IBM System Storage DS8000

Installing an Expansion Rack

Version 1 Release 2

GC26-7911-01

IBM System Storage DS8000

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GC26-7911-01

Note
Before using this information and the product it supports, read the information in "Notices" on page 141.

Second Edition (November 2006)

This edition replaces GC26-7911-00.

Technical changes to the text are indicated by a vertical line to the left of the text.

Contents

Notices and publication information

This section contains information about safety notices that are used in this guide, environmental notices for this product, publication information, and information about sending your comments to IBM.

Safety notices

Complete this task to find information about safety notices.

To find the translated text for a danger or caution notice:

1. Look for the identification number at the end of each danger notice or each caution notice. In the following examples, the numbers **1000** and **1001** are the identification numbers.

   DANGER

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

   1000

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

   1001

2. Find the number that matches in the *IBM System Storage™ Solutions Safety Notices for IBM Versatile Storage Server and IBM System Storage Enterprise Storage Server*, GC26-7229.

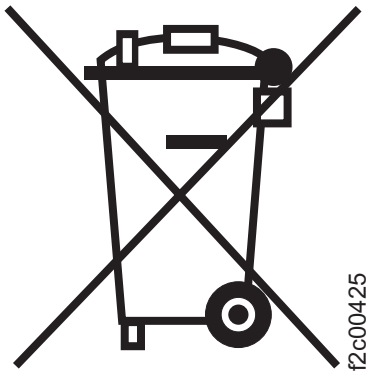
Environmental notices

This section identifies the environmental guidelines that pertain to this product.

Product recycling and disposal

This unit contains recyclable materials.

This unit must be recycled or discarded according to applicable local and national regulations. IBM® encourages owners of information technology (IT) equipment to responsibly recycle their equipment when it is no longer needed. IBM offers a variety of product return programs and services in several countries to assist equipment owners in recycling their IT products. Information on IBM product recycling offerings can be found on IBM's Internet site at http://www.ibm.com/ibm/environment/products/prp.shtml.



Notice: This mark applies only to countries within the European Union (EU) and Norway.

Appliances are labeled in accordance with European Directive 2002/96/EC concerning waste electrical and electronic equipment (WEEE). The Directive determines the framework for the return and recycling of used appliances as applicable throughout the European Union. This label is applied to various products to indicate that the product is not to be thrown away, but rather reclaimed upon end of life per this Directive.

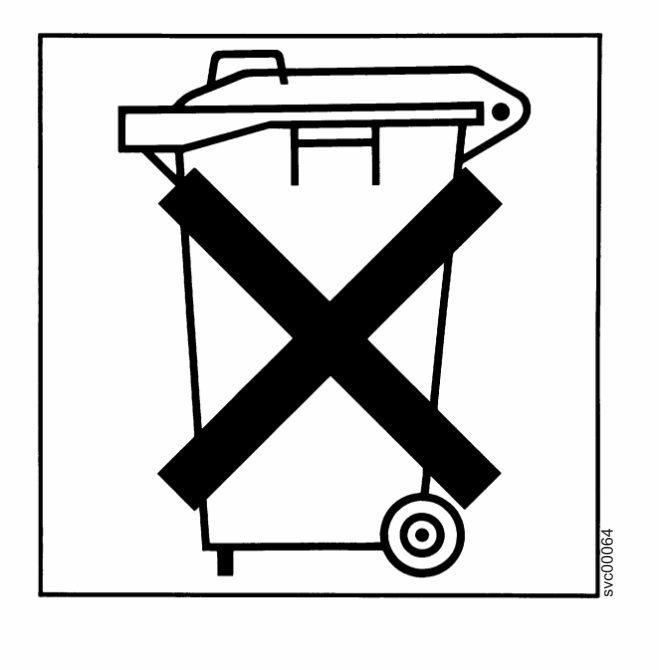
In accordance with the European WEEE Directive, electrical and electronic equipment (EEE) is to be collected separately and to be reused, recycled, or recovered at end of life. Users of EEE with the WEEE marking per Annex IV of the WEEE Directive, as shown above, must not dispose of end of life EEE as unsorted municipal waste, but use the collection framework available to customers for the return, recycling and recovery of WEEE. Customer participation is important to minimize any potential effects of EEE on the environment and human health due to the potential presence of hazardous substances in EEE. For proper collection and treatment, contact your local IBM representative.

Battery return program

This product may contain sealed lead acid, nickel cadmium, nickel metal hydride, lithium, or lithium ion battery. Consult your user manual or service manual for specific battery information. The battery must be recycled or disposed of properly. Recycling facilities may not be available in your area. For information on disposal of batteries outside the United States, go to http://www.ibm.com/ibm/environment/products/batteryrecycle.shtml or contact your local waste disposal facility.

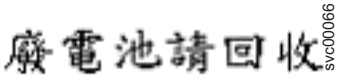
In the United States, IBM has established a return process for reuse, recycling, or proper disposal of used IBM sealed lead acid, nickel cadmium, nickel metal hydride, and other battery packs from IBM Equipment. For information on proper disposal of these batteries, contact IBM at 1-800-426-4333. Please have the IBM part number listed on the battery available prior to your call.

In the Netherlands the following applies:



For Taiwan:

Please recycle batteries.



Conventions used in this guide

The following typefaces are used to show emphasis:

boldface
Text in **boldface** represents menu items and lowercase or mixed-case command names.

italics
Text in *italics* is used to emphasize a word. In command syntax, it is used for variables for which you supply actual values.

`monospace`
Text in `monospace` identifies the data or commands that you type, samples of command output, or examples of program code or messages from the system.

Related information

The tables in this section list and describe the following publications:

- The publications that make up the IBM® System Storage™ DS8000™ series library
- Other IBM publications that relate to the DS8000 series
- Non-IBM publications that relate to the DS8000 series

See "Ordering IBM publications" on page xiii for information about how to order publications in the IBM System Storage DS8000 series publication library. See "How to send your comments" on page xiv for information about how to send comments about the publications.

DS8000 series library

These customer publications make up the DS8000 series library.

Unless otherwise noted, these publications are available in Adobe portable document format (PDF) on a compact disc (CD) that comes with the storage unit. If you need additional copies of this CD, the order number is SK2T-8825. These publications are also available as PDF files by clicking on the **Documentation link** on the following Web site:

http://www-1.ibm.com/servers/storage/support/disk

See "Ordering IBM publications" on page xiii for information about ordering these and other IBM publications.

Title	Description	Order Number
IBM System Storage DS: Command-Line Interface User's Guide	This guide describes the commands that you can use from the command-line interface (CLI) for managing your DS8000 configuration and Copy Services relationships. The CLI application provides a set of commands that you can use to write customized scripts for a host system. The scripts initiate predefined tasks in a Copy Services server application. You can use the CLI commands to indirectly control Remote Mirror and Copy and FlashCopy® configuration tasks within a Copy Services server group.	SC26-7625 (See Note.)
IBM System Storage DS8000: Host Systems Attachment Guide	This guide provides guidelines for attaching the DS8000 to your host system and for migrating to fibre-channel attachment from a small computer system interface.	SC26-7628 (See Note.)
IBM System Storage DS8000: Introduction and Planning Guide	This guide introduces the DS8000 product and lists the features you can order. It also provides guidelines for planning the installation and configuration of the storage unit.	GC35-0495
IBM System Storage Multipath Subsystem Device Driver User's Guide	This publication describes how to use the IBM Subsystem Device Driver (SDD) on open-systems hosts to enhance performance and availability on the DS8000. SDD creates single devices (vpaths) that consolidate redundant paths for logical unit numbers. SDD permits applications to run without interruption when path errors occur. It balances the workload across paths, and it transparently integrates with applications.	SC30-4096
IBM System Storage DS8000: User's Guide	This guide provides instructions for setting up and operating the DS8000 and for analyzing problems.	SC26-7623 (See Note.)
IBM System Storage DS Application Programming Interface Reference	This publication provides reference information for the IBM System Storage DS application programming interface (API) and provides instructions for installing the Common Information Model Agent, which implements the API.	GC35-0493

Title	Description	Order Number
IBM System Storage DS8000 Messages Reference	This publication provides explanations of error, information, and warning messages that are issued from the DS8000 user interfaces.	GC26-7659
Note: No hardcopy book is produced for this publication. However, a PDF file is available from the following Web site: http://www-1.ibm.com/servers/storage/support/disk		

Other IBM publications

Other IBM publications contain additional information that is related to the DS product library.

The following list is divided into categories to help you find publications that are related to specific topics. Some of the publications are listed under more than one category. See "Ordering IBM publications" on page xiii for information about ordering these and other IBM publications.

Title	Description	Order Number
Data-copy services		
z/OS DFSMS Advanced Copy Services	This publication helps you understand and use IBM Advanced Copy Services functions. It describes three dynamic copy functions and several point-in-time copy functions. These functions provide backup and recovery of data if a disaster occurs to your data center. The dynamic copy functions are peer-to-peer remote copy, extended remote copy, and coupled extended remote copy. Collectively, these functions are known as remote copy. FlashCopy, SnapShot, and concurrent copy are the point-in-time copy functions.	SC35-0428
IBM Enterprise Storage Server	This publication, from the IBM International Technical Support Organization, introduces the Enterprise Storage Server and provides an understanding of its benefits. It also describes in detail the architecture, hardware, and functions, including the advanced copy functions, of the Enterprise Storage Server.	SG24-5465
Implementing Copy Services 0n S/390	This publication, from the IBM International Technical Support Organization, tells you how to install, customize, and configure Copy Services on an Enterprise Storage Server that is attached to an S/390 or zSeries host system. Copy Services functions include peer-to-peer remote copy (PPRC), extended remote copy (XRC), FlashCopy®, and concurrent copy. This publication describes the functions, prerequisites, and corequisites and describes how to implement each function into your environment.	SG24-5680
IBM TotalStorage ESS Implementing Copy Services in an Open Environment	This publication, from the IBM International Technical Support Organization, tells you how to install, customize, and configure Copy Services on UNIX, Windows NT®, Windows 2000, Sun Solaris, HP-UX, Tru64, OpenVMS, and iSeries host systems. The Copy Services functions that are described include peer-to-peer remote copy (PPRC) and FlashCopy. This publication describes the functions and shows you how to implement them into your environment. It also shows you how to implement these functions in a high-availability cluster multiprocessing environment.	SG24-5757
Fibre channel		

Title	Description	Order Number
Fibre Channel Connection (FICON) I/O Interface: Physical Layer	This publication provides information about the fibre-channel I/O interface. This book is also available as a PDF file from the following Web site: http://www.ibm.com/servers/resourcelink/	SA24-7172
Fibre Transport Services (FTS): Physical and Configuration Planning Guide	This publication provides information about fibre-optic and ESCON-trunking systems.	GA22-7234
IBM SAN Fibre Channel Switch: 2109 Model S08 Installation and Service Guide	This guide describes how to install and maintain the IBM SAN Fibre Channel Switch 2109 Model S08.	SC26-7350
IBM SAN Fibre Channel Switch: 2109 Model S08 User's Guide	This guide describes the IBM SAN Fibre Channel Switch and the IBM TotalStorage ESS Specialist. It provides information about the commands and how to manage the switch with Telnet and the Simple Network Management Protocol.	SC26-7349
IBM SAN Fibre Channel Switch: 2109 Model S16 Installation and Service Guide	This publication describes how to install and maintain the IBM SAN Fibre Channel Switch 2109 Model S16. It is intended for trained service representatives and service providers.	SC26-7352
IBM SAN Fibre Channel Switch: 2109 Model S16 User's Guide	This guide introduces the IBM SAN Fibre Channel Switch 2109 Model S16 and tells you how to manage and monitor the switch using zoning and how to manage the switch remotely.	SC26-7351
Implementing Fibre Channel Attachment on the ESS	This publication, from the IBM International Technical Support Organization, helps you install, tailor, and configure fibre-channel attachment of open-systems hosts to the Enterprise Storage Server. It provides you with a broad understanding of the procedures that are involved and describes the prerequisites and requirements. It also shows you how to implement fibre-channel attachment.	SG24-6113
Open-systems hosts		
ESS Solutions for Open Systems Storage: Compaq AlphaServer, HP, and Sun	This publication, from the IBM International Technical Support Organization, helps you install, tailor, and configure the Enterprise Storage Server when you attach Compaq AlphaServer (running Tru64 UNIX), HP, and Sun hosts. This book does not cover Compaq AlphaServer that is running the OpenVMS operating system. This book also focuses on the settings that are required to give optimal performance and on the settings for device driver levels. This book is for the experienced UNIX professional who has a broad understanding of storage concepts.	SG24-6119
IBM TotalStorage ESS Implementing Copy Services in an Open Environment	This publication, from the IBM International Technical Support Organization, tells you how to install, customize, and configure Copy Services on UNIX or Windows 2000 host systems. The Copy Services functions that are described include peer-to-peer remote copy and FlashCopy. This publication describes the functions and shows you how to implement them into your environment. It also shows you how to implement these functions in a high-availability cluster multiprocessing environment.	SG24-5757
Implementing Fibre Channel Attachment on the ESS	This publication, from the IBM International Technical Support Organization, helps you install, tailor, and configure fibre-channel attachment of open-systems hosts to the Enterprise Storage Server. It gives you a broad understanding of the procedures that are involved and describes the prerequisites and requirements. It also shows you how to implement fibre-channel attachment.	SG24-6113

Title	Description	Order Number
S/390 and zSeries hosts		
Device Support Facilities: User's Guide and Reference	This publication describes the IBM Device Support Facilities (ICKDSF) product that are used with IBM direct access storage device (DASD) subsystems. ICKDSF is a program that you can use to perform functions that are needed for the installation, the use, and the maintenance of IBM DASD. You can also use it to perform service functions, error detection, and media maintenance.	GC35-0033
z/OS Advanced Copy Services	This publication helps you understand and use IBM Advanced Copy Services functions. It describes three dynamic copy functions and several point-in-time copy functions. These functions provide backup and recovery of data if a disaster occurs to your data center. The dynamic copy functions are peer-to-peer remote copy, extended remote copy, and coupled extended remote copy. Collectively, these functions are known as remote copy. FlashCopy, SnapShot, and concurrent copy are the point-in-time copy functions.	SC35-0428
DFSMS/MVS V1: Remote Copy Guide and Reference	This publication provides guidelines for using remote copy functions with S/390 and zSeries hosts.	SC35-0169
Fibre Transport Services (FTS): Physical and Configuration Planning Guide	This publication provides information about fibre-optic and ESCON-trunking systems.	GA22-7234
Implementing ESS Copy Services on S/390	This publication, from the IBM International Technical Support Organization, tells you how to install, customize, and configure Copy Services on an Enterprise Storage Server that is attached to an S/390 or zSeries host system. Copy Services functions include peer-to-peer remote copy, extended remote copy, FlashCopy, and concurrent copy. This publication describes the functions, prerequisites, and corequisites and describes how to implement each function into your environment.	SG24-5680
ES/9000, ES/3090: IOCP User Guide Volume A04	This publication describes the Input/Output Configuration Program that supports the Enterprise Systems Connection (ESCON) architecture. It describes how to define, install, and configure the channels or channel paths, control units, and I/O devices on the ES/9000 processors and the IBM ES/3090 Processor Complex.	GC38-0097
IOCP User's Guide, IBM e(logo)server zSeries 800 and 900	This publication describes the Input/Output Configuration Program that supports the zSeries 800 and 900 servers. This publication is available in PDF format by accessing ResourceLink at the following Web site: www.ibm.com/servers/resourcelink/	SB10-7029
IOCP User's Guide, IBM e(logo)server zSeries	This publication describes the Input/Output Configuration Program that supports the zSeries server. This publication is available in PDF format by accessing ResourceLink at the following Web site: www.ibm.com/servers/resourcelink/	SB10-7037
S/390: Input/Output Configuration Program User's Guide and ESCON Channel-to-Channel Reference	This publication describes the Input/Output Configuration Program that supports ESCON architecture and the ESCON multiple image facility.	GC38-0401
IBM z/OS Hardware Configuration Definition User's Guide	This guide provides conceptual and procedural information to help you use the z/OS Hardware Configuration Definition (HCD) application. It also explains: • How to migrate existing IOCP/MVSCP definitions • How to use HCD to dynamically activate a new configuration • How to resolve problems in conjunction with MVS/ESA HCD	SC33-7988

Title	Description	Order Number
OS/390: Hardware Configuration Definition User's Guide	This guide provides detailed information about the input/output definition file and about how to configure parallel access volumes. This guide discusses how to use Hardware Configuration Definition for both OS/390® and z/OS V1R1.	SC28-1848
OS/390 V2R10.0: MVS System Messages Volume 1 (ABA - ASA)	This publication lists OS/390 MVS™ system messages ABA to ASA.	GC28-1784
Using IBM 3390 Direct Access Storage in a VM Environment	This publication provides device-specific information for the various models of the 3390 and describes methods you can use to manage storage efficiently using the VM operating system. It provides guidance on managing system performance, availability, and space through effective use of the direct access storage subsystem.	GG26-4575
Using IBM 3390 Direct Access Storage in a VSE Environment	This publication helps you use the 3390 in a VSE environment. It includes planning information for adding new 3390 units and instructions for installing devices, migrating data, and performing ongoing storage management activities.	GC26-4576
Using IBM 3390 Direct Access Storage in an MVS Environment	This publication helps you use the 3390 in an MVS environment. It includes device-specific information for the various models of the 3390 and illustrates techniques for more efficient storage management. It also offers guidance on managing system performance, availability, and space utilization through effective use of the direct access storage subsystem.	GC26-4574
z/Architecture Principles of Operation	This publication provides a detailed definition of the z/Architecture™. It is written as a reference for use primarily by assembler language programmers and describes each function at the level of detail needed to prepare an assembler language program that relies on a particular function. However, anyone concerned with the functional details of z/Architecture will find this publication useful.	SA22-7832
SAN		
IBM OS/390 Hardware Configuration Definition User's Guide	This guide explains how to use the Hardware Configuration Data application to perform the following tasks: • Define new hardware configurations • View and modify existing hardware configurations • Activate configurations • Query supported hardware • Maintain input/output definition files (IODFs) • Compare two IODFs or compare an IODF with an actual configuration • Print reports of configurations • Create graphical reports of a configuration • Migrate existing configuration data	SC28-1848
IBM SAN Fibre Channel Switch: 2109 Model S08 Installation and Service Guide	This guide describes how to install and maintain the IBM SAN Fibre Channel Switch 2109 Model S08.	SC26-7350
IBM SAN Fibre Channel Switch: 2109 Model S08 User's Guide	This guide describes the IBM SAN Fibre Channel Switch and the IBM TotalStorage ESS Specialist. It provides information about the commands and how to manage the switch with Telnet and the Simple Network Management Protocol (SNMP).	SC26-7349
IBM SAN Fibre Channel Switch: 2109 Model S16 Installation and Service Guide	This publication describes how to install and maintain the IBM SAN Fibre Channel Switch 2109 Model S16. It is intended for trained service representatives and service providers.	SC26-7352

Title	Description	Order Number
IBM SAN Fibre Channel Switch: 2109 Model S16 User's Guide	This guide introduces the IBM SAN Fibre Channel Switch 2109 Model S16 and tells you how to manage and monitor the switch using zoning and how to manage the switch remotely.	SC26-7351
Implementing Fibre Channel Attachment on the ESS	This publication, from the IBM International Technical Support Organization, helps you install, tailor, and configure fibre-channel attachment of open-systems hosts to the Enterprise Storage Server. It provides you with a broad understanding of the procedures that are involved and describes the prerequisites and requirements. It also shows you how to implement fibre-channel attachment.	SG24-6113
Seascape family		
IBM Enterprise Storage Server	This publication, from the IBM International Technical Support Organization, introduces the Enterprise Storage Server and provides an understanding of its benefits. It also describes in detail the architecture, hardware, and functions, including the advanced copy functions, of the Enterprise Storage Server.	SG24-5465
IBM Enterprise Storage Server Performance Monitoring and Tuning Guide	This guide, from the IBM International Technical Support Organization, provides guidance on the best way to configure, monitor, and manage your Enterprise Storage Server to ensure optimum performance.	SG24-5656
IBM Versatile Storage Server: Introduction and Planning Guide	This publication introduces the IBM Versatile Storage Server™ and lists the features you can order. It also provides planning information for both 2105 Models B09 and 100.	GC26-7223
Implementing the IBM Enterprise Storage Server in Your Environment	This publication, from the IBM International Technical Support Organization, can help you install, tailor, and configure the Enterprise Storage Server in your environment.	SG24-5420
Storage management		
Device Support Facilities: User's Guide and Reference	This publication describes the IBM Device Support Facilities (ICKDSF) product used with IBM direct access storage device (DASD) subsystems. ICKDSF is a program that you can use to perform functions that are needed for the installation, the use, and the maintenance of IBM DASD. You can also use it to perform service functions, error detection, and media maintenance.	GC35-0033
IBM TotalStorage Solutions Handbook	This handbook, from the IBM International Technical Support Organization, helps you understand what makes up enterprise storage management. The concepts include the key technologies that you must know and the IBM subsystems, software, and solutions that are available today. It also provides guidelines for implementing various enterprise storage administration tasks so that you can establish your own enterprise storage management environment.	SG24-5250

Ordering IBM publications

You can order copies of IBM publications using the IBM publications center.

IBM publications center

The publications center is a worldwide central repository for IBM product publications and marketing material.

The IBM publications center offers customized search functions to help you find the publications that you need. Some publications are available for you to view or download free of charge. You can also order publications. The publications center displays prices in your local currency. You can access the IBM publications center through the following Web site:

http://www.elink.ibmlink.ibm.com/public/applications/publications/cgibin/pbi.cgi

Note: Open the Web site in a new browser window by right clicking on the link and selecting ″Open in New Window.″

Web sites

The following Web sites provide information about the IBM System Storage DS8000 series and other IBM storage products.

Type of Storage Information	Web Site
Concurrent Copy for S/390 and zSeries host systems	http://www.storage.ibm.com/software/sms/sdm/
Copy Services command-line interface (CLI)	http://www-1.ibm.com/servers/storage/support/software/cscli/
DS8000 Information Center	http://publib.boulder.ibm.com/infocenter/ds8000ic/index.jsp
DS8000 series publications	http://www-1.ibm.com/servers/storage/support/disk Click **Documentation**.
FlashCopy for S/390 and zSeries host systems	http://www.storage.ibm.com/software/sms/sdm/
Host system models, operating systems, and adapters that the storage unit supports	http://www.ibm.com/servers/storage/disk/ds8000/ Click **Interoperability matrix**.
IBM Disk Storage Feature Activation (DSFA)	http://www.ibm.com/storage/dsfa
IBM storage products	http://www.storage.ibm.com/
IBM System Storage DS8000 series	http://www-1.ibm.com/servers/storage/disk/ds8000
IBM version of the Java (JRE) that is often required for IBM products	http://www-106.ibm.com/developerworks/java/jdk/
Multiple Device Manager (MDM)	http://www.ibm.com/servers/storage/support/ Click **Storage Virtualization**.
Remote Mirror and Copy (formerly PPRC) for S/390 and zSeries host systems	http://www.storage.ibm.com/software/sms/sdm/
SAN fibre channel switches	http://www.ibm.com/storage/fcswitch/
Storage Area Network Gateway and Router	http://www-1.ibm.com/servers/storage/support/san/
Subsystem Device Driver (SDD)	http://www-03.ibm.com/servers/storage/support/software/sdd
Technical notes and product tips	http://www.ibm.com/servers/storage/support/disk/ds8100/ Click **Technical notes** on the Troubleshooting tab.
z/OS Global Mirror (formerly XRC) for S/390 and zSeries host systems	http://www.storage.ibm.com/software/sms/sdm/

How to send your comments

Your feedback is important to help us provide the highest quality information. If you have any comments about this information or any other DS8000 series documentation, you can submit them in the following ways:

- e-mail

  Submit your comments electronically to the following e-mail address:

starpubs@us.ibm.com

Be sure to include the name and order number of the book and, if applicable, the specific location of the text you are commenting on, such as a page number or table number.

- Mail

  Fill out the Readers' Comments form (RCF) at the back of this book. Return it by mail or give it to an IBM representative. If the RCF has been removed, you can address your comments to:

  International Business Machines Corporation
  RCF Processing Department
  Department 61C
  9032 South Rita Road
  TUCSON AZ 85775-4401

Chapter 1. Installing one expansion rack with I/O enclosures to an existing storage facility

This procedure is a **non-concurrent** installation used only for one expansion rack that already contains I/O enclosures (models 92E, 9AE).

If the rack you are installing does not contain I/O enclosures, you must go to the section Chapter 2, "Installing one expansion rack without I/O enclosures to an existing storage facility," on page 61.

DANGER

HEAVY EQUIPMENT -- PERSONAL INJURY OR EQUIPMENT DAMAGE MAY RESULT IF MISHANDLED (D006)

Attention: The customer should prepare his environment to accept the new product based on the installation planning information provided, with assistance from an IBM Installation Planning Representative (IPR) or IBM authorized service provider. In anticipation of the equipment delivery, the final installation site should be prepared in advance such that professional movers/riggers can transport the equipment to the final installation site within the computer room. If for some reason, this is not possible at the time of delivery, the customer will need to make arrangements to have professional movers/riggers return to finish the transportation at a later date. Only professional movers/riggers should transport the equipment. The IBM authorized service provider will only perform minimal frame repositioning within the computer room, as needed, to perform required service actions. The customer is also responsible for using professional movers/riggers in the case of equipment relocation or disposal.

Beginning the installation

Use the following sections to begin the installation.

Stopping all host activity

To prepare for a non-concurrent installation, all host system activity must be stopped.

1. Ensure the customer stops all host system activity to the existing rack before you continue.
2. Continue with "Ensuring existing rack has no open serviceable events."

Ensuring existing rack has no open serviceable events

Display and repair any open serviceable events on the existing rack that the new rack will be installed to. There must be no unrepaired serviceable events prior to beginning the installation.

1. Log into the management console (HMC) for rack 1.
2. In the HMC Navigation area, under the **Management Environment**, expand the HMC (identified by hostname).
3. Open **Service Applications** → **Service Focal Point**.

4. In the right content area, select **Manage Serviceable Events**, a window displays a list of selection criteria. Ensure the serviceable event status field is set to "Open".
5. You can use the default selection criteria or modify the criteria for your needs. Click **OK**.
6. The Serviceable Event Overview window is displayed. If a serviceable event is listed, repair it before you continue the install. To repair, click **Selected** (from the top tool bar), and then select **Repair**. Follow the guided repair process.

Checking for the latest level of installation instructions

MES instructions are required to install the storage enclosures. The following rack install procedure installs the rack, rack power, and RIO interfaces only.

These installation instructions are provided in two formats:

- Hardcopy: this is shipped with the subsystem and is printed from a PDF file. The PDF file is also available on the *IBM System Storage DS8000 series Service Documents CDROM* or from the DS8000 - Engineering Web site.
- Information Center: This is intended for online viewing. It is available on the *IBM System Storage DS8000 series Service Documents CDROM*, on the management console (HMC) or through the Intranet.

Ensure that you are using the latest version of the installation instructions.

1. If you are performing the installation using hardcopy instructions, then the latest level of the PDF file for printing will be available on the DS8000 - Engineering Web site (https://ssgtech4.sanjose.ibm.com/PFE/Squadrons-S%20PE%20Support.nsf/WVhome). Select **Related Links** → **Information Centers** → **Service**. Scroll to the section on Installation Guides in PDF format.
2. If you are performing the installation using the Information Center, then the latest version will be available on the Intranet. Use the link from the DS8000 - Engineering Web site (https://ssgtech4.sanjose.ibm.com/PFE/Squadrons-S%20PE%20Support.nsf/WVhome). Select **Related Links** → **Information Centers** → **Service**

Checking customer preparations

DANGER

HEAVY EQUIPMENT -- PERSONAL INJURY OR EQUIPMENT DAMAGE MAY RESULT IF MISHANDLED (D006)

1. Verify that the customer has two AC power sources for each rack in the DS8000 storage facility.

   For maximum fault tolerance, use two separate AC power sources.

   Note: The DS8000 is designed for connection to an IT power distribution system. In an IT power distribution system, the neutral conductor is isolated from earth (ground) by an impedance with exposed conductive parts in the installation that is tied directly to earth.

   No service representative action is needed. Information is for compliance with International Electrotechnical Commission Standard 950 for the safety of information technology equipment and electrical business equipment.

2. Verify the customer wall circuit breaker. The customer wall circuit breaker rating that protects each line cord depends on the voltage range as follows:
   - Low-voltage, three-phase installations (200 - 240 V) require wall circuit breakers that have a rating of 50 to 60 A. Do not exceed the wire rating of the facility.
   - High-voltage, three-phase installations (380 - 480 V) require wall circuit breakers that have a rating of 30 to 35 A. Do not exceed the wire rating of the facility.
3. If the DS8000 will be installed on a raised floor:
   a. Review the weight of each rack with the customer to verify that their raised floors have adequate support. An individual rack, fully configured can weigh a maximum of 2880 pounds (1307 kilograms). For details on the DS8000 rack weights, refer to *IBM System Storage DS8000 Introduction and Planning Guide*.
   b. To correctly cool a DS8000, place two floor tiles, that have holes for air flow, directly in the front and the rear of each DS8000 rack (for a total of 4). Also provide tiles with holes, for cable entry, under the rear tailgate.
4. If the DS8000 will not be installed on a raised floor, ensure the customer will provide adequate air flow and temperature around the DS8000.

   Notes:
   a. For information about the temperature requirements of the operating environment, see the *IBM System Storage DS8000 Introduction and Planning Guide*.
   b. The DS8000 rack cooling airflow enters through the front and rear covers and exits through the top and rear covers. The bottom of the DS8000 is sealed.
5. Verify that the customer has ordered, supplied, and routed the following cables to the DS8000 being installed. Routing of the customer cables must not be billed against the installation. If the customer wants the service representative to route the cables, that activity must be coded or billed separately.
   a. ESCON® host cables from the host to the DS8000 host adapters.
   b. Fibre host cables from the host to the DS8000 host adapters.

Preserving customer data

1. The existing customer data will be preserved. However, it is recommended for the customer to backup their existing data as a precaution.
2. Continue the install.

Checking for required microcode

1. Is the new storage facility being installed to an existing storage complex?
   - Yes, ensure the code level of the existing storage complex and management consoles are already at a compatible level or same level as the new code levels. Then go to step 2.
   - No, go to step 3 on page 4.

   Note: Normally, if there are two management consoles, they both must be running the same level of code.
2. Ensure the code level of the existing storage plex and management consoles are already at a compatible level or same level as the new storage facility code levels.

Note: Do not intermix the following bundles within a storage plex without the approval of next level of support.

- bundle 6.1.6xx.xx or prior
- bundle 6.2.0xx.xx or later

3. Determine if there is a required level of microcode available for your storage facility or management console. For IBM personnel, go to DS8000 - Engineering Web site (https://ssgtech4.sanjose.ibm.com/PFE/Squadrons-S%20PE%20Support.nsf/WVhome). For non-IBM personnel, follow the established process to determine the required code level.

   When the web site defines a code level as "required", it means that the storage facility must not be transferred over to the customer without the indicated code level installed.

   When the web site defines a code level as "recommended", it means the IBM service representative can either:

   - Give the storage facility to the customer when the installation is complete.
   - Negotiate with the customer for a more convenient time to update the microcode.

Checking RETAIN for storage facility installation tips

1. Sign on to RETAIN.
2. Select HSF.
3. Search for 2107 Install (p;2107 Install). RETAIN may have information that corrects problems that are not yet addressed by the install instructions.

Unpacking the expansion rack and verifying the ship group is complete

1. Remove the CE Unpacking Instructions from the Customer Engineer envelope taped to the front of the storage facility below the CEC enclosures. Use the CE Unpacking Instructions to unpack the storage facility frame(s) and prepare it for installation.
2. Verify that all items in the ship group were received.
   a. The ship group comes in one or more large boxes on pallets. The customer may not allow the pallet and large box in their machine room. Consequently, you may end up with a pile of parts on the floor.
   b. The side decorative covers that go between the racks are either packed in a separate long narrow box (early version) or are packed in the large ship group box (later version). The side covers for the later version fold in half.
   c. The hardcopy listing of the ship group contents is shipped loose with the other parts inside the large boxes. If it is missing, check if it was accidently discarded along with the pallets and large boxes. An additional copy of the paperwork may be included in the CE Envelope.
   d. The official ship group listing of parts is included in the ship group. Table 1 on page 5 is for reference only.

      Notes:

      - Version 1 part numbers are *not* eligible for use in European Union member states.
      - Version 2 part numbers are eligible for use everywhere including European Union member states.

- Only the most recent part numbers are listed. Your DS8000 or serviceable event FRU list may contain an older part number. The parts ordering system can automatically substitute a later part number as needed.

Table 1. Service ship group part numbers (expansion rack)

Description	Part number	
	Version 1	**Version 2**
Bolt, M8 x 20, interrack spacer	1621545	1621545
Cable, Ethernet, black, 31.0 m	22R1798	22R1798
Cable, Ethernet, gray, 31.0 m	22R1799	22R1799
CD-ROM, Code Bundle	[1]	[1]
CD-ROM, Customer Documents	[1]	[1]
CD-ROM, Service Documents	[1]	[1]
Cover, interrack decorative, side (one-piece)	22R4964	22R4964
Cover, interrack decorative, side (two-piece, hinged)[2]	23R1050[2]	23R1050[2]
Cover, interrack decorative, top	22R4962	22R4962
Drawing, interrack spacer stud	22R5481	22R5481
Label, operator panel warning, translated	22R1789	22R1789
Publication, Service Provider Start Here	22R4228	22R4228
Publication, Installation Guide	[1]	[1]
Publication, Installing an Expansion Rack	[1]	[1]
Publication, Statement of Limited Warranty	22R5940	22R6401
Publication, Waste Equipment (WEEE)	22R5822	22R5822
Spacer stud, interrack	22R5046	22R5046
Tag, "Do Not Operate"	23R0280	23R0280
Tie wrap	07J6655	07J6655
Washer, M8, interrack spacer	84X5850	84X5850
Wheel chocks (set of 4)	08J5557	08J5557

Notes:

1. The part number changes with each release. Call the next level of support.
2. A bracket (23R2044) and two nuts (84X4841) secure the two pieces at the hinge.

3. Place the ship group parts list in the document enclosure (front upper left of rack 1). This list can be used for future removal of the storage facility.

Determine if new expansion rack and existing rack 1 have compatible features

1. Determine the model of the expansion rack being installed. Observe the machine type model serial number label beneath the UEPO red switch on the rack operator panel.
2. Determine the rack expansion feature code for the rack being installed.

   The feature codes are listed on the Product Package Label sheet that is attached to the outside of the shipping carton. Remove the CE Unpacking Instructions from the Customer Engineer envelope taped to the front of the rack below the CEC enclosures.

3. Use Table 2 to determine if the feature of the rack being installed is compatible with the existing rack 1 model. If the sheet is not available, use the description in the second column of the table to determine the feature.

Table 2. Compatible rack models and features

If Rack 1 is model:	Rack 2 must be model and rack position feature code	Rack 3 must be model and rack position feature code
921/931	92E with no I/O enclosures Feature code 0211	None
922/932	92E with four I/O enclosures Feature code 0221	92E with no I/O enclosures Feature code 0222
9A2/9B2	9AE with four I/O enclosures Feature code 0231	9AE with no I/O enclosures Feature code 0232

4. Is the rack being installed compatible with the Rack 1 model?
   - Yes, continue with step 5.
   - No, **stop**, contact the next level of support.
5. Determine if Rack-1 has the extended power line disturbance (PLD) feature 1055 installed.

   Note: All racks in this storage facility must either have the PLD feature installed or not installed. There cannot be an intermix of racks with and without the PLD feature.

   a. At the rear of Rack-1, observe the top rear of a primary power supply (PPS). Refer to Figure 1 on page 7, location Ex-E2. If the feature is not installed, there will be a sheet metal blockout plate as shown. If the feature is installed, there will be a booster power module installed with a cable going to the 208VDC bus bars to the right of the PPS.

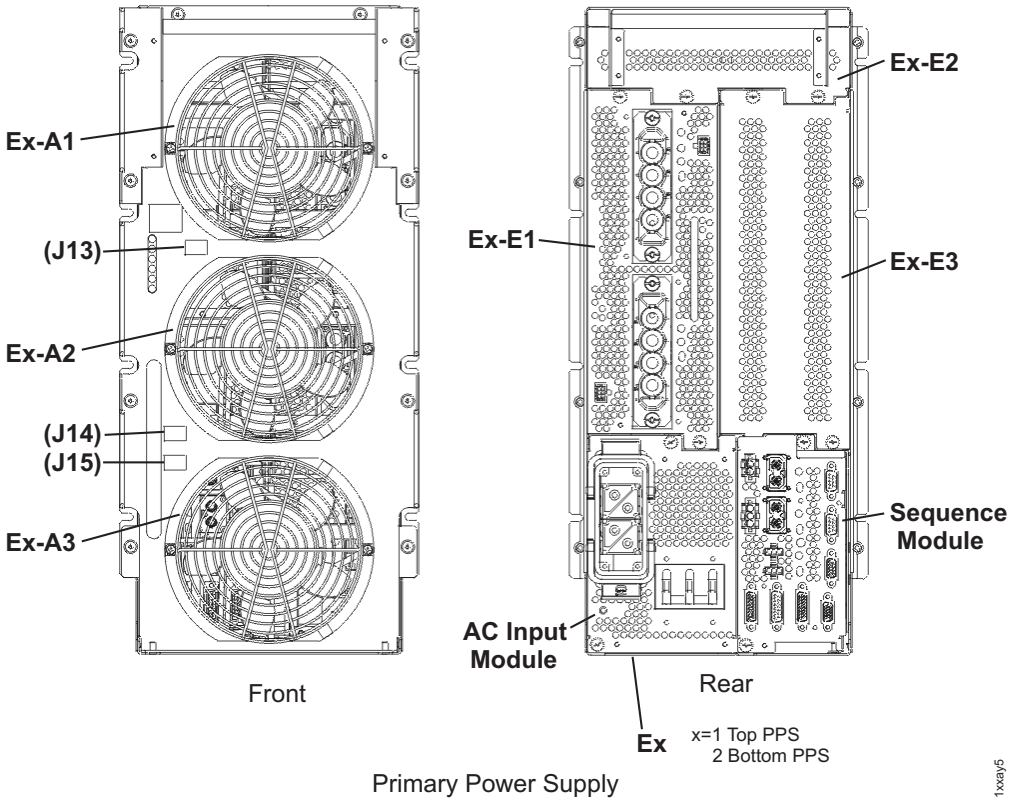


Figure 1. Locations for primary power supplies

6. Is the extended PLD feature 1055 present in Rack-1?
   - Yes, go to step 7.
   - No, go to step 9.
7. Does the expansion rack you are installing have the extended PLD feature present?
   - Yes, go to 8.
   - No, stop the installation and call the next level of support. The extended PLD feature as well as the battery assembly feature will need to be ordered and installed on the expansion rack before the installation of the expansion rack can continue.
8. Ensure the booster power module (Ex-E2 in Figure 1) cable is connected at both ends (to the booster power module and to the bus bar). Do this for both PPSs and then continue with the next step.
9. Does the expansion rack you are installing have the extended PLD feature present?
   - Yes, stop the install and call the next level of support. All racks in this storage facility must either have the PLD feature installed or not installed. There cannot be an intermix of racks with and without the PLD feature.
   - No, continue with Inspecting for shipping damage.

Inspecting for shipping damage

1. Inspect the storage facility for any damage that might have occurred during shipping.

2. If you observe shipping damage or missing items, do not install the storage facility without IBM management approval. Report all observed damage immediately, following existing procedures.

Determining if a safety inspection is required

Find the condition that applies to your expansion rack:

- New expansion rack from IBM. A safety inspection is not required. Continue with "Preparing the existing rack."
- Not a new expansion rack from IBM and was maintained by IBM. A safety inspection is not required. Continue with "Preparing the existing rack."
- Not a new expansion rack from IBM and was not maintained by IBM. A safety inspection is required. Continue with "Safety inspection" in the Service Information Center on the management console or the documentation CD-ROM. Then return here and continue at the next section.

Preparing the existing rack

1. Ensure the HMC power control mode for this DS8000 is set to Manual Power Mode. If it is not in Manual Power Mode, note the current customer setting and then change the setting to Manual Power Mode. At the end of the installation you will be directed to restore the original customer setting.
   a. In the HMC Navigation area, under the **Management Environment**, expand the HMC (identified by hostname).
   b. Open **Service Applications** → **Service Focal Point**.
   c. In the right content area, select **Service Utilities**. A window opens that displays a list of Machine Type/Machine Serials.
   d. Select a Machine Type/Machine Serial from the list.
   e. Click **Selected** (on top tool bar), then select **Manage Power Control**.
   f. Click the radio button for **Manual Power Mode**.

      Note: This prevents the DS8000 from unexpectedly powering off during this service action if any of the following occur:
      - The HMC is set to power off/on using customer-determined time of day schedules.
      - The remote power control feature is installed and enabled.
      - The customer remotely accesses the HMC to power off the DS8000.
2. Prepare the DS8000 for the add expansion rack process:
   a. Login to a management console (HMC) for rack 1.
   b. In the HMC Navigation area, under the **Management Environment**, expand the HMC (identified by hostname).
   c. Open **Service Applications** → **Service Focal Point**.
   d. In the right content area, select **Install/Add/Remove Hardware**, a window displays a list of Machine Type/Machine Serial.
   e. Select the Machine Type/Machine Serial that the new rack is being installed to.

      Note: The installation status of the existing rack should display "Install Completed".
   f. Click **Selected** (on top tool bar), then select **Install Expansion Rack**. An Install Expansion Rack screen is displayed.

g. Select **Add an Expansion Rack with I/O Enclosures (Non-Concurrent)** and click **Submit**.

h. A confirmation panel prompts you with the following question ″Were you sent here from the MES or installation instructions″? Click **Yes**.

3. A User Input Message Box is displayed requesting you to enter information in three fields.

   a. Use this step to determine how to enter the information.

Table 3. Required information fields for User Input Message Box

Information field	Format of entry

Enter Rack MTMS
 	
MTMS label is on rack operator panel beneath the red UEPO switch. The label format is:
`Type 2NNN-MMM`
`S/N XX-YYYYY`
	2NNN-MMM*XXYYYYY (Enter in *uppercase*, and without the dash that is on the MTMS label between the XX and YYYYY.)
	• **2NNN** = machine type 2107, 2421, 2422, 2423 or 2424
	• **MMM** = model
	• **XX** = plant of manufacture
	• **YYYYY** = rack serial number
	Note: If the MTMS is entered in lower case, the installation process will hang for several minutes and then fail.

Enter the number of battery enclosures containing battery modules (E10, E11, E12 in Figure 2 on page 10)	0 or 1 or 2 or 3
Enter the number of PPS modules present. See Figure 3 on page 11. • Ex-E1 is always present. • Ex-E2 is optional. The module is installed if there is a cable connector present. The module is not installed if there is a plain sheet metal dummy cover. • Ex-E3 is optional. **IMPORTANT:** – The cables to this module position are always present. – The module is present if it has LEDs and switches. – The module is not present if there are no LEDs and switches.	1 or 2 or 3 Only count positions Ex-E1, Ex-E2, and Ex-E3.

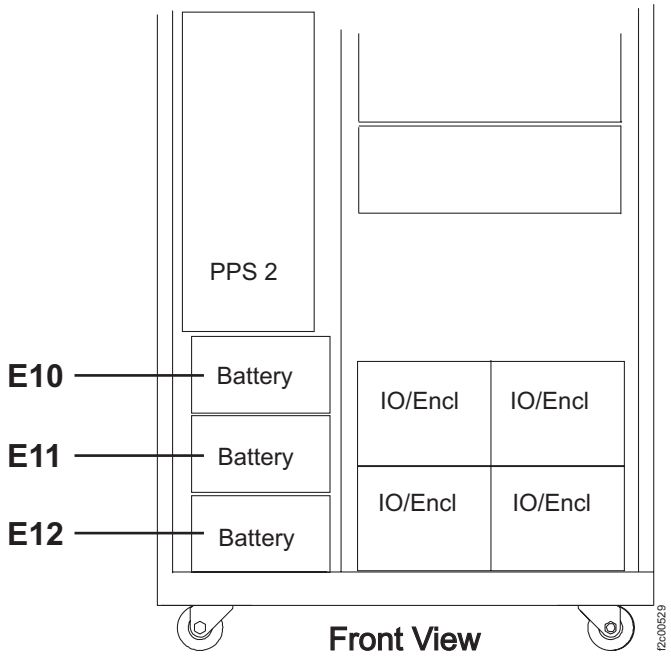


Figure 2. Battery module locations

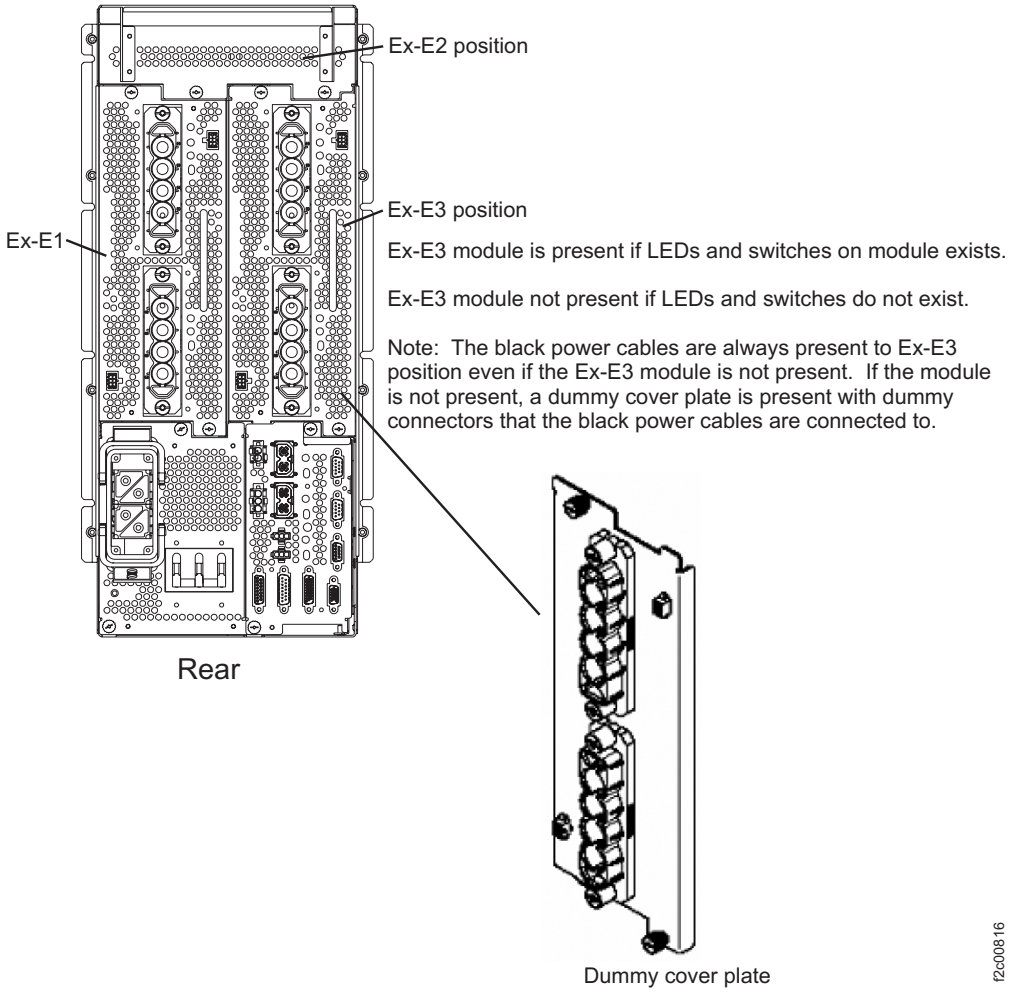


Figure 3. PPS module options

4. After the information is entered, click **OK** to continue.
5. The CEC enclosures will automatically power off. You will be sent back here to continue with the next step.
6. Continue with "Positioning and cabling the rack."

Positioning and cabling the rack

Use the following topics to position and cable the rack.

Removing right end and left rear covers from Rack-1

1. Observe the right end cover (viewed from the front) of Rack-1 to determine which version you have.
   - Older version has two cover retaining brackets as shown in Figure 4 on page 12. Go to the next step.
   - Newer version does not have the two cover retaining brackets as shown in Figure 4 on page 12. Go to step 3 on page 13.
2. Remove the old version of the front right end cover from the rack that the new rack will be installed to as shown in Figure 4 on page 12 and Figure 5 on page 12. Pull the cover near the top sides to release it from the top "hook and loop"

fasteners. Then pull lower down on each side of the cover to release it from the lower "hook and loop" fasteners. Failure to do this may bend the cover.

a. Release the two cover retaining brackets (pull them downward). See Figure 4. The cover is still secured to the frame by multiple "hook and loop" fasteners along each side of the cover.

   Note: Failure to follow the instructions in the following steps might result in a bent cover.

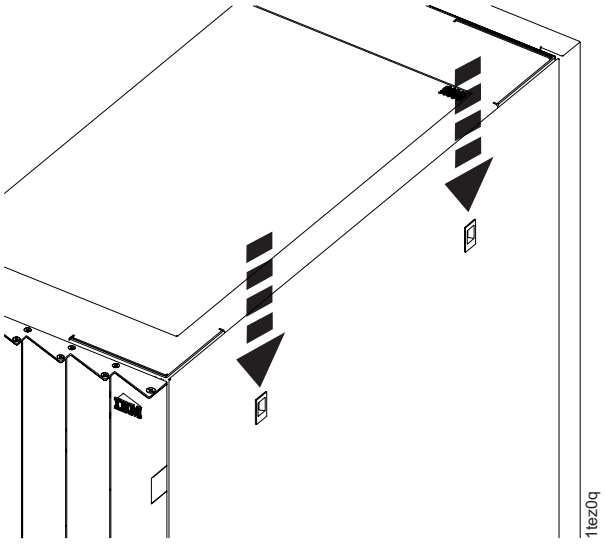


Figure 4. Disengaging the end cover

Attention: Pull lower down on each side of the cover to release it from the lower "hook and loop" fasteners. Failure to do this may bend the cover.

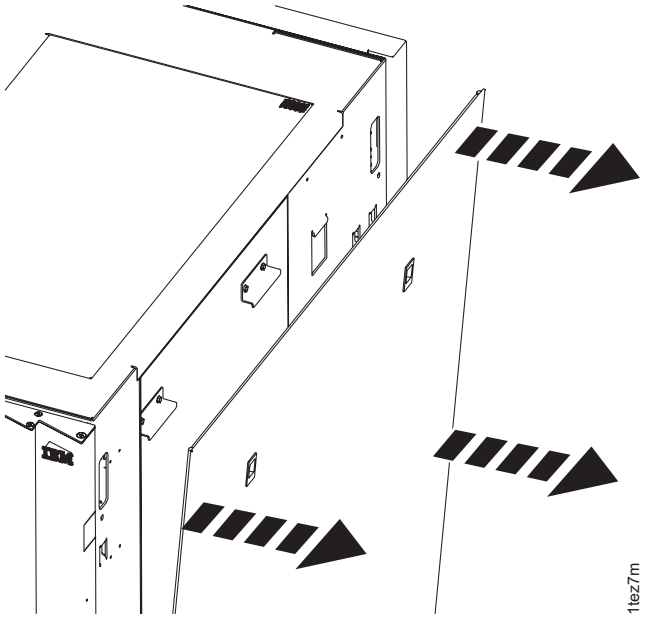


Figure 5. Removing the end cover

b. Pull the upper corners of the cover away from the rack to release the upper “hook and loop” fasteners and apply even pressure working your way down the sides. See Figure 5 on page 12.

c. Further down, pull each side of the cover away from the rack to release the lower “hook and loop” fasteners and remove the cover.

d. Remove the two end cover catch brackets from the rack. They will be reinstalled on the new end rack later.

e. Go to step 4.

3. Remove the new version of the right end cover (viewed from the front) from Rack-1.

   a. Remove the two screws at the top of the end cover, they are not visible from the side of the rack. The cover is still secured to the frame by multiple “hook and loop” fasteners along each side of the cover.

      Note: Failure to follow the instructions in the following steps might result in a bent cover.

      Attention: Pull lower down on each side of the cover to release it from the lower ″hook and loop″ fasteners. Failure to do this may bend the cover.

   b. Pull the upper corners of the cover away from the rack to release the upper ″hook and loop″ fasteners and apply even pressure working your way down the sides. See Figure 5 on page 12.

   c. Further down, pull each side of the cover away from the rack to release the lower ″hook and loop″ fasteners and remove the cover.

   d. Go to the next step.

4. Remove the left rear cover from Rack-1. Refer to Figure 6.

   a. On the upper and lower door hinges, loosen the screw 1 and move the retention plate 2 that prevents the hinge pin 3 from being removed.

   b. Remove the hinge pins, remove the rear cover and place it in a safe location.

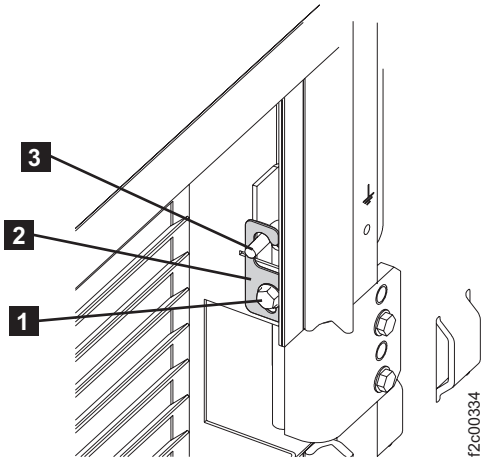


Figure 6. Removing rear left cover on Rack-1

5. Continue with “Checking for FC 1906 earthquake resistance kit” on page 14.

Checking for FC 1906 earthquake resistance kit

The earthquake resistance kit, Feature Code 1906, provides additional hardware to be installed. The kit stiffens the rack from flexing and also ties the rack directly to the concrete floor. The kit can be installed on a raised floor or non-raised floor.

- If the rack is new from IBM, the MES hardware kit for FC 1906 would be shipped with the rack.
- If the rack has been discontinued from another account, and the earthquake resistance kit was originally installed there, the kit would have been removed and shipped separately.

  The original kit included parts to tie-down the rack to a non-raised floor, a low raised floor, and a high raised floor. Parts not used at the original installation may not have been kept and shipped. If you are installing on a different floor type than the original floor type, you may not have all the necessary parts. Call the next level of support.

Important: If FC 1906 is to be installed, the base rack and any attached expansion racks must all have FC 1906 installed.

1. Is the Earthquake Resistance Kit Feature (FC 1906) to be installed on this storage facility?
   - Yes, go to Chapter 4, "Installing the earthquake resistance kit feature FC 1906," on page 119, then return here and continue at the next step.
   - No, continue with the next step.
2. Continue with "Positioning the storage expansion rack."

Positioning the storage expansion rack

If you have questions about floor loading and service clearances of the DS8000 racks, review the Site Requirements for the DS8000 section in the *IBM System Storage DS8000 Introduction and Planning Guide* which is available on the *IBM System Storage DS8000 series Service Documents CDROM*.

1. View the rack number label to determine the rack location. See Figure 7 for the location of the rack number label.

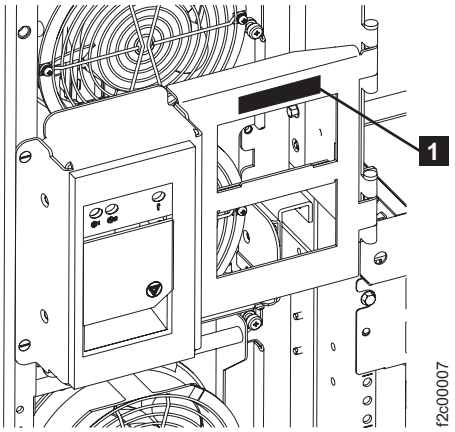


Figure 7. Rack operator panel label

2. Facing the front of Rack-1, all additional expansion racks will be installed to the right. Move the storage expansion rack into position approximately 3″ (75mm) from the existing rack.

3. Ensure the rack operator panel UEPO switch clear access cover is present. Some racks may be shipped with the cover removed and stored in a plastic bag in the document enclosure above the rack operator panel. The cover pivots on two small tabs at the top of the cover. To install the cover engage the left side tab **1** , push the cover gently to the right and then engage the right tab **2** . See Figure 8.

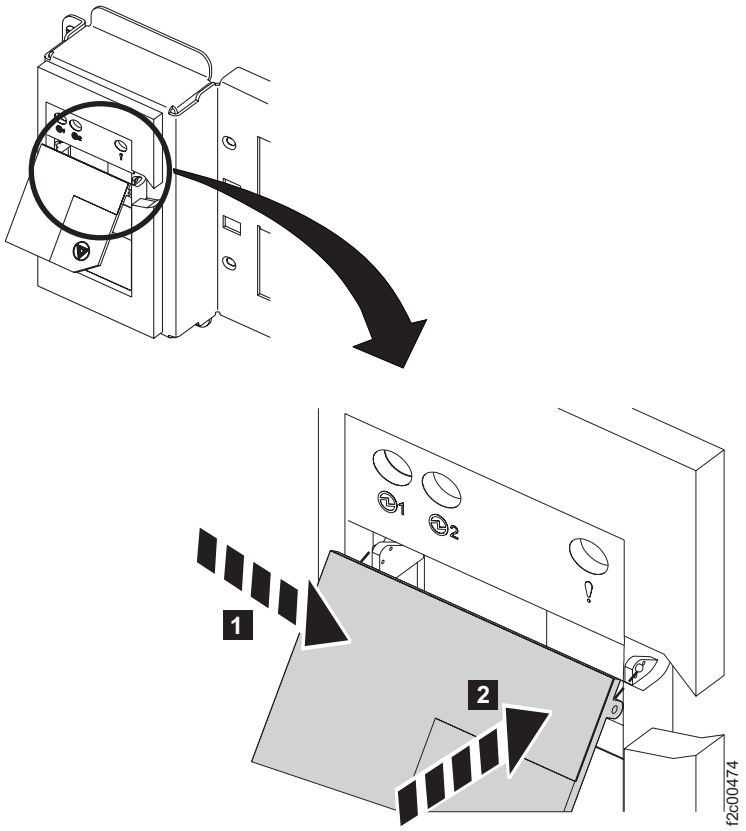


Figure 8. UEPO cover

4. Locate 4 x spacer studs P/N 22R5046, 7 x spacer mounting bolts P/N 1621545, and 7 x M8 washers P/N 84X5850 in the ship group.
5. Install the bottom spacer stud at the rear of the existing rack (Rack 1 or the storage expansion rack that is already installed).
   a. Refer to Figure 9 on page 16. Install a spacer stud **3** in the lower rear left corner of the rack using a mounting bolt **1** and a washer **2** . Leave the bolt loose so that it will be easier to align the spacer stud with the bolt from the new frame.

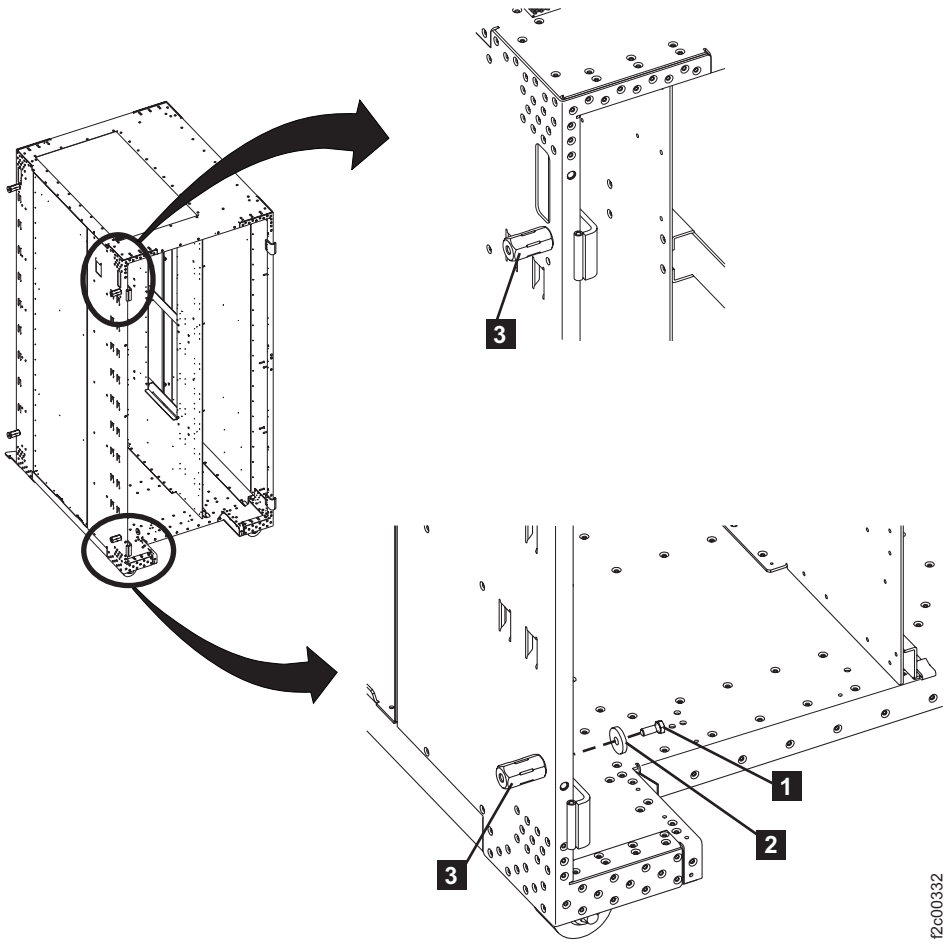


Figure 9. Interrack spacer studs

6. Determine the part number (P/N) of the interrack decorative side covers in your ship group. The P/N is printed near the middle of each side cover. There are two side covers and one top cover in the long narrow shipping box.
   - P/N 22R0786 (original version) go to step 7.
   - P/N 22R4964 (new version) go to step 8.
7. In the upper rear left corner of the existing rack, next to the hinge are two holes, one above the other. Use the upper hole and install a spacer stud **3** using a mounting bolt **1** and a washer **2**, see Figure 9. Do not tighten the bolt fully as some alignment will be needed. You can hold the side cover next to the spacer studs to ensure the spring clips align properly before going to step 9 on page 17.

   Note: On early frames, it may be necessary to remove the rear left top hinge and spacer plate to allow the mounting bolt to be inserted. Reinstall the hinge and plate when the bolt has been tightened.
8. In the upper rear left corner of the existing rack, next to the hinge, there are two holes; one above the other. Use the lower hole and install a spacer stud **3** using a mounting bolt **1** and a washer **2**, see Figure 9. **Do not** tighten the bolt fully as some alignment will be needed. You can hold the side cover next to the spacer studs to ensure the spring clips align properly before going to step 9 on page 17.

Note: On early frames, it may be necessary to remove the rear left top hinge and spacer plate to allow the mounting bolt to be inserted. Reinstall the hinge and plate when the bolt has been tightened.

9. On the rear of the storage expansion rack being installed, perform the following steps to remove the right cover.
   a. Open the rear left machine cover.
   b. Remove and retain the two screws **1** and open the rear right machine cover. Refer to Figure 10.

      Note: The screws must be reinstalled later to prevent non-service personnel from accessing a hazardous section of the machine.

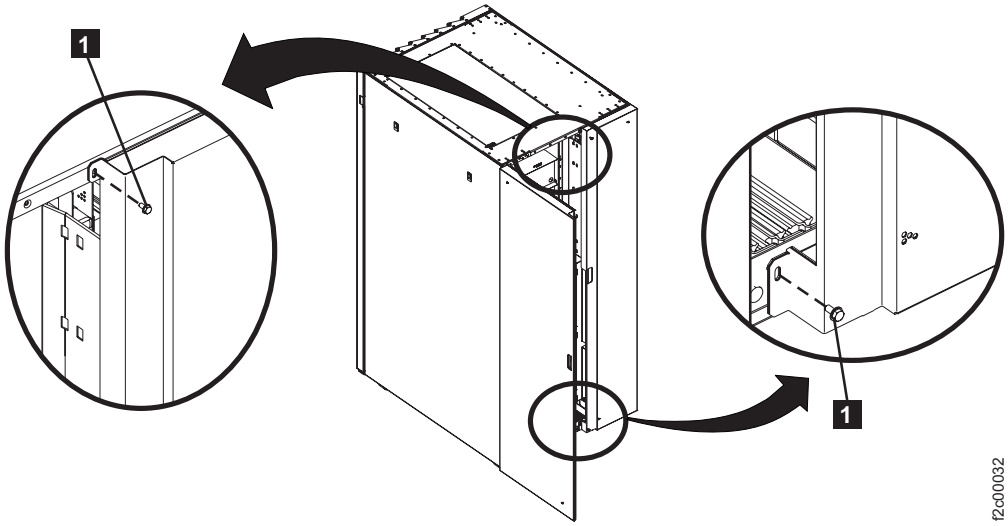


Figure 10. Removing retaining screws on right rear machine cover

   c. On the upper and lower door hinges, loosen the screw **1** and move the retention plate **2** that prevents the hinge pin **3** from being removed. Refer to Figure 11.
   d. Remove the hinge pins, remove the rear cover and place it in a safe location.

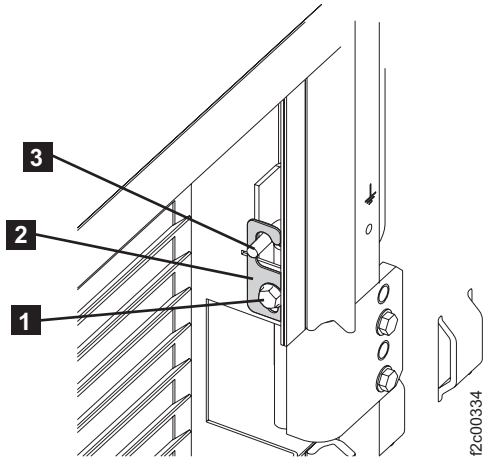


Figure 11. Removing rear left cover on Rack-1

10. Return to the front of the racks. Do not remove any front covers. Install 2 spacer studs on the front left of the storage expansion being installed.
    a. Install a spacer stud in the lower front left corner of the rack using a mounting bolt and a washer. **Do not** tighten the bolt fully as some alignment will be needed.
    b. Install a spacer stud in the upper front left corner of the rack using a mounting bolt and a washer. **If there are two frame holes near the hinge, use the same hole (upper or lower) as you did at the rear of the rack. Do not** tighten the bolt fully as some alignment will be needed.
11. Move the storage expansion rack being installed into its final position.
12. At the rear, secure the storage expansion rack being installed to the existing rack using one bolt and washer in the upper position only. The bolt is screwed into the spacer stud previously installed. Do not tighten the bolt fully.

    Note: It is not possible to install the bolt at the bottom of the rack because the 208VDC bus bars block access.
13. At the front, insert two bolts and washers from the left rack and screw into the spacer studs previously installed in the right rack. When the alignment is correct, tighten all the bolts that have been installed.
14. Install the wedge chocks **1** (located in the ship group) on all four casters. If caster locks are available, engage the caster locks on all casters. Refer to Figure 12.

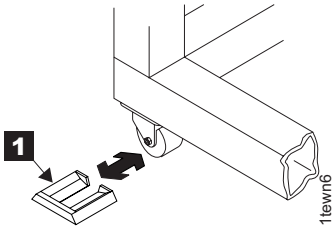


Figure 12. Wedge chocks

15. Continue at the next section.

Reinstalling the right end cover on the right-most rack

The right end cover was previously removed in the task “Removing the right end cover from the existing rack”.

1. Which version of the Rack-1 end cover do you have?
   - Old version has two cover retaining brackets. Go to the next step.
   - New version has two screws at the top of the cover. Go to step 3.
2. Install the two cover catch brackets from Rack 1 on the expansion rack. Install the right end cover (removed earlier) on the expansion rack, then go to step 4.

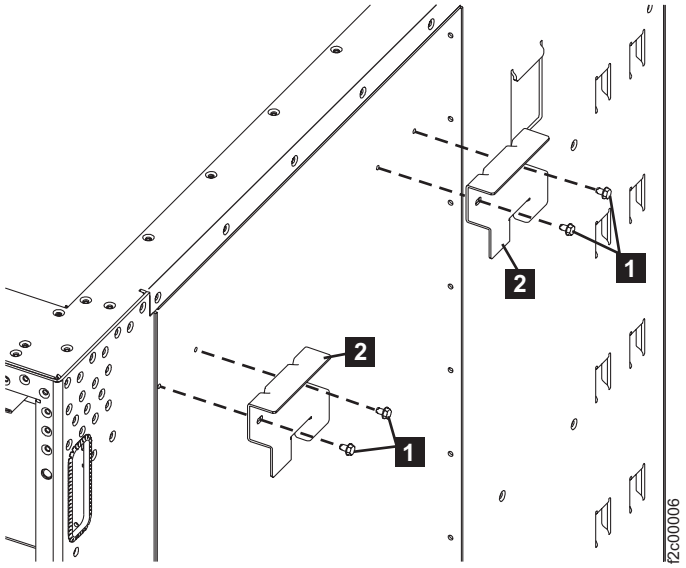


Figure 13. Removing/replacing right end cover

3. Does the expansion rack have the two screw holes in the top of the rack for the right end cover?
   - Yes, install the right end cover (removed earlier) on the expansion rack securing it with the two top screws.
   - No, call the next level of support. You will need to order the old version right end cover, retaining brackets and screws. Continue the installation without the right end cover.
4. Continue at the next section.

Checking for weight reduction feature

The weight reduction feature removes storage enclosures and/or battery modules to reduce the total rack weight. These parts are then shipped on a separate pallet and must be reinstalled.

1. Was the weight reduction feature (FC 0200) ordered for this storage expansion rack?

   Note: If FC 0200 was ordered, the storage enclosures will have been removed in manufacturing and shipped separately.

   - Yes, go to Chapter 3, "Installing hardware removed by weight reduction feature FC 0200," on page 111. Return here and continue when the storage enclosures have been reinstalled.
   - No, continue with the next step.
2. Continue with "Disconnecting some FC-AL cables."

Disconnecting some FC-AL cables

Note: Some FC-AL cables must be disconnected to isolate each storage enclosure. If these cables are left connected, in later steps the storage enclosures will be discovered too early in the installation process which may cause problems that require the next level of support. The storage enclosures will be physically cabled and logically installed one at a time.

1. **You must disconnect** all blue FC-AL cables connected to T3 and T4 connectors of both FCIC cards in each storage enclosure in the expansion rack being

installed, see Figure 14. Squeeze the top of the connector to release it. The cables will be reconnected in a later step.

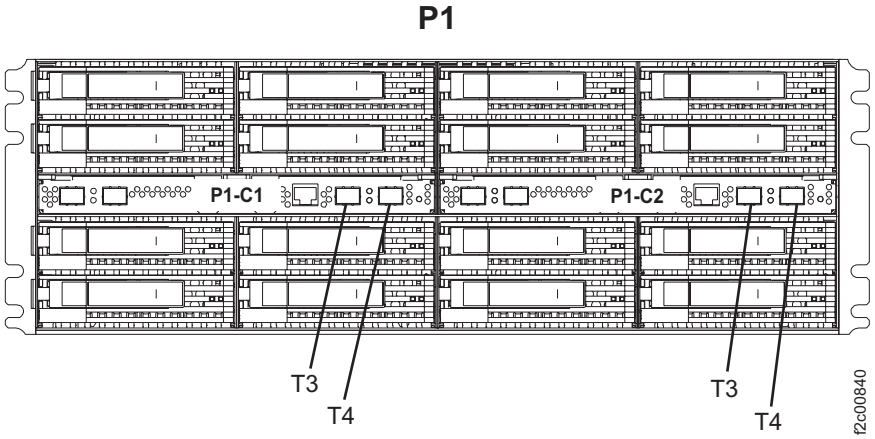


Figure 14. Storage enclosure connections

2. **You must disconnect** all blue FC-AL cables connected to the device adapter card connectors in the four I/O enclosures at the bottom of the expansion rack being installed. They will be reconnected in a later step.

   Refer to Figure 15 on page 21, the I/O enclosures are XI1, XI2, XI3, XI4.

   Figure 16 on page 21 shows the device adapter cards (T1, T2, T3, and T4) are in slot 3 or 6 of each I/O enclosure.

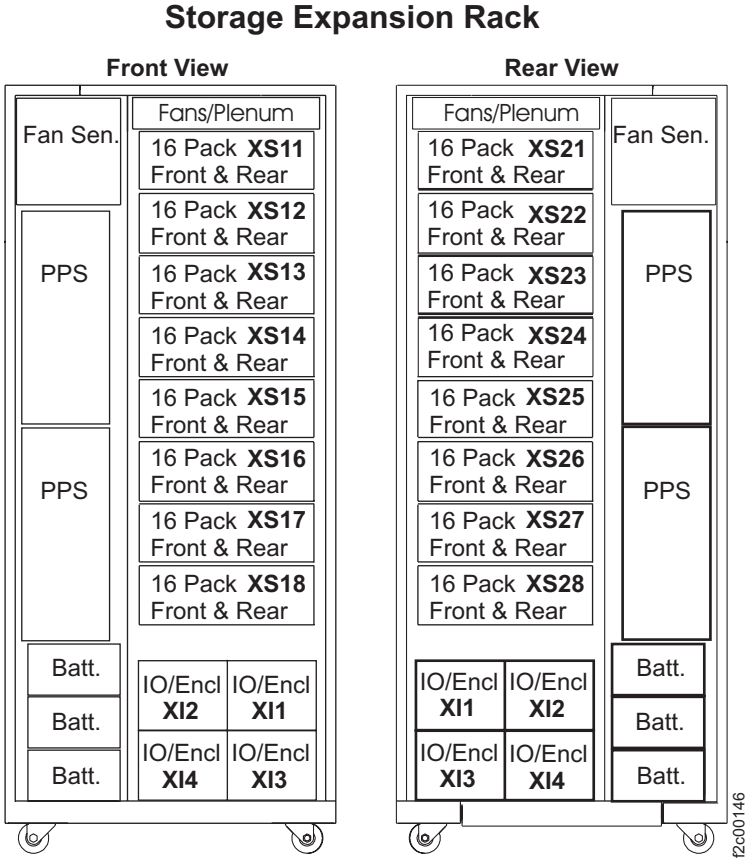


Figure 15. Storage expansion rack

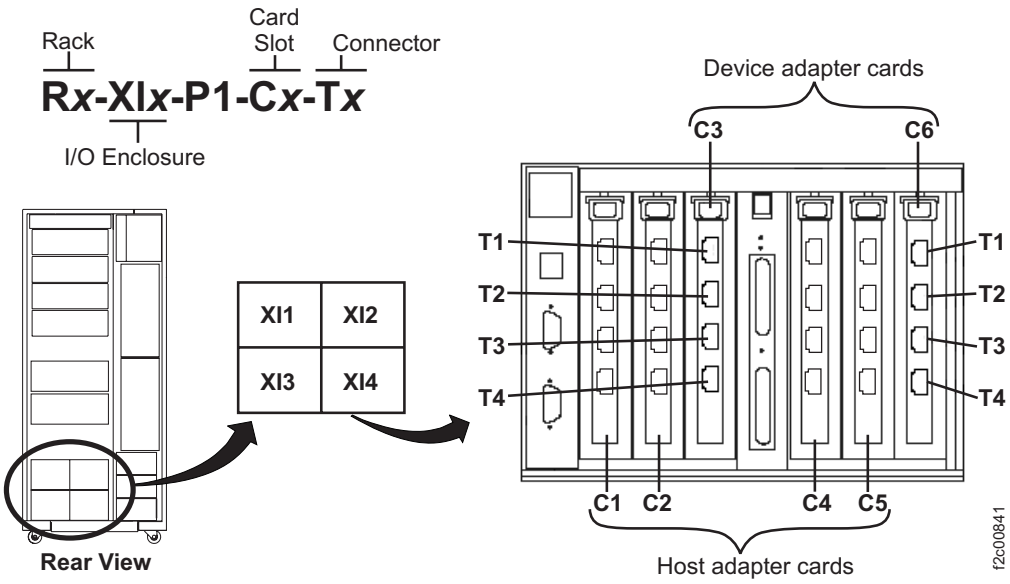


Figure 16. I/O enclosure locations (rear)

3. Continue with "Routing and connecting power control, RIO, and SPCN cables" on page 22.

Routing and connecting power control, RIO, and SPCN cables

DANGER

Electrical voltage and current from power, telephone, and communication cables are hazardous.

To avoid shock hazard:

- **Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.**
- **Connect all power cords to a properly wired and grounded electrical outlet. Ensure outlet supplies proper voltage and phase rotation according to the system rating plate.**
- **Connect any equipment that will be attached to this product to properly wired outlets.**
- **When possible, use one hand only to connect or disconnect signal cables.**
- **Never turn on any equipment when there is evidence of fire, water, or structural damage.**
- **Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.**
- **Connect and disconnect cables as described below when installing, moving, or opening covers on this product or attached devices.**

To disconnect:

1. **Turn everything OFF (unless instructed otherwise).**
2. **Remove power cords from the outlet.**
3. **Remove signal cables from connectors.**
4. **Remove all cables from devices.**

To connect:

1. **Turn everything OFF (unless instructed otherwise).**
2. **Attach all cables to devices.**
3. **Attach signal cables to connectors.**
4. **Attach power cords to outlet.**
5. **Turn device ON.**

(D005)

1. There are two versions of the Air baffle, determine which one you have:
   - Early version - one piece of sheet metal that must be removed before the 208VDC bus bar gate to the right of the baffle can be swung to the open position. Go to the next step.
   - Later version - sheet metal with a flexible plastic cutout at the right rear (see **3** in the figure that follows). The plastic cutout bends out of the way when the 208VDC bus bar gate is swung open. Go to step 3 on page 23.
2. Remove the two screws **1** and take out the Air baffle **2**. Retain the parts for later re-installation.

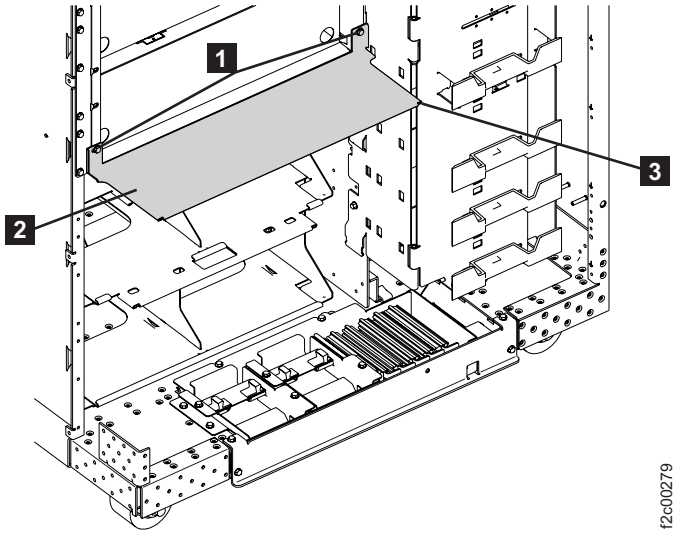


Figure 17. Air baffle

3. Remove the two screws **1** and pivot the 208VDC bus bar gate to the service position **2**, as shown in Figure 18.

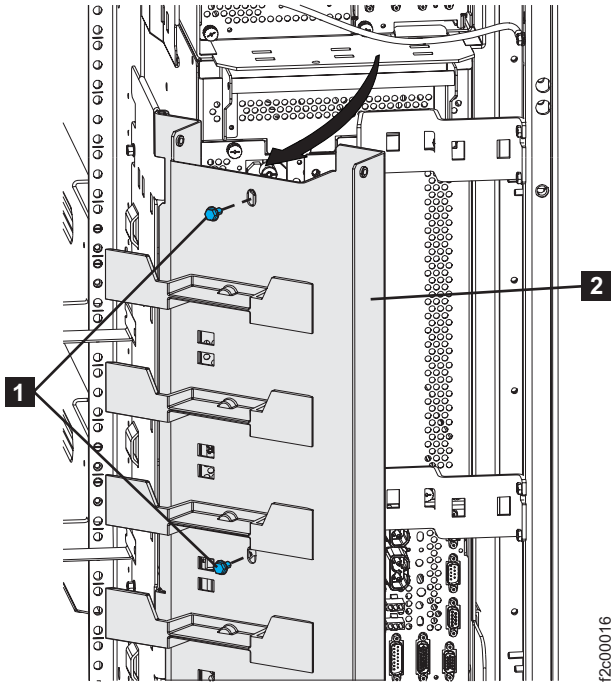


Figure 18. 208VDC bus bar gate service position

4. Remove the tailgate frame bracket. Remove two screws **2** as shown in Figure 19 on page 24. Loosen but do not remove the two top screws **1**. Slide the bracket out.

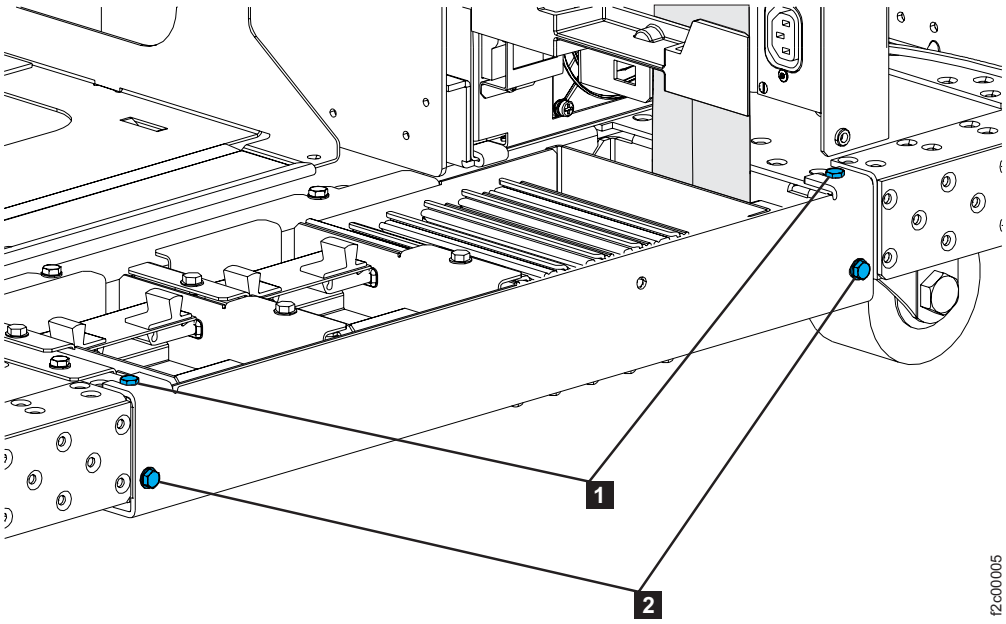


Figure 19. Tailgate frame bracket

5. Locate the two power control cables that are coiled in the top right rear of the expansion rack.
6. Route but do not connect the expansion rack power control cables to the RPC cards.
   a. Route the power control cables through the hole at the top rear right side to the RPC cards in Rack-1.

      If this rack is *not* Rack-2, the cables will need to be routed through all the intermediate racks between this one and Rack 1.

      Note: On early production racks, the cables may be labeled with "Base Rack". On later production racks, they will be labeled with"Rack 1".
7. Connect the power control cables into the RPC connector as indicated in Table 4 and Figure 20 on page 25.

   Note: On some early production storage expansion racks, the cables were labeled "RPC-0" and "RPC-1".

   The cable labeled "RPC-0" must be connected to RPC1.

   The cable labeled "RPC-1" must be connected to RPC2.

   Important: Do not cross the cables between the RPC cards. This could result in an unscheduled power drop during repair activities. If the RPC number labeling is not clear, trace the cables back to the PPS.
   - The cable to RPC1 originates from connector J1 on both PPSs.
   - The cable to RPC2 originates from connector J2 on both PPSs.
   - Some cables are color coded. Later versions may have a gray label for RPC1 and a yellow label for RPC2.

Table 4. Rack numbers and RPC connector locations

Rack Number being installed	2	3	4	5	6	7
RPC 1 and RPC 2 connector	J203	J205	J207	J209	J211	J213

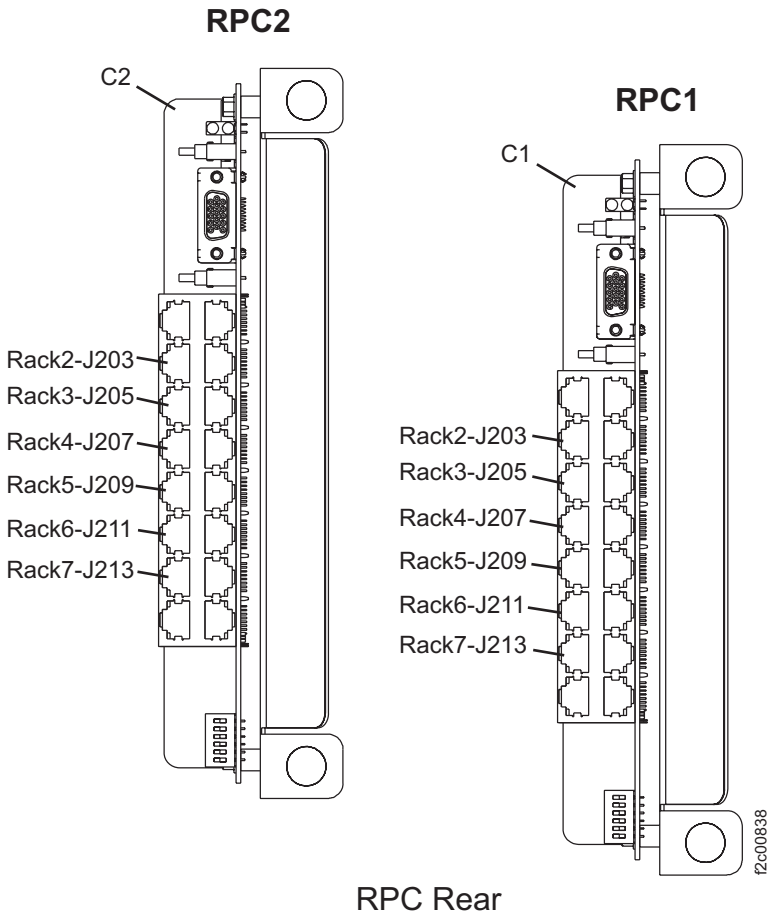


Figure 20. RPC card locations

8. Prepare the tailgate in the new and existing racks.
   a. For the earlier version of the tailgate design, remove the cable retention clamps **3**, as appropriate. Do this by removing the screws **1** from the underside and releasing the retention pins **2**. See Figure 21 on page 26.

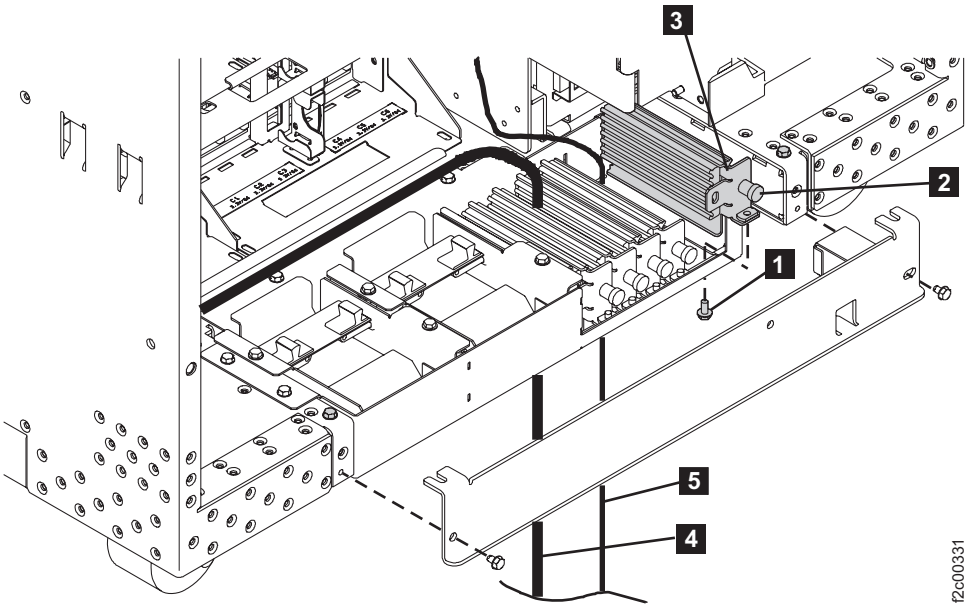


Figure 21. RIO & SPCN cable (remove or install)

b. For the later version tailgate design (4 cable slots to the left and 2 cable slots to the right), no additional preparation is needed.

9. This step shows an overview of the rack to rack routing of the RIO and SPCN cables. Do not route or connect the cables until directed in later steps.

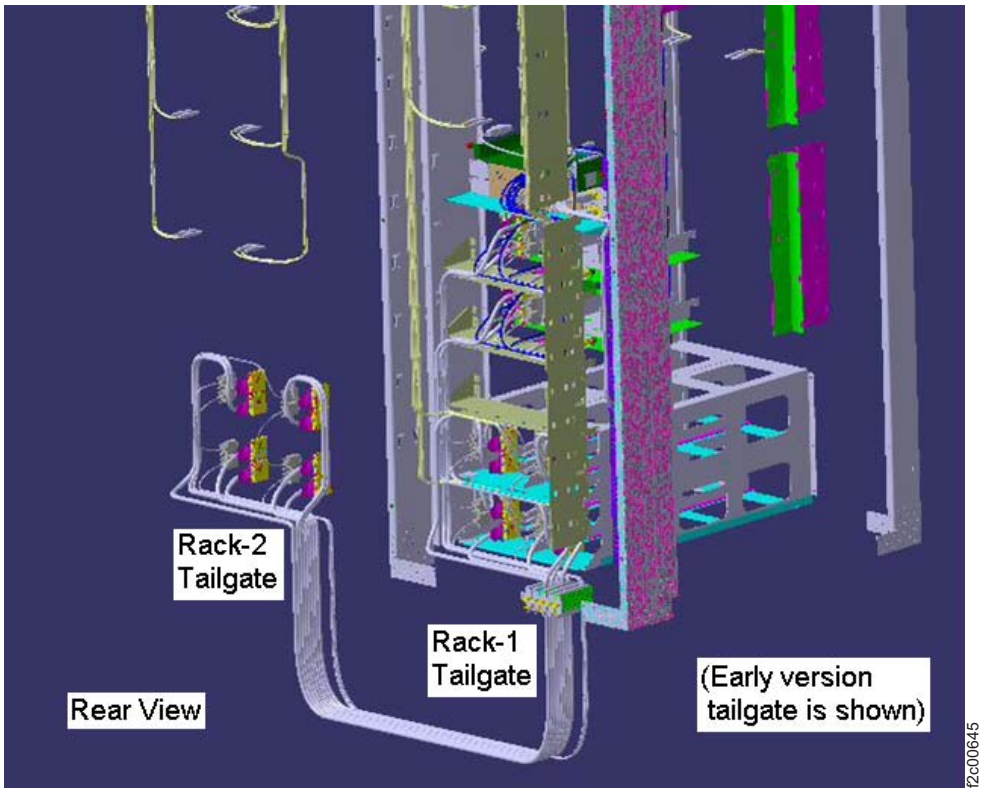


Figure 22. Mechanical routing of the RIO and SPCN cables (rack-to-rack)

- On a raised floor, the cables are routed down through the tile cutouts and underneath the floor.
- On a non-raised floor, the cables are routed beneath the racks.

10. Locate the thick black RIO cables that will be coiled near the tailgate and uncoil them. Locate the destination labels that are attached to the cables and identify which rack and I/O enclosure the cables need to be routed to. Refer to Figure 23.

    Note: On early production racks the cables may be labeled with "Base Rack" or "Expansion Rack". On later production racks they will be labeled with the Rack number.

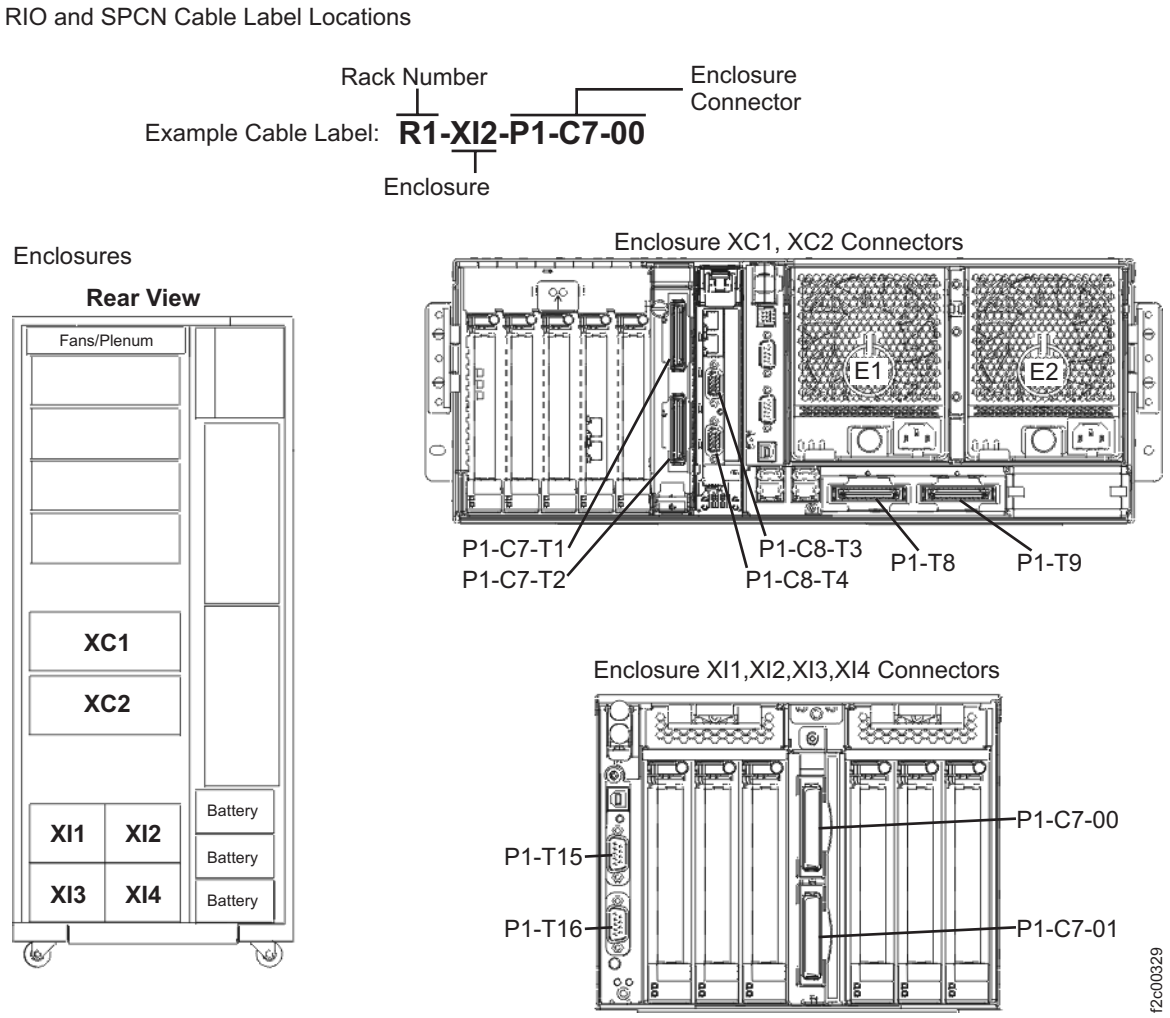


Figure 23. RIO and SPCN cable label locations

11. Route the RIO cables, but do not connect them.

    For cable routing inside of the rack, see Figure 24 on page 28.

    a. If you have the earlier version of the tailgate (all 5 cable slots to right of the tailgate), route all RIO cables through slot 3. See Figure 24 on page 28.

    b. If you have the later version of the tailgate (4 cable slots to the left and 2 cable slots to the right), route the RIO cables as follows:

        1) Route the RIO cables for the left side of the rack through the tailgate slot 1. See Figure 25 on page 29

2) Route the RIO cables for the right side of the rack through the tailgate slot 6. See Figure 25 on page 29.

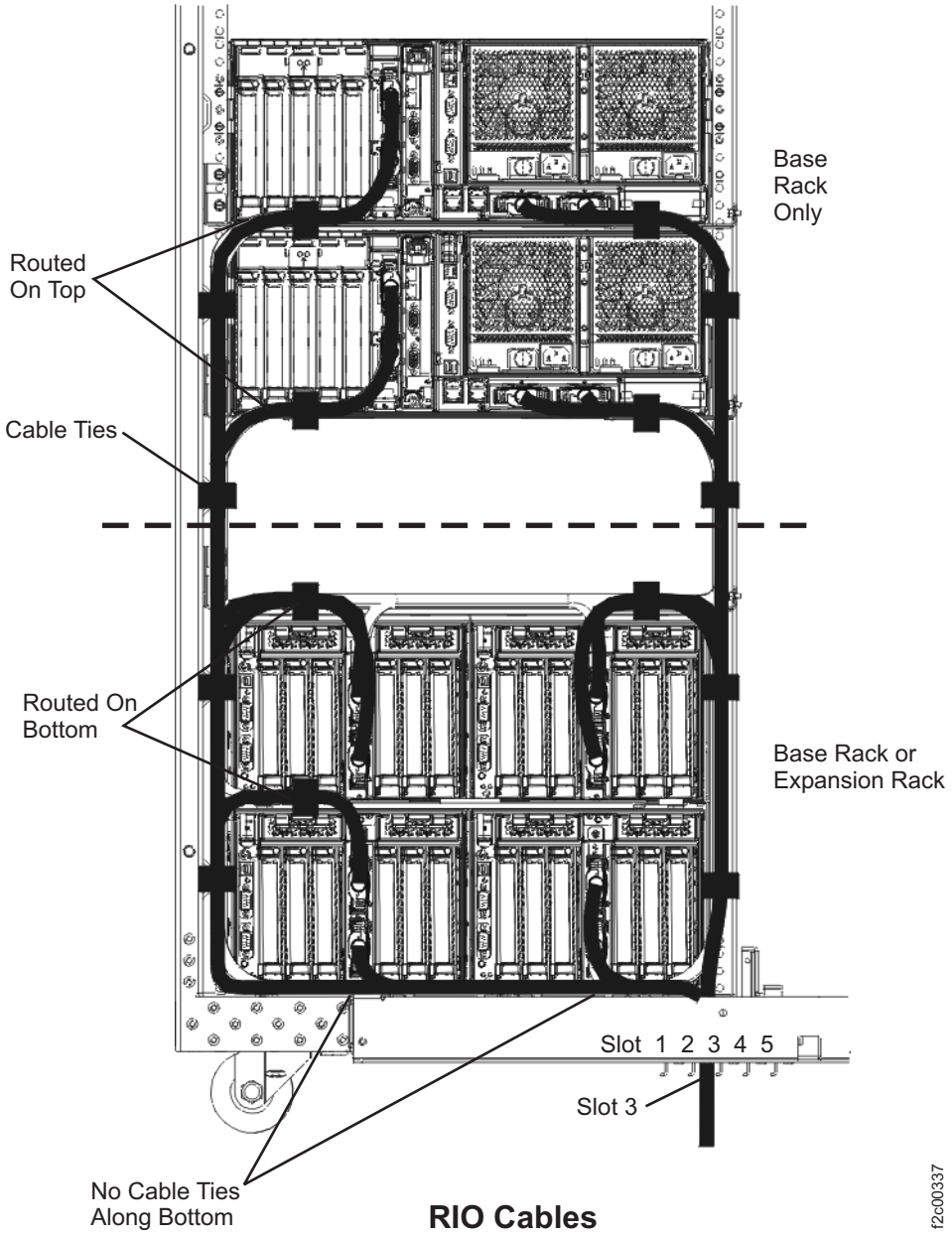


Figure 24. RIO cable routing (early version tailgate)

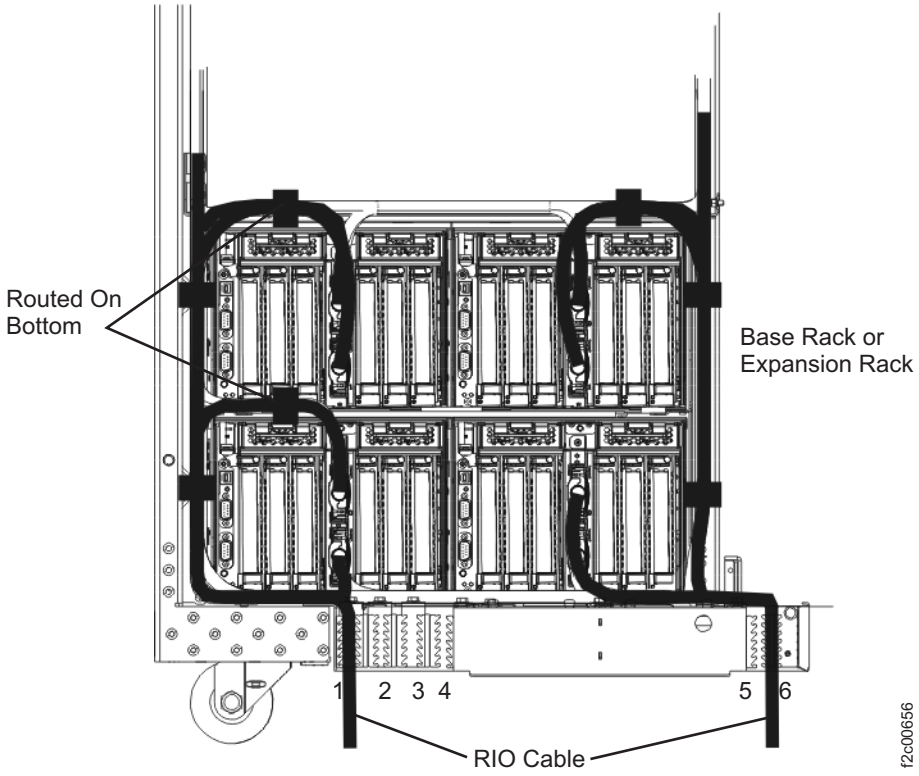


Figure 25. RIO cable routing through the tailgate (later version tailgate)

12. Locate the thin brown SPCN cables that will be coiled near the tailgate and uncoil them. Locate the destination labels that are attached to the cables and identify to which rack and I/O enclosure the cables need to be routed.

    Note: On early production racks the cables may be labeled with "Base Rack" or "Expansion Rack". On later production racks they will be labeled with the Rack number.

13. Route the SPCN cables, but do not connect them.

    For cable routing inside of the rack, see Figure 26 on page 30.

    a. If you have the earlier version of the tailgate (all five cable slots on the right end of the tailgate), route all of the SPCN cables through the tailgate slot 5. See Figure 26 on page 30.

    b. If you have the later version of the tailgate (four cable slots on the left and two cable slots on the right), route the SPCN cables as follows:

        1) Route the SPCN cables for the left side of the rack through the tailgate slot 2. See Figure 27 on page 31.

        2) Route the SPCN cables for the right side of the rack through the tailgate slot 5. See Figure 27 on page 31

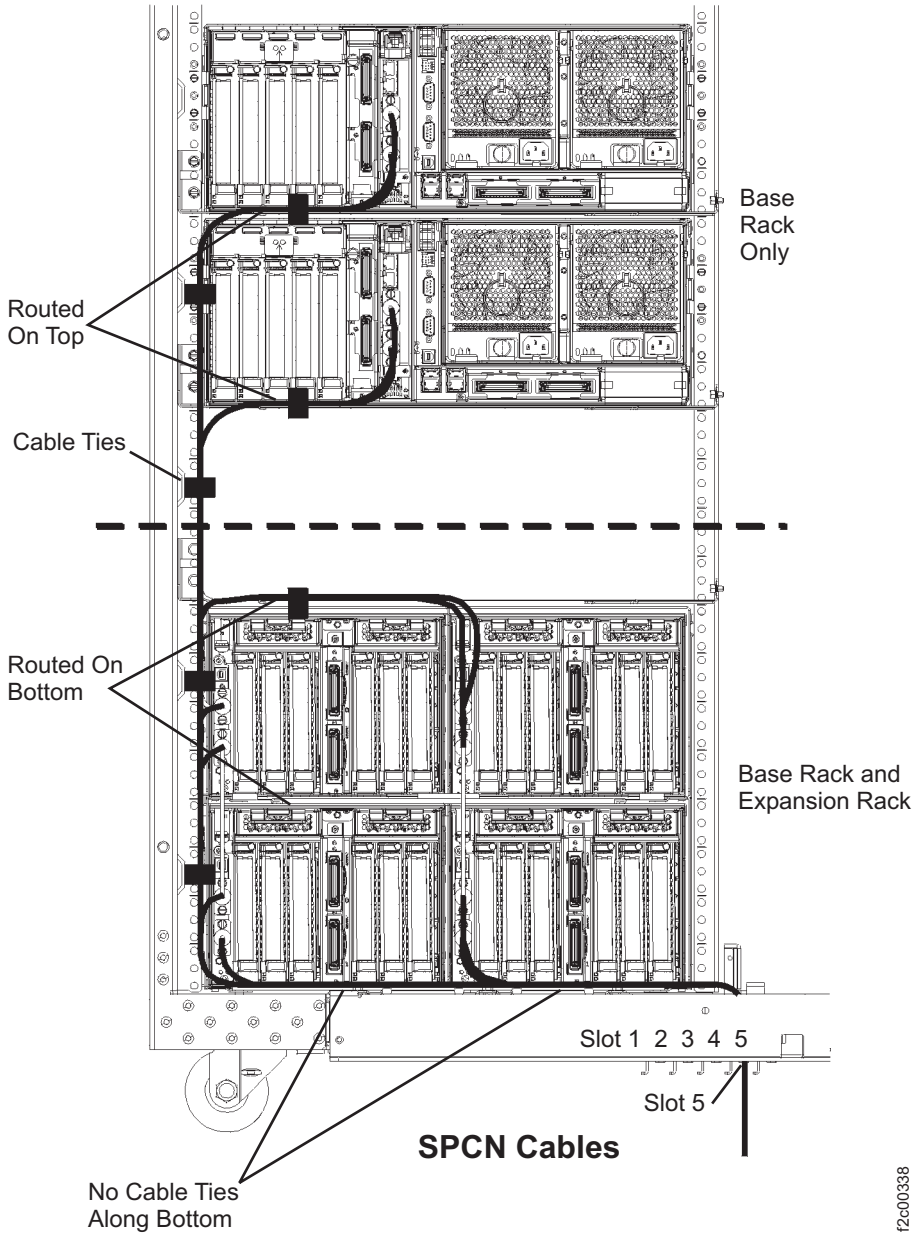


Figure 26. SPCN cable routing (early version of tailgate)

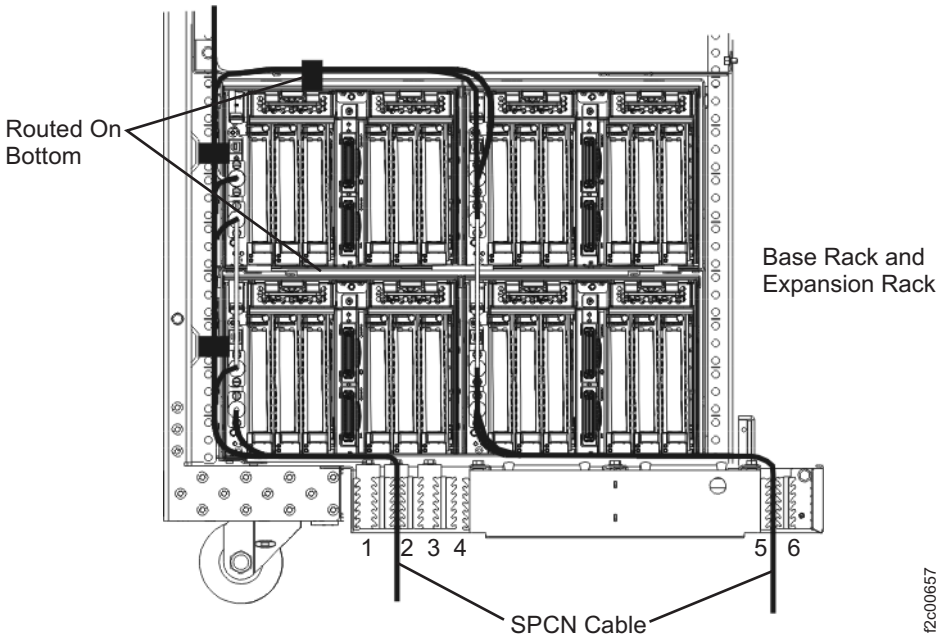


Figure 27. SPCN cable routing through the tailgate (later version tailgate)

14. This step has you connect each expansion rack RIO and SPCN cable to the connector location specified on the destination label. The cables will be connected one at a time to ensure they are not cross connected.
    a. Read the destination label on the expansion rack cable that will be connected.
    b. Use Figure 23 on page 27 to find the location that the expansion rack cable will be connected to.
    c. Read the destination label on the existing cable that will be disconnected so the expansion rack cable can be connected in its place.
    d. Ensure that the destination label location code on the existing cable and the expansion rack cable are the same.
    e. Unfasten the cable retention straps and disconnect the existing cable from the connector.

       Note: To disconnect a RIO cable, gently push in on the RIO cable, then gently pull the blue release handle towards you, and then pull the cable connector free of the sheet metal guide bracket.
    f. Connect the expansion rack cable.
    g. Repeat the previous steps for *each* RIO and SPCN cable.

       After all cables have been connected, continue with the next step.
    h. Both ends of each cable were disconnected in the previous steps. You must now remove those cables and store them above the I/O enclosures in the base rack. The cables can also be stored in the document enclosure at the front upper left of the rack. The cables will be reinstalled if the expansion rack is ever removed.
    i. Fasten the cable retention straps.
15. Reinstall the tailgate cable retention clamps to secure the RIO and SPCN cables in the tailgate.
16. Continue with "Installing the interrack decorative covers kit" on page 32.

Installing the interrack decorative covers kit

1. Locate the interrack decorative covers kit. It contains two side interrack covers and one top interrack cover. There are two versions of the interrack decorative covers kit.
   - Early version - the covers are packaged in a long narrow cardboard box normally taped to the expansion rack. The side interrack covers are one piece. Go to step 3.
   - Later version - the covers are packaged in the large ship group box. Each side interrack cover is in two pieces that are hinged together. Go to the next step.
2. Assemble each of the side interrack covers as follows:
   a. Open the hinged side interrack cover **1** so that it is straight. See the following figure.
   b. Loosen the two nuts **2** on the threaded studs next to the hinge points.
   c. Slide the plate **3** so that it engages both studs.
   d. Tighten both nuts.

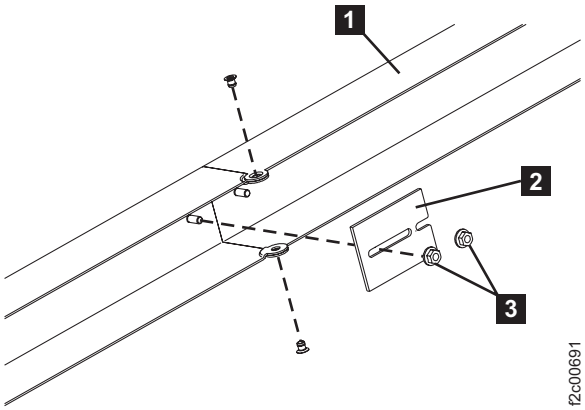


Figure 28. Assembling the later version of the interrack decorative side covers

3. Install each of the two interrack side covers **1** by pushing the cover into place over the interrack spacing studs. Take care not to interfere with any interrack cables. See Figure 29 on page 33.
4. Install the top interrack cover **2** by pressing it down squarely. The spring clips should hold the cover in place. See Figure 29 on page 33.

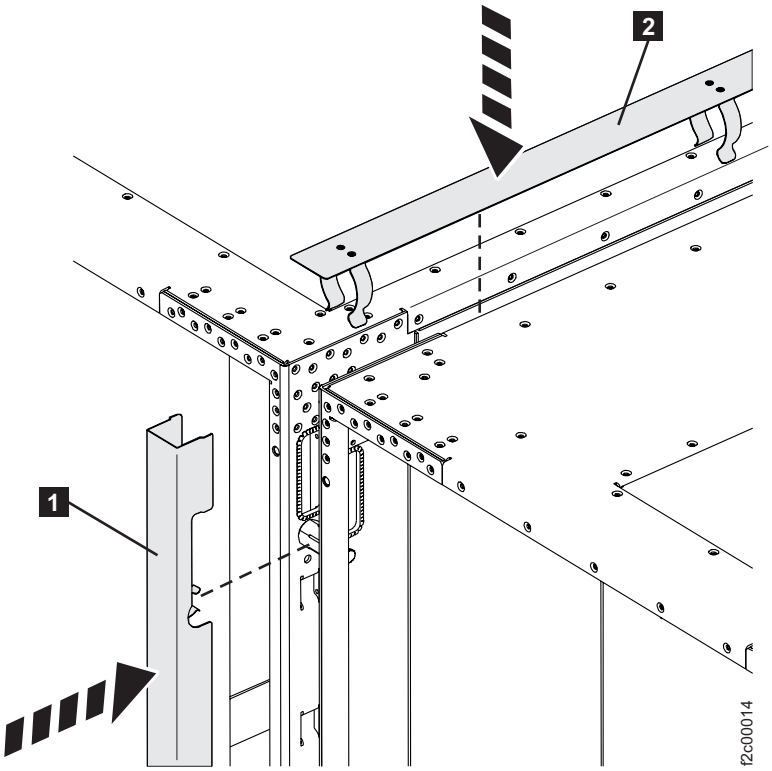


Figure 29. Installing the interrack decorative covers

5. Continue with "Performing the power and safety checks."

Performing the power and safety checks

Preparing to check DS8000 and customer power

DANGER

Lethal voltages are present in this area of the machine.

You will need the following tools to perform the power safety checks:

- For resistance checks, IBM analog ohmmeter P/N 00P7029 (Mastech Model 7040).
- For voltage checks, IBM digital multimeter P/N 8496278 (Fluke Model 179).
- For probing, high voltage test probe tips P/N 43L0951.

Note: Use listed P/N or equivalent approved by IBM.

Steps

1. Read the Danger notice and requirements above.
2. Continue with "Routing the mainline power cables."

Routing the mainline power cables

1. Uncoil the mainline power cables from the ship group.

2. The mainline power cable that connects to PPS-1 (upper) is longer than the mainline power cable that connects to PPS-2 (lower). Use the cable label and part number (P/N) to identify the longer cable.

Table 5. Cable label and part number

Feature Code	P/N of shorter cable	P/N of longer cable
1090 - 3 phase 60A non EMEA	22R1190	22R2222
1091 - 3 phase 60A EMEA	22R3794	22R3795
1092 - 3 phase 60A Japan	22R1191	22R2224
1093 - 3 phase 60A Chicago	22R1188	22R1189

3. Ensure the 208VDC bus bar gate **4** is in the open position. Refer to Figure 30 on page 35.
4. Route and connect the mainline power cables. Refer to Figure 30 on page 35 to complete the following steps:
   a. Route the longer mainline power cable up through the tailgate as shown and connect it to PPS-1 (upper).
   b. Route the cable in between the 5/12V DDM "Y " power cables that connect the PPS-2 (lower) to the 5/12V bus bars as shown.

      Note: To make this easier, you can temporarily disconnect the right most connectors of the "Y" cables by removing the 4 screws **2** and moving the power cable **1** out of the way. The screws are not captive, so do not let them fall when they are removed.
   c. Use a "hook and loop" fastener cable tie to fasten the upper cable to the bracket **3** .
   d. Route the shorter mainline power cable up through the tailgate as shown and connect it to PPS-2 (lower).

   Notes:
   - If this is on a raised floor, route the cables down through the floor cutout and near the customer power connectors.
   - If this is not on a raised floor, route the cables underneath the frame behind the rear caster so they exit to the side. The cables must not exit the rack in the front or rear service areas.

   CAUTION:
   Do not connect the mainline power cables to customer power until instructed to do so.

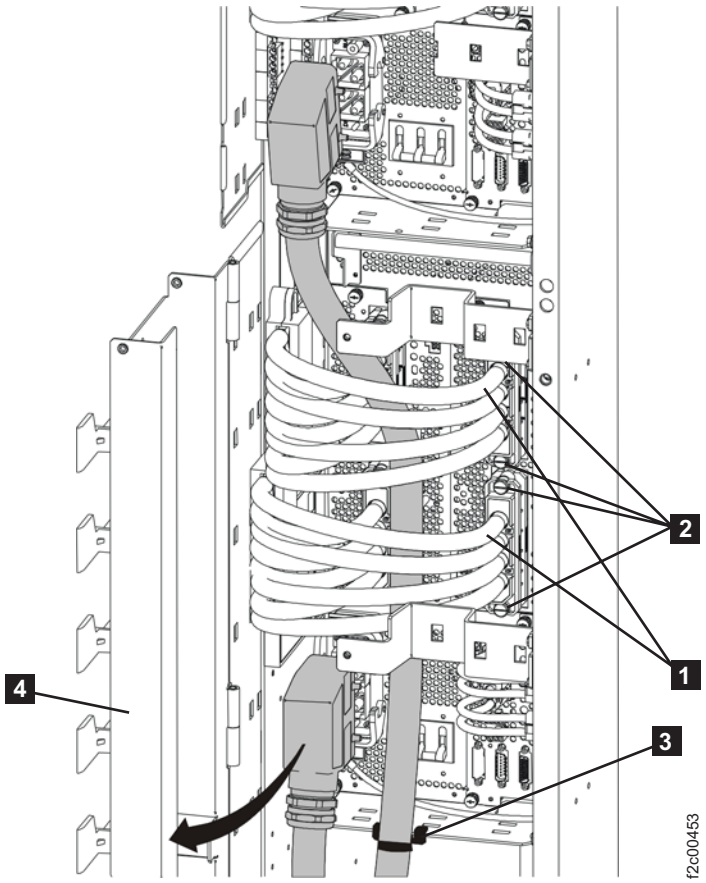


Figure 30. Routing the mainline power cables

Determining mainline power cable type (plug in or wired)

1. Locate the customer end of the mainline power cables from all the DS8000 frames that you are installing.
2. Determine if the customer end of the mainline power cables are for plug- in or wired installations.
   - Plug-in: The mainline power cable has a plug at both ends. Go to "Checking customer power for a plug-in mainline power cable."
   - Wired: The mainline power cable has a plug at one end and loose wires at the other end. Go to "Checking customer power for a ″wired″ mainline power cable" on page 39.

Checking customer power for a plug-in mainline power cable

Repeat the following sections for both mainline power cables in each rack being installed.

Checking power system ground continuity and voltage (plug in)

Attention: Use an IBM-approved analog multimeter. Do not use a digital meter.

1. Switch off the customer circuit breaker that supplies AC voltage to the mainline power cables.

CAUTION:
Do not connect the mainline power cables until instructed to do so.

2. **Attention:** Attach a "Do Not Operate" tag (S229-0237) and the safety lockout padlock to each customer circuit breaker that was switched off.
3. Verify the MAIN LINE circuit breaker **1** (CB00) on the rear of each primary power supply is set to Off (down). Refer to Figure 31.

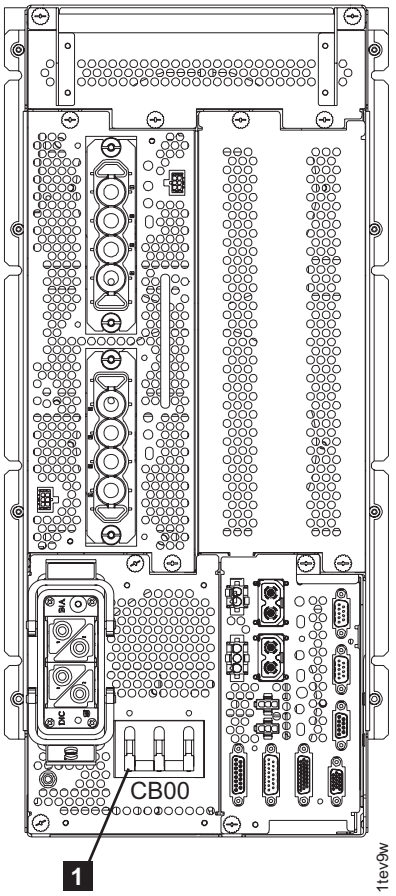


Figure 31. Rear view of PPS showing CB00

4. Verify the DS8000 mainline power cables are not connected to the customer power.
5. Prepare the multimeter to measure 0.1 ohm or less resistance. Place one lead of the multimeter on the ground pin of the male plug on the mainline power cable. Place the other lead on the conductive metal of its primary power supply enclosure. Refer to Figure 32 on page 37 for the location of the ground pin. Do this for each mainline power cable.

   Is there more than 0.1 ohm of resistance?

   - Yes, go to MAP2330 Repair rack ground continuity. To display the MAP, open the service Information Center on the management console, then open the **Isolation MAPs and Symbolic FRU procedures** section to locate the MAP.
   - No, go to "Checking customer receptacle ground pin continuity with customer CB off (plug-in)" on page 37.

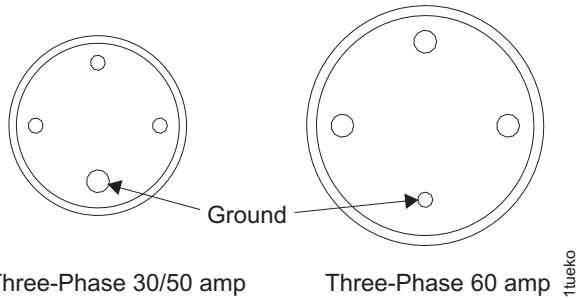


Figure 32. Three-phase amp

Checking customer receptacle ground pin continuity with customer CB off (plug-in)

1. Prepare the multimeter to measure 1.0 V ac or less. Measure the voltage at the customer's AC power outlet between the ground pin and the building ground.

   Is the voltage less than 1.0 V ac?

   - Yes, go to step 3.
   - No, continue with the following step.
2. Voltage is present at a customer outlet with the customer circuit breakers off.

   DANGER

   Inform the customer that, even though the circuit breaker is off, voltage higher than 1.0 V ac is measured at the failing customer voltage outlet pins. Do not continue until the voltage is less than 1.0 V ac. (1003)
3. Prepare the multimeter to measure 1.0 ohm or less of resistance.
4. Measure the resistance between the customer AC power outlet ground pin and the building ground. Refer to Figure 33 for the location of the ground pin.

   Is the resistance 1.0 ohm or less?

   - Yes, continue with "Checking customer receptacle voltage pins with customer CB off (plug in)" on page 38.
   - No, inform the customer. **Do not continue until the resistance is 1.0 ohm or less.**

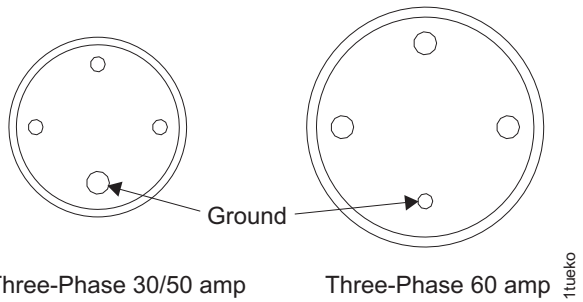


Figure 33. Three-phase amp

Checking customer receptacle voltage pins with customer CB off (plug in)

Prepare the multimeter to measure 1.0 V ac or less. Measure the voltage between each pair of voltage pins (**A**, **B**, and **C**) on the customer outlet. Also, measure the voltage between each voltage pin and ground pin on the customer outlet. Did any voltage measure more than 1.0 V ac? Refer to Figure 34 for the location of the voltage pins.

- Yes, inform the customer that one or more voltage pins on the customer receptacle measured greater than 1.0 V ac even though the circuit breaker is off. **Do not continue until the voltage is less than 1.0 V ac.**
- No, continue with the next task, "Checking customer receptacle voltage pins with customer CB on (plug in)."

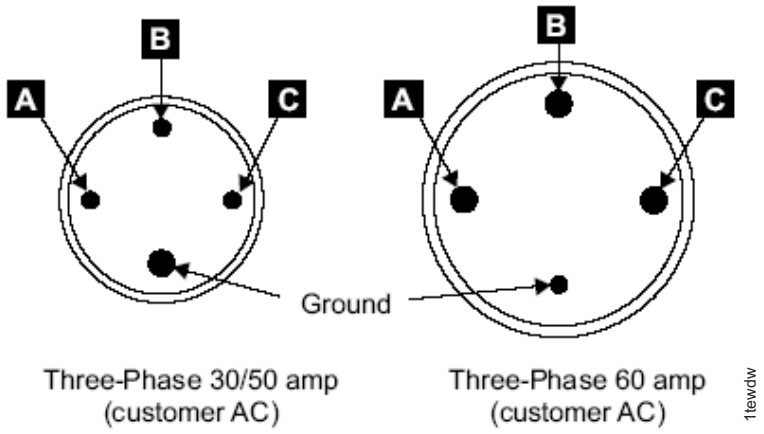


Figure 34. Measuring voltage between each pair of pins

Checking customer receptacle voltage pins with customer CB on (plug in)

1. Remove the "Do Not Operate" tag and the lockout padlock from each customer mainline AC voltage circuit breaker and then switch on the customer circuit breaker.
2. Prepare the multimeter to read line voltage AC.

   DANGER

   Dangerous voltages may be present. Do not touch the internal parts (pins and connectors) of the customer receptacle.

3. Measure the voltage between the ground pin and each voltage pin (**A** , **B** , and **C**) on the customer outlet. Refer to Figure 35 on page 39 for the location of the voltage pins.

   Are the voltages within 10% of each other?

   - Yes, continue with the next step.
   - No, inform the customer that the voltages are not correct. **Do not continue until the voltages are correct.**
4. Locate the DS8000 information label located near the top of the left side panel at the rear of the storage facility. Measure the voltage between each pair of voltage pins (**A** to **B** , **B** to **C** , and **C** to **A**) on the customer outlet.

Refer to Figure 35 for the location of the voltage pins. Verify that the customer AC input voltage that you just measured matches the machine input voltage information on the label.

Do the voltages correspond with the label?

- Yes, continue with "Connecting the mainline power cables on the racks (plug in)."
- No, **do not continue with the installation**. Contact the marketing representative to confirm that the DS8000 was ordered with the correct power input feature.

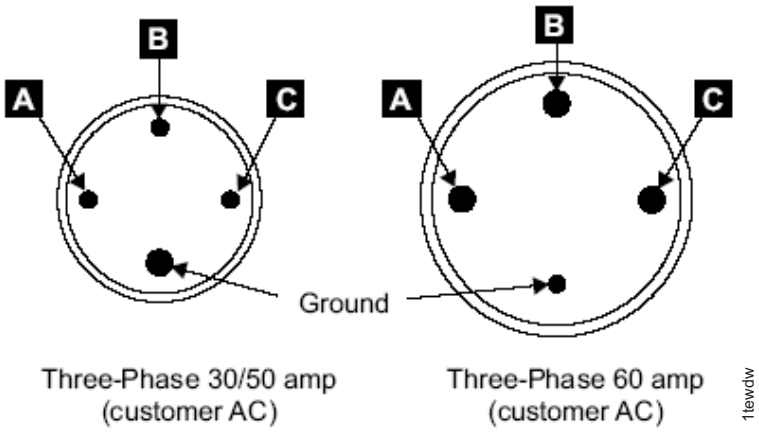


Figure 35. Measuring voltage between each pair of pins

Connecting the mainline power cables on the racks (plug in)

DANGER

An electrical outlet that is not correctly wired could place hazardous voltage on the metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock. (D004)

1. Switch the customer circuit breaker to Off for the mainline power cables.

   Attention: Attach a "Do Not Operate" tag (S229-0237) and the safety lockout padlock to each circuit breaker.
2. Verify the mainline circuit breaker (CB00) on the rear of each primary power supply is set to Off (down).
3. Connect each storage facility mainline power cable plug to the customer AC outlet.
4. Continue with "Checking the expansion rack switch settings" on page 44.

Checking customer power for a ″wired″ mainline power cable

Use the following power sections to check the customer's power for a wired mainline power cable.

Checking power system ground continuity and voltage (wired)

Attention: Use an IBM-approved analog multimeter. Do not use a digital meter.

1. Switch off the customer circuit breaker that supplies the AC voltage to the mainline power cables.

   CAUTION:
   Do not connect the mainline power cables until instructed to do so.
2. **Attention:** Attach a "Do Not Operate" tag (S229-0237) and the safety lockout padlock to each customer circuit breaker that was switched off. Refer to the *Electrical Safety for IBM Customer Engineers*.
3. Verify the MAIN LINE circuit breaker **1** (CB00) on the rear of each primary power supply is set to Off (down). Refer to Figure 36.

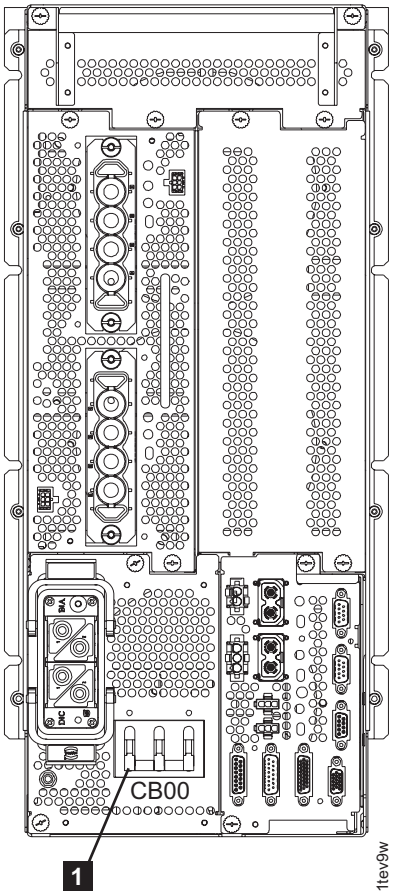


Figure 36. Rear view of PPS showing CB00

4. Verify the DS8000 mainline power cables are not connected to the customer power.
5. Connect the DS8000 mainline power cable to each primary power supply (PPS) input power connector.

   Note: Ensure that you connect the long mainline power cord to the upper primary supply and the short mainline power cord to the lower primary supply.
6. Prepare the multimeter to measure 0.1 ohm or less resistance. Place one lead of the multimeter on the green and yellow wire at the customer end of each mainline power cable. Place the other lead on the conductive metal of each PPS enclosure. Refer to Figure 37 on page 41.

   Is there more than 0.1 ohm of resistance?

- Yes, go to MAP2330 Repair rack ground continuity.
- No, continue with the next step.

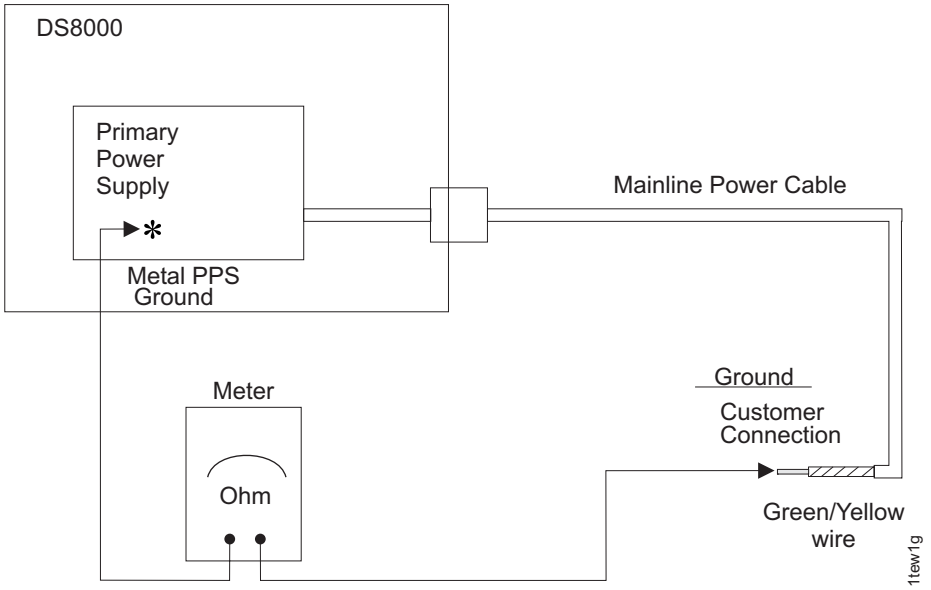


Figure 37. Prepare multimeter to measure ohm resistance

7. Disconnect the DS8000 mainline power cables from each PPS input power connector.
8. Instruct the customer to call a licensed electrician to connect each wired mainline power cable to the customer mainline power source.

   Attention: For EMEA installations, provide the following information to the electrician.

   EMEA Electrician Information

   The mainline power cord of this machine must be connected to the customer's mainline power source by a licensed electrician. The mainline power cable cannot be modified in any way.

   - For 3-phase machines:

     This machine must be connected to a 3-phase AC power. The mainline power cable is a four-conductor cable with the following color code:

     – L1 (phase 1) = black
     – L2 (phase 2) = blue
     – L3 (phase 3) = brown
     – PE (ground) = green/yellow

   Note: The connection to the AC power must be made without neutral, the blue wire must be used as a phase.
9. Continue with "Checking customer ground continuity with customer CB off (wired)."

Checking customer ground continuity with customer CB off (wired)

1. Prepare the multimeter to measure 1.0 V ac or less. Measure the voltage on the female ground pin on each mainline power cable and building ground. Refer to Figure 38 on page 42.

Is the voltage less than 1.0 V ac?

- Yes, go to step 3.
- No, continue at the following step.

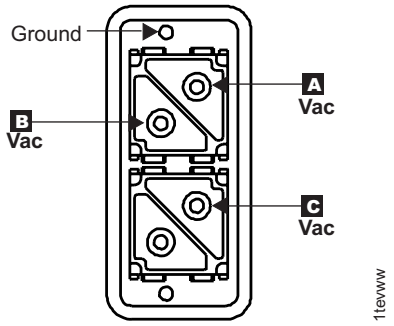


Figure 38. Mainline power cable connector

2. Voltage is present at a customer outlet with the customer circuit breakers off.

   DANGER

   Inform the customer that even though the circuit breaker is off, voltage higher than 1.0 V ac is measured at the failing customer voltage outlet pins.

   Do not continue until the voltage is less than 1.0 V ac.

3. Prepare the multimeter to measure 1.0 ohm or less of resistance.
4. Measure the resistance between the female connector ground pin on each mainline power cable and the building ground.

   Is the resistance 1.0 ohm or less?

   - Yes, continue with "Checking customer voltage with customer CB off (wired)."
   - No, inform the customer. **Do not continue until the resistance is 1.0 ohm or less**.

Checking customer voltage with customer CB off (wired)

1. Prepare the multimeter to measure 1.0 V ac or less.
2. Measure the voltage between each pair of voltage pins on the female connector on each mainline power cable. Also, measure the voltage between each voltage pin (**A**, **B**, and **C**) and the ground pin on each mainline power cable. Refer to Figure 39 on page 43.

   Did any voltage measure more than 1.0 V ac?

   - Yes, inform the customer that one or more voltage pins on the customer supply measured greater than 1.0 V ac even though the circuit breaker is off. **Do not continue until the voltage is less than 1.0 V ac.**
   - No, continue with "Checking customer voltage with customer CB on (wired)" on page 43.

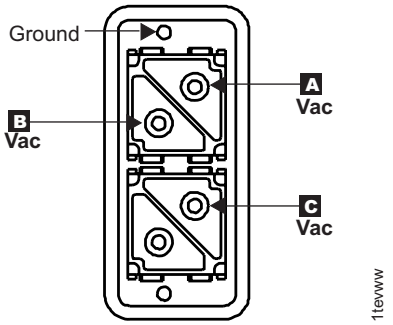


Figure 39. Mainline power cable connector

Checking customer voltage with customer CB on (wired)

1. Remove the "Do Not Operate" tag and the lockout padlock from each customer mainline AC voltage circuit breaker and then switch on the customer circuit breaker.
2. Prepare the multimeter to read line voltage AC.

   DANGER

   Dangerous voltages may be present. Do not touch the internal parts (pins and connectors) of the customer receptacle.

3. Measure the voltage between the ground pin and each voltage pin (**A** , **B** , and **C**) on each mainline power cable. Refer to Figure 40.

   Are the voltages within 10% of each other?

   - Yes, continue with the next step.
   - No, inform the customer that the voltages are not correct. **Do not continue until the voltages are correct.**

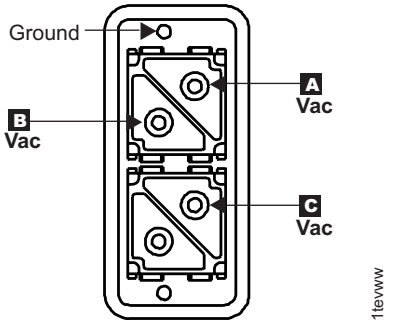


Figure 40. Mainline power cable connector

4. Locate the DS8000 information label located on the top of the left side panel at the rear of the storage facility. Measure the voltage between each pair of voltage pins (**A** to **B** , **B** to **C** , and **C** to **A**) on each mainline power cable. Refer to Figure 40. Verify that the customer AC input voltage that you just measured matches the machine input voltage information on the label.

   Does the voltage measured match the voltage on the DS8000 information label?

   - Yes, continue with "Connecting the mainline power cables on the racks (wired)" on page 44.

- No, **do not continue with the installation.** Contact the marketing representative to confirm that the DS8000 was ordered with the correct power input feature.

Connecting the mainline power cables on the racks (wired)

DANGER

An electrical outlet that is not correctly wired could place hazardous voltage on the metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock. (D004)

1. Switch the customer circuit breaker to Off for the mainline power cables.

   Attention: Attach a "Do Not Operate" tag (S229-0237) and the safety lockout padlock to each circuit breaker.
2. Verify the mainline circuit breaker (CB00) on the rear of each primary power supply is set to Off (down).
3. Connect each storage facility mainline power cable plug to the PPS then continue with "Checking the expansion rack switch settings."

Checking the expansion rack switch settings

1. Verify the setting of the following switches on each expansion rack. Each rack has:
   - One UEPO switch
   - Two PPSs
   - Zero to three battery enclosures

Table 6. Switch settings and locations for expansion racks

Switch	Setting	Location	Figure reference
Battery enclosure circuit breakers CB0 and CB1.	On (up)	On each battery assembly (rear of rack)	2 in Figure 41 on page 45
UEPO red switch	Off (down)	Rack operator panel (front of rack) **Note:** Press the recessed switch towards the bottom. It will appear flat when off.	n/a

Figure 41 on page 45 shows the rear view of the rack:

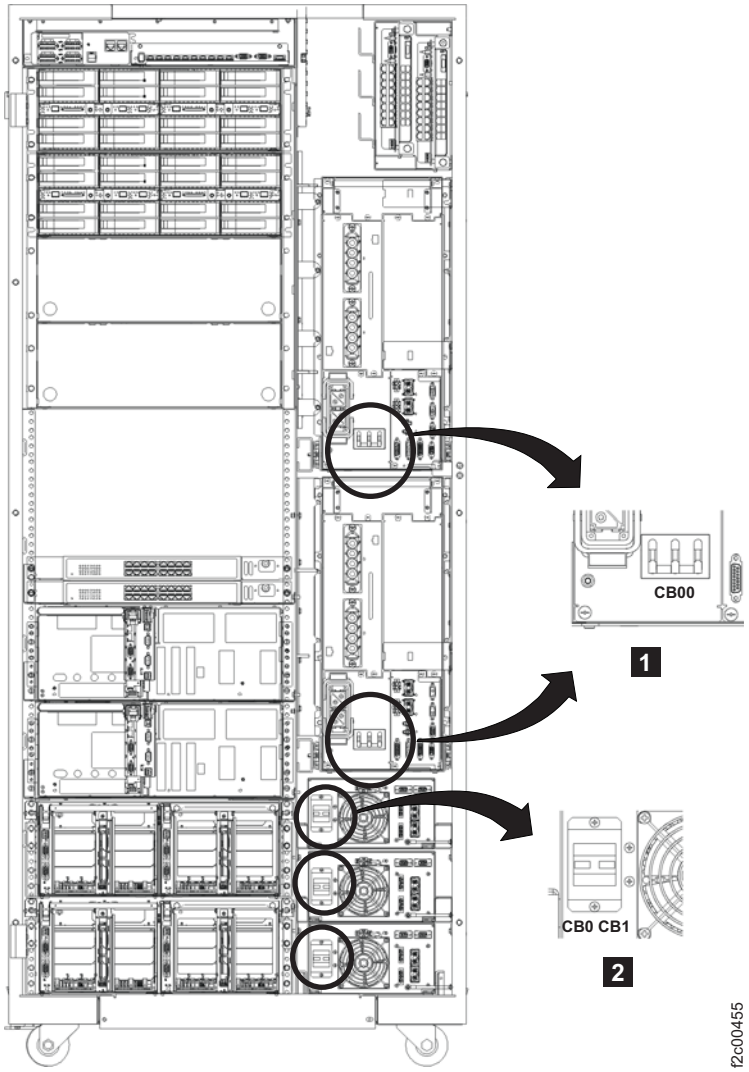


Figure 41. Rack rear view

2. Continue verifying the rack switch setting on the expansion rack.

Table 7. Switch settings and locations for expansion rack PPS sequencer module

Switch	Setting	Location	Figure reference
Primary power supply circuit breaker CB00	Off (down)	On each PPS, on the AC input power module (rear of rack)	1 in Figure 41
Primary power supply three sequencer module enable/disable switches	Enabled (up)	Three switches on each PPS (rear of rack)	1 in Figure 42 on page 46
Enable/disable switches on the PPS 5/12 V DDM power module	Enabled (up)	Two switches on each PPS (rear of rack)	1 in Figure 43 on page 47

Figure 42 on page 46 shows the enable disable switches for the primary power supply sequencer module.

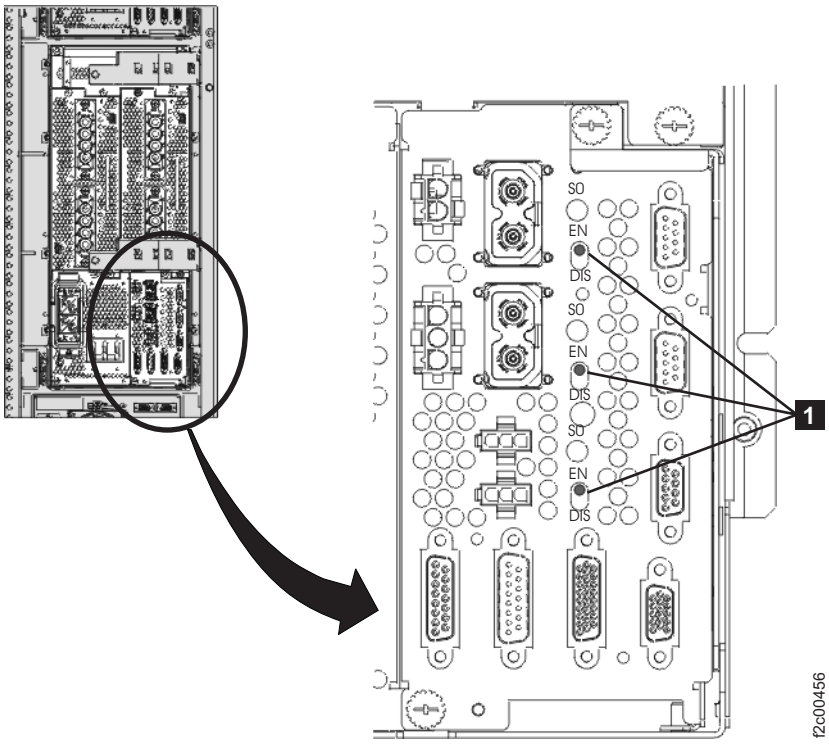


Figure 42. PPS sequencer module and LED enable/disable switch

Figure 43 on page 47 shows the enable disable switches for the primary power supply DDM.

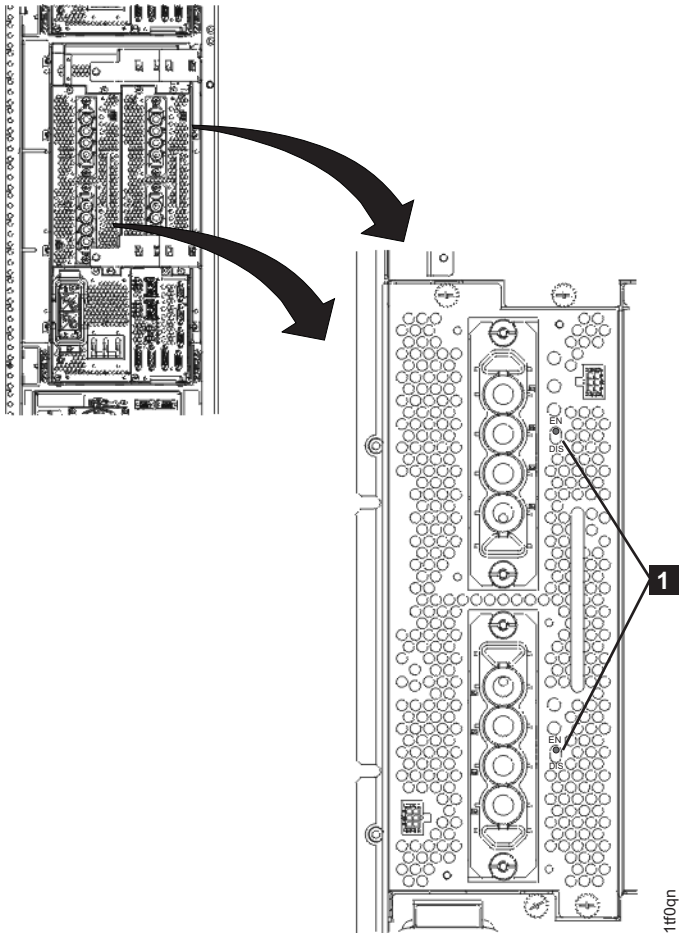


Figure 43. Enable/disable switches on a 5/12 V DDM power module (PPS)

3. Continue with "Checking the operation of the rack UEPO switch."

Checking the operation of the rack UEPO switch

1. Remove the "Do Not Operate" tag and the lockout padlock from each customer mainline AC voltage circuit breaker that supplies power to the rack that you are installing.
2. Switch on each customer circuit breaker.
3. Switch the MAINLINE CB00, on the rear of each primary power supply to On (up).
4. Observe the six vertical LED indicators at the front of each primary power supply (to the left of the fans).

   Use Table 8 to find the condition that applies.

   Note: The Rack-1 UEPO switch must be in the On position.

Table 8. LED indicators when MAINLINE CB00 is on

AC INPUT GOOD	UEPO LOOP GOOD	PPS Display Panel	Action
On	Off	Ignore	Normal condition, continue with the next step

Table 8. LED indicators when MAINLINE CB00 is on (continued)

AC INPUT GOOD	UEPO LOOP GOOD	PPS Display Panel	Action
On	On	Ignore	UEPO fault, go to MAP21F0 UEPO loop good LED should be off
Off	Off	Ignore	Input power fault, go to MAP2050 Loss of AC Input to a single primary power supply. **Note:** If both PPSs are failing, then repeat the customer voltage checks done previously.

5. In the rack being installed, push a thin paper clip through the small hole in the operator panel to reset the UEPO red switch to the On (up) position.

   Note: The expansion rack will automatically begin to power on.

   Use Table 9 to find the condition that applies.

Table 9. LED indicators when UEPO switch is on

AC INPUT GOOD	UEPO LOOP GOOD	PPS Display Panel	Action
On	On	Blank, U0 or XC **Note:** Some levels of PPS firmware will cause an XC error code to be displayed. This is a false error. The condition will remain until the DDM power supply is turned on in a later step. No action is required. Continue with the next step.	Normal condition, continue with the next step.
On	On	Error code	Go to MAP21A0 PPS fault isolation during install.
On	Off	N/A	UEPO fault, go to MAP21E0 UEPO Loop Good LED should be on.

6. Swing the 208VDC bus bar gate back into its non-service position. Reinstall and tighten the two retaining screws.
7. If you removed the air baffle **2** earlier to allow the 208VDC bus bar to swing open, reinstall it. See Figure 44 on page 49.

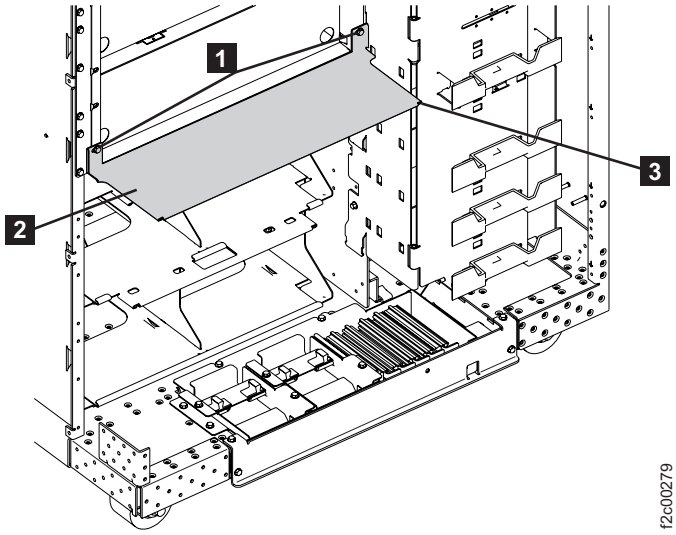


Figure 44. Air baffle

8. Continue with "Continuing the installation at the management console."

Continuing the installation at the management console

You will use the management console to continue with the installation. The racks will be automatically powered on during this phase of the installation process.

DANGER

The storage facility will be powered on automatically during this procedure. Hazardous voltages will be present. Ensure that all safety covers are in place and that normal safety precautions are taken.

1. Return to the HMC screen and click **Next**. Follow the on-screen instructions:
   a. **Do not** log off or reboot the management console.
   b. The racks will be automatically powered on and the installation process will continue.
   c. Check the WebSM GUI every 10 minutes and respond to any pop-up messages from the Installation process that may appear.
   d. If a problem occurs, an Error Detected pop-up screen is displayed. Find the error code displayed in the second line of the exception information. For example `ActivateException:2nnn-xxx`. The 2nnn value is the machine type. The *xxx* value defines the specific error. Go to MAP1400 HMC is reporting an installation error prior to serviceable events being created to repair the problem.

      Following is an example of **Error detected** test message displayed:

      ```
      Exception text(0): com.imb..hwmca.fw.service.
      statetransition.EffectorException:com.ibm.hwmca.fw.service.
      managedsystem.ActivateException: 2107-075 The systemLevelActivate
      CA - Rack 2 PPS-0The expected number of batteries: 1 does not
      match actual number found: 0. com.ibm.esshmc.sfw.effector.
      MmSystemLevelActivate.fire(MmSystemLevelActivate.java:123)
      ```

   e. A message displays that indicates the install has completed. You will be returned here to continue with step 2.

2. Display and repair any open serviceable events for hardware or code problems. Ignore serviceable events for status conditions such as statesave, PE-package, call home, and so on.
3. Display the storage facility image (SFI) state for each LPAR.
   a. In the HMC Navigation area, under the **Management Environment**, expand the HMC (identified by hostname).
   b. Click **Service Applications** → **Service Focal Point**.
   c. In the right content area, click **Service Utilities**. A list of storage facilities is displayed.
   d. Select the storage facility.
   e. On the main menu (top toolbar), click **Selected** → **Get Storage Facility Images**.
   f. Select the storage facility image.

      Note: Some models of storage facility have two storage facility images.
   g. On the main menu (top toolbar), click **Selected** → **Change/Show SFI State**. The following is an example of a storage facility image with a normal status.

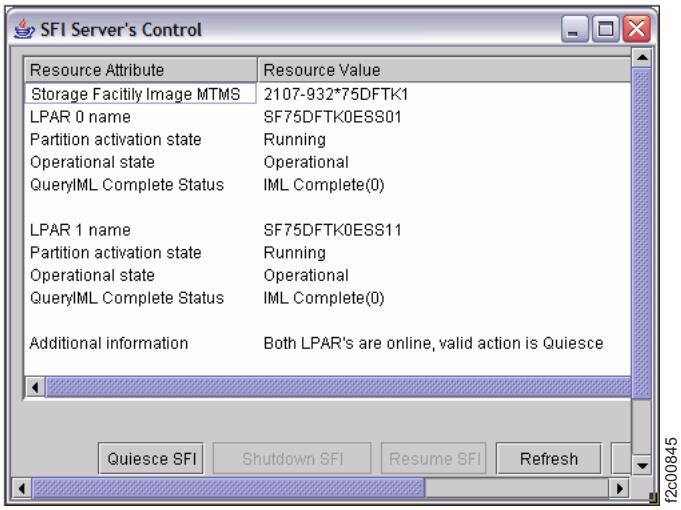


Figure 45. SFI Server's Control

4. Continue with the next section.

Installing and testing the storage enclosures

Use the procedures in this section to logically install and test the storage enclosures in this expansion rack.

Do not proceed with this section until you have verified there are no serviceable events for hardware or code problems.

1. This step is an overview of a device adapter (DA) pair. A DA pair is two device adapter cards, each in a different I/O enclosure but sharing the same storage enclosures.

   An example of a storage enclosure pair are storage enclosures XS11 and XS21 in Figure 46 on page 52.

Note: On the HMC as well as in Table 10, they are referred to as S11 and S21.

2. Determine the number of storage enclosure pairs in the expansion rack that will be installed to each DA pair in this expansion rack.
   a. In Table 10 column 3, put a check mark in front of each storage enclosure pair that is present in the expansion rack.
   b. In Table 10 column 4, write down the number of storage enclosure pairs for each DA pair.

Table 10. Storage enclosures pairs per DA pair

DA pair ID (from HMC)	DA pair (location code of I/O enclosure and slots) Figure 46 on page 52 and Figure 47 on page 52	Storage enclosure pairs (Location from HMC / Location on Figure 46 on page 52)	Record the number of storage enclosure pairs present for each DA pair ID
6	I/O enclosure XI3 Slot C3 I/O enclosure XI4 Slot C6	___ S11 and S21 / XS11 & XS21 ___ S12 and S22 / XS12 & XS22	
4	I/O enclosure XI1 Slot C3 I/O enclosure XI2 Slot C6	___ S13 and S23 / XS13 & XS23 ___ S14 and S24 / XS14 & XS24	
7	I/O enclosure XI3 Slot C6 I/O enclosure XI4 Slot C3	___ S15 and S25 / XS15 & XS25 ___ S16 and S26 / XS16 & XS26	
5	I/O enclosure XI1 Slot C6 I/O enclosure XI2 Slot C3	___ S17 and S27 / XS17 & XS27 ___ S18 and S28 / XS18 & XS28	

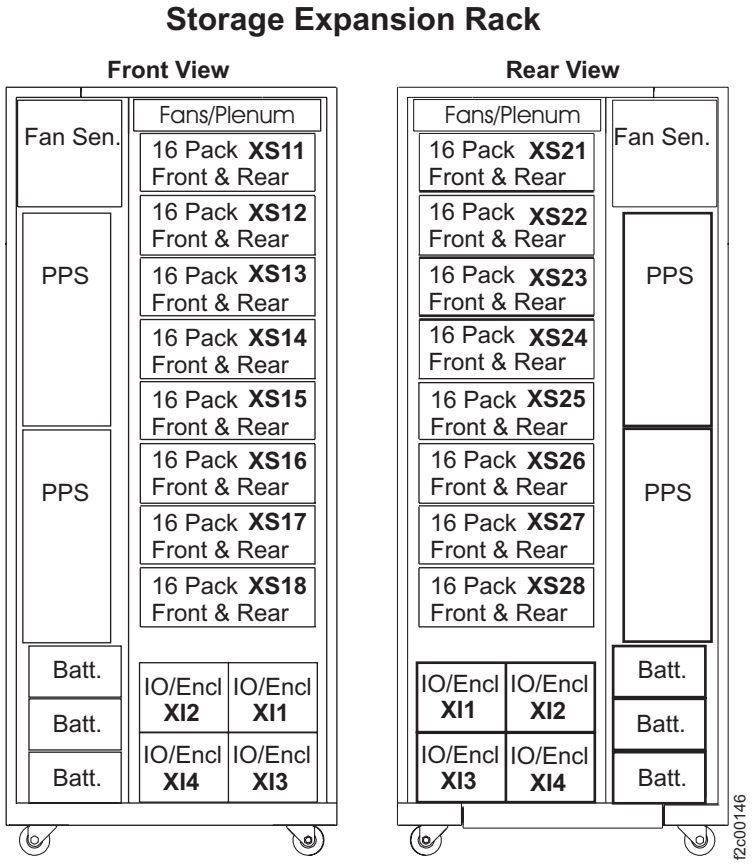


Figure 46. Storage expansion rack

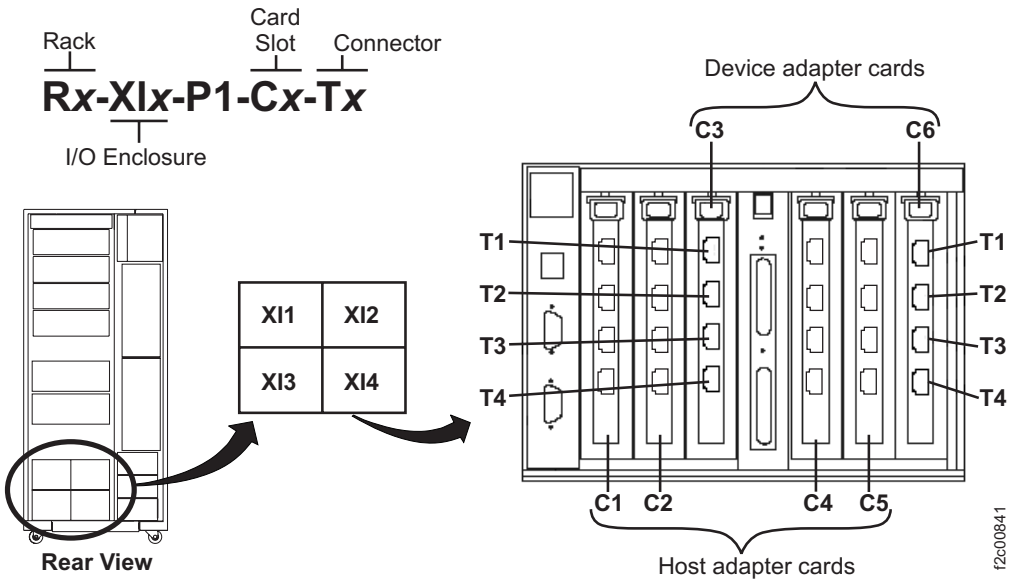


Figure 47. I/O enclosure locations (rear)

3. You are installing one or more pairs of storage enclosures. The management console will prompt you for the physical location for one storage enclosure at a time. The management console continues to redisplay the screens until all the storage enclosures have been installed.

Note: The HMC process will display the physical location of the next storage enclosure to be installed.

a. In the HMC Navigation area, under the **Management Environment**, expand the HMC (identified by hostname).

b. Open **Service Applications** → **Service Focal Point**.

c. In the right content area, select **Install/Add/Remove Hardware**, a window displays a list of storage facilities.

d. Select the storage facility, click **Selected** (on top tool bar), and then select **Install Storage Enclosure or DDMs**. A window displays asking if you were sent from the installation instructions. Click **Yes**.

e. A window displays prompting you what to install. Select **Install Storage Enclosures** and then click **Submit**.

f. If rack 1 is a Model 9A2 or 9B2, a window may open that prompts for the storage facility image to assign the storage enclosures to. Select the storage facility image and then click **Submit**.

Note:

The storage facility serial number ends in 0.
The first storage facility image serial number ends in 1.
The second storage facility image serial number ends in 2.

g. A window displays a listing of DA pairs available for additional storage enclosures, select the DA Pair and click **OK**.

h. A window displays a listing of the possible numbers of storage enclosure pairs that can be installed. Refer to Table 10 on page 51 column 4 for each DA pair ID. Select the number to install and click **OK**.

i. A window displays a listing of the physical location code of the one storage enclosure to be installed. **DO NOT CLICK** the Next button until directed in a later step.

j. When the HMC screen directs you to return to these installation instructions, go to the next step.

4. The HMC screen has returned you here with a storage enclosure location code displayed for the expansion rack being installed.

   The storage enclosure location code displayed by the HMC is of the format ″Rx-Sxx″. The storage enclosure physical location code in Figure 46 on page 52 is of the format ″XSxx″. They both refer to the same location.

   a. Using the displayed location code, refer to Figure 46 on page 52 to determine the location of the storage enclosure in the rack.

   b. Ensure the FC-AL cables (four total) are connected to the T1 & T2 connectors on both FCIC cards in the storage enclosure being installed. The other end of these four cables are not yet connected.

5. This step connects the four FC-AL cables for each storage enclosure to a DA pair or other storage enclosure. Two FC-AL cables come from each FCIC card in the storage enclosure.

   Note: Do not connect any other FC-AL cable until directed.

   a. Find the location code displayed by the HMC in column one of Table 11 on page 54 or Table 12 on page 54.

   b. Use columns two, three and four to determine the physical location to connect the other end of the four blue FC-AL cables.

   c. Refer to Figure 46 on page 52 and Figure 47 on page 52 to find the location of the enclosure for the other end of the cables.

d. Each end of the FC-AL cable is prelabeled with either the physical location code and connector location or just the connector location it connects to.
e. Find and connect the four cables determined using columns 2 through 4 in Table 11 or Table 12.
f. Go to the next step.

Table 11. FC-AL cable connection to device adapter cards

Physical location of storage enclosure displayed on HMC screen:	Physical location to connect the four FC-AL cables to:		
	Rack	**Device adapter card pair in I/O enclosures and slots Figure 47 on page 52**	**Device adapter card connectors Figure 47 on page 52**
Rx-S11	New expansion rack	I/O enclosure XI3 Slot C3 I/O enclosure XI4 Slot C6	T1 & T2 (Top two connectors)
Rx-S13	New expansion rack	I/O enclosure XI1 Slot C3 I/O enclosure XI2 Slot C6	T1 & T2 (Top two connectors)
Rx-S15	New expansion rack	I/O enclosure XI3 Slot C6 I/O enclosure XI4 Slot C3	T1 & T2 (Top two connectors)
Rx-S17	New expansion rack	I/O enclosure XI1 Slot C6 I/O enclosure XI2 Slot C3	T1 & T2 (Top two connectors)
Rx-S21	New expansion rack	I/O enclosure XI3 Slot C3 I/O enclosure XI4 Slot C6	T3 & T4 (Bottom two connectors)
Rx-S23	New expansion rack	I/O enclosure XI1 Slot C3 I/O enclosure XI2 Slot C6	T3 & T4 (Bottom two connectors)
Rx-S25	New expansion rack	I/O enclosure XI3 Slot C6 I/O enclosure XI4 Slot C3	T3 & T4 (Bottom two connectors)
Rx-S27	New expansion rack	I/O enclosure XI1 Slot C6 I/O enclosure XI2 Slot C3	T3 & T4 (Bottom two connectors)

Table 12. FC-AL cable connection to other storage enclosures

Physical location of storage enclosure displayed on HMC screen:	Physical location to connect the four FC-AL cables to:		
	Rack	**Storage enclosure Figure 46 on page 52**	**FCIC cards & connectors Figure 47 on page 52**
Rx-S12	New rack	Storage enclosure XS11	P1-C1-T3 P1-C2-T4

Table 12. FC-AL cable connection to other storage enclosures (continued)

Physical location of storage enclosure displayed on HMC screen:	Physical location to connect the four FC-AL cables to:		
	Rack	Storage enclosure Figure 46 on page 52	FCIC cards & connectors Figure 47 on page 52
Rx-S14	New rack	Storage enclosure XS13	P1-C1-T3 P1-C2-T4
Rx-S16	New rack	Storage enclosure XS15	P1-C1-T3 P1-C2-T4
Rx-S18	New rack	Storage enclosure XS17	P1-C1-T3 P1-C2-T4
Rx-S22	New rack	Storage enclosure XS21	P1-C1-T3 P1-C2-T4
Rx-S24	New expansion rack	Storage enclosure XS23	P1-C1-T3 P1-C2-T4
Rx-S26	New expansion rack	Storage enclosure XS25	P1-C1-T3 P1-C2-T4
Rx-S28	New expansion rack	Storage enclosure XS27	P1-C1-T3 P1-C2-T4

6. Return to the HMC and click **Next**.
   a. You will be sent back to the installation instructions to repeat steps 4, 5, 6, and 7 for each storage enclosure being installed on this DA pair.
   b. When all storage enclosures on this DA pair have been installed, go to the next step.
7. No action is required as the HMC initializes the storage facility image the storage enclosures are being installed to.

   The HMC displays:

   Task in Progress...**Powering on the FRU(s)**
   Verification Progress...**Verification progress:**
   Task in Progress...**Activating the system** (could take 20 minutes or more)
   Task in Progress...**Verifying system**
   Verification Progress...**Verification progress:**
   Task in Progress...**Activating applications(s)**

   When the HMC is finished, it displays:

   Service action is complete
   Service action is ending...

   The HMC directs you back to the installation instructions, go to the next step.
8. Continue with "Finish install and cleanup" on page 58.

Completing the installation

Use the following procedures to complete the installation.

Route and connect the host cables

1. Ask the customer to supply a diagram or output from the DS8000 Storage Manager to define the connectivity between the DS8000 host card ports and system host card ports.

2. Label the ESCON and fibre host cables from each customer host adapter.
3. Route the cables to the rear of the appropriate storage facility frame.

   Note: To allow correct connection and disconnection of external cables, label cables using the customer's current cable-identification plan and the labels provided by your customer.
4. In the tailgate, squeeze the black release levers **2**, pivot the retention bracket up and then remove it.

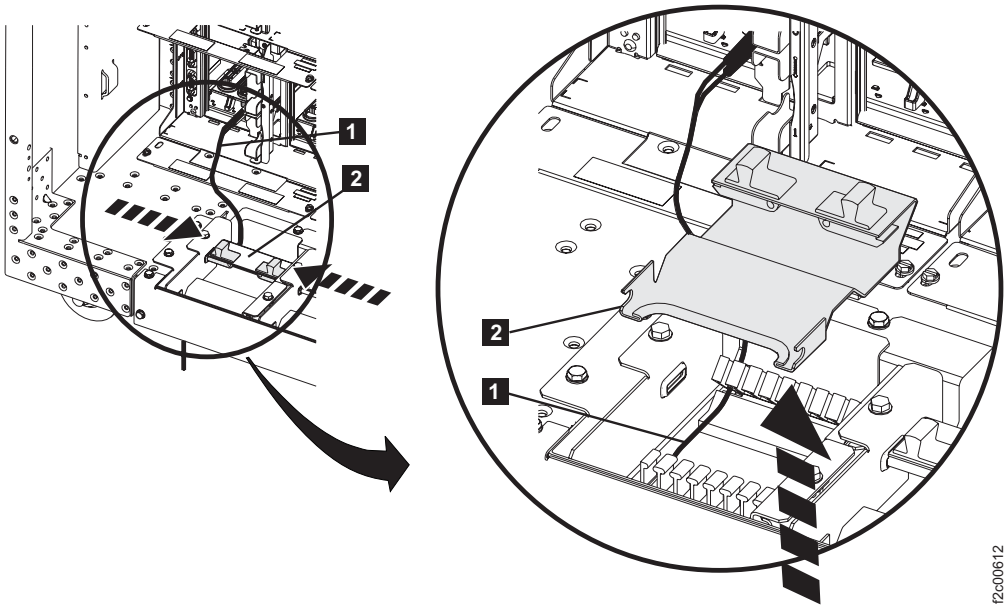


Figure 48. Tailgate cable and fibre channel cable retention

5. Identify the I/O enclosure that contains the host card and port to which the host cables from the host will be attached. See Figure 49 on page 57.

   Note: The syntax of the location code shown on the ICAT configuration tool might differ slightly from that shown in Figure 49 on page 57. For the device adapter card connectors, the syntax might be R*x*-I*x*-C*x*-T*x* (the backplane identifier of P1 is missing and I*x* is equivalent to XI*x*).

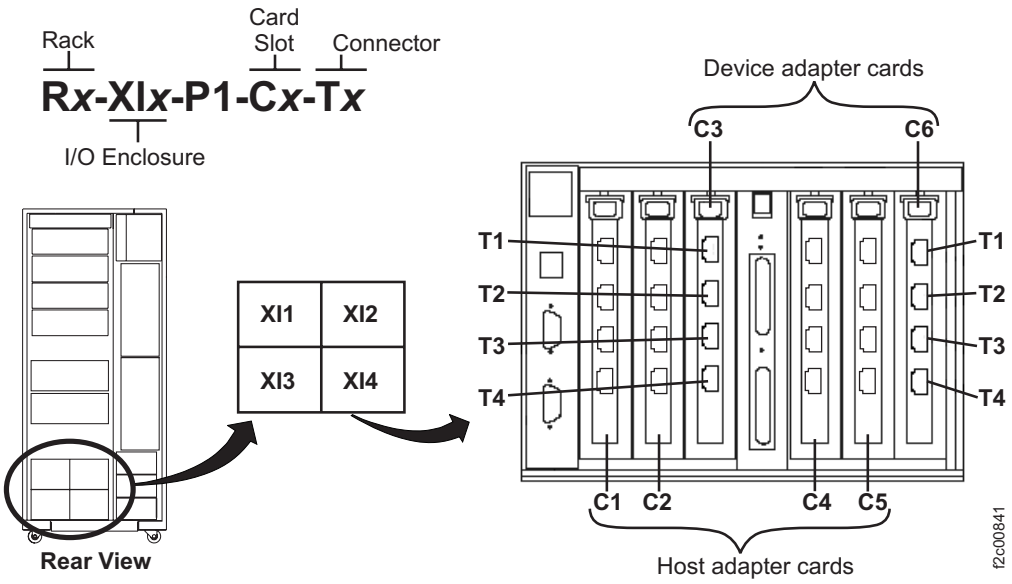


Figure 49. Location codes for device adapter and host adapter cards

6. Feed the host cables up through the tailgate and route them to the destination I/O enclosure and host card and plug them in.

   Notes:

   - Save the wrap tools removed from each Fibre or ESCON host card. The wrap tool can be used as a dust cover and also a wrap tool for diagnosis and repair.
   - There are two types of fibre channel cards:
     - Short wave
     - Long wave

7. Secure the host cables in the cable guide by pressing them into the slots.
8. Reinstall the retention bracket removed earlier.
9. Reinstall the tailgate bracket(s) in all frames using the screws **2** removed earlier. Tighten all four screws **1** and **2**. See Figure 50 on page 58

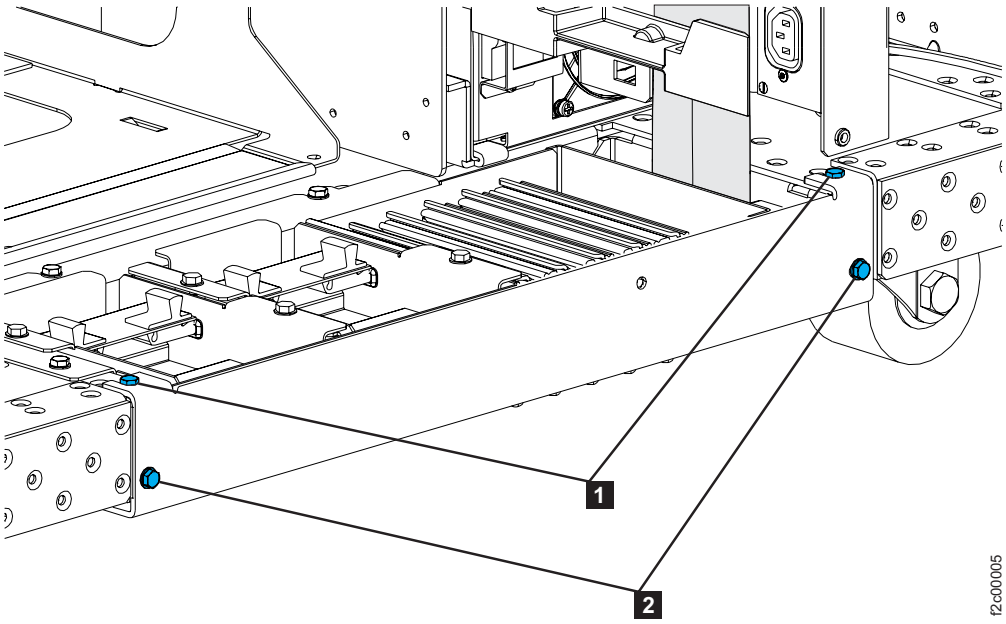


Figure 50. Tailgate frame bracket

Finish install and cleanup

1. Display and repair any open serviceable events.
2. Will you be installing additional racks, storage enclosures, or other hardware features to this storage facility as part of this installation activity?
   - Yes, the backup of critical console data will occur after all installation activity is complete. Go to step 6 on page 59.
   - No, the backup of critical console data will occur now. Go to the next step.
3. Locate the critical console data back up DVD disc for each HMC on this storage plex. The DVD disc should be in the ship group during an installation or kept in the HMC DVD-RAM drive after installation.

   There are two versions of the DVD disc:
   - Newer version is labeled with the HMC machine type model S/N and "HMC Critical Console Data Backup DVD, Keep in HMC DVD-RAM drive". If you have this version, go to 5.
   - Older version has no preprinted label, it should have the HMC machine type model S/N hand printed by the service representative. If you have this version, go to the next step.
4. Is the HMC machine type model and S/N printed on the DVD disc?
   - Yes, go to the next step.
   - No, hand print the HMC machine type model and S/N and "HMC Critical Console Data" on the DVD disc. For example: `HMC machine type model S/N: 8837-PLM 75KKTWT8R, HMC Critical Console Data`. Go to the next step.
5. Perform the following steps to back up critical console data on each HMC for this storage plex. Use the DVD disc with the HMC machine type model S/N for this HMC.
   a. Log into the management console (HMC) for rack 1.
   b. In the HMC Navigation area, under the **Management Environment**, expand the HMC (identified by hostname).

c. Open **Licensed Internal Code Maintenance → HMC Code Update**.
d. In the right content area, select **Back up Critical Console Data**.
e. Select **Back up to DVD on local system** and click **Next**.
f. Insert a formatted DVD-RAM media into the drive.
g. Enter a description for the archive data.
h. Click **OK** to store your critical console data on the DVD-RAM.
i. Leave the HMC Critical Console Data backup DVD in the HMC DVD-RAM drive. It is automatically updated once a week.

6. If used during this installation, store the customer-provided configuration worksheets in the rack 1 document enclosure (front upper right of rack).
7. Use the View Storage Facility Status utility to ensure there are no unreported or unexpected problems or conditions.
   a. In the HMC Navigation area, under the **Management Environment**, expand the HMC (identified by hostname).
   b. Open **Service Applications → Service Focal Point**.
   c. In the right content area, select **Service Utilities**, a window opens that displays a list of storage facilities.
   d. Select a storage facility, click **Selected** (on top tool bar), and then select **View Storage Facility State**.
   e. A window opens that lists passed/failed status for 25 or more system checks. You can display the details for each system check. For more information and options, go to MAP1100 View storage facility state (end of call).
8. If you have storage enclosures to install, return to "Installing and testing the storage enclosures" on page 50 to begin the storage enclosure installation process, and then return here and continue at the next step.
9. Monitor the certify DDM process for completion. It was started automatically for all DDMs being installed
   a. In the HMC Navigation area, under the **Management Environment**, expand the HMC (identified by hostname).
   b. Open **Service Applications → Service Focal Point**.
   c. In the right content area, select **Service Utilities**, a window displays a list of Storage Facilities.
   d. Select the Storage Facility that is being installed from the list. Click **Selected** from the top tool bar, and then select **Certify DDM**.
   e. When the certify DDM process is complete, inform the customer that the storage facility is now available for configuration.
10. Ensure the HMC power control mode for this storage facility is returned back to the original customer setting. (This was set to Manual Power Mode in step 1 of "Preparing the existing rack.")

    Note: This will return the storage facility power control to normal operation.
11. Refer to the pack/unpack instructions for return/discard information. Discard the shipping material locally.
12. The expansion rack is now regarded as "Installation complete".
    a. Update the account records to show the install is complete.
    b. Record any additional time to install features, ECs, MESs to the correct service code. Do not charge the additional time to the storage facility installation.

c. Go to the next step.

13. The on-site service actions are now complete.

Chapter 2. Installing one expansion rack without I/O enclosures to an existing storage facility

This procedure is a **concurrent** installation used only for one expansion rack that does not contain I/O enclosures (models 92E, 9AE).

If the rack you are installing contains I/O enclosures, you must go to the section Chapter 1, "Installing one expansion rack with I/O enclosures to an existing storage facility," on page 1.

DANGER

HEAVY EQUIPMENT -- PERSONAL INJURY OR EQUIPMENT DAMAGE MAY RESULT IF MISHANDLED (D006)

Attention: The customer should prepare his environment to accept the new product based on the installation planning information provided, with assistance from an IBM Installation Planning Representative (IPR) or IBM authorized service provider. In anticipation of the equipment delivery, the final installation site should be prepared in advance such that professional movers/riggers can transport the equipment to the final installation site within the computer room. If for some reason, this is not possible at the time of delivery, the customer will need to make arrangements to have professional movers/riggers return to finish the transportation at a later date. Only professional movers/riggers should transport the equipment. The IBM authorized service provider will only perform minimal frame repositioning within the computer room, as needed, to perform required service actions. The customer is also responsible for using professional movers/riggers in the case of equipment relocation or disposal.

Beginning the installation

Use the following sections to begin the installation.

Ensuring existing rack has no open serviceable events

Display and repair any open serviceable events on the existing rack that the new rack will be installed to. There must be no unrepaired serviceable events prior to beginning the installation.

1. Log into the management console (HMC) for rack 1.
2. In the HMC Navigation area, under the **Management Environment**, expand the HMC (identified by hostname).
3. Open **Service Applications** → **Service Focal Point**.
4. In the right content area, select **Manage Serviceable Events**, a window displays a list of selection criteria. Ensure the serviceable event status field is set to "Open".
5. You can use the default selection criteria or modify the criteria for your needs. Click **OK**.

6. The Serviceable Event Overview window is displayed. If a serviceable event is listed, repair it before you continue the install. To repair, click **Selected** (from the top tool bar), and then select **Repair**. Follow the guided repair process.

Checking for the latest level of installation instructions

MES instructions are required to install the storage enclosures. The following rack install procedure installs the rack, rack power, and RIO interfaces only.

These installation instructions are provided in two formats:

- Hardcopy: this is shipped with the subsystem and is printed from a PDF file. The PDF file is also available on the *IBM System Storage DS8000 series Service Documents CDROM* or from the DS8000 - Engineering Web site.
- Information Center: This is intended for online viewing. It is available on the *IBM System Storage DS8000 series Service Documents CDROM*, on the management console (HMC) or through the Intranet.

Ensure that you are using the latest version of the installation instructions.

1. If you are performing the installation using hardcopy instructions, then the latest level of the PDF file for printing will be available on the DS8000 - Engineering Web site (https://ssgtech4.sanjose.ibm.com/PFE/Squadrons-S%20PE%20Support.nsf/WVhome). Select **Related Links** → **Information Centers** → **Service**. Scroll to the section on Installation Guides in PDF format.
2. If you are performing the installation using the Information Center, then the latest version will be available on the Intranet. Use the link from the DS8000 - Engineering Web site (https://ssgtech4.sanjose.ibm.com/PFE/Squadrons-S%20PE%20Support.nsf/WVhome). Select **Related Links** → **Information Centers** → **Service**

Considerations if advanced software features are already installed

If this storage facility already has advanced features installed, read the following information and advise the customer.

The following are examples of Advanced Function Software feature codes 07*xx*:

FC0700 Point in time Copy (PTC)

FC0740 Remote Mirror Copy (RMC)

FC0760 Remote Mirror for Z series

FC0780 Parallel Access Volumes (PAV)

When you increase the storage capacity (installing more DDMs), it is also necessary to upgrade the Advanced Function Software (if installed) to match the new storage capacity except for CoD storage.

When CoD storage is activated, it will also disable the Advanced Function unless the customer activates a new upgrade license. Refer to *IBM System Storage DS8000 Introduction and Planning Guide*.

Checking customer preparations

DANGER

HEAVY EQUIPMENT -- PERSONAL INJURY OR EQUIPMENT DAMAGE MAY RESULT IF MISHANDLED (D006)

1. Verify that the customer has two AC power sources for each rack in the DS8000 storage facility.

   For maximum fault tolerance, use two separate AC power sources.

   Note: The DS8000 is designed for connection to an IT power distribution system. In an IT power distribution system, the neutral conductor is isolated from earth (ground) by an impedance with exposed conductive parts in the installation that is tied directly to earth.

   No service representative action is needed. Information is for compliance with International Electrotechnical Commission Standard 950 for the safety of information technology equipment and electrical business equipment.
2. Verify the customer wall circuit breaker. The customer wall circuit breaker rating that protects each line cord depends on the voltage range as follows:
   - Low-voltage, three-phase installations (200 - 240 V) require wall circuit breakers that have a rating of 50 to 60 A. Do not exceed the wire rating of the facility.
   - High-voltage, three-phase installations (380 - 480 V) require wall circuit breakers that have a rating of 30 to 35 A. Do not exceed the wire rating of the facility.
3. If the DS8000 will be installed on a raised floor:
   a. Review the weight of each rack with the customer to verify that their raised floors have adequate support. An individual rack, fully configured can weigh a maximum of 2880 pounds (1307 kilograms). For details on the DS8000 rack weights, refer to *IBM System Storage DS8000 Introduction and Planning Guide*.
   b. To correctly cool a DS8000, place two floor tiles, that have holes for air flow, directly in the front and the rear of each DS8000 rack (for a total of 4). Also provide tiles with holes, for cable entry, under the rear tailgate.
4. If the DS8000 will not be installed on a raised floor, ensure the customer will provide adequate air flow and temperature around the DS8000.

   Notes:

   a. For information about the temperature requirements of the operating environment, see the *IBM System Storage DS8000 Introduction and Planning Guide*.
   b. The DS8000 rack cooling airflow enters through the front and rear covers and exits through the top and rear covers. The bottom of the DS8000 is sealed.
5. Verify that the customer has ordered, supplied, and routed the following cables to the DS8000 being installed. Routing of the customer cables must not be billed against the installation. If the customer wants the service representative to route the cables, that activity must be coded or billed separately.
   a. ESCON host cables from the host to the DS8000 host adapters.
   b. Fibre host cables from the host to the DS8000 host adapters.

Checking for required microcode

1. Is the new storage facility being installed to an existing storage complex?
   - Yes, ensure the code level of the existing storage complex and management consoles are already at a compatible level or same level as the new code levels. Then go to step 2.
   - No, go to step 3.

   Note: Normally, if there are two management consoles, they both must be running the same level of code.
2. Ensure the code level of the existing storage plex and management consoles are already at a compatible level or same level as the new storage facility code levels.

   Note: Do not intermix the following bundles within a storage plex without the approval of next level of support.
   - bundle 6.1.6xx.xx or prior
   - bundle 6.2.0xx.xx or later
3. Determine if there is a required level of microcode available for your storage facility or management console. For IBM personnel, go to DS8000 - Engineering Web site (https://ssgtech4.sanjose.ibm.com/PFE/Squadrons-S%20PE%20Support.nsf/WVhome). For non-IBM personnel, follow the established process to determine the required code level.

   When the web site defines a code level as "required", it means that the storage facility must not be transferred over to the customer without the indicated code level installed.

   When the web site defines a code level as "recommended", it means the IBM service representative can either:
   - Give the storage facility to the customer when the installation is complete.
   - Negotiate with the customer for a more convenient time to update the microcode.

Checking RETAIN for storage facility installation tips

1. Sign on to RETAIN.
2. Select HSF.
3. Search for 2107 Install (p;2107 Install). RETAIN may have information that corrects problems that are not yet addressed by the install instructions.

Unpacking the expansion rack and verifying the ship group is complete

1. Remove the CE Unpacking Instructions from the Customer Engineer envelope taped to the front of the storage facility below the CEC enclosures. Use the CE Unpacking Instructions to unpack the storage facility frame(s) and prepare it for installation.
2. Verify that all items in the ship group were received.
   a. The ship group comes in one or more large boxes on pallets. The customer may not allow the pallet and large box in their machine room. Consequently, you may end up with a pile of parts on the floor.
   b. The side decorative covers that go between the racks are either packed in a separate long narrow box (early version) or are packed in the large ship group box (later version). The side covers for the later version fold in half.

c. The hardcopy listing of the ship group contents is shipped loose with the other parts inside the large boxes. If it is missing, check if it was accidently discarded along with the pallets and large boxes. An additional copy of the paperwork may be included in the CE Envelope.

d. The official ship group listing of parts is included in the ship group. Table 13 is for reference only.

Notes:

- Version 1 part numbers are *not* eligible for use in European Union member states.
- Version 2 part numbers are eligible for use everywhere including European Union member states.
- Only the most recent part numbers are listed. Your DS8000 or serviceable event FRU list may contain an older part number. The parts ordering system can automatically substitute a later part number as needed.

Table 13. Service ship group part numbers (expansion rack)

Description	Part number	
	Version 1	**Version 2**
Bolt, M8 x 20, interrack spacer	1621545	1621545
Cable, Ethernet, black, 31.0 m	22R1798	22R1798
Cable, Ethernet, gray, 31.0 m	22R1799	22R1799
CD-ROM, Code Bundle	[1]	[1]
CD-ROM, Customer Documents	[1]	[1]
CD-ROM, Service Documents	[1]	[1]
Cover, interrack decorative, side (one-piece)	22R4964	22R4964
Cover, interrack decorative, side (two-piece, hinged)[2]	23R1050[2]	23R1050[2]
Cover, interrack decorative, top	22R4962	22R4962
Drawing, interrack spacer stud	22R5481	22R5481
Label, operator panel warning, translated	22R1789	22R1789
Publication, Service Provider Start Here	22R4228	22R4228
Publication, Installation Guide	[1]	[1]
Publication, Installing an Expansion Rack	[1]	[1]
Publication, Statement of Limited Warranty	22R5940	22R6401
Publication, Waste Equipment (WEEE)	22R5822	22R5822
Spacer stud, interrack	22R5046	22R5046
Tag, "Do Not Operate"	23R0280	23R0280
Tie wrap	07J6655	07J6655
Washer, M8, interrack spacer	84X5850	84X5850
Wheel chocks (set of 4)	08J5557	08J5557

Notes:

1. The part number changes with each release. Call the next level of support.
2. A bracket (23R2044) and two nuts (84X4841) secure the two pieces at the hinge.

3. Place the ship group parts list in the document enclosure (front upper left of rack 1). This list can be used for future removal of the storage facility.

Determine if new expansion rack and existing rack 1 have compatible features

Determine if new and existing racks have compatible features.

1. Determine the model of the expansion rack being installed. Observe the machine type model serial number label beneath the UEPO red switch on the rack operator panel.
2. Determine the rack expansion feature code for the rack being installed.

   The feature codes are listed on the Product Package Label sheet that is attached to the outside of the shipping carton. Remove the CE Unpacking Instructions from the Customer Engineer envelope taped to the front of the rack below the CEC enclosures.
3. Use the following table to determine if the feature of the rack being installed is compatible with the existing Rack-1 model. The feature listed in the first column should also be on the Product Package Label sheet that is attached to the outside of the shipping carton. Later machines will also have a copy of the Product Package Label in the document enclosure (front upper left of rack). If the sheet is not available, use the description in the second column of the table to determine the feature.

Table 14. Compatible rack models and features

If Rack 1 is model:	Rack 2 must be model and rack position feature code	Rack 3 must be model and rack position feature code
921/931	92E with no I/O enclosures Feature code 0211	None
922/932	92E with four I/O enclosures Feature code 0221	92E with no I/O enclosures Feature code 0222
9A2/9B2	9AE with four I/O enclosures Feature code 0231	9AE with no I/O enclosures Feature code 0232

4. Is the rack being installed compatible with the Rack 1 model?
   - Yes, continue with step 5.
   - No, **stop**, contact the next level of support.
5. Determine if Rack-1 has the extended power line disturbance (PLD) feature 1055 installed.
   a. At the rear of Rack-1, observe the top rear of a primary power supply (PPS). Refer to Figure 51 on page 67, location Ex-E2. If the feature is not installed, there will be a sheet metal blockout plate as shown. If the feature is installed, there will be a module installed with cables going to the 208VDC bus bars to the right of the PPS.

   Note: All racks in this storage facility must either have the PLD feature installed or not installed. There cannot be an intermix of racks with and without the PLD feature.

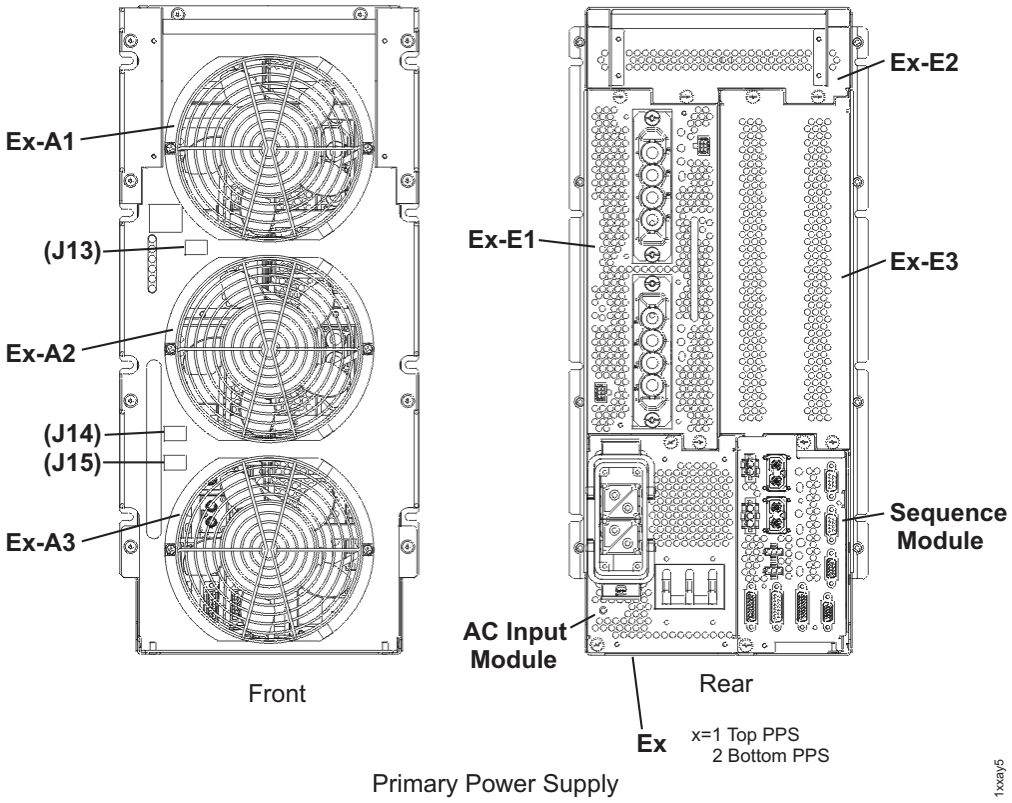


Figure 51. Locations for primary power supplies

6. Is the extended PLD feature 1055 present in Rack-1?
   - Yes, go to step 7.
   - No, go to step 8.
7. Does the expansion rack you are installing have the extended PLD feature present?
   - Yes, go to step 9.
   - No, stop the installation and call the next level of support. The extended PLD feature as well as the battery assembly feature will need to be ordered and installed on the expansion rack before the installation of the expansion rack can continue.
8. Does the expansion rack you are installing have the extended PLD feature present?
   - Yes, stop the installation and call the next level of support. All racks in this storage facility must either have the PLD feature installed or not installed. There cannot be an intermix of racks with and without the PLD feature.
   - No, go to step 9.
9. Count the number of device adapter cards in Rack-1 (for example: 4, 6, or 8). Device adapter cards will be in slot 3 or 6 of the four I/O enclosures as illustrated in Figure 52 on page 68.

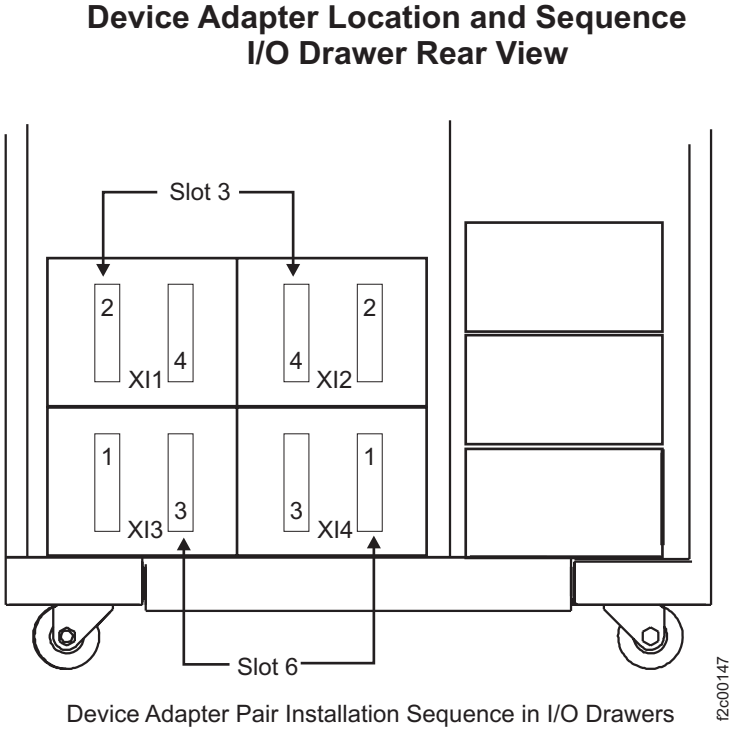


Figure 52. Device adapter location and sequence

10. Count the total number of storage enclosures (2 to 16) in the expansion rack being installed. Only count storage enclosures with DDMs present, do not count empty positions where storage enclosures are not yet present.
    - If there are 2 or 4 storage enclosures, Rack-1 must have six device adapter cards installed. (Three device adapter card pairs.)
    - If there are 3 to 16 storage enclosures, Rack-1 must have eight device adapter cards installed. (Four device adapter card pairs.)

    Does Rack-1 have enough device adapter cards?
    - Yes, continue with "Checking customer preparations" on page 63.
    - No, stop the installation and go to the next step.
11. Check with the customer to determine if they have purchased FC30x1 Device Adapters to be installed.

    Has the customer purchased FC30x1 Device Adapters?
    - Yes, refer to the Device Adapter MES Install Instructions for installation procedures.
    - No, call the next level of support.

Inspecting for shipping damage

1. Inspect the storage facility for any damage that might have occurred during shipping.
2. If you observe shipping damage or missing items, do not install the storage facility without IBM management approval. Report all observed damage immediately, following existing procedures.

Determining if a safety inspection is required

Find the condition that applies to your DS8000:

- New DS8000 from IBM. A safety inspection is not required. Continue with "Preparing the existing rack."
- Not a new DS8000 from IBM and was maintained by IBM. A safety inspection is not required. Continue with "Preparing the existing rack."
- Not a new DS8000 from IBM and was not maintained by IBM. A safety inspection is required. Continue with Safety inspection in the Service Information Center.

Preparing the existing rack

1. Ensure the HMC power control mode for this DS8000 is set to Manual Power Mode. If it is not in Manual Power Mode, note the current customer setting and then change the setting to Manual Power Mode. At the end of the installation you will be directed to restore the original customer setting.
   a. In the HMC Navigation area, under the **Management Environment**, expand the HMC (identified by hostname).
   b. Open **Service Applications** → **Service Focal Point**.
   c. In the right content area, select **Service Utilities**. A window opens that displays a list of Machine Type/Machine Serials.
   d. Select a Machine Type/Machine Serial from the list.
   e. Click **Selected** (on top tool bar), then select **Manage Power Control**.
   f. Click the radio button for **Manual Power Mode**.

   Note: This prevents the DS8000 from unexpectedly powering off during this service action if any of the following occur:
   - The HMC is set to power off/on using customer-determined time of day schedules.
   - The remote power control feature is installed and enabled.
   - The customer remotely accesses the HMC to power off the DS8000.
2. Prepare the DS8000 for the add expansion rack process:
   a. Log into the management console (HMC) for rack 1.
   b. In the HMC Navigation area, under the **Management Environment**, expand the HMC (identified by hostname).
   c. Open **Service Applications** → **Service Focal Point**.
   d. In the right content area, select **Install/Add/Remove Hardware**, a window displays a list of Machine Type/Machine Serial.
   e. Select the Machine Type/Machine Serial that the new rack is being installed to.
   f. Click **Selected** (on top tool bar), then select **Install Expansion Rack**.
   g. An Install Expansion Rack screen is displayed. Select **Install Rack with no I/O Enclosures (Concurrent)** and click **Submit**.
   h. Click **Continue** and follow the on screen guidance.
3. A User Input Message Box is displayed requesting you to enter information in three fields.
   a. Use Table 15 on page 70 to determine how to enter the information.
   b. After the information has been entered, the installation process will return you to this topic to continue at the next step.

      A User Input Message Box is displayed that requests you to enter the following information:

Table 15. Required information fields for User Input Message Box

Information field	Format of entry

Enter Rack MTMS
 	
MTMS label is on rack operator panel beneath the red UEPO switch. The label format is:
`Type 2NNN-MMM`
`S/N XX-YYYYY`
	2NNN-MMM*XXYYYYY (Enter in *uppercase*, and without the dash that is on the MTMS label between the XX and YYYYY.)
	• **MMM** = model
	• **XX** = plant of manufacture
	• **YYYYY** = rack serial number
	Note: If the MTMS is entered in lower case, the installation process will hang for several minutes and then fail.

Enter the number of battery enclosures containing battery modules (E10, E11, E12 in Figure 53 on page 71)	0 or 1 or 2 or 3
Enter the number of PPS modules present. See Figure 54 on page 72. • Ex-E1 is always present. • Ex-E2 is optional. The module is installed if there is a cable connector present. The module is not installed if there is a plain sheet metal dummy cover. • Ex-E3 is optional. **IMPORTANT:** – The cables to this module position are always present. – The module is present if it has LEDs and switches. – The module is not present if there are no LEDs and switches.	1 or 2 or 3 Only count positions Ex-E1, Ex-E2, and Ex-E3.

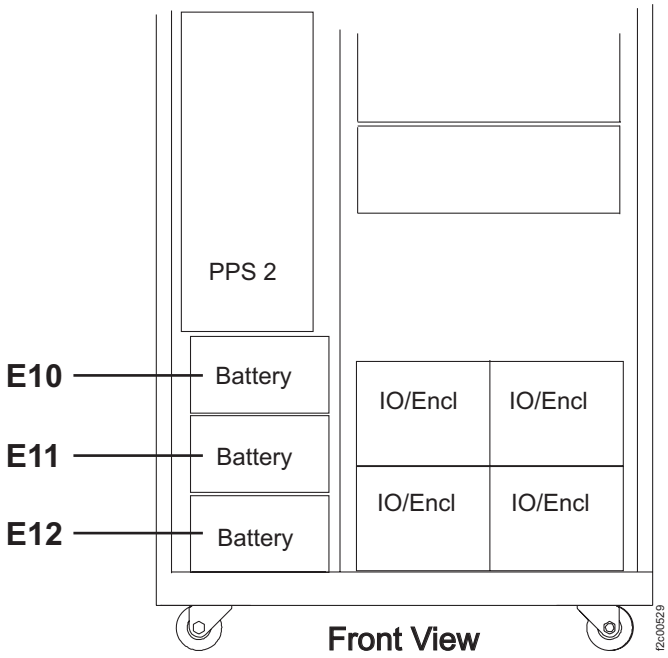


Figure 53. Battery module locations

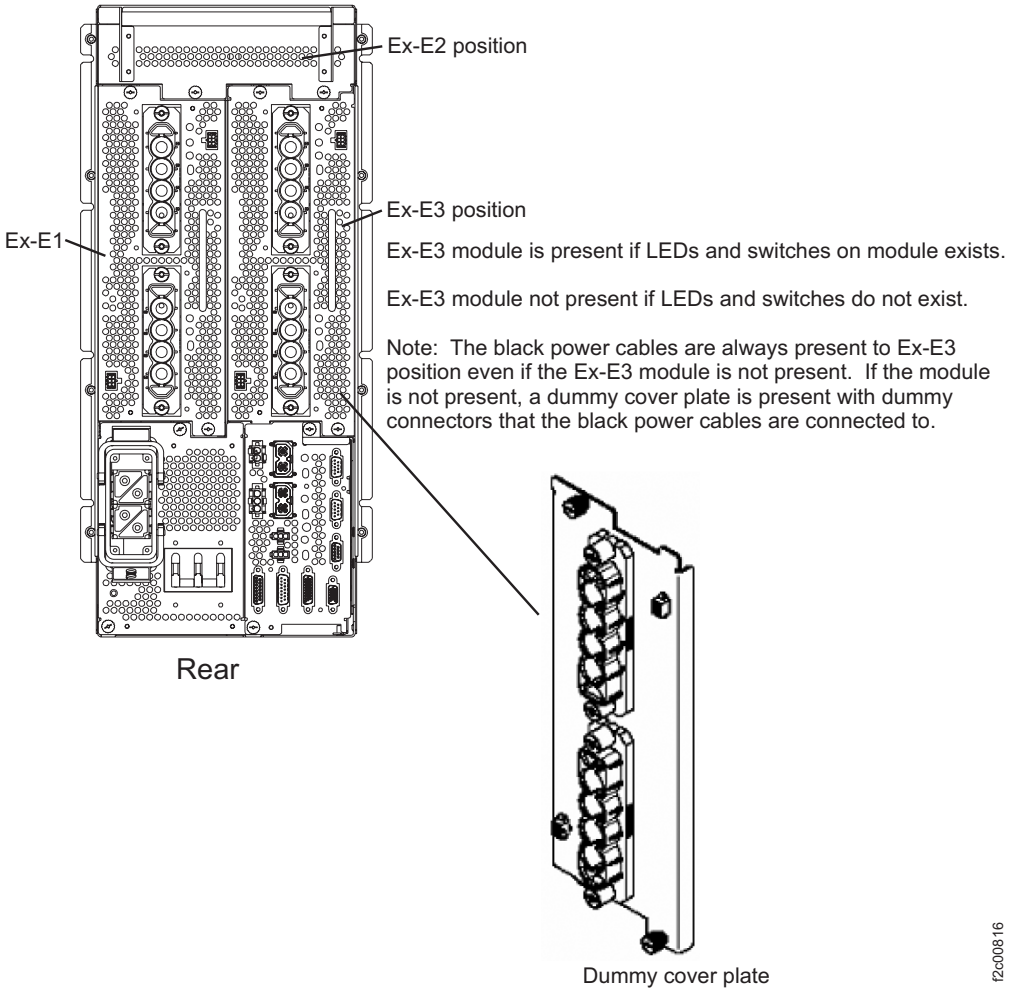


Figure 54. PPS module options

4. You have been returned to this step from the HMC expansion rack install process screen. Continue with "Positioning and preparing the rack."

Positioning and preparing the rack

Removing right end and left rear covers from Rack-1

1. Observe the right end cover (viewed from the front) of Rack-1 to determine which version you have.
   - Older version has two cover retaining brackets as shown in Figure 55 on page 73. Go to the next step.
   - Newer version does not have the two cover retaining brackets as shown in Figure 55 on page 73. Go to step 3 on page 74.
2. Remove the old version of the front right end cover from the rack that the new rack will be installed to as shown in Figure 55 on page 73 and Figure 56 on page 73. Pull the cover near the top sides to release it from the top "hook and loop" fasteners. Then pull lower down on each side of the cover to release it from the lower "hook and loop" fasteners. Failure to do this may bend the cover.

a. Release the two cover retaining brackets (pull them downward). See Figure 55. The cover is still secured to the frame by multiple "hook and loop" fasteners along each side of the cover.

   Note: Failure to follow the instructions in the following steps might result in a bent cover.

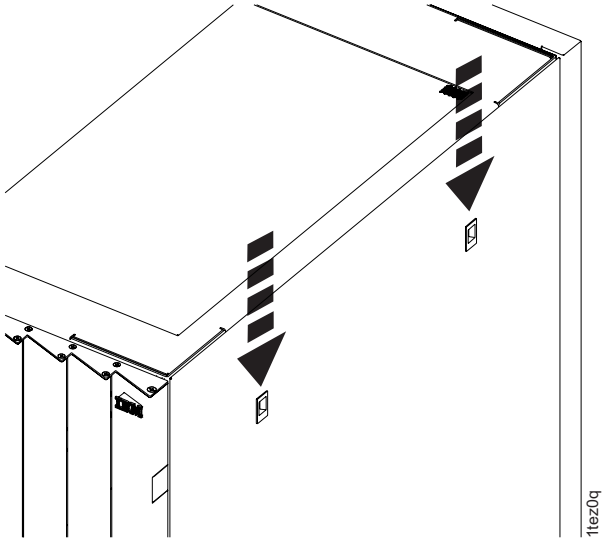


Figure 55. Disengaging the end cover

Attention: Pull lower down on each side of the cover to release it from the lower "hook and loop" fasteners. Failure to do this may bend the cover.

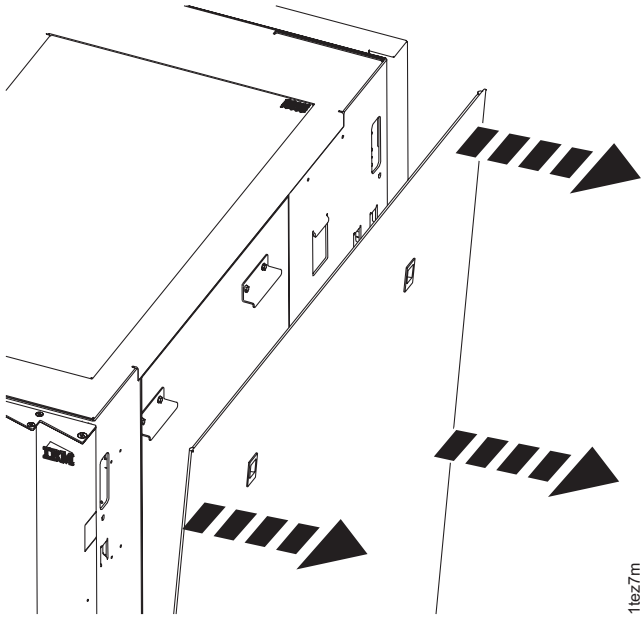


Figure 56. Removing the end cover

b. Pull the upper corners of the cover away from the rack to release the upper "hook and loop" fasteners and apply even pressure working your way down the sides. See Figure 56.

c. Further down, pull each side of the cover away from the rack to release the lower “hook and loop” fasteners and remove the cover.
d. Remove the two end cover catch brackets from the rack. They will be reinstalled on the new end rack later.
e. Go to step 4.

3. Remove the new version of the right end cover (viewed from the front) from Rack-1.
   a. Remove the two screws at the top of the end cover, they are not visible from the side of the rack. The cover is still secured to the frame by multiple “hook and loop” fasteners along each side of the cover.

      Note: Failure to follow the instructions in the following steps might result in a bent cover.

      Attention: Pull lower down on each side of the cover to release it from the lower ″hook and loop″ fasteners. Failure to do this may bend the cover.
   b. Pull the upper corners of the cover away from the rack to release the upper ″hook and loop″ fasteners and apply even pressure working your way down the sides. See Figure 56 on page 73.
   c. Further down, pull each side of the cover away from the rack to release the lower ″hook and loop″ fasteners and remove the cover.
   d. Go to the next step.
4. Remove the left rear cover from Rack-1. Refer to Figure 57.
   a. On the upper and lower door hinges, loosen the screw **1** and move the retention plate **2** that prevents the hinge pin **3** from being removed.
   b. Remove the hinge pins, remove the rear cover and place it in a safe location.

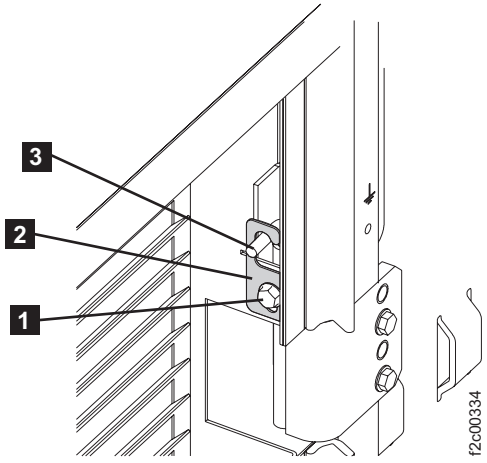


Figure 57. Removing rear left cover on Rack-1

5. Continue with “Checking for FC 1906 earthquake resistance kit.”

Checking for FC 1906 earthquake resistance kit

The earthquake resistance kit, Feature Code 1906, provides additional hardware to be installed. The kit stiffens the rack from flexing and also ties the rack directly to the concrete floor. The kit can be installed on a raised floor or non-raised floor.

- If the rack is new from IBM, the MES hardware kit for FC 1906 would be shipped with the rack.
- If the rack has been discontinued from another account, and the earthquake resistance kit was originally installed there, the kit would have been removed and shipped separately.

  The original kit included parts to tie-down the rack to a non-raised floor, a low raised floor, and a high raised floor. Parts not used at the original installation may not have been kept and shipped. If you are installing on a different floor type than the original floor type, you may not have all the necessary parts. Call the next level of support.

Important: If FC 1906 is to be installed, the base rack and any attached expansion racks must all have FC 1906 installed.

1. Is the Earthquake Resistance Kit Feature (FC 1906) to be installed on this storage facility?
   - Yes, go to Chapter 4, "Installing the earthquake resistance kit feature FC 1906," on page 119, then return here and continue at the next step.
   - No, continue with the next step.
2. Continue with "Positioning the storage expansion rack".

Positioning the storage expansion rack

If you have questions about floor loading and service clearances of the DS8000 racks, review the Site Requirements for the DS8000 section in the *IBM System Storage DS8000 Introduction and Planning Guide* which is available on the *IBM System Storage DS8000 series Service Documents CDROM*.

1. View the rack number label to determine the rack location. See Figure 58 for the location of the rack number label.

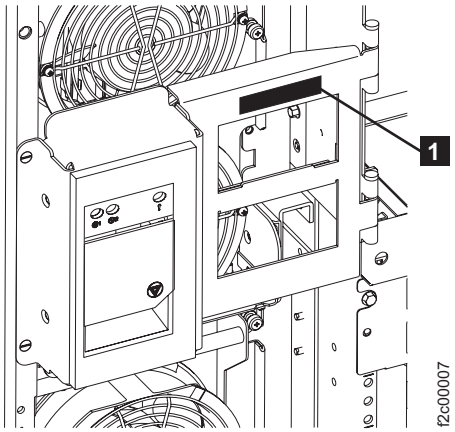


Figure 58. Rack operator panel label

2. Facing the front of Rack-1, all additional expansion racks will be installed to the right. Move the storage expansion rack into position approximately 3″ (75mm) from the existing rack.
3. Ensure the rack operator panel UEPO switch clear access cover is present. Some racks may be shipped with the cover removed and stored in a plastic bag in the document enclosure above the rack operator panel. The cover pivots on two small tabs at the top of the cover. To install the cover engage

the left side tab 1 , push the cover gently to the right and then engage the right tab 2 . See Figure 59.

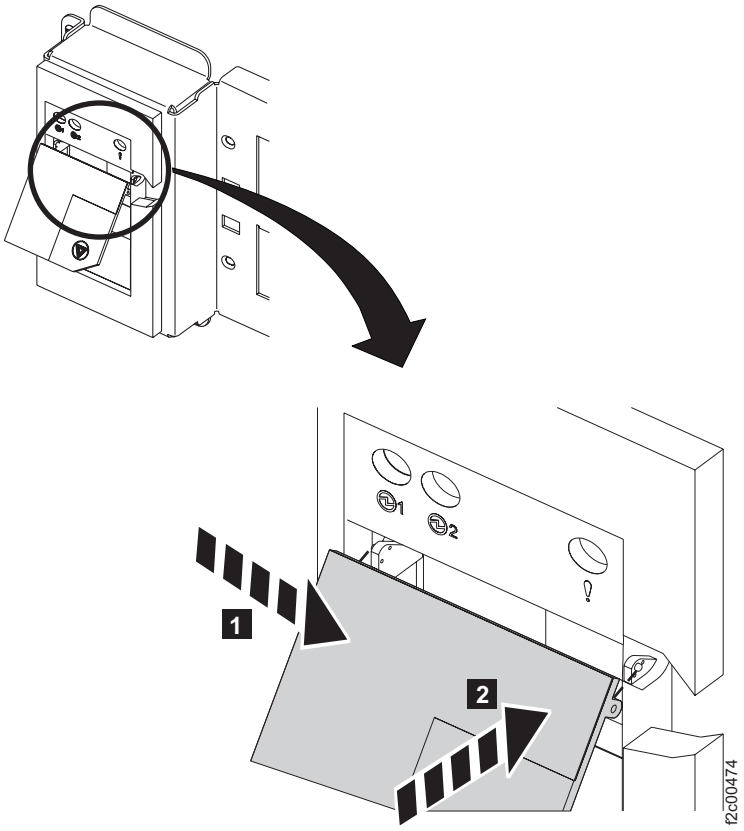


Figure 59. UEPO cover

4. Locate 4 x spacer studs P/N 22R5046, 7 x spacer mounting bolts P/N 1621545, and 7 x M8 washers P/N 84X5850 in the ship group.
5. Install the bottom spacer stud at the rear of the existing rack (Rack 1 or the storage expansion rack that is already installed).
   a. Refer to Figure 60 on page 77. Install a spacer stud 3 in the lower rear left corner of the rack using a mounting bolt 1 and a washer 2 . Leave the bolt loose so that it will be easier to align the spacer stud with the bolt from the new frame.

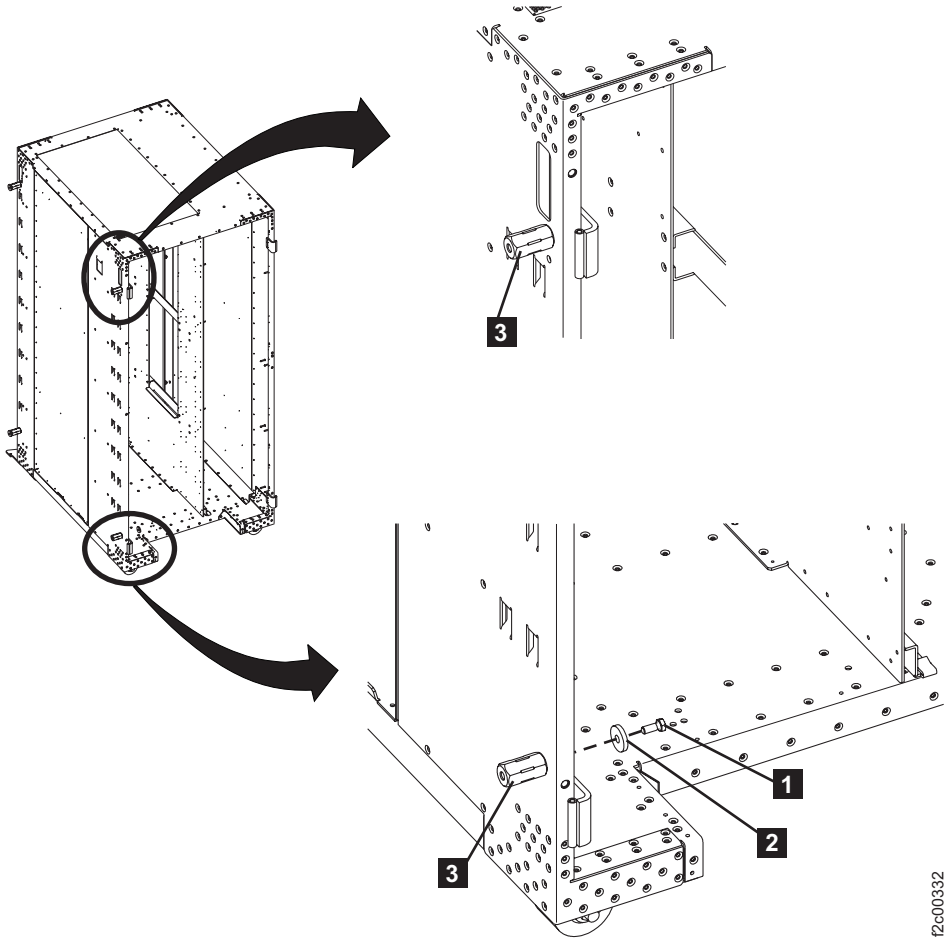


Figure 60. Interrack spacer studs

6. Determine the part number (P/N) of the interrack decorative side covers in your ship group. The P/N is printed near the middle of each side cover. There are two side covers and one top cover in the long narrow shipping box.
   - P/N 22R0786 (original version) go to step 7.
   - P/N 22R4964 (new version) go to step 8.
7. In the upper rear left corner of the existing rack, next to the hinge are two holes, one above the other. Use the upper hole and install a spacer stud **3** using a mounting bolt **1** and a washer **2**, see Figure 60. Do not tighten the bolt fully as some alignment will be needed. You can hold the side cover next to the spacer studs to ensure the spring clips align properly before going to step 9 on page 78.

   Note: On early frames, it may be necessary to remove the rear left top hinge and spacer plate to allow the mounting bolt to be inserted. Reinstall the hinge and plate when the bolt has been tightened.
8. In the upper rear left corner of the existing rack, next to the hinge, there are two holes; one above the other. Use the lower hole and install a spacer stud **3** using a mounting bolt **1** and a washer **2**, see Figure 60. **Do not** tighten the bolt fully as some alignment will be needed. You can hold the side cover next to the spacer studs to ensure the spring clips align properly before going to step 9 on page 78.

Note: On early frames, it may be necessary to remove the rear left top hinge and spacer plate to allow the mounting bolt to be inserted. Reinstall the hinge and plate when the bolt has been tightened.

9. On the rear of the storage expansion rack being installed, perform the following steps to remove the right cover.
   a. Open the rear left machine cover.
   b. Remove and retain the two screws **1** and open the rear right machine cover. Refer to Figure 61.

      Note: The screws must be reinstalled later to prevent non-service personnel from accessing a hazardous section of the machine.

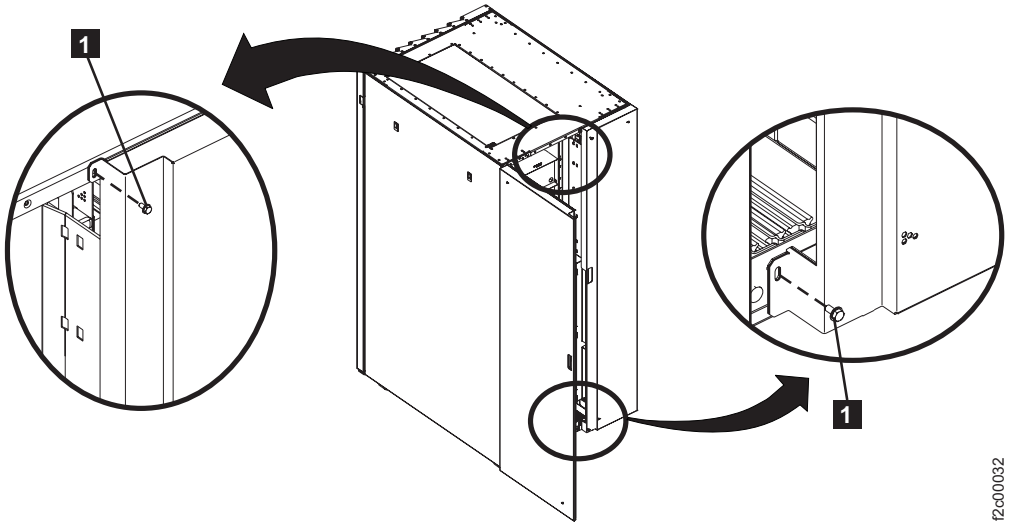


Figure 61. Removing retaining screws on right rear machine cover

   c. On the upper and lower door hinges, loosen the screw **1** and move the retention plate **2** that prevents the hinge pin **3** from being removed. Refer to Figure 62.
   d. Remove the hinge pins, remove the rear cover and place it in a safe location.

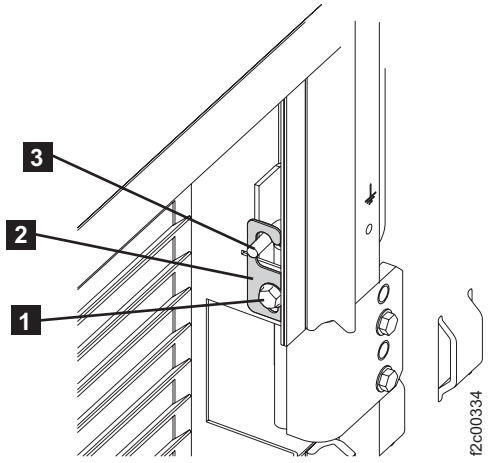


Figure 62. Removing rear left cover on Rack-1

10. Return to the front of the racks. Do not remove any front covers. Install 2 spacer studs on the front left of the storage expansion being installed.
    a. Install a spacer stud in the lower front left corner of the rack using a mounting bolt and a washer. **Do not** tighten the bolt fully as some alignment will be needed.
    b. Install a spacer stud in the upper front left corner of the rack using a mounting bolt and a washer. **If there are two frame holes near the hinge, use the same hole (upper or lower) as you did at the rear of the rack. Do not** tighten the bolt fully as some alignment will be needed.
11. Move the storage expansion rack being installed into its final position.
12. At the rear, secure the storage expansion rack being installed to the existing rack using one bolt and washer in the upper position only. The bolt is screwed into the spacer stud previously installed. Do not tighten the bolt fully.

    Note: It is not possible to install the bolt at the bottom of the rack because the 208VDC bus bars block access.
13. At the front, insert two bolts and washers from the left rack and screw into the spacer studs previously installed in the right rack. When the alignment is correct, tighten all the bolts that have been installed.
14. Install the wedge chocks **1** (located in the ship group) on all four casters. If caster locks are available, engage the caster locks on all casters. Refer to Figure 63.

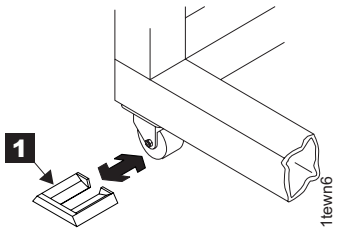


Figure 63. Wedge chocks

15. Continue at the next section.

Reinstalling the right end cover on the right-most rack

The right end cover was previously removed in the task "Removing the right end cover from the existing rack".

1. Which version of the Rack-1 end cover do you have?
   - Old version has two cover retaining brackets. Go to the next step.
   - New version has two screws at the top of the cover. Go to step 3.
2. Install the two cover catch brackets from Rack 1 on the expansion rack. Install the right end cover (removed earlier) on the expansion rack, then go to step 4.

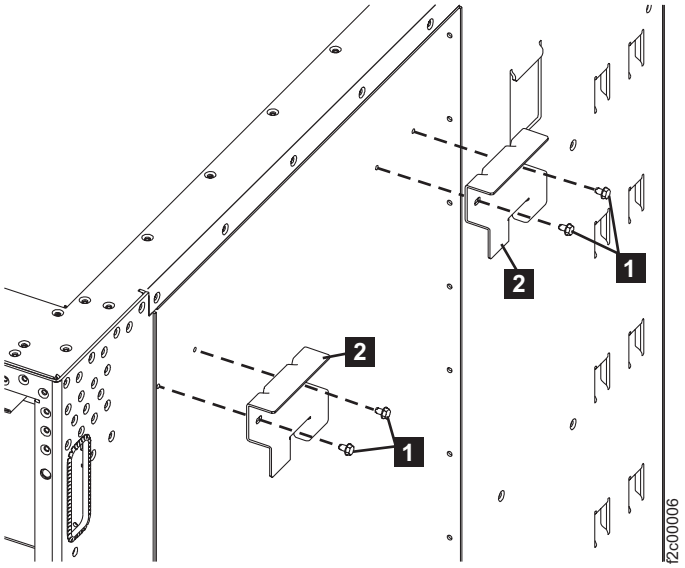


Figure 64. Removing/replacing right end cover

3. Does the expansion rack have the two screw holes in the top of the rack for the right end cover?
   - Yes, install the right end cover (removed earlier) on the expansion rack securing it with the two top screws.
   - No, call the next level of support. You will need to order the old version right end cover, retaining brackets and screws. Continue the installation without the right end cover.
4. Continue at the next section.

Opening the 208VDC bus bar gate

1. There are two versions of the Air baffle, determine which one you have:
   - Old version - one piece of sheet metal that must be removed before the 208VDC bus bar gate to the right of the baffle can be swung to the open position. Go to the next step.
   - New version - sheet metal with a flexible plastic cutout at the right rear (see **3** in the figure that follows). The plastic cutout bends out of the way when the 208VDC bus bar gate is swung open. Go to step 3.
2. Remove the two screws **1** and take out the Air baffle **2** as shown in Figure 65 on page 81. Retain the parts for later re-installation.

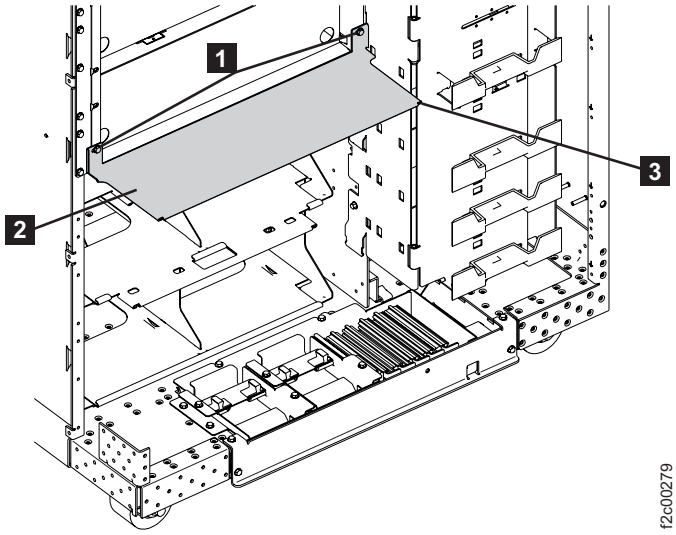


Figure 65. Air baffle

3. Remove the two screws **1** and pivot the 208VDC bus bar gate to the service position **2**, as shown in Figure 66.

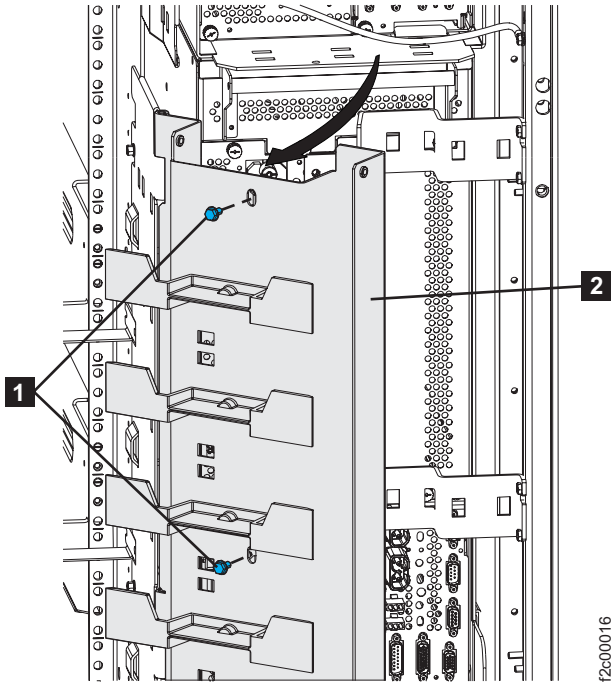


Figure 66. 208VDC bus bar gate service position

4. Remove the tailgate frame bracket. Remove two screws **2** as shown in Figure 67 on page 82. Loosen but do not remove the two top screws **1**. Slide the bracket out.

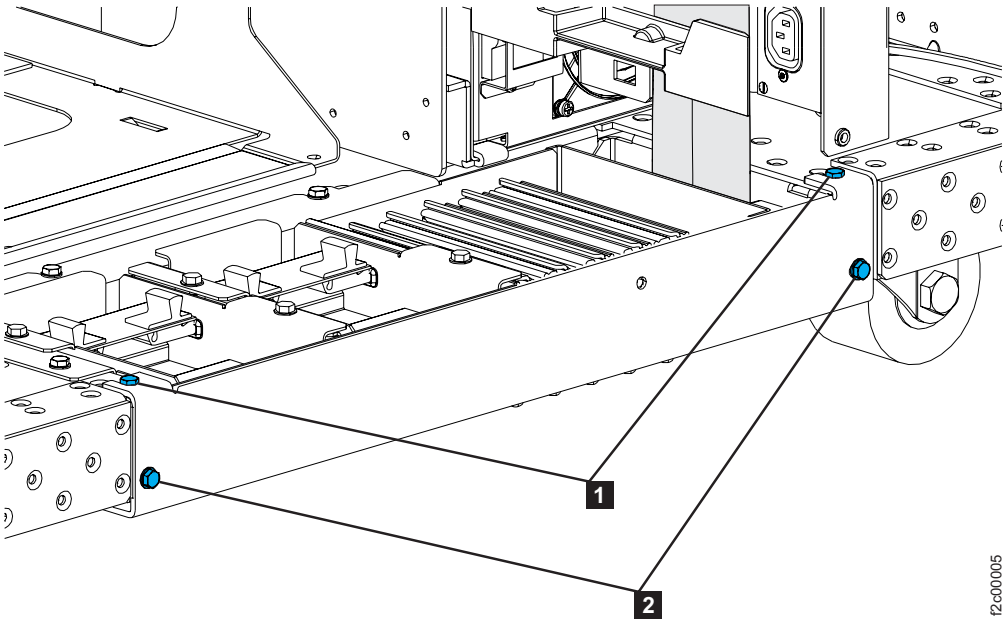


Figure 67. Tailgate frame bracket

5. Continue with "Installing the interrack decorative covers kit."

Installing the interrack decorative covers kit

1. Locate the interrack decorative covers kit. It contains two side interrack covers and one top interrack cover. There are two versions of the interrack decorative covers kit.
   - Early version - the covers are packaged in a long narrow cardboard box normally taped to the expansion rack. The side interrack covers are one piece. Go to step 3.
   - Later version - the covers are packaged in the large ship group box. Each side interrack cover is in two pieces that are hinged together. Go to the next step.
2. Assemble each of the side interrack covers as follows:
   a. Open the hinged side interrack cover **1** so that it is straight. See the following figure.
   b. Loosen the two nuts **2** on the threaded studs next to the hinge points.
   c. Slide the plate **3** so that it engages both studs.
   d. Tighten both nuts.

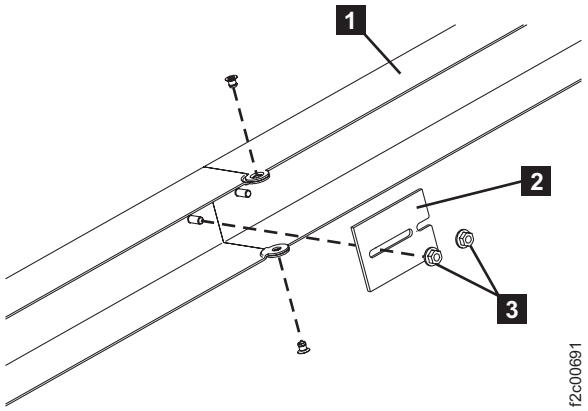


Figure 68. Assembling the later version of the interrack decorative side covers

3. Install each of the two interrack side covers by pushing the cover into place over the interrack spacing studs. Take care not to interfere with any interrack cables. See Figure 69.
4. Install the top interrack cover by pressing it down squarely. The spring clips should hold the cover in place. See Figure 69.

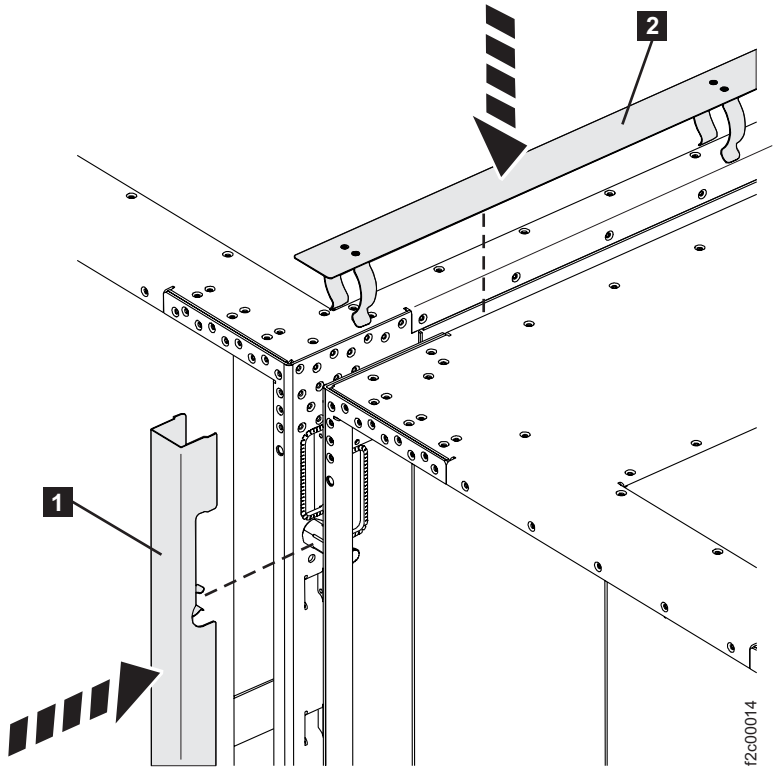


Figure 69. Installing the interrack decorative covers

5. Continue with "Checking for weight reduction feature."

Checking for weight reduction feature

The weight reduction feature removes storage enclosures and/or battery modules to reduce the total rack weight. These parts are then shipped on a separate pallet and must be reinstalled.

1. Was the Weight Reduction Feature (FC 0200) ordered for this storage expansion rack?

   Note: If FC 0200 was ordered, the Storage Enclosures will have been removed in manufacturing and shipped separately.

   - Yes, go to Chapter 3, "Installing hardware removed by weight reduction feature FC 0200," on page 111. Return here and continue when the storage enclosures have been installed.
   - No, continue with the next step.
2. Continue with "Performing the power and safety checks".

Performing the power and safety checks

Preparing to check DS8000 and customer power

DANGER

Lethal voltages are present in this area of the machine.

You will need the following tools to perform the power safety checks:

- For resistance checks, IBM analog ohmmeter P/N 00P7029 (Mastech Model 7040).
- For voltage checks, IBM digital multimeter P/N 8496278 (Fluke Model 179).
- For probing, high voltage test probe tips P/N 43L0951.

Note: Use listed P/N or equivalent approved by IBM.

Steps

1. Read the Danger notice and requirements above.
2. Continue with "Routing the mainline power cables".

Routing the mainline power cables

1. Uncoil the mainline power cables from the ship group.
2. The mainline power cable that connects to PPS-1 (upper) is longer than the mainline power cable that connects to PPS-2 (lower). Use the cable label and part number (P/N) to identify the longer cable.

Table 16. Cable label and part number

Feature Code	P/N of shorter cable	P/N of longer cable
1090 - 3 phase 60A non EMEA	22R1190	22R2222
1091 - 3 phase 60A EMEA	22R3794	22R3795
1092 - 3 phase 60A Japan	22R1191	22R2224
1093 - 3 phase 60A Chicago	22R1188	22R1189

3. Ensure the 208VDC bus bar gate **4** is in the open position. Refer to Figure 70 on page 85.
4. Route and connect the mainline power cables. Refer to Figure 70 on page 85 to complete the following steps:
   a. Route the longer mainline power cable up through the tailgate as shown and connect it to PPS-1 (upper).

b. Route the cable in between the 5/12V DDM "Y " power cables that connect the PPS-2 (lower) to the 5/12V bus bars as shown.

   Note: To make this easier, you can temporarily disconnect the right most connectors of the "Y" cables by removing the 4 screws **2** and moving the power cable **1** out of the way. The screws are not captive, so do not let them fall when they are removed.

c. Use a "hook and loop" fastener cable tie to fasten the upper cable to the bracket **3** .

d. Route the shorter mainline power cable up through the tailgate as shown and connect it to PPS-2 (lower).

Notes:

- If this is on a raised floor, route the cables down through the floor cutout and near the customer power connectors.
- If this is not on a raised floor, route the cables underneath the frame behind the rear caster so they exit to the side. The cables must not exit the rack in the front or rear service areas.

CAUTION:
Do not connect the mainline power cables to customer power until instructed to do so.

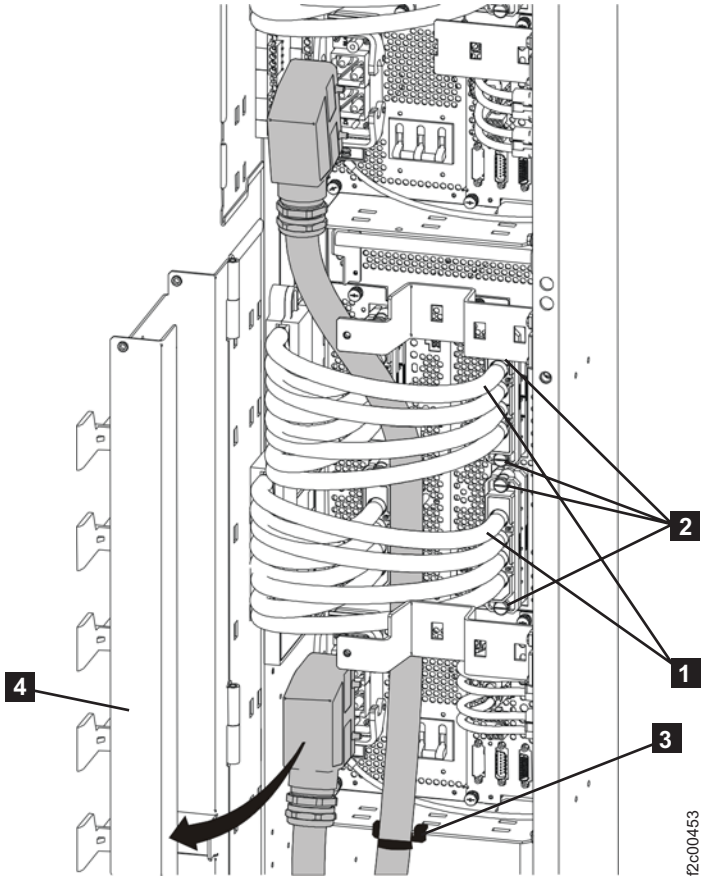


Figure 70. Routing the mainline power cables

Determining mainline power cable type (plug-in or wired)

1. Locate the customer end of the mainline power cables from all the DS8000 frames that you are installing.
2. Determine if the customer end of the mainline power cables are for plug-in or wired installations.
   - Plug-in: The mainline power cable has a plug at both ends. Go to "Checking customer power for a plug-in mainline power cable."
   - Wired: The mainline power cable has a plug at one end and loose wires at the other end. Go to "Checking customer power for a ″wired″ mainline power cable" on page 90.

Checking customer power for a plug-in mainline power cable

Repeat the following sections for both mainline power cables in the rack being installed.

Checking DS8000 power system ground continuity and voltage (plug in)

Attention: Use an IBM-approved analog multimeter. Do not use a digital meter.

1. Switch off the customer circuit breaker that supplies AC voltage to the mainline power cables.

   CAUTION:
   Do not connect the mainline power cables until instructed to do so.
2. **Attention:** Attach a "Do Not Operate" tag (S229-0237) and the safety lockout padlock to each customer circuit breaker that was switched off.
3. Verify the MAIN LINE circuit breaker **1** (CB00) on the rear of each primary power supply is set to Off (down). Refer to Figure 71 on page 87.

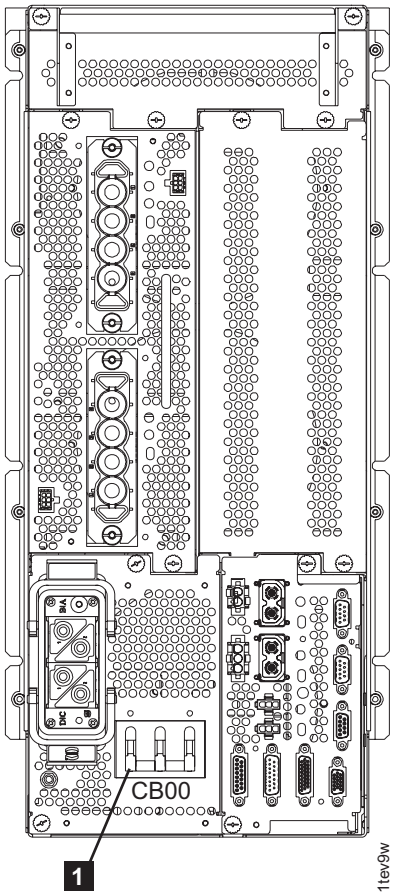


Figure 71. Rear view of PPS showing CB00

4. Verify the DS8000 mainline power cables are not connected to the customer power.
5. Prepare the multimeter to measure 0.1 ohm or less resistance. Place one lead of the multimeter on the ground pin of the male plug on the mainline power cable. Place the other lead on the conductive metal of its primary power supply enclosure. Refer to Figure 72 on page 88 for the location of the ground pin. Do this for each mainline power cable.

   Is there more than 0.1 ohm of resistance?

   - Yes, go to MAP2330 Repair rack ground continuity. To display the MAP, open the service Information Center on the management console, then open the **Isolation MAPs and Symbolic FRU procedures** section to locate the MAP.
   - No, go to "Checking customer receptacle ground pin continuity with customer CB off (plug in)" on page 88.

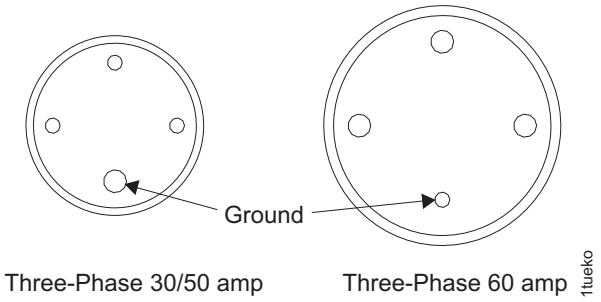


Figure 72. Three-phase amp

Checking customer receptacle ground pin continuity with customer CB off (plug in)

1. Prepare the multimeter to measure 1.0 V ac or less. Measure the voltage at the customer's AC power outlet between the ground pin and the building ground.

   Is the voltage less than 1.0 V ac?

   - Yes, go to step 3.
   - No, continue with the following step.
2. Voltage is present at a customer outlet with the customer circuit breakers off.

   DANGER

   Inform the customer that, even though the circuit breaker is off, voltage higher than 1.0 V ac is measured at the failing customer voltage outlet pins. Do not continue until the voltage is less than 1.0 V ac. (1003)
3. Prepare the multimeter to measure 1.0 ohm or less of resistance.
4. Measure the resistance between the customer AC power outlet ground pin and the building ground. Refer to Figure 73 for the location of the ground pin.

   Is the resistance 1.0 ohm or less?

   - Yes, continue with "Checking customer receptacle voltage pins with customer CB off (plug in)" on page 89.
   - No, inform the customer. **Do not continue until the resistance is 1.0 ohm or less.**

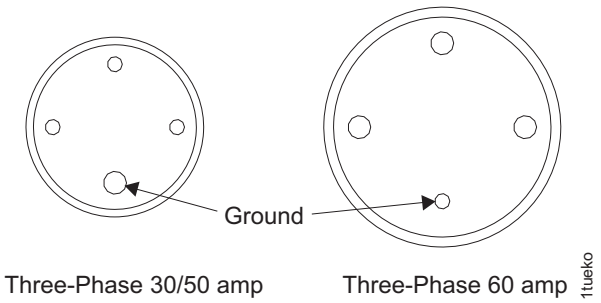


Figure 73. Three-phase amp

Checking customer receptacle voltage pins with customer CB off (plug in)

Prepare the multimeter to measure 1.0 V ac or less. Measure the voltage between each pair of voltage pins (**A**, **B**, and **C**) on the customer outlet. Also, measure the voltage between each voltage pin and ground pin on the customer outlet. Did any voltage measure more than 1.0 V ac? Refer to Figure 74 for the location of the voltage pins.

- Yes, inform the customer that one or more voltage pins on the customer receptacle measured greater than 1.0 V ac even though the circuit breaker is off. **Do not continue until the voltage is less than 1.0 V ac.**
- No, continue with the next task, "Checking customer receptacle voltage pins with customer CB on (plug-in)."

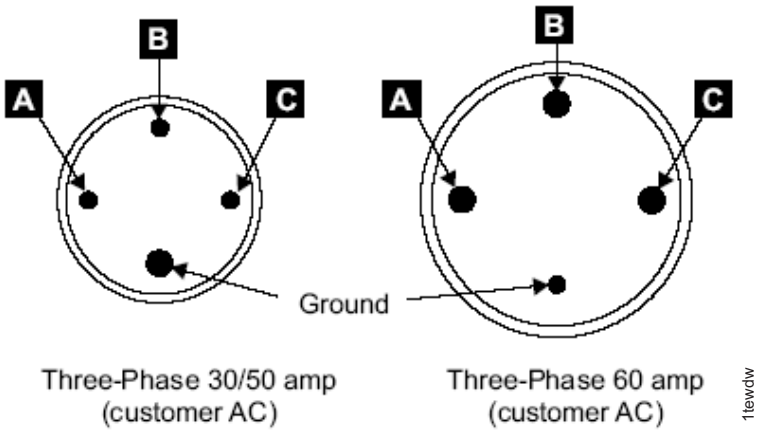


Figure 74. Measuring voltage between each pair of pins

Checking customer receptacle voltage pins with customer CB on (plug-in)

1. Remove the "Do Not Operate" tag and the lockout padlock from each customer mainline AC voltage circuit breaker and then switch on the customer circuit breaker.
2. Prepare the multimeter to read line voltage AC.

   DANGER

   Dangerous voltages may be present. Do not touch the internal parts (pins and connectors) of the customer receptacle.

3. Measure the voltage between the ground pin and each voltage pin (**A** , **B** , and **C**) on the customer outlet. Refer to Figure 75 on page 90 for the location of the voltage pins.

   Are the voltages within 10% of each other?

   - Yes, continue with the next step.
   - No, inform the customer that the voltages are not correct. **Do not continue until the voltages are correct.**
4. Locate the DS8000 information label located near the top of the left side panel at the rear of the DS8000. Measure the voltage between each pair of voltage pins (**A** to **B** , **B** to **C** , and **C** to **A**) on the customer outlet. Refer to

Figure 75 for the location of the voltage pins. Verify that the customer AC input voltage that you just measured matches the machine input voltage information on the label.

Do the voltages correspond with the label?

- Yes, continue with "Connecting the mainline power cables on the racks (plug-in)."
- No, **do not continue with the installation**. Contact the marketing representative to confirm that the DS8000 was ordered with the correct power input feature.

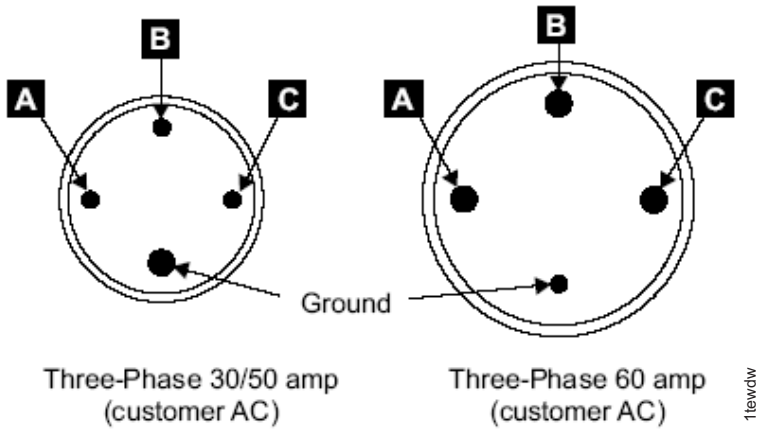


Figure 75. Measuring voltage between each pair of pins

Connecting the mainline power cables on the racks (plug-in)

DANGER

An electrical outlet that is not correctly wired could place hazardous voltage on the metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock. (D004)

1. Switch the customer circuit breaker to Off for the mainline power cables.

   Attention: Attach a "Do Not Operate" tag (S229-0237) and the safety lockout padlock to each circuit breaker.
2. Verify the mainline circuit breaker (CB00) on the rear of each primary power supply is set to Off (down).
3. Connect each storage facility mainline power cable plug to the customer AC outlet.
4. Continue with "Checking the expansion rack switch settings" on page 95.

Checking customer power for a ″wired″ mainline power cable

Use the following power sections to check the customer's power for a wired mainline power cable.

Check power system ground continuity and voltage (wired)

Attention: Use an IBM-approved analog multimeter. Do not use a digital meter.

1. Switch off the customer circuit breaker that supplies the AC voltage to the mainline power cables.

   CAUTION:
   Do not connect the mainline power cables until instructed to do so.
2. **Attention:** Attach a "Do Not Operate" tag (S229-0237) and the safety lockout padlock to each customer circuit breaker that was switched off. Refer to the *Electrical Safety for IBM Customer Engineers*.
3. Verify the MAIN LINE circuit breaker **1** (CB00) on the rear of each primary power supply is set to Off (down). Refer to Figure 76.

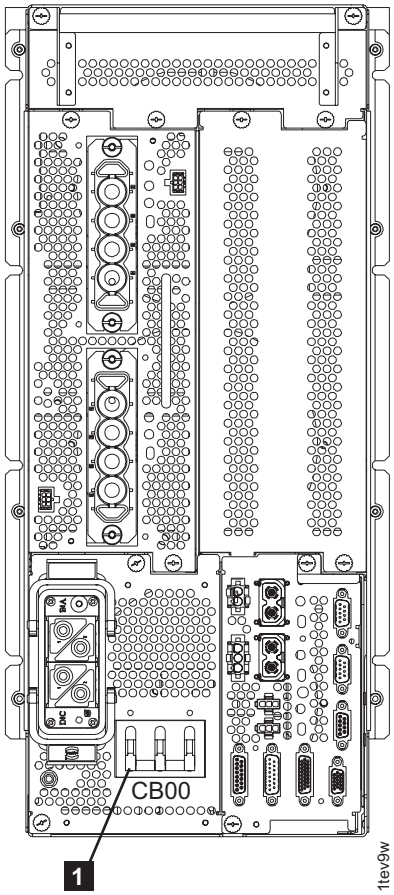


Figure 76. Rear view of PPS showing CB00

4. Verify the DS8000 mainline power cables are not connected to the customer power.
5. Connect the DS8000 mainline power cable to each primary power supply (PPS) input power connector.

   Note: Ensure that you connect the long mainline power cord to the upper primary supply and the short mainline power cord to the lower primary supply.
6. Prepare the multimeter to measure 0.1 ohm or less resistance. Place one lead of the multimeter on the green and yellow wire at the customer end of each mainline power cable. Place the other lead on the conductive metal of each PPS enclosure. Refer to Figure 77 on page 92.

   Is there more than 0.1 ohm of resistance?

- Yes, go to MAP2330 Repair rack ground continuity.
- No, continue with the next step.

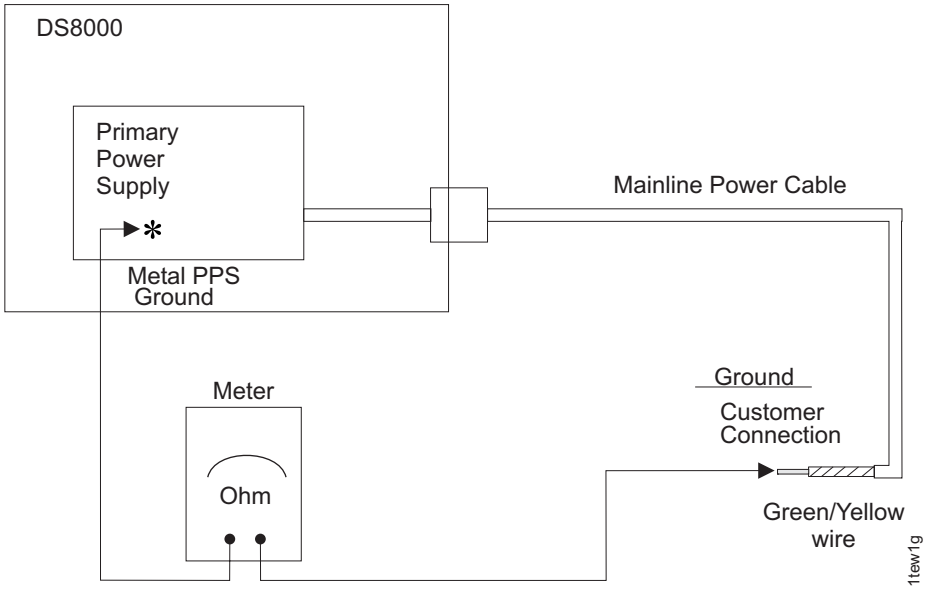


Figure 77. Prepare multimeter to measure ohm resistance

7. Disconnect the DS8000 mainline power cables from each PPS input power connector.
8. Instruct the customer to call a licensed electrician to connect each wired mainline power cable to the customer mainline power source.

   Attention: For EMEA installations, provide the following information to the electrician.

   EMEA Electrician Information

   The mainline power cord of this machine must be connected to the customer's mainline power source by a licensed electrician. The mainline power cable cannot be modified in any way.

   - For 3-phase machines:

     This machine must be connected to a 3-phase AC power. The mainline power cable is a four-conductor cable with the following color code:

     – L1 (phase 1) = black
     – L2 (phase 2) = blue
     – L3 (phase 3) = brown
     – PE (ground) = green/yellow

   Note: The connection to the AC power must be made without neutral, the blue wire must be used as a phase.
9. Continue with "Checking customer ground continuity with customer CB off (wired)."

Checking customer ground continuity with customer CB off (wired)

1. Prepare the multimeter to measure 1.0 V ac or less. Measure the voltage on the female ground pin on each mainline power cable and building ground. Refer to Figure 78 on page 93.

Is the voltage less than 1.0 V ac?

- Yes, go to step 3.
- No, continue at the following step.

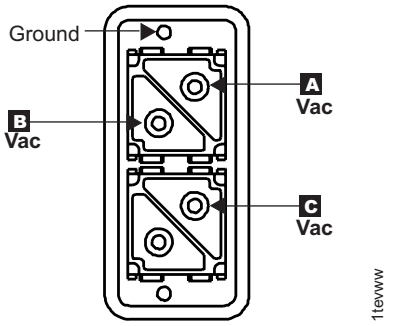


Figure 78. Mainline power cable connector

2. Voltage is present at a customer outlet with the customer circuit breakers off.

   DANGER

   Inform the customer that even though the circuit breaker is off, voltage higher than 1.0 V ac is measured at the failing customer voltage outlet pins.

   Do not continue until the voltage is less than 1.0 V ac.

3. Prepare the multimeter to measure 1.0 ohm or less of resistance.
4. Measure the resistance between the female connector ground pin on each mainline power cable and the building ground.

   Is the resistance 1.0 ohm or less?

   - Yes, continue with "Checking customer voltage with customer CB off (wired)."
   - No, inform the customer. **Do not continue until the resistance is 1.0 ohm or less**.

Checking customer voltage with customer CB off (wired)

1. Prepare the multimeter to measure 1.0 V ac or less.
2. Measure the voltage between each pair of voltage pins on the female connector on each mainline power cable. Also, measure the voltage between each voltage pin (**A**, **B**, and **C**) and the ground pin on each mainline power cable. Refer to Figure 79 on page 94.

   Did any voltage measure more than 1.0 V ac?

   - Yes, inform the customer that one or more voltage pins on the customer supply measured greater than 1.0 V ac even though the circuit breaker is off. **Do not continue until the voltage is less than 1.0 V ac.**
   - No, continue with "Checking customer voltage with customer CB on (wired)" on page 94.

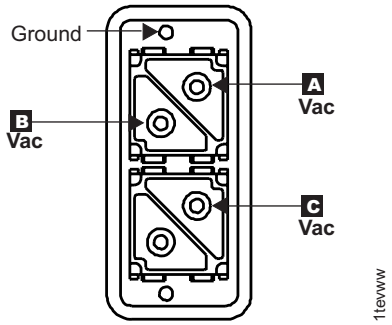


Figure 79. Mainline power cable connector

Checking customer voltage with customer CB on (wired)

1. Remove the "Do Not Operate" tag and the lockout padlock from each customer mainline AC voltage circuit breaker and then switch on the customer circuit breaker.
2. Prepare the multimeter to read line voltage AC.

   DANGER

   Dangerous voltages may be present. Do not touch the internal parts (pins and connectors) of the customer receptacle.

3. Measure the voltage between the ground pin and each voltage pin (**A** , **B** , and **C**) on each mainline power cable. Refer to Figure 80.

   Are the voltages within 10% of each other?

   - Yes, continue with the next step.
   - No, inform the customer that the voltages are not correct. **Do not continue until the voltages are correct.**

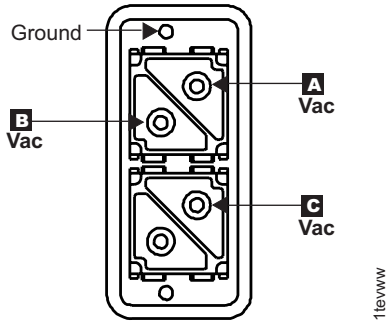


Figure 80. Mainline power cable connector

4. Locate the DS8000 information label located on the top of the left side panel at the rear of the storage facility. Measure the voltage between each pair of voltage pins (**A** to **B** , **B** to **C** , and **C** to **A**) on each mainline power cable. Refer to Figure 80. Verify that the customer AC input voltage that you just measured matches the machine input voltage information on the label.

   Does the voltage measured match the voltage on the DS8000 information label?

   - Yes, continue with "Connecting the mainline power cables on the racks (wired)" on page 95.

- No, **do not continue with the installation.** Contact the marketing representative to confirm that the DS8000 was ordered with the correct power input feature.

Connecting the mainline power cables on the racks (wired)

DANGER

An electrical outlet that is not correctly wired could place hazardous voltage on the metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock. (D004)

1. Switch the customer circuit breaker to Off for the mainline power cables.

   Attention: Attach a "Do Not Operate" tag (S229-0237) and the safety lockout padlock to each circuit breaker.
2. Verify the mainline circuit breaker (CB00) on the rear of each primary power supply is set to Off (down).
3. Connect each storage facility mainline power cable plug to the PPS then continue with "Checking the expansion rack switch settings."

Checking the expansion rack switch settings

1. Verify the setting of the following switches on each expansion rack. Each rack has:
   - One UEPO switch
   - Two PPSs
   - Zero to three battery enclosures

Table 17. Switch settings and locations for expansion racks

Switch	Setting	Location	Figure reference
Battery enclosure circuit breakers CB0 and CB1.	On (up)	On each battery assembly (rear of rack)	2 in Figure 81 on page 96
UEPO red switch	Off (down)	Rack operator panel (front of rack) **Note:** Press the recessed switch towards the bottom. It will appear flat when off.	n/a

Figure 81 on page 96 shows the rear view of the rack:

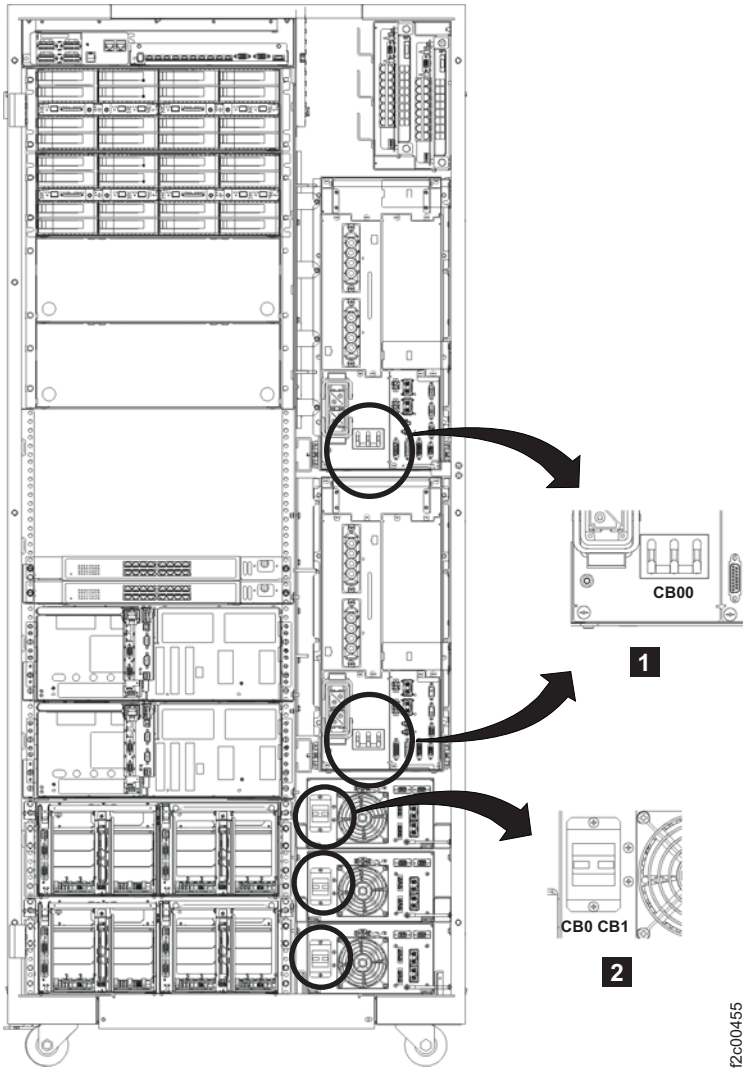


Figure 81. Rack rear view

2. Continue verifying the settings of the following switches on the expansion rack.

Table 18. Switch settings and locations for expansion rack PPS sequencer module

Switch	Setting	Location	Figure reference
Primary power supply circuit breaker CB00	Off (down)	On each PPS, on the AC input power module (rear of rack)	1 in Figure 81
Primary power supply three sequencer module enable/disable switches	Enabled (up)	Three switches on each PPS (rear of rack)	1 in Figure 82 on page 97
Enable/disable switches on the PPS 5/12 V DDM power module	Enabled (up)	Two switches on each PPS (rear of rack)	1 in Figure 83 on page 98

Figure 82 on page 97 shows the enable disable switches for the primary power supply sequencer module.

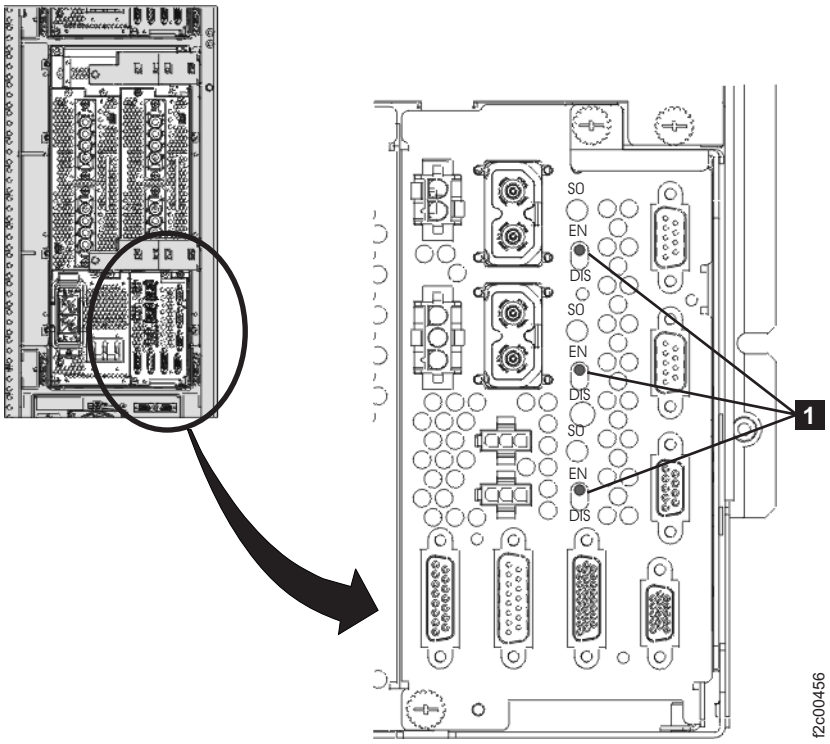


Figure 82. PPS sequencer module and LED enable/disable switch

Figure 83 on page 98 shows the enable disable switches for the primary power supply DDM.

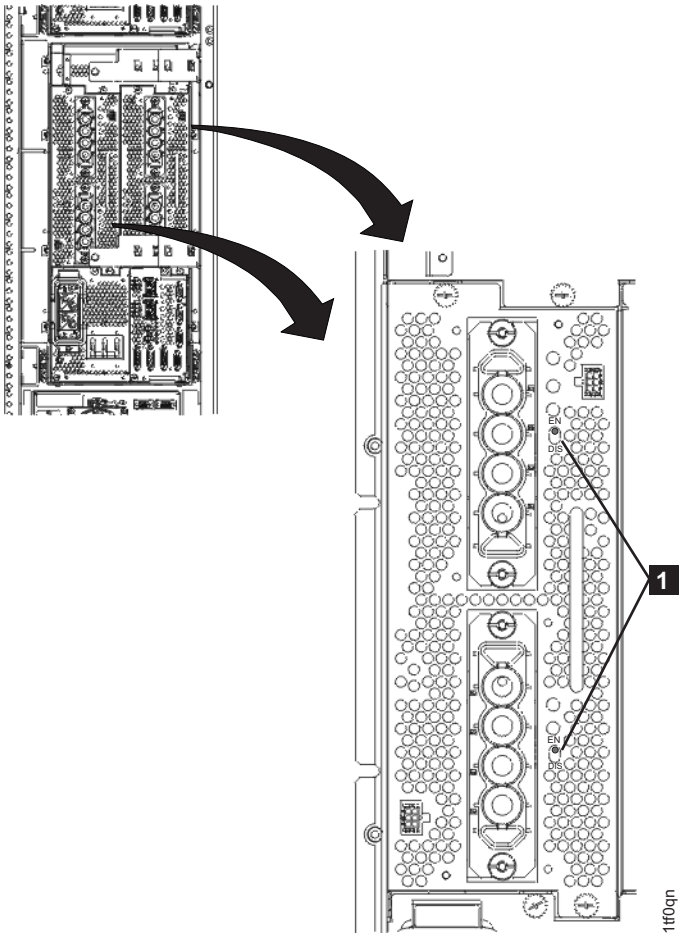


Figure 83. Enable/disable switches on a 5/12 V DDM power module (PPS)

3. Continue with "Checking the operation of the rack UEPO switch."

Checking the operation of the rack UEPO switch

1. Remove the "Do Not Operate" tag and the lockout padlock from each customer mainline AC voltage circuit breaker that supplies power to thestorage facility that you are installing.
2. Switch on each customer circuit breaker.
3. Switch the MAINLINE CB00, on the rear of each primary power supply to On (up).
4. Observe the six vertical LED indicators at the front of each primary power supply (to the left of the fans).

   Note: The Rack 1 UEPO switch must be in the On position.

   Use Table 19 to find the condition that applies:

Table 19. LED indicators when MAINLINE CB00 is on

AC INPUT GOOD	UEPO LOOP GOOD	PPS Display Panel	Action
On	Off	Ignore	Normal condition, continue with the next step

Table 19. LED indicators when MAINLINE CB00 is on (continued)

AC INPUT GOOD	UEPO LOOP GOOD	PPS Display Panel	Action
On	On	Ignore	UEPO fault, go to MAP21F0 UEPO loop good LED should be off
Off	Off	Ignore	Input power fault, go to MAP2050 Loss of AC Input to a single primary power supply. **Note:** If both PPSs are failing, then repeat the customer voltage checks done previously.

5. Push a paper clip through the small hole in the operator panel to reset the UEPO red switch to the On (up) position.

   Use Table 20 to find the condition that applies:

Table 20. LED indicators when UEPO switch is on

AC INPUT GOOD	UEPO LOOP GOOD	PPS Display Panel	Action
On	On	Blank, U0 or XC **Note:** Some levels of PPS firmware will cause an XC error code to be displayed. This is a false error. The condition will remain until the DDM power supply is turned on in a later step. No action is required. Continue with the next step.	Normal condition, continue with the next step.
On	On	Error code	Go to MAP21A0 PPS fault isolation during install.
On	Off	N/A	UEPO fault, go to MAP21E0 UEPO Loop Good LED should be on.

6. Swing the 208VDC bus bar gate back into its non-service position. Reinstall and tighten the two retaining screws.
7. If you removed the Air baffle **2** earlier to allow the 208VDC bus bar to swing open, reinstall it. See Figure 84 on page 100.

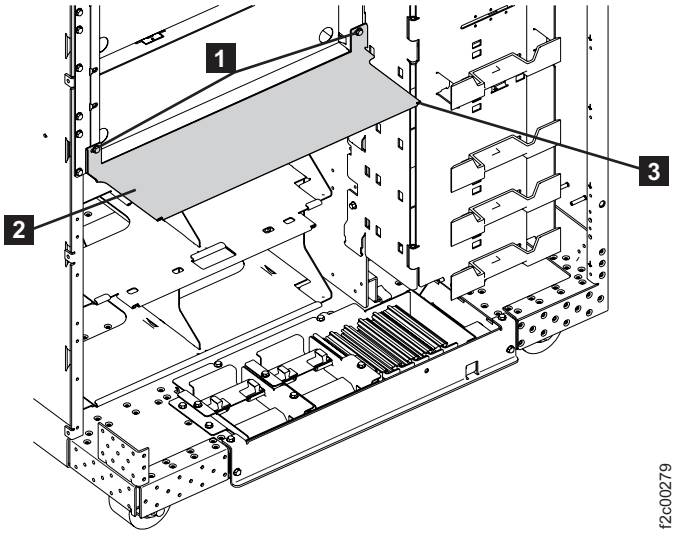


Figure 84. Air baffle

8. Continue with "Cabling, powering on, and verifying the storage facility."

Cabling, powering on, and verifying the storage facility

Use the topics in this section to connect the power control cables to start power on the rack and then verify the storage facility.

Connecting the power control cables to power on the rack

1. Locate the two RPC cables in the top rear of the expansion rack. Route the cables through the hole at the top rear right side to the RPC cards in Rack 1. If this is not Rack 2, then the cables will need to be routed through all the intermediate racks between this one and Rack 1.

   Note: On early production racks, the cables may be labeled with "Base Rack". On later production racks, they will be labeled with"Rack 1".

2. In the next step, connecting the PPS to RPC power control cables will power on the expansion rack automatically.

   Note: Because Rack-1 is already powered on, the RPC card ports for the expansion racks are also sending power on signals.

3. Connect the power control cables into the RPC connector as indicated in Table 21 on page 101 and Figure 85 on page 101.

   Note: On some early production storage expansion racks, the cables were labeled "RPC-0" and "RPC-1".

   The cable labeled "RPC-0" must be connected to RPC1.

   The cable labeled "RPC-1" must be connected to RPC2.

   Important: Do not cross the cables between the RPC cards. This could result in an unscheduled power drop during repair activities. If the RPC number labeling is not clear, trace the cables back to the PPS.

   - The cable to RPC1 originates from connector J1 on both PPSs.
   - The cable to RPC2 originates from connector J2 on both PPSs.

- Some cables are color coded. Later versions may have a gray label for RPC1 and a yellow label for RPC2.

Table 21. Rack numbers and RPC connector locations

Rack Number being installed	2	3	4	5	6	7
RPC 1 and RPC 2 connector	J203	J205	J207	J209	J211	J213

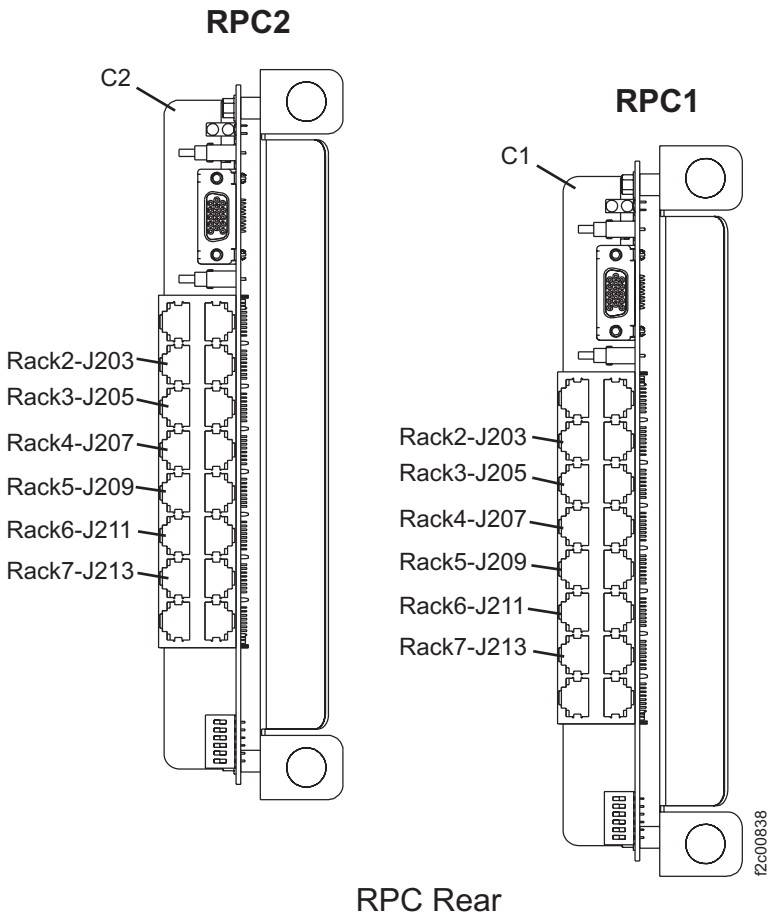


Figure 85. RPC card locations

Verifying the storage facility

1. Verify the storage facility. Return to the HMC screen that sent you back to these instructions and click the **Continue** button.
2. The install process will continue and verify the new rack.
   a. If the verify process completes successfully, you will be sent back here. Continue at "Finish install and cleanup" on page 108.
   b. If the verify process does not complete successfully and an exception screen is displayed, call the next level of support.

Installing and testing the storage enclosures

Use the procedures in this section to logically install and test the storage enclosures in this expansion rack.

1. **YOU MUST DISCONNECT** the FCIC card connector T3 and T4 FC-AL cables now in the storage enclosure being installed. Do this at the front and back of the rack.

   Note: You must do this now to ensure that each storage enclosure in the expansion rack can be physically cabled and logically installed one at a time. If these FC-AL cables are left connected, in later steps some of the storage enclosures will be discovered too early in the installation process which may cause problems that require the next level of support.

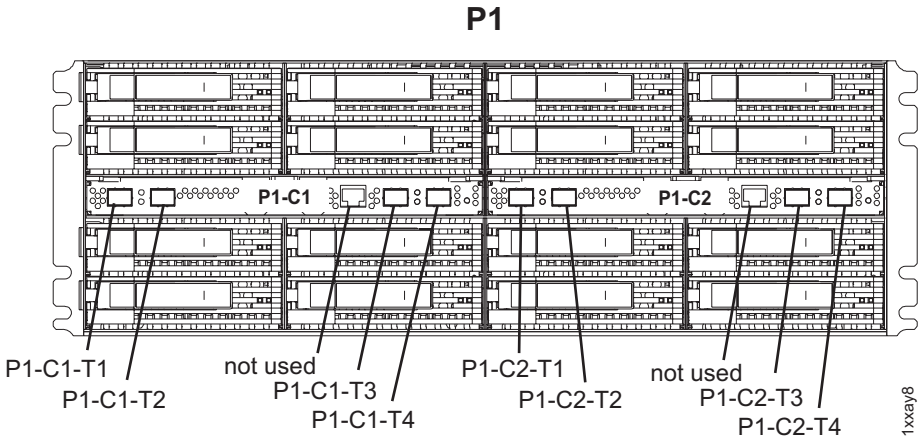


Figure 86. Storage enclosure connections

2. Determine the number of storage enclosure pairs in the expansion rack that will be installed to each DA pair in Rack 1. (A DA pair is two device adapter cards, each in a different I/O enclosure but sharing the same storage enclosures.)
   a. An example of a storage enclosure pair are storage enclosures XS11 and XS21 in Figure 87 on page 103.

      Note: On the HMC as well as in Table 22, they are referred to as S11 and S21.

   b. In Table 22 column 3, put a check mark in front of each storage enclosure pair that is present in the expansion rack.
   c. In Table 22 column 4, write down the number of storage enclosure pairs for each DA pair ID.

Table 22. Storage enclosures pairs per DA pair

DA pair ID (from HMC)	DA pair (location code of I/O enclosure slot)	Storage enclosure pairs (Location from HMC / Location on Figure 87 on page 103	Record the number of storage enclosure pairs present for each DA pair ID
2	I/O enclosure XI3 Slot C3 I/O enclosure XI4 Slot C6	___ S15 and S25 / XS15 and XS21 ___ S16 and S26 / XS16 and XS26	
0	I/O enclosure XI1 Slot C3 I/O enclosure XI2 Slot C6	___ S17 and S27 / XS17 and XS27 ___ S18 and S28 / XS18 and XS28	

Table 22. Storage enclosures pairs per DA pair (continued)

DA pair ID (from HMC)	DA pair (location code of I/O enclosure slot)	Storage enclosure pairs (Location from HMC / Location on Figure 87	Record the number of storage enclosure pairs present for each DA pair ID
3	I/O enclosure XI3 Slot C6 I/O enclosure XI4 Slot C3	___ S11 and S21 / XS11 and XS21 ___ S12 and S22 / XS12 and XS22	
1	I/O enclosure XI1 Slot C6 I/O enclosure XI2 Slot C3	___ S13 and S23 / XS13 and XS23 ___ S14 and S24 / XS14 and XS24	

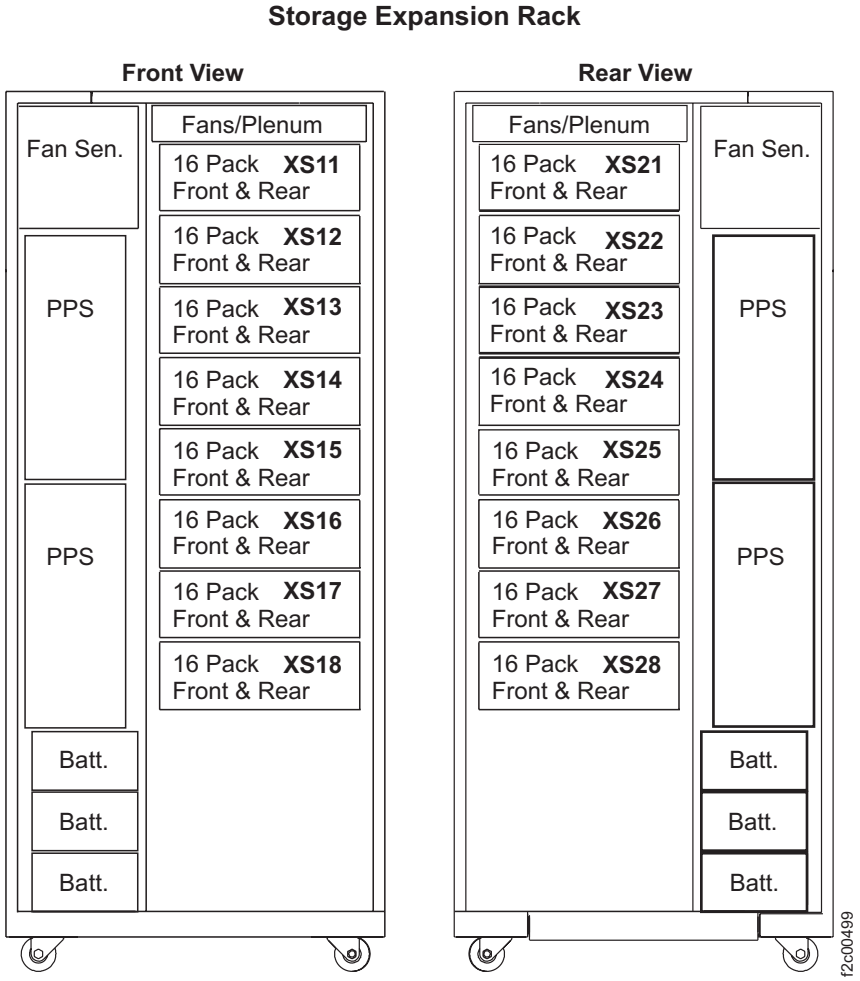


Figure 87. Storage expansion rack without I/O enclosures

3. Determine if Rack-1 has 8 device adapter cards installed. Device adapter cards will be in slot 3 or 6 of the four I/O enclosures at the bottom of rack 1. Refer to Figure 88 on page 104 and Figure 89 on page 104. Are there 8 device adapter cards installed?
   - Yes, go to step 5 on page 105.
   - No, go to step 4 on page 104.

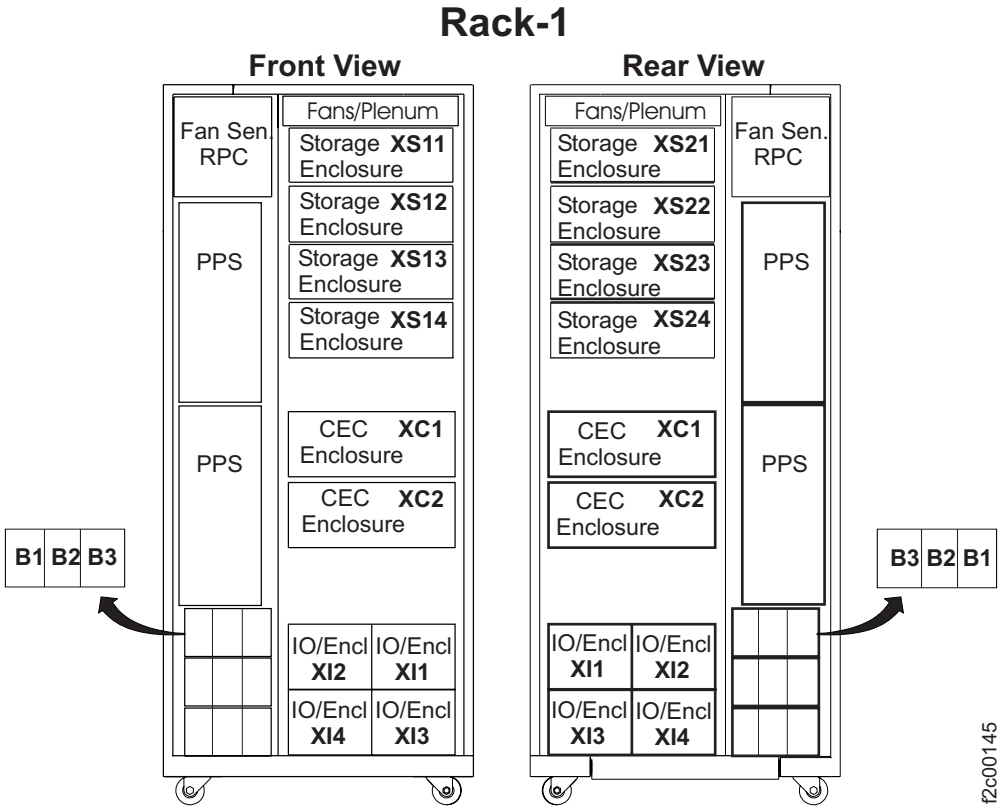


Figure 88. Physical location codes (Rack-1)

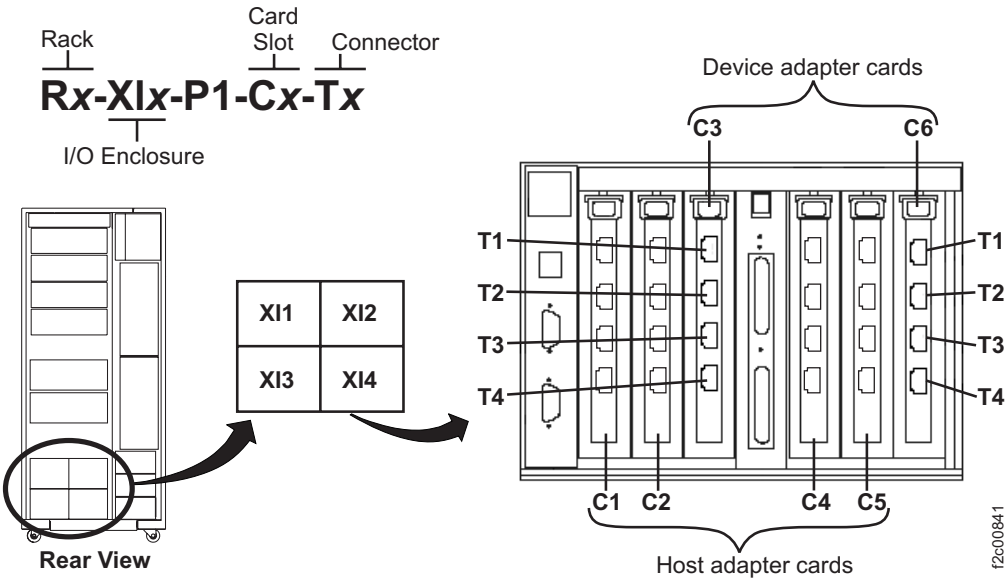


Figure 89. I/O enclosure locations (rear)

4. Determine if Rack-1 has enough device adapter cards to connect the storage enclosures that are present in the new expansion rack. Observe the rear of the rack and use Table 23 on page 105 to answer the question that follows.

   Note: Device adapter cards and storage enclosures comes in pairs, but as shown in the table you are only required to check for one of each.

Table 23. Determine device adapter cards needed

If the new expansion rack has a storage enclosure present in this physical location, (reference Figure 87 on page 103)	Rack-1 must have a device adapter card in this I/O enclosure and slot (reference Figure 88 on page 104 and Figure 89 on page 104)
S21 (XS21)	I/O enclosure XI3 Slot C6
S23 (XS23)	I/O enclosure XI1 Slot C6
S25 (XS25)	I/O enclosure XI4 Slot C6
S27 (XS27)	I/O enclosure XI2 Slot C6

Are the required device adapter cards present in rack 1?

- Yes, go to step 5.
- No, stop and call the next level of support. Additional device adapter cards must be added to Rack-1 to install all the storage enclosures. Another option is to continue the installation and only install those storage enclosures for the device adapter cards that are present. The HMC storage enclosure guided process will only allow you to install storage enclosures that have the proper device adapter cards already installed.

5. You are installing one or more pairs of storage enclosures. The management console GUI screen will prompt you for one storage enclosure at a time and will continue to redisplay the screens until all the storage enclosures have been installed.

   Note: The HMC process will display the physical location of the next storage enclosure to be installed.

   a. In the HMC Navigation area, under the **Management Environment**, expand the HMC (identified by hostname).
   b. Open **Service Applications** → **Service Focal Point**.
   c. In the right content area, select **Install/Add/Remove Hardware**, a window displays a list of storage facilities.
   d. Select the storage facility, click **Selected** (on top tool bar), and then select **Install Storage Enclosure or DDMs**. A window displays asking if you were sent from the installation instructions. Click **Yes**.
   e. A window displays prompting you what to install. Select **Install Storage Enclosures** and then click **Submit**.
   f. If rack 1 is a Model 9A2 or 9B2, a window may open that prompts for the storage facility image to assign the storage enclosures to. Select the storage facility image and then click **Submit**.

      Note:

      The storage facility serial number ends in 0.
      The first storage facility image serial number ends in 1.
      The second storage facility image serial number ends in 2.

   g. A window displays a listing of DA pairs available for additional storage enclosures, select the DA Pair and click **OK**.
   h. A window displays a listing of the possible numbers of storage enclosure pairs that can be installed. Refer to Table 22 on page 102 column 4 for each DA pair ID. Select the number to install and click **OK**.
   i. A window displays listing the physical location code of the storage enclosures to be connected. If the location codes are correct, click **OK**.

j. When the HMC screen directs you to return to these installation instructions, go to the next step.

6. The HMC screen has returned you here with a storage enclosure physical location code displayed for the expansion rack being installed.
   - The storage enclosure physical location code displayed by the HMC is of the format “Rx-Sxx”. The storage enclosure physical location codes in Figure 87 on page 103 are of the format ″XSxx″. They both refer to the same location.
   - Using the displayed physical location code, refer to Figure 87 on page 103 to determine the location of the storage enclosure in the rack.
   - Ensure the FC-AL cables (four total) are connected to the T1 & T2 connectors on both FCIC cards in the storage enclosure being installed. The other end of these four cables are not yet connected.
7. Connect the four FC-AL cables for each storage enclosure in the new expansion rack. Two FC-AL cables come from each FCIC card in the storage enclosure.

   Note: Do not connect any other FC-AL cable until directed.

   a. Find the physical location code displayed by the HMC in column one of Table 24, Table 25 on page 107, or Table 26 on page 107.
   b. Use columns two, three, and four to determine the physical location to connect the other end of the four blue FC-AL cables.
   c. Refer to Figure 87 on page 103, Figure 88 on page 104 and Figure 89 on page 104 to find the location of the enclosure for the other end of the cables.
   d. Each end of the FC-AL cable is prelabeled with either the physical location code of the enclosure and connector location or just the connector location it connects to.
   e. Find and connect the four cables determined using columns 2 through 4 in Table 24.
   f. For the rack to rack routing of the FC-AL cables, see Figure 90 on page 108.
   g. Go to the next step.

Table 24. FC-AL cable connections to I/O enclosures in Rack-1

Physical location of new expansion rack storage enclosure displayed on HMC screen:	Physical location to connect the four FC-AL cables to:		
	Rack	I/O Enclosure and slot	Connector
Rx-S11	Rack-1	XI3 Slot 6 and XI4 Slot 3	T1 & T2 (Top two connectors)
Rx-S13	Rack-1	XI1 Slot 6 and XI2 Slot 3	T1 & T2 (Top two connectors)
Rx-S21	Rack-1	XI3 Slot 6 and XI4 Slot 3	T3 & T4 (Bottom two connectors)
Rx-S23	Rack-1	XI1 Slot 6 and XI2 Slot 3	T3 & T4 (Bottom two connectors)

Table 25. FC-AL cable connections to storage enclosures in Rack-1

Physical location of new expansion rack storage enclosure displayed on HMC screen:	Physical location to connect the four FC-AL cables to:		
	Rack	**Storage enclosure**	**Connector**
Rx-S15	Rack-1	XS12	T3 & T4 on both FCIC cards
Rx-S17	Rack-1	XS14	T3 & T4 on both FCIC cards
Rx-S25	Rack-1	XS22	T3 & T4 on both FCIC cards
Rx-S27	Rack-1	XS24	T3 & T4 on both FCIC cards

Table 26. FC-AL cable connections to storage enclosures in same Rack

Physical location of new expansion rack storage enclosure displayed on HMC screen:	Physical location to connect the four FC-AL cables to:		
	Rack	**Storage enclosure**	**Connector**
Rx-S12	New expansion rack	XS11	T3 & T4 on both FCIC cards
Rx-S14	New expansion rack	XS13	T3 & T4 on both FCIC cards
Rx-S16	New expansion rack	XS15	T3 & T4 on both FCIC cards
Rx-S18	New expansion rack	XS17	T3 & T4 on both FCIC cards
Rx-S22	New expansion rack	XS21	T3 & T4 on both FCIC cards
Rx-S24	New expansion rack	XS23	T3 & T4 on both FCIC cards
Rx-S26	New expansion rack	XS25	T3 & T4 on both FCIC cards
Rx-S28	New expansion rack	XS27	T3 & T4 on both FCIC cards

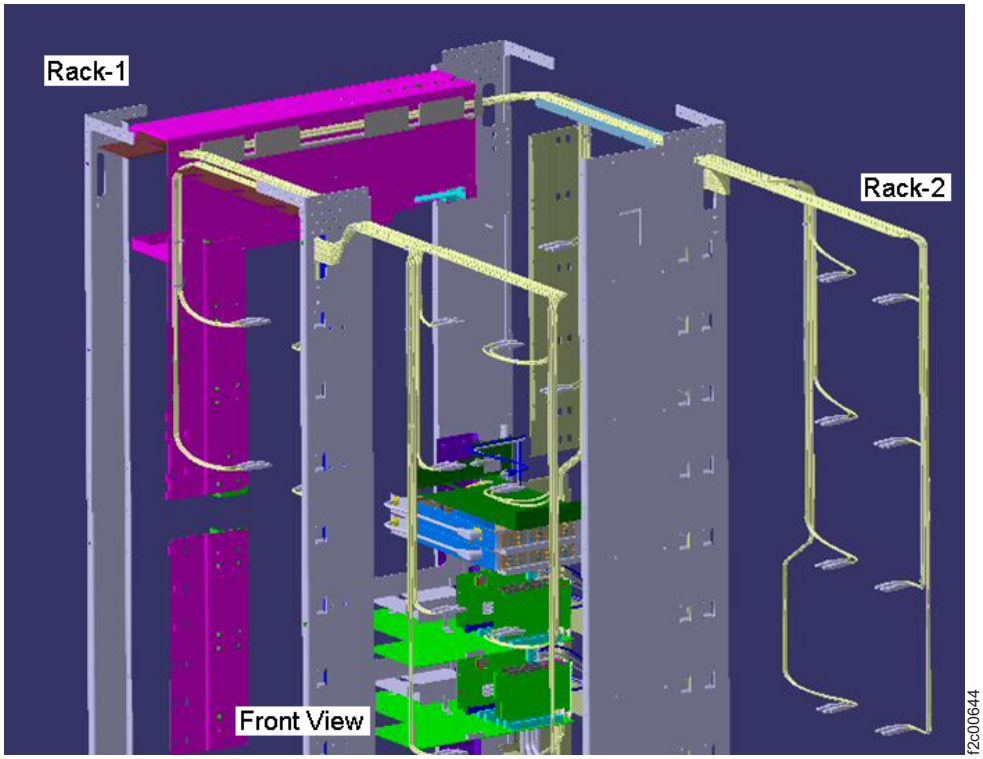


Figure 90. Mechanical routing of the FC-AL cables (rack-to-rack)

8. Return to the HMC and click **Next**.
   a. You will be sent back to the installation instruction to repeat steps 5, 6, 7, and 8 for each storage enclosure being installed on this DA pair.
   b. When all storage enclosures on this DA pair have been installed, go to the next step.
9. No action is required as the HMC initializes the storage facility image the storage enclosures are being installed to.

   The HMC displays:

   Task in Progress...**Powering on the FRU(s)**
   Verification Progress...**Verification progress:**
   Task in Progress...**Activating the system** (could take 20 minutes or more)
   Task in Progress...**Verifying system**
   Verification Progress...**Verification progress:**
   Task in Progress...**Activating applications(s)**

   When the HMC is finished, it displays:

   Service action is complete
   Service action is ending...

   The HMC directs you back to the installation instructions, go to the next step.
10. Continue with "Finish install and cleanup."

Completing the install

Finish install and cleanup

1. Display and repair any open serviceable events.

2. Will you be installing additional racks, storage enclosures, or other hardware features to this storage facility as part of this installation activity?
   - Yes. The backup of critical console data will occur after all installation activity is complete. Go to step 6.
   - No. The backup of critical console data will occur now. Go to the next step.
3. Locate the critical console data back up DVD disc for each HMC on this storage plex. The DVD disc should be in the ship group during an installation or kept in the HMC DVD-RAM drive after installation.

   There are two versions of the DVD disc:
   - Newer version is labeled with the HMC machine type model S/N and "HMC Critical Console Data Backup DVD, Keep in HMC DVD-RAM drive". If you have this version, go to 5.
   - Older version has no preprinted label, it should have the HMC machine type model S/N hand printed by the service representative. If you have this version, go to the next step.
4. Is the HMC machine type model and S/N printed on the DVD disc?
   - Yes, go to the next step.
   - No, hand print the HMC machine type model and S/N and "HMC Critical Console Data" on the DVD disc. For example: `HMC machine type model S/N: 8837-PLM 75KKTWT8R, HMC Critical Console Data`. Go to the next step.
5. Perform the following steps to back up critical console data on each HMC for this storage plex. Use the DVD disc with the HMC machine type model S/N for this HMC.
   a. Log into the management console (HMC) for rack 1.
   b. In the HMC Navigation area, under the **Management Environment**, expand the HMC (identified by hostname).
   c. Open **Licensed Internal Code Maintenance → HMC Code Update**.
   d. In the right content area, select **Back up Critical Console Data**.
   e. Select **Back up to DVD on local system** and click **Next**.
   f. Insert a formatted DVD-RAM media into the drive.
   g. Enter a description for the archive data.
   h. Click **OK** to store your critical console data on the DVD-RAM.
   i. Leave the HMC Critical Console Data backup DVD in the HMC DVD-RAM drive. It is automatically updated once a week.
6. If used during this installation, store the customer-provided configuration worksheets in the rack 1 document enclosure (front upper right of rack).
7. Use the View Storage Facility Status utility to ensure there are no unreported or unexpected problems or conditions.
   a. In the HMC Navigation area, under the **Management Environment**, expand the HMC (identified by hostname).
   b. Open **Service Applications → Service Focal Point**.
   c. In the right content area, select **Service Utilities**, a window opens that displays a list of storage facilities.
   d. Select a storage facility, click **Selected** (on top tool bar), and then select **View Storage Facility State**.
   e. A window opens that lists passed/failed status for 25 or more system checks. You can display the details for each system check. For more information and options, go to MAP1100 View storage facility state (end of call).

8. If you have storage enclosures to install, return to “Installing and testing the storage enclosures” on page 101 to begin the storage enclosure installation process, and then return here and continue at the next step.
9. Monitor the certify DDM process for completion. It was started automatically for all DDMs being installed
   a. In the HMC Navigation area, open the **Management Environment**, select and open the HMC.
   b. Open **Service Applications** → **Service Focal Point**.
   c. In the right content area, select **Service Utilities**, a window displays a list of Storage Facilities.
   d. Select the Storage Facility that is being installed from the list. Click **Selected** from the top tool bar, and then select **Certify DDM**.
   e. When the certify DDM process is complete, inform the customer that the storage facility is now available for configuration.
10. Ensure the HMC power control mode for this storage facility is returned back to the original customer setting. (This was set to Manual Power Mode in step 1 of ″Preparing the existing rack.″)

    Note: This will return the storage facility power control to normal operation.
11. Refer to the pack/unpack instructions for return/discard information. Discard the shipping material locally.
12. The expansion rack is now regarded as “Installation complete”.
    a. Update the account records to show the install is complete.
    b. Record any additional time to install features, ECs, MESs to the correct service code. Do not charge the additional time to the storage facility installation.
    c. The on-site service actions are now complete.

Chapter 3. Installing hardware removed by weight reduction feature FC 0200

Feature Code 0200 removes storage enclosures and sometimes battery modules to reduce the shipping weight of a rack. This is required if the weight limit of building floors or elevators is less than the weight of a fully loaded rack. The parts that are removed are shipped on separate pallets. Feature Code 0200 can be installed by:

- Manufacturing prior to shipment when ordered by the customer.
- The service representative on the computer room floor after rack discontinue or relocate if required.

  Note: IBM packing materials must have been ordered to properly protect the removed parts.
- The service representative at the customer loading dock prior to the rack being moved to the computer room floor if required.

  Note: IBM packing materials must have been ordered to properly protect the removed parts.

The instructions describe how to:

- Reinstall the battery modules in their original locations in the battery module chassis.
- Reinstall the storage enclosures in their original locations in the storage facility.

Copies of the *Weight Reduction Status* chart are in the CE envelope which may be taped to the front covers, or may be in the document enclosure (front upper left of rack) and each box on the pallet.

Attention: The DS8000 retains configuration information that was established during manufacture. If all components are not reinstalled into their original locations, significant problems will result.

CAUTION:
The weight of a fully populated storage enclosure exceeds the safe lifting limit for one service representative. Installation of this feature requires two service representatives.

To determine the estimated weight of a rack, use Table 27.

Table 27. Rack weight (estimated) after all shipping materials have been removed

Rack model	Rack weight without FC 0200 (non-reduced weight)[1, 2]	Rack weight with FC 0200 (reduced weight)[1, 2]
921, 931	1243 kg (2740 lbs)	934 kg (2060 lbs)
922, 9A2, 932, 9B2	1313 kg (2895 lbs)	950 kg (2095 lbs)
92E, 9AE with FC 1300[3] without FC 1300[4]	 1338 kg (2950 lbs) 1089 kg (2400 lbs)	 776 kg (1710 lbs) 689 kg (1520 lbs)

Table 27. Rack weight (estimated) after all shipping materials have been removed (continued)

Rack model	Rack weight without FC 0200 (non-reduced weight)[1, 2]	Rack weight with FC 0200 (reduced weight)[1, 2]

Notes:

1. If the shipping materials are still in place on the rack, add the following weight:
   - If the rack is in the carton but not crated, add 115 kg (250 lbs)
   - If the rack is in the carton and crated without desiccant/barrier bag, add 140 kg (310 lbs)
   - If the rack is in the carton and crated with desiccant/barrier bag, add 147 kg (325 lbs)
2. The estimated weights assume that both primary power supplies (PPSs) in the rack contain booster modules. (From the rear of the rack, if a booster module is present it is at the top of the PPS in the horizontal orientation.) If booster modules are not present, subtract 11kg (25 lbs) from the rack weight.
3. Four I/O enclosures.
4. No I/O enclosures.

Continue with "Installing battery module sets."

Installing battery module sets

Perform this task on any rack from which the battery module sets have been removed.

1. Locate the weight reduction status chart:
   - If the rack is new and IBM manufacturing applied FC 0200, the status sheet will be computer generated. Continue to the next step.
   - If the rack is not new from IBM manufacturing and FC 0200 was applied by a field service representative, the status sheet will be hand printed. Go to step 3 on page 113.
2. Remove the Weight Reduction Status chart from the CE envelope. Additional copies are in the boxes on the pallet. The Weight Reduction Status chart contains a record of the original installed location of each battery module. For a sample chart, see Figure 91 on page 113. For a description of the columns in the chart, see Table 28 on page 113. Then go to step 4 on page 113.

   Note: If the status chart cannot be found, contact the next level of support. There is a procedure to get a PDF copy sent from San Jose manufacturing.

Weight Reduction Status

Machine Serial Number: 0028970, Generated at Fri May 06 19:33:35 CEST 2005								
MCSN	**CRMMDL**	**CRINPN**	**CRINSQ**	**CRPLL2**	**CRPLL3**	**CRCDES**	**PARTFAMC**	
0028970	922	0000022R1128	YM10C04AC091	E10		BBU Sub-asm		
0028970	922	0000017P7655	Y1W0NE4C2055	E10		BBU Battery Module	BBUM1	B1
0028970	922	0000017P7655	Y1WONE4C2056	E10		BBU Battery Module	BBUM1	B2
0028970	922	0000017P7655	Y1WONE4C2057	E10		BBU Battery Module	BBUM1	B3
0028970	922	0000022R1128	YM10C04AC093	E11		BBU Sub-asm		
0028970	922	0000017P7655	Y1WONE4C2059	E11		BBU Battery Module	BBUM1	
0028970	922	0000017P7655	Y1WONE4C2060	E11		BBU Battery Module	BBUM1	
0028970	922	0000017P7655	Y1WONE4C2061	E11		BBU Battery Module	BBUM1	
0028970	922	0000022R0879	YM10750004E9	XS11		16PACK MPACK 73GB 15K	MPC11	
0028970	922	0000022R0879	YM10750006D2	XS12		16PACK MPACK 73GB 15K	MPC11	
0028970	922	0000022R0879	YM1075000502	XS13		16PACK MPACK 73GB 15K	MPC11	
0028970	922	0000022R0879	YM10750004FB	XS21		16PACK MPACK 73GB 15K	MPC11	
0028970	922	0000022R0879	YM10750006F2	XS22		16PACK MPACK 73GB 15K	MPC11	
0028970	922	0000022R0879	YM10750004EF	XS23		16PACK MPACK 73GB 15K	MPC11	

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Figure 91. Sample of a Weight Reduction Status chart

Table 28. Description of columns in a sample Weight Reduction Status chart

Column in chart	Description of column
CRINSQ	Battery module serial number
CRMMDL	Rack model number (*mmm* in the location code for the battery module chassis: U2*nnn*.*mmm*.sssssss-E1x-E2)
MCSN	Machine serial number
CRPLL2	Location of the battery module chassis (*xxx* in the location code for the battery module chassis: U2*nnn*.mmm.sssssss-*xxx*-E2; see Figure 92 on page 114)
(margin to the right of the table)	Location of the battery module, handwritten by manufacturing (when the rack is viewed from the front, B1 is on the left; see Figure 92 on page 114)

3. Locate the Weight Reduction Status chart, it should be included in one of the boxes for the removed parts. The Weight Reduction Status chart contains a record of the original installed location of each battery module.
4. Use the information in the status chart to determine where each battery module must be installed, and then go to step 5 on page 114.

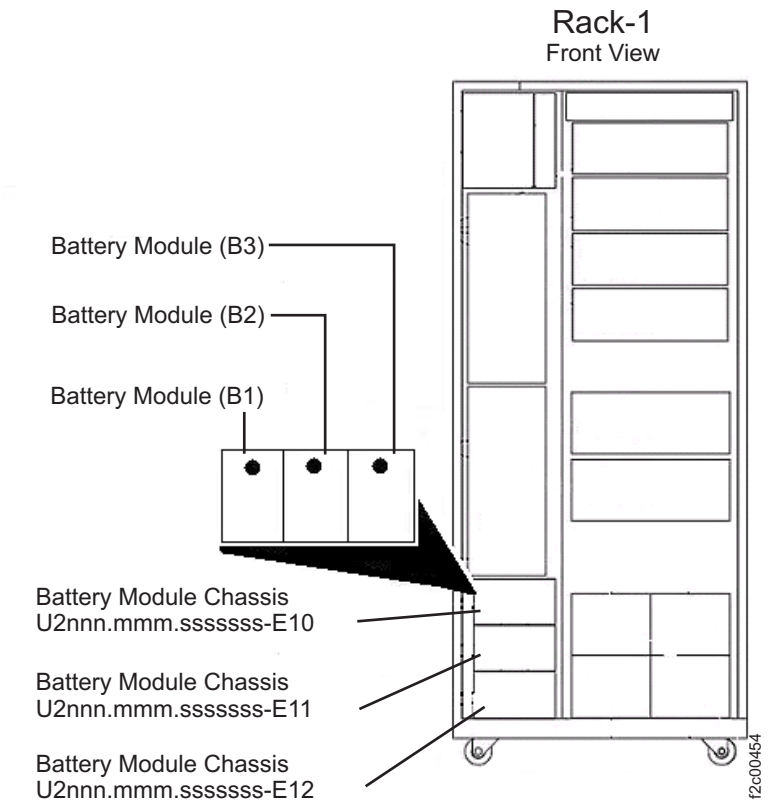

Figure 92. Locations of the battery modules

5. Using the location information from step 2 on page 112, slide each battery module into its original location and secure it with the thumbscrew. For additional guidance, go to Exchange the battery module set.
6. Continue with "Installing storage enclosures."

Installing storage enclosures

Perform this task on any rack from which the storage enclosures have been removed.

1. Remove the Weight Reduction Status chart from the CE envelope. The Weight Reduction Status chart contains a record of the original installed location of each storage enclosure. For a sample chart, see Figure 93 on page 115.

Weight Reduction Status

Machine Serial Number: 0028970, Generated at Fri May 06 19:33:35 CEST 2005								
MCSN	**CRMMDL**	**CRINPN**	**CRINSQ**	**CRPLL2**	**CRPLL3**	**CRCDES**	**PARTFAMC**	
0028970	922	0000022R1128	YM10C04AC091	E10		BBU Sub-asm		
0028970	922	0000017P7655	Y1W0NE4C2055	E10		BBU Battery Module	BBUM1	B1
0028970	922	0000017P7655	Y1WONE4C2056	E10		BBU Battery Module	BBUM1	B2
0028970	922	0000017P7655	Y1WONE4C2057	E10		BBU Battery Module	BBUM1	B3
0028970	922	0000022R1128	YM10C04AC093	E11		BBU Sub-asm		
0028970	922	0000017P7655	Y1WONE4C2059	E11		BBU Battery Module	BBUM1	
0028970	922	0000017P7655	Y1WONE4C2060	E11		BBU Battery Module	BBUM1	
0028970	922	0000017P7655	Y1WONE4C2061	E11		BBU Battery Module	BBUM1	
0028970	922	0000022R0879	YM10750004E9	XS11		16PACK MPACK 73GB 15K	MPC11	
0028970	922	0000022R0879	YM10750006D2	XS12		16PACK MPACK 73GB 15K	MPC11	
0028970	922	0000022R0879	YM1075000502	XS13		16PACK MPACK 73GB 15K	MPC11	
0028970	922	0000022R0879	YM10750004FB	XS21		16PACK MPACK 73GB 15K	MPC11	
0028970	922	0000022R0879	YM10750006F2	XS22		16PACK MPACK 73GB 15K	MPC11	
0028970	922	0000022R0879	YM10750004EF	XS23		16PACK MPACK 73GB 15K	MPC11	

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Figure 93. Sample of a Weight Reduction Status chart

2. Use the information in the chart to determine where each storage enclosure must be installed. For a description of the columns in the chart, see Table 29.

Table 29. Description of columns in a sample Weight Reduction Status chart

Column in chart	Description of column
CRINSQ	Storage enclosure serial number (on the front of the storage enclosure, at the far right, between the rack mounting screws; the number is in a vertical orientation)
CRMMDL	Rack model number
MCSN	Machine serial number
CRPLL2	Location of the storage enclosure (see Figure 94 on page 116 and Figure 95 on page 117)

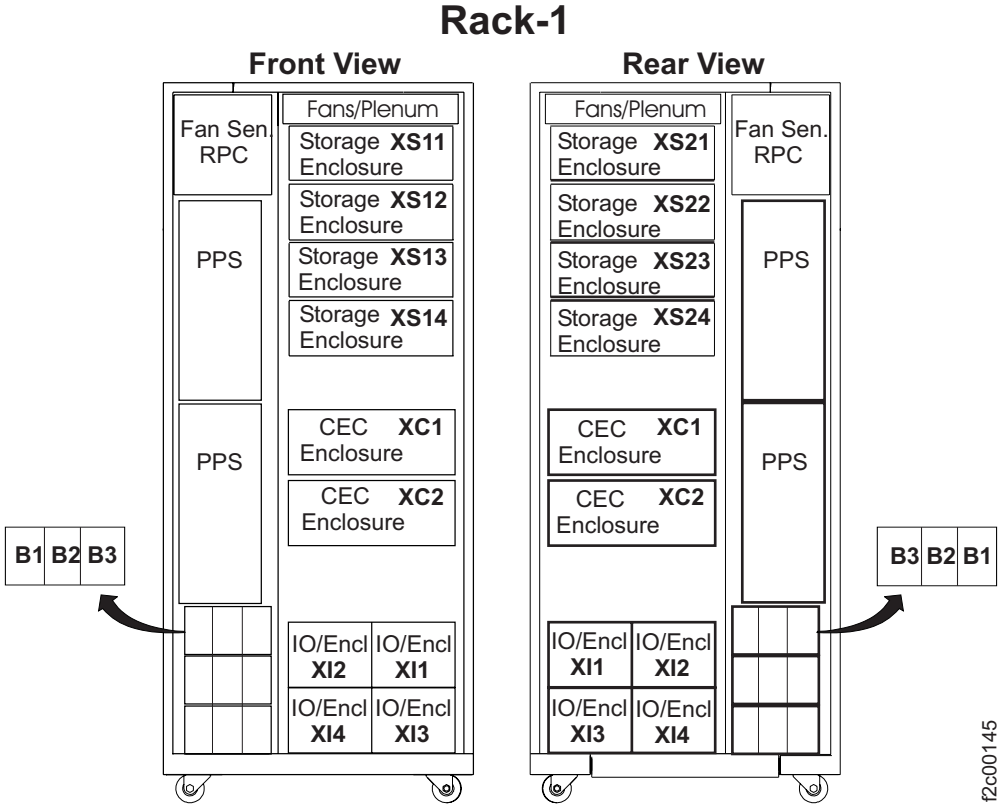

Figure 94. Physical location codes (Rack-1)

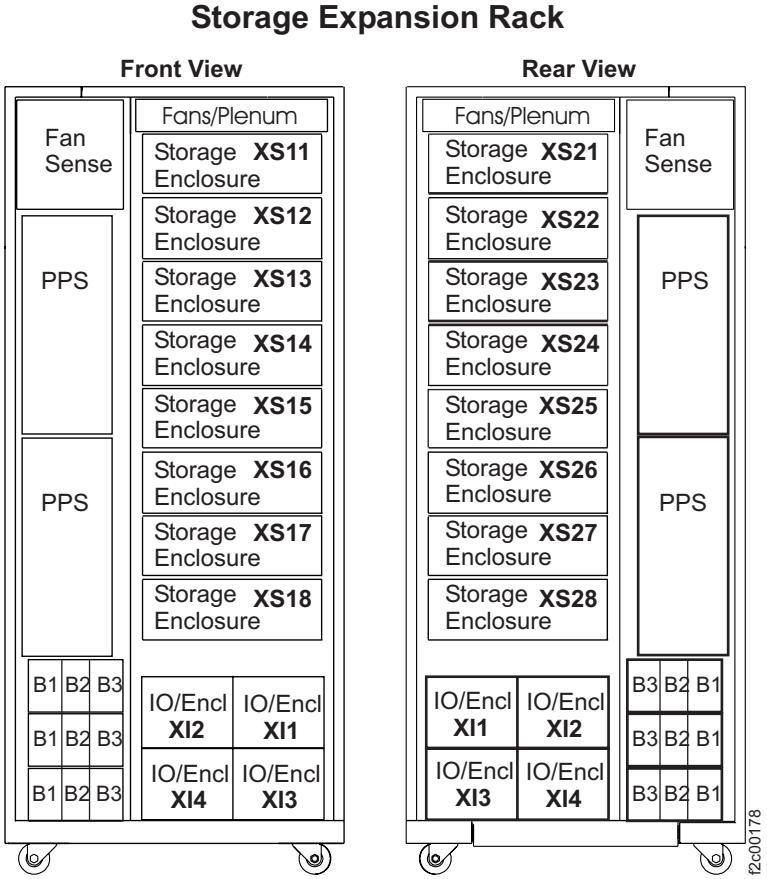

Figure 95. Physical location codes (expansion rack)

CAUTION:
A fully populated storage enclosure weighs 121 kgs (55 lbs). This weight exceeds the safe lifting limit for a single service representative. Installation of this feature requires two service representatives.

Note: DDMs are logically configured to a particular slot and if removed must be put back in the same slot.

3. Using the location information from step 2, install the storage enclosures in their original locations.
   a. Unlatch the sheet metal air flap so it can swing to the up position.
   b. Install the storage enclosure in the rack and fasten it with the four screws **2** provided. See Figure 96 on page 118.

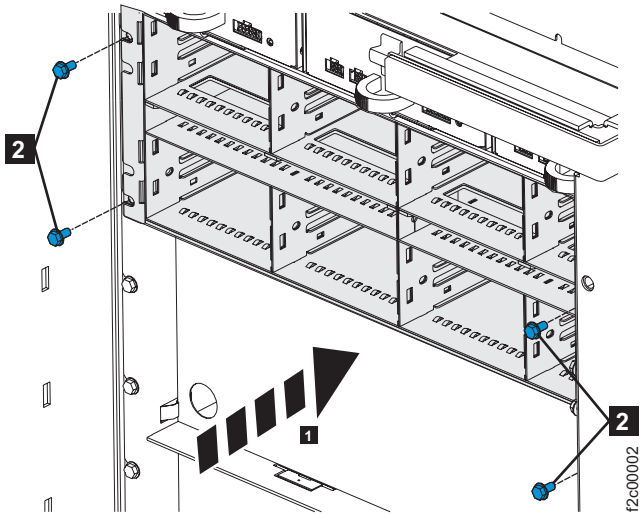

Figure 96. Install the storage enclosure

c. Connect the FC-AL cables to the Fiber Channel Interface Card connectors. For connector locations, see Figure 97.

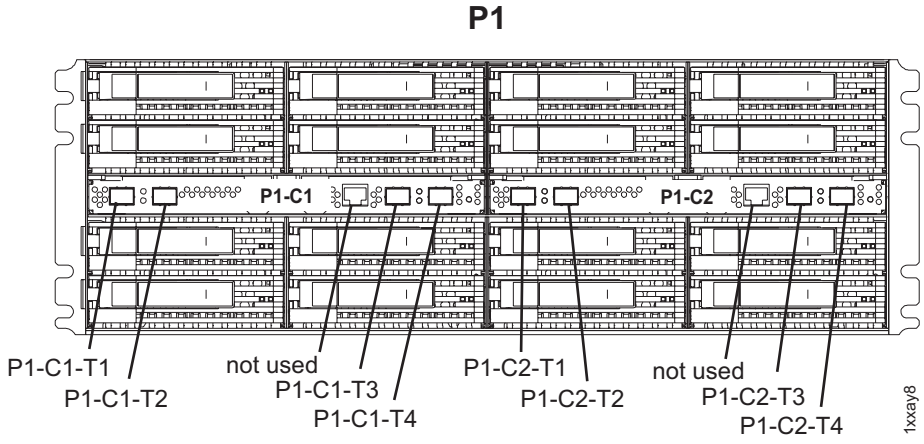

Figure 97. Storage enclosure locations

d. Repeat step 3 for each storage enclosure to be installed.

4. At each unused storage enclosure position, make sure that the sheet metal air flap is latched down in order to maintain correct cooling air flow to the installed storage enclosures.
5. Return to the procedure that sent you here.

Chapter 4. Installing the earthquake resistance kit feature FC 1906

Use this section to install the earthquake resistance kit, feature code 1906.

Earthquake resistance kit model 9xx FC 1906

The earthquake resistance kit, Feature Code 1906, provides additional hardware to be installed. The kit stiffens the rack from flexing and also ties the rack directly to the concrete floor. The kit can be installed on a raised floor or non-raised floor.

- If the rack is new from IBM, the MES hardware kit for FC 1906 would be shipped with the rack.
- If the rack has been discontinued from another account, and the earthquake resistance kit was originally installed there, the kit would have been removed and shipped separately.

  The original kit included parts to tie-down the rack to a non-raised floor, a low raised floor, and a high raised floor. Parts not used at the original installation may not have been kept and shipped. If you are installing on a different floor type than the original floor type, you may not have all the necessary parts. Call the next level of support.

Customer responsibility for site preparation

1. The marketing representative should have previously notified the customer of the prerequisites for the floor(s). The floor mounting requirements are defined in *IBM System Storage DS8000 Introduction and Planning Guide* (GC35-0515-01), which is included on the service documentation CD in the ship group.
2. The customer is responsible to obtain the service of a qualified consultant or Structural Engineer, to determine the appropriate anchoring for the lockdown plate, as needed, for the non-raised floor installation, as well as the determination of the heavy duty concrete or slab floor eyebolts for the raised floor(s) installation.
3. Are the storage facility racks being installed on a raised floor?
   a. Yes, go to "Raised floor installation."
   b. No, go to "Non-raised floor tie-down hardware" on page 123.

Raised floor installation

1. If the earthquake resistance kit is being installed, it must be installed on all racks in a storage facility (base rack and attached expansion racks).
2. Read this entire section to understand the rack stiffening and floor tie-down installation before you return to the installation instructions that sent you here. You will need to decide during the rack installations when to use the information in this procedure to install the earthquake resistance kit.
3. Inspect the floor where the storage facility racks are to be installed. Refer to Figure 98 on page 120 and ensure the following are already present for each rack:
   a. Floor tiles have one cable cutout.
   b. Floor tiles have four tie-down hardware holes.
   c. The concrete floor has four customer provided eyebolts installed.

Note: Customer floor preparation specifications are documented in *IBM System Storage DS8000 Introduction and Planning Guide* which is included on the *IBM System Storage DS8000 series Service Documents CDROM* and the customer documentation CDROM.

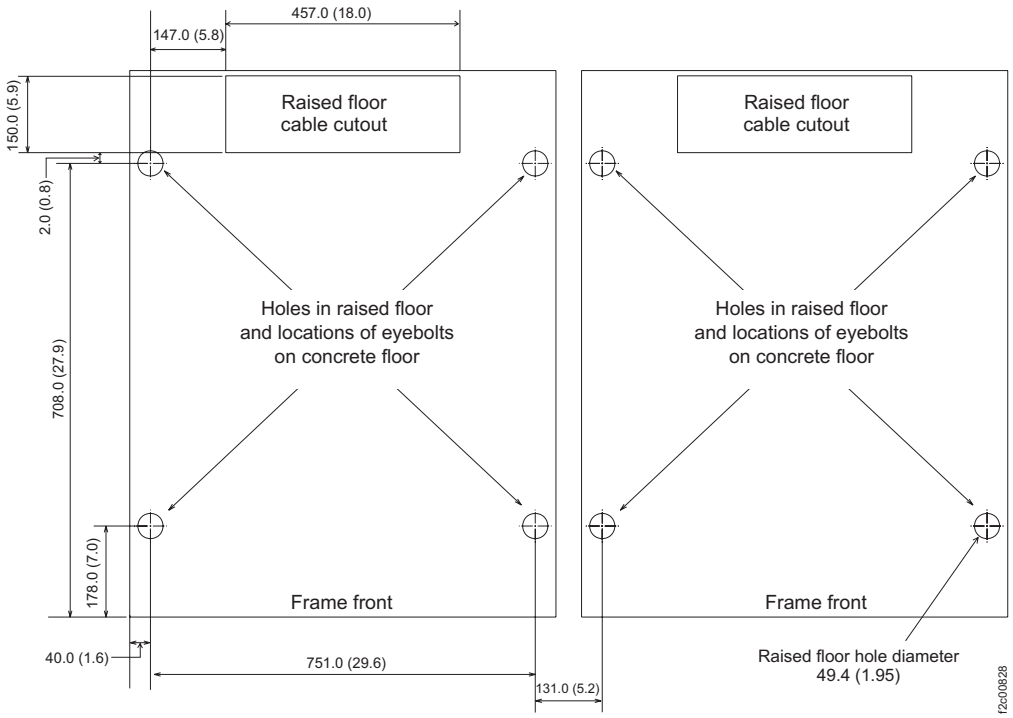

Figure 98. Locations for cable cutouts and rubber bushing holes for raised floor and eyebolt installation on concrete floor

4. Familiarize yourself with the MES kit hardware. Refer to "MES kit bill of materials, figures, and part numbers" on page 131.
5. Do the following after the rack is in its final position over the raised floor cutouts.
   a. Move one rack to the location and install the floor tie-down hardware before moving the next frame into position to have the tie-down hardware installed.
   b. Do not tighten the tie-down turnbuckles until all of the racks have been installed.
   c. There are two versions of the turnbuckle supplied in this kit, a short turnbuckle, and a long turnbuckle. The difference in the versions is for the height of the raised floor. The installation procedure is the same for both.
6. This is an overview of the floor tie-down hardware.
   - The leveler nut and support plate lift the rack up slightly to take the weight off the wheel caster.
   - The frame stud pulls the rack down against the floor to keep it from tipping over.

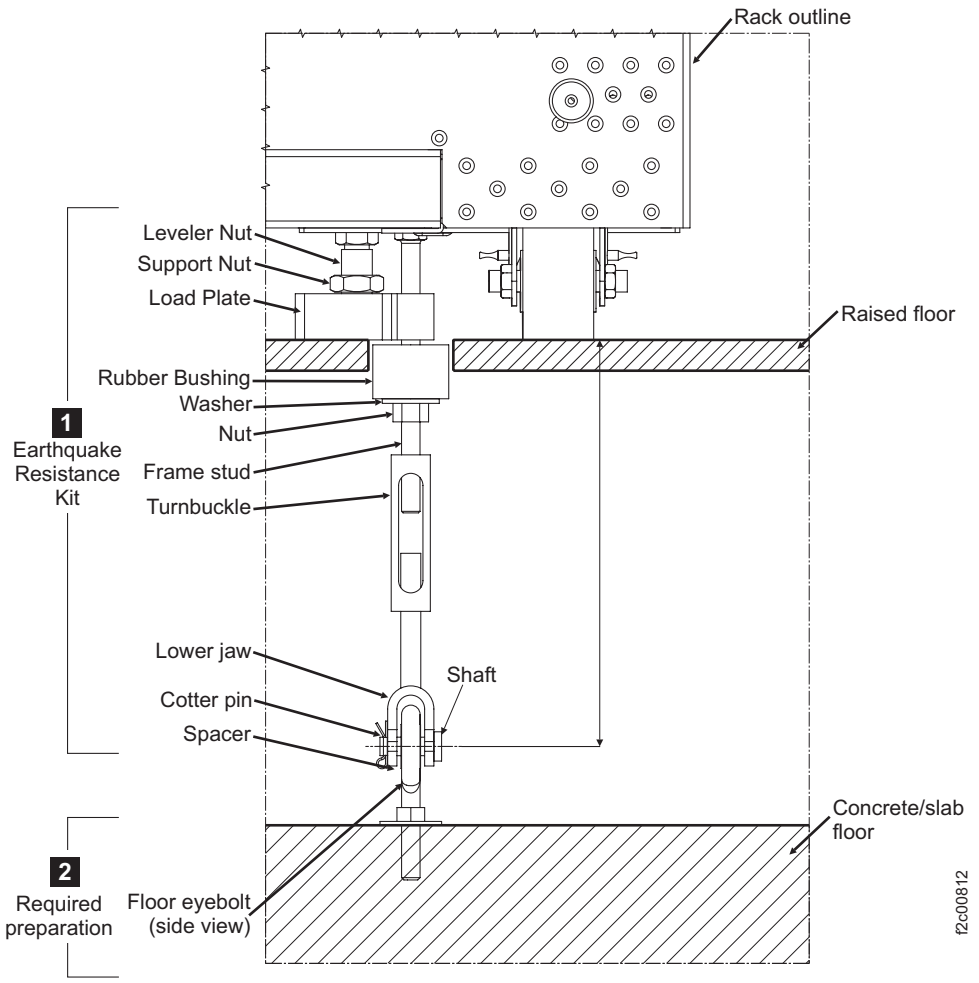

Figure 99. Floor tie-down hardware

7. The MES kit should include two frame jack assemblies. They can be used to raise one side of the rack at a time, so you have more clearance between the rack and the floor to install the floor tie-down hardware.

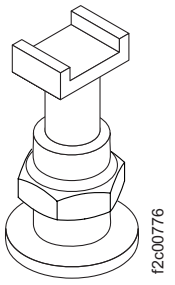

Figure 100. Frame jack tool

The following shows the raised floor tie-down hardware:

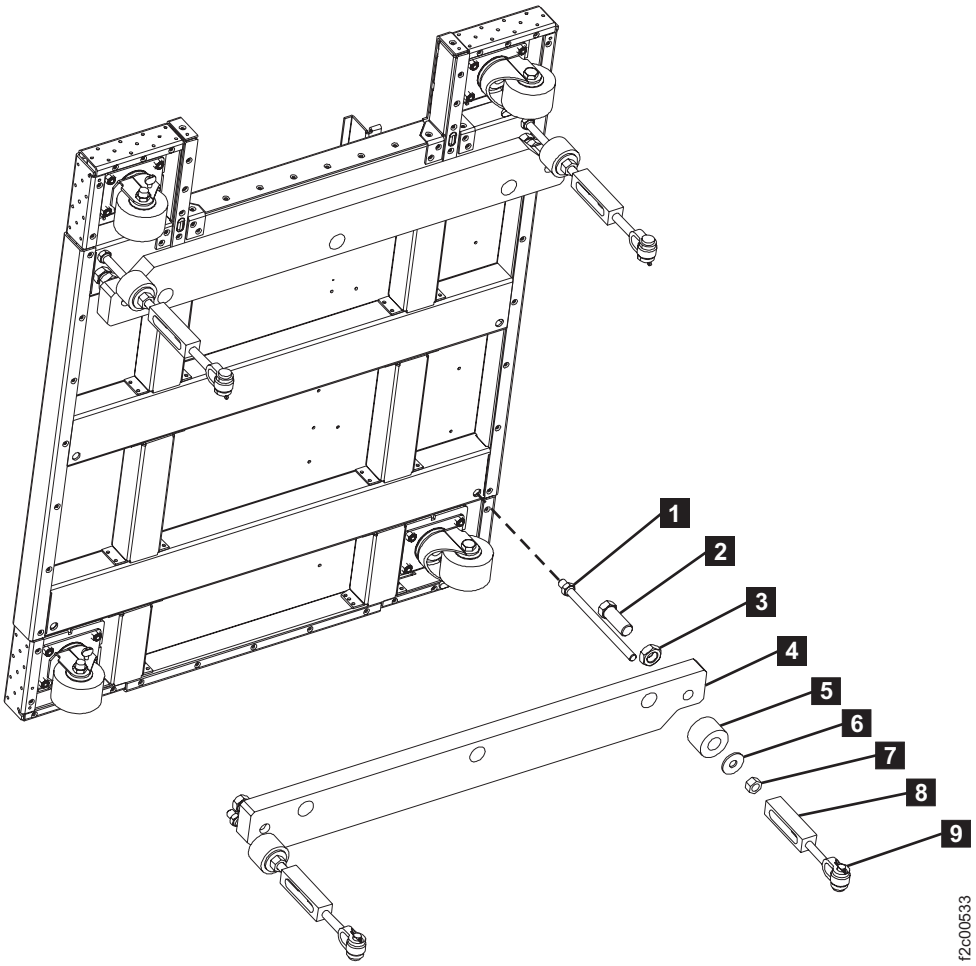

Figure 101. Raised floor tie-down

8. Install the jam nut **3** on leveler **2** and thread it on fully.
9. Install two levelers on each load plate **4**.
10. Position the load plates under the rack.
11. Install the tie-down studs **1** into the rack. You can do this from above or below the raised floor.

    Note: A frame jack tool assembly is provided to lift the frame as an aid in attaching the tie-down frame stud to the frame. Place them on the outside corners of one side of the frame. Attach the tie-down hardware to one side of the frame. Move the frame jack assembly to the outside corners of the other side of the frame to aid in attaching the tie-down hardware to the other side of the frame. This tool is to be used on unbolted frames.
12. Raise the leveler **2** by tightening until it is tight against the frame and then tighten it an additional one-half turn. This will take the rack weight off the caster wheel.
13. Use the jam nut **3** to lock the leveler.
14. Install the rubber bushing **5**, washer **6** and nut **7** on the frame stud **1**. This must be done from beneath the raised floor.
15. Tighten the nut until the rubber bushing is secure against the load plate and protects the frame stud from touching the sides of the raised floor hole.

16. Screw in the lower jaw assembly **9** into the turnbuckle **8**.
17. Screw the turnbuckle assembly onto the frame stud **1** ensuring that both shafts are equally inserted so that there is room to tighten them later.
18. Place the spacer into the customer-installed eyebolt.

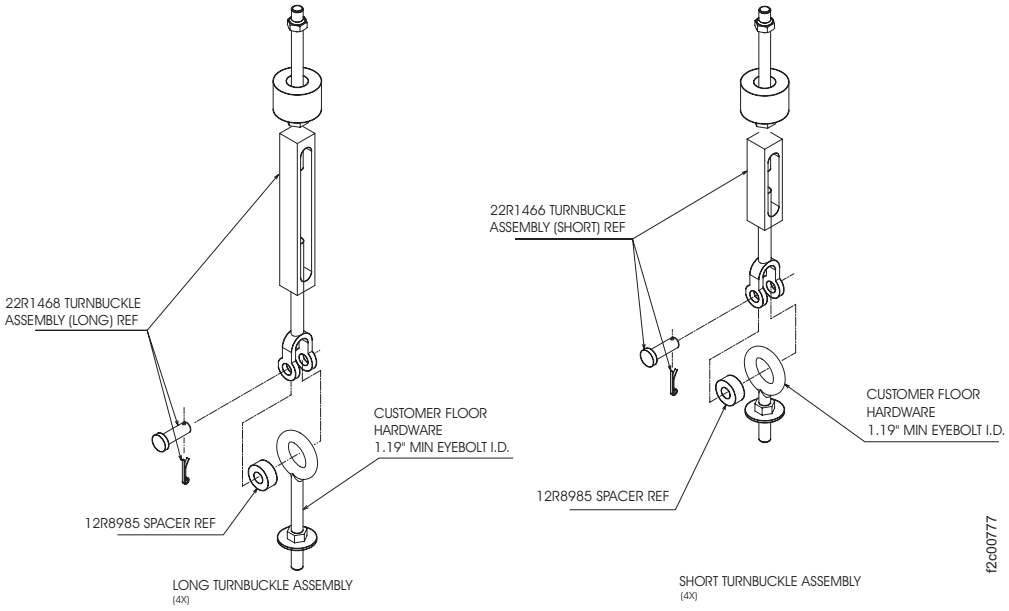

Figure 102. Turnbuckle assembly

19. Install the lower jaw onto the floor eyebolt with the shaft. Secure the shaft with cotter pin.
20. After installing all frames, tighten the turnbuckles by hand until snug, then tighten it an additional one-half turn to ensure that the tie-down assembly is sufficiently secure.

    Note: If you are working with a two or three frame storage facilities, you can leave the turn buckles loose until you have completed the installation of all the frames and then you can fully tighten them.
21. Repeat the above steps for each of the four corners in the frame.
22. Repeat these steps for each frame in the storage facility
23. Continue with "Installing front and rear rack stiffening hardware" on page 126.

Non-raised floor tie-down hardware

1. If the earthquake resistance kit is being installed, it must be installed on all racks in a storage facility (base rack and attached expansion racks).
2. Read this entire section to understand the rack stiffening and floor tie-down installation before you return to the installation instructions that sent you here. You will need to decide during the rack installations when to use the information in this procedure to install the earthquake resistance kit.
3. Inspect the floor where the storage facility racks are to be installed. Refer to Figure 103 on page 124 and ensure the following are already present for each rack:
   a. The concrete floor must have three fasteners per load plate.

b. Refer to Figure 104 on page 125, if the customer has threaded holes in the floor, you must be given three bolts and washers used to fasten each load plate to the floor. If the customer has provided studs, you must be given three nuts and washers to fasten each load plate to the floor.

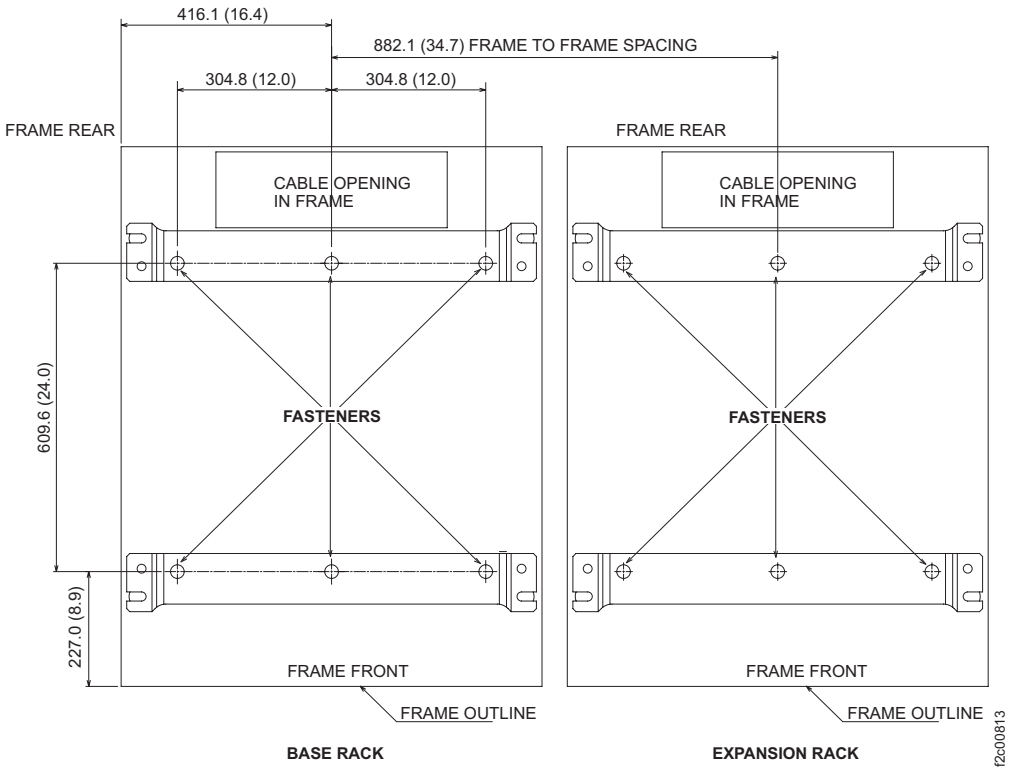

Figure 103. Locations for fastener installation (non-raised floor). Dimensions in millimeters (inches)

4. Familiarize yourself with the MES kit hardware. Refer to "MES kit bill of materials, figures, and part numbers" on page 131.
5. Do the following after the rack is in its final position.
   a. Move one rack to the location and install the floor tie-down hardware before moving the next frame into position to have the tie-down hardware installed.
6. This is an overview of the floor tie-down hardware.
   - The leveler nut and support plate lift the rack up slightly to take the weight off the wheel caster.
   - The frame stud pulls the rack down against the floor to keep it from tipping over.

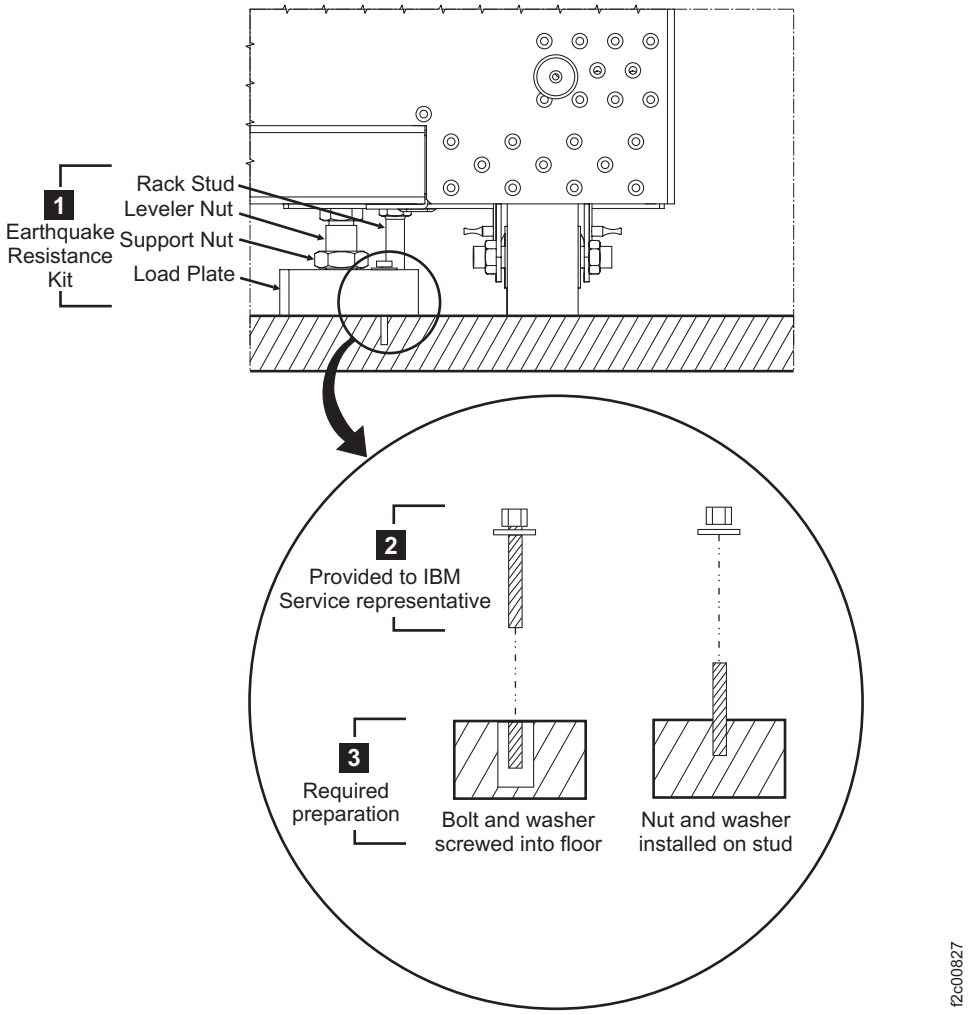

Figure 104. Earthquake resistance kit - common fasteners

7. The MES kit should include two frame jack assemblies. They can be used to raise one side of the rack at a time, so you have more clearance between the rack and the floor to install the floor tie-down hardware.

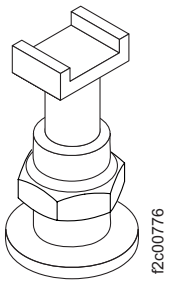

Figure 105. Frame jack tool

The following shows non-raised floor tie-down hardware.

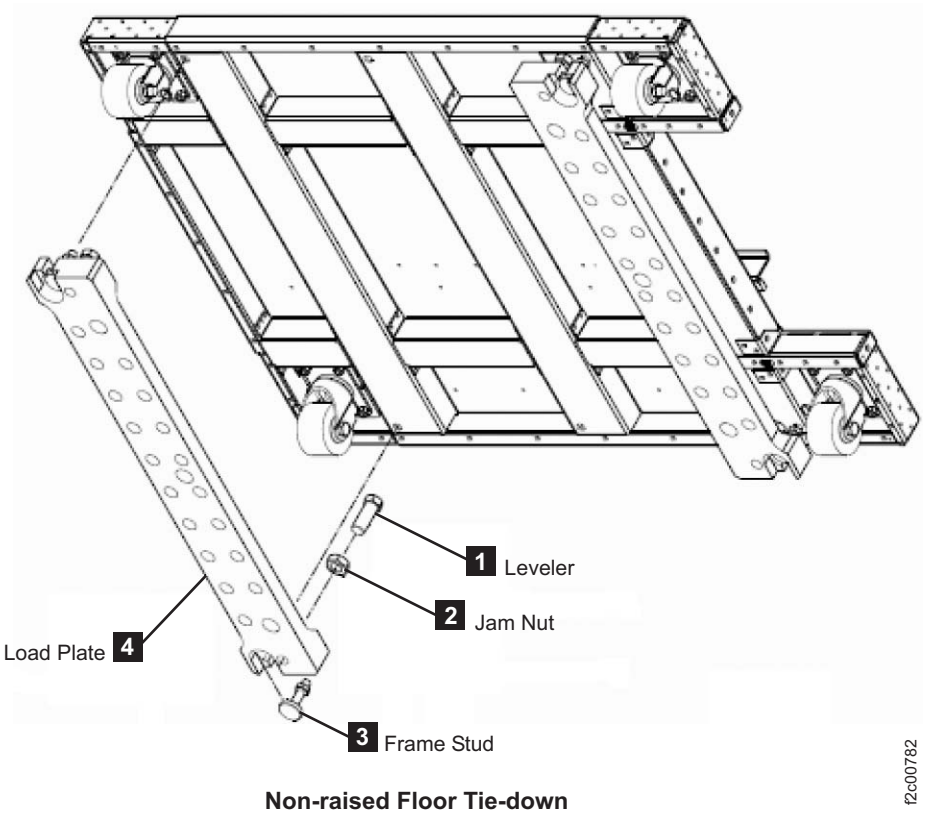

Figure 106. Non-raised floor tie-down hardware

8. Fasten the load plate to the concrete floor using the six fasteners for each rack provided to you by the customer.

   Note: A frame jack tool assembly is provided to lift the frame as an aid in attaching the tie-down frame stud to the frame. Place them on the outside corners of one side of the frame. Attach the tie-down hardware to one side of the frame. Move the frame jack assembly to the outside corners of the other side of the frame to aid in attaching the tie-down hardware to the other side of the frame. This tool is to be used on unbolted frames.
9. Install the leveler **1** and jam nut **2** onto the load plate.
10. Position the rack and install the frame studs into the rack. The frame stud goes into the slot at the bottom of the load plate and then threads into the bottom of the rack. After you have installed the frames, remove the jack tool from beneath the frame.
11. Raise the leveler by tightening the leveler until the frame stud head is tight against the load plate, then tighten it an additional one-quarter turn. This will remove some weight off the wheel caster.
12. Tighten the frame stud so it holds the rack securely down to the load plate.
13. Continue with "Installing front and rear rack stiffening hardware."

Installing front and rear rack stiffening hardware

Use this section to install the front and rear rack stiffening hardware for the earthquake resistance kit.

Rack front bracing

1. Remove the cover from the front of the rack.
2. Remove the front cover latch bracket **12** from the left side of the frame, near the rack operator panel. Refer to Figure 107. The cover latch bracket **7** will then be mounted on the frame extension **1** using the same screws in a later step.

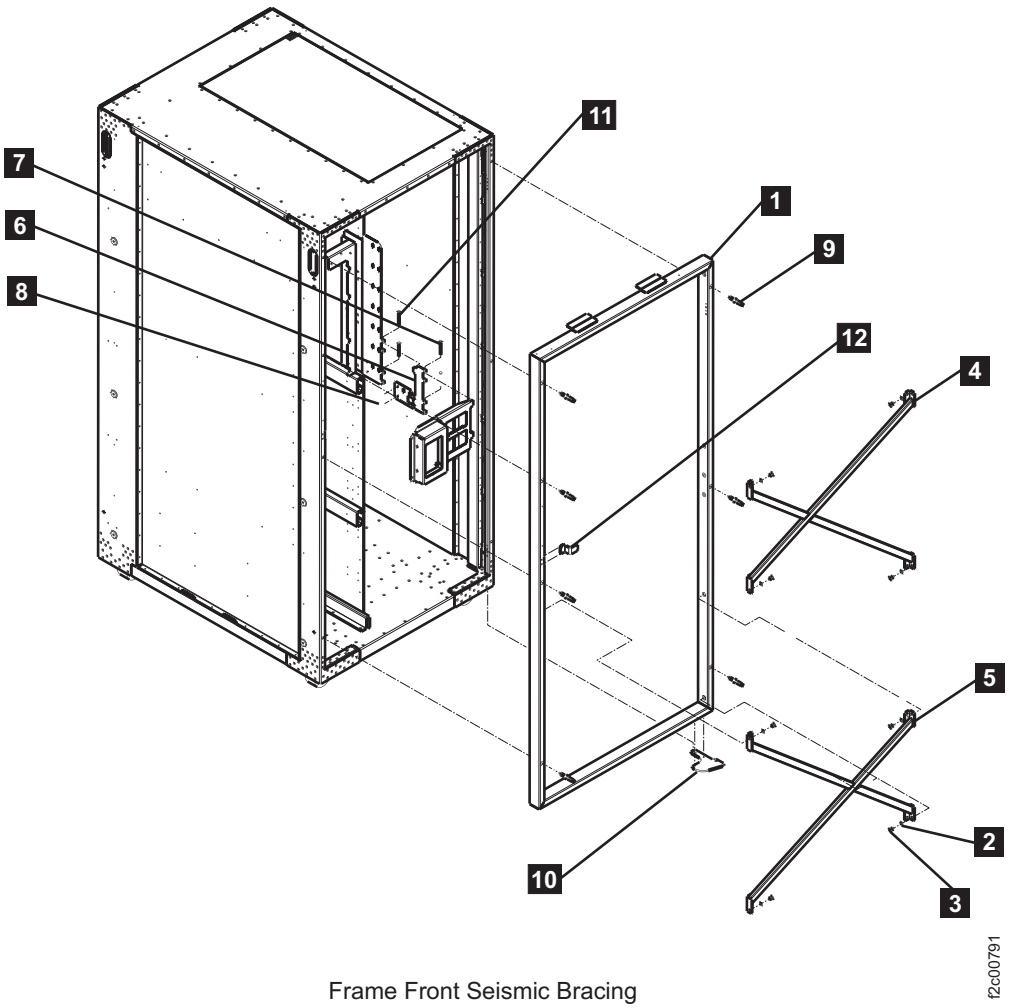

Figure 107. Earthquake resistance kit - front frame bracing

3. Remove the front cover hinges from the frame and the stop strap from the top of the frame.
4. Install the seven screws that secure the brace extension frame to the front of the rack. See Figure 107.

   Note: The brace extension frame weighs 17.0 kg (37.4 lbs). Installation of this assembly requires two service representatives.
5. Reinstall the latch bracket **7** on the extension frame **1**.
6. Relocate the front cover hinges from the frame to the extension frame with the existing screws.
7. Remove the operator panel pivot pins **11** from the existing bracket. See Figure 108 on page 128.

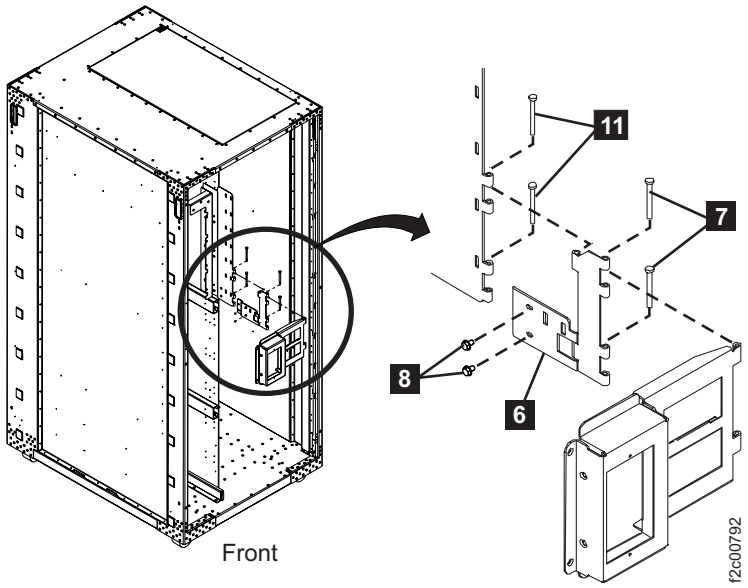

Figure 108. Earthquake resistance kit

8. Attach the rack operator panel relocation bracket **6** using the removed pivot pins **7** and screws **8**.
9. Remove the operator panel cable from the first cable tie above the operator panel.
10. Attach the operator panel to the relocation bracket using new pivot pins.
11. Install the upper X-brace **4** with screws and washers to the brace extension frame. See Figure 107 on page 127.
12. Install the lower X-brace **5** with screws and washers to the brace extension frame. See Figure 107 on page 127.
13. Reinstall the front cover and the stop strap on the top of the extension frame.

    Note: You might have to close the HMC to install the cover.

CEC enclosure rear bracing

You must install the CEC enclosure rear support brackets.

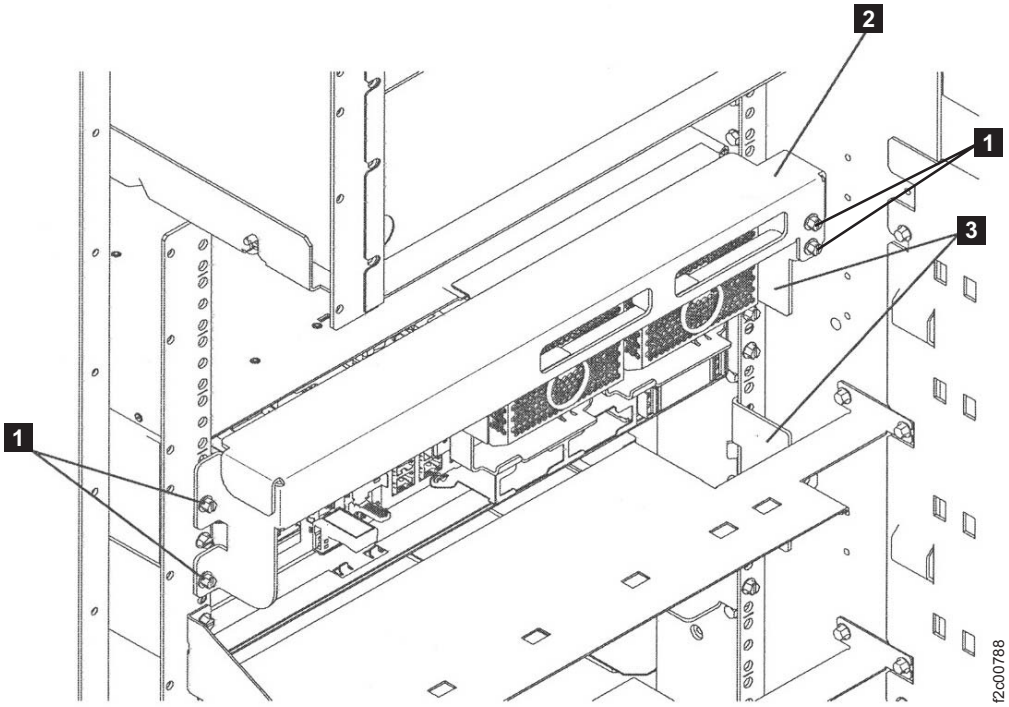

Figure 109. CEC support bracing

1. Earlier frames do not have the bracket **3** . If the bracket is missing from the frame, go to 2. If the bracket is present on the frame, go to 3.
2. Use two (2) screws to install the supplied bracket **3** . Repeat the installation for the second CEC enclosure.
3. Use four (4) screws to install the CEC support bracket **2** to the frame. Repeat the installation for the second CEC.

Rack rear bracing

1. Remove the covers from the rear of the rack.

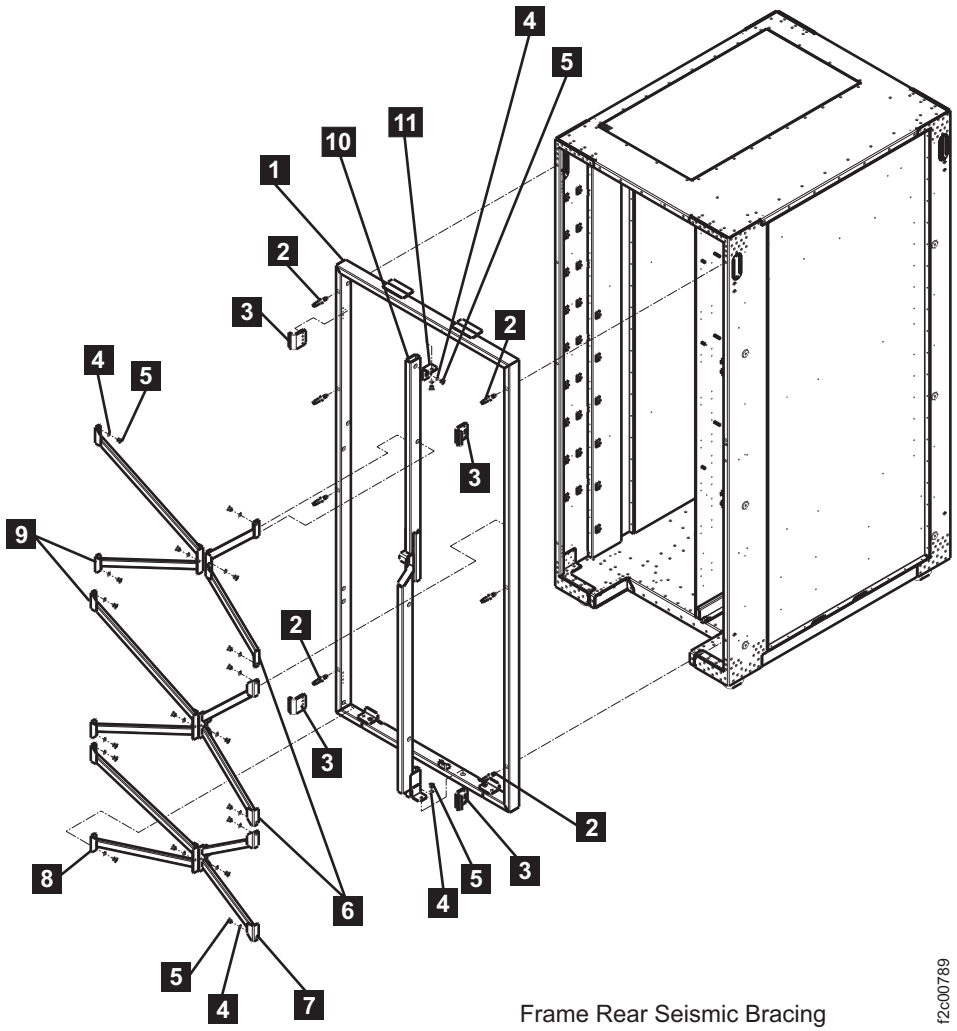

Figure 110. Frame rear

2. Remove the rear cover hinges (quantity 4 of item **3**) from the brace extension frame **1** .
3. Install the seven (7) screws that secure the brace extension frame to the rear of the rack. See Figure 110.
4. Reinstall the four (4) hinges with existing screws on the extension frame.
5. Install the rear center post **10** to the top and bottom mounting brackets that are installed on the brace extension frame with screws and washers.
6. Install the left side V-braces **8** **9** with screws and washers to the brace extension frame.
7. Install the right side V-brace **6** **7** with screws and washers to the brace extension frame.
8. Secure the V-braces with screws and washers to the rear center post.
9. Reinstall the rear covers on the extension frame.

MES kit bill of materials, figures, and part numbers

FFBM - 22R6616 basic kit
FFBM - 22R2053 for the 92x, 93x, and 9x2 models only

Earthquake resistance kit parts at the front of the rack (stiffeners)

Use the figures and tables that follow to locate information about the earthquake resistance kit brackets (stiffeners) at the front of the rack.

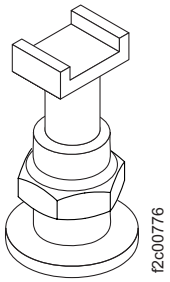

Figure 111. Frame jack tool

Table 30. Frame jack tool parts

Part name	Part number
Jack tool	17P8369

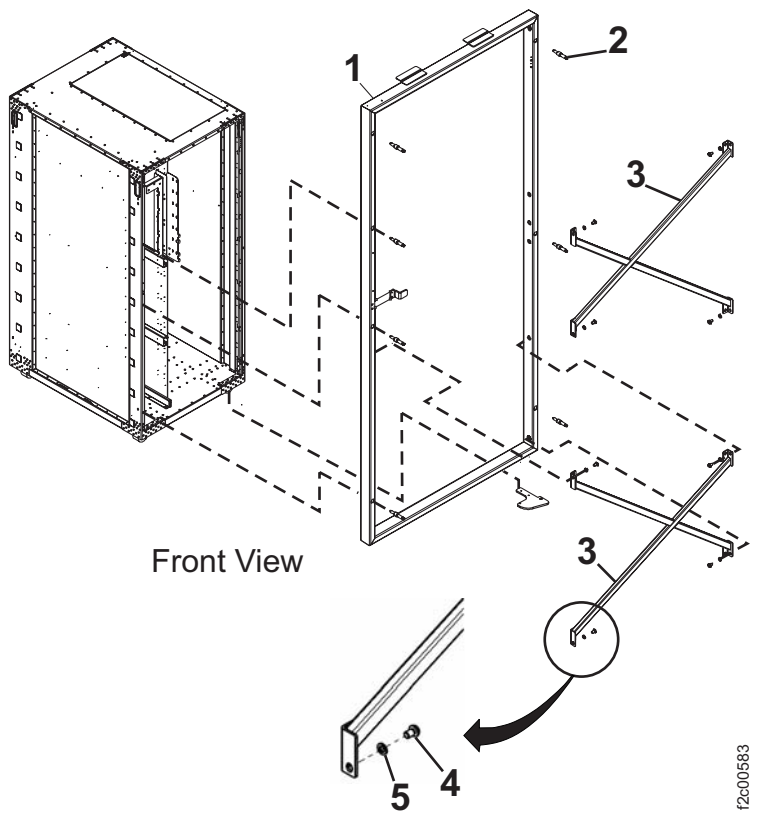

Figure 112. Earthquake resistance kit parts at the front of the rack

Table 31. Earthquake resistance kit parts (except relocation bracket for the operator panel)

Index	Part name	Part number
1	Brace extension frame	22R1317
2	Screw	22R2193
3	X-brace	22R1321
4	Screw (20mm)	1621538
5	Washer, Lock	1622321

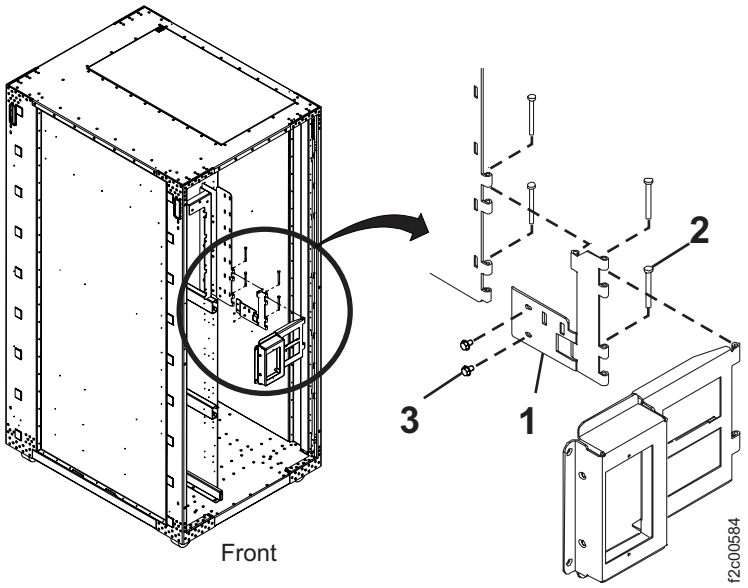

Figure 113. Earthquake resistance kit parts - Relocation bracket for the operator panel

Table 32. Earthquake resistance kit relocation bracket for the operator panel

Index	Part name	Part number
1	Bracket, relocation	22R1793
2	Pin, pivot	22R1794
3	Screw	1621842

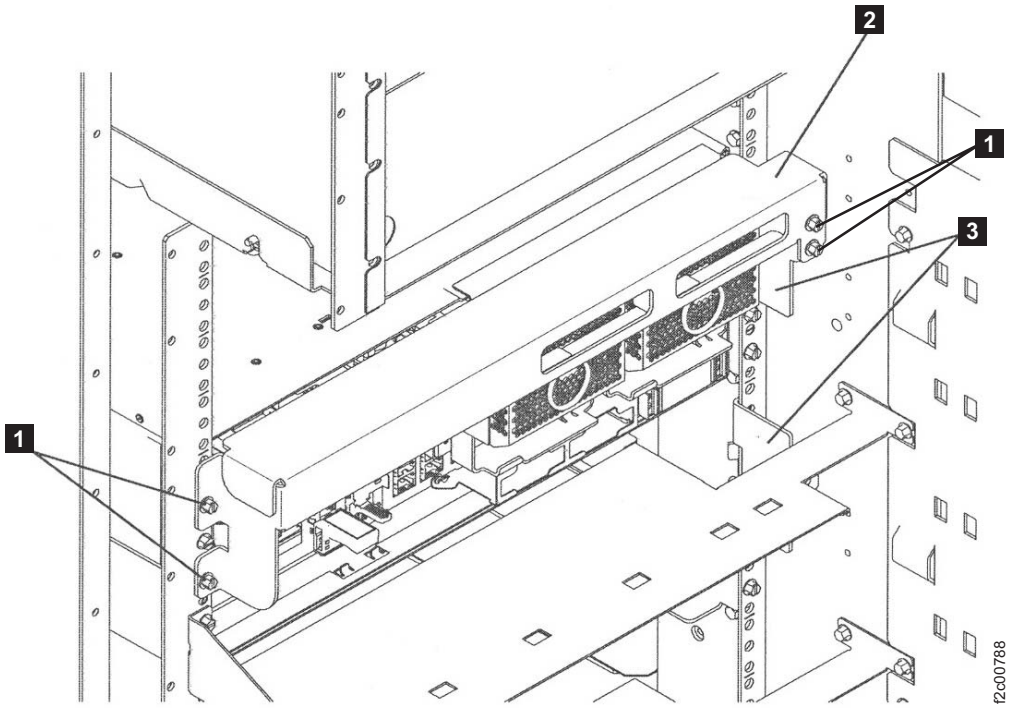

Figure 114. CEC support bracing

Table 33. CEC stiffeners

Index	Part name	Part number
1	Screw	23R1520
2	Bracket, stiffener	22R6856
3	Bracket, mounting	17P8485

Earthquake resistance kit parts at the rear of the rack (stiffeners)

Use the figures and tables that follow to locate information about the earthquake resistance kit brackets (stiffeners) at the rear of the rack.

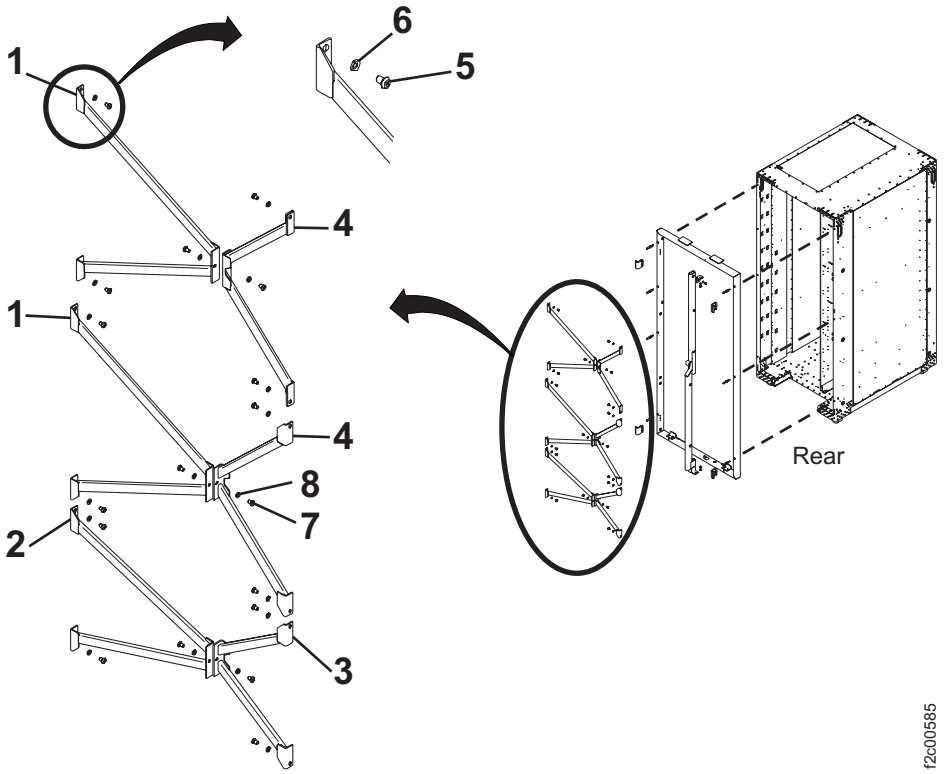

Figure 115. Earthquake resistance kit V-braces at the rear of the rack

Table 34. Earthquake resistance kit V-braces

Index	Part name	Part number
1	V-brace, main, upper	22R1313
2	V-brace, main, lower	22R1315
3	V-brace, power, lower	22R1316
4	V-brace, power, upper	22R1314
5	Screw (20mm)	1621538
6	Washer, Lock	1622321

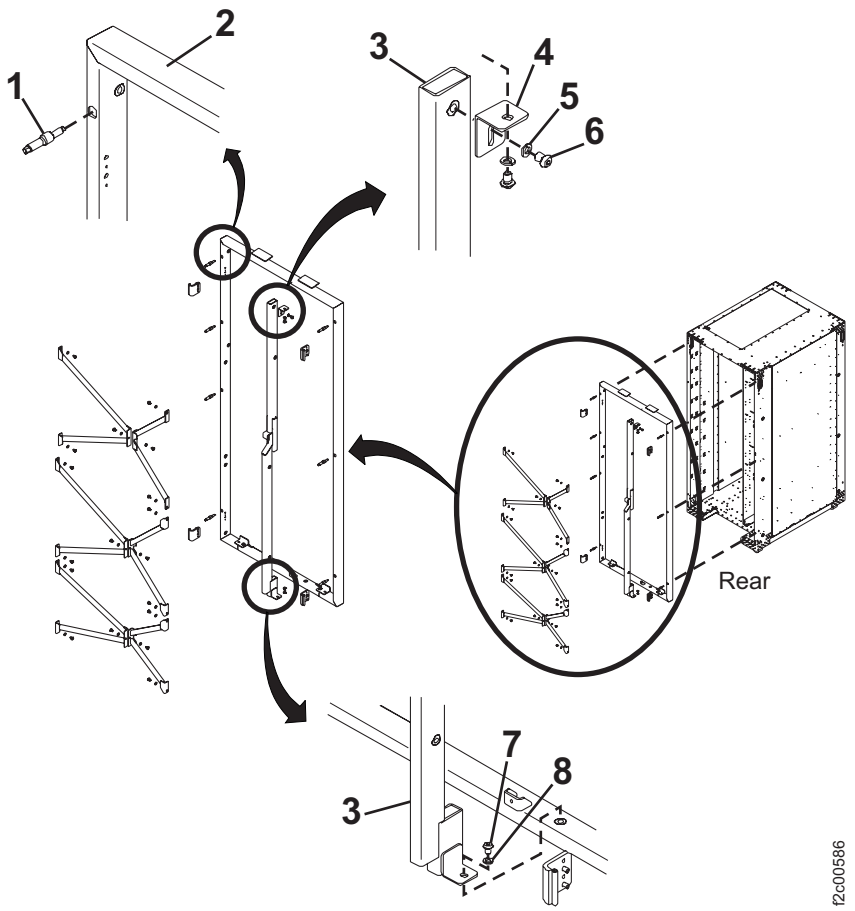

Figure 116. Earthquake resistance kit parts at the rear of the rack (except V-braces)

Table 35. Earthquake resistance kit parts (except V-braces)

Index	Part name	Part number
1	Screw	22R2193
2	Brace extension frame	22R5959
3	Vertical brace	22R1304
4	Bracket, vertical brace to frame	22R5960
5	Washer	1622321
6	Screw	1621538
7	Screw	1621538
8	Washer	1622321

Earthquake resistance kit parts at the floor (tie-downs)

Use the figures and tables that follow to locate information about the earthquake resistance kit parts that tie the rack to the floor.

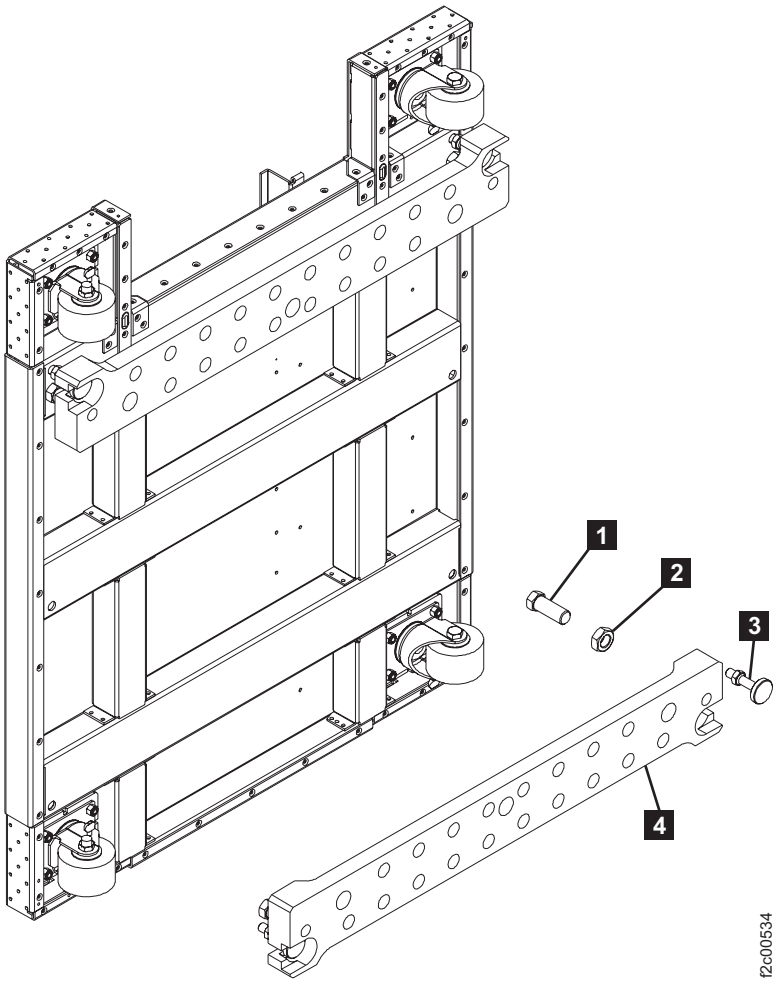

Figure 117. Floor tie-down parts of the earthquake resistance kit (non-raised floor)

Table 36. Floor tie-down parts of the earthquake resistance kit (non-raised floor)

Index	Part name[1]	Part number
1	Leveler	22R1462
2	Jam nut	22R1463
3	Stud	22R1461
4	Load plate	22R1515
Notes		
[1] - Part of the tie-down hardware kit P/N 22R1472.		

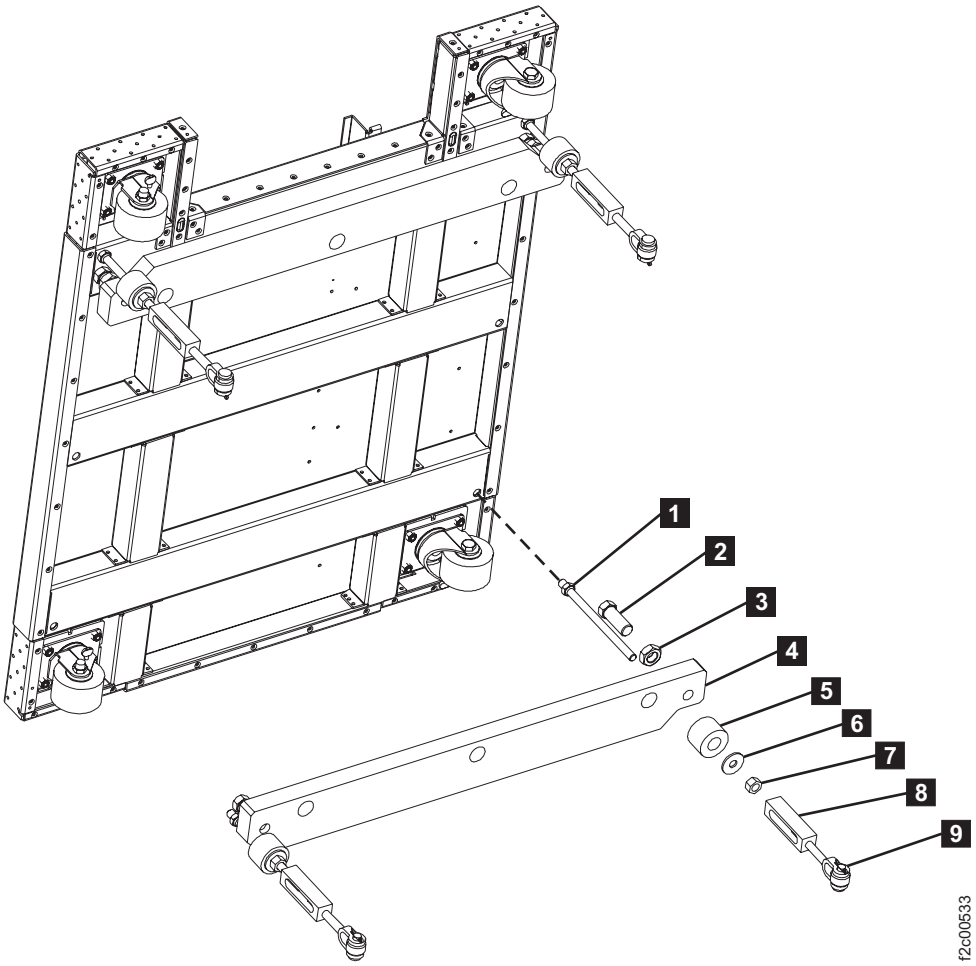

Figure 118. Floor tie-down parts of the earthquake resistance kit (raised floor)

Table 37. Floor tie-down parts of the earthquake resistance kit (raised floor)

Index	Part name	Part number
1	Stud, frame-to-turnbuckle	22R1464
2	Leveler	22R1462
3	Jam nut	22R1463
4	Load plate	22R1301
5	Bushing, rubber	44P2997
6	Washer (M12)	[1]
7	Nut (M12x1.75)	[2]
8	Turnbuckle, short[3]	22R1465
8	Turnbuckle, long[4]	22R1467
9	Spacer, jaw-to-floor hardware, cotter pin, and holding pin	[3], [4]
Notes		
[1] - McMaster-Carr P/N 91100A180 or IBM approved equivalent.		
[2] - McMaster-Carr P/N 90591A181 or IBM approved equivalent.		
[3] - Part of the short tie-down hardware kit (P/N 22R1466).		

Table 37. Floor tie-down parts of the earthquake resistance kit (raised floor) (continued)

Index	Part name	Part number
[4] - Part of the long tie-down hardware kit (P/N 22R1468).		

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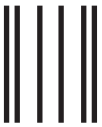

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