Silicon Graphics Peripherals Reference Guide

Document Number 108-7048-030

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Document Number 108-7048-030

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About This Book

This guide is designed as a reference document for Silicon Graphics® system support engineers. It consolidates information about peripheral devices used with the CHALLENGE™, Onyx®, Indigo™, Indy™ and Indigo²™ products in a single, easy-to-access document.

This manual does not cover any information regarding older Silicon Graphics systems such as the Crimson™ deskside, POWER Center™ or SkyWriter™ systems, or POWER Series™ racks. Nor does it cover any non-SCSI disk or tape drives. For information on older high-end Silicon Graphics systems and peripherals, see the *Peripherals Reference Guide* (P / N 108-7027-020).

All disk drawings have been modified to include an "optional jumper" designation. This is intended to clarify the difference between a default and an optional jumper placement.

You are encouraged to place this reference document along with other peripheral manuals into a binder so that all of your peripheral information is in one location. As new peripherals are released, device-specific information will be distributed to you. As it becomes available, this information should also be added to your peripherals binder.

This document is organized as follows:

Chapter 1 "Introduction to Current Silicon Graphics Peripherals" gives general device information, including SCSI bus considerations and allowable device configurations in the SGI rackmount, deskside, and desktop product lines.

Chapter 2 "Deskside and Rackmount Drive Information" provides guidelines on how to properly configure SCSI devices for connection to or installation into (high-end) Challenge or Onyx systems.

Chapter 3 "Desktop Drive Information" describes jumpering considerations for SCSI devices used with (low-end) desktop units.

Additional Reference Manuals

The following list of documents provides an expanded information base that may be useful for filling in details on topics that are not covered in this guide:

- *CHALLENGE and Onyx Deskside Installation Instructions* (P / N 108-7039-0x0)
- *CHALLENGE and Onyx Rackmount Installation Instructions* (P / N 108-7042-0x0)
- *CHALLENGE and Onyx Site Preparation Guide* (P / N 108-7040-0x0)
- *CHALLENGE and Onyx Diagnostic Roadmap* (P / N 108-7045-0x0)
- *CHALLENGE Vault Rack and SCSIBox 2 Installation Instructions* (P / N 108-7044-0x0)
- *CHALLENGE Vault L Installation Instructions* (P / N 108-0124-00x)
- *CHALLENGEvault M Owner's Guide* (P / N 007-2155-00x)
- *Digital Linear Tape Drive Owner's Guide* (P / N 007-2266-00x)
- *Multi-Channel Option Installation Instructions* (P / N 108-7047-0x0)
- *RAID Hardware Installation and Upgrade Instructions* (P / N 108-0104-00x)
- *RAID Administrator's Guide* (P / N 007-2113-00x)

Chapter 1

Introduction to Current Silicon Graphics Peripherals

This chapter discusses the peripheral device options available on high-end (Challenge and Onyx) and desktop (Indigo, Indigo^2, and Indy) platforms. The controller and I/O requirements for the various options are reviewed, and specific SCSI interface considerations are discussed. A brief discussion about optimizing disk drive performance is included at the end of this chapter. This chapter also contains some specific configuration instructions and warnings.

The SCSI devices discussed in this guide include devices such as disk drives, tape drives, floptical drives, and the CD-ROM drive. Storage devices released to manufacturing after this guide was published are not listed.

The term Onyx generically refers to a graphics model, while Challenge denotes a server model. Unless there is a specific reason for differentiation, the information applies to POWER Onyx and POWER Challenge systems. The graphics and server machines use the same basic chassis but completely different backplanes. There is a rackmount and a deskside chassis and these terms are used in the manual to differentiate the product device configurations. The Indigo, Indigo^2, and Indy products are referred to generically as desktop systems unless there is reason to differentiate them.

1.1 Overview of Device-Mounting Options

The figures shown in this manual are intended to help resolve drive configuration questions that may arise in the field when installing the listed peripherals.

Several basic peripheral containment formats are used on Challenge and Onyx platforms:

- Internal front-loading devices (FLDs) can be mounted in the single seven-bay drive rack provided in the deskside units, or the two eight-bay stubby SCSIBox 2s available in the rackmount units.
- The CHALLENGE Vault rack SCSI expansion rack holds a maximum of seven or twelve (depending on the model) eight-bay SCSIBoxes for rackmount external peripherals. You may also attach deskside systems to the drives in a vault rack. All SCSI connections to the CHALLENGE Vault rack must be differential SCSI lines.
- A six-disk SCSI expansion box (CHALLENGEvault M) is available with deskside and desktop systems only. For installation information, see the *CHALLENGEvault M Owner's Guide* (P/N 007-2155-00x). Disks mounted in the vault M do not use the Challenge and Onyx system drive sled hardware for mounting drives.

- An eight-device SCSI expansion box (CHALLENGE Vault L) is available for use with specific Silicon Graphics systems. Devices installed in the Vault L use the same drive sled hardware for mounting drives as that used in deskside and rackmount systems. See the *CHALLENGE Vault L Installation Instructions* (P / N 108-0124-00x) for detailed information on this product.
- External single-ended devices, such as the desktop 8-mm SCSI Jukebox, connect to a dedicated, external, single-ended SCSI connector on the system I / O panel.

Note: You should order peripherals and peripheral spares according to their expected installation location and part number for the specific system. Mounting hardware is required for all installations except external standalone SCSI devices. Never install a Toshiba 5301 CD-ROM drive in a rackmount system, Vault Rack, or Vault L. The drive's retention system will not hold the CD in place.

Desktop products such as Indy, Indigo^2, and Indigo can use both internal and external drives. Note that with the exception of Challenge S (a server variant of the Indy product) none of the desktop models uses differential SCSI devices. The desktop models hold internally mounted drives in the following number and size:

- Indigo^2 has one half-height 5.25-inch and two half-height 3.5-inch drive bays
- Indigo has three half-height 3.5-inch drive bays
- Indy has two inch-high 3.5-inch drive bays

1.2 Differential and Single-Ended SCSI Cable Lengths

The main purpose in using differential SCSI controllers is to improve the signal integrity of SCSI signals so they can be transmitted farther and faster than is possible with single-ended connections.

The maximum single-ended SCSI cable length is 19.6 feet (6 meters) from the SCSI controller board to the end of the SCSI bus. The recommended length is 9.8 feet (3 meters) when the bus is transferring in fast mode (10 M transfers per second). This means an external SCSI bus must be set for slow operation (5 M transfers per second). A single-ended SCSI bus should always be as short as possible, with as few connections as possible.

Length issues also have a significant impact on the success of a SCSI drive implementation. The first issue is the maximum allowable cable length. Additional key issues regarding SCSI implementation are listed below.

- Differential signals can be reliably driven greater distances than single-ended signals. The cable lengths required to connect two rackmount chassis exceed the length allowed for the single-ended SCSI interface.
- The reliable cable length for differential cables using a VME SCSI differential controller permits running SCSI signals up to 81 feet (25 meters).

Pay special attention to cable lengths, particularly when external devices are used with a single-ended SCSI bus.

Note: Usually, SCSI devices fail because of insufficient noise margins due to exceeding the maximum cable length, cable impedance mismatches, improper cable termination, or a combination of these. If you are having trouble with certain devices, particularly external devices, verify that you have not exceeded the maximum SCSI cable length. See Chapter 2 for additional important SCSI guidelines before you begin an installation.

Another consideration for SCSI devices is the connection method. You cannot use a T-connector on a SCSI bus. However, devices can be daisy-chained together as long as the total cable length from the I/O board to the last device on a single-ended bus does not exceed 19.6 feet (6 meters). In addition, the physical end of the bus must be properly terminated.

Note: Terminators are not required on internally mounted drives and must not be installed on any front-loading or internally mounted SCSI devices. The termination is handled on the SCSI drive backplane. The only exceptions are the (external) stand-alone data and backup devices that connect to an external SCSI bus. External devices are terminated with an externally mounted SCSI port terminator module on the rear of the drive; internal terminators are not used.

1.3 Optimizing Disk Drive Performance

The storage area on a disk drive is usually divided into partitions. Several partitions (usually on different disks) can be built up into one logical disk drive using logical volumes. A logical volume can include partitions from several physical disk drives and thus can be larger than any one of your physical disks. Logical volumes allow you to

- use larger filesystems
- grow existing filesystems
- improve performance using multiple disk drives

Logical volumes are created by either spanning or striping multiple disks. Spanning joins partitions end to end. It steps between partitions on multiple physical drives, and is the default for creating logical volumes. Storage covers multiple partitions of varying sizes, joined one after another. The resulting performance is the same as the component disk devices. Striping is more difficult to set up but can result in a significant performance gain on very large files. Disk performance can be increased by as much as three times using striping with like devices.

Consider the following guidelines before implementing logical volumes and disk striping:

- Carefully determine your strategy for backups before implementing disk striping. At times, it is easier to back up smaller filesystems.
- You can stripe different manufacturers' drives, but the performance improvement is relative to the slowest transfer speed of all drives used.
- You can have two partitions of similar or identical capacities with varying geometries.
- You can stripe across various disk interfaces; however, the resulting performance gain is difficult to characterize.

- For best performance, drives in a stripe group should be on separate controller ports or buses. SCSI devices can be striped if they are on the same channel, especially if you are optimizing a system for load averaging; however, the performance gains are greater if separate channels are used.
- Striping improves performance only if the drive or controller is not already being heavily used.
- In a four-way logical volume using an IO4 with two devices per channel, make sure that the devices are specified so that access to the two channels is interleaved (such as disk 1 channel 0, disk 1 channel 1, disk 2 channel 0, disk 2 channel 1).

Note: This type of application may not be advisable in a SCSI bus environment where channel 0 is single-ended and channel 1 is differential.

Caution: If a problem occurs on any disk in a logical volume, all of the data in the logical volume may be lost.

Chapter 2

Deskside and Rackmount Drive Information

This chapter includes the specific jumpering information for Challenge and Onyx peripherals. You must set the appropriate device addresses on each device in your system, before installing the peripheral in the system.

Caution: SGI qualifies devices and their controllers using specific hardware and software releases for each component. SGI often requests specific software or hardware changes or enhancements to permit the device to operate correctly in the hardware and software environment. The peripherals listed in this chapter should not be considered a referral list for third-party device purchases.

2.1 Drive Addressing

Certain drives, listed in Table 2-1, have default address numbering. If you are installing two devices with the same default address, you must physically change the address of one of the devices.

Note: In most cases, “high-end” drives are installed on sleds. The SCSI ID is selected by push button, and jumper selection of the ID is not needed.

Disk drives are usually numbered up from 1, and tape and CD-ROM drives are usually numbered down from 7.

Table 2-1 Default Drive Addresses

Drive Type	Default Address
Digital Linear Tape (DLT) drive	6
QIC-150 and 1 GB SCSI tape drive	7
8-mm tape and 4-mm DAT drives	5
SCSI system hard disk	1
CD-ROM drive	4

Note: When resolving device addressing conflicts, number the disk drives up from 1, and the tape and CD-ROM drives down from 7.

2.2 Deskside and Rackmount Disk Drives

Newer disk drives, organized by capacity, are shown on the following pages. Information is included about the following drives in Figure 2-1 through Figure 2-12. The standard hard system disks shipped with Challenge and Onyx rackmount and deskside systems are the Quantum 2.15 and 4.3 GB differential disks.

Note: All drives have the parity jumper set to “on.”

Drives in Challenge and Onyx systems always use delayed motor start; therefore, the DMS jumper must always be set to delay.

- Seagate ST4767N 655 MB SCSI Disk Drive
- Seagate ST4766N 655 MB SCSI Disk Drive
- Seagate ST41200N 1.05 GB SCSI Disk Drive
- IBM 0663 1.2 GB SCSI-2 Half-Height Disk Drive
- Seagate ST41650N 1.4 GB SCSI Disk Drive
- IBM 0664 2.1 GB Diff / SE SCSI-2 System Disk Drive
- IBM 0664 2.1 GB SCSI-2 Disk Configuration for CHALLENGEvault M
- IBM 0663 2.1 GB (2-up) Stacked SCSI-2 Disk Package
- IBM DFHS S2E and S4E 2.1 GB and 4.3 GB Differential SCSI-2 Disk Drives
- Quantum XP32150S 2.15 GB Inch-High Disk Drive
- Quantum XP34300S 4.3 GB Half-Height Disk Drive

Additional technical information on individual drives is available on the World Wide Web. At time of publication, the following sites listed OEM information:

- Seagate—http: / / www.seagate.com / techsuppt / drivespecs
- IBM—http: / / www.storage.ibm.com / storage / oem / menu1.htm
- Quantum—http: / / www.quantum.com / products / hcsg / hcsg2.html

For information on drives via fax, the following numbers were active 24 hours each day at time of publication:

Quantum—1-800-434-7532 (USA); 49-69-509-10891 (Europe); 65-452-2544 (Asia / Pacific)

Seagate—1-408-438-2620 (USA); 44-62-847-7080 (Europe)

IBM—1-415-855-4773 (USA) (Overseas callers must call this number from a fax machine.)

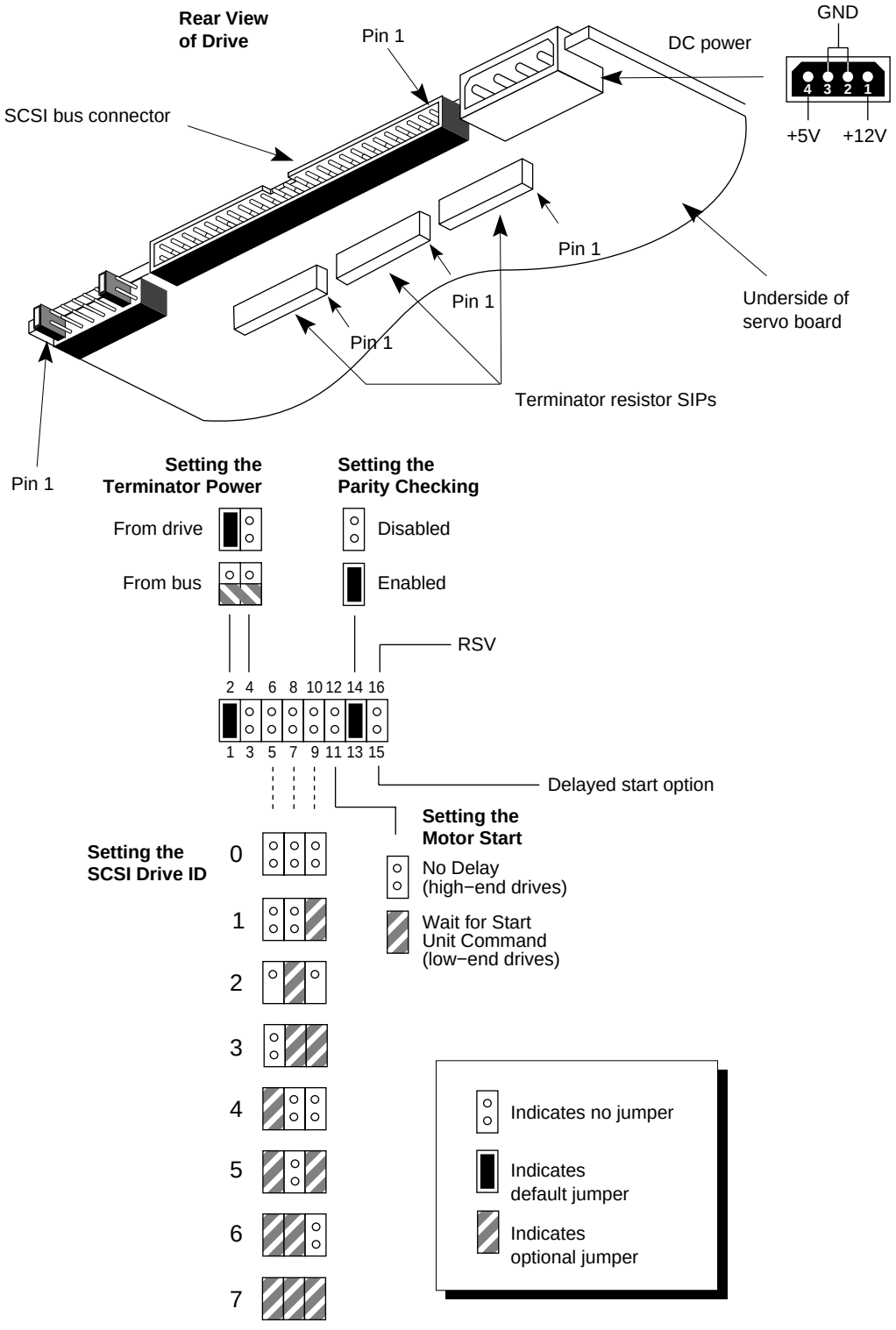


Figure 2-1 Seagate Model ST4767N (Wren Runner-2) 655 MB SCSI Disk Drive

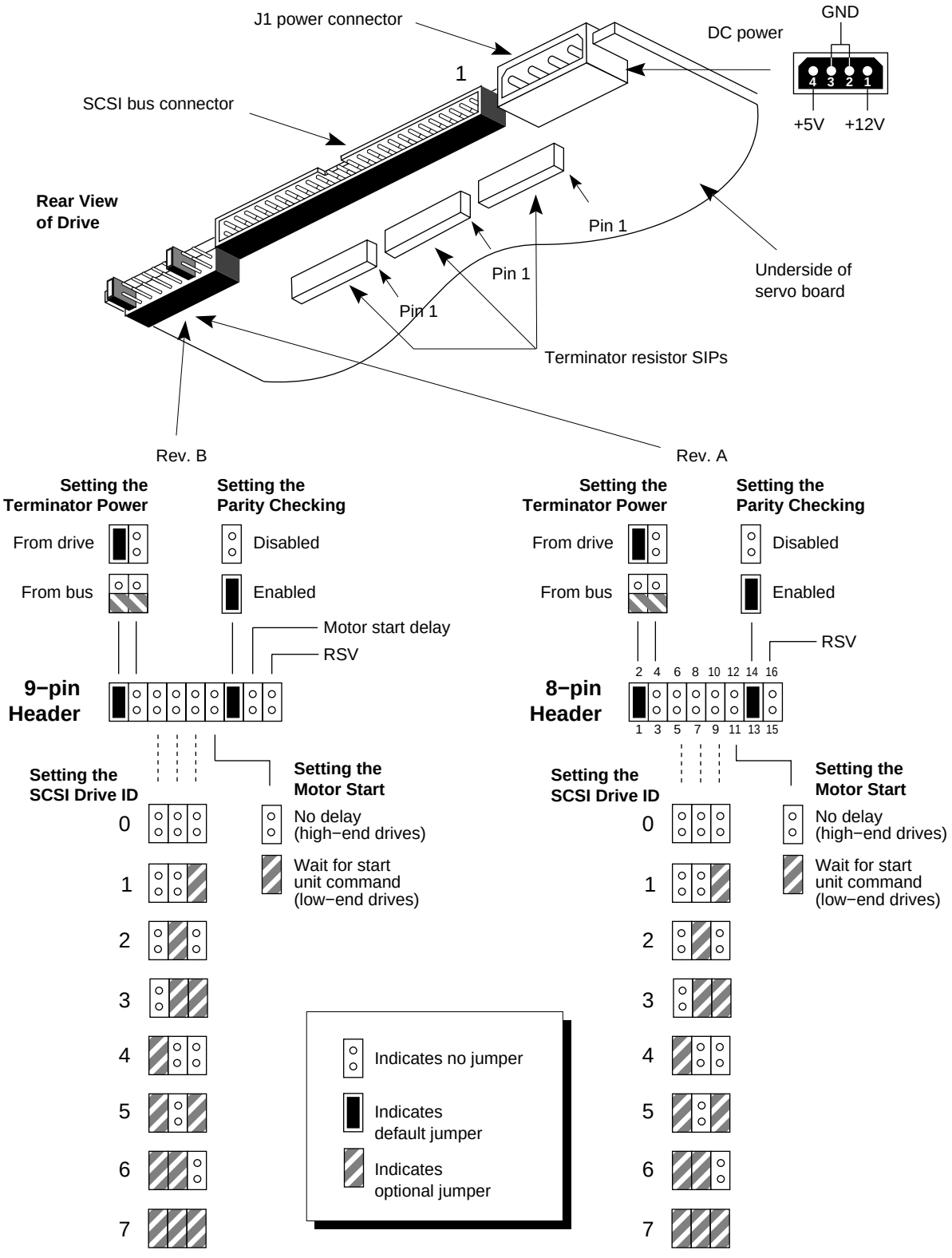


Figure 2-2 Seagate Model ST4766N (Wren 6) 655 MB SCSI Disk Drive

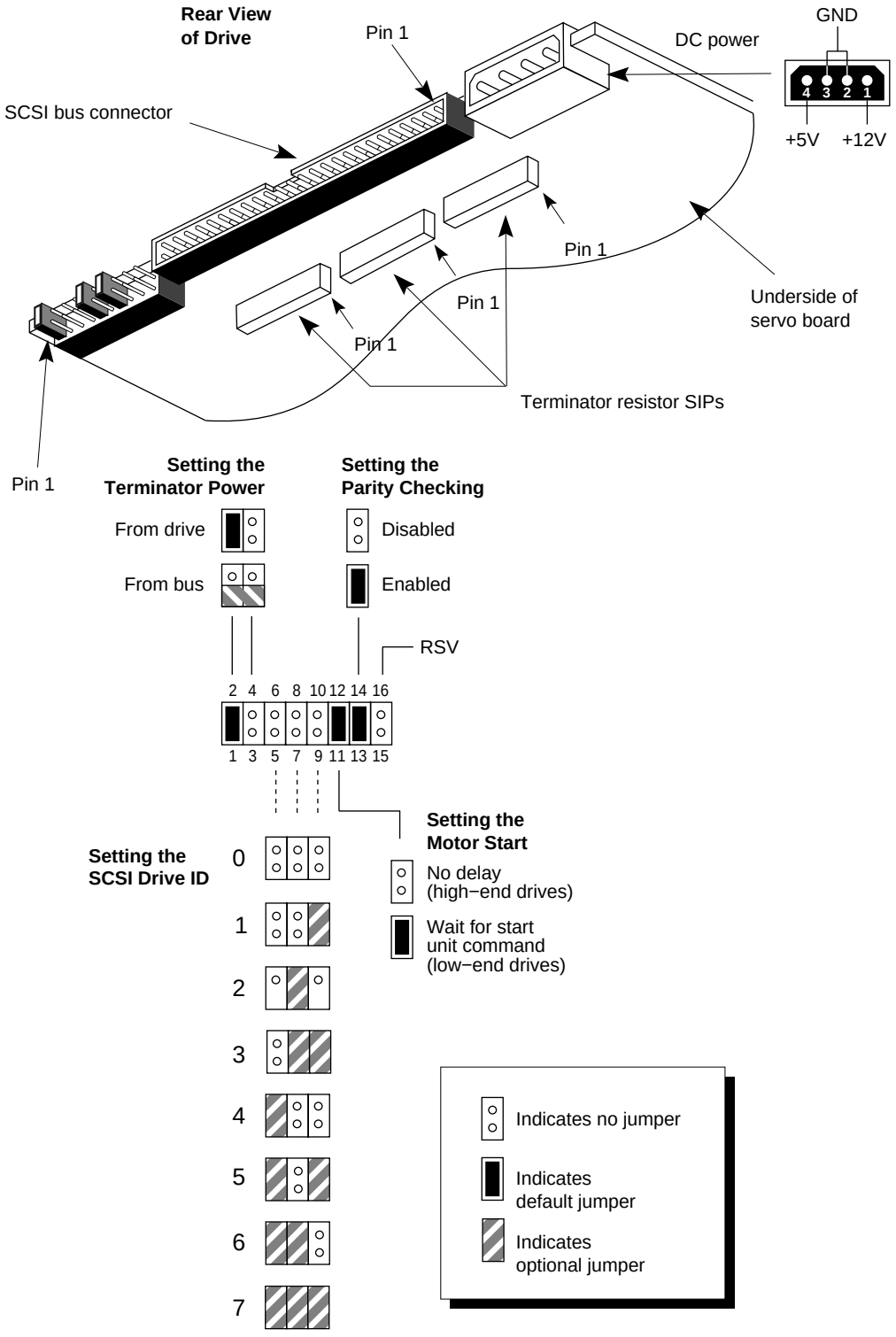


Figure 2-3 Seagate Model ST41200N (Wren 7) 1.05 GB SCSI Disk Drive

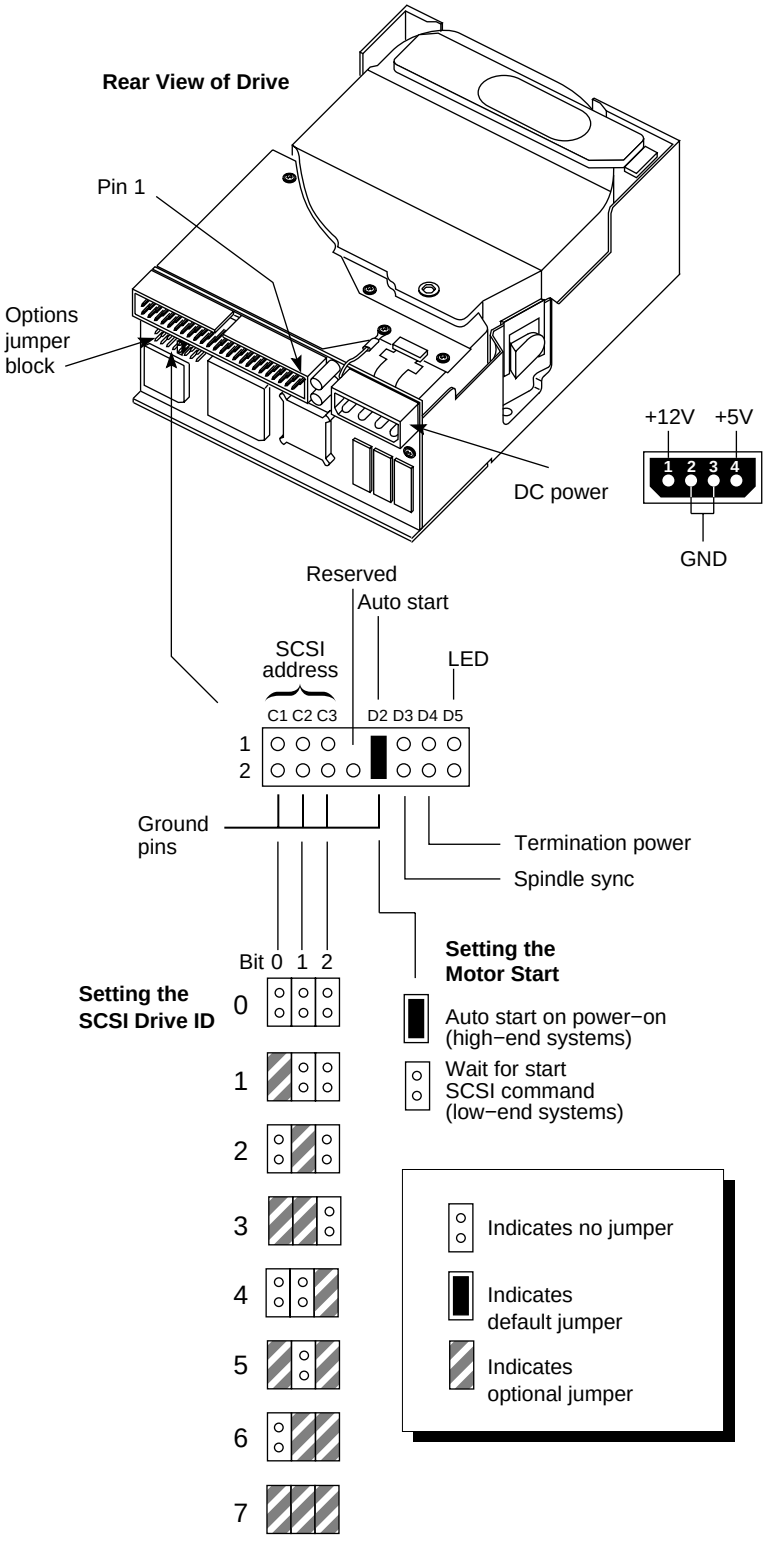


Figure 2-4 IBM 0663 (Corsair) 1.05 GB SCSI-2 Half-Height Disk Drive

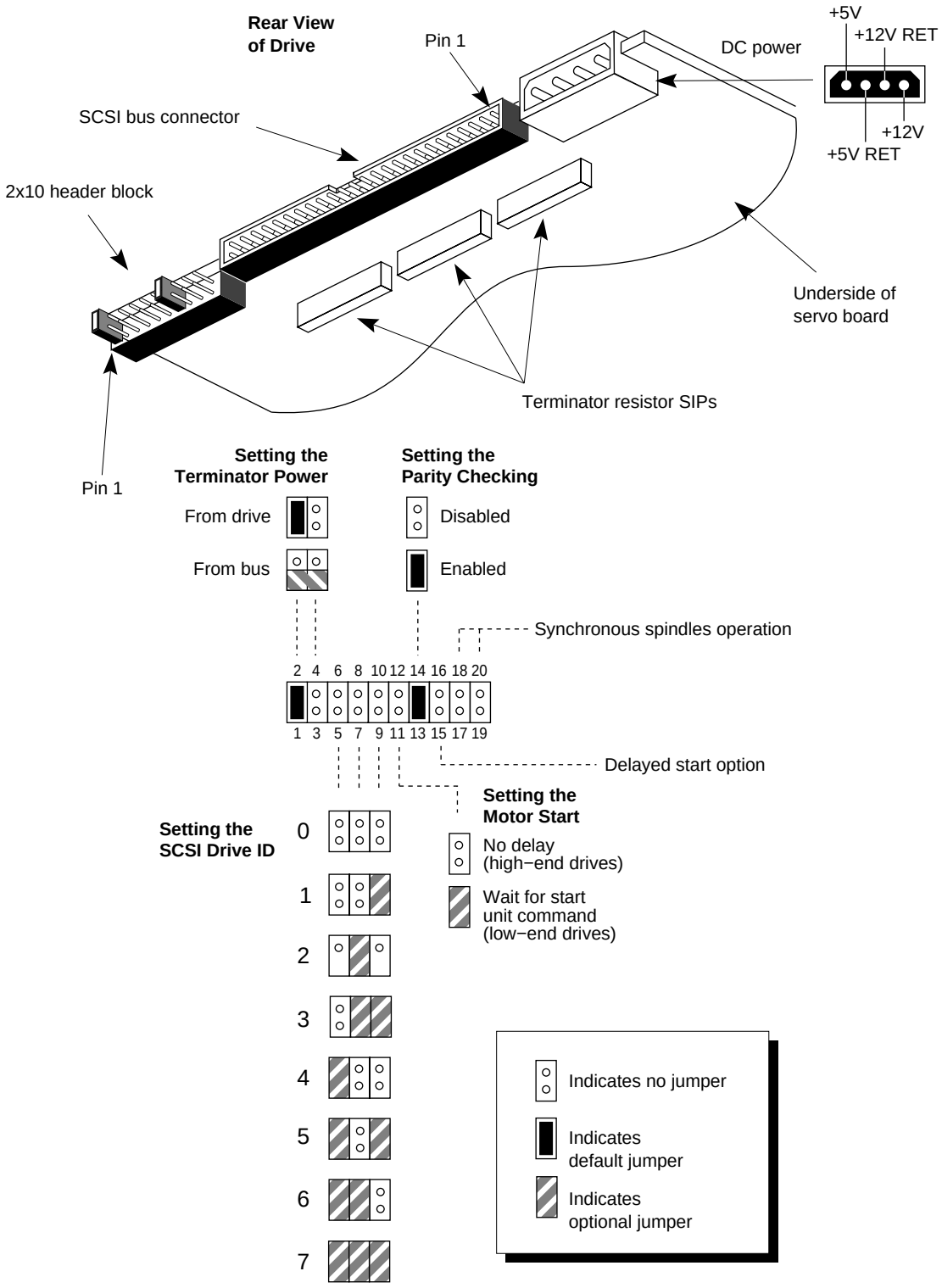
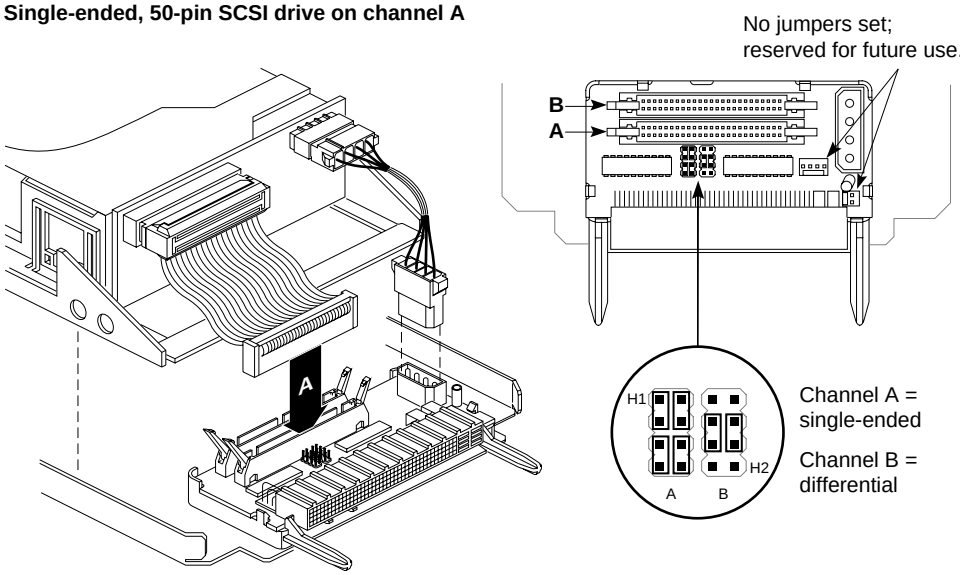


Figure 2-5 Seagate Model ST41650N (Wren 8 FH) 1.4 GB SCSI Disk Drive

Single-ended, 50-pin SCSI drive on channel A



Differential, 68-pin SCSI drive on channel B

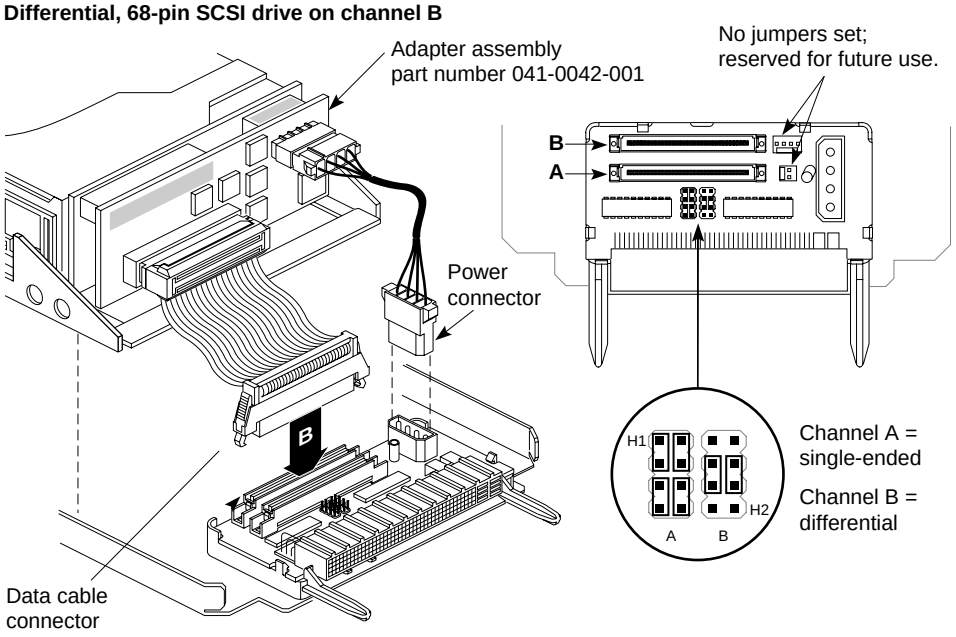


Figure 2-6 IBM 0664 2.1 GB SCSI-2 Differential Sled-Mounted Disk

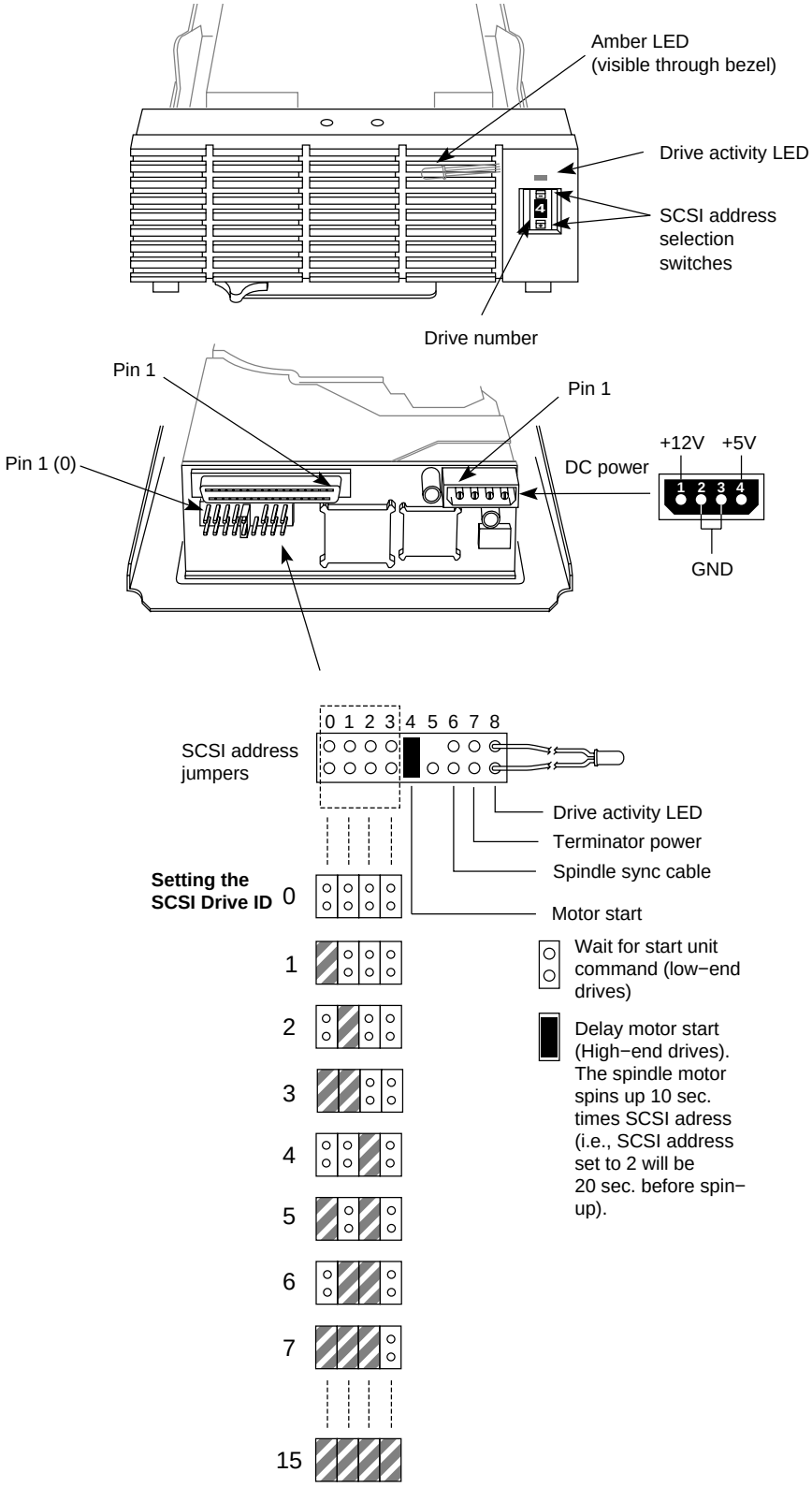


Figure 2-7 IBM 0664 2.1 GB SCSI-2 Single-Ended Disk (RAID)

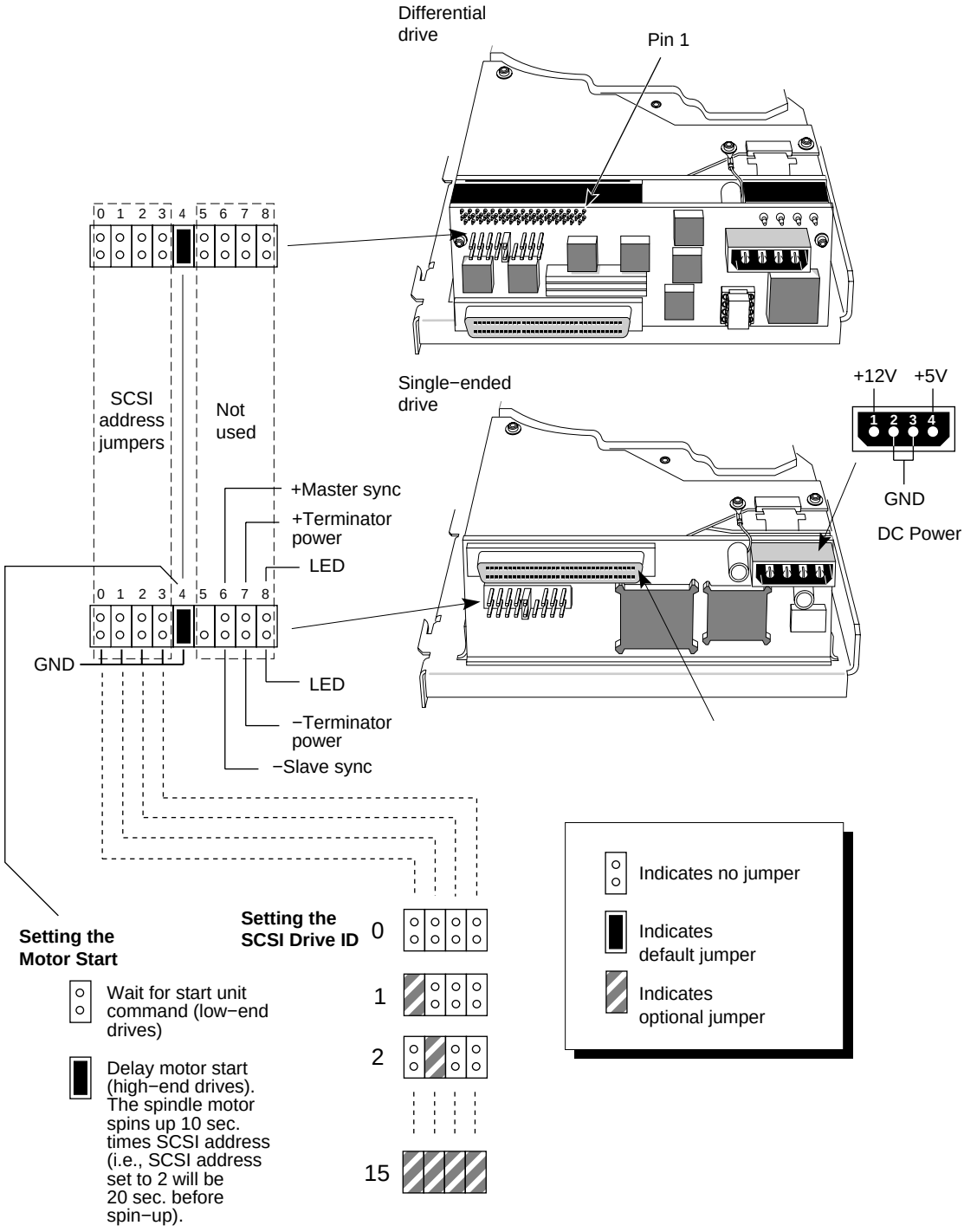


Figure 2-8 IBM 0664 2.1-GB SCSI-2 Disk Configuration for CHALLENGEvault M

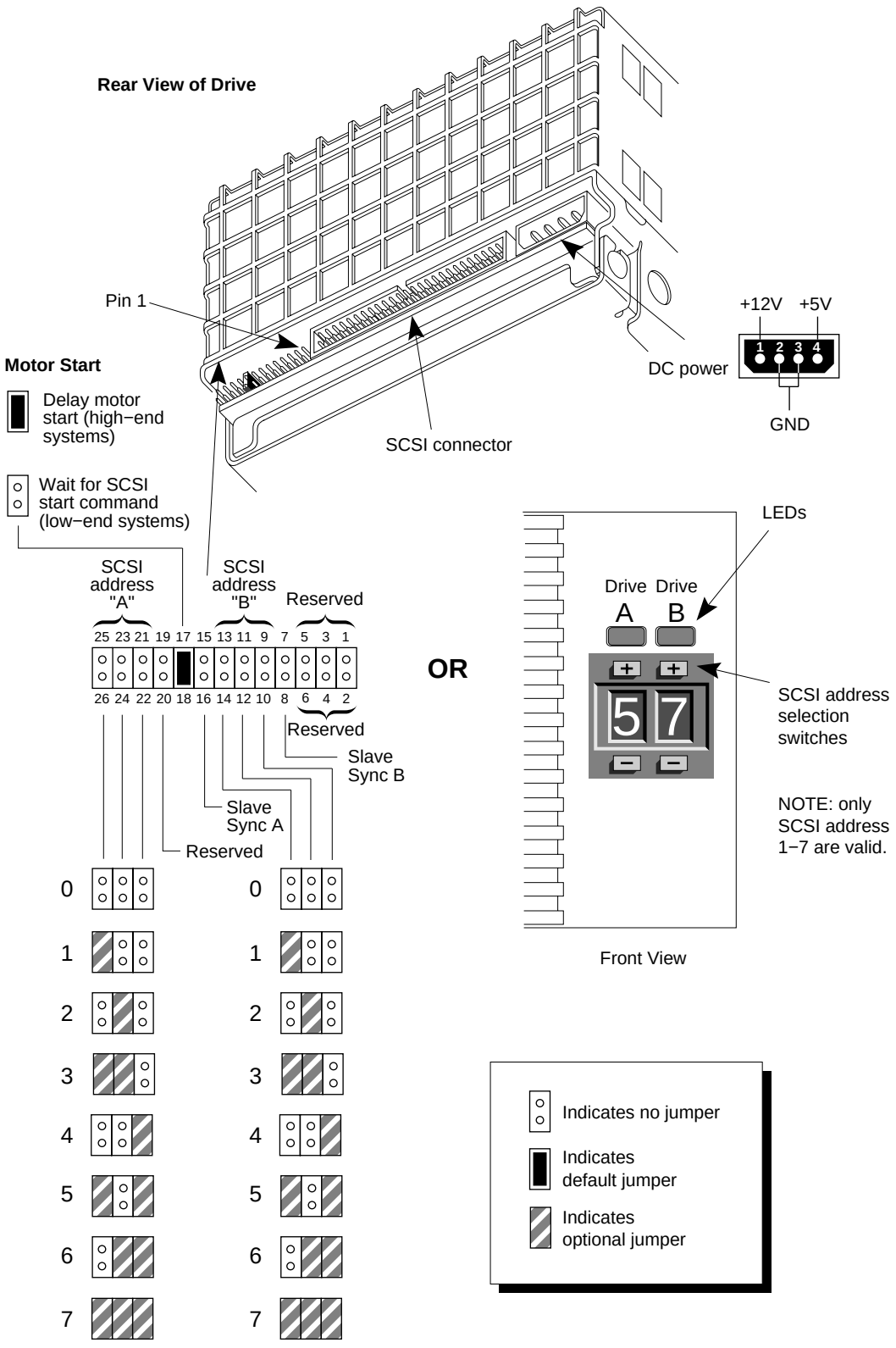


Figure 2-9 IBM 0663 2.1 GB (2-Up) Stacked SCSI-2 Disk Package

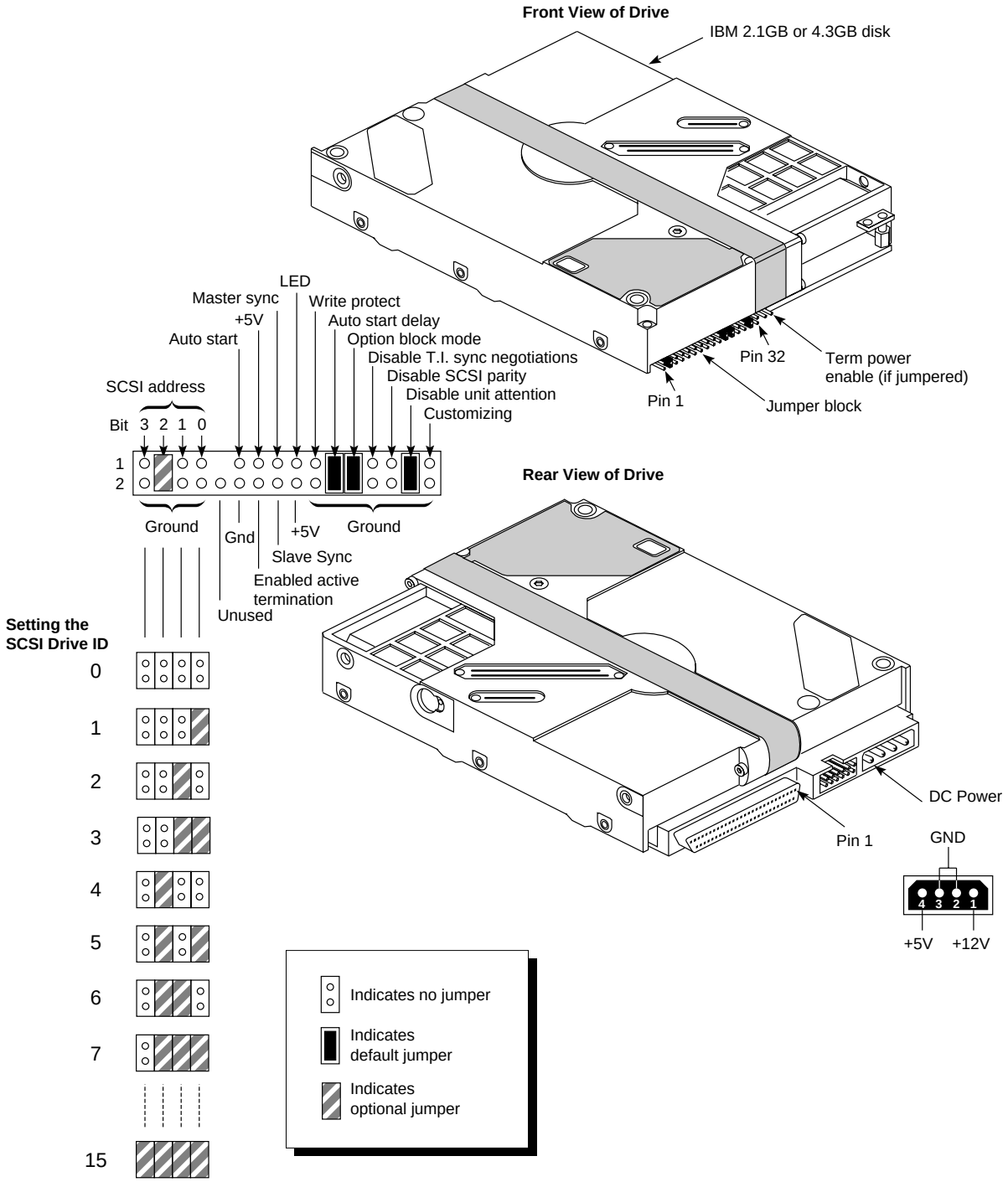


Figure 2-10 IBM DFHS Models S2E and S4E (Ultrastar) 2.1GB and 4.3GB Differential SCSI-2 Disk Drives

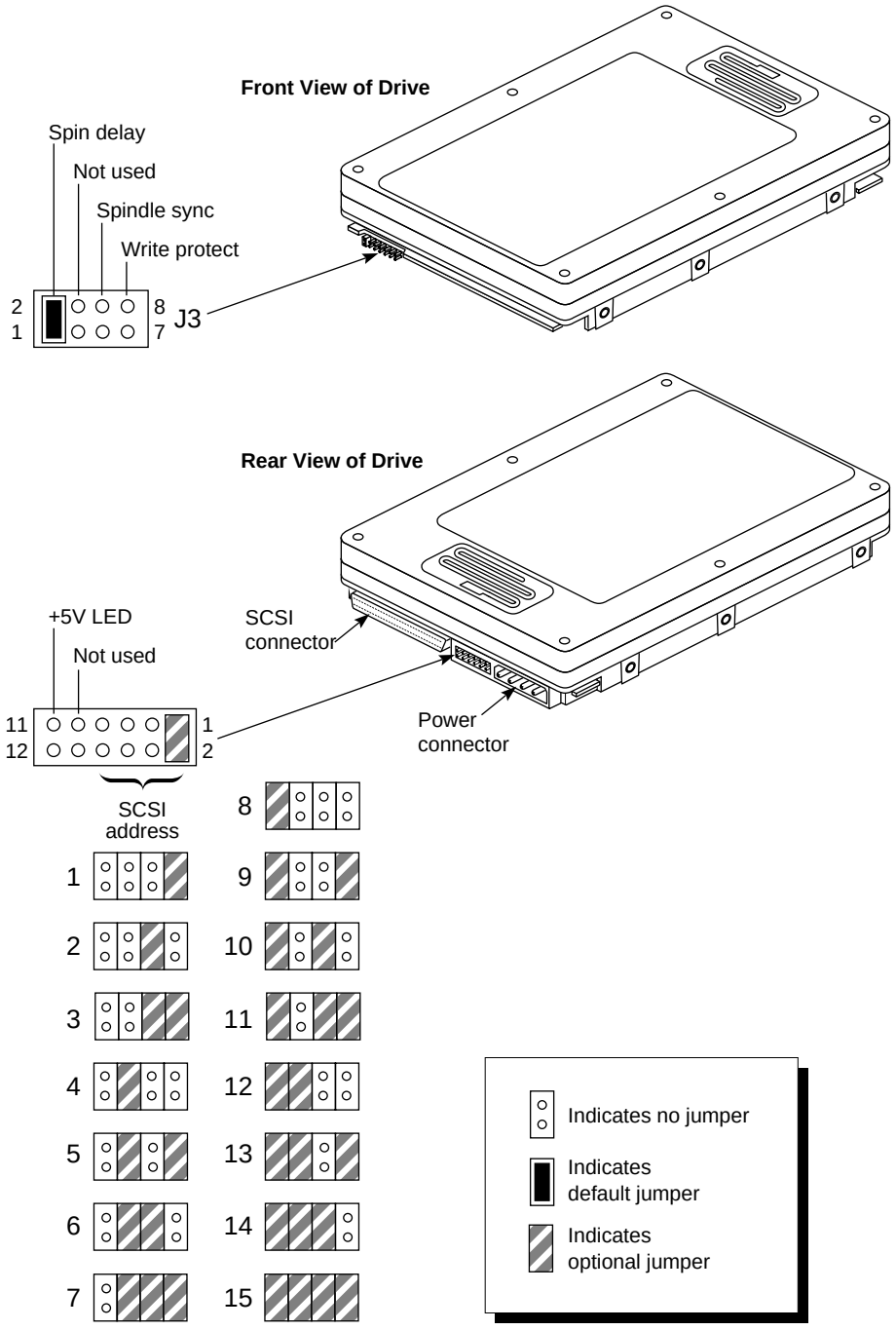


Figure 2-11 Quantum XP32150S 2.15GB Inch-High Disk Drive (68 Pin)

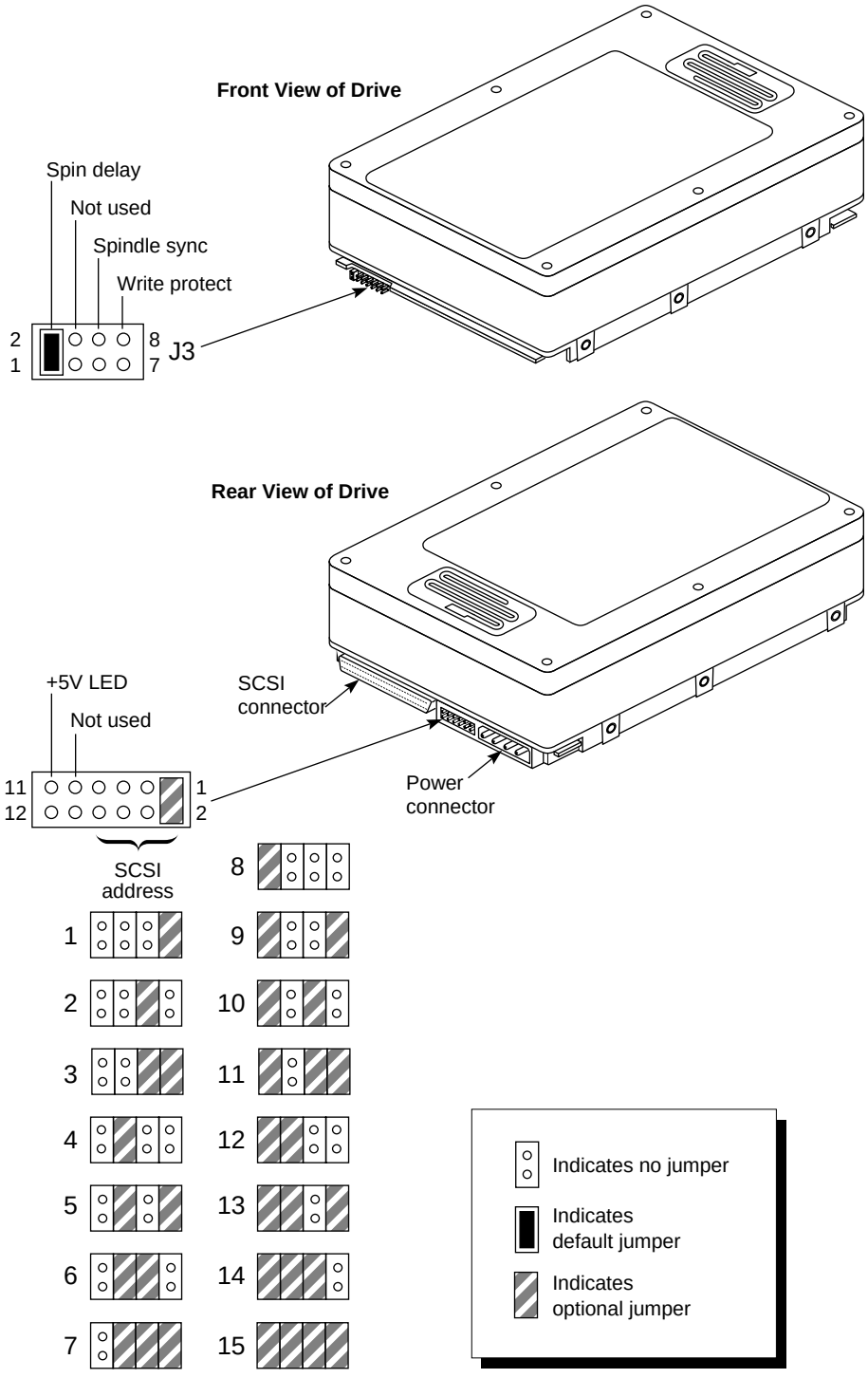


Figure 2-12 Quantum XP34300S 4.3GB Half-Height Disk Drive (68 Pin)

2.3 Removable Media Drives

Figure 2-13 through Figure 2-19 contain information about the following drives:

- 10-GB Digital Linear Tape Drive (DLT)
- Archive 150MB SCSI Tape Drive
- Archive Python 4-mm SCSI DAT Drive
- Exabyte EXB-8505 8-mm SCSI Tape Drive
- Exabyte EXB-8500 8-mm SCSI Tape Drive
- Exabyte EXB-8200 8-mm SCSI Tape Drive
- Toshiba CD-ROM SCSI Drive

Note: Proper jumpering for the CTD8000 (DDS-2) 4-mm internal SCSI DAT drive is illustrated in Figure 3-19 in the next chapter.

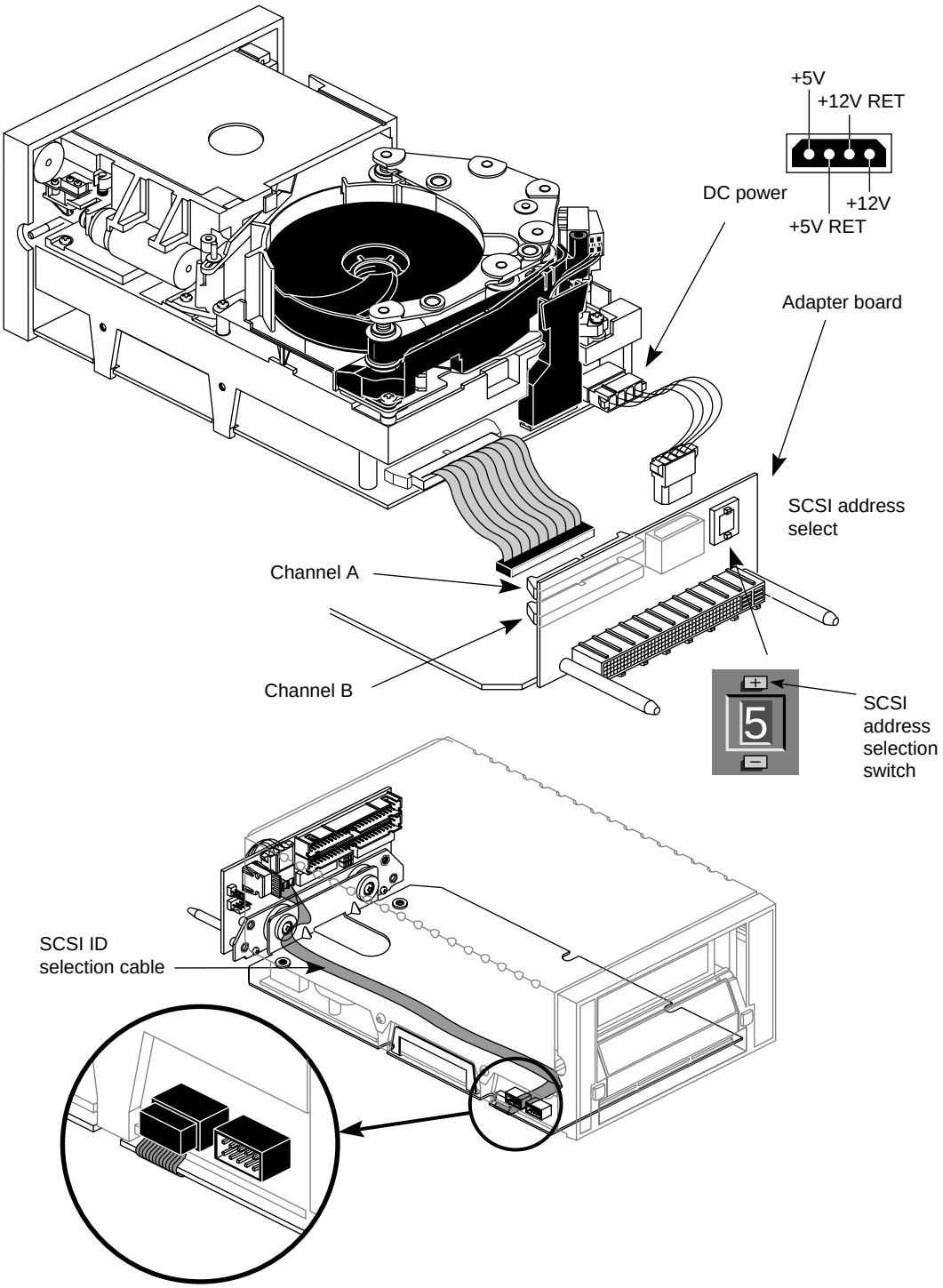


Figure 2-13 10GB Sled-Mounted Digital Linear Tape Drive

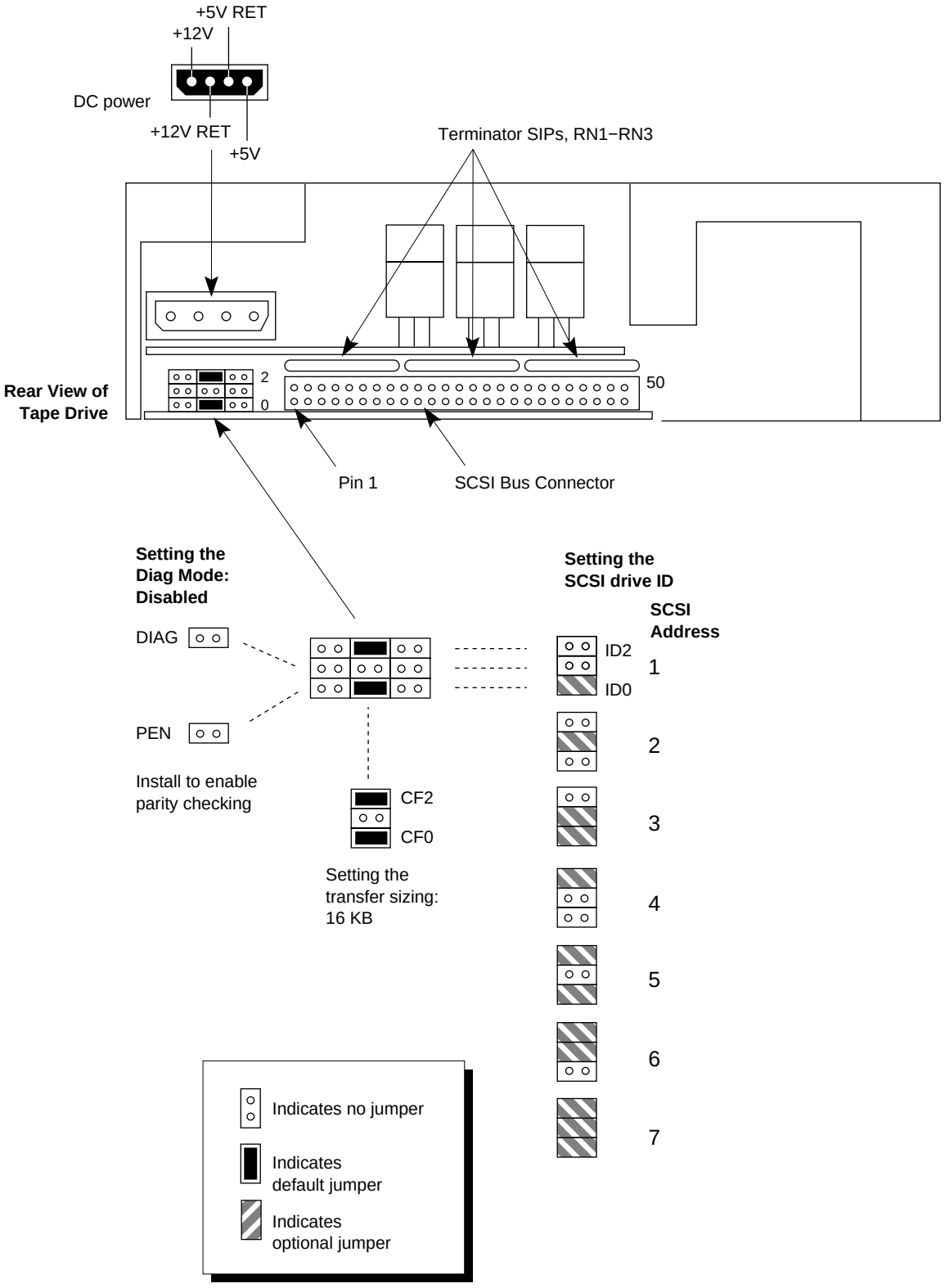
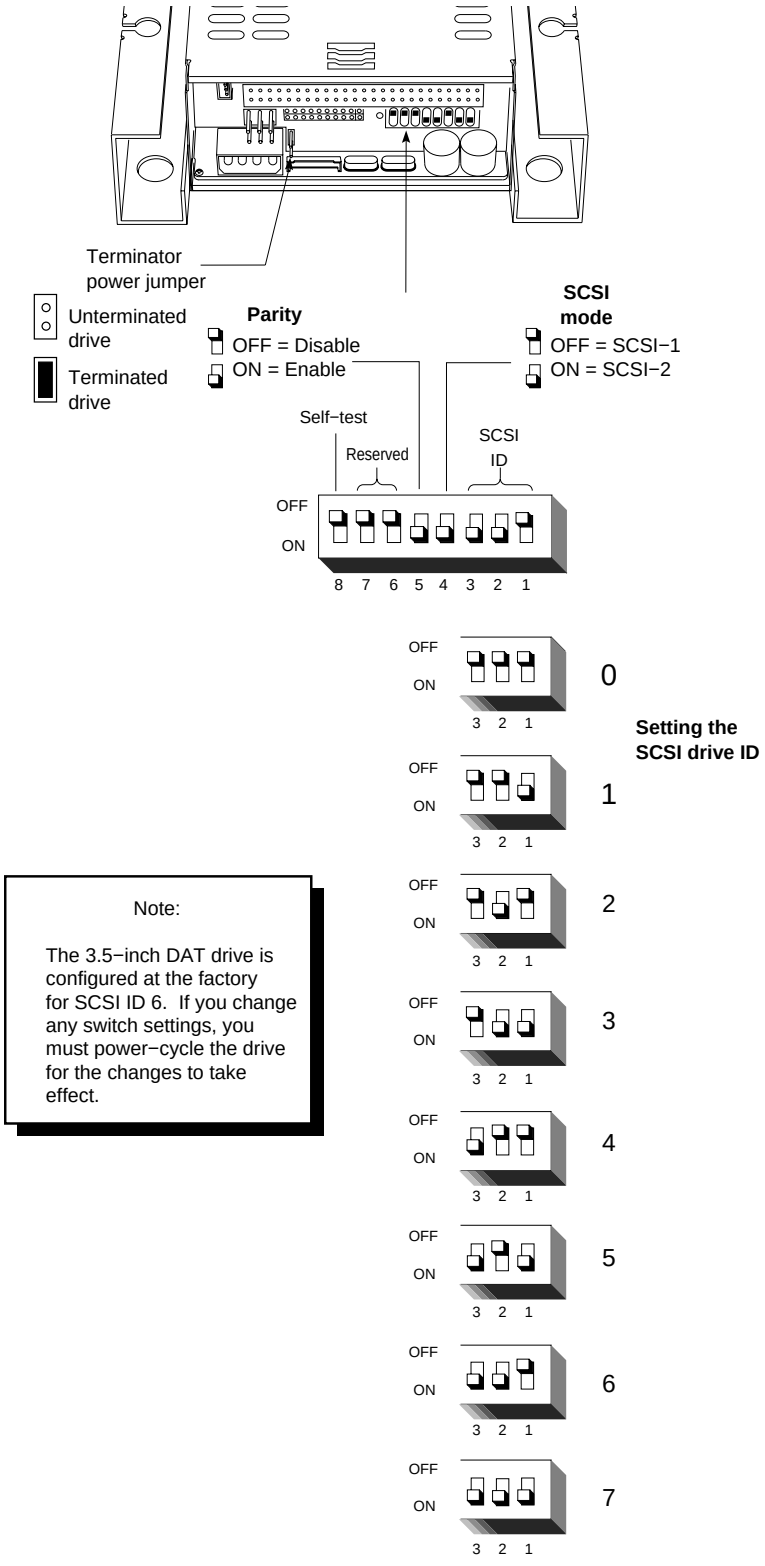


Figure 2-14 Archive (Viper) 150MB SCSI Tape Drive



Note:

The 3.5−inch DAT drive is configured at the factory for SCSI ID 6. If you change any switch settings, you must power−cycle the drive for the changes to take effect.

Figure 2-15 Archive (Python) 4-mm SCSI DAT Drive

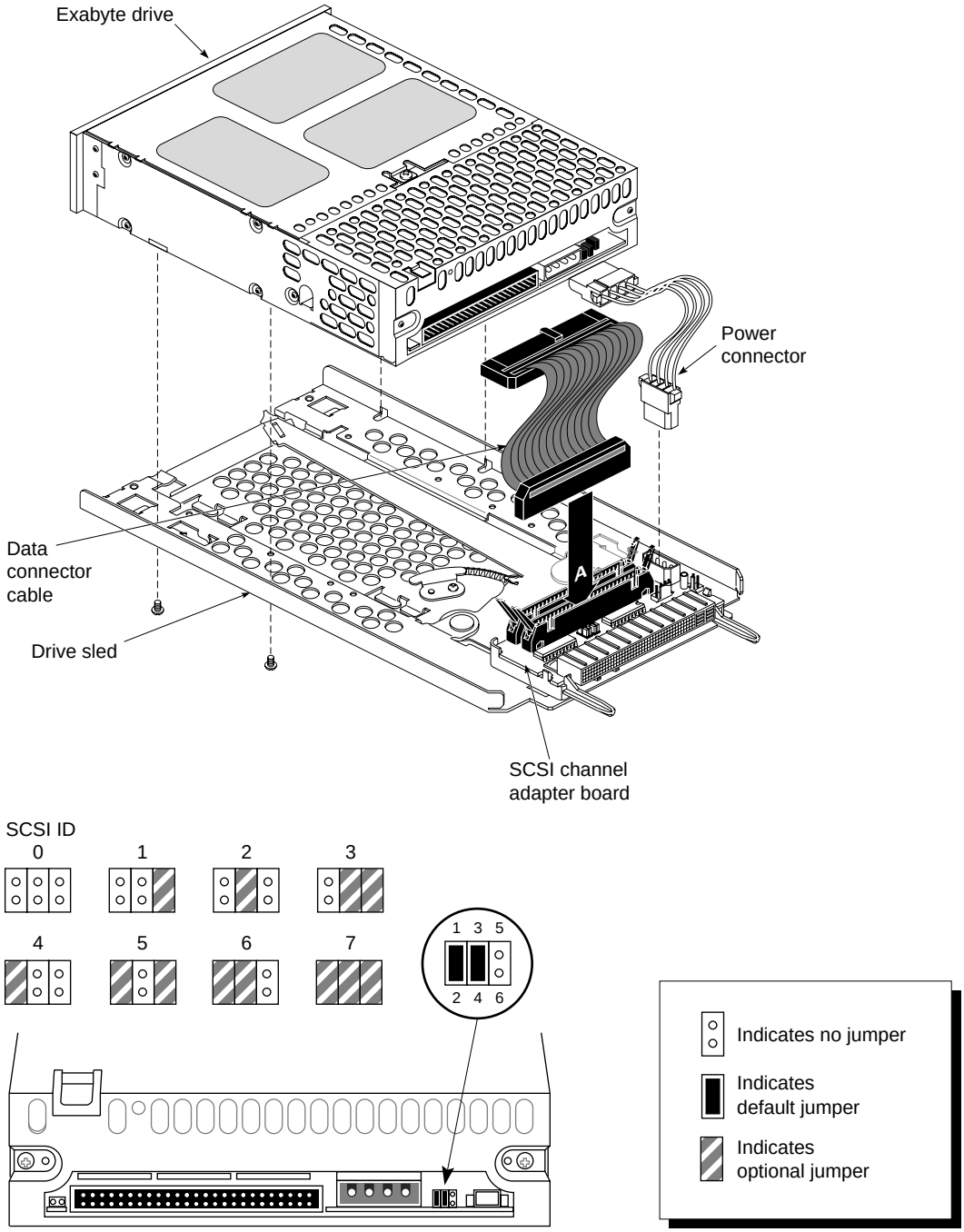


Figure 2-16 Exabyte EXB-8505 8-mm SCSI Tape Drive

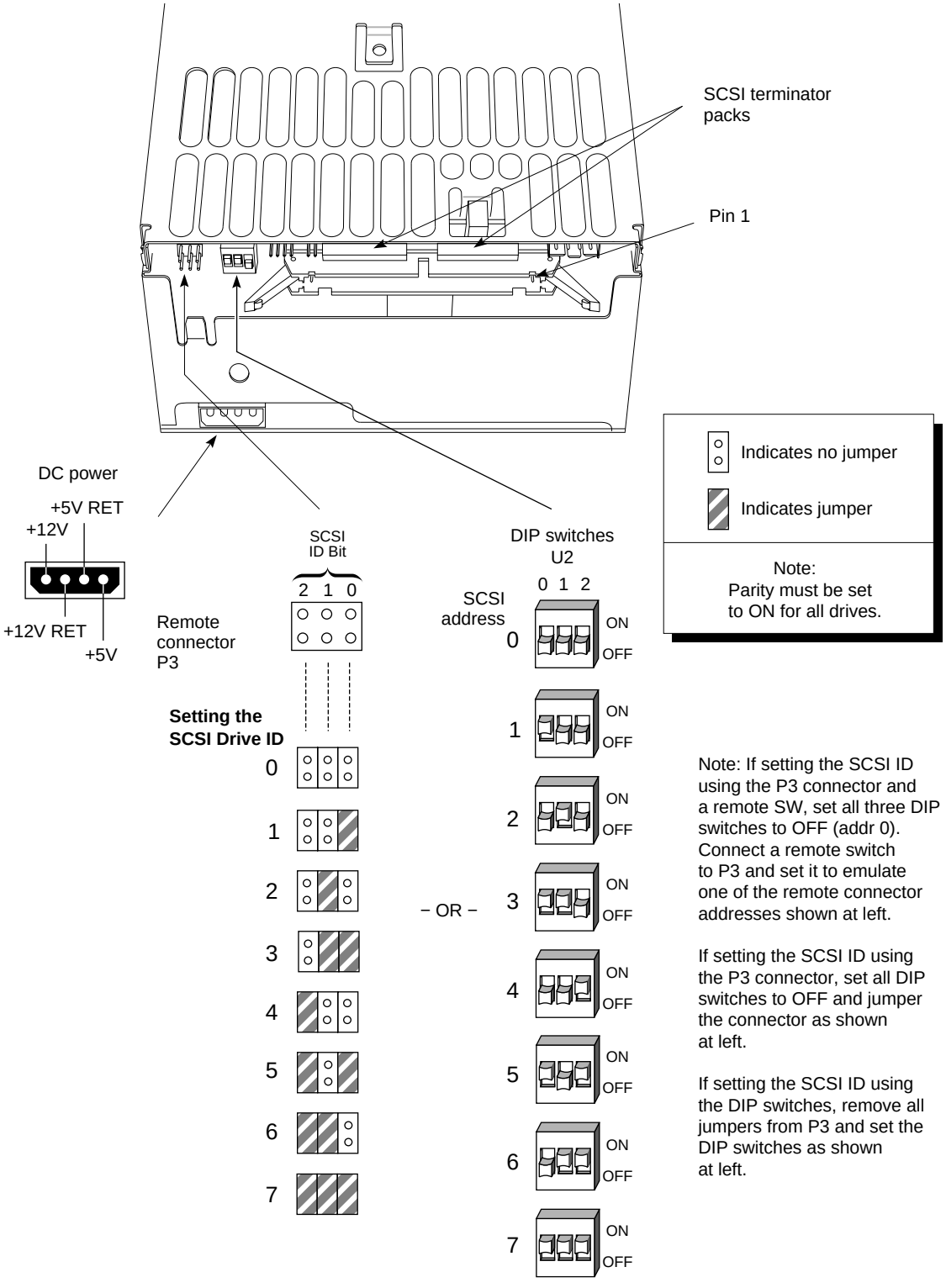


Figure 2-17 Exabyte Model EXB-8500 8-mm SCSI Tape Drive

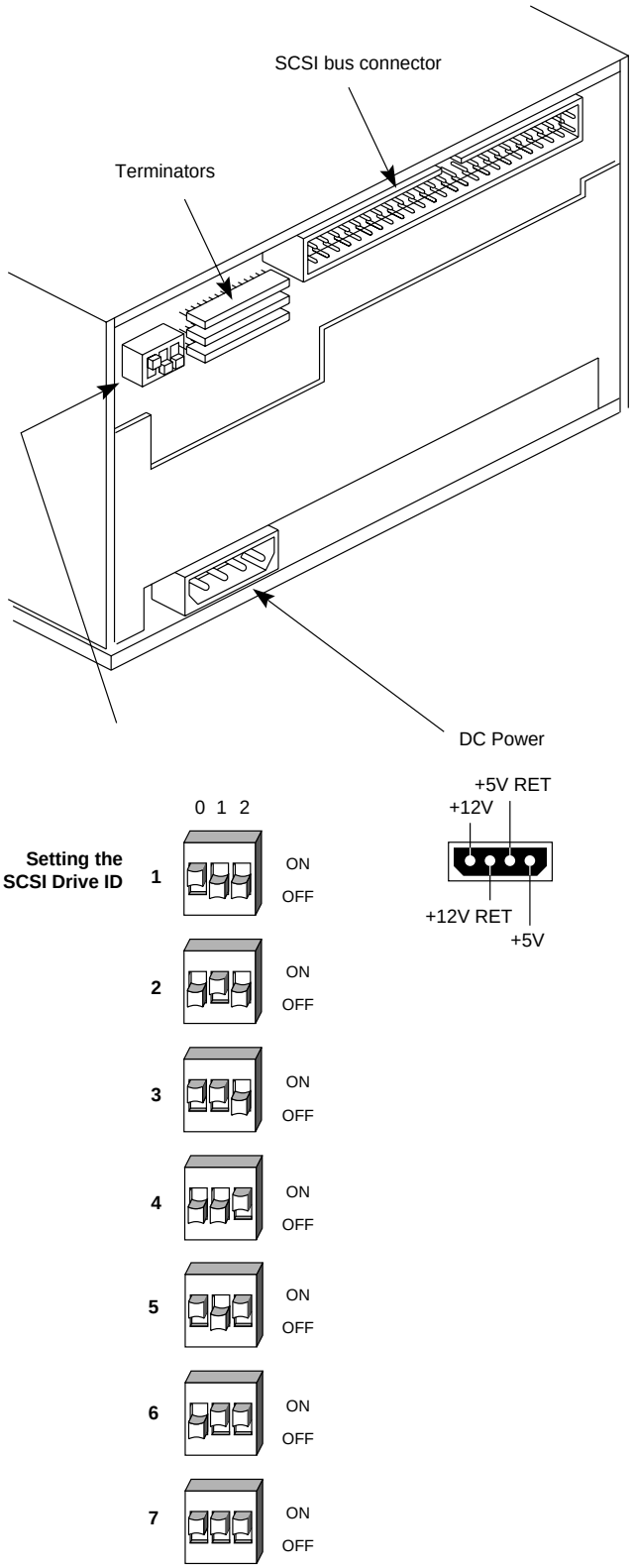


Figure 2-18 Exabyte Model EXB-8200 8-mm SCSI Tape Drive

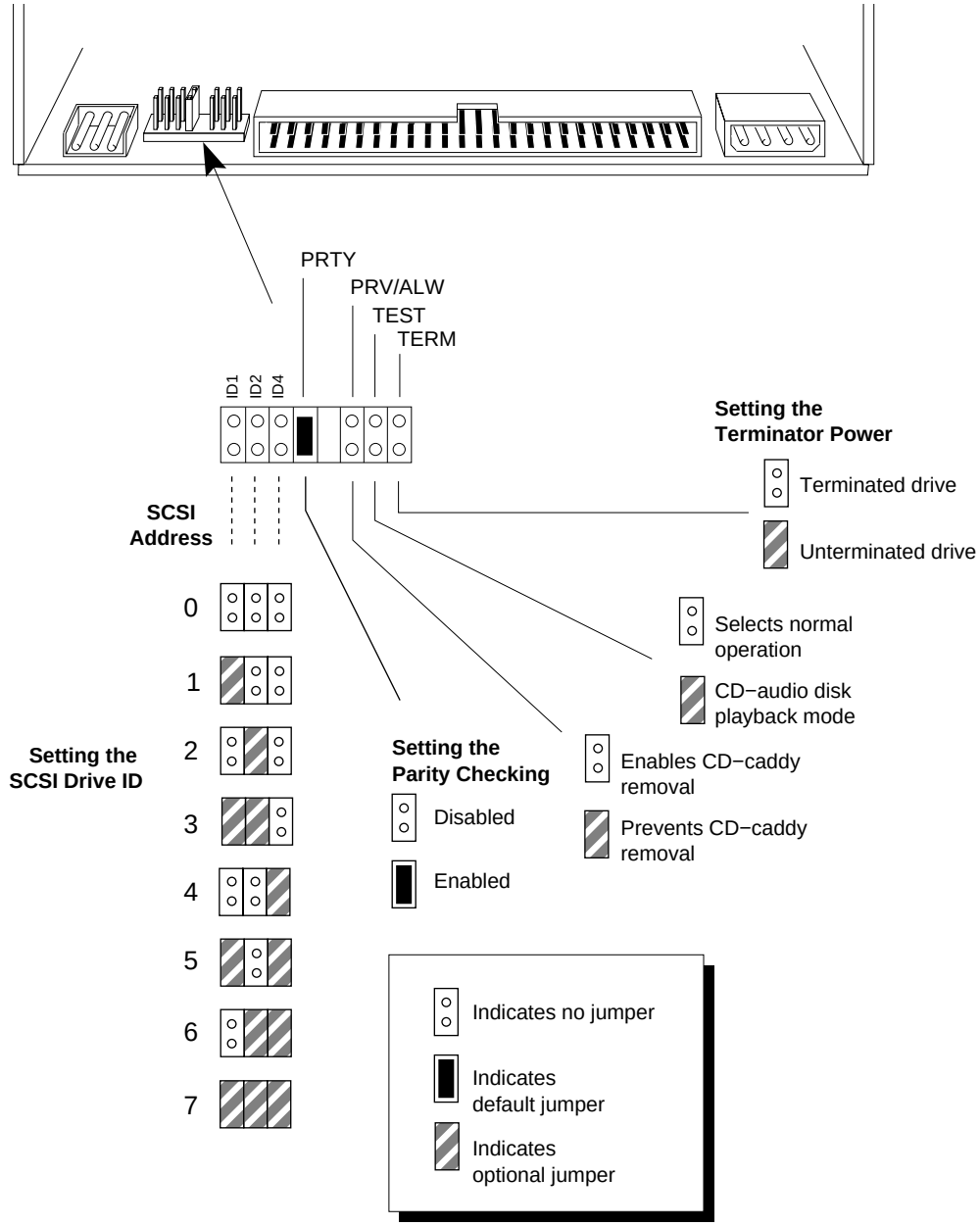


Figure 2-19 Toshiba CD-ROM SCSI Drive

Chapter 3

Desktop Drive Information

This chapter includes the specific jumpering information for desktop peripherals. You must set the appropriate device addresses on each device in your system, before installing the peripheral in the system.

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3.1 Drive Addressing

Certain drives, listed in Table 3-1, have default address numbering. If you are installing two devices with the same default address, you must physically change the address of one of the devices. Disk drives are usually numbered up from 1, and tape and CD-ROM drives are usually numbered down from 7.

Table 3-1 Default Drive Addresses

Drive Type	Default Address
Digital Linear Tape (DLT) drive	6
QIC-150 and 1GB SCSI tape drive	7
8-mm tape and 4-mm DAT drives	5
SCSI System hard disk	1
CD-ROM drive	4

Note: When resolving device addressing conflicts, number the disk drives up from 1, and the tape and CD-ROM drives down from 7.

3.2 Indy, Indigo, and Indigo^2 Disk Drives

Desktop disk drives are shown on the following pages. Figure 3-1 through Figure 3-12 contain information about the drives listed below.

Note: All drives have parity enabled.

Drives in desktop systems always use a motor start software command; therefore, the enable motor start jumper is always installed in internal devices.

Jumper and other configuration information is provided for the following drives used in desktop systems:

- Seagate ST3610N Inch-High 540 MB SCSI Disk
- IBM DSAS-3540 Inch-High 548 MB SCSI Disk
- Seagate ST31200N Inch-High 1.0 GB SCSI Disk
- Seagate ST31230N Inch-High 1.0 GB SCSI Disk
- IBM 0662 Inch-High 1.0 GB SCSI Disk
- IBM 0663 Half-Height 1.2 GB SCSI Disk
- Seagate ST12550N Half-Height 2.0 GB SCSI Disk
- Quantum XP32150 Inch-High 2.2 GB SCSI Disk
- Quantum XP34300 Half-Height 4.5 GB SCSI Disk
- Seagate (ST51080N) 19 mm-High 1.0 GB SCSI Disk
- IBM DFHS (Ultrastar XP) Inch-High 1.1 or 2.2 GB Disk
- IBM DFHS (Ultrastar XP) Half-Height 4.5 GB Disk

Additional technical information on individual drives is available on the World Wide Web. At time of publication, the following sites were listing OEM information:

- Seagate—http://www.seagate.com/techsuppt/drivespecs
- IBM—http://www.storage.ibm.com/storage/oem/menu1.htm
- Quantum—http://www.quantum.com/products/hcsg/hcsg2.html

For information on drives via fax, the following numbers were active 24 hours each day at time of publication:

Quantum—1-800-434-7532 (USA); 49-69-509-10891 (Europe); 65-452-2544 (Asia/Pacific)

Seagate—1-408-438-2620 (USA); 44-62-847-7080 (Europe)

IBM—1-415-855-4773 (USA) (Overseas callers must call this number from a fax machine.)

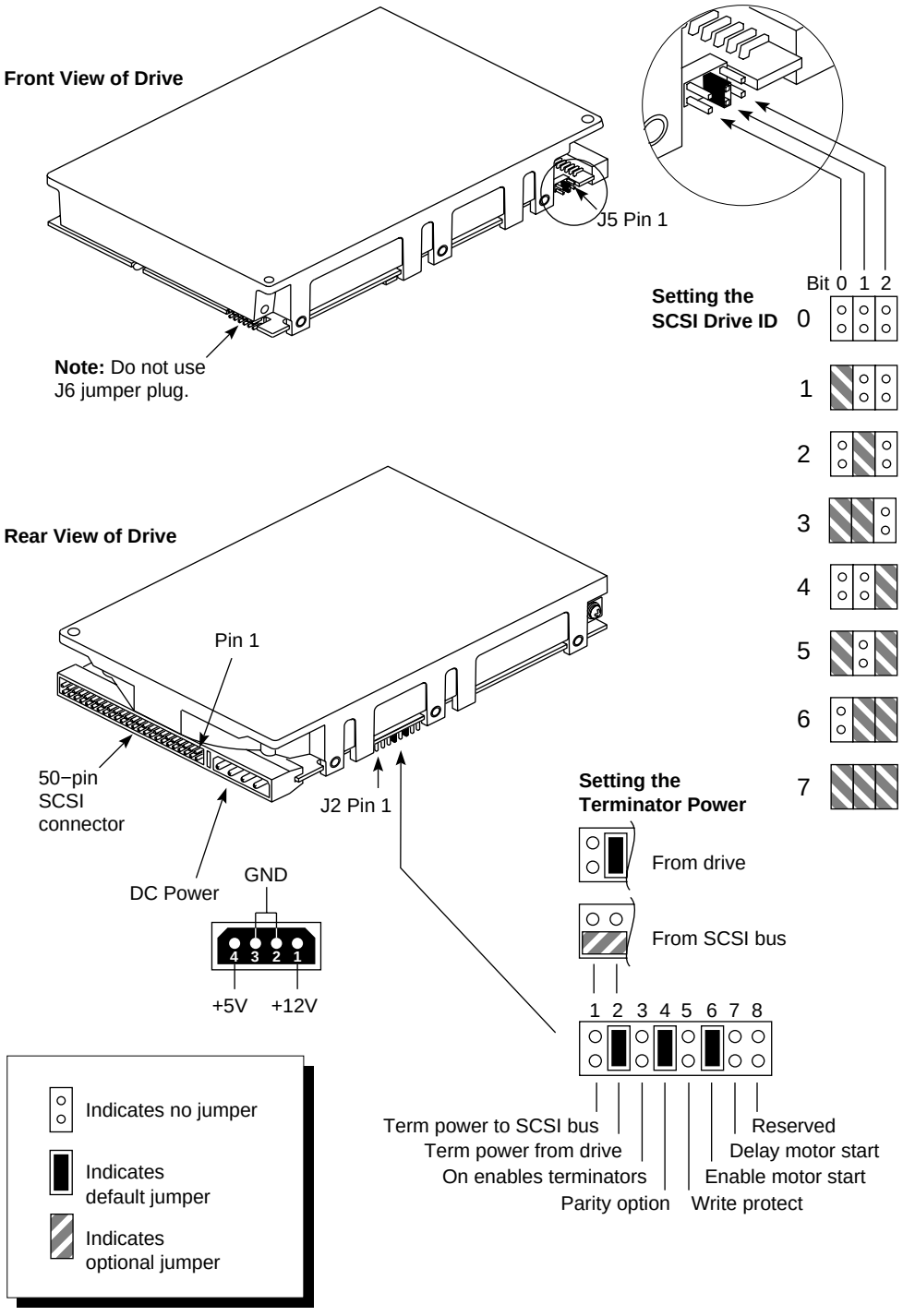


Figure 3-1 Seagate Model ST3610N Inch-High 540 MB SCSI Disk

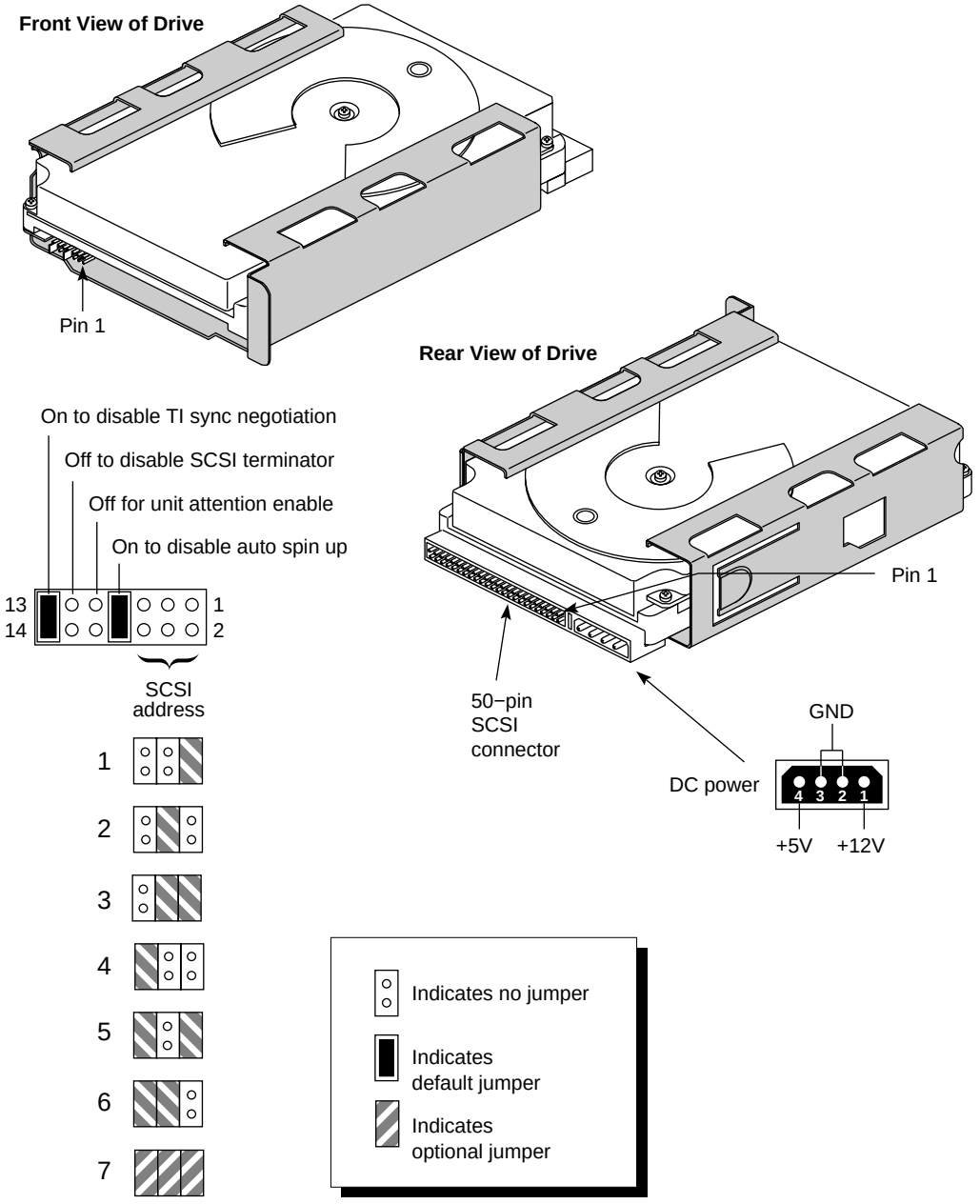


Figure 3-2 IBM DSAS-3540 Inch-High 548 MB SCSI Disk

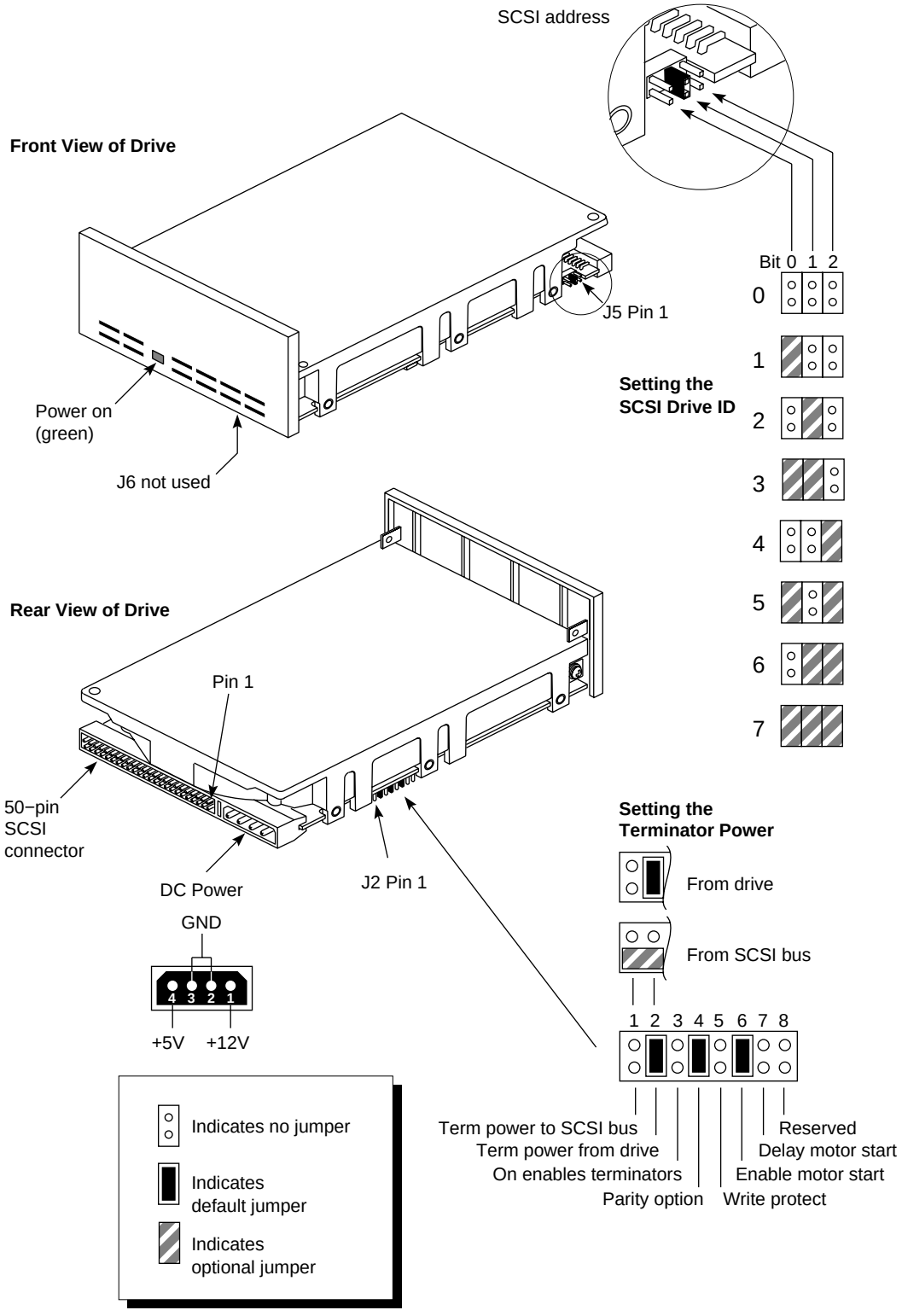


Figure 3-3 Seagate Model ST31200N (Hawk 1LP) Inch-High 1.0 GB SCSI Disk

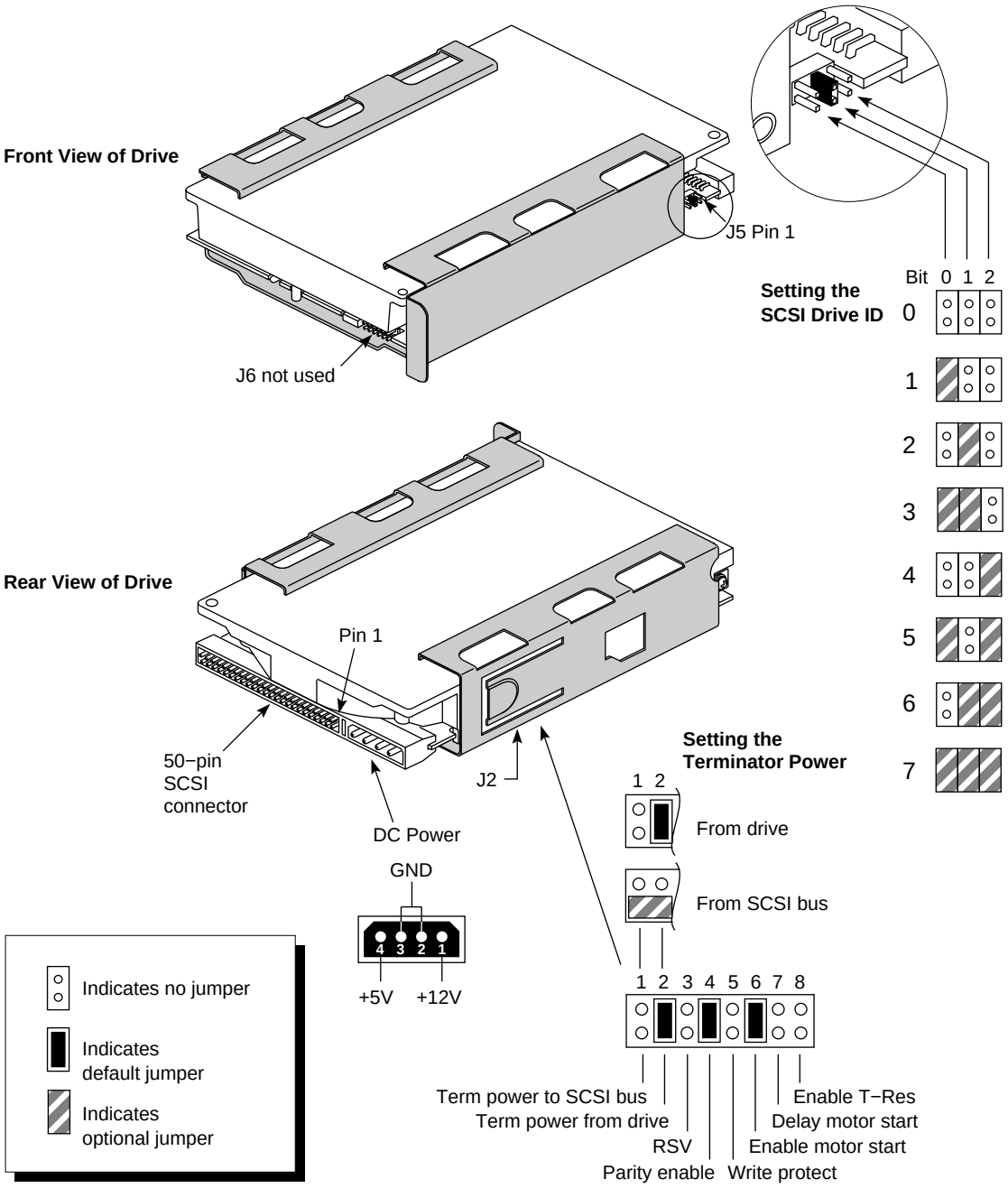


Figure 3-4 Seagate Model ST31230N (Hawk 2LP) Inch-High 1.0 GB SCSI Disk

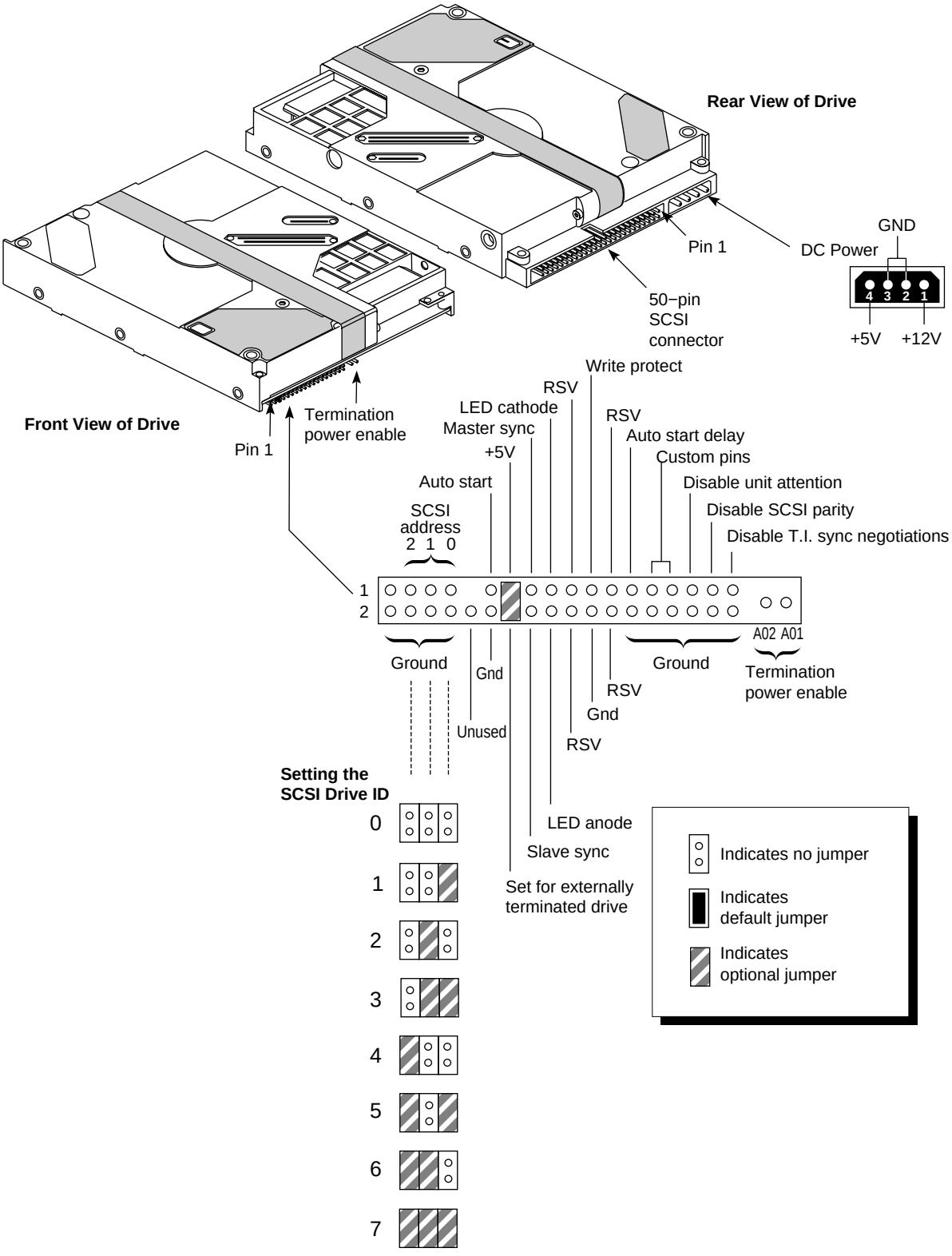


Figure 3-5 IBM 0662 Inch-High 1.0 GB SCSI Disk

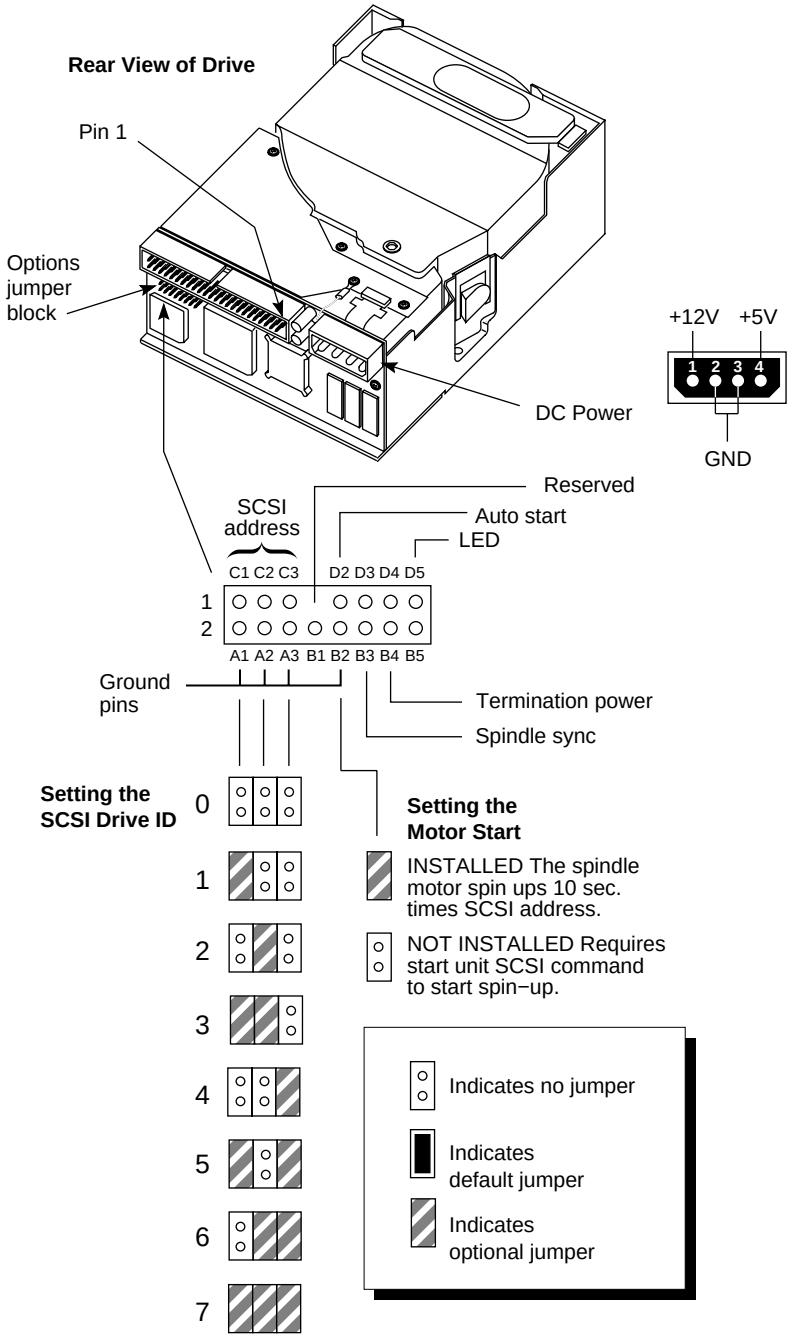


Figure 3-6 IBM 0663 (Corsair) Half-Height 1.2 GB SCSI Disk

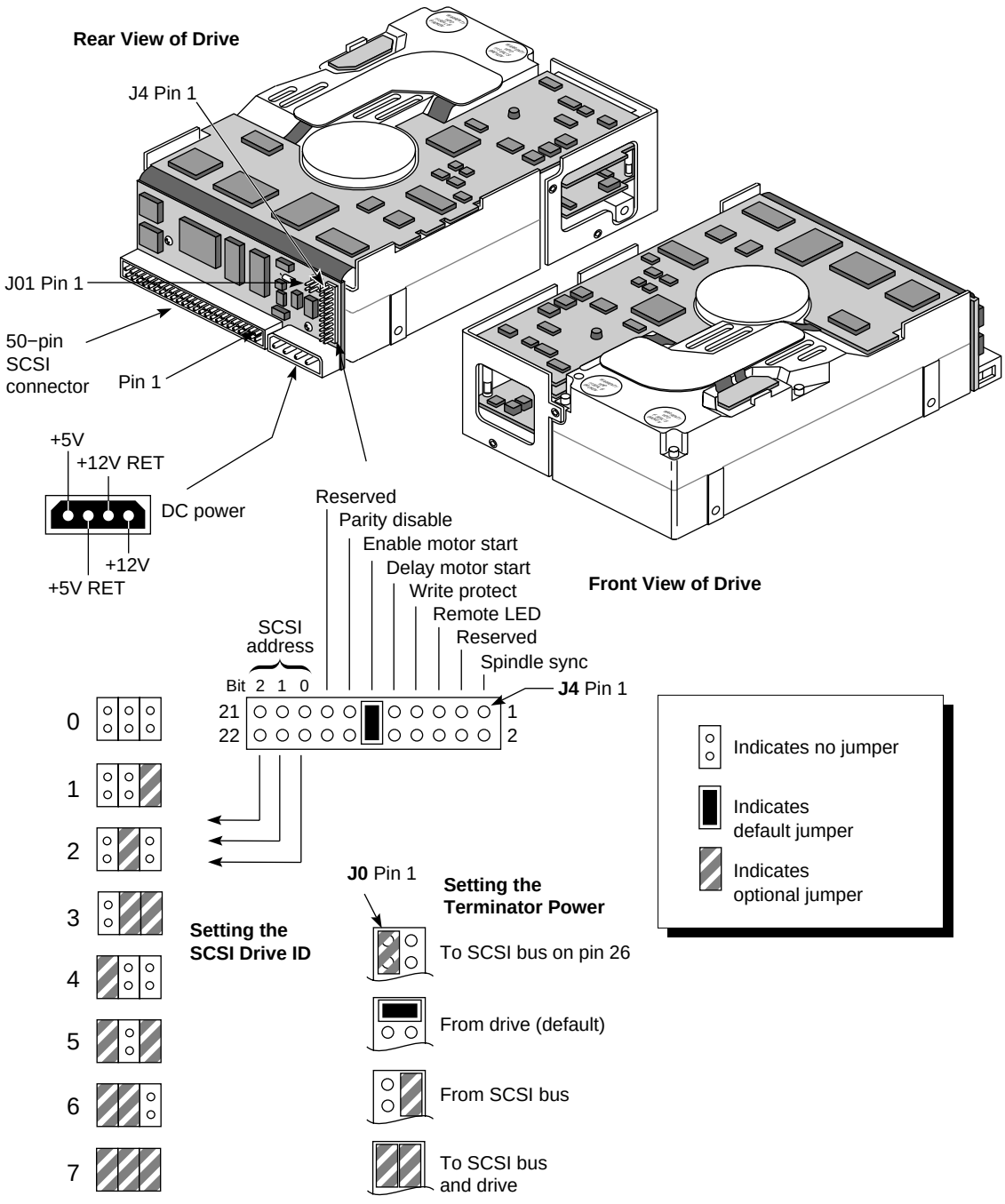


Figure 3-7 Seagate Model ST12550N (Barracuda 2) Half-Height 2.0 GB SCSI Disk

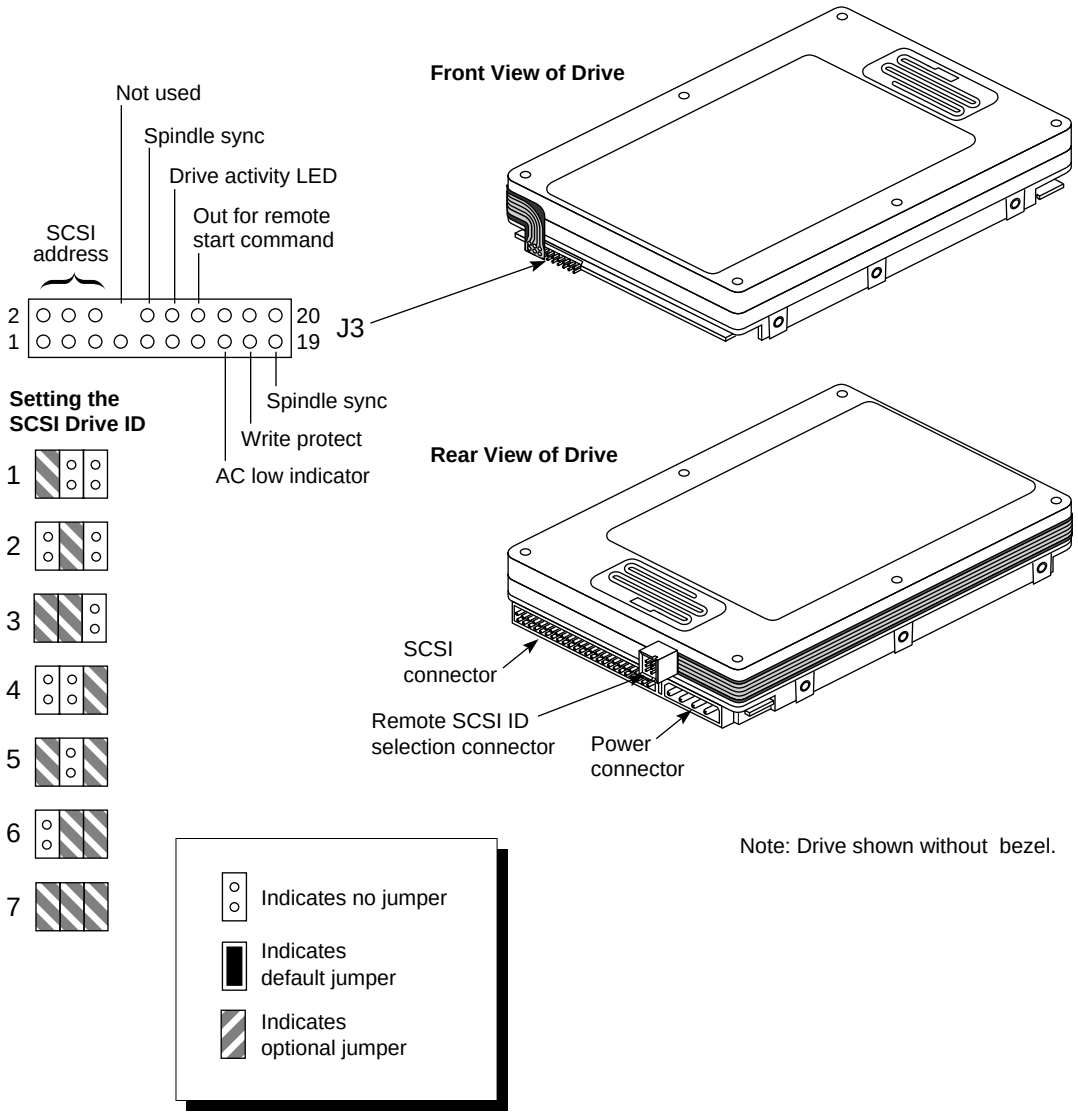


Figure 3-8 Quantum XP32150 Inch-High 2.2 GB SCSI Disk

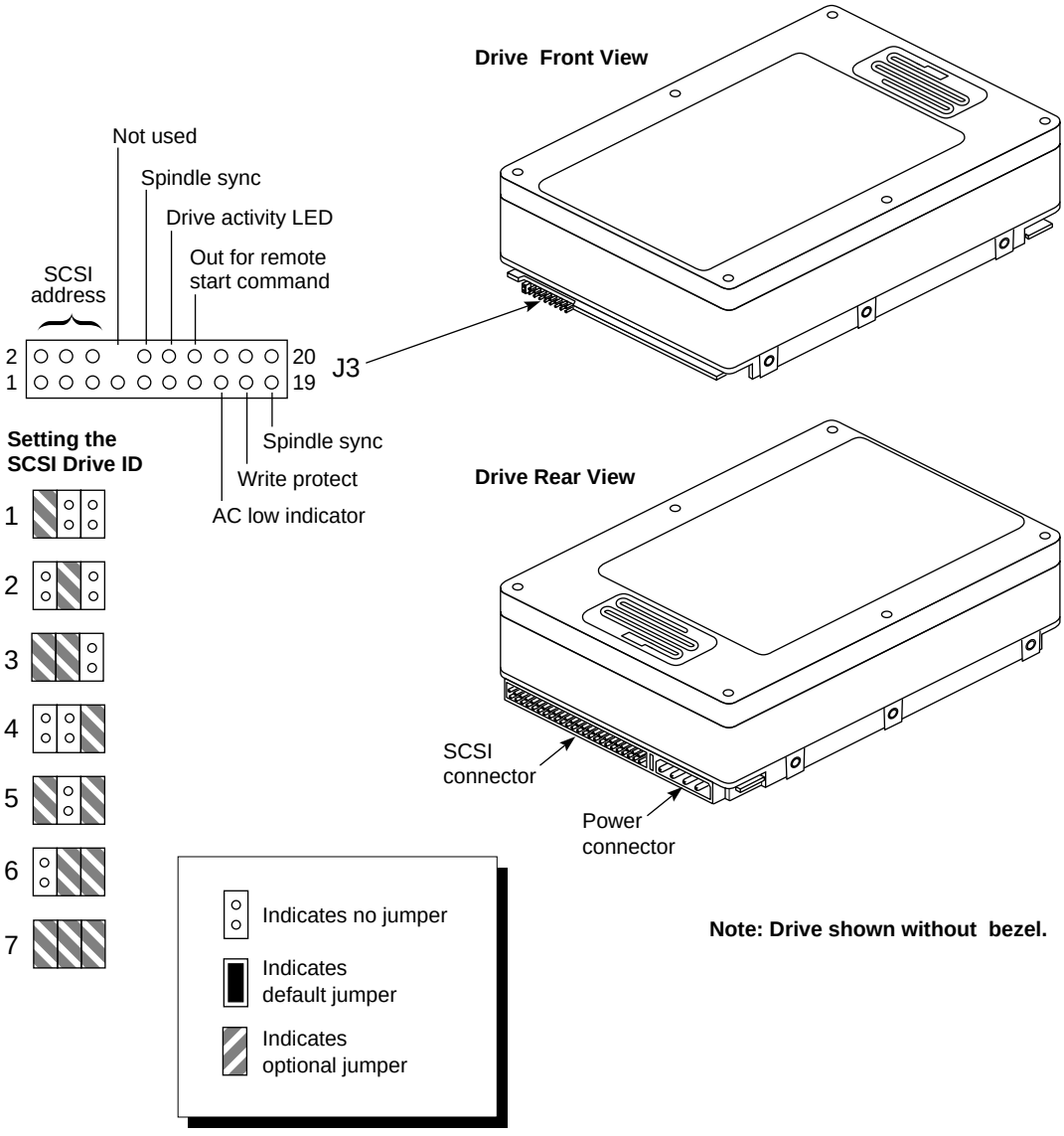


Figure 3-9 Quantum XP34300 Half-Height 4.5 GB SCSI Disk

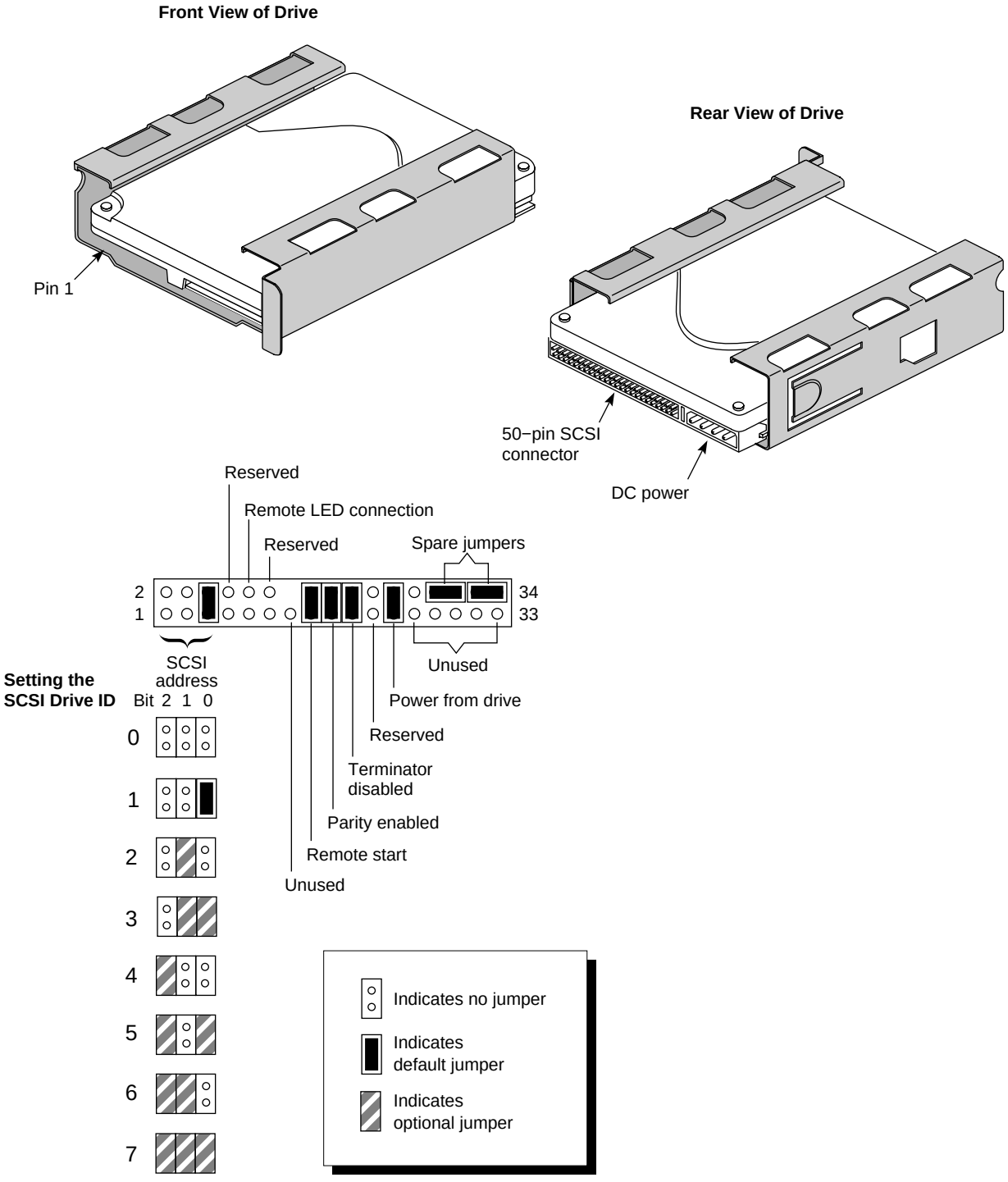


Figure 3-10 Seagate (ST51080N) 19 mm-High 1 GB SCSI Disk

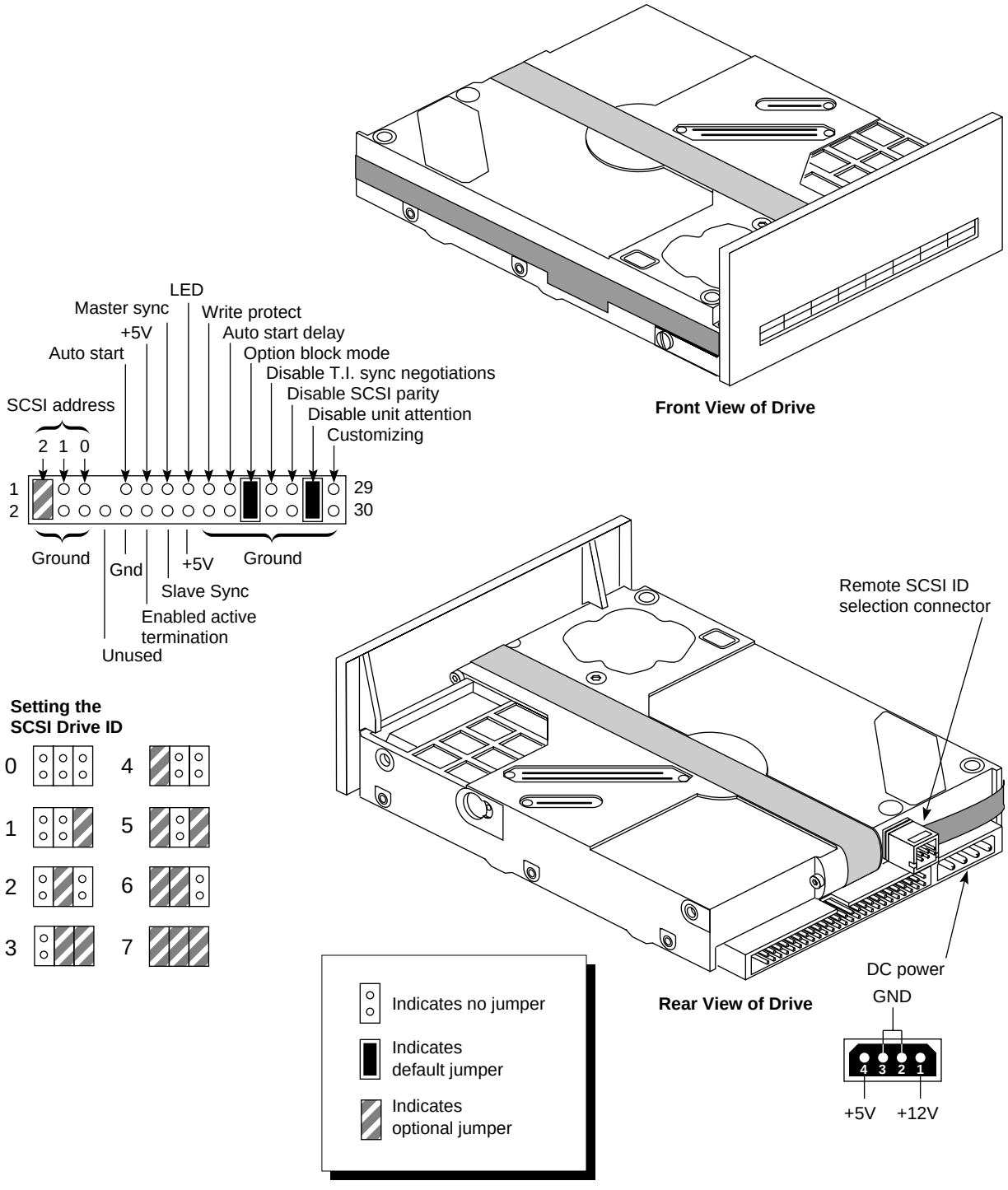


Figure 3-11 IBM DFHS (Ultrastar XP) Inch-High 1.1 or 2.2 GB Disk

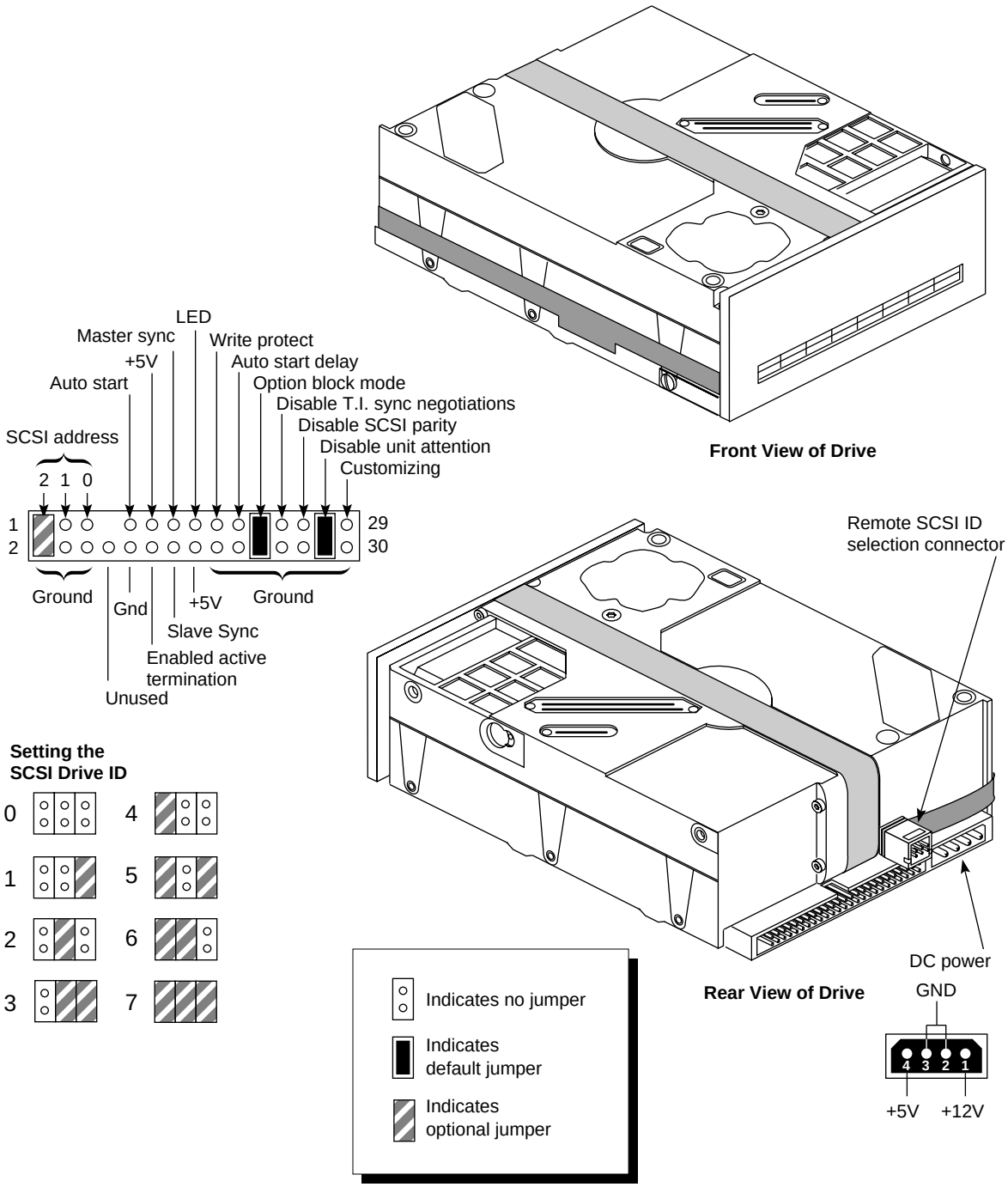


Figure 3-12 IBM DFHS (Ultrastar XP) Half-Height 4.5 GB Disk

3.3 Removable Media Drives

Figure 3-13 through Figure 3-20 contain information about the following removable media drives for desktop systems:

- Archive 4-mm external DAT drive
- Insite internally mounted 20-MB floptical disk drive
- Tandberg 1 GB QIC external tape drive
- Toshiba 5301 5.25-inch Internal CD-ROM (Indigo^2 only)
- Toshiba 5301 5.25-inch External CD-ROM
- Conner CTD8000H-R DDS-2 4-mm DAT Internal Drive
- Conner CTD8000E-S DDS-2 4-mm DAT External Drive
- Quantum DLT-2000 10 GB External Tape Drive

Note that older CD-ROM and QIC drives and the internal versions of the 4- and 8-mm tape drives are documented at the end of Chapter 2. The jumper plugs on these drives are the same in high-end and desktop systems.

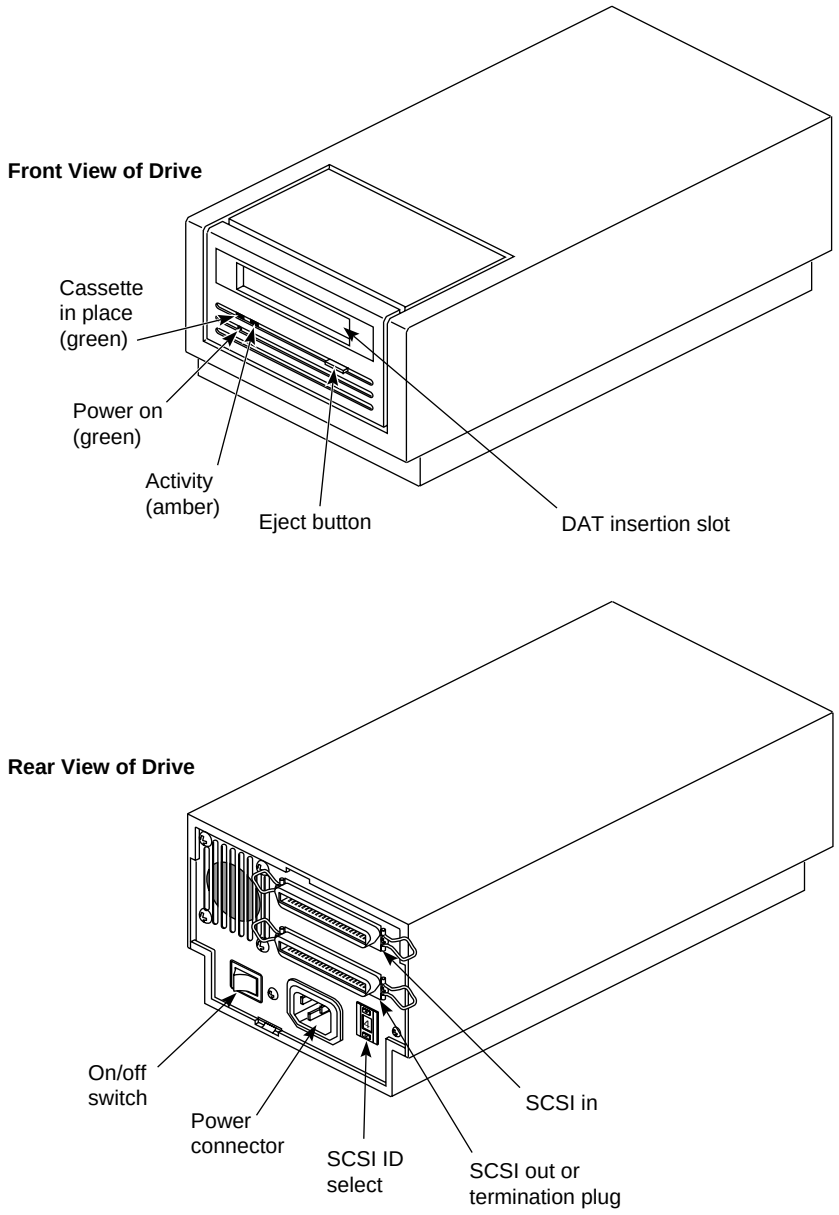


Figure 3-13 Archive 4-mm External DAT Drive

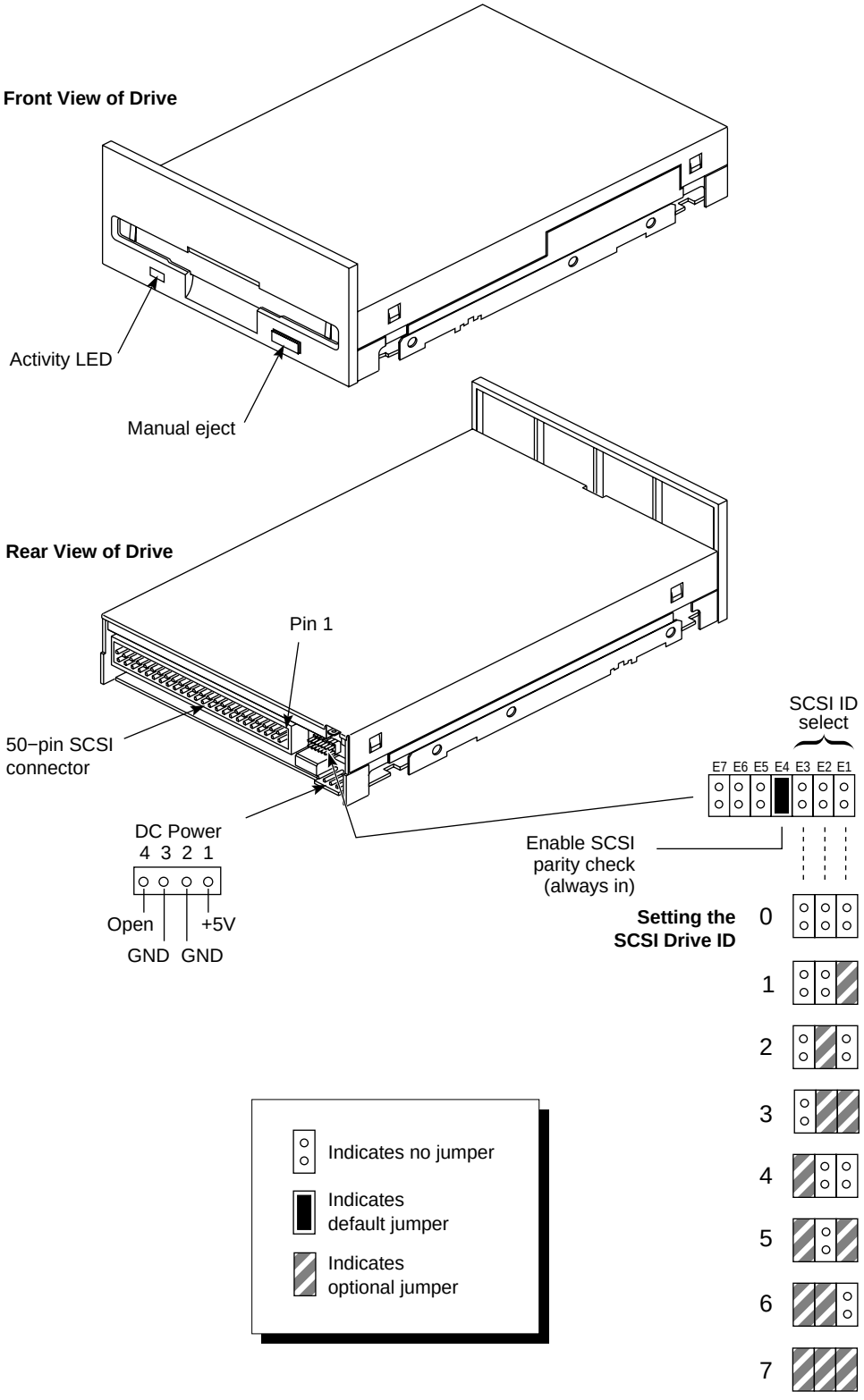


Figure 3-14 Insite Internally Mounted 20 MB Floptical Disk Drive

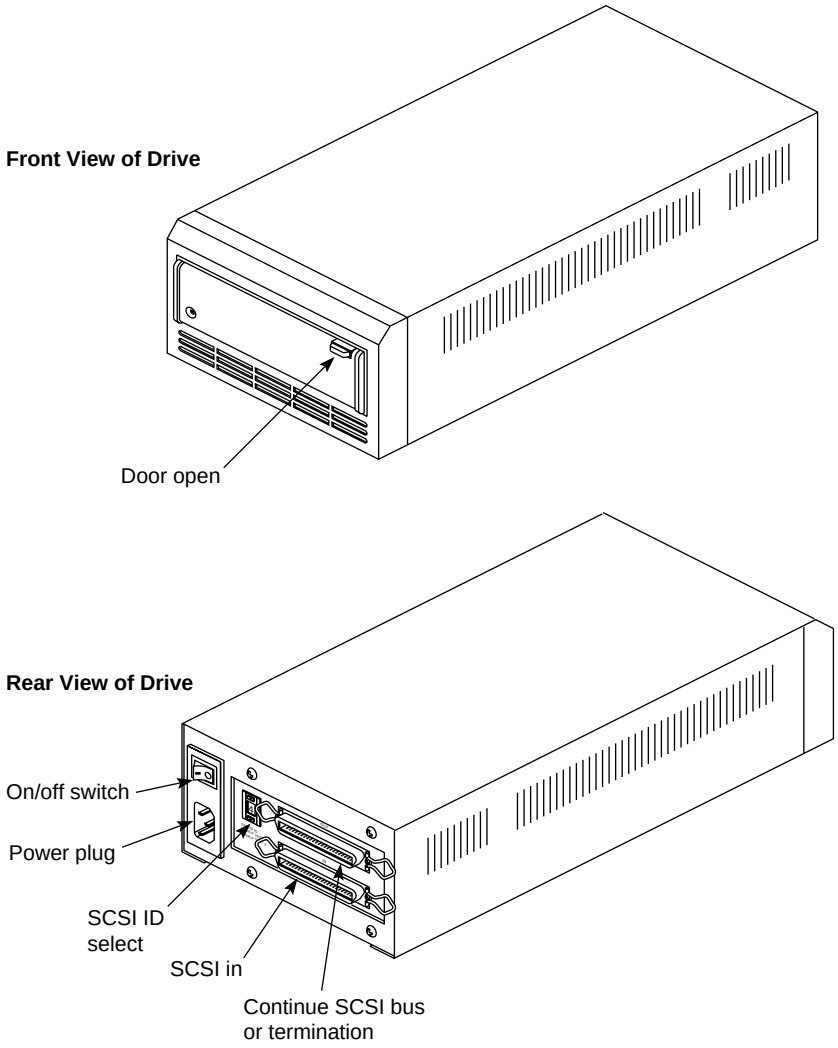


Figure 3-15 Tandberg 1 GB QIC External Tape Drive

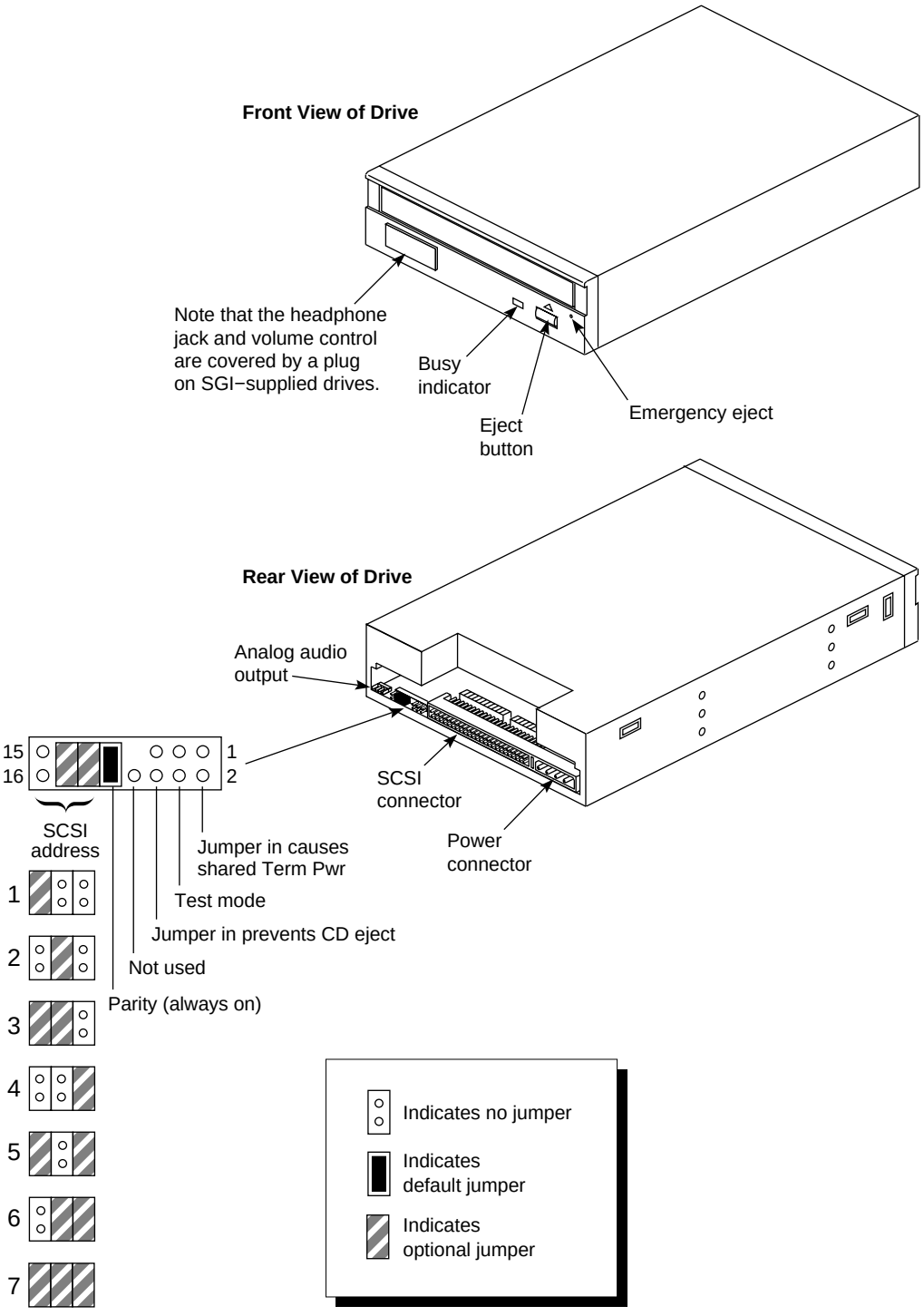


Figure 3-16 Toshiba 5301 5.25-Inch Internal CD-ROM

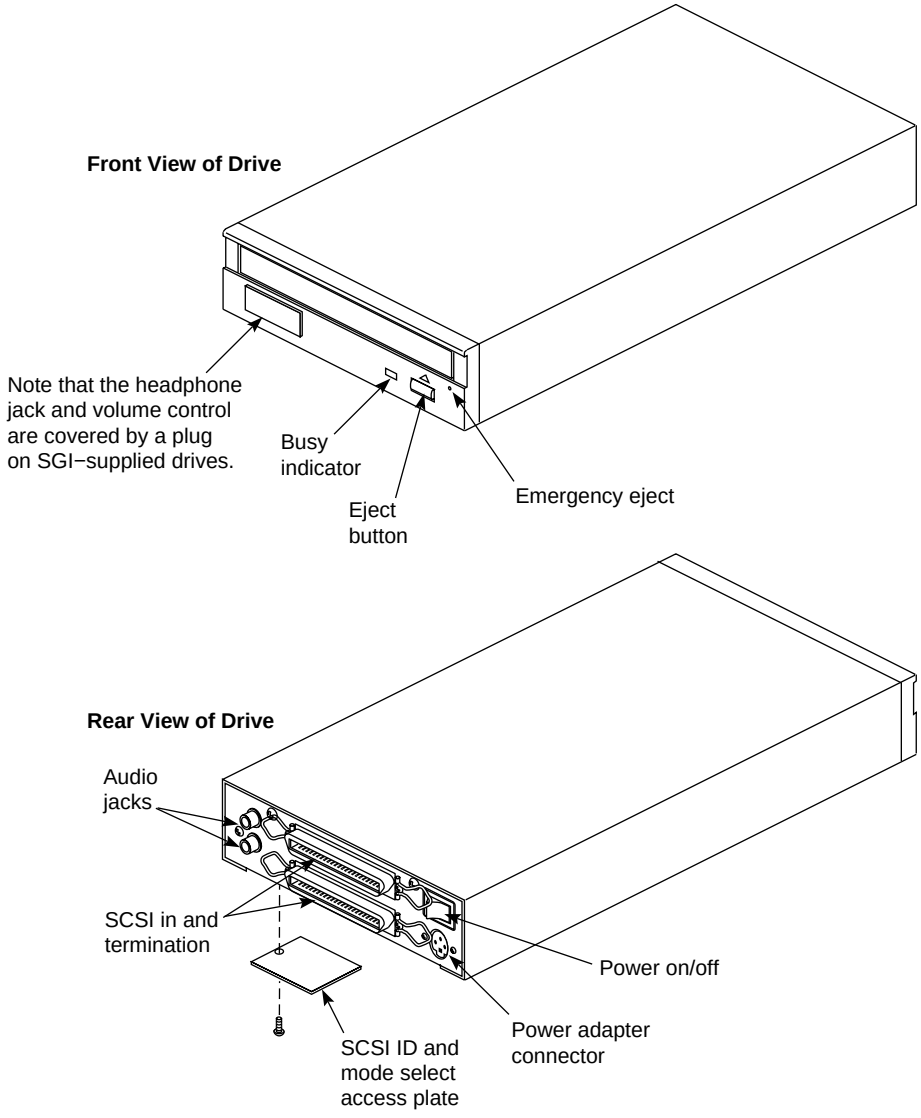


Figure 3-17 Toshiba 5301 5.25-Inch External CD-ROM

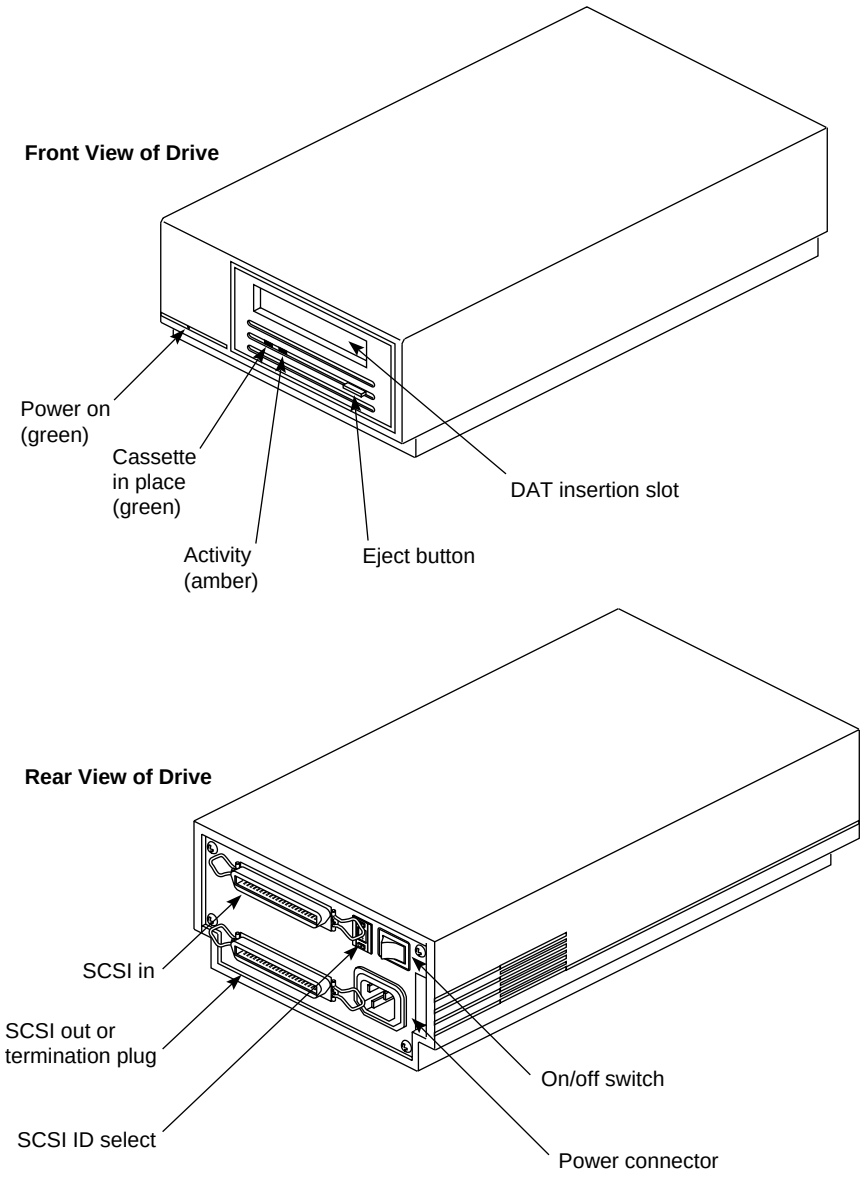


Figure 3-18 Conner CTD8000E-S DDS-2 External 4-mm DAT Drive

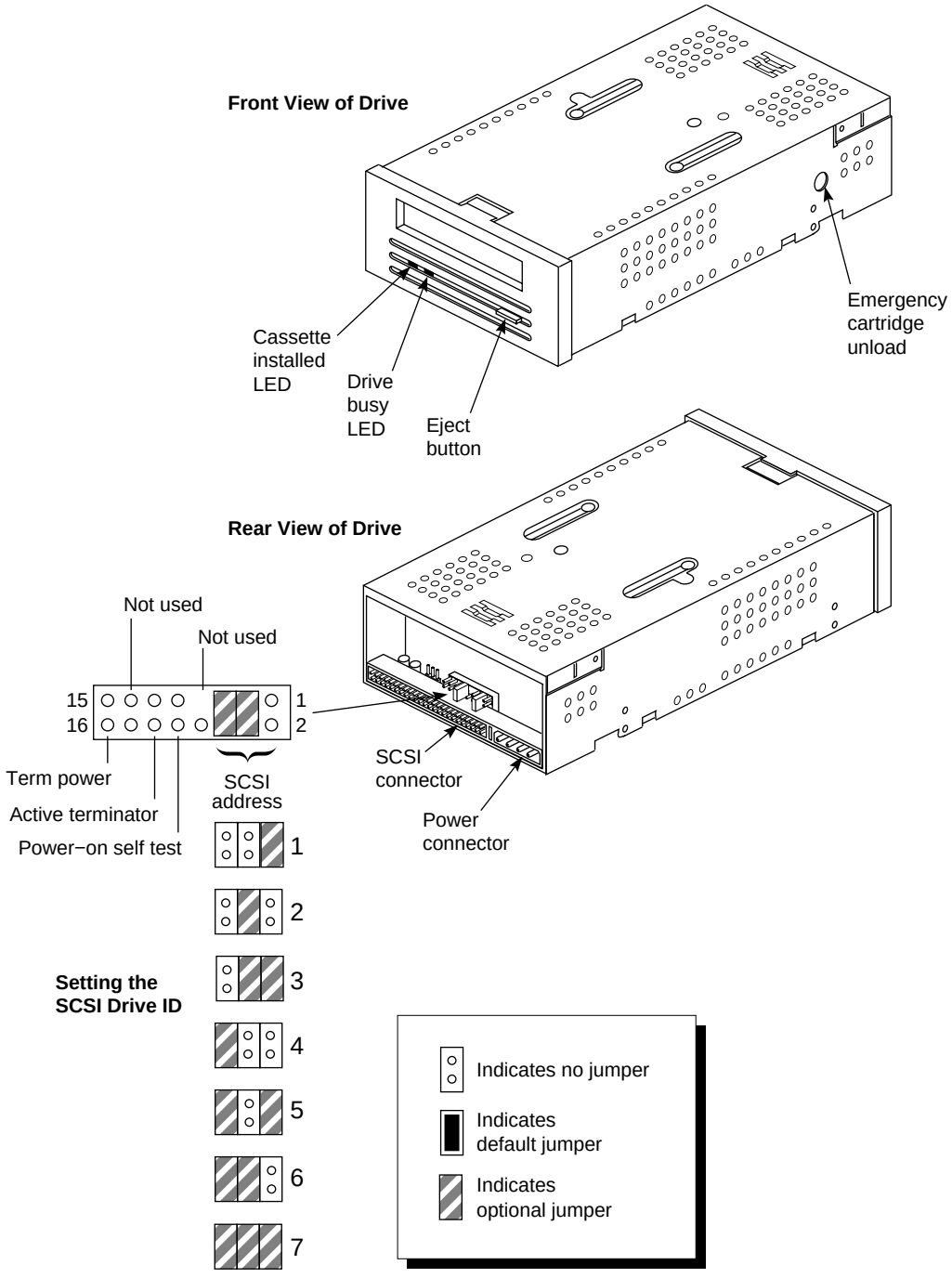
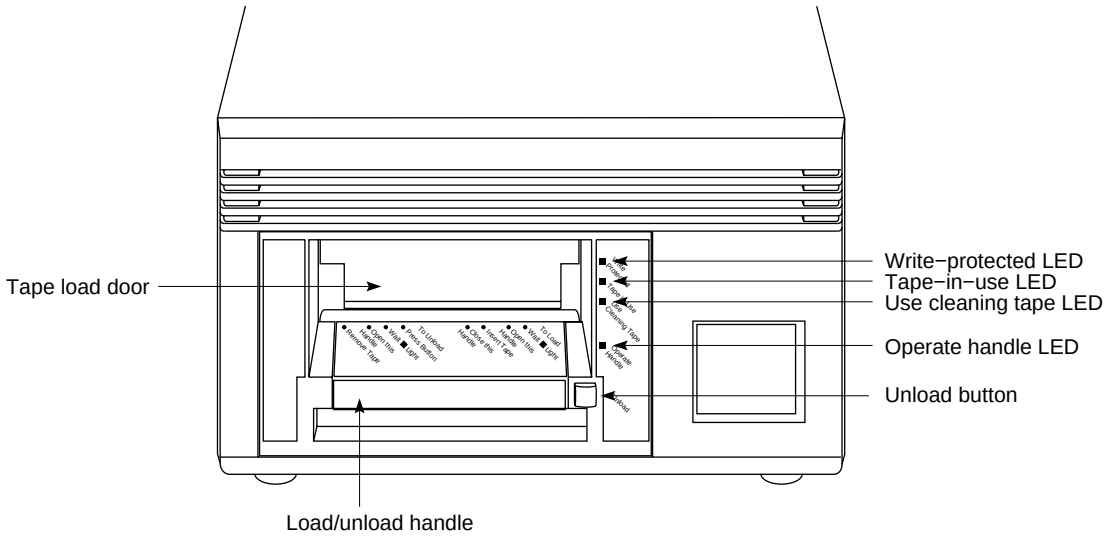


Figure 3-19 Conner CTD8000H-R DDS-2 Internal 4-mm DAT Drive

Front View of Drive



Rear View of Drive

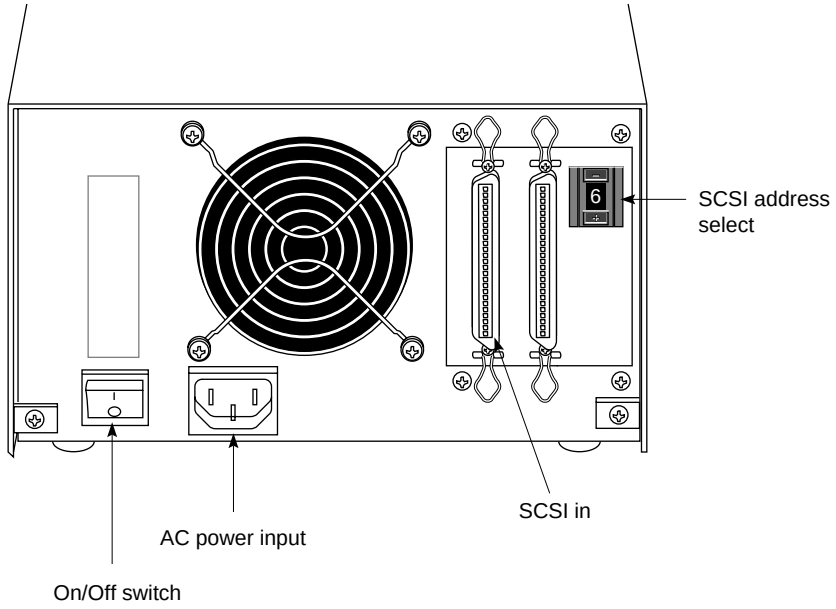


Figure 3-20 Quantum DLT-2000 10 GB External Tape Drive