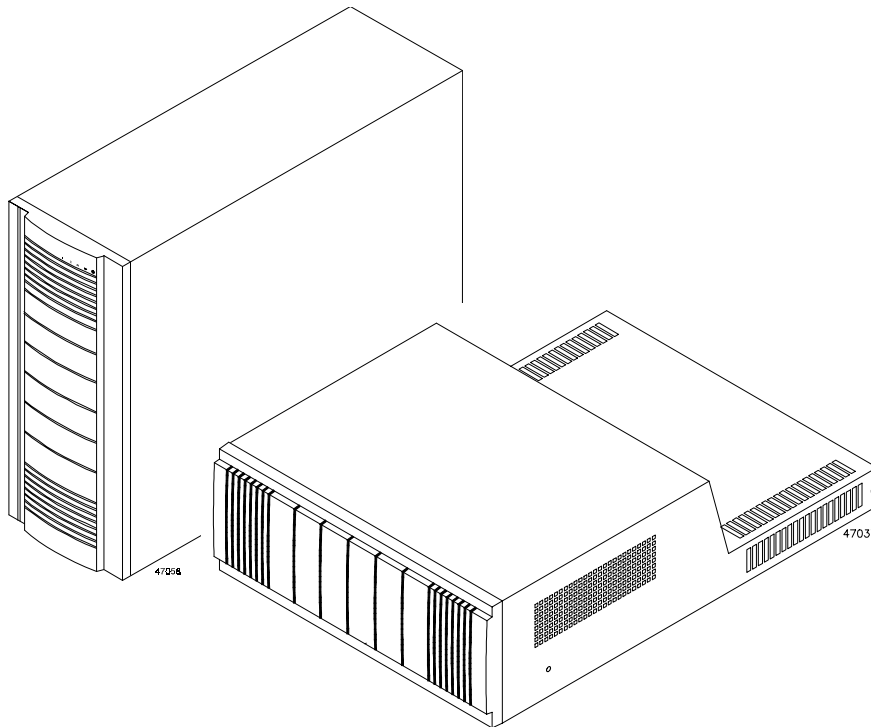




MetaStor Command Module



Installation Guide

This book is intended for system operators, system administrators, and service technicians. It provides site preparation information and step-by-step instructions for installing the MetaStor™ Command Module. This book assumes that the reader understands disk array, SCSI bus, and Fiber Channel technology, and has extensive knowledge of computer system operation, maintenance, and repair.

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Revision A

Federal Communications Commission (FCC) Radio Frequency Interference Statement

Information To User

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- 1 This device may not cause harmful interference, and
- 2 This device must accept any interference received, including interference that may cause undesired operation.

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

Symbios Logic Inc. is not responsible for any radio or television interference caused by unauthorized modification of this equipment or the substitution or attachment of connecting cables and equipment other than those specified by Symbios Logic. The correction of interference caused by such unauthorized modification, substitution, or attachment will be the responsibility of the user.

The digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classé A prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des

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取扱説明書に従って正しい取り扱いをして下さい。

Revision Record

Revision	Date	Affected Pages
	12/1997	Initial release
A	03/1998	All pages. Added Fiber Channel information and corrected errors.

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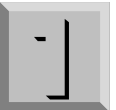
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Chapter One

Installation Instructions

This chapter contains instructions for installing a deskside or rackmount MetaStor Command Module. For information on operating and servicing the command module, refer to *MetaStor Command Module System Guide, J20971S*.

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<i>About the Installation Procedures</i>	<i>page 3</i>
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Getting Started

Important Note

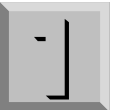


This section specifies the preparations you should have completed before beginning the installation and explains the overall installation process. **Read everything in this section before you start** the installation procedure.

Preparatory Tasks and Assumptions

The instructions in this book assume:

- You have already installed the applicable hosts and host adapters.
- Interface cables (SCSI or Fiber Channel) are attached to the appropriate hosts and are ready for final connection to the command module.
- The installation site meets all area, environmental, power, and site requirements for the command module. Refer to command module's requirements listed in ["Site Requirements" on page 52](#).
- If you are installing a rackmount command module in a Data Center cabinet, the cabinet is in its permanent operation location and is prepared for final installation. These preparations may include installing:
 - Support rails inside the cabinet for mounting the controller module
 - One or two independent power sources, such as an *uninterruptible power supply (UPS)*
 - Up to five MetaStor™ Drive Modules per command module
 - Additional MetaStor Command Modules
 - Additional power and interface cables
- If you are connecting a deskmount command module to deskmount drive modules, the units are near their final location and are prepared for installation.
- You have already removed the command module and other items from the shipping container. Besides this book, the shipment should include the following items:
 - **Two power cords.** These attach the command module to the AC power source inside the cabinet or to an external receptacle.
 - **Transmittal document.** This document contains last minute installation, configuration, or operational information about the command module.



Depending on how the command module was ordered, other items may be included with the command module, such as interface cables, 16-bit terminators, mounting hardware, or additional documentation. Refer to the shipping list or invoice included with the command module for a complete list of items.

Tools and Equipment You May Need

To complete this installation procedure, you will need some or all of the following:

- Power cords (shipped with unit)
- Screwdrivers and wrenches (various sizes)
- Antistatic protection (such as a grounding wrist strap)
- Interface cables, terminators, and tie wraps
- Mounting hardware (for rackmount installations)
- Table or cart (optional)
- Software (to configure the disk array)

About the Installation Procedures

The step-by-step procedures in this chapter will guide you through the entire installation process for both the deskside and rackmount command modules. These procedures include:

- Preparing the Data Center cabinet (rackmount installation only)
- Preparing drive modules that you intend to attach to the command module
- Preparing the command module
- Installing the command module
- Completing the installation

You should perform these tasks in the order that they are given, beginning with one of the following:

- **To install one or more rackmount command modules**, go to [“Preparing the Data Center Cabinet” on page 4](#).
- **To install one or more deskside command modules**, move the command module to the installation location, and go to [“Set the Drive SCSI IDs” on page 8](#).



Preparing the Data Center Cabinet

Before installing the command module in a Data Center cabinet, you must prepare the cabinet. Preparation may include:

- Turning off the main power
- Removing external cabinet panels
- Installing a set of support rails
- Changing the SCSI ID settings on the drive modules or other devices in the cabinet

This section lists some of the things you should check or do before you begin installing a rackmount command module.

About Support Rails and Blank Panels

To install the command module in a Data Center cabinet, you will need two kits: a rackmount support rail kit and a blank panel kit. Placement of support rails and blank panels in or on the cabinet depends on where you intend to position the command module.

Support rail kits are available from your local dealer. Kits are shipped separately. Each kit contains the following parts:

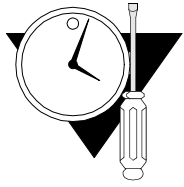
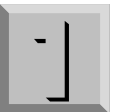
- One pair of rackmount support rails
- 16 (10-32 x 1/2) Phillips screws
- 4 (6-32 x 3/8) Phillips screws (non self-tapping)
- 2 (6-32 x 3/8) Phillips screws (self-tapping)

For installing the support rails in the Data Center cabinet for the command module, you will need the following parts from the kit:

- One pair of rackmount support rails
- 12 (10-32 x 1/2) Phillips screws
- 4 (6-32 x 3/8) Phillips screws (non self-tapping)

Also available from your local dealer, blank panel kits contain the following parts:

- One 1.75-inch blank panel with mounting bracket
- One 3.5-inch blank panel with mounting bracket
- One 5.25-inch blank panel with mounting bracket
- 10 (10-32 x 1/2) Phillips screws



Prepare the Cabinet

Tools/Equipment

Support rail kit and screwdrivers

Instructions

Use this procedure to setup a Data Center cabinet and prepare to install a **rackmount command module**. During this installation, you must be able to access the interior of the cabinet in order to mount hardware on the EIA rails, route power and interface cables, and set switches on the command module and drive modules. As well, you must have enough room around the outside of the cabinet to lift and install the command module chassis into the cabinet.

1 Turn off the power.

If applicable, stop all I/O activity to the Data Center cabinet in which you intend to install the command module. Turn off the power switches on both AC distribution boxes in the cabinet.

2 Remove the panels from the Data Center cabinet (Figure 1).

Remove the back panel from the cabinet. This will make it easier to install the support rails and command module hardware. If there is a blank panel on the front of the cabinet across the area where you intend to install the command module, remove the blank panel. For more information on removing and adjusting the blank panels on the Data Center cabinet, refer to the blank panel kit instructions.

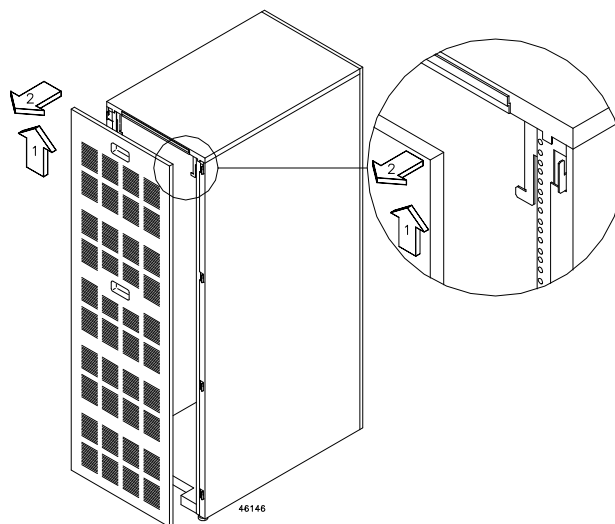


Figure 1 Removing Back Panel from Data Center Cabinet



3 Determine where to install the support rails (Figure 2).

In general, it is best to install devices in the Data Center cabinet from the bottom up to keep the cabinet from being top heavy. Therefore, try to install the command module in the next assigned position, above the topmost device in the cabinet. If you are also installing drive modules that will connect to the command module, you should install the drive modules above and below the command module for ease of cabling. There must be at least 7 inches clearance above the base of the new support rails for the command module. Refer to the cabling examples for rackmount modules beginning on page 29 for examples of command module and drive module placement in the cabinet.

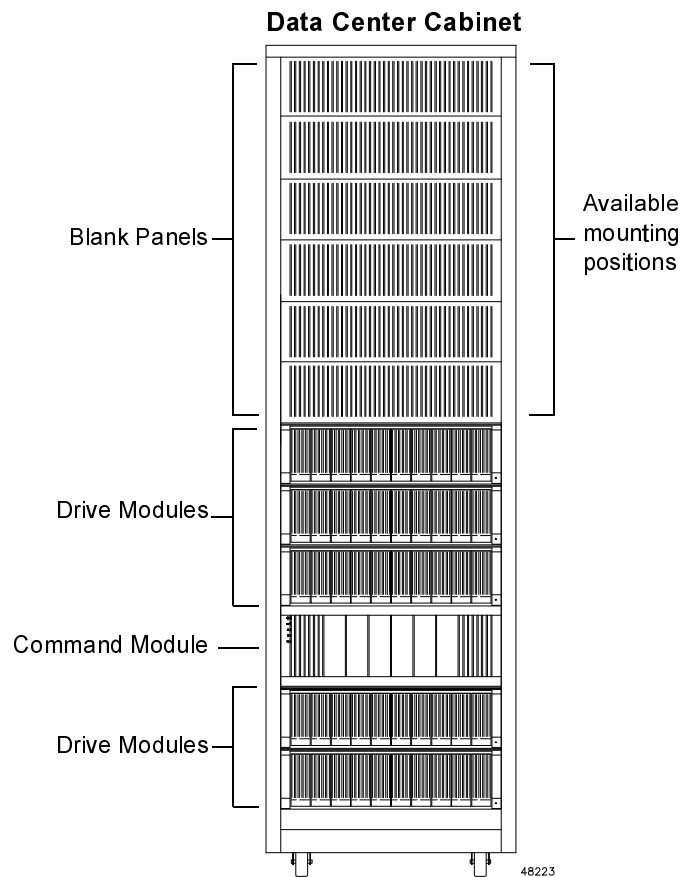
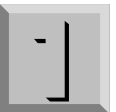


Figure 2 Data Center Cabinet Modules and Blank Panels



4 Install the support rails.

Make sure that the support rails are level before installing them in the cabinet. You can count the cabinet rail holes (from top or bottom) to find the correct position, then attach each support rail as follows:

- a Facing the front of the cabinet, hold the first support rail inside the cabinet so the mounting bracket holes align with the holes in the cabinet rail (Figure 3). Insert a 10-32 x 1/2 screw through the cabinet rail and into the middle hole on the support rail. Attach the second support rail to the front of the cabinet on the opposite side.
- b Facing the back of the cabinet, align the holes in the support rail with the holes in the back cabinet rail. Make sure that the support rail is level. Insert three 10-32 x 1/2 screws through the cabinet rail and into the bracket in the support rail. Attach the second support rail to the back of the cabinet.
- c On the front of the cabinet, install screws in the top and bottom holes of both support rail brackets.
- d If you are installing additional modules (command or drive) in this cabinet, repeat Step a through Step c to add more support rails. When you are finished, go to “Set the Drive SCSI IDs” on page 8.

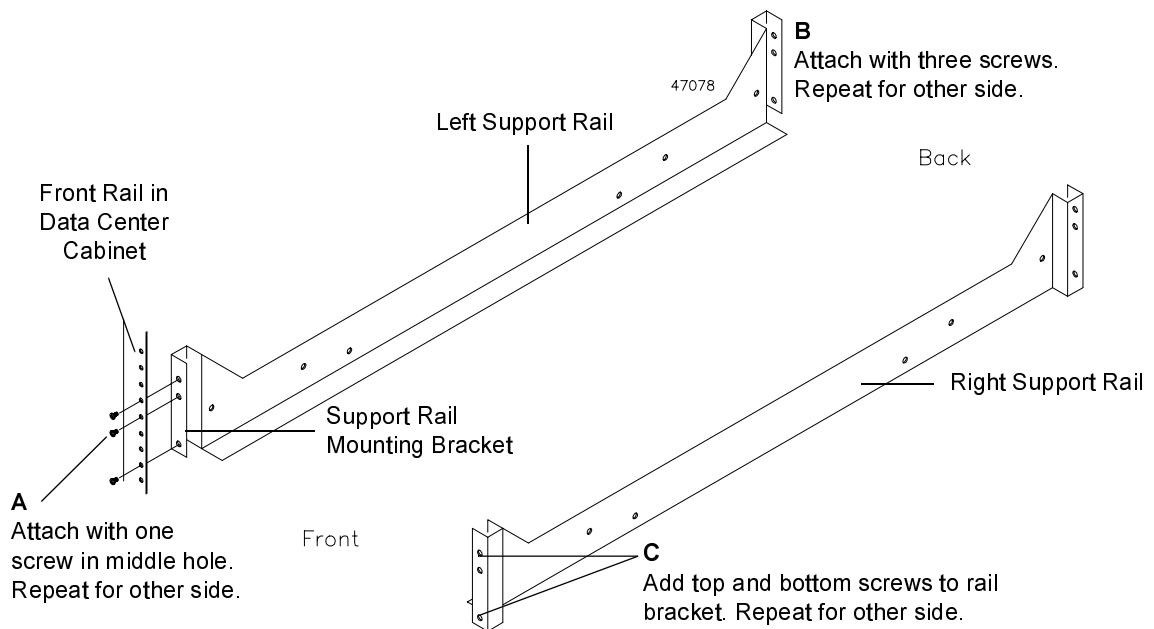
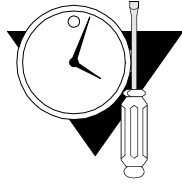


Figure 3 Installing Rackmount Rails

End of Procedure





Set the Drive SCSI IDs

Tools/Equipment

Antistatic wrist strap, screwdriver, jumpers, and other applicable tools

Instructions

A **deskside** or **rackmount command module** supports five SCSI drive channels with up to ten drives per channel. Although the host IDs for the command module controllers are selectable (see [page 12](#)), the drive SCSI IDs are not selectable on the controller module. The command module controllers reserve drive SCSI IDs 6 and 7. Drive modules can use drive SCSI IDs 0–4 or 8–12 (C hexadecimal). Use this procedure to check and change the drive SCSI IDs on all drive modules that you intend to attach to the command module.

CAUTION

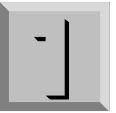


Electrostatic charge can damage sensitive components. Use a grounding wrist strap or other antistatic device before removing or handling the components in the cabinet.

- 1 Put on an antistatic wrist strap or other protective device.**
Make sure that the power to all applicable drive modules is turned off.
- 2 As necessary, change the SCSI ID settings on all drive modules that you are attaching to the command module.**
As necessary, change the drive module drive SCSI ID numbers using the instructions provided in the drive module hardware documentation and the examples shown in “[Deskside SCSI Cabling Examples](#)” on [page 26](#) or “[Rackmount SCSI Cabling Examples](#)” on [page 29](#). The illustrations show drive channel and drive SCSI ID numbering schemes, based on the number of attached drive modules. Do not use drive SCSI ID numbers 6 or 7.
- 3 Choose one:**
 - Installing a **rackmount command module**. Go to “[Preparing the Command Module](#)” on [page 9](#).
 - Installing a **deskside command module**. Go to “[Set the Host IDs on the Controllers](#)” on [page 12](#).

End of Procedure



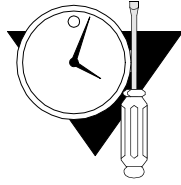


Preparing the Command Module

This procedure explains how to reduce the overall weight of the command module (for lifting purposes) and how to select its host SCSI ID settings.

Command Module Preparation Notes

It is easier to lift a rackmount command module and set it onto the support rails in the cabinet if you remove all the *customer replaceable units (CRUs)* first. CRUs are portable, removable units that house the controllers, fans, power supplies, and batteries. A fully loaded command module weighs approximately 34.5 kg (76 lb). You can reduce the overall weight approximately 18.1 kg (40 lb) by removing the controllers, battery, power supplies, and fans.



Remove the Command Module CRUs

Tools/Equipment Needed

Antistatic wrist strap and flat-blade screwdriver

Instructions

The following instructions tell you how to remove the CRUs from a **rackmount command module**.

Caution



Electrostatic discharge can damage sensitive components. Use a grounding wrist strap or other antistatic precautions before removing or handling any components in the cabinet.

Caution



Bending or damaging Fiber Channel cables could result in degraded performance or data loss. Keep the cables to the left side of the controller slot when you install a Fiber Channel controller CRU. Make sure the cables are not pinched, bent, nicked, or pulled during the installation.

Caution



Fibre optic cables are very fragile.

Do not pinch the cables with tie wraps.

- Do not make sharp bends when routing the cables.
- Do not step on the cables or locate them in aisles or walkways.

1 Remove the front panel and CRUs.

To reduce the overall weight of the command module, remove the CRUs (controller, controller fan, battery, power supply, and power supply fan). To do this, use the illustrations and instructions provided in [Figure 4](#). If this unit has been cabled for Fiber Channel, be careful not to damage the FC cable when removing or replacing the controllers.

2 Go to [“Set the Host IDs on the Controllers”](#) on page 12.

End of Procedure



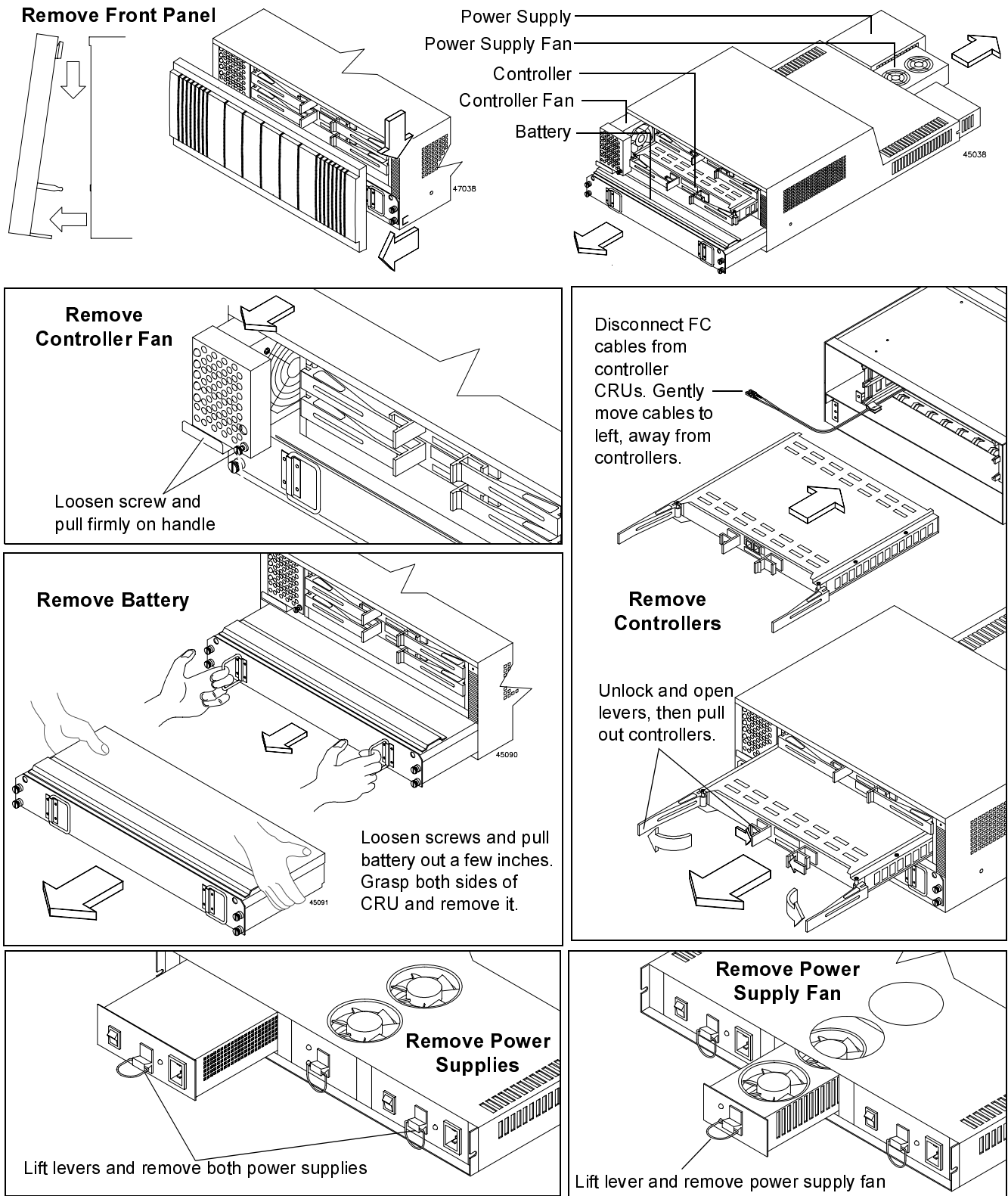
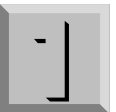
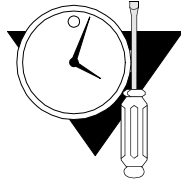


Figure 4 Removing and Installing the CRUs



Set the Host IDs on the Controllers

Tools/Equipment

Antistatic wrist strap, shunts (supplied with unit), and needle-nose pliers

Instructions

Every device attached to a SCSI bus or Fiber Channel network must have a unique ID number in order to communicate. Before shipping a **rackmount** or **deskside command module**, the manufacturer sets the controller host IDs to the following:

- Controller A, host ID 5
- Controller B, host ID 4

If these host ID numbers conflict with other devices on your system, use the following procedure to change the host IDs.

1 Put on an antistatic wrist strap or other protective device.

CAUTION



Electrostatic discharge can damage sensitive components. Use a grounding wrist strap or other antistatic precautions before removing or handling any components in the cabinet.

2 As necessary, change the controller host ID settings ([Figure 5](#)).

Look on the back of the command module in the upper right corner for rackmount models; the upper left corner for deskside models. There are sixteen pins, eight per controller, that determine the hosts ID numbers. To change an ID number, install or move jumpers to the appropriate pins. Use needle-nose pliers to remove the jumpers, if necessary.

3 Choose one:

- To install a **rackmount command module**, go to [“Installing the Rackmount Command Module” on page 14](#).
- To install a **deskside command module**, go to [“Connect the Interface Cables” on page 18](#).

End of Procedure



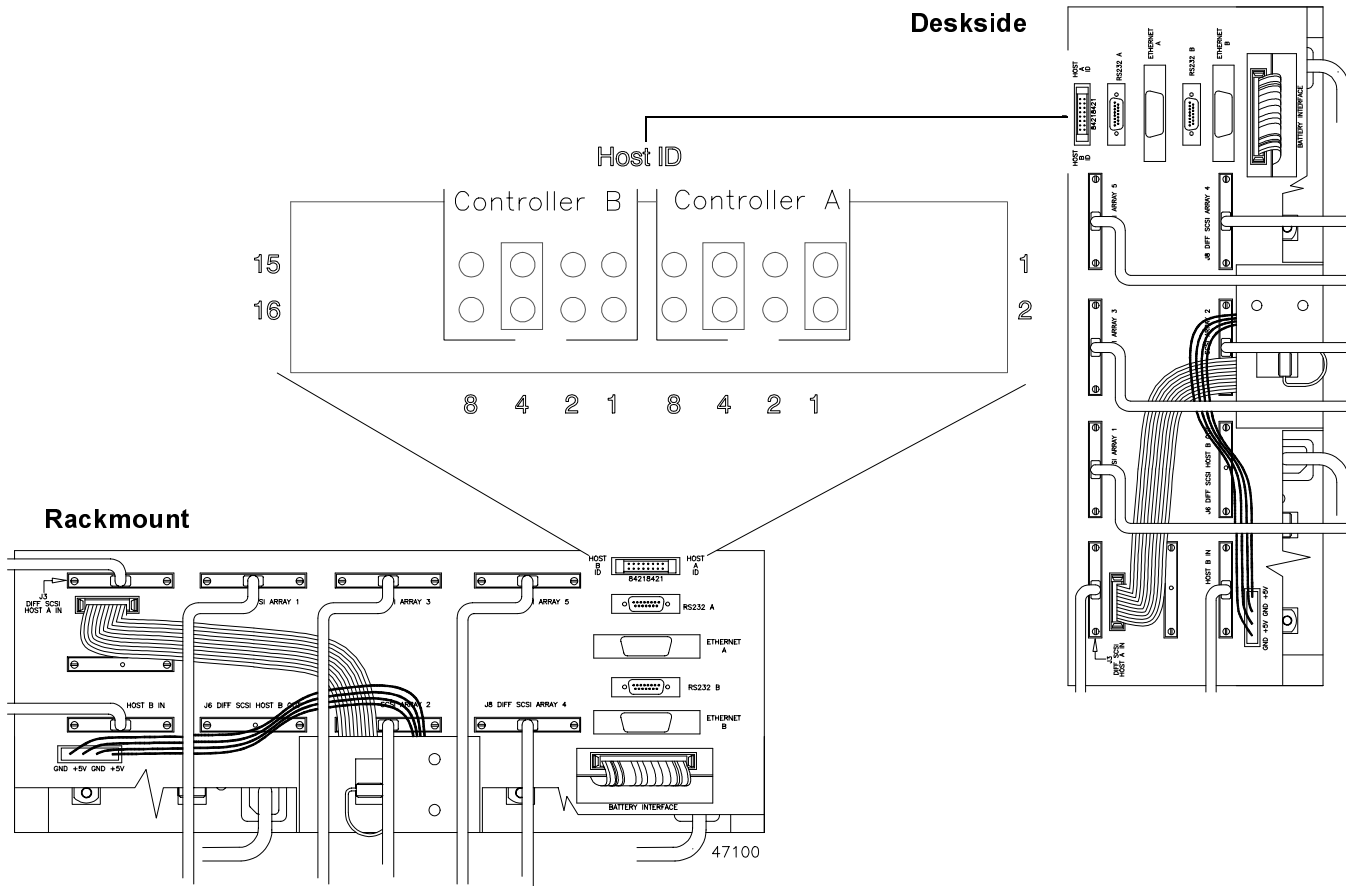


Figure 5 Setting Controller Host ID Numbers



Installing the Rackmount Command Module

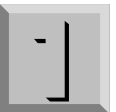
This procedure explains how to install a rackmount command module in a Data Center cabinet and how to connect the cables.

Power Cord Routing Notes

The command module uses two power cords, one for each power supply. The Data Center has two AC distribution boxes. Each AC distribution box has its own power cord. There are three options for connecting power to a rackmount command module in a Data Center cabinet ([Figure 6](#)):

- **Option 1 (Preferred): Redundant power to cabinet and command module.** Connect the AC distribution boxes to independent, external power receptacles. Connect one power cord from the command module to each AC box in the Data Center cabinet or to independent, external power receptacles.
- **Option 2: Redundant power to cabinet, non-redundant to command module.** Connect the AC distribution boxes to independent power sources. Connect both power cords from the command module to one AC box in the Data Center cabinet.
- **Option 3: Non-redundant power to cabinet and command module.** Connect both AC distribution boxes to a single power source. Connect both power cords from the command module to one or both AC boxes in the Data Center cabinet.

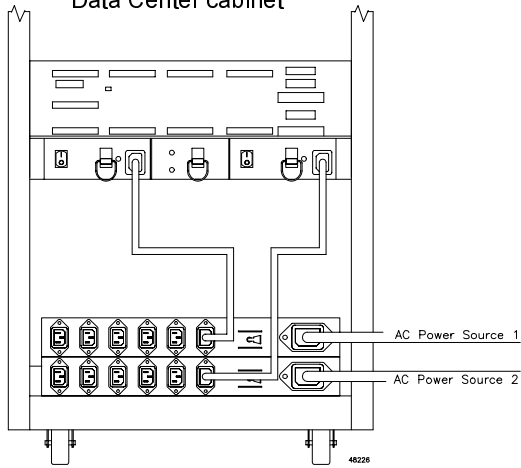
Because of the limited space inside the Data Center cabinet, it may be easier to connect and route power cords before you begin installing support rails and the command module. If you intend to connect the command module to the cabinet's internal power unit, consider connecting and routing the power cords in the cabinet before you install the command module.



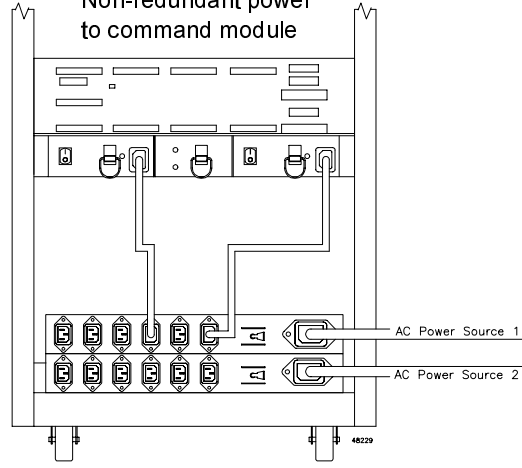
Recommended Power Connection



Option 1
Redundant power connections to both command module and Data Center cabinet



Option 2
Redundant power connection to Data Center cabinet.
Non-redundant power to command module



Option 3
Non-redundant power connections to both command module and Data Center cabinet

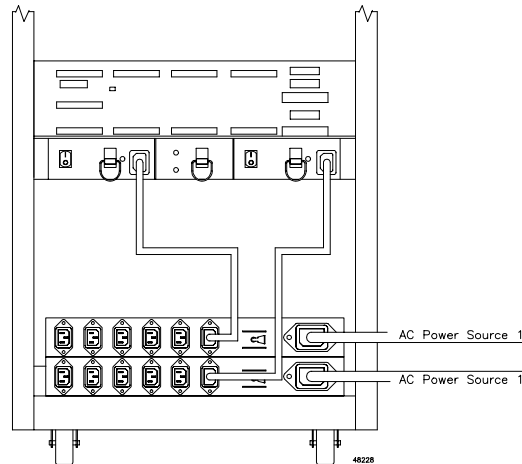
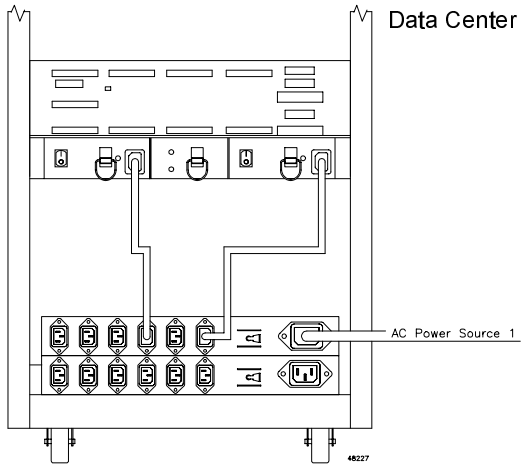
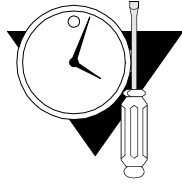


Figure 6 Power Connections to the Data Center Cabinet and Command Module



Mount the Command Module in the Cabinet

Tools/Equipment

Screwdrivers and all command module CRUs

Instructions

Use this procedure to install a **rackmount command module** chassis on the support rails in a Data Center cabinet.

1 Put the command module in the cabinet (Figure 7).

At the front of the Data Center cabinet, set the command module on the support rails and slide the module into the cabinet.

Important Note



To make cable installation easier, you can slide the command module slightly toward the back of the cabinet and attach all the SCSI cables before securing the command module to the rails. If you want to do this, refer to [“Connect the Interface Cables” on page 18](#) before performing [Step 2](#) of this procedure.

2 Secure the command module (Figure 7).

Align the front holes on each side of the module with the first holes on front of the support rails. From the inside of the chassis, insert 6-32 x 3/8 screws through the chassis and into the first holes in the support rail.

CAUTION



Electrostatic charge can damage sensitive components. Use a grounding wrist strap or other antistatic precautions before handling any components in the cabinet.

3 Are you connection this command module to a SCSI or Fiber Channel host?

- SCSI host. Go to [Step 4](#).
- Fiber Channel. Go to [Step 5](#).

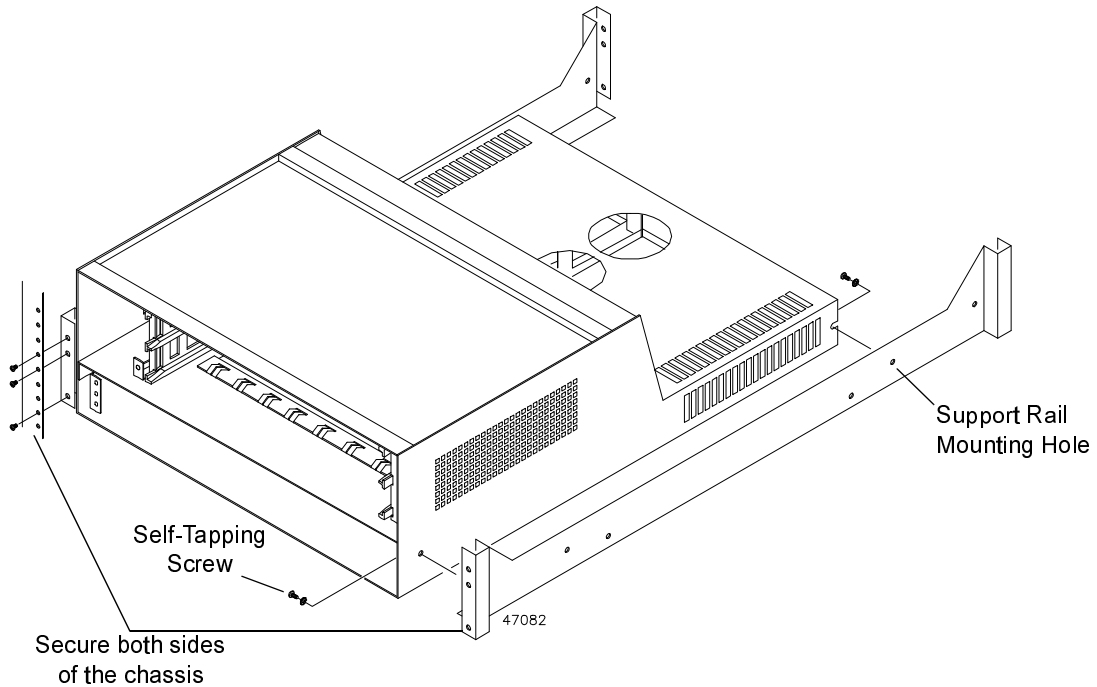
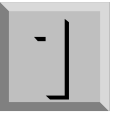


Figure 7 Chassis Mounting on Support Rails

4 Replace all of the CRUs that you removed in Step 1 on page 10.

Reverse the instructions shown in Figure 4 on page 11 to install the controllers, controller fan, battery, power supplies, and power supply fan into the chassis. As you install the CRUs, make sure that you:

- Use care when handling the and installing the CRUs
- Lock all CRUs securely in place
- Keep the Fiber Channel cables out of the way when inserting the controller CRUs (if applicable)

Note



The power supplies are interchangeable, so you can insert them in either slot.

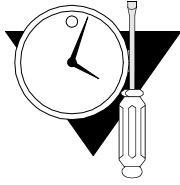
5 Replace the power supply and fan CRUs.

Reverse the instructions shown in Figure 4 on page 11 to install the controller fan, power supplies and power supply fan CRUs. Do not install the battery or controller CRUs at this time.

6 Go to “Connect the Interface Cables” on page 18

End of Procedure





Connect the Interface Cables



Note

There are thirteen interface connectors on the back of the command module:

- Four host SCSI connectors, two per controller.
- Five drive SCSI connectors, one per drive channel
- Two sets of Ethernet and RS-232 connectors, one set per controller

Fiber Channel models also have a connector on the front of each controller CRU. The fibre optic or copper wire cable runs from the controller CRUs, through the chassis, and out the back.

Tools/Equipment

Host interface cables (SCSI or Fiber Channel), drive SCSI cables, secondary interface cables (optional RS-232 or Ethernet) terminators, and tie wraps

Instructions

Use the following instructions to connect the interface cables to a **deskside** or **rackmount** command module.

1 Select the appropriate cabling procedure.

You are connecting a:

- Deskside or rackmount command module to a SCSI host. Go to [Step 7](#).
- Deskside command module to a Fiber Channel host. Go to [Step 2](#).
- Rackmount command module to a Fiber Channel host. Go to [Step 3](#).

2 Remove the battery and both controller CRUs ([Figure 8](#)).

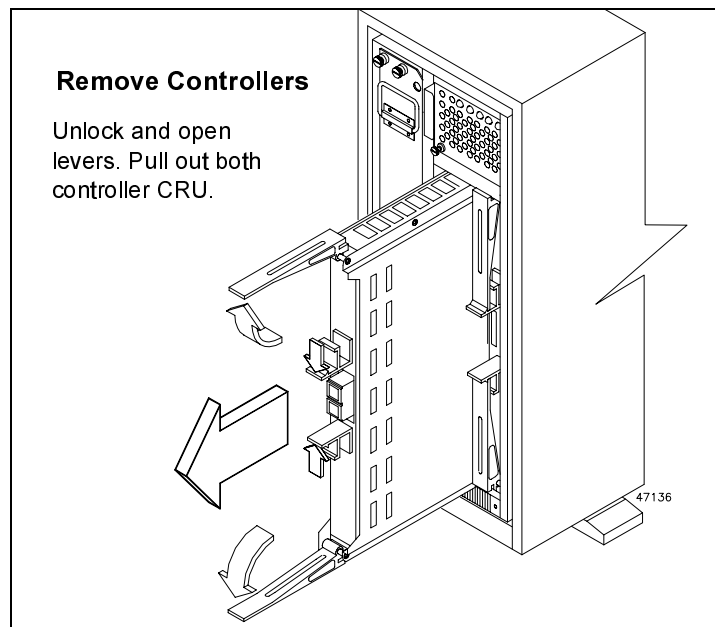
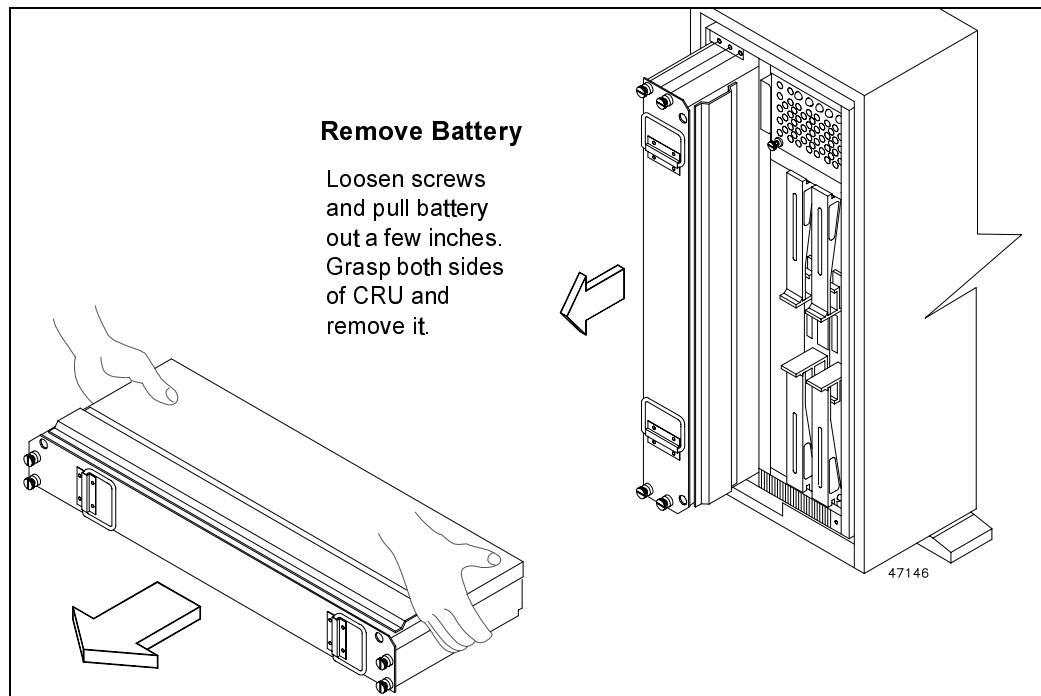
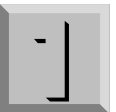




Figure 8 Removing the Battery and Controller CRUs



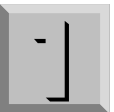
Caution  **Bending or damaging Fiber Channel cables could result in degraded performance or data loss.** Make sure the cables are not pinched, bent, nicked, or pulled during the installation.

Caution  **Fibre optic cables are very fragile.**

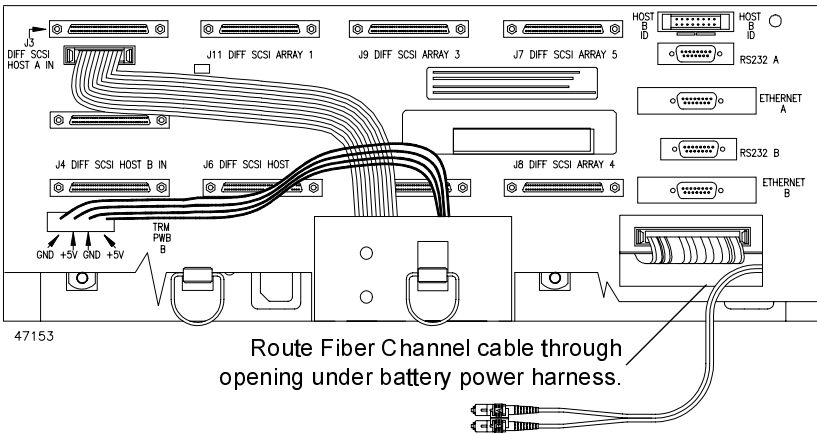
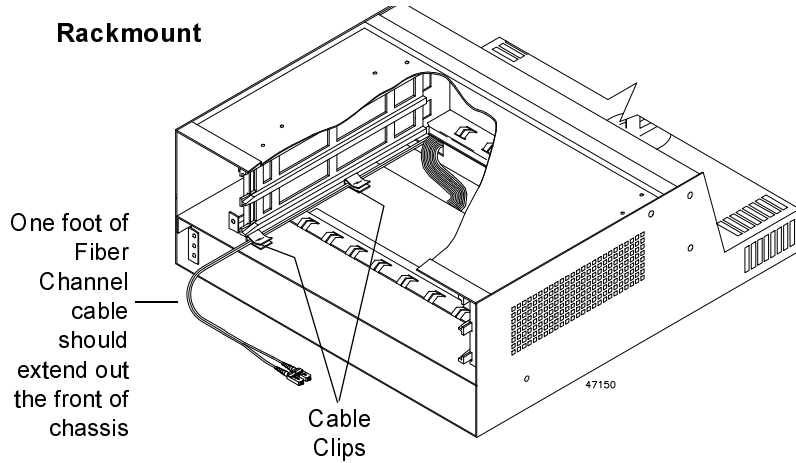
- Do not pinch the cables with tie wraps.
- Do not make sharp bends when routing the cables (see [Figure 9](#)).
- Do not step on the cables or locate them in aisles or walkways.

3 Route the Fiber Channel cables ([Figure 9](#)).

On the back of the command module, find the opening in the rear shield around the battery harness connector (lower right corner on a rackmount unit, upper right corner on a deskside unit). Take one of the Fiber Channel cables and push one end through this opening. From the front, gently pull the cable through the unit until approximately one foot of cable extends out the front of the controller slot. Secure the cable in the cable clips. Route the second cable in the same way.



Rackmount



CAUTION:
Bending, folding, or twisting fiber optic cable can damage it.

Do not bend closer than 3 inches

Deskside

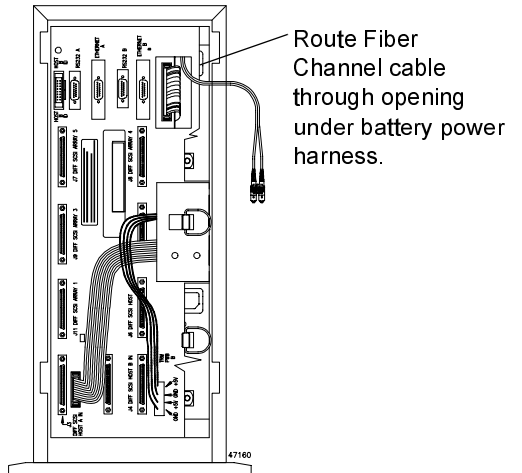
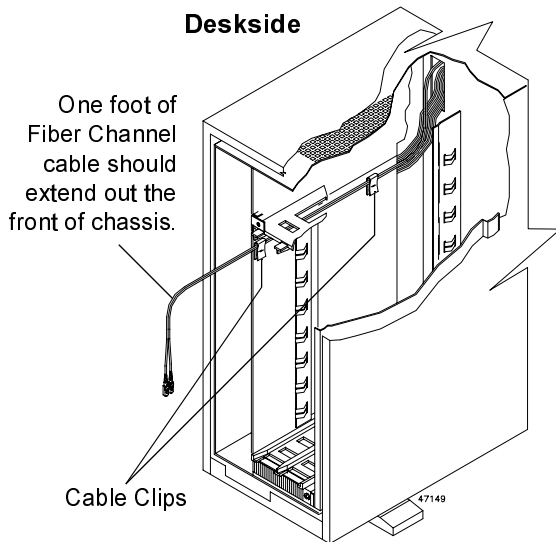


Figure 9 Fiber Channel Cable and Clips



4 Install the Fiber Channel controllers (Figure 10).

Take care not to pinch or bend the Fiber Channel cables. Move the cables out of the way (to the left or top) and slide the controller CRUs into the slots. Lock the CRUs in place.

5 Connect the Fiber Channel cables (Figure 10).

Attach one Fiber Channel cable to the front of each controller CRU. Connect the other end of each cable to the appropriate Fiber Channel device.

6 Replace the battery CRU (Figure 8 on page 19).

Slide the battery CRU into the slot and tighten the captive screws. Next, go to [Step 8 on page 24](#)

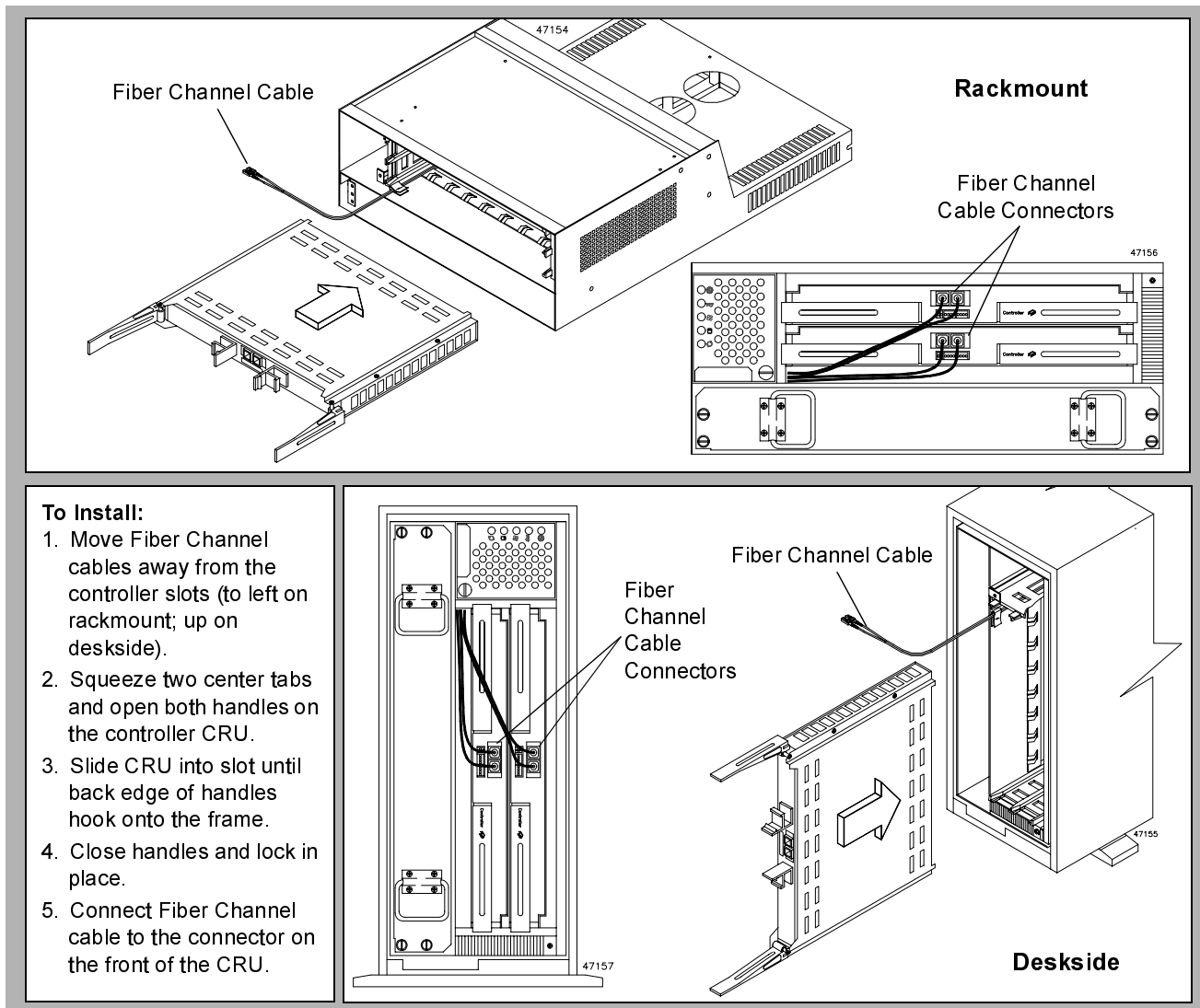
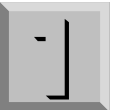


Figure 10 Installing the Fiber Channel Cable



7 Connect the host SCSI cables (Figure 11 on page 24).

Connect the host SCSI cables to the appropriate SCSI Host IN and OUT connectors on the back of the command module. Choose one of the following three methods:

- Attaching to **one host with one host adapter**.

Method 1:

- a Attach the incoming SCSI cable from host adapter 1 to controller A, J3 (Host A IN).
- b If the command module is in the **middle of the SCSI bus**, attach the outgoing SCSI cable to controller A, J5 (Host A OUT). Attach the other end to the next SCSI device. Install 16-bit terminators on the controller B connectors, J4 (Host B IN) and J6 (Host B OUT). If the command module is at the **end of the SCSI bus**, install terminators on connectors J4, J5, and J6.
- c Go to [Step 8](#).

Method 2:

- a Attach the incoming SCSI cable from host adapter 1 to controller A, J3 (Host A IN). Daisy-chain controller A to controller B by attaching a SCSI cable between J5 (Host A OUT) and J4 (Host B IN).
 - b If the command module is in the **middle of the SCSI bus**, attach the outgoing SCSI cable to controller B, J6 (Host B OUT). Attach the other end to the next SCSI device. If the command module is at the **end of the SCSI bus**, install a 16-bit terminator on connector J6.
 - c Go to [Step 8](#).
- Attaching to **one host with two host adapters** or to **two hosts with one host adapter each**.

Method 3:

- a Attach the incoming SCSI cable from host adapter 1 to controller A, J3 (Host A IN). Attach the incoming SCSI cable from host adapter 2 to controller B, J4 (Host B IN).



- b If the command module is in the **middle of the SCSI bus**, attach the outgoing SCSI cables to controller A, J5 (Host A OUT) and controller B, J6 (Host B OUT). Attach the other end to the next SCSI device. If the command module is at the **end of the SCSI bus**, install terminators on connectors J5 and J6.
- c Go to [Step 8](#).

8 Connect the drive SCSI cables.

- For the desktide command module, refer to the cabling examples in “[Desktide SCSI Cabling Examples](#)” on page 26.
- For the rackmount command module, refer to the cabling examples in “[Rackmount SCSI Cabling Examples](#)” on page 29.

The cabling examples show ways to connect one or more command modules to one or more MetaStor Drive Modules. Review the illustrations and determine which example most closely matches the configuration at your installation site. Then, attach SCSI cables to the drive SCSI connectors on the command module and to the SCSI connectors on the drive modules as shown in the appropriate example.

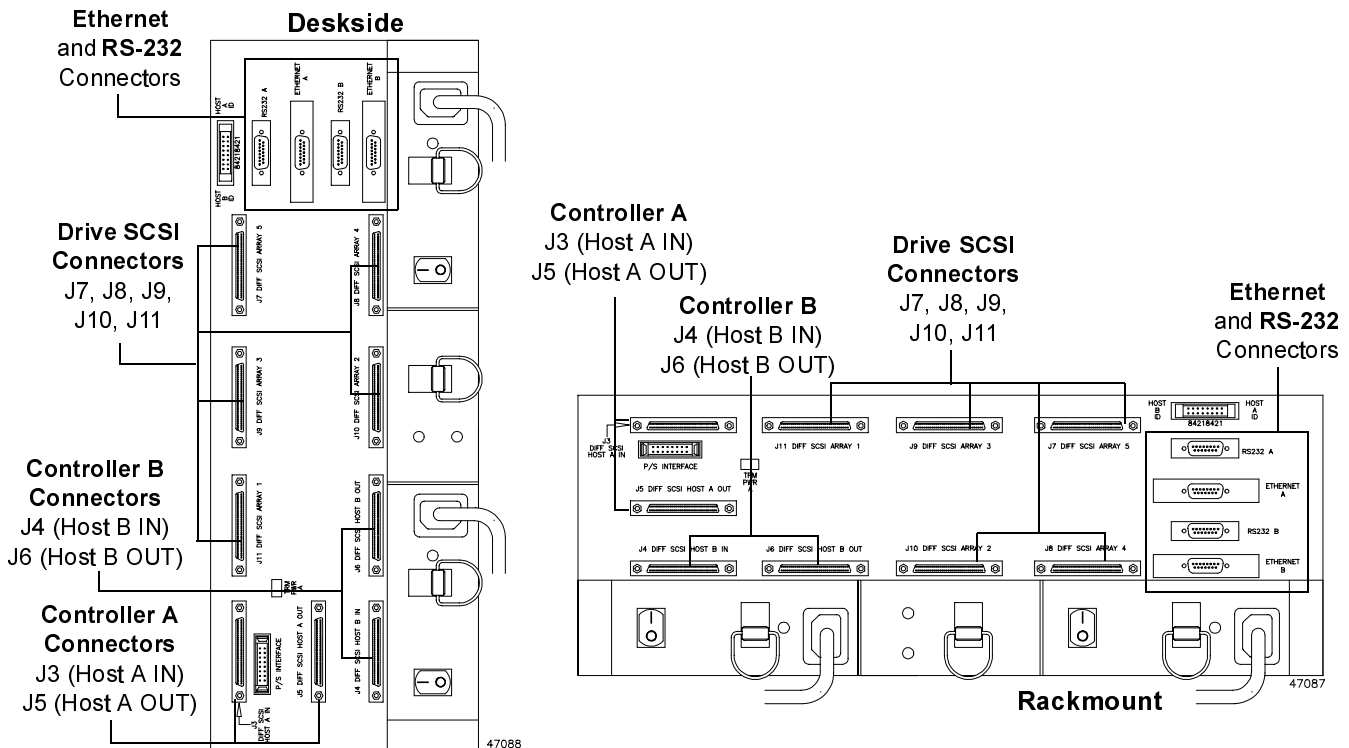
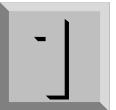


Figure 11 Interface Connections on Command Module



Caution



The air vents above the power supplies and fans must be free of obstructions. This includes interface cabling that exits the back of the command module. Once you connect the cables to the command module, secure them to the inside of the Data Center cabinet framework with tie wraps. Be careful not to route the cables across any sharp edges. On deskside units, loosely bundle the cables with tie wraps so the cables can exit the cabinet below the back panel.

9 If applicable, attach secondary interface cables (Figure 11 on page 24).

There is one RS-232 and one Ethernet cable connection for each controller on the back of the command module.

10 Organize and secure interface cables.

Arrange the interface cables so they clear the vents on the back of the command module. Secure the cables with tie-wraps.

11 Go to “Connect the Power Cords” on page 41.

End of Procedure





Deskside SCSI Cabling Examples

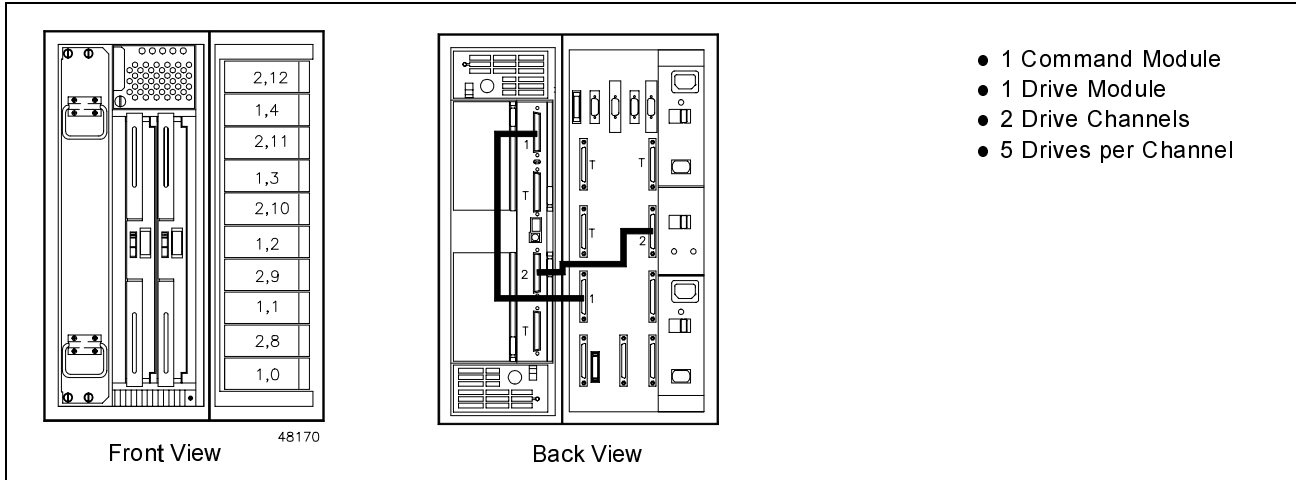


Figure 12 One Deskside Command Module to One Drive Module

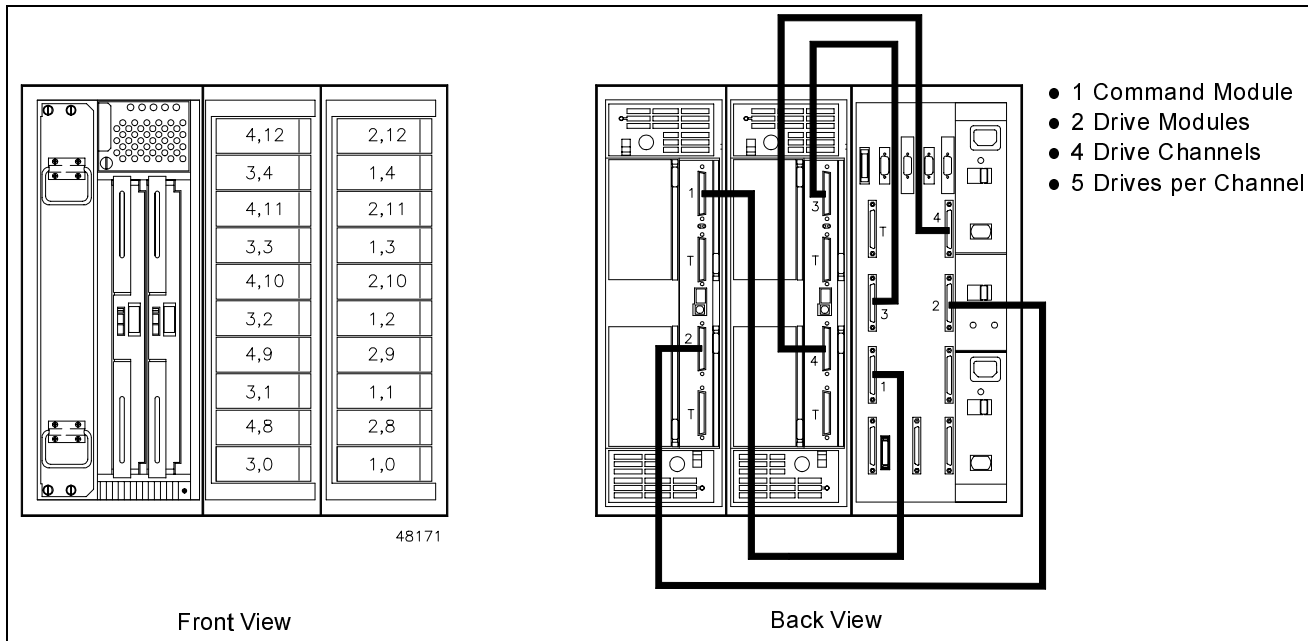


Figure 13 One Deskside Command Module to Two Drive Modules

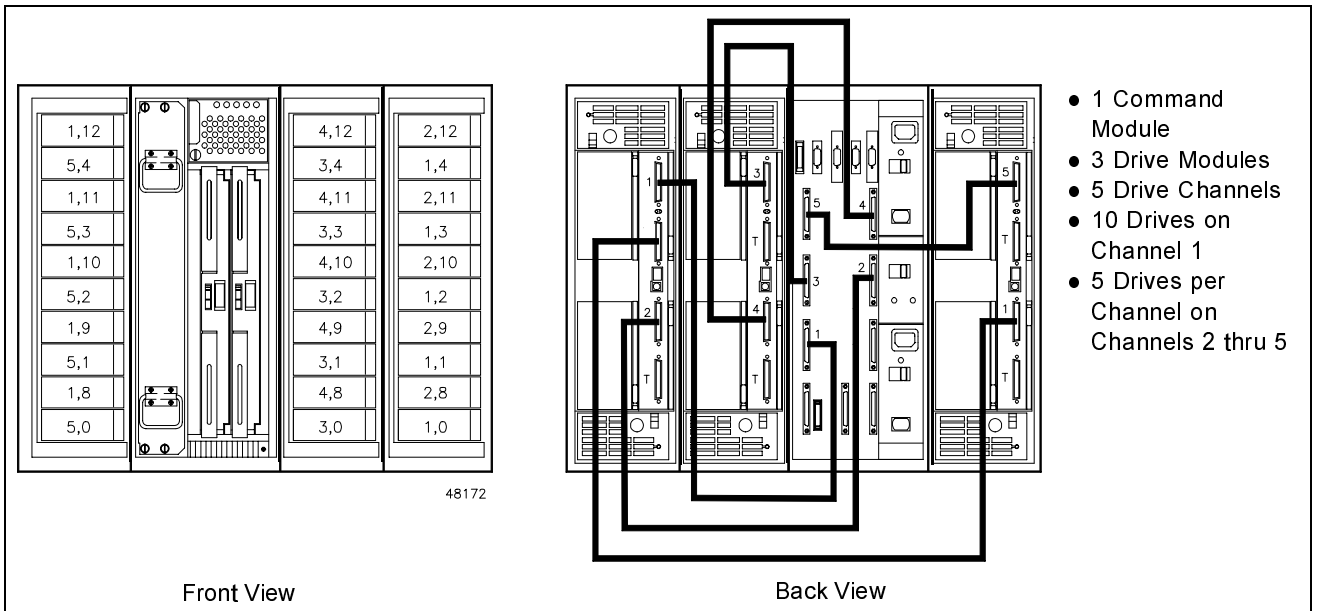
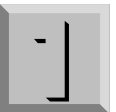


Figure 14 One Deskside Command Module to Three Drive Modules

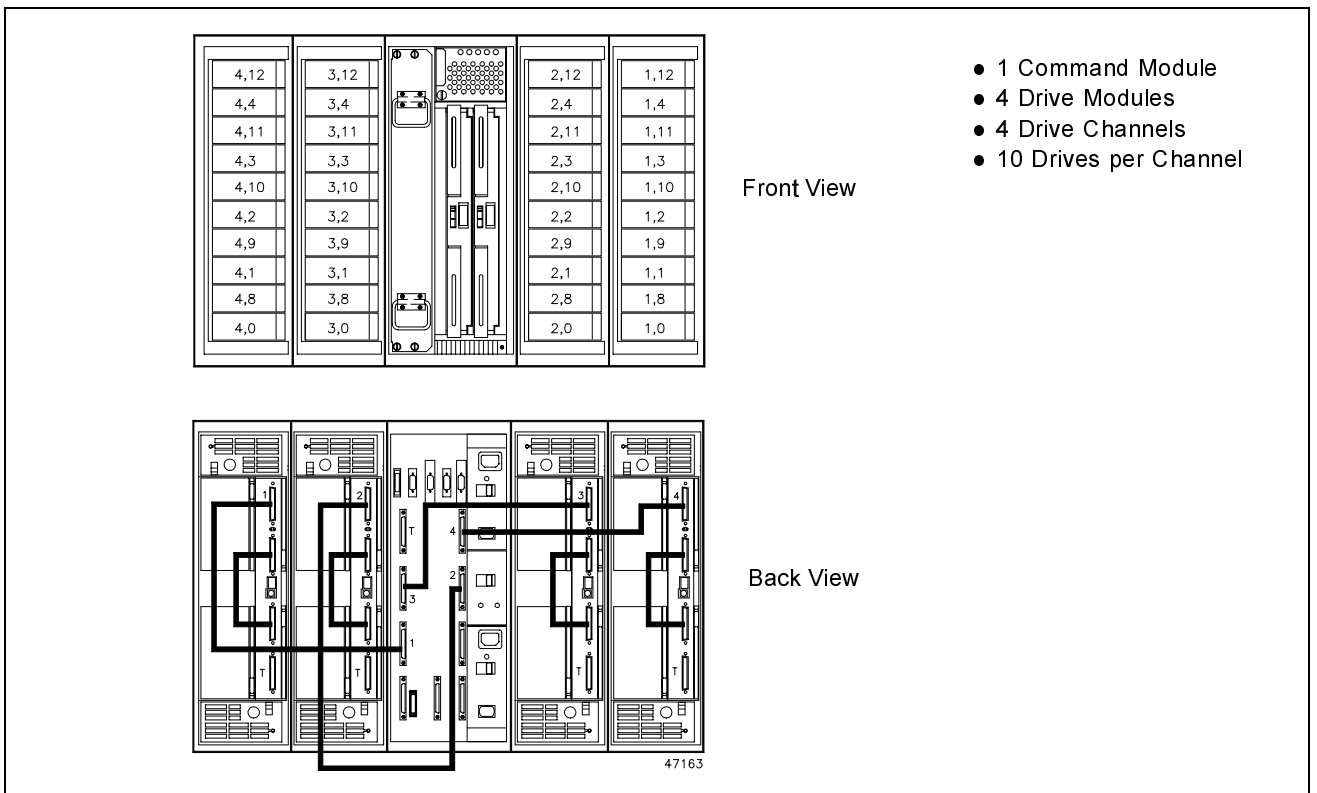


Figure 15 One Deskside Command Module to Four Drive Modules



Installing the Rackmount Command Module

Connect the Interface Cables

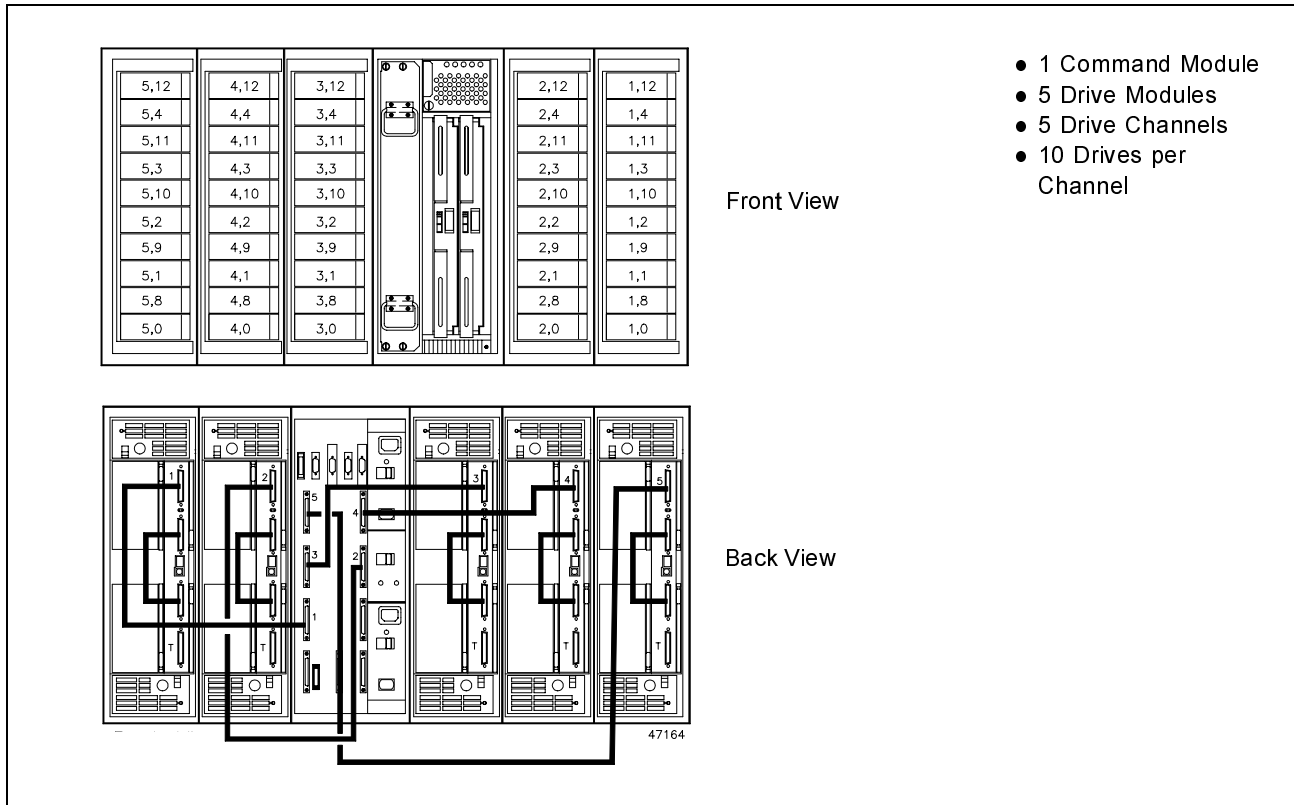
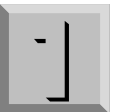


Figure 16 One Deskside Command Module to Five Drive Modules



Rackmount SCSI Cabling Examples

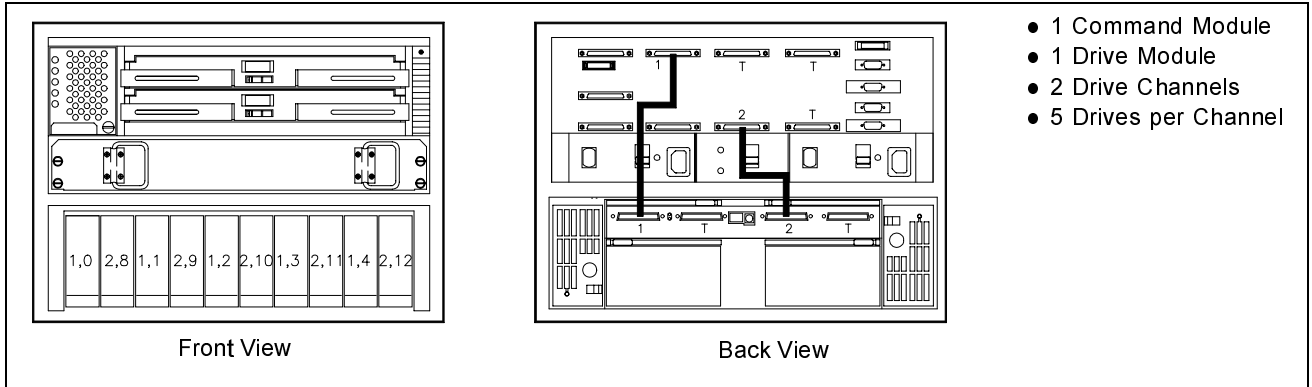


Figure 17 One Rackmount Command Module to One Drive Module

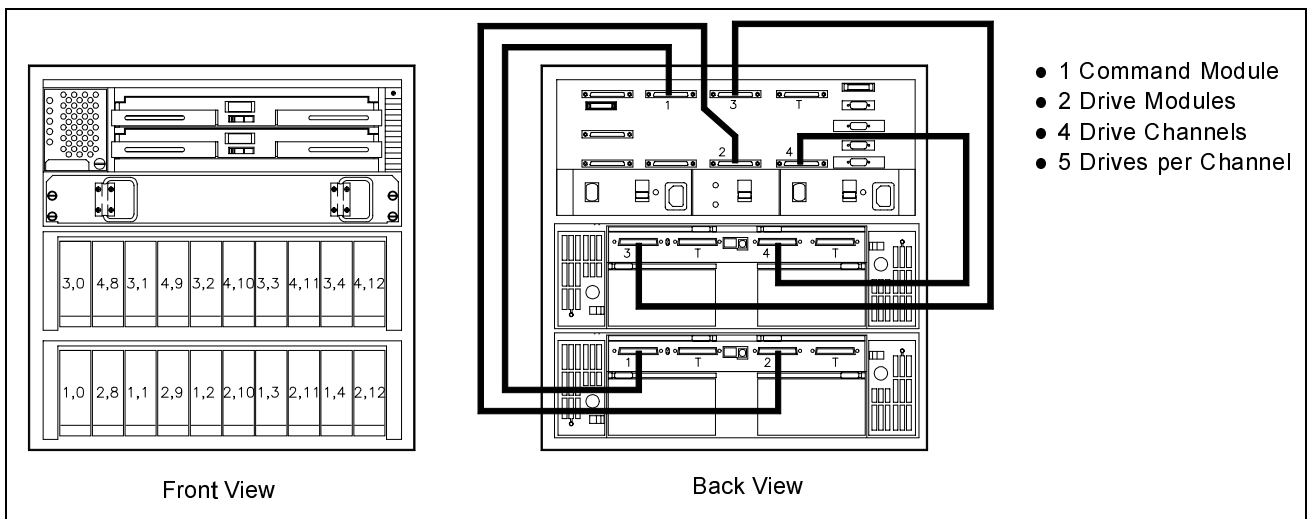


Figure 18 One Rackmount Command Module to Two Drive Modules

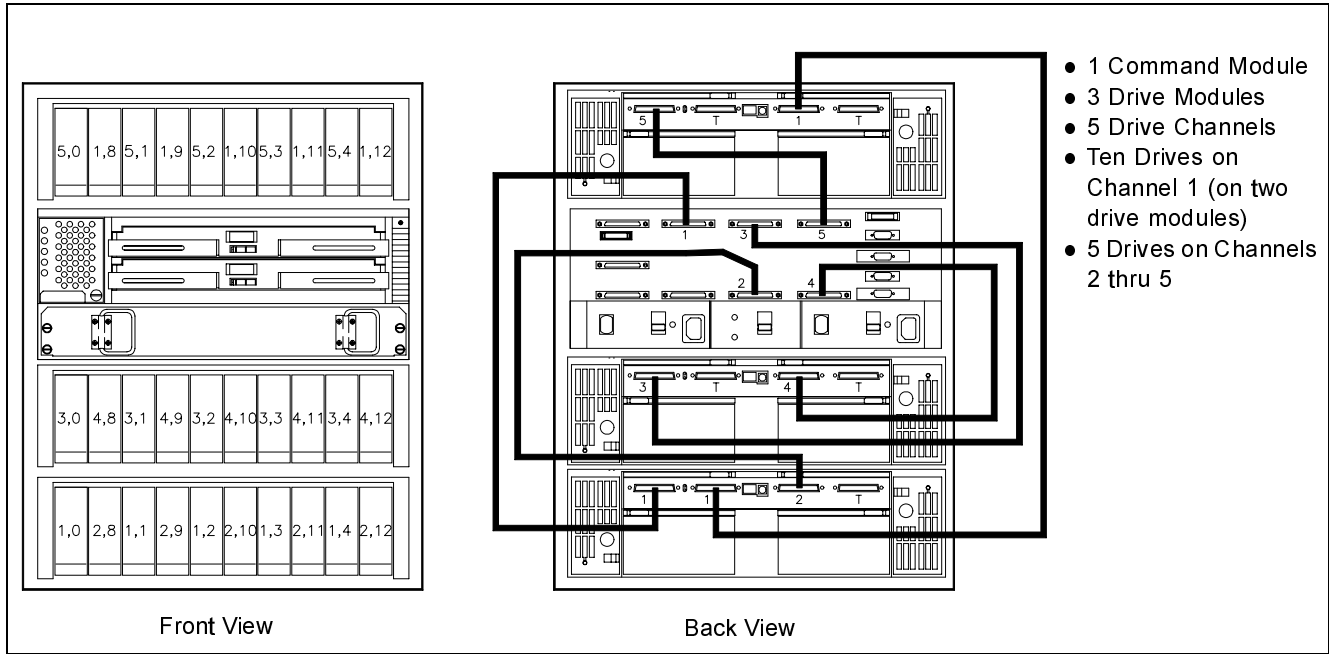


Figure 19 One Rackmount Command Module to Three Drive Modules

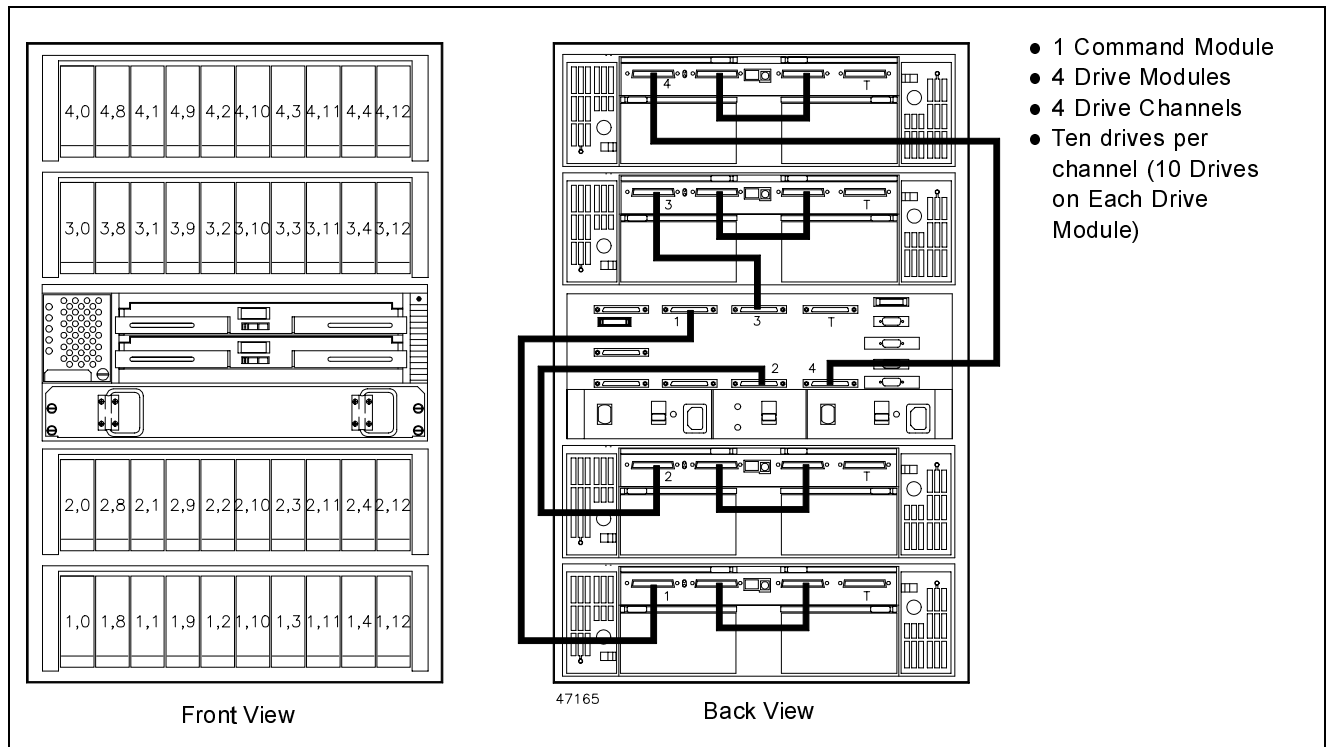


Figure 20 One Rackmount Command Module to Four Drive Modules

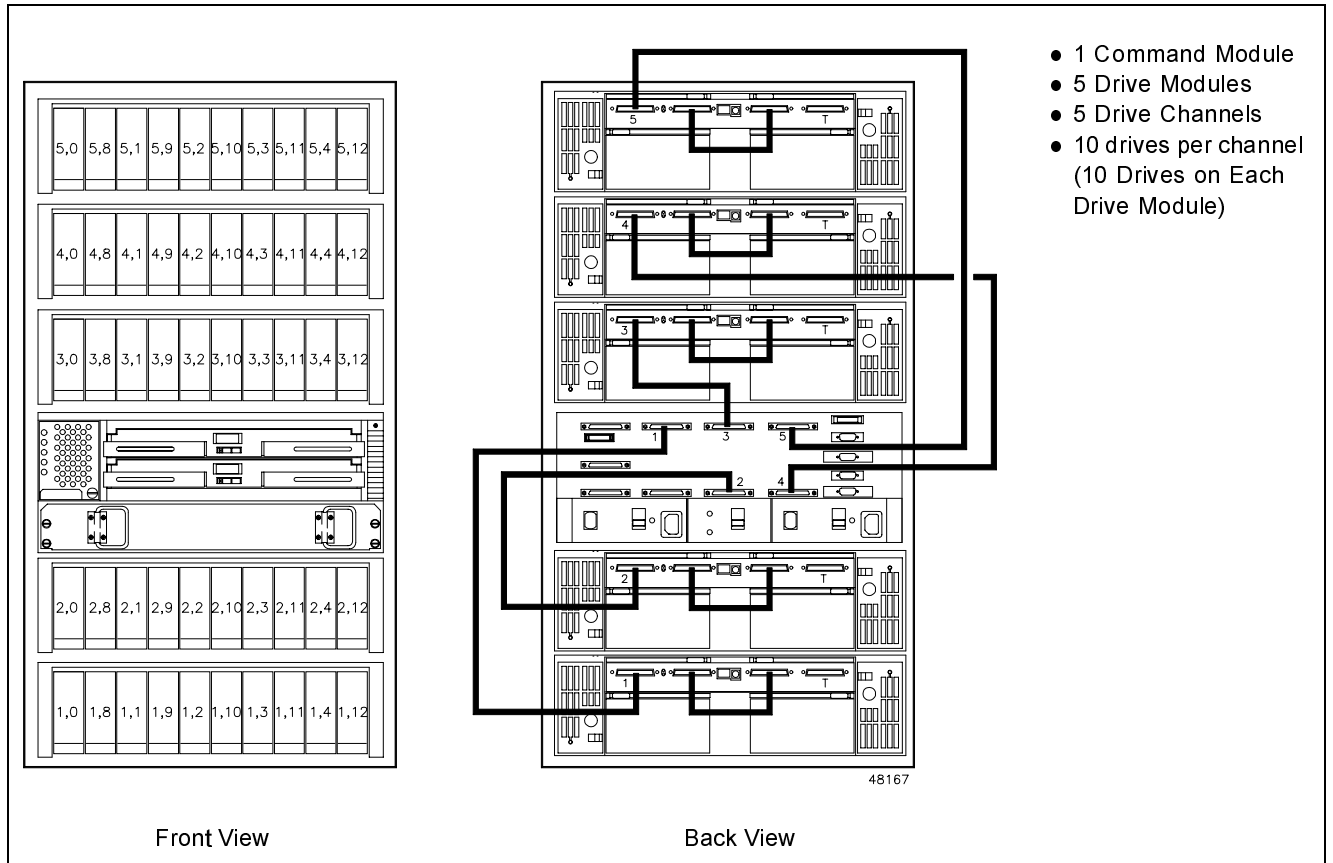
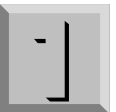


Figure 21 One Rackmount Command Module to Five Drive Modules



Installing the Rackmount Command Module Connect the Interface Cables

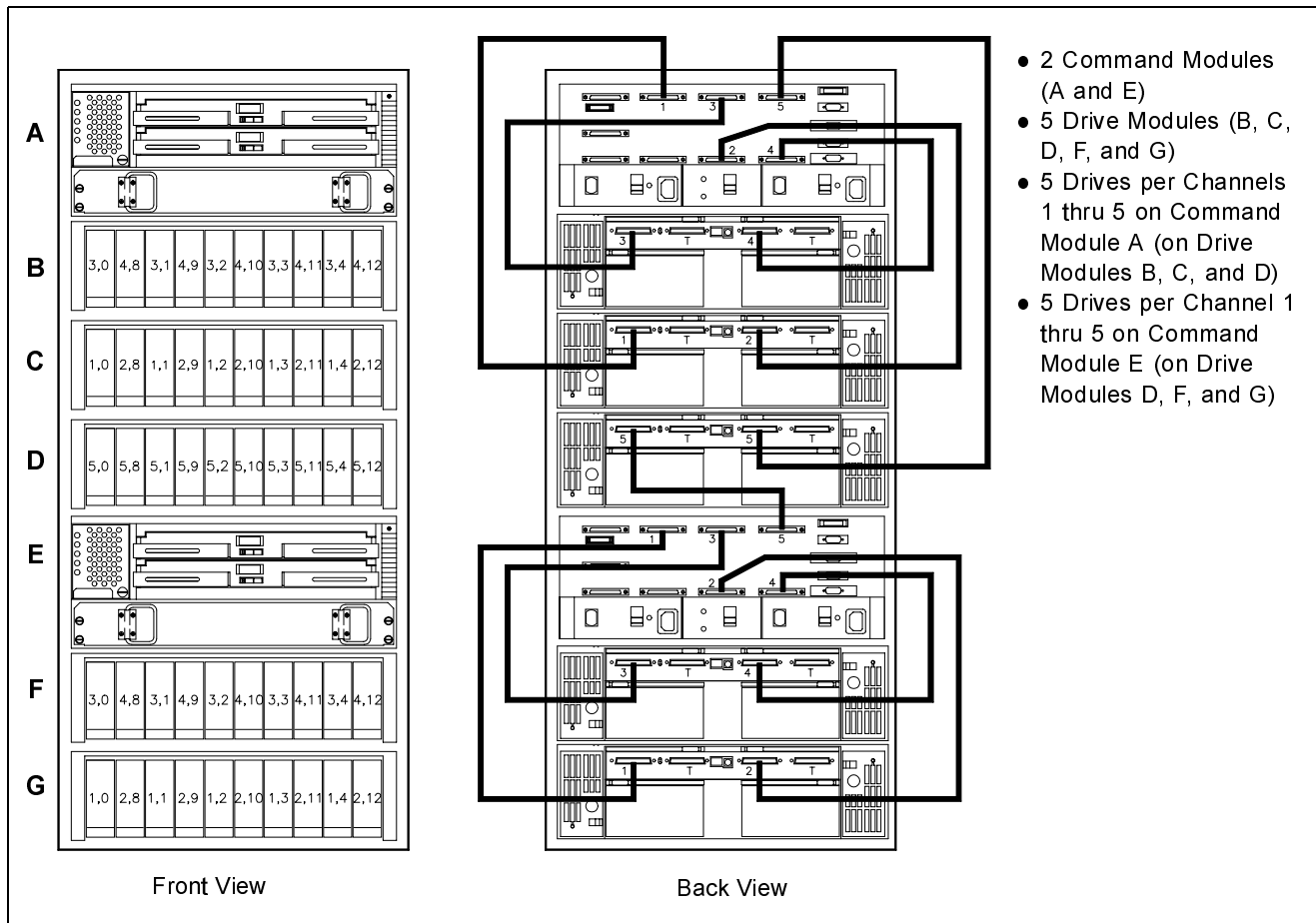


Figure 22 Two Rackmount Command Modules to Five Drive Modules

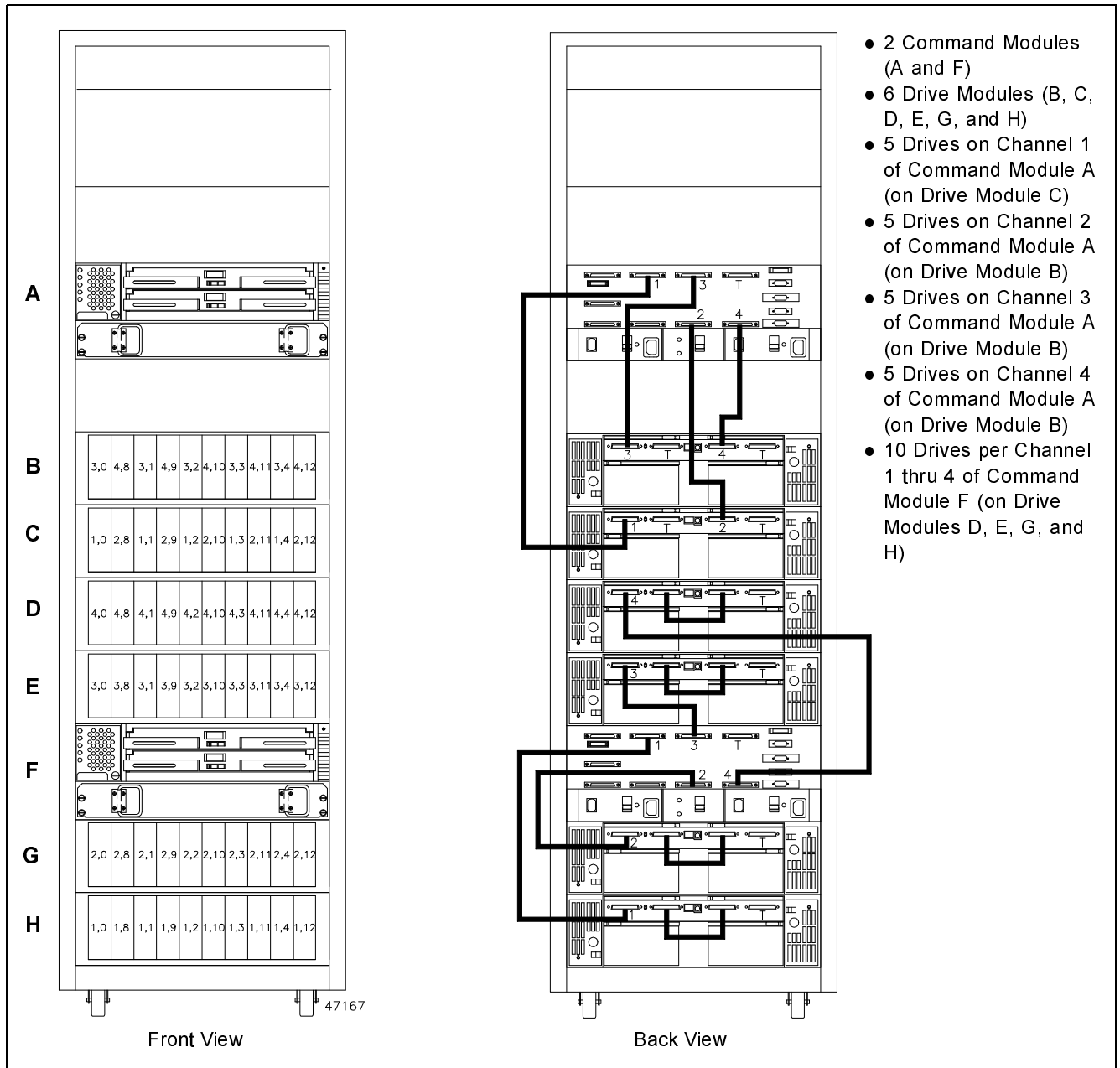
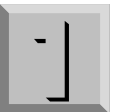


Figure 23 Two Rackmount Command Modules to Six Drive Modules

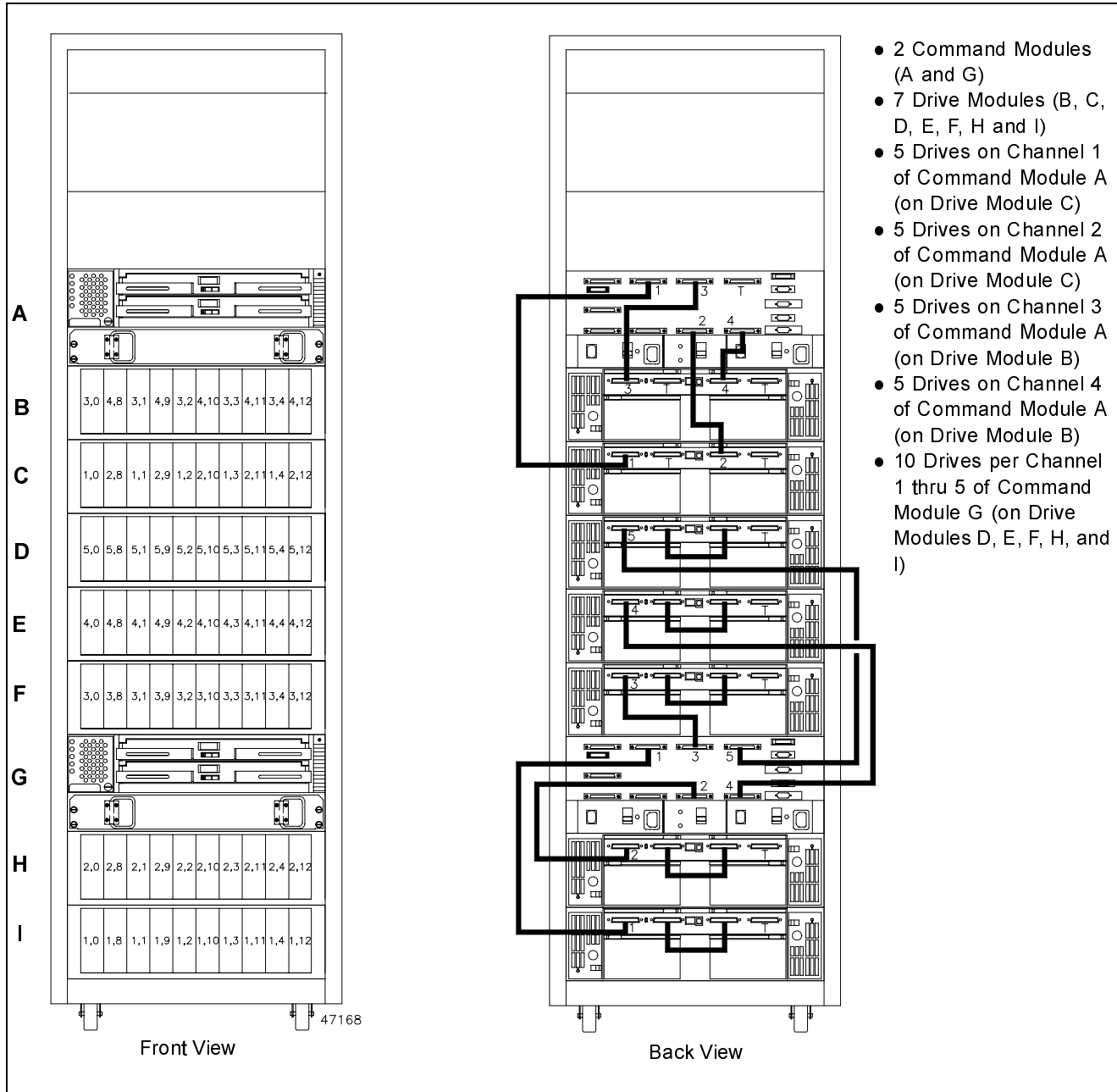


Figure 24 Two Rackmount Command Modules to Seven Drive Modules

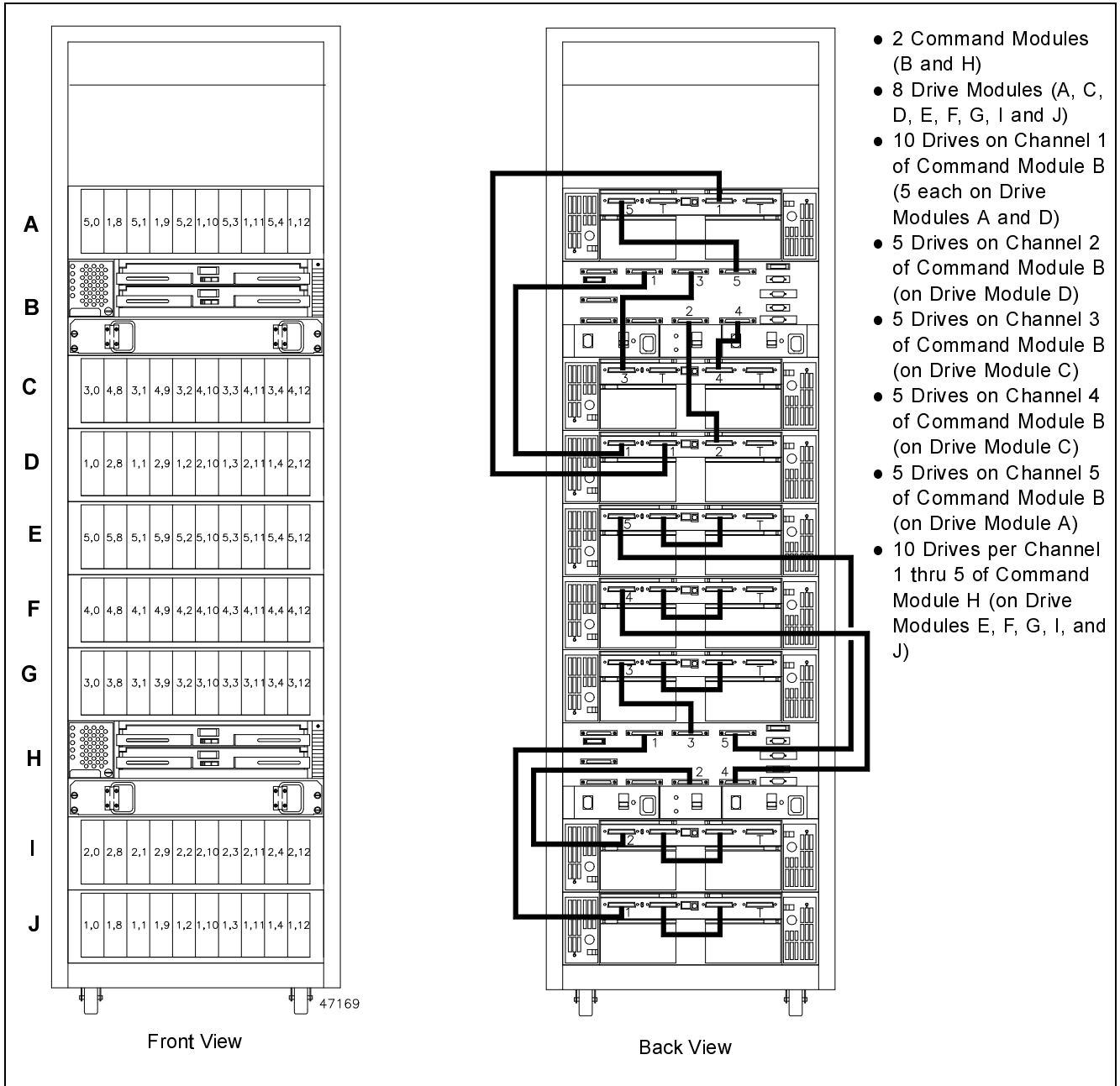


Figure 25 Two Rackmount Command Modules to Eight Drive Modules



Installing the Rackmount Command Module
Connect the Interface Cables

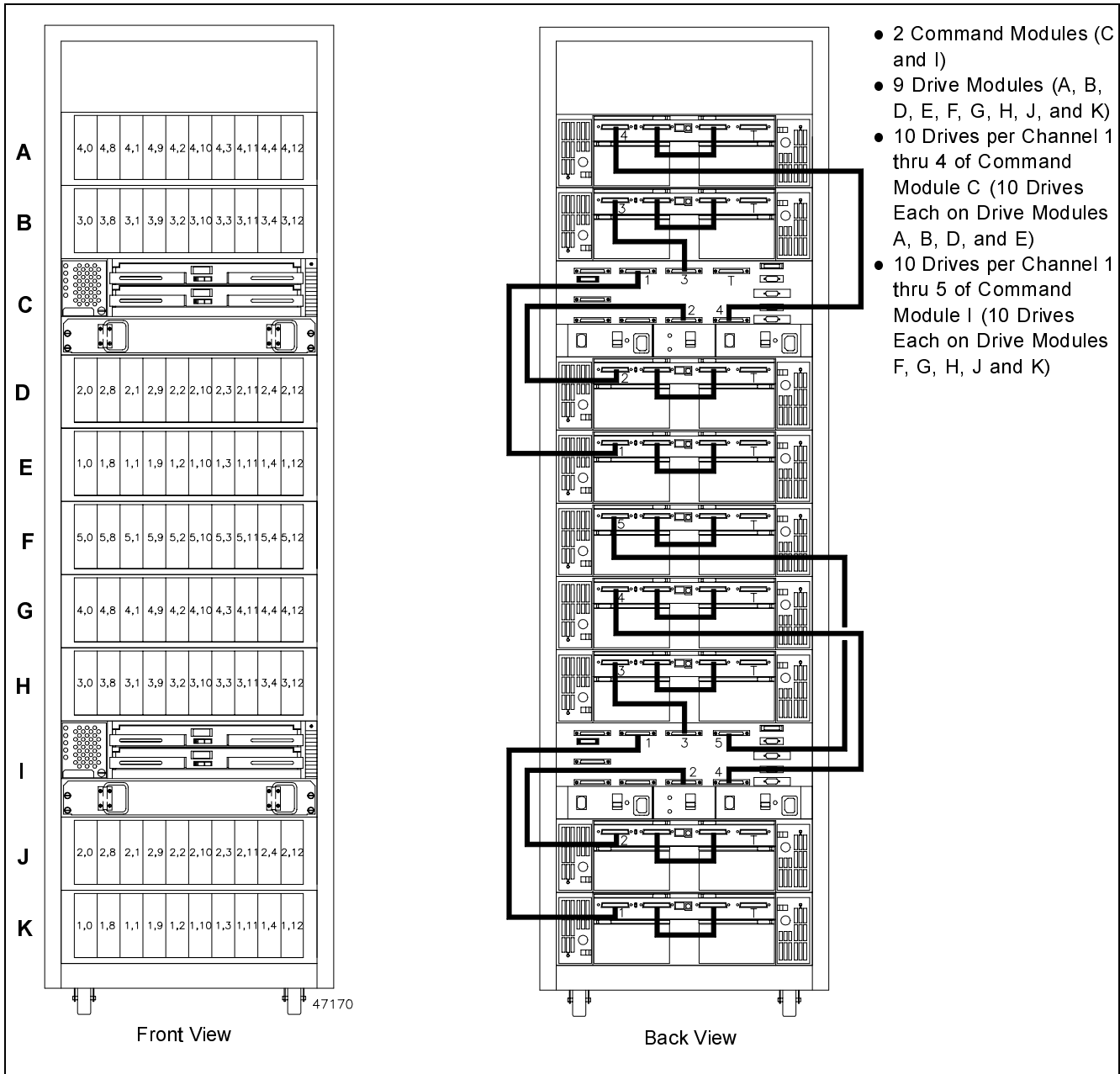


Figure 26 Two Rackmount Command Modules to Nine Drive Modules

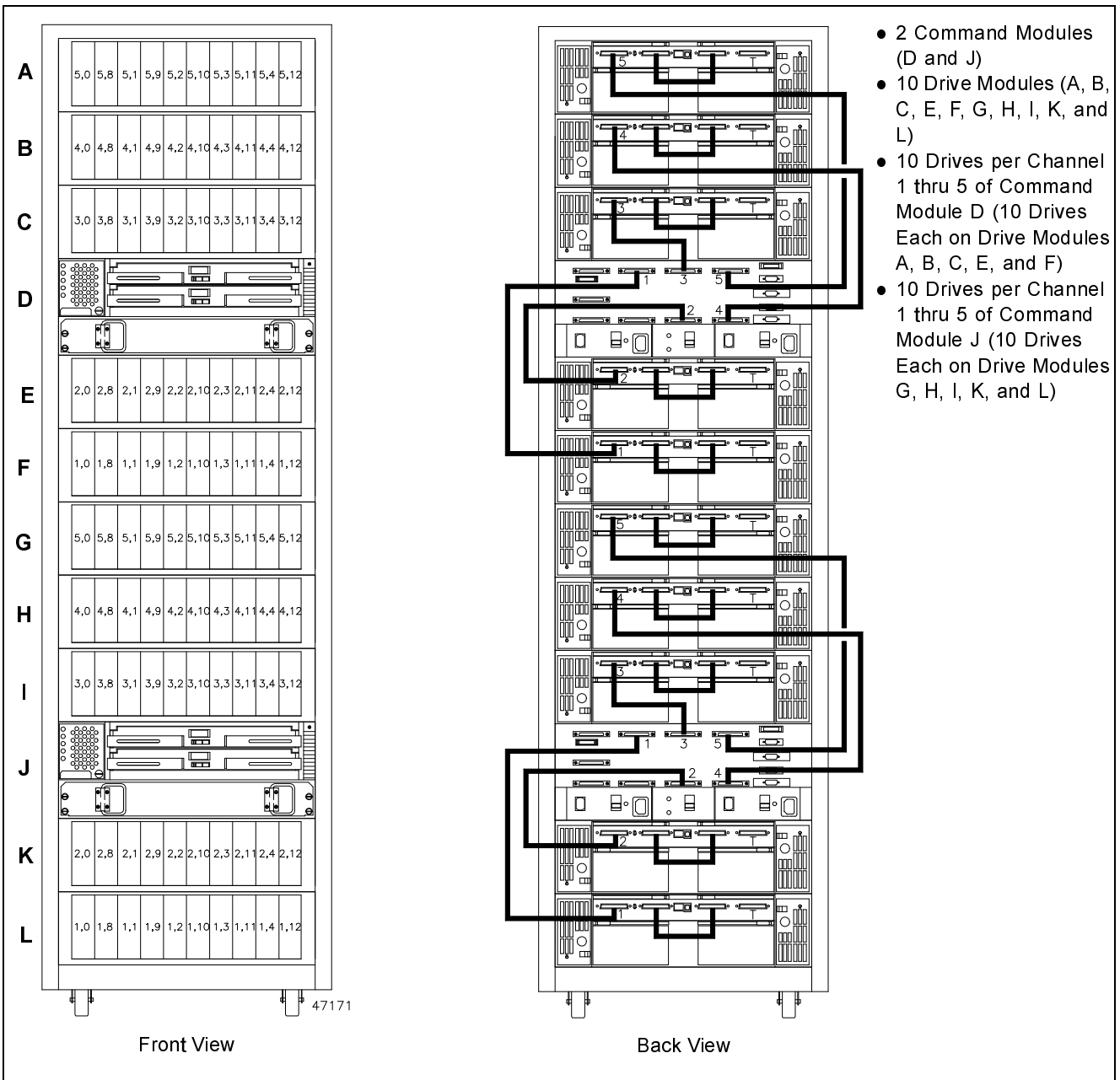


Figure 27 Two Rackmount Command Modules to Ten Drive Modules



Installing the Rackmount Command Module
Connect the Interface Cables

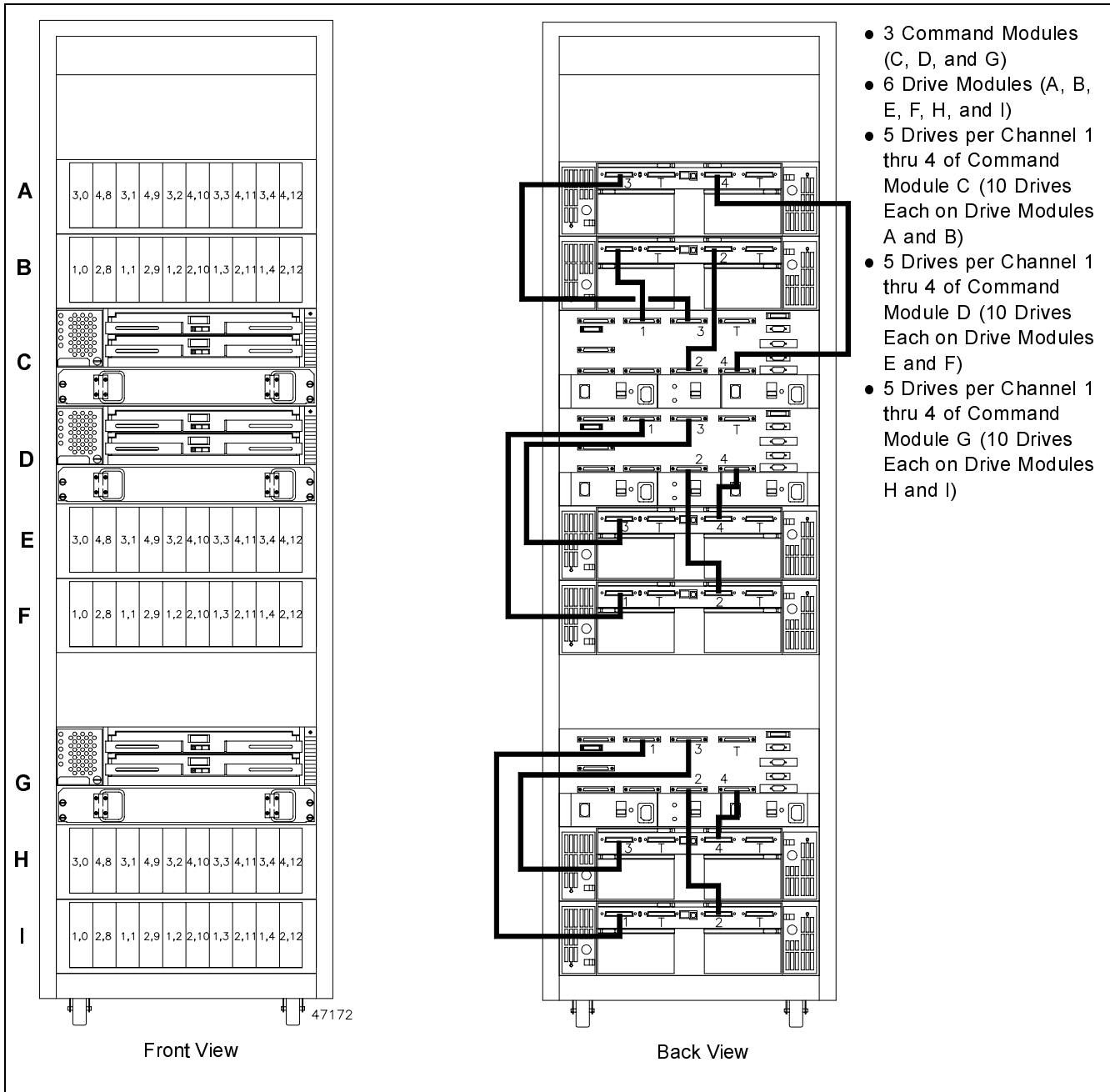


Figure 28 Three Rackmount Command Modules to Six Drive Modules

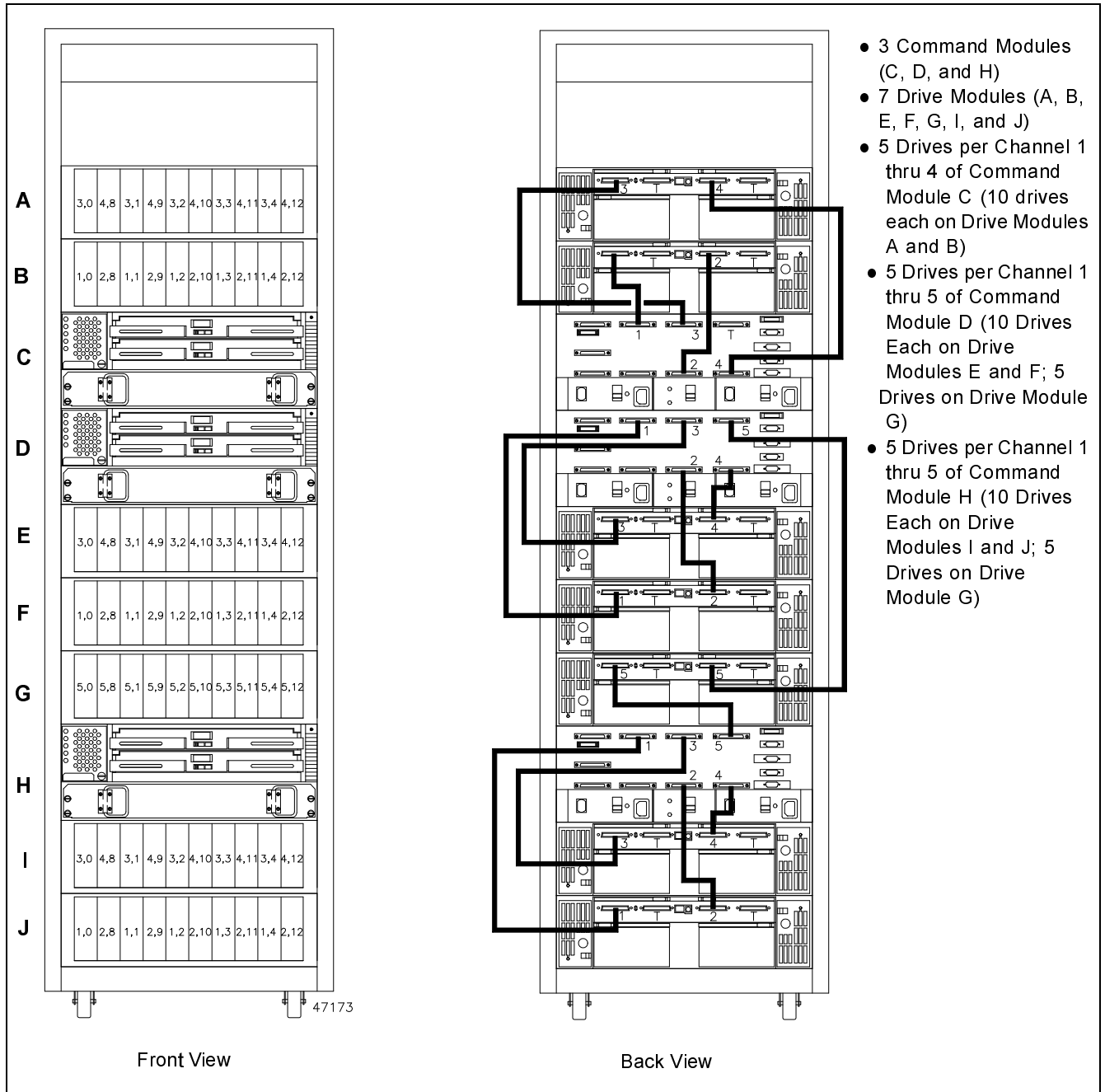


Figure 29 Three Rackmount Command Modules to Seven Drive Modules



Installing the Rackmount Command Module
Connect the Interface Cables

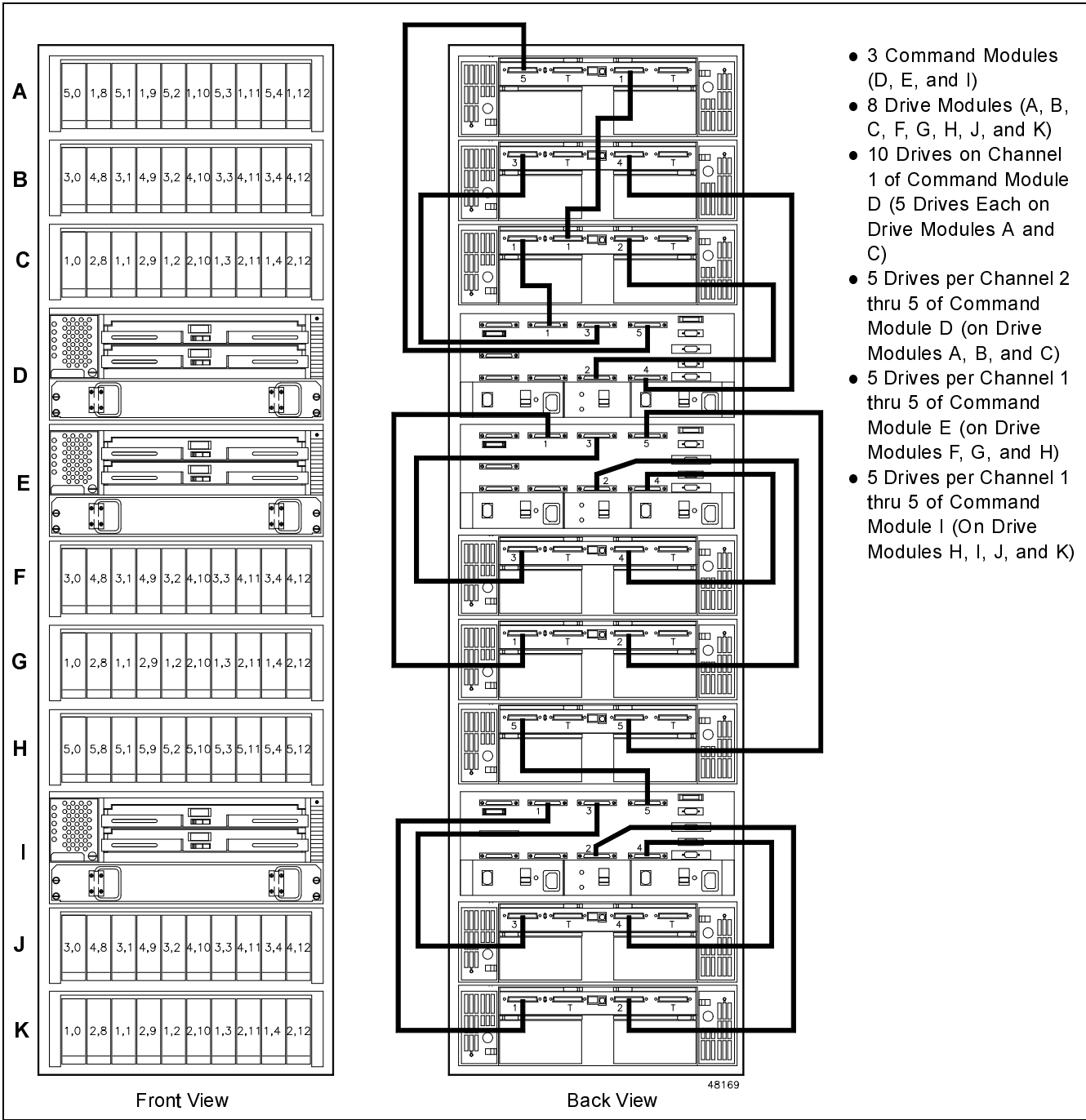
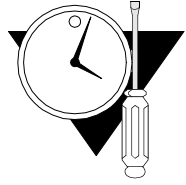
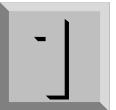


Figure 30 Three Rackmount Command Modules to Eight Drive Modules



Connect the Power Cords

Tools/Equipment

Power cords (shipped with the command module)

Instructions

Use these instructions to connect the power cords to a **rackmount or desktside command module**.

1 If this is a rackmount installation, read **“Power Cord Routing Notes” on page 14**. Otherwise, go to the next step.

2 Check the power switches on the command module.

Make sure that both power switches on the back of the command module are turned off.

Important Note



The Data Center cabinet may have one or more multiple-connector power cords installed at the factory. If the cabinet has one of these power cords with an open connector, you can use the connector to connect the command module.

3 Plug the power cords into the command module (**Figure 31 on page 42**).

There are two power cords supplied with the command module. Plug one cord into each power connector on the back of the command module.

4 Plug the power cords into the AC outlets.

*To maintain power redundancy, you must plug each power cord into an independent power source. For **desktside models**, plug the power cords into the appropriate AC power outlets or UPS. For **rackmount models**, plug the power cords into the AC distribution units inside the Data Center cabinet or into a UPS (see [page 14](#)).*

5 Go to **“Turn On the Power” on page 44**.

End of Procedure





Installing the Rackmount Command Module

Connect the Power Cords

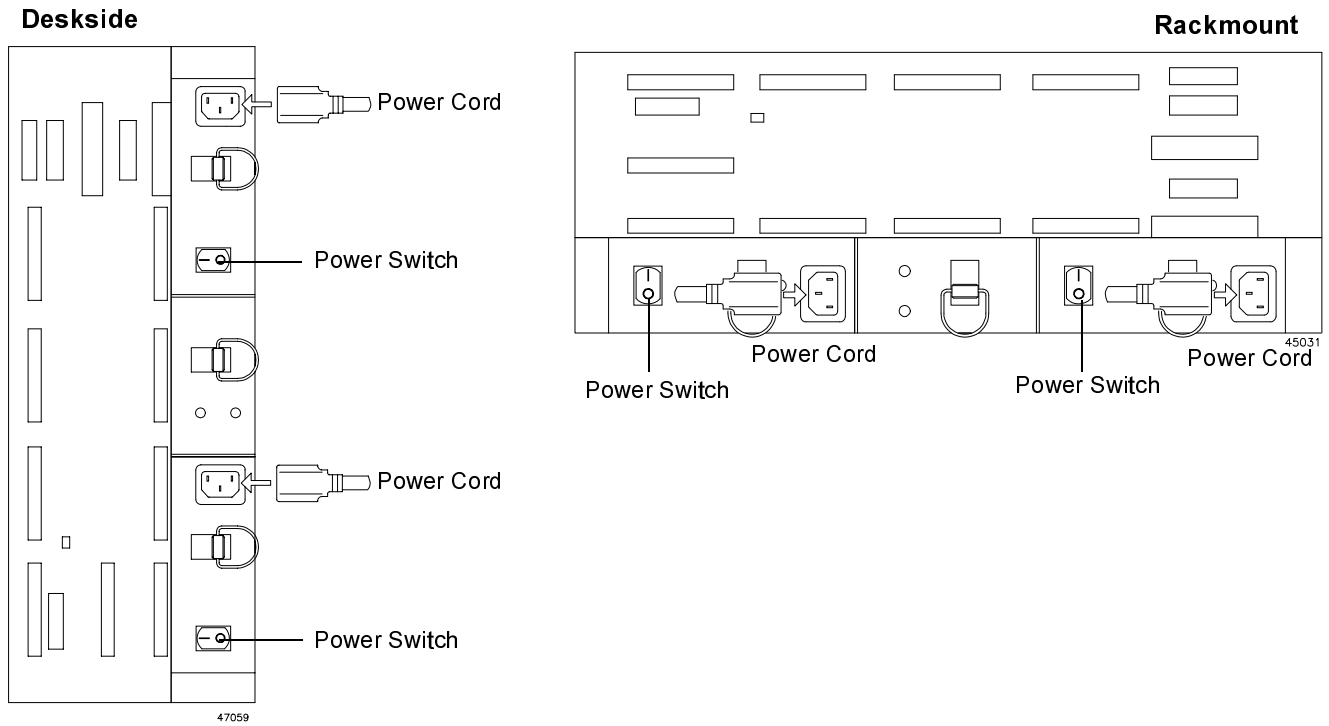
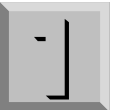


Figure 31 Power Switches and Power Cords



Completing the Installation

This procedure explains how to turn on the power and check the unit. It also provides a brief overview of configuration tasks you may need to perform.

Start-up Notes

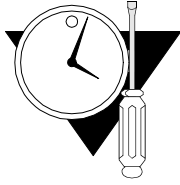
The command module has light emitting diodes (LEDs) that indicate the status of both the overall command module and the individual components within the unit. It is important that you check all the LEDs on the command module (front and back) when you turn on the power to make sure there are no problems.

Configuration Notes

Once you have finished installing the command module hardware, you will need to make sure that the physical drives are ready to store data. Before you attempt to store data on your system, you should use SYMplicity™ Storage Manager to determine the current status and factory settings of your system. Some default software parameters (such as RAID level, drive groups, and caching) are set at the factory prior to shipment.

Once you determine the initial factory settings for your system, you might need to configure or re-define the overall organization of the physical and logical space on the drives. Whether you configure the system depends on several factors, such as:

- How many drive units (shelves, trays, etc.) and drives are connected to the command module
- How and where the command module is connected to the SCSI bus
- What type of operating system and disk array management software (e.g. SYMplicity Storage Manager) you are using
- Whether you want to use the factory default configuration settings (number of logical units, RAID level, hot spare drives, etc.)



Turn On the Power

Important Note



You must power up the drive modules before the command module. If the command module is attached to one or more MetaStor Drive Modules, turn on the drive modules first, followed by the command module.

Instructions

Use this procedure to turn on the power to the command module and check the system's status.

1 Turn on the power (Figure 31 on page 42).

Turn on the power to each device as follows:

- a Main circuit breakers in the Data Center cabinet, if applicable
- b All drive modules attached to the command module
- c Both power switches on the back of the command module

2 Check the command module for faults.

The command module may take from three to ten seconds to power-up. During this time, you will see the amber and green LEDs on the command module turn on and off intermittently.

Check the LEDs on the front and back of the command module. Under normal start-up conditions, the green Power LEDs will be lit and the amber Fault LEDs will be unlit. If an amber Fault LED comes on, refer to the troubleshooting charts provided in the "MetaStor Command Module System Guide," J20971S.

3 Install blank panels as necessary (rackmount only).

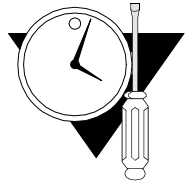
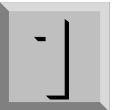
Use the kit instructions blank panel kits

4 Go to "Configure the System" on page 45.

If applicable, replace the front panel on the command module and panels on the Data Center cabinet.

End of Procedure





Configure the System

Tools/Equipment

You will need the following items:

- Software materials shipped with the command module (or separately)
- Configuration worksheet showing how you want to set up the disk array

Important Note



Some default software parameters (such as RAID level, drive groups, and caching) are set at the factory prior to shipment. Before you attempt to store data on your system, you should use SYMplicity Storage Manager to determine the current status and configuration of your system, and to re-configure it as required. For detailed instructions on configuring the disk array, refer to the SYMplicity Storage Manager software documentation.

Instructions

Use this procedure as a guideline for installing the disk array management software and for configuring the controllers and drives.

1 Check the shipping containers that came with the command module for software materials.

This shipment may have included: software installation diskettes or CDs, plus documentation.

- Shipment included software material: continue at [Step 2](#).
- Shipment did not contain software material: go to [Step 3](#).

2 Install the SYMplicity Storage Manager software.

Refer to the appropriate SYMplicity Storage Manager manual for instructions on using the software.

3 Configure the system.

Use the SYMplicity Storage Manager software to configure the controllers and drives as necessary. Refer to the appropriate SYMplicity Storage Manager manual for instructions on using the software.



Note

Depending on the RAID management software you are using, the command module, drive units, or other components in your system may be identified by names that differ from those used in this book. Keep this in mind when using the software.

End of Procedure



Congratulations! You have completed this installation. For information about operating and servicing the command module, refer to the *MetaStor Command Module System Guide, J20971S*.



Chapter Two

Technical Reference

This chapter contains specifications and other technical information about the MetaStor Command Module.

<i>Technical Specifications</i>	<i>page 48</i>
<i>Factory Default Settings</i>	<i>page 48</i>
<i>Weight</i>	<i>page 48</i>
<i>Dimensions</i>	<i>page 49</i>
<i>Hardware Features</i>	<i>page 50</i>
<i>Software Features</i>	<i>page 51</i>
<i>Site Requirements</i>	<i>page 52</i>
<i>Service Area Requirements</i>	<i>page 52</i>
<i>Environmental Requirements</i>	<i>page 53</i>
<i>Power Requirements</i>	<i>page 54</i>
<i>Site Wiring and Power Considerations</i>	<i>page 55</i>
<i>Host Interface</i>	<i>page 57</i>
<i>Interface Options</i>	<i>page 57</i>
<i>Fiber Channel Interface</i>	<i>page 58</i>
<i>SCSI Interface</i>	<i>page 60</i>
<i>Manufacturer and FCC Information</i>	<i>page 67</i>



Technical Specifications

Factory Default Settings

There are no specific factory default settings for the command module at this time.

Weight

The command module's total weight depends on the number of components installed in the chassis. [Table 1](#) lists the overall weight of the command module (unit and shipping), plus the weight for individual components. The maximum weight equals a command module containing two controllers, one battery, two power supplies, and two fans. Empty weight equals a command module with all CRUs removed.

Weight Criteria	Command Module Weight		Individual Component Weight				
	Maximum	Empty	Controller	Battery	Controller Fan	Power Supply Fan	Power Supply
Unit	34.5 kg (76.0 lb)	14.3 kg (31.6 lb)	3.0 kg (6.6 lb)	9.7 kg (21.4 lb)	0.9 kg (1.9 lb)	0.7 kg (1.5 lb)	1.5 kg (3.3 lb)
Shipping	48.5 kg (107.0 lb)	28.4 kg (62.6 lb)	2.3 kg (5.0 lb)	11.8 kg (26.0 lb)	2.3 kg (5.0 lb)	2.1 kg (4.5 lb)	2.9 kg (6.5 lb)

Table 1 Command Module Weight



Dimensions

Table 2 lists the dimensions for the command module, with and without the front panel, in and out of a shipping carton. Figure 32 shows measurements for both the deskside and rackmount models.

Model	With Front Panel			Without Front Panel ¹			Shipping Carton		
	Height	Width	Depth	Height	Width	Depth	Height	Width	Depth
Rackmount	17.48 cm (6.88 in.)	44.5 cm (17.5 in.)	63.2 cm (24.8 in.)	17.3 cm (6.81 in.)	44.5 cm (17.5 in.)	60.96 cm (24.08 in.)	44.5 cm (17.5 in.)	62.2 cm (24.5 in.)	78.7 cm (31 in.)
Deskside	52.8 cm (20.8 in.)	21.6 cm (8.5 in.)	68.8 cm (27.0 in.)	n/a	n/a	n/a	44.5 cm (17.5 in.)	62.2 cm (24.5 in.)	78.7 cm (31 in.)

¹ Front panel thickness is 0.375 in. to 0.875 in.

Table 2 Command Module Dimensions

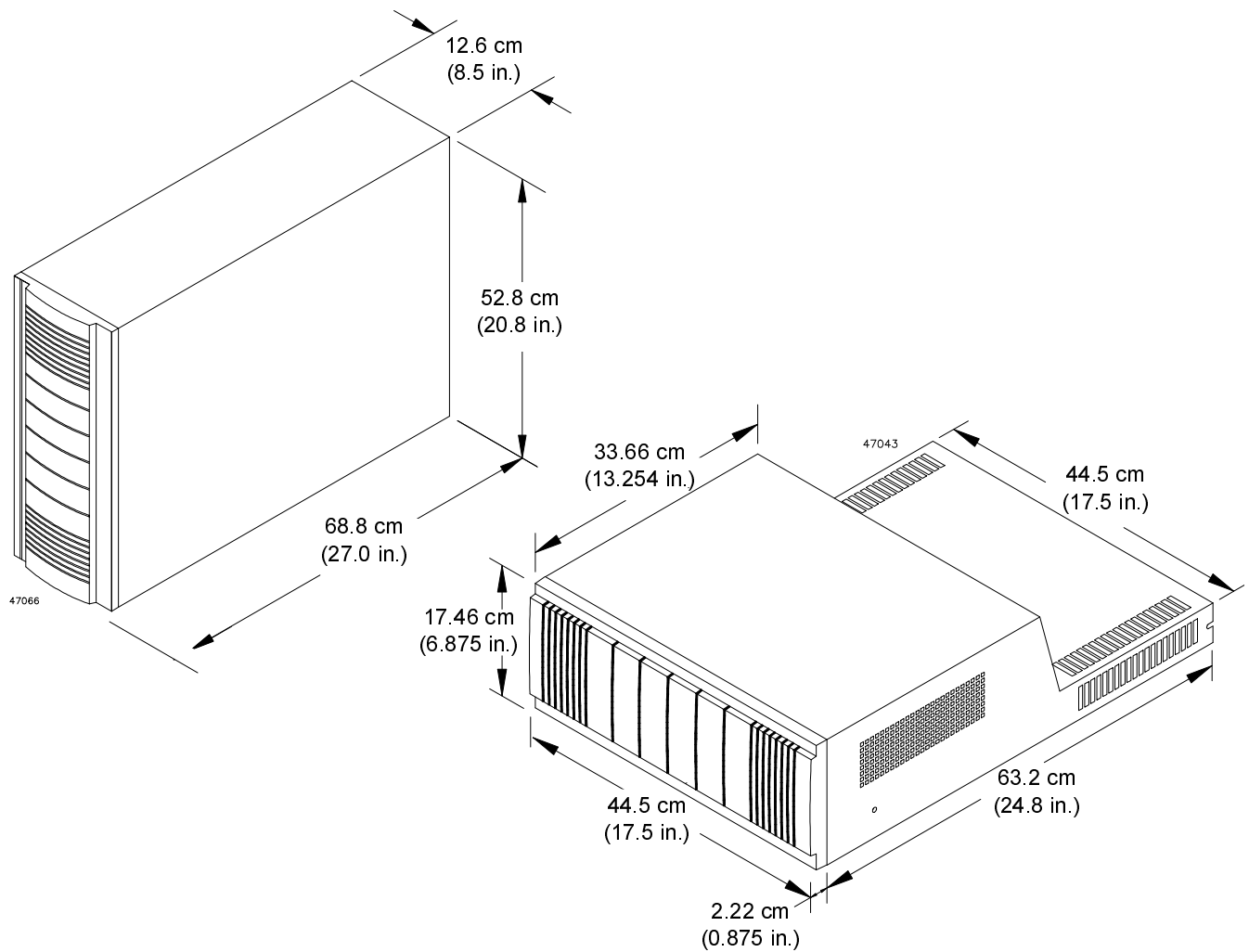


Figure 32 Command Module Dimensions



Hardware Features

Table 3 lists the some of the features you will find in the command module.

Features	Elements	Descriptions
General	Modularized Components	• SCSI array controller CRUs
		• Power supply CRUs
		• Battery CRUs
		• Cooling fan CRUs
	Technology	• Supports disk array technology
		• Supports RAID levels 0, 1, 3, and 5
		• SCSI or Fiber Channel (FC) host interface
		• Redundant controllers, cooling system, and power system
		• Hot swap logic for controller, power supply, and fan CRUs
	• Automatic recovery after power failure without user intervention	
	User Interface	• Built-in power, activity, and fault indicators
		• Identification labeling on CRUs, indicator lights, switches, and connectors
		• SYMlicity™ Storage Manager support for operating systems such as: Windows NT®, UNIX®, and Solaris®
		• RAID Manager for MS-DOS®
		• Easy-to-replace controller, battery, power supply, and fan CRUs
Controller	ID Numbers (can be modified)	• Host IDs: 4 and 5 (SCSI); 0 through 15 (FC)
	Technology and Interfaces	• Model: SCSI differential or Fiber Channel
		• SCSI bus interface: Four, high-density connectors for incoming and outgoing SCSI bus cables
		• Fiber Channel interface: One copper wire or fibre optic connector on each controller CRU
		• Five SCSI channels to drive modules
		• Two RS-232 and two Ethernet connectors (one each per controller)

Table 3 Command Module Features



Software Features

This command module supports SYMplicity Storage Manager software, an application used to configure and manage disk arrays. SYMplicity Storage Manager provides configuration tools that allow you to define the physical and logical space on each drive in preparation for data storage. Whether or not you need to configure the command module depends on several factors, such as:

- How many drives are attached to the command module
- How and where the command module is connected to the SCSI bus
- What type of host, host adapter, and operating system you are using with the command module
- What type of RAID management software you are using on the command module
- Whether or not you want to use the factory default configuration settings (number of LUNs, RAID level, hot spare drives, etc.)

[Table 4](#) lists a few of the default software parameters that may or may not be set at the factory prior to shipment. Before you attempt to store data on the drive units, you should use SYMplicity Storage Manager or the appropriate software to determine the following:

- Exactly how the drives and command modules are currently configured
- Whether or not you want to change that configuration

Software Parameters	Explanation
RAID Level	Defines how data is stored on the logical units (LUNs) and whether or not there is data redundancy, based on a RAID level. There are four RAID levels: 0, 1, 3, and 5.
Drive Group	Defines which physical drives make up each logical unit.
Caching	Determines whether data will be stored in cache memory. This is specified on a logical unit basis.
Segment Size	Defines the amount of data (segment size) a controller will write to a single drive in a logical unit, before writing data to the next drive. Segment sizes are determined by the total number of data blocks.
Reconstruction Rate	Determines the total number of data blocks the controller will reconstruct during one reconstruction operation. Defines the amount of time (delay interval) between each reconstruction operation.

Table 4 Sample Disk Array Software Parameter Settings



NOTE

Depending on the RAID management software you use, the command module may be referred to as a disk array, a RAID module, or other type of unit. Keep this in mind when using the RAID software.



Site Requirements

This section lists the space, environmental, and power requirements for the command module. For information on interface cables and connections, refer to the following pages:

- [“Fiber Channel Interface” on page 58](#)
- [“SCSI Interface” on page 60](#)

Service Area Requirements

The floor area at the installation site must provide:

- Enough stability to support the weight of the command module and associated equipment
- Sufficient space to install and service the command module

To help you determine area requirements, this section lists the weights, dimensions, and required floor space for the MetaStor Command Module.

The command module requires a minimum service area of:

- Front: 60.96 cm (24 in.)
- Back: 30.48 cm (12 in.)



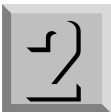
Environmental Requirements

Table 5 lists the environmental requirements for the command module.

Environment	Unit of Measure	Requirement	
Air Flow		Air flow is from front to back	
Altitude		Below Sea Level	Above Sea Level
	Operating Range	30.5 m (100 ft.)	3,000 m (9,840 ft.)
	Storage Range	30.5 m (100 ft.)	3,000 m (9,840 ft.)
	Transit Range	30.5 m (100 ft.)	12,000 m (40,000 ft.)
Temperature	Optimum ¹	22° C (72° F)	
	Operating Range ¹	5° C to 45° C (40° F to 113° F)	
	Storage Range	-10° C to 50° C (14° F to 120° F)	
	Transit Range	-40° C to 60° C (-40° F to 140° F)	
Temperature Change (maximum allowed)	Operating Range	10° C (18° F) per hour	
	Storage Range	15° C (27° F) per hour	
	Transit Range	20° C (36° F) per hour	
Relative Humidity (no condensation)	Operating Range	10% to 90%	
	Storage Range	10% to 90%	
	Transit Range	5% to 95%	
	Max. Dew Point	26° C (79° F)	
	Max. Humidity Gradient	10% per hour	
Heat Dissipation	0.329 kVA 214.0 W	731.0 Btu/hr	
Sound	Sound Power	6.5 bels	
	Sound Pressure	65 dBA	

¹ If you plan to operate the command module at altitudes between 1000 m and 3000 m (3280 ft. and 9850 ft.), you must lower the environmental temperature 1.7° C (3.3° F) for every 1000 m (3280 ft.) above sea level.

Table 5 Environment Requirements



Power Requirements

Table 6 lists the power requirements for the command module.

Power	Unit of Measure	Requirement		
Overall Command Module				
A.C. Power	Nominal Voltage	90 to 136 VAC, 198 - 257 VAC		
	Frequency	50/60 Hz		
	Idle Current	1.0 A ¹		
	Max. Operating Current	1.0 A ¹		
	Max Surge Current	2.0 A ¹		
Fuse		3.0 A slow-blow fuse per power supply		
Components				
Component Power		+5 VDC	+12 VDC	
	Controller	7.0 A	0.1 A	
	Battery	0.07 A	2.5 A	
	Controller Fan	0.07 A	0.7 A	
	Power Supply Fan	0.02 A	0.65 A	
	Power Supply		1.0 A (max. per power supply @ 220VAC)	
	Power Supply Interface Board	20.0 A	3.35 A	

¹ Typical current at 240 VAC, 60 Hz (assumes 0.70 power efficiency, 0.99 power factor).

Table 6 Power Requirements



Site Wiring and Power Considerations

The command module is a nominal 90 - 136 Volt or 198 - 257 Volt, 50/60 Hz unit that meets standard voltage requirements for both domestic (USA) and international (outside USA) operation. It uses standard industrial wiring with a line-to-neutral or line-to-line power connection ([Table 7](#)).

Input Power Connection	50 Hz			60 HZ		
	Nominal	Minimum	Maximum	Nominal	Minimum	Maximum
Single-Phase Line to Neutral	100	90	107	100	90	107
	127	114	136	120	104	127
	220	198	235			
	230	207	246			
	240	216	257			
Single-Phase Line to Line	200	180	214	200	180	214
				208	180	220
				240	208	254

Table 7 Site Wiring Voltages

When preparing the site and cabinet for the installation of this unit, consider the following:

- **AC power source.** The AC power source must provide the correct voltage, current, and frequency specified on the manufacturer's nameplate. Internal AC distribution boxes (such as the cabinet's power units) must be able to handle the power requirements for this unit ([Table 6 on page 54](#)). You must have an independent AC power source for each power supply in the command module in order to maintain redundancy.
- **Earth ground.** There must be an earth ground conductor on the AC power source.
- **Circuit overloading.** Make sure that the power circuits and associated circuit breakers in both the cabinet and building provide sufficient power and overload protection. To prevent possible damage to the unit, isolate its power source from large switching loads (such as air conditioning motors).
- **Redundant 90-136 Volt AC power.** If three or fewer drive modules are connected to a controller module, use two circuits. Connect one power supply from each module to one circuit and connect the other power supply from each module to the other circuit. If more than three drive modules are connected to a controller module, use four circuits. Connect half the modules to



two circuits and the other half of the modules to the other two circuits. This meets the current requirements while providing source power redundancy.

- **Redundant 198-257 volt AC Power.** Use two circuits and connect one power supply from each module to one circuit and connect the other power supply from each module to the other circuit. This meets the current requirements while providing source power redundancy. This meets the current requirements while providing source power redundancy.
- **Power interruptions.** The command module will withstand the following applied voltage interruptions:
 - Input transient: 50% of nominal voltage
 - Duration: one half cycle
 - Minimum frequency: once every 10 seconds
- **Power failures.** Once power is restored following a complete power failure, the unit will automatically perform a power-up recovery sequence without operator intervention.



Host Interface

The command module contains or uses several interface components, which include the following hardware elements:

- Two array controllers (FC or SCSI)
- One controller card cage (includes controller backpanel)
- Interface cables (fibre optic, copper, or SCSI, plus Ethernet and RS-232 cables)

These components attach the command module to drive units and to other devices on the FC network or SCSI bus.

Interface Options

The command module supports both *Fiber Channel (FC)* and *Small Computer System Interface (SCSI)*, pronounced “scuzzy”) protocols through its disk array controllers and cable connections. These interface connections allow you to attach the command module to multiple hosts or devices on either a SCSI bus or Fiber Channel network.

There are two types of controllers available: SCSI or FC. The *SCSI controllers* provide two SCSI host connections for 16-bit, differential SCSI-2 buses. The *FC controllers* provide two host connections for either fibre optic or copper networks. In addition, the controllers manage all I/O between the hosts and drive modules through SCSI-2 connectors provided on the back of the command module. The controllers use these five independent drive channels to manage data distribution and storage for up to fifty disk drives (10 drives per channel x 5 drive channels).

The following sections provide detailed information regarding both the Fiber Channel and the SCSI interfaces, cabling requirements, and other things you should know regarding command module installation requirements.



Fiber Channel Interface

The command module supports one or two Fiber Channel controllers. Fiber Channel controllers contain a *gigabaud link module (GLM)* that has either a *fibre optic* or *copper wire* connector extending through an opening in the front of the controller CRU (**Figure 33**). There is a blank strip covering this opening on SCSI controller CRUs. Using these interface connectors, the command module attaches to FC hosts using three types of Fiber Channel topologies:

- Hubs (copper or fibre optic)
- Arbitrated loops (fibre optic only)
- FC hosts (copper or fibre optic)

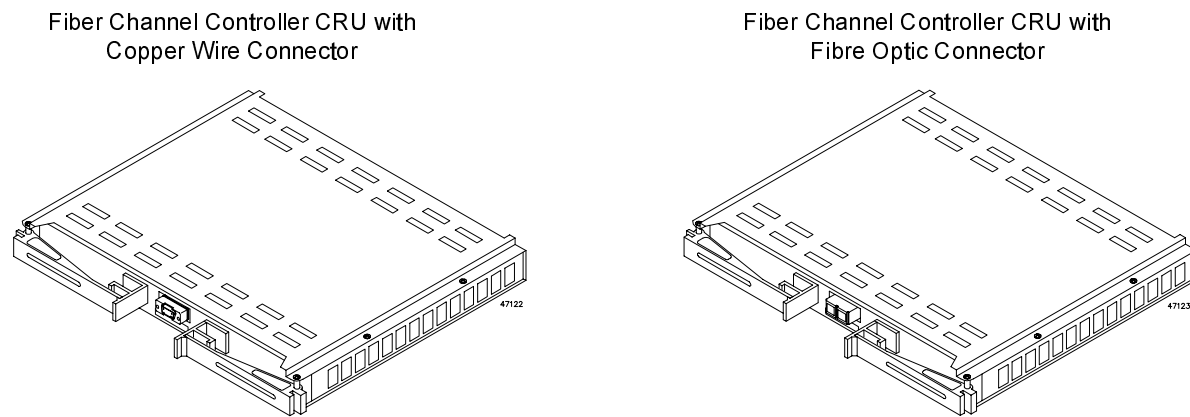


Figure 33 Copper Wire and Fibre Optic Connectors

Fibre Optic and Copper Wire Cables

You must use either multi-mode fibre optic cable or shielded, twisted pair cable to connect the command module to the appropriate host or network device. **Table 8** lists the cables that you can use on this command module.

Cable Descriptions						Cable Order Information	
Item	Cable Type	Media Type	Data Size	Transfer Speed	Range	Part No.	Length
Fibre Optic	Multi-mode, 50 micrometer	Shortwave laser	100 MB/sec	1062.5 Mbaud	Up to 0.5 kilometer	006-1086416	3 meter (10 ft)
						006-1086417	10 meter (33 ft)
Copper Wire	Shielded, twisted pair	Electrical signal	100 MB/sec	1062.5 Mbaud	Up to 30 meters	006-1086418	3 meter (10 ft)
						006-1086419	10 meter (33 ft)

Table 8 Command Module Fiber Channel Interface Cables



FC Host ID Pins

If the command module is installed on a Fiber Channel network, the controllers must have unique *FC host ID* numbers. The FC host ID numbers assigned to each controller are based on two elements:

- Hardware host ID settings through the host ID pins on the back of the command module (Figure 34)
- Software algorithms that calculate the actual FC address, based on the command module's hardware ID settings

The hardware host ID settings on the command module are limited to #0 through #15 for each controller. For more information about software host ID settings for Fiber Channel, refer to your software documentation.

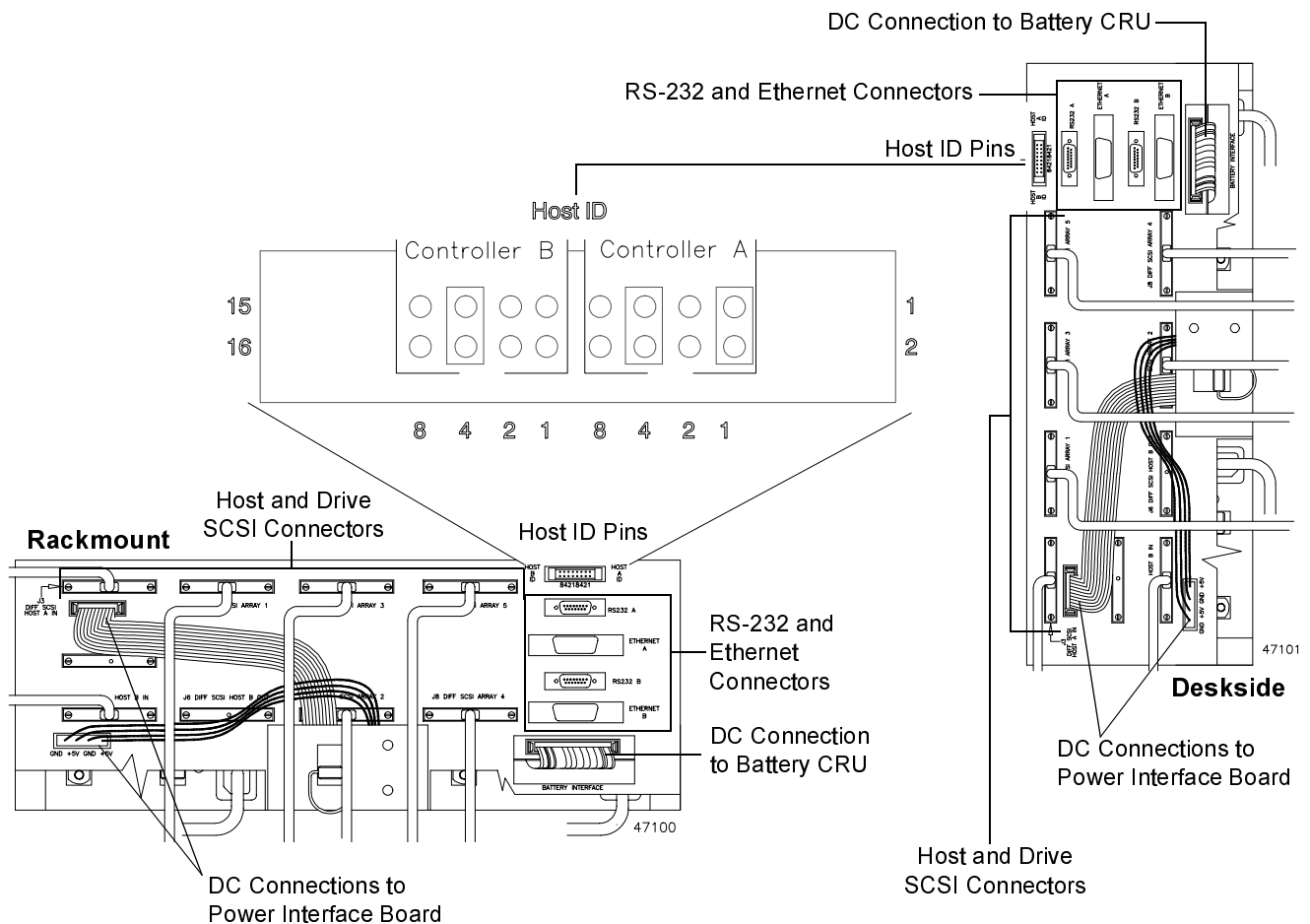


Figure 34 Interface Connectors and Host ID Pins



SCSI Interface

The command module supports one or two SCSI controllers. The *SCSI controllers* can use both 8-bit and 16-bit, differential Ultra SCSI-2 interface connections to communicate with the host and drive units. These connections are provided on the back of the command module and allow you to:

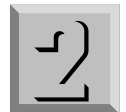
- Connect one controller to a single SCSI bus
- Connect dual, redundant controllers to a single SCSI bus
- Connect dual, independent controllers to two SCSI buses

SCSI Connectors and Cables

There are thirteen interface connectors, three power connectors, and a set of sixteen host ID pins on the back of the command module ([Figure 34 on page 59](#)). These connectors and pins extend through the back wall, or *rear shield*, of the command module chassis. They include the following:

- Four **host SCSI connectors** (two IN and two OUT) for attaching SCSI controllers to one or two SCSI buses
- Five **drive SCSI connectors** for attaching up to five drive modules to the command module
- Two **RS-232 connectors** for attaching diagnostic cables to each controller
- Two **Ethernet connectors** for attaching diagnostic cables to each controller
- Two **DC connectors** to the power interface board
- One **DC connector** to the battery CRU
- Sixteen **host ID pins**; eight per controller

You must use 68-pin, high-density, SCSI cables to connect the command module to the hosts and drive modules. The maximum length for any SCSI bus is 25 m (82 ft.). [Table 9](#) lists the SCSI cables that you can use on this command module.



Type	Cable ID No.	Connection to Command Module	Connection to Host
16-bit	1415-C078-xxxx ¹	68-pin, HD, 180° ²	68-pin, HD, 180°
16-bit	1415-C086-xxxx	68-pin, HD, 180°	68-pin, HD, 180° PLENUM ³
8-bit	1415-C080-xxxx	68-pin, HD, 180°	68-pin, LD, 180°
8-bit	1415-C076-xxxx	68-pin, HD, 180°	50-pin, HD, 180°
8-bit	1415-C085-xxxx	68-pin, HD, 180°	50-pin, HD, 180° PLENUM
16-bit	1415-C078-0023	68-pin, HD, 180°	2.3 M (7.5 ft) channel-to-channel daisy-chain
16-bit	1415-C078-0004	68-pin, HD, 180°	0.4 M (1.3 ft) controller-to-controller daisy-chain

¹ xxxx = length of cable in tenths of a meter

² 180° = angle that cable connector exits the unit

³ PLENUM = used for air plenums (required for cables over 10 ft. used in air plenums)

Table 9 Command Module SCSI Interface Cables

16-Bit Vs. 8-Bit Connections Although the command module is a 16-bit unit, it supports either an 8-bit (50-pin) or 16-bit (68-pin) differential, SCSI-2 interface. The interface connectors and type of cables you use depend on the following:

- What kind of host SCSI bus you are connecting the command module to (an 8-bit or 16-bit bus)
- Where you are connecting the command module on the bus

You can install this command module on either an 8-bit or 16-bit host SCSI bus as long as you follow these guidelines:

- **Installing command module in middle of a 16-bit bus** — You can install the command module anywhere between the first and last device on a 16-bit bus simply by attaching the SCSI cables to the appropriate host SCSI connectors on the back of the unit. The incoming SCSI cables attach to the IN connectors. The SCSI cables on the OUT connectors attach to the next device on the bus.
- **Installing command module at end of a 16-bit bus** — If you are installing the command module as the last device on a 16-bit bus, you must connect the incoming host SCSI cable to the IN connector, then install a terminator on the corresponding OUT connector. For more information on terminators, read “[SCSI Terminators](#)” (next section).
- **Installing command module on an 8-bit bus** — If you intend to connect the command module to an 8-bit host SCSI bus, **you must install the command module as the last device on the bus.** You cannot install this command module in the middle of an 8-bit SCSI bus. The incoming SCSI cable attaches to the IN



connector. You must install a 16-bit terminator on the corresponding OUT connector. For more information on terminators, read “[SCSI Terminators](#)” (next section).



Note

If you attach the command module to an 8-bit bus, it will confine the command module’s performance to 8-bit limits.

SCSI Terminators If you install the command module where one or both controllers are the last devices on a SCSI bus, you must terminate the bus. To do this, you must put a 16-bit, differential terminator on each SCSI-OUT connector on the command module's back panel. For details on installing the command module, refer to the instructions in Chapter 1.

SCSI Host ID Pins

If the command module is installed on a SCSI bus, the controllers must have unique *SCSI host ID* numbers, which are set through ID pins on the back of the unit ([Figure 34 on page 59](#)). The factory default settings for the controllers are SCSI ID 5 (Controller A) and SCSI ID 4 (Controller B).



Host SCSI Pin Assignments and Signals Table 10 lists the host SCSI interface pin assignments for the differential P-cable connections. The shaded areas show open signals for 8-bit connections. Table 11 on page 64 describes each SCSI signal.

Pin #	Signal	Pin #	Signal	Pin #	Signal	Pin #	Signal
1	+DB(12)	18	TERMPWR	35	-DB(12)	52	TERMPWR
2	+DB(13)	19	RESERVED	36	-DB(13)	53	RESERVED
3	+DB(14)	20	+ATN	37	-DB(14)	54	-ATN
4	+DB(15)	21	GROUND	38	-DB(15)	55	GROUND
5	+DB(P1)	22	+BSY	39	-DB(p1)	56	-BSY
6	GROUND	23	+ACK	40	GROUND	57	-ACK
7	+DB(0)	24	+RST	41	-DB(0)	58	-RST
8	+DB(1)	25	+MSG	42	-DB(1)	59	-MSG
9	+DB(2)	26	+SEL	43	-DB(2)	60	-SEL
10	+DB(3)	27	+C/D	44	-DB(3)	61	-C/D
11	+DB(4)	28	+REQ	45	-DB(4)	62	-REQ
12	+DB(5)	29	+I/O	46	-DB(5)	63	-I/O
13	+DB(6)	30	GROUND	47	-DB(6)	64	GROUND
14	+DB(7)	31	+DB(8)	48	-DB(7)	65	-DB(8)
15	+DB(P)	32	+DB(9)	49	-DB(P)	66	-DB(9)
16	DIFFSENS	33	+DB(10)	50	GROUND	67	-DB(10)
17	TERMPWR	34	+DB(11)	51	TERMPWR	68	-DB(11)

NOTE: Shaded areas indicate open signals for 8-bit connections.

Table 10 SCSI Pin Assignments for Differential P-Cable



Signal	Name	Description
BSY	BUSY	An “or-tied” signal indicating that the bus is being used.
SEL	SELECT	A signal used by an Initiator to select a Target or by a Target to re-select an Initiator.
C/D	COMMAND/DATA	A signal driven by a Target indicating whether CONTROL or DATA information is on the data bus. True indicates CONTROL.
I/O	INPUT/OUTPUT	A signal driven by a Target controlling the direction of data movement on the data bus with respect to the Initiator. True indicates input to the Initiator.
MSG	MESSAGE	A signal driven by the Target during a MESSAGE phase.
REQ	REQUEST	A signal driven by the Target to indicate a request for an REQ/ACK data transfer handshake.
ACK	ACKNOWLEDGE	A signal driven by the Initiator to indicate acknowledgment for an REQ/ACK data transfer handshake.
ATN	ATTENTION	A signal driven by the Initiator indicating an ATTENTION condition.
RST	RESET	An “or-tied” signal indicating the RESET condition.
DB(0-15,P,P1)	DATA BUS, PARITY	Sixteen-bit data bus with odd parity used for data transfer and BUS DEVICE ID during ARBITRATION

Table 11 Host SCSI Signal Descriptions



SCSI Drive Pin Assignments and Signals

Table 12 lists the SCA-2 interface pin assignments for the SCSI disk drives. Table 13 on page 66 describes each SCSI signal.

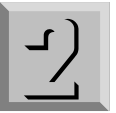
Pin #	Signal	Pin #	Signal	Pin #	Signal	Pin #	Signal
1	+12 V charge	21	DB(7)	41	GROUND	61	GROUND
2	+12 V	22	DB(6)	42	GROUND	62	GROUND
3	+12 V	23	DB(5)	43	GROUND	63	GROUND
4	+12 V	24	DB(4)	44	Mated 1	64	GROUND
5	NC (Opt. 3.3 V)	25	DB(3)	45	NC (Opt. 3.3 V charge)	65	GROUND
6	NC (Opt. 3.3 V)	26	DB(2)	46	GROUND	66	GROUND
7	DB(11)	27	DB(1)	47	GROUND	67	GROUND
8	DB(10)	28	DB(0)	48	GROUND	68	GROUND
9	DB(9)	29	DB(P1)	49	GROUND	69	GROUND
10	DB(8)	30	DB(15)	50	GROUND	70	GROUND
11	I/O	31	DB(14)	51	GROUND	71	GROUND
12	REQ	32	DB(13)	52	GROUND	72	GROUND
13	C/D	33	DB(12)	53	GROUND	73	GROUND
14	SEL	34	+5 V	54	GROUND	74	Mated Ground
15	MSG	35	+5 V	55	GROUND	75	GROUND
16	RST	36	+5 V charge	56	GROUND	76	GROUND
17	ACK	37	SYNC +	57	GROUND	77	ACTIVE_LED
18	BSY	38	RMT_START	58	GROUND	78	DLYD_START
19	ATN	39	SCSI ID0 +	59	GROUND	79	SCSI ID1 +
20	DB(P)	40	SCSI ID2 +	60	GROUND	80	SCSI ID3 +

Table 12 SCA-2 Interface Pin Assignments



Signal	Name	Description
+12 V	+12 V power	Power supply voltage for the drives.
+12 V charge	+12 V pre-charge	A +12 V pre-charge for “hot plugging” the drives.
+5 V	+5 V power	Power supply voltage for the drives.
+5 V charge	+5 V pre-charge	A +5 V pre-charge for “hot plugging” the drives.
Mated 1/2	In place lines	Signals used to determine when the drive is in place. Mated 2 is ground for the drive and can be used as the “drive in place” signal. Mated 1 connects to Mated 2 on the mid-plane.
SYNC +	SYNC Spindle	Not used by this command module. A signal used to synchronize spindles between multiple drives.
RMT_START	Remote Start	A signal that specifies whether or not the drive must wait for a command from the host controller before performing SCSI spin-up. A low signal means wait for the spin-up command
DLYD_START	Delayed Start	When the RM_START signal is high, this signal specifies whether or not the drive must delay spin-up based on its SCSI ID. If this signal is high, the drive will spin-up as soon as power is applied. If this signal is low, the drive will delay spin-up after power is applied for <i>nn</i> seconds (12 seconds x drive SCSI = <i>nn</i> seconds). If the RM-START signal is low, the DLYD_START signal has no effect on the drive spin-up
SCSI_ID0-3	SCSI ID	Signals used to specify the drive SCSI ID.
ACTIVE_LED	Active LED driver	A signal used to activate a remote Active LED that specifies when the drive is active.
BSY	BUSY	An “or-tied” signal indicating that the bus is being used.
SEL	SELECT	A signal used by an Initiator to select a Target or by a Target to re-select an Initiator.
C/D	COMMAND/DATA	A signal driven by a Target indicating whether CONTROL or DATA information is on the data bus. True indicates CONTROL
I/O	INPUT/OUTPUT	A signal driven by a Target controlling the direction of data movement on the data bus with respect to the Initiator. True indicates input to the Initiator.
MSG	MESSAGE	A signal driven by the Target during a MESSAGE phase.
REQ	REQUEST	A signal driven by the Target to indicate a request for an REQ/ACK data transfer handshake
ACK	ACKNOWLEDGE	A signal driven by the Initiator to indicate acknowledgment for an REQ/ACK data transfer handshake.
ATN	ATTENTION	A signal driven by the Initiator indicating an ATTENTION condition.
RST	RESET	An “or-tied” signal indicating the RESET condition.
DB(0-15,P,P1)	DATA BUS, PARITY	Sixteen-bit data bus with odd parity used for data transfer and BUS DEVICE ID during ARBITRATION.

Table 13 SCA-2 Signal Descriptions



Manufacturer and FCC Information

Product Labels

There are manufacturer's labels on the back of the command module that list the following information about your unit:

- Class Number
- Model Number
- Serial Number
- Tracer Number
- Emissions and FCC Compliances



Manufacturer and FCC Information
Product Labels

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