QUALSTAR®

The Tape Library Experts

AIT Tape Drives

Installation and Operation Manual

501050 Rev. P

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Technical Support Information

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1.   Introduction

This manual provides detailed installation and operation information on the following AIT tape drives:

1.1 Tape Drive Models:

Model	Technology	68 Pin SCSI Interface Type	Bezel Type/Color
Sony SDX-300C	AIT-1	Single-ended	Desktop/White
Sony SDX-310C	AIT-1	DIFF/HVD	Desktop/White
Sony SDX-300C/L	AIT-1	Single-ended	Library/White
Sony SDX-310C/L	AIT-1	DIFF/HVD	Library/White
Sony SDX-500C	AIT-2	LVD/SE	Desktop/White
Sony SDX-510C	AIT-2	DIFF/HVD	Desktop/White
Sony SDX-500C/L	AIT-2	LVD/SE	Library/**Black**
Sony SDX-510C/L	AIT-2	DIFF/HVD	Library/**Black**
Sony SDX-700C	AIT-3	LVD/SE	Desktop/White
Sony SDX-700C/L	AIT-3	LVD/SE	Library/**Black**
Seagate STA150000W-SL	AIT-1	Single-ended	Library/White
Seagate STA150000WD-SL	AIT-1	Differential	Library/White

Table 1-1   Tape Drive Models Covered in this Manual

1.2 Tape Drive Firmware

This manual applies to Sony tape drives using the following firmware:

Tape Drive Format	Firmware Version
AIT-1	0400 or Higher
AIT-2	1.07 or Higher
AIT-3	0101 or Higher

Table 1-2   Firmware Versions of Sony Tape Drives

If your tape drive has a lower level of firmware, contact Qualstar for a firmware upgrade or additional information.

1.3 Tape Drive Hardware

This manual applies to tape drives having the following hardware revisions:

Tape Drive Format	Hardware Revision
AIT-1	B1 or Higher
AIT-2	A0 or Higher
AIT-3	A0 or Higher

Table 1-3   Hardware Revisions of AIT Tape Drives

The revision level of the tape drives is displayed on the revision label on the top cover. Note that AIT-2 and AIT-3 library tape drives shipped by Qualstar have black bezels to distinguish them from AIT-1 drives.

1.4 Media

AIT data tape cartridges are required for use in AIT tape drives. The media is an *advanced metal evaporative* (AME) tape, manufactured exclusively for AIT tape drives. These cartridges are not interchangeable with any other tape drive products. AIT tape drives will automatically eject foreign cartridges.

CAUTION

Do not apply labels to the top surface of AIT data tape cartridges. They can cause the tape cartridge to become stuck inside the tape drive.

Mfg.	Part Number	Technology	Memory In Cartridge	Length (meters)	Native Capacity
Sony	SDX-T3N (obsolete)	AIT-1	NO	170	25 GB
Sony	SDX-T3C SDX1-25C	AIT-1	YES	170	25 GB
Sony	SDX1-35C	AIT-1	YES	230	35 GB
Sony	SDX2-36C	AIT-2	YES	170	36 GB
Sony	SDX2-50C	AIT-2	YES	230	50 GB
Sony	SDX3-100C	AIT-3	YES	230	100 GB
Sony	SDX-TCL	Cleaning	NO	7.5	—
Seagate	STMA50G	AIT-1	YES	170	25 GB
Seagate	STMACL	Cleaning	NO	7.5	—

Table 1-4   AIT Tape Drive Media

The Sony SDX-700C AIT-3 tape drives support the AIT-1, AIT-2 and AIT-3 tape cartridge formats. The Sony SDX-500/510C AIT-2 tape drive can use both the AIT-2 and AIT-1 tape cartridges. The Sony SDX-300/310C AIT-1 tape drives are not compatible with AIT-2 or AIT-3 tape cartridges.

1.5 Precautions

1.5.1 Installation

Please observe the following recommendations:

- Installation should be performed by a qualified service technician.
- Always remove power from the TLS before working inside the library.
- Avoid mechanical shock as the drives are easily damaged.
- Use only media recommended by the drive's manufacturer.
- Differential-SCSI tape drives must not be connected to a SCSI bus with Single-Ended or LVD SCSI devices on it.
- All SCSI busses must be properly terminated at both ends of the bus. The host adapter card typically terminates the host-end of the cable. *Properly* means the correct choice of a SE, HVD (DF), LVD or LVD/SE terminator.

1.5.2 Operation

- Do not intentionally turn tape drive power off with a tape cartridge inside the drive.
- If a tape drive experiences a rapid change in temperature (from a low to a high temperature) moisture may form inside the unit. In such a case, wait at least one hour for the condensation to evaporate before turning on the tape drive's power.

2.   DIP Switches and Jumpers

2.1 Introduction

This chapter covers the configuration of the tape drive. The drive's configuration is changed by DIP Switches and Jumper Settings.

2.2 DIP Switch Settings and Definitions

In addition to the functions described in Section 2.2.2, DIP switches are also used to configure the tape drive for use with various host systems as described in Section 2.2.4.

2.2.1 DIP Switch Pack Location

The DIP Switch Pack is located on the bottom of the drive, as shown below.
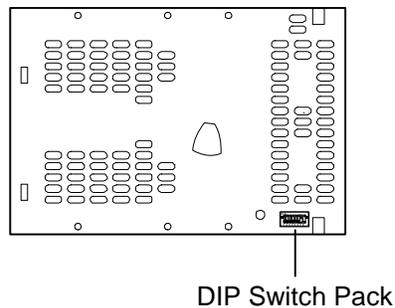
DIP Switch Pack

Figure 2-1   AIT Tape Drives - Bottom View

2.2.2 DIP Switch Settings for <u>AIT-1</u> Drives (switches 1-8)

AIT-1 tape drives are available in single ended (SDX-300) and differential (SDX-310) interfaces. Figure 2-1 shows the location of the DIP switches while Figure 2-2 indicates their definitions and factory default settings. DIP switch settings only take effect as the drive is powered on.

- DIP switch numbers 1-4 determine System Compatibility with certain host computers. See Figure 2-4 and Chapter 5 (Application Notes) of this manual.

- DIP switch number 5, **Termination Power**:
  This switch turns the internal SCSI termination power **ON** or **OFF** to the drive's SCSI connector. Bus termination power should be turned on only if this drive is at one end of a SCSI bus.

- DIP switch number 6 is reserved.

- DIP switch number 7, **Data Compression Enable:**
  Data Compression will be enabled at power-on if switch number 7 is set to ON.

- DIP switch number 8, **Data Compression Remote Control:**
  Data Compression can be controlled by the host system when switch number 8 is set to OFF.

Switch No.	Definition	Setting
1	Reserved for configuration	OFF (down)
2	Reserved for configuration	OFF (down)
3	Reserved for configuration	OFF (down)
4	Reserved for configuration	OFF (down)
5	SCSI Termination Power	OFF (down)
6	Reserved for configuration	OFF (down)
7	Data Compression Enable	ON (up)
8	Data Compression Remote Control	OFF (down)

Figure 2-2   AIT-1 Default DIP Switch Settings and Definitions

Switches reserved for configuration are defined in Section 2.2.4.

2.2.3 DIP Switch Settings for <u>AIT-2</u> and <u>AIT-3</u> Drives (switches 1-8)

AIT-2 and AIT-3 Tape Drives are available in LVD/SE (SDX-500/700) and differential (SDX-510) interfaces. Figure 2-1 shows the location of the DIP switches while Figure 2-3 indicates their definitions and factory default settings. DIP switch settings only take effect when the drive is powered on.

- DIP switch numbers 1-4 determine System Compatibility with certain host computers.

- DIP switch number 5, **Termination Power**:
  This switch turns the internal SCSI termination power **ON** or **OFF** to the drive's SCSI connector. Bus termination power should be turned on only if this drive is at one end of a SCSI bus.

- DIP switch number 6 is reserved.

- DIP switch number 7, **Data Compression Enable:**
  Data Compression will be enabled at power-on if switch number 7 is set to ON.

- DIP switch number 8, **Data Compression Remote Control:**
  Data Compression can be controlled by the host system when switch number 8 is set to OFF.

Switch No.	Definition	Setting
1	Reserved for configuration	OFF (down)
2	Reserved for configuration	OFF (down)
3	Reserved for configuration	OFF (down)
4	Reserved for configuration	OFF (down)
5	SCSI Termination Power	OFF (down)
6	Reserved for configuration	OFF (down)
7	Data Compression Enable	ON (up)
8	Data Compression Remote Control	OFF (down)

Figure 2-3   AIT-2 and AIT-3 Default DIP Switch Settings and Definitions

Switches reserved for configuration are defined in Section 2.2.4.

2.2.4 System Configuration DIP Switch Settings (switches 1-4)

System	Switch Settings	Remarks
PC systems Windows NT IBM AIX 4.2.5 IBM AIX 4.3.1 SCO Fixed Block	*(DIP switch diagram, switches 1-8)*	• Fixed 512–byte block mode. • Standard Qualstar Configuration.
PC systems DOS Windows NT	*(DIP switch diagram, switches 1-8)*	• Variable block mode.
PC systems DOS Windows NT	*(DIP switch diagram, switches 1-8)*	• Reports Sony SDT-5000 inquiry string if AIT-1 drive. • Reports AIT-1 inquiry string if AIT-2 or AIT-3 drive. • Sony drives only.
SCO UNIX	*(DIP switch diagram, switches 1-8)*	• Variable block mode.
IBM RS/6000 AIX 3.2.x	*(DIP switch diagram, switches 1-8)*	• Fixed 512–byte block mode. • No disconnects during inquiry. • No disconnects during data phase. • Kernel modification required (SMIT).
IBM RS/6000 AIX 3.2	*(DIP switch diagram, switches 1-8)*	• Fixed 512–byte block mode. • No disconnects during inquiry. • Disconnects allowed during data phase. • Kernel modification required (SMIT).
DEC Workstation VMS, ULTRIX	*(DIP switch diagram, switches 1-8)*	• Variable block mode. • Signed residual on space reverse. • System device file control. • Order Configuration 500900-12-1.
SUN Workstation UltraSparc-Solaris	*(DIP switch diagram, switches 1-8)*	• Variable block mode. • System device control. • *Non-buffered mode enabled.* • Kernel modification required for device control of compression modes.
SUN Workstation Sparc-SunOS	*(DIP switch diagram, switches 1-8)*	• Variable block mode. • System device control. • *Non-buffered mode disabled.* • Kernel modification required for device control of compression modes. • Order Configuration 500900-23-8.
SGI Workstation IRIX	*(DIP switch diagram, switches 1-8)*	• Fixed 512–byte block mode. • Busy status for not ready. • 4-byte boundary disconnects. • Perform READ POSITION command and return ZERO during REWIND immediate. • Kernel modification required. • Order Configuration 500900-22-0.
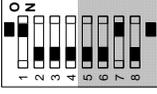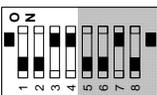
continued

HP Workstation (HP 9000, HP_UX)		• Variable block mode.
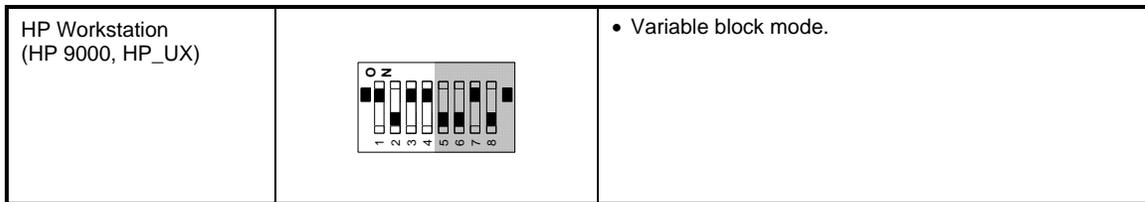
Figure 2-4   AIT-1, AIT-2 and AIT-3 Tape Drive DIP Switch Settings

In Figure 2-4 switches 1-4 determine system configuration only. Switches 5-8 control operation as given in Sections 2.2.2 and 2.2.3.

2.3 SCSI ID Number Jumpers (AIT-1, AIT-2 and AIT-3)

2.3.1   Jumper Settings

Refer to Figure 2-5 to identify the jumpers (located on the drive's rear panel) as follows:

- **ID0-ID3**:
  Use these jumpers to set the drive's SCSI ID number. The default SCSI ID number settings for tape drives T1-T6 or LT1-LT6 and RT1-RT6 in a TLS library are given in Table 2-1. See Section 2.3.2 to select SCSI ID numbers.

- **Parity Disable**:
  SCSI bus parity checking is disabled when this jumper is installed. The default and recommended setting is enabled (jumper omitted).

- **No Connection**:
  This jumper is presently not used.
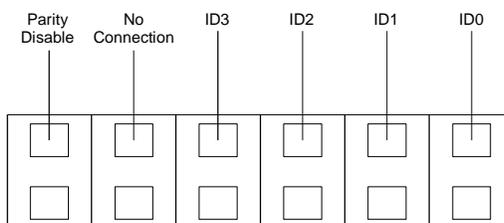
Figure 2-5   Jumper Definitions

Note: A jumper is installed if it connects both pins together. A jumper is not installed if it is on one pin only or is not present.

2.3.2 Setting a Tape Drive's SCSI ID Number

NOTE

SCSI ID numbers are now set in the library via a control cable. The following information is for reference purposes only.

1. Refer to Table 2-1 to determine the jumper settings for the desired SCSI ID number.

2. Use the SCSI ID number jumpers ID0 through ID3 to set the tape drive's SCSI ID number.

NOTE

For TLS-4000 libraries, the TLS Handler's default SCSI ID number is 0. For Host Computers the SCSI ID number is usually 7.

SCSI ID No.	ID3	ID2	ID1	ID0	Default Settings[1]
0	Open	Open	Open	Open	-----
1	Open	Open	Open	Installed	T1 / LT1
2	Open	Open	Installed	Open	T2 / LT2
3	Open	Open	Installed	Installed	T3 / LT3
4	Open	Installed	Open	Open	T4 / LT4
5	Open	Installed	Open	Installed	T5 / LT5
6	Open	Installed	Installed	Open	T6 / LT6
7	Open	Installed	Installed	Installed	-----
8	Installed	Open	Open	Open	RT1
9	Installed	Open	Open	Installed	RT2
10	Installed	Open	Installed	Open	RT3
11	Installed	Open	Installed	Installed	RT4
12	Installed	Installed	Open	Open	RT5
13	Installed	Installed	Open	Installed	RT6
14	Installed	Installed	Installed	Open	-----
15	Installed	Installed	Installed	Installed	-----

[1]Tape Drive SCSI ID settings for use in Qualstar TLS-4000 Series libraries. T# is the drive number in single-bay libraries. LT# is the left drive bay and RT# is the right drive bay in dual-bay libraries (TLS-412xxx).

Table 2-1   SCSI ID Jumper Settings

3.   Tape Drive – Physical Installation

NOTICE

The TLS-4000 Underwriters Laboratories (UL) listing requires that only UL Recognized NWGQ2 tape drives be installed within the TLS models. The tape drive power consumption must also be suitably rated. Only supported tape drives should be used in the system. The list of supported tape drives is contained in Product Information Note 014, which can be found at www.qualstar.com.

This installation procedure should only be performed by qualified service personnel in accordance with each manufacturer's published instructions.

3.1 Tape Drive Installation Overview

1. Unpack the tape drive(s).

2. Make certain that each tape drive's SCSI interface matches that of the SCSI bus to which it is to be connected (68 pin, LVD, SE or optional HVD).

3. Remove or disable all SCSI terminators on all tape drives if they are not to provide termination.

4. Enable or disable the drives termination power dependent on the bus configuration in which it will be used.

5. Attach the mounting tray or brackets to the drive.

6. Attach the AIT control and power cables to the drive.

7. Open the front door of the library.

8. Install the drives into the TLS-4000 or TLS-412xxx and lock in place with the two 1/4-Turn Fasteners on the mounting brackets.

9. Open the rear of the library for drive access.

10. Connect the AIT Control and power cable to the Drive Bay or Power Distribution board.

11. Connect the internal SCSI cable to the drive.

12. Power-up the library and check the tape drive power supplies.

13. Setup the `Configuration\Drive\T?` menus for each installed drive. This subject is fully covered in the TLS-4000 Installation & Operation Manual (Qualstar Document No. 501370) and the TLS-412xxx Installation and Operation Manual (Qualstar document number 501300).

AIT tape drives come in two basic types: Desktop and Library. Only library ready drives may be used in any TLS. AIT library ready drives are identified with an "L" at the end of the model number. Check the barcode label on the rear of the drive to determine it's model number. Figure 3-4 and Figure 3-5 depict the library required Automation Bezel.

3.2 Tape Drive Installation Kit

Tape Drive Installation Kits are available from Qualstar. Only Qualstar-furnished mounting trays or brackets can be used to install tape drives. The following table explains the usage and part numbers available.

Drive Make/Model	Use in TLS-4212/4222	Installation Kit P/N
AIT (Library version only) 5.25 inch mount	No	500849-05-4
AIT (Library version only) 3.50 inch mount	Yes	500849-07-0

Table 3-1 Tape Drive Mounting Kit Options

Each 500849-05-4 AIT Tape Drive Installation Kit contains the following items:

- One Mounting Tray
- Bag of four M3 x 5mm screws
- Power Cable
- One AIT Control Cable

Each 500849-07-0 AIT Tape Drive Installation Kit contains the following items:

- Two Mounting Brackets
- Bag of four M3 x 5mm screws
- Power Cable
- One AIT Control Cable

3.3 AIT Tape Drive Setup

AIT tape drives have an 8 position DIP switch which affects how a drive interfaces with different host operating systems as well as controlling its data compression and termination power. All of this is explained in Chapter 2. Additionally, there are six jumpers on the rear of the drive that determine its SCSI ID and disable SCSI bus parity error detection.

1.   Unpack the drive.

2.   Remove the 4 SCSI ID jumpers (rightmost 4) from the rear of the AIT tape drive by using tweezers or a small bladed knife, etc. (see Figure 3-2) Store the jumpers with the drive packing materials in case the drive should ever need to be returned.

3.   Set the DIP switches to meet your system requirements Figure 3-1 shows the default settings.
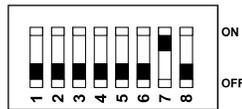
Figure 3-1   Qualstar Default DIP Switch Settings for AIT-1, AIT-2 and AIT-3

3.4 Drive Installation

Requires one AIT Drive Installation Kit (Qualstar P/N 500849-05-4 or 500849-07-0) for each drive to be installed and a No. 1 Phillips Screwdriver.

1.   Open the Drive Installation Kit and remove the four M3 screws from their bag.

2.   For 5.25 inch drive bay installation refer to Figure 3-4 and mount the drive to the mounting tray using the four M3 screws and a No. 1 Phillips screwdriver. Do not over-tighten.

3.   For 3.50 inch drive bay installation refer to Figure 3-5 and attach a mounting bracket to each side of the drive using the four M3 screws and a No. 1 Phillips screwdriver. Do not over-tighten.

4.   Refer to Figure 3-3 and connect the AIT Control Cable to the drive's serial connector. This connector is keyed.

5.   Connect the AIT Control Cable to the drive's SCSI ID jumper pins. Note that this connector is not keyed and the blue wire must be oriented to the upper right corner (top pin of ID0).

6.   Connect one end of the drive power cable to the drive – note the connector is keyed by two chamfered corners.

Power Cable
P/N 500816-01-2

AIT Control Cable
P/N 501342-01-8
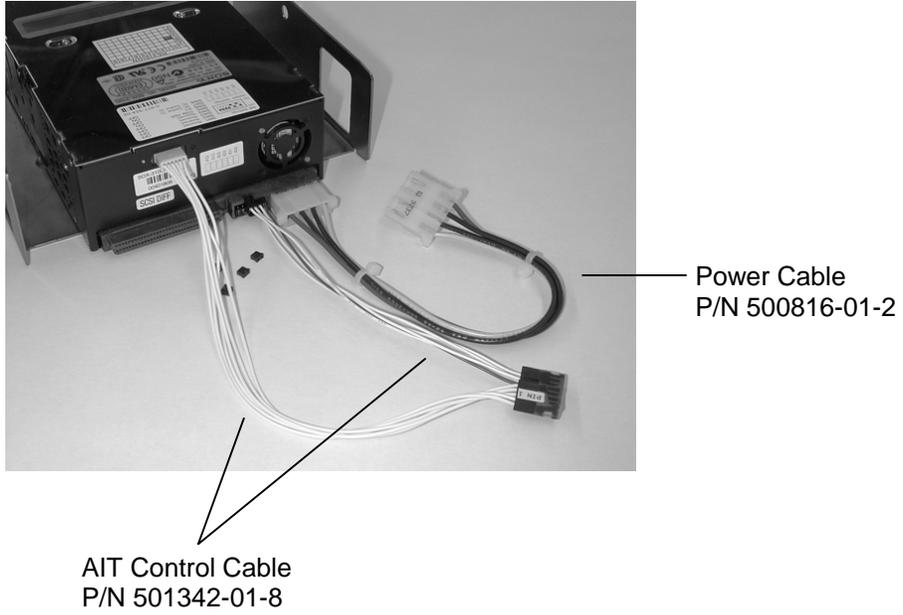
Figure 3-2   AIT Control & Power Cables

Drive
Serial
Connector

SCSI ID Connector
(Blue Wire Upper Right)

Removed 4 Right Jumpers
(Left 2 remain)
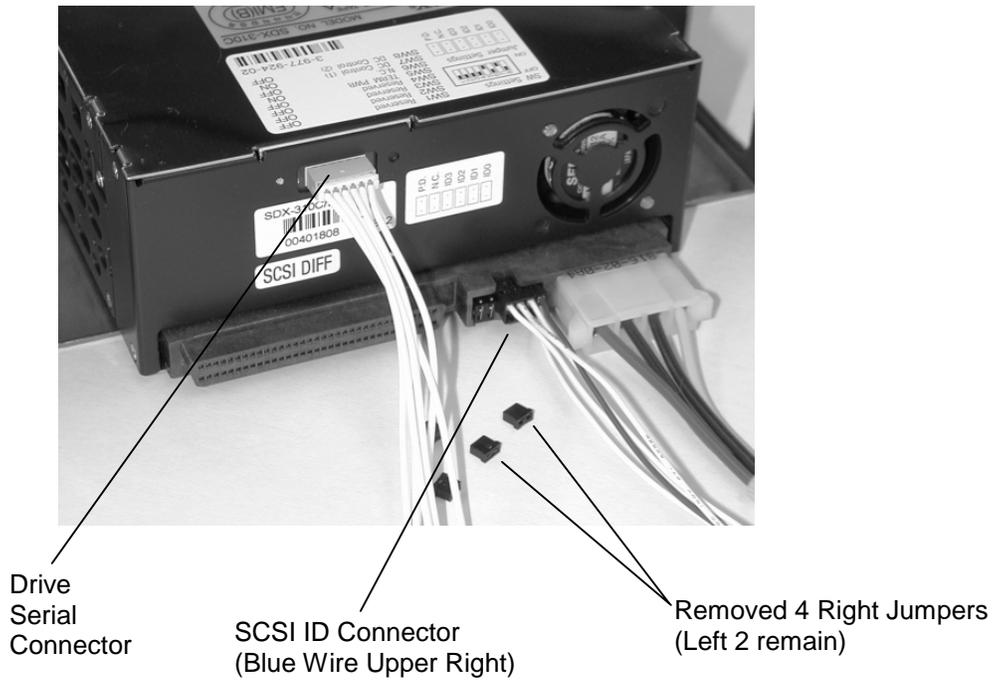
Figure 3-3   AIT Control Cable Details

NOTICE

AIT tape drives are produced in two versions: automation-specific and stand-alone. <u>Only automation-specific tape drives can be used in the TLS-4000 Series libraries</u>. The front bezel of the automation-specific tape drives is shown in Figure 3-4 and Figure 3-5.

AIT Automation Bezel

P/N 500849-05-4
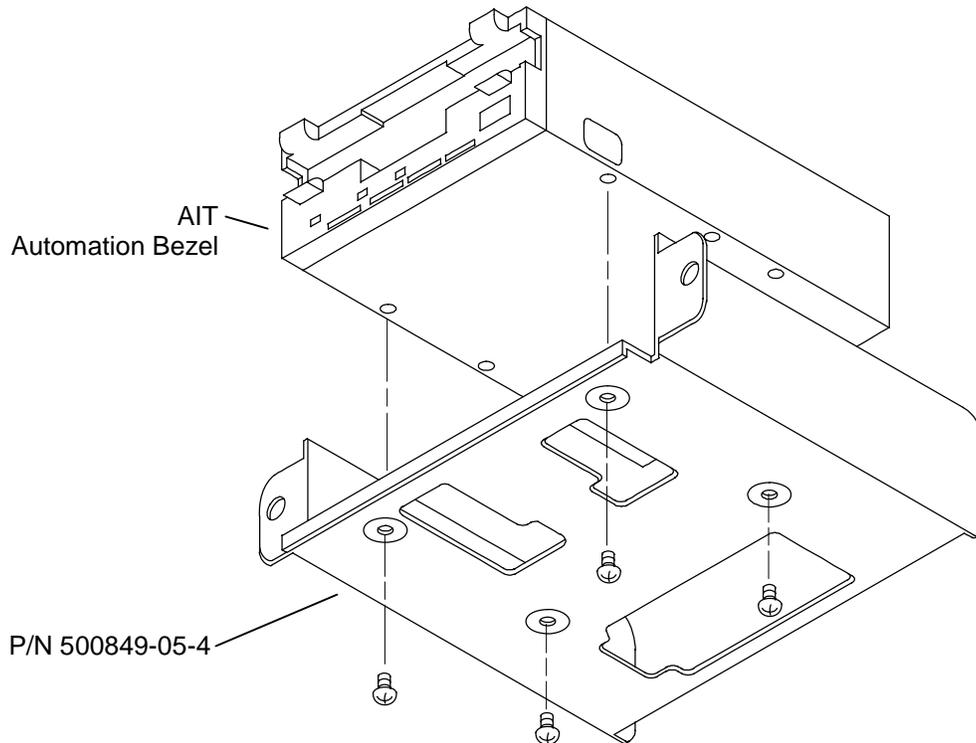
Figure 3-4   Bottom View of AIT Series Mounting Tray (not for TLS-4212/4222)

Mounting Brackets P/N 500849-07-0

2 M3 Screws

AIT Automation Bezel   No.1 Phillips Screwdriver
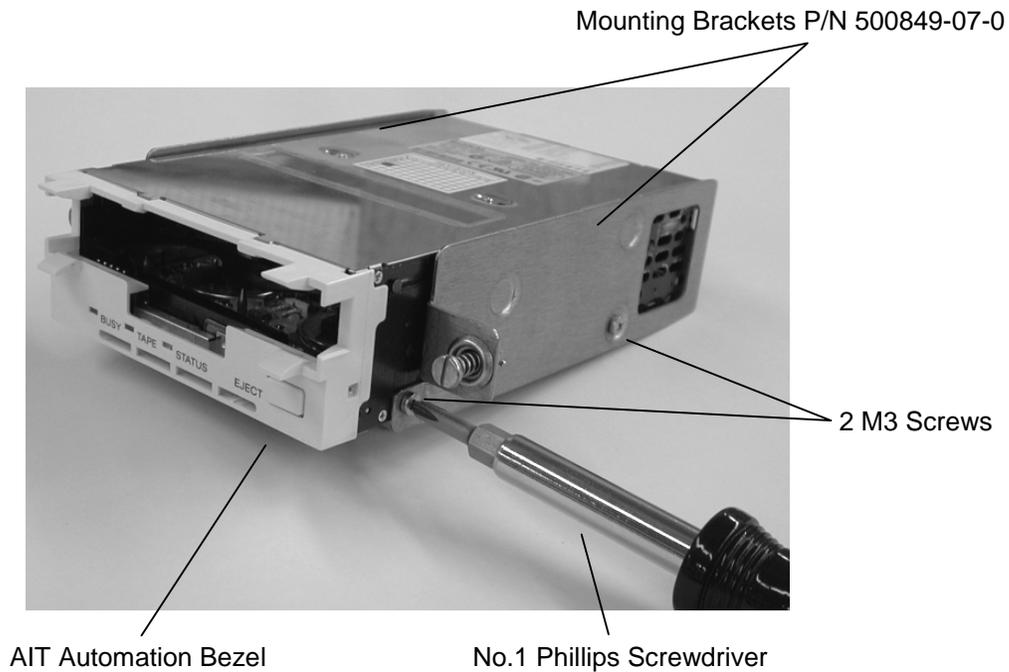
Figure 3-5   View of AIT Series Mounting Brackets (for TLS-4212/4222 only)

3.4.1   Open the Drive Access Hatch or Remove the Drive Access Cover

CAUTION

Make certain that the TLS power switch is OFF and the power cord is removed.

1. On TLS-42xx series libraries, unlock the Drive Access Hatch at the rear of the TLS by turning the two 1/4-Turn Fasteners one-quarter turn counter-clockwise (see Figure 3-6).

2. Lower the Drive Access Hatch to gain access to the tape drives and Drive Bay board. The hatch swings down on hinges.
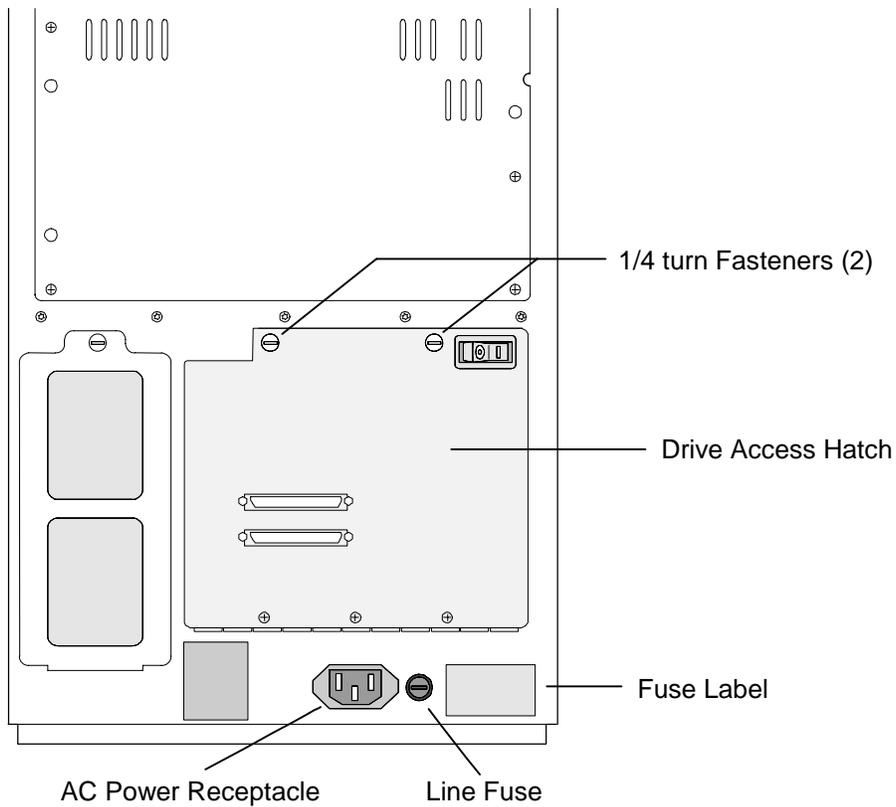
Figure 3-6   TLS Rear View (42xx shown)

On TLS-44xx and TLS-46xx series libraries, remove the Drive Access Panel at the rear of the TLS by turning the three or four 1/4-Turn Fasteners one quarter-turn counter-clockwise (see Figure 3-7).
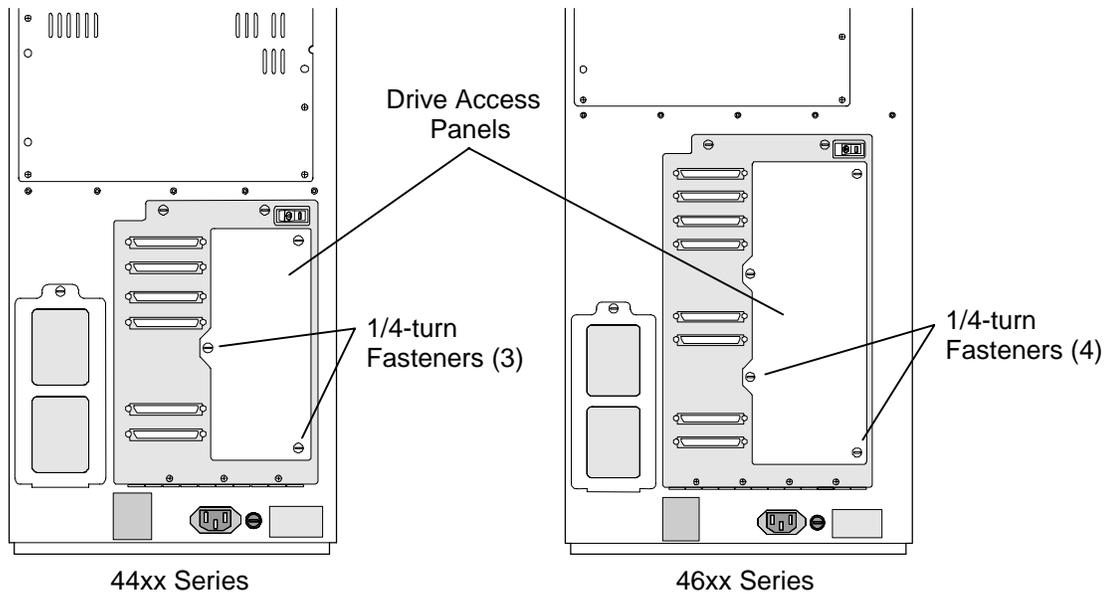
Figure 3-7   TLS Rear View (44xx and 46xx shown)

On 412xxx series libraries, remove the appropriate Drive Access Panel at the rear on the TLS by turning the five 1/4-Turn Fasteners one quarter-turn counter-clockwise (see Figure 3-8).
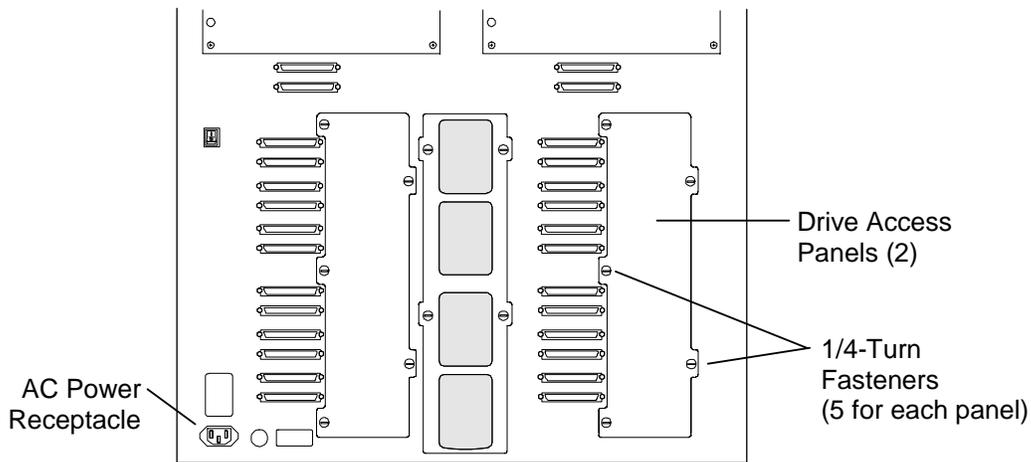
Figure 3-8   TLS Rear View (412xxx shown)

3.4.2   Installing the Tape Drives into the Drive Bay

The following steps outline the actions necessary to install a tape drive into the TLS drive bay.

CAUTION

Make certain that the TLS power switch is OFF and the power cord is removed.

1. Open the front door and if necessary, manually lift the carriage up and out of the way of the drive bay.

2. Slide the tape drive into its assigned location while guiding the attached AIT Control and Power cables so that they pass easily to the rear of the drive bay. It may be helpful to temporarily hold the cables in place over the back of the drive with a strip of masking or cellophane tape.

3. Secure the tape drive by depressing and simultaneously turning the two 1/4-Turn Fasteners on the mounting brackets one quarter-turn clockwise as shown in Figure 3-9.

4. Repeat steps 2 & 3 to mount additional tape drives.

Figure 3-9   Installing the Drive into the Drive Bay

3.4.3   Plug the Power and AIT Control Cables into the Drive Bay Circuit Board

1.   Plug the drive's drive power cable into the corresponding numbered drive power header on the Drive Bay PCBA (e.g. D1PWR, D2PWR, etc.; the connectors are polarized). See Figure 3-10. Connector D1PWR belongs to the top tape drive.

NOTE

Libraries manufactured prior to July of 1999 (S/N < 907xxx) utilize a Power Distribution board instead of the Drive Bay board. The power connection is identical.
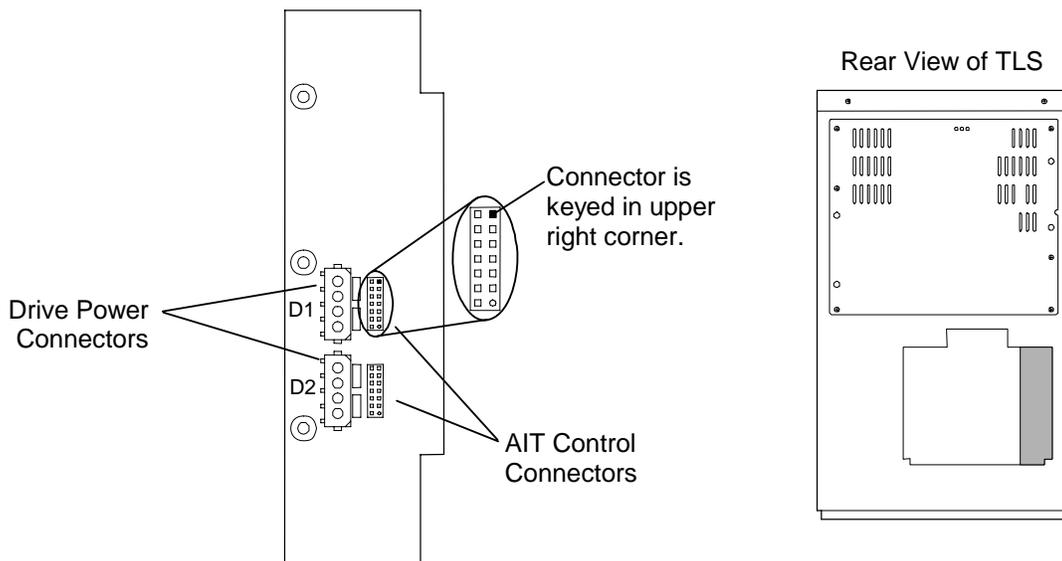
Figure 3-10   Drive Bay PCBA Connectors (42xx shown)

2. Connect the AIT Control Cable to the corresponding DxCNTL header on the Drive Bay board. Note the connector is keyed. See Figure 3-12.

3. Repeat steps 1-2 for the remaining tape drives. Connector D2PWR goes to the second tape drive from the top, etc.
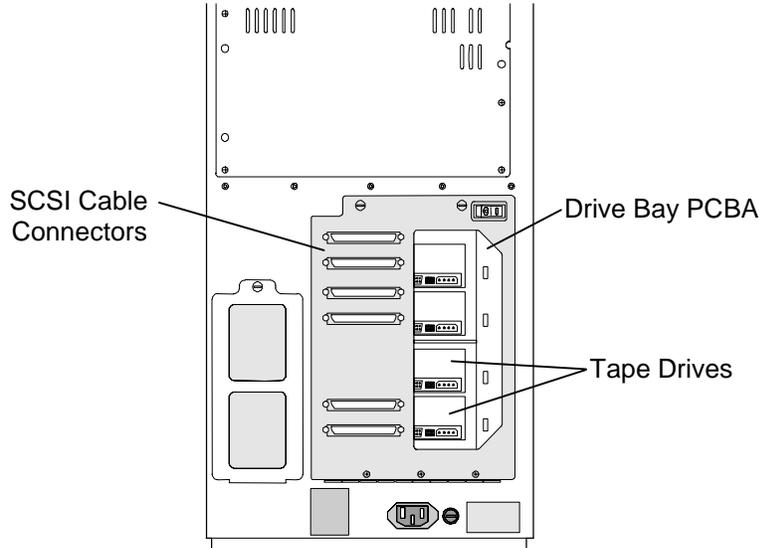
Figure 3-11   Tape Drives & Drive Bay PCBA (TLS Rear View)
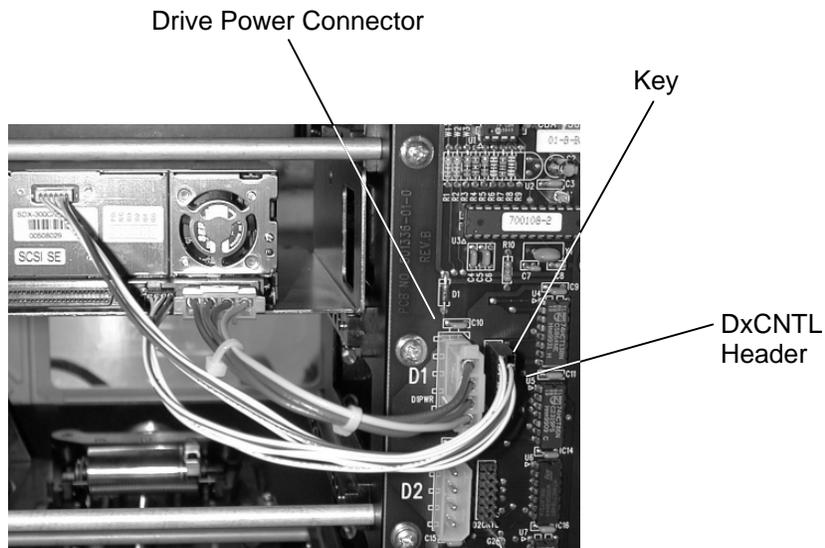
Figure 3-12   AIT Control and Power Cables

3.4.4 Connecting the SCSI Data Cable

CAUTION

SCSI cables are fragile and can be damaged by pulling on the cable instead of the pull-tab provided at each connector.

1. Connect the top SCSI Data Cable Connector to the top tape drive. Make certain the connector is fully inserted at both ends.

2. If additional tape drives are being installed, be sure to connect the Data Cable Connectors in order, top to bottom.
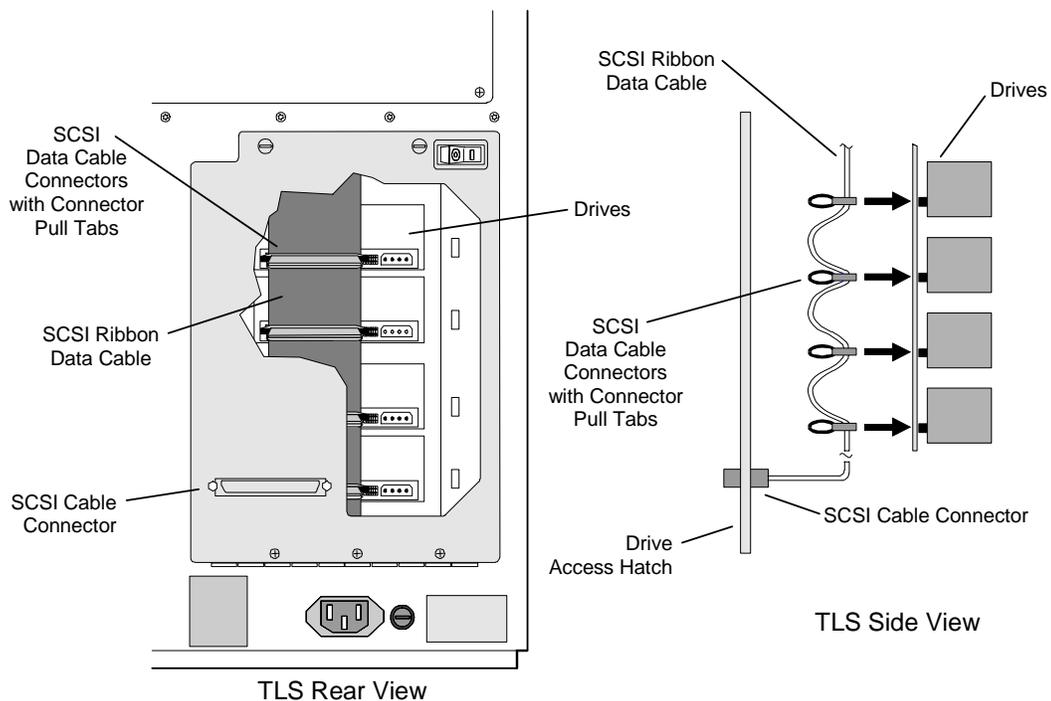
Figure 3-13   Connecting SCSI Data Cables

NOTE

Figure 3-13 shows 1 SCSI Ribbon Data Cable Connected to 4 Drives. Complete cabling options for each TLS model are shown in the TLS-4000 Installation and Operation Manual (Qualstar document number 501370). Cabling options for the 412xxx series of libraries is shown in the TLS-412xxx Installation and Operation Manual (Qualstar document number 501300).

3.4.5 Check Tape Drive Power

1. Attach the AC (mains) power cord to the library and turn its power switch on.

2. Observe that the two green LEDS (+5V & +12V) on the Drive Bay board (or Power Distribution board on libraries manufactured prior to July of 1999 (S/N < 907xxx)) are fully illuminated. They should be of nearly equal brilliance and must remain steadily on. Any deviation from two bright & steady LEDS indicates a problem with the drive power supply, a tape drive or the drive power wiring. If a problem exists, contact Qualstar Technical Support at the location or numbers listed on page i of this manual.

3. **Turn off the library's power switch and remove the AC (mains) power cord.**

3.4.6 Replace the Drive Access Panel or Close the Drive Access Hatch

1. On TLS-42xx series libraries, lift the Drive Access Hatch to its closed position and secure by turning the two 1/4-Turn Fasteners one-quarter turn clockwise (see Figure 3-6).

2. On TLS-44xx, TLS-46xx and TLS-412xxx series libraries, replace the Drive Access Panel at the rear of the TLS and secure by turning the three, four or five 1/4-Turn Fasteners one quarter-turn clockwise (see Figure 3-7 and Figure 3-8).

3.4.7 Proceed with Library Configuration

The TLS must be configured to recognize the installed tape drives. Their make and model numbers must be selected from the list a supported drives found in the `Configuration\Drive\Drive ?` menu. The Qualstar default SCSI ID's for the drives are T1=1, T2=2, etc. Proceed to the Medium-changer configuration section in the Installation chapter of the TLS-4000 Installation and Operation Manual (Qualstar document number 501370) for detailed instructions on TLS-4000 series libraries. For TLS-412xxx series libraries refer to the TLS-412xxx Installation and Operation Manual (Qualstar document number 501300).

3.4.8 Tape Drive Removal

The tape drive removal procedure is the reverse of the installation procedure. If a tape drive is removed, or replaced, the changer must be correctly reconfigured to reflect any changes. Please refer to the TLS-4000 Installation and Operation Manual (Qualstar document number 501370) for the necessary configuration procedures in TLS-4000 libraries. For the configuration procedures in TLS-412xxx series libraries refer to the TLS-412xxx Installation and Operation Manual (Qualstar document number 501300).

4.   Operation

4.1 Summary of <u>AIT-1</u> and <u>AIT-2</u> LED Indications

AIT-1 and AIT-2 tape drive's LEDs have five different methods of reporting the current status/operation of the drive, as shown in Table 4-1.

LED Function	Meaning
Off	Not active
On	Activity
Flashing - Mode 1	Drive Activity
Flashing - Mode 2	Warning
Flashing - Code 1 or 2	Failure

Table 4-1   Possible LED indications

Figure 4-1 shows the locations of the tape drive's front panel LEDs.

BUSY   TAPE   STATUS   Eject Button
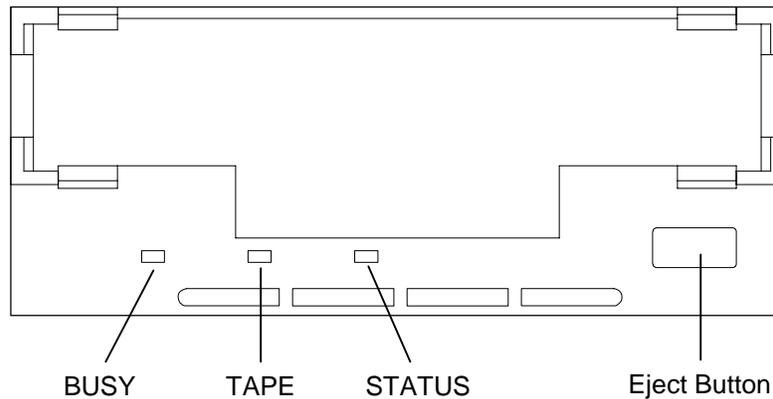
Figure 4-1   Tape Drive LEDs on AIT-1 and AIT-2 Models

Table 4-2 defines each of the tape drive's LED indications.

LED	Busy	Tape	Status
Off	Not Busy	Unloaded	
On	SCSI active	Loaded	Write Protected
Flashing - Mode 1	Drive active	Loading/Unloading	Cleaning Tape at EOM
Flashing - Mode 2		Error Rate Warning	Cleaning Request
Flashing - Code 1	Waiting for Reset	Waiting for Eject	
Flashing - Code 2			Selftest Failure

Table 4-2   LED Indications

0.25
sec.
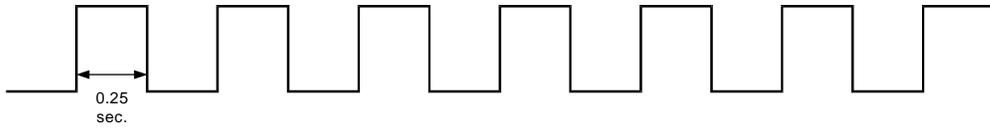
Figure 4-2 LED Flashing Mode 1 Diagram: 0.25 sec ON/ 0.25 sec OFF

0.5
sec.

3.5
sec.
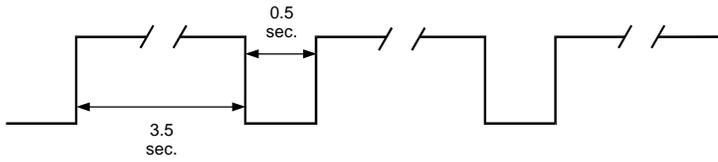
Figure 4-3 LED Flashing Mode 2 Diagram: 3.5 sec ON/0.5 sec OFF

0.25
sec.

1.25
sec.
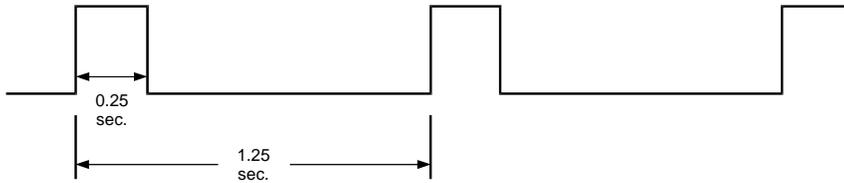
Figure 4-4 LED Flashing Code 1 Diagram: One Pulse

0.25
sec.

1.25
sec.
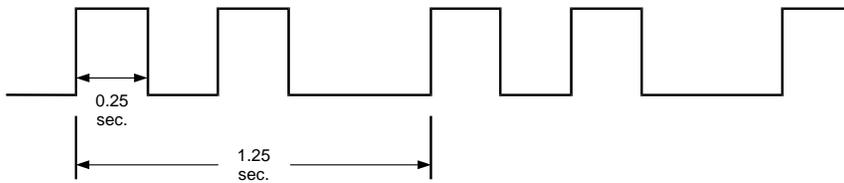
Figure 4-5 LED Flashing Code 2 Diagram: Two Pulses

Table 4-3 shows the LED indication for each AIT-1 and AIT-2 tape drive status/condition. Items marked with an asterisk (*) are not defined.

STATE			LED		
Activity	Cartridge	Other	Busy	Tape	Status
None	None	None	Off	Off	Off
SCSI	None	None	On	Off	Off
Drive	Loading/ Unloading	None	Flashing - Mode 1	Flashing - Mode 1	Off
Drive	Loading/ Unloading	Write Protected	Flashing - Mode 1	Flashing - Mode 1	On
None	Loaded	Cleaning Tape at EOM	Off	On	Flashing - Mode 1
None	Loaded	None	Off	On	Off
SCSI	Loaded	None	On	On	Off
SCSI/ Drive	Loaded	None	Flashing - Mode 1	On	Off
*	Loaded	Write Protected	*	On	On
*	Loaded	Error Rate Warning	*	Flashing - Mode 2	*
*	*	Cleaning Request	*	*	Flashing - Mode 2
*	*	Selftest Failure	*	*	Flashing - Code 2
*	*	Waiting for Reset	Flashing - Code 1	*	*
*	*	Waiting for Eject	*	Flashing - Code 1	*
		Front Panel Test		See Section 4.4.4.1.1	

Table 4-3   AIT-1 and AIT-2 Tape Drive LED Indications

4.2 Summary of <u>AIT-3</u> LED Indications

AIT-3 tape drives have three LED's on the front panel of the drive. The "Tape Motion" LED is to indicate tape motion in the drive. The "Cleaning Request" LED will be on when the use of a cleaning tape is required. The "Replace Tape" LED will be lit when the tape cartridge needs to be replaced. It should also be on if a medium error occurs. All of the LED's will flash fast simultaneously, if there is a tape drive malfunction.

Tape Motion   Cleaning Request   Replace Tape   Eject Button
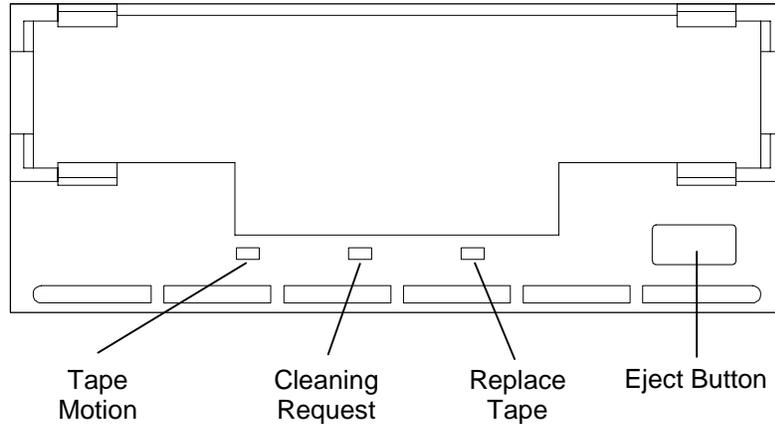
Figure 4-6 Tape Drive LEDs on AIT-3 Models

Table 4-4 defines each of the tape drive's LED indications.

LED	Tape Motion	Cleaning Request	Replace Tape
Off	No Tape is Loaded	Cleaning is Not Necessary	No Media Error Occurred
On	Tape is Loaded	Cleaning is Requested	Media Error Occurred
Flashing - Slowly	Tape Access in Progress (Write/Read)	Cleaning is Not Completed	Media Warning
Flashing - Fast	Tape Access in Progress (Others)		
All LED's Flashing Fast	Hardware Error Occurred		

Table 4-4 AIT-3 Tape Drive LED Indications
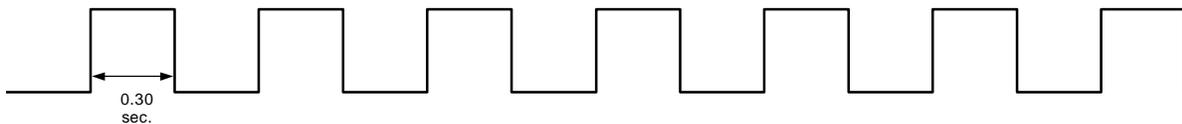
0.30 sec.

Figure 4-7 LED Flashing Fast Diagram: 0.30 sec ON/ 0.30 sec OFF
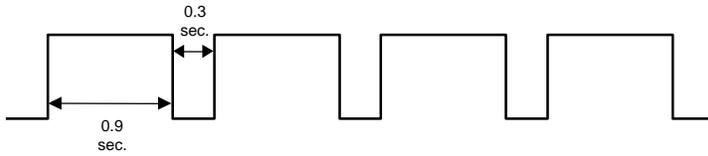
Figure 4-8   LED Flashing Slowly Diagram: 0.9 sec ON/ 0.3 sec OFF

4.3 Operator Action

4.3.1 Applying Power

When the tape drive's power is turned on, it executes a power-up diagnostic, sets internal parameters according to the DIP switch and jumper configuration and then comes on-line.

Once a tape has been loaded, the tape drive sends a CHECK CONDITION response upon receipt of the next SCSI command from the host. The UNIT ATTENTION key is set in the returned REQUEST SENSE data, to indicate that the tape may have been changed. (Sense Key/ASC/ASCQ = 06/28/00.)

4.3.2 Inserting Tapes

As the tape is inserted, the tape drive takes it and automatically loads it into the drive mechanism. The tape drive then performs a tape load sequence, as described in Section 4.4.1. The AIT tape drives will automatically eject an incompatible cartridge. Do not interfere with this ejection process.

4.3.3 Removing Tapes

The tape can be removed from the tape drive, either in response to a SCSI UNLOAD sequence, or by pressing the Eject button (Figure 4-1).

The operator uses the Eject button to initiate the tape unload sequence (see Section 4.4.2). The mechanism winds the tape to its Beginning-of-Media (BOM) position, unthreads it, then ejects the tape from the tape drive.

NOTE

Operation of the Eject button is disabled if the host has previously sent an SCSI PREVENT ALLOW MEDIUM REMOVAL command, with prevent bit set to 1. In this case, pressing the Eject button has no effect and does not initiate an unload sequence. The Eject button returns to normal operation following receipt of a PREVENT ALLOW MEDIUM REMOVAL command, with the prevent set to 0.

4.3.4 Write-Protecting Tapes

Slide the write-protect tab on the back of the tape to the open position to write-protect the tape (Figure 4-9). This way, data can be read from the tape, but not written to it.

To write on a tape, close the write-protect tab to the REC position.

SDX or SDX1

SDX2 or SDX3

To write-protect a tape, open the write-protect tab to the SAFE position.
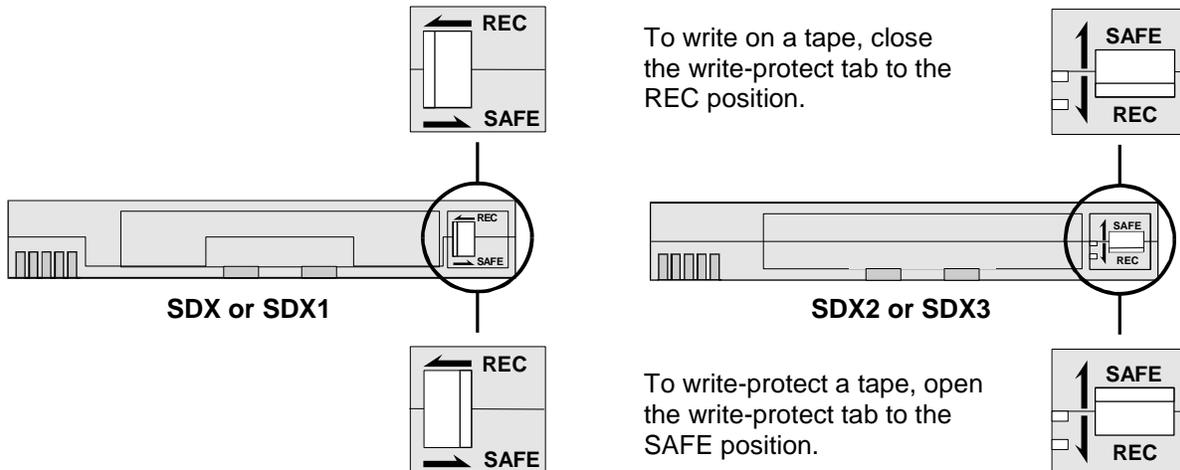
Figure 4-9   Write-protecting a Tape

When a write-protected tape is loaded into an AIT-1 or AIT-2 tape drive, the TAPE and STATUS LEDs light. Also, the BUSY LED lights when there is any activity on the SCSI bus, or any mechanical motions in the tape drive.

CAUTION

When using Sony SDX-T3N non-MIC cartridges the tape log on a write-protected tape (which contains a history of the tape's use) cannot be updated, because new tape log data (held in RAM) cannot be written onto the tape during the unload sequence. Therefore, because the tape log data on the tape becomes obsolete as the write-protected tape is used, the media warning cannot be relied on to indicate when the tape needs to be copied and replaced.

4.3.5 Barcode Labels

Media Size	Qualstar Part Number	Description
AIT	734-0003-8	6 digits, with check character, numbered 0-179.

4.4 Internal Function

4.4.1 The Tape Load Sequence

The following events occur during the tape load sequence:

1. The tape drive accepts a compatible cartridge, threads the tape and rewinds the tape to its Beginning-of-Media (BOM) position. If the tape is not compatible with the tape drive, the tape drive should eject the tape immediately. During the tape threading process, cartridges with MIC (Memory in Cartridge) transfer System Log information to the drive.

2. The tape is moved to its Beginning-of-Tape (BOT) position and the tape's Reference Area is checked to determine the tape's format.

3. When using Sony SDX-T3N non-MIC cartridges, the tape's System Area is accessed and the system log is read into the tape drive.

4. Finally, the tape drive becomes ready.

4.4.2 The Tape Unload Sequence

The following events occur during the tape unload sequence:

1. Following write type commands the tape drive always writes any buffered data onto the tape, followed by an End-of Data (EOD) marker, before it begins the tape unload sequence.

2. The tape drive rewinds the tape to its Beginning-of-Tape (BOT) position.

3. When using Sony SDX-T3N non-MIC cartridges, if the tape is write-enabled, a copy of the tape log held in RAM is written back onto the tape.

4. The tape drive rewinds the tape to its Beginning-of-Media (BOM) position, and un-threads the tape from the drive's mechanism. Cartridges with MIC transfer System Log information from the drive to the cartridge during the unthreading of the tape.

5. Finally, the tape is either retained in the tape drive or ejected, depending on whether media removal is enabled by the PREVENT ALLOW MEDIUM REMOVAL command.

4.4.3 Power-Fail or SCSI Reset Handling

If a power-fail condition occurs, the tape drive performs the following actions, and then reverts to its default configuration:

1. The tape drive remains positioned at the point where the power-fail condition, or a SCSI RESET command, occurred.

2. When power is restored, the tape drive executes the power-up, self-test sequence.

3. If a tape is in the tape drive, the drive starts a tape load sequence, rewinds the tape to its Beginning-of-Tape (BOT) position and remains on-line.

4. The tape drive returns a CHECK CONDITION status for the first command after a power-fail condition, or a SCSI Bus Device Reset message is issued.

4.4.4 Diagnostic and Normal Status Displays

This section describes the LED displays that appear while the tape drive is starting up.

When the tape drive's power is turned on, the drive goes through its diagnostic tests to reach its normal, on-line condition. When a failure is detected during diagnostics, the LEDs show that the tape drive is out of order and needs to be repaired (see Table 4-3 or Table 4-4).

4.4.4.1 Diagnostic Status Display

The power-on diagnostic function starts with the Front Panel Test, which is immediately followed by the Kernel Test.

4.4.4.1.1 Front Panel Test

1. All three front panel LEDs light together for 0.25 or 0.30 seconds (model dependent), then go off together for 0.25 or 0.30 seconds.

2. Step 1 repeats a second time.

3. This concludes the Front Panel test. The Kernel test follows immediately.

4.4.4.1.2 Kernel Test

After the Front Panel test is complete, the tape drive uses the Kernel test to checks its internal units. Note that the name of the LED and the length of time that it is lit will depend on the series of AIT tape drive.

1. The Busy or Tape Motion LED lights by itself for 0.25 or 0.30 seconds, then goes off.

2. The Tape or Cleaning Request LED lights by itself for 0.25 or 0.30 seconds, then goes off.

3. The Status or Replace Tape LED lights by itself for 0.25 or 0.30 seconds, then goes off.

4. Steps 1-3 repeat until the end of the power-on diagnostics function.

NOTE

If a failure is detected during the Kernel test, the AIT drive displays the Failed Unit.

5. When a diagnostic error occurs, the tape drive's power must be turned off. The tape drive will not work at this point and it should be checked or repaired immediately.

NOTE

> *The diagnostic firmware functionally tests the tape drive's electronics. If the diagnostic request comes from the host through the SCSI bus, then the results of the tests are reported back to the host through the SCSI bus.*

4.4.4.2 Normal Status Display

If no failures were detected during the power-on diagnostics, the tape drive enters the Normal Status mode. The LEDs show various Normal Status (No Error) indications, as shown in Table 4-5 and Table 4-6. Items marked with an asterisk (*) are not defined.

LED			STATE		
Busy	**Tape**	**Status**	**Activity**	**Cartridge**	**Other**
Off	Off	Off	None	None	None
On	Off	Off	SCSI	None	None
Flashing - Mode 1	Flashing - Mode 1	Off	Drive	Loading/ Unloading	None
Flashing - Mode 1	Flashing - Mode 1	On	Drive	Loading/ Unloading	Write Protected
Off	On	Flashing - Mode 1	None	Loaded	Cleaning Tape at EOM
Off	On	Off	None	Loaded	None
On	On	Off	SCSI	Loaded	None
Flashing - Mode 1	On	Off	SCSI/Drive	Loaded	None
*	On	On	*	Loaded	Write Protected

Table 4-5   AIT-1 and AIT-2 Tape Drive Normal Status LED Indications

LED	Tape Motion	Cleaning Request	Replace Tape
Off	No Tape is Loaded	Cleaning is Not Necessary	No Media Error Occurred
On	Tape is Loaded	Cleaning is Requested	Media Error Occurred
Flashing - Slowly	Tape Access in Progress (Write/Read)	Cleaning is Not Completed	Media Warning
Flashing - Fast	Tape Access in Progress (Others)		
All LED's Flashing Fast	Hardware Error Occurred		

Table 4-6   AIT-3 Tape Drive Normal Status LED Indications

4.4.4.3 Media Warning

When a Media Warning threshold is exceeded in AIT-1 or AIT-2 tape drives the drive indicates that the tape is defective by flashing the Tape LED: on for 3.5 seconds, then off for 0.5 seconds. The Busy and Status LEDs operate normally. If a Media Warning

threshold is exceeded in AIT-3 drives the Replace Tape LED will flash: on for 0.9 seconds, then off for 0.3 seconds. The Tape Motion and Cleaning Request LEDs operate normally.

If a Media Warning occurs, the data on the tape should be suspected of being incorrect. The tape should be checked, or the previous operations performed using a different tape.

4.5 Tape Format

Advanced Intelligent Tape (AIT) formats, are standards developed by Sony.

4.6 Data Compression

The Data Compression control page allows the host computer to enable and disable data compression. DIP switch number 8 can be used to enable/disable data compression control by the host computer (see Section 2.2.2).

NOTE

The AIT formats allow both compressed and uncompressed data to reside on the same tape.

DIP switch number 7 is used to enable or disable data compression (see Section 2.2). After a power-on reset, with this switch set to OFF, data compression is disabled. However, a MODE SELECT command can override the switch if DIP switch number 8 is off. After a power-on reset, with DIP switch number 7 set to ON, data compression is enabled.

4.7 Maintenance, Troubleshooting and Service

4.7.1 Head Cleaning

The tape drive has a built-in cleaning function, which prevents and recovers from head contamination. However, the use of an approved cleaning tape after every 25 hours of tape drive use is recommended.

4.7.1.1 Cleaning Request Message

1. When a tape drive displays a Cleaning Request message, i.e. when the STATUS LED flashes Mode 2 on AIT-1 and 2 models (see Figure 4-3 and Table 4-3), when AIT-3 models have the CLEANING REQUEST LED on or when a SCSI REQUEST SENSE command is received with the CLN bit set, use a cleaning tape to clean the drive.

2. The Cleaning Request message does not automatically appear at periodic intervals.

4.7.1.2 Using a Cleaning Tape

Use only Sony SDX-TCL or Seagate STMACL cleaning tapes when a drive displays a Cleaning Request message (see Figure 4-3 and Table 4-3) or after 25 hours of use.

1. When a cleaning tape is inserted, automatic cleaning operation starts. When the cleaning cycle is complete, the cleaning tape is ejected.

2. One cleaning tape has enough cleaning tape to clean the tape drive approximately 35 times. If the cleaning tape is ejected without cleaning the tape drive, it is possible that the cleaning tape in the cartridge is already used up. If this happens, insert a new cleaning tape. Do not rewind cleaning tapes.

NOTE

Use only approved cleaning tapes in AIT tape drives.

4.7.2 Troubleshooting Guide

Two types of problems may be encountered during tape drive operation: Operational problems and Read/Write problems.

- Operational problems include any conditions that prevent the tape drive from operating. Operational problems usually are discovered the first time the tape drive is installed in a system, when the system configuration is changed, or when the system is physically moved.

- Read/Write problems include conditions that effect the transfer of data to and from the tape media. Commands such as REWIND, REQUEST SENSE and UNLOAD execute normally, but data transfers fail.

The following sections describe the recommended procedures for solving operational problems and solving read/write problems.

4.7.2.1 Operational Problems

1. The tape drive will not accept a cartridge.

- The cartridge may not be an AIT series cartridge.

- Withdraw the cartridge, then turn off the tape drive's power. Wait 5 seconds, then turn the tape drive's power back on**.** Observe the tape drive and check for a normal power-up diagnostics sequence (see Section 4.4.4).

- If the LEDs do not light, check the power supply and power cable connection. If the tape drive completes the power-up diagnostics sequence normally, but still will not accept a cartridge, the drive may be defective.

- A cartridge may already be in the tape drive.
  If the Tape or Tape Motion LED is on, press the EJECT button to eject the cartridge from the tape drive, then insert the desired cartridge.

- The tape drive's power was turned off while a cartridge was in the drive.
  When the tape drive's power is turned on, the drive will detect the cartridge and rewind it to its Beginning-of-Tape (BOT) position. When the tape reaches its BOT position, press the EJECT button to eject the cartridge.

2. A cartridge is in the tape drive and the drive will not eject it.

- If the SCSI PREVENT ALLOW MEDIUM REMOVAL command has been sent to the tape drive (with the Prevent bit set to ONE), the drive will not eject the cartridge and the drive's EJECT button will be disabled, even after an unload sequence is issued. In this case, do one of the following things to override the PREVENT MEDIA REMOVAL condition:
  a) Send a PREVENT ALLOW MEDIUM REMOVAL SCSI command to the tape drive, with the Prevent bit clear.
  b) Issue a SCSI Bus Device Reset Message.
  c) Turn the tape drive's (library's) power off and then back on. **Wait at least ten seconds after power is turned off before reapplying power to the library.** The library must have sufficient time to complete it's logical power down sequence.

- If the tape has not yet ejected from the drive, follow this procedure:
  a) Manually press the EJECT button.
  b) If the previous step did not work, press and hold the EJECT button for 10 seconds. This will only work when the firmware recognizes a fault condition.
  c) If the previous step did not work, cycle the drive's (library's) power off and back on. **Wait at least ten seconds after power is turned off before reapplying power to the library.** The library must have sufficient time to complete it's logical power down sequence.
  d) Manually press the EJECT button.
  e) If the previous step did not work, press and hold the EJECT button for 10 seconds.

- If a cartridge is still in the tape drive after following the procedures above, the drive has a serious problem and should be returned for repair, preferably with the cartridge in place (see Section **Error! Reference source not found.**).

3. The tape drive powers up properly and loads/unloads cartridges, but will not respond to any SCSI commands.

- If a SCSI Bus Device Reset does not cause the tape drive to reset, the same way the drive resets during the power-on, self-test diagnostics, try the following options:
  a) Check the SCSI cable connectors.
  b) Check for bent pins in the male connector.
  c) Check for a broken cable or a defective connector.
  d) Temporarily replace the tape drive with another SCSI device that is known to be good, in the same location on the SCSI bus, and check the good device's operation.

- If a SCSI Bus Device Reset does cause the tape drive to reset, then the problem may be with the SCSI bus ID or termination. In this case, try the following options:
  a) Check that the SCSI bus ID jumpers are set for the proper address (see Section 2.2.4).
  b) Check the SCSI bus termination.
  c) Make sure that the two SCSI devices at the ends of the SCSI bus are terminated, and

that no other units on the SCSI bus have terminators installed.

d) Make sure that no two devices on the same bus have the same SCSI ID number.

NOTE

The strength of the SCSI bus signals can be affected, and signal drivers can be damaged, if too many terminators are installed on the SCSI bus.

4.7.2.2 Read/Write Problems

To prevent read/write errors, follow the cleaning recommendations in Section 4.7.1.

If a read/write error occurs, a combination of the following steps should correct the problem.

- Remove the tape.

- Clean the tape drive with an approved AIT cleaning tape (model SDX-TCL).
  Try cleaning the drive approximately 5 times in succession.

- Load a new tape into the tape drive.

- Retry the read/write operation.

NOTE

If the steps in Section 4.7.2 do not correct the problem, the tape drive may be defective and should be returned for service.

4.7.3 Packaging for Return to Qualstar

The tape drive should be returned in suitable packaging. Call Qualstar Technical Support if the proper packaging is not available (see *Technical Support* in the front of this manual).

Qualstar will not take responsibility for shipping damage caused to an improperly packaged tape drive.

5.   Application Notes

5.1 SDT5000 Emulation

The Sony SDX-300/310 firmware offer the ability to set the tape drive to report the inquiry string of the Sony SDT5000 DDS (4mm) tape drive. This feature enables the Sony AIT drive to be addressed by applications that do not yet recognize the SDX inquiry string. Operating the Sony SDX-300 in this mode does not change its performance or capacity.

To select the SDT5000 emulation mode, set the tape drive's DIP switches, *before installing the Sony SDX tape drive* (refer to Chapter 2).

5.2 SDX-300C Emulation

The Sony SDX-500C and SDX-700C firmware offers the ability to set the tape drive to report the inquiry string of the Sony SDX-300C AIT-1 tape drive. This feature enables a AIT-2 or AIT-3 drive to be addressed by applications that do not yet recognize the SDX-500 or SDX-700 inquiry string. Operating the Sony SDX-500 or SDX-700 in this mode does not change its performance or capacity.

To select the SDX-300C emulation mode, set the tape drive's DIP switches, *before installing the Sony SDX-500C or SDX-700C tape drive* (refer to Chapter 2).

5.3 Sony SDX-310 Inquiry String

The Sony SDX-310 tape drive reports the same inquiry string as the Sony SDX-300 tape drive, for operating system compatibility and to simplify interfacing with known computer systems.

5.4 Sony SDX-510 Inquiry String

The Sony SDX-510 tape drive reports the same inquiry string as the Sony SDX-500 tape drive, for operating system compatibility and to simplify interfacing with known computer systems.

5.5 PC-based Systems

SCO UNIX and Unixware

AIT tape drives should be "plug-and-play" compatible with SCO UNIX, SCO Unixware and XENIX, using the configuration switch settings for *PC-Based SCO Workstations* in Chapter 2.

5.6 IBM Workstations

5.6.1 AIX 3.2 and AIX 3.2.x

The AIT tape drive can be configured to work with AIX 3.2 and AIX 3.2.x by reconfiguring the kernel using the SMIT utility. Select the *Other SCSI Device* option and use the configuration switch settings for *IBM RS/6000 Workstations* shown in Chapter 2.

To configure AIX using the SMIT utility, do the following:

1. Type: `smit tape`.

2. Select: `add a tape drive`.

3. Select: `SCSI tape drive`.

4. Select: `change/show characteristics of a tape drive`, and set the appropriate connection address.

5. Select: `Other SCSI tape drive`.
   Do not select `4mm2gb`.

6. The default block size is 512 bytes.

5.6.2 AIX 4.2.5 and 4.3.1

The default mode dip switch settings (switches 1-4 off) can be used to configure the drives to work with AIX 4.x.

After the drive is connected and SCSI bus integrity has been verified do the following:

1. Boot the RS6000, log in as root, and start a terminal window.

2. To list a hardware inventory of the configured SCSI devices type: `lsdev -C -s scsi`. The tape should be marked as "available" with an rmt device name. It will be configured as a generic device. It is not necessary to use "SMIT" to modify any of the tapes software control parameters.

3. The tape can now be used for data operations.

5.7 DEC Workstations

5.7.1 VMS and Digital UNIX v3.x

The AIT drive is "plug-and-play" compatible with VMS and Digital UNIX, using the configuration switch settings for *Digital Workstations* in Chapter 2. If for some reason there is a problem, Digital UNIX can be reconfigured to use the Sony SDX as follows:

1. Add the following information to the ***cam_devdesc_tab*** structure of the ***/usr/sys/data/cam_data.c*** file:

Sony drives:

```
/* Sony tape drive */
{
"SONY     SDX-300C, 13, DEV_TZRDAT,
(ALL_DTYPE_SEQUENTIAL&lt;<DTYPE_SHFT)|SZ_RDAT_CLASS,
(struct pt_info *)ccmn_null_sizes, SZ_NO_BLK,(DEC_MAX_REC-1),
&tlz09_dens, NO_MODE_TAB, SZ_NO_FLAGS,
NO_OPT_CMDS, SZ_READY_DEF, SZ_NO_QUE,
DD_RQSNS_VAL|DD_INQ_VAL,
36,64
},
```

Seagate drives:

```
/* Seagate Sidewinder 50 tape drive */
{
"SEAGATE     AIT, 11, DEV_TZRDAT,
(ALL_DTYPE_SEQUENTIAL&lt;<DTYPE_SHFT)|SZ_RDAT_CLASS,
(struct pt_info *)ccmn_null_sizes, SZ_NO_BLK,(DEC_MAX_REC-1),
&tlz09_dens, NO_MODE_TAB, SZ_NO_FLAGS,
NO_OPT_CMDS, SZ_READY_DEF, SZ_NO_QUE,
DD_RQSNS_VAL|DD_INQ_VAL,
36,64
},
```

NOTE

In the line "`SONY     SDX-300C`" above, there are four blank spaces between `SONY` and `SDX-300C`. These spaces are critical for proper operation. This also applies to the Sony SDX-500C, Sony SDX-700C and Seagate configuration.

2. Rebuild the kernel using the ***doconfig*** script and reboot the system.

3. Device files can be created by typing the following:

```
#cd /dev/rmt#./MAKEDEV tzX
```

```
where X = <(8 * bus ID) + SCSI ID>
```

5.7.2 Digital UNIX v4.x

The AIT tape drive will run on Digital Unix 4.x without any kernel modifications. However, for the AIT drive the maximum block size supported in the default configuration is 64K. Significant performance improvements can be achieved by using 256K block sizes. To reconfigure Digital UNIX to support BS>64K:

1) log in as root

2) cd /etc

3) make a backup copy of the DDR database source file cp ddr.dbase ddr.dbase_orig

4) edit the DDR database source file: vi ddr.dbase

5) locate the SCSIDEVICE entry for "TZS20". Make a copy of this entire entry. Change "DEC" to "SONY" and change "TZS20" to "SDX-300C". Save the changes and exit vi.

```
Sony drives:
SCSIDEVICE
#
      Type=tape
      Name="Sony"  "SDX-300C"
      #
            PARAMETERS:
            TypeSubClass=8mm
            TagQueueDepth=0
            MaxTransferSize=0x0ffffff#(16MB-1)
            ReadyTimeSeconds=90#seconds
            DENSITY:
                  #
                  DensityNumber=0,3,4,5,6,7
                  DensityCode=default
                  CompressionCode=0x0
                  Buffered=0x1
                  DENSITY:
                        #
                        DensityNumber=1,2
                        DensityCode=default
                        CompressionCode=0x1
                        Buffered=0x1
```

```
Seagate drives:
SCSIDEVICE
#
        Type=tape
        Name="Seagate"  "SIDEWINDER 50"
        #
                PARAMETERS:
                TypeSubClass=8mm
                TagQueueDepth=0
                MaxTransferSize=0x0ffffff#(16MB-1)
                ReadyTimeSeconds=90#seconds
                DENSITY:
                        #
                        DensityNumber=0,3,4,5,6,7
                        DensityCode=default
                        CompressionCode=0x0
                        Buffered=0x1
                        DENSITY:
                                #
                                DensityNumber=1,2
                                DensityCode=default
                                CompressionCode=0x1
                                Buffered=0x1
```

Find the entry: `scsi_density_table_size = 0x30` or
Find the entry: `scsi_density_table_size = 0x31`

Change entry to: `scsi_density_table_size = 0x31` and/or
Change entry to: `scsi_density_table_size = 0x32`

Find the entry: `scsi_tape_density[0x29] = "density_code_29"  0    0`
Append with: `scsi_tape_density[0x29] = "density_code_30"  0    0`
and
Append with: `scsi_tape_density[0x29] = "density_code_31"  0    0`

Compile the DDR database: `#ddr_config -c ddr.dbase`

Create tape devices as required: (most versions of 4.x will dynamically create device files on bootup) `./MAKEDEV tz`

5.8 Sun Workstations

Under most conditions, the AIT drive will work on SunOS and Solaris without kernel modification. For device file control of compression and non-compression modes, the kernel must be reconfigured as described below in Section 5.8.1 and Section 5.8.2.

5.8.1 SunOS 4.1.x

To configure SunOS 4.1.x, the **stdef.h** and **st_conf.c** files in the **/usr/sys/scsi/targets** directory must be modified, and then the kernel must be rebuilt.

1. Modify the **stdef.h** file by adding a define statement as follows:
   Sony drives:

   ```
   #define ST_TYPE_SONY <value>
   ```
   Seagate drives:

   ```
   #define ST_TYPE_SEAGATE <value>
   ```

   Add this line after the last ST_TYPE_define statement in the file and use the next incremental hexadecimal value. Depending on the release and device support included in the system, the hexadecimal value used may vary. For example, if the last ST_TYPE_define statement in the file is

   ```
   #define ST_TYPE_METRUM 0x2d
   ```

   add the following define statement:

   ```
   #define ST_TYPE_SONY 0x2e
   ```

   <div align="center">

   or

   </div>

   ```
   #define ST_TYPE_SEAGATE 0x2e
   ```

2. Modify the **st_conf.c** file by adding the following lines at the end of the device definition list:

   Sony drives:

   ```
   /* Sony AIT 8mm drive */
   {
   "Sony 8mm Helical Scan",15,"SONY     SDX-300C",
   ST_TYPE_EXB8500, 1024,(ST_VARIABLE |ST_BSF |ST_BSR
   |ST_LONG_ERASE |ST_KNOWS_EOD),
   5000,5000,
   {0x13,0x13,0x8C,0x8C},{0,0,0,0}
   },
   ```

   Seagate drives:

   ```
   /* Seagate Sidewinder 50 drive */
   {
   "Seagate AIT",15,"Seagate     Sidewinder 50",
   ST_TYPE_EXB8500, 1024,(ST_VARIABLE |ST_BSF |ST_BSR
   |ST_LONG_ERASE |ST_KNOWS_EOD),
   5000,5000,
   {0x13,0x13,0x8C,0x8C},{0,0,0,0}
   },
   ```

3. Rebuild the kernel to include the new device definition by using the **config** command. Please refer to the **config man page** for more information.

5.8.2   Solaris 2.3

To configure Solaris 2.3 to use AIT drives, add the following lines to the **st.conf** file in the **/kernel/drv/st.conf** file and reboot the system using the **boot -r** option:

```
Sony drives:

tape-config-list=
“SONY     SDX-300C”,“Sony AIT 8mm”,“SONY_TAPE”;
SONY_TAPE=1,0x34,1024,0x1639,4,0x13,0x8c,0x8c,0x8c,3;
```

or

```
“SONY     SDX-500C”,“Sony AIT2 8mm”,“SONY_TAPE”;
SONY_TAPE=1,0x34,1024,0x1639,4,0x13,0x8c,0x8c,0x8c,3;
```

or

```
“SONY     SDX-700C”,“Sony AIT3 8mm”,“SONY_TAPE”;
SONY_TAPE=1,0x34,1024,0x1639,4,0x13,0x8c,0x8c,0x8c,3;

Seagate drives:

tape-config-list=
“SEAGATE    SIDEWINDER 50”,“Seagate AIT 8mm”,“SEAGATE_TAPE”;
SEAGATE_TAPE=1,0x34,1024,0x1639,4,0x13,0x8c,0x8c,0x8c,3;
```

Now, reboot the system using the **boot -r** option. The **-r** option will force the system to check for any new devices, and will update the **/dev** device file directory.

5.8.3 Solaris 2.4, 2.5.1, 2.6, 7 and 8

To configure Solaris 2.4 and up to use AIT drives, add the following lines to the **st.conf** file in the **/kernel/drv/st.conf** file and reboot the system using the **boot -r** option:

```
Sony drives:

tape-config-list=
"SONY    SDX-300C","Sony AIT 8mm","SONY_TAPE";
SONY_AIT=1,0x36,0,0xd679,4,0x00,0x00,0x00,0x00,0;
```

<div align="center">or</div>

```
"SONY    SDX-500C","Sony AIT2 8mm","SONY_TAPE";
SONY_AIT=1,0x36,0,0xd679,4,0x00,0x00,0x00,0x00,0;
```

<div align="center">or</div>

```
"SONY    SDX-700C","Sony AIT3 8mm","SONY_TAPE";
SONY_AIT=1,0x36,0,0xd679,4,0x00,0x00,0x00,0x00,0;

Seagate drives:

tape-config-list=
"SEAGATE    SIDEWINDER 50","Seagate AIT 8mm","SEAGATE_TAPE";
SEAGATE_TAPE=1,0x36,0,0xd679,4,0x00,0x00,0x00,0x00,0;
```

NOTE

In the line "SONY   SDX-300C" above, there are four blank spaces between SONY and SDX-300C. These spaces are critical for proper operation. This also applies to the Sony SDX-500C, Sony SDX-700C and Seagate configuration.

Now, reboot the system using the **boot -r** option. The **-r** option will force the system to check for any new devices, and will update the **/dev** device file directory.

NOTE

On Sun Ultra series systems using the Symbios 53C875 scsi chip, the console will recognize the devices, but may not create device files. If this happens set the drive to the IRIX switch settings and rebuild the kernel as above.

5.9 SGI Workstations

Irix 5.x and Irix 6.x

The AIT tape drive is command-line compatible with the Irix 5.x and Irix 6.x, using the configuration switch settings for *SGI Workstations* in Chapter 2. For device file control and tape access from the Irix desktop, the kernel needs to be modified and the correct patch must be loaded. See the SGI support website at www.sgi.com for current releases, you will need a support contract for access to most of the patches.

As of 9/21/98 these are the patches needed:

IRIX Version	Patch#	Description
IRIX 5.3	2184 1948 2224	+5.3 Tape driver bug fixes +HINV rollup +SCSI Rollup for 5.3
IRIX 6.2	2861	+6.2 Tape driver rollup
IRIX 6.3	2838	+6.3 Tape driver fixes
IRIX 6.4	3301 2998 3305	+SCSI rollup +6.4 Tape driver fixes +HINV rollup

For **IRIX 5.3, 6.2, and 6.3** add the following entry to **/dev/MAKEDEV/.d/TPS_base**

Search for the following entry:

```
*Drive?type:*DAT*|Drive?type:*8mm?8200*)
    set s nrs ns "" nrns nr sv nrsv nsv v nrnsv nrv ;
    for add in 0 1 2 2 3 3 4 5 6 6 7 7 ; do
        mdev=`expr $minor + $add`;
        mknod ${prf}$1 c ${C_TPS} $mdev;
        case "$stat" {
        *Device:*Python*01931*) # DDS2 drive with compression
                mdev=`expr $mdev + 8`;
                mknod ${prf}$1c c ${C_TPS} $mdev;
                ;;
        }
        shift;
    done ;;
```

Add the (**bold**) entry so that the entire entry looks like this:

```
Sony drives:

*Drive?type:*DAT*|Drive?type:*8mm?8200*)
    set s nrs ns "" nrns nr sv nrsv nsv v nrnsv nrv ;
    for add in 0 1 2 2 3 3 4 5 6 6 7 7 ; do
        mdev=`expr $minor + $add`;
        mknod ${prf}$1 c ${C_TPS} $mdev;
        case "$stat" {
```

```
              *Device:*Python*01931*) # DDS2 drive with compression
                      mdev=`expr $mdev + 8`;
                      mknod ${prf}$1c c ${C_TPS} $mdev;
                      ;;
      *Device:*SDX-300C*)
                      mdev=`expr $mdev + 8`;
                      mknod ${prf}$1 c ${C_TPS} $mdev;
                      ;;
      }
      shift;
  done ;;
```

<div align="center">

NOTE

</div>

You can substitute the correct inquiry string for any Sony drive you wish to add.
*For example, instead of ***Device:SDX-300C*)** you can use ***Device:SDX-500C*)***

```
Seagate drives:

*Drive?type:*DAT*|Drive?type:*8mm?8200*)
    set s nrs ns "" nrns nr sv nrsv nsv v nrnsv nrv ;
    for add in 0 1 2 2 3 3 4 5 6 6 7 7 ; do
        mdev=`expr $minor + $add`;
        mknod ${prf}$1 c ${C_TPS} $mdev;
        case "$stat" {
      *Device:*Python*01931*) # DDS2 drive with compression
                      mdev=`expr $mdev + 8`;
                      mknod ${prf}$1c c ${C_TPS} $mdev;
                      ;;
      *Device:*SIDEWINDER 50*)
                      mdev=`expr $mdev + 8`;
                      mknod ${prf}$1 c ${C_TPS} $mdev;
                      ;;
      }
      shift;
  done ;;
```

Add the following entry to **/var/sysgen/master.d/scsi**

```
Sony drives:

{
DATTAPE,TPDAT,4,8,"SONY","SDX-300C",0,0,{0,0,0,0},
MTCAN_BSF|MTCAN_BSR|MTCAN_APPEND|MTCAN_SETMK|MTCAN_PART|
MTCAN_PREV|MTCAN_SYNC|MTCAN_SPEOD|MTCAN_CHKRDY|
MTCAN_VAR|MTCAN_SETSZ|MTCAN_SILI|MTCAN_SEEK|
MTCAN_CHTYPEANY|MTCAN_SETDEN,
60,4*60,4*60,6*60,512,512*512
},
```

NOTE

You can substitute the correct inquiry string for any Sony drive you wish to add.
*For example, instead of **Device:SDX-300C*)** you can use **Device:SDX-500C*)***

```
Seagate drives:

{
DATTAPE,TPDAT,7,3,"SEAGATE","AIT",0,0,{0,0,0,0},
MTCAN_BSF|MTCAN_BSR|MTCAN_APPEND|MTCAN_SETMK|MTCAN_PART|
MTCAN_PREV|MTCAN_SYNC|MTCAN_SPEOD|MTCAN_CHKRDY|
MTCAN_VAR|MTCAN_SETSZ|MTCAN_SILI|MTCAN_SEEK|
MTCAN_CHTYPEANY|MTCAN_SETDEN,
60,4*60,4*60,512,512*512
},
```

After the **scsi** file is modified, the system must be reconfigured using the **autoconfig** command. Please refer to the **autoconfig man page** for more information.

For **IRIX 6.4** support you must get at least the following patches from SGI. (It is always a good idea to search the SGI website at www.sgi.com for the latest available patches, see patch table above):

#2837 SCSI rollup
#2863 Tape driver updates
#2871 HINV rollup

After loading the required patches you may need to follow the IRIX 5.3, 6.2, and 6.3 procedure above to modify the kernel. If the **/dev/MAKEDEV.d/TPS_base** and the **/var/sysgen/master.d/scsi** files already contain the appropriate entries you will just need to run **autoconfig**.

For IRIX 6.5 support for the AIT tape drive no kernel modifications are necessary.

SGI specific notes:

The Kernel must be rebuilt with AIT drive configuration information or the correct patch must be loaded for the drive to appear on the desktop. SGI is frequently releasing patches, for the latest patches please check the SGI support website at www.sgi.com.

MTCAN notes for /var/sysgen/master.d/scsi file:
These device file names can be interpreted as follows:

Device Name	Function
nr	No rewind on close
v	Device supports variable block sizes
ns	Device does not byte-swap
s	Device does byte-swap
stat	Allows the device to be used when one of the other device files specifying the same physical device is already opened.

The MTCAN values have the following functions:

MTCAN value	Capability Enabled
APPEND	Append to existing tape data
BSF	Backspace file
BSR	Backspace record
CHKRDY	Determine if tape cartridge is present
CHTYPEANY	Change density and/or fixed to variable at points other than beginning of tape
PART	Multiple Partitions
PREV	Prevent media removal
SEEK	Seek to a particular block
SETMK	Setmarks
SETSZ	Fixed Block Size can be set
SILI	Suppress illegal length indicators
SPEOD	Space to end of data
SYNC	Synchronous Mode SCSI
VAR	Variable block sizes

The constants have the following functions:

Constant	Description
40	Transfer time-out in "inverse ticks"
4*60	Minimum time-out in seconds for any command
4*60	Space command time-out in seconds
5*60	Time-out in seconds for long operations (such as rewinds)
512	Default block size in bytes for fixed block size mode
64*512	Recommended blocking factor in bytes for the upper limit of read/write commands

5.10 HP 9000 Workstations

The AIT drive is compatible with the HP 9000 Series 300, 400 and 700, using the configuration switch settings for *HP Workstations* in Chapter 2, and reconfiguring the HP kernel using the SAM utility. The HP 9000 Series 800 servers require a factory modification of the tape drive by Qualstar.

To configure HP-UX, the kernel must be reconfigured using the SAM utility as follows:

1. Log on as root.

2. Run SAM: `$/usr/bin/sam`

3. Choose **Peripheral Devices** and activate [Open].

4. Choose **Tape Drives** and activate [Open].

5. From the "Actions" menu in the "Tape Device Manager" window, choose **Add**.

6. Within the "Add a Tape Drive" window, read the instructions, then activate [OK].

7. SAM may detect that your HP-UX kernel lacks the drivers necessary to make use of the tape drive. If so, read the messages in the "Device Driver Check" window and choose the appropriate action. If **Build a new kernel and shut down the system immediately** is your choice, SAM will create the kernel you need and reboot your computer. The rebooted system will be able to use the tape drive.

8. If you had to shut down your system in order to physically connect the tape drive, re-enter SAM and repeat steps 3 through 6 above.

9. Choose the new tape drive.

10. From the "Actions" menu, choose **Create Device Files**.

11. Activate [OK] and exit SAM.