QT13 TAPE COUPLER
TECHNICAL MANUAL

EMULEX

WARNING

This equipment generates, uses and can radiate radio frequency energy, and if not installed and used in accordance with the technical manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of Federal Communications Commission (FCC) Rules, which are designed to provide reasonable protection against such interference when operating in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

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EMULEX PRODUCT WARRANTY

CONTROLLER WARRANTY: Emulex warrants for a period of twelve (12) months from the date of shipment that each Emulex controller product supplied shall be free from defects in material and workmanship.

CABLE WARRANTY: All Emulex provided cables are warranted for ninety (90) days from the time of shipment.

The above warranties shall not apply to expendable components such as fuses, bulbs, and the like, nor to connectors, adaptors, and other items not a part of the basic product. Emulex shall have no obligation to make repairs or to cause replacement required through normal wear and tear or necessitated in whole or in part by catastrophe, fault or negligence of the user, improper or unauthorized use of the product, or use of the product is such a manner for which it was not designed, or by causes external to the product, such as but not limited to, power failure or air conditioning. Emulex's sole obligation hereunder shall be to repair or replace any defective product, and, unless otherwise stated, pay return transportation cost for such replacement.

Purchaser shall provide labor for removal of the defective product, shipping charges for return to Emulex and installation of its replacement. THE EXPRESSED WARRANTIES SET FORTH IN THIS AGREEMENT ARE IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING WITHOUT LIMITATION, ANY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, AND ALL OTHER WARRANTIES ARE HEREBY DISCLAIMED AND EXCLUDED BY EMULEX. THE STATED EXPRESS WARRANTIES ARE IN LIEU OF ALL OBLIGATIONS OR LIABILITIES ON THE PART OF EMULEX FOR DAMAGES, INCLUDING BUT NOT LIMITED TO SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES ARISING OUT OF, OR IN CONNECTION WITH THE USE OR PERFORMANCE OF THE PRODUCT.

RETURNED MATERIAL: Warranty claims must be received by Emulex within the applicable warranty period. A replaced product, or part thereof, shall become the property of Emulex and shall be returned to Emulex at
Purchaser's expense. All returned material must be accompanied by a RETURN MATERIALS AUTHORIZATION (RMA) number assigned by Emulex.

1.1   Introduction

This manual describes the installation and use of the Emulex QT13 Tape Coupler. The contents of the manual are as follows:

- **Section 1 (Description)** contains the functional description and specifications of the QT13 Tape Coupler.

- **Section 2 (Installation)** explains how to set up and install the coupler for a subsystem, including switch settings and cabling.

- **Section 3 (Troubleshooting)** describes fault isolation procedures that can be used to pinpoint trouble spots.

- **Appendix A (PROM Removal and Replacement)** instructs on removing and replacing the firmware PROM.

- **Appendix B (Drive Configurations)** presents configuration instructions for supported tape drives with a subsystem.

1.2   Subsystem Description

The QT13 Tape Coupler is a modular, microprocessor-based single dual-wide printed circuit board assembly (PCBA). With a 9-track tape drive, it can emulate either a DEC TSV05 or TMSCP subsystem. The emulation is selectable by means of a switch onboard the QT13. The QT13 connects a single tape transport to Digital Equipment Corporation's Q-bus in PDP-11 and MicroVAX computers via a standard Pertec interface.

The tape transport, either streaming or nonstreaming, must have an internal formatter that uses the industry-standard Pertec interface. Two 50-pin ribbon cables connect the QT13 to the embedded formatter. Figure 1-1 shows a typical configuration.

The QT13 is hardware-compatible with a formatted nine-track tape transport systems that operates with any of the following formats:

- Non-Return-to-Zero-Inverted (NRZI) format at 800 bits per inch (bpi)

- Phase Encoded (PE) format at 1600 or 3200 bpi

- Group Code Recording (GCR) format at 6250 bpi

The QT13 will work with a dual or tri-density transport operating at any industry-standard tape speed from 12.5 to 140 inches per second (ips). The QT13 shifts from nonstreaming to streaming mode, automatically, if enough data is available to support the higher throughput rate.
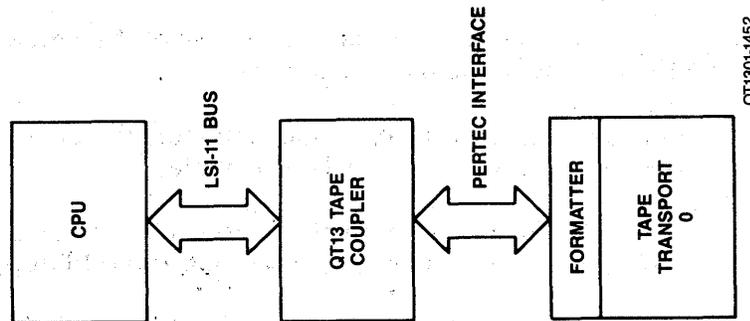
Figure 1-1. QT13 Subsystem Configuration

1.3 Subsystem Components

The QT13 tape coupler, shown in Figure 1-2, is shipped with the items listed in Table 1-1. Options are listed in Table 1-2. A minimum of two cables are required to connect the QT13 to a tape transport. The available cable types and lengths are listed in Table 1-3.

Table 1-1. QT13 Standard Components

Item	Description	Part Number	Comment
1	QT13 Controller	QT1310201-00	
2	QT13 Technical Manual	QT1351001-00	
3	22-Bit Addressing Kit	QD0113002-00	Required for 22-bit addressing applications like MicroVMS
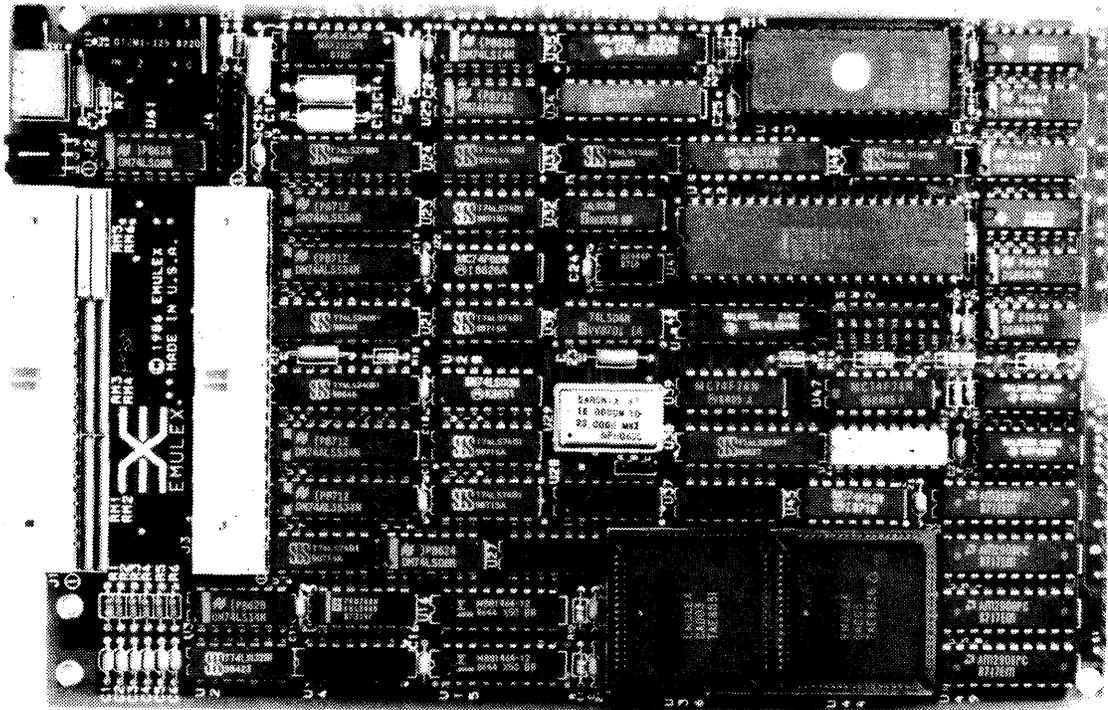
Figure 1-2. QT13 Tape Coupler

Table 1-2. QT13 Options

Item	Description	Part Number	Comment
1	TS11 Software Driver	VD9951803-xx	Allows the TSV05 emulation to be used under MicroVMS.

2	Diagnostics
	   for LSI-11
	   for MicroVAX
		
		PX9951801-xx
		VX9951804-xx	

3	Onboard Port Cable*	QT1311201-00	For connecting a ASCII terminal to the onboard serial port.

Table 1-3. Cables and Adapters

Item	Part Number	Description	Length	Qty Rqd	Application
1	TU1211201-01	Cable, Unshielded	3 ft.	2	Pertec
	TU1211201-02	Cable, Unshielded	5 ft.	2	Pertec
	TU1211201-03	Cable, Unshielded	8 ft.	2	Pertec
	TU1211201-04	Cable, Unshielded	15 ft.	2	Pertec
	TU1211201-05	Cable, Unshielded	25 ft.	2	Pertec
2	TU1211202-01	Cable, Shielded	3 ft.	2	Pertec
	TU1211202-02	Cable, Shielded	5 ft.	2	Pertec
	TU1211202-03	Cable, Shielded	8 ft.	2	Pertec
	TU1211202-04	Cable, Shielded	15 ft.	2	Pertec
3	TU1211203-01	Cable, Extension	20 in.	2	Pertec
	TU1211203-02	Cable, Extension	40 in.	2	Pertec
	TU1211203-03	Cable, Extension	60 in.	2	Pertec
	TU1211203-04	Cable, Extension	80 in.	2	Pertec
	TU1211203-05	Cable, Extension	100 in.	2	Pertec
	TU1211203-06	Cable, Extension	120 in.	2	Pertec
4	TU1211204-01	Cable, Extension	20 in.	2	Pertec
	TU1211204-02	Cable, Extension	40 in.	2	Pertec
	TU1211204-03	Cable, Extension	60 in.	2	Pertec
	TU1211204-04	Cable, Extension	80 in.	2	Pertec
	TU1211204-05	Cable, Extension	100 in.	2	Pertec
	TU1211204-06	Cable, Extension	120 in.	2	Pertec
5	TU1210201	Cable I/O Adapter Panel	NA	2-3	
6	CU222031	Rack-Mount Panel	NA	1-2	

1.4 Features

The following features enhance the usefulness of the QT13 Tape Coupler.

- **Microprocessor Design.** An eight-bit CMOS microprocessor provides microprogramming flexibility for either TMSCP compatibility or TSV05 emulation.

- **Configuration Flexibility.** The QT13's nonvolatile random access memory (NOVRAM) permits changes to stored drive configurations through menus.

- **Onboard Port and Diagnostics.** Menu-driven embedded diagnostic firmware can be accessed through either the onboard serial port or host console.

- **Self-Test.** This routine exercises all parts of the microprocessor, the on-board memory, the buffer controller, and the host adapter controller (HAC).

- **Buffering.** The QT13 has 61Kbytes of data buffering, which enables the QT13 to support a high-speed GCR transport.

- **Adaptive DMA.** The burst length value for this bus optimization feature can be programmed by the host processor or selected by the user.

- **Block-Mode DMA.** A 16-word data burst is transmitted after the memory address to reduce bus overhead.

- **22-Bit Addressing.** The QT13 supports the 22-bit addressing capability of the extended LSI-11 bus.

1.5   Compatibility

1.5.1   Diagnostics

The QT13's self-test and embedded diagnostic firmware are all that is required to test the subsystem's integrity. Additionally, however, the QT13 is compatible with the DEC PDP-11 ZTSH Data Reliability diagnostic.

As options, Emulex supplies the following diagnostics:

- IQT12 - MicroVAX TSV05 Emulation Installation Diagnostic

- T1SX2A - Data Reliability Diagnostic

- T1SX3A - Data Reliability Diagnostic (for transports which do not support read reverse)

1.5.2   Operating Systems

The QT13 is compatible with the indicated versions of the following DEC operating systems:

Operating System	TSV05 Version	TMSCP Version
μVMS	4.0*	4.0
RSTS/E	8.0	9.1
RSX-11M	4.2	4.2
RSX-11M-PLUS	3.0	3.0
RT-11	4.0	5.3
Ultrix-11	1.0	2.0
Ultrix-32M	2.2	2.2

* with optional Emulex driver

1.5.3 Media

Tapes written in accordance with ANSI Standard X3.40-1976, which include DEC's 9-track tape subsystems, are interchangeable with tapes written by tape transports with the QT13 Tape Coupler.

1.5.4 Hardware

The QT13 complies with DEC LSI-11 bus protocol and directly supports 22-bit addressing. The QT13 works on a MicroVAX I **only** in TSV05 mode using an Emulex-supplied TS11 driver.

Tape transfer rates up to 1.0M byte per second and tape transports that use the standard Pertec interface are supported by the QT13. The following transports are certified by Emulex to work with the QT13:

- CDC 92185-02 (Buffered Enhanced only)
- Cipher F880 (1600 bpi only)
- Cipher M891
- Cipher F910
- Cipher M990
- Kennedy 9220 formatter
  with attached 9000, 9100, 9300 drives
- Kennedy 9400, 9401 embedded formatter drives
- Kennedy 9600, 9600A, 9610
- Megatape MT-500 and MT-750

NOTE

Proper operation of any listed drive at 3200 bpi requires that the tape drive supplies the correct PEID burst. This is not an industry-standard requirement.

1.5.5   Bootstrap Options

The bootstrap options supported are DEC TSV05 and TK25, the standard DEC TS bootstrap and, for TMSCP compatibility, the standard DEC TMSCP bootstrap.

1.6   General Specifications

Table 1-4 contains general specifications for the QT13 Tape Coupler.

Table 1-4. QT13 General Specifications

Parameter	Description
Emulation	Provides complete functional emulation of the DEC TSV05 or compatibility with DEC's TMSCP
TSV05 Operating System Compatibility	VMS (v4 and above) RSTS/E (v8 and above) RSX-11M (v4.2 and above) RSX-11M-PLUS (v3.0 and above) RT-11 (v4.0 and above) Ultrix-11 (v1.0 and above) Ultrix-32m (v2.2 and above)
TSV05 Diagnostic Compatibility	DEC ZTSH for LSI-11; Emulex IQT12 for MicroVAX II
TMSCP Operating System Compatibility	VMS (v4 and above) RSTS/E (v9.1 and above) RSX-11M (v4.2 and above) RSX-11M-PLUS (v3.0 and above) RT-11 (v5.3 and above) Ultrix-11 (v2.0 and above) Ultrix-32m (v2.2 and above)
TMSCP Diagnostic Compatibility	None
Media Compatibility	0.5-inch wide magnetic tape per ANSI Standard X3.40-1976; compatible with DEC TSV05 or TMSCP format
Tape Transport Interface	Pertec
Number of Tape Transports Supported	One
Maximum Cable Length	25 feet

Table 1-4. QT13 General Specifications (continued)

Parameter	Description
Tape Speeds	All standard tape speeds from 12.5 to 140 ips
CPU Interface	Standard DEC LSI-11 bus
Addressing Modes	16-, 18-, and 22-bit
Data Block Capacity	Up to 65,535 bytes
Priority Level	BR 4 (always enabled) or 5 (jumper selectable)
Data Buffering	61K bytes
Data Transfer	Block mode DMA, 16-bit word; adaptive DMA. Transfer rate: 1us/word coupler-to-host
LSI Bus-Addressable Registers	2
Base Device Address	Switch selectable to LSI-11 and MicroVAX II standard and alternate addresses

	TSV05	TMSCP
Standard	772520	774500
Alternates	772524	760404
	772530	760410
	772534	760414
	772440	760444
	772444	760450
	772450	760454
	772454	760504

Parameter	Description
Vector Address	224 - (TSV05) NOVRAM programmable 260 - (TMSCP) Software selectable
Bus Loading	1 DC Load, 2.5 AC Loads
Indicators	
QT13 Tape Coupler	3 Fault LEDs (red)
Electrical	
Power	2.5 amps @ +5 Vdc $\pm$ 5%
Bus Loading	ac bus loads: 2.5 max.; dc bus loads: 1 max.

1.7 Physical Specifications

Table 1-5 contains physical specifications for the QT13 Tape Coupler.

Table 1-5. QT13 Tape Coupler Physical Specifications

Parameter	Description
Packaging	Single dual-sized Q-Bus PCBA
Dimensions	Height: 13.172 cm (5.186 inches) Width: 1.27 cm (0.5 inch) Length: 22.098 cm (8.7 inches)
Shipping Weight	4 pounds
Connectors	
LSI-11 Bus	Standard DEC PCBA edge connectors

1.8 Environmental Specifications

Table 1-6. contains environmental specifications for the QT13 Tape Coupler.

Table 1-6. QT13 Tape Coupler Environmental Specifications

Parameter	Description
Temperature	
Operating	5°C (41°F) to 50°C (122°F)
Storage	-40°C (-xx°F) to 66°C (150°F)
Relative Humidity	
Operating	10% to 95%, noncondensing
Storage	10% to 95%, noncondensing
Airflow	
Operating to 50°C	Maximum temperature rise across module must not exceed 20°C (68°F) input to output

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2.1 Overview

Procedures for installing the QT13 Tape Coupler are described in this section. The section **does not** contain every step necessary for bringing up the system. An Installation Checklist, which outlines the entire process, is provided on page 2-4.

2.1.1 Subsystem Configurations

This section is limited to switch setting data and physical installation instructions. No attempt is made to describe the many subsystem configurations that are possible.

When installing the subsystem, it is advisable to make a record of the subsystem configuration and environment. Figures 2-1 and 2-2 are Configuration Record Sheets for TSV05 and TMSCP, respectively, that list the information required and show where the data can be found. This information will also be of help to an Emulex service representative, should your subsystem require service.

2.1.2 Maintaining FCC Class A Compliance

Emulex has tested the QT13 Tape Coupler with DEC computers that comply with FCC Class A limits for radiated and conducted interference. When properly installed, the QT13 does not cause compliant computers to exceed Class A limits.

There are two possible configurations in which the QT13 and its associated tape peripheral can be installed:

- With both the QT13 Tape Coupler and the tape transport mounted in the same cabinet, and

- With the QT13 mounted in the CPU cabinet and the tape transport mounted in a separate cabinet.

To limit radiated interference, DEC completely encloses the components of its computers that generate or could conduct radio-frequency interference (RFI) with a grounded metal shield (earth ground). It is your responsibility to make sure that nothing must be done that reduces this shield's effectiveness (i.e., there must be no gap in the shield that would allow RFI to escape).

Conducted interference is generally prevented by installing a filter in the ac line between the computer and the ac outlet. Most power distribution panels that are of current manufacture contain suitable filters.

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QT13 CONFIGURATION REFERENCE SHEET
for TSV05

GENERAL INFORMATION

- Host computer type _____
- Host computer operating system _____ Version _____
- Tape transport type _____

TSV05 NOVRAM PARAMETERS

Drive type, 0 = Start-Stop, 1 = Streamer (0-1,def = 1 dec):
On-the-fly commands (Y/N, def = Y):
Enable data busy timeout delay (Y/N, def = Y):
Remote density (Y/N, def = N):
CDC tape drive (Y/N, def = N):
Use IDEN line to select remote density (Y/N, def = Y):
IDEN line true selects high density (Y/N, def = N):
Adaptive DMA (Y/N, def = N):
Blank tape timeout value, in seconds (1-60, def = 5 dec):
DMA burst word count (1-16, def = 16):
μSec delay between DMA bursts (2/8, def = 2):
Enable write data prefill (Y/N, def = N):
Adaptive DMA threshold (1-7, def = 4 dec):
Interrupt vector (0-774, def = 224 oct):

Notes:
def = default. Default values indicate current NOVRAM values only.
dec = decimal
oct = octal

QT13 CONFIGURATION

- Firmware revision number_____
- Top assembly number_____
- LSI-11 bus address_____
- 22-bit addressing IC (7438) installed (Y or N) _____
- Warranty expiration date_____
- Serial number_____
- Interrupt vector address_____
- Switch settings (☐ = OFF   ■ = ON)

</div>
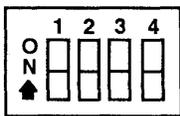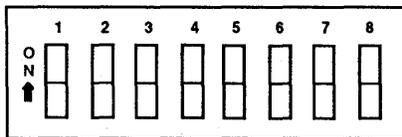
Figure 2-1. QT13 (for TSV05) Configuration Reference Sheet

QT13 CONFIGURATION REFERENCE SHEET
for TMSCP

GENERAL INFORMATION
- Host computer type _____
- Host computer operating system _____ Version _____
- Tape transport type _____

TMSCP NOVRAM PARAMETERS

Drive type, 0 = Start-Stop, 1 = Streamer (0-1, def = 1 dec):
On-the-fly commands (Y/N, def = Y):
Enable data busy timeout delay (Y/N, def = Y):
Remote density (Y/N, def = Y):
CDC tape drive (Y/N, def = N):
Use IDEN line to select remote density (Y/N, def = Y):
IDEN line true selects high density (Y/N, def = N):
Adaptive DMA (Y/N, def = N):
Blank tape timeout value, in seconds (1-60, def = 5 dec):
Max retry count for tape errors (1-10, def = 8):
μSec delay between DMA bursts (2/8, def = 2):
Enable write data prefill (Y/N, def = N):
Adaptive DMA threshold (1-7, def = 4 dec):
Tape drive speed thousands of bytes/second (0-65535.def = 200 dec)
Support 800 BPI density (Y/N, def = Y):
Support 1600 BPI density (Y/N, def = Y):
Support 6250 BPI density (Y/N, def = Y):

Notes: def = default. Default values indicate current NOVRAM values only.
        dec = decimal

QT13 CONFIGURATION
- Firmware revision number _____
- Top assembly number _____
- LSI-11 bus address _____
- 22-bit addressing IC (7438) installed (Y or N) _____
- Warranty expiration date _____
- Serial number _____
- Interrupt vector address _____
- Switch settings (□ = OFF   ■ = ON)
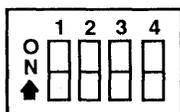
SW1
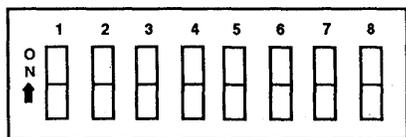
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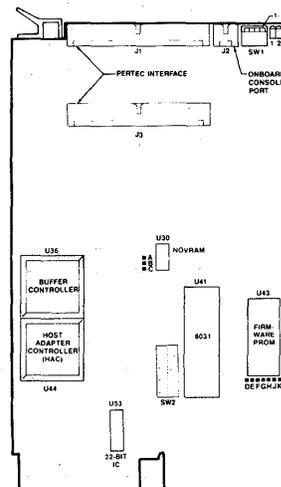
QT13-02

Figure 2-2. QT13 (for TMSCP) Configuration Reference Sheet

2.2 Inspection

Emulex products are shipped in special containers designed to provide full protection under normal transit conditions. Immediately upon receipt, the shipping container should be inspected for evidence of possible damage incurred in transit. Any obvious damage to the container, or indications of actual or probable equipment damage, should be reported to the carrier company in accordance with instructions on the form included in the container.

Unpack the QT13 subsystem and, using the shipping invoice, verify that all equipment is present. Verify also that model or part numbers (P/N), revision levels, and serial numbers agree with those on the shipping invoice. Subsection 1.4 explains model numbers and details contents. These verifications are important to confirm warranty. Check for such items as bent or broken connector pins, damaged components, or any other evidence of physical damage. If evidence of physical damage or identity mismatch is found, notify an Emulex representative immediately. If the equipment must be returned to Emulex, it should be shipped in the original container.

INSTALLATION CHECKLIST

☐ 1. Inspect the QT13 Tape Coupler.

☐ 2. Set up the switches on the QT13 module.

☐ 3. Install the coupler in the backplane of the computer.

☐ 4. Install and connect the tape transport to the QT13.

☐ 5. Connect the serial port on the QT13, if used, to the terminal which must be set for 8-bit, no parity, 9600 baud.

☐ 6. Reconfigure the operating system to include the QT13.

☐ 7. Run the onboard embedded diagnostics.

☐ 8. Bring the system up.

2.3 Tape Coupler Setup

Several configuration setups must be made on the QT13 Tape Coupler before inserting it into the chassis. These setups are made by option switches SW1 and SW2.

Figure 2-3 shows the locations of the configuration switches referenced in the following paragraphs.
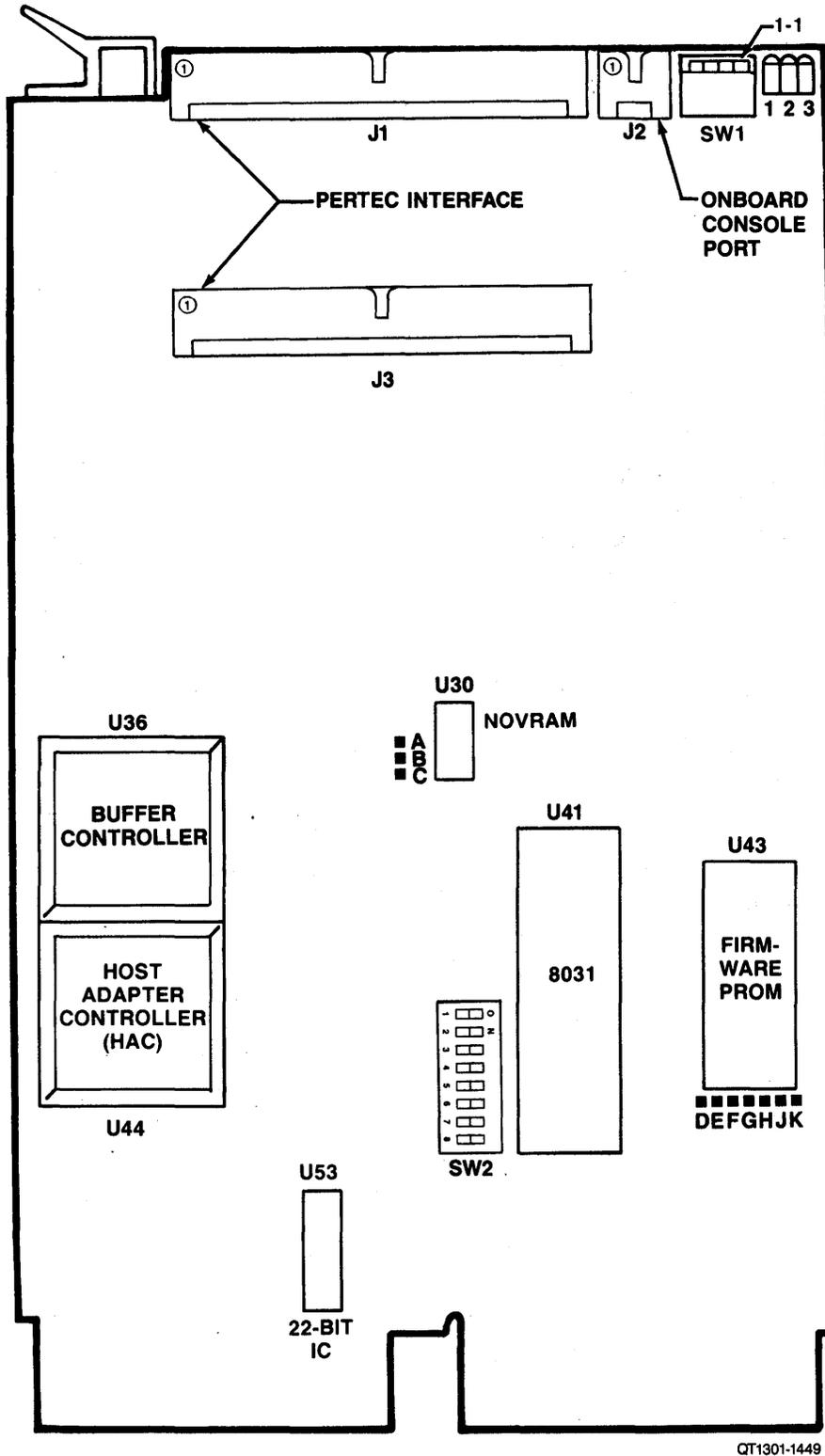
Figure 2-3. QT13 Tape Coupler Assembly

CAUTION

Setting these switches in proper sequence is
extremely important. Follow the NOVRAM loading
procedures given in subsection 2.4 carefully. In
particular, be certain that SW1-3 and SW1-4 are set
before SW1-2. Otherwise, the results are
unspecified and data corruption may occur.
Additionally, SW2-6 and SW2-7 should never be
ON or OFF at the same time.

Table 2-1 defines the function and factory configuration of all switches on the
QT13 coupler. The factory configuration switch settings are representative of
most QT13 Tape Coupler applications. Table 2-2 lists the QT13 jumpers and
their factory settings.

There are two dual function switches in SW1. In Diagnostic mode, SW1-3
enables onboard port communications (OFF) or host console communications
(ON). **TSV05 ONLY: In Operational mode, SW1-3 either enables record
buffering (ON) or disables it (OFF).** Also in Diagnostic mode, SW1-4 selects a
MicroVAX host (ON) or PDP-11 host (OFF). In Operational mode, SW1-4 loops
on self-test (ON), or continues on self-test (OFF).

Table 2-1. QT13 Switch Definitions/Factory Configuration

Switch	OFF(0)	ON(1)	Fact	Function	Section
SW1-1	Run	Reset	OFF(0)	QT13 Tape Coupler Reset	2.3
SW1-2	Operational	Diagnostic	OFF(0)	Mode Select	2.4
SW1-3	Disable	Enable	OFF(0)	Record Buffering (TSV05)[1]	2.3.3
SW1-3*	Onboard	Host	OFF(0)	Console Select	2.4.2
SW1-4	Continue	Loop	OFF(0)	Loop on Self-test Error	2.4.4.2
SW1-4*	LSI-11	MicroVAX	OFF(0)	Host Type Select	2.3.4
SW2-1	Address Sel.	-	OFF(0)	Qbus Address Select (1 of 8)	2.3.6
SW2-2	Address Sel.	-	OFF(0)	Qbus Address Select	2.3.6
SW2-3	Address Sel.	-	OFF(0)	Qbus Address Select	2.3.6
SW2-4	TMSCP	TSV05	OFF(0)	Emulation Select	2.3.5
SW2-5	Disable	Enable	OFF(0)	22-bit Addressing	2.3.8
SW2-6	Edge Select	-	OFF(0)	WDS Lead./Trail. Edge Select[1]	2.3.9
SW2-7	Edge Select	-	ON(1)	WDS Lead./Trail. Edge Select[1]	2.3.9
SW2-8	-	-	OFF(0)	Reserved	

ON(1)	= Closed	Fact	= Factory switch setting		* Dual function switch
OFF(0)	= Open	WDS	= Write Data Strobe		
[1]See CAUTION note on page 2-6.					

Table 2-2. QT13 Jumper Definitions and Factory Configuration

Jumper	Function	Factory
BC[1]	Clock	IN
DE[1]	Factory Test	OUT
FG[2]	Monitor IRQ Level 6	OUT
GH[2]	Monitor IRQ Level 5	IN
JK[2]	IRQ Level 5 Request	OUT

[1]These are not options. They should be set as indicated at the factory. Do not reconfigure these jumpers.
[2]See subsection 2.3.10 for optional settings.

2.3.1 QT13 Tape Coupler Reset (SW1-1)

When ON, this switch causes a hard reset of the QT13 hardware. When set OFF, the QT13 operates normally after executing its power-on self-test. The host must initialize the controller after a hard reset.

2.3.2 Mode Select (SW1-2)

When ON, this switch causes the QT13 to execute the interactive on-board diagnostics for loading the NOVRAM and testing the subsystem. In this diagnostic mode, the QT13 is not emulating a tape subsystem and will not respond to host system accesses.

When set OFF, the QT13 performs a normal TSV05 or TMSCP emulation.

For a complete description of how to use this switch, see subsection 2.4.

2.3.3 Record Buffering (TSV05 ONLY) (SW1-3)

When ON, this switch selects record buffering (TSV05 emulation only). For DEC operating systems, leave this switch OFF.

The QT13 allows the software to control record buffering as required by the DEC TSV05 emulation. In those cases where the QT13 is used with custom software which does not have provision for software control, record buffering can be controlled with SW1-3.

NOTE

Be certain that your software supports record buffering before setting SW1-3 ON; otherwise, indeterminate error conditions could result. Leave this switch OFF when using DEC Operating System and Diagnostics to allow the software to control buffering.

2.3.4 Host Select (SW1-4)

This option is used only in Diagnostic mode. Switch SW1-4 is set ON for a MicroVAX host system; OFF for an LSI-11. For a complete description of how to use this switch, see subsection 2.4.

2.3.5 Emulation Select (SW2-4)

Either TMSCP or TSV05 must be selected. Set switch SW2-4 to ON to select TSV05 mode; OFF for TMSCP mode.

2.3.6 Tape Coupler Bus Address (SW2-1:SW2-3)

The address for the first of the QT13's two LSI-11 bus registers is selected by DIP switches SW2-1 through SW2-3. See Table 2-3 for TSV05 or TMSCP register address switch settings.

The register address you select for the QT13 depends on the emulation selected (TSV05 verses TMSCP) and the number of other devices of the same class in the system. The various operating systems used on Q-bus machines expect to find the QT13 at specific addresses. The following table identifies those addresses:

Emulation	Standard Address	First Alternate Address
TSV05	772520	772524
TMSCP	774500	760404

For the TMSCP emulation, the first alternate address is in floating address space. The presence of other, higher ranking devices in floating address space will affect the address for the QT13 (and TMSCP-class devices are near the bottom of the current list). See the appropriate operating system manual for a discussion of floating addresses.

Some operating systems require the CSR address rather than the base address when the operating system is being configured to recognized a device. The QT13's CSR is its second register, so add 2_8 to the base address to determine the CSR address:

Emulation	Standard Address	CSR Address
TSV05	772520	772522
TMSCP	774500	774502

Table 2-3. Coupler Address Switch Settings

TSV05 Bus Address (in octal)	TMSCP Bus Address (in octal)	--- SW2 ---		
		1	2	3
772520	774500	0	0	0
772524	760404	1	0	0
772530	760410	0	1	0
772534	760414	1	1	0
772440	760444	0	0	1
772444	760450	1	0	1
772450	760454	0	1	1
772454	760504	1	1	1

2.3.7 Interrupt Vector Address

The interrupt vector address for the TSV05 emulation is specified through the NOVRAM maintenance menu. The value used for the first TSV05 device is 224_8. Vector values for additional units are selected from floating vector space, starting at 300_8. The presence of other devices which use floating vectors will affect the vector assigned to the QT13. See the appropriate operating system documentation.

For a TMSCP-class device, the operating system loads the interrupt vector into the controller during initialization. The value used for the first TMSCP device is 260_8. Vector values for additional units are selected from floating vector space, starting at 300_8. The presence of other devices which use floating vectors will affect the vector assigned to the QT13. See the appropriate operating system documentation.

2.3.8 22-Bit Addressing (SW2-5)

Twenty-two-bit addressing capability is an option with some LSI-11 operating systems and processors. Check your system documentation. It is required for MicroVAX systems. To enable, install the single 7438 IC in socket U53 on the QT13 PCBA and set SW2-5 ON.

CAUTION

Some LSI-11 bus backplane manufacturers use the backplane lines devoted to extended addressing for power distribution. Installing a QT13 with the 22-bit option in such a system **will** damage the option IC. Before installing, confirm that neither positive nor negative potential exists between lines BC1, BD1, BE1, BF1, and logic ground. A QT13 without the 22-bit option will not be damaged if power is present on those lines.

2.3.9   Write Data Strobe Option (SW2-6:SW2-7)

These two switches allow you to specify which edge of the write data strobe is used by the drive to latch data. The factory setting for trailing edge should be used for all drives with the exception of the Kennedy 9300 and Anritsu Tape Drives. If in doubt, see the documentation for your particular drive. The table below describes how to set the switches to select between the two options. SW2-6 and SW2-7 should never be ON or OFF at the same time.

Function	Switch Settings
Leading Edge	SW2-6 ON; SW2-7 OFF
Trailing Edge	SW2-6 OFF; SW2-7 ON

2.3.10   Interrupt Priority Level

The QT13 is factory configured for interrupt request (IRQ) level 4 (BR4). This is the preferred configuration for most DEC Q-bus systems. In the case of special applications, the user may change to IRQ5 (BR5) via jumpers. If you use IRQ5, Emulex strongly recommends that the QT13 be located ahead of all DEC devices on the bus. Table 2-4 describes the different jumper settings. If you use IRQ5, Emulex strongly recommends that the QT13 be located ahead of all DEC devices on the bus.

Table 2-4. Interrupt Priority Level

Jumper	Description	BR4	BR5
FG	Monitor IRQ Level 6	OUT	IN
GH	Monitor IRQ Level 5	IN	OUT
JK	IRQ Level 5 Request	OUT	IN

2.4   Onboard Diagnostics

The onboard diagnostics which are embedded in the QT13's firmware permit you to:

● Select configuration options for the tape drive

● Test the functionality of the coupler and drive

● Verify the switch settings on the QT13 module

Options are selected through menus. Menus are accessed through the host console.

NOTE

Configuration options must be loaded into the NOVRAM before the coupler can be used. The NOVRAM is not loaded at the factory, and its contents are indeterminate as delivered by the factory.

2.4.1 Control Characters

Table 2-5 explains the functions of control characters when used with the QT13 diagnostics.

Table 2-5. Use of Control Characters with QT13 Diagnostics

CTRL/	USE
C	Aborts a currently executing test or a command being entered. If entered while test is executing, control is returned to present menu. If entered in response to a prompt, control is returned to the previous level.
O	Stops the display of test information on the screen or hardcopy terminal. Entering CTRL/O a second time will re-start the information appearing at the terminal.
S - Q	The CTRL/S, or terminal-generated XOFF, causes typed responses at the terminal to pause. CTRL/Q, or a terminal-generated XON, permits the output to resume.
T	Displays summary of currently executing test.
U	Aborts a command being entered; used only if < return > has not been entered yet. On CRTs, it deletes and ignores any characters entered. On hardcopy terminals, it displays "^U" and reprints prompt on new line.
W	Rewrites screen or prompt, as when switch settings were changed externally on board, and updates display.
Z	Same as C.

2.4.2   Diagnostic Setup Sequence

Instructions for starting the onboard diagnostics are presented in the
accompanying checklists. One is designed for MicroVAX II use; the other, for
LSI-11 use.

NOTE

For both MicroVAX and LSI-11, TMSCP onboard
port mode only: You may observe that tests hesitate
intermittently or keyboard input is temporarily not
accepted, due to the DEC host's polling of TMSCP
devices. **This is normal.** Tests will eventually
complete automatically; keep trying with keyboard
input until it is accepted.

CAUTION

If you change a switch position on QT13, or change
the configuration in the NOVRAM, you must also
reset the QT13 so that the host operating system's
initialization sequence reads the codes established by
the switch settings and/or NOVRAM. To reset the
QT13, either toggle switch SW1-1 (ON then OFF), or
power-down and power-up system. **If you toggle
SW1-1, be sure the system is offline. Resetting the
coupler with the system running is likely to crash
the system.**

If you use an RS232 terminal to run the onboard diagnostics, you will need the
cable described below to connect the terminal to the board. Alternatively, this
cable can be purchased from Emulex (part #QT1311201-00).

The cable is a three-wire cable. One end is DB25S (female 25-pin connector) that
connects to any standard asynchronous terminal. The other is a connector that
consists of two Berg/DuPont pieces (Berg part numbers 78211-003 and
48049-000). Connect the following pins on the two connectors:

- Berg Pin 1 (Signal Ground) to DB25S Pin 7 (Signal Ground)
- Berg Pin 2 (Receive Data) to DB25S Pin 2 (Transmit Data)
- Berg Pin 3 (Transmit Data) to DB25S Pin 3 (Receive Data)

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DIAGNOSTIC STARTUP
(MicroVAX II)

QT13 ONBOARD PORT MODE:

NOTE: Before running the onboard diagnostics, the QT13 must have all of its option switches set appropriately. If you have not specified the QT13's bus address, emulation, and other options, do so now. See subsection 2.2.

If the QT13 is in TMSCP mode, the operating system must be configured to recognize the QT13, and it must be running in order to use the onboard diagnostic port. The QT13 must be in Operational mode when the system is booted and the host system must be fully operational before switching to Diagnostic mode. In TSV05 mode, the onboard port can be used with or without the operating system running.

☐ 1. Connect a terminal to QT13 RS-232 onboard port via an appropriate cable, and set SW1-1 OFF.

☐ 2. Boot the operating system (optional for TSV05 emulations), and allocate the QT13 tape transport to prevent user access during onboard diagnostic procedure.

☐ 3. Set SW1-3 OFF to select the QT13 Onboard Port.

☐ 4. Set SW1-2 ON to select Diagnostic mode. The initial menu is displayed and either NOVRAM maintenance or subsystem diagnostics can be run at this time.

☐ 5. Perform necessary diagnostic functions (see following pages for details).

☐ 6. To exit Diagnostic mode, set SW1-2 OFF, set SW1-3 to original position (if changed), and type an "X" at the Main Menu prompt on the terminal. After this step, the tape transport can be accessed normally from the operating system. Note: If NOVRAM is changed, the controller must be reset.

SYSTEM CONSOLE MODE:

☐ 1. Set SW1-1 OFF.

☐ 2. Perform a system reset, either from power-up or reset. Do not allow the operating system to boot!

☐ 3. Set SW1-3 and 1-4 ON to select Host console and MicroVAX processor.

☐ 4. Set SW1-2 ON to select Diagnostic mode.

☐ 5. At the >>> prompt, type:

```
D/P/W 20001F40 20<return>

D/P/L 20088000 80000000<return>

D/P/L 20088004 80000001<return>
```

☐ 6. Toggle QT13 switch SW1-1 from OFF (Run) to ON (Reset) to OFF. LEDs 1 and 2 on the QT13 will illuminate momentarily, indicating that the MicroVAX driver is being uploaded.

☐ 7. At the system >>> prompt, type:

```
ST 80<return>
```

The initial menu is displayed and either NOVRAM maintenance or subsystem diagnostics can be run at this time.

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DIAGNOSTIC STARTUP
(LSI-11)

QT13 ONBOARD PORT MODE:

NOTE: Before running the onboard diagnostics, the QT13 must have all of its option switches set appropriately. If you have not specified the QT13's bus address, emulation, and other options, do so now. See subsection 2.2.

If the QT13 is in TMSCP mode, the operating system must be configured to recognize the QT13, and it must be running in order to use the onboard diagnostic port. The QT13 must be in Operational mode when the system is booted and the host system must be fully operational before switching to Diagnostic mode. In TSV05 mode, the onboard port can be used with or without the operating system running.

☐ 1. Connect a terminal to QT13 RS-232 onboard port via an appropriate cable, and set SW1-1 OFF.

☐ 2. Boot the operating system (optional for TSV05 emulations), and allocate the QT13 tape transport to prevent user access during onboard diagnostic procedure.

☐ 3. Set SW1-3 OFF to select the QT13 Onboard Port.

☐ 4. Set SW1-2 ON to select Diagnostic mode. The initial menu is displayed and either NOVRAM maintenance or subsystem diagnostics can be run at this time.

☐ 5. Perform necessary diagnostic functions (see following pages for details).

☐ 6. To exit Diagnostic mode, set SW1-2 OFF, set SW1-3 to original position if changed, and type an "X" from the Main Menu prompt on the terminal connected to the QT13 onboard port. After this step, the tape transport can be accessed normally from the operating system. Note: If NOVRAM is changed, the controller must be reset.

SYSTEM CONSOLE MODE:

☐ 1. Set SW1-1 OFF.

☐ 2. Perform a system reset, either from power-up or reset. Do not allow the operating system to boot!

☐ 3. Halt the system and enter OG in response to the ODT prompt.

☐ 4. Set SW1-3 ON to select Host console and SW1-4 OFF to select LSI-11 processor.

☐ 5. Set SW1-2 ON to select Diagnostic mode.

☐ 6. Toggle SW1-1 from ON (Reset) to OFF (Run). LEDs 1 and 2 will illuminate briefly, indicating that the driver is being uploaded.

☐ 7. Load 200 (octal) in Register 7:

   R7/XXXXXX 200 < return >

☐ 8. At the system prompt, type:

   p

   The initial menu is displayed and either NOVRAM maintenance or QT13 diagnostics can be run at this point.

</div>

2.4.3   Initial Screen

The initial Diagnostics screen shows the revision level of the diagnostic firmware being used, drive online or offline status, and CSR address location. You are prompted to specify whether a video or hardcopy terminal will be used to run the diagnostics.

NOTE

Video display mode supports VT1XX/VT2XX or compatible terminals. Use Hardcopy mode for non-VT1XX/VT2XX terminals.

After you specify the type of terminal and enter a < return >, the Main Menu is displayed.

2.4.4   Main Menu

The Main Menu for a video display terminal is shown in Figure 2-4. This menu presents choices for running diagnostic tests, configuring the subsystem for tape transport characteristics, and for displaying the switch settings.

```
                            MAIN MENU

            A - All tests
            R - Retry limit value
            N - NOVRAM maintenance
            T - Test selection menu
            S - Display switch settings
            Q - Quick test on positioning and erase
            X - Exit Maintenance mode after resetting switches


                    Select function (def = A) :


    CTRL/C - Returns you to the previous level
    CTRL/U - Deletes current input if no < CR > entered
    CTRL/W - Rewrites the screen or prompt
```
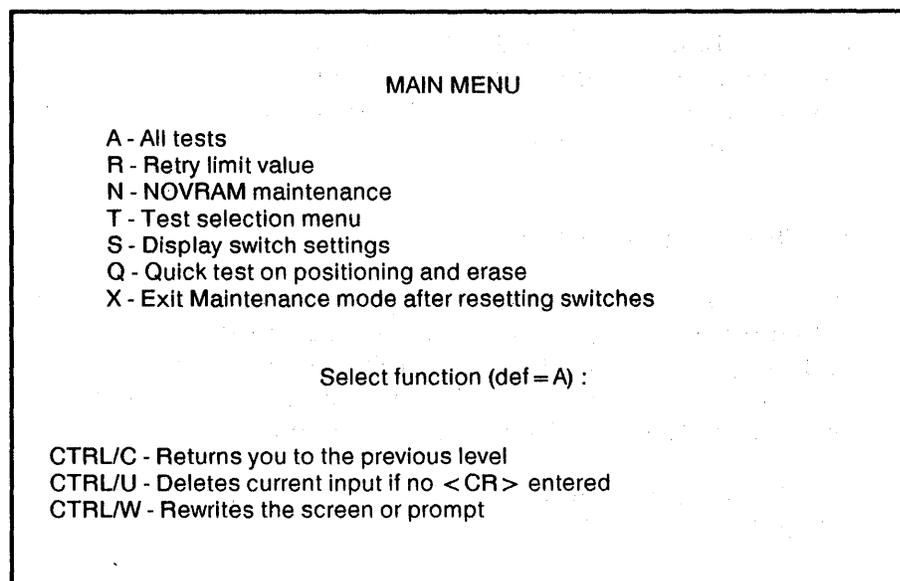
Figure 2-4. Main Menu

To make a selection from the Main Menu, type the letter of the selection you want and follow it with a < return >. The choices are:

A - All tests. All onboard firmware installation diagnostic tests are executed once and any errors reported. A good time to select this is after the NOVRAM has been loaded.

R - Retry limit value. Allows the operator to specify the number of retries to be performed on Write Errors. The program defaults to 10. Errors that occur within the limits set by this parameter are reported as soft errors. The default limit is set each time the test is restarted from the Main Menu.

N - NOVRAM maintenance. Current configuration values are displayed and any errors are reported. You can make changes to the NOVRAM through this option.

T - Test selection menu. This option lets you selectively run any of the six onboard diagnostic tests. A loop count selection lets you determine how many times the tests are run.

S - Display switch settings. The switchpack ON/OFF settings are portrayed on this screen to verify that the firmware has interpreted your settings correctly. The specific configuration option represented by the switch setting is also identified.

Q - Quick test on positioning and erase. Causes the Erase and Positioning Test to terminate after 256 records instead of running all the way to EOT. Once set, the option remains in effect until reset by the operator in the Main Menu.

X - Exit Maintenance mode after resetting switches. After resetting the Operational/Diagnostic and Loop/Continue switches, "X" will return you to the operational mode. If you haven't reset any switches, "X" will return you to the initial diagnostics screen.

2.4.4.1   NOVRAM Maintenance

This function lets you specify the QT13's configuration options. When selected, the NOVRAM's current data is displayed on the terminal. You will see the NOVRAM parameter descriptor, followed by the range of values in parentheses. There is a separate menu for TSV05 and TMSCP emulations, determined by the selection of TSV05 or TMSCP emulation through switch SW2-4.

NOVRAM menus for the TSV05 and TMSCP emulations are shown in Figures 2-5 and 2-6, respectively.

NOTE

The default value, which appears with the range of values for each option, is indeterminate and indicates **only** the current value. This value may, or may not, be the value your installation requires.

If the NOVRAM maintenance function fails, it may be because of corrupted or unprogrammed NOVRAM. In this case, an error message will be printed and you are permitted to continue the operation.

You will then be asked if you want to modify the NOVRAM.

If you answer "N", control is returned to the Main Menu.

```
        Drive type, 0 = Start-Stop, 1 = Streamer (0-1,def = 1 dec) :
        On-the-fly commands (Y/N, def = Y) :
        Enable data busy timeout delay (Y/N, def = Y) :
        Remote density (Y/N, def = N) :
        CDC tape drive (Y/N, def = N) :
        Use IDEN line to select remote density (Y/N, def = Y) :
        IDEN line true selects high density (Y/N, def = N) :
        Adaptive DMA (Y/N, def = N) :
        Blank tape timeout value, in seconds (1-60, def = 5 dec) :
        DMA burst word count (1-16, def = 16) :
        uSec delay between DMA bursts (2/8, def = 2) :
        Enable write data prefill (Y/N, def = N) :
        Adaptive DMA threshold (1-7, def = 4 dec) :
        Interrupt vector (0-774,def = 224 oct) :


Modify ?  (Y/N, def = N) :
```

Figure 2-5. Sample TSV05 NOVRAM Maintenance Menu

```
        Drive type, 0 = Start-Stop, 1 = Streamer (0-1,def = 1 dec) :
        On-the-fly commands (Y/N, def = Y) :
        Enable data busy timeout delay (Y/N def = Y) :
        Remote density (Y/N, def = Y) :
        CDC tape drive (Y/N, def = N) :
        Use IDEN line to select remote density (Y/N,def = Y) :
        Iden line true selects high density (Y/N def = N) :
        Adaptive DMA (Y/N, def = N) :
        Blank tape timeout value, in seconds (1-60, def = 5 dec) :
        Max retry count for tape errors (1-10, def = 8) :
        uSec delay between DMA bursts (2/8. def = 2) :
        Enable write data prefill (Y/N, def = N) :
        Adaptive DMA threshold (1-7, def = 4 dec) :
        Tape drive speed thousands of bytes/second (0-65535,def = 200 dec)
        Support  800 BPI density (Y/N,def = Y)  :
        Support 1600 BPI density (Y/N,def = Y)  :
        Support 6250 BPI density (Y/N,def = Y)  :


Modify ?  (Y/N,def = N) :
```

Figure 2-6. Sample TMSCP NOVRAM Maintenance Menu

If you answer "Y", the cursor moves to the first data field to be modified and you can make changes.

NOTE

The tape coupler must be reinitialized before the values you enter take effect.

At a hardcopy terminal, the descriptors will be output and the cursor will be positioned at the end of the prompt.

If you enter a CTRL/Z or CTRL/C, control returns to the main menu and the NOVRAM will not be written.

Menu selections are described below. Options that pertain to both TSV05 and TMSCP applications are described first; followed by TSV05-only and TMSCP-only options.

Some of the values you enter will be mandated by the transport that you use, others by the operating system configuration; however, some of the parameters are for system tuning and thus less definite. In those cases, we have included **recommended settings**. When in doubt, use the recommended settings.

TSV05 and TMSCP:

- **Drive type.** Specify whether your transport is of the start/stop or streaming variety. In addition, you can override the built-in "auto high-speed control" function that optimizes system performance: by specifying "start/stop" when your transport type is actually a streamer, you can force the transport to respond to commands more slowly, if your application requires it.

- **On-the-fly commands.** This option is designed to optimize system performance, so normally you would specify "yes".

- **Enable data busy timeout delay.** This feature allows you to enable (Y) or disable (N) a watch-dog timer which looks for a FALSE to TRUE transition of the Data Busy (DBY) signal on the tape interface during certain operations. Most drives are compatible with this option (i.e., Y); follow the configurations given for specific drives in Appendix B.

- **Remote density.** If your transport supports this, specify "yes". If you specify "no", you will have to set the density on the transport itself.

- **CDC Drive.** This question applies to the remote density parameter and CDC 9218X-style tape drives. CDC drives require a special code to allow proper remote density selection. Enter Y in response to this question for CDC 9218X-style tape drives only.

- **Use IDEN line to select remote density.** If your transport supports remote density selection using an IDEN signal at the Pertec interface, specify this option (Y). If your transport uses a command sequence to select density, answer N to this question. Consult your transport documentation to determine whether or not it uses IDEN. **Remote density** must also be enabled for this option to work. This feature is used to select density **only** for start/stop transports. Consult your drive documentation for information on how to use this method.

- **IDEN line true selects high density.** The controller uses IDEN to select the tape transport's recording. This feature allows you to invert the "true" state of the IDEN line. Consult your tape drive manual for usage requirements.

- **Adaptive DMA.** Enabling this option ensures that CPU or other device functions are not locked out for excessive periods of time, by allowing the QT13, while in the middle of a Block Mode DMA transfer, to release the bus to another device. When disabled, the QT13 will seize the bus for the entire DMA burst count. Recommended setting: "yes".

- **Blank tape timeout value.** This value tells the QT13 how long to wait for data before timing out. The value, selected from a range of 1 to 60 seconds, should approximate the number of seconds it takes 300 inches (25 feet) of tape to pass the read head. Divide your transport's maximum speed in inches per second (ips) into 300 and round to the nearest whole number to determine the timeout value.

- **uSec delay between DMA bursts.** The value of this option can be either 2 or 4 microseconds. It determines the delay, between DMA bursts, before the QT13 will attempt to gain bus control. Choose based on whether or not there are other slower DMA devices on the bus. If so, select 4 to give the other devices more opportunity to catch the bus. Recommended setting: "2".

- **Enable write data prefill.** If enabled, this option allows the QT13 to fill the write buffer with a complete data record before it initiates transfer to the tape drive. Enable this option only if your system logs "data late" errors to the tape drive during write operations. Be aware that some loss of tape streaming efficiency occurs when this option is enabled. Default: disabled.

- **Adaptive DMA threshold.** The threshold is the maximum number of words processed by the QT13 before releasing the bus when another device is trying to gain bus control. The choice is any number in the range of 1 to 7 words. Choose based on your system priorities. If you wish to give interrupt service priority over DMA, set this value on the low side. If you wish to favor DMA, set this value on the high side. Avoid extremes. Recommended setting: "4".

TSV05 ONLY:

- **DMA burst word count.** This value, selected from a range of 1 to 16, specifies the number of words the QT13 will process in each burst of DMA transfer activity. Choose based on your system priorities. If your system configuration includes devices with heavy PIO requirements or interrupt loads, set this value on the low side. If you wish to favor DMA, set this value on the high side. Also, higher values aid streaming operation. Recommended setting: 16.

- **Interrupt vector.** The standard vector is 224_8. Vector values for additional units are selected from floating vector space, starting at 300_8. The presence of other devices which use floating vectors will affect the vector assigned to the QT13. See the appropriate operating system documentation.

TMSCP ONLY:

- **Max retry count for tape errors.** This parameter defines the number of retry operations that the controller will try before reporting an error. This is not a software parameter and will not affect software retries. Lowering the retry count will reduce the time required to initialize a tape, especially for tri-density drives. Recommended setting: 1 or 2.

- **Tape drive speed.** The tape drive speed, expressed in kilobytes per second (refer to your drive documentation), is a value required from the QT13 by the host system. It does not affect system performance.

- **Support 800 BPI density.** This value is reported back to the host. It works in conjunction with the remote density option, if that option was enabled.

- **Support 1600 BPI density.** This value is reported back to the host. It works in conjunction with the remote density option, if that option was enabled.

2.4.4.2   Test Selection

This option permits you to selectively run any of the six tests by means of a menu. Type the letter of the test, followed by a < return >, at the prompt. Repeat for as many tests as you want, then select "Go" to begin test execution.

```
                    TEST SELECTION MENU

        B - BOT and Rewind
        W - Write/Read
        F - File mark
        S - Space forward/reverse
        P - Positioning
        E - Erase
        H - Host Memory DMA
        L - Loop Count
        D - Display selections
        C - Clear selections
        G - Go
        X - Exit this Menu


                  Select Function (def = X):


CTRL/C - Returns you to the previous level
CTRL/U - Deletes current input in no < CR > entered
CTRL/W - Rewrites the screen or prompt
```

Figure 2-7. Test Selection Menu

Eight diagnostic tests and their descriptions follow. Other selections deal with displaying and running the tests.

B - BOT and Rewind. The QT13 checks for the Beginning of Tape (BOT) status by issuing a write, then a rewind, command.

W - Write/Read. The QT13 issues write and read commands and compares the data.

F - Filemark. The QT13 writes a filemark, rewinds, spaces forward a record, and checks for the End of File (EOF).

S - Space forward/reverse. In this test, the QT13 issues commands to check that the tape transport is properly spacing forward and backward with respect to the EOF mark.

P - Positioning. The QT13 issues write, rewind, and space commands to check that the tape transport can position properly with respect to EOT and BOT.

E - Erase. The QT13 issues an erase command to EOT and checks for the blank tape timeout.

H - Host memory DMA. The QT13 uses host memory as a scratch pad to verify that the Qbus interface is functioning.

L - Loop count. This option lets you determine how many times, from 0 to 255, a given test is executed. Zero selects an infinite number of passes. If this option is not used, the default number of executions is 1.

D - Display selections. This is a convenience option. Test selection is typically made by selecting (but not executing) the tests you want all at once, then selecting the "Go" option which executes the tests. If you want to see the tests you have selected prior to executing them, **Display selections** will list them on the screen. You can then either go ahead with test execution or change the tests.

C - Clear selections. If you want to cancel the tests you have previously selected but not executed, this option will effectively cancel all selections.

G - Go. This option begins test execution. You will be asked for confirmation that you do want to run the tests.

X - Exit this Menu. This option will return you to the Main Menu.

Completed tests are followed by a message on the screen confirming the number of passes made and the number, if any, of hard, soft, or device errors.

2.4.4.3 Display Switch Settings

This option shows the switch settings of SW1 and SW2 on the QT13 module. A sample display for SW1 follows in Figure 2-8; a sample display for SW2 is shown in Figure 2-9. With SW1-2 ON, SW1-3 and SW1-4 reflect QT13 characteristics related to the Diagnostic mode. With SW1-2 OFF, SW1-3 and SW1-4 will reflect characteristics related to Operational mode. Refer to subsection 2.3.

If, while looking at the screen display, you decide to change the switch settings, do so on the QT13 module. Then, by typing CTRL/W, the screen display will be refreshed, displaying the changes you just made.

```
       Switch 1
      OFF    ON
      -------
     |        |
     |  [    ] |     1     QT13 Tape Coupler Reset Switch, Unreadable Hardware Switch
     |  [  * ] |     2     Diagnostic Mode
     |  [  * ] |     3     Onboard Port Communications
     |  [  * ] |     4     LSI-11 Host
     |        |
      -------
```
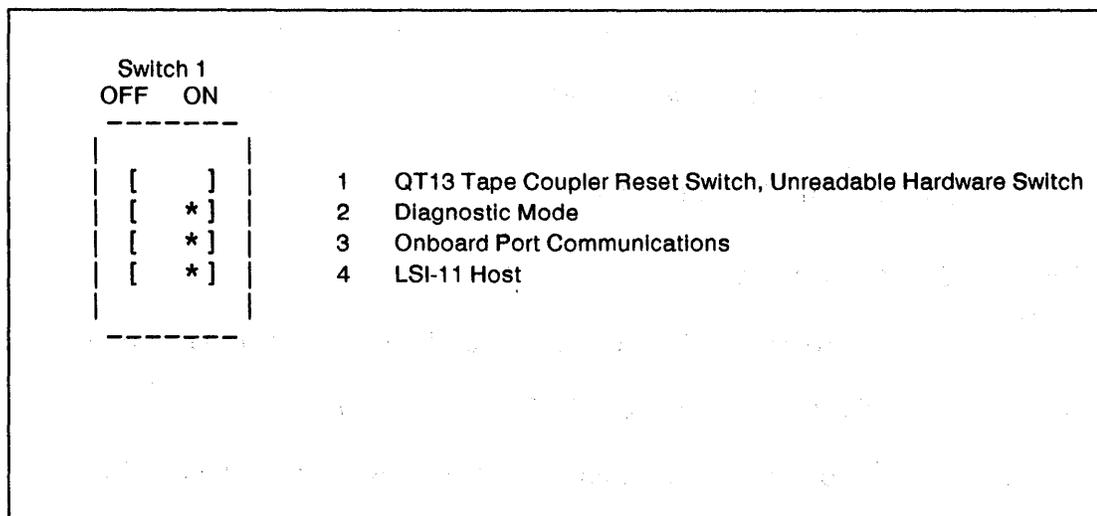
Figure 2-8. Sample SW1 Switch Setting Display

```
   Switch 2
   OFF    ON
   ------------
  |          |
  |  [ *   ] |     1    \
  |  [ *   ] |     2    Address = 174500 Oct
  |  [ *   ] |     3    /
  |  [ *   ] |     4    TMSCP
  |  [    *] |     5    Enable 22-bit Addressing
  |  [     ] |     6    WDS Trailing Edge Select, Unreadable Hardware Switch
  |  [     ] |     7    WDS Leading Edge Select, Unreadable Hardware Switch
  |  [     ] |     8    Not Used, Unreadable Hardware Switch
  |          |
   ------------
```
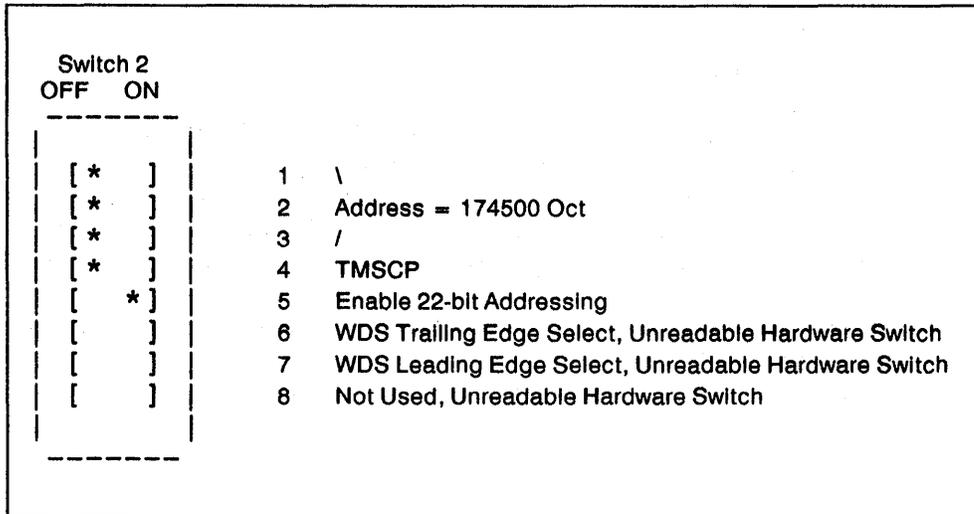
Figure 2-9. Sample SW2 Switch Setting Display

2.5   Physical Installation

2.5.1   System Preparation

To prepare your CPU to accept the QT13, use the following procedures:

MICRO/PDP-11 and MicroVAX II Preparation:

1. Power down the system by switching OFF the main ac breaker.

2. Remove the rear cover from the chassis so that the patch panel is exposed. (Rack-mount version does not have a rear cover.)

3. Loosen the captive screws from the patch panel using a standard screwdriver. Remove the patch panel.

4. Find the ribbon cable that connects the CPU module to the patch panel. For easier board installation, you may disconnect the CPU ribbon cable from the patch panel.

LSI-11 Series Preparation:

1. Power down the system by switching OFF the main AC breaker.

2. Remove the cover from the chassis so that the backplane is exposed.

Do not replace the covers or patch panels until the installation is verified.

2.5.2 Slot Selection

The QT13 may be assigned to any desired slot because it uses the LSI four-level interrupt scheme to perform distributed interrupt arbitration.

If you configure the QT13 to use interrupt level 4, install it toward the end of the NPR priority chain. The QT13 can buffer up to 61K bytes of data; therefore, it requires less direct memory access (DMA) priority than controller devices that contain less buffering. Controllers with RK, RL, or TM11 emulations require higher DMA priority than the QT13 Tape Coupler for faster access to prevent buffer overrun.

If you configure the QT13 to use interrupt level 5, install it ahead of (closer to the CPU) DEC devices that are configured to use interrupt level 4 (some DEC devices do not monitor the next highest request level and fail to pass grants to higher priority devices).

DMA continuity must be ensured by leaving no empty LSI-11 bus slots between PCBAs in the backplane. For specific information regarding DMA continuity requirements, refer to the backplane or CPU user's guide.

2.5.3 Mounting

Plug the QT13 into the LSI-11 backplane with components oriented in the same direction as the CPU and other modules. Always insert and remove the boards with the computer power OFF to avoid possible damage to the circuitry. Be sure that the board is properly positioned in the throat of the board guides before attempting to seat the board by means of the extractor handle.

2.6 Tape Transport Preparation

Unpack and install the tape transport according to the manufacturer's instructions. Position and level it in its final place before beginning installation of the QT13. This allows the input/output (I/O) cable routing and length requirements to be determined accurately.

Configure the tape transport for the desired operating mode by using the appropriate switches on the transport operator control panel (OCP) or by issuing appropriate commands via software. Drive must be set up as unit 0.

2.7 Cabling

The QT13 interfaces with the tape transport it controls through two 50-pin flat-cable connectors attached to 50-conductor flat ribbon cables. The cables are connected from connectors J1 and J3 on the QT13 to connectors on the formatter PCBA in the tape transport in the system. Maximum cable length is 25 feet. Figure 2-9 shows the basic cable installation. Table 2-6 lists coupler-to-formatter connections.

QT1301-1452
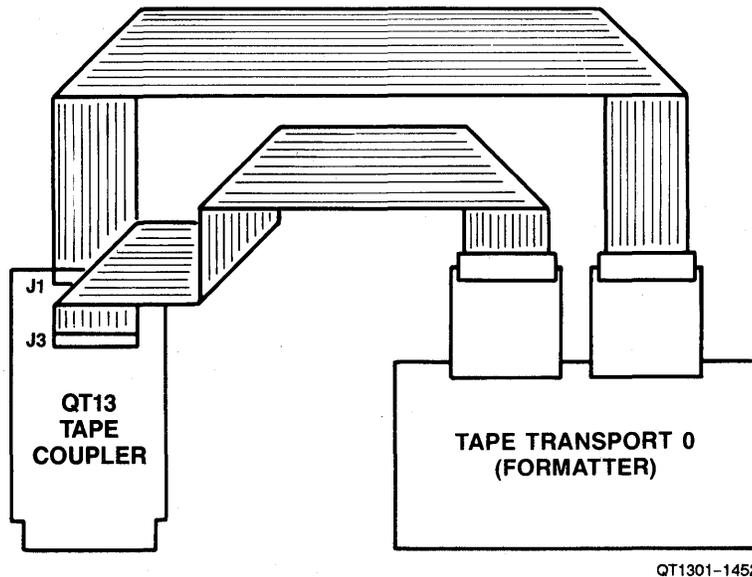
Figure 2-10. Drive Cabling

Table 2-6. QT13 Coupler-to-Formatter Connections

Manufacturer	Model	QT13 Conn. J1 to:	QT13 Conn. J3 to:
CDC (Tandberg)	92180	J124	J125
CDC (Keystone)	92181 (BY3A6)	P5	P4
CDC	92185	J3	J2
Cipher	F100X, F900X	P5	P4
Cipher	F880, CT-75, CT-125	P2	P1
Digi-Data	All Formatted	J3	J4
Kennedy	9000, 9100, 9300	J1	J5
Kennedy	9400	P200	P100
Kennedy	9600, 9600A, 9610	J2	J1
Pertec	Formatted Start/Stop	P5	P4
Telex	9251	I/02	I/01

NOTE

Some formatters have 100-pin connectors and need an adapter that allows the two Emulex 50-pin connectors to be used. The adapter must be ordered from the formatter manufacturer.

2.7.1 Same Cabinet Installation

When the QT13 and its tape transport are installed in the same cabinet, it is possible that the cabinet itself provides sufficient RFI shielding. In such cases, it is not necessary to shield the cables that connect the subsystem.

NOTE

> If the cabinet in which the QT13 and CPU are installed was manufactured before 1 October 1983, it may not provide sufficient shielding or filtering to prevent excessive RFI radiation or conduction. It is the operator's responsibility to take whatever steps are necessary to correct interference.

To cable the subsystem, match the arrow that identifies pin 1 of the first ribbon cable header with the arrow on J1. Press the header into the connector; press the header at the other end of the cable into the formatter's connector. Repeat for the second ribbon cable header and J3. Install the cable terminator (supplied with the transport) on the formatter connector.

2.7.2 Separate Cabinet Installation

If the QT13 and the tape transport are located in separate cabinets, the cables that run between the cabinets must be shielded. The points of cabinet exit and entry must not cause the computer installation to exceed FCC limits for RFI. Extension cables, cable I/O adapter panels, and shielded cables designed for this purpose are available from Emulex (subsection 1.3).

The cable I/O adapter panels are designed to fit directly into the I/O bulkhead that is built into most FCC-compatible DEC CPU expansion cabinets. See Figure 2-10. If there is no I/O bulkhead in the cabinet, the rack-mount panel holds two cable I/O adapter panels and mounts in any standard 19-inch RETMA rack. The rack-mount panel is shown in Figure 2-11.

There are two possible separate cabinet configurations. In one, the transport is mounted in a freestanding RETMA rack (a RETMA rack attached to a PDP CPU cabinet is not considered a separate cabinet installation). In the other configuration, the transport has its own cabinet and is itself freestanding. These two configurations are shown in Figures 2-12 and 2-13. The cabling procedure that follows is a generic one for use with either configuration.

Procedure:

1. Open the rear bulkhead door or panel of the equipment cabinet.

2. Install the QT13 in an appropriate CPU bus slot.

3. Install a cable I/O adapter panel in a convenient aperture in the rear bulkhead of the CPU or expansion cabinet and secure it with the eight captive screws. Tighten the screws finger-tight. Make sure that no gaps are present above or below the cable I/O adapter panel.

4. Install a rack-mount panel in the RETMA rack (Figure 2-12) or peripheral cable adapter kit in the transport cabinet (Figure 2-13).

5. To cable the subsystem, match the arrow that identifies pin 1 of the first ribbon cable header with the arrow on J1. Press the header into JJ1; connect the header at the other end to the formatter connector. Repeat for the second cable with J3.

6. Select a shielded cable that is long enough to reach from the CPU or expansion cabinet to the RETMA rack or the freestanding transport.

7. Remove (or loosen) the clamping bars on the widest slot of the cable I/O adapter panel in the CPU or expansion cabinet.

8. Route one end of the prepared cable through the widest slot in the cable I/O adapter panel (see detail in Figure 2-12). Clamp the bare shielding against the cable I/O adapter panel with the clamping bar.

9. Find the arrow that is molded into the male cable header of the extension cable. Align this arrow with the corresponding arrow in the female header of the shielded cable and press the headers together.

10. Repeat steps 7 through 9 for each cable.

Use the Following Steps for Rack-Mount Configurations

11. Repeat steps 7 and 8 at the tape end of the cable.

12. Select an extension cable that will reach from the cable I/O adapter panel in the RETMA rack to the tape transport.

0.25
INCHES

4.690
INCHES

8.375
INCHES

QT13-03
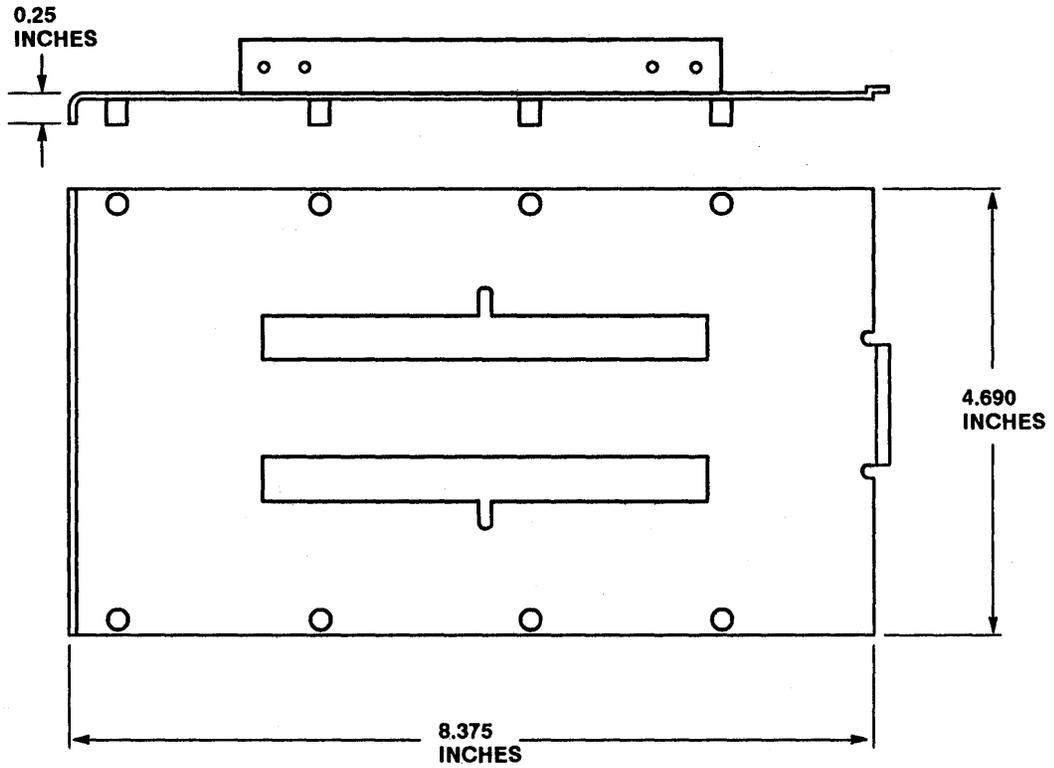
Figure 2-11. Cable I/O Adapter Panel

2.060
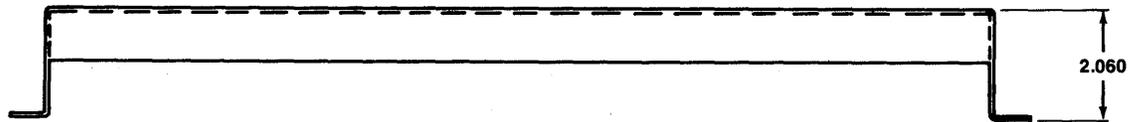
ALL DIMENSIONS IN INCHES

17.590

3.500

2.250

1.484

.859

5.218

.43 TYP

19.00

QT1301-0201
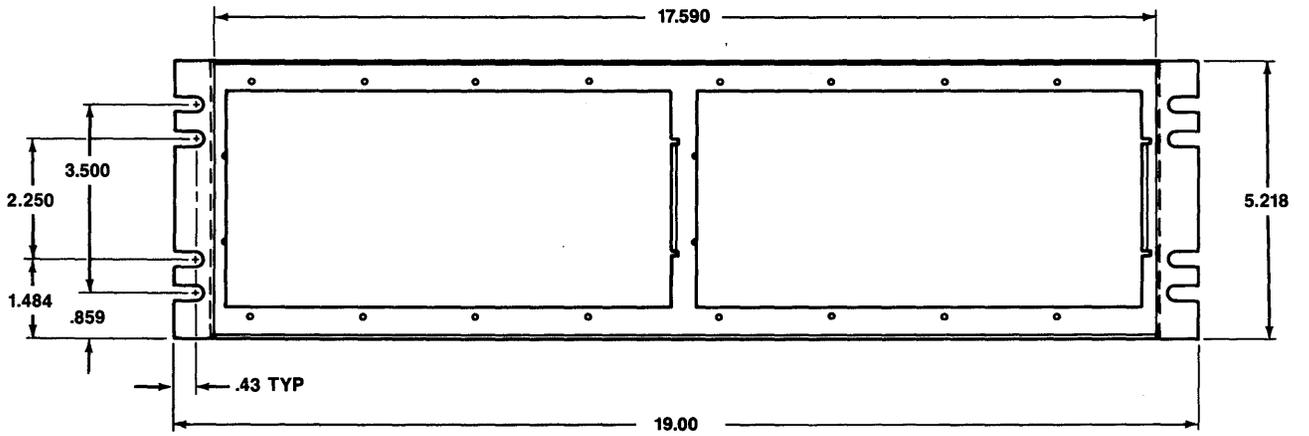
Figure 2-12. Rack-Mount Panel

13. Find the arrow that is molded into the female cable header of the extension cable. Align the cable arrow with the corresponding arrow of one of the tape transport's cable connectors and press the header into the connector. Make sure that the latches on the connector fully engage the cable header.

14. Terminate the cable by installing a terminator (included with the transport) on the transport.

15. Connect a ground cable from the logic ground of the CPU to the logic ground of the tape transport.

Use the Following Steps for Freestanding Transport Configurations

16. Select two extension cables long enough to reach from the transport's cable connector to the peripheral cable adapter. (Alternatively, you can strip enough insulation off the shielded cable to allow the shield to be clamped at the adapter and the cable head to connect at the transport's cable connector.

17. Connect both cables to the transport's cable connectors by matching pin 1 (molded-in arrow on cable header) and pressing the header onto the connector.

18. Clamp both shielded cables in the wide section of the peripheral cable adapter.

19. Connect the extension cables to the shielded cables as described in step 9.

20. Select an extension cable that will reach from the peripheral cable adapter rack to the transport's cable connector.

21. Clamp the shielded cable from the coupler in the peripheral adapter. Connect the extension cable and the shielded cable.

22. Install a terminator (included with the transport) on the transport's unused cable connector.

End of Procedure
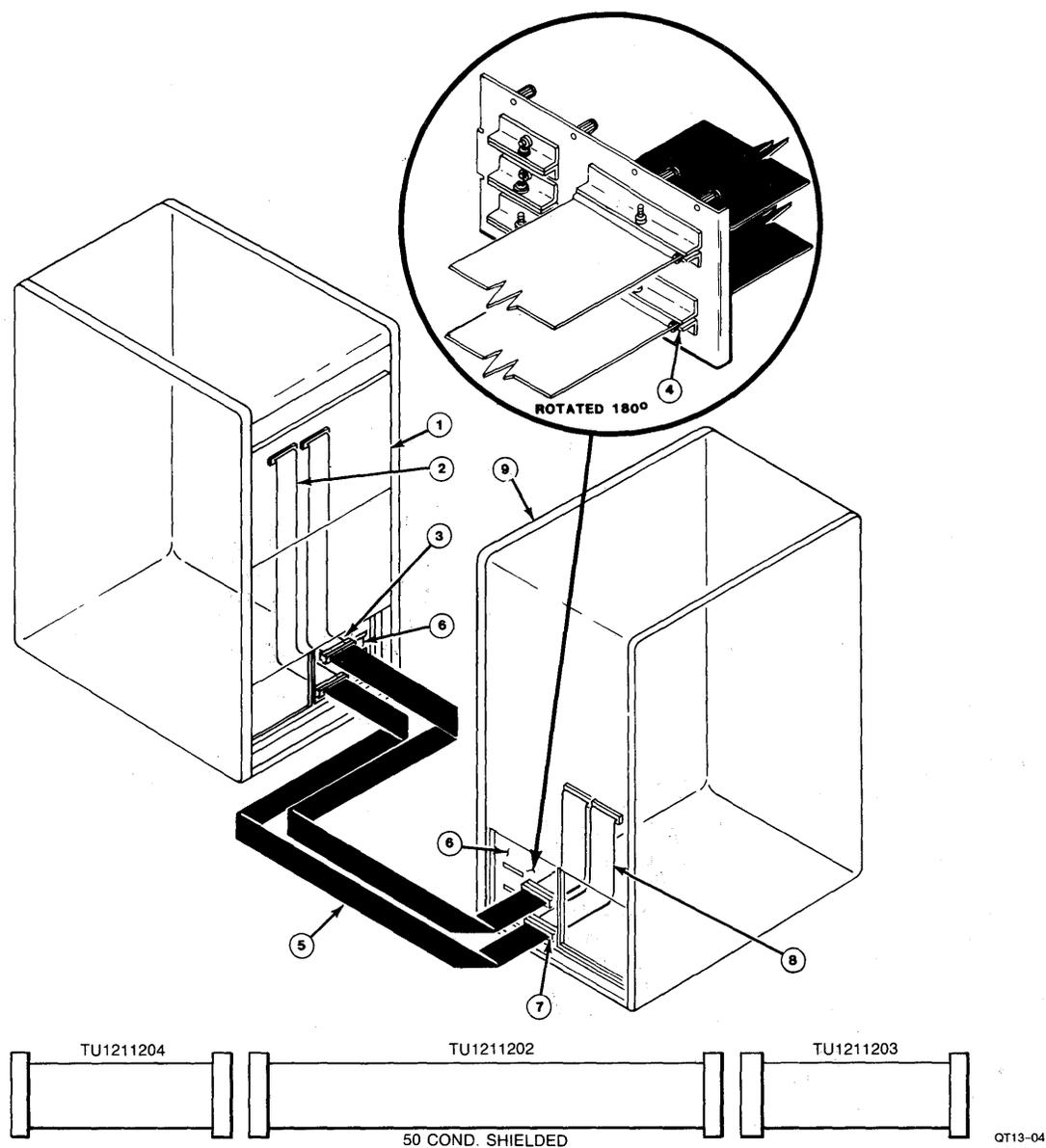
Figure 2-13. Rack-Mount Drive Cabling Configuration

1. Tape Coupler PCBA Enclosure
2. Nonshielded Extension Cable
3. Cable Connectors, Extension Cable to Shielded Cable
4. Clamp - Shield of Shielded Cable Clamped Within
5. Shielded/Jacketed Cable, External to Equipment Cabinets
6. Cable I/O Adapter Panel
7. Cable Connectors, Shielded Cable to Extension Cable
8. Nonshielded Extension Cable
9. Peripheral Device
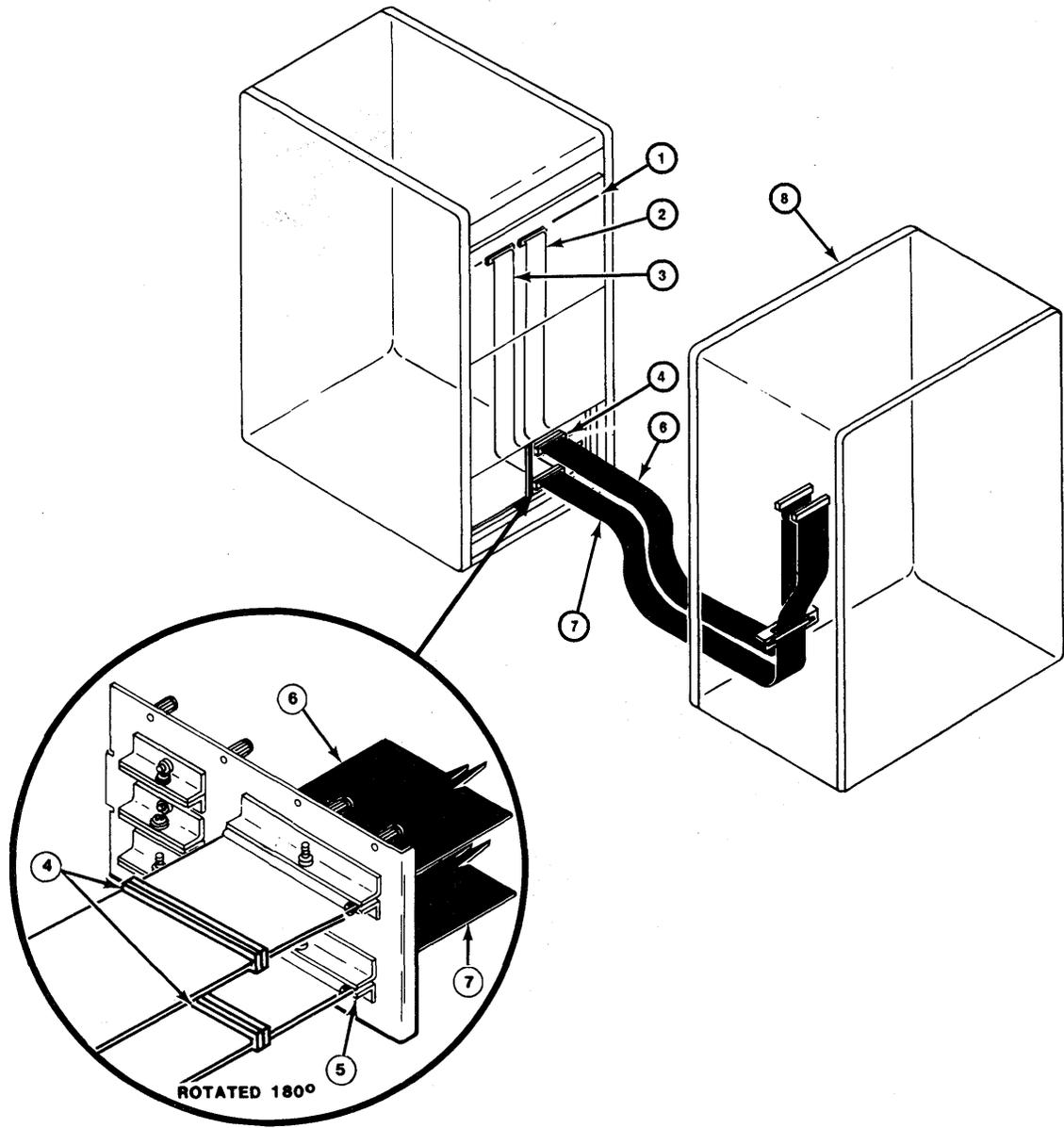
QT13-05

Figure 2-14. Freestanding Transport Cabling Configuration

1. Tape Coupler PCBA
2. Nonshielded Extension Cable
3. Nonshielded Extension Cable
4. Cable Connectors, Extension Cables to Shielded Cables
5. Clamp - Shield of Shielded Cable Clamped Within
6. Shielded/Jacketed Cable, External to Equipment Cabinets
7. Cable I/O Adapter Panel
8. Peripheral Device

2.7.3 Grounding

The recommended grounding method is to connect the transport to a common point on the CPU chassis using a half-inch or larger braided ground strap, preferably insulated, or an AWG number 10 (or heavier) wire.

For most applications, connect the drive chassis and logic grounds (ac and dc grounds). In environments with noise problems, however, it may work better to separate these two grounds. Consult the tape transport manual for specific instructions on connecting the chassis and logic grounds.

NOTE

Failure to observe proper signal grounding methods generally results in marginal operation with random error conditions.

2.8 Integration and Operation

2.8.1 Testing and Indicators

There are three light-emitting diodes (LEDs) on the QT13 PCBA. These LEDs are used for both diagnostics and for normal operations.

If switch SW1-4 is OFF (CONTINUE), the QT13 executes a self-test at the following times:

- on power-up
- after a reset condition
- after a bus initialization
- after a write operation to the base address register

In TSV05 mode, the QT13 will go immediately into self-test after power-up.

In TMSCP mode, the self-test routine consists of two test sequences: preliminary and self-test. The preliminary test sequence exercises the 8031 microprocessor chip. When the QT13 successfully completes the preliminary test, LED3 illuminates to indicate that the QT13 is waiting for initialization.

During TMSCP initialization, by host software control, the QT13 executes a second self-test that exercises the buffer controller chip, the Host Adapter Controller (HAC) chip and its associated circuitry, the on-board RAM, and the control memory PROM. If the QT13 passes this sequence of its self-test successfully, all QT13 LED indicators are OFF.

If a fatal error is detected either during self-test or while the system is running, all three of the edge-mounted LED indicators are ON. If the QT13 fails, you can select Diagnostic mode (switch SW1-2 ON) which causes the LED indicators to display an error code. See Self-Test Error Reporting, in Section 3, TROUBLESHOOTING.

During normal operation, LED1 flickers occasionally to indicate that a command is being executed.

2.8.2 Operation

There are no operational instructions. The QT13 is ready for initialization as soon as it is powered up.

3.1 Overview

This section describes how to isolate problems with the QT13.

3.2 Service

Your Emulex QT13 Tape Coupler has been designed to give years of trouble-free service, and it was thoroughly tested before leaving the factory.

Should one of the fault isolation procedures indicate that the QT13 is not working properly, the product must be returned to the factory or to one of Emulex's authorized repair centers for service. Emulex products are not designed to be repaired in the field.

Before returning the QT13 Tape Coupler to Emulex, whether or not it is under warranty, you must contact the factory or the factory's representative for instructions and a Return Materials Authorization (RMA) number.

Do not return a product to Emulex without authorization. A product or component returned for service without an authorization will be returned to the owner at the owner's expense.

In the continental United States, Alaska, and Hawaii, contact:

Emulex Technical Support
3545 Harbor Boulevard
Costa Mesa, Ca 92626
(714) 662-5600   TWX 910-595-2521
Outside California: (800) 854-7112

After 5 p.m. Pacific Time, call (800) 638-7243. When answered, you will be prompted to key in 37115, followed by a # symbol, then a message.

Outside the United States, notify the distributor from whom the subsystem was initially purchased.

To help you efficiently, Emulex or its representative requires certain information about the product and the environment in which it is installed. During installation, you should have made a record of the switch settings on the Configuration Reference Sheet.

After you have notified Emulex and received an RMA, package the product (preferably using the original packing material) and send it **postage paid** to the address provided by the Emulex representative. You must also insure the package.

3.3   Fault Isolation

The fault isolation procedure is provided in flow chart format in Figure 3-1. This procedure is based on standard troubleshooting techniques as well as the self-diagnostics incorporated into the QT13. The procedure is designed to be used if the self-test fails or if many errors are flagged by the subsystem during normal operation. (If neither of these events takes place, then it is not necessary to follow these procedures.)
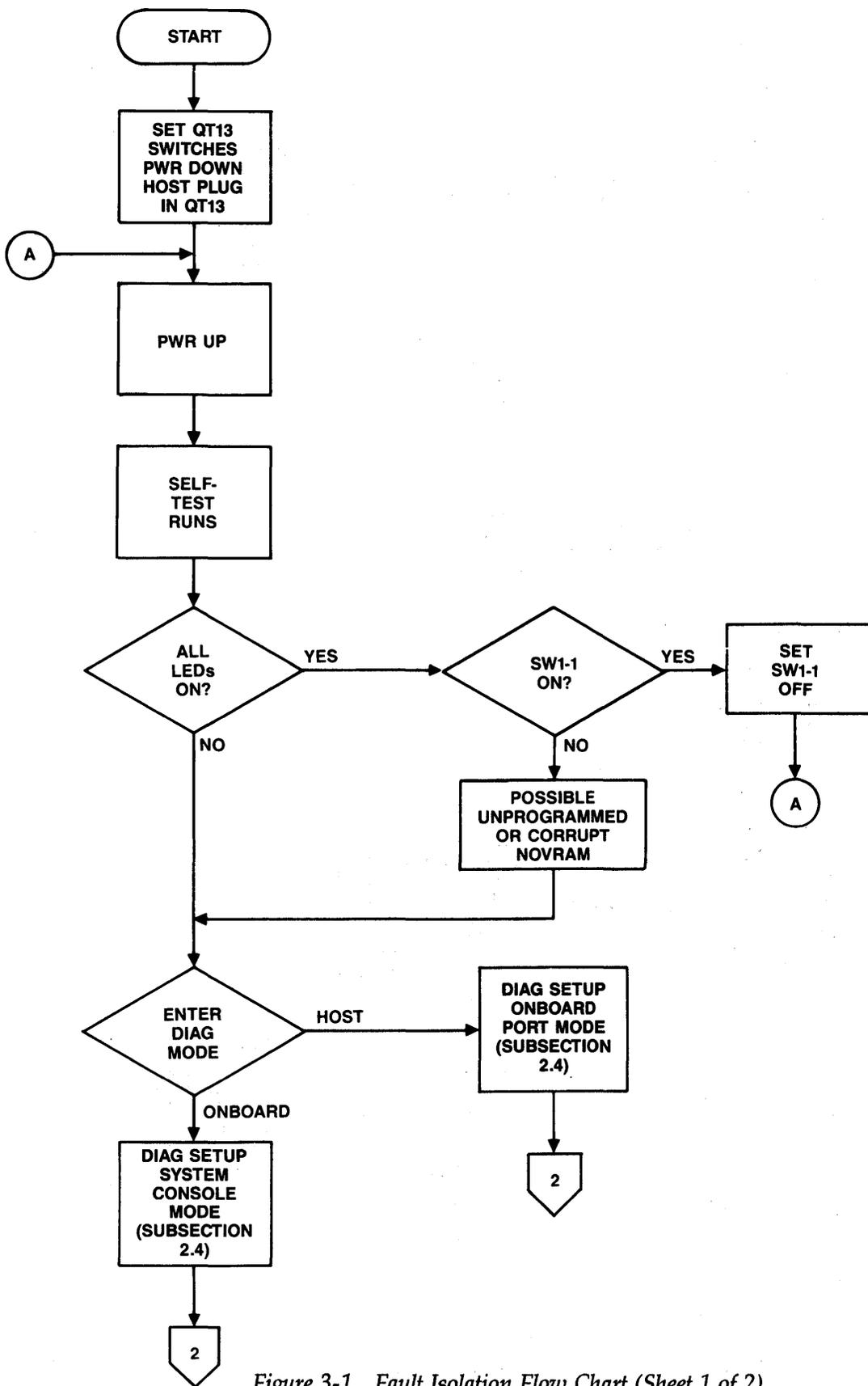
Figure 3-1. Fault Isolation Flow Chart (Sheet 1 of 2)

QT0103-1702
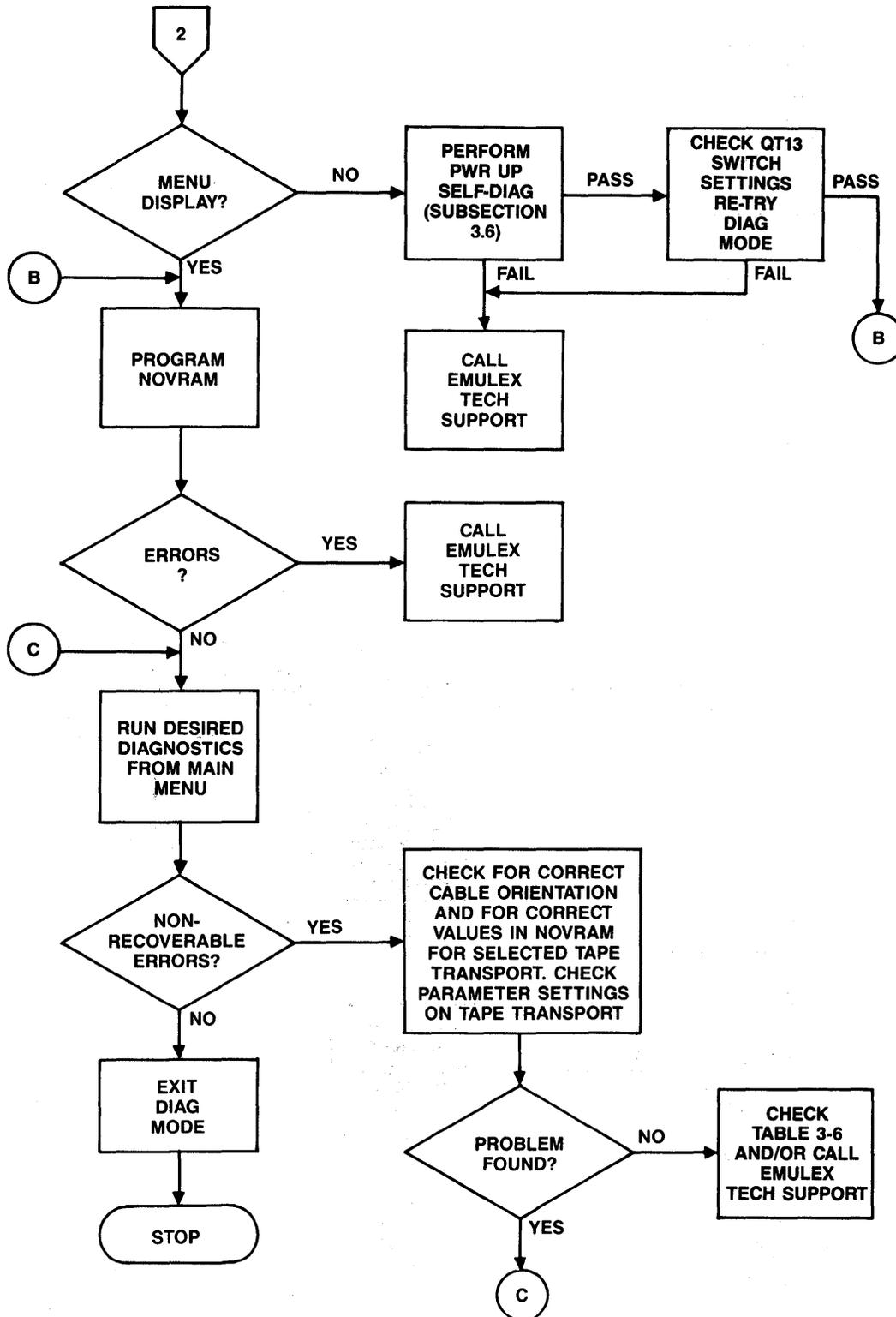
Figure 3-2. Fault Isolation Flow Chart (Sheet 2 of 2)

QT0103-1703

3.4   Power-up Self-diagnostic

The QT13 executes an extensive self-diagnostic to ensure that the tape coupler is in good working order. The self-test is divided into several parts. The LED Error Codes in Table 3-2 indicates the order in which the tests are performed.

In TSV05 mode, self-test is executed immediately after power-up, a reset, a bus INIT, or a write to the base address register. If the QT13 fails self-test, the second LED will be illuminated. If all three LEDs are illuminated and the NOVRAM has never been programmed, you can proceed to program the NOVRAM at this point. After subsequent successful self-tests, the LEDs will be off. If all three LEDs are illuminated and the NOVRAM has been previously programmed, then a fatal error has occurred and you will need to call Emulex Technical Support.

In TMSCP mode, the first test is executed immediately after power-up, a reset, a bus INIT, or a write to the base address register. The other tests are executed as the controller interacts with the initialization routine. If the QT13 fails any of the tests, it posts a TMSCP fatal error code in the low byte of the SA register (base address plus 2) and turns on a combination of the three LEDs which are located on the outside edge of the PWB. The TMSCP fatal error codes used by the QT13 are listed in Table 3-2.

To help determine the location of the problem, you can select a special Loop-on-Self-test mode that causes the LEDs to display an error code. To enable this mode, place the CPU halt switch to ON and set QT13 switch SWI-2 OFF and SW1-4 ON. Next, the host computer must be powered down or QT13 switch SW1-1 must be toggled (turned ON and then OFF) to cause the QT13 to again perform its self-test.

Upon encountering an error, the host microprocessor halts and the LEDs display an error code. The error codes are listed and described in Table 3-1.

If the QT13 completes looping on self-test without errors, all three LEDs are OFF. Set switch SW1-4 in the OFF position and reset the QT13 coupler before using.

Table 3-1. LED Error Codes
(1 = LED **ON**)

LED 3	2	1	Error Description
0	0	1	CPU Chip Test failed
1	0	0	Controller idle, waiting for initialization
0	1	1	Buffer Controller or External Memory Test failed
1	0	1	HAC Test failed
1	1	0	Emulation PROM Checksum Test failed
0	0	0	Self-Diagnostic complete without errors
1	1	1	(TSV05) NOVRAM Not Programmed (or fatal)
1	1	1	(TMSCP) Refer to Table 3-2

3.5   TMSCP Fatal Error Codes

If the QT13 encounters a fatal error anytime during operation, all three LEDs are illuminated and an error code is posted in the low byte of the SA register (base address plus 2). Table 3-2 lists the TMSCP fatal error codes used by the QT13.

Table 3-2. TMSCP Fatal Error Codes used by the QT13

Octal Code	Hex Code	Description
0	0	No information in message packet.
1	1	Possible parity or timeout error when the QT13 attempted to read data from a message packet.
2	2	Possible parity or timeout error when the QT13 attempted to write data to a message packet.
4	4	QT13 diagnostic self-test indicated a controller RAM error.
5	5	QT13 diagnostic self-test indicated a firmware checksum error.
6	6	Possible parity or timeout error when the QT13 attempted to read an envelope address from a command ring.
7	7	Possible parity or timeout error when the QT13 attempted to write an envelope address to a command ring.
11	9	Host did not communicate with QT13 within the time frame established while bringing the controller online.
13	B	Controller unable to perform DMA transfer operation correctly.
14	C	QT13 diagnostic self-test indicated controller fatal error.
16	E	The TMSCP connection identifier is invalid.
23	13	An error occurred during the TMSCP initialization sequence.

3.5.1   Diagnostic Messages

The QT13 diagnostics provide informational, warning and error messages to aid the user. Table 3-3 lists the messages.

Table 3-3. QT13 Diagnostic Messages

Message	Description
Invalid Response	The typed response at terminal is invalid; re-enter it.
Out of Range	The typed response at terminal is out-of-range; re-enter it.
Unprogrammed or Corrupted NOVRAM	An error occurred while reading the contents of the NOVRAM.
Writing NOVRAM	An error occurred during an attempt to write data to the NOVRAM.

In addition, the QT13 provides a series of error messages to indicate possible errors with the tape transport. These messages are:

Cable may be upside down on connector
Cables may be reversed
Invalid byte count for read
Hard error reported
Parity error reported
Tape Drive command timeout
Blank tape read
Tape record truncated
Data miscompare
Unexpected BOT encountered
Tape not blank
Invalid byte count for write

Unit not online
Done rewinding, not at BOT
At BOT but not ready
Correctable error reported
Data Late error reported
Tape write-protected, not scratch tape
Unexpected EOF encountered
Tape record short
Expected EOF not found
Expected BOT not encountered
Tape mark not written

A.1 Overview

This appendix provides instructions for replacing the QT13's firmware PROM.

A.2 Exchanging PROMS

The QT13 firmware PROM is located in the socket at U43. Remove the existing PROM from its socket using an IC puller or an equivalent tool.

The QT13 PROM is identified by the part numbers on top of the PROMs. Place the QT13 PROM in U43. Make certain that the PROM is firmly seated and that no pins are bent or misaligned. (If the two rows of PROM pins are too far apart to fit in the socket, grasp the PROM at its ends using your thumb and forefinger and bend one of the pin rows inward by pressing it against a table top or other flat surface.) When PROM is changed, it is possible that NOVRAM corruption will occur. It is necessary to reprogram NOVRAM if all LEDs are on after the power-up.

PROM Number	PCBA Location
G80	U43

BLANK

B.1 Overview

The NOVRAM menu tables in this appendix define the recommended QT13 options for a variety of typical tape drives. (A point to remember is that NOVRAM default values are indeterminate. The "selected" options in the NOVRAM tables, which follow, frequently reflect whatever default value previously existed.) Although not all vendors are covered, these tables can be used for configuring almost any vendor's drive:

Tape Transport	Tables
92185-02	B-4, B-5
Cipher 891	B-6, B-7
Cipher 990	B-8, B-9
Kennedy 9400	B-10, B-11
Kennedy 9000F, 9100F, 9300	B-12
Kennedy 9600, 9600A	B-13, B-14
Kennedy 9610	B-15, B-16
Megatape MT-500 and MT-750	B-19, B-20

Most drives will use the leading edge for data strobe. Known exceptions, however, are the Kennedy 9000F, 9100F, and 9300F drives which use the trailing edge for data strobe. Consult your drive documentation for information.

NOTE

Proper operation of any listed drive at 3200 bpi requires that the tape drive supplies the correct PEID burst. This is not an industry-standard capability; check your drive manufacturer's documentation for more information.

B.2 CDC 92181

The CDC 92181 is a 1600-bpi only, 25/100 ips streaming-type tape drive with its own embedded formatter. This transport supports all standard commands. It has several optional features and selectable addresses that must be considered during the installation process. Option and address selection components are contained on the Formatter/Control printed wiring assembly (PWA). Refer to the manufacturer's technical manual for component identification.

B.3   CDC 92185-02

The CDC 92185 series tape drive is a dual density drive that is capable of 1600 bpi and 6250 bpi operation. It operates at 25 ips in slow streaming mode and at 75 ips in high-speed streaming mode. The buffered version has an identification tag labeled "Buffered Std, I/O kit" on the inside lower right corner of the front door.

Option and address selection components are contained on the Interface, Formatter Write, and Servo/Control PWAs. Refer to the manufacturer's technical manual for component identification. Table B-2 summarizes tape transport parameters.

Table B-1. QT13 NOVRAM Options for CDC 92185-02

TSV05 NOVRAM Configuration Menu	Select:
Drive type, 0 = Start-Stop, 1 = Streamer (0-1,def = 1 dec)	: 1
On-the-fly commands (Y/N, def = Y)	: Y
Enable data busy timeout delay (Y/N, def = Y)	: Y
Remote density (Y/N, def = N)	: N
CDC tape drive (Y/N, def = N)	: Y
Use IDEN line to select remote density (Y/N,def = Y)	: N
IDEN line true selects high density (Y/N, def = N)	: N
Adaptive DMA (Y/N, def = Y)	: Y
Blank tape timeout value, in seconds (1-60, def = 5 dec)	: 5
DMA burst word count (1-16, def = 16)	: 16
uSec delay between DMA bursts (4/8, def = 4)	: 4
Adaptive DMA threshold (1-7, def = 4 dec)	: 4
Interrupt vector (0-774,def = 224 oct)	: 224
TMSCP NOVRAM Configuration Menu	**Select:**
Drive type, 0 = Start-Stop, 1 = Streamer (0-1,def = 1 dec)	: 1
On-the-fly commands (Y/N, def = Y)	: Y
Enable data busy timeout delay (Y/N def = Y)	: Y
Remote density (Y/N, def = N)	: Y
CDC tape drive (Y/N, def = N)	: Y
Use IDEN line to select remote density (Y/N,def = Y)	: N
IDEN line true selects high density (Y/N, def = N)	: N
Adaptive DMA (Y/N, def = Y)	: Y
Blank tape timeout value, in seconds (1-60, def = 5 dec)	: 5
Max retry count for tape errors (1-10, def = 8)	: 8
uSec delay between DMA bursts (4/8, def = 4)	: 4
Adaptive DMA threshold (1-7, def = 4 dec)	: 4
Tape drive speed thousands of bytes/second (0-65535,def = 200 dec)	: 200
Support 800 BPI density (Y/N,def = Y)	: N
Support 1600 BPI density (Y/N,def = Y)	: Y
Support 6250 BPI density (Y/N,def = Y)	: Y

Table B-2. CDC 92185-02/04 Operating Parameter Values

Parameter	Setting
Enable Buffer	Enable
Enable AVC	Enable
Remote Density	TSVO5 Disable TMSCP Enable
Error Recovery	Disable
Ramp Delay	1 msec
Density Status	Disable
Write Parity	Enable
Interface Transfer Rate (F22)	500 bytes/second
Maximum Block Size (F22)	16K bytes
Formatter Address (H24)	Transport 0-3 Transport 4-7
Transport Address (H24)	Address 0 (FAD 0), 4 (FAD 1)

B.4   Cipher 891

The Cipher 891 series tape drive is a data caching streamer that emulates start/stop operation. It is available in two versions: the 891-1 (1600 bpi, 100 ips) and the 891-2 (supports both 1600 and 3200 bpi at 100 ips). Table B-3 summarizes QT13 tape coupler NOVRAM selections for the Cipher 891, and Table B-4 lists parameter requirements.

Table B-3. QT13 NOVRAM Options for Cipher 891

TSV05 NOVRAM Configuration Menu	Select:
Drive type, 0 = Start-Stop, 1 = Streamer (0-1,def = 1 dec)	: 0
On-the-fly commands (Y/N, def = Y)	: Y
Enable data busy timeout delay (Y/N, def = Y)	: Y
Remote density (Y/N, def = N)	: N
CDC tape drive (Y/N, def = N)	: N
Use IDEN line to select remote density (Y/N,def = Y)	: N
IDEN line true selects remote density (Y/N, def = N)	: N
Adaptive DMA (Y/N, def = Y)	: Y
Blank tape timeout value, in seconds (1-60, def = 5 dec)	: 5
DMA burst word count (1-16, def = 16)	: 16
uSec delay between DMA bursts (4/8, def = 4)	: 4
Adaptive DMA threshold (1-7, def = 4 dec)	: 4
Interrupt vector (0-774,def = 224 oct)	: 224

TMSCP NOVRAM Configuration Menu	Select:
Drive type, 0 = Start-Stop, 1 = Streamer (0-1,def = 1 dec)	: 0
On-the-fly commands (Y/N, def = Y)	: Y
Enable data busy timeout delay (Y/N, def = Y)	: Y
Remote density (Y/N, def = N)	: N
CDC tape drive (Y/N, def = N)	: N
Use IDEN line to select remote density (Y/N,def = Y)	: N
IDEN line true selects high density (Y/N, def = N)	: N
Adaptive DMA (Y/N, def = Y)	: Y
Blank tape timeout value, in seconds (1-60, def = 5 dec)	: 5
Max retry count for tape errors (1-10, def = 8)	: 8
uSec delay between DMA bursts (4/8, def = 4)	: 4
Adaptive DMA threshold (1-7, def = 4 dec)	: 4
Tape drive speed thousands of bytes/second (0-65535,def = 200 dec)	: 200
Support 800 BPI density (Y/N,def = Y)	: N
Support 1600 BPI density (Y/N,def = Y)	: Y
Support 6250 BPI density (Y/N,def = Y)	: N

Table B-4. Cipher 891 Operating Parameter Values

Parameter	Setting
Unit Address Select	FAD O, UNIT O
Post-EOT Streaming	Disable
3200 BPI IDEN	Enable
EOT Location	Disable
External Parity	Enable
Maximum Block Size	9K bytes
Ramp Delay	Disable
Selected Simulated Speed	250

Refer to the manufacturer's manual for specific drive setup information.

B.5   Cipher 990

The Cipher 990 is a start/stop emulating caching streamer. It features tri-density operation (1600, 3200, or 6250 bpi) at simulated tape speed of up to 100 ips at 1600 bpi.

Table B-5 lists QT13 tape coupler NOVRAM configuration options for the Cipher 990, and Table B-6 lists tape transport parameters to be entered via the drive operator's panel.

Table B-5. QT13 NOVRAM Options for Cipher 990

TSV05 NOVRAM Configuration Menu	Select:
Drive type, 0 = Start-Stop, 1 = Streamer (0-1,def = 1 dec)	: 0
On-the-fly commands (Y/N, def = Y)	: Y
Enable data busy timeout delay (Y/N, def = Y)	: Y
Remote density (Y/N, def = N)	: N
CDC tape drive (Y/N, def = N)	: N
Use IDEN line to select remote density (Y/N,def = Y)	: N
IDEN line true selects high density (Y/N, def = N)	: N
Adaptive DMA (Y/N, def = Y)	: Y
Blank tape timeout value, in seconds (1-60, def = 5 dec)	: 5
DMA burst word count (1-16, def = 16)	: 16
uSec delay between DMA bursts (4/8, def = 4)	: 4
Adaptive DMA threshold (1-7, def = 4 dec)	: 4
Interrupt vector (0-774,def = 224 oct)	: 224

TMSCP NOVRAM Configuration Menu	Select:
Drive type, 0 = Start-Stop, 1 = Streamer (0-1,def = 1 dec)	: 0
On-the-fly commands (Y/N, def = Y)	: Y
Enable data busy timeout delay (Y/N, def = Y)	: Y
Remote density (Y/N, def = N)	: Y
CDC tape drive (Y/N, def = N)	: N
Use IDEN line to select remote density (Y/N,def = Y)	: N
IDEN line true selects high density (Y/N, def = N)	: N
Adaptive DMA (Y/N, def = Y)	: Y
Blank tape timeout value, in seconds (1-60, def = 5 dec)	: 5
Max retry count for tape errors (1-10, def = 8)	: 8
uSec delay between DMA bursts (4/8, def = 4)	: 4
Adaptive DMA threshold (1-7, def = 4 dec)	: 4
Tape drive speed thousands of bytes/second (0-65535,def = 200 dec)	: 200
Support 800 BPI density (Y/N,def = Y)	: N
Support 1600 BPI density (Y/N,def = Y)	: Y
Support 6250 BPI density (Y/N,def = Y)	: Y

Table B-6. Cipher 990 Operating Parameter Values

Parameter	Setting
Serial Port Baud Rate	150
Host Supplied Parity	Yes
Echo Read Strobes on Writes	Yes
EOT Mode	Normal
Echo 1600 bpi ID Burst	Yes
Echo 3200 bpi ID Burst	No
Echo 6250 bpi ID Burst	Yes
Abort Active Writes on Overwrites	No
Interface Transfer Rate	632.8K bytes/sec
Default Density at Power Up	1600 bpi
Maximum Block Size	16K
Interface Ramp Delay	0 msec
Filemark Write Sync	No
Read Error Retrys	4
Write Error Retrys	16
Error Correction On	Yes
Unit Logical Address	0
Lock Out 3200 bpi Write Error	No
Remote Density Select Enabled	TSVO5 No TMSCP Yes
Factory Mode	No

Refer to the manufacturer's manual for specific drive setup information.

B.6   Kennedy 9400

The Kennedy 9400 is a tri-density, embedded formatter, start/stop tape drive. It operates at 75 ips in either 800 or 1600 bpi, and at 45 ips at 6250 bpi.

QT13 coupler NOVRAM selections are listed in Table B-7.

Table B-7. QT13 NOVRAM Options for Kennedy 9400

TSV05 NOVRAM Configuration Menu	Select:
Drive type, 0 = Start-Stop, 1 = Streamer (0-1,def = 1 dec)	: 0
On-the-fly commands (Y/N, def = Y)	: Y
Enable data busy timeout delay (Y/N, def = Y)	: Y
Remote density (Y/N, def = N)	: N
CDC tape drive (Y/N, def = N)	: N
Use IDEN line to select remote density (Y/N,def = Y)	: Y
IDEN line true selects high density (Y/N, def = N)	: Y
Adaptive DMA (Y/N, def = Y)	: Y
Blank tape timeout value, in seconds (1-60, def = 5 dec)	: 5
DMA burst word count (1-16, def = 16)	: 16
uSec delay between DMA bursts (4/8, def = 4)	: 4
Adaptive DMA threshold (1-7, def = 4 dec)	: 4
Interrupt vector (0-774,def = 224 oct)	: 224
TMSCP NOVRAM Configuration Menu	**Select:**
Drive type, 0 = Start-Stop, 1 = Streamer (0-1,def = 1 dec)	: 0
On-the-fly commands (Y/N, def = Y)	: Y
Enable data busy timeout delay (Y/N, def = Y)	: Y
Remote density (Y/N, def = N)	: Y
CDC tape drive (Y/N, def = N)	: N
Use IDEN line to select remote density (Y/N,def = Y)	: Y
IDEN line true selects high density (Y/N, def = N)	: Y
Adaptive DMA (Y/N, def = Y)	: Y
Blank tape timeout value, in seconds (1-60, def = 5 dec)	: 5
Max retry count for tape errors (1-10, def = 8)	: 8
uSec delay between DMA bursts (4/8, def = 4)	: 4
Adaptive DMA threshold (1-7, def = 4 dec)	: 4
Tape drive speed thousands of bytes/second (0-65535,def = 200 dec)	: 200
Support 800 BPI density (Y/N,def = Y)	: Y
Support 1600 BPI density (Y/N,def = Y)	: Y
Support 6250 BPI density (Y/N,def = Y)	: Y

NOTE

Use of the remote density feature of the Kennedy 9400 permits selection of any **two** densities. Refer to your drive documentation for more information.

Table B-8. Kennedy 9400 Operating Parameter Values

Parameter
Formatter address switch OFF
Transport address is determined via front panel.
Remote Dual Density via the front panel. Two of the three densities are selected via IDEN. Requires special software for TSVO5.
IDEN = 0, PE; IDEN = 1, GCR.
IDEN = 0, NRZI; IDEN = 1, GCR.
IDEN = 0, NRZI; IDEN = 1, PE.
Data rate 312K bytes/second.

B.7   Kennedy 9000F, 9100F, and 9300F

The Kennedy 9X00F series tape drives are dual-density, single-speed transports with an attached 9220 formatter. All models support both 800 and 1600 bpi operation. The 9000F is a tension arm 45 ips drive, whereas the 9100F and 9300F are vacuum column, 75 ips/125 ips drives.

The formatter can be used with tape transports operating at seven different speeds, ranging from 12.5 to 125 ips.

Table B-9 indicates the QT13 NOVRAM selections.

Table B-9. QT13 NOVRAM Options for Kennedy 9X00F Series

TSV05 NOVRAM Configuration Menu	Select:
Drive type, 0 = Start-Stop, 1 = Streamer (0-1,def = 1 dec)	: 0
On-the-fly commands (Y/N, def = Y)	: Y
Enable data busy timeout delay (Y/N, def = Y)	: Y
Remote density (Y/N, def = N)	: Y
CDC tape drive (Y/N, def = N)	: N
Use IDEN line to select remote density (Y/N,def = Y)	: Y
IDEN line true selects high density (Y/N, def = N)	: Y
Adaptive DMA (Y/N, def = Y)	: Y
Blank tape timeout value, in seconds (1-60, def = 5 dec)	: 5
DMA burst word count (1-16, def = 16)	: 16
uSec delay between DMA bursts (4/8, def = 4)	: 4
Adaptive DMA threshold (1-7, def = 4 dec)	: 4
Interrupt vector (0-774,def = 224 oct)	: 224

TMSCP NOVRAM Configuration Menu	Select:
Drive type, 0 = Start-Stop, 1 = Streamer (0-1,def = 1 dec)	: 0
On-the-fly commands (Y/N, def = Y)	: Y
Enable data busy timeout delay (Y/N, def = Y)	: Y
Remote density (Y/N, def = N)	: Y
CDC tape drive (Y/N, def = N)	: N
Use IDEN line to select remote density (Y/N,def = Y)	: Y
IDEN line true selects high density (Y/N, def = N)	: Y
Adaptive DMA (Y/N, def = Y)	: Y
Blank tape timeout value, in seconds (1-60, def = 5 dec)	: 5
Max retry count for tape errors (1-10, def = 8)	: 8
uSec delay between DMA bursts (4/8, def = 4)	: 4
Adaptive DMA threshold (1-7, def = 4 dec)	: 4
Tape drive speed thousands of bytes/second (0-65535,def = 200 dec)	: 200
Support 800 BPI density (Y/N,def = Y)	: Y
Support 1600 BPI density (Y/N,def = Y)	: Y
Support 6250 BPI density (Y/N,def = Y)	: N

Refer to the manufacturer's manual for specific drive switch setting requirements.

B.8 Kennedy 9600, 9600A, and 9610

The Kennedy 9600 and 9600A are autoloading buffer arm tape transports with an embedded formatter. They operate at 100 ips in streaming mode and at 45 ips in start/stop mode. The 9600 supports 800 and 1600 bpi operation; the 9600A supports 800, 1600, and 6250 bpi.

The 9610 is a hybrid streaming tape system which operates at 100 ips in streaming mode and at 50 ips in start/stop mode. Four densities are supported: 800, 1600, 3200, and 6250 bpi. (3200 bpi is not supported by DEC operating systems in either TSV05 or TMSCP mode; therefore, it must be selected via the front panel.)

Table B-10 indicates the standard QT13 NOVRAM selections for the 9600 and 9600A; Table B-12 indicates selections for the 9610.

Table B-10. QT13 NOVRAM Options for Kennedy 9600 and 9600A

TSV05 NOVRAM Configuration Menu	Select:
Drive type, 0 = Start-Stop, 1 = Streamer (0-1, def = 1 dec)	: 0
On-the-fly commands (Y/N, def = Y)	: Y
Enable data busy timeout delay (Y/N, def = Y)	: Y
Remote density (Y/N, def = N)	: N
CDC tape drive (Y/N, def = N)	: N
Use IDEN line to select remote density (Y/N, def = Y)	: Y
IDEN line true selects high density (Y/N, def = N)	: N
Adaptive DMA (Y/N, def = Y)	: Y
Blank tape timeout value, in seconds (1-60, def = 5 dec)	: 5
DMA burst word count (1-16, def = 16)	: 16
uSec delay between DMA bursts (4/8, def = 4)	: 4
Adaptive DMA threshold (1-7, def = 4 dec)	: 4
Interrupt vector (0-774, def = 224 oct)	: 224

TMSCP NOVRAM Configuration Menu	Select:
Drive type, 0 = Start-Stop, 1 = Streamer (0-1, def = 1 dec)	: 0
On-the-fly commands (Y/N, def = Y)	: Y
Enable data busy timeout delay (Y/N, def = Y)	: Y
Remote density (Y/N, def = N)	: Y
CDC tape drive (Y/N, def = N)	: N
Use IDEN line to select remote density (Y/N, def = Y)	: Y
IDEN line true selects high density (Y/N, def = N)	: Y
Adaptive DMA (Y/N, def = Y)	: Y
Blank tape timeout value, in seconds (1-60, def = 5 dec)	: 5
Max retry count for tape errors (1-10, def = 8)	: 8
uSec delay between DMA bursts (4/8, def = 4)	: 4
Adaptive DMA threshold (1-7, def = 4 dec)	: 4
Tape drive speed thousands of bytes/second (0-65535, def = 200 dec)	: 200
Support 800 BPI density (Y/N, def = Y)	: Y
Support 1600 BPI density (Y/N, def = Y)	: Y
Support 6250 BPI density (Y/N, def = Y)	: N

Table B-11. Kennedy 9600, 9600A Operating Parameter Values

Parameter	Setting
Default density	1600 TSVO5 1600 Remote TMSCP
Speed	Auto
Timeout	25 ft on
Security	Disabled
Parity	Check
CLR Fbsy	Postrepo
Long Gap	1.2 inch

Refer to the manufacturer's manual for more information.

Table B-12. QT13 NOVRAM Options for Kennedy 9610

TSV05 NOVRAM Configuration Menu	Select:
Drive type, 0 = Start-Stop, 1 = Streamer (0-1,def = 1 dec)	: 0
On-the-fly commands (Y/N, def = Y)	: Y
Enable data busy timeout delay (Y/N, def = Y)	: Y
Remote density (Y/N, def = N)	: N
CDC tape drive (Y/N, def = N)	: N
Use IDEN line to select remote density (Y/N,def = Y)	: N
IDEN line true selects high density (Y/N, def = N)	: Y
Adaptive DMA (Y/N, def = Y)	: Y
Blank tape timeout value, in seconds (1-60, def = 5 dec)	: 5
DMA burst word count (1-16, def = 16)	: 16
uSec delay between DMA bursts (4/8, def = 4)	: 4
Adaptive DMA threshold (1-7, def = 4 dec)	: 4
Interrupt vector (0-774,def = 224 oct)	: 224

TMSCP NOVRAM Configuration Menu	Select:
Drive type, 0 = Start-Stop, 1 = Streamer (0-1,def = 1 dec)	: 0
On-the-fly commands (Y/N, def = Y)	: Y
Enable data busy timeout delay (Y/N, def = Y)	: Y
Remote density (Y/N, def = N)	: Y
CDC tape drive (Y/N, def = N)	: N
Use IDEN line to select remote density (Y/N, def = Y)	: N
IDEN line true selects high density (Y/N, def = N)	: N
Adaptive DMA (Y/N, def = Y)	: Y
Blank tape timeout value, in seconds (1-60, def = 5 dec)	: 5
Max retry count for tape errors (1-10, def = 8)	: 8
uSec delay between DMA bursts (4/8, def = 4)	: 4
Adaptive DMA threshold (1-7, def = 4 dec)	: 4
Tape drive speed thousands of bytes/second (0-65535,def = 200 dec)	: 200
Support 800 BPI density (Y/N, def = Y)	: Y
Support 1600 BPI density (Y/N, def = Y)	: Y
Support 6250 BPI density (Y/N, def = Y)	: Y

Table B-13. Kennedy 9610 Operating Parameter Values

Parameter	Setting
Default density	1600 Local TSVO5 1600 Remote TMSCP
Speed	Auto
Timeout	25 ft on
Security	Disabled
Parity	Check
Long Gap	1.2 inch
GCR CERR	Enabled
ARA CAL	Enabled
NRZI CCG	Enabled
CLR FBSY	Postrepo
IFEN	Normal

Refer to the manufacturer's manual for more information.

B.9 Megatape MT-500 and MT-750

The Megatape MT-500 and MT-750 are streaming tape cartridge transports that have an unformatted capacity of 500 and 750 megabytes respectively. Each drive contains a 24 track bit-serial, serpentine-format cartridge unit. The MT-500 operates at 45 ips and 180 ips and supports 10,666 bpi operation. The MT-750 supports 16,000 bpi and operates at 60 ips and 120 ips.

Refer to the manufacturer's technical manual for switch locations and factory default parameters.

Table B-14 indicates the QT13 NOVRAM selections for the MT-500 and MT-750.

Tables B-15 and B-16 give recommended configuration values for the MT-500 and MT-750, respectively.

Table B-14. QT13 NOVRAM Selections for Megatape MT-500 and MT-750

TSV05 NOVRAM Configuration Menu	**Select:**
Drive type, 0 = Start-Stop, 1 = Streamer (0-1,def = 1 dec)	: 0
On-the-fly commands (Y/N, def = Y)	: Y
Enable data busy timeout delay (Y/N, def = Y)	: Y
Remote density (Y/N, def = N)	: N
CDC tape drive (Y/N, def = N)	: N
Use IDEN line to select remote density (Y/N,def = Y)	: N
IDEN line true selects remote density (Y/N, def = N)	: N
Adaptive DMA (Y/N, def = Y)	: Y
Blank tape timeout value, in seconds (1-60, def = 5 dec)	: 5
DMA burst word count (1-16, def = 16)	: 16
uSec delay between DMA bursts (4/8, def = 4)	: 4
Adaptive DMA threshold (1-7, def = 4 dec)	: 4
Interrupt vector (0-774,def = 224 oct)	: 224

TMSCP NOVRAM Configuration Menu	**Select:**
Drive type, 0 = Start-Stop, 1 = Streamer (0-1,def = 1 dec)	: 0
On-the-fly commands (Y/N, def = Y)	: Y
Enable data busy timeout delay (Y/N, def = Y)	: Y
Remote density (Y/N, def = N)	: N
CDC tape drive (Y/N, def = N)	: N
Use IDEN line to select remote density (Y/N,def = Y)	: N
IDEN line true selects high density (Y/N, def = N)	: N
Adaptive DMA (Y/N, def = Y)	: Y
Blank tape timeout value, in seconds (1-60, def = 5 dec)	: 5
Max retry count for tape errors (1-10, def = 8)	: 5
uSec delay between DMA bursts (4/8, def = 4)	: 4
Adaptive DMA threshold (1-7, def = 4 dec)	: 4
Tape drive speed thousands of bytes/second (0-65535,def = 200 dec)	: 200
Support 800 BPI density (Y/N,def = Y)	: N
Support 1600 BPI density (Y/N,def = Y)	: Y
Support 6250 BPI density (Y/N,def = Y)	: N

Table B-15. Megatape MT-500 Operating Parameter Values

Parameter	Setting
Formatter Board (U86):	
Track zero alignment	Enable
Blank tape detect	Enable
Track select	IRDY
Test switches	Factory setting
Formatter Board (U88):	
Normal operation	Enable
Read verify	Enable
Unit address	Unit 0
Low speed	1/2 high speed
Gap selection	Host
Gap size	Short
Cache I/O Board:	
Transfer rate	250KBS
ECC block size	32KB
Max record size	32KB
Unit select address	Unit 0
Transport tape speed	High speed
ECC enable	Error correction required
Ramp delay	No simulated ramp delay
Collect records	Write immediate
Read strobes in write	Return read strobes

Table B-16. Megatape MT-750 Operating Parameter Values

Parameter	Setting
Formatter Board (U86):	
Track zero Alignment	Enable
Blank tape detect	Enable
Track select	IRDY
Test switches	Factory setting
Formatter Board (U88):	
Normal Operation	Enable
Read verify	Enable
Unit address	Unit 0
Low speed	1/2 high speed
Gap selection	Host
Gap size	Short
Cache I/O Board:	
Transfer rate	250KBS
Unit select address	Unit 0
Transport tape speed	High speed
ECC enable	Error correction required
Ramp delay	No simulated ramp delay
Collect records	Write immediate
Read strobes in write	Return read strobes

Table B-15. QT13 NOVRAM Options for Kennedy 9610

TSV05 NOVRAM Configuration Menu	Select:
Drive type, 0 = Start-Stop, 1 = Streamer (0-1,def = 1 dec)	: 0
On-the-fly commands (Y/N, def = Y)	: Y
Enable data busy timeout delay (Y/N, def = Y)	: Y
Remote density (Y/N, def = N)	: N
CDC tape drive (Y/N, def = N)	: N
Use IDEN line to select remote density (Y/N,def = Y)	: N
IDEN line true selects high density (Y/N, def = N)	: Y
Adaptive DMA (Y/N, def = Y)	: Y
Blank tape timeout value, in seconds (1-60, def = 5 dec)	: 5
DMA burst word count (1-16, def = 16)	: 16
uSec delay between DMA bursts (4/8, def = 4)	: 4
Adaptive DMA threshold (1-7, def = 4 dec)	: 4
Interrupt vector (0-774,def = 224 oct)	: 224

TMSCP NOVRAM Configuration Menu	Select:
Drive type, 0 = Start-Stop, 1 = Streamer (0-1,def = 1 dec)	: 0
On-the-fly commands (Y/N, def = Y)	: Y
Enable data busy timeout delay (Y/N, def = Y)	: Y
Remote density (Y/N, def = N)	: Y
CDC tape drive (Y/N, def = N)	: N
Use IDEN line to select remote density (Y/N, def = Y)	: N
IDEN line true selects high density (Y/N, def = N)	: Y
Adaptive DMA (Y/N, def = Y)	: Y
Blank tape timeout value, in seconds (1-60, def = 5 dec)	: 5
Max retry count for tape errors (1-10, def = 8)	: 8
uSec delay between DMA bursts (4/8, def = 4)	: 4
Adaptive DMA threshold (1-7, def = 4 dec)	: 4
Tape drive speed thousands of bytes/second (0-65535,def = 200 dec)	: 200
Support 800 BPI density (Y/N, def = Y)	: Y
Support 1600 BPI density (Y/N, def = Y)	: Y
Support 6250 BPI density (Y/N, def = Y)	: Y

Table B-16. Kennedy 9610 Operating Parameter Values

Parameter	Setting
Default density	1600 Local TSVO5 1600 Remote TMSCP
Speed	Auto
Timeout	25 ft on
Security	Disabled
Parity	Check
Long Gap	1.2 inch
GCR CERR	Enabled
ARA CAL	Enabled
NRZI CCG	Enabled
CLR FBSY	Postrepo
IFEN	Normal

Refer to the manufacturer's manual for more information.

B.9   Megatape MT-500 and MT-750

The Megatape MT-500 and MT-750 are streaming tape cartridge transports that have an unformatted capacity of 500 and 750 megabytes respectively. Each drive contains a 24 track bit-serial, serpentine-format cartridge unit. The MT-500 operates at 45 ips and 180 ips and supports 10,666 bpi operation. The MT-750 supports 16,000 bpi and operates at 60 ips and 120 ips.

Refer to the manufacturer's technical manual for switch locations and factory default parameters.

Table B-17 indicates the QT13 NOVRAM selections for the MT-500 and MT-750.

Tables B-18 and B-19 give recommended configuration values for the MT-500 and MT-750, respectively.

Table B-17. QT13 NOVRAM Selections for Megatape MT-500 and MT-750

TSV05 NOVRAM Configuration Menu	Select:
Drive type, 0 = Start-Stop, 1 = Streamer (0-1,def = 1 dec)	: 0
On-the-fly commands (Y/N, def = Y)	: Y
Enable data busy timeout delay (Y/N, def = Y)	: Y
Remote density (Y/N, def = N)	: N
CDC tape drive (Y/N, def = N)	: N
Use IDEN line to select remote density (Y/N,def = Y)	: N
IDEN line true selects remote density (Y/N, def = N)	: N
Adaptive DMA (Y/N, def = Y)	: Y
Blank tape timeout value, in seconds (1-60, def = 5 dec)	: 5
DMA burst word count (1-16, def = 16)	: 16
uSec delay between DMA bursts (4/8, def = 4)	: 4
Adaptive DMA threshold (1-7, def = 4 dec)	: 4
Interrupt vector (0-774,def = 224 oct)	: 224

TMSCP NOVRAM Configuration Menu	Select:
Drive type, 0 = Start-Stop, 1 = Streamer (0-1,def = 1 dec)	: 0
On-the-fly commands (Y/N, def = Y)	: Y
Enable data busy timeout delay (Y/N, def = Y)	: Y
Remote density (Y/N, def = N)	: N
CDC tape drive (Y/N, def = N)	: N
Use IDEN line to select remote density (Y/N,def = Y)	: N
IDEN line true selects high density (Y/N, def = N)	: N
Adaptive DMA (Y/N, def = Y)	: Y
Blank tape timeout value, in seconds (1-60, def = 5 dec)	: 5
Max retry count for tape errors (1-10, def = 8)	: 5
uSec delay between DMA bursts (4/8, def = 4)	: 4
Adaptive DMA threshold (1-7, def = 4 dec)	: 4
Tape drive speed thousands of bytes/second (0-65535,def = 200 dec)	: 200
Support 800 BPI density (Y/N,def = Y)	: N
Support 1600 BPI density (Y/N,def = Y)	: Y
Support 6250 BPI density (Y/N,def = Y)	: N

Table B-18. Megatape MT-500 Operating Parameter Values

Parameter	Setting
Formatter Board (U86):	
Track zero alignment	Enable
Blank tape detect	Enable
Track select	IRDY
Test switches	Factory setting
Formatter Board (U88):	
Normal operation	Enable
Read verify	Enable
Unit address	Unit 0
Low speed	1/2 high speed
Gap selection	Host
Gap size	Short
Cache I/O Board:	
Transfer rate	250KBS
ECC block size	32KB
Max record size	32KB
Unit select address	Unit 0
Transport tape speed	High speed
ECC enable	Error correction required
Ramp delay	No simulated ramp delay
Collect records	Write immediate
Read strobes in write	Return read strobes

Table B-19. Megatape MT-750 Operating Parameter Values

Parameter	Setting
Formatter Board (U86):	
Track zero Alignment	Enable
Blank tape detect	Enable
Track select	IRDY
Test switches	Factory setting
Formatter Board (U88):	
Normal Operation	Enable
Read verify	Enable
Unit address	Unit 0
Low speed	1/2 high speed
Gap selection	Host
Gap size	Short
Cache I/O Board:	
Transfer rate	250KBS
Unit select address	Unit 0
Transport tape speed	High speed
ECC enable	Error correction required
Ramp delay	No simulated ramp delay
Collect records	Write immediate
Read strobes in write	Return read strobes

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