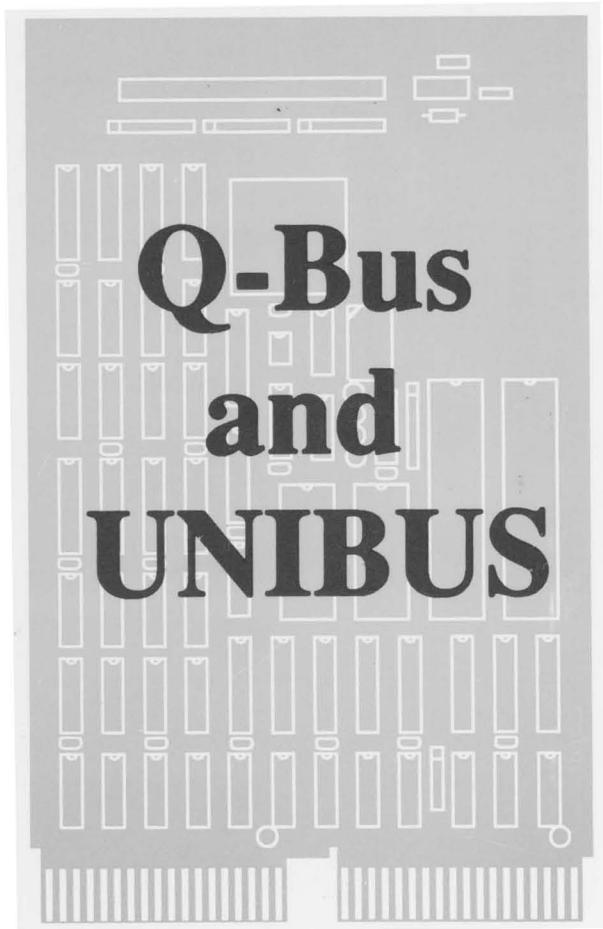


***QT/UT Series
High Performance
SCSI Host Adapters***



Owner's Manual

TTI TRANSITIONAL
TECHNOLOGY, INC.

QT/UT Family
Q-BUS and UNIBUS
TMSCP Compatible
SCSI Host Adapters

Owner's Manual



TRANSITIONAL TECHNOLOGY, INC.

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About This Manual

Nomenclature

The term QT_x is used in this manual to describe one or more members of the QT family of SCSI Host Adapters for Digital Equipment Corp.'s Q-BUS. The term UT_x-1 is used in this manual to describe either or both members of the UT family of SCSI Host Adapters for Digital Equipment Corp.'s UNIBUS. The single-ended option for both the QT series and the UT series is designated by x = 'S', while the differential option is designated by x = 'D'.

The QT series consists of two versions, the QT_x-1 and the QT_x-3. The QT_x-3 has a handle and cabling connection for the BA-200 series enclosures of the MicroVAX 3000/4000, while the QT_x-1 has a standard Q-BUS handle.

When referring to a feature or option of all family members, the term QT_x-1 will be used unless otherwise noted.

Purpose of This Manual

This manual describes how to install, test, and maintain the QT_x-1/QT_x-3 and UT_x-1 family of high performance SCSI host adapters for Digital Equipment Corp.'s Q-BUS and UNIBUS.

Who Should Use This Manual

This manual is for anyone installing and using the QTx-1/QTx-3 or UTx-1 for the first time.

Structure of This Manual

This manual is divided into three chapters:

- Chapter 1 includes an overview of the QT and UT series host adapters and introduces you to some of the features of the product.
- Chapter 2 shows how to install your new QTx or UTx-1.
- Chapter 3 gives you information you will need to make optimal use of the QTx-1/QTx-3 or UTx-1.

Contents

About This Manual	i
Nomenclature	i
Purpose of This Manual	i
Who Should Use This Manual	i
Structure of This Manual	ii
Contents	iii
About the QT/UT Family.....	1-1
Overview	1-1
System Highlights	1-2
Installing Your Host Adapter	2-1
Unpacking	2-2
About SCSI	2-3
SCSI Cabling.....	2-3
SCSI IDs	2-4
Terminators	2-4
Jumper Configuration	2-4
Board Installation	2-5

Determining the Host Adapter CSR.....	2-5
Installing the QTx-1/QTx-3	2-5
Installing the UTx-1	2-6
Drive Configuration	2-8
Adapter Configuration	2-9
[T] Tape CSR	2-10
[S] SCSI ID	2-11
[R] SCSI reset	2-11
[F] Flags	2-12
[0] - [7] SCSI Units	2-13
[DFLT] Factory NovRam Settings	2-15
[TEST] Test SCSI Device	2-15

Using Your QTx/UTx-1 3-1

Figures

2-1	MicroVAX II Installation.....	2-6
2-2	UNIBUS Backplane Layout.....	2-8
2-3	Configuration Options Menu	2-10
2-4	CSR Address Ranges	2-11
2-5	CTLR Flags Definition Table	2-13
2-6	Device Type Configuration Options	2-14
2-7	Cartridge Types.....	2-15
3-1	Multiple Drive/Single Host Configuration	3-2
3-2	Multiple Host/Single Drive Configuration	3-3

3-3	Multiple Drive/Multiple Host Configuration	3-4
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About the QT/UT Family

This chapter describes some of the features of the QT/UT series host adapters.

Overview

The QT series host adapters are intelligent high-performance Q-BUS SCSI host adapters which are fully compatible with the DEC Tape Mass Storage Control Protocol (TMSCP).

The UT series host adapters are intelligent high-performance UNIBUS SCSI host adapters which are fully compatible with the DEC Tape Mass Storage Control Protocol (TMSCP).

Because each member of the QT and UT family of adapters conform strictly to TMSCP, they may be used with nearly every DEC operating system without the use of special software drivers.

System Highlights

- The QT and UT family products work with MicroVAX and PDP-11 systems. VMS, ULTRIX, and selected other operating systems which support TMSCP devices are all supported.
- QT and UT family host adapters are available in either single-ended or differential versions, for cable lengths of up to 20 or 80 feet, respectively.
- The QT and UT family support up to four tape devices with full SCSI arbitration and disconnect/reconnect.
- The QT and UT family supports asynchronous SCSI data transfers, with transfer rates up to 3MB/s.
- The QT and UT family support a wide variety of SCSI tape devices, including TTI's CTS-8210 and CTS-8510 8mm helical scan tape drives.

Installing Your Host Adapter

After helping you check that you have all your equipment, this chapter shows how to set up your QT or UT adapter, including:

- Connecting it to your host computer
- Terminating your SCSI bus
- Setting the SCSI ID and option switches
- Connecting the power cord

Unpacking

Before beginning with the installation, check to make sure you have the following parts which are shipped with your host adapter:

- The interface board itself,
- The bulkhead adapter panel assembly,
- The internal flat ribbon cable that connects the board to the bulkhead panel (except QTx-3, which has a connector for the BA-200 Series MicroVAX 3000/4000 enclosure),
- An external 10 foot shielded cable for connecting external SCSI devices,
- An RS-232 cable for attaching a terminal for configuration and diagnostics, and,
- The QT/UT Family Owner's Manual (this book).

About SCSI

The Small Computer Systems Interface, known as SCSI (pronounced “scuzzy”), is an ANSI standard interface for connecting computers and peripherals together.

SCSI Cabling

There can be as many as eight SCSI devices (including your VAX) connected in a system. Devices are connected to the SCSI bus in a *daisy chain* manner. This means that the cable goes from the host to the first device on the bus, from the first device to the second, and so on.

The overall length of the SCSI cabling may not exceed 6 meters (19.6 feet). Differential SCSI devices such as the CTS-8520 require that cable lengths for the entire bus not exceed 25 meters (81.6 feet). This includes the cabling which connects between the host adapter inside the computer to the rear panel of the computer, which is an important consideration in large VAX computers.

Single-ended SCSI is normally adequate for Q-BUS systems and for single or double drive UNIBUS systems where the drive(s) can be located physically near the host computer. Differential SCSI is typically required in large computer installations where drives are located some distance from the host computer, or are connected to multiple hosts.

When computing cabling lengths, remember that a UNIBUS VAX system requires about 8 feet of cable just to get from the host adapter to the outside of the computer enclosure.

All host adapters and drives on a single SCSI bus must be of the same type. It is not possible to connect differential drives to single-ended host adapters and vice versa. Attempting to do so may cause permanent damage to the equipment and voids all warranties.

SCSI IDs

Each device on the SCSI bus, including the host adapter, is identified by a SCSI ID which is a number ranging from 0 to 7. Each device connected by means of SCSI must have its own unique SCSI ID. The QTx and UTx-1 come preset at the factory to SCSI ID 7.

Terminators

An important part of a properly configured SCSI system are components called SCSI terminators. Terminators are required to avoid electrical reflections that may produce unwanted signals in the SCSI cabling. For the SCSI bus to function reliably, terminators should be installed at each end of the SCSI wiring. The QT and UT family adapters include removable terminators on the board itself; only under unusual circumstances should these be removed.

Jumper Configuration

The QTx and UTx-1 have no hardware jumpers and must be configured via the terminal port. See "Adapter Configuration" below.

Board Installation

First, determine the CSR address to be used by the host adapter. After the adapter is installed, it is configured using an RS-232 terminal. Finally, the configured tape drive is attached to the adapter and the host system is booted.

The following tools are necessary to complete the installation:

- Medium Phillips screwdriver
- Small, thin-bladed screwdriver
- RS-232 terminal such as a VT-100, VT-200 or VT-300 series
- Small pair of diagonal cutters (UTx-1 only)
- Wire wrap tool and wire (UTx-1 only)

Determining the Host Adapter CSR

The host adapter must occupy a specific bus address in order to function properly within the host computer. If the QTx/UTx-1 is the only TMSCP controller on the bus, then the CSR is normally set to 774500. If there are other TMSCP controllers on the bus, then the CSR used depends entirely on the other devices already installed. Existing devices may also need to be reconfigured in order to install this adapter. Determine the CSR address under VMS by using the SYSGEN CONFIGURE command as described in the VMS System Generation Utility Manual.

Installing the QTx-1/QTx-3

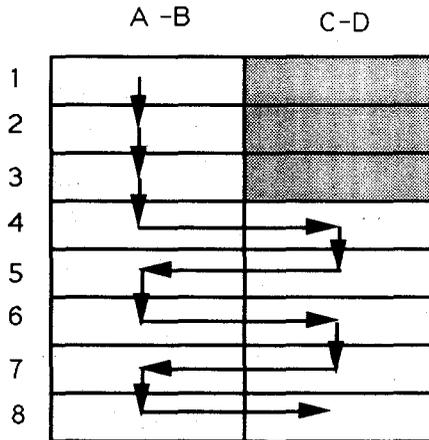
Before installing the adapter, ensure that the power requirements are met (+5 VDC @ 2A).

Normally, the QTx should be installed *last* in the backplane. There can be no vacant slots between the QTx and the CPU module or the DMA and interrupt grant signals will not be routed to the adapter. If the backplane contains disk controllers

that do not pass the bus grant signal properly, then the QTx should be installed *ahead* of those controllers.

Connect the tape drive(s) to the QTx using the provided cabling. The 50-conductor ribbon cable plugs into the host adapter's J2 connector with the red-striped edge of the cable to the left (when viewing the adapter from the component side, with the Q-BUS connectors pointing down). The QTx is marked with a "1" at the J2 connector to indicate the position of the cable stripe.

Figure 2-1 MicroVAX II Installation



Installing the UTx-1

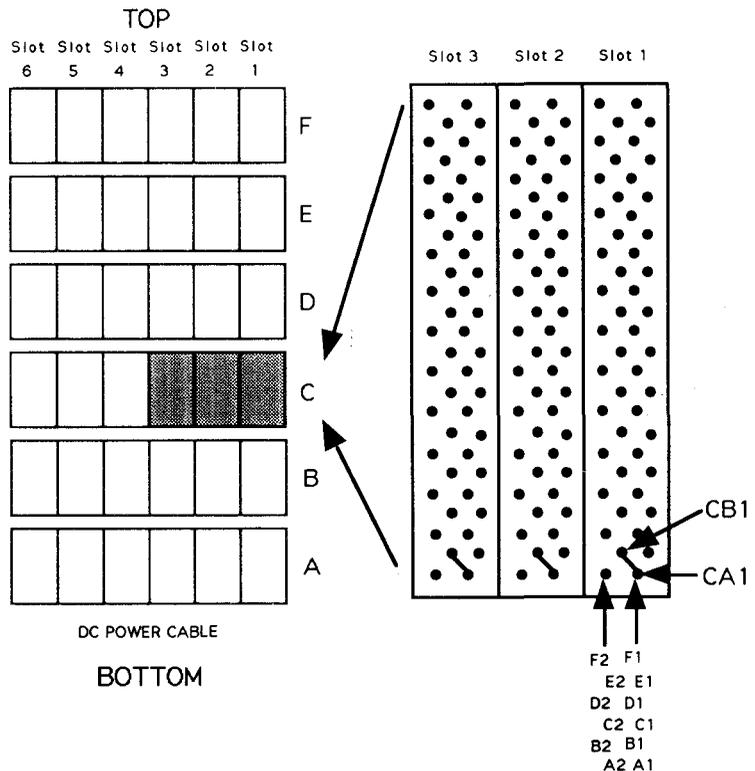
The UTx-1 places 1 DC and 1 AC load on the UNIBUS. Before installing the adapter, ensure that the power requirements are met (+5 VDC @ 2A).

The UTx-1 requires a quad-wide SPC slot in the UNIBUS backplane. The slot **MUST** be one that can accommodate a DMA device. An empty DMA slot will normally have a dual wide, tall grant card installed.

If the proposed slot contains one of the short square grant cards, you will have to remove a wire on the back side of the backplane that jumpers the NPG (Non-Processor Grant) signal. This jumper is located between pins CA1 and CB1 of the slot.

If you are unsure of how to do this, contact TTI or your normal field service personnel for assistance. If it is necessary to remove the host adapter from the system, the jumper will have to be re-installed.

Figure 2-2 UNIBUS Backplane Layout



View after expansion box has been tilted up, exposing wire wrap side of the backplane.

Exploded View of Section 1

Note that each backplane slot has six card edge connectors, while the host adapter has only four. The host adapter must be installed in the CDEF section of the backplane. In most UNIBUS cabinets, this is the part of the backplane closest to you if you are standing directly in front of the machine.

Plugging the board into the ABCD slots will permanently damage the board and void its warranty.

The UTx-1 should be installed last in the backplane. If there is more than one UNIBUS backplane, the UTx-1 should be installed in the first backplane.

Connect the drives to the host adapter using the provided cabling. The 50-conductor ribbon cable plugs into the host adapter's J2 connector with the red-stripped edge of the cable toward the left when the board is viewed from the component side.

Drive Configuration

TMSCP unit numbers are user selectable and range between 0 and 31 (decimal). See "Adapter Configuration" below for a description of assigning the TMSCP unit number to the tape drive SCSI ID. For further information on drive configuration, please refer to your Workstation Compatible 8mm Helical Scan Tape Subsystem Owner's Manual or other tape drive documentation.

Adapter Configuration

The host adapter is configured after the board has been installed in the host system. The host CPU must be halted after applying power to the system to prevent booting before the host adapter has been properly configured.

To configure the host adapter, an RS-232 terminal is connected via the supplied cable to J1 on the board. The terminal should be set up for 9600 baud, 8 data bits, no parity, and 1 stop bit. Press "Return" on the terminal and a menu similar to Figure 2-3 should appear:

Figure 2-3 Configuration Options Menu

```
Host Adapter Configuration
Firmware Version 2.x
Copyright (C) 1988, 1989 by Transitional Technology, Inc.

[T] Tape CSR = 774500 (F940)
[S] SCSI ID = 7 [R] SCSI Reset = Enabled

[F] Flags = None

[0] Unit 0 = Tape, TMSCP Unit = 0, Tape = P6
[1] Unit 1 = unused
[2] Unit 2 = unused
[3] Unit 3 = unused
[4] Unit 4 = unused
[5] Unit 5 = unused
[6] Unit 6 = unused

[DFLT] Factory NOVRAM Settings [TEST] Test SCSI Device

Select Option >
```

Enter the options you wish to configure at the " Select Option > " prompt at the bottom of the screen. Examples are given for each configuration option with the prompt in normal type and user input in **bold** type. Note that the prompt contains the current option setting in brackets [].

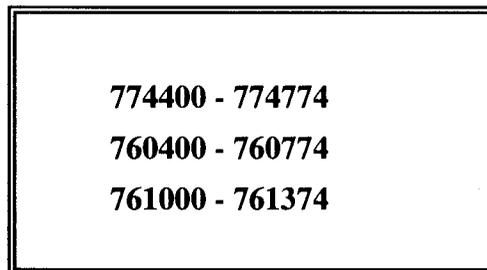
[T] Tape CSR

This option is used to change the address of the Controller's Control Status Register (CSR). Valid address ranges are listed in Figure 2-4. The following example changes the controller status register address to **774400** Octal:

Select Option > **T**<cr>

Enter New Tape CSR value [774500] > **774400**<cr>

Figure 2-4 CSR Address Ranges



774400 - 774774
760400 - 760774
761000 - 761374

[S] SCSI ID

This option is used to change the controller's SCSI ID in the range from 0 to 7. Note that the SCSI ID (unit number) selected for the controller is not displayed in the unit number list of the Options Menu. The following example will change the SCSI ID of the controller to 6.

Select Option > **S** <cr>

Enter the new SCSI ID [7] > **6** <cr>

[R] SCSI Reset

This option is used to enable or disable a SCSI Bus reset during a controller power-up or Bus init. This option should be set to "**Disabled**" in multihost configurations.

Select Option > **R** <cr>

Disable SCSI Reset? (Y/N) **Y** <cr> for Yes,
N <cr> for No

or

Enable SCSI Reset? (Y/N) **Y** <cr> for Yes,
N <cr> for No

[F] Flags

This option is used to set or clear certain controller flags. The default value (None) should not be changed unless otherwise directed by TTI technical staff. The following example sets the "Disable Deferred Filemarks" flag and the "Disable Short Filemarks" flag.

Select Option > **F** <cr>

Enter CTLR Flags (...) [None] > **3,4** <cr>

Figure 2-5 CTLR Flags Definition Table

CTLR Flags Definition Table	
7	- Enable Error Traps
6	- unused
5	- Disable Fast File Search
4	- Disable Deferred Filemarks
3	- Disable Short Filemarks
2	- Disable Burst/Block Mode DMA
1	- Enable TTI Passthru Mode
0	- Enable SCSI Slow Cable Mode
N	- None

Enter CTLR Flags (...) [None] >

[0] - [7] SCSI Units

These options are used to configure the individual SCSI devices. The following example configures SCSI unit 1 as a tape device, TMSCP unit 1 and Tape type P6. See Figure 2-7 for modes and corresponding cartridge types.

SCSI unit numbers can range between 0 and 7. The TMSCP unit number can range between 0 and 31 (decimal). The tape type is one of P5, P6, PI (letter 'i') or DS (Default Setting).

Select Option > 0 <cr>

Enter new device type for SCSI unit 0 [0] > 2 <cr>

Enter new TMSCP unit number (DEC) [0] > 1 <cr>

Enter the tape type (P6,P5,PI or DS) [DS] > P6 <cr>

Figure 2-6 Device Type Configuration Options

```
Enter option > 0 <cr>
```

```
Device Types: 0 = Unused, 1 = Other Host, 2 = Tape
```

```
Enter new device type for SCSI unit 0 [0] >
```

Note: Device type 1 (Other Host) is used only for multihost configurations. Each host in the daisy chain must identify the SCSI ID of the other host(s). Multihost configurations are only supported under VMS.

Figure 2-7 Cartridge Types

Sense Mode	Cartridge Type	Maximum Capacity
P5	P5-15	419 MBytes
	P5-30	816 MBytes
	P5-60	1,609 MBytes
	P5-90	2,413 MBytes

P6	P6-15	287 MBytes
	P6-30	573 MBytes
	P6-60	1,146 MBytes
	P6-90	1,719 MBytes
	P6-120	2,292 MBytes

PI	P6-15	287 MBytes
	P6-30, P5-15	419 MBytes
	P6-60, P5-30	816 MBytes
	P6-90, P5-60	1,609 MBytes
	P6-120, P5-90	2,292 MBytes

		4,585 MBytes

[DFLT] Factory NovRam Settings

This command resets all factory NovRam settings to their default values. The following example will change the configuration back to it's default condition as shown in Figure 2-3.

Select Option > **DFLT** <cr>

[TEST] Test SCSI Device

This command is normally used after power up or controller configuration (prior to system boot) in order to verify that installed devices are communicating. There is no drive activity evident during this test. The following example is used to test Unit 1.

Select Option > **TEST** <cr>

Enter the SCSI unit number > **1** <cr>

An information line will appear identifying the device type, model number, firmware revision and capacity.

Using Your QTx/UTx-1

The QTx/UTx-1, in conjunction with its attached SCSI tape drives, emulates one or more standard DEC TMSCP tape drives (such as the TU81, TK-50, and others). Standard commands such as BACKUP and COPY are completely supported.

See your Workstation Compatible 8mm Helical Scan Tape Subsystem Owner's Manual for further details on software compatibility and drive operation.

The figures below illustrate example configurations with multiple drives on a single host, and with multiple hosts sharing one or more drives. Pay particular attention to the SCSI ID assignment and drive/adaptor bus termination.

Figure 3-1 Multiple Drive/Single Host Configuration

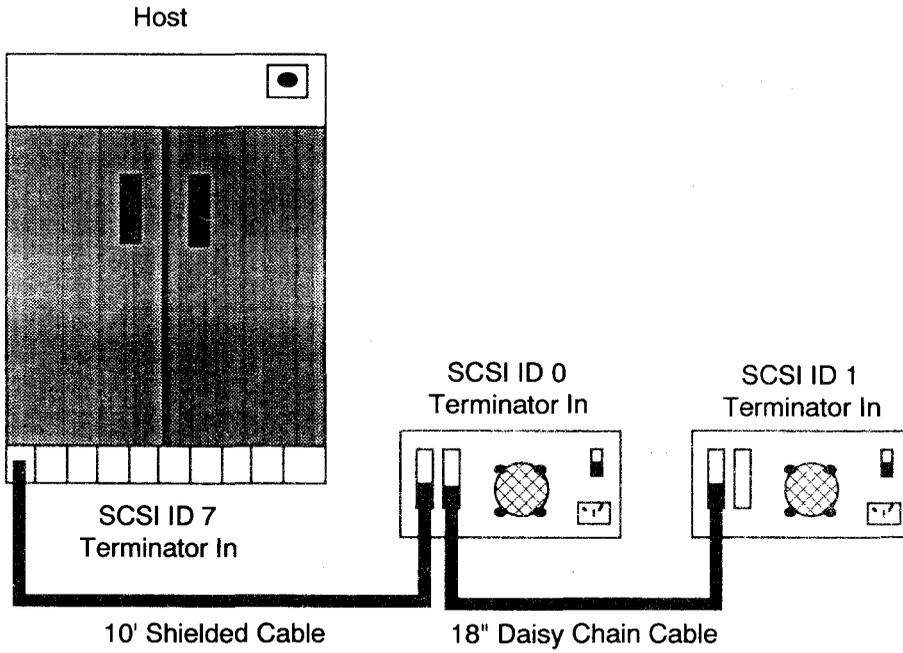


Figure 3-2 Multiple Host/Single Drive Configuration

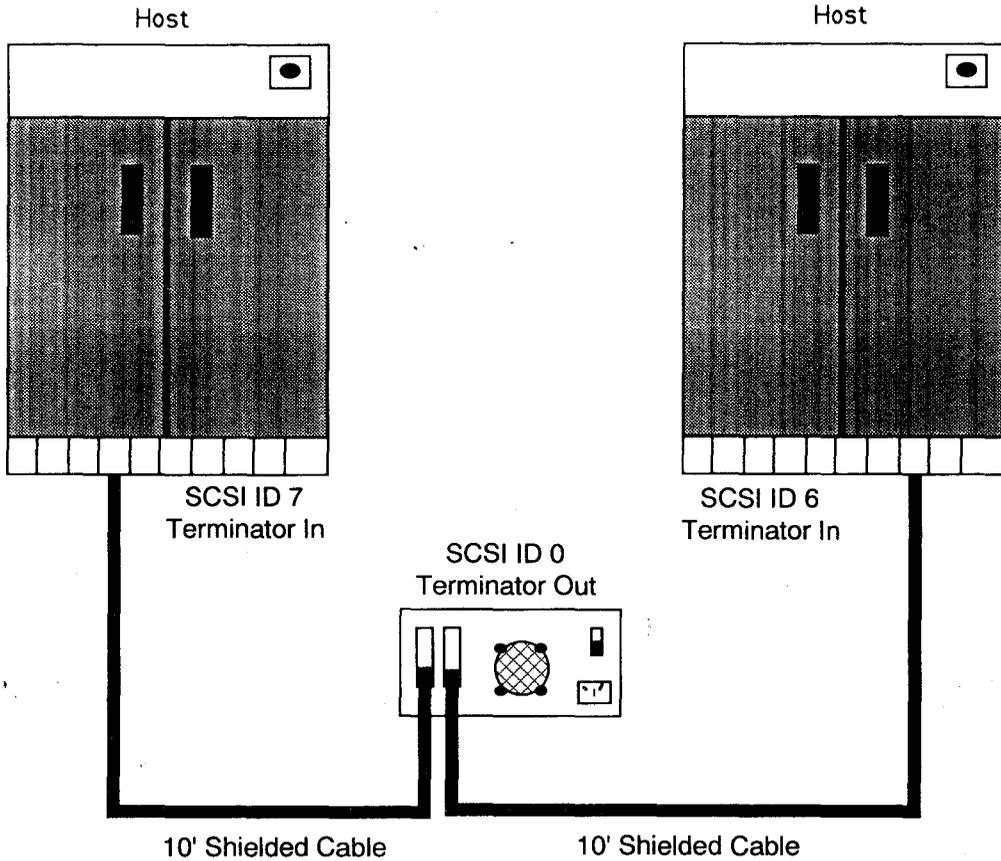
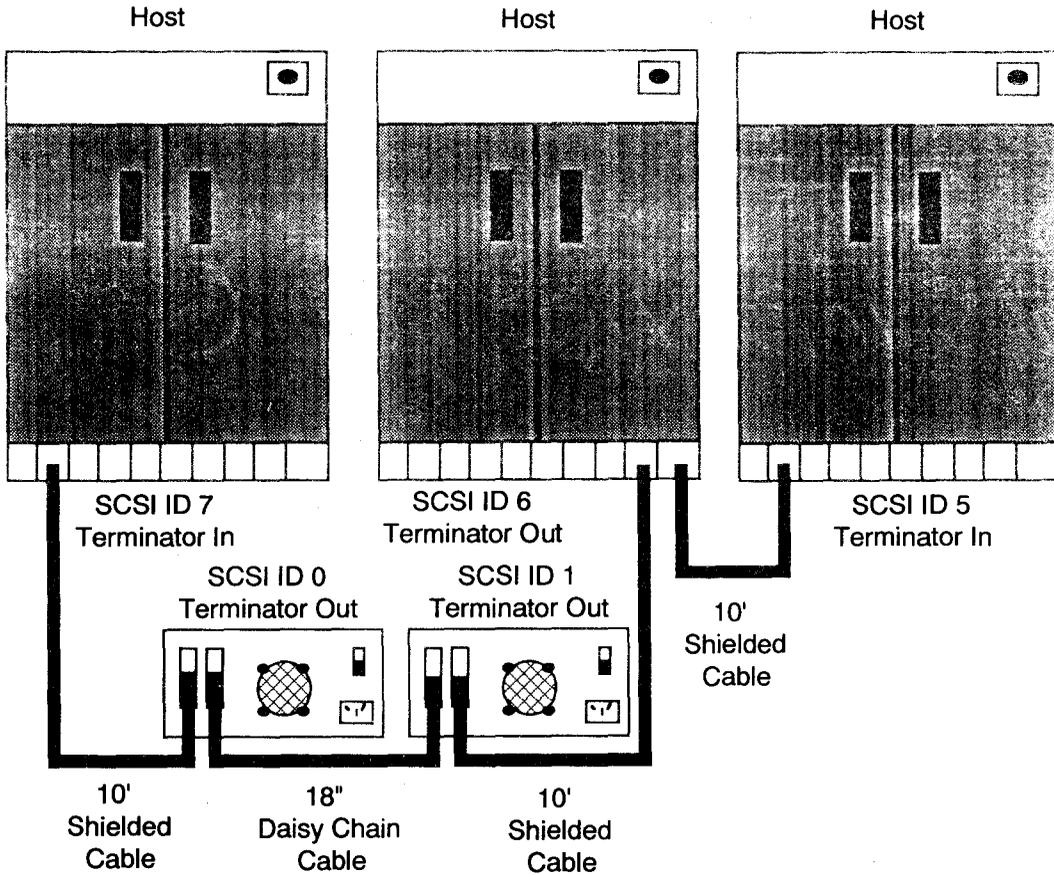


Figure 3-3 Multiple Drive/Multiple Host Configuration





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