

Model STA-2

Tape Interface Adapter

Technical Manual

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REVISION HISTORY

ECO No.	Date	Description	Pages

PREFACE

This manual provides complete instructions for installing ZETACO'S Model STA-2 Tape Interface Adapter. Installation of the unit is relatively simple since in most applications unit installation and cabling are the only steps involved. Reference to manuals provided with the tape coupler and tape drive to be used with the STA-2 may be necessary.

The information in this manual is organized into four major sections:

- SECTION 1.0 PRODUCT OVERVIEW - Fully describes the STA-2 features, capabilities, specifications, and power and interface requirements.

- SECTION 2.0 INSTALLATION - Describes and illustrates the procedures required to install the STA-2.

- SECTION 3.0 TROUBLE-SHOOTING AND CUSTOMER SERVICE - Contains information useful in analyzing faults and how to get help.

- APPENDIX A STA-2 Unique Pertec Interface Specifications

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1.0 PRODUCT OVERVIEW

1.1 GENERAL DESCRIPTION

The STA-2 Tape Interface Adapter allows connection of a Pertec-interfaced tape coupler to Fujitsu 243X Series tape drives. STA-2 operation is transparent to the host system during operation. The STA-2 is perceived from the tape coupler as a Pertec-interfaced tape drive, while from the tape drive's perspective, the STA-2 appears to be an STC-interfaced tape coupler.

Please read this overview section entirely before proceeding with the installation.

1.2 FEATURES

1.2.1 FIFO BUFFER

The implementation of a FIFO buffer in the STA-2 allows for independent data transfer, from either the Pertec or STC side of the STA-2, thereby minimizing the bandwidth constraints of either the tape coupler or the tape drive. The minimum data rate capability of the tape coupler used must equal or exceed the average sustained data rate of the tape drive.

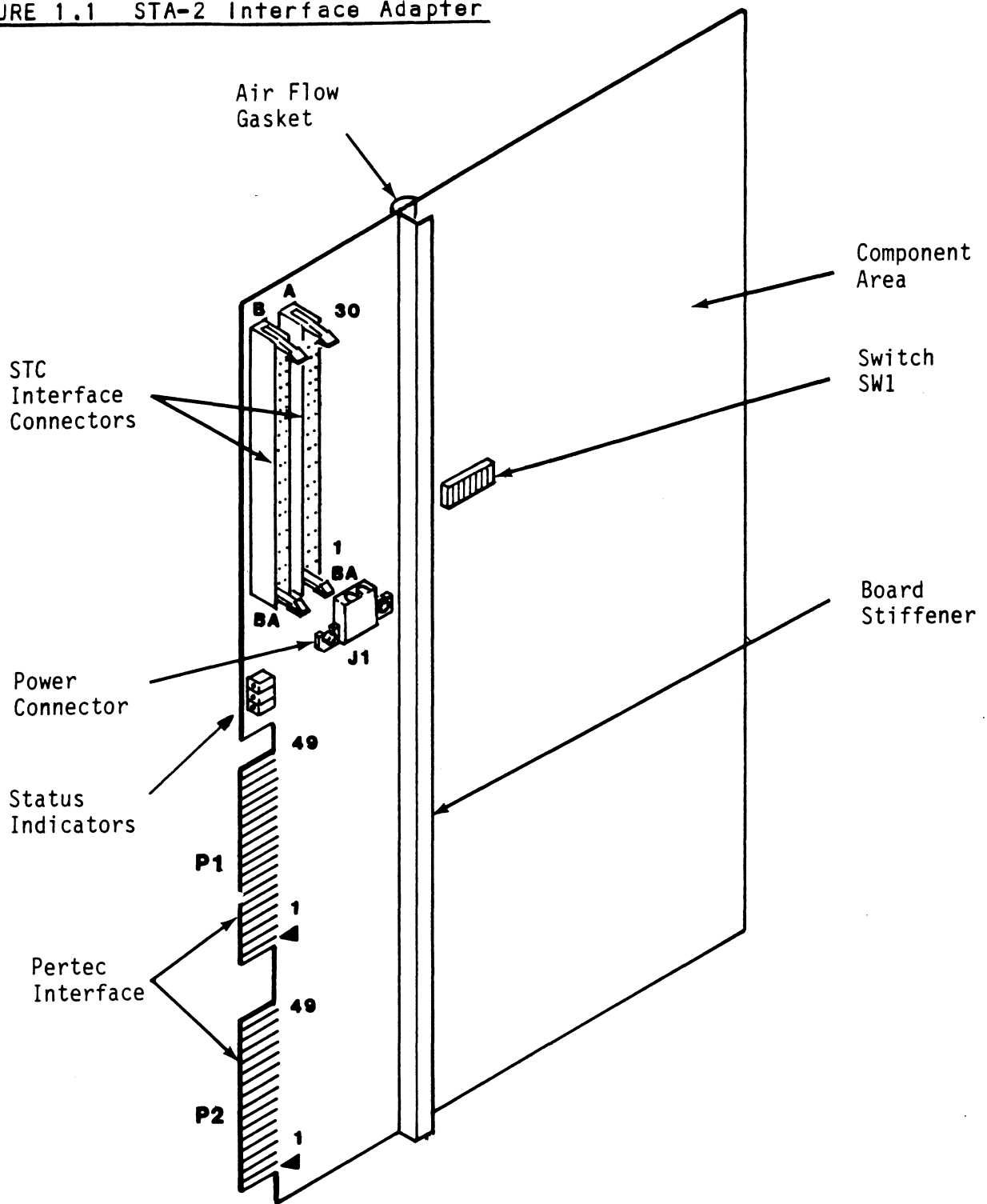
1.2.2 INTERFACE COMPATIBILITY

All standard aspects of the Pertec interface are supported, including remote density select and remote dual speed capability. All necessary functional aspects of the STC interface are supported with the exception of the error status lines, which are used for STC remote diagnostics, and not supported as a Pertec standard.

1.2.3 CONFIGURABILITY

The STA-2 supports a maximum of 8 tape drives. The STA-2 may be configured for addressing units 0-3; 4-7 or 0-7.

FIGURE 1.1 STA-2 Interface Adapter



1.2.4 INSTALLATION

The STA-2 occupies an unused slot in the Fujitsu formatter card cage. No electrical connections are made to the formatter backplane. All connections are made from the front of the STA-2 adapter. Ensure that the switches on the STA-2 are set up for the standard factory configuration before installing the board. Refer to Figure 2.1.

1.2.5 ON BOARD STATUS INDICATORS

1.2.5.1 BUSY INDICATOR - GREEN

The BUSY indicator lights when a command has been accepted and is being executed by one of the 8 possible tape drives connected to the system. During this period no other commands will be accepted.

1.2.5.2 GCR INDICATOR - YELLOW

The GCR indicator lights when the STC-interfaced tape drive is in the GCR 6250 BPI mode. The indicator will not be lit if a density other than 6250 BPI is selected.

1.2.5.3 ERROR INDICATOR - RED

The ERROR indicator lights if any one of four error status lines on the STC interface become active. ERROR will become active due to a command reject, bus parity, data check, or a data overrun error. Re-initiation of a new command will clear the error. Errors will be reported to the system as Hard Errors on the Pertec interface.

1.2.6 STANDARD INTERFACE CABLES

The Pertec interface uses 50-pin edge connectors with flat or round cable, limited in length to the maximum Pertec standard of 20 feet.

Connection to the STC interface requires a 60-pin flat ribbon cable with 60-pin headers, which is supplied with the STA-2. The length of the "A" cable is 4 inches and the "B" cable is 9 inches.

1.3 SPECIFICATIONS

The STA-2 specifications included in this section are general and provide only basic product information. A more detailed specification of Pertec Interface signal and timing requirements is available in Appendix A of this manual.

Reference to specifications of both the tape coupler and tape drive used with the STA-2 in conjunction with Appendix A is advised if Pertec Interface compatibility is in question.

1.3.1 INTERFACE CIRCUITRY

All drivers and receivers used in the STA-2 adhere to Pertec and STC specifications and are active low. All drivers have open collector outputs. All receivers have Schmitt Trigger inputs.

1.3.2 MECHANICAL DIMENSIONS

Dimensions: 11.19" X 10" X .4"
 (28.4 cm X 25.4 cm X 1 cm)

1.3.3 POWER REQUIREMENTS

Typically 1.5 amps at +5 VDC $\pm 5\%$

1.3.4 ENVIRONMENTAL REQUIREMENTS

Operating Temperature: 0° to 55° C

Relative Humidity: 10% to 90% (non-condensing)

2.0 INSTALLATION

2.1 UNPACKING AND INSPECTION

Upon receipt of the Model STA-2 from the carrier, inspect the shipping carton immediately for any evidence of damage or mishandling in transit.

If the shipping carton is water stained or damaged, contact the carrier and shipper immediately, specify the nature and extent of the damage and request that the carrier's agent be present when the carton is opened.

ZETACO's warranty does not cover shipping damage.

For repair or replacement of any ZETACO product damaged in shipment, call ZETACO to obtain return authorization instructions.

Included with the shipment of the STA-2 will be STC cables, Pertec cables, a power cable, and mounting hardware.

2.2 PROGRAMMABLE STA-2 OPTIONS

Programmable switches are provided on the STA-2 to facilitate setup of the Pertec data rate, unit addressing, and enabling of the dual speed selection capability. All switches are resident on one 8-position switch block.

2.2.1 FACTORY SETTINGS

The STA-2 has been initially set up at the factory for the Fujitsu 243X series tape drives. The standard factory settings are listed below.

Data rate:	1.25 MBytes/second
Pertec strobe duration:	300 ns
Unit addressing:	Units 0-7
Dual speed enable:	OFF

If any alterations of this setup need to be made, refer to Figures 1.1 and 2.1 for switch SW1 location.

2.2.2 PERTEC DATA RATE SELECTION

The data rate on the Pertec interface is selectable from .63 to 2.5 MBytes/second. Selection of the Pertec data rate should be set up for the average data rate of the fastest STC-Interfaced drive connected. Average data rate can be calculated as the product of the tape speed (IPS) and the density (BPI). For the Fujitsu 243X Series tape drives, the data rate is factory set to 1.25 MBytes/second.

$$\text{Average Data Rate} = \text{IPS} \times \text{BPI}$$

The table below shows the different data rate options allowable.

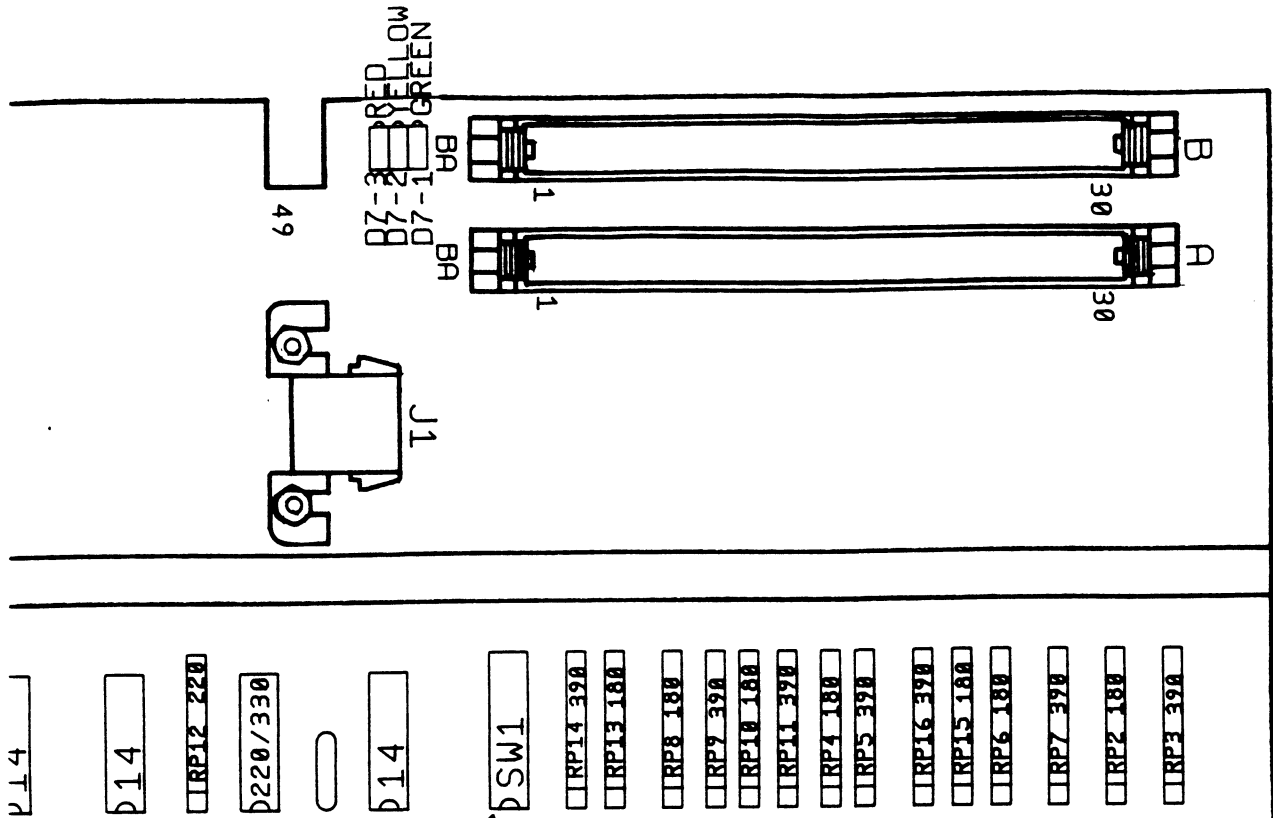
DATA RATE IN MBYTES/ SEC.					
SW1-1	SW1-2	SW1-3	SW1-4	SW1-5 ON	SW1-5 *OFF
*ON	*ON	*ON	*OFF	2.50	*1.25
OFF	OFF	OFF	ON	2.22	1.11
ON	OFF	OFF	ON	2.00	1.00
OFF	ON	OFF	ON	1.82	.91
ON	ON	OFF	ON	1.67	.83
OFF	OFF	ON	ON	1.54	.77
ON	OFF	ON	ON	1.43	.71
OFF	ON	ON	ON	1.33	.67
ON	ON	ON	ON	1.25	.63

*STANDARD FACTORY SETTING (Refer to Figure 2.1)

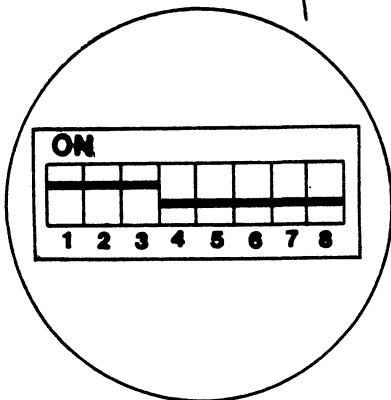
2.2.3 PERTEC READ AND WRITE STROBE TIMING

Selection of SW1-5 "ON" yields a read and write strobe timing of 150 ns. SW1-5 "OFF" doubles the read and write strobe timing to 300 ns. Only 150 ns strobe periods are allowed above a 1.25 MBytes/second data rate selection. The STA-2 is factory configured for a strobe period of 300 ns for the Fujitsu 243X Series tape drives.

FIGURE 2.1 STA-2 Switch Location



NOTE: Switch shown in Standard Configuration for Fujitsu 243X.



<u>SWITCH</u>	<u>POSITION</u>
1	ON
2	ON
3	ON
4	OFF
5	OFF
6	OFF
7	OFF
8	OFF

2.2.4 DEVICE ADDRESS SELECTION

The STA-2 can be configured to allow unit addressing of drives 0-3, 4-7, or 0-7.

TAPE DRIVE ADDRESS SELECTION

SW1-6	SW1-7	DRIVES SELECTED
ON	OFF	0-3
OFF	ON	4-7
*OFF	*OFF	*0-7

*STANDARD FACTORY SETTING (Refer to Figure 2.1)

2.2.5 REMOTE DUAL SPEED SELECT ENABLE

A switch is provided for enabling dual speed capability of the tape drives. If the dual speed function is to be used, SW1-8 must be "ON". If this option is not to be used, the switch must be "OFF". Refer to Figure 2.1 for switch location.

Activation of the HISP (High Speed) line on the Pertec interface prior to initiation of a command sequence by a GO pulse will set the HIGH SPEED MODE of the tape drive. Deactivation of the HISP line prior to a GO pulse will set the NORMAL SPEED MODE. Refer to Pertec interface specifications for additional information.

*STANDARD FACTORY SETTING - SW1-8 "OFF" (Refer to Figure 2.1)

2.3 INSTALLATION OF THE STA-2

The STA-2 will occupy slot 10 of the Fujitsu formatter card cage. Remove the blank board in slot 10 and replace it with the STA-2. Make sure the component side of the STA-2 is facing right. Install the board retainer (Figure 2.2) provided with the STA-2.

2.4 STA-2 POWER CABLING

Connect the power cable assembly to the terminals labeled +5v and GND, located on the back of the Fujitsu formatter. These terminals are accessible from the rear of the Fujitsu tape drive. The red wire of the power cable will attach to +5 VDC and the black wire will attach to GROUND.

Route the power cable assembly up over the Fujitsu formatter card cage and insert the plug in connector J1, located on the STA-2 component side. Make sure power is connected correctly or damage to the STA-2 may occur.

2.5 STA-2 INTERFACE CABLING

Refer to Figures 2.2 and 2.3 for cable routing. The connectors labeled P1 and P2 are the Pertec connectors. They will be routed to the tape coupler resident in the CPU chassis. Slide on the 50-pin board edge connectors making sure pin 1 is in the lower right corner. The ground lug attached to the shielding wire of both P1 and P2 should be connected to frame ground of the Fujitsu tape drive. A well grounded screw close to the formatter card cage will suffice.

Table A.1 defines the pin assignment of the P1 and P2 connectors.

Connect the STC interface 4-inch "A" cable and the 9-inch "B" cable between the STA-2 and the Fujitsu formatter board in slot 7. Make sure Pin 1 is in the lower right corner.

Table A.2 defines the pin assignment of the A and B connectors.

FIGURE 2.2 Fujitsu Formatter Card Cage

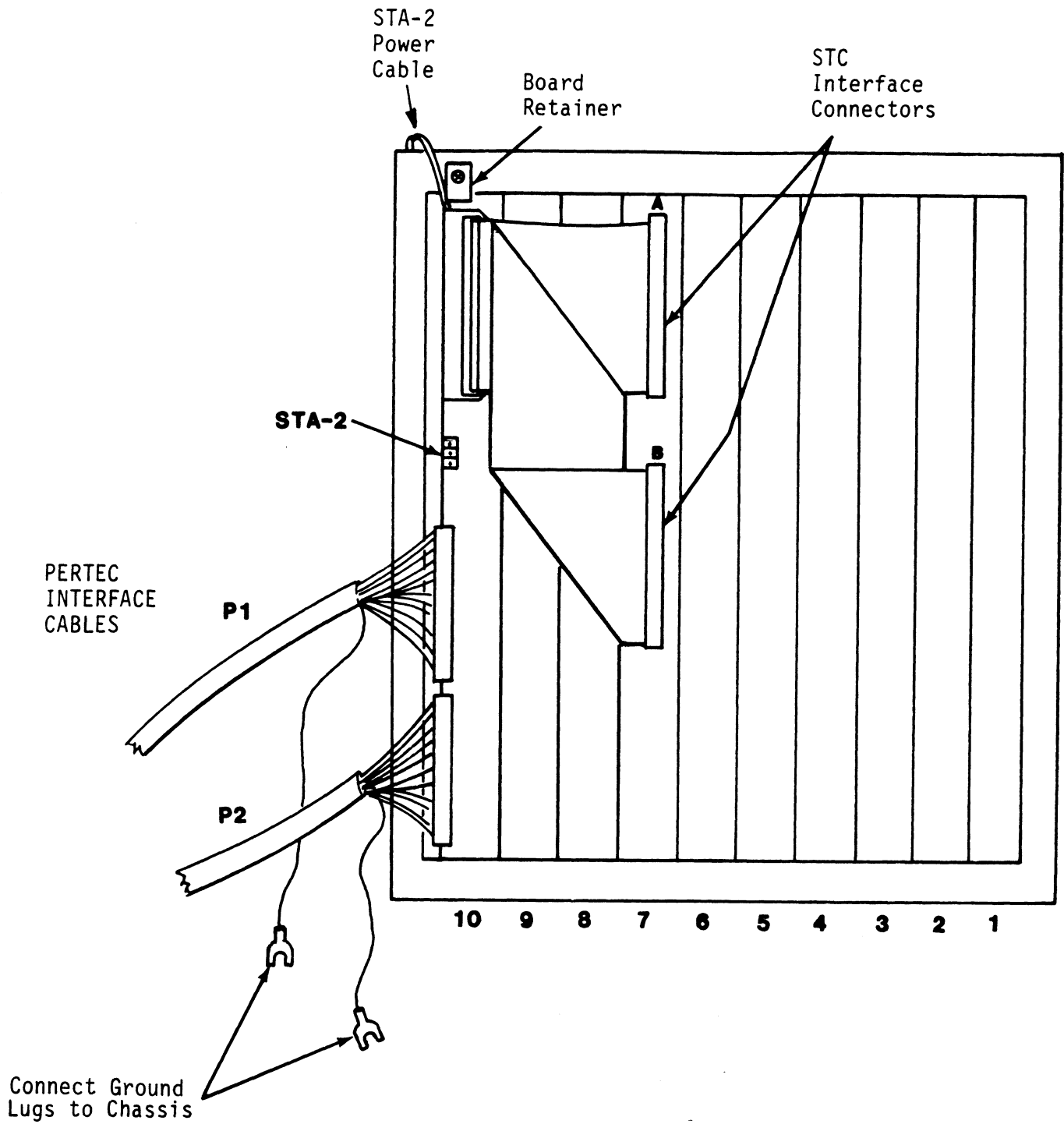
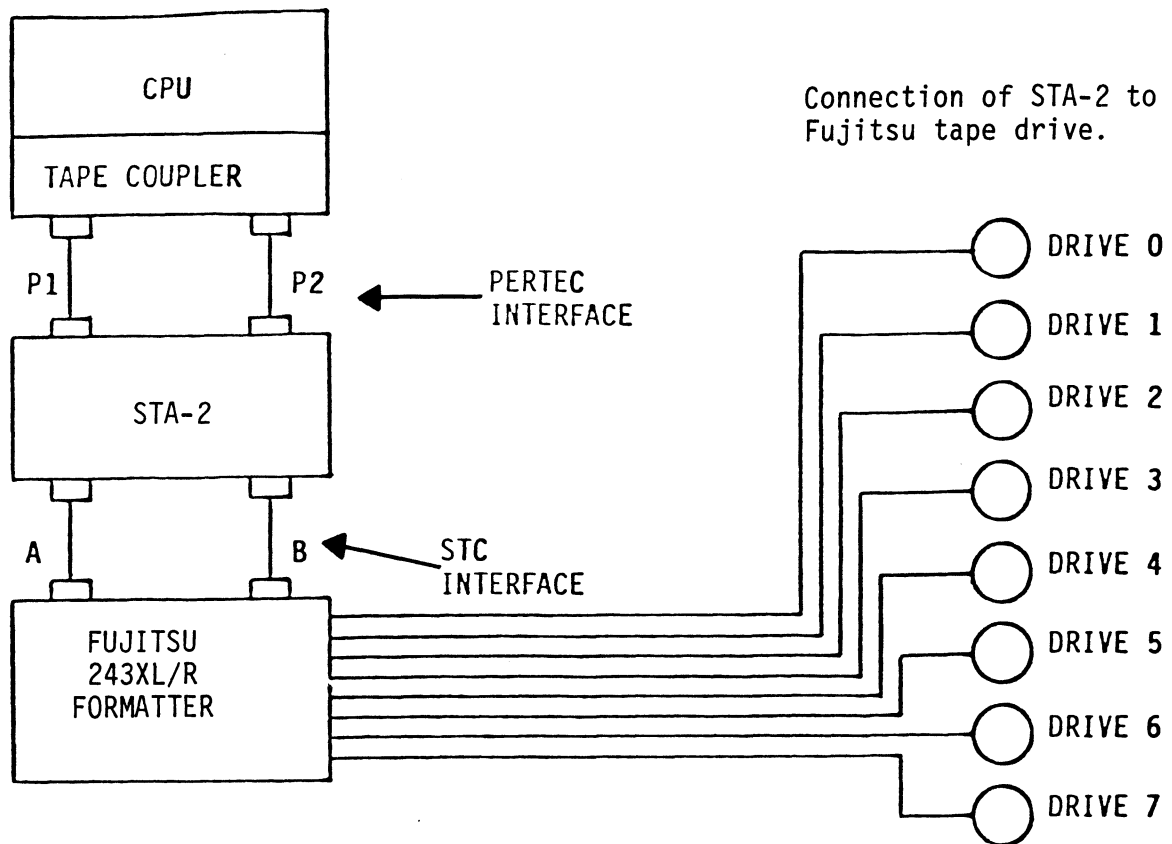


FIGURE 2.3 STA-2 Cabling Configuration



3.0 TROUBLE-SHOOTING AND CUSTOMER SERVICE

If problems occur during operation of the STA-2 after installation, follow the Trouble-shooting Checklist below. If the problem cannot be resolved, contact the ZETACO Customer Support Hotline for assistance. (See Section 3.1.)

1. Are the proper cables being used? Do they exceed the maximum specified length? Are the cables installed correctly?
2. Is the data rate capability of the tape coupler sufficient to handle the average data rate of the tape drive? The average data rate of the Fujitsu 243X Series tape drives is 1.25 MBytes/second.
3. Is the data rate set up correctly on the STA-2?
4. Ensure that the set-up of the unit addressing, remote density, and remote speed selection are correct on both the STA-2 and the tape coupler.
5. Is the tape coupler configured properly to handle all desired STA-2 command functions such as Remote Density Selection?
6. Is there a problem with the tape drive? Are there any error codes displayed? If so, refer to the tape drive manual for fault isolation.

3.1 CUSTOMER SUPPORT HOTLINE

ZETACO, Inc. provides a Customer Support Hotline to answer technical questions and to assist with installation and trouble-shooting.

The Hotline is manned by a technical team from 8:00 a.m. to 5:00 p.m. (Central Time) Monday through Friday. (612-941-9480)

3.2

WARRANTY INFORMATION

The STA-2 is warranted free from manufacturing and material defects, when used in a normal and proper manner, for a period of up to one year from date of shipment. Except for the express warranties, stated above, ZETACO disclaims all warranties including all implied warranties of merchantability and fitness. The stated express warranties are in lieu of all obligations or liabilities on the part of ZETACO for damages, including but not limited to, special, indirect or consequential damages arising out of or in connection with the use or performance of ZETACO's products.

APPENDIX A

A.0 STA-2 PERTEC INTERFACE SPECIFICATIONS

Only Pertec Interface specifications that are unique to the STA-2 will be presented in this section. Reference to a more general Pertec specification is advisable for acquiring additional information.

If your Pertec-interfaced tape coupler meets these specifications, the STA-2 may be installed without further timing adjustment or signal implementation. Check the Technical Manual of the tape coupler, or call the tape coupler manufacturer to confirm compatibility.

A.1 PERTEC WRITE SEQUENCE

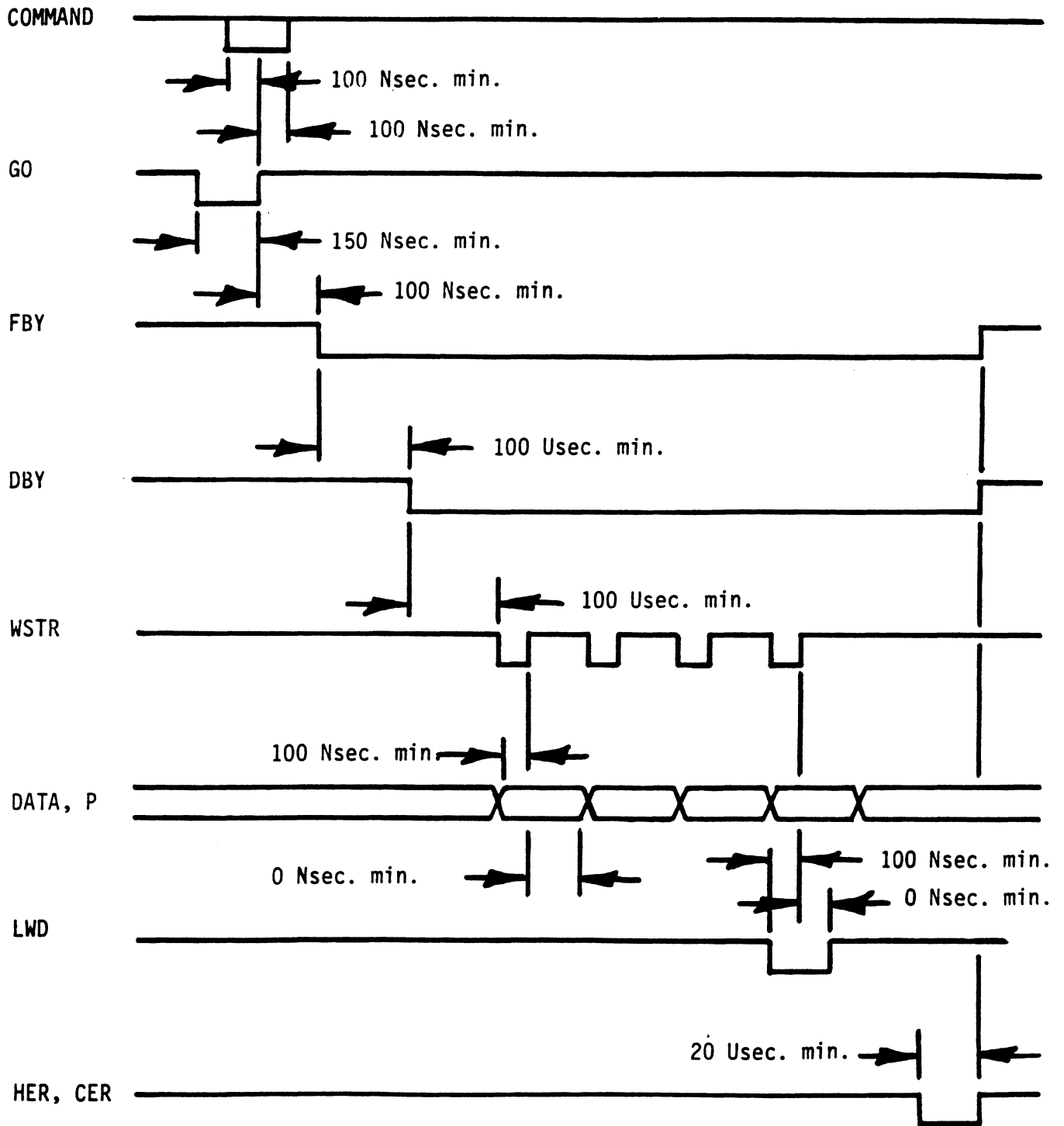
Refer to Figure A.1 for WRITE Timing Diagram. Initiation of a command operation requires the command lines of the Pertec interface to be stable at least 100 nanoseconds (Nsec.) prior to and after the trailing edge of the GO pulse. The command lines are WRT (write), REV (reverse), WFM (write file mark), EDIT, ERASE, and HISP (high speed). GO should be pulsed for a minimum of 150 nanoseconds.

After the initiation of a WRITE command sequence, FBY (formatter busy) will go true no sooner than 100 nanoseconds after the trailing of GO. DBY (data busy) will not go true for at least 100 microseconds after FBY. The first WSTR (write strobe) will occur no sooner than 100 microseconds after DBY goes true. This will allow time for data to be set up on the Pertec interface data lines from the controller.

DATA and PARITY must be stable on the Pertec WRITE DATA lines at least 100 nanoseconds before the trailing edge of each WSTR, but need not remain stable after the trailing edge. Before the last data word is strobed, LWD (last word) must be true 100 nanoseconds before the trailing edge of the last WSTR, but need not remain stable after the trailing edge.

HER (hard error) and CER (corrected error) status will be true at least 20 microseconds before FBY and DBY become false. After all data has been written FBY, DBY, HER and CER will become false, terminating the WRITE sequence.

FIGURE A.1 Pertec Interface Write Timing



A.2 PERTEC READ SEQUENCE

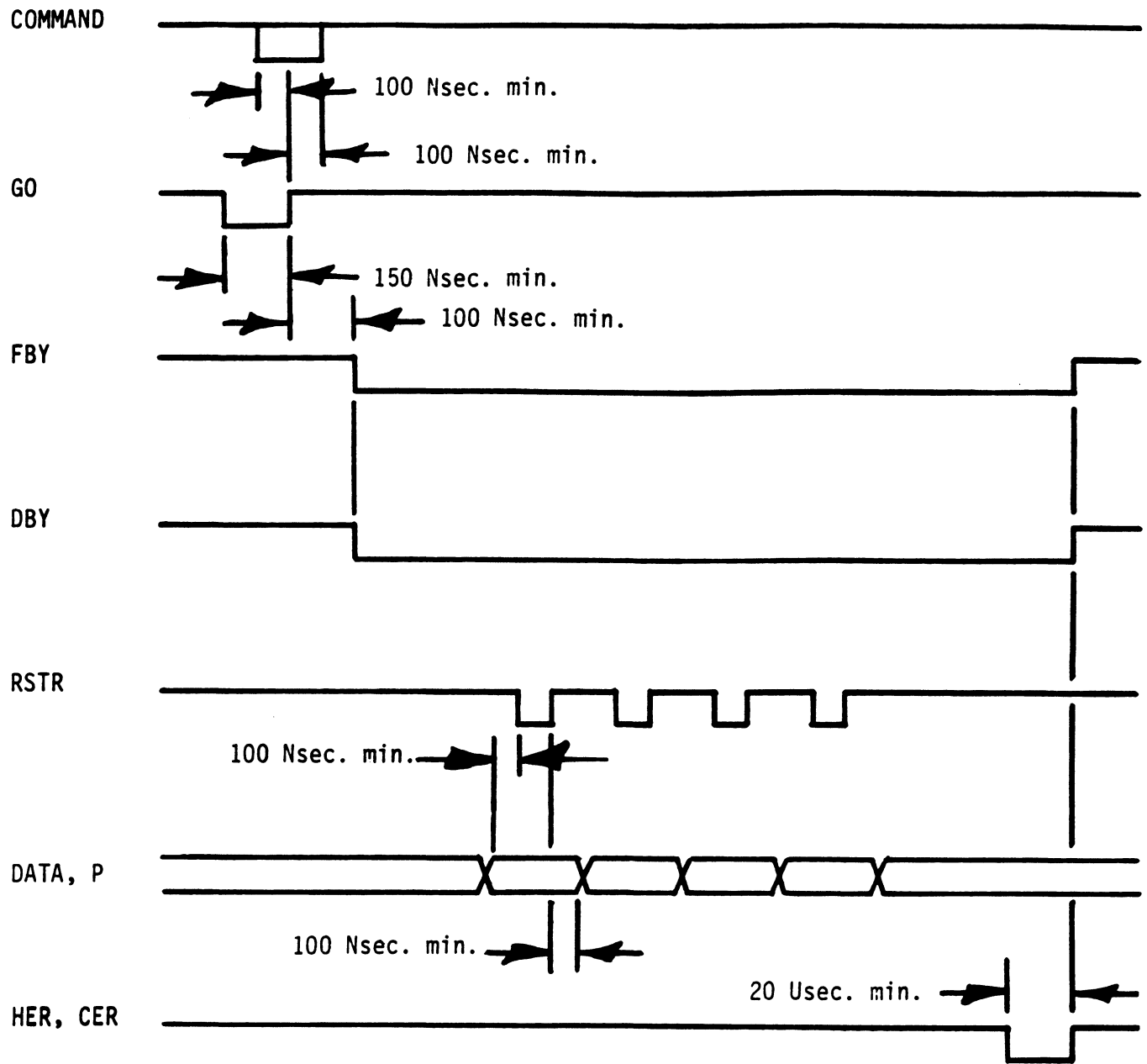
Refer to Figure A.2 for READ Timing Diagram. A READ command sequence is initiated with the same command timing as a WRITE command sequence. Differences exist in DBY timing, data direction and RSTR (read strobe) timing.

After the initiation of a READ command sequence, FBY and DBY will go true no sooner than 100 nanoseconds after the trailing edge of GO. The first RSTR will not occur until the tape has moved and data is read into the FIFO buffer of the STA-2.

DATA and PARITY will be stable on the Pertec READ DATA lines at least 100 nanoseconds before the leading edge, and 100 nanoseconds after the trailing edge of each RSTR.

A READ command sequence will terminate the same as a WRITE command sequence with respect to the resetting of FBY, DBY, HER and CER lines.

FIGURE A.2 Pertec Interface Read Timing



A.3 REMOTE DENSITY SELECT

Remote Density Select is supported in the STA-2. Density selection is defined in the Pertec command repertoire and is translated to STC density select lines. Make sure the Operating System and the Tape Drive also support remote density selection capability if remote density selection is required.

Pertec command lines are listed below showing the state in which they must be at least 100 nanoseconds prior to the trailing edge of the GO pulse issued on the Pertec interface. A logical "1" is defined as an active low.

	REVERSE	WRITE	WRITE FILEMARK	EDIT	ERASE
GCR	1	0	1	1	1
PE	0	0	1	1	1
NRZI	1 OR 0	1	1	1	1

The density at which the tape drive is operating is available on Pertec interface NRZ and SPEED status lines. This status is important in assuring that the tape drive did indeed change density after a density change command or different tape installation. When a tape is installed of a different density than what the drive is set up for, the status lines will change to reflect the density as specified in the ID block at the beginning of the tape.

Below is a table of the density status lines. Again, a logical "1" is defined as active low on the Pertec interface.

	NRZ	SPEED
GCR	1	0 or 1
PE	0	0
NRZI	0	1

TABLE A.1 Pertec 50-Position Ribbon Cable Pin Assignments

P1	PIN #	NAME	P2	PIN #	NAME
	1	GND		1	RP
	2	FBY		2	RO
	3	GND		3	R1
	4	LWD		4	BOT
	6	W4		6	R4
	8	GO		8	R7
	10	WO		10	R6
	12	W1		12	HER
	14	NOT USED		14	FMK
	16	NOT USED		16	IDENT
	18	REV		18	FEN
	20	REW		20	R5
	22	WP		22	EOT
	24	W7		24	RWU
	26	W3		26	NRZ
	28	W6		28	RDY
	30	W2		30	RWD
	32	W5		32	FPT
	34	WRT		34	RSTR
	36	NOT USED		36	WSTR
	38	EDIT		38	DBY
	40	ERASE		40	SPEED
	42	WFM		42	CER
	44	NOT USED		44	ONL
	46	TADO		46	TAD1
	48	R2		48	FAD
	50	R3		50	HISP

P1 5-49 AND P2 5-49 = GND

TABLE A.2 STC 60-Position Ribbon Cable Pin Assignments

CABLE "A"		CABLE "B"	
Pin #	Name	Pin #	Name
A1	ADO	A1	ERRMX-P
A2	AD1	A2	ERRMX-0
A3	CMD0	A3	ERRMX-1
A4	CMD1	A4	ERRMX-2
A5	CMD2	A5	ERRMX-3
A6	CMD3	A6	ERRMX-4
A7	DS0	A7	ERRMX-5
A8	START	A8	ERRMX-6
A9	STOP	A9	ERRMX-7
A10	TRAK	A10	BUSY
A11	DATA-P	A11	TREQ
A12	DATA-0	A12	RECV
A13	DATA-1	A13	ID-BRST
A14	DATA-2	A14	OP- INC
A15	DATA-3	A15	ENDATP
A16	DATA-4	A16	TMS
A17	DATA-5	A17	REJECT
A18	DATA-6	A18	OVRNS
A19	DATA-7	A19	DATA CHK
A20	RESET	A20	ROMPS
A21	SLX1	A21	CRERR
A22	SLX0	A22	BLOCK
A23	DS1	A23	NRZ I
A24	SLX2	A24	BUSER
A25	SSC	A25	ONLS
A26	OSC	A26	HDENS
A27	EOTS	A27	RDYS
A28	BOTS	A28	WRTS
A29	FPTS	A29	AD2
A30	REWS	A30	CMDE

NOTE: Cable "A" and "B", pins B1 through B30 = GND.

TABLE A.3 STA-2 J1 Pin Assignments

PIN #	DESCRIPTION
1	+5 VDC
2	GROUND

