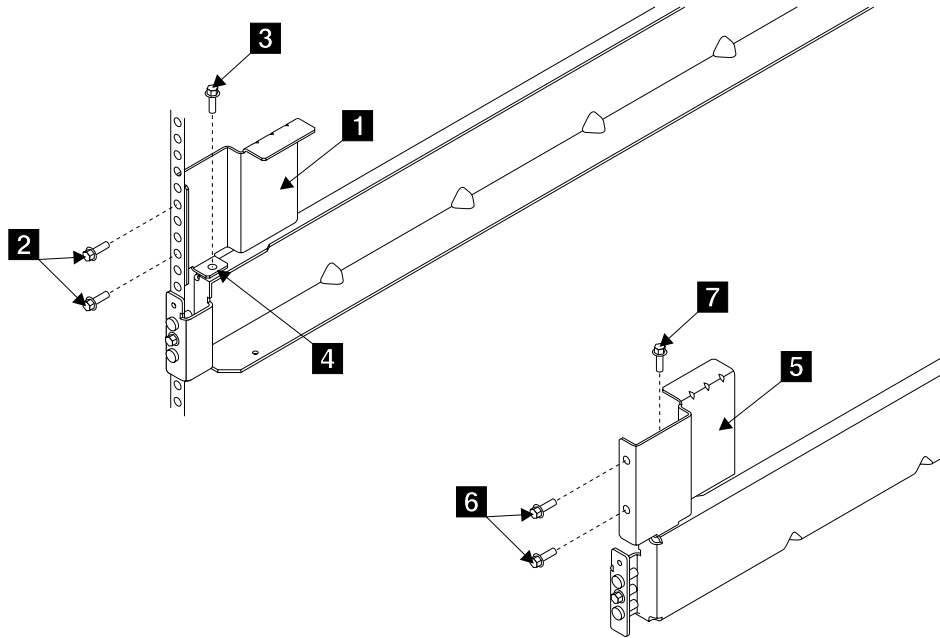
Step 14.   Refer to Figure 8.

Figure 8. Installing the Back Brackets onto an RS/6000 Rack

Step 15.   Place the right-hand back bracket **1** (now on your left) into position, so that its small flange **4** touches the support rail.

Step 16.   Install the screws **2** , but tighten the screws only a few turns.

Step 17.   Lift the bracket upward as far as the holes in the rack allow, then tighten both screws *finger tight*.

Step 18.   Install the screw **3** , and tighten it *finger tight*.

Step 19.   Place the other back bracket **5** into position, as shown in Figure 8.

Step 20.   Using the screws **6** and **7** , repeat steps 16 through 18.

Step 21.   Go to "Removing the Disk Drive Modules and Dummy Disk Drive Modules" on page 18.

Preparing the Netfinity Rack

Attention:

- Before you start to install the 7133, ensure that the rack has been correctly located and installed, as described in the *Netfinity Rack: Planning and Installation Guide*, S24L-8055.

- Check the strength of the floor.

  Racks can be installed as single units or as combinations of up to five units. Each Model 900 (42U) rack can contain up to three power distribution units and six 7133s. Each 42U rack or combination puts a large concentration of weight onto a small area of floor. Table 1 shows the weight concentrations of various numbers of 42U racks.

  Table 1. Average Weights of 42U Racks

Number of Racks in Combination	Average Weight on Floor	
	kg per m²	lb per ft²
1	269	55
2	333	68
3	367	75
4	391	80
5	406	83

  The table assumes that:

  – The racks are next to each other

  – The weight of the combination of racks is distributed over an area that includes the specified servicing and cooling clearances for the rack, which are:
      1.5 m (5 ft) at the front of the rack or combination
      0.8 m (2.5 ft) at the back of the rack or combination
      0.9 m (3 ft) at *each* side of the rack or combination

  Ensure that you observe the weight limits that pertain to the site. If necessary, consult a qualified consultant or structural engineer.

- Install any power distribution units (PDUs) or uninterruptible power supply (UPS) units that are required.

- To ensure that the rack enclosure remains steady, install the 7133 into the lowest available position in the rack. If you are installing two or more 7133s into the rack enclosure, always start at the lowest available position, and work upward.

- If the rack contains a power distribution unit (PDU), a gap of three EIA positions is needed between the PDU and the 7133 to allow cables to pass through.

  If the rack contains a uninterruptible power supply (UPS) unit, no gap is needed.

- The bottom of the topmost 7133 in a 42U rack must not be higher than EIA position 30.

- Do not try to install any type of support rail other than the type that is described here. If you do not have the correct type of support rail, contact your Marketing Representative.

- To prevent overheating of the 7133 due to incorrect airflow, blank filler panels must be installed into the front of all unused positions of the rack. If your rack has any unused positions, **do not operate the 7133 for longer than 15 minutes unless blank filler panels have been installed**.
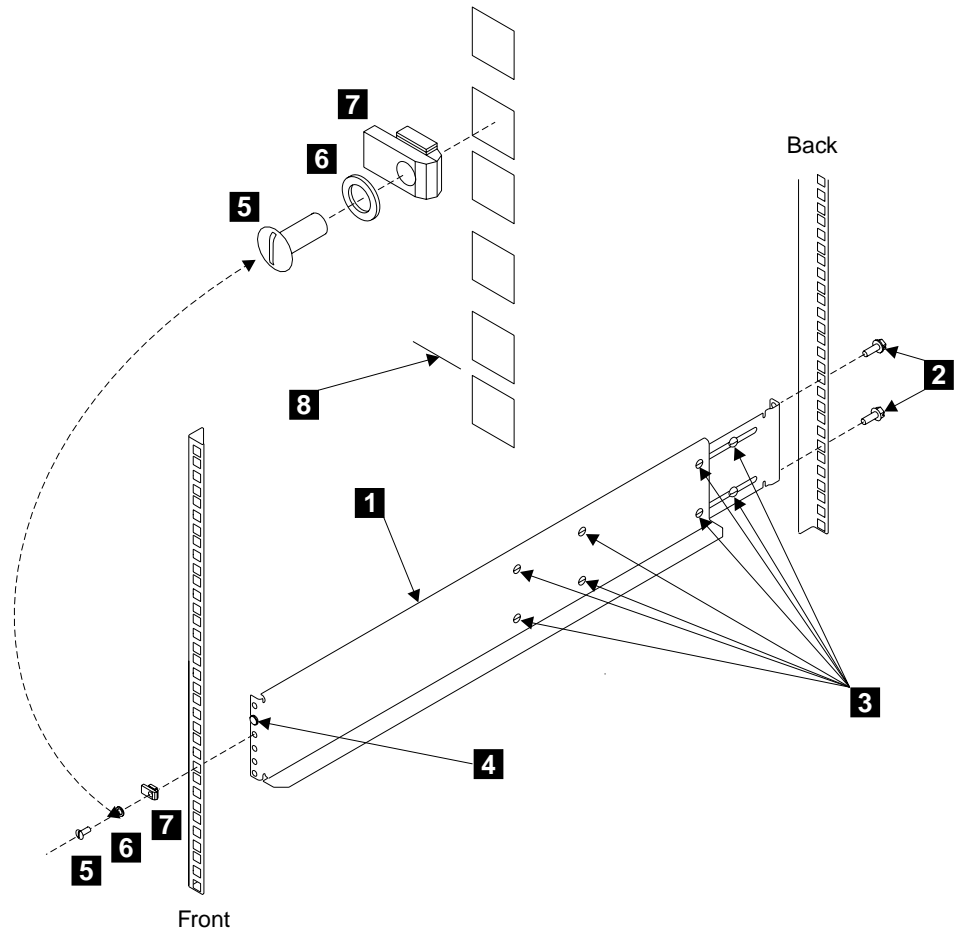
Step   1.   Refer to Figure 9.

Figure 9. Installing the Support Rails

Step   2.   Observe the EIA positions on the rack, and determine where you are going to install the 7133. If appropriate, allow for possible future installation of other subsystems.

> **Note:** The bottom flange of the support rail must align with the EIA mark **8** (on a narrow bar of the rack).

Step   3.   Find the left-hand support rail **1** .

Step   4.   Loosen the eight adjustment screws **3** .

Step   5.   Hold the support rail in position in the rack, then install and fully tighten the two hexagonal M6 mounting screws **2** at the back of the rail.

Step 6.   Extend the support rail toward the front of the rack.

         Note: Hold the support rail in position until you have completed step 10.

Step 7.   Ensure that the support rail is horizontal (a spirit level might be useful here).

Step 8.   Install the rail retainer **7** .

Step 9.   Install the pan head M4 screw **5** and lock washer **6** .

Step 10.   Fully tighten the screw.

Step 11.   Ensure that the rail retainer has fully engaged the hole in the rack.

         If the retainer has not engaged the hole, loosen the screw, reengage the retainer, then tighten the screw fully.

Step 12.   Ensure that the locator pin **4** is flush with the front edge of the rack.

         If the locator pin is not flush, loosen the screw, reengage the retainer, then tighten the screw fully.

Step 13.   Fully tighten the eight adjustment screws **3** .

Step 14.   Repeat steps 4 through 13 for the right-hand support rail.
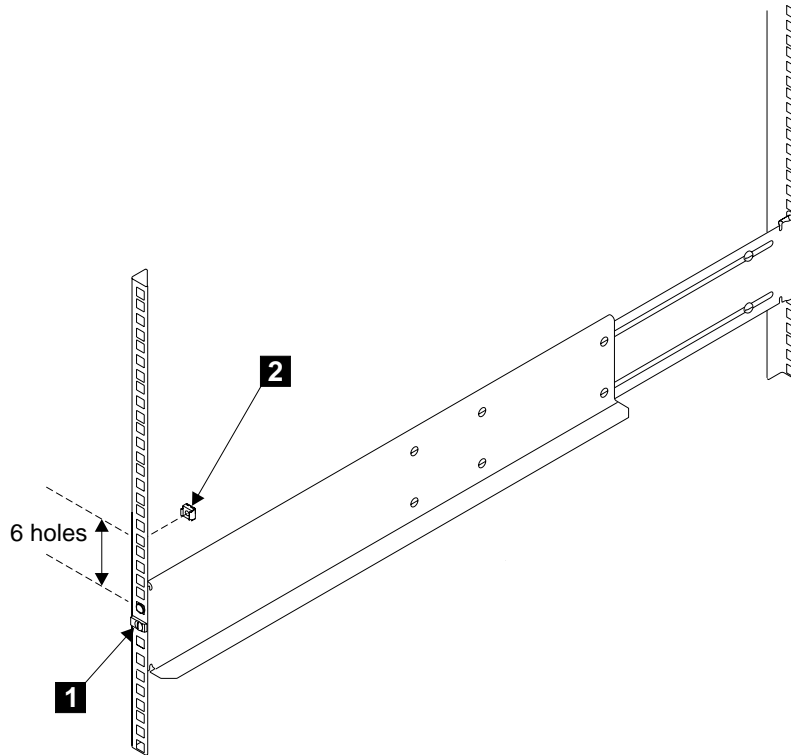
Step 15. Refer to Figure 10.

Figure 10. Installing the Nut Clips

Step 16. At the front of the rack, on the left-hand side, count six holes upward *from* the retainer screw **1** .

Step 17. At the sixth hole, install a nut clip **2** .

Step 18. Repeat for the right-hand side of the rack.

Step 19. Go to "Removing the Disk Drive Modules and Dummy Disk Drive Modules" on page 18.

Removing the Disk Drive Modules and Dummy Disk Drive Modules

CAUTION:
A 7133 Model D40 weighs up to 55 kg (121 lb) with disk drive modules installed. Do not attempt to lift the 7133 into the rack unless all the disk drive modules have been removed.

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

Step   1.   Refer to Figure 11.

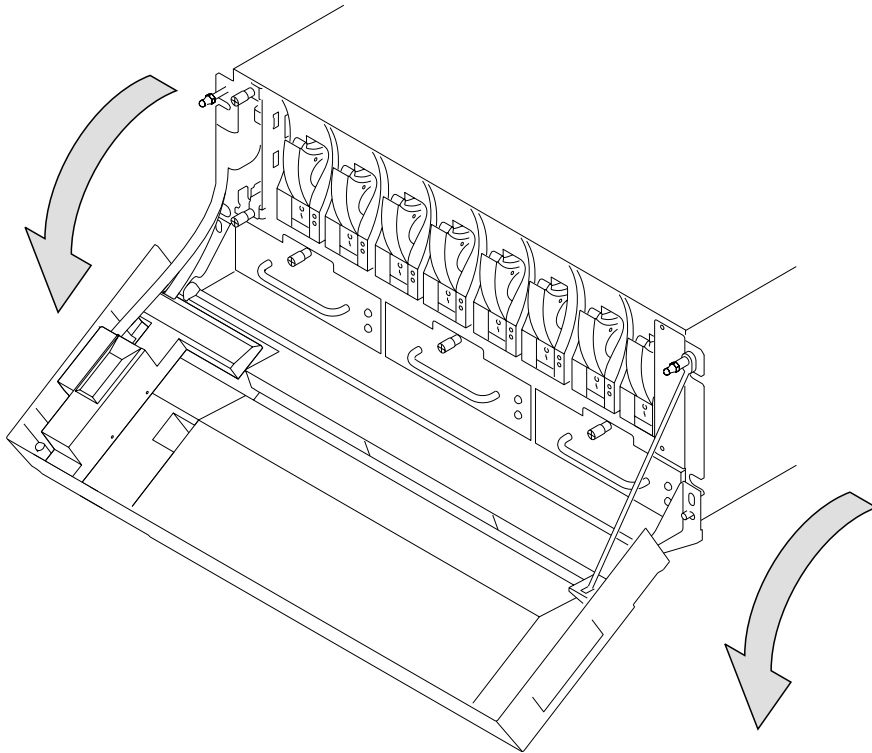Step   2.   Grip the sides of the front cover, and pivot the cover downward.

Figure 11. Opening the Front Cover

Step 3. Before you start to remove any modules, note which slots in the 7133 contain disk drive modules, and which contain dummy disk drive modules. This action helps you to reinstall the modules into their correct slots after you have installed the 7133 into the rack. Disk drive modules have a serial-number label **1** ; dummy disk drive modules do not (see Figure 12).

Note: 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).
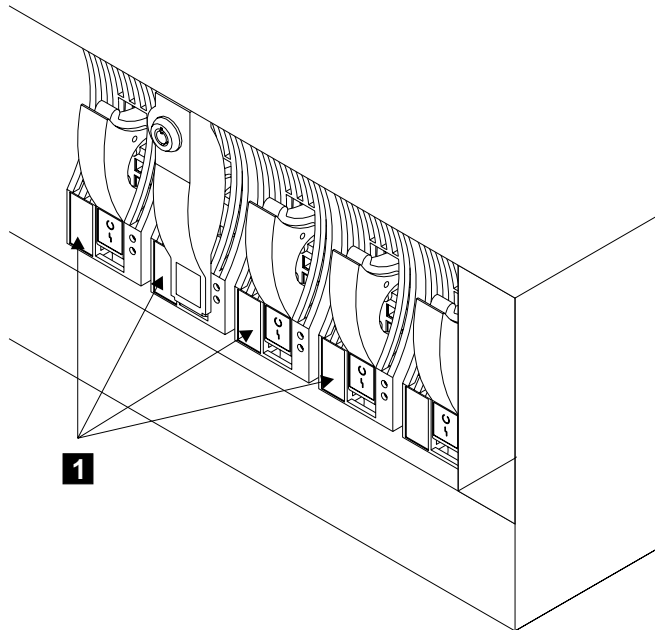

Figure 12. Serial-Number Label on Disk Drive Modules
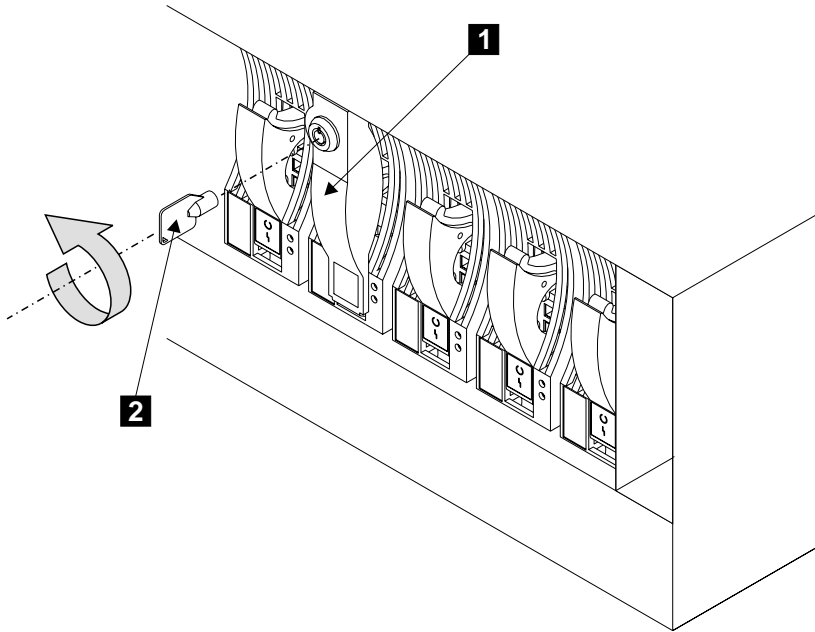
Step   4.   Refer to Figure 13.

Figure 13. Removing the Lock from a Disk Drive Module (1)

Step   5.   If the disk drive modules have locks **1** , go to step 6.

If the disk drive modules do not have locks, go to step 10 on page 22.

Step   6.   Find the key (supplied with the 7133).

Step   7.   Insert the key **2** into the lock, then turn the key counterclockwise.
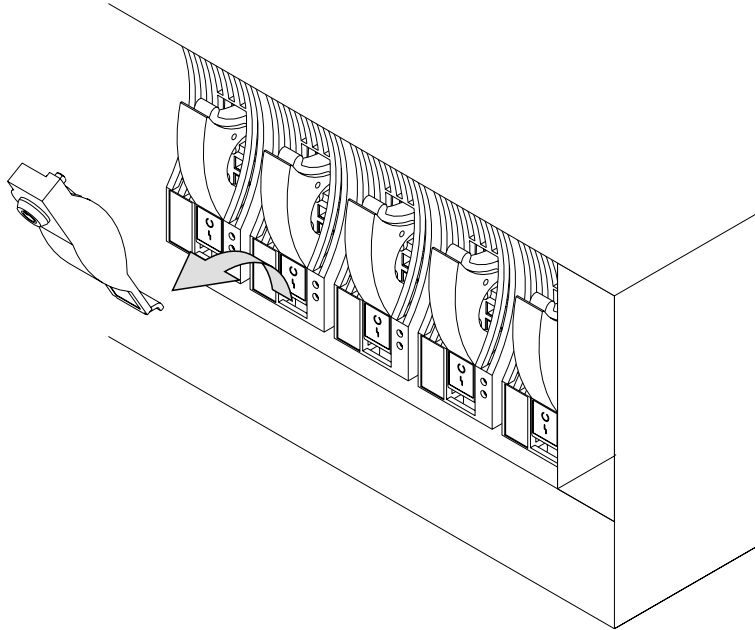
Step 8. Refer to Figure 14.

Figure 14. Removing the Lock from a Disk Drive Module (2)

Step 9. Pull the lock forward, then upward, to remove it.
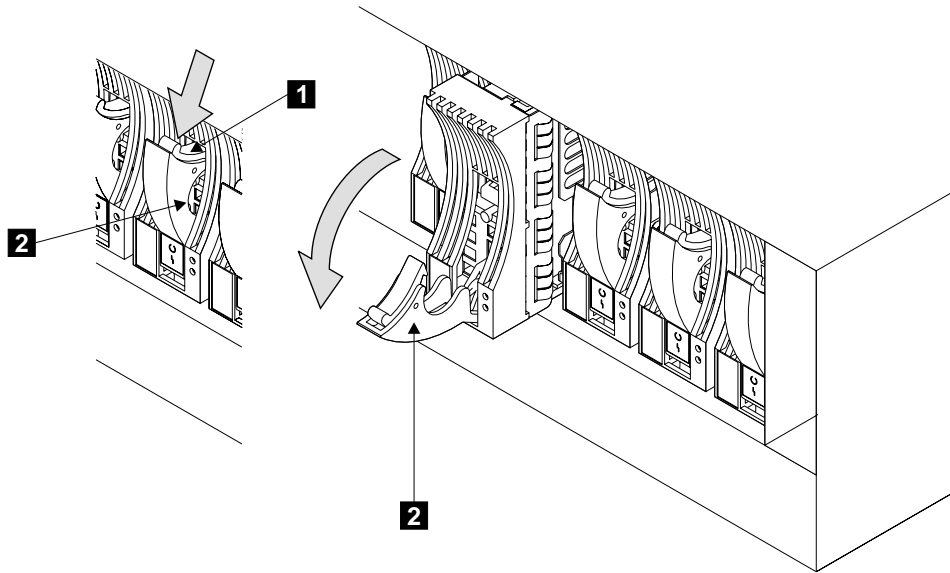
Step 10.   Refer to Figure 15.

Figure 15. Opening the Handle of a Disk Drive Module

Step 11.   Press the blue latch **1** , and pull down the handle **2** fully. This action pulls
the disk drive module partially out of its slot.
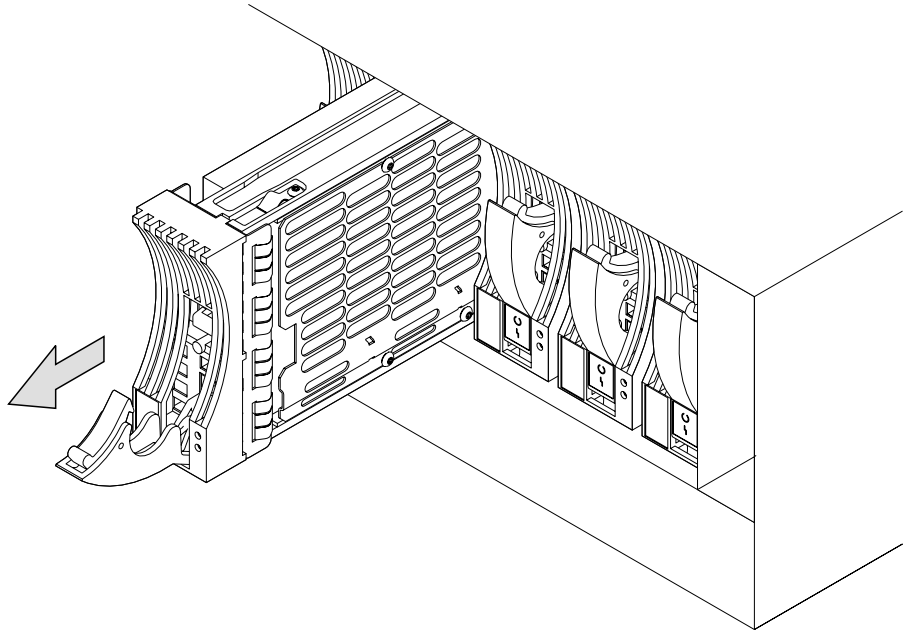
Step 12.   Refer to Figure 16.

Figure 16. Removing a Disk Drive module

Step 13.   Grip the handle, and carefully pull out the disk drive module. As the module comes out, put one hand under its base to prevent it from falling.
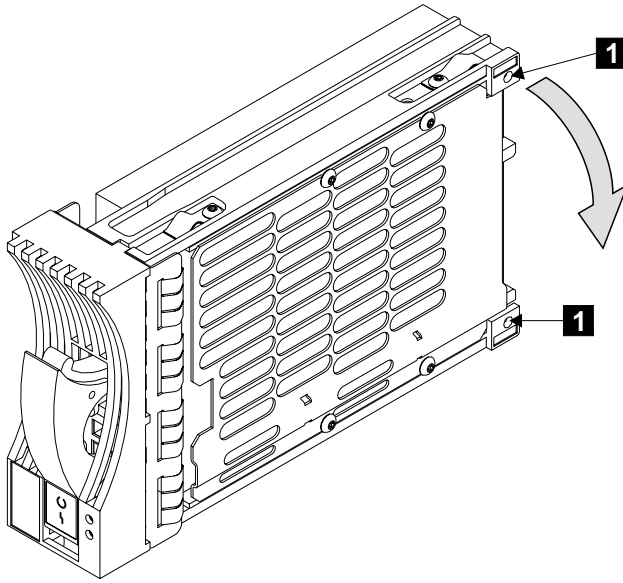
Step 14.   Refer to Figure 17.

Figure 17. Placing a Disk Drive Module into a Safe Position

Step 15.   Lay down the disk drive module so that it rests on the supports **1** .

Step 16.   Repeat steps 4 through 15 for each disk drive module or dummy disk drive module. Ensure that you remove all the modules from the front and back of the 7133.

Step 17.   If you are installing the 7133 into an RS/6000 rack, go to "Installing the 7133 Model D40 into an RS/6000 Rack" on page 25.

Installing the 7133 Model D40 into an RS/6000 Rack

CAUTION:

- **The stabilizer must be correctly attached to the bottom front of the rack, or the rack must be firmly fastened to the floor, to prevent the rack from tipping forward while the 7133 is being installed into the rack. Do not install or pull out any unit unless either the stabilizer is firmly attached to the rack, or the rack is firmly fastened to the floor, as described in the rack installation instructions.**

- **If you are installing the 7133 into a Model T00 or T42 rack, you must also observe the safety notices for those racks before you start to install the 7133. You can find the safety notices in the System Installation chapter of the** *7014 Model T00 and T42 Rack Installation and Service Guide,* **SA33-0577, or at web page:**

  http://www.rs6000.ibm.com/resource/hardware_docs/sa38-0577/a4aw9bas.html

Step 1. **CAUTION:**

A 7133 Model D40 weighs up to 55 kg (121 lb) with disk drive modules installed. Do not attempt to lift the 7133 into the rack unless all the disk drive modules have been removed.

If you have not already done so, remove all the disk drive modules from the 7133 Model D40 (see "Removing the Disk Drive Modules and Dummy Disk Drive Modules" on page 18).
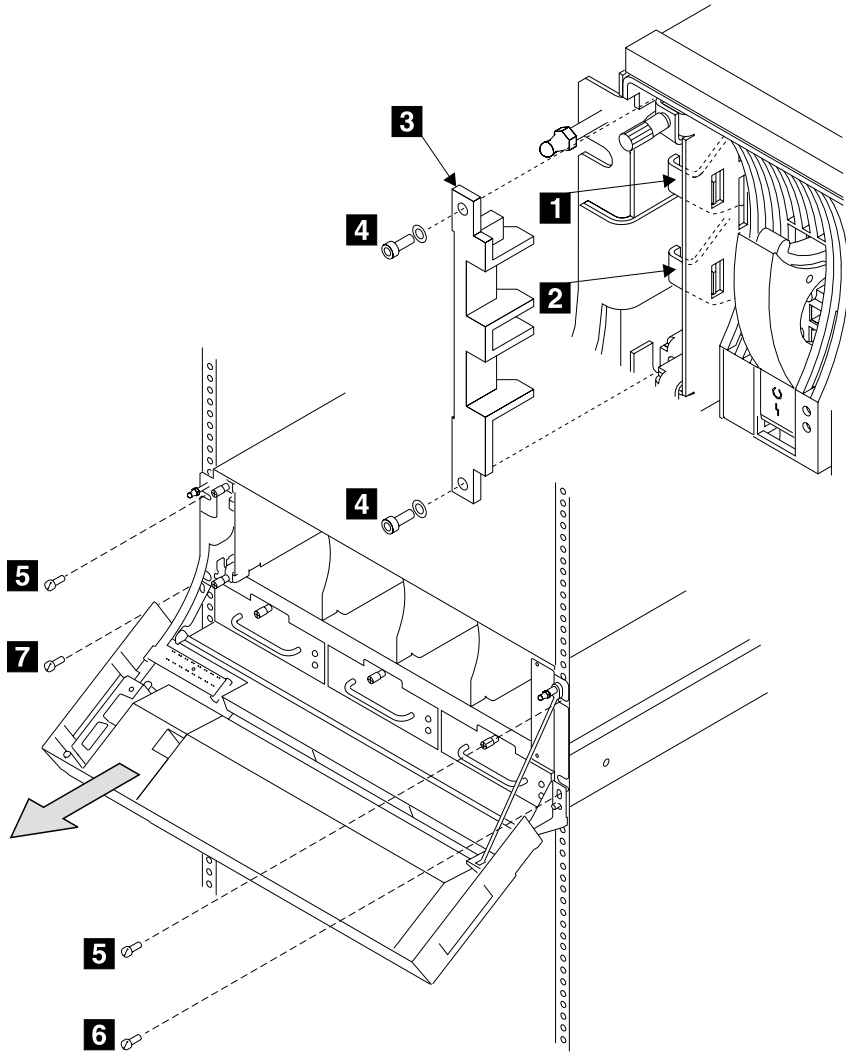
Step 2. Refer to Figure 18.

Figure 18. Installing the 7133 into an RS/6000 Rack

Step 3. **CAUTION:**
Do not attempt to lift the 7133 by yourself. Ask another person for aid.
Stand at the front of the rack and, with aid from another person, place the
back of the 7133 onto the support rails, then slide the 7133 into the rack.

Step 4. **Attention:** To prevent damage to the flexible circuits, disconnect them before you install the front mounting screws.

If a cable retainer **3** is present, remove the two screws **4** and the latch retainer.

Move the latch **2** to your left, then pull it forward to unplug the operator-panel flexible circuit from the controller card assembly.

Step 5. Do the same actions with the latch **1** to unplug the disk-drive-status-light flexible circuit from the controller card assembly.

Step 6. **Attention:** Ensure that you install the front mounting screws in the sequence given, so that the 7133 is correctly aligned in the rack.

Install the lower left-hand front mounting screw **7** . This screw locates the 7133 laterally. Do not fully tighten the screw yet.

Step 7. Install the two upper front mounting screws **5** and the lower right-hand mounting screw **6** . Do not fully tighten the screws yet.

Step 8. Fully tighten the lower left-hand front mounting screw **7** .

Step 9. Fully tighten the other three front mounting screws.

Step 10. Reconnect the two flexible circuits.

> **Note:** Ensure that the latches of the operator panel flexible circuit and the disk drive status lights flexible circuit engage fully in the slots of the 7133 frame assembly.

Step 11. Go to the back of the rack.

Step 12. If you have installed clamp plates, go to step 13.

If you have installed back brackets, go to step 17 on page 29.
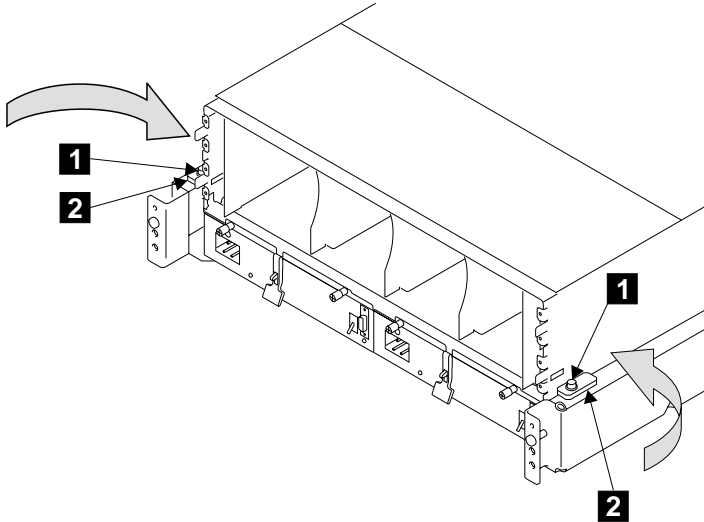
Step 13. Refer to Figure 19.

Figure 19. Engaging the Clamp Plates

Step 14. Loosen the two screws **1**, and turn the two clamp plates **2** inward so that they engage the slots in the sides of the 7133.

Step 15. Tighten the two screws **1**.

Step 16. Go to "Reinstalling the Disk Drive Modules and Dummy Disk Drive Modules" on page 34.
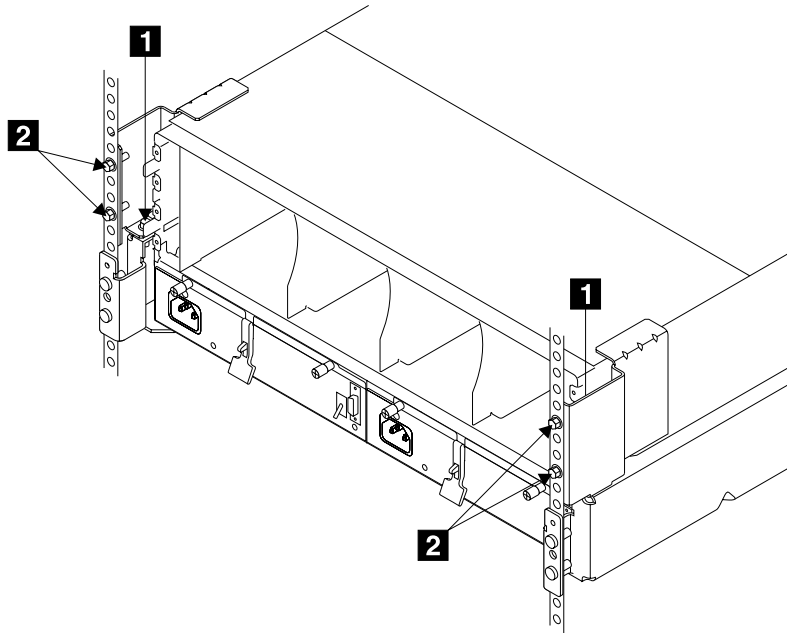
Step 17.   Refer to Figure 20.

Figure 20. Tightening the Back Brackets

Step 18.   Fully tighten the two screws **1** .
Step 19.   Fully tighten the four screws **2** .
Step 20.   Go to "Reinstalling the Disk Drive Modules and Dummy Disk Drive Modules"

Installing the 7133 Model D40 into a Netfinity Rack

CAUTION:
The stabilizer must be correctly attached to the bottom front of the rack, or the rack must be firmly fastened to the floor, to prevent the rack from tipping forward while the 7133 is being installed into the rack. Do not install or pull out any unit unless either the stabilizer is firmly attached to the rack, or the rack is firmly fastened to the floor, as described in the rack installation instructions.

Step 1. **CAUTION:**
A 7133 Model D40 weighs up to 55 kg (121 lb) with disk drive modules installed. Do not attempt to lift the 7133 into the rack unless all the disk drive modules have been removed.

If you have not already done so, remove all the disk drive modules from the 7133 (see "Removing the Disk Drive Modules and Dummy Disk Drive Modules" on page 18).
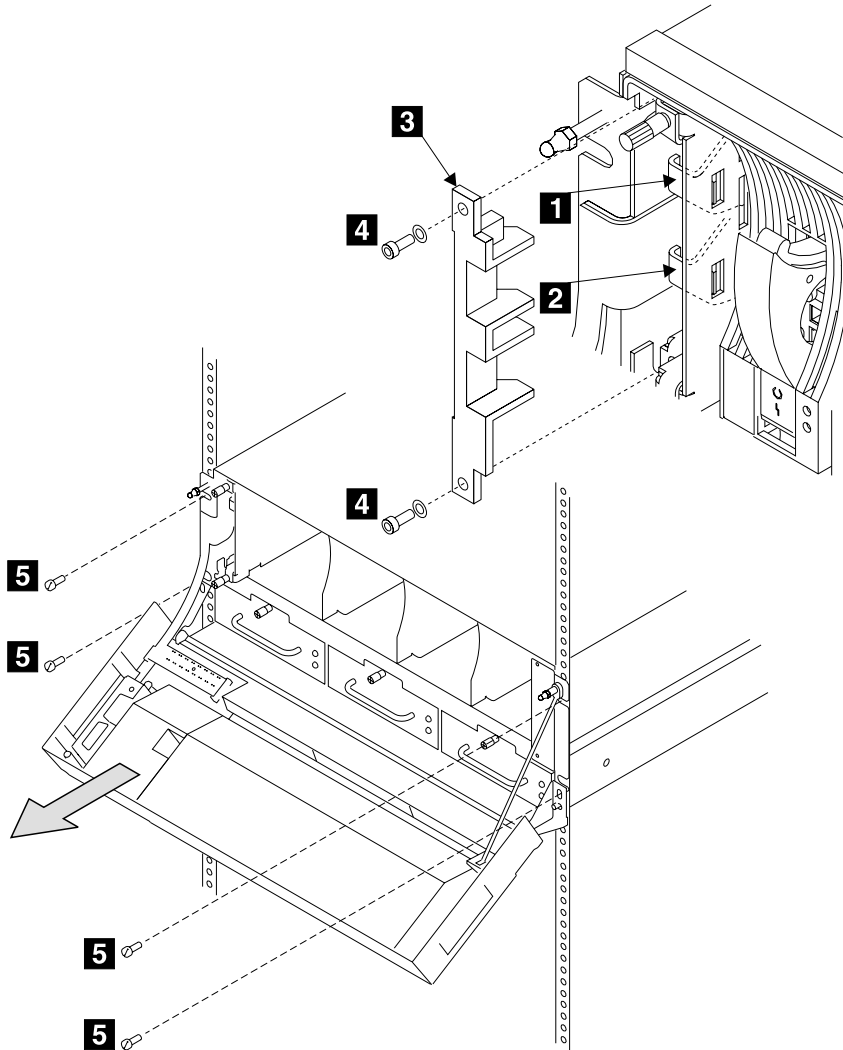
Step 2. Refer to Figure 21.

Figure 21. Installing the 7133 into a Netfinity Rack

Step 3. **CAUTION:**
Do not attempt to lift the 7133 by yourself. Ask another person for aid.

Stand at the front of the rack and, with aid from another person, place the back of the 7133 onto the support rails, then slide the 7133 into the rack.

Step 4. **Attention:** To prevent damage to the flexible circuits, disconnect them before you install the front mounting screws.

If a latch retainer **3** is present, remove the two screws **4** and the latch retainer.

Move the latch **2** to your left, then pull it forward to unplug the operator-panel flexible circuit from the controller card assembly.

Step 5. Do the same actions with the latch **1** to unplug the disk-drive-status-light flexible circuit from the controller card assembly.

Step 6. Install the four front M5 mounting screws **5** .

Note: The upper two screws screw into the nut clips that you installed earlier. If a nut clip is in the wrong position, remove the 7133 from the rack, relocate the nut clip, then reinstall the 7133.

The lower two screws pass through the holes in the front cover hinge of the 7133, and screw into the support rails.

Step 7. Reconnect the two flexible circuits.

Note: Ensure that the latches of the operator panel flexible circuit and the disk drive status lights flexible circuit engage fully in the slots of the 7133 frame assembly.

Step 8. Find the right-hand back bracket and its screws and washers (see Figure 3 on page 7).
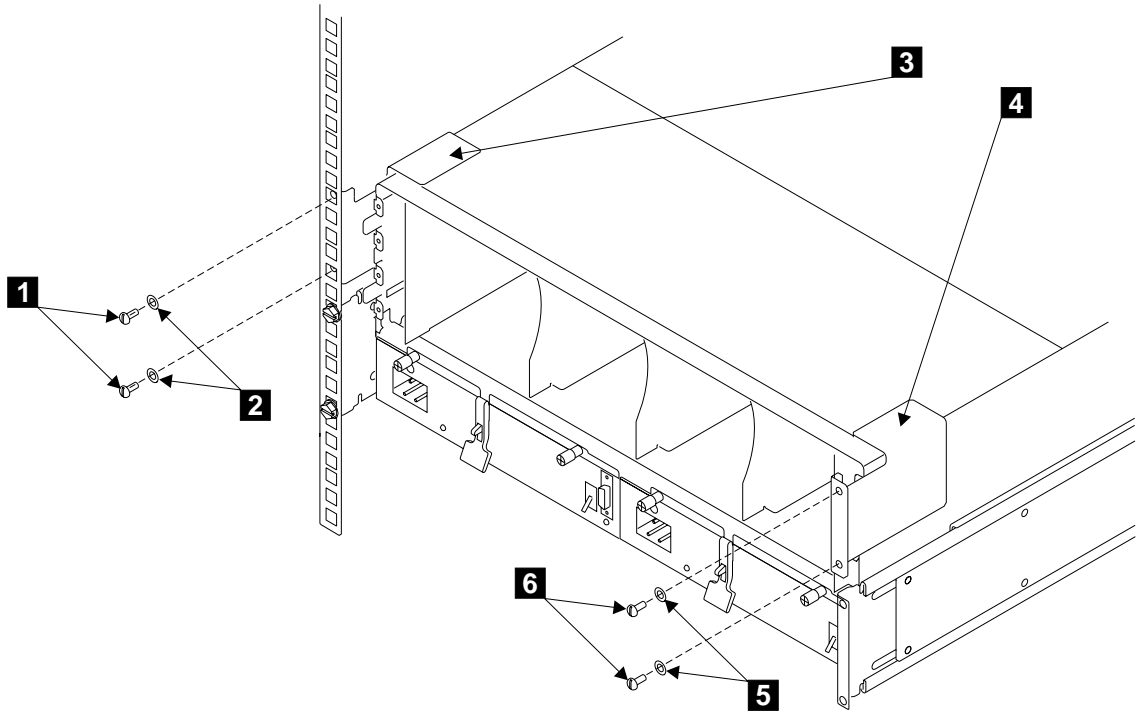
Step   9.   Refer to Figure 22.

Figure 22. Installing the Back Brackets

Step 10.   At the back of the rack, place the right-hand back bracket **3** (now on your left) into position, as shown in Figure 22.

Step 11.   Install the screws **1** and the washers **2**, but do not tighten the screws fully.

Step 12.   With a flat hand, press and hold downward the bracket.

Step 13.   Fully tighten the top screw. You can now remove your hand from the bracket.

Step 14.   Fully tighten the bottom screw.

Step 15.   Place the other back bracket **4** into position, as shown in Figure 22.

Step 16.   Using the screws **6** and the washers **5**, repeat steps 11 through 14.

Step 17.   Go to "Reinstalling the Disk Drive Modules and Dummy Disk Drive Modules" on page 34.

Reinstalling the Disk Drive Modules and Dummy Disk Drive Modules

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 disk drive module provides continuity of the SSA loop, and ensures that the correct airflow is maintained around the disk drive modules in the other slots.

- A –48 volt 7133 Model D40 that is connected to a 15-amp circuit breaker and contains at least one 18.2 GB, 10 000 to 10 020 rpm disk drive module must contain no more than nine disk drive modules. Otherwise, no limitations exist for other types of disk drive module.

  If the 7133 is connected to a 20-amp circuit breaker, no limitations exist for any types of disk drive module.

Step 1. Referring to the note that you made about the original locations of the modules, reinstall the modules as described in the following steps.
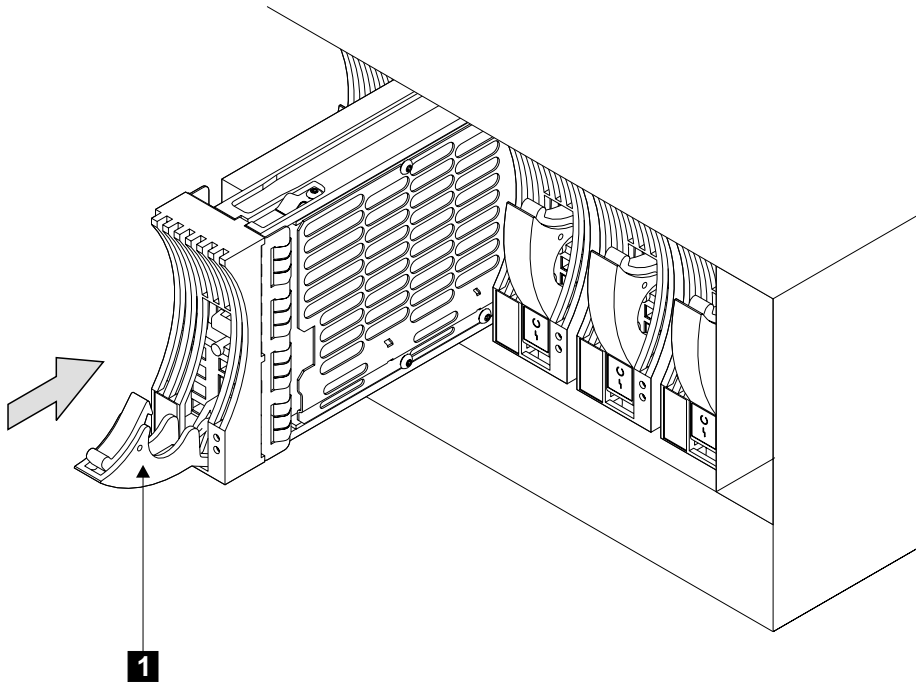
Step 2. Refer to Figure 23.

Figure 23. Reinstalling a Disk Drive Module

Step 3. Ensure that the handle **1** is fully open on the disk drive module that you are going to install.

Step 4. With one hand giving support to the base of the module, insert the module, and push it into the slot. The module stops before it is fully home.
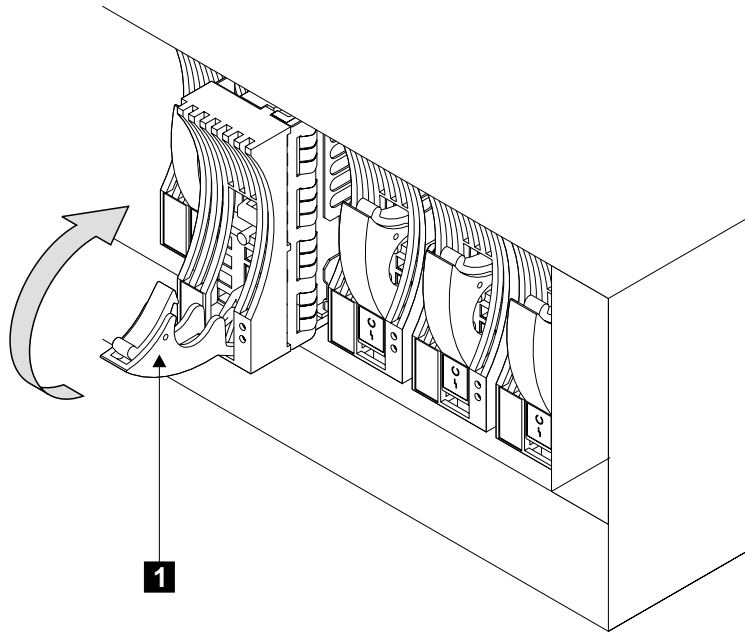
Step 5. Refer to Figure 24.

Figure 24. Closing the Handle of a Disk Drive Module

Step 6. Close the handle **1** . Press it in until you hear a click. This action pushes the module fully home.

Step 7. Repeat steps 2 through 6 for each disk drive module and dummy disk drive module.
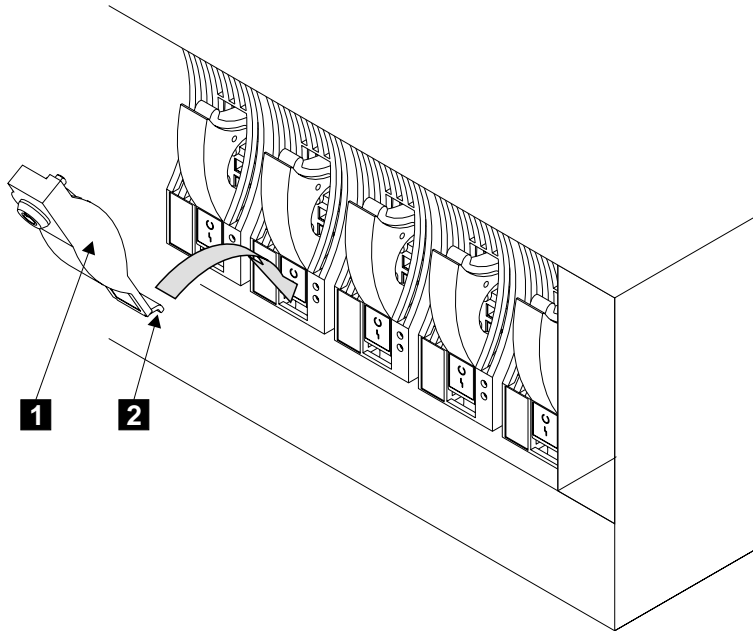
Step 8. Refer to Figure 25

Figure 25. Installing the Lock onto a Disk Drive Module (1)

Step 9. If any disk drive module or dummy disk drive module has a lock **1** , go to step 10. Otherwise, go to step 15 on page 37.

Step 10. Insert the flange **2** of the lock into the slot in the front of the disk drive module.
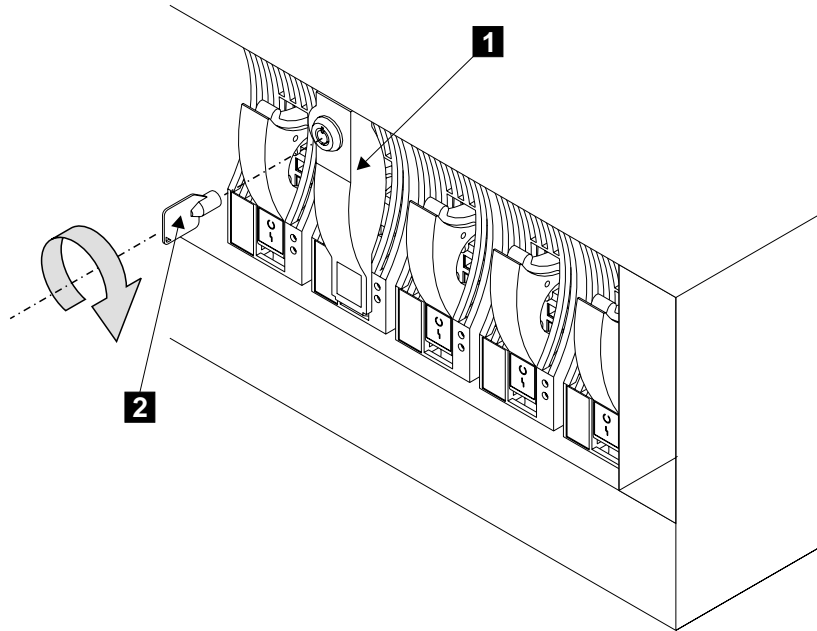
Step 11.   Refer to Figure 26.

Figure 26. Installing the Lock onto a Disk Drive Module (2)

Step 12.   Push the lock **1** over the handle of the disk drive module.

Step 13.   Insert the key **2** into the lock, then turn the key clockwise.

Step 14.   Repeat steps 8 through 13 for each disk drive module and dummy disk drive module. Put the key into a safe place when you have finished.

Step 15.   **Attention:** Any slot that has no disk drive module installed *must* contain a dummy disk drive module. The dummy disk drive module provides continuity of the SSA loop, and ensures that the correct airflow is maintained around the disk drive modules in the other slots.

Ensure that the 7133 has no empty slots. Install dummy disk drive modules if necessary.

Step 16.   If the 7133 has a Remote Power On Control feature, go to "Installing the Remote-Power-On Control Unit (if Present)" on page 38. Otherwise:

- Go to "Connecting the 7133 Model D40 to a 220-Volt Power Source" on page 41 if the 7133 has 220 volt power-supply assemblies. (That is, if the power sockets at the back of the 7133 each have three pins.)

- Go to "Connecting the 7133 Model D40 to a –48 Volt Power Source" on page 42 if the 7133 has –48 volt power-supply assemblies. (That is, if the power sockets at the back of the 7133 each have 12 pins.)

Installing the Remote-Power-On Control Unit (if Present)

Note: The remote-power-on control unit is always installed in the position shown in the diagram; that is, at the back left-hand side of the rack, directly above the support rail for the 7133 Model D40.
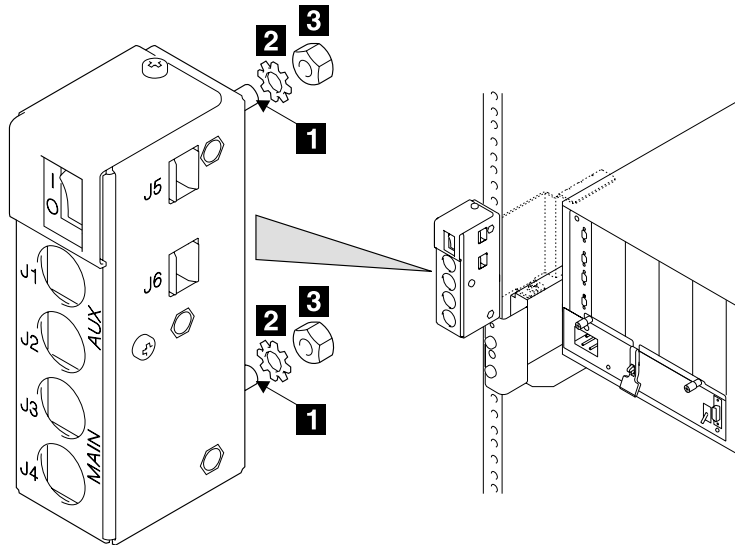
Step 1. Refer to Figure 27.

Figure 27. Installing the Remote-Power-On Control Unit

Step 2. If the back of the 7133 is fastened by brackets, ensure that the right-hand bracket (shown dotted in the diagram) is has three extra holes and a slot in its back flange (see Figure 1 on page 4). Otherwise, you cannot install the remote-power-on control unit. If you do not have the correct bracket, contact your marketing representative, or order part 34L6469.

Step 3. At the back of the rack, insert the studs **1** of the remote-power-on control unit into the holes in the rack, and install the two lock washers **2** . Install and tighten the nuts **3** .

> **Note:** Where a bracket is present, the lower stud of the remote-power-on control unit passes through the bottom hole in the flange of the bracket; the upper stud passes through the slot.
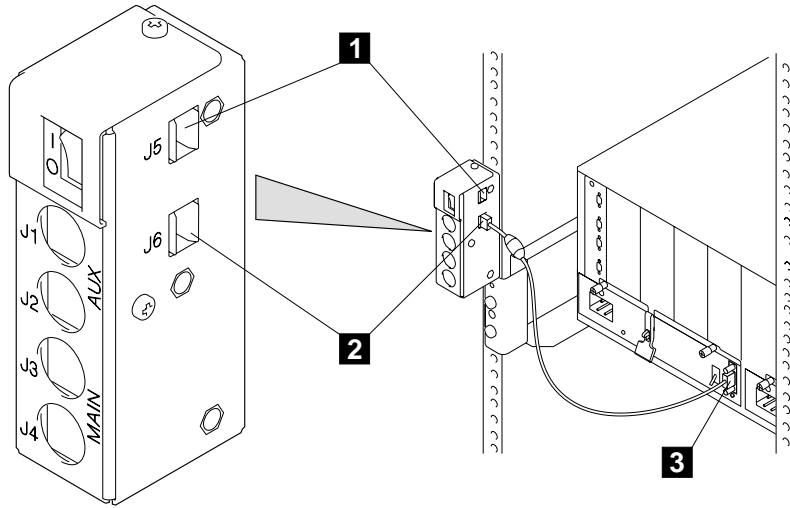
Step 4. Refer to Figure 28.

Figure 28. Connecting the Remote-Power-On Control Unit to the 7133 Model D40

Step 5. Connect one end of the 7133 power-control cable to connector J5 **1** , or to connector J6 **2** of the remote-power-on control unit.

Step 6. Connect the other end of the cable to the connector **3** on the left-hand power supply assembly of the 7133.

Step 7. Using the preinstallation planning information, or other relevant information, determine whether the 7133 is to be connected to one using system or to two.
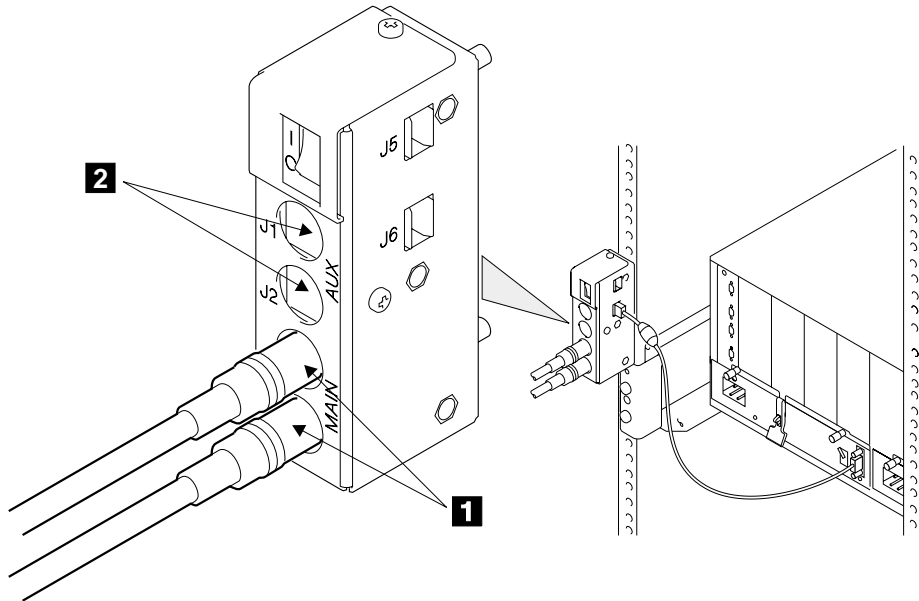
Step 8. Refer to Figure 29.

Figure 29. Connecting the Remote-Power-On Control Unit to the Using System

Step 9. If the 7133 is to be connected to only one using system, connect two using-system power-control cables to the MAIN connectors (J3 and J4) **1** .

If the 7133 is to be connected to two using systems, connect two using-system power-control cables to the MAIN connectors (J3 and J4) **1** and two using-system power-control cables to the AUX connectors (J1 and J2) **2** .

Step 10. Connect the other ends of the using-system power-control cables to the using system (see the using-system *Installation and Service Guide*, or equivalent).

Step 11. Go to "Connecting the 7133 Model D40 to a 220-Volt Power Source" on page 41 if the 7133 has 220 volt power-supply assemblies. (That is, if the power sockets at the back of the 7133 each have three pins.)

Go to "Connecting the 7133 Model D40 to a –48 Volt Power Source" on page 42 if the 7133 has –48 volt power-supply assemblies. (That is, if the power sockets at the back of the 7133 each have 12 pins.)

Connecting the 7133 Model D40 to a 220-Volt Power Source
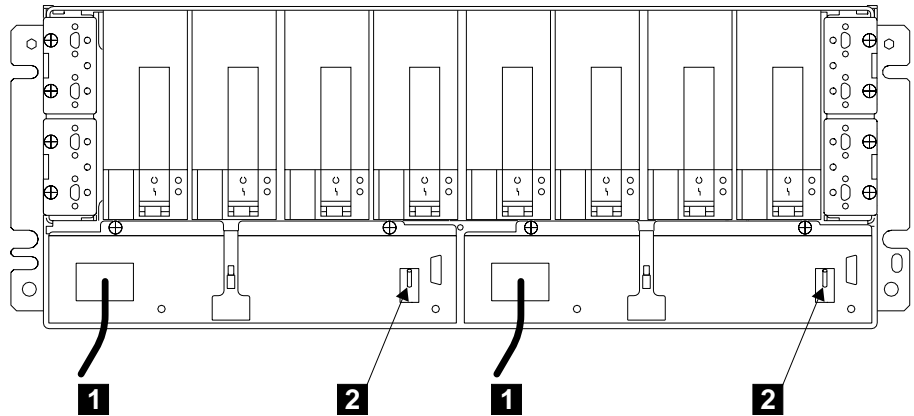
Step 1. Refer to Figure 30.

Figure 30. Connecting the Power Cables and Checking the Switches (220-Volt)

Step 2. At the back of the 7133, plug a power cable **1** into each power supply assembly.

> **Attention:** *Never use power cables from a 7133 Model 010, 020, 500, or 600 to connect a 7133 Model D40 to the mainline power outlet. Use only the shielded power cables that are supplied with the 7133 Model D40.*

Step 3. Ensure that both power supply assemblies are switched on; that is, the PWR/FAULT RESET switch lever **2** of each power supply assembly is pointing upward. To switch on a power supply assembly, push the switch upward.

> **Note:** On early power supply assemblies, pull the switch outward, then push it upward.

Step 4. If you have installed the 7133 into an RS/6000 rack, go to step 5.

If you have installed the 7133 into a Netfinity rack, go to "Appendix E. Alternative Methods for the Connection of Power in a Netfinity Rack" on page 105. For Netfinity racks, alternative methods for the connection of power to a 7133 are available.

Step 5. Plug the other end of the power cables into the power source in the rack (see the *Installation and Service Guide*, or equivalent, for the rack).

Step 6. If the 7133 has a remote-power-on control unit, go to step 7. Otherwise, go to "Connecting the 7133 Model D40 to the Using System" on page 46.

Step 7. Check whether you need to set any rack switches to allow for remote-power-on control (see the *Installation and Service Guide*, or equivalent, for the rack).

Step 8. Go to "Connecting the 7133 Model D40 to the Using System" on page 46.

Connecting the 7133 Model D40 to a –48 Volt Power Source

The rack provides two separate –48 volt power sources by way of two bus bars. One source is available on bus bar A; the other source is available on bus bar B. Power cables are permanently connected to these bus bars. To ensure a continuous supply of power, one power supply assembly of the 7133 must be connected to bus bar A; the other must be connected to bus bar B. If you need further details about the –48 volt power distribution, see the *Installation and Service Guide*, or equivalent, for the rack.

Notes:

1. If you have installed your 7133 Model D40 into a new –48 volt rack, that rack contains one-way power cables.
2. If you have installed your 7133 Model D40 into a –48 volt rack that previously contained 7133 Models 010 or 020, that rack contains three-way power cables. Ensure that you connect only one Model D40 to each three-way power cable.

Step 1. If the rack has one-way cables, go to step 2.

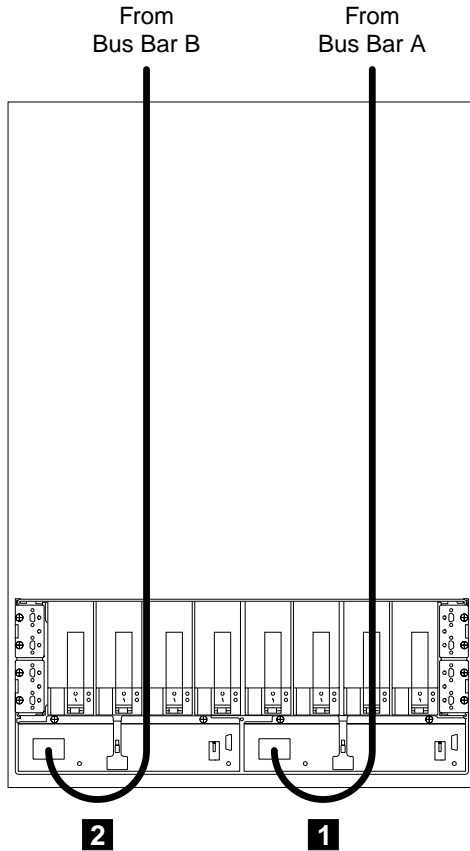If the rack has three-way cables, go to step 6 on page 44.

Step 2. Refer to Figure 31.

Figure 31. Connecting One-Way Power Cables to a 7133 Model D40 (−48 Volts)

Step 3. To one power supply assembly of the 7133, connect a power cable **1** from bus bar A.

Step 4. To the other power supply assembly of the 7133, connect a power cable **2** from bus bar B.
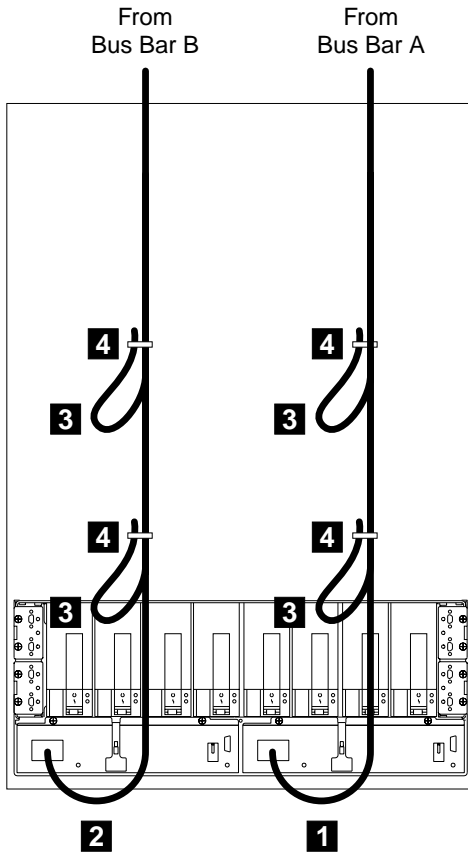
Step 5. Go to step 11 on page 45.

Step   6.   Refer to Figure 32.

Figure 32. Connecting Three-Way Power Cables to a 7133 Model D40 (−48 Volts)

Step   7.   To **one** power supply assembly of the 7133, connect a three-way power cable **1** from bus bar A.

Step   8.   To the other power supply assembly of the 7133, connect a three-way power cable **2** from bus bar B.

Step   9.   **Important:** Ensure that you fasten the ends of the spare cables.

Use cable ties **4** to fasten the ends of the spare cables **3** .

Step 10.   Go to step 11 on page 45.

Step 11.   Refer to Figure 33.
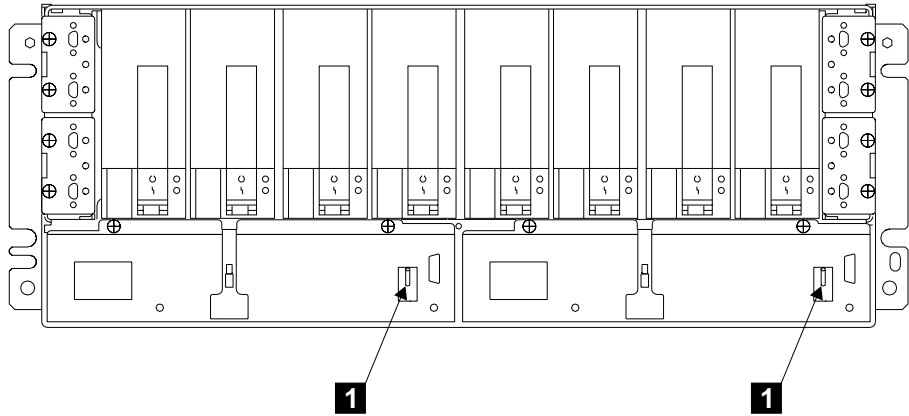
Figure 33. Checking the Switches (−48 Volts)

Step 12.   Ensure that both power supply assemblies are switched on; that is, the PWR/FAULT RESET switch lever **1** of each power supply assembly is pointing upward. To switch on a power supply assembly, push the switch upward.

>   **Note:** On early power supply assemblies, pull the switch outward, then push it upward.

Step 13.   If the 7133 has a remote-power-on control unit, go to step 14. Otherwise, go to "Connecting the 7133 Model D40 to the Using System" on page 46.

Step 14.   Check whether you need to set any rack switches to allow for remote-power-on control (see the *Installation and Service Guide*, or equivalent, for the rack).

Step 15.   Go to "Connecting the 7133 Model D40 to the Using System" on page 46.

Connecting the 7133 Model D40 to the Using System

Step 1. The disk drive modules of a 7133 are connected to the SSA attachment hardware, or to other devices, by way of SSA loops. Before you go any further in these instructions, read carefully the following notes.

Important Notes:

a. Rules for SSA Loops:

Refer to the user or maintenance manual for your using-system SSA attachment hardware, and check the rules that you must follow when you configure SSA loops. These rules ensure that your loops are valid loops.

The manual also contains rules for the physical relationship between disk drive modules and SSA attachments. These rules help you to get the best performance from your subsystem.

SSA loops that include the disk drive modules of a 7133 must also follow these additional rules:

- A maximum of three neighboring dummy disk drive modules can be connected in a particular SSA loop.

- The maximum permitted length for an external SSA cable that connects two SSA nodes (for example, disk drive modules) is 25 meters (82 feet).

- The maximum permitted length for an external fibre optic cable that connects two SSA nodes (for example, disk drive modules) is 10 kilometers (32800 feet).

Connectors	Disk Drive Modules
1 and 4	Front disk drive modules 1 through 4
5 and 8	Front disk drive modules 5 through 8
9 and 12	Back disk drive modules 9 through 12
13 and 16	Back disk drive modules 13 through 16

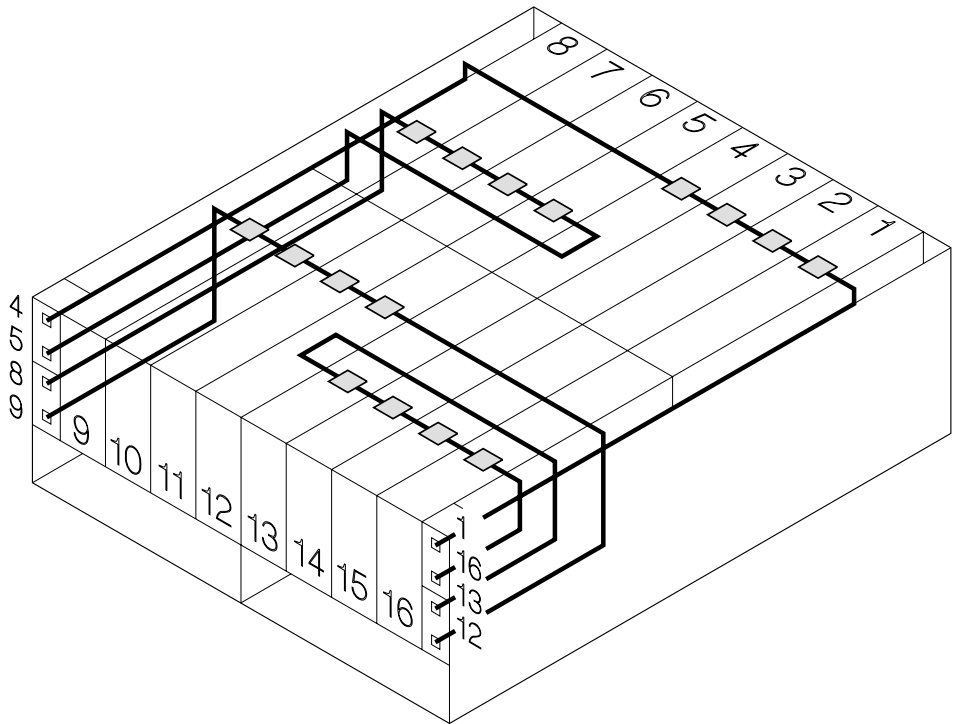Figure 34 shows the internal connections of a Model D40.

Figure 34. Internal Connections of Model D40

Examples of configurations are given in Appendix A. Example Configurations.

Step 2. The SSA connectors at the back of the 7133 are mounted on four bypass cards (also known as SNBC cards). These bypass cards can operate in Automatic mode or in Forced Inline mode. The default setting is for Automatic mode. You can put a bypass card into Forced Inline mode by changing the positions of the two jumpers on the card.

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 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 second example in "Higher-Availability Configurations" on page 70 shows a typical configuration of this type.
- The disk drive modules in one 7133 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.

Refer to the customer's subsystem configuration information, and check whether all four bypass cards are to remain in Automatic mode.

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

If the cards are to remain in Automatic mode, take no further action. Go to step 3.

If any card is to be changed to Forced Inline mode, go to "Appendix B. Changing the Jumpers on a Bypass Card" on page 75, and make the change. When you have finished, return here, and go to step 3.

Step 3. If the 7133 was already installed in the rack when it arrived at the customer's premises, go to step 4.

If you have just installed the 7133 into the rack, go to step 5.

Step 4. Refer to the customer's subsystem configuration information, and verify that the 7133 has been connected to the using system as described in the configuration information. For some configurations, you might need to install additional cables.

If you need to install additional cables, go to "Connecting SSA Cables to the 7133 Model D40" on page 49 or to "Installing and Connecting Advanced SSA Optical Extenders to the 7133 Model D40" on page 50, as required by the configuration information.

If all the cables have been installed, go to "Switching On and Testing the 7133 Model D40" on page 57.

Step 5. Refer to the customer's subsystem configuration information, and verify that the rules for SSA configurations have been observed (see Note 1a on page 46). When you have verified the information, go to "Connecting SSA Cables to the 7133 Model D40" on page 49 or to "Installing and Connecting Advanced SSA Optical Extenders to the 7133 Model D40" on page 50, as required by the configuration information.

Note: If the subsystem configuration information is not available, agree with the customer to use one of the example configurations that are shown in "Appendix A. Example Configurations" on page 63, then go to "Connecting SSA Cables to the 7133 Model D40" on page 49 or to "Installing and Connecting Advanced SSA Optical Extenders to the 7133 Model D40" on page 50, as required by the customer.

Connecting SSA Cables to the 7133 Model D40

Step 1. Attach identification labels to the SSA cables (see your *Site and Hardware Planning Information* manual, or equivalent, for details).
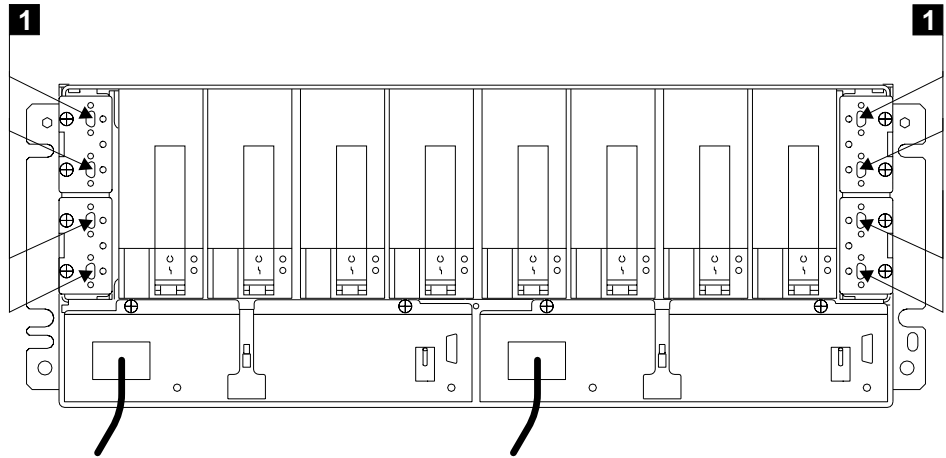
Step 2. Refer to Figure 35.

Figure 35. SSA Connectors at the Back of the 7133 Model D40

Step 3. Using the subsystem configuration information and the information from step 1 on page 46, plug SSA cables into the appropriate connectors **1** on the 7133. Ensure that you tighten the screws on the cable connectors.

> **Note:** To prevent damage to the SSA connector screws, ensure that you use the special screwdriver (SSA tool, part 32H7059) to tighten them. The screwdriver is supplied with the 7133.

Step 4. Ensure that all the SSA cables are correctly connected.

Step 5. If you are also connecting the 7133 to fibre optic cables, but have not done so yet, go to "Installing and Connecting Advanced SSA Optical Extenders to the 7133 Model D40" on page 50. Otherwise, go to Connecting to the Using System in the "Additional Information" appendix (in this book) for your using system.

Installing and Connecting Advanced SSA Optical Extenders to the 7133 Model D40

Notes:

1. **It is the customer's responsibility to obtain the fibre optic cables, and to have those cables installed.**

2. The Advanced SSA Optical Extenders can drive single-mode operations and multi-mode operations. Fibre optic cables and connectors must be to the following specifications:

Fibre optic cables for single-mode operations	9/125 microns
Fibre optic cables for multi-mode operations	50/125 microns or 62.5/125 microns **Note:** Each type of cable needs a particular type of Advanced Multi-Mode Conditioner (see the Parts Catalog in the *7133 Models D40 and T40 Serial Disk Systems: Service Guide*).
Connector type	ST2 (preferred for all new installations) or ST
Uniter type (multi-mode only)	ST2
Maximum permitted length between two SSA nodes (for example, disk drives)	3 kilometers (9842 feet) for multi-mode operations, but see also Note. 10 kilometers (32800 feet) for single-mode operations, but see also Note. **Note:** Lengths of 3 kilometers and 10 kilometers are permitted only if the fibre optic connection is between: • Two 7133s Model D40 or T40 • A 7133 Model D40 and a 7133 Model T40 • A 7133 Model D40 or T40 and an Advanced SerialRAID Adapter • A 7133 Model D40 or T40 and an Advanced SerialRAID/X Adapter • Two Advanced SerialRAID Adapters • Two Advanced SerialRAID/X Adapters Otherwise, the maximum permitted length for single-mode and multi-mode operations is 2.4 kilometers (7874 feet).

3. Because the fibre optic cables can be up to 10 kilometers (32800 feet) long, we recommend that you complete the installation at one end of the fibre optic cables before you start work at the other end.

Step 1. Attach identification labels to the fibre optic cables so that you can recognize the opposite ends of each cable (see the *Site and Hardware Planning Information* manual, or equivalent, for details).

> **Note:** When the fibre optic cables were installed, the installer might have marked the cables to enable you to recognize opposite ends of the cables. You might still need to attach labels for a more detailed identification.

Step 2. If you are connecting the fibre optic cables for single-mode operations, go to "Connecting Fibre Optic Cables for Single-Mode Operations" on page 52.

If you are connecting the fibre optic cables for multi-mode operations, go to "Connecting Fibre Optic Cables for Multi-Mode Operations" on page 54.

Connecting Fibre Optic Cables for Single-Mode Operations

Step 1. Refer to Figure 36.
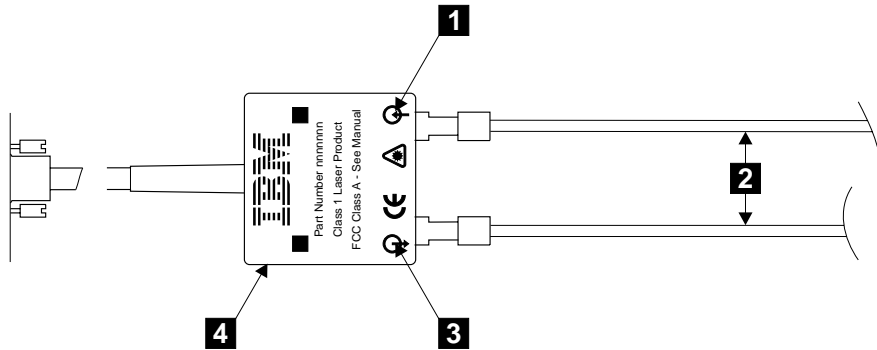
Figure 36. Connecting the Fibre Optic Cables to an Optical Extender

Step 2. **Attention:**

- Ensure that each fibre optic cable is connected between the Receive connector (note the symbol **1**) of one optical extender and the Transmit connector (note the symbol **3**) of the optical extender at the other end of the fibre optic link.
- Before connecting fibre optic cables and devices, ensure that the end faces of the cables are clean. If necessary, use a small cotton pad to apply a fibre-cleaning fluid, such as IPA/D-1 Water Mix 106-17F, to the end faces.

Connect the fibre optic cables **2** to each optical extender **4** that you are going to connect to the 7133.

Note: The fibre optic cables have:

- An inner connector with an alignment lug that engages a slot in the connector of the optical extender
- An outer, bayonet (push-and-twist) connector that locks the cable to the optical extender.

To connect a fibre optic cable:

a. Push it into the connector of the optical extender. As you push the cable, use a twisting motion to ensure that the alignment lug engages the slot in the connector of the optical extender.

b. Fasten the bayonet connector in the normal way.

   If you cannot fasten the bayonet connector, disconnect the cable, and try again.

Step 3. Ensure that all fibre optic cables are correctly connected.

Step 4. **Attention:** Excessive movement at connections in a fibre optic link might cause link errors.

Ensure that the fibre optic cables are held tightly by cable ties to prevent strain and movement at the optical extenders.

Step 5. If not already done, put the wrap cable and adapter assembly into its plastic bag, and put the bag into a safe place that is as close to the optical extender as possible.

Step 6. Go to "Connecting the Optical Extenders to the 7133" on page 56.

Connecting Fibre Optic Cables for Multi-Mode Operations

Step 1. Refer to Figure 37.
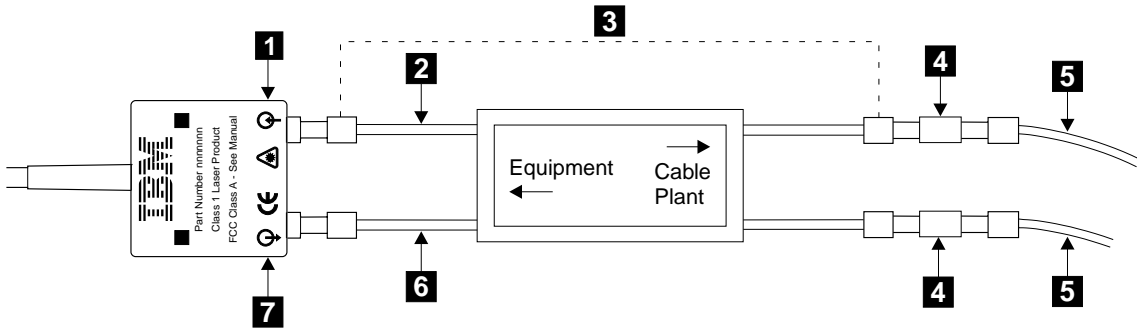
Figure 37. Connecting a Multi-Mode Conditioner

Step 2. **Attention:**

- Ensure that each fibre optic cable is connected, via the multi-mode conditioner **3**, between the Receive connector (note the symbol **1**) of one optical extender and the Transmit connector (note the symbol **7**) of the optical extender at the other end of the fibre optic link.

- Before connecting fibre optic cables and devices, ensure that the end faces of the cables are clean. If necessary, use a small cotton pad to apply a fibre-cleaning fluid, such as IPA/D-1 Water Mix 106-17F, to the end faces.

Identify the yellow fibre **6** of the multi-mode conditioner.

Step 3. Connect the yellow fibre to the Transmit connector (note the symbol **7**) of the optical extender.

Step 4. Connect the orange fibre **2** to the Receive connector (note the symbol **1**) of the optical extender.

Step 5. Repeat steps 3 and 4 for all the optical extenders that you are going to connect to the 7133.

Step 6. Find the uniters **4** that are supplied with the multi-mode conditioner.

Step 7. Using the uniters, connect the main fibre optic cables **5** to the multi-mode conditioner.

   Note: The fibre optic cables have:
   - An inner connector with an alignment lug that engages a slot in the connector of the uniter
   - An outer, bayonet (push-and-twist) connector that locks the cable to the uniter.

   To connect a fibre optic cable:
   a. Push it into the uniter. As you push the cable, use a twisting motion to ensure that the alignment lug engages the slot in the uniter.
   b. Fasten the uniter to the multi-mode conditioner.

Step 8. Repeat step 7 for all the multi-mode conditioners that you are going to install.

Step 9. Ensure that all fibre optic cables are correctly connected.

Step 10. **Attention:** Excessive movement at connections in a fibre optic link might cause link errors.

   Ensure that the fibre optic cables are held tightly by cable ties to prevent strain and movement at the optical extenders.

Step 11. If not already done, put the wrap cable and adapter assembly into its plastic bag, and put the bag into a safe place that is as close to the optical extender as possible.

Step 12. Go to "Connecting the Optical Extenders to the 7133" on page 56.

Connecting the Optical Extenders to the 7133

Step 1. Refer to Figure 38.
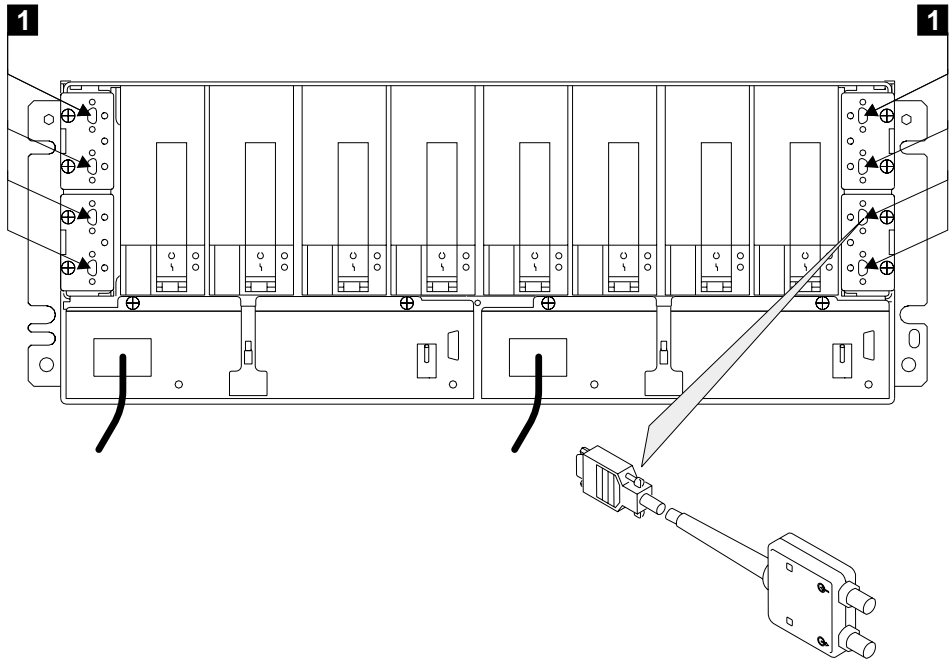
Figure 38. Connecting the Optical Extenders to a 7133 Model D40

Step 2. Using the subsystem configuration information and the information from step 1 on page 46, plug the optical extenders into the appropriate connectors **1**. Ensure that you tighten the screws on the connector of each optical extender.

> **Note:** To prevent damage to the SSA connector screws, ensure that you use the special screwdriver (SSA tool, part 32H7059) to tighten them. The screwdriver is supplied with the 7133.

Step 3. If you are also connecting the 7133 to SSA cables, but have not done so yet, go to "Connecting SSA Cables to the 7133 Model D40" on page 49. Otherwise, go to Connecting to the Using System in the "Additional Information" appendix (in this book) for your using system.

Switching On and Testing the 7133 Model D40

Step 1. If the 7133 has a remote-power-on control unit, go to step 2. Otherwise, go to step 4.

Step 2. Refer to Figure 39.
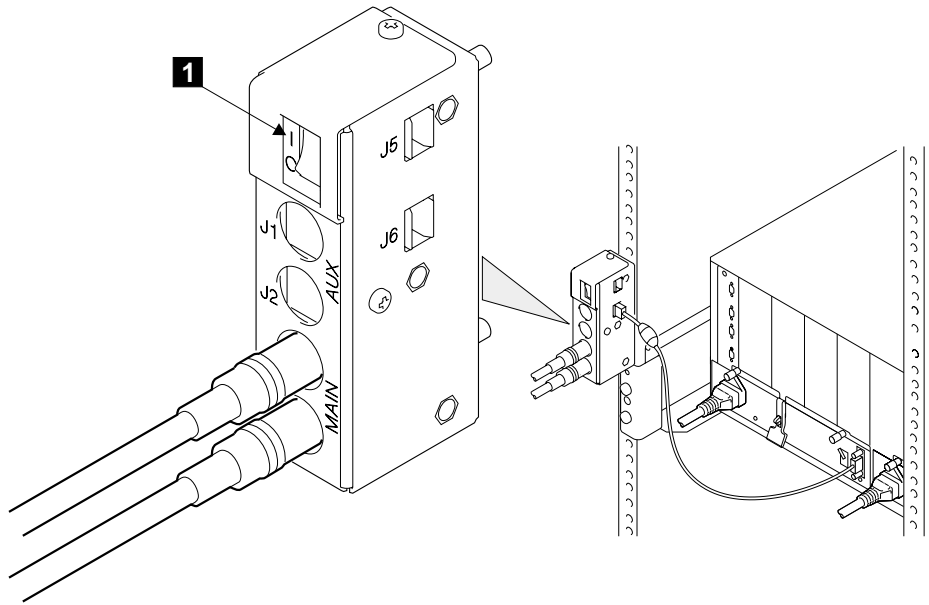
Figure 39. Power Switch of the Remote-Power-On Control Unit

Step 3. Ensure that the power switch **1** of the remote-power-on control unit is set to **|** (on).

Step 4. If the power to the using system is switched off, switch it on.

Step 5. Refer to Figure 40.
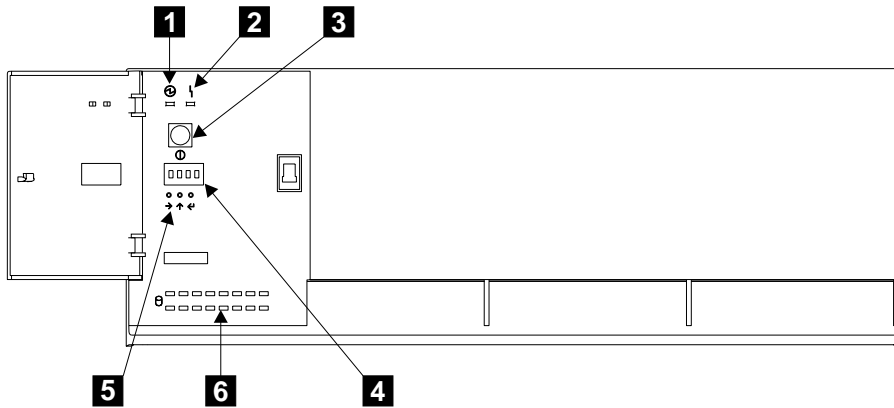
Figure 40. Checking the Lights and Switches

Step 6. Check whether the 7133 Power light **1** comes on. If it comes on, go to step 10.

If it does not come on, go to:

- Step 7 if the 7133 has a remote-power-on control unit installed.
- Step 8 if the 7133 does not have a remote-power-on control unit installed.

Step 7. Ensure that you have set the power switch of the remote-power-on control unit to **|** (on). If the 7133 Power light comes on, go to step 10.

If it still does not come on, go to step 8.

Step 8. Press and release the 7133 power switch **3** .

Step 9. If the 7133 Power light **1** comes on, go to step 10.

If the light still does not come on, go to "MAP 2010: 7133 – START" in the *7133 Models D40 and T40 Serial Disk Systems: Service Guide* if you are qualified technically to do so. Otherwise, call your service representative.

Step 10. Using the ID push buttons **5** , the service functions (see the *7133 Models D40 and T40 Serial Disk Systems: Service Guide*), or the command line functions (see the user or maintenance information for your SSA attachment), set the four-digit enclosure ID. You can, for example, set the first two digits to show the rack number, and the second two digits to show the ID of the 7133. You can use any combination of the following characters to make the enclosure ID:

A through Z
0 through 9
? ! & . blank

Ensure that this four-digit enclosure ID is different from all other enclosure IDs that are used in the SSA subsystem.

The enclosure ID that you set is displayed on the ID display **4** . The using system uses this ID to configure the 7133 into the SSA subsystem. Errors that are detected in the 7133 are logged against this enclosure ID.

Step 11. The using system automatically configures the SSA loop when power is supplied to the disk drive modules. This configuration might take a few minutes to complete. When the disk drive status lights **6** for all the installed disk drive modules are on continuously (not flashing), configuration is complete.

> **Note:** These 16 green status lights are related to the disk drive modules that are installed in the 7133. The upper row of eight lights represents, from left to right, the front disk drive modules 1 through 8. The lower row represents, from right to left, the back disk drive modules 9 through 16. If a dummy disk drive module is present in a particular slot, the related disk drive status light does not come on.

When the configuration is complete, observe the 7133, and check whether the lights and the display are as described here (refer to Figure 40 on page 58):

7133 Power light **1** : On

7133 Check light **2** : Off

Disk drive status light for each installed disk drive module **6** : On

ID display **4** : Continuously showing the ID of the 7133

If the lights and ID display are as described here, go to Verifying the Installation in the "Additional Information" appendix (in this book) for your using system.

If the lights and ID display are not as described here, go to step 12.

Step 12. If the 7133 Check light is on, observe the ID display **4** .

- If the ID display is continuously showing the ID of the 7133, go to "MAP 2010: 7133 – START" in the *7133 Models D40 and T40 Serial Disk Systems: Service Guide* if you are qualified technically to do so. Otherwise, call your service representative.
- If the ID display is showing alternating IDs, go to step 13 on page 60.

Step 13. If a failure occurs in the 7133, the ID display shows an error ID alternating with the enclosure ID. Table 2 shows these error IDs.

Table 2. Error IDs and Their Related SRNs

Error ID	See SRN
BP1 BP16	80241 80242
BP4 BP5	80243 80244
BP8 BP9	80245 80246
BP12 BP13	80247 80248
CODE	80210
COLD	80253
COOL	80254
CTRL	80210
FAN1	80231
FAN2	80232
FAN3	80233
HOT	80251
OPNL	80211
POST-FAIL-XXXX Where XXXX= XROM WDOG IROM IRAM LED! I2C RTC1 RTC2 TIME UART FAN XRAM	80210
PSU1	80221
PSU2	80222
SLOT	80260
WARM	80252

Note: If the COLD or HOT error ID remains for four minutes, the internal dc power switches off (that is, the 7133 enters Standby mode).

If the error ID is COLD, the internal dc power switches on automatically after the temperature has increased and has remained more than 5°C above the critical temperature for 15 minutes.

If the error ID is WARM, the error is not reset until the ambient temperature has fallen at least 2°C below the warning level.

If the error ID is HOT, the internal dc power switches on automatically after the temperature has decreased and has remained more than 5°C below the critical temperature for 15 minutes.

a. Find the displayed error ID in Table 2 on page 60, and note its related SRN.

b. Go to "Service Request Numbers" in the *7133 Models D40 and T40 Serial Disk Systems: Service Guide* if you are qualified technically to do so. Otherwise, call your service representative.

Step 14. When the lights and ID display are correct, go to "Verifying the Installation" in the "Additional Information" appendix (in this book) for your using system.

Appendix A. Example Configurations

The diagrams in this appendix show some example configurations for the 7133. 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.

Under the standard SSA rules, you can mix any compatible SSA devices in a particular SSA loop.

Simplest Configuration

A 7133 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 one of the two pairs of connectors on an SSA attachment in the using system (see Figure 41).
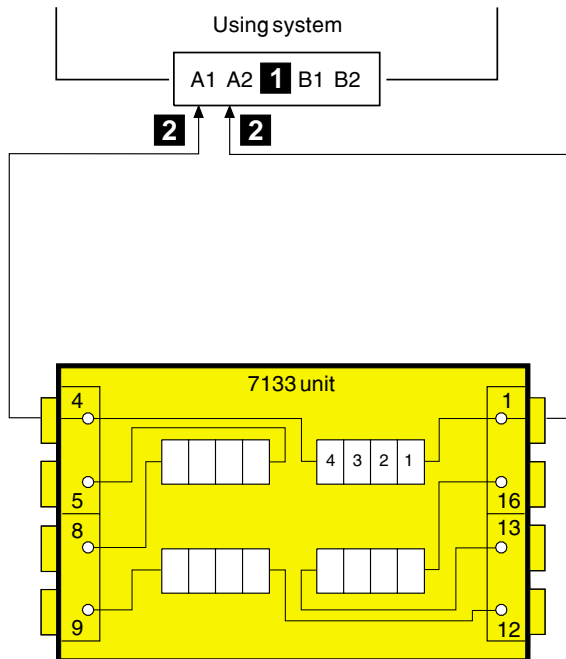
Figure 41. Simplest Configuration

No improvement in performance is gained if the disk drive modules are moved to other slots and connected in more than one loop.

The cables are described in "SSA Cables" on page 74. The internal connections of Model D40 are shown in Note 1b on page 47.

For information about the rules for SSA loops, see Note 1a on page 46.

Larger Configurations

Four more disk drive modules can be added to the base configuration in one loop. For a balanced subsystem, however, it is recommended that the two groups of disk drive modules be connected in two separate loops, each of which is connected to a separate pair of connectors on the SSA attachment (see Figure 42).
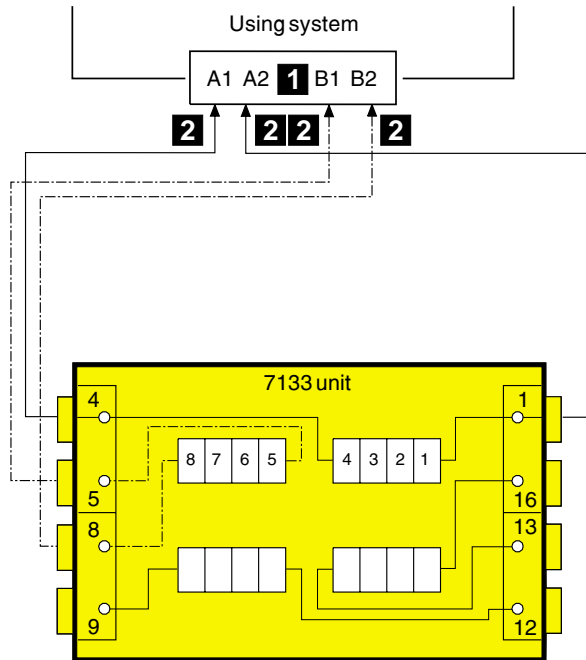
Figure 42. Larger Configuration

No improvement in performance is gained if the disk drive modules are moved to other slots and connected in more than two loops by way of an additional SSA attachment.

The cables are described in "SSA Cables" on page 74. The internal connections of Model D40 are shown in Note 1b on page 47.

For information about the rules for SSA loops, see Note 1a on page 46.

Largest Configurations with One 7133

All 16 disk drive modules in a full 7133 can be connected in one loop. For a balanced subsystem, however, it is recommended that two groups of eight disk drive modules be connected in two separate loops, each of which is connected to a separate pair of connectors on the SSA attachment (see Figure 43).
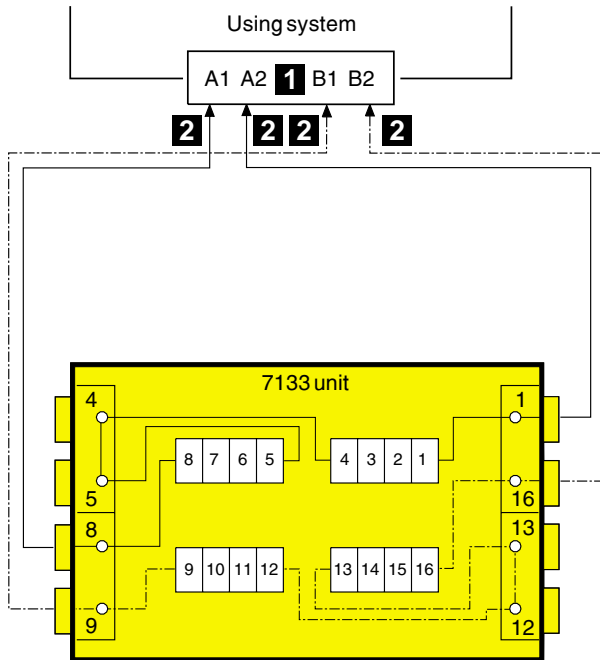
Figure 43. Largest Configuration with One 7133

No improvement in performance is gained if the disk drive modules are connected in more than two loops by way of an additional SSA attachment.

The cables are described in "SSA Cables" on page 74. The internal connections of Model D40 are shown in Note 1b on page 47.

For information about the rules for SSA loops, see Note 1a on page 46.

Multiple-Unit Configurations

An SSA subsystem can include disk drive modules that are installed in more than one 7133. You can connect up to 48 disk drive modules in one loop, and up to 96 disk drive modules to one SSA attachment.

In larger subsystems, unless the work load of the system has special requirements, best performance is obtained if you connect equal numbers of disk drive modules to the loops that are available. In the following example, 32 disk drive modules are connected to an SSA attachment. They can all be connected in one loop, but for better performance and better serviceability, it is recommended that the disk drive modules be connected in two loops, each of which is connected to a separate pair of connectors on the SSA attachment (see Figure 44 on page 68).
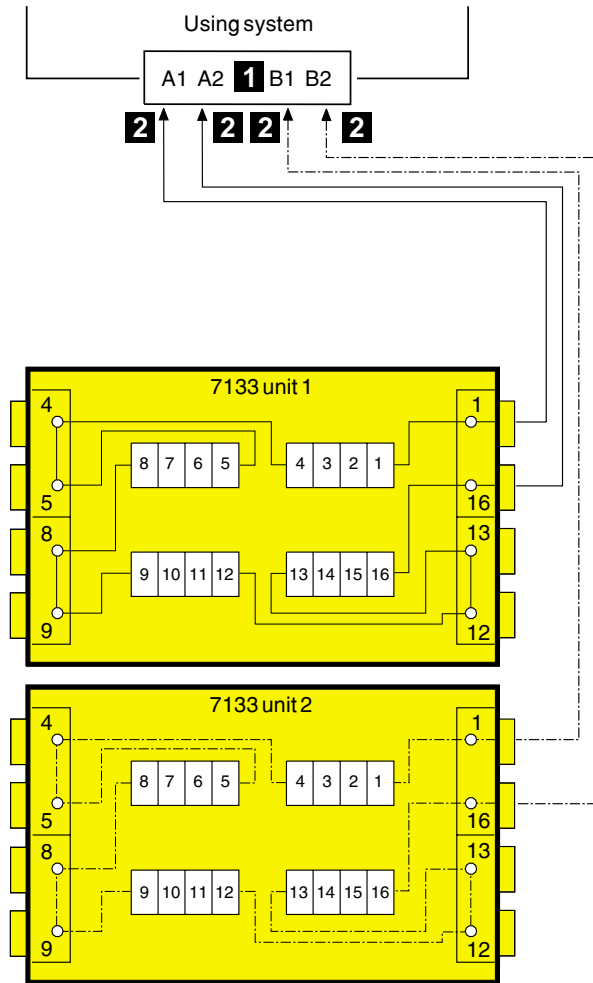
Figure 44. Multiple-Unit Configuration (Two 7133s)

The cables are described in "SSA Cables" on page 74. The internal connections of Model D40 are shown in Note 1b on page 47.

For information about the rules for SSA loops, see Note 1a on page 46.

Figure 45 on page 69 shows 96 disk drive modules, in six 7133s, connected to one SSA attachment.
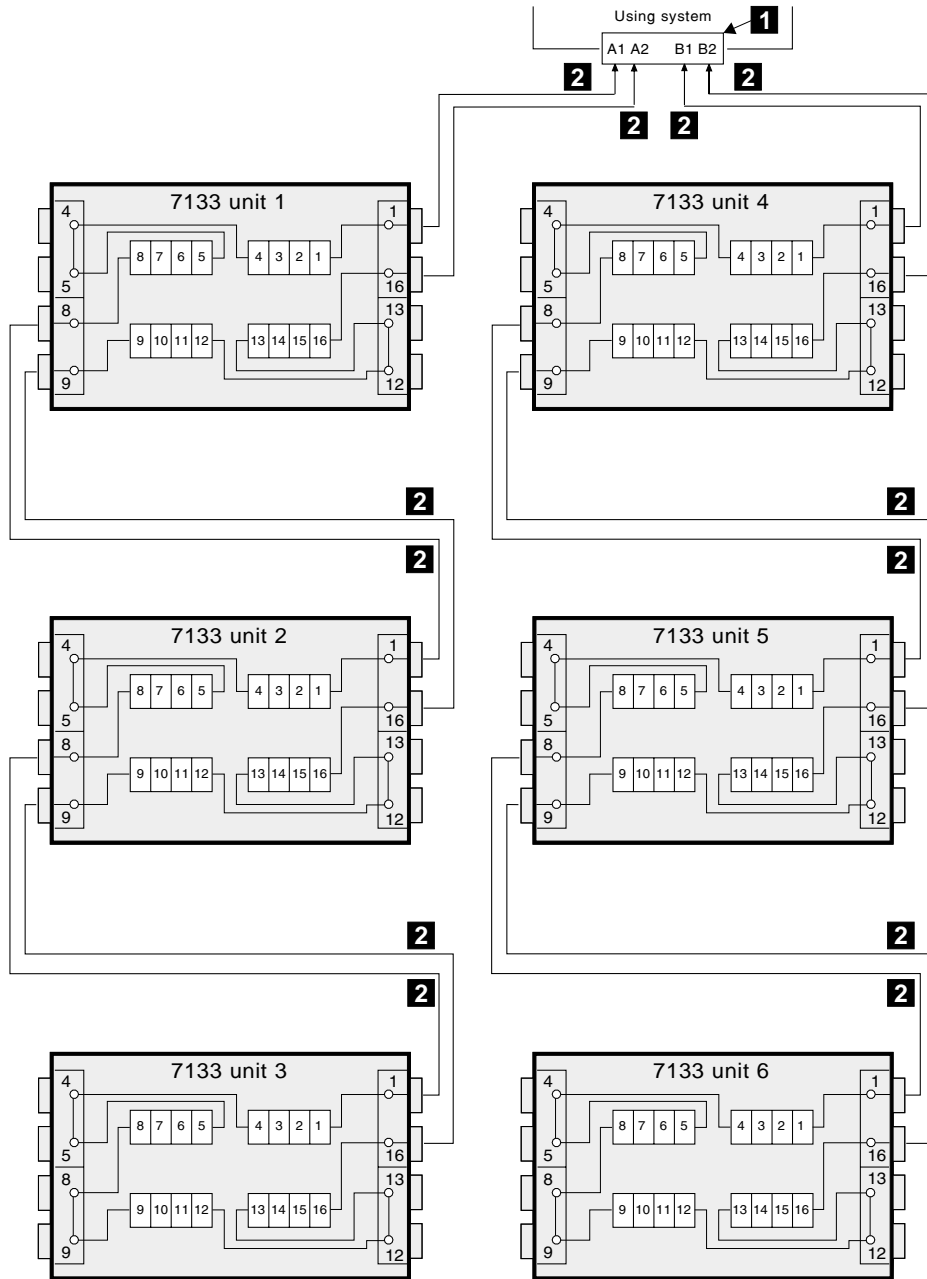
Figure 45. Multiple Unit Configuration (Six 7133s)

Higher-Availability Configurations

For higher availability, you can connect more than one SSA attachment in an SSA loop.

In loops that have multiple SSA attachments, you can often get best performance if you connect the SSA attachments as equally as possible between the disk drive modules.

Figure 46 shows one 7133 connected in one loop with two SSA attachments.
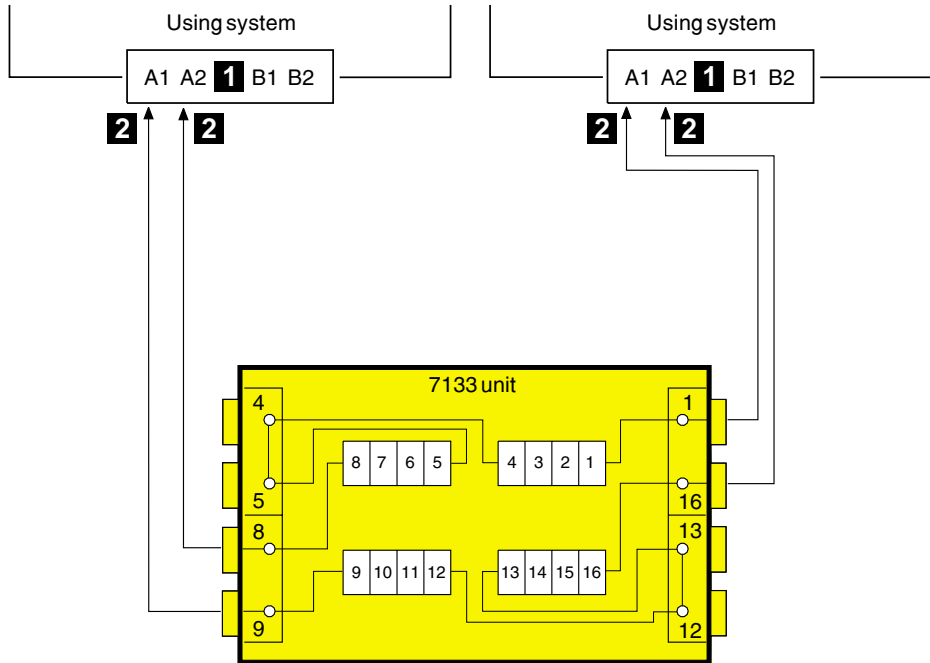
Figure 46. Higher-Availability Configuration (One 7133)

The cables are described in "SSA Cables" on page 74. The internal connections of Model D40 are shown in Note 1b on page 47.

For information about the rules for SSA loops, see Note 1a on page 46.

Figure 47 on page 71 shows three 7133s connected in one loop with six SSA attachments. The broken line represents optional cables that provide additional availability if a fault occurs.
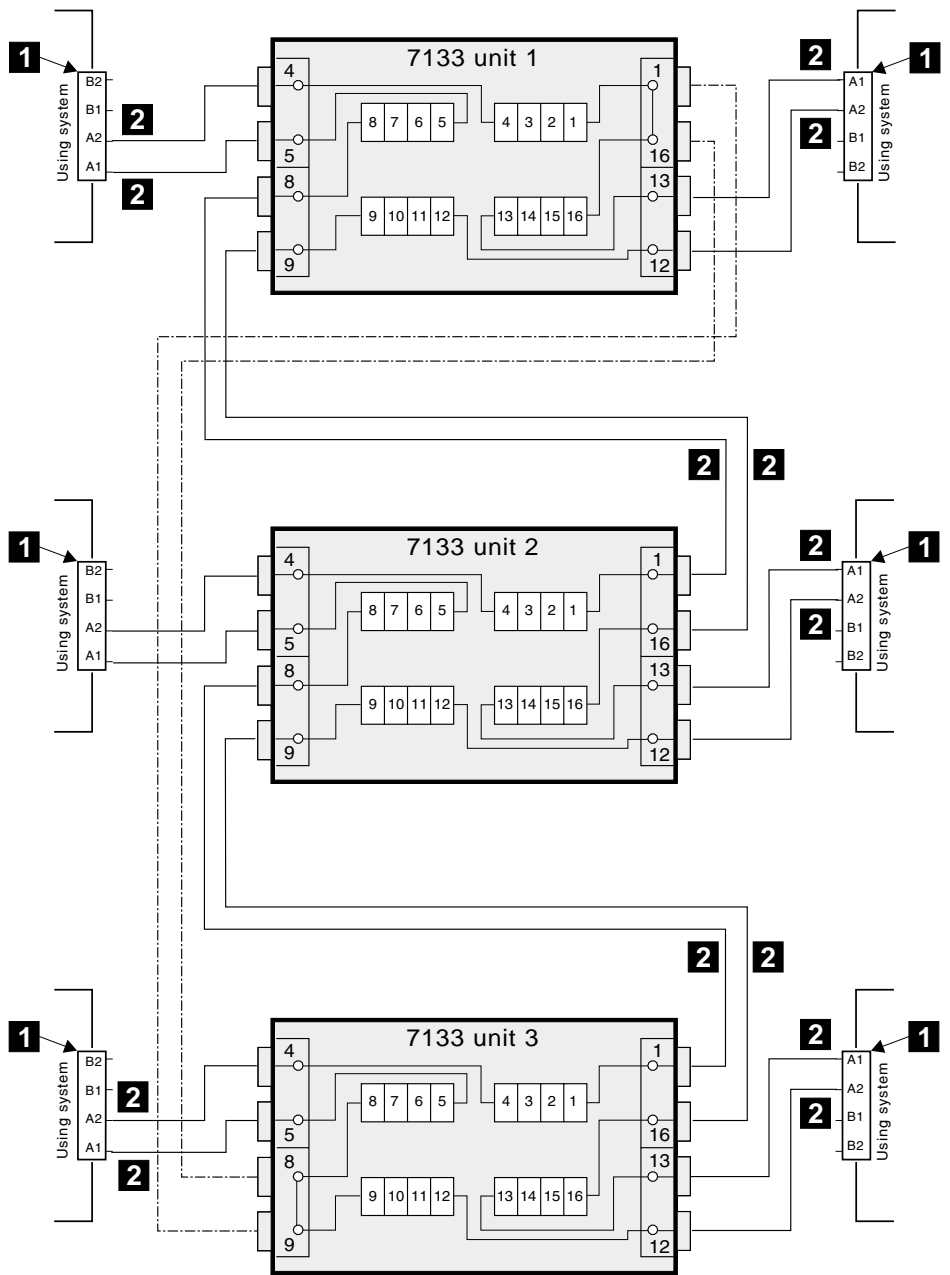
Figure 47. Higher-Availability Configuration (Three 7133s)

Preventing the Isolation of Disk Drives in Higher-Availability Configurations

If a loop contains four SSA attachments, with two attachments in each of two using systems, disk drive modules become isolated if they are connected between the two SSA attachments of one using system, and both those attachments fail, or are held reset, *but remain powered on*.

Bypass Note: A bypass card switches the internal strings of the 7133 only if it detects that neither of its connectors is connected to a powered-on SSA attachment or device. Therefore, if the two SSA attachments fail, or are held reset, but remain powered on, the bypass card does not operate, and the disk drive modules become isolated.

In Figure 48, SSA attachments **1** and **2** are in using system 1; SSA attachments **3** and **4** are in using system 2. In each using system, the two SSA attachments are connected to each other.

If the two SSA attachments of either using system fail, or are held reset, but remain powered on, all the disk drive modules can still communicate with the other using system.
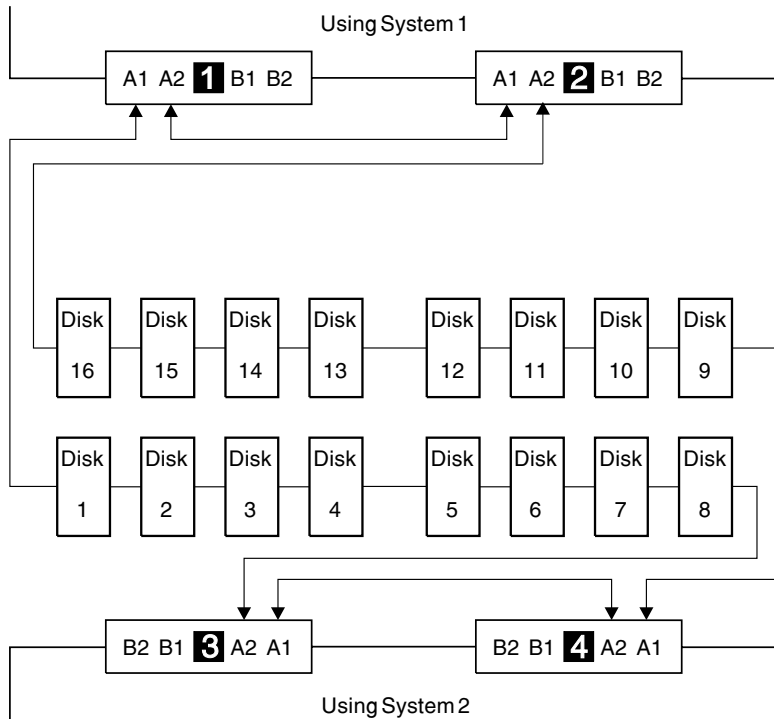
Figure 48. One Loop, Two SSA Attachments in Each of Two Using Systems

If, however, disk drive modules are connected into the link between two SSA attachments that are in the same using system, those disk drive modules become isolated if both SSA attachments fail, or are held reset, but remain powered on (see also "Bypass Note" on page 72). In Figure 49, disk drive modules 13 through 16 have been connected between the SSA attachments in using system 1. If both attachments fail, or are held reset, but remain powered on, disk drives 1 through 12 can still communicate with using system 2. Disk drives 13 through 16, however, cannot communicate with using system 2, because their data paths are through the SSA attachments in using system 1. When using system 1 is rebooted, disk drives 13 through 16 remain unavailable for a long time.
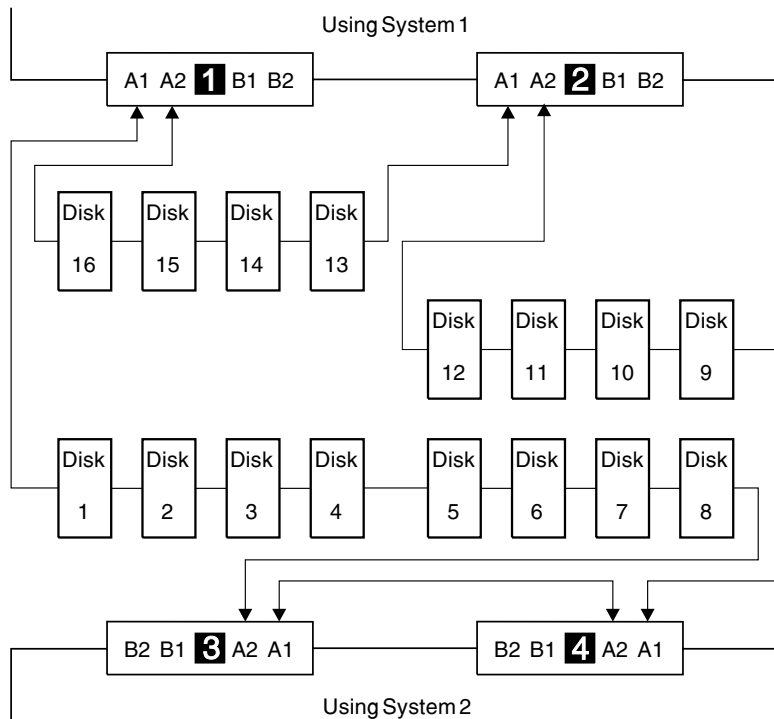
Figure 49. Disk Drive Modules Isolated by Failing SSA Attachments

SSA Cables

This section gives details of the cables that are shown in the diagrams in this appendix. In Table 3, the item number is the number by which a particular cable is identified in the diagrams.

Table 3. Description of SSA Cables

Item	Description	Part	Feature	Length
1	SSA Attachment Hardware	–	(System Features)	–
2	SSA copper cable, 7133 Model D40 to SSA attachment **Attention:** The correct SSA copper cables for the 7133 Model D40 are colored blue.	08L7908 08L7909 08L7910 08L7911 08L7912	8801 8802 8805 8810 8825	1.0 m (3.3 ft) 2.5 m (8.2 ft) 5.0 m (16.4 ft) 10 m (32.8 ft) 25 m (82.0 ft)

If the 7133 Model D40 is shipped as part of an RS/6000, two 5.0 m (16.4 ft) cables are supplied with it.

The cables might be connected to the 7133, to the SSA attachment, or to both. You might need to disconnect and discard them when you connect the 7133 into the configuration that is required by the customer.

Order any additional cables that are needed for your configuration using the feature and part numbers shown in Table 3.

Note: If the 7133 has the Advanced SSA Optical Extender (Pair) feature, fibre optic cables can be used instead of the standard SSA copper cables.

Appendix B. Changing the Jumpers on a Bypass Card

This appendix describes how to change the mode of a bypass card.

Attention: The bypass cards are electrostatic-discharge (ESD) sensitive. Use the tools and procedures defined by your organization to protect such parts.

Step 1.   If external SSA cables or optical extenders are already connected to the 7133, note their positions, then disconnect them. 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.

Step 2.   Refer to Figure 50.
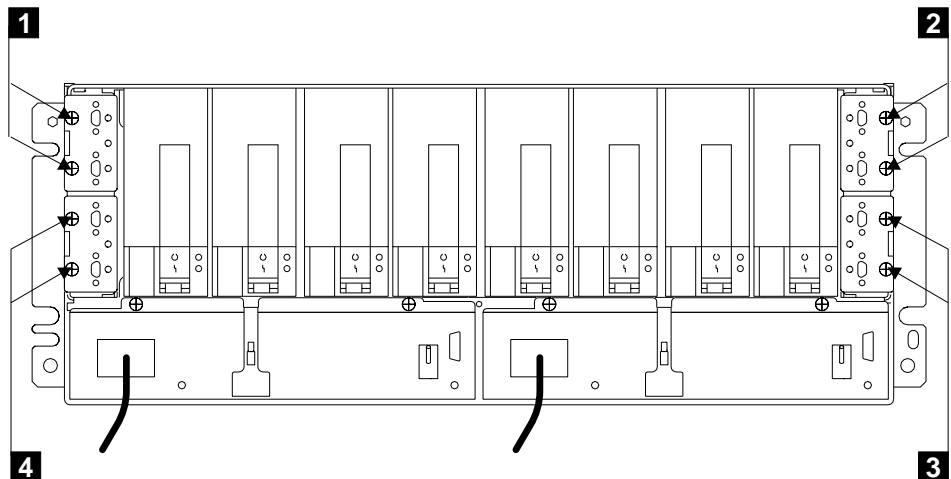
Figure 50. Removing Bypass Cards

Step 3.   Unscrew the thumbscrews **1**, **2**, **3**, or **4** on the card that you are going to remove.

Step 4.   Pull out the card.

Step 5.   Refer to Figure 51.
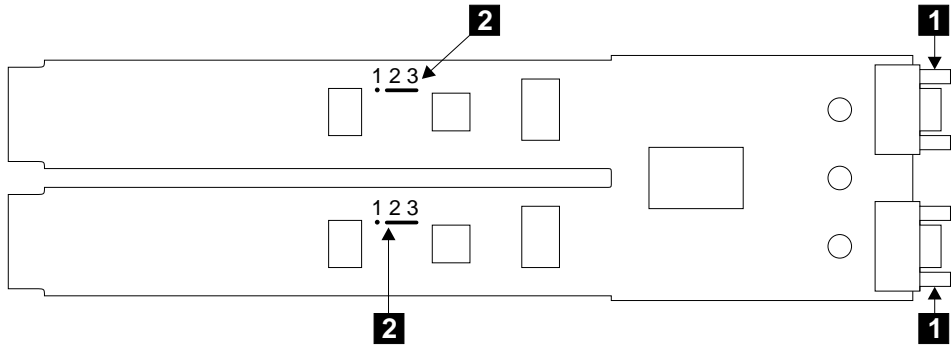
Figure 51. Bypass Card Set for Automatic Mode

Step 6.   Lay the card down with its electronic components upward and its SSA
connectors **1** to your right.

Step 7.   Note that, in Figure 51, the jumpers are set for **Automatic Mode**. That is, the
jumpers **2** connect pins 2 and 3.

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

In Figure 52, the jumpers are set for **Forced Inline Mode**. That is, the
jumpers **2** connect pins 1 and 2.

Note: When a bypass card is jumpered for Forced Inline mode, its mode light
shows green when power is present at the card.
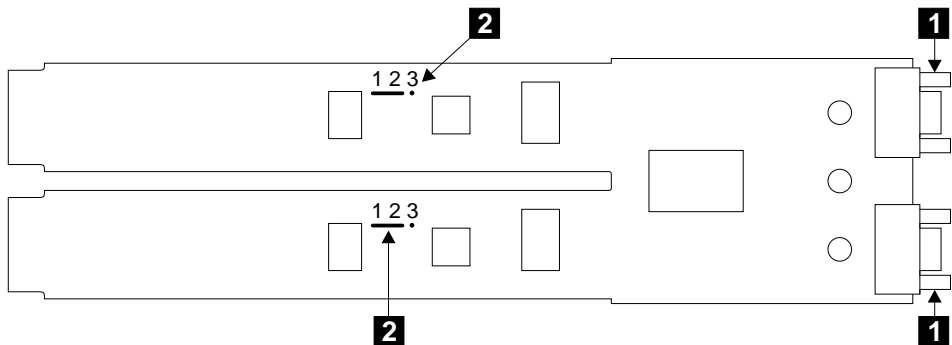
Figure 52. Bypass Card Set for Forced Inline Mode

Step 8.   If you need to change the mode of the bypass card:

a.   Remove the jumpers, and install them into the required positions (see
figures 51 and 52).

b.   Reinstall the bypass cards, and tighten their thumbscrews.

c. If you removed any SSA cables or optical extenders at the start of this procedure, reinstall them.

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

d. Return to the installation instructions.

Appendix C. Additional Information for RISC Systems

Related Publications

This section lists the publications that are related to your using system.

The *Installation and Service Guide* for your using system

7014 Model S00 Rack: Installation and Service Guide, SA38-0550

7015 Model R00 Rack: Installation and Service Guide, SA23-2744

7014 Model T00 and T42 Rack Installation and Service Guide, SA38-0577

Diagnostic Information for Micro Channel Bus Systems, SA23-2765

Diagnostic Information for Multiple Bus Systems, SA38-0509

Site and Hardware Planning Information, SA38-0508

Adapters, Devices, and Cable Information for Micro Channel Bus Systems, SA23-2764

Adapters, Devices, and Cable Information for Multiple Bus Systems, SA38-0516

SSA Adapters: User's Guide and Maintenance Information, SA33-3272

Advanced SerialRAID Adapters: User's Guide and Maintenance Information, SA33-3285

Are You Using the Correct Book? *Do not use this book if you are installing a 7133 Model 010 or Model 020 SSA Disk Subsystem.* For those models, use the *7133 Models 010 and 020 SSA Disk Subsystems: Installation Guide,* GA33-3260.

Web Support Pages

When you are installing an SSA device or subsystem, upgrading your SSA subsystem, or doing preventive maintenance on your SSA subsystem, refer to the web pages that are listed here. Refer to these pages also if you are upgrading your system hardware or operating system, and the system contains SSA devices. These web pages provide access to the latest SSA publications and support-microcode for the using system, SSA adapters, and SSA subsystem.

http://www.hursley.ibm.com/ssa/
> This web page provides links to SSA publications and other web pages, including the other web page in this list.

http://www.hursley.ibm.com/ssa/rs6k/
> This web page contains a list of the latest levels of SSA support microcode, and provides a microcode download capability for the RS/6000 and AIX environments.

Connecting to the Using System

Step 1. If the SSA adapter has not yet been installed into the using system, install it now (see the user or maintenance information for your using-system).

For information about the various types of SSA adapter, see the *User's Guide and Maintenance Information* manual for your SSA adapter.

Step 2. Check whether the AIX system has support for 7133 Models D40 and T40 installed. On the command line, type:

```
lsdev -P -s ssa
```

The information that is displayed contains a reference to the SSA enclosure if the correct support has been installed.

If the support has been installed, go to "Connecting SSA Cables to the SSA Adapter" on page 81 or to "Installing and Connecting Advanced SSA Optical Extenders to the SSA Adapter" on page 83, as required by the customer's subsystem configuration information.

If SSA support has not been installed, ask the customer to install the relevant software support. (Your Software Support Center can help you to identify the correct software.) Then go to "Connecting SSA Cables to the SSA Adapter" on page 81 or to "Installing and Connecting Advanced SSA Optical Extenders to the SSA Adapter" on page 83, as required by the customer's subsystem configuration information.

Connecting SSA Cables to the SSA Adapter

Note: For details of SSA cables, see "SSA Cables" on page 74.

Step 1. Attach identification labels to the SSA cables (see the *Site and Hardware Planning Information* manual for details).

Step 2. Find the SSA adapter in the using system.

Step 3. Refer to Figure 53.

1	Connector B2	**4**	Connector A1
2	Connector B1	**5**	Type-number label
3	Connector A2		
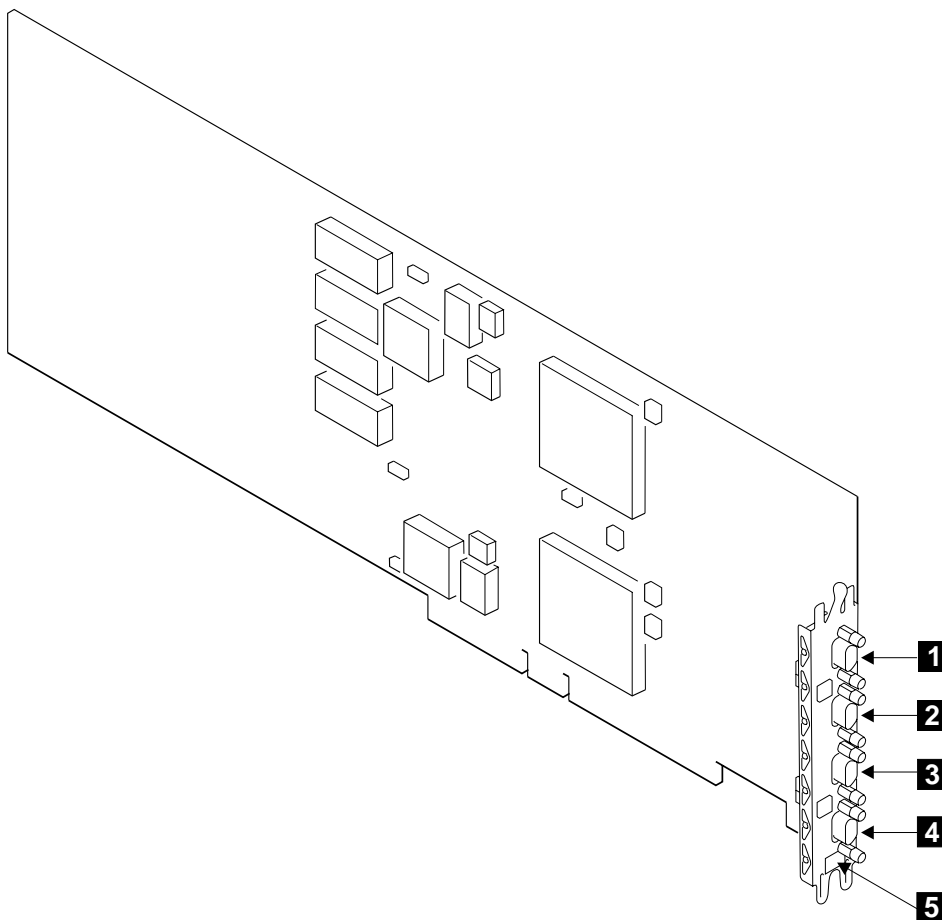
Figure 53. A Typical SSA Adapter

Step 4. Using the subsystem configuration information and the information from step 1 on page 46, plug an SSA cable into the appropriate connector on the SSA adapter. Ensure that you tighten the screws on the cable connectors.

> **Note:** To prevent damage to the SSA connector screws, ensure that you use the special screwdriver (SSA tool, part 32H7059) to tighten them. The screwdriver is supplied with the 7133.

Step 5. Ensure that all the SSA cables are correctly connected.

Step 6. If you are also connecting fibre optic cables, but have not done so yet, go to "Installing and Connecting Advanced SSA Optical Extenders to the SSA Adapter" on page 83. Otherwise, go to "Switching On and Testing the 7133 Model D40" on page 57.

Installing and Connecting Advanced SSA Optical Extenders to the SSA Adapter

Notes:

1. **It is the customer's responsibility to obtain the fibre optic cables, and to have those cables installed.**

2. The Advanced SSA Optical Extenders can drive single-mode operations and multi-mode operations. Fibre optic cables and connectors must be to the following specifications:

Fibre optic cables for single-mode operations	9/125 microns
Fibre optic cables for multi-mode operations	50/125 microns or 62.5/125 microns **Note:** Each type of cable needs a particular type of Advanced Multi-Mode Conditioner (see the Parts Catalog in the *7133 Models D40 and T40 Serial Disk Systems: Service Guide*).
Connector type	ST2 (preferred for all new installations) or ST
Uniter type (multi-mode only)	ST2
Maximum permitted length between two SSA nodes (for example, disk drives)	3 kilometers (9842 feet) for multi-mode operations, but see also Note. 10 kilometers (32800 feet) for single-mode operations, but see also Note. **Note:** Lengths of 3 kilometers and 10 kilometers are permitted only if the fibre optic connection is between: • Two 7133s Model D40 or T40 • A 7133 Model D40 and a 7133 Model T40 • A 7133 Model D40 or T40 and an Advanced SerialRAID Adapter • Two Advanced SerialRAID Adapters Otherwise, the maximum permitted length for single-mode and multi-mode operations is 2.4 kilometers (7874 feet).

3. Because the fibre optic cables can be up to 10 kilometers (32800 feet) long, we recommend that you complete the installation at one end of the fibre optic cables before you start work at the other end.

Step 1. Attach identification labels to the fibre optic cables so that you can recognize the opposite ends of each cable (see the *Site and Hardware Planning Information* manual, or equivalent, for details).

> **Note:** When the fibre optic cables were installed, the installer might have marked the cables to enable you to recognize opposite ends of the cables. You might still need to attach labels for a more detailed identification.

Step 2. If you are connecting the fibre optic cables for single-mode operations, go to "Connecting Fibre Optic Cables for Single-Mode Operations" on page 85.

If you are connecting the fibre optic cables for multi-mode operations, go to "Connecting Fibre Optic Cables for Multi-Mode Operations" on page 87.

Connecting Fibre Optic Cables for Single-Mode Operations

Step 1.   Refer to Figure 54.
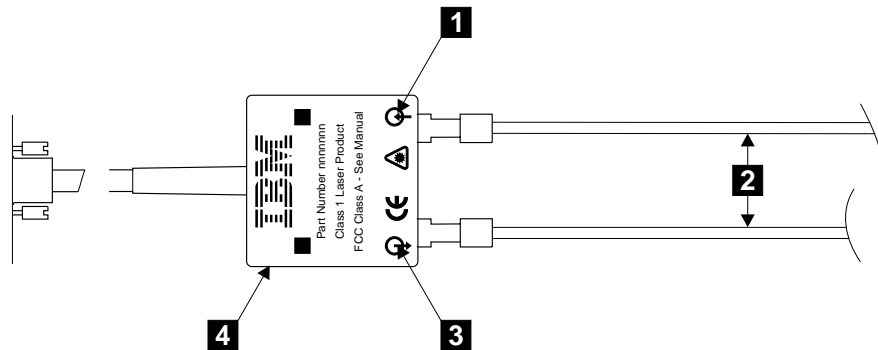
Figure 54. Connecting the Fibre Optic Cables to an Optical Extender

Step 2.   **Attention:**

- Ensure that each fibre optic cable is connected between the Receive connector (note the symbol **1**) of one optical extender and the Transmit connector (note the symbol **3**) of the optical extender at the other end of the fibre optic link.

- Before connecting fibre optic cables and devices, ensure that the end faces of the cables are clean. If necessary, use a small cotton pad to apply a fibre-cleaning fluid, such as IPA/D-1 Water Mix 106-17F, to the end faces.

Connect the fibre optic cables **2** to each optical extender **4** that you are going to connect to the SSA adapter.

Note: The fibre optic cables have:

- An inner connector with an alignment lug that engages a slot in the connector of the optical extender
- An outer, bayonet (push-and-twist) connector that locks the cable to the optical extender.

To connect a fibre optic cable:

a.   Push it into the connector of the optical extender. As you push the cable, use a twisting motion to ensure that the alignment lug engages the slot in the connector of the optical extender.

b.   Fasten the bayonet connector in the normal way.

If you cannot fasten the bayonet connector, disconnect the cable, and try again.

Step 3.   Ensure that all fibre optic cables are correctly connected.

Step 4. **Attention:** Excessive movement at connections in a fibre optic link might cause link errors.

Ensure that the fibre optic cables are held tightly by cable ties to prevent strain and movement at the optical extenders.

Step 5. If not already done, put the wrap cable and adapter assembly into its plastic bag, and put the bag into a safe place that is as close to the optical extender as possible.

Step 6. Go to "Connecting Optical Extenders to the SSA Adapter" on page 89.

Connecting Fibre Optic Cables for Multi-Mode Operations

Step 1. Refer to Figure 55.
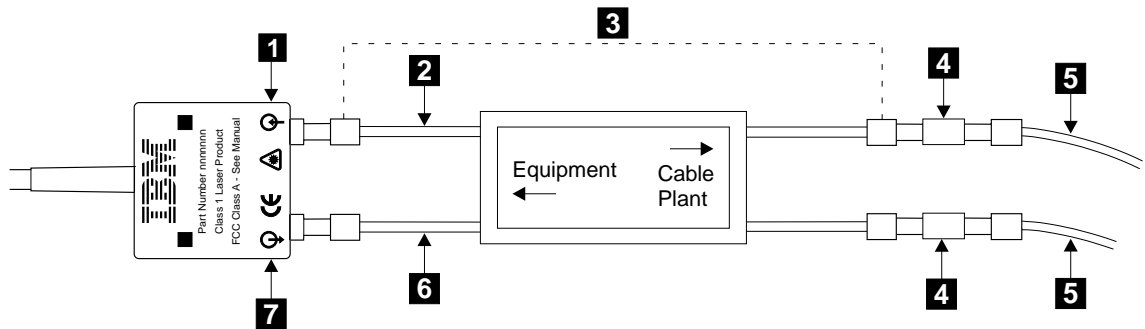
Figure 55. Connecting a Multi-Mode Conditioner

Step 2. **Attention:**

- Ensure that each fibre optic cable is connected, via the multi-mode conditioner **3** , between the Receive connector (note the symbol **1**) of one optical extender and the Transmit connector (note the symbol **7**) of the optical extender at the other end of the fibre optic link.

- Before connecting fibre optic cables and devices, ensure that the end faces of the cables are clean. If necessary, use a small cotton pad to apply a fibre-cleaning fluid, such as IPA/D-1 Water Mix 106-17F, to the end faces.

Identify the yellow fibre **6** of the multi-mode conditioner.

Step 3. Connect the yellow fibre to the Transmit connector (note the symbol **7**) of the optical extender.

Step 4. Connect the orange fibre **2** to the Receive connector (note the symbol **1**) of the optical extender.

Step 5. Repeat steps 3 and 4 for all the optical extenders that you are going to connect to the SSA adapter.

Step 6. Find the uniters **4** that are supplied with the multi-mode conditioner.

Step 7. Using the uniters, connect the main fibre optic cables **5** to the multi-mode conditioner.

> **Note:** The fibre optic cables have:
> - An inner connector with an alignment lug that engages a slot in the connector of the uniter
> - An outer, bayonet (push-and-twist) connector that locks the cable to the uniter.
>
> To connect a fibre optic cable:
> a. Push it into the uniter. As you push the cable, use a twisting motion to ensure that the alignment lug engages the slot in the uniter.
> b. Fasten the uniter to the multi-mode conditioner.

Step 8. Repeat step 7 for all the multi-mode conditioners that you are going install.

Step 9. Ensure that all fibre optic cables are correctly connected.

Step 10. **Attention:** Excessive movement at connections in a fibre optic link might cause link errors.

Ensure that the fibre optic cables are held tightly by cable ties to prevent strain and movement at the optical extenders.

Step 11. If not already done, put the wrap cable and adapter assembly into its plastic bag, and put the bag into a safe place that is as close to the optical extender as possible.

Step 12. Go to "Connecting Optical Extenders to the SSA Adapter" on page 89.

Connecting Optical Extenders to the SSA Adapter

Step 1.   Find the SSA adapter in the using system.

Step 2.   Refer to Figure 56.

1	Connector B2	**4**	Connector A1
2	Connector B1	**5**	Type-number label
3	Connector A2	**6**	Optical Extender
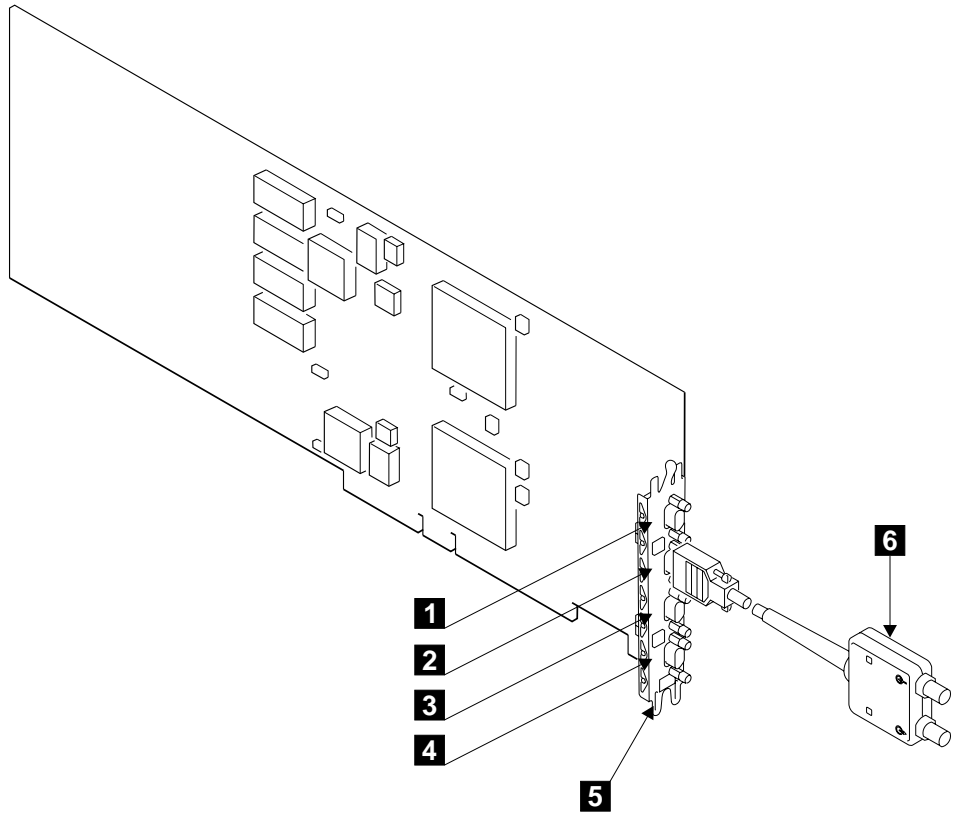
Figure 56. Connecting an Optical Extender to an SSA Adapter

Step 3.   Using the subsystem configuration information and the information from step 1 on page 46, plug the optical extenders **6** into the connectors on the SSA adapter. Ensure that you tighten the screws on the connector of each optical extender.

> **Note:** To prevent damage to the SSA connector screws, ensure that you use the special screwdriver (SSA tool, part 32H7059) to tighten them. The screwdriver is supplied with the 7133.

Step 4. If you are also connecting SSA cables, but have not done so yet, go to "Connecting SSA Cables to the SSA Adapter" on page 81. Otherwise, go to "Switching On and Testing the 7133 Model D40" on page 57.

Verifying the Installation

Step 1. If the 7133 is going to be used as an SSA RAID subsystem, go to the *User's Guide and Maintenance Information* manual for your SSA adapter for information about how to configure RAID arrays. When you have configured the RAID arrays, return here and go to step 6.

If the 7133 is not going to be used as an SSA RAID subsystem, go to step 2.

Step 2. Run the **cfgmgr** command to configure all the devices into AIX.

If the 7133 is connected to a loop that contains two or more SSA adapters, and those adapters are installed in two or more using systems, run the **cfgmgr** command on each using system.

Note: Alternatively, set the Key Mode switch of each using system to Service mode, then boot each system. When the operator panels display 200, set the keys to Normal mode to continue the boot process.

Step 3. Manually vary-on the volume groups, and mount the file systems as required.

Step 4. Use the Physical Link Configuration service function on the installed SSA adapters to verify that the configuration of the disk drive modules on the SSA loops is as specified by the customer. (See the *7133 Models D40 and T40 Serial Disk Systems: Service Guide* for instructions on how to use the Physical Link Configuration service aid.)

If the Physical Link Configuration service function shows that no disk drive modules have been configured on the SSA adapter, run diagnostics to assist with problem determination. (Such a condition might be caused by a loop configuration that is not valid; see Note 1a on page 46.)

Step 5. Run system diagnostics in System Verification mode to the 7133 and to all the attached SSA physical disk drives (pdisks).

Step 6. Close the front cover of the 7133.

Step 7. If the 7133 has the Advanced SSA Optical Extender (Pair) feature, go to step 8 on page 92. Otherwise, go to step 10 on page 92.

Step 8. Refer to Figure 57.
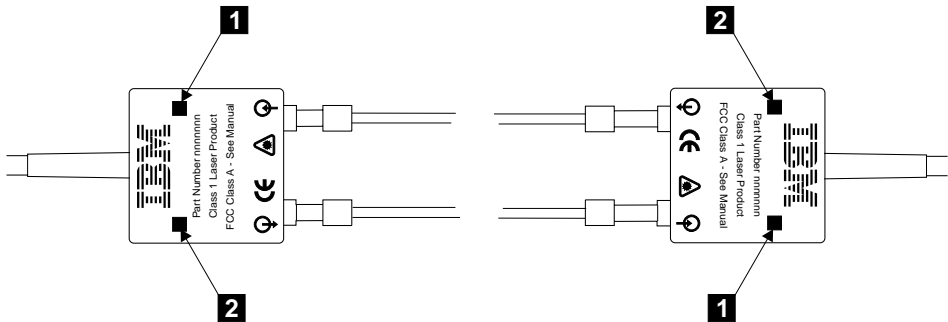
Figure 57. Checking the Lights on an Optical Extender

Step 9. Ensure that the Power light **2** and the Receive light **1** of every optical extender are on.

If all the lights are on, go to step 10.

If any light is off, go to "MAP 2330: 7133–Optical Extender" in the *7133 Models D40 and T40 Serial Disk Systems: Service Guide* if you are qualified technically to do so. Otherwise, call your service representative.

Step 10. If you have done the previous steps as part of the initial installation of the *complete system*, return to the system installation instructions.

Appendix D. Additional Information for PC Servers

Related Publications

This section lists the publications that are related to your using system.

- *IBM PC Servers: IBM® SSA RAID Cluster Adapter: Hardware Maintenance Manual Supplement*, S96H-9840
- *IBM PC Servers: IBM SSA RAID Adapter for PC Servers: Hardware Maintenance Manual Supplement*, S32H-3817
- *IBM PC Servers: IBM SerialRAID Adapter: Hardware Maintenance Manual Supplement*, SY33-0193
- *IBM PC Servers: IBM Advanced SerialRAID/X Adapter: User's Guide and Maintenance Information*, SA33-3288
- *IBM Netfinity Rack: Planning and Installation Guide*, S24L-8055
- The *User's Handbook* for your server
- The *Installation and User's Guide* for your adapter

Are You Using the Correct Book? *Do not use this book if you are installing a 7133 Model 010 or Model 020 SSA Disk Subsystem.* For those models, use the *IBM 7133 SSA Disk Subsystem for PC Servers: User's Handbook,* S96H-9763.

Web Support Pages

When you are installing an SSA device or subsystem, upgrading your SSA subsystem, or doing preventive maintenance on your SSA subsystem, refer to the web pages that are listed here. Refer to these pages also if you are upgrading your system hardware or operating system, and the system contains SSA devices. These web pages provide access to the latest SSA publications and support-microcode for the using system, SSA adapters, and SSA subsystem.

http://www.hursley.ibm.com/ssa/
> This web page provides links to SSA publications and other web pages, including the other web page in this list.

http://www.hursley.ibm.com/ssa/pcserver/
> This web page contains a list of the latest levels of SSA support microcode, and provides a microcode download capability for PC server environments.

Connecting to the Using System

If the SSA adapter has not yet been installed into the using system, install it now (see the user or maintenance information for your using system and for the adapter).

Go to "Connecting SSA Cables to the SSA Adapter" on page 95 or to "Installing and Connecting Advanced SSA Optical Extenders to the SSA Adapter" on page 96, as required by the customer's configuration requirements.

Connecting SSA Cables to the SSA Adapter

Note: For details of SSA cables, see "SSA Cables" on page 74.

Step 1. Attach identification labels to the SSA cables.

Step 2. Find the SSA adapter in the using system.

Step 3. Refer to Figure 58.

1	SSA Loop B Port 2	**3**	SSA Loop A Port 2
2	SSA Loop B Port 1	**4**	SSA Loop A Port 1
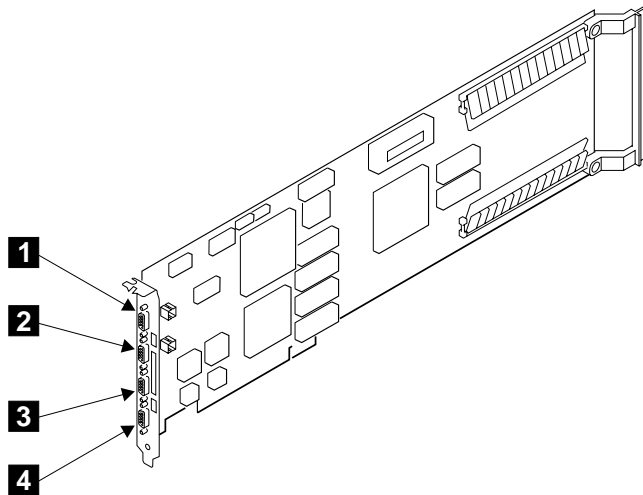
Figure 58. A Typical SSA Adapter

Step 4. Using your plan for the subsystem configuration and the information from step 1 on page 46, plug SSA cables into the appropriate connectors on the SSA attachment. Ensure that you tighten the screws on the cable connectors.

> **Note:** To prevent damage to the SSA connector screws, ensure that you use the special screwdriver (SSA tool, part 32H7059) to tighten them. The screwdriver is supplied with the 7133.

Step 5. Ensure that all the SSA cables are correctly connected.

Step 6. If you are also connecting fibre optic cables, but have not done so yet, go to "Installing and Connecting Advanced SSA Optical Extenders to the SSA Adapter" on page 96. Otherwise, go to "Switching On and Testing the 7133 Model D40" on page 57.

Installing and Connecting Advanced SSA Optical Extenders to the SSA Adapter

Notes:

1. **It is the customer's responsibility to obtain the fibre optic cables, and to have those cables installed.**

2. The Advanced SSA Optical Extenders can drive single-mode operations and multi-mode operations. Fibre optic cables and connectors must be to the following specifications:

Fibre optic cables for single-mode operations	9/125 microns
Fibre optic cables for multi-mode operations	50/125 microns or 62.5/125 microns **Note:** Each type of cable needs a particular type of Advanced Multi-Mode Conditioner (see the Parts Catalog in the *7133 Models D40 and T40 Serial Disk Systems: Service Guide*).
Connector type	ST2 (preferred for all new installations) or ST
Uniter type (multi-mode only)	ST2
Maximum permitted length between two SSA nodes (for example, disk drives)	3 kilometers (9842 feet) for multi-mode operations, but see also Note. 10 kilometers (32800 feet) for single-mode operations, but see also Note. **Note:** Lengths of 3 kilometers and 10 kilometers are permitted only if the fibre optic connection is between: • Two 7133s Model D40 or T40 • A 7133 Model D40 and a 7133 Model T40 • A 7133 Model D40 or T40 and an Advanced SerialRAID/X Adapter • Two Advanced SerialRAID/X Adapters Otherwise, the maximum permitted length for single-mode and multi-mode operations is 2.4 kilometers (7874 feet).

3. Because the fibre optic cables can be up to 10 kilometers (32800 feet) long, we recommend that you complete the installation at one end of the fibre optic cables before you start work at the other end.

Step 1. Attach identification labels to the fibre optic cables so that you can recognize the opposite ends of each cable (see the *Site and Hardware Planning Information* manual, or equivalent, for details).

> **Note:** When the fibre optic cables were installed, the installer might have marked the cables to enable you to recognize opposite ends of the cables. You might still need to attach labels for a more detailed identification.

Step 2. If you are connecting the fibre optic cables for single-mode operations, go to "Connecting Fibre Optic Cables for Single-Mode Operations" on page 98.

If you are connecting the fibre optic cables for multi-mode operations, go to "Connecting Fibre Optic Cables for Multi-Mode Operations" on page 100.

Connecting Fibre Optic Cables for Single-Mode Operations
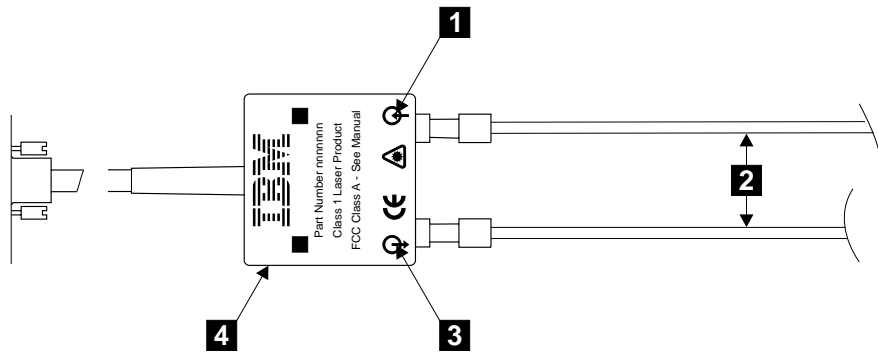
Step 1.   Refer to Figure 59.

Figure 59. Connecting the Fibre Optic Cables to an Optical Extender

Step 2.   **Attention:**

- Ensure that each fibre optic cable is connected between the Receive connector (note the symbol **1**) of one optical extender and the Transmit connector (note the symbol **3**) of the optical extender at the other end of the fibre optic link.
- Before connecting fibre optic cables and devices, ensure that the end faces of the cables are clean. If necessary, use a small cotton pad to apply a fibre-cleaning fluid, such as IPA/D-1 Water Mix 106-17F, to the end faces.

Connect the fibre optic cables **2** to each optical extender **4** that you are going to connect to the SSA adapter.

Note: The fibre optic cables have:

- An inner connector with an alignment lug that engages a slot in the connector of the optical extender
- An outer, bayonet (push-and-twist) connector that locks the cable to the optical extender.

To connect a fibre optic cable:

a.   Push it into the connector of the optical extender. As you push the cable, use a twisting motion to ensure that the alignment lug engages the slot in the connector of the optical extender.

b.   Fasten the bayonet connector in the normal way.

If you cannot fasten the bayonet connector, disconnect the cable, and try again.

Step 3.   Ensure that all fibre optic cables are correctly connected to the SSA adapter.

Step 4. **Attention:** Excessive movement at connections in a fibre optic link might cause link errors.

Ensure that the fibre optic cables are held tightly by cable ties to prevent strain and movement at the optical extenders.

Step 5. If not already done, put the wrap cable and adapter assembly into its plastic bag, and put the bag into a safe place that is as close to the optical extender as possible.

Step 6. Go to "Connecting Optical Extenders to the SSA Adapter" on page 102.

Connecting Fibre Optic Cables for Multi-Mode Operations

Step 1. Refer to Figure 60.
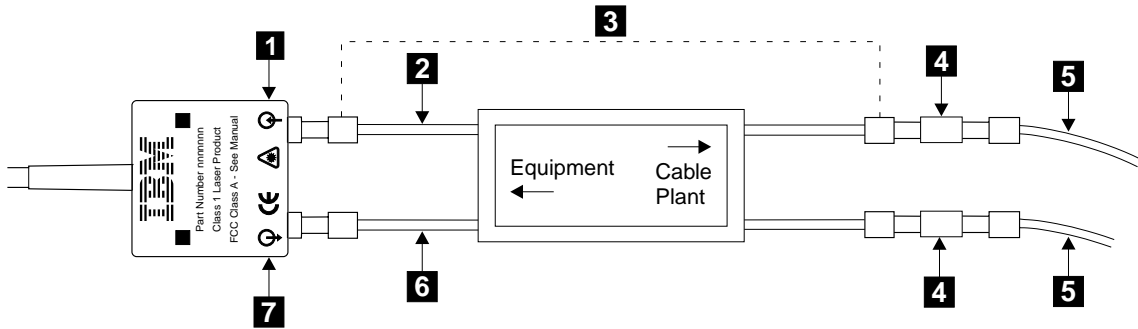
Figure 60. Connecting a Multi-Mode Conditioner

Step 2. **Attention:**

- Ensure that each fibre optic cable is connected, via the multi-mode conditioner **3**, between the Receive connector (note the symbol **1**) of one optical extender and the Transmit connector (note the symbol **7**) of the optical extender at the other end of the fibre optic link.

- Before connecting fibre optic cables and devices, ensure that the end faces of the cables are clean. If necessary, use a small cotton pad to apply a fibre-cleaning fluid, such as IPA/D-1 Water Mix 106-17F, to the end faces.

  Identify the yellow fibre **6** of the multi-mode conditioner.

Step 3. Connect the yellow fibre to the Transmit connector (note the symbol **7**) of the optical extender.

Step 4. Connect the orange fibre **2** to the Receive connector (note the symbol **1**) of the optical extender.

Step 5. Repeat steps 3 and 4 for all the optical extenders that you are going to connect to the SSA adapter.

Step 6. Find the uniters **4** that are supplied with the multi-mode conditioner.

Step 7. Using the uniters, connect the main fibre optic cables **5** to the multi-mode conditioner.

> **Note:** The fibre optic cables have:
> - An inner connector with an alignment lug that engages a slot in the connector of the uniter
> - An outer, bayonet (push-and-twist) connector that locks the cable to the uniter.
>
> To connect a fibre optic cable:
> a. Push it into the uniter. As you push the cable, use a twisting motion to ensure that the alignment lug engages the slot in the uniter.
> b. Fasten the uniter to the multi-mode conditioner.

Step 8. Repeat step 7 or all the multi-mode conditioners that you are going to install.

Step 9. Ensure that all fibre optic cables are correctly connected.

Step 10. **Attention:** Excessive movement at connections in a fibre optic link might cause link errors.

Ensure that the fibre optic cables are held tightly by cable ties to prevent strain and movement at the optical extenders.

Step 11. If not already done, put the wrap cable and adapter assembly into its plastic bag, and put the bag into a safe place that is as close to the optical extender as possible.

Step 12. Go to "Connecting Optical Extenders to the SSA Adapter" on page 102.

Connecting Optical Extenders to the SSA Adapter

Step 1. Find the SSA adapter in the using system.

Step 2. Refer to Figure 61.

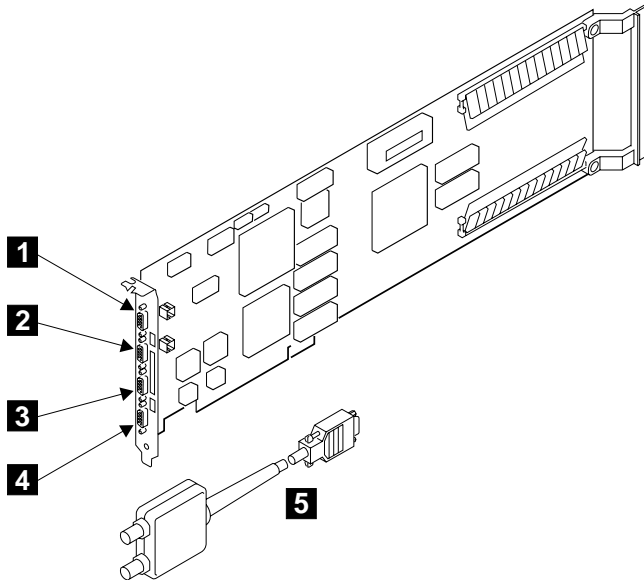|			
1	SSA Loop B Port 2	**4**	SSA Loop A Port 1
2	SSA Loop B Port 1	**5**	Optical Extender
3	SSA Loop A Port 2		

Figure 61. A Typical SSA Adapter with Optical Extender

Step 3. Using the subsystem configuration information and the information from step 1 on page 46, plug optical the extenders **5** into the appropriate connectors on the SSA adapter. Ensure that you tighten the screws on the connector of each optical extender.

> **Note:** To prevent damage to the SSA connector screws, ensure that you use the special screwdriver (SSA tool, part 32H7059) to tighten them. The screwdriver is supplied with the 7133.

Step 4. If you are also connecting SSA cables, but have not done so yet, go to "Connecting SSA Cables to the SSA Adapter" on page 95. Otherwise, go to "Switching On and Testing the 7133 Model D40" on page 57.

Verifying the Installation

Step 1. If the 7133 is going to be used as an SSA RAID subsystem, go to the user or service information for your SSA adapter for information about how to configure RAID arrays. When you have configured the RAID arrays, return here and go to step 2.

If the 7133 is not going to be used as an SSA RAID subsystem, go to step 2.

Step 2. Use the SSA Remote Systems Management configurator to check whether the SSA loops that you have configured on the adapter are complete and correct. (For information about the SSA Remote Systems Management configurator, see the user or service information for your SSA adapter.

If the loops are correct, go to step 3.

If the loops are not correct, go to the START MAP in the service information for your SSA adapter, if you are qualified technically to do so. Otherwise, call your service representative.

Step 3. Run diagnostics to the:
- Adapter
- Disk drive modules
- Enclosure (7133)

For information about diagnostics, see the "Additional Information" appendix for your using system in the *7133 Models D40 and T40 Serial Disk Systems: Service Guide* if you are qualified technically to do so. Otherwise, call your service representative.

Step 4. Close the front cover of the 7133.

Step 5. If the 7133 has the Advanced SSA Optical Extender (Pair) feature, go to step 6. Otherwise, go to step 8 on page 104.
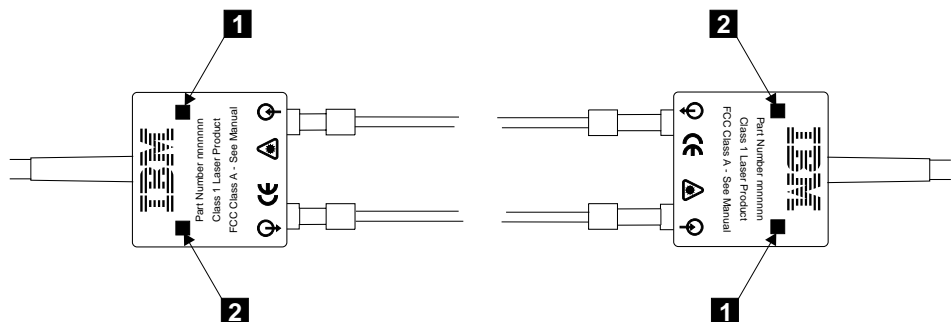
Step 6. Refer to Figure 62.

Figure 62. Checking the Lights on an Optical Extender

Step 7. Ensure that the Power light **2** and the Receive light **1** of every optical extender are on.

If all the lights are on, go to step 8 on page 104.

If any light is off, go to "MAP 2330: 7133–Optical Extender" in the *7133 Models D40 and T40 Serial Disk Systems: Service Guide* if you are qualified technically to do so. Otherwise, call your service representative.

Step 8. If you have done the previous steps as part of the initial installation of the *complete system*, return to the system installation instructions.

Appendix E. Alternative Methods for the Connection of Power in a Netfinity Rack

Note: In this section, the following abbreviations are used:

PDU   Power distribution unit

PDB   Power distribution board

UPS   Uninterruptible power supply

Where applications require the greatest possible availability of a 7133 SSA subsystem, that subsystem must not include any item whose failure alone might make a 7133 disk drive module become unavailable to the using system. Such an item is known as a *single point of failure*.

For example, the 7133 Model D40 has two power supply assemblies. If one power supply assembly fails, the 7133 can still operate. A power supply assembly, therefore, is not a single point of failure. If both power supply assemblies are connected to the same PDU, that PDU is a single point of failure; if it fails, the 7133 cannot operate.

Alternative methods for the connection of power to a 7133 are available. Each method decreases the number of common connections and single points of failure, and therefore increases the availability of the 7133.

Before you connect the 7133 to the power source, read through the information provided to determine which method best suits your requirements.

Standard-Availability Cabling Methods

Figure 63 shows a 7133 Model D40 with both its power supply assemblies connected to one PDU. The PDU is a single point of failure.
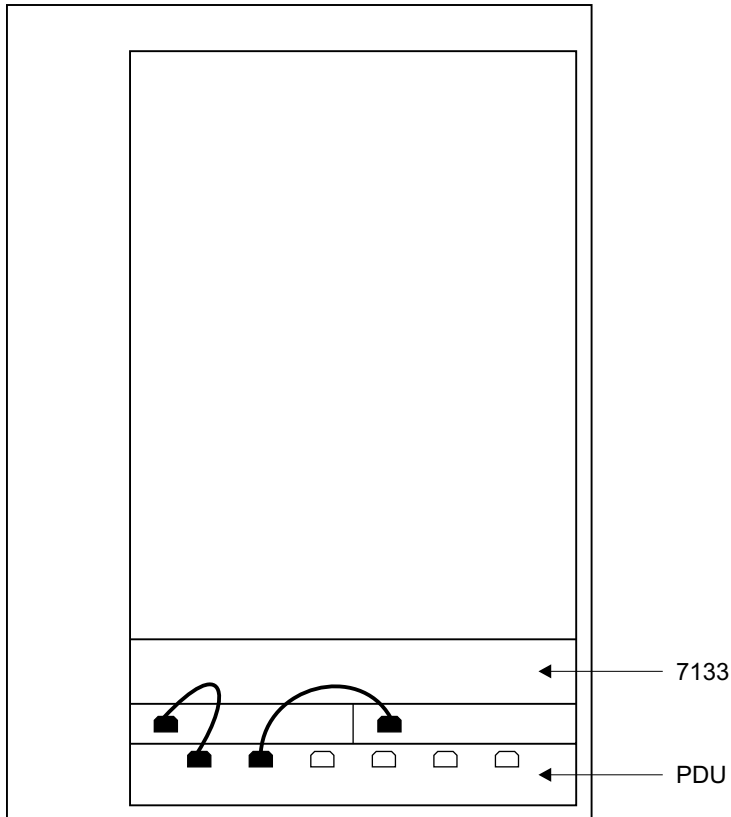
Figure 63. Standard-Availability Cabling for the 7133 Model D40

If you going to use standard-availability cabling, ensure that you observe the restrictions that are given in "Standard-Availability PDU, PDB, and UPS Cabling Restrictions" on page 108.

PDU, PDB, and UPS Loading Restrictions

Table 4. Loading Restrictions

PDU/PDB/UPS Type	Rated Voltage	Rated Max. I in	Main CB	Rated Max I out	Outlets	Rated Max. outlet I	Rack Type and Feature Code (FC)
PDU IBM PN 12J5303 FRU 12J4483	200–240	16 A	20 A	16 A	10 x IEC320	10 A	9306-900 Order Number 94G7450
1400 RMiB UPS IBM PN 94G6675 (EMEA, AP) 1400VA–950 W	220–240	–	12 A	–	4 x IEC320 C14	–	9306-900 FC N/A
3000 RMiB UPS IBM PN 94G6677 (EMEA, AP) 3000VA–2250 W	220–240	–	20 A	–	8 x IEC320 C14	–	9306-900 FC N/A

Legend:

Rated Voltage
Rated input voltage range.

Rated Max. I in
Rated maximum input current. Figures in brackets are the maximum current capacity of the input connector.

Main CB
Maximum current capacity of the main circuit breaker on input.

Rated Max. I out
Maximum rated total output current.

Outlets
Number and type of output sockets on the PDU.

Rated Max. outlet I
Maximum rated current for each outlet socket.

N/A   Not Applicable.

Note: In High-Availability power cabling configurations, you can use UPSs instead of PDUs or PDBs. See Standard-Availability PDU, PDB, and UPS Cabling Restrictions through Summary of PDU and UPS Requirements for 7133 Model D40 for more information.

Standard-Availability PDU, PDB, and UPS Cabling Restrictions

> **Attention**
> **Use this table only for standard-availability cabling. Do not use it for high-availability cabling**.

Table 5 contains information that is suitable only for standard-availability cabling (that is, when both power supply assemblies in the 7133 are connected to a **single PDU, PDB, or UPS**). The equivalent information for high-availability cabling is given in Table 6 on page 110.

Table 5. Standard Availability Cabling. This table shows the maximum number of cables that can be used with a PDU, PDB, or UPS in a standard cabling system.

| PDU/PDB/UPS Type	Rated Voltage	Outlets	Max. No. of Sockets That Can Be Used
PDU IBM PN 12J5303 FRU 12J4483	200–240	10 x IEC320	8
1400 RMiB UPS IBM PN 94G6675 (EMEA, AP) 1400VA–950 W	220–240	4 x IEC320	2
3000 RMiB UPS IBM PN 94G6677 (EMEA, AP) 3000VA–2250 W	220–240	8 x IEC320 C14	8

Note: Table 5 refers to single cables only.

See "7133 Input Current Ratings" on page 112 for current consumption of the above standard availability cabling system.

High-Availability Cabling

Each 7133 Model D40 is attached to the mainline power source by way of two PDUs.

7133

7133

PDU
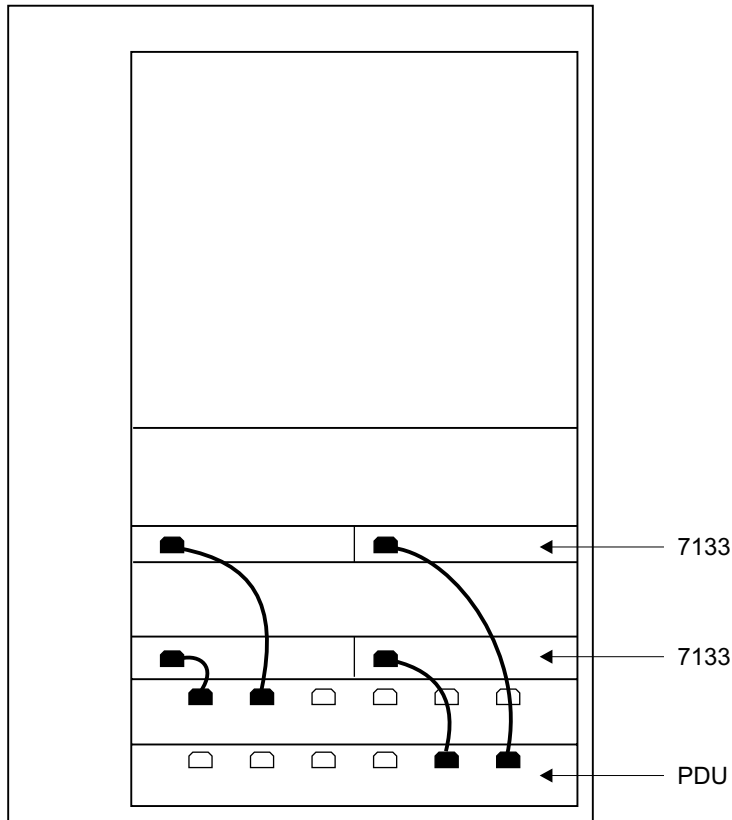
Figure 64. Connections to PDUs. Each power supply assembly is connected to a separate power source in the rack. A 42U rack can contain up to six 7133s; a 22U rack can contain up to four 7133s.

A minimum of two PDUs is needed, each of which must be connected to a separate power source. It is preferable that each power source be connected to a separate phase of the mainline power system.

Ensure that you do not exceed the loading restrictions and input-current ratings for the PDU when you install the power cables into the rack. See the following sections for more information:
- "PDU, PDB, and UPS Loading Restrictions" on page 107
- "7133 Input Current Ratings" on page 112

High-Availability PDU, PDB, and UPS Cabling Restrictions

Table 6. Maximum High-Availability Cabling. This table shows the maximum number of cables that can be used with a PDU, PDB, or UPS.

PDU/PDB/UPS Type	Rated Voltage	Outlets	Max. No. of Sockets That Can Be Used
PDU IBM PN 12J5303 FRU 12J4483	200–240	10 x IEC320	4
3000 RMiB UPS IBM PN 94G6677 (EMEA, AP) 3000VA–2250 W	220–240	8 x IEC320 C14	4

Notes:

1. Table 6 refers to single cables only.
2. The 1400 RMiB UPS cannot be used for high-availability cabling.

Example of Maximum Number of 7133s Connected to PDUs

This section shows an example of power cable connections for PDUs (IBM part 12J5303) or for 3000 RMiB UPS units. Other combinations of cables are possible, but no more than four power cables can be connected to each PDU or UPS unit, and each 7133 must be connected to two different PDUs, or UPS units. For six 7133s, three PDUs, or UPS units, are needed.

Table 7 shows the identifications of the power supply assemblies of six 7133s and three PDUs, or UPS units.

Note: This configuration is possible only in a 42U rack.

Table 7. Power Supply Assembly and PDU, or UPS Unit, Identifications

7133/PDU	Left Power Supply Assembly	Right Power Supply Assembly
7133 Model D40	1	2
7133 Model D40	3	4
7133 Model D40	5	6
7133 Model D40	7	8
7133 Model D40	9	10
7133 Model D40	11	12
230 V PDU	A	
230 V PDU	B	
230 V PDU	C	

Table 8 shows example power cable connections for high-availability operations. An X shows the connection. For example, the X in box 1A shows that power supply assembly 1 is connected to PDU A. Similarly, the X in box 7C shows that power supply assembly 7 is connected to PDU C.

Table 8. Example Power Cable Connections

	1	2	3	4	5	6	7	8	9	10	11	12
A	X		X		X			X				
B				X		X				X		X
C		X					X		X		X	

7133 Input Current Ratings

Note: For the Netfinity rack, 100–120 volt operation is not recommended. The 100–120 volt ratings are shown here for reference only.

A single 7133 requires a supply current as shown below. Two values are shown, one for standard operation, and another for maximum demand. Maximum demand occurs at startup with one nonoperational power supply assembly.

Supply Voltage	Normal Operation	Maximum Demand
100 V ac	4.4 A	7.0 A
240 V ac	1.8 A	2.8 A

Summary of PDU and UPS Requirements for 7133 Model D40

Table 9 shows how many PDUs or UPS units are needed for various numbers of 7133s in a Netfinity Rack. In the table:

- The 230-volt PDU is a Pulizzi 884-1 (IBM part 12J5303) that has been set for 230-volt operation.
- The APC 1400RMiB UPS is for 240-volt operation.
- The APC 3000 RMiB UPS is for 240-volt operation.

*Table 9. PDU and UPS Requirements for the 7133 Model D40. * indicates configurations that are available only in a 42U Netfinity rack.*

Number of 7133s	230 V PDU Standard Avail	230 V PDU High Avail	1400 RMiB UPS Standard Avail	3000 RMiB UPS Standard Avail	3000 RMiB UPS High Avail
1	1	2	1	1	2
2	1	2	2	1	2
3	1	2	3	1	2
4	1	2	4*	1	2
5*	2*	3*	–	–	–
6*	2*	3*	–	–	–

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