

72-Inch Cabinet

Site Preparation and Installation Guide

AA1167-E1, First Edition



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This document describes the 72-inch style of LSI Logic Corporation's 19-inch wide rackmount cabinet and will remain the official reference source for all revisions/releases of this product until rescinded by an update.

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Revision Record		
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About this Site Preparation Guide

This document is intended for service technicians. It contains site preparation requirements and instructions for installing a 72-inch cabinet. This document also provides instructions for transporting the cabinet to another location. These instructions assume that the reader is knowledgeable in computer system operation, maintenance, and repair.

Customer Responsibilities

The following list describes some of the items and equipment you must provide, plus the facility preparations you must complete before installing a 72-inch high rackmount cabinet:

- Provide a site drawing that shows the location of the following:
 - Equipment currently installed at the site and the area designated for the 72-inch cabinet installation
 - Existing site wiring (power, signal paths, and lengths)
 - Equipment capable of generating electrical noise, electromagnetic interference, and heat
- Provide and install the following items:
 - Required communications cables, wall jacks, special connectors, and associated hardware
 - Necessary power distribution boxes, conduits, grounds, lightning protection, and associated hardware (see ["Power Requirements" on page 10](#))
 - Required auxiliary power or other equipment
- Make building alterations necessary to meet wiring, environmental, and other site requirements
- Make sure all site construction, wiring, or other alterations meet applicable codes, regulations, and laws (including, but not limited to, electrical, building, safety, and health)
- Provide necessary storage and service areas (see ["Environmental Requirements" on page 9](#))
- Provide floor coverings and environmental systems that limit or control electricity build-up and discharge

Cabinet Features

The rackmount cabinet (Figure 1) has a detachable back door and standard Electronic Industry Association (EIA) rails, which provide mounting holes for installing 19-inch wide devices. The cabinet has four roller casters and four adjustable guides for moving and leveling the cabinet during installation and relocation. Newer models of this cabinet have interface cable access holes on the top and a removable stability foot that prevents the cabinet from tipping when it is moved.

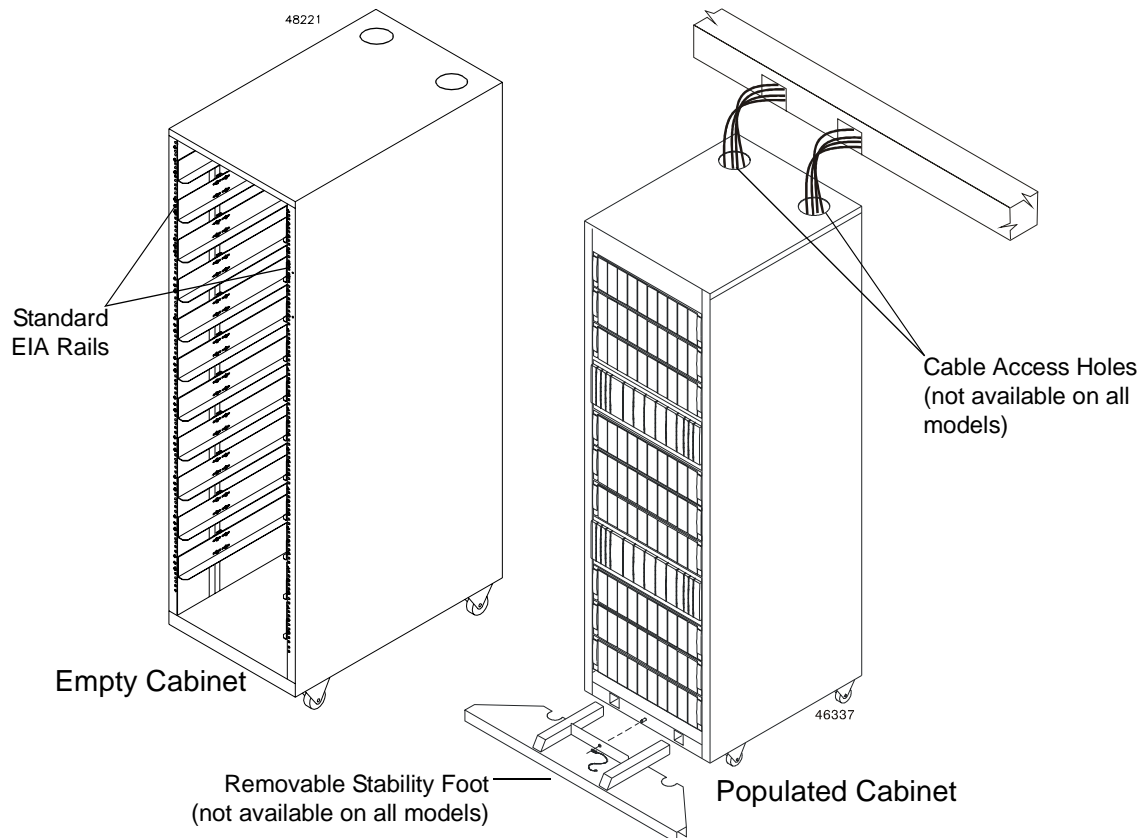


Figure 1 72-inch Cabinet

Depending upon performance, capacity, and availability requirements, you can customize the cabinet to meet your data storage needs. The cabinet contains two AC distribution boxes and can support up to twelve command modules and drive modules. The command module is a rackmount unit containing two array controllers, a battery, redundant cooling fans and power supplies. Drive modules may contain up to fourteen drives, redundant fans and power supplies, and either an array controller or Environmental Service Monitor (ESM) board. See ["Reference Documentation" on page 4](#) for information on the modules.

[Figure 2](#) shows a typical configuration that includes five drive modules and one command module mounted in the 72-inch rackmount cabinet. The cabinet is shipped with only the bottom half filled to provide stability when shipping and moving the cabinet to the installation site. The top half is filled with blank panels.

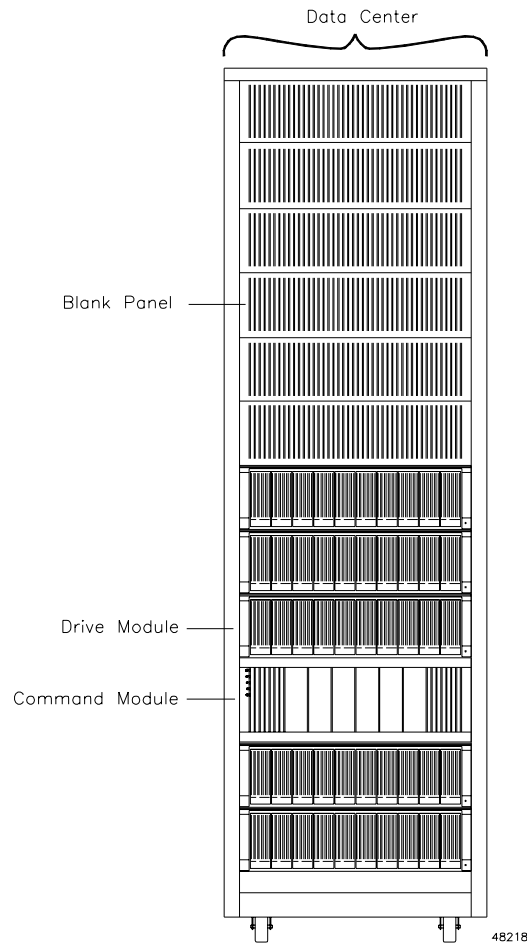


Figure 2 72-inch Cabinet with Command and Drive Modules

Reference Documentation

The following documents contain additional information on command and drive modules, their installation, and cabling schemes. These documents are listed chronological order from newest to oldest, based on the month and year they were released.

- ***Command Module and Drive Module Installation Guide, AP1154-E1, First Edition*** (March 2001) – provides information and step-by-step instructions for installing command modules (E3300, E4400, and E2400) and drive modules (E3300, FC-1 10x and FC-1 14x) running SANtricity Storage Manager 7.10 software
- ***Command Module Site Preparation Guide, CC1151-E1, First Edition*** (March 2001) – provides information for preparing the building and equipment to install E3300 and E4400 Command Modules running SANtricity Storage Manager 7.10 software
- ***Command Module User Guide, CC1140-E1, First Edition*** (March 2001) – provides information and step-by-step instructions for operating, upgrading, troubleshooting and servicing E3300 and E4400 Command Modules running SANtricity Storage Manager 7.10 software
- ***Drive Module Site Preparation Guide, DF1153-E1, First Edition*** (March 2001) – provides information for preparing the building and equipment to install drive modules (E3300, FC-1 10x and FC-1 14x) and the E2400 Command Module running SANtricity Storage Manager 7.10 software
- ***Drive Module User Guide, DF1144-E1, First Edition*** (March 2001)– provides information and step-by-step instructions for operating, upgrading, troubleshooting and servicing drive modules (E3300, FC-1 10x and FC-1 14x) and the E2400 Command Module running SANtricity Storage Manager 7.10 software
- ***MetaStor E-Series, E4400 Command Module and E4400 Drive Module Installation Guide, AP1008-E1, First Edition*** (May 2000) – provides information and step-by-step instructions for installing E4400 command modules (4774) and E4400 Drive Modules (FC-FC ESM) running SANtricity Storage Manager 7.01 software
- ***MetaStor E-Series, E4400 Command Module and E4400 Drive Module Site Preparation Guide, AP1010-E1, First Edition*** (May 2000) – provides information for preparing the building and equipment to install E4400 command modules (4774) and E4400 Drive Modules (FC-FC ESM) running SANtricity Storage Manager 7.01 software
- ***MetaStor E-Series, E4400 Command Module User Guide, CC1012-E1, First Edition*** (May 2000) – provides information and step-by-step instructions for operating and servicing E4400 command modules (4774) running SANtricity Storage Manager 7.01 software
- ***MetaStor E-Series, E4400 Drive Module User Guide, DF1014-E1, First Edition*** (May 2000) – provides information and step-by-step instructions for operating and servicing E4400 Drive Modules (FC-FC ESM) running SANtricity Storage Manager 7.01 software

- ***MetaStor CM2000 Command Module Installation Guide, J90981S-0999, Revision B, Third Printing*** (March 2000) – provides information and step-by-step instructions for installing CM2000 Command Modules containing 4766 controllers and running SYMplicity Storage Manager (6.x) or SANtricity Storage Manager (7.00, 7.01, or 7.02) software
- ***MetaStor CM2000 Command Module User Guide, J91981S-0999, Revision B, Third Printing*** (March 2000) – provides information and step-by-step instructions for operating, upgrading, troubleshooting and servicing CM2000 Command Modules containing 4766 controllers and running SYMplicity Storage Manager (6.x) or SANtricity Storage Manager (7.00, 7.01, or 7.02) software
- ***MetaStor DM2000 Drive Module Installation Guide, J23971S-0899, Revision E, Third Printing*** (March 2000) – provides information and step-by-step instructions for installing DM2000 Command Modules containing LVD-SE or LVD-LVD Environmental Services Monitor (ESM) boards and running SYMplicity Storage Manager (6.x) or SANtricity Storage Manager (7.00, 7.01, or 7.02) software
- ***MetaStor DM2000 Drive Module User Guide, J22971S-0899, Revision E, Third Printing*** (March 2000) – provides information and step-by-step instructions for operating, upgrading, troubleshooting and servicing DM2000 Command Modules containing LVD-LVD ESM boards and running SYMplicity Storage Manager (6.x) or SANtricity Storage Manager (7.00, 7.01, or 7.02) software
- ***MetaStor Command Module System Guide, J20971S-0999, Revision B, Second Printing*** (March 2000) – provides information and step-by-step instructions for operating, upgrading, troubleshooting and servicing command modules containing 3621 or 3702 controllers and running SYMplicity Storage Manager 6.x software
- ***MetaStor Command Module Installation Guide, J21971S-0398, Revision B, Second Printing*** (March 2000) – provides information and step-by-step instructions for installing command modules containing 3621 or 3702 controllers and running SYMplicity Storage Manager 6.x software

Dimensions and Weights

Dimensions

The cabinet has the following dimensions (Figure 3), excluding the removable stability foot:

- Height: 183 cm (72 in.)
- Width: 56 cm (22 in.)
- Depth: 91 cm (36 in.)

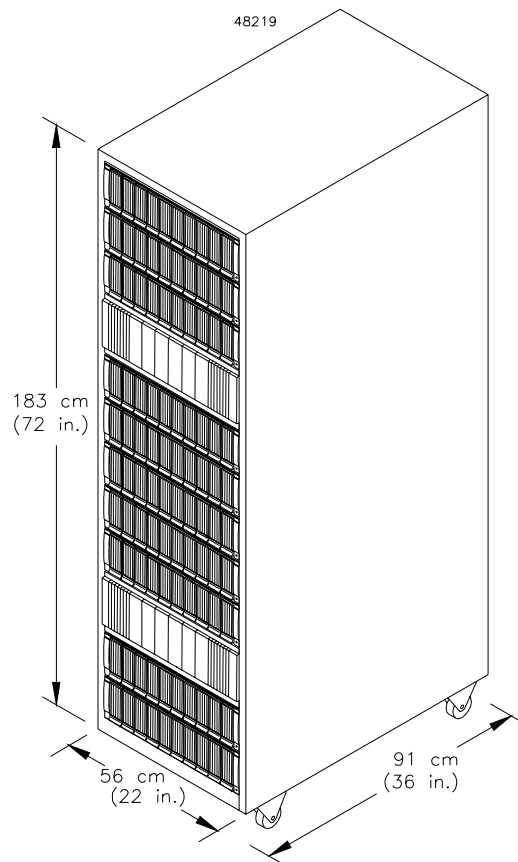


Figure 3 Cabinet Dimensions

Weights

The total weight depends on the type and quantity of modules installed in the 72-inch cabinet. [Table 1](#) lists the overall weight of the cabinet, plus the maximum weights for the command and drive modules. You can use these weights to estimate the total weight of your system, based on the number of devices installed in the cabinet.

Remember, the cabinets are shipped with only the bottom half filled with modules. If you order enough modules to fill the cabinet, they will be packed separately. In the United States and Canada, the cabinet and modules are shipped in a padded van. Internationally, the cabinet and modules are shipped in packing crates.

Table 1 Cabinet, Crate, and Module Weights

	Cabinet	Crate¹	Command Module	Drive Module²	E4400 Command Module	E4400 Drive Module
	Empty	Empty	Maximum	Maximum	Maximum	Maximum
Unit Weight	121.0 kg (267.0 lb)	97.0 kg (215.0 lb)	34.5 kg (76.0 lb)	39.3 kg (86.6 lb)	40.5 kg (89.0 lb)	40.0 kg (88.0 lb)

¹ Add for international shipments only

² Half-height drives

Area Requirements

The floor area at the installation site must provide:

- Enough stability to support the weight of the 72-inch cabinet and installed devices ([Table 1 on page 7](#))
- Sufficient space to install and service the cabinet and components ([Figure 4](#))
- Sufficient ventilation to provide a free flow of air to the cabinet. Air flow in the cabinet is from the front to back.

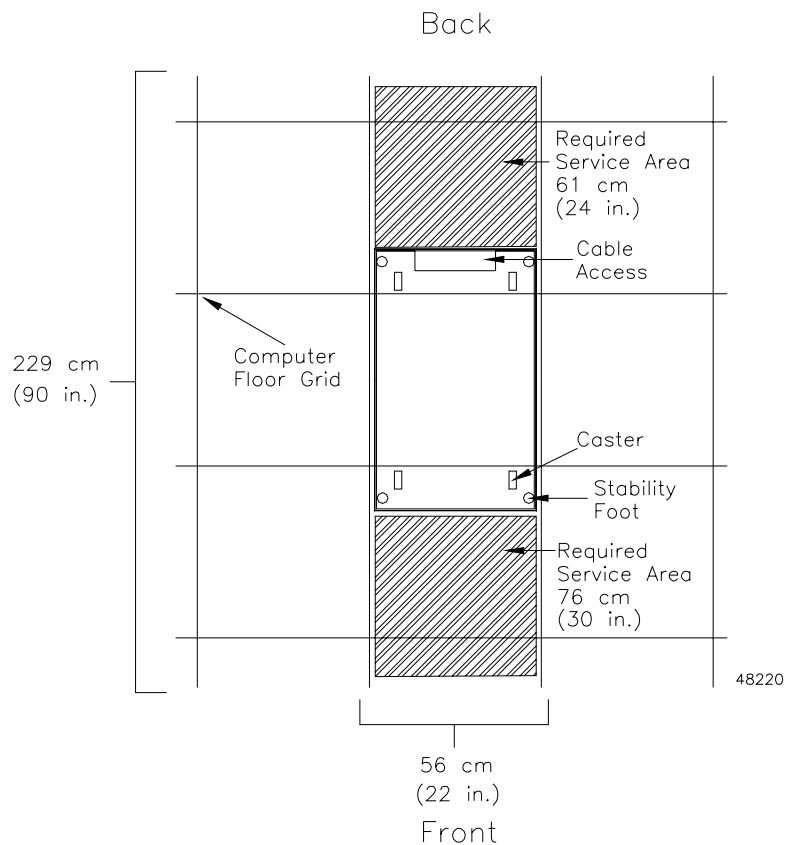


Figure 4 Cabinet Area Requirements

Environmental Requirements

Table 2 Environmental Requirements

Environment	Requirements			
Altitude	Operating Range	Storage Range	Transit Range	
Below Sea Level	30.5 m (100 ft.)	30.5 m (100 ft.)	30.5 m (100 ft.)	
Above Sea Level	3000 m (9840 ft.)	3000 m (9840 ft.)	12,000 m (40,000 ft.)	
Temperature	Operating Range	Storage Range	Transit Range	
Temperature Range	10° C to 35° C (50° F to 104° F)	15° C per hour (31° F per hour)	20° C per hour (42° F per hour)	
Temperature Change	10° C per hour (21° F per hour)	15° C per hour (31° F per hour)	20° C per hour (42° F per hour)	
Relative Humidity	Operating Range	Storage Range	Transit Range	Maximum Allowed
No Condensation	20% to 80%	10% to 90%	5% to 95%	
Dew Point				28° C (82° F)
Humidity Gradient				10% per hour
Noise	Steady/Non-Steady		Normal Operation	
Level	6.8 bels		65 dBA	
Heat Dissipation¹	Component	Configuration A	Configuration B	Configuration C
	LP Drives	1.62 kVA 1601 W 5467 Btu/hr	3.23 kVA 3202 W 10,934 Btu/hr	2.90 kVA 2866 W 9788 Btu/hr
	HH Drives	1.69 kVA 1677 W 5727 Btu/hr	3.39 kVA 3354 W 11,454 Btu/hr	3.02 kVA 2988 W 10,205 Btu/hr

¹ These are kVA, W, and Btu calculations for three configurations containing Low-Profile (LP) and Half-Height (HH) drives, including:

- Configuration A contains 1 command module and 5 drive modules
- Configuration B contains 2 command modules and 10 drive modules
- Configuration C contains 3 command modules and 8 drive modules

Power Requirements

Table 3 Power Requirements

Unit/Component	Requirements			
	Domestic		International	
AC Power	250 VAC, 30 A		230 VAC, 32 A	
AC Plug	NEMA L6-30P, locking plug		IEC 309 locking plug	
Receptacle	6-30R, receptacle		IEC 309 receptacle	
Circuit Breaker	20 A			
Voltage Range	180 to 257 VAC			
Frequency	49 to 50.5 Hz or 59 to 60.6 Hz			
Current (specified frequency)	220 VAC, 50/60 Hz			
		Configuration A ¹	Configuration B ¹	Configuration C ¹
Operational Current	LP Drives ²	7.35 A	14.70 A	13.16 A
	HH Drives ²	7.70 A	15.40 A	13.72 A
Surge Current	LP Drives	10.95 A	21.90 A	22.20 A
	HH Drives	11.45 A	22.90 A	23.00 A

¹ Power specifications for three configurations containing Low-Profile (LP) and Half-Height (HH) drives, including:
 Configuration A contains 1 command module and 5 drive modules
 Configuration B contains 2 command modules and 10 drive modules
 Configuration C contains 3 command modules and 8 drive modules

² LP drives are 1.0 inch tall; HH drives are 1.6 inches tall.

AC Power Distribution

The 72-inch cabinet has two identical AC power boxes (Figure 5). Depending on the configuration ordered, each box supports either domestic or international units and includes the following features:

- One domestic plug (NEMA L6-30P, 30 A, 220 VAC) or one international plug (IEC 309, 30 A, 3-pin, 230 VAC)
- One circuit breaker (20 A)
- Two power outlets (IEC 320, 16 A, C-19, filtered individually for international and domestic EMC compliance)
- Support for up to 12 attachments per box (24 per cabinet) using two, ladder-attach cables (see "Power Box Cables" on page 12)

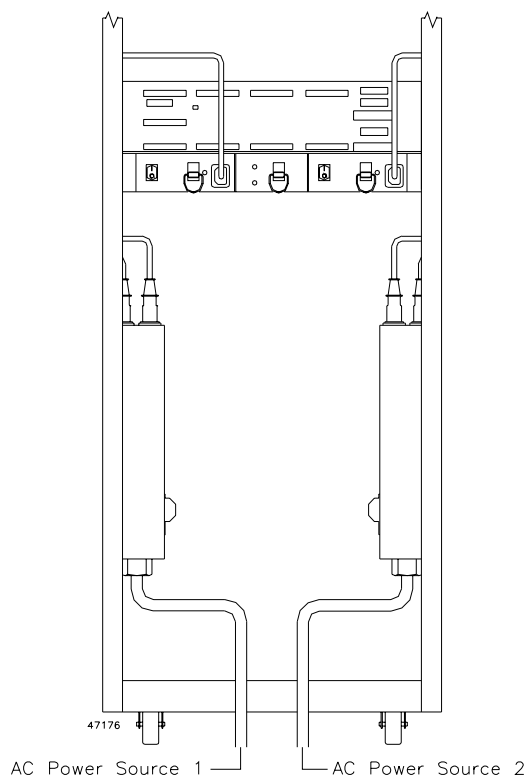


Figure 5 72-Inch Cabinet AC Distribution

Power Box Cables

Each AC box outlet supports on ladder-attach power cable (Figure 6) that you can connect to a maximum of six devices. You may connect up to twelve 220/230 VAC devices to each AC box for a maximum of twenty-four power attachments inside the cabinet.

Although the cabinet may not be fully populated when shipped, the 72-inch cabinet is shipped with four, ladder-attach cables for easier expansion in the future. Each cable has the following specifications:

- **Cable:** 10 A per cable (1.67 A per connection if all are used)
- **Input Connector:** IEC 320, C-19, 16 A, 250 VAC
- **Plugs:** IEC 320, C-14, 10 A, 250 VAC
- **Ladder Step:** 5.25 inches between connections
- **Cable Routing:** Route cables between the mounting rails and side skins of cabinet

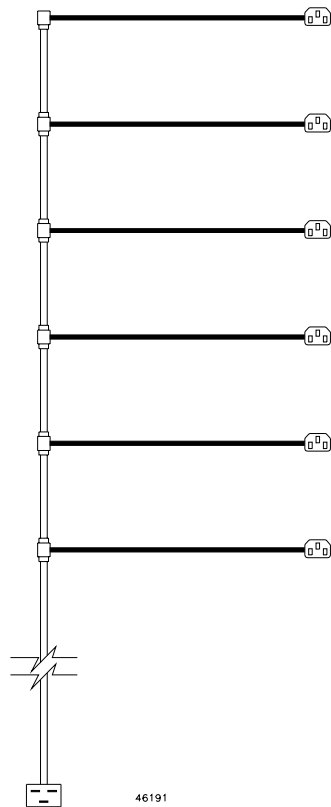


Figure 6 Ladder-Attach Cable for a 72-Inch Cabinet

Power Cords and Receptacles

The cabinet is shipped with two power cords: one for domestic use, the other for international use. Each cord connects to an independent 24 A circuit breaker and an AC distribution box. The AC distribution box has two outlets for connecting the power cords from devices installed in the cabinet. [Figure 7](#) shows these receptacles.

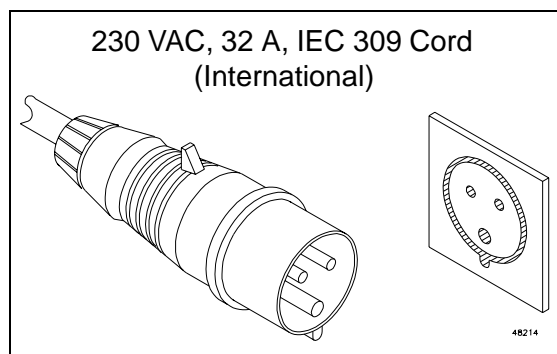
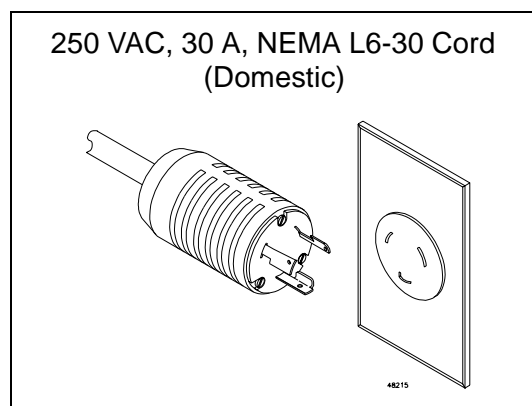
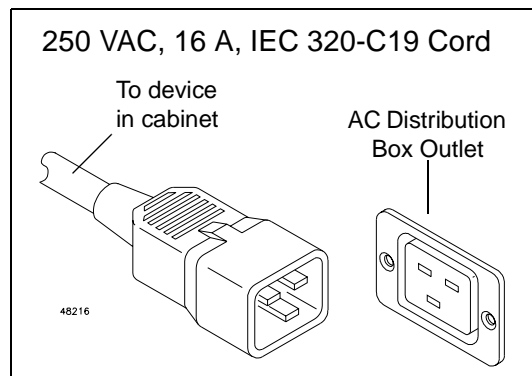


Figure 7 AC Power Cords and Receptacles

Site Wiring and Power Considerations

The cabinet's AC distribution boxes use common industrial wiring. Consider the following site wiring and power source requirements:

- **AC power source.** The AC power source must provide the correct voltage, current, and frequency specified on the manufacturer's name plate.
- **Earth ground.** You must have an earth grounding conductor to the cabinet's power receptacles.
- **Circuit overloading.** Make sure the power circuits and associated circuit breakers provide sufficient power and overload protection. To prevent possible damage to the AC distribution boxes and other components in the cabinet, isolate its power source from large switching loads (such as air conditioning motors, elevator motors, and factory loads).
- **Module power distribution.** There are two accessory outlets inside the cabinet for module power distribution. All units attached to these outlets must be auto-ranging between 180 through 257 VAC, 50-60 Hz.
- **Power Interruptions.** The 72-inch cabinet and its modules will withstand the following applied voltage interruptions (with or without an integrated UPS):
 - **Input transient:** 50% of nominal voltage
 - **Duration:** one half cycle
 - **Maximum frequency:** once every ten seconds
- **Power Failures.** After total power failure, the modules within the cabinet will automatically perform a power-up recovery without operator intervention, once power is restored.

Installation Instructions

Tools and Equipment

You will need the following tools and equipment to unpack and install a 72-inch cabinet:

- **Wrench** (supplied in shipping crate) – to raise and lower the leveling glides
- **Shears** – to cut the metal bands on the shipping crate
- **Forklift** (optional) – to remove the cabinet from the shipping skid
- **Communication cables** (optional)– additional cables to attach the cabinet to the host

Unpacking and Moving the Cabinet



WARNING Risk of bodily injury! The cabinet can weigh up to 636 kg (1420 lb) fully loaded. Do not attempt to move the cabinet without a forklift or sufficient help from others. Always push the cabinet from the front to prevent it from tipping over ([Figure 10](#)). If you need to move the cabinet up or down a ramp (with or without a forklift), remove drive modules from the upper half of the cabinet to improve stability.

CAUTION If you receive the cabinet and modules in extremely cold weather (below 32 °F), leave them crated for at least 24 hours to prevent condensation. This 24-hour stabilization period can be modified either up or down, depending on the outside temperature at arrival.

The shipping crate provides built-in ramps and instructions for rolling the cabinet off of the skid without the use of a forklift. Some models have a removable stability foot that prevents the cabinet from tipping over when it is moved. You must attach the stability foot to the front of the cabinet (at the bottom) before you move the cabinet. [Figure 8 on page 17](#) shows the unpacking instructions included on the front side of the shipping crate for cabinets without a stability foot. [Figure 9 on page 18](#) shows unpacking instructions for cabinets with a stability foot. [Figure 10 on page 19](#) shows the incorrect and correct methods for moving the cabinet. For your safety, follow all these instructions carefully.

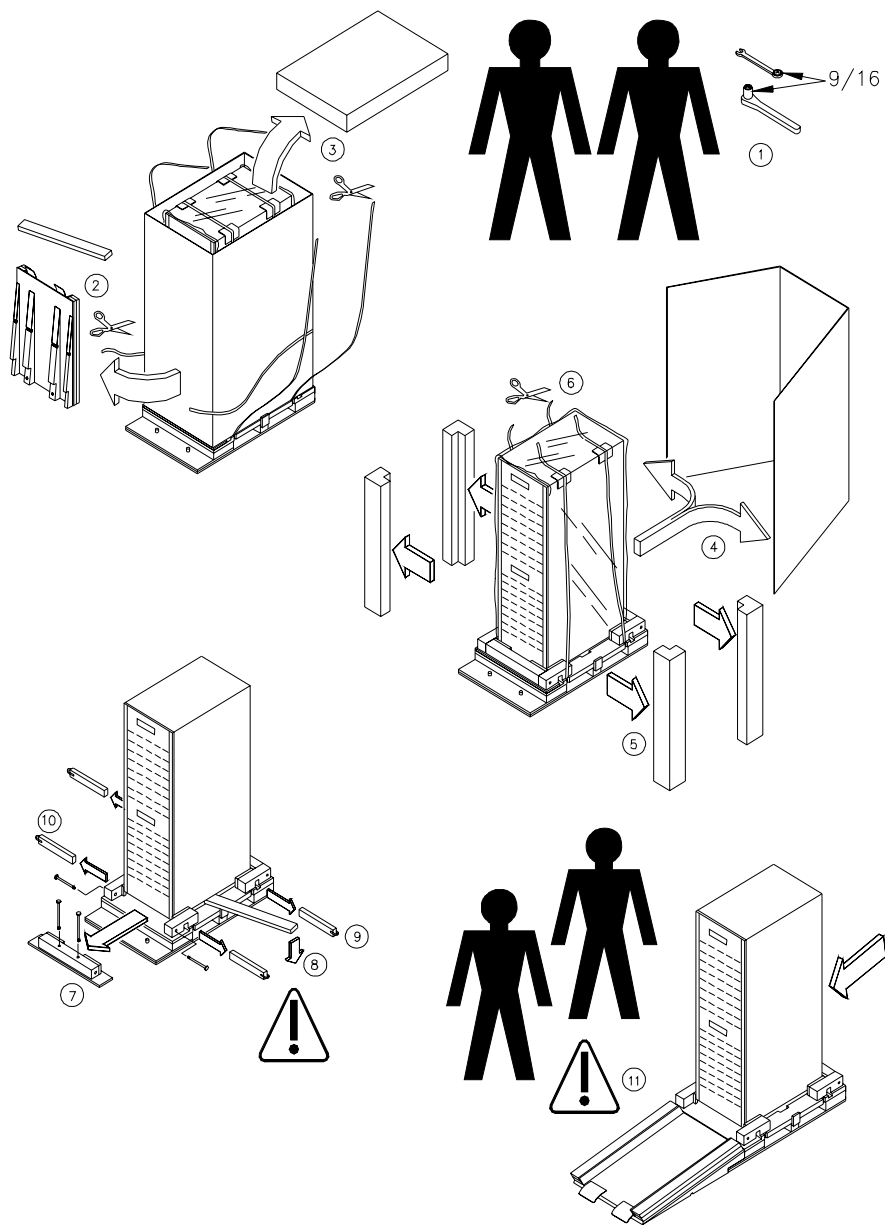


Figure 8 Unpacking Instructions for a 72-inch Cabinet without a Stability Foot

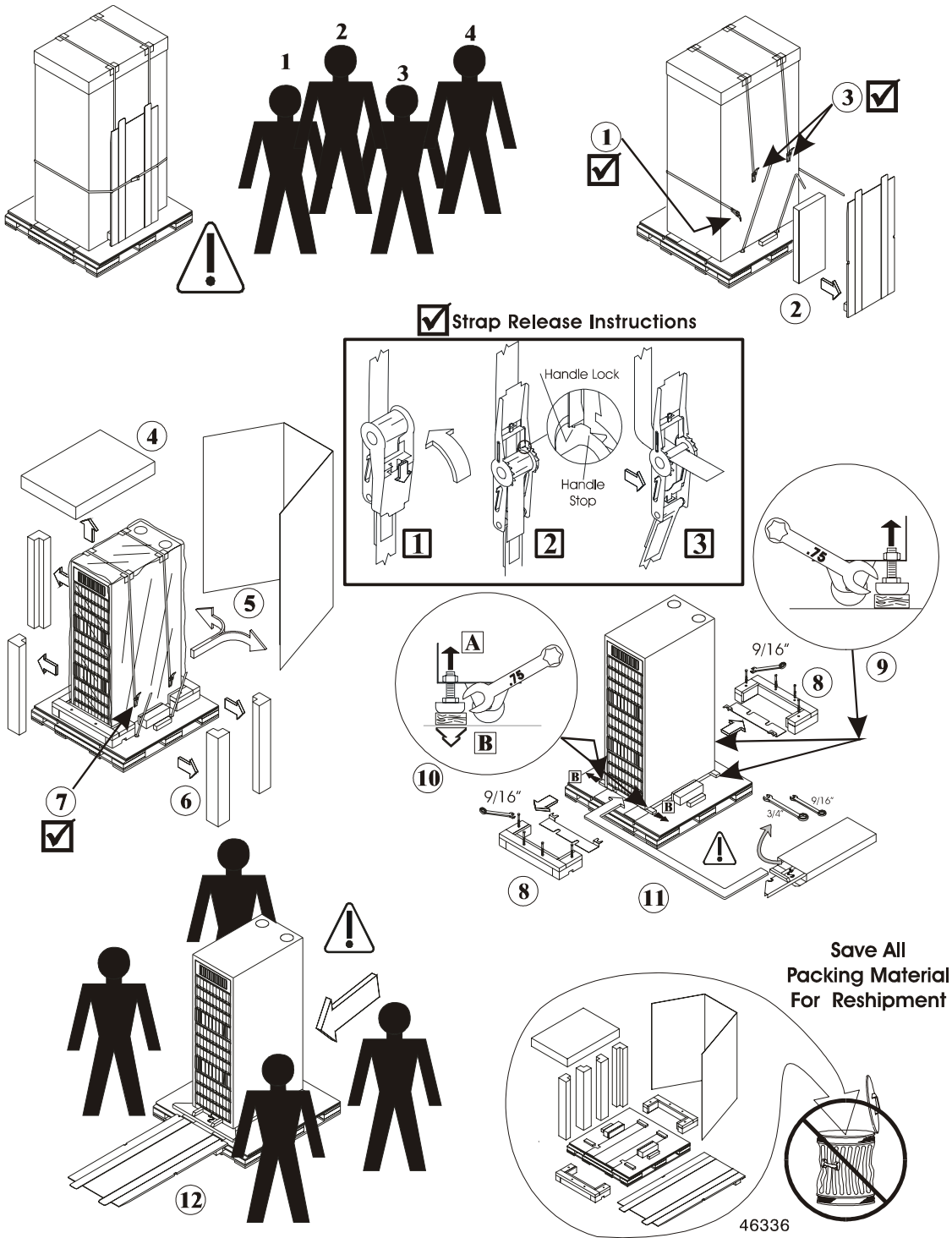


Figure 9 Unpacking Instructions for a 72-inch Cabinet with a Stability Foot

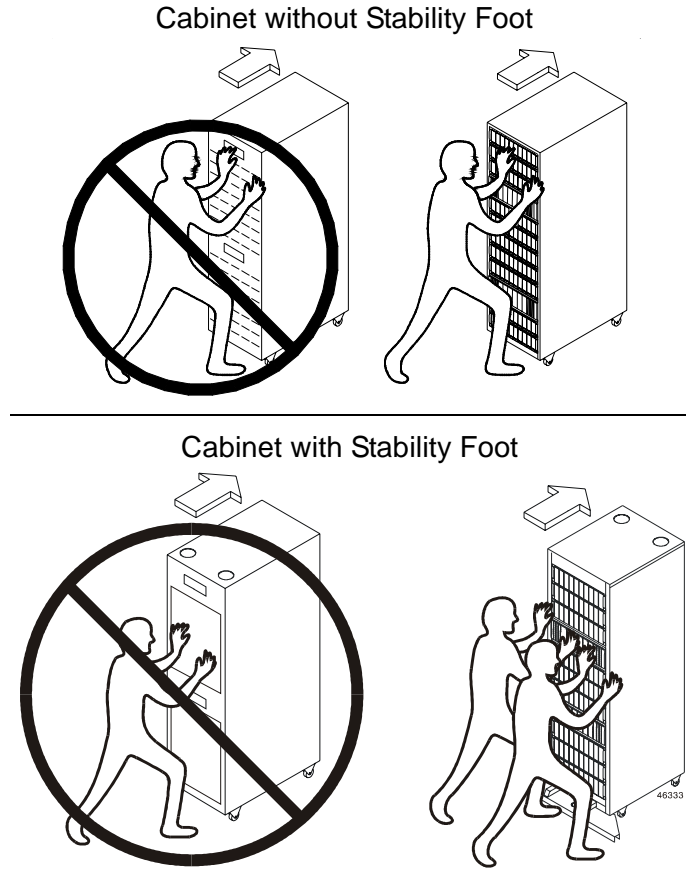


Figure 10 Incorrect and Correct Methods for Pushing the Cabinet

Installing the Cabinet

The installation tasks you must perform depends on how you ordered the 72-inch cabinet and its associated modules. In most cases, you will need to do some or all of the following:

- 1 Check the shipping contents list to make sure all equipment arrived at the site.
- 2 Move the cabinet to its final location. Once it is in position, lower the levelling glides and level the unit as necessary.
- 3 Install all applicable host, host adapter boards, hubs, switches, and other devices on the network. Route the appropriate interface cables to the cabinet.
- 4 Route the main power cords from the cabinet to the external power source (but *do not* plug in yet).
- 5 If necessary, install applicable mounting hardware for rackmount units. Refer to kit instructions.
- 6 Install all devices in cabinet (command modules, drive modules, etc.) Refer to applicable installation instructions for each device.
- 7 Route and connect appropriate interface and power cables to devices in cabinet.
- 8 Plug in main power cord to cabinet and turn on power. Make sure that you power-up all devices in the proper sequence.
- 9 Test all devices in the cabinet and on the SCSI bus or Fibre Channel network for error free operation.
- 10 Install software and configure the drive modules and controller modules as necessary.

For installation and operation information on individual modules , software, or other network components, refer to the user manuals shipped with each unit.

Transportation Instructions



WARNING Risk of bodily harm. Failure to follow this procedure could result in a cabinet becoming very unstable up/down inclines or over uneven surfaces.

To maximize stability during the transportation of a 72-inch cabinet, the center of gravity for the cabinet must be as close to the base as possible. For this reason, it is recommended that you transport the unit with the upper half of the modules depopulated. All heavier weighted components in the upper half of the cabinet should be taken out and transported by static protective means. This includes drives, battery canisters, and controllers.

It is not necessary to remove components in the rear of the modules, such as power supplies. These components will not disturb an optimal center of gravity. If the original shipping boxes are available, these may serve as ideal transportation for these components. Here are some guidelines to follow:

- Make note of the Tray ID settings for the drive modules. It is imperative that the drives be replaced in the exact slots from which they were removed. Make sure the drives are in the same order during shipping and that the drives have been associated with the proper Tray ID.
- If any cables need to be disconnected, note the cable configuration for future assembly. The module's user guide will help by providing cabling diagrams.
- Keep all components from the same modules together.
- All components must be replaced to the same module and location. This will avoid conflicts and data loss.

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